TITLE: COMPUTERWORLD

REEL NO: 4 of 4

VOLUME: 17 ISSUES: 40-52

DATE: October 3 - December 26, 1983

PUBLICATION NO: 6206

NOTES: Includes:
BUYER'S GUIDES (Issues 40A and 50A)
SPECIAL ISSUES (Issues 41A and 48a)

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SERIAL PUBLICATIONS
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ANN ARBOR MI 48106

NEWSPAPER

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper — Second-class postage paid at Framingham, Mass. and additional mailing offices ©1983 by CW Communications/Inc.

$44/year — October 3, 1983 — Vol. XVII, No. 40

Releases il Service st Entry In Smart Net Set

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — MCI Communications Corp. last week unveiled an electronic mail service that offers rates substantially below current competitive offerings.

Dubbed MCI Mail, it is the first of several smart network services that will be offered by MCI Digital Information Service Corp., a newly formed MCI subsidiary.

For $1, an MCI Mail subscriber can transmit up to 7,500 characters to any other subscriber. That is the equivalent of about five pages of text, according to the company. Alternatively, a private courier service such as Purolator Corp. will deliver a hard copy of the same message to an addressee located in any of 15 major cities. MCI has a processing center in each city equipped with a laser printer. Delivery is guaranteed within four hours after the message has been sent.

Overnight courier delivery of a

(Continued on Page 6)

Teenage Hacker Lectures House On DP Security

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Accessing computer systems linked to telecommunications networks without authorization is almost child's play. But effective preventive measures are simple and inexpensive, one of the infamous "414" hackers told a House of Representatives subcommittee last week.

The 414s are a group of young computer enthusiasts who gained notoriety recently following reports of their alleged breaches of computer security around the country.

Neal Patrick, a 17-year-old high school senior, told the Science and Technology Subcommittee on Transportation, Aviation and Materials that he is, in the words of his attorney, who accompanied him, "not an information age Robin Hood" and he regrets his actions. Patrick said he now realizes "the potential for damage was enormous" in the actions of the loosely knit, seven-person 414 group.

The group reportedly accessed via GTE Telenet Communications Corp.'s Telenet network some five dozen computer systems around the

(Continued on Page 12)

Photo by T. Morse

As two teams clash on the collegiate gridiron, it becomes a simple test of strategic mind against sheer muscle, right? Wrong. In today's football, as in many sports, the computer plays an increasingly important role in planning before, during and after the big game. And if you want to be a football hero, you can't just rely on microcomputers, as Boston College's Eagles have shown. See Page 15.

Inside

The vendor delivered and the installation went fine. However, one of the first users of IBM's System/36 minicomputer is still waiting for IBM to deliver the necessary machine code needed to convert programs from a System/34 computer. **Page 5.**

• • •

Speaking of deliveries, Digital Equipment Corp. last week put its stamp on a souped-up version of its Rainbow personal computer. The firm also unveiled a buyer's protection plan for both retail and corporate customers. **Page 6.**

• • •

The police in Michigan also had their share of deliveries recently, in the form of an alleged con artist/thief who was nabbed by an on-line realty computer system called Midas while allegedly going for someone else's "gold." **Page 14.**

• • •

The breakup of AT&T will be completed Jan. 1. However, the firm's local communications spirit will live on in the form of an independent Central Services Organization. Run by former Bell employees, the CSO will aid regional networks and even dabble in cellular radio. **Page 65.**

• • •

Storage Technology Corp. has announced a nonerasable optical disk storage system that boasts up to 4G bytes of memory and is one of the first to be compatible with IBM mainframes. **Page 75.**

• • •

Is the shine on Apple Computer, Inc. beginning to fade? That's what analysts say, especially following a severed micro-to-mainframe agreement with Cullinet Software, Inc. and lack of demand for its highly touted Lisa computer. **Page 89.**

Harris Unwraps 48-Bit System Aimed at DEC, DG Superminis

By Ed Scannell
CW Staff

FORT LAUDERDALE, Fla. — Billing it as the industry's fastest single-processor superminicomputer, Harris Corp. today unveiled a top-of-the-line 48-bit, virtual-memory system that will be directed at both the scientific and high-performance business markets. The Harris 1000 is the firm's most powerful minicomputer to date.

Capable of processing four million instructions per second, the Harris 1000 is 350% faster than Digital Equipment Corp.'s VAX-11/780 and almost 60% faster than Data General Corp.'s MV/10000 superminicomputers in scientific applications, according to Harris' Whetstone benchmark tests.

The Model 1000 is software-compatible with Harris' Model 600, 700 and 800 superminicomputers and can also use those systems' peripherals. Fully configured, the Model 1000 supports 192 terminals, a spokesman said.

Harris attributes the Model 1000's processing speed in part to the first-time use of 100K-bit emitter-coupled logic technology, which the company claims is two to three times faster than Schottky transistor-transistor logic technology.

By incorporating ECL circuitry into the 1000's CPU, designers were able to employ high-speed large-scale integrated circuits and interconnection techniques usually re-

(Continued on Page 4)

Corporate Power Struggle Brewing

Merger of Voice, Data Networks Foreseen

By Jim Bartimo
CW Staff

SAN DIEGO — A major power struggle is brewing between the voice and data communications departments as corporations combine voice and data on the same network.

Most of the randomly selected attendees of the Tele-Communications Association annual meeting (TCA '83) held here last week said that the struggle will force both departments to merge, with voice communications emerging as the dominant technology.

A few of the telecommunications managers and attendees surveyed at the show referred to data processing professionals as "empire builders" and "power brokers," noting that voice communications professionals are much more accustomed to working with users than are the data departments.

CW at TCA '83

"They speak a language all their own," said one telecommunications manager who chose to remain anonymous. "We wanted to buy electronic typewriters, and the data processing department said we had to go through them first because the machines had memory."

The merging of the voice department (usually organized under facilities or building management) and data departments (under the umbrella of administration) will involve a major reorganization, according to Dennis Briley, manager of general services for Downey Savings and Loan Association of Costa Mesa, Calif.

"From a prejudiced viewpoint, I think the network is going to end up on the voice side with the [private branch exchange]," Briley said. "Data people would like to keep their data world intact, but with the personal computer in the company, the back room secret is out."

In addition to the DP department's alleged reputation for not delivering quality service to the end user, there is the problem that telephones are mostly analog and computers are all digital.

"They're in two different worlds right now," said Dale Lindsay, telecommunications analyst for the Los

(Continued on Page 10)

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THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
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Second-class postage paid at Framingham, Mass., and additional mailing offices. Computerworld (ISSN 0010-4841) is published weekly, except: February (5 issues), April (5 issues), May (5 issues), June (5 issues), August (5 issues), September (5 issues), October (5 issues), November (5 issues), December (4 issues) and a single combined issue for the last week in December and the first week in January by CW Communications/Inc., Box 880, 375 Cochituate Road, Framingham, MA 01701.

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Special requests should be addressed to Nancy M. Shuman, CW Communications/Inc. Box 880, 375 Cochituate Rd., Framingham, MA 01701. ISSN 0010-4841/83 $0.00 + $.50

$1.50 a copy; U.S. — $44 a year; Canada, Central & So. America — $110 a year; Europe — $165 a year; all other countries — $265 a year (normal service). Four weeks notice is required for change of address. Please allow six weeks for new subscription service to begin.

POSTMASTER: Send Form 3579 Change of Address to Computerworld, Circulation Dept., Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

Facing Charge of Pirating Copy

FBI Nabs Student in Software Theft

By Jeffry Beeler
CW West Coast Bureau

SAN FRANCISCO — Local Federal Bureau of Investigation agents last month arrested a Purdue University student who allegedly tried to sell a pirated copy of his former employer's proprietary software product to a Bay Area-based consulting firm.

James Barrick Jr., 22, has been charged with interstate transportation of stolen property for reportedly offering a finite element modeling program, including its source code, to Anamet Laboratories, Inc. in nearby San Carlos, Calif.

Used primarily by structural engineers, the Supertab Release 7.0 program is the brainchild of Milford, Ohio-based Structural Dynamics Research Corp. (SDRC), where Barrick worked on and off under a co-op student agreement between SDRC and Purdue.

Until his Sept. 9 arrest, Barrick was one of about 20 participants in the co-op student program, in which university students work at SDRC and pursue their undergraduate studies in alternating semesters, according to the company's attorney, Douglas Thompson.

Before he finished his latest work cycle at SDRC and returned to Purdue at summer's end, Barrick is believed to have illicitly copied Supertab 7.0, whose price ranges from $50,000 to more than $1 million, Thompson said.

He then offered to sell the resulting object and source code tapes — as well as their accompanying program manuals — to Anamet for $34,000, according to FBI press spokesman Frank Daniel.

Software Developers

Both Anamet and SDRC are consulting firms and, to a lesser extent, software developers specializing in structural engineering jobs. Anamet's vice-president, Richard Citerley, characterized the two companies as direct competitors, but Thompson disagreed.

Although it has recently created some software packages that "might be construed as being competitive" with SDRC's products, Anamet is more of a consumer of engineering analysis and modeling programs than a developer, Thompson said. The reverse is said to be true of the Ohio company.

Barrick's alleged efforts to sell Supertab to Anamet led him eventually to call Citerley for the first time on Aug. 10, Daniel said. Citerley then reported the overture to SDRC, which in turn informed the FBI.

In an effort to abort the proposed theft and trap its would-be perpetrator, federal investigators approached Citerley and persuaded him to play along with Barrick in his alleged scheme and keep them abreast of his actions.

Two Transactions

Barrick's involvement with Anamet was reportedly marked by two main transactions. In the first, he mailed Citerley two SDRC program manuals and a reel of magnetic tape containing Supertab 7.0's object code. In the second, about two weeks later, he sent Anamet another batch of tape purported to contain the modeling package's source code, Citerley said.

Partly because of their proprietary nature, all the stolen program materials were immediately confiscated by the FBI, Thompson added.

A few days after the tapes and manuals reached their destination, Barrick allegedly flew here from the Midwest for a scheduled meeting with Citerley. But instead of consummating the deal and receiving the promised payment for the stolen materials, he was arrested by waiting FBI agents and charged with one count of transporting stolen goods across state lines.

That particular offense carries a maximum penalty of 10 years in federal prison or a $10,000 fine — or both, Daniel said.

Barrick's alleged entanglement in the Supertab theft scheme abruptly ended his three-and-a-half year participation in the SDRC co-op student program, which gives university undergraduates an opportunity to gain practical work experience. The program exposed him to a wide variety of technical tasks, one of which was to fix bugs in SDRC's programs, and gave him ready access to Supertab's latest release, Thompson said.

Taking advantage of his privileged position, Barrick was apparently able to duplicate Supertab's master source code tapes without his employer's knowledge, the attorney speculated. None of the master tapes, which are kept under lock and key, has ever been reported missing.

This Week

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Power Company Short-Circuits Meter Thieves

By John Gallant
CW Staff

NEW ORLEANS — Electricity thieves beware: the long arm of the law now has an even longer reach, thanks to a computerized detection system designed to expose Louisiana Power and Light Co. (LP&L) customers who tamper with their electric meters.

According to company spokesman James Fort, when customer payments are processed through the IBM 3081 mainframe operated by Middle South Services Co., a division of Middle South Utilities, Inc., the computer system automatically alerts authorities to those customers whose bills have dropped significantly over a period of two or more months.

Middle South Services provides computer services to the parent company's subsidiaries, which include the Louisiana, Arkansas and Mississippi power and light companies, and New Orleans Public Service Co.

LP&L began the pilot program in the neighboring towns of Chalmette and Arabi, La., last year. Though Fort would not comment on the number of power thieves apprehended, he said the program was so successful the company has expanded it to include the 85,000 LP&L customers in the Algiers-Gretna district of New Orleans. After reviewing the results found in that area, LP&L may widen the scope of the detection system to include metropolitan New Orleans within the next year, according to Fort.

"This system has proved to be quite effective in ferreting out customers tampering with their meters. It's really helped us in prosecuting those people who are abusing the system. The program shows a great deal of promise," Fort said.

Fort compares the theft of electricity to shoplifting in a retail store. While he would not estimate the amount of electricity stolen each year by meter tamperers, he said the price of electricity must be increased to make up for the loss.

"Meter tampering has certainly affected costs. The loss eventually winds up affecting other consumers. It's like the situation at any department store; the pilferage ups the prices to other customers."

According to Fort, the illegal practice is also punishable with fines ranging from $500 to $1,000 and up to a year in prison.

If a customer's bill drops for just one month because the family is away on vacation, for example, the computerized detection system will not flag the payment record. The program is designed to alert LP&L officials only to those consumers whose bills drop substantially for a period of two or three months or more.

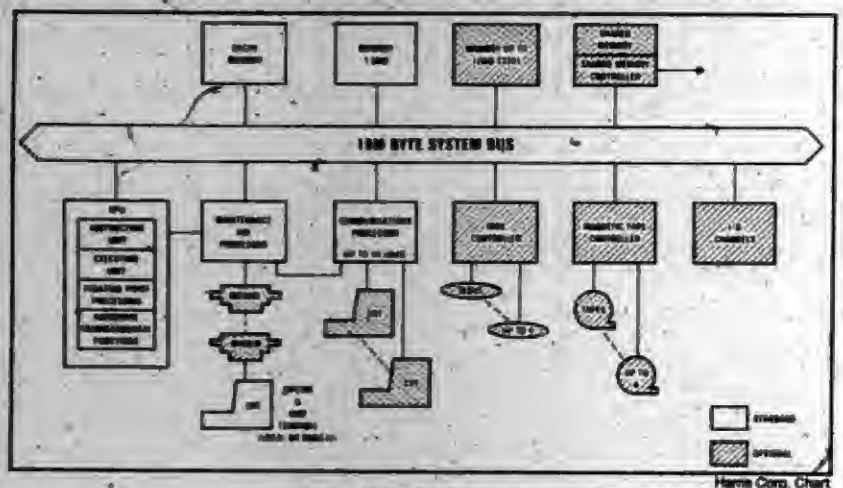
Once alerted, those officials confront offenders with the evidence. Fort said that violators are usually more than willing to pay the amount the company estimates they have stolen, rather than face prosecution.

"We usually add up what we believe was stolen, plus the cost of the investigation and any amount of damage to our equipment. If they don't agree to pay the costs, we'll file suit. But, we rarely have to do that," Fort said.

LP&L began the computerized detection program in an effort to stem the growing incidence of electricity theft.

The company still monitors meter tampering in other districts with what Fort described as a fairly sophisticated investigative system involving meter readers and specialists, but he admits the new computerized system allows LP&L to accomplish a great deal more.

Harris 1000 Geared Toward Science, Business Markets



Harris Corp. Chart

Harris 1000 System

(Continued from Page 1)

served for use in supercomputers. These circuit integration and packaging technologies have enabled the company to build 60,000 logic gates and 1 million static random-access memory (RAM) bits into a single CPU card, a spokesman pointed out.

Another factor contributing to the Model 1000's increased overall performance is the hardware implementation of virtual memory and transcendental functions in the CPU, the spokesman said.

The 1000's demand-paged virtual memory totals 48M bytes. The CPU has one virtual address register for each page to track the virtual-to-physical memory relationship for every page, a spokesman stated. This implementation results in virtual memory benefits without the performance drawbacks associated with software virtual memory.

Hardware-implemeted transcendental functions in the CPU include sine, cosine, tangent, arc sine, arc cosine, exponent and logarithm. All of these functions are directly supported by the firm's VOS operating system and its Fortran compiler.

Also implemented in the 1000's hardware is 32-bit single precision, 48-double precision, 64-bit triple precision and 96-bit quadruple precision. Users have the option of selecting the precision needed for particular calculations without incurring any performance degradation, a spokesman related.

Complementing the CPU is the Maintenance Aid Processor (MAP), a microprogrammed processor that controls power-up diagnostics and runs checks on memory, I/O channels and CPU data paths before loading microcode each time the system is powered up. The MAP also carries out local or remote system maintenance.

Another processor, the Communications Network Processor (CNP) is a standard component in the 1000 and controls communications through asynchronous, synchronous, bisynchronous and Ansi X.25 protocols. A single-board CNP supports up to 16 communications lines for either local or remote device connection. As many as 14 CNPs reportedly can be configured with the 1000.

The system's soft control store feature allows the CPU's microcode for instructions to be implemented in RAM instead of its more traditional residence, programmable read-only memory. This feature allows users to integrate enhancements by distributing new microcode instead of field upgrading via CPU boards.

The 1000 model uses the company's recently introduced Integrated Memory Subsystem, which contains the memory controller and 1.5M bytes of memory on a single board for both main memory and shared memory. Also part of the subsystem is the company's Integrated Disk Controller, which combines the functions of an I/O and disk controller.

The CPU is housed on 10 printed-circuit boards and fits into a single 19-in. cabinet with memory and I/O placed in a second cabinet. In this arrangement, up to four peripherals can be installed.

Priced at $250,000, the basic configuration of the 1000 is made up of the CPU with 6K bytes of cache memory, 16 external interrupts, a line frequency clock and an internal timer, 1.5M bytes of memory, one CNP with an operator's console port, a CRT terminal as an operator's console and MAP terminal, the VOS operating system and dual cabinets.

Initial shipments of the 48-bit system are slated for early next year, the company said from 2101 W. Cypress Creek Road, Fort Lauderdale, Fla. 33309.

DP Degrees May Not Prove Enough for Big Bucks

By Katherine Hafner
CW Staff

INDIANAPOLIS — Unless accompanied by a good dose of experience, a degree in data processing may not be worth its weight in parchment.

That is the conclusion of a recent salary survey by International Computer Programs, Inc. (ICP), which found that a DP professional with a high school diploma and several years of experience is paid as much as, if not more than, a colleague with a bachelor's or master's degree.

"A professional's experience seems to be the winning ticket, even in management positions," ICP President Larry Welke said. "While a computer science student takes time to complete the academic requirements for a degree, others are out in the business world acquiring experience and being well compensated for it."

According to Welke, the reason that advanced degrees are not as stiff a requirement in DP as in other fields is that current curricula do not properly prepare students to enter the profession.

"Universities cannot compete with DP salaries in the business world," Welke explained. "To tempt the best and brightest in the working world into academia is a supreme challenge."

The survey's statistics were compiled with personnel information provided to ICP by its 220-member companies.

The survey also found that DPers in the East are paid considerably more than those in the Midwest. Regional salary statistics compiled by ICP reveal that a DP manager in the East makes an average of $73,980, while his Midwest counterpart makes $57,743.

Below DP managers are systems development managers. Those in the East make an average of $59,533, while those in the Midwest make $47,195.

At the bottom of the heap fall programmer trainees; those in the East make $18,349, while trainees in the Midwest average $16,231.

According to the survey, yearly salary increases, which have traditionally been high, have dropped from a 10% to 15% increase to a 5% to 10% increase.

Turnover, too, has slowed from 20% to 30% in recent years to 10%, according to the survey. ICP attributed this to "the reluctance of DP professionals to change jobs in an inflationary environment."

The survey is available to ICP member companies from ICP, 9000 Keystone Crossing, Box 40946, Indianapolis, Ind. 46240.

System/36 First User Satisfied, But Waiting

By Ed Scannell
CW Staff

MONTPELIER, Vt. — One of the first users of the System/36, IBM's long-awaited upgrade to its widely used System/34, reported that the delivery and installation of its system went smoothly.

And based on benchmark tests, Vermont Mutual Insurance Co. is looking forward to the system that will eliminate the throughput and storage crunches currently burdening its two System/34s.

The reason Win Perron, DP manager for Vermont Mutual, is still looking forward to his 12-week-old System/36 solving his problems is IBM's failure to deliver proprietary machine instruction code necessary to develop a compatible data base management system (DBMS). Without the DBMS, which is Cincom Systems, Inc.'s Total, Perron is unable to convert his library of System/34 software so it will run on System/36.

Half Dozen Others

According to Richard French, product manager at Cincom, there are a half dozen other firms besides Vermont Mutual waiting for IBM to release the necessary code. French said IBM signed an agreement with Cincom two weeks ago, agreeing to deliver the code, but has yet to receive the code. French added, however, that IBM sent a letter of confirmation last Tuesday, telling Cincom it would have the necessary code in hand by Sept. 29.

French suspected that the late delivery of the code is due to the usual bureaucratic tangle rather than IBM's decision, made last February [CW, Feb. 28], to restrict or eliminate program materials from certain of its licensed programs. That policy was scheduled to take effect Sept. 1.

"It could very well be," French said, alluding to the possibility that IBM's delay in delivering the code is an implementation of its new policy. "I remember we had to fill in all sorts of forms to get to use it," he said.

Asked about the delay, an IBM spokesman said the code's documentation review process was taking longer than expected, but said he thought IBM would "forward all of the material Cincom requested within the next 24 hours." He added that IBM's longer-than-expected delivery of the code has nothing to do with its decision to restrict source code.

"We do have a new policy with source code, but I am told that Cincom did not need and did not ask for source code material. They were requesting access to the privileged instruction set, and that is not part of the source code."

Perron said it was his understanding this code would be delivered along with the system. "This [lack of code] has been a problem in the past, but I was led to believe it wouldn't be this time. It has caused a slight delay in our conversion to the 36," he explained.

While he has been waiting for delivery of the code, Perron said he has been using the System/36 to run financial assistance systems such as stocks-and-bonds portfolios, but "nothing tying the main systems together."

Ron Grant, president of Systems Assurance Corp., the company that developed all of Vermont Mutual's applications software, said IBM's failure to deliver the proprietary code involves usual bureaucratic tangles and issues of security. Grant said IBM's concern about the code falling into the hands of plug-compatible manufacturers, particularly the Japanese, is legitimate, but it is a problem that should have been resolved some time ago.

"There is a valid area for concern, but it is one of those things they could have resolved in an hour anytime during the past year. They provided me with assurances a year ago that they would address this properly," Grant said.

According to Grant, IBM has made an agreement to resolve the problem and has appointed someone to address it. He added, however, that IBM has been promising to resolve the problem "in a week or two for the past several months."

Perron said he was apprehensive about being a pioneer user of the System/36.

"Experience tells you that you don't want to be the first kid on the block [to buy a system], but I was torn by the fact that I was outgrowing the machines. I had to be a much earlier recipient than I normally would want to be," Perron said.

Aside from the tardy software, everything connected with the system's delivery and installation went smoothly, Perron said. He said the system was so easy to configure and power up that the presence of IBM personnel was not necessary.

When evaluating potential upgrades for the System/34s, Perron said he wanted to stay with a mini-type system rather than a mainframe because of the unexplored potential he feels minicomputers have. "I think their potential resources haven't been tapped. Therefore, our intention always was to stay with a mini-type system."

Looking back, Perron said he is happy with his decision to go with the System/36 and would only do one thing differently. "I would have it written in blood that IBM give me that code earlier," he said.

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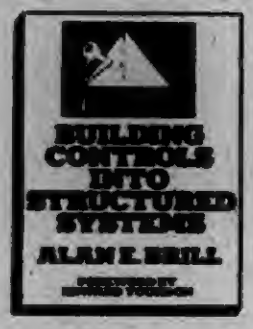

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DEC Seen Confronting IBM's XT

Rainbow 100+ Bows With Special Service Plan

By David Myers
CW New York Bureau

NEW YORK — In what is seen by some as an attempt to dress up its image, Digital Equipment Corp. unwrapped a stepped-up version of its personal computer and announced a buyer's protection plan here last week.

In a news conference here, the Maynard, Mass.-based computer vendor introduced the Rainbow 100+, a small computer with a 10M-byte Winchester hard disk backed up by two floppies. At the same time, the company announced a warranty plan giving retail buyers a year's worth of protection and corporate buyers 90 days' worth.

"We are becoming the tough marketers many of you said we must be," Edward A. Kramer, vice-president of corporate marketing, said.

In other developments, DEC said Microsoft, Inc.'s MS-DOS and Digital Research, Inc.'s CP/M 86/80 operating systems, as well as Lotus Development Corp.'s Lotus 1-2-3 financial spreadsheet, would be available later this month on the small computer and noted that a Unix Version 7 would be available later this month for its Professional series microcomputer.

Industry insiders pointed out that the version of DEC's personal computer is directly slotted against IBM's Personal Computer XT. Along with the new IBM-like service plan, the decision to go head to head with IBM's XT betrays DEC's desire to establish itself as IBM's primary competitor in the personal computer market, some industry observers said.

"I see [last week's announcements] as DEC's way of differentiating itself from the others in the tier of companies below IBM," Frederic H. Cohen, an analyst at Rothschild, L.F. Unterberg, Towbin here, said. He named Hewlett-Packard Co., Wang Laboratories, Inc., Data General Corp. and "maybe" Apple Computer, Inc. as the other companies in the "second tier."

Other consultants and analysts agreed that the timing and style of the announcements overshadowed what was actually announced.

"It is important in the overall face-off that is coming down to IBM and DEC anyway. It provides the image which IBM has established already and which DEC must establish if they are going to compete effectively," George J. Weiss, director of computer systems studies for Quantum Science Corp. here, said.

Weiss called last week's announcements a "facial uplift" for the company.

"They sure do need one," Marc G. Schulman, an analyst at First Boston Corp. here, maintained.

"Here's a company that grew up in the cold scientific and engineering world. They never seemed to understand that if you're going to succeed in personal computers, you need a little flash and hype," Schulman said.

For the most part, consultants and analysts were not awed by the technological advances of DEC's personal computer version.

"Were there any technology surprises? No. I thought Lotus might come in under CP/M, and it did not," Cohen said. DEC said the spreadsheet package created by Cambridge, Mass.-based Lotus, available later this month, will run under MS-DOS.

"It's a system combining user expectations for additional power and capability. It's not something radical and earthshaking, but it shows a commitment," Weiss agreed.

Aaron Goldberg, research manager for information systems at Framingham, Mass.-based International Data Corp., called the latest Rainbow a very attractive computer at "quite a low price. It gives people an alternative to IBM," he said.

DEC said the latest version of the Rainbow personal computer is aimed at small to mid-size businesses and corporate managers. It holds 128K bytes of main memory and runs MS-DOS and CP/M 86/80 operating systems at $250 extra.

Schulman said his calculations showed the Rainbow — with the dual operating system option and a printer added on — would sell for about $7,020, while the comparable array from IBM would cost $7,094.

DEC lists the computer at $6,295, including keyboard and monitor. The company also said it is offering a 10M-byte hard disk upgrade kit at $2,995 for its original Rainbow 100, which retails for $3,495.

In a prepared statement, DEC described the Rainbow 100+ as equipped with "[Zilog, Inc.] Z80A and [Intel Corp.] 8088 microprocessors, a 10M-byte Winchester hard disk, a dual floppy diskette with 800K-byte capacity, [synchronous/asynchronous] communications, built-in terminal emulator, printer port and 128K bytes of system memory."

The system will also permit the mounting of a 256K-bit chip on board, "allowing you to get 900K [bytes] out of the memory. That meets most present-day user requirements," Weiss said. Use of the Lotus package requires 256K bytes of memory, DEC cautioned.

DEC is headquartered at Maynard, Mass.

DEC's Warranty Perceived As Boon to Small Business

NEW YORK — The warranty plan announced here last week by Digital Equipment Corp. may not sway corporate managers from buying IBM Personal Computers, but for small businesses and home users it might just be enough to clinch the sale.

That is the consensus of opinion in the wake of DEC's announcement that retail buyers of the manufacturer's personal computer will be guaranteed one year of on-site service. Corporate buyers are guaranteed for 90 days.

"There is probably no other company in the business that can think about doing this," Joel Schwartz, small systems group vice-president, said at the press gathering where the plan was made public.

George J. Weiss, director of computer systems studies for Quantum Science Corp. here, said the warranty is "a direct challenge to IBM's service mystique."

The warranty, called the Investment Protection Plan, includes a one-year guarantee covering all software and optional add-ons purchased with the DEC system. In addition, buyers are offered a year's use of a toll-free telephone number to call in times of trouble.

A 30-day money-back return policy expires Jan. 31, 1984.

IBM's Personal Computer warranty is a three-month plan requiring the purchaser to return the equipment to the store. Software is not covered under the plan.

DEC dealers said their warranty plan would increase sales of the Maynard, Mass., company's personal computers.

"No other company does anything like that. It's the best way to get a computer and get started with it," Philip A. Boerger, vice-president of business products at Berliner Computer Centers here, said.

One dealer compared the on-site warranty to an auto maker's promise to make any repairs in the buyer's driveway.

For corporate buyers, however, the warranty is expected to have less of an impact.

"If you were going to buy IBM, this won't sway you. But if you were going to buy DEC anyway, this works as a discount," Frederic H. Cohen, an analyst with Rothschild, L. F. Unterberg, Towbin here, said.

MCI Takes Wraps Off Electronic Mail Service

(Continued from Page 1)

7,500-char. message costs $6. The recipient can be in any of 20,000 continental U.S. cities, and MCI promises to complete delivery by noon of the following day.

For $2, MCI, after transmitting the message to one of its 15 terminating cities, will deliver it via the U.S. Postal Service.

In most cases, there will be no additional charges.

A spokesman for Federal Express Co., which offers a service that competes directly with MCI's new offering, maintained that "we've always anticipated" competition; he took the position that his firm's service is designed to be "superior and extremely competitive with anything else being offered." He noted that MCI is "talking about transmission of data; we're talking about transmission of images. They're talking about involving other parties, such as Purolator and first-class mail . . . we've involved only our own employees."

The MCI service, accessible through a dial-up local telephone call, interfaces with any personal computer that has an asynchronous 300 or 1,200 bit/sec communications interface, said J. Robert Harcharik, president of the new subsidiary. A variety of communicating word processors and low-speed terminals can also be connected, along with telex machines, Harcharik added. Word processors reportedly compatible with the service include some or all of those made by Lanier Business Products, Inc., Wang Laboratories, Inc., Xerox Corp., IBM and Digital Equipment Corp., Harcharik explained.

Every MCI Mail subscriber, regardless of his terminal type, receives a telex number, and he can both send and receive domestic and international telex messages through the network. The question of whether to add a facsimile machine interface is still under consideration, he added.

The U.S. Postal Service charges $9.35 for overnight delivery of a 3- to 5-page message, and private courier service rates are approximately the same or higher, according to Harcharik. Contending that MCI Mail is 30% to 50% cheaper, he maintained that underpricing the competition will enable MCI Mail to tap a new market comprised of "hundreds of thousands" of subscribers.

Although this market consists largely of home computer users, it also includes companies. MCI Mail has two features designed especially for this latter group. Letterheads, signatures, invoice and other business form formats can be stored within the system — and accessed automatically — for $10/year. Also, a user who wants to address letters on a recurring basis to a specified group of recipients can store their names and addresses within the system for $10/mo.

The growing use of personal computers, the growing need for transmitting time-sensitive messages plus new options will expand the market for the new service, Harcharik said. One upcoming option would be bulk rates for mass mailers which will reportedly be offered "in a few months."

Three Firms Charged

T/S Service Subject of $53 Million Lawsuit

By Jim Bartimo
CW Staff

LOS ANGELES — Claiming the time-sharing services they contracted for were never properly rendered, a real estate management company and a retirement community here have filed a $53 million breach of contract suit against McAuto Systems Group, Bradford National Corp. and McDonnell Douglas Corp.

However, at least one of the defendants has denied responsibility for the alleged loss of service. In a statement released to *Computerworld*, Bradford National, a diversified financial services provider, said it is initiating a separate lawsuit objecting to any alleged wrongdoing and charging one of the principals in the real estate management company with the illegal taping of telephone conversations.

When contacted recently, McAuto, McDonnell Douglas' time-sharing subsidiary, refused to comment on the case. However, the legal volleys between defendants and plaintiffs will probably come before the court sometime next year.

Golden Rain Foundation, a retirement community in Laguna Hills, Calif., and its management, Professional Community Management, Inc., contracted with Bradford National's time-sharing branch in 1981 for general ledger, accounts payable, accounts receivable, fixed assets and investment management applications. "In late 1981, we had massive defects in the system design and found fraudulent status reports," Anthony C. Ligoretti of Professional Community Management said. "It took us months to process one month's accounts."

Upon further investigation, Professional Community Management allegedly found that many of the specific programs it needed were not written, although reports from Bradford National indicated progress was on schedule. "We found that programs were untested or unwritten; there was a really good cover-up job," Ligoretti continued.

Still more problems arose when Bradford sold its time-sharing subsidiary, Bradford Administrative Services, Inc., to McDonnell Douglas. "When they got sold to McDonnell Douglas, [Bradford] didn't tell [McDonnell Douglas] about our contract. The first comment from McDonnell Douglas was, 'Who are you guys?'" Ligoretti said.

Bradford Charges

In its statement, Bradford charged that Professional Community's "inability to decide upon and communicate its specific needs of the data processing system, as well as its inability to retain the manpower necessary to convert data, created hardship for Bradford."

Bradford did not answer charges that it withheld information from McAuto during the sale of its time-sharing subsidiary, but said it "observes that the alleged incompletion of contract occurred after McDonnell Douglas purchased the contract, in 1981, as part of [Bradford's] former systems division."

Although Ligoretti denied that a suit has been filed, Bradford also said it has "initiated a separate lawsuit ... to recover statutory damages for violation of California law prohibiting illegal tape recording of telephone conversations. This surreptitious taping of telephone conversations between Professional Community Management and Bradford employees was initiated by Professional Community Management through one of its officers, Anthony Ligoretti."

Professional Community Management is now performing its accounting manually while it awaits a trial. Last July, the Central District Court of California struck down a request from Bradford National that Professional Community Management's case be thrown out of court.

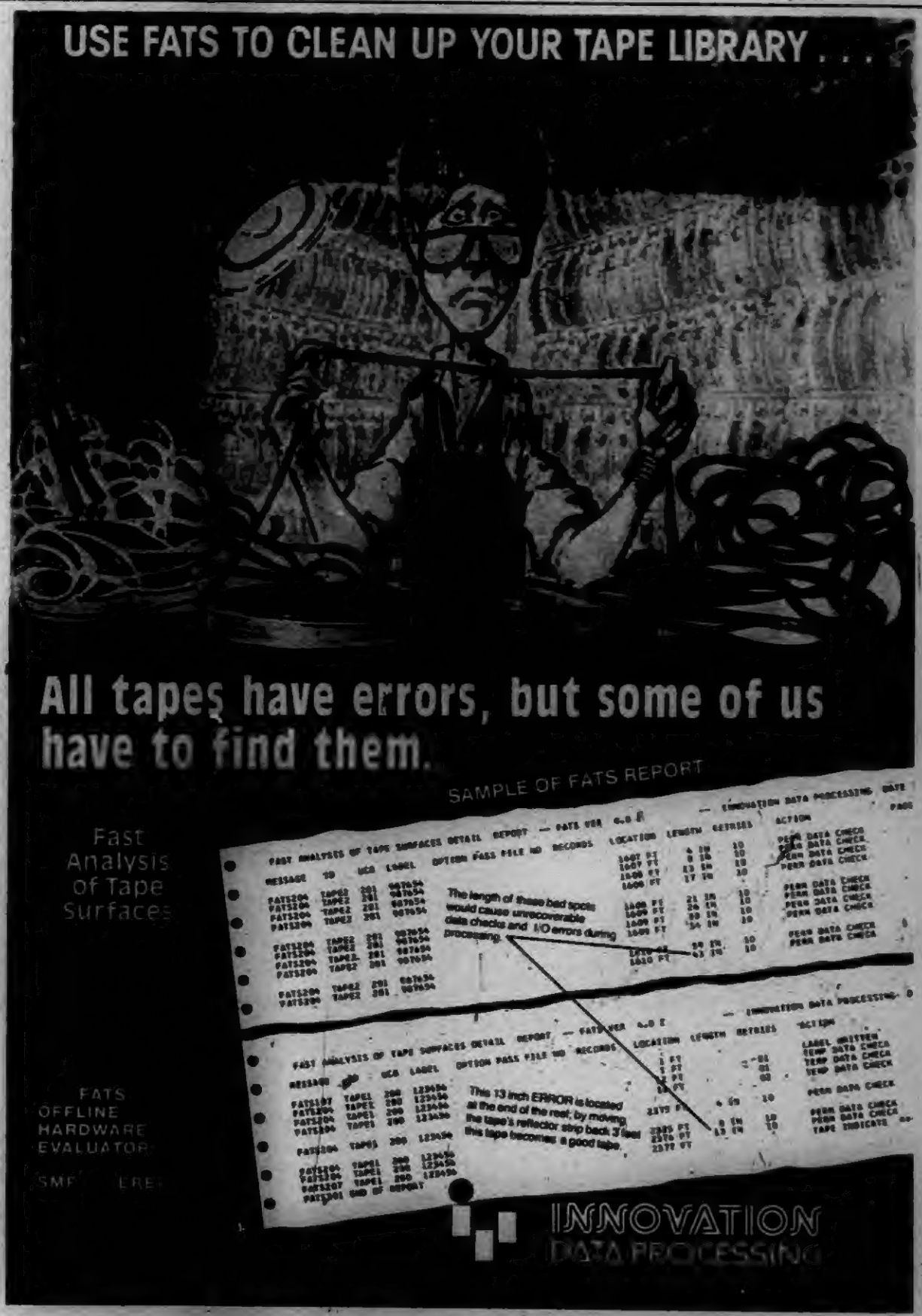
The damages of $53 million include out-of-pocket expenses to investigate the allegedly unwritten programs and direct and punitive damages.

London to Host Info Meet Dec. 6

ABINGDON, England — The Seventh Annual International On-Line Information Meeting will be held Dec. 6-8 at the Cunard International Hotel in London.

Sponsored by Learned Information Ltd., the main event of the meeting will be the conference, which will feature papers covering major aspects of on-line information retrieval. Subjects will include downloading, full-text data bases, microcomputers, in-house information systems, chemical substructures, education and training, electronic publishing, data base industry and videotex.

Further information is available from Learned Information, Besselsleigh Road, Abingdon, Oxfordshire OX13 6LG, England.



Supercomputing Seen Key to Economic Success

By Jake Kirchner
CW Washington Bureau

GAITHERSBURG, Md. — The so-called "supercomputer race" is not just a contest for national technological supremacy; it is a struggle to ensure the U.S.' future economic success, according to Dr. Ruth M. Davis, former director of the National Bureau of Standards' Institute for Computer Sciences and Technology (ICST).

"We're losing sight of the fact that we need supercomputing for entirely different objectives than technology," Davis said last week. "The race we're really in is between countries, not for supercomputers, not for national security. . . . We're in a race to control the resources of the world, both natural resources and informational resources."

After leaving her ICST post in 1977, Davis served in the U.S. Department of Defense (DOD), where she initiated the current DOD Very High-Scale Integrated Circuit Program, and the U.S. Department of Energy. She is now president of Pymatuning Group, Inc., a technology management corporation.

She made her remarks on supercomputing at last week's conference here of ICST and the Federation of Government Information Processing Councils. Reviewing the current U.S. projects on supercomputing, Davis noted there are a number of separate but related programs in both government and the private sector.

"There is a very close bond" among the initiatives begun in the last five years, she said, such as those of DOD's Advanced Research Projects Agency, the National Science Foundation, the Department of Energy and the National Aeronautics and Space Administration. There are other government programs, of which she suggested "it's worth coalescing a lot of the government efforts that are less than critical mass" into a more coherent program.

In the private sector, she singled out three undertakings that are likely to have "enough critical mass" to contribute to supercomputer development. The research plans of Microelectronics and Computer Technology Enterprises, the 13-firm research and development consortium founded by Control Data Corp. (CDC) Chairman William Norris, could lead to "a superb set of technologies that are feeder technologies into the supercomputing world," she said.

The Semiconductor Industry Association's Semiconductor Research Corp. "hits the bottom end of that pipeline from research to marketplace products" by supporting universities and research institutions, according to Davis. Of the new CDC supercomputer spin-off, ETA Systems, Inc., Davis suggested CDC technology and financial support, plus the entrepreneurial approach of the new firm, may or may not prove successful. But, she added, "I am 100% supporting it."

Addressing this broadened and intensified drive to promote supercomputer development in the U.S., Davis noted that a number of recently and almost-completed studies on the subject have come up with a "commonality of recommendations." These include government funding, guaranteed government purchases of supercomputers and an interagency coordinating committee.

A guaranteed market for future supercomputers is essential, Davis said, noting estimates of a combined U.S. and Western European government market of as many as 100 to 120 supercomputers. Although she did not directly endorse a recommendation that the U.S. government buy the first three of any new supercomputer, Davis did say that "I don't know what the industry can realistically do if it has to take all the front-end risks and the down-side risks."

Among her other concerns, she said, is that "we're looking at the supercomputing area as a race. . . . That may have totally obscured the real problem. For example, I'm not sure what the finish line is. I'm not sure how to tell when we have won the race or lost the race." According to Davis, computers will never be fast enough. "It's like high-energy physics: If we're there, it ain't high energy; if we're there in computers, it isn't supercomputers."

The real object is not to advance technology, but to be able to control the discovery, development, management and dissemination of natural and information resources, which can only be done with computers, she said.

In trying to reach that goal, the U.S. needs to help the research community and make some sense of current methods of government/industry cooperation, which she described as currently "back door." The economy is no longer rife with robber barons that require government control, she said, stating that we need a "much stronger emphasis on legislative reform . . . to reflect this U.S. government/industry change.

Tops Nuclear Proliferation

Privacy Ranks High in Canadian Concerns

By Jake Kirchner
CW Washington Bureau

LONDON, Ont. — A recently published survey of 210 Canadian households found that personal privacy is of greater concern than the spread of nuclear weapons. Most worried of all were those with knowledge of electronics, the survey found.

The study, conducted for the Ontario Ministry of Transport and Communications, found that although Canadians are more worried about inflation, unemployment and crime in the streets than privacy, the respondents rated privacy more important than freedom of speech, freedom of the press, sexual equality and minority rights.

"Concern for privacy is very high," reported the study's author, Prof. Neil Vidmar from the Department of Psychology at the University of Western Ontario.

"Sixty-eight percent of the people interviewed believe Canadians have less privacy than [they did] 10 years ago, and 62% indicated they are concerned about threats to their personal privacy," the study said.

"People are concerned about how government uses the personal information it collects about Canadians, but they trusted private business even less," according to the poll results. "There is a widespread belief that many public and private organizations collect more information than is necessary."

Whereas more than one in four Canadian households reported they were victims of significant privacy invasions in the past 10 years, a far greater number said they expected to be victims in the next five years. The study said that 55% expected the invasion to come from a computer or data bank, 58% from a credit rating agency, 51% from an insurance company, 52% from the federal government and 50% from a bank.

"People who reported knowledge of microelectronics technology were those most likely to anticipate the likelihood of a privacy invasion," the report stated.

The study was prepared in conjunction with a research project on privacy in two-way cable television services. The opinion poll found that "people are generally enthusiastic about many of the services that could be provided by two-way cable television, but they are concerned about potential privacy violations due to the amount of personal information that could be compiled by cable companies."

Seventy-two percent of those polled said cable TV company data collection should be regulated by government; only 17% trusted the companies to regulate themselves. "Overwhelmingly, people believe that cable companies should tell subscribers what information is being collected about them and that written permission from individuals should be required before any data can be collected," the study said.

"In fact," it said, "there is substantial support for the proposition that the collection of identifiable personal information by cable companies should be forbidden."

The main study in the project, titled "Protecting Privacy: Data Protection in Two-Way Cable Television Services," noted that the systems will involve "the production and collection of a great deal of personal information about subscribers and other users."

This, according to the study's author, Prof. David H. Flaherty, who teaches history and law at the University of Western Ontario's Privacy Project, "has the potential for becoming a significant barrier to consumer acceptance of such services, if concerns for privacy are not alleviated in advance."

Flaherty recommended that Canadian cable TV companies and the Canadian Cable Television Association adopt privacy guidelines similar to those already adopted by some firms in the U.S. These guidelines, such as those recently promulgated by the U.S. Videotex Industry Association, call for disclosure of record keeping practices, strong security measures and nondisclosure of personal information without advance authorization [CW, July 11].

University to Study Social Effects of Tech

BOSTON — Aiming to help understand the social implications of emerging technology and to assist in the formation of national policy in this area, the Center for Technology and Policy at Boston University opened its doors this month.

Under the direction of Dr. J. Herbert Hollomon, the center hopes to achieve these goals through research, report writing and consulting and the development of an educational program that will consist of workshops and degree programs.

According to Prof. Gerald Gordon, co-director of the center, one of the characteristics that makes the center at BU different from other recently established technology-oriented research centers is the mix of people involved there.

"The problem with academic settings, for the most part, is that very often you have people that don't know what's going on in the real world. . . . We have people who have worked in the real world, in universities, people who have been in senior policy positions, people from government . . . . scholars," Gordon said.

The center at BU also has a charter that states that "the center has the right to develop graduate courses and to be an integral part of the university rather than a peripheral unit," Gordon said.

According to John Hansen, assistant professor of research and technology, the mandate of the center includes developing a master's degree level program.

"Though the shape of the program hasn't been formed yet, it might begin sometime next fall with course offerings related to technology management, teaching innovation, policy analysis and science and technology policy. The program will be for people interested in technology, technology policy and management of technology, whether these individuals presently work in the field or they're students interested in those fields."

Some of the areas of research that will be examined at the center are the effects of factory automation on workers and management, the implications of technology on social policy, the impact of computers on manufacturing and forecasting technical labor markets.

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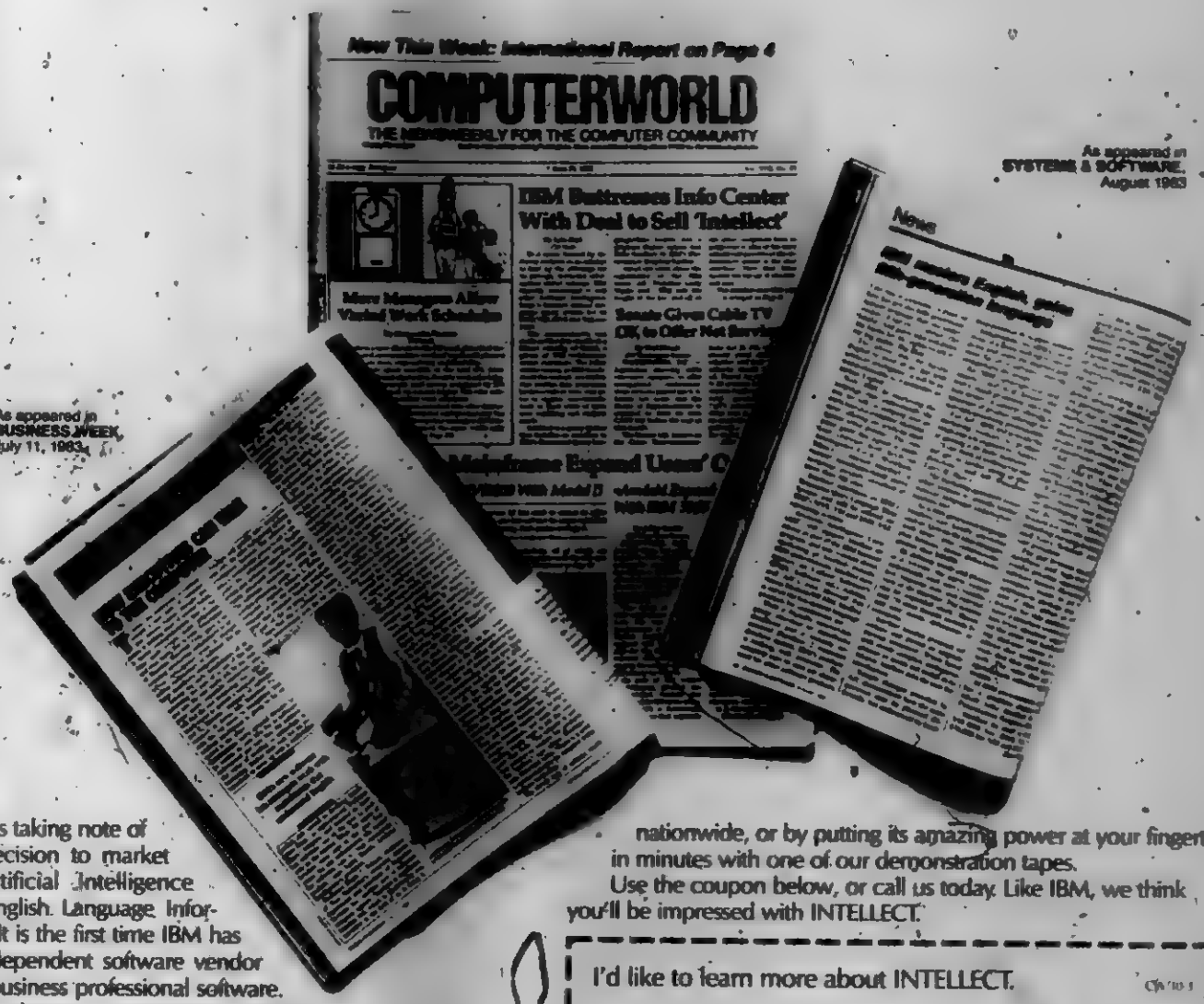

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Sidereal Takes Wraps Off Multiuser Info System

By Jeffry Beeler
CW West Coast Bureau

SAN DIEGO — Up to 12 communications lines, protocols and interfaces can be supported simultaneously with a multiuser office information system introduced here last week by Sidereal Corp. at the Tele-Communications Association (TCA '83) conference.

The management of Micronet 85's data communications activities takes place in the background and thus remains entirely transparent to the system's users, a spokesman said.

In addition to performing all the necessary speed, protocol and code conversions automatically for a multiline system, Micronet 85 boasts a user interface reminiscent of Apple Computer, Inc.'s Lisa personal computer.

The Micronet Operators' Environment interface provides users with six global commands and a series of screen-displayed icons that represent familiar office fixtures such as filing cabinets, folders, documents and in-baskets. By selecting the right combination of icons and global commands — which include Open, Close, Move, Copy, Delete and Execute — users can perform practically the full spectrum of file maintenance and communications functions.

The use of a Lisa-like interface minimizes the need to enter long command sequences, simplifying user training and making Micronet 85 easy for a nontechnical office worker to operate, he said.

Like Lisa, the Sidereal system reportedly allows multiple windows to be displayed on one screen at the same time, with each window capable of independently executing a different application. Because the system's standard application packages are all integrated, data can be automatically transferred from one window to any other, the source said.

CW at TCA '83

Micronet 85 is built around a Motorola, Inc. 68000-based controller that supports up to four workstations through a coaxial cable link. Using the controller, each workstation has equal access to a common disk system, up to five shared printers and a maximum of 12 communications lines, the spokesman said.

As many as 256 controllers can reportedly be tied together either remotely, through a High-Level Data Link Control (HDLC) protocol, or locally, through MIC-Link, Sidereal's local networking facility. The HDLC protocol allows the workstations to be installed as far as 1,000 feet from the nearest controller.

Expected to compete directly with office information systems from companies such as Fortune Systems, Inc. and Convergent Technologies, Inc., Micronet 85 operates with M-Stos, Sidereal's Unix look-alike operating system.

Micronet 85 is said to support a wide variety of communications capabilities and facilities, including:

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A fully expanded Micronet 85 incorporates a controller with a CPU, 1M byte of random-access memory and 80M bytes of disk storage. A basic system with a 512K-byte processor and a 5M-byte disk module costs $19,500 and will be available in October from Sidereal at 9600 S.W. Barnes Road, Portland, Ore. 97225.

Voice, Data Fight Forcing Merger?

(Continued from Page 1)

Angeles-based California Federal Savings and Loan. "But the technology will bring them together."

One communications manager said the voice will become the dominant technology simply because of its mass use. "Eighty percent to 90% of all communications is voice," said Thomas D. Graham of the Communications Systems/Information Systems Department of Rockwell International Corp. of Anaheim, Calif.

But another manager of voice communications at a major insurance company disagreed. "The data side will take over voice because they have been keeping up with education; in my company, data gets all the money they need for education, while I'm hand-training my operators."

The telecommunications manager also said that the bitter battle will not be settled for at least 10 years. "Our voice and data people aren't going to merge very easily," she said.

But Robert Justham of telecommunications planning in California's Department of Motor Vehicles is already planning for the integration of the two networks. "Our concept is to have voice and data in the same [departmental] unit," he said. "With the divestiture of AT&T, we're forced to create our own voice network."

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Two More Hopefuls Join PBX System Ranks

By Jim Bartimo
CW Staff

SAN DIEGO — With some 85 private branch exchange systems (PBX) already on the market from some 25 vendors, at least two more were added to the list here last week at the Tele-Communications Association annual meeting (TCA '83) here.

GTE Business Communications Systems, Inc. added to its Omni line of PBX systems with the introduction of the GTE Omni SIII said to switch both voice and data. With a capacity of 2,048 voice and data lines, the PBX can interface with local-area networks and public packet-switched data networks.

The Omni SIII uses a dual-bus architecture that permits high-speed communications over existing single twisted-pair wiring, according to a vendor spokesman.

Shipments will begin in February at an average cost of approximately $600 to $700 per port.

More information is available from GTE at 12502 Sunrise Valley Drive, Reston, Va. 22090.

Harris Corp. added another PBX to its line of switches with the introduction of the Harris 400 PBX. Said to switch digital data at 9,600 bit/sec up to 4,000 feet, it also offers disk-based software.

The switch can direct calls to the least costly route, collect call information for pricing and processing with a personal computer and link at multiple sites to provide a company-wide network, a vendor spokesman said.

CW at TCA '83

All system parameters can be entered and changed for the Model 400 with a menu-driven personal computer — either locally or from a remote location. Available in January, the PBX will cost approximately $500 per line from Harris' Digital Telephone Systems Division, One Digital Drive, P.O. Box 1188, Novato, Calif. 94948.

A somewhat unusual entry into the product announcement arena was a message storage and retrieval system said to run in conjunction with the IBM Personal Computer. Candela Electronics, Inc. released software and a small printer to bring voice messaging to the microcomputer.

The Can-Print software allows the Personal Computer to store up to 800 message, entered from a keyboard and recalled on the screen. A Message Printer provides users with hard-copy message retrieval. The user pushes a button on the thermal printer to recall all messages, a vendor spokesman said.

The software is available for $350, the printer for $160 from Candela, 550 Del Ray Ave., Sunnyvale, Calif. 94088.

Several facsimile machines were also introduced at the show including those from Canon, Inc.

Canon's FAX-300 series desktop digital facsimile includes the FAX 330, which is said to send a message in 22 seconds. The 330 also features an LCD display that provides information about the party sending or receiving a transmission. The 330 is available for $4,495.

The 320E can enlarge documents by as much as 33% and can also reduce document size. It has all the features of the 330 and is available for $5,995.

Canon is located at 1 Canon Plaza, Lake Success, N.Y. 11042.

Top PBX Item: Can It Get A Dial Tone?

SAN DIEGO — "A lot of vendors are talking about all the features on their PBXs, but the most important feature is to get a dial tone," according to Jerry Wertzer, assistant director of private branch exchange (PBX) engineering for NEC Telephones, Inc.

Speaking at the Tele-Communications Association's (TCA '83) annual meeting here last week, Wertzer explained that a PBX should be measured by how well it establishes connections from one station to another and not necessarily by other available features.

In an attempt to guide the audience in the purchase of a PBX system, Wertzer suggested some questions to ask vendors.

First, switching systems can be judged by one factor in any given installation — the number of simultaneous conversations that can take place. With an eye toward the capacity of the PBX, users should also buy more lines than they immediately need and plan for the future, Wertzer said.

In order to plan for such new PBX features as data switching and voice store and forward, users should ask, "How much memory do I have to add and how much processing power?" Wertzer said.

Once the PBX is purchased, there are additional problems to be solved. For example, integrating voice and data means integrating the voice and data processing departments within the organization, he noted.

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'No Way of Knowing About Logic Bomb'

WASHINGTON, D.C. — The Los Alamos National Laboratory security chief said last week there is no way of knowing whether a "logic bomb" was entered into the lab's computer system by hackers who have accessed the system without authorization.

A logic bomb is a programming command entered without trace in a computer system to perform some function at a later date, possibly including alteration or destruction of the computer's operating system and data files.

"I see no way to guarantee that there is not one," Jim McClary, Los Alamos Operational Security and Safeguards Division leader, told the House of Representatives Science and Technology Subcommitee investigating computer security. "Software verification is a very difficult problem; no one knows how to do it now," he said.

McClary, called on the carpet by the subcommittee, assured its members that there was no breach of security in the computer systems that are used for classified work by the laboratory staff, who conduct nuclear weapons research. The system accessed is an open computing system linking scientific and academic researchers around the country.

Little Loss

The unauthorized access by the "414" gang of computer hackers resulted in the loss of Los Alamos and Telenet computer time worth less than $300, he said. But "the disruption . . . required three to four workmonths of effort on the part of system managers and security personnel in establishing exactly what the intruders had done," according to McClary.

Although there was no damage to the system before the laboratory discovered the access and moved to prevent further incidents, according to McClary, "the intruders could have caused confusion, delay and perhaps incorrect results for many users of the open distributed processors," he said.

He also stated that the lab has seen one other intrusion and other unsuccessful attempts since June, when the 414 incident occurred. Those have also been reported to the Federal Bureau of Investigation, he said.

On the subject of security, McClary commented: "We weren't shocked when this occurred. We were disappointed that certain system managers had not changed the passwords [that came from the hardware manufacturer]. The nature of open computing," he said, "is such that things like this are going to happen occasionally."

Subcommittee Grills Hacker

(Continued from Page 1)

country, including those of the Los Alamos National Laboratory in New Mexico and the Sloan-Kettering Institute for Cancer in New York.

Asked by Rep. Bill Nelson (D-Fla.), sponsor of the pending federal computer crime bill, when he first realized this access was improper, Patrick said, "Not until the FBI knocked on my door."

Patrick spent about an hour educating the subcommittee in the ways of illegal computer hacking activities. He said the Telenet access number and the passwords used to access the computer systems were available from electronic bulletin boards used by other hackers.

The access, he said, "is something that just about anyone can do. . . . I don't think any members of the group were geniuses or anything of that sort, but they were above average" in terms of home computer users. He noted that most of the computer systems still were using access codes that came from the factory, including "Test" and "System." Those passwords were ones that opened up the Los Alamos system, he said.

Asked by Rep. Albert Gore Jr. (D-Tenn.) how he was caught, Patrick replied, "I really don't know." Gore then told Patrick the Security Pacific Bank had set a trap for the hackers by offering a Star Trek game to keep them on the line until they could be traced. Patrick quietly said he remembered playing that game for several hours.

Patrick said he got his start in hacking after his father purchased a Radio Shack TRS-80 Model II computer for business purposes. Eventually, he said, "we [the 414 group] wanted to do more than just play around with our home computers" and get some experience working with large mainframes.

The 414s, who took their name from the Milwaukee area code, came together, he said, through a common interest in computers and had no formal organization or leadership. Patrick said he has been hacking for six or seven months and during the summer spent as much as 20 hours a week at that activity. It was, he said, "something to do in the evenings."

Most of the illegal access would have been prevented if the system operators had merely changed the passwords that came with the hardware, he said. "It's very easy to prevent that [access]," he said. "Just commonsense ideas and attitudes would prevent most of this — if not all of this — from happening."

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Consultant Trys Break-Ins to Beef Up Security

Hired Hacker Not New Phenomenon to Geisco

By Tom Henkel
CW Staff

While many firms frown upon the mischief hackers cause in DP operations, a major computer time-sharing firm here has been relying on hackers for years as a way to beef up its security.

General Electric Information Services Co. (Geisco) has had a private consultant trying to crack password codes in its Mark III time-sharing system for better than 10 years.

Geisco hired its private consultant in the early 1970s to iron out security problems in the then new Mark III time-sharing system. Based on Honeywell, Inc. hardware, the Mark III software was developed in-house and geared to a time-sharing environment.

Geisco vice-president of technology operations, Raymond W. Marshall, said the consultant has yet to break into either the Mark III system or the more recently developed IBM-based Mark 3000 system. The consultant has, however, been able to identify potential problems.

"He acts as our most intelligent user," Marshall said, noting the Geisco consultant probably knows as much about the Mark III system as many in-house employees.

Attempts Unauthorized Use

The Geisco consultant's job is to use a fairly low-level system access password on the Mark III and IBM-based Mark 3000 systems and attempt to make unauthorized use of DP service, or to gain access to the code for the applications programs available on the two time-sharing services, Marshall said.

To perform his hacking duties, the consultant is given free reign with the firm's manuals and system descriptions that might help him learn enough about the Mark III system to break its security, Marshall said.

"We just let him poke around," Marshall added, noting the consultant submits regular reports on his hacking adventures, including how successful he has been with a particular method.

While noting that neither the hired hacker nor anyone else outside of Geisco has successfully gained unauthorized access to the Mark III or Mark 3000 systems, Marshall said the biggest risk to large systems is from in-house. Geisco also uses a third-party auditing firm, Peat, Marwick, Mitchell & Co., to do a regular independent audit of security measures at Geisco.

He cited the example of a very valued employee who has access to internal passwords in a system. If that employee leaves, especially if under unpleasant circumstances, there is a chance he could either steal information from the system or damage it in some way. The Peat, Marwick, Mitchell audits help to ensure such a user has been locked out of the Geisco system by identifying all passwords assigned to that user. In addition, the audits also help identify passwords that are no longer assigned to valid users, Marshall said.

School Invites Hackers to Break Into Its Systems

SEATTLE — While General Electric Information Services Co. is not inviting anyone with a flair for hacking to try to break into its computer systems, Western Washington University (WWU) here is doing just that.

With more than 30,000 students and faculty members signing onto the school's system each quarter, Joan Hayes, the school's coordinator of academic computing services, said hacking is a way of life.

Instead of punishing offenders, administrators reward students for reporting security problems in the school's Digital Equipment Corp. VAX-11/780 processor. Hayes said rewards usually take the form of more memory for the individual's account.

The school instituted the reward policy back in 1975 when four students managed to break into an earlier Perkin-Elmer Corp. processor.

The major flaw with the WWU policy, Hayes admitted, is it is often unclear whether students caught attempting to break into unauthorized parts of the WWU system are doing so for the good of the university or for personal gain. This is further clouded by the fact that the university has adopted legislation making devious computer hacking a crime.

As long as data has not been lost or altered, Hayes said, the school is usually lenient toward hackers — provided they are willing to cooperate in closing system loopholes. If they do not cooperate, the offender is barred from using the system until he repents. Hayes added, the policy only applies to bona fide internal system security problems. Students who steal passwords, for example, are treated much more harshly.

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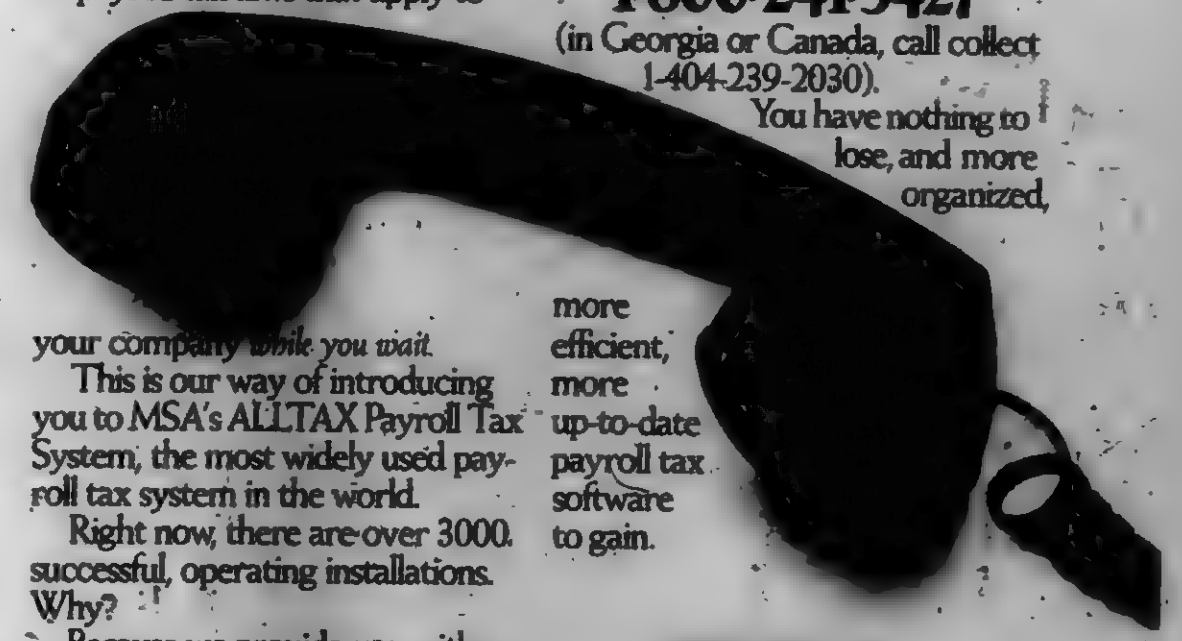

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Attempted Robbery Foiled by 'Midas' Touch

By Peter Bartolik
CW Staff

CLINTON TOWNSHIP, Mich. — Midas did not provide the golden touch for an alleged thief apprehended here recently.

Midas is an acronym for Multiple Listing Information Data Assistance System, the user-written software for an on-line system connecting more than 100 real estate agents with the Macomb County Multiple Listing Service (MLS).

The alleged con artist/thief was nabbed in a real estate office here recently after an employee read the culprit's description in the MLS system's electronic mail.

William Lawson is being held in lieu of $10,000 cash surety and faces 10 outstanding warrants in addition to the larceny charge filed here, according to a police detective who described Lawson as a "local con man."

According to Virginia Easton and Phil Hogan of the MLS center in St. Clair Shores, about 10 miles from here, a thief had been fleecing real estate agents by posing as an executive looking for a house and then robbing the real estate personnel.

"He was going into real estate offices and saying he worked for the GM [General Motors Corp.] Technical Center in Warren and that he was looking for a home in the $150,000 to $175,000 range," Easton said. When the agents left the room to check listings, the man would rifle through purses and flee.

The robberies had reportedly been going on for about two or three weeks, Easton said. After a pattern became apparent, the MLS put a message on its on-line system, providing a description and warning real estate offices to be on the alert.

On Tuesday, Sept. 20, when Lawson walked into the Re-Max Real Estate Co. office here, one of the agents in the office was looking at the terminal and read the message.

The MLS, which carried the crime alert, serves 275 offices in the county, 127 of which are connected on-line to the service's Stratus Computer, Inc. Stratus/32 superminicomputer, Hogan said.

The police were immediately called and secretly observed Lawson's actions from another room. When the agents left the office, Lawson allegedly was seen going into an employee's purse and was apprehended.

Police said two charges have been lodged and that Lawson has said he may have committed five similar crimes. Lawson technically already faces a prison escape charge because he was arrested while assigned to a halfway house after serving seven months of a three- to 14-year prison sentence for writing bad checks.

San Diego Man Pleads Guilty In Fraud Case

By Patricia Keefe
CW Staff

ATLANTA — A 22-year-old San Diego man pleaded guilty last Monday in the U.S. District Court of Northern Georgia here to charges that he posed as a representative of a major industrial corporation and fraudulently ordered a microcomputer system.

Last January, Brian A. Graves reportedly used the guise of a General Dynamics Corp. representative to order a Vector Graphic, Inc. Model V4/30 microcomputer.

In return for his plea, the U.S. District Attorney's office here has agreed to recommend a sentence of five years. If he had not entered a guilty plea and was found guilty, Graves could have been sentenced to 10 years in prison, according to U.S. District Attorney Richard Dean. Sentencing for Graves was scheduled for last week. Although Graves pleaded guilty to the January incident, it is allegedly not the first time he has posed as a General Dynamics executive or fraudulently ordered computers or computer equipment.

In fact, he was arrested June 23 in Jacksonville, Fla., when he allegedly attempted to pick up another computer valued at more than $4,000, according to Federal Bureau of Investigation Special Agent Doug Jones. That computer was allegedly shipped by Teleram Communications Corp., although officials of the White Plains, N.Y., firm expressed no knowledge of the fraudulent order.

Graves also allegedly attempted to place other orders — some for as much as $10,000 worth of computers and parts — from computer suppliers. In each case, he reportedly used various aliases, all fictitiously identified as employees of General Dynamics. Whether Graves was successful in picking up any of these alleged orders and what he is supposed to have done with the computer equipment are not known.

To date, the alleged felon has only been indicted on the January incident, District Attorney Dean said. Dean would not comment on the possibility of other indictments involving Graves.

Graves' attorney, Michael McIntyre, declined to comment on the case other than to confirm Graves' plea.

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But Not Enough to Win Game

System Helps BC Football Coach Call the Plays

By David Myers
CW New York Bureau

CHESTNUT HILL, Mass. — Computers can do a great many things, but they cannot block and tackle.

That was the story when 15th-ranked Boston College (BC) fell to eighth-ranked West Virginia University on the Alumni Stadium turf here, by the score of 27-17 on Sept. 24.

The showdown between the two eastern powers had been building up as a test of computers in college football since BC uses an IBM 4341 to set its strategy while West Virginia sticks with the time-hallowed method of doing things by hand.

Jack Bicknell, head coach at BC, told *Computerworld* in a pregame interview that the Eagles depend on the mainframe for "everything we do."

West Virginia, meanwhile, has an Amdahl Corp. AS7 mainframe on its Morgantown, W. Va., campus, and the university's data specialists have assured Mountaineers' head coach Don Nehlen it would be no problem to program the computer to comb through scouting reports and offer strategy.

So far, however, the Mountaineers have made use of the computer only in recruiting high school athletes.

BC, by contrast, feeds its on-campus mainframe a mountain of scouting reports on its next week's foe. The computer then spits out an analysis of the team's play selection.

"It tells us what to expect from them on first and 10, or second and long or third and inches," Bicknell said. The BC coaching staff uses the information to array its defenses.

But more than that, the Eagles use the computer week by week to scout themselves.

"We want to know what our opponents are looking at when they look at us. What we're trying to do is make sure we don't have a lot of tendencies. We don't want to be predictable. We use it [the computer] in planning our attack," Bicknell said.

But Bicknell added that his squad's computer tactics, marshaled by Brian O'Connor — a total high school teacher — are nothing rare. "All colleges are into computers," Bicknell said. "They give you a more complete look and a lot more concise information than you could ever get through the old-fashioned way of compiling reports by hand."

Actually, Bicknell was wrong. West Virginia does not use a computer in its football program.

"We're looking into it. We want to do it. We have all the same data our opponents have. All we need to do now is speed up the process," assistant coach Donnie Young said.

A lack of manpower in the school's DP center has left West Virginia lagging behind its Saturday opponents in appointing a computer to its football brain trust.

"We've got the talent, and I've been encouraging [the coaches] to pursue it. But so far, I guess they haven't had the time," Dan Ord, an administrative data specialist, said.

Even so, the West Virginia coaches said they were not afraid their foes' computers give them an advantage. "In football, there's just so much data you can use," Young said.

Helps Coaches Prepare

Bicknell agreed the computer "is not going to help your kids play. But it is going to help your coaches prepare," he insisted. And the computer printouts on West Virginia had given his staff a complete familiarity with the Mountaineers by game time.

All the beautiful clear logic of the Eagles' computerized game plan was scrambled when BC lost its leading ground-gainer and the ball on the opening kickoff.

Starting tailback Troy Stradford was knocked momentarily unconscious and fumbled the football at his own 16-yard line. West Virginia recovered, scored just over a minute later, and for the rest of the afternoon, BC was forced to play catch up.

But as one college coach told CW privately, "Sometimes it [computer strategy] holds up, and sometimes it doesn't."

GSA Appoints Reeder as Chief Of DP Group

WASHINGTON, D.C. — The U.S. General Services Administration (GSA) has announced that Franklin S. Reeder has been appointed chairman of the Interagency Committee on Automatic Data Processing for 1983-84.

Reeder, a member of the information policy staff of the Office of Management and Budget, succeeds former chairman Reed Phillips of the Department of the Interior, who resigned from government service to work in private industry.

The committee, sponsored by the GSA under executive order, prepares position papers and makes recommendations for improving automatic DP within the U.S. government.

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DOD Calls Access Charge Threat to U.S. Security

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The U.S. Department of Defense (DOD) last week reiterated claims that the effects of telecommunications deregulation, particularly the Federal Communications Commission's (FCC) controversial access charge decision, jeopardize national security.

The breakup of the AT&T system and pro-competitive FCC actions, by increasing the number of communications carriers the department will have to deal with, will create special burdens on DOD communications planning, the DOD said. In addition, the access charge could seriously raise the costs to the government for defense communications, according to the DOD, which spends more than $1 billion annually for commercial communications services.

"I cannot overstate the significance of the impact upon us, from a cost, management and operational standpoint," Lt. Gen. Winston D. Powers, director of the Defense Communications Agency, told the House of Representatives Government Operations Subcommittee on Government Information, Justice and Agriculture last week. The subcommittee was continuing a series of hearings on the FCC's access charge decision.

The access charge would initially add $2 a month to residential phone bills and $6 to businesses. The charge is meant to make up for the lost long-distance subsidies to local telephone rates under the telephone system that will go out of existence at the end of the year when the reorganization of the Bell system is complete.

Spate of Bills

A spate of bills in Congress would alter the access plan; one proposal would add charges for bypass systems to help subsidize universal telephone service. Efforts to produce a bill acceptable to a wide spectrum of legislators and the public have been unsuccessful so far. The Senate Commerce Committee failed last week to draft an acceptable bill, although a proposal to delay the access charge for one year gained ground; the House Telecommunications Subcommittee, which is having similar difficulties, is slated to take up the effort again this week.

Representatives of the Florida and Michigan public service commissions told the government information subcommittee last week that the access charge could easily lead to a doubling or tripling of consumer telephone rates. This would result in several hundreds of thousands of people in every state being forced to give up telephone service, they claimed.

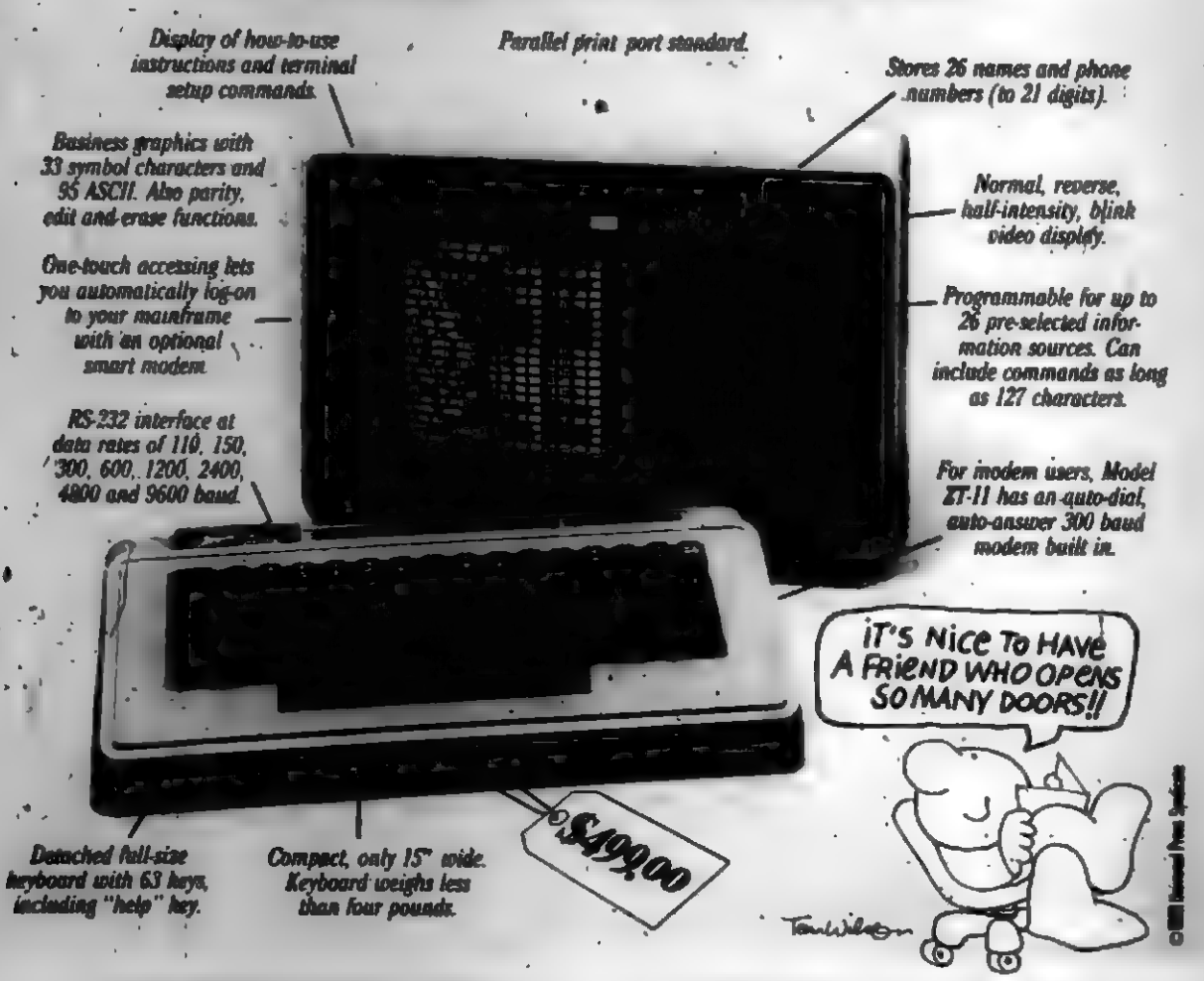
The Defense Department has been uneasy about telecommunications deregulation for some time and has attempted to derail or limit it.

Deregulation and related FCC decisions, the DOD's Powers told the subcommittee, "mean higher costs of obtaining service and increased manpower costs for the DOD, both in the short term and in the long run, no matter how well we communicators do our job. Indeed," he added, "I believe that most of these decisions simply do not adequately account for the problems of a nationwide communications customer with the unique needs of the DOD."

With many of these changes imminent, the government does not have the money budgeted to pay for what it expects will be significantly higher telecommunications costs, warned Donald C. Latham, deputy under secretary of defense for communications, command, control and intelligence.

The situation is also of concern to the civilian federal agencies, but Frank J. Carr, assistant administrator of the General Services Administration (GSA), said it is impossible to predict accurately how the agencies will be affected. Carr, who heads the GSA Office of Information Resources Management, which has governmentwide responsibility for computer and communications procurements, said conservative estimates are that these agencies will spend between $37 million and $40 million more in 1984 alone.

There's a lot to like about the new Zenith ZT-10, starting with the price.



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Dbase II Meet Set for Nov. 10 In Long Beach

CULVER CITY, Calif. — Users of Dbase II will have their "Dbase II Runtime: Key to Success" conference aboard the Queen Mary Hotel in Long Beach, Calif., Nov. 10-12.

A keynote speaker will be Edward A. Feigenbaum, professor of computer science at Stanford University and coauthor of *The Fifth Generation: Artificial Intelligence and Japan's Computer Challenge to the World.*

Sponsored by Ashton-Tate, Inc., vendor of Dbase II, the conference will include keynote speakers, panel sessions, seminars and technical workshops aimed at providing Dbase II users and developers with technical expertise, start-up business advice and marketing assistance.

Registration for the conference is $350. Further information is available from Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, Calif. 90230.

Facing Increasing Poverty Gap

Computer Literacy Seen Key for Black Workers

By Peter Bartolik
CW Staff

NEWARK, N.J. — Black Americans face an increasing poverty gap if they don't strive to become computer literate, a black physicist told the Fifth National Convention of the Black Data Processing Association (BDPA) here recently.

Prof. Chandler Dennis, physics professor at Stockton State College in New Jersey, told BDPA members meeting here recently that their future is "encouraging" because of industry demands. But for most blacks, he added, "There's a revolution going on, and we're not part of it."

He said blacks hold 10% of the skilled, manual jobs at mainframe sites and 8% of programming jobs. "Those are the kind of ratios we want to see," he said.

Promotion Prospects Good

Promotion prospects for "blue-collar workers of the future" are good, according to Dennis, particularly because the industry is generally not hampered by unionization, which he said has tended to hold back minorities.

However, he added, "My research has indicated that black folks are not particularly computer literate" and face potentially severe unemployment problems as robotics eliminates the need for nonskilled production workers, of which "we comprise a disproportionate share."

He urged BDPA members to serve as role models for young blacks and to encourage early development of computer skills in poor schools. If computer literacy is not strongly encouraged, he concluded, blacks generally "will become economically obsolete."

CW at BDPA

In keeping with the conference theme, "Rise to the Challenge" — inspired by a speech delivered by Martin Luther King in 1962 — blacks already involved in data processing were encouraged by Dennis and other speakers to hone their professional and interpersonal skills to take advantage of shortages in the data processing field.

Interpersonal Skills

Len Myers, vice-president for technical operations at Computer Horizons, Inc., a consulting firm, told BDPA members that the most important requirement for budding black DP entrepreneurs is the development of interpersonal skills.

"When you can't communicate, you cease to exist," he said. Myers said blacks have to develop professional credibility to obtain contracts.

Robert Davis urged BDPA members to seek out professional "networks" to enhance their careers and to seek out mentors to improve their prospects.

Davis was a Sloan Foundation fellow at MIT in 1978; he is presently director of administrative services and facilities with AT&T's Central Services Organization in New Jersey.

A powerful asset not to be overlooked in the DP industry is the ability to write well, according to Bessie William, manager of General, Small and Office Systems Support for IBM's Federal Systems Division in Washington, D.C.

Writing, she said, "gives you an opportunity to influence many people, some that you don't even see."

BDPA Issues DP Challenge To U.S. Industry

By Peter Bartolik
CW Staff

NEWARK, N.J. — The Black Data Processing Association (BDPA) is challenging U.S. industry to increase productivity through automation. In line with that challenge, it is developing its own strategies to bring computer skills, which could then be used as a resource, to the general black population.

"In order to survive, American business needs to increase productivity and improve the quality of its products and make a long-term commitment to growth. Failure to do any one of these things will result in the death of that business or that industry in America," said Gerard Anderson, coordinator for the BDPA's fifth annual meeting held here recently and a systems engineer with IBM.

For the past few months, Anderson has been traveling throughout the country as a representative of the BDPA's education committee.

Anderson's message is twofold. First, he said, "I'm trying to get blacks in DP to understand the pressures on American business and the effects of foreign competition."

The rest of the message deals with "how blacks in the DP industry have the responsibility to be as produc-

(Continued on Page 18)

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Kenneth Russell

BDPA Members Discuss Backgrounds

By Peter Bartolik
CW Staff

NEWARK, N.J. — Deborah Watson knows where she is going. Kenneth Russell knows what it's like to get there.

Both are members of the Black Data Processing Association (BDPA), and during that organization's fifth annual convention here recently they told *Computerworld* of their experiences and goals in the DP industry. While their goals are somewhat similar, their experiences with racism in the industry are quite different; Russell said his skin color has not adversely influenced his career, while Watson said she has experienced discrimination because of both race and sex.

CW at BDPA

Watson is a senior analyst/programmer with Smithkline Beckman Corp., a pharmaceutical company located in Philadelphia and has a firm idea of where she would like her career to evolve. "Within the next five years, I'd like to be in Smithkline's management; within 10 years, I'd like to have my own business," she said.

Russell already has his own business, Information Systems Consultants in Cleveland, a partnership he entered into with another BDPA member he met during the organization's first convention in 1979.

Prior to that he had worked in several Cleveland-area businesses, starting off as a computer operator during a transition from an IBM 1401G to an IBM 3160

(Continued on Page 19)

BDPA Offers Strategies For Change

(Continued from Page 17)

tive, as responsible and as resourceful as anyone else in the business," he said.

Automation, according to Anderson, is the most efficient way for business to increase productivity; but, as many speakers at the convention noted, it is also potentially most threatening to the many blacks who work in nontechnical manufacturing jobs that may be eliminated by the increased use of robotics.

BDPA members are apparently fully aware of the effect their efforts may have on the black population in general. To create more jobs for blacks, "we must help American business stay on its feet to remain competitive and move ahead," Anderson said.

Pointed Strategy

It is a pointed strategy for blacks in DP: "We acquire a can-do attitude that we can take back to the black community and motivate those who are still struggling there to move ahead and fill our shoes," Anderson said.

Each of the local BDPA chapters has established and is developing programs to bring to the black community the skills of computer literacy.

The BDPA, therefore, has three tasks, according to Anderson: It must help blacks in DP to advance their careers; bring the age of computers to the black community; and help the DP industry make advances that will increase competitiveness and thereby produce more jobs in America.

Those sentiments, from a quite different perspective, had been voiced at the start of the convention by Newark's black mayor, Kenneth A. Gibson, who delivered the welcoming address. "We need your talents, your experience and knowledge and growing knowledge."

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And Career Decisions, Look to Future

(Continued from Page 18)

and progressing to programmer and then to systems analyst. Along the way he acquired experience — in communications and in data bases. "Data base experience made me valuable," he said, and led to consulting.

Watson started her career with an insurance company in 1968. After 13 years with three insurance companies, she felt her career prospects were limited, and she moved to Smithkline, where she now works in a shop with an IBM 3031, IBM 3033 and some personal computers.

She has also started a part-time consulting firm, Compufer Information Management Systems, offering computer literacy services. "Eventually I want to start my own consulting firm to offer DP skills to small businesses in the area," she said.

Russell already had contacts in the private sector when he formed his partnership, which "had two people who were marketable and who could generate revenue." The firm has grown to seven people and two offices, and growth required a structured marketing effort, he said.

The partnership offers DP services in data distribution, systems analysis and programming. Last year "was bad for everyone" in consulting, he said, and the firm added an aspect he believes will level off the cash flow sheets "that looked like mountain ranges."

He has established a dealership with Nippon Electric Co. marketing microcomputer systems and developing integrated software in such areas as dental office management, school administration, wholesale distributorships and others.

Being black has not placed extra obstacles in his path, Russell said. "I consider myself as a black in business, not a black businessman." The challenge, he said, is being an independent businessman.

Cash flow is the toughest problem facing independents, according to Russell. Seeing unlimited opportunities opening up in this decade with the increasing availability of computer hardware, "The challenge is how to grow as fast as possible with the money available to you," he concluded.

Watson said she has felt discrimination in the industry. When she started her career, "There was a push to get black women — because they fit two [affirmative action] categories — into higher positions, so we moved very rapidly," she recalled. In the late '70s the atmosphere changed, and she felt limited career opportunities in the "basically structured" insurance industry.

"It's difficult, sometimes proving yourself to a white male manager; it's not only black women who have problems but also white women," she said.

CW Photo by P. Forsyth

Deborah Watson

San Diego To Sponsor Net Meet

SAN DIEGO — Broadband local-area network technology will be the topic of the second local-area network conference sponsored by Sytek, Inc. and San Diego State University (SDSU) here Nov. 8-10.

The three-day conference will apply classroom techniques to network systems evaluation, design, implementation and control, using the university's broadband local-area network as a model.

Registration for the conference is $675 in advance or $750 on the first day of the conference. Additional information is available from SDSU/Sytek Conference at 1225 Charleston Road, Mountain View, Calif. 94043.

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Programmers Told to Develop Skills in DBMS

By Peter Bartolik
CW Staff

NEWARK, N.J. — "You won't have jobs unless you understand data base management systems [DBMS] and nonprocedural languages."

That was the advice Robert Stewart gave to a group of black programmers who attended a workshop on future trends here at the recent fifth annual meeting of the Black Data Processing Association (BDPA).

Stewart, a manager of competitive analysis for Sperry Corp.'s Competitive Systems Division in Blue Bell, Pa., said blacks in DP, and particularly applications programmers, need to develop professional skills in areas that are likely to be at the forefront of future computer systems developments.

Communications Arena

"If I were you, I'd get involved in communications," he said, pointing out that communications within networks and through gateway technology to other computer systems will be required by businesses seeking to maintain profitability. "I'd go back to school and take some courses," he added.

Also speaking at the workshop was Antonio Parham, a black member of Hewlett-Packard Co.'s Systems Development Group, who explained his company's work in the field of integrated medical systems.

HP, according to Parham, is developing extensive networking structures to enable hospitals to "improve productivity in the delivery of services" as increasing demands for services strain limited financial resources.

Stewart, who is responsible for analyzing systems developed by Sperry's competitors, said, "All the vendors are putting their money" into the development of relational data bases.

Businesses, seeking to maximize productivity and profits, will seek common data bases for all functional departments within their organizations, according to Stewart. "Programmers are not just going to have to know bits and bytes, [they are] also going to have to understand how the company makes money from its products," he said.

As microcomputers proliferate in business organizations, Stewart said, programmers will have to become adept as data base managers. "[DBMS] are going to be the thing I think that we, as vendors, both software and hardware, are going to concentrate on the next few years."

CW at BDPA

Parham pointed out that hospital life-support functions previously hooked into minicomputer systems can now be located at bedside in microprocessor-based monitors. As such devices proliferate, he added, "We're going to have to have strategies in place to distribute the data over networks" to a limited staff.

Microcomputers will have easier-to-use applications languages with which to manipulate data, but they will still require DP personnel to manage data bases, according to Stewart. The task for DP personnel, he said, "will be how do we manage data — putting information into the hands of the end user."

Stewart noted that Sperry and other vendors all maintain data bases on their competitors and make them available on-line to sales personnel who need the information immediately.

"We've taken a long time to do some of these things, an awful long time. We're not going to be able to do that anymore," he said.

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To Develop Management Document

OMB Requests Public Comments on Info Policy

WASHINGTON, D.C. — The U.S. Office of Management and Budget (OMB) has requested public comments to help it revise current federal information management policies and develop a comprehensive policy document.

The OMB project, the agency said, was undertaken to "establish government-wide policies which enhance the appropriate application of information technology, encourage better management and allocation of technological resources and eliminate unnecessary structural or administrative barriers to more efficient information resources management."

The agency is reviewing existing policy circulars that cover such topics as DP administration and management, computer security, records maintenance, cost recovery and interagency sharing of DP facilities.

OMB also said it is considering broadening the range of its policy directives in its effort to develop a more comprehensive policy statement.

The agency is soliciting comments on a number of topics including: general principles of information resources management, privacy in information gathering and processing, competition with the private sector, DP security, standards, software management, long-range planning and microcomputer technology, end-user computing and office technology.

Comments on these and other topics related to the OMB policy project should be submitted by Nov. 14 to J. Timothy Sprehe, Office of Information and Regulatory Affairs, Room 3235, New Executive Office Bldg., Office of Management and Budget, Washington, D.C. 20503.

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Users Group To Donate Licenses

COLLEGE PARK, Md. — The Mumps Users Group has announced a program to donate licenses for the use of Mumps computer languages in colleges and universities.

According to Dr. Ruth E. Dayhoff, chairwoman of the Mumps Users Group, the licenses, provided by six vendors of Mumps-based systems, will be awarded on the basis of proposals to use Mumps for educational and research purposes as well as on the qualifications of the applying institutions.

A grants panel created by the organization's executive committee will review the proposals.

"Our objectives are to set the stage for the next generation of Mumps users and to give the language a more assertive presence in the pre-professional student world," Dayhoff said. Each participating institution will be expected to produce reports suitable for publication describing the projects being undertaken, Dayhoff said.

The vendors in the program are: Data Tree, Inc.; Digital Equipment Corp.; Harris Corp.; Intersystems, Inc.; Micronetics, Inc.; and Vista Computer Co.

Institutions interested in participating in the Mumps licensing program should send their proposals and qualifications to Ruth Dayhoff, Chairwoman; Mumps Users Group, Suite 308, 4321 Hartwick Road, College Park, Md. 20740.

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Wiley Speaks on AT&T Breakup Via Audio Link

By Jim Bartimo
CW Staff

SAN DIEGO — Although detained by a late-breaking development in Washington, D.C., Richard Wiley — a former head of the Federal Communications Commission (FCC) and senior partner of a Washington law firm — still managed to address International Data Corp.'s 1983 Fall Executive Conference here last week in absentia.

Through an audio conference linkup, Wiley, who is with the firm of Wiley, Johnson & Rein, spoke about the Jan. 1 breakup of AT&T. His comments were in tune with the conference's theme, "Business Communications: Challenges for the 80s."

"I'm not saying AT&T likes the breakup," Wiley said, "but if they had to have divestiture, this one left them in a good position. The company is now in a position to be a major player in the communications game beyond the local loop."

In the unusual keynote address format, Wiley also expressed his feelings on the following divestiture issues:

● On the Bell operating companies — "The [Bell operating companies] have a difficult road ahead. We're going to see a lot of effort made to free them up from the regulation the divestiture has placed on them."

● On costs — "We're going to see some real negative reaction to the higher local costs, the complex billing structure and the lack of good services. Congress will blame the FCC for this."

● On state regulation of the Bell operating companies — "It's unfortunate to see states limiting bypass [of the operating companies' local loop]. While bypass will definitely hurt the [Bell operating companies], it is still the implementation of a new technology. The technologies are there, and the government has said it wants to see this type of competition."

● On other carriers such as MCI Communications Corp. and Sprint — "These companies will have a more limited access [to the long-distance telephone network] than AT&T," Wiley claimed. "If these companies are forced to raise their rates and AT&T's are lowered, the question will be 'Why go with the other carriers and dial all those extra digits?'

"There's a real problem here. We brought you all this [divestiture] to bring competition to the telecommunications industry. We don't want to go back to a monopoly."

Wiley also suggested that all the complexity of divestiture and the confusion that will inevitably follow might have best been avoided by never bringing AT&T to court.

"The lawyers and the consultants will benefit the most from this change," he said, adding that it is probably too late to turn back now.

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Exec: Users to Monitor AT&T After Breakup

By Jim Bartimo
CW Staff

SAN DIEGO — Because the Federal Communications Commission (FCC) will not regulate AT&T and the U.S. Congress will probably not legislate heavily against the company after divestiture, the responsibility of monitoring AT&T will be left to the users, according to Alan Pearce, president of Information Age Economics, Inc. and editor of the "Telecom Insider" newsletter.

"The onus of making the change from monopoly to competition lies with us, the users," Pearce said, "and I pray to God we're up to it."

Taking a relatively dim view of the coming divestiture, Pearce made his comments at International Data Corp.'s 1983 Fall Executive Conference held here last week.

Reason for Concern

One reason for his concern about divestiture is the FCC's departure from the regulation business. Due to the laissez-faire attitude of the Reagan administration, the FCC will not be looking out for users' needs, Pearce said.

"In Washington, [D.C.], the referees and the umpires [at the FCC] are going into retirement. Imagine what Sunday's games would have been like without referees and umpires," he explained, using the sports world as an example.

Calling AT&T after divestiture a "down-sized monster," Pearce said the monster would come to market angry and take its anger out on users. This will lead to two trends: Short-haul costs will increase, and long-haul costs will increase, he said.

A more positive trend will be the changing of the long-distance network from mostly analog to mostly digital. "This is a decision that was made early on in the data processing market," Pearce said. The same decision could have come earlier if AT&T had not had such a large installed analog base.

Another trend for users to watch is the bundling of services by AT&T. Although bundling will make it easier for users, the end-to-end service will cost significantly more. "Bundled services will play on your ignorance," Pearce said. "AT&T is going to charge you if you confess your ignorance."

Pearce said that Americans have a fascination for competition that led to the AT&T breakup. "Competition is not all it's cracked up to be. Competition can be nasty . . . and confusing for telecommunications managers," he said.

Booklet Aims At Security For Micros

MADISON, Wis. — Assets Protection Publishing has made available "Microcomputers: A Checklist of Security and Recovery Considerations," which provides a set of questions designed to assist users in establishing a comprehensive protection program for micros.

The publication covers security, application backup, documentation, maintenance and contingency planning and addresses security and recovery considerations for large companies with increasing numbers of microcomputers.

Copies of the publication are available for $1 each from Assets Protection Publishing through P.O. Box 5323, Madison, Wis. 53705.

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September 21, 1983

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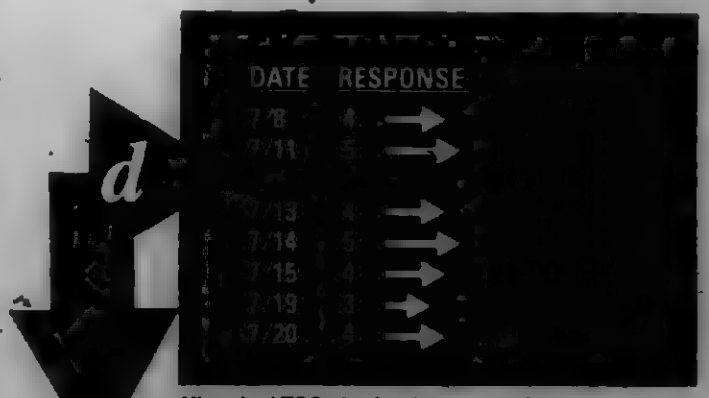
Step 1

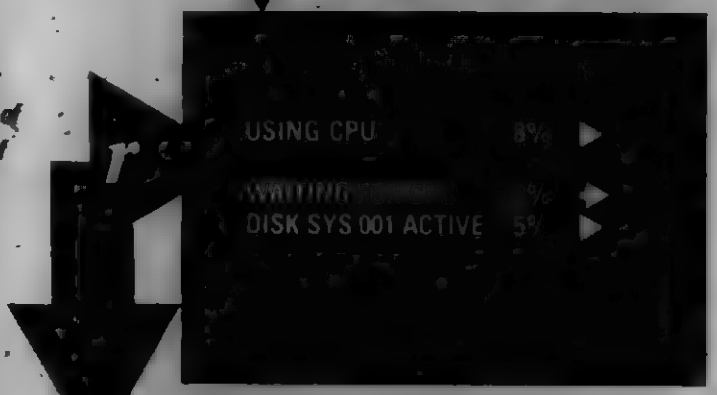
Discover your problems. Ask EPILOG/MVS to plot TSO response times or batch job run times (yesterday, last week, last month) on your CRT. After analyzing the workload for problems, simply place a "d" next to the problem time period and press enter. In this example, July 12 is the problem day.



Historical TSO plot for the month of July

Step 2

The result is a display of degradation reasons for that time period. Now you know the major causes of poor response. In this case, paging caused 60% of response time problems. But what is causing the degradation? Place an "r" on the problem line and press enter.



Detailed analysis of TSO response time for July 12

Step 3

EPILOG/MVS will automatically bring you the information needed to help analyze degradation for that time of day. In this example, Step 3 shows an analysis of paging activity where a paging device has contention from another system.

Use EPILOG/MVS for monitoring: trends, capacity, TSO response time problems, batch job run times, effect of changing hardware, and effects of making tuning changes. It's as easy as 1-2-3.

Analysis for paging on July 12

The examples depicted represent only a portion of the product's full capabilities.

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A-197

International Report

FROM THE CW INTERNATIONAL NEWS NETWORK

FRANCE

PARIS — France's two leading electronics companies, Compagnie Generale d'Electricite (CGE) and Thomson-Brandt, announced they will pool their resources in order to avoid competition, curb losses, increase imports and help keep France out in front with high technology. This move marks the first major restructuring in the electronics industry since it became nationalized after the election of Francois Mitterand. After an exchange of company assets, CGE will become France's premiere telecommunications manufacturer, and Thomson will concentrate on consumer and military electronic components.

PARIS — Thomson-Brandt unveiled a fully digital private switching system called the Opus 4000 here during Sicob. Based on the Motorola, Inc. 68000 microprocessor, the voice and data system reportedly features multifunction business terminals (called Communicators) and a digital switch that reportedly enables regular telephone wire to handle voice, data, text and images. The Communicator is an integrated multiservice communications system with a capacity of up to 4,000 lines and can reportedly integrate heterogeneous networks such as telephone, data processing, office automation and telex networks.

Thomson contended that the business communications market is growing at over 18% a year and is aiming its product at U.S. OEM contracts. Thomson added that 40% of its $2 million in annual sales comes from export markets.

PARIS — Norsk Data A.S., the Norwegian vendor of the 32-bit ND-500 family of superminicomputers, unveiled a new high-end model here at Sicob. The Model ND-570/CXA boasts capabilities of 3.4 million instructions per second, according to the vendor. The basic ND-570/CXA system configuration, priced at $300,000, consists of one ND-500 CPU, one ND-100 CPU, a multiuser operating system, a floppy disk, a system console and 2.25M bytes of main memory. The system is also said to run on the Unix operating system.

JAPAN

TOKYO — Apple Computer Japan, Inc. will market its Lisa microcomputer product family in Japan in October. Nasaya Fukushima, president of Apple's Japanese subsidiary, said Lisa will appeal to the Japanese office environment, especially after Kanji character processing capabilities are added.

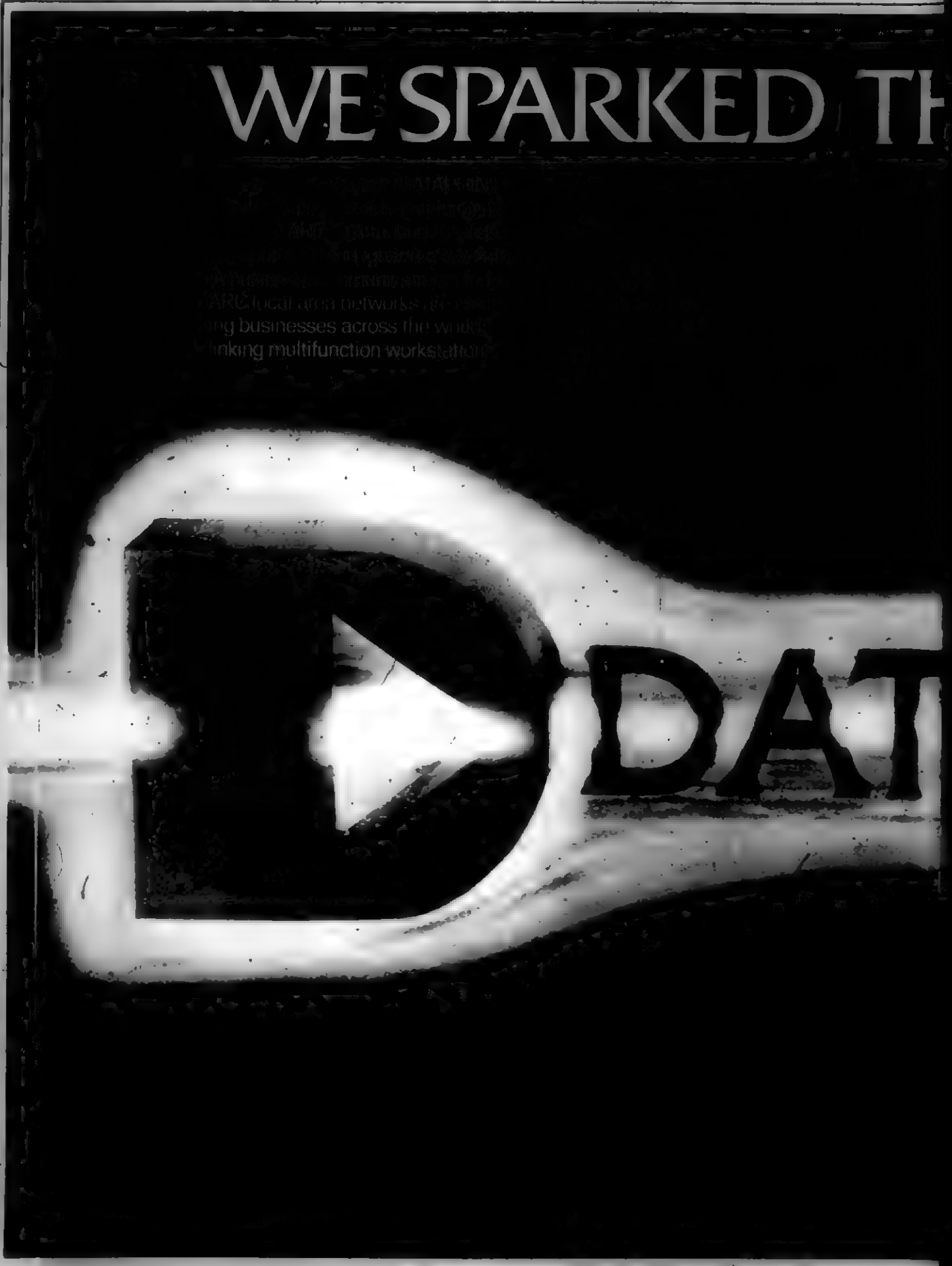
TOKYO — Digital Equipment Corp. Japan has developed a Japanese version of the VAX/VMS operating system software for the company's VAX-11 family of 32-bit superminicomputers. At the same time, DEC Japan has unveiled Japanese word processing software, Japanese electronic mail and a Japanese editor.

OSAKA — Sharp Corp. has introduced a line of television receivers equipped with 8-bit integrated microprocessors. Called Micomputer TVC1, the product line includes a 14-in. screen model ($423) and a 19-in. screen version ($660). With the aid of a basic five-function key box, the user can perform graphics, message exchange and tap educational and game applications as well, the vendor claimed.

TOKYO — Toshiba Corp. has unveiled a thermal color printer designed to operate with TN-5400 personal computers. The product reportedly features seven colors at speeds of one page/min. Pricing on the TN-5400 starts at $4,000, Toshiba said.

MEXICO

MEXICO CITY — To assist in the development of a more nationalized computer industry, representatives from several private comput-



International Report

FROM THE CW INTERNATIONAL NEWS NETWORK

er companies here demanded that Mexican government contracts for DP equipment be limited to those offered by Mexican firms. "Adequate legislation should be promoted to force the federal government to publish their requirements for acquisitions of computer goods and services far enough in advance so that Mexican firms might be able to complete them in time," Ing. Sergio Ferragut of Cullinet International stated.

PUEBLA — A data base of metal workers and engineers has been established here by the Bureau of Subcontracting, an agency that represents about 250 Mexican contracting firms. A spokesman stated that the bureau will manage information on its members and try to match them with the needs of subcontractors in Mexico.

SWEDEN

STOCKHOLM — "Never before has there been so much interest in a programming language as there has been in Ada," claimed Lennar Manson, a research engineer at Sweden's military research center. Ada is going to be used in battle-control equipment ordered by the Swedish Air Force, according to the State Defense Materials Authority. According to Manson, who is one of the founders of the Ada Society in Sweden, the Swedish State Telephone Co., Ericsson Information Systems and Swedish Philips are all in the process of starting Ada projects. Industry sources claim the Institute of Technology at Land University is itching to start teaching Ada.

STOCKHOLM — The Swedish Data Vulnerability Board recently announced a training program designed to identify data security risks and improve data security in both Swedish commercial enterprises and government agencies. "It is impossible to determine the extent of data spying in Sweden; the victims are as silent in Sweden as in other countries. "Nobody wants to say how bad he is at security work," a spokesman said. The new program, SBA-Metoden, consists of written and audiovisual material that reportedly enables managers to evaluate and identify quickly their security risks and requirements. The program costs approximately $160 and is available from the Swedish Vulnerability Board at Datainspektionen, Box 12050, 102 22 Stockholm, Sweden.

STOCKHOLM — "We must put an end to private copying" was the battle cry sounded by big Swedish software houses and the Swedish organization for suppliers of computer and office equipment, LKD, during a recent software forum here. Iwan Bratt of LKD estimated that roughly $10 million worth of revenues are lost each year due to illegal copying. "The serious problem is not so much 'buddy copying' of games between youngsters, but theft of expensive professional programs," Bratt maintained. To help combat private copying, LKD has established a special legal department and is closely cooperating with Sweden's major software companies in order to track their anticopying efforts. Swedish legislation has not kept up with the technical developments very well, Bratt said, and few, if any, cases of illegal copying have been brought to court.

WEST GERMANY

RUESSELSHEIM — A radical group calling itself "Rote Zellen" used explosives last week to blow up of one of Germany's major machine factories, Maschinenfabrik Augsburg-Nuernberg AG (MAN), leveling the data center of the manufacturer. Damage is estimated at $7.4 million. The group claimed responsibility for the act in a letter stating that MAN was building transport vehicles designed for Pershing II rockets, due to arrive in the federal Republic of West Germany this fall.

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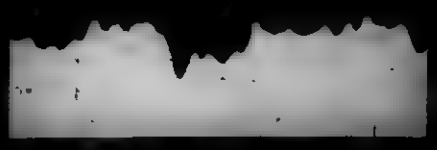

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Australia's Tax Break Plan Gets Warm Reception

International Report

By Alan Power
Australasian CW

CROWS NEST, Australia — The Australian federal government's high-technology investment incentive tax scheme, which was approved by cabinet Sept. 16, has been warmly received by both the computer industry and the finance sector, although there is some concern that the scope of the scheme may be too broad.

The concern is that areas such as agriculture, fishing, forestry, architectural surveying and engineering consultant services, which are included in the scheme, may not be relevant to high-technology development and may erode the venture capital opportunities open to other specific industries.

However, the Minister for Science and Technology, Barry Jones, defended the plan by saying the government had followed the proposal committee's recommendations to the letter, and these areas had been included in the recommendations.

Under the plan, the government will forego about $18 million in tax revenue by giving investors in high-technology industries a 100% tax deduction on their investments. According to Jones, the total funds available for investment in the current fiscal year will amount to $39 million if all investment comes from the corporate sector.

Investments in high-technology companies will be from licensed management and investment companies which will be administered by a management and investment company licensing board.

Companies eligible for venture capital under the scheme will operate in the following fields: manufacturing, agriculture, fishing, forestry, postal, telephone, telegraph or teleprinter communications production, architectural surveying, consultant engineering, education/training and scientific services, computer software, data processing services and biotechnology.

"The point is that in terms of the 24 nations in the OECD [Organization for Economic Cooperation and Development], we rank 23rd in high-technology production. Time is running out for us; we have got to move very quickly," Jones declared.

The general opinion of the finance sector was that the scheme was a positive step forward not only in fostering the development of high technology in Australia, but also in creating an indigenous venture capital market.

Harold Tilley, the general manager of Business Loans and Equity Capital Ltd., a joint venture between Westpac Banking Corp. and UK banking interests, said that while there were reservations about the breadth of the scheme, it is a positive encouragement to Australian high-technology development.

Power is the managing director of Australasian Computerworld.

Bank School Set for Oct. 8

WASHINGTON, D.C. — The American Bankers Association (ABA) has announced that space is still available for the 1983 Trust Management School, Oct. 8-14, at Northwestern University in Evanston, Ill.

The week-long program will concentrate on general management concepts and specific trust management skills for banking executives. The 1983 program theme is strategic planning.

The cost is $1,950, which includes tuition, room, meals, program materials and school-related activities. Information is available from Victoria L. Street, ABA, 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

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It is an asynchronous terminal that can also be configured to operate in IBM 3270 and other sophisticated computer environments. This flexibility gives users high speed access to a full range of corporate and public data bases.

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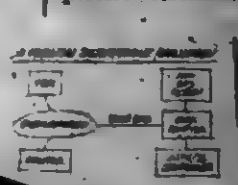

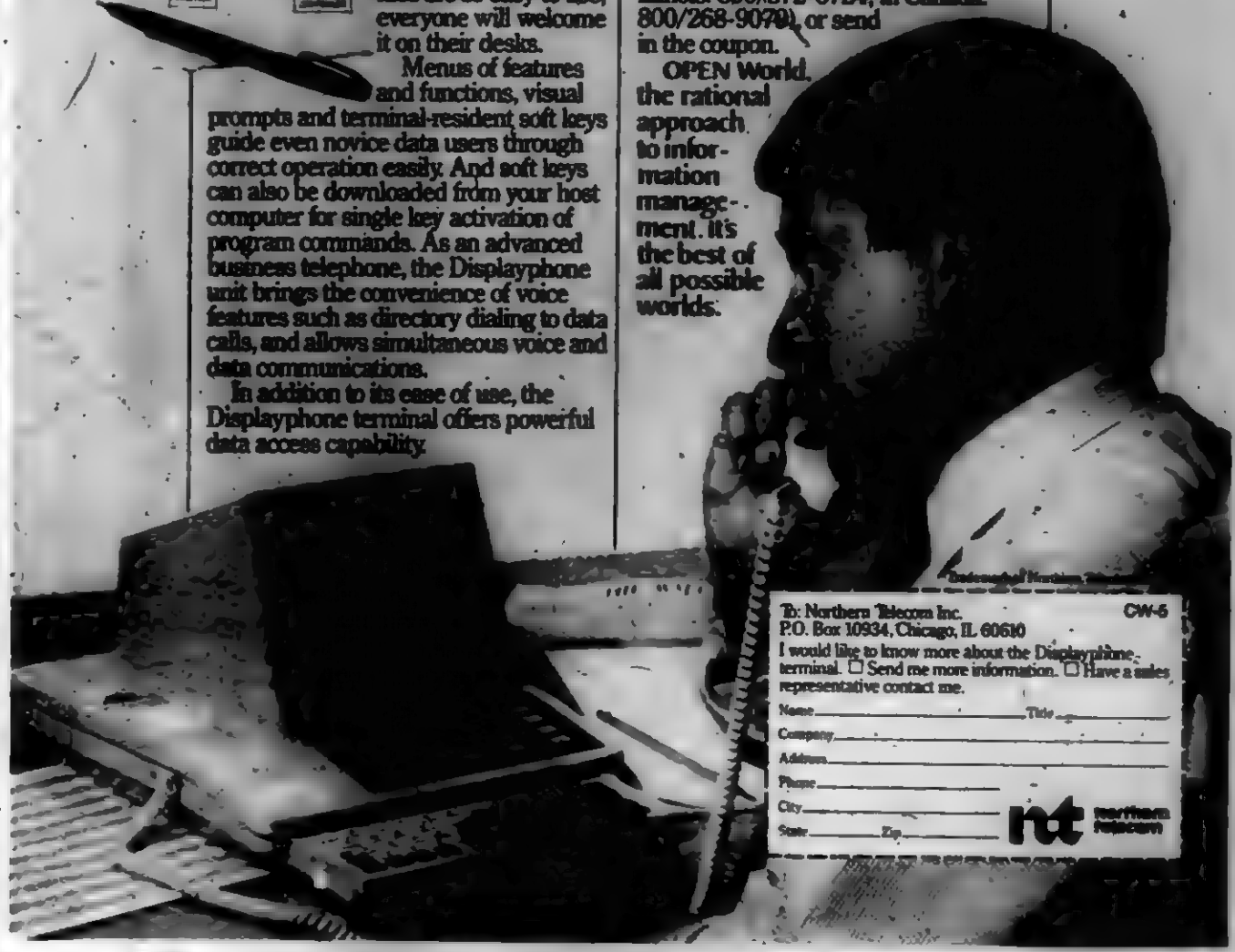

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Processor Glitch Interrupts Service to 18,500

By David Myers
CW New York Bureau

FREMONT, Calif. — A breakdown in a single electronic connector drove the Pacific Telephone Co.'s central processors insane earlier this month, leaving 18,500 phone users here without service for three-quarters of an hour.

John Vautier, control and analysis supervisor for Pacific Telephone, said the breakdown caused a plug-in circuit pack to "blitz" the entire phone system, wiping out "a certain percentage" of computer memory.

"It blitzed the central processors and wouldn't shut up. It kept putting out garbage. It made the central controller more or less insane," Vautier explained.

As a result, the computer's Western Electric 32K-byte ferrite-core memory device forgot phone numbers that had been changed or added to the system in the last 2½ weeks.

Phone company technicians had to erase the rest of the computer's temporary "call-store" memory and feed the phone numbers back into the system from floppy disks where the recent service changes had been recorded, Vautier said. The whole process took 15 hours.

The crisis started late in the afternoon on a hot day in this San Francisco Bay Area city.

Fremont's city hall, police department, libraries and emergency center all lost phone service.

Anyone trying to use his phone heard "a gong-like sound, like a cable slapping against a flagstaff, while in the background there was a singsong of many numbers being dialed at once but no one answering," *The Oakland Tribune* quoted one phone user as saying.

Ken Dunham, spokesman for the phone company, originally blamed the outage on temperatures that hit 84 degrees that day. Later Dunham said the heat had been "discounted" as a possible cause for the computer's lapse in memory.

But Vautier told *Computerworld* that heat might in fact have caused the problem.

"It cannot be ruled out. We know circuit packs are sensitive to heat, and though the temperature that day was well within their operating limits, the cooler in the building was driving temperatures up and down all day. My feeling is that rapid changes may be more harmful than a rapid heat increase," Vautier said.

Whatever the reason for the failure, however, Pacific Telephone is taking steps to prevent its computer from forgetting any more phone numbers.

Vautier said the phone company is going to "a newer type processor" with on- and off-line disk files and memory residing in several locations.

The new processor is also manufactured by Western Electric, but the disk drives are made by Burroughs Corp., Vautier said.

"Divestiture gave us the chance to look at equipment from other manufacturers. Now all the [Bell] operating companies are looking for the best dollar value. We aren't necessarily locked into one manufacturer any more," Vautier said.

Video Packages From Deltak Eye Communications

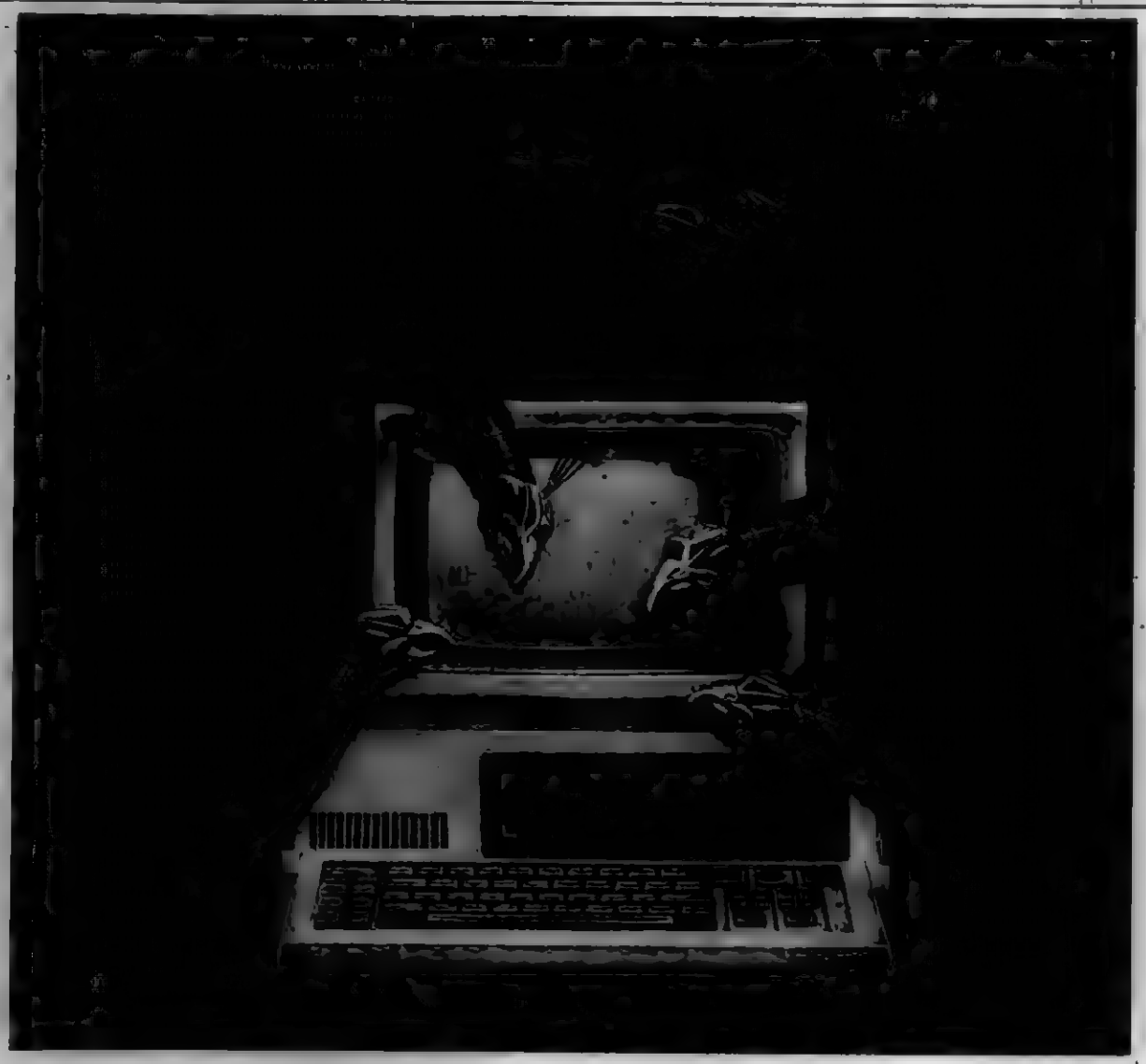
NAPERVILLE, Ill. — Deltak, Inc. has made available two videotape conference journals containing edited highlights from speeches given by experts and policymakers in the communications industry at the fifth annual Communication Networks Conference held earlier this year in New Orleans.

The packages, produced by CW Communications, Inc. of Framingham, Mass., are said to provide industry information for executives and communications professionals who were unable to attend the conference. Each videotape in both series runs about 30 minutes and is said to be intended for busy executives and group presentations.

"Communication Networks: Alternatives for the '80s," Series 7CW-D99, features excerpts from speeches given by Federal Communications Commission Chairman Mark Fowler, former American Bell, Inc. President Archie McGill and Dr. Dixon Doll on topics such as short-haul microwave, private branch exchange technology, communications processors and satellite technology. The series is made up of five color video sessions.

In four video sessions, "Local-Area Networks: The Major Considerations," Series 7CW-E99, offers excerpts from the speeches of data communications pioneer Dr. John McQuillan, Diana Last, Dr. Kenneth Thurber and Dr. Howard Frank. The sessions focus on the capabilities and architecture of local-area network communications and the baseband vs. broadband debate, including how to choose the best systems for needs, flow control and diagnostic network monitoring.

The packages can be purchased or rented through Deltak's flexible Deltavision Library Plan. Purchase price is $150 per videotape or $600 for the series from Deltak, East/West Technological Center, 1751 W. Diehl Road, Naperville, Ill. 60566.



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In Providing Information for Lodging

Hotel System to Assist '84 World's Fair Attendees

NEW ORLEANS — If your heart is set on visiting the 1984 World's Fair and you discover that your favorite hotel is already booked solid, relax. You'll have plenty of help finding alternative lodging with the aid of a $400,000 computerized hotel referral system donated by Qantel Corp. of Hayward, Calif.

According to William Chernish, president of Qantel distributor Sunbelt Business Computers, Inc. based here, the computerized referral system was actually donated to the University of New Orleans' School of Hotel, Restaurant and Tourism Management, which has made the system available for use during the fair.

With the help of representatives from the Greater New Orleans Hotel-Motel Association, the Greater New Orleans Tourist and Convention Commission and the Louisiana Hotel-Motel Association, students from the school will operate the system, which was designed to give callers a wealth of information, including hotel availability for specific dates, a rating of each hotel and the hotel's address and telephone number.

Heart of the System

At the heart of the computerized referral system is Qantel's System 64 minicomputer equipped with a streaming tape drive, a 400M-byte disk drive and 10 Qantel VT 3 terminals. The System 64 will operate under the company's Hospitality and Leisure software package, which was designed for use in the hotel industry.

Chernish said the referral system will be tied to the fair's main information center using the company's Bestnet local-area network system. The system has been installed in a building adjacent to the fair site on the banks of the Mississippi River and is currently undergoing a 30-day shakedown run. Fair officials hope to have the system in use by November.

"It's a very simple system to use, but it's going to be very useful in assisting people who are trying to find accommodations for the fair," Jeffrey Stack, vice-president for marketing for the fair, said.

According to Stack, the Qantel system will only be used as a backup to the hotels' own reservations systems. If a particular hotel is booked, a caller will be given the number of the referral system, which will then direct the caller to alternative lodging.

Operators of the computerized referral system will not make reservations for callers and will not accept any money for hotel bookings. Organizers hope to avoid the problems that plagued the Knoxville, Tenn., World's Fair hotel reservations system — problems that led to millions of dollars in lawsuits from irate visitors.

"The Knoxville system resulted in massive lawsuits," Stack said. "They just simply overpromised. We are in the business of running a fair, not making hotel reservations. This system is designed simply to give visitors a source of information."

Organizers of the fair, which will revolve around the theme "Rivers of the World: Fresh Water as a Source of Life," expect approximately 11 million visitors to attend the event here, which will feature pavilions from 25 countries, eight major corporations and a number of states. Stack said that among the attractions will be pavilions highlighting space, transportation, flight and the world of high technology. The fair will run from May 12 through Nov. 11.

JCIT to Meet In Jerusalem May 21-25

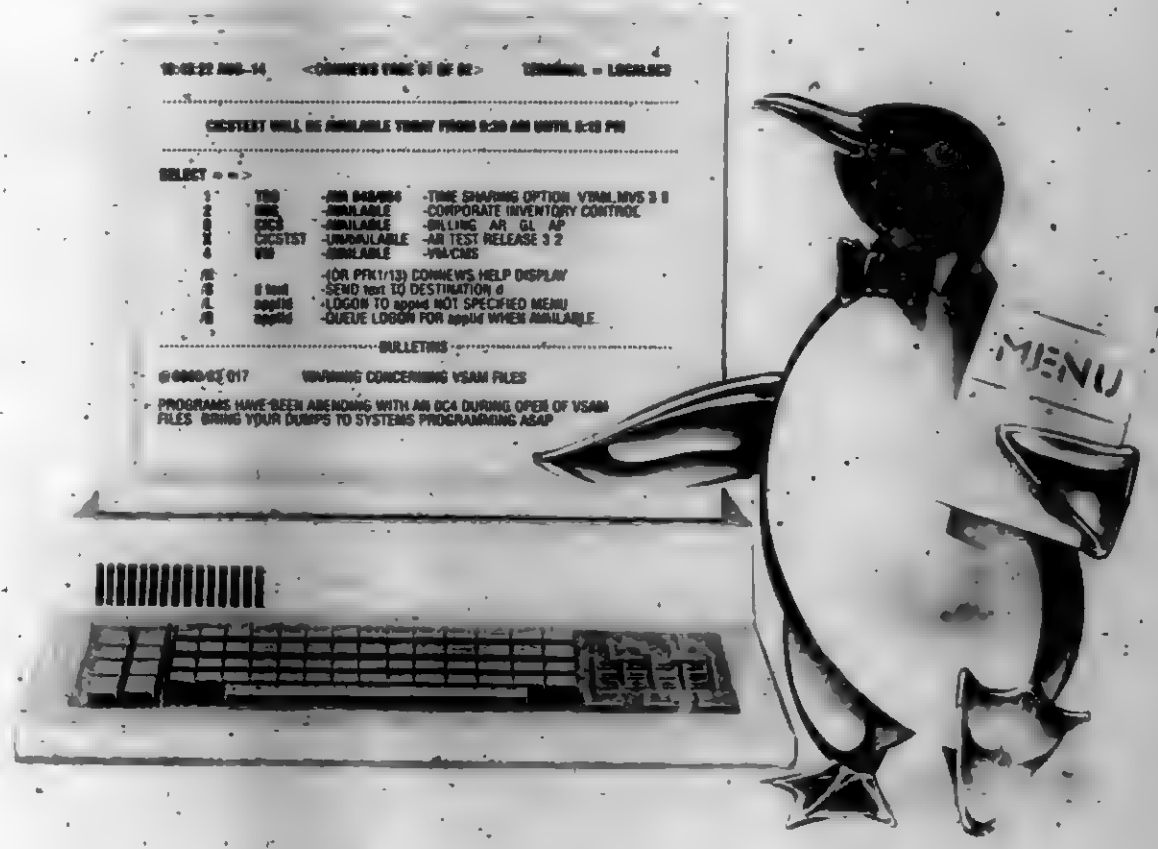
SILVER SPRING, Md. — The Fourth Jerusalem Conference on Information Technology (JCIT) will be held at the Jerusalem Hilton in Israel from May 21-25.

Sponsored by the Information Processing Association of Israel and the Institute of Electrical and Electronics Engineers, in cooperation with the Association for Computing Machinery, JCIT will cover a broad range of topics on computer technology and applications and explore the economics and management of the information industry, with an emphasis on software engineering and manufacturing.

The technical program will consist of papers by prominent invited speakers, submitted papers, panel discussion, workshops and exhibitions.

Registration fees prior to May 1 are as follows: participants are charged $200; senior executives are charged $200; students are charged $100; and accompanying persons are charged $100. After May 1, fees are: participant, $225; senior executive, $225; student, $115; accompanying person, $115.

Further information is available from JCIT-4 through P.O. Box 639, Silver Spring, Md. 20901.



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2. Millennium has common functions across all applications.

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3. All Millennium systems are real-time, on-line.

Working in the borderless environment, you perform routine file maintenance on the spot as you cross from system to system. You can update fields, records or any other information in your files instantly. There's no waiting for batch processing. You get accurate, up-to-

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Call for Papers

OFFICE EQUIPMENT EXPOSITION/OFFICE INFORMATION SYSTEMS CONFERENCE (Coee/OIS), Rose, Ill. June 19-21, 1984.

Papers are sought for presentation in the technical program at the eighth annual Coee/OIS. The OIS conference will augment Coee, a comprehensive exhibition encompassing computers, software and peripherals, office information systems, word processing systems, data and telecommunications, office furnishings and other related products.

Abstracts are solicited in the following or related subject areas: new developments and applications of software business operations, communications, networking, data base management, word processing and interconnection of computers, data base management and systems, distributed data processing, computer systems for small businesses, mainframes, minis, micros and portables, applications and development and graphics.

Abstracts are also needed for the following areas:

Communications/networking: voice, data, video (new development), local-area network, private branch exchange, integration and wideband networks.

Information systems management: designing, planning and implementing, effective information systems for business planning and operations.

Office automation: integrated office automation systems, effectiveness, benefits of office automation, management and administrative support systems, office automation applications and new developments.

Word/information processing centers: new developments, user application case histories and specific task implementation.

Authors are invited to submit 200- to 300-word abstracts of their proposed papers by Nov. 15. Papers will be selected and authors notified on or about Jan. 15. Abstracts should be submitted to Coee/OIS Program Coordinator, Cahners Exposition Group, Cahners Plaza, 1350 E. Tougy Ave., P.O. Box 5060, Des Plaines, Ill. 60018.

THE CUSTOM INTEGRATED CIRCUITS CONFERENCE, Rochester, N.Y., May 21-23, 1984.

Original papers are solicited in the following areas as they relate to custom devices and integrated circuits.

Computer-aided design: device and process modeling, circuit simulation, layout verification, testability and very large-scale integration design aids.

Gate arrays, semicustom and full-custom integrated circuits: trade-offs and design techniques, complementary metallic oxide semiconductors (MOS), N-Channel MOS, bipolar and gate arrays.

Custom analog integrated circuits: smart sensors, imaging arrays, signal processing and transform implementation.

Applications: industrial, automotive, consumer, communications and medical. Designed integrated circuit systems on chip.

Fabrication technologies: silicon and nonsilicon, mixed processes and direct wafer writing.

Interfaces and packaging: voltage/current translators, hybrids and interconnects.

Testing and reliability: design for testability measurement techniques.

Authors are asked to submit 50 copies of a 250-word summary and a 35-word abstract representing original, unpublished work suitable for a 20-minute presentation. Deadline for submission is Dec. 30. Papers received after December 30 will be considered late papers. The author's name, affiliation, complete address and telephone number must appear on the summary. Notice of acceptance will be mailed by Feb. 10. Authors of accepted papers will be required to submit a manuscript by March 16 of up to five pages, including figures, in camera-ready format for publication in the conference proceedings. Late papers received by March 1 will be considered for a 10-minute presentation.

Abstracts and other correspondence should be addressed to Dr. Wesley N. Grant, Technical Program Chairman, Sperry Computer Systems, Sperry Park, P.O. Box 43525 MS Y1181, St. Paul, Minn. 55164.

FIRST ANNUAL ASSOCIATION FOR COMPUTING MACHINERY (ACM) NORTHEAST REGIONAL CONFERENCE: INTEGRATING THE INFORMATION WORK PLACE — THE KEY TO PRODUCTIVITY, Lowell, Mass., March 19-21, 1984.

The conference will concentrate on topics with near-term applicability to both the business and industrial computer environments. Particular emphasis will be placed on how the professional can use the many tools currently available to create a more productive environment.

Papers are sought for the following topics: integrated manufacturing (computer-aided design and manufacturing), artificial intelligence, power personal/professional workstations, office automation, decision support systems, distributed and centralized data base management systems and local and wide-area networks.

Additional information on submitting papers may be obtained from Lloyd Howells, Program Chairman, ACM Northeast Regional Conference, P.O. Box 499, Sharon, Mass. 02067.

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DPMA's Palmer Named Director At NCGA

FAIRFAX, Va. — Edward J. Palmer, executive director of the Data Processing Management Association (DPMA) of Park Ridge, Ill., has been named executive director of the National Computer Graphics Association (NCGA).

Palmer, who will take over the position in October, will be responsible for managing overall planning and programming and will serve as liaison between NCGA's staff and the board of directors and executive committee.

Palmer joined DPMA in 1976. He holds a degree in business administration from Boston University and a certificate in data processing from the Institute for the Certification of Computer Professionals.

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Critical to Successful Data Control

Management of I/O Bottleneck Key, Exec Warns

By Robert Batt
CW West Coast Bureau

SAN FRANCISCO — Managing the I/O bottleneck will be the key to the successful management of data within an organization, the recent IBM Futures Conference here was told.

Gene DeKoster, vice-president of planning and requirements at Storage Technology Corp., said there will be new architectures and more ways of performing I/O functions in the next five years than there have been in the previous quarter century.

"Connectivity to the information base will be critical and will result in control passing away from the data processing center to the users. We have to understand what is happening in the market and to applications to assess correctly our response," he told his audience of DP managers and professionals.

Demanding Answers Now

Users are demanding answers now, he added, and are not willing to wait for the DP department to catch up with its backlog.

"The whole system is under stress. There are 25 million office terminals alone waiting to come onto mainframes. This is going to cause a huge data connectivity problem, and migration is essential both within the DP shop and without," he said.

To be successful in this arena, the former IBM technician continued, companies will need to be vertically integrated. They will have to manage multiple technologies within a system environment.

This will require effective application of innovative technologies, he stressed, including optimized CPU resources, automated handling techniques and increased performance/capacity ratios.

New storage systems must be developed, he added, and new maintenance methodologies defined to include remote maintenance — designing the actual maintenance facility within the storage device.

But DeKoster warned against so-called panaceas. A single device or technology cannot solve the variety of storage systems requirements, he contended, because of the wide spectrum of such requirements.

CW at IBM Futures

"Knowing what data is on what technology at what time and for what purpose and being able to manage those questions is going to be the problem of the future in the storage arena," he said.

DeKoster cautioned against being "carried away" with the potential of device technology, such as thin-film-head technology. Performance, he noted, has not kept pace with increases in capacity. It is the data path, he asserted, where the problems lie and which needs to be fixed, not the devices.

As a result, he continued, innovative new packaging techniques are vital. "Data path is the key, and data management is the solution," he said.

DeKoster also warned against an industry trend toward erasable data. It is a moot issue, he insisted, because the value of data through time can often be enormous. "Information is not changeable. In fact, users do not want to change data; they want to refer to it, and the cost of storing data is the only consideration to be dealt with," he concluded.

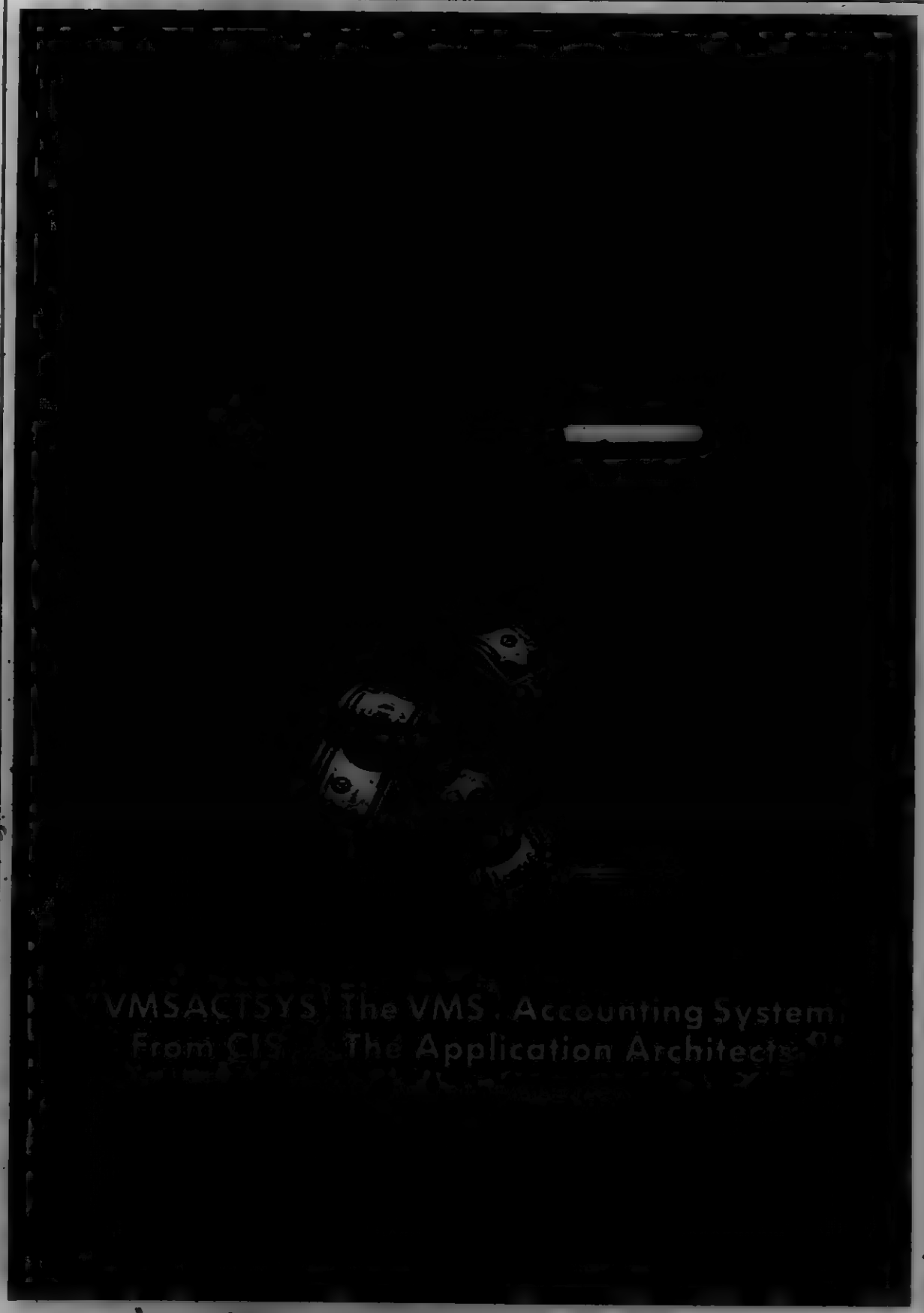
Venator Named To Replace DPMA Director

PARK RIDGE, Ill. — The Data Processing Management Association (DPMA) has announced that John A. Venator, deputy executive director of DPMA, has been named acting executive director following the resignation of DPMA Executive Director Edward J. Palmer.

Venator, who has served DPMA since 1977, became deputy executive director in 1981, adding the duties of that position to his responsibilities as director of marketing and membership programs and services, a DPMA spokesman said.

Edward Palmer, who was DPMA executive director since 1976, is leaving the association to take a similar position in the Virginia area. Palmer has been a member of DPMA since 1961. He had served 24 years in all areas of information processing, operations and administration prior to serving as DPMA executive director from 1976 to 1983, according to the spokesman for DPMA.

Venator will direct a headquarters staff that supports the membership and educational programs of DPMA, which has 32,000 members who are computer management executives in industry, business, education and finance as well as a computer student population of 11,000.



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AI Applied to OA Eases Human Interface: Exec

By Cheryl M. Gelb
CW Staff

PARIS — Making a strong commitment to human-oriented design principles, Japan's Toshiba Corp. has found that "the application of artificial intelligence techniques to office automation systems is currently feasible and improves the human interface."

So said Kenichi Mori, manager of Toshiba's Information Systems Laboratories, at the Ninth World Computer Congress held here recently by the International Federation for Information Processing (Ifip).

In the past, Mori told a large audience eager for news of Japanese advances in OA, engineers have endorsed a "machine-oriented design principle with the objective of enhancing machine efficiency.

But, Mori asked, "can engineers continue to design new machines using old machine-oriented techniques?" The answer is clearly "no" if automated office systems are "to be of simple use and as helpful as possible for all levels of office workers, from executive managers and professionals to clerical and secretarial staff."

The solution thus lies in a commitment to a human-oriented design principle which has as its objective the enhancement of human efficiency, Mori said. The result of this approach is a product whose size and shape is fit for human environments. Commands to the machine are made in "human communication media," including "voice characters and graphics," according to Mori. Moreover, the machine can be used by an unskilled operator.

"The ideal machine," Mori added, "should allow the worker in an office to communicate with the machine in natural forms of human communication."

With this creation of office systems that ease the human interface, Toshiba has also developed four systems by applying AI techniques. The four systems include a word processor capable of converting Kana (Japanese) to Kanji (Chinese), a voice activated word processor, an optical character recognition (OCR) system that reads hand-printed Japanese characters and a line-drawing interpretation system that converts hand-drawn graphics into printed output.

Using AI Advances

Toshiba was able to develop these systems, Meri pointed out, "because the field of artificial intelligence is providing advanced techniques. The primary feature of this advance is the use of knowledge-based assistance to recognize and understand" the forms of human communication that are "natural" or relatively unsophisticated.

Before discussing the development of Japanese word processors, Mori reminded his audience that the Japanese language consists of both Kanji and Kana characters. Typically, more than 3,000 Kanji and 50 Kana characters are used in everyday business communications. "The abundance of Kanji characters," Mori said, "has impeded the introduction of office automation systems" in Japan.

While Kana can be used exclusively, the resulting document is often awkwardly worded. Toshiba developed both a Kana-to-Kanji translation technique and a true Japanese word processor that contains a 30,000-word dictionary and permits input at 50 to 120 char./min.

"Now, for the first time in Japan, typing is faster than handwriting," Mori quipped.

To extend OA systems to managers and others unfamiliar with key operators, Toshiba next developed a voice-activated word processor. The user speaks slowly into the machine which "comprehends" the syllables and then converts the speech into Kana. A microprocessor containing the knowledge base then translates the Kana into Kanji.

'Not So Fast'

This input speed of the voice-activated word processor is 100 syllables per minute — "not so fast," Mori admitted — however, with the application of the knowledge base, it recognized 30,000 words and is 99.8% accurate.

Toshiba has also developed an OCR system that recognizes hand-printed characters. This accomplishment is notable, Mori said, because the structure of Japanese characters — of which 3,000 are in common use — is very complex, and many characters clearly resemble other characters.

Toshiba's OCR machine reads 50 hand-printed char./sec and is generally 95% accurate; however, with the application of the knowledge base, the machine is 99.6% accurate, Mori reported.

The fourth AI-based OA system developed by Toshiba is the hand-written, line-drawing interpretation system. This converts hand-written graphics, such as charts, into machine output. The user can predefine 200 symbols, Mori noted.

"These examples represent the leading edge of technology in the direction of friendly interface man-machine systems," Mori concluded, adding, however, that much work remains to be done in natural language processing, continuous speech understanding and knowledge-based systems.

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IN 1984 THE ENTIRE SOFTWARE WORLD WILL TURN ITS ATTENTION TO ONE INTERNATIONAL EVENT

Merger of Needs Cited as Key to Data Base Use

By Paul Gillin
CW Staff

PARIS — Important barriers need to be broken down before artificial intelligence and other high-powered applications of data bases can be made practical. That was the consensus of two data base experts who discussed "Data Models and Knowledge Representation" at the recent International Federation of Information Processing (Ifip '83) Conference held here.

"It's become quite apparent that if we are going to reduce the cost of using computers we have to make it easier for people to design and use data bases," asserted Antonio Furtado, a professor at Pontifica Universidade Catolica in Rio De Janeiro. But to do that we first have to come to some sort of agreement between the different interests of those who use the data base, he said.

Furtado said that efforts to standardize data base architectures have typically centered on very different needs. "Those that emphasized efficiency [such as network and hierarchical models] were based on navigation," Furtado added. "However, these models have been criticized on semantic grounds. People felt that those data models are too close to physical files and not close enough to reality."

Efforts to fill the gap between physical files and reality have evolved into a two-stage process, he said. The data model is typically close to the physical files, but ways to create an "information model" that is helpful to the user have stirred controversy.

Some solutions such as order logic and abstract data types have been criticized for straying too far away from artificial intelligence applications, while interfaces like semantic networks and frames and scripts are considered too close to artificial intelligence.

"There is some pressure toward creating better data models," Furtado said. These include nonconventional techniques like text, speech and image interfaces as well as time dimension stored facts and inferential data bases, active systems, decision-support-like systems with data base components and expert systems.

Furtado would not recommend which method was best but said the fundamental question was how to satisfy the three major interest groups that are involved.

Designers, Implementors, Users

On the other hand, designers want to see semantic complexities and are concerned with what he called "expressive power." Implementors are concerned with machine complexities and generally want to improve efficiency. Users, however, do not want any complexity. Their first priority is simplicity, he said.

"Each of these guys should see the data base as they want to see it," he said. Until these conflicts are resolved, "it may be too soon to have very large data bases with knowledge-based techniques," he said.

Without offering a specific solution, Furtado recommended that simplicity is the criterion to attack first. The data dictionary is a good abbreviated frame of reference from which users could work. "Since this is much smaller, it is perhaps the place to start to help users use the data base more efficiently," he recommended.

Programming in its current form is totally unsuited to knowledge-based systems concepts, stated Carl Hewitt, a professor at MIT. Hewitt argued that data base management systems (DBMS) will actually play a very small role in the future of knowledge-based systems because their logical programming structure is inherently unsuited to the task. DBMS designers have focused too much on how systems are currently implemented rather than on how they should be implemented, he said.

Logic's Limitations

Praising Socratic Logic as "a marvelous achievement," he nevertheless stated that it has implicit limitations in programming. Those who are working toward knowledge-based systems should first try to understand those constraints, he said. "All state-of-the-art data base designers should take a compulsory course in logic and realize a lot of the things they're missing," he said.

Logic was defined to describe things, whereas knowledge systems are intended to "take action," Hewitt said. Logic is inherently inconsistent while logic programming strives for consistency.

To be effective, knowledge-based systems need to tolerate that inconsistency, he said.

"In most current DBMS, if you can't say something is not true then you can't say anything about it at all," he said. "As a result, standard semantics are not good for empirical knowledge."

The move toward open, distributed systems requires a structure that accommodates inconsistencies between the systems, which logic programming does not, Hewitt said. "Logic implementation and quantification are not suitable for this open, knowledgeable environment," he said. "We need a whole new logic structure to optimize the uses of logic in data management."

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Calendar

Week of Oct. 23

Oct. 24, Washington, D.C. — **Telephone Bypass Technologies and Economics.** Contact: Frances A. Gatz, Telestrategies, Suite 102, 6842 Elmm St., McLean, Va. 22101.

Oct. 24-26, Amsterdam — **The Second Annual Comdex/Europe.** Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

Oct. 24-26, Boston — **Local-Area Networks: Equipment and Systems.** Contact: Architecture Technology Corp., P.O. Box 24344, Minneapolis, Minn. 55424. Also being held Oct. 27-28 in Orlando, Fla.

Oct. 24-28, Orlando, Fla. — **Structured Analysis and System Specification Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Oct. 24-28, Chicago — **Auditing in the Contemporary Computer Environment.** Contact: Marge Umlor, EDP Auditors Foundation, 373 S. Schmale Road, Carol Stream, Ill. 60187.

Oct. 24-28, Cleveland — **Structured Systems Development.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Oct. 24-28, New York — **Structured Analysis for Microprocessors.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Oct. 24-28, Cleveland — **CICS/VS Command-Level Coding.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Oct. 25, Los Angeles — **The Role of Facility Management.** Contact: Ms. Jinx Andrews, Facility Management Institute, 3971 S. Research Park Drive, Ann Arbor, Mich. 48104.

Oct. 25-26, Cary, N.C. — **Enhancing SAS Technical Support Skills.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Oct. 25-26, New York — **1984 Impact of Divestiture on Users and Vendors.** Contact: Marilyn Chasteen, The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

Oct. 25-26, New York — **IBM CICS/VS Systems Design Concepts.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Oct. 25-26, Washington, D.C. — **Telephone Bypass Strategies in Response to Access Charge Tariffs and Legislation.** Contact: Frances A. Gatz, Telestrategies, Suite 102, 6842 Elmm St., McLean, Va. 22101.

Oct. 25-27, Dallas — **The Second Qualtest Conference and Exposition.** Contact: James Bram, American Society for Quality Control, 230 W. Wells St., Milwaukee, Wis. 53203.

Oct. 25-27, New York — **Data Communication Concepts.** Contact: Suzzane Galliart, Memorex Customer Education, 3393 Octavius Drive, M/S 03-16, Santa Clara, Calif. 95051.

Oct. 25-27, Los Angeles — **SAS Processing Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Oct. 25-27, New York — **SAS Basics Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Oct. 25-28, Los Angeles — **Data Base Management Systems: Mini, Micro and Distributed Applications.** Contact: Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405.

Oct. 25-28, San Diego — **Designing with 16-Bit Micros.** Contact: Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405.

Oct. 25-28, San Francisco — **The 19th Meeting of the Computer Performance Evaluation Users Group '83.** Contact: Institute of Computer Sciences and Technology, U.S. Department of Commerce, National Bureau of Standards, Washington, D.C. 20234.

Oct. 25-28, Boston — **Programming in C: A Hands-On Workshop.** Contact: Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405.

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Managers on the Move

HENRY E. MORELLI has been appointed to the position of vice-president, management information systems (MIS), for Datapoint Corp. in San Antonio, Texas. In this position, he will provide a centralized focus for Datapoint's internal management information systems. He will be responsible for reorganizing all the decentralized MIS activities within the company, setting new direction for systems development and integrating that plan with operational information systems.

Prior to joining Datapoint, Morelli spent eight years with Racal-Milgo, Inc. in Miami, where he was director of the MIS group. Prior to that, he held various information systems management positions with IBM and Informatics, Inc.

A graduate of Pace University with BBA and MBA degrees, he has also completed additional courses in information management.

• • •

BILL ELWOOD has been appointed to the position of vice-president of information systems at T.G. & Y, located in Oklahoma City. In his new position, he will be responsible for the information systems division. Elwood has the additional responsibilities of researching new technological advancements, developing strategic plans and interfacing with the systems steering committee, made up of T.G. & Y senior management.

Before joining T.G. & Y., Elwood worked for Target Stores as director of management information systems for eight years and as a senior financial analyst for three years. He was also a consultant with Touche Ross and Co. for two years. He also served as exchange officer with the U.S. Navy.

Elwood earned a bachelor of science degree in business administration and an MBA from the University of Minnesota.

• • •

CASEY L. PERRIMAN has been promoted to vice-president in the Systems Planning & Architecture Department at Union Bank's Southern California Service Center.

She has been with the bank since 1979, and her most recent position was that of systems manager. Perriman holds a bachelor of arts degree in computer science from the State University of New York.

(Continued on Page 45)

Casey Perriman

Bill Elwood

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Managers on the Move

(Continued from Page 44)

MICHAEL L. LACH has joined Allergan Pharmaceuticals as director of management information systems in Irvine, Calif. In this capacity, Lach will be responsible for all data and word processing functions within the organization.

Before joining Allergan, he served in a variety of management positions at Carter Hawley Hale Stores, where he was director of systems development as well as manager of technical support and computer operations for all divisions.

Prior to Carter Hawley Hale, Lach was district manager, systems software, for Pacific Northwest Bell Telephone Co.

Lach has a B.A. degree from St. Mary College in Winona, Minn., and a master's degree from the U.S. International University in San Diego.

• • •

WAYNE F. SMITH has been named manager of information systems and resources for Towlift, located in Cleveland. In his new position, he will be responsible for computer equipment and operations, systems and programming, credit area and collections, office equipment procurement in all stores and special projects.

Prior to his promotion, he served at Huntington Bank (Union Commerce) as manager of systems research and planning. From 1978 to 1981, he was the assistant vice-president of information services for Euclid National Bank. From 1977 to 1978 he was a project manager for the Computer Services Co. Smith is a graduate of Baldwin-Wallace College.

SHIRLEY ANN STOUGH has joined Quantum Corp. as a communications manager. In her new position, she will be responsible for public relations, advertising, trade shows and promotions.

She comes to Quantum from the Strayton Corp., where she served as a California branch manager.

Prior to that, she was corporate communications manager for General Automation, Inc. in Anaheim, Calif. She also worked as regional sales manager for *Production Magazine* and in marketing communications for NCR Data Pathing Systems Divisions.

• • •

The Daily News has appointed BRIAN F. CRYNES to the post of director of management information systems in New York City.

Crynes, a computer systems expert with broad technical and management experience, will be responsible for the operations of computer and communication systems that are used at *The Daily News*.

Before joining *The Daily News*, he was a senior manager in the management advisory services department in the New York office of Price Waterhouse & Co.

He graduated from the University of Scranton in 1968 and obtained a master's in business administration and finance from the same school in 1972.

• • •

MICHAEL J. BILOTTI has been named senior vice-president, systems and technical services, for Zayre Corp. in Framingham, Mass.

In his new position, he will be responsible for computer systems development, the telecommunications network and technical systems support.

He graduated from the University of Syracuse with a B.S. in electrical engineering; he has also done post-graduate work at Northeastern University.

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EDITORIAL

The Right Stuff

The Michigan Supreme Court judgment affirming the difference between custom and canned software for sales tax purposes is an enlightened view that other states would do well to adopt.

At a time when the federal government is carefully rationing financial aid to the states, states are actively seeking new sources of revenue to replenish their treasuries, and the burgeoning software industry has become a likely target.

This is not to say that the explosive growth in sales of both custom and prewritten software should not become contributory factors in the states' annual budget balancing acts. But sales taxes seem clearly to be the wrong vehicle, at least where custom software is concerned.

The issue that was before the Michigan courts is similar to cases pending in courts elsewhere, namely, the tangibility of software. "Tangibility" implies substance, and sales taxes, as a general rule, apply to substantive things — clothing, machinery, books and food in some cases.

Few reasonable people will dispute the tangibility of game software and canned programs for small computers. These programs can be found in book outlets, department stores and other retail establishments and, from the outside, are indistinguishable from music tapes, records and so on. The user takes them home, inserts them into his machine, and they do what they're supposed to do without any modification from the user. Their value, intrinsic and otherwise, is contained on the tape or disk.

Indeed, only one state — Texas — exempts even game software from sales taxes. Most states agree on the tangibility and, therefore, taxability of all prewritten software.

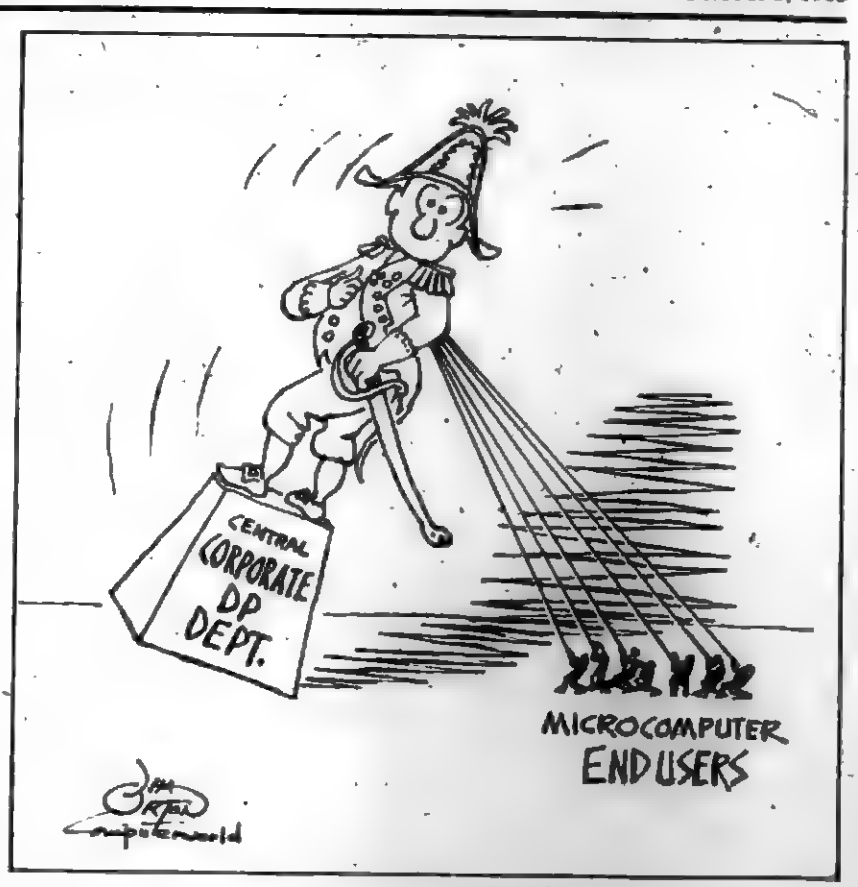
It is the custom programs, written largely for mainframes and whose value usually extends far beyond the tapes on which they are written, that are in question. And it is the users of these programs that have initiated the suits contesting state laws taxing custom software, because it is the users who ultimately pay the 3% to 7% sales taxes.

One extreme in the custom software case is given by Ohio, which taxes everything from custom programs to routine maintenance to consultation to time-sharing services. Clearly, most of these items are services, even though the services rendered are made manifest at some point as magnetic impressions on a computer tape.

But is the service of a consultant or contract programmer working in a mainframe environment so different from that performed by a lawyer or accountant, whose services are not subject to sales taxes? Is a modified application program any different from a will in this regard?

The point is that Ohio, Massachusetts and over a dozen other states that tax custom software apply the tax to what is actually a service, to a good measure. In most states, this is clearly not the spirit of sales taxes.

In fairness, states that wish to tax custom programs should either tax similar professional services or apply a special tax to custom software whose value is, in great part, derived from intangibles. To cushion the blow to users and vendors, these same states might consider some creative use for software-derived taxes, such as earmarking the proceeds for aid to computer education.



LETTERS

Measures DP Knowledge

The editorial "Stop Dangling Carrots" [CW, Sept. 5] seems to have been written by someone with an embittered attitude toward the DP industry due to his own lack of merit badges, certificates or education.

I passed the Certificate in Data Processing (CDP) exam this year and wonder if the people who condemn or talk down the exam have actually taken it and if they have, if they passed it.

I hold two degrees, and my DP experience stems from being a computer operator, programmer and, at the present time, a systems analyst.

I did not take the CDP exam to "inflate a resume" or for a "gold star." I believe the exam measures one's basic DP knowledge and can point out areas in which a person might be weak.

Any company that would hire or promote a DP individual merely on the basis of having a CDP would be making a serious mistake. Hiring or promotions should never be based on one particular aspect of a person's credentials, but on a variety, such as experience, ability and education.

The idea behind the CDP and any test for that matter is not to "instill professionalism," but to test basic knowledge. Professionalism cannot be instilled, but is a prerequisite for taking the exam.

Those that pass the CDP exam have a certificate only; being a professional is another matter entirely.

Chris A. Wolfe
Systems Analyst
Cuyahoga Falls, Ohio

Reconsider Your Position

Ten years have passed, and *Computerworld* editorials continue the myopic narrow-mindedness characteristic of a prejudiced position.

Not that I object to *Computerworld* having an opinion, mind you, but rather that it is willing to exercise its considerable editorial power to foster a position apparently based on a stubborn, preconceived conclusion rather than on reality.

Computerworld speaks of reason in its editorial on DP certification "Stop Dangling Carrots" [CW, Sept.5]. What reason does the editorial reveal?

What I see are simplifications, misconceptions and clear misinformation. One would expect simplifications from bigots and misconceptions from poor research and scant knowledge; but misinformation from a responsible publisher is unacceptable.

Computerworld clearly has the power of the media forum, and I suspect it feels responsible. My earlier comments ought to concern *Computerworld* and to prompt investigation of its position in a responsible manner. The ethics of responsible reporting in a free society demand no less.

Should *Computerworld* take this challenge seriously, it may come to a better understanding of what "professional" means and what the Institute for Certification of Computer Professionals (ICCP) represents than is displayed in the editorial.

I, as a past president of ICCP and a current member of the board of directors, can promise *Computerworld* the opportunity for frank discussions and review of the issues.

A good idea dies hard, even when oppressed by a hostile, powerful press. In 10 years, *Computerworld* has not killed it. Isn't it about time to ask why?

There's a great story here. Maybe *Computerworld* ought to be the one to tell it.

G. Gary Casper
Director
Sysorex Institute
Cupertino, Calif.

LECHT ON SCIENCE /Charles P. Lecht

A 100G-Flops Processor: The Sixth Generation

This is the second of a three-part series on supercomputer development in the U.S.

In the first part of this series concerning the National Security Agency/Los Alamos National Laboratory Conference (NSA/LANL) on the frontiers of supercomputing (Los Alamos, N.M., Aug. 15-19, 1983), I offered my impressions of the general conference environment: its sponsors, speakers, attendees and facilities [CW: Sept. 19]. I paid my compliments to the conference and its organizers, and those compliments were sincerely meant. I also observed, although I did not elaborate at the time, that there was much accomplished at this extraordinary convocation, and I alluded, not entirely in sport, to "Year One of the Federation," harking back to the governance of galaxies that was the tacit theme of the now legendary *Star Trek* television series.

But regular readers of this column will surely have noted that there were things I did not say — for example, that the only turbulence at the NSA/LANL conference was that caused by the ceaseless tossing of bouquets and blowing of kisses across the vast spaces of the J. Robert Oppenheimer Study Center by all the experts gathered there. That's because the give-and-take did involve a measurable degree of snarling and contentiousness, along with the exchange of reasoned dialogue and politesses.

The usual self-interested groups made their appearances, right on schedule. And what some individuals saw fit to remark about others, and vice versa, surely confounded cruelty with candor. In other words, it was a nonorchestrated meeting of real people.

'The conference served to reveal to some, and reconfirm to others, just how important our need is to create systems of devices of one billion floating point operations per second (gigaflops) capacities, that is, supercomputers, and how failure to do so would constitute the most grievous of errors. The kinds and magnitude of calculations required to pursue America's scientific research and development would simply be impossible without such systems.'

Divergent Views

While the conference can certainly be described as having been united by a common interest — supercomputers — it was a bit startling to witness so many divergent views on key issues and even, on occasion, to hear them expressed with passion — regarding, for example, how many supercomputers we need, when, of what power and by whom they should be paid for.

Nonetheless, the very presence of so many serious and successful scientists at the conference surely betrayed a greater commonality of goals than they might have cared publicly to own up to — idealism and patriotism often make scientists blush. Consider all this in light of the fact that it was the first meeting of its kind, and you will have to concede that it is a wonder anything of value could have come out of it.

So what, then, did? For one thing, the conference served to reveal to some, and reconfirm to others, just how important our need is to create systems of devices of one billion floating point operations per second (gigaflops) capacities, that is, supercomputers, and how failure to do so would constitute the most grievous of errors. The kinds and magnitude of calculations required to pursue America's scientific research and development would simply be impossible without such systems.

Internationally, our trade objectives would be seriously undermined; our leadership in nuclear, space, genetic, economic and other critical fields cannot be maintained by scientists using less powerful systems than those available to their colleagues abroad. And it does not require limitless imagination to see that the existence of a massive, supercomputational leviathan in even the smallest country could rapidly turn that country into a significant economic power, with little more to sell than the ideational derivations of that power.

A Few Vials of Nasty Germs

As if these were not in themselves compelling enough reasons, I call your attention to the fact that the size of a nation's territory or population is becoming increasingly irrelevant insofar as its status as a world military power is concerned. A few atomic bombs with matching suitcases, a few vials of nasty germs and the perseverance to distribute their contents in an attention-arresting way are all that modern reality requires. This represents a dramatic shift away from the tenets of conventional wisdom we have heretofore always applied in defining/perceiving strategic power. It is my opinion that a few gigaflop systems in foreign laboratories will dramatically alter our perceptions of what constitutes military might. For modern weaponry, surveillance techniques and the like depend upon supercomputers for their development, in the first place, and, ultimately, for their use as well (as in the case of applied laser technologies, for example).

The meeting also exposed great weaknesses in America's supercomputer efforts. At the head of the list was a sorry lack of imagination regarding possible applications of su-

(Continued on Page 48)

HUMAN CONNECTION /Jack Stone

This Country Needs a Good Portable Micro

There's no problem with stuffing a portable computer into the trunk of your car and whisking it across the Texas border into the soft-textured lands of sunny Mexico, assuming that the gendarmes will tolerate its passage. But dragging it into John F. Kennedy Airport and cramming it under a seat on a 747 jet is an altogether different matter.

There is no way I would make it past the security check what with the hulk and bulk of my machine, even without the printer.

Yet I was determined to haul along some sort of word processing capability on my forthcoming trip to the British Isles. I suppose it's because I'm hooked on the facility — a WP junkie, as it were — believing that keyboarding somehow gives life to my otherwise listless expressions. And I find myself terribly given to speech, perhaps as a sort of psychological carthasis.

My friends have remarked as to how wonderful it is that I can give vent to my verbosity through the medium of a machine rather than inflicting my rushing words on them.

So I began trudging around in the footsteps of those many thousands of weary buyers who are trying to figure out what make and model of portable machine to buy.

'I was determined to haul along some sort of word processing capability on my forthcoming trip to the British Isles. I suppose it's because I'm hooked on the facility — a WP junkie, as it were — believing that keyboarding somehow gives life to my otherwise listless expressions. And I find myself terribly given to speech, perhaps as a sort of psychological carthasis.'

In store after store, I presented my needs: "Portability is paramount. I should be able to stow it aboard a commercial airliner. It should be no more than 5 pounds, but I'll settle for 10. Word processing software should be very simple. I want a tube that I can see without a telescope. I can do without a print capability on the road, as long as the machine will drive the printer from my current system when I get back home."

I looked at a computer from Osborne Computer Corp. (at the time, the sales personnel were not pushing the machine too hard, for reasons that have recently become painfully clear), a system from Kaypro, Inc. and Otrona Corp.'s Attache, but they were all too heavy.

I turned to the battery-operated "laps" and found that only Radio Shack's TRS-100 had a word processing feature and that was a built-in read-only memory (ROM) package.

I quickly imagined myself pounding away at its keyboard and unraveling some mystery of computer life, while driving along a mountainous road somewhere in the Scottish Highlands.

At first blush, the TRS-100 looked awfully good, what with its weighing in at four pounds. Also, it provides a cute little file manager, again ROM-based, with a simple search function.

The machine sports a built-in modem, but I have no practical use for this feature, other than as an item for discussion at a cocktail party. And, sure enough, there was an RS-232 serial interface for my printer peeking out of its backside.

I trundled the printer over to the local Radio Shack, all 36 pounds of it, just to make doubly certain that there was no connection problem.

I'll Never Know

Well, I'll never know if there is one because the salesman didn't have the slightest idea about what controls to use to drive the printer. As he struggled to find them, I looked over the operating manual and discovered, much to my dismay, that Tandy apparently released the machine, or at least the word processing function, only partially completed.

It's easy enough to enter text, and the editing features are nifty, but there are no print format capabilities other than line width selection and an option to print either a screen or the entire file. Reluctantly, I was forced to abandon the notion of a lap.

The solution to my needs? For the time being, I'm going peripheral instead of mainframe, and analog at that. I'm taking a two-pound audio tape recorder, a remote microphone and a mess of cassettes that I'll transcribe and pump into my machine when I return.

The Sixth Generation

. . (Continued from Page 47)

percomputer technology. It was this dearth of imagination that inspired some of the ludicrously low estimates of how many supercomputers could practically be employed in this country (or elsewhere) that we heard. Not surprisingly, this led to a pitch for government subsidies for supercomputer development.

Although I agree that there is legitimate reason to support such subsidies, I could not agree with the estimates made at the conference of how many supercomputers might be needed; and I was genuinely flabbergasted by the paucity and unoriginality of the ideas proposed for applying the powers of these machines. You would think there was no commercial marketplace at all and that beyond doing incredibly fast arithmetic, the systems were utterly useless.

True, architectures other than those found in our current supercomputers are needed if their application to the commercial sector is to be widened; but these are already known. The beautiful promise of our emerging integrated services digital network technology to distribute the powers engendered by computer systems everywhere, like telephone service, is predicated upon the availability of ever faster and larger capacity systems than those currently in existence.

Need I do more than cite the fantastic commercial rewards implicit in holographic projection to make my case? Or the widespread availability of artificial intelligence (while we're waiting for the real stuff to mature)?

'Commercial applications of supercomputer systems rival those found for fuel . . . We learned that we don't need the goad of recent Japanese successes in electronics any more than we need the technological triumphs of Germany or France or any other nation to motivate us to continue our supercomputer efforts. . . . Our requirement for supercomputers is a far larger issue than our perceived need to beat the pants off any single foreign country. Our competition is with all of them.'

The possible commercial applications of supercomputer systems rival those found for fuel (of all sorts), and their impact on our future lives will be no less. And we learned that we don't need the goad of recent Japanese successes in electronics any more than we need the technological triumphs of Germany or France or any other nation to motivate us to continue our supercomputer efforts. The requirement — our requirement — for supercomputers is a far larger issue than our perceived need to beat the pants off any single foreign country. Our competition is with all of them.

I left Los Alamos with the uneasy feeling that our identification of Japan as the country to beat in the world computer marketplace is unhealthful. For if we really believe that they learned everything they know from us and are now beating us at our own game, then it must be terribly demoralizing to those American scientists who were the classmates of today's successful Japanese scientific leadership to feel that they (the Americans) have been adjudged de facto retardates in its playing.

I, for one, do not subscribe to this insulting opinion. We must protect our scientific community from such unwarranted, and surely unintended, slurs. That Japan accounts for less than 3% of the world computer systems marketplace, whereas American manufacturers effectively dominate it, more nearly embodies the truth of the issue.

We've beaten the pants off the Japanese computer industry — and it was our scientists who did it. That is not to say that we cannot improve, or that others are not improving, making it safe for us to rest on our laurels. To avoid the dangers inherent in such resting, someone must enunciate a national goal for American computer science achievement, like a 100G-Flops processor. Call it the sixth generation, and let's get on with it.

Lecht is chairman of Lecht Sciences, Inc.; a New York-based think tank specializing in computer and communications technologies.

LETTERS

Training Pays Off

Larry Long's Turnaround Time column [CW, Sept. 5] really hit home.

I have worked in two DP shops over nearly three years and have received no formal training in either place. What I did learn from one DP position didn't transfer well to the next job.

Experience in one organization on one system can be totally unlike the experience in another organization on a different system. Thus, whether one's talking about entry-level or experienced DPers, it is absolutely essential that DP shops give employees adequate training. This doesn't mean just tossing them manuals. It means hands-on training, mixed with in-house classes, professional seminars and membership of employees in professional organizations.

The uncertainty of trying to work on something and not knowing what you're doing is frustrating, not to mention inefficient.

To expect ready-trained employees either from other DP shops or colleges is totally unrealistic. To be willing to expend nothing on training for fear the employee will seek greener pastures is a self-fulfilling prophesy.

Karen L. Edwards
Nelson Division
TRW
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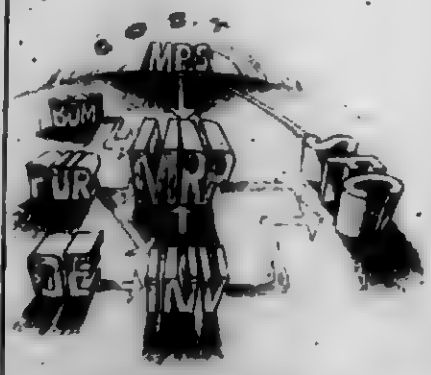

Seminars on Cullinet's Manufacturing System, and their entire line of software products, will be held in the following cities during the coming weeks.

Baltimore, MD	Oct. 12
Denver, CO	Oct. 11
Detroit, MI	Nov. 3
Edmonton, ALTA	Oct. 13
Harrisburg, PA	Nov. 22
Meadowlands, NJ	Nov. 30
Phoenix, AZ	Oct. 12
Pittsburgh, PA	Nov. 1
Raleigh, NC	Oct. 13
Regina, SASK	Nov. 15
San Jose, CA	Oct. 18
Tampa, FL	Nov. 29
Tulsa, OK	Oct. 11
Valley Forge, PA	Dec. 1
Vancouver, BC	Nov. 30
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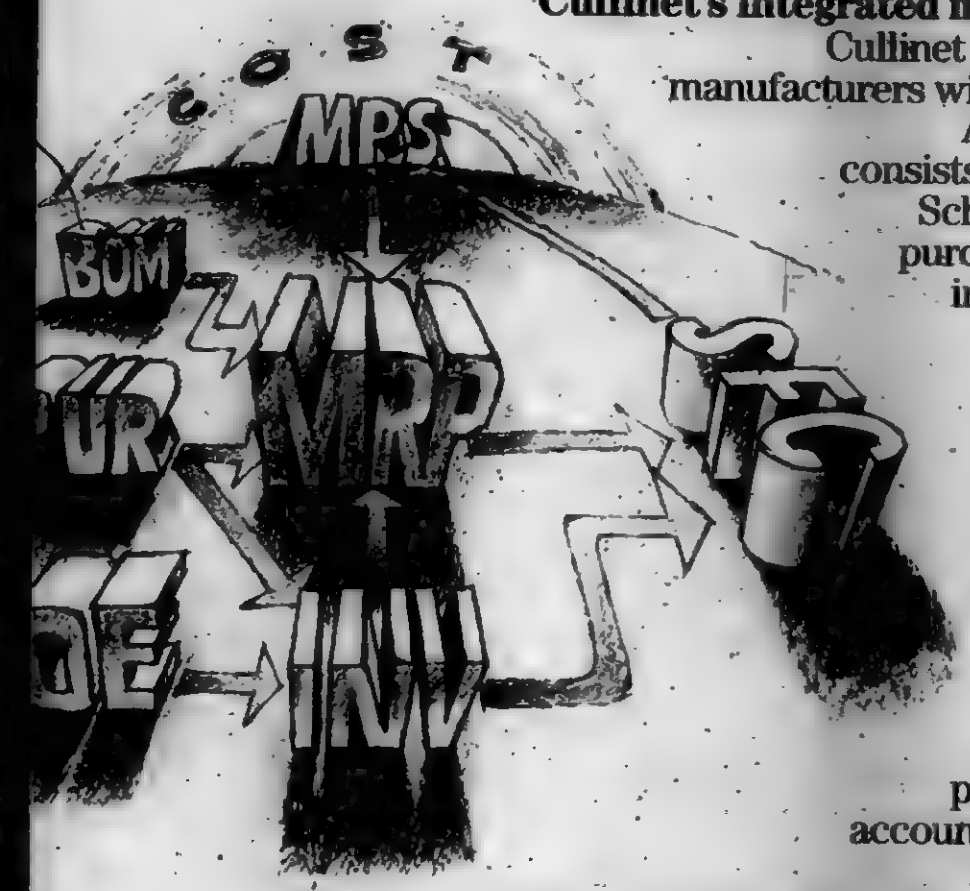

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For more information or to attend a seminar on Cullinet's Manufacturing Software, see the page adjacent.

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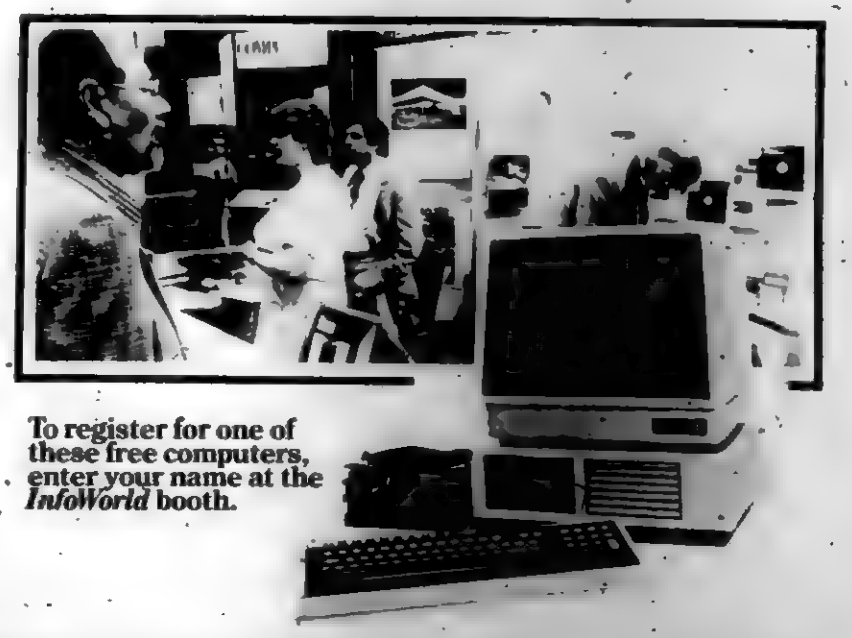

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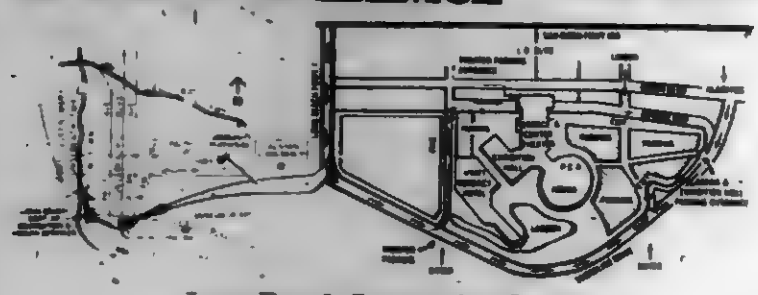

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OS CICS Users Get 'Umax,' Utilization Monitor

MCLEAN, Va. — Johnson Systems, Inc. has released Version 3.1 of the CICS Utilization Monitor and Chargeback System (Umax) for OS CICS users.

The latest version of Umax, a data collection and reporting tool, offers full support for OS CICS/VS Release 1.6 and 1.5, independent real CPU time and paging statistics data collection and security enhancements to permit users to screen Umax transactions and prevent unauthorized execution, Johnson said.

In addition, the system provides virtual storage constraint relief through individual file and program-level collection techniques, as well as a file-nesting level indicator.

The cost of the OS Umax system is $6,000 from Johnson Systems at 8300 Greensboro Drive, McLean, Va. 22102.

Production Control Involves Complex Weave

By Layne Bradley
Special to CW‡

One area within the data center that is receiving much attention with regard to productivity issues is automated scheduling and production control. The production control environment involves an extremely complex group of interrelated tasks and responsibilities such as data entry, job preparation, work load scheduling, abend recovery and resolution and reports production and distribution.

In production control raw input is processed through several workstations into a deliverable product for the customer. Thus there are many labor-intensive, repetitive activities involved. The productivity issues address two aspects:

- How can the activities be automated to increase work flow through the system?
- How can the activities be combined or eliminated in such a way as to reduce the number of people required to run the system?

In a production environment there are several work areas through which work must flow. Thus, one function which production control systems must perform is to track work through these various workstations. Mere tracking is not sufficient, however. The system must provide information on a real-time basis.

Each workstation has different requirements. For example, in a data entry work area the primary concern is receipt and logging of input data, preparation of the data and transmission of data in some manner. A production control system should be able to provide rapid information, such as the arrival time of data, the time data was prepared for transmission and the volume of data that has been received.

In addition, an automated system should provide some preemptive control. If, for example, input data is scheduled to be submitted by the user at a certain time and isn't, the production control system should automatically and immediately alert appropriate personnel.

Activities in the job-setup workstation typically involve making temporary changes to job control language, rearranging job or step sequences, inserting necessary parameter information or adding instructive comments.

The automated production control system should "remember" all the tasks required for a particular job. It should allow requirements to be defined ahead of time and then automatically inform the opera-

(Continued on Page 56)

Application Development Tools Serve Gcos-Based Large Systems

PHOENIX — Honeywell, Inc. has announced five application development facilities for its Gcos-based large-scale systems. These products are designed to enhance programmer productivity by providing new language processors, forms options, program generators and testing models, the company said.

These five products are the first to be acquired by Honeywell's program of externally sourced products for bringing third-party software to a Honeywell large-scale environment. They include the Transaction Screen Management (TSM) system, Transaction Application Test System (Tats), System-80 automatic program generator, the Softool set of programming tools and the C programming language. All five facilities operate on Honeywell's DPS 88, DPS 8 or DPS 66 large computers under Gcos Release 4JS3 or Gcos 8 Releases 2000 and 2300.

The TSM system is designed to aid terminal-independent program design of online applications programs in the DM-IV transaction processing environment. According to Honeywell, TSM relieves the programmer from coding network-dependent information such as forms control data for terminals and security control mechanisms.

TSM comprises a set of DM-IV transaction processing programs, a supporting IDS/II data base and a set of Cobol-74 batch utility programs. The system requires at least one Honeywell VIP 7800 terminal for operation and also will support the VIP 7700 and terminal systems with VIP emulation capabilities.

TSM is available for a one-time license

(Continued on Page 56)

'Calc/1' Spreadsheet Upgraded

SAN FRANCISCO — H & A Computer Products, Inc. has announced an enhanced version of the IBM Calc/1 electronic spreadsheet originally introduced in August of 1982.

The Calc/1 is modeled on the more popular spreadsheet programs available for personal computers. It is designed for IBM EDX Series/1 processors with 4978/79 or 3101 terminals.

The enhanced Calc/1 now provides a "virtual" spreadsheet allowing a 254-row by 63-col work sheet to be processed within Calc/1's minimum 32K-byte memory requirement. The enhanced version of the Calc/1 is priced at $500.

The vendor specializes in software products for EDX Series/1 development, performance measurement and data communications. H & A Computer Products is located at Suite 204, 30 Hoteling Place, San Francisco, Calif. 94111.

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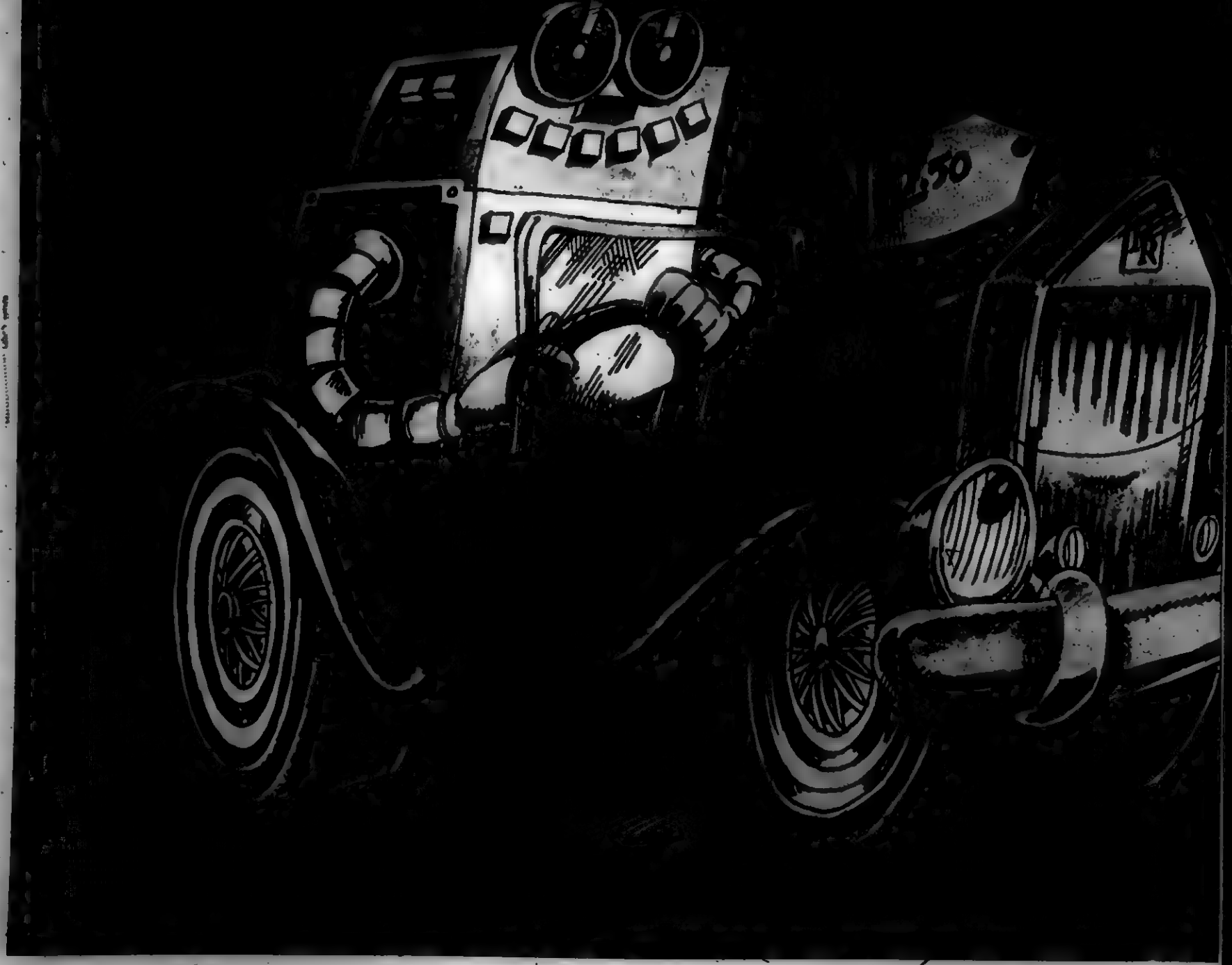
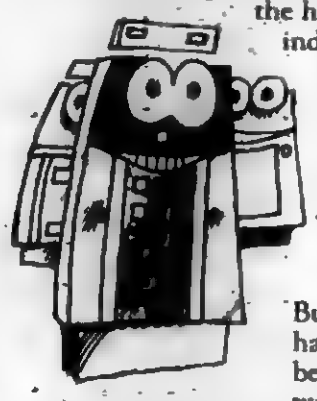
"If the auto industry had done what the computer industry has done in the last 30 years, a Rolls-Royce would cost $2.50 and get 2,000,000 miles per gallon."



Computers aren't just an industry, they're a revolution in the way mankind operates. And no one covers this revolution better than we do!

We are CW Communications/Inc. and despite our youth (only 15 years) we're the world's largest publisher of newspapers and magazines for computer people all over the world.

Most of our publications are weekly newspapers, because so many things happen so rapidly in the computer business (as the headline quote from a prominent industry executive makes so clear). In only thirty years the industry has gone from the development of the giant Eniac system, through the tube-powered, water-cooled Univac I (the world's first business computer), to the incredibly cheap, battery-powered microprocessor.



But as unbelievable as the last 30 years have been, the next 30 will probably be even more incredible. In the next two years alone, the installed power of general purpose computer systems will grow almost as much as it did in the previous 16 years. And the supercomputers of the 90's will transfer data at a rate several hundred times faster than even today's speedy computers! It's hard to remember this is real science, not fiction.

This extraordinary increase in efficiency has led to a rapid expansion in computer use, as human ingenuity finds more and more applications for these powerful tools. So the market for computer products and services has turned out to be more elastic than most observers had thought.

Worldwide expenditures are currently at $90 Billion, and growing by 20% a year.

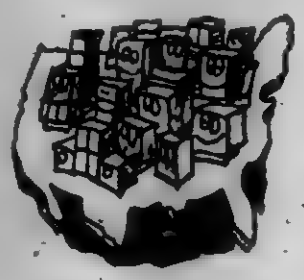
A constant flow of new products; rapid changes in technology; more and more new applications; and large and growing expenditures. It's an industry with a strong need for current, complete and accurate information. Which is where we come in.

Our oldest publication is COMPUTERWORLD, a weekly newspaper with a growing all-paid circulation in excess of 120,000 (quite an increase from our modest 7,500 in 1967).

COMPUTERWORLD serves America's computer users with the consumer-oriented, objective information they need. And it has become America's top business/professional publication, measured by advertising revenue.

ISO WORLD is our semi-monthly publication for retailers, dealers, distributors and other independent sales organizations (ISOs) in the resellers marketplace. This is a relatively new marketplace which has grown up around the minicomputer and microcomputer, and which shows every sign of very rapid growth for at least the next decade.

The latest phenomenon of the computer industry is personal and desk-top computers and we're covering it with our newest publication, INFOWORLD and PC WORLD. INFOWORLD is a weekly newspaper for all micro users and it features complete software and hardwate reviews, while PC WORLD is a monthly magazine devoted to users of the IBM PC and compatibles.



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'Omnicalc' Release Provides Spreadsheet Capabilities

IRVINE, Calif. — Tower Systems, Inc. has announced Release 4 of Omnicalc, which provides users with spreadsheet capabilities while utilizing the power of existing mainframe terminals.

Release 4 features cell formula entry, support for IBM's VM/CMS and TSO, variable cell widths, online print capabilities, support for color and extended attributes, three-dimensional screen display and bar graphs.

The product was designed for IBM's CICS environment. Monthly rental prices begin at $295 from Suite 365, 19782 MacArthur Blvd., Irvine, Calif. 92715.

Designed for Flexibiltiy

Financial Control System Debuts

NEW YORK — Data Design Associates, Inc., a supplier of financial applications software for medium-scale to large computers, has announced the development of a general ledger financial control system that allows corporate end users greater flexibility in tailoring financial data to their needs than any existing software.

According to a vendor spokesman, the new system incorporates English-language user commands, a personal computer interface, online data entry and inquiry and other features aimed at simplifying data base access.

The features are aimed at putting the power of the system in end users' hands.

Installations of the general ledger financial control system will begin the first quarter of 1984 with a base price ranging from $60,000 to $86,000.

More information is available from the vendor at Suite 310, 1250 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Multitask Upgrades 'Libxref'

WEST HARTFORD, Conn. — Multitask, Inc. has announced an enhancement designed to enable its Libxref software tool to load and maintain data dictionaries on IBM mainframes.

The User Report Generation Package (URGP) assists users to populate and keep current data dictionaries, the vendor said. Libxref, a cross-reference and documentation productivity tool, captures all cross-reference data for the dictionary, which can be used to manipulate and scrub data.

The URGP is supplied with reusable source code routines that can be modified to load data into any data dictionary system, Multitask said. It is designed for use in all major IBM mainframe operating systems.

Libxref prices start from $7,000 from Multitask, 1007 Farmington Ave., West Hartford, Conn. 06107.

Payroll Tool Unveiled For Wang VS

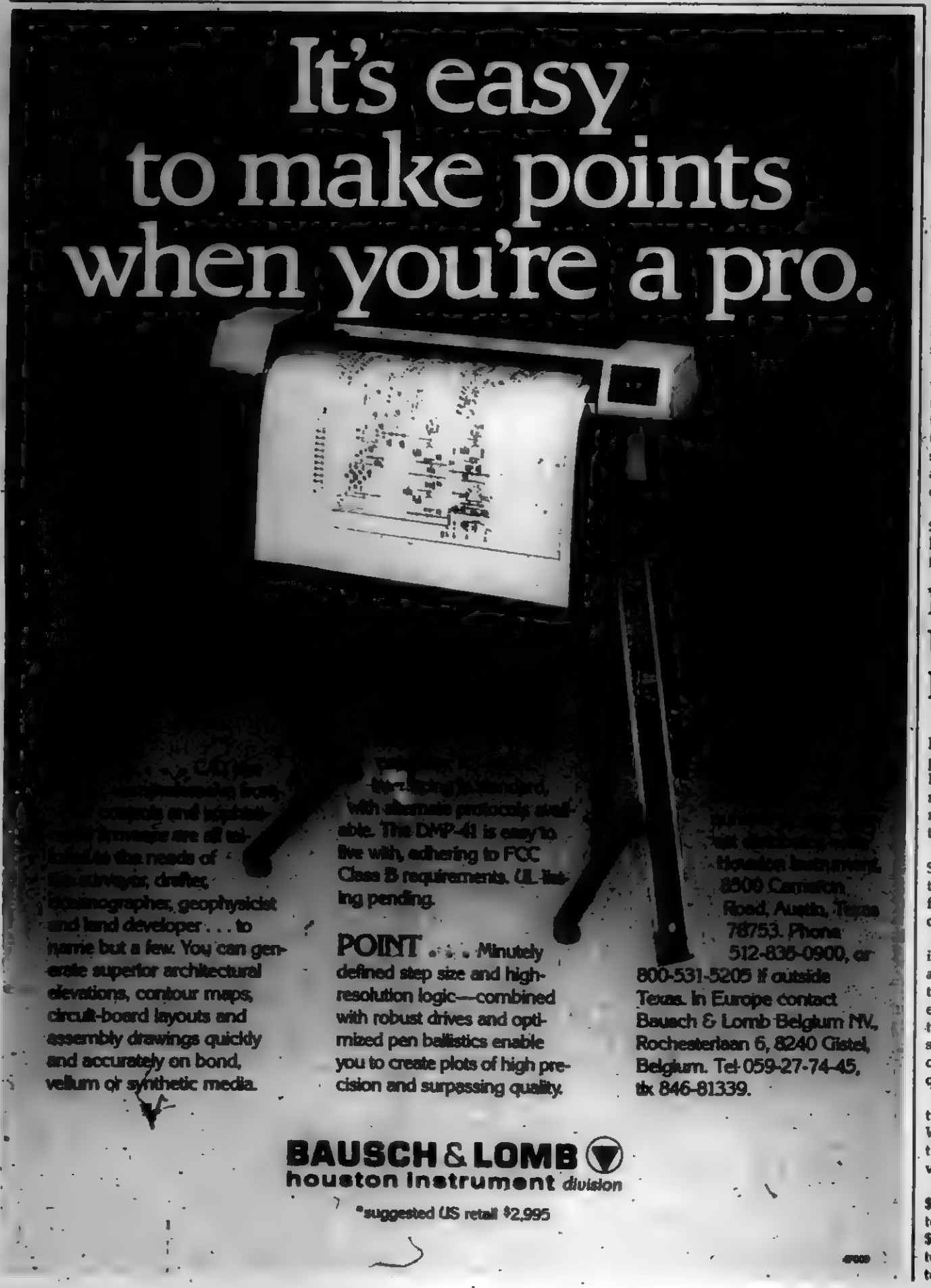
WHEATON, Ill. — An online payroll and personnel package for use on Wang Laboratories, Inc. VS series minicomputers has been announced by Generated Systems, Inc.

The Payroll/Personnel System is based on a system that was originally designed for use on IBM mainframes, a company spokesman said.

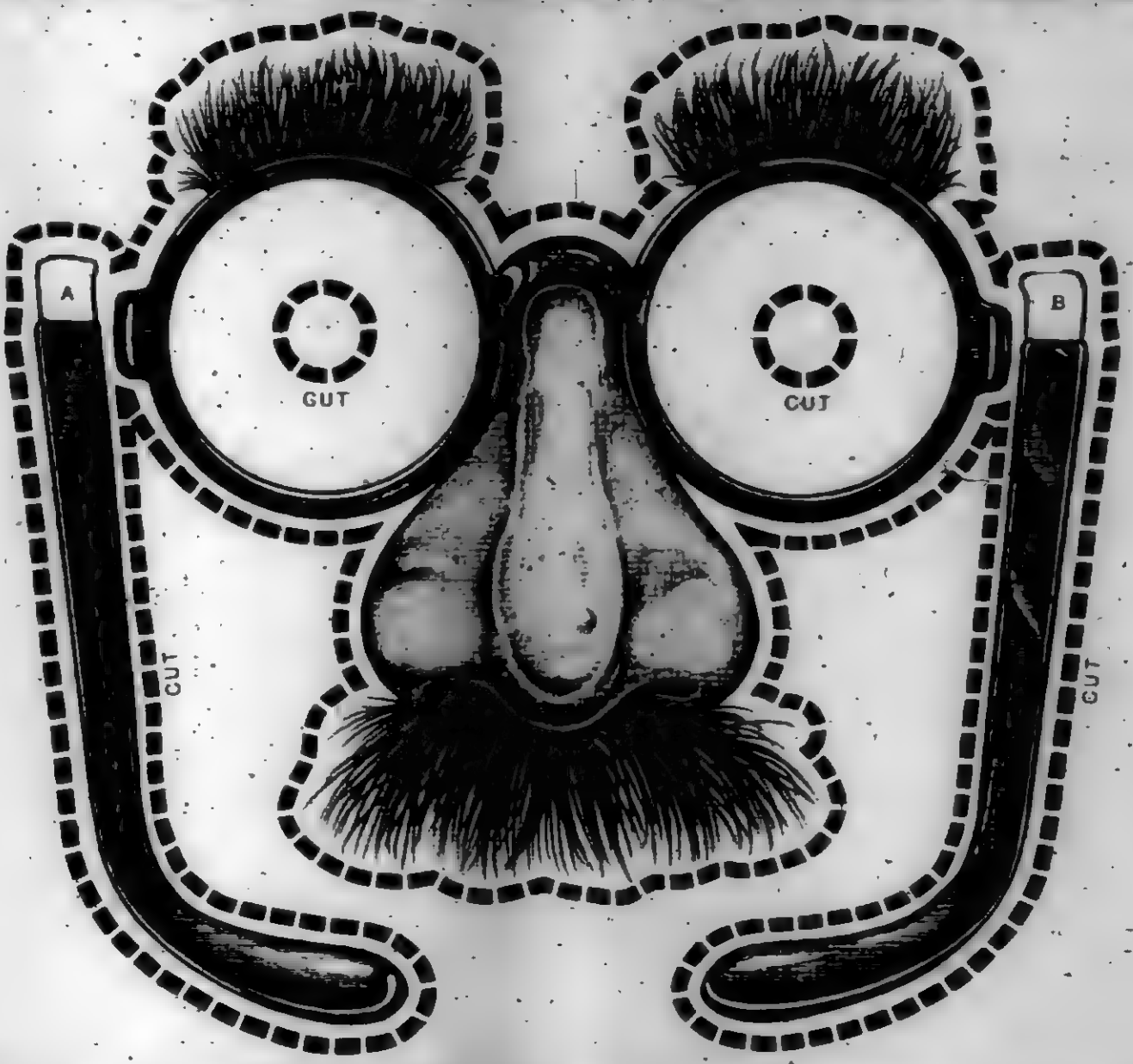
It reportedly utilizes an integrated file structure for all employee data and features unlimited tracking of earnings, taxes and deductions for each employee. The system can handle multiple companies, payrolls and frequencies, the vendor said.

Written in Ansi 74 Cobol, the system may be used on Wang systems starting with the VS25. Source code is provided.

Software is priced from $15,000, and complete systems, with hardware start at $45,000 from Generated Systems, 209 N. Hale St., Wheaton, Ill. 60187.



WHAT TO WEAR TO WORK IF YOU BUY THE WRONG DBMS INSTEAD OF OUR MODEL 204.



Picking the best, most productive DBMS for an OS, DOS or CMS environment requires the use of all your faculties. Because many DBMSs never live up to their promises. And sooner or later those deficiencies are bound to catch up with you. Leaving you looking for something to hide behind.

Computer Corporation of America doesn't have to put on an act to convince you. Our MODEL 204 DBMS is the only commercial DBMS ever designed from scratch for online systems. Every other DBMS was converted from batch. And that means new applications come up faster with MODEL 204. In fact, 5 to 50 times faster. And your applications and databases are much easier to maintain.

What about performance? If you end up with a DBMS that can barely carry a few million records and a dozen or so users, you won't be able to mask the fact forever. Especially if someone finds out that MODEL 204 can handle up to 513 billion records and 999 concurrent updates.

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Finally, two other things that no other DBMS can say. MODEL 204 received the highest overall rating in a recent *Datapro* survey: 3.5.[1] And it's the fastest growing system for IBM mainframes from an independent vendor.[2]

Now faced with these facts wouldn't you look silly buying anything but MODEL 204 DBMS?

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1. *Datapro* "User Ratings of Proprietary Software-COMPLETE" November 1982. 2. *Computerworld* December 20, 1982

Other Offices: New York, Houston, Dallas, Los Angeles, San Francisco, Chicago, Philadelphia, Washington, D.C., Morristown, NJ, Stamford, CT/Representatives: Canada, U.K., Europe, Australia, Japan, Saudi Arabia.

Five Application Tools Fit Gcos-Based Systems

(Continued from Page 51)

fee of $24,000 or $980/mo for a minimum of one year.

The Tats package is a time-sharing software tool for interactively writing, compiling, testing and debugging application procedures outside the transaction processing environment. It utilizes a program skeleton generator and forms mode terminal to build and debug a single transaction. Once completed, routines are compiled through Cobol-interactive commands, a Honeywell spokesman said.

The one-time license fee for Tats is $10,800. It can also be licensed monthly for $580 for a minimum of one year. Tats is available immediately.

System-80 is a set of two software tools designed to facilitate routine Cobol program development tasks such as coding, maintenance and documentation. The Cobol program generator produces menu-driven data entry and file maintenance programs that interact with the user while executing, according to Honeywell.

The System-80 products are scheduled for availability in October. The Cobol program generator costs $18,400 for one-time licensing or $780/mo, while the report generator is $9,900 or $430/mo.

Honeywell's Softool products, which the company said can provide facilities to support software life cycles, increase programmer productivity, facilitate software maintenance and improve management visibility and control, are comprised of two products: a Cobol programming environment and a change and configuration control (CCC) package.

The Softool program set is offered in three different packages. Cobol programming environment will be available in October for a one-time charge of $33,500 or $1,400/mo. CCC is available now for $30,000 or $1,500/mo. Both Softool components can be acquired for $60,000 or $2,500/mo for a minimum of 12 months.

C is a general-purpose programming language that deals with characters, numbers and addresses designed for writing real-time numerical, text processing and data base programs.

The one-time license fee for C, available immediately, is $8,000. It can also be licensed for $340/mo.

Information about all five programming tools is available from Honeywell through P.O. Box 8000/T-60, Phoenix, Ariz. 85066.

Scheduling, Product Control Interrelated

(Continued from Page 51)

tor of the need to accomplish the required tasks. It should notify appropriate personnel of the necessary requirements at the scheduled time and date. It should provide readily accessible documentation or instructions for personnel unfamiliar with the tasks and provide notification to the operator whether the changes are successful or unsuccessful.

The CPU is certainly a workstation in the production work flow. Many hardware and software tools are available to help improve its performance. Since the control of job processing is handled well by the CPU, the production control system should ensure that work is submitted in an orderly, scheduled manner to ensure timely delivery of output.

Work should be scheduled taking into consideration resources allocated for production processing, business priorities, due-out times, predecessor/successor relationships, data availability, date and time. The system should allow the routine work to be easily predefined and automatically submitted with little or no operator intervention.

Another important area is abend handling and recovery from system failure. Since time is usually critical in production work, the system should allow rapid correction and resubmittal of individual jobs as well as recovery and backup for the entire system.

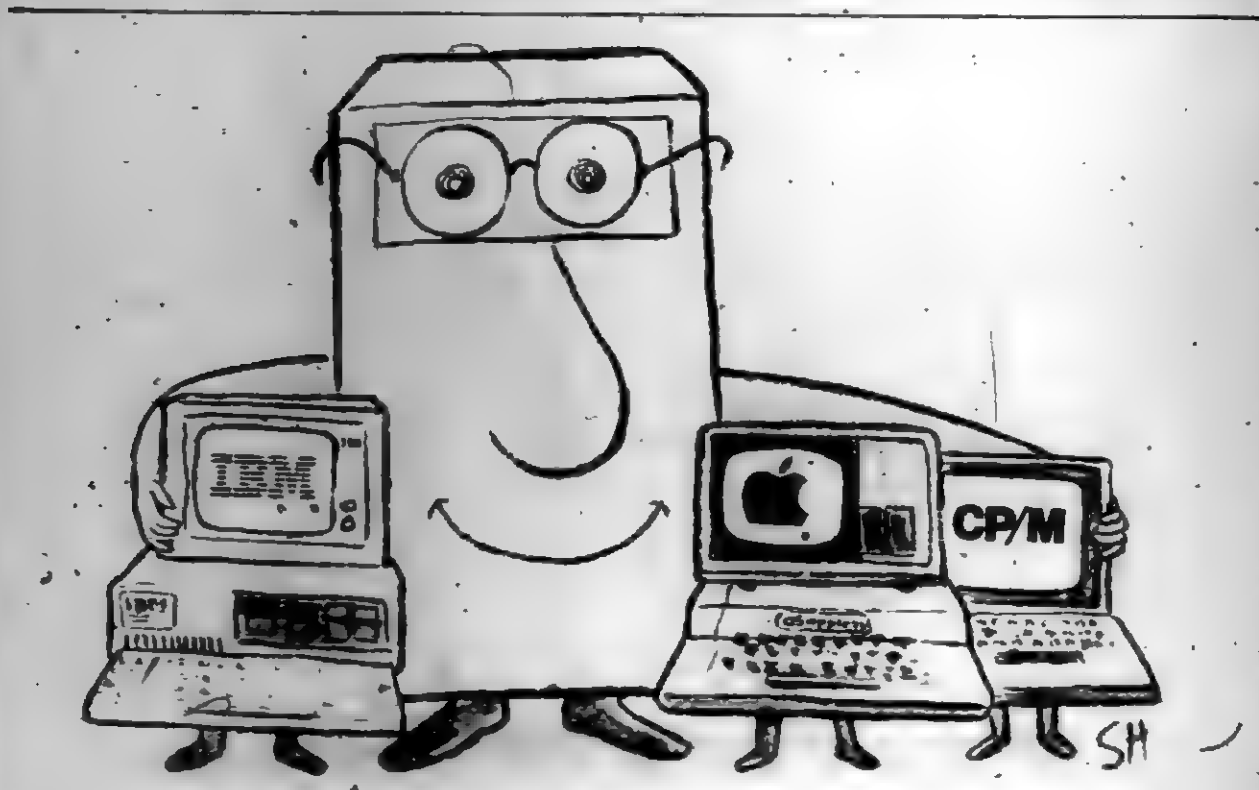
To be completely effective, the production control system must not only handle the majority of ongoing work automatically, it must also provide flexible capabilities for nonroutine tasks. It must offer complete, readily accessible information concerning the overall status of work flowing through the system and rapid notification of problem areas.

Control and tracking capabilities should also be available for the output distribution work areas. The system should be able to track individual reports from the time they are created through the various report processing activities to the final distribution.

Other information should include number of copies of a report, number of reports created and distribution information.

Reporting is the final function to be automated. The production control system should provide a wide range of technical reporting capabilities for performance tuning as well as management reporting for decision support.

Bradley is a marketing manager at University Computing Co. in Dallas.



Your micros need never stand alone again.

One of the liveliest topics among MIS managers is how to effectively transfer files between all those corporate microcomputers and an IBM mainframe.

Today, one solution stands out: OBS FTP.

FTP is a general purpose, utility program that provides 2-way file transfer between micros and IBM mainframe computers.

FTP was originally developed by UCLA and first introduced in mid-1982. It represents the state of the art in asynchronous file transfer.

The product comes in two parts. Host FTP runs under TSO or VM/CMS at the mainframe, while Micro FTP runs on the IBM PC (PC-DOS), Apple II, or II+ (DOS or CP/M) and 8080 and Z80 processors running CP/M.

Full data transparency

Unlike other file transfer alternatives, OBS FTP can transfer either text or binary files. This allows you to upload and download object programs or other non-text files. FTP uses a layered protocol featuring the exchange of 1K/byte packets to speed transmission.

Guaranteed reliability

Other micro communication packages may allow you to dial a host-based editor to transfer text files. But they only transfer one line at a time. And they can't prevent data loss or recover from transfer errors.

FTP offers a 16-bit Cyclic Redundancy Check (CRC) that is calculated by the sending program and recalculated by the receiving program. If the calculations don't match, FTP automatically tries again.

Highly flexible, easy to use

Programmers can download a source program to their micro at home, complete the program, and upload it for compiling and testing.

And think of the redundant diskettes you save. Archival data, backed-up files and programs can all be stored at the mainframe until they're needed by the PC user.

Micro FTP includes a terminal emulator so your micro can sign on to VM/CMS or TSO.

To upload or download a file, the user simply provides the file names and issues a single command. FTP will operate at line speeds that are limited only by your communications hardware.

OBS Software has been a vendor of IBM systems software solutions since 1977. We understand mainframe organizations and speak your language. You can count on us for solid support when you need it.

OBS FTP. There's nothing else like it. To build the most effective mainframe/micro network possible, contact us today.

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Informatics Updates Mark V For IBM CICS Environments

WOODLAND HILLS, Calif. — Informatics General Corp. has introduced Release 4.1 of its on-line application generation package for users of IBM mainframes. The firm also announced that its Mark V package can be used in IBM CICS environments.

The addition of CICS compatibility to the basic Mark V package for IBM IMS/Data Communications (DC) environments provides teleprocessing portability for design, implementation, documentation and maintenance of on-line systems with performance-critical environments, the vendor said.

A major enhancement included in both the IMS and CICS versions of Release 4.1 is output of a design manual on request with every generated application.

This document reportedly includes overall summaries on screen-to-screen flow, data base usage, a field reference index and summaries for each individual screen.

Other enhancements to Release 4.1 include: support for the PL/I programming language in an IMS/DC environment and the ability to install the Mark V package on IBM 3380 disk drives, the vendor said.

Release 4.1 is offered free to current Mark V users. For new users the Mark V package costs approximately $100,000. The CICS versions of Mark V cost $36,000 for an OS environment and $24,000 for a DOS environment.

Informatics General is located at 21031 Ventura Blvd., Woodland Hills, Calif. 91364.

Monitor, Service Announced For IBM VM

RIDGEFIELD, Conn. — Adesse Corp. has announced the VM On-line Performance Monitor (Vmon) for IBM VM operating environments.

The firm is also offering a service designed to identify performance problems at virtual machine installations.

The Vmon package is a general-purpose tool for use in performance problem determination activities. The package can reportedly produce output for full-screen or line-mode terminals that is tailored to a specific analysis situation: Vmon can be used for analysis of virtual machine performance problems, as well as for performing I/O subsystem studies.

Vmon offers display formats that can be tailored to provide a variety of information in a usable form. In addition, the package can make use of the highlighting and color capabilities of IBM 3270 series CRT terminals, and displayed output can be captured in spool files for later examination.

The program operates interactively and allows ad hoc performance problem analysis. This allows virtual machines to be grouped for aggregate analysis or for exclusion from a display, the vendor said.

The Vmon package can be leased on a per-CPU basis for $310/mo and purchased for $5,500. Maintenance is included in the monthly charge, while customers who purchase Vmon must pay a $60/mo charge for maintenance, the vendor said.

The Vmap analysis service includes a one-time analysis of a computer system running VM/370 or VM/SP either with guest operating systems, CMS or both.

The study includes an annotated copy of the analytic reports, showing likely bottlenecks, performance hitches, high loads or overloads.

The analysis service costs $875 from Adesse, P.O. Box 515, Ridgefield, Conn. 06877.

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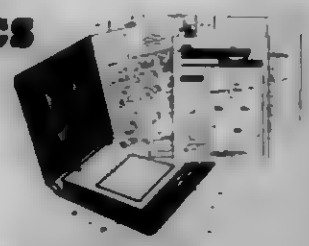

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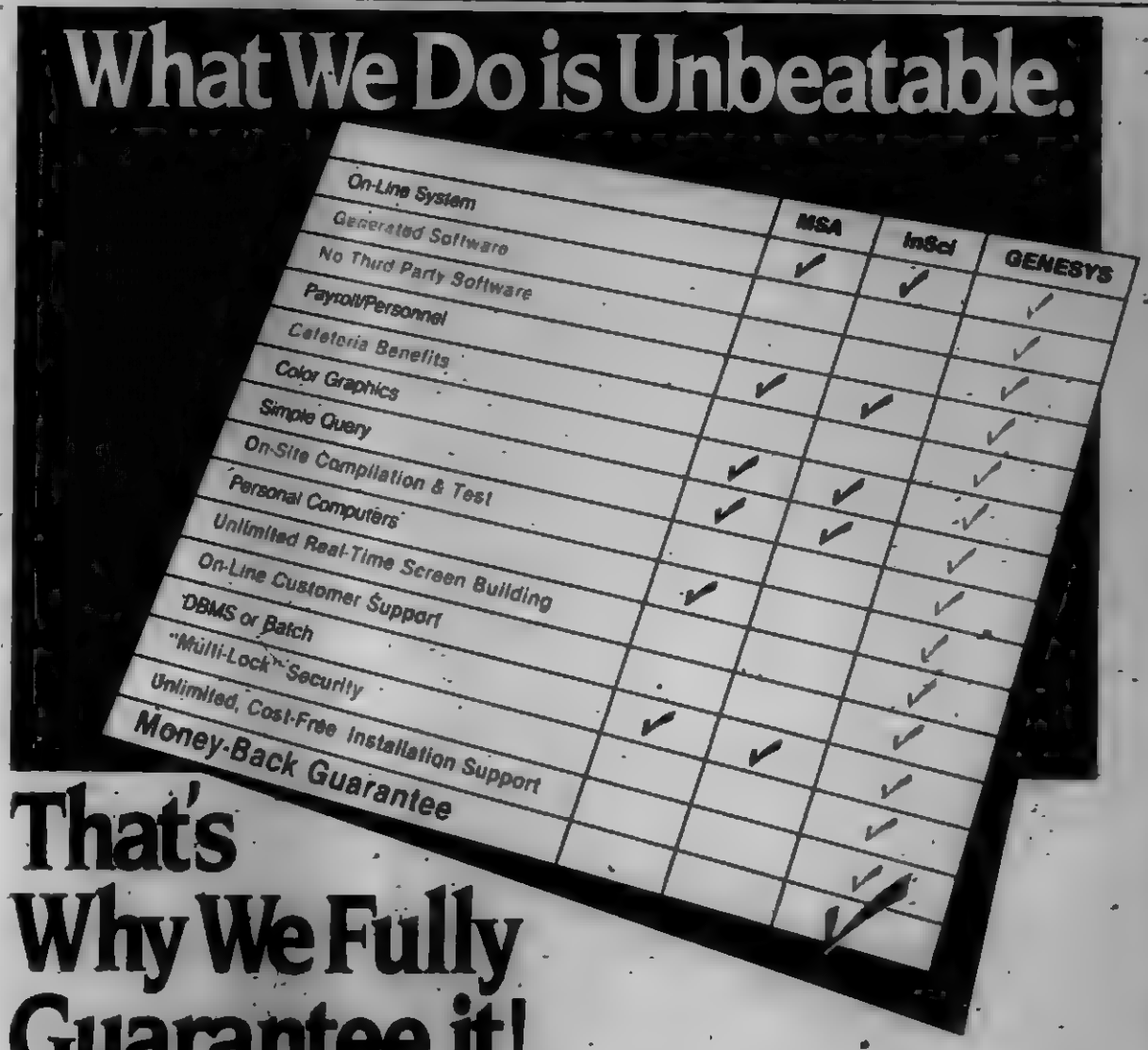

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SYSD Maintenance System for CICS Enhanced

BOISE, Idaho — H & W Computer Systems, Inc. has announced Release 3.3 of SYSD, its source program maintenance system for CICS.

According to the vendor, the new release includes the following:

- A flexible partitioned data set editor features commands to copy, move, insert, replicate, add, delete and change individual or groups of lines.
- A user-friendly spool display system allows viewing of the entire job or access to specific reports. Special commands include search for character string, display of condition codes, end of reports and browse forward and backward.
- A spool printing system provides an economical means of distributing job entry system reports to remote locations with the high cost of remote job entry terminals.
- A direct access storage device management system allows users to scratch, rename, catalog and uncatalog data sets or to create generation data groups.
- Complete security exists at the function, subfunction, command and report levels.
- Support exists for CICS 1.6, MVS/XA and JES2 SP1.3.3.

SYSD reportedly operates under VS1 and MVS operating systems with CICS/VS Release 1.4 and above. Site licenses are available for $8,500, with the first year of maintenance included. A 30-day free trial is available to qualified prospects, according to a spokesman for the vendor.

More information on SYSD is available from H & W Computer Systems through P.O. Box 4785, Boise, Idaho 83711.

Buffer Control Software Links Prime Systems to Micros, Nets

WOOD DALE, Ill. — Computronics, Inc. has announced the release of its input buffer control software for users who wish to connect their Prime Computer, Inc. systems to microcomputers, local-area networks or other high-speed equipment.

A modification of the existing Primos package, the software provides a buffer control for data coming into a Prime system on any asynchronous communications line. When a user has the input buffer control and the Prime computer buffers approach the full state, the Prime will send a Control-S to the microcomputer, local-area network or other device. When Prime catches up and the Primos buffer is nearly empty, the Prime will send a Control-Q character.

No extra software is needed on the remote device to support the operation. The buffer control feature can be enabled or disabled on a line-by-line basis. It is available for all Prime 50 series systems, including the Prime 2250. It will also work on the Prime 400 and 500.

The price of the input buffer control is $600, which includes a one-year warranty and all new releases of Primos that are required during the time period. A maintenance contract can be purchased after the one-year period for $200 a year.

Prices are for single computer systems. Prices for additional systems are two-thirds of the above prices for software and maintenance. A license covering the total number of systems on which the software will be used must be purchased.

Computronics is located at 130 North Ash, Wood Dale, Ill. 60191.

Financial Software Announced for Mark III Net

ROCKVILLE, Md. — A comprehensive, personal financial planning software system is now available on the Mark III teleprocessing network, General Electric Information Services Co. (Geisco) announced.

Execplan, developed by J. P. Sawhney & Co. of New York, reportedly provides a flexible system for financial planners to produce a comprehensive personal financial plan.

Execplan provides two modes of persoffal financial planning, according to the vendor.

Executive planning reportedly provides planning analysis reports, estate tax statements, left-to-heirs balance sheets and estate distribution flow charts; tax planning provides income tax alternatives and estate analysis.

Costs for using the system to develop a financial plan typically range from $30 to $150, according to a spokesman for the vendor.

More information is available from Geisco, 401 N. Washington St., Rockville, Md. 20850.

Jspool Driver Released For DOS 2.0

PALO ALTO, Calif. — Tall Tree Systems has announced the release of Jspool, an installable device driver for DOS 2.0.

Compatible with both parallel and serial interface ports, Jspool allows Xon/Xoff protocol and has nine special processing commands. These commands can be input by the user directly or placed at the top of text files and automatically input as the spooler processes each file, a spokesman said.

With these commands, the user can set tabs, odd/even page boundaries and the communications rate. These commands also control pausing or continuing print execution, flushing the spooler buffer and directing the output to one of seven printers, the spokesman added.

With Jspool, the size of the spooler buffer may be changed from 2K bytes up to 2M bytes. It is available now for $40, including source code for the drivers, from Tall Tree Systems, 1032 Elwell Court, No. 124, Palo Alto, Calif. 94303.

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	$ Amount	Total	26757.94	24040.36	10853.55	16777.59
		Percent of Regional Sales	55.8	42.9	47.4	50.8
50000 to 500000	Quantity	Total	9012	13509	13280	11605
	$ Amount	Total	13787.06	22071.22	20954.00	14210.25
		Percent of Regional Sales	28.7	39.4	52.6	43.0
Under 50000	Quantity	Total	4048	5131	None	1811
	$ Amount	Total	7428.34	9944.05	None	2034.05
		Percent of Regional Sales	15.5	17.7	None	6.2

Boasts More Than 60 Variables

Text Editor Out for DEC VAX-11s

CAMBRIDGE, Mass. — Computer Corp. of America has introduced the Emacs text editor for Digital Equipment Corp.'s VAX-11 systems.

The product features more than 60 user-defined variables that allow the operator to customize Emacs to meet various application needs and different user styles. These include: horizontal and vertical multiwindowing; a set of forward and backward movement, deletion, justification, filling, centering and transposition commands for characters, words, sentences, paragraphs, program expressions and arbitrary regions; text editing functions such as incremental search and query replace, automatic case adjustment, word abbreviation, movement of rectangular regions within tables and interactive spelling checking and correction; and a directory editor that allows viewing and modifying files and directory.

The product runs under DEC's VMS operating system or the University of California at Berkeley's version of the Unix operating system.

Emacs is priced from $350 to $850. Volume discounts and special rates for OEMs and educational institutions are available, Computer Corp. of America said from Four Cambridge Center, Cambridge, Mass. 02142.

'Capeditor' for Wang VS Handles Cobol Applications

TORONTO — A Cobol text editor for Wang VS series computers has been announced by Netron, Inc., which said the product features advanced diagnostics, logging and recovery facilities.

The product is an addition to Netron's Computer-Aided Programming (CAP) automated application development and maintenance system. Capeditor reportedly features an on-line documentation system that can be accessed from any program by a single keystroke.

The product is available separately for $3,000 or as a component of CAP Release 3.0.0, which costs $32,000. More information can be obtained from Netron at 99 St. Regis Crescent N., Downsview, Canada M3J 1Y9.

T/S Service Enhances Program

BOULDER, Colo. — Tentime, a time-sharing service, said it has added to the financial modeling program it developed for Applied Data Research, Inc.'s decision support system.

The added features to Applied Data's Empire system include on-line computer-based instruction, forecasting, graphics, assumption analysis graphics, simultaneous equations, directory searching and editing, the vendor said.

The program also permits access to its own internal line editor, as well as to system editors.

The entire system is currently available from the vendor for $70,000. Additional information can be obtained from Tentime at 5375 Western Ave., Boulder, Colo. 80301.

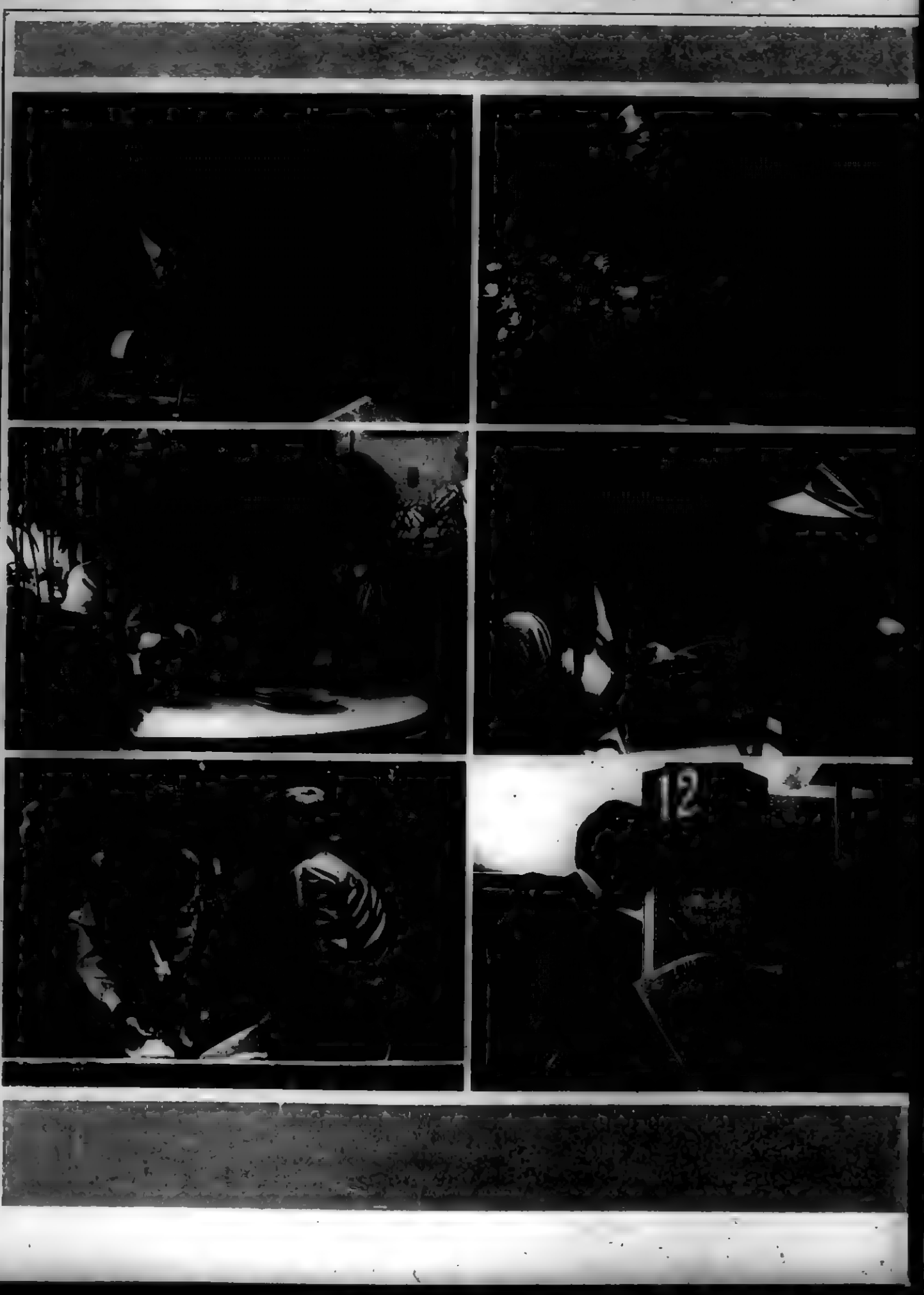
'Reporter' Targets System/38

OAK BROOK, Ill. — Michaels, Ross & Cole, Ltd. has brought to market a report writer for use with the IBM System/38 CPF Release 5.0.

Called the Reporter Version 1.1, the software is intended to be used with the company's Query series and is said to give nontechnical managers access to System/38 information.

The self-documenting package is said to allow media-independent query capabilities.

The price for the report writer is $1,140, according to a spokesman. It is currently available from Michaels, Ross & Cole at Suite 501, 1302 W. 22nd St., Oak Brook, Ill. 60521.



General Ledger Package Supports IBM, HP CPUs

SUNNYVALE, Calif. — Data Design Associates has announced the General Ledger Financial Control System. The package is aimed principally at users of IBM mainframes and large-scale processors developed by Hewlett-Packard Co. However, the vendor said the package can be adapted to operate on most large mainframes.

The package uses English-language user commands.

The package includes an Automatic Interface Module which reportedly makes it easier to use the firm's Accounts Payable and Fixed Assets packages.

The package costs between $60,000 and $86,000, Data Design said from 1279 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Measures Improvement Rate

Productivity Service Debuts

MCLEAN, Va. — Quantitative Software Management (QSM) has announced a new software productivity service that is designed to determine a software organization's development capability and provide the means to measure the rate of improvement over time.

QSM's technique is a combination of quantitative and qualitative information about a software project. Quantitative data provides the basis for objective tracking of productivity improvements. The qualitative data identifies the major productivity drivers.

QSM is able to quantify the benefits in terms of shorter schedules, dollars saved, manpower saved and return on investment in new tools and methodologies.

The price of the service is $1,000 per system analyzed. Discounts are available for more than 10 systems, the vendor said.

QSM is located at 1057 Waverley Way, McLean, Va. 22101.

Gateway Links Micro To IBM CPU

SANTA ANA, Calif. — Laguna Laboratories has brought out its first data gateway linking personal computers to mainframes.

Christened the Decisionlink/34, the gateway is a bidirectional interface between personal computers and IBM's System/34.

Made of a front-end controller and software, the new system includes a data base access module.

It also provides software that enables users of personal computers to query the mainframe and store results on a personal computer's disk.

Using one synchronous data link control communications channel, the controller can handle up to 16 personal computers linked to the mainframe via asynchronous modems or local cable connections, according to the vendor.

Price on an eight-port system is $8,500, available in November, from Laguna at 1300 Normandy Place, Santa Ana, Calif. 92705.

Package Ties Graphics Kit To Library

BOULDER, Colo. — Robertson Software, Inc. has introduced a software connector to fashion an interface between Precision Visuals' device-independent graphics package and the graphics utilities library of the National Center for Atmospheric Research (Ncar).

Named the Ncar Connector, the collection of portable Fortran 66 routines links the public-domain Ncar graphics utility routines for mapmaking, velocity vectors and streamline fields with low-level routines performed by Precision Visuals' DI-3000 package, according to a vendor spokesman.

It is now available for $1,000, from Robertson Software at 1001 Pine St., Boulder, Colo. 80302, or from Precision Visuals at 6260 Lookout Road, Boulder, Colo. 80301.

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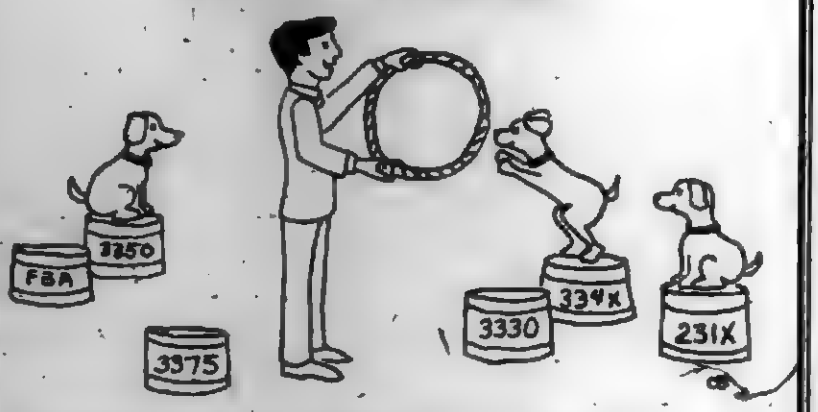

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CAD Drafting Systems Interface With IBM XT

NEW YORK — United Networking Systems, Inc. (UNS) has announced a family of two-dimensional computer-aided drafting (CAD) systems said to interface with the IBM Personal Computer XT.

Draft-Aide was developed by Safford Systems, Inc., and all rights have been acquired by UNS. The multidiscipline CAD software system is said to operate in production mode and features elaboration and magnification, data base manipulation/control function and component compatibility with the XT.

The line contains five products, all subsets of the Draft-Aide System 300, which is said to provide nearly 700 user capabilities for businesses that want to set up drafting service centers. It costs from $50,000 to $100,000. The five products are:

- PRO 300 — Designed for large corporate or engineering departments and sophisticated users, it sells for $25,000.
- PRO 200 — Designed for professional users, such as architecture or electronic firms, requiring a "full-power" drafting package, it costs $7,500.
- PRO 100 — A basic drafting package, it was designed for users with limited drafting requirements. It is priced at $595.
- Academic 100 — Designed for use by universities and trade, technical and company-sponsored schools for training novice and advanced users, it sells for $395.
- Starter 100 — An introductory service, it costs $95.

UNS is located at Suite 108, 7007 Gulf Freeway, Houston, Texas, 77087.

'P-Stat' Package Available for Use On Apollo Micro

PRINCETON, N.J. — P-Stat, a data management and statistical analysis package from P-Stat, Inc., is available for use on the Apollo Computer, Inc. Domain microcomputer.

The P-Stat package offers interactive data management, data display, statistical analysis and report writing capabilities.

Features for P-Stat include an on-line Help facility, interactive data entry, relational data base capabilities, macros and a range of statistical commands, according to a spokesman for the company. In addition, P-Stat provides for expandability through a user links facility, the spokesman noted.

Domain computers are 32-bit shared network processors that range from the monochromatic DN3000 and DN420 to the color DN6000 workstation.

Each processing node offers up to 3.5M bytes of main memory with multiple window display.

The license fee for P-Stat for a single Apollo Domain node is $2,000 for the first year and $1,000 for annual renewal. Annual and perpetual licenses for multiple nodes are also available, as well as corporate site licenses.

Additional information about the product, which will be available for the Domain micro in November, is available by contacting P-Stat through P.O. Box AH, Princeton, N.J. 08542.

Text Processor By Hemenway Fits Two Systems

BOSTON — Hemenway Corp. has announced the availability of a text processing package for use on Motorola Versados and Hemenway's MSP/68000 operating systems.

The text processor, Texpro, formats text for typewriter-like printers and terminals. It accepts lines of text interspersed with lines of format control information and produces the text formatted into a printable, paginated document.

Any already available text editor may be used to create the input text file to be processed by the text processor. Texpro can be used to produce a variety of documents, including manuals, form letters and contracts.

The price of Texpro is $500 per copy. The package includes Texpro text processor object code on an appropriate floppy diskette, user documentation and a one-year maintenance and support fee.

More information is available from Hemenway at 101 Tremont St., Boston, Mass. 02108.

Payroll/Personnel System Out

ROSELAND, N.J. — Automatic Data Processing, Inc. (ADP) has introduced a new payroll/personnel information processing system for companies with more than one site or 500 or more employees.

ADP's new service provides personnel analysis and reporting plus delivery of paychecks. According to the vendor, the data is entered directly into a terminal supplied by ADP, eliminating the need for hand-written input forms. The terminal is linked to a mainframe computer at ADP's regional computer center via an on-line, dial-up modem.

The system uses Digital Equipment Corp.'s VT 131 terminal and 120 bit/sec modem. Users can patch onto the on-line system 24 hours a day, seven days a week.

The payroll/personnel system consolidates all payroll and personnel data from a company's various locations into a centralized human resources data bank.

Additional information is available from ADP, 405 Rt. 3, Clifton, N.J. 07015.

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Micro Notes

Select Information Systems has announced that a French-language version of its **Select Word Processor** is now available for use with Digital Equipment Corp.'s Rainbow 100 microcomputers, with German, Spanish and Italian versions soon to follow. The software is base priced at $495 from the vendor at 919 Sir Francis Drake Blvd., Kentfield, Calif. 94904.

Pinnacle Software Systems has unveiled two additional versions of its **Superlist Manager** system for use on the IBM Personal Computer and the Kaypro II microcomputer from Non-Linear Systems, Inc. The software reportedly combines a structured data base management system with a word processor. It costs $249. The vendor can be reached through P.O. Box 1220, Fort Collins, Colo. 80522.

Xeno-Copy is a menu-driven software utility that reportedly allows 18 different microcomputers to transfer files directly disk-to-disk to IBM's PC-DOS format disks without any additional hardware or modems. The product is priced at $99.50 and is available from Vertex Systems at 7950 West 4th St., Los Angeles, Calif. 90048.

North American Business Systems, Inc. has released its latest version of **Memory/Shift**, which is said to give the IBM Personal Computer XT many of the capabilities of Apple Computer, Inc.'s Lisa microcomputer. It reportedly allows the Personal Computer XT user to have up to nine programs in memory at the same time and enables the machine to work with two monitors at the same time. It is priced at $99 from the vendor at 642 Office Parkway, St. Louis, Mo. 63141.

Advanced Systems, Inc. has announced the availability of its **Microtutor** interactive microcomputer diskette-based training courses to teach personal computing literacy and application skills on specific software. Microtutor courses include instruction on Ashton-Tate's Dbase-II, Visicorp's Visicalc and Lotus Development Corp.'s 1-2-3. Priced from $55 to $75, the courseware is available from the vendor at 2340 S. Arlington Heights Road, Arlington Heights, Ill. 60005.

Televideo Systems, Inc. has introduced **Telesolutions II**, a kit containing three software packages for use on the vendor's TS 803 and TS 1603 personal computers. The kit contains Telewrite for the first-time user, Telecalc for financial planning and business calculations and Telechart to allow users to display portions of the data in the spreadsheet graphically. Priced at $795 for the TS 803 and $595 for the TS 1603, the kit is available from the vendor at 1170 Morse Ave., Sunnyvale, Calif. 94086.

Lantech Systems, Inc. has released **Unetix**, a multitask operating system compatible with Unix. Stand-alone and networking versions of the package are available for 8086 or 8088-based micros, including IBM's Personal Computer. The stand-alone version includes a Microsoft, Inc. MS-DOS emulator. The first networking version is a distributed file system; a virtual file system for very large network installations is due by the end of the year. Unetix costs $99 from the vendor at 9635 Wendell Road, Dallas, Texas 75243.

Fischer Innis Systems Corp. has introduced **Watchdog**, a software system said to provide data security and system protection for microcomputers with hard disks. Designed for use on microcomputers running under Digital Research, Inc.'s CP/M operating system, Watchdog is priced at $295. More information is available from the vendor at 4175 Mercantile Ave., Naples, Fla. 33942.

Business Software Pty. Ltd. has announced **Profin**, a financial analysis package running under Digital Research, Inc. CP/M-80, MS-DOS, and IBM PC-DOS operating systems. Profin requires a minimum of 64K bytes of memory and a minimum disk size of 240K bytes. Priced at $295, Profin is available from the vendor at 1651 Third Ave., New York, N.Y. 10028.

Day One Software, Inc. has introduced **Day One**, a personal business software system for use on IBM's Personal Computer and Apple Computer, Inc.'s personal computers, among others. The software features multiple indexing, report generation, file scanning and search capability. Priced at $495 for the basic version and $695 for the advanced version, Day One is available from the vendor at 618 Shoemaker Road, King of Prussia, Pa. 19406.

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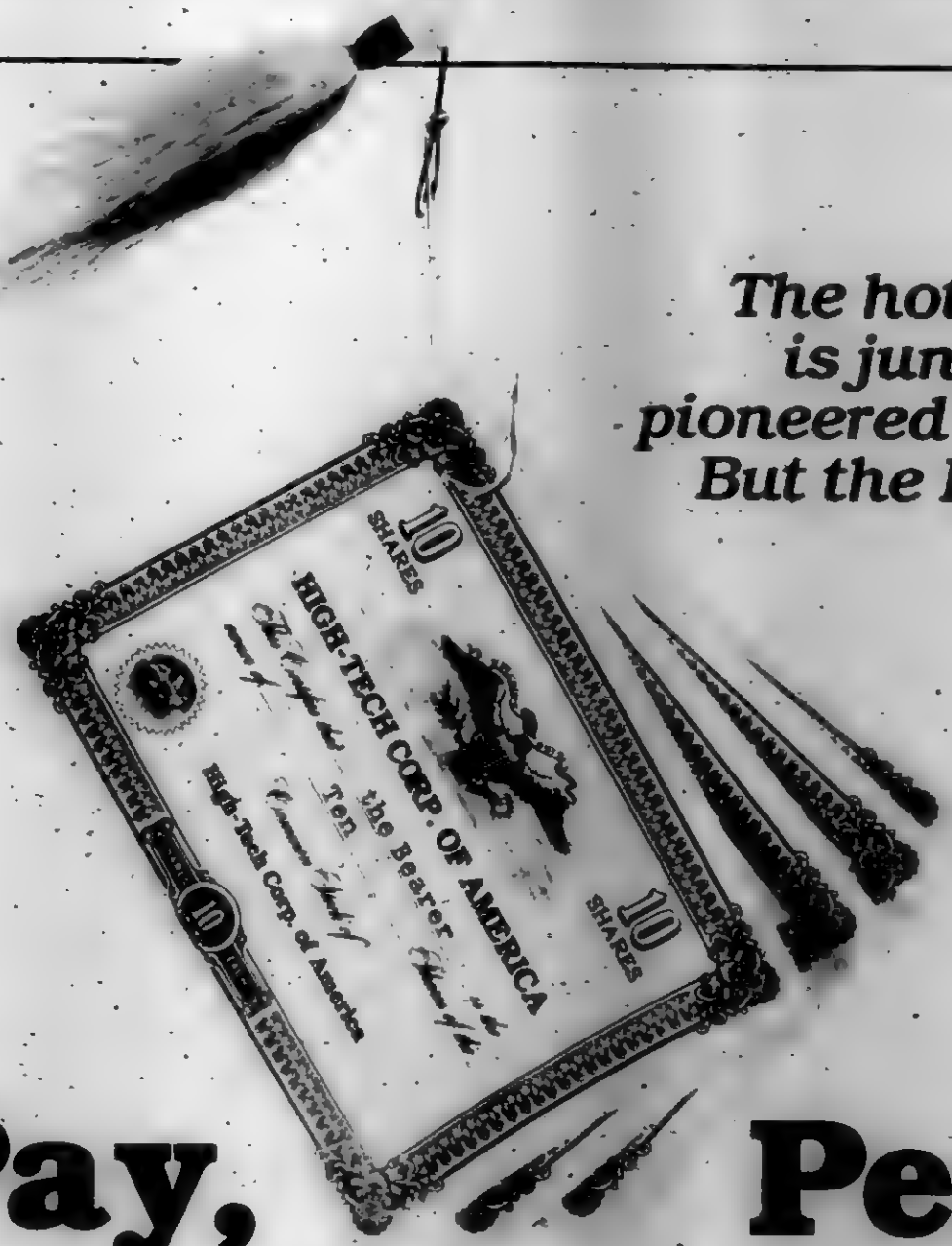

The hottest new incentive is junior common stock, pioneered by Genetech Corp. But the IRS has yet to rule.

Pay, Perks and Promises

By J.E. Richard and Michael F. Spratt

High-tech firms are creating compensation methods and reward systems almost as innovative as the products they manufacture.

The executive with an $80,000 annual salary may earn a long-term incentive (in the form of founder's stock or stock options) that could make him a millionaire in three to five years. The $120,000 executive in general industry would earn just a fraction of this fortune during the same period.

When Alan F. Shugart established Seagate Technology in Scotts Valley, Calif., in 1979, a handful of company founders bought six million shares for a fraction of a cent each. In 1981, the company went public with shares priced at $10 apiece.

Several factors distinguish the compensation policies of high-tech companies, including their relative size and stage of development. Contrast "threshold" companies with sales of no more than $1 million to industry giants with revenues counted in the billions.

Affiliation — whether the company is independent, part of a large established corporation or one unit of a conglomerate — affects all human resources policy, especially compensation. Location is another variable because local culture influences corporate culture and, thus, corporate compensation policy.

Organizations, whether large or small, often search the same market for technical, professional and managerial people. In a reviving economy, the increased need for key people surely will affect personnel and compensation practices.

Perhaps the best way of looking at compensation practices is to compare high-tech companies with each other and then with general industry. First, here's a look at the executive level.

Base salaries for executives in small ($2 million to $50 million) and mid-size ($50 million to $200 million) high-tech firms usually are significantly lower than salaries for the comparable position in general industry or even in larger high-tech companies. A $120,000-per-year position in general industry might pay as little as $80,000 in a small or medium high-tech operation.

Why, then, are these positions in high tech so attractive? The reason: primarily because the total compensation package is highly leveraged. The $80,000-per-year high-tech executive is likely to have annual bonus and

IN DEPTH

long-term incentive arrangements that potentially may provide him with far greater rewards than the executive in general industry can ever hope for.

The compensation practices and tactics in start-up and threshold high-tech companies best illustrate this potential. Key executives, working for salaries well below what they might command in other more established industries, receive options to purchase so-called "founder's stock." The price often is only several dollars per share, sometimes even dipping below one dollar. If the company is successful when it goes public, the executive reaps considerable rewards. Perhaps the best-known example occurred several years ago when Apple Computer, Inc.'s first public offering created several dozen "instant millionaires."

Even without resorting to founder's stock, more established and smaller high-tech companies provide stock option incentives that will attract and retain key executive talent. These companies have this advantage over larger high-tech corporations and general industry both: Smaller firms can risk a deeper dilution of their equity by issuing stock options to executives. Some can dilute equity by up to 30%, compared with 8% or less for larger firms. These companies can take this step because of their potential for rapid growth and the confidence that the investment community shows in them.

'Smaller firms can risk a deeper dilution of their equity by issuing stock options to executives. Some can dilute equity by up to 30%, compared with 8% or less for larger firms.'

Of course, there are risks — for the executive and the high-tech company alike. Any growth industry is more volatile than general industry — a variable known as a higher beta factor.

Usually, a small surge in the general economy will yield a larger growth rate in high tech. These industries, for instance, were growing at a 30% clip just before the 1981 recession. During the recent economic revival, technology stocks are among the leaders, with many far exceeding the average increases in the Dow Jones index.

But this "upside" potential is balanced by the inevitable converse scenario: A faltering economy generally will do greater damage to entrepreneurial efforts than to more firmly rooted industries. Between 1981 and the end of 1982, high-tech businesses suffered severely. Many companies in the semiconductor industry, for instance, were forced to cut back on production, lay off employees on all levels and in some cases even institute across-the-board pay cuts. Stock in National Semiconductor Corp. fell to about $14 per share as recently as a year ago. (In the upturn, it has traded as high as $60.)

So, for the executive seeking his fortune, high tech is not always a sure thing. (Witness the recent shutdown of Osborne Computer Corp., which just a year ago was selling 10,000 units a month.) But this uncertainty is the basis for executive compensation in this area. Growing a business in a competitive, quick-changing environment requires people who are risk-takers and entrepreneurially oriented. But the company gamble must be tied to their own personal risk.

Offering a large incentive in the form of founder's stock or other stock option arrangements accomplishes three objectives: It helps attract the right kind of person for a growing business; it links personal performance with the development of the company; and, by the nature of its payout schedule, it helps retain key people during the firm's early growth phases.

Retaining Executives

But even with the potentially lucrative compensation arrangements available to successful high-tech executives, many companies — particularly in the high-tech hotbed south of San Francisco — still are challenged to hold on to their top managers. Why? As the executives cash in on their options, there usually can be no repeat performance within their company. By this time, sales

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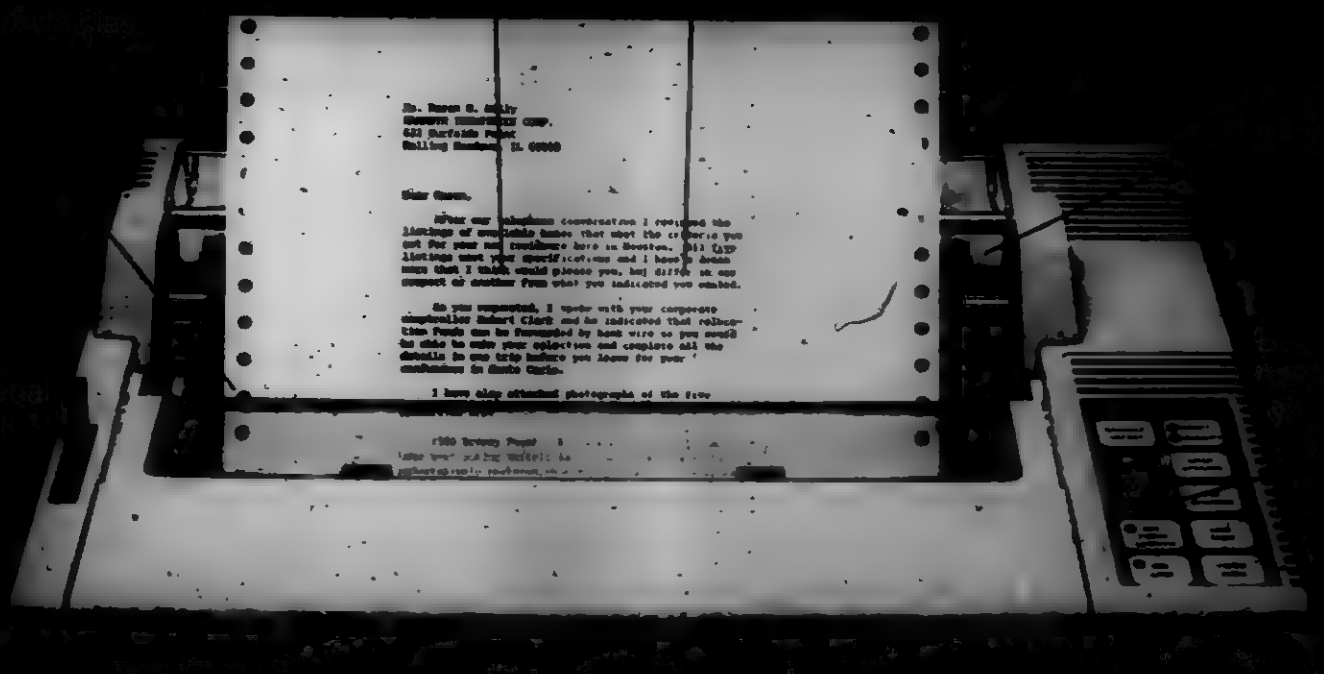

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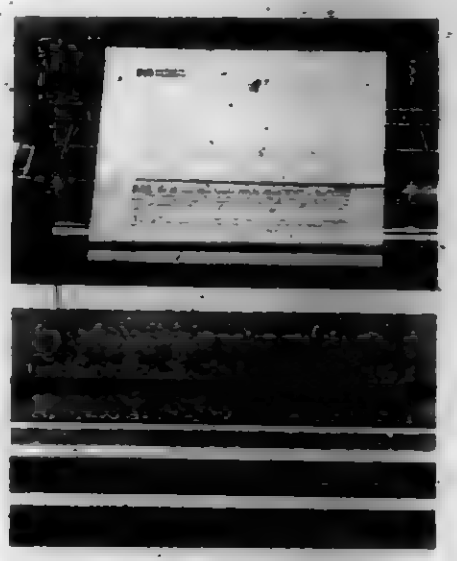

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IN DEPTH

probably are $50 million to $200 million or more. Further, continued high-level dilution of equity becomes inadvisable.

So, for those who thrived on risk and challenge, there is a great temptation to try it again. And many do just that, leaving to join new start-up companies. Then, too, there are those who joined a company too late for the first round of large-scale stock option distribution. They are ripe for picking by the emerging young high-tech firms that can offer them the potential for largess they just missed.

How, then, do more established high-tech companies and general industry manage to compete for executive talent? And how can they hold on to that talent once they have secured it? Several factors and practices are at work. First, not all competent executives thrive on the heavy risk and pressure that dominate the high-technology industries — particularly the threshold and small firms. So, there is a certain degree of self-selection that distributes this executive pool into appropriate positions. Still, there is the need for larger firms to assure themselves of some management continuity — to hold on to their best people. And other industries also must recognize the lure of high tech.

The venerable Pepsi-Cola Co. learned this lesson earlier in the year when Apple Computer wooed and won over that company's highly regarded president, John Sculley. Recently Atari hired away James Morgan, former executive vice-president at Philip Morris, Inc. High-tech industry now is reaching out for non-technical executives with consumer products expertise.

Fighting Back

Larger high-tech firms and industry in general have been searching for ways to combat the aggressive compensation strategies of younger high-tech companies. One popular incentive is a restricted stock arrangement. Here the executives receive stock that is subject to various transfer restrictions until certain performance or time requirements are met.

But perhaps the hottest new incentive is "junior common" stock. Since it was pioneered four years ago by California's Genetech Corp., junior stock has been used by about 40 companies of all sizes. It appears to be an increasingly popular vehicle for high-tech subsidiaries of larger companies. Under this plan, companies issue executives junior shares of their stock at a lower price than their regular common — a $20 share might cost just $2, for instance — or grant it outright. Typically, junior stock provides no voting or liquidation rights, nor does it yield dividends.

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The major downside risk to junior common is that the Internal Revenue Service and the tax courts have not yet ruled on it. The tax consequences and potential compensation expenses of junior common, therefore, are uncertain.

Different Picture

The compensation picture for middle managers and professionals in technology industries is very different from the one for those on the executive levels. Here, extensive leveraging is impractical. (In start-up companies, however, where there may be only one or two engineers at the outset, it is common for these people to get "a piece of the action.")

Salaries, therefore, even in the smaller companies, are usually above general industry averages — in response both to the demand for qualified people and the premium that many high-tech companies situated in high cost-of-living areas (San Francisco and the Peninsula area, Boston and so on) must pay.

At the middle-management level, high-tech companies generally pay at the 60th to 75th percentile of the all-U.S. average. Our own surveys show that electronics engineers, at the technical center of most high-technology enterprises, are paid above all-engineer averages — at least 5% more at the managerial level.

But compensation for middle managers and professionals in high-technology companies differs in other ways. The pattern of supplemental income for these employees is distinct from larger industry. These differences are deliberate — a way for these companies to attract the kinds of people they need.

A Share of the Company

Results of our recent survey of 21 of the larger high-tech companies in the U.S. ($300 million or more in revenues) clearly indicated that the compensation programs within these companies were driven by a desire to maintain a more egalitarian culture. To foster a "team approach," these companies emphasized sharing in company growth. For instance, profit-sharing programs are quite prevalent. Almost half of the companies in the survey had some kind of profit-sharing plan. On the other hand, a Hay/Huggins survey of more than 800 companies in a cross-section of large U.S. industry and business showed that only about one in five companies used this reward device.

In smaller companies, this share-the-wealth philosophy can be extended even further. Cullinet Software, Inc. of Massachusetts, for example, reportedly makes stock options available to its full work force of 800.

Another way that some high-tech companies promote a less hierarchical culture is by eliminating some so-called executive "perks" or by extending them and other compensation vehicles down to broader levels of employees. For instance, while long-term incentives such as restricted stock or stock grant bonuses usually are reserved for officers in large industrial companies, the high-tech companies that use these vehicles offer them to key contributors.

At the same time, the executive perquisites that distinguish between the executive caste and others in the company are less noticeable in high tech. Only one perk — physical examinations — is present in more than half (67%) of the high-tech companies surveyed.

There are special vacation policies for executives in only 14% of the high-tech survey vs. a 40% prevalence in the Hay/Huggins survey. Again, only 14% of the high-tech sample provide loans to executives, compared with 47% in general industry and business. Supplemental retirement plans also were less prevalent — 24% as opposed to 59%.

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In medium and smaller high-tech companies, the distinction between executives and other employees probably blurs even more. There, systems of special perquisites are either very limited or nonexistent.

Key Contributor Programs

On the technical level, many companies face this compensation dilemma: Although technical professionals supply much of the energy and innovation necessary for success, they are rarely eligible for the incentives available in executive compensation programs. How, then, can companies attract, retain and motivate their technical professional corps?

As mentioned earlier, above-average salary is one way. But this feature has its upper limits before it creates problems of "salary compression" — a subordinate's salary too closely approaches that of his superior. Many high-tech firms resort to the so-called "front-end bonus," a bounty of several thousand dollars just for signing on. (About one-quarter of the high-tech firms in our survey indicated that they used this device, compared with only 5% in general industry.)

But the front-end bonus — very popular for geologists and petroleum engineers when oil companies were prospering several years ago — is a short-term compensation vehicle. It actually encourages job hopping rather than employee retention and performance. A better program that high-tech companies are adopting gives a variety of awards to key contributors.

Special compensation practices to reward key contributors and contributions range from recognition awards (from plaques on up to large cash awards) to royalty arrangements for developing a new product. Computer and computer game software is one example of this. One large company reportedly provided personal computers to its employees, with this vast labor pool subsequently developing much of the needed software at a total cost far less than that of funding a research and development team.

But with few exceptions, most key contributor plans are not really plans at all. They are informal, fragmented and inconsistent in their application. Often they are reactive (responding to accomplishments) rather than proactive (encouraging them).

Approach-Avoidance

So while the principle of key contribution seems sound, there is concern over its potential to be counterproductive. As one executive recently remarked, "We reward the few and offend the many." This has resulted in a "approach-avoidance" conflict: Some companies have attempted to develop key contributor programs, only to back off when confronted with the possibility of negative effects and/or administrative difficulties.

Still, even though they may be difficult to develop and administer, soundly built and well-communicated key contributor programs can be effective — even essential. In the high-tech industry, where executives can become instant millionaires and income at the top level is almost open-ended, it is important for the "little guy" to operate in an environment where his special effort can yield some special reward.

Compensation practices, especially in technology industries, will not be stagnant. As companies grow and change, as new tax laws and rulings emerge and as executives and professionals manifest new personal aspirations, reward systems will adjust accordingly. The companies that will retain a competitive edge in the human resources marketplace will not necessarily be those who pay the most. Rather, the winners in the search for talent will be those who pay the best — pay the best people in a way that best suits both the strategic direction of the company and the individual needs of employees on all levels.

About the Authors

J.E. Richard and Michael F. Spratt are senior consultants in the San Francisco office of Hay Management Consultants. Richard specializes in developing compensation programs for executives. Spratt directs Hay consulting activities for high-technology firms.

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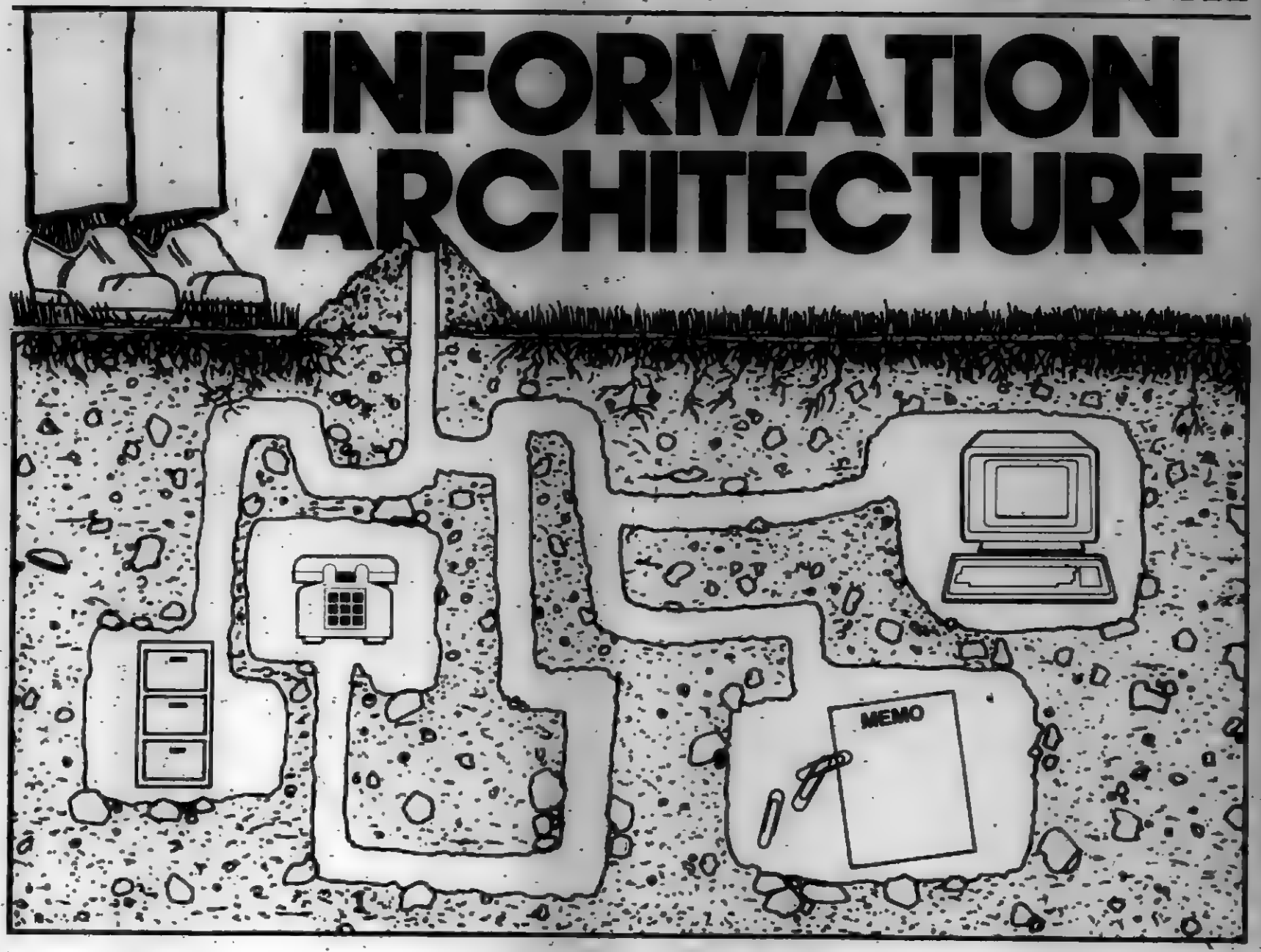
INFORMATION ARCHITECTURE



By Edward Roche

To optimize information management on an enterprisewide basis, MIS can use information architecture — a global depiction of information flow supporting the organization's essential functions. Implementing this information structure requires a two- to five-year perspective.

For the systems development manager, information architecture uses conceptual tools to depict the underlying structure of corporate information flow in a manner intelligible to management. These tools provide a lens to focus on areas where systems development resources can be applied most usefully.

The concept of information architecture and how it may aid productivity is guided by an integrated business overview of the entire firm and its goals. Without such an agreed-upon overview, the organization cannot rationally apply technology to meet basic business needs.

A key decision facing top management of any corporation is how to find areas for investing capital within the corporation that have the highest potential for increasing total corporate productivity. Especially in the industrial sector, which is heavily capital intensive in machinery and physical stock, white-collar occupations are commonly managed as overhead items. Under these circumstances, major capital allocation decisions take place within the context of improving the physical plant. The white-collar section of the "plant" is ignored.

But this is not to say that no capital flows into the white-collar area. Instead, we occasionally find that white-collar expenditures and overhead are shooting upward at a rate exceeding available capital investment in crucial sectors of the corporation. The problem lies in the uncoordinated criteria governing capital allocation.

In the case of plant investment, highly rationalized methodologies are employed for finding the optimum path. However, in the white-collar area, the discretion and standards employed are far less stringent. Since white-collar productivity is thought to be a vague concept (because it is more difficult to measure than blue-collar machine productivity), the stringent rationalizations applied to other areas are usually avoided.

At the same time the white-collar work force is undercapitalized, the information it is handling, manipulating and making day-to-day operational decisions upon is not being managed systematically and rationally. The cost of information — its creation, storage, manipulation and distribution — is impossible to account for in most firms.

Furthermore, various units within firms frequently use different forms of information when the substance is essentially the same: Various information "pools" are located in diverse sections of the organization

IN DEPTH

and growing rapidly, thanks to the expanding power of newer information technologies — first the photocopy machine, later the word processor.

In order for one division or section of a company to communicate with another, information frequently has to be translated into forms, symbols and languages compatible with the recipient organization. The number of clerical jobs with this process of simple translation as their sole function has multiplied. Letters are changed into memos, memos are changed into letters, forms are changed into machine information, ordering information is translated into accounting information, inventory information is translated into sales and marketing information and so on throughout the firm.

As information is transferred throughout the business enterprise, accounting has little control over costs of discrete informational items or over discrete information processes.

With the spread of office automation and management information systems, accounting has improved — but only for machine-held information. Remaining outside the comprehension of standard accounting systems is that vast amount of documentation and bureaucratic process that takes place on paper. In contrast to the MIS department, this vast world of information stores, information processes and information flows is uncharted territory.

Its size is essentially unknown. Systematic rationalizations of its processes are difficult, and results of improvements are impossible to determine. In this world, costs are measured in terms so vague as to raise questions about reasons for measurement in the first place.

Firms are beginning to recognize that information technology can be a strategic weapon in a competitive environment. A fast-moving, transparent, flexible and reactive information system can go far in making those marginal differences in service, price and response time to customers that are necessary to gain market share or retain clients.

Companies such as American Hospital Supply have realized strategic improvements by placing order entry terminals in the offices of customers. And the new Citibank bank-from-home system is clearly an attempt to use the same strategy. Warren McFarlan has frequently argued that the most recent collapse of Braniff Airlines was due in part to its inability to control airline reservation systems.

Need for Comprehensive Model

The drive for improved reaction times of various company units and the increasing need for translation of information coming from other information pools in the firm have resulted in a natural desire that data elements, in either a paper- or machine-readable mode, be made consistent.

Individual decision-making units within an organization, at any level, should be able to receive information or reports concerning other distinct sections of the firm without having to rely on the personnel of those other units to produce the information required. If such a horizontal and vertical reporting structure is to be possible, then the walls separating different information units must be destroyed.

Although in many cases the information barriers, both horizontal and vertical, between different sections of the firm have become more transparent because of demand and frequency of use, this situation has seldom developed according to a well-thought-out plan. Such a plan would ensure that breaking down barriers would not result in creating new ones. It would also ensure a rational prioritization in allocating scarce human and capital resources. It should ensure that the sections of information flow given priority treatment are those that all agree are essential to the effective operation of the firm.

Finally, the plan must ensure that the criteria used for rationalization of information channels and structures within the organization conform directly with the corporation's long-term overall strategic plan, since rational information manage-

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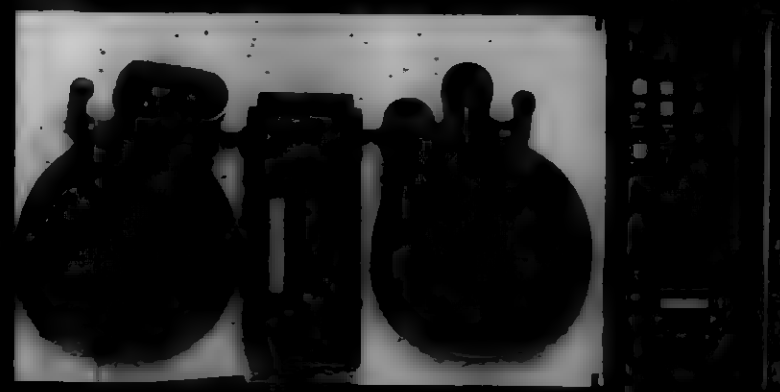

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ment is not a self-contained process independent of the business mission.

Incremental Changes

Information architecture is not being fueled by the realization that information itself, including the way it is processed, its range of application and its timeliness, is the firm's key asset. It is not being fueled by the realization that some overall plan for all information within a firm must be put into place. Nor is it driven by any overarching vision of the corporation as an "information machine."

These holistic and comprehensive approaches to information technology and management are not behind the transition to information architecture. Instead, the concept is driven by a series of incremental changes in the scope of information technology utilization within the firm. Various complexes of intensive information technology utilization are forming at increasingly lower levels, and both employees and managers are recognizing that these information complexes must communicate across departmental boundaries and geographical distances.

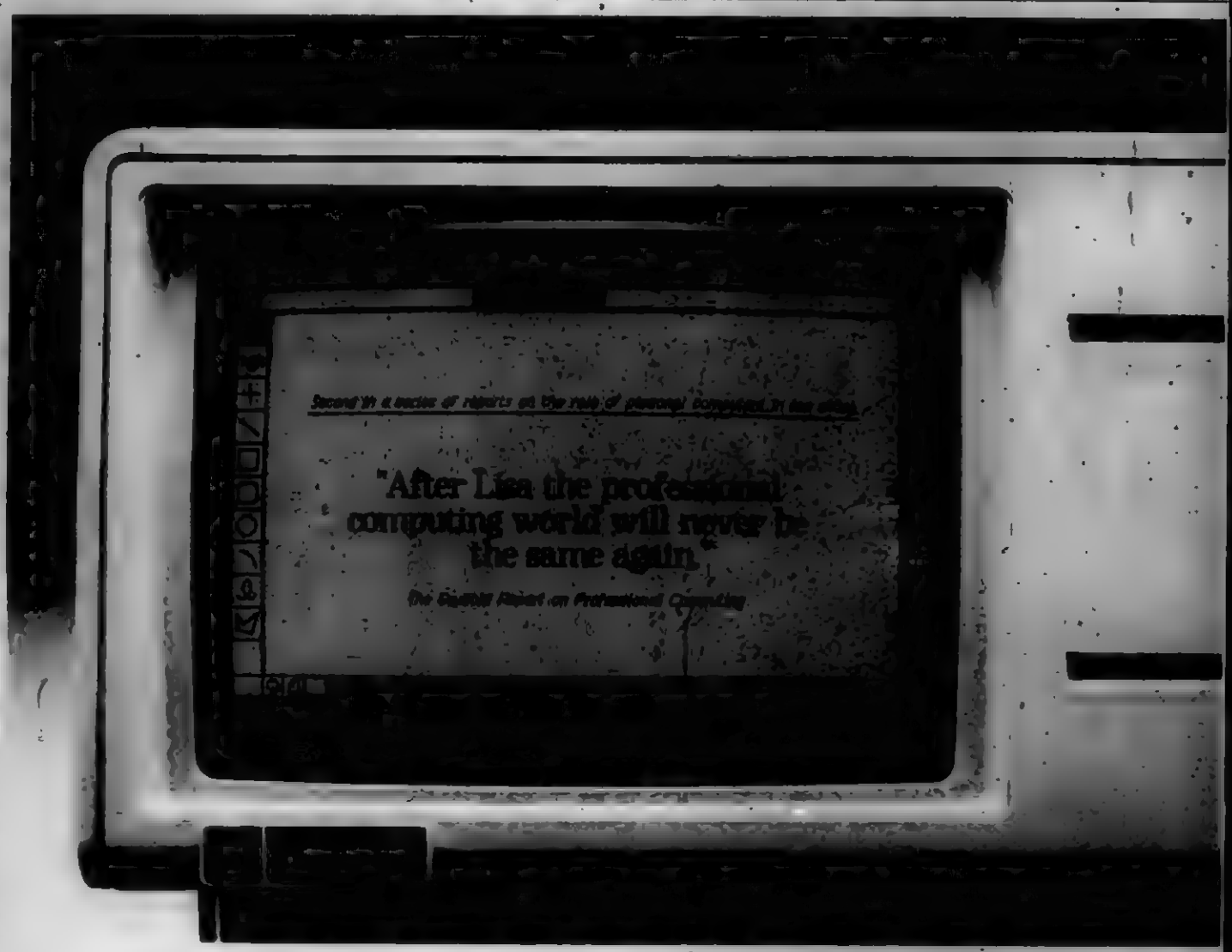
Older designs of MIS systems inevitably depended on a "paper nexus" — a boundary somewhere between the information *machine* and the broader corporatewide information *system*. Thus, an automated parts inventory subsystem, for example, would "talk" to the accounting department subsystem via paper-based intermediation. This paper nexus is being increasingly absorbed by direct hookup of previously unconnected information subsystems.

Piece by piece and link by link, these networks are being built on the foundations of paper-based systems. This information restructuring is a response to the need of information subsystems to maintain the same forms of communication with other parts of the firm as had existed under paper-based conditions.

Information architecture argues that such linkages should be made part of an overall plan. Furthermore, as automation of paper-based reporting relationships and their associated job functions takes place, a window of opportunity opens briefly to the possibility of restructuring not only information definition, but job functions as well.

Although present in all sectors, this trend is most visible in the publishing industry in such newspapers as *The Financial Times* of London, which recently suffered a prolonged strike in part over a proposal to let reporters file their stories directly into an electronic system. The recent strike against AT&T by the Communication Workers of America also in part concerned the perception of possible "deskilling" of service personnel.

The negotiations in 1979 between the Ford Motor Co. and the United Auto Workers union established a National Committee on Technology Progress to ensure workers were "upskilled" to automated processes. These examples point to the risks



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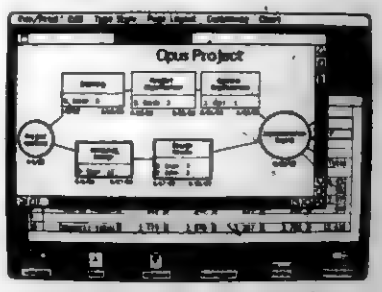

Lisa's revolutionary software® lets users perform several applications simultaneously, even "cut" and "paste" them together. The powerful project management program seen here is a Lisa exclusive.

Lisa replaces complex computer commands with symbols familiar to anyone who's ever worked at a desk.

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To information managers, that means dramatically reduced training time and increased productivity.

But people don't just learn faster on Lisa, they also work faster. Each of Lisa's powerful applications* use symbols and commands common to all. So with little practice, users can move from LisaCalc to LisaGraph to LisaWrite without missing a beat. Or use them all at once, "cutting" information from one program and "pasting" it directly into another.

INFORMATION ARCHITECTURE

and opportunities inherent in aggressive automation efforts.

Information Machine

As efforts are made to transform the paper-based substructure of the corporation to a computer-mediated superstructure, communication between various sections of the firm must take place. This communication must define those linkages that both lend themselves best to computerization and conform with priorities of interdepartmental relationships. As automation of linkages takes place, definitions must be worked out regarding individual communication streams, locations of data bases and sharing of costs for automatization. These definitions, in their final form, encompass the individual data elements.

With huge numbers of data elements in the firm and many interrelationships between fields of data at varying locations under the paper-based system, it is simply a matter of practicality that no comprehensive systematization can be created without a global, corporatewide view that relates all major business functions to their constituent informational components.

The information architecture management approach views the entire organization in terms of its informational superstructure. It also recognizes that as automation of the paper-based substructure takes place, large quantities of information will become redundant. The basic utility of the information architecture approach lies in its ability to consolidate the information and communications functions of the organization in accordance with structural rules derived not from cost/benefit analysis of single applications but rather from the functional principles of the business mission.

Charting Information Flows

Since the entire organization can be defined in terms of its information flows, the task of mapping the detailed informational structure can best be accomplished by starting with a macro-level simplified analysis of the aggregate flows of information and connection between large units of the organization. In the simplest form, the corporation takes in information from the outside environment and converts it to control signals that regulate the processing of raw materials into products.

The simplified model leads to further breakdowns of the categories of information coming into the firm. These include marketing information, intelligence on other companies, government regulations, prices of raw materials, labor demands, orders for products, announcements of new products and many other types of information. Within the firm also are myriad channels of communication and many different "families" of information: personnel records, payroll and accounting, the legal department, inventory management, internal pricing and chargeback.

As raw materials are processed into the final product,

There's even a program—LisaProject—that lets you use the mouse to chart the progress of complex projects, automatically recalculating when deadlines or resources change.

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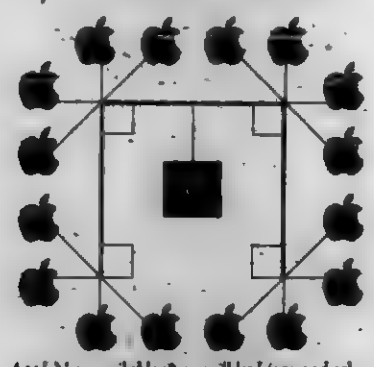

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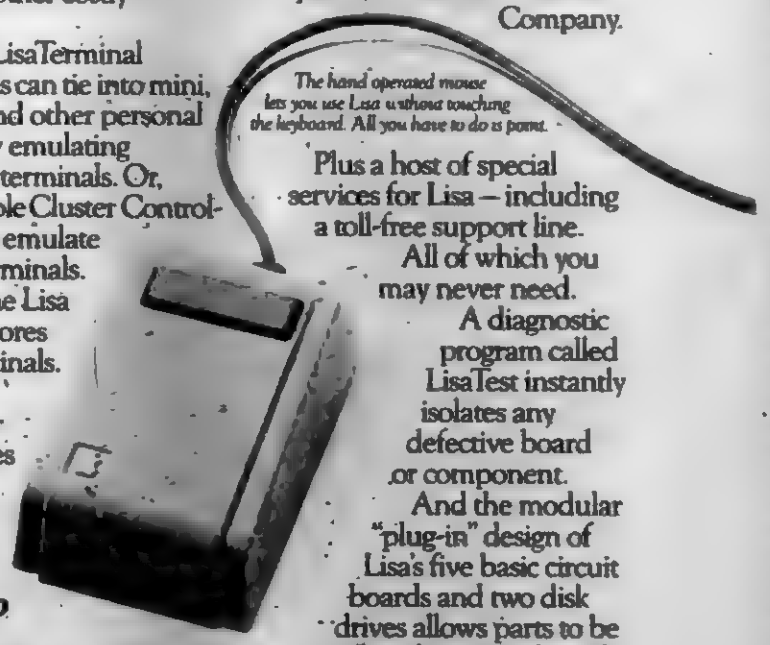

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IN DEPTH

a large but finite number of repeated information flows takes place. Although at first these may appear chaotic, analysis can identify underlying patterns of interaction between different informational units of the firm. As these underlying relationships are discovered, the macro-level generalized representation of the firm is broken down into successively more detailed and refined maps.

At an even more refined level, each communication pattern and channel is broken down into each of the types of information it transmits. These general types of information are then broken down to the individual data element level.

At this point, an entire information map of the firm is completed. It is as detailed as a blueprint for a building and may be called an information architecture. Each level of analysis, from the individual data element level up to the departmentwide or division level, is comprehensible to corresponding levels of management in terms of the other sections of the organization.

Functional Specifications

Once these informational flows and relationships have been identified and mapped, it is possible to trace how far into an organization a particular bit of initially external information goes. Some types of information are absorbed into the organization and quickly digested. Other types of information might be passed along throughout the organization to different levels or divisions. Some types might be combined with information available only from inside the firm and then passed along further.

By tracing the paths of information flow throughout the different functional centers of the organization, it is possible to identify information flows by function. This process helps even further in prioritization tasks.

Ultimately, it has been determined that the patterns of information flow are by no means random. Information flows correspond roughly to hierarchical relationships within the organization. Information flows and functions associated with certain tasks are also identifiable. Since the organization's general business plan goes far in determining priorities for specific business functions, it should be possible, after having completed the above steps, to define needed changes in information relationships.

This can be done by analyzing the capabilities, speed, volume and capacity of the various functionally related communications channels. For information storage and retrieval, frequency of access and other factors should help in deciding the relative importance of each particular information pool or information channel to the function being supported. Obviously, for example, information flows supporting high-priority functions should not suffer barriers.

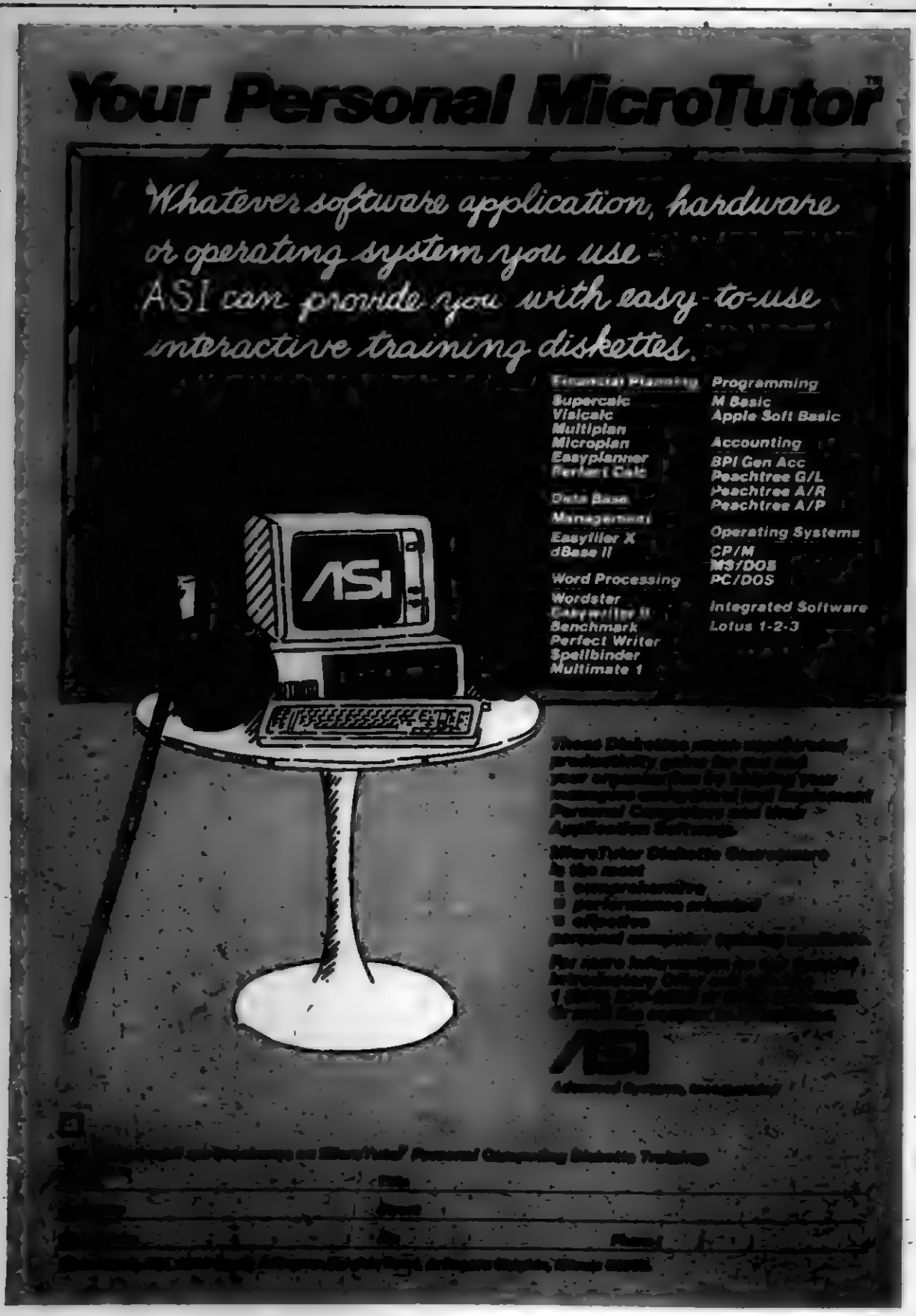
External Interfaces

Another problem being recognized by practitioners of information architecture involves the relationship between those "information accounting systems" pertaining to internally held information and those pertaining to external information.

One must recognize from the start that paying a great deal of attention to the channeling and handling of information within a firm will be ineffective in the end if the structure and volume of information flowing to and from the outside are not also taken into consideration. And the internal department structure should be designed to reflect the types of information relationships it must maintain outside its environment, either within the firm or external.

Without careful information architecture, there may be a tendency to design the operations of a given unit with a view to maximizing its internal efficiency and to design the external interfaces as an afterthought. When each unit is designed to be internally efficient, it might erroneously be thought that the "sum of the parts" — the whole organization — should also be working at maximum efficiency. This line of reasoning ignores the internal communication that must take place within the organization.

Further, for that level of analysis



in information architecture where the firm and its relationships with the business environment are considered, it is wrong to base designs of internal information and communications systems solely on criteria of firmwide efficiency.

Information architecture suggests that from its initial phases, any project to revamp an internal information and communication structure should give the external gateways and interfaces a weight proportional to their relationship to the overall strategic business plan. This rule is applied at the unit level as well.

Weberian Transformation

The commonplace paradigm in organizational theory used to describe the firm revolves around basic concepts best formulated by Max Weber. The Weberian concept of bureaucracy, and thus of business organization, is rooted in a pyramid-like hierarchical formulation of control in which general commands are given at the top and transformed into concrete discrete steps by an army of trained specialists at each lower step of the organization. Generally speaking, command information travels downward through the hierarchical organization, whereas reporting information necessary for intelligent control functions travels upward.

Under this system, the levels at the top of the pyramid frequently become overwhelmed with information. Although the velocity of information within the organization might increase dramatically, information overload can inhibit control function response time, thus harming the organization.

Occasionally, for efficiency, the higher levels of the organization are circumvented through informal communication networks. Rather than continue waiting for delayed responses from higher levels within the organization, individual units communicate with one another and make independent judgments about the most probable trajectory of a decision, based on previous experience.

As the information overload within an organization increases, these informal networks become more important because higher levels of the organization cease to exercise effective control and monitoring.

Information architecture recognizes that, at some point, these informal lateral networks are more important than the formal hierarchical system, traditionally measured in terms of span of control.

Generally, the reduction in effective span of control caused by increasing hierarchically flowing volumes of information can be mitigated to some extent by:

- Increasing velocity of information.
- Increasing selectivity of control information.
- Vertically delegating control functions.
- Increasing number of decision makers at the top levels of the hierarchy.
- Increasing number of effective control decisions.
- Reducing amount of information required to make the same operational decisions.

'If products are expected to change in response to a cycle, it is natural to expect entire industrial sectors to do the same. Such an adjustment is impossible if the information systems — the nervous system of the organization — are hardened into a rigid structure.'

However, these traditional techniques for handling information overload ignore the potential of the informal networks that are inevitably built up within the organization.

Information architecture would solve the span-of-control problem by first focusing analysis upon the functionally determined control networks operating within the firm. In contrast, traditional analysis would make remedial changes based on

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hierarchically determined control networks. Thus in the old paradigm, much effort might well be focused on packing more and more decision support capability at the higher levels of an organization, whereas an information architecture analysis might recognize that control can remain decentralized.

Surge Capacity

Using information architecture, priorities for allocating information technology are based not solely on the level of perceived internal demand, but rather on the relationship between that demand and priorities identified in the business plan. Of course, those sections of the organization that have experienced overloading during peak periods and that are crucial to the conduct of business in a short-term environment would be designed to accommodate any surge in business activity.

The integration of this capability into the design of a firm's information flows is particularly crucial in high-transaction, high-velocity business sectors. Seasonal or market-induced changes in demand can be large enough to harm the organization's competitive position if it should fail to meet the unexpected demand surge.

One indication of fundamental change in the infrastructure of industrial society is the shortening of the product cycle. Economic policy has also had an effect upon the MIS environment insofar as capital available for investment has become more scarce. Increasingly, the argument is heard that just as separate products are subject to a product cycle, so too are entire industries. Analogously, if products are expected to change in response to a cycle, it is natural to expect entire industrial sectors to do the same. Such an adjustment is impossible if the information systems — the nervous system of the organization — are hardened into a rigid structure.

While virtually any information and communication system can be changed in response to industrial restructuring, a key question obviously is, "How much does it cost?" Information architecture would ask, "To what degree has the information system been designed to change its structure quickly — and inexpensively?"

To a certain extent, some of the same concerns that arise in designing a system for expansion also occur when designing a system for change — for example, modularity of peripheral and subsystem interconnection, transportability of hardware, ability to add on major computer interfaces. However, information architecture would recognize that the base of information structural change is the actual business requirements and corporate information flows, not the hardware systems that have been installed.

Organizational Benefits

Adopting a comprehensive information architecture approach will result in several tangible benefits to the organization.

1. Achieve Political Consensus.

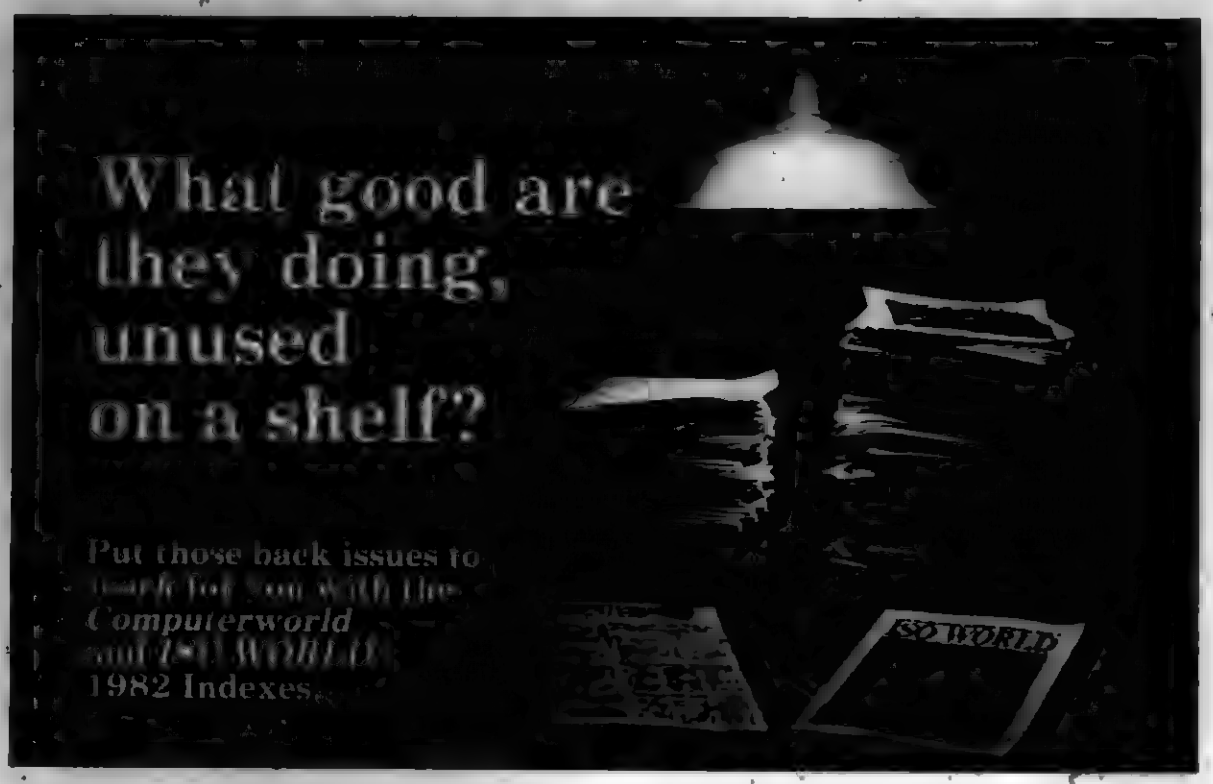
Information architecture may begin both to address and to diminish the problems of perception that are straining relations between users, management and MIS. It does this by helping to communicate clearly how information processing and flows relate directly to specific business needs and activities.

Although a key barrier to the effective use of information architecture is politics, significant technical problems must be solved as well. The demonstration of tangible benefits that may accrue leads to a powerful political strategy for implementation.

When there is disagreement on the issues, political considerations tend to win out. Information architecture helps eliminate conflicting beliefs by promoting a common view of the business.

2. Speed and Service With Higher Revenues.

The quickening of information velocity throughout the firm directly increases the productive capacity of each employee and business unit. Decisions are improved and customers get better service. Information technology, therefore, can become a key factor in the firm's strategic



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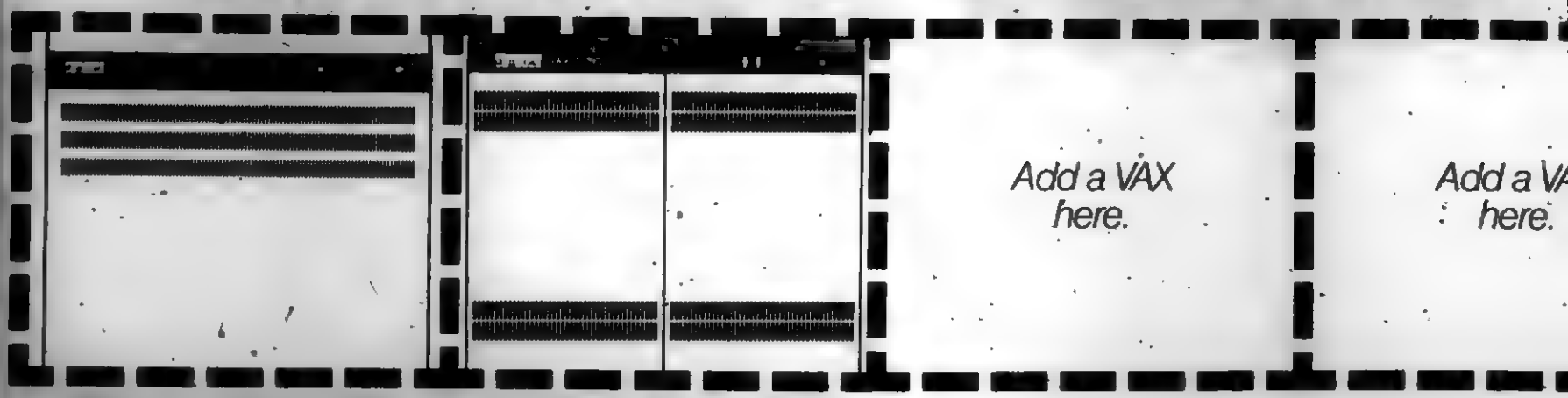

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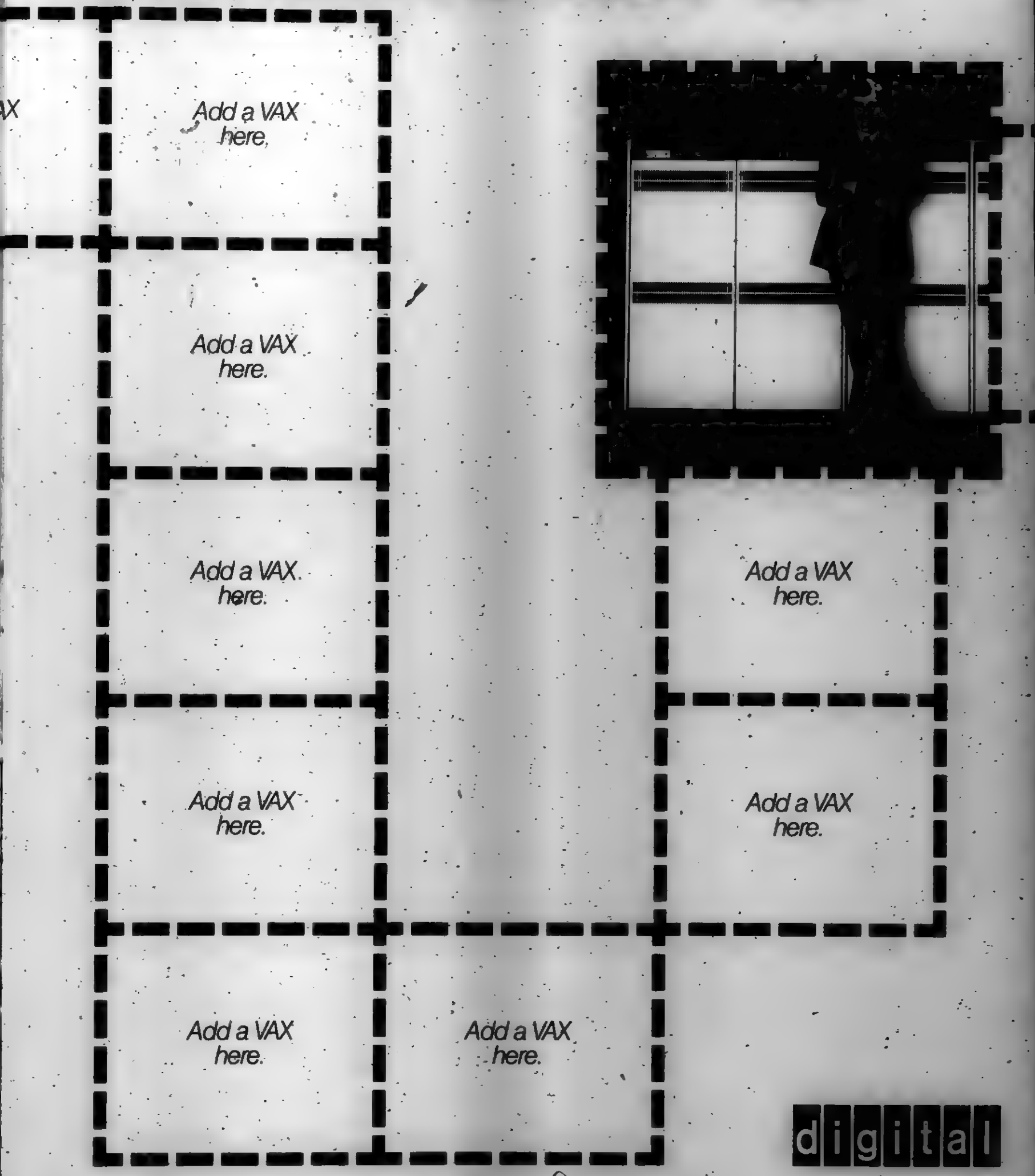

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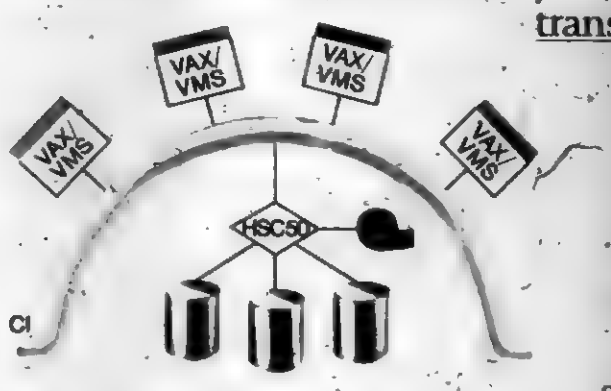

A VAXcluster is a loosely-coupled, multi-computer system with globally-shared data. Globally-shared data means that all mass storage devices are available to any user connected to any host. A cluster is comprised of VAX system processors, the HSC50 mass storage server and the Computer Interconnect. These components can be mixed and matched in almost unlimited ways to respond to growing application demands.

Digital's new HSC50 and the VMS operating system make this possible.

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Each HSC50 supports over 10 gigabytes of disk storage. Since a cluster can contain many HSC50s, you can build a common file system of huge proportions while minimizing the cost of your mass storage investment.

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Protecting your wealth of information.

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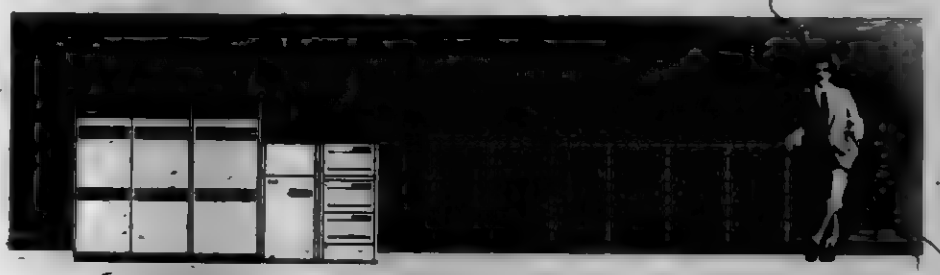

Among them: Common Journaling to track file system activity as it happens and provide a precise means of recovering from failure. Recovery Facilities to protect the data from corruption. Checkpointing to protect each user's investment in computation. And a Distributed Lock Manager to synchronize access to common resources across the cluster.

In a VAXcluster system, information becomes the corporate resource it should be. Each user in the cluster, performing his or her highly specialized task, relies on the same body of information.

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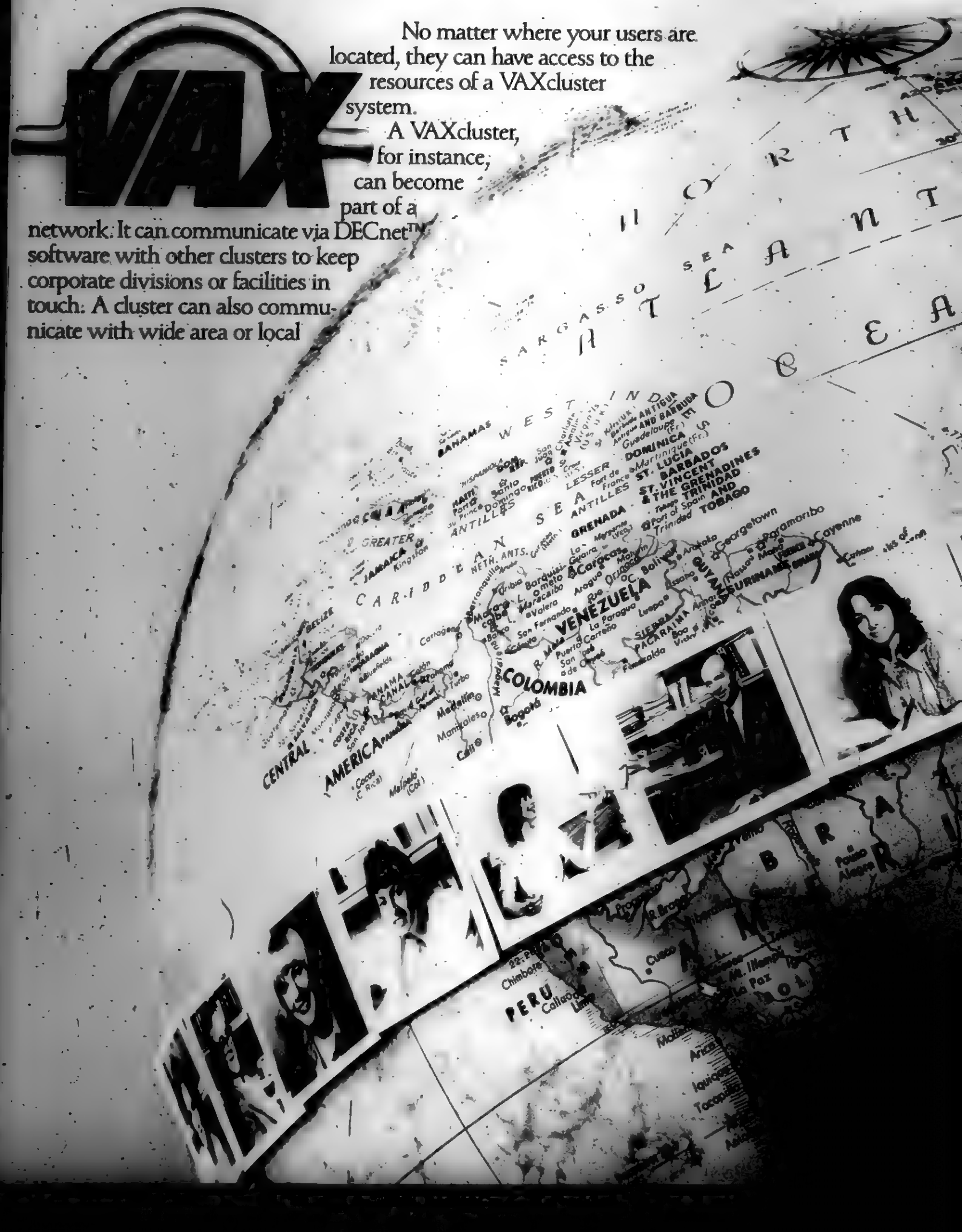
No matter where your users are located, they can have access to the resources of a VAXcluster system.

A VAXcluster, for instance, can become part of a network. It can communicate via DECnet™ software with other clusters to keep corporate divisions or facilities in touch. A cluster can also communicate with wide area or local



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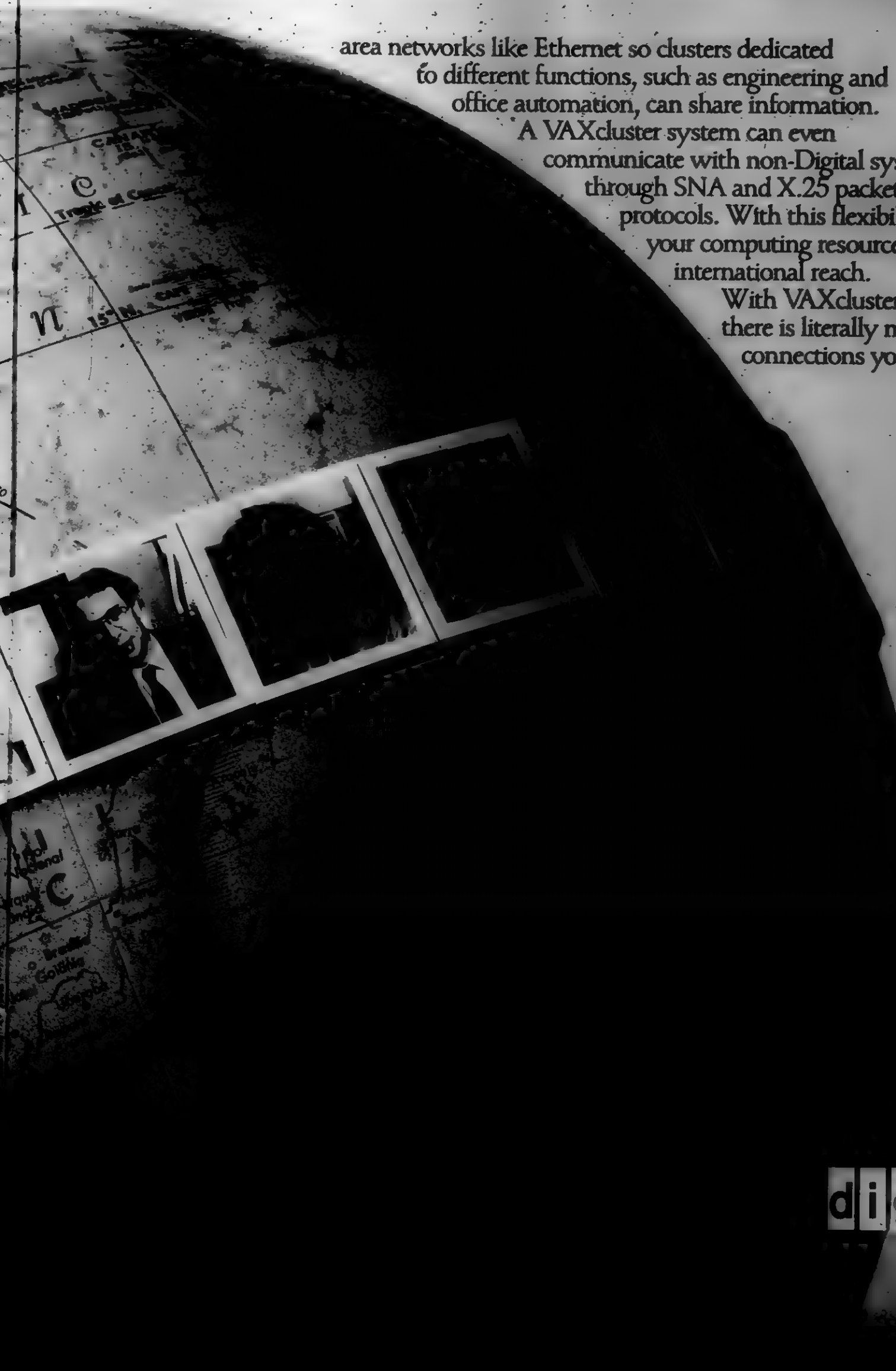

area networks like Ethernet so clusters dedicated to different functions, such as engineering and office automation, can share information. A VAXcluster system can even communicate with non-Digital systems through SNA and X.25 packet-switching protocols. With this flexibility, your computing resources can have international reach.

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development and competitive strategy, rather than merely an overhead item.

3. Rational Allocation of Resources.

A comprehensive information architecture approach should facilitate distribution of scarce information and communication resources so that they map more closely the firm's inherent information structure and its associated flows. To the extent that allocation of scarce resources is made in accordance with overall need determined by business mission, that allocation approaches rationality.

4. Security.

Information and data security within corporations has long been hampered by the artificial division between the paper world and the machine world. Corporations have built up elaborate mechanisms for protecting computer-held data only to find that once information is created in paper form, it easily flows to places where it could do potential harm to an individual or to the organization. As information technology spreads throughout the firm, and thus as increasing amounts of paper-held and manipulated information are absorbed into the machine domain, some improvement in ability to protect corporate information can be expected.

As the number of end users increases in the interactive environment, security administration will become a greater problem, since it is frequently found that individual access profiles must be set for each employee, a process that is not yet highly automated. Certain Western European governments will soon require presentation of corporate data protection plans. An overall security plan not meeting standards will be de-licensed.

Information architecture can help this process by enabling the corporate security officer, either within MIS or working in conjunction with MIS, to grasp quickly the possible avenues of "leaks" of important information from one system to the next. Instead of having to classify information at the data element level, information architecture should allow aggregate summarizations of security classifications, thus simplifying the process.

Another important factor is that not only data, but written documents, reports and memoranda can be equipped with an "audit trail" listing the number, type and time of each access. Each time a document is printed rather than read on a CRT screen, a record would be made. The amount of connect time would also be recorded, along with various other factors useful to security analysis. Ultimately, documents themselves could be encoded with an "information structure domain," which would specify the limits within the corporate information system beyond which they could not be transmitted or accessed.

'Information and data security within corporations has long been hampered by the artificial division between the paper world and the machine world.'

5. Flexibility for Change.

The adoption of information architecture should enhance a firm's long-term survivability by adding flexibility for adjustment to severe destabilizing fluctuation in the environment. Dropping departments and divisions, cutting or adding workers, forcing speed-ups in production and stretching out activities without substantially increasing costs should be more manageable and controllable.

Flexibility of information and communications structure should also enhance the ability of aggressive employees to learn more and take on increased job responsibility as they pick up competence. Organizational units being temporarily underutilized should be able to switch over and take on other tasks, which have

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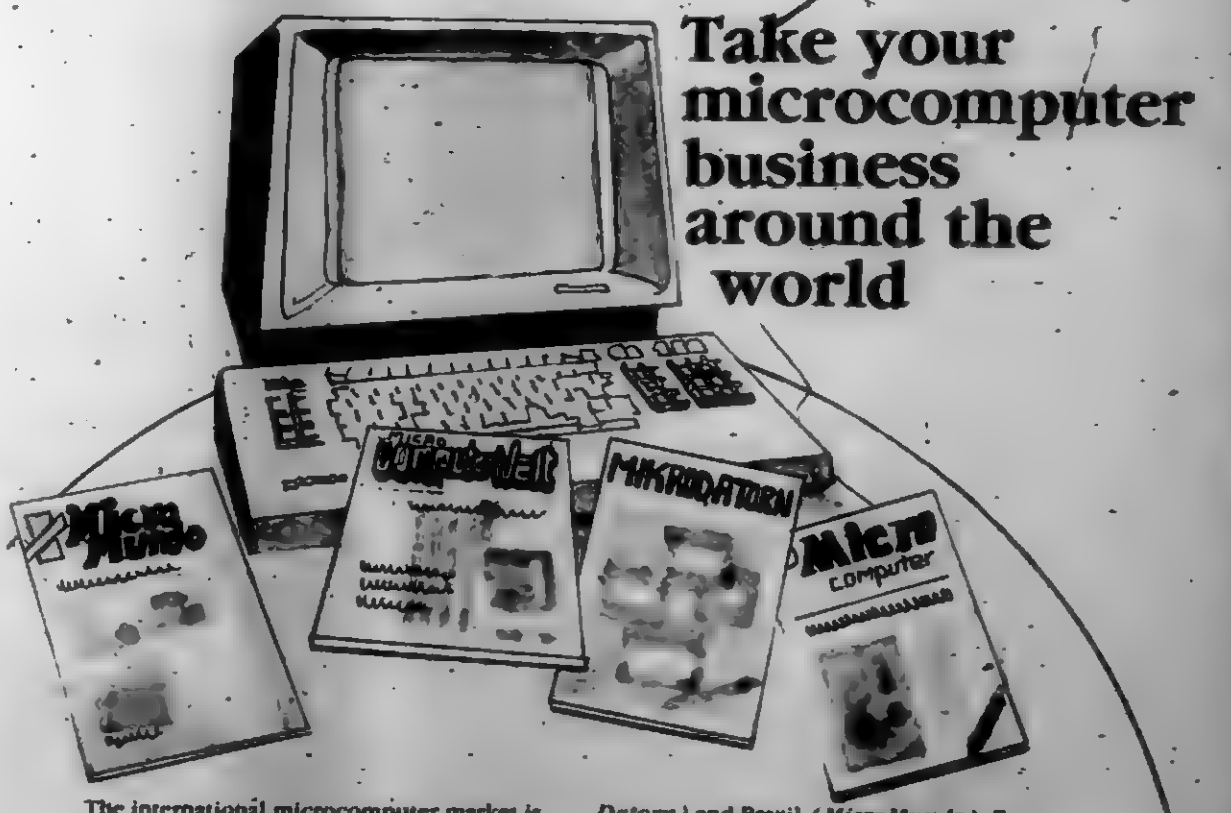

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"spilled over" from another section of the organization, on a temporary basis. If a corporatewide system is properly planned, this switch over would be possible without substantial hardware, training or software problems.

6. Inventory of Systems and Identification of Backlog.

In the past, MIS used various tools for setting priorities, including project backlog lists, which indicated that the average months of backlog can vary nationally from an average 26 months to five years. Other tools used include system narratives and specialized technology for documenting systems. The global and systematic overview provided by information architecture should yield a clear view of the backlog, but as defined by more comprehensive criteria than usual. The inventory of systems that should accompany any information architecture project will show where the concentration of effort and investment is likely to have the broadest payoff.

7. A Note on Frameworks.

As there is no standardized methodology, information architecture should define an internally consistent language that bridges the communication gap between management and MIS. As it is applied to successively more detailed levels of the organization and as the individual data element level is approached, the fundamental properties, characteristics and internal logic of that language should not change.

When the focus shifts to how applications of technology can be directly related to strategic business issues, it should be realized that information architecture is not solely a technical solution. In fact, the technical side may be the least important. The key to the approach is that it provides a tool to communicate with and build consensus among nontechnical user managers and with senior management. All management should be able to discuss key issues coherently with reference to how information technology can be applied to meeting the business requirements of the enterprise.

About the Author

Edward Roche is an associate at The Diebold Group, Inc. in New York. He organizes the Diebold Research Interchange Service, a nonprofit organization that has reciprocal arrangements with a variety of institutions around the world. The service publishes a bulletin that summarizes ongoing research projects in high-technology, communications and management fields.

Roche is currently writing his doctoral dissertation in the Department of Political Science at Columbia University. The dissertation will focus on the political process within the Department of State Advisory Committee on Transborder Data Flow.

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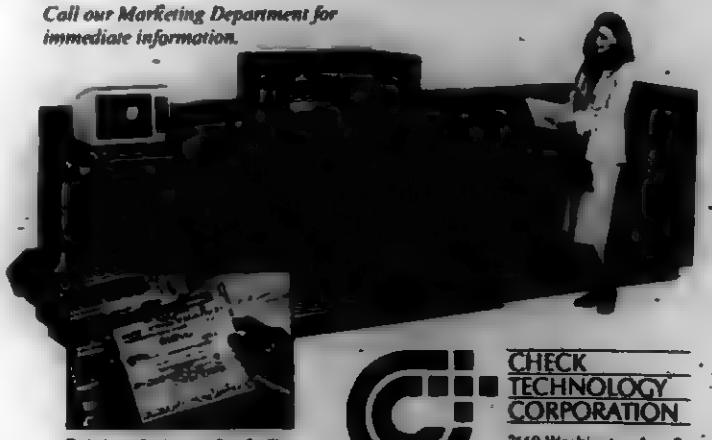

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Education Before Change In Systems Implementation

By Gloria S. Bronsema and Peter G.W. Keen

The complex process of developing large-scale information systems is too often marked by failure. During the past decade, several methods have emerged to improve the development process. They are: 1) systems development life cycle — a methodology for project management that focuses on planning, not coding; 2) software productivity tools, including structured methods, automated design and documentation aids and walk-throughs; and 3) implementation strategies — strategies that concentrate on managing organizational change caused by new technologies and systems.

The focus of this article is on the last method — implementation strategies. There is a growing body of conceptual and empirical (descriptive and prescriptive) research that provides the basis for implementation strategies that are as well-formalized as the systems development life cycle. The implementation cycle is the behavioral equivalent of the systems development life cycle. It emphasizes consulting skills and facilitation and defines the role of implementor as that of change agent.

We will first discuss implementation education as the vehicle for change. One study indicated that the likelihood of success in an implementation effort increases substantially if there is a strong commitment to use education to lead the implementation process, rather than to use training to follow it. Two additional studies suggested that education has the potential to be a major, formal component of the implementation cycle.

We will discuss the principles that were used in one particular education intervention workshop called "Preparing for IPS" (Integrated Processing System). The workshop was given in a major bank, hereafter referred to as Megabank, in a country we will call Hyperion. (A central branch is generally regarded as a single country.) The purpose of the education intervention workshop was to prepare middle managers for a large-scale systems implementation in which their commitment and participation were crucial to its success.

A Case Study: Megabank-Hyperion. Integrated Processing System is a real-time processing system that integrates the major services and products of an international bank, Megabank. IPS is a strategic innovation in terms of the bank's technology, business activities, work flows and organization. Although the system was originally intended to be highly generalized, in practice, substantial local modification was needed to adapt it to the local banking procedures, government regulations and market characteristics.

The success of this system, which is being implemented in more than 60 countries, has varied widely. In some countries, IPS has been disastrous — behind schedule, disruptive and expensive. In other countries, however, implementation has gone relatively smoothly.

Megabank Hyperion is a medium-size central branch and is just beginning the IPS implementation. Responsibility for implementing IPS in Hyperion falls to the operations division, known as the "back office" of the bank. Operations handles all aspects of processing, including

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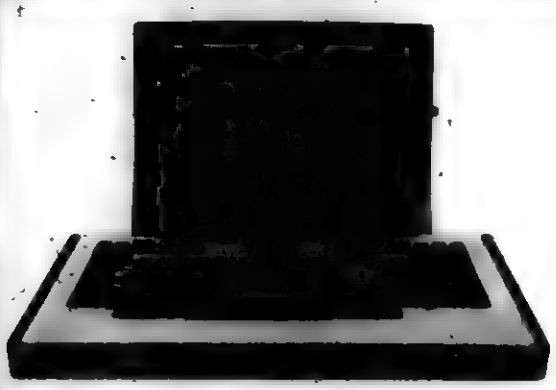

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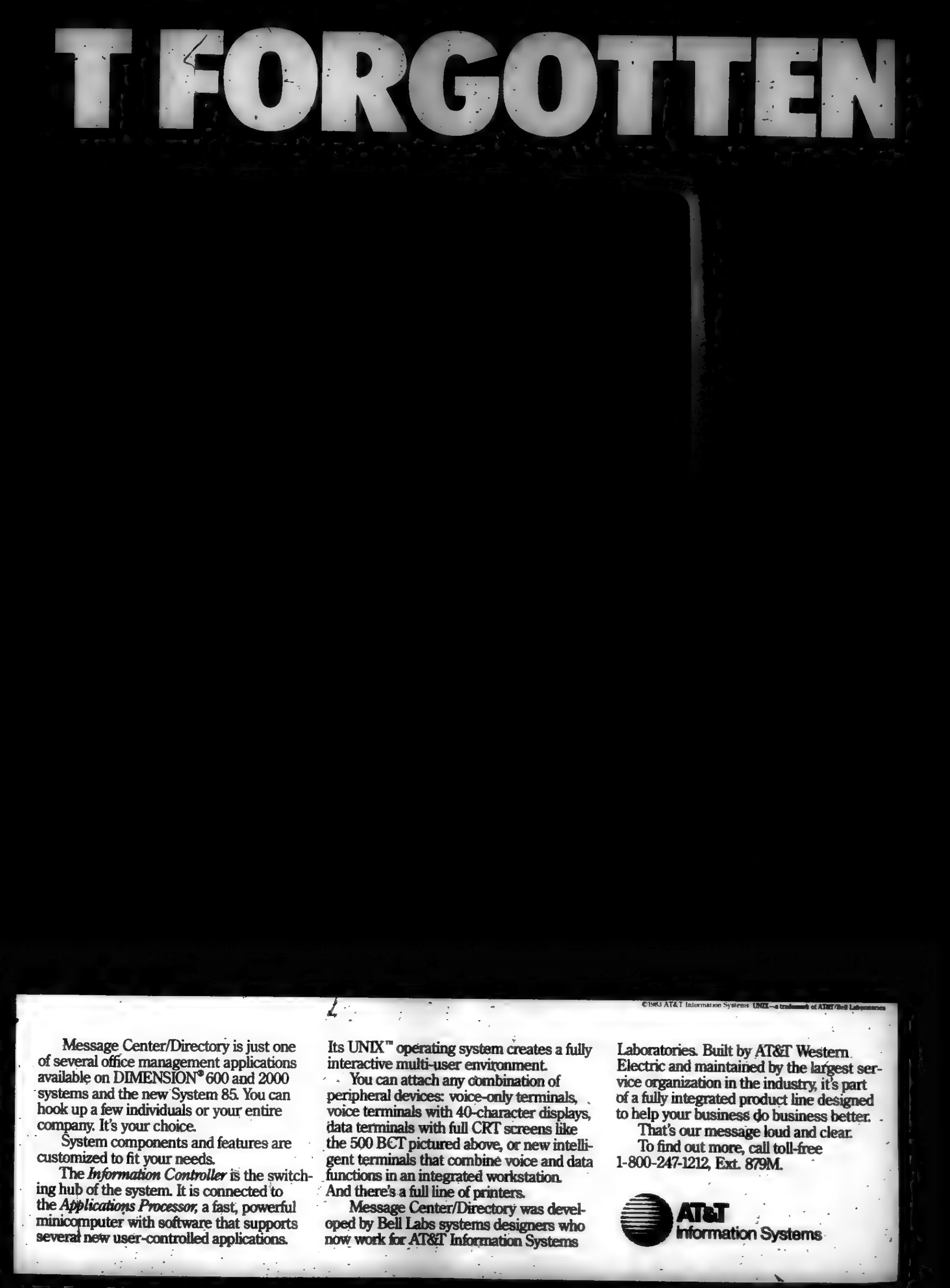

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computer components. The marketing division, known as the "front office," has up to now focused mainly on loans. But because the worldwide corporate banking market is rapidly changing, credit-based products (loans) are only marginally profitable. Growth in revenues and earnings depends on asset-based and fee-based services, such as leases, balances and trade financing. It is essential that the implementation cycle involve both operations and marketing divisions because IPS will serve as the technical base of Megabank's marketing strategy for electronic banking.

There is, however, a distinct culture gap between the marketing and operations personnel in Megabank Hyperion. Marketing personnel are considered the "elite," and they know little about computers. Operations personnel, including systems personnel, are psychologically and physically isolated from marketing, as is the case in most branches.

IPS implies a major shift in how the bank should function. Thus, in order for the IPS implementation to be successful, this culture gap will have to be closed. Although many managers speak of the need for "user involvement," marketing does not want to participate. Hyperion's attempts to narrow the culture gap and to involve others in the implementation of IPS have thus been largely unsuccessful. The question is, "What should or could Hyperion management do next?"

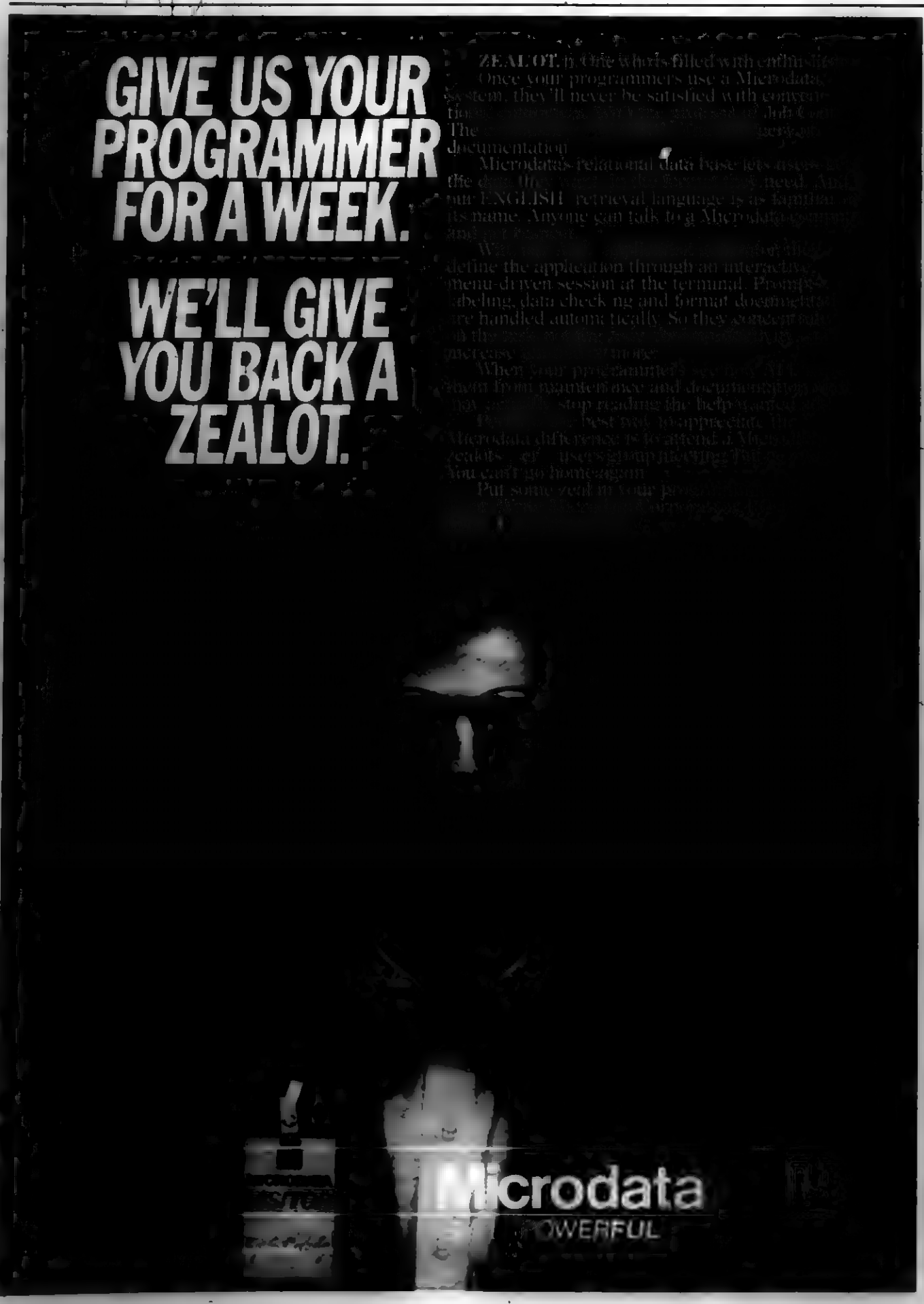
Since the bank's need at that point was to change people's attitudes and actions, some intervention aimed at achieving this end was needed. While a training program had been tried before, it had largely been ineffective. This time, Hyperion went outside the organization for help. Hired as external consultants, we were asked to develop a workshop that was explicitly aimed at "technology mobilization" for IPS.

The main objectives of the IPS workshop were: 1) to close the culture gap by changing attitudes between operations and marketing and 2) to ensure that participants understood the implementation plans and the need for initiating actions on their own (action creation). The workshop was based on general models of implementation, with case studies and structured interviews being integral parts of the design process.

Eight Principles

Our particular work — the design and delivery of the workshop — was based on eight general principles. The principles are grounded in implementation research. We believe these principles are valid and valuable and can serve as general guidelines for the design of future education interventions. Our design was based on the following principles:

1. Use data from the participants' world as the basis for examples and discussions.
2. Demonstrate senior management commitment.
3. Provide a forum for participants to express concerns and to get answers to their questions.



4. Provide an opportunity for action.

5. Move the sequence of events; that is, begin with the concrete, move to the abstract, then to the reflective and finally to the active.

6. Limit the number of participants: select a heterogeneous group.

7. Select a teacher with research, consulting and teaching skills.

8. Conduct follow-up activities.

Each of these principles is discussed in detail.

1. Data from the participants' world. Information technology is at the same time both concrete and abstract. The concrete components are the hardware and the program code, and they can be presented clearly in any course or seminar. The abstract components, which are so often critical in implementation, are not so clear or easy to discuss. These abstract components include:

- General psychological, organizational and political issues.
- Management process.
- Systems-user culture gap.
- "Resistance to change."
- User involvement and management commitment.

These abstractions must be made concrete so participants can move from principles to procedures, from ideas to action, from intentions to commitments.

In many ways, education for implementation is a form of action research. A key first step is to identify feedback to the organization regarding its perceptions, problems and needs. Hidden agendas must be brought out, and examples and discussions based on the participants' context (not on some distant, general and semirelevant case) must be presented.

We developed a general approach to collecting such data and have applied it in many settings. Using this approach in Megabank Hyperion, we spent approximately one week interviewing 30 people at all levels of the organization. A structured interview format was used to focus on:

- The subjects' knowledge and perception of the information system and the implementation process.
- How their work is likely to be affected by it.
- Their expected and anticipated role in the implementation.
- Their views on how and when a course, seminar or other education intervention could help smooth implementation.
- Their recommendations on what management should be doing to help provide commitments, resources, directives and mandates.

The Hyperion interview data revealed consistent, well-articulated areas of concern that needed to be

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discussed openly. Managers often had an incomplete or even inaccurate understanding of their own organization, especially of the lower levels. For example, they tended to assume that subordinates had more understanding of the system and its goals than the subordinates really did; or, the managers ascribed more commitment and involvement to subordinates than really existed.

The interview data also provided a base for writing a case to be used in the implementation workshop. Case studies are useful components of any course on implementation. Too often, however, the case is a disaster study. Using such a case has several disadvantages. It associates computer systems with failure and provides only negative guidelines: "Don't do the stupid things these people did!"

For this particular IPS implementation workshop, we developed a case study that showed a fairly successful implementation strategy. The workshop focused on issues raised in the interviews, such as: 1) the need for user involvement to be real and sustained; 2) the importance of liaison roles; and 3) the need for careful phasing, which may conflict with management's wish to speed things up and meet artificial deadlines.

The case was presented as a development effort similar to Hyperion's. It was a form of "faction" — factual fiction. In other words, the terminology, jobs, concerns expressed and potential problem areas in the case more or less matched Hyperion and IPS.

Implementation Effort

Implementation is a dynamic process including cognitive and affective components. The stakes are often high; people see computers as affecting their sense of self, their jobs and skills, politics and organizational relationships. It is hard to elicit these perceptions and processes except by letting people express their views in their own way. We therefore view our research as a form of detective work and discovery.

There are contradictory perceptions of "fact," subjective perceptions and historical factors that shape the context of the implementation effort. The data collected via the structured interviews is a form of text to be analyzed in terms of themes, motifs and key words, in the same way as a literary text is.

Both implementation research and implementation education benefit from being rooted in the data taken from people's own words. The "texts" from the interviews were integral to the design of the IPS workshop and to the case in particular. The use of anonymous quotations from the interviews gave a concreteness, immediacy and "relevance" to the education curriculum and process.

Obviously, it is more expensive to spend one to two weeks interviewing than it is to use "off-the-shelf" material to design a workshop. But whether it is effective to do so, in terms of cost/benefit trade-offs, depends entirely on the behavioral objectives of the education effort. If the goal is information sharing rather than action creation, off-the-shelf components may be fully adequate. But we conclude from our experience in Hyperion and elsewhere that the investment in collecting data to

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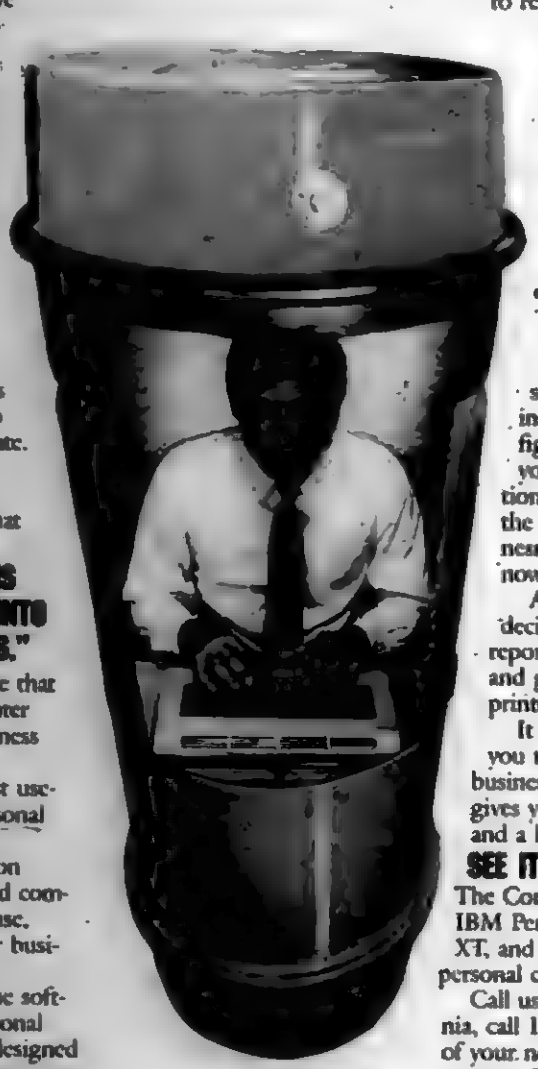

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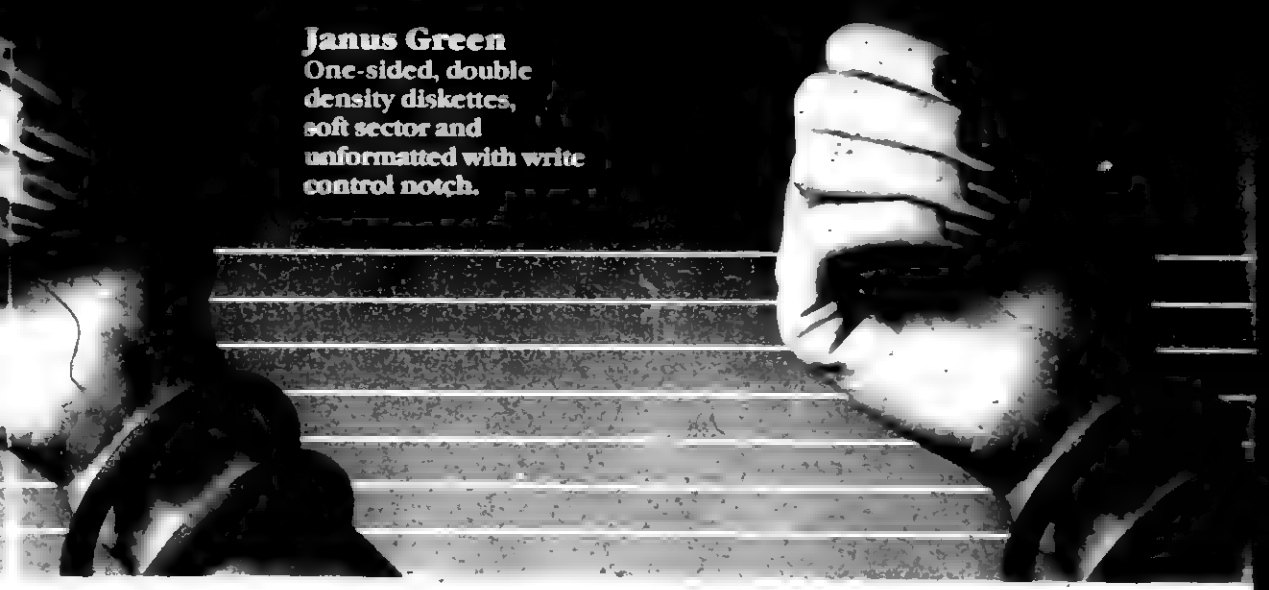

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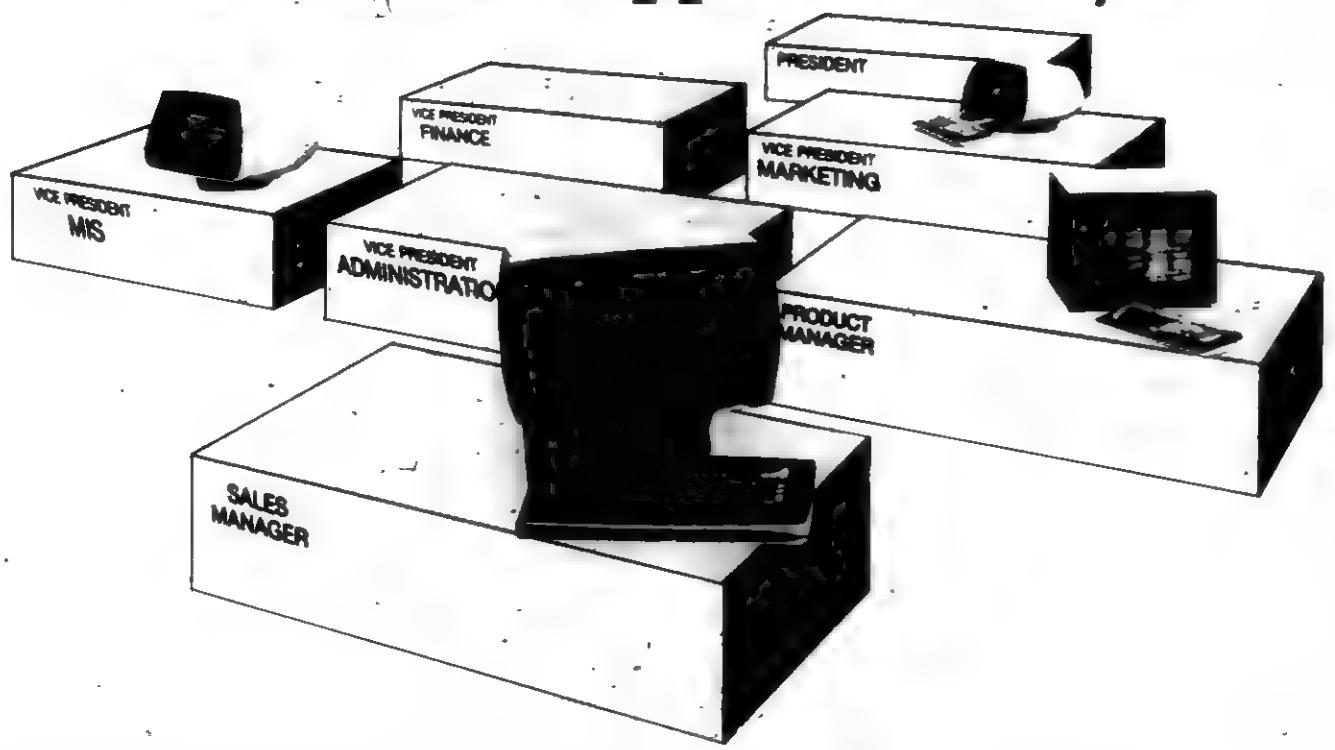

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IN DEPTH

ground the content and process in the participants' reality is often essential to make education a mobilizing force for implementation.•

2. Senior management commitment. The need for senior management commitment is well established in the MIS implementation literature. With IPS, virtually every manager interviewed spoke about his commitment. However, there is a catch: What is commitment? Is it an expression of support, a willingness to allocate funds and staff, active leadership or a statement of expectations? While many senior managers see their verbal statements as "commitment," their subordinates watch what they do rather than what they say.

Effective commitment involves a public investment of time, prestige and attention. In other words, the manager's position, prestige and success are linked to the success of the implementation effort. The manager provides authority and accepts accountability. Subordinates who are given authority are also *de facto* held accountable.

It was clear from the IPS interviews that subordinates tried to decipher what management's real intentions were, and they ascribed motives and set their own agendas according to their deductions. Lack of senior management commitment or inconsistent commitment was an important signal to others in the organization. This finding was very relevant, and we made it clear to Hyperion's senior managers, particularly to the country head, that there was little point in designing an IPS workshop unless they demonstrated — not just stated — their commitment. Such a commitment required that the country head explain the wider goals and context of IPS, instead of leaving it to the staff to work out the details. (Not surprisingly, workers often assume that the main intent of the organization is to reduce head count or beat the unions.) Thus the country head and head of operations addressed workshop participants to clarify the business aims that led to IPS and to outline the overall planning process, roles and phasing.

In addition, workshop participants had the opportunity to indicate in writing what additional actions, resources or information were needed from senior management. Unanswered questions, unresolved issues and suggestions for implementation were presented in a memo to senior management at the end of the workshop. A week later, the country head scheduled a meeting of senior managers and workshop participants to discuss the memo: Concrete expressions of commitment should not end with the last day of the education intervention.

Unless senior management continues to play an active role in the implementation process, it is unfair to ask subordinates to make commitments that depend on managerial involvement. Valid tests of senior managers' commitment are their willingness to be subjected to awkward questioning by subordinates, to go on record and stake their prestige and to respond to their subordinates' statement of needs.

Since the McKinsey Corp. study established commitment as a key factor for effective implementation, it has been accepted as conventional wisdom. We agree. However, our case studies suggest that when examining "commitment," one needs to pay particular attention to the perceptions of subordinates as well as to top managers. Only then can concrete mechanisms be developed for communicating senior management commitment to the rest of the organization.

3. Forum. The paradigm of implementation as a process of social change within the organization is the theoretical base that guided our research, as well as shaped the design of the IPS workshop. A key theme in this paradigm is that "resistance" needs to be viewed as a legitimate response from an organizational system that sees the cost of change as being greater than the expected benefits.

The teacher should encourage and respond to the open expression of resistance, not smooth it over or suppress it. The process of "getting it out" is necessary. As one workshop

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participant said: "You talked about your problems and frustrations. It was good that people talked; it was perfect. People had to talk, to get it out, or it would have been a mistake."

A key conclusion we drew from case studies in general was that implementation requires an educational forum as the base for information sharing, attitude change (that is, open expression of concerns and needs and mutual understanding), action creation and skill building. It seems clear from normative empirical discussions of user involvement that such forums are an essential component of any strategy for involvement. Furthermore, we believe that involvement, commitment and communication require a forum.

4. Action. Many of the participants did not consider Hyperion's earlier IPS training efforts to be relevant to their jobs. While training involved information sharing, it did not lead to the "unfreezing" that has been identified as a first step in effective organizational change. The Lewin-Schein (1969) model of the consulting process has three stages — unfreezing, moving and refreezing — and has been adopted by many MIS researchers.

Information sharing is unlikely in itself to lead to unfreezing. What is required is attitude change. In turn, attitude change may not help the moving stage: Methodologies for planning and explicit commitments are needed.

As previously discussed, the workshop was designed to put management at risk and to challenge it to demonstrate commitment. It was made clear to the country head and to the head of operations that the vague goodwill concepts of commitment and involvement must be translated into action. Participants were told they had the right to expect commitment and involvement from senior management. At the same time, participants were asked to act and to make plans for their own involvement and commitment.

"User," "involvement," "commitment" — words matter. A major concern in the design of the workshop was to define the behaviors that represent these words. Methodologies and planning frameworks were provided to help the participants translate words and attitudes into actions.

Workshop sessions moved toward specific definitions of roles and specific commitments. Most of the participants had never been involved in a major computer project. Nonetheless, they were ready to become "involved," but needed a vocabulary and set of methods to do so. Project phases, milestones and tasks were explained.

As there frequently is a passivity among staff in user departments, they have no idea of what they could or should do. The workshop also focused on roles: The teacher helped participants define who does what, not just what is to be done. Besides clarifying roles, the participants initiated role playing, and there was substantial active experimentation, particularly through the use of the case study.

'While training involved information sharing, it did not lead to the "unfreezing" that has been identified as a first step in effective organizational change. Unfreezing requires attitude change.'

5. Sequence of events. Obviously, the exact content and sequence of sessions in a workshop will vary depending on the nature of the new system, the technology, the organization and the characteristics of the participants. Bearing this in mind, we believe there are some general rules about sequence of events that should be considered. Kolb and Frohman introduced a model of learning that focuses on four modes: 1) concrete experience, 2) abstract

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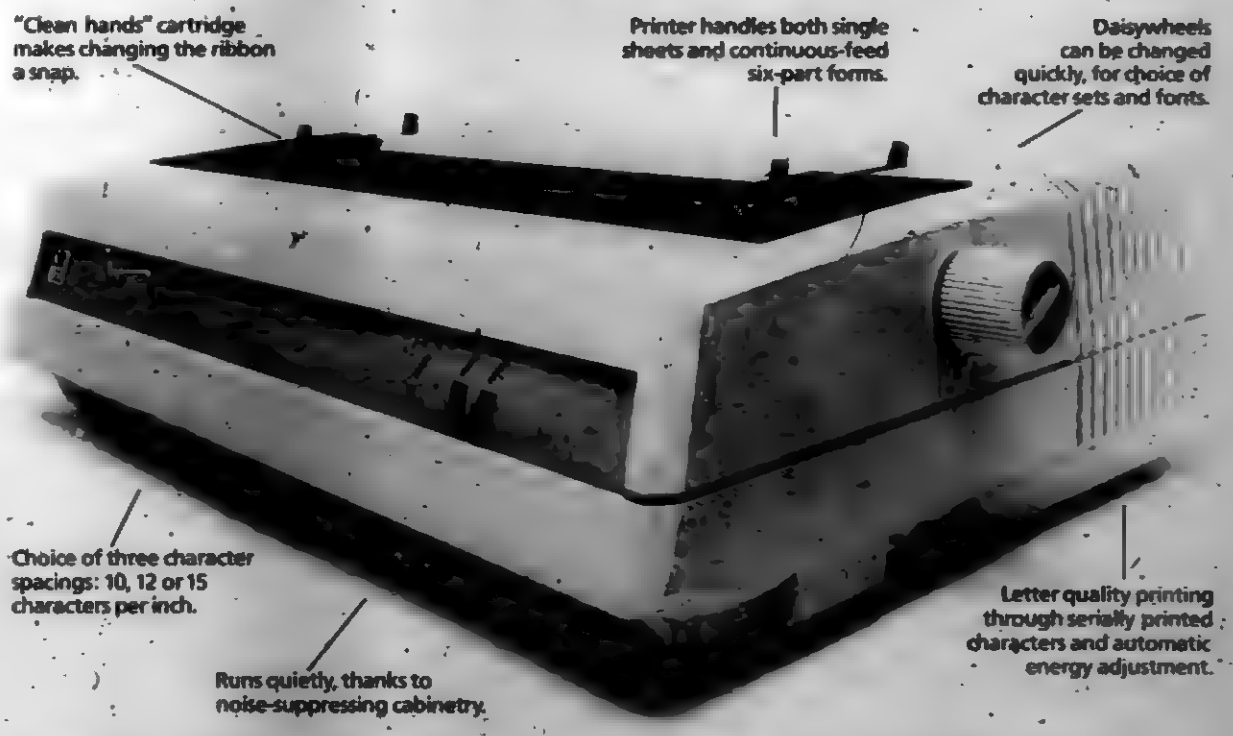

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IN DEPTH

conceptualization, 3) reflective observation and 4) active experimentation. In retrospect, the IPS workshop was consistent with this model.

Concrete experience. The first session of the IPS workshop began with a hands-on exercise in which computer games were used to create "funds" that were transferred to bank accounts using IPS-type technology. This exercise served several purposes: It broke the ice, reduced fears of the machine, established the potential usefulness of IPS and, above all, made IPS concrete.

Abstract conceptualization. The next few sessions described the business goals and context of IPS in terms of abstract conceptualization of the Kolb-Frohman model. The complex analysis of the economic, market, political and organizational considerations that lie behind the decision to introduce an innovation of the scope of IPS may be well understood by senior management and many of the technical staff. However, the complexities are seldom understood by users. For this reason, a workshop session was spent reviewing trends in banking, competitive strategies and business goals that lead to IPS.

The workshop next discussed the likely impacts of IPS on people and jobs. Only after these discussions did the workshop describe the technology behind IPS.

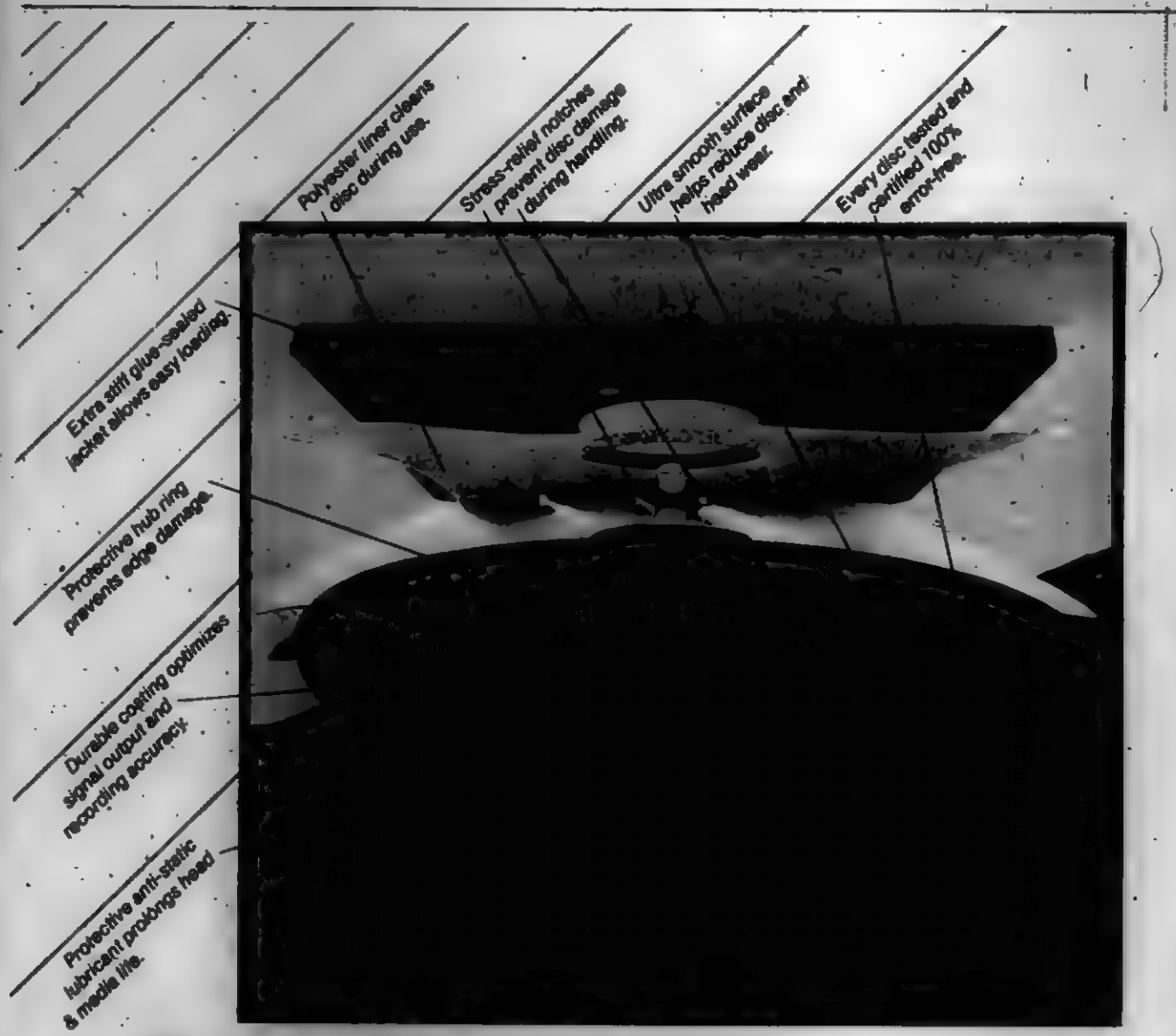
Reflective observation. The following workshop session began with a case study. As previously discussed, the case study was faction: It was similar to Hyperion's IPS implementation story. In this session, role playing was encouraged. The case was followed by an exercise called "Red Flags/Green Flags." The "flags" were anonymous quotations, many of them made by Megabank employees in Hyperion.

"Red flags" were quotations that signaled implementation problems. For example, "Technologists and business managers — it's a dialogue of the deaf!"

On the other hand, "green flags" were positive implementation signals. For example, "Technologists know the system and business people know the market. We need each other; we teach each other."

The flags were instructive in themselves, providing early warning signals and a basis for diagnosis of the participants' organization. Words are powerful; quotations are concrete. The use of quotations led the participants to work to relate the teacher's material to their own situation and to take positions.

Active experimentation. The participants' positions were shaped, extended, modified, explained and used in the final and longest segment of the workshop — planning agenda. The teacher presented a methodology for planning and a detailed framework and checklist for action. Project phases, timetables and issues were discussed. In relation to these discussions, participants defined their roles, commitments and actions. The workshop ended with the composition of a memo to senior management in which



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participant questions and suggestions were expressed.

As stated earlier, the content, pace and sequence of events of a workshop depend on many situational factors. But a workshop needs to have a structure that moves participants forward via concrete experience, concepts, reflection and experimentation. In this respect, education is a dynamic process, and the IPS workshop was in itself an implementation effort, beginning with the unfreezing stage and ending with the moving stage.

"The workshop was a jolt to many: It seemed to have facilitated a culture integration through a culture clash. It was also seen as manipulative by some. In one way, education is manipulative, no matter how "participative" its intent."

6. **Number of participants/heterogeneous group.** A group of 10 to 15 participants is optimal. This size group is large enough to represent a diversity of opinions and yet small enough to provide the opportunity for all participants to contribute.

The second issue is the composition of the group. The culture gap between marketing and operations in Hyperion was probably no larger than it is in many other companies. Lack of mutual understanding between end users and systems personnel is extremely common in most organizations. While it is easier to build consensus within a homogeneous group, it is impossible to address actively solutions for a "culture gap" with such a group.

In Hyperion, marketing and operations personnel below the senior-management level had never before taken a course together. One participant stated that the workshop was "the first time marketing and operations had been in the same room together." Therefore, it is not surprising that at times there was substantial conflict among workshop participants from different functional areas. This was intended: The culture gap became a culture clash. The "Green Flags/Red Flags" game and the case study seemed to help people recognize the gap and clash and consequently to try to integrate the two departments.

7. **Teacher.** The role of the teacher is complex. We define it as that of an adviser combining and moving between the roles of teaching, research and consulting. Teaching is trust; that is, presenting general principles and methods and classroom management. Research is knowledge; that is, presenting data from this and other settings and providing theories and frameworks. Consulting is action; that is, giving advice and expertise.

The adviser needs a range of skills, for implementation education would be ineffective or incomplete if any of the skills were missing:

1. Teacher-researcher, with the consultant role missing: The workshop would be too abstract.

2. Teacher-consultant, with the researcher role missing: There may be a credibility gap as the teacher is seen as "selling" something.

3. Researcher-consultant, with the teacher role missing: Classroom skills are vital; there is a need for formal transfer of information and teaching of methodologies and concepts.

The supply of qualified advisers is a major constraint on effective implementation education, just as the shortage of qualified process consultants, liaison staff and change agents hinders implementation itself.

8. **Follow-up.** Most follow-up research of corporate education programs tends to focus only on "happiness quotients" (that is, students are asked to rate the quality of the teacher and their own satisfaction with the course). Hyperion's training center staff distributed a teacher evaluation questionnaire to workshop participants. The teacher received an average rating of 8.6 on a

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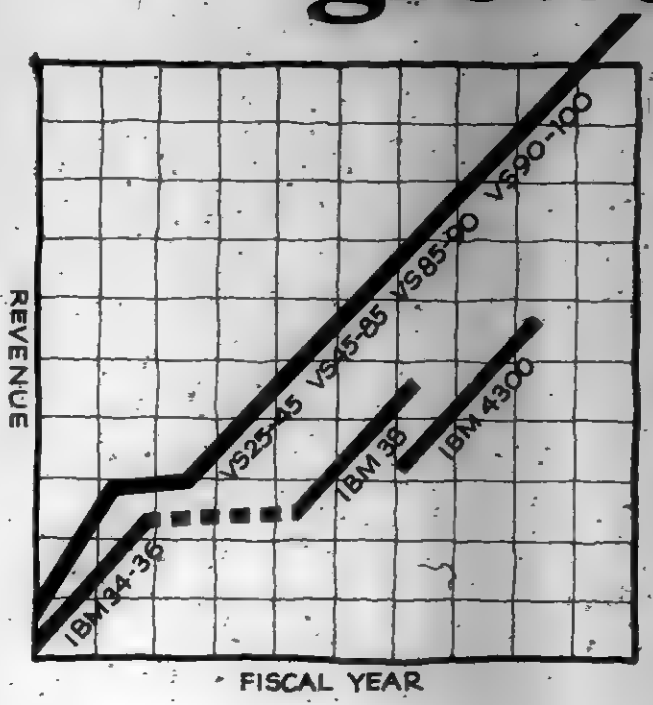

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nine-point scale, ranked on nine variables.

This information, however, did not tell us if the behavioral objectives were met, if the curriculum should be modified or if the course should be offered to others. High ratings may have little or nothing to do with learning. In assessing the impact of the IPS workshop, we were more interested in the satisfactory actions it stimulated.

The issue of follow-up is linked to that of behavioral objectives. It is almost meaningless to evaluate a program for which clear operational goals are not defined *before* implementation. After the IPS workshop, we interviewed all the participants to assess the immediate impact of the workshop in relation to the stated objectives.

Close the culture gap. The first objective was to close the culture gap. The workshop was a jolt to many: It seemed to have facilitated a culture integration through a culture clash. It was also seen as manipulative by some. In one way, education is manipulative, no matter how "participative" its intent. People in the marketing department spoke of a new feeling of commitment to IPS after the workshop. The following comments were typical:

"Don't get me wrong, the course was very good, but it was brainwashing!"

"This workshop is called 'Preparing for IPS.' You should change the name to 'Committing to IPS!'."

"Before this workshop, I was *told* I would be a part of IPS. After the workshop, I *feel* a part of it."

Create action. The second objective was to create action. Since the main goal for the workshop was to influence action, its success mainly depended on follow-up activities directly initiated as a result. Recommended actions by participants included: 1) sharing information and experiences with colleagues; 2) pushing the workshop down to junior-level and up to senior-level employees; and 3) meeting with senior management.

Over the next month, several actions were initiated. Workshop participants met with the country head. The meeting proved fruitful, both as another forum for operations and marketing to share information and ideas and as a vehicle for new commitment for further education.

Regarding further education, an operations manager was assigned to be responsible for IPS training in Hyperion. However, when he was interviewed, the manager admitted he felt uncomfortable with his new role and said: "The problem is *how* to educate — with terminals, with conferences . . . with what?"

This remark is disturbing. The workshop was a force for unfreezing: It broke open the status quo and stimulated an awareness of the need for a wider, deeper education effort at all levels. The workshop also led to a significant increase in the resources committed to and the priority placed on education as part of the IPS implementation process in Hyperion.

However, without a plan for education strategies and methodologies, increased resources are unlikely to yield results. The long-term impact of the workshop and of the increased resources allocated for education can only be guessed at. The future will largely depend on Hyperion's ability to determine how to educate.

The principles described here may be valuable for designing and delivering a single education intervention to address issues inherent in implementing computer technology. But regardless of the success of one intervention, without a long-term, comprehensive education strategy, the workshop simply could have been lots of "sound and fury signifying nothing."

About the Authors

Gloria Bronsema is an independent management consultant based in Boston. She is a consultant to multinational corporations on the organizational impacts of the implementation of computer technologies.

Peter Keen is chairman of Micro Mainframe, Inc. in Cambridge, Mass. His current research interests lie in the areas of decision support systems, telecommunications and business policy and strategic computing education.

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CSO to Emerge From AT&T Divestiture

By Katherine Hafner
CW Staff

LIVINGSTON, N.J. — Perhaps the most prominent new acronym to emerge from the Jan. 1 AT&T breakup will be CSO, which stands for Central Services Organization.

Simply put, the CSO is the local companies' version of Bell Laboratories. Recognizing that the optimal setup would not be to disperse such an organization throughout the nation, but to maintain a central facility in New Jersey, the local companies each own an equal portion of the CSO, and the board of directors is made up of a representative from each region.

AT&T's goal is to have the CSO in full swing by Oct. 1 in preparation for the final split three months later.

Staffed mainly by former Bell Labs employees, the CSO is smaller and a bit different in its focus than its progenitor. While the main thrust of Bell Labs is toward research and development, proportionately less of the CSO staff will conduct pure research and must thus be more selective in its research endeavors.

"The CSO is really a continuation of the kind of work Bell Labs was doing for AT&T and the telephone companies in the past," explained Larry Bernstein, assistant vice-president for information systems development. "But there are certain areas of work we won't be involved in, such as developing integrated circuits or hardware development for switching systems."

According to Bernstein, another fundamental difference between Bell Labs and the CSO is that while Bell Labs routinely endorsed Western Electric's equipment, the CSO will not endorse any one equipment manufacturer.

"We'll analyze what's available, give suggestions as to performance and analyze reliability," Bernstein said, "but we won't make any recommendations. It's strictly a technical report."

The largest department at the CSO is the technical services department for developing generic plans and software to help the regions design and manage their communications networks, a CSO spokesman said.

(Continued on Page 66)

CSO Will Have Seven Sister Firms For Cellular Radio

The Central Services Organization, the offshoot of Bell Laboratories to go into operation when AT&T's divestiture becomes official Jan. 1, will have seven sister organizations devoted to cellular mobile radio.

AT&T's current cellular operation is called Advanced Mobile Phone Service, Inc. (Amps), a separate AT&T subsidiary. As of Jan. 1, Amps will be broken up into seven separate regions, each of which will act as a subsidiary of the corresponding regional holding company, according to Christine Davies, a spokes-

(Continued on Page 66)

DCA's INA, Concentrator, Mux Get IBM-Compatible Products

NORCROSS, Ga. — Digital Communications Associates, Inc. (DCA) has announced IBM-compatible products for its Integrated Network Architecture (INA), a network control concentrator and a bit-synchronous time-division multiplexer.

The Binary Synchronous Communications (BSC) Transport System (INA/BTS) is said to transport data formatted under the IBM 3270 BSC protocol through a DCA INA network.

The capabilities of INA/BTS include host selection in an IBM BSC environment, transmission of both 3270 synchronous and asynchronous data through the same telephone line, elimination of the overhead of poll/response through the network and efficient satellite links, a vendor spokesman said.

INA/BTS is available for a starting price of $995.

The Asynchronous Terminal Controller (INA/ATC) allows asynchronous Ascii terminals — either directly connected or connected via dial-up to the DCA network — to communicate with an IBM or IBM-compatible computer using 3270 BSC or Systems Network Architecture protocols.

Prices for the INA/ATC start at $8,950.

The company has also announced its Network Control Concentrator (NCC) for its INA series of networks. Working in conjunction with the DCA Series/300 network processors, the NCC collects and integrates exception reports from network processors throughout the entire network and allows the operator to direct commands to any processor and receive replies at the terminal, according to a vendor spokesman.

The NCC is available for $4,995.

Also introduced was Megalink, a bit-synchronous time-division multiplexer said to provide voice and data transmission in addition to network management and diagnostic capabilities.

Available in tabletop or rack-mounted enclosures, Megalink comprises its own stand-alone network or integrates into any DCA network. Megalink's features also include: trunk speeds from 50 bit/sec to 2.048M bit/sec, support of 128 ports up to 256K bit/sec and integrated voice and data support with four ports of digitized voice per interface card.

Megalink is available for $3,800.

More information is available from DCA, located at 303 Technology Park, Norcross, Ga. 30092.

Mohawk Offers SNA Capability For Series 21 Line

PARSIPPANY, N.J. — Mohawk Data Sciences Corp. has announced the availability of IBM's Systems Network Architecture (SNA) communications capability on the vendor's Series 21 family of distributed processing systems.

Designed to encompass both batch and interactive communications, Mohawk Data's Intelligent 3270 emulator reportedly enables Series 21 users to satisfy communications requirements within a multistation network environment.

The product allows the Series 21 to attach to an SNA network and permits the Series 21 to appear as an SNA remote batch terminal, enabling it to communicate with and function as a remote extension of a central site batch teleprocessing program or subsystem within an SNA environment.

Pricing begins at $1,500 per system from the vendor at Seven Century Drive, Parsippany, N.J. 07054.

Control Concepts Announces 3274 Protocol Controller Unit

MANASSAS, Va. — Control Concepts Corp. has announced the 3274 Protocol Controller, an addition to its line of IBM-compatible controllers and terminals.

According to the vendor, the 3274 functions like an IBM 3274 controller for up to 32 asynchronous Ascii terminals and printers. It is available in both IBM Binary Synchronous Communication and Systems Network Architecture/Synchronous Data Link Control models and can be configured with four to 32 ports. Setup is via a series of menu panels.

The 3274 can support over 100 models of Ascii terminals, including the IBM Personal Computer. Additional support of personal computers, color terminals and keyboard send/receive printers, password protection and graphics can also be configured, according to a spokesman for the vendor.

Starting price for this product is $4,950 from Control Concepts, 12004-B Balls Ford Road, Manassas, Va. 22110.

Display Station Unwrapped

SANTA CLARA, Calif. — Datastream Communications, Inc. has announced a multifunction display station said to be the first in a series of displays designed for use with its IBM 3270 Binary Synchronous Communications and Systems Network Architecture remote cluster controllers.

The 178 Display Station reportedly is compatible with IBM's 3178 and Digital Equipment Corp.'s VT52 terminals and can be used for minicomputer or time-sharing applications.

Its keyboard includes all features of the IBM 3278 keyboard, plus some operator productivity features found only on the IBM 3290 plasma display keyboard, a vendor spokesman said.

Features reportedly include a cost-effective, flexible alternative to 3178 terminals, access to IBM and minicomputer hosts from a single display station, networking flexibility for printers, enhanced IBM 3290-style keyboard functions, dynamic reconfiguration of 3270 keyboard layouts on an applications basis, ergonomic design and compatibility with any serial RS-232 Ascii printer.

The 178 Display Station costs $975 from the vendor at 2520 Mission College Blvd., Santa Clara, Calif. 95050.

Bell Labs' Offshoot to Handle Cellular Radio

(Continued from Page 65)

woman for Bell Atlantic, one of the seven new regions.

The cellular solution promises to solve the problem of overcrowding of radio channels for mobile telephones. Unlike traditional mobile systems, which work through high-powered central base stations, cellular radio works through a series of different cells, each containing its own low-powered transmitter.

Since cellular communications allows for frequency reuse, there is little restriction on the number of mobile radios that can be operating at a time.

The extent to which each regional company delves into cellular services depends on its own level of interest, according to Davies. The individual regions will also be responsible for preparing applications to the Federal Communications Commission in order to obtain licenses.

In Chicago, for instance, the American Information Technology (Ameritech) region in the Midwest will be the first in the nation to provide cellular services to its customers this November. The Chicago service will be called Ameritech Mobile Communications, Inc., and the equipment for the system will be supplied by OKI Advanced Communications of Hackensack, N.J., and Motorola, Inc.

The Pacific Telesis Group (Pactel) covering California and Nevada will operate a cellular unit called Pactel Mobile Access.

Bell Atlantic Mobile Systems is the name for the Bell cellular subsidiary in the Atlantic states, and Southwestern Bell Mobile Systems, Inc. is the name for Southwestern Bell's subsidiary.

AT&T Split To Form Arm For Research

(Continued from Page 65)

Five subsets of the technical services department are: the technology systems area, to provide technical and operations systems support for the networks; the applied research area, to keep the regions up-to-date on technology; the information systems development area, to design and develop operations support systems; the network planning area, to provide planning support for network and operations systems architecture; and applied research, to conduct research in science, math and computer systems.

For day-to-day operations support, the engineering and operations area will provide support on switching, interoffice facilities, distribution services, operator services and special services.

In addition to technical planning and basic research, the CSO will provide the operating companies with many of the services formerly offered by Western Electric and AT&T's general departments.

On the nontechnical side is CSO's administrative services, representing a distinct minority (7,200 out of 8,800 CSO employees are in technical areas). This division will preside over access tariffs, personnel, finance and industry relations.

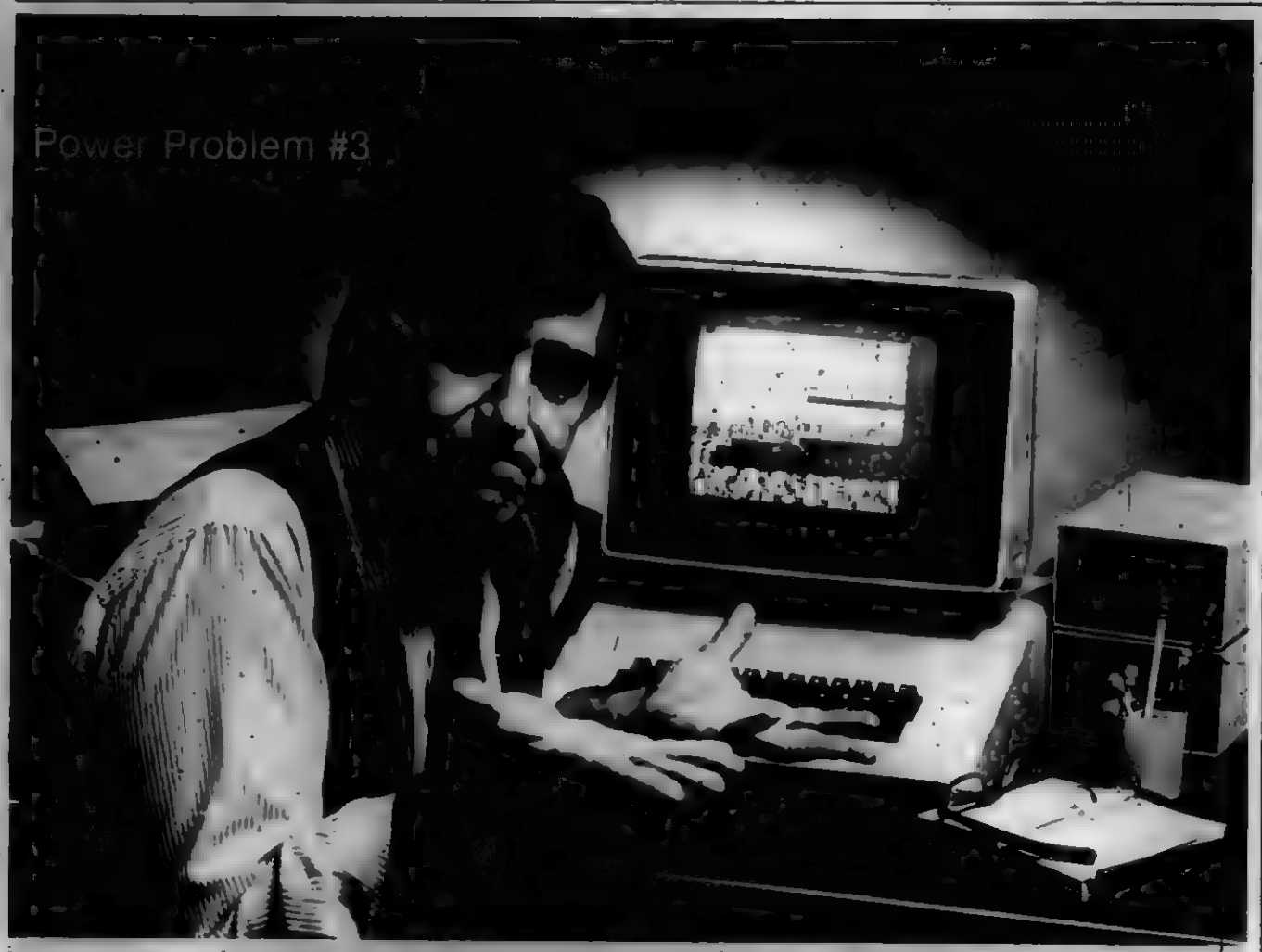
Whether the CSO will be able to follow in the successful footsteps of Bell Labs, out of which have come 20,000 patents and four Nobel Prizes, remains a question that only time can answer.

Switch Out For RS-232C

WATERTOWN, Mass. — Digital Laboratories, Inc. has introduced an RS-232C A-B-C-D switch said to operate under complete software control or with manual override.

The Digital ESP-1 Port Expander reportedly creates four RS-232C serial ports from one and allows switching to different printers and other peripheral devices. The Digital ESP-1 reportedly switches four lines per port.

Priced at $395, it is available from the vendor at 600 Pleasant St., Watertown, Mass. 02172.



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Dual Data Link Model Out For Timeplex Microplexer

WOODCLIFF LAKE, N.J. — Timeplex, Inc. has announced a dual data link model of the Microplexer X.25 Packet Assembler/Disassembler (MX.25 PAD) that reportedly has been certified for use on three major U.S. public data networks.

The MX.25 PAD supports two separate composite links running simultaneously at speeds up to 9,600 bit/sec each; if one link fails, the other reportedly can carry all data traffic.

The vendor said the device has been certified on Tymnet, Inc.'s Tymnet, GTE Telenet Communication Corp.'s Telenet and Uninet, Inc.'s Uninet networks and has also demonstrated compatibility with the Datapac network operated in Canada by the Trans Canada Telephone System.

Prices for a complete MX.25 PAD start at $1,750 from Timeplex, 400 Chestnut Ridge Road, Woodcliff Lake, N.J. 07675.

Harris Enhances PBX System

NOVATO, Calif. — Harris Corp. has added automatic wake up, room-status display and an audible reminder that a phone has been placed on call-forwarding to the Harris 110 Private Branch Exchange (PBX) hotel/motel and business systems.

Attendants and guests can "program" the Harris 110 to place a wake-up or appointment reminder call, while the room-status feature allows each room to be assigned a code reflecting its status — reserved, occupied or in need of cleaning, for example, the vendor said.

The call-forwarding tone helps to ensure that users do not continue to redirect calls after they have returned to their rooms.

The Harris 110 PBX accommodates up to 111 lines and 20 trunks.

The PBX system is available in two models. The price for Model 674 is $7,500. Model 676 costs $9,000 and includes accounting codes capability and station message detailed recording capability. More information is available from Harris, Digital Telephone Systems Division, Novato, Calif. 94948.

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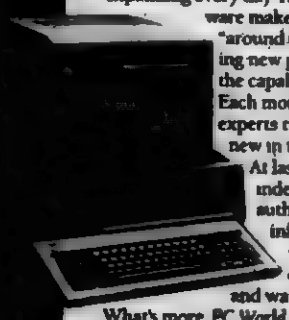

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Three Designed for Networking

NEC America Introduces Series of Modems

MELVILLE, N.Y. — NEC America, Inc. has announced a series of modems, including three modems which are said to be designed for networking configurations.

The SPN9600/4800/2400-U series modems are designed for point-to-point, multipoint and tandem data transmission over leased lines with data speeds of 9,600, 4,800 and 2,400 bit/sec. The series also features fast polling capability, diagnostic control and monitoring systems. Prices range from $2,000 to $7,000 per unit.

The SP14400-U is a high-speed modem designed to provide a 14.4K bit/sec data rate. It also includes local and remote addressable loopback, bit error rate and polling tests using a built-in test pattern generator and front-panel error display. It is available for $7,800, according to a vendor spokesman.

The DSP224AR is a 2,400 bit/sec full-duplex modem designed for operation on two wire-switched network lines. Diagnostics include local and remote loopbacks, bit error test using a built-in test pattern generator and front-panel indicator. It is available for $1,195.

The DSP208A/B is a 4,800 bit/sec modem compatible with the Bell 208A/B modem. It reportedly can be used over the dial-up network and two-wire/four-wire private line circuits. It is available for $1,750 per unit.

The SP0801-U is a mounting rack designed for the DSP series and lists for $800. More information on these products is available from NEC America, located at 532 Broad Hollow Road, Melville, N.Y. 11747.

Bridge Receives OK to Work Xerox Gateway on GTE Nets

CUPERTINO, Calif. — Bridge Communications, Inc. has announced that it has received approval from GTE Telenet Communications Corp. to work its Xerox Corp. Ethernet local-area network gateway over GTE's data networks.

Bridge said its gateway, called the GS/1, would now be able to connect Xerox networks to host computers via GTE's packet switching and by means of the CCITT X.25 protocol.

Consisting of modular hardware and software divided into three logical modules, the gateway acts as a communications link between an Ethernet and an X.25 network. Bridge said its gateway can link up with as many as 48 Ethernets.

Price is $13,500 with a $100 software charge from Bridge at 10440 Bubb Road, Cupertino, Calif. 95014.

Racal-Milgo Adds Encryptor To Product Line

MIAMI — Racal-Milgo, Inc. has added a wideband-circuit data encryptor to its family of products designed to secure the transmission of computer information.

The new device, dubbed the Datacryptor HI, is said to prevent unauthorized access to information over point-to-point wideband circuits at rates of up to 112K bit/sec.

Equipped with V.35 and RS-232 interfaces, the encryptor uses the DES algorithm in the single-bit cipher feedback mode, which is said to permit protocol transparency.

Its price is $4,995. The product will first be available in November from Racal-Milgo at 8600 N.W. 41st St., Miami, Fla. 33166.

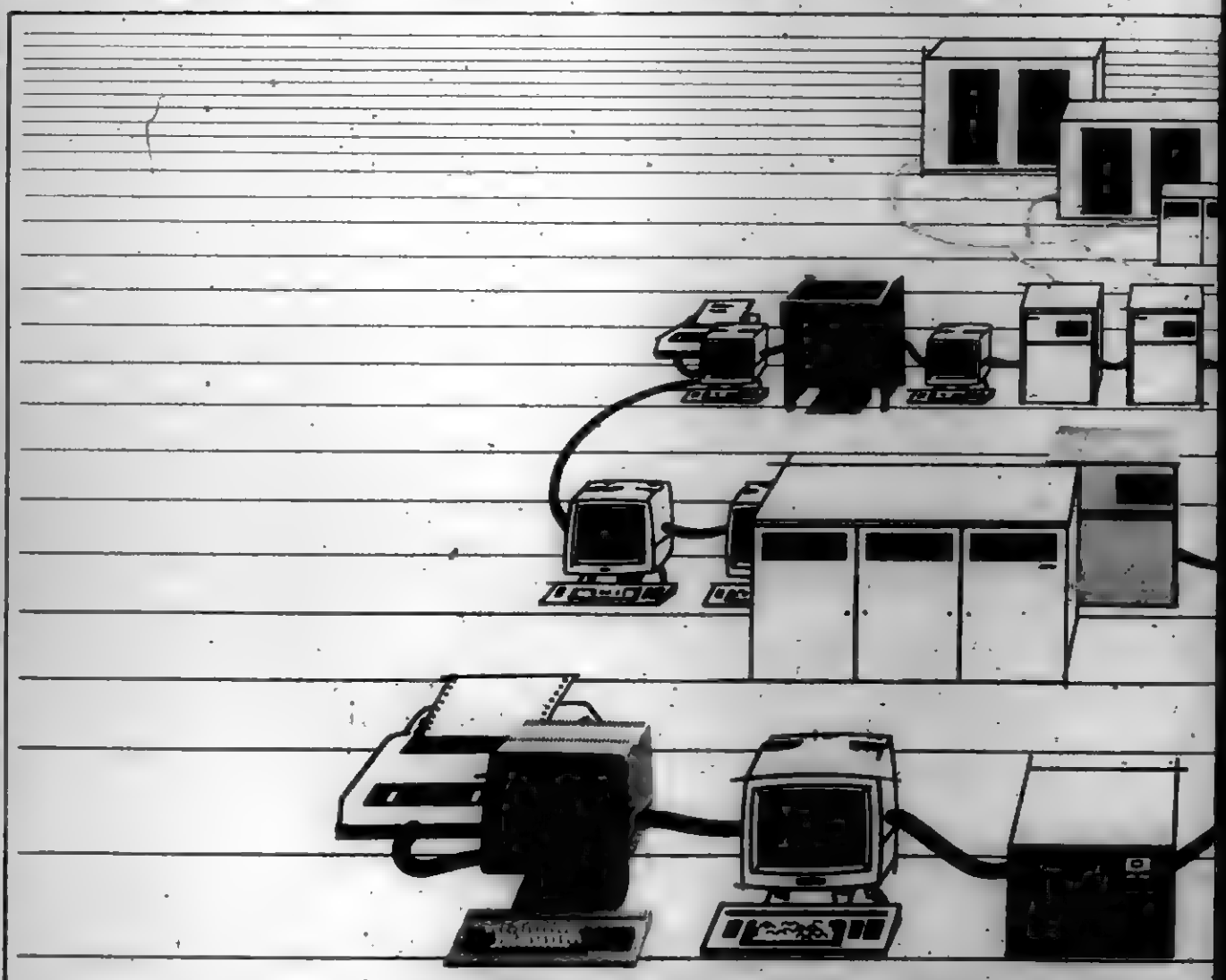
Wyse Unveils Two Terminals, One for X3.64

SAN JOSE, Calif. — Wyse Technology, Inc. has unveiled two 14-in. display terminals, one of them conforming to a subset of the newly adopted Ansi X3.64 standard.

Called the Models WY-50 and WY-75, the terminals have a nonglare green phosphor display and offer between 80-col. and 132-col. widths, a vendor spokesman said.

The 101-key detached keyboard is fitted with 16 programmable function keys and 32 control codes. Both terminals reportedly incorporate nonvolatile memory, which allows for the elimination of dual in-line package switches and enables the terminals' parameters to be entered from the keyboard, according to the vendor spokesman.

The terminals, priced at $695 and $795, are available this month from Wyse at 3040 N. 1st St., San Jose, Calif. 95134.



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Loose Approach to DDP Avoids Some Problems

By Stephen Moore
CW International News Network

MELBOURNE, Australia — While offering many advantages, distributed computer systems pose several problems, such as costliness and lack of security. The solution to these problems might well be found in the "loosely" coupled approach to the multiprocessor as opposed to the "tightly" coupled alternative.

By definition, a distributed microcomputer or minicomputer system is a system composed of two or more micros or minis connected through shared memory or via high- or low-speed data links and running under the same operating system. Micro or minicomputer systems that use the shared memory interconnect approach have been coined as "tightly coupled systems."

Tightly coupled systems are systems in which all processors in the system can execute code out of the shared memory; I/O and all other system resources may be shared by the processors as well. Also, the interprocessor communications latency is low due to potential access time being only limited by the actual memory access time.

This type of system, however, poses many serious drawbacks for some applications. In addition to the expense of a shared memory and the tightly coupled system's relatively few security features, the operating system tends to become very hardware specific.

Alternately, loosely coupled systems do not share a common primary memory, and they offer the user a less confining distributed system and only a few shortcomings.

At the hardware level, there must be an explicit communications interface between the micros or minis. A communications interface implies that there is a higher latency of communications between processors than would be the case if they directly shared primary memory.

Changes in architecture are usually not easily made in tightly coupled systems or in multiprocessors. In contrast, a loosely coupled multiprocessor system allows for any processor to be changed without affecting the rest of the system. As long as the communications protocol is maintained, knowledge of attached processors is not required.

Three widely used interconnect methods for loosely coupled processors are the time-shared/common bus, mailbox/shared memory and global multiple-access bus.

With microcomputer systems, the global multiple-access bus is gaining popularity. Such systems include Datapoint Corp.'s Arcnet (token-passing system), Intertec Data Systems Corp.'s Compustar (parallel access bus) and Xerox Corp.'s Ethernet (carrier-sense multiple access with collision detection [CSMA/CD]). Of the three, the CSMA/CD system offers the best proposition when speed and bus utilization are considered.

Mailbox memory systems have been appearing on some distributed microcomputer systems, but they do suffer some drawbacks with microcomputer hardware.

If the information passed to an attached processor must go either via an I/O port or through a common area of memory, long delays may be experienced if other processors are transferring at the same time.

The Dewhirst Corp. of Melbourne, Australia, has manufactured a networked multiprocessor machine that is said to address many of these problems. The company's objective was to create a loosely coupled system that offered expandability, maximum performance and, most importantly, the capability of using existing software.

The objective of using existing software was achieved with two products:

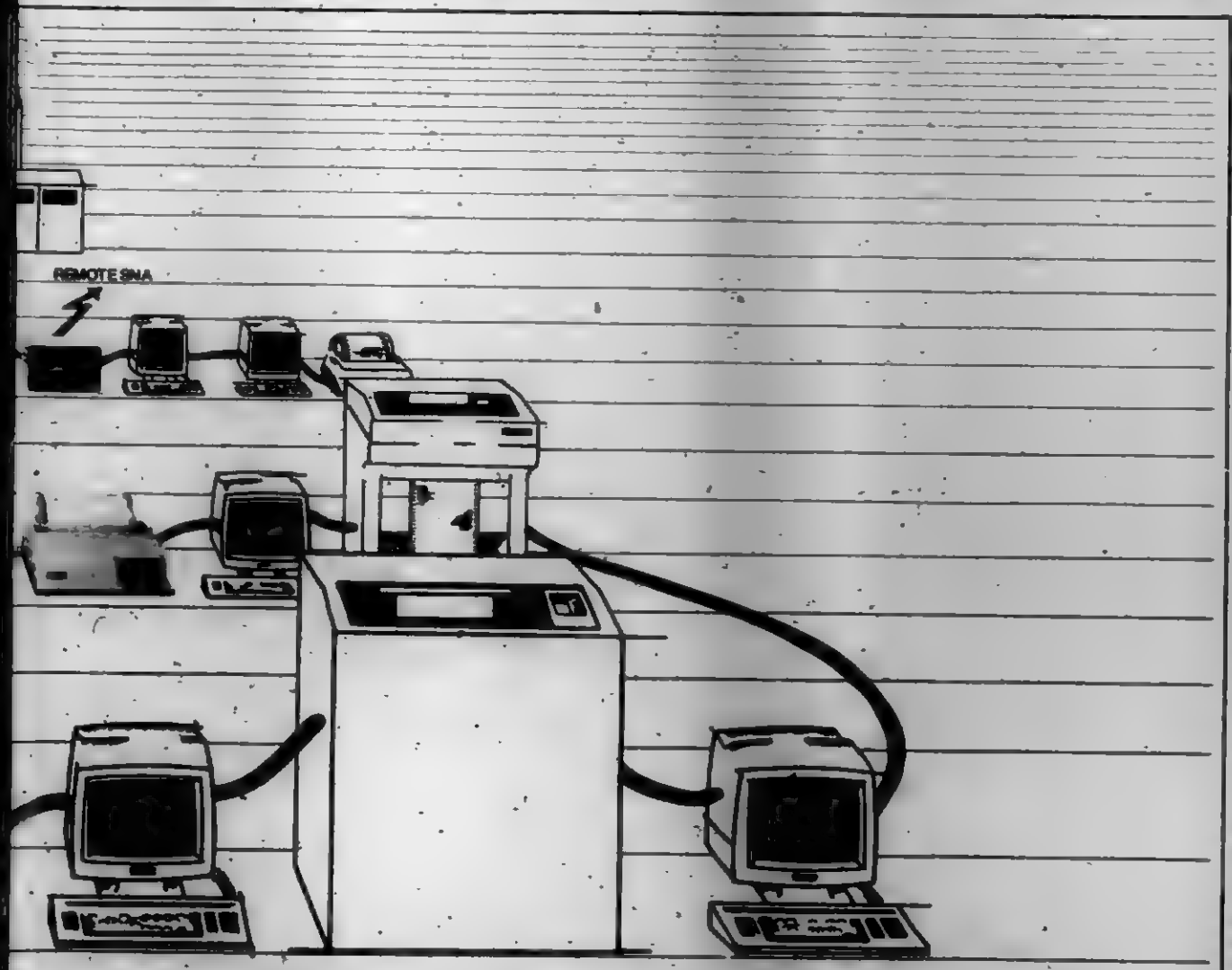
- A Musys Corp. network operating system called Turbodos, which runs Digital Research, Inc.'s CP/M software and the Micro Data Base Systems' MDBS III multiuser data base management system for sophisticated systems builders.
- The use of Zilog, Inc. Z80 microprocessors to give the widest microcomputer software base.

With Z80s acting as slave processors in the distributed system, compatibility with CP/M was maintained and the highest speed Z80 components were used. Also, a local floating point processor was placed on the card to provide a good scientific computing capability, according to the designer of the system, Mike Dewhirst.

Dewhirst said the slave processors operate with semicustom devices that include a high-speed direct memory access channel to move data to or from the slave at speeds 10 times in excess of those achievable by programmed I/O techniques.

Since two slaves can simultaneously perform this transfer with no contention, a 60-fold improvement in the data transfer rate can be achieved, he said. This type of communications system yields results comparable to those from a shared-memory system without the hardware and software complications.

Moore is an editor specializing in office automation technology at Australasian Computerworld. *This article originally appeared in* Computerworld's *Australian sister publication and appears here as part of the CW International News Network.*



four distinct controllers—and multiple coaxial links of up to 10,000 feet each—to any of those LANs.

Imagine the economies of a system that handles that networking with standard 3270 coax. That requires no commitment to special architectures or non-standard LAN technologies. And that, thanks to a multi-drop, station-to-station design, can eliminate thousands of feet of twin coax.

Of course, such a system would have SNA compatibility. But it would also have a set of capabilities to dramatically increase efficiency and throughput, while reducing hardware configuration and support cost in any environment. Capabilities like multi-host and multi-personality support, application and address switching, session swapping and system printing.

This system would have an IBM-compatible personal computing option "built into" the network, not "bolted on" at the workstation—an option that would let you assign true 16-bit computing power, maintain overall MIS control, and share expensive resources, like hard disks and letter-quality printers.

Such a system would offer a full range of printers, including matrix, correspondence, and high-volume, high-speed models—all designed for maximum efficiency and convenience. And it would boast an intelligent display station that displays more than just data, but a mastery of ergonomic and aesthetic design as well. With multi-screen formats, anti-glare screen, low-profile keyboard, and a tilt-and-swivel pedestal that gives the station the smallest footprint in the industry.

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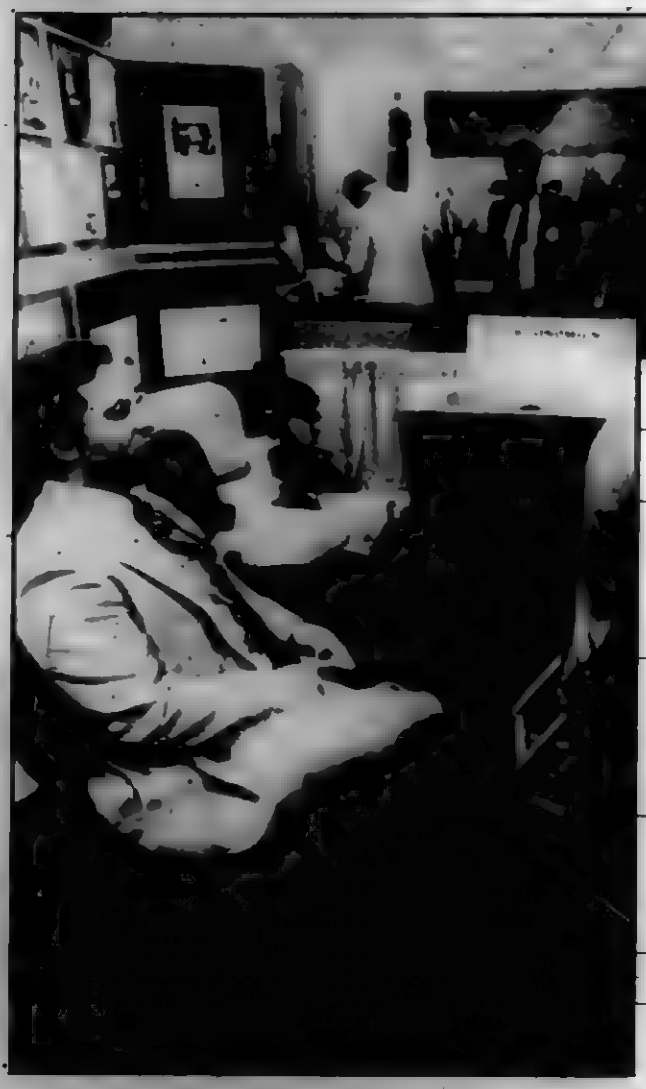

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The EMCE Conference Agenda, October 5-7 1983

THURSDAY, OCTOBER 6, 1983

7:45 - 8:45 a.m.	EYE OPENER: **The Personal Computer in Communications** Dr. Larry Magid, Executive Vice President, Know How, Inc.
9:00 - 10:00 a.m.	KEYNOTE: **The Micro/PC Industry: IBM Domination & Future Directions** Adam Osborne, Chairman of the Board, Osborne Computer Corp.
10:00 - 11:00 a.m.	**The Executive/Professional Workstation** John Crudele, Sr. Manager, Management Information Consulting, Arthur Andersen & Co. **Software for Engineering Users** Aki Runchal, President, Analytic and Computational Research, Inc. **Channels of Distribution for Microcomputers** Jim Finke, President, Internetworx, Inc.
2:00 - 3:00 p.m.	**Spreadsheet Applications** Laurence Press, President, Small Systems Group **The Micro-Mainframe Connection** Dick Andersen, Director, AM/MS, Charles Bornheim, Principal, AM/MS; Marc Cummings, Senior Consultant, Mini/Micro Technology, Bank of America. **Packaging & Documenting Software** Howard Zack, Marketing Communications Manager, VisiCorp
3:10 - 4:10 p.m.	**The Future of Business Graphics** Dr. Irwin Jarrett, Chairman and Founder, Fingraph Corp. **The Engineering/Technical Workstation** Glenn Stewart, Industry Marketing Manager, WICAT Systems **The Personal Computer After Market** To be announced
4:20 - 5:30 p.m.	**Micros and the Changing Role of MIS** Dr. Michael Hammer, President, Hammer & Co., Inc.

FRIDAY, OCTOBER 7, 1983

7:45 - 8:45 a.m.	EYE OPENER: **Information Utilities for Personal Computing** Fran Spigai, President, Data Base Services.
9:00 - 10:00 a.m.	KEYNOTE: **The Fifth Generation Workstation & Artificial Intelligence** Pamela McCorduck, co-author, "The Fifth Generation: Artificial Intelligence and Japan's Computer Challenge"
10:00 - 11:00 a.m.	**Word Processing for Micros: The Next Step** John Murphy, Vice President, Advanced Office Concepts Corp. **Networking Microcomputers in the Corporate Environment** Arnold M. Roberts, Consultant, ADC Associates **Delivering Good Training and Support to the Corporate User** Karen Orton, Vice President, National Training Systems
2:00 - 3:00 p.m.	**The Information Resource Center** Tom Kosnik, Researcher, Stanford Business School, William G. Haven, Independent Computer Consultant **Portable Computers for Professionals** Doug Mosher, Division Manager, Sybex, Inc. **How to Raise Venture Capital** Moderator: Melody Johnson, Securities Analyst, Cable, Howse & Ragan Panelists: Tom Cable, Partner, Cable, Howse & Cosadd
3:10 - 4:10 p.m.	**Defining Integrated Software** Moderator: Gordon Eubanks, Vice President, Commercial Systems Division, Digital Research, Inc. Panelists: Fred Gibbons, President, Software Publishing; Kurt Lynn, Product Marketing Manager, VisiCorp; Jeanne Mowids, Quarterdeck Office Systems **DBMS on Microcomputers** Scott Kuklin, Executive Vice President, Helix Corp. **Selling to the Corporate Account: Problems & Pitfalls** William H. Ludan, President, ComputerEase
4:20 - 5:30 p.m.	**The Role of Microcomputers in Business** Moderator: Edwin H. Shepard, Product Manager, The Software Products Division, Alexander Grant & Co. Panelists: Richard L. Willmarth, Manager, Office Systems, Storage Technology Corporation; Marc Cummings, Senior Consultant, Mini/Micro Technology, Bank of America.

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EMCE has arranged for after-hours tours of the world's largest airplane, Howard Hughes' famed "Spruce Goose." Tours will be held Wednesday and Thursday, October 5 & 6 from 6:00 - 8:00 PM. You can pick up your free ticket from any exhibitor on the show floor.

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FOUR "IN DEPTH" TUTORIALS
Wednesday, October 5 from 9:00 a.m. - 5:30 p.m.

EMCE's "In Depth" Tutorials are all day seminars for managers who need a comprehensive understanding of one of the topics outlined below. All tutorials include two coffee breaks and a complete course notebook with reference materials. The tutorials will be held at the R.M.S. Queen Mary, Long Beach, CA.

How to Select a Business/Personal Computer

- How to Select the Features You Need
- Determining What Size Computer You Really Need
- What to Look For — and Look Out For — In Your Hardware and Software
- How to Determine What To Spend
- How to Select The Right Software Package For You
- How to Simply Define Your Computer System Requirements
- How to Minimize Costly Professional Help
- How to Select the Best System and Suppliers

Course Instructor: Arnold M. Roberts, president of ADC Associates brings to the tutorial extensive experience in seminar leadership having presented tutorials to managers across the country in the areas of data base management, networking and other application specific areas. Mr. Roberts has over twelve years experience in the field of Business Data Processing, with a strong background in systems analysis and design, technical support, in-house training as well as assisting corporations in the selection and integration of personal computers.

Microcomputers and Local Networks

- Overview of Networking and Definitions
- Hardware Issues
- Interconnection Technologies
- Microcomputers and Components
- Software Issues including Operating Systems
- Centralization vs. Decentralization
- Equipment and Systems: A look at Network Models
- Technology Trends and Future Directions

Course Instructor: J. Scott Haugdahl is a systems specialist at Architecture Technology Corporation, Minneapolis, Minnesota, a consulting firm specializing in computer architecture, including local networks and office systems. His work has included simulation and performance analysis of multi-processor computer systems, design and implementation of servers for local networks, and analysis of the latest developments and product offerings in the local computer network market. Mr. Haugdahl received his B.S.C.S. from the University of Minnesota Institute of Technology in 1980. He is a member of both the IEEE and ACM.

UNIX Tutorial for Managers

- The History of Unix
- UNIX — The Product
- Dynamics of the UNIX Marketplace
- Overview of Available UNIX Products
- Comparison of Hardware Systems
- A look at Application Software
- The Capabilities and Limitations of UNIX

Course Instructor: Jean Yates, president and associates of Yates Ventures specialize in researching UNIX systems, applications and the growing UNIX marketplace. Yates Ventures has been involved in extensive laboratory testing of UNIX related products and has been credited with producing 5 books on the subject. Well-known lecturer and industry consultant, Ms. Yates brings to the seminar both hands-on and technical experience of UNIX and UNIX related products as well as extensive user research.

Business Graphics for Managers

- Assessing Your Hardware Requirements Including Printers, Plotters and CRT's
- Assessing Your Software Requirements Including Operating Systems and Interfaces
- Evaluating Current Business Graphics Software
- Developing and Using Business Graphics Software
- Producing Pie and Bar Charts
- Understanding Program Compatability
- Creating Presentations with Graphic "Slide Shows"

Course Instructor: James Morrison, independent consultant and educator, has trained many people in the area of microcomputers. As a contributing editor to LIST software publication and newsletter, and an evaluation expert for FIRST SOFTWARE, Mr. Morrison is a true professional in his field. He has published a number of books in the area of process which include subjects such as micro data communications, business software applications and "how to maintain" your microcomputer.

The Executive Microcomputer Workshop
Thursday and Friday, October 6 and 7

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The Executive Microcomputer Workshop will be held at the Long Beach Convention Center. Enrollment is limited.

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- ☐ "In Depth" Tutorials Wednesday, October 5, 9:00-5:30 (select one only) $195
  - ☐ How to Select a Business/Personal Computer (T1)
  - ☐ Microcomputers and Local Networks (T2)
  - ☐ UNIX Tutorial for Managers (T3)
  - ☐ Business Graphics for Managers (T4)

  (In Depth tutorials will be held at the R.M.S. Queen Mary, Long Beach, California).

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CWTS

Joint Venture With AT&T

Hilton Gets Video Network

BEVERLY HILLS, Calif. — Users will have access to 35 public video teleconferencing rooms by the end of 1984 when AT&T and Hilton Hotels Corp. complete their joint venture, it was announced recently.

The rooms will use AT&T's Accunet Reserved 1.5 service — formerly called High Speed Switched Digital Service — which offers data transmission of 1.5M bit/sec.

Hilton will build, own and operate the video conferencing rooms — the first of which will be in New York and Los Angeles. "The new digital network will supplement the corporation's existing analog network which has been providing video conferencing for businesses as well as entertainment and special events programming," according to Jim Collins, senior vice-president of marketing for Hilton.

Features of the Hilton network include the ability to:

- Set up video conferences with as little as one hour's notice.
- Originate and receive communications at any point on the net.
- Conduct simultaneous two-way communications between any two points.
- Communicate with compatible non-Hilton video conferencing rooms using Accunet.

Further information is available from Hilton Hotels, 9880 Wilshire Blvd., Beverly Hills, Calif. 90210.

Net/Alert System Enhanced For 16-Line Net Systems

CHERRY HILL, N.J. — Avant-Garde Computing, Inc. has announced an enhanced version of its Net/Alert network performance monitoring and management system for 16- to 64-line data communications networks. Previously, Net/Alert systems were unavailable for systems as small as 16 lines.

The Series 50 Net/Alert System for small networks includes all basic Net/Alert system functions, such as the standard real-time performance and status color displays and more than 24 Net/Alert reports and color analytical charts.

Application or transaction monitoring will be available as an option for small networks, with monitoring for up to eight applications priced at $25,000. An additional option is a host interface adaptor to transfer the Net/Alert data base to a mainframe for advanced statistical analysis using packages such as SAS Institute's SAS.

Each Series 50 includes a system control unit with fixed and removable disks, one or more line monitoring units, a color CRT and a printer. Up to 64 lines and 1,600 devices and the more than 30 Net/Alert protocols reportedly can be handled by the Series 50.

The Series 50 Net/Alert ranges in price from $75,000 to $142,000. Avant-Garde Computing is located at 2091 Springdale Road, Cherry Hill, N.J. 08003.

Everything you always wanted to know about mainframes in one little box.

Just when you think you have it all figured out, something new hits the DP world. You can't always hire a consultant to keep pace with new developments, but you can take advantage of Amdahl's industry-leading expertise. Keeping Current—Amdahl's unique video series—is the answer. Keeping Current is the time and money saving way for senior DP staff to obtain a clear and insightful analysis of mainframe problem areas, the latest trends, and future directions in hardware and software. You'll learn how to prevent problems, how to get the most out of your existing system, and shortcuts for daily operations.

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For more information, call Amdahl Education at 800-538-8460 ext. 6393. Within California call (408) 746-6393.

the amdahl phenomenon

In October, 1970, a company was formed expressly to build one product. A mainframe computer that would outperform the mainframe that owned the market at that time. Today this company is an international success story, a phenomenon.

Firm Unveils Responsetime/1 For IBM Series/1

SAN FRANCISCO — Firesign Computer Co. has introduced a response-time monitoring and reporting system for the IBM Series/1 under the EDX operating system.

The Responsetime/1 is said to identify underutilized terminals and provide a security audit of program usage. The system runs on each CPU to be monitored and occupies 2K bytes of storage, according to a vendor spokesman.

Consisting of two main programs — a data capture program and a report generation program — the system is said to generate reports from the captured interaction data.

Priced at $965 for a single-site license, the system is available from Firesign Computer Co. at 524 Union St., San Francisco, Calif. 94133.

Excelan Offers Protocol Tool For Xerox Net

SAN JOSE, Calif. — Excelan has put into market a transmission control and internet protocol package for use with its own front-end processor for the Xerox Corp. local-area network.

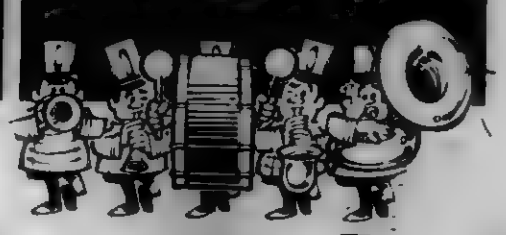
The software, along with its Model 101 processor, makes up the first self-contained local-area network subsystem, according to the vendor.

The two-part package includes a protocol module and a Unix system networking kit. Said to conform to the U.S. Department of Defense's Arpanet specifications, the module also contains user datagram and internet control message protocols.

Provided in source form, the networking kit includes an I/O driver for the protocol module together with networking applications.

The price of the package is $75 in quantities of 1,000. The protocol module's source is listed at $20,000. Availability is scheduled for next month from Excelan at 2180 Fortune Drive, San Jose, Calif. 95131.

NEW



Abend-AID
PRODUCT ANNOUNCEMENTS

Abend-AID, the standard of performance for debugging OS and DOS programs, has been significantly enhanced with the following options:

Abend-AID/COBOL
explains the reason for a program abend, indentifies the COBOL statement and verb where the error occurred, and provides the COBOL symbolic name and contents of the data field causing the error.

The contents of all data elements in Working Storage are displayed by symbolic name and decimal location.

The contents of the current record for each file are displayed by decimal location using record layout. format.

Abend-AID/COBOL is a practical SOURCE LEVEL debugging tool.

Abend-AID/ON LINE
gives programmers the ability to view Abend-AID's diagnostic output in an easy-to-use screen format.

The programmer can easily solve abends at a terminal workstation without cumbersome horizontal scrolling and without the need for printed output.

Abend-AID/SPF
is a powerful, menu-driven product which gives programmers the ability to view Abend-AID interactively.

Programmers can quiz Abend-AID/SPF to determine why the program abended, where the program abended, and what data is involved.

Abend-AID/SPF in an innovative approach to debugging which makes it easier than ever for programmers to debug programs quickly and conveniently at their terminal workstation.

FREE Abend-AID Product Evaluation.
For additional product information or to arrange for your 30 day FREE evaluation just call 800-521-9353 (in Canada or Michigan, 313-540-0900) or return the enclosed coupon to: Compuware, Systems Software Division, 32100 Telegraph Road, Birmingham, Michigan 48010.

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ARE YOU KEEPING PACE WITH THE CHANGING FACE OF DBMS?

Watch for Computerworld's October 31st Special Report and get current—

FAST.

How do you select the right DBMS for your installation? Are you fully utilizing the data base management system you have? Are you aware of the do's and don'ts for success with DBMS? Are you clear on the real benefits of DBMS?
You'll get the answers to these and a great many other questions you have on Data Base Management Systems in the pages of *Computerworld's* October 31st Special Report, "The Changing Face of DBMS." You'll get an examination of the latest market studies regarding DBMS. You'll get a look at the changing role of the data base administrator. You'll read about how microcomputer DBMS products are used for projects within mainframe-oriented DP installations.
And there's more. Lots more. Take a look:

- Trends in DBMS products for minicomputers
- The impact of DBMS on the information center
- New uses for data dictionaries
- The impact of fourth-generation languages on DBMS
- Controlling end user access to the corporate data base

You'll get application stories, case studies, news articles and tutorials in this Special Report. And the topics listed above will bring you right through to articles on installing a second DBMS and managing multi-DBMS shops. From search through set-up to multiple systems — you'll get a detailed look at the whole area of data base management systems.
And if you sell utility software packages, data management systems or data base management systems, here's where you'll find your customers next October 31st — reading *Computerworld's* Special Report on Data Base Management Systems. Your ad in this issue will assure them more complete information on the products in the field. Ad close for this Special Report is October 14th. Call your local sales representative at one of the offices listed below or call Don Fagan, Vice President, Sales and Marketing at 617-879-0700.

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Bantam Offers Pair of Micros Compatible With Pick

LOS ANGELES — Bantam Computers, Inc. has unveiled a pair of microcomputers compatible with the Pick operating system.

Called the Series 002, the systems come in a desktop model, the 002/7, and a floor model, the 002/15. The hardware is based on the Motorola, Inc. 16/32-bit 68000 microprocessor.

The desktop version comes with 128K bytes of random-access memory, a 10M-byte, 5¼-in. Winchester disk, a 20M-byte, ¼-in. tape cartridge and three RS-232 ports said to support transmission rates of 19.2K bit/sec.

The floor version is enlarged by a 30M-byte Winchester disk and 11 ports.

The desktop computer costs $13,695; the floor model sells for $24,395.

Both versions are available from Bantam, which is located at Suite 1200, 6033 W. Century Blvd., Los Angeles, Calif. 90045.

Compatible With IBM 370

STC Rolls Out Optical Disk

By Jim Bartimo
CW Staff

LOUISVILLE, Colo. — Boasting 4G bytes of storage and transmission rates of up to 3M char./sec, Storage Technology Corp. (STC) has released a nonerasable optical disk storage system said to be fully compatible with IBM 370, 4300 and 30 series processors running under the MVS/SP 1.3 operating system.

The 7600 Optical Storage Subsystem consists of a 7640 Optical Storage Unit, a 7440 Optical Media Unit (optical disk), an 8880 Storage Control Unit and Opsam software said to allow a host CPU to write data to an optical disk and retrieve the data as necessary.

Each optical platter will store four billion characters, which is the equivalent of two million pages of double-spaced, typed information. The Optical Media Unit has a reported life of 10 years.

"The STC release will be one of many optical disk systems on the market in 1984," according to Ken Bosomworth, president of International Resources Development, Inc. "Magnetic disks will be the dominant technology for small amounts of data, but optical disks will push magnetic disks out completely for large applications."

The Optical Storage Unit accepts interchangeable optical disks and uses a technology of coherent light from two lasers — one records a code on the disk that is read by the second laser as data for the host CPU. Error detection is said to provide the user with only one possible error in 312 disks or 10 trillion bits.

(Continued on Page 76)

Canaan Computer Corp.'s single-user workstation

Risk Management System Announced by Comtec

SOUTHFIELD, Mich. — Comtec, Inc. has announced a turnkey risk management system said to address all major risk management functions.

Risk Master reportedly allows the user to enter and analyze data for four major modules: general claims ($1,750), workmans' compensation ($1,750), incidents ($3,000) and medication-error tracking ($1,000). A fifth module, Sortmaster, allows the user to create and define detailed ad hoc reports using a step-by-step menu process.

The turnkey system allows users to respond immediately to management requests, determine trends, pinpoint problem areas and foresee potential problems. The software runs on IBM, Honeywell, Inc., Prime Computer, Inc. and Digital Equipment Corp. computers using Pick & Associates, Inc.'s Pick operating system, the vendor said. Also, Risk Master is reportedly fully operational on the IBM Personal Computer; an IBM XT version is also available.

The four main modules are available individually or as a complete package for $7,500. Sortmaster costs $1,500 and is not optional. Comtec is located at 28366 Franklin Road, Southfield, Mich. 48034.

Canaan Workstation Boasts Mainframe Power

By Patricia Keefe
CW Staff

TRUMBULL, Conn. — Canaan Computer Corp. has announced what it calls the first of a new generation of networkable, single-user workstations that offer mainframe power and run IBM 370 VM/CMS programs.

According to the vendor, the system is designed to put "mainframe-class" computing power into the hands of end-users who are dependent on a centralized mainframe, but are getting inadequate response and capability and want to run IBM 370 software.

The system is also designed to be purchased as an alternative to time-sharing.

Canaan's target market is the Fortune 1,000 IBM 370 time-sharing users, plus the largest financial and insurance organizations.

The Canaan computer is built around an operating system that not only provides access to the extensive body of 370 software — including 370 VM/CMS applications — but also provides access to a host of capabilities reportedly not available in 370-class mainframe systems. These include integrated graphics, multiwindowing display, multiprocessing, concurrent processing and high-speed interaction. The op-

(Continued on Page 76)

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Workstation Runs IBM Programs

(Continued from Page 75)

erating system also is said to feature a built-in Ethernet local-area network system that allows communications to shared resources.

The Canaan machine communicates with other computers and peripherals via a high-speed, 10M bit/sec channel. When communicating, the system operates in a peer network, reportedly avoiding the restrictions of traditional master/slave configurations. Other technical specifications include:

- A 32-bit proprietary processor that executes 370 VM/CMS software in machine language and communicates and shares resources with other Canaan workstations via Ethernet — reportedly without degrading system speed — and a separate processor that performs all I/O functions, including device control, file management and network access.
- A two-bus system architecture — a 32-bit main bus supports the main processor and main memory, speeds program execution and data transfer, while a 16-bit multibus supports peripherals and network and increases throughput.
- A 1M-byte error-correcting main memory, expandable to 4M bytes.
- A very high-resolution, bit-mapped CRT display (1,024 pixels by 768 pixels), with detached keyboard and full graphics controller.
- Automatic self-diagnosis to isolate problem components and an automatic problem diagnosis dial-up modem for remote service and system upgrades.

Options include a 35M- to 140M-byte Winchester disk, 200 or 400 char./sec dot matrix printers, an IBM-compatible ½-in. tape drive and an additional very high-resolution display and keyboard, the vendor said.

Since access to IBM 370 application software is said to be the primary ingredient of Canaan's marketing strategy, the vendor has an ongoing program of evaluating and certifying third-party software. According to the vendor, three fourth-generation management systems have already been certified: Information Builders, Inc.'s Focus; D&B Computing Services' Nomad2; and Mathematica, Inc.'s Ramis 2. Currently, the only package available for licensing on the Canaan system is Focus, which starts at $6,500 for the first single-user workstation.

In a typical network of six nodes with shared peripherals, the average price will be about $35,000 per node. Plans are to introduce a two-user node later this year, further reducing the cost per unit, Canaan said from 39 Linderman Drive, Trumbull, Conn. 06611.

CAD Unit Based On HP Micro

SCOTTS VALLEY, Calif. — Avera Corp. has introduced a computer-aided design (CAD) engineering-workstation built around Hewlett-Packard Co.'s 32-bit microprocessor.

Designated the EDS-2100, the system is intended to support the engineering of integrated and hybrid circuits and circuit boards.

The workstation runs schematics and layout design software along with analysis packages. It has a Tektronix, Inc. 19-in. display, the Model 4115B.

The workstation costs approximately $100,000 and will be available in January from Avera, 200 Technology Circle, Scotts Valley, Calif. 95066.

STC Unveils Storage System With 4G Bytes

(Continued from Page 75)

The disk is a 14-in. coated aluminum platter in a protective cartridge that is automatically removed during loading into the storage unit. The disk is then placed on a high-speed spindle and raised into position under the optical head which contains the read-and-write lasers, a vendor spokesman said. It can be written to or read from at 3M char./sec.

The Opsam executes IBM's MVS/SP 1.3 operating system and converts commands from the controller to drive the correct action and responses in the storage unit.

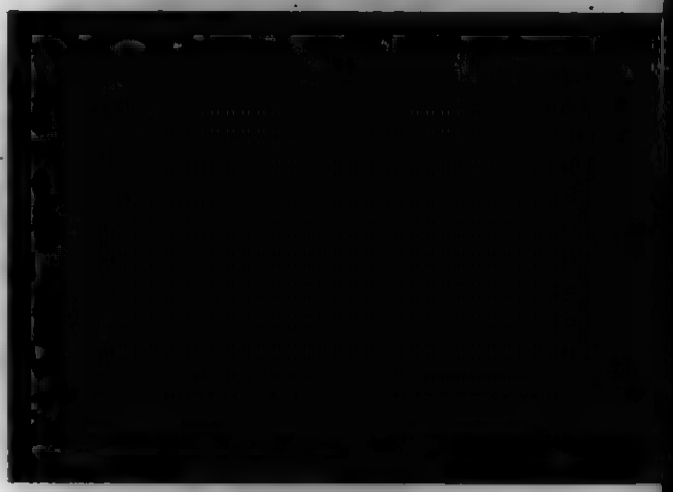
The storage system can also include programmable channel switches said to allow a properly configured 8880 control unit to direct data operations over a combination of one to 16 channels, increasing storage availability and data throughput.

List purchase price for the 7640 is $130,000 with a lease rate of $3,785/mo on a 36-mo basis. The 8880 Storage Control Unit, which can have either two or four storage directors, is available immediately for $65,000. The 7440 media unit is available for $140 to $225, depending on quantity. The Opsam software is licensed to 7600 users for an installation charge of $1,000 and a monthly fee of $400. A distributed system license option is available for an installation charge of $750 and a monthly fee of $300, according to the vendor.

Shipments to end users will begin in the second quarter of 1984, and the disks and storage units will be available through OEMs.

More information is available from STC, 2270 S. 88th St., Louisville, Colo. 80028.

IF YOU'RE CONSIDERING CONSIDER



As a systems integrator, you know that there's a world of difference between first generation software products and second. (Think of VisiCalc™ and Lotus 1-2-3,™ for example.)

It's the difference between setting standards. And then raising them.

INTRODUCING R:BASE,™ FROM MICRORIM.™

R:base is the new generation of relational database software. With a combination of capacity, speed and transportability that today's more powerful PC applications need. (Check out the comparisons.)

Not only that, R:base is much simpler to use and learn. For both you *and* your customers. Anyone—computer literate or not—can enter and view data, and generate reports. So applications are up in days, instead of weeks. And quicker turnaround time means higher volume sales for you. Just what you would expect from a second generation product.

MANAGING A DATABASE. CONVENIENTLY.

With R:base, it's simple. A series of prompts guides you every step of the way. Which means you don't have to be a programmer to create data entry or report forms just like the ones you're used to using.

As you become more proficient, you'll create shortcuts by customizing menus of stored commands. And print reports as simple or complex as you like at the touch of a key. With R:base, prompted, ad-hoc queries and customized report formatting become the reality that first generation products could only promise!

R:base is also very forgiving. It's very hard to make a mistake. That's because commands are simple English expressions—like SELECT, PROJECT, WITH, WHERE, FROM, etc. Dates and dollar amounts are written normally: 11/16/83;

dBASE II is a trademark of Ashton-Tate. VisiCalc is a trademark of VisiCorp. 1-2-3 is a trademark of Lotus. [illegible] are trademarks of Microsoft. CP/M is a trademark of Digital Research. Unix is a trademark of Bell Labs.

Redshaw's Micro Functions as Workstation

PITTSBURGH, Pa. — Redshaw, Inc. has made available a new Professional Computer, manufactured by Wang Laboratories, Inc., which will function as a workstation on the Redshaw Comprehensive System for the insurance industry, a software and hardware package utilizing the Wang 2200 minicomputer.

The Professional Computer, which the company said is designed for office rather than home use, will allow Redshaw System users to take advantage of software packages offered by insurance companies and other software suppliers.

The Professional Computer is based on the Intel Corp. 8088/6 microprocessor, using Microsoft, Inc.'s MS-DOS operating system. A spokesman said that because this is the same microprocessor and operating system utilized by the IBM Personal Computer, most software currently written for the IBM system will be compatible with the Redshaw Professional Computer.

According to the company, the Professional Computer is designed for office and word processing use and features a keyboard with 32 special function keys. The system uses a 16-bit internal data bus and operates at a higher cycle speed, allowing it to run comparable programs faster.

The Professional Computer is priced at $5,200, Redshaw said from 103 Yost Blvd., Pittsburgh, Pa. 15221.

Adviser K-Series Gets High-End Addition

MINNEAPOLIS — Computer Designed Systems, Inc. has announced a high-end addition to its Adviser K-Series of minicomputers which the company said is 40% faster and stores 35% more than IBM's System/38.

The line, which makes use of report generators and source code generators, is described as "extremely user friendly" and is designed for manufacturers, medical users and wholesale distributors requiring fast terminal response.

The system runs spreadsheet programs such as Visicorp's Supercalc or Visicalc, a spokesman said. Users may add word processing and text editing modules as well as several thousand application programs. The K-Series computers are said to be upward-compatible with existing Adviser hardware and software.

The K-Series computers are priced between $140,900 and $1,200,000. Information can be obtained from Computer Designed Systems, 10911 Olson Memorial Highway, Minneapolis, Minn. 55441.

ESC Announces Design Graphix For CAD Users

BATON ROUGE, La. — Engineering Systems Corp. (ESC) has announced a three-dimensional computer-aided design and drafting system that provides basic geometry, automatic utilities and bill of materials, symbols from user-definable menus, 16 possible pens and 16 layer functions.

According to an ESC spokesman, Design Graphix allows users to take advantage of Rapid, the system's high-level programming language, to include calculations and special commands in the drafting process.

The system also offers Teach, an on-line programmed course, plus the Help facility to assist in-house operating personnel.

Design Graphix can operate on micros and minicomputers as a stand-alone system or as a workstation attached to a larger computer. The system supports a large range of peripherals, including graphics displays, digitizers, plotters and magnetic tape, and can expand to meet future user needs.

Software for a complete Design Graphix system is priced under $10,000. More information is available from ESC through P.O. Box 80318, Baton Rouge, La. 70898.

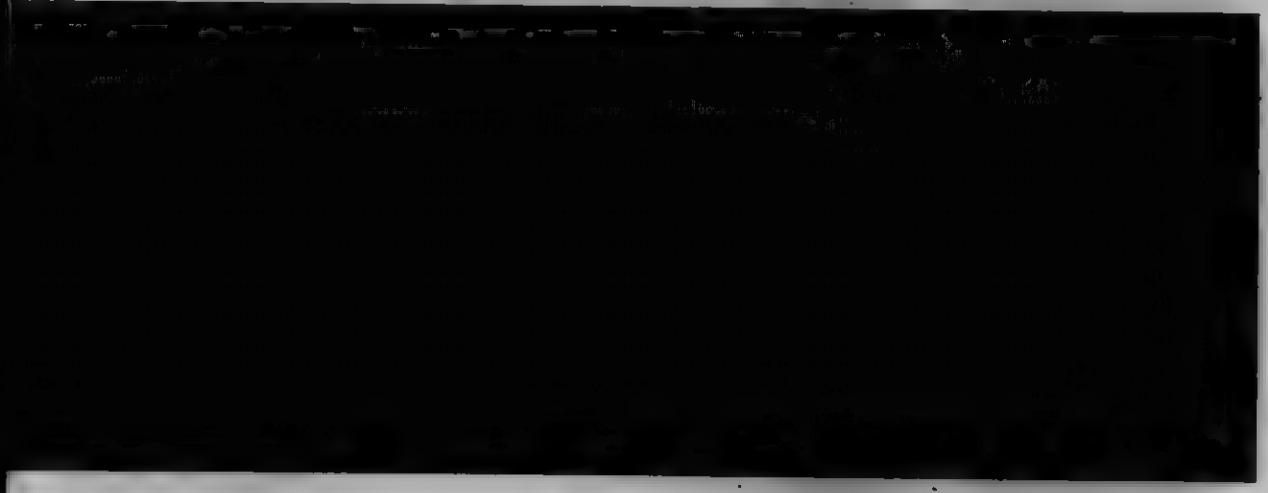
Power System Targets Desktops

DALLAS — Bits Power Systems, Inc. has announced a portable, self-contained uninterruptible power system that can be used with most desktop computers.

The 115V, 60Hz isolated output reportedly protects computer operations against utility gaps, spikes, surges, noise, brownouts or complete outages. Backup or portable operating time ranges from five hours at 25W to one hour at 100W, the vendor said. Input power is switch-selectable for either 115 or 230 Vac, 50Hz/60Hz for worldwide application. A 12-Vdc power cord is included, a spokesman said.

Model Pups-AC is available through computer dealers only and costs $495. Bits Power Systems is located at Suite B114, 11020 Audelia Road, Dallas, Texas 75243.

PURCHASING dBASE II, THIS FIRST.



$500.00. And, because data entry verification rules are defined up front, you just can't put any "garbage in"—even if you try!

What's more, Rbase allows you to sort and select data on up to ten different criteria, perform totals, and then display the results—all with a single, powerful command (see screens).

QUESTIONS? ASK FOR HELP.

The Rbase HELP feature provides detailed information that describes every command and process required for complete mastery of the database. (As does our plain-English documentation.) For example, if you're not sure what SELECT does, simply key in HELP SELECT and Rbase will tell you what the command does, how it works, even the proper syntax. This way you don't have to keep referring back to the user manual—it's all right there in front of you.

Rbase + MULTIPLAN™ = POWER.²

Unlike first generation microdatabases offering the "amazing" capacity of one file and some 60,000 records, Rbase literally blows the lid off database size. You may never create an application using forty files with 100 billion records. But with Rbase, you can.

Now imagine being able to tap all that power in conjunction with one of the most popular spreadsheet programs on the market today: MultiPlan. Rbase is fully compatible with MultiPlan, so you can zip back and forth between programs without cumbersome file manipulation.

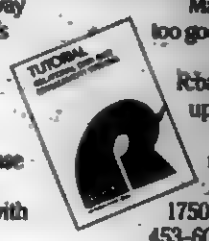
THE Rbase PRODUCT FAMILY.

Rbase™ 4000 is a single-user relational database (MS-DOS™ version is list $495). Rbase™ 6000 is a multi-user version, available early 1984. In addition to MS-DOS, both packages will also be available in CTOS,™ with UNIX™ to follow.

The optional extended ReportWriter™ provides enhanced reporting and calculating capabilities (MS-DOS version is list $150). Program Interface™ is a set of subroutines which allows direct database access from PASCAL or FORTRAN programs (MS-DOS Version is list $395).

And what happens if you've already got dBASE II? Not to worry. It's easy to transfer your files to Rbase.

30-DAY EVALUATION.



Many computer professionals think Rbase sounds too good to be true. Actually, it's even better.

To prove our point, we'll send you the complete Rbase package for a 30-day trial. If it doesn't live up to your expectations, just ship it back.

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Provide for Data Collection

Caere Introduces Bar Code Scanners

LOS GATOS, Calif. — Caere Corp., maker of optical character recognition (OCR) systems, has introduced a family of bar code scanners enabling the user to provide a broad range of automated data collection.

The Caere 200 series bar code scanner is able to provide the speed and accuracy of bar code scanning to users of the IBM Personal Computer, minicomputers, serial terminals and IBM 3278-type terminals with a simple computer interface, the company claimed.

According to the vendor, the bar code scanners and OCR readers offer an alternative to the standard keyboard data collection that allows the user a higher level of data entry control.

The bar code scanners provide interface to most industrial and administrative CRT serial computer terminals and to synchronous data link control displays. The bar code scanners are easily adaptable to harsh environment applications like inventory and shop-floor control, document tracking and accounting procedures, according to the vendor.

Minicomputers, serial terminals and most personal computers are interfaced through an available RS-232C port by the Caere 212 Dual Serial Bar Code Scanner, a spokesman explained. The Caere 240 PCscanner provides the user of the IBM Personal Computer or Personal Computer XT an integrated board that is a program-transparent keyboard interface.

Users of terminals such as the IBM 3278 and 3178, the Memorex Corp. 2078, the Telex Computer Products, Inc. 278 and the IBM 5251 are supported by the scanner's program-transparent keyboard interface as well. In addition, users of the Personal Computer and 3278-type equipment can add Caere's bar code scanners to applications without changing the existing software.

The Model 240 scanner for the IBM Personal Computer is priced at $745. An optional program to print bar code on the IBM Personal Computer or Personal Computer XT is offered for $179. Model 212 scanners for minicomputers, serial terminals and personal computers are priced at $789, while the 220 Bar Code Keyboard Scanner is $944.

The 240 and 212 models will be available at the end of October; the 220 will be ready one month later.

More information is available from Caere at 100 Cooper Court, Los Gatos, Calif. 95030.

Plessey Matrix Printer Boasts Letter-Quality Capability

IRVINE, Calif. — Plessey Peripheral Systems, Inc. has introduced a low-cost matrix printer with correspondence-quality capability.

The Plessey Model LCQ50, manufactured by Texas Instruments, Inc., contains a standard Ascii character set plus seven additional international character sets in a desktop printer.

It has 24 font combinations including standard, compressed, double-wide, enhanced, double-strike and emphasized. The printer also supports raster and mosaic graphics and is compatible with both serial and parallel interfaces.

Model LCQ50 operates at 150 char./sec in the draft mode or at 90 char./sec in the enhanced mode. The bidirectional LCQ50 supports 80 standard characters per line or 132 compressed.

Six or 8 line/in. may be specified. A 256-char. receive buffer is also standard, with an option of upgrading to a 4,000-char. buffer with X-on and X-off.

The printer, available immediately upon receipt of order, is priced at $535. More information is available from the vendor at 2632 Du Bridge Ave., Irvine, Calif. 92714.

Disk Controller Can Handle Four Drives

MINNEAPOLIS — Ciprico, Inc., a supplier of multibus disk and magnetic tape controllers, has introduced a high-performance storage module drive disk controller called the Rimfire 50.

The Rimfire 50 controls up to four disk drives and incorporates features such as 48-bit, dual-function error correction code with 16-bit correction, 8- and 16-bit data bus operations, 16K bytes of programmable read-only memory, 32K bytes of optional buffer random-access memory, 24-bit addressing, 2 MHz direct memory access (DMA) transfer rate and 1:1 interleave and generates up to two independent interrupts.

According to the vendor, the Rimfire 50 has the "power and flexibility of the Intel [Corp.] 80186 and the dual-DMA 80186." Two independent DMA devices, one internal to the 80186 and one discrete, can transfer data simultaneously from the disk to the buffer and from the buffer to the system memory, enabling disk interleave of 1:1.

Another feature of the Rimfire 50 is the attach command allowing the user to establish communication with another system peripheral controller.

The price for small quantities of the disk is $1,606. More information is available from the vendor at 2405 Annapolis Lane, Plymouth, Minn. 55441.

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Seminar: How to automate system development.

Seminars on Cullinet's IDMS/R with Automatic System Facility, and their entire line of software products, will be held in the following cities during the coming weeks.

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Allentown, PA	October 12
Anchorage, AK	October 20
Baltimore, MD	October 12
Bridgeport, CT	October 13
Champaign, IL	October 12
Chicago/Oakbrook, IL	October 13
Columbus, GA	October 12
Denver, CO	October 11
Edmonton, ALTA	October 13
Halifax, NS	October 13
Huntsville, AL	October 12
Jackson, MS	October 13
Little Rock, AK	October 14
Moncton, NB	October 12
New York, NY	October 12
Phoenix, AZ	October 12
Portland, ME	October 12
Raleigh, NC	October 13
Richmond, VA	October 11
Roanoke, VA	October 12
San Jose, CA	October 18
Syracuse, NY	October 20
Tulsa, OK	October 11
Wilmington, DE	October 18

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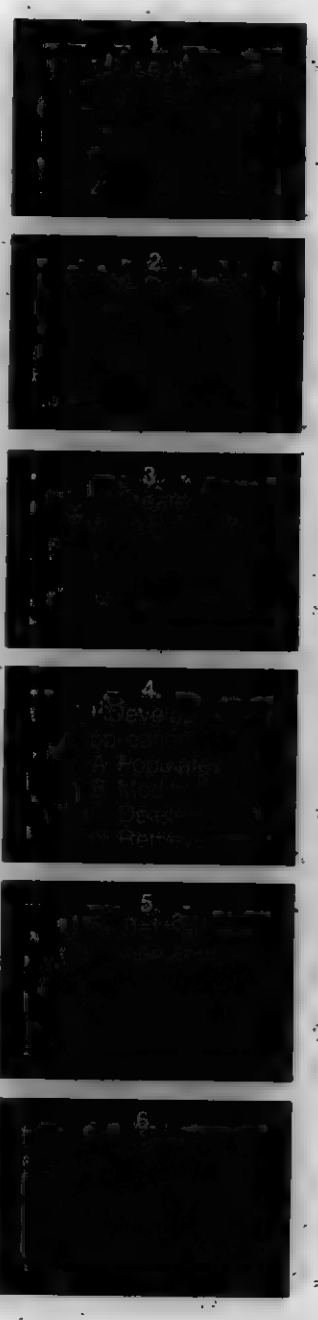

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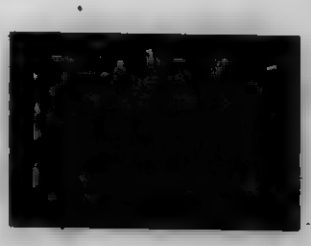

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One database management system provides an Automatic System Facility for system development: IDMS/R.

Fourth generation languages, though excellent productivity tools, only address part of the system development task—namely, steps three and four as shown above. IDMS/R with Automatic System Facility, however, automates all of the steps necessary to develop systems. All you do is specify the data.

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It defines the database; creates screen formats; develops the applications; links the definition, screen and application together, then documents the system.

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For more information on this unique facility, to attend a seminar or for a demonstration see the adjacent page.

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  "Selecting a Personal Business Computer"
- David Friend, Special Consultant
  "Graphics: New Management Solutions"
- Will Zachman, VP, Technology Assessment, IDC
  "Microprocessor Impact on Systems and Uses"
- Dr. Howard Frank, President, ConTel Information Systems, Inc.
  "Local Networks: Before You Get One"
- Dr. Howard Morgan, Chairman, Advanced Office Concepts
  "Solving DP/WP Integration Problems"
- Edward Horrell, President, Mitchell & Horrell, Inc.
  "Integration through CBX Technology"
- Dr. John McQuillan, President, McQuillan Consulting, Inc.
  "Strategic Planning for Integration — Who, How, When & Why"
- Harry Newton, President, The Telecom Library
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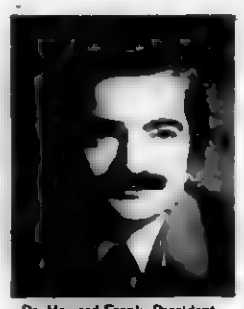
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Conferences

Professional seminars and discussions concerning state-of-the-art-technologies will be led by the foremost experts in the field. It is the first time so many of the best and most renowned industry speakers will be gathered together under one roof to discuss the integration of communications, office automation and data processing.

Over 35 *General Sessions* will be presented by professionals with 'hands-on' experience — professionals who have actually lived through the experience tell their stories and offer suggestions and solutions.

Here's a sampling of the general session topics:

- *"Satellite Networks"*
- *"Network Intelligence"*
- *"The Multifunction Workstation"*
- *"Pilot Projects: Corporate PC Acceptance"*
- *"MIS — OA: Resolving the Conflicts"*

Edmund B. Fitzgerald, President of Northern Telecom, Ltd. will speak on "Business Integration — the Vision and the Reality."

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John Diebold — internationally acknowledged expert and founder and chairman of the Diebold Group, Inc. Mr. Diebold will speak on "Integration: A Corporate Effort."

Exhibits

There will be over 400 exhibits by leading information companies with the latest vendor architecture and technologies available. Special time is set aside for conference attendees to view all the exhibits and talk first-hand to the vendors.

Here are just some of the fine companies you can expect to see exhibiting at INTECH '83: Apple Computer, Inc., Applied Data Research, Inc., AT & T Information System, Inc., Computer Automation, Cullinet Software, Inc., Data General Corporation, Datapoint Corporation, Digital Equipment Corporation, Exxon Office Systems, Inc., Grid Systems Corporation, ITT World Communications, Inc., Lanier Business PRoducts, Inc., Lee Data Corporation, NCR Corporation, Prolink Corporation, and Telautograph Corporation.

Exhibit hours are 12:00-6:00 p.m. Tuesday, 10:00 a.m.-6:00 p.m. Wednesday, and 10:00 a.m.-5:00 p.m. Thursday.

In-Depth Tutorials

On October 31 some of the nation's leading consultants take the platform for a full day's formal instruction. These four concurrent in-depth tutorials include lecture notes, lunch and a reception with the speakers.

A — *"Corporate PC Management"* — Dr. Michael Hammer, Hammer & Co.

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C — *"Local Area Networks"* — Dr. Ken Thurber & Dr. Harvey Freeman, Architecture Technology Corp.

D — *"Strategic OA Planning"* — Dr. John McQuillan, McQuillan Consulting

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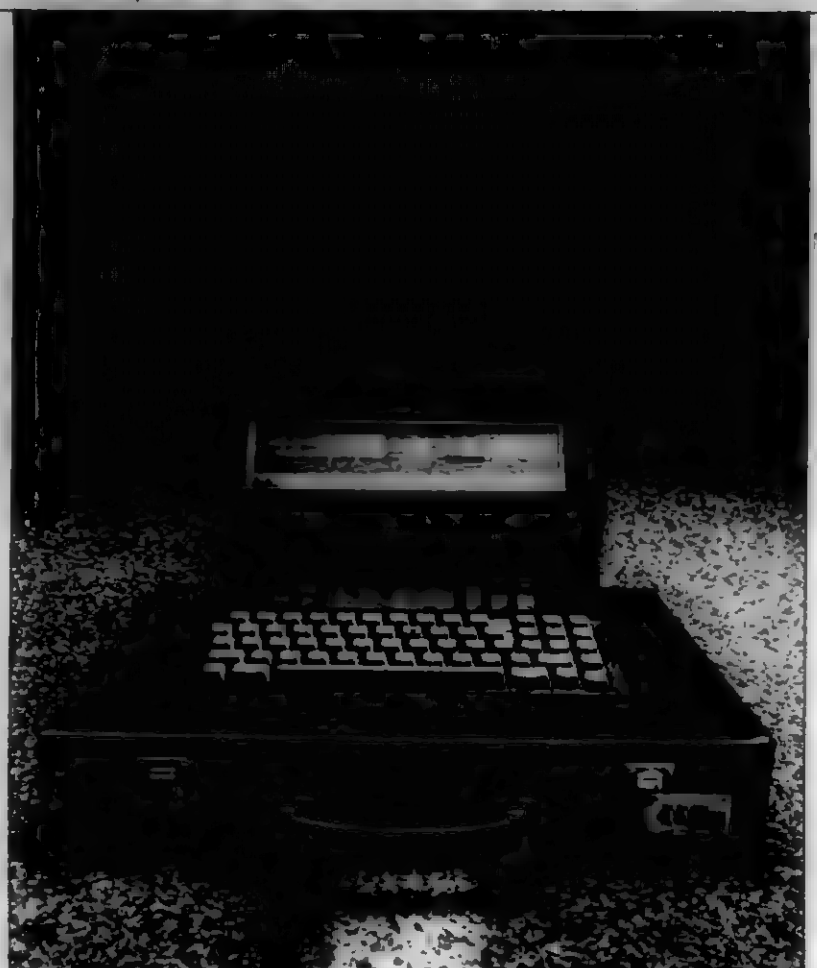

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The intuitive ease of talking to the computer through the touch panel is made possible by the unique Gavilan operating environment and software packages.

The applications packages come in durable capsules called Capsule-Ware.™ They plug directly into the body of the computer, adding no additional volume. The operating software, (GO System™) then lets each of the applications communicate with each other through a common interface and a sharing of data.

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The Gavilan mobile computer and its Capsule-Ware programs are creating vertical market demands—both in MS/DOS and the Gavilan operating environment—for software packages completely unrealized one short year ago.

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Increased Volume Cited

IDT Cuts Cost of Tape Transports

SAN DIEGO — Innovative Data Technology, Inc. (IDT) has announced a 15% price reduction on its Series 1050 IBM/Ansi/Ecma industry-compatible, ½-in. nine- or seven-track tape transports and interface peripherals, which prior to the price cuts ranged in price from $4,200 to $10,000.

The reduction is due to increased volume and state-of-the-art production, the vendor said. Included in the price reduction are all models of the TD-1050 series, including the associated systems interfaces for the following mini and micro business computers: Digital Equipment Corp.'s PDP-11, LSI-11 and VAX-11; Intel Corp.'s Multibus; Texas Instruments, Inc.'s Model 990; Centronics Data Computer Corp.'s Port; IBM's Personal Computer or Personal Computer XT; and Apple Computer, Inc.'s Apple II or III.

IDT is located at 4060 Morena Blvd., San Diego, Calif. 92117.

SDSystems Introduces Controller

DALLAS — SDSystems, Inc. has introduced its VFW-III peripheral controller for the IEEE-696 (S-100) bus.

The VFW-III is a single-board controller for floppy and Winchester disk drives that complies with the IEEE-696 standard. The board supports simultaneous use of up to three 5¼-in. Winchester drives and four 5¼- and 8-in. floppy drives in any combination.

The Winchester interface is the ST506/412, which allows systems integrators to select Winchester drives from the majority of manufacturers. Floppy drives may be single- or double-sided and single- or double-density.

The VFW-III is a multilayer card with full power and ground planes. It includes variable-length sector buffers and direct memory access or programmed I/O control. Floppy disk operations include a phase-lock-loop data separator and write-logic software.

The VFW-III is priced at $895. More information is available from the vendor through P.O. Box 28810, Dallas, Texas 75228.

Firm Unveils Printer Line

PHILADELPHIA — Scriptomatic, Inc. has introduced three dot-matrix printers compatible with the company's Scriptomatic Addressing Computer (SAC I).

The model 280 is an 80-col, bidirectional printer that prints 120 char./sec. The model 281 is a 136-col printer, also at 120 char./sec. Model 282 is a 136-col printer rated at 200 char./sec.

All three low-profile printers are designed to operate with the SAC I, and when combined with a Series 300 Labeler any of the printers forms a complete addressing system.

The models are priced at $695 for the Model 280, $1,095 for the 281 and $1,695 for the 282. More information is available from Scriptomatic at 1 Scriptomatic Plaza, Philadelphia, Pa. 19131.

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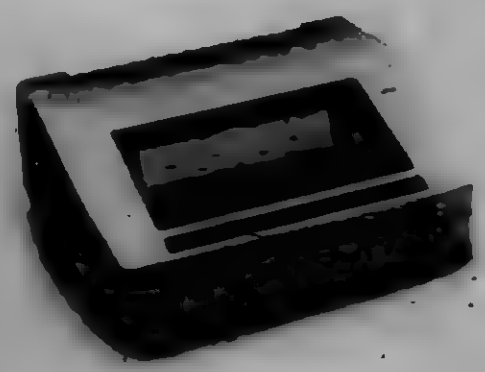

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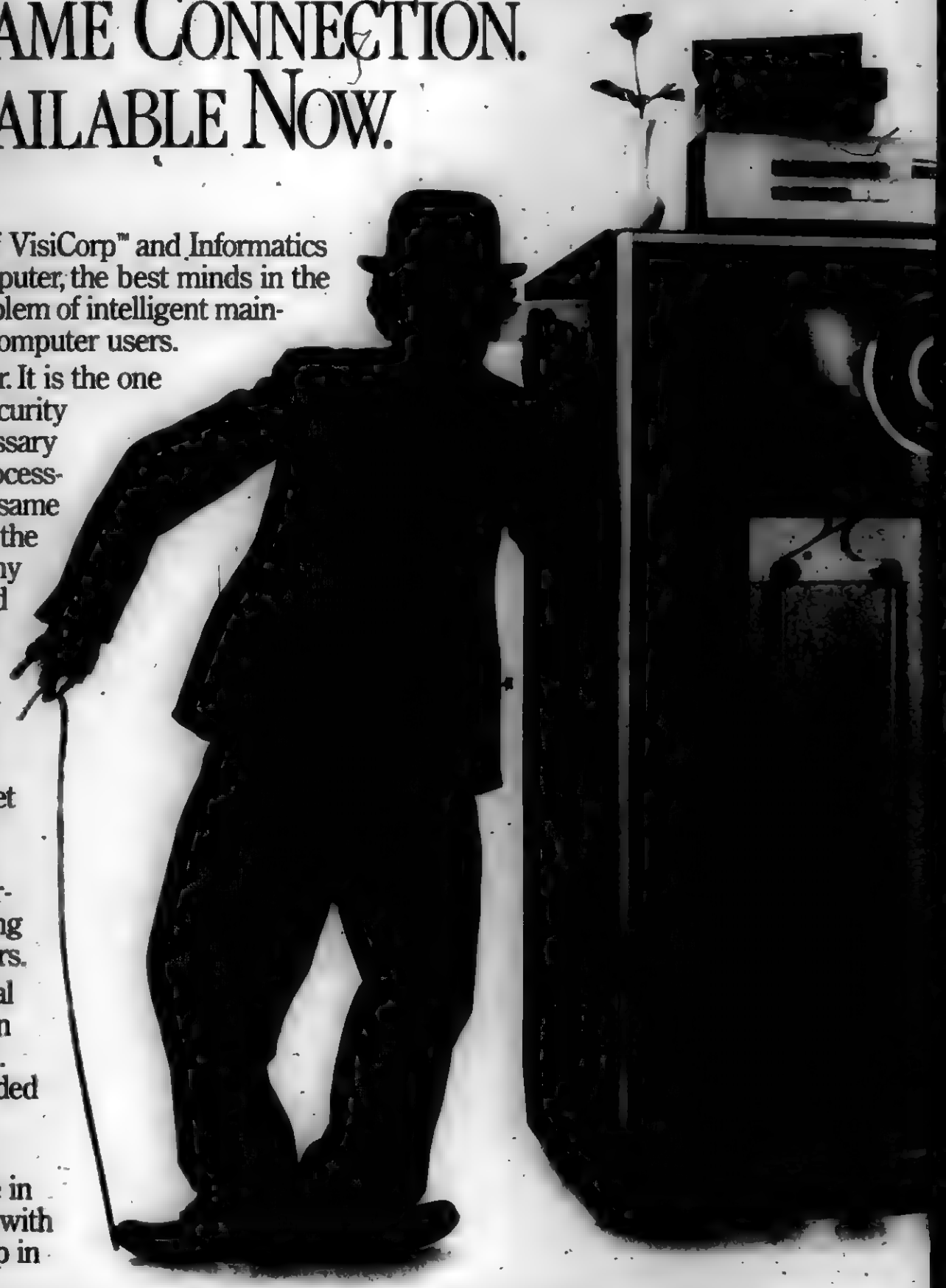

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Informatics general corporation

For Use With Micros

UPS Debut in 200W, 350W Models

SAN DIEGO — Elgar Corp. has announced 200W and 350W uninterruptible power systems (UPS) for microcomputers.

Both models, the SPR 201 and SPR 401, are said to eliminate power line anomalies and to provide a reserve battery power system that can run computer systems for up to 25 minutes.

The models feature simple control panels indicating the condition of the power supply and a warning buzzer that activates when the devices switch to reserve power, a spokesman said. The vendor also said that the battery on a device will be automatically recharged when the normal power supply resumes.

The devices are priced at $645 for the 200W model and $795 for the 350W model. More information may be obtained from Elgar at 8225 Mercury Court, San Diego, Calif. 92111.

Graphics Plug-In Card Fits DEC-Compatible CIT-161

IRVINE, Calif. — CIE Terminals, Inc. has introduced a new color graphics plug-in card for its Digital Equipment Corp.-compatible CIT-161 color terminal.

The CIG-267 combines DEC alphanumeric software commands and the Tektronix, Inc. 4027A color graphics command structure.

The CIG-267's dual DEC/Tektronix personality allows computer-aided design, engineering and scientific designers to use DEC alpha commands (in color) and the 4027A terminal's color graphics capabilities simultaneously.

The CIT-161 color terminal provides designers with a 572-by-480 dot resolution and a 75Hz refresh rate for flicker-free displays. Ansi X3.64-compatible, the terminal has 64 programmable color combinations of its eight primary colors.

The cost of the CIG-267 graphics card list is $1,195; the CIT-161 terminal is $2,595, for a total of $3,790 for the package.

The CIG-267 card will be available next month, according to a spokesman for the vendor.

More information is available from CIE Terminals, which is located at 2505 McCabe Way, Irvine, Calif. 92714.

Bar Code Wand, Decoder Interface to RS-232 Port

MOUNTAIN VIEW, Calif. — A bar code reader wand and decoder that can be interfaced to an RS-232 port are available from Intertelephon USA, Inc.

Using existing light-emitted diodes, photosense and microprocessor-controlled algorithms stored in erasable programmable read-only memory, the decoder interprets the digital output from the hand-held wand upon scanning printed bar codes. Codes currently read and decoded include UPC-A, UPC-E, MSI Plessey, EAN-8, EAN-13, industrial and interleaved, according to a vendor spokesman.

The decoder assembly is available in a stand-alone configuration with enclosure and speaker to alert the operator that the code has been read and transmitted and in two printed-circuit board configurations for mounting within a system, terminal, modem or host computer, a spokesman said.

The bar code reader wand costs $70 in single quantities, while the decoder is priced at $495 from Intertelephon at 1200 Levin Ave., Mountain View, Calif. 94040.

Cache Memory Enhances Units

CLARK, N.J. — Ultimate Corp. has introduced a cache memory enhancement for its Honeywell, Inc. DPS 6-based computer systems.

Designed for use on Ultimate systems that also have the High Performance Processor (HPP) enhancement, the cache memory board contains 4K bytes of high-speed memory and is available as a $7,000 upgrade. The HPP, also available as a field upgrade, is $29,000, a vendor spokesman said.

More information about Ultimate systems is available from the firm at 77 Brant Ave., Clark, N.J. 07066.

ACDC Unwraps Power Supply

OCEANSIDE, Calif. — ACDC Electronics has announced a five-output 500W switching power supply.

Features of the RSF505 include an external 115/230 Vac conversion switch, outputs of 2V to 28V on all channels and wireless submodular construction.

Prices of the power supply begin at $985 from ACDC at 401 Jones Road, Oceanside, Calif. 92054.

Gould Unveils Enhancement To Its Model GSU 3056 UPS

SAN DIEGO — Gould, Inc. has introduced an enhanced version of its 500W rated uninterruptible power system (UPS).

The Model GSU 3056 on-line system reportedly provides continual voltage regulation and noise elimination for personal computers, point-of-sale systems and other sensitive loads as well as battery reserve during complete power outages. In addition, the power system includes an internal 10-min battery, or it can be used with external 48V batteries for periods up to several days, Gould said.

The latest version of the Gould Micro-UPS features line synchronization with slow slew acquisition, table or rack mounting and optional static transfer switch. It measures 5¼- by 17- by 23-in. deep and weighs 75 lbs. Prices start at $1,450 with distributor discounts available from Gould, Power Conversion Division, 2727 Kurtz St., San Diego, Calif. 92110.

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Our newest publication does for communications what OA does for Office Automation. *Computerworld on Communications* covers the fast-merging worlds of computers and communications with in-depth articles on important trends and current topics. Subjects which have been or are scheduled to be covered in *CW on Communications* in its two 1983 issues include: Voice and Data Communications, Local Area Networks, Communicating Personal Computers, Local Loops, Convergent Technologies, and Telecommunications Management.

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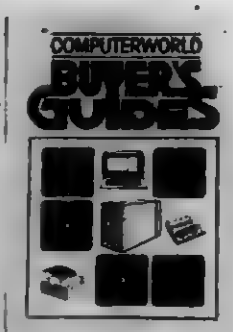

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1. BUSINESS/INDUSTRY (Circle one)

End Users

10 Manufacturer (other than computer)
20 Finance/Insurance/Real Estate
30 Medicine/Law/Education
40 Wholesale/Retail Trade
50 Business Service (except DP)
60 Government-State/Federal/Local
65 Public Utility/Communication Systems/Transportation
70 Mining/Construction/Petroleum/Refining
75 Other User _____

Vendors

80 Manufacturer of Computers, Computer-related Systems or Peripherals
85 Computer Service Bureau/Software/Planning/Consulting
90 Computer/Peripheral Dealer/Distributor/Retailer
95 Other Vendor _____

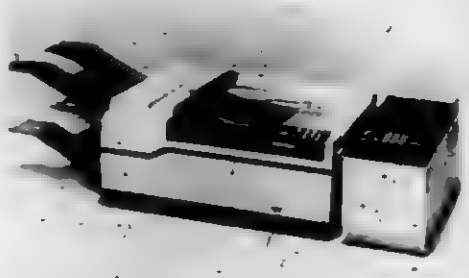
2. OCCUPATION/FUNCTION (Circle one)

11 President/Owner/Partner/General Manager
12 [illegible]
13 [illegible]
21 Director/Manager/Supervisor DP/MIS Services
22 Director/Manager of Operations/Planning/Administrative Service
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
35 OA/WP Director/Manager/Supervisor
36 Data Comm Network/Systems Mgmt
41 Engr/Scientific/R&D/Tech Mgmt
51 Mfg Sales Reps/Sales/Marketing Mgmt
60 Consulting Mgmt
70 Medical/Legal/Accounting Mgmt
80 Educator/Journalist/Librarian/Student
90 Other _____

3. COMPUTER INVOLVEMENT (Circle all that apply)

Types of equipment with which you are personally involved either as user, vendor or consultant

A. Mainframes/Superminis
B. Minicomputers/Small Business Computers
C. Microcomputers/Desktops
D. Communications Systems
E. Office Automation Systems



Rapicom 5000 With SAF-PAK

Rapicom Unveils Facsimile Device With Redialing

FAIRFIELD, N.J. — Rapicom, Inc. has introduced a desktop digital facsimile transceiver said to incorporate broadcast functions via programmable memory.

The Rapicom 5000 is a microprocessor-controlled CCITT Group 3 facsimile device that provides a 9,600 bit/sec step-down modem said to provide transmission speeds of 15 sec/page.

When equipped with the vendor's store-and-forward package, SAF-PAK, the 5000 can also function in networking applications.

The unit offers a 30-page document feeder and storage of up to 100 telephone numbers for autodialing, a vendor spokesman said.

If a remote terminal fails to accept a telephone call from a transmitting 5000, the local unit will initiate two redialing sequences five minutes apart in an attempt to complete document transfer.

The Rapicom 5000 is available for $7,000.

With the SAF-PAK software, it is available for between $9,900 and $11,000. More information is available from Rapicom, which is located at 7 Kingsbridge Road, Fairfield, N.J. 07006.

Flexible Strategy Seen Key To Office of the Future

By Robert Batt
CW West Coast Bureau

SAN FRANCISCO — An essential key to establishing an effective "office of the future" is for information specialists to put in place a viable strategy, according to Joseph Izzo, president of the JIA Management Group, Inc.

Speaking here recently at the Third Annual Conference on Personal Business Computers, Izzo, an expert in the development and implementation of management and control techniques, said companies must immediately address the issues of productivity posed by office automation.

Addressing the issue of how to integrate personal computers into the evolving office of the future, Izzo said it is vital that DP managers and users together develop a flexible, evolutionary strategic plan that allows for experimentation and change and permits the incorporation of new devices.

"With a flexible strategy in place, the probability of success will be very high," Izzo said. "The company will also be on the leading edge of solving the office productivity problem. Without a strategy, there is a high probability of failure . . . in achieving the necessary productivity gains for the business."

The key phrase for office automation is "as need dictates generator." This means that instead of getting information from data processing in a fixed format, which must then be reworked to meet the individual needs of executives, the requirements of executives will dictate the form and content of the information they receive, he explained.

"Executives and their professional support staff will have access to the data base they require to extract, analyze and format information to solve the problem at hand. As the problem changes and pressures mold the issues, [executives] again have easy access to the data base to view new information and perhaps alter their decisions," Izzo said.

Importance of Simplicity

It is important to move toward simplicity in problem solving. Executives want to see a problem, have access to the details relative to it and solve it. "If most companies were to wait for this information from the data processing department, they would have a long wait. They will have lost their competitive edge. Companies must begin immediately to address and resolve the issue of productivity," he warned.

Izzo claimed the problem has been exacerbated by exaggerated claims about the capabilities of personal computers. For example, despite claims to the contrary, there is no communications discipline that allows a broad range of personal computers to work easily or effectively together.

Also, he added, while the personal computer is perceived as a $2,000 to $5,000 expense, as users acquire memory, printers, software and communications links and add the costs of training, a desktop computer can, in reality, cost more than $30,000.

"But personal computers do have their place," Izzo conceded. "They will become just one part of the upcoming, comprehensive, corporate office automation. Rather than attempting to solve the problem of integrating personal computers into existing information networks, companies should focus on a strategy for integrating them into the evolving office of the future," he said.

Philips to Announce Products at Info '83

DALLAS — Philips Information Systems, Inc. will introduce six products aimed at the office automation market at the Info '83 exhibition in New York this month.

Two of the products featured will be the Information Processing System (IPS), a 32-bit supermicrocomputer said to support Philips universal workstations, and the Conversational Management Information System (Comis).

Also to be introduced are: Megadoc, a laser-disk mass storage and retrieval device; the 3005 universal workstation; the 1002 workstation; and a local-area network.

- The IPS will run the Unix System III operating system and permit end-user programming. It is also said to provide capabilities such as shared filing, electronic mail, telex and meetings management. The system will be available at the end of 1984 for between $50,000 and $300,000.
- Comis is a software package developed for IBM and compatible mainframes. It uses the IBM 3270 protocol feature of the Philips universal workstations. The package will be available in the second half of 1984 for $150,000.
- The Philips 3005 series workstation uses an integrated 10M-byte hard disk and can be configured as a stand-alone workstation or clustered with other 3000 series workstations using the Philips local-area network. Available in the second quarter of 1984, the workstation will cost between $9,000 and $15,000.
- The Megadoc laser-disk system uses advanced digital optical recording technology to provide archival storage and retrieval for very high-volume business applications. Available in the second half of 1984, it will cost between $250,000 and $3 million.
- The Philips 1002 is a device said to provide keystroke capture, editing and text transfer through a communications link. It will be available for between $1,700 and $2,200 in 1984.
- For local-area networking applications, these and other Philips products can be interconnected through the Philips local-area network architecture. The network can be introduced as a twisted pair or a CATV coaxial cable. It will be available for $1,250 per connection in the first quarter of 1984.

More information on these products is available from Philips Information Systems, 4040 McEwen, Dallas, Texas 75234.

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Analysts Say Apple Committed to IBM Link

By Katherine Hafner
CW Staff

CUPERTINO, Calif. — The recent cooling of relations between Cullinet Software, Inc. and Apple Computer, Inc. has prompted speculation over whether Apple's Lisa will be locked out of entry into the IBM mainframe environment.

The response of many industry analysts is a cautious "no."

An April 19 agreement to link the Lisa to mainframe-based corporate data bases through Cullinet's Information Database would have promoted the micro's entry into the IBM environment. The deal came to a standstill after the two companies could not agree on development or marketing strategies for the interface [CW, Sept. 26].

"It's definitely a setback," commented Mayvid Maclay, an analyst at Creative Strategies International, Inc. in San Jose, Calif. "But even if the agreement doesn't work out with Cullinet, Apple is talking to other companies."

"The important thing is that Apple is committed to the capability to communicate with a mainframe," commented Greg Kelsey, an analyst at San Francisco-based Hambrecht and Quist, Inc. "The key is that they plan to do it. And if you look at the communications technology, there's not any great magic to it."

Joan McKay, an analyst at Kidder Peabody, Inc. in New

(Continued on Page 90)

Is Apple's Polish Beginning to Fade?

By Patricia Keefe
CW Staff

Despite expected sales of $1 billion this year, Apple Computer, Inc. has suffered a few bruises, according to some industry analysts interviewed recently.

These analysts are predicting layoffs of up to 600 Apple employees by Christmas and expect the personal computer maker's stock value to take a nose dive in the early part of next year if the layoffs occur.

Apple is beginning to show signs of wear and tear. Following the announcement two weeks ago of a price cut and the unbundling of the firm's top-of-the-line Lisa, Apple's stock dropped 8¼ points. So far this year, Apple's stock has plunged from a high of $62 per share in June to a low of $24.25 in the third week of September.

In addition, Apple recently projected a sharp decline in fiscal fourth-quarter earnings over the same period a year earlier, forecasting a profit of $5 million to $8 million vs. the previous year's fourth quarter of $18.7 million.

However, Apple still expects its earnings for the year to exceed 1982 results by 25% to 30%.

Kenneth Bosomworth, president of International Resource Development, Inc., reported rumblings concerning Apple layoffs. Short-

(Continued on Page 90)

The bare light bulbs and exposed I beams (above) will soon give way to a broad expanse of airy showrooms (see sketch) as work begins in earnest at Boscom, an international computer and communications market center on Boston's waterfront. The official "ground breaking" at the converted warehouse was held recently, witnessed by a large crowd of press and city officials and featuring keynote speaker F.G. Rogers, IBM's vice-president of marketing. IBM has agreed to lease over 20% of the Boscom floor space. The facility is one of several such permanent showrooms planned throughout the country.

IBM Seen Leading Pack With Personal Computer

By Robert Batt
CW West Coast Bureau

SAN FRANCISCO — IBM will ship 1.2 million personal computer units in 1984, a 45% market share, according to Peter Wright, vice-president at The Gartner Group, Inc.

Speaking at the recent IBM Futures Conference here, Wright, a former financial analyst at IBM, said the personal computer industry will also witness a violent shakeout over the next 18 months, with only

(Continued on Page 92)

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Analysts Say Apple Beginning to Lose Its Shine

(Continued from Page 89)

term layoffs of 120 people — 40 in the Lisa group and 80 in the Apple IIe group — are likely, according to another industry analyst. Moreover, if Christmas sales are slow, "there is a possibility of up to 600 layoffs," he added, suggesting that Apple is overstaffed.

An Apple spokeswoman denied all reports of layoffs. She suggested analysts might be confused by the recent dismissal of temporary workers in Dallas, who were hired to handle an increase in demand for the IIe. Sales for the IIe have since "flattened out, as expected."

But the decline of what some industry observers call Apple's cash cow (the IIe), mismarketing of the Lisa and stepped-up competition, particularly from IBM, are seen as the primary reasons behind the bruising of Apple. Several analysts pinpointed what they perceive as problems:

- Competition from IBM — Possibly because of a feeling that Apple lacks the necessary resources to compete with IBM, several analysts suggested Apple as a probable merger candidate.
- The Lisa — There is concern that Apple may have "too many eggs in its Lisa basket," noted Charles Newton of Newton-Evans Research Co. Despite an 18% price cut, the Lisa is still too expensive, according to Bosomworth, consultant Marc Rudov of Venture Development Corp. and other analysts. These analysts charge that while the few packages available for the Lisa do not address the needs of small business users, the Lisa has been stymied by the IBM Personal Computer in the corporate environment.
- The IIe and III — Sales are said to be slipping. Most analysts interviewed agreed the two older Apple machines need to be upgraded. Apple is expected to unveil a Lisa-like upgrade for the IIe in January. Plans also include a separate business unit devoted to the Apple III, the spokeswoman said.
- Marketing — Apple is seen as a victim of its own success. It is similar to Osborne Computer Corp. in that it created a market and then failed to understand how that market changed, according to Rudov and other analysts. Rudov recommended Apple abandon its "No. 1 strategy" and start thinking of itself as "No. 2."

Apple Wants IBM Link

(Continued from Page 89)

York, said that while the termination of the agreement is a "minor negative," the recent increase of software development for the Lisa is bound to produce a similar link for the computer, "whether they do it themselves or have somebody else do it. I think it's safe to assume that Apple knows it has to have an IBM link for its computer to be a viable part of a corporate environment," McKay added.

Marc H. Rudov of Venture Development Corp. in Wellesley, Mass., holds a slightly dimmer view of the Lisa's fate. "Cullinet probably figured Lisa was going to go gang busters, then when it didn't, they pulled out," Rudov said.

Apple, however, persists in its optimism for the Lisa's future; insisting that the computer is intended for a different market than the IBM Personal Computer.

"We realize the importance of providing a system solution to users," commented Floyd Kvamme, Apple's executive vice-president of marketing and sales in a recent interview, "but it's important to understand that Apple is fundamentally in the business of making individual people capable of being more productive in their jobs."

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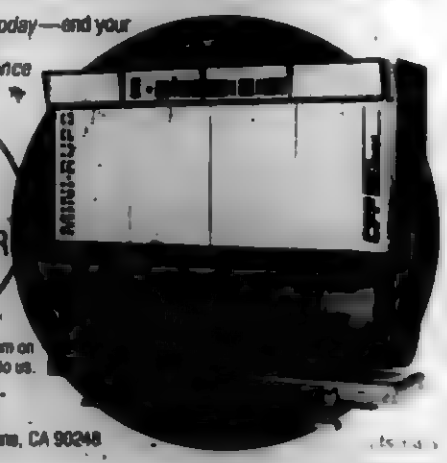

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Semiconductor Industry Warns

Stiffer Export Act Seen Damaging

BOSTON — The Reagan administration's current desire to tighten national security export controls represents a major threat to the U.S. semiconductor equipment and materials industry, executives of that industry told government officials here recently.

At a day-long series of meetings on technology transfer, the Semiconductor Equipment and Materials Institute (Semi) leveled several blasts at representatives from Washington, D.C., including William Schneider Jr., under secretary of state; Frank Knapper, assistant deputy under secretary of defense; and Lawrence Brady, assistant secretary of commerce.

Larry Hansen, executive vice-president of Varian Associates and head of Semi's government affairs committee, commented on the administration-proposed replacement to the current export administration act, which expired Sept. 30.

"There are current bills in both the House and Senate that have been developed over a period of time with inputs from Semi and other industrial associations, and both bills propose a new act that would be more explicit in how exports should be administered," Hansen said. "The administration's version, by comparison, is very broad and allows the administration to write export regulations any way it sees fit.

"The administration is working on a false assumption that equipment being 'diverted' to unfriendly countries comes largely from the U.S.," Hansen continued. "The reality is that less than 3% of all semiconductor manufacturing equipment produced in the free world, which is shipped to the Eastern bloc, is made in the U.S."

The House and Senate bills have met with the approval of Semi, as well as the Computer and Business Equipment Manufacturers Association, the American Electronics Association and the Scientific Apparatus Manufacturers Association. Hansen outlined the industry-supported legislation, which included:

- Elimination of certain individual license requirements within the block of countries belonging to the North Atlantic Treaty Organization, excluding Iceland, including Japan.
- Ensuring availability of bulk licenses, such as the distribution license, for exports to Western destinations.
- Establishment of a comprehensive operations license for the transfer of critical technology to Western destinations.

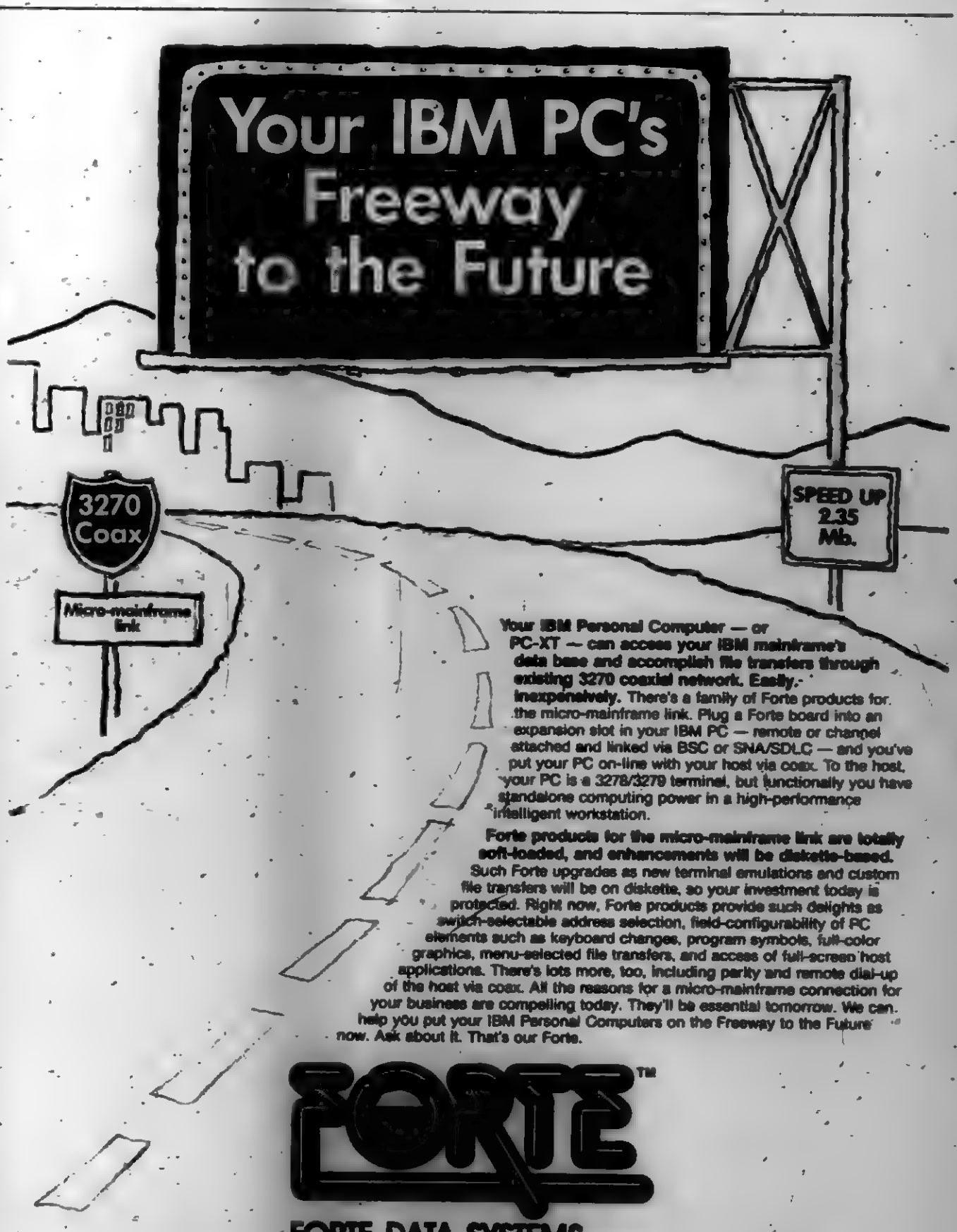
"Western overseas markets are indispensable to the growth of U.S. industry," Hansen said. "Any further steps to restrict U.S. sales to these markets in a pretense of restricting shipments to Eastern Europe could literally put many of our companies out of business."

U.S., Japan Pact Eliminates Tariffs on Semiconductors

WASHINGTON, D.C. — An agreement reportedly reached recently between the U.S. and Japan will eliminate tariffs on semiconductor imports in both countries beginning next spring.

A formal announcement is expected within weeks, as the Japanese must first seek clearance from their parliament. Legislation to cut the tariffs is also pending in the U.S. House.

The agreement is designed to stimulate trade between the two countries — the largest consumers of semiconductors in the world — and is considered a victory for the semiconductor industry here.



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Forte products for the micro-mainframe link are totally soft-loaded, and enhancements will be diskette-based. Such Forte upgrades as new terminal emulations and custom file transfers will be on diskette, so your investment today is protected. Right now, Forte products provide such delights as switch-selectable address selection, field-configurability of PC elements such as keyboard changes, program symbols, full-color graphics, menu-selected file transfers, and access of full-screen host applications. There's lots more, too, including parity and remote dial-up of the host via coax. All the reasons for a micro-mainframe connection for your business are compelling today. They'll be essential tomorrow. We can help you put your IBM Personal Computers on the Freeway to the Future now. Ask about it. That's our Forte.

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Exec: What PCMs Need to Compete With IBM

By Robert Batt
CW West Coast Bureau

SAN FRANCISCO — Better technology, competitive prices and equal service and support facilities are essential for plug-compatible manufacturers (PCM) competing with IBM.

This was the message delivered to data processing professionals and computer vendors at the IBM Futures Conference here recently by Robert O'Neill, director of corporate planning and business development at Amdahl Corp.

O'Neill told attendees at the conference that, for the most part, being equal to IBM is not good enough if PCMs are to succeed.

"The only way to be successful against IBM is to provide machines that offer significantly better performance than theirs at costs that at the very least are no worse than IBM's," he declared.

CW at IBM Futures

O'Neill, a former IBM researcher, said that with Big Blue's huge bulk buying ability, its costs per chip are inevitably lower. The only way to compete with IBM, according to O'Neill, is by having better technology and getting better performance per chip.

"It's going to be increasingly necessary to provide users with added value. Therefore a PCM vendor has to be as good as, if not better than, IBM's service and support systems.

"It's not enough on its own, but without it a manufacturer cannot stay in the game for long," O'Neill warned attendees at the IBM

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IBM to Gain Micro Share, Exec Says

(Continued from Page 89)

IBM and Apple Computer, Inc. becoming real money winners.

Big Blue, he asserted, will gain an additional 20% market share in 1983 compared with last year through the shipment of 600,000 Personal Computers and XT models. This compares with 190,000 Personal Computers shipped in 1982, the model's first shipment year.

In 1984, he continued, IBM will double its 1983 performance, excluding the expected introduction of the low-end Peanut computer.

While Apple will sell over 600,000 units of its Apple IIe this year, Wright said it will be the last personal computer product to have such a long life cycle (seven years).

The personal computer industry, he asserted, is undergoing a changing competitive environment, with product cycles getting shorter, vendor margins declining (now at around 17%, compared with 25% in 1980), less profitable distribution channels and increasing dealer requirements.

"To be a low-cost manufacturer and compete with IBM, you must add value to your material costs or be a better purchaser of components than IBM."

Wright said IBM's strategy for micros is to leave the pioneering to others, while developing technology in-house and purchasing from outside vendors. IBM will respond to competition only if it considers the incursion into the market serious.

Wright said that IBM plans to expand its personal computer marketing channels on a flexible but controlled basis.

By the end of the decade, Wright predicted, microcomputers will account for over 30% of data processing expenditures. To prepare for this, IBM will have an expansive low-end product line in place by 1985, including a low-cost personal computer, an upgraded Personal Computer, a home computer and terminals with local intelligence and peripherals for direct entry into data bases.

"IBM will have multiple products for each market segment. They will roll out their products and notch up a lot of winners," he claimed.

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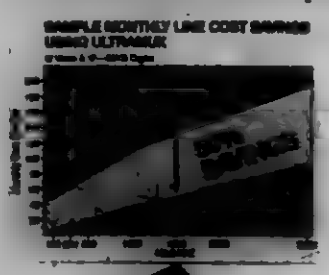

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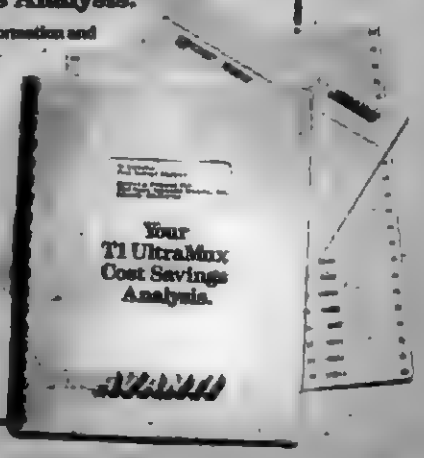

Industry Consultant Tells Attendees

Big Blue Seen Poised for Office of Future Assault

By Robert Batt
CW West Coast Bureau

SAN FRANCISCO — IBM is poised for a full-scale assault on the office of the future, overtaking AT&T in the process, according to an industry consultant.

John King, vice-president of the DMW Group, a consulting firm specializing in communications and data base technology, said IBM will emerge as a major player in all aspects of communications technology over the next 10 years.

Speaking at the recent IBM Futures Conference here, King said Big Blue's communications plan is to expand into new markets, take a leadership role where required, work with leading-edge companies such as Rolm Corp. and Satellite Business Systems and "cover all the bases," including office systems, local-area networks, private branch exchanges, network management and home computers.

'Architectural Upheaval'

"We are in the midst of an architectural upheaval in the world of information processing as communications technology becomes as important as computing, and by the end of this decade, IBM will be taking more money out of American business than the telephone companies," he asserted.

Claiming that AT&T's Western Electric is still in a "utility mode," King said users should not expect leadership products from AT&T.

"This does not mean that IBM will jump willy-nilly into things that are not related to what they are doing today. They are only slowly developing the gut feeling that moving information is as important as storing or processing it, and they are willing to follow the competition into new areas," he said.

IBM, King added, will initially concentrate its communications products on the business sector and evolve new products from its current installed base.

However, to grow in this new arena, he contended, IBM must recognize that its Systems Network Architecture (SNA) will not suffice.

CW at IBM Futures

While conceding that SNA is the dominant data communications network in the world today, with between 60,000 and 80,000 users, King said its major problem is that it was designed in an era when IBM thought all problems could be solved on mainframes.

"Implementations have become very cumbersome on SNA. Nevertheless, it has become too costly to abandon or rewrite [an estimated $30 billion of user code has been written to support SNA], and so it will be extended to include more applications, local-area networks and network management facilities," he said.

Turning to the low end, King asserted that the microprocessor-based desktop computer has changed the nature of computing and the requirements for communications.

"Mips [millions of instructions per second] are migrating straight to the desktop. By the end of 1984, more computing power will be on desktops than in computer rooms, and there is a growing need to make computing power conform to how people work," he said.

What is Needed To Compete With IBM: Exec

(Continued from Page 92)

conference.

This will not be easy, according to O'Neill, because of increasingly unfavorable cost ratios in the area of service and support. Labor costs are going up, he explained, at the same time that hardware costs are decreasing.

This means that as more devices are integrated into the hardware — a job for skilled DPers — units that need to be replaced become more expensive.

Squeezing Mini Sector

In line with other speakers at the IBM conference, O'Neill asserted that the rise of the microcomputer and the sustaining influence of mainframes are resulting in the squeezing of the minicomputer sector.

"The mainframe is the engine for certain types of processing, for example, the creation of centrally controlled large files, which micros or distributed processing will never be able to take over.

"At the same time," he continued, "the growth of micros is supplying work for mainframes and therefore aiding their growth. Mainframes would be growing by 10% to 15% less than they currently are if it were not for micros."

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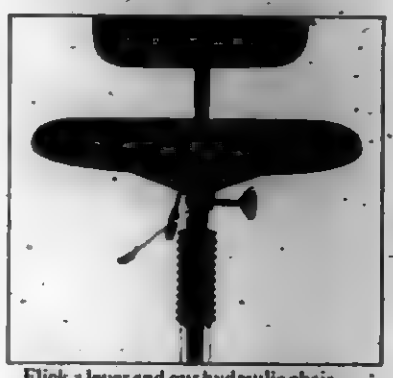

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Forecasts & Findings

BOCs to Reap Windfall

The deregulated Bell operating companies will experience a $5 billion regulatory windfall over the next decade from the implementation of cellular-radio telephone service, according to "Cellular Mobile Radio," a report from International Resource Development, Inc. (IRD).

With telephone companies granted rights to one of two cellular systems for each city authorized by the Federal Communications Commission, and competition for the other rights likely to result in delays for nontelephone company bidders, the former operating companies should build up a lead of 700,000 users of the services, according to IRD.

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The report is priced at $1,850 and is available from IRD, 30 High St., Norwalk, Conn. 06851.

Software Houses Tested

Systems software for microcomputers will need to become more powerful and easier to use to satisfy greater demands and will play a major determining role in spectacular marketing successes and failures over the next few years, according to a report by Creative Strategies International, Inc. (CSI).

Software houses will face a challenge to their market holds as increased memory capacities and lower transportability barriers between systems take hold, CSI said. Companies will have to be well positioned in all areas of microcomputer strategy to remain viable, according to the report, which examines the structure of the industry.

"Microcomputer Operating Systems" is available for $1,450 from CSI, Suite 275, 4340 Stevens Creek Blvd., San Jose, Calif. 95129.

On-Line Banking Booming

On-line branch equipment for banking systems will create a $4.8 billion market over the next five years, with automated teller machines (ATM) and cash dispensers comprising 51% of the market and teller terminals another 41%, according to a report from Frost & Sullivan, Inc.

While banks and thrift institutions will continue to consolidate, the number and size of bank branches will grow, and the growth will require on-line equipment to ease management of the larger networks, the report said. Commercial banks will place 68.2% of the orders, with savings and loans acquiring 22.4%, according to the study.

Priced at $1,275, "On-Line Branch Banking Forecast: 1983-87" is available from Frost & Sullivan, 106 Fulton St., New York, N.Y. 10038.

AT&T Seen Losing Share

AT&T is likely to continue to lose market share in the $800 million modem industry in the U.S. as deregulation offers more opportunities than problems to independent vendors, according to a report by Venture Development Corp. (VDC).

Although AT&T originally set the standards for modems, independents have selected market niches and have innovated technologically, while AT&T has failed to respond quickly to opportunities presented by changes in technology and the competitive environment, according to "The Market For Voice Grade Modem Equipment."

Priced at $2,790, the report is available from VDC, 1 Washington St., Wellesley, Mass. 02181.

Mag Media Mart to Grow

The computer magnetic media industry will grow at a 30.9% annual rate over the next five years, with flexible diskettes experiencing a market-share growth from 33% in 1982 to 56.5% in 1987, according to "The Computer Magnetic Media Industry: A Strategic Analysis 1982-1987," a 250-page study by Venture Development Corp. (VDC).

In 1982, media shipments totalled $1.3 billion and should grow to $5.2 billion in 1987, according to the report. The flexible-diskette industry will grow at an annual compound rate of 45.8% over the five-year period, increasing sales from $445.1 million to $2.9 billion.

The study is available for $3,290 from VDC, 1 Washington St., Wellesley, Mass. 02181.

Outside Maintenance OK

Computer users have a much higher opinion of independent computer maintenance firms than most computer and terminal manufacturers believe, according to a recent study by Frost & Sullivan, Inc.

The study, "Third-Party Maintenance of Computers and Data Terminals in the U.S.," states that "the use of third-party maintenance may have a significant place in your business." The study showed that most computer and data terminal users think third-party maintenance companies are as good or better at maintenance than the computer maker, often more responsive and nearly always lower in price.

Independents now account for about 10% of the total computer and terminal maintenance market, the study reported.

The study is available for $1,350 from Frost & Sullivan, which is located at 106 Fulton St., New York, N.Y. 10038.

Competition, Pricing Wars Seen in Portables Market

NORWALK, Conn. — Bitter competition and pricing wars are forecast in the portable and transportable computer market, according to a recent report from International Resource Development, Inc.

The 215-page report predicted that "at least half of the current manufacturers of portables will be acquired, out of business or in niche markets within the next three years."

The report also estimated that by 1987 approximately one-quarter of all personal business computers and office workstations will be portable, amounting to more than a million units.

The report advised manufacturers to seek out small, specialty, industry-specific markets to escape the bruising competition in the general "white-collar productivity tools" market area.

Successful manufacturers in the portable computer market of the mid-'80s will likely be those who have achieved good distribution and lowered manufacturing costs, according to the report.

Entitled "Portable Computers," the report (568) is available for $1,650 from International Resource Development at 30 High St., Norwalk, Conn. 06851.

CDC to Expand Business Advisors Subsidiary

MINNEAPOLIS — Control Data Corp. has announced plans to market the expertise of company specialists in human resource development and strategic planning through the expansion and reorganization of Control Data Business Advisors.

One hundred and fifty corporate staff employees have been transferred to Business Advisors, a wholly owned subsidiary of CDC, where they will be included in the work force of three new Business Advisors organizations that will market their skills nationally while still providing them to the parent company.

According to a company spokesman, the reorganization of Business Advisors is an example of Control Data's strategy of using existing staff resources to establish additional businesses or profit centers that sell services to the parent company and the external market.

By marketing the staff functions, the company expects to reduce overhead expenses while increasing Business Advisors' product offerings and revenues.

Under the expansion and reorganization plan, Business Advisors' President George F. Troy will oversee three operating companies: the Human Resources Services Co., to be headed by President Roger G. Wheeler; the Marketing and Planning Services Co., with President James R. Morris; and the Small Business Services Co., which will be under the direction of President Gail E. Bergsven.

GSS Developing Drivers for Manufacturers

WILSONVILLE, Ore. — Graphic Software Systems, Inc. (GSS) has begun a program to distribute software device drivers to graphics peripheral equipment manufacturers.

Through the Peripheral Vendor Distribution Program, manufacturers can obtain standard device drivers for MS-DOS as well as Visjon for the personal computer. Drivers for Unix will be available soon, GSS said.

To participate in the program, the manufacturer supplies GSS with a prototype or production version of the peripheral. GSS will then develop, debug and test the device driver with a number of different personal and small business computers. After the manufacturer approves the driver, it is placed in GSS-Drivers, a library of drivers for distribution to microcomputer OEMs and independent software vendors. The peripheral manufacturer receives the device driver, rights to royalty-free distribution and appropriate documentation.

Cost of the device drivers ranges from $10,000 to $25,000 from GSS through P.O. Box 673, 25117 S.W. Parkway, Wilsonville, Ore. 97070.

New Division To Concentrate On Office Mart

ROCHESTER, N.Y. — Computer Consoles, Inc. has established its Office Systems Group to develop integrated hardware and software products for the office market.

The division, based in Reston, Va., will develop systems building on the company's telephone technology and incorporating word and data processing, file management, electronic mail and administrative and decision support functions. New products emanating from the group will feature integrated software, the Unix operating system and several fault-tolerant capabilities, the company said.

John McNulty, vice-president and general manager, will head the new group. The division's initial product offering is Officepower, a Unix-based system incorporating several office automation features.

Disk Cartridge Key to Iomega, Verbatim Pact

SUNNYVALE, Calif. — Verbatim Corp. and Ogden, Utah-based Iomega Corp. have entered into a joint licensing agreement to produce a flexible disk cartridge.

Under the terms of the agreement, Verbatim will supply Iomega with the media for the disk cartridge, which will incorporate Bernoulli technology.

Commenting on the agreement, Gabriel Fusco, president and chief executive officer of Iomega, said, "Flexible disk cartridge technology will bring into one product the removability and low cost of flexible disks with the superior storage capabilities and random-access time of rigid, giving end users another alternative in magnetic media storage."

Iomega manufactures and markets the Alpha 10, an 8-in. flexible disk cartridge, and the Beta 5, its 5¼-in. version.

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Executive Corner

● **Gerald A. Poch** has been named president and chief operating officer of Technicom International, Inc.

● **Martin F. Ryan** has been appointed president of Pro Computing.

● **Richard A. Gutermuth** has been appointed president and chief executive officer, and **Cecil Morehouse Jr.** has been named vice-president of finance at Computer System Dynamics.

● **Shozo Yokogawa**, president and chief executive officer of Yokogawa-Hokushin Electric Corp., has been elected to Hewlett-Packard Co.'s board of directors.

● **Edward F. Thompson** has been named vice-president, chief financial officer and secretary of Amdahl Corp.

● **George F. Brecht Jr.** has been named vice-president of administration at Digital Systems Corp.

● **Terry Schmidt** has been promoted to vice-president and general manager of Carterfone Communications Corp.'s Information Systems Division.

● **James C. Cogan** has been appointed vice-president of operations at Wicat Systems, Inc.

● **Gerald F. Atterbury** has been appointed vice-president of engineering at Data Electronics, Inc.

● **John DiGregorio** has been elected vice-president, sales, at Starnet Corp.

● **John R. Cook** has been named vice-president, corporate development, at Wyly Corp.

● **Klein S. Gilhousen** has been promoted to vice-president, advanced technology, at M/A-COM Linkabit, Inc.

● **Robert J. Bodnar** has joined North Star Computers, Inc. as vice-president, U.S. sales.

● **Howard M. Drourr** has been promoted to senior division vice-president of Anacomp, Inc.'s Data Systems and Services Group.

● **George W. MacIntyre** has been named vice-president, marketing, for Lantech Systems, Inc.

● **Jonathan D. Rick** has been appointed vice-president and general manager of Northern Telecom, Inc.'s Northeast Electronics Division.

● Data General Corp. has named **George D. McClelland** vice-president and treasurer; **Donald L. McDougall**, vice-president and general manager of the Technical Products Division; and **J. Thomas West**, vice-president, Systems Development Division.

● **Rodger M. Sanders** has been appointed director, operating arrangements, at RCA Global Communications, Inc.

AT&T Branch, Firm Announce Lease Program

PARSIPPANY, N.J. — Anticipating the future growth potential of videotex and teletext services, AT&T Consumer Products and the Machine Tool Finance Corp. of Bridgewater, N.J., recently announced a new lease/purchase program for AT&T's Frame Creation System.

The program for the system, which allows users to create, edit and format graphics and textual information for videotex and teletext applications, will be available through Information Systems.

According to Clarence Selin, director of Consumer Information Products for AT&T Consumer Products, the company expects interactive services will continue to increase in popularity. He said the company intends to support that growth, which will make two-way information services available to millions of households by 1990.

The Information Systems leasing subsidiary was established solely to accommodate the leasing of videotex, teletext and other information systems equipment.

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IBM's French Factory Customizes Latest Chips

By Paul Gillin
CW Staff

CORBEIL-ESSONNES, France — In the eerie yellow light of an environment that more closely resembles a laboratory than a factory, IBM here is producing integrated circuits for its full line of large computers — including the new 4361 and 4381 — using equipment and procedures the company says are the most advanced in the world.

The methods are a step up from the "liquid" technology of chip production that has dominated that field since integrated circuits were first introduced in the early 1960s. For the first time they allow chips to be customized without requiring engineering changes or retooling, a spokesman said.

Discarding traditional photolithography methods, which are too unreliable for high-density production, the procedure allows chips to be generated directly from magnetic tapes prepared by computer-assisted design (CAD). The new techniques further allow a variety of integrated circuit types to be etched on the same silicon wafer, a capability that was also not previously available.

Corbeil-Essonnes is the largest integrated circuit plant in Europe and maintains the world's largest catalog of parts, with over 16,000 different numbers, IBM said. It produces integrated circuits for all IBM large computers distributed outside the U.S.

'Clean' Environment

Production takes place in a "clean" environment in which air purification equipment occupies nearly as much space as manufacturing equipment. Air is purified to the point of less than 100 particles per cubic foot compared to tens of thousands in the fresh air of the surrounding French countryside. Workers, clad from head to foot in sterile white lab gear, tread in antistatic shoes on floors that are scrubbed three times every five days. In all, the degree of cleanliness is "1,000 times better than in surgery," according to IBM spokesman Raymond Duranton. Still, dust is the primary enemy of integrated circuits, more than 54% of which are discarded as unusable after the six-month manufacturing process is complete.

Two new processes, however, have recently improved both the reliability and flexibility of chip production, Duranton said. Electron-beam etching uses a high-intensity shaft of energy to carve channels in the silicon wafers. The etches are then filled with boron — conducting material that is injected into the paths.

The process of preparing the silicon wafer has not changed much in recent years. Cylinders of pure silicon from Germany are cut using diamond-tooth saws into slices measuring 0.4 mm across. The wafers are then polished to a mirror finish and coated with photosensitive resin.

However, etching and "doping," which is the process of injecting the boron into the chips, have been improved with the new technology. Whereas etching was previously done by exposing the wafers to light through a photo-mask and washing away the substrate with acid, the electron-beam technology produces a cleaner and sharper etch, Duranton said.

Driven by two IBM 3033 mainframes and multiple slave minicomputers, the electron scanner directs deflected beams onto the integrated circuit. The design is driven by a CAD program written on magnetic tape. The computer-intensive application makes Corbeil-Essonnes, "the largest IBM customer in Europe," he said.

Doping was previously done at high temperatures with gas diffusion in a process that required precise temperature control for long periods of time. The new process uses particle acceleration and ion implantation to direct a nearly pure shaft of particles into the etches. The beam is so pure that an injection of 1,020 atoms per square centimeter can be controlled to a purity of 100 atoms per square centimeter, Duranton said.

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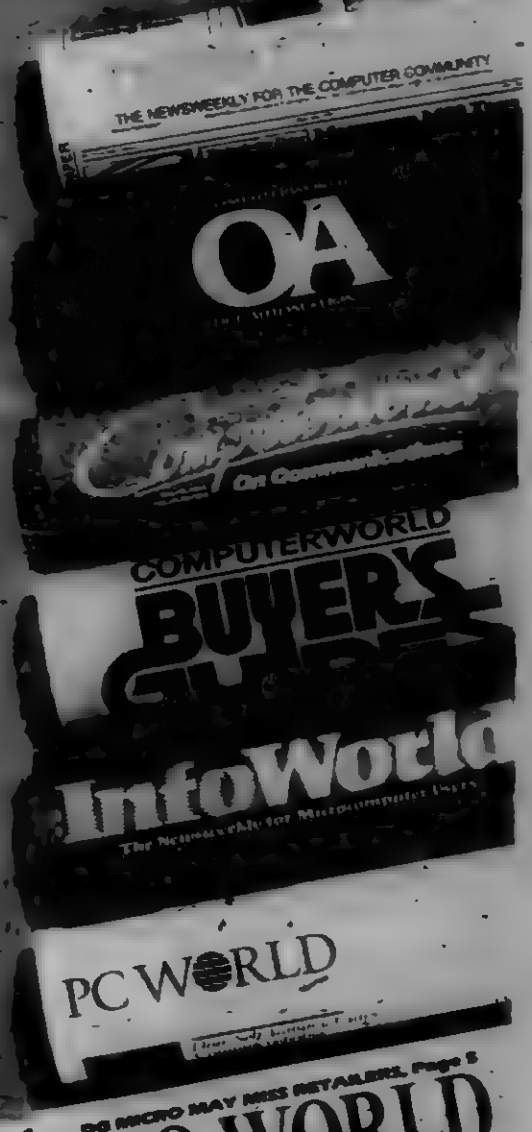

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CDC, NCR Division to Open CAD Services Center

SANTA CLARA, Calif. — Control Data Corp. and NCR Corp.'s Microelectronics Division have jointly announced the opening of an electronic, computer-aided design (CAD) services center.

Through the venture, the vendors will offer a combination of consulting, training and computing resources designed to assist integrated circuit manufacturers and systems houses in applying state-of-the-art CAD techniques, from the initial design concept to the production stage.

Located here, the center will be managed by CDC's Information Systems Design unit and has specially designed and equipped work areas for customer use, including engineering workstations hooked into CDC's Cybernet data services network.

NCR will provide its Semicustom Design System, an integrated set of tools for design capture, logic simulation, performance analysis and ac/dc test generation. The computer-simulated circuit description will be transmitted via Cybernet services to NCR. Device fabrication will take place at NCR's Fort Collins, Colo., microelectronics facility.

AT&T Announces Officers Of Info Systems Division

MORRISTOWN, N.J. — AT&T has announced the top officers of its Information Systems Division, which will provide installation, maintenance and sales services for the comany's business customers in 1984.

Bruce G. Schwartz has been named division president, effective Jan. 1, and William G. Ebben was appointed executive vice-president, responsible for national services operations.

Additionally named as officers were: John Berndt, Eldon Hanes and Peter Milano, all vice-presidents reporting to Schwartz; and regional vice-presidents Paul Caswell, Northeast; Tom Cross, Mid-Atlantic; Bob Haley, Southeast; Ken McLarty, Great Lakes; Dan Wiedemeier, Western; and Bob Clark, Pacific, all reporting to Ebben.

The new division will comprise 60,000 field services and sales employees, who will be transferred from the Bell operating companies when the court-ordered divestiture is initiated.

AT&T said that the employees will be doing for the new division what they are presently doing for the Bell operating companies, namely leasing, selling, installing and maintaining the company's line of communications equipment.

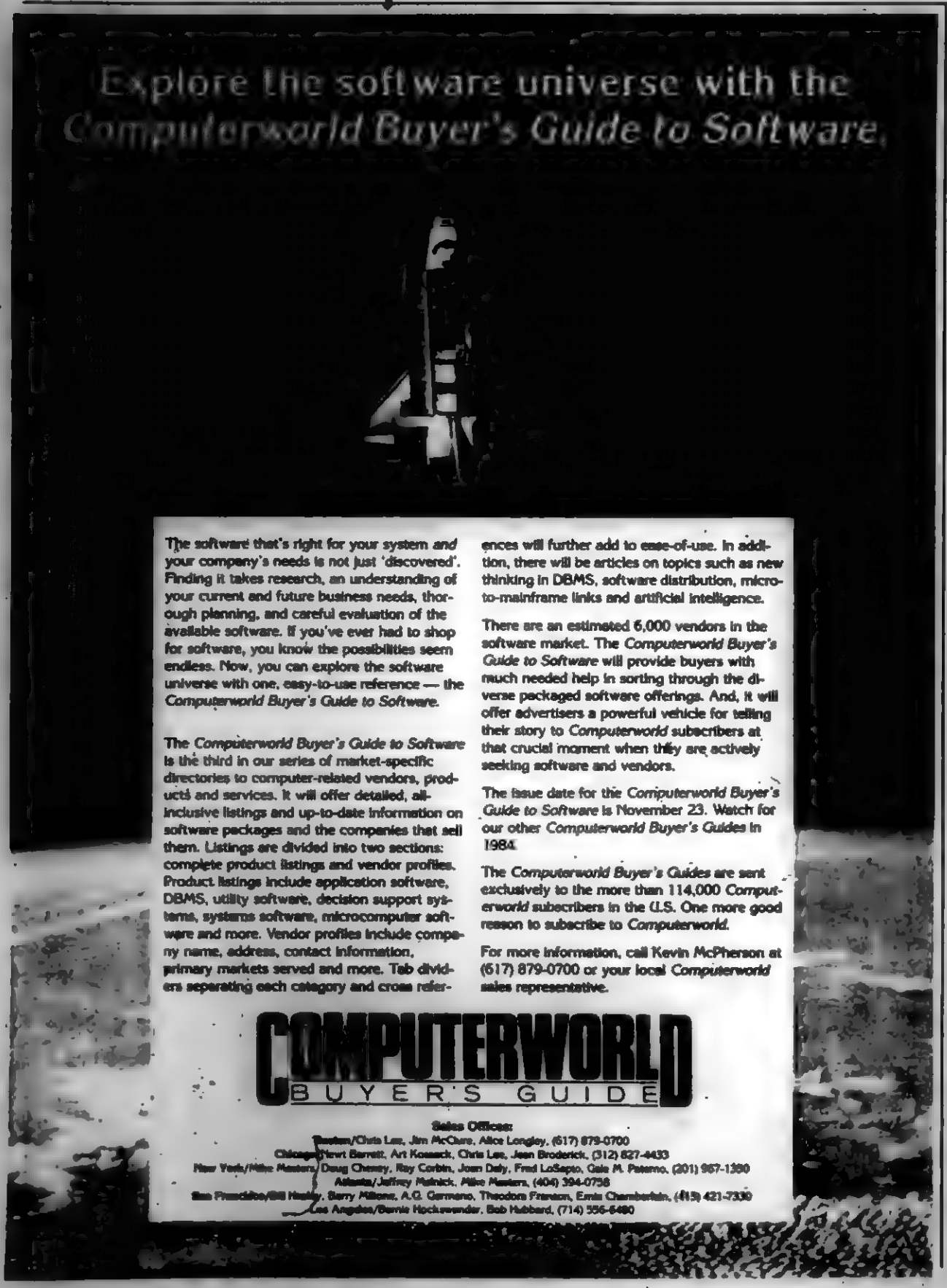
Compucorp Plans To Acquire Litton's Monroe

SANTA MONICA, Calif. — Compucorp, Inc. recently announced the signing of a letter of intent to purchase the operating assets and business of the Monroe Division of Litton Business Systems, a subsidiary of Litton Industries, Inc.

According to Compucorp President Elmer R. Easton, the addition of Monroe's resources would give Compucorp one of the largest distribution capabilities of office automation and related products in the U.S. The company said the combined sales of Compucorp and Monroe are currently $200 million a year.

Monroe, which has assets of approximately $100 million, will be owned 80% by Compucorp and 20% by Litton, with the intent of eventual 100% ownership by Compucorp. The transaction, which is expected to close by year end, is subject to approval by the board of directors and shareholders of Compucorp and the board of directors of Litton.

Monroe markets a line of calculator, computer, copier and accounting machine products. Compucorp manufactures and markets a line of office automation products and systems ranging from stand-alone word processors to multistation local-area networks.



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The *Computerworld Buyer's Guide to Software* is the third in our series of market-specific directories to computer-related vendors, products and services. It will offer detailed, all-inclusive listings and up-to-date information on software packages and the companies that sell them. Listings are divided into two sections: complete product listings and vendor profiles. Product listings include application software, DBMS, utility software, decision support systems, systems software, microcomputer software and more. Vendor profiles include company name, address, contact information, primary markets served and more. Tab dividers separating each category and cross references will further add to ease-of-use. In addition, there will be articles on topics such as new thinking in DBMS, software distribution, micro-to-mainframe links and artificial intelligence.

There are an estimated 6,000 vendors in the software market. The *Computerworld Buyer's Guide to Software* will provide buyers with much needed help in sorting through the diverse packaged software offerings. And, it will offer advertisers a powerful vehicle for telling their story to *Computerworld* subscribers at that crucial moment when they are actively seeking software and vendors.

The issue date for the *Computerworld Buyer's Guide to Software* is November 23. Watch for our other *Computerworld Buyer's Guides* in 1984.

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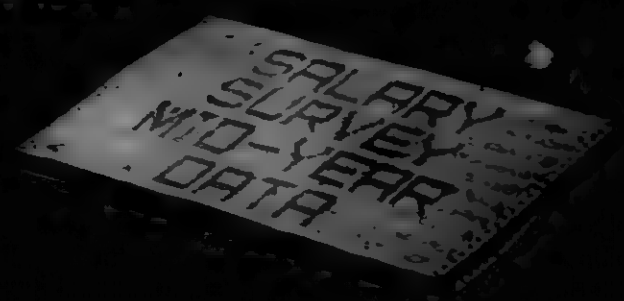

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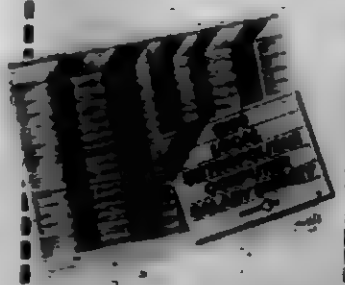

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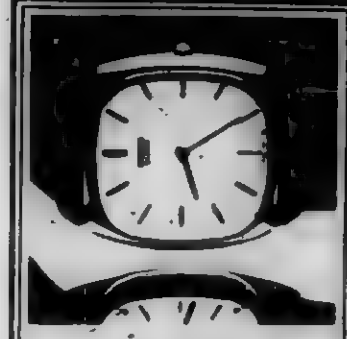

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Requires experience with MVS, JES2 operating systems (VM a plus) and operating knowledge of CICS online under VTAM. Must have prior supervisory experience and ability to write operational procedures. Position open at our Los Angeles facility. **Contact or send resume to D. Servi.**

Data Security Specialist

Must have minimum of 3 years MVS operating system experience and previous experience with design/implementation of data security systems. Position open at our Los Angeles facility. **Contact or send resume to D. Servi.**

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You will assist with design review, design coordination and product planning. Other responsibilities include current/future product research and consulting to the Marketing Department.

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For this position you'll need experience with Honeywell Level 6, DPS-6 minicomputer hardware, software and systems applications. Requires a knowledge of CP/M-MS/DOS, Assembler and COBOL. Degree in Business Programming or Computer Science plus at least 3-4 years systems software programming, maintenance and documentation experience preferred.

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To qualify, you should have 2-4 years CODASYL data base experience with IDMS, DMS/11, or IDS-2 with on-line interactive software. Two of these years should include COBOL experience in a business environment. In addition, you should have a background in T.P. Systems with TPFO, a working knowledge of conversational and non-conversational TPR techniques, plus the ability to translate schemas and subschemas and work with application systems in analyzing design alternatives and debugging.

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12720 Hillcrest Suite 520
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DETROIT: Electronic Systems Personnel Inc
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FLORIDA: Data Sciences Personnel Inc
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KANSAS CITY: DP Career Associates
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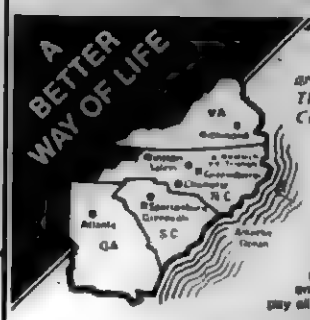

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Franklin, KY

We're seeking a motivated, team-oriented person to perform systems analysis and design functions. Other responsibilities include hardware planning, coordinate testing and implementation with users and systems personnel, and to assist in training system users. This position reports directly to Corporate MIS at Kendall's worldwide headquarters in Boston, MA.

The ideal candidate would be APICS-Certified, with 5-7 years experience and have effective systems methodology and verbal/written communication skills. You should also have a combined knowledge of manufacturing applications, systems analysis, project management, and prior work experience with closed loop manufacturing systems. A Bachelor's degree in Business or Computer Science is preferred.

Interested applicants should forward resumes to George R. Sweeney, The Kendall Company, One Federal Street, Boston, MA 02101.

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San Francisco Bay Area

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APL offers excellent compensation and top corporate benefits. Expedite resume with salary history to R. Wenzel, American President Lines, Ltd., Three Waters Park Drive, Suite 115, San Mateo, CA 94403. No phone inquiries please. Responses will be limited to request for interview. The company will not consider resumes without salary information. We are an equal opportunity employer m/f/h.

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Your expertise is needed to support the NOS version 2.1 operating system on Cyber 865 and Cyber 740 computers. In addition, you will provide networking support for 2551 network processing units. Successful individuals should have extensive experience with assembly language programming and operating system internals.

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We are building an integrated network of distributed resources ranging from personal computers to vector super computers. This will include high performance local area network (hardware and software) and remote links to Cyber 205 and Cray super computers. Experience with hyperchannel hardware, CDC and DEC computers, and DECNET and high performance networking software is desired.

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In this position, you will support existing remote batch and PDP 11 workstations. Qualified candidates will have VAX VMS operating system experience in addition to distributed processing and communications concepts experience.

SOHIO's search for the best technical talent is an integral part of our expansion strategy. Our facilities include a new data center, enabling SOHIO to put the most advanced data processing technologies at your disposal. For immediate, confidential consideration for any of these opportunities, forward your resume with salary history today to Judy Alter, Sohio Petroleum Company, SO36, 50 Fremont Street, San Francisco, CA 94105. We are an equal opportunity employer M/F/H/V.

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For prompt, confidential consideration, please send resume with salary history to Cheryl Snyder, Dept. B55, NCR Corporation, P.O. Box 728, Cambridge, Ohio 43725.

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CRB Systems, Inc., a computer systems/consulting firm located in Rockville, Maryland has a position open for an experienced programmer/analyst. Candidate should have:

- B.S. in Computer Science, Math or Physics,
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- experience in design and implementation of computer systems;
- experience with design of systems for microcomputers; and,
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5 plus years Sperry 1106 COBOL experience, working knowledge of TIP, DMS-1100, FORTRAN or 1100 Assembler preferred.

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(SPERRY 1100)

3-5 years TIP support experience, working knowledge of TIP internal, utilities and statistics. Proficient in COBOL and 1100 Assembler.

DATA COMMUNICATIONS SPECIALIST

3 years communication network establishment and maintenance experience. Working knowledge of analog/digital converters. Experience with line monitoring and analyzing equipment. Previous experience with Sperry 1100 utilizing CMS will be a plus.

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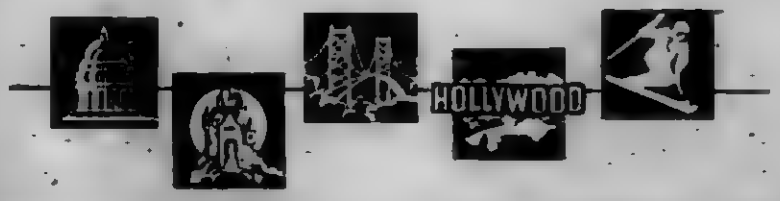

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EOE M/F

SEMINARS

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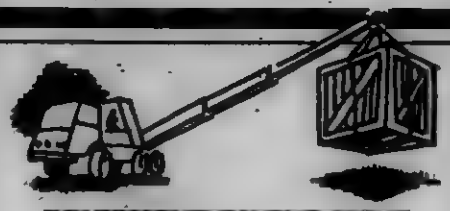

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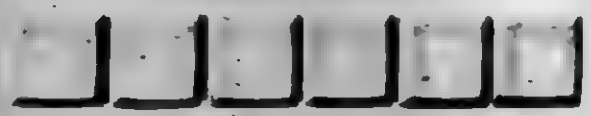

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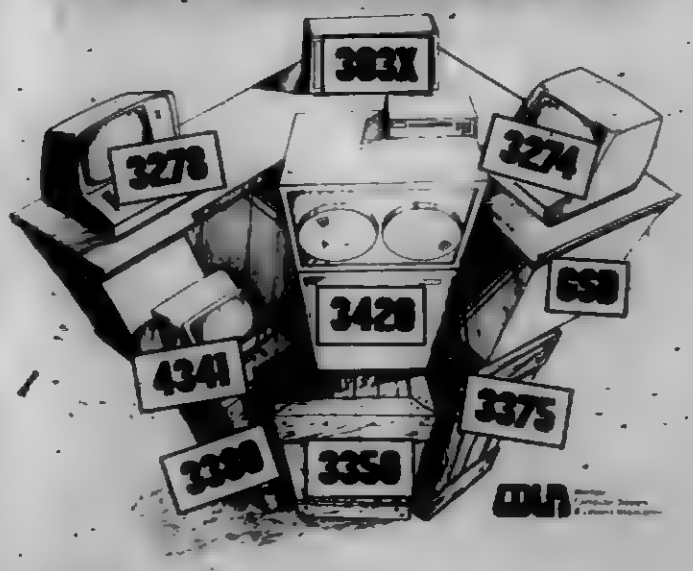

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It's easy to advertise in COMPUTERWORLD. If you don't have an advertising agency to supply us with copy, layout and order, or a camera ready mechanical, stat or film negative of your ad, just call one of our ad-takers at 1-800-343-6474. They will be glad to take your ad and typeset it in available fonts at no extra charge. If you have lengthy ads that require logos and artwork, just send a clean typewritten copy of your ad to the classified advertising department at COMPUTERWORLD (telecopier service is available): note the ad size you want; and, if you want your company logo to appear in your ad, please be sure to include a camera-ready copy with your insertion order. You should also supply any special borders, headlines and artwork that you want in your ad. Our Art Department will follow your suggested layout as closely as possible if you wish to send one.

Ad closing is every Friday, 6 working days prior to issue date.

Rates: Open rate is $112.70 per column inch. Columns are 2" wide. Minimum ad size is 2 column inches (1 column wide by 2 inches deep), and costs $225.40 per insertion. Additional space is available in half-inch increments. Some sample sizes and costs are shown.

1 col x 4" - $450.80
2 cols x 4" - $901.60
2 cols x 5" - $1127.00
2 cols x 8" - $1803.20

Discounts are available when you run more than 35 column inches of advertising in a year anywhere in Computerworld. Box Numbers are available, $15.00 per insertion.

To reserve space for your ad, or if you'd like more information on Classified advertising in COMPUTERWORLD, call our office nearest you.

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William J. Mills,
Manager Classified Advertising

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THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
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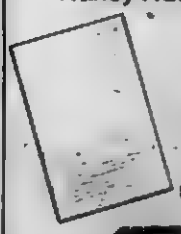

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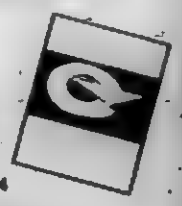
845 CROSSOVER LANE
P. O. BOX 240297
MEMPHIS, TENNESSEE 38124



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DL11-E (used)	$ 375	MS750-DC (new)	$8,950
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DZ11-E (new)	$3,595	RUA50-AA (new)	Call
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6102 Micro 12.5/1.2 Disk Sys	6026 D/D Tape System
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FOR SALE OR LEASE

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Irving TX 75062
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BIDS & PROPOSALS

NOTICE OF REQUEST FOR PROPOSALS

The General Manager of the Utah Transit Authority requests the submission of proposals in five copies to Darrell Swenson, Grants Administrator, Utah Transit Authority, 3600 South 700 West, P.O. Box 31810, Salt Lake City, Utah 84131, any time prior to the hour of 2:00 p.m. on Monday, October 24, 1983 for furnishing a computer-based software inventory system to Utah Transit Authority.

The project is being financed in part with Federal funds. The contract to be let, therefore, is subject to the terms of a financial assistance contract between the Utah Transit Authority and the U.S. Department of Transportation.

The proposals will be received and recorded at the office of the Grants Administrator of the Utah Transit Authority, 3600 South 700 West, P.O. Box 31810, Salt Lake City, Utah 84131 at 2:00 p.m. on Monday, October 24, 1983. The Authority reserves the right to waive any irregularities and informalities or to reject any or all proposals submitted to and accepted by the Authority. The Authority further reserves the right to select the proposal in order to negotiate a contract and to make a contract award in the best interest of the Authority.

The contractor will be required to comply with all applicable and equal employment opportunity laws and regulations. The Utah Transit Authority in accordance with Title VI of the Civil Rights Act of 1964, as amended, and 49 CFR Part 23 issued pursuant to the Act will afford Disadvantaged Business Enterprises (DBE's) and Women Business Enterprises (WBE's) full opportunity to respond and will not discriminate against any interested firm or person on the basis of race, color, sex, age or national origin in the review of qualifications or contract award. Qualified firms will be required to address the utilization of DBE's and WBE's in the text of their proposals.

Proposal forms and specifications will be furnished upon request.

Any name appearing on the Comptroller General's List of Ineligible Contractors for Federally Financed and Assisted Construction, Materials or Equipment Contracts is not an eligible bidder.

John C. Pingree
General Manager
Utah Transit Authority

NOTICE

Solicitation of Consultant Services
For Operation of Control Center
Integrated Motorist Information System
N.Y. State Department of Transportation

The New York State Department of Transportation is soliciting consultant services to operate a computer-assisted freeway and arterial street traffic management control center at its Region 10 office in Hauppauge, New York. The operators at the control center will oversee traffic operations on 128 miles of highways in the northwestern quadrant of Long Island.

Any firm wishing consideration and further information must submit a letter of interest together with Federal Standard Form 254 to Mr. Joseph Contegni, IMIS Project Director, New York State Department of Transportation, State Office Building, Veterans Memorial Highway, Hauppauge, New York 11788, no later than Thursday, November 10, 1983.

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The Omaha Public Power District invites proposals for an interactive computer software package to perform electrical distribution planning and analyses and to install this software on either the District's IBM 4341 mainframe or on a minicomputer supplied by the vendor. Interested vendors capable of providing such a package may obtain copies of the specifications by contacting:

E. Morriessette, Manager-Contracts
Omaha Public Power District
1623 Harney Street
Omaha, NE 68102
Tel. (402) 536-4600

Requests will be received until 4:30 pm October 7, 1983.

CLASSIFIED ADVERTISING ORDER FORM

Computerworld's Classifieds work.

Issue Date: Ad closing is every Friday, 10 days prior to issue date.

Sections: Please be sure to specify the section you want: Time and Services, Software for Sale, Position Announcements and Buy/Sell/Swap. (Available upon request: Software Wanted, Turnkey Systems and Real Estate.)

Copy: We'll typeset your ad at no extra charge. Please attach CLEAN typewritten copy. Figure about 25 words to a column inch, not including headlines.

Cost: Our rates are $112.70 per column inch. (A column is 2" wide.) Minimum size is two column inches (2" wide by 2" deep) and costs $225.40 per insertion. Extra space is available in half-inch increments and costs $56.35. Box numbers are $15.00 extra.

Billing: If you're a first-time advertiser, (or if you have not established an account with us.) WE MUST HAVE YOUR PAYMENT IN ADVANCE.

Ad size desired:

_____ columns wide by _____ inches deep.

Issue Date(s): _____

Section: _____

Signature: _____

Name: _____

Company: _____

Title: _____

Address: _____

Telephone: _____

Send this form to:
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COMPUTERWORLD
375 Cochituate Road, Box 880,
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The Bulletin Board

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(QTY) 3370-A1 & B1 Disk
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S/38
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Bought - Sold - Lease
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Available Now
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Vargo Companies
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Your ad can be here for $115

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6169 D211 VDT New	$995
6166 D410 VDT New	$1 350
6181 147MB New	$18 500
6081 192MB Zebra SS	$16 900
6103 25MB Winchester SS	$4 900
[illegible] Dual Density Tape SS	$1 900
[illegible] Dual Density Tape	$2 300
6706 2MB MV8000 MDS	$7 500
6098 12 5MB w/F	$4 200

Data Investors (201) 939-7661

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Cougar Computer Corp.
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[illegible] Euclid Office Plaza
Euclid, OH 44132
(216) 261-3500

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Systems, Peripherals and Applications Software
Mention this ad for a 5% discount
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1-800-241-3159

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Quantity disc. available from stock.

MVP-150	$3 400
P300	$4 900
P600	$5 300

ALETA ENTERPRISES INC.
16 Southwind, Irvine, Ca 92714
(714)552-3559

More Bulletin Board on the next page.

THE BULLETIN BOARD

A Low-Cost Way to Sell Hardware and Software in Computerworld.

What is The Bulletin Board?

It's a classified section in Computerworld designed especially for the selling and buying of individual pieces of hardware in a convenient, low-cost format. It is especially suited to companies that have a piece of used equipment they want to sell. For one low price, you can inform more than half a million Computerworld readers around the country of your equipment's availability.

How Does The Bulletin Board Work?

Bulletin Board ads come in standard units (one column wide by one inch deep) and standard typefaces. (Units may be combined to produce deeper ads, but one column is the maximum width and no units of less than one inch are available.) Ads are arranged under headings (such as "IBM", "DEC" or "Printers"). The headline of the ad is set in larger, bold type, and should contain the standard equipment identification. The body copy should describe the equipment very briefly and give the person to contact. This is all the information an interested buyer needs to follow up. No ad should have more than one piece of equipment or software.

The price for each standard unit is only $115.00 (One unit minimum and no fractional units available.) Anyone can place an ad, but no agency commissions are paid, no quantity discounts allowed, and no credit toward rate is given for contract advertisers who advertise in other sections of Computerworld. It's a simple and effective system for buying and selling hardware and software.

How to Place an Ad in the Bulletin Board.

Ads are accepted in the mail, by phone or by telecopier. Ads can be accepted up until the Monday before issue (7 days in advance of issue date). You should write out your ad before submitting it. (The standard size will hold approximately 25 words of copy.)

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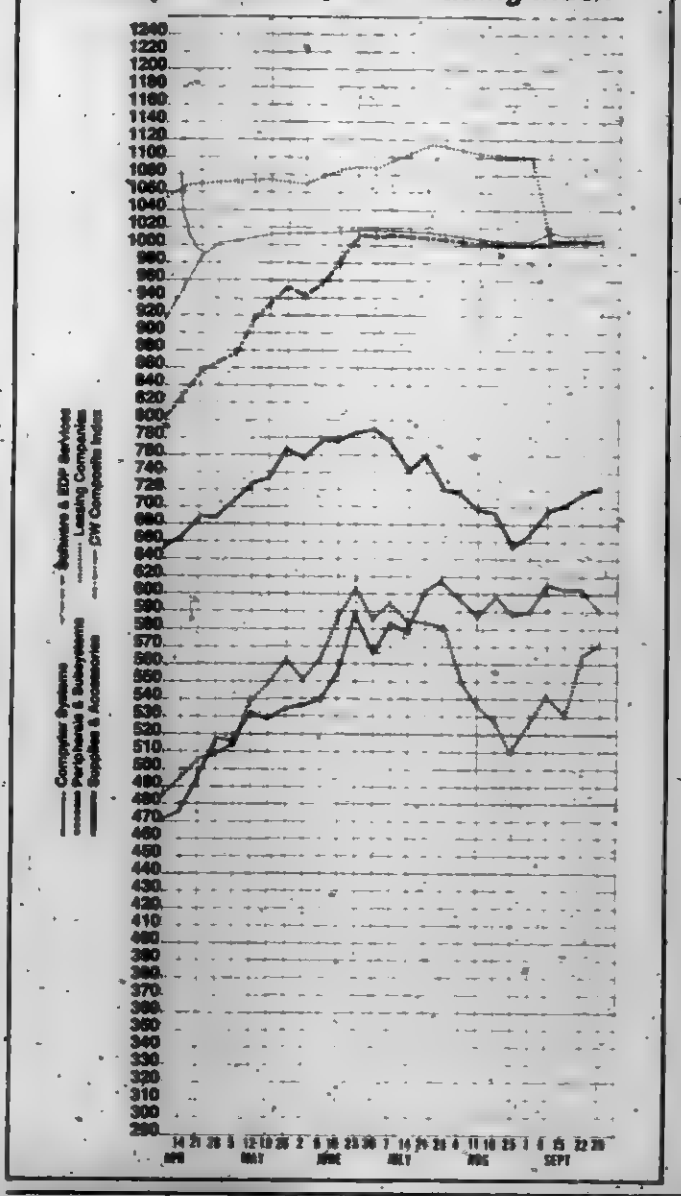

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CLOSING PRICES WEDNESDAY, SEPTEMBER 28, 1983

	1982-83 RANGE (1)	CLOSE SEP 28, 1983	WEEK NET CHANGE	WEEK PCT CHANGE
COMPUTER SYSTEMS				
ALPHA MICROSYSTEMS	12- 24	18 1/4	+ 1/4	+1.5
AUTOM COMPUTER SYST	9- 28	9 1/2	-3 1/2	-19.5
AMDAHL CORP	9- 30	18 3/4	+ 7/8	+4.8
APPLE COMPUTER INC	23- 63	32 7/8	+2 5/8	+7.3
AT&T	60- 70	65 3/8	-2 1/8	-3.1
BURROUGHS CORP	28- 58	54 1/8	- 7/8	-1.5
COMPUTER AUTOMATION	7- 17	7 3/8	-3 7/8	-34.4
COMPUTER CONSOLES	6- 25	19 5/8	-3	-4.8
CONTROL DATA CORP	21- 62	31	0	0.0
CONVERGENT TECHNOL	22- 41	24 7/8	- 1/2	-1.9
CRAY RESEARCH INC	29- 52	44 5/8	- 1/8	-0.3
DATA GENERAL CORP	29- 62	56	+3 5/8	+7.5
DATAPOINT CORP	11- 36	29 5/8	+ 1/8	+0.8
DIGITAL EQUIPMENT	62-132	108	- 1/8	-0.2
EECO INC	6- 16	14 7/8	- 5/8	-4.0
ELECTRONIC ASSOC.	5- 13	12 3/4	- 1/2	-3.7
FLOATING POINT SYST	16- 44	35 1/8	+1 1/8	+3.3
FOLLETT	22- 47	34 7/8	+1 1/8	+3.3
GENERAL AUTOMATION	3- 16	11 1/4	- 3/8	-3.2
GOULD INC	21- 44	32 1/8	-1 7/8	-5.8
[illegible]				
[illegible] CORP	20- 51	38 3/4	+1 1/2	+4.0
HEWLETT PACKARD CO	33- 66	43 1/4	-2	-4.4
HONEYWELL INC	60- 125	124	+1 7/8	+1.5
IBM	97-129	128 3/4	+5 3/4	+4.6
[illegible] SYSTEMS INC	3- 14	8 1/2	- 1/4	+2.8
LANIER BUSINESS PROD	12- 21	18 3/4	+ 5/8	+3.2
M/A-COM INC	25- 38	37	-1 1/4	-3.6
MAGNUSON COMP SYSTS	2- 9	9	0	0.0
MANAGEMENT ASSIST	7- 18	16 1/2	- 3/8	-2.4
MATSUSHITA ELEC(ADR)	47- 75	74 3/4	+5 1/4	+8.1
MODULAR COMPUTER SYS	8- 16	12 3/4	-1 1/2	-10.5
MOHAWK DATA SCI	10- 19	14 1/8	+ 3/4	+5.6
MOTOROLA INC	82-148	148	+7 1/2	+5.4
NAT'L SEMICONDUCTOR	25- 60	57	+2 1/8	+3.8
NCR	38-130	128 1/4	+6 3/8	+5.2
PERKIN-ELMER	37- 57	38 1/8	- 7/8	-2.2
PRIME COMPUTER INC	31- 80	67 1/2	+1	+0.0
SPERRY CORP	21- 48	46	+ 3/8	+0.8
TANDEM COMPUTERS INC	14- 38	33 3/8	- 1/2	-1.5
TANDY CORP	37- 69	38 1/2	-5 1/8	-11.7
TELEVIDEO SYSTEMS	10- 41	16 7/8	-1 5/8	-8.7
TEXAS INSTRUMENTS	71-178	118 3/8	- 3/8	-0.3
VECTOR GRAPHICS INC	4- 14	9 3/8	- 9/8	-14.7
WANG LABS "B"	13- 62	36	+ 1/2	+1.4
WANG LABS "A"	11- 62	34 1/4	+ 1/8	+0.3
XEROX CORP	39- 90	63	-1	-1.6
LEASING COMPANIES				
BOOTHE FINANCIAL CP	11- 29	29 3/8	+1 3/4	+6.2
CIT FINANCIAL CP	7- 43	38 1/2	+1 3/8	+3.6
CONTINENTAL INFO SYS	3- 16	13 3/4	+ 1/2	+3.7
DPF INC	3- 16	14 3/8	+1 3/8	+10.5
U.S. LEASING	18- 47	40 7/8	- 5/8	-1.8

EXCH: N=NEW YORK A=AMERICAN P=PACIFIC B=BOSTON; I=INTERNATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
0-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
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	1982-83 RANGE (1)	CLOSE SEP 28, 1983	WEEK NET CHANGE	WEEK PCT CHANGE
SOFTWARE & EDP SERVICES				
ADVANCED COMP TECH	1- 8	4 1/2	- 1/8	-2.7
ADVANCED SYSTEMS INC	6- 27	17 3/4	0	0.0
AGS COMPUTERS INC	7- 32	28 1/2		+7.2
AMERICAN SOFTWARE	21- 31	27 3/8	- 1/4	-0.9
ANACOMP INC	6- 23	8 7/8	+ 5/8	+8.7
ANALYSTS INTL CORP	3- 17	13 3/4	+1	+8.2
APPLIED DATA RES.	8- 37	29 1/8	- 3/4	-2.5
ASK COMPUTER SYSTEMS	6- 21	20 3/4	+ 1/2	+2.4
AUTOMATIVE COMP IND	1- 7	4 3/4	- 5/8	+10.0
AUTOMATIC DATA PROC	21- 44	33	- 1/2	-1.5
CGA COMPUTER ASSOC	9- 16	15 1/2	+1 1/8	+8.7
COMPUTER ASSOC INT'L	6- 35	29 7/8	+2 3/8	+8.6
COMPUTER HORIZONS	8- 20	11 1/2	- 1/2	-4.1
COMPUTER METHODS	4- 10	7 3/8	- 1/8	-1.6
COMPUTER SCIENCES	11- 23	18	+1 1/8	+6.6
COMPUTER TASK GROUP	6- 22	16	+ 1/2	+3.2
COMPUTER USAGE	2- 22	17	+2 1/2	+38.0
COMPUTONE SYSTEMS	7- 38	7 1/8	-1 3/8	-15.6
CONSERV CORP	3- 20	8 3/4	+ 1/2	+5.7
CONSAD	3- 13	10 3/4	- 3/8	-3.3
CULLINET SOFTWARE	13- 30	28 3/4	- 5/8	-2.1
CYCARE SYSTEMS INC	8- 27	26 1/2	+ 1/2	+2.3
ELECTRONIC DATA SYST	10- 42	38 1/8	+2 7/8	+7.8
HOGAN SYSTEM INC	27- 93	46 3/4	-3 1/2	-6.9
GENERAL ELECTRIC CO	85- 98	95 1/4	+2 1/8	+2.2
GTE CORP	38- 48	43 3/4	0	0.0
INFORMATICS INC	16- 34	27 1/8	+1	+3.8
INFORMATION SYSTEMS COM	28- 43	38	-2	-5.0
KEANE ASSOCIATES	4- 19	10 1/4	0	0.0
LOGICON	8- 30	27 3/4	- 3/8	-1.3
MCI COMMUNICATIONS	14- 78	18 1/8	- 7/8	-4.6
MGMT SCI AMER INC	6- 23	22 1/4	+2 1/2	+8.4
MATHEMATICAL APP GRP	12- 22	15	+ 1/2	+3.4
MICOM SYSTEMS INC	25- 56	46 3/4	- 1/4	+0.5
MINICHIP-WEBER CP	10- 22	14 3/4	+2 1/4	+18.0
NATIONAL DATA CORP	9- 28	17 1/4	- 7/8	-4.8
ON-LINE SOFTWARE INT	18- 27	20 1/2	0	0.0
PANSOPHIC SYSTEMS	8- 30	25 3/8	- 1/2	-1.9
PLANNING RESEARCH	8- 21	19 3/8	+ 1/8	+0.6
POLICY MGMT SYSTS CP	30- 68	38 3/4	-2	-3.2
PROGRAMMING & SYS	1- 8	7 3/8	+ 1/4	+3.5
REYNOLDS & REYNOLD	17- 53	48	+2 3/4	+5.7
SEI CORP	11- 34	29 1/4	- 1/2	-1.5
SHARED MEDICAL SYST	13- 43	43 3/4	+2 1/2	+6.1
SCIENTIFIC COMPUTERS	8- 16	11 3/4	+ 1/2	+4.4
SOFTWARE AG	9- 17	11 3/8	+ 1/2	+4.6
TYMSHARE INC	12- 30	21 3/8	- 1/8	-0.5
URS CORP	8- 18	14 3/8	+ 3/8	+2.6
UYLS CORP	7- 17	11 3/8	- 7/8	-5.1
COMPONENTS				
ADVANCED MICRO DEV	13- 35	31 3/4	+ 1/4	+0.7
ADV'D SEMICONDUCTOR	12- 36	30 1/4	+1	-3.1
ANALOG DEVICES INC	18- 42	40 3/8	- 7/8	-2.1
ANALOGIC CORP	23- 37	29 1/2	+1 1/4	+4.8
APPLIED MAGNETICS CP	18- 43	38 1/4	+ 5/8	+1.8
TEKELEC	14- 37	37 1/4	+4 1/4	+12.9
PERIPHERALS & SUBSYSTEMS				
AM INTERNATIONAL	2- 7	6 7/8	-1 1/8	-10.7
ANDERSON JACOBSON	8- 20	11 3/4	- 3/4	-6.0
AUTO-TROL TECHNOLOGY	8- 23	23 1/4	- 3/8	-1.5
BANTEC INC	3- 33	19 1/8	-1	-5.1
BERKLINE INTL	4- 18	8 3/4	+1 1/8	+10.3
BOLT, BERANEK & NEW	8- 60	39 1/2	-2 3/4	-4.8
CANRAD CORP	2- 6	2 1/4	- 1/8	-5.2
CENTRONICS DATA COMP	8- 20	15	-1 5/8	-9.1
CITEC CORP	4- 12	10 7/8	- 7/8	-8.7
COMMTRONICS	2- 20	10	-1 1/8	-10.1
COMPUTER DEVICES INC	2- 21	3 5/8	- 1/8	-3.5
COMPUTER TRANSCEIVER	4- 12	6 3/8	0	0.0
COMPUTER VISION CORP	18- 53	31 1/2	- 1/4	-0.6
CONRAC CORP	17- 38	16 1/2	- 1/8	-0.5
DATAPRODUCTS CORP	16- 43	28 1/4	+1 1/8	+4.1
DATARAM CORP	5- 12	10 1/2	- 3/4	-6.6
DATA SWITCH CORP	13- 41	30 1/2	- 1/2	-1.6
DATUM INC	3- 17	11 1/2	+1 1/8	+8.8
DECISION DATA COMPUT	3- 16	6 7/8	- 1/8	-1.8
DOCUTEL-OLIVETTI	19- 30	10	-2 1/8	-16.9
ELECTRONIC M & M	9- 11	9 1/2	- 1/8	-1.6
EVANS & SUTHERLAND	18- 54	42 1/4	-3 1/4	-7.1
GENERAL TECHNOLOGIES	8- 22	8 1/4	- 5/8	-6.3
GEN'L DATA COMM IND	6- 28	27 7/8	- 1/8	-0.4
GREAT SOUTHWEST INC	2- 8	8 3/4	0	0.0
HAZELTINE CORP	7- 31	23	-2	-8.0
ICOT CORP	3- 19	4 1/2	- 7/8	-16.2
INFORMATION INTL INC	14- 22	18 1/2	- 1/2	-2.6
INTEL CORP	11- 45	43 1/2	- 5/8	-0.9
IPL SYSTEMS INC	3- 18	9 1/2	+ 1/4	+2.8
LANDY ELECTRONICS	7- 18	14 7/8	+2	+15.9
MEGADATA CORP	9- 15	13 1/2	+ 3/4	+5.8
MSI DATA CORP	15- 37	17	+ 1/2	+3.0
OKIDATA CORP	9- 28	27 3/8	- 3/8	-1.4
NETWORK SYSTEMS CORP	8- 34	21 3/8	-4 1/8	-16.1
NV AMERICAN PHILIPS	67- 73	68 3/8	-2 5/8	-3.6
NORTHERN TELECOM LTD	32- 48	47 3/8	+1 1/8	+2.4
OMEX	3- 8	6	0	0.0
PARADYNE CORP	14- 30	18 3/8	-2	-9.8
PERKIN ELMER CORP	7- 19	16 7/8	- 1/8	-1.1
PHONFAY AMERICAN INC	7- 17	10 1/8	0	0.0
PLESSEY CO (ADR)	28- 61	32 1/8	+ 1/2	+1.5
PRINTRONIX INC	23- 38	32 3/4	-2 1/4	-6.4
RANTEC CORP	12- 28	15 1/8	- 1/8	-0.8
RAYTHEON CO	42- 98	87 3/8	- 1/2	-1.4
RECOGNITION EQUIP.	8- 17	16 5/8	+1 5/8	+10.8
ROLM CORP	40- 80	66	+1 3/8	+2.1
SANDERS ASSOCIATES	60-120	110 1/2	0	0.0
SCAN DATA	1- 3	1 1/2	0	0.0
SCAN-TRON CORP	12- 48	43	- 1/4	-1.8
SCIENTIFIC ATLANTA	19- 43	37 1/8	- 3/8	-2.1
STORAGE TECHNOLOGY	18- 33	18 7/8	- 3/8	-3.8
SYKES DATATRONICS	6- 27	6 1/2	0	0.0
SYSTEMS & COMP TECH	27- 38	28	+1	+3.8
T BAR INC	7- 17	10 1/2	- 1/8	-1.2
TAB PRODUCTS CO	8- 28	24 7/8	+ 1/8	+0.5
TANDON CORP	19- 35	27 1/2	-2 3/4	-9.0
TEC INC	8- 13	7 7/8	+1 1/4	+18.9
TEKTRONIX, INC	36- 67	58 1/2	-2 5/8	-4.1
TELEX	9- 32	27 3/8	0	0.0
TERADATA SYSTEMS CP	3- 17	11	-1 3/8	-10.1
TIMEPLEX INC	7- 28	24 1/8	+ 1/8	+0.5
UTRON TECHNOLOGY	8- 25	18 1/4	- 1/2	-2.6
SUPPLIES & ACCESSORIES				
AMERICAN BUS FORMS	11- 33	32 3/4	+ 1/2	+1.5
BARRY WRIGHT	13- 31	30 1/8	- 1/8	-0.4
DUPLEX PRODUCTS INC	12- 28	26 3/8	+1 1/8	+4.7
ENNIS BUS. FORMS	8- 23	22 1/8	+ 1/8	+0.5
3M COMPANY	49- 89	83 1/4	+5 3/8	+6.9
MOORE CORP LTD	28- 51	48 1/2	0	0.0
STANDARD REGISTER	11- 34	32	+1	+3.2
WALLACE BUS FORMS	21- 38	30 5/8	-2 1/8	-7.3

15 pointed questions to ask MSA or any software supplier

These questions will help you when you sit down with individual software companies.

They're tough questions. Relevant ones. And any supplier who is worth his salt should be able to answer them without backpedaling.

Ask MSA

We'll answer all these questions to your satisfaction—plus any others you may have.

In fact, we're probably the best equipped to answer them. Because MSA is the software company. We offer the most complete line of totally integrated systems in the software industry, including financial, human resource and manufacturing.

So you avoid the headache of trying to tie together individual systems. (And the even bigger headache of adding to them.)

With MSA's integrated systems, there's no unnecessary duplication of data or effort. Reporting is faster. All your company's information is more timely and accurate—and in the right form.

Our technical edge comes from experience

Staying ahead is easier for a company that's steeped in software technology. MSA has spent years developing, refining, testing and enhancing our systems.

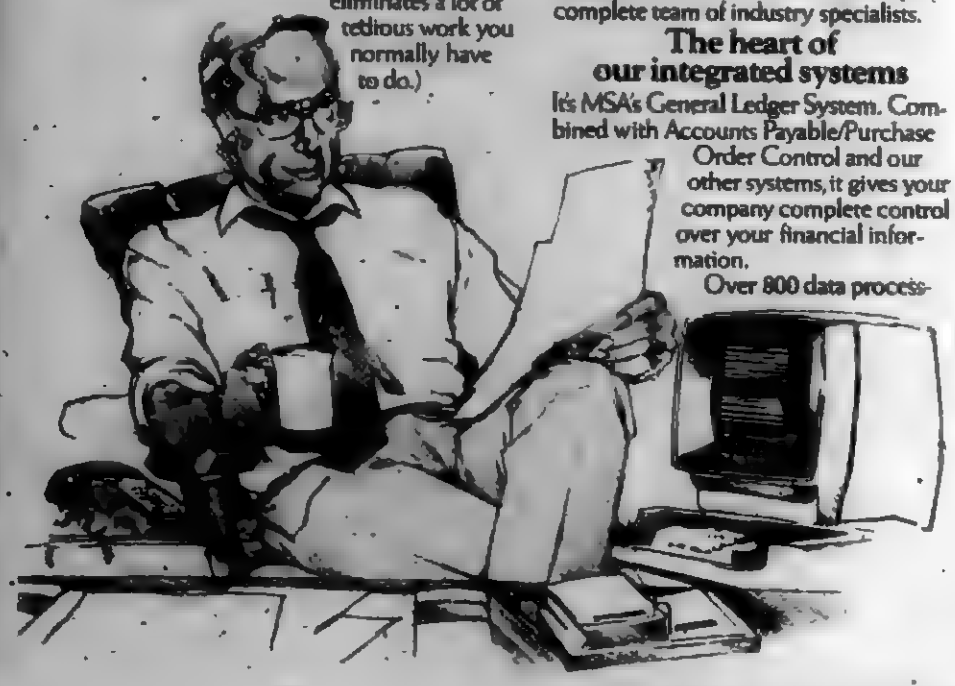
This year alone, we'll invest $25 million to make sure all our systems are technologically razor sharp. That gives us a decided advantage over flash-in-the-pan technology that may not have the bug-free logic of a more experienced system.

It also gives you a decided advantage over "custom" systems you have to update yourself.

MSA relieves you of that time-consuming burden. We update and enhance your software for a full year. Then we continue this service for a surprisingly low annual fee.

Maintenance includes keeping your system up-to-date technologically. Enhancing it with new features that make it work even harder for you.

And making sure it reflects changes in accounting procedures and government regulations, including 401(k), TEFRA, and FAS52. (That eliminates a lot of tedious work you normally have to do.)



Save this box. It can help you make an intelligent software decision.

1. Can you offer us a complete range of software systems designed to work together?
Or will we have to piece together a patchwork of systems?

2. Are your systems just record keepers, or can they really help us make decisions?
Can we pull together information from any of our integrated systems? In exactly the form we want it?

3. Can you provide business software for both mainframe and microcomputers?
Do you develop this software yourself or do you simply market it for another company?

4. Are your systems truly online so all of our information is current?
How many of your systems are online? How secure are they?

5. Will my company have to be the one that discovers the bugs in your brand new system?
Just how long have your systems actually been used, and how have they been tested?

6. Will you update your systems as technology advances and regulations change?
What are some of your most recent updates? Will you keep us current on regulatory changes?

7. Do your systems really do everything you say they will?
Or will we have to change them or add to them to get the features we want?

8. How long have you been in business?
What are your revenues? What is your growth record? Where will your company be five years from now?

9. How many systems has your company installed?
How many of these were installed in the past six months? How many of your earlier customers are still using—and liking—your systems?

10. Do your financial systems handle unlimited foreign currencies?
Do your financial systems use a common set of currency exchange rates?

11. Can you link our executives' computers directly to the mainframe—so they can get their own information?
Is that software available right now?

12. How will you make sure our own people thoroughly understand your system?
Do you have educational centers near us, or will we have to travel all the way across the country to find one? Will you be there to help during installation and after?

13. How many of your people specialize in software for my industry?
How many accountants work for you? Human resource specialists? Manufacturing experts?

14. Do your systems have built-in features that make them easier to use?
What happens if someone needs help figuring out a feature? Do you have online documentation that's easy to understand?

15. As my business changes will your system be flexible enough to change with it?
Or will we have to pay a lot to revamp it? Or even regenerate it?

35,000 days of training

At MSA, we make sure your people have a firm grasp of our systems. Last year alone, we conducted more than 35,000 student days of customer training for over 1,800 companies. At education centers all over the world, as well as at our headquarters.

From training sessions to cassettes to complete, easy-to-understand documentation, MSA provides the most extensive Customer Education Programs in the industry.

And MSA systems are just as friendly as our people. Our online HELP feature actually guides users through our systems, and EASY-SCREEN™ lets them design their own screens without creating data processing nightmares.

If there's ever a question or problem with our systems, MSA customers are always close to service.

Our Account Managers are knowledgeable, responsive, and backed by a complete team of industry specialists.

The heart of our integrated systems

It's MSA's General Ledger System. Combined with Accounts Payable/Purchase Order Control and our other systems, it gives your company complete control over your financial information.

Over 800 data processing specialists, accountants, and financial experts work together to make MSA's financial systems the most advanced and most highly integrated in the industry.

MSA has the answers

Whatever your size—whatever your business—MSA has a total software solution.

We'll provide the highest quality integrated online software.

We'll tie your business and manufacturing software systems together, using our exclusive Extended Closed Loop™ manufacturing system.

We'll provide business software for your microcomputers, through our Peachtree Software Company.

We'll even link your microcomputers to your company's mainframe—with MSA's Executive Peachpak™ application software. A revolutionary concept that lets executives get the mainframe information they need through their personal computers.

MSA ready-to-install application software
1. General Ledger
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3. Budgetary Control/Encumbrance
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18. Peachtree Software™ office productivity systems for microcomputers

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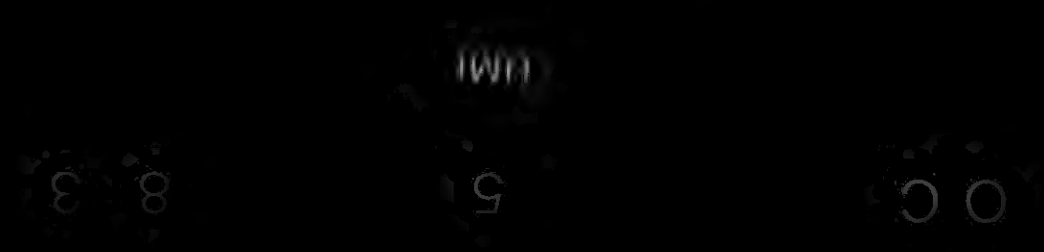

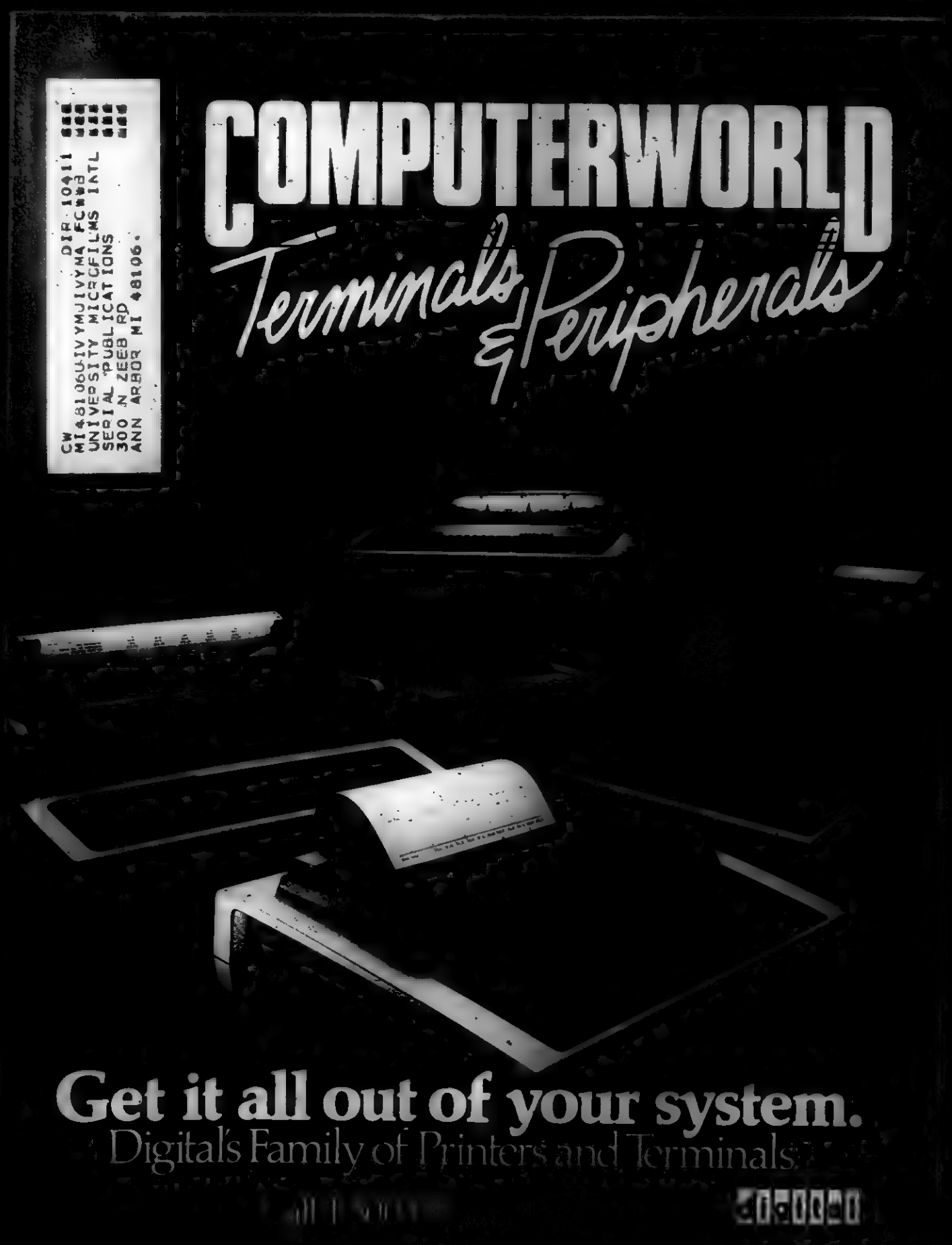
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Second-class postage paid at Framingham Mass., and additional mailing offices PN127420. *Computerworld* (ISSN 0010-4841) is published weekly, except February (5 issues), April (5 issues), May (6 issues), June (5 issues), August (7 issues), September (5 issues), October (7 issues), November (6 issues), December (4 issues) and a single combined issue for the last week in December and the first week in January by CW Communications/Inc., Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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Computerworld subscription prices: $1.50 a copy; U.S. — $44 a year; Canada, Central & So. America — $110 a year; Europe — $165 a year; all other countries — $245 a year (air mail service). Four weeks notice is required for change of address. Please allow six weeks for new subscription service to begin.

Computerworld can be purchased on 35mm microfilm through University Microfilms Inc., Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone (313) 761-4700. *Computerworld* is indexed; write to Circulation Dept. for subscription information.

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COMPUTERWORLD BUYER'S GUIDE

Terminals & Peripherals

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About the Guide

The *Computerworld Buyer's Guide to Terminals & Peripherals* is a reference manual containing concise descriptions of terminal and peripheral products and short profiles of the vendors selling these products.

The guide has eleven product sections grouped within four tab dividers. The products covered in this guide are, in order, intelligent terminals, printers, teleprinters, smart/conversational terminals, plotters, digitizers, disk drives, tape drives, memory devices, magnetic media suppliers and peripheral controllers.

Product sections are preceded by a divider, with a fold-out tab identifying the products listed within that section. In cases where several different types of products are included within one tab section, a page with a product classification identifier is inserted before the listings.

Preceding the product listing section is a vendor profile unit (Section V).

The front of the guide has a magazine section featuring articles about the state of the industry, markets and technical information for specific product categories and issues concerning terminals and peripherals.

Also featured in the guide are several indices which provide an overview of the diverse products listed in the guide. These indices are located in the specific product section, preceding the complete listings.

Note: Vendors were offered the option of placing their company name in a larger typeface than the standard listing size. Vendors were also offered the opportunity to add a boxed insert at the the end of their listing. These options were paid for by the vendors and should in no way be construed as an endorsement of these companies or products by the publishers of the *Computerworld Buyer's Guide to Terminals & Peripherals*.

PRODUCT LISTINGS Most of the products listed in the guide have been sorted by a variety of methods and grouped together to allow readers to locate easily the products about which they are interested in learning. For example, disk drives have been categorized into three groupings — floppy disks, rigid disks and Winchester disks. Furthermore, within each disk drive type, products are listed according to drive capacity ranges.

Other methods used to sort the products contained in this guide include print speed, transmission rates, device technology and recording speeds, among others. *When speed or capacity ranges are used to group product listings, those speeds and capacities are always listed in descending order from the fastest to the slowest or from the highest to the lowest.*

Within each specific product category vendors are listed alphabetically, with their products listed in alphabetical and numerical order by model name.

Each product listing contains information about specifications relative to the particular product grouping. Two examples of these listings follow — one for a Winchester disk drive and one for an intelligent terminal.

Each vendor's product listing also contains a cross-reference directing the reader to the appropriate page for the vendor's company profile.

WINCHESTER DISK LISTING

CONTROL DATA CORP.
CDC 9715 FSD-340
Disk Diameter: 9 in.
Capacity: 344M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 20 msec
Mean Time Between Failure: 11,250 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: SMD
[illegible]: OEM
Date First Installed: 1983
(See Vendor Profile Page V-9)

INTELLIGENT TERMINAL LISTING

HARRIS CORP.
9178
Compatibility: IBM 3270
Minimum Memory Required: 16K bytes
Maximum Memory Required: 64K bytes
Processor Model: Zilog Z80
Simultaneous Users: No
Communications Protocols: SDLC
Data Transmission Characteristics: Half-Duplex
Maximum Transmission Speed: [illegible]
Diagonal Screen Size: 12 in.
Line/Screen: 24
[illegible]
Program Function Keys: 24, standard; 24, maximum
[illegible]: End user
(See Vendor Profile Page V-16)

About the Guide

COMPANY PROFILES The company profile section of the *Computerworld Buyer's Guide to Terminals & Peripherals* contains each vendor's address and telephone number as well as a listing of key management, marketing or technical personnel within the firm. In addition, the profile includes the company's target markets, revenue, and geographic market coverage, among other details.

An example of a typical entry is shown on the right.

[illegible] COMPUTER CORP.
33 Moulton
Cambridge, MA 02238
(617) 497-3053
Major Market: Computer and Terminal Manufacturing
Target Industries: Defense; Government, Federal Agencies; Large Corporations
Target Applications: OA, Data Control
Contacts:
Head of Marketing: Charles Stein
Head of Sales: Terry Fagin
Geographic Coverage: International
Year Established: 1978
Number of Employees: 449

INDEXING SYSTEM Each product category contained in this guide is preceded by an index, which is located just prior to the complete product listings for the particular product group. The introduction to each index explains the method used to sort the products for indexing as well as the order the full product listings for that category will appear. When necessary, a brief definition of the product is also included in the explanatory notes for the index.

In general, products are indexed according to compatibility with other vendors' systems, technology of the device, capacity, speed and so on. *When product speeds or capacities form the basis of the index, those speeds or capacities are always listed in descending order from the highest to the lowest of the quantity measured.*

In addition, each index includes a variety of other important product information which permits readers to decide which products may best meet their needs and avoid lengthy perusing of the guide. All indices contain the price of the particular product and the page number on which the full product listing is located.

Examples of the disk drive index and intelligent terminal index follow.

Winchester Disk Drives

VENDOR	MODEL	CAPACITY	DIAMETER	PRICE	PAGE
Control Data Corp.	CDC 33600 DIRECT	2,520M bytes, formatted	14 in.	$83,000, w/o controller	C-39
National Advanced Systems	NAS 7380	2,520M bytes, unformatted	14 in.	NA	C-39
NCR Corp.	8550	1,920M bytes, unformatted	14 in.	$50,000, w/o controller	C-39

Burroughs-Compatible Terminals

VENDOR	MODEL	MAXIMUM MEMORY	PRICE	PAGE
American Datacom	ADC SUPERTELEX 400	32.0K bytes	$3,395	A-8
Burroughs Corp.	ET 2000	256.0K bytes	$3,795	A-10
Datapoint Corp.	1580	128.0K bytes	$3,195	A-12

About the Guide

THE ENTERPRISE FILE The Enterprise File is a data base containing information on the thousands of companies that produce or provide computer-related products and services. It is the source of listing information contained in the *Computerworld Buyer's Guide to Terminals & Peripherals*

plement to the International Data Corp. Data File, a well-known data base of end-user facilities.

Information is gathered and regularly updated by International Data Corp. through printed questionnaires and telephone surveys. To date the Enterprise file has records on nearly 12,000 companies and is targeting 35,000 to 40,000 products for inclusion in the file in the near future.

Editor's Note

Barely a day goes by without several announcements of new terminal and peripheral products crossing an editor's desk. And the exodus of executives from major computer companies to start up firms is a daily occurrance.

This fast-paced environment is indicative of a healthy industry which, in the last analysis, creates technological change and product innovations that benefit the computer user.

However, the benefits of all this activity are not always readily discernable. So, while there may be more products to choose from on the marketplace, making those choices becomes increasingly difficult as the number of competitors in the terminals and peripherals marketplace escalates at unprecedented speeds. For example, the micro-Winchester disk system hit the market in 1980. Today there are more than 125 different products on the market offered by more than three dozen vendors.

Last year $1.8 billion was invested in 976 rounds of venture capital funding, according to *The Venture Capital Journal*. Of this $1.8 billion, 38%, or $684 million, was invested in computer-related firms. Some 26% of the funding for computer related ventures went to terminals and peripherals firms — no small accomplishment.

Some of these new companies will be the leaders of tomorrow and others will fall by the wayside. This can be unsettling to the data processing professionals who have to make decisions on purchasing capital equipment.

Today some established and once glamorous companies such as Texas Instruments, Inc., Victor Technologies, Inc. and Computer Devices, Inc. are experiencing varying degrees of financial difficulty. Last month, the once high-flying Osborne Computer Corp., the first firm to debut the portable computer (only two years ago), filed for protection under Chapter 11 of the U.S. Bankruptcy Code, a dramatic example of the vagaries of the computer marketplace.

A major parameter that buyers use in making a purchasing decision is the financial health of the company selling the product. These occasional, but dramatic financial upheavals do nothing to make buyers feel confident about newer, unknown companies in the industry.

One of the ways buyers can make more informed decisions about what products they add to their growing repertoire of information processing systems is to be as knowledgeable as possible about what is happening in the marketplace.

Providing this knowledge is the aim of the *Computerworld Buyer's Guide to Terminals & Peripherals*, the second issue in this series of easy-to-use, market-specific reference manuals. This issue takes an in-depth look at several terminal and peripheral product areas, focusing on the markets, technologies and the future of this vast array of products.

Marcia Blumenthal

Magazine

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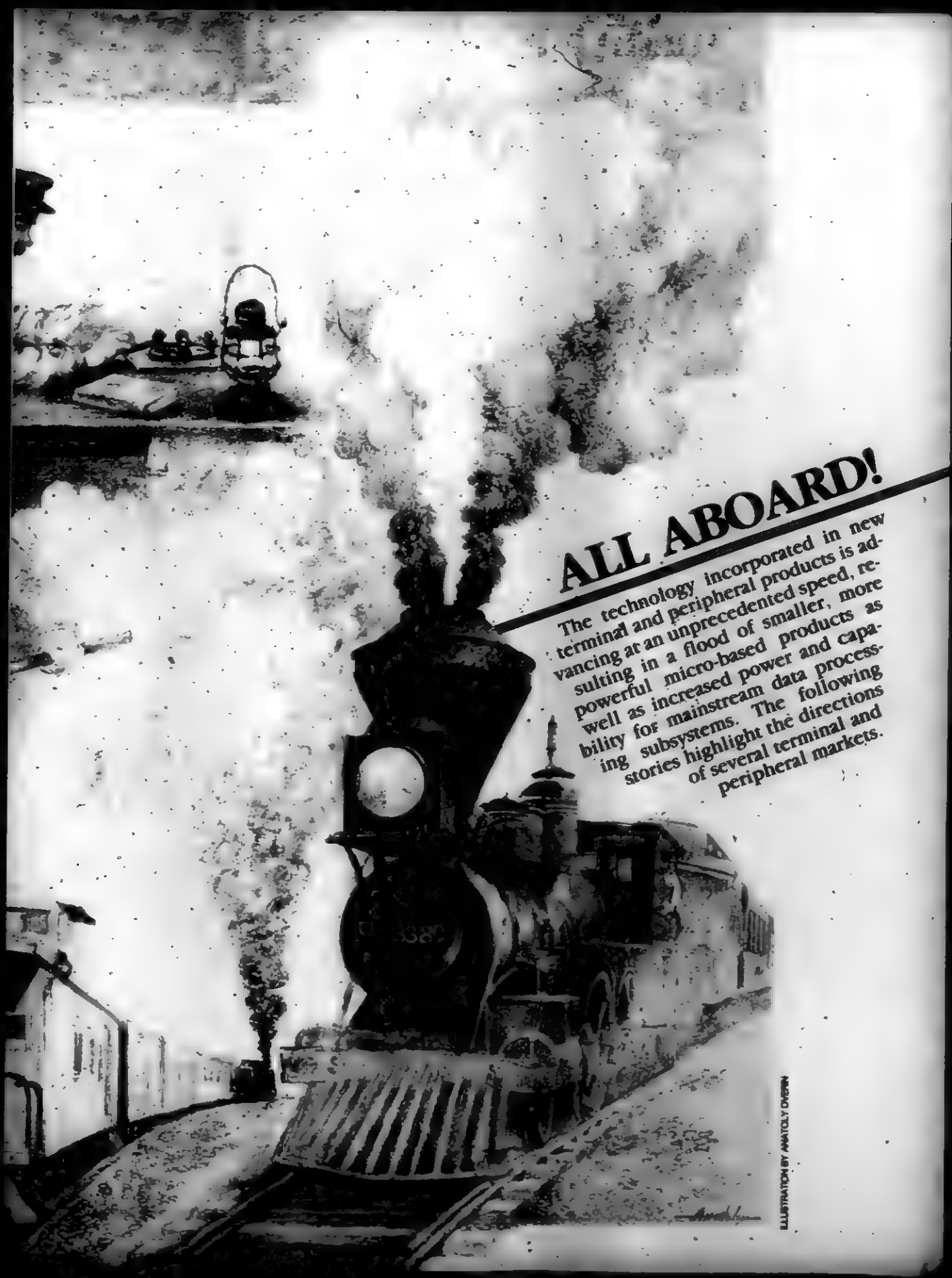

ALL ABOARD!

The technology incorporated in new terminal and peripheral products is advancing at an unprecedented speed, resulting in a flood of smaller, more powerful micro-based products as well as increased power and capability for mainstream data processing subsystems. The following stories highlight the directions of several terminal and peripheral markets.

ILLUSTRATION BY ANATOLY DVERIN

Learn more about Personal Computing, Office Automation or Communications in these video journals from CW Communications and Deltak.

Personal Computing:
A Business Perspective
Taped on location during CW Communications' COMPUTERWEEK conference, these six video sessions feature many of the biggest names in the microcomputer industry as they share their insights into the application of personal computers in the business environment. Each of the six tapes is 20-30 minutes long, and focuses on a specific issue. Available through Deltak singly or as a group.

- *Thinking Small for Big Business*
- *The Purchase Decision*
- *Finding a Vendor*
- *Sales Trends and IBM*
- *New Languages and Networking*
- *A Look Toward the Future*

Office Automation: The Essential Issues
Last Fall, executives from around the country attended the OA Forum, a national conference conducted by CW Communications on the introduction, integration and implementation of office automation in today's business environment. Leading industry experts and top corporate managers discussed key office automation planning issues. These discussions are now available to you in seven carefully edited conference journals. Each journal is in full color, and 20-30 minutes long. They are available from Deltak singly or in a group.

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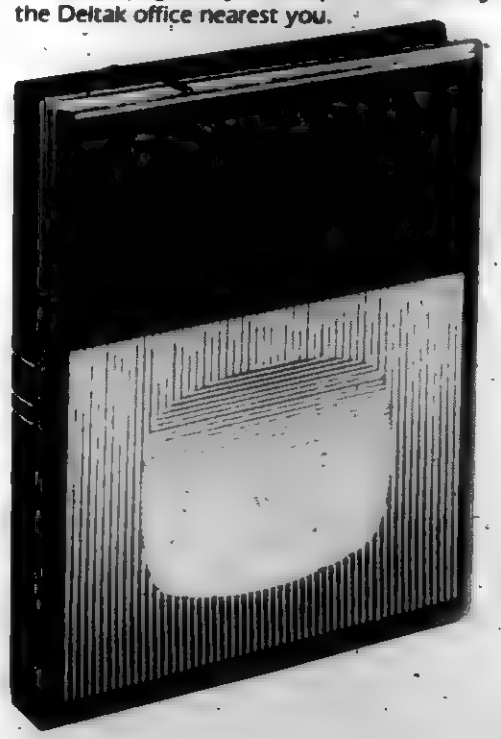
- *Introducing Office Automation to Your Organization*

Communications
Leading experts in all areas of communications were recently taped at the 1983 Communication Networks Conference in New Orleans. The result was two brand new video conference journals of key interest to all levels of corporate and technical understanding:

- Communication Networks: Alternatives for the 80's
- Local Area Networks: The major considerations

All of these useful journals are available through Deltak, inc., 1751 Diehl Road, Naperville, IL 60566. To get more information, or to find out about rentals, just call Deltak Order-Entry at (312) 369-3000 (in Canada, (416) 678-9222), or check the white pages of your telephone directory for the Deltak office nearest you.



CW COMMUNICATIONS/INC.
Publishers of Computerworld, InfoWorld, PC World, ISO WORLD, and other leading computer publications around the world.

The Terminal Connection

By Joseph F. Kelly

Among the approximately 600 vendors who exhibited at the National Computer Conference (NCC) in Anaheim, Calif., last June, the competitors in the alphanumeric display terminal market were, as usual, well represented. These vendors could be found in virtually every nook and cranny of the exhibit floor. Although this market does not attract the same attention as some of the current "glamour" markets such as microcomputers and local-area networks do, competition remains heavy.

The coming of age of the microcomputer has posed a serious threat to the display terminal as it exists today. There has been a great deal of discussion regarding the possibility of the microcomputer obsoleting the display terminal. Most of these discussions have centered on the low end of this market, the dumb and smart terminals. Micros, after all, can be purchased for little more than it would have cost to buy a fully featured smart terminal a few years ago.

However, the largest threat to the microcomputer explosion may be to the traditional stand-alone intelligent terminal.

The general-purpose alphanumeric display terminal market is composed of two basic segments: the IBM 3270 and 3270-compatible market and the Ascii terminal market. Both areas are highly competitive and both seem to be flourishing. The degree of competition to be found in these markets greatly benefits the end user through lower prices.

IBM 3270 Market

In March of this year, IBM made some long-awaited changes to its mainstay 3270 Information Display System product line. Introduced were: the 3178 Display Station, a smaller and less expensive version of the popular 3278 Model 2 display; new versions of the 3274

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Control Unit that offer improved price/performance characteristics; the 3290 Information Panel, a gas plasma display; the 3299 terminal multiplexer, a coaxial cable eliminator; and a personal computer attachment for the 3278. Also announced were price reductions on older existing 3270 models and purchase discounts for the 3178.

Presumably IBM made these changes to put added pressure on the independent 3270-compatible vendors. These independent vendors, through lower prices or improved price/performance qualities, have been eroding IBM's share of this market, which is a very profitable one for the industry giant. In order to remain competitive, these vendors now have been forced to reply to the recent IBM announcements with new products or price reductions.

For instance, Harris Corp. and ITT Courier Terminal Systems, Inc. have introduced 3178-compatible terminals. Some firms have reduced the prices of their 3278-compatible terminals and are offering them as full-size alternatives to the 3178.

With this increased pressure, it is now more important than ever for the independent vendors to offer a complete line of 3270-compatible products.

International Data Corp., a market research firm located in Framingham, Mass., estimates the installed base of IBM 3270 and plug-compatible terminals at 31% of the total U.S. installed terminal base of over 6.6 million units.

The table on page 14 gives a summary of some of the major 3270-compatible vendors and some of their products.

The Ascii, or asynchronous, display terminal market has been engaged in a price war for the last few years. While the recent price reductions in the 3270 market have been significant, the reductions in the Ascii market can be characterized as drastic. A few years ago, a display terminal with a single quantity price tag of less than $1,000 was rare; today, most vendors carry low-end models with prices in the $500 to $700 range.

One development which has served to confuse many people in this market has been the blurring of the lines of demarcation between the different types of terminals offered. Traditionally, the general purpose low-end terminal has consisted of two types — the so-called "dumb" and "smart" terminals. The dumb terminal name (coined by Lear Siegler, Inc. in the early 1970s) has been applied to those units which operate in conversational mode, transmitting data character-by-character as it is entered on the keyboard. These terminals, as a rule, possess limited editing capabilities and visual attributes. Smart terminals, on the other hand, are differentiated from their dumb counterparts by offering block mode transmission, more extensive editing capabilities and enhanced visual attributes. But, as hardware costs fell vendors began to offer more and more functionality, for the same or lower prices. As a result very few truly "dumb" terminals now exist.

Another significant development in this market is the proliferation of inexpensive, general-purpose color terminals. It is generally acknowledged that IBM legitimized the color terminal market with the introduction of the 3279 Color Display Station in 1979. Most of the major independent 3270-compatible vendors have since added color models of their own. In November 1982, Applied Digital Data Systems, Inc. (ADDS) introduced the Viewpoint/Color, an Ascii color model. The Viewpoint/Color was not the first color terminal of its kind; its significance, however, lay in its price. At $995 in OEM quantities of 100, the Viewpoint/Color broke the important sub-$1,000 barrier and became the lowest priced general-purpose color terminal on the market at the time. Esprit Systems (formerly Hazeltine Corp.) responded by introducing the Esprit III Color at NCC, which carried a price tag of $995 in single quantities. It certainly seems only a matter of time before most of the vendors in this market introduce their own affordable color models.

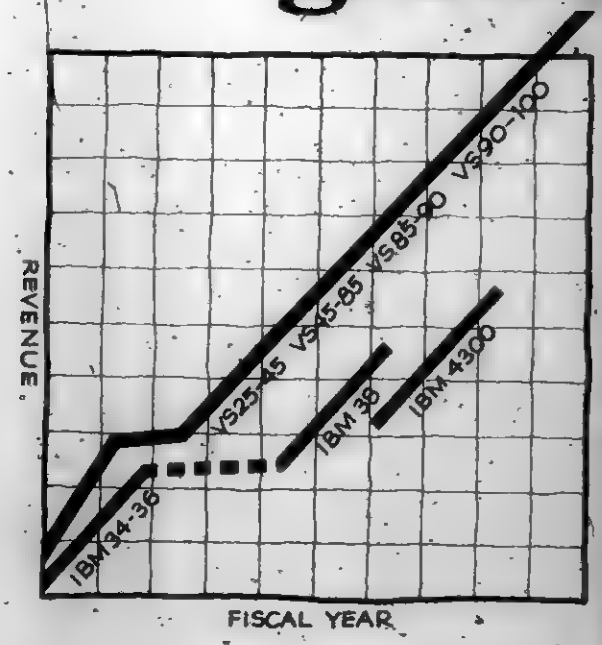
Despite plummeting price tags, an increasing number of new vendors seem willing to take the plunge into the terminal market. A subsidiary of ITT, Qume Corp., is the most noteworthy new entrant. Presumably, many of these new entrants have been spurred on by the success of TeleVideo Systems, Inc., a Sunnyvale, Calif.-based manufacturer that began deliveries of its first low-cost Ascii terminals in 1979. By 1982, the company had shipped 100,000 units. TeleVideo has capitalized on its success in the terminal market to expand into the lucrative micro and personal computer market.

In contrast to the display terminal market, the past few years has seen little activity in the intelligent terminal area, with most of the emphasis directed to distributed data processing. The distributed concept provides for the placing of intelligent devices in multiple sites within a company, with each device providing local processing capabilities as well as having the capability to access resources at remote sites. Both interactive and batch data communications capabilities are provided by most DDP systems. A wide variety of applications software is usually available, providing such diverse capabilities as data entry and word processing.

Some of the more significant DDP products currently marketed include the Four-Phase Systems, Inc. Series 5000; the Harris Mind series; IBM's 8100; Mohawk Data Sciences Corp.'s Series 21; the Northern Telecom, Inc. 585; and Sperry Corp.'s UTS 4000. As mentioned previously, however, the classification of these types of systems is tricky; there are many diverse systems that are marketed as and can perform as a distributed data processing system.

Likewise, many microcomputers were marketed as intelligent terminals before the micro became a "star." Given the variety of mi-

A computer upgrade with Wang won't stunt your company's growth.



The best reason for choosing a Wang VS computer today may be tomorrow. Because unlike comparable IBM systems, the Wang VS line is a computer family with a smooth, proven and continuous growth path.

Consider. All Wang VS computers use a single operating system and single system software. Once your people are familiar with one Wang VS, they're already familiar with the next.

On the other hand, the IBM 34/36, 38 and 4300 all use different operating systems, different source codes and even different software. Upgrading from one to another is almost like starting over again with a whole new system.

A typical conversion from the IBM 34/36 to a Wang VS computer takes about two months. From then on, no other conversions are necessary.

Converting from the IBM 34/36 to the IBM 38 is a long and tedious process. And you face an even more difficult task going to an IBM 4300. That's time and money that a growing company just can't afford.

If you want to spend more time doing business, and less time getting ready to do business, choose the Wang VS computer line. It won't stunt your company's growth no matter how fast you grow.

For a demonstration of Wang VS computers call **1-800-225-9264.** Or send this coupon to: Wang Laboratories, Inc., Business Executive Center, One Industrial Avenue, Lowell, MA 01851

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Company
Address
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CBN

WANG

The Office Automation Computer People.

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crocomputer and personal computer products currently offered, one would be hard pressed in many cases to tell the difference between micros and intelligent terminals. This being the case, one would expect that vendors of products that traditionally have been classified as intelligent terminals to switch to the microcomputer market. Many traditional dumb and smart terminal vendors have expressed interest in this transition, and one, TeleVideo, has enjoyed tremendous success. Others will try to emulate this strategy, but their success will be dependent upon their ability to market software as well as hardware.

Intelligent terminals are also being pressured from that very same low end. Many smart terminals have been upgraded to the point that their capabilities compare favorably with their higher-priced cousins. In addition, a number of display terminal vendors, specifically those competing in the nonintelligent 3270-compatible area, have added optional personal computing capabilities to their products. The Digital Equipment Corp. VT100, an Ascii terminal, may be upgraded to a personal computer through the addition of a printed circuit board. Given the popularity and widespread acceptance afforded to the IBM Personal Computer since its introduction, it is not unlikely to see this type of optional capability being added to more terminals.

Finally, with the emerging interest in the local-area networking concept, it is unlikely that in the future there will be many microcomputers introduced that do not contain extensive communications capabilities. Already widely accepted as a corporate tool, the microcomputer will achieve full acceptance once it becomes an integral part of the firm's communications network. So, as the distinctions between different terminals continue to fade, it is possible that the intelligent terminal may become the first casualty of the microcomputer onslaught.□

Kelly is associate editor/analyst at Datapro Research Corp., located in Delran, New Jersey.

Vendor	Model	IBM Control Units Emulated	IBM Display Stations Emulated	Personal Computing Capability
Carterfone	7276	—	3276	No
Computer Communications (CCI)	Group 8000	3274	3276/3278	No
Control Concepts	EM-3276/CC-3276	—	3276	No
Datamedia	Excel 3270	—	3276/3278	No
Harris	9200	3274	3178/3278/3279	Yes
Ical	700/701	—	3278	No
Informer	370	3274	3278	No
C. Itoh (ACM)	CIE-7800	—	3178/3278	No
ITT Courier	270	3274	3276/3178/ 3278/3279	No
Lan Data	Series 300/400	3274	3278/3279	Yes
MDS Trivex	Plus 80	3274	3278	No
Memorex	2078	—	3276/3278/3279	No
Northern Telecom	290	3274/3276	3278	No
Paradyne	PDS 270	—	3278	Yes
Phaze	P9010/P3278	—	3178/3278	Yes
Razel-Migic	4270	3274	3276/3278	No
Raytheon	PTS-2000	3274	3276/3278/3279	No
Teletype	4540/5540	3274/3276	3276/3278	No
Telex	270	3274	3276/3178/3278/ 3279	Yes

Source: Datapro Research Corp.

The terminal that faces up to everyone's problems.

Now there's a low-cost, high-performance terminal that faces up to all the needs of the clerical workstation: Qume's QVT 102™ terminal.

The QVT 102™ has all the features of the Hazeltine 1500, Lear Siegler ADM 3A/5, and Televideo 910, and emulates any one of them with a keystroke! Plus, features found in higher-priced terminals are standard on the QVT 102™ —including block and conversational modes, local editing, a 25th status line, menu set-up mode, and screen content printing.

Best of all, superior ergonomic design makes the QVT 102™ a perfect fit for everyone on your staff. They'll love the tilt/swivel screen in green or amber. The big 9 x 12 character cell. The optional 14-inch display for even better readability. The detached, low-profile keyboard. And many other features that make people more comfortable and productive.

So choose Qume's QVT 102™ —the terminal that's ideal for people, performance, and price. Talk to your Qume sales office, or write Qume Corporation, 2350 Qume Drive, San Jose, California 95131.

QVT™ terminals. Your best investment in productivity.

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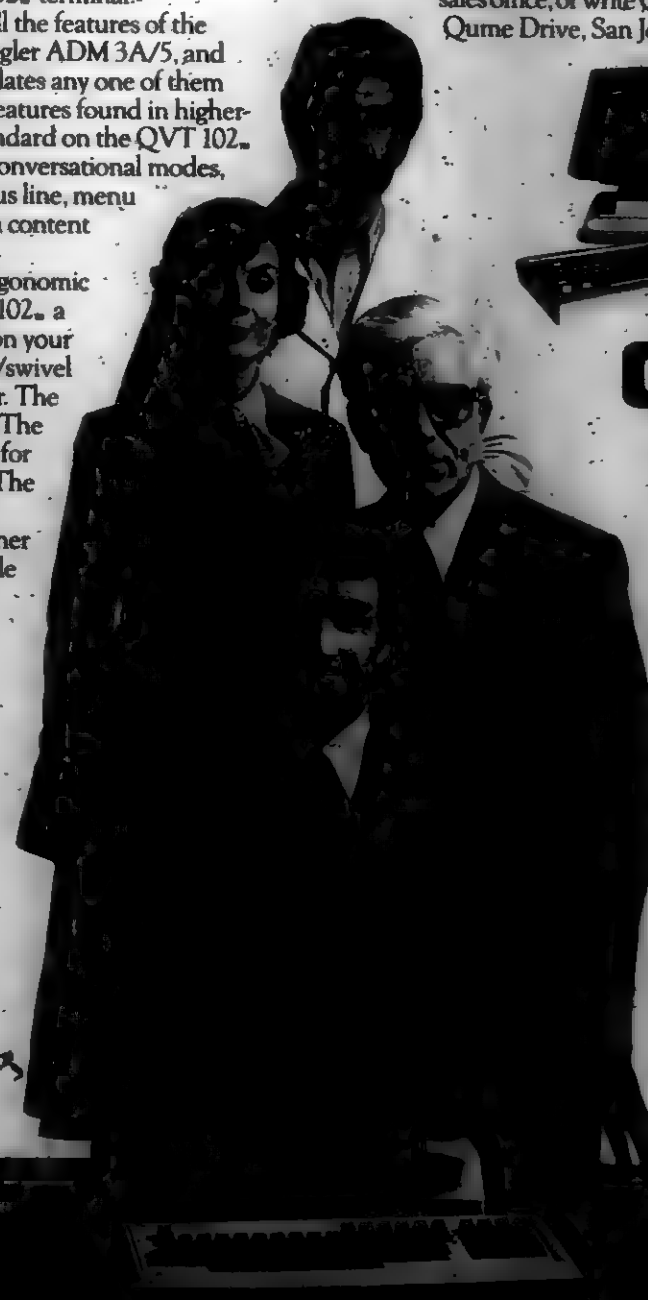
A Subsidiary of ITT



QUME CORPORATION

HEADQUARTERS
2350 Qume Drive
San Jose, CA 95131

CALIFORNIA
San Jose (408) 942-4111
Culver City (213) 410-1458
Santa Ana (714) 957-4040

COLORADO
Aurora (303) 752-3000

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Hoffman Estates (312) 490-9320

OHIO
Dayton (513) 439-0469

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Irving (214) 659-0745

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MASSACHUSETTS
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CANADA
Quebec PH (514) 695-3837

Comfortable Computing

By Joseph F. Kelly

Any discussion of current trends in the display terminal industry would be incomplete if it did not touch on the subject of ergonomic design. The most obvious change in display terminals over the last few years would have to be in their physical appearance. Only five years ago, a display terminal equipped with an attached or integral keyboard was fairly commonplace; nowadays, nearly every display made includes a detached keyboard. Thus the operator can move the keyboard to virtually any spot on the desk or on the lap, if desired. Many vendors are now offering a "low-profile" keyboard, a thinner version of the standard keyboard, which, in some cases, also provides tilt adjustments.

A good deal of controversy has surfaced on the effects of constant CRT terminal use on workers. Spurred by workers' complaints of eye strain, dizziness, nausea, and skin irritations, agencies such as the National Institute for Occupational Safety and Health have conducted studies on the potential health hazards presented by display terminals. Up to now the results have been inconclusive, but the vendors have responded by designing new terminal enclosures that they hope will bring their product line acceptance among operators.

More and more vendors have introduced terminals with 15-in. diagonal screens. While the characters on these screens are easier to read, the monitor is larger and takes up more room on the desk. IBM's new 3178 contains a 12-in. screen, in place of the IBM 3278's 14-in. screen, and provides a smaller footprint. Footprint size is an important factor in companies where desk space is limited. Informer, Inc., a terminal vendor located in Laguna Hills, Calif., specializes in terminals which take up a minimal amount of space. They have also recently introduced a terminal with a 9-in. screen that is portable; the keyboard folds up into the terminal face and locks. Direct, Inc., located in Santa Clara, Calif., also provides the fold up and lock type keyboard.

As with the detachable keyboard, display screens with tilt and swivel adjustments are quickly becoming the rule. These allow the operator to position the screen in the most comfortable viewing position and helps to eliminate glare. Antiglare screens themselves also combat this problem. Green-phosphor characters can now be found in the vast majority of displays, instead of the traditional white. Amber-phosphor characters, currently popular in Europe, are gaining in usage in the U.S.

Alternative display technologies, most notably flat-panel displays, are currently under development in many companies. IBM's 3290 Information Panel drew a great deal of interest at this past National Computer Conference. But the relative expensiveness of these technologies ensures that the CRT will be with us for some time.

HELLO CENTRAL

By Joseph F. Kelly

Because a great deal of today's corporate business is accomplished over the phone, the addition of telephony to conventional display stations is creating a new dimension in the terminal/workstation marketplace. This added voice feature is propelling the usage of workstations by managers, a group that has resisted the workstation concept because of the association of a keyboard with clerical tasks.

In 1981, Northern Telecom, Inc. got the ball rolling in this market with the introduction of its Displayphone, a device which integrated voice capabilities with data capabilities through the addition of a conventional telephone handset.

Acceptance for the Displayphone came slowly, but it is finally burgeoning, with Northern Telecom reporting installation of 10,000 units since its introduction two years ago.

The range of applications for which a voice/data workstation can be used is large, and probably will continue to grow. Comparisons of the currently available models, which are detailed at the end of this article show that no two products are exactly alike. The basic telephone features, such as automatic dialing, last number redial and call forwarding have been combined with a wide array of data functions. New products from Mitel Corp. and Sydis are equipped with internal memory which gives them personal computing capabilities to go along with their voice capabilities.

The standard feature common to all

products is the telephone handset. The handset in most cases is located on the keyboard or display console (exceptions to this are the Basic Telecommunications Corp. Datavoice terminals, in which the handset is located on top of the display, and Novation, Inc.'s portable Infone, which contains a miniature handset which embeds just above the LCD display). All of the models contain a telephone number directory which stores frequently used numbers (along with name and address data) for automatic dialing. Other telephony features common to these workstations include:

- Automatic redialing of the last number called.
- A hold-call capability.
- Multiple telephone line connection, so that voice and data transmissions can be made simultaneously.
- Hands-free dialing, so that numbers can be dialed without having to lift the handset.
- Hands-free speakerphone, so that one or more persons can listen without having to lift the handset.

Depending on the degree of sophistication that the vendor has built into the product, several other features facilitate voice communications. In addition, some vendors (such as Northern Telecom) have introduced or will shortly introduce workstations specifically designed for use with a private branch exchange (PBX).

Another important capability common to most of the products is electronic mail. Electronic mail capabilities vary from product to product, but most of the workstations allow the user to create, to edit and to send electronic messages as well as to receive and file them. Voice mail is also available on some models.

All of the products can perform basic terminal functions. All support asynchronous (Ascii) transmission; some offer IBM 3270 and Digital Equipment Corp. VT100 compatibility, either standard or as an option. All can access internal data bases, as well as external data bases, such as Source Telecomputing Corp.'s The Source, to give the executive valuable financial information, often at the touch of a single key. Some of the workstations provide enhanced data processing capabilities also, as well as word processing. As was mentioned earlier, no two of the products covered here are exactly alike — they can fit a variety of needs. The comparison columns at the end of this article can help you identify the workstation that is most suited for your needs.

The Competition

Northern Telecom introduced the Displayphone in February 1981, thus becoming the pioneer in this market. Initially, the Displayphone encountered the usual problems that a brand new (or unknown) product generally encounters. Two years later, however, the product has been fully accepted and is very successful. Physically, the Displayphone is one of the smallest products of this kind, with a 7-in. (diagonal) display and a keyboard which retracts into the main unit. The Displayphone features basic data and voice capabilities as well as electronic mail.

Vendor/Product	Basic Tele-Communications Model 10/20	Davox Series 821/921	Digital Transactions Telterminal	GTE XT300
Characteristics				
Configuration	Stand-alone	Cluster	Stand-alone	Stand-alone
Teletype compatibility	Yes	Optional	Yes	Yes
IBM 3270 compatibility	Yes	Yes	No	No
Display screen size	9 inches	12 inches	1 line	9 inches
Display capacity (no. char.)	1920	1920	640	1920
Editing features	Yes	Yes	No	Yes
Electronic mail	Yes	Yes	Yes	Yes
Keyboard	Detachable	Detachable	Integral	Integral
Telephone no. directory	100	Yes	250	50 voice, 8 data
Hands-free dialing	Yes	Optional	Yes	Yes
Last number redial	Yes	Yes	Yes	Yes
Purchase price	$2,150-$2,495	$1,995-$2,180	$2,495	$1,495

Northern Telecom now makes the Displayphone available in a variety of configurations, including the Displayphone SL-1, designed for use with the company's SL-1 PBX. Several enhancements have been made to the original product, and more are anticipated.

Davox Communications Corp. (formerly Datavox) is a high-technology firm formed in 1981. Its products, the Series 821 and Series 921, are unique in this market in that they are cluster-type, multiprotocol workstations aimed primarily at the IBM 3270 market. In addition to IBM emulation, the company also offers Ascii and DEC emulations, as well as IBM Personal Computer capabilities. The Davox desksets provide a high degree of functionality in both the data and voice area. This functionality is facilitated to a great degree by the workstation's "Smart Buttons," software keys which can be personalized by the user to perform several types of functions via a single key stroke. Also available is a unique teleconferencing capability that allows the user to interrupt voice conversation, transmit data to the party on the other end of the line and then resume the voice conversation.

Tymshare, Inc. unveiled the Scanset-XL in November 1982. The Scanset XL combines voice capabilities with the data capabilities of the company's Scanset personal information terminals, which were designed primarily to access data via single- or dual-button operation. The Scanset XL carries a price tag of only $895; included in the price are special subscriptions to The Source, Dow Jones' News Retrieval Service and Comp-U-Star shopping service.

GTE Business Communication Systems brought the XT300 Action Station to market in September 1982. Like the Displayphone and the Scanset XL, the XT300 is a compact workstation (9-in. display with integral keyboard) designed to occupy a minimum of desk space. The XT300 provides full voice and data capabilities, as well as electronic mail (GTE's Telemail access). The voice capabilities of the XT300 are particularly impressive — it features simultaneous voice and data transmission over two telephone lines, as well as a wide variety of additional telephony features.

Basic Telecommunications, located in Fort Collins, Colo., offers the Datavoice workstations in two models, the Model 10 and 20, both of which provide a wide range of features. The workstations feature a 9-in. display and a detachable keyboard. Electronic mail is standard on both models, with voice mail available on Model 20 only. IBM 3270 emulation, as well as Ascii emulation, is also available for both models.

One of the most talked-about products in this market is the Kontact, from Mitel. The Kontact is a full-size (12-in. display with detached keyboard), multifunction workstation. Features include full voice capabilities, full data capabilities including visual attributes and editing features, electronic mail and IBM 3270 and DEC emulation. Features that set the Kontact apart from most of the previously mentioned products include 128K

	Mitel Kontact	Northern Telecom Displayphone	Novation Infone	Rolm Cypress	Tymshare Scanset XL	Sydis Voicestation
	Stand-alone	Stand-alone	Stand-alone (portable)	Stand-alone	Stand-alone	Cluster
	Yes Yes	Yes Yes	Yes No	Yes Yes	Yes No	Yes Yes
	12 inches 2480 Yes Yes Detachable	7 inches 1920 Optional Yes Retractable	1 line 40 No Yes Integral	9 inches 1920 Yes No Detachable	9 inches 1920 No No Integral	12 inches 3952 Yes Yes Detachable
	200 Yes Yes	90 Yes Yes	200 Yes Yes	200 Yes Yes	36 Yes No	Yes Yes Yes
	Under $5,000 (configuration-dependent)	$900-$3,400 (configuration-dependent)	$1,150	$1,950	$895	$5,000-$7,000 (configuration-dependent)

Source: Datapro Research Corporation

bytes of random-access memory (an additional 128K bytes is optional), a 5¼-in. disk drive (a second drive is optional) and a pair of optional software packages, Parallax Systems, Inc.'s Execuwrite (word processing) and Execucalc (electronic spreadsheet). The Kontact is designed for more extensive applications than some of the other products mentioned here. In addition, Mitel has under development a new workstation, the Superset 7, designed for use with the company's SX-2000 PBX.

Another new high-technology entry in this field is the Voicestation, manufactured by Sydis. The Voicestation is a multifunctional workstation which is clustered around a central node. The Voicestation integrates voice, data, text and graphics applications. Featured are full telephony capabilities, dictation, transcription, voice annotation of text, voice messaging and personal computing. Menu selection of features can be accomplished through an optional mouse. The Voicestation can communicate over Sydis' Sylink local-area network at 320K bit/sec, using existing telephone lines. Finally, the Voicestation features a unique ergonomic design with a full size 12-inch screen and a detached keyboard which occupies only 123 square inches of desk space

Rolm Corp.'s new entry in this market is the Cypress personal communication terminal. The Cypress is a compact unit with a 9-in. screen and a retractable and movable keyboard. Functionally, the Cypress provides IBM 3270 compatibility (via the Rolm IBM Gateway), and DEC compatibility, and provides one-button access to Rolm Phonemail. It can also operate over from one to four phone lines.

A newcomer to this field is Digital Transactions, a Stamford, Conn.-based start-up. Their new product is called the Telterminal, which features an eight-line LCD display and integral keyboard. Full voice capabilities are standard on the Telterminal

Novation's Infone sports an integral modem, has a single-line LCD display, calculator-type keyboard and a miniature handset built into the face of the terminal. The Infone's small size and electronic mail capabilities make it ideal for executives and sales people who travel a great deal.

In addition to already announced products, several companies are said to be developing voice/data products. Among them are AT&T Information Systems, Inc., formerly American Bell, Inc., and Harris Corp. Look for many more vendors to follow suit, particularly those who are heavily involved in telecommunications.□

Putting Power In The House

By William L. Martin

Although users may have little interest in the areal density of magnetic disk storage, increases in areal density, however, have lead directly to reductions in storage costs. Today, 1M byte of leased disk space costs 90 cents per month based on 1.5M bytes per square inch of areal density. In 1966, the cost was $18 per month. This dramatic change is due primarily to increased areal density (bit density times track density). If 3M bytes per square inch is reached, costs are expected to decline to about 45 cents per megabyte per month. Five manufacturers today offer areal densities of 1.5M bytes per square inch — Control Data Corp., Ibis Systems, Inc., IBM, Memorex Corp. and Storage Technology Corp. Thin-film head technology is the most recent achievement contributing to increased areal density. Three factors have made this possible: automation, "clean room" environment and smaller head size. Automation of photolithographic techniques has replaced former manual processes for fabricating read/write heads, the device that reads from and writes on the disk surface. Automation not only reduces costs; but also greatly increases the degree of precision possible. This is key to increasing product reliability. Another factor is fabri-

cating the heads in a "clean" room, through which air is filtered to control contaminant particle count. Photolithography occurs in a room with fewer than 100 particles per cubic foot. In comparison, a typical office environment has 20,000 particles per cubic foot. Removing contaminants is another way to improve reliability.

Increases in density are achieved by reducing the size of the head structure. The width of the head determines the track width, and the width of the gap in the head determines the bit length. The current track width of 35 microns — a micron being a millionth of a meter — yields 810 tracks per inch, and bit length of 4 microns gives 15,200 bits per inch.

Technology will make possible much greater bit densities. It will not, however, make possible greatly improved rotation speeds or seek characteristics. These are basic physical limitations imposed by the nature of physical motion.

Among the several thin-film head manufacturers, little difference exists in this aspect of the technology. Two considerations in selecting a vendor are the manufacturer's commitment to thin-film head technology and their demonstrated investment in clean room facilities.

Fixed Media

The first unit to feature nonremovable media was the IBM 3350-type disk. The media was enclosed to maintain an environment free of particles which cause head crashes.

Two options are available in the IBM 3380-type disks. One is a device with a sophisticated three-stage air filtering system. The last stage, an "absolute" filter, limits the maximum particle size. The second option is a smaller, sealed head disk assembly that creates less heat. Cooling is done by conduction through the case, and air does not pass through the assembly. Humidity is expected to be much less of a problem in this design than in the first option.

Two types of media are currently available: ferrous oxide (particulated) or metallic (plated). Ferrous oxide has been the industry standard and is used in the 3350-type disks. As bit densities increase and bit size becomes smaller, media with higher frequency capability will be required.

The 3380-type disk today is offered with the ferrous oxide media. It is less expensive and meets current bit-density requirements. Significantly higher bit density in the future will require metallic media.

The increased business efficiency made possible by on-line data bases, has led directly to the tremendous growth in computer systems and the amount of disk storage used with these systems. A typical system today will have 4G bytes of disk storage for each millions of instructions per second (Mips) performance of the main processor. For example, an IBM 3083 Group Model J is rated at 7.3 Mips. This would be supported by 30G bytes of disk storage in the I/O subsystem, or about 80 3350-type spindles.

Increased use of disk storage has also caused other impacts. The disk is now shared by many users. With multiprogramming this allows two or more tasks to access the same disk simultaneously and contention is introduced into the system. Although simulations and measurements have proved contention exists, there are no means to quantify it.

The user must now be aware that the configuration selection and data placement have become more important with regard to the new disk technology. To solve this problem the user may need a systems programmer, perhaps an unforeseen situation.

Increased levels of contention was a major fear when the 28M-byte IBM 2314 disks replaced the 7.3M-byte IBM 2311 model. One main concern was whether this nearly four-fold increase in capacity would cripple increase in capacity would cripple performance.

Similar fears accompanied the introduction of 100M-, 200M-, 317.5M- and 635M-byte devices. In each case, conversion to larger capacity was successful without major contention problems.

The key to avoiding contention in large capacity volumes is intelligent storage management. One feature to examine carefully is the availability of additional data paths offered in some disk units to give greater access to each data volume. Dynamic Path Select and the improved Dynamic Path Select Extended features provide better performance for these large capacity volumes.

Although the 3380-type devices provide increased reliability compared with past devices, what about availability? Failures do occur and the DP operation must continue in spite of them. The goal is to minimize the negative impact of a failure by making sure the most critical data is placed on the best performing device.

Several techniques such as IBM's Logrec, the data set name in the system, and Sysres — the system resident pack — have been developed to determine both the most critical data and which device would best perform given availability problems. A side benefit of these techniques is that the user will also find out which device performs worst and can then direct some needed maintenance toward correcting the problem.

Power supplies are a common point of failures, and redundancy in power supplies is rare. Even if a supply itself does not fail, it often must be shut down while a card in a device is being changed. If the supply provides power for additional devices, they are also affected by the failure. The impact of a failure from a power supply can be minimized by selecting devices designed with independent pow-

er supplies.

Some 3380-type devices have been designed with special attention to maintenance. Remote technical-assistance capability can greatly improve availability. This feature enables design engineers to interact with the system from a remote location to solve a complicated system-level timing problem.

Other maintenance considerations include what units are field-replaceable and how long it takes to change a head assembly. Some designs are better than others.

In addition to considering maintenance features built into a device, planning recovery procedures before a failure occurs can minimize interruption of operations.

Technology changes bring many impacts on the user. Most are beneficial but all require that the user adapt the new technology to specific applications.

The current trends in increased density for auxiliary storage devices will continue. Technology will make possible much greater bit densities. It will not, however, make possible greatly improved rotation speeds or seek characteristics. These are basic physical limitations imposed by the nature of physical motion. But a range of disk devices that attempt to cover the range of application needs will become available.

At one extreme will be disks with several heads per track to provide improved seek times at the expense of capacity. At the other extreme will be devices with great capacity with modest search or access times. We may also see disks with increased data rate capability that will be the result of greater bits per inch.

There is reason for the 630M-byte logical volume to remain. Migration from one type of disk to another continues to be difficult simply due to the large quantity of data that must be handled. If means can be found to avoid this unproductive work, then there is the possibility for change. This is probably not very likely and the present volume sizes should persist for some time.

New Devices

The most promising new storage device is the optical or laser disk. These may provide the largest capacity units in future systems. Today's laboratory units easily record 1G byte per surface, with 4G bytes per surface probable in the near future. Except for some work on an eraseable device, a unique feature of the optical disk is that the media is not reuseable. Estimates of media cost are in the range of $100 per disk or 10 cents per megabyte.

A user may find in such a device ideal solutions to several current problems. It may provide an ideal archival device. Its cost is low and it provides a level of access comparable to a disk because it is a random-access device. It also provides a means to avoid the need for special backup files. When a file is changed, a new copy is simply made, retaining the old version for backup purposes. This is a process very similar to "generation data groups."

Finally, it can be made removable, so that a full disk can be removed and placed on the shelf. A full 1,000M bytes of data can be restored by hand from a shelf or stroage room much quicker than a fixed media volume can be restored today.□

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On Track With The 3380

By William L. Martin

The advancement in technology that has lead to the development of the IBM 3380 disk storage device not only brings new capabilities to computer systems but also challenges users to bridge efficiently the gap from the old to the new storage systems.

An orderly and controlled migration of data to a new disk system is no doubt a rarity, but such a migration is a requirement if users are to maintain efficient, cost-effective computer systems. There are several reasons for migration.

Growth in new applications tops the list of reasons for migrating to the 3380-type disk device. The applications backlog in most DP departments is testimony to this growing de-

mand. New applications and growth in existing applications creates the need for additional space to hold new data files. Today the typical disk storage space growth rate is 40% to 50% annually.

The improved efficiency and responsiveness that results when an application is changed from a batch to an on-line environment is another reason for converting many applications.

As files and data sets become larger and are used by more people, response time often begins to suffer and contention within the system increases. Converting to the higher performance 3380-type disk device is a way of addressing this problem. The 3380 disk provides improvements in cost per megabyte. Currently, the monthly leased cost per megabyte is 90 cents based on the price of the IBM 3380 model B4 disk unit.

And, finally, users need storage devices with improved reliability. On-line applications are more demanding and are less tolerant of device failures. In addition, as the number of devices increases, their reliability must also increase to sustain overall system reliability.

For example, if a disk unit fails once per year, then a system with one unit fails once each year. A system with 12 units will fail 12 times in a year. In order to maintain the original system reliability, a device with a 12-times improvement in reliability is needed.

Now that 3380-type disk drives are readily available, users must address the task of incorporating them into systems as efficiently as possible.

The requirement for migration exists because the new device has characteristics that are not transparent to application data files. Changes in these characteristics require changes to the user applications not only so they will use the storage space efficiently but also so the applications will execute successfully.

The task of migration can be divided into five steps: planning, premigration analysis, migration, post-migration problems and post-migration analysis.

The size of the migration task will determine how extensive a plan is needed. Conceptually, the task is straightforward. In a typical system today, there are nearly 10,000 data sets that are candidates for migration. This can be a major undertaking, and a systematic plan for migration is needed.

An important first step is determining which data sets will be moved to the new disks. This is a complex decision with no hard rules and is a compromise between many different requirements.

Data set size: 3380-type disks have large 47K-byte tracks. If space is to be allocated by the track, a 4K-byte data set may not be a good choice for migration.

Block size: 3380-type disks have large 480-byte gaps between blocks (185 bytes on 3350-type disks). Short blocks are therefore very inefficient.

Data rate: 3380-type disks have a 3M byte per second data rate (1.2M bytes on 3350-type devices). Where the data rate will improve performance, the 3380-type disk is a good choice.

Software support: Not all programs have been modified to provide 3380 support. This is a changing situation that needs to be continually reviewed.

Floor space: The 3380-type disk has a smaller footprint. This is often the most important consideration since the new disk is the only way to allow growth in a confined facility.

This list is not exhaustive, but it suggests major factors that must be considered. Some users are maintaining their existing system and placing new applications on new disks. Later, they may move data sets to the most optimal device.

The 3380-type disk has a track length of 47K bytes. The largest block that can be written by existing access methods is 23K bytes. The problem then is to find a block size that fits the 47K track, can be written by the software and will fit into main storage as well as be accepted by the JCL, and, if the data set is also to be on other disk types, accommodate their unique track sizes efficiently.

The following table may prove helpful as a starting point:

Block Size (K bytes)	Device Types
6.2	*3330, 3350, 3380*
9.0	*3350, 3380*
23.0	*3380*

The requirement for migration exists because the new device has characteristics that are not transparent to application data files. Changes in these characteristics require changes to the user applications not only so they will use the storage space efficiently but also so the applications will execute successfully.

The fact is that large block sizes, when used with large numbers of buffers, require large amounts of virtual space and may negatively impact the amount of paging in a system.

The 3380-type disk has the following performance characteristics:

Transfer rate:	*3.0M byte/sec*
Seek:	
1 track	*3.0 msec*
Average (295 tracks)	*16.0 msec*
Max. (885 tracks)	*30.0 msec*
Rotational Delay:	*16.67 msec*

Not only must users keep these characteristics in mind, but they must also consider the effect that a configuration has on performance. Some vendors are providing additional data paths to the 3380-type disk; this not only improves availability, but decreases the amount

of contention. Contention for data on large capacity volumes is going to increase simply because there is more data on the volume.

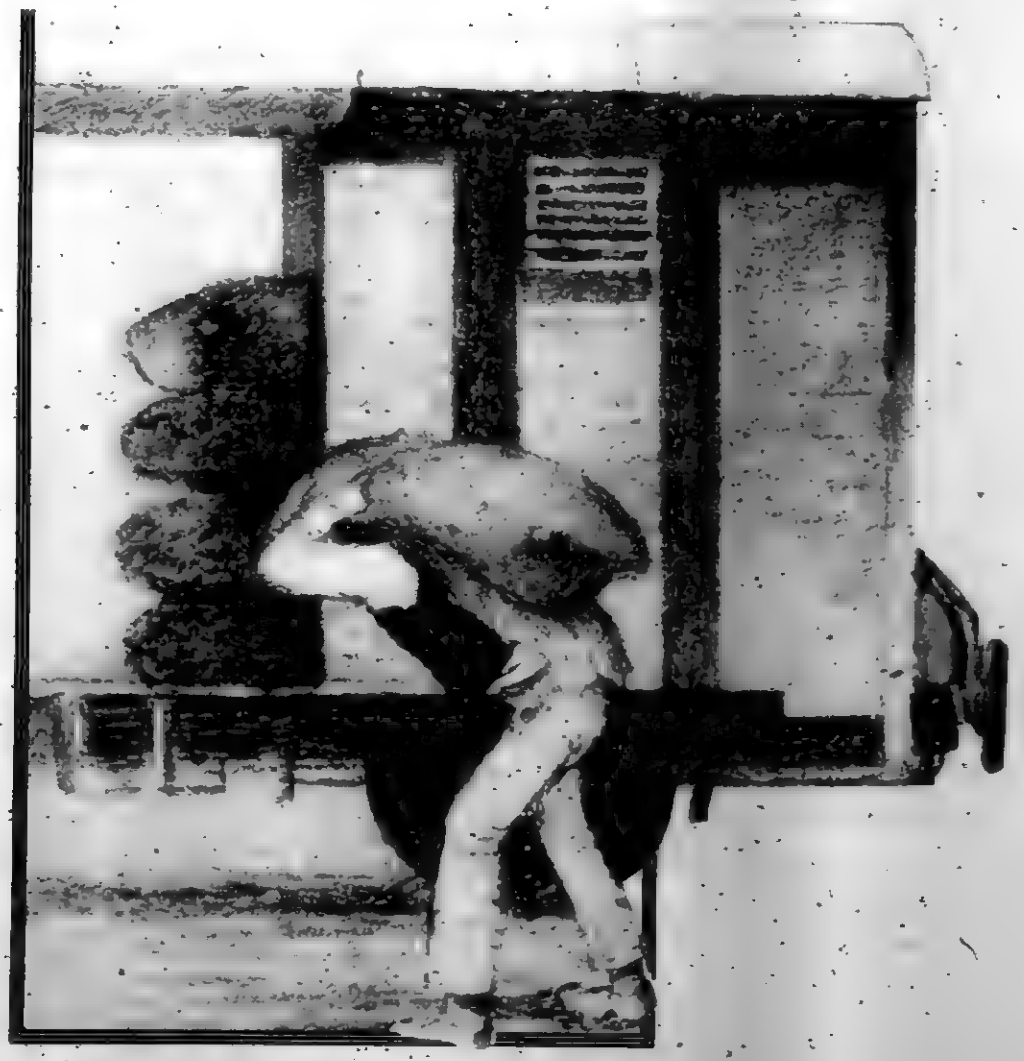
Migration: The actual migration can be anticlimatic if the planning and pre-analysis have been done carefully. There are several utilities such as IBM's Iebcopy, Ieb gener and Iehprogram that may be employed to perform the actual move. Some of these may be incorporated into other functions such as the hierarchical management system.

Post-Migration Problems: A complete migration plan includes verification that once the data has been moved, the application program will still run successfully. Performing this test before the original data has been erased may prove very beneficial in discovering subtle job control language problems that had not been anticipated

Post-Migration Analysis: As has been mentioned, once the selected data has been migrated, performance analysis may be appropriate to determine if the anticipated performance gains have been achieved. Though the 3380-type disk has a higher data rate, placing several files requiring this higher data rate on it will probably cause too much contention.

Functions performed during this post-migration period involve standard maintenance and monitoring activities.

Technology has provided the means to achieve new levels of performance and efficiency in the form of the 3380-type disk device. It is the users who must provide the bridge to utilize that technology through familiarity with their own systems.□



Loading Smaller Disks With More Bits

By Robert Abraham

Today, the 8-in. floppy is essentially a commodity item and is still a major factor in the marketplace, but it has been surpassed in sales this year by the 5¼-in. minifloppy drive, which offers the widest range of capacities and speeds of all flexible drives.

On the horizon is a still smaller diskette drive — the sub-5¼-in. microfloppy. The market for this diminutive drive, which appears to be crystallizing around the 3½-in. diskette, is gathering momentum and will soon become a third disk storage alternative. What all three drive types share — and users benefit from — is better performance and lower costs through the use of microprocessors. An examination of the markets,

technologies, applications, pricing and tradeoffs for each drive will help computer users decide on the one that best suits their needs.

Three major factors are driving the performance, configuration and pricing of flexible disk systems. These factors are: increased use of microprocessors in drive design; smaller package sizes with the addition of half-height configurations in 5¼-in. and 8-in. drives and the emergence of a sub-5¼-in. microfloppy drive; and an upward growth in capacities in the 5¼-in. and sub-5¼-in. versions. Each advance brings distinct benefits and helps to further entrench the floppy disk drive as the basic random-access, low-cost storage device for mini- and microcomputers.

Microprocessors can provide more accurate positioning of read/write heads. In positioning heads, tolerances are microscopic, and the microprocessor seems tailormade for the task. It precisely aligns the recording head that travels from track to track in 3 msec, typically, to access data on a track that is only 0.0074 in. from adjacent tracks (135 tracks per in.). The payoff to the user is greater accuracy and reliability of data. The second improvement in performance is a result of the microprocessor's ability to speed up the damping, or settling, time of a head before it arrives at a track destination.

Buffered seek operation also improves access time. When a drive's controller directs the read/write head to move 60 tracks across a disk's surface, for example, it takes 180 msec to carry this out at the typical stepping rate of 3 msec. In a normal operation, the controller issues a command every 3 msec. Hence, the controller is tied up for 180 msec while issuing the 60 discrete commands.

A microprocessor, however, uses a buffered seek mode of operation to receive all 60 commands in a short burst of pulses. The microprocessor memory buffers, or holds, this information and carries out the orders by itself, freeing the controller to perform other functions

Smaller Sizes. Compared to the 14-in., 24-in. and even 48-in. diameter rigid disks that provided random-access data storage in the earliest computer systems, the 8-in. flexible diskette that appeared in the early 1970s was a study in miniaturization. A drive became standardized around this 8-in. diskette, measuring approximately 4.6 in. high, 8.5 in. wide and 14 in. long.

In 1980, Tandon Corp. became a pioneer in the marketplace by developing a drive that did exactly the same tasks as the larger 8-in. drive but was half as high. Thus, a designer could double disk memory capacity in the same space or design a smaller system. This trend literally took the 8-in. market by storm. Today, virtually, all new 8-in. drives offered are half-heights or smaller — measuring some 2.3 in. high. The user benefits from higher storage capacity in the same tabletop system. The reduction to half-height size has been accomplished through miniaturization of essential parts, greater use of microprocessors and large-scale integrated circuits and more efficient packaging techniques.

In the late 1970s, 5¼-in. drives, developed by Shugart Associates, Inc., proved to be not only smaller in size, but ultimately capable of higher capacities and speeds than 8-in. drives. This drive was incorporated into many of the personal, home and business computers that fueled the dramatic growth of the computer industry during the past two to three years. Again, a standardized form factor emerged: A drive approximately 3.2 in. high, 5.75 in. wide and 8 in. deep.

The new design, component and packaging techniques that reduced the height of the 8-in. drive proved just as tempting to the 5¼-in. disk drive market. Thus, a half-height minifloppy drive was developed by Alps in 1981, measuring about 1.6 in. high. This precipitated a new wave of half-height drives, which account today for a growing percentage of the market.

As the market for truly portable computers, intelligent instruments and smaller office and home systems grows, the need for even smaller random-access storage devices becomes apparent. A diskette drive smaller than the newly standardized half-height 5¼-in. drive is coming to the fore. This sub-5¼-in. device uses the familiar oxide-coated mylar diskette and the same components as its larger counterparts. The market is currently sorting out the merits of four different diskette sizes. A 3½-in. version has gained the earliest and widest acceptance. The user will be the ultimate winner. These microfloppy drives pack nearly the same capacity as their larger counterparts, are a fraction of the volume and some versions are compatible with interfacing requirements and software written for the 5¼-in. drives.

Higher Capacities. While the storage in the 8-in. floppy has stabilized at 800K bytes for a single-sided drive, and 1.6M bytes for a double-sided drive, the capacities of 5¼-in. drives and the barely emergent sub-5¼-in. microfloppies are increasing. In commercially available 5¼-in. offerings, capacities range from 125K bytes for a single-sided, single-density disk with 48 track/in. configuration to 2M bytes for a double-sided, double density disk with 96 track/in. configuration. New positioning techniques that space recording heads more accurately are making possible drives with capacities in the 3.3M-byte range. New recording technologies, primarily vertical recording, augur well for a 5¼-in. drive with 10 megabytes of capacity in the near future.

In the sub-5¼-in. microfloppy field, the earliest announced products less than two years ago featured capacities in the 250K- to 400K-byte range. Today microfloppies are available with 1M byte of storage.

The single-sided 8-in. floppy became the first low-cost random interchange standard for data. Shipments peaked in 1982 after a

decade of growth. Standardization is a living, breathing fact. Most 8-in. diskettes can be read on most 8-in. drives. Capacities have stabilized primarily because of the properties of the oxide-coated mylar disk media.

This product is being nudged aside by a double-sided version of itself, which features a capacity of 1.6M bytes with the same access time and transfer rate as the single-sided verson.

Half-height drives, both single- and double-sided, are the fastest growing segment of the 8-in. market. The half-heights have dominated new product introductions in this group for the past two years.

In addition, double-sided 5¼-in. drives, also offering capacity and price advantages, are proving an attractive alternative to the single-sided 8-in. floppy drive.

Applications. According to James N. Porter, author of the "1982 Disk/Trend Report," published by Disk/Trend, Inc., approximately one-third of all single-sided 8-in. disk drives are used in small business systems, about one-fourth in word processing applications and nearly one-fifth in mini- and microcomputer applications.

With double-sided 8-in. and 5¼-in. drives capturing more of the market for DP-type applications, three-year projections show a decline in single-sided 8-in. drives for small business systems, but a modest growth in word processing applications. On the other side of the 8-in. coin, the double-sided drive is overwhelmingly used in small business systems applications. For users who place a premium on completely standardized products and complete interchangeability of media, the 8-in. floppy niche is the place to be.

Pricing. As befits a commodity-type product, the 8-in. disk drive market is characterized by comparative price stability. Incorporation of the microprocessor in new drives and manufacturing economies have driven down the price for newer drives. Retail pricing averages $1,100 for an 800K-byte dual disk drive with power supply to $1,300 for a 1.6M-byte, double-sided drive with power supply.
power supply.

Fueled by the adoption of the 5¼-in. drive in the IBM Personal Computer and several other major personal computers, this minifloppy drive equalled the 8-in. drive in sales revenue in 1982 — about $400 million. This year, according to the Disk/Trend report, 5¼-in. drive sales will surpass 8-in. drive sales, and will continue to grow dramatically for the next three or four years. This growth will eventually be dampened by the incursion of low-cost 5¼-in. Winchester drives on the upper end and microfloppies on the lower end of the capacity spectrum.

Capacity. In contrast to the highly standardized 8-in. diskette segment and its two-capacity structure, the 5¼-in. disk drive field offers users a wealth of capacities and speeds. And more choices are in development. While it makes a choice more difficult, this diversity provides a better possibility of matching a 5¼-in. drive exactly to a user's needs.

The principal variations of 5¼-in. drives are functions of the number of recording surfaces (single- or double-sided), track density (48- or 96 track/in.) and recording density (single, double or quadruple). Typically, single-sided drives are configured with 48 track/in. and either single-or double-density recording. Double-sided drives typically are configured with 48 track/in. or 96 track/in. and double density recording to achieve the higher capacities that are much in demand today. A closer look at the capacity ladder:

- *250K bytes:* As a basic random-access memory unit, this single-sided, 48 track/in., double-density drive is a very popular model. It can also be operated in a single density mode to achieve 125K bytes of storage.
- *500K bytes:* By far the best-selling capacity level in a 48 track/in., double-sided recording mode. This capacity is the favorite of personal computer manufacturers, including IBM.
- *500K bytes:* In the 96 track/in., single-sided recording mode, this capacity level has not received high market acceptance, but is available from many manufacturers.
- *1M byte:* The most desired of the higher capacity, 5¼-in. diskette drives, and growing in popularity. These drives are configured for 96 track/in., double-sided, double density recording.
- *1.6M bytes:* Basically an emulator of the 8-in. floppy drive, this capacity level has a higher transfer rate (500K bit/sec), and is becoming popular in applications where media interchangeability with the 8-in. format is desirable. It is characterized by 96 track/in., double-sided recording.
- *2M bytes:* This capacity level, which requires special oxide-coated mylar media, also needs a system capable of dealing with its higher transfer rate — 500K bit/sec. These drives utilize 96 track/in., double-sided recording and quadruple density formatting. It remains a prime candidate for Winchester backup and other capacity-hungry applications.
- *3.3M bytes:* The acceptance of the 10M-byte, 5¼-in. Winchester as the desired storage level in small computer systems such as IBM's Personal Computer has created a growing demand for low-cost backup memory. A minifloppy with a 3.3M-byte capacity is attractive because only three media changes are required. These capacities are being achieved in 5¼-in. drives by Amlyn Corp. (3.2M bytes) by using a single prerecorded servo track to position heads and 170 track/in. density, which is 70% higher than the standard 100 track/in. Remex has also announced a similar product. Drivetec is offering a 3.3M-byte drive by embedding positioning data throughout a disk's recording track, and 192 track/in. density.

These higher capacity minifloppies are used for software loading and backup applications in these

systems, which generally incorporate a 5¼-in. Winchester disk drive.

Intensive development activity focusing on new recording techniques and materials, such as vertical recording, is expected to soon produce a 10M-byte capacity in the standard 5¼-in. drive package. In vertical recording, magnetic domains are lined upright like soldiers on the recording media, rather than horizontally, as cars on a busy freeway. Densities of up to 10 times higher than conventional oxide media are possible. Vertimag has already achieved more than 6M bytes in a drive using vertical recording.

A dynamic and growing base of software stamps the 5¼-in. drive world as one of stability and comfort for the user. In addition, media is very inexpensive and is universally available.

Unlike the highly standardized 8-in. market, complete interchangeability of media is not a reality in the 5¼-in. sector. A user must be cautioned that some computer manufacturers offer drives in systems in unique proprietary formats. Hence, media is not always interchangeable between different systems using different formats. However, media is always interchangeable between drives using a common format. The correct format must be selected for a specific drive.

In the past two years, users have benefited from a sharp 25% reduction in the price of 5¼-in. diskette drives.

Retail prices range from $350 for a 250K-byte, single-sided drive, $389 for a 500K byte 48-track/in., double-sided drive; to $450 for a 1M-byte, 96-track/in. drive double-sided drive.

Sub-5¼-In. Floppy Drives

Just as the market is absorbing the benefits and diversity of the 5¼-in. diskette drive, an even smaller memory alternative is emerging.

These smaller disk drives, aptly called microfloppies, employ basically the same technologies as their larger 5¼-in. and 8-in. counterparts. The notable difference is a smaller disk size. By mid-1983, drives embodying four different disk diameters were vying for acceptance in an extremely dynamic marketplace. At stake are large latent markets for random-access storage in portable computers, very small business systems, small personal and home computers, diminutive WP systems, intelligent instruments and other systems.

An estimated 63,000 units were shipped in 1982, a mere forerunner of the one million nearly anticipated within the next three years, predicts Disk/Trend's Porter.

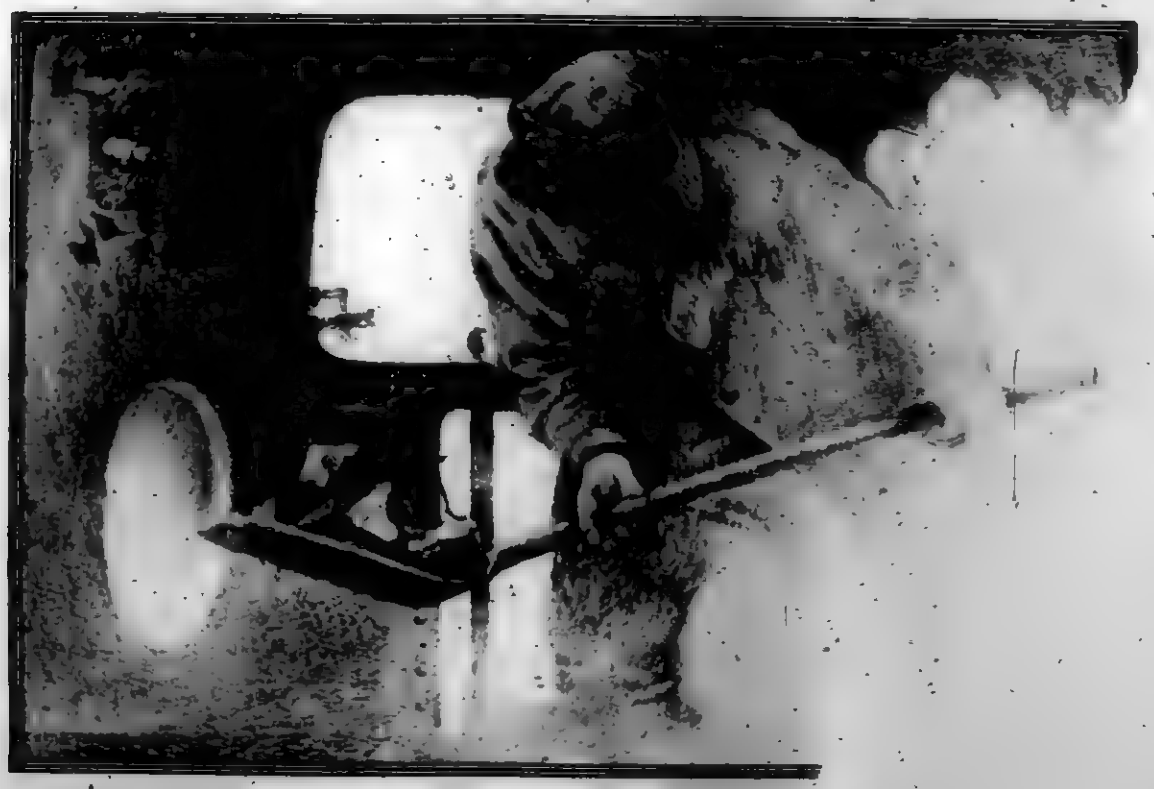
Microfloppy disk drives are being offered with four different size disks, all less than 5¼-in. in diameter. All but the IBM drives are available with 5¼-in. compatibility in data formatting and interfacing. The leading sub-5¼-in. drive vendors are:

- 3-in. diskette drives: Hitachi, Ltd., backed by a group of Japanese manufacturers, has announced a drive with 250K- and 500K-byte capacities. A rigid-media jacket design does not include a metal centering hub, which is becoming a user-preferred standard. Micro Peripherals, Inc., a U.S. manufacturer, also offers this drive in 250K- and 500K-byte models. At least two companies — Maxell Corp. and TDK Electronics, Inc. — offer 3-in. media.
- 3¼-in. diskette drives: Tabor Corp. offers a drive with 250K- and 500K-byte capacities, and has licensed Seagate Technologies, Inc. to manufacture its own version. A soft jacket, similar to that on 5¼- and 8-in. diskettes, encases the media. An automatic shutter, to protect the media when it's removed from the drive, also emerging as a user-preferred feature, is not offered. At least four companies provide 3¼-in. media.
- 3½-in. diskette drives: Pioneered by Sony Corp. in 1981, this size drive, with capacities of 500K- and 1M bytes, is being offered by Tandon, Shugart, and Matsushita Electric Corp. In addition to those vendors, the Micro Floppy Standards Committee, an adhoc committee formed by several manufacturers has recommended this media size to American National Standards Institute. The media features an automatic shutter, a rigid media jacket, and a metal media centering hub. At least six companies offer 3½-in. diskettes.
- 100-mm diskette drive: This year, IBM announced a 100-mm diameter disk drive. Its nonstandard capacity (358M bytes), and transfer rate (333K byte/sec) may not set well in a user's environment where compatibility with the massive 5¼-in. drive software is beckoning. IBM also provides the media.

Users should be cautioned, however, that two microfloppy disk drive standards might well become a reality. For instance, the U.S. computer industry may adopt the 3½-in. standard, but the offshore market, in particular the Japanese, may adopt a 3-inch standard. A second caution for users is the availability of media. Microfloppy media are not as readily available yet as the 5¼- and 8-in. diskettes, but they will be available within the next year. Finally, users should be aware that the acceptance of the microfloppy is inevitable, but it may be slow in reaching the marketplace.

While the microfloppy disk drive will be smaller than its minifloppy counterpart, the price at first will not be correspondingly smaller. When manufacturers have benefited from a production learning curve and large-scale volume that brings cost economies, the price of the drive should be the same or less than minifloppies. But the added value of smaller size, a shirt-pocket diskette, and lower weight should make the microfloppy an extremely cost-effective and an appealing memory device of the future.□

Abrabam is product marketing manager at Tandon Corp. located in Chatsworth, California.



Firing Up The Mini Winnie Market

By Andrew Roman

The quest for higher reliability and higher storage capacity and performance are the primary factors motivating buyers of small Winchester disk drives.

The new wave of portable microcomputers, desktop workstations and personal computers has triggered new demands for small Winchester disk drives with industry standard interfaces that can withstand extended use in small office environments with high reliability, low maintenance, increased storage capacity and faster access and throughput times.

Users who have chosen a personal computer or a microcomputer as a workstation should evaluate Winchester disk drive subsystems making sure they have enough capacity to handle everything from word processing and business files to color graphics. In this context the Winchester disk drive must be compact and reliable, with enough memory storage capability and performance to provide fast access to increased amounts of data files needed for such applications as financial spread sheets or business graphics.

New technology developments incorporated into today's compact new winchester disk drives are being offered by several manufacturers to address the demands for applications in desktop units. These developments include implementation of IBM's Whitney technology read/write heads, thin film media and smaller motors that allow higher storage densities to be packaged in more compact chassis. Smaller components, in turn, allow the manufacture of compact half-height 5¼-in. Winchesters for applications in portable as well as transportable microcomputer systems.

One of the newest developments in the market are half-height Winchesters measuring exactly 1.625 inches in height which were introduced last year by SyQuest

Technology of Fremont, California. At the same time slim line 5¼ in. floppies, intended as functional companions to fixed media 5¼-in Winchesters, also appeared. These introductions added to the growing trend towards compact packaged drives that permit the same storage capacity and performance but are mounted in half the space required by their full-height counterparts. Slim-line Winchesters, with capacities in the 6M-byte and 12M-byte range, are now being offered by Seagate Technology, Cogito Systems Corp., Shugart Associates, Inc., Tandon Corp., Miniscribe Corp., and Microscience International.

One consideration, however, is that standards for the interchangeability of data between cartridge disk drives do not exist. Presently no manufacturer's drive can read data written on a cartridge from another manufacturer's drive.

Today's head and media technology is adequate to meet market requirements for faster, smaller low-cost Winchesters, but the growing number of vendors face a key challenge to efficiently manufacture products in high volume and at low unit prices.

Thin film media and new head technologies are the keys to unlocking greater capacity in a smaller, more compact package. The upward progression to higher capacity for compact half-height Winchester disk drives will be reflected in an increasing market demand for plated media and low profile thin-film recording heads.

Most plated media is supplied to independent Winchester drive manufacturers by Ampex Corp. and Polydisc Systems, Inc. A growing trend, however, calls for Winchester disk drive manufacturers to produce and supply their own plated media for these smaller drives. Manufacturers that started this trend include Evotek, Syquest Technology, Inc., Tandon Corp. and Disctron, Inc., as well as such established manufacturers as Memorex and Control Data Corp.

Slim-line drives also require low profile lightly-loaded recording heads like those used on the 14-in. IBM 3380 "Whitney." Small Winchester drive manufacturers who also plan to manufacture their own read/write heads include SyQuest, Tandon, Disctron, and GDC

Look for the industry's first thin film read/write heads aimed at slim-line 5¼-in. Winchesters forthcoming from Magnex Corp. and other independent thin-film head makers such as Cybernex and Dastek

Thin-film heads especially developed for 5¼-in. and 8-in. Winchesters promise to improve data signals at high-flux densities, used on the new plated disks or the older proven oxide-coated media. Higher flux densities and higher track densities enable greater storage densities per disk surface. This allows total unit drive capacities to be increased without stacking more platters. This, in turn, promises the introduction of half-height 5¼-in. Winchesters with capacities exceeding 100M bytes. More sub-5¼-in. drives can be expected. However, presently these units have storage capcities of 6M bytes When the media is fixed and non-removable; standardization of diameter is not a major technology issue as it is for removable cartridge drives.

Removable cartridge Winchesters return the "personal touch" to personal computers and provide instant data backup, program/data loading and portability. A renaissance in removable Winchester drives has been declared with 5¼-in. removable cartridge drives from DMA Systems, Western Dynex, Memorex and Athenaeum Technology, Inc. The new DMA Model 5/15 features 26M bytes — 19.5M bytes fixed and 6.5M bytes removable. The new Athenaeum 5¼-in. Winchester drive features a total of 25.5M bytes with an equal 12.75M bytes fixed and removable. Seagate recently cancelled any further plans for their ST206 removable platter cartridge 5¼-in. Winchester disk drive storing 6.38M bytes, citing insufficient availability of plated media.

These drives benefit from ANSI standardization of mechanical dimensions for the cartridge first established by Dysan, an independent media manufacturer.

Several new 8-in. Winchesters also featuring removable cartridge drives, were recently unveiled. Newly formed Amcodyne, Inc., of Longmont, Colo., is offering an 8-in. Winchester featuring 25.8M bytes fixed with an equal amount removable. This cartridge drive is compatible with the ANSI 8-in. cartridge standard. It was also adopted earlier by Century Data Systems in their model C2048. The Century Data disk drive features 16M bytes fixed, and 32M bytes removable.

The new Lark II from CDC features 25.8M bytes fixed and the same removable. Vermont Research unveiled their 8-in. model 8520 with 11M bytes fixed and 11M bytes removable. All of these drives offer the industry standard SMD compatible interface.

Bernoulli Technology

Bernoulli technology is adapted by Iomega Corp. of Ogden, Utah in their Alpha 10 to offer a low-cost 8-in. cartridge drive with removable 10M bytes. First pioneered, but yet to be announced by IBM, Bernoulli technology achieves stable flying height for the read/write heads flying over low cost flexible media. Iomega also announced a new 5¼-in. model named Beta 5, which features 6.38M bytes. The drive uses a removable 5¼-in. flexible media cartridge with a Seagate Technology ST506 interface. Both Iomega drives offer the fast data transfer rates and quick access times of rigid disk Winchesters but use standard very-high resolution 8-in. or 5¼-in. flexible media. Dy-

san is expected to second-source the 8-in. Iomega media and cartridge.

One consideration, however, is that standards for the interchangeability of data between cartridge disk drives do not exist. Presently no manufacturer's drive can read data written on a cartridge from another manufacturer's drive.

The need for standardization in media is mandatory if removable cartridge disk drives are to be accepted by the industry and developed into a growing market. Eight-in. removable cartridge Winchesters experience the same data interchangability problem.

Mechanical interchangability, but not data read/write compatibility, can be performed with cartridges between Amcodyne, Inc., Disctron, Inc., Century Data Systems, Inc. and Vermont Research.

High-Capacity Winchesters

Increased competition among more than three dozen existing 5¼-in. Winchester disk drive manufacturers has resulted in the introduction of 125 different disk drive products since the first such products were announced in January 1980. Second-wave entrants joined the fray with something new and unique by shifting to higher capacity, higher performance disk drives. 5¼-in. Winchester drives with capacities ranging from 30M bytes up to and exceeding 140M bytes will open up new applications for 16- and 32-bit microcomputers which feature 256K bytes of random-access memory main memory. These drives may be used to accommodate high-resolution graphics, local-area networks and other multitasking and multiuser markets.

The key, however, to unlocking greater densities on smaller disks is thin-film sputtered media, such as that planned for perpendicular recording. The most effective way to uncover the full potential of this new plated media for both 5¼-in. and 8-in. Winchesters will be through the use of the new non-IBM thin-film heads originated and independently developed under a proprietary process by Magnex. These lightly loaded thin film heads will increase flying stability and enable higher resolution through precise control of the .0015-in. wide magnetic track as well as higher production yield resulting in lower unit manufacturing costs.

Propelled upwards past the 100M-byte range by the onslaught of so many new 5¼-in. Winchester disk drives, new 8-in. Winchesters are also advancing to the 100 to 300M-byte range. Some of the significant product introductions are exemplified by CDC's model 9715 and Northern Telecom, Inc.'s 222M-byte Mercury series. The significance of CDC's 9-in. 165M byte fixed storage drive was that it violated the 8-in. floppy form factor barrier, with its 230mm (9-in. diameter) media and its overall drive box dimensions; a width of 8.75 in., height of 10.5 in. and a 24-in. diameter. A companion drive, the model 9710 RSD (Removable Storage Drive), stores 92.9M bytes (80M bytes, formatted). It features removable media on a three-platter cartridge for backup. The cartridge also mounts next to the FSD in a standard 19-in. rack mount slot that measures 10½-in. high.

Several Winchester drive manufacturers are preparing to announce disk drives targeted past the 200M byte range. Drives such as Northern Telecom's six platter 222M byte, 8-in. Winchester are being designed by stacking multiple standard 8-in. oxide media on the spindle while still maintaing the 8-in. floppy form factor. Offering the de-facto CDC SMD interface on the disk drive is the key to this market. Fujitsu, Micropolis, Megavault, Priam, Quantum and NEC are currently shipping 8-in. Winchesters in this storage capacity range featuring the industry standard SMD interface.

With so many variables to consider in selecting a small Winchester disk drive, it is truly a time of "buyer beware." Several choices are available in small Winchester disk drives including half-height disk drive sizes featuring thin film media, new Whitney technology read/write heads, smaller motors, greater memory capacities and higher performance packaged in less space. Furthermore, there are choices to make among 8-in., 5¼-in. and sub-5¼-in. drive sizes.

The selection of the most suitable Winchester disk drive for a desk top micro computer or personal computer should be based on the intended applications for the microsystem and its companion peripheral drive. For example,

The need for standardization in media is mandatory if removable cartridge disk drives are to be accepted by the industry and developed into a growing market.

if system throughput time is a factor, a faster access drive with a servo- controlled voice coil actuator and larger storage capacity should be considered. The same follows if business graphics or financial spreadsheets are to be generated by the computer.

However, for single work station applications such as in a desk-top word processing system where physical size and limited cabinet or desk-top space are a factor, a half-height 10M-byte 5¼-in. Winchester disk drive packaged in a compact subsystem chassis and mounted next to a companion half-height 5¼-in. floppy disk drive should be considered.

In every case a small Winchester disk drive subsystem should be purchased only after its compatibility to its host computer has been determined. Less frequent user intervention between the drive and the computer will increase operating reliability and reduce service charges. And after the hardware link has been established, it is the operating system software which assures smooth and efficient oper-

ation and fast throughput.

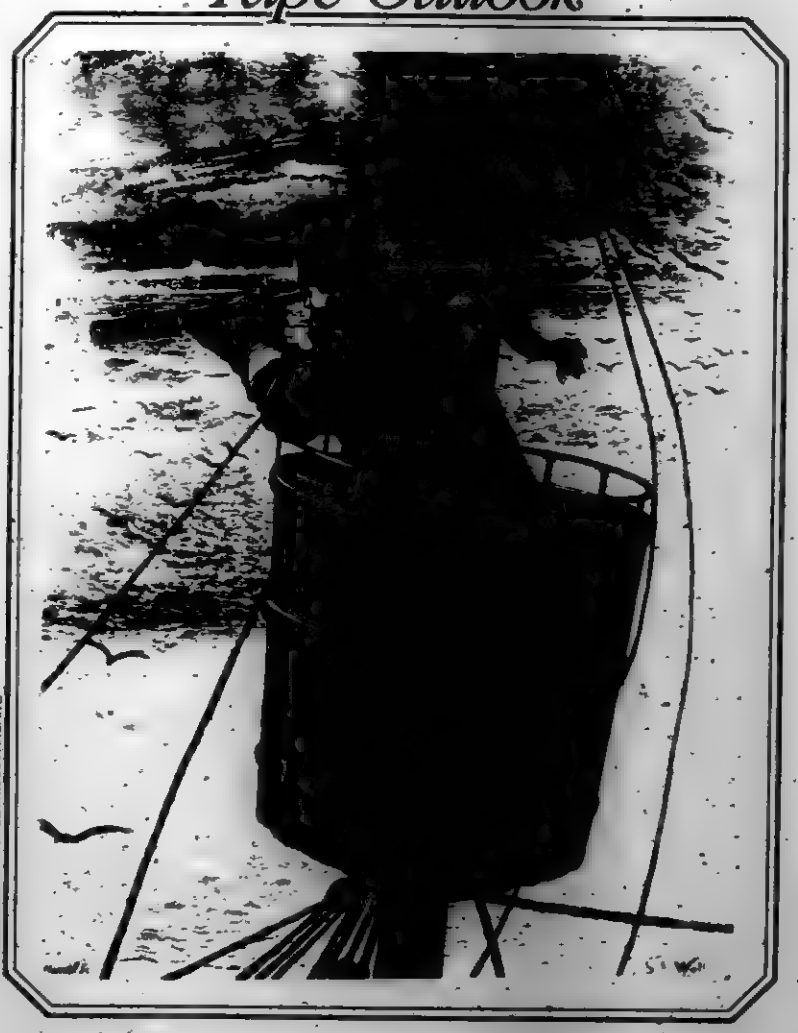
The market for 5¼-in. Winchesters is exploding. By the closing of the 1983 National Computer Conference last May in Anaheim, Calif., the 5¼-in. Winchester industry numbered forty manufacturers who accounted for a selection of 125 different 5¼-in. Winchesters. Over two dozen new 5¼-in. Winchester products alone were announced and shown for the first time at the conference. According to various industry market research sources, slightly over six hundred thousand 5¼-in. Winchester units will be shipped in 1983, valued at over $565 million And these shipments are projected to increase to three million units by 1988, valued at $3 billion. Although cost in dollars per megabyte is decreasing over the long term, the average unit sales price per 5¼-in. Winchester disk drive is going up because of the continuing trends towards higher performance and storage capacity per drive, up past the 100M-byte range. These numbers include shipments for the two main market segments, the OEM and the captive market and represent a combined annual growth rate exceeding 50%.

In 1982, 90% of 5¼-in. Winchester disk drive sales revenues were accounted for by drives with storage capacities under 10M bytes. By 1988, 33% of projected revenues will be generated by 5¼-in. Winchester products with capacities up to 25M bytes, mostly packaged in the compact 5¼-in. half-height configuration.

No other disk drive market has ever accounted for such an accelerated price erosion. Within only 2 years the average unit sales price of 5¼-in. Winchesters decreased by 33%.

In contrast to the market dynamics of the 5¼-in. Winchester market, the 8-in. Winchester disk drive market took four years to develop and expand to its present state. IBM introduced it in 1978, but in 1979, which was the first year of 8-inch Winchester OEM shipments, less than 5,000 total units shipped, valued at $9 million. In 1982, OEM 8-in. Winchester shipments accounted for 175,000 units, valued at $300 million This is projected to increase to $1.2 billion by 1988, and includes both non-standard 9-in. and 10.5-in. disk diameter Winchester product categories.□

Roman is vice president of marketing and sales and one of the founders of Cogito Systems Corp., a 5¼-in. Winchester disk drive manufacturer located in San Jose, Calif.



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The Tape Horizon

By Donald C. Collier

Borrowing from Mark Twain's well-worn adage, news of computer tape's death has been greatly exaggerated. From its beginnings in the early 1950s for program and file storage, tape remains the dominant medium for exchange between computers as well as for data archiving. The meteoric rise in storage efficiency of random access disks, beginning in the mid-1960s, was thought to be the death knell of this sequential storage method, but the need for backup and archival storage has remained strong. Today's computer tape drives come small enough to fit in handheld portable calculators and large enough to resemble a refrigerator.

Tape is the slowest but also the most economical means of storing data.

Tape drives were integral members of the DP stream in the batch-sequential, job-by-job days when the application focus was accounting. However, modern computers run many different jobs concurrently by using large-capacity random-access disk storage, so tape is no longer used in a main-line processing role.

Backup, utility I/O and initialization uses remain, indicating magnetic tape has a healthy future. There was a close relationship between main memory, disk and tape storage on IBM mainframe systems from 1967 to 1979 and that balance is expected to continue.

Under the nose of high-end

computer systems, the microcomputer explosion has created a similar memory need, though scaled down in terms of capacity per system. Microcomputers have outstripped floppy disk capacity, particularly after high-level user-friendly software was introduced. Microcomputer networks and multiuser systems added to the already insatiable hunger for direct-access data storage and gave rise to the 5¼-inch and 8-inch,

Long column drives will continue their steady decline in market share, a victim of short column GCR competitors. IBM's 3420 series is now 12 years old and no longer a technology match for other alternatives.

Winchester disks, which are sealed and require backup. At first floppy disks performed the backup role, but as fixed disk capacities went to 10M bytes and above, cassettes and 3M Co.-type data cartridges became prime candidates for this role.

High-End Tape Subsystems

Since 1953, IBM has led the way in tape development, with other vendors offering plug-compatible versions and OEM derivatives. The first IBM tape drive, Model 726, was a seven-track device operating at 100 bit/in. and 75 in./sec. This unit transferred data at 7.5K byte/sec and furnished a recording density of 1400 bits per square inch. Over the next two decades, IBM made six more advances in recording density, achieving an 80-fold improvement to 112,500 bits per square inch when the 3420 models 4, 6 and 8 were shipped in 1973. These units brought 6,250 bit/in. recording to the market and boosted data transfer rates to 1,250K byte/sec. Traditionally, densities have doubled every 3½ years. The table on page 37 lists IBM products which increased tape recording densities.

Technology advances in computer tape recording essentially ceased in 1973. Research and development (R&D) funding was diverted to disk storage products for the balance of the decade, and as of today, no new advance in recording density has yet been brought to market in a high volume product. The 80-fold improvement in tape recording densities since the initial product's introduction contrasts with the 5000-fold advance in disk recording densities during the same period. At the same time, data transfer rates for tape relative to disk have lagged by a factor of 3.

Suppliers

While IBM has been the industry bellwether for high-end tape developments, many other OEM and plug-compatible manufacturers offer half-inch tape drives. Currently 34 companies produce 209 tape drive models. The three fastest growing segments are in the phase-encoded (PE) streamer, low-cost group-coded recording (GCR) and half-inch cartridge areas. Tension arm drives, short-column PE drives and long-column drives are showing signs of market decline due to the introduction of lower cost designs.

The leading half-inch producers across all classes, in units, are Pertec Peripherals Corp., Cipher Data Products, Inc., Kennedy Co., Standard Technology Corp. (STC) and Nippon Electric Corp. (NEC). The market for half-inch reel type drives will grow at a compound annual rate of 15% through 1987, led by streamers and low cost GCR drives. Half-inch cartridge tape drives will grow at a much faster rate, over 30% through 1987.

All PE reel type drives have an unformatted capacity of 46M bytes per reel at 1,600 bit/in. and 92M bytes at 3,200 bit/in. One of the oldest classes of these drives is the tension arm drives — tension arm start and stop transfer rates are typically 72K-byte/sec, but higher performance models from Digi-Data Corp. and Innovative Data Technology raise the rates to 120K byte/sec. and Datum, Inc. offers 200K byte/sec via a streaming mode on their Model DMF-1000. Most tension arm drives run at tape speeds up to 45 in./sec, but there are a few exceptions: Digi-Data, Innovative Data and TDX Peripherals offer models with start/stop speeds to 75 in./sec, and Datum, Thorn EMI Datatech, Teac Corp. and Victor Data Systems Co., Ltd. offer streaming mode options boosting tape speed to 100 in./sec. Typical end-user pricing for this product class is $7,500 and varies with control level.

The fastest growing PE reel product class is streamer drives. They were originally developed to provide economical backup for Winchester disks by reducing mechanical complexity. After IBM's introduction of the first PE streamer, the Model 8809, the first OEM version appeared from Cipher Data Products. Its Microstreamer drives quickly caught on and several other companies have since introduced similar products.

Cipher followed with two innovations, a 3,200 bit/in. PE recording option to boost capacity and a Cachetape drive allowing their streamer to emulate a start/stop drive and thereby simplifying system integration. PE streamer drives normally transfer data at 160K byte/sec in streaming mode and have far slower start/stop modes ranging from 20K to 40K byte/sec. Digi-Data offers two models that extend transfer rates to 200K byte/sec in the streaming mode. The 3.2K bit/in. option is now offered by Cipher, Digi-Data, Ibex, Pertec, and Thorn EMI Datatech, with more offerings expected in the near future. Digital Equipment Corp. will be using Control Data Corp. Keystone PE and GCR streamers in their VAX series systems. Typical end-user pricing for PE streamers is around $5,000, depending upon the control level.

Short vacuum-column PE drives

are slowing in shipment volume as more competitive alternatives appear. The leaders in this class, Cipher, Pertec, Kennedy and STC, project a slow market decline, although certain performance-sensitive PE users will opt for the relatively competitive transfer rates of between 240K and 320K byte/sec. The user pays for this edge, however, with a typical unit priced at about $11,000.

A new product class is evolving: low-cost GCR drives. They are intended for attachment to minicomputers and superminis whose users are cost-sensitive yet need the performance advantages of GCR. Products in this class can be either start/stop or streaming and offer transfer rates as high as 625K byte/sec , storing 180M bytes, unformatted, per reel. The three present participants are STC with their Avalanche, CDC with the Keystone streamer, and Fujitsu with the Model M2440. STC's drive is a start/stop device operating at 50 in./sec and transferring data at 331K byte/sec. CDC's Keystone transfers data in streaming mode at 469K byte/sec., and in start/stop mode at 156K byte/sec. More entrants are expected in this class, including Cipher and Kennedy. Typical end user pricing is in the $12,000 neighborhood for a formatted drive.

Traditional short-column GCR drives continue to show growth and find uses in high-performance minicomputer and mainframe applications where general-purpose start/stop functionality is required. Transfer rates are as high as 781K byte/sec at 120 in./sec tape speed, with Memorex/Fujitsu offering a drive with a streaming mode of 200 in./sec which gives a 1,250K byte/sec data transfer.

STC holds a commanding market share in this class, following by Telex Computer Products, Inc. and Pertec. STC offers a Model 4800 tape acceleration option for their Model 4500 drives to increase CPU channel efficiency under selector mode operation. Telex has been successful in selling their high-performance GCR drives to the seismic-exploration industry for data recording. Kennedy recently introduced their low cost 9400 model with 75 in./sec start/stop operation. IBM warmed over their old 3410 short-column PE drive by offering a GCR version, the Model 3430, announced earlier this year. Typical end user pricing for traditional short-column GCR drives is about $30,000 formatted.

Long-column drives will continue their steady decline in market share, a victim of short-column GCR competitors. IBM's 3420 series is now 12 years old and no longer a technology match for other alternatives. STC remains the largest independent manufacturer of long-column drives with a large installed base from IBM-compatible sales. Typical end user pricing runs about $35,000 for this class.

Considerable action is expected in half-inch cartridge products, with two distinct subsegments developing — drives with a transfer rate below 150K byte/sec and those at 150K byte/sec or above. Three companies fit in the lower performance segment: Tandon Corp., Rosscomp Corp., and Tokyo Electric Company.

Tandon's recently announced TM-951 uses a 5¼-inch floppy disk, has a storage capacity of 50M bytes and transfers data at 32K byte/sec. Rosscomp's drive stores 160M bytes, transferring data at up to 130K byte/sec. Their drive is primarily designed for 8-inch disk backup, while Tandon's is for 5¼-inch backup. Tokyo Electric Company offers a unique endless loop cartridge drive storing up to 200M bytes and is intended for disk backup and mass storage for microcomputers. Corvus Systems, Inc. is offering the unit in a subsystem called The Bank. These three cartridge models are designed for low-cost operation at medium performance applications. Typical pricing will be in the $1,500 range.

High-end cartridge products are not expected to develop until IBM drops its long-awaited other shoe and announces a new series to succeed the aging 3420 line. Only one company, Megatape Corp. makes a high-end cartridge drive, offering 330M bytes and transferring data at up to 240K byte/sec. Many new members of this club are expected to join as soon as IBM gives the market its much needed shape by establishing media and recording standards. IBM's problem of backing up 3380 disks remains and, when a double density version appears, the problem will be further exacerbated. Expect CDC, DEC, Fujitsu, NEC and STC to join in with plug-compatible or OEM versions.

Low-End Tape Systems

Tape drives for microcomputer and low end minicomputer systems are generally ¼-inch cartridge or cassette types. Computer-grade cassette drives currently range in capacity from 3M to 20M bytes and ¼-inch cartridge ranges from 10M to 70M bytes.

Forty companies produce 179 models of cassette and cartridge tape drives. The two fastest growing segments are standard cas-

IBM TAPE DRIVE HISTORY

Family	FCH	Bit/Sq in.	$/K Bytes/Sec
726	1953	1,400	111.31
727	1954	2,800	36.33
729 II	1959	7,800	16.61
729 VI	1962	11,200	10.41
2401	1966	29,091	4.82
2420	1968	29,000	3.44
3420 Odd	1971	30,000	2.26
3420 Even	1973	110,000	0.70

Source: Peterson Reports

Future of Tape

What does the future hold for the tape drive market? In a nutshell expect the following developments in the ½-in. tape arena:

• IBM will likely introduce its new series, code-named Del Oro, and establish the accompanying cartridge media as the next ½-in. media standard. This new media will then form the basis for new OEM tape drives ranging from floppy-size units to mainframe configurations. But do not expect reel drives to disappear. New tape standards, especially 18-track versions, will penetrate the market slowly due to large libraries of older tape.

• Conventional reel tape drives will continue to be down-sized and reduced in cost. Low-cost group-coded recording units will compete against more expensive traditional drives as well as against phase-encoded streamer drives.

• Chromium-dioxide media will be used extensively to bring recording densities above 15,000 bit/in.

• Optical-disk technology will have an impact upon tape, particularly for archival applications, but the effect will not be felt until mid-decade.

• New architectures, merging tape and disk drives into storage subsystems, will evolve. Tape drives will become more intelligent, will be able to perform housekeeping functions on their own and streamer-emulating of start/stop drives will become popular via buffered controllers. High-end tape subsystems will transfer data at rates closer to disk units and controllers will free CPU channels for more efficient operation.

Looking ahead in the low-end tape drive market, expect:

• Common interface and data formats will emerge, increasing worldwide interchange capabilities of ¼-in. cartridges.

• New down-sized ¼-in. cartridge drives will compete successfully for the 5¼-in. disk backup role.

• Cassette tape may awake from its somewhat sleepy market niche and become a contender for 5¼-in. Winchester disk backup.

settes with a transfer rate of more than 3K bytes/sec and ¼-inch streaming drives.

The leading cassette makers, in order of market share, are Teac, Memtec Corp., Philips Industries, Memodyne Corp., Raymond Engineering, Inc. and Braemar Computer Devices, Inc. Quarter-inch cartridge drives are led by Data Electronics, Inc., 3M, Archive, Kennedy and Qantex. Hewlett-Packard Co. and DEC dominate production of mini-cartridge drives.

The market for cassette tape drives will grow at a compound annual rate of 18% through 1987, the flagships being high-performance drives used for Winchester disk backup. Cartridge drives will see a growth rate of 29% through 1987, led by quarter-inch streamers.

Most data cassettes produced today hold less than 1M byte per media unit and transfer data below 3K bytes/sec. These are generally used for data logging and instrument recording. Four companies are active in higher performance cassettes: Braemar, Memtec, Raymond and Teac.

Minicartridge drives are used mostly for data logging and auxiliary storage, losing ground for the high-opportunity disk backup role to their ¼-inch "big brothers."

Quarter-inch start/stop devices continue to be used where incremental (file-by-file) access is a necessity; systems software permitting, streaming tapes are used in this instance. Overall package size is shrinking, with most manufacturers now offering the 5¼-inch form in full or half-height drives.

Notable ¼-inch cartridge products include Archive's Scorpion and Sidewinder series in 5¼-inch or 8-inch sizes with capacities of 20M bytes or 45M bytes and transfer rates at 30K or 90K byte/sec. DEI offers a full line of 5¼-inch and 8-inch drives holding 10M to 50M bytes in the start/stop or streaming mode. Their very popular Funnel start/stop drive was the first cartridge device to win wide acceptance for disk backup. Wangtek offers a half-height 5¼-inch drive in 20M- or 45M-byte capacity. At the top of the capacity spectrum 3M's HCD75 stores 67M bytes. An interesting departure was made by Cipher with their Floppy Tape Series 525-CT. Storing 32M bytes, this low-cost device connects to the host system via a standard floppy disk interface. Cipher also offers conventional streaming drives. Tandberg Data Corp. also provides both streaming and start/stop models.

Most data cartridge drives are sold with intelligent controller/formatters that have on-board error correction and housekeeping logic. The industry recently turned an important corner by adopting the so-called QIC data format and interface standards. These permit formatted data interchange between drives and a common interface to ease integration.

High performance cassette or ¼-inch cartridge drives will cost from $1,000 to $3,000 to the end user, depending on the degree of control sophistication. Market pressures will force prices down, particularly as 5¼-inch versions are produced in volume, providing economies of scale.□

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Challenging The Old Guard

By Jonathan W. Dower

The historical mandate of the computer printing industry may best be described as the effort to make printers quieter, faster, cheaper and more reliable. To this end, the industry has spawned eleven distinct print technologies, all of which were — or still are — expected to revolutionize the computer printer industry and to make sweeping changes in the way printers are used. Nonetheless, only three of those technologies — full-character line printers, full-character serial printers and impact matrix serial printers — now account for more than 80% of the total printer revenues and nearly 95% of all printer shipments.

This is not to say that the other eight print technologies, which are mostly nonimpact, have been unsuccessful in achieving their goals of speed, low noise and reliability. It says, rather, that they have been forced to compete against the three successful and firmly entrenched technologies and against equally entrenched market biases.

Needless to say, none of these technologies are perfect: daisywheels are noisy and have probably reached their most practical speed limitation at 55 char./sec, dot-matrix printers are also noisy and have been plagued by borderline print quality and line printers lack flexibility as well as high print quality.

Despite these shortcomings, emerging technol-

ogies must prove that they offer substantial benefits over existing technologies at a comparable cost and without any innate drawbacks of their own. So far, nonimpact page printers, thermal printers, ink-jet printers and high-density impact-matrix printers have been unable to do this, but this is sure to change.

As new applications emerge for computers, so do new applications for printers, resulting in ever-growing demands for printer capabilities. Applications that seem to be de rigueur today include color, graphics, bar codes, font flexibility, graphics/text integration and increased speed to handle shared printing tasks and increasing processing speeds. These new applications tend to make the traditional printing technologies more and more limited in their abilities to serve these new markets.

Daisywheel and line printers are poorly suited for these tasks. Serial impact-matrix printers, on the other hand, will remain somewhat resistant to the growth of new nonimpact printing technologies even though their color capability is less satisfactory than ink-jet or thermal-transfer technologies and may prove to be too noisy for future office environments. Impact-matrix printers, however, have the flexibility and speed to serve virtually any application.

The table on page 43 divides the specific printer technologies into generic classifications. "Serial Nonimpact Printers" includes ink-jet as well as thermal, thermal transfer, and electrographic printing. "Nonimpact Page Printers" includes electrophotographic devices as well as ionographic, magnetic, and thermal printers. Primary and secondary applications of each technology are shown as well as emerging applications and an estimated current annual growth rate for each technology.

In looking at the table, the heading marked "Primary Applications" may be considered the traditional marketplace for printers: data and word processing output. And taken as a whole, "Emerging Applications" represents the applications directions of printers. The dominant growth will occur in printers whose technologies perform traditional as well as emerging tasks more quietly, quickly, reliably and at a lower cost.

As the table indicates, full-character serial and line impact printers satisfy none of the emerging technologies which seem to be driving the development of printers today. Furthermore, it can be seen that several nonimpact and serial-matrix impact printing technologies are now entering the traditional applications areas of daisywheels and line printers.

What all this would lead industry observers to conclude is that the future of computer printers belongs to dot-matrix and nonimpact printers. Dot-matrix printers because of the speed, cost and versatility of raster output devices; nonimpact printers because of their speed, low noise, versatility and output quality. Other than this generalized presumption, the jury is still out as to when nonimpact technologies will assume a majority market share and to what extent nonimpact printers and high-density impact-matrix printers will impact the daisywheel market.

The annual growth rates in Table 1 look impressive and would seem to foretell significant growth in market share for nonimpact serial and page printers. But when these figures are compared with the estimated market shares for the six general printing technology categories through 1984, nonimpact serial printers actually show a decline in market share. Serial impact-matrix technology is the only technology which will gain ground in terms of market share, on the shoulders of a 35% annual growth rate.

Foretelling the demise of daisywheels, an industry that is currently enjoying a 25% to 30% growth rate, requires a certain amount of prognosticative chutzpah. But, the estimated market-share percentages are only for a four-year span and, despite the rapid explosion in the electronics market projected over the next two or three years, market shares change slowly. And it is particularly hard to increase that share in a market as competitive as this one.

Growth of market share for new printing technologies has been further hampered by lack of widely available software and application packages for these new products. Traditionally, appropriate interfacing and software development has not been the domain of the printer manufacturer.

This interfacing and development has instead been left to the systems manufacturer to provide the development effort that would permit the integration of new products into their systems. These developments have been extremely slow in materializing since, historically, the software industry has lagged painfully behind its hardware counterparts. This has been a particularly difficult hurdle for any of the high-resolution matrix technologies such as near letter-quality, ink-jet or laser printing. In order for any of these printers to be broadly successful in WP applications it would have to accept daisywheel protocol as well as be able to accommodate a software package that provided for command codes which allow the printer to do those things for which high-resolution raster printing is intended — graphics, font changes and special character sets.

The net result of all this struggling has been that, by the end of 1982, new technology printers have managed to wriggle only into limited, specialized market and application niches, from which they are jealously eyeing the mainstream application areas. Ink-jet printers — with the single exception of the IBM 6640 — have established themselves in the color graphics area with such units as the Siemens Corp.-based Printacolor Corp. and Advanced Color Technology, Inc. printers. Conventional thermal printing, long-derided

for its paper and low print quality, has been very successful in low-cost printer application area (40 columns or less) and for use with such portable terminals as the Texas Instruments, Inc. Silent 700 series. Electrographic printing on dielectric paper is employed in only one page printer, the Honeywell, Inc. Page Printing System (PPS) and is otherwise solely relegated to plotting functions. And low-end nonimpact page printers, the vaunted 'intelligent copier/printers, have found work primarily as high-cost output devices for specialized engineering, computer-aided design systems and electronic page makeup. The first thermal transfer units are not expected to be available until mid-1983. Magnetography has yet to be represented by a serious product beyond the prototype stage.

The Turning Point?

However, 1983 has promised to be a significant year for the printer industry in terms of the long-awaited arrival of nonimpact printers and high-resolution, serial impact-matrix printers in addition to interesting developments in the daisy-wheel market. The list of systems companies offering OEM laser printers now includes such companies as Digital Equipment Corp., Wang Laboratories, Inc., Data General Corp., NBI, Inc., CPT Corp. and Royal Business Machines, Inc. Important new ink-jet products have been introduced by Exxon Corp., Diablo, Inc. and Canon Corp. And 1983 will probably be the year in which high-resolution impact matrix printing begins what is sure to be its climb to market significance.

The following is a look at some of the product trends and developments taking place in each of the major technology areas.

Full-Character Impact Line Printers: DP Stalwarts. This market has been relatively sluggish for the past few years due largely to the effects of the economy upon high-priced capital goods purchases by users, but also due to the maturity of a market which cannot support the phenomenal growth rates enjoyed by other sectors. Nonetheless, impact line printers remain the workhorses of the DP stables. Following the trend of most electronic products, line printers have decreased in price while increasing in output speed and reliability. Dataproducts Corp. and Data Printer, Inc. both introduced 2000 line/min models in 1983. IBM also brought out a 2000 line/min model that is actually priced below the IBM 3211 chain printer which prints at the same speed.

In May, Centronics showed what some believe to be the only new technology advancement in impact line printers for some time: linear-motion print hammers in their new Linewriter 400 printer. Like other new line printers, the Linewriter makes use of more customized large-scale integrated chips for control functions in order to reduce size and cost. Nevertheless, many observers feel that the Linewriter is not a truly evolutionary product and, as a result, will find it hard to wrest any sizeable contracts from the 300- to 600 line/min band printers that currently control that market area.

Dot-Matrix Line Printers: Bar Codes, Labels, and Graphics. This interesting print technology had originally been seen as an alternative to full-character line printers for data processing applications. But the growth of industrial graphics, bar codes and labels has proven to be a bigger market for such manufacturers as Mannesmann Tally, Printronix, Inc., Hewlett-Packard Co. and IBM. Like other printers, much of the development in dot matrix line printing has been to provide greater amounts of "on-board" intelligence rather than put it in special controllers or under host control. On-board processors now handle character generation and bit-mapping functions, as well as adapt to various software graphics programs such as Versatec, Inc.'s Versaplot or Harris Corp.s Plot 10.

Like serial printer manufacturers, dot matrix line printer suppliers have been looking toward near letter-quality functions. Printronix was the first on this band wagon in 1981 with their MVP printer. But a large dot size has been an impediment to any serious consideration in this area. In 1983, Printronix introduced its 4160 line printer which prints 130 lines per minute with a smaller dot size and higher density. Also new in 1983 was a pair of printers from General Electric Co., their first venture into this technology. The GE 4030 and GE 4060 operate at 300- and 600 line/min respectively. Both offer double-dot density for near letter-quality printing.

Mannesmann Tally, a longtime contender in the dot matrix line printer market, introduced a new series of printers in 1982, the first of which, the MT660, is expected to appear on the market in 1983. Although Mannesmann Tally has plans to include a 900 line/min model in this series, that product may be some time off since, to date, dot matrix line printing seems to be technology bound at 600 line/min.

Serial Matrix-Impact Printing. Cost-cutting and feature-adding developments in serial dot-matrix printing may well be taken as a reflection of the state of the entire printing industry. Prices have plummeted — as low as $249; sales have exploded — over one million units sold in the U.S. in 1982. In addition to this, Japanese suppliers have emerged as one of the most significant market forces. With only a few exceptions, U.S. manufacturers have fled from the more volatile low-cost market, ensconcing themselves, instead, in the medium- to high-performance sectors (160 char./sec and up) and in the near letter-quality markets.

The Japanese have dogged their path into these markets as well and the past year has seen the introduction of such higher priced, high performance models as Okidata Corp.'s Pacemark series (draft quality — 350 char./sec; near let-

ter-quality — 75 char./sec), Fujitsu Microelectronics, Ltd.'s DPL 24 (draft quality — 160 char./sec; near letter-quality — 80 char./sec), Panasonic KX-P1090 (draft quality — 196 char./sec), and the C. Itoh CIC8600 (draft quality — 180 char./sec; near letter-quality — 90 char./sec). So far, none of the Japanese manufacturers have been very successful in the medium- to high-performance marketplace. Many systems manufacturers find it easier and more cost-effective purchasing printers, with the level of customization they need, from U.S. suppliers rather than dealing with an offshore company. But this, too, is changing.

Although Leading Edge Products, Inc. was the hit of the 1983 National Computer Conference with its Banana Printer (the Seikosha unihammer printer priced at $249), price alone is not enough to make a printer competitive any more. After the first flurry of price slashing, suppliers are now dedicating themselves to the task of making their low-cost units more than just bare bones models. New models in this price range (generally from $339 to $650) include such standard offerings as graphics capability, three-way paper feed, enhanced character formats, greater printhead life expectancy and speeds from 100 char./sec to 150 char./sec as the norm.

The other side of impact serial matrix printing is high-resolution printing for office and multifunction applications. This has become such a heavily promoted and discussed concept that virtually every printer manufacturer offers at least one near letter-quality model in their lineup despite the fact that fewer than 10,000 units were sold in the U.S. in 1982. This printing technology provides another example of the lag time between product/technology introduction and market impact. In this case, near letter-quality printing dates to the introduction of the Sanders Technology, Inc.'s Media 12/7 in early 1978. But until the closing months of 1982 not one single OEM of any significance — other than a low-key effort by IBM — was offering a high-density impact matrix printer with a system. In 1983 high-density matrix printers began to snake their way out to end users. These printers are now being offered by office and computer equipment manufacturers as diverse as CPT (Toshiba America, Inc. TH2100H), Sperry Corp. (Mannesmann Tally MT180), Basic Four Corp. (GE 3000 series), Tandy Corp. (Toshiba TH2100H) and Wang and DEC, both of whom manufacture their own dual-mode printers.

Printer and systems manufacturers have been able to respond to suspected public resistance to these printers by supplying successful and convenient interfacing, daisywheel plug-compatibility and more carefully designed fonts to dramatically improve output quality. Presently, the bulk of these machines seem to be finding applications within specialized environments — scientific, engineering and mathematics, for example — which can take advantage of the flexibility of WP-type draft printing. But in the not-too-distant future, the speed, flexibility, output quality and prices of these devices will force users to consider them as desirable replacements for their daisywheel print devices.

Nonimpact Page Printers. Nineteen eighty-three may be the year for this technology; it has brought the printer industry some of its most sophisticated and exciting imaging techniques. It is also one of the most diverse and includes electrophotography (using lasers, LEDs, LCDs, CRTs and fiber optics), electrography, ionography, and magnetography.

Nonimpact page printing is also another textbook case of the market dragging well behind the technology. Page printers have been a part of data processing since the Xerox Corp. 1200 first appeared in 1973. In 1979, the introduction of the IBM 6670 had consultants and industry analysts gushing over the coming era of intelligent copiers/printers and their role in the office of tomorrow. Data communications, electronic mail and facsimile, graphics/text integration, distributed processing and word processing, coupled with the growing access to information processing by office workers, are all tasks for which these printers are ideally suited.

As of early 1983, both sectors of this technology — high-speed page printers for DP (50 page/min and greater) and low- to medium-speed page printers (over 6 page/min) — have seen some growth, but nothing close to what had been envisioned.

The high-speed end is represented in this country by only five companies — IBM, Honeywell, Xerox, Delphax Systems, Inc., and Siemens — and of those companies only IBM, Xerox, Siemens, and Honeywell have any sizeable installed base. New products in this market include a 80 page/min laser printer from Siemens; the 68 page/min MP60 magnetic printer from CII Honeywell Bull, a French firm; and the Xerox 8700 at 70 page/min. Growth in this area has been restricted by the high purchase or lease prices which have limited their appeal to large DP centers that can cost-justify such capital investments. As it turns out, the number of such centers is limited, and consequently many observers feel that these machines are approaching a market saturation point.

Nonimpact page printing in the low- to medium-speed ranges may emerge from fledgling status this year to walk actually on its own in 1983. But it will only do so with the support that office automation equipment and systems manufacturers are now beginning to offer. The early front-runner in this market has been the Xerox 2700, a 12 page/min laser printer which is now offered by Wang, DEC, DG and others. Despite its excellent print quality, the 2700 may well be only a first-generation device due:

Computer Printer Applications by Technology

	IMPACT				NON-IMPACT		
Type	Serial, Dot Matrix	Serial Full Character	Line, Full Character	Line, Dot Matrix	Serial, Dot Matrix	Page, High Speed	Page Low-to-Med. Speed
Primary Applications	DP, PC SBC Output	WP	DP	DP	Low-Cost DP Output	DP	WP, DP
Secondary Applications	Graphics	PC, SBC Output	—	Bar Codes, Graphics	Portable Terminals	—	—
Emerging Applications	WP	—	—	Graphics, WP	WP, Color Graphics	In-House Publishing	WP, Typography Elec. Mail
AGR*	35%	25-30%	5-8%	10%	20%	3-5%	40%

SOURCE: DATEK INFORMATION SERVICES, INC. *Current Annual Growth Rate

to its cost: $27,000 to $30,000 in OEM configurations. Over the past two years literally dozens of electrophotographic page printers have been introduced, primarily by Japanese copier manufacturers, with potentially more attractive cost/performance ratios. Among the most promising to date are the Ricoh of America, Inc. LP212, a 12 page/min laser printer that is to be offered by CPT; and the Minolta SP50 which prints at 20 page/min with exceptional print quality and is priced around $19,000 to the end-user.

Non-impact Serial Printing: Moving Towards the Office. This printer category includes four distinct technologies: ink-jet, conventional thermal, thermal transfer and electrographic (or electrosensitive). At present, none of these have managed to transcend its application niche and move into mainstream use. A possible exception to this may be ink-jet which gave an encouraging performance in the IBM OS6 and 5520 systems. Approximately 15,000 of those machines were sold, but IBM is now discontinuing them and so far has offered no replacement. Otherwise, ink-jet has seen only moderate success in the color graphics field, but the proliferation of color graphics systems as well as new products from Diablo and Canon will undoubtedly help spur that market. At the same time, black-only ink-jet printing may get a [illegible]ide of the electronic-imaging con-

boost from the introduction of the Exxon 965 printer, which appeared in early 1983. The Exxon development made great efforts to address one of the technology's trickiest issues and probably one of the most widely held public perceptions of ink-jet technology's drawback — poor reliability due to ink problems such as clogging and drying.

Thermal printing has been, for some time, relegated to specialty areas — portable terminals, for example — largely on the basis of its objectionable paper and its low-level print quality. This is not to say that the technology has not been a successful one: TI has sold over 200,000 Silent 700s since their introduction. But two events have happened in the last two years that are destined to change thermal printing greatly. First, the birth of the extremely low-cost computer, such as the Timex Computer Corp. Sinclair, has created a tremendous demand for equally low-priced printers. Thermal printing fits the bill beautifully. Alphacom, Inc., manufacturers of 40 and 80 column thermal printers, announced in mid-1983 that it had signed a deal with Timex for $54 million worth of 40 column printers.

The second development was the sprouting of thermal transfer printing as an important technology. Before 1982, few people outference circuit had even heard of thermal transfer printing. But following the low-key introduction of a few high-priced color units in late 1982, suddenly Diablo was showing a six page/min thermal-transfer page printer priced at $5,000 and aimed squarely at the office environment. Since then, units have been fielded by Toshiba, Sanyo Business Systems Corp. and Fujitsu. Thermal devices are also being marketed by Gavilan Computer Corp. as part of its Mobile Computer Division and by Brother Industries, Inc. in a portable typewriter. The attributes of thermal transfer printing — quiet, reliable, inexpensive, high resolution and, most importantly, plain-paper printing — have evoked the rumbling of widespread approval of the technology as print technology of tomorrow. And it shows promise, too, since it actually seems to be the embodiment of the printer industry's historic direction — quieter, faster and cheaper. But then, the jury is still out.D

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Etch Marks The Spot

By Tim Scannell

New recording technologies will change the way in which information is stored. Vertical recording devices and optical disks will soon make inroads into DP shops. Major computer vendors are investing research dollars to aid in developing these new recording techniques

In the past few decades, computers have evolved from the multiroom-size behemoths that took months to program to the small palm-size machines that can perform elaborate calculations at speeds rivaling the human thought process. Unfortunately, like a younger sibling who is forever following in the footsteps of an older and more visible brother, peripherals — the devices that are to computers what the tires and body are to an automobile — have been relatively slow to evolve from their beginnings.

Magnetic disk and tape drives, which are the mainstays of the data processing industry, have been improved to operate at faster recording and playback speeds and boast substantial capacities, but they are still firmly rooted in a technology that was borrowed from the audio recording industry. While they sport a fancier package, they also consist of the same basic mechanisms common to a standard tape recorder — the drive, read/write heads and the capstan.

Things, however, are about to change. Nearly every

ILLUSTRATION BY DAVE SULLIVAN

major computer company in the U.S. — including such industry heavyweights as IBM , Hewlett Packard Co. and Digital Equipment Corp. — has devoted a substantial portion of their research and development dollars into finding new and more cost-effective means to store the data that is processed by the CPU. These include such things as microfloppy diskettes, vertical recording, bubble memories, high-capacity random-access memory chips, miniature Winchester-type hard disks, and digital laser-based optical disks

Some of the technology under development — such as vertical recording, which is actually an effort to teach an old magnetic dog new recording tricks — is aimed at stretching more mileage from traditional magnetic recording techniques. It does this by shifting the placement of the magnetic signals on a standard disk or tape to pack up to ten times more information. Other technologies — such as the use of optical or video disks — utilize new methods to keep data in its place.

The dynamics behind the current market for magnetic media are being fueled by vendors trying to commercialize new recording technologies. According to figures released by Venture Development Corp., sales of magnetic media are growing at a healthy annual rate of 30% and should reach more than $5 billion by 1987. However, the bulk of these numbers are based on the sales and use of standard magnetic tape, 5¼-in. floppy disks and hard Winchester-type disks. What the figures do not take into consideration is the possibility that new technologies will not only add fuel to the sales and usage fire, but could obsolete what is considered today to be the recording norm.

For instance, as new technologies, offering more capacity for less cost, barge into the recording market, the price of previous technologies plummets. At present, the current cost to store 1M byte of information on a standard floppy disk is about five dollars. However, such devices as the optical disk offer the same storage capability for about one dollar, making it a more attractive alternative to users with high storage needs.

Vendors can also pack more data onto a disk or tape without changing the physical size of the media. However, to do this they must adopt an entirely different method of magnetically stacking the information on the mylar surface to increase the density of the tracks. This is the theory behind vertical recording.

First proposed in 1975 by a professor of magnetics at Japan's Tohoku University, vertical recording involves arranging the magnetic particles of a recording vertically rather than horizontally on a disk's or tape's recording surface. With standard magnetic recording technology, the particles are arranged end-to-end to form a pattern recognizable to the recorder and replay mechanism. But, vertical recording turns these particles 90 degrees, standing them on their magnetic poles. The result is more room on the media's surface for more magnetic particles, theoretically allowing up to 20 times more space and a boost in capacity from 10K to 200K bits per inch.

Although the U.S.-based Vertimeg is the closest to offering a product based on vertical recording technology (it will reportedly soon offer a vertical recording disk drive that will cost $500 in quantity orders, with disks priced at about $25) and another American firm, Potter Instrument Company, Inc. is said to lead in the production of ferrite-type recording head technology which necessary to accommodate the different recording style, the Japanese seem to be ahead in the technology's research. Most of this research — which has been ongoing for about seven years is conducted at Japanese universities, funded by business and the government's Ministry of International Trade and Industry. By contrast, only one U.S. university, the University of Minnesota, is conducting any serious researeh into vertical recording. IBM has been investigating the technology for about five years, but is the only U.S computer firm that has the budget to devote substantial time and money into the project. However, other firms — Sperry Corp., Hewlett-Packard and Ibis Systems, Inc., in particular — have devoted some portion of their R&D budget to vertical recording.

One important detail that vertical recording technology has going for it is that, although it is an innovative technology, it is not an entirely revolutionary change from the user standpoint. While users of vertical recording will need new disk and tape units to accommodate the new media, the disks and tapes are not physically different from standard recording materials. Therefore, there will not be the initial hesitation users have to accept a new technology that looks physically different than something they have grown familiar with.

Also, just as vertical recording got its start in laboratories in Japan, most of the innovative products will come from that country. Although U.S. firms like Vertimeg, Sperry and IBM are adopting vertical techniques in their disk products, the Japanese have extended research into video-recording and audio-disk devices. As a result, consumers will see a wealth of vertical recording devices at the same time American business starts to use them in limited applications.

While many firms struggle to manipulate and enhance technologies familiar to DP, others seek to adapt distant relatives to business applications. One of the more popular adaptations — and one with a great deal of potential, particularly in the area of high-capacity archival storage — is the digital optical disk.

Optical disks resemble standard phonograph records except they are slightly thicker and sturdier and their surface has a metallic sheen. Information is recorded on

the disks by a laser that burns information onto the disks' surface, creating the necessary bits and bytes that are familiar to a computer's processing unit. Although a relatively new technology — it got its start some years ago in the form of video disks for home entertainment and only recently has been investigated by computer firms as a viable alternative to magnetic disk drives and micrographics storage — optical disks are already involved in a standards battle involving different types of disks and recording methods. Basically, there are three types of optical disks: capacitance electronic disks, which allow users to play back information by using a device that runs a stylus over grooves burned into the disk's surface, much like a phonograph record; optical-encoded disks, sometimes called laser disks; and video high-density disks. However, only one disk type, optical-encoded, offers benefits to DP because of its ihigh capacity. It is also the only type of disk that can be erased and rerecorded upon, as demonstated recently by a Japanese firm.

The most attractive feature of optical disks are their storage capabilities. The average optical disk can maintain up to 1G byte of information — approximately 500,000 pages of typewritten text. Most optical disks range in size from 10 to 12 inches, but Sony Corp. is reportedly readying the introduction of a 4.7-in. model that is capable of holding 635M bytes of data on one side. Philips Research has shown a 2-in. version that can not only store up to 10M bytes of data (or 5,000 pages of text), but offers erasability, which makes it a keen competitor to the floppy disk in the portable computer market.

There are a number of ways information is recorded into the surface of an optical disk. The most common is called the ablative technique which involves using a laser which blasts tiny holes into a thin metal film usually made from a tellurium alloy. The holes are read as bits of data. In another technique, the laser is used to blister the surface of the metal, raising tiny bumps. Although the disk is not "destroyed" by burning a hole or raising a bump, it cannot be rerecorded upon with new information.

The third recording method, and the most viable for anything other than archival storage needs, involves using the laser's pinpoint beam of heat to scorch the surface of the metal, changing its reflective properties. The laser can read these different reflective shades as bits of information. More importantly, the laser can be refocused on the disk to change the reflective properties again and again, ronto the disk's surface, a vast improvement over the ablative and blister techniques.

Matsushita Electric Industrial Co. was the first to introduce officially an erasable optical disk earlier this year at the National Computer Conference, in Anaheim, Calif. It is priced at approximately $100,000 for a full system or $30,000 for the recorder/playback mechanism alone. In addition to Matsushita, Sony also recently introduced an erasable disk in New York.

The most likely first uses of optical-disk systems will be to supplement rather than to replace standard data processing. For example, the city of Boston has just finished compiling a data and optical-disk system that allows people in the city's tax department to call up instantly both words and pictures regarding a taxpayer's residence. Because of the high storage capabilities of optical-disk systems and the prsent high cost of erasable devices, optical recording will have a heavy impact on historical and archival filing techniques. At the moment, micrographics is the leading archival storage technology, but optical disks seem to offer a more cost-effective alternative to this photographic-film-based method of long-term data storage.

One indication that optical disks are quickly moving into the archival storage area and are threatening to obsolete image techniques is that the National Micrographics Association earlier this year underwent both a change in name and philosophy. The group, now called The Association for Information and Image Management has broadened its view to recognize all forms of information storage, including the optical disk.

A number of things may hold up the erasable disk's ultimate entry into the business market. One is that old bugaboo, standards. At a standards meeting held in Washington, D.C., earlier this year, disk manufacturers could not even agree on the size of the spindle hole, let alone a recording format. Then there is the legal question, brought about by some manufacturers inadvertently or knowingly stepping on other vendors' developmental toes.

Shortly after its introduction, for example, Matsushita was issued a temporary restraining order, barring them from showing or discussing its erasable disk product in public. The reason for this was reportedly because some of the technology used in the disk — based on amorphous semiconductors — was copied from technology patented by a small firm in Troy, Mich., Energy Conversion Devices.

A few weeks later, at a press conference held in Japan, Msaid to have admitted adopting some of Energy Conversion Devices' techniques in its erasable optical disk design. However, according to at least one consultant in the area, the affair could serve to delay development of the erasable optical disk.□

Scannell is Technical Editor at Computerworld *newspaper.*

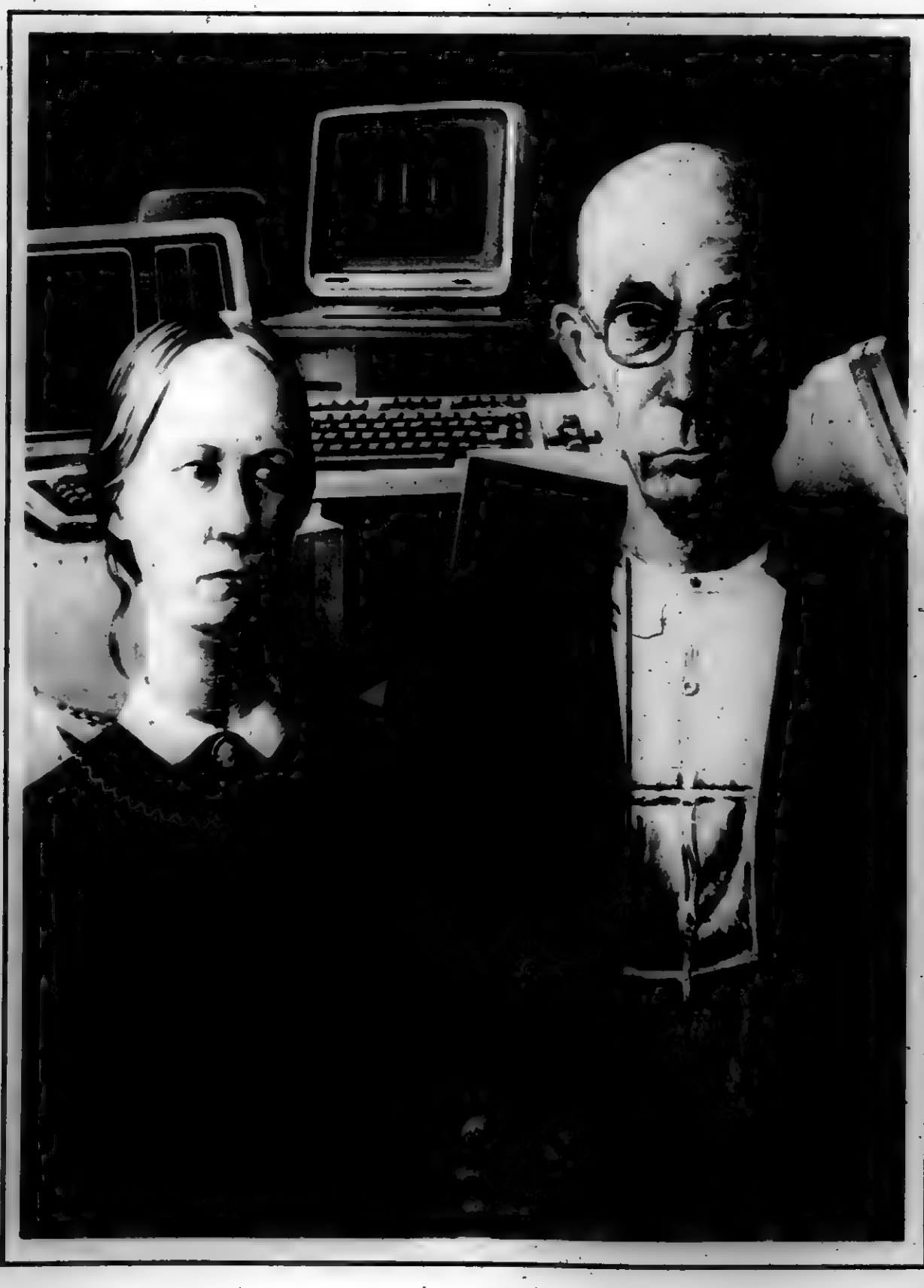

ILLUSTRATION BY MIKE MEYER

May We Help You?

By R.C. Lodie

For data processing managers and professionals used to working with mainframes and minicomputers, unfamiliarity with the microcomputer marketplace can present a two-fold purchasing challenge. First, buyers must be able to choose from an escalating number of peripherals and software now available because of an increase in microcomputer use. They must also be knowledgeable about the number and types of new distribution channels appearing in the marketplace.

The DP professional today is much more on his own to narrow the options and select a microcomputer system that fits his company's needs. No longer can he rely on a team of specialists to supply the appropriate stand-alone computers or networking systems, cost-effective printers, modems, plotters and other peripherals. Today's DP manager must be able to aggressively seek out the right dealer to help him select, install and make productive the company's microcomputer system.

Typically, a mainframe or minicomputer sale is made by a team of technical and sales specialists working directly for the computer manufacturer or for a large systems house. The team evaluates everything, including existing hardware and software and networking needs and suggests possible hardware and software support, financing and leasing alternatives.

When purchasing a microcomputer and its accompanying peripherals and software, on the other hand, the degree of support the DP professional gets depends largely on the type of vendor selected. There are several types to choose from, including manufacturers themselves, office supply dealers, storefronts within large corporations, retail dealers and value-added dealers — or systems integrators as they are sometimes called.

A manufacturer already servicing an account will add microcomputers to his line of products and continue to call on the DP or management information systems manager. Benefits of this type of vendor are his computer expertise and his knowledge of the company's business and compatibility between existing high-end systems and a line of microcomputer systems.

The strength of office supply dealers is their knowledge of the office environment. An extra demand is placed upon the buyer, however, because he must thoroughly investigate the technical expertise of the salesmen, the maintenance programs offered and the counseling capabilities of this group. Office suppliers typically have an outside sales force and DP professionals should expect to receive sales calls from these vendors.

One of the newest types of outlets that has yet to see widespread acceptance is the company store, which is usually located on the premises of large corporations. The store stocks microcomputer products approved by that company and employs personnel to demonstrate systems, answer application questions and service installations. Benefits of this type of outlet are convenience, the availability of technical expertise and, in some cases, better prices due to volume purchasing or the fact that the corporation does not have to show a profit for the store.

A fourth type of dealer, computer retailers, best serves customers who are computer experts. Traditionally, retail outlets provide a se-

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lection of microcomputer systems, peripherals and software and are staffed by personnel whose technical expertise may be quite limited. A minimum of customer interface and training is available. Although large dollar volume sales are initiated and directed by retail outlets, this type of vendor takes more of a do-it-yourself approach than value-added dealers.

Value-added dealers, or systems integrators, offer a full range of services, including help with requirements analysis and cost justification; proposed financing alternatives; the selection and installation of hardware and software, training, on-going system maintenance and software support. Many principals of value-added dealerships have come out of a solid computer sales and systems analysis background, or out of involvement in a particular industry.

People leaving an industry to open their own businesses will often sell software programs they've developed for specific vertical markets. Buyers who deal with the smaller value-added dealerships sometimes have access to a greater percentage of the principal's time than those who deal with large dealerships. In either case, for equipment purchases of over a thousand dollars, the recommended first step is finding a value-added dealer who knows your area of business.

Although products from value-added dealers may initially cost slightly more, the serious purchaser should not confuse price with cost. In the long run, working with a vendor who can put together a system that meets your short and long term needs, and who will provide on-going maintenance and counsel, is preferable to buying less expensive equipment that is incompatible or quickly outdated. Value-added dealers usually extend the above mentioned services as part of their business practice.

Personal referral is one of the best methods for locating the right dealer. You probably already know someone in your professional circle or within your own company who can make an objective dealer recommendation. Articles and publicity in trade and professional journals are another source of dealer leads.

When you have compiled a list of a few potential dealers, call each one and ask for references, then talk to the customers before deciding on a dealer. You may want to make an appointment to personally visit the references that are using computer systems for applications similar to yours.

When you contact each of the customers, be prepared to ask specific questions:

Did the dealer sell a system that meets the customer's needs, or was he trying to move equipment? Did he spend time discussing and trying to understand the buyer's needs before offering a solution? Did he help clarify the customer's needs? Did he take a personal interest in the purchase and understand the intended applications?

Besides having the ability to listen to an analysis of your company's needs, a good dealer will adopt the ethical approach of not trying to sell equipment that is not needed. He will also have enough experience in customizing computer systems to recognize hidden needs in your situation or to suggest additional peripherals. He knows that extra time and effort spent up front investigating the situation and laying out short and long range plans will more than repay the buyer in the long run.

Other questions you should ask the customer are:

Was the dealer there at the time of installation? Did the customer receive adequate training? Does the dealer have a well-trained and professional staff to provide on-going support? What kind of follow-up and maintenance does the dealer provide and how promptly does he follow through?

Since it's the dealer, not the buyer, who is most familiar with the equipment, a good vendor will take responsibility for overseeing the correct installation of the equipment and making it productive. Bringing company personnel up to speed on how to operate the system is another task that efficient dealers consider to be part of the sale. Ideally, the value-added dealer will employ personnel with strong backgrounds relating to either the technical or applications side of the equipment. A short mean time between repair is important and availability of the dealership's technical support team should be discussed before a purchase is made.

Since it is the dealer, not the buyer, who is most familiar with the equipment, a good vendor will take responsibility for overseeing the correct installation of the equipment and making it productive. Ideally, the value-added dealer will employ personnel with strong backgrounds relating to either the technical or applications side of the equipment.

Another important question to ask the customer referred by the value-added dealer is whether the system does what the vendor said it would. Before a purchase is made, an exact analysis of business needs and what the proposed system can do should be drawn up. After installation, a comparison of functions the on-line system is performing should be made with the original analysis. Keep the dealer apprised of any discrepancies or failures within the system. A good value-added dealer will be responsive to your requests.

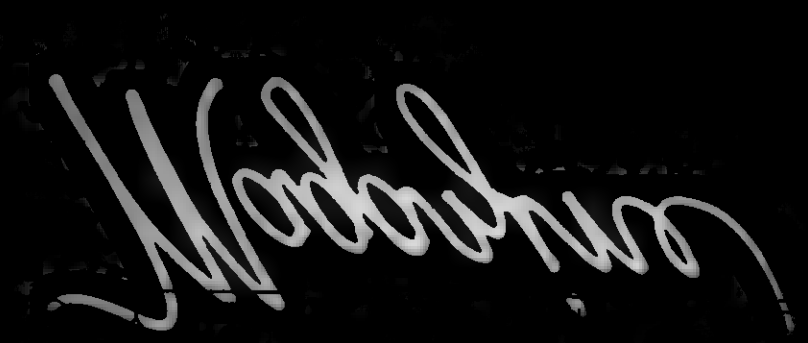
Finally, ask if the manufacturer provides access to a national maintenance organization such as TRW, Inc. If not, find out if the dealer has an adequate, reputable, well staffed service department for on-going maintenance of equipment.

Your next step is to visit those dealers that have earned high marks from their customers. Describe your business activities and discuss your system requirements in depth. The best dealer will demonstrate an interest in and an understanding of your specific needs. He will suggest additional ways a computer system can be used to your advantage, such as the initial purchase of a few terminals that can then be networked as your company expands, or peripherals with flexible capabilities that can be shared.

It is also important that your dealer be familiar with available software, and as mentioned, many value-added dealers have developed software packages for very specific markets. They can customize computer hardware and software to your own specifications within those markets. Typically, a dealer offers three kinds of software: packages compatible with a specific computer and supplied by the manufacturer; compatible software developed by a third party but sold through the dealer; and software developed by the dealer. Markets covered by individual vendors vary with the size of their outlets and customer bases but smaller value-added dealers tend to specialize in one to three vertical markets.

To summarize, carefully assess your business and application needs. Use all the procedures described above to help you find a dealer in whom you have confidence and with whom you can build a long-term relationship. He should be able to add value in terms of requirements analysis, software, training, and support. Then work closely with your chosen dealer to select a system that provides business solutions for today and can be expanded to meet your future requirements.□

Lodie is director of the national accounts program at Vector Graphic, Inc. located in Thousand Oaks, California



VENDOR PROFILES

AB DICK CO.
Videojet Systems Division
2200 Arthur Ave
Elk Grove Village, IL 60007
(312) 593-8800
Major Market: Peripheral Manufacturing
Contacts:
Head of Marketing: Ronald Peterson
Head of Engineering: James Stone
Geographic Coverage: International
Year Established: 1972
Number of Employees: 280

AB DICK CO.
Office Products Division
5700 W Touhy Ave
Chicago, IL 60648
(312) 647-8800
Major Market: Component, Computer, Terminal, Peripheral and Office Equipment Manufacturing, OEM (Computer Systems); Software House, Maintenance/Other Services, Miscellaneous Computer Supplies
Target Industries: Education, Government, Legal
Target Applications: Integrated Office Systems; OA
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing: Clayton Sokley
Geographic Coverage: International
Year Established: 1884

ABLE COMPUTER
1732 Reynolds Ave
Irvine, CA 92714
(714) 979-7030
Major Market: Peripheral and Communications Equipment Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Bob Jones
Geographic Coverage: International
Year Established: 1975
Number of Employees: 160

ACC
228 E. Coat St
Santa Barbara, CA 93101
(805) 963-8801
Major Market: Component, Computer and Communications Equipment Manufacturing, Software House; Systems House (Commercial OEM)
Target Industries: Manufacturing; Engineering, R&D, Government
Target Applications: Networking; Interfacing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: David Lawton
Head of Engineering: Ed Fash
Head of Customer Service: Bob Crane
Geographic Coverage: National
Year Established: 1975
Number of Employees: 110

ACTION COMPUTER, INC.
430 N. Halstead St.
Pasadena, CA 91105
(213) 351-5451
Major Market: Computer Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Herb Siegel
Head of Engineering: Kwok Ong
Geographic Coverage: International
Year Established: 1979
Number of Employees: 40

ADAPTEC, INC.
1625 McCarthy Blvd
Milpitas, CA 95035
(408) 946-8600
Major Market: Component Manufacturing
Contacts:
Head of Marketing: Don Rector
Head of Software: P. Breiden
Head of Engineering: Bernie Nieman
Head of Customer Service: Wayne Higashi
Geographic Coverage: International
Year Established: 1981
Number of Employees: 22

ADAPTIVE DATA & ENERGY SYSTEMS
2627 Pomona Blvd
Pomona, CA 91768
(714) 594-5856
Major Market: Component Manufacturing
Target Industries: OEM; Systems Integrators
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Richard Oldnixon
Head of Engineering: William Horton
Geographic Coverage: International
Year Established: 1980
Number of Employees: 20

ADDMASTER CORP.
P.O. Box 387
San Gabriel, CA 917780387
(213) 285-1121
Target Industries: Banking; Retail, Engineering, Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Lou Doshay
Head of Sales: Larry Wirtz
Geographic Coverage: International
Year Established: 1956
Number of Employees: 200

ADVANCED COLOR TECHNOLOGY, INC.
21 Alpha Road
Chelmsford, MA 01824
(617) 256-1222
Major Market: Peripheral Manufacturing
Target Industries: Business Graphics
Contacts:
Head of Sales: Jack Flynn
Head of Engineering: Dennis Buckley
Geographic Coverage: International
Year Established: 1980
Number of Employees: 50

ADVANCED DIGITAL CORP.
12700-B Knott St.
Garden Grove, CA 92641
(714) 891-4004
Major Market: Computer Manufacturing
Target Industries: OEM; Distributors
Geographic Coverage: International
Year Established: 1980
Number of Employees: 35

ADVANCED DIGITAL TECHNOLOGY
696 E. Trimble Road
San Jose, CA 95131
(408) 946-0503
Major Market: Computer and Peripheral Manufacturing
Target Industries: OEM; Computer Manufacturing
Net Sales: $1 Million — $5 Million (1982)
Geographic Coverage: International
Year Established: 1976
Number of Employees: 19

ADVANCED ELECTRONICS DESIGN, INC.
440 Potrero
Sunnyvale, CA 94086
(408) 733-3555
Major Market: Component Manufacturing, Terminal Manufacturing; OEM (Computer Systems)
Target Industries: DEC
Target Applications: CAD
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing/Sales: Stan Coffee
Head of Engineering: Francs Siv
Geographic Coverage: International
Year Established: 1970
Number of Employees: 200

ADVANCED LOGIC SYSTEMS, INC.
1195 E. Argues Ave.
Sunnyvale, CA 94086
(408) 730-0306
Major Market: Component Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Robert Ackerman
Head of Engineering: Charles Maurow
Geographic Coverage: International
Year Established: 1980
Number of Employees: 25

ADVANCED MICRO DEVICES, INC.
901 Thompson Place
Sunnyvale, CA 94086
(800) 538-8450
Major Market: Component Manufacturing; Dealer/Distributor
Contacts:
Head of Marketing: Ben Anixter
Head of Sales: Steven Zalenski
Head of Engineering: John East
Geographic Coverage: International
Year Established: 1971
Number of Employees: 10,000

AEROCOMP, INC.
Redbird Airport
Building 8
P.O. Box 24829
Dallas, TX 75224
(214) 337-4346
Major Market: Component and Peripheral Manufacturing
Target Industries: Microcomputer Users
Contacts:
Head of Marketing: John Lanclone
Geographic Coverage: International
Year Established: 1979
Number of Employees: 15

AGILE CORP.
25 E. Trimble Road
San Jose, CA 95131
(408) 946-7576
Major Market: Component, Terminal, Peripheral, and Communications Equipment Manufacturing; Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1981)
Geographic Coverage: International
Year Established: 1977
Number of Employees: 15

A.I.C.S., INC.
P.O. Box 4691
University Park, NM 88003
(505) 526-6842
Target Industries: Engineering; Scientific
Target Applications: WP
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Engineering: Dr. Wirt Atmar
Geographic Coverage: International
Year Established: 1976
Number of Employees: 25

ALETEL, INC.
8716 Production Ave.
San Diego, CA 92121
(619) 578-0660
Major Market: Computer Manufacturing, OEM (Peripherals/Terminals); Software House
Target Applications: General Business, Software Development
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Lovell C. Chase III
Head of Software: William Allen
Geographic Coverage: International
Year Established: 1979
Number of Employees: 10

ALGO, INC.
9451 Sohap Lane
Columbia, MD 21045
(301) 730-7442
Major Market: Peripheral Manufacturing
Target Industries: Telephone; Banking; OEM
Target Applications: Data Logging
Contacts:
Head of Marketing/Sales: C.W. Alexander
Head of Software/Engineering: Thomas Grescok
Geographic Coverage: International
Year Established: 1980
Number of Employees: 20

ALLOY COMPUTER PRODUCTS
Alloy Computer Products Division
100 Pennsylvania Ave.
Framingham, MA 01701
(617) 875-6100
Major Market: Peripheral Manufacturing
Contacts:
Head of Marketing: Nigel R. Spicer
Head of Engineering: Ronald Richards
Geographic Coverage: International
Year Established: 1979
Number of Employees: 40

ALPHACOM, INC.
2323 S. Bascom Ave.
Campbell, CA 95008
(408) 559-8000
Major Market: Peripheral

Vendors

Manufacturing, OEM (Peripherals, Terminals)
Target Industries: Electronic Instrument
Target Applications: Medical, OEM, Retail, Portable Terminals
Net Sales: $5 Million — $25 Million (1982)
Geographic Coverage: International
Year Established: 1979
Number of Employees: 25

ALPHA DATA, INC.
20750 Manila St
Chatsworth, CA 91311
(213) 882-6500
Major Market: Peripheral Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: L.T. Lincoln
Head of Sales: Rudi Krajovic
Geographic Coverage: International
Year Established: 1968
Number of Employees: 112

ALPHA MERICS CORP.
20931 Nordhoff St
Chatsworth, CA 91311
(213) 709-1155
Major Market: Peripheral Manufacturing
Target Industries: Engineering, Manufacturing
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing/Sales: Geoffrey Groom
Head of Engineering: Phil Mobley
Head of Customer Service: John Long
Geographic Coverage: International
Year Established: 1979
Number of Employees: 50

ALPHA MICRO
17332 Von Karman
Irvine, CA 92714
(714) 957-8500
Major Market: Computer Manufacturing
Net Sales: $25 Million — $100 Million (1982)
Contacts:
Head of Marketing: Richard Oliva
Head of Sales: Barry Dearborn
Head of Engineering, John Glade
Geographic Coverage: International
Year Established: 1977
Number of Employees: 280

ALS CORP.
Infotek Systems Division
1400 N. Baxter St.
Anaheim, CA 92806
(714) 956-9300
Major Market: Peripheral Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Botheo Stevens
Geographic Coverage: International
Year Established: 1976
Number of Employees: 250

ALTEK CORP.
2150 Industrial Pkwy.
Silver Spring, MD 20904
(301) 622-3906
Major Market: Peripheral Manufacturing; OEM (Computer Systems)
Target Industries: Manufacturing, Engineering
Target Applications: Graphics Mapping, CAD/CAM
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing/Sales: Lowell Nerenberg
Geographic Coverage: International
Year Established: 1970
Number of Employees: 45

ALTOS COMPUTER SYSTEMS
2641 Orchard Park Way
San Jose, CA 95134
(408) 946-6700
Major Market: Computer Manufacturing
Target Industries: OEM, Distributors, CAD
Target Applications: General Business
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing: Robert Bozeman
Geographic Coverage: International
Year Established: 1977
Number of Employees: 500

AMCODYNE, INC.
1301 S. Sunset St.
Longmont, CO 80501
(303) 772-2601
Major Market: Peripheral Manufacturing
Target Industries: OEM
Contacts:
Head of Marketing/Sales: William T. Chambers
Head of Engineering: Dave Cordano
Geographic Coverage: International
Year Established: 1981
Number of Employees: 135

AMDAHL CORP.
1250 E. Arques Ave
P.O. Box 470
Sunnyvale, CA 94086
(408) 746-7116
Major Market: Component, Computer, Peripheral, Communications Equipment Manufacturing; OEM (Computer Systems); Software House, Dealer/Distributor; Maintenance/Other Services
Target Applications: Project Productivity
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: William F. O'Connell
Head of Software: Fredrick M. Trapnell Jr.
Head of Engineering: Bruce O'Beebe
Geographic Coverage: International
Year Established: 1970
Number of Employees: 5,300

AMDEK
2201 Lively Blvd.
Elk Grove Village, IL 60007
(312) 364-1160
Major Market: Peripheral Manufacturing, Maintenance/Other Services; Miscellaneous Computer Supplies
Contacts:
Head of Sales: J. Daniel Rimes
Geographic Coverage: National
Year Established: 1977
Number of Employees: 22

AM ELECTRONICS
2809 Boardwalk
Ann Arbor, MI 48104
(313) 996-1956
Major Market: Peripheral Manufacturing, Dealer/Distributor
Geographic Coverage: International
Year Established: 1975
Number of Employees: 8

AMERICAN COMMUNICATIONS CORP.
180 Roberts St.
East Hartford, CT 06108
(203) 289-3491
Major Market: Terminal Manufacturing
Target Industries: Phone Companies
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Marketing: T. Dunn
Geographic Coverage: National
Year Established: 1978
Number of Employees: 20

AMERICAN COMPUTER HARDWARE CORP.
2005 S. Wright St.
Santa Ana, CA 92705
(714) 549-2688
Major Market: Component and Peripheral Manufacturing, Dealer/Distributor, Maintenance/Other Services
Target Industries: Wholesale, Retail
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: E. St. Amour
Head of Software: B.D. Faw
Geographic Coverage: International
Year Established: 1979
Number of Employees: 23

AMERICAN DATACOM
16931 Milliken Ave.
Irvine, CA 92714
(714) 863-3000
Major Market: Terminal Manufacturing
Contacts:
Head of Marketing: Bobbi Haaenan
Head of Engineering: William Prast
Geographic Coverage: National
Year Established: 1973
Number of Employees: 20

AMF GEO SPACE CORP.
5803 Glenmont
Houston, TX 77081
(713) 666-1611
Major Market: Peripheral Manufacturing; OEM (Computer Systems)
Target Industries: Seismic
Target Applications: Graphics; Landsat
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Paul Hackey
Head of Sales: Christopher Smith
Head of Software: Dwight Walker
Head of Engineering: Tawassul Khan
Head of Customer Service: Norber Pietsch
Geographic Coverage: International
Year Established: 1957
Number of Employees: 350

AMF LOGIC SCIENCES, INC.
Suite 100
10535 Rockley Road
Houston, TX 77099
(713) 879-0536
Major Market: Computer Manufacturing, OEM (Computer Systems)
Target Industries: Oil Exploration
Target Applications: Displays
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing/Sales: Roger Fuller
Head of Software/Engineering: John Barugh
Head of Customer Service: Jim Nipper
Geographic Coverage: International
Year Established: 1973
Number of Employees: 35

AM INTERNATIONAL, INC.
Varityper Division
11 Mount Pleasant Ave.
East Hanover, NJ 07936
(201) 887-8000
Major Market: Computer, Terminal and Peripheral Manufacturing
Target Industries: Publishing, Printing
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: Richard Flanagan
Head of Sales: Richard Schwobel
Geographic Coverage: International
Year Established: 1956
Number of Employees: 2,000

AMLYN CORP.
2450 Autumnvale Drive
San Jose, CA 95131
(408) 946-8616
Major Market: Peripheral Manufacturing
Target Industries: OEM
Contacts:
Head of Marketing: Robert Oakley
Head of Engineering: Michael Wong
Head of Customer Service: Dennis Svancorek
Geographic Coverage: International
Year Established: 1980
Number of Employees: 85

AMPAR BUSINESS SYSTEMS, INC.
2640 Walnut
Tustin, CA 92680
(714) 731-4217
Major Market: Component Manufacturing; OEM (Peripherals-Terminals)
Target Industries: IBM
Geographic Coverage: National
Year Established: 1980
Number of Employees: 8

AMPERIF
21345 Lassen St.
Chatsworth, CA 91311
(213) 998-7666
Major Market: Peripheral Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Neil Lynch
Geographic Coverage: International
Year Established: 1971
Number of Employees: 100

AMPEX CORP.
Memory Products Division
200 N. Nash St.
El Segundo, CA 90245

Major Market: Peripheral Manufacturing
Target Industries: OEM
Contacts:
Head of Marketing: Ken C. Jones
Geographic Coverage: International
Year Established: 1959
Number of Employees: 2,000

ANACOM GENERAL CORP.
1116 E. Valencia Drive
Fullerton, CA 92681
(714) 992-0223
Major Market: Peripheral Manufacturing
Contacts:
Head of Marketing: William A. Hines Jr.
Head of Engineering: Christopher Kirk
Geographic Coverage: International
Year Established: 1970
Number of Employees: 30

ANACONDA-ERICSSON, INC.
Communications Division
7465 Lampson
Garden Grove, CA 92641
(714) 635-0150
Major Markets: OEM (Computer Systems)
Target Industries: Banking; Business
Contacts:
Head of Marketing: E.T. Stephens
Head of Sales: Bengt Paulsson
Geographic Coverage: National
Year Established: 1980
Number of Employees: 1,000

ANADEX, INC.
9825 De Soto Ave.
Chatsworth, CA 91311
(213) 998-8010
Major Market: Peripheral Manufacturing
Net Sales: $25 Million — $100 Million (1983)
Contacts:
Head of Marketing: K.A. Mathews
Head of Sales: J.W. Knox
Geographic Coverage: International
Year Established: 1957
Number of Employees: 400

ANALOG & DIGITAL PERIPHERALS
815 Diana Drive
Troy, OH 45373
(513) 339-2241
Major Market: Peripherals Manufacturing; OEM (Computer Systems); Dealer/Distributor
Target Industries: OEM
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Lyle Kuebler
Head of Engineering: Don Millican
Geographic Coverage: International
Year Established: 1978
Number of Employees: 25

ANALOG PRECISION, INC.
1620 N. Park Ave.
Tucson, AZ 85719
(602) 622-1344
Major Market: Component Manufacturing, OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Manufacturing; Wholesale
Target Applications: Process Control
Net Sales: $100,000 — $500,000 (1981)
Geographic Coverage: National
Year Established: 1976
Number of Employees: 11

ANATRON, INC.
Aegis Systems
202 W. Bennett St.
Saline, MI 48176
(313) 429-2678
Major Market: Peripheral and Communications Equipment Manufacturing; Dealer/Distributor
Contacts:
Head of Marketing: Alfred W. Riley
Geographic Coverage: International
Year Established: 1981
Number of Employees: 8

ANDERSON JACOBSON, INC.
521 Charcot Ave.
San Jose, CA 95131
(408) 263-8520
Major Market: Terminal, Peripheral and Communications Equipment Manufacturing; Voice Data Systems Managers
Contacts:
Head of Marketing: Mr. Delong
Geographic Coverage: International
Year Established: 1967
Number of Employees: 850

ANDROMEDA SYSTEMS, INC.
9000 Eton Ave.
Canoga Park, CA 91304
(213) 709-7600
Major Market: Component, Computer and Terminal Manufacturing; Software House, Systems House (Commercial OEM)
Target Industries: Scientific
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Les Lazar
Geographic Coverage: International
Year Established: 1977
Number of Employees: 25

ANN ARBOR TERMINALS, INC.
6175 Jackson Road
Ann Arbor, MI 48103
(313) 663-8000
Major Market: Terminal Manufacturing
Target Industries: Education; Manufacturing
Target Applications: Small Business Systems; Inventory Control; WP; MRP
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing: Gary DeLuca
Head of Customer Service: Mary Schmidt
Geographic Coverage: International
Year Established: 1979
Number of Employees: 60

APPARAT, INC.
4401 S. Tamarac Pkwy.
Denver, CO 80237
(303) 741-1778
Major Market: Component and Peripheral Manufacturing; Software House, Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: General Business
Target Applications: Data Base
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing/Sales: Lois Lauletta
Head of Software: Jason Matthews
Head of Engineering: Billy Roach
Head of Customer Service: Roosevelt Wilson
Geographic Coverage: International
Year Established: 1978
Number of Employees: 35

APPLE COMPUTER, INC.
20525 Mariani Ave.
Cupertino, CA 95014
(408) 996-1010
Major Market: Computer, Terminal and Peripheral Manufacturing; OEM (Computer Systems)
Target Industries: General Business
Target Applications: General Business; Personal; Entertainment
Net Sales: More than $100 Million (1982)
Contacts:
Head of Sales: Gene Carter
Geographic Coverage: International
Year Established: 1976
Number of Employees: 3,500

APPLIED DIGITAL DATA SYSTEMS, INC. (ADDS)
100 Marcus Blvd.
Hauppauge, NY 11787
(516) 231-5400
Major Market: Computer and Terminal Manufacturing
Contacts:
Head of Marketing: Joe Maronna
Head of Customer Service: John Witherow
Geographic Coverage:
Year Established: 1969
Number of Employees: 900

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Denver.....(303) 694-1662
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San Diego.....(619) 268-1201
Sunnyvale.....(408) 773-9990

APPLIED DYNAMICS INTERNATIONAL
3800 Stone School Road
Ann Arbor, MI 48104
(313) 973-1300
Major Market: Component and Computer Manufacturing
Target Industries: Aerospace; Energy; Automobile
Target Applications: Simulation Systems; Transmission Design
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Edward Fadden
Head of Customer Service: Donald Chandler
Geographic Coverage: International
Year Established: 1955
Number of Employees: 83

APPLIED PERIPHERAL SYSTEMS
[illegible] E. Brokaw Road
San Jose, CA 95112
(408) 995-6700
Major Market: Peripheral Manufacturing
Target Industries: OEM
Geographic Coverage: International
Year Established: 1978
Number of Employees: 80

APPLIED SYSTEMS CORP.
26401 Harper
St. Clair Shores, MI 48081
(313) 779-8700
Major Market: Component and Computer Manufacturing; OEM (Computer Systems)
Geographic Coverage: Regional
Year Established: 1965
Number of Employees: 15

APPLIED TECHNOLOGY [illegible], INC. (ATVINC)
2921 S. Dernier St.
Santa Anna, CA 92705
(714) 546-3551
Major Market: Computer Manufacturing, Systems House (Commercial OEM)
Target Industries: Hospitality; Office Information
Contacts:
Head of Customer Service: Phil Gomez
Geographic Coverage: International
Year Established: 1979
Number of Employees: 650

APSTEK, INC.
Suite 336
2636 Walnut Hill Lane
Dallas, TX
(214) 357-5266

Vendors

Major Market: Peripheral Manufacturing
Target Applications: Micro Users
Contacts:
Head of Marketing: David Rowe
Geographic Coverage: National
Year Established: 1982
Number of Employees: 4

ARCHIVE CORP.
3540 Cadillac Ave.
Costa Mesa, CA 92626
(714) 641-0279
Major Market: Peripheral Manufacturing
Target Industries: OEM
Contacts:
Head of Marketing: Tom Makmann
Geographic Coverage: International
Year Established: 1980
Number of Employees: 100

ARDENT COMPUTER PRODUCTS, INC.
145 Palisades St.
Dobbs Ferry, NY 10522
(914) 693-6500
Major Market: Component and Computer Manufacturing; Miscellaneous Computer Supplies
Target Industries: OEM
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Gilbert Heim
Geographic Coverage: National
Year Established: 1980
Number of Employees: 50

ARISTO GRAPHIC CORP.
6 Emery Ave.
Randolph, NJ 07869
(201) 366-7000
Major Market: Component, Computer and Communications Equipment Manufacturing; OEM (Computer Systems)
Target Industries: Microwave
Geographic Coverage: National
Year Established: 1971
Number of Employees: 10

ARTEC ELECTRONICS
605 Old Country Road
San Carlos, CA 95050
(415) 592-2740
Major Market: Component and Computer Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Geographic Coverage: International
Year Established: 1972
Number of Employees: 25

ARTS COMPUTER PRODUCTS, INC.
Suite 1200
80 Boylston St.
Boston, MA 02116
(617) 482-6340
Major Market: Component and Terminal Manufacturing; OEM (Computer Systems); Software House; Systems House (Commercial OEM)
Target Industries: Education; Small Business
Target Applications: WP
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Alane Gartner
Geographic Coverage: National
Year Established: 1977
Number of Employees: 58

AST RESEARCH, INC.
2372 Morse Ave.
Irvine, CA 92714
(714) 540-1333
Major Market: Peripheral and Communications Equipment Manufacturing
Target Industries: Banking, Communications; OA; IBM Personal Computer Users
Contacts:
Head of Marketing: Tom Yuen
Head of Engineering: Albert Wong
Geographic Coverage: International
Year Established: 1980
Number of Employees: 34

ASTRONAUTICS CORP. Of AMERICA
4115 N. Teutonia Ave.
P.O. Box 523
Milwaukee, WI 53201
(414) 447-8200
Major Market: Component, Computer, Terminal and Peripheral Manufacturing
Target Industries: Aerospace; Military
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing: R.D. Seinfeld
Geographic Coverage: International
Year Established: 1959
Number of Employees: 1,300

ATARI, INC.
1265 Borregas Ave.
P.O. Box 427
Sunnyvale, CA 94086
(408) 745-2000
Major Market: Computer Manufacturing; OEM (Computer Systems); Software House
Target Industries: Personal Computer; Education
Target Applications: Educational; General Business; Games
Contacts:
Head of Marketing: Tom McDonough
Head of Engineering: M.E. Hoff Jr.
Geographic Coverage: International
Year Established: 1972
Number of Employees: 10,000

ATES, INC.
32 Wiggins Ave.
Bedford, MA 01730
(617) 275-8300
Major Market: Terminal and Peripheral Manufacturing; OEM (Computer Systems); Manufacturing Special Systems
Target Industries: Printing; In-Plant Printing; Publishing
Target Applications: Text Editing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Roy Cundiff
Head of Sales: Ed Easley
Geographic Coverage: International
Year Established: 1968
Number of Employees: 1,000

ATHENAEUM TECHNOLOGY, INC.
105 Baystate Drive
Braintree, MA 02184
(617) 848-6388
Major Market: Peripheral Manufacturing
Contacts:
Head of Marketing: Jean-Paul Garodel
Geographic Coverage: International
Year Established: 1982
Number of Employees: 12

AUTECH CORP.
1301 W. Copans Road
Pompano Beach, FL 33064
(305) 979-2700
Major Market: Computer, Terminal and Peripheral Manufacturing; Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Marvin L. Bunn
Head of Sales: Richard H. Caro
Geographic Coverage: International
Year Established: 1968
Number of Employees: 75

AUTOMATIC FUNDS TRANSFER SERVICES, INC.
2040 Westlake N. 313
Seattle, WA 98109
(206) 285-5658
Major Market: Peripheral Manufacturing
Target Industries: Banking
Geographic Coverage: International
Year Established: 1971
Number of Employees: 10

AVIV CORP.
26 Cummings Park
Woburn, MA 01801
(617) 933-1165
Major Market: Component Manufacturing
Geographic Coverage: National
Year Established: 1976
Number of Employees: 25

AXIOM CORP.
1014 Griswold Ave.
San Fernando, CA 91340
(213) 365-9521
Major Market: Peripheral Manufacturing
Target Industries: Instrumentation; Medical; Microcomputer
Target Applications: Hard Copy; Scanning; Data Logging
Contacts:
Head of Marketing: Simon Harrison
Head of Sales: Doug Wilson
Geographic Coverage: International
Year Established: 1973
Number of Employees: 50

AXLON, INC.
70 Daggett Drive
San Jose, CA 95134
(408) 945-0500
Major Market: Terminal and Peripheral Manufacturing
Contacts:
Head of Marketing/Sales: Don Mandell
Geographic Coverage: International
Year Established: 1980
Number of Employees: 45

AZURDATA, INC.
4102 148th Ave. N.E.
Redmond, WA 98052
(206) 881-8180
Major Market: Computer and Terminal Manufacturing; Software House
Target Industries: Food; Drug
Target Applications: Order Entry; Rate Accounting; Third-Party Billing; Inventory
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Ray Dawson
Geographic Coverage: National
Year Established: 1972
Number of Employees: 180

BALL CORP.
P.O. Box 589
Broomfield, CO 80020
(303) 457-5260
Major Market: Component Manufacturing, Dealer/Distributor
Target Industries: Banking; Retail; Telephone
Contacts:
Head of Marketing: Jurgen Mammitzsch
Head of Sales: Dick Searle
Head of Engineering: Frank DeVall
Head of Customer Service: Michelle Galema
Geographic Coverage: International
Year Established: 1975
Number of Employees: 125

BALL CORP.
Electronic Systems Division
9300 W. 108th Circle
P.O. Box 589
Broomfield, CO 80030
(303) 457-5298
Major Market: Peripheral Manufacturing
Target Industries: Communications; OEM; Systems Houses
Geographic Coverage: International
Year Established: 1974
Number of Employees: 480

BASF SYSTEMS CORP.
Crosby Drive
Bedford, MA 01730
(617) 271-4000
Major Markets: Peripheral Manufacturing; Miscellaneous Computer Supplies
Contacts:
Head of Sales: John J. Nealon
Geographic Coverage: National
Year Established: 1961
Number of Employees: 1,100

BBN COMPUTER CORP.
33 Moulton
Cambridge, MA 02238
(617) 497-3053
Major Market: Computer and Terminal Manufacturing
Target Industries: Defense; Government; Federal Agencies; Large Corporations
Target Applications: OA; Data Control
Contacts:
Head of Marketing: Charles Stein
Head of Sales: Terry Fagin
Geographic Coverage: International
Year Established: 1978
Number of Employees: 440

BDS CORP.
1120 Crane St.
Menlo Park, CA 94025
(415) 326-2113
Major Market: OEM (Peripheral Terminals)
Year Established: 1975
Number of Employees: 36

BEDFORD COMPUTER CORP.
Terrell Hill Road
Bedford, NH 03102
(603) 668-3400

Major Market: Terminal Manufacturing; OEM (Computer Systems)
Target Industries: Fortune 500; [illegible], Insurance
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Dennis Avila
Head of Sales: Michael Shook
Geographic Coverage: International
Year Established: 1977
Number of Employees: 200

BEEHIVE INTERNATIONAL
4910 Amelia Earhart Drive
Salt Lake City, UT 84125
(801) 355-6000
Major Market: Component and Terminal Manufacturing
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Sales: John McClone
Head of Engineering: Carl Lee
Geographic Coverage: International
Year Established: 1968
Number of Employees: 450

BENSON, INC.
2690 Orchid Pkwy.
San Jose, CA 95152
(408) 945-1000
Major Market: Peripheral Manufacturing
Target Applications: Seismic; CAD/CAM
Contacts:
Head of Marketing: Alexander A. Salottolo
Head of Sales: Larry Maguire
Head of Software: R. Bonino
Geographic Coverage: International
Year Established: 1957
Number of Employees: 300

BERKS INDUSTRIES, INC.
747 E. Brokaw Road
San Jose, CA 95112
(408) 298-8552
Major Market: Peripheral Manufacturing
Target Industries: HP Users
Contacts:
Head of Marketing: Chin Choy
Geographic Coverage: International
Year Established: 1981
Number of Employees: 15

BGL TECHNOLOGY CORP.
19151 Parthenia St.
Complex C
Northridge, CA 91324
(213) 349-5905
Major Market: Computer and Peripheral Manufacturing
Net Sales: $500,000 — $1 Million (1981)
Geographic Coverage: International
Year Established: 1978
Number of Employees: 6

BILLINGS COMPUTER CORP.
[illegible] E. 37th Terrace
Independence, MO 64057
(816) 373-0000
Major Market: Computer Manufacturing; OEM (Peripherals/Terminals); Software House; Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Retail; WP
Target Applications: Electronic Mail; Accounting; Program Development; DBMS

Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Peter Berg
Head of Software: Stephen Hatch
Head of Engineering: Robert J.Ridge
Head of Customer Service: Bill Thomas
Geographic Coverage: International
Year Established: 1978

BIT 3 COMPUTER CORP.
8120 Penn Ave. S.
Minneapolis, MN 55431
(612) 881-6955
Major Market: Component, Peripheral and Communications Equipment Manufacturing; Maintenance/Other Services
Geographic Coverage: International
Year Established: 1980
Number of Employees: 18

BRAEGEN CORP.
Minicomputer Peripherals Division
3320 E. LaPalma Ave.
Anaheim, CA 92806
(714) 632-9600
Major Market: Peripheral Manufacturing; OEM (Computer Systems); OEM (Peripherals/Terminals)
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Larry Howell
Geographic Coverage: International
Year Established: 1978
Number of Employees: 100

BRAEGEN CORP.
525 Los Coches St.
Milpitas, CA 95035
(408) 945-1900
Major Market: Computer, Terminal and Peripheral Manufacturing; OEM (Disk Subs)
Contacts:
Head of Marketing: George Everhart
Head of Sales: Ray Foster
Head of Engineering: Ken McCoy
Geographic Coverage: International
Year Established: 1973
Number of Employees: 420

BRAEMAR COMPUTER DEVICES, INC.
11950 12th Ave. S.
Burnsville, MN 55337
(612) 890-5135
Major Market: Peripheral Manufacturing
Target Industries: Manufacturing
Contacts:
Head of Sales: Richard Morris
Head of Engineering: John Rooks
Geographic Coverage: International
Year Established: 1970
Number of Employees: 80

BROOMALL INDUSTRIES, INC.
700 Abbott Drive
Broomall, PA 19008
(215) 328-1040
Major Market: Component and Peripheral Manufacturing; OEM (Computer Systems); OEM (Peripherals/Terminals); Software House; Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Cartography; Engineering
Target Applications: Cartography; CAD/CAM; Technical Publications; Graphic Data Capture
Contacts:
Head of Marketing/Sales: W.C. Schmidt
Head of Software: A.M. Trollo
Head of Engineering: E.B. Busch
Head of Customer Service: J. Bauer
Geographic Coverage: International
Year Established: 1972
Number of Employees: 30

BROTHER INTERNATIONAL CORP.
8 Corporate Place
Piscataway, NJ 08854
(201) 981-0300
Major Market: Peripheral and Office Equipment Manufacturing
Contacts:
Head of Marketing: Ron Fair
Geographic Coverage: International
Year Established: 1955
Number of Employees: 200

BUBBL-TEC
[illegible] Sierra Court
Dublin, CA 94566
(415) 829-8700
Major Market: Computer and Peripheral Manufacturing
Target Industries: Manufacturing
Target Applications: Process Control; Communications; Industrial Automation
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: R.L. Nelson
Head of Sales: T.J. [illegible]
Head of Software: J.W. [illegible]
Head of Engineering: A.G. Foreman
Geographic Coverage: International
Year Established: 1978
Number of Employees: 18

BURR BROWN RESEARCH CORP.
Data Acquisition and Control System Division
3631 E. 44th St.
Tuscon, AZ 85713
(602) 747-0711
Major Market: Component, Computer, Terminal and Peripheral Manufacturing; OEM (Computer Systems)
Target Industries: Manufacturing; Energy
Target Applications: Process Control; Factory Data Collection
Net Sales: $1 Million — $25 Million (1981)
Contacts:
Head of Marketing: Richard Fretwell
Geographic Coverage: International
Year Established: 1976
Number of Employees: 200

BURROUGHS CORP.
Burroughs Place
Detroit, MI 48232
(313) 972-7000
Major Market: Component, Computer, Terminal, Peripheral, Communications Equipment and Office Equipment Manufacturing; OEM (Computer Systems); Software House; Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Financial; Distribution; Manufacturing; Education; Government; OA; Office Supply
Net Sales: More than $100 Million (1982)
Geographic Coverage: National
Year Established: 1886
Number of Employees: 62,000

BUSINESS INFORMATION SYSTEMS, INC.
1140 36th St.
Ogden, UT 84403
(801) 621-1481
Major Market: Computer Manufacturing; OEM (Peripherals); Terminals; Dealer/Distributor
Target Industries: OEM; Sperry Univac Users
Contacts:
Head of Marketing: Buddy Aubie
Geographic Coverage: International
Year Established: 1977
Number of Employees: 28

BYTEK COMPUTER SYSTEMS CORP.
2283 S. Federal
Delray Beach, FL 33444
(305) 272-2051
Major Market: Peripheral Manufacturing
Geographic Coverage: National
Year Established: 1979
Number of Employees: 15

BYTRONIX CORP.
2701 E. Chapman Ave.
Fullerton, CA 92631
(714) 871-8763
Major Market: Computer Manufacturing
Target Industries: OEM
Contacts:
Head of Engineering: Keith Wakuling
Geographic Coverage: International
Year Established: 1976
Number of Employees: 21

CALDISK, INC.
18600 E. 37th Terrace
[illegible], MO 64057
(816) 373-0008
Major Market: Computer and Peripheral Manufacturing
Target Industries: OEM
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Eileen Harding
Head of Engineering: Robert Ridge
Geographic Coverage: International
Year Established: 1979
Number of Employees: 60

CALIFORNIA COMPUTER PRODUCTS, INC. (CALCOMP)
2411 W. La Palma Ave.
Anaheim, CA 92801
(714) 821-2011
Major Markets: Component and Peripheral Manufacturing; Maintenance/Other Services
Target Industries: Engineering; Architecture; Construction
Target Applications: CAD/CAM
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: R.A. Peters
Head of Sales: James Waltz
Head of Software: Ray Johnston
Head of Engineering: L.T. Baldam
Head of Customer Service: Ken Raby
Geographic Coverage: International
Year Established: 1958
Number of Employees: 2,000

Vendors

CALIFORNIA COMPUTER SYSTEMS
[illegible] Canyon Drive
Sunnyvale, CA 94086
(408) 734-5811
Major Markets: Computer Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Lauren Wiley
Head of Sales: Peter Passaretti
Geographic Coverage: International
Year Established: 1979
Number of Employees: 75

CALIFORNIA MINICOMPUTER SYSTEMS
5534 Westlawn Ave.
Los Angeles, CA 90066
(213) 306-4321
Major Markets: Systems House (Commercial OEM)
Target Industries: Utilities
Target Applications: Accounting; Utility
Geographic Coverage: National
Year Established: 1976
Number of Employees: [illegible]

CALLAN DATA SYSTEMS
2645 Townsgate Road
Westlake Village, CA 91361
(805) 497-6837
Major Markets: Computer Manufacturing
Target Industries: Medical; Manufacturing; Communications; [illegible]
Target Applications: Process Control
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Jim Alexander
Geographic Coverage: International
Year Established: 1980
Number of Employees: 45

CAMBEX CORP.
360 Second Ave.
Waltham, MA 02154
[illegible] 890-8000
Major Markets: Computer and Peripheral Manufacturing
Contacts:
Head of Marketing: Jean P. Larkin
Geographic Coverage: International
Year Established: 1968
Number of Employees: 120

CAMEO ELECTRONICS, INC.
[illegible] Cleftonville St.
[illegible], CA 90022
(714) 535-1882
Major Markets: Peripheral and Communications Equipment Manufacturing; Systems House (Commercial OEM)
Net Sales: $1 Million — $5 Million [illegible]
Contacts:
Head of Customer Service: Ray Janssen
Geographic Coverage: International
Year Established: 1980
Number of Employees: 17

CANDID LOGIC, INC.
[illegible] John R. Road
P.O. Box 18
Hazel Park, MI 48030
(313) 542-7095
Major Markets: Component Manufacturing; OEM (Computer Systems); Software House; Systems House (Commercial OEM)
Target Industries: Manufacturing
Target Applications: Industrial Control; Data Gathering, Monitoring
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Robert Kosovich
Geographic Coverage: National
Year Established: 1971
Number of Employees: 45

CANON U.S.A., INC.
1 Canon Plaza
Lake Success, NY 11042
(516) 488-6700
Major Markets: Computer, Peripheral and Office Equipment Manufacturing; Systems House; OEM (Computer Systems)
Net Sales: Over $100 Million (1982)
Geographic Coverage: International
Year Established: 1[illegible]
Number of Employees: 2,500

CAPITOL CIRCUITS CORP.
Printer Products Division
24 Denby Road
Allston, MA 02134
(617) 787-2030
Major Markets: Peripheral Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Martin Schiff
Head of Customer Service: Ginger Wilson
Geographic Coverage: International
Year Established: 1967
Number of Employees: 180

CARDAMATION CO.
P.O. Box 746
Frazer, PA 19355
(215) 647-8260
Major Markets: Peripheral Manufacturing; Dealer/Distributor
Contacts:
Head of Marketing: Lou Kranzley
Geographic Coverage: International
Year Established: 1973
Number of Employees: 15

CARDIFF TECHNOLOGY, INC.
4060 Morena Blvd.
San Diego, CA 92117
(619) 270-3990
Major Markets: Peripheral Manufacturing
Target Industries: OEM
Contacts:
Head of Marketing: Aldo Falosi
Geographic Coverage: International
Year Established: 1982
Number of Employees: 11

CARDINAL SCALE MANUFACTURING CO.
P.O. Box 151
Webb City, MO 64870
(417) 673-4631
Major Markets: Computer and Peripheral Manufacturing; OEM (Peripherals/Terminals); Software House
Net Sales: $25 Million — $100 Million (1982)
Contacts:
Head of Marketing: Don Johnson
Head of Sales: Steve Cohl
Geographic Coverage: International
Year Established: 1950
Number of Employees: 400

CARTERFONE COMMUNICATIONS CORP.
Suite 1400
1111 W. Mockingbird Lane
Dallas, TX 75247
(214) 630-9700
Major Markets: Component and Communications Equipment Manufacturing; OEM (Computer Systems); OEM (Peripherals/Terminals); Dealer/Distributor
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing: Terry Schmidt
Geographic Coverage: National
Number of Employees: [illegible]

CENTRAL DATA CORP.
1602 Newton Drive
Champaign, IL 61821
(217) 359-8010
Major Markets: Component, Computer and Peripheral Manufacturing; OEM (Peripherals/Terminals); Dealer/Distributor
Target Applications: General Business; Accounting; Testing [illegible]
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Earl D. Jacobsen
Head of Sales: Norman MacGregor
Geographic Coverage: International
Year Established: 1[illegible]
Number of Employees: 65

CENTRONICS DATA COMPUTER CORP.
1 Wall St.
Hudson, NH 03051
(603) 883-0111
Major Markets: Peripheral and Office Equipment Manufacturing; OEM (Peripherals/Terminals); Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: Neil D. Kleinfeld
Head of Sales: Warren E. Allen Jr.
Head of Engineering: Dr. Edward Correll
Geographic Coverage: International
Year Established: 1[illegible]
Number of Employees: 1,800

CENTURY DATA SYSTEMS, INC.
1270 N. Kraemer Blvd.
Anaheim, CA 92806
(714) 632-7500
Major Markets: Peripheral Manufacturing
Target Industries: High Technology
Contacts:
Head of Marketing: Richard Brechtlein
Geographic Coverage: International
Year Established: 1968
Number of Employees: 800

CERB MICROTECH, INC.
P.O. Box 102
Langhorne, PA 19047
(215) 757-0284
Major Markets: Peripheral and Communications Equipment Manufacturing; Software House; Dealer/Distributor
Target Industries: Engineering
Target Applications: WP
Net Sales: Less than $100,000 (1981)
Geographic Coverage: International
Year Established: 1975
Number of Employees: 5

CHI CORP.
21111 Chagrin Blvd.
Beachwood, OH 44122
(216) 991-9000
Major Markets: Terminal and Communications Equipment Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other [illegible]
Geographic Coverage: International
Year Established: 1[illegible]
Number of Employees: 24

CHRISLIN INDUSTRIES, INC.
Computer Products Division
31352 Via Colinas, No. 102
Westlake Village, CA 91362
(213) 991-2254
Major Markets: Peripheral Manufacturing; OEM (Computer Systems)
Target Industries: Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Linda Siroin
Geographic Coverage: International
Year Established: 1975
Number of Employees: 38

CINEMATICS, INC.
[illegible] Mountain Industrial Blvd.
Tucker, GA 30084
(404) 493-7000
Major Markets: Computer and Special Systems Manufacturing
Target Industries: Manufacturing; Engineering
Target Applications: Graphics; Process Control; CAD/CAM
Contacts:
Head of Marketing: M.L. Durham
Head of Sales: Dan Cornett
Geographic Coverage: International
Year Established: 1[illegible]

CIE SYSTEMS, INC.
2515 McCabe Way
P.O. Box 16579
Irvine, CA 92713
(714) 660-1600
Major Markets: Computer [illegible]
Target Industries: Product and Systems OEM
Target Applications: General Business
Contacts:
Head of Marketing: Warren Blossom
Geographic Coverage: National
Year Established: 1981
Number of Employees: 60

CIPHER DATA PRODUCTS, INC.
[illegible] Willow Creek Road
San Diego, CA 92131
(714) 578-9100
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: Larry Hemmerich
Geographic Coverage: International
Year Established: 1968
Number of Employees: 1,100

CIPRICO, INC.
2405 Annapolis Lane
Plymouth, MN 55441
(612) 559-2034
Major Markets: Component Manufacturing
Target Industries: OEM; One-Time Buyers
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Stu Reile
Head of Software: Bill Moran
Head of Engineering: Mike Quesly
Head of Customer Service: Bill Sieck
Geographic Coverage: International
Year Established: 1978
Number of Employees: 22

C. ITOH ELECTRONICS, INC.
5301 Beethoven St.
Los Angeles, CA 90066
(213) 306-6700
Major Markets: Terminal and Peripheral Manufacturing; Dealer/Distributor
Geographic Coverage: International
Year Established: 1973
Number of Employees: 75

CMC INTERNATIONAL
Suite 220
1720 130th Ave. N.E.
Bellevue, WA 98005
(206) 453-9777
Major Markets: Computer Manufacturing
Target Industries: Dealers
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Gerald Jones
Geographic Coverage: International
Year Established: 1978
Number of Employees: 25

COASTAL DATA PRODUCTS, INC.
7370 N.W. 36 Ave.
Miami, FL 33147
(305) 696-6800
Major Markets: Peripheral and Communications Equipment Manufacturing
Target Industries: Manufacturers; Hospitals
Target Applications: Attendance; Job/Labor Costing; Security Access; Inventory
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Andrew R. Sevick
Head of Software: Rick Smith
Geographic Coverage: International
Year Established: 1973

COBAR, INC.
2570 E. Cerrito Ave.
Anaheim, CA 92806
(714) 634-2800
Major Markets: Terminal Manufacturing
Geographic Coverage: International
Year Established: 1980

COBAR TECHNOLOGY
1428 Fenton
Longmont, CO 80501
(303) 776-0472
Major Markets: Terminal Manufacturing; OEM (Computer Systems)
Year Established: 1980
Number of Employees: 7

COGATA SYSTEMS CORP.
285 N. Wolfe Road
Sunnyvale, CA 94086
(408) 735-1744
Major Markets: Computer Manufacturing; OEM (Peripherals/Terminals); Software House
Target Industries: Engineering
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Beau Vrolyk
Head of Engineering: Bob Davis
Geographic Coverage: International
Year Established: 1979
Number of Employees: 55

CODEX CORP.
20 Cabot Blvd.
Mansfield, MA 02048
(617) 364-2000
Major Markets: Computer, Terminal and Peripheral Manufacturing
Target Applications: Data Communications; Data Processing
Contacts:
Head of Marketing: John Pugh
Geographic Coverage: International
Year Established: 1962
Number of Employees: 2,500

COGITO SYSTEMS, INC.
118 Charcut Ave.
San Jose, CA 95135
(408) 842-5262
Contacts:
Head of Marketing: Andrew Roman
Geographic Coverage: International
Year Established: 1982
Number of Employees: 110

COLORADO VIDEO, INC.
P.O. Box 928
Boulder, CO 80306
(303) 444-3972
Major Markets: Peripheral and Communications Equipment Manufacturing; Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Cynthia Keen
Head of Engineering: John Sperka
Geographic Coverage: National
Year Established: 1965
Number of Employees: 41

COLORGRAPHIC COMMUNICATIONS CORP.
Suite 105
2379 John Glenn Drive
P.O. Box 80448
Atlanta, GA 30341
(404) 455-3921
Major Markets: Terminal Manufacturing; OEM (Peripherals/Terminals)
Target Industries: Business
Target Applications: Process Control
Contacts:
Head of Engineering: James C. Higgins
Geographic Coverage: International
Year Established: 1981
Number of Employees: 15

COLUMBIA DATA PRODUCTS, INC.
9180D Rumsey Road
Columbia, MD 21045
(301) 992-5400
Major Markets: Computer and Peripheral Manufacturing
Target Industries: Manufacturing; Engineering; Professional
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: John A. White
Head of Sales: Michael Hellman
Head of Engineering: Richard Mathews
Geographic Coverage: International
Year Established: 1976
Number of Employees: 150

COMARK CORP.
93 West St.
P.O. Box 474
Medfield, MA 02052
(617) 359-8161
Major Markets: Component, Computer and Peripheral Manufacturing; OEM (Computer Systems); Dealer/Distributor; Maintenance/Other Services
Target Applications: Process Control; Lab Functions; Data Acquisition; Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Mike Glindt
Head of Sales: William Breen
Geographic Coverage: International
Year Established: 1975
Number of Employees: 50

COMBUR CORP.
4116 Via Solano
Palos Verdes Estates, CA 90274
(213) 375-7880
Major Markets: Component and Peripheral Manufacturing; Dealer/Distributor
Net Sales: $500,000 — $1 Million (1981)
Geographic Coverage: International
Year Established: 1975
Number of Employees: 12

COMDEX, LTD.
141 Central Park S.
Hartsdale, NY 10530
(303) 671-7460
Major Markets: Component Manufacturing
Target Applications: Communications
Net Sales: $1 Million — $5 Million (1981)
Geographic Coverage: International
Year Established: 1980
Number of Employees: 20

COMMODORE BUSINESS MACHINES, INC.
Systems Division
487 Devon Park Drive
Wayne, PA 19087
(215) 687-4750
Major Markets: Computer and Peripheral Manufacturing; Software Houses; Systems House (Commercial OEM)
Contacts:
Head of Software: Paul Dimarzo
Geographic Coverage: International

COMMODORE BUSINESS MACHINES, INC.
The Meadows
487 Devon Park Drive
Wayne, PA 19087
(215) 687-9750
Major Marketing Department
Computer, Terminal, Peripheral and Communications Equipment Manufacturing; Software House
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: Myrddin Jones
Geographic Coverage: International
Year Established: 1976
Number of Employees: 520

COMMUNICATION MANUFACTURING CO.
3300 E. Spring St.
Long Beach, CA 90801
(213) 426-0311
Major Markets: Computer Manufacturing; Security System
Target Industries: Security; Access Control
Target Applications: Facility Management
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Jack Shelton
Head of Sales: Jim St. Pierre
Geographic Coverage: International
Year Established: 1962
Number of Employees: 250

COMPATIBLE COMPUTER CORP.
1965 Lown, MD Blvd.
Salt Lake City, UT 84115
(801) 487-8825
Major Markets: Component and Computer Manufacturing; OEM (Computer Systems); Dealer/Distributor
Contacts:
Head of Sales: Royal D. Smith
Geographic Coverage: National
Year Established: 1978
Number of Employees: 12

COMPTHNT, INC.
340 E. Middlefield Road
Mountain View, CA 94043
Major Markets: Peripheral Manufacturing; Maintenance/Other Services
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Engineering: Larry Kelly
Geographic Coverage: Regional
Year Established: 1978
Number of Employees: 6

COMPUGRAPHIC CORP.
200 Ballardvale St.
Wilmington, MA 01887
(617) 944-0311
Major Markets: Computer Manufacturing; OEM (Computer Systems)
Target Industries: Publishing, Newspaper; Commercial Printing; Education; Government
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing: Bryan E. Newman
Head of Sales: James Winters
Head of Software: Edward Klemm
Head of Engineering: David Lundquist
Geographic Coverage: International
Year Established: 1961
Number of Employees: 4,300

COMPUPRO CORP.
Building 7/25
Oakland Airport, CA 94614
(415) 562-0636

Vendors

Major Markets: Computer and Peripheral Manufacturing; OEM (Peripherals/Terminals); Maintenance/Other Services
Target Industries: General Business; Industrial; Scientific
Contacts:
Head of Sales: Jim Lamphear
Head of Engineering: Kevin Fisher
Geographic Coverage: International
Year Established: 1975
Number of Employees: 50

COMPUTEX, INC.
51 Second Ave.
Burlington, MA 01803
(617) 272-8100
Major Markets: Computer and Terminal Manufacturing; OEM (Computer Systems); Software House
Target Industries: Publishing; Typographic, OA
Target Applications: Front-End Typesetting, WP
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Michael Gold
Head of Sales: Robert Moran
Head of Software: Martin King
Head of Engineering: William Riley
Head of Customer Service: Carmen Levinson
Geographic Coverage: International
Year Established: 1969
Number of Employees: 90

COMPUTER AUTOMATION, INC.
Commercial Systems Division
2181 Dupont Drive
Irvine, CA 92713
(714) 833-8830
Major Markets: Computer and Communications Equipment Manufacturing; Maintenance/Other Services
Target Industries: Distribution; End Users
Contacts:
Head of Marketing: Richard A. Comstock
Geographic Coverage: International
Year Established: 1975
Number of Employees: 500

COMPUTER COMMUNICATIONS SPECIALISTS, INC.
6683 Jimmy Carter Blvd.
Norcross, GA 30071
(404) 441-3114
Major Markets: Component, Computer, Peripheral and Communications Equipment Manufacturing; OEM (Computer Systems); Software House; Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Utilities; Manufacturing, Retail; Wholesale
Target Applications: Data Entry; POS Polling, Badge Readers; Bar Code Readers
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Steve A. Aufderhar
Head of Software: R.L. Pass
Head of Engineering: Dr. Dwight Jones
Geographic Coverage: International
Year Established: 1977
Number of Employees: 30

COMPUTER COMMUNICATIONS, INC.
2211 Columbia St.
Torrance, CA 90503
(213) 320-9101
Major Markets: Terminal and Communications Equipment Manufacturing
Target Industries: IBM 3700 Series Front-End Processor; Message Switchers; Airline Reservations; Electronic Mail
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Gary L. Brumfield
Head of Sales: Robert L. Cole
Head of Software: Tony R. Fonze
Head of Engineering: Carl E. Vanderbeek
Head of Customer Service: Jess Acciacca
Geographic Coverage: National
Year Established: 1966
Number of Employees: 150

COMPUTER CONSOLES, INC.
97 Humbolt St.
Rochester, NY 14609
(716) 482-5000
Major Markets: Computer Manufacturing; OEM (Computer Systems)
Target Industries: Telephone; OA
Target Applications: WP; Directory Assistance, OA
Contacts:
Head of Marketing/Sales: Gary Haynes
Head of Engineering: William Deller
Geographic Coverage: National
Year Established: 1968
Number of Employees: 1,050

COMPUTER DESIGNED SYSTEMS, INC.
Commercial Systems Division
10911 Olson Memorial Highway
Minneapolis, MN 55441
(612) 545-2855
Major Markets: Component, Computer, Terminal and Peripheral Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Manufacturing; Distribution, Medical
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Engineering: Thanasis Spiropoulos
Geographic Coverage: National
Year Established: 1968
Number of Employees: 45

COMPUTER DEVICES, INC.
25 North Ave.
Burlington, MA 01803
(617) 273-1550
Major Markets: Computer and Terminal Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing/Sales: Robert Joseph
Head of Engineering: Gerry Galicki
Geographic Coverage: International
Year Established: 1969
Number of Employees: 350

COMPUTER DYNAMICS, INC.
105 S. Main St.
Greer, SC 29651
(803) 877-7471
Major Markets: OEM (Peripherals/Terminals), Software House
Target Industries: Engineering; Small Business
Contacts:
Head of Marketing: Susan Priester
Head of Sales: Kurt Priester
Geographic Coverage: National
Year Established: 1981
Number of Employees: 24

COMPUTER EQUIPMENT SERVICES
P.O. Box 36
Hawthorne, CA 90250
(213) 777-4070
Target Industries: DP
Target Applications: DP
Contacts:
Head of Marketing: Rick Erich
Head of Engineering: Chuck Williams
Head of Customer Service: John Brown
Geographic Coverage: International
Year Established: 1968
Number of Employees: 35

COMPUTER EXTENSION SYSTEM, INC.
17511 El Camino Real
Houston, TX 77058
(713) 488-8830
Major Markets: Computer, Peripheral and Office Equipment Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: WP; Business; OEM
Target Applications: WP; OEM; Business
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Gary L. Wagner
Head of Engineering: Dante A. Marcucci
Geographic Coverage: National
Year Established: 1975
Number of Employees: 10

COMPUTER IDENTICS CORP.
5 Shawmut Road
Canton, MA 02021
(617) 821-0830
Major Markets: Peripheral Manufacturing; OEM (Computer Systems); Maintenance/Other Services; Code Scanning Equipment
Target Industries: Materials Handling; Distribution, Foods
Target Applications: Distribution Management; Production Management; Inventory Control; Data Acquisition
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Edmund P. Andersson
Head of Sales: Charles E. Mara
Head of Software: Theodore Williams
Head of Engineering: Chris B. Kapsambelis
Geographic Coverage: International
Year Established: 1968
Number of Employees: 110

COMPUTER MEMORIES, INC.
9116 Van Ave.
Chatsworth, CA 91311
(213) 709-6445
Major Markets: Peripheral Manufacturing
Contacts:
Head of Sales: Trevor Constable
Head of Engineering: Avi Brand
Geographic Coverage: International
Year Established: 1981
Number of Employees: 250

COMPUTER PARTS EXCHANGE (CPX)
19821 Nordhoff St.
Northridge, CA 91324
Major Markets: Dealer/Distributor; Maintenance/Other Services, Miscellaneous Computer Supplies
Target Industries: Third-Party Maintenance; Large End User; Systems House (OEM)
Target Applications: Maintenance
Net Sales: $8.1 Million (1982)
Contacts:
Head of Marketing: Bob MacGonigal
Head of Sales: Don Jarrel
Geographic Coverage: International
Year Established: 1976
Number of Employees: 64

COMPUTER PERIPHERALS, INC.
2621 Van Buren Ave.
Norristown, PA 19403
(215) 666-5000
Major Markets: Peripheral Manufacturing
Contacts:
Head of Sales: Phil Grice
Geographic Coverage: International
Year Established: 1970
Number of Employees: 700

COMPUTERS INTERNATIONAL, INC.
3540 Wilshire Blvd.
Los Angeles, CA 90010
(213) 386-3111
Major Markets: Systems House (Commercial OEM)
Target Industries: OEM
Net Sales: $1 Million — $5 Million (1981)
Geographic Coverage: National
Year Established: 1977
Number of Employees: 50

COMPUTER TALK, INC.
2885 S. Rooney Road
Morrison, CO 80465
(303) 697-5400
Major Markets: Computer Manufacturing; Software House; Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Engineering; Manufacturing
Target Applications: Visual-Graphics, Engineering, Design
Net Sales: $500,000 — $1 Million (1981)
Geographic Coverage: National
Year Established: 1972
Number of Employees: 10

COMPUTER TRANSCEIVER SYSTEMS, INC.
66 E. Midland Ave.
P.O. Box 15
Paramus, NJ 07652
(201) 261-6800
Major Markets: Terminal Manufacturing
Target Industries: Banking; Engineering

Target Applications: Accounting
Contacts:
Head of Engineering: Al Kritz
Geographic Coverage: International
Year Established: 1968
Number of Employees: 150

COMPUTERWISE, INC.
4006 E 137th Terrace
Grandview, MO 64030
(816) 765-3330
Major Markets: Terminal Manufacturing; Maintenance/Other Services
Target Applications: Commercial; Industrial
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Marketing/Software: William W Brown
Head of Engineering: Rick Culver
Geographic Coverage: International
Year Established: 1971
Number of Employees: 15

COMPUTRAC, INC.
8614 Hamilton
Huntington Beach, CA 92646
(714) 536-5000
Major Markets: Component Manufacturing
Target Industries: OEM
Net Sales: $100,000 — $500,000 (1982)
Geographic Coverage: International
[illegible]
Number of Employees: 4

CONREX INTERNATIONAL, INC.
[illegible] 120
3701 Skypark Drive
Torrance, CA 90505
(213) 373-0280
Major Markets: Peripheral Manufacturing
Target Industries: Business; Home
Contacts:
Head of Marketing: Robert Pearce
Head of Sales: Bill Falkenstein
Head of Engineering: Marshall Brown
Geographic Coverage: International
[illegible]

CONTEC INFORMATION SYSTEMS, INC.
Digitronics Division
53 John St.
Cumberland, RI 02864
(401) 724-8500
Major Markets: Terminal and Peripheral Manufacturing
Target [illegible] Government
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Richard A. [illegible]
Geographic Coverage: International
[illegible]
Number of Employees: 40

CONSOLINK CORP.
1840 Industrial Circle
Longmont, CO 80501
[illegible]
Major Markets: Peripheral Manufacturing
Target Industries: Small Computer
Contacts:
[illegible]
Head of Engineering: John Wang
Geographic Coverage: International

Year Established: 1982
Number of Employees: 15

CONTEMPORARY CONTROL SYSTEMS, INC.
4949 Forest Ave.
Downers Grove, IL 60515
(312) 963-7070
Major Markets: Computer Manufacturing; OEM (Computer Systems)
Target Industries: Industrial
Target Applications: Automatic Testing; Process Monitoring; Machine Control; Scientific Laboratory
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: George Thomas
Head of Engineering: Ron Alban
Geographic Coverage: National
Year Established: 1975
Number of Employees: 9

CONTROL CONCEPTS
P.O. Box 2367
Manassas, VA 22110
(800) 368-3078
Major Markets: Terminal and Communications Equipment Manufacturing
Contacts:
Head of Marketing: Samual Ginder
Geographic Coverage: International
Year Established: 1963
Number of Employees: 270

CONTROL DATA CORP.
8100 34th Ave. S.
P.O. Box O
Minneapolis, MN 55417
(612) 853-8100
Major Markets: Component, Computer, Terminal, Peripheral and Communications Equipment Manufacturing; Data Services (Service Bureau); Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Manufacturing; Electric Utilities, Petroleum/Mining; [illegible]
Target Applications: CAD/CAM; Computer-Based Education; Petroleum Exploration; Electric Engineering
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: R.D. Schmidt
Head of Sales: Richard Rickanbach
Head of Customer Service: Gerald W. Gilbert
Geographic Coverage: International
Year Established: 1957
Number of Employees: 57,000

CONTROL SYSTEMS
1317 Central Ave.
Kansas City, KS 66102
(913) 342-3535
Major Markets: OEM (Computer Systems)
Target Industries: Grain; Coal
Target Applications: Process Control
Geographic Coverage: International
Year Established: 1967
Number of Employees: 85

CONTROL SYSTEMS, INC.
2855 Anthony Lane
Minneapolis, MN 55418
(612) 789-2421

Major Markets: Peripheral Manufacturing, Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Geographic Coverage: National
Year Established: 1976
Number of Employees: 8

COOSOL, INC.
Suite 1
2845 Mesa Verde Drive E.
Costa Mesa, CA 92626
(714) 545-2216
Major Markets: Peripheral Manufacturing, Software House, Systems House (Commercial OEM)
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: A. Solomonian
Head of Engineering: Jim E. Cook
Geographic Coverage: National
Year Established: 1979
Number of Employees: 24

CORE, INC.
542 S.E. 5th Ave.
Delray Beach, FL 33444
(305) 276-3929
Major Markets: Peripheral Manufacturing, Software House; Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Manufacturing; Accountants, Agriculture, Broadcasting
Target Applications: Accounting; General Business
Contacts:
Head of Sales: Fionne Prewitt
Geographic Coverage: International
Year Established: 1977
Number of Employees: 7

[illegible] DATA SYSTEMS, INC.
31324 Via Colinas
Westlake Village, CA 91361
(213) 706-1505
Major Markets: Computer and Peripheral Manufacturing
Contacts:
Head of Marketing: P. Kramarz
Head of Sales: George McMurtry
Geographic Coverage: International
Year Established: 1981
Number of Employees: 180

CORVUS SYSTEMS, INC.
2029 O'Toole Ave
San Jose, CA 95131
(408) 946-7700
Major Markets: Computer and Peripheral Manufacturing; Software [illegible]
Target Industries: Fortune 1000
Net Sales: $25 Million — $100 Million (1982)
Contacts:
Head of Marketing: Joseph Hughes
Head of Engineering: Mark C. Hahn
Geographic Coverage: International
Year Established: 1979
Number of Employees: 325

CRAY RESEARCH, INC.
608 Second Ave. S.
Minneapolis, MN 55402
(612) 333-5889
[illegible] Computer Manufacturing
Target Industries: Scientific Research; Engineering; Weather; Aerospace

Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: Michael Dickey
Head of Sales: Bruce N. Kasson
Head of Software: Margaret Loftus
Head of Engineering: Les T. Davis
Head of Customer Service: Don Whiting
Geographic Coverage: International
Year Established: 1972
Number of Employees: 50

[illegible]
280 Bernardo Ave.
Mountain View, CA 94043
(415) 964-7400
Major Markets: Component, Computer and Peripheral Manufacturing
Contacts:
Head of Marketing: Andrew Procassini
Head of Engineering: Dr. Roger Melton
Geographic Coverage: National
Year Established: [illegible]
Number of Employees: 500

CTS [illegible], INC.
System Division
6900 Shady Oak Road
Eden Prairie, MN 55344
(612) 941-9100
Major Markets: OEM (Peripherals/Terminals)
Target Industries: Military, Environments, Telecommunications
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Engineering: Emmet Johnson
Geographic Coverage: International
Year Established: 1957
Number of Employees: [illegible]

CUSTOM TERMINALS, INC.
[illegible]
Raleigh, NC 27604
(919) 876-8731
Major Markets: Communications Equipment Manufacturing, OEM (Peripherals/Terminals), Software House, Systems House (Commercial OEM)
Target Applications: Communications Control
Contacts:
Head of Marketing: J. David Hill
Head of Software: Richard Scott
Geographic Coverage: International
Year Established: 1980
Number of Employees: 30

CVIS SYSTEMS, INC.
Suite 7
[illegible]
Major Markets: OEM (Computer Systems), OEM (Peripherals/Terminals), Software House, [illegible]
Target Industries: Automobile, [illegible]
Target Applications: General [illegible]
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Software: Gary Martin
Geographic Coverage: California
Year Established: [illegible]
Number of Employees: 12

Vendors

CYBERCHRON CORP.
Rt 9
Garrison, NY 10524
(914) 424-3755
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: Eric Santos
Head of Engineering: Ed Delaney
Geographic Coverage: International
Year Established: 1974
Number of Employees: 15

CYBER DATA CORP.
2611 Garden Road
Monterey, CA 93940
(408) 373-2601
Major Markets: Computer and Peripheral Manufacturing, OEM (Peripherals/Terminals), Software House
Target Industries: Retail
Target Applications: POS
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software: W. Greve
Head of Engineering: H. Ghy
Geographic Coverage: International
Year Established: 1974
Number of Employees: 25

CYBERNATION, INC.
377 Putnam Ave.
Cambridge, MA 02139
(617) 492-8810
Major Markets: Component Manufacturing, OEM (Computer Systems)
Target Industries: Industrial
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing/Sales: James White
Head of Software: Paul McBride
Head of Engineering: Ned Woodman
Geographic Coverage: International
Year Established: 1974
Number of Employees: 35

CYNTHIA PERIPHERAL CORP.
766 San Aleso Ave
Sunnyvale, CA 94086
(408) 745-0855
Major Markets: Peripheral Manufacturing
Target Industries: OEM
Contacts:
Head of Marketing: George Toor
Head of Customer Service: Michael Dunnigan
Geographic Coverage: International
Year Established: 1981
Number of Employees: 20

DAKTRONICS
Systems Division
331 32nd Ave
Brookings, SD 57006
(605) 692-6145
Major Markets: Component, Computer, Terminal and Peripheral Manufacturing, OEM (Computer Systems); Software House
Target Industries: Sports; Government, Financial
Target Applications: Sporting Scoreboards, Voting Systems, Time/Temperature Displays
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Engineering: James B. Morgan
Geographic Coverage: International
Year Established: 1968
Number of Employees: 130

DASA CORP.
15 Stevens St
Andover, MA 01810
(617) 475-4940
Major Markets: Component and Peripheral Manufacturing, Software House
Target Industries: Business
Contacts:
Head of Marketing: Chuck Thompson
Head of Engineering: Ernest Von Holten
Head of Customer Service: William Hanlon
Geographic Coverage: International
Year Established: 1966
Number of Employees: 20

DATA ACCESS CORP.
4221 Ponce de Leon Blvd
Coral Gables, FL 33146
(305) 446-0669
Major Markets: Software House, Systems House (OEM)
Contacts:
Head of Marketing/Sales: Charles Casanave III
Head of Software: Cory Casanave
Geographic Coverage: International
Year Established: 1976
Number of Employees: 10

DATA CARD CORP.
11111 Bren Road W
P.O. Box 9355
Minneapolis, MN 55440
(612) 933-1223
Major Markets: Peripheral Manufacturing
Target Industries: Finance
Contacts:
Head of Marketing: Chuck Baggoerer
Head of Sales: Ted Liberkowski
Head of Customer Service: Bob Keyport
Geographic Coverage: International
Year Established: 1969
Number of Employees: 2,000

DATA DESIGN LOGIC SYSTEMS, INC.
4800 Patrick Henry Drive
Santa Clara, CA 95054
(408) 988-7722
Major Markets: Peripheral Manufacturing
Target Industries: Scientific; Engineering; Architecture
Target Applications: CAD
Contacts:
Head of Marketing/Sales: Conrad B Vance
Head of Software/Engineering: James E. Newland
Head of Customer Service: P. Janet Rose
Geographic Coverage: International
Year Established: 1968

DATADYNE CORP.
P.O. Box 247
King of Prussia, PA 19406
(215) 666-5751
Major Markets: Peripheral Manufacturing
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Marketing: James Riggs
Head of Sales: John Keffer
Geographic Coverage: International
Year Established: 1969
Number of Employees: 23

DATA ELECTRONICS, INC.
10150 Sorrento Valley Road
San Diego, CA 92121
(619) 452-7840
Major Markets: Peripheral Manufacturing
Geographic Coverage: International
Year Established: 1974
Number of Employees: 400

DATA ENGINEERING, INC.
Suite 207
2515 N. State Road 7
Margate, FL 33063
(305) 971-0400
Major Markets: Component, Computer and Peripheral Manufacturing, OEM (Peripherals/Terminals), Maintenance/Other Services
Target Industries: Simulation; Scientific, Real Time
Target Applications: Simulation
Net Sales: $1 Million — $5 Million (1981)
Geographic Coverage: International
Year Established: 1974
Number of Employees: 11

DATA GENERAL CORP.
4400 Computer Drive
Westboro, MA 01580
(617) 366-8911
Major Markets: Computer, Terminal and Peripheral Manufacturing
Net Sales: More than $100 Million (1981)
Contacts:
Head of Sales: Frank M. Keaney
Geographic Coverage: International
Year Established: 1968
Number of Employees: 14,545

DATA IMPACT PRODUCTS, INC.
745 Atlantic Ave
Boston, MA 02111
(617) 482-4214
Major Markets: Peripheral and Communications Equipment Manufacturing
Target Industries: Dealers
Contacts:
Head of Marketing: Kevin Noonan
Geographic Coverage: International
Year Established: 1976
Number of Employees: 260

DATALOGICS, INC.
325 W. Huron St
Chicago, IL 60610
(312) 266-4444
Major Markets: Terminal Manufacturing; Software House, Systems House (Commercial OEM)
Target Industries: Publishing, Insurance, Inplant
Target Applications: Typesetting
Contacts:
Head of Sales: Brad Lindroth
Geographic Coverage: National
Year Established: 1968
Number of Employees: 40

DATAMAC PERIPHERAL PRODUCTS
595 Pastoria Ave
Sunnyvale, CA 94086
(408) 735-0323
Major Markets: Component, Computer and Peripheral Manufacturing, OEM (Peripherals/Terminals)
Target Industries: OEM, Dealer/Distributer, Systems Houses
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing/Sales: Evan Trevino
Head of Engineering: Fletcher Glenn
Geographic Coverage: International
Year Established: 1980
Number of Employees: 100

DATA IMPACT PRODUCTS, INC.
745 Atlantic Ave
Boston, MA 02111
(617) 482-4214
Major Markets: Peripheral Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing/Sales: Kevin Noonan
Head of Engineering: Asshin Zandieh
Geographic Coverage: International
Year Established: 1976
Number of Employees: 280

DATAMAGNETICS, INC.
338 N. Rockwell Ave.
Oklahoma City, OK 73127
Target Industries: Manufacturing
Net Sales: $100,000 — $500,000 (1981)
Geographic Coverage: National
Year Established: 1969
Number of Employees: 25

DATA MANAGEMENT LABS, INC.
2180 Bering Drive
San Jose, CA 95131
(408) 946-9424
Major Markets: Peripheral Manufacturing, Maintenance/Other Services
Target Industries: Systems Integrators
Target Applications: File Management
Contacts:
Head of Marketing: John A. Roth
Geographic Coverage: International
Year Established: 1976
Number of Employees: 25

DATA-MAX
1965 Pratt Blvd.
Elk Grove Village, IL 60007
(312) 981-8205
Major Markets: Computer, Terminal and Peripheral Manufacturing; OEM (Computer Systems)
Target Industries: Education
Target Applications: Animation; Graphics
Contacts:
Head of Marketing: Stuart Tanaka
Head of Sales: Justin Crowley
Geographic Coverage: International
Year Established: 1971
Number of Employees: 10

DATAMEDIA CORP.
7401 Central Highway
Pennsauken, NJ 08109
(609) 665-5400
Major Markets: Computer and Terminal Manufacturing; OEM

(Peripherals/Terminals), Systems House (Commercial OEM)
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Engineering: Fred Rando
Geographic Coverage: International
Year Established: 1969
Number of Employees: 250

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Tulsa ..... (918) 665-3200

WEST
Denver ..... (303) 694-1662
Phoenix ..... (602) 243-6601
San Diego ..... (619) 268-1201
Sunnyvale ..... (408) 773-9990

DATAMETRICS CORP.
Defense Products Division
7630 Glona Ave.
Van Nuys, CA 91408
(213) 989-3840
Major Markets: Peripheral Manufacturing
Target Industries: Defense
Target Applications: Military
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing/Sales: James Foti
Geographic Coverage: International
Year Established: 1962
Number of Employees: 150

DATAPLEX, INC.
2521 Pan Ave
Elk Grove, IL 60007
(312) 860-5665
Major Markets: Software House, Systems House (Commercial OEM), Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Manufacturing, Finance, Process Control
Target Applications: Process Control; Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Marketing: Ruby Kutzer
Head of Engineering: Ron Dusky
Geographic Coverage: International
Year Established: 1978
Number of Employees: 17

DATA PLUS, INC.
1218 Massachusetts Ave.
Cambridge, MA 02138
(617) 547-4875
Major Markets: Software House
Target Industries: Architecture; Restaurant
Target Applications: OA
Geographic Coverage: Regional
Year Established: 1973
Number of Employees: 25

DATAPOINT CORP.
9725 Datapoint Drive
San Antonio, TX 78284
(512) 699-7000
Major Markets: Computer Manufacturing
Target Industries: General Business, Scientific, Government
Target Applications: DP, WP, OA, Electronic Messaging
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing: Lawrence Seigman
Head of Engineering: Victor D. Poor
Geographic Coverage: International
Year Established: 1968
Number of Employees: 8,800

DATA PRINTER CORP.
99 Middlesex St
Malden, MA 02148
(617) 321-2400
Major Markets: Peripheral Manufacturing
Target Industries: OEM, Distribution
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing/Sales: Jack Garrity
Geographic Coverage: International
Year Established: 1968
Number of Employees: 400

DATAPRODUCTS CORP.
6200 Canoga Ave.
P.O. Box 746
Woodland Hills, CA 91365-
(213) 887-8000
Major Markets: Terminal, Peripheral and Communications Equipment Manufacturing, OEM (Peripherals/Terminals)
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: John Harker
Head of Sales: Jim Towell
Head of Engineering: Clifford Jones
Geographic Coverage: International
Year Established: 1962
Number of Employees: 4,600

DATAPRODUCTS NEW ENGLAND, INC.
Data Communications Division
Barnes Park N
Wallingford, CT 06492
(203) 265-7151
Major Markets: Terminal and Communications Equipment Manufacturing, OEM (Computer Systems), Software House
Target Industries: Military, Telephone, Insurance, Oil
Target Applications: Network Management, Inscription
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing: Joseph Flaherty
Head of Engineering: William Gallagher
Geographic Coverage: International
Year Established: 1981
Number of Employees: 700

DATARAM CORP.
Princeton Road
Cranbury, NJ 08512
(609) 799-0071
Major Markets: Component Computer and Peripheral Manufacturing, OEM (Computer Systems), Software House
Target Industries: Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Engineering: Bernie Hellrigel
Geographic Coverage: International
Year Established: 1967
Number of Employees: 200

DATASOUTH COMPUTER
P.O. Box 240947
Charlotte, NC 28224
(704) 523-8500
Major Markets: Component and Peripheral Manufacturing
Target Industries: Distribution, OEM
Net Sales: $5 Million — $25 Million (1983)
Contacts:
Head of Marketing: James Busby
Head of Engineering: James Shero
Geographic Coverage: International
Year Established: 1977
Number of Employees: 160

DATA [illegible]
3455 Commercial Ave.
Northbrook, IL 60062
(312) 564-1800
[illegible]
Manufacturing
Target Industries: Industrial, ISO
Target Applications: Bar Code; OCR
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: John H Kindsvater Jr
Geographic Coverage: International
Year Established: 1969
Number of Employees: 100

DATA STORAGE [illegible]
14752 Sinclair Circle
Tustin, CA 92680
(714) 730-0722
Major Markets: Maintenance/Other Services
Net Sales: $500,000 — $1 Million (1981)
[illegible]
Head of Marketing: Tom Sammons
Geographic Coverage: National
Year Established: 1981
Number of Employees: 18

DATA SYSTEMS [illegible]
2241 Lundy Ave
San Jose, CA 95131
(408) 946-5800
Major Markets: OEM (Peripherals/Terminals), Tape Peripheral Manufacturing
Target Industries: OEM
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing: George Fink
Head of Sales: Ed Churchill
Geographic Coverage: International
Year Established: 1971
Number of Employees: 300

DATASYSTEMS CORP.
10072 Willow Creek Road
San Diego, CA 92131
(619) 566-5500
Major Markets: Component Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: William Hughes
Geographic Coverage: International
Year Established: 1977
Number of Employees: 15

DATA [illegible] CORP.
2775 N. Western Parkway
Santa Clara, CA 95051
(408) 496-0434
Major Markets: Component and Peripheral Manufacturing, Maintenance/Other Services
Target Industries: Manufacturing
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing/Sales: Mike Kirby
Head of Engineering: Lloyd Ebisu
Geographic Coverage: International
Year Established: 1979
Number of Employees: 105

DATA [illegible], INC.
4 Gill St
Woburn, MA 01801
[illegible]
Major Markets: Peripheral Manufacturing, OEM (Computer Systems), OEM (Peripherals/Terminals)
Target Industries: Cartology, Footwear, Photography
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing/Sales: Donald Skenberian
Head of Software: Dean Cox
Head of Engineering: George Bruschi
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 75

DATA TERMINALS & COMMUNICATIONS
590 Division St
Campbell, CA 95008
(408) 378-1112

Vendors

Major Markets: Terminal Manufacturing
Contacts:
Head of Marketing: Mark Bell
Geographic Coverage: National
Year Established: 1968
Number of Employees: 63

DATA-TYPE, INC.
2615 Miller Ave
Mountain View, CA 94040
(415) 949-1053
Major Markets: Terminal Manufacturing, OEM (Computer Systems), OEM (Peripherals/Terminals)
Target Industries: Engineering; Education, Manufacturing
Target Applications: CAD/CAM
Contacts:
Head of Sales: Ron Kain
Geographic Coverage: International
Year Established: 1982
Number of Employees: 10

DATAVUE CORP.
1911 22nd Ave S
Seattle, WA 98144
(206) 322-9330
Major Markets: Component, Computer and Terminal Manufacturing; OEM (Computer Systems), Software House
Target Industries: Financial; OA; CAD
Target Applications: CP/M; CAD; General Business
Contacts:
Head of Marketing: Donna Perron
Head of Engineering: Dick Kretzmer
Head of Customer Service: Perry [illegible]
Geographic Coverage: International
Year Established: 1974
Number of Employees: 50

DATRICON CORP.
200 Datricon Plaza
155 B Ave.
Lake Oswego, OR 97034
(503) 636-7671
Major Markets: Computer and Peripheral Manufacturing; OEM (Computer Systems)
Target Industries: Manufacturing
Target Applications: Process
Contacts:
Head of Marketing: Rob Schram
Head of Engineering: David Baasch
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 40

DATUM, INC.
1363 State College Blvd.
Anaheim, CA 92806
(714) 533-6330
Major Markets: Component and Peripheral Manufacturing, OEM (Peripherals/Terminals); Systems House (Commercial OEM)
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: William Baldwin
Head of Engineering: Clyde E. Cole
Geographic Coverage: International
Year Established: 1969
Number of Employees: 210

DAYTIME SYSTEMS, INC.
217 Humboldt Coit Drive
Sunnyvale, CA 94089
(408) 734-4900
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: R. L. Newsome
Head of Sales: Valon Soares
Head of Software: Tim Lundeen
Head of Engineering: R. Apt
Geographic Coverage: International
Year Established: 1981
Number of Employees: 150

DECISION DATA COMPUTER CORP.
100 Witmer Road
Horsham, PA 19044
(800) 523-5357
Major Markets: Peripheral Manufacturing, Maintenance/Other Services
Target Industries: IBM Replacement
Net Sales: $25 Million — $100 Million (1982)
Contacts:
Head of Marketing: Michael Brody
Geographic Coverage: International
Year Established: 1969
Number of Employees: 1,600

DELTA DATA SYSTEMS CORP.
2595 Metropolitan Drive
Trevose, PA 19047
(215) 322-5400
Major Markets: Computer, Terminal and Office Equipment Manufacturing, OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor, Maintenance/Other Services
Target Industries: Banking, Health care; Printing & Publishing; Service bureaus
Target Applications: OA, Data Entry
Net Sales: $25 Million — $100 Million (1982)
Contacts:
Head of Sales: John McBride
Head of Software: Steve Miller
Head of Engineering: Stan Peery
Head of Customer Service: Stanley Forman
Geographic Coverage: International
Year Established: 1968
Number of Employees: 300

DELTA SYSTEMS, INC.
6060 W. 91st Ave
Westminster, CO 80030
(303) 430-0857
Major Markets: Systems House (Commercial OEM)
Net Sales: $1 Million — $5 Million (1981)
Geographic Coverage: National
Year Established: 1978
Number of Employees: 11

DENELCOR, INC.
17000 E. Ohio Place
Aurora, CO 80017
(303) 337-7900
Major Markets: Computer Manufacturing
Contacts:
Head of Marketing: J. Phillip Carley
Head of Sales: Russell Saunders
Head of Software: John Lennon
Head of Engineering: Richard Woerner
Geographic Coverage:
Number of Employees: 160

DENNISON MANUFACTURING CO., INC.
300 Howard St.
Framingham, MA 01701
(617) 879-0511
Major Markets: Component and Peripheral Manufacturing, OEM (Computer Systems), OEM (Peripherals/Terminals), Software House, Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Industrial; Commercial
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing: Paul N. Kraus
Head of Sales: Cless Constine
Head of Engineering: Henry R. Lewis
Geographic Coverage: International
Year Established: 1847

DENTRONIX SYSTEMS, INC.
2635 Croddy Way
Santa Ana, CA 92704
(714) 966-0015
Major Markets: Terminal Manufacturing
Contacts:
Head of Marketing: Vaughn Densley
Geographic Coverage: International
Year Established: 1977
Number of Employees: 50

D.E.M. CORP.
7671 Central Ave. N.E.
Minneapolis, MN 55432
(612) 784-7499
Major Markets: Component Manufacturing, OEM (Computer Systems); Software House, Maintenance/Other Services
Target Industries: Retail, Hotel, Large Mass Merchant; Small Business
Net Sales: $100,000 — $500,000 (1982)
Geographic Coverage: International
Year Established: 1977
Number of Employees: 6

DIABLO SYSTEMS, INC.
901 Page Road
P.O. Box 5030
Fremont, CA 94538
(415) 786-5000
Major Markets: Peripheral Manufacturing, Miscellaneous Computer Supplies
Contacts:
Head of Marketing: Paul Shapiro
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 1,670

DIAN CONTROLS, INC.
944 Dorchester Ave
Boston, MA 02125
(617) 288-7700
Major Markets: Terminal Manufacturing, OEM (Computer Systems); OEM (Peripherals/Terminals)
Target Industries: Transportation; Finance, Entertainment, Medical
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Robert Blaha
Head of Sales: C. S. Aspinwall Jr.
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 100

DICOM INDUSTRIES
715 N. Pastoria
Sunnyvale, CA 94086
(408) 732-1060
Major Markets: Peripheral Manufacturing, OEM (Computer Systems); OEM (Peripherals/Terminals), Systems House (Commercial OEM)
Net Sales: $1 Million — $5 Million (1981)
Geographic Coverage: International
Year Established: 1969
Number of Employees: 20

DICTAPHONE CORP.
120 Old Post Road
Rye, NY 10580
(914) 967-7300
Major Markets: Terminal, Peripheral and Office Equipment Manufacturing, OEM (Peripherals/Terminals)
Target Industries: Medical, Insurance, Banking, Legal
Target Applications: Dictation Equipment, WP
Contacts:
Head of Marketing: Vernon C. Jobson Jr.
Head of Sales: John G. Lindroth
Head of Engineering: Dr. Richard Wesson
Geographic Coverage: International
Year Established: 1920
Number of Employees: 2,500

DIGICOMP RESEARCH CORP.
Terrace Hill
Ithaca, NY 14850
(607) 273-5900
Major Markets: Computer Manufacturing
Target Industries: Government, Military
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Marketing/Sales: Jeff Cox
Head of Software: Jim Elkins
Geographic Coverage: National
Year Established: 1975
Number of Employees: 25

DIGI-DATA CORP.
8580 Dorsey Run Road
Jessup, MD 20794
(301) 498-0200
Major Markets: Peripheral Manufacturing
Target Industries: OEM
Contacts:
Head of Marketing: Allen R. Grams
Year Established: 1962
Number of Employees: 80

DIGIDYNE CORP.
4901 Morena Blvd
Building 600
San Diego, CA 92117
(619) 483-0364
Major Markets: Component and Computer Manufacturing, OEM (Peripherals/Terminals)
Contacts:
Head of Marketing: Bill Job
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 68

DIGITAL ASSOCIATES CORP.
1039 E. Main St.
Stamford, CT 06902
(203) 327-9210
Major Markets: Component and Communications Equipment Manufacturing, OEM (Peripherals/Terminals), Maintenance/Other Services

Target Industries: Minicomputer Integrators, Banking, Education
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Robert Grenier
Head of Sales: Simon Harvey
Head of Software: Charles Teets
Head of Engineering: Robert Ricca
Geographic Coverage: National
Year Established: 1971
Number of Employees: 50

DIGITAL DATA SYSTEMS, INC.
1551 N W 65th Ave.
Plantation, FL 33313
(305) 792-3290
Major Markets: Dealer/Distributor; Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Alfred Gomez
Geographic Coverage: International
Year Established: 1976
Number of Employees: 12

DIGITAL DEVELOPMENT CORP.
P O Box 23447
San Diego, CA 92123
(619) 278-9920
Major Markets: Peripheral Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Charles Theodore
Head of Engineering: Norman Buton
Geographic Coverage: International
Year Established: 1959
Number of Employees: 500

DIGITAL EQUIPMENT CORP.
146 Main St.
Maynard, MA 01754
(617) 897-5111
Major Markets: Component, Computer, Terminal, Peripheral and Communications Equipment Manufacturing; Software House; Dealer/Distributor, Maintenance/Other Services; Miscellaneous-Computer Supplies
Net Sales: More than $100 Million (1981)
Geographic Coverage: International
Year Established: 1957
Number of Employees: 71,000

DIGITAL INTERFACE SYSTEMS, INC.
2380 Pipestone Road
P O Box 1408
Benton Harbor, MI 49022
(616) 926-2148
Major Markets: OEM (Computer Systems); Software House
Target Industries: Manufacturing; Telecommunications
Target Applications: PBS Report Generation; Process Control, Testing Systems
Contacts:
Head of Marketing: Mahesh K. Seth
Geographic Coverage: Regional
Year Established: 1977
Number of Employees: 30

DIGITAL LABORATORIES, INC.
[illegible]
Watertown, MA 02172
(617) 924-1680
Major Markets: Peripheral Manufacturing, Maintenance/Other Services
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Marketing/Software: W [illegible]
Head of Sales: L. Call
Head of Engineering: D. Stone
Head of Customer Service: P. Krawitz
Year Established: 1971
Number of Employees: 10

DIGITEC CORP.
918 Woodley Road
Dayton, OH 45403
(513) 254-6251
Major Markets: Peripheral Manufacturing
Target Industries: Industrial
Target Applications: Control, Monitoring
Contacts:
Head of Sales: Peter Neutist
Head of Software: Paul Kemble
Head of Customer Service: Chris Fraga
Geographic Coverage: International
Year Established: 1958
Number of Employees: 125

DIGITUS CORP.
22 W 25th St.
Baltimore, MD 21218
(301) 467-3223
Major Markets: Terminal Manufacturing, OEM (Peripherals/Terminals); Software House, Systems House (Commercial OEM)
Target Industries: Medical, Military, Manufacturing
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software/Engineering: Kwok Li
Geographic Coverage: Virginia, Maryland and DC Area
Year Established: 1978
Number of Employees: 15

DILOG
12800 Garden Grove Blvd
Garden Grove, CA 92643
(714) 534-8950
Major Markets: Component Manufacturing; Maintenance/Other Services
Target Industries: Manufacturing; OEM/System Integrators
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing/Sales: Dan Sullivan
Head of Engineering: Dale Gradvig
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 72

DIMENSION, INC.
4201 Burton Drive
Santa Clara, CA 95054
(408) 980-1414
Major Markets: Computer and Terminal Manufacturing
Target Industries: Retail
Contacts:
Head of Marketing: Steve Auvitore
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 150

DISC TECH ONE, INC.
849 Ward Drive
Santa Barbara, CA 93111
(805) 964-3535
Major Markets: Peripheral Manufacturing
Geographic Coverage: International
Year Established: 1982
Number of Employees: 35

DISCTRON, INC.
1701 McCarthy Blvd
Milpitas, CA 95035
(408) 946-6692
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: David Calwell
Head of Sales: Evert Babre
Head of Software: Andy Nester
Geographic Coverage: International
Year Established: 1980
Number of Employees: 200

DISK MEMORY TECHNOLOGY, INC.
155 B Ave.
Lake Oswego, OR 97034
(503) 297-1475
Major Markets: Peripheral Manufacturing
Target Applications: [illegible] Automobile
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Marketing/Engineering: Pat Foley
Geographic Coverage: National
Year Established: 1976
Number of Employees: 20

DISPLAY DATA CORP.
Executive Plaza IV
Hunt Valley, MD 21031
(800) 638-1100
Major Markets: Computer Manufacturing; Maintenance/Other Services
Target Industries: Automobile; Trucking; Agriculture; Soft Drink
Target Applications: Accounting, Inventory, Route Distribution, Vending Machine Control
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Sales: Jack Parson
Head of Engineering: David Sykes
Head of Customer Service: Richard Songer
Geographic Coverage: National
Year Established: [illegible] 1971
Number of Employees: 500

DISPLAYS UNLIMITED
4361 S 89th St
Omaha, NE 68127
(402) 339-0165
Major Markets: Component Manufacturing, Software House
Target Industries: Manufacturing
Target Applications: Industrial Displays
Contacts:
Head of Marketing: Robert Thomas
Geographic Coverage: National
Year Established: 1980
Number of Employees: 5

DISTRIBUTED LOGIC CORP.
12800-G Garden Grove Blvd.
Garden Grove, CA 92643
(714) 534-8950
Major Markets: Component Manufacturing; Dealer/Distributor
Contacts:
Head of Marketing: Steven Arnaudoff
Geographic Coverage: International
Year Established: 1978
Number of Employees: 60

DMA SYSTEMS CORP.
601 Pine Ave
Goleta, CA 93117
(805) 683-3811
Major Markets: Peripheral Manufacturing
Geographic Coverage: International
Year Established: 1981
Number of Employees: 160

D & N MICRO PRODUCTS, INC.
3702 N Wells St
Fort Wayne, IN 46808
(219) 485-6414
Major Markets: Component and Computer Manufacturing, OEM (Computer Systems), Software House, Dealer/Distributor, Maintenance/Other Services
Target Industries: Manufacturing; Professional
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Jim Kuker
Geographic Coverage: International
Year Established: 1978
Number of Employees: 10

DOCUMATION
150 Wickham Road
P O Box 1240
Melbourne, FL 32901
(305) 724-1111
Major Markets: Peripheral Manufacturing
Contacts:
Head of Engineering: D. Swatik
Geographic Coverage: International
Year Established: [illegible] 1971
Number of Employees: 1,400

DOCUMENTECH CORP.
Office Products Division
155 White Plains Road
Tarrytown, NY 10591
(914) 631-8100
Major Markets: Computer, Terminal, Peripheral and Communications Equipment Manufacturing
Target Industries: General Business
Target Applications: OA, General Accounting
Contacts:
Head of Marketing: Arthur Oppenberg
Geographic Coverage: International
Year Established: 1955

DP-TEX, INC.
245 N Hydrowlic
Wichita, KS 67214
(316) 269-3068
Major Markets: OEM (Peripherals/Terminals); Software House, Systems House (Commercial OEM)
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Marketing: Allen Frazier
Geographic Coverage: International
Year Established: 1980
Number of Employees: 5

DRIVETEC, INC.
2140 Bering Drive
San Jose, CA 95131
(408) 942-1515

Vendors

Major Markets: Peripheral Manufacturing
Target Industries: OEM
Target Applications: Small Business Systems
Contacts:
Head of Marketing: Ivo Adams
Geographic Coverage: International
Year Established: 1982
Number of Employees: 42

DUAL SYSTEMS CORP.
2530 San Pablo
Berkeley, CA 94702
(415) 549-3890
Major Markets: Computer Manufacturing, OEM (Computer Systems), OEM (Peripherals/ Terminals)
Target Industries: Education, OEM
Target Applications: Software Development
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Peter DeVries
Geographic Coverage: National
Year Established: 1979
Number of Employees: 30

DYLON CORP.
9561 Ridgehaven Court
San Diego, CA 92123
(714) 292-5584
Major Markets: OEM (Computer Systems), OEM (Peripherals/ Terminals)
Target Industries: Engineering
Net Sales: $1 Million — $5 Million (1981)
Geographic Coverage: International
Year Established: 1976
Number of Employees: 25

DYNABYTE
521 Cottonwood Drive
Milpitas, CA 95035
(408) 263-1221
Major Markets: Computer Manufacturing, Systems House (Commercial OEM)
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Jerry Keeran
Head of Software: John Borders
Head of Engineering: Ed Fauvre
Geographic Coverage: International
Year Established: 1977
Number of Employees: 100

EATON PRINTER PRODUCTS
Technical Research Park
Riverton, WY 82501
(307) 856-4821
Major Markets: OEM (Peripherals/ Terminals)
Target Industries: Communications, Banking
Contacts:
Head of Marketing: Roger Rayburn
Head of Engineering: Jerry Spering
Geographic Coverage: International
Year Established: 1971
Number of Employees: 150

EDS MICROSYSTEMS, INC.
215 Devcon Drive
San Jose, CA 95112
(408) 286-4200
Major Markets: Computer Manufacturing, OEM (Computer Systems), Systems House (Commercial OEM).
Target Industries: DP
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing: Barry Hoffwade
Head of Engineering: Jon Garman
Geographic Coverage: International
Year Established: 1979
Number of Employees: 80

EDGE TECHNOLOGY
2735 S.E. Raymond
Portland, OR 97202
(503) 231-1057
Major Markets: Peripheral and Communications Equipment Manufacturing
Target Industries: Communications, OA
Target Applications: Credit Reporting
Net Sales: $1 Million — $5 Million (1981)
Geographic Coverage: International
Year Established: 1977
Number of Employees: 15

EIKONIX CORP.
23 Crosby Drive
Bedford, MA 01730
(617) 275-5070
Major Markets: Peripheral Manufacturing, Software House, Maintenance/Other Services
Target Industries: Education, Government, Fuel and Oil, Scientific
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Brian Chapman
Head of Sales: Thomas Bilotta
Head of Software: Peter Tracy
Head of Engineering: Craig Wood
Geographic Coverage: National
Year Established: 1968
Number of Employees: 75

ELECTRO-DESIGN, INC.
660 B Rancheros Drive
San Marcos, CA 92069
(714) 471-0680
Major Markets: Peripheral Manufacturing, OEM (Peripherals/ Terminals)
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Engineering: John Foster
Geographic Coverage: National
Year Established: 1962
Number of Employees: 10

ELECTRONIC PROCESSORS, INC.
1285 W. Dartmouth Ave.
Englewood, CO 80110
(303) 761-8540
Major Markets: Peripheral Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Robert Derschang
Geographic Coverage: International
Year Established: 1971
Number of Employees: 80

ELITE CORP.
906 N. Main St.
Wichita, KS 67203
(316) 265-0959
Major Markets: Computer Manufacturing
Target Industries: High Technology
Target Applications: Robotics, Listing
Geographic Coverage: International
Year Established: 1982
Number of Employees: 10

ELOGRAPHICS, INC.
1976 Oak Ridge Tnpk.
Oak Ridge, TN 37830
(615) 482-4038
Major Markets: Peripheral Manufacturing
Target Industries: Manufacturing; Military, Retail
Target Applications: Video Catalogs
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Robert Highfill
Head of Software: John E. Talmage
Geographic Coverage: International
Year Established: 1971
Number of Employees: 50

EMM/SESCO
20630 Plummer St.
Chatsworth, CA 91311
(213) 998-9090
Major Markets: Computer and Peripheral Manufacturing
Target Industries: Military
Contacts:
Head of Marketing: Russel Summers
Head of Sales: John O Donohue
Geographic Coverage: International
Year Established: 1961
Number of Employees: 2,000

EMULEX CORP.
3545 Harbor Blvd.
P.O. Box 6725
Costa Mesa, CA 92626
(714) 662-5600
Major Markets: Peripheral and Communications Equipment Manufacturing
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing: Sol Zechter
Head of Sales: Philip G. Begich
Head of Engineering: Bob Snyder
Geographic Coverage: International
Year Established: 1978
Number of Employees: 400

ENTER COMPUTER, INC.
Suite D
6867 Nancy Ridge Drive
San Diego, CA 92121
(619) 450-0601
Major Markets: Computer and Peripheral Manufacturing, Software House
Contacts:
Head of Marketing: Robert Sherwood
Head of Engineering: Richard Murray
Geographic Coverage: International
Year Established: 1981
Number of Employees: 55

ENVISION TECHNOLOGY, INC.
631 River Oaks Pkwy
San Jose, CA 95134
(408) 946-9755
Major Markets: Terminal and Peripheral Manufacturing
Target Industries: OEM
Target Applications: Graphics
Contacts:
Head of Marketing: William Elmore
Head of Sales: Jeff Lenches
Geographic Coverage: National
Year Established: 1981
Number of Employees: 85

EPIC COMPUTER PRODUCTS, INC.
18381 Bandilier Circle
Fountain Valley, CA 92708
(714) 964-4722
Major Markets: Computer and Terminal Manufacturing, Software House
Target Industries: Manufacturing; Distribution
Net Sales: $5 Million — $25 Million (1982)
Geographic Coverage: International
Year Established: 1981
Number of Employees: 20

EPSCO, INC.
411 Providence Highway
Westwood, MA 02090
(617) 329-1500
Major Markets: Peripheral Manufacturing
Target Industries: Marine Electronics
Net Sales: $5 Million — $25 Million (1981)
Geographic Coverage: International
Year Established: 1981
Number of Employees: 200

EPSON AMERICA, INC.
3415 Kashiwa St.
Torrance, CA 90505
(213) 539-9140
Major Markets: Component, Computer and Peripheral Manufacturing, OEM (Computer Systems), OEM (Peripherals/ Terminals)
Geographic Coverage: International
Year Established: 1981
Number of Employees: 85

ESPRIT SYSTEMS, INC.
Hazeltine Terminals Division
100 Marcus Drive
Melville, NY 11747
(516) 293-5600
Major Markets: Terminal Manufacturing, Maintenance/Other Services
Net Sales: More than $100 Million (1981)
Contacts:
Head of Customer Service: Howell Schorr
Geographic Coverage: International
Year Established: 1981
Number of Employees: 2,700

ESSEX ELECTRONICS CO.
Essex Industrial Park
Essex, CT 06426
(203) 767-8221
Major Markets: Component, Computer and Terminal Manufacturing
Target Industries: Government; Hospital, Food Processing; Industrial
Target Applications: Data Acquisition
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Bruce Joslyn
Geographic Coverage: Regional
Year Established: 1982
Number of Employees: 85

ETI SYSTEMS, INC.
6918 Sierra Court
Dublin, CA 94568

(415) 829-6600
Major Markets: Computer Manufacturing, Software House; Dealer/Distributor
Target Industries: Pipeline Transportation; Telemetry; Industrial I/O Processing; Multibus
Target Applications: Data Acqusition, Process Control
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Jesse O Hussman
Head of Engineering: Gary Tebbett
Geographic Coverage: National
Year Established: 1979
Number of Employees: 14

[illegible]
1316 N Avalon Blvd
Wilmington, CA 91744
(213) 835-2421
Major Markets: Computer Manufacturing, Software House; Systems House (Commercial OEM); Maintenance/Other Services
Contacts:
Head of Marketing: Tom Widrt
Geographic Coverage: National
Year Established: 1971
Number of Employees: 25

EVENTIDE, INC.
265 W. 54th St.
New York, NY 10019
(212) 581-9290
Major Markets: Peripheral Manufacturing, OEM (Computer Systems); Software House
Target Industries: Broadcasting
Target Applications: Signal Processing; Time Compression
Geographic Coverage: International
Year Established: 1971

EVOTEK CORP.
1220 Page Ave
Fremont, CA 94538
(415) 490-3100
Major Markets: Peripheral Manufacturing
[illegible]
Head of Marketing: James Lawson
Head of Engineering: Burton Sieco
Geographic Coverage: International
Year Established: 1981
Number of Employees: 270

EX-CELL-O, INC./REMEX
1733 Alton
P O Box C-19533
Irvine, CA 92714
(714) 557-6860
Major Markets: OEM (Peripherals/Terminals), Systems House (Commercial OEM)
Target Industries: Electronic
Contacts:
Head of Marketing: Woody Floyd
Geographic Coverage: International
Year Established: 1959
Number of Employees: 300

EXTEL CORP.
4000 Commercial Ave.
Northbrook, IL 60062
(312) 291-2500
Major Markets: Terminal **[illegible]**
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing: Ashok Roa
Geographic Coverage: International
Year Established: 1964
Number of Employees: 1,000

EXXON ENTERPRISES
Exxon Office Systems Co
777 Long Ridge Road
Stamford, CT 06902
(203) 329-5000
Major Markets: Peripheral and Office Equipment Manufacturing
Target Applications: OA
[illegible]
Head of Marketing: Douglas V Brunson
Geographic Coverage: International
Year Established: 1981
Number of Employees: 3,000

FACIT, INC.
Facit/Dataroyal
235 Main Dunstable Road
Nashua, NH 03061
(603) 883-4157
Major Markets: Peripheral Manufacturing
Net Sales: $5 Million — $25 Million (1981)
[illegible]
Head of Marketing: O Bjearklyann
Head of Sales: Eric Binder
Head of Engineering: Paul Ramsden
Geographic Coverage: International
Year Established: 1968
Number of Employees: 300

FALCO DATA PRODUCTS, INC.
1286 Lawrence Station Road
Sunnyvale, CA 94089
(408) 745-7123
Major Markets: Terminal Manufacturing
[illegible]
Head of Marketing: Don Naples
Head of Engineering: Kachun Lee
Head of Customer Service: Lee Falco Jr
Geographic Coverage: International
Year Established: 1980
Number of Employees: 65

FLORIDA DATA CORP.
600 D John Rhodes Blvd.
Melbourne, FL 32935
(305) 259-4700
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: B. Winkelspecht
Geographic Coverage: International
Year Established: 1973
Number of Employees: 135

FOURTH DIMENSION SYSTEMS
Suites A and B
1101 S. Grand Ave.
Santa Ana, CA 92705
(714) 835-6202
Major Markets: Peripheral Manufacturing
Target Industries: Retail; Distribution
Contacts:
[illegible]
Geographic Coverage: International
Year Established: 1981
Number of Employees: 20

FRANCHISE MAILING SYSTEMS
3420 W. Capitol Drive
Milwaukee, WI 53216
(414) 444-9980
Major Markets: Computer Manufacturing; OEM (Computer Systems); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Bank, Retail
Contacts:
Head of Marketing: Mark Resh
Head of Sales: Glenn Bucolt
Geographic Coverage: International
Year Established: 1952
Number of Employees: 65

FRANKLIN COMPUTER CORP.
2128 Rt 38
Cherry Hill, NJ 08002
(609) 482-5800
Major Markets: Component, Computer and Peripheral Manufacturing
Geographic Coverage: International
Year Established: 1981
Number of Employees: 580

FUJITSU AMERICA, INC.
2945 Oakmead Village Court
Santa Clara, CA 95051
(408) 727-4300
Major Markets: Terminal, Peripheral, Communications Equipment and Office Equipment Manufacturing, Dealer/Distributor
Net Sales: More than $100 Million (1981)
Contacts:
Head of Software: Fred Bihler
Head of Engineering: Ken Katashiba
Geographic Coverage: International
Year Established: 1976
Number of Employees: 300

GAW CONTROL CORP.
TDX Peripherals Division
148 New York Ave.
Halesite, NY 11743
(516) 423-3232
Major Markets: Component and Peripheral Manufacturing; **[illegible]**
Target Industries: Communications
Target Applications: Data Logging, Library and Interfacing, Disk Backup
Net Sales: $1,000,000 — $500,000,000 (1981)
Contacts:
Head of Marketing/Sales: George A. Wuffing
Head of Engineering: Michael Chang
Geographic Coverage: International
Year Established: 1979
Number of Employees: 4

GEN/COMP, INC.
6 Algonquin Road
Canton, MA 02021
(617) 828-2008
Major Markets: Component Manufacturing
Target Industries: OEM
Contacts:
Head of Marketing/Sales: Gerald Nutter
Geographic Coverage: International
Year Established: 1976

GENERAL BUSINESS TECHNOLOGY, INC.
[illegible]
[illegible], CA **[illegible]**
(714) 731-2346
Major Markets: Terminal and Peripheral Manufacturing; OEM (Peripherals/Terminals); Maintenance/Other Services
Target Applications: WP; Terminal Printing; High-Speed Printing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: William A. Wells
Head of Engineering: Robert L. Granda
Geographic Coverage: International
Year Established: 1980
Number of Employees: 25

GENERAL DIGITAL CORP.
700 Burnside Ave
E Hartford, CT 06108
(203) 528-9041
Major Markets: Component and Terminal Manufacturing, OEM (Computer Systems)
Target Industries: Manufacturing, Medical, Education, Government
Target Applications: Multibusiness
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Stuart Hoffer
Geographic Coverage: International
Year Established: **[illegible]**
Number of Employees: 30

[illegible] INDUSTRIES, INC.
7702 Governors Drive
Huntsville, AL 35805
(205) 837-8305
Major Markets: Component, Computer and Terminal Manufacturing, OEM (Computer Systems), Software House, Systems House (Commercial OEM)
Target Industries: Manufacturing, System House, Software Development Firms, OEM
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Lyle Needhain
Geographic Coverage: National
Year Established: **[illegible]**
Number of Employees: 40

GENERAL ELECTRIC CO.
Data Communications Product Division
General Electric Drive
Waynesboro, VA 22980
(703) 949-1170
Major Markets: Terminal and Peripheral Manufacturing
Target Industries: **[illegible]**, Minicomputer Manufacturing, Timesharing, Micro Processors
Target Applications: CAD/CAM, Bar Code, OCR
Contacts:
Head of Marketing: Harvey Labban
Head of Sales: Robert O'Flaherty
Geographic Coverage: North America; Western Europe
Year Established: 1969
Number of Employees: 1,500

GENERAL OPTRONICS CORP.
3005 Hadley Road
S Plainfield, NJ 07080
(201) 753-6700
Major Markets: Peripheral Manufacturing; OEM (Peripherals/Terminals)
Contacts:
Head of Marketing: Peter Hankin
Geographic Coverage: International
Year Established: 1977
Number of Employees: 50

GENERAL ROBOTICS CORP.
57 N. Main St
[illegible], WI 53017
(414) 673-6600

Vendors

Major Markets: Component and Computer Manufacturing
Target Industries: OEM; System
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Donald Woelz
Head of Engineering: Barbara Pick
Head of Customer Service: Glenn Rodgers
Geographic Coverage: International
Year Established: 1974
Number of Employees: 50

GENERAL TERMINAL CORP.
14831 Franklin St.
Tustin, CA 92680
(714) 730-0123
Major Markets: Terminal Manufacturing
Target Industries: OEM, Distributors, End Users
Contacts:
Head of Marketing: Diane Belk Ford
Geographic Coverage: International
Year Established: 1970
Number of Employees: 45

GENIE COMPUTER CORP.
Suite 607
31131 Via Colinas
Westlake Village, CA 91362
(213) 991-6210
Major Markets: Peripheral Manufacturing
Target Industries: Dealers
Contacts:
Head of Marketing: Marvin Raizer
Geographic Coverage: International
Year Established: 1981
Number of Employees: 10

GENISCO COMPUTERS CORP.
3545 Cadillac Ave.
Costa Mesa, CA 92626
(714) 556-4916
Major Markets: Terminal Manufacturing, Software House
Target Industries: Scientific, Engineering, Manufacturing
Target Applications: CAD/CAM
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing: Hank Stover
Geographic Coverage: International
Year Established: 1971
Number of Employees: 150

GENRAD CANADA, INC.
1200 N. Bowser Road
Richardson, TX 75080
(214) 238-7211
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Apparel; Footwear, Automobile, Airline
Contacts:
Head of Marketing: John Phipps
Head of Sales: Ray Wheeler
Geographic Coverage: International
Year Established: 1971
Number of Employees: 350

GERBER SCIENTIFIC INSTRUMENT CO.
83 Gerber Road
S. Windsor, CT 06074
(203) 644-1551
Major Markets: Terminal and Peripheral Manufacturing, OEM, (Computer Systems), Maintenance/Other Services
Target Industries: Engineering, Manufacturing, Printing
Target Applications: CAD
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing: David Ryan
Head of Engineering: Robert Pavonne
Geographic Coverage: International
Year Established: 1948
Number of Employees: 650

GIDDINGS & LEWIS, INC.
Electronics Division
666 S. Military Road
Fonddulac, WI 54935
(414) 921-9400
Major Markets: Component Manufacturing, OEM (Computer Systems); OEM (Peripherals/ Terminals)
Target Industries: Manufacturing
Target Applications: Positioning, Motion Control
Contacts:
Head of Marketing/Sales: Tom Bullock
Head of Engineering: Bruce Beadle
Head of Customer Service: John Boyle
Geographic Coverage: International
Year Established: 1960
Number of Employees: 250

GRAFTEK, INC.
1777 Conestoga
Boulder, CO 80301
(303) 449-1138
Major Markets: Terminal Manufacturing; OEM (Computer Systems); Software House
Target Industries: Plastics, Capital Goods, Machinery; Numerical Control
Target Applications: CAD/CAM, Graphics, Mechanical Design
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Don Miller
Geographic Coverage: International
Year Established: 1980
Number of Employees: 100

GRECO SYSTEMS
10020 Prospect Ave.
Santee, CA 92071
(619) 449-5775
Major Markets: Component and Peripheral Manufacturing; Software House, Maintenance/Other Services
Target Applications: Numerical Control
Contacts:
Head of Marketing/Sales: Larry Haynes
Head of Engineering: Thomas Rodstrom
Geographic Coverage: National
Year Established: 1977
Number of Employees: 11

GTCO CORP.
1055 First St
Rockville, MD 20850
(301) 279-9550
Major Markets: Peripheral Manufacturing
Target Industries: OEM
Target Applications: Graphics
Contacts:
Head of Sales: George Heiser
Geographic Coverage: International
Year Established: 1975

GTECH CORP.
101 Dyer St.
Providence, RI 02903
(401) 273-7700
Major Markets: Terminal and Communications Equipment Manufacturing; OEM (Computer Systems); OEM (Peripherals/ Terminals); Maintenance/Other Services
Target Industries: Public Gaming
Contacts:
Head of Marketing: Bill Morrisey
Head of Sales: George Murray
Head of Engineering: William Metzger
Geographic Coverage: International
Year Established: 1981
Number of Employees: 250

HARRIS CORP.
Computer Systems Division
2101 W. Cyprus Creek Road
Ft. Lauderdale, FL 33310
(305) 974-1700
Major Markets: Computer and Peripheral Manufacturing, OEM (Computer Systems), Software House, Systems House (Commercial OEM), Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Scientific; Engineering, Education; Military
Target Applications: Simulation, CAD/CAM, Data Acquisition, Administration
Net Sales: $25 Million — $100 Million (1981)
Contacts;
Head of Sales: J. Oromaner
Head of Software: Joe Payne
Geographic Coverage: International
Year Established: 1967
Number of Employees: 1,000

HARRIS CORP.
Information Systems Division
1025 W. Nasa Blvd
Melbourne, FL 32919
(305) 727-9100
Major Markets: Component, Computer, Terminal, Peripheral, Special Systems, Office Equipment and Communications Equipment Manufacturing, Software House; OEM (Computer Systems), OEM (Peripherals/Terminals), Maintenance/Other Services
Target Industries: Manufacturing; Scientific, Government, Education
Target Applications: General Business, Scientific, Control; Engineering
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: Lloyd G. Butler
Head of Engineering: Jack C. Davis
Geographic Coverage: International
Year Established: 1895
Number of Employees: 27,000

HARVEY HUBBEL, INC.
Pulsecom
2900 Towerview Road
Herndon, VA 22071
(703) 471-2900
Major Markets: Component Manufacturing, OEM (Computer Systems); Software House, Dealer/Distributor
Target Industries: OEM
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: Mike Vanocur
Head of Customer Service: Kevin Medlyn
Geographic Coverage: International
Year Established: 1964
Number of Employees: 325

HASTECH, INC.
670 N. Commercial St.
Manchester, NH 03101
(603) 669-9050.
Major Markets: Terminal Manufacturing, OEM (Computer Systems)
Target Industries: Publishing, Newspaper
Target Applications: Text Editing; Page Layout
Contacts:
Head of Software: George Sylvester
Head of Engineering: James Stenze
Geographic Coverage: International
Year Established: 1980
Number of Employees: 260

HEATH CO.
Benton Harbor, MI 49022
(616) 982-3200
Major Markets: Computer, Terminal and Peripheral Manufacturing, OEM (Computer Systems), Software House, Dealer/Distributor
Target Industries: Small Business, Education, Personal Computers
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing: David Altwies
Geographic Coverage: International
Year Established: 1930
Number of Employees: 1,500

HETRA COMPUTER & COMMUNICATIONS INDUSTRIES, INC.
P.O. Box 970
Melbourne, FL 32901
(305) 724-1574
Major Markets: Computer, Terminal, Peripheral and Communications Equipment Manufacturing, OEM (Computer Systems), Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Government; Military, Business
Target Applications: Remote Job Entry
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: Keith Milligan
Head of Customer Service: Robert Byers
Geographic Coverage: International
Year Established: 1968
Number of Employees: 100

HEURIKON CORP.
3001 Latham Drive
Madison, WI 53713
(608) 271-8700
Major Markets: Component, Computer and Communications Equipment Manufacturing; OEM (Computer Systems)
Target Industries: Communications
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Engineering: Jeffrey Mattox
Geographic Coverage: National
Year Established: 1972
Number of Employees: 30

HEWLETT-PACKARD CO.
Corporate Headquarters
3000 Hanover St
P.O. Box 10301
Palo Alto, CA 94304
(415) 857-1501
Major Markets: Component, Computer, Terminal, Peripheral and Office Equipment Manufacturing, Software House, Maintenance/Other Services, Miscellaneous Computer Supplies
Target Industries: Engineering, Manufacturing
Target Applications: CA, CAD/CAM
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing: Al Oliverio
Head of Sales: Jim Arthur
Head of Software: Andre Schwager
Geographic Coverage: International
Year Established: 1939
Number of Employees: 67,000

HI-G/AMS CONTROL CORP.
580 Spring St
Windsor Locks, CT 06096
(203) 623-2481
Major Markets: OEM (Computer Systems); Software House; Systems House (Commercial OEM)
Target Industries: Transportation; Retail; Manufacturing
Target Applications: Cash Forwarding; Process Control; Financial Control; POS
Contacts:
Head of Marketing/Sales: Steven Friedman
Head of Software/Engineering: Dr. Gordon Minns
Geographic Coverage: National
Year Established: 1981

HITACHI AMERICA, LTD.
Machine Tool Division
449 Alaska Ave
Torrance, CA 90503
(213) 533-0888
Major Markets: Dealer/Distributor
Target Industries: OEM
Target Applications: Mapping
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Jack MacDonald
Geographic Coverage: International
Year Established: 1978
Number of Employees: 35

[illegible] ENTERPRISES, INC.
[illegible] Town Road
Etters, PA 17319
(717) 938-4691
Major Markets: Terminal Manufacturing; Dealer/Distributor
Contacts:
Head of Marketing: Jack Adair
Geographic Coverage: International
Year Established: 1965
Number of Employees: 30

HONEYWELL, INC.
Information Systems Division
Honeywell Plaza
Minneapolis, MN 55408
(612) 870-5200
Major Markets: Computer, Terminal, Peripheral, Communications Equipment and Office Equipment Manufacturing, OEM (Computer Systems), OEM (Peripherals/Terminals), Software House, Data Services (Service Bureau), Dealer/Distributor, Maintenance/Other Services; Special Hardware
Target Industries: Manufacturing/Distribution, Government, Education, Airline
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: Richard R. Douglas
Geographic Coverage: International
Year Established: 1955
Number of Employees: 25,000

HOUDAILLE INDUSTRIES
Strippit Houdaille
12975 Clarence Center Road
Akron, NY 14001
(716) 542-4511
Major Markets: Component Manufacturing
Contacts:
Head of Marketing: Brian W. Young
Head of Engineering: David R. Feller
Head of Customer Service: Donald Roy
Geographic Coverage: International
Number of Employees: 600

HOUSTON INSTRUMENTS
8500 Cameron Road
P.O. Box 15720
Austin, TX 78753
(800) 531-5479
Major Markets: Peripheral Manufacturing
Target Industries: Architecture; Graphics
Target Applications: Charts; Graphs
Contacts:
Head of Marketing: Rod Schaffner
Head of Sales: John Williams
Head of Software: Mary Grace Baker
Geographic Coverage: International
Year Established: 1959

HUMAN DESIGNED SYSTEMS, INC.
3440 Market St.
Philadelphia, PA 19104
(215) 382-5000
Major Markets: Terminal Manufacturing
Target Industries: Education; OEM
Contacts:
Head of Marketing: Roger Pincus
Head of Sales: Mike Gelberg
Geographic Coverage: International
Year Established: 1976

IDEX COMPUTER CORP.
20741 Marilla St.
Chatsworth, CA 91311
(213) 709-8100
Major Markets: Component Manufacturing, Dealer/Distributor
Target Industries: OEM
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Bert T. Johnston
Head of Engineering: David Hardman
Geographic Coverage: International
Year Established: 1979
Number of Employees: 17

[illegible] STATIONS, INC.
1850 Evergreen
Duarte, CA 91010
(213) 357-2180
Major Markets: Component and Peripheral Manufacturing
Target Industries: OEM, End Users
Geographic Coverage: International
Year Established: 1980
Number of Employees: 275

IBM
World Headquarters
Old Orchard Road
Armonk, NY 10504
(914) 765-1900
Major Markets: Component, Computer, Terminal, Peripheral, Communications Equipment and Office Equipment Manufacturing, Software House, Data Services (Service Bureau), Dealer/Distributor, Maintenance/Other Services, Miscellaneous Computer Supplies
Net Sales: More than $100 Million (1982)
Contacts:
Head of Customer Service: Thomas M. Liptak
Geographic Coverage: International
Number of Employees: 350,000

IBM
Information Products and Systems Products Divisions
44 S. Broadway
White Plains, NY 10601
(914) 686-1900
Major Markets: Computer, Component, Terminal, Peripheral and Office Equipment Manufacturing, Software House, Miscellaneous Computer Supplies
Geographic Coverage: National
Number of Employees: 14,000

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Kansas City ..... (913) 888-4747
St. Louis ..... (314) 291-5350
Tulsa ..... (918) 665-3200

WEST
Denver ..... (303) 694-1662
Phoenix ..... (602) 243-6601
San Diego ..... (619) 268-1201
Sunnyvale ..... (408) 773-9990

ICL, INC.
415 E. Airport Freeway
Irving, TX 75062
(214) 258-8525
Major Markets: Component and Terminal Manufacturing, OEM (Computer Systems)
Target Industries: Retail; Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Ronald Kiyohiro
Head of Software: Paul Nagy
Head of Customer Service: Ted Morgan
Geographic Coverage: National
Year Established: 1968
Number of Employees: 130

ICOT CORP.
P.O. Box 7248
Mountain View, CA 94039
(415) 964-4635
Major Markets: Terminal and Communications Equipment Manufacturing, OEM (Computer Systems)
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing/Sales: Michael M. Denning
Head of Engineering: Peter Hepburn
Geographic Coverage: International
Year Established: 1968
Number of Employees: 350

IDE ASSOCIATES, INC.
7 Oak Park Drive
Bedford, MA 01730
(617) 275-4430
Major Markets: Peripheral and Communications Equipment Manufacturing
Contacts:
Head of Marketing: Nora Feldman
Head of Sales: Jim Bender
Head of Engineering: David Hunter
Geographic Coverage: International
Year Established: 1982
Number of Employees: 20

IDEOGRAPHIX, INC.
532 Mercury Drive
Sunnyvale, CA 94086
(408) 739-1290
Major Markets: Computer, Terminal, Peripheral and Communications Equipment Manufacturing, OEM (Computer Systems), OEM (Peripherals/Terminals), Systems House (Commercial OEM), Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Chinese DP, Chinese Communication Systems
Target Applications: Chinese Data Entry, Chinese Telex
Net Sales: $1 Million — $5 Million (1981)

Vendors

Contacts:
Head of Marketing: C. K. Yeh
Head of Sales: Eric Wang
Head of Software: David Chang
Head of Engineering: Chan A. Yeh
Head of Customer Service: George Tsai
Geographic Coverage: Far East
Year Established: 1972
Number of Employees: 55

3D SYSTEMS CORP.
4089 Leap Road
Hilliard, OH 43026
(614) 876-1595
Major Markets: Terminal Manufacturing, Dealer/Distributor
Target Industries: Business
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Marketing: Ray D'Onofrio
Geographic Coverage: International
Year Established: 1980
Number of Employees: 25

[illegible] TECHNOLOGY, INC.
42 Pleasant St
Watertown, MA 02172
(617) 924-3113
Major Markets: Component Manufacturing, OEM (Computer Systems); Maintenance/Other Services
Target Industries: Manufacturing, [illegible]
Target Applications: Graphics; Process Control; CAD; Medical, Manufacturing
Contacts:
Head of Marketing: Larre Nelson
Geographic Coverage: International
Year Established: 1981
Number of Employees: 12

[illegible] INDUSTRIES DATA SYSTEMS, INC.
301 Stanley Blvd.
Shelbyville, TN 37160
(615) 684-8731
Major Markets: Computer and Communications Equipment Manufacturing; Maintenance/Other [illegible]
Target Industries: Xerox Sigma Users, Engineering
Contacts:
Head of Sales: John C. Smith
Head of Software: Raymond Nix
Head of Engineering: Donald J. Friedman
Head of Customer Service: Rick Chambless
Geographic Coverage: National
Year Established: 1981
Number of Employees: 15

[illegible] GRAPHICS, INC.
107 Ardmore St
Fairfield, CT 06430
(203) 259-1394
Major Markets: Peripheral Manufacturing, OEM (Computer Systems)
Target Industries: Mapping; Geophysical; Engineering; Image Recording
Target Applications: Data Recording, Engineering, Graphics
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: F.P. Whitley
Head of Software: J. Turek
Head of Engineering: A.A. Ternowski
Head of Customer Service: W. Williams
Geographic Coverage: National
Year Established: 1974
Number of Employees: 35

IMAGE RESOURCE, INC.
2260 Townsgate Road
Westlake Village, CA 91361
(805) 496-6617
Major Markets: Peripheral Manufacturing
Target Industries: Medical, Business Graphics, Video; Manufacturing
Target Applications: CAD/CAM, Video
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Lee Benedict
Geographic Coverage: International
Year Established: 1978
Number of Employees: 30

IMC CORP.
P.O. Box 350
Aptos, CA 95003
(408) 688-0629
Major Markets: Terminal Manufacturing, Systems House (Commercial OEM)
Target Industries: Manufacturing; Distribution
Target Applications: Material and Management Control; Marco Tracking Systems
Contacts:
Head of Marketing: Michael Tansy
Geographic Coverage: National
Year Established: 1980
Number of Employees: 15

IMLAC CORP.
150 A St.
Needham, MA 02194
(617) 449-4600
Major Markets: Terminal Manufacturing; OEM (Computer Systems)
Target Industries: OEM; Engineering
Target Applications: CAD/CAM; Simulation
Contacts:
Head of Marketing: Paul Norman
Head of Sales: John Desjardins
Geographic Coverage: International
Year Established: 1968
Number of Employees: 100

IMS INTERNATIONAL
2800 Lockheed Way
Carson City, NV 89701
(702) 883-7611
Major Markets: Computer and Peripheral Manufacturing; OEM (Computer Systems)
Target Industries: Commercial
Target Applications: Graphics
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing: Bill Ploskin
Head of Sales: Richard Wallace
Head of Software: Don Lehr
Head of Customer Service: Jim [illegible]
Geographic Coverage: International
Year Established: 1975
Number of Employees: 130

INTEKS
Information Displays Division
28 Kaysal Court
Armonk, NY 10504
(914) 273-5805
Major Markets: Peripheral and Office Equipment Manufacturing; OEM (Peripherals/Terminals)
Target Industries: Printing; Publishing; Aerospace, Military
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Marketing: Frank Fazio
Head of Software: Michael Myers-Jouan
Head of Engineering: Kim Meyers
Geographic Coverage: National
Year Established: 1980
Number of Employees: 9

INCONNET, INC.
2772 Johnson Drive
Ventura, CA 93003
(805) 654-1616
Major Markets: Computer Manufacturing, OEM (Computer Systems); Software House, Data Services (Service Bureau)
Target Industries: Financial, Insurance, Automotive, Aircraft
Target Applications: Message Switch; Accounting; Inventory
Contacts:
Head of Marketing/Sales: Ray Healy
Head of Engineering: Glen Kelley
Geographic Coverage: National
Year Established: 1974
Number of Employees: 48

INDEPENDENT BUSINESS SYSTEMS, INC.
5915 Graham Court
Livermore, CA 94550
(415) 443-3131
Major Markets: Computer Manufacturing
Target Industries: Engineering; Scientific, General Business
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Marketing: Dick Glass
Geographic Coverage: International
Year Established: 1978
Number of Employees: 10

[illegible]PROCOMP, INC.
5409 Perry Drive
Drayton Plains, MI 48020
(313) 674-2294
Major Markets: Component and Terminal Manufacturing; OEM (Computer Systems), OEM (Peripherals/Terminals); Software House, Systems House (Commercial OEM)
Target Industries: Manufacturing; Automotive
Target Applications: Automated Systems, Data Collection
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Lawrence Borkowski
Head of Software: Lawrence Kuivenhoven
Geographic Coverage: International
Year Established: 1976
Number of Employees: 14

[illegible] DATA TERMINALS
173 Heatherdown Drive
Westerville, OH 43081
(614) 882-3282
Major Markets: Terminal Manufacturing
Target Industries: Manufacturing; Engineering
Target Applications: Process Control; Programmable Controls, Business Color Graphics, Industrial Graphics
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing/Sales: Frank Magalski
Head of Software: Ward Giannini
Head of Engineering: Ron Fowler
Head of Customer Service: Dan Hicks
Geographic Coverage: International
Year Established: 1975
Number of Employees: 50

INFOLINK
1925 Holste Road
Northbrook, IL 60062
(312) 291-2900
Major Markets: Component and Communications Equipment Manufacturing; OEM (Peripherals/Terminals)
Target Industries: Manufacturing; Financial
Target Applications: Factory Data Collection
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Paul Green
Head of Engineering: Jim Lysaught
Geographic Coverage: International
Year Established: 1976
Number of Employees: 60

[illegible], INC.
186 Middlesex Tnpk.
Burlington, MA 01803
(617) 272-6470
Major Markets: Component and Computer Manufacturing, OEM (Computer Systems); Software House; Systems House (Commercial OEM)
Target Industries: Manufacturing; Retail, Government
Target Applications: Data Entry; File Management
Contacts:
Head of Sales: Gene Parrett
Head of Engineering: Russell Heneault
Geographic Coverage: International
Year Established: 1968
Number of Employees: 300

INFORMATION [illegible] APPLICATIONS
10759 Tucker St.
Beltsville, MD 20705
(301) 937-3600
Major Markets: Component, Computer, Terminal and Peripheral Manufacturing; Software House, Systems House (Commercial OEM)
Target Industries: Government, Aerospace, Manufacturing
Target Applications: General business
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Barbara Duffy
Geographic Coverage: National
Year Established: 1970
Number of Employees: 150

[illegible] CORP.
Suite 102
2500 Mission College Blvd.
Santa Clara, CA 95054
Major Markets: Terminal, Peripheral and Communications Equipment Manufacturing, OEM (Peripherals/Terminals), Systems House (Commercial OEM), Dealer/Distributor, Maintenance/Other Services
Target Industries: Engineering
Target Applications: Structures, CAD/CAM, Earth Sciences
Contacts:
Head of Marketing/Sales: Tom Melby
Head of Software/Engineering: Frank [illegible]
Geographic Coverage: National
Year Established: 1981
Number of Employees: 15

INFORMATION PRODUCTS SYSTEMS
6567 Rookin
Houston, TX 77074
(713) 776-0071
Major Markets: Component Manufacturing, OEM (Computer Systems), Software House
Target Industries: Seismic; General Business
Contacts:
Head of Marketing: Henry Meitzen
Head of Engineering: Delbert Taylor
Geographic Coverage: International
Year Established: 1967
Number of Employees: 45

INFORMER COMPUTER TERMINALS, INC.
22936 Mill Creek Road
Laguna Hills, CA 92653
(714) 855-3112
Major Markets: Component, Terminal, Peripheral and Communications Equipment Manufacturing
Target Industries: Banking; Medical; Library; Systems Houses
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Lars-Persson
Geographic Coverage: International
Year Established: 1972
Number of Employees: 120

INFOSCRIBE, INC.
2720 S. Croddy Way
Santa Ana, CA 92704
(714) 641-8595
Major Markets: Peripheral Manufacturing
Target Industries: Computer
Contacts:
Head of Marketing/Sales: Richard A. Barry
Head of Engineering: Dale E. [illegible]
Geographic Coverage: International
Year Established: 1980
Number of Employees: 50

[illegible]
1 Fenwick Road
[illegible], NH 03103
(603) 624-2700
Major Markets: Computer Manufacturing; OEM (Computer Systems)
Target Industries: Accountants; [illegible]
Target Applications: Fuel Oil Accounting, Job Costing; Property Management, Medical
Contacts:
Head of Marketing: Calvin Hok
Head of Sales: Jack Flynn
Head of Engineering: Joel Weber
Geographic Coverage: National
Year Established: 1975
Number of Employees: 150

INFOTEK
1400 N. Baxter St.
Anaheim, CA 92806
(714) 956-9300
Major Markets: Peripheral Manufacturing, Software House
Target Industries: HP
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Marketing/Sales: Theo Stevens
Head of Software: Bruce Toback
Head of Engineering: John Haynie
Geographic Coverage: International
Year Established: 1976
Number of Employees: 300

[illegible] ACCESS CORP.
Suite K
517 Marine View
Belmont, CA 94002
(415) 591-8295
Major Markets: Component and Peripheral Manufacturing, Software House
Geographic Coverage: International
Year Established: 1979
Number of Employees: 94

INNOTRONICS CORP.
Brooks Road
Lincoln, MA 01773
(617) 259-0600
Major Markets: Computer and Peripheral Manufacturing
Target Industries: OEM; Distributors
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Frank Myers
Geographic Coverage: Regional
Year Established: 1977
Number of Employees: 22

[illegible]OVATIVE DATA TECHNOLOGY
4060 Morena Blvd.
San Diego, CA 92117
(619) 270-3990
Major Markets: Peripheral Manufacturing
Target Industries: OEM
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Aldo Falossi
Geographic Coverage: International
Year Established: 1976
Number of Employees: 70

INNOVATIVE ELECTRONICS, INC.
4714 N.W. 105th St.
Miami, FL 33014
(305) 624-1644
Major Markets: Peripheral and Communications Equipment Manufacturing
Target Industries: Banking, Airlines, [illegible]
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Diane Ruggero
Head of Engineering: Matt Intihar
Geographic Coverage: National
Year Established: 1976
Number of Employees: 30

INSTOR CORP.
175 Jefferson Drive
Menlo Park, CA 94025
(415) 326-9830
Major Markets: Peripheral Manufacturing
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Marketing: David Agerter
Geographic Coverage: International
Year Established: 1979
Number of Employees: 18

INSTRUMENTATION LABORATORY, INC.
Pixel Division
1 Burtt Road
Andover, MA 01810
(617) 861-0710
Major Markets: Computer and Terminal Manufacturing
Target Industries: OEM, Medical
Net Sales: Less than $100,000 (1981)
Contacts:
Head of Engineering: James McHale
Geographic Coverage: International
Year Established: 1980
Number of Employees: 120

INSTRUMENTATION [illegible]
19360 Business Center Drive
Northridge, CA 91324
(213) 886-2034
Major Markets: Peripheral Manufacturing
Target Industries: Government, Aerospace
Target Applications: Special Instrumentation, Test
Net Sales: $500,000 — $1 Million (1981)
Geographic Coverage: National
Year Established: 1981
Number of Employees: 14

INTECOLOR
225 Technology Park
Norcross, GA 30092
(404) 449-5961
Major Markets: Computer and Terminal Manufacturing, OEM (Computer Systems), Maintenance/Other Services
Target Industries: Control MIS/Data Processing, Business Graphics; Measurement/Testing
Net Sales: $5 Million — $25 Million (1982)
Geographic Coverage: International
Year Established: 1973
Number of Employees: 375

[illegible] DATA SYSTEMS, INC.
Rt. 13 S.
Milford, NH 03055
(603) 673-9100
[illegible]
Manufacturing
Target Industries: Retail, OEM
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: John Henry
Head of Sales: M. Barch
Geographic Coverage: International
Year Established: 1977
Number of Employees: 350

[illegible] DIGITAL PRODUCTS
3156 E. La Palma
Unit A
Anaheim, CA 92806
(714) 632-6972
Major Markets: Computer and Peripheral Manufacturing, Software House
Target Industries: System Houses
Geographic Coverage: International
Year Established: 1979
Number of Employees: 5

[illegible] SOLUTIONS, INC.
Suite 201
1350 Dell Ave.
Campbell, CA 95008
(408) 374-2441
Major Markets: Component Manufacturing, OEM (Peripherals/Terminals)
Geographic Coverage: National
Year Established: 1981
Number of Employees: 2

[illegible], INC.
233 N. Juniper St.
Philadelphia, PA 19107
(215) 568-9681
Major Markets: Peripheral Manufacturing
Geographic Coverage: National
Year Established: 1981
Number of Employees: 12

INTEL CORP.
3065 Bowers Ave.
Santa Clara, CA 95051
[illegible]
Major Markets: Component and Peripheral Manufacturing, OEM (Computer Systems), OEM (Peripherals/Terminals), Software House, Systems House (Commercial OEM), Maintenance/Other Services
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing: William H. Davidow
Head of Sales: Henry M. O'Hara
Geographic Coverage: International
Year Established: 1969
Number of Employees: 17,000

INTERACTION SYSTEMS, INC.
24 Munroe St.
Newtonville, MA 02160
(617) 964-5300
Major Markets: Component and Terminal Manufacturing, Software House
Target Industries: OEM
[illegible]
Head of Marketing: John A. Allston
Head of Engineering: Henry Ng
Geographic Coverage: International
Year Established: 1981
Number of Employees: 40

INTERFACE ELECTRONICS, INC.
21134 Bridge St.
[illegible]
(313) 352-8820
Major Markets: Communications Equipment Manufacturing, Software House, Systems House (Commercial OEM), Dealer/Distributor

Vendors

Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Engineering: Alan Barman
Geographic Coverage: National
Year Established: 1975
Number of Employees: 10

INTERFACE SYSTEMS, INC.
5855 Interface Drive
Ann Arbor, MI 48103
(313) 769-5900
Major Markets: Peripheral Manufacturing
Target Industries: Manufacturing; Medical, Education
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Barry Belluci
Geographic Coverage: International
Year Established: 1967
Number of Employees: 30

INTERMEM CORP.
47 Dutchess Tnpk.
Poughkeepsie, NY 12603
(914) 473-4300
Major Markets: Peripheral Manufacturing
Geographic Coverage: International
Year Established: 1972

INTERNATIONAL ANTEX, INC.
Antex Systems Division
2630 California St.
Mt. View, CA 94040
(415) 941-7914
Major Markets: Component and Peripheral Manufacturing
Target Industries: Personal Computer, Industrial
Target Applications: Design; Local
Net Sales: $1 Million — $5 Million (1982)
Geographic Coverage: International
Year Established: 1974
Number of Employees: 35
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Engineering: Alan Barman
Geographic Coverage: National
Year Established: 1975
Number of Employees: 10

INTERNATIONAL ENTRY SYSTEMS, INC.
408 N.E. 72nd
Seattle, WA 98115
(206) 525-6800
Major Markets: Computer, Terminal and Peripheral Manufacturing
Target Industries: Service Bureaus
Target Applications: Data Entry;
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Jerry Horvath
Geographic Coverage: International
Year Established: 1976
Number of Employees: 25

INTERPHASE CORP.
[redacted]
(214) 238-0971
Major Markets: Peripheral Manufacturing
Target Industries: OEM
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Robert Woods
Head of Sales: Robert Walker
Head of Engineering: Tom Thawley
Geographic Coverage: International
Year Established: 1978
Number of Employees: 34

INTERSCIENCE SYSTEMS, INC.
8435 Canoga Ave
Canoga Park, CA 91304
(213) 709-7711
Major Markets: Peripheral Manufacturing
Target Industries: Government; Commercial
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Frank J. LaChapelle
Geographic Coverage: National
Year Established: 1975
Number of Employees: 50

INTERSIL, INC.
Datel-Intersil
11 Cabot Blvd.
Mansfield, MA 02048
Major Markets: Peripheral Manufacturing
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing: Fran Shoreys
Head of Sales: Harland Batchelder
Geographic Coverage: International
Year Established: 1970
Number of Employees: 550

INTERSIL SYSTEMS, INC.
1275 Hammerwood Ave.
Sunnyvale, CA 94089
(408) 743-4300
Major Markets: Component, Computer, Terminal and Peripheral Manufacturing; Software House, Dealer/Distributor, Maintenance/Other Services
Target Industries: Manufacturing;
Target Applications: Factory Automation, OA, DP
Contacts:
Head of Marketing/Sales: Lee Jensen
Head of Engineering: Ted Britton
Head of Customer Service: Max Myers
Geographic Coverage: International
Year Established: 1982
Number of Employees: 300

INTERTEC
2085 Park Blvd
Palo Alto CA 94306
(415) 326-6900
Major Markets: Software House; Data Services (Service Bureau)
Target Industries: Manufacturing
Target Applications: Accounting; MRP — Netchange
Contacts:
Head of Marketing/Sales: J. A. Lozon
Head of Software: John E. Lozon
Geographic Coverage: International
Year Established: 1970
Number of Employees: 80

INTERTEC DATA SYSTEMS CORP.
2300 Broad River Rd.
Columbia, SC 29210
(803) 798-9100
Major Markets: Computer Manufacturing
Contacts:
Head of Marketing: Ron Wells
Geographic Coverage: International
Year Established: 1973
Number of Employees: 400

INTRON CORP.
Suite 403
7830 Backlick Road
Springfield, VA 22150
(703) 569-1502
Major Markets: Component Manufacturing; Software House; Systems House (Commercial OEM)
Target Industries: MIS, Government, Education; Telecommunications
Target Applications: Graphics
Contacts:
Head of Marketing/Sales: Hugh
Geographic Coverage: National
Year Established: 1979
Number of Employees: 12

IOMEGA CORP.
4646 S. 1500 West
Ogden, UT 84403
(801) 392-7581
Major Markets: Component and Peripheral Manufacturing
Target Industries: OEM
Net Sales: Less than $100,000 (1981)
Contacts:
Head of Sales: Richard F. Carlton
Geographic Coverage: International
Year Established: 1980
Number of Employees: 140

IPL SYSTEMS, INC.
1370 Main St.
Waltham, MA 02254
(617) 890-6620
Major Markets: Computer Manufacturing; Maintenance/Other Services
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing/Sales: William Manser
Head of Software: Charles A. Cornell
Head of Engineering: Robert Marriott
Head of Customer Service: Lee Gendron
Geographic Coverage: National
Year Established: 1973
Number of Employees: 250

IRIDEX MARKETING, INC.
2311 Green Road
Ann Arbor, MI 48105
(313) 996-3300
Major Markets: Peripheral Manufacturing, OEM (Peripherals/Terminals)
Target Industries: OEM
Contacts:
Head of Marketing: Max Sadowsky
Geographic Coverage: International
Year Established: 1979
Number of Employees: 100

ITEK COMPOSITION SYSTEMS
Large System Operation Division
355 Middlesex Ave
Wilmington, MA 01887
(617) 933-7000
Major Markets: Terminal Manufacturing; OEM (Computer Systems)
Target Industries: Newspaper; Printing
Target Applications: Photocomposition
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: William Heimbach
Head of Sales: William Kelly
Head of Software: Robert Fink
Head of Engineering: Arnie Coben
Geographic Coverage: International
Year Established: 1971
Number of Employees: 250

ITHACA INTERSYSTEMS, INC.
1650 Hanshaw Road
P.O. Box 91
Ithaca, NY 14850
(607) 273-2500
Major Markets: Computer and Terminal Manufacturing
Target Industries: Dealers, OEM
Target Applications: Graphics, Business, Education
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing/Sales: Andy D. Avanzo
Head of Software/Engineering: Jeff Moskow
Geographic Coverage: International
Year Established: 1978
Number of Employees: 100

ITT COURIER TERMINAL SYSTEMS, INC.
1515 W. 14th St.
Tempe, AZ 85281
(602) 894-7000
Major Markets: Component, Terminal and Peripheral Manufacturing; OEM (Peripherals/Terminals)
Contacts:
Head of Sales: Robert E. McKeon
Head of Engineering: Vincent Morelli
Geographic Coverage: International
Year Established: 1969
Number of Employees: 2,400

I.V.I., INC.
5757 Uplander Way
Culver City, CA 90230
(213) 417-8080
Major Markets: Terminal Manufacturing
Target Industries: System Houses; Sales & Service, Electronics
Contacts:
Head of Sales: John McGovern
Head of Software: Dr. Robert Doyle
Geographic Coverage: Australia, UK
Year Established: 1981
Number of Employees: 18

JADE COMPUTER PRODUCTS, INC.
[redacted]
Hawthorne, CA 90250
(213) 973-7707
Major Markets: Component, Computer and Peripheral Manufacturing
Net Sales: $5 Million — $25 Million (1982)
Geographic Coverage: International
Year Established: 1976
Number of Employees: 50

JAPAN DIGITAL LABORATORY
Pacific Technology Services, Inc
Suite 610
332 Pine Street
San Francisco, CA 94104
(415) 956-3926
Major Markets: Component, Computer, Peripheral and Office Equipment Manufacturing
Target Industries: Scientific; Engineering
Target Applications: CAD/CAM
Geographic Coverage: International
Year Established: 1968
Number of Employees: 500

JOHN BELL ENGINEERING
1014 Center St
San Carlos, CA 94070
(415) 592-8411
Major Markets: Component, Computer and Peripheral Manufacturing, Software House
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: John Bell Jr
Head of Customer Service: Renee Paredy
Geographic Coverage: International
Year Established: 1979
Number of Employees: 6

JOHN FLUKE MANUFACTURING CO., INC.
Industrial Measurement and Control Division
6920 Seaway Blvd
P O Box C-9090
Everett, WA 98206
(206) 342-6300
Major Markets: Terminal and Special Systems Manufacturing
Target Industries: Manufacturing
Target Applications: Production Testing
Contacts:
Head of Customer Service: Jerry LaRoche
Geographic Coverage: International
Year Established: 1949
Number of Employees: 400

JVC AMERICA
299 Market St
Saddle Brook, NJ 07662
(201) 368-3666
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing/Sales: Mr. Ochiai
Geographic Coverage: National
Number of Employees: 50

JUPITER SYSTEMS, INC.
2126 Sixth St
Berkeley, Ca 94710
(415) 644-1024
Major Markets: Terminal Manufacturing, Maintenance/Other Services
Target Industries: Manufacturing; Engineering, Research, Animation
Target Applications: CAD/CAM; Graphics, Simulation Modeling
Contacts:
Head of Marketing: Leroy Becker
Geographic Coverage:
Year Established: 1982
Number of Employees: 35

KATE INSTRUMENTS, INC.
11 Deangelo Drive
Bedford, MA 01730
(617) 275-0300
Major Markets: OEM (Computer Systems)
Target Applications: Physical Measurement
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Jack Joyce
Head of Engineering: Dr. Robert [illegible]
Geographic Coverage: International
Year Established: 1955
Number of Employees: 180

KENNEDY CO.
1600 Shamrock Ave.
Monrovia, CA 91016
(213) 357-8831
Major Markets: Peripheral Manufacturing
Target Industries: OEM Suppliers, OEM
Net Sales: $25 Million — $100 Million (1982)
Contacts:
Head of Marketing: Ross [illegible]
Geographic Coverage: International
Year Established: 1954
Number of Employees: 1,000

KENNEWICK INDUSTRIAL CORP.
113 E. Columbia Drive
Kennewick, WA 99336
(509) 582-5156
Major Markets: Terminal Manufacturing, Dealer/Distributor
Contacts:
Head of Marketing: Dan Bernard
Geographic Coverage: International
Year Established: 1980
Number of Employees: 52

KINTRON CORP.
2225-I Martin Ave
Santa Clara, CA 95050
(408) 727-1510
Major Markets: Terminal Manufacturing
Target Industries: Distributors, System Integrators, OEM
Geographic Coverage: International
Year Established: 1979
Number of Employees: 14

KLC CORP.
2500 E. Colorado Blvd
Pasadena, CA 91107
(213) 796-0525
Major Markets: Peripheral Manufacturing, OEM (Computer Systems), Software House, Maintenance/Other Services
Target Industries: Apparel; Manufacturing; Marketing
Target Applications: Piecework; Payroll, Product Control
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Marketing: K. Connelly
Head of Sales: J. Chris Connelly
Head of Engineering: D. Chesterby
Head of Customer Service: R. Connelly
Geographic Coverage: International
Year Established: 1976
Number of Employees: 8

KMW SYSTEMS CORP.
8307 Highway 71 W.
Austin, TX 78735
(512) 288-1453
Major Markets: Computer, Peripheral, Communications Equipment and Interface Manufacturing
Target Industries: Geophysical, Aerospace
Target Applications: Communication, Graphics; Channel Interfacing
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing: Fred Klingensmith
Head of Sales: Steve Stillman
Head of Software: Harry D. Kelms
Head of Engineering: Thomas Allen
Head of Customer Service: Karen Willey
Geographic Coverage: International
Year Established: 1975
Number of Employees: 40

KONAN CORP.
1448 N. 27th Ave
Phoenix, AZ 85009
(602) 269-2649
Major Markets: Component Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Ben Baughman
Geographic Coverage: International
Year Established: 1978
Number of Employees: 35

KONGSBERG NORTH AMERICA, INC.
Data Systems
11500 Charles St
Houston, TX 77041
(713) 466-4881
Major Markets: Peripheral Manufacturing, OEM (Computer Systems)
Target Industries: Engineering
Contacts:
Head of Marketing: Erik Berg
Head of Software: Jim Willis
Geographic Coverage: International
Year Established: 1983

KONISHIROKU PHOTO [illegible] CO., LTD.
440 Sylvan Ave
Englewood Cliffs, NJ 07632
(201) 568-3100
Major Markets: Peripheral Manufacturing, OEM (Peripherals/Terminals)
Contacts:
Head of Marketing: K. Surayoshi
Head of Sales: Bill Dimmo
Geographic Coverage: National
Year Established: 1953
Number of Employees: 150

LEADING EDGE PRODUCTS, INC.
221 Turnpike St.
Canton, MA 02021
[illegible]
Major Markets: Peripheral Manufacturing, Dealer/Distributor, Miscellaneous Computer Supplies
Target Industries: System houses; Computer Retail Stores
Target Applications: Accounting; Games, Education
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing: William Sellers
Geographic Coverage: International
Year Established: 1979
Number of Employees: 160

LEAR SIEGLER, INC. (LSI)
Data Products Division
714 N. Brookhurst St.
Anaheim, CA 92803
(714) 774-1010
Major Markets: Peripheral Manufacturing, OEM (Peripherals/Terminals)
Target Industries: OEM; Large End Users
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing: George Beardsley
Geographic Coverage: International
Year Established: 1978
Number of Employees: 500

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11333 Pagemill Road
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[illegible]
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Tulsa ..... (918) 665-3200

WEST
Denver..... (303) 694-1662
Phoenix..... (602) 243-6601
San Diego..... (619) 268-1201
Sunnyvale..... (408) 773-9990

LEE DATA CORP.
7075 Flying Cloud Drive
[illegible]

Vendors

Major Markets: Terminal Manufacturing
Net Sales: $5 Million — $25 Million (1980)
Contacts:
Head of Sales: Fred Sweeny
Head of Engineering: Doug Pihl
Geographic Coverage: International
Year Established: 1979
Number of Employees: 800

LEGEND INDUSTRIES, LTD.
Industrial Computer Division
2220 Scott Lake Road
P O Box 112
Pontiac, MI 48054
(313) 674-0953
Major Markets: Peripheral Manufacturing
Target Industries: Computer; Apple Computer Market
Geographic Coverage: International
Year Established: 1980
Number of Employees: 11

LIBERTY ELECTRONICS, U.S.A.
100 Clement St.
San Francisco, CA 94118
(415) 751-7560
Major Markets: Terminal Manufacturing
Contacts:
Head of Marketing: Tim Meadows
Head of Sales: Ed Trotter
Head of Engineering: Brad Wang
Geographic Coverage: International
Year Established: 1981
Number of Employees: 20

LSI RESEARCH CORP.
2620 Walnut
Tustin, CA 92680
(714) 641-8850
Major Markets: Component and Computer Manufacturing, Dealer/Distributor
Target Industries: Small Business
Contacts:
Head of Marketing: Ken Woog
Geographic Coverage: International
Year Established: 1979
Number of Employees: 40

LOBO SYSTEMS, INC.
358 S Fairview Ave
Goleta, CA 93117
(805) 683-1576
Major Markets: Computer and Peripheral Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Doug Rex
Head of Engineering: Kirk Hobart
Geographic Coverage: International
Year Established: 1977
Number of Employees: 40

LOCAL DATA, INC.
2701 Toledo St
Torrance, CA 90503
(213) 320-7126
Major Markets: Communications Equipment Manufacturing
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Dave Guthrie
Head of Engineering: Dennis Klien
Head of Customer Service: Kevin Jackson
Geographic Coverage: International
Year Established: 1977
Number of Employees: 23

LOCOM CORP.
2350 Bering Drive
San Jose, CA 95131
(408) 942-1414
Major Markets: Peripheral Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Sandra Davenport
Geographic Coverage: International
Year Established: 1979
Number of Employees: 25

LOMAS DATA PRODUCTS, INC.
66 Hopkinton St
Westboro, MA 01581
(617) 366-6434
Major Markets: Component Manufacturing, OEM (Computer Systems)
Target Industries: OEM; Dealers
Target Applications: General Purpose
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Software/Engineering: Richard Lomas
Geographic Coverage: International
Year Established: 1980
Number of Employees: 15

L-W INTERNATIONAL
6416 Vanet Ave
Woodland Hills, CA 91367
(213) 348-8614
Major Markets: Peripheral Manufacturing
Target Industries: Engineering, Medical; Sports, Military
Geographic Coverage: National
Year Established: 1957
Number of Employees: 20

MACROLINK
1150 E Stanford Court
Anaheim CA 92805
(714) 634-8080
Major Markets: Component, Peripheral and Communications Equipment Manufacturing
Target Industries: Oil, Scientific
Target Applications: CAD/CAM
Contacts:
Head of Marketing: Bill Goodale
Geographic Coverage: International
Year Established: 1978
Number of Employees: 19

MACROTECH INTERNATIONAL CORP.
20630 Lassen St
Chatsworth CA 91311
(213) 700-1501
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing/Sales: Bruce Kimmel
Head of Engineering: Michael H Pelkey
Geographic Coverage: International
Year Established: 1981
Number of Employees: 20

MAGNATAPE CORP.
P O Box 317
Duarte, CA 91010
(213) 357-9921
Major Markets: Peripheral Manufacturing
Target Industries: OEM
Contacts:
Head of Marketing: Gary L. Webb
Head of Engineering: KoKo Gyi
Geographic Coverage: National
Year Established: 1981
Number of Employees: 25

MAGNUSON COMPUTER SYSTEMS, INC.
2902 Orchard Pkwy
San Jose, CA 95134
(408) 946-8100
Major Markets: Computer Manufacturing; OEM (Computer Systems)
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing: Jerome J. Burke
Head of Engineering: N. David Wheeler
Geographic Coverage: International
Year Established: 1977
Number of Employees: 285

MANAGEMENT ASSISTANCE, INC.
Basic Four Information Systems
14101 Myford Road
Tustin, CA 92680
Major Markets: Computer and Office Equipment Manufacturing, Software House, Systems House (Commercial OEM), Dealer/Distributor
Target Industries: Distribution, Manufacturing
Contacts:
Head of Marketing: William Rigby
Head of Sales: Paul Olin
Head of Software: Roger Sparks
Head of Engineering: Robert Hery
Geographic Coverage: International
Year Established: 1971
Number of Employees: 1,500

MANNESMANN TALLY CORP.
8301 S 180th
Kent WA 98032
(206) 251-5500
Major Markets: Component, Terminal and Peripheral Manufacturing
Contacts:
Head of Marketing: Horst Mader
Head of Sales: David del Valle
Head of Software/Engineering: Robert Adams
Head of Customer Service: Doug Hurrell
Geographic Coverage: International
Year Established: 1948
Number of Employees: 450

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MASSCOMP
543 Great Road
Littleton MA 01460
(617) 486-9425
Major Markets: Computer Manufacturing, OEM (Computer Systems)
Target Industries: Engineering; Scientific, OEM
Target Applications: Computation, Graphics
Contacts:
Head of Marketing: Allan L. Wallack
Geographic Coverage: National
Year Established: 1981
Number of Employees: 45

MASSTOR SYSTEMS, CORP.
541 Lakeside Drive
Sunnyvale, CA 94086
(408) 737-2500
Major Markets: Peripheral Manufacturing, Software House, Systems House (Commercial OEM); Dealer/Distributor, Maintenance/Other Services
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: John Oelschlaeger
Geographic Coverage: International
Year Established: 1976
Number of Employees: 150

MATCHLESS SYSTEMS
18444 S Broadway
Gardena, CA 90248
(213) 327-1010
Major Markets: Computer Manufacturing; OEM (Computer Systems); OEM (Peripherals/Terminals)
Target Industries: OEM/Dealer
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Marketing: Bette Hammond
Geographic Coverage: International
Year Established: 1979

MAXTON CORP.
61 E. Daggett
San Jose, CA 95134
(408) 942-1700
Major Markets: Peripheral Manufacturing
Target Industries: Computer
Contacts:
Head of Marketing: Robert G. Teal
Head of Sales: Leon Mahmud
Head of Engineering: Jack S. Swartz
Head of Customer Service: Norman K. Zimmerman
Geographic Coverage: International
Year Established: 1982
Number of Employees: 175

MDB SYSTEMS, INC.
1995 N. Batavia St.
Orange, CA 92665
(714) 998-6900
Major Markets: Component and Communications Equipment Manufacturing
Target Industries: Education; Government
Contacts:
Head of Marketing: Jonnda Perry
Head of Sales: Bill Wollam
Geographic Coverage: International
Year Established: 1970
Number of Employees: 150

MDS TRIVEX, INC.
Trivex Division
3180 Redhill Ave.
Costa Mesa, CA 92626
(714) 546-7781
Major Markets: Component, Terminal and Peripheral Manufacturing
Target Applications: IBM 3270-Compatible
Contacts:
Head of Marketing: Carol Hoffman
Head of Sales: V. Kenneth Leer
Head of Engineering: Richard P. Kretschmann
Geographic Coverage: International
Year Established: 1964
Number of Employees: 100

MEASUREMENT SYSTEMS & CONTROLS, INC.
Systems Group
1601 Orangewood Ave.
Orange, CA 92668
(714) 633-4460
Major Markets: Component, Computer and Peripheral Manufacturing
Target Industries: Education; Government
Target Applications: Accounting; Inventory; WP
Contacts:
Head of Sales/Marketing: Dave Jenoff
Head of Software/Engineering: Lowell Dunn
Geographic Coverage: International
Year Established: 1978
Number of Employees: 45

MEGADATA CORP.
35 Orville Drive
Bohemia, NY 11716
(516) 589-6800
Major Markets: Computer and Office Equipment Manufacturing
Net Sales: $1 Million — $5 Million (1982)
Geographic Coverage: International
Year Established: 1967
Number of Employees: 150

MEGALOGIC CORP.
9659 National Road
Brookville, OH 45309
(513) 833-5222
Contacts:
Head of Marketing: Nick Schuster
Geographic Coverage: International
Year Established: 1976
Number of Employees: 13

MEGATEK CORP.
9605 Scranton Road
San Diego, CA 92121
(619) 455-5590
Major Markets: Terminal Manufacturing
Target Industries: Engineering, Manufacturing, Energy, Oil Exploration
Target Applications: CAD/CAM
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing: Hiram French
Head of Engineering: Charles Daley
Geographic Coverage: International
Year Established: 1972
Number of Employees: 450

MEGAVAULT
6431 Independence Ave.
Woodland Hills, CA 91367
(213) 884-7300
Major Markets: Peripheral Manufacturing
Target Industries: System Houses
Contacts:
Head of Sales: Howard Wing
Geographic Coverage: International
Year Established: 1982
Number of Employees: 100

MEMODYNE CORP.
220 Reservoir St.
Needham Heights, MA 02194
(617) 444-7000
Major Markets: Peripheral Manufacturing
Contacts:
Head of Sales: Normand H. Renaud
Geographic Coverage: International
Year Established: 1971
Number of Employees: 40

MEMOREX CORP.
Santomas and Central Expressways
Santa Clara, CA 95052
(408) 987-1000
Major Markets: Terminal and Peripheral Manufacturing, Miscellaneous Computer Supplies
Contacts:
Head of Marketing: James Castle
Head of Sales: Sam Spadafora
Head of Customer Service: Robert Berry
Geographic Coverage: International
Year Established: 1961
Number of Employees: 10,000

MEMORY MERCHANT
[illegible]
San Leandro, CA 94577
(415) 483-1008
Major Markets: Component Manufacturing
Net Sales: $500,000 — $1 Million (1982)
Geographic Coverage: International
Year Established: 1981
Number of Employees: 4

MEMOTECH CORP.
[illegible]
7550 W. Yale Ave.
Denver, CO 80227
(303) 986-1516
Major Markets: Component, Terminal and Peripheral Manufacturing, OEM (Computer Systems), Software House, Dealer/Distributor
Target Industries: Manufacturing, Retail
Target Applications: Graphics
Net Sales: $1 Million — $5 Million (1982)
Geographic Coverage: International
Year Established: 1980
Number of Employees: 56

MENTEC
Keewaydin Drive
Salem, NH 03079
(603) 893-8080
Major Markets: OEM (Peripherals/Terminals)
Target Industries: Microcomputer Manufacturing
Contacts:
Head of Marketing: Pat Dodds
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 250

MENTAL LOGIC LABORATORIES
U.S. Rt. 6
Clarks Corner
Hampton, CT 06247
(203) 455-0008
Major Markets: Component Manufacturing, OEM (Computer Systems), Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: OEM
Geographic Coverage: National
Year Established: 1972
Number of Employees: 5

[illegible]
15181 Business Ave.
Dallas, TX 75234
(214) 484-0640
Major Markets: Computer and Peripheral Manufacturing
Target Industries: Manufacturing, OEM, Restaurant
Target Applications: Restaurant Management
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Mike Harvey
Geographic Coverage: National
Year Established: 1980
Number of Employees: 20

MERGENTHALER/SYCRO-TEK
820 W. 2nd St.
Wichita, KS 67203
(316) 945-5087
Major Markets: Computer and Terminal Manufacturing, Software House, Systems House (Commercial OEM), Dealer/Distributor, Maintenance/Other Services
Target Industries: Newspaper; Publisher, Video
Target Applications: Front-End System; Video
Contacts:
Head of Marketing: David Walker
Head of Sales: Jerry Perkins
Head of Software: David S. Gilbert
Head of Customer Service: Al [illegible]
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 180

MESA TECHNOLOGY CORP.
16021 Industrial Drive
Gaithersburg, MD 20877
(301) 948-4612
Major Markets: Peripheral Manufacturing, Software House, Systems House (Commercial OEM), Dealer/Distributor
Target Industries: Government, Banking, Engineering
Contacts:
Head of Marketing: David Bolotti
Geographic Coverage: National
Year Established: 1969
Number of Employees: 62

METHEUS CORP.
5289 Elam Young Parkway
Hillsboro, OR 97123
(503) 640-8000
Major Markets: Component Manufacturing, OEM (Computer Systems), OEM (Peripherals/Terminals), Software House
Target Applications: CAD/CAM
Contacts:
Head of Marketing: Gary Romans
Head of Sales: Weldon Gates
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 50

MICMAN SYSTEMS, INC.
[illegible]
Palo Alto, CA 94303
(415) 964-2862
Major Markets: OEM (Computer Systems)
Target Industries: Process Control, Communications
Target Applications: Graphics, [illegible]
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software/Engineering: Rod Allen
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 12

MICROCOMPUTER SYSTEMS, INC.
1814 Ryder Drive
Baton Rouge, LA 70808
(504) 769-2154
Major Markets: OEM (Computer Systems), Systems House (Commercial OEM)
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 12

MICRO CONTROL SYSTEMS, INC.
143 Tunnel Road
Vernon, CT 06066
Year Established: [illegible]
Major Markets: Peripherals
Manufacturing; OEM (Computer Systems), Software House, CAD graphics
Target Industries: Manufacturing; Engineering, Education
Target Applications: CAD, Three-Dimensional Graphics
Contacts:
Head of Marketing: Livingston Davies
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 15

Vendors

MICRODATA CORP.
4000 McArthur
P O Box 19501
Irvine, CA 92713
(714) 250-1000
Major Markets: Computer, Terminal and Peripheral Manufacturing
Target Industries: General Business
Contacts:
Head of Marketing/Sales: John R [illegible]
Geographic Coverage: International
Year Established: 1969
Number of Employees: 3,000

[illegible]
Rt 30 W
Greengate Professional Building
Greensburg, PA 15601
(412) 837-7072
Major Markets: Peripheral Manufacturing, Systems House (Commercial OEM)
Contacts:
Head of Sales: Ron Menhorn
Geographic Coverage: International
Year Established: 1977
Number of Employees: 5

MICROMATION
1620 Montgomery
San Francisco, CA 94111
(415) 398-0289
Major Markets: Computer and Terminal Manufacturing, OEM (Peripherals/Terminals), Maintenance/Other Services
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: William McIntyre
Head of Software: Vince Conroy
Head of Engineering: Benjamin Cooper
Geographic Coverage: International
Year Established: 1977
Number of Employees: 100

[illegible], INC.
9436 Irondale Ave.
Chatsworth, CA 91311
(213) 998-0070
Major Markets: Peripheral Manufacturing
Target Industries: Process Control
Contacts:
Head of Sales: Mose Jadaon
Geographic Coverage: International
Year Established: 1976
Number of Employees: 30

[illegible], INC.
9754 Deering Ave
Chatsworth, CA 91311
(213) 709-4202
[illegible] Peripheral Manufacturing
Target Applications: WP; Small Business Systems; Personal Computer
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing/Sales: Michael Krunic
Head of Engineering: Jim Scieszinski
[illegible] Spindler
Geographic Coverage: International
Year Established: 1977
Number of Employees: 600

MICRO PERIPHERALS, INC.
4426 S Century
Salt Lake City, UT 84107
(801) 263-3081
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: Otis Page
Geographic Coverage: International
Year Established: 1976
Number of Employees: 95

MICROPOLIS CORP.
21329 Nordhoff St
Chatsworth, CA 91311
(213) 709-3300
Major Markets: Peripheral Manufacturing
Geographic Coverage: International
Year Established: 1977
Number of Employees: 500

MICROPROCESSOR SYSTEMS, INC.
215 Candace Drive
Maitland, FL 32751
(305) 834-2393
Major Markets: Computer, Terminal and Peripheral Manufacturing, OEM (Computer Systems)
Target Industries: OEM
Target Applications: CPM, MPM
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Wendell A. [illegible]
Head of Engineering: Jerry A. Horn
Geographic Coverage: International
Year Established: 1976
Number of Employees: 42

MICROPRODUCTS
24627 Watt Road
Ramona, CA 92065
(619) 789-6510
Major Markets: Peripheral Manufacturing, Software House; Systems House (Commercial OEM)
Geographic Coverage: Regional
Year Established: 1978
Number of Employees: 7

MICRO-SCI
2188 S. Hathaway St.
Santa Ana, CA 92705
(714) 662-2801
Major Markets: Peripheral Manufacturing; Software House
Contacts:
Head of Marketing: Tim Hanson
Geographic Coverage: International
Year Established: 1980
Number of Employees: 70

MICROSCIENCE [illegible]
575 E. Middlefield Road
Mountain View, CA 94043
(415) 961-2212
Major Markets: Peripheral Manufacturing
Target Industries: OEM
Contacts:
Head of Marketing: Marica Adams
Geographic Coverage: International
Year Established: 19[illegible]
Number of Employees: 40

MICROSOFT
10700 Northup Way
Bellevue, WA 98004
(206) 828-8080
Major Markets: Software House
Target Industries: Manufacturing
Contacts:
Head of Marketing: Nigel Smith
Geographic Coverage: International
Year Established: 1976
Number of Employees: 150

MICRO SYSTEMS DEVELOPMENT CORP., INC.
1560 Teaneck Road
Teaneck, NJ 07666
(201) 837-0032
Major Markets: Terminal Manufacturing; Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Engineering: Joseph Bontritou
Geographic Coverage: International
Year Established: 1977
Number of Employees: 12

MICRO TECHNOLOGY, INC.
1620 Miraloma Ave.
Placenta, CA 92670
(714) 632-7560
Major Markets: Component and Peripheral Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Mike Jacobs
Geographic Coverage: International
Year Established: 1978
Number of Employees: 11

MICROTEK
4750 Viewridge Ave.
San Diego, CA 92123
(619) 569-0900
Major Markets: Terminal Manufacturing
Contacts:
Head of Marketing: Win Schwartau
Geographic Coverage: International
Year Established: 1978
Number of Employees: 70

[illegible], INC.
1314 Hanley Industrial Court
St. Louis, MO 63144
(314) 968-8151
Major Markets: Terminal Manufacturing
Target Industries: OEM; Distribution
Contacts:
Head of Marketing/Sales: Kaye Sutton
Head of Engineering: Geary Green
Geographic Coverage: International
Year Established: 1976
Number of Employees: 100

MIDWESTERN INSTRUMENTS, INC.
5436 S. Mingo Road
Tulsa, OK 74145
(918) 627-7521
Major Markets: Peripheral Manufacturing
Target Industries: R&D
Contacts:
Head of Sales/Customer Service: Argus Castlebury
Head of Engineering: Pat Patterson
Geographic Coverage: National
Year Established: 1948
Number of Employees: 50

MIDWEST SCIENTIFIC INSTRUMENTS, INC.
220 W. Cedar St.
Olathe, KS 66061
(913) 764-3273
Major Markets: Computer and Peripheral Manufacturing; OEM (Computer Systems); Software House, Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1981)
Geographic Coverage: National
Year Established: 1970
Number of Employees: 10

MILTOPE CORP.
1770 Walt Whitman Road
Melville, NY 11747
(516) 420-0200
Major Markets: Peripheral Manufacturing
Target Industries: Military
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing: Robert Ceonzo
Head of Sales: Fred Corb
Head of Software/Engineering: Brian Birch
Geographic Coverage: International
Year Established: 1971
Number of Employees: 475

MINI-COMPUTER SYSTEMS, INC.
399 Fairview Park Drive
Elmsford, NY 10523
(914) 592-8812
Major Markets: Computer Manufacturing; Software House; Systems House (Commercial OEM)
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Jim Tomkins
Head of Software: Chris Sanders
Geographic Coverage: National
Year Established: 19[illegible]
Number of Employees: 150

MINICOMPUTER TECHNOLOGY
696 E. Trimble Road
San Jose, CA 95131
(408) 942-1616
Major Markets: Component Manufacturing
Net Sales: $1 Million — $5 Million (1982)
Geographic Coverage: International
Year Established: 1972
Number of Employees: 30

MINISCRIBE CORP.
1871 Lefthand Circle
Longmont, CO 80501
(303) 651-6000
Major Markets: Peripheral Manufacturing; OEM (Computer Systems)
Contacts:
Head of Marketing/Sales: Dennis Resnik
Geographic Coverage: International
Year Established: 19[illegible]
Number of Employees: 1,000

MINOLTA CORP.
Business Equipment Division
101 Williams Drive
Ramsey, NJ 07446
(201) 825-4000
Major Markets: Dealer/Distributor; Maintenance/Other Services
Target Industries: OA
Contacts:
Head of Marketing: John Vacca
Head of Software/Customer Service: Dorsey Johnson
Geographic Coverage: International
Year Established: 19[illegible]
Number of Employees: 500

MITRON SYSTEMS CORP.
2000 Century Plaza
Columbia, MD 21044
(301) 992-7700
Major Markets: Terminal and Communications Equipment Manufacturing
Geographic Coverage: International
Year Established: 1969
Number of Employees: 20

MITSUBISHI ELECTRONICS AMERICA, INC.
Computer Division
991 Knox St.
Torrance, CA 90502
(213) 515-3993
Major Markets: Computer, Terminal and Peripheral Manufacturing; OEM (Computer Systems); Software House, Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing;
Target Applications: Accounting; Data Entry
Net Sales: More than $100 Million (1981)
Geographic Coverage: National
Year Established: 1979
Number of Employees: 100

MODULAR COMPUTER SYSTEMS, INC. (MODCOMP)
1650 W. McNab Road
Ft. Lauderdale, FL 33310
(305) 974-1380
Major Markets: Computer and Communications Equipment Manufacturing; Maintenance/Other Services
Target Industries: Process Control; Communications, Viewdata; Power Generation
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing: Philippe Courtot
Head of Engineering: Harold Koplow
Head of Customer Service: Jess
Geographic Coverage: International
Year Established: 1970
Number of Employees: 1,500

MOHAWK DATA SCIENCES CORP.
Seven Century Drive
Parsippany, NJ 07054
(201) 540-9060
and Peripheral Manufacturing;
Software House
Target Industries: Hospitals; Hospitality, Retail Footware; Motor
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: Brian S. Gaylord
Geographic Coverage: International
Year Established: 1964
Number of Employees: 5,300

MONITOR DYNAMICS, INC.
1121 W. 9th St.
Upland, CA 91786
(714) 982-2216
Major Markets: Peripheral Manufacturing; OEM (Computer Systems)
Target Industries: OEM
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: William Blaine
Geographic Coverage: National
Year Established: 1972
Number of Employees: 16

MONOLITHIC SYSTEMS CORP.
84 Inverness Circle E.
Englewood, CO 80112
(303) 770-7400
Major Markets: Component, Computer and Peripheral Manufacturing, OEM (Peripherals/Terminals); Software House
Net Sales: $1 Million — $5 Million (1981)
Geographic Coverage: International
Year Established: 1970
Number of Employees: 100

MORROW DESIGNS
San Leandro, CA 94577
(415) 430-1970
Major Markets: Component and Computer Manufacturing
Contacts:
Head of Marketing: Thomas Van
Head of Sales: Chris Ray
Geographic Coverage: International
Year Established: 1977
Number of Employees: 100

MOSAIC SYSTEMS, INC.
5221 Central Ave
Richmond, CA 94804
(415) 524-2101
Major Markets: Component, Computer and Peripheral Manufacturing; Software House; Systems House (Commercial OEM)
Contacts:
Head of Marketing: Bob Dilworth
Geographic Coverage: International
Year Established: 1976
Number of Employees: 70

MOSELEY ASSOCIATES, INC.
111 Castilian Drive
Goleta, CA 93117
(805) 968-9621
Major Markets: Component and Communications Equipment Manufacturing
Contacts:
Head of Marketing: Charles Rockhill
Head of Engineering: David Sairley
Geographic Coverage: International
Year Established: 1960
Number of Employees: 150

MOSTEK CORP.
1215 W. Crosby Road
Carrollton, TX 75006
(214) 466-6000
Major Markets: Component, Computer and Peripheral Manufacturing; Software House
Target Industries: Manufacturing
Geographic Coverage: International
Year Established: 1970
Number of Employees: 3,800

MOTOROLA, INC.
Semiconductor Sector
5005 E. McDowell Road
Phoenix, AZ 85008
(602) 244-6900
Major Markets: Component, Computer, Terminal and Peripheral Manufacturing; OEM (Computer Systems); Maintenance/Other
Target Industries: Government, Industrial, Commercial
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing: Charles E. Thompson
Head of Sales: Brian Hilton
Geographic Coverage: International
Number of Employees: 20,000

MOUNTAIN ASSOCIATES, INC.
300 El Pueblo Road
Scotts Valley, CA 95066
(408) 438-6650
Major Markets: Peripheral and Communications Equipment Manufacturing
Target Applications: Data Entry; Communications, Storage System
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of
Head of Engineering: Eric Swartz
Geographic Coverage: International
Number of Employees: 70

MPC PERIPHERALS CORP.
9424 Chesapeake Drive
San Diego, CA 92123
(619) 278-0630
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: J. Morton Stong
Head of Engineering: Richard Ostrow
Head of Customer Service: Rene Youngers
Geographic Coverage: International
Year Established: 1981
Number of Employees: 12

MSI DATA CORP.
340 Fischer Ave.
(714) 549-6000
Major Markets: Terminal Manufacturing
Target Applications: Data Entry
Net Sales: $50 Million — $100 Million (1981)
Contacts:
Head of Marketing: Don Brosnan
Head of Sales: Aubrey Easterlin
Head of Software: Al Pappas
Geographic Coverage: International
Number of Employees: 850

MULTI-SYSTEMS
3014 Robert T. Longway Blvd.
Flint, MI 48506
(313) 235-3538
Major Markets: Component Manufacturing, OEM (Computer Systems), Software House; Dealer/Distributor, Maintenance/Other Services
Target Industries: Manufacturing, Medical
Geographic Coverage: National
Year Established: 1977
Number of Employees: 15

MYLEE DIGITAL SCIENCES, INC.
155 Weldon Parkway
Maryland Heights, MO 63043
(314) 567-3420
Major Markets: Computer Manufacturing; Systems House (Commercial OEM)
Target Industries: Plumbing, Heating, Air Conditioning
Target Applications: Inventory Management; POS Polling, Accounting
Head of Marketing: Tom Fisher
Geographic Coverage: National
Number of Employees: 65

NABU COMMERCIAL
INC.
333 Metro Park
Rochester, NY 14623
(716) 475-1221
Major Markets: Dealer/Distributor
Target Industries: OEM, Distribution
Geographic Coverage: National
Year Established: 1980
Number of Employees: 10

NANODATA COMPUTER CORP.
1 Computer Park
Buffalo, NY 14203
(716) 845-6000
Major Markets: Computer
Target Industries: Aerospace, Government, Education
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing/Sales: Michael Senft
Geographic Coverage: National
Year Established: 1971
Number of Employees: 25

NATIONAL ADVANCED SYSTEMS
Mountain View, CA 94043
(415) 962-6000
Major Markets: Component and Computer Manufacturing, OEM (Peripherals/Terminals), Software House; Maintenance/Other Services
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing/Sales: Jerry Ungermann
Head of Software: Alan Cade
Head of Engineering: C. B. Luce
Head of Customer Service: David Turner
Geographic Coverage: International
Year Established: 1979
Number of Employees: 2,400

Vendors

NATIONAL MEMORY SYSTEMS CORP.
721 Mayview
Livermore, CA 94550
(415) 443-1669
Major Markets: Peripheral Manufacturing, Systems House (Commercial OEM)
Target Industries: Image Processing; Computer Graphics
Target Applications: Financial, Scientific
Geographic Coverage: National
Year Established: 1982
Number of Employees: 13

NATIONAL MICRO PRODUCTS, INC.
430 Southlake Blvd.
Richmond, VA 23236
(804) 794-0517
Major Markets: Computer and Communications Equipment Manufacturing, OEM (Computer Systems), Systems House (Commercial OEM), Dealer/Distributor, Maintenance/Other Services
Target Industries: Small Business, Lodging, Security
Target Applications: Office Networks, Process Control
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Marketing/Software: Carol Nygent
Geographic Coverage: National
Year Established: 1980
Number of Employees: 20

NATIONAL SEMICONDUCTOR CORP.
2900 Semiconductor Drive
Santa Clara, CA 95051
(408) 721-5000
Major Markets: Special Systems, Computer, Peripheral and Communications Equipment Manufacturing
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: F. J. Van Popelen
Geographic Coverage: International
Year Established: 1965
Number of Employees: 35,000

NCR CORP.
World Headquarters
1700 S. Patterson Blvd.
Dayton, OH 45479
(513) 445-5000
Major Markets: Component, Computer, Terminal, Peripheral, Communications Equipment and Office Equipment Manufacturing, Software House, Systems House (Commercial OEM), Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Retail, Banking, Commercial/Industrial, Medical, Education, Government
Target Applications: POS, ATM; General Accounting
Net Sales: $1 Million — $5 Million (1981)
[illegible]
Head of Customer Service: V. F. [illegible]
Geographic Coverage: International
Year Established: 1884
Number of Employees: 63,000

NEC INFORMATION SYSTEMS, INC.
5 Militia Drive
Lexington, MA 02173
(617) 862-3120
Major Markets: Computer and Peripheral Manufacturing, Software House
Target Industries: Pharmacy, Accounting, Legal, Resort
Contacts:
Head of Marketing: Harland K. Lavigne
Geographic Coverage: International
Year Established: 1977
Number of Employees: 500

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Sunnyvale . . . . . (408) 773-9990

NESTAR SYSTEMS, INC.
2585 E. Bayshore Road
Palo Alto, CA 94303
(415) 493-2223
Major Markets: Communications Equipment Manufacturing
[illegible]
Head of Marketing: Peter Hertan
Head of Sales: William Coleman
Head of Engineering: Leonard J. Shustek
Geographic Coverage: International
Year Established: 1978
Number of Employees: 100

NEW ENGLAND DIGITAL CORP.
49 N. Main St.
P.O. Box 546
White River Junction, VT 05001
(802) 295-5800
Major Markets: Computer Manufacturing, OEM (Computer Systems)
Target Industries: Communications, Music
Contacts:
Head of Marketing: Brad Naples
Head of Software: Jeff Risberg
Geographic Coverage: International
Year Established: 1976
Number of Employees: 35

NEW MEDIA GRAPHICS CORP.
279 Cambridge St.
Burlington, MA 01803
(617) 272-8844
Major Markets: Terminal Manufacturing, OEM (Computer Systems), OEM (Peripherals/Terminals)
Target Applications: POS, Training; Visual Data Bases
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Marketing/Sales: Arthur J. Franke
Head of Software/Customer Service: Paul M. Raila
Head of Engineering: Jeffrey Wise
Geographic Coverage: International
Year Established: 1980
Number of Employees: 6

NEWPORT ELECTRONICS, INC.
630 E. Young St.
Santa Ana, CA 92705
(714) 540-4914
Major Markets: Peripheral Manufacturing
Target Industries: Process Control
Contacts:
Head of Marketing: Rob Britton
Head of Engineering: Karl Hindrichs
Geographic Coverage: International
Year Established: 1969
Number of Employees: 180

NICOLET ZETA CORP.
2300 Stanwell Drive
Concord, CA 94520
(415) 671-0600
Major Markets: Peripheral Manufacturing
Target Industries: Banking; OEM
Contacts:
Head of Marketing: Gary Hasenfus
Geographic Coverage: International
Year Established: 1969
Number of Employees: 160

NISSEI SANGYO AMERICA, LTD.
825 Third Ave.
New York, NY 10022
(212) 755-2900
Major Markets: Peripheral Manufacturing, Manufacturers Representatives
Target Industries: OEM
Contacts:
Head of Sales: J. Kanno
Geographic Coverage: National
Year Established: 1957
Number of Employees: 100

NIXDORF COMPUTER CORP.
300 Third Ave.
Waltham, MA 02154
(617) 890-3600
Major Markets: Component, Computer, Terminal, Peripheral and Communications Equipment Manufacturing, Software House; Maintenance/Other Services
Target Industries: Banking, Retail, Transportation, Medical
Target Applications: Accounting; General Business
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: Mike Backler
Head of Sales: Robert Davis
Head of Software: James Addlesberger
Geographic Coverage: International
Year Established: 1952
Number of Employees: 1,800

NOKIA DATA NORTH AMERICAN, INC.
55 William St.
Wellesley, MA 02181
(617) 237-7945
Major Markets: Computer Manufacturing; OEM (Computer Systems), Dealer/Distributor
Target Industries: Government
Geographic Coverage: International
Year Established: 1967
Number of Employees: 1,000

NORTH ATLANTIC INDUSTRIES
Qantex Division
60 Plant Ave.
Hauppauge, NY 11788
(516) 582-6500
Major Markets: Terminal and Peripheral Manufacturing, OEM (Peripherals/Terminals)
Target Industries: Aerospace; Government
Target Applications: Data Logging; Disk Backup
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: S. Richard Rausch
Head of Software: Mario Difede
Head of Engineering: Arthur Frelich
Head of Customer Service: Daniel Carroll
Geographic Coverage: International
Year Established: 1955
Number of Employees: 375

NORTHERN TELECOM, INC.
Cook Electric Division
6201 Oakton St.
Morton Grove, IL 60053
(312) 967-6600
Major Markets: Peripheral and Communications Equipment Manufacturing
Target Industries: Communication
[illegible]
Head of Marketing: W. Viviano
Head of Sales: G. Meyer
Geographic Coverage: International
Year Established: 1886
Number of Employees: 700

NORTHERN TELECOM, INC.
Electronic Office Systems Division
Data Park

P.O Box 1222
Minneapolis, MN 55440
(612) 932-8000
Major Markets: Computer, Terminal, Peripheral, Communications Equipment and Office Equipment Manufacturing, Software House; Maintenance/Other Services
Target Industries: Manufacturing, Banking, Government, Education
Target Applications: Inquiry/Response, Data Entry, DDP, Remote Job Entry
Contacts:
Head of Marketing: R.W. Duthie
Head of Sales: S.T. Oppenheimer
Geographic Coverage: International

NORTHERN TELECOM, INC.
Terminal Systems Division
P.O Box 1222
Minneapolis, MN 55440
(612) 932-8000
Major Markets: Computer and Terminal Manufacturing, Software House, Dealer/Distributor, Maintenance/Other Services
Target Industries: Government; Military, Education, Business/Industrial
Target Applications: Data Entry, DDP, OA, On-Line Office
Contacts:
Head of Marketing: Bob Dyerndon
Geographic Coverage: International
Year Established: 1976
Number of Employees: 1,300

NORTHERN TELECOM, INC.
Integrated Office Systems Division
1201 Arapaho
Richardson, TX 75081
(214) 234-7500
Major Markets: Computer, Terminal, Peripheral and Communications Equipment Manufacturing; OEM (Computer Systems); Maintenance/Other Services
Target Industries: Medical, Government, Lodging, Hospitality
Target Applications: Telecommunications
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing: James Landon
Head of Sales: David J. Horton
Geographic Coverage: International
Year Established: 1975
Number of Employees: 7,500

NOVATION, INC.
20409 Prairie St
Chatsworth, CA 91311
[illegible]
Major Markets: Terminal and Communications Equipment Manufacturing
Contacts:
Head of Sales: Jerry Grimson
Geographic Coverage: International
Year Established: 1967
Number of Employees: 125

NOVELL DATA SYSTEMS, INC.
1170 N. Industrial Park Drive
Orem, UT 84057
(801) 226-8202
Major Markets: Terminal and Peripheral Manufacturing
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing: D. Guerrero
Head of Sales: Reid Clark
Geographic Coverage: International
Year Established: 1980
Number of Employees: 35

NUMONICS
418 Pierce St
Lansdale, PA 19446
(215) 362-2766
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: Phyllis Ulrich
Geographic Coverage: International
Year Established: 1969
Number of Employees: 30

OCTAGON COMPUTER SYSTEMS
151 Burnell Ave.
San Jose, CA 95119
(408) 225-2700
Major Markets: Computer Manufacturing
Target Applications: General Purpose
Contacts:
Head of Software: Charles Goodman
Head of Engineering: Joel Walz
Geographic Coverage: International
Year Established: 1982
Number of Employees: 10

OKIDATA CORP.
111 Gaither Drive
Mt. Laurel, NJ 08054
(609) 235-2600
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: C. Baffa
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 300

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Phoenix ..... (602) 243-6601
San Diego ..... (619) 268-1201
Sunnyvale ..... (408) 773-9990

OLYMPIA U.S.A., INC.
Rt. 22
P.O Box 22
Somerville, NJ 08876
(201) 722-7000
Major Markets: Computer and Office Equipment Manufacturing, OEM (Peripherals/Terminals); Miscellaneous Computer Supplies
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Sales: Carl Robbins
Geographic Coverage: National
Year Established: 1940
Number of Employees: 280

OMTI
557 Salmar Ave.
Campbell, CA 95008
(408) 370-3555
Major Markets: Component Manufacturing
Contacts:
Head of Marketing: Richard Gunderson
Geographic Coverage: International
Year Established: 1980
Number of Employees: 40

ONYX & IMI, INC.
Datafilux Corp
1050 Stewart Drive
Sunnyvale, CA 94086
(408) 732-7070
Major Markets: Peripheral Manufacturing
Target Industries: OEM
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Albert Havan
Head of Engineering: Donald Parker
Geographic Coverage: National
Year Established: 1970
Number of Employees: 65

ONYX & IMI, INC.
International Memories, Inc.
10381 Bandley Drive
Cupertino, CA 95014
(408) 446-9779
Major Markets: Component and Peripheral Manufacturing
Target Industries: OEM
Contacts:
Head of Marketing: Joel Levine
Geographic Coverage: International
Year Established: 1977
Number of Employees: 325

ONYX SYSTEMS
25 E. Trimble Road
San Jose, CA 95131
(408) 946-6330
Major Markets: Computer Manufacturing
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing: Tom Anthony
Head of Sales: Mike Spera
Geographic Coverage: International
Year Established: 1979
Number of Employees: 120

OPE PRINTERS, INC.
505 White Plains Road
Tarrytown, NY 10591
(914) 631-3000
Major Markets: OEM (Peripherals/Terminals)
Contacts:
Head of Marketing: Gianni Subrizi
Geographic Coverage: National
Year Established: 1983
Number of Employees: 10

OPTRONICS INTERNATIONAL, INC.
7 Stuart Road
Chelmsford, MA 01824
(617) 256-4511
Major Markets: Computer and Peripheral Manufacturing, Software House, Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Medical, Manufacturing, Remote Sensing
Contacts:
Head of Marketing: Les E. Silvern
Head of Software: Gregory Hirshan
Head of Engineering: Thomas Boston
Geographic Coverage: International
Year Established: 1968
Number of Employees: 100

PALM BEACH COMPUTERS, INC.
[illegible]
Lantana, FL 33462
[illegible]
Major Markets: Component and Computer Manufacturing, OEM (Computer Systems), Software [illegible]
Target Industries: Accounting; [illegible]
Contacts:
Head of Software: T.D. Farnsworth
Geographic Coverage: Florida
Year Established: 1978
Number of Employees: 5

PANASONIC INDUSTRIAL CO.
Matsushita Electronic Corp. of America
One Panasonic Way
Secaucus, NJ 07094
(201) 348-7000
Major Markets: Component, Computer, Communications Equipment and Office Equipment Manufacturing, OEM (Computer Systems); OEM (Peripherals/Terminals)
Target Industries: Banking; Manufacturing, Retail
Target Applications: Data Entry
Contacts:
Head of Marketing: Scott Minakami
Head of Sales: Joe Shohtoku
Geographic Coverage: International
Year Established: 1982
Number of Employees: 2,000

PARADYNE CORP.
8550 Ulmerton Road
P.O. Box 2826
Largo, FL 33540
(813) 530-2000
Major Markets: Computer, Terminal and Communications Equipment

Vendors

Manufacturing, OEM (Computer Systems), OEM (Peripherals/Terminals), Maintenance/Other Services
Target Industries: Banking, Engineering, Manufacturing, Retail
Target Applications: WP, Data Entry, DBMS, OA
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: Jerry T Kendall
Head of Sales: John Mullaney
Head of Engineering: Ken Wall
Head of Customer Service: John [illegible]
Geographic Coverage: International
Year Established: 1969
Number of Employees: 3 100

PCE SYSTEMS
4219 S Market Court
Unit H
Sacramento, CA 95834
(916) 921-5454
Major Markets: Component and Computer Manufacturing, OEM (Computer Systems); Software House
Target Industries: Engineering, Financial
Target Applications: Office Communications
Net Sales: $1 Million — $5 Million (1982)
[illegible]
Head of Marketing: Dave Alling
Geographic Coverage: International
Year Established: 1977
Number of Employees: 20

PESC, INC.
501 D. Vandell Way
Campbell, CA 95008
(408) 866-7838
Major Markets: Component and Peripheral Manufacturing
Geographic Coverage: International
Year Established: 1975
Number of Employees: 10

PENTEL OF AMERICA, LTD.
2715 Columbia St
Torrance, CA 90503
(213) 320-3831
Major Markets: Computer and Peripheral Manufacturing
Target Industries: Commercial
[illegible]
Head of Marketing/Sales: M. Osada
Head of Software: Y. Shimoeda
Head of Engineering: T. Ozeki
Head of Customer Service: T Nakayama
Geographic Coverage: International
[illegible]
Number of Employees: 300

PERCOM DATA CORP.
11220 Pagemill Road
Dallas, TX 75243
(214) 340-7081
Major Markets: Peripheral Manufacturing, Software House
Contacts:
Head of Marketing: George MacIntyre
Geographic Coverage: International
Year Established: 1976

PERIPHERAL SYSTEMS, INC.
1000 Lincoln Drive E.
Marlton, NJ 08053
(609) 983-7300
Major Markets: Terminal Manufacturing
Contacts:
Head of Marketing: Anna Marie Sebastiano
Geographic Coverage: National
Year Established: 1978
Number of Employees: 15

PERIPHERAL TECHNOLOGY, INC.
14784 N E 95th St
Redmond, WA 98052
(206) 881-6691
Major Markets: Component and Terminal Manufacturing, Software House, Maintenance/Other Services
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Marketing/Sales: Richard Aydelotte
Head of Engineering/Customer Service: Al Williams
Geographic Coverage: International
Year Established: 1979
Number of Employees: 35

PERKIN-ELMER CORP.
Terminals Division
360 Rt. 206 S
Flanders, NJ 07836
(201) 584-1400
Major Markets: Terminal Manufacturing
Geographic Coverage: International
Year Established: 1976
Number of Employees: 200

PERKIN-ELMER CORP.
Data Systems Group
2 Crescent Place
Oceanport, NJ 07757
(201) 870-4712
Major Markets: Computer Manufacturing
Target Industries: Financial, Scientific; Geophysical, Aerospace and Weapons
Target Applications: CAD/CAM, Simulation
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: B. Rosenbaum
Head of Sales: James K. Sims
Head of Software: David Caplan
Head of Customer Service: Joseph Rechner
Geographic Coverage: International
Year Established: 1968
Number of Employees: 2,000

PERRY DATA SYSTEMS, INC.
3401 Spring Forest Road
Raleigh, NC 27604
(919) 876-8100
Major Markets: Terminal Manufacturing, OEM (Computer Systems)
Target Industries: Oil, Auto; Restaurants, Government
Target Applications: Government Operations; Building Supplies, [illegible]
Net Sales: $5 Million — $25 Million (1982)
Geographic Coverage: National
Year Established: 1967
Number of Employees: 50

PES SCI, INC.
12624 Daphne Ave
Hawthorne, CA 90250
(213) 777-7536
Major Markets: Peripheral Manufacturing, Dealer/Distributor
Contacts:
Head of Marketing: Dennis Ammons
Geographic Coverage: International
Year Established: 1975
Number of Employees: 50

PERSONAL MICRO COMPUTERS, INC.
475 Elks St.
Mountain View, CA 94043
(415) 962-0220
Major Markets: Computer, Peripheral and Office Equipment Manufacturing, Software House
Contacts:
Head of Marketing: Ron Troxell
Geographic Coverage: International
Year Established: 1980

PERTEC COMPUTER CORP.
Peripherals Division
9610 Desoto Ave
P O Box 2198
Chatsworth, CA 91311
(213) 882-0030
Major Markets: Terminal and Peripheral Manufacturing
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: Jim Youngblood
Geographic Coverage: International
Year Established: 1967
Number of Employees: 1,000

PH-ASSOCIATES, INC.
8720 Old Courthouse Road
Vienna, VA 22180
(703) 281-5762
Major Markets: OEM (Computer Systems), Software House
Target Industries: Government, Commercial
Net Sales: $100,000 — $500,000 (1982)
Geographic Coverage: National
Year Established: 1979
Number of Employees: 5

PHASE DYNAMICS MACHINES CORP.
7650 E. Redfield Road
Scottsdale, AZ 85260
(602) 991-6855
Major Markets: Computer and Terminal Manufacturing
Target Industries: Fortune 500
Contacts:
Head of Marketing: Robert Goerner
Geographic Coverage: International
[illegible]
Number of Employees: 36

PHC, INC.
22 Metty Drive
P.O. Box 1108
Ann Arbor, MI 48106
(313) 994-0504
Major Markets: Component and Computer Manufacturing, OEM (Computer Systems), Software House, Maintenance/Other Services
Target Applications: Process Control
Net Sales: $100,000 — $500,000 (1982)
Geographic Coverage: National
Year Established: 1971
Number of Employees: 6

PHILIPS PERIPHERALS, INC.
385 Oyster Point Blvd
Unit 12
San Francisco, CA 94080
(415) 952 3000
Major Markets: Dealer/Distributor, Maintenance/Other Services
Contacts:
Head of Sales: Meryl Manthey
Head of Customer Service: Warren Whittington
Geographic Coverage: National
Year Established: 1983
Number of Employees: 4

PHOENIX COMPUTER SYSTEMS, INC.
119 Board
Lafayette, LA 70508
(318) 234-0063
Major Markets: Terminal Manufacturing, Software House
Target Industries: Scientific, Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Larry Purcell
Geographic Coverage: National
Year Established: 1976
Number of Employees: 18

PHOENIX DATA, INC.
3384 W. Osborn Road
Phoenix, AZ 85017
(602) 278-8528
Major Markets: Peripheral and Communications Equipment Manufacturing
Contacts:
Head of Marketing: J. Makedonsky
Geographic Coverage: International
Year Established: 1968
Number of Employees: 50

PHOENIX DIGITAL CORP.
2315 N. 35th Ave.
Phoenix, AZ 85009
(602) 278-3591
Major Markets: Computer Terminal and Communications Equipment Manufacturing; OEM (Computer Systems), Maintenance/Other Services
Target Industries: Automotive
Target Applications: Data Acqusition, Process Control
[illegible]
Head of Marketing: Gerald Trussell
Geographic Coverage: International
Year Established: 1977
Number of Employees: 30

PHOSAR, INC.
Inteligent Systems Division
1911 Concourse Drive
San Jose, CA 95131
(408) 946-8030
Major Markets: Terminal Manufacturing
Target Industries: OEM
[illegible]
Head of Marketing: John Cosley
Head of Sales: Fred Fowler
Geographic Coverage: International
Year Established: 1977
Number of Employees: 25

PLESSEY [illegible]
451 Hungerford Drive
Rockville, MD 20850
(301) 279-2892
Major Markets: Computer, Peripheral and Communications Equipment Manufacturing; Dealer/Distributor
Net Sales: More than $100 Million (1981)

Contacts:
Head of Marketing: Garry Tomlins
Head of Sales: Randy Williams
Head of Engineering: Nick Robertshaw
Geographic Coverage: International
Year Established: 1923
Number of Employees: 50,000

PLESSEY PERIPHERAL SYSTEMS
2632 DuBridge Ave.
Irvine, CA 92714
(714) 540-6288
Major Markets: Computer Manufacturing, OEM (Computer Systems); Software House; Systems House (Commercial OEM)
Contacts:
Head of Marketing: Jack Neth
Head of Sales: Gerard Mottier
Head of Software: Randy Hardy
Head of Engineering: Bob Edgart
Geographic Coverage: International
Year Established: 1972
Number of Employees: 100

PLEXUS COMPUTERS, INC.
2230 Martin Ave
Santa Clara, CA 95050
(408) 988-1755
Major Markets: Computer Manufacturing, OEM (Computer Systems)
Target Industries: OEM; Commercial, OA
Target Applications: OA
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: Ralph Mele
Geographic Coverage: International
Year Established: 1980
Number of Employees: 75

POINT FOUR DATA CORP.
2569 McCabe Way
Irvine, CA 92714
(714) 754-4114
Major Markets: Computer Manufacturing, Software House; Dealer/Distributor
Target Industries: OEM; Systems Houses, General Business
Target Applications: Project Management; Code Generation
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales/Marketing: Robin Oliver
Geographic Coverage: International
Year Established:
Number of Employees: 200

POLHEMUS NAVIGATION SCIENCES, INC.
P O Box A
Essex Junction, VT 05452
(802) 879-6547
Major Markets: Peripheral Manufacturing; Maintenance/Other Services
Target Industries: Military
Net Sales: $1 Million — $5 Million (1982)
Geographic Coverage:
Year Established: 1978
Number of Employees: 40

POLYMORPHIC SYSTEMS
Santa Barbara, CA 93117
(805) 967-0468
Major Markets: Computer Manufacturing
Target Industries: Small Business
Target Applications: Business
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing/Sales: Ken Gudis
Head of Software: Lenny Araki
Head of Customer Service: Jeannette Lawson
Geographic Coverage: International
Year Established: 1975
Number of Employees: 85

POTTER INSTRUMENT CO.
10 Main St
Gonic, NH 03867
(603) 332-1991
Major Markets: Component Manufacturing, Data Services (Service Bureau), Maintenance/Other Services
Geographic Coverage: National
Number of Employees: 23

PRACTICAL PERIPHERALS, INC.
31245 LaBaya Drive
Westlake Village, CA 91362
(213) 991-8200
Major Markets: Peripheral Manufacturing
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Arnold Okum
Geographic Coverage: International
Year Established:
Number of Employees: 90

PRESEARCH, INC.
Control Concepts Division
2361 S. Jefferson Davis Highway
P O Box 2367
Manassas, VA 22110
(800) 368-3078
Major Markets: OEM (Peripherals/Terminals)
Target Industries: Bank, Insurance;
Target Applications: Remote 3270
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Marketing: Michael Gollobin
Head of Engineering: Roy Peters
Geographic Coverage: International
Year Established: 1963
Number of Employees: 275

PRIAM CORP.
20 W. Montague Expressway
San Jose, CA 95134
(408) 946-4500
Major Markets: OEM (Computer Systems)
Target Industries: OEM
Contacts:
Head of Marketing: Ben Taniguchi
Head of Engineering: Alonzo A.
Geographic Coverage: International
Year Established: 1978
Number of Employees: 700

PRIMAGES, INC.
620 Johnson Ave
Bohemia, NY 11716
(516) 567-8200
Major Markets: Peripheral Manufacturing; Maintenance/Other Services
Target Industries: Computer Manufacturing
Contacts:
Head of Marketing/Sales: Ted
Head of Software: David Chiang
Head of Engineering: Mosi Chu
Geographic Coverage: International
Year Established: 1981
Number of Employees: 30

PRIME COMPUTER, INC.
Prime Park
Natick, MA 01760
(617) 655-8000
Major Markets: Component, Computer, Terminal, Peripheral and Communications Equipment Manufacturing; OEM (Peripherals/Terminals), Software Reuse, Maintenance/Other Services
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: Robert G. Claussen
Head of Software: Edward J. Christiansen
Head of Engineering: Roland D. Pamper
Geographic Coverage: International
Year Established: 1972
Number of Employees: 5,000

PRINCETON GRAPHIC SYSTEMS
1101-I State Road
Princeton, NJ 08540
(609) 683-1660
Major Markets: Terminal Manufacturing
Target Industries: Apple/IBM Personal Computer
Contacts:
Head of Marketing: Kathy Smith
Geographic Coverage: International
Year Established:
Number of Employees: 10

PRINTACOLOR CORP.
5965 Peachtree Corners E.
Norcross, GA 30071
(404) 448-2675
Major Markets: Peripheral Manufacturing
Target Industries: Manufacturing, Engineering
Target Applications: CAD/CAM; Business Graphics
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Ben Cornett
Geographic Coverage: International
Year Established: 1980
Number of Employees: 35

PRINTEK, INC.
1517 Townline Road
Benton Harbor, MI 49022
(616) 925-3200
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: Wayne Ashby
Geographic Coverage: International
Year Established:
Number of Employees: 70

PRINTRONIX, INC.
17500 Cartwright Road
Irvine, CA 92714
(714) 549-7700
Major Markets: Peripheral Manufacturing
Target Applications: Graphics
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Sales/Marketing: Mel Posin
Geographic Coverage: International
Year Established: 1974
Number of Employees: 1,000

PRODUCT DEVELOPMENT SERVICES, INC.
2000 Black Rock Tnpk
Fairfield, CT 06430
(203) 333-5183
Major Markets: Terminal and Peripheral Manufacturing, OEM (Computer Systems), OEM (Peripherals/Terminals), Software House, Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Engineering, Manufacturing, Power, Medical
Target Applications: Accounting; Special Terminals; Special
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Software: M. Denlinger
Head of Engineering: R. Smith-Vanz
Geographic Coverage: National
Year Established:
Number of Employees: 46

PROFESSIONAL MICRO SYSTEMS
1422 Industrial Way
P.O. Box 1377
(702) 782-8105
Major Markets: Peripheral Manufacturing, OEM (Computer Systems), Software House, Systems House (Commercial OEM)
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing/Sales: Sandy Schepper
Head of Software: David Fitzpatrick
Geographic Coverage:
Year Established: 1980
Number of Employees: 5

PROMETHEUS PRODUCTS
45277 Fremont Blvd
Fremont, CA 94538
(415) 490-2320
Major Markets: Component and Peripheral Manufacturing,
Target Industries: Retail
Contacts:
Head of Marketing: Robert Christiansen
Head of Software/Engineering: Joseph Brabek
Geographic Coverage: International
Year Established: 1981
Number of Employees: 10

PROTOCOL COMPUTER, INC.
Suite 100
6150 Canoga Ave.
Woodland Hills, CA 91367
(213) 716-5500
Major Markets: Communications Equipment Manufacturing
Contacts:
Head of Sales/Marketing: Addison Woods
Geographic Coverage: International
Year Established: 1980

Vendors

PSITECH
2842 C Walnut Ave.
Tustin, CA 92680
(714) 730-0981
Major Markets: Computer and Terminal Manufacturing
Target Industries: Banking; Office; [illegible]
Target Applications: Graphic
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing/Sales: Herbert B. [illegible]
Head of Engineering: Paul Gosselin
Head of Customer Service: Steve Dulson
Geographic Coverage: National
Year Established: 1976
Number of Employees: 20

QANTEL CORP.
4142 Point Eden Way
Hayward, CA 94545
(415) 887-7777
Major Markets: Component, Computer, Terminal and Peripheral Manufacturing, OEM (Computer Systems); OEM (Peripherals/Terminals), Software House; Systems House (Commercial OEM); [illegible]
Target Industries: Manufacturing; Transportation; Lodging; Retail
Contacts:
Head of Marketing: Mike McCorry
Head of Sales: John Moeller
Head of Software: Troy Lemons
Head of Engineering: Lou Poumakis
Geographic Coverage: International
Year Established: 1969
Number of Employees: 800

QANTEX DIVISION OF NORTH ATLANTIC INDUSTRIES
60 Plant Ave.
Hauppauge, NY 11788
[illegible]
Major Markets: Peripheral Manufacturing
Target Industries: Computer Related Industries
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 200

Q1 CORP.
125 Ricefield Lane
Hauppage, NY 11787
(516) 543-7800
Major Markets: Computer Manufacturing
Contacts:
Head of Marketing: Richard Van Brunt
Geographic Coverage: International
Year Established: 1971
Number of Employees: 20

QUADRAM CORP.
[illegible] Pleasant Drive
Norcross, GA 30093
(404) 923-6666
Major Markets: Component, Terminal and Peripheral Manufacturing; OEM (Peripherals/Terminals)
Target Industries: Distributors; Retail
Contacts:
Head of Marketing/Sales: Leland Strange
Geographic Coverage: International
Year Established: 1981
Number of Employees: 130

QUADRI CORP.
1725 W. 17th St.
Tempe, AZ 85281
(602) 894-2151
Major Markets: Peripheral Manufacturing
Target Industries: Military
Net Sales: $1 Million — $5 Million (1981)
Geographic Coverage: International
Year Established: 1968
Number of Employees: 100

QUALEX TECHNOLOGY
Suite 112
6850 Canby Ave
Reseda, CA 91335
(213) 708-1170
Major Markets: Peripheral Manufacturing, OEM (Peripherals/Terminals), Maintenance/Other Services
Target Applications: HP 1000, 3000
Geographic Coverage: International
Year Established: 1980
Number of Employees: 25

QUALITY COMPUTER SERVICE
Suite 105
801 S. Victoria No. 104
Ventura, CA 93003
(805) 656-1330
Major Markets: Systems House (Commercial OEM), Dealer/Distributor
Target Industries: Retail; Manufacturing
Geographic Coverage: National
Year Established: 1980
Number of Employees: 8

QUALITY MICRO SYSTEMS, INC.
57 S. Schelinger Road
Mobile, AL 36608
(205) 343-2767
Major Markets: Component Manufacturing
Contacts:
Head of Engineering: John MacNaughton
Head of Customer Service: Don Parker
Geographic Coverage: International
Year Established: 1977
Number of Employees: 115

QUANTUM CORP.
1804 McCarthy Blvd.
Milpitas, CA 95035
(408) 262-1100
Major Markets: Peripheral Manufacturing
Target Industries: OEM; Distribution
Contacts:
Head of Marketing: Steve Berkley
Head of Software: Dale Hiatt
Head of Engineering: David Brown
Geographic Coverage: International
Year Established: 1980
Number of Employees: 350

QUARTRONICS, INC.
211 Vandale Drive
Houston, PA 15342
(412) 745-2663
Major Markets: Component, Computer, Terminal, Peripheral and Communications Equipment Manufacturing; OEM (Computer Systems); OEM (Peripherals/Terminals)
Target Applications: Data Acquisition
Contacts:
Head of Marketing: Victor Sulkowski
Head of Sales: Harry Frost
Head of Engineering: Lupan J. Spalla
Geographic Coverage: International
Year Established: 1971
Number of Employees: 50

QUENTIN RESEARCH, INC.
9207 Eton Ave
Chatsworth, CA 91311
(213) 709-6500
Major Markets: Component, Peripheral and Communications Equipment Manufacturing
Geographic Coverage: National
Year Established: 1979
Number of Employees: 45

QUME CORP.
2350 Qume Drive
San Jose, CA 95131
(408) 942-4000
Major Markets: Peripheral Manufacturing; Miscellaneous Computer Supplies
Contacts:
Head of Marketing: Randall Hawks
Head of Engineering: Allen McVicar
Geographic Coverage: International
Year Established: 1973
Number of Employees: 2,800

QUINCY SYSTEMS, INC.
3693 Commercial Ave
Northbrook, IL 60062
(312) 498-5060
Major Markets: Computer and Peripheral Manufacturing
Contacts:
Head of Marketing: Kerry Berland
Head of Sales: Arnold Jacobs
Head of Engineering: Don Martin
Head of Customer Service: Richard VanBuren
Geographic Coverage: International
Year Established: 1975
Number of Employees: 100

RACAL-DANA INSTRUMENTS, INC.
4 Goodyear St.
P.O. Box C19541
Irvine, CA 92713
(714) 859-8999
Major Markets: Peripheral Manufacturing;
Target Industries: Industrial; Aerospace; Military
Target Applications: Automatic Test
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing: N. Lasngrich
Head of Sales: Tom Cannon
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 250

RACAL-MILGO, INC.
8600 Northwest 41st St.
Miami, FL 33166
[illegible]
Major Markets: Communications Equipment Manufacturing
Net Sales: More than $100 Million (1982)
Geographic Coverage: International
Year Established: 1950
Number of Employees: 3,500

RAMTEK CORP.
2211 Lawson Lane
Santa Clara, CA 95050
(408) 988-2211
Major Markets: Terminal Manufacturing, Dealer/Distributor
Target Industries: Engineering, Manufacturing
Target Applications: CAD/CAM; Imaging
Contacts:
Head of Marketing: Peter W. Cassady
Head of Sales: Tony Glinkas
Geographic Coverage: International
Year Established: 1971
Number of Employees: 525

RANA SYSTEMS
24300 Superior St.
Chatsworth, CA 91311
(213) 709-5484
Major Markets: Peripheral Manufacturing
Target Industries: Manufacturing; Dealer/Distributor
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Marketing: Michael Joseph
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 100

RASTER TECHNOLOGIES
9 Executive Park Drive
N. Billerica, MA 01862
(617) 667-8900
Major Markets: Component Manufacturing
Target Applications: Graphics
Contacts:
Head of Marketing: Roger Nielson
Head of Engineering: Nathan Parke
Geographic Coverage: International
Year Established: 1981

RAYMOND ENGINEERING, INC.
Raycorder Products
217 Smith St.
Middletown, CT 06457
(203) 632-1000
Major Markets: Peripheral Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Bruce Greenfield
Head of Engineering: Fred Ciechowski
Geographic Coverage: International
Year Established: 1936
Number of Employees: 85

RAYTHEON CO.
Raytheon Data Systems Division
115 Norwood Park S
[illegible]
(617) 762-6700
Major Markets: Computer, Terminal, Peripheral, Communications Equipment and Office Equipment Manufacturing; OEM (Peripherals/Terminals), Dealer/Distributor; Maintenance/Other Services
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: John Hooper
Geographic Coverage: International
Year Established: 1969
Number of Employees: 7,000

RELATIONAL MEMORY SYSTEMS, INC.
1180 Maraloma Way
Sunnyvale, CA 94086
[illegible]

Major Markets: Computer and Peripheral Manufacturing
Target Industries: Engineering; Manufacturing
Contacts:
Head of Marketing: Mary Modeste
Geographic Coverage: International
Year Established: 1975

RENAISSANCE MARKETING, INC.
P.O. Box 201
Huntington, NY 11743
(516) 271-2389
Major Markets: Peripheral Manufacturing; Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Service Bureaus
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Marketing/Sales: R. J. Murray
Head of Engineering/Customer Service: F. J. DePalma
Geographic Coverage: National
Year Established: 1975
Number of Employees: 11

RENAISSANCE TECHNOLOGY
1045 Detroit Ave
Concord, CA 94518
(415) 676-5757
Major Markets: Component Manufacturing; Software House; Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Store Front Dealers
Contacts:
Head of Marketing/Sales: Barbara Baylor
Head of Engineering: Victor Ivashin
Head of Customer Service: Chris [illegible]
Geographic Coverage: [illegible]
Year Established: 1980
Number of Employees: 90

REXON BUSINESS MACHINES CORP.
5800 Uplander Way
Culver City, CA 90230
(213) 641-7110
Major Markets: Computer Manufacturing; Systems House (Commercial OEM)
Target Industries: Manufacturing, Health, General Business
Target Applications: WP; DBMS; [illegible]
Contacts:
Head of Sales: Don Sullivan
Head of Software/Engineering: Bill Ang
Geographic Coverage: International
Year Established: 1978
Number of Employees: 125

R-O-S DESIGNS, INC.
3375 Woodward Ave
Santa Clara, CA 95050
(408) 748-0400
Major Markets: Peripheral Manufacturing; OEM (Peripherals/Terminals)
Geographic Coverage: International
Year Established: 1982
Number of Employees: 5

R.H. ELECTRONICS, INC.
[illegible]
[illegible], CA 93427
(805) 688-2047
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: Chancy Hicks
Year Established: 1980
Number of Employees: 13

RANDA ELECTRONICS
2535 Via Palma
Anaheim, CA 92801
(714) 995-6552
Major Markets: Computer, Peripheral and Communications Equipment Manufacturing
Target Industries: Data General OEM, DEC OEM
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Frank Williams
Head of Engineering: Jose Ventura
Head of Customer Service: Bill Cantwell
Geographic Coverage: International
Year Established: 1977
Number of Employees: 35

RICOH OF AMERICA
20 Gloria Lane
Fairfield, NJ 07006
(201) 575-9550
Major Markets: Peripheral Manufacturing; OEM (Peripherals/Terminals)
Geographic Coverage: International
Year Established: 1[illegible]
Number of Employees: 18,000

RIDGE COMPUTERS
[illegible]
Sunnyvale, CA 94086
(408) 745-0400
Major Markets: Computer Manufacturing
Target Industries: Engineering; [illegible]
Target Applications: CAD; Graphics, Engineering Computation
Contacts:
Head of Marketing: Penny Dara-[illegible]
Head of Sales: William Shooe
Head of Software: Edwin Basart
Head of Engineering: Hugh Martin
Geographic Coverage: Ca
Year Established: 1980
Number of Employees: 22

ROCKWELL INTERNATIONAL CORP.
Electronic Devices Division
[illegible]
Newport Beach, CA 92660
(714) 833-4522
Major Markets: Component and Communications Equipment [illegible]
Contacts:
Head of Marketing: C. V. Kovac
Geographic Coverage: International

RODIME CORP.
[illegible]
[illegible]
Mission Viejo, CA 92691
(714) 770-3085
Major Markets: Peripheral Manufacturing
Target Industries: OEM
Contacts:
Head of Marketing: Malcolm Dudson
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 200

ROSSCOMP CORP.
16643 Valley View Ave.
Cerritos, CA 90701
(213) 926-5533
Major Markets: Peripheral Manufacturing
Net Sales: Less than $100,000 (1982)
[illegible]
Head of Marketing/Sales: Jose Elaydo
Head of Engineering: Bob Tullos
Geographic Coverage: International
Year Established: 1[illegible]
Number of Employees: 20

SANTA CLARA SYSTEMS, INC.
560 Division St
Campbell, CA 95008
(408) 374-5972
Major Markets: Peripheral Manufacturing
[illegible]
Head of Marketing: Darell Evora
Geographic Coverage: [illegible]
Year Established: 1980

SANTEC CORP.
9 Columbia Drive
Amherst, NH 03031
[illegible]
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing/Sales: Ron Bleakney
Geographic Coverage: International
Year Established: 1975
Number of Employees: 80

SANYO BUSINESS SYSTEMS CORP.
51 Joseph St
Moonachie, NJ 07074
(201) 440-9300
Major Markets: Computer, Terminal, Peripheral and Office Equipment Manufacturing; OEM (Peripherals/Terminals); Software House
Contacts:
Head of Marketing: N Yamashita
Head of Sales: Arthur Sheber
Head of Customer Service: Mike Zajak
Geographic Coverage: [illegible]

SAT[illegible]
3990 Varsity Drive
Ann Arbor, MI 48104
(313) 973-8422
Major Markets: Peripheral Manufacturing; Software House
Contacts:
Head of Marketing: Randy LeSage
Geographic Coverage: International
Year Established: 1981
[illegible]

SAYLOR ELECTRONICS INTERNATIONAL
400 Hot Springs Road
Carson City, NV 89701
[illegible]
Major Markets: Peripheral Manufacturing
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Marketing/Sales: Jolynne L. Saylor
Head of Software/Engineering: Tom Poole
Geographic Coverage: International
Year Established: 1971
Number of Employees: 7

SCIENCE ACCESSORIES CORP.
970 Kings Highway W
Southport, CT 06490
(203) 255-1526
Major Markets: Peripheral Manufacturing
Target Industries: Construction, [illegible]
Target Applications: Graphics; Mapping; CAD/CAM
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing/Sales: Harold Cleveland
Head of Engineering: Richard Roznoy
Geographic Coverage: International
Year Established: 1964
Number of Employees: 40

SCIENTIFIC MICRO SYSTEMS
777 E. Middlefield Road
Mountain View, CA 94043
(415) 964-5700
Major Markets: Computer and Peripheral Manufacturing, OEM (Computer Systems); Software House; Systems House (Commercial OEM)
Target Industries: OEM Micro Computer, Scientific
Target Applications: Industrial Control; Small Business Application
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Michael A. Liccardo
Geographic Coverage: International
Year Established: 1[illegible]
Number of Employees: 175

SCI SYSTEMS, INC.
5000 Technology Drive
P.O. Box 1000
Huntsville, AL 35807
(205) 882-4800
Major Markets: Component, Computer and Terminal Manufacturing, OEM (Computer Systems), Systems House (Commercial OEM)
Year Established: 1961
Number of Employees: 3,000

SCOTT SYSTEMS, INC.
1 Metropolitan Corp. Center
Marlboro, MA 01752
(617) 481-6371
Major Markets: Terminal Manufacturing, OEM (Computer Systems)
Target Industries: Airline, Banking; [illegible]
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Sam Adams
[illegible]
Year Established: 1[illegible]
Number of Employees: 50

SE SYSTEMS, INC.
[illegible]
Dallas, TX 75228
(214) 340-0303
Major Markets: Component and Computer Manufacturing, OEM (Computer Systems), OEM (Peripherals/Terminals)
Target Industries: General Business
Target Applications: Accounting; WP; Medical

Vendors

Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Peter Pennisi
Head of Software/Engineering: Doug Locke
Geographic Coverage: International
Year Established: 1977
Number of Employees: 100

SEAGATE TECHNOLOGY
920 Disc Drive
Scotts Valley, CA 95066
(408) 438-6550
Major Markets: Peripheral Manufacturing, Dealer/Distributor
Net Sales: $25 Million — $100 Million (1981)
Geographic Coverage: International
Year Established: 1979
Number of Employees: 1,000

SEATTLE COMPUTER PRODUCTS
1114 Industry Drive
Seattle, WA 98188
(206) 575-1830
Major Markets: Computer Manufacturing
Target Applications: WP
Geographic Coverage: International
Year Established: 1977
Number of Employees: 36

SEIKO INSTRUMENTS U.S.A., INC.
Graphic Device and System Division
Suite 140
2620 Augustine Drive
Santa Clara, CA 95051
(408) 727-0768
Major Markets: Terminal and Peripheral Manufacturing
Target Industries: Engineering
Target Applications: Graphics
Contacts:
Head of Marketing: Andrew Wei
Geographic Coverage: National
Year Established: 1981

SEMIDISK SYSTEMS
P O Box GG
Beaverton, OR 97075
(503) 642-3100
Major Markets: Peripheral Manufacturing
Target Industries: OEM; Micro Software Developing
Contacts:
Head of Sales: Ray Pear
Geographic Coverage: International
Year Established: 1981
Number of Employees: 5

S. GOLDMAN CO.
Distributed Logic Technology
[illegible] Dr.
Maitland, FL 32751
[illegible]
Major Markets: Component Manufacturing; Software House, Maintenance/Other Services
Target Industries: Engineering; Manufacturing
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Marketing/Sales: Gary Redwine
Head of Software: [illegible]
Head of Engineering/Customer Service: [illegible]
Geographic Coverage: National
Year Established: 1979
Number of Employees: 15

SHUGART ASSOCIATES, INC.
475 Oakmead Parkway
Sunnyvale, CA 94086
(408) 733-0100
Major Markets: Component and Peripheral Manufacturing
Target Applications: WP, Small Business
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: George H Sullman
Head of Software: Thomas Gadner
Head of Engineering: Carl Neun
Geographic Coverage: International
Year Established: 1973
Number of Employees: 3,200

SIDEREAL CORP.
9600 S W Barnes Road
Portland, OR 97225
(503) 297-5531
Major Markets: Terminal and Communications Equipment Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: James Miller
Head of Sales: Richard A Becher
Head of Engineering: V Ole Kilgore
Head of Customer Service: Robert [illegible]
Geographic Coverage: National
Year Established: 1971
Number of Employees: 160

SIERRA INFORMATION SYSTEMS CORP.
455 Cayuga Drive
P.O. Box 222
Buffalo, NY 14225
(716) 631-6200
Major Markets: Terminal, Peripheral and Communications Equipment Manufacturing
Target Industries: Manufacturing
Target Applications: Data Entry
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: Roy H Hobson
Head of Software: Edwin L. Hill
Head of Engineering: Mike Rupp
Geographic Coverage: International
Year Established: 1969
Number of Employees: 100

SIGMA DESIGNS, INC.
Suite F-23
2990 Scott Blvd.
Santa Clara, CA 95050
(408) 496-0536
Major Markets: Component and Peripheral Manufacturing
Target Applications: IBM Personal Computer users
Contacts:
Head of Marketing: Steve Weingarten
Geographic Coverage: National
Year Established: 1982
Number of Employees: 15

SIGMA INFORMATION SYSTEMS, INC.
6505 Serrano Ave.
Anaheim, CA 92807
(714) 974-0166
Major Markets: Peripheral Manufacturing
Net Sales: $1 Million — $5 Million (1982)
Geographic Coverage: International
Year Established: 1980
Number of Employees: 25

SILVER-REED AMERICA, INC.
8665 Hayden Place
Culver City, CA 90230
(213) 837-6104
Major Markets: Peripheral and Office Equipment Manufacturing
Contacts:
Head of Sales: Bill Eberhardt
Head of Customer Service: Tanny Palmese
Geographic Coverage: International
Year Established: 1977
Number of Employees: 200

SINGER DATA PRODUCTS
2351 Devon St.
Elk Grove Village, IL 60007
(312) 860-6500
Major Markets: Computer and Peripheral Manufacturing
Target Industries: OEM
Contacts:
Head of Sales: Ron Wilson
Geographic Coverage: International
Year Established: 1958
Number of Employees: 1,300

SMC SEIGOH
981 Rt. 22 W
Bridgewater, VT 08807
(201) 685-0070
Major Markets: Computer and Peripheral Manufacturing; Software House
Contacts:
Head of Marketing: Ken Reifer
Geographic Coverage: International
Year Established: 1982
Number of Employees: 25

SCM CORP.
Smith-Corona Division
65 Locust Ave.
New Canaan, CT 06840
(203) 972-1473
Major Markets: Peripheral and Office Equipment Manufacturing, Miscellaneous Computer Supplies
Target Industries: Small Business; Personal Use, Office; Business
Contacts:
Head of Marketing: Mort Gutman
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 25,500

SOCIETY CONSULTANTS BROADCASTING
31336 Via Colinas St
Westlake Village, CA 91362
(213) 889-9340
Major Markets: Computer Manufacturing; Systems House (Commercial OEM)
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Jim Allday
Head of Sales: Jim Allday
Head of Engineering: Kan Erickson
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 20

SOLTEC CORP.
11684 Pendelton St.
Sun Valley, CA 91352
(213) 767-0044
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: Gary Purser
Geographic Coverage: International
Year Established: 1960
Number of Employees: 50

SONY COMMUNICATIONS PRODUCTS CO.
Microcomputer Division
1 Sony Drive
Park Ridge, NJ 07656
(201) 930-1000
Major Markets: Computer, Terminal and Peripheral Manufacturing
Geographic Coverage: National
Year Established: 1981

SOROC TECHNOLOGY, INC.
161 Freedom Ave
Anaheim, CA 92801
(714) 992-2860
Major Markets: Terminal Manufacturing
Target Industries: OEM; End Users
Contacts:
Head of Marketing: Joe Zedalis
Head of Engineering: Herb Higashi
Geographic Coverage: International
Year Established: 1975
Number of Employees: 75

SORRENTO VALLEY ASSOCIATES
11722-D Sorrento Valley Road
San Diego, CA 92121
(714) 452-0101
Major Markets: Peripheral Manufacturing, Maintenance/Other
Contacts:
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Jeff Clark
Head of Sales: Elizabeth Marr
Head of Customer Service: Jeannette Wills
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 25

SOUTHERN SYSTEMS, INC.
2841 Cypress Creek Road
Ft. Lauderdale, FL 33309
(800) 237-5904
Major Markets: Peripheral and Communications Equipment Manufacturing, OEM (Peripherals/Terminals); Maintenance/Other
Contacts:
Target Industries: Printer Users; Small System Houses, Small Business System User; Mainframe System User
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: James W. Rule
Head of Sales: Donald R. Dooley
Head of Engineering: Ronald Murr
Geographic Coverage: International
Year Established: 1975
Number of Employees: 50

SPECTRA LOGIC CORP.
[illegible]
Sunnyvale, CA 94086
(408) 744-0930
Major Markets: Component Manufacturing
Target Industries: OEM
Contacts:
Head of Marketing: Steve Robert
Head of Sales: Robert Carter
Head of Engineering: Harvey Wallace
Geographic Coverage: International
Year Established: 1980
Number of Employees: 40

SPECTRA SYSTEMS, INC.
Suite A-4
3841 Old Conejo Road
Newbury Park, CA 91320
(805) 499-4324
Major Markets: Computer and Terminal Manufacturing, OEM (Computer Systems), Systems House (Commercial OEM)
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Marketing/Sales: Al Coulter
Geographic Coverage: International
Year Established: 1978
Number of Employees: 55

SPERRY CORP.
Sperry Univac Division
Township Line and Union Meeting [illegible]
P O Box 500
Blue Bell, PA 19424
(215) 542-4011
Major Markets: Component, Computer, Terminal, Peripheral and Communications Equipment Manufacturing, OEM (Computer Systems); Software House; Maintenance/Other Services
Target Industries: Manufacturing; Public Sector; Distribution, Airlines
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Marketing: Joseph Ciasullo
Geographic Coverage: International
Year Established: 19[illegible]
Number of Employees: 48,000

SPUR PRODUCTS CORP.
1904 Centinela Ave.
Los Angeles, CA 90025
(213) 826-4595
Major Markets: Component Manufacturing
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Marketing: Ray Lorenz
Geographic Coverage: International
Year Established: 1972
Number of Employees: 13

SSM MICROCOMPUTER [illegible], INC.
2190 Paragon Drive
San Jose, CA 95131
(408) 946-7400
Major Markets: Component, Peripheral and Communicaitons Equipment Manufacturing; Software House
Target Applications: Datacomm
Contacts:
Head of Marketing: D. Wertzberger
Head of Engineering: Malcolm Wright
Geographic Coverage: International
Year Established: 1974
Number of Employees: 50

STANDARD ENGINEERING CORP.
44800 Industrial Drive
Fremont, CA 94538
(415) 657-7555
Major Markets: Component, Peripheral, Special Systems and Communications Equipment Manufacturing; OEM (Computer Systems)
Target Industries: Manufacturing
Target Applications: Process Control, Industrial Control; Instrumentation
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Donald Little
Head of Sales: Del Settle
Head of Engineering: Gerald Buckman
Geographic Coverage: International
Year Established: 1972
Number of Employees: 60

STANNUM CONTROLS, INC. (S.C.I.)
[illegible]Micro-Sci
2158 S. Hathaway
Santa Ana, CA 92705
(714) 662-2801
Major Markets: Peripheral Manufacturing, Software House
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Marketing/Sales: Timothy Hanson
Geographic Coverage: International
Year Established: 19[illegible]
Number of Employees: 30

STAR MICRONICS, INC.
[illegible] Suite 2309
200 Park Ave.
New York, NY 10166
(212) 986-6770
Major Markets: Component and Peripheral Manufacturing
Target Industries: OEM
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: Thomas Bongorno
Geographic Coverage: International
Year Established: 1976
Number of Employees: 12

STAR TECHNOLOGIES
3180 Pullman St.
Costa Mesa, CA 92626
(714) 557-8640
Major Markets: Peripheral Manufacturing, OEM (Computer Systems)
Net Sales: $1 Million — $5 Million (1981)
Geographic Coverage: National
Year Established: 1976
Number of Employees: 28

STORAGE TECHNOLOGY CORP.
2270 S. 88th St.
Lousville, CO 80028
(303) 673-5151
Major Markets: Component, Peripheral and Communications Equipment Manufacturing; OEM (Computer Systems); Software House; Systems House (Commercial OEM)
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing/Sales: Jake Scott
Head of Customer Service: H. Derby
Year Established: 1969
Number of Employees: 15,000

STRATUS COMPUTER, INC.
[illegible] Spectrum Pond
Natick, MA 01760
(617) 653-1466
Major Markets: Computer Manufacturing, OEM (Peripherals, Terminals); Software House
Target Applications: Transaction Processing
Contacts:
Head of Marketing/Sales: John Morgridge
Head of Software: Bob Freiburghouse
Head of Engineering: Gardner Hendrie
Head of Customer Service: Jim Schroeder
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 110

STROBE, INC.
897 Independence Ave.
Bldg. 5A
Mountain View, CA 94043
(415) 969-5130
Major Markets: Peripheral Manufacturing
Target Applications: Chart Plotting, Business Graphics
Contacts:
Head of Marketing: Russ Hebert
Geographic Coverage: National
Year Established: 1978
Number of Employees: 20

SUMMAGRAPHICS CORP.
35 Brentwood Ave.
Fairfield, CT 06430
(203) 384-1344
Major Markets: [illegible] Equipment Manufacturing, Systems House (Commercial OEM)
Target Industries: AEC; Manufacturing
Target Applications: CAD/CAM; Mapping; Data Entry; CRT Cursor Control
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Frank K. Garvey
Head of Sales: Anthony Joyce
Head of Software: David Gratt
Head of Engineering: Anthony DiPentima
Head of Customer Service: Russ Cox
Geographic Coverage: International
Year Established: 1972
Number of Employees: 400

SUN-FLEX CO., INC.
20 Pimental Court
Novato, CA 94947
(415) 883-1221
Major Markets: Component and Peripheral Manufacturing
Target Industries: Video; OEM, [illegible] Sales
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Douglas Rosestone
Geographic Coverage: International
Year Established: 1978
Number of Employees: 80

SYLVANIA COMPUTER SYSTEMS
801 Buckeye Court
[illegible], CA 9[illegible]
(408) 946-3191
Major Markets: Computer Manufacturing; Software House; Maintenance/Other Services
Target Industries: Banking; Library Services
Target Applications: Transaction Processing
Contacts:
Head of Marketing/Sales: Stanton Joseph
Head of Software/Engineering: Elliot [illegible]
Head of Customer Service: Jay Denny
Year Established: 1980
Number of Employees: 80

SYMTEST [illegible]
40 Locke Drive
Marlboro, MA 01752
(617) 481-7827
Major Markets: Peripheral Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Curtis P. Hoffman
Geographic Coverage: International
Year Established: 1971
Number of Employees: 20

SYQUEST TECHNOLOGY, INC.
47923 Warm Spring Blvd.
Fremont, CA 94538
(415) 490-7511
Major Markets: [illegible] Manufacturing
Contacts:
Head of Marketing: Larry Sarisky
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 40

SYSGEN
47853 Warm Spring Blvd.
Fremont, CA 94539
Major Markets: Component and Peripheral Manufacturing
Target Industries: OEM System Integrators, Retail
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Dick Newsome
Head of Sales: [illegible]
Head of Engineering: Richard Tam
Head of Customer Service: Norman Lo
Geographic Coverage: International
Year Established: 1981
Number of Employees: 20

SYSTECH, INC.
[illegible] Joliet Road
Countryside, IL 60525
Major Markets: Software House; Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Manufacturing; [illegible]
Target Applications: Order Entry; MRP; Accounting; Purchasing
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Tracey Coop
Head of [illegible]
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 20

SYSTEMATIC COMPUTER SERVICES, INC.
690A Alpha Drive
Cleveland, OH 44143
(216) 461-7027
Major Markets: Peripheral Manufacturing, OEM (Computer Systems); Maintenance/Other Services
Target Industries: Engineering; Automotive, Aerospace
Net Sales: $500,000 — $1 Million (1981)

Vendors

Geographic Coverage: International
Year Established: 1971
Number of Employees: 14

SYSTEM INDUSTRIES, INC.
1855 Barber Lane
Milpitas, CA 95035
(408) 942-1212
Major Markets: Peripheral Manufacturing
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Sales: D.K. Winton
Geographic Coverage: International
Year Established: 1969
Number of Employees: 500

SYSTEM INTEGRATORS, INC.
P.O. Box 13626
Sacramento, CA 95853
(916) 929-9481
Major Markets: Terminal Manufacturing, OEM (Computer Systems)
Target Industries: Publishing
Target Applications: WP; Text Publishing
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing: Robert Clarke
Head of Sales: Al Edwards
Geographic Coverage: International
Year Established: 1974
Number of Employees: 280

SYSTEMS GROUP
1601 Orangewood Ave.
Orange, CA 92668
(714) 633-4460
Major Markets: Computer Manufacturing, OEM (Computer Systems), Software House; Maintenance/Other Services
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing: Dave Jenoss
Geographic Coverage: International
Year Established: 1978
Number of Employees: 50

SYSTEMS RESEARCH, INC.
2400 Science Pkwy.
Okemos, MI 48864
(517) 349-0200
Major Markets: Component and Communications Equipment Manufacturing; OEM (Computer Systems)
Target Applications: Telecommunications
Net Sales: $5 Million — $25 Million (1981)
Geographic Coverage: International
Year Established: 1967
Number of Employees: 150

T&R PRODUCTS CO.
1400 Page Mill Road
Palo Alto, CA 94304
(415) 858-2500
Major Markets: Computer, Terminal, Peripheral, Communications Equipment and Office Equipment Manufacturing, Miscellaneous Computer Supplies
Target Applications: Data Entry (Micros)
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Robert Stroh
Head of Sales: Phil Croel
Geographic Coverage: National
Year Established: 1949
Number of Employees: 1,000

TAIHAN ELECTRIC WIRE CO., LTD.
Data Device Division
2020 Jericho Tnpk
New Hyde Park, NY 11040
(516) 437-8100
Major Markets: Terminal Manufacturing
Target Industries: Distribution
Contacts:
Head of Marketing: H. C. Ham
Geographic Coverage: International
Year Established: 1981
Number of Employees: 20,000

TALLGRASS TECHNOLOGIES CORP.
11667 W. 90th St
Overland Park, KS 66214
(913) 492-6002
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: Steve Volk
Geographic Coverage: International
Year Established: 1980
Number of Employees: 20

TALL TREE SYSTEMS
1036 Los Altos Ave
Los Altos, CA 94022
(415) 941-5500
Major Markets: Peripheral Manufacturing
Target Industries: Retail
Net Sales: Less than $100,000 (1982)
Geographic Coverage: International
Year Established: 1974
Number of Employees: 5

TANDBERG DATA, INC.
1 Labriola Court
P.O. Box 99
Armonk, NY 10504
(914) 273-6400
Major Markets: Dealer/Distributor
Geographic Coverage: International
Year Established: 1982
Number of Employees: 8

TANDBERG DATA STORAGE, INC.
Data Storage Division
571 N. Poplar St.
Orange, CA 92668
(714) 978-6771
Major Markets: Peripheral Manufacturing
Target Industries: OEM
Contacts:
Head of Marketing: Ray Rogers
Geographic Coverage: International
Year Established: 1982
Number of Employees: 4

TANDEM COMPUTERS, INC.
19333 Vallco Pkwy.
Cupertino, CA 95014
(408) 725-6000
Major Markets: Computer and Terminal Manufacturing; Software House
Contacts:
Head of Marketing: David Mackie
Head of Sales: Jerry Peterson
Head of Software/Engineering: Larry Launch
Head of Customer Service: Jerry Everett
Geographic Coverage: International
Year Established: 1974
Number of Employees: 4,000

TANDON CORP.
20320 Prairie St.
Chatsworth, CA 91311
(213) 993-6644
Major Markets: Peripheral Manufacturing
Target Industries: Computer OEM
Target Applications: General Data Storage
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Sales: Jeff Segers
Head of Engineering: Kenneth R. Fannin
Geographic Coverage: International
Year Established: 1975
Number of Employees: 3,000

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Tulsa.....(918) 665-3200

WEST
Denver.....(303) 694-1662
Phoenix.....(602) 243-6601
San Diego.....(619) 268-1201
Sunnyvale.....(408) 773-9990

TANDY CORP.
Radio Shack
1800 One Tandy Center
Fort Worth, TX 76102
(817) 390-3011
Major Markets: Computer, Terminal, Peripheral and Communications Equipment Manufacturing; OEM (Computer Systems); Software House, Dealer/Distributor, Maintenance/Other Services
Target Industries: Legal, Medical, Real Estate, General Business
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing: Ron Stagell
Geographic Coverage: International
Year Established: 1921
Number of Employees: 27,000

TARBELL ELECTRONICS
Suite B
950 Dovlen Place
Carson, CA 90746
(213) 538-4251
Major Markets: Component and Computer Manufacturing, OEM (Computer Systems); Software House; Systems House (Commercial OEM)
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Donald E. Tarbell
Geographic Coverage: National
Year Established: 1975
Number of Employees: 10

TBC
203 E. Main St.
Riverton, WY 82501
(307) 856-1111
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: Lois Wiczewski
Geographic Coverage: International
Year Established: 1979
Number of Employees: 18

TEAC CORP. OF AMERICA
7733 Telegraph Road
Montebello, CA 90640
(213) 726-0303
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: Barry Goldman
Geographic Coverage: International
Year Established: 1963
Number of Employees: 125

TEATRONICS, INC.
101-D Suburban Road
San Luis Obispo, CA 93401
(805) 544-3555
Major Markets: Component Manufacturing, OEM (Computer Systems); Maintenance/Other Services
Target Industries: Theater; Entertainment, Theatrical
Target Applications: Lighting Control
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Kathy Mooney
Head of Software: Paul Rabinovitz
Head of Engineering: Rand Pitchford
Geographic Coverage: International
Year Established: 1971
Number of Employees: 25

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120 W. Wieuca Road, NE
Atlanta, GA 30042
(404) 252-1045

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(617) 879-0700

Major Markets: Component and Communications Equipment Manufacturing, OEM (Peripherals/Terminals), Software House, Systems House (Commercial OEM)
Target Industries: Theater; Accountants
Target Applications: Accounting; Graphics
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Robert J. Zack
Head of Sales: Gerald W. Buran
Geographic Coverage: National
Year Established: 1965
Number of Employees: 60

TECHNICAL MICRO SYSTEMS
2101 S. Standard Ave.
Santa Ana, CA 92701
(714) 549-3991
Major Markets: Peripheral Manufacturing; Test Equipment
Geographic Coverage: National
Year Established: 1976
Number of Employees: 5

TECMICO, INC.
2901 Druid Park Drive
Columbia, MD 21215
(301) 669-1400
Major Make
Manufacturing; Software House
Target Industries: Education; Small Business; Industrial Application
Target Applications: Training; Office Applications
Net Sales: $1 Million — $5 Million (1981)
Geographic Coverage: National
Year Established: 1978
Number of Employees: 10

TECNITAB INQUETRICS, INC.
200 Commerce Drive
Rochester, NY 14623
(716) 334-9640
Major Markets: Peripheral and Communications Equipment Manufacturing; Maintenance/Other Services
Target Industries: Telephone
Target Applications: Data Storage; Message Recording
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing/Engineering: Robert Wagner
Head of Sales: Ray Smith
Geographic Coverage: International
Year Established: 1981
Number of Employees: 120

TEC, INC.
Peripheral Products Division
2727 N. Fairview Ave.
P.O. Box 5646
Tucson, AZ 85703
(602) 792-2230
Major Markets: Component, Terminal and Peripheral Manufacturing
Target Industries: OEM
Target Applications: Data Entry, Access Control, Security Application
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: W. Selders
Head of Sales/Customer Service: Lloyd Schiller
Head of Engineering: Bob Moore
Geographic Coverage: International
Year Established: 1958
Number of Employees: 625

TECMAR, INC.
23600 Mercantile Road
Cleveland, OH 44122
(216) 464-7410
Major Markets: Computer and Peripheral Manufacturing
Target Industries: Personal Computing; Scientific, Manufacturing
Target Applications: Industrial Control
Contacts:
Head of Sales: John Brandon
Head of Software: Kenneth Stern
Head of Engineering: David Cwynar
Geographic Coverage: International
Year Established: 1975
Number of Employees: 70

TECSTOR, INC.
16161 Gothard St.
Huntington Beach, CA 92647
(714) 842-0077
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: Joe Molina
Head of Sales: R. Clay Mallard
Geographic Coverage: National
Year Established: 1979
Number of Employees: 65

TEKTRONIX, INC.
P.O. Box 500
Beaverton, OR 97077
(503) 627-7111
Major Markets: Component, Computer, Terminal, Peripheral and Communications Equipment Manufacturing; Software House; Maintenance/Other Services
Target Industries: Engineering; Manufacturing; Television
Target Applications: Test & Measurement; Graphics
Net Sales: More than $100 Million (1981)
Geographic Coverage: International
Year Established: 1946
Number of Employees: 22,000

TELCON INDUSTRIES, INC.
1401 NW 69th St.
Ft. Lauderdale, FL 33309
(305) 971-2250
Major Markets: Computer, Terminal, Peripheral and Communications Equipment Manufacturing; OEM (Computer Systems), OEM (Peripherals/Terminals); Software House
Target Industries: Newspaper; Telecommunications
Contacts:
Head of Marketing/Sales: Ian Moss
Head of Software: George Gruber
Head of Engineering: Rod Namen
Head of Customer Service: Karen Irwin
Geographic Coverage: International
Year Established: 1969
Number of Employees: 100

TELECOM TERMINAL SYSTEMS
3877 Grandview Blvd.
Los Angeles, CA 9006
(213) 390-9494
Major Markets: Terminal Manufacturing
Target Industries: Banking; Airlines
Contacts:
Head of Marketing: Leonard Winters
Head of Sales: Robert Crowley
Head of Software/Engineering: Bernie Winters
Geographic Coverage: International
Year Established: 1955
Number of Employees: 15

TELECTRONIC, INC.
Suite B
2759 S. Third West
Salt Lake City, UT 84115
(801) 486-9266
Major Markets: Component, Computer and Communications Equipment Manufacturing; OEM (Computer Systems), Software House, Systems House (Commercial OEM), Dealer/Distributor; Maintenance/Other Services
Target Industries: Hospitality; Telephone
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: David J. Gray
Head of Software: Bill Larkin
Head of Engineering: Susan Sandberg
Geographic Coverage: National
Year Established: 1978
Number of Employees: 24

TELEFILE COMPUTER PRODUCTS, INC.
17131 Daimler St.
Irvine, CA 92714
(714) 557-6860
Major Markets: Computer Manufacturing
Contacts:
Head of Marketing: Jim Nishry
Head of Sales: C. DeGabriello
Head of Engineering: D. Bello
Geographic Coverage: International
Year Established: 1981
Number of Employees: 70

TELERAN COMMUNICATIONS CORP.
2 Corp. Park Drive
White Plains, NY 10604
(914) 694-9270
Major Markets: Computer and Terminal Manufacturing
Target Industries: Newspapers; Graphic Arts
Target Applications: Text Editing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Robert Schwebel
Head of Sales: Jerry Gallagher
Head of Engineering: John K. Koffel
Geographic Coverage: National
Year Established: 1978
Number of Employees: 70

TELERAY
Control Systems Division
P.O. Box 24064
Minneapolis, MN 55424
(612) 941-3300
Major Markets: Terminal Manufacturing
Target Industries: Education; Telecommunications
Target Applications: Information Processing; Data Processing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Engineering: John Belmand
Geographic Coverage: International
Year Established: 1972
Number of Employees: 120

TELESENSORY SYSTEMS, INC.
3408 Hillview Ave.
Palo Alto, CA 94304
(415) 493-2626
Major Markets: Terminal and Peripheral Manufacturing
Target Applications: Terminals For The Blind
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: James Bronson
Geographic Coverage: International
Year Established: 1971
Number of Employees: 150

TELETYPE CORP.
5555 Touhy Ave.
Skokie, IL 60077
(312) 982-2000
Major Markets: Terminal and Peripheral Manufacturing; Dealer/Distributor
Target Industries: Communications; Government; Data Communications
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing: Dan Printz
Geographic Coverage: International
Year Established: 1907
Number of Employees: 5,000

TELEVIDEO SYSTEMS, INC.
1170 Morse Ave.
Sunnyvale, CA 94086
(408) 745-7760
Major Markets: Computer and Terminal Manufacturing
Target Industries: Small Business; Home/Hobby
Contacts:
Head of Marketing: R. DuBridge
Head of Sales: Mark Siegal
Head of Software: Erne Holland
Geographic Coverage: International
Year Established: 1977
Number of Employees: 525

TELEX COMPUTER PRODUCTS, INC.
6422 E. 41st St.
Tulsa, OK 74135
(918) 627-1111
Major Markets: Terminal and Peripheral Manufacturing
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing/Sales: Roy King
Head of Sales: Douglas Kendrick
Geographic Coverage: International
Year Established: 1966
Number of Employees: 2,000

TELEX COMPUTER PRODUCTS, INC.
General Computer Systems Division
16509 Adison Road
P.O. Box 126
Dallas, TX 75248
(214) 931-8511
Contacts:
Head of Marketing: Mike Wilgen
Geographic Coverage: International
Year Established: 1981
Number of Employees: 50

TELPAR, INC.
4132 Billy Mitchell Road
Addison, TX 75001
(214) 233-6831

Major Markets: Terminal and Peripheral Manufacturing
Target Industries: Electronics, OEM
Geographic Coverage: International
Year Established: 1972
Number of Employees: 20

TELTON CORP.
3330 W Market St
Akron, OH 44313
(216) 867-3700
Major Markets: Terminal Manufacturing
Geographic Coverage: International
Year Established: 1969
Number of Employees: 400

TERMIFLEX CORP.
18 Airport Road
Nashua, NH 03063
(603) 889-3883
Major Markets: Peripheral Manufacturing
Target Industries: Aerospace; Military, OEM
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: C. R. Teeple
Head of Sales: Mark Simons
Head of Engineering: Paul Smola
Geographic Coverage: International
Year Established: 1975
Number of Employees: 39

TERMINAL DATA CORP.
11878 Oakley Circle
Rockville, MD 20852
(301) 881-7655
Major Markets: Peripheral and Office Equipment Manufacturing, Dealer/Distributor, Miscellaneous Computer Supplies
Contacts:
Head of Marketing: Mark Tartelbaum
Geographic Coverage: National
Year Established: 1971
Number of Employees: 10

TERM-TRONICS
7408 Trade St
San Diego, CA 92121
(619) 271-1770
Major Markets: OEM (Peripherals/Terminals)
Target Industries: Banking; Retail; Manufacturing
Target Applications: Data Entry
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Marketing: Robert M. Beaver
Head of Software: James K. Clements
Head of Engineering: Steven P. Sweeney
Head of Customer Service: Dale Abbott
Geographic Coverage: International
Year Established: 1980
Number of Employees: 47

TEXAS INSTRUMENTS, INC.
Data Systems Group
12501 Research Blvd
P.O. Box 2909
Austin, TX 78769
(512) 250-7111
Major Markets: Component, Computer, Terminal, Peripheral and Communications Equipment Manufacturing
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: Tom Elks
Head of Engineering: George H Heilmeier
Geographic Coverage: International
Year Established: 1930
Number of Employees: 80,000

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Tulsa ..... (918) 665-3200

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Denver ..... (303) 694-1662
Phoenix ..... (602) 243-6601
San Diego ..... (619) 268-1201
Sunnyvale ..... (408) 773-9920

THOMAS ENGINEERING
1040 Oak Grove Road
Concord, CA 94518
(415) 680-8640
Major Markets: Computer Manufacturing
Contacts:
Head of Marketing: Richard Mondloch
Head of Engineering: Douglas Broadwell
Geographic Coverage: International
Year Established: 1976
Number of Employees: 20

THOUGHTWORKS, INC.
3532 W. Thomas Road
Phoenix, AZ 85019
(602) 269-6841
Major Markets: Computer and Peripheral Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Military, Education
Target Applications: Office Automation, Education
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales/Marketing: Roy Evans
Geographic Coverage: Regional
Year Established: 1978
Number of Employees: 18

3M CO.
Telecommunications Products Division
3M Center
St Paul, MN 55144
(612) 733-1110
Major Markets: Terminal and Communications Equipment Manufacturing; OEM (Computer Systems)
Geographic Coverage: International
Year Established: 1902

3M CO.
Data Recording Products
3M Center
Bldg 223-5N
St Paul, MN 55144
(612) 733-1338
Major Markets: Peripheral Manufacturing, Magnetic Media
Target Applications: Magnetic media
Contacts:
Head of Marketing: Curtis Koelod
Head of Sales: Gerald R. Wallin
Geographic Coverage: International
Year Established: 1970

TOSHIBA AMERICA, INC.
2441 Michelle Drive
Tustin, CA 92680
(714) 730-5000
Major Markets: Computer, Peripheral and Office Equipment Manufacturing
Target Industries: Small Business, Large Business
Contacts:
Head of Marketing: James Getzinger
Head of Sales: Phil Vertin
Head of Software: Sorel Reisman
Head of Customer Service: Larry Miller
Geographic Coverage: National
Year Established: 1981
Number of Employees: 60

TRAK MICROCOMPUTER CORP.
1511 Ogden Ave.
Downers Grove, IL 60515
(312) 968-1716
Major Markets: Peripheral Manufacturing, OEM (Peripherals/Terminals)
Target Industries: OEM, Computer Dealers, System Integrators, Computer Distributors
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Brian Gustafson
Geographic Coverage: International
Year Established: 19[illegible]
Number of Employees: 15

TRANSIAC CORP.
2375 Garcia Ave
Mountain View, CA 94043
(415) 969-0151
Major Markets: Terminal and Peripheral Manufacturing
Target Industries: End Users, Scientific, Education, R&D
Contacts:
Head of Marketing: Paul Alley
Head of Sales: Ken Hahn
Head of Engineering: Alan Broad
Head of Customer Service: Matt Miller
Geographic Coverage: International
Year Established: 1981
Number of Employees: 20

TRANS-LUX CORP.
110 Richards Ave
Norwalk, CT 06854
(203) 853-4321
Major Markets: Terminal Manufacturing
Net Sales: $25 Million — $100 Million (1982)
Contacts:
Head of Marketing: Frank Crocker
Head of Sales: K. Hirschauer
Head of Engineering: Charles Holdman
Head of Customer Service: F. Daniels
Geographic Coverage: National
Year Established: 1920
Number of Employees: 550

TRANSTAR
Omega Northwest, Inc.
2110 116 Ave. N.E.
P.O. Box C-96975
Bellevue, WA 98009
(206) 454-9250
Major Markets: Peripheral Manufacturing
Target Industries: Retail
Contacts:
Head of Marketing: Jack Shriver
Head of Sales: Katherine James
Head of Customer Service: John Schuitemaker
Geographic Coverage: National
Year Established: 1981
Number of Employees: 20

TRANSWAVE CORP.
Computer Division
Cedar Valley Facility
P.O. Box 489
Vanderbilt, PA 15486
(412) [illegible]
Major Markets: Component, Computer and Peripheral Manufacturing, Systems House (Commercial OEM)
Target Industries: Process Control, Energy Management
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing/Sales: J. D. Russell
Head of Software: J. S. Surrey
Head of Engineering: H. R. Sampey
Head of Customer Service: Donna Bartko
Geographic Coverage: International
Year Established: 1975
Number of Employees: 30

TRAXTON SYSTEMS LTD.
Suite I
4432 Enterprise St
Fremont, CA 94538
(415) 490-3441

Vendors

Major Markets: Peripheral Manufacturing
Target Industries: Dealers
Geographic Coverage: International
Year Established: 1981
Number of Employees: 8

TRENDATA CORP.
Standard Memories Division
3400 W. Segerstrom
Santa Ana, CA 92704
(714) 540-3605
Major Markets: Peripheral Manufacturing
Target Applications: Memory expansion
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Marketing: Miles S. Efron
Geographic Coverage: International
Number of Employees: 200

TRENDCOM
Communication Products Division
480 Oakmead Pkwy
Sunnyvale, CA 94086
(408) 737-0747
Major Markets: Terminal and Peripheral Manufacturing
Target Applications: Electronic Mail; Remote Communication
Contacts:
Head of Marketing: Bob Hemford
Geographic Coverage: International
Year Established: 1978
Number of Employees: 100

TRIMATION SYSTEMS, INC.
3132 S.E. Jay St.
Stuart, FL 33494
(305) 283-4817
Major Markets: Computer Manufacturing; OEM (Peripherals/Terminals)
Net Sales: $500,00 — $1 Million (1982)
Contacts:
Head of Marketing: Kurt Stappling
Geographic Coverage: International
Year Established: 1981
Number of Employees: 80

TRILOG, INC.
17391 Murphy Ave.
Irvine, CA 92714
(714) 549-4079
Major Markets: Peripheral Manufacturing
Target Industries: Manufacturing; Engineering
Target Applications: CAD/CAM
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Marketing: Jack Rice
Head of Engineering: LeRoy Thompson
Geographic Coverage: International
Year Established: 1978
Number of Employees: 30

TRT DATA PRODUCTS
Northfield Communications Division
3 Depot Place
E. Norwalk, CT 06855
(203) 853-2713
Major Markets: Component and Communications Equipment Manufacturing; OEM (Computer Systems)
Contacts:
Head of Marketing: Arnold Benard
Head of Engineering: Ron Kelley
Geographic Coverage: International
Year Established: 1969
Number of Employees: 30

TSD DISPLAY PRODUCTS, INC.
35 Orville Drive
Bohemia, NY 11716
(516) 589-6800
Major Markets: Component, Terminal and Peripheral Manufacturing
Contacts:
Head of Sales: Steven Sloan
Geographic Coverage: International
Year Established: 1980
Number of Employees: 25

TYMSHARE, INC.
20705 Valley Green Drive
Cupertino, CA 95014
(408) 446-6000
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Finance, Manufacturing, Utilities, Government
Target Applications: POS, Tax Processing, Reservations
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: R. W. Braniff
Head of Sales: W. F. Prince
Head of Software: L. Rakoczi
Geographic Coverage: International
Year Established: 1966
Number of Employees: 4,000

TYMSHARE, INC.
Applied Systems Division
6935 Wisconsin Ave.
Bethesda, MD 20815
(301) 951-0122
Major Markets: Component and Communications Equipment Manufacturing, Systems House (Commercial OEM); Data Services (Service Bureau)
Contacts:
Head of Engineering: Alan Monatch
Geographic Coverage: International
Year Established: 1978
Number of Employees: 35

U-MICROCOMPUTERS, INC.
300 Board St
Stamford, CT 06901
(203) 359-4236
Geographic Coverage: International
Year Established: 1982

UNITED PERIPHERALS, INC.
432 Lakeside Drive
Sunnyvale, CA 94086
(408) 730-4440
Major Markets: Peripheral Manufacturing
Target Industries: OEM
Contacts:
Head of Marketing/Sales: Roo Radcliff
Head of Customer Service: Bill Sullivan
Geographic Coverage: International
Year Established: 1980
Number of Employees: 300

UNIVATION, INC.
1037 N. Fair Oaks Ave.
Sunnyvale, CA 94089
(408) 745-0180
Major Markets: Component and Peripheral Manufacturing
Geographic Coverage: International
Year Established: 1981
Number of Employees: 7

USDATA, INC.
1551 Glenville Road
Richardson, TX 75081
(214) 680-9700
Major Markets: Terminal, Peripheral and Communications Equipment Manufacturing, Software House, Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Communication; Process Control; General Business
Target Applications: Communication; Process Control; General Business
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Gary Kuehneman
Head of Software: Mitchell Vaughs
Geographic Coverage: International
Year Established: 1971
Number of Employees: 105

U.S. DESIGN CORP.
5150 Philadelpia Way
Lanham, MD 20706
(800) 368-2811
Major Markets: Peripheral Manufacturing, Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Marketing: Larry Tashbook
Head of Sales: Bill Bickford
Head of Engineering: Sran Mar Monsen
Geographic Coverage: International
Year Established: 1978
Number of Employees: 50

VECTOR GRAPHIC, INC.
500 N. Ventura Park Road
Thousand Oaks, CA 91320
(805) 499-5831
Major Markets: Computer and Communications Equipment Manufacturing
Net Sales: $25 Million — $100 Million (1982)
Contacts:
Head of Marketing: Fred Snow
Geographic Coverage: International
Year Established: 1976
Number of Employees: 350

VERMONT RESEARCH CORP.
Precision Park
N. Springfield, VT 05150
(802) 886-2256
Major Markets: Component and Peripheral Manufacturing; OEM (Peripherals/Terminals)
Target Industries: Manufacturing; Telecommunications
Target Applications: Process Control, Robotics; CAD/CAM
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: W. Austin, III
Head of Sales: R. C. Simmons
Head of Engineering: R. A. Stover
Head of Customer Service: W. Keith
Geographic Coverage: International
Year Established: 1960
Number of Employees: 210

VERSATEC, INC.
2710 Walsh Ave
Santa Clara, CA 95051
(408) 988-2800
Major Markets: Peripheral Manufacturing, OEM (Peripherals/Terminals); Maintenance/Other Services
Target Industries: Geophysical; Mapping, Engineering, Business Graphics
Target Applications: CAD
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing/Software: Milton Chang
Head of Sales: Rodney Murray
Head of Engineering: William Lloyd
Geographic Coverage: International
Year Established: 1969
Number of Employees: 1,200

VERTEX
2150 Bering Drive
San Jose, CA 95131
(408) 942-0606
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: J. Adkisson
Head of Sales: Norm Hayes
Head of Engineering: R. Stromsta
Geographic Coverage: International
Year Established: 1982
Number of Employees: 50

VICTOR TECHNOLOGIES, INC.
8420 Bynmarn Ave
Chicago, IL 60615
(312) 539-8200
Major Markets: Computer, Terminal and Office Equipment Manufacturing, OEM (Computer Systems), Software House; Systems House (Commercial OEM)
Target Industries: Cross
Target Applications: Business Accounting, Word Processing; Electronic Spread Sheets, Banking Applications
Contacts:
Head of Marketing: Roy McIlwaine
Head of Sales: Jack Huber
Head of Software: Van Lewig
Head of Engineering: Robert Taylor
Geographic Coverage: National
Year Established: 1917
Number of Employees: 2,500

VISTA COMPUTER CO., INC.
1317 E. Edinger St.
Santa Ana, CA 92705
(714) 953-0523
Major Markets: Peripheral Manufacturing
Target Industries: Microcomputers
Contacts:
Head of Marketing: King R. Lee
Geographic Coverage: International
Year Established: 1977
Number of Employees: 35

VISUAL TECHNOLOGY, INC.
540 Main St
Tewksbury, MA 01876
(617) 851-5000
Major Markets: Terminal Manufacturing
Target Applications: Graphics
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Andrew Kay
Head of Sales: John Bruni
Head of Engineering: Ken Bailey

Geographic Coverage: International
Year Established: 1978
Number of Employees: 250

VS DATA CORP.
777 Henderson Blvd
Folcroft, PA 19032
(215) 461-5300
Major Markets: Peripheral Manufacturing, OEM (Computer Systems); Dealer/Distributor
Target Industries: Retail, Manufacturing, Wholesaling
Target Applications: Accounting
Contacts:
Head of Marketing: Michele Speed
Head of Engineering: William Glaub
Geographic Coverage: International
Year Established: 1972
Number of Employees: 18

WANG LABORATORIES, INC.
One Industrial Ave.
Lowell, MA 01851
(617) 459-5000
Major Markets: Computer, Terminal, Peripheral, Communications Equipment and Office Equipment Manufacturing
Target Industries: Banking, Insurance, Legal, State/Local Government
Target Applications: Data Entry; Electronic Mail; Human Resource Management, Programmer Utilities
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing/Sales: John F. Cunningham
Head of Software/Engineering: Frederick A. Wang
Geographic Coverage: International
Year Established: 1951
Number of Employees: 19,200

[illegible]
711 W. Algonquin Road
Arlington Heights, IL 60005
(312) 364-8500
Major Markets: Office Equipment Manufacturing
Target Industries: Chemical, Pharmaceutical; Food Processing; Government
Contacts:
Head of Marketing: J. B. Crassweller
Head of Sales: A. Swanson
Geographic Coverage: International
[illegible]
Number of Employees: 485

WESPERCORP
Western Peripherals Division
14321 Myford Road
Tustin, CA 92680
(714) 730-6250
Major Markets: Component and Peripheral Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Jack Olson
Geographic Coverage: International
[illegible]
Number of Employees: 140

WESPERMICRO SYSTEMS, INC.
14321 Myford Road
Tustin, CA 92680
(714) 850-1666
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: Randy Knapp
Head of Engineering: Gerald [illegible]
Geographic Coverage: International
Year Established: 1981
Number of Employees: 10

WESTERN DIGITAL CORP.
2445 McCabe Way
Irvine, CA 92714
(714) 557-3550
Major Markets: Component; Computer and Communications Equipment Manufacturing
Target Industries: Computer; Telecommunication
Net Sales: $25 Million — $100 Million (1982)
Contacts:
Head of Sales: Joseph Pleso
Geographic Coverage: National
Year Established: 1970
Number of Employees: 883

WESTERN DYNEX CORP.
3536 W. Osborn Road
Phoenix, AZ 85019
(602) 269-6401
Major Markets: Peripheral Manufacturing
Target Industries: Systems Houses (OEM), System Integrators
Contacts:
Head of Sales: Christine H. Flaherty
Geographic Coverage: International
Year Established: 1971

WESTERN GRAPHTEC
Formerly Watanabe Instrument
12 Chrysler St.
Irvine, CA 92714
(714) 770-6910
Major Markets: Peripheral Manufacturing
Target Industries: Engineering
Target Applications: Graphics, Electronics
Contacts:
Head of Marketing: Jack Campbell
Head of Engineering: Edward P. Brooks
Head of Customer Service: Nancy Clemons
Geographic Coverage: International
Year Established: 1980
Number of Employees: 25

WESTERN TELEMATIC, INC.
2435 St. Anne St.
Santa Ana, CA 92704
(800) 854-7226
Major Markets: Peripheral and Communications Equipment Manufacturing
Target Industries: Data Communications, PBX Telephone Industries
Contacts:
Head of Sales: David Shumway
Geographic Coverage: International
Year Established: 1964
Number of Employees: 20

WESTREX OEM PRODUCTS
51 Penn St
Fall River, MA 02724
(617) 676-1011
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: J. C. Murray
Geographic Coverage: International
Year Established: 1979
Number of Employees: 300

WICAT SYSTEMS, INC.
1875 S. State St
P.O. Box 539
Orem, UT 84057
(801) 224-6400
Major Markets: Computer Manufacturing, OEM (Peripherals/Terminals); Software House
Target Industries: Education, General Business
Target Applications: Accounting; [illegible]
Contacts:
Head of Marketing: Frank Richardson
Head of Software: Tom Seal
Head of Engineering: David Bailey
Geographic Coverage: International
Year Established: 1976
Number of Employees: 450

WILLIAM PALMER INDUSTRIES
17971 H. Skypark Circle Drive
Irvine, CA 92714
(714) 545-9622
Major Markets: Peripheral Manufacturing, Software House, Systems House (Commercial OEM)
Target Industries: Military, Research; Medical, Quality Control
Contacts:
Head of Engineering: Chris Horne
Geographic Coverage: National
Year Established: 1975
Number of Employees: 12

WINTEK CORP.
1801 South St
Lafayette, IN 47904
(317) 742-8428
Major Markets: Computer Manufacturing, Software House, Maintenance/Other Services
Target Industries: OEM
Target Applications: Industrial Control, General Business
Contacts:
Head of Software: Stephen E. Belter
Head of Engineering: James B. Wilson
Geographic Coverage: National
[illegible]
Number of Employees: 12

WORDPLEX CORP.
141 Triumfo Canyon Road
West Lake Village, CA 91361
(213) 889-4455
Major Markets: Office Equipment Manufacturing
Geographic Coverage: International
Year Established: 1974
Number of Employees: 220

WORLD STORAGE [illegible], LTD.
14251 Franklin Ave
Tustin, CA 92680
(714) 838-1491
Major Markets: OEM (Peripherals/Terminals)
Contacts:
Head of Marketing: J. Barrie Clark
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 130

WORLD STORAGE TECHNOLOGY, LTD.
OEM Office Terminals Division
14251 Franklin Ave
Tustin, CA 92680
(714) 838-4491
Major Markets: Terminal and Peripheral Manufacturing
Geographic Coverage: National
Year Established: 1975
Number of Employees: 300

WYSE TECHNOLOGY, INC.
3040 First St
San Jose, CA 95134
(408) 946-3075
Major Markets: Terminal Manufacturing
Target Industries: OEM, Mini- and microcomputers
Contacts:
Head of Marketing/Sales: Larry Lummus
Head of Engineering: Grace Tse
Geographic Coverage: National
Year Established: 1981
Number of Employees: 60

[illegible], INC.
7566 Trade St
San Diego, CA 92121
(619) 271-8730
Major Markets: Component Manufacturing
Target Industries: OEM
Contacts:
Head of Sales: William Perry
Geographic Coverage: International
Year Established: 1976
Number of Employees: 60

XEBEC
432 Lakeside Drive
Sunnyvale, CA 94086
(408) 733-4200
Major Markets: Component and Terminal Manufacturing
Geographic Coverage: International

XEROX CORP.
Printing Systems Division
880 Apollo St
El Segundo, CA 90245
(213) 536-7000
Major Markets: Terminal and Peripheral Manufacturing
Target Applications: Non-Impact Printing
Geographic Coverage: International
Year Established: 1949
Number of Employees: 116,000

[illegible], INC.
51 Lake St
Nashua, NH 03060
(603) 881-8122
Major Markets: Peripheral Manufacturing, OEM (Peripherals/Terminals), Data Services (Service Bureau), Dealer/Distributor, Maintenance/Other Services, Miscellaneous Computer Supplies
Target Industries: Publishing, Education, OEM, Manufacturing
Target Applications: Text Editing
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Engineering: Daniel [illegible]
Geographic Coverage: International
[illegible]
Number of Employees: 6

XICOR
851 Buckeye Court
Milpitas, CA 95035
(408) 946-6920

Vendors

Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: Bud Koch
Head of Sales: Tom North
Geographic Coverage: International
Year Established: 1978
Number of Employees: 254

XYLOGICS, INC.
144 Middlesex Tnpk.
Burlington, MA 01803
(617) 272-8140
Major Markets: Component and Peripheral Manufacturing
Target Industries: Education
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing/Sales: Howard Lev
Head of Engineering: Chappell Cory
Geographic Coverage: International
Year Established: 1975
Number of Employees: 128

ZYMETRICS, INC.
Electroglass Division
2901 Coronado Drive
Santa Clara, CA 95051
(408) 727-6500
Major Markets: OEM (Computer Systems), Systems House (Commercial OEM)
Target Applications: Wafer Handling
Geographic Coverage: International
Year Established: 1968
Number of Employees: 300

YOKOGAWA OF AMERICA
2 Dart Road
Shenandoah, GA 30265
(404) 253-7000
Major Markets: Peripheral Manufacturing
Contacts:
Head of Marketing: Jack Stegenga
Geographic Coverage: International
Year Established: 1957
Number of Employees: 70

ZANAZ COMMUNICATIONS, INC.
207 Lakin Drive
Huntsville, AL 35801
(205) 881-2200
Major Markets: Component and Communications Equipment Manufacturing
Target Industries: Lodging; Banks
Target Applications: Voice Mail; Dictation, Electronic Mail, Voice Storage and Forwarding
Contacts:
Head of Marketing: Dennis Miller
Head of Software: Ron Jackson
Head of Engineering: Preston Jett
Geographic Coverage: Regional
Year Established: 1982
Number of Employees: 9

ZENDEX CORP.
6644 Sierra Lane
Dublin, CA 94568
(415) 828-3000
Major Markets: Component and Computer Manufacturing
Target Industries: Industrial Control
Contacts:
Head of Marketing/Sales: Rob Reiners
Head of Engineering: John Hight
Geographic Coverage: International
Year Established: 1978
Number of Employees: 30

ZENITH DATA SYSTEMS
1000 Milwaukee Ave
Glenview, IL 60025
(312) 391-8860
Major Markets: Computer, Terminal, Peripheral, Communications Equipment and Office Equipment Manufacturing, OEM (Computer Systems), OEM (Peripherals/Terminals), Miscellaneous Computer Supplies
Target Industries: Fortune 1000; Small Business, OEM Computer Equipment; Higher Education
Target Applications: OA, Graphics; Accounting
Net Sales: $25 Million — $100 Million (1982)
Contacts:
Head of Marketing: Robert K. Reid
Head of Sales: John Frank
Head of Software: Tom Dornback
Head of Engineering: Hey Chang
Geographic Coverage: International
Year Established: 1979
Number of Employees: 1,000

ZENITH RADIO CORP.
CRT and Component Operations Division
1000 Milwaukee Ave.
Glenview, IL 60025
(312) 391-8860
Major Markets: Component, Terminal and Peripheral Manufacturing; Software House; Maintenance/Other Services
Target Industries: Small Business; Professional
Contacts:
Head of Marketing: H. Rudolph Ziedler
Head of Software/Engineering: Leonard Dietch
Head of Customer Service: William A. Nail
Geographic Coverage: National
Year Established: 1979
Number of Employees: 50

ZENTEC CORP.
2400 Walsh Ave.
Santa Clara, CA 95050
(408) 727-7667
Major Markets: Computer and Terminal Manufacturing
Target Industries: OEM
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing: Neal Dempsey
Head of Sales: Rich McNees
Head of Software/Engineering: David Bullard
Geographic Coverage: International
Year Established: 1978
Number of Employees: 300

ZILOG, INC.
1315 Dell Ave.
Campbell, CA 95008
(408) 370-8000
Major Markets: Component and Computer Manufacturing
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Marketing: David Guzeman
Head of Sales: Bernard Vonderschmitt
Head of Engineering: Bernard Vonderschmitt
Geographic Coverage: International
Year Established: 1974
Number of Employees: 1,000

ZITEL CORP.
Memory Systems/Datacom Division
2075 Zanker Road
San Jose, CA 95131
(408) 946-9600
Major Markets: Peripheral Manufacturing
Target Industries: OEM
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Marketing/Sales: James L. Siehl
Head of Engineering: John Conaway
Head of Customer Service: Don Johnson
Geographic Coverage: National
Year Established: 1978
Number of Employees: 65

ZOBEX
Suite J
7343 Ronson Road
San Diego, CA 92111
(714) 571-6971
Major Markets: Computer and Peripheral Manufacturing
Geographic Coverage: National
Year Established: 1979

INTRODUCING A CONVERSATIONAL TERMINAL WITH A LOT TO SAY FOR ITSELF.

An attractive low price plus a long list of features make the 5410 terminal from Teletype Corporation a great value. In fact, it's hard to beat this ANSI 3.64 based asynchronous terminal's cost-effectiveness for applications such as time sharing, inquiry response, data retrieval and software development. Unlike most terminals in its class, the 5410 lets you change from an 80 to 132 column mode so that you can put more data–even accounting spreadsheets–on the screen. No matter which mode you're in, you'll get high resolution with crisp, easy-to-read characters.

The 5410 is also surprisingly user-friendly. For starters, it has 8 programmable function keys that can be down-line loaded from a host or entered locally by the operator. These non-volatile keys are easily associated with screen labels. When the operator goes to another application and changes the function keys, the screen labels can change right along with them. There's no need to put plastic strips or messy tape on the screen.

When it comes to optioning, the 5410 features an English menu (see screen above) for fast set up. The operators don't have to flip DIP switches or figure out complicated codes. They'll also appreciate the 5410's character attributes which include blinking, boldfacing, underlining, non-displayed and reverse video.

Of course, we had the operator in mind when we designed the 5410. That's evident in the detachable, low-profile keyboard that's light enough to rest on the operator's lap. And in the tiltable, non-glare screen with brightness control.

The 5410 also stretches to suit your needs as well as the operator's. For example, it features [illegible] A printer port; the internal software to do editing, split screen and line drawing graphics; [illegible]s up to 19200 bps.

[illegible] thing about the 5410 is its ability to diagnose its own problems. And that if service [illegible] established nationwide service organization lets us respond quickly to your call. [illegible] conversational terminals, we think you'll find our 5410 speaks for itself.

[illegible]TYPE: VALUE SETS US APART.

[illegible]ington, 5555 Touhy Ave., Dept. 3223, Skokie, IL 60077. Tel. 1 800 323-1229.

"Teletype" is a registered trademark and service mark of Teletype Corporation.

INTELLIGENT TERMINALS
PRINTERS & TELEPRINTERS

THE TOTALLY COMPATIBLE TERMINAL.

Introducing the 5540, the terminal that suits 3270 protocols, agrees with your pocketbook and gets along with people. It's our most value-packed 3270-compatible terminal yet.

When Teletype Corporation unveiled its first 3270-compatible terminal some 10 years ago, people asked if we were committed to this business. And when we introduced our second terminal, the 4540, we still got asked the same question.

Well, quite frankly, there's no doubt about our commitment. The introduction of the 5540 offers more proof that we're in the 3270-business to stay.

But the best thing about the 5540 is that it represents an even better value than its predecessors. Because besides being competitively priced, the 5540 supports 3270 SNA/SDLC in addition to 3270 BSC line protocols. And there's full SNA character string support. It can also replace existing SNA terminals without host software modifications. And you can upgrade from BSC to SNA simply by changing diskettes.

We've also given the 5540 a more powerful microprocessor-based controller that will cluster up to 32 devices. Or you can choose a compact tabletop controller. You also get a choice of reduced size or standard displays, and 80 or 132 column data formats.

To improve operator productivity, the 5540 features a detachable keyboard with 3270-like layouts; 24 program function keys; a non-glare, high resolution tilt screen; plus a status line that includes a row and column counter.

Another nice thing about the 5540 is that it supports our existing 4540 displays and printer devices. Thus, you can mix and match existing and new terminals while holding down the cost of upgrading your system.

Backed by Teletype's experience in building over 200,000 3270-compatible terminals, the 5540 will certainly enhance our proven record for reliability. In the unlikely event of problems, self-diagnostics help pinpoint them. Modular design simplifies repairs. And with an established nationwide service organization, we're able to respond quickly when you need us. That includes delivering and installing terminals like the 5540.

Get to know our 5540 a little better. You'll find it's very easy to like.

TELETYPE: VALUE SETS US APART.

Teletype Corporation, 5555 Touhy Ave., Dept. 3223-F, Skokie, IL 60077. Tel. 1 800 323-1223, Extension 501. "Teletype" is a registered trademark and service mark of Teletype Corporation.

Intelligent Terminals Index By Compatibility

The index to intelligent terminals is designed to provide an overview of the products contained in this section of the buyer's guide and contains information on terminal compatibility, the maximum memory with which the terminal can be configured and the price and the page number on which the terminal is listed. Products are indexed according to compatibilities with seven major vendors' systems, including Burroughs Corp., Control Data Corp., Honeywell, Inc., NCR Corp. and Sperry Corp. In addition there there also two sections that contain terminals that are specifically TTY- or IBM 3270-compatible. The classification headings are listed in alphabetical order. Within each section, vendors and their products are listed alphabetically or numerically by model number. If a particular terminal is compatible with more than one vendor's product it is listed under each vendor with whom it is compatible.

If a particular terminal is not compatible with or has additional compatibilities outside of the major classifications it has been placed within the section entitled "Terminals With Other Compatibilities."

Manufacturers who did not specify compatiblity with any vendor's systems are listed alphabetically under the category "Terminals With No Compatibility Specified."

Complete product listings follow the index.

Burroughs-Compatible Terminals

VENDOR	MODEL	MAXIMUM MEMORY	PRICE	PAGE
American Datacom	ADC SUPERTELEX 400	32K bytes	$3,395	A-8
Burroughs Corp.	ET 2000	256K bytes	$3,795	A-10
Datapoint Corp.	1560	128K bytes	$3,195	A-12
ECS Microsystems, Inc.	4000	N/A	N/A	A-14
	4100	N/A	N/A	A-15
	4200	N/A	N/A	A-15
	4500	N/A	N/A	A-15
	4600	N/A	N/A	A-15
	4700	N/A	N/A	A-15
	5000	N/A	N/A	A-15
Ideographix, Inc.	IPX 5460	99.9M bytes	$20,000	A-18
Industrial Data Terminals	IDT 2250	32K bytes	$16,595	A-20
PSITech	215	120K bytes	$3,995	A-25
	GT 800	120K bytes	$3,500	A-25
	GTC 214	120K bytes	$4,500	A-25
	GTC 224	120K bytes	$5,000	A-25
	GTC 319	120K bytes	$5,500	A-25
Tektronix, Inc.	4115B	N/A	$19,950	A-30

CDC-Compatible Terminals

VENDOR	MODEL	MAXIMUM MEMORY	PRICE	PAGE
American Datacom	ADC SUPERTELEX 400	32K bytes	$3,395	A-8
Ideographix, Inc.	IPX 5460	99.9M bytes	$20,000	A-18
PSITech	215	120K bytes	$3,995	A-25
	GT 800	120K bytes	$3,500	A-25
	GTC 214	120K bytes	$4,500	A-25
	GTC 224	120K bytes	$5,000	A-25
	GTC 319	120K bytes	$5,500	A-25
Tektronix, Inc.	4115B	N/A	$19,950	A-30
	4118A	800K bytes	$22,400	A-30

Intelligent Terminals Index

Honeywell-Compatible Terminals

VENDOR	MODEL	MAXIMUM MEMORY	PRICE	PAGE
American Datacom	ADC SUPERTELEX 400	32K bytes	$3,395	A-8
Datapoint Corp.	1560	128K bytes	$3,195	A-12
ECS Microsystems, Inc.	4000	N/A.	N/A.	A-14
	4100	N/A.	N/A.	A-15
	4200	N/A.	N/A.	A-15
	4500	N/A.	N/A.	A-15
	4600	N/A.	N/A.	A-15
	4700	N/A.	N/A.	A-15
	5000	N/A.	N/A.	A-15
Ideographix, Inc.	IPX 5460	99.9M bytes	$20,000	A-18
Megadata Corp.	8178	512K bytes	$2,500	A-22
	8188	512K bytes	$2,500	A-22
PSITech	215	120K bytes	$3,995	A-21
	GT 800	120K bytes	$3,500	A-25
	GTC 214	120K bytes	$4,500	A-26
	GTC 224	120K bytes	$5,000	A-26
	GTC 319	120K bytes	$5,500	A-26
Tektronix, Inc.	4115B	N/A.	$19,950	A-30

IBM 3270-Compatible Terminals

VENDOR	MODEL	MAXIMUM MEMORY	PRICE	PAGE
AM Unit Co.	MAGNA-SL	N/A.	$5,000	A-8
	MAGNA 3	N/A.	$11,000 to $29,000	A-8
Anardata, Inc.	SCOREPAD	128K bytes	$1,850 to $3,300	A-9
	SCOREPAK	64K bytes	$350 to $1,200	A-9
Bedford Computer Corp.	METEOR I	256K bytes	$10,000	A-9
	METEOR II	256K bytes	$20,000	A-9
	METEOR III	256K bytes	$38,000	A-9
Burroughs Corp.	ET 2000	256K bytes	$3,795	A-10
Codex Corp.	CDX-268/1	384K bytes	$1,900	A-10
Datapoint Corp.	1560	128K bytes	$3,195	A-12
	8220	N/A.	$1,895	A-12
	8600	256K bytes	$7,500	A-12
Dictaphone Corp.	6110/6111	256K bytes	$5,950	A-14
	6140/6141	256K bytes	N/A.	A-14
	6150/6151	258K bytes	N/A.	A-14
ECS Microsystems, Inc.	4000	N/A.	N/A.	A-14
	4100	N/A.	N/A.	A-15
	4200	N/A.	N/A.	A-15
	4500	N/A.	N/A.	A-15
	4600	N/A.	N/A.	A-15
	4700	N/A.	N/A.	A-15
	5000	N/A.	N/A.	A-15
Harris Corp.	9178	64K bytes	N/A.	A-16
	9278-01	64K bytes	N/A.	A-16
	9278-02	64K bytes	N/A.	A-16
	9278-11	64K bytes	N/A.	A-16
	9278-12	64K bytes	N/A.	A-16
	9278-15	32K bytes	N/A.	A-16
	9279-2A	32K bytes	N/A.	A-16
ICL, Inc.	DRS 10	112K bytes	$3,995	A-17
	DRS 20	224K bytes	$6,050	A-17
	DRS 25	224K bytes	$9,050	A-17
	DRS 40	512K bytes	$7,900	A-18
	DRS 50	512K bytes	$13,945	A-18
Icot Corp.	ICOT-757	N/A.	$2,395	A-18
	ICOT-767	N/A.	$2,595	A-18
	ICOT-768	N/A.	$2,995	A-18
Ideographix, Inc.	IPX 5460	99.9M bytes	$20,000	A-18
IMC Corp.	FACTORY WORK STATION	26K bytes	$1,195	A-18
	MOBILE WORK STATION	N/A.	$5,495	A-18
Information Devices Corp.	RMS-600	N/A.	$50,000	A-20
Instrumentation Laboratory, Inc.	PIXEL-80	6M bytes	$14,000	A-20
Interbe Data Systems Corp.	SUPERBRAIN II JR.	64K bytes	$2,495	A-21
	SUPERBRAIN II QD	64K bytes	$2,995	A-21
	SUPERBRAIN II SD	64K bytes	$3,495	A-21
Megadata Corp.	8178	512K bytes	$2,500	A-22

Intelligent Terminals Index

VENDOR	MODEL	MAXIMUM MEMORY	PRICE	PAGE
Megadata Corp.	8188	512K bytes	$2,500	A-22
Microdata Corp.	7510	64K bytes	$6,825	A-22
Micromation	M/SYSTEM	N/A	$6,000	A-22
	MARINER	N/A	$7,000	A-22
	MI SYSTEM	N/A	$6,990	A-22
Paradyne Corp.	PDS-270	N/A	$3,000 to $5,850	A-24
Phoenix Computer Systems, Inc.	1024-1	1M bytes	$12,000	A-24
	1024-2	1M bytes	$18,000	A-25
PSITech	GT 800	120K bytes	$3,500	A-25
	215	120K bytes	$3,995	A-25
	GTC 214	120K bytes	$4,500	A-26
	GTC 224	120K bytes	$5,000	A-26
	GTC 319	120K bytes	$5,500	A-26
Raytheon Co.	200-1E and 200-2E	512K bytes	$3,995	A-26
	201E and 202E	512K bytes	$3,995	A-26
	210	512K bytes	$3,995	A-26
	220	512K bytes	$6,750	A-26
	1202E	512K bytes	$3,995	A-26
	PTS-2078	N/A	N/A	A-26
	PTS-2079	32K bytes	N/A	A-26
	RDS-1202	96K bytes	$8,955	A-26
	RDS-1303	96K bytes	$9,995	A-26
Scott Systems, Inc.	ACCESS ST-8	N/A	N/A	A-26
	ACCESS ST-12	N/A	N/A	A-26
Sidereal Corp.	MICRONET 8	256K bytes	$18,900	A-28
Spectra Systems, Inc.	SPECTRA-880	2M bytes	N/A	A-29
TEI Display Products, Inc.	8118 VIT	512K bytes	$2,650	A-30
Victor Technologies, Inc.	SYSTEM 700	64K bytes	$3,500 to $10,000	A-30
	VICTOR 9000A	256K bytes	$3,995	A-31
	VICTOR 9000B	256K bytes	$4,745	A-31
	VICTOR 9000C	256K bytes	$5,995	A-31
Wordplex Corp.	WORDPLEX MODEL 80-210	64K bytes	$5,100	A-31
	WORDPLEX MODEL 80-220	64K bytes	$6,000	A-31
	WORDPLEX MODEL 80-3	128K bytes	$7,700	A-31
	WORDPLEX MODEL 80-4	128K bytes	$11,800	A-31
Zenith Data Systems	Z89	48K bytes	$1,999	A-32
	Z90	64K bytes	$2,499	A-32
	ZF 100	768K bytes	$2,899	A-32
	ZW 100	768K bytes	$5,499	A-32

NCR-Compatible Terminals

VENDOR	MODEL	MAXIMUM MEMORY	PRICE	PAGE
American Datacom	ADC SUPERTELEX 400	32K bytes	$3,395	A-8
ECS Microsystems, Inc.	4000	N/A	N/A	A-14
	4100	N/A	N/A	A-15
	4200	N/A	N/A	A-15
	4500	N/A	N/A	A-15
	4600	N/A	N/A	A-15
	4700	N/A	N/A	A-15
	5000	N/A	N/A	A-15
PSITech	215	120K bytes	$3,995	A-25
	GT 800	120K bytes	$3,500	A-25
	GTC 214	120K bytes	$4,500	A-26
	GTC 224	120K bytes	$5,000	A-26
	GTC 319	120K bytes	$5,500	A-26
Tektronix, Inc.	4115B	N/A	$19,950	A-30

Sperry-Compatible Terminals

VENDOR	MODEL	MAXIMUM MEMORY	PRICE	PAGE
American Datacom	ADC SUPERTELEX 400	32K bytes	$3,395	A-8
Chi Corp.	RAINBOW 100	256K bytes	$4,995	A-10
ECS Microsystems, Inc.	4000	N/A	N/A	A-14

Intelligent Terminals Index

VENDOR	MODEL	MAXIMUM MEMORY	PRICE	PAGE
ECS Microsystems, Inc.	4100	N/A	N/A	A-14
	4200	N/A	N/A	A-15
	4500	N/A	N/A	A-15
	4600	N/A	N/A	A-15
	4700	N/A	N/A	A-15
	5000	N/A	N/A	A-15
Ideographix, Inc.	IPX 5460	99.9M bytes	$20,000	A-16
PSITech	215	120K bytes	$3,995	A-25
	GT 800	120K bytes	$3,500	A-25
	GTC 214	120K bytes	$4,500	A-26
	GTC 224	120K bytes	$5,000	A-26
	GTC 319	120K bytes	$5,500	A-26
Tektronix, Inc.	4115B	N/A	$19,950	A-30

TTY-Compatible Terminals

VENDOR	MODEL	MAXIMUM MEMORY	PRICE	PAGE
AB Dick Co.	MAGNA-SL	N/A	$5,000	A-8
	MAGNA 3	N/A	$11,000 to $29,000	A-8
American Datacom	ADC SUPERTELEX 400	32K bytes	$3,395	A-8
AM Varityper	EPICS TERMINAL	128K bytes	$4,500	A-8
BBN Computer Corp.	BITGRAPH	512K bytes	$4,995	A-8
Bedford Computer Corp.	METEOR I	256K bytes	$10,800	A-8
	METEOR II	256K bytes	$20,000	A-8
	METEOR III	256K bytes	$38,000	A-8
Beehive International	ATL-008	128K bytes	$2,995	A-8
	TOPPER	N/A	N/A	A-8
Burroughs Corp.	ET 2000	256K bytes	$3,795	A-10
Codex Corp.	CDX-268/1	384K bytes	$1,900	A-10
Computek, Inc.	8115	64K bytes	$2,200	A-10
	8125	256K bytes	$4,995	A-10
Computer Talk, Inc.	MODEL 423	N/A	$3,606	A-10
	MODEL 425	3K bytes	$9,650	A-12
	MODEL 427	N/A	$4,379 to $7,000	A-12
Comtec Information Systems, Inc.	ALPHA-VERTER-500	90K bytes	$3,825	A-12
Cromemco, Inc.	C10, CKBA, CBL-CS	64K bytes	$1,240	A-12
	C10, CKBC, CBL-CS	64K bytes	$1,440	A-12
Datapoint Corp.	1560	128K bytes	$3,195	A-12
	8220	N/A	$1,895	A-12
	8600	256K bytes	$7,500	A-12
Delta Data Systems Corp.	7260T	N/A	$7,500	A-12
	7265T	64K bytes	$11,000	A-12
	7268T	64K bytes	$12,000	A-14
	7586	N/A	$11,340	A-14
	DELTA 2201	64K bytes	$2,200	A-14
	DELTA 2203	256K bytes	$2,300	A-14
	DELTA 7103	64K bytes	$4,855	A-14
	DELTA 7303	N/A	$4,855	A-14
	DELTA 7506	64K bytes	$6,000	A-14
Dentronix Systems, Inc.	D-400	N/A	$1,450	A-14
	DENTRONIX 200	N/A	$1,450	A-14
Dictaphone Corp.	6110/6111	256K bytes	$5,950	A-14
ECS Microsystems, Inc.	4000	N/A	N/A	A-14
	4100	N/A	N/A	A-15
	4200	N/A	N/A	A-15
	4500	N/A	N/A	A-15
	4600	N/A	N/A	A-15
	4700	N/A	N/A	A-15
	5000	N/A	N/A	A-15
Esprit Systems, Inc.	ESPRIT I	N/A	$595	A-15
	ESPRIT II	N/A	$645	A-15
	ESPRIT III	256K bytes	$895	A-15
	EXECUTIVE MODEL 10	64K bytes	$1,195	A-15
Essex Engineering Co.	SX 1101	1M bytes	$11,000	A-15
Extel Corp.	B-31	32K bytes	$2,900	A-15
General Digital Industries, Inc.	DGT 66	N/A	$4,500	A-15
HMW Enterprises, Inc.	9060	64K bytes	$2,200	A-16
Human Designed Systems, Inc.	CONCEPT AVT	N/A	$1,295	A-17
	CONCEPT GVT	N/A	N/A	A-17
	CONCEPT AVT-APL	N/A	$1,295	A-17
	CONCEPT APL8	N/A	N/A	A-17

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VENDOR	MODEL	MEMORY	PRICE	PAGE
Ideographix, Inc.	IPX 5460	99.9M bytes	$20,000	A-18
ID Systems Corp.	ID-188	N/A	$10,445	A-18
IMC Corp.	FACTORY WORK STATION	26K bytes	$1,195	A-18
	MOBILE WORK STATION	N/A	$5,495	A-18
Instrumentation Laboratory, Inc.	PIXEL-80	6.0M bytes	$14,000	A-20
Intecolor	INTECOLOR 8001	64K bytes	$2,395	A-20
	INTECOLOR 8051	N/A	$3,880	A-20
	INTECOLOR 8052	N/A	$4,495	A-20
	INTECOLOR 8053	N/A	$5,495	A-20
	INTECOLOR 8054	N/A	$6,495	A-20
	INTECOLOR 8063	64K bytes	$5,955	A-20
	INTECOLOR 8064	N/A	$7,085	A-20
International Entry Systems, Inc.	DATACORDER II	64K bytes	N/A	A-20
	DATACORDER III	64K bytes	N/A	A-21
Itek Composition Systems	80	64K bytes	$4,600	A-21
	61	64K bytes	$6,900	A-21
Ithaca Intersystems, Inc.	GRAPHOS	64K bytes	$7,995	A-21
Megadata Corp.	8178	512K bytes	$2,500	A-22
	8188	512K bytes	$2,500	A-22
Micro Systems Development Corp., Inc.	MDC.350	32K bytes	$4,950	A-24
New Media Graphics Corp.	GRAPHOVER 9500	N/A	$9,850	A-24
Parodyne Corp.	PDS-270	N/A	$3,000 to $5,850	A-24
Peripheral Systems, Inc.	BUREAUCRAT	40K bytes	$3,495	A-24
	LOBBYIST	40K bytes	$2,995	A-24
Phoenix Computer Systems, Inc.	1024-1	1.0M bytes	$12,000	A-24
	1024-2	1.0M bytes	$18,000	A-25
Prime Computer, Inc.	PT 65	32K bytes	N/A	A-25
PSITech	215	120K bytes	$3,995	A-25
	GT 860	120K bytes	$3,500	A-25
	GT 1609	512K bytes	$7,000	A-25
	GTC 214	120K bytes	$4,500	A-26
	GTC 224	120K bytes	$5,000	A-26
	GTC 319	120K bytes	$5,500	A-26
Ramtek Corp.	RAMTEK 6211	16K bytes	$4,995	A-26
	RAMTEK 6221	16K bytes	$5,995	A-26
Sidereal Corp.	MICRONET 8	256K bytes	$18,900	A-28
	MICRONET 20	N/A	$4,500	A-28
	MICRONET 25	N/A	$6,500	A-28
Sierra Information Systems Corp.	DT-2000	32K bytes	N/A	A-28
Sorec Technology, Inc.	CHALLENGER 135	N/A	$995	A-29
	CHALLENGER 530	N/A	$595	A-29
	IQ-130	N/A	$1,095	A-29
Spectra Systems, Inc.	SPECTRA-123	N/A	$13,000	A-29
System Integrators, Inc.	COYOTE 1	N/A	N/A	A-29
	COYOTE 4	N/A	N/A	A-29
Tektronix, Inc.	4051	32K bytes	$6,295	A-29
	4052A	N/A	$9,900	A-29
	4054A	N/A	$14,950	A-30
	4114A	800K bytes	$17,900	A-30
	4115B	N/A	$19,950	A-30
	4116A	800K bytes	$22,400	A-30
Telerau Communications Corp.	PORTABLE-81	256K bytes	$4,800	A-30
	T-3000	64K bytes	$2,995	A-30
Triformation Systems, Inc.	FSST-3	N/A	$4,495	A-30
Visual Technology, Inc.	VISUAL 300	N/A	$1,150	A-31
Wordplex Corp.	WORDPLEX MODEL 80-210	64K bytes	$5,100	A-31
	WORDPLEX MODEL 80-220	64K bytes	$6,000	A-31
	WORDPLEX MODEL 80-3	128K bytes	$7,760	A-31
	WORDPLEX MODEL 80-4	128K bytes	$11,600	A-31
Zenith Data Systems	Z89	48K bytes	$1,999	A-32
	ZF 100	768K bytes	$2,699	A-32
	ZW 100	768K bytes	$5,499	A-32

Terminals With Other Compatibilities

VENDOR	MODEL	MEMORY	PRICE	PAGE
Azurdata, Inc.	SCOREPAK	64K bytes	$350 to $1,200	A-8
Computalk, Inc.	8115	64K bytes	$2,200	[illegible]
	8126	256K bytes	$4,995	A-10

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VENDOR	MODEL	MAXIMUM MEMORY	PRICE	PAGE
[illegible]	1560	128K bytes	$3,195	A-12
Gtech Corp.	GSC-101	64K bytes	$6,500	A-16
Ideographix, Inc.	IPX 5460	99.9M bytes	$20,000	A-18
Tektronix, Inc.	4114A	800K bytes	$17,900	A-30
	4115B	N/A	$19,950	A-30
Victor Technologies, Inc.	VICTOR 9000A	256K bytes	$3,995	A-31
	VICTOR 9000B	256K bytes	$4,745	A-31
	VICTOR 9000C	256K bytes	$5,995	A-31

Terminals With No Compatibility Specified

VENDOR	MODEL	MAXIMUM MEMORY	PRICE	PAGE
Advanced Electronics Design, Inc.	AED 11	512K bytes	$19,995	A-8
	AED 512	N/A	$3,995	A-8
A.I.C.S., Inc.	SYSTEM 2000 WP	N/A	$1,900	A-8
Astronautics Corp. of America	P/E	N/A	N/A	A-8
	P/N 204050-2	528K bytes	N/A	A-8
	P/N 204050-3	16K bytes	N/A	A-8
	P/N 204050-4	528K bytes	N/A	A-8
	P/N 204050-5	528K bytes	N/A	A-9
	P/N 204050-6	528K bytes	N/A	A-9
	P/N 204050-7	528K bytes	N/A	A-9
	P/N 204050-8	N/A	N/A	A-9
Autech Corp.	DISPLAY MASTER	N/A	N/A	A-9
Chromatics, Inc.	CG SERIES	96K bytes	$7,995	A-10
	CGC 7900	9M bytes	$41,995	A-10
Comark Corp.	MB85I	24M bytes	$7,000	A-10
	[illegible]	8M bytes	$8,000	A-10
[illegible]	427 ECP	64K bytes	$14,500	A-10
Daktronics	OLYMPIAN 80	64K bytes	$3,500	A-12
Datalogics, Inc.	6300 SERIES	N/A	$7,000	A-12
	6350	N/A	$7,000	A-12
Harris Corp.	MULTIFUNCTION 9278	64K bytes	N/A	A-16
	MULTIFUNCTION 9285	64K bytes	N/A	A-16
Hastech, Inc.	PAGE PRO	N/A	N/A	A-16
Hewlett-Packard Co.	HP2647F	64K bytes	$9,950	A-16
HMW Enterprises, Inc.	9081	N/A	$5,100	A-17
	9083	N/A	$4,100	A-17
	9083 S	N/A	$4,100	A-17
	9203	N/A	$5,500	A-17
Imlac Corp.	1600 IID	192K bytes	$21,700	A-18
	SERIES 2 MODEL 8000	192K bytes	$15,750	A-18
Industrial Data Terminals	IDT 1900	32K bytes	$7,500	A-20
	IDT 2200	32K bytes	$12,000	A-20
Interior Data Systems Corp.	COMPUSTAR VPU 10	64K bytes	$1,995	A-21
	COMPUSTAR VPU 20	64K bytes	$2,995	A-21
	COMPUSTAR VPU 30	64K bytes	$3,495	A-21
	COMPUSTAR VPU 40	64K bytes	$3,995	A-21
Jupiter Systems, Inc.	JUPITER 12	N/A	[illegible]	A-21
Megatek Corp.	1650	256K bytes	$15,900	A-22
	6200	96K bytes	$17,900	A-22
	7200	96K bytes	$30,000	A-22
Microdata Corp.	5750	64K bytes	$5,100	A-22
Microprocessor Systems, Inc.	RUBICON 2000	256K bytes	N/A	A-22
	RUBICON 2001	256K bytes	N/A	A-22
[illegible]	MSI/55	N/A	N/A	A-23
	MSI/85	N/A	N/A	A-24
	MSI/88E	N/A	N/A	A-24
	MSI/88F	N/A	N/A	A-24
	[illegible]	N/A	N/A	A-24
Northern Telecom, Inc.	DISPLAY TERMINAL	512K bytes	$2,000	A-24
Phoenix Computer Systems, Inc.	708-24	768K bytes	[illegible]	A-24
	708-25	768K bytes	[illegible]	A-24
	1024-14	768K bytes	$12,200	A-24
	1024-18	768K bytes	$14,600	A-25
	1024-24	768K bytes	$18,000	A-25
	1024-28	768K bytes	$20,000	A-25
	1024-34	768K bytes	N/A	A-25
	1024-38	768K bytes	N/A	A-25

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VENDOR	MODEL	MAXIMUM MEMORY	PRICE	PAGE
Gantel Corp.	QANTEL 4041	*N/A*	*$4,500*	*A-28*
Sidereal Corp.	MICRONET 4D	*256K bytes*	*$14,900*	*A-28*
	MICRONET 8	*256K bytes*	*$16,900*	*A-28*
Sorec Technology, Inc.	IQ-150	*N/A*	*$1,395*	*A-29*
Sperry Corp.	UTS 40	*128K bytes*	*$3,200*	*A-29*
Teletype Corp.	5620	*256K bytes*	*$6,115*	*A-30*
TSD Display Products, Inc.	700 RTE	*512K bytes*	*$2,650*	*A-30*
Usdata, Inc.	REACT	*N/A*	*$8,950 to $14,500*	*A-31*
Wyse Technology, Inc.	WY-200	*32K bytes*	*$1,295*	*A-31*
	WY-210	*128K bytes*	*$1,595*	*A-31*
	WY-220	*128K bytes*	*$1,695*	*A-32*
Zenith Data Systems	Z100	*192K bytes*	*$2,899*	*A-32*
Zentec Corp.	8000	*64K bytes*	*$1,750*	*A-32*
	SERIES 2000	*56K bytes*	*$8,095*	*A-32*
	ZMS-35	*16K bytes*	*$1,350*	*A-32*

Intelligent Terminals

AB DICK CO.
MAGNA-SL
Specific Application: WP
Compatibility: IBM 3270; TTY
Plug Compatibility: DEC VT52
Minimum Memory Required: 128K bytes
Languages Supported: Cobol, Basic
Simultaneous Users: Yes
Terminal Configuration: Cluster
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 250,000 bit/sec
Integrated Modem/Coupler: [illegible]
Diagonal Screen Size: 14 in.
Line/Screen: 27, standard; 90, optional
Character/Line: 80
Color Capability: No
Program Function Keys: 15, standard; 15, maximum
List Price: $3,000
Distribution Method: End user; Third-party
Date First Installed: 1981
(See Vendor Profile Page V-1)

AB DICK CO.
MAGNA 3
Specific Application: WP
Compatibility: IBM 3270; TTY
Plug Compatibility: DEC VT52
Languages Supported: Cobol, Basic
Processor Model: Intel
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: [illegible]
Diagonal Screen Size: 12 in.
Line/Screen: 25, standard; 80, optional
Character/Line: 80
Color Capability: No
Program Function Keys: 50
List Price: $11,000 to $29,000
Distribution Method: End user; Third-party
Date First Installed: 1981

ADVANCED ELECTRONICS DESIGN, INC.
AED 11
Specific Application: CAD/CAM
Minimum Memory Required: 256K bytes
Maximum Memory Required: 512K bytes
Languages Supported: Fortran, Basic, Xenix
Processor Model: Motorola 6502
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in
Line/Screen: 24
Character/Line: 80
Color Capability: Yes
Program Function Keys: 10, standard; 10, maximum
List Price: $19,995
Distribution Method: End user
Date First Installed: August 1982
(See Vendor Profile Page V-1)

ADVANCED ELECTRONICS DESIGN, INC.
AED 512
Plug Compatibility: Tektronix 4010
Languages Supported: Assembly
Processor Model: Motorola 6502
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 13 in., standard; 19 in., optional
Program Function Keys: 8, standard; 8, maximum
List Price: $3,295
Distribution Method: Third-party
Date First Installed: 1980

A.I.C.S., INC.
SYSTEM 2000 WP
Specific Application: WP
Languages Supported: Cobol, Fortran, Basic, Basic Plus, Basic Plus 2, Pascal, RPG, APL, PL/1, Proc, Corel
Processor Model: Intel 8080
Simultaneous Users: No
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 160, optional
Color Capability: No
Program Function Keys: 28, standard; 28, maximum
List Price: $1,900
Average Monthly Maintenance: $71
Distribution Method: End user
Date First Installed: December 1979
(See Vendor Profile Page V-1)

AMERICAN DATACOM
ASC SUPERTELEX XXI
Compatibility: TTY; Honeywell; Sperry; Burroughs; NCR; CDC
Minimum Memory Required: 4K bytes
Maximum Memory Required: 32K bytes
Languages Supported: Telex ASC II
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 300 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 30
List Price: $3,395
Average Monthly Maintenance: $40
Distribution Method: End user, Third-party
Date First Installed: September 1982
(See Vendor Profile Page V-2)

AM VARITYPER
EPICS TERMINAL
Specific Application: Typesetting
Compatibility: TTY
Minimum Memory Required: 128K bytes
Maximum Memory Required: 128K bytes
Languages Supported: Macro
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Cluster; 8
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 14 in
Line/Screen: 14
Character/Line: 64
Color Capability: No
Program Function Keys: 8, standard; 8, maximum
List Price: $4,500
Distribution Method: End user
Date First Installed: March 1983
(See Vendor Profile Page V-3)

ANACOMP-SYSCOM, INC.
ALFASKOP
Compatibility: IBM 3270
Plug Compatibility: IBM 3278, 3279
Processor Model: Intel 8088
Terminal Configuration: Cluster, 32
Communications Protocols: Asynchronous, Synchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii, Ebcdic
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 43
Character/Line: 80
Color Capability: Optional, 7
Program Function Keys: 12
Distribution Method: End user
Date First Installed: March 1983
(See Vendor Profile Page V-3)

ASTRONAUTICS CORP. OF AMERICA
P/E
Languages Supported: Fortran, Pascal, PL/M 86
Processor Model: Intel 8086
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16
Distribution Method: End user, OEM
(See Vendor Profile Page V-4)

ASTRONAUTICS CORP. OF AMERICA
P/N 204050-2
Minimum Memory Required: 16K bytes
Maximum Memory Required: 528K bytes
Languages Supported: Fortran, Pascal, PL/M 86
Processor Model: Intel 8086
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16
Distribution Method: End user, OEM

ASTRONAUTICS CORP. OF AMERICA
P/N 204050-3
Minimum Memory Required: 16K bytes
Maximum Memory Required: 16K bytes
Languages Supported: Fortran, Pascal, PL/M 86
Processor Model: Intel 8086
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 15 in.

ASTRONAUTICS CORP. OF AMERICA
P/N 204050-4
Minimum Memory Required: 16K bytes
Maximum Memory Required: 528K bytes
Languages Supported: Fortran, Pascal, PL/M 86
Processor Model: Intel 8086
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 15 in.

Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16
Distribution Method: End user, OEM

ASTRONAUTICS CORP. OF AMERICA
P/N 204050-5
Minimum Memory Required: 16K bytes
Maximum Memory Required: 528K bytes
Languages Supported: Fortran, Pascal, PL/M 86
Processor Model: Intel 8086
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16
Distribution Method: End user, OEM

ASTRONAUTICS CORP. OF AMERICA
P/N 204050-6
Minimum Memory Required: 16K bytes
Maximum Memory Required: 528K bytes
Languages Supported: Fortran, Pascal, PL/M 86
Processor Model: Intel 8086
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16
Distribution Method: End user, OEM

ASTRONAUTICS CORP. OF AMERICA
P/N 204050-7
Minimum Memory Required: 16K bytes
Maximum Memory Required: 528K bytes
Languages Supported: Fortran, Pascal, PL/M 86
Processor Model: Intel 8086
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16
Distribution Method: End user, OEM

ASTRONAUTICS CORP. OF AMERICA
P/N 204050-8
Specific Application: Color Graphics
Languages Supported: Fortran, Pascal, PL/M 86
Processor Model: Intel 8086
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 15 in.
Color Capability: 16 colors
Program Function Keys: 16
Distribution Method: End user, OEM

AUTECH CORP.
DISPLAY MASTER
Minimum Memory Required: 64K bytes
Languages Supported: Fortran, Basic
Processor Model: Motorola 68000
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Full-Duplex, Synchronous
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 19 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 16 colors, optional
Program Function Keys: 10, standard, 10, maximum
Distribution Method: End user
Date First Installed: May 1983
(See Vendor Profile Page V-4)

AZURDATA, INC.
SCOREPAD
Specific Application: Auditing; Route Accounting
Compatibility: IBM 3270
Minimum Memory Required: 64K bytes
Maximum Memory Required: 128K bytes
Languages Supported: Pascal
Processor Model: Motorola 6502
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 3 in.
Line/Screen: 1
Character/Line: 24
Color Capability: No
List Price: $1,850 to $3,300
Distribution Method: End user
Date First Installed: March 1979
(See Vendor Profile Page V-4)

AZURDATA, INC.
SCOREPAK
Specific Application: Remote Order Entry
Compatibility: IBM 3270, Series/1,

Minimum Memory Required: 4K bytes
Maximum Memory Required: 64K bytes
Processor Model: RCA
Data Transmission Characteristics: Half-Duplex
Maximum Transmission Speed: 1,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 3 in.
Line/Screen: 1
Character/Line: 14
Color Capability: No
List Price: $350 to $1,200
Distribution Method: End user
Date First Installed: May 1978

IBM COMPUTER SITGRAPH
Specific Application: Graphics, CAD/CAM
Compatibility: TTY
Plug Compatibility: DEC VT100, VT52
Minimum Memory Required: 128K bytes
Maximum Memory Required: 512K bytes
Languages Supported: Fortran, Macro Assembly
Processor Model: Motorola 68000
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: SDLC/SNA
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 15 in.
Line/Screen: 66
Color Capability: No
List Price: $4,995
Distribution Method: Third-party
Date First Installed: November 1981
(See Vendor Profile Page V-4)

BEDFORD COMPUTER CORP.
METEOR I
Compatibility: IBM 3270; TTY
Minimum Memory Required: 256K bytes
Maximum Memory Required: 256K bytes
Languages Supported: Unix
Processor Model: Motorola 68000
Simultaneous Users: No
Terminal Configuration: Cluster
Communications Protocols: SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 64
Character/Line: 84
Color Capability: No
List Price: $10,000
Distribution Method: Third-party
Date First Installed: June 1982
(See Vendor Profile Page V-4)

BEDFORD COMPUTER CORP.
METEOR II
Compatibility: IBM 3270; TTY
Minimum Memory Required: 256K bytes
Maximum Memory Required: 256K bytes
Languages Supported: J
Processor Model: Motorola 68000
Simultaneous Users: No
Terminal Configuration: Cluster
Communications Protocols: SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 64
Character/Line: 84
Color Capability: No
List Price: $20,000
Distribution Method: Third-party
Date First Installed: June 1982

BEDFORD COMPUTER CORP.
METEOR III
Compatibility: IBM 3270, TTY
Minimum Memory Required: 256K bytes
Maximum Memory Required: 256K bytes
Languages Supported: Unix
Processor Model: Motorola 68000
Simultaneous Users: No
Terminal Configuration: Cluster
Communications Protocols: None, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 64
Character/Line: 84
Color Capability: No
List Price: $38,000
Distribution Method: Third-party
Date First Installed: June 1982

BEEHIVE INTERNATIONAL
ATL-008
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: DEC VT100
Minimum Memory Required: 32K bytes
Maximum Memory Required: 128K bytes
Languages Supported: RPG
Processor Model: Motorola 68008
Simultaneous Users: No
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 27
Character/Line: 132
Color Capability: No
Program Function Keys: 246
List Price: $2,995
Distribution Method: End user, OEM, Third-party
Date First Installed: June 1983
(See Vendor Profile Page V-5)

BEEHIVE INTERNATIONAL
TOPPER
Compatibility: TTY
Languages Supported: Cobol, Fortran, Basic, Pascal
Processor Model: Zilog Z80A
Terminal Configuration: Stand-alone

Intelligent Terminals

Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Distribution Method: End user, OEM, Third-party
Date First Installed: June 1982

BURROUGHS CORP.
BT 2000
Compatibility: IBM 3270; Burroughs
Plug Compatibility: IBM 3275; Burroughs MT 985
Processor Model: Intel 8086
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, Asynchronous, Synchronous, Burroughs, Poll/Select
Data Transmission Characteristics: Half-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 56,400 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 26
Character/Line: 80
Color Capability: 8
Program Function Keys: 10, standard, 20 maximum
List Price: $3795
Distribution Method: End user
Date First Installed: August 1983
(See Vendor Profile Page V-5)

DEC CORP.
RAINBOW 100
Compatibility: Sperry
Plug Compatibility: Sperry UTS400
Minimum Memory Required: 64K bytes
Maximum Memory Required: 256K bytes
Languages Supported: Basic, Pascal
Processor Model: Zilog Z80; Intel 8088
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 16 colors, optional
Program Function Keys: 14
List Price: $4,995
Average Monthly Maintenance: $45
Distribution Method: End user, Third-party
Date First Installed: May 1983
(See Vendor Profile Page V-6)

DICOMATICS, INC.
CG SERIES
Specific Application: Business Graphics
Minimum Memory Required: 16K bytes
Maximum Memory Required: 96K bytes
Languages Supported: Basic, Pascal
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 34,000 bit/sec
Diagonal Screen Size: 19 in., standard; 15 in., optional
Line/Screen: 51
Character/Line: 85
Color Capability: 16 colors, optional
Program Function Keys: 8, standard; 8, maximum
List Price: $7,995
Distribution Method: End user
Date First Installed: June 1978
(See Vendor Profile Page V-6)

CHROMATICS, INC.
CGC 7900
Specific Application: Graphics; CAD/CAM
Minimum Memory Required: 128K bytes
Maximum Memory Required: 9M bytes
Languages Supported: Fortran, Pascal
Processor Model: Motorola 68000
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 768
Character/Line: 88
Color Capability: 256 colors, optional
Program Function Keys: 32, standard; 32, maximum
List Price: $11,995
Distribution Method: End user
Date First Installed: March 1981

CODEX CORP.
LDX-216/1
Specific Application: OA
Compatibility: IBM 3270; TTY
Minimum Memory Required: 192K bytes
Maximum Memory Required: 384K bytes
Languages Supported: Cobol, Basic
Processor Model: Motorola 68000
Simultaneous Users: Yes
Terminal Configuration: Cluster; 8
Communications Protocols: Bisynchronous, X.25, Asynchronous, SDLC, HDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 24
List Price: $1,900
Distribution Method: End user, OEM
Date First Installed: 1980
(See Vendor Profile Page V-7)

COMARK CORP.
M685I
Maximum Memory Required: 24M bytes
Languages Supported: Fortran, Basic, Pascal, Forth
Processor Model: Intel 8085
Simultaneous Users: No
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 11, standard; 11, maximum
List Price: $7,000
Distribution Method: End user
Date First Installed: 1981
(See Vendor Profile Page V-7)

COMARK CORP.
QS-II
Maximum Memory Required: 8M bytes
Languages Supported: Fortran, Basic, Pascal
Processor Model: DEC 11/23
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Programmable
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 11, standard; 11, maximum
List Price: $8,000
Distribution Method: End user
Date First Installed: June 1982

COMPUTEK, INC.
8118
Compatibility: TTY, DEC
Plug Compatibility: DEC VT100
Minimum Memory Required: 16K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Assembler
Processor Model: Zilog Z80A
Simultaneous Users: No
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard, 16, maximum
List Price: $2,200
Distribution Method: OEM
Date First Installed: November 1981
(See Vendor Profile Page V-8)

COMPUTEK, INC.
8128
Compatibility: TTY; DEC
Plug Compatibility: DEC VT100
Minimum Memory Required: 64K bytes
Maximum Memory Required: 256K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal, Assembler
Simultaneous Users: Yes, 4
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard; 16, maximum
List Price: $4,995
Distribution Method: Third-party
Date First Installed: November 1981

COMPUTER TALK, INC.
427 ECP
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Cobol, Fortran, Basic
Processor Model: Zilog Z80
Simultaneous Users: Yes
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 19 in.
Line/Screen: 20, standard; 25, optional
Character/Line: 64, standard; 80, optional
Color Capability: No
Program Function Keys: 5
List Price: $14,500
Distribution Method: End user
Date First Installed: June 1975
(See Vendor Profile Page V-8)

COMPUTER TALK, INC.
MODEL 423
Compatibility: TTY
Processor Model: Zilog Z80
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 20, standard; 24, maximum
Character/Line: 64, standard; 80, optional
Color Capability: No
Program Function Keys: 5, standard; 5, maximum
List Price: $2,995
Distribution Method: End user
Date First Installed: June 1984

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IT MEETS SYSTEM NEEDS.

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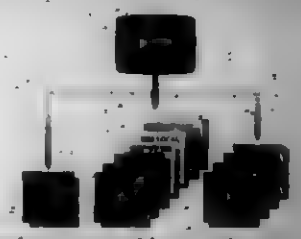
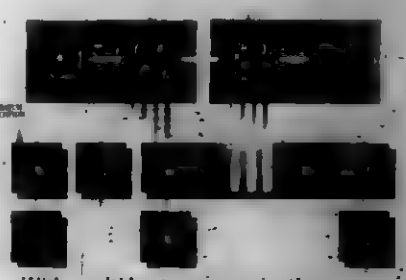
On the system side, Alfaskop terminal, disk and printer modules let you design any configuration from a single dedicated workstation to a multi-terminal, multi-tasking network. The system is compatible with most hosts, offers a choice of communications processors and protocols (BSC and SNA/SDLC included), and is available with a comprehensive collection of emulations and local software programs.

On the human side, the system is easily tailored to operator preferences. The non-reflecting screen turns, tilts and swivels to suit any personal style.



Alfaskop comes with operating system and emulation software, plus a choice of application programs.



With multi-host communication, mainframe selection is handled via keyboard commands.

The freestanding keyboard and its detachable numeric pad can be individually positioned and angled.

From both system and human viewpoints, Alfaskop fits your plans perfectly. For more information, contact Ericsson Information Systems, The Meadows Office Complex, 301 Route 17 North, Rutherford, NJ 07070. Telephone (201) 939-5300. Or Ericsson Information Systems-Marketing Operations, 7465 Lampson Avenue, P.O. Box 938, Garden Grove, CA 92642. Telephone (714) 895-3962.

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COMPUTER TALK, INC.
MODEL 425
Compatibility: TTY
Minimum Memory Required: 3K bytes
Maximum Memory Required: 3K bytes
Processor Model: Zilog Z80
Terminal Configuration: Stand-alone
Communications Protocols: RS-232
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 19 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 2 colors
Program Function Keys: 5, standard; 5, maximum
List Price: $9,650
Distribution Method: End user
Date First Installed: March 1983

COMPUTER TALK, INC.
MODEL 427
Compatibility: TTY
Processor Model: Zilog Z80
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 5, standard; 5, maximum
List Price: $4,379 to $7,000
Distribution Method: End user
Date First Installed: June 1977

COMTEC INFORMATION SYSTEMS, INC.
ALPHA-VERTER-500
Compatibility: TTY
Maximum Memory Required: 90K bytes
Languages Supported: PL/1
Processor Model: Intel 8086
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 1,200 bit/sec
Integrated Modem/Coupler: Standard
Line/Screen: 2
Character/Line: 40
Color Capability: No
Program Function Keys: 48, maximum
List Price: $3,825
Distribution Method: End user
Date First Installed: November 1981
(See Vendor Profile Page V-9)

CROMEMCO, INC.
C10, CKBA, CBL-CS
Compatibility: TTY
Plug Compatibility: Cromemco 3102
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal
Processor Model: Zilog Z80A
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 20
List Price: $1,440
Distribution Method: Third-party
Date First Installed: December 1982

DAKTRONICS
OLYMPIAN 80
Minimum Memory Required: 32K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Assembler
Processor Model: RCA 1802
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $3,500
Distribution Method: Third-party
Date First Installed: January 1981
(See Vendor Profile Page V-10)

DATALOGICS, INC.
6300 SERIES
Specific Application: Typesetting
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in., standard; 12 in., optional
Color Capability: No
List Price: $7,000
Distribution Method: End user
Date First Installed: 1983
(See Vendor Profile Page V-10)

DATALOGICS, INC.
6350
Specific Application: Typesetting
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Color Capability: No
List Price: $7,000
Distribution Method: End user
Date First Installed: 1983

DATAPOINT CORP.
1560
Compatibility: IBM 3270; TTY; Honeywell, Burroughs, IBM 3780
Minimum Memory Required: 12K bytes
Maximum Memory Required: 128K bytes
Languages Supported: Fortran, Basic, Plus
Processor Model: Zilog Z80A
Simultaneous Users: Yes
Terminal Configuration: Cluster; 4
Communications Protocols: Bisynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 10, standard, 10, maximum
List Price: $3,195
Average Monthly Maintenance: $51
Distribution Method: End user
Date First Installed: October 1982
(See Vendor Profile Page V-11)

DATAPOINT CORP.
8220
Compatibility: IBM 3270; TTY
Languages Supported: Cobol, RPG
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Cluster
Data Transmission Characteristics: Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 10, standard, 10, maximum
List Price: $1,895
Average Monthly Maintenance: $18
Distribution Method: End user
Date First Installed: September 1981
(See Vendor Profile Page V-11)

DATAPOINT CORP.
8600
Compatibility: IBM 3270; TTY
Minimum Memory Required: 128K bytes
Maximum Memory Required: 256K bytes
Languages Supported: Cobol, Fortran, Basic Plus
Processor Model: Zilog Z80
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 56,000 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 10, standard, 10, maximum
List Price: $7,500
Average Monthly Maintenance: $80
Distribution Method: End user
Date First Installed: September 1981

DELTA DATA SYSTEMS CORP.
7260T
Compatibility: TTY
Processor Model: TI 9900
Communications Protocols: X.25, Echo
Data Transmission Characteristics: Half-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 32
Character/Line: 80
Color Capability: No
Program Function Keys: 36, standard, 36, maximum
List Price: $7,500
Distribution Method: End user
Date First Installed: 1978
(See Vendor Profile Page V-12)

DELTA DATA SYSTEMS CORP.
7265T
Compatibility: TTY
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Processor Model: TI 9900
Terminal Configuration: Stand-alone
Communications Protocols: X.25
Data Transmission Characteristics: Half-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.

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Line/Screen: 28
Character/Line: 80
Color Capability: No
Program Function Keys: 36, standard, 36, maximum
List Price: $11,000
Distribution Method: End user
Date First Installed: 1978

DELTA DATA SYSTEMS CORP.
7285T
Compatibility: TTY
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal
Processor Model: TI 9900
Communications Protocols: ACK,NAK
Data Transmission Characteristics: Half-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 28
Character/Line: 80
Color Capability: No
Program Function Keys: 36, standard, 36, maximum
List Price: $12,000
Distribution Method: End user
Date First Installed: 1978

DELTA DATA SYSTEMS CORP.
7586
Compatibility: TTY
Processor Model: TI 9900
Data Transmission Characteristics: Half-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 28
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard, 20, maximum
List Price: $11,340
Distribution Method: End user
Date First Installed: 1977

DELTA DATA SYSTEMS CORP.
DELTA 2201
Compatibility: TTY
Minimum Memory Required: 32K bytes
Maximum Memory Required: 64K bytes
Terminal Configuration: Stand-
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen:
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard, 16, maximum
List Price: $2,200
Average Monthly Maintenance: $33
Distribution Method: Third-party
Date First Installed: 1981

DELTA DATA SYSTEMS CORP.
DELTA 2203
Specific Application: Data Entry
Compatibility: TTY
Minimum Memory Required: 256K bytes
Maximum Memory Required: 256K bytes
Processor Model: Intel 8085
Simultaneous Users: No
Terminal Configuration: Stand-
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16
List Price: $2,300
Average Monthly Maintenance: $33
Distribution Method: End user, OEM, Third-party
Date First Installed: 1982

DELTA DATA SYSTEMS CORP.
DELTA 7103
Compatibility: TTY
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Processor Model: TI 9900
Communications Protocols: X.25, Echo
Data Transmission Characteristics: Half-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen:
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard, 12, maximum
List Price: $4,855
Average Monthly Maintenance: $33
Distribution Method: End user, OEM, Third-party

DELTA DATA SYSTEMS CORP.
DELTA 7203
Specific Application: Text Processing
Compatibility: TTY
Languages Supported: Basic, TDS
Processor Model: TI 9900
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Asynchronous
Diagonal Screen Size: 15 in.
Line/Screen:
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard, 12, maximum
List Price: $4,855
Average Monthly Maintenance: $33
Distribution Method: End user, OEM, Third-party

DELTA DATA SYSTEMS CORP.
DELTA 7506
Compatibility: TTY
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Processor Model: TI 9900
Communications Protocols: Echo
Data Transmission Characteristics: Half-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen:
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 12, maximum
List Price: $6,000
Average Monthly Maintenance: $33
Distribution Method: End user, OEM, Third-party

DENTRONIX SYSTEMS, INC.
D-400
Compatibility: TTY
Plug Compatibility: DG D400
Languages Supported: Cobol, Fortran, Basic
Processor Model: Intel 8085
Simultaneous Users: No
Communications Protocols:
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 15 in., optional
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 15, standard, 15, maximum
List Price: $1,450
Distribution Method: OEM
Date First Installed: April 1982
(See Vendor Profile Page V-12)

DENTRONIX SYSTEMS, INC.
DENTRONIX 300
Compatibility: TTY
Plug Compatibility: DG D200
Languages Supported: Cobol, Fortran, Basic
Processor Model:
Simultaneous Users: No
Communications Protocols:
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 15 in., optional
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 15, standard, 15, maximum
List Price: $1,450
Distribution Method: OEM
Date First Installed: April 1982

DICTAPHONE CORP.
6110/6111
Specific Application: WP
Compatibility: IBM 3270; TTY
Minimum Memory Required: 128K bytes
Maximum Memory Required: 256K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal
Processor Model:
Terminal Configuration: Cluster; 14
Communications Protocols: Bisynchronous, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $5,950
Average Monthly Maintenance: $60
Distribution Method: End user
Date First Installed: November 1983
(See Vendor Profile Page V-12)

DICTAPHONE CORP.
6140/6141
Specific Application: WP
Compatibility:
Minimum Memory Required: 128K bytes
Maximum Memory Required: 256K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal
Processor Model: Intel 8085
Terminal Configuration: Cluster; 14
Communications Protocols: Bisynchronous, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed:
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Average Monthly Maintenance: $60
Distribution Method: End user

DICTAPHONE CORP.
6150/6151
Specific Application: WP
Compatibility: IBM 3270
Minimum Memory Required: 128K bytes
Maximum Memory Required: 256K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal
Processor Model: Intel 8085
Terminal Configuration: Cluster; 14
Communications Protocols: Bisynchronous, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Average Monthly Maintenance: $60
Distribution Method: End user

DIS
4000
Compatibility: IBM 3270; TTY; Honeywell, Sperry, Burroughs, NCR
Plug Compatibility: IBM 3270
Processor Model: Zilog Z80
Terminal Configuration: Cluster; 8
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability:

Program Function Keys: 16, standard; 16, maximum
Distribution Method: Third-party
Date First Installed: 1978
(See Vendor Profile Page V-14)

ECS MICROSYSTEMS, INC.
4100
Compatibility: IBM 3270; TTY; Honeywell; Sperry; Burroughs, NCR
Plug Compatibility: IBM 3270
Processor Model: Zilog Z80
Terminal Configuration: Cluster; 8
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard; 16, maximum
Distribution Method: Third-party
Date First Installed: 1981

ECS MICROSYSTEMS, INC.
4200
Compatibility: IBM 3270; TTY; Honeywell; Sperry; Burroughs, NCR
Plug Compatibility: IBM 3270
Languages Supported: Cobol, Fortran, Basic, Pascal, Assembler
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Cluster; 8
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard; 16, maximum
Distribution Method: Third-party
Date First Installed: 1982

ECS MICROSYSTEMS, INC.
4500
Compatibility: IBM 3270; TTY; Honeywell; Sperry; Burroughs; NCR
Plug Compatibility: IBM 3270
Languages Supported: Cobol, Fortran, Basic, Pascal, Assembler
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Cluster; 8
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard; 16, maximum
Distribution Method: Third-party
Date First Installed: 1980

ECS MICROSYSTEMS, INC.
4600
Compatibility: IBM 3270; TTY; Honeywell; Sperry; Burroughs; NCR
Plug Compatibility: IBM 3270
Languages Supported: Cobol, Fortran, Basic, Pascal, Assembler
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Cluster; 8
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard; 16, maximum
Distribution Method: Third-party
Date First Installed: 1982

ECS MICROSYSTEMS, INC.
4700
Compatibility: IBM 3270; TTY; Honeywell; Sperry; Burroughs, NCR
Plug Compatibility: IBM 3270
Languages Supported: Cobol, Fortran, Basic, Pascal, Assembler
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Cluster; 8
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard; 16, maximum
Distribution Method: Third-party

ECS MICROSYSTEMS, INC.
5000
Compatibility: IBM 3270; TTY; Honeywell; Sperry; Burroughs, NCR
Plug Compatibility: IBM 3270
Languages Supported: Cobol, Fortran, Basic, Pascal, Assembler
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Cluster; 8
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard; 16, maximum
Distribution Method: Third-party

ESPRIT SYSTEMS, INC.
ESPRIT I
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: Regent 25; Hazeltine 1500, ADDS
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Character/Line: 80
Color Capability: No
Program Function Keys: 14
List Price: $595
Distribution Method: OEM, Third-party
Date First Installed: April 1981
(See Vendor Profile Page V-14)

ESPRIT SYSTEMS, INC.
ESPRIT II
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: Hazeltine 1510
Processor Model: Rockwell 6502
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Character/Line: 80
Color Capability: No
Program Function Keys: 14
List Price: $645
Distribution Method: OEM, Third-party
Date First Installed: April 1982

ESPRIT SYSTEMS, INC.
ESPRIT III
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: Televideo 950
Minimum Memory Required: 4K bytes
Maximum Memory Required: 256K bytes
Processor Model: Rockwell 65C02
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, RS-232D
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Color Capability: Yes
Program Function Keys: 22
List Price: $895
Distribution Method: OEM, Third-party
Date First Installed: December 1982

ESPRIT SYSTEMS, INC.
EXECUTIVE MODEL 10
Specific Application: Data Entry
Compatibility: TTY
Minimum Memory Required: 6K bytes
Maximum Memory Required: 64K bytes
Processor Model: Intel 8085
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Character/Line: 40
Color Capability: No
Program Function Keys: 10, standard; 10, maximum
List Price: $11,000
Average Monthly Maintenance: $110
Distribution Method: End user
Date First Installed: July 1982
(See Vendor Profile Page V-14)

EXTEL CORP.
8-31
Specific Application: Communications
Compatibility: TTY
Maximum Memory Required: 32K bytes
Processor Model: Zilog Z80
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 300 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $2 900
Average Monthly Maintenance: $50
Date First Installed: January 1979
(See Vendor Profile Page V-15)

GENERAL DIGITAL INDUSTRIES, INC.
DGT 68
Specific Application: Graphics
Compatibility: TTY

Intelligent Terminals

Plug Compatibility: DEC VT100; ISC 8001; Tektronix 4014
Processor Model: Motorola 68000
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 19 in.
Line/Screen:
Character/Line: 80
Color Capability: 512 colors
Program Function Keys: 16, maximum
List Price: $4,500
Distribution Method: OEM, Third-party
(See Vendor Profile Page V-15)

GTECH CORP.
GSC-101
Specific Application: Lottery Ticket Sales
Compatibility: None
Plug Compatibility: No
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Fortran, Assembler
Processor Model: Zilog Z80
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed:
Integrated Modem/Coupler:
Diagonal Screen Size: 5 in.
Line/Screen:
Character/Line: 40
Color Capability: 8 colors, optional
List Price:
Distribution Method: End user
Date First Installed: August 1982
(See Vendor Profile Page V-16)

HARRIS CORP.
9178
Compatibility: IBM 3270
Minimum Memory Required: 16K bytes
Maximum Memory Required: 64K bytes
Processor Model: Zilog Z80
Simultaneous Users: No
Communications Protocols: SDLC
Data Transmission Characteristics: Half-Duplex
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 24,
Distribution Method: End user
(See Vendor Profile Page V-16)

HARRIS CORP.
9278-01
Compatibility: IBM 3270
Minimum Memory Required: 16K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Basic
Processor Model: Zilog Z80
Simultaneous Users: No
Diagonal Screen Size: 15 in.
Line/Screen: 12, standard, 12, optional
Character/Line: 80, standard, 40, optional

HARRIS CORP.
9278-02
Compatibility: IBM 3270
Minimum Memory Required: 16K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Basic
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: SDLC
Data Transmission Characteristics: Half-Duplex
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
Distribution Method: End user
Date First Installed: May 1980

HARRIS CORP.
9278-11
Compatibility: IBM 3270
Minimum Memory Required: 16K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Basic
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: SDLC
Data Transmission Characteristics: Half-Duplex
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 32
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
Distribution Method: End user
Date First Installed: April 1981

HARRIS CORP.
9278-12
Compatibility: IBM 3270
Minimum Memory Required: 16K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Basic
Processor Model: Zilog Z80
Simultaneous Users: No
Communications Protocols: SDLC
Data Transmission Characteristics: Half-Duplex
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 43
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard; 24, maximum
Distribution Method: End user
Date First Installed: April 1980

HARRIS CORP.
9278-15
Specific Application: Data Entry
Compatibility: IBM 3270
Minimum Memory Required: 16K bytes
Maximum Memory Required: 32K bytes
Processor Model: Z80
Simultaneous Users: No
Communications Protocols: SDLC
Data Transmission Characteristics: Half-Duplex
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 27
Character/Line: 132
Color Capability: No
Program Function Keys: 24, standard; 24, maximum
Distribution Method: End user
Date First Installed: July 1982

HARRIS CORP.
9279-24
Specific Application: Data Entry
Compatibility: IBM 3270
Minimum Memory Required: 16K bytes
Maximum Memory Required: 32K bytes
Processor Model: Zilog Z80
Simultaneous Users: No
Communications Protocols: SDLC
Data Transmission Characteristics: Half-Duplex
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 4 colors
Program Function Keys: 24, standard, 24, maximum
Distribution Method: End user
Date First Installed: July 1982

HARRIS CORP.
MULTIFUNCTION 9278
Maximum Memory Required: 64K bytes
Languages Supported: Cobol, Regal
Processor Model: Zilog Z80
Simultaneous Users: Yes
Communications Protocols: X.25
Data Transmission Characteristics: Synchronous
Maximum Transmission Speed: 500K bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25, standard; 33, optional
Character/Line: 80
Color Capability: 2 colors
Program Function Keys: 24, standard, 24, maximum
Distribution Method: End user
Date First Installed: May 1981

HARRIS CORP.
MULTIFUNCTION 9288
Minimum Memory Required: 32K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Cobol, Regal
Processor Model: Zilog Z80
Simultaneous Users: Yes
Terminal Configuration: Cluster; 80
Communications Protocols: X.25
Data Transmission Characteristics: Synchronous
Maximum Transmission Speed: 38,000 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line:
Color Capability: 2 colors
Program Function Keys: 24, standard, 24, maximum
Distribution Method: End user
Date First Installed: May 1981

HASTECH, INC.
PACE PRO
Minimum Memory Required: 192K bytes
Languages Supported: Assembler
Processor Model: TI 9900
Simultaneous Users: No
Terminal Configuration: Cluster; 8
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Diagonal Screen Size: 19 in
Color Capability: No
Distribution Method: End user, Third-party
Date First Installed: January 1980
(See Vendor Profile Page V-00)

HEWLETT-PACKARD CO.
HP2647F
Specific Application: Graphics
Minimum Memory Required: 12K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Basic
Processor Model: Intel 8085
Simultaneous Users: No
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in
Line/Screen: 24
Character/Line: 80
Program Function Keys: 8
List Price: $9,950
Average Monthly Maintenance:
Distribution Method: End user, OEM
Date First Installed: September 1981
(See Vendor Profile Page V-17)

[illegible]
Specific Application: Graphics
Compatibility: TTY
Plug Compatibility: ISC 8001-G; DEC VT100
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Processor Model: Intel 80-86
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed:
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 13 in.,

standard, 19 in., optional
Line/Screen: 24, standard; 48, optional
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 16
List Price: $2,200
Distribution Method: OEM
Date First Installed: June 1982
(See Vendor Profile Page V-17)

HMW ENTERPRISES, INC.
9081
Specific Application: Process Control
Plug Compatibility: ISC 8001-G; DEC VT100
Languages Supported: Assembler
Processor Model: Intel 8085
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 19 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 16, standard, 16, maximum
List Price: $5,100
Distribution Method: Third-party
Date First Installed: June 1982

HMW ENTERPRISES, INC.
9083
Specific Application: Process Control
Plug Compatibility: ISC 8001-G; DEC VT100
Languages Supported: Assembler
Processor Model: Intel 8085
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 13 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 16, standard, 16, maximum
List Price: $4,100
Distribution Method: Third-party
Date First Installed: June 1982

HMW ENTERPRISES, INC.
9083 S
Specific Application: Process Control
Plug Compatibility: ISC 8001-G; DEC VT100
Languages Supported: Assembler
Processor Model: Intel 8085
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 13 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 13, standard, 13, maximum
List Price: $5,500
Distribution Method: Third-party
Date First Installed: December 1982

HUMAN DESIGNED SYSTEMS, INC.
CONCEPT AVT
Specific Application: Text Editing
Compatibility: TTY
Plug Compatibility: DEC VT100
Processor Model: Zilog Z80A
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 43, standard, 43, maximum
List Price: $1,295
Distribution Method: End user
Date First Installed: November 1982
(See Vendor Profile Page V-17)

HUMAN DESIGNED SYSTEMS, INC.
CONCEPT GVT
Specific Application: Graphics
Compatibility: TTY
Plug Compatibility: DEC VT100, Tektronix 4010
Processor Model: Zilog Z80A
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 43
List Price: $1,295
Distribution Method: End user
Date First Installed: November 1982

HUMAN DESIGNED SYSTEMS, INC.
CONCEPT-APL8
Specific Application: Text Editing
Compatibility: TTY
Plug Compatibility: DEC VT100
Processor Model: Zilog Z80A
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 16, standard, 36, maximum
Distribution Method: End user
Date First Installed: January 1981

HUMAN DESIGNED SYSTEMS, INC.
CONCEPT 100
Specific Application: Text Editing
Compatibility: TTY
Processor Model: Zilog Z80A
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 16, standard, 36, maximum
Distribution Method: End user
Date First Installed: January 1981

ICL, INC.
DRS 10
Compatibility: IBM 3270
Minimum Memory Required: 112K bytes
Maximum Memory Required: 112K bytes
Languages Supported: Cobol, Basic, Pascal
Processor Model: Intel 8085
Simultaneous Users: Yes
Terminal Configuration: Cluster
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 17
List Price: $3,995
Distribution Method: End user, Third-party
Date First Installed: March 1982
(See Vendor Profile Page V-17)

ICL, INC.
DRS 20
Compatibility: IBM 3270
Minimum Memory Required: 160K bytes
Maximum Memory Required: 224K bytes
Languages Supported: Cobol, Basic, Pascal
Processor Model: Intel 8085
Simultaneous Users: Yes
Terminal Configuration: Cluster
Communications Protocols: X.25, Asynchronous, Sperry
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 17
List Price: $6,050
Distribution Method: End user, Third-party
Date First Installed: December 1982

Additional information provided for by vendor

DRS 20
Distributed resource system
Multimicroprocessor architecture
Full networking capability
Cobol, Basic, Pascal and CP/M
Word processing
Full range of peripherals
Application software available
Works in standard office environment

ICL, INC.
DRS 28
Compatibility: IBM 3270
Minimum Memory Required: 160K bytes

Intelligent Terminals

Maximum Memory Required: 224K bytes
Languages Supported: Cobol, Basic, Pascal
Processor Model: Intel 8085
Simultaneous Users: Yes
Terminal Configuration: Cluster
Communications Protocols: X.25, Asynchronous, Sperry
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 2
Character/Line: 80
Color Capability: No
Program Function Keys: 17
List Price: $9,050
Distribution Method: End user, Third-party
Date First Installed: December 1982

ICL, INC.
DRS 40
Compatibility: IBM 3270
Minimum Memory Required: 160K bytes
Maximum Memory Required: 512K bytes
Languages Supported: Cobol, Basic, Pascal
Processor Model: Intel 8085
Terminal Configuration: Cluster
Communications Protocols: X.25, Asynchronous, Sperry
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 17
List Price: $7,900
Distribution Method: End user, Third-party
Date First Installed: March 1982

ICL, INC.
DRS 50
Compatibility: IBM 3270
Minimum Memory Required: 160K bytes
Maximum Memory Required: 512K bytes
Languages Supported: Cobol, Basic, Pascal
Processor Model: Intel 8085
Simultaneous Users: Yes
Terminal Configuration: Cluster
Communications Protocols: X.25, Asynchronous, Sperry
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 17
List Price: $13,945
Distribution Method: End user, Third-party
Date First Installed: March 1982

ICOT CORP.
ICOT-757
Specific Application: Airline Terminal
Compatibility: IBM 3270
Plug Compatibility: IBM 3270
Minimum Memory Required: 64K bytes
Processor Model: Intel 8088
Simultaneous Users: Yes
Terminal Configuration: Cluster; 32
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 15, standard; 27, optional
Character/Line: 64, standard; 132, optional
Color Capability: No
Program Function Keys: 12, standard; 12, maximum
List Price: $2,595
Distribution Method: End user
Date First Installed: December 1982

ICOT CORP.
ICOT-756
Specific Application: Airline Terminal
Compatibility: IBM 3270
Plug Compatibility: IBM 3270
Minimum Memory Required: 64K bytes
Processor Model: Intel 8088
Simultaneous Users: Yes
Terminal Configuration: Cluster; 32
Communications Protocols: Bisynchronous, Para
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 15, standard; 27, optional
Character/Line: 64, standard; 132, optional
Color Capability: No
Program Function Keys: 12, standard; 12 maximum
List Price: $2,995
Distribution Method: End user
Date First Installed: December 1982

IDEOGRAPHIX, INC.
IPX 5480
Specific Application: Chinese DP
Compatibility: IBM 3270, 2280; TTY; Honeywell; Sperry; Burroughs; CDC
Plug Compatibility: IBM 2870, IBM 3870
Minimum Memory Required: 128K bytes
Maximum Memory Required: 99M bytes
Languages Supported: PL/1, Fortran, Macro Assembler
Processor Model: Intel 8086
Simultaneous Users: Yes
Terminal Configuration: Cluster; 4
Communications Protocols: Bisynchronous, X.25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Color Capability: Yes, optional
Program Function Keys: 35, standard; 160, maximum
List Price: $20,000
Average Monthly Maintenance: $140
Distribution Method: End user
Date First Installed: June 1972
(See Vendor Profile Page V-17)

ID SYSTEMS CORP.
ID-188
Compatibility: TTY
Plug Compatibility: DEC VT100; Tektronix 4010
Languages Supported: Cobol, Fortran, Basic, Pascal
Processor Model: Intel 8088
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24, standard; 48, optional
Character/Line: 80
Color Capability: Yes
Program Function Keys: 4, standard, 4, maximum
List Price: $10,445
Distribution Method: End user, OEM
Date First Installed: 1983
(See Vendor Profile Page V-18)

IMC CORP.
FACTORY WORK STATION
Specific Application: Data Collection
Compatibility: IBM 3270; TTY
Minimum Memory Required: 2K bytes
Maximum Memory Required: 26K bytes
Languages Supported: Assembly
Processor Model: Rockwell 6502
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 3 in.
Line/Screen: 2
Character/Line: 20
Color Capability: No
Program Function Keys: 10, standard, 20, maximum
List Price: $1,195
Average Monthly Maintenance: $25
Distribution Method: End user
Date First Installed: October 1982
(See Vendor Profile Page V-18)

IMC CORP.
MOBILE WORK STATION
Specific Application: Data Collection
Compatibility: IBM 3270; TTY
Languages Supported: Assembly
Processor Model: Rockwell 6502
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 7 in.
Line/Screen: 16
Character/Line: 26
Color Capability: No
Program Function Keys: 10, standard, 20, maximum
List Price: $5,495
Distribution Method: End user
Date First Installed: September 1[illegible]

IMLAC CORP.
[illegible]
Minimum Memory Required: 64K bytes
Maximum Memory Required: 192K [illegible]
Processor Model: Intel 8086
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 50
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
List Price: $21,700
Average Monthly Maintenance: $230
Distribution Method: End user, OEM, Third-party
Date First Installed: March 1982
(See Vendor Profile Page V-18)

IMLAC CORP.
[illegible]
Specific Application: Graphics
Minimum Memory Required: 64K bytes
Maximum Memory Required: 192K [illegible]
Processor Model: Intel 8086
Simultaneous Users: No
Terminal Configuration: Stand-alone

It's time the technology of data collection caught up to the technology of data processing.

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MSI DATA CORPORATION

The world leader in portable data collection systems.

Intelligent Terminals

Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 50
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard; 24, maximum
List Price: $15,750
Average Monthly Maintenance: $145
Distribution Method: End user, OEM, Third-party
Date First Installed: May 1981

INDUSTRIAL DATA TERMINALS
IDT 1900
Specific Application: Graphics
Minimum Memory Required: 32K bytes
Maximum Memory Required: 32K bytes
Simultaneous Users: No
Communications Protocols: None
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in.
Color Capability: 8 colors
Program Function Keys: 27, standard; 27, maximum
List Price: $7,500
Average Monthly Maintenance: $75
Distribution Method: End user
Date First Installed: June 1981
(See Vendor Profile Page V-18)

INDUSTRIAL DATA TERMINALS
IDT 2200
Specific Application: Graphics
Minimum Memory Required: 32K bytes
Maximum Memory Required: 32K bytes
Simultaneous Users: No
Communications Protocols: None
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in.
Color Capability: 8 colors
Program Function Keys: 27, standard; 27, maximum
List Price: $12,000
Distribution Method: End user
Date First Installed: March 1980

INDUSTRIAL DATA TERMINALS
IDT 2250
Specific Application: Graphics
Compatibility: Burroughs
Minimum Memory Required: 32K bytes
Maximum Memory Required: 32K bytes
Simultaneous Users: No
Communications Protocols: None
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in.
Color Capability: 8 colors
Program Function Keys: 27, standard; 27, maximum
List Price: $16,595
Distribution Method: End user
Date First Installed: February 1981

INFORMATION DEVICES CORP.
RMS 500
Specific Application: Graphics
Compatibility: IBM 3270
Minimum Memory Required: 64K bytes
Languages Supported: Basic
Processor Model: Intel 8080
Simultaneous Users: Yes
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous, X.25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $50,000
Average Monthly Maintenance: $320
Distribution Method: End user
Date First Installed: January 1981
(See Vendor Profile Page V-19)

INSTRUMENTATION LABORATORY, INC.
PEEL-48
Specific Application: Graphics
Compatibility: IBM 3270; TTY
Minimum Memory Required: 512K bytes
Maximum Memory Required: 6M bytes
Languages Supported: Cobol, Fortran, Pascal, APL
Processor Model: Motorola 68000
Simultaneous Users: Yes
Communications Protocols: SDLC, HDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 9, standard; 9, maximum
List Price: $14,000
Distribution Method: OEM
(See Vendor Profile Page V-19)

INTECOLOR
INTECOLOR 8001
Compatibility: TTY
Minimum Memory Required: 8K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Fortran, Basic, Assembler
Processor Model: Intel 8080
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 16, maximum
List Price: $2,395
Distribution Method: Third-party
Date First Installed: 1973
(See Vendor Profile Page V-19)

INTECOLOR
INTECOLOR 8051
Compatibility: TTY
Languages Supported: Fortran, Basic
Processor Model: Intel 8080
Simultaneous Users: No
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 16, maximum
List Price: $3,880
Distribution Method: Third-party

INTECOLOR
INTECOLOR 8052
Compatibility: TTY
Languages Supported: Fortran, Basic, Assembler
Processor Model: Intel 8080
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 16, maximum
List Price: $4,495
Distribution Method: Third-party

INTECOLOR
INTECOLOR 8053
Compatibility: TTY
Languages Supported: Fortran, Basic, Assembler
Processor Model: Intel 8080
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 16, maximum
List Price: $5,495
Distribution Method: Third-party

INTECOLOR
INTECOLOR 8063
Compatibility: TTY
Languages Supported: Fortran, Basic, Assembler
Processor Model: Intel 8080
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 8, maximum
List Price: $7,085
Distribution Method: Third-party

INTERNATIONAL ENTRY SYSTEMS, Inc.
DATACORDER II
Compatibility: TTY
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Processor Model: Zilog Z80
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous

Maximum Transmission Speed: 19,200 bit/sec
Line/Screen: 24
Character/Line: 40
Color Capability: No
Distribution Method: Third-party
(See Vendor Profile Page V-20)

INTERNATIONAL ENTRY SYSTEMS, INC.
DATACORDER III
Compatibility: TTY
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Processor Model: Zilog Z80
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 2 in.
Line/Screen: 24
Character/Line: 80, standard
Color Capability: No
Distribution Method: Third-party

INTERTEC DATA SYSTEMS CORP.
COMPUSTAR VPU 10
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/1
Processor Model: Zilog Z80A
Simultaneous Users: Yes
Terminal Configuration: Cluster; 1
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $1,995
Distribution Method: End user
Date First Installed: 1981
(See Vendor Profile Page V-20)

INTERTEC DATA SYSTEMS CORP.
COMPUSTAR VPU 20
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/1
Processor Model: Zilog Z80A
Simultaneous Users: Yes
Terminal Configuration: Cluster; 1
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $2,995
Distribution Method: OEM
Date First Installed: 1981

INTERTEC DATA SYSTEMS CORP.
COMPUSTAR VPU 40
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/1
Processor Model: Zilog Z80A
Simultaneous Users: Yes
Terminal Configuration: Cluster; 1
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $3,995
Distribution Method: End user
Date First Installed: 1981

INTERTEC DATA SYSTEMS CORP.
SUPERBRAIN II JR.
Compatibility: IBM 3270
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/1
Processor Model: Zilog Z80A
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $2,495
Distribution Method: OEM
Date First Installed: January 1978

INTERTEC DATA SYSTEMS CORP.
SUPERBRAIN II QD
Compatibility: IBM 3270
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/1
Processor Model: Zilog Z80A
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $2,995
Distribution Method: OEM
Date First Installed: January 1978

INTERTEC DATA SYSTEMS CORP.
SUPERBRAIN II SD
Compatibility: IBM 3270
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal, PL/1
Processor Model: Zilog Z80A
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $3,495
Distribution Method: OEM
Date First Installed: January 1978

ITEK COMPOSITION SYSTEMS 60
Compatibility: TTY
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Assembly
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 9
List Price: $4,600
Distribution Method: End-user
Date First Installed: June 1982
(See Vendor Profile Page V-20)

ITEK COMPOSITION SYSTEMS 61
Specific Application: Text Editing
Compatibility: TTY
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Assembly
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 9
List Price: $6 900
Distribution Method: End user, Third-party
Date First Installed: August 1982

ITHACA INTERSYSTEMS, INC.
GRAPHOS
Specific Application: Business Graphics
Compatibility: TTY
Plug Compatibility: Tektronix 4010, DEC VT100
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Any
Processor Model: Motorola 68000
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: RS-1708
Line/Screen: 16, optional
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 30
Character/Line: 600
Color Capability: 256 colors
Program Function Keys: 7, standard, 7, maximum
List Price: $7,995
Distribution Method: Third-party
Date First Installed: January 1983
(See Vendor Profile Page V-20)

JUPITER SYSTEMS, INC.
JUPITER 12
Specific Application: Graphics
Languages Supported: Fortran, Basic, Pascal
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,000 bit/sec
Diagonal Screen Size: 19 in.
Color Capability: 16 colors
Program Function Keys: 30, standard, 30, maximum
List Price: $25,000
Distribution Method: OEM, Third-party
(See Vendor Profile Page V-21)

Intelligent Terminals

MEGADATA CORP.
8178
Compatibility: IBM 3270; TTY, Honeywell
Minimum Memory Required: 128K bytes
Maximum Memory Required: 512K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal
Processor Model: Motorola 68000
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 15 in.
Line/Screen: 29
Character/Line: 132
Color Capability: 4, optional
Program Function Keys: 100, maximum
List Price: $2,500
Distribution Method: End user
Date First Installed: January 1983
(See Vendor Profile Page V-23)

MEGADATA CORP.
8188
Compatibility: IBM 3270; TTY; Honeywell
Minimum Memory Required: 128K bytes
Maximum Memory Required: 512K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal
Processor Model: Motorola 68000
Simultaneous Users: Yes
Terminal Configuration: Cluster; 32
Communications Protocols: Bisynchronous, X 25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 15 in.
Line/Screen: 29
Character/Line: 132
Color Capability: 4 colors, optional
Program Function Keys: 100, maximum
List Price: $2,500
Distribution Method: End user
Date First Installed: January 1983

MEGATEK CORP.
1650
Plug Compatibility: DEC VT100, DEC VT52
Minimum Memory Required: 128K bytes
Maximum Memory Required: 256K bytes
Languages Supported: Fortran
Processor Model: Intel 8086
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in
Line/Screen: 25
Character/Line: 80
Color Capability: Yes
Program Function Keys: 16
List Price: $15,900
Average Monthly Maintenance: $130
Distribution Method: OEM
Date First Installed: November 1982
(See Vendor Profile Page V-23)

MEGATEK CORP.
6200
Specific Application: CAD/CAM
Minimum Memory Required: 32K bytes
Maximum Memory Required: 96K bytes
Languages Supported: Fortran
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 96,000 bit/sec
Diagonal Screen Size: 12 in.
Character/Line: 80
Color Capability: Yes, optional
Program Function Keys: 16, standard, 16, maximum
List Price: $17,900
Distribution Method: OEM
Date First Installed: January 1980

MEGATEK CORP.
7200
Specific Application: CAD/CAM
Minimum Memory Required: 32K bytes
Maximum Memory Required: 96K bytes
Languages Supported: Fortran
Simultaneous Users: Yes
Terminal Configuration: Cluster; 2
Communications Protocols: DMA
Data Transmission Characteristics: Synchronous
Maximum Transmission Speed: 1,200,000 bit/sec
Diagonal Screen Size: 12 in.
Character/Line: 80
Color Capability: Yes, optional
Program Function Keys: 16, standard, 32, maximum
List Price: $30,000
Average Monthly Maintenance: $300
Distribution Method: OEM
Date First Installed: January 1980

MICRODATA CORP.
5750
Minimum Memory Required: 16K bytes
Maximum Memory Required: 64K bytes
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous, Hasp
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 8, standard, 8, maximum
List Price: $5,100
Average Monthly Maintenance: $55
Distribution Method: End user, Third-party
Date First Installed: 1980
(See Vendor Profile Page V-24)

MICRODATA CORP.
7510
Compatibility: IBM 3270
Minimum Memory Required: 16K bytes
Maximum Memory Required: 64K bytes
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 8, standard; 8, maximum
List Price: $6,625
Average Monthly Maintenance: $57
Distribution Method: End user
Date First Installed: 1978

MICROMATION
M/SYSTEM
Compatibility: IBM 3270
Minimum Memory Required: 64K bytes
Languages Supported: Cobol, Fortran, Basic, Basic Plus, Basic Plus 2, Pascal, RPG, APL, PL/1
Processor Model: Zilog Z80
Terminal Configuration: Cluster
Communications Protocols: Bisynchronous, SDLC
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 3
List Price: $7,000
Distribution Method: Third-party
Date First Installed: September 1979

MICROMATION
M/SYSTEM
Compatibility: IBM 3270
Minimum Memory Required: 64K bytes
Languages Supported: Cobol, Fortran, Basic, Basic Plus, Basic Plus 2, Pascal, RPG, APL, PL/1
Processor Model: Zilog Z80
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, SDLC
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 3
List Price: $6,990
Distribution Method: Third-party
Date First Installed: October 1982

MICROPROCESSOR SYSTEMS, INC.
RUBICON 8000
Specific Application: Data Entry and WP
Plug Compatibility: IBM 3350
Minimum Memory Required: 122K bytes
Maximum Memory Required: 256K bytes
Languages Supported: Basic
Simultaneous Users: Yes
Terminal Configuration: Cluster; 5
Data Transmission Characteristics: Half-Duplex, Asynchronous, Synchronous
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 132
Color Capability: No
Program Function Keys: 14
Distribution Method: Third-party
(See Vendor Profile Page V-24)

MICROPROCESSOR SYSTEMS, INC.
RUBICON 2001
Specific Application: Data Entry and WP
Plug Compatibility: IBM 3350
Minimum Memory Required: 122K bytes
Maximum Memory Required: 256K bytes
Languages Supported: Basic
Simultaneous Users: Yes
Terminal Configuration: Cluster; 5
Data Transmission Characteristics: Half-Duplex, Asynchronous, Synchronous
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 22 in.
Line/Screen: 24
Character/Line: 132
Color Capability: No
Program Function Keys: 14
Distribution Method: Third-party

MICROMATION
MARINER
Compatibility: IBM 3270
Minimum Memory Required: 64K bytes
Languages Supported: Cobol, Fortran, Basic, Basic Plus, Basic Plus 2, Pascal, APL, PL/1
Processor Model: Zilog Z80
Simultaneous Users: Yes
Terminal Configuration: Cluster; 1
Communications Protocols: Bisynchronous, SDLC
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80

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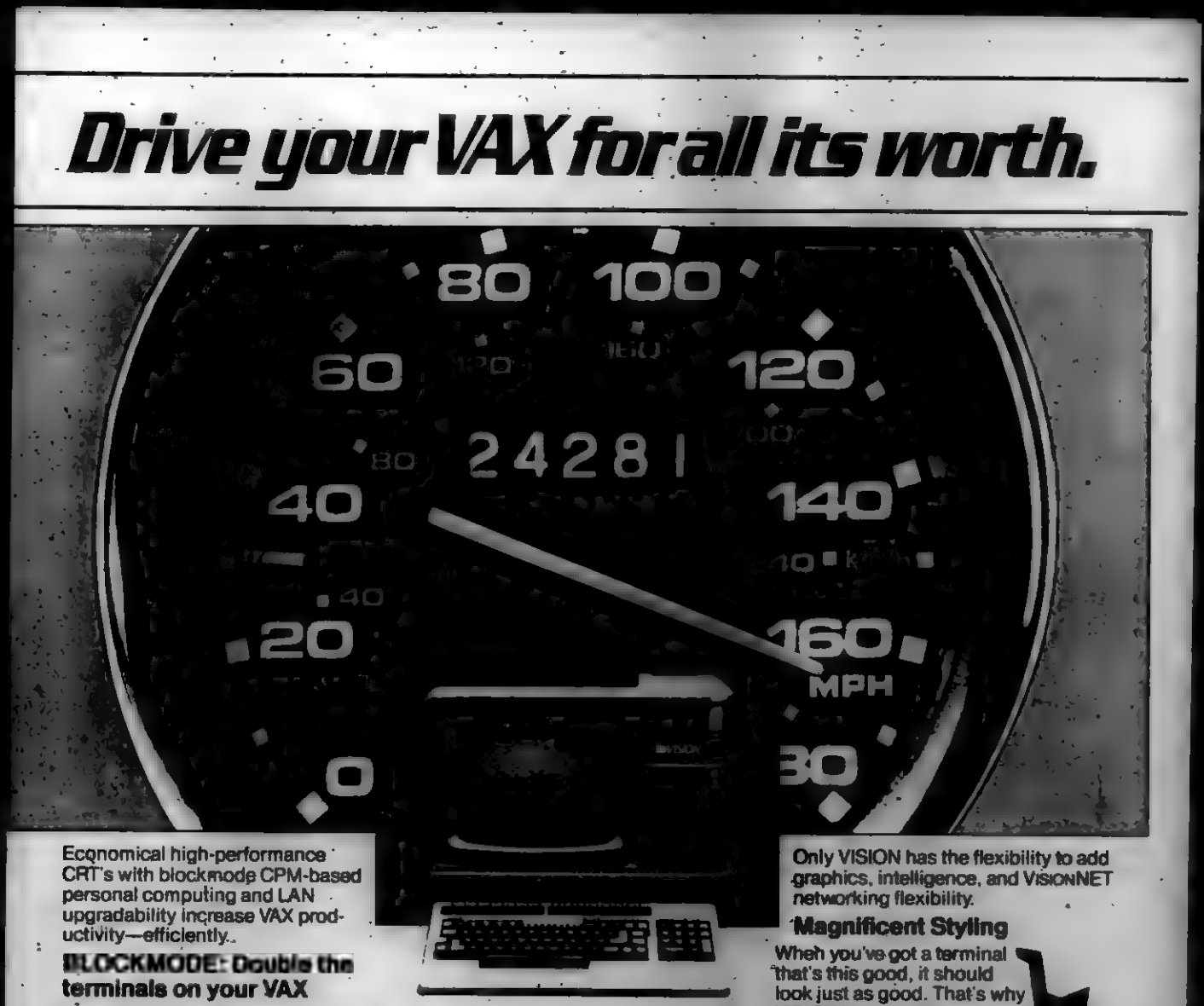

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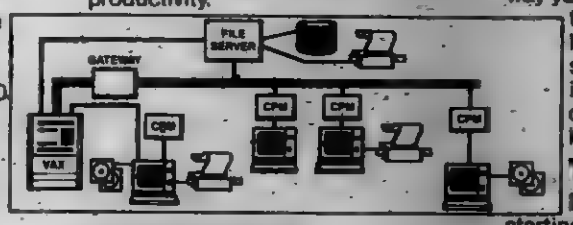

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Intelligent Terminals

MICRO SYSTEMS DEVELOPMENT CORP., INC.
MDC 350
Specific Application: Graphics Arts
Compatibility: TTY
Plug Compatibility: Compugraphic MDT 350
Minimum Memory Required: 32K bytes
Maximum Memory Required: 32K bytes
Languages Supported: Assembly
Processor Model: Intel 8085
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 18, standard, 18, maximum
List Price: $4,950
Distribution Method: Third-party
Date First Installed: June 1982
(See Vendor Profile Page V-24)

MSI DATA CORP.
MSI/55
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Line/Screen: 1
Character/Line: 12
Color Capability: No
Distribution Method: Third-party
(See Vendor Profile Page V-25)

MSI DATA CORP.
MSI/85
Processor Model: RCA Cmos 1802
Communications Protocols: Asynchronous
Data Transmission Characteristics: Asynchronous, Ascii
Maximum Transmission Speed: 4,800 bit/sec
Line/Screen: 1
Character/Line: 16
Color Capability: No
Distribution Method: Third-party

MSI DATA CORP.
MSI/88E
Processor Model: RCA Cmos 1802
Communications Protocols: Asynchronous
Data Transmission Characteristics: Asynchronous, Ascii
Maximum Transmission Speed: 4,800 bit/sec
Line/Screen: 1
Character/Line: 16
Color Capability: No
Distribution Method: Third-party

MSI DATA CORP.
MSI 88F
Processor Model: RCA Cmos 1802
Communications Protocols: Asynchronous
Data Transmission Characteristics: Asynchronous, Ascii
Maximum Transmission Speed: 4,800 bit/sec
Line/Screen: 1
Character/Line: 32
Color Capability: No
Distribution Method: Third-party

NEW MEDIA GRAPHICS CORP.
GRAPHOVER 9500
Specific Application: Graphics
Compatibility: TTY
Processor Model: Motorola 6809
Terminal Configuration: Cluster
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 25 in., optional
Line/Screen: 480, optional
Character/Line: 109, optional
Color Capability: Yes
List Price: $9,850
Distribution Method: End user, OEM
(See Vendor Profile Page V-26)

NORTHERN TELECOM, INC.
DISPLAY TERMINAL
Specific Application: DDP
Minimum Memory Required: 128K bytes
Maximum Memory Required: 512K bytes
Languages Supported: Cobol
Processor Model: Intel 8086
Simultaneous Users: Yes
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard, 24, maximum
List Price: $2,000
Average Monthly Maintenance: $20
Distribution Method: End user, Third-party
Date First Installed: July 1981
(See Vendor Profile Page V-26)

PARADYNE CORP.
PDS-270
Specific Application: WP
Compatibility: IBM 3270; TTY
Languages Supported: Cobol
Processor Model: Zilog Z80
Simultaneous Users: Yes
Terminal Configuration: Cluster; 32
Communications Protocols: SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 72
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
List Price: $3,000 to $5,850
Average Monthly Maintenance: $25
Distribution Method: End user, OEM
Date First Installed: August 1980
(See Vendor Profile Page V-27)

PERIPHERAL SYSTEMS, INC.
BUREAUCRAT
Specific Application: Typesetting
Compatibility: TTY
Minimum Memory Required: 16K bytes
Maximum Memory Required: 40K bytes
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 1,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 9 in.
Line/Screen: 16
Character/Line: 64
Color Capability: No
List Price: $3,495
Distribution Method: End user
Date First Installed: June 1978
(See Vendor Profile Page V-28)

PERIPHERAL SYSTEMS, INC.
LOBBYIST
Specific Application: Typesetting
Compatibility: TTY
Minimum Memory Required: 16K bytes
Maximum Memory Required: 40K bytes
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 1,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 5 in.
Line/Screen: 16
Character/Line: 32
Color Capability: No
List Price: $2,995
Distribution Method: End user
Date First Installed: June 1978

PHOENIX COMPUTER SYSTEMS, INC.
768-24
Specific Application: Graphics
Plug Compatibility: Tektronix
Minimum Memory Required: 128K bytes
Maximum Memory Required: 768K bytes
Languages Supported: Fortran, Basic, Pascal, PL/1, Assembler
Processor Model: Intel 8086
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in., standard; 13 in., optional
Line/Screen: 60
Character/Line: 80
Color Capability: 256 colors
Program Function Keys: 37, standard, 37, maximum
List Price: $21,000
Distribution Method: OEM
Date First Installed: September 1983
(See Vendor Profile Page V-28)

PHOENIX COMPUTER SYSTEMS, INC.
1024-1
Specific Application: CAD/CAM
Compatibility: IBM 3270; TTY
Plug Compatibility: Tektronix
Minimum Memory Required: 128K bytes
Maximum Memory Required: 1M bytes
Languages Supported: Fortran
Processor Model: Intel 8086
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: HDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Diagonal Screen Size: 19 in.
Line/Screen: 64
Character/Line: 80
Color Capability: 256 colors
Program Function Keys: 32,
List Price: $12,000
Average Monthly Maintenance: $120
Distribution Method: OEM
Date First Installed: December 1982

PHOENIX COMPUTER SYSTEMS, INC.
1024-14

Specific Application: Graphics
Plug Compatibility: Tektronix
Minimum Memory Required: 128K bytes
Maximum Memory Required: 768K bytes
Languages Supported: Fortran, Basic, Pascal, PL/1, Assembler
Processor Model: Intel 8086
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in., standard; 13 in., optional
Line/Screen: 60
Character/Line: 80
Color Capability: 256 colors
Program Function Keys: 37, standard; 37, maximum
List Price: $12,200
Distribution Method: OEM
Date First Installed: September 1982

PHOENIX COMPUTER SYSTEMS, INC.
1024-16
Specific Application: Graphics
Plug Compatibility: Tektronix
Minimum Memory Required: 128K bytes
Maximum Memory Required: 768K bytes
Languages Supported: Fortran, Basic, Pascal, PL/1, Assembler
Processor Model: Intel 8086
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in., standard; 13 in., optional
Line/Screen: 60
Character/Line: 80
Color Capability: 256 colors
Program Function Keys: 37, standard; 37, maximum
List Price: $14,400
Distribution Method: OEM
Date First Installed: September 1982

PHOENIX COMPUTER SYSTEMS, INC.
1024-2
Specific Application: GAD/CAM
Compatibility: IBM 3270, TTY
Plug Compatibility: Tektronix
Minimum Memory Required: 128K bytes
Maximum Memory Required: 1M bytes
Languages Supported: Fortran, Basic, Pascal, PL/1
Processor Model: Intel 8086
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: HDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 64
Character/Line: 80
Color Capability: 256 colors
Program Function Keys: 32, standard, 128, maximum
List Price: $18,000
Average Monthly Maintenance: $150
Distribution Method: OEM
Date First Installed: December 1982

PHOENIX COMPUTER SYSTEMS, INC.
1024-24
Specific Application: Graphics
Plug Compatibility: Tektronix
Minimum Memory Required: 128K bytes
Maximum Memory Required: 768K bytes
Languages Supported: Fortran, Basic, Pascal, PL/1, Assembler
Processor Model: Intel 8086
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in., standard; 13 in., optional
Line/Screen: 60
Character/Line: 80
Color Capability: 256 colors
Program Function Keys: 37, standard; 37, maximum
List Price: $16,000
Distribution Method: OEM
Date First Installed: September 1983

PHOENIX COMPUTER SYSTEMS, INC.
1024-28
Specific Application: Graphics
Plug Compatibility: Tektronix
Minimum Memory Required: 128K bytes
Maximum Memory Required: 768K bytes
Languages Supported: Fortran, Basic, Pascal, PL/1, Assembler
Processor Model: Intel 8086
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in., standard; 13 in., optional
Line/Screen: 60
Character/Line: 80
Color Capability: 256 colors
Program Function Keys: 37, standard; 37, maximum
List Price: $20,000
Distribution Method: OEM
Date First Installed: September 1983

PHOENIX COMPUTER SYSTEMS, INC.
1024-34
Specific Application: Graphics
Plug Compatibility: Tektronix
Minimum Memory Required: 128K bytes
Maximum Memory Required: 768K bytes
Languages Supported: Fortran, Basic, Pascal, PL/1, Assembler
Processor Model: Intel 8086
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in., standard, 13 in., optional
Line/Screen: 60
Character/Line: 80
Color Capability: 256 colors
Program Function Keys: 37, standard, 37, maximum
Distribution Method: OEM
Date First Installed: September 1983

PRIME COMPUTER, INC.
PT 85
Compatibility: TTY
Minimum Memory Required: 32K bytes
Maximum Memory Required: 32K bytes
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12,
Distribution Method: Third-party
(See Vendor Profile Page V-29)

PRINCETON GRAPHIC SYSTEMS
HX-12
Diagonal Screen Size: 13 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 16
Distribution Method: Third-party
Date First Installed: October 1982
(See Vendor Profile Page V-29)

PSITECH
215
Compatibility: IBM 3270; TTY, Honeywell; Sperry; Burroughs; NCR; CDC
Minimum Memory Required: 63K bytes
Maximum Memory Required: 128K bytes
Languages Supported: Basic, Pascal, Ada
Processor Model: Motorola MC 6809
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25, Asynchronous, SDLC, HDLC, Synchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in
Line/Screen: 48
Character/Line: 85
Color Capability: No
Program Function Keys: 32
List Price: $3,995
Distribution Method: OEM, Third-party
Date First Installed: 1981
(See Vendor Profile Page V-30)

PSITECH
GT 800
Compatibility: IBM 3270, TTY; Honeywell; Sperry; Burroughs; NCR; CDC
Minimum Memory Required: 63K bytes
Maximum Memory Required: 128K bytes
Languages Supported: Basic, Pascal, Ada
Processor Model: MC-6809
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25, Asynchronous, SDLC, HDLC, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in
Line/Screen: 48
Character/Line: 85
Color Capability: No
Program Function Keys: 32
List Price: $3,500
Distribution Method: OEM, Third-party
Date First Installed: 1979

PSITECH
GT 1600
Compatibility: TTY
Minimum Memory Required: 128K bytes
Maximum Memory Required: 512K bytes
Languages Supported: Basic
Processor Model: Motorola MC 6809
Simultaneous Users: Yes
Terminal Configuration: Stand-alone

Intelligent Terminals

Communications Protocols: Bisynchronous, X.25, SDLC, BDLC/SNA
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in
Line/Screen: 24, standard; 48, optional
Character/Line: 85
Color Capability: 8 colors, optional
Program Function Keys: 32, standard; 93, maximum
List Price: $7,000
Distribution Method: End user, OEM

PSITECH
GTC 214
Specific Application: Process Control
Compatibility: IBM 3270; TTY, Honeywell; Sperry; Burroughs; NCR; CDC
Minimum Memory Required: 63K bytes
Maximum Memory Required: 120K bytes
Languages Supported: Basic, Pascal, Ada
Processor Model: Motorola MC-6809
Simultaneous Users: Yes
Communications Protocols: Bisynchronous, X.25, Asynchronous, SDLC, HDLC, Synchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 48
Character/Line: 85
Program Function Keys: 32
List Price: $4,560
Distribution Method: OEM, Third-party
Date First Installed: 1982

PSITECH
GTC 216
Specific Application: Process Control
Compatibility: IBM 3270; TTY, Honeywell, Sperry, Burroughs; CDC; NCR
Plug Compatibility: DEC VT52
Minimum Memory Required: 63K bytes
Maximum Memory Required: 120K bytes
Languages Supported: Basic, Pascal, Ada
Processor Model: Motorola MC-6809
Simultaneous Users: Yes
Terminal Configuration: Cluster; 32
Communications Protocols: Bisynchronous, X.25, Asynchronous, SDLC, HDLC, Synchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 48
Character/Line: 85
Program Function Keys: 32
List Price: $5,000
Distribution Method: OEM, Third-party
Date First Installed: 1982

PSITECH
GTC 319
Specific Application: Process Control
Compatibility: IBM 3270; TTY, Honeywell, Sperry Univac; Burroughs, NCR; CDC
Minimum Memory Required: 63K bytes
Maximum Memory Required: 120K bytes
Languages Supported: Basic, Pascal, Ada
Processor Model: Motorola MC 6809
Simultaneous Users: Yes
Terminal Configuration: Cluster; 32
Communications Protocols: Bisynchronous, X.25, Asynchronous, SDLC, HDLC, Synchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 48
Character/Line: 85
Color Capability: 4096 colors
List Price: $5,500
Distribution Method: OEM, Third-party
Date First Installed: 1982

QANTEL CORP.
QANTEL 4041
Minimum Memory Required: 54K bytes
Languages Supported: Basic
Processor Model: Zilog Z80B
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 24 in., optional
Line/Screen: 31, standard; 35, optional
Character/Line: 89, standard; 90, optional
Color Capability: No
Program Function Keys: 2, standard; 2, maximum
List Price: $4,500
Average Monthly Maintenance: $45
Distribution Method: Third-party
(See Vendor Listing Page V-30)

RAMTEK CORP.
RAMTEK 6211
Specific Application: Graphics
Compatibility: TTY
Minimum Memory Required: 16K bytes
Maximum Memory Required: 16K bytes
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 13 in., standard; 19 in., optional
Line/Screen: 24
Color Capability: 16 colors
List Price: $4,995
Average Monthly Maintenance: $60
Distribution Method: End user, OEM
Date First Installed: November 1981
(See Vendor Profile Page V-30)

RAMTEK CORP.
RAMTEK 6221
Specific Application: Graphics
Compatibility: TTY
Minimum Memory Required: 16K bytes
Maximum Memory Required: 16K bytes
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Color Capability: 16 colors
List Price: $5,995
Average Monthly Maintenance: $72
Distribution Method: End user, OEM
Date First Installed: April 1983

RAYTHEON CO.
200-1E and 200-2E
Compatibility: IBM 3270
Minimum Memory Required: 128K bytes
Maximum Memory Required: 512K bytes
Languages Supported: Basic
Processor Model: Intel 8085
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25, standard; 66, optional
Character/Line: 80, standard; 126, optional
Color Capability: No
List Price: $3,995
Average Monthly Maintenance: $65
Distribution Method: End user, Third-party
Date First Installed: October 1982
(See Vendor Profile Page V-30)

RAYTHEON CO.
210
Compatibility: IBM 3270
Minimum Memory Required: 128K bytes
Maximum Memory Required: 512K bytes
Languages Supported: Basic
Processor Model: Intel 8085
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25, standard; 66, optional
Character/Line: 80, standard; 126, optional
Color Capability: No
List Price: $3,995
Average Monthly Maintenance: $65
Distribution Method: End user, Third-party
Date First Installed: October 1982

RAYTHEON CO.
220
Compatibility: IBM 3270
Minimum Memory Required: 128K bytes
Maximum Memory Required: 512K bytes
Languages Supported: Basic
Processor Model: Intel 8085
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25, standard; 66, optional
Character/Line: 80
Color Capability: No
List Price: $6,750
Average Monthly Maintenance: $75
Distribution Method: Third-party
Date First Installed: October 1982

RAYTHEON CO.
1202E
Compatibility: IBM 3270
Minimum Memory Required: 128K bytes
Maximum Memory Required: 512K bytes
Languages Supported: Basic
Processor Model: Intel 8085
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous

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Intelligent Terminals

Data Transmission Characteristics: Half-Duplex, Full-Duplex
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25, standard; 66, optional
Character/Line: 80, standard; 126, optional
Color Capability: No
List Price: $3,995
Average Monthly Maintenance: $65
Distribution Method: End user, Third-party
Date First Installed: October 1982

RAYTHEON CO.
PTS-2075
Compatibility: IBM 3270
Plug Compatibility: 3278
Minimum Memory Required: 16K bytes
Languages Supported: Macro
Processor Model: Intel 8086
Simultaneous Users: Yes
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 15 in.
Line/Screen: 25
Color Capability: No
Program Function Keys: 12, standard; 12, maximum
Distribution Method: End user
Date First Installed: October 1979

RAYTHEON CO.
PTS-2079
Compatibility: IBM 3270
Plug Compatibility: 3279
Minimum Memory Required: 16K bytes
Maximum Memory Required: 32K bytes
Languages Supported: Macro
Processor Model: Intel 8086
Simultaneous Users: Yes
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 15 in.
Line/Screen: 25
Color Capability: 4 colors
Program Function Keys: 12, standard, 12, maximum
Distribution Method: End user
Date First Installed: 1981

RAYTHEON CO.
RDS-1202
Compatibility: IBM 3270
Minimum Memory Required: 48K bytes
Maximum Memory Required: 96K bytes
Languages Supported: Basic
Processor Model: Intel 8085
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25, standard; 66, optional
Character/Line: 80, standard; 126, optional
Color Capability: No
List Price: $9,995
Distribution Method: End user, Third-party
Date First Installed: February 1979

SCOTT SYSTEMS, INC.
ACCESS ST-8
Specific Application: Airlines
Compatibility: IBM 3270
Minimum Memory Required: 64K bytes
Processor Model: Intel 8088
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, Asynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 9 in.
Line/Screen: 25
Character/Line: 64, standard; 80, optional
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
Distribution Method: End user
Date First Installed: August 1982
(See Vendor Profile Page V-31)

SCOTT SYSTEMS, INC.
ACCESS ST-12
Specific Application: Airlines
Compatibility: IBM 3270
Minimum Memory Required: 64K bytes
Processor Model: Intel 8088
Simultaneous Users: Yes
Communications Protocols: 3270, Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard; 24, maximum
Distribution Method: End user
Date First Installed: August 1982

SIDEREAL CORP.
MICRONET 4D
Minimum Memory Required: 128K bytes
Maximum Memory Required: 256K bytes
Processor Model: Motorola 6809
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 1,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 4
List Price: $14,900
Distribution Method: OEM, Third-party
Date First Installed: September 1980
(See Vendor Profile Page V-32)

SIDEREAL CORP.
MICRONET 6
Minimum Memory Required: 128K bytes
Maximum Memory Required: 256K bytes
Processor Model: Motorola 6809
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 1,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 4
List Price: $16,900
Distribution Method: OEM, Third-party
Date First Installed: September 1980

SIDEREAL CORP.
MICRONET 8
Compatibility: IBM 3270; TTY
Minimum Memory Required: 128K bytes
Maximum Memory Required: 256K bytes
Processor Model: Motorola 6800
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 4
List Price: $18,900
Distribution Method: Third-party
Date First Installed: June 1981

SIDEREAL CORP.
MICRONET 20
Compatibility: TTY
Processor Model: Motorola 6809
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 1,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 4
List Price: $4,500
Distribution Method: Third-party
Date First Installed: July 1982

SIDEREAL CORP.
MICRONET 25
Compatibility: TTY
Processor Model: Motorola 6809
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 1,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 4
List Price: $6,500
Distribution Method: OEM, Third-party
Date First Installed: September 1982

SIERRA INFORMATION SYSTEMS CORP.
DT-2000
Specific Application: Shop Floor Control
Compatibility: TTY
Minimum Memory Required: 8K bytes
Maximum Memory Required: 32K bytes
Languages Supported: Cobol, Fortran
Processor Model: Motorola 68000
Simultaneous Users: No
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous

Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 26
Character/Line: 80
Color Capability: Yes, optional
Program Function Keys: 16
Distribution Method: End user, OEM
(See Vendor Profile Page V-32)

SOROC TECHNOLOGY, INC.
CHALLENGER 135
Compatibility: TTY
Languages Supported: Cobol, Basic
Processor Model: Zilog Z80
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 14, standard; 64, maximum
List Price: $995
Distribution Method: Third-party
Date First Installed: June 1982
(See Vendor Profile Page V-32)

Additional information provided for by vendor

AMERICAN-MADE "CHALLENGER" TERMINALS

Smart, programmable, detached keyboard, typewriter styled, low profile, green screen, keyboard setup includes intensity editing, block mode, speeds to 38.4K bytes, programmable function keys.

Options include tilt/swivel ergonomics and integral modems and expanded storage. Call (800) 854-0147 or (714) 992-2860 for special evaluation pricing.

SOROC TECHNOLOGY, INC.
CHALLENGER 530
Compatibility: TTY
Languages Supported: Cobol, Basic
Processor Model: Zilog Z80
Simultaneous Users: Yes
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 14, standard; 64, maximum
List Price: $595
Distribution Method: Third-party
Date First Installed: November 1982

SOROC TECHNOLOGY, INC.
IQ-130
Compatibility: TTY
Languages Supported: Cobol, Basic
Processor Model: Zilog Z80
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 14, standard, 64, maximum
List Price: $1,095
Distribution Method: Third-party
Date First Installed: January 1982

SOROC TECHNOLOGY, INC.
IQ-150
Languages Supported: Cobol, Basic
Processor Model: Zilog Z80
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 14, standard, 64, maximum
List Price: $1,395
Distribution Method: Third-party
Date First Installed: January 1982

SPECTRA SYSTEMS, INC.
SPECTRA-123
Compatibility: TTY
Plug Compatibility: DEC VT100
Minimum Memory Required: 128K bytes
Languages Supported: Cobol, Fortran, Basic, Basic Plus, Basic Plus 2, APL, Unix
Processor Model: DEC LSI-11
Simultaneous Users: Yes
Terminal Configuration: Cluster; 8
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 56,000 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 132
Color Capability: 8 colors, optional
List Price: $13,000
Distribution Method: OEM, Third-party
(See Vendor Profile Page V-33)

SPECTRA SYSTEMS, INC.
SPECTRA-880
Compatibility: IBM 3270
Maximum Memory Required: 2M bytes
Processor Model: Intel 8086; Zilog Z80
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 14, standard, 64, maximum
List Price: $1,395
Distribution Method: Third-party
Date First Installed: January 1982

SPERRY CORP.
UTS 40
Minimum Memory Required: 64K bytes
Maximum Memory Required: 128K bytes
Languages Supported: Cobol
Processor Model: Zilog Z80A
Simultaneous Users: No
Terminal Configuration: Cluster; 31
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Character/Line: 80
Color Capability: No
Program Function Keys: 22
List Price: $3,200
Average Monthly Maintenance: $80
Distribution Method: End user
Date First Installed: June 1981
(See Vendor Profile Page V-33)

SYSTEM INTEGRATORS, INC.
COYOTE STANDARD
Specific Application: Text Editing
Minimum Memory Required: 128K bytes
Languages Supported: Assembler
Processor Model: Motorola MC 68000
Simultaneous Users: No
Terminal Configuration: Cluster; 15
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Diagonal Screen Size: 15 in.
Line/Screen: 21, standard; 28, optional
Character/Line: 64, standard; 96, optional
Color Capability: No
Program Function Keys: 200
Distribution Method: End user
Date First Installed: April 1983
(See Vendor Profile Page V-34)

SYSTEM INTEGRATORS, INC.
COYOTE 1
Specific Application: Text Editing
Compatibility: TTY
Minimum Memory Required: 128K bytes
Languages Supported: Assembler
Processor Model: Motorola 68000
Terminal Configuration: Cluster; 15
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 80,000 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 21, standard; 28, optional
Character/Line: 64, standard; 96, optional
Color Capability: No
Program Function Keys: 200
Distribution Method: End user
Date First Installed: February 1982

SYSTEM INTEGRATORS, INC.
COYOTE 4
Specific Application: Text Editing
Compatibility: TTY
Minimum Memory Required: 128K bytes
Languages Supported: Assembler
Processor Model: Motorola 6800
Simultaneous Users: No
Terminal Configuration: Cluster; 15
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 200
Distribution Method: End user
Date First Installed:

TEKTRONIX, INC.
4051
Specific Application: Graphics
Compatibility: TTY
Minimum Memory Required: 16K bytes
Maximum Memory Required: 32K bytes
Languages Supported: Basic
Processor Model: Motorola 68000
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 2400 bit/sec
Diagonal Screen Size: 11 in.
Line/Screen: 35
Character/Line: 72
Color Capability: No
Program Function Keys: 10, standard, 20, maximum
List Price: $6,295
Average Monthly Maintenance: $80
Distribution Method: End user
Date First Installed: November 1978
(See Vendor Profile Page V-35)

TEKTRONIX, INC.
4052A
Specific Application: Graphics
Compatibility: TTY
Languages Supported: Basic
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Diagonal Screen Size: 11 in.
Line/Screen: 35
Character/Line: 72
Color Capability: No
Program Function Keys: 10, standard, 20, maximum
List Price: $9,900
Average Monthly Maintenance: $80
Distribution Method: End user
Date First Installed: September 1979

Intelligent Terminals

TEKTRONIX, INC.
4054A
Specific Application: Graphics
Compatibility: TTY
Languages Supported: Basic
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 35, standard; 64, optional
Character/Line: 72, standard; 132, optional
Color Capability: Yes, optional
Program Function Keys: 10, standard, 20, maximum
List Price: $14,950
Average Monthly Maintenance: $125
Distribution Method: End user
Date First Installed: September 1979

TEKTRONIX, INC.
4114A
Compatibility: TTY; Ascii
Minimum Memory Required: 256K bytes
Maximum Memory Required: 800K bytes
Languages Supported: Fortran, Assembler
Processor Model: Intel 8086, 8087
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 35, standard; 64, optional
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 16
List Price: $17,900
Distribution Method: End user, OEM

TEKTRONIX, INC.
4115B
Specific Application: Graphics
Compatibility: TTY; Honeywell; Sperry, Burroughs, NCR; CDC; DEC
Languages Supported: Fortran, Basic
Processor Model: Intel 8086, 8087
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 64
Character/Line: 160
Color Capability: 256 colors
Program Function Keys: 8
List Price: $19,500
Average Monthly Maintenance: $120
Distribution Method: End user, OEM
Date First Installed: September 1983

TEKTRONIX, INC.
4118A
Compatibility: TTY; CDC
Plug Compatibility: Tektronix 4010
Minimum Memory Required: 512K bytes
Maximum Memory Required: 800K bytes
Languages Supported: Fortran
Processor Model: Intel 8086, 8087
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 25 in.
Line/Screen: 35
Character/Line: 74
Color Capability: No
Program Function Keys: 8
List Price: $22,400
Average Monthly Maintenance: $120
Distribution Method: End user
Date First Installed: December 1982

TELERAM COMMUNICATIONS CORP.
PORTABLE-81
Specific Application: WP
Compatibility: TTY
Minimum Memory Required: 64K bytes
Maximum Memory Required: 256K bytes
Processor Model: Zilog Z80
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, Synchronous, ACK/NAK
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 5 in.
Line/Screen: 17, standard; 24, optional
Character/Line: 51, standard; 80, optional
Color Capability: No
List Price: $4,995
Average Monthly Maintenance: $60
Distribution Method: End user
Date First Installed: January 1979
(See Vendor Profile Page V-36)

TELERAM COMMUNICATIONS CORP.
T-3000
Compatibility: TTY
Plug Compatibility: TVI 920
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Cobol, Fortran, Basic
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 8 in., standard; 24 in., optional
Line/Screen: 4
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard, 51, maximum
List Price: $2,995
Distribution Method: End user, OEM, Third-party
Date First Installed: February 1983

TELETYPE CORP.
5820
Minimum Memory Required: 256K bytes
Maximum Memory Required: 256K bytes
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Color Capability: No
Program Function Keys: 8, standard; 8, maximum
List Price: $6,115
Distribution Method: Third-party
Date First Installed: November 1982
(See Vendor Profile Page V-36)

TELEVIDEO SYSTEMS, INC.
950
Compatibility: TTY
Plug Compatibility: DEC VT100; VT102
Terminal Configuration: Stand Alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80 standard, 132 optional
Color Capability: No
Program Function Keys: 16
Distribution Method: Third-party
(See Vendor Profile Page V-36)

TRANSFORMATION SYSTEMS, INC.
FSST-3
Compatibility: TTY
Languages Supported: Cobol, Fortran, Basic
Processor Model: Zenith H19
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 22, standard, 22, maximum
List Price: $4,495
Distribution Method: End user, Third-party
Date First Installed: January 1980
(See Vendor Profile Page V-36)

TSD DISPLAY PRODUCTS, INC.
TSD 870
Minimum Memory Required: 128K bytes
Maximum Memory Required: 512K bytes
Languages Supported: Fortran, Basic
Processor Model: Intel
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: SDLC, HDLC, Synchronous, SDLC/SNA
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 200
Color Capability: 4 colors, optional
List Price: $3,600
Distribution Method: OEM
Date First Installed: January 1983
(See Vendor Profile Page V-36)

TSD DISPLAY PRODUCTS, INC.
8119 VIT
Compatibility: IBM 3270; TTY
Minimum Memory Required: 128K bytes
Maximum Memory Required: 512K bytes
Languages Supported: Fortran, Basic
Processor Model: Motorola 68000
Simultaneous Users: Yes
Terminal Configuration: Stand-alone
Communications Protocols: SDLC, HDLC, Synchronous, SDLC/SNA
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 19 in.
Line/Screen: 24
Character/Line: 200
Color Capability: 4 colors, optional
List Price: $2,650
Average Monthly Maintenance: $150
Distribution Method: OEM
Date First Installed: January 1983

TSD DISPLAY PRODUCTS, INC.
SYSTEM 700
Compatibility: IBM 3278; TTY
Minimum Memory Required: 32K bytes
Maximum Memory Required: 64K bytes
Processor Model: Intel
Simultaneous Users: Yes

Terminal Configuration: Stand-alone
Communications Protocols: SDLC, Synchronous, SDLC/SNA
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $3,500 to $10,000
Distribution Method: OEM
Date First Installed: January 1980

UDATA, INC.
REACT
Plug Compatibility: ISC 8000
Languages Supported: Basic, Assembly
Processor Model: Intel 8080
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 19 in., standard; 25 in., optional
Line/Screen: 25
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 24, standard, 171, maximum
List Price: $8,950 to $14,500
Distribution Method: End user, OEM
Date First Installed: December 1980
(See Vendor Profile Page V-38)

VICTOR TECHNOLOGIES, INC.
VICTOR 9000A
Compatibility: IBM 3270, 3780
Minimum Memory Required: 128K bytes
Maximum Memory Required: 256K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal
Processor Model: Intel 8088
Simultaneous Users: Yes
Terminal Configuration: Cluster
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 9, standard, 9, maximum
List Price: $4,745
Distribution Method: Third-party
Date First Installed: January 1982

VICTOR TECHNOLOGIES, INC.
VICTOR 9000
Compatibility: IBM 3270, 3780
Minimum Memory Required: 128K bytes
Maximum Memory Required: 256K bytes
Languages Supported: Cobol, Fortran, Basic
Processor Model: Intel 8088
Simultaneous Users: Yes
Terminal Configuration: Cluster
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 9, standard, 9, maximum
List Price: $5,995
Distribution Method: Third-party
Date First Installed: January 1982

VISUAL TECHNOLOGY, INC.
VISUAL 300
Specific Application: WP
Compatibility: TTY, DEC VT100
Plug Compatibility: DEC VT100
Processor Model: Zilog Z80
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard, 12, maximum
List Price: $1,150
Distribution Method: Third-party
Date First Installed: September 1981
(See Vendor Profile Page V-39)

WORDPLEX CORP.
WORDPLEX MODEL 80-210
Specific Application: WP
Compatibility: IBM 3270; TTY
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 36, standard, 36, maximum
List Price: $5,100
Average Monthly Maintenance: $100
Distribution Method: End user, Third-party
Date First Installed: June 1981
(See Vendor Profile Page V-39)

WORDPLEX CORP.
WORDPLEX MODEL 80-220
Specific Application: WP
Compatibility: IBM 3270; TTY
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal
Processor Model: Zilog Z80
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 36, standard, 36, maximum
List Price: $6,000
Average Monthly Maintenance: $100
Distribution Method: End user, Third-party
Date First Installed: June 1981

WORDPLEX CORP.
WORDPLEX MODEL 80-3
Specific Application: WP
Compatibility: IBM 3270, TTY
Minimum Memory Required: 128K bytes
Maximum Memory Required: 128K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 36, standard, 36, maximum
List Price: $7,700
Average Monthly Maintenance: $100
Distribution Method: End user, Third-party
Date First Installed: June 1981

WORDPLEX CORP.
WORDPLEX MODEL 80-4
Specific Application: WP
Compatibility: IBM 3270, TTY
Minimum Memory Required: 128K bytes
Maximum Memory Required: 128K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal
Processor Model: Zilog Z80
Simultaneous Users: Yes
Terminal Configuration: Cluster; 3
Communications Protocols: Bisynchronous, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 36, standard, 36, maximum
List Price: $11,800
Average Monthly Maintenance: $100
Distribution Method: End user, Third-party
Date First Installed: June 1983

WYSE TECHNOLOGY, INC.
WY-200
Plug Compatibility: TVI 912
Minimum Memory Required: 32K bytes
Maximum Memory Required: 32K bytes
Languages Supported: Assembly
Processor Model: Intel 8088
Simultaneous Users: No
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 26
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 8, standard; 16, maximum
List Price: $1,295
Distribution Method: OEM, Third-party
Date First Installed: February 1983
(See Vendor Profile Page V-39)

WYSE TECHNOLOGY, INC.
WY-210
Plug Compatibility: TVI 912
Minimum Memory Required: 128K bytes
Maximum Memory Required: 128K bytes
Languages Supported: Assembly
Processor Model: Intel 8088
Simultaneous Users: No
Terminal Configuration: Stand-alone

Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 25
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 8, standard, 16, maximum
List Price: $1,595
Distribution Method: OEM, Third-party
Date First Installed: February 1983

WYSE TECHNOLOGY, INC.
WY-220
Plug Compatibility: TVI 912
Minimum Memory Required: 128K bytes
Maximum Memory Required: 128K bytes
Languages Supported: Assembly
Processor Model: Intel 8088
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 26
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 8, standard, 16, maximum
List Price: $1,595
Distribution Method: OEM, Third-party
Date First Installed: February 1983

ZENITH DATA SYSTEMS
Z89
Compatibility: IBM 3270; TTY
Plug Compatibility: DEC VT52
Minimum Memory Required: 48K bytes
Maximum Memory Required: 48K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal, Assembler
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 56
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 12, maximum
List Price: $1,995
Average Monthly Maintenance: $20
Distribution Method: OEM, Third-party
Date First Installed: September 1978
(See Vendor Profile Page V-40)

ZENITH DATA SYSTEMS
Z90
Compatibility: IBM 3270
Minimum Memory Required: 64K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Cobol, Fortran, Basic, Basic Plus, Pascal
Processor Model: Zilog Z80
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 57,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 12, maximum
List Price: $2,495
Distribution Method: OEM, Third-party
Date First Installed: June 1981

ZENITH DATA SYSTEMS
Z100
Maximum Memory Required: 192K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal, Assembler
Processor Model: Intel 8085, 8088
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 38,400 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 8 colors, optional
Program Function Keys: 12, standard; 12, maximum
List Price: $2,695
Distribution Method: OEM, Third-party
Date First Installed: August 1982

ZENITH DATA SYSTEMS
ZF100
Compatibility: IBM 3270; TTY
Plug Compatibility: IBM 3270, 3275
Minimum Memory Required: 128K bytes
Maximum Memory Required: 768K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal, Macro, C-Basic
Processor Model: Intel 8085, 8088
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 38,400 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 13
List Price: $2,295
Distribution Method: OEM, Third-party
Date First Installed: September 1982

ZENITH DATA SYSTEMS
ZW100
Compatibility: IBM 3270; TTY
Plug Compatibility: IBM 3270, 3275
Minimum Memory Required: 192K bytes
Maximum Memory Required: 768K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal, Macro, C-Basic
Processor Model: Intel 8085, 8088
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 38,400 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 13
List Price: $5,499
Distribution Method: OEM, Third-party
Date First Installed: March 1983

ZENTEC CORP.
8000
Minimum Memory Required: 16K bytes
Maximum Memory Required: 64K bytes
Languages Supported: Cobol
Processor Model: Intel 8085A
Simultaneous Users: No
Terminal Configuration: Cluster
Communications Protocols: Asynchronous, SDLC, Synchronous, SDLC/SNA
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 15 in., optional
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard, 32, maximum
List Price: $1,750
Distribution Method: End user, OEM
Date First Installed: March 1982
(See Vendor Profile Page V-40)

ZENTEC CORP.
SERIES 2000
Minimum Memory Required: 16K bytes
Maximum Memory Required: 56K bytes
Languages Supported: Cobol, Fortran, Basic, Pascal
Processor Model: Intel 8085
Simultaneous Users: No
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 38,400 bit/sec
Diagonal Screen Size: 12 in., standard, 15 in., optional
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard; 32, maximum
List Price: $3,095
Distribution Method: End user, OEM
Date First Installed: June 1983

ZENTEC CORP.
ZMS-35
Minimum Memory Required: 16K bytes
Maximum Memory Required: 16K bytes
Processor Model: Intel 8085A
Simultaneous Users: No
Terminal Configuration: Cluster
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard; 32, maximum
List Price: $1,350
Distribution Method: End user, OEM
Date First Installed: 1979

PRINTERS

Printer Index
By Print Technique and Print Speed

The following index has been designed to provide an overview of the printer products contained in this section of the buyer's guide. Printers have been indexed according to the type of print technique used for output — band, belt, chain/train, daisywheel, dot-matrix, drum, electrosensitive, ink-jet, laser, thermal matrix and thimble. Within each category the printers have been arranged in descending order from the highest to lowest print speed, represented in either lines per minute or characters per second. In addition to printer speed, the index contains information on the price of the printer and the page number in the section where the full product listing is located.

The printer product listings have been broken down by printer type, whether they are line, serial or page printers. Line printers output a line at a time, serial printers print a character at a time and page printers print a page at a time. Within each printer type, products have been separated by print speed ranges. Within each range the products can be found in alphabetical order by vendor name. The line printers ranges are as follows: over 1,200 line/min, 801- to 1200 line/min, 401- to 800 line/min, 201- to 400 line/min and 0 to 200 line/min. Serial printers are arranged from those products which have print speeds of over 501 char./sec, followed by the 301- to 500 char./sec range, the 101- to 300 char./sec range, and those with speeds under 100 char./sec. Page printers have been sorted in alphabetical order by vendor name.

Band Printers

VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Documation	3000 SERIES, MODEL 3000	3,000 line/min	[illegible]	A-47
	3000 SERIES, MODEL 2600	2,600 line/min	$87,000	A-47
Centronics Data Computer Corp.	E-SERIES MODEL III	2,400 line/min	$17,550	A-47
Documation	3000 SERIES, MODEL 2250	2,250 line/min	$80,000	A-47
BDS Corp.	B2000	2,000 line/min	N/A	A-47
Centronics Data Computer Corp.	CENTRONICS 9370 FASTRAIN SERIES	2,000 line/min	$40,000	A-47
Dataproducts Corp.	BP-2000	2,000 line/min	[illegible]	A-47
IBM	4245	2,000 line/min	$63,500	[illegible]
Nissei Sangyo America, Ltd.	FP2000	2,000 line/min	N/A	A-48
Southern Systems, Inc.	BP 2000	2,000 line/min	[illegible]	A-50
Documation	3000 SERIES, MODEL 1800	1,800 line/min	[illegible]	A-47
Storage Technology Corp.	UNIVERSAL 1000	1,600 line/min	$13,775	[illegible]
Cynthia Peripheral Corp.	PR-54	1,530 line/min	$18,000	A-47
BDS Corp.	[illegible]1500	1,500 line/min	N/A	A-47
Data Printer Corp.	BT 1500	1,500 line/min	N/A	A-47
Dataproducts Corp.	BP-1500	1,500 line/min	$23,000	A-47
Documation	1500 SERIES, MODEL 1500	1,500 line/min	$37,000	A-47
Southern Systems, Inc.	BP 1500	1,500 line/min	[illegible]	A-50
Centronics Data Computer Corp.	E-SERIES MODEL II	1,440 line/min	$13,740	A-47
General Business Technology, Inc.	324 OLP	1,440 line/min	$25,000	A-48
NCR Corp.	NCR 6420-0501	1,440 line/min	[illegible]	[illegible]
Decision Data Computer Corp.	MODEL 8814	1,400 line/min	$23,000	A-47
Burroughs Corp.	B9246-12-13	1,250 line/min	$42,500	A-47
Nissei Sangyo America, Ltd.	FP1250	1,250 line/min	$15,000	[illegible]
Braegan Corp.	8573	1,200 line/min	N/A	A-50
Data Printer Corp.	3121	1,200 line/min	N/A	[illegible]
Documation	1500 SERIES, MODEL 1200	1,200 line/min	$33,000	[illegible]
Honeywell, Inc.	PRU 9120/9620	1,200 line/min	[illegible]	A-51
Nixdorf Computer Corp.	8203-12	1,200 line/min	[illegible]	A-51
Southern Systems, Inc.	QT 1200	1,200 line/min	$18,000	A-51
Centronics Data Computer Corp.	E-SERIES MODEL I	1,130 line/min	$12,550	A-50
General Business Technology, Inc.	323 OLP	1,130 line/min	[illegible]	[illegible]
NCR Corp.	NCR 6420-2301	1,130 line/min	[illegible]	A-51
Decision Data Computer Corp.	MODEL 8811	1,100 line/min	$17,000	A-50
BDS Corp.	B1000	1,000 line/min	N/A	A-50
Data Printer Corp.	3101	1,000 line/min	N/A	A-50

Printer Index

VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Dataproducts Corp.	B-1000	1,000 line/min.	*$12,800*	*A-50*
Southern Systems, Inc.	B-1000	1,000 line/min.	*$14,000*	*A-51*
	QT 1000	1,000 line/min.	*$14,000*	*A-51*
Hetra Computer	MODEL 3100 MEDIUM SPEED BAND PRINTER	900 line/mn	*$14,000*	*A-51*
Honeywell, Inc.	PRU 9119/9619	900 line/mn	*$26,000*	*A-51*
Mixdorf Computer Corp.	549	900 line/min	*$24,500*	*A-51*
Centronics Data Computer Corp.	MODEL 6081	750 line/mn	*$7,120*	*A-52*
	MODEL 6085	750 line/min	*$7,120*	*A-52*
Data Printer Corp.	3751	750 line/mn	*N/A*	*A-53*
General Business Technology, Inc.	322 OLP	720 line/mn	*$13,600*	*A-53*
NCR Corp.	NCR 6420-3202	720 line/mn	*$16,800*	*A-54*
Decision Data Computer Corp.	MODEL 6807	700 line/min	*$12,100*	*A-53*
Burroughs Corp.	B9246-6	650 line/mn	*$14,700*	*A-52*
[illegible]	3262	650 line/mn	*$15,040*	*A-53*
[illegible] Corp.	B600	600 line/mn	*N/A*	*A-52*
Datapoint Corp.	9258	600 line/mn	*$14,500*	*A-52*
Data Printer Corp.	3601	600 line/mn	*N/A*	*A-52*
Dataproducts Corp.	B-600	600 line/min	*$8,642*	*A-52*
Harris Corp.	HARRIS 4330/4335	600 line/mn	*$15,000*	*A-53*
Honeywell, Inc.	PRU 0615	600 line/mn	*N/A*	*A-53*
	PRU 9126/9127	600 line/min	*N/A*	*A-53*
	PRU 9626/9627	600 line/min	*N/A*	*A-53*
Mixdorf Computer Corp.	546	600 line/mn	*$15,300*	*A-54*
	6362	600 line/mn	*$15,300*	*A-54*
	8203-06	600 line/mn	*$15,300*	*A-54*
Perkin-Elmer Corp.	LP600	600 line/mn	*$13,000*	*A-54*
Southern Systems, Inc.	B-600	600 line/mn	*$9,000*	*A-54*
	QT 600	600 line/mn	*$11,000*	*A-54*
Centronics Data Computer Corp.	LINEWRITER 400	500 line/mn	*$4,500*	*A-52*
Braegan Corp.	8571	400 line/mn	*N/A*	*A-54*
General Business Technology, Inc.	321 OLP	360 line/mn	*$9,500*	*A-55*
NCR Corp.	NCR 6420-2101	360 line/min	*$12,000*	*A-55*
	NCR 6430	360 line/mn	*$9,000*	*A-55*
Mohawk Data Sciences Corp.	2142-2	340 line/mn	*$11,320*	*A-56*
Telex Computer Products, Inc.	TELEX 289C	340 line/mn	*$11,500*	*A-56*
BDS Corp.	B300	300 line/min	*N/A*	*A-54*
Datapoint Corp.	9257	300 line/mn	*$10,800*	*A-55*
Dataproducts Corp.	B-300	300 line/mn	*$6,800*	*A-55*
Harris Corp.	HARRIS 4320/4325	300 line/mn	*$10,000*	*A-55*
Mixdorf Computer Corp.	543	300 line/min	*$10,900*	*A-55*
	6360	300 line/min	*$10,900*	*A-56*
	8203-03	300 line/mn	*$10,900*	*A-56*
	8289-30	300 line/min	*$10,900*	*A-56*
	8333	300 line/mn	*$10,900*	*A-56*
Perkin-Elmer Corp.	LP-300	300 line/mn	*$9,000*	*A-56*
Southern Systems, Inc.	B-300	300 line/mn	*$6,700*	*A-57*
	QT 300	300 line/mn	*$8,000*	*A-57*
NCR Corp.	NCR 6420-2401	285 line/mn	*$9,600*	*A-56*
Mohawk Data Sciences Corp.	2142-1	240 line/min	*$8,120*	*A-56*
Computer Designed Systems, Inc.	PB-900	900 char./sec	*$25,000*	*A-61*
	PB-400	400 char./sec	*$22,000*	*A-62*

Belt Printers

VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Honeywell, Inc.	PRU 1600	1,600 line/mn	*N/A*	*A-48*
	PRU 1201	1,200 line/min	*N/A*	*A-51*
	PRU 1205	1,200 line/min.	*N/A*	*A-51*
	PRU 0901	900 line/mn	*N/A*	*A-51*
	PRU 0906	900 line/mn	*N/A*	*A-51*
General Electric Co.	GE 340	545 line/min	*$4,835*	*A-51*
	GE 310	340 line/min	*$4,170*	*A-55*
ITT Courier Terminal Systems, Inc.	2760 SERIES	340 line/min	*N/A*	*A-56*
Teletype Corp.	MODEL 40 PRINTER	300 line/mn	*$5,133*	*A-58*
Honeywell, Inc.	PRU 7014	220 line/min	*N/A*	*A-55*
General Electric Co.	GE 510	510 char./sec	*$5,795*	*A-62*

Chain/Train Printers

VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Burroughs Corp.	B9246-20	2,800 line/min.	$69,800	A-47
IBM	3211	2,000 line/min.	$69,365	A-48
NCR Corp.	NCR 647	2,000 line/min.	$71,000	A-48
Renaissance Marketing, Inc.	RENASSANCE LP7000	1,500 line/min.	$21,000	A-48
Storage Technology Corp.	1500 SERIES	1,500 line/min	N/A	A-50
Harris Corp.	HARRIS 4260/4270	1,200 line/min.	$40,000	A-50
Hetra Computer	MODEL 3300 HIGH SPEED INPACT PRINTER	1,200 line/min.	$22,000	A-51
IBM	3203-5	1,200 line/min.	$33,875	A-51
NCR Corp.	NCR 646	1,200 line/min.	$58,000	A-51
Braegen Corp.	3128	1,000 line/min.	N/A	A-50
Braegen Corp.	3127	600 line/min	N/A	A-51
Data Printer Corp.	1260	600 line/min	N/A	A-52
Hewlett-Packard Co.	HP 2611A CHAIN TRAIN LINE PRINTER	600 line/min	$18,560	A-53
	HP 2619A CHAIN TRAIN LINE PRINTER	600 line/min	$26,370	A-53
General Business Technology, Inc.	5201FA	400 line/min	$7,200	A-55
	5202 LP	400 lpe/min	$8,000	A-55
Burroughs Corp.	B9249-375	375 line/min	$8,915	A-54
Business Information Systems, Inc.	C-4300	300 line/min	$6,000	A-55
Innovative Electronics, Inc.	INNOVATOR 154	300 line/min	$4,995	A-55
	INNOVATOR 202	300 line/min	$4,995	A-55
	INNOVATOR 250	300 line/min	$4,995	A-55
Q1 Corp.	203	300 line/min	$7,600	A-57

Daisywheel Printers

VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Mixdorf Computer Corp.	8336	600 line/min	$15,300	A-54
Printronix, Inc.	P600	600 line/min	$7,700	A-54
	P300	300 line/min	$5,700	A-57
	MVP (TASK MASTER II)	200 line/min	$3,500	A-56
	P150	150 line/min	$2,600	A-54
Automatic Funds Transfer Services	AFT 200 MICR PRINTER	400 char./sec	$19,500	A-55
Business Information Systems, Inc.	C-4810	150 char./sec	$1,700	A-56
	C-4510	120 char /sec	$995	A-56
Fujitsu America, Inc.	SP830	80 char./sec	$2,950	A-61
Qume Corp.	TWIN TRACK	75 char /sec	$4,000	A-62
IBM	5219	60 char./sec	$5,835	A-62
SDS Corp.	LQ55	55 char./sec	N/A	A-77
Business Information Systems, Inc.	C-4055	55 char./sec	$2,500	A-78
Cromemco, Inc.	3358	55 char./sec	$3,495	A-78
Dataproducts Corp.	DP-55	55 char /sec	$2,495	A-79
ITT Courier Terminal Systems, Inc.	8760	55 char./sec	N/A	A-82
Qume Corp.	SPRINT 7	55 char /sec	$2,500	A-84
	SPRINT 8/50	50 char /sec	$2,500	A-84
	SPRINT 10/50	50 char./sec	$2,500	A-85
Fujitsu America, Inc.	SP 320	48 char /sec	$1,595	A-61
Billings Computer Corp.	P45	45 char./sec	$1,995	A-77
Braegen Corp.	3125	45 char./sec	N/A	A-77
Mohawk Data Sciences Corp.	2141	45 char./sec	$4,293	A-81
	2141-1	45 char./sec	$4,760	A-82
Mixdorf Computer Corp.	515 TERMINAL PRINTER	45 char./sec	$5,120	A-83
	8345	45 char./sec	$5,120	A-83
	8045	45 char./sec	$5,120	A-83
	8321	45 char./sec	$5,120	A-83
	8745	45 char./sec	$5,120	A-84
Primages, Inc.	IMAGE I	45 char./sec	$1,650	A-84
Q1 Corp.	201	45 char./sec	$5,000	A-85
Ricoh of America	1600	45 char./sec	N/A	A-85
Tandy Corp.	DWIIB	43 char./sec	$1,995	A-86
Apple Computer, Inc.	APPLE LETTER QUALITY PRINTER	40 char./sec	$2,195	A-77
Automatic Funds Transfer Services	AFT 100 MICR PRINTER	40 char./sec	$12,500	A-77
Business Information Systems, Inc.	C-4040	40 char./sec	$2,500	A-78
Diablo Systems, Inc.	630	40 char./sec	N/A	A-78
Dictaphone Corp.	DICTAPHONE 6720	40 char./sec	$2,695	A-80

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VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Facit, Inc..	FACIT 4565	40 char./sec	$1,895	A-81
Hewlett-Packard Co.	HP 2601	40 char./sec	$3,520	A-81
IBM	5210	40 char./sec	$3,530	A-81
	5218	40 char./sec	$3,300	A-81
Leading Edge Products, Inc.	STARWRITER F10-40PU	40 char./sec	$1,895	A-82
	STARWRITER F10-40RU	40 char./sec	$1,895	A-82
Mohawk Data Sciences Corp.	2141-3	40 char./sec	$3,550	A-82
Olympia U.S.A., Inc.	ESW 3000	40 char./sec	$1,899	A-84
Qume Corp.	SPRINT 11/40-130 PLUS	40 char./sec	$1,990	A-85
	SPRINT 11/40-130 WT PLUS	40 char./sec	$2,965	A-85
Transtar	TRANSTAR 140	40 char./sec	$1,695	A-88
Dataproducts Corp.	DP-35	35 char./sec	$1,995	A-79
Honeywell, Inc.	PRU 7007	35 char./sec	N/A	A-81
Qume Corp.	SPRINT 8.35	35 char./sec	$2,500	A-84
	SPRINT 10.35	35 char./sec	$2,500	A-84
	SPRINT 11/40 PLUS	35 char./sec	$1,776	A-85
Data Terminals & Communications	DTC 380Z	32 char./sec	$1,495	A-79
Digital Equipment Corp.	LQP02 LETTER-QUALITY PRINTER	32 char./sec	$2,800	A-80
Dictaphone Corp.	DICTAPHONE 6710	30 char./sec	$2,200	A-79
Docutel Olivetti Corp.	ET 351 (LCU340)	30 char./sec	$4,800	A-80
Nixdorf Computer Corp.	837	30 char./sec	$5,000	A-83
Ricoh of America	1300	30 char./sec	N/A	A-86
Tandy Corp.	DWP410	30 char./sec	$1,295	A-88
Wang Laboratories, Inc.	MODEL 2281 WCR	30 char./sec	$7,000	A-88
	MODEL 2281 WR	30 char./sec	$5,000	A-88
	MODEL 6581 W	30 char./sec	$5,000	A-88
	MODEL 6581 WC	30 char./sec	$7,000	A-88
Docutel Olivetti Corp.	DY 211	27 char./sec	$1,595	A-80
	ET 231 (LCU310)	27 char./sec	$2,770	A-80
Computers International	DAISYWRITER	25 char./sec	$1,495	A-78
Diablo Systems, Inc.	620	25 char./sec	N/A	A-79
	620 PLUS	25 char./sec	$2,100	A-79
Docutel Olivetti Corp.	DY 250	25 char./sec	$1,200	A-80
Hewlett-Packard Co.	HP 2602	25 char./sec	$1,950	A-81
OPE Peripherals, Inc.	DY 250	25 char./sec	$1,200	A-84
Ope Printers, Inc.	D4250	25 char./sec	$795	A-84
Wang Laboratories, Inc.	MODEL 6581 WD	25 char./sec	$9,750	A-88
Facit, Inc..	FACIT 4560	22 char./sec	$1,395	A-81
Olympia U.S.A., Inc.	ESW102	20 char./sec	$1,399	A-84
Ricoh of America	1200	20 char./sec	N/A	A-85
Wang Laboratories, Inc.	DW/05-20	20 char./sec	$2,695	A-88
Xerox Corp.	MODEL 6100	18 char./sec	$699	A-92
Tandy Corp.	DWP 210	18 char./sec	$799	A-88
Transtar	TRANSTAR 130	18 char./sec	[illegible]	A-88
Comrex International	COMREX CR-I	17 char./sec	$995	A-78
	COMREX CR-I COMRITER	17 char./sec	$1,019	A-78
Docutel Olivetti Corp.	ET 121 (LCU1131)	17 char./sec	$995	A-80
Silver-Reed America, Inc.	EXP 500 II	17 char./sec	[illegible]	A-81
Brother International Corp.	HR-1 DAISY WHEEL PRINTER	16 char./sec	$1,200	A-78
Sanyo Business Systems Corp.	SANYO PR 5500	16 char./sec	$995	A-85
Silver-Reed America, Inc.	EXP 500	14 char./sec	N/A	A-81
Transtar	TRANSTAR 120	14 char./sec	$599	A-88
Brother International Corp.	HR-15 DAISY WHEEL PRINTER	13 char./sec	$599	A-78
Comrex International	COMREX CR-II	13 char./sec	$599	A-78
	COMREX CR-II COMRITER	13 char./sec	$629	A-78
Cromemco, Inc.	CLQ	13 char./sec	$795	A-79
Docutel Olivetti Corp.	PRAXIS 41 (LSU41)	12 char./sec	$795	A-80
SCM Corp.	TP-I(SERIES)	12 char./sec	$895	A-83
Qume Corp.	SPRINT 9	5 char./sec	$2,250	A-84
Datapoint Corp.	9611	N/A	$3,495	A-82
Qume Corp.	SPRINT 11/55 PLUS	N/A	$1,990	A-89

Dot-Matrix Printers

VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Versatec, Inc.	VERSATEC V-80	1,000 line/min.	$9,950	A-52
Mannesmann Tally Corp.	MT 660	600 line/min	$7,995	A-54
Nissei Sangyo America, Ltd	AD60	600 line/min	$7,000	A-54
IBM	5225-4	560 line/min	$16,940	A-54
	5225-3	490 line/min	$15,495	A-53
Hewlett-Packard Co.	HP 2608A/2608S DOT MATRIX LINE PRINTER	400 line/min	$11,170	A-82

Printer Index

VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
IBM	5225-2	400 line/min	$13,945	A-56
Nissei Sangyo America, Ltd.	AD30	300 line/min	$5,400	A-56
Raçal-Milgo, Inc.	4295	300 line/min	$5,500	A-57
Technical Analysis Corp.	MACRO GRAFIX L/300-2	300 line/min	N/A	A-57
Trilog, Inc.	C-60	300 line/min	$11,500	A-58
Weber Marking Systems	LEGITRONICS 1560	300 line/min	$15,000	A-58
	LEGITRONICS 2060	300 line/min	$19,800	A-58
Data Specialties, Inc.	ZEBRA DEMAND PRINTER	263 line/min	$3,470	A-55
Trilog, Inc.	C-100	250 line/min	$8,200	A-58
	T-100	250 line/min	$8,200	A-58
	T-1100A	250 line/min	$9,050	A-58
IBM	5224-2	240 line/min	$7,280	A-55
Miltope Corp.	HSP 3809-212A HIGH-SPEED LINE PRINT	240 line/min	[illegible]	[illegible]
IBM	5225-1	200 line/min	$12,075	A-56
Trilog, Inc.	C-144	190 line/min	$11,500	A-60
Ideographix, Inc.	IPX MODEL 3000	150 line/min	$11,000	[illegible]
Megatek Corp.	HCU-T	150 line/min	N/A	[illegible]
Miltope Corp.	LP 3036 LINE PRINTER	150 line/min	$7,000	[illegible]
Trilog, Inc.	TIP-150	150 line/min	[illegible]	A-60
Weber Marking Systems	LEGITRONICS 1550	150 line/min	$9,000	A-60
IBM	5224-1	140 line/min	$6,395	[illegible]
NCR Corp.	NCR 6440-0202	125 line/min	N/A	[illegible]
Telxon Corp.	TELXON IT-40	120 line/min	$895	A-60
[illegible]	NCR 6410	90 line/min	$2,300	[illegible]
Capitol Circuits Corp.	SERIES S400L	72 line/min	$795	A-58
NCR Corp.	NCR 6440-0302	70 line/min	N/A	A-60
	NCR 6440-0402	50 line/min	N/A	A-60
Ramtek Corp.	4100 COLORGRAPHIC PRINTER	40 line/min	$6,995	A-60
Datametrics Corp.	DMC-2001	2,000 char /sec	$8,000	A-61
Perkin-Elmer Corp.	650	960 char /sec	N/A	A-62
	660	960 char /sec	N/A	A-62
Computer Designed Systems, Inc.	PM-600	600 char /sec	$13,500	A-61
Dennison Manufacturing Co.	2110	600 char /sec	$10,000	A-61
	2200	600 char /sec	$10,000	A-61
	2310	600 char /sec	$10,000	A-61
Florida Data Corp.	OSP 120	600 char /sec	$3,900	A-61
	OSP 130	600 char /sec	$4,100	A-62
Information Devices Corp.	RMS-600	600 char /sec	[illegible]	[illegible]
	RMS-600 REMOTE BATCH PRINTER	600 char /sec	$21,000	[illegible]
Computer Designed Systems, Inc.	PM-450	450 char /sec	$13,500	[illegible]
Centronics Data Computer Corp.	MODEL 357	400 char /sec	N/A	[illegible]
	MODEL 358	400 char /sec	N/A	[illegible]
Diablo Systems, Inc.	DOT MATRIX 38	400 char./sec	$2,200	[illegible]
General Business Technology, Inc.	5220DP	400 char./sec	$5,400	[illegible]
	5220MP	400 char /sec	$4,750	[illegible]
[illegible]	GE 3400	400 char./sec	$2,410	A-64
	GE 3404	400 char./sec	$2,610	[illegible]
Sartec Corp.	S700 VARIFLEX	390 char./sec	$3,600	[illegible]
Dennison Manufacturing Co.	4200	350 char /sec	$5,500	[illegible]
Interface Systems, Inc.	MODEL 467	350 char /sec	$4,950	A-64
Okidata Corp.	PACEMARK 2350	350 char /sec	$2,695	[illegible]
	PACEMARK 2410	350 char./sec	$2,995	[illegible]
Braegen Corp.	3126-9	340 char /sec	N/A	[illegible]
Dataproducts Corp.	M-200	340 char /sec	$3,000	[illegible]
IBM	3268	340 char./sec	$7,500	[illegible]
Printek, Inc.	PRINTEK 920	340 char /sec	[illegible]	A-64
Southern Systems, Inc.	M-200	340 char /sec	[illegible]	A-64
Tektronix, Inc.	4643	340 char /sec	$4,300	A-64
Teletype Corp.	AP-200	[illegible]	$3,868	[illegible]
Vector Graphic, Inc.	M200	340 char /sec	[illegible]	[illegible]
Facit, Inc.	FACIT 4570	330 char /sec	[illegible]	[illegible]
NCR Corp.	NCR 6442	325 char./sec	$3,700	A-64
BDS Corp.	GP300	300 char /sec	N/A	[illegible]
Computer Designed Systems, Inc.	PM-211	300 char /sec	$2,000 to $8,500	[illegible]
	PM-300	300 char /sec	$13,500	A-60
Envision Technology, Inc.	MODEL 420 COLOR PRINTER	300 char /sec	$4,450	[illegible]
	MODEL 430 COLOR VECTOR PRINTER	300 char /sec	$5,450	A-69
General Electric Co.	GE 3300	300 char./sec	$2,210	[illegible]
	GE 3304	[illegible]	$2,450	[illegible]
Philips Peripherals, Inc.	GP 300	300 char /sec	$3,300	A-74
	GP 300L	300 char /sec	$3,500	[illegible]
Anadex, Inc.	WP-6000 MULTI-MODE PRINTER	285 char /sec	$3,250	[illegible]
Computer Designed Systems, Inc.	PM-210	250 char./sec	N/A	[illegible]
Facit, Inc.	FACIT 4542	250 char /sec	$3,280	[illegible]
	FACIT 4544	[illegible]	[illegible]	[illegible]
Printek, Inc.	PRINTEK 930	250 char./sec	$1,895	[illegible]
Digital Equipment Corp.	LP-100	240 char /sec	$2,215	[illegible]
ITT Courier Terminal Systems, Inc.	8720	240 char./sec	N/A	A-71

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VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
ITT Courier Terminal Systems, Inc.	8725	240 char./sec	N/A	A-71
Texas Instruments, Inc.	OMNI 800/ENHANCED 810	225 char /sec	$2,295	A-76
Tandy Corp.	DMP500	220 char /sec	$1,795	A-75
Wang Laboratories, Inc.	MODEL 2235R	220 char./sec	$4,500	A-76
	MODEL 5535	220 char /sec	$4,500	A-76
Nixdorf Computer Corp.	8287-20B	210 char /sec	N/A	A-73
Anadex, Inc.	DP-9620A	200 char /sec	$1,845	A-65
	DP-9625A	200 char /sec	$1,995	A-65
Braegen Corp.	3122-8	200 char./sec	N/A	A-66
	3122-9	200 char /sec	N/A	A-66
	8460	200 char /sec	N/A	A-66
	8562	200 char /sec	N/A	A-66
	8587	200 char /sec	N/A	A-66
Cardinal Scale Manufacturing Co.	CARDINAL 2170	200 char /sec	$2,300	A-66
Centronics Data Computer Corp.	MODEL 351 PRINTSTATION	200 char /sec	$2,195	A-67
	MODEL 352 PRINTSTATION	200 char /sec	$1,795	A-67
	MODEL 353 PRINTSTATION	200 char /sec	$2,495	A-67
General Business Technology, Inc.	5203DP	200 char /sec	$4,795	A-68
	5203MP	200 char /sec	$4,496	A-68
General Electric Co.	GE 200 LINE PRINTER	200 char /sec	$3,010	A-70
	GE 3024	200 char /sec	$1,550	A-70
Infoscribe, Inc.	1000	200 char /sec	$1,895	A-71
	1100	200 char /sec	$2,195	A-71
	1200	200 char /sec	$2,495	A-71
Integral Data Systems, Inc.	PRISM 80	200 char /sec	$1,299	A-71
	PRISM 132	200 char /sec	$1,499	A-71
Mannesmann Tally Corp.	MT 1600	200 char /sec	$1,695	A-72
	MT 1800	200 char /sec	$2,295	A-72
Okidata Corp.	MICROLINE 84	200 char /sec	$1,395	A-73
Printek, Inc.	PRINTEK 910	200 char./sec	$1,595	A-74
Q1 Corp.	202	200 char /sec	$5,500	A-74
Racal-Milgo, Inc.	4287N	200 char /sec	$4,125	A-75
Panasonic Industrial Co.	KX-P1160	196 char./sec	$1,750	A-74
Wang Laboratories, Inc.	MODEL 5577	192 char /sec	$5,975	A-76
Computer Designed Systems, Inc.	PM-180	180 char /sec	N/A	A-67
Cromemco, Inc.	3703	180 char./sec	$3,195	A-68
Daisyproducts Corp.	M-120	180 char /sec	$2,700	A-68
Datasouth Computer	DS 180 MATRIX PRINTER	180 char /sec	$1,595	A-68
General Electric Co.	GE 3180	180 char /sec	$1,990	A-70
	GE 3181	180 char /sec	$1,930	A-70
	GE 3184	180 char /sec	$2,190	A-70
	GE 3185	180 char /sec	$2,130	A-70
Hewlett Packard Co.	HP 2631B	180 char./sec	$3,970	A-70
	HP 2631G	180 char /sec	$3,970	A-70
Interface Systems, Inc.	151-387	180 char /sec	$4,250	A-71
ITT Courier Terminal Systems, Inc.	8700 SERIES	180 char./sec	N/A	A-71
	8740	180 char /sec	N/A	A-71
Lear Siegler, Inc.	VERSAPRINT 500	180 char /sec	$1,695	A-72
MDS Trivex, Inc.	8087	180 char./sec	N/A	A-72
Memorex Corp.	2087 MATRIX PRINTERS	180 char /sec	$5,159	A-72
Microprocessor Systems, Inc.	R250	180 char /sec	N/A	A-73
NEC Information Systems	PINWRITER P1	180 char /sec	$795	A-73
North Atlantic Industries	7020	180 char /sec	$1,595	A-73
	7030	180 char /sec	$1,995	A-73
	7040	180 char /sec	$2,195	A-73
Northern Telecom, Inc.	SYCOR SPRINTER	180 char /sec	N/A	A-73
Perkin-Elmer Corp.	CP180R	180 char /sec	$4,500	A-74
	CP180	180 char /sec	$4,500	A-74
Facit, Inc.	FACIT 4528	165 char /sec	$2,195	A-69
	FACIT 5000C	165 char /sec	N/A	A-69
	FACIT 5000V	165 char /sec	N/A	A-69
Harris Corp.	HARRIS 4415	165 char /sec	$4,000	A-70
Hi-G / AMS Control Corp.	132 PS	165 char /sec	$1,295	A-70
Billings Computer Corp.	P160	160 char /sec	$700	A-68
	P200	160 char /sec	$1,250	A-68
Dataproducts Corp.	9621	160 char /sec	$2,500	A-68
	9622	160 char./sec	$2,500	A-68
	[illegible]	160 char /sec	$895	A-68
Epson America, Inc.	FX 80	160 char /sec	$699	A-68
General Electric Co.	GE 3014	160 char /sec	$1,350	A-70
Honeywell, Inc.	PRU 1018	160 char /sec	N/A	A-70
	PRU 9614	160 char /sec	N/A	A-70
IBM	5242	160 char /sec	$2,975	A-71
Mannesmann Tally Corp.	MT 160I	160 char /sec	$698	A-72
	MT 160L	160 char /sec	$798	A-72
	MT 180I	160 char /sec	[illegible]	A-72
	MT 180L	160 char /sec	[illegible]	A-72
Okidata Corp.	MICROLINE 92	160 char./sec	$699	A-73

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VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Okidata Corp.	MICROLINE 93	160 char /sec	$1,249	A-74
Racal-Milgo, Inc.	8160-1	160 char /sec	$1,160	A-75
	8161-2	160 char /sec	$1,100	A-75
Anacom General Corp.	ANACOM 150-132	150 char /sec	$1,495	A-65
	ANACOM 150-132-Z	150 char /sec	$1,895	A-65
	ANACOM 150-80	150 char /sec	$1,420	A-65
	ANACOM 150-80-Z	150 char /sec	$1,820	A-65
	ANACOM 160-132	150 char /sec	$1,750	A-65
	ANACOM 160-132-Z	150 char /sec	$2,150	A-65
	ANACOM 160-80	150 char /sec	$1,675	A-65
	ANACOM 160-80-Z	150 char /sec	$2,075	A-65
Anadex, Inc.	DP-9000A	150 char /sec	$1,625	A-65
	DP-9001A	150 char /sec	$1,625	A-65
	DP-9500A	150 char /sec	$1,725	A-65
	DP-9501A	150 char /sec	$1,725	A-65
Capitol Circuits Corp.	SERIES S400	150 char /sec	$775	A-66
	SERIES S400T	150 char /sec	$775	A-66
Centronics Data Computer Corp.	MODEL 150	150 char /sec	N/A	A-67
	MODEL 152	150 char /sec	N/A	A-67
	MODEL 159	150 char /sec	N/A	A-67
	MODEL 704	150 char /sec	$2,205	A-67
Commodore Business Machines, Inc.	CBM 8023P	150 char /sec	$995	A-67
Cromemco, Inc.	315	150 char /sec	$1,295	A-68
Decision Data Computer Corp.	MODEL 8541-02	150 char /sec	$4,000	A-68
	MODEL 8541-05	150 char /sec	$5,000	A-68
	MODEL 8541-07	150 char /sec	$3,800	A-68
Facit, Inc.	FACIT 5000A	150 char /sec	N/A	A-69
General Business Technology, Inc.	5210BL	150 char /sec	$4,995	A-69
Hi-G/AMS Control Corp.	9/80	150 char /sec	$1,050	A-70
Infoscribe, Inc.	500	150 char /sec	$1,530	A-71
ITT Courier Terminal Systems, Inc.	8710	150 char /sec	N/A	A-71
Micro Peripherals, Inc.	PRINTMATE 350	150 char /sec	N/A	A-72
Nixdorf Computer Corp.	520	150 char /sec	$6,000	A-73
Novell Data Systems, Inc.	IMAGE 800	150 char /sec	N/A	A-73
Perry Data Systems, Inc.	2014	150 char /sec	N/A	A-74
	2042	150 char /sec	N/A	A-74
Raytheon Co.	R2187-1 PRINTER	150 char /sec	$4,600	A-75
TDC	HPM 11	150 char /sec	N/A	A-75
	HPM 80	150 char /sec	$276	A-75
	HPM 136	150 char /sec	$286	A-75
Texas Instruments, Inc.	OMNI 800/810	150 char /sec	$1,645	A-75
	OMNI 800/820	150 char /sec	$1,995	A-75
	OMNI 800/850	150 char /sec	$599	A-76
Weber Marking Systems	LEGITRONICS 2050	150 char /sec	$14,500	A-76
Zenith Data Systems	ZENITH Z-125 DOT MATRIX PRINTER	150 char /sec	$1,499	A-76
Zenith Radio Corp.	Z-125	150 char /sec	$1,499	A-76
Japan Digital Laboratory	JDL P700	145 char /sec	$2,000	A-71
Dataproducts Corp.	M-100	140 char /sec	$3,000	A-68
Mannesmann Tally Corp.	MT 78-5	140 char /sec	$4,345	A-72
Southern Systems, Inc.	M-100	140 char /sec	$3,000	A-75
Tandy Corp.	DMP 420	140 char /sec	$899	A-75
Westrex OEM Products	MODEL 8400	140 char /sec	$750	A-76
Integrex Inc.	CX 80	125 char /sec	$1,595	A-71
Apple Computer, Inc.	APPLE DOT MATRIX PRINTER	120 char /sec	$695	A-65
Canon U.S.A., Inc.	A 1200	120 char /sec	$595	A-66
Carterfone Communications Corp.	5082	120 char /sec	$750	A-66
	5083	120 char /sec	$1,150	A-67
Centronics Data Computer Corp.	MODEL 122 GRAPHICS	120 char /sec	$995	A-67
Facit, Inc.	FACIT 4510	120 char /sec	$695	A-69
General Business Technology, Inc.	5207FA	120 char /sec	$2,995	A-69
	5207MP	120 char /sec	$2,995	A-69
IBM	5256-3	120 char /sec	$4,535	A-71
Informer Computer Terminals, Inc.	387 MATRIX PRINTER	120 char /sec	$1,000	A-71
Leading Edge Products, Inc.	PROWRITER 2 1550 BCD	120 char /sec	$995	A-72
	PROWRITER 8510 AP	120 char /sec	$495	A-72
	PROWRITER 8510 BCD	120 char /sec	$695	A-72
Mohawk Data Sciences Corp.	2144	120 char /sec	$1,900	A-73
NCR Corp.	NCR 6411-136 COLUMN	120 char /sec	$1,200	A-73
	NCR 6411-80 COLUMN	120 char /sec	$900	A-73
Okidata Corp.	MICROLINE 82A	120 char /sec	$549	A-73
	MICROLINE 83A	120 char /sec	$899	A-73
Perkin-Elmer Corp.	CP120	120 char /sec	N/A	A-74
Personal Micro Computers, Inc.	DMP-85	120 char /sec	$495	A-74
Philips Peripherals, Inc.	GP 150	120 char /sec	N/A	A-74
Q1 Corp.	204	120 char /sec	$4,500	A-74
Racal-Milgo, Inc.	4285	120 char /sec	$825	A-74
Tandy Corp.	DWP200	120 char /sec	$699	A-75
Telecom Terminal Systems	AIRLINE REGISTRATION SYSTEM	120 char /sec	$3,000	A-75

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VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Telecom Terminal Systems	TELEX PRINTER	120 char /sec	$2,500	A-75
Wang Laboratories, Inc.	MODEL 2233R	120 char./sec	$3,500	A-76
	MODEL 5533	120 char /sec	$3,500	A-76
Cecosi, Inc.	101 B-80E	110 char./sec	$450	A-68
	102A-48	110 char /sec	$350	A-68
Integral Data Systems, Inc.	MICROPRISM 480	110 char /sec	N/A	A-71
Trans-Lux Corp.	TRANS-LUX 300	110 char./sec	$2,865	A-76
Axiom Corp.	IMP-4 PROFESSIONAL PRINTER	100 char./sec	$749	A-77
Data Impact Products, Inc.	DIP-81A	100 char./sec	$499	A-79
	DIP-84G	100 char./sec	$695	A-79
	DIP-92	100 char /sec	$399	A-79
Data Impact Products,Inc.	D-92	100 char /sec	$399	A-79
Diablo Systems, Inc.	MATRIX 11	100 char /sec	N/A	A-79
	MATRIX 11A	100 char./sec	N/A	A-79
	MODEL 31	100 char./sec	$950	A-79
	MODEL 31A	100 char /sec	N/A	A-79
Digital Equipment Corp.	LA50	100 char./sec	$695	A-80
Honeywell, Inc.	PRU 7060/7061	100 char /sec	N/A	A-81
	PRU 7065/7066	100 char /sec	N/A	A-81
	PRU 7070/7071	100 char /sec	$1,195	A-81
	PRU 7075/7076	100 char /sec	$1,495	A-81
Micro Peripherals, Inc.	PRINTMATE 99	100 char /sec	$599	A-82
Nixdorf Computer Corp.	6350	100 char./sec	$3,950	A-83
	8287-10A	100 char /sec	$3,550	A-83
	8287-10B	100 char /sec	$3,950	A-83
Singer Data Products	5010	100 char./sec	$1,075	A-86
	5011	100 char./sec	$1,075	A-86
	5012	100 char./sec	$1,075	A-86
	5080	100 char /sec	$995	A-86
Star Micronics, Inc.	GEMINI-10	100 char./sec	$499	A-86
	GEMINI-15	100 char./sec	$645	A-86
Syntest Corp.	SYNTEST SP-2000	100 char /sec	$925	A-86
TDC	GPM 40	100 char /sec	$180	A-86
	GPM 80	100 char /sec	$235	A-86
01 Corp.	205	96 char /sec	N/A	A-85
Business Information Systems, Inc.	C-4180	80 char /sec	$1,600	A-78
Computer Designed Systems, Inc.	PM-080	80 char./sec	N/A	A-78
	PM-200	80 char./sec	N/A	A-78
Epson America, Inc.	MX-80 FT	80 char./sec	$695	A-80
IBM	4975 1L	80 char /sec	$2,800	A-81
	5222-1	80 char /sec	$2,345	A-82
	5241	80 char /sec	$2,040	A-82
	5256-2	80 char./sec	$4,340	A-82
Okidata Corp.	MICROLINE 80	80 char /sec	$449	A-84
Panasonic Industrial Co.	KX-1090	80 char./sec	$499	A-84
Hi-G / AMS Control Corp.	9/80 PSF	75 char./sec	$1,195	A-81
Japan Digital Laboratory	JDL P200	70 char./sec	$2,000	A-82
Capitol Circuits Corp.	SERIES S100	65 char./sec	$460	A-78
	SERIES 100T	65 char./sec	$660	A-78
	SERIES 270	65 char./sec	$660	A-78
Axiom Corp.	GP-250X	50 char /sec	$339	A-77
Anadex Printer Products	7000+	50 char./sec	$425	A-80
Tandy Corp.	DMP100	50 char /sec	$399	A-86
Alsto, Inc.	1025	40 char /sec	$549	A-77
IBM	5256-1	40 char./sec	$4,145	A-82
Axiom Corp.	GP-100A	30 char /sec	$266	A-77
Digitec	PRINTER 6630	22 char./sec	$565	A-86
Epson America, Inc.	COMRITER	17 char /sec	$1,100	A-80
Razzi-Dana Instruments, Inc.	1001 THERMAL	3 char./sec	$1,300	A-85
	1002-THERMAL	3 char /sec	$1,600	A-85
Addmaster Corp.	MODEL 171/172	2 char /sec	$345	A-77
Digitec	PRINTER 6620	2 char /sec	$495	A-86
Addmaster Corp.	MODEL 181/182	1 char./sec	$459	A-77
Digitec	PRINTER 6610	N/A.	$495	A-86
	PRINTER 6611	N/A.	$525	A-86
Honeywell, Inc.	PRU 7270/7271/7272	N/A.	$3,450	A-86
Philips Peripherals, Inc.	GP100	N/A.	$2,600	A-86
Renaissance Marketing, Inc.	RENAISSANCE PAGE PRINTING	N/A.	N/A	A-80
Tandy Corp.	DMP120	N/A.	$500	A-86
	DMP2100	N/A.	$1,995	A-86
Tritag, Inc.	TIP-300	N/A.	$4,900	A-86

Drum Printers

VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Cynthia Peripheral Corp.	MP-6090	6,000 line/min	$75,000	A-47
Decision Data Computer Corp.	MODEL 6610	1,000 line min	$22 000	A-50
Datapoint Corp.	9265	900 line min	$29 750	A-50
Data Card Corp.	CFO SYSTEM 10	800 line/min	$85,000	A-52
	CFO SYSTEM 20	800 line/min	$10 000	A-52
	CFO SYSTEM 30	800 line/min	$115,000	A-52
	CFO SYSTEM 40	800 line/min	$13,000	A-52
	CFO SYSTEM 50	800 line/min	$15,000	A-52
Decision Data Computer Corp.	MODEL 6680	800 line/min	$19 000	A-53
	MODEL 6665	650 line/min	$17,000	A-53
Mohawk Data Sciences Corp.	2145	300 line/min	$20 600	A-56
DI/AN Controls, Inc.	8100	20 line/min	$3,500	A-58
	8379	20 line/min	$4,500	A-58
	8500	20 line/min	$6,000	A-58
	8510	20 line/min	$7,000	A-58
Datadyne Corp.	MODEL 722	4,800 char./sec	$2,100	A-61
Computer Designed Systems, Inc.	PD-600	600 char /sec	$23,000	A-61
	PD-300	300 char./sec	$23,000	A-67
Digitec	DIGITAL RECORDER 6100 SERIES	45 char./sec	$1,000	A-60

Electrosensitive Printers

VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Honeywell, Inc.	PPS IIE	18,000 line/min	$53,200	A-90
	PPS II	12,000 line/min	$27 600	A-90
Automatic Funds Transfer Services	AFT 300 PAGE PRINTER	9,000 line/min	$50 000	A-90
Honeywell, Inc.	PPS	8,000 line/min	$10,000	A-90
Houston Instruments	MODEL 8210	2,400 line/min	$3 995	A-48
	MODEL 8230	1,400 line/min	$3 995	A-48
	MODEL 8220	1,000 line/min	$3 995	A-51
Versatec, Inc.	V80	1,000 line min	$8,950	A-51
Benson, Inc.	9322 ELECTROSTATIC	560 line/min	N/A	A-52
	9424 ELECTROSTATIC	475 line/min	N/A	A-52
	9336 ELECTROSTATIC	370 line/mn	N/A	A-54
	9436 ELECTROSTATIC	238 line/min	N/A	A-54
	9344 ELECTROSTATIC	230 line/min	N/A	A-54
Datametrics Corp.	DMC-4680	160 line/min	$9,000	A-58
Axiom Corp.	EX-801 MICRO PRINTER	120 line/min	$640	A-58
Datametrics,Inc.	DMC 1500	1,600 char /sec	$28 000	A-61
	DMC 4003	1,100 char./sec	$16 000	A-61
SCI Systems, Inc.	SCI MODEL 1180	1,100 char./sec	$1,200	A-62
Axiom Corp.	EX-1620	960 char sec	$999	A-61
	EX-420	550 char /sec	$849	A-61
	EX-1601	240 char /sec	$699	A-65
Comprint, Inc.	912 AG	225 char./sec	$695	A-67
	912 ALFA-NUMERIC	225 char /sec	$495	A-67
	912 GO	225 char./sec	$995	A-67
	COMPRINT 912	225 char /sec	$595	A-67
Axiom Corp.	EX401A	192 char./sec	$549	A-65
	EX 401B	192 char sec	$599	A-65
Digitec	BENCHTOP 6300 SERIES	64 char /sec	$1 000	A-60
	DESKTOP 6400 SERIES	42 char /sec	$400	A-60
	PANEL PRINTER 6500 SERIES	42 char /sec	$475	A-60

Ink-Jet Printers

VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Anderson Jacobson, Inc.	AJ 650	123 line/min	N/A	A-58
Docutel Olivetti Corp.	JP 101	50 line/min	$495	A-58
Ope Printers, Inc.	JP-101 (PR2300)	50 line/min	$495	A-60

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VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Franchise Mailing Systems	DOMINO UNIJET	1;523 char /sec	*$15,000*	*A-62*
AB Dick Co.	VIDEO JET PRINTER 9400 SERIES	1,375 char /sec	*$50,000*	*A-61*
World Storage Technology, Ltd.	2712	270 char /sec	*$2,700*	*A-76*
Nixdorf Computer Corp.	8287-50B	210 char /sec	*N/A*	*A-73*
Telex Computer Products, Inc.	TELEX 287C	150 char./sec	*$5,340*	*A-75*
	TELEX 287D	150 char /sec	*$5,150*	*A-75*
World Storage Technology, Ltd.	PT 88	150 char./sec	*$895*	*A-76*
Telex Computer Products, Inc.	TELEX 281B	120 char /sec	*$900*	*A-75*
Konishiroku Photo Industry Co., Ltd	JM 241	117 char./sec	*N/A*	*A-72*
Printacolor Corp.	TC1040	100 char /sec	*$5,495*	*A-84*
Exxon Enterprises	965	90 char./sec	*$4,400*	*A-80*
	965S	90 char /sec	*$6,000*	*A-81*
Printacolor Corp.	GP 1024	60 char /sec	*$5,495*	*A-84*
Canon U.S.A., Inc.	A 1210	40 char./sec	*$795*	*A-78*
Printacolor Corp.	IS8001	40 char./sec	*$4,495*	*A-84*
	PRINTACOLOR PG-1000	40 char./sec	*$4,995*	*A-84*
Tandy Corp.	CGP220	37 char /sec	*$699*	*A-86*
Diablo Systems, Inc.	COLOR INK JET PRINTER	20 char./sec	*$1,300*	*A-79*
AB Dick Co.	VIDEO JET PRINTER 9100 SERIES	N/A.	*$5,000*	*A-88*
Advanced Color Technology, Inc.	ACT II	N/A.	*$6,400*	*A-88*

Laser Printers

VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Sperry Corp.	0777-87 ON-LINE PRINTER	21,000 line/min.	*$315,000*	*A-50*
World Storage Technology, Ltd.	ND2	21,060 line/min.	*$31,000*	*A-[illegible]*
	ND3	10,500 line/min.	*$19,000*	*A-[illegible]*
Xerox Corp.	8700 ELECTRONIC PRINTING SYSTEM	9,240 line/min.	*$250,000*	*A-90*
Hewlett-Packard Co.	HP 2680A LASER PRINTER	2,970 line/min	*$93,000*	*A-48*
General Optronics Corp.	HOLLOSCAN 28 LASER GRAPHIC PRTR	2,000 line/min	*N/A*	*A-[illegible]*
Konishiroku Photo Industry Co., Ltd	1800C	1,700 line/min.	*N/A*	*A-48*
	2800C	1,700 line/min	*$9,000*	*A-[illegible]*
Minolta Corp.	SP50B	1,300 line/min.	*$20,000*	*A-48*
Fujitsu America, Inc.	M3071A PRINTER MODULE	20 line/min	*N/A*	*A-[illegible]*
Ricoh of America	RICOH LP 212	12 char /sec	*N/A*	*A-85*
IBM	3800	N/A	*$315,000*	*A-90*
Inteks	PPT-10	N/A	*$30,000*	*A-90*
Xerox Corp.	5700 ELECTRONIC PRINTING SYSTEM	N/A.	*$100,000*	*A-90*

Thermal Matrix Printers

VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Mitsuba Corp.	TP3000 SERIES THERMAL LINE PRINTER	300 line/min	*$16,000*	*A-[illegible]*
Datametrics,Inc.	DMC 1600	240 line/min	*$20,000*	*A-55*
NCR Corp.	NCR 6425	240 line/min	*$2,800*	*A-[illegible]*
Printronix International Corp.	A65/40-0600 GRAPHICS PRINTER	240 line/min	*$300*	*A-57*
John Fluke Mfg. Co., Inc.	2020A UNIVERSAL PRINTER	180 line/min	*$1,200*	*A-[illegible]*
Mitsuba Corp.	TP2000 THERMAL LINE PRINTER	160 line/min	*$7,000*	*A-[illegible]*
Teipar, Inc.	PL 20C	150 line/min	*$395*	*A-60*
	PL 12E	130 line/min	*$297*	*A-60*
	PL 20E	130 line/min	*$297*	*A-[illegible]*
	PL 20CX	120 line/min	*$395*	*A-60*
	PL 20EX	120 line/min	*$297*	*A-[illegible]*
	PL 20RM	120 line/min	*$575*	*A-60*
Memodyne Corp.	MAP-PAC	110 line/min	*N/A*	*A-59*
	MAP-PBC	110 line/min	*$625*	*A-[illegible]*
	MAP-SBC	110 line/min	*N/A*	*A-59*
	MAP-20 IAC	110 line/min	*$875*	*A-[illegible]*
	MAP-20 IEC	110 line/min	*$875*	*A-59*
	MAP-20 SAC	110 line/min	*N/A*	*A-59*
	MAP-20,SEC	110 line/min	*N/A*	*A-59*
Interall, Inc.	APP-20A21/D21/E21/J21/V21 SERIES	72 line/min	*$725*	*A-59*
	APP-48A/D/E/J2 SERIES	72 line/min	*$1,095*	*A-59*
	APP-48A/E1/J1/D1 SERIES	72 line/min	*$1,095*	*A-[illegible]*
	APP-48A3/E3/J3/D3 SERIES	72 line/min	*$1,095*	*A-59*

VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Interall, Inc.	APP-20A3/E3/J3/D3/V3 SERIES	66 line/min	$795	A-59
	APP-M20 SERIES	63 line/min	$675	A-59
	APP-20A1/D1/E1/J1/V1 SERIES	63 line/min	$625	A-59
Product Development Services, Inc.	EKG PRINTER	200 char./sec	N/A	A-74
Alphacom, Inc.	ALPHACOM 40	160 char./sec	$295	A-64
Hewlett-Packard Co.	HP 2671G	120 char./sec	$1,240	A-70
	HP 2673A	120 char./sec	$1,240	A-70
Texas Instruments, Inc.	SILENT 700/781RO	120 char./sec	$1,395	A-76
Memodyne Corp.	MAP-IBC	110 char./sec	$875	A-72
Perkin-Elmer Corp.	655	160 char./sec	$1,460	A-66
Alphacom, Inc.	ALPHACOM 42	80 char./sec	$220	A-77
	VP42	80 char./sec	$210	A-77
Mitsubishi Electronics America, Inc.	M4234 COLOR PRINTER	45 char./sec	$1,050	A-62
American Communications Corp.	AMCON/P	40 char./sec	$600	A-77
Apple Computer, Inc.	APPLE SILENTYPE II PRINTER*	40 char./sec	$350	A-77
	APPLE SILENTYPE III PRINTER	40 char./sec	$390	A-77
3M	TRENDCOM MODEL 150	40 char./sec	$259	A-68
	TRENDCOM MODEL 151	40 char./sec	$249	A-68
	TRENDCOM MODEL 250	40 char./sec	$299	A-68
	TRENDCOM MODEL 251	40 char./sec	$289	A-68
Tandy Corp.	TP10	30 char./sec	$100	A-86
Texas Instruments, Inc.	SILENT 700/743RO	30 char./sec	$895	A-96
Sony Communications Products Co.	SONY COMPACT PRINTER	15 char./sec	$280	A-96
Newport Electronics, Inc.	ELECTRONIC 820	2 char./sec	$649	A-63
	ELECTRONIC 821	2 char./sec	$649	A-63
	ELECTRONIC 822	2 char./sec	$649	A-63
Diablo Systems, Inc.	EPM 200	N/A	$5,000	A-90
Hewlett-Packard Co.	HP 2671A	N/A	$1,240	A-69
Memodyne Corp.	MAP-PEC	N/A	N/A	A-89
Product Development Services, Inc.	BOWLING PRINTER	N/A	$160	A-89

Thimble Printers

VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
General Business Technology, Inc.	5205WP	55 char./sec	$4,295	A-61
Interface Systems, Inc.	MODEL 736	55 char./sec	$5,150	A-62
NEC Information Systems	SPINWRITER 7700D	55 char./sec	$2,535	A-63
	SPINWRITER 7700Q	55 char./sec	$2,535	A-63
	SPINWRITER MODEL 7710	55 char./sec	$3,055	A-63
	SPINWRITER 7715	55 char./sec	$2,500	A-63
	SPINWRITER 7730	55 char./sec	$3,055	A-63
Vector Graphic, Inc.	7700	55 char./sec	$3,450	A-88
General Business Technology, Inc.	5206WP	35 char./sec	N/A	A-61
Vector Graphic, Inc.	3500	33 char./sec	$2,695	A-88
NEC Information Systems	SPINWRITER 3500 SERIES	30 char./sec	$1,750	A-63
	MODEL 2000R TERMINAL	20 char./sec	$995	A-62

Printers Which Use Other Technologies

VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Sperry Corp.	0777 LASER PRINTING SYSTEM	21,000 line/min.	$415,000	A-90
Xerox Corp.	XEROX 9700 ELECTRONIC PRINTING SYS	18,000 line/min.	$400,000	A-90
Southern Systems, Inc.	MERCURION 1	5,280 line/min.	$59,950	A-90
Harris Corp.	HARRIS 4760	1,000 line/min.	$12,000	A-91
Decision Data Computer Corp.	6703 MATRIX LINE PRINTER	300 line/min.	$6,200	A-55
Mannesmann Tally Corp.	MT 3309	300 line/min.	$4,995	A-56
Interall, Inc.	DPP-Q7 MINI DIGITAL PANEL PRINTER	240 line/min.	$575	A-55
Ope Printers, Inc.	JP101	50 line/min.	$400	A-80
Florida Data Corp.	OSP 125	600 char./sec.	$4,100	A-61
IBM	4975 2L	160 char./sec.	$4,175	A-70
Nixdorf Computer Corp.	8353	150 char./sec.	$5,000	A-73
Triformation Systems, Inc.	LED-120	120 char./sec.	$14,500	A-78
Nixdorf Computer Corp.	835	100 char./sec.	$3,950	A-73
	8341	80 char./sec.	$1,700	A-73
Honeywell, Inc.	PRU 7004/7006	55 char./sec.	N/A	A-91

Printer Index

VENDOR	MODEL	PRINT SPEED	PRICE	PAGE
Interface Systems, Inc.	MODEL 736	55 char./sec	*$5,150*	*A-82*
Transtar	TRANSTAR 315	50 char./sec	*$599*	*A-88*
Atari, Inc.	1027	20 char./sec	*$350*	*A-77*
Tandy Corp.	CGP115	12 char./sec	*$200*	*A-86*
Atari, Inc.	1020 COLOR PRINTER	10 char./sec	*$299*	*A-77*
General Business Technology, Inc.	6600XP	N/A.	*$26,000*	*A-90*
Harris Corp.	HARRIS 4240/4250	N/A.	*$30,000*	*A-89*
Renaissance Marketing, Inc.	RENAISSANCE PAGE PRINTING	N/A.	*$70,000*	*A-90*
Xerox Corp.	XEROX 2700 DISTRIBUTED PRINTER	N/A.	*$19,000*	*A-90*

Print Speeds Over 1,200 line/min

BDS CORP.
B1500
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,500 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Distribution Method: End user
Date First Installed: 1979
(See Vendor Profile Page V-4)

BDS CORP.
B2000
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 2,000 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Distribution Method: End user
Date First Installed: 1979

BURROUGHS CORP.
B9246-12-13
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,250 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96
Character Code: Ascii, Ebcdic
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $37,500
Distribution Method: End user
(See Vendor Profile Page V-5)

BURROUGHS CORP.
B9246-20
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 2,000 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 48
Optional Character Set Sizes: 64, 96
Character Code: Ascii, Ebcdic
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $69,800
Distribution Method: End user

CENTRONICS DATA COMPUTER CORP.
CENTRONICS 9370 FASTRAIN SERIES
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 2,000 line/min
Maximum Characters Per Line: 136
Optional Character Set Sizes: 48
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $40,000
Distribution Method: OEM
Number Installed to Date: 5,500
Date First Installed: 1973
(See Vendor Profile Page V-6)

CENTRONICS DATA COMPUTER CORP.
E-SERIES MODEL II
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,440 line/min
Maximum Characters Per Line: 136
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96, 128
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $13,740
Distribution Method: OEM

CENTRONICS DATA COMPUTER CORP.
E-SERIES MODEL III
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 2,400 line/min
Maximum Characters Per Line: 136
Optional Character Set Sizes: 48, 64, 96, 128
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Maximum Form Width: 16 in.
Price: $17,550
Distribution Method: OEM

CYNTHIA PERIPHERAL CORP.
[illegible]
Print Mechanism: Nonimpact
Print Technique: Drum
Maximum Print Speed: 6,000 line/min
Optional Character Set Sizes: 48, 64, 96, 128
Character Code: Ascii, Ebcdic
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $75,000
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: February 1984
(See Vendor Profile Page V-10)

CYNTHIA PERIPHERAL CORP.
PR-54
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,530 line/min
Maximum Characters Per Line: 136
Optional Character Set Sizes: 48, 64, 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll, Continuous
Price: $18,000
Distribution Method: OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: July 1982

DATA PRINTER CORP.
BT 1500
Print Mechanism: Impact
Print Technique: Band Train
Maximum Print Speed: 1,500 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 48
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 20 in.
(See Vendor Profile Page V-11)

DATAPRODUCTS CORP.
BP-1500
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,500 line/min
Maximum Characters Per Line: 132, 136
Optional Character Set Sizes: 48, 64, 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 18¾ in.
Price: $23,000
Distribution Method: OEM, Third-party
Date First Installed: [illegible]
(See Vendor Profile Page V-11)

DATAPRODUCTS CORP.
BP-2000
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 2,000 line/min
Maximum Characters Per Line: 132, 136
Standard Character Set Size: 48
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 18¾ in.
Price: $38,800
Distribution Method: OEM, Third-party
Date First Installed: 1982

DELUXE DATA SYSTEMS CORP.
MODEL 6614
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,400 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96, 61
Character Code: Ascii, Other
Form Feed Method: Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 11 in.
Price: $22,000
Distribution Method: End user
Number Installed to Date: 600
Date First Delivered: Late 1982
(See Vendor Profile Page V-12)

DOCUMATION
1500 SERIES, MODEL 1520
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,500 line/min
Maximum Characters Per Line: 132
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 19 in.
Price: $37,000
Distribution Method: End user
Number Installed to Date: 500 - 1,000
Date First Installed: 1978
(See Vendor Profile Page V-13)

DOCUMATION
2000 SERIES, MODEL 2020
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,500 line/min
Maximum Characters Per Line: Optional
Optional Character Set Sizes: Unlimited
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 19 in.
Price: $68,000
Distribution Method: End user
Number Installed to Date: 500 - 1,000
Date First Installed: 1976

DOCUMATION
2000 SERIES, MODEL 2250
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 2,250 line/min
Maximum Characters Per Line: 132
Maximum Characters Per Line: Optional
Optional Character Set Sizes: Unlimited
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 19 in.
Price: $80,000
Distribution Method: End user
Number Installed to Date: 500 - 1,000
Date First Installed: 1978

DOCUMATION
[illegible]
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 2,600 line/min
Maximum Characters Per Line: Optional
Optional Character Set Sizes: Unlimited
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 19 in.
Price: $87,000
Distribution Method: End user
Number Installed to Date: 500 - 1,000
Date First Installed: 1976

DOCUMATION
3000 SERIES, MODEL 3000
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 3,000 line/min

Line Printers

Over 1,200 line/min

Maximum Characters Per Line: 132
Optional Character Set Sizes: Unlimited
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 19 in
Price: $94 000
Distribution Method: End user
Number Installed to Date: 500 - 1 000
Date First Installed: September 1976

GENERAL [illegible] TECHNOLOGY, INC.
324 OLP
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,440 line min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48-64 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in
Price: $25 000
Distribution Method: Third-party
Date First Installed: September 1982
(See Vendor Profile Page V-15)

GENERAL OPTRONICS CORP.
HOLLOSCAN 28 LASER GRAPHIC PRTR
Print Mechanism: Nonimpact
Print Technique: Laser
Maximum Print Speed: 2,000 line min
Maximum Characters Per Line: 132
Character Code: Ascii, G
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Cut sheet
Maximum Form Width: 11 in
Number Installed to Date: Under 100
Date First Installed: October 1982
(See Vendor Profile Page V-15)

HEWLETT PACKARD CO.
HP 2680A LASER PRINTER
Print Mechanism: Nonimpact
Print Technique: Laser
Maximum Print Speed: 2,970 line min
Maximum Characters Per Line: 255
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Graphics Functions Supported: Full Bit Map Graphics
Price: $93 000
Distribution Method: End user
Date First Installed: May 1981
(See Vendor Profile Page V-17)

HONEYWELL, INC.
[illegible]
Print Mechanism: Impact
Print Technique: Belt
Maximum Print Speed: 1,600 [illegible]
Maximum Characters Per Line: 136
Optional Character Set Sizes: 48, 96 63 94
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 22 in

HOUSTON INSTRUMENTS
MODEL 8210
Print Mechanism: Nonimpact
Print Technique: Electrostatic Carbon Deposit
Maximum Print Speed: 2,400 line min
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Forms Type Accepted: Fan fold, [illegible]
Price: $3,995
Distribution Method: End user
Date First Installed: 1973
(See Vendor Profile Page V-17)

HOUSTON INSTRUMENTS
MODEL 8230
Print Mechanism: Nonimpact
Print Technique: Electrostatic Carbon Deposit
Maximum Print Speed: 1 400 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial Parallel
Forms Type Accepted: Fan fold Roll
Colors Supported: 1
Price: $3,995
Distribution Method: End user
Date First Installed: September 1973

IBM
3211
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 2,000 line-min
Maximum Characters Per Line: 132
Standard Character Set Size: 48
Optional Character Set Sizes: 64, 96, 128
Character Code: Ebcdic
Communications Port: Parallel
Form Feed Method: Pin Feed Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 19 in
Price: $69,365
Distribution Method: End user
Date First Installed: October 1971
(See Vendor Profile Page V-17)

IBM
4245
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 2,000 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 48
Optional Character Set Sizes: 63, 94 124
Character Code: Ebcdic
Communications Port: Parallel
Form Feed Method: Pin Feed Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 22 in
Price: $63 500
Distribution Method: End user
Date First Installed: July 1983

KONISHIROKU PHOTO INDUSTRY CO., LTD.
1800C
Print Mechanism: Nonimpact
Print Technique: Laser
Maximum Print Speed: 1,700 line-min
Maximum Characters Per Line: 80
Optional Character Set Sizes: 48, 64, 96, 128
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Cut sheet
Maximum Form Width: 9 in.
Date First Installed: June 1983
(See Vendor Profile Page V-21)

KONISHIROKU PHOTO INDUSTRY CO., LTD.
2500C
Print Mechanism: Nonimpact
Print Technique: Laser
Maximum Print Speed: 1,700 line min
Maximum Characters Per Line: 80
Optional Character Set Sizes: 48, 64, 96, 128
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Cut sheet
Maximum Form Width: 9 in
Price: $9,000
Distribution Method: OEM
Date First Installed: June 1983

MINOLTA CORP.
SP508
Print Mechanism: Nonimpact
Print Technique: Laser
Maximum Print Speed: 1,300 line/min
Maximum Characters Per Line: 210
Optional Character Set Sizes: 126, 254
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Friction
Forms Type Accepted: Cut sheet
Maximum Form Width: 9 in
Graphics Functions Supported: Vector, Raster, Character Graphics
Price: $20,000
Distribution Method: OEM
Date First Installed: June 1983
(See Vendor Profile Page V-24)

NCR CORP.
[illegible]
Print Technique: Chain/Train
Maximum Print Speed: 2,000 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96, 52, 57, Custom
Character Code: Ebcdic
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 21 in.
Price: $71,000
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1974
(See Vendor Profile Page V-26)

NCR CORP.
NCR 6420-0601
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,440 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in
Price: $36,000
Distribution Method: End user
Date First Installed: 1979

NISSEI SANGYO AMERICA, LTD.
[illegible]
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,250 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96, 128
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in
Price: $15,000
Distribution Method: OEM
Date First Installed: 1981
(See Vendor Profile Page V-26)

NISSEI SANGYO AMERICA, LTD.
[illegible]
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 2,000 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96, 128
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 19 in
Distribution Method: OEM
Date First Installed: 1983

RENAISSANCE MARKETING, INC.
[illegible]
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 1,500 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96
Form Feed Method: Pin Feed Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 19 in
Price: $21,000
Distribution Method: End user, Third-party
Number Installed to Date: 100 - 500
Date First Installed: 1974
(See Vendor Profile Page V-31)

SOUTHERN SYSTEMS, INC.
[illegible]
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,500 line/min
Maximum Characters Per Line: 132
[illegible]
Optional Character Set Sizes: 48, 96
Character Code: Ascii, Ebcdic
[illegible]
Forms Type Accepted: Fan fold
Maximum Form Width: 19 in.
Price: $21,000
Date First Installed: January 1983
(See Vendor Profile Page V-32)

DEC PRIME
DATA GENERAL
IBM WANG
HP TANDEM
PERKIN-ELMER

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Digital Associates Corporation

better printers at better prices

SOUTHERN SYSTEMS, INC.
SP 2000
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 2,000 line/mn
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96
Character Code: Ascii, Ebcdic
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 19 in
Price: $30,000
Number Installed to Date: Under 100
Date First Installed: January 1983

SPERRY CORP.
0777-87 ON-LINE PRINTER
Print Mechanism: Nonimpact
Print Technique: Laser
Maximum Print Speed: 21,000 line mn
Maximum Characters Per Line: 244
Optional Character Set Sizes: 64
Character Code: Ascii, Ebcdic
Communications Port: Serial
Form Feed Method: Pin
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 16 in.
Price: $315 000
Distribution Method: End user
Number Installed to Date: 100
Date First Installed: 1981

STORAGE TECHNOLOGY CORP.
[illegible] SERIES
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 1,500 line/mn
Maximum Characters Per Line: 150
Optional Character Set Sizes: 48, 64
Character Code: Ascii, Ebcdic
Communications Port: Parallel
Form Feed Method: Tractor
Maximum Form Width: 4 in.
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
(See Vendor Profile Page V-33)

STORAGE TECHNOLOGY CORP.
UNIVERSAL 1000
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,800 line mn
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64 96 Switch Selectable
Character Code: Ascii, Ebcdic
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 19 in.
Price: $13,775
Distribution Method: OEM
Number Installed to Date: 1,000 - [illegible]
Date First Installed: January 1980

WORLD STORAGE TECHNOLOGY, LTD.
ND2
Print Mechanism: Nonimpact
Print Technique: Laser
Maximum Print Speed: 21,000 line/mn
Maximum Characters Per Line: 204
Optional Character Set Sizes: Over 250 Available
Character Code: Ascii, Ebcdic
Communications Port: Parallel
Form Feed Method: Pin
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 14 in
Price: $31,000
Number Installed to Date: 1,000 - 5,000
(See Vendor Profile Page V-39)

WORLD STORAGE TECHNOLOGY, LTD.
ND3
Print Mechanism: Nonimpact
Print Technique: Laser
Maximum Print Speed: 10,500 line/mn
Maximum Characters Per Line: 204
Optional Character Set Sizes: Over 250 Available
Character Code: Ascii, Ebcdic
Communications Port: Parallel
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 14 in
Price: $19,000
Date First Installed: March 1983

801- to 1,200 Line/Min Print Speeds

BDS CORP.
B1050
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,000 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, [illegible]
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Distribution Method: End user
Date First Installed: 1979
(See Vendor Profile Page V-4)

BRAEGEN CORP.
3128
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 1,000 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 14 in.
Distribution Method: End user
Date First Installed: February 1975
(See Vendor Profile Page V-5)

BRAEGEN CORP.
3571
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,200 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold

CENTRONICS DATA COMPUTER CORP.
E-SERIES MODEL I
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,130 line/mn
Maximum Characters Per Line: 136
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96, 128
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $12,550
Distribution Method: OEM
(See Vendor Profile Page V-00)

DATAPOINT CORP.
5251
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 900 line/min
Maximum Characters Per Line: 136
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $29,750
(See Vendor Profile Page V-11)

DATA PRINTER CORP.
3101
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,000 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 18 in.
(See Vendor Profile Page V-11)

DATA PRINTER CORP.
3121
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,200 line/mn
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 18 in.
Distribution Method: End user

DATAPRODUCTS CORP.
B-1000
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,000 line/min
Maximum Characters Per Line: 136
Optional Character Set Sizes: 48, 64, 96
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $12,800
(See Vendor Profile Page V-11)

DECISION DATA COMPUTER CORP.
MODEL 6610
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 1,000 line/mn
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, [illegible]
Character Code: Ascii, Ebcdic
Form Feed Method: Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $22,000
Distribution Method: End user
(See Vendor Profile Page V-12)

[illegible] DATA COMPUTER CORP.
MODEL 6611
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,100 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96, 61
Character Code: Ascii, Ebcdic
Form Feed Method: Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 18 in.
Price: $17,000
Distribution Method: End user

DOCUMATION
[illegible] SERIES, MODEL [illegible]
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,200 line/mn
Maximum Characters Per Line: 132
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 19 in.
Price: $22,500
Distribution Method: End user
Number Installed to Date: 500 - 1,000
Date First Installed: 1978
(See Vendor Profile Page V-13)

GENERAL BUSINESS [illegible]
323 OLP
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,130 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $25,450
Date First Installed: 1982
(See Vendor Profile Page V-15)

HARRIS CORP.
HARRIS 4260/4270
Print Mechanism: Impact

Print Technique: Chain/Train
Maximum Print Speed: 1,200 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 96
Character Code: Ascii
Maximum Form Width: 20 in.
Price: $40,000
Distribution Method: End user
(See Vendor Profile Page V-16)

HARRIS CORP.
HARRIS 4760
Print Mechanism: Nonimpact
Maximum Print Speed: 1,000 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Maximum Form Width: 11 in.
Price: $12,000
Distribution Method: End user

[illegible]
[illegible] 2100 MEDIUM SPEED BAND PRTR
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 900 line/min
Maximum Characters Per Line: 136
Optional Character Set Sizes: 48, 64, 96, 120
Character Code: Ascii, Ebcdic, F
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold; Roll
Maximum Form Width: 18 in.
Price: $14,000
Distribution Method: End user
Number Installed to Date: 50
Date First Installed: 1981
(See Vendor Profile Page V-16)

[illegible]
[illegible] 7200 HIGH SPEED IMPACT PRTR
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 1,200 line/min
Maximum Characters Per Line: 136
Optional Character Set Sizes: 48, 96, 128
Character Code: Ascii, Ebcdic, TN
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 19 in.
Price: $22,000
Distribution Method: End user
Number Installed to Date: 500
Date First Installed: 1978

HONEYWELL, INC.
PRU 0901
Print Mechanism: Impact
Print Technique: Belt
Maximum Print Speed: 900 line/min
Maximum Characters Per Line: 136
Standard Character Set Size: 64
Optional Character Set Sizes: 96
Character Code: Ascii, OCR-A
Maximum Form Width: 19 in.
(See Vendor Profile Page V-17)

HONEYWELL, INC.
PRU 0906
Print Mechanism: Impact
Print Technique: Belt
Maximum Print Speed: 900 line/min
Maximum Characters Per Line: 136
Optional Character Set Sizes: 63,94
Character Code: Ascii, OCR-A
Maximum Form Width: 19 in.

HONEYWELL, INC.
PRU 1201
Print Mechanism: Impact
Print Technique: Belt
Maximum Print Speed: 1,200 line/min
Maximum Characters Per Line: 136
Optional Character Set Sizes: 64, 96
Character Code: Ascii, OCR-A
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 19 in.

HONEYWELL, INC.
PRU 1205
Print Mechanism: Impact
Print Technique: Belt
Maximum Print Speed: 1,200 line/min
Maximum Characters Per Line: 136
Optional Character Set Sizes: 63,94
Character Code: Ascii, OCR-A
Maximum Form Width: 19 in.

HONEYWELL, INC.
PRU 9119/9619
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 900 line/min
Maximum Characters Per Line: 136
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96, Custom
Character Code: Ascii, Ebcdic, Custom
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 19 in
Price: $26,000
Distribution Method: End user

HONEYWELL, INC.
PRU 9120/9620
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,200 line/min
Maximum Characters Per Line: 136
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96, Custom
Character Code: Ascii, Ebcdic, Custom
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 19 in.
Price: $33,000
Distribution Method: End user
Date First Installed: June 1983

HOUSTON INSTRUMENTS
MODEL 8926
Print Mechanism: Nonimpact
Print Technique: Electrostatic Carbon Deposit
Maximum Print Speed: 1,000 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Forms Type Accepted: Fan fold, Roll
Colors Supported: 1
Price: $3,995
Distribution Method: End user
Date First Installed: 1979
(See Vendor Profile Page V-17)

IBM
3203-5
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 1,200 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 48
Optional Character Set Sizes: 64, 96, 128
Character Code: Ebcdic
Communications Port: Parallel
Form Feed Method: Tractor, Pin, Pin Feed Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 20 in
Price: $33,875
Distribution Method: End user
Date First Installed: April 1979
(See Vendor Profile Page V-17)

NCR CORP.
NCR 646
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 1,200 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96, 52, 57, Custom
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 21 in.
Price: $19,200
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
(See Vendor Profile Page V-26)

NCR CORP.
NCR 6420-Z301
Print Technique: Band
Maximum Print Speed: 1,130 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $24,000
Distribution Method: End user
Date First Installed: 1979

NIXDORF COMPUTER CORP.
549
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 900 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 96
Character Code: Ascii, Ebcdic
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $29,500
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: 1983
(See Vendor Profile Page V-26)

NIXDORF COMPUTER CORP.
8203-12
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,200 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $26,500
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: January 1981

[illegible]
[illegible]
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,000 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96
Character Code: Ascii, Ebcdic
Communications Port: [illegible] Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 18 in
Price: $14,000
Distribution Method: End user
Number Installed to Date: 1,000 - 1,500
Date First Installed: 1978
(See Vendor Profile Page V-32)

SOUTHERN SYSTEMS, INC.
QT 1000
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: [illegible] line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in
Price: $14,000
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: April 1981

SOUTHERN SYSTEMS, INC.
QT 1200
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 1,200 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in
Price: $18,000
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: April 1981

[illegible]
V80
Print Mechanism: Nonimpact

Print Technique: Electrostatic
Maximum Print Speed: 1,000 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96, 128, 256
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 11 in
Graphics Functions Supported: Plots (200 Dots)
Colors Supported: 1
Price: $8,950
Distribution Method: End user, OEM
Number Installed to Date: 10,000 - 50,000
Date First Installed: January 1980
(See Vendor Profile Page V-38)

VERSATEC, INC.
VERSATEC V-80
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 1,000 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 256
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Roll
Graphics Functions Supported: Arc, Three Dimensional, Curves, Charts, Pattern
Price: $9,950
Distribution Method: End user

401- to 800 Line/Min Print Speeds

[illegible]
[illegible]
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in
Distribution Method: End user
Date First Installed: 1979
(See Vendor Profile Page V-4)

BENSON, INC.
9322 ELECTROSTATIC
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 560 line/min
Maximum Characters Per Line: 264
Optional Character Set Sizes: 123
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 22 in
Graphics Functions Supported: [illegible]
Colors Supported: 1
Distribution Method: End user, OEM, Third-party
(See Vendor Profile Page V-5)

BENSON, INC.
9424 ELECTROSTATIC
Print Technique: Electrosensitive
Maximum Print Speed: 475 line/min
Optional Character Set Sizes: 123
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 24 in
Graphics Functions Supported: Point Addressable
Colors Supported: 1
Distribution Method: End user

BRAEGEN CORP.
3127
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 14 in
Distribution Method: End user
Date First Installed: February 1975
(See Vendor Profile Page V-5)

BURROUGHS CORP.
B9246-6
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 650 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96
Character Code: Ascii, Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Price: $14,700
Distribution Method: End user
(See Vendor Profile Page V-5)

CENTRONICS DATA COMPUTER CORP.
LINEWRITER 400
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 500 line/min
Maximum Characters Per Line: 136
Optional Character Set Sizes: 48, 64, 96, 128, 192
Character Code: Ascii, Ebcdic, C
Communications Port: Serial, [illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in
Price: $4,500
Distribution Method: OEM
(See Vendor Profile Page V-6)

CENTRONICS DATA COMPUTER CORP.
[illegible]
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 750 line/min
Maximum Characters Per Line: 136
Optional Character Set Sizes: 48, 64, 96, 128
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 19 in
Price: $7,120
Distribution Method: OEM

CENTRONICS DATA COMPUTER CORP.
MODEL 8085
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 750 line/min
Maximum Characters Per Line: 136
Optional Character Set Sizes: 48, 64, 96, 128
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Maximum Form Width: 17 in
Price: $7,120

DATA CARD CORP.
CFO SYSTEM 10
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 800 line/min
Maximum Characters Per Line: 104
Optional Character Set Sizes: Custom
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Pin
Forms Type Accepted: Fan fold, [illegible]
Maximum Form Width: 23 in
Price: $85,000
Distribution Method: End user
Number Installed to Date: 50
Date First Installed: January 1982
(See Vendor Profile Page V-10)

DATA CARD CORP.
CFO SYSTEM 20
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 800 line/min
Maximum Characters Per Line: 120
Optional Character Set Sizes: Custom
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Pin
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 23 in
Price: $10,000
Distribution Method: End user
Number Installed to Date: 50
Date First Installed: January 1982

DATA CARD CORP.
CFO SYSTEM 30
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 800 line/min
Maximum Characters Per Line: 144
Optional Character Set Sizes: Custom
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Pin
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 29 in
Price: $115,000
Distribution Method: End user
Number Installed to Date: 50
Date First Installed: January 1982

DATA CARD CORP.
[illegible]
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 800 line/min
Maximum Characters Per Line: 144
Optional Character Set Sizes: Custom
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Pin
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 23 in
Price: $13,000
Distribution Method: End user
Number Installed to Date: 50
Date First Installed: January 1982

DATA CARD CORP.
[illegible]
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 800 line/min
Maximum Characters Per Line: 176
Optional Character Set Sizes: Custom
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Pin
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 23 in
Price: $15,000
Distribution Method: End user
Number Installed to Date: 50
Date First Installed: January 1982

DATAPOINT CORP.
[illegible]
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $14,500
Date First Installed: May 1981

DATA PRINTER CORP.
[illegible]
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
[illegible]
Optional Character Set Sizes: 48, [illegible]
[illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 20 in
[illegible]
(See Vendor Profile Page V-11)

DATA PRINTER CORP.
[illegible]
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
[illegible]
Optional Character Set Sizes: 48, 64, 96
[illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 18 in
[illegible]

DATA PRINTER CORP.
3751
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 750 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, [illegible]
Maximum Form Width: 18 in.
Distribution Method: End user

DATAPRODUCTS CORP.
B-600
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 136
Optional Character Set Sizes: 48, [illegible]
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $8,642
Distribution Method: OEM, Third-party
Date First Installed: 1970
(See Vendor Profile Page V-11)

DECISION DATA COMPUTER CORP.
MODEL 6665
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 650 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii, Ebcdic
Form Feed Method: Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $17,000
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: June 1979
(See Vendor Profile Page V-12)

DECISION DATA COMPUTER CORP.
MODEL 6680
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 800 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii, Ebcdic
Form Feed Method: Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $19,000
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: June 1979

DECISION DATA COMPUTER CORP.
MODEL [illegible]
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 700 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96, 61
Character Code: Ascii, Ebcdic
Form Feed Method: Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 18 in.
Price: $12,100
Distribution Method: End user

GENERAL BUSINESS TECHNOLOGY, INC.
[illegible] GLP
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 720 line/min
Maximum Characters Per Line: 198
Optional Character Set Sizes: 48, [illegible]
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $13,600
Distribution Method: End user, Third-party
Date First Installed: 1982
(See Vendor Profile Page V-15)

GENERAL ELECTRIC CO.
GE 340
Print Mechanism: Impact
Print Technique: Belt
Maximum Print Speed: 545 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $4,835
Distribution Method: OEM
Date First Installed: February 1976
(See Vendor Profile Page V-15)

HARRIS CORP.
[illegible]
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 65
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Price: $15,000
Distribution Method: End user
(See Vendor Profile Page V-16)

HEWLETT-PACKARD CO.
HP 2611A CHAIN TRAIN LINE PRINTER
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $18,560
Distribution Method: End user
Date First Installed: September 1982
(See Vendor Profile Page V-17)

HEWLETT-PACKARD CO.
HP 2613A CHAIN TRAIN LINE PRINTER
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132

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Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: [illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $26,370

HONEYWELL, INC.
PRU 0615
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 136
Standard Character Set Size: 63
Optional Character Set Sizes: 94
Maximum Form Width: 15 in
(See Vendor Profile Page V-17)

HONEYWELL, INC.
PRU [illegible]
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
[illegible]
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in

HONEYWELL, INC.
PRU 9626/9627
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
[illegible]
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in

IBM
[illegible]
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 650 line/min
[illegible]
Standard Character Set Size: 48
[illegible]
Character Code: Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Pin Feed Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Price: $15,040
[illegible]
Date First Installed: August 1979
(See Vendor Profile Page V-17)

IBM
5225-3
Print Mechanism: Impact
Print Technique: Dot [illegible]
Maximum Print Speed: 490 line/min
Maximum Characters Per Line: 198
[illegible]
Character Code: [illegible]

Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 18 in
Graphics Functions Supported: Characters
Price: $15,495
Distribution Method: End user
Date First Installed: October 1980

IBM
5225-4
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 560 line/min
Maximum Characters Per Line: 198
Standard Character Set Size: 96
Optional Character Set Sizes: 184
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 18 in
Price: $16 940
Distribution Method: End user
Date First Installed: October 1980

[illegible] TALLY CORP.
MT 660
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Graphics Functions Supported: Dot Addressable
Colors Supported: 4
Price: $7 995
Distribution Method: OEM, Third-party
Number Installed to Date: Under [illegible]
Date First Installed: January 1983
(See Vendor Profile Page V-22)

NCR CORP.
NCR 9420-2250
Print Technique: Band
Maximum Print Speed: 720 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64 96
Character Code: Ascii
Maximum Form Width: 17 in.
Price: $16 800
Date First Installed: 1979
(See Vendor Profile Page V-26)

[illegible] EUROPE AMERICA, LTD.
AD60
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $7 000
Distribution Method: [illegible]
Date First Installed: 1983
(See Vendor Profile Page V-26)

[illegible] COMPUTER CORP.
548
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii, Ebcdic
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $15,300
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: 1982
(See Vendor Profile Page V-26)

NIXDORF COMPUTER CORP.
6362
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $15,300
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1978

NIXDORF COMPUTER CORP.
8203-06
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $15,300
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1981

NIXDORF COMPUTER CORP.
8336
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 96
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $15,300
Distribution Method: Third-party
Number Installed to Date: 100 - 500
Date First Installed: 1979

PERKIN-ELMER CORP.
LP600
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 14 in.
Price: $13,000
Distribution Method: End user
(See Vendor Profile Page V-28)

PRINTRONIX, INC.
P600
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96, 128, 32
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Graphics Functions Supported: Arcs, Curves, Patterns, Bar Code Labeling, Three Dimensional
Price: $7,700
Distribution Method: OEM; Third-party
Number Installed to Date: 10,000 - 50,000
(See Vendor Profile Page V-29)

SOUTHERN SYSTEMS, INC.
S-600
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $9,000
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1978
(See Vendor Profile Page V-32)

SOUTHERN SYSTEMS, INC.
DT 800
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 600 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $11,000
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: April 1981

201- to 400 Line/Min Print Speeds

[illegible] CORP.
8300
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Distribution Method: End user
Date First Installed: 1979
(See Vendor Profile Page V-4)

BENSON, INC.
9436 ELECTROSTATIC
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 370 line/min
Optional Character Set Sizes: 123
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 36 in
Graphics Functions Supported: Dot [illegible]
Distribution Method: End user
(See Vendor Profile Page V-5)

BENSON, INC.
9345 ELECTROSTATIC
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 230 line/min
Maximum Characters Per Line: 540
Optional Character Set Sizes: 123
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 44 in.
Graphics Functions Supported: Point Addressable
Distribution Method: End user

BENSON, INC.
9436 ELECTROSTATIC
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 238 line/min
Optional Character Set Sizes: 123
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 36 in.
Graphics Functions Supported: Point Addressable
Distribution Method: End user

BRADNER CORP.
8571
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 400 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Distribution Method: End User
Date First Installed: November 1983
(See Vendor Profile Page V-5)

BURROUGHS CORP.
B9249-375
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 375 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96
Character Code: Ascii, Ebcdic
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $8,715
Distribution Method: End user
(See Vendor Profile Page V-5)

BUSINESS INFORMATION SYSTEMS, INC.
C-4300
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 132 in.
Price: $6,000
Distribution Method: End user, OEM
Number Installed to Date: 1,000 - [illegible]
Date First Installed: 1981
(See Vendor Profile Page V-5)

DATAMETRICS, INC.
DMC 1600
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 240 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 9 in.
Graphics Functions Supported: All Types
Price: $20,000
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First Installed: May 1983
(See Vendor Profile Page V-11)

DATAPOINT CORP.
9257
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $10,800
Date First Installed: May 1981
(See Vendor Profile Page V-11)

DATAPRODUCTS CORP.
B-300
Print Technique: Band
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132, 136
Optional Character Set Size: 48, 64, 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $8,800
Distribution Method: End user, Third-party
Date First Installed: 1978
(See Vendor Profile Page V-11)

DATA SPECIALTIES, INC.
ZEBRA DEMAND PRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 263 line/min
Maximum Characters Per Line: 27
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 3 in.
Graphics Functions Supported: Bar [illegible]
Colors Supported: 1
Price: $3,470
Distribution Method: OEM, Third-party
Number Installed to Date: 100 - 500
Date First Installed: September 1982
(See Vendor Profile Page V-11)

DECISION DATA COMPUTER CORP.
6703 MATRIX LINE PRINTER
Print Mechanism: Impact
Print Technique: Dual-head Matrix
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 74
Character Code: Ascii, Ebcdic
Form Feed Method: Fri
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $6,200
Distribution Method: End user
Number Installed to Date: 500
Date First Installed: September 1982
(See Vendor Profile Page V-12)

GENERAL BUSINESS TECHNOLOGY, INC.
311 DLP
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 360 line/min
Maximum Characters Per Line: 198
Optional Character Set Sizes: 48, 64, 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $9,500
Distribution Method: End user, Third-party
Date First Installed: 1982
(See Vendor Profile Page V-15)

GENERAL BUSINESS TECHNOLOGY, INC.
5201FA
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 400 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 9 in.
Price: $7,200
Distribution Method: Third-party

GENERAL BUSINESS TECHNOLOGY, INC.
5202 LP
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 400 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in
Price: $8,000
Date First Installed: [illegible]

GENERAL ELECTRIC CO.
GE 310
Print Mechanism: Impact
Print Technique: [illegible]
Maximum Print Speed: 340 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: [illegible]
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $4,170
Distribution Method: OEM
Date First Installed: February 1976
(See Vendor Profile Page V-15)

HARRIS CORP.
HARRIS 4320-4325
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 96
Character Code: Ascii
Maximum Form Width: 16 in.
Price: $10,000
Distribution Method: End user
(See Vendor Profile Page V-16)

HEWLETT-PACKARD CO.
HP 2608A/2608S DOT MATRIX LINE PRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 400 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Graphics Functions Supported: Raster Graphics
Price: $11,170
Distribution Method: End user
Date First Installed: December 1978
(See Vendor Profile Page V-17)

HONEYWELL, INC.
PRU 7014
Print Mechanism: Impact
Print Technique: [illegible]
Maximum Print Speed: 220 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Form Feed Method: Tractor
(See Vendor Profile Page V-17)

IBM
5224-2
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 240 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Optional Character Set Sizes: 184
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Graphics Functions Supported: Characters
Price: $7,290
Distribution Method: End user
Date First Installed: July 1982
(See Vendor Profile Page V-17)

IBM
5225-2
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 400 line/min
Maximum Characters Per Line: 198
Standard Character Set Size: 96
Optional Character Set Sizes: 184
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 18 in
Graphics Functions Supported: Characters
Price: $13,945
Distribution Method: End user
Date First Installed: October 1980

INNOVATIVE ELECTRONICS, INC.
INNOVATOR 134
Print Technique: Chain/Train
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll, Cut sheet
Colors Supported: 1
Price: $4,995
Distribution Method: End user
Date First Installed: June 1978
(See Vendor Profile Page V-19)

INNOVATIVE ELECTRONICS, INC.
INNOVATOR 136
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Roll, Cut sheet
Colors Supported: 1
Price: $4,[illegible]
Distribution Method: End user
Date First Installed: June 1978

INNOVATIVE ELECTRONICS, INC.
INNOVATOR 250
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: [illegible]
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll, Cut sheet
Colors Supported: 1
Price: $4,995
Date First Installed: June 1978

INTERSIL, INC.
OPP-Q7 MINI DIGITAL PANEL PRINTER
Print Mechanism: Nonimpact
Print Technique: Segment Parallel Thermal

Line Printers

201- to 400 line/min

Maximum Print Speed: 240 line/min
Maximum Characters Per Line: 7
Optional Character Set Sizes: 10 (Numeric only)
Character Code: Ebcdic
Communications Port: Parallel
Form Feed Method: Gear
Forms Type Accepted: Roll
Maximum Form Width: 2 in.
Price: $575
Distribution Method: End user, OEM
Number Installed to Date: 5,000 - 10,000
Date First Installed: July 1979
(See Vendor Profile Page V-20)

ITT COURIER TERMINAL SYSTEMS, INC.
2760 SERIES
Print Mechanism: Impact
Print Technique: Belt
Maximum Print Speed: 340 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 96
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in
(See Vendor Profile Page V-20)

[illegible] TALLY CORP.
MT 9300
Print Mechanism: Impact
Print Technique: Shuttle
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Tractor
Price: $4 995
Distribution Method: OEM, Third-party
Number Installed to Date: 5,000 - 10 000
Date First Installed: April 1980
(See Vendor Profile Page V-22)

MILTOPE CORP.
HSP 3609-212A HIGH-SPEED LINE PRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 240 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96, 128 Programmable
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold
Maximum Form Width: 10 in
[illegible]
Distribution Method: OEM
Date First Installed: 1975
(See Vendor Profile Page V-24)

MILTOPE CORP.
[illegible] SERIES THERMAL LITE PRINTER
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Size: 64
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Maximum Form Width: 10 in
Graphics Functions Supported: Plotting
Colors Supported: 1
Price: $16 000
Distribution Method: OEM
Date First Installed: September 1982

MOHAWK DATA SCIENCES CORP.
2142-1
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 240 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in
Price: $8 120
Distribution Method: End user, OEM, Third-party
(See Vendor Profile Page V-25)

MOHAWK DATA SCIENCES CORP.
2142-2
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 340 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $11,320
Distribution Method: End user, OEM, Third-party

MOHAWK DATA SCIENCES CORP.
[illegible]
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Price: $20,600
Distribution Method: End user, OEM, Third-party

NCR CORP.
NCR 6420-2101
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 360 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in
Price: $12,000
Distribution Method: End user
Number Installed to Date: 6,420
Date First Installed: September 1976
(See Vendor Profile Page V-26)

NCR CORP.
NCR 6420-2401
Print Technique: Band
Maximum Print Speed: 285 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $9,600
Distribution Method: End user
Date First Installed: 1978

NCR CORP.
[illegible]
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 240 line/min
Maximum Characters Per Line: 80
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll, Fan Fold
Maximum Form Width: 9 in
Price: $2,800
Distribution Method: End user
Number Installed to Date: 500 - 1,000
Date First Installed: June 1981

NCR CORP.
NCR 6430
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 360 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96, 128, Custom Designable
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $9,000
Distribution Method: End user
Date First Installed: March 1983

NISSEI SANGYO AMERICA, LTD
AD30
Print Mechanism: Impact.
Print Technique: Dot Matrix
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $5,400
Distribution Method: OEM
Date First Installed: 1983
(See Vendor Profile Page V-26)

NIXDORF COMPUTER CORP.
543
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii, Ebcdic
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $10,900
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: July 1982
(See Vendor Profile Page V-26)

NIXDORF COMPUTER CORP.
6360
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $10,900
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1978

NIXDORF COMPUTER CORP.
8203-03
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $10,900
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1981

NIXDORF COMPUTER CORP.
[illegible]
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $10,900
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1981

NIXDORF COMPUTER CORP.
8333
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $10 900
Distribution Method: Third-party
[illegible] Under 100
Date First Installed: June 1982

PERKIN ELMER CORP.
[illegible]
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 300 line/min
[illegible]
Optional Character Set Sizes: 64, 96
[illegible]
Communications Port: Parallel
[illegible]
Forms Type Accepted: Fan fold
Maximum Form Width: 14 in
[illegible]
Distribution Method: End user
(See Vendor Profile Page V-28)

PRINTRONIX, INC.
P300
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96, 128, 32
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Graphics Functions Supported: Arcs, Curves, Patterns, Bar Code Labeling, Three Dimensional
Price: $5,700
Distribution Method: OEM, Third-party
Number Installed to Date: 10,000 - 50,000
Date First Installed: 1974
(See Vendor Profile Page V-29)

G1 CORP.
203
Print Mechanism: Impact
Print Technique: Chain/Train
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 94
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Price: $7,600
Distribution Method: End user, Third-party
Date First Installed: 1978
(See Vendor Profile Page V-30)

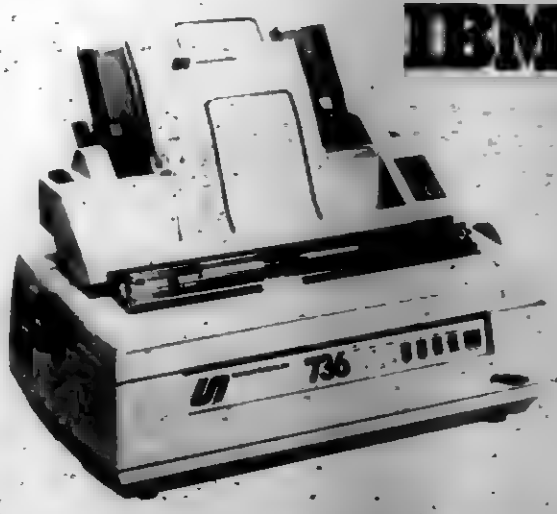
RACAL-MILGO, INC.
4295
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $6,333
Number Installed to Date: 75
Date First Installed: January 1982
(See Vendor Profile Page V-30)

ROCKWELL INTERNATIONAL CORP.
A65/40-0600 GRAPHICS PRINTER
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 240 line/min
Maximum Characters Per Line: 40
Optional Character Set Sizes: 256
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Colors Supported: 2
Price: $300
Distribution Method: OEM, Third-party
Date First Installed: September 1981
(See Vendor Profile Page V-31)

SOUTHERN SYSTEMS, INC.
S-300
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96
Character Code: Ascii, Ebcdic
Communications Port: Serial, [illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $6,700
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: September 1978
(See Vendor Profile Page V-32)

SOUTHERN SYSTEMS, INC.
QT 300
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 48, 96
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $8,000
Distribution Method: End user

TECHNICAL ANALYSIS CORP.
MACRO GRAFIX L/300-2
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel



Better than IBM 5210, the ISI-736 Printer is available now!

Solid Character, Letter Quality

Plug compatible with the 3287 for on-line printing from your IBM system. Optional Twinfeeder automatically feeds letterheads and second sheets selectively from trays under program control. Ideal for IBM CPU-based word processing software. Multiple fonts and separate pitches. Support most languages. Features include: programmable tray selection, underscoring, boldface type, subscripting and super-scripting. And no need to run SNA to use these features!

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5855 Interface Drive, Ann Arbor, MI 48103
Telephone (313) 769-5900. TWX 810-223-6058

Form Feed Method: Tractor
Forms Type Accepted: Roll
Maximum Form Width: 14 in.
Graphics Functions Supported: Bar Code
Colors Supported: 1
Distribution Method: End user
Number Installed to Date: 500
Date First Installed: 1978
(See Vendor Profile Page V-34)

TELETYPE CORP.
MODEL 40 PRINTER
Print Mechanism: Impact
Print Technique: Belt
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Forms Access
Forms Type Accepted: Fan fold
Price: $5,133
Distribution Method: OEM
Date First Installed: October 1976
(See Vendor Profile Page V-36)

TELEX COMPUTER PRODUCTS, INC.
TELEX 2240
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 340 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 94
Character Code: Ascii, Ebcdic
Form Feed Method: Pin
Maximum Form Width: 15 in.
Price: $11,500
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1981
(See Vendor Profile Page V-36)

TRILOG, INC.
D-80
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 220
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Graphics Functions Supported: Arcs, Curves, Patterns, Three Dimensional, Charts
Colors Supported: 256
Price: $11,500
Distribution Method: OEM, Third-party
Number Installed to Date: Under 100
Date First Installed: 1979
(See Vendor Profile Page V-38)

TRILOG, INC.
D-100
Print Technique: Dot Matrix
Maximum Print Speed: 250 line/min
Maximum Characters Per Line: 220
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Graphics Functions Supported: Arcs, Curves, Patterns, Three Dimensional, Charts
Colors Supported: 256
Price: $8,200
Distribution Method: OEM, Third-party
Number Installed to Date: 600
Date First Installed: 1979

TRILOG, INC.
T-100
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 250 line/min
Maximum Characters Per Line: 220
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Graphics Functions Supported: Arcs, Curves, Patterns, Three Dimensional, Charts
Price: $8,200
Distribution Method: OEM, Third-party
Number Installed to Date: 600
Date First Installed: 1978

TRILOG, INC.
T-1100A
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 250 line/min
Maximum Characters Per Line: 220
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Graphics Functions Supported: Arcs, Curves, Patterns, Three Dimensional, Charts
Price: $9,050
Distribution Method: OEM, Third-party
Number Installed to Date: Under 100
Date First Installed: September 1978

WEBER MARKING SYSTEMS
LEGITRONICS 1560
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 198
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Maximum Form Width: 15 in.
Price: $15,000
Number Installed to Date: 100 - 500
Date First Installed: September 1982
(See Vendor Profile Page V-39)

WEBER MARKING SYSTEMS
LEGITRONICS 2080
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 198
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Maximum Form Width: 15 in.
Price: $19,800
Number Installed to Date: 100 - 500
Date First Installed: February 1982

Print Speeds Under 200 Line/Min

ANDERSON JACOBSON, INC.
AJ 630
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 123 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 9 in.
Distribution Method: End user
(See Vendor Profile Page V-3)

AXIOM CORP.
EX-801 MICRO PRINTER
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 120 line/min
Maximum Characters Per Line: 20
Optional Character Set Sizes: 96, 256
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Price: $640
Distribution Method: End user, OEM, Third-party
Date First Installed: 1977
(See Vendor Profile Page V-4)

CAPITOL CIRCUITS CORP.
SERIES 5400L
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 72 line/min
Maximum Characters Per Line: 40
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Sprocket
Forms Type Accepted: Fan fold, Roll
Price: $795
Distribution Method: End user, OEM
Date First Installed: June 1983
(See Vendor Profile Page V-6)

DATAMETRICS CORP.
DMC-4880
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 160 line/min
Maximum Characters Per Line: 80
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 5 in.
Graphics Functions Supported: Charts, Patterns
Price: $3,500
Distribution Method: End user, OEM
Date First Installed: January 1982
(See Vendor Profile Page V-11)

DI/AN CONTROLS, INC.
8100
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 20 line/min
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 5 in.
Price: $3,500
Distribution Method: End user, OEM
Date First Installed: 1973
(See Vendor Profile Page V-12)

DI/AN CONTROLS, INC.
8379
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 20 line/min
Optional Character Set Sizes: Various
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 3 in.
Price: $4,500
Distribution Method: End user, OEM
Date First Installed: 1982

DI/AN CONTROLS, INC.
8500
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 20 line/min
Optional Character Set Sizes: Various
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 4 in.
Price: $6,000
Date First Installed: 1972

DI/AN CONTROLS, INC.
8510
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 20 line/min
Optional Character Set Sizes: Various
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 8 in.
Price: $7,000
Distribution Method: End user, OEM
Date First Installed: 1973

DOCUTEL OLIVETTI CORP.
JP 101
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 50 line/min
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Graphics Functions Supported: Arcs, Curves, Charts, Patterns
Price: $4,500
Distribution Method: OEM, Third-party
Date First Installed: June 1983
(See Vendor Profile Page V-13)

FUJITSU AMERICA, INC.
MSET/A PRINTER MODULE
Print Mechanism: Nonimpact

Print Technique: Laser
Maximum Print Speed: 20 line/min
Communications Port: Serial
Form Feed Method: Cut Sheet
Forms Type Accepted: Cut sheet
Graphics Functions Supported: Plotting
Distribution Method: OEM, Third-party
Date First Installed: November 1983
(See Vendor Profile Page V-15)

IBM
5124-1
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 140 line/min
Maximum Characters Per Line: 198
Standard Character Set Size: 96
Optional Character Set Sizes: 128, 184
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 18 in
Graphics Functions Supported: Characters
Price: $6,395
Distribution Method: End user
Date First Installed: July 1982
(See Vendor Profile Page V-17)

IBM
5225-1
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 line/min
Maximum Characters Per Line: 198
Standard Character Set Size: 96
Optional Character Set Sizes: 184
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 18 in
Graphics Functions Supported: Characters
Price: $12,075
Distribution Method: End user
Date First Installed: October 1980

[illegible], INC.
[illegible] MODEL 2000
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 line/min
Maximum Characters Per Line: 132
Optional Character Set Size: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Price: $11,000
Distribution Method: End user, OEM
Number Installed to Date: 500 - 1,000
Date First Installed: 1976
(See Vendor Profile Page V-17)

INTERSIL, INC.
[illegible]
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 63 line/min
Maximum Characters Per Line: 20
Optional Character Set Size: 96
Character Code: Ascii
Communications Port: [illegible]
Form Feed Method: Gear
Forms Type Accepted: Roll
Maximum Form Width: 3 in.
Price: [illegible]
Distribution Method: OEM

Number Installed to Date: Under 100
Date First Installed: April 1983
(See Vendor Profile Page V-20)

INTERSIL, INC.
APP-20A1/D1/E1/J1/V1 SERIES
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 63 line/min.
Maximum Characters Per Line: 20
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Gear
Forms Type Accepted: Roll
Maximum Form Width: 2 in.
Price: $625
Distribution Method: End user, OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1981

INTERSIL, INC.
APP-20A21/D21/E21/J21/V21 SERIES
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 72 line/min
Maximum Characters Per Line: 20
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Gear
Forms Type Accepted: Roll
Maximum Form Width: 2 in.
Price: $725
Distribution Method: End user, OEM
Number Installed to Date: 500 - 1,000
Date First Installed: October 1982

INTERSIL, INC.
APP-20A3/E3/J3/D3/V3 SERIES
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 66 line/min
Maximum Characters Per Line: 20
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Gear
Forms Type Accepted: Roll
Maximum Form Width: 2 in.
Price: [illegible]
Distribution Method: End user, OEM
Number Installed to Date: 1,000 - [illegible]
Date First Installed: September [illegible]

INTERSIL, INC.
APP-48A/D/E/J3 SERIES
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 72 line/min
Maximum Characters Per Line: 48
Optional Character Set Size: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Gear
Forms Type Accepted: Roll
Maximum Form Width: 5 in.
Price: $1,095
Distribution Method: End user, OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: July 1982

INTERSIL, INC.
APP-48A/E1/J1/D1 SERIES
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 72 line/min
Maximum Characters Per Line: 48
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Gear
Forms Type Accepted: Roll
Maximum Form Width: 5 in
Price: $1,095
Distribution Method: End user, OEM
Number Installed to Date: 500 - 1,000
Date First Installed: June 1982

INTERSIL, INC.
APP-48A3/E3/J3/D3 SERIES
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 72 line/min
Maximum Characters Per Line: 48
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Gear
Forms Type Accepted: Roll
Maximum Form Width: 5 in.
Price: $1,095
Distribution Method: End user, OEM
Number Installed to Date: 500 - 1,000
Date First Installed: July 1982

JOHN FLUKE MFG. CO., INC.
[illegible] PRINTER
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 180 line/min
Maximum Characters Per Line: 20
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction, Belt Drive
Graphics Functions Supported: Plot Mode
Price: $1,200
Distribution Method: End user
Number Installed to Date: 1,000 - [illegible]
Date First Installed: January 1979
(See Vendor Profile Page V-21)

MEGATEK CORP.
HCU- T
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, [illegible]
Maximum Form Width: 15 in.
Distribution Method: End user
Date First Installed: 1980
(See Vendor Profile Page V-23)

MEMODYNE CORP.
[illegible]
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 110 line/min
Optional Character Set Sizes: [illegible]
Character Code: Ascii
Communications Port: Parallel
Date First Installed: [illegible]
(See Vendor Profile Page V-23)

MEMODYNE CORP.
MAP-PBC
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 110 line/min
Optional Character Set Size: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Price: $625
Date First Installed: January 1981

MEMODYNE CORP.
MAP-SBC
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 110 line/min
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Number Installed to Date: 725
Date First Installed: 1981

MEMODYNE CORP.
MAP-20 IAC
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 110 line/min
Optional Character Set Sizes: 96
Character Code: Ascii
Form Feed Method: Friction
Forms Type Accepted: Roll
Price: [illegible]
Date First Installed: 1981

MEMODYNE CORP.
[illegible]
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 110 line/min
Maximum Characters Per Line: 20
Optional Character Set Sizes: 96
Character Code: Ascii
Form Feed Method: Friction
Forms Type Accepted: Roll
Price: $875
Date First Installed: 1981

MEMODYNE CORP.
[illegible]
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 110 line/min
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Distribution Method: OEM
Number Installed to Date: 725
Date First Installed: [illegible]

MEMODYNE CORP.
MAP-20 SEC
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 110 line/min
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Number Installed to Date: 725

MILTOPE CORP.
[illegible] LINE PRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 line/min
Maximum Characters Per Line: 36
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 4 in.
Price: $7,000
Distribution Method: OEM

Date First Installed: 1976
(See Vendor Profile Page V-24)

MILTOPE CORP.
TP2000 THERMAL LINE PRINTER
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 160 line/min
Maximum Characters Per Line: 66 8
Optional Character Set Sizes: 64, 96 128
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 4 in
Graphics Functions Supported: 400 Dots Line Graphics
Price: $7 000
Distribution Method: OEM

NCR CORP.
NCR 6410
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 90 line/min
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 10 in
Price: $2 300
Distribution Method: End user
Number Installed to Date: 1,000 - 5 000
Date First Installed: June 1981
(See Vendor Profile Page V-26)

NCR CORP.
NCR 6440-0202
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 125 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Maximum Form Width: 17 in
Date First Installed: 1978

NCR CORP.
NCR 6440-0302
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 70 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Maximum Form Width: 17 in

NCR CORP.
NCR [illegible]
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 50 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Maximum Form Width: 17 in
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1978

OLIVETTI OPE PRINTERS, INC.
JP101
Print Mechanism: Nonimpact
Print Technique: Spark Ink-Jet
Maximum Print Speed: 50 line/min
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial Parallel
Form Feed Method: Friction Pin
Forms Type Accepted: Fan fold Roll, Cut sheet
Maximum Form Width: 9 in
Price: $400
Distribution Method: OEM
Date First Installed: June 1983
(See Vendor Profile Page V-27)

RAMTEK CORP.
4100 COLORGRAPHIC PRINTER
Print Mechanism: Nonimpact
Print Technique: Dot Matrix
Maximum Print Speed: 40 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Graphics Functions Supported: ARC, Patterns, Curves
Colors Supported: 8
Price: $6 995
Distribution Method: End user, OEM
(See Vendor Profile Page V-30)

TELPAR, INC.
PL 12E
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 130 line/min
Maximum Characters Per Line: 12
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 2 in
Price: $297
Distribution Method: OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1979
(See Vendor Profile Page V-36)

TELPAR, INC.
PL 20C
Print Technique: Thermal Matrix
Maximum Print Speed: 150 line/min
Maximum Characters Per Line: 20
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 3 in
Price: $395
Distribution Method: OEM
Number Installed to Date: 500 - 1 000
Date First Installed: 1980

TELPAR, INC.
PL 20CI
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 120 line/min
Maximum Characters Per Line: 20
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 3 in
Price: $395
Distribution Method: OEM
Number Installed to Date: 100 - 500
Date First Installed: 1980

TELPAR, INC.
PL 20E
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 130 line/min
Maximum Characters Per Line: 20
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 3 in
Price: $297
Distribution Method: OEM
Number Installed to Date: 5,000 - 10 000
Date First Installed: 1978

TELPAR, INC.
PL 20EX
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 120 line/min
Maximum Characters Per Line: 20
Optional Character Set Size: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 3 in.
Price: $297
Distribution Method: OEM
Number Installed to Date: 5,000 - 10,000
Date First Installed: 1978

TELPAR, INC.
PL [illegible]
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 120 line/min
Maximum Characters Per Line: 20
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 9 in.
Price: $575
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: 1983

TELXON CORP.
TELXON IT-40
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 line/min
Maximum Characters Per Line: 40
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll, Ticket
Maximum Form Width: 4 in
Graphics Functions Supported: Dot Addressable
Price: $895
Distribution Method: End user, OEM
Date First Installed: 1979
(See Vendor Profile Page V-37)

TRILOG, INC.
C-144
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 190 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Graphics Functions Supported: Arcs, Curves, Patterns, Three Dimensional, Charts
Colors Supported: 256
Price: $11,500
Distribution Method: OEM, Third-party
Number Installed to Date: Under 100
Date First Installed: 1979
(See Vendor Profile Page V-38)

TRILOG, INC.
TIP-150
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 line/min
Maximum Characters Per Line: 220
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Graphics Functions Supported: Arcs, Curves, Patterns, Three Dimensional, Charts
Price: $3 90[illegible]
Distribution Method: OEM, Third-party
[illegible] 100
Date First Installed: May 1983

WEBER MARKING SYSTEMS
[illegible]
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 line/min
[illegible]
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Maximum Form Width: 15 in.
[illegible]
Number Installed to Date: 100 - 500
[illegible]
(See Vendor Profile Page V-39)

Print Speeds Over 500 Char./Sec

AB DICK CO.
VIDEO JET PRINTER 9400 SERIES
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 1,375 char /sec
Maximum Characters Per Line: Variable
Optional Character Set Sizes: Variable
Character Code: Ascii
Communications Port: Serial, Parallel
Colors Supported: 6
Price: $50,000
Distribution Method: End user
Number Installed to Date: 5 000 - 10 000
Date First Installed: 1968
(See Vendor Profile Page V-1)

AXIOM CORP.
EX-420
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 550 char /sec
Maximum Characters Per Line: 96
Optional Character Set Sizes: 96, 64
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 5 in
Price: $849
Distribution Method: End user, OEM, Third-party
Date First Installed: October 1982
(See Vendor Profile Page V-4)

AXIOM CORP.
EX-1520
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 960 char /sec
Maximum Characters Per Line: 160
Optional Character Set Sizes: 96, Optional 6
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 9 in.
Price: $999
Distribution Method: End user, OEM, Third-party
Date First Installed: September 1982

COMPUTER DESIGNED SYSTEMS, INC.
PS-506
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 900 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, Variable
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 14 in
Price: $25,000
Number Installed to Date: Under 100
Date First Installed: October 1980
(See Vendor Profile Page V-8)

COMPUTER DESIGNED SYSTEMS, INC.
PS-600
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 600 char /sec
Maximum Characters Per Line: 132
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 14 in
Graphics Functions Supported: Arcs, Curves, Patterns, Charts
Price: $23,000
Date First Installed: January 1980

COMPUTER DESIGNED SYSTEMS, INC.
PM-600
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 600 char /sec
Optional Character Set Sizes: 132
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 14 in
Price: $13 500
Number Installed to Date: 1,000 - 5,000
Date First Installed: February 1978

DATADYNE CORP.
MODEL 772
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 4,800 char /sec
Maximum Characters Per Line: 22
Optional Character Set Sizes: 48, 64 16
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 3 in
Colors Supported: 1
Price: $2,100
Distribution Method: OEM
Number Installed to Date: 1,300
Date First Installed: March 1969
(See Vendor Profile Page V-10)

DATAMETRICS CORP.
DMC-2001
Print Mechanism: Nonimpact
Print Technique: Dot Matrix
Maximum Print Speed: 2,000 char /sec
Maximum Characters Per Line: 32
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Roll
Maximum Form Width: 4 in
Graphics Functions Supported: Charts, Patterns.
Price: $11,000
Distribution Method: End user, OEM
Date First Installed: January 1962
(See Vendor Profile Page V-11)

DATAMETRICS,INC.
DMC 1500
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 1,600 char /sec
Maximum Print Speed: 1,200 line min
Maximum Characters Per Line: 80
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold
Maximum Form Width: 8 in
Price: $28 000
Distribution Method: End user, OEM
Number Installed to Date: 500 - 1,000
Date First Installed: January 1973

DATAMETRICS,INC.
DMC 4000
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 1,100 char /sec
Maximum Print Speed: 2,000 line/min
Maximum Characters Per Line: 33
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 4 in
Price: $16,000
Distribution Method: End user, OEM
Number Installed to Date: 100 - 500
Date First Installed: January 1978

DENNISON MANUFACTURING CO., INC. CO.
2110
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 600 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: Variable
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Tags
Graphics Functions Supported: Enlarged Characters, Logos, Bar Codes
Price: $10,000
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: September 1977
(See Vendor Profile Page V-12)

DENNISON MANUFACTURING CO., INC.
2200
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 600 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: Variable
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Graphics Functions Supported: Enlarged Characters, Logos, Bar Codes
Price: $10 000
Distribution Method: End user
Number Installed to Date: 500 - 1 000
Date First Installed: September 1977

DENNISON MANUFACTURING CO., INC.
2300
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 600 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: Variable
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Graphics Functions Supported: Enlarged Characters, Logos, Bar Codes
Price: $10,000
Distribution Method: End user
Number Installed to Date: 500 - 1 000
Date First Installed: 1977

FLORIDA DATA CORP.
DSP 120
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 600 char /sec
Maximum Characters Per Line: 235
Optional Character Set Sizes: Variable to 100
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Pin
Forms Type Accepted: Cut sheet
Maximum Form Width: 14 in
Graphics Functions Supported: Raster Graphics
Price: $3 900
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 5 000 - 10 000
Date First Installed: September 1981
(See Vendor Profile Page V-15)

FLORIDA DATA CORP.
DSP 125
Print Mechanism: Impact
Print Technique: Impact
Maximum Print Speed: 600 char /sec
Maximum Characters Per Line: 235
Optional Character Set Sizes: Variable to 100 Character Code: Ascii Communications Port: Serial, Parallel
Forms Type Accepted: Cut sheet
Maximum Form Width: 14 in
Graphics Functions Supported: Raster Graphics
Price: $4,100
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 1,000 - 10,000
Date First Installed: September 1981

Serial Printers

Over 500 char./sec • 301- to 500 char./sec

FLORIDA DATA CORP.
[illegible] 180
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 600 char /sec
Maximum Characters Per Line: 235
Optional Character Set Sizes: Variable to 100
Character Code: Ascii
Communications Port: Serial, Parallel
[illegible] Method: Fric
Forms Type Accepted: Cut sheet
Maximum Form Width: 14 in
Graphics Functions Supported: Raster Graphics
Price: $4,100
Distribution Method: End user, OEM, Third-party
Date First Installed: 1981

FRANCHISE MAILING SYSTEMS
[illegible] UNIJET
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 1,523 char /sec
Maximum Characters Per Line: 255
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Serial, Parallel
Price: $15,000
Distribution Method: End user
Number Installed to Date: 100 - 500
(See Vendor Profile Page V-15)

GENERAL ELECTRIC CO.
GE 510
Print Mechanism: Impact
Print Technique: Belt
Maximum Print Speed: 510 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $5,795
Distribution Method: [illegible]
(See Vendor Profile Page V-15)

INFORMATION DEVICES CORP.
[illegible]
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 600 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96, 128
Character Code: Ascii
Communications Port: [illegible] Parallel
Form Feed Method: Fri
Forms Type Accepted: Fan fold
Maximum Form Width: 14 in
Colors Supported: 1
Price: $20,000
Distribution Method: End user, OEM, Third-party
Date First Installed: January 1980
(See Vendor Profile Page V-19)

INFORMATION DEVICES CORP.
[illegible] REMOTE BATCH PRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 600 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in
Graphics Functions Supported: Arcs, Curves, Patterns, Three Dimensional, Charts
Price: $21,000
Distribution Method: End user
Date First Installed: December 1980

PERKIN-ELMER CORP.
650
Print Mechanism: Nonimpact
Print Technique: Dot Matrix
Maximum Print Speed: 960 char /sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Stepper Motor
Forms Type Accepted: Roll
Distribution Method: End user
Date First Installed: 1978
(See Vendor Profile Page V-28)

PERKIN-ELMER CORP.
500
Print Mechanism: Nonimpact
Print Technique: Dot Matrix
Maximum Print Speed: 960 char /sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Stepper Motor
Forms Type Accepted: Roll
Graphics Functions Supported: Standard Graphics, Columns, Lines
Distribution Method: End user
Date First Installed: 1978

SCI SYSTEMS, INC.
SCI MODEL 1180
Print Technique: Electrosensitive
Maximum Print Speed: 1,100 char /sec
Maximum Characters Per Line: 136
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 2 in.
Price: $1 200
Distribution Method: OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1980
(See Vendor Profile Page V-31)

301- to 500 Char./Sec Print Speeds

AUTOMATIC FUNDS TRANSFER SERVICES, INC.
AFT 200 MICRO PRINTER
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 400 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Continuous
Maximum Form Width: 16 in
Price: $19,500
Distribution Method: End user
Date First Installed: 1979
(See Vendor Profile Page V-4)

BRAEGEN CORP.
3126-9
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 340 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 14 in.
Distribution Method: End user
Date First Installed: June 1980
(See Vendor Profile Page V-5)

CENTRONICS DATA COMPUTER CORP.
MODEL 357
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 400 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96, 7 International Sets Available
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in
Distribution Method: OEM, Third-party
Date First Installed: 1900
(See Vendor Profile Page V-6)

CENTRONICS DATA COMPUTER CORP.
[illegible]
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 400 char /sec
[illegible]
Optional Character Set Sizes: 96, 7 International Sets Available
[illegible]
Communications Port: Serial, [illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in
Distribution Method: OEM, Third-party
Date First Installed: 1900

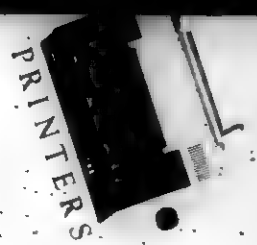
COMPUTER DESIGNED SYSTEMS, INC.
PS-400
Print Mechanism: Impact
Print Technique: Band
Maximum Print Speed: 400 char /sec
[illegible]
Optional Character Set Sizes: 48, Any Option
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 14 in
Price: $22,000
Number Installed to Date: Under 100
Date First Installed: October 1980
(See Vendor Profile Page V-8)

COMPUTER DESIGNED SYSTEMS, INC.
[illegible]
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 450 char /sec
Optional Character Set Sizes: 132
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 14 in.
Graphics Functions Supported: Arcs, Curves, Patterns, Charts
Colors Supported: 1
Price: $13,500
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: February 1978

DATAPRODUCTS CORP.
M-[illegible]
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 340 char /sec
[illegible]
Optional Character Set Sizes: 128
[illegible]
Communications Port: Serial, [illegible]
Maximum Form Width: 15 in.
Price: $3,000
Distribution Method: OEM, Third-party
Date First Installed: 1978
(See Vendor Profile Page V-11)

DENNISON MANUFACTURING CO., INC.
[illegible]
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 350 [illegible]
Maximum Characters Per Line: 132
Optional Character Set Sizes: [illegible]
Character Code: Ascii
[illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Graphics Functions Supported: Enlarged Characters, Logos, Bar [illegible]
Price: $8,300
Distribution Method: [illegible]
Number Installed to Date: Under 100
Date First Installed: January 1983
(See Vendor Profile Page V-12)

DIABLO SYSTEMS, INC.
DOT MATRIX 36
[illegible]
Print Technique: Dot Matrix
Maximum Print Speed: 400 char /sec
[illegible]
Standard Character Set Size: 96
Character Code: Ascii



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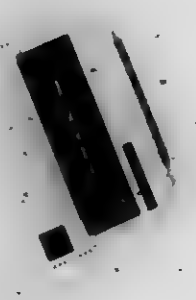

DIABLO SYSTEMS INC.
a Xerox Company
P.O. Box 5030
Fremont, California 94537.

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Diablo

Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 15 in
Price: $2 200
Distribution Method: Third-party
(See Vendor Profile Page V-12)

FACIT, INC.
FACIT 4570
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 330 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 128, 256, 512
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in
Colors Supported: 1
Price: $2 995
Distribution Method: OEM
(See Vendor Profile Page V-15)

GENERAL BUSINESS TECHNOLOGY, INC.
[illegible]
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 400 char /sec
Maximum Characters Per Line: 198
Optional Character Set Sizes: 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in
Price: $5 400
Distribution Method: Third-party

GENERAL BUSINESS TECHNOLOGY, INC.
5220MP
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 400 char /sec
Maximum Characters Per Line: 198
Optional Character Set Sizes: 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Maximum Form Width: 15 in
Price: $4,750.

GENERAL ELECTRIC CO.
GE 3404
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 400 char /sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Price: $2 410
Distribution Method: OEM, Third-party
(See Vendor Profile Page V-15)

GENERAL ELECTRIC CO.
GE 3404
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 400 char /sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Price: $7,500
Distribution Method: End user
(See Vendor Profile Page V-17)

INTERFACE SYSTEMS, INC.
MODEL 487
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 350 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 167
Character Code: Ebcdic
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 16 in
Colors Supported: 7
Price: $4,950
(See Vendor Profile Page V-19)

NCR CORP.
NCR 7441
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 325 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Graphics Functions Supported: Business Graphics
Price: $3,700
Date First Installed: March 1983
(See Vendor Profile Page V-26)

OKIDATA CORP.
PACEMARK 2350
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 350 char /sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 16 in.
Colors Supported: 2
Price: $2,695
Distribution Method: Third-party
Date First Installed: March 1983
(See Vendor Profile Page V-27)

OKIDATA CORP.
PACEMARK 2410
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 350 char /sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut Sheet
Maximum Form Width: 16 in.
Colors Supported: 2
Price: $2,995
Distribution Method: Third-party

PRINTEK, INC.
PRINTEK 320
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 340 char /sec
Maximum Characters Per Line: 227
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Graphics Functions Supported: All Point Addressable
Colors Supported: 1
Price: $2,395
Distribution Method: End user, OEM, Third-party
(See Vendor Profile Page V-29)

PRINTRONIX, INC.
MVP (TASK MASTER II)
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 200 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96, 128, 32
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Graphics Functions Supported: Arcs, Curves, Patterns, Three Dimensional, Bar Code Labeling
Price: $3,500
(See Vendor Profile Page V-29)

PRINTRONIX, INC.
P[illegible]
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 150 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96, 128, 32
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Graphics Functions Supported: Arcs, Patterns, Bar Code Labeling, Curves, Three Dimensional
Price: $4,600
Number Installed to Date: 10,000 - 50,000

SANTEC CORP.
9700 VARIFLEX
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 390 char /sec
Maximum Characters Per Line: 153
Optional Character Set Sizes: 96, 192
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Single OR
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 14 in
Graphics Functions Supported: 16 Available
Price: $3,600
Distribution Method: End user, OEM
Number Installed to Date: 2,000
(See Vendor Profile Page V-31)

SOUTHERN SYSTEMS, INC.
M-200
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 340 [illegible]
Maximum Characters Per Line: 132
Standard Character Set Size: 128
Character Code: Ascii, Ebcdic
Communications Port: Serial, [illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 160 in.
Price: $3 000
Number Installed to Date: 1,000 - 5,000
(See Vendor Profile Page V-32)

TEKTRONIX, INC.
4692
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 340 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Price: $4 300
Distribution Method: End user
(See Vendor Profile Page V-36)

TELETYPE CORP.
[illegible]
Print Technique: Dot Matrix
Maximum Print Speed: 340 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 128
Character Code: Ascii, Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $3,888
(See Vendor Profile Page V-36)

VECTOR GRAPHIC, INC.
M200
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 340 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial

Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Price: $3,450
Distribution Method: OEM, Third-party
(See Vendor Profile Page V-39)

101- to 300 Char./Sec Print Speeds

ALPHACOM, INC.
ALPHACOM 40
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 160 char /sec
Maximum Characters Per Line: 40
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 9 in.
Graphics Functions Supported: Arcs, Curves, Patterns, Charts
Colors Supported: 1
Price: $295
Distribution Method: End user, OEM, Third-party
Date First Installed: May 1981
(See Vendor Profile Page V-1)

ANACOM GENERAL CORP.
ANACOM 150-132
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 94
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $1,495
Distribution Method: End user, Third-party
(See Vendor Profile Page V-3)

ANACOM GENERAL CORP.
ANACOM 150-132-Z
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Graphics Functions Supported: Dot Addressable
Colors Supported: 1
Price: $1,895
Distribution Method: End user, Third-party
Date First Installed: November 1980

ANACOM GENERAL CORP.
ANACOM 150-80
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 94
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 12 in.
Price: $1,420
Distribution Method: End user, Third-party

ANACOM GENERAL CORP.
ANACOM 150-80-Z
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 12 in.
Graphics Functions Supported: Dot Addressable
Colors Supported: 1
Price: $1,820
Distribution Method: End user, Third-party

ANACOM GENERAL CORP.
ANACOM 160-132
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 94
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $1,750
Distribution Method: End user, Third-party

ANACOM GENERAL CORP.
ANACOM 160-132-Z
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Graphics Functions Supported: Dot Addressable
Colors Supported: 1
Price: $2,150
Distribution Method: End user, Third-party

ANACOM GENERAL CORP.
ANACOM 160-80
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 94
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 12 in.
Price: $1,675
Distribution Method: End user, Third-party

ANACOM GENERAL CORP.
ANACOM 160-80-Z
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 12 in.
Graphics Functions Supported: Dot Addressable
Colors Supported: 1
Price: $2,075

ANADEX, INC.
DP-9000A
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 95
Character Code: Ascii
Communications Port: Serial, Parallel
Maximum Form Width: 15 in.
Price: $1,625
Distribution Method: OEM, Third-party
(See Vendor Profile Page V-3)

ANADEX, INC.
DP-9001A
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 80
Character Code: Ascii
Communications Port: Serial, Parallel
Maximum Form Width: 15 in.
Price: $1,625
Distribution Method: OEM, Third-party
Date First Installed: October 1980

ANADEX, INC.
DP-9500A
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 132
Character Code: Ascii
Communications Port: Serial, Parallel
Maximum Form Width: 16 in.
Price: $1,725
Distribution Method: OEM, Third-party

ANADEX, INC.
DP-9501A
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 95
Character Code: Ascii
Communications Port: Serial, Parallel
Maximum Form Width: 15 in.
Price: $1,725
Distribution Method: OEM, Third-party
Date First Installed: May 1980

ANADEX, INC.
DP-9620A
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 132
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Maximum Form Width: 15 in.
Price: $1,845
Distribution Method: OEM, Third-party

ANADEX, INC.
DP-9625A
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 132
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $1,995

ANADEX, INC.
WP-6000 MULTI-MODE PRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 285 char /sec
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction, Tractor
Forms Type Accepted: Fan fold, Single Sheet
Maximum Form Width: 15 in.
Price: $3,250
Distribution Method: OEM, Third-party

APPLE COMPUTER, INC.
APPLE DOT MATRIX PRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 136
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 10 in.
Graphics Functions Supported: High resolution
Colors Supported: 1
Price: $695
Distribution Method: Third-party
Date First Installed: January 1983
(See Vendor Profile Page V-3)

AXIOM CORP.
EX401A
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 192 char./sec
Maximum Characters Per Line: 20
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel

Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 5 in
Price: $549
Distribution Method: End user, OEM, Third-party
Date First Installed: 1977
(See Vendor Profile Page V-4)

AXIOM CORP.
EX 401B
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 192 char /sec
Maximum Characters Per Line: 64, 128
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 5 in
Price: $299
Distribution Method: End user, OEM, Third-party
Date First Installed: 1977

AXIOM CORP.
EX 1601
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 240 char /sec
Maximum Characters Per Line: 27
Optional Character Set Sizes: 96, [illegible]
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 9 in.
Price: $699
Distribution Method: End user, OEM, Third-party
Date First Installed: 1977

EDS CORP.
GP300
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 300 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in
Distribution Method: End user, OEM, Third-party
Date First Installed: 1983
(See Vendor Profile Page V-4)

BILLINGS COMPUTER CORP.
P160
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 160 [illegible]
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction, Pin
Forms Type Accepted: Fan fold, Cut sheet
Graphics Functions Supported: Dot Addressable
Price: $700
Distribution Method: End user, Third-party
(See Vendor Profile Page V-5)

BILLINGS COMPUTER CORP.
P200
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 160 char /sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in
Graphics Functions Supported: Dot Addressable
Price: $1,250
Distribution Method: End user, Third-party

BRAEGEN CORP.
3122-8
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Distribution Method: End user
Date First Installed: January 1982

BRAEGEN CORP.
3122-9
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Roll
Maximum Form Width: 14 in.
Distribution Method: End user
Date First Installed: January 1982
(See Vendor Profile Page V-5)

BRAEGEN CORP.
3460
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Cut sheet
Distribution Method: End user
Date First Installed: September [illegible]

BRAEGEN CORP.
8562
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Cut sheet
Distribution Method: End user
Date First Installed: November 1983

BRAEGEN CORP.
8567
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Cut sheet
Distribution Method: End user
Date First Installed: November 1983

BUSINESS INFORMATION SYSTEMS, INC.
C-4510
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 48
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 15 in.
Price: $995
Distribution Method: OEM, Third-party
Number Installed to Date: 3,000 - 5,000
Date First Installed: 1981
(See Vendor Profile Page V-5)

BUSINESS INFORMATION SYSTEMS, INC.
C-4810
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48.
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 182 in.
Price: $1,700
Distribution Method: End user, OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1981

CANON U.S.A., INC.
A 1200
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 136
Standard Character Set Size: 128
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Pin
Forms Type Accepted: Roll, Cut sheet
Maximum Form Width: 9 in.
Colors Supported: 1
Price: $595
Distribution Method: Third-party
(See Vendor Profile Page V-6)

CAPITOL CIRCUITS CORP.
SERIES 5400
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Print Speed: 180 line/min
Maximum Characters Per Line: 40
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Friction
Forms Type Accepted: Cut sheet
Price: $775
Distribution Method: End user, OEM
Number Installed to Date: 1,200
Date First Installed: September 1982
(See Vendor Profile Page V-6)

CAPITOL CIRCUITS CORP.
SERIES 5400T
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Print Speed: 180 line/min
Maximum Characters Per Line: 40
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Friction
Forms Type Accepted: Roll
Price: $775
Distribution Method: End user, OEM
Number Installed to Date: 2,200
Date First Installed: September 1982

CARDINAL SCALE MANUFACTURING CO.
CARDINAL 2120
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 [illegible]
Maximum Characters Per Line: 132
Optional Character Set Sizes: Various
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Cut sheet
Price: $2,300
Distribution Method: OEM
Number Installed to Date: 500 - 1,000
Date First Installed: March 1981
(See Vendor Profile Page V-6)

CARTERFONE COMMUNICATIONS CORP.
5062
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 [illegible]
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 9 in.
Price: $750
Distribution Method: End user, OEM, Third-party
(See Vendor Profile Page V-6)

CARTERFONE COMMUNICATIONS CORP.
5083
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 14 in.
Price: $1,150
Distribution Method: End user, OEM, Third-party

CENTRONICS DATA COMPUTER CORP.
MODEL 122 GRAPHICS
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $995
Distribution Method: Third-party
(See Vendor Profile Page V-6)

CENTRONICS DATA COMPUTER CORP.
MODEL 150
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 10 in.
Distribution Method: End user, OEM, Third-party

CENTRONICS DATA COMPUTER CORP.
MODEL 152
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 66
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Distribution Method: End user, OEM, Third-party

CENTRONICS DATA COMPUTER CORP.
MODEL 199
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold
Maximum Form Width: 10 in.
Distribution Method: End user, OEM, Third-party

CENTRONICS DATA COMPUTER CORP.
MODEL 351 PRINTSTATION
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $3,195
Distribution Method: OEM, Third-party
Date First Installed: September 1982

CENTRONICS DATA COMPUTER CORP.
MODEL 352 PRINTSTATION
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $1,795
Distribution Method: OEM, Third-party
Date First Installed: March 1982

CENTRONICS DATA COMPUTER CORP.
MODEL 352 PRINTSTATION
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $2,495
Distribution Method: OEM, Third-party
Date First Installed: April 1982

CENTRONICS DATA COMPUTER CORP.
MODEL 704
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 13
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 13 in.
Price: $2,205
Distribution Method: OEM, Third-party
Date First Installed: 1976

COMMODORE BUSINESS MACHINE INC. SYSTEMS
CBM 8023P
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 136
Form Feed Method: Tractor, Friction
Price: $995
Distribution Method: Third-party
(See Vendor Profile Page V-7)

COMPRINT, INC.
912 AG
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 225 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 9 in.
Price: $895
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First Installed: March 1983
(See Vendor Profile Page V-7)

COMPRINT, INC.
912 ALFA-NUMERIC
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 225 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 9 in.
Price: $495
Distribution Method: End user
Number Installed to Date: 7,000
Date First Installed: January 1979

COMPRINT, INC.
912 GO
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 225 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii-
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 9 in.
Price: $995
Distribution Method: OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: September 1980

COMPRINT, INC.
COMPRINT 912
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 225 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 11 in.
Price: $595
Distribution Method: End user, OEM
Number Installed to Date: 5,000 - 10,000
Date First Installed: January 1979

COMPUTER DESIGNED SYSTEMS, INC.
PD-300
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 300 char./sec
Maximum Characters Per Line: 132
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 14 in.
Graphics Functions Supported: Arcs, Curves, Patterns, Charts
Colors Supported: 2
Price: $3,995
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: September 1980
(See Vendor Profile Page V-8)

COMPUTER DESIGNED SYSTEMS, INC.
PM-180
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 14 in.
Graphics Functions Supported: Arcs, Patterns, Curves, Charts
Colors Supported: 2
Distribution Method: End user
Number Installed to Date: 10,000 - 50,000

COMPUTER DESIGNED SYSTEMS, INC.
PM-210
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 250 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii, Ebcdic, A
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Maximum Form Width: 14 in.
Graphics Functions Supported: Arcs, Curves, Patterns, Charts

Colors Supported: 2
Distribution Method: End user
Number Installed to Date: 10,000 - [illegible]
Date First Installed: June 1977

COMPUTER DESIGNED SYSTEMS, INC.
PM-211
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 300 char. sec
Optional Character Set Sizes: 132
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 14 in
Graphics Functions Supported: Arcs, Curves, Patterns, Charts
Colors Supported: 1
Price: $2,000 to $8,500
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: June 1977

COMPUTER DESIGNED SYSTEMS, INC.
PM-300
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 300 char. sec
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 14 in
Graphics Functions Supported: Arcs, Curves, Patterns, Charts
Colors Supported: 1
Price: $13,500
Distribution Method: End user
Number Installed to Date: 1,000 - [illegible]
Date First Installed: February 1978

COSTAL, INC.
101 S-455
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 110 char. sec
Maximum Characters Per Line: 88
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 12 in
Graphics Functions Supported: Dot Addressable, Graphics
Price: $450
Distribution Method: End user
Number Installed to Date: 500 - 1,000
Date First Installed: January 1980
(See Vendor Profile Page V-9)

COSTAL, INC.
102A-48
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 110 char. sec
Maximum Characters Per Line: 48
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll, Cut sheet
Maximum Form Width: 7 in.
Graphics Functions Supported: Dot Addressable, Graphics
Price: $350
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: March 1980

CROMEMCO, INC.
315
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 80
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 12 in.
Price: $1,295
Distribution Method: Third-party
Number Installed to Date: 100 - 500
Date First Installed: 1981
(See Vendor Profile Page V-9)

CROMEMCO, INC.
3703
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96, 192
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $3,195
Distribution Method: Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: 1977

DATAPOINT CORP.
8621
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 160 char./sec
Maximum Characters Per Line: 132
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Fri
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $2,500
Distribution Method: End user
Date First Installed: June 1979
(See Vendor Profile Page V-11)

DATAPOINT CORP.
9622
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 160 char./sec.
Maximum Characters Per Line: 132
Character Code: Ascii
Communications Port: Parallel
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $2,500
Distribution Method: End user
Date First Installed: June 1979

DATAPOINT CORP.
9628
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 160 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 10 in.
Price: $895
Distribution Method: End user
Date First Installed: October 1982

DATAPRODUCTS CORP.
M-100
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 140 char./sec
Maximum Characters Per Line: 132, 218 condensed
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 15 in.
Graphics Functions Supported: Automatic Bar Codes, Charts, Pattern, Automatic Block Letters, Line Drawings
Price: $3,000
Distribution Method: OEM, Third-party
Date First Installed: 1981
(See Vendor Profile Page V-11)

DATAPRODUCTS CORP.
M-120
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 132, 218 condensed
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 15 in.
Price: $2,700
Distribution Method: OEM, Third-party
Date First Installed: 1981

DATAPRODUCTS CORP.
M-200
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 340 char./sec
Maximum Characters Per Line: 132, 218 condensed
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 15 in.
Price: $3,000
Distribution Method: OEM, Third-party
Date First Installed: 1978

DATASOUTH COMPUTER
DS 180 MATRIX PRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Colors Supported: 1
Price: $1,595
Distribution Method: Third-party
Number Installed to Date: 22,000
Date First Installed: June 1980
(See Vendor Profile Page V-11)

DECISION DATA COMPUTER CORP.
MODEL 8541-02
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii, Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 15 in.
Price: $4,000
Distribution Method: End user, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: 1980
(See Vendor Profile Page V-12)

DECISION DATA COMPUTER CORP.
MODEL 8541-05
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96, 184
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 15 in.
Price: $5,000
Distribution Method: End user
Number Installed to Date: 250
Date First Installed: 1981

DECISION DATA COMPUTER CORP.
MODEL 8641-07
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ebcdic
Form Feed Method: Tractor
Maximum Form Width: 15 in.
Price: $3,800
Number Installed to Date: 4,500
Date First Installed: March 1981

DIGITAL EQUIPMENT CORP.
LP-100
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 240 char./sec
Maximum Characters Per Line: 132

Optional Character Set Sizes: Variable
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Graphics Functions Supported: Bit Map (Raster)
Price: $2,215
Distribution Method: End user, OEM, Third-party
(See Vendor Profile Page V-13)

EPSON TECHNOLOGY, INC.
MODEL 420 COLOR PRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 300 char /sec
Maximum Characters Per Line: 240
Optional Character Set Sizes: 128, 196
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in
Graphics Functions Supported: Arcs, Three-Dimensional, Curves, Charts, Patterns
Colors Supported: 8
Price: $4,450
Distribution Method: OEM, Third-party
Date First Installed: November 1982
(See Vendor Profile Page V-14)

ENVISION TECHNOLOGY, INC.
MODEL 430 COLOR VECTOR PRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 300 char /sec
Maximum Characters Per Line: 240
Optional Character Set Sizes: 128, 196
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Graphics Functions Supported: Arcs, Three-Dimensional, Curves, Charts, Patterns
Colors Supported: 8
Price: $5,450
Distribution Method: OEM, Third-party
Date First Installed: November 1982

EPSON AMERICA, INC.
FX 80
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 160 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 10 in.
Graphics Functions Supported: Curves, Patterns, Charts.
Colors Supported: 2
Price: $699
Distribution Method: Third-party
Date First Installed: June 1983
(See Vendor Profile Page V-14).

FACIT, INC.
FACIT 4510
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Print Speed: 55 line/min
Optional Character Set Sizes: 96, Variable
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 11 in.
Graphics Functions Supported: Block Graphics, Pin Graphics
Price: $895
Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: July 1982
(See Vendor Profile Page V-15)

FACIT, INC.
FACIT 4528
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 165 char /sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96, Variable
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Colors Supported: 8
Price: $2,165
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: April 1983

FACIT, INC.
FACIT 4542
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 250 char /sec
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 150
Optional Character Set Sizes: 128, 256, 512
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 18 in.
Colors Supported: 2
Price: $3,295
Distribution Method: OEM
Number Installed to Date: 5,000 - 10,000
Date First Installed: September 1979

FACIT, INC.
FACIT 4544
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 250 char /sec
Maximum Characters Per Line: 150
Optional Character Set Sizes: 128, 256, 512
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 18 in.
Price: $3,995
Distribution Method: OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1981

FACIT, INC.
FACIT 5000A
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Distribution Method: OEM
Number Installed to Date: 10,000 - 50,000
Date First Installed: September 1979

FACIT, INC.
FACIT 5000C
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 165 char /sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Colors Supported: 1
Distribution Method: OEM
Number Installed to Date: 10,000 - 50,000
Date First Installed: January 1980

FACIT, INC.
FACIT 5000Y
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 165 char /sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96, Variable
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Colors Supported: 1
Price: $2,095
Distribution Method: OEM
Number Installed to Date: 500 - 1,000
Date First Installed: September 1982

GENERAL BUSINESS TECHNOLOGY, INC.
5203DP
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 198
Optional Character Set Sizes: 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $4,795
Distribution Method: End user, Third-party
Date First Installed: 1981
(See Vendor Profile Page V-15)

GENERAL BUSINESS TECHNOLOGY, INC.
5203MP
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char /sec
Maximum Characters Per Line: 198
Optional Character Set Sizes: 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $4,495
Distribution Method: End user, Third-party
Date First Installed: 1981

GENERAL BUSINESS TECHNOLOGY, INC.
5207FA
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $2,995
Distribution Method: Third-party
Date First Installed: 1982

GENERAL BUSINESS TECHNOLOGY, INC.
5207MP
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 198
Optional Character Set Sizes: 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $3,495
Distribution Method: End user, Third-party
Date First Installed: 1982

GENERAL BUSINESS TECHNOLOGY, INC.
5210BL
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: Variable
Optional Character Set Sizes: 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $4,995
Distribution Method: End user, Third-party
Date First Installed: 1983

GENERAL ELECTRIC CO.
GE 300 LINE PRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $3,010
Distribution Method: OEM
Date First Installed: April 1978
(See Vendor Profile Page V-15)

GENERAL ELECTRIC CO.
GE 3014
Print Technique: Dot Matrix
Maximum Print Speed: 160 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $1,350
Distribution Method: OEM, Third-party
Date First Installed: January 1983

GENERAL ELECTRIC CO.
GE 3024
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $1,550
Distribution Method: OEM, Third-party
Date First Installed: 1983

GENERAL ELECTRIC CO.
GE 3180
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Price: $1,990
Distribution Method: OEM, Third-party
Date First Installed: 1982

GENERAL ELECTRIC CO.
GE 3181
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 12 in.
Price: $1,930
Distribution Method: OEM, Third-party
Date First Installed: January 1982

GENERAL ELECTRIC CO.
GE 3184
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Price: $2,190
Distribution Method: OEM, Third-party
Date First Installed: January 1982

GENERAL ELECTRIC CO.
GE 3185
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 12 in.
Price: $2,130
Distribution Method: OEM, Third-party
Date First Installed: January 1982

GENERAL ELECTRIC CO.
GE 3300
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 300 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Price: $2,210
Distribution Method: OEM, Third-party

GENERAL ELECTRIC CO.
GE 3304
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 300 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Price: $2,450
Distribution Method: OEM, Third-party
Date First Installed: 1982

HARRIS CORP.
HARRIS 4418
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 165 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Maximum Form Width: 17 in.
Price: $4,000
(See Vendor Profile Page V-16)

HEWLETT-PACKARD CO.
HP 2631B
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 256
Character Code: Ascii
Communications Port: Serial
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $3,970
Distribution Method: End user
Date First Installed: July 1980
(See Vendor Profile Page V-17)

HEWLETT-PACKARD CO.
HP 2631G
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 256
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $3,970
Distribution Method: End user
Date First Installed: July 1980

HEWLETT-PACKARD CO.
HP 2671G
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 80
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 9 in.
Price: $1,240
Distribution Method: End user
Date First Installed: May 1981

HEWLETT-PACKARD CO.
HP 2673A
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 80
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 9 in.
Price: $1,240
Distribution Method: End user
Number Installed to Date: 10,000 - 50,000
Date First Installed: May 1981

HI-G-AMS CONTROL CORP.
9/80
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 10 in.
Graphics Functions Supported: Dot Controlled
Price: $1,050
Distribution Method: Third-party
Date First Installed: December 1981
(See Vendor Profile Page V-17)

HI-G-AMS CONTROL CORP.
132 PS
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 165 char./sec
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Graphics Functions Supported: Arcs, Patterns, Charts
Price: $1,295
Distribution Method: OEM, Third-party
Date First Installed: February 1981

HONEYWELL, INC.
PRU 1018
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 160 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
(See Vendor Profile Page V-17)

HONEYWELL, INC.
PRU 9614
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.

IBM
4975 2L
Print Mechanism: Impact
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 192
Optional Character Set Sizes: 128
Character Code: Ebcdic
Communications Port: Serial
Maximum Form Width: 15 in.

Price: $4,175
Distribution Method: End user
Date First Installed: September 1981
(See Vendor Profile Page V-17)

IBM
5242
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 160 char /sec
Maximum Characters Per Line: 198
Standard Character Set Size: 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $2,975
Distribution Method: End user
Date First Installed: September 1981

IBM
5256-3
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $4,535
Distribution Method: End user
Date First Installed: January 1978

INFORMER COMPUTER TERMINALS, INC.
307 MATRIX PRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold
Maximum Form Width: 13 in.
Graphics Functions Supported: 64 Symbols
Price: $1,000
Distribution Method: End user
Date First Installed: April 1982
(See Vendor Profile Page V-19)

INFOSCRIBE, INC.
500
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $1,530
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1981
(See Vendor Profile Page V-19)

INFOSCRIBE, INC.
1000
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char /sec
Maximum Characters Per Line: 136
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Price: $1,895
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1982

INFOSCRIBE, INC.
1100
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Colors Supported: 1
Price: $2,195
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1983

INFOSCRIBE, INC.
1200
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Colors Supported: 4
Price: $2,495
Distribution Method: OEM, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: 1983

INTEGRAL DATA SYSTEMS, INC.
MICROPRISM 480
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 110 char /sec
Maximum Characters Per Line: 132
Optional Character Set Size: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 10 in.
Colors Supported: 1
Distribution Method: Third-party
Date First Installed: September 1982
(See Vendor Profile Page V-19)

INTEGRAL DATA SYSTEMS, INC.
PRISM 80
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 10 in.
Colors Supported: 4
Price: $1,299
Distribution Method: Third-party
Date First Installed: January 1982

INTEGRAL DATA SYSTEMS, INC.
PRISM 132
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Colors Supported: 4
Price: $1,499
Distribution Method: Third-party
Date First Installed: January 1982

INTEGREX, INC.
CX 80
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 125 char /sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 10 in.
Colors Supported: 7
Price: $1,595
Distribution Method: End user
Date First Installed: 1980
(See Vendor Profile Page V-19)

INTERFACE SYSTEMS, INC.
151-387
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 167, VariableCharacter Code: Ebcdic
Form Feed Method: Tractor, Pin
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 14 in.
Price: $4,250
Distribution Method: End user
Number Installed to Date: 1,500
(See Vendor Profile Page V-19)

ITT COURIER TERMINAL SYSTEMS, INC.
3700 SERIES
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char /sec
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 96
Character Code: Ascii
Form Feed Method: Tractor, Pin
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
(See Vendor Profile Page V-20)

ITT COURIER TERMINAL SYSTEMS, INC.
3710
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.

ITT COURIER TERMINAL SYSTEMS, INC.
3720
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 240 char./sec
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.

ITT COURIER TERMINAL SYSTEMS, INC.
3725
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 240 char./sec
Maximum Characters Per Line: 80
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.

ITT COURIER TERMINAL SYSTEMS, INC.
3740
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.

JAPAN DIGITAL LABORATORY
JDL P700
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 145 char./sec
Maximum Characters Per Line: 132
Optional Character Set Size: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction, Pin
Forms Type Accepted: Fan fold, Cut sheet
Graphics Functions Supported: Arcs, Three-Dimensional, Curves, Charts, Patterns

Price: $2,000
Distribution Method: OEM
Date First Installed: January 1982
(See Vendor Profile Page V-21)

KONISHIROKU PHOTO INDUSTRY CO., LTD.
JM 241
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 117 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 98
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Distribution Method: OEM
Date First Installed: November 1983
(See Vendor Profile Page V-21)

LEADING EDGE PRODUCTS, INC.
PROWRITER 2 1550 BCD
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 136
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction, Pin
Maximum Form Width: 15 in
Graphics Functions Supported: High Resolution
Price: $995
Distribution Method: OEM, Third-party
Date First Installed: 1983
(See Vendor Profile Page V-21)

LEADING EDGE PRODUCTS, INC.
PROWRITER 8510 AP
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction, Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 10 in
Graphics Functions Supported: High Resolution
Price: $495
Date First Installed: 1983

LEADING EDGE PRODUCTS, INC.
PROWRITER 8510 BCD
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction, Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 10 in.
Graphics Functions Supported: High Resolution
Price: $695
Distribution Method: OEM, Third-party
Date First Installed: 1982

LEAR SIEGLER, INC.
VERSAPRINT 500
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char /sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96, 128
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Pin, Friction
Forms Type Accepted: Fan fold, Roll, Cut Sheet
Colors Supported: 4
Price: $1,695
Distribution Method: Third-party
Number Installed to Date: 300
Date First Installed: September 1979
(See Vendor Profile Page V-21)

MANNESMANN TALLY CORP.
MT 75-5
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 140 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 9 in.
Price: $4,345
Distribution Method: OEM, Third-party
Number Installed to Date: 5,000 - 10,000
Date First Installed: April 1981

MANNESMANN TALLY CORP.
MT 160I
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 160 char./sec
Maximum Characters Per Line: 160
Optional Character Set Sizes: 96, Variable
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 10 in.
Graphics Functions Supported: Dot Addressable
Price: $998
Distribution Method: OEM, Third-party
Number Installed to Date: 10,000 - 50,000
Date First Installed: July 1982
(See Vendor Profile Page V-22)

MANNESMANN TALLY CORP.
MT 160L
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 160 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96, Variable
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 10 in
Graphics Functions Supported: Dot Addressable
Price: $798
Distribution Method: OEM, Third-party
Number Installed to Date: 10,000 - 50,000
Date First Installed: July 1982

MANNESMANN TALLY CORP.
MT 180I
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 160 char./sec
Maximum Characters Per Line: 264
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 16 in.
Graphics Functions Supported: Dot Addressable
Price: $998
Distribution Method: OEM, Third-party
Number Installed to Date: 10,000 - 50,000
Date First Installed: May 1982

MANNESMANN TALLY CORP.
MT 180L
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 160 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 16 in.
Graphics Functions Supported: Dot Addressable
Price: $1,098
Distribution Method: OEM, Third-party
Number Installed to Date: 10,000 - 50,000
Date First Installed: May 1982

MANNESMANN TALLY CORP.
MT 1601
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Graphics Functions Supported: Dot Addressable
Price: $1,695
Distribution Method: OEM, Third-party
Number Installed to Date: More than 50,000
Date First Installed: 1975

MANNESMANN TALLY CORP.
MT 1800
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Graphics Functions Supported: Dot Addressable
Price: $2,295
Number Installed to Date: 10,000 - 50,000
Date First Installed: 1981

MPI TECH, INC.
3317
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 256
Character Code: Ebcdic
Forms Type Accepted: Fan fold, Roll
Number Installed to Date: 1,000 - 5,000
(See Vendor Profile Page V-23)

MEMODYNE CORP.
MAP-IBC
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 110 char /sec
Maximum Characters Per Line: 20
Optional Character Set Sizes: 96
Character Code: Ascii
Form Feed Method: Friction
Forms Type Accepted: Roll
Price: $875
Date First Installed: 1981
(See Vendor Profile Page V-23)

MEMOREX CORP.
1617 MATRIX PRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii, Ebcdic
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in
Price: $5,159
Distribution Method: End user
Number Installed to Date: 5,000 - 10,000
Date First Installed: September 1981
(See Vendor Profile Page V-23)

MICRO PERIPHERALS, INC.
PRINTMATE 150
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 136,
Optional Character Set Size: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Graphics Functions Supported: Picture Graphics, Print Sizes, Logos, Intermix Graphics

Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: April 1982
(See Vendor Profile Page V-24)

MICROPROCESSOR SYSTEMS, INC.
R250
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char /sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: ASCII
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 11 in
Price: $800
Distribution Method: OEM
Number Installed to Date: 500 - 1,000
Date First Installed: February 1979
(See Vendor Profile Page V-24)

MONARK DATA SCIENCES CORP.
2144
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $1,800
Distribution Method: End user, OEM, Third-party
(See Vendor Profile Page V-25)

NCR CORP.
NCR 8411-66 COLUMN
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96, 96 Proportional
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Graphics Functions Supported: Bit Addressable, Three-Dimensional
Price: $7,795
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: May 1983
(See Vendor Profile Page V-26)

NCR CORP.
NCR 8411-66 COLUMN
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 64, 96, 96 Proportional
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $1,800
Distribution Method: End user, OEM, Third-party
(See Vendor Profile Page V-25)

Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Graphics Functions Supported: Bit Addressable, Charts, Curves, Three-Dimensional
Price: $900
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: May 1983

NEC INFORMATION SYSTEMS
PINWRITER P1
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 136
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction, Sheet Feed
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 10 in.
Graphics Functions Supported: Full Graphic Capabilities
Price: $795
Date First Installed: July 1983

NEDCOM COMPUTER CORP.
520
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 132
Character Code: Ascii, Ebcdic
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $8,000
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: 1982
(See Vendor Profile Page V-26)

NIXDORF COMPUTER CORP.
8287-20B
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 210 char /sec
Maximum Characters Per Line: 132
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Distribution Method: End user
Date First Installed: September 1983

NIXDORF COMPUTER CORP.
8287-50B
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 210 char /sec
Maximum Characters Per Line: 132
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Distribution Method: End user
Date First Installed: September 1983

NIXDORF COMPUTER CORP.
8353
Print Mechanism: Impact
Print Technique: Needle
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 132
Character Code: Ascii, Ebcdic
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $5,000

Distribution Method: Third-party
Number Installed to Date: 100- 500
Date First Installed: June 1981

NORTH ATLANTIC INDUSTRIES
7020
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char /sec
Maximum Characters Per Line: 136
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Graphics Functions Supported: Full Dot Addressable
Price: $1,595
Distribution Method: Third-party
Date First Installed: January 1983
(See Vendor Profile Page V-26)

NORTH ATLANTIC INDUSTRIES
7030
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char /sec
Maximum Characters Per Line: 136
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Graphics Functions Supported: Dot Addressable
Price: $1,995
Distribution Method: Third-party
Number Installed to Date: 5,000 - 10,000
Date First Installed: January 1982
(See Vendor Profile Page V-26)

NORTH ATLANTIC INDUSTRIES
7040
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char /sec
Maximum Characters Per Line: 136
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Graphics Functions Supported: Dot Addressable
Price: $2,195
Distribution Method: Third-party
Number Installed to Date: 5,000 - 10,000
Date First Installed: January 1982

NORTHERN TELECOM, INC.
SYCOR SPRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char /sec
Maximum Characters Per Line: 132
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Pin, Sheet Feed
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 14 in.
Distribution Method: OEM
Date First Installed: May 1976
(See Vendor Profile Page V-26)

NOWELL DATA SYSTEMS, INC.
PRAXIS 200
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Distribution Method: End user, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: 1983
(See Vendor Profile Page V-27)

OKIDATA CORP.
MICROLINE 83A
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction, Pin
Forms Type Accepted: Fan fold, Roll Optional
Maximum Form Width: 10 in.
Price: $449
Distribution Method: Third-party
Date First Installed: February 1982
(See Vendor Profile Page V-27)

OKIDATA CORP.
MICROLINE 83A
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Maximum Form Width: 16 in
Price: $899
Distribution Method: Third-party
Date First Installed: February 1982

OKIDATA CORP.
MICROLINE 84
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char /sec
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Maximum Form Width: 16 in
Price: $1,395
Distribution Method: Third-party
Date First Installed: January 1983

OKIDATA CORP.
MICROLINE 92
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 160 char /sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel

Form Feed Method: Friction, Pin
Forms Type Accepted: Fan fold, Roll Optional
Maximum Form Width: 10 in
Price: $699
Distribution Method: Third-party
Date First Installed: December 1982

OKIDATA CORP.
MICROLINE 93
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 160 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Maximum Form Width: 16 in.
Price: $1,249
Distribution Method: Third-party

PANASONIC INDUSTRIAL CO.
KX-P1160
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 198 char./sec
Maximum Characters Per Line: 272
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Graphics Functions Supported: Curves, Arcs, Patterns
Price: $1,750
Distribution Method: Third-party
Number Installed to Date: Under [illegible]
(See Vendor Profile Page V-27)

PERKIN-ELMER CORP.
CP180R
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 Char /Sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: [illegible]
Character Code: Ascii
Communications Port: [illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan Fold
Maximum Form Width: 14 in.
Price: $4,500
Distribution Method: End User
(See Vendor Profile Page V-28)

PERKIN-ELMER CORP.
CP120
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 14 in.
Distribution Method: End user

PERKIN-ELMER CORP.
CP180
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 14 in.
Price: $4,500
Distribution Method: End user

PERRY DATA SYSTEMS, INC.
2014
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 40
Optional Character Set Sizes: 48
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Maximum Form Width: 4 in.
Number Installed to Date: Under 100
Date First Installed: January 1983
(See Vendor Profile Page V-28)

PERRY DATA SYSTEMS, INC.
2042
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 40
Optional Character Set Sizes: 48
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction.
Forms Type Accepted: Fan fold, Cut sheet, Documents
Maximum Form Width: 9 in.
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1983

PERSONAL MICRO COMPUTERS, INC.
DMP-85
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 10 in.
Graphics Functions Supported: All Bit Image
Colors Supported: 1
Price: $[illegible]
Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: September 1981
(See Vendor Profile Page V-28)

PHILIPS PERIPHERALS, INC.
GP 150
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 120
Optional Character Set Sizes: 141
Character Code: [illegible]
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin, Sheet Feed
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 14 in.
Graphics Functions Supported: Dot Addressable
Distribution Method: OEM, Third-party
Number Installed to Date: 2,600
Date First Installed: 1900
(See Vendor Profile Page V-28)

PHILIPS PERIPHERALS, INC.
GP 300
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: [illegible] char./sec
Maximum Characters Per Line: 120
Optional Character Set Sizes: 141
Character Code: [illegible]
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Front Feed
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 14 in.
Graphics Functions Supported: Dot Addressable
Price: $3,300
Distribution Method: OEM, Third-party
Number Installed to Date: 5,000 - 10,000
Date First Installed: 1983.

PHILIPS PERIPHERALS, INC.
GP 300L
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 300 char./sec
Maximum Characters Per Line: 144
Character Code: [illegible]
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 17 in.
Graphics Functions Supported: Dot Addressable
Colors Supported: 4
Price: $3,800
Distribution Method: OEM, Third-party
Number Installed to Date: 5,000 - 10,000

PRINTEK, INC.
PRINTEK 910
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 [illegible]
Maximum Characters Per Line: 227
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Graphics Functions Supported: Point Addressable
Colors Supported: 1
Price: $1,595
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: April 1982
(See Vendor Profile Page V-29)

PRINTEK, INC.
PRINTEK [illegible]
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char /sec
Maximum Characters Per Line: 227
Character Code: [illegible]
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 16 in.
Colors Supported: 1
Price: $1,895
Distribution Method: End user, OEM, Third-party
Date First Installed: July 1982

PRODUCT DEVELOPMENT SERVICES, INC.
EKG PRINTER
Print Technique: Thermal Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: Continuous
Graphics Functions Supported: EKG Trace, Alphanumeric
Distribution Method: End user
Date First Installed: March 1983
(See Vendor Profile Page V-29)

[illegible] CORP.
202
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Price: $[illegible]
Distribution Method: End user, Third-party
Date First Installed: 1976
(See Vendor Profile Page V-30)

Q1 CORP.
204
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Price: $4,500
Distribution Method: End user, Third-party
Date First Installed: [illegible]

RACAL-MILGO, INC.
4285
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 80
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Maximum Form Width: [illegible]
Price: $825
Distribution Method: [illegible]
Number Installed to Date: 3,000
Date First Installed: May 1982
(See Vendor Profile Page V-30)

RACAL-MILGO, INC.
4287N
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char /sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $4,125
Number Installed to Date: 600
Date First Installed: November 1981

RACAL-MILGO, INC.
8150-1
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 160 char /sec
Maximum Characters Per Line: 80
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Roll
Maximum Form Width: 10 in.
Price: $1,160
Distribution Method: End user

RACAL-MILGO, INC.
8161-2
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 160 char./sec
Maximum Characters Per Line: 80
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 10 in.
Price: $1,100
Number Installed to Date: 50
Date First Installed: May 1983

RAYTHEON CO.
R2187-1 PRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $4,800
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: September 1982
(See Vendor Profile Page V-30)

SOUTHERN SYSTEMS, INC.
M-100
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 140 char /sec
Maximum Characters Per Line: 132
Standard Character Set Size: 128
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Graphics Functions Supported: Bit Image Graphics
Price: $3,000
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: September 1978
(See Vendor Profile Page V-32)

TANDY CORP.
DMP 420
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 140 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96, 30, 32
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Cut sheet
Maximum Form Width: 14 in.
Graphics Functions Supported: RS Bit Image Graphics
Price: $999
Distribution Method: End user, OEM, Third-party
Date First Installed: 1983
(See Vendor Profile Page V-34)

TANDY CORP.
DMP500
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 220 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96, 30, 32
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 14 in.
Price: $1,795
Distribution Method: End user, OEM, Third-party
Date First Installed: 1982

TANDY CORP.
DWP200
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96, 30, 32
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Graphics Functions Supported: Bit Image Graphics
Price: $999
Distribution Method: End user, OEM, Third-party
Date First Installed: 1983

TEC
HPM 11
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 80
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Distribution Method: End user
Date First Installed: November 1983
(See Vendor Profile Page V-34)

TEC
HPM 80
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 10
Character Code: Ascii
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold
Graphics Functions Supported: Three Dimensional
Colors Supported: 1
Price: $276
Distribution Method: End user
Date First Installed: November 1983

TEC
HPM 120
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 136
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $286
Distribution Method: End user
Number Installed to Date: 2,000
Date First Installed: December 1981

TELECOM TERMINAL SYSTEMS
AIRLINE COMMUNICATION SYSTEM
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Cut sheet
Price: $3,000
Distribution Method: End user
Number Installed to Date: 500
(See Vendor Profile Page V-36)

TELECOM TERMINAL SYSTEMS
TELEX Printer
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Price: $7,500
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 500

TELEX COMPUTER PRODUCTS, INC.
TELEX 287B
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: Variable
Character Code: Ascii, Ebcdic
Communications Port: Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Price: $5,340
Number Installed to Date: 1,000 - 10,000
Date First Installed: 1980
(See Vendor Profile Page V-36)

TELEX COMPUTER PRODUCTS, INC.
TELEX 287C
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: Variable
Optional Character Set Sizes: Variable
Character Code: Ascii, Ebcdic
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Price: $5,340
Number Installed to Date: 1,000 - 10,000
Date First Installed: 1980
(See Vendor Profile Page V-36)

TELEX COMPUTER PRODUCTS, INC.
TELEX 287D
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: Variable
Optional Character Set Sizes: Variable
Character Code: Ascii, Ebcdic
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Price: $5,150
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: September 1981

TEXAS INSTRUMENTS, INC.
OMNI 800/810
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 64, 95
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $1,645
Distribution Method: End user, Third-party
Date First Installed: June 1977
(See Vendor Profile Page V-37)

TEXAS INSTRUMENTS, INC.
OMNI 800/820
Print Mechanism: Impact
Print Technique: Dot Matrix

Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 218
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $1,995
Distribution Method: End user, Third-party
Date First Installed: October 1978

TEXAS INSTRUMENTS, INC.
OMNI 800/850
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 134
Optional Character Set Sizes: 95
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 10 in.
Graphics Functions Supported: Raster, Mosaic
Price: $599
Distribution Method: End user, Third-party
Date First Installed: May 1983

TEXAS INSTRUMENTS, INC.
OMNI 800/ENHANCED 810
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 225 char /sec
Maximum Characters Per Line: 218
Optional Character Set Sizes: 95
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Graphics Functions Supported: Raster, Mosaic
Colors Supported: 1
Price: $2,395
Distribution Method: End user, Third-party
Date First Installed: May 1982

TEXAS INSTRUMENTS, INC.
SILENT 700/781RO
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 9 in.
Price: $1,795
Distribution Method: End user, Third-party
Date First Installed: May 1980
(See Vendor Profile Page V-37)

TRANS-LUX CORP.
TRANS-LUX 300
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 110 char /sec
Maximum Characters Per Line: 80
Communications Port: Serial
Price: $2,865
Number Installed to Date: 500 - 1,000
Date First Installed: 1976
(See Vendor Profile Page V-37)

TRIFORMATION SYSTEMS, INC.
LED-T20
Print Mechanism: Impact
Print Technique: Braille Pins
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 80
Character Code: Ascii, Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Maximum Form Width: 13 in
Price: $14,500
Distribution Method: Third-party
Number Installed to Date: 100 - 500
Date First Installed: June 1970
(See Vendor Profile Page V-38)

WANG LABORATORIES, INC.
MODEL 2233R
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 158
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Continuous
Maximum Form Width: 15 in.
Price: $3,500
Distribution Method: End user
Date First Installed: April 1981
(See Vendor Profile Page V-39)

WANG LABORATORIES, INC.
MODEL 2235R
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 220 char /sec
Maximum Characters Per Line: 158
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Continuous
Price: $4,500
Distribution Method: End user
Date First Installed: April 1981

WANG LABORATORIES, INC.
MODEL 5533
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 158
Optional Character Set Sizes: 113
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Continuous
Price: $3,500
Distribution Method: End user
Date First Installed: April 1981

WANG LABORATORIES, INC.
MODEL 5535
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 220 char /sec
Maximum Characters Per Line: 158
Optional Character Set Sizes: 113
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Continuous
Price: $4,500
Distribution Method: End user
Date First Installed: April 1981
(See Vendor Profile Page V-39)

WANG LABORATORIES, INC.
MODEL 5577
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 192 char./sec
Maximum Characters Per Line: 158
Optional Character Set Sizes: Variable to 224
Character Code: Ascii, Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Cut sheet, Continuous
Price: $5,975
Distribution Method: End user
Date First Installed: May 1982

WEBER MARKING SYSTEMS
LEGITRONICS 2050
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 229
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 15 in.
Price: $14,500
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: November 1981
(See Vendor Profile Page V-39)

WESTREX CRM PRODUCTS
MODEL 8400
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 140 char /sec
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Cut sheet
Maximum Form Width: 8 in.
Price: $750
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: January 1983
(See Vendor Profile Page V-39)

WORLD STORAGE TECHNOLOGY, LTD.
2712
Print Mechanism: Nonimpact,
Print Technique: Ink-Jet
Maximum Print Speed: 270 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 16 in.
Graphics Functions Supported: Raster Scan, Bit Image Graphics
Price: $2,700
Date First Installed: May 1982
(See Vendor Profile Page V-39)

WORLD STORAGE TECHNOLOGY LTD.
PT 88
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Roll, Cut sheet
Maximum Form Width: 16 in.
Graphics Functions Supported: Bit Image
Price: $895
Distribution Method: End user, OEM
Date First Installed: April 1983

ZENITH DATA SYSTEMS
ZENITH Z-125 DOT MATRIX PRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 132
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 8 in.
Price: $1,499
Distribution Method: OEM, Third-party
Date First Installed: 1981
(See Vendor Profile Page V-40)

ZENITH RADIO CORP.
Z-125
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 158
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $1,499
Distribution Method: Third-party
(See Vendor Profile Page V-40)

Print Speeds Under 100 Char./Sec

ADDMASTER CORP.
MODEL 59
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 3 char./sec
Maximum Characters Per Line: 16
Optional Character Set Sizes: 11
Character Code: BCD
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 3 in.
Price: $130
Distribution Method: OEM
Number Installed to Date: 500 - 1,000
Date First Installed: June 1982
(See Vendor Profile Page V-1)

ADDMASTER CORP.
MODEL 166
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 3 char./sec

Maximum Characters Per Line: 16
Optional Character Set Sizes: 11
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 3 in.
Price: $350
Distribution Method: OEM
Number Installed to Date: More than 50,000
Date First Installed: March 1985

ADDMASTER CORP.
MODEL 171/172
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 2 char./sec
Maximum Characters Per Line: 16
Optional Character Set Sizes: 96
Character Code: Ascii, Baudot
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 2 in.
Price: $345
Number Installed to Date: 100 - 500
Date First Installed: November 1981

ADDMASTER CORP.
MODEL 181/182
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 1 char./sec
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 2 in.
Price: $459
Date First Installed: July 1983

ALPHACOM, INC.
ALPHACOM 42
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 40
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 2 in.
Graphics Functions Supported: Arcs, Curves, Patterns, Charts
Colors Supported: 1
Price: $200
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: March 1982
(See Vendor Profile Page V-1)

ALPHACOM, INC.
VP42
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 40
Optional Character Set Sizes: 96
Character Code: Ascii
Forms Type Accepted: Fan fold, Roll
Graphics Functions Supported: Arcs, Curves, Patterns, Charts
Colors Supported: 1
Price: $210
Distribution Method: End user, Third-party
Number Installed to Date: 500 - 1000
Date First Installed: January 1983

AMERICAN COMMUNICATIONS CORP.
AMCON/P
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 40
Optional Character Set Sizes: 48
Character Code: Ascii
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 4 in.
Graphics Functions Supported: Graphic Option
Price: $600
Distribution Method: End user, Third-party
Number Installed to Date: 100 - 500
Date First Installed: November 1982
(See Vendor Profile Page V-2)

APPLE COMPUTER, INC.
APPLE LETTER QUALITY PRINTER
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 132
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Graphics Functions Supported: Standard Graphics
Colors Supported: 1
Price: $2,195
Distribution Method: Third-party
Date First Installed: January 1983
(See Vendor Profile Page V-3)

APPLE COMPUTER, INC.
APPLE SILENTYPE II PRINTER
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 9 in.
Graphics Functions Supported: High Resolution
Colors Supported: 1
Price: $350
Distribution Method: Third-party
Date First Installed: 1979

APPLE COMPUTER, INC.
APPLE SILENTYPE III PRINTER
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 9 in
Graphics Functions Supported: High Resolution
Colors Supported: 1
Price: $390
Distribution Method: Third-party
Date First Installed: 1979

ATARI, INC.
1020 COLOR PRINTER
Print Mechanism: Impact
Print Technique: Pen
Maximum Print Speed: 10 char./sec
Maximum Characters Per Line: 40
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Graphics Functions Supported: Graphs, Charts, Curves
Colors Supported: 4
Price: $299
Distribution Method: Third-party
(See Vendor Profile Page V-4)

ATARI, INC.
1025
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 9 in.
Price: $549
Distribution Method: Third-party

ATARI, INC.
1027
Print Mechanism: Impact
Print Technique: Letter Quality
Maximum Print Speed: 20 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll, Cut sheet
Maximum Form Width: 9 in.
Price: $350
Distribution Method: Third-party

AUTOMATIC FUNDS TRANSFER SERVICES, INC.
AFT 100 MICRO PRINTER
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Continuous
Maximum Form Width: 15 in.
Price: $12,500
Distribution Method: End user
Date First Installed: 1977
(See Vendor Profile Page V-4)

AXIOM CORP.
GP-100A
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 80
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Maximum Form Width: 10 in.
Price: $266
Distribution Method: End user, OEM, Third-party
(See Vendor Profile Page V-4)

AXIOM CORP.
GP-280X
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 50 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Maximum Form Width: 10 in.
Price: $339
Distribution Method: End user, OEM, Third-party

AXIOM CORP.
IMP-4 PROFESSIONAL PRINTER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Roll
Maximum Form Width: 10 in.
Price: $749
Distribution Method: End user, OEM, Third-party
Date First Installed: 1979

BDS CORP.
LQ55
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 55 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 15 in.
Distribution Method: End user
Date First Installed: 1983
(See Vendor Profile Page V-4)

BILLINGS COMPUTER CORP.
P45
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 45 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $1,995
Distribution Method: End user, Third-party
(See Vendor Profile Page V-5)

BRAEGEN CORP.
3125
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 45 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 14 in.
Distribution Method: End user
Date First Installed: March 1978
(See Vendor Profile Page V-5)

BROTHER INTERNATIONAL CORP.
HR-1 DAISYWHEEL PRINTER
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 16 char./sec
Maximum Characters Per Line: 158
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $1,200
Distribution Method: Third-party
Number Installed to Date: 47,000
Date First Installed: February 1982
(See Vendor Profile Page V-5)

BROTHER INTERNATIONAL CORP.
HR-15 DAISYWHEEL PRINTER
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 13 char./sec
Maximum Characters Per Line: 110
Optional Character Set Sizes: 96
Communications Port: Serial, Parallel
Form Feed Method: Friction, Tractor F
Forms Type Accepted: Fan fold, Cut Sheet
Maximum Form Width: 14 in
Colors Supported: 2
Price: $599
Distribution Method: Third-party
Date First Installed: May 1983

BUSINESS INFORMATION SYSTEMS, INC.
C-4040
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 132 in.
Price: $3,000
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1981
(See Vendor Profile Page V-5)

BUSINESS INFORMATION SYSTEMS, INC.
C-4055
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 55 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Roll, Cut sheet
Maximum Form Width: 132 in.
Price: $2,500
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1981

BUSINESS INFORMATION SYSTEMS, INC.
C-4180
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 132 in
Price: $1,600
Distribution Method: End user, OEM
Date First Installed: 1981

CANON U.S.A., INC.
A 1210
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 9 in
Colors Supported: 7
Price: $795
(See Vendor Profile Page V-6)

CAPITOL CIRCUITS CORP.
SERIES 8100
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 65 char./sec
Maximum Print Speed: 144 line/min
Maximum Characters Per Line: 27
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 3 in
Colors Supported: 2
Price: $460
Distribution Method: End user, OEM
Number Installed to Date: 2,500
Date First Installed: 1979
(See Vendor Profile Page V-6)

CAPITOL CIRCUITS CORP.
SERIES 100T
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 65 char./sec
Maximum Print Speed: 144 line/min
Maximum Characters Per Line: 27
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 3 in.
Colors Supported: 2
Price: $560
Distribution Method: End user, OEM
Number Installed to Date: 1,800
Date First Installed: 1981

CAPITOL CIRCUITS CORP.
SERIES 270
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 65 char./sec
Maximum Print Speed: 144 line/min
Maximum Characters Per Line: 27
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Cut sheet
Price: $660
Distribution Method: End user, OEM
Number Installed to Date: 1,000
Date First Installed: September 1980

COMPUTER DESIGNED SYSTEMS, INC.
PM-080
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 14 in.
Graphics Functions Supported: Arcs, Curves, Patterns, Charts
Colors Supported: 2
Distribution Method: End user
Number Installed to Date: 10,000 - 50,000
Date First Installed: September 1977
(See Vendor Profile Page V-8)

COMPUTER DESIGNED SYSTEMS, INC.
PM-200
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 14 in.
Graphics Functions Supported: Arcs, Patterns, Curves, Charts
Colors Supported: 2
Distribution Method: End user
Number Installed to Date: 10,000 - 50,000
Date First Installed: June 1977

COMPUTERS INTERNATIONAL DAISYWRITER
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 25 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 17 in.
Graphics Functions Supported: Arcs, Curves, Patterns, Charts
Colors Supported: 1
Price: $1,495
Distribution Method: Third-party
Number Installed to Date: 10,000 - 50,000
Date First Installed: June 1982
(See Vendor Profile Page V-9)

COMREX INTERNATIONAL
COMREX CR-I
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 17 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Price: $995
Distribution Method: Third-party
Number Installed to Date: 5,000 - 10,000
Date First Installed: May 1982

COMREX INTERNATIONAL
COMREX CR-I COMPUTER
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 17 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Price: $1,019
Distribution Method: Third-party
Number Installed to Date: 5,000 - 10,000
Date First Installed: May 1982

COMREX INTERNATIONAL
COMREX CR-II
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 13 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 8 in
Price: $799
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: May 1983

COMREX INTERNATIONAL
COMREX CR-II COMPUTER
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 13 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 9 in.
Price: $629
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: May 1983

CROMEMCO, INC.
3358
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 55 char./sec

Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Price: $3,495
Distribution Method: Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: 1977
(See Vendor Profile Page V-9)

CROMEMCO, INC.
CLQ
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 13 char./sec
Maximum Characters Per Line: 80
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Cut sheet
Maximum Form Width: 10 in.
Price: $795
Distribution Method: Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: December 1982

DATA IMPACT PRODUCTS, INC.
DIP-81A
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction, Tractor OP
Forms Type Accepted: Roll
Maximum Form Width: 10 in.
Price: $499
Distribution Method: End user, OEM, Third-party
Date First Installed: June 1982
(See Vendor Profile Page V-10)

DATA IMPACT PRODUCTS, INC.
DIP-84G
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 10 in.
Price: $695
Date First Installed: June 1982

DATA IMPACT PRODUCTS, INC.
DIP-92
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction, Tractor Optional
Forms Type Accepted: Roll
Maximum Form Width: 10 in.
Price: $399
Distribution Method: End user, OEM, Third-party
Date First Installed: June 1982

DATA IMPACT PRODUCTS, INC.
D-92
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Price: $399
Distribution Method: OEM

DATAPRODUCTS CORP.
DP-35
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 35 char./sec
Maximum Characters Per Line: 158
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction, Sheet Feed
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Graphics Functions Supported: Charts
Colors Supported: 2
Price: $1,995
Distribution Method: OEM, Third-party
Date First Installed: 1982
(See Vendor Profile Page V-11)

DATAPRODUCTS CORP.
DP-55
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 55 char./sec
Maximum Characters Per Line: 158
Standard Character Set Size: 96
Optional Character Set Sizes: 88 through 92
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Graphics Functions Supported: Charts
Colors Supported: 2
Price: $2,495

DATA TERMINALS & COMMUNICATIONS
DTC 382Z
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 32 char./sec
Maximum Characters Per Line: 196
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Sheet Feed
Forms Type Accepted: Fan fold, Roll
Price: $1,495
Distribution Method: Third-party
Number Installed to Date: 1,500
Date First Installed: October 1982
(See Vendor Profile Page V-11)

DIABLO SYSTEMS, INC.
630
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 25 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Distribution Method: Third-party
Date First Installed: October 1981
(See Vendor Profile Page V-12)

DIABLO SYSTEMS, INC.
630 PLUS
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 25 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Price: $[illegible]
Distribution Method: Third-party
Date First Installed: December 1982

DIABLO SYSTEMS, INC.
630
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 198
Standard Character Set Size: 96
Optional Character Set Sizes: 48, 64, 88, 92
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Distribution Method: Third-party
Date First Installed: October 1980

DIABLO SYSTEMS, INC.
COLOR INK JET PRINTER
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 20 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Optional Character Set Sizes: 64, Mosaic
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 10 in.
Graphics Functions Supported: Mosaic Graphics, Bit Map Graphics
Price: $1,300.
Distribution Method: Third-party
Date First Installed: June 1983

DIABLO SYSTEMS, INC.
MATRIX 11
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 80
Standard Character Set Size: 96
Optional Character Set Sizes: 64,
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 10 in.
Distribution Method: Third-party
Date First Installed: September 1982

DIABLO SYSTEMS, INC.
MATRIX 11A
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 80
Standard Character Set Size: 96
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 10 in.
Distribution Method: Third-party
Date First Installed: 1983

DIABLO SYSTEMS, INC.
MODEL 31
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 15 in.
Price: $950
Distribution Method: Third-party
Date First Installed: September 1982

DIABLO SYSTEMS, INC.
MODEL 31A
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in
Distribution Method: Third-party
Date First Installed: 1983

DICTAPHONE CORP.
DICTAPHONE 6710
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 204
Optional Character Set Sizes: 124
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Price: $2,200
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: September 1981
(See Vendor Profile Page V-12)

Serial Printers

Under 100 char./sec

DICTAPHONE CORP.
DICTAPHONE 6720
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 204
Optional Character Set Sizes: 125
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in
Price: $2,995
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: October 1981

DIGITAL EQUIPMENT CORP.
LA50
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold; Cut sheet
Maximum Form Width: 10 in.
Graphics Functions Supported: Bit Map Graphics
Price: $695
Distribution Method: End user, OEM, Third-party

DIGITAL EQUIPMENT CORP.
LQP02 LETTER-QUALITY PRINTER
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 32 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 128, Variable
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in
Price: $2,500
Distribution Method: End user, OEM, Third-party

DIGITEC
DESKTOP 6300 SERIES
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 64 char./sec
Maximum Characters Per Line: 21
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 2 in
Price: $1,000
Distribution Method: End user, OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1978
(See Vendor Profile Page V-13)

DIGITEC
DESKTOP 6400 SERIES
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 42 char./sec
Maximum Characters Per Line: 21
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 2 in
Price: $400
Distribution Method: End user, OEM
Number Installed to Date: 5,000 - 10,000
Date First Installed: 1978

DIGITEC
DIGITAL RECORDER 6100 SERIES
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 45 char./sec
Maximum Characters Per Line: 10
Character Code: Ebcdic
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold
Maximum Form Width: 2 in
Colors Supported: 2
Price: $1,000
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1976

DIGITEC
PANEL PRINTER 6500 SERIES
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Print Technique: F
Maximum Print Speed: 42 char./sec
Maximum Characters Per Line: 21
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 2 in.
Price: $475
Distribution Method: End user, OEM
Number Installed to Date: 500 - 1,000
Date First Installed: 1980

DIGITEC
PRINTER 6620
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 2 char./sec
Maximum Characters Per Line: 24
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 2 in.
Graphics Functions Supported: Charts, Curves, Designs, Histograms, Logos
Price: $495
Distribution Method: End user, OEM
Date First Installed: June 1983

DIGITEC
PRINTER 6630
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 22 char./sec
Maximum Characters Per Line: 16-2
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 2 in
Graphics Functions Supported: Charts, Curves, Designs, Histograms, Logos
Colors Supported: 1
Price: $565
Distribution Method: End user, OEM
Date First Installed: August 1983

DOCUTEL OLIVETTI CORP
DY 211
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 27 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96, 128
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction, Optional Tractor
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Price: $1,595
Distribution Method: Third-party
Date First Installed: January 1981
(See Vendor Profile Page V-13)

DOCUTEL OLIVETTI CORP.
DY 250
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 25 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor; Friction
Forms Type Accepted: Fan fold, Cut sheet
Price: $1,200
Distribution Method: OEM, Third-party
Date First Installed: June 1983

DOCUTEL OLIVETTI CORP.
ET 121 (LCU1131)
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 17 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96, 80, 132
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction, Optional Tractor
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $995
Distribution Method: Third-party
Date First Installed: January 1981

DOCUTEL OLIVETTI CORP.
ET 231 (LCU310)
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 27 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96, 132
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction, Pin.
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Price: $2,770
Distribution Method: Third-party

DOCUTEL OLIVETTI CORP.
ET 351 (LCU340)
Print Technique: Daisywheel
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96, 132
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 13 in.
Price: $4,800
Date First Installed: January 1981

DOCUTEL OLIVETTI CORP.
PRAXIS 41 (LSU41)
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 12 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96, 132
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll, Cut sheet
Maximum Form Width: 10 in.
Price: $795
Distribution Method: Third-party
Date First Installed: July 1982

EATON PRINTER PRODUCTS
7000 +
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 50 char./sec
Maximum Characters Per Line: 64
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 4 in
Price: $425
Date First Installed: June 1981
(See Vendor Profile Page V-14)

EPSON AMERICA, INC.
COMRITER
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 17 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Colors Supported: 2
Price: $1,100
Distribution Method: Third-party
(See Vendor Profile Page V-14)

EPSON AMERICA, INC.
MX-80 FT
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold
Maximum Form Width: 10 in.
Graphics Functions Supported: Curves, Patterns, Charts
Colors Supported: 2
Price: $695

EXXON ENTERPRISES
965
Print Mechanism: Nonimpact
Print Technique: Ink-Jet

Maximum Print Speed: 90 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96, 192
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll, Cut
[illegible]
Maximum Form Width: 17 in.
Price: $4,400
(See Vendor Profile Page-V-15)

EXXON ENTERPRISES
965S
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 90 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96, 192
Communications Port: Serial
Price: $6,000

FACIT, INC.
FACIT 4560
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 22 char./sec
Maximum Characters Per Line: 130
Optional Character Set Sizes: 105 to 112
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction, Cut Sheet
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Colors Supported: 1
Price: $1,395
Distribution Method: Third-party
[illegible] to Date: 500 - 1,000
Date First Installed: September 1982
(See Vendor Profile Page V-15)

FACIT, INC.
FACIT 4565
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction, Cut Sheet
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Colors Supported: 1
[illegible]
Distribution Method: Third-party
[illegible] to Date: 500 - 1,000

FUJITSU AMERICA, INC.
SP 320
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 48 char./sec
Maximum Characters Per Line: 136
[illegible] 127
Character Code: Ascii
[illegible] Parallel
Form Feed Method: Tractor, Friction, Pin, Sheet Feed
Forms Type Accepted: Fan fold, [illegible]
Maximum Form Width: 16 in.
Graphics Functions Supported: Subscripts, Superscripts, Curves
Colors Supported: 2
Price: $1,595
Distribution Method: OEM, Third-party
Date First Installed: September [illegible]
(See Vendor Profile Page V-15)

FUJITSU AMERICA, INC.
SP 830
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 163
Optional Character Set Sizes: 96, 127
Communications Port: Serial
Form Feed Method: Tractor, Friction
Maximum Form Width: 16 in
Graphics Functions Supported: Plotting
Price: $2,950
Distribution Method: OEM, Third-party
Date First Installed: May 1981

GENERAL BUSINESS TECHNOLOGY, INC.
5205WP
Print Technique: Print Thimble
Maximum Print Speed: 55 char./sec
Maximum Characters Per Line: 198
Optional Character Set Sizes: 128
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Price: $4,295
Distribution Method: End user, Third-party
Date First Installed: [illegible]
(See Vendor Profile Page V-15)

GENERAL BUSINESS TECHNOLOGY, INC.
5206WP
Print Mechanism: Impact
Print Technique: Print Thimble
Maximum Print Speed: 35 char./sec
Maximum Characters Per Line: 198
Optional Character Set Sizes: 128
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $4,295
Distribution Method: End user, Third-party
Date First Installed: 1981

HEWLETT-PACKARD CO.
HP 2601
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
[illegible]
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction, Automatic
[illegible]
Price: $3,[illegible]
Distribution Method: End user
Number Installed to Date: 10,000 - 50,000
Date First Installed: November 1980
(See Vendor Profile Page V-17)

HEWLETT-PACKARD CO.
HP 2602
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 25 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction, Automatic
Forms Type Accepted: Fan fold
Price: $1,950,
[illegible]
Number Installed to Date: 10,000 - 50,000
Date First Installed: November 1982

HI-G / AMS CONTROL CORP.
9/80 PSF
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 75 char./sec
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
[illegible]
Forms Type Accepted: Fan fold
[illegible]
Graphics Functions Supported: Arcs, Curves, Patterns, Charts
Colors Supported: 1
Price: $1,195
Distribution Method: OEM, Third-party
Date First Installed: September 1981
(See Vendor Profile Page V-17)

HONEYWELL, INC.
PRU 7004/7006
Print Mechanism: Impact
Maximum Print Speed: 55 char./sec
[illegible]
Optional Character Set Sizes: 128
Character Code: Ascii
Form Feed Method: Tractor, Friction, Sheet Feed
Forms Type Accepted: Cut sheet
Maximum Form Width: 16 in
(See Vendor Profile Page V-17)

HONEYWELL, INC.
PRU 7007
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 35 char./sec
Maximum Characters Per Line: 136
Standard Character Set Size: 128
Character Code: Ascii
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.

HONEYWELL, INC.
PRU 7060/7061
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
[illegible]
Forms Type Accepted: Fan fold
[illegible]

HONEYWELL, INC.
PRU 7065/7066
[illegible]
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
[illegible]
Standard Character Set Size: 96
Character Code: Ascii
Form Feed Method: Sprocket
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in

HONEYWELL, INC.
PRU 7070/7071
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100
[illegible]
Maximum Characters Per Line: 80
Standard Character Set Size: 96
Character Code: Ascii
Communications [illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 10 in
Graphics Functions Supported: Line Graphics
Price: $1,195
[illegible]
Date First Installed: December 1981

HONEYWELL, INC.
PRU 7075/7076
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 132
[illegible]
Character Code: Ascii
[illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in
Graphics Functions Supported: Line Graphics
Price: $1,495
[illegible]
1,000
Date First Installed: December 1981

IBM
4975 1L
Print Mechanism: Impact
Print Technique: [illegible]
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 132
[illegible]
[illegible]
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet, Forms
Maximum Form Width: 15 in.
Price: $2,800
Distribution Method: [illegible]
(See Vendor Profile Page V-17)

IBM
5210
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 198
[illegible]
Communications Port: Serial
[illegible]
Forms Type Accepted: Cut sheet
Maximum Form Width: 15 in
Graphics Functions Supported: Bar Charts, Pie Charts
Price: $3,530
Distribution Method: End user
Date First Installed: September 1980

IBM
5218
Print Mechanism: Impact

Print Technique: Daisywheel
Maximum Print Speed: 40 char /sec
Maximum Characters Per Line: 198
Standard Character Set Size: 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor, Automatic feed
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Graphics Functions Supported: Charts
Price: $3,300
Distribution Method: End user
Date First Installed: March 1980

IBM
5219
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 60 char./sec
Maximum Characters Per Line: 198
Standard Character Set Size: 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 12 in.
Graphics Functions Supported: Charts
Price: $5,835
Distribution Method: End user
Date First Installed: March 1980

IBM
5222-1
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Optional Character Set Sizes: 185
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $2,345
Distribution Method: End user
Date First Installed: May 1981

IBM
5241
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 198
Standard Character Set Size: 96
Optional Character Set Sizes: 128
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Cut sheet
Maximum Form Width: 15 in.
Price: $2,040
Distribution Method: End user
Date First Installed: July 1981

IBM
5256-1
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Optional Character Set Sizes: 64
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $4,145
Distribution Method: End user
Date First Installed: January 1978

IBM
5256-2
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 80 char /sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Optional Character Set Sizes: 84
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in
Price: $4,340
Distribution Method: End user
Date First Installed: January 1978

INTERFACE SYSTEMS, INC.
MODEL 736
Print Mechanism: Impact
Print Technique: Thimble
Maximum Print Speed: 55 char./sec
Maximum Characters Per Line: 163
Optional Character Set Sizes: 167
Character Code: Ebcdic
Form Feed Method: Tractor, Friction, Twin-Bin feed
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 16 in.
Price: $5,150
Distribution Method: End user
Number Installed to Date: 300
Date First Installed: August 1982
(See Vendor Profile Page V-19)

ITT COURIER TERMINAL SYSTEMS, INC.
S760
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 55 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
(See Vendor Profile Page V-20)

JAPAN DIGITAL LABORATORY
JDL P200
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 70 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Automatic
Forms Type Accepted: Fan fold, Cut sheet
Graphics Functions Supported: Arcs, Three-Dimensional, Curves, Charts, Patterns
Price: $2,000
Distribution Method: OEM
Date First Installed: January 1982
(See Vendor Profile Page V-21)

JUKI AMERICA
MODEL 6100
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 18 char./sec
Maximum Characters Per Line: 220
Optional Character Set Sizes: 100
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 13 in.
Price: $609
Distribution Method: Third-party
Date First Installed: July 1983
(See Vendor Profile Page V-21)

LEADING EDGE PRODUCTS, INC.
STARWRITER F10-40PU
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 136
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction, Tractor
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $1,895
Distribution Method: OEM, Third-party
Date First Installed: 1982
(See Vendor Profile Page V-21)

LEADING EDGE PRODUCTS, INC.
STARWRITER F10-40KU
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 136
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction, Tractor Optional
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $1,695
Distribution Method: OEM, Third-party
Date First Installed: 1982

MICRO PERIPHERALS, INC.
PRINTMATE 99
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char /sec
Maximum Characters Per Line: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 10 in.
Graphics Functions Supported: Plotting, Logos, Screen Graphics
Price: $599
Distribution Method: Third-party
Number Installed to Date: 1,000-5,000
Date First Installed: August 1981
(See Vendor Profile Page V-24)

MITSUBISHI ELECTRONICS AMERICA, INC.
M-624 COLOR PRINTER
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 45 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction, Pin
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 10 in.
Graphics Functions Supported: Arbitrary Bit Mapping
Price: $1,250
Distribution Method: OEM, Third-party
Date First Installed: August 1983
(See Vendor Profile Page V-25)

MOHAWK DATA SCIENCES CORP.
2141
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 45 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $4,293
Distribution Method: End user, OEM, Third-party
(See Vendor Profile Page V-25)

MOHAWK DATA SCIENCES CORP.
2141-1
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 45 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $4,293
Distribution Method: End user, OEM, Third-party

MOHAWK DATA SCIENCES CORP.
2141-3
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $3,500
Distribution Method: OEM
(See Vendor Profile Page V-25)

NEC INFORMATION SYSTEMS
MODEL 2000R TERMINAL
Print Mechanism: Impact
Print Technique: Print Thimble
Maximum Print Speed: 20 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold,

Roll, Cut sheet
Maximum Form Width: 16 in.
Price: $995
Distribution Method: Third-party
(See Vendor Profile Page V-26)

NEC INFORMATION SYSTEMS
SPINWRITER 3500 SERIES
Print Mechanism: Impact
Print Technique: Print Thimble
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 16 in.
Price: $1,750
Distribution Method: Third-party

NEC INFORMATION SYSTEMS
SPINWRITER 7700D
Print Mechanism: Impact
Print Technique: Printer Thimble
Maximum Print Speed: 55 char /sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction, Cut Sheet
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Graphics Functions Supported: High Resolution, Fine-Line Plotting
Price: $2,535
Distribution Method: Third-party
Date First Installed: 1978

NEC INFORMATION SYSTEMS
SPINWRITER 7700Q
Print Mechanism: Impact
Print Technique: Print Thimble
Maximum Print Speed: 55 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction, Cut Sheet
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Graphics Functions Supported: High Resolution, Fine Line Plotting
Price: $2,535
Distribution Method: Third-party
Date First Installed: 1978

NEC INFORMATION SYSTEMS
SPINWRITER MODEL 7710
Print Mechanism: Impact
Print Technique: Print Thimble
Maximum Print Speed: 55 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction, Cut Sheet
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Graphics Functions Supported: Full Graphics
Price: $3,055
Distribution Method: Third-party
Date First Installed: 1977

NEC INFORMATION SYSTEMS
SPINWRITER 7715
Print Mechanism: Impact
Print Technique: Printer Thimble
Maximum Print Speed: 55 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction, Cut Sheet
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Graphics Functions Supported: Full Graphic Capabilities
Price: $3,055
Distribution Method: Third-party

NEWPORT ELECTRONICS, INC.
ELECTRONIC 820
Print Technique: Thermal Matrix
Maximum Print Speed: 2 char./sec
Maximum Characters Per Line: 20
Optional Character Set Sizes: Numeric
Character Code: Ascii, Ebodic
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 2 in.
Price: $649
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: January 1982
(See Vendor Profile Page V-26)

NEWPORT ELECTRONICS, INC.
ELECTRONIC 821
Print Technique: Thermal Matrix
Maximum Print Speed: 2 char./sec
Maximum Characters Per Line: 20
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 2 in.
Price: $649
Number Installed to Date: 1,000 - 5,000
Date First Installed: January 1982

NEWPORT ELECTRONICS, INC.
ELECTRONIC 822
Print Technique: Thermal Matrix
Maximum Print Speed: 2 char./sec
Maximum Characters Per Line: 20
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 2 in.
Price: $649
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: January 1983

NIXDORF COMPUTER CORP.
515 TERMINAL PRINTER
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 45 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Asca, Ebodic
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan,fold
Maximum Form Width: 15 in.
Price: $5,120
Distribution Method: End user
Number Installed to Date: 500 - 1,000
Date First Installed: 1978
(See Vendor Profile Page V-26)

NIXDORF COMPUTER CORP.
835
Print Mechanism: Impact
Print Technique: Needle
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 132
Character Code: Asci
Communications Port: Parallel
Form Feed Method: Tractor
Maximum Form Width: 15 in.
Price: $3,950
Distribution Method: Third-party
Number Installed to Date: 100 - 500
Date First Installed: June 1981

NIXDORF COMPUTER CORP.
837
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 96
Character Code: Asci
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $5,000
Distribution Method: Third-party
Number Installed to Date: 100 - 500
Date First Installed: 1979

NIXDORF COMPUTER CORP.
8345
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 45 char./sec
Maximum Characters Per Line: 132
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold
Price: $5,120
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1978

NIXDORF COMPUTER CORP.
8350
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 132
Character Code: Asci
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold
Price: $3,950
Distribution Method: End user
Date First Installed: 1978

NIXDORF COMPUTER CORP.
8045
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 45 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in
Price: $5,120
Distribution Method: End user
Date First Installed: 1979

NIXDORF COMPUTER CORP.
8287-10A
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char /sec
Maximum Characters Per Line: 80
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 11 in.
Price: $3,550
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: February 1981

NIXDORF COMPUTER CORP.
8287-10B
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 132
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $3,950
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: February 1981

NIXDORF COMPUTER CORP.
8321
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 45 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Asci
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in
Price: $5,120
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: September 1982

NIXDORF COMPUTER CORP.
8341
Print Mechanism: Impact
Print Technique: Needle
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 80
Character Code: Asci
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Price: $1,700
Distribution Method: Third-party

Date First Installed: September 1983

HEXBORE COMPUTER CORP.
8745
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 45 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
[illegible] **Code:** Ascii
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in
Price: $5,120
Distribution Method: End user
Date First Installed: February 1983

[illegible]
[illegible]
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction, Pin
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 10 in.
Price: $449
Distribution Method: OEM, Third-party
(See Vendor Profile Page V-27)

OLYMPIA U.S.A., INC.
ESW102
Print Technique: Daisywheel
Maximum Print Speed: 20 char./sec
Maximum Characters Per Line: 141
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Sheet Feed
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 17 in.
Price: $1,399
Distribution Method: OEM, Third-[illegible]
Date First Installed: April 1982
(See Vendor Profile Page V-27)

OLYMPIA U.S.A., INC.
[illegible]
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 150
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
[illegible] 17 in.
Graphics Functions Supported: Curves
Price: $1,899
Distribution Method: OEM, Third-party
Date First Installed: March 1983

[illegible]
DY 250
[illegible] Impact
Print Technique: Daisywheel
Maximum Print Speed: 25 char./sec
[illegible] **Per Line:** 132
Optional Character Set Sizes: 307 Teletext
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin, Feed
Forms Type Accepted: Cut sheet
Maximum Form Width: 16 in
Price: $1,200
Distribution Method: OEM
Date First Installed: June 1983
(See Vendor Profile Page V-27)

OPE PRINTERS, INC.
D4250
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 25 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 17 in
Price: $795
Distribution Method: OEM
Date First Installed: June 1983

PANASONIC INDUSTRIAL CO.
KX-1090
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 158
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 10 in.
Graphics Functions Supported: Curves, Patterns, Arcs
Price: $499
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: March 1983
(See Vendor Profile Page V-27)

PERKIN-ELMER CORP.
855
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
[illegible] 8 in.
Price: $1,460
Distribution Method: End user
(See Vendor Profile Page V-28)

PRIMAGES, INC.
IMAGE I
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 45 char./sec
Maximum Characters Per Line: 135
Optional Character Set Sizes: 96
[illegible] **Code:** Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Automatic Sheet Feed
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 14 in.
Graphics Functions Supported: Arcs, Charts, Patterns, Plotter
Price: $1,650
Distribution Method: Third-party
Number Installed to Date: 100 - 500
Date First Installed: January 1983
(See Vendor Profile Page V-29)

PRINTACOLOR CORP.
GP 1024
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 60 char./sec
Maximum Characters Per Line: 128
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Colors Supported: 8
Price: $5,495
Distribution Method: OEM, Third-party
Number Installed to Date: 350
Date First Installed: September 1982
(See Vendor Profile Page V-29)

PRINTACOLOR CORP.
IS8001
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 64, 128, Variable
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Pin
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in
Graphics Functions Supported: Plotting, Character Graph
Colors Supported: 8
Price: $4,495
Distribution Method: OEM, Third-party
Number Installed to Date: 100 - 500
Date First Installed: 1980

PRINTACOLOR CORP.
PRINTACOLOR PC-1000
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 48 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96, 256
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Colors Supported: 16
Price: $4,995
Distribution Method: OEM, Third-party
Number Installed to Date: 25
Date First Installed: September 1982

PRINTACOLOR CORP.
TC1040
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 100 char./sec
[illegible] **Character Set Sizes:** 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Pin
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 14 in.
Graphics Functions Supported: Fully Dot Addressable
Colors Supported: 7
Price: $5,495
Distribution Method: End user, Third-party
Number Installed to Date: Under 100
Date First Installed: June 1983

QUME CORP.
SPRINT 7
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 55 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
[illegible] **Port:** Parallel
Forms Type Accepted: Roll, Cut sheet
Maximum Form Width: 15 in.
Price: $2,500
[illegible] **Method:** OEM
Date First Installed: January 1982
(See Vendor Profile Page V-30)

QUME CORP.
[illegible]
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 35 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
[illegible] **Port:** Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Roll, Cut sheet
Maximum Form Width: 15 in.
Price: $2,500
[illegible] **Method:** OEM
Date First Installed: December 1982

QUME CORP.
SPRINT 8/50
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 50 char./sec
[illegible] **Per Line:** 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
[illegible] **Width:** 15 in.
Price: $2,500
[illegible] **Method:** OEM
[illegible] **Installed:** December 1982

QUME CORP.
SPRINT 9
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 5 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 94
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
[illegible] **Width:** 15 in.
Price: $2,250
Distribution Method: OEM
Date First Installed: 1982

QUME CORP.
SPRINT 10/35
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 35 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96

Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 15 in.
Price: $2,500
Distribution Method: OEM
Date First Installed: June 1982

QUME CORP.
SPRINT 10/50
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 50 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Price: $2,500
Distribution Method: OEM
Date First Installed: June 1982

QUME CORP.
SPRINT 11/40-130 PLUS
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 197
Optional Character Set Sizes: 130
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Graphics Functions Supported: Dot Addressable
Colors Supported: 1
Price: $1,990
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: January 1983

QUME CORP.
SPRINT 11/40-130 WT PLUS
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 293
Optional Character Set Sizes: 130
Character Code: Ascii
Communications Port: Serial, Parallel
Maximum Form Width: 22 in.
Graphics Functions Supported: Dot Addressable
Colors Supported: 1
Price: $2,[illegible]
Number Installed to Date: 1,000 - 2,[illegible]

QUME CORP.
SPRINT 11/40 PLUS
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 35 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Price: $1,715
Distribution Method: OEM
Date First Installed: December 1982

QUME CORP.
SPRINT 11/40 PLUS
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 35 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 15 in.
Price: $1,776
Distribution Method: OEM
Date First Installed: December 1982

QUME CORP.
TWIN TRACK
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 75 char./sec
Maximum Characters Per Line: 264
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 28 in.
Price: $4,000
Distribution Method: OEM
Date First Installed: September 1979

Q1 CORP.
201
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 45 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Price: $5,000
Distribution Method: End user, Third-party
Date First Installed: 1978
(See Vendor Profile Page V-30)

Q1 CORP.
205
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 96 char./sec
Maximum Characters Per Line: 40
Optional Character Set Sizes: 2
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Distribution Method: End user, Third-party
Date First Installed: 1980

RACAL-DANA INSTRUMENTS, INC.
1001 THERMAL
Print Mechanism: Nonimpact
Print Technique: Dot Matrix
Maximum Print Speed: 3 char./sec
Maximum Characters Per Line: 64
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 3 in.
Price: $1,300
Number Installed to Date: 100 - 500
Date First Installed: June 1983
(See Vendor Profile Page V-30)

RACAL-DANA INSTRUMENTS, INC.
1002-THERMAL
Print Mechanism: Nonimpact
Print Technique: Dot Matrix
Maximum Print Speed: 3 char./sec
Maximum Characters Per Line: 64
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 3 in.
Price: $1,600
Number Installed to Date: 100 - 500
Date First Installed: June 1980

RICOH OF AMERICA
1200
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 20 char./sec
Maximum Characters Per Line: 165
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Cut sheet
Maximum Form Width: 14 in.
Graphics Functions Supported: Charts
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: April 1983
(See Vendor Profile Page V-31)

RICOH OF AMERICA
1300
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 165
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Cut sheet
Maximum Form Width: 17 in.
Graphics Functions Supported: Charts
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: July 1983

RICOH OF AMERICA
1600
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 45 char./sec
Maximum Characters Per Line: 165
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Cut sheet
Maximum Form Width: 16 in
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: June 1983

RICOH OF AMERICA
RICOH LP 212
Print Mechanism: Nonimpact
Print Technique: Laser
Maximum Print Speed: 12 char./sec
Standard Character Set Size: 68
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Cut sheet
Maximum Form Width: 14 in.
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: February 1983

SANYO BUSINESS SYSTEMS CORP.
SANYO PR 5500
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 16 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Communications Port: Parallel
Form Feed Method: Tractor
Maximum Form Width: 17 in
Price: $995
Distribution Method: OEM
Number Installed to Date: 500 - 1,000
Date First Installed: March 1983
(See Vendor Profile Page V-31)

SCM CORP.
TP-I (SERIES)
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 12 char./sec
Maximum Characters Per Line: 105
Optional Character Set Sizes: 88
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 13 in.
Graphics Functions Supported: Plotting
Price: $895
Distribution Method: Third-party
Date First Installed: September 1982
(See Vendor Profile Page V-32)

SILVER-REED AMERICA, INC.
EXP 500
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 14 char./sec
Maximum Characters Per Line: 101
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 13 in
Date First Installed: July 1983
(See Vendor Profile Page V-32)

SILVER-REED AMERICA, INC.
EXP 500 II
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 17 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 14 in.
Price: $895
Distribution Method: Third-party
Number Installed to Date: 13,000 - 50,000
Date First Installed: February 1983

SINGER DATA PRODUCTS
5010
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 4 in.
Price: $1,075
Distribution Method: End user, OEM
Date First Installed: 1975
(See Vendor Profile Page V-32)

SINGER DATA PRODUCTS
5011
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char /sec
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Serial
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 4 in.
Price: $1,075
Distribution Method: End user, OEM
Date First Installed: 1975

SINGER DATA PRODUCTS
5012
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 4 in.
Price: $1,075
Distribution Method: End user, OEM
Date First Installed: 1975

SINGER DATA PRODUCTS
5080
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char /sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction, Tractor
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 9 in.
Graphics Functions Supported: All
Price: $995
Distribution Method: End user, OEM
Date First Installed: 1979

SONY COMMUNICATIONS PRODUCTS CO.
SONY COMPACT PRINTER
Print Mechanism: Nonimpact
Print Technique: Thermal Ribbon
Maximum Print Speed: 15 char./sec
Maximum Characters Per Line: 80
Form Feed Method: Tractor
Forms Type Accepted: Roll, Cut sheet
Maximum Form Width: 9 in.
Price: $280
Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: July 1982
(See Vendor Profile Page V-32)

STAR MICRONICS, INC.
GEMINI-10
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 96
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 10 in.
Graphics Functions Supported: Block Graphics
Price: $499
Distribution Method: Third-party
Number Installed to Date: More than 50,000
Date First Installed: November 1982
(See Vendor Profile Page V-33)

STAR MICRONICS, INC.
GEMINI-15
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 16 in.
Graphics Functions Supported: Block Graphics
Price: $645
Distribution Method: Third-party
Number Installed to Date: More than 50,000
Date First Installed: November 1982

SYNTEST CORP.
SYNTEST SP-2000
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char /sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Price: $975
Distribution Method: OEM
(See Vendor Profile Page V-33)

TANDY CORP.
CGP115
Print Mechanism: Impact
Print Technique: Ball Point
Maximum Print Speed: 12 char./sec
Maximum Characters Per Line: 40
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Graphics Functions Supported: All
Colors Supported: 4
Price: $200
Distribution Method: End user, OEM, Third-party
Date First Installed: 1982
(See Vendor Profile Page V-34)

TANDY CORP.
CGP220
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Print Speed: 37 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96, 30, 32
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Graphics Functions Supported: RS Bit Image Graphics
Colors Supported: 7
Price: $699
Distribution Method: End user, OEM, Third-party
Date First Installed: 1983

TANDY CORP.
DMP100
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 50 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Graphics Functions Supported: RS Bit Image Graphics
Price: $350
Distribution Method: End user, OEM, Third-party
Date First Installed: 1982

TANDY CORP.
DWI1B
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 43 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 124
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Cut sheet, Envelope Feed
Maximum Form Width: 14 in.
Price: $1,595
Distribution Method: End user, OEM, Third-party

TANDY CORP.
DWP210
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 18 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 100
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Cut sheet
Maximum Form Width: 13 in.
Price: $799
Distribution Method: End user, OEM, Third-party
Date First Installed: April 1983

TANDY CORP.
DWP410
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 124
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Cut sheet
Maximum Form Width: 14 in.
Price: $1,295
Distribution Method: End user, OEM, Third-party
Date First Installed: 1982

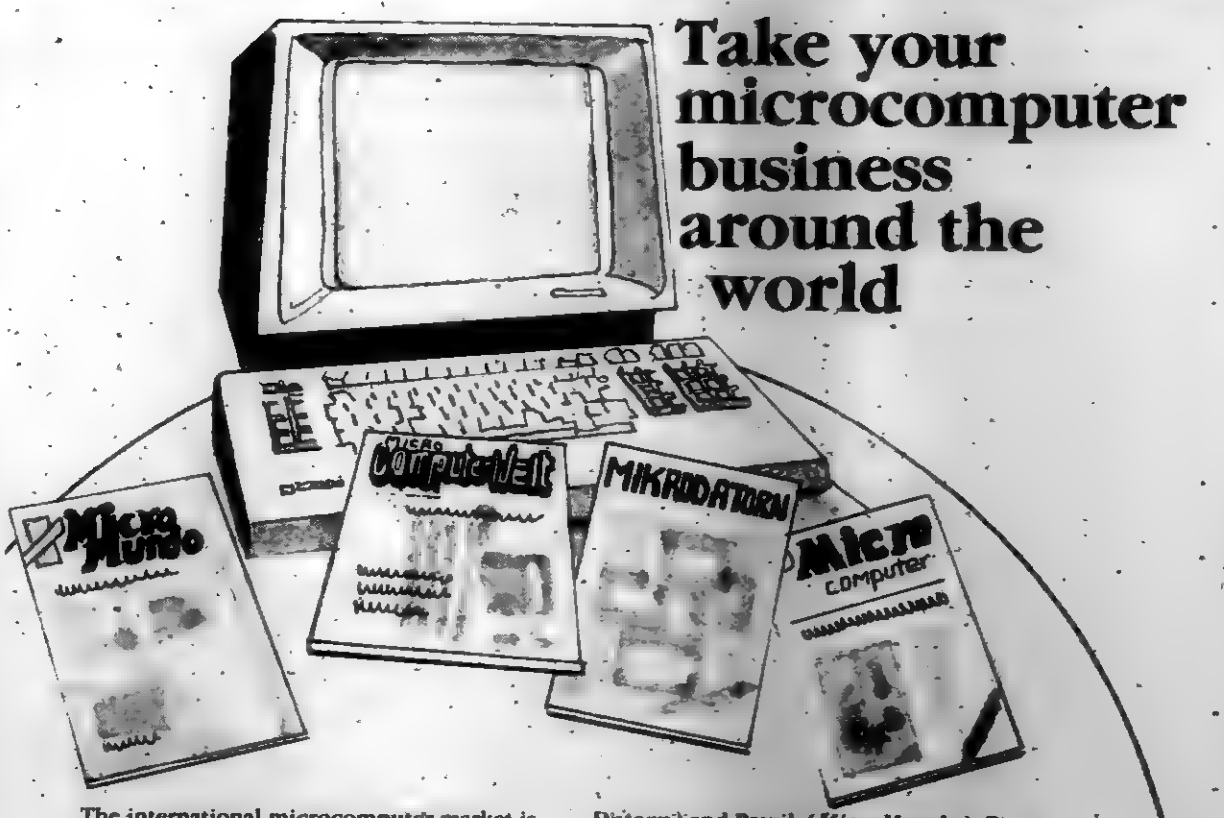
TANDY CORP.
TP10
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 32
Optional Character Set Sizes: 96, 16
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 4 in.
Price: $100
Distribution Method: End user, OEM, Third-party
Date First Installed: 1983

TDC
EP8 40
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 40
Character Code: Ascii
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 10 in.
Graphics Functions Supported: Curves, Patterns, Three Dimensional, Charts
Colors Supported: 1
Price: $180
Distribution Method: End user
Number Installed to Date: 5,000 - 10,000
Date First Installed: January 1981
(See Vendor Profile Page V-34)

TDC
GPM 80
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 100 char./sec
Maximum Characters Per Line: 80
Character Code: Ascii
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Colors Supported: 1
Price: $235
Distribution Method: End user
Number Installed to Date: 40,000
Date First Installed: September 1979

TEXAS INSTRUMENTS, INC.
SILENT 700/743RO
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 95
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 8 in.
Price: $595

Take your microcomputer business around the world



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Distribution Method: End user, Third-party
Date First Installed: January 1976
(See Vendor Profile Page V-37)

3M
TRENDCOM MODEL 150
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 80
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 4 in.
Graphics Functions Supported: Graphs, Special Symbols, Line Drawings, Foreign Languages Symbols, Bar Charts
Price: $250
Distribution Method: Third-party
Date First Installed: May 1983
(See Vendor Profile Page V-37)

3M
TRENDCOM MODEL 151
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 80
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 4 in
Graphics Functions Supported: Graphs, Line Drawings, Bar Charts, Special Symbols, Foreign Language Symbols
Price: $249
Distribution Method: Third-party
Date First Installed: May 1983

3M
TRENDCOM MODEL 250
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 136
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Graphics Functions Supported: Graphs, Line Drawings, Bar Charts, Special Symbols, Foreign Language Symbols
Price: $299
Distribution Method: Third-party
Date First Installed: May 1983

3M
TRENDCOM MODEL 251
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 136
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Graphics Functions Supported: Graphs, Line Drawings, Bar Charts, Special Symbols, Foreign Language Symbols
Price: $289
Distribution Method: Third-party
Date First Installed: May 1983

TRANSTAR
TRANSTAR 120
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 14 char./sec
Maximum Characters Per Line: 100
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 12 in.
Price: $599
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: June 1983
(See Vender Profile Page V-37)

TRANSTAR
TRANSTAR 130
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 18 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 17 in.
Price: $895
Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: January 1983

TRANSTAR
TRANSTAR 140
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 160
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction, Cut Sheet
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Price: $1,695
Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: February 1982

TRANSTAR
TRANSTAR 315
Print Mechanism: Impact
Print Technique: Four-Hammer Rotating Pin
Maximum Print Speed: 50 char./sec
Maximum Characters Per Line: 100
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Maximum Form Width: 10 in.
Graphics Functions Supported: Pictures, Charts, Patterns
Colors Supported: 40
Price: $395
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: June 1983

VECTOR GRAPHIC, INC.
3500
Print Mechanism: Impact
Print Technique: Print Thimble
Maximum Print Speed: 33 char./sec
Maximum Characters Per Line: 158
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Price: $2,695
Distribution Method: Third-party
(See Vendor Profile Page V-38)

VECTOR GRAPHIC, INC.
7700
Print Mechanism: Impact
Print Technique: Print Thimble
Maximum Print Speed: 55 char./sec
Maximum Characters Per Line: 161
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Price: $3,450
Distribution Method: OEM, Third-party

WANG LABORATORIES, INC.
DW/05-20
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 20 char./sec
Maximum Characters Per Line: 158
Optional Character Set Sizes: 116
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Continuous
Maximum Form Width: 15 in.
Price: $2,695
Distribution Method: End user
Date First Installed: March 1982
(See Vendor Profile Page V-39)

WANG LABORATORIES, INC.
MODEL 2281 WCR
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 180
Optional Character Set Sizes: 116
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Cut sheet, Continuous
Price: $7,500
Distribution Method: End user
Date First Installed: May 1979

WANG LABORATORIES, INC.
MODEL 2281 WII
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 30 char./sec
Optional Character Set Sizes: 114
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor
Forms Type Accepted: Cut sheet, Continuous
Maximum Form Width: 15 in.
Price: $5,000
Distribution Method: End user
Date First Installed: May 1979

WANG LABORATORIES, INC.
MODEL 5581 W
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 158
Optional Character Set Sizes: 116
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $5,000
Distribution Method: End user
Date First Installed: May 1979

WANG LABORATORIES, INC.
MODEL 6581 WC
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 180
Optional Character Set Sizes: 116
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Cut sheet, Continuous
Price: $7,000
Distribution Method: End user
Date First Installed: May 1979

WANG LABORATORIES, INC.
MODEL 6581 WII
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 25 char./sec
Maximum Characters Per Line: 290
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Cut sheet, Continuous
Maximum Form Width: 31 in.
Price: $9,750
Distribution Method: End user
Date First Installed: February 1980

Printers Without Specified Print Speeds

AB DICK CO.
VIDEO JET PRINTER 9100 SERIES
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Maximum Characters Per Line: Variable
Optional Character Set Sizes: Variable
Character Code: Ascii
Communications Port: Serial, Parallel
Forms Type Accepted: Any
Graphics Functions Supported: Anything
Colors Supported: 6
Price: $2,300
Distribution Method: End user
Number Installed to Date: 5,000 - 10,000
(See Vendor Profile Page V-1)

ADVANCED COLOR TECHNOLOGY, INC.
ACT II
Print Mechanism: Nonimpact
Print Technique: Ink-Jet
Optional Character Set Sizes: 256
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Pin
Maximum Form Width: 15 in.
Graphics Functions Supported: Arcs, Curves, Patterns, Charts, Three Dimensional
Colors Supported: 125
Price: $6,400
Distribution Method: OEM, Third-party

Date First Installed: June 1983
(See Vendor Profile Page V-1)

[illegible]
9222 ELECTROSTATIC
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Optional Character Set Sizes: 123
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 22 in.
Graphics Functions Supported: Point Addressable
Colors Supported: 1
Distribution Method: End user, OEM
(See Vendor Profile Page V-4)

BENSON, INC.
9444 ELECTROSTATIC
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Optional Character Set Sizes: 123
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 44 in.
Graphics Functions Supported: Point Addressable
Distribution Method: End user

BENSON, INC.
[illegible] ELECTROSTATIC
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Optional Character Set Sizes: 123
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 36 in.
Graphics Functions Supported: Point Addressable
Distribution Method: End user

DATAPOINT CORP.
9611
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Characters Per Line: 198
Optional Character Set Sizes: 72
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 21 in.
Price: $3,495
Date First Installed: September [illegible]
(See Vendor Profile Page V-11)

DIGITEC
[illegible]
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Characters Per Line: 24
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 2 in.
Graphics Functions Supported: Charts, Curves, Designs, Histograms, Logos
Price: $495
Distribution Method: End user, OEM
Date First Installed: May 1983
(See Vendor Profile Page V-13)

DIGITEC
PRINTER 6611
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Characters Per Line: 24
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 2 in.
Graphics Functions Supported: Charts, Curves, Designs, Histograms, Logos
Colors Supported: 1
Price: $525
Distribution Method: End user, OEM
Date First Installed: July 1983

HARRIS CORP.
HARRIS 4240/4250
Print Mechanism: Impact
Maximum Characters Per Line: 132
Standard Character Set Size: 64
Character Code: Ascii
Forms Type Accepted: Fan fold
Maximum Form Width: 20 in.
Price: $30,000
Distribution Method: End user
(See Vendor Profile Page V-16)

NEWLETT-PACKARD CO.
[illegible] 2671A
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Characters Per Line: 80
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 9 in.
Price: $1,240
Distribution Method: End user
Number Installed to Date: 10,000 - [illegible]
Date First Installed: May 1981
(See Vendor Profile Page V-17)

[illegible]
PRU 7270/7271/7272
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Price: $3,450
Date First Installed: August 1983
(See Vendor Profile Page V-17)

[illegible]
[illegible]
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
[illegible]
Date First Installed: 1981
(See Vendor Profile Page V-23)

[illegible]
QP100
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Characters Per Line: 120
Optional Character Set Sizes: 141
[illegible]
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet, Feeders
Maximum Form Width: 14 in.
Graphics Functions Supported: Dot Addressable
Price: $2,600
Distribution Method: OEM, Third-party
Number Installed to Date: 5,000 - 10,000
Date First Installed: 1980
(See Vendor Profile Page V-28)

PRODUCT DEVELOPMENT SERVICES, INC.
BOWLING PRINTER
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Characters Per Line: 22
Form Feed Method: Friction
Maximum Form Width: 4 in.
Price: $180
Distribution Method: End user
Number Installed to Date: 1,000 - [illegible]
Date First Installed: 1978
(See Vendor Profile Page V-29)

QUME CORP.
SPRINT 11/55 PLUS
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Characters Per Line: 197
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Graphics Functions Supported: Dot [illegible]
Colors Supported: 1
Price: $1,990
Distribution Method: OEM, Third-[illegible]
Number Installed to Date: 10,000 - 50,000
Date First Installed: December 1982
(See Vendor Profile Page V-30)

TANDY CORP.
DMP120
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96, 30, 32
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Graphics Functions Supported: RS Bit Image Graphics
Price: $500
Distribution Method: End user, OEM, Third-party
Date First Installed: 1982
(See Vendor Profile Page V-34)

TANDY CORP.
DMP2100
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96, 30, 32
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 14 in.
Graphics Functions Supported: RS Bit Image Graphics, High Resolution
Price: $1,995
Distribution Method: End user, OEM, Third-party
Date First Installed: January 1983

TRILOG, INC.
TIP-300
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Characters Per Line: 220
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, [illegible]
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in
Graphics Functions Supported: Arcs, Curves, Patterns, Three Dimensional, Charts
Colors Supported: 1
Price: $4,900
Distribution Method: OEM, Third-party
Number Installed to Date: 500
Date First Installed: November 1982
(See Vendor Profile Page V-36)

Page Printers

AUTOMATIC FUNDS TRANSFER SERVICES, INC.
AFT 200 PAGE PRINTER
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 9,000 line/min
Maximum Characters Per Line: 204
Optional Character Set Sizes: 96
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Sheet Feed
Forms Type Accepted: Cut sheet
Maximum Form Width: 9 in.
Graphics Functions Supported: Logos, Forms Overlay
Colors Supported: 1
Price: $30,000
Distribution Method: End user
Date First Installed: 1983
(See Vendor Profile Page V-4)

DIABLO SYSTEMS, INC.
EPM 200
Print Mechanism: Nonimpact
Print Technique: Thermal Transfer
Maximum Characters Per Line: 132
Optional Character Set Sizes: Bit Mapping
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction, Automatic Sheet Feed
Forms Type Accepted: Cut sheet
Maximum Form Width: 9 in.
Price: $5,000
Date First Installed: December 1982
(See Vendor Profile Page V-12)

GENERAL BUSINESS TECHNOLOGY, INC.
6900XP
Print Mechanism: Nonimpact
Print Technique: Xerographic
Maximum Characters Per Line: 166
Optional Character Set Sizes: 96
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Cut sheet
Graphics Functions Supported: Plotting Images
Price: $26,000
Distribution Method: Third-party
Date First Installed: September 1982
(See Vendor Profile Page V-15)

HONEYWELL, INC.
PPS
Print Mechanism: Nonimpact
Print Technique: Electrostatic Carbon Deposit
Maximum Print Speed: 8,000 line/min
Price: $10,000
(See Vendor Profile Page V-17)

HONEYWELL, INC.
PPS II
Print Mechanism: Nonimpact
Print Technique: Electrostatic Carbon Deposit
Maximum Print Speed: 12,000 line/min
Price: $27,600

HONEYWELL, INC.
PPS IE
Print Mechanism: Impact
Print Technique: Electrostatic Carbon Deposit
Maximum Print Speed: 18,000 line/min
Price: $53,200

IBM
3800
Print Mechanism: Nonimpact
Print Technique: Laser
Maximum Characters Per Line: 132
Standard Character Set Size: 256
Character Code: Ebcdic
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in
Graphics Functions Supported: Dot Addressable, Electric Form Overlay, External Fonts
Price: $315,000
Distribution Method: End user
Date First Installed: 1975
(See Vendor Profile Page V-17)

IBM
4250
Print Mechanism: Nonimpact
Print Technique: Electro Erosion
Maximum Characters Per Line: Variable
Optional Character Set Sizes: Variable
Character Code: Ebcdic
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 13 in.
Graphics Functions Supported: Dot Addressable, CAD/CAM
Price: $21,000
Distribution Method: End user

IMTEKS
PPT-10
Print Mechanism: Nonimpact
Print Technique: Laser
Maximum Characters Per Line: Less than 300
Communications Port: Serial
Form Feed Method: Friction, Cut Sheet
Forms Type Accepted: Cut sheet
Maximum Form Width: 11 in
Graphics Functions Supported: Graphics, Patterns, APS Plot, Siggraph Code
Colors Supported: 1
Price: $30,000
Distribution Method: End user
Number Installed to Date: 2
Date First Installed: September 1982
(See Vendor Profile Page V-18)

Additional information provided for by vendor

Type style publishing features: Variety - serif and sans serif fonts, each with 128 symbols in 12 point sizes ranging 6 point to 36 point in height. Special symbols, Greek/math, utility characters, signatures and logotypes. DP fonts 10, 12 and 16 symbols/in.. Portrait or landscape print. All fonts on-line with no buffer limitations.

RENAISSANCE MARKETING, INC.
RENAISSANCE PAGE PRINTING SYSTEM
Print Mechanism: Nonimpact
Print Technique: Dot Matrix
Optional Character Set Sizes: 128
Communications Port: Parallel
Form Feed Method: Sheet Feed
Forms Type Accepted: Cut sheet
Maximum Form Width: 8 in.
Distribution Method: End user, Third-party
Number Installed to Date: 65,000
Date First Installed: April 1983
(See Vendor Profile Page V-31)

RENAISSANCE MARKETING, INC.
RENAISSANCE PAGE PRINTING SYSTEM
Print Mechanism: Nonimpact
Print Technique: Ion Deposition
Maximum Characters Per Line: 20
Optional Character Set Sizes: 48, 64, 96, 128, 256, Variable
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 8 in.
Price: $70,000
Distribution Method: End user, Third-party
Number Installed to Date: Under 100
Date First Installed: April 1983

SOUTHERN SYSTEMS, INC.
MERCURION 1
Print Mechanism: Nonimpact
Print Technique: Ion Deposition
Maximum Print Speed: 5,280 line/min
Maximum Characters Per Line: 132
Optional Character Set Size: 128
Character Code: Ascii, Ebcdic
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Cut sheet
Maximum Form Width: 9 in
Graphics Functions Supported: Raster Scan
Price: $59,950
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First Installed: April 1983

SPERRY CORP.
0777 LASER PRINTING SYSTEM
Print Mechanism: Nonimpact
Maximum Print Speed: 21,000 line/min
Maximum Characters Per Line: 204
Optional Character Set Sizes: 64, 128, 256, 3200
Character Code: Ascii, Ebcdic
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $415,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: September 1980
(See Vendor Profile Page V-33)

XEROX CORP.
2700 DISTRIBUTED PRINTER
Print Technique: Xerographic
Optional Character Set Sizes: 96
Communications Port: Parallel
Form Feed Method: Cut Sheet
Forms Type Accepted: Cut sheet
Maximum Form Width: 9 in.
Graphics Functions Supported: Charts, Patterns
Price: $19,000
Distribution Method: End user, OEM
Date First Installed: August 1982
(See Vendor Profile Page V-39)

XEROX CORP.
5700 ELECTRONIC PRINTING SYSTEM
Print Mechanism: Nonimpact
Print Technique: Laser
Print Technique: Xerographic
Communications Port: Serial
Form Feed Method: Cut Sheet
Forms Type Accepted: Cut sheet
Maximum Form Width: 9 in.
Graphics Functions Supported: Dot Addressable
Price: $100,000
Distribution Method: End user, OEM
Date First Installed: September 1980

XEROX CORP.
5750 ELECTRONIC PRINTING SYSTEM
Print Mechanism: Nonimpact
Print Technique: Laser
Print Technique: Xerographic
Maximum Print Speed: 9,240 line/min
Standard Character Set Size: 128
Optional Character Set Sizes: Variable
Character Code: Ascii, Ebcdic, BCD
Communications Port: Serial
Form Feed Method: Sheet Feed
Forms Type Accepted: Cut sheet
Maximum Form Width: 8 in.
Graphics Functions Supported: Dot Addressable
Price: $250,000
Distribution Method: End user, OEM
Date First Installed: July 1982

XEROX CORP.
9700 ELECTRONIC PRINTING SYSTEM
Print Mechanism: Nonimpact
Print Technique: Xerographic
Maximum Print Speed: 18,000 line/min
Optional Character Set Sizes: 64, 128, Variable
Character Code: Ascii, Ebcdic, BCD
Communications Port: Serial
Form Feed Method: Cut Sheet
Forms Type Accepted: Cut Sheet
Maximum Form Width: 8 in.
Graphics Functions Supported: Dot Addressable
Colors Supported: 11
Price: $480,000
Distribution Method: End user, OEM
Date First Installed: July 1982

TELEPRINTERS.

Teleprinter Index
By Technology Type and Transmission Speed

Teleprinter products have been indexed according to type — automatic send/receive, keyboard send/receive and receive-only. Within each product type products are indexed according to their maximum transmission speed in descending order from fastest to slowest. In addition to speed, the index contains information on the price of the teleprinter and the page number in the section where the full product listing is located.

The actual product listings have been separated according to the teleprinter type and, within each category, can be found in alphabetical order by vendor name.

Automatic Send/Recieve Teleprinters

VENDOR	MODEL	TRANSMISSION SPEED	PRICE	PAGE
Mapcom International, Inc.	EZ PRINT 21 AND 40	9,600 bit/sec	*$445*	*A-86*
Kaye Instruments, Inc.	LP-1	2,400 bit/sec	*$2,995*	*A-86*
Teletype Corp.	MODEL 42	1,800 bit/sec	*$1,617*	*A-86*
	MODEL 43	1,800 bit/sec	*$1,650*	*A-86*
American Datacom	SUPERTELEX 400	1,200 bit/sec	*$3,395*	*A-86*
Qwint Systems, Inc.	MSN-742-12B-I	1,200 bit/sec	*$1,695*	*A-86*
	MSN-744-1	1,200 bit/sec	*$1,295*	*A-86*
	MSN-744-11B	1,200 bit/sec	*$1,695*	*A-86*
	MSB 743-12	1,200 bit/sec	*$1,495*	*A-86*
American Datacom	ADC 300	300 bit/sec	*$2,995*	*A-86*
Trans-Lux Corp.	TRANS-LUX CONNECTION	300 bit/sec	*$3,695*	*A-86*
3M Co.	PACKAGE 80	300 bit/sec	*$1,145*	*A-86*
	PACKAGE 82	300 bit/sec	*$1,045*	*A-86*
Computer Transceiver Systems, Inc.	EXECUPORT 4120	N/A	*$3,295*	*A-86*
	EXECUPORT 4120 BLOCK SEND, RECEIVE	N/A	*$3,995*	*A-86*
Honeywell, Inc.	PRT/PRU 7005	N/A	*N/A*	*A-86*
IBM	3287	N/A	*$5,150*	*A-86*
	6670	N/A	*$45,500*	*A-86*
3M	PACKAGE 83	N/A	*$1,300*	*A-86*

Keyboard Send/Recieve Teleprinters

VENDOR	MODEL	TRANSMISSION SPEED	PRICE	PAGE
Digital Equipment Corp.	LA12 DEC-WRITER CORRESPONDENT	9,600 bit/sec	*$1,395*	*A-86*
	LA120 DEC WRITER III	9,600 bit/sec	*$2,750*	*A-86*
	LETTERWRITER 100	9,600 bit/sec	*$2,860*	*A-86*
General Electric Co.	GE 2030	9,600 bit/sec	*$1,250*	*A-87*
	GE 2120	[illegible]	*$2,275*	*A-87*
Hewlett-Packard Co.	HP 2635B	9,600 bit/sec	*$4,370*	*A-87*
International Entry Systems, Inc.	DATACORDER I	9,600 bit/sec	*N/A*	*A-87*
Trendata Standard Memories Corp.	T-350	9,600 bit/sec	*N/A*	*A-87*
	T-6000	[illegible]	*N/A*	*A-87*
	T-8000	9,600 bit/sec	*N/A*	*A-87*
General Electric Co.	GE 200 RO/KSR	1,200 bit/sec	*$2,350*	*A-86*
NCR Corp.	NCR 2600 (KSR)	1,200 bit/sec	*$2,450*	*A-87*
NEC Information Systems	SPINWRITER 7720	1,200 bit/sec	*N/A*	*A-87*
	SPINWRITER 7725	1,200 bit/sec	*N/A*	*A-87*
Qwint Systems, Inc.	KSR 700 SERIES	1,200 bit/sec	*$995*	*A-87*
	KSR-742-I	1,200 bit/sec	*$1,195*	*A-87*
	KSR-744	1,200 bit/sec	*$1,295*	*A-87*
Trendata Standard Memories Corp.	T-4000	[illegible]	*N/A*	*A-86*
	T-300	300 bit/sec	*N/A*	*A-86*
Trans-Lux Corp.	TLT	50 bit/sec	*$2,395*	*A-86*
Computer Devices, Inc.	SERIES 2000	N/A	*$1,395*	*A-86*
Computer Transceiver Systems, Inc.	EXECUPORT 430	N/A	*$995*	*A-86*
	EXECUPORT 440	N/A	*$1,195*	*A-86*

Teleprinter Index

VENDOR	MODEL	TRANSMISSION SPEED	PRICE	PAGE
Computer Transceiver Systems, Inc.	EXECUPORT 443	N/A	*$1,795*	*A-96*
	EXECUPORT 4000 SERIES	N/A	*N/A*	*A-96*
Dataproducts New England, Inc.	MXT 1200 TEMPEST MESSAGE TERMINAL	N/A	*$11,390*	*A-96*
Diablo Systems, Inc.	630 KSR	N/A	*$2,800*	*A-96*
Honeywell, Inc.	PRU/TWU 1005	N/A	*N/A*	*A-97*
	PRU/TWU 1901	N/A	*N/A*	*A-97*
	PRU 1001/TWU 1001	N/A	*N/A*	*A-97*
	WST 1005/ PRT 7005	N/A	*N/A*	*A-97*
Olympia U.S.A., Inc.	ESW103	N/A	*$1,899*	*A-97*
Qwint Systems, Inc.	KSR 743	N/A	*$995*	*A-97*

Recieve-Only Teleprinters

VENDOR	MODEL	TRANSMISSION SPEED	PRICE	PAGE
C. Itoh Electronics	1550-B	9,600 bit/sec	*$995*	*A-98*
	1550-S	9,600 bit/sec	*$1,295*	*A-98*
	1550-SC	9,600 bit/sec	*N/A*	*A-98*
	8510-B	9,600 bit/sec	*$695*	*A-98*
	8510-S	9,600 bit/sec	*$825*	*A-98*
	8510-SC	9,600 bit/sec	*$925*	*A-98*
	8600-B	9,600 bit/sec	*$1,395*	*A-98*
	F-10-55	9,600 bit/sec	*N/A*	*A-99*
Fujitsu America, Inc.	SP320	9,600 bit/sec	*$1,500*	*A-99*
Qwint Systems, Inc.	RO 700 SERIES	9,600 bit/sec	*$795*	*A-99*
	RO 743	9,600 bit/sec	*$795*	*A-100*
Teletype Corp.	T-300	9,600 bit/sec	*$4,625*	*A-100*
	MODEL 40-TELE	7,200 bit/sec	*$7,685*	*A-100*
C. Itoh Electronics	A-10	4,800 bit/sec	*$995*	*A-98*
Dataproducts New England, Inc.	MXT 1200 TEMPEST MATRIX PRINTER	4,800 bit/sec	*$8,525*	*A-99*
Teletype Corp.	MODEL 40	4,800 bit/sec	*$6,992*	*A-100*
C. Itoh Electronics	F-10-40	2,400 bit/sec	*$1,795*	*A-98*
Fujitsu America, Inc.	TTP 16	1,200 bit/sec	*$650*	*A-99*
Mannesmann Tally Corp.	MT 1612	1,200 bit/sec	*N/A*	*A-99*
NCR Corp.	NCR 2600 (RO)	1,200 bit/sec	*$1,995*	*A-99*
Qwint Systems, Inc.	RO-744	1,200 bit/sec	*$995*	*A-100*
Telecom Terminal Systems	AIRLINE TICKET PRINTER	75 bit/sec	*$2,000*	*A-100*
Computer Transceiver Systems, Inc.	EXECUPORT 420 RO	N/A	*$795*	*A-98*
Data General Corp.	4433	N/A	*$1,800*	*A-99*
Dataproducts New England, Inc.	2910 (TT-624)MILITARY TELEPRINTER	N/A	*N/A*	*A-99*
Diablo Systems, Inc.	630 ECS	N/A	*$5,000*	*A-99*
	SERIES 32	N/A	*$1,400*	*A-99*
Fujitsu America, Inc.	DPL 24	N/A	*$1,995*	*A-99*
	DPML 24	N/A	*N/A*	*A-99*

Other Teleprinters

VENDOR	MODEL	TRANSMISSION SPEED	PRICE	PAGE
Intel Corp.	COM SCRIBE	9,600 bit/sec	*$1,300*	*A-100*
	COM MASTER	1,200 bit/sec	*$5,000*	*A-100*
	COM WRITER	1,200 bit/sec	*$1,695*	*A-100*
Qwint Systems, Inc.	MSR 700 SERIES	1,200 bit/sec	*$1,295*	*A-100*

Automatic Send/Recieve Teleprinters

AMERICAN DATACOM
ADC 300
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 300 bit/sec
Integral Modem/Coupler: Standard
Print Mechanism: Nonimpact
Print Technique: Dot Matrix
Maximum Print Speed: 30 char /sec
Maximum Characters Per Line: 80
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 11 in.
Price: $2,995
Distribution Method: End user, Third-party
Number Installed to Date: 5,000 - 10,000
Date First Installed: 1978
(See Vendor Profile Page V-2)

AMERICAN DATACOM
SUPERTELEX 400
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Integral Modem/Coupler: Standard
Print Mechanism: Nonimpact
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 80
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 11 in.
Price: $3,395
Distribution Method: End user, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: September 1982

COMPUTER TRANSCEIVER SYSTEMS, INC.
EXECUPORT 4128
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Ascii
Integral Modem/Coupler: Standard
Print Mechanism: Nonimpact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 233
Standard Character Set Size: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 15 in
Graphics Functions Supported: Charts, Histograms
Price: $3,295
Distribution Method: End user, OEM
Date First Installed: January 1982
(See Vendor Profile Page V-8)

COMPUTER TRANSCEIVER SYSTEMS, INC.
EXECUPORT 4120 BLOCK SEND, RECEIVE
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Ascii
Integral Modem/Coupler: Standard
Print Mechanism: Nonimpact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char /sec
Maximum Characters Per Line: 233
Standard Character Set Size: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Graphics Functions Supported: Curves, Patterns, Charts
Colors Supported: 4
Price: $5,150
Distribution Method: End user
Date First Installed: October 1977
(See Vendor Profile Page V-17)

IBM
3287
Data Transmission Characteristics: Half-Duplex, Synchronous, Ebcdic
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii, Ebcdic
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Graphics Functions Supported: Curves, Patterns, Charts
Colors Supported: 4
Price: $5,150
Distribution Method: End user
Date First Installed: October 1977
(See Vendor Profile Page V-17)

IBM
6670
Data Transmission Characteristics: Half-Duplex, Synchronous, Ascii, Ebcdic/WP
Integral Modem/Coupler: Optional
Print Mechanism: Nonimpact
Print Technique: Laser
Maximum Print Speed: 1,800 line/min
Maximum Characters Per Line: 132
Standard Character Set Size: 103
Optional Character Set Sizes: 8 Fonts
Character Code: Ascii, Ebcdic, Ebcdic/WP
Communications Port: Parallel
Form Feed Method: Friction
Forms Type Accepted: Cut sheet
Maximum Form Width: 9 in.
Graphics Functions Supported: Logos, Signatures
Price: $45,500
Distribution Method: End user
Date First Installed: April 1979

KAYE INSTRUMENTS, INC.
LP-1
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 2,400 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 137 char./sec
Maximum Characters Per Line: 137
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 11 in.
Price: $2,395
Distribution Method: End user
Date First Installed: March 1982
(See Vendor Profile Page V-21)

MEPCOM INTERNATIONAL, INC.
EZ PRINT 21 AND 40
Data Transmission Characteristics: Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 72 line/min
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Colors Supported: 1
Price: $445
Distribution Method: End user
Number Installed to Date: 1,000
(See Vendor Profile Page V-23)

QWINT SYSTEMS, INC.
MSN-742-12B-I
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 65 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96, 68
Character Code: Ascii, Ebcdic
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 9 in.
Price: $1,595
Distribution Method: Third-party
Date First Installed: May 1982
(See Vendor Profile Page V-30)

QWINT SYSTEMS, INC.
MSN-744-1
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Integral Modem/Coupler: Standard
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 65 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii, Ebcdic
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 9 in.
Graphics Functions Supported: Dot Addressable
Price: $1,295
Distribution Method: Third-party
Date First Installed: January 1982

QWINT SYSTEMS, INC.
MSN-744-11B
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Integral Modem/Coupler: Standard
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 65 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii, Ebcdic
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 9 in.
Graphics Functions Supported: Dot Addressable
Price: $1,650
Distribution Method: Third-party
Date First Installed: 1982

QWINT SYSTEMS, INC.
MSR 743-12
Data Transmission Characteristics: Half-Duplex, Asynchronous
Maximum Transmission Speed: 1,200 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii, Ebcdic
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 9 in.
Price: $1,495
Distribution Method: Third-party
Date First Installed: April 1983

TELETYPE CORP.
MODEL 42
Data Transmission Characteristics: Half-Duplex, Asynchronous, Baudot
Maximum Transmission Speed: 1,800 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 47 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 128
Character Code: Ebcdic
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Price: $1,617
Distribution Method: Third-party
Number Installed to Date: More than 50,000
(See Vendor Profile Page V-36)

TELETYPE CORP.
MODEL 43
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii

Teleprinters

Maximum Transmission Speed: 1,800 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 47 char /sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 128
[illegible]
Communications Port: Serial
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Price: $1,650
Distribution Method: Third-party
[illegible] than 50,000
Date First Installed: November 1976

3M
PACKAGE 00
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: [illegible]
Integral Modem/Coupler: Standard
Print Mechanism: Nonimpact
Maximum Print Speed: 35 char./sec
Maximum Characters Per Line: 136
Character Code: Ascii
Form Feed Method: Friction
Forms Type Accepted: Roll
Price: $1,145
Distribution Method: End user, OEM, Third-party
Date First Installed: May 1983
(See Vendor Profile Page V-37)

3M
PACKAGE 02
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 300 bit/sec
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 35 char./sec
Maximum Characters Per Line: 80
Character Code: Ascii
[illegible]
Form Feed Method: Friction
Forms Type Accepted: Roll
Price: $1,045
Distribution Method: End user, OEM, Third-party
[illegible]

3M
PACKAGE 03
Data Transmission Characteristics: Full-Duplex, Asynchronous, Baudot
Integral Modem/Coupler: Standard
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 20 char./sec
Maximum Characters Per Line: 69
Character Code: Ebcdic
Form Feed Method: Friction
Forms Type Accepted: Roll
Price: $1,300
Distribution Method: End user, Third-party
Date First Installed: February 1982

TRANS-LUX CORP.
TRANS-LUX CONNECTION
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 300 bit/sec
Integral Modem/Coupler: Standard
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 50 char./sec
Maximum Characters Per Line: 80
Communications Port: Serial
Maximum Form Width: 9 in.
Price: $3,695
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: 1982
(See Vendor Profile Page V-37)

Keyboard Send/Recieve Teleprinters

COMPUTER DEVICES, INC.
SERIES 2000
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Integral Modem/Coupler: Standard
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 160 char./sec
Maximum Characters Per Line: 80
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Roll
Maximum Form Width: 8 in.
Price: $1,395

COMPUTER TRANSCEIVER SYSTEMS, INC.
EXECUPORT 420
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Ascii
Integral Modem/Coupler: Standard
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 80 char /sec
Maximum Characters Per Line: 140
Standard Character Set Size: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll, Cut sheet
Maximum Form Width: 9 in.
Graphics Functions Supported: Dot Addressable
Price: $995
Distribution Method: End user
Date First Installed: February 1982
(See Vendor Profile Page V-6)

COMPUTER TRANSCEIVER SYSTEMS, INC.
EXECUPORT 440
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Ascii
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 140
Standard Character Set Size: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll, Cut sheet
Maximum Form Width: 9 in.
Graphics Functions Supported: Dot Addressable
Price: $1,195
Distribution Method: End user
Date First Installed: February 1982

COMPUTER TRANSCEIVER SYSTEMS, INC.
EXECUPORT 445
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Ascii
Integral Modem/Coupler: Standard
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 80 char /sec
Maximum Characters Per Line: 140
Standard Character Set Size: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll, Cut sheet
Maximum Form Width: 9 in.
Graphics Functions Supported: Dot Addressable
Price: $1,795
Distribution Method: End user
Date First Installed: April 1983

COMPUTER TRANSCEIVER SYSTEMS, INC.
EXECUPORT 4000 SERIES
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Ascii
Integral Modem/Coupler: Standard
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 136
Standard Character Set Size: 128
Character Code: Ascii, APL
[illegible]
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 15 in.
Graphics Functions Supported: Dot Addressable
Distribution Method: End user, OEM

DATAPRODUCTS NEW ENGLAND, INC.
MXT 1280 TEMPEST MESSAGE TERMINAL
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 340 char /sec
Maximum Print Speed: 500 line/min
Maximum Characters Per Line: 69
[illegible]
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 9 in.
Price: $11,390
[illegible]
Number Installed to Date: 100 - 500
Date First Installed: December 1981
(See Vendor Profile Page V-11)

DIABLO SYSTEMS, INC.
630 KSR
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Optional Character Set Sizes: 88, 92
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
[illegible]
Distribution Method: Third-party
Date First Installed: December 1981
(See Vendor Profile Page V-12)

DIGITAL EQUIPMENT CORP.
LA12 DEC-WRITER
[illegible]
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integral Modem/Coupler: Standard
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char /sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Graphics Functions Supported: Bit Mapping, Dot Addressable
Price: $1,395
Distribution Method: End user, OEM, Third-party
Date First Installed: 1983
(See Vendor Profile Page V-13)

DIGITAL EQUIPMENT CORP.
LA120 DEC WRITER III
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 [illegible]
Maximum Characters Per Line: 132
Optional Character Set Sizes: 128
[illegible]
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 14 in
Graphics Functions Supported: Textprint Option
[illegible]
Distribution Method: End user, OEM, Third-party

DIGITAL EQUIPMENT CORP.
LETTERWRITER 100
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: [illegible]
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 240 char./sec
Maximum Characters Per Line: 132
[illegible] Variable
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 15 in.
Graphics Functions Supported: Dot Addressable
Price: $2,660
Distribution Method: End user, OEM, Third-party

GENERAL ELECTRIC CO.
GE 200 RO/KSR
Data Transmission Characteristics:

Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 17 in.
Price: $2,350
Distribution Method: OEM
Date First Installed: May 1978
(See Vendor Profile Page V-15)

GENERAL ELECTRIC CO.
GE 2030
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 60 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Graphics Functions Supported: Dot Master Printing
Colors Supported: 1
Price: $1,250
Distribution Method: OEM, Third-party

GENERAL ELECTRIC CO.
GE 2120
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 16 in.
Price: $2,275
Distribution Method: OEM, Third-party

HEWLETT-PACKARD CO.
HP 2635B
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 256
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold

Price: $4,370
Distribution Method: End user
Date First Installed: June 1980
(See Vendor Profile Page V-17)

HONEYWELL, INC.
PRU/TWU 1005
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Ascii
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in
(See Vendor Profile Page V-17)

HONEYWELL, INC.
PRU/TWU 1901
Data Transmission Characteristics: Half-Duplex; Full-Duplex, Ascii
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.

HONEYWELL, INC.
PRU 1001 / TWU 1001
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 95
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.

HONEYWELL, INC.
WST 1005/ PRT 7005
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Ascii
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in

INTERNATIONAL ENTRY SYSTEMS, INC.
DATACORDER I
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Integral Modem/Coupler: Standard
Print Mechanism: Nonimpact
Print Technique: Electrosensitive
Maximum Print Speed: 180 lns/min
Maximum Characters Per Line: 80
Optional Character Set Sizes: 64
Communications Port: Serial
Form Feed Method: Friction
Maximum Form Width: 5 in.

Distribution Method: End user, OEM
Number Installed to Date: 1,000 - 5,000
(See Vendor Profile Page V-20)

NCR CORP.
NCR 2600 (KSR)
Data Transmission Characteristics: Asynchronous
Maximum Transmission Speed: 1,200 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 9 in.
Price: $2,450
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: June 1981
(See Vendor Profile Page V-26)

NEC INFORMATION SYSTEMS
SPINWRITER 7720
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Print Mechanism: Impact
Print Technique: Print Thimble
Maximum Print Speed: 55 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction, Cut Sheet
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in
Graphics Functions Supported: Full Graphic Capabilities
Distribution Method: Third-party
Date First Installed: 1977
(See Vendor Profile Page V-28)

NEC INFORMATION SYSTEMS
SPINWRITER 7725
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Print Mechanism: Impact
Print Technique: Print Thimble
Maximum Print Speed: 55 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor, Friction, Cut Sheet
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in
Graphics Functions Supported: Full Graphic Capabilities
Distribution Method: Third-party
Date First Installed: 1977

OLYMPIA U.S.A., INC.
ESW103
Data Transmission Characteristics: Half-Duplex, Full-Duplex
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 20 char./sec
Maximum Characters Per Line: 141
Communications Port: Serial, Parallel

Form Feed Method: Tractor, Friction, Sheet Feed
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 17 in.
Price: $1,899
Distribution Method: OEM, Third-party
Date First Installed: April 1982
(See Vendor Profile Page V-27)

QUINT SYSTEMS, INC.
KSR 700 SERIES
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii, Baudot
Maximum Transmission Speed: 1,200 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 60 char./sec
Maximum Characters Per Line: 137
Optional Character Set Sizes: 96, 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 9 in.
Price: $995
Distribution Method: Third-party
Number Installed to Date: 500 - 1,000
(See Vendor Profile Page V-30)

QUINT SYSTEMS, INC.
KSR-742-I
Data Transmission Characteristics: Half-Duplex, Asynchronous
Maximum Transmission Speed: 1,200 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 65 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Asci, Ebcdic
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Fan fold
Maximum Form Width: 9 in
Graphics Functions Supported: Dot Addressable
Colors Supported: 1
Price: $1,195
Distribution Method: Third-party

QUINT SYSTEMS, INC.
KSR 743
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 65 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 9 in.
Graphics Functions Supported: Dot Addressable
Price: $995
Distribution Method: Third-party
Date First Installed: January 1981

QUINT SYSTEMS, INC.
KSR-744
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii

Teleprinters

Maximum Transmission Speed: 1,200 bit/sec
Integral Modem/Coupler: Standard
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 65 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 9 in
Graphics Functions Supported: Dot [illegible]
Price: $1,295
Distribution Method: Third-party

TRANSLUZ CORP.
TLT
Data Transmission Characteristics: Asynchronous, Synchronous, Telex
Maximum Transmission Speed: 50 bit/sec
Integral Modem/Coupler: Standard
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 66 char./sec
Maximum Characters Per Line: 69
Communications Port: Serial
Form Feed Method: None
Maximum Form Width: 9 in
Graphics Functions Supported: None
Price: $2,295
Number Installed to Date: 500 - 1,000
(See Vendor Profile Page V-37)

TRENDATA CORP.
T-300
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ansi
Maximum Transmission Speed: 300 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 15 in.
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
(See Vendor Profile Page V-38)

TRENDATA CORP.
T-330
Data Transmission Characteristics: Ascii, Ansi
Maximum Transmission Speed: 9,600 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 165 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 128
Character Code: Ascii (Default)
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 15 in.
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1980

TRENDATA CORP.
T-4000
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in
Distribution Method: End user
Number Installed to Date: 5,000 - 10,000
Date First Installed: 1975

TRENDATA CORP.
T-6000
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii, Ansi
Maximum Transmission Speed: 9,600 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: 1982

TRENDATA CORP.
T-8000
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Type Element
Maximum Print Speed: 15 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 128
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 15 in.
Distribution Method: End user
Date First Installed: 1983

Recieve-Only Teleprinters

C. ITOH ELECTRONICS
1554-S
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char./sec
Maximum Characters Per Line: 230
Optional Character Set Sizes: Unlimited
Character Code: Ascii
Communications Port: Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 16 in.
Price: $995
Distribution Method: OEM, Third-party
(See Vendor Profile Page V-7)

C. ITOH ELECTRONICS
1560-S
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 230
Optional Character Set Sizes: Unlimited
Character Code: Ascii
Communications Port: Serial, Parallel
Forms Type Accepted: Roll, Cut sheet
Maximum Form Width: 16 in.
Price: $1,295
Distribution Method: OEM, Third-party

C. ITOH ELECTRONICS
1550-SC
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 230
Optional Character Set Sizes: Unlimited
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 16 in.
Distribution Method: OEM, Third-party

C. ITOH ELECTRONICS
8510-S
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char./sec
Optional Character Set Sizes: 96, Unlimited
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 10 in.
Price: $695
Distribution Method: OEM, Third-party

C. ITOH ELECTRONICS
8510-S
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Optional Character Set Sizes: Variable
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 10 in.
Price: $825
Distribution Method: OEM, Third-party

C. ITOH ELECTRONICS
8510-SC
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: Unlimited
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 10 in.
Price: $925
Distribution Method: OEM, Third-party

C. ITOH ELECTRONICS
8500-S
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Print Mechanism: Impact
Maximum Print Speed: 180 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: Unlimited
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 10 in.
Colors Supported: 1
Price: $1,395
Distribution Method: OEM, Third-party

C. ITOH ELECTRONICS
A-10
Data Transmission Characteristics: Asynchronous, Ascii
Maximum Transmission Speed: 4,800 bit/sec
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 20 char./sec
Maximum Characters Per Line: 118

Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 15 in.
Price: $000
Distribution Method: OEM, Third-party

C. ITOH ELECTRONICS
F-10-40
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 2,400 bit/sec
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 136
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Price: $1,795
Distribution Method: OEM, Third-party

C. ITOH ELECTRONICS
F-10-55
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 55 char./sec
Maximum Characters Per Line: 136
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Distribution Method: OEM, Third-party
Number Installed to Date: 2,295

COMPUTER TRANSCEIVER SYSTEMS, INC.
EXECUPORT 420 RO
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Ascii
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 140
Standard Character Set Size: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll, Cut sheet
Maximum Form Width: 9 in.
Graphics Functions Supported: Dot Addressable
Price: $715
Distribution Method: End user
Date First Installed: February 1982
(See Vendor Profile Page V-8)

DATA GENERAL CORP.
4433
Data Transmission Characteristics: Asynchronous
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 14 in.
Price: $1,800
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: July 1982
(See Vendor Profile Page V-10)

DATAPRODUCTS NEW ENGLAND, INC.
2910 (TT-624) MILITARY TELEPRINTER
Print Mechanism: Impact
Print Technique: Drum
Maximum Print Speed: 1,110 line/min
Maximum Characters Per Line: 72
Optional Character Set Sizes: 64
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 9 in.
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1978
(See Vendor Profile Page V-11)

DATAPRODUCTS NEW ENGLAND, INC.
M/T 120D TEMPEST MATRIX PRINTER
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 4,800 bit/sec
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 340 char./sec
Maximum Print Speed: 500 line/min
Maximum Characters Per Line: 69
Optional Character Set Sizes: 96
Character Code: Ascii, Ebcdic
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 9 in.
Price: $8,525
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: December 1981

DIABLO SYSTEMS, INC.
630 ECS
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 40 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 192
Optional Character Set Size: 96, 88, 92
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Price: $5,000
Distribution Method: Third-party
Date First Installed: February 1982
(See Vendor Profile Page V-12)

DIABLO SYSTEMS, INC. SERIES 32
Data Transmission Characteristics: Full-Duplex, Ascii
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 150 char./sec
Maximum Characters Per Line: 132
Standard Character Set Size: 96
Optional Character Set Sizes: 64
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 15 in.
Graphics Functions Supported: Dot Addressable
Price: $1,400
Distribution Method: Third-party
Date First Installed: January 1982

FUJITSU AMERICA, INC.
DPL 24
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction, Pin, Sheet Feed
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 16 in.
Graphics Functions Supported: Graphics
Price: $1,995
Number Installed to Date: Under 100
(See Vendor Profile Page V-15)

FUJITSU AMERICA, INC.
DPML 24
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Print Mechanism: Impact
Maximum Print Speed: 80 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction, Pin, Sheet Feed
Forms Type Accepted: Fan fold, Cut sheet
Maximum Form Width: 10 in.
Graphics Functions Supported: Graphics
Number Installed to Date: Under 100

FUJITSU AMERICA, INC.
SP320
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 48 char./sec
Maximum Characters Per Line: 136
Optional Character Set Sizes: 96, 128
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor, Friction, Pin, Bin Feeder
Forms Type Accepted: Fan fold
Maximum Form Width: 16 in.
Price: $1,500
Date First Installed: December 1983

FUJITSU AMERICA, INC.
TTP 16
Data Transmission Characteristics: Half Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Cut sheet
Maximum Form Width: 10 in.
Price: $650
Date First Installed: March 1984
(See Vendor Profile Page V-15)

MANNESMANN TALLY CORP.
MT 1612
Data Transmission Characteristics: Half Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Print Mechanism: Impact
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Maximum Form Width: 15 in.
Distribution Method: OEM, Third-party
Number Installed to Date: 10,000 - 50,000
Date First Installed: 1978
(See Vendor Profile Page V-22)

NCR CORP.
NCR 2600 (RO)
Data Transmission Characteristics: Asynchronous
Maximum Transmission Speed: 1,200 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Nonimpact
Print Technique: Thermal Matrix
Maximum Print Speed: 30 char./sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 9 in.
Price: $1,995
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: June 1981
(See Vendor Profile Page V-26)

OKIDATA SYSTEMS, INC.
RO 700 SERIES
Data Transmission Characteristics: Half Duplex, Asynchronous, Baudot
Maximum Transmission Speed: 9,600 bit/sec

Teleprinters

Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 60 char./sec
Maximum Characters Per Line: 137
Optional Character Set Sizes: 96, 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 8 in.
Price: $795
Distribution Method: Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: September 1981
(See Vendor Profile Page V-30)

QWINT SYSTEMS, INC.
RO 743
Data Transmission Characteristics: Half Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 65 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Fan fold
Maximum Form Width: 9 in.
Graphics Functions Supported: Dot Addressable
Price: $795
Distribution Method: Third-party
Date First Installed: June 1981

QWINT SYSTEMS, INC.
RO-744
Data Transmission Characteristics: Half Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Integral Modem/Coupler: Standard
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 65 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 9 in.
Graphics Functions Supported: Dot Addressable
Price: $895
Distribution Method: Third-party
Date First Installed: November 1981

TELECOM TERMINAL SYSTEMS
AIRLINE TICKET PRINTER
Data Transmission Characteristics: Half Duplex, Asynchronous
Maximum Transmission Speed: 75 bit/sec
Integral Modem/Coupler: Standard
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 64
Character Code: Ebcdic
Communications Port: Serial
Form Feed Method: Line Feed
Price: $2,000
Distribution Method: End user
Number Installed to Date: 1,000
Date First Installed: November 1979
(See Vendor Profile Page V-36)

TELETYPE CORP.
MODEL 40
Data Transmission Characteristics: Half Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 4,800 bit/sec
Print Mechanism: Impact
Print Technique: Belt
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $6,992
Distribution Method: Third-party
Date First Installed: September 1974
(See Vendor Profile Page V-36)

TELETYPE CORP.
MODEL 40-TELE
Data Transmission Characteristics: Half Duplex, Synchronous, Ascii
Maximum Transmission Speed: 7,200 bit/sec
Print Mechanism: Impact
Print Technique: Belt
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 48, 64, 96
Character Code: Ascii, Ebcdic
Communications Port: Serial
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $7,685
Distribution Method: Third-party
Date First Installed: April 1978

TELETYPE CORP.
T-300
Data Transmission Characteristics: Half Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Print Mechanism: Impact
Print Technique: Belt
Maximum Print Speed: 300 line/min
Maximum Characters Per Line: 132
Optional Character Set Sizes: 64, 96, 128, 256
Character Code: Ascii
Communications Port: Serial, Parallel
Form Feed Method: Tractor
Forms Type Accepted: Fan fold
Price: $4,425
Distribution Method: Third-party
Date First Installed: 1983

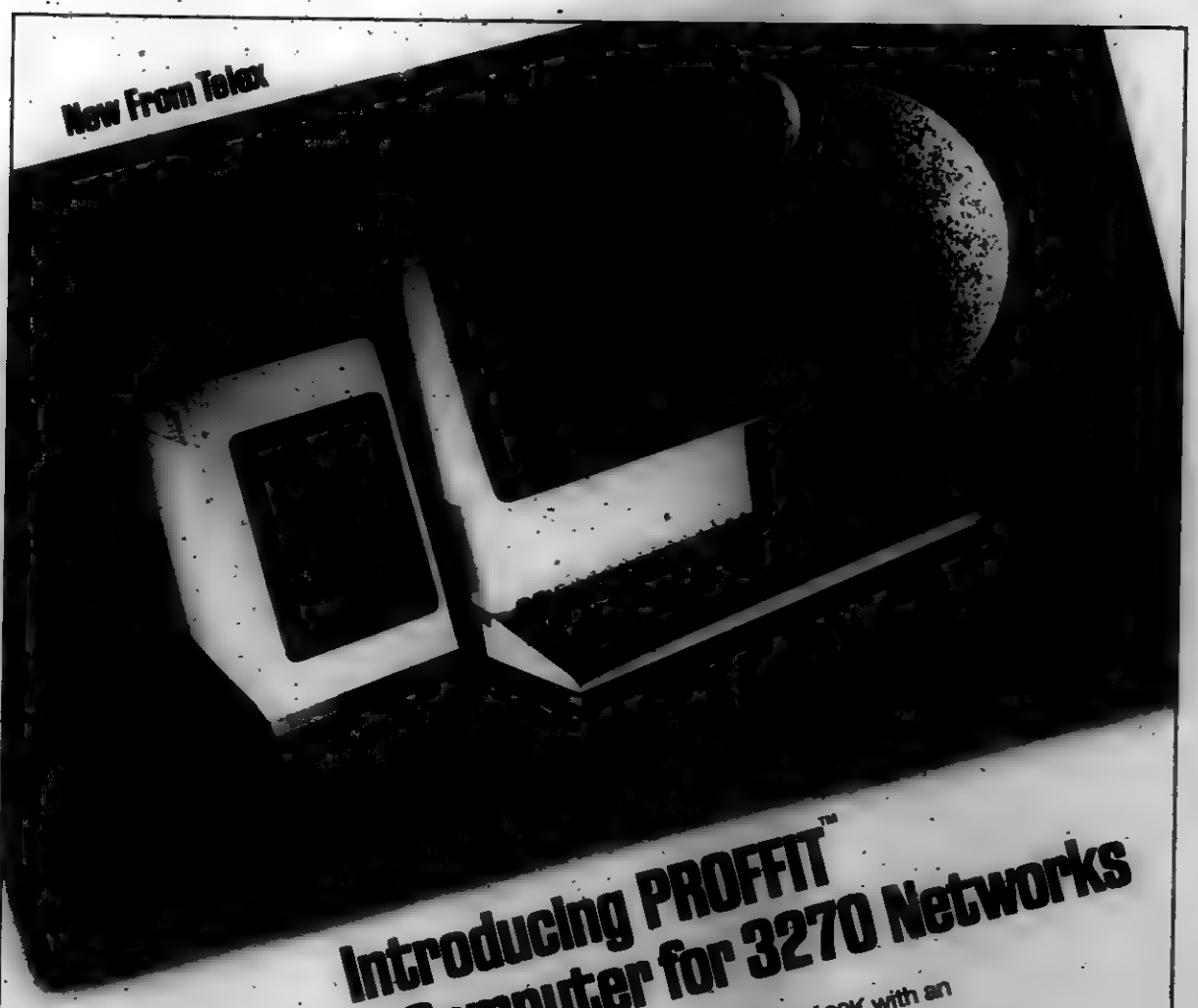
Other Teleprinter Types

EXTEL CORP.
COM MASTER
Data Transmission Characteristics: Half Duplex, Asynchronous
Maximum Transmission Speed: 1,200 bit/sec
Integral Modem/Coupler: Standard
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 200 char./sec
Maximum Characters Per Line: 132
Optional Character Set Sizes: 96, 128
Character Code: Ascii, Baudot
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll, Cut sheet
Maximum Form Width: 10 in.
Price: $5,000
Number Installed to Date: 100 - 500
Date First Installed: June 1983
(See Vendor Profile Page V-15)

EXTEL CORP.
COM SCRIBE
Data Transmission Characteristics: Half Duplex
Maximum Transmission Speed: 9,600 bit/sec
Integral Modem/Coupler: Standard
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 60 char./sec
Maximum Characters Per Line: 50,6
Optional Character Set Sizes: 64, 96, 128
Character Code: Ascii, B
Communications Port: Serial
Form Feed Method: Friction, Pin
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 10 in.
Price: $1,300
Number Installed to Date: 100 - 500
Date First Installed: June 1983

EXTEL CORP.
COM WRITER
Data Transmission Characteristics: Half Duplex, Asynchronous, Ascii, Baudot
Maximum Transmission Speed: 1,200 bit/sec
Integral Modem/Coupler: Standard
Print Mechanism: Impact
Print Technique: Daisywheel
Maximum Print Speed: 120 char /sec
Maximum Characters Per Line: 80
Optional Character Set Sizes: 128
Character Code: Ascii, B
Communications Port: Serial
Form Feed Method: Tractor, Friction, Pin
Forms Type Accepted: Fan fold, Roll
Maximum Form Width: 9 in.
Price: $1,695
Distribution Method: Third-party
Number Installed to Date: 100 - 500
Date First Installed: June 1983

QWINT SYSTEMS, INC.
MSR 700 SERIES
Data Transmission Characteristics: Half Duplex, Full Duplex, Asynchronous, Ascii, Baudot
Maximum Transmission Speed: 1,200 bit/sec
Integral Modem/Coupler: Optional
Print Mechanism: Impact
Print Technique: Dot Matrix
Maximum Print Speed: 60 char /sec
Maximum Characters Per Line: 137
Optional Character Set Sizes: 96, 128
Character Code: Ascii
Communications Port: Serial
Form Feed Method: Friction
Forms Type Accepted: Roll
Maximum Form Width: 8 in.
Price: $1,295
Distribution Method: Third-party
Date First Installed: March 1982
(See Vendor Profile Page V-30)



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	3274 Plug-Compatible	12'' Screen, 1920 Characters	Upper Case/ Lower Case	Keyboard Choices	Response Time Indicator	Attachable Printer	Light Pen	Loose Plate Available	Narrow Keyboard	Keyboard Inter-changeable w/278, 279	Single Key Clear, PA1, PA2	Numeric Pad
Telex 178	YES	YES	YES	35	YES	YES	YES	YES	YES	YES	YES	YES
IBM 3178	YES	YES	YES	2	NO	NO	NO	NO	NO	NO	NO	NO

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Smart/Conversational Terminal Index By Compatibility

The index to smart/conversational terminals is designed to provide an overview of the products contained in this section of the buyer's guide and contains information on terminal compatibility, the terminal type and the price and the page number on which the terminal is listed. For purposes of this guide, a conversational terminal is considered a dumb terminal that offers two way communication with a host. A smart terminal has added features or editing capability and may or may not have some local memory.

Products are indexed according to compatibilities with seven major vendors' systems, including Burroughs Corp., Control Data Corp., Honeywell, Inc., NCR Corp. and Sperry Corp. In addition there there also two sections that contain terminals that are specifically TTY- or IBM 3270-compatible. The classification headings are listed in alphabetical order. Within each section, vendors and their products are listed alphabetically or numerically by model number. If a particular terminal is compatible with more than one vendor's product it is listed under each vendor with whom it is compatible.

If a particular terminal is not compatible with or has additional compatibilities outside of the major classifications it has been placed within the section entitled "Terminals With Other Compatibilities."

Manufacturers who did not specify compatiblity with any vendor's systems are listed alphabetically under the category "Terminals With No Compatibility Specified."

Complete product listings follow the index.

Burroughs-Compatible Terminals

VENDOR	MODEL	TYPE	PRICE	PAGE
Arts Computer Products, Inc.	ORATOR 1	Conversational	$5,300	B-40
	ORATOR 2	Conversational	$4,500	B-40
Burroughs Corp.	ET 1100	Smart	$1,895	B-13
Carterfone Communications Corp.	CARTERFONE 9830	Smart	$1,495	B-13
Cobar, Inc.	COBAR 3830	Smart	$1,795	B-14
Computerwise, Inc.	TRANSTERM 1A	Conversational	$449	B-41
Morgenthaler/Myers-Tek	MC 4010	Smart	$3,500	B-28
	MG4003	Smart	N/A	B-28
Northern Telecom, Inc.	DISPLAY PHONE	Conversational	$1,295	B-45
Tektronix, Inc.	4006	Conversational	$3,900	B-46
	4012	Conversational	$6,200	B-46
	4014-1	Smart	$15,750	B-32
	4016-1	Smart	$20,500	B-32
	4025A	Smart	$5,900	B-32
	4027A	Smart	$10,900	B-32
Transiac Corp.	TR 1024	Smart	$4,500	B-36

CDC-Compatible Terminals

VENDOR	MODEL	TYPE	PRICE	PAGE
Arts Computer Products, Inc.	ORATOR 1	Conversational	$5,300	B-40
	ORATOR 2	Conversational	$4,500	B-40
Computerwise, Inc.	TRANSTERM 1A	Conversational	$449	B-41
Control Data Corp.	MODEL 714-30	Smart	N/A	B-14
	MODEL 714-40	Smart	N/A	B-14
	MODEL 722	Smart	N/A	B-14
	VIKING 721-20	Smart	N/A	B-14
	VIKING 721-30	Smart	N/A	B-14
Northern Telecom, Inc.	DISPLAY PHONE	Conversational	$1,295	B-45
Tektronix, Inc.	4006	Conversational	$3,900	B-46

Smart/Conversational Terminals Index

VENDOR	MODEL	TYPE	PRICE	PAGE
Tektronix, Inc.	4012	*Conversational*	*$6,200*	**B-46**
	4014-1	*Smart*	*$15,750*	**B-32**
	4016-1	*Smart*	*$20,500*	**B-32**
	4025A	*Smart*	*$5,900*	**B-32**
	4027A	*Smart*	*$10,900*	**B-32**
Teleray	MODEL 7	*Smart*	*$1,295*	**B-33**
	MODEL 100	*Smart*	*$1,395*	**B-33**
Transtec Corp.	TR 1024	*Smart*	*$4,500*	**B-36**

Honeywell-Compatible Terminals

VENDOR	MODEL	TYPE	PRICE	PAGE
Arks Computer Products, Inc.	ORATOR 1	*Conversational*	*$5,300*	**B-40**
	ORATOR 2	*Conversational*	*$4,500*	**B-40**
Computerwise, Inc.	TRANSTERM 1A	*Conversational*	*$449*	**B-41**
Honeywell, Inc.	7315	*Smart*	*N/A*	**B-20**
	7325	*Smart*	*N/A*	**B-20**
	VDU 7020	*Smart*	*N/A*	**B-20**
	VIP 7200	*Smart*	*N/A*	**B-20**
	VIP 7201	*Smart*	*N/A*	**B-20**
	VIP 7205	*Smart*	*N/A*	**B-20**
	VIP 7207	*Smart*	*N/A*	**B-20**
	VIP 7301	*Smart*	*N/A*	**B-20**
	VIP 7303	*Smart*	*N/A*	**B-20**
	VIP 7305	*Smart*	*N/A*	**B-21**
	VIP 7307	*Smart*	*N/A*	**B-21**
	VIP 7311	*Smart*	*N/A*	**B-21**
	VIP 7321	*Smart*	*N/A*	**B-21**
	VIP 7802	*Smart*	*N/A*	**B-21**
	VIP 7803	*Smart*	*N/A*	**B-21**
	VIP 7804	*Smart*	*N/A*	**B-21**
	VIP 7805	*Smart*	*N/A*	**B-21**
	VIP 7813	*Smart*	*N/A*	**B-21**
	VIP 7814	*Smart*	*N/A*	**B-21**
	VIP 7823	*Smart*	*N/A*	**B-21**
ITT Courier Terminal Systems, Inc.	7700	*Smart*	*N/A*	**B-27**
	7750	*Smart*	*N/A*	**B-27**
Northern Telecom, Inc.	DISPLAY PHONE	*Conversational*	*$1,296*	**B-45**
Tektronix, Inc.	4006	*Conversational*	*$3,900*	**B-46**
	4012	*Conversational*	*$6,200*	**B-46**
	4014-1	*Smart*	*$15,750*	**B-32**
	4016-1	*Smart*	*$20,500*	**B-32**
	4025A	*Smart*	*$5,900*	**B-32**
	4027A	*Smart*	*$10,900*	**B-32**
Thomas Engineering	T-780X	*Smart*	*$1,895*	**B-36**
Transtec Corp.	TR 1024	*Smart*	*$4,500*	**B-36**

IBM 3270-Compatible Terminals

VENDOR	MODEL	TYPE	PRICE	PAGE
Braegen Corp.	B-6	*Smart*	*$2,000*	**B-12**
	8420	*Conversational*	*$1,500*	**B-40**
	8520 SERIES	*Smart*	*$1,500*	**B-12**
	8521	*Smart*	*$1,500*	**B-12**
	8522	*Smart*	*$1,500*	**B-12**
	8523	*Smart*	*$1,500*	**B-12**
Carterfone Communications Corp.	CARTERFONE 7276	*Smart*	*$2,995*	**B-13**
Computer Communications, Inc.	8278 DISPLAY STATION	*Smart*	*$1,500*	**B-14**
Computerwise, Inc.	TRANSTERM 1A	*Conversational*	*$449*	**B-41**
Control Concepts Corp.	CC-3276	*Smart*	*$3,300*	**B-14**
	CC-3278	*Conversational*	*$1,300*	**B-41**
	EM-3275	*Smart*	*N/A*	**B-14**
	EM-3276	*Smart*	*$2,600*	**B-14**
Custom Terminals, Inc.	CTI1000A	*Smart*	*$2,350*	**B-15**
Data General Corp.	DASHER D200	*Conversational*	*N/A*	**B-41**

Smart/Conversational Terminals Index

VENDOR	MODEL	TYPE	PRICE	PAGE
Datamedia Corp.	3270-5	*Smart*	*N/A.*	*B-15*
	3270-6	*Smart*	*N/A.*	*B-15*
	3270-8	*Smart*	*N/A.*	*B-15*
Decision Data Computer Corp.	3751-11 DISPLAY STATION	*Conversational*	*$2,175*	*B-42*
	3791-01 DISPLAY STATION	*Conversational*	*$1,810*	*B-42*
Digitus Corp.	DIGITUS CAD/CAM WORK STATION	*Smart*	*$55,000*	*B-18*
Epic Computer Products, Inc.	EPIC 327X	*Smart*	*$1,995*	*B-18*
IBM	3104	*Smart*	*N/A.*	*B-21*
	3178	*Smart*	*$1,660*	*B-21*
	3278	*Smart*	*$6,390*	*B-21*
	3277-1	*Smart*	*$1,470*	*B-21*
	3277-2	*Smart*	*$1,905*	*B-21*
	3278-1	*Smart*	*$2,185*	*B-21*
	3278-2	*Smart*	*$2,080*	*B-22*
	3278-3	*Smart*	*$2,525*	*B-22*
	3278-5	*Smart*	*$3,070*	*B-22*
	3279	*Smart*	*N/A.*	*B-22*
	5251	*Smart*	*N/A.*	*B-22*
	5252	*Smart*	*N/A.*	*B-22*
	5291	*Smart*	*N/A.*	*B-22*
	5292	*Smart*	*N/A.*	*B-22*
	8775	*Smart*	*N/A.*	*B-22*
Ikon Corp.	ICOT-700	*Smart*	*$1,095*	*B-22*
	ICOT-701	*Smart*	*$1,095*	*B-22*
Informer Computer Terminals, Inc.	INFORMER 207	*Smart*	*N/A.*	*B-24*
	INFORMER 376	*Smart*	*N/A.*	*B-24*
	INFORMER 378	*Smart*	*N/A.*	*B-24*
	MODEL 205	*Conversational*	*N/A.*	*B-43*
ITT Courier Terminal Systems, Inc.	700-15	*Smart*	*N/A.*	*B-26*
	1700	*Smart*	*$1,550*	*B-26*
	2700-13	*Smart*	*N/A.*	*B-26*
	2700-14	*Smart*	*N/A.*	*B-26*
	2700-16	*Smart*	*N/A.*	*B-26*
	2750	*Smart*	*N/A.*	*B-26*
	2770	*Smart*	*N/A.*	*B-26*
	2790-2A	*Smart*	*N/A.*	*B-26*
	2790-3A	*Smart*	*N/A.*	*B-27*
	2790-4A	*Smart*	*N/A.*	*B-27*
Lee Data Corp.	MODEL 1216	*Conversational*	*$1,411*	*B-43*
	MODEL 1218	*Conversational*	*$2,394*	*B-44*
	MODEL 1220	*Conversational*	*$2,790*	*B-44*
	MODEL 1230	*Conversational*	*$3,521*	*B-44*
MDS Trivex	8078 SERIES	*Smart*	*N/A.*	*B-28*
Memorex Corp.	1377 DISPLAY STATION	*Conversational*	*$1,100*	*B-44*
	2051 DISPLAY STATION	*Conversational*	*N/A.*	*B-44*
	2078 DISPLAY STATION	*Conversational*	*$3,435*	*B-44*
	2079 COLOR DISPLAY STATION	*Conversational*	*$3,726*	*B-44*
Microdata Corp.	7450	*Conversational*	*$1,990*	*B-44*
Mixtorf Computer Corp.	171 DATA TERMINAL	*Smart*	*$1,550*	*B-29*
	172 DATA TERMINAL	*Smart*	*$2,065*	*B-29*
	8278-X2X	*Smart*	*$1,945*	*B-29*
	8730	*Smart*	*$4,315*	*B-29*
	DAP 4	*Smart*	*$1,945*	*B-29*
Northern Telecom, Inc.	DISPLAY PHONE	*Conversational*	*$1,295*	*B-45*
Paradyne Corp.	MODEL 9476	*Smart*	*$4,600*	*B-29*
	MODEL 9478	*Smart*	*$2,000*	*B-29*
Phase Information Machines Corp.	P3278	*Smart*	*$1,545*	*B-30*
Product Development Services, Inc.	1150 INDUSTRIAL TERMINAL	*Conversational*	*$3,950*	*B-45*
Protocol Computer, Inc.	PCI51	*Conversational*	*$995*	*B-45*
	PCI78	*Conversational*	*$995*	*B-45*
Racal-Milgo, Inc.	4276	*Smart*	*$3,550*	*B-31*
	8278-2	*Smart*	*$1,640*	*B-31*
	8278-3	*Smart*	*$2,333*	*B-31*
	8278-4	*Smart*	*$2,333*	*B-31*
	8278-5	*Smart*	*$2,556*	*B-31*
Sperry Corp.	UTS 20	*Smart*	*$2,800*	*B-32*
Teletype Corp.	4540	*Smart*	*$4,745 to $5,040*	*B-33*
	5540	*Smart*	*$4,500 to $11,500*	*B-33*
Telex Computer Products, Inc.	178	*Smart*	*$1,550*	*B-34*
	276	*Smart*	*N/A.*	*B-34*
	276 MODEL 2	*Smart*	*N/A.*	*B-34*
	276 MODEL 3	*Smart*	*N/A.*	*B-34*
	276 MODEL 4	*Smart*	*N/A.*	*B-34*
	276 MODEL 5	*Smart*	*N/A.*	*B-34*
	278	*Smart*	*$3,900*	*B-34*
	478B	*Smart*	*N/A.*	*B-34*
	478L	*Smart*	*N/A.*	*B-34*
	478S	*Smart*	*N/A.*	*B-34*

Smart/Conversational Terminals Index

VENDOR	MODEL	TYPE	PRICE	PAGE
Wang Laboratories, Inc.	5300 SERIES	*Smart*	*$1,200*	**B-38**
	5900 SERIES	*Smart*	*$6,200*	**B-38**
	6300 SERIES	*Smart*	*$5,985*	**B-38**
	AWS-1	*Smart*	*$7,700*	**B-38**
	ERGO-2 MODEL 5740-4	*Smart*	*$8,000*	**B-38**
	ERGO-2 MODEL 5947	*Smart*	*$7,700*	**B-38**
	ERGO-2 MODEL 5948	*Smart*	*$7,000*	**B-38**
	ERGO-2 MODEL 5949	*Smart*	*$8,000*	**B-38**
	MODEL 2282	*Smart*	*$3,600*	**B-38**
	MODEL 2336DW	*Smart*	*$2,000*	**B-38**
	MODEL 5536	*Smart*	*$6,400*	**B-38**
	MODEL 5937	*Smart*	*N/A*	**B-38**
	MODEL 5938	*Smart*	*N/A*	**B-38**
	MODEL 5939	*Smart*	*N/A*	**B-39**
	UFKF ERGO-2	*Smart*	*$2,200*	**B-39**
	UGJGJLOMODEL 5846-4	*Smart*	*$6,700*	**B-39**

NCR-Compatible Terminals

VENDOR	MODEL	TYPE	PRICE	PAGE
Arts Computer Products, Inc.	ORATOR 1	*Conversational*	*$5,300*	**B-40**
	ORATOR 2	*Conversational*	*$4,500*	**B-40**
Computerwise, Inc.	TRANSTERM 1A	*Conversational*	*$449*	**B-41**
Northern Telecom, Inc.	DISPLAY PHONE	*Conversational*	*$1,295*	**B-[illegible]**
Tab Products Co.	TAB 132/15	*Smart*	*$2,100*	**B-32**
	TAB 132/15G	*Smart*	*$2,100*	**B-32**
Tektronix, Inc.	4006	*Conversational*	*$3,900*	**B-[illegible]**
	4012	*Conversational*	*$6,200*	**B-[illegible]**
	4014-1	*Smart*	*$15,750*	**B-32**
	4016-1	*Smart*	*$20,500*	**B-[illegible]**
	4025A	*Smart*	*$5,900*	**B-[illegible]**
	4027A	*Smart*	*$10,900*	**B-32**
Transtec Corp.	TR 1024	*Smart*	*$4,500*	**B-[illegible]**

Sperry-Compatible Terminals

VENDOR	MODEL	TYPE	PRICE	PAGE
Arts Computer Products, Inc.	ORATOR 1	*Conversational*	*$5,300*	**B-[illegible]**
	ORATOR 2	*Conversational*	*$4,500*	**B-40**
Chi Corp.	CHI 6830	*Smart*	*$2,700*	**B-13**
Computerwise, Inc.	TRANSTERM 1A	*Conversational*	*$449*	**B-41**
Intecolor	INTECOLOR 8001R/M	*Smart*	*$5,100*	**B-26**
Northern Telecom, Inc.	DISPLAY PHONE	*Conversational*	*$1,295*	**B-45**
Racal-Milgo, Inc.	4220/U200	*Smart*	*$3,370*	**B-31**
	4220/UTS 20	*Smart*	*$3,370*	**B-31**
Tektronix, Inc.	4006	*Conversational*	*$3,900*	**B-46**
	4012	*Conversational*	*$6,200*	**B-46**
	4014-1	*Smart*	*$15,750*	**B-32**
	4016-1	*Smart*	*$20,500*	**B-[illegible]**
	4025A	*Smart*	*$5,900*	**B-32**
	4027A	*Smart*	*$10,900*	**B-[illegible]**
Transtec Corp.	TR 1024	*Smart*	*$4,500*	**B-36**

TTY-Compatible Terminals

VENDOR	MODEL	TYPE	PRICE	PAGE
Alpha Micro Systems	AM60	*Smart*	*$1,000*	**B-11**
American Communications Corp.	AMCOM D	*Conversational*	*$449*	**B-40**
	AMCOM P	*Conversational*	*$695*	**B-40**

Smart/Conversational Terminals Index

VENDOR	MODEL	TYPE	PRICE	PAGE
American Communications Corp.	AMCOM 1	*Conversational*	*$449*	**B-40**
American Datacom	MODEL 300	*Smart*	*$2,995*	**B-11**
	400 SERIES MODEL 400	*Smart*	*$2,895*	**B-11**
	400 SERIES MODEL 450	*Smart*	*$3,895*	**B-11**
Ampex Corp.	D-125	*Smart*	*$679*	**B-11**
	D-150	*Smart*	*$849*	**B-11**
	D-175	*Smart*	*$869*	**B-11**
Anderson Jacobson, Inc.	AJ510	*Conversational*	*$1,995*	**B-40**
	AJ520	*Smart*	*$2,395*	**B-11**
Andromeda Systems, Inc.	VDT 11A	*Conversational*	*$1,700*	**B-40**
	VDT 11B	*Conversational*	*$1,900*	**B-40**
	VDT 11C	*Conversational*	*$2,200*	**B-40**
Ann Arbor Terminals, Inc.	ANN ARBOR AMBASSADOR	*Smart*	*$1,595*	**B-11**
	GENIE	*Smart*	*$1,195*	**B-11**
	GENIE+	*Smart*	*$1,395*	**B-11**
	GURU	*Smart*	*$2,395*	**B-12**
Applied Digital Data Systems, Inc.	VIEWPOINT-COLOR	*Smart*	*$1,295*	**B-12**
	VIEWPOINT A-1	*Smart*	*$650*	**B-12**
	VIEWPOINT A-2	*Smart*	*NA*	**B-12**
	VIEWPOINT 3A+	*Smart*	*$1,095*	**B-12**
	VIEWPOINT 78	*Smart*	*$1,095*	**B-12**
	VIEWPOINT 90	*Smart*	*$1,295*	**B-12**
Arts Computer Products, Inc.	ORATOR 1	*Conversational*	*$5,300*	**B-40**
	ORATOR 2	*Conversational*	*$4,500*	**B-40**
Burr Brown Research Corp.	TM25	*Smart*	*$256*	**B-12**
	TM27	*Smart*	*$250*	**B-12**
	TM70	*Smart*	*$495*	**B-12**
	TM71	*Smart*	*$595*	**B-12**
	TM71B	*Smart*	*$1,495*	**B-12**
	TM71-IO	*Smart*	*$695*	**B-13**
	TM76	*Smart*	*$495*	**B-13**
	TM77	*Smart*	*$595*	**B-13**
	TM77B	*Smart*	*$1,495*	**B-13**
	TM77-IO	*Smart*	*$69,500*	**B-13**
CIE Systems, Inc.	CIT-80	*Conversational*	*$1,195*	**B-40**
	CIT-101	*Conversational*	*$1,495*	**B-40**
	CIT-101E	*Smart*	*$1,495*	**B-13**
	CIT-161	*Conversational*	*$2,595*	**B-40**
	CIT-414	*Conversational*	*$1,695*	**B-40**
	CIT-427	*Conversational*	*NA*	**B-40**
	CIT-500	*Smart*	*$2,150*	**B-13**
Cobar, Inc.	3100	*Conversational*	*$1,195*	**B-40**
	COBAR 3132	*Smart*	*$1,495*	**B-14**
Colorgraphic Communications Corp.	MVI-7	*Smart*	*$3,500*	**B-14**
	MVI-100	*Smart*	*$2,750*	**B-14**
Computervisa, Inc.	TRANSTERM 1	*Conversational*	*$449*	**B-41**
	TRANSTERM 1A	*Conversational*	*$449*	**B-41**
	TRANSTERM 2	*Conversational*	*$549*	**B-41**
	TRANSTERM 3	*Conversational*	*$499*	**B-41**
Control Data Corp.	MODEL 714-30	*Smart*	*NA*	**B-14**
	MODEL 714-40	*Smart*	*NA*	**B-14**
	MODEL 722	*Smart*	*NA*	**B-14**
	VIKING 721-20	*Smart*	*NA*	**B-14**
	VIKING 721-30	*Smart*	*NA*	**B-14**
Cromemco, Inc.	3102	*Smart*	*$2,295*	**B-14**
	CI, CTI, CKBA	*Conversational*	*$885*	**B-41**
	CI, CTI, CKBC	*Conversational*	*$1,085*	**B-41**
Data General Corp.	6052 DASHER	*Conversational*	*NA*	**B-41**
	6053 DASHER	*Conversational*	*NA*	**B-41**
	DASHER D100	*Conversational*	*NA*	**B-41**
	DASHER D280C	*Conversational*	*NA*	**B-41**
	DASHER G300	*Conversational*	*NA*	**B-41**
	DASHER D400	*Conversational*	*NA*	**B-41**
	DASHER D450	*Conversational*	*NA*	**B-41**
Datamedia Corp.	COLORSCAN 10	*Conversational*	*NA*	**B-41**
	COLORSCAN 10 RETROGRAPHICS	*Smart*	*NA*	**B-15**
	COLORSCAN 30	*Conversational*	*NA*	**B-41**
	COLORSCAN 60	*Smart*	*NA*	**B-15**
	COLORSCAN 60 RETROGRAPHICS	*Smart*	*NA*	**B-15**
	COLORSCAN 70	*Conversational*	*NA*	**B-42**
	EXCEL 10	*Conversational*	*NA*	**B-42**
	EXCEL 20	*Conversational*	*NA*	**B-42**
	EXCEL 30	*Conversational*	*NA*	**B-42**
	EXCEL 30 MULTIPLE ATTRIBUTE WP	*Smart*	*NA*	**B-15**
	EXCEL 40	*Smart*	*NA*	**B-15**
	EXCEL 60	*Smart*	*NA*	**B-15**
Data Type, Inc.	X5A	*Conversational*	*$4,995*	**B-42**

Smart/Conversational Terminals Index

VENDOR	MODEL	TYPE	PRICE	PAGE
Data Type, Inc.	XK1	*Conversational*	*$4,495*	**B-42**
Datavue Corp.	132C	*Smart*	*$1,795*	**B-15**
Delta Data Systems Corp.	D2830 IU	*Smart*	*$1,895*	**B-15**
	DELTA 2100	*Conversational*	*$1,995*	**B-42**
	DELTA 2202	*Smart*	*$2,300*	**B-15**
	DELTA 2830 II	*Smart*	*$1,695*	**B-16**
	TC 2832	*Smart*	*$4,995*	**B-16**
Digital Equipment Corp.	VT100	*Smart*	*$2,140*	**B-16**
	VT101	*Conversational*	*$1,350*	**B-42**
	VT102	*Smart*	*$1,710*	**B-16**
	VT125	*Smart*	*$3,800*	**B-16**
	VT131	*Smart*	*$1,825*	**B-16**
Envision	ENVISION 210	*Smart*	*$2,750*	**B-16**
	ENVISION 220	*Smart*	*$4,950*	**B-16**
Esprit Systems, Inc.	ESPRIT	*Smart*	*N/A*	**B-16**
	EXECUTIVE 80/20	*Smart*	*N/A*	**B-16**
	EXECUTIVE 80/30	*Smart*	*N/A*	**B-16**
	HAZELTINE III	*Smart*	*N/A*	**B-19**
Falco Data Products, Inc.	TS1	*Smart*	*$1,195*	**B-19**
General Terminal Corp.	SW 10	*Smart*	*$849*	**B-19**
Genisco Computers Corp.	G-1000	*Smart*	*$9,950*	**B-19**
	G-2200	*Smart*	*$12,500*	**B-19**
Graftek, Inc.	METEOR WS-1024	*Smart*	*$35,000*	**B-19**
Heath Co.	ZTX-10	*Smart*	*$399*	**B-19**
Hewlett-Packard Co.	2382A	*Conversational*	*$1,720*	**B-42**
	2621B/2629L	*Smart*	*$1,645*	**B-20**
	2623A	*Smart*	*$3,250*	**B-20**
	2624B	*Smart*	*$3,035*	**B-20**
	2626A	*Smart*	*$4,400*	**B-20**
	2648A	*Smart*	*$7,150*	**B-20**
	HP2627A	*Smart*	*$5,975*	**B-20**
	HP2645A	*Smart*	*$4,600*	**B-20**
Hitachi	3101	*Smart*	*$1,495*	**B-21**
ID Systems Corp.	ID-100	*Smart*	*$3,695*	**B-22**
	ID-100MVBSP	*Smart*	*$3,395*	**B-22**
	ID-100MVA	*Smart*	*$2,895*	**B-22**
	ID-100MVBLP	*Smart*	*$3,695*	**B-22**
	ID-100V	*Smart*	*$3,895*	**B-24**
	ID-100VA	*Smart*	*$4,395*	**B-24**
	ID-100VBLP	*Smart*	*$5,895*	**B-24**
	ID-100VBSP	*Smart*	*$5,395*	**B-24**
Informer Computer Terminals, Inc.	304	*Smart*	*N/A*	**B-24**
	INFORMER 207	*Smart*	*N/A*	**B-24**
	INFORMER 401	*Smart*	*N/A*	**B-24**
	MODEL 201	*Conversational*	*N/A*	**B-43**
	MODEL 202	*Conversational*	*N/A*	**B-43**
	MODEL 203	*Conversational*	*N/A*	**B-43**
Intecolor	INTECOLOR VHR-19	*Smart*	*$3,700*	**B-24**
	INTECOLOR 2405	*Smart*	*$1,295*	**B-24**
	INTECOLOR 2427D	*Smart*	*$2,695*	**B-24**
	INTECOLOR 8001G	*Smart*	*$2,745*	**B-24**
	INTECOLOR 8001H	*Smart*	*$3,175*	**B-24**
	INTECOLOR 8001R	*Smart*	*$3,975*	**B-24**
	INTECOLOR 8001UL	*Smart*	*$3,795*	**B-24**
	INTECOLOR 8301G	*Smart*	*$3,045*	**B-26**
	INTECOLOR 8301H	*Smart*	*$3,440*	**B-26**
	INTECOLOR 8301R	*Smart*	*$4,240*	**B-26**
Interaction Systems, Inc.	TT/100	*Conversational*	*$4,000*	**B-43**
	TT/150	*Conversational*	*$2,470*	**B-43**
IXO, Inc.	TC-101 PORTABLE TERMINAL	*Conversational*	*$300*	**B-43**
	TC-102 PORTABLE TERMINAL	*Conversational*	*$325*	**B-43**
	TC-200 PORTABLE TERMINAL	*Smart*	*$350*	**B-27**
John Fluke Manufacturing Co., Inc.	1780A	*Conversational*	*$1,995*	**B-43**
Jupiter Systems, Inc.	JUPITER 7 PLUS	*Smart*	*$15,000*	**B-27**
Kimtron Corp.	ABM 83	*Smart*	*$695*	**B-27**
	ABM 85	*Smart*	*$795*	**B-27**
	ABM 85H	*Smart*	*$865*	**B-27**
	ABM 86	*Smart*	*$995*	**B-27**
Lear Siegler, Inc.	ADM 3A	*Conversational*	*$595*	**B-43**
	ADM 5	*Conversational*	*$645*	**B-43**
	ADM 23	*Smart*	*$795*	**B-27**
	ADM 24	*Smart*	*$1,195*	**B-27**
	ADM 42	*Smart*	*$2,195*	**B-28**
	ADM II	*Conversational*	*$695*	**B-43**
Lee Data Corp.	MODEL 1216	*Conversational*	*$1,411*	**B-43**
	MODEL 1218	*Conversational*	*$2,394*	**B-44**
	MODEL 1220	*Conversational*	*$2,795*	**B-44**

Smart/Conversational Terminals Index

VENDOR	MODEL	TYPE	PRICE	PAGE
Liberty Electronics, U.S.A.	FREEDOM 50	Smart	$395	B-28
	FREEDOM 100	Smart	$595	B-28
Morgenthaler/Skyero-Tek	ADCOM	Smart	$20,000	B-28
	MG4003 (TEXT TERMINAL)	Smart	N/A	B-28
Microdata Corp.	PRISM IV	Conversational	$1,495	B-44
Micro-Term, Inc.	ACT 5A	Smart	$995	B-28
	ERGO 201	Smart	$695	B-28
	ERGO 301	Smart	$895	B-28
	ERGO 4000	Smart	$1,895	B-28
	MIME 2A	Smart	$1,045	B-29
Milgo Corp.	MIL-TERM-280	Conversational	$15,600	B-44
Motorola, Inc.	EXORTERM 155	Smart	$2,590	B-29
NABU Commercial Terminal, Inc.	3100	Smart	$1,095	B-29
	4404	Conversational	$695	B-44
NCR Corp.	7900 MODEL 1	Conversational	N/A.	B-44
	7900 MODEL 2	Conversational	N/A.	B-44
	7900 MODEL 3	Conversational	N/A.	B-44
	7900 MODEL 4	Conversational	N/A.	B-44
	NCR 7901	Conversational	$850	B-45
Nixdorf Computer Corp.	NIXDORF 8141	Smart	$2,300	B-29
Northern Telecom, Inc.	DISPLAY PHONE	Conversational	$1,295	B-45
Novation, Inc.	EXECUTIVE	Smart	$945	B-29
	MAXI & CCITT	Smart	$1,150	B-29
Perkin-Elmer Corp.	550	Conversational	N/A.	B-45
	550B	Conversational	N/A.	B-45
	550E	Conversational	N/A.	B-45
	550S	Smart	N/A	B-29
	1245	Smart	N/A.	B-30
	1250	Smart	N/A.	B-30
	1251	Smart	N/A.	B-30
	DATA STATION	Smart	N/A.	B-30
PHC, Inc.	IWS 100	Conversational	$1,595	B-45
Phoenix Digital Corp.	IDT 900A	Smart	$5,850	B-30
	IDT 900A-D	Smart	$6,825	B-30
	OPTOVIEW 100	Smart	$3,850	B-30
Plessey Peripheral Systems	PT-600 COLOR TERMINAL	Smart	$3,200	B-30
Prime Computer, Inc.	PT 25	Smart	N/A.	B-30
	PT 45	Smart	N/A.	B-30
Product Development Services, Inc.	1150 INDUSTRIAL TERMINAL	Conversational	$3,950	B-45
Protocol Computer, Inc.	PCI51	Conversational	$995	B-45
	PCI78	Conversational	$995	B-45
Qume Corp.	QVT-102	Smart	$695	B-31
	QVT-103	Smart	$1,095	B-31
	QVT-108	Smart	$895	B-31
Sanyo Business Systems Corp.	CRX101	Smart	N/A.	B-31
Seiko Instruments U.S.A., Inc.	D-SCAN 2212	Smart	N/A	B-31
	D-SCAN 2412	Smart	$21,850	B-32
Sperry Corp.	UTS 10	Conversational	$1,426 to $1,720	B-45
Tab Products Co.	TAB 132/15	Smart	$2,100	B-32
	TAB 132/15G	Smart	$3,295	B-32
Tandberg Data, Inc.	TDV 2200 SERIES	Smart	$1,875	B-32
TEC, Inc.	TEC ET 100	Smart	$1,975	B-32
Tektronix, Inc.	4006	Conversational	$3,900	B-46
	4012	Conversational	$6,200	B-46
	4014-1	Smart	$15,750	B-32
	4016-1	Smart	$20,500	B-32
	4025A	Smart	$5,900	B-32
	4027A	Smart	$10,900	B-32
Telex Information, Inc.	780	Smart	$2,595	B-32
	GC-100	Smart	$3,395	B-32
	GC-500	Smart	$1,195	B-33
	VCS-780 DX	Smart	$3,795	B-33
	VCS-780D	Smart	$3,495	B-33
Teleray	16-7801	Smart	$1,795	B-33
	16-APL	Smart	$1,545	B-33
	16-GRF	Smart	$3,000	B-33
	MODEL 7	Smart	$1,295	B-33
Teleconcepts Systems, Inc.	P2C	Conversational	$8,950	B-46
Teletype Corp.	4430	Smart	$4,245	B-33
	5410	Conversational	$995	B-46
	5420	Smart	$1,495	B-33
TeleVideo Systems, Inc.	910	Conversational	$649	B-46
	910 PLUS	Smart	$695	B-34
	914	Smart	$699	B-34
	924	Smart	$899	B-34
	925	Smart	$995	B-34
	950	Smart	$1,195	B-34

Smart/Conversational Terminals Index

VENDOR	MODEL	TYPE	PRICE	PAGE
TeleVideo Systems, Inc.	970	Smart	$1,495	B-34
Telpar, Inc.	801	Smart	$3,200	B-36
	802	Smart	$3,950	B-36
	IT651C	Smart	$3,200	B-36
	IT801C	Smart	$3,200	B-36
	IT802C	Smart	$3,950	B-36
	M651C	Smart	$3,200	B-36
Transiac Corp.	TR 1024	Smart	$4,500	B-36
Trans-Lux Corp.	TRANSLUX CONNECTION	Conversational	$3,495	B-40
Trendcom	WHISPER SCREEN	Smart	$1,695	B-36
Visual Technology, Inc.	VISUAL 55	Conversational	$895	B-40
	VISUAL 100	Smart	$1,345	B-36
	VISUAL 110	Smart	$1,395	B-36
	VISUAL 200	Smart	N/A.	B-36
	VISUAL 310	Smart	$1,300	B-36
	VISUAL 330	Smart	$1,150	B-36
	VISUAL 400	Smart	N/A.	B-36
	VISUAL 500	Smart	$2,495	B-36
	VISUAL 550	Smart	N/A.	B-36
Wang Laboratories, Inc.	5300 SERIES	Smart	$1,200	B-36
	5900 SERIES	Smart	$6,200	B-36
	6300 SERIES	Smart	$5,985	B-36
	AWS-1	Smart	$7,700	B-36
	ERGO-2 MODEL 5740-4	Smart	$8,000	B-36
	ERGO-2 MODEL 5947	Smart	$7,700	B-36
	ERGO-2 MODEL 5948	Smart	$7,000	B-36
	ERGO-2 MODEL 5949	Smart	$8,000	B-36
	MODEL 2282	Smart	$3,600	B-36
	MODEL 2336DW	Smart	$2,000	B-36
	MODEL 5536	Smart	$6,400	B-36
	MODEL 5937	Smart	N/A.	B-36
	MODEL 5938	Smart	N/A.	B-36
	MODEL 5939	Smart	N/A.	B-36
	UFKF ERGO-2	Smart	$2,200	B-36
	UGJGJLOMODEL 5846-4	Smart	$6,700	B-36
World Storage Technology Ltd.	SERIES 4100	Smart	$2,500	B-36
Wyse Technology, Inc.	WY-100	Smart	$900	B-36
	WY-300	Smart	$1,295	B-36
Xeta, Inc.	XETA	Conversational	$395	B-40
Zenith Data Systems	Z-19	Smart	$895	B-36
	Z-29	Smart	$849	B-36
	ZT-1	Smart	$699	B-36
	ZT1	Smart	$590	B-36
Zentec Corp.	COBRA	Smart	$1,250	B-36
	ZEPHYR	Smart	$1,150	B-36

Terminals With Other Compatibilities

VENDOR	MODEL	TYPE	PRICE	PAGE
Ampex Corp.	D-175	Smart	$899	B-11
Andromeda Systems, Inc.	VDT 11C	Conversational	$2,200	B-40
Arts Computer Products, Inc.	ORATOR 1	Conversational	$5,300	B-40
	ORATOR 2	Conversational	$4,500	B-40
Data General Corp.	DASHER D280C	Conversational	N/A.	B-41
Datamedia Corp.	COLORSCAN 10	Conversational	N/A.	B-41
	COLORSCAN 30	Conversational	N/A.	B-41
	COLORSCAN 60 RETROGRAPHICS	Smart	N/A.	B-15
	COLORSCAN 70 RETROGRAPHICS	Smart	N/A.	B-15
	EXCEL 30 MULTIPLE ATTRIBUTE WP	Smart	N/A.	B-15
	EXCEL 70	Conversational	N/A.	B-42
Heath Co.	ZTX-10	Smart	$399	B-19
	ZTX-11	Smart	$449	B-19
Milgo Corp.	MIL-TERM-280	Conversational	$15,600	B-44
PHC, Inc.	IWS 100	Conversational	$1,595	B-45
Pheasey Peripheral Systems	PT-100B VIDEO DISPLAY TERMINAL	Smart	$1,450	B-30
	PT-600 COLOR TERMINAL	Smart	$3,200	B-30
Product Development Services, Inc.	4150 MONITOR	Conversational	$1,900	B-45
Sperry Corp.	UTS 20	Smart	$2,800	B-32
Tab Products Co.	TAB 132/15	Smart	$2,100	B-32
	TAB 132/15G	Smart	$3,295	B-32
Tallbee Electric Wire Co., Ltd.	TH-3	Conversational	N/A.	B-46

Smart/Conversational Terminals Index

VENDOR	MODEL	TYPE	PRICE	PAGE
Tektronix, Inc.	4025A	Smart	$5,900	B-32
	4027A	Smart	$10,900	B-32
Teleray	MODEL 100	Smart	$1,395	B-33
TeleVideo Systems, Inc.	970	Smart	$1,495	B-34
Visual Technology, Inc.	VISUAL 310	Smart	$1,300	B-36

Terminals With No Compatibility Specified

VENDOR	MODEL	TYPE	PRICE	PAGE
Advanced Electronics Design, Inc.	AED 767	Smart	$5,995	B-11
	AED 1024	Smart	$9,995	B-11
Altos Computer Systems	ALTOS II	Smart	$1,195	B-11
Applied Digital Data Systems, Inc.	VIEWPOINT 79	Smart	N/A.	B-12
Arts Computer Products, Inc.	LPVT	Conversational	$5,300	B-40
Carterfone Communications Corp.	CARTERFONE 7700	Smart	$9,800	B-13
	CARTERFONE 7800	Smart	$5,020	B-13
Chromatics, Inc.	CT 4100	Smart	$2,995	B-13
	CT 4200	Smart	$3,995	B-13
	CT 4300	Smart	$6,995	B-13
Computerwise, Inc.	TRANSTERM 3P	Smart	$649	B-14
Datamedia Corp.	COLORSCAN 30 RETROGRAPHICS	Smart	N/A.	B-15
Direct, Inc.	HP-825	Smart	$1,890	B-16
Epic Computer Products, Inc.	EPIC 146	Smart	$995	B-16
Fujitsu America, Inc.	8840	Smart	$3,200	B-19
	8844	Smart	$3,680	B-19
	8846	Smart	$4,920	B-19
General Digital Corp.	VUE POINT	Conversational	$3,500	B-42
General Terminal Corp.	AVANT 251-251	Smart	$995	B-19
	SW 80	Smart	$995	B-19
Harris Corp.	1675	Conversational	N/A.	B-42
	1685	Conversational	N/A.	B-42
Heath Co.	Z-29	Smart	$849	B-19
Hewlett-Packard Co.	2622A	Smart	$2,210	B-20
	2700	Smart	$19,990	B-20
IBM	3278-4	Smart	$2,650	B-22
	3290	Smart	$7,190	B-22
	4704	Smart	N/A.	B-22
ICL, Inc.	KOKUSAI KDS 7362	Conversational	$900	B-43
IMS International	IMS ULTIMA II	Smart	N/A.	B-24
Intecolor	INTECOLOR 2405D	Smart	$1,395	B-24
Intertec Data Systems Corp.	INTERTUBE	Smart	$795	B-26
Kennewick Industrial Corp.	KIE-3682	Conversational	$995	B-43
Lear Siegler, Inc.	ADM 22	Smart	$995	B-27
	ADM 31	Smart	$1,095	B-28
	ADM 32	Smart	$1,295	B-28
	ADM 36	Smart	$1,595	B-28
	ADM 36I	Smart	$1,695	B-28
Lee Data Corp.	MODEL 1231	Conversational	$3,647	B-44
Mixbert Computer Corp.	8026A	Smart	$8,975	B-29
Pontel of America, Ltd.	PVW 2000	Smart	$4,000	B-29
Perry Data Systems, Inc.	9200	Conversational	$1,375	B-45
	9310	Conversational	$3,529	B-45
	9460	Conversational	$5,529	B-45
Prime Computer, Inc.	PST-100	Smart	N/A.	B-30
Product Development Services, Inc.	2150	Smart	$1,395	B-30
PSITech	GTC 329	Conversational	N/A.	B-45
Qantel Corp.	QANTEL 4031	Smart	$2,700	B-30
Racal-Milgo, Inc.	4010	Smart	$3,695	B-31
	4015	Smart	$4,155	B-31
Sanyo Business Systems Corp.	CRX1100	Smart	$695	B-31
Tandem Computers, Inc.	TANDEM 6530	Smart	$2,975	B-32
Tandy Corp.	DT-1	Conversational	$699	B-46
TEC, Inc.	TEC 630	Smart	$1,295	B-32
Telecom Terminal Systems	TRAVELVISION	Smart	N/A.	B-33
	VISION 1	Smart	N/A.	B-33
Teleray	MODEL 16	Smart	$1,945	B-33
Terminitpx Corp.	CD-20	Conversational	$495	B-46
	HT-2	Conversational	$1,495	B-46
	HT-3	Conversational	$795	B-46
	HT-4	Conversational	$1,195	B-46
	HT-6	Conversational	$1,795	B-46

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VENDOR	MODEL	TYPE	PRICE	PAGE
Terminiflex Corp.	HT-6W	*Conversational*	*$2,980*	B-46
	HT-7	*Conversational*	*$2,595*	B-46
	HT-7W	*Conversational*	*$3,780*	B-46
	HT-8	*Conversational*	*$3,995*	B-46
	HT-8W	*Conversational*	[illegible]	B-46
	HT-10	*Conversational*	*$495*	B-46
	HT-11	*Conversational*	*$595*	B-46
	HT-12	*Conversational*	*$750*	B-46
	HT-12MO	*Conversational*	*$400*	B-46
	HT-20	*Conversational*	*$495*	B-46
	HT-1000	*Conversational*	*$795*	B-46
Trans-Lux Corp.	VIDIQUOTE	*Conversational*	*$2,000*	B-46
Tymshare, Inc.	SCANSET XL	*Conversational*	*$895*	B-46
	SCANSET 410	*Conversational*	*$495*	B-46
	SCANSET 415	*Conversational*	*$649*	B-46
	SCANSET 415/HS	*Conversational*	*$1,295*	B-46

ADVANCED ELECTRONICS DESIGN, INC.
AED 767
Specific Application: CAD/CAM
Plug Compatibility: Tektronix 4010
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 13 in., standard; 19 in., optional
Line/Screen: 24
Character/Line: 80
Color Capability: Yes
Program Function Keys: 18, standard, 18, maximum
List Price: $5,995
Distribution Method: End user
Date First Installed: January 1981
(See Vendor Profile Page V-1)

ADVANCED ELECTRONICS DESIGN, INC.
AED 1024
Specific Application: CAD/CAM
Plug Compatibility: Tektronix 4010
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 13 in., standard; 19 in., optional
Line/Screen: 24
Character/Line: 80
Color Capability: Yes
Program Function Keys: 18, standard, 18, maximum
List Price: $9,995
Distribution Method: End user
Date First Installed: July 1983

ALPHA MICRO
AM60
Compatibility: TTY
Terminal Configuration: Cluster; 8
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 26
Character/Line: 80
Color Capability: No
Program Function Keys: 16
List Price: $1,000
Distribution Method: End user, Third-party
Date First Installed: April 1983
(See Vendor Profile Page V-2)

ALTOS COMPUTER SYSTEMS
ALTOS V
Communications Protocols: ASC, Asynchronous, Synchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 25, standard; 40, optional
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 16, standard; 32, maximum
List Price: $1,195
Distribution Method: End user, OEM, Third-party
(See Vendor Profile Page V-2)

AMERICAN DATACOM
AMERICAN DATACOM MODEL 200
Specific Application: Telex
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 300 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
List Price: $2,995
Distribution Method: End user
Date First Installed: September 1978
(See Vendor Profile Page V-2)

AMERICAN DATACOM
AMERICAN DATACOM 400 SERIES MODEL 402
Specific Application: Telex
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $2,695
Distribution Method: End user
Date First Installed: January 1982

AMERICAN DATACOM
AMERICAN DATACOM 400 SERIES MODEL 450
Specific Application: Telex
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: Yes
List Price: $3,395
Distribution Method: End user
Date First Installed: March 1983

AMPEX CORP.
D-125
Specific Application: WP, Data Entry
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $2,695
Distribution Method: End user, OEM, Third-party
Date First Installed: March 1983
(See Vendor Profile Page V-2)

AMPEX CORP.
D-150
Specific Application: Data Entry, WP
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 20; maximum 20
List Price: $995
Distribution Method: End user, OEM, Third-party
Date First Installed: December 1982

AMPEX CORP.
D-175
Specific Application: Data Entry, WP
Compatibility: TTY; ADDS; DEC
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 20, standard, 20, maximum
List Price: $869
Distribution Method: End user, OEM, Third-party
Date First Installed: November 1982

ANDERSON JACOBSON, INC.
AJ520
Compatibility: TTY
Plug Compatibility: DEC VT100, VT52
Terminal Configuration: Stand-alone
Communications Protocols: None, APL
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 132
Color Capability: 2 colors
Program Function Keys: 24, standard, 24, maximum
List Price: $2,395
Average Monthly Maintenance: $120
Distribution Method: End user, Third-party
Date First Installed: January 1982
(See Vendor Profile Page V-3)

ANN ARBOR TERMINALS, INC.
ANN ARBOR AMBASSADOR
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 60
Character/Line: 80
Color Capability: No
Program Function Keys: 36
List Price: $1,795
Average Monthly Maintenance: $6
Distribution Method: End user, OEM, Third-party
Date First Installed: November 1980
(See Vendor Profile Page V-3)

ANN ARBOR TERMINALS, INC.
GENIE
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 30
Character/Line: 80
Color Capability: No
Program Function Keys: 24
List Price: $1,195
Average Monthly Maintenance: $6
Distribution Method: End user, OEM, Third-party
Date First Installed: November 1982

ANN ARBOR TERMINALS, INC.
GENIE +
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 30
Character/Line: 80
Color Capability: No
Program Function Keys: 36
List Price: $1,395
Average Monthly Maintenance: $6
Distribution Method: End user, OEM, Third-party
Date First Installed: November 1982

Smart Terminals

[illegible] APSON TERMINALS, INC.
GURU
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-[illegible]
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
[illegible]
Character/Line: 170
Color Capability: No
Program Function Keys: 36
List Price: $2,395
Average Monthly Maintenance: $8
[illegible]: End user, OEM, Third-party
Date First Installed: June 1983

APPLIED DIGITAL DATA SYSTEMS, INC.
VIEWPOINT-COLOR
Compatibility: TTY
Terminal Configuration: Cluster; 2
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 24
[illegible]
Color Capability: 8 colors
Program Function Keys: 16, standard; 16, maximum
List Price: $1,295
Average Monthly Maintenance: $2
Distribution Method: Third-party
Date First Installed: June 1983
(See Vendor Profile Page V-3)

APPLIED DIGITAL DATA SYSTEMS, INC.
[illegible]
Compatibility: TTY
Terminal Configuration: Cluster
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 8, standard; 8, maximum
List Price: $650
Average Monthly Maintenance: $2
Distribution Method: Third-party
Date First Installed: January 1981

APPLIED DIGITAL DATA SYSTEMS, INC.
VIEWPOINT A-2
Compatibility: TTY
Terminal Configuration: Cluster; 2
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
[illegible]
Program Function Keys: 8, [illegible]
Average Monthly Maintenance: $2
Distribution Method: Third-party
Date First Installed: June 1981

APPLIED DIGITAL DATA SYSTEMS, INC.
VIEWPOINT 3A+
Compatibility: TTY
Terminal Configuration: Cluster; 2
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $1,095
Average Monthly Maintenance: $2
Distribution Method: Third-party
Date First Installed: September 1981

APPLIED DIGITAL DATA SYSTEMS, INC.
VIEWPOINT 75
Compatibility: TTY
Terminal Configuration: Cluster; 16
Communications Protocols: SDLC
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
[illegible]
Color Capability: No
Program Function Keys: 32, standard; 32, maximum
List Price: $1,095
Average Monthly Maintenance: $2
Distribution Method: Third-party
Date First Installed: April 1983

APPLIED DIGITAL DATA SYSTEMS, INC.
[illegible]
Terminal Configuration: Stand-[illegible]
Communications Protocols: SDLC
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 4 colors
Program Function Keys: 32, standard; 32, maximum
Average Monthly Maintenance: $2
Distribution Method: End user
Date First Installed: September 1983

APPLIED DIGITAL DATA SYSTEMS, INC.
VIEWPOINT 90
Compatibility: TTY
Terminal Configuration: Stand-alone
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 30, [illegible]
List Price: $1,295
Average Monthly Maintenance: $2
Distribution Method: Third-party
Date First Installed: 1982

BRAEGEN CORP.
[illegible]
Specific Application: Data Entry; Personal Computing
Plug Compatibility: IBM 3270
Terminal Configuration: Cluster; 60
Communications Protocols: Synchronous
Data Transmission Characteristics: Half-Duplex; Full-Duplex, Synchronous; Ascii; Ebodic
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
[illegible]
Date First Installed: November 1983
(See Vendor Profile Page V-5)

BRAEGEN CORP.
8521
Plug Compatibility: IBM 3270
Terminal Configuration: Cluster; 60
Communications Protocols: Synchronous
Data Transmission Characteristics: Half-Duplex; Full-Duplex; Synchronous; Ascii; Ebodic
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Distribution Method: End user
Date First Installed: November 1983

BRAEGEN CORP.
8522
Plug Compatibility: IBM 3270
Terminal Configuration: Cluster; 60
Communications Protocols: Synchronous
Data Transmission Characteristics: Half-Duplex; Full-Duplex; Synchronous; Ascii; Ebodic
Diagonal Screen Size: 12 in.
Line/Screen: 24, standard; 32, [illegible]
Character/Line: 80, standard; 32, optional
Distribution Method: End user
Date First Installed: November 1983

BRAEGEN CORP.
8523
Specific Application: Data Entry; Personal Computing
Plug Compatibility: IBM 3270
Terminal Configuration: Cluster; 60
Communications Protocols: Synchronous
Data Transmission Characteristics: Half-Duplex; Full-Duplex; Synchronous; Ascii; Ebodic
Diagonal Screen Size: 12 in.
Line/Screen: 24, standard; 32 or 43, optional
Character/Line: 80
Distribution Method: End user
Date First Installed: November 1983

BRAEGEN CORP.
B-6
Plug Compatibility: IBM 3270
Terminal Configuration: Cluster; 32
Communications Protocols: Bisynchronous; Synchronous
Data Transmission Characteristics: Half-Duplex; Full-Duplex; Synchronous; Ascii; Ebodic
Diagonal Screen Size: 15 in.
[illegible]
Date First Installed: 1979

BURR BROWN RESEARCH CORP.
TM28
[illegible]
Compatibility: TTY
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex
Maximum Transmission Speed: [illegible]
Character/Line: 8
Program Function Keys: 8
List Price: $256
Distribution Method: End user, Third-party
Date First Installed: June 1979
(See Vendor Profile Page V-5)

BURR BROWN RESEARCH CORP.
TM27
[illegible] Collection
Compatibility: TTY
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: [illegible]
Line/Screen: 1
[illegible]
Program Function Keys: 8
[illegible]
Distribution Method: End user, Third-party

BURR BROWN RESEARCH CORP.
TM70
Specific Application: Data Collection
Compatibility: TTY
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Line/Screen: 1
[illegible]
Program Function Keys: 8
[illegible]
Distribution Method: End user, Third-party

BURR BROWN RESEARCH CORP.
TM71
Specific Application: Data Collection
Compatibility: TTY
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Line/Screen: 1
Character/Line: 16
Program Function Keys: 8
List Price: $595
Distribution Method: End user, Third-party

BURR BROWN RESEARCH CORP.
TM71B
Specific Application: Data Collection
Compatibility: TTY
Terminal Configuration: Cluster; 16

Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Line/Screen: 1
Character/Line: 16
Program Function Keys: 8
List Price: $1,495
Distribution Method: End user, Third-party
Date First Installed: March 1982

BURR BROWN RESEARCH CORP.
TM71-IO
Specific Application: Data Collection
Compatibility: TTY
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Line/Screen: 1
Character/Line: 16
Program Function Keys: 8
List Price: $695
Distribution Method: End user, Third-party

BURR BROWN RESEARCH CORP.
TM78
Specific Application: Data Collection
Compatibility: TTY
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Line/Screen: 1
Character/Line: 12
Program Function Keys: 8
List Price: $495
Distribution Method: End user, Third-party

BURR BROWN RESEARCH CORP.
TM77
Specific Application: Data Collection
Compatibility: TTY
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Line/Screen: 1
Character/Line: 16
Program Function Keys: 8
List Price: $595
Distribution Method: End user, Third-party

BURR BROWN RESEARCH CORP.
TM77B
Specific Application: Data Collection
Compatibility: TTY
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex
Maximum Transmission Speed: 19,200 bit/sec
Line/Screen: 1
Character/Line: 16
Program Function Keys: 8
List Price: $1,495
Distribution Method: End user, Third-party
Date First Installed: March 1982

BURR BROWN RESEARCH CORP.
TM77-IO
Specific Application: Data Collection
Compatibility: TTY
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Line/Screen: 1
Character/Line: 16
Program Function Keys: 8
List Price: $1,595
Distribution Method: End user, Third-party

BURROUGHS CORP.
ET 1100
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous, Synchronous, Burroughs, Poll/Select
Data Transmission Characteristics: Half-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 38,400 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 26
Character/Line: 80
Program Function Keys: 10, standard; 20 maximum
List Price: $1,495
Distribution Method: End user, Third-party
Date First Installed: July 1983
(See Vendor Profile Page V-5)

CARTERFONE COMMUNICATIONS CORP.
CARTERFONE 7276
Specific Application: Data Entry
Compatibility: IBM 3101
Terminal Configuration: Stand-alone
Communications Protocols: X.25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 24
List Price: $3,500
Distribution Method: Third-party
Date First Installed: 1982
(See Vendor Profile Page V-6)

CARTERFONE COMMUNICATIONS CORP.
CARTERFONE 7700
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 300 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Character/Line: 64
List Price: $9,800
Distribution Method: Third-party
Date First Installed: 1982

CARTERFONE COMMUNICATIONS CORP.
CARTERFONE 7800
Specific Application: Data Entry
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 3
List Price: $5,020
Distribution Method: Third-party
Date First Installed: 1979

CARTERFONE COMMUNICATIONS CORP.
CARTERFONE 9630
Specific Application: Data Entry
Compatibility: Burroughs
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25, TDI
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 12, standard; 24, optional
Character/Line: 40, standard; 80, optional
Program Function Keys: 4
List Price: $1,495
Distribution Method: Third-party
Date First Installed: 1983

CHI CORP.
CHI 8830
Compatibility: Sperry
Plug Compatibility: Sperry UTS400
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 22, standard; 22, maximum
List Price: $2,700
Average Monthly Maintenance: $35
Distribution Method: End user, Third-party
Date First Installed: 1981
(See Vendor Profile Page V-6)

CHROMATICS, INC.
CT 4100
Specific Application: Process Control
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 96,000 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 48
Character/Line: 85
Color Capability: 8 colors
List Price: $2,995
Distribution Method: End user
(See Vendor Profile Page V-6)

CHROMATICS, INC.
CT 4200
Specific Application: Graphics
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 834
Character/Line: 80
Color Capability: 16 colors, optional
Program Function Keys: 16, standard, 16, maximum
List Price: $3,995
Distribution Method: End user
Date First Installed: July 1983

CHROMATICS, INC.
CT 4300
Specific Application: Graphics
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 768
Character/Line: 80
Color Capability: 16 colors, optional
Program Function Keys: 16
List Price: $6,995
Distribution Method: End user
Date First Installed: July 1983

CIE SYSTEMS, INC.
CIT-101E
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 132
List Price: $1,495
Distribution Method: Direct, Third-party
(See Vendor Profile Page V-6)

CIE SYSTEMS, INC.
CIT-500
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous

Smart Terminals

Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 64
Character/Line: 80
List Price: $2,150
Distribution Method: Third-party

COBAR, INC.
COBAR 1133
Compatibility: TTY
Plug Compatibility: DEC VT131, VT132
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Program Function Keys: 18
List Price: $1,495
Average Monthly Maintenance: $35
Distribution Method: End user
Date First Installed: November 1981
(See Vendor Profile Page V-7)

COBAR, INC.
COBAR 3830
Compatibility: Burroughs
Plug Compatibility: Burroughs MT983
Communications Protocols: Bisynchronous, X.25, BDI
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80, standard; 132, optional
Program Function Keys: 18
List Price: $1,795
Average Monthly Maintenance: $35
Distribution Method: End user
Date First Installed: June 1982

COLOROGRAPHIC COMMUNICATIONS CORP.
MVI-7
Specific Application: Graphics
Compatibility: TTY
Plug Compatibility: DEC VT100, VT52; ADDS Regent 20; Hazeltine 1510
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 13 in., standard; 19 in., optional
Line/Screen: 24
Character/Line: 80
Color Capability: 16 colors
Program Function Keys: 24
List Price: $3,000
Distribution Method: OEM
Date First Installed: 1981
(See Vendor Profile Page V-7)

COLOROGRAPHIC COMMUNICATIONS CORP.
MVI-100
Specific Application: Graphics
Compatibility: TTY
Plug Compatibility: DEC VT100, VT52; ADDS Regent 20; Hazeltine 1510
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 13 in., standard; 19 in., optional
Line/Screen: 24, standard; 48, optional
Character/Line: 80
Color Capability: 16 colors
Program Function Keys: 24
List Price: $2,750
Distribution Method: OEM
Date First Installed: May 1982

COMPUTER COMMUNICATIONS, INC.
8378 DISPLAY STATION
Compatibility: IBM 3270
Plug Compatibility: IBM 3278
Terminal Configuration: Cluster; 48
Communications Protocols: HDLC
Data Transmission Characteristics: Half-Duplex, Ascii
Maximum Transmission Speed: 38,400 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 25
List Price: $1,500
Date First Installed: 1983
(See Vendor Profile Page V-8)

COMPUTERVISION, INC.
TRANSTERM 3P
Specific Application: Remote Data Acquisition
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Line/Screen: 2
Character/Line: 40
List Price: $649
Date First Installed: April 1983
(See Vendor Profile Page V-8)

CONTROL CONCEPTS
CC-3278
Compatibility: IBM 3270
Plug Compatibility: IBM 3278
Terminal Configuration: Stand-alone
Communications Protocols: SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii, Ebcdic
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Program Function Keys: 24
List Price: $3,300
Average Monthly Maintenance: $25
Distribution Method: End user
Date First Installed: June 1982
(See Vendor Profile Page V-9)

CONTROL CONCEPTS
EM-3275
Compatibility: IBM 3270
Plug Compatibility: IBM 3275
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii, Ebcdic
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Program Function Keys: 24, standard; 24, maximum
Average Monthly Maintenance: $25
Distribution Method: End user
Date First Installed: August 1980
(See Vendor Profile Page V-)

CONTROL CONCEPTS
EM-3276
Compatibility: IBM 3270
Plug Compatibility: IBM 3278
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii, Ebcdic
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard; 24, maximum
List Price: $2,600
Average Monthly Maintenance: $25
Distribution Method: End user
Date First Installed: August 1980

CONTROL DATA CORP.
MODEL 714-30
Compatibility: TTY; CDC
Terminal Configuration: Cluster; 14
Communications Protocols: X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 16, standard; 24, optional
Character/Line: 80
Color Capability: No
Distribution Method: End user
Date First Installed: 1979
(See Vendor Profile Page V-9)

CONTROL DATA CORP.
MODEL 714-40
Compatibility: TTY; CDC
Terminal Configuration: Stand-alone
Communications Protocols: X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 16, standard; 24, optional
Character/Line: 80
Color Capability: No
Distribution Method: End user
Date First Installed: 1979

CONTROL DATA CORP.
MODEL 722
Compatibility: TTY; CDC
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12
Distribution Method: End user
Date First Installed: 1979

CONTROL DATA CORP.
VIKING 721-30
Compatibility: TTY; CDC
Terminal Configuration: Cluster; 14
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 30
Character/Line: 80
Color Capability: No
Distribution Method: End user
Date First Installed: 1980

CONTROL DATA CORP.
VIKING 721-30
Compatibility: TTY; CDC
Terminal Configuration: Cluster; 14
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 32
Character/Line: 64
Color Capability: No
Distribution Method: End user
Date First Installed: 1980

CROSSROAD, INC.
3102
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Program Function Keys: 20
List Price: $2,295
Distribution Method: Third-party
Date First Installed: 1980
(See Vendor Profile Page V-9)

CUSTOM TERMINALS, INC.
CTI1000A
Specific Application: Data Entry
Compatibility: IBM 3270
Plug Compatibility: IBM-3274
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Program Function Keys: 15, standard; 15, maximum
List Price: $2,350
Average Monthly Maintenance: $25
Distribution Method: End user
Date First Installed: December 1982
(See Vendor Profile Page V-9)

DATAMEDIA CORP.
3270-5
Specific Application: Data Entry
Compatibility: IBM 3270
Plug Compatibility: IBM 3275
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 24, standard; 24, maximum
Distribution Method: OEM, Third-party
(See Vendor Profile Page V-10)

DATAMEDIA CORP.
3270-6
Specific Application: Data Entry
Compatibility: IBM 3270
Plug Compatibility: IBM 3276
Terminal Configuration: Cluster; 3
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 24, standard; 24, maximum
Distribution Method: OEM, Third-party

DATAMEDIA CORP.
3270-8
Specific Application: Data Entry
Compatibility: IBM 3270
Plug Compatibility: IBM 3276
Terminal Configuration: Cluster; 3
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard; 24, maximum
Distribution Method: OEM, Third-party

DATAMEDIA CORP.
COLORSCAN 10 RETROGRAPHICS
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: DEC VT100, VT52; Tektronix 4027, 4010
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: 8 colors
Program Function Keys: 12, standard; 12, maximum
Distribution Method: OEM, Third-party

DATAMEDIA CORP.
COLORSCAN 30 RETROGRAPHICS
Specific Application: Data Entry
Plug Compatibility: ADDS Regent 25; Hazeltine 1420; LSI ADM-3A; Datamedia 1521
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: 8 colors
Program Function Keys: 8, standard; 8, maximum
Distribution Method: OEM, Third-party

DATAMEDIA CORP.
COLORSCAN 60
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: DEC VT132, VT100, VT52
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: 8 colors
Program Function Keys: 12, standard; 12, maximum
Distribution Method: OEM, Third-party

DATAMEDIA CORP.
COLORSCAN 80 RETROGRAPHICS
Specific Application: Data Entry
Compatibility: TTY; DEC; TEK
Plug Compatibility: DEC VT132, VT100, VT52, Tektronix 4027, 4010
Terminal Configuration: Stand-alone
Communications Protocols: RS-232C, ITT V1
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: 8 colors
Program Function Keys: 12, standard; 12, maximum
Distribution Method: OEM, Third-party

DATAMEDIA CORP.
COLORSCAN 70 RETROGRAPHICS
Specific Application: Data Entry
Compatibility: DG, TEK
Plug Compatibility: DG D100, 200, 6052, 6053; Tektronix 2027, 4010
Terminal Configuration: Stand-alone
Communications Protocols: RS-232C; ITT V1
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: 8 colors
Program Function Keys: 12, standard; 12, maximum
Distribution Method: OEM, Third-party

DATAMEDIA CORP.
EXCEL 30 MULTIPLE ATTRIBUTE WP
Specific Application: WP
Compatibility: TTY; Hazeltine
Plug Compatibility: Datamedia 1521, ADDS Regent 25; LSI ADM-3A; Hazeltine 1420
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 14 in., optional
Distribution Method: OEM, Third-party

DATAMEDIA CORP.
EXCEL 40
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: Televideo 950; LSI ADM-31
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 14 in., optional
Line/Screen: 24
Character/Line: 80
Program Function Keys: 32, standard; 32, maximum
Distribution Method: OEM, Third-party

DATAMEDIA CORP.
EXCEL 60
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: DEC VT100, VT52, VT132
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard, 14 in., optional
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Program Function Keys: 12, standard; 12, maximum
Distribution Method: OEM, Third-party

DATAVUE CORP.
132C
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 132
Program Function Keys: 16, standard; 32, maximum
List Price: $1,795
Distribution Method: OEM, Third-party
(See Vendor Profile Page V-12)

DELTA DATA SYSTEMS CORP.
D2830 IIJ
Compatibility: TTY
Plug Compatibility: Burroughs TD830, TD960
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, Echo
Data Transmission Characteristics: Half-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 10, standard; 10, maximum
List Price: $1,895
Average Monthly Maintenance: $33
Distribution Method: End user, OEM, Third-party
Date First Installed: August 1982
(See Vendor Profile Page V-12)

DELTA DATA SYSTEMS CORP.
DELTA 2202
Specific Application: WP
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25

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Data Transmission Characteristics: Half-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in
Line/Screen: 25
Character/Line: 80
Program Function Keys: 16
List Price: $2,300
Average Monthly Maintenance: $33
Distribution Method: End user, OEM, Third-party
Date First Installed: 1981

DELTA DATA SYSTEMS CORP.
DELTA 2830 II
Compatibility: TTY
Plug Compatibility: Burroughs TD831, TD833
Terminal Configuration: Stand-alone
Communications Protocols: Echo
Data Transmission Characteristics: Half-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 10, standard; 10, maximum
List Price: $1,595
Average Monthly Maintenance: $33
Distribution Method: End user, OEM, Third-party
Date First Installed: October 1981

DELTA DATA SYSTEMS CORP.
TC 2820
Compatibility: TTY
Plug Compatibility: Burroughs
Terminal Configuration: Stand-alone
Communications Protocols: Echo
Data Transmission Characteristics: Half-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
List Price: $4,995
Average Monthly Maintenance: $33
Distribution Method: End user, OEM, Third-party
Date First Installed: October 1981

DIGITAL EQUIPMENT CORP.
VT100
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Program Function Keys: 4, standard; 4, maximum
List Price: $2,140
Average Monthly Maintenance: $1
Distribution Method: Third-party
(See Vendor Profile Page V-15)

DIGITAL EQUIPMENT CORP.
VT102
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: Yes
Program Function Keys: 4, standard; 4, maximum
List Price: $1,710
Average Monthly Maintenance: $22
Distribution Method: Third-party

DIGITAL EQUIPMENT CORP.
VT125
Specific Application: Graphics
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: 4 colors, optional
List Price: $3,800
Average Monthly Maintenance: $29
Distribution Method: Third-party

DIGITAL EQUIPMENT CORP.
VT131
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Program Function Keys: 4
List Price: $1,825
Average Monthly Maintenance: $23
Distribution Method: OEM, Third-party

DIGITUS CORP.
DIGITUS CAD/CAM WORKSTATION
Specific Application: CAD/CAM Graphics
Compatibility: IBM 3270
Terminal Configuration: Stand-alone
Communications Protocols: SNA
Data Transmission Characteristics: Full-Duplex, Synchronous
Maximum Transmission Speed: 64,000 bit/sec
Diagonal Screen Size: 12 in., standard; 19 in., optional
Line/Screen: 25, standard; 49, optional
Character/Line: 80, standard; 100, optional
Color Capability: 224 colors
Program Function Keys: 44
List Price: $55,000
Distribution Method: End user, OEM
(See Vendor Profile Page V-13)

DIRECT, INC.
HF-825
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24, standard; 28, optional
Character/Line: 80, standard; 132, optional
Program Function Keys: 8, standard; 8, maximum
List Price: $1,890
Average Monthly Maintenance: $24
Distribution Method: Third-party
Date First Installed: June 1981
(See Vendor Profile Page V-13)

ENVISION TECHNOLOGY, INC.
ENVISION 210
Compatibility: TTY
Plug Compatibility: DEC VT100; Tektronix 4014
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 13 in., standard; 19 in., optional
Line/Screen: 24
Character/Line: 80
Color Capability: Yes
List Price: $2,750
Distribution Method: Third-party
Date First Installed: August 1982
(See Vendor Profile Page V-14)

ENVISION TECHNOLOGY, INC.
ENVISION 220
Compatibility: TTY
Plug Compatibility: DEC VT100; Tektronix 4014
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 13 in., standard; 19 in., optional
Line/Screen: 24
Character/Line: 80
Color Capability: 4096 colors
List Price: $4,950
Average Monthly Maintenance: $30
Distribution Method: Third-party
Date First Installed: August 1982

ENVISION TECHNOLOGY, INC.
ENVISION 230
Compatibility: TTY
Plug Compatibility: DEC VT100; Tektronix 4014
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 13 in., standard; 19 in., optional
Line/Screen: 24
Character/Line: 80
Color Capability: 4096 colors
List Price: $6,950
Average Monthly Maintenance: $38
Distribution Method: Third-party
Date First Installed: August 1982

EPIC COMPUTER PRODUCTS, INC.
EPIC 14E
Plug Compatibility: TVI 925
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 16, standard; 22, maximum
List Price: $995
Average Monthly Maintenance: $20
Distribution Method: OEM, Third-party
Date First Installed: November 1982
(See Vendor Profile Page V-14)

EPIC COMPUTER PRODUCTS, INC.
EPIC 327X
Compatibility: IBM 3270
Plug Compatibility: IBM 3278
Terminal Configuration: Cluster; 5
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 24
List Price: $1,995
Average Monthly Maintenance: $25
Distribution Method: End user, Third-party
Date First Installed: November 1982

ESPRIT SYSTEMS, INC.
ESPRIT
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Distribution Method: Third-party
(See Vendor Profile Page V-14)

ESPRIT SYSTEMS, INC.
EXECUTIVE 80/20
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous

Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 15 in., optional
Line/Screen: 25
Character/Line: 80, standard; 132, optional
Program Function Keys: 8, standard; 16, maximum
Distribution Method: End user

ESPRIT SYSTEMS, INC.
EXECUTIVE 80/30
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 15 in., optional
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Program Function Keys: 3, standard; 16, maximum
Distribution Method: Third-party

ESPRIT SYSTEMS, INC.
HAZELTINE III
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 22
Distribution Method: Third-party

FALCO DATA PRODUCTS, INC.
TS1
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 256, optional
Color Capability: Yes, optional
Program Function Keys: 12, standard; 28, maximum
List Price: $1,195
Distribution Method: Third-party
Date First Installed: 1980
(See Vendor Profile Page V-15)

FUJITSU AMERICA, INC.
8040
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous, Asynchronous, SDLC, SDLC/SNA
Data Transmission Characteristics: Half-Duplex, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 24
List Price: $3,200
Distribution Method: End user
Date First Installed: 1981
(See Vendor Profile Page V-15)

FUJITSU AMERICA, INC.
8044
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous, Asynchronous, SDLC, SDLC/SNA
Data Transmission Characteristics: Half-Duplex, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 24
List Price: $3,680
Distribution Method: End user
Date First Installed: 1981

FUJITSU AMERICA, INC.
8846
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous, Asynchronous, SDLC, SDLC/SNA
Data Transmission Characteristics: Half-Duplex, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 7 colors
Program Function Keys: 24
List Price: $4,920
Distribution Method: End user

GENERAL TERMINAL CORP.
AVANT 251-251
Specific Application: Data Entry
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 16
List Price: $995
Distribution Method: OEM
Date First Installed: February 1983

GENERAL TERMINAL CORP.
SW 10
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: VTI V100; DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 8 standard; 8, maximum
List Price: $849
Distribution Method: Third-party
Date First Installed: June 1981

GENERAL TERMINAL CORP.
SW 80
Specific Application: Data Entry
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 24
List Price: $995
Distribution Method: OEM
Date First Installed: March 1983

GENISCO COMPUTERS CORP.
G-1000
Specific Application: Graphics
Compatibility: TTY
Plug Compatibility: Tektronix 4014-1
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in.
Program Function Keys: 8
List Price: $9,950
Average Monthly Maintenance: $90
Distribution Method: End user
Date First Installed: January 1981

GENISCO COMPUTERS CORP.
G-2200
Specific Application: Graphics
Compatibility: TTY
Plug Compatibility: Tektronix 4014; DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 180,000 bit/sec
Diagonal Screen Size: 19 in.
Color Capability: 16 colors
Program Function Keys: 8
List Price: $12,500
Average Monthly Maintenance: $125
Distribution Method: End user

GRAFTEK, INC.
METEOR WS-1024
Specific Application: CAD/CAM
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, ISO Synchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in.

optional
Character/Line: 102, standard; 1078, optional
Color Capability: 256 colors
Program Function Keys: 27,
List Price: $35,000
Average Monthly Maintenance: $300
Distribution Method: End user
Date First Installed: April 1982

HEATH CO.
Z-29
Plug Compatibility: Zenith Z19; DEC VT100; Hazeltine 1500; LSI ADM-3A
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 9, standard; 27, maximum
Average Monthly Maintenance: $9
Distribution Method: OEM
Date First Installed: April 1983

HEATH CO.
ZTX-10
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 4, standard; 8, maximum
List Price: $399
Average Monthly Maintenance: $4
Distribution Method: OEM, Third-party

HEATH CO.
ZTX-11
Compatibility: None
Plug Compatibility: DEC VT52
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 4, standard; 8, maximum
List Price: $449
Average Monthly Maintenance: $5
Distribution Method: OEM, Third-party

Smart Terminals

HEWLETT-PACKARD CO.
2621B/2629L
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 10 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 8
List Price: $1,645
Average Monthly Maintenance: $24
Distribution Method: End user, OEM
Data First Installed: 1982
(See Vendor Profile Page V-17)

HEWLETT-PACKARD CO.
2622A
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 10 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 8
List Price: $2,210
Average Monthly Maintenance: $25
Distribution Method: End user, OEM
Data First Installed: 1981

HEWLETT-PACKARD CO.
2623A
Specific Application: Graphics
Compatibility: TTY
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 10 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 8
List Price: $3,250
Average Monthly Maintenance: $36
Distribution Method: End user, OEM
Date First Installed: 1981

HEWLETT-PACKARD CO.
2624B
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 10 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 8
List Price: $3,035
Average Monthly Maintenance: $32
Distribution Method: End user, OEM
Date First Installed: 1981

HEWLETT-PACKARD CO.
2626A
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 10 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 8
List Price: $4,400
Average Monthly Maintenance: $41
Distribution Method: End user, OEM
Date First Installed: 1980

HEWLETT-PACKARD CO.
2648A
Specific Application: Graphics
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Character/Line: 80
Program Function Keys: 9
List Price: $7,150
Average Monthly Maintenance: $41
Distribution Method: End user, OEM
Date First Installed: 1977

HEWLETT-PACKARD CO.
2700
Specific Application: Color Graphics
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 9
List Price: $14,960
Average Monthly Maintenance: $129
Distribution Method: End user, OEM
Date First Installed: 1982

HEWLETT-PACKARD CO.
HP2627A
Specific Application: Graphics
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 10 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 8
List Price: $5,975
Average Monthly Maintenance: $34
Distribution Method: End user, OEM
Date First Installed: 1982

HEWLETT-PACKARD CO.
HP2645A
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 8
List Price: $4,600
Average Monthly Maintenance: $34
Distribution Method: End user, OEM
Date First Installed: 1978

HONEYWELL, INC.
7215
Compatibility: Honeywell
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Distribution Method: Third-party

HONEYWELL, INC.
7325
Compatibility: Honeywell
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80

HONEYWELL, INC.
VIP 7205
Compatibility: Honeywell
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 7, standard; 7, maximum
Distribution Method: Third-party

HONEYWELL, INC.
VIP 7205
Compatibility: Honeywell
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 7, standard; 14, maximum
Distribution Method: Third-party

HONEYWELL, INC.
VIP 7207
Compatibility: Honeywell
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 7
Distribution Method: Third-party

HONEYWELL, INC.
VIP 7301
Compatibility: Honeywell
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, expand 24 maximum
Distribution Method: Third-party

HONEYWELL, INC.
VIP 7303
Specific Application: WP
Compatibility: Honeywell
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec

Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 14
Distribution Method: Third-party

HONEYWELL, INC.
VIP 7305
Compatibility: Honeywell
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12
Distribution Method: Third-party

HONEYWELL, INC.
VIP 7307
Specific Application: Data Entry
Compatibility: Honeywell
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous,-Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 12, standard, 24, maximum
Distribution Method: Third-party

HONEYWELL, INC.
VIP 7311
Compatibility: Honeywell
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 12, standard, 24, maximum
Distribution Method: Third-party

HONEYWELL, INC.
VIP 7321
Compatibility: Honeywell
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 24, maximum
Distribution Method: Third-party

HONEYWELL, INC.
VIP 7802
Compatibility: Honeywell
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Distribution Method: Third-party

HONEYWELL, INC.
VIP 7803
Specific Application: WP
Compatibility: Honeywell
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 14
Distribution Method: Third-party

HONEYWELL, INC.
VIP 7804
Specific Application: Data Editing
Compatibility: Honeywell
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Distribution Method: Third-party

HONEYWELL, INC.
VIP 7805
Compatibility: Honeywell
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Distribution Method: Third-party

HONEYWELL, INC.
VIP 7813
Compatibility: Honeywell
Communications Protocols: Bisynchronous, RS-232C
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 12, maximum
Distribution Method: Third-party

HONEYWELL, INC.
VIP 7814
Compatibility: Honeywell
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous; Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12
Distribution Method: Third-party

HONEYWELL, INC.
VIP 7823
Compatibility: Honeywell
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 12, maximum
Distribution Method: Third-party

IBM
3101 MODELS 10, 12, 13, 20, 22 & 23
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 8, standard; 8, maximum
List Price: $1,295
Distribution Method: End user
Date First Installed: January 1980

IBM
3104
Compatibility: IBM 3270
Communications Protocols: X.25, Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii, Ebcdic
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 24, maximum
Distribution Method: End user

IBM
3178
Compatibility: IBM 3270
Terminal Configuration: Cluster
Communications Protocols: X.25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ebcdic
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 24, maximum
List Price: $1,660
Distribution Method: End user
Date First Installed: June 1983

IBM
3276
Compatibility: IBM 3270
Terminal Configuration: Cluster; 8
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii, Ebcdic
Maximum Transmission Speed: 7,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Program Function Keys: 12, standard; 24, maximum
List Price: $6,390
Distribution Method: End user

IBM
3277-1
Compatibility: IBM 3270
Terminal Configuration: Cluster; 32
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 7,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 12
Character/Line: 40
Color Capability: No
Program Function Keys: 12
List Price: $1,470
Average Monthly Maintenance: $62
Distribution Method: End user
Date First Installed: May 1972

IBM
3277-2
Compatibility: IBM 3270
Plug Compatibility: IBM 3277
Terminal Configuration: Cluster
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ebcdic
Maximum Transmission Speed: 2,400 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12
List Price: $1,905
Average Monthly Maintenance: $120
Distribution Method: End user
Date First Installed: May 1972

IBM
3278-1
Compatibility: IBM 3270
Terminal Configuration: Cluster
Communications Protocols: X.25, Asynchronous

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Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii, Ebcdic
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 12
Character/Line: 80
Color Capability: No
Program Function Keys: 12
List Price: $2,185
Distribution Method: End user

IBM
3278-2
Compatibility: IBM 3270
Terminal Configuration: Cluster
Communications Protocols: X.25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii, Ebcdic
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12
List Price: $2,050
Distribution Method: End user

IBM
3278-3
Compatibility: IBM 3270
Terminal Configuration: Cluster
Communications Protocols: X.25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii, Ebcdic
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 32
Character/Line: 80
Color Capability: No
Program Function Keys: 12
List Price: $2,525
Distribution Method: End user

IBM
3278-4
Terminal Configuration: Cluster
Communications Protocols: X.25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii, Ebcdic
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 43
Character/Line: 80
Color Capability: No
Program Function Keys: 12
List Price: $2,650
Distribution Method: End user

IBM
3278-5
Compatibility: IBM 3270
Terminal Configuration: Cluster
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii, Ebcdic
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 27
Character/Line: 132
Color Capability: No
Program Function Keys: 12
List Price: $3,070
Distribution Method: End user

IBM
3279
Compatibility: IBM 3270
Communications Protocols: X 25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii, Ebcdic
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Color Capability: Yes
Program Function Keys: 12, standard; 24, maximum
Distribution Method: End user

IBM
3290
List Price: $7,100
Distribution Method: Third-party
Date First Installed: March 1983

IBM
4704
Specific Application: Banking
Communications Protocols: X.25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ebcdic
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Distribution Method: End user

IBM
5251 MODELS 1, 2, 11 & 12
Compatibility: IBM 3270
Communications Protocols: Bisynchronous, X.25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii, Ebcdic
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in., standard; 15 in., optional
Line/Screen: 12, standard; 24, optional
Character/Line: 80
Color Capability: No
Program Function Keys: 24, maximum
Distribution Method: End user

IBM
5252
Compatibility: IBM 3270
Communications Protocols: Bisynchronous, X.25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii, Ebcdic
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 12, standard; 24, optional
Character/Line: 80
Color Capability: No
Program Function Keys: 24, maximum
Distribution Method: End user

IBM
5291
Compatibility: IBM 3270
Communications Protocols: Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii, Ebcdic
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
Distribution Method: End user

IBM
5292
Compatibility: IBM 3270
Communications Protocols: Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii, Ebcdic
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 7 colors
Program Function Keys: 24, standard; 24, maximum
Distribution Method: Third-party

IBM
8775
Compatibility: IBM 3270
Communications Protocols: X.25, Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ebcdic
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 12, standard; 43, optional
Character/Line: 80
Distribution Method: End user

ICOT CORP.
ICOT-700
Compatibility: IBM 3270
Plug Compatibility: IBM 3270, 3280
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 13, standard, 24, maximum
List Price: $1,095
Distribution Method: End user, Third-party

ICOT CORP.
ICOT-701
Compatibility: IBM 3270
Plug Compatibility: IBM 3270
Terminal Configuration: Cluster; 8
Communications Protocols: None, Bisynchronous
Data Transmission Characteristics: Full-Duplex, Ascii
Diagonal Screen Size: 12 in.
Line/Screen: 25, standard; 44, optional
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 13, standard, 24, maximum
List Price: $1,095
Distribution Method: End user, Third-party

ID SYSTEMS CORP.
ID-100
Compatibility: TTY
Plug Compatibility: DEC VT100; Tektronix 4010
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: Yes
Program Function Keys: 4, standard; 4, maximum
List Price: $3,895
Average Monthly Maintenance: $80
Distribution Method: End user, OEM
Date First Installed: 1980

ID SYSTEMS CORP.
ID-100MVBSP
Specific Application: Graphics
Compatibility: TTY
Plug Compatibility: DEC VT100; Tektronix 4010
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: Yes
Program Function Keys: 4, standard; 4, maximum
List Price: $1,695
Distribution Method: Third-party

ID SYSTEMS CORP.
ID-100MVA
Compatibility: TTY
Plug Compatibility: DEC VT100; Tektronix 4010
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex
Maximum Transmission Speed: 19,200 bit/sec
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 4, standard; 4, maximum
List Price: $2,895
Distribution Method: End user, OEM
Date First Installed: 1981

ID SYSTEMS CORP.
ID-100MVBLP
Compatibility: TTY
Terminal Configuration: Stand-alone

Frankly, Tek, we're flattered.

When we heard that you folks at Tektronix will have a text/graphics color terminal like our Envision 220 available soon, we weren't really surprised.

We were flattered.

Because you've always had a reputation for doing things the right way.

That means providing all the features both OEMs and end-users want. Like text and graphics on the same screen. A convenient desktop size. Distributed graphics processing. High-resolution 640 x 480 color graphics. And a display of 16 colors from a palette of 4,096.

And it means designing your product to use the industry's most popular software. Our terminals are compatible with VT100 alphanumeric software, PLOT 10,™ DISSPLA,® TELL-A-GRAF,® DI3000/GRAFMAKER® and TEMPLATE,™ among others.

To really do it right, you'll need a whole family of terminals that are both compatible and upgradable. Like our 210, 220 and 230.

And the innovations that people are clamoring for. Like our mouse, graphics tablet and optional 19-inch screen.

Then there's the matter of printer compatibility. Our color VectorPrinter™ prints letter-quality text and plotter-quality graphics, together.

So while we're flattered that you may be giving us a run for our money in the text/graphics color terminal market, we're not too worried.

Because it looks like the leader may be following us.

Envision

631 River Oaks Parkway
San Jose, CA 95134
(408) 946-9755. Telex 176437

VectorPrinter™ is a trademark of Envision.
Nationwide service available through ITT Courier.
Authorized service centers worldwide.

Smart Terminals

Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24, standard; 48, optional
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 4, standard; 4, maximum
List Price: $3,895
Average Monthly Maintenance: $35
Distribution Method: End user, OEM
Date First Installed: 1982

ID SYSTEMS CORP.
ID-100V
Specific Application: Graphics
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24, standard; 48, optional
Character/Line: 80, standard; 132, optional
Color Capability: 8 colors
Program Function Keys: 4, standard; 4, maximum
List Price: $3,895
Average Monthly Maintenance: $40
Distribution Method: Third-party

ID SYSTEMS CORP.
ID-100VA
Specific Application: Graphics
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: 8 colors
Program Function Keys: 4, standard; 4, maximum
List Price: $4,295
Average Monthly Maintenance: $35
Distribution Method: Third-party
Date First Installed: 1981

ID SYSTEMS CORP.
ID-100VBLP
Compatibility: TTY
Plug Compatibility: DEC VT100; Tektronix 4010
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: 8 colors
Program Function Keys: 4, standard; 4, maximum
List Price: $5,895
Distribution Method: OEM
Date First Installed: 1982

ID SYSTEMS CORP.
ID-100VBSP
Specific Application: Graphics
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: 8 colors
Program Function Keys: 4, standard; 4, maximum
List Price: $5,395
Average Monthly Maintenance: $30
Distribution Method: Third-party

IMS INTERNATIONAL
IMS LA TIMA II
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 36, standard; 36, maximum
Distribution Method: Third-party
Date First Installed: August 1983

INFORMER COMPUTER TERMINALS, INC.
304
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 9 in.
Line/Screen: 24, standard; 12, optional
Character/Line: 80, standard; 40, optional
Program Function Keys: 14, standard; 14, maximum
Distribution Method: Third-party

INFORMER COMPUTER TERMINALS, INC.
INFORMER 207
Specific Application: Portable
Compatibility: IBM 3270; TTY
Plug Compatibility: DEC VT52; IBM 3278
Communications Protocols: Bisynchronous, Asynchronous, HDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 9 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard; 24, maximum
Distribution Method: Third-party

INFORMER COMPUTER TERMINALS, INC.
INFORMER 376
Compatibility: IBM 3270
Plug Compatibility: IBM 3276-12
3274
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous, HDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 9 in., standard; 12 in., optional
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
Distribution Method: Third-party

INFORMER COMPUTER TERMINALS, INC.
INFORMER 378
Compatibility: IBM 3270
Plug Compatibility: IBM 3277-2, 3278-2
Terminal Configuration: Cluster
Communications Protocols: Asynchronous, HDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 9 in., standard; 12 in., optional
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard; 24, maximum
Distribution Method: Third-party

INFORMER COMPUTER TERMINALS, INC.
INFORMER 401
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Diagonal Screen Size: 9 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 8, standard; 8, maximum
Distribution Method: Third-party

INTECOLOR
INTECOLOR VNR-19
Compatibility: TTY
Plug Compatibility: Tektronix 4010
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 16 colors
Program Function Keys: 16
List Price: $6,700
Distribution Method: Third-party

INTECOLOR
INTECOLOR 2406
Compatibility: TTY
Plug Compatibility: DEC VT100, VT52
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 12, standard; 24, maximum
List Price: $1,295
Distribution Method: Third-party
Date First Installed: October 1982

INTECOLOR
INTECOLOR 8051D
Plug Compatibility: DEC VT100, VT52
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 24, maximum
Distribution Method: Third-party
Date First Installed: June 1983

INTECOLOR
INTECOLOR 2427D
Compatibility: TTY
Plug Compatibility: Tektronix 4027
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 8 colors
List Price: $2,895

INTECOLOR
INTECOLOR 8001G
Compatibility: TTY
Terminal Configuration: Stand-alone

Retro-Graphics and DEC.

Now GEN.II™ delivers Tek 4010/4014/4027 compatible graphics on your VT100, VT101, VT102, VT103, VT131, or VT132.

Generating cost-efficient yet sophisticated images on your DEC™ terminal first begins with your choice of VT100™-Series displays. Then add Digital Engineering's GEN.II Retro-Graphics terminal enhancement. Our plug-in-upgrade transforms an otherwise "dumb" terminal into a multi-featured bit-map graphics workstation, capable of plotting complex business and technical renderings. In a raster-scan resolution of 800 by 480 and in concert with your Tektronix®-based program.

But best of all a Retro-Graphics enhancement costs only a fraction of what you'd pay for an equivalent graphics terminal. about $1200 - 1800, depending on the GEN.II model you order.

Introducing GEN.II Retro-Graphics for DEC. More graphics power and Tek™ simulation.

An easily installed PC card assembly, our second-generation enhancement provides emulation of the Tektronix 4010 graphics terminal *plus* one-color simulation of the Tek 4027 color graphics terminal.

And for extra power — and compatibility with your existing or future Tek 4014 applications programs — *GEN.II for DEC also features one-color 4014 simulation.* With little or no software modification.

In addition, GEN.II's 32 Kb's of "local" intelligence ensures that images come up quickly — and costly terminal-host data transmissions are held to a minimum. And because GEN.II is based on industry-standard Tektronix protocol, graphics programming and operation are considerably eased. Case in point: by entering from the keyboard or computer the following command string

FIX 100, 0, 300, 45

an eight-sided *polygon* with a radius of 100 will be plotted and its interior will be *filled* with a shading pattern (GEN.II maps 4027 colors to dithered shades).

With similar high-level command strings, GEN.II will also perform *arc* and *vector drawing. Define* and *shape text characters. Store* and *recall* graphs. And, while in 4014 mode, *perform additional graphics annotation using all four 4014 character sets.* And you get all this with no loss of existing terminal features.

Software compatibility ensures your long-term investment.

Since our GEN.II products for DEC provide 4010/4014/4027 compatibility, their use with utility and applications programs, whether now or in the future, is guaranteed. Currently, more than 20,000 Retro-Graphics products are performing successfully on graphics programs such as DISSPLA® and TELLAGRAF®, PLOT 10™, Template™, DI-3000™, and ILS®.

Graphics I/O and solid backup throughout.

Digital Engineering has built a solid foundation of "user-chosen" interactive tools for GEN.II. For instance, a crosshair cursor and light-pen port (for our optional light pen) are standard features, while optional interfaces allow you to simultaneously interact with a digitizer while outputting to an impact or non-impact serial printer and video device.

Comprehensive documentation assists at every level of operation. A worldwide distribution network assures prompt delivery and backup. And whether you tap our service network or opt for on-site service — from one of the largest field service organizations in the world — your needs will be quickly met.

DEC's VT100, VT101™, VT102™, VT103™, VT131™, or VT132™ and Digital Engineering's GEN.II Retro-Graphics — for high-grade imaging in a low-cost graphics system.

Call us today for full details, demonstration, and the name of your local Retro-Graphics distributor — your "one-stop" source for graphics.

DIGITAL ENGINEERING

630 Bercut Drive, Sacramento, CA 95814
(916) 447-7600 Telex: 910-367-2009

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Smart Terminals

Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 16
List Price: $2,745
Distribution Method: Third-party

INTECOLOR
INTECOLOR 8001H
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 16
List Price: $3,175
Distribution Method: Third-party
Date First Installed: 1979

INTECOLOR
INTECOLOR 8001R
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 16
List Price: $3,975
Distribution Method: Third-party
Date First Installed: 1981

INTECOLOR
INTECOLOR 8001R/M
Compatibility: Sperry
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 48, standard; 24, optional
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 16
List Price: $5,100
Distribution Method: Third-party
Date First Installed: January 1983

INTECOLOR
INTECOLOR 8001-UL
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 16
List Price: $3,795
Distribution Method: Third-party
Date First Installed: 1982

INTECOLOR
INTECOLOR 8001G
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 16
List Price: $3,045
Distribution Method: Third-party

INTECOLOR
INTECOLOR 8301H
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 16
List Price: $3,440
Distribution Method: Third-party
Date First Installed: 1979

INTECOLOR
INTECOLOR 8301R
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 16
List Price: $4,240
Distribution Method: Third-party
Date First Installed: 1981

INTERTEC DATA SYSTEMS CORP.
INTERTUBE
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $795
Distribution Method: OEM
Date First Installed: 1979

ITT COURIER TERMINAL SYSTEMS, INC.
700-13
Compatibility: IBM 3270
Plug Compatibility: IBM 3270, 3277
Terminal Configuration: Cluster
Communications Protocols: X.25, Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 43
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard; 24, maximum
Distribution Method: Third-party

ITT COURIER TERMINAL SYSTEMS, INC.
1700
Compatibility: IBM 3270
Plug Compatibility: IBM 3278
Terminal Configuration: Cluster
Communications Protocols: X.25, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard; 24, maximum
List Price: $1,550
Distribution Method: Third-party

ITT COURIER TERMINAL SYSTEMS, INC.
2700-13
Compatibility: IBM 3270
Plug Compatibility: IBM 3270; 3277
Terminal Configuration: Cluster
Communications Protocols: X.25, Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 24, standard; 24, maximum
Distribution Method: Third-party

ITT COURIER TERMINAL SYSTEMS, INC.
2700-14
Compatibility: IBM 3270
Plug Compatibility: IBM 3270, 3277
Terminal Configuration: Cluster
Communications Protocols: X.25, Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 32
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard; 24, maximum
Distribution Method: End User

ITT COURIER TERMINAL SYSTEMS, INC.
2700-16
Compatibility: IBM 3270
Plug Compatibility: IBM 3270, 3277
Terminal Configuration: Cluster
Communications Protocols: X.25, Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 27
Character/Line: 132
Color Capability: No
Program Function Keys: 24, standard; 24, maximum
Distribution Method: Third-party

ITT COURIER TERMINAL SYSTEMS, INC.
2750
Compatibility: IBM 3270
Plug Compatibility: IBM 3275
Terminal Configuration: Stand-alone
Communications Protocols: X.25, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 12, maximum
Distribution Method: Third-party

ITT COURIER TERMINAL SYSTEMS, INC.
2760
Compatibility: IBM 3270
Plug Compatibility: IBM 3277
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard; 24, maximum
Distribution Method: Third-party

ITT COURIER TERMINAL SYSTEMS, INC.
2790-2A
Compatibility: IBM 3270
Plug Compatibility: IBM 3279
Terminal Configuration: Cluster; 32
Communications Protocols: Bisynchronous, X.25, Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous

Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 7 colors
Program Function Keys: 24, standard; 24, maximum
Distribution Method: Third-party

ITT COURIER TERMINAL SYSTEMS, INC.
2790-3A
Compatibility: IBM 3270
Plug Compatibility: IBM
Terminal Configuration: Cluster
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
[illegible]
Character/Line: 80
Color Capability: 7 colors
Program Function Keys: 24, standard; 24, maximum
Distribution Method: Third-party

ITT COURIER TERMINAL SYSTEMS, INC.
2790-4A
Compatibility: IBM 3270
Plug Compatibility: IBM
Terminal Configuration: Cluster
Communications Protocols: X.25, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 43
Character/Line: 80
Color Capability: 7 colors
Program Function Keys: 24, standard; 24, maximum
Distribution Method: Third-party

ITT COURIER TERMINAL SYSTEMS, INC.
7700
Compatibility: Honeywell
Plug Compatibility: Honeywell VIP 7700, VIP 7750, VIP 7700R
Terminal Configuration: Cluster; 32
Data Transmission Characteristics: Half-Duplex
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 10, standard; 10, maximum
Distribution Method: Third-party

ITT COURIER TERMINAL SYSTEMS, INC.
7750
Compatibility: Honeywell
Plug Compatibility: Honeywell VIP 7700, VIP 7750, VIP 7700R
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Color Capability: No
Program Function Keys: 10, standard; 10, maximum
Distribution Method: Third-party

LEO, INC.
TC-200 PORTABLE TERMINAL
Specific Application: Electronic Mail
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 300 bit/sec
Integrated Modem/Coupler: Standard
Line/Screen: 1
Character/Line: 16
Color Capability: No
Program Function Keys: 6
List Price: $350
Distribution Method: End user, Third-party

JUPITER SYSTEMS, INC.
JUPITER 7 PLUS
Specific Application: Graphics
Compatibility: TTY
Plug Compatibility: Tektronix 4014
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 13 in., standard; 29 in., optional
Color Capability: 256 colors
Program Function Keys: 30, standard; 30, maximum
List Price: $15,000
Distribution Method: OEM, Third-party
Date First Installed: September 1982

KIMTRON CORP.
ABM 83
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in., standard; 14 in., optional
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard
List Price: $695
Average Monthly Maintenance: $20
Distribution Method: OEM, Third-party
Date First Installed: February 1983

KIMTRON CORP.
ABM 85
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: Televideo; LSI; Hazeltine, ADDS
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in., standard; 14 in., optional
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard, 50, maximum
List Price: $865
Average Monthly Maintenance: $22
Distribution Method: OEM, Third-party
Date First Installed: December 1982

KIMTRON CORP.
ABM 86
Compatibility: TTY
Communications Protocols: Bisynchrooous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in., standard, 14 in., optional
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard, 50, maximum
List Price: $995
Distribution Method: OEM, Third-party
Date First Installed: February 1983

LEAR SIEGLER, INC.
ADM 22
Specific Application: Data Entry
Plug Compatibility: Hazeltine; ADDS Regent 25
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 7, standard; 7, maximum
List Price: $695
Distribution Method: Third-party
Date First Installed: June 1982

LEAR SIEGLER, INC.
ADM 23
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 8, standard, 8, maximum
List Price: $795
Distribution Method: Third-party
Date First Installed: December 1982

LEAR SIEGLER, INC.
ADM 24
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchroous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 14 in., standard, 15 in., optional
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 8, standard; 16, maximum
List Price: $1,195
Distribution Method: Third-party
Date First Installed: June 1983

LEAR SIEGLER, INC.
ADM 24E
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in., standard; 15 in., optional
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard, 32, maximum
List Price: $1,250
Distribution Method: Third-party
Date First Installed: September 1983

Smart Terminals

LEAR SIEGLER, INC.
ADM 31
Specific Application: Data Entry
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $1,095
Distribution Method: Third-party
Date First Installed: June 1976

LEAR SIEGLER, INC.
ADM 32
Specific Application: Data Entry
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in., standard; 15 in., optional
Line/Screen: 25
Character/Line: 80
Color Capability: No
List Price: $1,295
Distribution Method: Third-party
Date First Installed: 1980

LEAR SIEGLER, INC.
ADM 36
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 15 in., optional
Line/Screen: 24
Character/Line: 80
Program Function Keys: 4, [illegible] 4, maximum
List Price: $1,195
Distribution Method: Third-party
Date First Installed: August 1981

LEAR SIEGLER, INC.
ADM 36I
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Diagonal Screen Size: 12 in., standard; 15 in., optional
Line/Screen: 24
Character/Line: 80
Program Function Keys: 12
List Price: $1,800
Distribution Method: Third-party
Date First Installed: January 1982

LEAR SIEGLER, INC.
ADM 42
Specific Application: Data Entry
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard; 32, maximum
List Price: $2,195
Distribution Method: Third-party
Date First Installed: June 1978

LIBERTY ELECTRONICS, U.S.A.
FREEDOM 50
Compatibility: TTY
Plug Compatibility: Televideo 910; ADDS Regent 25; Hazeltine 1420
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 10
List Price: $395
Distribution Method: OEM, Third-party
Date First Installed: February 1983

LIBERTY ELECTRONICS, U.S.A.
FREEDOM 100
Compatibility: TTY
Plug Compatibility: Televideo 910; ADDS Regent 25; Hazeltine 1420
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 20, standard; 29, maximum
List Price: $595
Distribution Method: OEM, Third-party
Date First Installed: September 1982

MDS TRIVEX
6078 SERIES
Specific Application: Data Entry
Compatibility: IBM 3270
Plug Compatibility: IBM 3270
Terminal Configuration: Cluster; 32
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 10
Distribution Method: End user
Date First Installed: September 1980

MERGENTHALER/MYCRO-TEK
ADCOM
Specific Application: Text Editing
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 115,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 15
Character/Line: 64
Color Capability: No
Program Function Keys: 45, maximum
List Price: $20,000
Date First Installed: 1980

MERGENTHALER/MYCRO-TEK
[illegible] ADVERTISING TERMINAL]
Specific Application: Text Editing
Compatibility: Burroughs
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 115,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 15
Character/Line: 64
Color Capability: No
Program Function Keys: 45, maximum
List Price: $3,500
Date First Installed: 1980

MERGENTHALER/MYCRO-TEK
MG4003 (TEXT TERMINAL)
Specific Application: Text Editing
Compatibility: TTY; Burroughs
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 115,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 15
Character/Line: 64
Color Capability: No
Program Function Keys: 45, maximum
Date First Installed: 1977

MICRO-TERM, INC.
ACT 5A
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: DTR
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 8
List Price: $995
Average Monthly Maintenance: $18
Distribution Method: End user, OEM, Third-party
Date First Installed: September 1976

MICRO-TERM, INC.
ERGO 201
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: DTR
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 32
List Price: $[illegible]
Average Monthly Maintenance: $20
Distribution Method: End user, OEM, Third-party
Date First Installed: March 1983

MICRO-TERM, INC.
ERGO 301
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: DTR
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 4
List Price: $895
Average Monthly Maintenance: $22
Distribution Method: End user, OEM, Third-party
Date First Installed: March 1983

MICRO-TERM, INC.
ERGO 4000
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 132
Color Capability: No
Program Function Keys: 1β, [illegible]
List Price: $1,895
Average Monthly Maintenance: $22
Distribution Method: End user,

OEM, Third-party
Date First Installed: November 1982

MICRO-TERM, INC.
MIME 2A
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: DTR
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 9
List Price: $1,045
Average Monthly Maintenance: $10
Distribution Method: End user, OEM, Third-party
Date First Installed: September 1976

MOTOROLA, INC.
EXORTERM 155
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Program Function Keys: 12
List Price: $2,590
Distribution Method: End user, Third-party
Date First Installed: 1978

NABU COMMERCIAL TERMINAL, INC.
3100
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 16
List Price: $1,095
Distribution Method: Third-party
Date First Installed: 1982

NIXDORF COMPUTER CORP.
171 DATA TERMINAL
Compatibility: IBM 3270
Terminal Configuration: Cluster; 32
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 9 in.
Line/Screen: 12
Character/Line: 40
Color Capability: No
Program Function Keys: 16, standard; 16, maximum
List Price: $1,550
Average Monthly Maintenance: $20
Distribution Method: End user
Date First Installed: 1977

NIXDORF COMPUTER CORP.
172 DATA TERMINAL
Compatibility: IBM 3270
Terminal Configuration: Cluster; 32
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard, 16, maximum
List Price: $2,065
Average Monthly Maintenance: $22
Distribution Method: End user
Date First Installed: 1980

NIXDORF COMPUTER CORP.
8026A
Specific Application: WP
Terminal Configuration: Cluster; 4
Data Transmission Characteristics: Synchronous, Ascii
Maximum Transmission Speed: 4,800 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
List Price: $3,970
Average Monthly Maintenance: $29
Distribution Method: End user
Date First Installed: 1979

NIXDORF COMPUTER CORP.
8278-X2X
Compatibility: IBM 3270
Plug Compatibility: IBM 3278-2
Terminal Configuration: Cluster; 32
Communications Protocols: SDLC/SNA
Data Transmission Characteristics: Half-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 24, maximum
List Price: $1,945
Average Monthly Maintenance: $19
Distribution Method: End user
Date First Installed: September 1982

NIXDORF COMPUTER CORP.
8730
Compatibility: IBM 3270
Terminal Configuration: Cluster; 8
Communications Protocols: Asynchronous
Data Transmission Characteristics: Synchronous, Ascii
Maximum Transmission Speed: 4,800 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 27, standard; 27, maximum
List Price: $4,315
Average Monthly Maintenance: $30
Distribution Method: End user
Date First Installed: February 1982

NIXDORF COMPUTER CORP.
DAP 4
Compatibility: IBM 3270
Terminal Configuration: Cluster; 24
Communications Protocols: SDLC/SNA
Data Transmission Characteristics: Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 15, standard, 15, maximum
List Price: $1,945
Average Monthly Maintenance: $19
Distribution Method: End user

NIXDORF COMPUTER CORP.
NIXDORF 8141
Compatibility: TTY
Terminal Configuration: Cluster; 8
Communications Protocols: None
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 15, standard, 15, maximum
List Price: $2,300
Average Monthly Maintenance: $19
Distribution Method: End user, OEM, Third-party
Date First Installed: January 1983

NOVATION, INC.
EXECUTIVE
Specific Application: Electronic Mail
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Integrated Modem/Coupler: Standard
Line/Screen: 1
Character/Line: 40
Color Capability: No
Program Function Keys: 12
List Price: $945
Distribution Method: End user, OEM, Third-party
Date First Installed: June 1981

NOVATION, INC.
MAXI & CCITT
Specific Application: Electronic Mail
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Integrated Modem/Coupler: Standard
Line/Screen: 1
Character/Line: 40
Color Capability: No
Program Function Keys: 12
List Price: $1,150
Distribution Method: End user, OEM, Third-party
Date First Installed: June 1981

PARADYNE CORP.
MODEL 9476
Compatibility: IBM 3270
Plug Compatibility: IBM 3276
Terminal Configuration: Cluster; 32
Communications Protocols: Bisynchronous, SDLC
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 250,000 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
List Price: $4,600
Average Monthly Maintenance: $25
Distribution Method: End user
Date First Installed: June 1981

PARADYNE CORP.
MODEL 9478
Specific Application: 3278 WP Emulator
Compatibility: IBM 3270
Plug Compatibility: IBM 3278
Terminal Configuration: Cluster; 32
Communications Protocols: SDLC
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 250,000 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
List Price: $2,000
Average Monthly Maintenance: $15
Distribution Method: End user
Date First Installed: June 1981

PENTEL OF AMERICA, LTD.
PVW 2000
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $4,000
Distribution Method: Third-party
Date First Installed: November 1982

PERKIN-ELMER CORP.
8500
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous

Smart Terminals

Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: 3 colors, optional
Distribution Method: End user
Date First Installed: 1978

PERKIN-ELMER CORP.
1248
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: 3 colors, optional
Program Function Keys: 32, standard, 32, maximum
Distribution Method: End user
Date First Installed: 1979

PERKIN-ELMER CORP.
1250
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: 3 colors, optional
Program Function Keys: 32, standard, 32, maximum
Distribution Method: End user
Date First Installed: 1980

PERKIN-ELMER CORP.
1251
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: 3 colors, optional
Program Function Keys: 32, standard, 32, maximum
Distribution Method: End user
Date First Installed: 1979

PERKIN-ELMER CORP.
DATA STATION
Specific Application: Graphics
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in
Line/Screen: 25
Character/Line: 80
Color Capability: 3 colors, optional
Program Function Keys: 24, standard; 24, maximum
Distribution Method: End user
Date First Installed: 1980

PHAZE INFORMATION MACHINES CORP.
F3278
Specific Application: Data Entry
Compatibility: IBM 3270
Plug Compatibility: IBM 3270
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 7 colors, optional
Program Function Keys: 24, standard; 24, maximum
List Price: $1,545
Distribution Method: Third-party
Date First Installed: February 1983

PHOENIX DIGITAL CORP.
IDT 900A
Specific Application: Graphics
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25, Asynchronous, SDLC, Synchronous, SDLC/SNA
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 56,000 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 19 in.
Line/Screen: 25
Character/Line: 80
List Price: $5,850
Distribution Method: End user, OEM, Third-party
Date First Installed: December 1978

PHOENIX DIGITAL CORP.
IDT 900A-D
Specific Application: Graphics
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25, Asynchronous, SDLC, Synchronous, SDLC/SNA
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 56,000 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 19 in.
Line/Screen: 25
Character/Line: 80
Program Function Keys: 19
List Price: $6,875
Distribution Method: End user, OEM, Third-party
Date First Installed: December 1978

PHOENIX DIGITAL CORP.
OPTOVIEW 100
Specific Application: Graphics
Compatibility: TTY
Communications Protocols: Bisynchronous, X.25, Asynchronous, SDLC, Synchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 2,000,000 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 19 in.
Line/Screen: 25
Character/Line: 80
Color Capability: 16 colors
Program Function Keys: 19
List Price: $3,850
Distribution Method: End user, OEM, Third-party
Date First Installed: September 1979

PLESSEY PERIPHERAL SYSTEMS
PT-1000 VIDEO DISPLAY TERMINAL
Compatibility: DEC
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 4
List Price: $1,450
Distribution Method: End user, OEM
Date First Installed: April 1982

PLESSEY PERIPHERAL SYSTEMS
PT-500 COLOR TERMINAL
Specific Application: Graphics
Compatibility: TTY, DEC
Plug Compatibility: DEC VT100, VT52
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: 8 colors
Program Function Keys: 4
List Price: $3,200
Average Monthly Maintenance: $55
Distribution Method: End user, OEM
Date First Installed: November 1982

PRIME COMPUTER, INC.
PST 100
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 22, standard, 22, maximum
Distribution Method: Third-party

PRIME COMPUTER, INC.
PT 25
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 8, standard; 8, maximum
Distribution Method: Third-party

PRIME COMPUTER, INC.
PT 45
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard; 16, maximum
Distribution Method: Third-party

PRODUCT DEVELOPMENT SERVICES, INC.
2150
Specific Application: Factory Automation
Plug Compatibility: Tektronix 4010
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25, Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 15 in., standard; 19 in., optional
Line/Screen: 66
Character/Line: 132
Color Capability: 8 colors, optional
Program Function Keys: 37, standard; 37, maximum
List Price: $4,339
Distribution Method: OEM

QANTEL CORP.
QANTEL 4031
Communications Protocols: None
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 27, standard; 24, optional

Character/Line: 64, standard; 80, optional
Color Capability: No
Program Function Keys: 2, standard; 2, maximum
List Price: $2,700
Average Monthly Maintenance: $5
Distribution Method: Third-party
Date First Installed: March 1980

GUNZE CORP.
[illegible]
Compatibility: TTY
Plug Compatibility: TVI 910; LSI ADM-3A, Hazeltine 1500
Terminal Configuration: Stand-[illegible]
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 14 in., optional
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 8, standard; 12, maximum
List Price: $695
Average Monthly Maintenance: $25
Distribution Method: Third-party
Date First Installed: March 1983

GUNZE CORP.
QVT-103
Compatibility: TTY
Plug Compatibility: DEC VT100, VT101, VT52
Terminal Configuration: Stand-[illegible]
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/spc
Diagonal Screen Size: 12 in., standard; 14 in., optional
[illegible]
Character/Line: 80
Color Capability: No
Program Function Keys: 8, standard; 12, maximum
List Price: $1,095.
Average Monthly Maintenance: $25
Distribution Method: Third-party

GUNZE CORP.
[illegible]
Compatibility: TTY
Plug Compatibility: TVI 905, 912, 920
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 14 in., optional
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 22, standard; 33, maximum
List Price: $895
Average Monthly Maintenance: $25
Distribution Method: Third-party
Date First Installed: August 1983

RACAL-MILGO, INC.
4010
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 4,800 bit/sec
Diagonal Screen Size: 15 in.
[illegible]
Character/Line: 80
Program Function Keys: 6, standard; 6, maximum
List Price: $3,555
Distribution Method: End user, Third-party
Date First Installed: July 1980

RACAL-MILGO, INC.
4015
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 4,800 bit/sec
Diagonal Screen Size: 15 in.
[illegible]
Character/Line: 80
Program Function Keys: 6, standard; 6, maximum
List Price: $4,155
Distribution Method: End user
Date First Installed: June 1982

RACAL-MILGO, INC.
4220/U200
Compatibility: Sperry
Terminal Configuration: Stand-alone
Communications Protocols: X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii
Maximum Transmission Speed: [illegible] bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24, standard; 12, optional
Character/Line: 80
Color Capability: No
Program Function Keys: 4, standard; 4, maximum
List Price: $3,370
[illegible]
Date First Installed: November 1981

RACAL-MILGO, INC.
4220/UTS 20
Compatibility: Sperry
Plug Compatibility: Sperry UTS 20
Terminal Configuration: Stand-alone
Communications Protocols: X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24, standard; 12, optional
Character/Line: 80
Color Capability: No
Program Function Keys: 22, [illegible]
[illegible]
Distribution Method: [illegible]
Date First Installed: January 1983

RACAL-MILGO, INC.
4276
Compatibility: IBM 3270
Plug Compatibility: IBM 3275, 3276
Terminal Configuration: Stand-alone
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
List Price: $3,550
Distribution Method: End user
Date First Installed: July 1980

[illegible]
8278-2
Specific Application: Data Entry
Compatibility: [illegible]
Plug Compatibility: [illegible]
Terminal Configuration: Cluster-
Communications Protocols: Asynchronous, HDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
List Price: $1,640
Distribution Method: [illegible]
Date First Installed: [illegible]

RACAL-MILGO, INC.
8278-3
Specific Application: Data Entry
Compatibility: IBM 3270
Plug Compatibility: IBM 3278
Communications Protocols: Asynchronous, HDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 32
Character/Line: 80
Color [illegible]: No
Program Function Keys: 24, standard, 24, maximum
List Price: $2,333
[illegible]
Date First Installed: March 1983

RACAL-MILGO, INC.
8278-4
Specific Application: Data Entry
Compatibility: [illegible]
Plug Compatibility: [illegible]
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 43
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
List Price: $2,333
Distribution Method: End user
Date First Installed: March 1983

RACAL-MILGO, INC.
8278-5
Specific Application: Data Entry
Compatibility: IBM 3270
Plug Compatibility: [illegible]
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Diagonal Screen Size: 15 in.
Line/Screen: 27
Character/Line: 132
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
List [illegible]
Distribution Method: End user
Date First Installed: [illegible]

SANYO BUSINESS SYSTEMS CORP.
[illegible]
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: Yes, optional

SANYO BUSINESS SYSTEMS CORP.
CRX1100
Specific Application: WP
Terminal Configuration: Stand-alone
Communications Protocols: X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 8, standard; 8, maximum
List Price: $695
Distribution Method: OEM, Third-party
Date First Installed: January 1983

SEIKO INSTRUMENTS U.S.A., INC.
D-SCAN 2212
Specific Application: Graphics
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 64
Character/Line: [illegible]
Program Function Keys: 8, standard; 16, maximum
[illegible]
Date First Installed: September 1982

Smart Terminals

[illegible] INSTRUMENTS U.S.A., INC.
D-SCAN 2412
Specific Application: Graphics
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 66
Character/Line: 132
Color Capability: 7 colors
Program Function Keys: 8, standard; 16, maximum
List Price: $21,850
Distribution Method: End user, OEM
Date First Installed: September 1982

SPERRY CORP.
UTS 20
Compatibility: IBM 3270, Uniscope
Communications Protocols: Unscope
Data Transmission Characteristics: Half-Duplex
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 22
List Price: $2,500
Average Monthly Maintenance: $30
Distribution Method: End user
Date First Installed: October 1980

TAB PRODUCTS CO.
TAB 132/15
Compatibility: TTY; NCR; DEC
Plug Compatibility: DEC VT100, VT132
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 27
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 22
List Price: $2,150
Average Monthly Maintenance: $22
Distribution Method: End user
Date First Installed: January 1980

TAB PRODUCTS CO.
TAB 132/15G
Specific Application: Graphics
Compatibility: TTY; NCR; DEC
Plug Compatibility: DEC VT100, VT132
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 27
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 22
List Price: $3,295
Average Monthly Maintenance: $22
Distribution Method: End user
Date First Installed: January 1982

TANDBERG DATA
TDV 2200 SERIES
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in
Line/Screen: 24, standard; 25, optional
Character/Line: 80
Color Capability: No
Program Function Keys: 20, standard; 27, maximum
List Price: $1,875
Distribution Method: End user, OEM, Third-party
Date First Installed: 1981

TANDEM COMPUTER, INC.
TANDEM 6530
Specific Application: Data Entry
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25, Asynchronous, SDLC, Synchronous, SDLC/SNA
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard; 16, maximum
List Price: $2,575
Average Monthly Maintenance: $29
Distribution Method: End user
Date First Installed: February 1982

TEC, INC.
TEC 830
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 7
List Price: $1,310
Distribution Method: OEM
Date First Installed: May 1980

TEC, INC.
TEC ET 80
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 16
List Price: $1,975
Distribution Method: OEM
Date First Installed: May 1982

TEC, INC.
TEC ET 100
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80, standard; 125, optional
Program Function Keys: 9
List Price: $1,975
Distribution Method: OEM
Date First Installed: November 1982

TEKTRONIX, INC.
4014-1
Specific Application: Graphics
Compatibility: TTY; Honeywell; Sperry; Burroughs; NCR; CDC
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 35, standard; 64, optional
Character/Line: 74, standard; 133, optional
Color Capability: No
List Price: $16,750
Distribution Method: End user, OEM
Date First Installed: December 1978

TEKTRONIX, INC.
4016-1
Specific Application: Graphics
Compatibility: TTY; Honeywell; Sperry; Burroughs; NCR; CDC
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Diagonal Screen Size: 19 in.
Line/Screen: 35, standard; 66, optional
Character/Line: 74
Color Capability: No
List Price: $20,500
Average Monthly Maintenance: $120
Distribution Method: End user, OEM
Date First Installed: May 1978

TEKTRONIX, INC.
4025A
Compatibility: TTY; Honeywell; Sperry; Burroughs; NCR; CDC
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 34
Character/Line: 80
Color Capability: No
Program Function Keys: 12
List Price: $5,900
Distribution Method: End user, OEM
Date First Installed: September 1981

TEKTRONIX, INC.
4027A
Compatibility: TTY; Honeywell; Sperry; Burroughs; NCR; CDC
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 34
Character/Line: 80
Color Capability: 120 colors
Program Function Keys: 12
List Price: $10,900
Average Monthly Maintenance: $96
Distribution Method: End user, OEM
Date First Installed: May 1978

TELCON INDUSTRIES, INC.
780
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: DEC VT52
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 4,800 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
List Price: $2,595
Distribution Method: End user, Third-party
Date First Installed: March 1982

TELCON INDUSTRIES, INC.
GC-100
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: DEC VT52
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii
Maximum Transmission Speed: 4,800 bit/sec
Integrated Modem/Coupler: Optional

Diagonal Screen Size: 7 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 99, standard, 99, maximum
List Price: $3,395
Distribution Method: End user, Third-party
Date First Installed: March 1983

TELCON INDUSTRIES, INC.
GC-500
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: DEC VT52
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 7 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $1,195
Distribution Method: End user, Third-party
Date First Installed: April 1983

TELCON INDUSTRIES, INC.
VCS-780 DX
Compatibility: TTY
Plug Compatibility: DEC VT52
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 4,800 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $3,795
Distribution Method: End user, Third-party
Date First Installed: August 1982

TELCON INDUSTRIES, INC.
VCS-7900
Compatibility: TTY
Plug Compatibility: DEC VT52
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 4,800 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $3,495
Distribution Method: End user, Third-party
Date First Installed: August 1982

TELCON TERMINAL SYSTEMS
TRAVELVISION
Specific Application: Data Entry
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 25
Distribution Method: End user
Date First Installed: November 1981

TELECOM TERMINAL SYSTEMS
VISION 1
Specific Application: Telex
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 15
Distribution Method: Third-party
Date First Installed: January 1982

TELERAY
16-7801
Compatibility: TTY
Plug Compatibility: Honeywell 7801
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 9 in., standard; 15 in., optional
Line/Screen: 25
Character/Line: 80, standard; 255, optional
Program Function Keys: 32, standard; 32, maximum
List Price: $1,795
Distribution Method: Third-party
Date First Installed: 1983

TELERAY
16-APL
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 9 in., optional
Line/Screen: 10
Character/Line: 80, standard; 255, optional
Program Function Keys: 32, standard; 32, maximum
List Price: $1,545
Distribution Method: Third-party
Date First Installed: 1983

TELERAY
16-GRF
Compatibility: TTY
Plug Compatibility: Tektronix 4014
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 9 in., standard, 15 in., optional
Line/Screen: 25
Character/Line: 80, standard; 255, optional
Color Capability: No
Program Function Keys: 32, standard; 32, maximum
List Price: $3,000
Distribution Method: Third-party
Date First Installed: 1983

TELERAY
MODEL 7
Specific Application: Data Entry
Compatibility: TTY, CDC
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard, 15 in., optional
Line/Screen: 10, standard; 98, optional
Character/Line: 20, standard; 256, optional
Color Capability: No
Program Function Keys: 64
List Price: $1,295
Distribution Method: End user, OEM, Third-party
Date First Installed: January 1983

TELERAY
MODEL 16
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard, 15 in., optional
Line/Screen: 25
Character/Line: 80, standard; 255, optional
Program Function Keys: 32, standard, 32, maximum
List Price: $1,545
Distribution Method: Third-party
Date First Installed: 1982

TELERAY
MODEL 100
Specific Application: Data Entry
Compatibility: CDC, DEC
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 91 in., optional
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 20
List Price: $1,395
Distribution Method: End user, OEM, Third-party
Date First Installed: 1980

TELETYPE CORP.
4430
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 4,800 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $4,245
Distribution Method: Third-party
Date First Installed: December 1981

TELETYPE CORP.
4540
Specific Application: Data Entry
Compatibility: IBM 3270
Plug Compatibility: IBM 3271
Terminal Configuration: Cluster; 32
Communications Protocols: X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii, Ebcdic
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 13 in.
Line/Screen: 25
Character/Line: 80.
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
List Price: $4,745 to $5,040
Date First Installed: January 1980

TELETYPE CORP.
5420
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii, Ebcdic
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24, standard, 27, optional
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 16, standard, 16, maximum
List Price: $1,495
Distribution Method: Third-party
Date First Installed: July 1983

TELETYPE CORP.
5540
Compatibility: IBM 3270
Plug Compatibility: IBM 3278-2, 3178, 3278-5
Terminal Configuration: Cluster; 32
Communications Protocols: X.25, Asynchronous, HDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous, Ascii, Ebcdic

Smart Terminals

Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in., standard; 13 in., optional
Line/Screen: 24, standard; 27, optional
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 24, standard; 24, maximum
List Price: $4,500 to $11,500
Distribution Method: Third-party
Date First Installed: April 1983

TELEVIDEO SYSTEMS, INC.
910 PLUS
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
List Price: $695
Distribution Method: OEM, Third-party
Date First Installed: 1982

TELEVIDEO SYSTEMS, INC.
914
Compatibility: TTY
Plug Compatibility: ADDS Viewpoint
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 3, standard, 6, maximum
List Price: $699
Distribution Method: OEM, Third-party
Date First Installed: September 1983

TELEVIDEO SYSTEMS, INC.
924
Compatibility: TTY
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard, 32, maximum
List Price: $899
Distribution Method: OEM, Third-party
Date First Installed: September 1983

TELEVIDEO SYSTEMS, INC.
925
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 11, standard, 22, maximum
List Price: $995
Distribution Method: OEM, Third-party
Date First Installed: February 1982

TELEVIDEO SYSTEMS, INC.
950
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 11, standard, 22, maximum
List Price: $1,195
Distribution Method: OEM, Third-party
Date First Installed: February 1981

TELEVIDEO SYSTEMS, INC.
970
Compatibility: TTY; DEC
Plug Compatibility: DEC VT100, VT52
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 16, standard, 32, maximum
List Price: $1,495
Distribution Method: OEM, Third-party
Date First Installed: February 1983

TELEX COMPUTER PRODUCTS, INC.
178
Compatibility: IBM 3270
Plug Compatibility: IBM 3270
Communications Protocols: Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 12, standard, 24, maximum
List Price: $1,550
Average Monthly Maintenance: $12
Distribution Method: End user
Date First Installed: May 1982

TELEX COMPUTER PRODUCTS, INC.
276
Compatibility: IBM 3270
Plug Compatibility: IBM 3278
Communications Protocols: Bisynchronous, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24, standard; 43, optional
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 12, standard, 24, maximum
Distribution Method: Third-party

TELEX COMPUTER PRODUCTS, INC.
276 MODEL 2
Compatibility: IBM 3270
Plug Compatibility: IBM 3278
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 24, maximum
Distribution Method: Third-party

TELEX COMPUTER PRODUCTS, INC.
276 MODEL 3
Compatibility: IBM 3270
Plug Compatibility: IBM 3278
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 32
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 24, maximum
Distribution Method: Third-party

TELEX COMPUTER PRODUCTS, INC.
276 MODEL 4
Compatibility: IBM 3270
Plug Compatibility: IBM 3278
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 43
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 24, maximum
Distribution Method: Third-party

TELEX COMPUTER PRODUCTS, INC.
276 MODEL 5
Compatibility: IBM 3270
Plug Compatibility: IBM 3278
Terminal Configuration: Cluster; 12
Communications Protocols: Bisynchronous, Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Diagonal Screen Size: 15 in.
Line/Screen: 27
Character/Line: 132
Color Capability: No
Program Function Keys: 12, standard; 24, maximum
Distribution Method: Third-party

TELEX COMPUTER PRODUCTS, INC.
279
Compatibility: IBM 3270
Plug Compatibility: IBM 3270
Communications Protocols: Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 32
Character/Line: 80
Color Capability: 4 colors
Program Function Keys: 12
List Price: $3,900
Average Monthly Maintenance: $12
Distribution Method: End user
Date First Installed: March 1979

TELEX COMPUTER PRODUCTS, INC.
4768
Compatibility: IBM 3270
Plug Compatibility: IBM 3278
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 24, maximum

TELEX COMPUTER PRODUCTS, INC.
4781
Compatibility: IBM 3270
Plug Compatibility: IBM 3278
Terminal Configuration: Cluster; 16.
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 24, maximum
Distribution Method: Third-party

TELEX COMPUTER PRODUCTS, INC.
4788
Compatibility: IBM 3270
Plug Compatibility: IBM 3278
Communications Protocols: HDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Maximum Transmission Speed: 9,600 bit/sec

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Smart Terminals

Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard, 24, maximum
Distribution Method: Third-party

TELPAR, INC.
801
Specific Application: Graphics
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: Yes
Program Function Keys: 16, standard, 16, maximum
List Price: $3,200
Distribution Method: OEM
Date First Installed: June 1981

TELPAR, INC.
802
Compatibility: TTY
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 48, standard
Character/Line: 80
Color Capability: Yes
Program Function Keys: 16, standard, 16, maximum
List Price: $3,950
Distribution Method: OEM

TELPAR, INC.
IT651C
Specific Application: Graphics
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 15, standard; 16, maximum
List Price: $3,200
Distribution Method: OEM
Date First Installed: May 1981

TELPAR, INC.
IT802C
Specific Application: Graphics
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 48
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 16, standard; 32, maximum
List Price: $3,950
Distribution Method: OEM

TELPAR, INC.
M651C
Specific Application: Graphics
Compatibility: TTY
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: Yes
Program Function Keys: 16, standard; 16, maximum
List Price: $3,200
Distribution Method: OEM
Date First Installed: March 1982

THOMAS ENGINEERING
T-7800
Specific Application: Forms Data Entry
Compatibility: Honeywell
Plug Compatibility: Honeywell VIP 7800
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard, 36, maximum
List Price: $1,895
Average Monthly Maintenance: $12
Distribution Method: End user
Date First Installed: December 1982

TRANSIAC CORP.
TR 1024
Specific Application: Graphics
Compatibility: IBM 3270; TTY, Honeywell; Sperry; Burroughs; NCR; DEC
Plug Compatibility: Tektronix 4014, DEC VT100
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 42
Character/Line: 170
Color Capability: No
Program Function Keys: 4, standard; 4, maximum
List Price: $4,500
Distribution Method: End user, OEM, Third-party
Date First Installed: 1981

TRENDCOM
WHISPER SCREEN
Compatibility: TTY
Plug Compatibility: DEC VT52, VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 9 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12
List Price: $1,695
Distribution Method: Third-party

VISUAL TECHNOLOGY, INC.
VISUAL 150
Compatibility: TTY
Plug Compatibility: DEC VT100
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 14 in., optional
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
List Price: $1,345
Distribution Method: Third-party
Date First Installed: March 1980

VISUAL TECHNOLOGY, INC.
VISUAL 110
Compatibility: TTY
Plug Compatibility: DG Dasher 605, D200
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 14 in., optional
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 12, standard; 12, maximum
List Price: $1,395
Distribution Method: Third-party
Date First Installed: June 1981

VISUAL TECHNOLOGY, INC.
VISUAL 200
Compatibility: TTY
Plug Compatibility: DEC VT52; Hazeltine 1500; ADDS 520
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 14 in., optional
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 14
Distribution Method: End user, Third-party

VISUAL TECHNOLOGY, INC.
VISUAL 310
Specific Application: WP
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 12
List Price: $1,595
Distribution Method: Third-party
Date First Installed: January 1982

VISUAL TECHNOLOGY, INC.
VISUAL 330
Specific Application: WP
Compatibility: TTY
Plug Compatibility: DEC VT52; DG Dasher 200
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 12
List Price: $1,795
Distribution Method: Third-party
Date First Installed: March 1982

VISUAL TECHNOLOGY, INC.
VISUAL 400
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 14 in., optional
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Program Function Keys: 12, standard; 12, maximum

In the world of emulating terminals...
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VISUAL EMULATION CAPABILITY
VISUAL 50/55 are low cost smart terminals. The VISUAL 50 emulates DEC VT52*, Lear Siegler ADM3A,* Hazeltine Esprit* and ADDS Viewpoint.* VISUAL 55 emulates the same plus Hazeltine 1500/1510 and VISUAL 200/210.
VISUAL 100 is 100% compatible with the DEC VT100* and also emulates the VT52.
VISUAL 300/330 are versatile terminals that can be easily customized. The VISUAL 300 emulates the DEC VT100 and VT52. VISUAL 330 emulates the DEC VT52, ADM3A, Hazeltine 1500 and Data General D200
VISUAL 500/550 are low cost, high resolution graphic terminals with powerful alphanumeric capabilities. The VISUAL 500 emulates the VT52, ADM3A, Hazeltine 1500, D200 and Tektronix* 4010/4014. The VISUAL 550 emulates the VT100, VT52 and Tektronix 4010/4014.
VISUAL terminals feature extended ergonomics including tilt and swivel non-glare 12" or 14" screens, detached keyboard; large character size, menu-style setup, sculptured key caps and more.

VISUAL has earned for itself an exclusive place . . . a solitary niche . . . in the arena of emulating terminals. Four great terminal series offer a combination of advanced features found on no other terminals anywhere in the world. Each series delivers higher performance at lower cost for its particular market segment. And nobody else gives such a wide choice of emulations as VISUAL . . . the pioneer in the field.

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VISUAL **See for yourself**

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Smart Terminals

Distribution Method: End user, Third-party

VISUAL TECHNOLOGY, INC.
VISUAL 690
Specific Application: Graphics
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 33
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 12, maximum
List Price: $2,495
Distribution Method: Third-party
Date First Installed: September 1982

VISUAL TECHNOLOGY, INC.
VISUAL 550
Compatibility: TTY
Plug Compatibility: DEC VT52; Hazeltine 1500, DG D200
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 33
Character/Line: 80
Color Capability: Yes
Program Function Keys: 12, standard; 12, maximum
Distribution Method: Third-party

WANG LABORATORIES, INC.
5300 SERIES
Compatibility: IBM 3270; TTY
Terminal Configuration: Cluster; 120
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $1,200
Average Monthly Maintenances: $20
Distribution Method: End user
Date First Installed: 1981

WANG LABORATORIES, INC.
5900 SERIES
Compatibility: IBM 3270; TTY
Terminal Configuration: Cluster; 32
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $6,200
Distribution Method: End user
Date First Installed: 1981

WANG LABORATORIES, INC.
6300 SERIES
Specific Application: Graphics
Compatibility: IBM 3270; TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Color Capability: No
List Price: $5,985
Distribution Method: End user
Date First Installed: 1982

WANG LABORATORIES, INC.
AWS-1
Specific Application: Archiving
Compatibility: IBM 3270; TTY
Terminal Configuration: Cluster; 32
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 22
List Price: $7,700
Average Monthly Maintenances: $66
Distribution Method: End user
Date First Installed: 1976

WANG LABORATORIES, INC.
ERGO-2 MODEL 5740-4
Specific Application: Archiving
Compatibility: IBM 3270; TTY
Terminal Configuration: Cluster; 128
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $8,000
Average Monthly Maintenances: $81
Distribution Method: End user
Date First Installed: 1980

WANG LABORATORIES, INC.
ERGO-2 MODEL 5947
Specific Application: Archiving
Compatibility: IBM 3270; TTY
Terminal Configuration: Cluster; 128
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $7,000
Average Monthly Maintenances: $50
Distribution Method: End user
Date First Installed: 1980

WANG LABORATORIES, INC.
ERGO-2 MODEL 5948
Specific Application: Archiving
Compatibility: IBM 3270; TTY
Terminal Configuration: Cluster; 128
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $7,000
Average Monthly Maintenances: $50
Distribution Method: End user
Date First Installed: 1980

WANG LABORATORIES, INC.
ERGO-2 MODEL 5949
Specific Application: Archiving
Compatibility: IBM 3270; TTY
Terminal Configuration: Cluster; 128
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $8,000
Average Monthly Maintenances: $55
Distribution Method: End user
Date First Installed: 1980

WANG LABORATORIES, INC.
MODEL 2336DW
Compatibility: IBM 3270; TTY
Terminal Configuration: Cluster; 12
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 18
List Price: $2,000
Average Monthly Maintenances: $20
Distribution Method: End user
Date First Installed: 1978

WANG LABORATORIES, INC.
MODEL 5536
Compatibility: IBM 3270; TTY
Terminal Configuration: Cluster; 32
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $6,400
Average Monthly Maintenances: $27
Distribution Method: End user
Date First Installed: 1975

WANG LABORATORIES, INC.
MODEL 5537
Compatibility: IBM 3270; TTY
Terminal Configuration: Cluster; 128
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Date First Installed: 1978

WANG LABORATORIES, INC.
MODEL 5938
Compatibility: IBM 3270; TTY
Terminal Configuration: Cluster; 128
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No

Distribution Method: End user
Date First Installed: 1978

WANG LABORATORIES, INC.
MODEL 5939
Compatibility: IBM 3270; TTY
Terminal Configuration: Cluster; 128
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Distribution Method: End user
Date First Installed: 1978

WANG LABORATORIES, INC.
UFKF ERGO-2
Compatibility: IBM 3270; TTY
Terminal Configuration: Cluster; 12
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard, 32, maximum
List Price: [illegible]
Distribution Method: End user
Date First Installed: 1981

WANG LABORATORIES, INC.
UGJGJLOMODEL 5846-4
Compatibility: IBM 3270; TTY
Terminal Configuration: Cluster; 128
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $6,700
Distribution Method: End user
Date First Installed: 1980

WORLD STORAGE
TECHNOLOGY LTD.
SERIES 4100
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 1,200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 3
List Price: $2,500
Average Monthly Maintenance: $25
Distribution Method: End user, Third-party
Date First Installed: April 1983

WYSE TECHNOLOGY, INC.
WY-100
Specific Application: WP
Compatibility: TTY
Plug Compatibility: LSI 331, TVI 912
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: Yes, optional
Program Function Keys: 8, standard; 16, maximum
List Price: $800
Distribution Method: Third-party
Date First Installed: March 1982

WYSE TECHNOLOGY, INC.
WY-300
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 26
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 8, standard, 16, maximum
List Price: $1,295
Distribution Method: Third-party

ZENITH DATA SYSTEMS
Z-19
Compatibility: TTY
Plug Compatibility: DEC VT52
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asci
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard, 12, maximum
List Price: $[illegible]
Average Monthly Maintenance: $9
Distribution Method: [illegible] Third-party
Date First Installed: June 1979

ZENITH DATA SYSTEMS
Z-29
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Maximum Transmission Speed: 38,000 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 9
List Price: $[illegible]
Distribution Method: Third-party
Date First Installed: March 1982

ZENITH DATA SYSTEMS
ZT-1
Compatibility: TTY
Plug Compatibility: DEC VT52
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 300 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
List Price: $699
Distribution Method: Third-party
Date First Installed: June 1982

ZENITH DATA SYSTEMS
ZT1
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Maximum Transmission Speed: 4,800 bit/sec
Maximum Transmission Speed: 56
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 4
List Price: $590
Distribution Method: [illegible] Third-party
Date First Installed: May 1982

ZENTEC CORP.
COBRA
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard, 15 in., optional
Line/Screen: 24
Character/Line: 80
Program Function Keys: 16, standard, 32, maximum
List Price: $1,[illegible]
Distribution Method: End user, OEM
Date First Installed: September 1982

ZENTEC CORP.
ZEPHYR
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard; 32, maximum
List Price: $1,150
Distribution Method: End user, OEM
Date First Installed: 1[illegible]

Conversational Terminals

AMERICAN COMMUNICATIONS CORP.
AMCOM D
Compatibility: TTY
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Asynchronous
Integrated Modem/Coupler: [illegible]
Diagonal Screen Size: 2 in.
Line/Screen: 1
Character/Line: 16
List Price: $449
Distribution Method: Third-party
Date First Installed: May 1982
(See Vendor Profile Page V-1)

AMERICAN COMMUNICATIONS CORP.
AMCOM P
Compatibility: TTY
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Integrated Modem/Coupler: [illegible]
Diagonal Screen Size: 2 in
Line/Screen: 1
Character/Line: 16
Color Capability: No
List Price: $695
Average Monthly Maintenance: $75
Distribution Method: Third-party
Date First Installed: July 1982

AMERICAN COMMUNICATIONS CORP.
AMCOM 1
Compatibility: TTY
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Integrated Modem/Coupler: [illegible]
Diagonal Screen Size: 2 in.
Line/Screen: 1
Character/Line: 16
Color Capability: No
List Price: $495
Distribution Method: Third-party
Date First Installed: 1979

AMERICAN JACOBSON, INC.
AJ510
Compatibility: TTY
Plug Compatibility: DEC
Terminal Configuration: Stand-alone
Communications Protocols: APL
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $4,995
Average Monthly Maintenance: $180
Distribution Method: End user, Third-party
Date First Installed: January 1980
(See Vendor Profile Page V-3)

ANDROMEDA SYSTEMS, INC.
VDT 11A
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Diagonal Screen Size: 12 in
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 4, standard, 4, maximum
List Price: $1,700
Distribution Method: End user
Date First Installed: April 1981
(See Vendor Profile Page V-3)

ANDROMEDA SYSTEMS, INC.
VDT 11B
Specific Application: WP
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Diagonal Screen Size: 12 in
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 19
List Price: $1,900
Distribution Method: End user
Date First Installed: October 1981

ANDROMEDA SYSTEMS, INC.
VDT 11C
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 19, standard, 19, maximum
List Price: $2,200
Average Monthly Maintenance: $1[illegible]
Distribution Method: End user
Date First Installed: January 1982

ARTS COMPUTER PRODUCTS, INC.
LPVT
Specific Application: DP for the Blind
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 19 in., standard; 25 in., optional
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $3,300
Average Monthly Maintenance: $53
Distribution Method: End user, Third-party
Date First Installed: December 1979
(See Vendor Profile Page V-4)

ARTS COMPUTER PRODUCTS, INC.
ORATOR 1
Specific Application: DP for the Blind
Compatibility: TTY; Honeywell; Sperry; Burroughs; NCR; CDC; DEC
Plug Compatibility: LSI ADM-3A
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 19 in.
Line/Screen: 24
Character/Line: 80
List Price: $4,500
Average Monthly Maintenance: $45
Distribution Method: End user, Third-party
Date First Installed: December 1982

BRAEGEN CORP.
8420
Compatibility: IBM 3270
Terminal Configuration: Cluster
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: [illegible]
Character/Line: [illegible]
Color Capability: No
Program Function Keys: 24
List Price: $1,500
Average Monthly Maintenance: $20
Distribution Method: End user
Date First Installed: March 1983
(See Vendor Profile Page V-5)

CIE SYSTEMS, INC.
CIT-80
Compatibility: TTY
Plug Compatibility: DEC VT52
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $1,195
Distribution Method: Third-party
(See Vendor Profile Page V-6)

CIE SYSTEMS, INC.
CIT-101
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
List Price: $1,495
Distribution Method: Third-party

CIE SYSTEMS, INC.
CIT-161
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: Yes
List Price: $2,595
Distribution Method: Third-party

CIE SYSTEMS, INC.
CIT-414
Compatibility: TTY
Plug Compatibility: Tektronix 4010, 4014
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $1,895
Distribution Method: Third-party

CIE SYSTEMS, INC.
CIT-427
Compatibility: TTY
Plug Compatibility: Tektronix 4027
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: Yes
Distribution Method: Third-party

COBAR, INC.
3100
Compatibility: TTY

Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 18, standard, 18, maximum
List Price: $1,195
Average Monthly Maintenance: $35
Distribution Method: End user
Date First Installed: January 1981
(See Vendor Profile Page V-7)

COMPUTERWISE, INC.
TRANSTERM 1
Specific Application: Data Entry
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Line/Screen: 2
Character/Line: 32
Color Capability: No
List Price: $449
Distribution Method: End user
Date First Installed: March 1981
(See Vendor Profile Page V-9)

COMPUTERWISE, INC.
TRANSTERM 1A
Compatibility: IBM 3270; TTY; Honeywell; Sperry; Burroughs; NCR; CDC
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Line/Screen: 2
Character/Line: 32
Color Capability: No
List Price: $449
Distribution Method: End user
Date First Installed: March 1981

COMPUTERWISE, INC.
TRANSTERM 2
Specific Application: Data Entry
Compatibility: TTY
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $549
Distribution Method: End user
Date First Installed: March 1982

COMPUTERWISE, INC.
TRANSTERM 3
Compatibility: TTY
Data Transmission Characteristics: Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Line/Screen: 2
Character/Line: 40
Color Capability: No
List Price: $499
Distribution Method: End user
Date First Installed: January 1983

CONTROL CONCEPTS CORP.
CC-3278
Compatibility: IBM 3278
Plug Compatibility: IBM 3278
Terminal Configuration: Cluster; 32
Communications Protocols: Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii, Ebodic
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Program Function Keys: 24, standard, 24, maximum
List Price: $1,300
Average Monthly Maintenance: $25
Distribution Method: End user
Date First Installed: July 1982
(See Vendor Profile Page V-9)

CROMEMCO, INC.
C1, CTI, CKBC
Compatibility: TTY
Data Transmission Characteristics: Full-Duplex, Ascii
Maximum Transmission Speed: 60,000 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
List Price: $885
Distribution Method: Third-party
Date First Installed: May 1983
(See Vendor Profile Page V-9)

CROMEMCO, INC.
C1, CTI, CKBC
Compatibility: TTY
Data Transmission Characteristics: Full-Duplex, Ascii
Maximum Transmission Speed: 60,000 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 20
List Price:
Distribution Method: Third-party
Date First Installed: June 1983

DATA GENERAL CORP.
6052 DASHER
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 8, standard, 8, maximum
Distribution Method: Third-party
(See Vendor Profile Page V-10)

DATA GENERAL CORP.
6053 DASHER
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 11, standard, 11, maximum
Distribution Method: Third-party

DATA GENERAL CORP.
DASHER D100
Compatibility: TTY
Terminal Configuration: Cluster
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Asynchronous, Ascii
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 96
Color Capability: No
Program Function Keys: 15, standard, 15, maximum
Distribution Method: Third-party
Date First Installed: 1981

DATA GENERAL CORP.
DASHER D200
Compatibility: IBM 3101
Terminal Configuration: Cluster
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 96
Color Capability: No
Program Function Keys: 15, standard; 15, maximum
Distribution Method: Third-party
Date First Installed: 1981

DATA GENERAL CORP.
DASHER D200C
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 13 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 8 colors
Program Function Keys: 15, standard; 15, maximum
Distribution Method: Third-party

DATA GENERAL CORP.
DASHER G300
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 10, standard; 20, maximum
Distribution Method: Third-party

DATA GENERAL CORP.
DASHER D400
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 135, optional
Color Capability: No
Program Function Keys: 15, standard, 20, maximum
Distribution Method: Third-party

DATA GENERAL CORP.
DASHER D450
Compatibility: TTY
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Ascii
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 135, optional
Program Function Keys: 15, standard, 20, maximum
Distribution Method: Third-party

DATAMEDIA CORP.
COLORSCAN 10
Specific Application: Data Entry
Compatibility: TTY, DEC
Plug-Compatibility: DEC VT100, DEC VT52
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, optional
Color Capability: 8 colors
Program Function Keys: 12, standard, 12, maximum
Distribution Method: OEM, Third-party
(See Vendor Profile Page V-10)

DATAMEDIA CORP.
COLORSCAN 30
Specific Application: Data Entry
Compatibility: TTY, Hazeltine 1420
Plug Compatibility: ADDS Regent 25, LSI ADM-3A, Hazeltine 1420, Datamedia 1521
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous

Conversational Terminals

Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: 8 colors
Program Function Keys: 8, standard; 8, maximum
Distribution Method: OEM, Third-party

DATAMEDIA CORP.
COLORSCAN 70
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: DG D100/200, D6053, D6052
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: 8 colors
Program Function Keys: 12, standard; 12, maximum
Distribution Method: OEM, Third-party

DATAMEDIA CORP.
EXCEL 10
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: DEC VT100, VT52
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 14 in., optional
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Program Function Keys: 4, standard; 4, maximum
Distribution Method: OEM, Third-party

DATAMEDIA CORP.
EXCEL 20
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: DEC VT100, VT52
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 14 in., optional
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
Distribution Method: OEM, Third-party

DATAMEDIA CORP.
EXCEL 30
Specific Application: Data Entry
Compatibility: TTY
Plug Compatibility: Datamedia 1521; ADDS Regent 25; LSI ADM-3A; Hazeltine 1420
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 14 in., optional
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 8, maximum
Distribution Method: OEM, Third-party

DATAMEDIA CORP.
EXCEL 70
Specific Application: Data Entry
Compatibility: TTY; DG
Plug Compatibility: DG D100/200, DG 6053, DG 6052
Terminal Configuration: Stand-alone
Communications Protocols: RS 232
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 14 in., optional
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 12, standard, 19, maximum
Distribution Method: OEM, Third-party

DATA-TYPE, INC.
XE4
Specific Application: Graphics
Compatibility: TTY
Plug Compatibility: Tektronix 4006, 4010, 4014, 4016
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in., standard; 14 in., optional
Line/Screen: 24, standard; 40, optional
Character/Line: 80, standard; 132, optional
Color Capability: Yes
Program Function Keys: 12, standard, 12, maximum
List Price: $4,995
Average Monthly Maintenance: $60
Distribution Method: End user
Date First Installed: October 1982
(See Vendor Profile Page V-12)

DATA TYPE, INC.
XK1
Specific Application: Graphics
Compatibility: TTY
Plug Compatibility: Tektronix 4006, 4014, 4010, 4016
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 12, standard; 12, maximum
List Price: $4,495
Average Monthly Maintenance: $60
Distribution Method: End user
Date First Installed: October 1982

DECISION DATA COMPUTER CORP.
3791-11 DISPLAY STATION
Compatibility: IBM 3270
Plug Compatibility: IBM 5251-11
Communications Protocols: X.25, IBM Interface
Data Transmission Characteristics: Synchronous, Ebcdic
Maximum Transmission Speed: 1 MHz
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 24
List Price: $2,175
Average Monthly Maintenance: $21
Distribution Method: End user
Date First Installed: 1981
(See Vendor Profile Page V-12)

DECISION DATA COMPUTER CORP.
3791-01 DISPLAY STATION
Compatibility: IBM 3270
Plug Compatibility: IBM 5291-1
Communications Protocols: X.25
Data Transmission Characteristics: Synchronous
Maximum Transmission Speed: 2 MHz
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Program Function Keys: 24.
List Price: $1,810
Distribution Method: End user
Date First Installed: July 1983

DELTA DATA SYSTEMS CORP.
DELTA 2100
Compatibility: TTY
Terminal Configuration: Cluster; 8
Communications Protocols: Echo
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
List Price: $1,995
Average Monthly Maintenance: $33
Distribution Method: End user
(See Vendor Profile Page V-12)

DIGITAL EQUIPMENT CORP.
VT101
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 4, standard; 4, maximum
List Price: $1,350
Average Monthly Maintenance: $15
Distribution Method: Third-party
(See Vendor Profile Page V-13)

GENERAL DIGITAL CORP.
VUE POINT
Specific Application: Touch Screen
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 9 in.
Line/Screen: 12
Character/Line: 40
Color Capability: No
List Price: $3,500
Average Monthly Maintenance: $35
Distribution Method: End user
Date First Installed: 1979
(See Vendor Profile Page V-15)

HARRIS CORP.
1675
Specific Application: Data Entry
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 12, maximum
Distribution Method: End user
Date First Installed: 1978
(See Vendor Profile Page V-16)

HARRIS CORP.
1685
Specific Application: Data Entry
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Asynchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 12, maximum
Distribution Method: End user
Date First Installed: 1978

HEWLETT-PACKARD CO.
2382A
Compatibility: TTY
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 8 in.

Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 8
List Price: $1,720
Average Monthly Maintenance: $20
Distribution Method: End user, OEM
Date First Installed: 1981
(See Vendor Profile Page V-16)

ICL, INC.
KOKUSAI KDS 7362
Terminal Configuration: Cluster
Communications Protocols: Half-Duplex, Full-Duplex; Asynchronous; Synchronous; Ascii
Data Transmission Characteristics: Asynchronous, Synchronous
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 19
List Price: $800
Distribution Method: Third-party
Date First Installed: 1981
(See Vendor Profile Page V-17)

Additional information provided for by vendor
Kokusai KDS 7362
Video display terminal
RS232C or 20 MA current loop I/F
Detachable keyboard
Multi-language
Full screen attributes
up to 9600 baud; selectable parity
low cost; high reliability

INFORMER COMPUTER TERMINALS, INC.
MODEL 201
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 9 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Distribution Method: Third-party
(See Vendor Profile Page V-19)

INFORMER COMPUTER TERMINALS, INC.
MODEL 202
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 9 in., standard; 12 in., optional
Line/Screen: 24
Character/Line: 80
Color Capability: No
Distribution Method: Third-party

INFORMER COMPUTER TERMINALS, INC.
MODEL 203
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 9 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Distribution Method: Third-party

INFORMER COMPUTER TERMINALS, INC.
MODEL 205
Compatibility: IBM 3270
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Distribution Method: Third-party

INTERACTION SYSTEMS, INC.
TT/100
Specific Application: Data Entry
Compatibility: TTY
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: Yes
Program Function Keys: 20, standard; 20, maximum
List Price: $4,000
Distribution Method: End user
(See Vendor Profile Page V-19)

INTERACTION SYSTEMS, INC.
TT/150
Specific Application: Data Entry
Compatibility: TTY
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 25
Character/Line: 80
Color Capability: Yes
Program Function Keys: 20, standard; 20, maximum
List Price: $2,470
Distribution Method: End user
Date First Installed: January 1983

IXO, INC.
TC-101 PORTABLE TERMINAL
Specific Application: Electronic Mail
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 300 bit/sec
Integrated Modem/Coupler: Standard
Line/Screen: 1
Character/Line: 16
Color Capability: No
Program Function Keys: 6
List Price: $300
Distribution Method: End user, Third-party
Date First Installed: April 1982
(See Vendor Profile Page V-20)

IXO, INC.
TC-102 PORTABLE TERMINAL
Specific Application: Electronic Mail
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 300 bit/sec
Integrated Modem/Coupler: Standard
Line/Screen: 1
Character/Line: 16
Color Capability: No
Program Function Keys: 6
List Price: $325
Distribution Method: End user, Third-party
Date First Installed: August 1982

JOHN FLUKE MANUFACTURING CO., INC.
1780A
Compatibility: TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 9 in.
Line/Screen: 16
Character/Line: 80
Color Capability: No
Program Function Keys: 60
List Price: $1,995
Average Monthly Maintenance: $11
Distribution Method: End user, OEM, Third-party
Date First Installed: June 1982
(See Vendor Profile Page V-21)

KENNEDY INDUSTRIAL CORP.
KIE-3662
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 62
List Price: $995
Distribution Method: End user, Third-party
(See Vendor Profile Page V-21)

LEAR SIEGLER, INC.
ADM-3A
Specific Application: Data Entry
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $595
Distribution Method: Third-party
Date First Installed: 1975
(See Vendor Profile Page V-21)

LEAR SIEGLER, INC.
ADM-5
Specific Application: Data Entry
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $645
Distribution Method: Third-party
Date First Installed: 1981

LEAR SIEGLER, INC.
ADM-8
Specific Application: Data Entry
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Program Function Keys: 4, standard; 8, maximum
List Price: $695
Distribution Method: Third-party
Date First Installed: June 1983

LEE DATA CORP.
MODEL 1216
Specific Application: Interactive inquiry
Compatibility: IBM 3270; TTY
Plug Compatibility: IBM 3178; DEC VT100

Conversational Terminals

Terminal Configuration: Cluster; 32
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
List Price: $1,411
Distribution Method: End user
Date First Installed: July 1983
(See Vendor Profile Page V-21)

LEE DATA CORP.
MODEL 1218
Compatibility: IBM 3270; TTY
Plug Compatibility: IBM 3278; DEC VT100
Terminal Configuration: Cluster; 32
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
List Price: $2,394
Date First Installed: June 1981

LEE DATA CORP.
MODEL 1219
Compatibility: IBM 3270; TTY
Plug Compatibility: IBM 3278; DEC VT100
Terminal Configuration: Cluster; 32
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80, standard; 132, optional
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
List Price: $2,791
Average Monthly Maintenance: $11
Distribution Method: Third-party
Date First Installed: June 1981

LEE DATA CORP.
MODEL 1230
Compatibility: IBM 3270
Plug Compatibility: IBM 3279
Terminal Configuration: Cluster; 32
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: 4 colors
Program Function Keys: 24, standard; 24, maximum
List Price: $3,341
Average Monthly Maintenance: $11
Distribution Method: End user
Date First Installed: November 1981

LEE DATA CORP.
MODEL 1231
Plug Compatibility: IBM 3279
Terminal Configuration: Cluster; 32
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 15 in.
Line/Screen: 24, standard, 32, optional
Character/Line: 80
Color Capability: 4 colors
Program Function Keys: 24, standard, 24, maximum
List Price: $3,841
Date First Installed: November 1981

MEMOREX CORP.
1377 DISPLAY STATION
Compatibility: IBM 3270
Communications Protocols: Asynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard, 12, maximum
List Price: $1,100
Distribution Method: End user
Date First Installed: 1977
(See Vendor Profile Page V-23)

MEMOREX CORP.
2051 DISPLAY STATION
Compatibility: IBM 3270
Plug Compatibility: IBM 5251 MD II
Terminal Configuration: Cluster
Communications Protocols: Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Diagonal Screen Size: 15 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Distribution Method: Third-party
Date First Installed: October 1981

MEMOREX CORP.
2075 DISPLAY STATION
Compatibility: IBM 3270
Plug Compatibility: Memorex 2074, 2076; IBM 3274, 3276
Terminal Configuration: Cluster; 32
Communications Protocols: Asynchronous, Synchronous
Diagonal Screen Size: 15 in.
Line/Screen: 43
Character/Line: 132
Color Capability: No
Program Function Keys: 10, standard; 24, maximum
List Price: $3,435
Average Monthly Maintenance: $18
Distribution Method: End user
Date First Installed: December 1980

MEMOREX CORP.
2079 COLOR DISPLAY STATION
Specific Application: Graphics
Compatibility: IBM 3270
Plug Compatibility: Memorex 2074, 2076, IBM 3274, 3276
Terminal Configuration: Cluster; 32
Communications Protocols: SDLC, HDLC, Synchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Synchronous
Diagonal Screen Size: 15 in.
Line/Screen: 32
Character/Line: 132
Color Capability: 7 colors
Program Function Keys: 10, standard, 24, maximum
List Price: $3,726
Average Monthly Maintenance: $38
Distribution Method: End user

MICRODATA CORP.
7452
Specific Application: Data Entry
Compatibility: IBM 3270
Terminal Configuration: Cluster; 16
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Diagonal Screen Size: 9 in.
Character/Line: 40
Color Capability: No
List Price: $1,990
Average Monthly Maintenance: $17
Distribution Method: End user
Date First Installed: 1978
(See Vendor Profile Page V-24)

MICRODATA CORP.
PRISM IV
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 8, standard; 16, maximum
List Price: $1,495
Average Monthly Maintenance: $11
Distribution Method: End user, Third-party
Date First Installed: February 1983

MILTOPE CORP.
MILTERM-980
Specific Application: Military
Compatibility: TTY, DEC
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Line/Screen: 25
Character/Line: 80
Program Function Keys: 9, standard; 12, maximum
List Price: $15,600
Distribution Method: OEM
Date First Installed: 1980
(See Vendor Profile Page V-24)

NABU COMMERCIAL TERMINAL, INC.
4404
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 10
List Price: $695
Distribution Method: Third-party
Date First Installed: 1981
(See Vendor Profile Page V-25)

NCR CORP.
7900 MODEL 1
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 5
Distribution Method: End user
(See Vendor Profile Page V-26)

NCR CORP.
7900 MODEL 2
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 17
Distribution Method: End user

NCR CORP.
7900 MODEL 3
Compatibility: TTY
Terminal Configuration: Cluster; 96
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 10
Distribution Method: End user

NCR CORP.
7900 MODEL 4
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Data Capability: No
Program Function Keys: 10
Distribution Method: End user

NCR CORP.
NCR 7901
Compatibility: TTY
Terminal Configuration: Cluster
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 10, standard, 10, maximum
List Price: $850
Distribution Method: Third-party
Date First Installed: June 1982

NORTHERN TELECOM, INC.
DISPLAY PHONE
Specific Application: Data Base Access
Compatibility: IBM 3270; TTY; Honeywell; Sperry; Burroughs; NCR; CDC
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 7 in.
Line/Screen: 25
Character/Line: 40
Color Capability: No
Program Function Keys: 5, standard, 24, maximum
List Price: $1,295
Average Monthly Maintenance: $16
Distribution Method: End user, Third-party
Date First Installed: April 1982
(See Vendor Profile Page V-26)

PERKIN-ELMER CORP.
550
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: 3 colors, optional
Distribution Method: End user
Date First Installed: 1977
(See Vendor Profile Page V-26)

PERKIN-ELMER CORP.
550B
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: 3 colors, optional
Distribution Method: End user
Date First Installed: 1977

PERRY DATA SYSTEMS, INC.
9200
Specific Application: POS
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard, 12, maximum
List Price: $1,375
Distribution Method: End user
Date First Installed: June 1982
(See Vendor Profile Page V-26)

PERRY DATA SYSTEMS, INC.
9310
Specific Application: POS
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard, 12, maximum
List Price: $3,500
Distribution Method: End user
Date First Installed: June 1982

PERRY DATA SYSTEMS, INC.
9480
Specific Application: POS
Plug Compatibility: IBM 3701; DG D200, ADDS Regent 25
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard, 12, maximum
List Price: $3,500
Distribution Method: End user
Date First Installed: June 1982

PINC, INC.
IWS 100
Specific Application: Factory
Compatibility: TTY, DEC
Plug Compatibility: DEC VT100
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 16
List Price: $1,595
Distribution Method: End user
(See Vendor Profile Page V-28)

PRODUCT DEVELOPMENT SERVICES, INC.
1150 INDUSTRIAL TERMINAL
Specific Application: Factory Automation
Compatibility: IBM 3270; TTY
Plug Compatibility: DEC VT100
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous, X.25, Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Optional
Diagonal Screen Size: 15 in., standard, 12 in., optional
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 37, standard, 37, maximum
List Price: $3,950
Distribution Method: OEM
Date First Installed: March 1983
(See Vendor Profile Page V-29)

PRODUCT DEVELOPMENT SERVICES, INC.
4150 INDUSTRIAL MONITOR
Specific Application: Factory Automation
Compatibility: RS 170
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Synchronous
Maximum Transmission Speed: 24,000 bit/sec
Diagonal Screen Size: 19 in., standard; 12 in., optional
Color Capability: 8 colors, optional
List Price: $1,900
Distribution Method: OEM
Date First Installed: March 1983

PROTOCOL COMPUTER, INC.
PC51
Compatibility: IBM 3270; TTY
Plug Compatibility: IBM 5251-11, 5291
Terminal Configuration: Cluster; 7
Communications Protocols: Bisynchronous, Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard, 24, maximum
List Price: $995
Distribution Method: End user, OEM, Third-party
Date First Installed: March 1983
(See Vendor Profile Page V-29)

PROTOCOL COMPUTER, INC.
PC78
Compatibility: IBM 3270; TTY
Plug Compatibility: IBM 3277, 3178, 3278
Terminal Configuration: Cluster; 7
Communications Protocols: Bisynchronous, Asynchronous, SDLC
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 24, standard; 24, maximum
List Price: $995
Distribution Method: End user, OEM, Third-party
Date First Installed: March 1983

PRITECH
GTC 329
Plug Compatibility: DEC VT52
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 14 in.
Line/Screen: 48
Character/Line: 85
Color Capability: 409 colors
Program Function Keys: 32, standard, 93, maximum
Distribution Method: End user, OEM
Date First Installed: February 1983
(See Vendor Profile Page V-30)

SPERRY CORP.
UTS 10
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 12, maximum
List Price: $1,428 to $1,720
Distribution Method: End user
Date First Installed: October 1980
(See Vendor Profile Page V-33)

Conversational Terminals

TAIWAN ELECTRIC WIRE CO., LTD.
TW-8
Compatibility: LSI ADM-3A
Terminal Configuration: Cluster
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 24
Distribution Method: OEM
(See Vendor Profile Page V-34)

TANDY CORP.
DT-1
Plug Compatibility: Televideo 910, 5
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 9,600 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 2, standard, 2, maximum
List Price: $699
Distribution Method: End user
Date First Installed: 1981
(See Vendor Profile Page V-34)

TEALTRONICS, INC.
4008
Specific Application: Graphics; Data Entry
Compatibility: TTY; Honeywell; Sperry; Burroughs; NCR; CDC
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 4,800 bit/sec
Diagonal Screen Size: 11 in.
Line/Screen: 35
Character/Line: 74
Color Capability: No
List Price: $3,900
Average Monthly Maintenance: $42
Distribution Method: End user, OEM
Date First Installed: June 1975
(See Vendor Profile Page V-36)

TEALTRONICS, INC.
4012
Specific Application: Graphics; Data Entry
Compatibility: TTY; Honeywell; Sperry; Burroughs; NCR; CDC
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 11 in.
Line/Screen: 35
Character/Line: 74
Color Capability: No
List Price: $6,200
Average Monthly Maintenance: $46
Distribution Method: End user, OEM
Date First Installed: June 1973

TELESENSORY SYSTEMS, INC.
P2C
Specific Application: Braille Terminal
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: None
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Integrated Modem/Coupler: Standard
Line/Screen: 1
Character/Line: 20
Color Capability: No
Program Function Keys: 6, standard; 6, maximum
List Price: $6,950
Distribution Method: End user
Date First Installed: December 1979
(See Vendor Profile Page V-36)

TELETYPE CORP.
5410
Compatibility: TTY
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
Program Function Keys: 16, standard, 16, maximum
List Price: $995
Distribution Method: OEM
Date First Installed: July 1983
(See Vendor Profile Page V-36)

TELEVIDEO SYSTEMS, INC.
910
Compatibility: TTY
Plug Compatibility: LSI ADM-5; Hazeltine 410; ADDS Region 25
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 12 in.
Line/Screen: 24
Character/Line: 80
Color Capability: No
List Price: $695
Distribution Method: OEM, Third-party
Date First Installed: November 1981
(See Vendor Profile Page V-36)

TERMIFLEX CORP.
CD-20
Specific Application: Military
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 5 in.
Line/Screen: 1
Character/Line: 20
Color Capability: No
List Price: $495
Distribution Method: Third-party
Date First Installed: June 1974
(See Vendor Profile Page V-37)

TERMIFLEX CORP.
HT-2
Specific Application: Military
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 5 in.
Line/Screen: 2
Character/Line: 10
Color Capability: No
List Price: $2,495
Distribution Method: Third-party
Date First Installed: October 1973

TERMIFLEX CORP.
HT-3
Specific Application: Military
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 5 in.
Line/Screen: 1
Character/Line: 12
Color Capability: No
List Price: $795
Distribution Method: Third-party
Date First Installed: October 1975

TERMIFLEX CORP.
HT-4
Specific Application: Military
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 5 in.
Line/Screen: 2
Character/Line: 12
Color Capability: No
List Price: $1,198
Distribution Method: Third-party
Date First Installed: June 1974

TERMIFLEX CORP.
HT-6
Specific Application: Military
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec

Diagonal Screen Size: 5 in.
Line/Screen: 1
Character/Line: 20
Color Capability: No
List Price: $1,795
Distribution Method: Third-party
Date First Installed: June 1974

TERMIFLEX CORP.
HT-6W
Specific Application: Military
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 5 in.
Line/Screen: 1
Character/Line: 20
Color Capability: No
List Price: $2,980
Distribution Method: Third-party
Date First Installed: October 1982

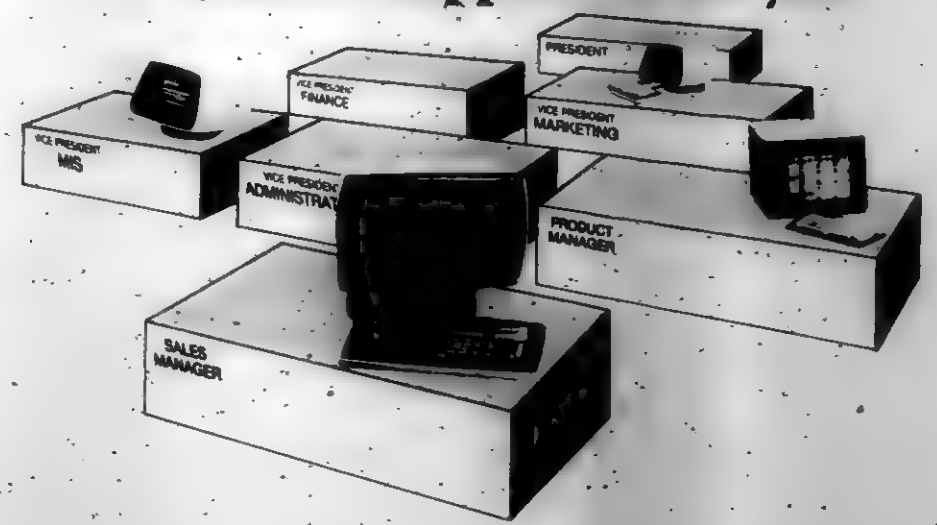
TERMIFLEX CORP.
HT-7
Specific Application: Military
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 5 in.
Line/Screen: 2
Character/Line: 20
Color Capability: No
List Price: $3,780
Distribution Method: Third-party
Date First Installed: June 1974

TERMIFLEX CORP.
HT-7W
Specific Application: Military
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 5 in.
Line/Screen: 2
Character/Line: 20
Color Capability: No
List Price: $3,780
Distribution Method: Third-party
Date First Installed: October 1982

TERMIFLEX CORP.
HT-8
Specific Application: Military
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 5 in.
Line/Screen: 4
Character/Line: 20
Color Capability: No
List Price: $3,995

WHAT'S THE FUTURE OF MICROS IN YOUR ORGANIZATION?

Turn to "The Micro Mission" this fall and get the future mapped out for you.



What's the future of Micros in your organization? Turn to "The Micro Mission" this fall and get the future mapped out for you.

This November, *Computerworld* will give you an Extra! you can't afford to miss. Not if you plan to take advantage of the hundreds of possibilities micros give you. You'll get articles, interviews, applications stories, tutorials, market data, and advice from the experts — a whole issue of *Computerworld Extra!* devoted to "The Micro Mission." And it will come in the mail at the end of November as a bonus issue! You don't have to do a thing. Just look at what's coming to you:

You'll get an examination of the politics of microcomputers in organizations, a roundtable discussion by DP/MIS experts dealing with a wide range of topics relating to personal computers — from selection to implementation. And, there'll be a whole article devoted to how large companies deal with training personnel to use personal computers.

You'll get articles on:

- The types of peripherals available for setting up an overall system
- Word processing software for personal computers
- An evaluation of spreadsheet software for personal computers
- Networking personal computers into the corporate database
- Maintenance, service and support policies of vendors
- Database management systems on personal computers

And there'll be a special profile of an operating information center where employees are trained on the use of personal computers. You'll see how they're helped in selecting the right product for their needs and how they're aided in implementation and ongoing training. You'll also get a look at the financial ins and outs of the market, pros and cons of personal computers replacing CRTs, and . . . you get the idea. You're going to get a whole issue packed with news on micros you can't afford to miss.

And if you sell micros and micro products, you shouldn't miss this opportunity of having your product represented in this *Computerworld Extra!* issue that will be saved and used as a reference. The deadline for ads is October 21. To get your space reserved, call Don Fagan, Vice President Sales/Marketing at (617) 879-0700 or call your local *Computerworld* sales office, listed below.

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

To: Don Fagan
Vice President Sales/Marketing
CW Communications/Inc.
375 Cochituate Road
Framingham, MA 01701
(617) 879-0700

☐ *Please send me advertising information on your Micro Extra!*
☐ *Please have a sales representative contact me*

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Title _____
Company _____
Address _____
City _____ State _____ Zip _____
Telephone _____

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Art Kossack, Newt Barrett, Chris Lee, Joan Fowler Broderick, (312) 827-4433

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Mike Masters, Doug Cheney, Ray Corbin, Joan Daly, Fred Lo Sapio, Gale M. Paterno, (201) 967-1900

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Los Angeles
Bob Hubbard, Bernie Hockenweiler, Beverly Benn, (714) 556-4410

Conversational Terminals

Distribution Method: Third-party
Date First Installed: June 1974

TERMIFLEX CORP.
HT-8W
Specific Application: Military
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 5 in.
Line/Screen: 4
Character/Line: 20
Color Capability: No
List Price: $5,180
Distribution Method: Third-party
[illegible]

TERMIFLEX CORP.
HT-10
Specific Application: Military
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 5 in.
Line/Screen: 1
Character/Line: 12
List Price: $495
Distribution Method: End user, Third-party
Date First Installed: June 1974

TERMIFLEX CORP.
HT-11
Specific Application: Military
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 5 in.
Line/Screen: 1
Character/Line: 16
List Price: $595
Distribution Method: Third-party
Date First Installed: June 1974

TERMIFLEX CORP.
HT-12
Specific Application: Military
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 5 in.
Line/Screen: 2
Character/Line: 16
List Price: $750
Distribution Method: Third-party
Date First Installed: June 1974

TERMIFLEX CORP.
HT-12MO
Specific Application: Military
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 5 in.
Line/Screen: 2
Character/Line: 16
Color Capability: No
List Price: $400
Distribution Method: Third-party
Date First Installed: May 1983

TERMIFLEX CORP.
HT-20
Specific Application: Military
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 5 in.
Line/Screen: 1
Character/Line: 16
Color Capability: No
List Price: $495
Distribution Method: End user, Third-party
Date First Installed: June 1974

TERMIFLEX CORP.
HT-1200
Specific Application: Military
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 19,200 bit/sec
Diagonal Screen Size: 5 in.
Line/Screen: 4
Character/Line: 16
Color Capability: No
Program Function Keys: 4, standard; 4, maximum
List Price: $795
Distribution Method: Third-party
Date First Installed: October 1973

TRANS-LUX CORP.
TRANSLUX CONNECTION
Specific Application: Telex
Compatibility: TTY
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Asynchronous, Ascii
Maximum Transmission Speed: 300 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 12 in.
Line/Screen: 32
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 12, maximum
List Price: $3,495
Distribution Method: End user, Third-party
Date First Installed: 1982
(See Vendor Profile Page V-37)

TRANS-LUX CORP.
VIDIQUOTE
Specific Application: Telex
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous
Diagonal Screen Size: 12 in.
Line/Screen: 48
Character/Line: 132
Color Capability: No
List Price: $2,000
Distribution Method: End user

TYMSHARE, INC.
SCARSET XL
Specific Application: Information Access
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 300 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 9 in.
Line/Screen: 24
Character/Line: 40, standard; 80, optional
Color Capability: No
Program Function Keys: 6, standard; 12, maximum
List Price: $895
Average Monthly Maintenance: $95
Distribution Method: End user, OEM, Third-party
Date First Installed: 1983
(See Vendor Profile Page V-38)

TYMSHARE, INC.
SCARSET 410
Specific Application: Information Access
Terminal Configuration: Stand-alone
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 300 bit/sec
Diagonal Screen Size: 9 in.
Line/Screen: 24
Character/Line: 40, standard; 80, optional
Color Capability: No
Program Function Keys: 6, standard; 12, maximum
List Price: $495
Average Monthly Maintenance: $95
Distribution Method: End user, OEM, Third-party
Date First Installed: 1982

TYMSHARE, INC.
SCARSET #15/16
Specific Application: Information Access
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Synchronous, Ascii
Maximum Transmission Speed: 1200 bit/sec
Integrated Modem/Coupler: Standard
Diagonal Screen Size: 9 in.
Line/Screen: 24
Character/Line: 40, standard; 80, optional
Color Capability: No
Program Function Keys: 6, standard; 12, maximum
List Price: $1,295
Distribution Method: End user, OEM, Third-party
Date First Installed: 1983

VISUAL TECHNOLOGY, INC.
VISUAL 55
Compatibility: TTY
Plug Compatibility: DEC VT52; Hazeltine Esprit; ADDS Viewpoint; LSI ADM-3
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Half-Duplex, Full-Duplex, Asynchronous, Ascii
Diagonal Screen Size: 12 in.
Line/Screen: 25
Character/Line: 80
Color Capability: No
Program Function Keys: 12, standard; 12, maximum
List Price: $895
Distribution Method: End user, Third-party
(See Vendor Profile Page V-39)

XETA, INC.
XETA
Specific Application: Typesetting
Compatibility: TTY
Plug Compatibility: None
Terminal Configuration: Stand-alone
Communications Protocols: Bisynchronous
Data Transmission Characteristics: Asynchronous, Ascii
Diagonal Screen Size: 12 in.
Line/Screen: 525
Character/Line: 80
Color Capability: 2 colors
List Price: $395
Distribution Method: End user
Date First Installed: July 1983
(See Vendor Profile Page V-39)

PLOTTERS

Plotter Index By Technology Type

A plotter is a computer-output device that generates graphics; the following index is designed to provide an overview of the plotters contained in this section of the buyer's guide. Plotter products are indexed by category according to the type of plotter — drum, electrostatic or flatbed — and contain information on the vendor, product, plotting method, price and the page number on which the product is listed. In addition to the three sections on the main types of plotters, there is also a section for products which use other technologies.

Drum Plotters

VENDOR	MODEL	PLOTTING METHOD	PRICE	PAGE
AMF Geo Space Corp.	GS6400	Raster, Other	$60,000	B-56
Atari, Inc.	1020 COLOR PRINTER	Line plot	$299	B-56
Benson, Inc.	1312/1313	Line plot	N/A	B-56
	1322/1323 PEN PLOTTER	Line plot	N/A	B-56
	1332/1333 PEN PLOTTER	Line plot	N/A	B-56
	1455	Line plot	N/A	B-56
California Computer Products, Inc.	CALCOMP 1012	Line plot	$8,405	B-57
	CALCOMP 1037	Line plot	N/A	B-57
	CALCOMP 1038	Line plot	N/A	B-57
	CALCOMP 1039	Line plot	N/A	B-57
	CALCOMP 1051	Line plot	$18,240	B-57
	CALCOMP 1055	Line plot	$25,250	B-57
	CALCOMP 1060	Line plot	$34,990	B-57
Data Design Logic Systems, Inc.	MODEL 2200	Point plot	$11,500	B-57
	MODEL 3400	Point plot	$14,500	B-58
Houston Instruments	COMPLOT PLOTTER CPS-19	Line plot	$13,950	B-58
	COMPLOT PLOTTER CPS-20	Line plot	$3,995 to $4,595	B-58
	COMPLOT PLOTTER CPS-30	Line plot	$5,995	B-58
	HIPLOT PLOTTER DMP-40	Line plot	$995	B-58
	HIPLOT PLOTTER DMP-41/42	Line plot	$2,995	B-58
Hilltop Corp.	TP 3000	Point plot	$15,600	B-62
Nicolet Zeta Corp.	5400	N/A	$32,900	B-62
	ZETA 6	Line plot	$5,950	B-62
	ZETA 822	Line plot	$12,900	B-62
	ZETA 887	Line plot	$7,950	B-62
	ZETA 3610	Line plot	$25,900	B-62
	ZETA 3620	N/A	$32,900	B-62
	ZETA 3653SX	Line plot	$19,900	B-62
Optronics International, Inc.	4040	Point plot	N/A	B-62
	C-4300	Point plot	N/A	B-63
	C-4500	Point plot	N/A	B-63
	L-5500	Point plot	N/A	B-63
	P-1600	Point plot	N/A	B-63
	P-1500	Point plot	N/A	B-63
	P-1700	Point plot	N/A	B-63
Strobe, Inc.	MODEL 100	Point plot	$699	B-63
	MODEL 209	Point plot	$795	B-63

Electrostatic Plotters

VENDOR	MODEL	PLOTTING METHOD	PRICE	PAGE
Benson, Inc.	9211 ELECTROSTATIC	Point plot	N/A	B-56
California Computer Products, Inc.	CALCOMP 5000/5005	Point plot	$9,640	B-57
	CALCOMP 5100/5105	Point plot	$19,790	B-57
	CALCOMP 5200	N/A	$10,640	B-57
	CALCOMP 5300	Point plot	$23,790	B-57

Plotter Index

VENDOR	MODEL	PLOTTING METHOD	PRICE	PAGE
California Computer Products, Inc.	CALCOMP 5500	Point plot	*N/A*	*B-57*
Megatek Corp.	HCU-V	N/A	*N/A*	*B-62*
Soltec Corp.	6801	Line plot	*$1,995*	*B-63*
Versatec, Inc.	8222F	Point plot	*$26,500*	*B-64*
	8224F	Point plot	*$29,500*	*B-64*
	8236F	Point plot	*$41,500*	*B-64*
	8242F	Point plot	*$53,500*	*B-64*
	8244A	Point plot	*$56,200*	*B-64*
	8259A	Point plot	*N/A*	*B-64*
	8272A	Point plot	*$83,000*	*B-64*
	ECP42	Point plot	*$98,000*	*B-64*
	V80	Point plot	*$8,950*	*B-64*
	V80F	Point plot	*$9,950*	*B-64*

Flatbed Plotters

VENDOR	MODEL	PLOTTING METHOD	PRICE	PAGE
Alpha Merics Corp.	ALPHAPLOT I	Point plot	*$4,590*	*B-56*
	ALPHAPLOT II	Point plot	*$5,590*	*B-56*
Amdek	AMPLOT-II	Line plot	*$1,299*	*B-56*
	DXY-100	Line plot	*$749*	*B-56*
Aristo Graphic Corp.	ARISTOMAT 100 SE	Line plot	*$48,000 to $70,000*	*B-56*
California Computer Products, Inc.	CALCOMP 84	Line plot	*$1,995*	*B-56*
	CALCOMP 748	Line plot	*$77,980*	*B-56*
Computer Talk, Inc.	500 FLATBED PLOTTER	Line plot	*$42,500*	*B-57*
	520 FLATBED PLOTTER	Line plot	*$12,200*	*B-57*
Data Design Logic Systems, Inc.	MODEL 3200	Point plot	*$9,500*	*B-58*
Data Technology, Inc.	DT 3454	Arch	*$25,000*	*B-58*
	DT 4060	Arch	*$27,000*	*B-58*
Epsco, Inc.	EPSCO	Line plot	*$5,000*	*B-58*
Gerber Camsco, Inc.	MP-5	Line plot	*N/A*	*B-58*
Gerber Scientific Instrument Co.	MODEL 32	Line plot	*N/A*	*B-58*
	MODEL 33	Line plot	*N/A*	*B-58*
	MODEL 34	Line plot	*N/A*	*B-58*
	MODEL 35	Line plot	*N/A*	*B-58*
	MODEL 41	Line plot	*N/A*	*B-58*
	MODEL 75	Line plot	*N/A*	*B-58*
	MODEL 77	Line plot	*N/A*	*B-58*
Houston Instruments	HIPLOT PLOTTER DMP-29	Line plot	*$2,295*	*B-59*
Image Graphics, Inc.	CRT 2000	Line plot	*$450,000*	*B-59*
International Antex, Inc.	HIGH SPEED PLOTTER	Line plot	*$1,000*	*B-59*
Kongsberg North America, Inc.	KONGSBERG I	Line plot	*$150,000 to $300,000*	*B-59*
Mannesmann Tally Corp.	PIXY 3	Line plot	*$795*	*B-62*
Panasonic Industrial Co.	VP-6801P	Line plot	*$1,995*	*B-63*
	VP-6802P	Line plot	*N/A*	*B-63*
Sanyo Business Systems Corp.	X-Y PLOTTER	Point plot	*$995*	*B-63*
Systematic Computer Services, Inc.	ORTHOMAT 6000	Line plot	*$100,000 to $250,000*	*B-63*
Tandy Corp.	FP-215 PLOTTER/PRINTER	Line plot	*$995*	*B-63*
Tektronix, Inc.	4662 INTERACTIVE DIGITAL PLOTTER	Line plot	*$5,800*	*B-63*
	4663S INTERACTIVE DIGITAL PLOTTER	Line plot	*$10,900*	*B-63*
Western Graphtec	MP 1000	Point plot	*N/A*	*B-64*
Xynetics, Inc.	SERIES 1000 DRAFTING TABLE	Line plot	*$85,000*	*B-64*
Yokogawa of America	GRAPHMATE II	Line plot	*$2,950*	*B-64*
	PL 2000	Line plot	*$2,100*	*B-64*

Plotters Using Other Technologies

VENDOR	MODEL	PLOTTING METHOD	PRICE	PAGE
Aristo Graphic Corp.	ARISTOMAT 200	Linear/Circular Interpolation	*N/A*	*B-56*
Benson, Inc.	1565 RADIAL BED PEN PLOTTER	Line plot	*N/A*	*B-56*
	9215 ELECTROSTATIC PLOTTER	Point plot	*N/A*	*B-56*
California Computer Products, Inc.	CALCOMP 945	Line plot	*$15,790*	*B-56*

Plotter Index

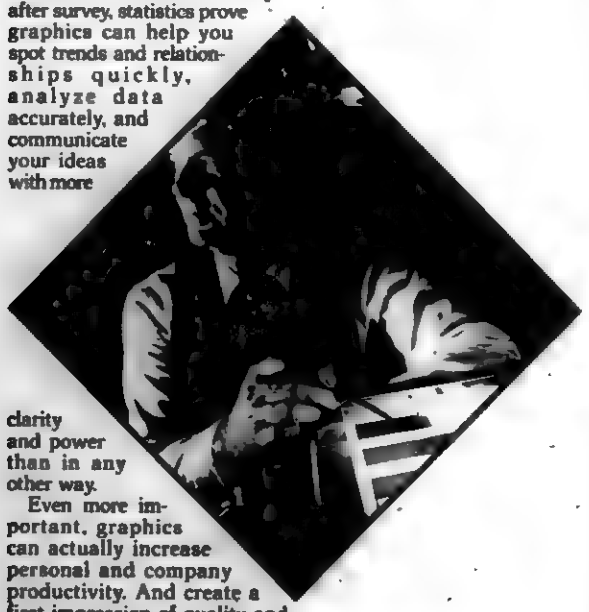
VENDOR	MODEL	PLOTTING METHOD	PRICE	PAGE
California Computer Products, Inc.	CALCOMP 965	Line plot	*$20,500*	**B-57**
	CALCOMP 970	Line plot	*$39,610*	**B-57**
Digital Equipment Corp.	CORRESPONDENT LA12	Bit-map	*$1,995*	**B-58**
	DECWRITER IV LA34-VA	Bit-map	*$1,550*	**B-58**
	LETTERPRINTER 100 LA100	Bit-map	*$2,500*	**B-58**
Enter Computer, Inc.	SWEET-P 100	Line plot	*$795*	**B-58**
Gerber Scientific Instrument Co.	MODEL 42	Line plot	*N/A*	**B-58**
	MODEL 43	Line plot	*N/A*	**B-58**
Hewlett-Packard Co.	HP 7470A GRAPHICS PLOTTER	Line plot	*$1,575*	**B-59**
	HP 7580B	Line plot	*$16,100*	**B-59**
	HP 7585B	Line plot	*$22,900*	**B-59**
Image Graphics, Inc.	EBR 2000	[redacted]	*$350,000*	**B-59**
Image Resource, Inc.	VIDEO PRINT MODEL 5090	Raster	*$6,000*	**B-59**
Kongsberg North America, Inc.	KONGSBERG II	Line plot	*$150,000 to $300,000*	**B-62**
Numonics	5412	Line plot	*$1,295*	**B-62**
	5424	Line plot	*$2,975*	**B-62**
Seiko Instruments U.S.A., Inc.	CH-5201	Point plot	*N/A*	**B-63**
Soltec Corp.	6802	Line plot	*$2,595*	**B-63**
Western Graphtec	WX 4630 SERIES	Point plot	*$3,990 to $6,990*	**B-64**
	WX 4731 PLOT WRITER	Point plot	*$2,490*	**B-64**
Yokogawa of America	PL1000	Line plot	*$1,150*	**B-64**

How HP business graphics

Enhance your reputation for being more professional, persuasive, credible and effective than your competition with the new HP 7475A Business Professional's Plotter.

Make a first impression that lasts

The vital importance of graphics to today's business professional cannot be overstated. In survey after survey, statistics prove graphics can help you spot trends and relationships quickly, analyze data accurately, and communicate your ideas with more



clarity and power than in any other way.

Even more important, graphics can actually increase personal and company productivity. And create a first impression of quality and professionalism that lasts and lasts.

Graphics: the end to meetings that go nowhere

In a fascinating research project conducted by The University of Pennsylvania, 123 MBA candidates were involved in a study designed to test the effectiveness of business graphics in meeting situations. The results were startling. In the group where visual aids were used:

- **Meetings were shorter:** The study showed a 28% reduction in meeting length when transparencies were used.
- **Group consensus was faster:** Agreement was reached by 79% of the group using transparencies, compared with only 8% among the control group using no visual aids.
- **The decision process was accelerated:** 64% of study participants said they made their business decisions *immediately after the visual presentation.* When overheads were not used, the control group said they delayed decision-making until *some time after the group discussion following the presentation.*
- **Presenters with visual aids were perceived as being more professional, persuasive, credible and effective than those not using visual aids.**

Now, with the new HP 7475A Business Professional's Plotter, your meetings can have immediate and productive results like these.

How the quality look of HP graphics can help

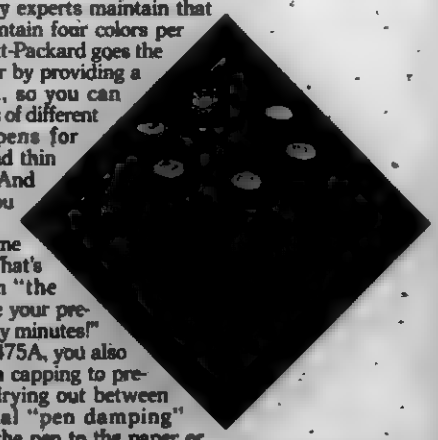
The way you present your information can be equally as important as the actual information you're presenting. And that's where the new HP 7475A Business Professional's Plotter lets your professionalism shine through.

Standards unsurpassed in the plotter business

The technical standards of the HP 7475A have no equal for producing quality graphics. With a resolution of one-thousandth-of-an-inch, curved lines are smooth, not jagged, and straight lines are *consistently* straight. Its exceptional repeatability (the ability of a pen to return *precisely* to a given point) assures that intersecting lines and circular shapes will meet *exactly.* The result is *high-quality* charts and graphs you'll be proud to present.

Why 6 pens when experts say 4 will do?

Graphics industry experts maintain that good graphics contain four colors per chart. But Hewlett-Packard goes the experts two better by providing a six-pen carousel, so you can store and use pens of different widths—thick pens for bold headings and thin pens for details. And with six pens, you won't have to waste valuable time changing them. That's important when "the boss wants to see your presentation in twenty minutes!"

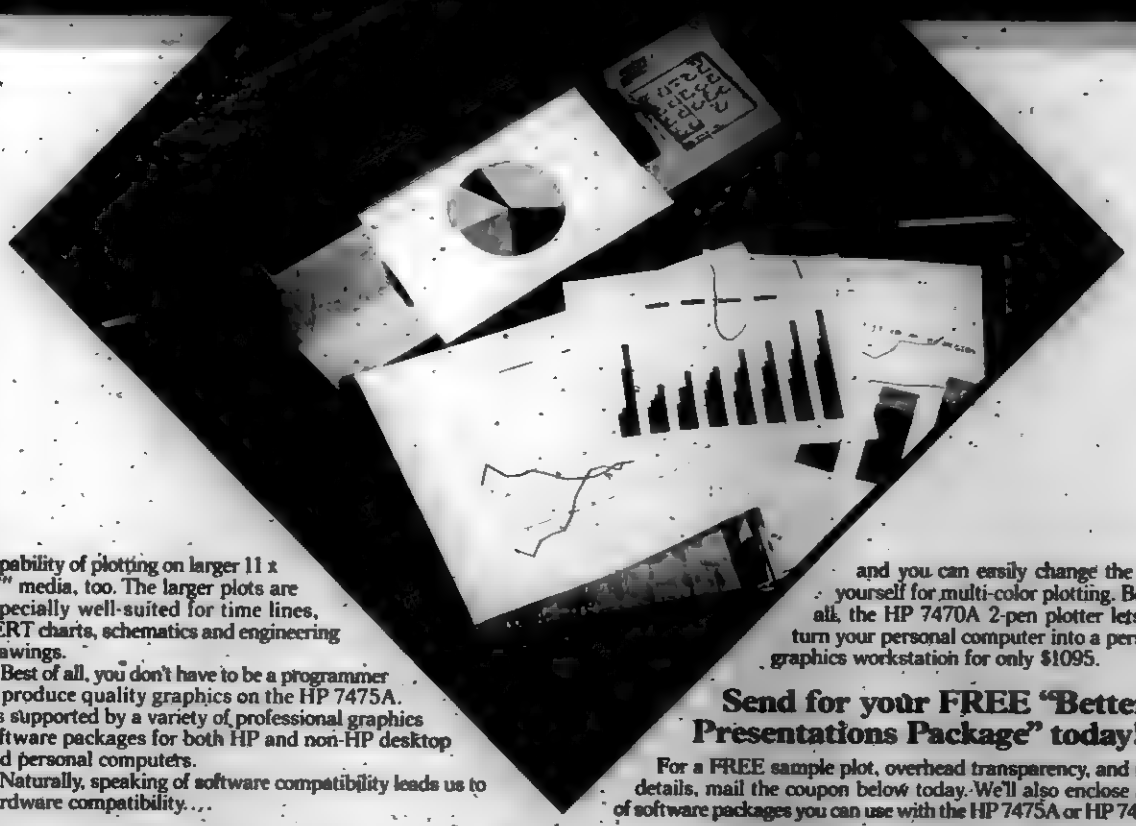


With the HP 7475A, you also get automatic pen capping to prevent pens from drying out between uses, and special "pen damping" (gently lowering the pen to the paper or transparency) to increase pen life and ensure better line quality... use after use after use. You also get a rainbow of 10 colors to choose from, in two line widths.

Your choice: 2 paper sizes and today's most popular graphics software packages

While most professional business applications will be satisfied with standard 8½ x 11" paper or transparencies, the HP 7475A adds the

can be the key to your success.



capability of plotting on larger 11 x 17" media, too. The larger plots are especially well-suited for time lines, PERT charts, schematics and engineering drawings.

Best of all, you don't have to be a programmer to produce quality graphics on the HP 7475A. It's supported by a variety of professional graphics software packages for both HP and non-HP desktop and personal computers.

Naturally, speaking of software compatibility leads us to hardware compatibility...

Compatible with almost any personal computer in the marketplace today

With two interfaces available, the HP 7475A quickly "makes friends" with most models of today's most popular personal computers, including IBM,® Apple,™ Compaq,™ Osborne® and Commodore™ --as well as a host of HP computers.

The cost? Surprisingly affordable

The new HP 7475A Business Professional's Plotter is an amazingly affordable $1895. When you consider that a typical fee for a single five-color transparency from a graphics service is $50—and that the same transparency can be prepared for about $1 in materials on the HP 7475A—the return on your investment is almost immediate.

Another choice: HP's low-cost, high performance Personal Computer Plotter

For the "business on a budget," you may also want a look at our 2-pen Personal Computer Plotter, the 7470A. Its low cost (only $1095) is as remarkable as the quality of its plots. With many of the same features as the new HP 7475A, the HP 7470A plots on a single paper size (8½ x 11"). It stores and caps two pens, and you can easily change the pens yourself for multi-color plotting. Best of all, the HP 7470A 2-pen plotter lets you turn your personal computer into a personal graphics workstation for only $1095.

Send for your FREE "Better Presentations Package" today!

For a FREE sample plot, overhead transparency, and more details, mail the coupon below today. We'll also enclose a list of software packages you can use with the HP 7475A or HP 7470A.

For the name of your nearest Hewlett-Packard dealer call toll-free 800-547-3400.

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Send to: Hewlett-Packard
16399 W. Bernardo Drive, San Diego, CA 92127
Attn: Marketing Communications 11303 CWO

Plotters

ALPHA MERICS CORP.
ALPHAPLOT I
Compatibility: HP 7580
Plotter Type: Flatbed
Plotting Method: Point plot
Accuracy: .005000 in.
Resolution: 001250 in.
Number and Types of Pens: 1; Fiber-tip
Peak Pen Speed: 8 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 18 in. by 30 in.
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial
Price: $4,590
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: January 1983
(See Vendor Profile Page V-2)

ALPHA MERICS CORP.
ALPHAPLOT II
Plotter Type: Flatbed
Plotting Method: Point plot
Accuracy: .005000 in.
Resolution: 001250 in.
Number and Types of Pens: 1; Fiber-tip
Peak Pen Speed: 8 in./sec
Output Medium: Film
Maximum Output Size: 24 in. by 34 in.
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial
Price: $3,590
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: January 1983

AMDEK
AMPLOT-II
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: 002000 in.
Repeatability: 008000 in.
Resolution: .000125 in.
Number and Types of Pens: 6, Fiber or Ceramic/Plastic tip
Peak Pen Speed: 8 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 10 in. by 15 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Price: $1,299
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: April 1983
(See Vendor Profile Page V-2)

AMDEK
DXY-100
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: 010000 in
Repeatability: .008000 in
Resolution: 002250 in.
Number and Types of Pens: 1, Ballpoint, Liquid ink, Fiber-tip
Peak Pen Speed: 3 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 10 in. by 14 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel
Price: $749
Distribution Method: Third-party
Number Installed to Date: 400
Date First Installed: November 1982

AMF GEO SPACE CORP.
QS6400
Compatibility: DEC PDP-11/23, DEC VAX-11, Raytheon RDS 500
Plotter Type: Drum
Plotting Method: Analog, Raster
Accuracy: 010000 in
Repeatability: 002500 in
Resolution: 005000 in
Output Medium: Paper, Film, Photographic Paper
Maximum Output Size: 42 in. by 60 in.
Routines Supported: Graphing, Three-dimensional graphics, Mapping
Data Transmission Characteristics: Ascii
Price: $60,000
Distribution Method: End user, OEM
Number Installed to Date: 80
Date First Installed: 1976
(See Vendor Profile Page V-2)

ARISTO GRAPHIC CORP.
ARISTOMAT 100 SE
Plotter Type: Flatbed
Plotting Method: Line Plot, Circular Interpolation
Accuracy: 001500 in
Repeatability: 000400 in.
Resolution: .000200 in
Number and Types of Pens: 1; Ballpoint, Fiber-tip, Tangentially Controlled
Peak Pen Speed: 2.8 in./sec
Output Medium: Paper, Film, Mylar, Stripping Film
Maximum Output Size: 48 in. by 60 in.
Routines Supported: Graphing, Geometrics, Drafting, Repeat Patterns
Data Transmission Characteristics: Ascii, Ebcdic, EIA, Serial
Price: $48 to $70,000
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: December 1975
(See Vendor Profile Page V-4)

ARISTO GRAPHIC CORP.
ARISTOMAT 200
Plotting Method: Linear, Circular Interpolation
Repeatability: .001000 in.
Resolution: 000800 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip, Tangentially Controlled
Peak Pen Speed: 15 in./sec
Output Medium: Paper, Film, Mylar, Stripping Films
Maximum Output Size: 48 in. by 60 in.
Routines Supported: Graphing, Geometrics, Drafting
Data Transmission Characteristics: Ascii, Ebcdic, Pure, Serial
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: 1973

ATARI, INC.
1025 COLOR PRINTER
Plotter Type: Drum
Plotting Method: Line plot
Number and Types of Pens: 4; Fiber-tip
Peak Pen Speed: 1 in./sec
Output Medium: Paper
Maximum Output Size: 4 in.
Routines Supported: Graphing, Charts, Diagram
Data Transmission Characteristics: Ascii, Serial
Price: $299
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: 1983
(See Vendor Profile Page V-4)

BENSON, INC.
1312/1313
Plotter Type: Drum
Plotting Method: Line plot
Number and Types of Pens: 3, Ballpoint, Fiber-tip
Output Medium: Paper, Film, Mylar, Cotton Vellum
Maximum Output Size: 37 in. by 1,968 in
Routines Supported: Interactive design, Line/Area drawing
Data Transmission Characteristics: Ascii, Ebcdic, Parallel, Serial
Distribution Method: End user
(See Vendor Profile Page V-5)

BENSON, INC.
1322/1323 PEN PLOTTER
Plotter Type: Drum
Plotting Method: Line plot
Accuracy: .002000 in.
Resolution: 000500 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip
Peak Pen Speed: 8.4 in./sec
Output Medium: Paper, Film, Mylar, Cotton Vellum
Maximum Output Size: 37 in. by 1,968 in.
Routines Supported: Interactive design, Line/Area drawing
Data Transmission Characteristics: Ascii, Ebcdic, Parallel, Serial
Distribution Method: End user

BENSON, INC.
1332/1333 PEN PLOTTER
Plotter Type: Drum
Plotting Method: Line plot
Accuracy: 002000 in.
Resolution: 000500 in.
Output Medium: Paper, Film, Mylar, Cotton Vellum
Maximum Output Size: 37 in. by 1,968 in.

BENSON, INC.
1455
Plotter Type: Drum
Plotting Method: Line plot
Number and Types of Pens: 4; Ballpoint, Fiber-tip
Output Medium: Paper, Film, Mylar, Cotton Vellum
Routines Supported: Interactive design, Line/Area
Data Transmission Characteristics: Ascii

BENSON, INC.
1845 RADIAL BED PEN PLOTTER
Plotter Type: Radial Bed
Plotting Method: Line plot
Accuracy: 004000 in
Repeatability: 002000 in
Resolution: 000005 in.
Number and Types of Pens: 4; Ballpoint
Output Medium: Paper, Film, Mylar, Cotton Vellum
Routines Supported: Area/Line Drawing
Data Transmission Characteristics: Ascii, Parallel, Serial
Distribution Method: End user

BENSON, INC.
9211 ELECTROSTATIC
Plotter Type: Electrostatic
Plotting Method: Point plot
Output Medium: Paper, Film, Cotton Vellum
Routines Supported: Area Line Drawing
Data Transmission Characteristics: Ascii, Parallel, Serial
Distribution Method: OEM

BENSON, INC.
9215 ELECTROSTATIC PLOTTER
Plotting Method: Point plot
Output Medium: Paper, Film, Cotton Vellum
Routines Supported: Area/Line Drawing
Data Transmission Characteristics: Ascii, Parallel, Serial
Distribution Method: End user

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 84
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .002000 in.
Repeatability: .004000 in.
Resolution: 004000 in
Number and Types of Pens: 8; Fiber-tip
Peak Pen Speed: 17.7 in./sec
Output Medium: Paper, Film
Maximum Output Size: 9 in. by 11 in
Routines Supported: Graphing
Price: $1,995
Date First Installed: March 1983
(See Vendor Profile Page V-5)

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 748
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: 004000 in
Repeatability: 002000 in.
Resolution: 000200 in,
Number and Types of Pens: 4; Fiber-tip, Liquid Ball
Peak Pen Speed: 42 in./sec
Output Medium: Mylar, Vellum; Translucent
Maximum Output Size: 50 in. by 82 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial
Price: $77,980
Date First Installed: December 1977

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 945
Plotter Type: Belted
Plotting Method: Line plot
Accuracy: 010000 in
Repeatability: .005000 in.
Resolution: 000490 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip, Liquid Ball
Peak Pen Speed: 42 in./sec

Output Medium: Paper, Film, Mylar, Translucent, Vellum
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Price: $15,790
Distribution Method: End user
Date First Installed: December 1982

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 965
Plotter Type: Belted
Plotting Method: Line plot
Accuracy: .010000 in.
Repeatability: .005000 in.
Resolution: .000490 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip, Liquid Ball
Peak Pen Speed: 42 in./sec
Output Medium: Paper, Mylar, Translucent Vellum
Maximum Output Size: 34 in. by 60 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Price: $20,500
Distribution Method: End user
Date First Installed: December 1982

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 970
Plotter Type: Belted
Plotting Method: Line plot
Accuracy: .010000 in.
Repeatability: .005000 in.
Resolution: .000490 in.
Peak Pen Speed: 42.4 in./sec
Output Medium: Paper, Mylar, Translucent Vellum
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Price: $39,610
Date First Installed: February 1980

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 1012
Plotter Type: Drum
Plotting Method: Line plot
Resolution: .002000 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip, Liquid Ball
Peak Pen Speed: 14.1 in./sec
Output Medium: Paper, Film, Translucent Vellum
Maximum Output Size: 11 in. by 2,125 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Price: $8,405
Distribution Method: End user
Date First Installed: October 1978

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 1037
Plotter Type: Drum
Plotting Method: Line plot
Resolution: .002000 in.
Number and Types of Pens: 1; Ballpoint, Fiber-tip, Liquid Ball
Peak Pen Speed: 2.8 in./sec
Output Medium: Mylar, Translucent Vellum
Maximum Output Size: 34 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Date First Installed: September 1977

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 1038
Plotter Type: Drum
Plotting Method: Line plot
Resolution: .002000 in.
Number and Types of Pens: 1; Ballpoint, Fiber-tip, Liquid Ball
Peak Pen Speed: 6.3 in./sec
Output Medium: Paper, Mylar, Translucent, Vellum
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Distribution Method: End user
Date First Installed: September 1977

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 1039
Plotter Type: Drum
Plotting Method: Line plot
Resolution: .002000 in.
Number and Types of Pens: 3; Ballpoint, Fiber-tip, Liqeid Ball
Peak Pen Speed: 6.3 in./sec
Output Medium: Paper, Mylar, Translucent, Vellum
Maximum Output Size: 34 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Date First Installed: July 1979

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 1051
Plotter Type: Drum
Plotting Method: Line plot
Resolution: .001000 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip
Peak Pen Speed: 14.1 in./sec
Output Medium: Paper, Mylar, Translucent, Vellum
Maximum Output Size: 34 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Price: $18,240
Date First Installed: September 1977

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 1055
Plotter Type: Drum
Plotting Method: Line plot
Accuracy: .004000 in.
Resolution: .000500 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip, Liquid Ball
Peak Pen Speed: 42 4 in./sec
Output Medium: Paper, Film, Mylar, Translucent, Vellum
Maximum Output Size: 34 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping
Price: $25,250
Distribution Method: End user
Date First Installed: March 1978

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 1060
Plotter Type: Drum
Plotting Method: Line plot
Resolution: .000500 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip
Peak Pen Speed: 42.4 in./sec
Output Medium: Paper, Mylar, Translucent Vellum
Maximum Output Size: 52 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel
Price: $34,990
Distribution Method: End user
Date First Installed: January 1981

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 5800/5906
Plotter Type: Electrostatic
Plotting Method: Point plot
Output Medium: Paper, Film, Translucent
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics; Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel
Price: $9,640
Distribution Method: End user
Date First Installed: October 1979

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 5100/5105
Plotter Type: Electrostatic
Plotting Method: Point plot
Output Medium: Film, Mylar, Translucent
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Price: $19,790
Distribution Method: End user
Date First Installed: October 1979

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 5300
Plotter Type: Electrostatic
Output Medium: Paper, Film, Translucent Vellum
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Price: $10,640
Distribution Method: End user
Date First Installed: October 1979

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 5360
Plotter Type: Electrostatic
Plotting Method: Point plot
Output Medium: Paper, Mylar, Translucent Vellum
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Price: $23,790
Distribution Method: End user
Date First Installed: October 1979

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 5500
Plotter Type: Electrostatic
Plotting Method: Point plot
Output Medium: Paper, Film, Translucent Vellum
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Distribution Method: End user
Date First Installed: May 1981

COMPUTER TALK, INC.
500 FLATBED PLOTTER
Compatibility: RS-232
Plotter Type: Flatbed
Plotting Method: Line plot
Plotting Method: Curve
Accuracy: .005000 in.
Repeatability: .000500 in.
Resolution: .000500 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip
Peak Pen Speed: 50 in./sec
Output Medium: Paper, Film, Mylar, Photographic Film
Maximum Output Size: 52 in. by 88 in.
Routines Supported: Geometrics, Drafting, Mapping, Interactive design, Film, Cutting
Data Transmission Characteristics: Ascii, Ebcdic, Pure, BCD, Serial
Price: $42,500
Distribution Method: End user
Number Installed to Date: 2
Date First Installed: June 1982
(See Vendor Profile Page V-8)

COMPUTER TALK, INC.
520 SINGLE PEN FLATBED PLOTTERS
Compatibility: RS-232
Plotter Type: Flatbed
Plotting Method: Line plot
Plotting Method: Curve
Accuracy: .015000 in.
Repeatability: .008000 in.
Resolution: .005000 in.
Number and Types of Pens: 1; Ballpoint, Fiber-tip
Peak Pen Speed: 10 in./sec
Output Medium: Paper, Film, Mylar
Data Transmission Characteristics: Ascii, Ebcdic, Pure, BCD, Serial
Price: $12,200
Distribution Method: End user
Number Installed to Date: 7
Date First Installed: May 1981

DATA DESIGN LOGIC SYSTEMS, INC.
MODEL 2200
Plotter Type: Drum

Plotters

Plotting Method: Point plot
Accuracy: .000500 in.
Repeatability: .000500 in
Resolution: .000156 in
Number and Types of Pens: 4, Ballpoint, Fiber-tip
Peak Pen Speed: 14.5 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 26 in.
Routines Supported: 64 Commands
Data Transmission Characteristics: Ascii, Serial
Price: $11,500
Distribution Method: End user, OEM
Number Installed to Date: 100 - 500
Date First Installed: 1979
(See Vendor Profile Page V-10)

DATA DESIGN LOGIC SYSTEMS, INC.
MODEL 2200
Plotter Type: Flatbed
Plotting Method: Point plot
Accuracy: .001000 in.
Repeatability: .001000 in.
Resolution: .001000 in
Number and Types of Pens: 1; Ballpoint, Fiber-tip
Peak Pen Speed: 8.5 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 25 in. by 37 in.
Routines Supported: 64 Commands
Data Transmission Characteristics: Ascii, Serial
Price: $8,000
Distribution Method: End user, OEM
Date First Installed: March 1983

DATA DESIGN LOGIC SYSTEMS, INC.
MODEL 3400
Plotter Type: Drum
Plotting Method: Point plot
Accuracy: .005000 in.
Repeatability: .000500 in.
Resolution: .000156 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip
Peak Pen Speed: 14.5 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 37 in.
Routines Supported: Three-dimensional graphics, interactive design
Data Transmission Characteristics: Ascii, Serial
Price: $14,500
Distribution Method: End user, OEM
Date First Installed: 1979

DATA TECHNOLOGY, INC.
DT 3454
Compatibility: RS-232
Plotter Type: Flatbed
Plotting Method: Arm
Accuracy: .004000 in.
Repeatability: .002500 in.
Resolution: .002500 in.
Number and Types of Pens: 2; Ballpoint, Fiber-tip, Scribing
Peak Pen Speed: 6 in./sec
Output Medium: Paper, Mylar, Vellum
Maximum Output Size: 34 in. by 54 in.
Routines Supported: Graphing, Geometrics, Drafting, Mapping
Data Transmission Characteristics: Ascii, Pure, Serial
Price: $25,000
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: June 1974
(See Vendor Profile Page V-11)

DATA TECHNOLOGY, INC.
DT 4060
Plotter Type: Flatbed
Plotting Method: Arch
Accuracy: .004000 in
Repeatability: .002500 in
Resolution: .002500 in
Number and Types of Pens: 2, Fiber-tip, Scribing
Peak Pen Speed: 16 in./sec
Output Medium: Paper, Mylar, Vellum
Maximum Output Size: 40 in. by 60 in.
Routines Supported: Graphing, Geometrics, Drafting, Mapping
Data Transmission Characteristics: Ascii, Pure, Serial
Price: $27,000
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: June 1978
(See Vendor Profile Page V-11)

DIGITAL EQUIPMENT CORP.
CORRESPONDENT LA12
Plotter Type: Plateau
Plotting Method: Bit-Map
Output Medium: Paper
Maximum Output Size: 11 in.
Routines Supported: Graphing, Geometrics, Mapping
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial
Price: $1,995
Distribution Method: End user
Date First Installed: June 1982
(See Vendor Profile Page V-13)

DIGITAL EQUIPMENT CORP.
DECWRITER IV LA34-VA
Plotter Type: Plateau
Plotting Method: Bit-Map
Output Medium: Paper
Maximum Output Size: 14 in.
Routines Supported: Graphing, Geometrics, Mapping
Data Transmission Characteristics: Ascii, Pure, Serial
Price: $1,550
Distribution Method: End user, OEM
Date First Installed: July 1981

DIGITAL EQUIPMENT CORP.
LETTERPRINTER 100 LA100
Plotter Type: Plateau
Plotting Method: Bit-Map
Output Medium: Paper
Maximum Output Size: 14 in.
Routines Supported: Graphing, Geometrics, Mapping
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial
Price: $2,500
Distribution Method: End user
Date First Installed: December 1981

ENTER COMPUTER, INC.
SWEET-P 100
Plotter Type: Paper Mover
Plotting Method: Line plot
Accuracy: .004000 in.
Repeatability: .004000 in.
Resolution: .004000 in.
Number and Types of Pens: 4
Peak Pen Speed: 6 in./sec
Output Medium: Paper, Mylar
Maximum Output Size: 9 in. by 120 in.
Routines Supported: Text
Data Transmission Characteristics: Ascii, Pure, Parallel
Price: $795
Date First Installed: January 1983
(See Vendor Prpfile Page V-14)

EPSCO, INC.
EPSCO
Compatibility: NMEA Standard
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .005000 in.
Repeatability: .002000 in.
Resolution: .002000 in.
Peak Pen Speed: 8 in./sec
Output Medium: Paper
Maximum Output Size: 44 in. by 36 in.
Routines Supported: Mapping
Data Transmission Characteristics: Ascii, BCD, Serial
Price: $5,000
Distribution Method: Third-party
Number Installed to Date: 100 - 500
(See Vendor Profile Page V-14)

GERBER CAMSCO, INC.
MP-5
Compatibility: Gerber AM-5
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .000500 in.
Resolution: .030000 in.
Number and Types of Pens: 1, Ballpoint
Peak Pen Speed: 30 in./sec
Output Medium: Paper
Maximum Output Size: 70 in.
Data Transmission Characteristics: Ascii
Distribution Method: End user
Number Installed to Date: 100
Date First Installed: 1982
(See Vendor Profile Page V-16)

GERBER SCIENTIFIC INSTRUMENT CO.
MODEL 22
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .000800 in.
Repeatability: .000400 in.
Resolution: .000100 in
Number and Types of Pens: 6, Photo-head
Peak Pen Speed: Over 3 in./sec
Output Medium: Paper, Film, Mylar, Photostatic Film
Maximum Output Size: 48 in. by 60 in.
Routines Supported: Mapping, PCB Artworks
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: 1981
(See Vendor Profile Page V-16)

GERBER SCIENTIFIC INSTRUMENT CO.
MODEL 33
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .000500 in
Repeatability: .000150 in.
Resolution: .000100 in.
Number and Types of Pens: 5, Photo-head
Peak Pen Speed: Over 3 in./sec
Output Medium: Paper, Film, Mylar, Photo Film, Glass plates
Maximum Output Size: 25 in. by 30 in.
Routines Supported: Photo, Plotter
Distribution Method: End user, OEM
Number Installed to Date: 100 - 500
Date First Installed: 1969

GERBER SCIENTIFIC INSTRUMENT CO.
MODEL 24
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .000020 in.
Repeatability: .000010 in.
Resolution: .000005 in
Output Medium: Photo Film, Glass Plates
Maximum Output Size: 18 in. by 22 in
Routines Supported: Manufacturing, TV Masking
Data Transmission Characteristics: Extended Binary, Serial
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: 1975

GERBER SCIENTIFIC INSTRUMENT CO.
MODEL 11
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .000200 in.
Repeatability: .000160 in.
Resolution: .000050 in.
Peak Pen Speed: 5 in./sec
Output Medium: Photo Film, Glass Plates
Maximum Output Size: 32 in. by 40 in
Routines Supported: PCB Master
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: February 1983

GERBER SCIENTIFIC INSTRUMENT CO.
MODEL 41
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .001000 in
Repeatability: .000500 in
Resolution: .000250 in
Number and Types of Pens: 1; Ballpoint, Photo-head
Output Medium: Paper, Film, Mylar, Photo Film, Glass Plates
Maximum Output Size: 16 in. by 20 in.
Routines Supported: PCB Artwork
Distribution Method: End user, OEM
Date First Installed: 1981

GERBER SCIENTIFIC INSTRUMENT CO.
MODEL 42
Plotter Type: Hybrid
Plotting Method: Line plot
Accuracy: .004000 in.
Repeatability: .002000 in.
Resolution: .000500 in
Number and Types of Pens: 4; Ballpoint, Photo-head, Pencil-head
Peak Pen Speed: 30 in./sec
Output Medium: Paper, Film, Mylar, Photo Film
Maximum Output Size: 37 in. by 48 in.
Routines Supported: Drafting, Mapping, Graphic Arts, PCB
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: 1975

GERBER SCIENTIFIC INSTRUMENT CO.
MODEL 43
Plotter Type: Hybrid,

Plotting Method: Line plot
Accuracy: .005000 in.
Repeatability: .003000 in.
Resolution: .000500 in
Number and Types of Pens: 4; Photo-head, Pencil-head
Output Medium: Paper, Film, Photographic Films
Maximum Output Size: 48 in. by 88 in.
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: 1980

GERBER SCIENTIFIC INSTRUMENT CO.
MODEL 75
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .004000 in.
Repeatability: .002000 in.
Resolution: .000500 in
Peak Pen Speed: 12 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 96 in. by 288 in.
Routines Supported: Auto and Aerospace
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: 1974

GERBER SCIENTIFIC INSTRUMENT CO.
MODEL 77
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .005000 in.
Repeatability: .002000 in.
Resolution: .000500 in.
Number and Types of Pens: 4; Ballpoint, Pencil-head, Photo-head
Peak Pen Speed: 47 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 72 in. by 288 in.
Routines Supported: Marine Engineering
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: 1974

HEWLETT-PACKARD CO.
HP 7470A GRAPHICS PLOTTER
Compatibility: HP, IBM Personal Computer, Apple
Plotter Type: Moving Paper
Plotting Method: Line plot
Repeatability: .004000 in.
Resolution: .001000 in.
Number and Types of Pens: 2; Fiber-tip, Transparency
Peak Pen Speed: 15 in./sec
Output Medium: Paper, Film
Routines Supported: Graphing, Geometrics, Drafting, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Parallel, Serial, HP-IL
Price: $1,575
Distribution Method: End user, Third-party
Date First Installed: February 1982
(See Vendor Profile Page V-17)

HEWLETT-PACKARD CO.
HP 7550S
Compatibility: HP, DEC, IBM
Plotter Type: Moving Paper
Plotting Method: Line plot
Accuracy: .009600 in
Repeatability: .002000 in.
Resolution: .000984 in.
Number and Types of Pens: 8; Ballpoint, Fiber-tip
Peak Pen Speed: 24 in./sec
Output Medium: Paper, Film, Mylar, Vellum
Maximum Output Size: 25 in. by 49 in.
Routines Supported: Graphing, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Parallel, Serial
Price: $16,100
Distribution Method: End user
Date First Installed: March 1981

HEWLETT-PACKARD CO.
HP 7585B
Compatibility: HP, DEC, IBM
Plotter Type: Moving Paper
Plotting Method: Line plot
Accuracy: .009800 in.
Repeatability: .003000 in.
Resolution: .000984 in.
Number and Types of Pens: 8; Ballpoint, Fiber-tip
Peak Pen Speed: 24 in./sec
Output Medium: Paper, Film, Mylar, Vellum
Maximum Output Size: 37 in. by 49 in.
Routines Supported: Graphing, Geometrics, Drafting, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Parallel, Serial
Price: $22,900
Distribution Method: End user, OEM
Date First Installed: July 1982

HOUSTON INSTRUMENTS
COMPLOT PLOTTER CPS-11
Plotter Type: Drum
Plotting Method: Line plot
Accuracy: .001000 in.
Repeatability: .002000 in.
Resolution: .001000 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip
Peak Pen Speed: 15 in./sec
Maximum Output Size: 35 in. by 150 in.
Routines Supported: Graphing, Geometrics, Drafting, Mapping
Data Transmission Characteristics: Ascii, BCD, Serial
Price: $13,950
Distribution Method: End user, OEM
Date First Installed: June 1982
(See Vendor Profile Page V-17)

HOUSTON INSTRUMENTS
COMPLOT PLOTTER CPS-20
Plotter Type: Drum
Plotting Method: Line plot
Resolution: .005000 in.
Peak Pen Speed: 3 in./sec
Output Medium: Paper, Mylar, Vellum
Maximum Output Size: 11 in.
Routines Supported: Graphing
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial, Incremental Parallel
Price: $3,995 to $4,595
Distribution Method: End user, OEM
Date First Installed: June 1981

HOUSTON INSTRUMENTS
COMPLOT PLOTTER CPS-30
Plotter Type: Drum
Plotting Method: Line plot
Resolution: .005000 in.
Number and Types of Pens: 1; Fiber-tip
Peak Pen Speed: 2 in./sec
Output Medium: Paper, Mylar, Vellum
Maximum Output Size: 22 in.
Routines Supported: Graphing
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial, Incremental Parallel
Price: $5,995
Distribution Method: End user, OEM
Date First Installed: July 1981

HOUSTON INSTRUMENTS
HIPLOT PLOTTER DMP-29
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .008000 in.
Repeatability: .004000 in.
Resolution: .001000 in.
Number and Types of Pens: 8
Peak Pen Speed: 22.6 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 11 in. by 17 in.
Routines Supported: Graphing, Geometrics, Drafting, Mapping, Interactive design
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial, GPIB
Price: $2,295
Distribution Method: OEM, Third-party
Date First Installed: September 1982

HOUSTON INSTRUMENTS
HIPLOT PLOTTER DMP-40
Plotter Type: Drum
Plotting Method: Line plot
Repeatability: .005000 in.
Resolution: .005000 in.
Number and Types of Pens: 1
Peak Pen Speed: 4.2 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 11 in. by 17 in.
Routines Supported: Graphing, Geometrics, Drafting, Mapping, Interactive design
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial, GPIB
Price: $995
Distribution Method: Third-party
Date First Installed: November 1982

HOUSTON INSTRUMENTS
HIPLOT PLOTTER DMP-41/42
Plotter Type: Drum
Plotting Method: Line plot
Repeatability: .005000 in.
Resolution: .005000 in.
Number and Types of Pens: 1
Peak Pen Speed: 4.2 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 24 in. by 36 in.
Routines Supported: Graphing, Geometrics, Drafting, Mapping, Interactive design
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial, GPIB
Price: $2,995
Distribution Method: Third-party
Date First Installed: January 1983

IMAGE GRAPHICS, INC.
CRT 2000
Compatibility: DEC PDP-11 Series
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .000100 in.
Repeatability: .005000 in.
Resolution: .001000 in.
Number and Types of Pens: 32; Light
Output Medium: Film
Maximum Output Size: 48 in. by 60 in.
Routines Supported: Mapping
Data Transmission Characteristics: Ascii, Ebcdic, Parallel
Price: $450,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: May 1978
(See Vendor Profile Page V-18)

IMAGE GRAPHICS, INC.
EBR 2000
Compatibility: DEC PDP-11 Series; PE 3200 Series
Plotter Type: Microfilm
Plotting Method: Electron Beam
Accuracy: .010000 in.
Repeatability: .003000 in.
Resolution: .00125 in.
Number and Types of Pens: 250; Electron Beam
Output Medium: Film
Maximum Output Size: 9 in. by 11 in.
Routines Supported: Drafting, Mapping, Geophysical Imaging
Data Transmission Characteristics: Ascii, Ebcdic, Pure, Parallel
Price: $350,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: February 1977

IMAGE RESOURCE, INC.
VIDEO PRINT,MODEL 5000
Plotter Type: Photographic
Plotting Method: Raster
Accuracy: .001500 in.
Output Medium: Film
Routines Supported: Terminal Dependent
Data Transmission Characteristics: Ascii, RGB Video, Video Interface
Price: $6,000
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: January 1980
(See Vendor Profile Page V-18)

INTERNATIONAL ANTEX, INC.
HIGH SPEED PLOTTER
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .001000 in.
Repeatability: .050000 in.
Resolution: .001000 in.
Number and Types of Pens: 3; Ballpoint, Fiber-tip
Peak Pen Speed: 20 in./sec
Output Medium: Paper, Mylar
Maximum Output Size: 11 in.
Price: $1,000
Distribution Method: End user, OEM, Third-party
Date First Installed: September 1983
(See Vendor Profile Page V-20)

KONGSBERG NORTH AMERICA, INC.
KONGSBERG I
Compatibility: DEC VAX-11/780, VAX-11/750
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .001000 in.
Repeatability: .000100 in.
Resolution: .008000 in.
Number and Types of Pens: 4;

If you have a Personal Computer PCI speaks your language.

The PCI 1076 protocol converter from Protocol Computers, Inc. can support your Personal Computer – Apple, Cannon, DEC, Hewlett Packard, IBM-PC, Kaypro, NEC, Osborne, Sanyo, Sony, Tandy/Radio Shack, MOD, Xerox, etc, etc, etc – in IBM's SNA/SDLC world..

Simply, conveniently, economically, the PCI 1076 makes IBM SNA hosts talk to your Personal Computer in its own language. It converts the Personal Computer's ASCII code to appear as the SNA/SDLC protocol used by IBM hosts, and vice versa. But before showing you how we support Personal Computers in IBM's world, here's how to support your own Personal Computer vocabulary.

GLOSSARY:

ASCII (American Standard Code for Information Interchange) The language spoken by most Personal Computers.

ASYNCHRONOUS Low speed, low cost modems used with most Personal Computers.

BSC Some Personal Computers support, via existing programs, the BSC (Bisync) protocol. See PCI 71B/SNA for SNA-compatibility.

CoaxFACE™ Exclusive PCI converter allows you to drive Personal Computer using standard coax cable, without re-cabling with RS-232C.

FULL SCREEN The ability to modify an entire CRT screen of data without interruption of host.

MODEMS Provide terminal/CPU digital interface into an analog signal for the phone lines.

and want to talk to IBM,

PaperCRT™ ASCII hard copy keyboard terminals have all the versatility of 3278 CRTs with this PCI option.
PCI (Protocol Computers, Inc.). We're making the non-IBM world IBM-compatible.
SDLC (Synchronous Data Link Control). Expeditor for moving data in IBM systems.
SNA (System Network Architecture). Network for moving data in IBM systems.
SNA/SDLC Non-compatible with Personal Computers' ASCII language (without PCI).
SYNCHRONOUS High speed, high cost communications device for communications with host computers.
PCI 71B/SNA When using Bisync running on the Personal Computer, PCI 71B/SNA protocol converter makes it SNA-compatible.
PCI 78 Networker™ Keystroke for keystroke 3278 keyboard compatible terminal.
PCI 1076 Makes Personal Computers function as 3278s.
3274/76 IBM controllers which support 3278, 3287 devices in an SNA/SDLC network.
3278/3287 IBM's CRT; IBM's printer.

HOW PCI SPEAKS THEIR LANGUAGE.

The PCI 1076 facilitates communication to and from the Personal Computer with absolutely no change in host application programs. When you use your Personal Computer's display and keyboard, they appear and function as 3278s.

If you need printed reports, PCI's exclusive "Dynamic Printer Assignment" feature addresses the Personal Computer's printer as if it were a 3287 over a single communication line. And, the PCI 1076 allows the Personal Computer's diskette to store data from, and send information to the host system.

PERSONAL CONNECTIONS.

The PCI 1076 gives you tremendous flexibility for those locations with PCs.

- Make a direct connection using standard RS-232C cable.
- You can connect-up with existing coax cable, eliminating the need to re-cable with RS-232C. Using coax from 5 to 5,000 feet, the Personal Computer may be installed at the remote end, the PCI 1076 in place of 3274/76s – and the RS-232C conversion is provided by PCI's CoaxFACE.™
- You can connect to existing 2-wire twisted pair cables installing the Personal Computer at the end of a point-to-point link with the use of our asynchronous line devices.
- Or, you can take your Personal Computer home, on the road, wherever. To make an asynchronous ASCII dial-in connection, simply use low cost modems and acoustic couplers.

PCI OPENS YOUR OPTIONS.

The PCI 1076 has a graphics terminal interface that lets you use ASCII graphics terminals on your SNA/SDLC network as 3278s. With our PaperCRT,™ ASCII hard copy keyboard terminals have all the flexibility of 3278s, including capability to full screen edit on paper with portable hard copy terminals from anywhere in the world – just pick up the phone.

If you'd like to hear more, our PCI 1076 speaks for itself. Call PCI today for a demonstration unit.

ALSO AVAILABLE:

1067: SNA/SDLC to ASCII 3767 emulation. The NTO alternative.
1051: ASCII to Sys 34/36/38 5250 emulation.
71B/SNA: BSC 3271 to SNA/SDLC 3274 emulation.
75B/SNA: BSC 3275 to SNA/SDLC 3276 emulation.
1071: ASCII to BSC 3270 emulation.
73SX: SNA/SDLC through X.25 connection interface.
1076X: ASCII to 3270 SNA/SDLC through X.25 networks. (With PAD included.)
Videotex 67: SNA/SDLC to Videotex protocol conversion.
PCI 51 Networker: Keystroke for keystroke 5251 keyboard compatible ASCII CRT.
PCI 7887 Plus: IBM-PC software package for 3270 emulation.
PCI 5156 Plus: IBM-PC software package for Sys 34/36/38 emulation.

Send more information on:
☐ The PCI 1076 Protocol Converter
☐ The PCI 78 Networker Terminal
☐ The PCI Personal Computer Support book
☐ All PCI Products

Name

Company Name

Address

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PCI
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6150 Canoga Avenue
Suite 100
Woodland Hills, CA
91367-3773

(800) 423-5904
(213) 716-5900
(In California)

PCI Making the non-IBM world IBM compatible.

Plotters

Ballpoint, Fiber-tip, Scribing Tools
Peak Pen Speed: 40 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 72 in. by 300 in.
Routines Supported: Graphing, Drafting, Scribing
Data Transmission Characteristics: Ascii, Pure, Parallel
Price: $150,000 to $300,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1983
(See Vendor Profile Page V-21)

KONGSBERG NORTH AMERICA, INC.
KONGSBERG II
Compatibility: DEC VAX-11/780, VAX-11/750
Plotting Method: Line plot
Accuracy: .001000 in.
Repeatability: .000100 in.
Resolution: .008000 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip, Scribing Tools
Peak Pen Speed: 40 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 63 in. by 47 in.
Routines Supported: Graphing, Drafting, Scribing
Data Transmission Characteristics: Ascii, Pure, Parallel
Price: $150,000 to $300,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1983

MANNESMANN TALLY CORP.
PIXY 3
Compatibility: IBM; Apple
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .003000 in.
Repeatability: .012000 in.
Resolution: .004000 in.
Number and Types of Pens: 3; Fiber-tip, Ceramic
Peak Pen Speed: 8 in./sec
Output Medium: Paper, Mylar
Maximum Output Size: 9 in. by 11 in.
Routines Supported: Graphing, Geometrics, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel
Price: $795
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: April 1983
(See Vendor Profile Page V-22)

MEGATEK CORP.
MCU-V
Compatibility: Megatek 7200, 7600, SGI Iris
Plotter Type: Electrostatic
Accuracy: .010000 in.
Repeatability: .005000 in.
Resolution: .013000 in.
Output Medium: Paper
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Binary, Parallel
Distribution Method: End user
Date First Installed: 1980
(See Vendor Profile Page V-23)

MILTOPE CORP.
TP 3000
Plotter Type: Drum
Plotting Method: Point plot
Resolution: .005000 in.
Output Medium: Paper
Maximum Output Size: 8 in
Routines Supported: Graphing
Data Transmission Characteristics: Ascii, Parallel, Serial
Price: $15,600
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: 1983
(See Vendor Profile Page V-24)

NICOLET ZETA CORP.
5400
Compatibility: RS-232
Plotter Type: Drum
Accuracy: .001000 in.
Repeatability: .001000 in.
Resolution: .000500 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip, Liquid Roller
Peak Pen Speed: 50 in./sec
Output Medium: Paper, Film, Mylar, Vellum, Kromecote
Maximum Output Size: 54 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Ebcdic, Pure, Parallel, Serial
Price: $32,900
Distribution Method: End user
Date First Installed: 1981
(See Vendor Profile Page V-26)

NICOLET ZETA CORP.
ZETA 8
Compatibility: RS-232, IEEE
Plotter Type: Drum
Plotting Method: Line plot
Accuracy: .002000 in.
Repeatability: .002000 in.
Resolution: .001000 in.
Number and Types of Pens: 8; Ballpoint, Fiber-tip, Liquid Roller
Peak Pen Speed: 20 in./sec
Output Medium: Paper, Film, Mylar, Vellum, Kromecote
Maximum Output Size: 11 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Ebcdic, Pure, Parallel
Price: $5,950
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1982

NICOLET ZETA CORP.
ZETA 822
Compatibility: RS-232
Plotter Type: Drum
Plotting Method: Line plot
Accuracy: .002000 in.
Repeatability: .002000 in.
Resolution: .001000 in.
Number and Types of Pens: 8; Ballpoint, Fiber-tip, Liquid Roller
Peak Pen Speed: 25 in./sec
Output Medium: Paper, Film, Mylar, Vellum, Kromecote
Maximum Output Size: 24 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Ebcdic, Pure, Parallel, Serial
Price: $12,900
Distribution Method: End user
Date First Installed: 1983

NICOLET ZETA CORP.
ZETA 887
Compatibility: RS-232, 3274/3276
Plotter Type: Drum
Plotting Method: Line plot
Accuracy: .002000 in.
Repeatability: .002000 in.
Resolution: .001000 in.
Number and Types of Pens: 8; Ballpoint, Fiber-tip, Liquid Roller
Peak Pen Speed: 20 in./sec
Output Medium: Paper, Film, Mylar, Vellum, Kromecote
Maximum Output Size: 12 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Price: $7,950
Distribution Method: End user
Date First Installed: 1983

NICOLET ZETA CORP.
ZETA 2818
Compatibility: RS-232
Plotter Type: Drum
Plotting Method: Line plot
Accuracy: .002000 in.
Repeatability: .002000 in.
Resolution: .001000 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip, Liquid Roller
Peak Pen Speed: 28 in./sec
Output Medium: Paper, Film, Mylar, Vellum, Kromecote
Maximum Output Size: 36 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Interactive design
Data Transmission Characteristics: Ascii, Ebcdic
Price: $25,900
Distribution Method: End user
Date First Installed: 1981

NICOLET ZETA CORP.
ZETA 3620
Compatibility: RS-232
Plotter Type: Drum
Accuracy: .001000 in.
Repeatability: .001000 in.
Resolution: .000500 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip, Liquid Roller
Peak Pen Speed: 50 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 36 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Ebcdic, Pure, Parallel, Serial
Price: $32,900
Distribution Method: End user
Date First Installed: 1981

NICOLET ZETA CORP.
ZETA 3653SX
Compatibility: RS-232
Plotter Type: Drum
Plotting Method: Line plot
Accuracy: .002000 in.
Repeatability: .002000 in.
Resolution: .001000 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip, Liquid Roller
Peak Pen Speed: 21 in./sec
Output Medium: Paper, Film, Mylar, Vellum, Kromecote
Maximum Output Size: 36 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping, Interactive design
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Price: $19,900
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: 1980

NUMONICS
5410
Compatibility: RS-232
Plotter Type: Gridwheel
Plotting Method: Line plot
Accuracy: .025000 in.
Repeatability: .003000 in.
Resolution: .005000 in.
Output Medium: Paper, Film, Mylar
Maximum Output Size: 10 in. by 36 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional graphics, Mapping
Data Transmission Characteristics: Ascii, Pure, BCD, Parallel, Serial
Price: $1,295
Distribution Method: OEM
Number Installed to Date: 100 - 500
Date First Installed: June 1981
(See Vendor Profile Page V-27)

NUMONICS
5424
Compatibility: RS-232
Plotter Type: Gridwheel
Plotting Method: Line plot
Accuracy: .025000 in.
Repeatability: .003000 in.
Resolution: .005000 in.
Number and Types of Pens: 1; Ballpoint, Fiber-tip
Output Medium: Paper, Film, Mylar
Maximum Output Size: 23 in. by 36 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping
Data Transmission Characteristics: Ascii, Pure, BCD, Serial
Price: $2,575
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First Installed: March 1983

OPTRONICS INTERNATIONAL, INC.
4040
Compatibility: DEC VAX
Plotter Type: Drum
Plotting Method: Point plot
Resolution: .001000 in.
Output Medium: Film
Maximum Output Size: 40 in. by 40 in.
Routines Supported: Mapping, Graphics
(See Vendor Profile Page V-27)

OPTRONICS INTERNATIONAL, INC.
C-4300
Compatibility: DEC VAX; DG
Plotter Type: Drum
Plotting Method: Point plot
Resolution: .000250 in.
Maximum Output Size: 10 in. by 10 in.

Routines Supported: Remote Sensing
Number Installed to Date: Under 100

OPTRONICS INTERNATIONAL, INC.
C-4500
Compatibility: DEC VAX; DG
Plotter Type: Drum
Plotting Method: Point plot
Resolution: .002000 in.
Output Medium: Film
Maximum Output Size: 10 in. by 10 in.
Routines Supported: Mapping, Remote Sensing
Distribution Method: Third-party
Number Installed to Date: 100 - 500

OPTRONICS INTERNATIONAL, INC.
L-3500
Compatibility: DEC VAX; DG
Plotter Type: Drum
Plotting Method: Point plot
Accuracy: .002000 in.
Output Medium: Paper, Film
Maximum Output Size: 10 in. by 10 in.
Routines Supported: Graphics, Remote Sensing
Distribution Method: OEM
Number Installed to Date: 100 - 500

OPTRONICS INTERNATIONAL, INC.
P-1000
Compatibility: DEC VAX; DG
Plotter Type: Drum
Plotting Method: Point plot
Resolution: .002000 in.
Maximum Output Size: 14 in. by 17 in.
Routines Supported: Graphics, Remote Sensing
Distribution Method: OEM
Number Installed to Date: 100 - 500

OPTRONICS INTERNATIONAL, INC.
P-1500
Compatibility: DEC VAX; DG
Plotter Type: Drum
Plotting Method: Point plot
Resolution: .001000 in.
Output Medium: Film
Maximum Output Size: 10 in. by 10 in.
Routines Supported: Remote Sensing
Distribution Method: End user
Number Installed to Date: Under 100

OPTRONICS INTERNATIONAL, INC.
P-1700
Compatibility: DEC VAX; DG
Plotter Type: Drum
Plotting Method: Point plot
Resolution: .000500 in.
Output Medium: Film
Maximum Output Size: 10 in. by 10 in.
Routines Supported: Remote Sensing
Distribution Method: OEM
Number Installed to Date: 100 - 500

PANASONIC INDUSTRIAL CO.
VP-6801P
Plotter Type: Flatbed
Plotting Method: Line plot
Repeatability: .012000 in.
Resolution: .004000 in.
Number and Types of Pens: 6; Ballpoint, Fiber-tip
Peak Pen Speed: 16 in./sec
Output Medium: Paper, Mylar
Maximum Output Size: 7 in. by 10 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping, Interactive design
Price: $1,995
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: November 1982
(See Vendor Profile Page V-27)

PANASONIC INDUSTRIAL CO.
VP-6802P
Plotter Type: Flatbed
Plotting Method: Line plot
Repeatability: .012000 in.
Resolution: .004000 in.
Number and Types of Pens: 8; Ballpoint, Fiber-tip, Plastic-tip
Peak Pen Speed: 16 in./sec
Output Medium: Paper, Mylar
Maximum Output Size: 10 in. by 14 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping, Interactive design
Distribution Method: Third-party
Date First Installed: July 1983

SANYO BUSINESS SYSTEMS CORP.
X-Y PLOTTER
Plotter Type: Flatbed
Plotting Method: Point plot
Accuracy: .000000 in.
Repeatability: .020000 in.
Resolution: .010000 in.
Number and Types of Pens: 4; Fiber-tip
Output Medium: Paper
Maximum Output Size: 11 in. by 17 in.
Routines Supported: Graphing, Geometrics, Drafting, Mapping, Interactive design
Price: $995
Distribution Method: Third-party
Number Installed to Date: 100 - 500
Date First Installed: December 1982
(See Vendor Profile Page V-31)

SEIKO INSTRUMENTS U.S.A., INC.
CH-5201
Compatibility: Syntronix; RGB Video
Plotter Type: Thermal ink tracing
Plotting Method: Point plot
Output Medium: Paper, Film
Data Transmission Characteristics: Analog Video, Parallel, Video
Distribution Method: End user, OEM
Date First Installed: September 1983
(See Vendor Profile Page V-32)

SOLTEC CORP.
6801
Compatibility: Apple II; IBM Personal Computer
Plotter Type: Electrostatic
Plotting Method: Line plot
Accuracy: .008000 in.
Repeatability: .008000 in.
Resolution: .000250 in.
Number and Types of Pens: 6; Ballpoint, Fiber-tip, Plastic-tip
Peak Pen Speed: 16 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 9 in. by 11 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping, Interactive design, Scientific Calculating
Data Transmission Characteristics: Ascii, BCD, Parallel
Price: $1,995
Distribution Method: End user, OEM
Date First Installed: September 1982
(See Vendor Profile Page V-32)

SOLTEC CORP.
6802
Compatibility: Apple II; IBM Personal Computer
Plotting Method: Line plot
Accuracy: .008000 in.
Repeatability: .008000 in.
Resolution: .000250 in.
Number and Types of Pens: 8; Ballpoint, Fiber-tip, Plastic-tip,
Peak Pen Speed: 16 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 11 in. by 17 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping, Interactive design, Scientific Calculating
Data Transmission Characteristics: Ascii, BCD, Parallel
Price: $2,595
Date First Installed: April 1983

STROBE, INC.
MODEL 100
Plotter Type: Drum
Plotting Method: Point plot
Accuracy: .000200 in.
Resolution: .000200 in.
Number and Types of Pens: 1, Fiber-tip
Output Medium: Paper, Mylar
Maximum Output Size: 8 in. by 10 in.
Routines Supported: Graphing
Data Transmission Characteristics: Ascii, Pure, Serial
Price: $699
Distribution Method: End user, OEM, Third-party
Date First Installed: February 1981
(See Vendor Profile Page V-33)

STROBE, INC.
MODEL 200
Plotter Type: Drum
Plotting Method: Point plot
Accuracy: .000200 in.
Resolution: .000200 in.
Number and Types of Pens: 1, Fiber-tip
Output Medium: Paper, Mylar
Maximum Output Size: 8 in. by 10 in.
Routines Supported: Graphing, Drafting, Interactive design
Data Transmission Characteristics: Ascii, Pure, Serial
Price: $795
Distribution Method: End user, OEM, Third-party
Date First Installed: September 1981

SYSTEMATIC COMPUTER SERVICES, INC.
ORTHOMAT 8800
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .003000 in.
Repeatability: .001600 in.
Resolution: .000001 in.
Number and Types of Pens: 6; Ballpoint, Fiber-tip, Diamond Scribe
Peak Pen Speed: 15 in./sec
Output Medium: Paper, Film, Mylar, Aluminum
Maximum Output Size: 72 in. by 280 in.
Routines Supported: Drafting, Three-dimensional Graphics
Data Transmission Characteristics: Ascii, Ebcdic, Serial
Price: $100,000 to $250,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: June 1980
(See Vendor Profile Page V-33)

TANDY CORP.
FP-215 PLOTTER/PRINTER
Plotter Type: Flatbed
Plotting Method: Line plot
Repeatability: .012000 in.
Resolution: .003930 in.
Number and Types of Pens: 1, Fiber-tip
Peak Pen Speed: 3.93 in./sec
Output Medium: Paper
Maximum Output Size: 10 in. by 14 in.
Routines Supported: Ascii, CTL Codes
Price: $995
Distribution Method: End user
Date First Installed: 1982
(See Vendor Profile Page V-34)

TEKTRONIX, INC.
4662 INTERACTIVE DIGITAL PLOTTER
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .034000 in.
Repeatability: .025000 in.
Resolution: .000000 in.
Number and Types of Pens: 6; Fiber-tip, Fine-Line Nylon tip
Peak Pen Speed: 22 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 11 in. by 17 in.
Data Transmission Characteristics: Ascii, Serial, IEEE-488
Price: $5,800
Distribution Method: End user, OEM
(See Vendor Profile Page V-36)

TEKTRONIX, INC.
4663 INTERACTIVE DIGITAL PLOTTER
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .036000 in.
Repeatability: .002500 in.
Resolution: .001000 in.
Number and Types of Pens: 2, Fine-Line Nylon tip
Peak Pen Speed: 22 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 17 in. by 22 in.
Data Transmission Characteristics: Ascii, Serial, IEEE-488
Price: $10,900
Distribution Method: End user, OEM

TERMINET, INC.
8222F
Plotter Type: Electrostatic
Plotting Method: Point plot
Accuracy: .015000 in.

Plotters

Repeatability: 010000 in.
Resolution: 005000 in.
Output Medium: Paper, Film, Vellum, 100% Cotton
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping, Interactive design, PC Board Layout
Price: [illegible]
Distribution Method: End user, OEM
(See Vendor Profile Page V-38)

VERSATEC, INC.
8224F
Plotter Type: Electrostatic
Plotting Method: Point plot
Accuracy: .015000 in.
Repeatability: .010000 in.
Resolution: .005000 in.
Output Medium: Paper, Film, Vellum, 100% Cotton
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping, Interactive design, PC Board Layout
Price: [illegible]
Distribution Method: End user, OEM

VERSATEC, INC.
8236F
Plotter Type: Electrostatic
Plotting Method: Point plot
Accuracy: .015000 in.
Repeatability: .010000 in.
Resolution: .005000 in.
Output Medium: Paper, Film, Vellum, [illegible]
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping, Interactive design, PC Board Layout
Price: $41,500
Distribution Method: End user, OEM

VERSATEC, INC.
8242F
Plotter Type: Electrostatic
Plotting Method: Point plot
Accuracy: .015000 in.
Repeatability: .010000 in.
Resolution: .005000 in.
Output Medium: Paper, Film, Vellum, [illegible]
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping, Interactive design, PC Board Layout
Price: [illegible]
Distribution Method: End user, OEM

VERSATEC, INC.
8244A
Plotter Type: Electrostatic
Plotting Method: Point plot
Accuracy: .015000 in.
Repeatability: .010000 in.
Resolution: [illegible]
Output Medium: Paper, Vellum, [illegible]
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping, Interactive design, PC Board Layout
Price: [illegible]
Distribution Method: End user, OEM

VERSATEC, INC.
8259A
Plotter Type: Electrostatic
Plotting Method: Point plot
Accuracy: .015000 in.
Repeatability: .010000 in.
Resolution: [illegible]
Output Medium: Paper, Vellum, 100% Cotton
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping, Interactive design, PC Board Layout
Distribution Method: End user, OEM

VERSATEC, INC.
8272A
Plotter Type: Electrostatic
Plotting Method: Point plot
Accuracy: .015000 in.
Repeatability: .010000 in.
Resolution: .005000 in.
Output Medium: Paper, Vellum, 100% Cotton
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping, Interactive design, PC Board Layout
Price: $83,000
Distribution Method: End user, OEM

VERSATEC, INC.
ECP42
Plotter Type: Electrostatic
Plotting Method: Point plot
Accuracy: .015000 in.
Repeatability: .010000 in.
Resolution: .005000 in.
Output Medium: Paper, Film, Vellum, 100% Cotton
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping, Interactive design, PC Board Layout
Price: [illegible]
Distribution Method: End user, OEM

VERSATEC, INC.
V80
Plotter Type: Electrostatic
Plotting Method: Point plot
Accuracy: .015000 in.
Repeatability: .010000 in.
Resolution: .005000 in.
Output Medium: Paper, Vellum, 100% Cotton
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping, Interactive design, PC Board Layout
Price: [illegible]
Distribution Method: End user, OEM

VERSATEC, INC.
V80F
Plotter Type: Electrostatic
Plotting Method: Point plot
Accuracy: .015000 in.
Repeatability: .010000 in.
Resolution: .005000 in.
Output Medium: Paper, Film, Vellum, 100% Cotton
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping, Interactive design, PC Board Layout
Price: $9,500
Distribution Method: End user, OEM

WESTERN GRAPHTEC
MP 1000
Plotter Type: Flatbed
Plotting Method: Point plot
Accuracy: .001000 in.
Repeatability: .012000 in.
Number and Types of Pens: 6
Peak Pen Speed: 6 in./sec
Output Medium: Paper
Maximum Output Size: 14 in. by 11 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping
Distribution Method: End user, OEM, Third-party
(See Vendor Profile Page V-39)

WESTERN GRAPHTEC
WX 4630 SERIES
Plotter Type: Roll Chart
Plotting Method: Point plot
Accuracy: .004000 in.
Repeatability: .006000 in.
Number and Types of Pens: 10, Ballpoint
Peak Pen Speed: 16 in./sec
Output Medium: Paper, Mylar
Maximum Output Size: 15 in. by 9 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping
Price: $3,990 to $6,990
Distribution Method: OEM, Third-party
Date First Installed: 1978

WESTERN GRAPHTEC
WX4731 PLOT WRITER
Plotting Method: Point plot
Accuracy: .002000 in.
Repeatability: .008000 in.
Resolution: .004000 in.
Number and Types of Pens: 4, Ballpoint
Output Medium: Paper
Maximum Output Size: 11 in. by 39 in.
Routines Supported: Graphing, Geometrics, Drafting, Three-dimensional Graphics, Mapping
Price: $2,490
Distribution Method: End user, OEM
Date First Installed: 1979

XYNETICS, INC.
XYNETICS SERIES 1000
DRAFTING TABLE
Compatibility: RS-232
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .005000 in.
Repeatability: .001000 in.
Resolution: .001000 in.
Number and Types of Pens: 4; Ballpoint, Fiber-tip, Diamond Scribe
Peak Pen Speed: 40 in./sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 72 in. by 192 in.
Routines Supported: All Graphics
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Price: $65,000
Distribution Method: End user, OEM
Number Installed to Date: 100 - 500
Date First Installed: 1980
(See Vendor Profile Page V-40)

YOKOGAWA OF AMERICA
EPLOTMATE II
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .010000 in.
Repeatability: .006000 in.
Resolution: .002500 in.
Number and Types of Pens: 4, Ceramic, Felt, Drafting
Peak Pen Speed: 10 cm/sec
Output Medium: Paper, Film, Mylar
Maximum Output Size: 9 in. by 11 in.
Routines Supported: Interactive design, Business Graphics, Zoom
Price: [illegible]
Distribution Method: End user, OEM
Number Installed to Date: 100 - 500
Date First Installed: October 1982
(See Vendor Profile Page V-40)

YOKOGAWA OF AMERICA
PL1000
Plotter Type: Grid Wheel
Plotting Method: Line plot
Accuracy: .001000 in
Repeatability: .008000 in.
Resolution: .004000 in.
Number and Types of Pens: 4; Plastic Tip, Oil Base
Peak Pen Speed: 4 in./sec
Output Medium: Paper, Mylar
Maximum Output Size: 11 in. by 17 in.
Routines Supported: Graphing, Arc Circles
Price: $1,150
Distribution Method: End user, OEM
Date First Installed: January 1983

YOKOGAWA OF AMERICA
PL 2000
Plotter Type: Flatbed
Plotting Method: Line plot
Accuracy: .010000 in.
Repeatability: .008000 in.
Resolution: .000000 in.
Number and Types of Pens: 4; Ceramic, Felt-tip, Drafting
Peak Pen Speed: 10 cm/sec
Output Medium: Paper, Mylar
Maximum Output Size: 9 in. by 11 in.
Routines Supported: Graphing, Character rotational sizing
Price: $2,100
Distribution Method: End user, OEM
Number Installed to Date: 100
Date First Installed: January 1983

DIGITIZERS

Digitizer Index by Technology

A digitizer is a device that converts graphic data into digital or numeric form. The index has been sorted according to two types — flatbed and image-scan digitizers. It contains information on the vendor, the product, price and the page number on which the listing is found. There is an additional section which includes digitizers which utilize other technologies. Vendors are listed alphabetically with their products following in alphabetical order.

Flatbed Digitizers

VENDOR	MODEL	PRICE	PAGE
Altek Corp.	DATATAB	N/A	B-69
Aristo Graphic Corp.	ARISTOMAT 100D	$25,000	B-69
Computer Talk, Inc.	600 CURSOR DIGITIZER	$2,000 to $13,000	B-69
Data Technology, Inc.	DT 4060-D	$38,000	B-69
Elographics, Inc.	E230	$600	B-69
Envision Technology, Inc.	90301 GRAPHICS TABLET	$2,000	B-70
Gerber Camsco, Inc.	M-1705	N/A	B-70
GTCO Corp.	DIGI-PAD 5 FAMILY	$795	B-70
Hewlett-Packard Co.	HP 9111A	$2,050	B-70
	HP 17623A	$1,920	B-70
Hitachi America, Ltd.	COMPUDESIGN HS	$87,500	B-70
	HICOMSCAN	$1,000 to $8,000	B-70
Houston Instruments	COMPLOT DIGITIZER SERIES 7000	$2,950 to $6,750	B-70
	HIPAD DIGITIZER	$840 to $1,195	B-70
Kongsberg North America, Inc.	KARTOSCAN	$350,000	B-70
Numonics	2200	$675 to $1,275	B-71
	2300	$2,250 to $6,025	B-71
	2400	$3,825 to $8,000	B-71
Summagraphics Corp.	BIT PAD 1	[redacted]	B-71
	BIT PAD 10	$700	B-71
	ID	$4,000	B-71
	MICROGRID	$4,600	B-71
	MM	$750	B-72
	SUMMAGRID DIGITIZERS	$6,000	B-72
	SUPERGRID	$3,000	B-72
Sun-Flex Co., Inc.	TOUCH PEN SYSTEM	$795	B-72
Tektronix, Inc.	411X OPTION 13 GRAPHICS TABLET	$2,750	B-72
	411X OPTION 14 GRAPHICS TABLET	$4,950	B-72
	4956 GRAPHIC TABLET	$5,670	B-72

Image-Scan Digitizers

VENDOR	MODEL	PRICE	PAGE
Broomall Industries, Inc.	LAS-200 SCANNER DIGITIZER	$118,500	B-69
Colorado Video, Inc.	XY DIGITIZER 622	$4,500	B-69
Computer Talk, Inc.	540 AUTOMATIC SCANNING DIGITIZER	$147,000	B-69
Datamax	DG VIDEO DIGITIZER	$2,000	B-69
Data Technology, Inc.	ALD-4060	$50,000	B-69
Illenix Corp.	EIKONIXSCAN 78/99	$20,000	B-69
	EIKONIXSCAN 7800 SERIES	$60,000	B-69
L-W International	110C	$20,000	B-70

Digitizers Using Other Technologies

VENDOR	MODEL	PRICE	PAGE
Aristo Graphic Corp.	ARISTOGRID 100	$14,000	B-69

Digitizer Index

VENDOR	MODEL	PRICE	PAGE
Broomall Industries, Inc.	D-400 SCANNER DIGITIZER	$38,000	B-69
California Computer Products, Inc.	CALCOMP 2000 SERIES	$560	B-69
	CALCOMP 4000 SERIES	$1,080	B-69
	CALCOMP 6000 SERIES	$1,930	B-69
	CALCOMP 8000 SERIES	$2,850	B-69
	CALCOMP 9000	$1,541	B-69
Elographics, Inc.	E270	$1,500	B-70
Interface Electronics, Inc.	DATATRAK DIGITIZER	$5,000	B-70
Micro Control Systems, Inc.	SPACE TABLET	$795	B-70
Optronics International, Inc.	C-4100	N/A	B-71
Polhemus Navigation Sciences, Inc.	3 SPACE DIGITIZER	$20,000 to $30,000	B-71
Science Accessories Corp.	GD-3	$3,775	B-71
	GP-3D-P	$10,700	B-71
	GP-6	$4,755	B-71
	GP-6-3D	$10,700	B-71
	GP-6-25H/26H	$3,000	B-71
	GP-7	$865	B-71
	GP-8	$2,450	B-71

ALTEK CORP.
DATATAB
Compatibility: DEC VAX-11/780; HP 1000; DG
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Free/Cross hair
Accuracy: .003 in.
Repeatability: .001 in.
Resolution: .001 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental, Vector
Maximum Tablet/Input Size: 42 in. by 130 in.
Data Transmission Characteristics: Ascii, Ebcdic, Pure, BCD, Parallel, Serial, IEEE-48
Distribution Method: OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: June 1978
(See Vendor Profile Page V-2)

ARISTO GRAPHIC CORP.
ARISTOGRID 100
Compatibility: DEC PDP-11, LSI-11
Digitizer Type: Gridboard
Digitization Method: Active
Cursor Type: Free/Pen, Touch panel
Accuracy: .003 in.
Resolution: .001 in.
Digitization Rate: 160 coordinate-pair/sec
Operating Mode: Point, Continuous
Maximum Tablet/Input Size: 39 in. by 60 in.
Data Transmission Characteristics: Ascii, Parallel, Serial
Price: $14,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: September 1978
(See Vendor Profile Page V-4)

ARISTO GRAPHIC CORP.
ARISTOMAT 1060
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: TV System Closed Circuit
Accuracy: .001 in.
Repeatability: .0004 in.
Resolution: .0002 in.
Operating Mode: Point, Formatted and Coded
Maximum Tablet/Input Size: 48 in. by 60 in.
Data Transmission Characteristics: Ascii, Ebcdic, Pure, Parallel, Serial
Price: $25,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1975

BROOMALL INDUSTRIES, INC.
D-400 SCANNER DIGITIZER
Compatibility: DEC PDP-11, VAX-11
Digitizer Type: Drum Scanner
Accuracy: .0025 in.
Repeatability: .005 in.
Resolution: .0025 in.
Digitization Rate: 3 min per 12-in. by 18 in. document
Maximum Tablet/Input Size: 12 in. by 18 in.
Data Transmission Characteristics: Pure, Parallel
Price: $38,000
Distribution Method: End user
Date First Installed: 1975
(See Vendor Profile Page V-5)

BROOMALL INDUSTRIES, INC.
LAS-200 SCANNER DIGITIZER
Compatibility: DEC PDP-11, VAX-11
Digitizer Type: Image Scan
Digitization Method: Active
Cursor Type: Scanner
Accuracy: .002 in.
Repeatability: .001 in.
Digitization Rate: 5.5 min per 8.5 in. by 11 in. document
Maximum Tablet/Input Size: 44 in. by 65 in.
Data Transmission Characteristics: Pure, Parallel
Price: $118,500
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: 1979

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 2000 SERIES
Digitizer Type: Tablet
Digitization Method: Active
Cursor Type: Free/Pen, Free/Cross hair, Free Cursor
Accuracy: .025 in.
Resolution: .005 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous, Track
Maximum Tablet/Input Size: 12 in. by 12 in.
Data Transmission Characteristics: Ascii, Serial, RS-232C
Price: $560
Distribution Method: OEM
Date First Installed: May 1982
(See Vendor Profile Page V-6)

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 4000 SERIES
Digitizer Type: Tablet
Digitization Method: Active
Cursor Type: Free/Pen, Free/Cross hair
Accuracy: .025 in.
Resolution: .0025 in.
Digitization Rate: 240 coordinate-pair/sec
Operating Mode: Point, Continuous
Maximum Tablet/Input Size: 11 in. by 11 in.
Price: $1,000
Distribution Method: OEM
Date First Installed: 1979

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 6000 SERIES
Digitizer Type: Tablet
Cursor Type: Free/Pen, Free/Cross hair
Accuracy: .0105 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental, Track
Maximum Tablet/Input Size: 44 in. by 60 in.
Price: $1,930
Distribution Method: OEM
Date First Installed: 1974

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 6000 SERIES
Digitizer Type: Tablet
Digitization Method: Active
Cursor Type: Free/Pen, Free/Cross hair
Accuracy: .0105 in.
Resolution: .001 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental, Track
Maximum Tablet/Input Size: 44 in. by 60 in.
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial
Price: $2,550
Distribution Method: OEM
Date First Installed: 1979

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 9000
Digitizer Type: Tablet
Digitization Method: Active
Cursor Type: Free/Pen
Accuracy: .0105 in.
Resolution: .001 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental, Track and Line
Maximum Tablet/Input Size: 60 in. by 44 in.
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial
Price: $1,541
Distribution Method: OEM
Date First Installed: 1982

COLORADO VIDEO, INC.
XY DIGITIZER 622
Digitizer Type: Image Scan
Digitization Rate: 60 coordinate-pair/sec
Operating Mode: Point, Continuous
Data Transmission Characteristics: Pure, Parallel
Price: $4,500
Distribution Method: End user
Date First Installed: 1973
(See Vendor Profile Page V-7)

COMPUTER TALK, INC.
540 AUTOMATIC SCANNING DIGITIZER
Digitizer Type: Image Scan
Digitization Method: Passive
Cursor Type: Restricted
Accuracy: .001 in.
Resolution: .005 in.
Digitization Rate: 200,000 coordinate-pair/sec
Operating Mode: Automatic
Maximum Tablet/Input Size: 42 in. by 60 in.
Data Transmission Characteristics: User-Formattable, Pure, BCD, Off-Line
Price: $147,000
Distribution Method: End user
Number Installed to Date: 3
Date First Installed: 1979
(See Vendor Profile Page V-8)

COMPUTER TALK, INC.
600 CURSOR DIGITIZER
Digitizer Type: Flatbed
Digitization Method: Passive
Cursor Type: Free/Cross hair
Accuracy: .005 in.
Resolution: .001 in.
Digitization Rate: 1000 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental, Area, Volume, Linear
Maximum Tablet/Input Size: 63 in. by 86 in.
Data Transmission Characteristics: Ascii, Ebcdic, Binary, Pure, BCD, Serial, IEEE-488
Price: $2,000 to $13,000
Distribution Method: End user
Date First Installed: May 1972

DATAMAX
DG VIDEO DIGITIZER
Compatibility: Datamax UV-1R
Digitizer Type: Image Scan
Digitization Method: Active
Cursor Type: Video Camera
Operating Mode: Continuous
Price: $7,000
Distribution Method: Third-party
(See Vendor Profile Page V-10)

DATA TECHNOLOGY, INC.
ALD-4060
Digitizer Type: Image Scan
Digitization Method: Active
Cursor Type: Photoelectric
Accuracy: .004 in.
Repeatability: .001 in.
Resolution: .001 in.
Digitization Rate: 200 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 40 in. by 60 in.
Data Transmission Characteristics: Ascii, Serial
Price: $50,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: October 1980
(See Vendor Profile Page V-11)

DATA TECHNOLOGY, INC.
DT 4020-D
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Free/Cross hair, Stylus
Accuracy: .005 in.
Repeatability: .001 in.
Resolution: .001 in.
Digitization Rate: 200 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 48 in. by 60 in.
Data Transmission Characteristics: Ascii, Pure, Serial
Price: $38,000
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First Installed: February 1983

EIKONIX CORP.
EIKONIXSCAN 78/80
Compatibility: DEC
Digitizer Type: Image Scan
Digitization Method: Active
Accuracy: .0005 in.
Resolution: .0002 in.
Operating Mode: Continuous
Maximum Tablet/Input Size: 30 in. by 30 in.
Price: $21,000
Distribution Method: End user
Number Installed to Date: Under 100
(See Vendor Profile Page V-14)

EIKONIX CORP.
EIKONIXSCAN 7980 SERIES
Compatibility: DEC
Digitizer Type: Image Scan
Digitization Method: Active
Accuracy: .0005 in.
Resolution: .0002 in.

Digitizer Index

VENDOR	MODEL	PRICE	PAGE
Broomall Industries, Inc.	D-400 SCANNER DIGITIZER	$38,000	B-69
California Computer Products, Inc.	CALCOMP 2000 SERIES	$560	B-69
	CALCOMP 4000 SERIES	$1,080	B-69
	CALCOMP 6000 SERIES	$1,930	B-69
	CALCOMP 8000 SERIES	$2,850	B-69
	CALCOMP 9000	$1,541	B-69
[illegible], Inc.	E270	$1,500	B-70
Interface Electronics, Inc.	DATATRAK DIGITIZER	$5,000	B-70
Micro Control Systems, Inc.	SPACE TABLET	$795	B-70
Optronics International, Inc.	C-4100	N/A	B-71
Polhemus Navigation Sciences, Inc.	3 SPACE DIGITIZER	$20,000 to $30,000	B-71
Science Accessories Corp.	GD-3	$3,775	B-71
	GP-3D-P	$10,700	B-71
	GP-6	$4,755	B-71
	GP-6-3D	$10,700	B-71
	GP-6-25H/26H	$3,000	B-71
	GP-7	$865	B-71
	GP-8	$2,450	B-71

ALTEK CORP.
DATATAB
Compatibility: DEC VAX-11/780; HP 1000; DG
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Free/Cross hair
Accuracy: .003 in.
Repeatability: .001 in.
Resolution: .001 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental, Vector
Maximum Tablet/Input Size: 42 in. by 130 in.
Data Transmission Characteristics: Ascii, Ebcdic, Pure, BCD, Parallel, Serial, IEEE-48
Distribution Method: OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: June 1978
(See Vendor Profile Page V-2)

ARISTO GRAPHIC CORP.
ARISTOGRID 100
Compatibility: DEC PDP-11, LSI-11
Digitizer Type: Gridboard
Digitization Method: Active
Cursor Type: Free/Pen, Touch panel
Accuracy: .003 in.
Resolution: .001 in.
Digitization Rate: 160 coordinate-pair/sec
Operating Mode: Point, Continuous
Maximum Tablet/Input Size: 39 in. by 60 in.
Data Transmission Characteristics: Ascii, Parallel, Serial
Price: $14,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: September 1978
(See Vendor Profile Page V-4)

ARISTO GRAPHIC CORP.
ARISTOMAT 100D
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: TV System Closed Circuit
Accuracy: .001 in.
Repeatability: .0004 in.
Resolution: .0002 in.
Operating Mode: Point, Formatted and Coded
Maximum Tablet/Input Size: 48 in. by 60 in.
Data Transmission Characteristics: Ascii, Ebcdic, Pure, Parallel, Serial
Price: $25,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1975

BROOMALL INDUSTRIES, INC.
D-400 SCANNER DIGITIZER
Compatibility: DEC PDP-11, VAX-11
Digitizer Type: Drum Scanner
Accuracy: .0025 in.
Repeatability: .005 in.
Resolution: .0025 in.
Digitization Rate: 3 min per 12 in. by 18 in. document
Maximum Tablet/Input Size: 12 in. by 18 in.
Data Transmission Characteristics: Pure, Parallel
Price: $38,000
Distribution Method: End user
Date First Installed: 1975
(See Vendor Profile Page V-5)

BROOMALL INDUSTRIES, INC.
LAS-200 SCANNER DIGITIZER
Compatibility: DEC PDP-11, VAX-11
Digitizer Type: Image Scan
Digitization Method: Active
Cursor Type: Scanner
Accuracy: .002 in.
Repeatability: .001 in.
Digitization Rate: 5.5 min per 8.5 in. by 11 in. document
Maximum Tablet/Input Size: 44 in. by 65 in.
Data Transmission Characteristics: Pure, Parallel,
Price: $118,500
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: 1979

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 2000 SERIES
Digitizer Type: Tablet
Digitization Method: Active
Cursor Type: Free/Perf, Free/Cross hair, Free Cursor
Accuracy: .025 in.
Resolution: .005 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous, Track
Maximum Tablet/Input Size: 12 in. by 12 in.
Data Transmission Characteristics: Ascii, Serial, RS-232C
Price: $560
Distribution Method: OEM
Date First Installed: May 1982
(See Vendor Profile Page V-5)

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 4000 SERIES
Digitizer Type: Tablet
Digitization Method: Active
Cursor Type: Free/Pen, Free/Cross hair
Accuracy: .025 in.
Resolution: .0025 in.
Digitization Rate: 240 coordinate-pair/sec
Operating Mode: Point, Continuous
Maximum Tablet/Input Size: 11 in. by 11 in.
Price: $1,080
Distribution Method: OEM
Date First Installed: 1979

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 6000 SERIES
Digitizer Type: Tablet
Cursor Type: Free/Pen, Free/Cross hair
Accuracy: .0105 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental, Track
Maximum Tablet/Input Size: 44 in. by 60 in.
Price: $1,930
Distribution Method: OEM
Date First Installed: 1974

CALIFORNIA COMPUTER PRODUCTS, INC.
CALCOMP 9000 SERIES
Digitizer Type: Tablet
Digitization Method: Active
Cursor Type: Free/Pen, Free/Cross hair
Accuracy: .0105 in.
Resolution: .001 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental, Track
Maximum Tablet/Input Size: 60 in. by 44 in.
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial
Price: $1,541
Distribution Method: OEM
Date First Installed: 1982

COLORADO VIDEO, INC.
XY DIGITIZER 622
Digitizer Type: Image Scan
Digitization Rate: 60 coordinate-pair/sec
Operating Mode: Point, Continuous
Data Transmission Characteristics: Pure, Parallel
Price: $4,500
Distribution Method: End user
Date First Installed: 1973
(See Vendor Profile Page V-7)

COMPUTER TALK, INC.
540 AUTOMATIC SCANNING DIGITIZER
Digitizer Type: Image Scan
Digitization Method: Passive
Cursor Type: Restricted
Accuracy: .001 in.
Resolution: .0005 in.
Digitization Rate: 200,000 coordinate-pair/sec
Operating Mode: Automatic
Maximum Tablet/Input Size: 42 in. by 60 in.
Data Transmission Characteristics: User-Formattable, Pure, BCD, Off-Line
Price: $147,000
Distribution Method: End user
Number Installed to Date: 3
Date First Installed: 1979
(See Vendor Profile Page V-8)

COMPUTER TALK, INC.
600 CURSOR DIGITIZER
Digitizer Type: Flatbed
Digitization Method: Passive
Cursor Type: Free/Cross hair
Accuracy: .005 in.
Resolution: .001 in.
Digitization Rate: 1000 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental, Area, Volume, Linear
Maximum Tablet/Input Size: 63 in. by 88 in.
Data Transmission Characteristics: Ascii, Ebcdic, Binary, Pure, BCD, Serial, IEEE-488
Price: $2,000 to $13,000
Distribution Method: End user
Date First Installed: May 1972

DATAMAX
DG VIDEO DIGITIZER
Compatibility: Datamax UV-1R
Digitizer Type: Image Scan
Digitization Method: Active
Cursor Type: Video Camera
Operating Mode: Continuous
Price: $2,000
Distribution Method: Third-party
(See Vendor Profile Page V-10)

DATA TECHNOLOGY, INC.
ALD-4060
Digitizer Type: Image Scan
Digitization Method: Active
Cursor Type: Photoelectric
Accuracy: .004 in.
Repeatability: .001 in.
Resolution: .001 in.
Digitization Rate: 200 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 40 in. by 60 in.
Data Transmission Characteristics: Ascii, Serial
Price: $50,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: October 1982
(See Vendor Profile Page V-11)

DATA TECHNOLOGY, INC.
DT 4060-D
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Free/Cross hair, Stylus
Accuracy: .005 in
Repeatability: .001 in.
Resolution: .001 in.
Digitization Rate: 200 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 40 in. by 60 in.
Data Transmission Characteristics: Ascii, Pure, Serial
Price: $38,000
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First Installed: February 1983

EIKONIX CORP.
EIKONIXSCAN 78/90
Compatibility: DEC
Digitizer Type: Image Scan
Digitization Method: Active
Accuracy: .0005 in.
Resolution: .0002 in.
Operating Mode: Continuous
Maximum Tablet/Input Size: 30 in. by 30 in.
Price: $20,000
Distribution Method: End user
Number Installed to Date: Under 100
(See Vendor Profile Page V-14)

EIKONIX CORP.
EIKONIXSCAN 7000 SERIES
Compatibility: DEC
Digitizer Type: Image Scan
Digitization Method: Active
Accuracy: .0005 in.
Resolution: .0002 in.

Digitizers

Operating Mode: Continuous
Maximum Tablet/Input Size: 30 in. by 30 in.
Data Transmission Characteristics: Parallel
Price: $60,000
Distribution Method: End user
Number Installed to Date: Under 100

[illegible], INC.
E230
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Touch panel
Accuracy: .040 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 48 in. by 60 in.
Data Transmission Characteristics: Ascii, BCD, Serial
Price: $600
Distribution Method: End user, OEM, Third-party
Date First Installed: 1972
(See Vendor Profile Page V-14)

[illegible], INC.
E270
Digitizer Type: Curved
Digitization Method: Active
Cursor Type: Touch panel
Accuracy: .040 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 48 in. by 60 in.
Data Transmission Characteristics: Ascii, BCD, Serial
Price: $1,500
Distribution Method: End user, OEM, Third-party
Date First Installed: 1978

[illegible] TECHNOLOGY, INC.
[illegible] GRAPHICS TABLET
Compatibility: Envision 200 Series
Digitizer Type: Flatbed
Digitization Method: Passive
Cursor Type: Free/Pen, Free/Cross hair
Accuracy: .01 in.
Resolution: .001 in.
Digitization Rate: 200 coordinate-pair/sec
Operating Mode: Point, Continuous
Maximum Tablet/Input Size: 11 in. by 11 in.
Data Transmission Characteristics: Ascii, Pure, BCD, Serial
Price: $2,000
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: February 1983
(See Vendor Profile Page V-14)

GERBER CAMSCO, INC.
M-1705
Compatibility: Gerber AM-5
Digitizer Type: Flatbed
Digitization Method: [illegible] Active
Cursor Type: Free/Cross hair
Digitization Rate: 255 coordinate-pair/sec
Operating Mode: Incremental
Maximum Tablet/Input Size: 44 in. by 60 in.
Distribution Method: End user
Number Installed to Date: 150
Date First Installed: 1982
(See Vendor Profile Page V-16)

GTCO CORP.
DIGI-PAD 5 FAMILY
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Free/Pen
Accuracy: .005 in.
Repeatability: .001 in.
Resolution: .001 in.
Digitization Rate: 200 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 42 in. by 60 in.
Data Transmission Characteristics: Ascii, Binary, Pure, BCD, Parallel, Serial, Dual RS-232
Price: $795
Distribution Method: OEM, Third-party
Date First Installed: January 1981
(See Vendor Profile Page V-16)

HEWLETT-PACKARD CO.
HP 9111A
Compatibility: HP 80, 200, 1000
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Free/Pen
Repeatability: .004 in.
Resolution: .004 in.
Digitization Rate: 60 coordinate-pair/sec
Operating Mode: Point, Continuous
Maximum Tablet/Input Size: 9 in. by 12 in.
Data Transmission Characteristics: Parallel
Price: $2,050
Distribution Method: End user
Date First Installed: November 1981
(See Vendor Profile Page V-17)

HEWLETT-PACKARD CO.
HP 17222A
Compatibility: HP 1000, 3000, 2623/2627
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Free/Pen
Repeatability: .0003 in.
Resolution: .0003 in.
Digitization Rate: 9600 coordinate-pair/sec
Operating Mode: Point, Continuous
Maximum Tablet/Input Size: 12 in. by 9 in.
Data Transmission Characteristics: Ascii, Binary, Serial
Price: $1,920
Distribution Method: End user
Date First Installed: February 1983

HITACHI AMERICA, LTD.
[illegible]
Compatibility: DEC LSI-11
Digitizer Type: Flatbed
Digitization Method: Active, Electromagnetic
Cursor Type: Free/Cross hair
Accuracy: .005 in.
Repeatability: .25 in.
Resolution: .005 in.
Digitization Rate: 200 coordinate-pair/sec
Operating Mode: Point, Entity
Maximum Tablet/Input Size: 37 in. by 23 in.
Data Transmission Characteristics: Ascii, Pure, Parallel
Price: $87,500
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: December 1981
(See Vendor Profile Page V-17)

HITACHI AMERICA, LTD.
HICOMSCAN
Compatibility: RS-232
Digitizer Type: Free Cursor
Digitization Method: Active
Cursor Type: Free Cursor
Accuracy: .005 in.
Repeatability: .005 in.
Resolution: .001 in.
Digitization Rate: 200 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 44 in. by 60 in.
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial
Price: $1,000 to $8,000
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 2,000
Date First Installed: 1981

HOUSTON INSTRUMENTS
[illegible] DIGITIZER SERIES 7000
Compatibility: RS-232C
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Free/Pen, Free/Cross hair
Accuracy: .005 in.
Resolution: .001 in.
Digitization Rate: 150 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental, Switch-stream
Maximum Tablet/Input Size: 42 in. by 60 in.
Data Transmission Characteristics: Ascii, GPIB, BCD, Parallel, Serial
Price: $2,950 to $6,750
Distribution Method: OEM
Date First Installed: July 1981
(See Vendor Profile Page V-17)

HOUSTON INSTRUMENTS
HiPAD DIGITIZER
Compatibility: RS-232C
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Free/Pen, Free/Cross hair
Accuracy: .015 in.
Repeatability: .015 in.
Resolution: .005 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous
Maximum Tablet/Input Size: 11 in. by 11 in.
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial
Price: $840 to $1,195
Distribution Method: OEM, Third-party
Date First Installed: 1980

INTERFACE ELECTRONICS, INC.
DATAFAX DIGITIZER
Compatibility: DG Nova; RS-232
Digitizer Type: Electromagnetic
Digitization Method: Passive
Cursor Type: Free/Cross hair
Accuracy: .005 in.
Repeatability: .001 in.
Resolution: .001 in.
Digitization Rate: 300 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 42 in. by 60 in.
Data Transmission Characteristics: Ascii, BCD, Binary, Parallel, Serial
Price: $5,000
Distribution Method: End user, OEM
Number Installed to Date: 100 - 500
Date First Installed: 1977
(See Vendor Profile Page V-19)

[illegible] NORTH AMERICA, INC.
KARTOSCAN
Compatibility: DEC VAX-11/780, VAX-11/750
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Optical
Accuracy: .001 in.
Repeatability: .005 in.
Resolution: .001 in.
Digitization Rate: 1.25 coordinate-pair/sec
Operating Mode: Pixel
Maximum Tablet/Input Size: 24 in. by 40 in.
Data Transmission Characteristics: Ascii, Pure, Parallel
Price: $350,000
Distribution Method: End User
Number Installed to Date: Under 100
Date First Installed: March 1981
(See Vendor Profile Page V-21)

[illegible]
110C
Digitizer Type: Image Scan
Digitization Method: Passive
Cursor Type: Free/Pen, Free/Cross hair
Accuracy: .010 in.
Repeatability: .001 in.
Resolution: .001 in.
Digitization Rate: 200 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 20 in. by 20 in.
Data Transmission Characteristics: Ascii, Binary, Parallel
Price: $20,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: June 1981
(See Vendor Profile Page V-22)

[illegible] CONTROL SYSTEMS, INC.
[illegible] TABLET
Compatibility: IBM Personal Computer; Apple II
Digitizer Type: Mechanical Three-dimensional
Digitization Method: Active
Cursor Type: Robotic Arm
Resolution: .001 in.
Digitization Rate: 2 coordinate-pair/sec
Operating Mode: Point
Data Transmission Characteristics: Ascii, Pure, Serial
Price: $[illegible]
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: August 1982
(See Vendor Profile Page V-23)

NUMONICS
2200
Digitizer Type: Flatbed
Digitization Method: Passive
Cursor Type: Free/Cross hair
Accuracy: .005 in.
Repeatability: .005 in.
Resolution: .001 in.
Operating Mode: Point, Continuous, Incremental, Switch-stream
Maximum Tablet/Input Size: 42 in. by 60 in.
Data Transmission Characteristics: Ascii, Pure, BCD, Parallel, Serial
Price: $875 to $1,275
Distribution Method: OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: March 1981
(See Vendor Profile Page V-27)

NUMONICS
2300
Digitizer Type: Flatbed
Digitization Method: Passive
Cursor Type: Free/Cross hair
Accuracy: .005 in.
Repeatability: .005 in.
Resolution: .001 in.
Operating Mode: Point, Continuous, Incremental, Switch-stream
Maximum Tablet/Input Size: 42 in. by 60 in.
Data Transmission Characteristics: Ascii, Pure, BCD, Parallel, Serial
Price: $2,250 to $6,025
Number Installed to Date: 1,000 - 5,000
Date First Installed: June 1981

NUMONICS
2400
Digitizer Type: Flatbed
Digitization Method: Passive
Cursor Type: Free/Cross hair
Accuracy: .005 in.
Repeatability: .005 in.
Resolution: .001 in.
Operating Mode: Point, Continuous, Incremental, Switch-stream
Maximum Tablet/Input Size: 42 in. by 60 in.
Data Transmission Characteristics: Ascii, Pure, BCD, Parallel, Serial
Price: $3,825 to $8,000
Distribution Method: End user, OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: July 1980

OPTRONICS INTERNATIONAL, INC.
C-4109
Compatibility: DEC VAX; DG
Distribution Method: OEM
Number Installed to Date: Under 100
(See Vendor Profile Page V-27)

POLHEMUS NAVIGATION SCIENCES, INC.
3 SPACE DIGITIZER
Digitizer Type: Magnetic Transducing
Digitization Method: Active
Cursor Type: Free/Stylus
Accuracy: .032 in.
Resolution: .016 in.
Digitization Rate: 50 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 50 in. by 50 in.
Data Transmission Characteristics: Ascii, Binary, User-definable, Parallel, Serial
Price: $20,000 to $30,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: April 1982
(See Vendor Profile Page V-29)

SCIENCE ACCESSORIES CORP.
GD-3
Digitizer Type: Sonic
Digitization Method: Active
Cursor Type: Free/Pen, Free/Cross hair
Accuracy: .001 in.
Repeatability: .01 in.
Resolution: .01 in.
Digitization Rate: 140 coordinate-pair/sec
Operating Mode: Point, Continuous
Maximum Tablet/Input Size: 60 in. by 72 in.
Data Transmission Characteristics: Ascii, Pure, BCD, Parallel, Serial
Price: $3,775
Distribution Method: OEM, Third-party
Number Installed to Date: 5,000 - 10,000
(See Vendor Profile Page V-31)

SCIENCE ACCESSORIES CORP.
GP-3D-P
Digitizer Type: Sonic
Digitization Method: Active
Cursor Type: Free/Pen
Accuracy: .001 in.
Repeatability: .0254 in.
Resolution: .0254 in.
Digitization Rate: 80 coordinate-pair/sec
Operating Mode: Point, Continuous
Maximum Tablet/Input Size: 72 in. by 72 in.
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial
Price: $10,700
Distribution Method: OEM, Third-party
Number Installed to Date: Under 100
Date First Installed: February 1983

SCIENCE ACCESSORIES CORP.
GP-6
Digitizer Type: Sonic
Digitization Method: Active
Cursor Type: Free/Pen, Free/Cross hair
Accuracy: .001 in.
Repeatability: .01 in.
Resolution: .01 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 60 in. by 72 in.
Data Transmission Characteristics: Ascii, Pure, Parallel, Serial
Price: $4,755
Distribution Method: OEM, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: March 1978

SCIENCE ACCESSORIES CORP.
GP-6-3D
Digitizer Type: Sonic
Digitization Method: Active
Cursor Type: Free/Pen
Accuracy: .001 in.
Repeatability: .0254 in.
Resolution: .0254 in.
Digitization Rate: 80 coordinate-pair/sec
Operating Mode: Point, Continuous
Maximum Tablet/Input Size: 72 in. by 72 in.
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial
Price: $10,700
Distribution Method: OEM, Third-party
Number Installed to Date: Under 100
Date First Installed: May 1979

SCIENCE ACCESSORIES CORP.
GP-6-25H/28H
Digitizer Type: Sonic
Digitization Method: Active
Cursor Type: Free/Pen, Free/Cross hair
Accuracy: .001 in.
Repeatability: .01 in.
Resolution: .005 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous
Maximum Tablet/Input Size: 60 in. by 72 in.
Data Transmission Characteristics: Ascii, BCD, Parallel, Serial
Price: $3,600
Distribution Method: OEM, Third-party
Number Installed to Date: 100 - 500
Date First Installed: April 1979

SCIENCE ACCESSORIES CORP.
GP-7
Digitizer Type: Sonic
Digitization Method: Active
Cursor Type: Free/Pen, Free/Cross hair
Accuracy: .003 in.
Repeatability: .01 in.
Resolution: .01 in.
Digitization Rate: 200 coordinate-pair/sec
Operating Mode: Point, Continuous, Stream
Maximum Tablet/Input Size: 18 in. by 24 in.
Data Transmission Characteristics: Ascii, Parallel, Serial
Price: $865
Distribution Method: OEM, Third-party
Number Installed to Date: 100 - 500
Date First Installed: December 1981

SCIENCE ACCESSORIES CORP.
GP-8
Digitizer Type: Sonic
Digitization Method: Active
Cursor Type: Free/Pen, Free/Cross hair
Accuracy: .001 in.
Repeatability: .005 in.
Resolution: .01 in.
Digitization Rate: 80 coordinate-pair/sec
Operating Mode: Point, Continuous, Stream
Maximum Tablet/Input Size: 60 in. by 72 in.
Data Transmission Characteristics: Ascii, Pure, BCD, Parallel, Serial
Price: $2,450
Distribution Method: OEM, Third-party
Number Installed to Date: 100
Date First Installed: January 1983

SUMMAGRAPHICS CORP.
BIT PAD 1
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Free/Pen
Accuracy: .06 in.
Resolution: .005 in.
Digitization Rate: 200 coordinate-pair/sec
Operating Mode: Point, Continuous, Switch-stream, Remote
Maximum Tablet/Input Size: 11 in. by 11 in.
Data Transmission Characteristics: Ascii, Pure, BCD, Parallel, RS-232, IEEE
Price: $700
Distribution Method: Third-party
Number Installed to Date: 10,000 - 50,000
Date First Installed: 1981
(See Vendor Profile Page V-33)

SUMMAGRAPHICS CORP.
BIT PAD 10
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Free/Pen
Accuracy: .06 in.
Resolution: .005 in.
Digitization Rate: 200 coordinate-pair/sec
Operating Mode: Point, Continuous, Switch-stream, Remote
Maximum Tablet/Input Size: 11 in. by 11 in.
Data Transmission Characteristics: Ascii, Pure, BCD, Parallel, RS-232, IEEE
Price: $750
Number Installed to Date: 10,000 - 50,000
Date First Installed: 1981

SUMMAGRAPHICS CORP.
ID
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Free/Pen
Accuracy: .004 in.
Repeatability: .5 in.
Resolution: .005 in.
Digitization Rate: 200 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental, Remote
Maximum Tablet/Input Size: 20 in. by 20 in.
Data Transmission Characteristics: Ascii, Pure, BCD, Parallel, Serial, RS-232, IEEE
Price: $4,000
Distribution Method: Third-party
Number Installed to Date: 10,000 - 50,000
Date First Installed: 1978

SUMMAGRAPHICS CORP.
MICROGRID
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Free/Cross hair
Accuracy: .010 in.
Resolution: .001 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental, Remote, Switch-stream

Digitizers

Maximum Tablet/Input Size: 42 in. by 60 in.
Data Transmission Characteristics: Ascii, Pure, BCD, Parallel, Serial
Price: $4,900
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: May 1983

SUMMAGRAPHICS CORP.
MM
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Free/Pen
Accuracy: .01 in.
Resolution: .005 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental, Diagnostic
Maximum Tablet/Input Size: 12 in. by 12 in.
Data Transmission Characteristics: Ascii, Pure, Serial, RS-232
Price: $750
Distribution Method: Third-party
Number Installed to Date: 10,000 - 50,000
Date First Installed: 1978

SUMMAGRAPHICS CORP.
SUMMAGRID DIGITIZERS
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Free/Pen
Accuracy: .005 in.
Resolution: .001 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 42 in. by 60 in.
Data Transmission Characteristics: Ascii, Pure, BCD, Parallel
Price: $5,000
Distribution Method: Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: 1980

SUMMAGRAPHICS CORP.
SUPERGRID
Digitizer Type: Flatbed
Digitization Method: Passive
Cursor Type: Free/Pen
Accuracy: .005 in.
Resolution: .001 in.
Digitization Rate: 100 coordinate-pair/sec
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 20 in. by 20 in.
Data Transmission Characteristics: Ascii, Pure, BCD, Parallel, RS-232, IEEE
Price: $3,000
Distribution Method: Third-party
Number Installed to Date: 100 - 500
Date First Installed: 1980

SUN-FLEX CO., INC.
TOUCH PEN SYSTEM
Compatibility: IBM Personal Computer; Victor 9000
Digitizer Type: Flatbed
Digitization Method: Active
Cursor Type: Free/Cross hair
Accuracy: .005 in.
Repeatability: .001 in.
Resolution: .001 in.
Digitization Rate: 30 coordinate-pair/sec
Operating Mode: Continuous
Maximum Tablet/Input Size: 12 in. by 8 in.
Data Transmission Characteristics: Ascii, Pure, Serial
Price: $795
Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: July 1981
(See Vendor Profile Page V-33)

TEKTRONIX, INC.
4113 OPTION 13 GRAPHICS TABLET
Compatibility: Tektronix 411X Terminal
Digitizer Type: Flatbed
Digitization Method: Magnetostrictive
Accuracy: .01 in.
Repeatability: .005 in.
Resolution: .005 in.
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 11 in. by 11 in.
Price: $2,750
Distribution Method: End user
Date First Installed: 1981
(See Vendor Profile Page V-36)

TEKTRONIX, INC.
4113 OPTION 14 GRAPHICS TABLET
Compatibility: Tektronix 411X Terminal
Digitizer Type: Flatbed
Digitization Method: Magnetostrictive
Cursor Type: Free/Pen
Accuracy: .010 in.
Repeatability: .005 in.
Resolution: .005 in.
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 30 in. by 40 in.
Price: $4,950
Date First Installed: 1981

TEKTRONIX, INC.
4956 GRAPHIC TABLET
Compatibility: Tektronix 405X
Digitizer Type: Flatbed
Digitization Method: Magnetostrictive
Cursor Type: Free/Pen
Accuracy: .004 in.
Resolution: .005 in.
Operating Mode: Point, Continuous, Incremental
Maximum Tablet/Input Size: 20 in. by 20 in.
Data Transmission Characteristics: Ascii, GPIB
Price: $5,670
Distribution Method: End user, OEM
Date First Installed: 1977

A Memory to Treasure

Century Data's 300 Megabyte Winchester Disk Memory

For OEMs, this high-end disk memory is not only an exciting advance in technology, but a memory to treasure.

And AMS-315 is more than twice as reliable as 300 megabyte removable pack disk drives used in the past. It plugs into the same SMD interface and operates with the same software as removable pack drives. This large capacity Winchester disk memory needs only one-third as much room to provide 300 megabytes of memory.

Best of all, it costs one-third less than a removable pack drive and is now available in OEM quantities.

To configure a new computer system or upgrade an existing one, the AMS-315 is the memory to treasure.

Century Data Systems
1270 North Kraemer Blvd.
Anaheim, California 92806
(714) 999-2660

Century Data Systems
A Xerox Company

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Disk Drive Index by Capacity

The index to disk drives has been divided according to the technology on which the drive is based — floppy, rigid or Winchester. Winchester disk drives are sealed units that contain high-density rigid disks and floating read/write heads, as opposed to rigid disk units, which are unsealed and have fixed access heads. Within each category, the products have been arranged in descending order from the highest to the lowest disk storage capacity. Each listing in the index contains information on the vendor, drive name, storage capacity and whether the capacity is formatted or unformatted, disk diameter size, price with or without controller and the page number on which the complete product listing can be found.

The disk drive product listings have also been sorted into sections by drive technology type, and within each section, the products have been broken down according to the capacity range of the disks that run on the drive. Floppy disk drives have been subdivided into the following capacity ranges: over 3M bytes, 1M to 3M bytes, 512K bytes to 1M byte and 0 to 512K bytes. Rigid disk drives have been subdivided according to the following ranges: over 500M bytes, 201M to 500M bytes, 101M to 200M bytes and 1M to 100M bytes. Drives employing Winchester technology have been subdivided starting with those drives that have over 700M bytes of storage, followed by the 201M- to 700M-byte capacity range, the 101M- to 200M-byte range, the 20M- to 100M-byte range and the under 20M-byte range.

Floppy Disk Drives

VENDOR	MODEL	CAPACITY	DIAMETER	PRICE	PAGE
Ex-Cell-O, [illegible]	RFS4810	16M bytes, formatted	8 in.	$1,350, w/controller	C-14
Heath Co.	Z37	12.8M bytes, formatted	5¼ in	$1,995, w/o controller	C-14
	Z207-41	12.8M bytes, formatted	8 in.	$1,599, w/controller	C-14
	Z207-42	12.8M bytes, formatted	8 in.	$2,299, w/controller	C-14
Iomega Corp.	ALPHA-10	10M bytes, unformatted	8 in	$795, w/o controller	C-14
Tecmar, Inc.	BAC-PAC	10M bytes, unformatted	5¼ in	NA	C-14
Amlyn Corp.	5650	8M bytes, formatted	5¼ in.	$975, w/o controller	C-14
	A506	8M bytes, formatted	5¼ in.	$995, w/o controller	C-14
Iomega Corp.	BETA-5	5.2M bytes, unformatted	5¼ in.	$895, w/o controller	C-14
Amlyn Corp.	5460	5M bytes, formatted	5¼ in.	$975, w/o controller	C-14
Corona Data Systems	STAR FIRE 5	5M bytes, unformatted	5¼ in.	$2,195, w/controller	C-14
Tecmar, Inc.	FLOPPY 5/8 SUBSYSTEM	5M bytes, unformatted	8 in.	$1,995, w/controller	C-14
Per Sci, Inc.	299B HIGH SPEED	3.2M bytes, formatted	8 in.	$2,495, w/o controller	[illegible]
Trak Microcomputer Corp.	C-2000A	3.2M bytes, formatted	8 in.	$2,000, w/controller	C-14
	C-2000I	3.2M bytes, formatted	8 in.	NA	C-14
Per Sci, Inc.	299B	3M bytes, formatted	8 in.	$1,685, w/o controller	C-14
Drivetec, Inc.	320	2.6M bytes, unformatted	5¼ in.	$495, w/controller	C-15
Inster Corp.	INSTOR/SMDR	2.5M bytes, unformatted	8 in.	$5,500, w/controller	C-15
	INSTOR/85	2.5M bytes, unformatted	8 in.	$5,500, w/controller	C-15
	INSTOR/85P	2.5M bytes, unformatted	8 in.	$5,500, w/controller	[illegible]
Bering Industries, Inc.	BERING 2895	2.4M bytes, unformatted	8 in.	$4,990, w/controller	C-14
CompuPro Corp.	FLOPPY DISK SUBSYSTEM	2.4M bytes, unformatted	8 in.	$3,295, w/controller	C-15
Univation, Inc.	SLIMLINE	2.4M bytes, unformatted	8 in.	NA	C-17
Hewlett-Packard Co.	9895A (DUAL)	2.3M bytes, unformatted	8 in.	$5,910, w/controller	C-15
Lobo Systems, Inc.	5202CA	2.2M bytes, unformatted	8 in.	$1,925, w/controller	C-16
Commodore	CBM 8250	2.1M bytes, formatted	5¼ in.	$2,195, w/o controller	C-15
Analog & Digital Peripherals	E-Z-DISC 4	2M bytes, unformatted	5¼ in.	$1,100, w/controller	C-14
Canon U.S.A., Inc.	MDD 422	2M bytes, formatted	5¼ in.	$335, w/o controller	C-15
	MDD 423	2M bytes, formatted	5¼ in.	$370, w/o controller	C-15
Control Data Corp.	D2001	2M bytes, unformatted	8 in.	NA	[illegible]
Christin Industries, Inc.	CI-1220	2M bytes, unformatted	8 in.	$2,095, w/o controller	C-15
Computer Automation, Inc.	45118-02	2M bytes, formatted	8 in.	$3,240, w/o controller	[illegible]
Micropolis Corp.	1117-VI	2M bytes, formatted	5¼ in.	NA	C-16
Mitsubishi Electronics	M8455	2M bytes, formatted	5¼ in.	[illegible]	C-16
Caldisk, Inc.	143 M	1.7M bytes, unformatted	8 in	$630, w/o controller	C-14
Western Telematic, Inc.	MINI MATE-III	1.6M bytes, unformatted	5¼ in.	$3,195, w/o controller	C-17
Milltape Corp.	DD400 FLEXIBLE DISK DRIVE	1.6M bytes, formatted	8 in.	$5,000, w/o controller	C-16

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VENDOR	MODEL	CAPACITY	DIAMETER	PRICE	PAGE
D. Itoh Electronics Inc.	YD-380T	1.6M bytes, formatted	5¼ in.	N/A	C-15
Control Data Corp.	CDC 9406-4	1.6M bytes, formatted	5¼ in.	N/A	C-15
Ex-Cell-O, Inc.	RFD4000	1.6M bytes, formatted	8 in.	$750, w/o controller	C-15
Micro Peripherals, Inc.	42	1.6M bytes, unformatted	8 in.	$300, w/o controller	C-16
Mitsubishi Electronics	M2894-63	1.6M bytes, formatted	8 in.	$600, w/o controller	C-16
	M2896-63	1.6M bytes, formatted	8 in.	$800, w/o controller	C-16
	M4854	1.6M bytes, formatted	5¼ in.	$500, w/o controller	C-16
NEC Information Systems	FD1165	1.6M bytes, unformatted	5¼ in.	$525, w/controller	C-16
Qume Corp.	QUMETRAK 242	1.6M bytes, formatted	8 in.	$415, w/o controller	C-16
	QUMETRAK 842	1.6M bytes, formatted	8 in.	$445, w/o controller	C-16
Shugart Associates, Inc.	SA850/851	1.6M bytes, formatted	8 in.	N/A	C-16
	SA860	1.6M bytes, formatted	8 in.	N/A	C-16
Tandon Corp.	TM848-2	1.6M bytes, formatted	8 in.	N/A	C-16
TEAC Corp. of America	FD55-G	1.6M bytes, formatted	5¼ in.	$450, w/o controller	C-16
Toshiba America, Inc.	ND-40D	1.6M bytes, formatted	8 in.	N/A	C-16
Univation, Inc.	FLOPPY EXTERNAL DRIVE	1.6M bytes, unformatted	5¼ in.	N/A	C-17
World Storage Technology	FDD200-8	1.6M bytes, formatted	8 in.	$700, w/o controller	C-17
Per Scl, Inc.	277	1.5M bytes, formatted	8 in.	$1,150, w/o controller	C-16
	277 HIGH SPEED	1.3M bytes, formatted	8 in.	$1,595, w/o controller	C-16
Zenith Data Systems	ZENITH Z-207-41	1.3M bytes, formatted	8 in.	$1,599, w/o controller	C-17
	ZENITH Z-207-42	1.3M bytes, formatted	8 in.	$2,299, w/o controller	C-17
Infotek	FD9830	1.2M bytes, formatted	8 in.	$3,675, w/o controller	C-15
IBM	4965	1.2M bytes, unformatted	8 in.	N/A	C-15
ALS Corp.	FD9830	1.2M bytes, unformatted	8 in.	$3,675, w/controller	C-16
	FD9885	1.2M bytes, formatted	8 in.	$3,450, w/controller	C-14
Trak Microcomputer Corp.	E-2000Z	1.2M bytes, unformatted	8 in.	$845, w/o controller	C-16
	M-2000Z	1.2M bytes, unformatted	8 in.	$1,199, w/o controller	C-17
Hewlett-Packard Co.	9895A OPT 010 (SINGLE)	1.1M bytes, unformatted	8 in.	$4,580, w/controller	C-15
Lobo Systems, Inc.	8202 CA	1.1M bytes, unformatted	8 in.	$1,625, w/controller	C-16
	5101CA	1.1M bytes, unformatted	8 in.	$1,625, w/controller	C-16
IBM	5246	1.1M bytes, unformatted	8 in.	N/A	C-15
Sony Comm. Products	SMI-7012	1.1M bytes, unformatted	3½ in.	$1,100, w/controller	C-16
VR Data Corp.	TANDON 100-1	1.06M bytes, unformatted	5¼ in.	$250, w/o controller	C-17
Commodore	CBM 8050	1M bytes, formatted	5¼ in.	$1,695, w/o controller	C-15
CORE Microtech, Inc.	877-2	1M bytes, unformatted	8 in.	$1,695, w/o controller	C-15
	C877-2	1M bytes, unformatted	8 in.	$1,695, w/o controller	C-15
Amdek	AMDISK III	1M bytes, formatted	3 in.	$599, w/o controller	C-17
AM Electronics	220-C	1M bytes, formatted	5¼ in.	$499, w/o controller	C-17
Analog & Digital Peripherals	ADPI PORTA-DISK	1M bytes, unformatted	5¼ in.	$850, w/controller	C-17
	E-Z-DISC 3	1M bytes, unformatted	5¼ in.	$1,050, w/controller	C-17
Canon U.S.A., Inc.	MDD 221	1M bytes, formatted	5¼ in.	$235, w/o controller	C-17
Control Data Corp.	D2000	1M bytes, unformatted	8 in.	$2,800, w/controller	C-17
Cumark Corp.	MF800XB	1M bytes, formatted	8 in.	$3,295, w/o controller	C-18
	MF800B	1M bytes, unformatted	8 in.	$3,495, w/o controller	C-18
	MF85DSS	1M bytes, formatted	8 in.	$2,995, w/o controller	C-18
Control Data Corp.	CDC 9409T	1M bytes, formatted	5¼ in.	$260, w/o controller	C-18
	CDC 9429	1M bytes, formatted	5¼ in.	N/A	C-18
Cybercircon Corp.	CFD-211	1M bytes, unformatted	8 in.	$2,995, w/o controller	C-18
	CFD-221	1M bytes, unformatted	8 in.	$2,995, w/controller	C-18
Data Systems Design, Inc.	DSD 770 FLOPPY	1M bytes, unformatted	5¼ in.	N/A	C-18
	DSD 880 FLOPPY	1M bytes, unformatted	8 in.	$3,895, w/controller	C-18
Ex-Cell-O, Inc.	RFD960	1M bytes, formatted	5¼ in.	$410, w/o controller	C-18
	RFD965	1M bytes, formatted	5¼ in.	$360, w/o controller	C-18
Honeywell, Inc.	DIU 9608	1M bytes, unformatted	5¼ in.	$1,100, w/o controller	C-19
Infotek	FD9885	1M bytes, formatted	8 in.	$3,450, w/o controller	C-19
Micro Peripherals, Inc.	92	1M bytes, unformatted	5¼ in.	$200, w/o controller	C-19
	902	1M bytes, unformatted	5¼ in.	$190, w/o controller	C-19
Micropolis Corp.	1115-V	1M bytes, formatted	5¼ in.	$199, w/o controller	C-19
	1115-VI	1M bytes, formatted	5¼ in.	$248, w/o controller	C-19
Mitsubishi Electronics	M4852	1M bytes, formatted	5¼ in.	$450, w/o controller	C-19
	M4853	1M bytes, formatted	5¼ in.	$450, w/o controller	C-20
MCN Corp.	7646	1M bytes, unformatted	8 in.	$3,500, w/o controller	C-20
Mitsui Seiggy America, Ltd.	FB500	1M bytes, formatted	5¼ in.	$300, w/o controller	C-20
Nixdorf Computer Corp.	8320	1M bytes, unformatted	8 in.	$2,300, w/o controller	C-20
Qume Corp.	QUMETRAK 592	1M bytes, formatted	5¼ in.	$315, w/o controller	C-20
Shugart Associates, Inc.	SA460	1M bytes, formatted	5¼ in.	N/A	C-20
	SA465	1M bytes, formatted	5¼ in.	N/A	C-20
Sony Comm. Products	OA-D32W	1M bytes, formatted	3½ in.	N/A	C-20
Tandon Corp.	TM55	1M bytes, formatted	5¼ in.	N/A	C-20
	TM100-4	1M bytes, formatted	5¼ in.	N/A	C-20
	TM101-4	1M bytes, formatted	5¼ in.	N/A	C-20
TEAC Corp. of America	FD55-F	1M bytes, formatted	5¼ in.	$395, w/o controller	C-20
Toshiba America, Inc.	ND-08D	1M bytes, formatted	5¼ in.	N/A	C-20
World Storage Technology	FDD221-5	1M bytes, unformatted	5¼ in.	[illegible]	C-21
Wyse Wave Systems	SLIMLINE	985K bytes, unformatted	8 in.	$1,550, w/o controller	C-19
Micropolis Corp.	6440	982K bytes, unformatted	5¼ in.	N/A	C-19
Micropolis Corp.	1115-IV	960K bytes, unformatted	5¼ in.	$248, w/o controller	C-19
Tandon Corp.	TM35	875K bytes, unformatted	3½ in.	N/A	C-20

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VENDOR	MODEL	CAPACITY	DIAMETER	PRICE	PAGE
Western Telematic, Inc.	MINI MATE-III	816K bytes, unformatted	5¼ in.	$1,995, w/o controller	C-21
Caldisk, Inc.	142 M	802K bytes, formatted	8 in.	$550, w/o controller	C-17
	143 M1	802K bytes, formatted	8 in.	$510, w/o controller	C-17
	842 D	802K bytes, formatted	8 in.	$500, w/o controller	C-17
Control Data Corp.	CDC 9404B	800K bytes, formatted	8 in.	N/A	C-18
Ex-Cell-O, Inc.	RFD2000	800K bytes, formatted	8 in.	$560, w/o controller	C-18
	RFS2410	800K bytes, formatted	8 in.	$1,195, w/controller	C-18
Micro Peripherals, Inc.	41	800K bytes, unformatted	8 in.	$250, w/o controller	C-19
Miltope Corp.	DD450	800K bytes, formatted	8 in.	$16,000, w/controller	C-19
Shugart Associates, Inc.	SA 801/801R	800K bytes, formatted	8 in.	N/A	C-20
	SA 810	800K bytes, formatted	8 in.	N/A	C-20
Tandon Corp.	TM848-1	800K bytes, formatted	8 in.	N/A	C-20
World Storage Technology	FDD100-8	800K bytes, formatted	8 in.	$600, w/o controller	C-21
Datamax	DATAMAX DFD-1	770K bytes, unformatted	5¼ in.	$1,685, w/controller	C-18
Wang Laboratories, Inc.	2270A-3	750K bytes, unformatted	8 in.	$6,200, w/o controller	C-21
Western Telematic, Inc.	DATA MATE-II-DUAL	656K bytes, unformatted	5¼ in.	$3,195, w/o controller	C-21
Rana Systems	ELITE THREE	652K bytes, formatted	5¼ in.	$585, w/o controller	C-20
Trak Microcomputer Corp.	PC-2	640K bytes, formatted	N/A	$495, w/o controller	C-21
	PC-4	640K bytes, formatted	5¼ in.	$495, w/o controller	C-21
Zenith Data Systems	ZENITH Z-37	640K bytes, unformatted	5¼ in.	$1,699, w/o controller	C-21
CORS Microtech, Inc.	340-2	592K bytes, unformatted	3½ in.	$995, w/o controller	C-17
	540-2	592K bytes, unformatted	5¼ in.	$875, w/o controller	C-17
	C340-2	592K bytes, unformatted	3½ in.	$995, w/o controller	C-18
	C540-2	592K bytes, unformatted	5¼ in.	$875, w/o controller	C-18
Micro-Sci	A-143	572K bytes, unformatted	5¼ in.	$659, w/o controller	C-19
	PRO-140	572K bytes, unformatted	5¼ in.	$659, w/o controller	C-19
Stanton Controls, Inc.	MICRO-SCI-A143	572K bytes, unformatted	5¼ in.	$659, w/o controller	C-20
	MICRO-SCI-6457	572K bytes, unformatted	5¼ in.	$479, w/controller	C-20
Lobo Systems, Inc.	8101CA	570K bytes, unformatted	8 in.	$1,325, w/controller	C-19
Sony Comm. Products	SMI-7011	560K bytes, unformatted	3½ in.	$650, w/controller	C-20
	SMI-7013	560K bytes, unformatted	3½ in.	$775, w/controller	C-20
Hewlett-Packard Co.	9121D (DUAL)	540K bytes, unformatted	3½ in.	$1,775, w/controller	C-19
	82901M (DUAL)	540K bytes, unformatted	5¼ in.	$2,230, w/controller	C-19
CORS Microtech, Inc.	877-1	512K bytes, unformatted	8 in.	$995, w/o controller	C-18
	C877-1	512K bytes, unformatted	8 in.	$995, w/o controller	C-18
Computer Automation, Inc.	46003-01	512K bytes, unformatted	8 in.	$3,000, w/o controller	C-18
Digital Equipment Corp.	DEC RXO2	512K bytes, unformatted	8 in.	$4,500, w/controller	C-18
	RX02	512K bytes, unformatted	8 in.	N/A	C-18
Innotronics Corp.	INNOTRONICS MODEL 410	512K bytes, unformatted	8 in.	$700, w/o controller	C-19
Micro Peripherals, Inc.	52	512K bytes, unformatted	5¼ in.	N/A	C-19
	91	512K bytes, unformatted	5¼ in.	$190, w/o controller	C-19
	502	512K bytes, unformatted	5¼ in.	$165, w/o controller	C-19
	901	512K bytes, unformatted	N/A	$175, w/o controller	C-19
SemiDisk Systems	SEMIDISK 4941	512K bytes, unformatted	N/A	$1,495, w/controller	C-20
Toshiba America, Inc.	ND-04D	512K bytes, formatted	5¼ in.	N/A	C-20
Aerocomp, Inc.	80 TRACK DOUBLE SIDED	500K bytes, unformatted	5¼ in.	$379, w/o controller	C-21
AM Electronics	210-C	500K bytes, formatted	5¼ in.	$450, w/o controller	C-21
Analog & Digital Peripherals	E-Z-DISC 2	500K bytes, unformatted	5¼ in.	$1,000, w/controller	C-21
Control Data Corp.	CDC 9409	500K bytes, formatted	5¼ in.	N/A	C-22
	CDC 9428	500K bytes, formatted	5¼ in.	$150, w/o controller	C-22
Data Systems Design, Inc.	DSD 440	500K bytes, unformatted	8 in.	$3,895, w/controller	C-22
Ex-Cell-O, Inc.	RFD480	500K bytes, formatted	5¼ in.	$360, w/o controller	C-22
	RFD485	500K bytes, formatted	5¼ in.	$295, w/o controller	C-22
	RFD961	500K bytes, formatted	5¼ in.	$360, w/o controller	C-22
	RFD966	500K bytes, formatted	5¼ in.	$295, w/o controller	C-22
Matchless Systems	MITUBISHI 80 TRACK DD/DF	500K bytes, formatted	5¼ in.	$1,029, w/o controller	C-23
Mitsubishi Electronics	M4851	500K bytes, formatted	5¼ in.	$400, w/o controller	C-24
	MF351	500K bytes, formatted	3½ in.	$350, w/o controller	C-24
Personal Micro Computers	FDD-420	500K bytes, formatted	5¼ in.	$295, w/o controller	C-24
Qume Corp.	QUMETRAK 142	500K bytes, formatted	5¼ in.	$185, w/o controller	C-24
	QUMETRAK 542	500K bytes, formatted	5¼ in.	$210, w/o controller	C-24
R-G-B Designs, Inc.	SHUGART SA 455	500K bytes, formatted	5¼ in.	$375, w/o controller	C-24
Shugart Associates, Inc.	SA 300	500K bytes, formatted	3½ in.	N/A	C-25
	SA 410	500K bytes, formatted	5¼ in.	N/A	C-25
	SA 450	500K bytes, formatted	5¼ in.	N/A	C-25
	SA 455	500K bytes, formatted	5¼ in.	N/A	C-25
Sony Comm. Products	OA-D32V	500K bytes, formatted	3½ in.	$340, w/o controller	C-25
Tandon Corp.	T100-2	500K bytes, formatted	5¼ in.	N/A	C-25
	TM50	500K bytes, formatted	5¼ in.	N/A	C-25
	TM100-3	500K bytes, formatted	5¼ in.	N/A	C-25
TEAC Corp. of America	FD55-B	500K bytes, formatted	5¼ in.	$360, w/o controller	C-26
	FD55-E	500K bytes, formatted	5¼ in.	[illegible]	C-26
Trak Microcomputer Corp.	AT-D2 DOUBLE DENSITY	500K bytes, unformatted	5¼ in.	$550, w/controller	C-26
Wang Laboratories, Inc.	2270A-2	500K bytes, unformatted	8 in.	$400, w/o controller	C-27
World Storage Technology	D FDD211-5	500K bytes, formatted	5¼ in.	$450, w/o controller	C-27
	FDD121-5	500K bytes, formatted	5¼ in.	$450, w/o controller	C-27
	FDD200-5	500K bytes, formatted	5¼ in.	$450, w/o controller	C-27
	FDD212-5	500K bytes, formatted	5¼ in.	$330, w/o controller	C-27

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VENDOR	MODEL	CAPACITY	DIAMETER	PRICE	PAGE
Micropolis Corp.	1115-II	480K bytes, formatted	5¼ in.	$199, w/o controller	C-23
Digital Equipment Corp.	DEC RX50	409K bytes, unformatted	5¼ in.	$995, w/controller	C-22
Western Telematic, Inc.	MINI MATE-III-408K	408K bytes, unformatted	5¼ in.	$1,695, w/o controller	C-27
[illegible]	DD400	400K bytes, formatted	8 in.	$13,000, w/controller	C-24
Techtran Industries, Inc.	980XX	400K bytes, formatted	5¼ in.	$1,585, w/controller	C-26
Cromemco, Inc.	DDF	390K bytes, unformatted	5¼ in.	$1,295, w/o controller	C-22
IBM	4-INCH	358K bytes, formatted	4 in.	$165, w/o controller	C-23
Commodore	4040 CMB	340K bytes, formatted	5¼ in.	N/A	C-22
Western Telematic, Inc.	DATA MATE-II-328K	328K bytes, unformatted	5¼ in.	$2,195, w/o controller	C-27
Rana Systems	ELITE TWO	326K bytes, formatted	5¼ in.	$455, w/o controller	C-24
Fourth Dimension Systems	S111-5	320K bytes, formatted	5¼ in.	$185, w/o controller	C-23
	S211-5	320K bytes, formatted	5¼ in.	$235, w/o controller	C-23
IBM	320KB	320K bytes, formatted	5¼ in.	$650, w/o controller	C-23
Peroom Data Corp.	IBM 40 SERIES	320K bytes, unformatted	5¼ in.	$549, w/o controller	C-24
Sanyo Business Systems	EFD-160 MODEL 1000	320K bytes, unformatted	5¼ in.	$695, w/o controller	C-24
	EFD-360	320K bytes, unformatted	5¼ in.	$1,295, w/o controller	C-25
Trak Microcomputer Corp.	PC-1	320K bytes, formatted	N/A	$375, w/o controller	C-26
	PC-3	320K bytes, formatted	5¼ in.	$375, w/o controller	C-26
	Z-1	320K bytes, formatted	5¼ in.	$375, w/o controller	C-26
	Z-2	320K bytes, formatted	5¼ in.	N/A	C-26
VR Data Corp.	TANDON 100-2	320K bytes, unformatted	5¼ in.	$350, w/o controller	C-27
CORS Microtech, Inc.	340-1	296K bytes, unformatted	3½ in.	N/A	C-22
	540-1	296K bytes, unformatted	5¼ in.	$595, w/o controller	C-22
	C340-1	296K bytes, unformatted	3½ in.	N/A	C-22
	C540-1	296K bytes, unformatted	5¼ in.	$595, w/o controller	C-22
Fourth Dimension Systems	FDS-40A	288K bytes, formatted	5¼ in.	$205, w/o controller	C-22
	FDS-40AWO	288K bytes, formatted	5¼ in.	$280, w/controller	C-23
Amdek	AMDISK I	286K bytes, unformatted	3 in.	$299, w/o controller	C-21
Micro-Sci	A-73	286K bytes, unformatted	5¼ in.	$529, w/o controller	C-23
	PRO-70	286K bytes, unformatted	5¼ in.	$529, w/o controller	C-24
Standun Controls, Inc.	MICRO-SCI-A70	286K bytes, unformatted	5¼ in.	$529, w/o controller	C-25
	MICRO-SCI-A73	286K bytes, unformatted	5¼ in.	$529, w/o controller	C-25
	MICRO-SCI-6428	286K bytes, unformatted	5¼ in.	N/A	C-25
Sony Comm. Products	SMI-7014	280K bytes, unformatted	3½ in.	$500, w/o controller	C-25
Hewlett-Packard Co.	9121S (SINGLE)	270K bytes, unformatted	3½ in.	$1,200, w/controller	C-23
	9130A	270K bytes, unformatted	5¼ in.	$880, w/o controller	C-23
	82902M (SINGLE)	270K bytes, unformatted	5¼ in.	$1,520, w/controller	C-23
World Storage Technology	FDD112-5	265K bytes, formatted	5¼ in.	$280, w/o controller	C-27
Digital Equipment Corp.	RX01	256K bytes, unformatted	8 in.	N/A	C-22
Micro Peripherals, Inc.	51	256K bytes, unformatted	5¼ in.	$150, w/o controller	C-23
	501	256K bytes, unformatted	5¼ in.	$235, w/o controller	C-23
Micro-Sci	A-70	256K bytes, unformatted	5¼ in.	$529, w/o controller	C-23
[illegible]	FD-8	256K bytes, formatted	8 in.	$2,000, w/o controller	C-24
World Storage Technology	FDD100-5	256K bytes, formatted	5¼ in.	$350, w/o controller	C-27
Ampcomp, Inc.	40 TRACK DOUBLE SIDED	250K bytes, unformatted	5¼ in.	$279, w/o controller	C-21
	80 TRACK FLIPPY	250K bytes, unformatted	5¼ in.	$239, w/o controller	C-21
	80 TRACK SINGLE SIDED	250K bytes, unformatted	5¼ in.	$299, w/o controller	C-21
Analog & Digital Peripherals	E-Z-DISC 1	250K bytes, unformatted	5¼ in.	$950, w/controller	C-21
[illegible]	CDC 9408	250K bytes, formatted	5¼ in.	$160, w/o controller	C-22
Ex-Cell-O, Inc.	RFD481	250K bytes, formatted	5¼ in.	$305, w/o controller	C-22
	MDS[illegible]	250K bytes, formatted	5¼ in.	$235, w/o controller	C-22
[illegible]	40 TRACK DD/DF	250K bytes, formatted	5¼ in.	$880, w/o controller	C-23
Shugart Associates, Inc.	SA 200	250K bytes, formatted	5¼ in.	N/A	C-25
	SA 400	250K bytes, formatted	5¼ in.	N/A	C-25
	SA 405	250K bytes, formatted	5¼ in.	N/A	C-25
Tandon Corp.	TM100-1	250K bytes, formatted	5¼ in.	N/A	C-25
TEAC Corp. of America	FD-30	250K bytes, formatted	3 in.	$298, w/o controller	C-26
	FD55-A	250K bytes, formatted	5¼ in.	$298, w/o controller	C-26
Trak Microcomputer Corp.	AT-D2 SINGLE DENSITY	250K bytes, unformatted	5¼ in.	$450, w/controller	C-26
Wang Laboratories, Inc.	2270A-1	250K bytes, unformatted	8 in.	$3,200, w/o controller	C-27
World Storage Technology	FDD111-5	250K bytes, formatted	5¼ in.	$350, w/o controller	C-27
Control Data Corp.	CERTAINTY 210 SERIES	246K bytes, unformatted	8 in.	$2,950, w/controller	C-22
Nixdorf Computer Corp.	8540	243K bytes, unformatted	8 in.	$1,825, w/controller	C-24
Dictaphone Corp.	6430	237K bytes, unformatted	5¼ in.	N/A	C-22
Micro-Sci	A-82	230K bytes, unformatted	5¼ in.	$569, w/o controller	C-23
Western Telematic, Inc.	MINI MATE-III-204K	204K bytes, unformatted	5¼ in.	$1,475, w/o controller	C-27
Aerocomp, Inc.	APPLE COMPATIBLE	200K bytes, formatted	5¼ in.	$279, w/o controller	C-21
Techtran Industries, Inc.	980	200K bytes, formatted	5¼ in.	$1,485, w/controller	C-26
	981	200K bytes, formatted	5¼ in.	$1,985, w/controller	C-26
Tandy Corp.	TRS-80 2611-64	186K bytes, unformatted	5¼ in.	$449, w/o controller	C-25
[illegible]	AT-D2	176K bytes, unformatted	5¼ in.	$499, w/controller	C-26
Commodore	CBM 2031	170K bytes, formatted	5¼ in.	$595, w/o controller	C-22
Micro-Sci	A-40	164K bytes, unformatted	5¼ in.	$379, w/o controller	C-23
	PRO-40	164K bytes, unformatted	5¼ in.	$299, w/o controller	C-24
[illegible]	MICRO-SCI-A40	164K bytes, unformatted	5¼ in.	$379, w/o controller	C-25
[illegible]	DATA MATE-II-164K	164K bytes, unformatted	5¼ in.	$1,995, w/o controller	C-27
Rana Systems	ELITE ONE	163K bytes, formatted	5¼ in.	$285, w/o controller	C-24
R-G-S [illegible]	MINI TAUR	163K bytes, unformatted	5¼ in.	$350, w/o controller	C-24

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VENDOR	MODEL	CAPACITY	DIAMETER	PRICE	PAGE
R-G-B Designs, Inc.	MINI TAUR II	163K bytes, unformatted	5¼ in.	$359, w/o controller	C-24
	TAUR II	163K bytes, unformatted	5¼ in.	$300, w/o controller	C-24
Trak Microcomputer Corp.	PI-2	163K bytes, unformatted	5¼ in	N/A	C-26
	PI-3	163K bytes, unformatted	5¼ in.	N/A	C-26
Quentin Research, Inc.	AP-100	160K bytes, unformatted	5¼ in	$335, w/o controller	C-24
Franklin Computer Corp.	ACE 10	143K bytes, unformatted	5¼ in	$399, w/o controller	C-23
Lobo Systems, Inc.	3101	143K bytes, unformatted	5¼ in.	$385, w/controller	C-23
	3101-I	143K bytes, unformatted	5¼ in.	$455, w/controller	C-23
Micro-Sci	A-2	143K bytes, unformatted	5¼ in	$345 w/o controller	C-23
	A-3	143K bytes, unformatted	5¼ in.	$379, w/o controller	C-23
Stanton Controls, Inc.	MICRO-SCI-A2	143K bytes, unformatted	5¼ in.	$345, w/o controller	C-25
	MICRO-SCI-A3	143K bytes, unformatted	5¼ in.	$379, w/o controller	C-25
	MICRO-SCI-6414	143K bytes, unformatted	5¼ in.	N/A	C-25
Trak Microcomputer Corp.	0510	143K bytes, unformatted	5¼ in.	$300, w/o controller	[illegible]
	PI-1	143K bytes, unformatted	5¼ in.	$299, w/o controller	C-26
Apple Computer, Inc.	DISK II	140K bytes, unformatted	5¼ in.	N/A	C-21
	DISK III	140K bytes, unformatted	5¼ in.	N/A	C-21
Aerocomp, Inc.	SINGLE SIDED FLIPPY	125K bytes, formatted	5¼ in.	$239, w/o controller	C-21
	40 TRACK COMPLETE	125K bytes, formatted	5¼ in.	$199, w/o controller	C-21
AM Electronics	6108-C	125K bytes, formatted	5¼ in.	$390, w/o controller	C-21
Terminal Data Corp.	5452000/10	125K bytes, unformatted	5¼ in.	$995, w/o controller	C-28
Zenith Data Systems	ZENITH Z87 DUAL	100K bytes, unformatted	5¼ in.	$999, w/o controller	C-27
Atari, Inc.	1050	88K bytes, unformatted	5¼ in.	$450 w/controller	C-22
Percom Data Corp.	AT-88 S1/A1/S2	88K bytes, unformatted	5¼ in.	$749, w/controller	C-24
Trak Microcomputer Corp.	AT-D1	88K bytes, unformatted	5¼ in.	$499 w/controller	[illegible]
	AT-1	88K bytes, unformatted	5¼ in.	$429, w/controller	C-26
Percom Data Corp.	TFD 340N2/340N2	31K bytes, unformatted	5¼ in.	$1,099, w/o controller	C-24
Sony Comm. Products	OA-D31V	N/A	3½ in	$340, w/o controller	[illegible]

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VENDOR	MODEL	CAPACITY	DIAMETER	PRICE	PAGE
Control Data Corp.	271-10	24 DG bytes, unformatted	14 in.	$22,000, w/controller	[illegible]
Wang Laboratories, Inc.	2260-3	804M bytes, unformatted	14 in.	$21,000, w/o controller	[illegible]
Emulex Corp.	CDC-9775	675M bytes, formatted	14 in	$21 600, w/o controller	C-28
	M2351	474M bytes, formatted	14 in.	$12,950, w/o controller	[illegible]
Hewlett-Packard Co.	7933H/7933G	404M bytes, unformatted	14 in.	$25,000, w/controller	[illegible]
	7935H	404M bytes, unformatted	14 in.	$27,500, w/controller	[illegible]
IBM	3330 MODEL 11	400M bytes, unformatted	14 in.	$47,920, w/o controller	[illegible]
	3333 MODEL 11	400M bytes, unformatted	14 in	$56,450, w/o controller	C-29
Sperry Corp.	8480	358.4M bytes, unformatted	14 in.	$75,000, w/o controller	C-29
Miltope Corp.	RDS4502 RIGID SYSTEM	320M bytes, formatted	8 in.	$20,000, w/o controller	[illegible]
Century Data Systems, Inc.	TRIDENT T302	315.2M bytes, formatted	14 in.	$13,900, w/o controller	[illegible]
	TRIDENT T306	315.2M bytes, formatted	14 in.	$13,900, w/o controller	C-28
	TRIDENT T536	315.2M bytes, formatted	14 in.	$16,000, w/o controller	[illegible]
	TRIDENT T300	312.1M bytes, formatted	14 in.	$13,900, w/o controller	[illegible]
Ampex Corp.	DM-9300	312M bytes, formatted	14 in.	$16,500, w/o controller	C-28
	DM-9000	300M bytes, formatted	14 in.	N/A	[illegible]
	DM-9300AQ	300M bytes, formatted	14 in.	N/A	C-28
Computer Automation, Inc.	45239-30	300M bytes, formatted	14 in.	$22,100, w/o controller	C-28
Control Data Corp.	CDC 9766 SMD	300M bytes, formatted	14 in.	N/A	[illegible]
Emulex Corp.	CDC-9766	300M bytes, formatted	14 in.	$14,920, w/o controller	C-29
Harris Corp.	5650	300M bytes, unformatted	14 in	$19,500, w/o controller	C-29
System Industries, Inc.	9766	300M bytes, formatted	14 in.	N/A	[illegible]
Telefile Computer Products	T3283	300M bytes, formatted	5¼ in.	$22,000, w/controller	C-29
Data General Corp.	6122	277M bytes, unformatted	14 in.	$43,350 w/controller	C-28
Wang Laboratories, Inc.	6585	275M bytes, unformatted	8 in.	$34,000, w/o controller	C-29
Datapoint Corp.	9397	270M bytes, unformatted	14 in.	$31,950, w/controller	C-28
Digital Equipment Corp.	RM05	256M bytes, unformatted	14 in.	$34,000, w/o controller	C-28
Honeywell, Inc.	MSU 9804	256M bytes, unformatted	14 in.	N/A	[illegible]
Burroughs Corp.	B9484-12	252M bytes, unformatted	14 in.	N/A	C-28
Control Data Corp.	CERTAINTY 270-30 SMD	240M bytes, unformatted	14 in.	N/A	C-30
Century Data Systems, Inc.	TRIDENT T202	210.1M bytes, formatted	14 in.	$12,500, w/o controller	[illegible]
	TRIDENT T200	208.1M bytes, formatted	14 in.	$12,500, w/o controller	[illegible]
Memorex Corp.	677-70	208M bytes, formatted	14 in.	$10,500, w/o controller	[illegible]
Digital Equipment Corp.	RA60	205M bytes, unformatted	10½ in.	$15,000, w/o controller	C-28
Datapoint Corp.	9331	202M bytes, unformatted	14 in	$17,000, w/controller	[illegible]
IBM	3330 MODEL 1,2	200M bytes, unformatted	14 in.	$33,670, w/o controller	[illegible]
	3333 MODEL 1	200M bytes, unformatted	14 in.	$42,200, w/o controller	C-30
Nixdorf Computer Corp.	8330-11	200M bytes, unformatted	14 in.	$19,170, w/o controller	C-30
Data General Corp.	6061	190M bytes, unformatted	14 in.	$35,900, w/controller	C-29

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VENDOR	MODEL	CAPACITY	DIAMETER	PRICE	PAGE
[illegible] Corp.	658.	182M bytes, unformatted.	14 in.	$24,650, w/o controller	C-30
Digital Equipment Corp.	RP06	176M bytes, unformatted	14 in.	$39,140, w/o controller	C-30
Sperry Corp.	[illegible]	174 1M bytes, unformatted	14 in.	$19,000, w/o controller	C-30
Ampex Corp.	DM-9160	165 8M bytes, formatted	14 in.	$10,370, w/o controller	C-29
	DM-900	160M bytes, formatted	14 in.	N/A	C-29
Control Data Corp.	CERTAINTY 280 SERIES CMC	155M bytes, unformatted	14 in.	$14,040, w/controller	C-29
Dicom Industries	DICOM 403	154M bytes, formatted	5¼ in.	$10,000, w/controller	C-29
Master Corp.	XT1140	140M bytes, unformatted	5¼ in.	$4,290, w/o controller	C-30
Burroughs Corp.	B9484-51	130 4M bytes, unformatted	14 in.	N/A	C-29
Hewlett-Packard Co.	7925 M/S/H	120M bytes, unformatted	14 in.	$22,050, w/o controller	C-30
Santa Clara Systems, Inc.	SABRINA	120M bytes, unformatted	8 in.	$16,252, w/controller	C-30
Master Corp.	XT1105	105M bytes, unformatted	5¼ in.	$3,340, w/o controller	C-30
Ball Corp.	BDA100/MOD II	100M bytes, formatted	14 in.	$9,000, w/o controller	C-31
Ampex Corp.	SUPER DFR 856	97 7M bytes, unformatted	14 in.	N/A	C-30
Computer Automation, Inc.	45236-96	96M bytes, formatted	14 in.	$15,000, w/o controller	C-31
Control Data Corp.	CDC 9448-96 CMD	96M bytes, formatted	14 in.	N/A	C-31
Motorola, Inc.	M68KDE96-1	96M bytes, formatted	14 in.	$18,920, w/o controller	C-35
Wang Laboratories, Inc.	2280V-3	90M bytes, unformatted	14 in.	$19,000, w/o controller	C-36
Sperry Corp.	8470	89 6M bytes, unformatted	14 in.	$28,000, w/o controller	C-37
Ampex Corp.	DM-980	82 9M bytes, formatted	14 in.	$9,370, w/o controller	C-30
Century Data Systems, Inc.	TRIDENT T82	82 9M bytes, formatted	14 in.	$7,900, w/o controller	C-31
Control Data Corp.	CDC 9710 REMOVABLE	82 9M bytes, formatted	9 in.	N/A	C-31
Emulex Corp.	CDC-9710	82 9M bytes, formatted	8 in.	N/A	C-34
Century Data Systems, Inc.	TRIDENT T80	82 1M bytes, formatted	14 in.	$7,900, w/o controller	C-31
[illegible] Corp.	[illegible]	81M bytes, unformatted	14 in.	$13,500, w/o controller	C-36
[illegible] Laboratories, Inc.	2280N-3	80 4M bytes, unformatted	14 in.	$19,000, w/o controller	C-37
	6580-3	80 4M bytes, unformatted	14 in.	$19,000, w/o controller	C-37
Ball Corp.	BDA80/MOD I	80M bytes, formatted,	14 in.	$8,000, w/o controller	C-30
	BDA80/MOD II	80M bytes, formatted.	14 in.	$8,306, w/o controller	C-31
	BDA80/MOD III	80M bytes, formatted	14 in.	$8,500, w/o controller	C-31
Computer Automation, Inc.	45014-00	80M bytes, formatted	14 in.	$14,800, w/o controller	C-31
Control Data Corp.	CDC 9412 WINDSOR	80M bytes, formatted	8 in.	N/A	C-31
	CDC 9415-80 WREN	80M bytes, formatted	N/A	N/A	C-31
	CDC 9762 SMD	80M bytes, formatted	14 in.	N/A	C-32
Emulex Corp.	CDC-9762	80M bytes, formatted	14 in.	$8,755, w/o controller	C-34
System Industries, Inc.	9762	80M bytes, formatted	14 in.	N/A	C-37
Telefile Computer Products	T3288	80M bytes, formatted	5¼ in.	$18,000, w/controller	C-37
Mohawk Data Sciences Corp.	MODEL 2175	78M bytes, unformatted,	14 in.	$28,600, w/controller	C-35
[illegible] Computer Corp.	6324	78M bytes, unformatted	14 in.	$22 700, w/o controller	C-36
Wang Laboratories, Inc.	2265V-1	75M bytes, unformatted	14 in.	$17,000, w/o controller	C-37
IBM	3340 A2/B1/B2	69 8M bytes, unformatted	14 in.	$8,600 w/o controller	C-34
Digital Equipment Corp.	RM02	67 4M bytes, unformatted	14 in.	$22,500, w/o controller	C-34
	RM03	67 4M bytes, unformatted	14 in.	$22,500, w/o controller	C-34
Honeywell, Inc.	CDU 9636, 9638	67M bytes, unformatted	14 in.	$16,000, w/o controller	C-34
Nixdorf Computer Corp.	6326	66M bytes, unformatted,	14 in.	$17,050, w/o controller	C-36
Emulex Corp.	SUPER DFR 964	65.1M bytes, formatted	14 in.	N/A	C-33
Master Corp.	XT1065	65M bytes, unformatted	5¼ in.	$2,390, w/o controller	C-30
Computer Automation, Inc.	45236-64	64M bytes, formatted	14 in.	$13,000, w/o controller	C-31
Control Data Corp.	CDC 9448-64 CMD	64M bytes, formatted	14 in.	N/A	C-31
	CERTAINTY 270-10 & 270-20	63M bytes, unformatted	14 in.	$17,915, w/controller	C-33
Texas Instruments, Inc.	[illegible]	62 7M bytes, unformatted	N/A	N/A	C-37
Wang Laboratories, Inc.	2280V-2	60M bytes, unformatted	14 in.	$18,000, w/o controller	C-36
Century Data Systems, Inc.	TRIDENT T50	54 7M bytes, formatted	14 in.	$7,000, w/o controller	C-31
Wang Laboratories, Inc.	6580-2	53.6M bytes, unformatted	14 in.	$18,000, w/o controller	C-36
Amcodyne, Inc.	ARAPAHO 7110	53.2M bytes, formatted	8 in.	$4,550, w/o controller	C-30
Core, Inc.	CORE 5117	53M bytes, unformatted	8 in.	$12,990, w/controller	C-32
Vermont Research Corp.	5017	52M bytes, unformatted.	14 in.	$11,000, w/controller	C-37
Ball Corp.	BDA50/MOD II	50M bytes, formatted.	14 in.	$6,900, w/o controller	C-30
	BDA50/MOD I	50M bytes, formatted	14 in.	$6,700, w/o controller	C-30
CXB Systems, Inc.	R-50	50M bytes, formatted.	14 in.	$4,400, w/o controller	C-32
Hewlett-Packard Co.	7920 M/S/H	50M bytes, unformatted.	14 in.	$19,000, w/o controller	C-34
Motorola, Inc.	M68KDE50-1	50M bytes, formatted	8 in.	$12,920, w/o controller	C-35
Wang Laboratories, Inc.	2280-2	40 6M bytes, unformatted	14 in.	$20,000, w/o controller	C-36
Aerospatiale Corp. of America	SMD DRIVE	40M bytes, unformatted	14 in.	N/A	C-30
Control Data Corp.	CDC 9760 SMD	40M bytes, formatted	14 in.	N/A	C-31
Datapoint Corp.	9310	40M bytes, unformatted.	11	$7,850, w/controller	C-32
	9320	40M bytes, unformatted.	11 in.	$7,850, w/controller	C-32
Onyx & ISI, Inc.	5840R	40M bytes, unformatted.	5¼ in.	$10,900, w/o controller	C-28
Nixdorf Computer Corp.	6323	39M bytes, unformatted	14 in.	$16,500, w/o controller	C-33
Athenaeum Technology, Inc.	AEGIS 10/10	38.2M bytes, formatted	5¼ in.	$1,300, w/o controller	C-30
Sperry Corp.	8433	34 3M bytes, unformatted	14 in.	$27,000, w/o controller	C-37
Nixdorf Computer Corp.	6325	33M bytes, unformatted.	14 in.	$14,050, w/o controller	C-36
	8845/4	33M bytes, formatted	14 in.	N/A	C-36
Ampex Corp.	SUPER DFR 932	32 5M bytes, formatted	14 in.	$7,570, w/o controller	C-30
Computer Automation, Inc.	45236-32	32M bytes, formatted	14 in.	$11,000, w/o controller	C-31
Control Data Corp.	CDC 9448-32 CMD	32M bytes, formatted	14 in.	N/A	C-31
Motorola, Inc.	M68KHDE32-1	32M bytes, formatted.	14 in.	$12,920, w/o controller	C-35
Data Systems Design, Inc.	DSD 890	31.2M bytes, unformatted	8 in.	$10,300, w/controller	C-30

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VENDOR	MODEL	CAPACITY	DIAMETER	PRICE	PAGE
Data Systems Design, Inc.	DSD 880	31M bytes, unformatted	8 in.	N/A	D-22
VR Data Corp.	HARD DISK 3 DUAL 15M	30M bytes, formatted	5¼ in.	$2,299, w/o controller	C-37
Wang Laboratories, Inc.	2280V-1	30M bytes, unformatted	14 in.	$17,000, w/o controller	D-36
Renaissance Marketing, Inc.	DD4314-1	29M bytes, formatted	N/A	$700, w/o controller	D-35
Wang Laboratories, Inc.	2280-1	26.8M bytes, unformatted	14 in.	$19,000, w/o controller	C-36
	2280N-1	26.8M bytes, unformatted	14 in.	$17,000, w/o controller	C-36
	6580-1	26.8M bytes, unformatted	14 in.	$17,000, w/o controller	D-36
Mixdorf Computer Corp.	6322	26M bytes, unformatted	14 in.	$12,520, w/o controller	C-36
Pertec Computer Corp.	D3000 EXTENSION	24M bytes, formatted	14 in.	$6,280, w/o controller	C-36
PolyMorphic Systems	HD/184	23M bytes, formatted	3.9 in.	$5,995, w/controller	C-36
Cynthia Peripheral Corp.	D-520	21M bytes, unformatted	5¼ in.	$3,150, w/o controller	C-32
Cipher Data Products	VANGUARD-3	20M bytes, unformatted	14 in.	$6,000, w/o controller	C-31
Dictaphone Corp.	6620	20M bytes, unformatted	5¼ in.	N/A	C-32
Genie Computer Corp.	GENIE 5-10-15-20	20M bytes, unformatted	5¼ in.	$3,195, w/o controller	C-34
Innovative Data Technology	R-120	20M bytes, unformatted	5¼ in.	N/A	C-36
Mohawk Data Sciences Corp.	MODEL 2174	20M bytes, unformatted	14 in.	$11,800, w/controller	C-35
Onyx & Hill, Inc.	5820R	20M bytes, unformatted	5¼ in.	$10,400, w/o controller	C-36
Santa Clara Systems, Inc.	MINI MEGA	20M bytes, unformatted	3.9 in.	$2,285 to $5,056, w/controller	C-36
Vermont Research Corp.	8010	20M bytes, unformatted	N/A	$2,725, w/controller	C-37
VR Data Corp.	HARD DISK 3 (DUAL 10MB)	20M bytes, formatted	5¼ in.	$1,599, w/o controller	C-37
Hewlett-Packard Co.	7906 M/S/MR/SR/H/HR	19.6M bytes, unformatted	14 in.	$13,000, w/o controller	C-34
Memorex Corp.	415	19.2M bytes, formatted	5¼ in.	$1,980, w/o controller	C-35
Disctron, Inc.	D519	19.1M bytes, formatted	8 in.	$775, w/controller	C-34
Datamac Peripheral Products	DD18	18M bytes, formatted	5¼ in.	$2,895, w/controller	D-22
Control Data Corp.	CDC 9445 LARK	16M bytes, unformatted	8 in.	$2,345, w/o controller	C-31
Motorola, Inc.	M68KHDE16-1	16M bytes, formatted	8 in.	$2,500, w/o controller	D-28
	MLD-16	16M bytes, formatted	8 in.	$7,500, w/o controller	D-28
Memorex Corp.	410	12.8M bytes, formatted	5¼ in.	$1,800, w/o controller	D-25
Datamac Peripheral Products	DD12	12M bytes, formatted	N/A	$2,295, w/controller	D-22
Pertec Computer Corp.	D3000	12M bytes, formatted	14 in.	$5,275, w/o controller	D-36
Professional Micro Systems	PMS 12	12M bytes, formatted	5¼ in.	$2,695, w/o controller	C-36
Fujitsu America, Inc.	M2301	11.9M bytes, formatted	8 in.	N/A	C-34
Core, Inc.	CORE 5115	10.6M bytes, unformatted	8 in.	$6,995, w/controller	C-32
Digital Equipment Corp.	RL02	10.4M bytes, unformatted	14 in.	$3,000, w/o controller	C-34
Wang Laboratories, Inc.	MVP-P3	10.2M bytes, unformatted	5¼ in.	$11,125, w/o controller	C-38
	MVP-P2	10.1M bytes, unformatted	5¼ in.	$8,725, w/o controller	C-38
Cynthia Peripheral Corp.	D-120	10M bytes, unformatted	10½ in.	$2,000, w/o controller	C-32
	D-140	10M bytes, unformatted	10½ in.	$3,100, w/o controller	D-31
DMA Systems Corp.	MICRO-MAGNUM 5/5	10M bytes, unformatted	5¼ in.	$2,200, w/o controller	C-34
Midwest Scientific	HD-8	10M bytes, formatted	14 in.	$9,000, w/o controller	D-31
Onyx & Hill, Inc.	5810R	10M bytes, unformatted	5¼ in.	$9,500, w/o controller	C-36
Vermont Research Corp.	8520	10M bytes, unformatted	N/A	$3,180, w/controller	C-37
VR Data Corp.	HARD DISK 3 (DUAL 5MB)	10M bytes, formatted	5¼ in.	$1,590, w/o controller	C-37
Wang Laboratories, Inc.	6560A	10M bytes, unformatted	8 in.	$9,000, w/o controller	C-39
Western Dynex Corp.	SERIES 6000	10M bytes, unformatted	14 in.	$2,100, w/o controller	C-39
NCR Corp.	656/6560	9.8M bytes, unformatted	14 in.	$10,500, w/o controller	C-36
	6566	9.8M bytes, unformatted	14 in.	$5,000, w/o controller	C-36
Digital Development Corp.	9100	9.6M bytes, formatted	12in.	N/A	D-34
	A7310	8.7M bytes, unformatted	12in.	N/A	C-34
Syquest Technology, Inc.	XQ306R	6.3M bytes, unformatted	3.9 in.	$995, w/o controller	C-37
Redime Corp.	RO351	6.3M bytes, unformatted	5½ in.	[illegible]	D-34
Datamac Peripheral Products	DD6	6M bytes, formatted	5¼ in.	$1,995, w/controller	C-32
Disctron, Inc.	D514	5.7M bytes, formatted	5¼ in.	$655, w/controller	C-34
Datricon	601B	5.5M bytes, formatted	9 in.	$7,500, w/controller	C-32
Digital Equipment Corp.	RL01	5.2M bytes, formatted	14 in.	$3,000, w/o controller	C-34
DMA Systems Corp.	MICRO-MAGNUM 5R	5M bytes, unformatted	5¼ in.	$2,000, w/o controller	C-34
Genie Computer Corp.	GENIE X5	5M bytes, unformatted	5¼ in.	$2,295, w/o controller	C-34
Mixdorf Computer Corp.	8840/5	5M bytes, unformatted	14 in.	N/A	C-36
Tecmar, Inc.	CAR. SHARE EXPANSION	5M bytes, unformatted	3.9 in.	$2,695, w/controller	C-37
Wang Laboratories, Inc.	6560B	5M bytes, unformatted	8 in.	$9,000, w/o controller	C-39
Western Dynex Corp.	WD505	5M bytes, unformatted	5¼ in.	$495, w/o controller	C-39
IMM	5022 MODEL 1	4.9M bytes, unformatted	14 in.	$11,040, w/o controller	C-35
	5022 MODEL 2	4.9M bytes, unformatted	14 in.	$12,060, w/o controller	C-35
Digital Development Corp.	60	4.8M bytes, formatted	12 in.	N/A	C-32
	750	4.8M bytes, formatted	14 in.	N/A	C-32
	M6000	4.8M bytes, formatted	12 in.	N/A	C-32
Datricon	601A	2.8M bytes, formatted	9in.	$5,000, w/controller	C-33
Mohawk Data Sciences Corp.	MODEL 2172	2.5M bytes, unformatted	14 in.	$7,712, w/controller	C-35
IBM	5322	1.1M bytes, unformatted	8 in.	N/A	C-35
Wang Laboratories, Inc.	2265V-3	640K bytes, unformatted	14 in.	[illegible]	C-38

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VENDOR	MODEL	CAPACITY	DIAMETER	PRICE	PAGE
Control Data Corp.	CDC 33800 DIRECT	2,520M bytes, formatted	14 in.	$93,000, w/o controller	C-38
National Advanced Systems	NAS 7380	2,520M bytes, unformatted	14 in.	N/A	C-38
Delta Systems, Inc.	HP/D SERIES	2,500M bytes, formatted	14 in.	N/A	C-38
NCR Corp.	6550	1,920M bytes, unformatted	14 in.	$50,000, w/o controller	C-38
Control Data Corp.	CDC 33750 DIRECT	1,630M bytes, formatted	14 in.	$83,000, w/o controller	C-38
Ibis Systems, Inc.	IBIS 1400	1,409M bytes, formatted	14 in.	$66,000, w/o controller	C-38
Interscience Systems, Inc.	CDC	1,270M bytes, formatted	14 in.	$53,000, w/o controller	C-38
	STC	1,270M bytes, formatted	14 in.	$53,000, w/o controller	C-38
IBM	3380 A4/AA4/B4	1,260 4M bytes, unformatted	14 in.	$98,640, w/o controller	C-38
Storage Technology Corp.	8380	1,260M bytes, formatted	14 in.	$70,170, w/o controller	C-38
Control Data Corp.	CDC 33502 DIRECT	1,200M bytes, formatted	14 in.	$59,000, w/o controller	C-38
	CDC 9771 EMD	825M bytes, formatted	14 in.	N/A	C-38
Qualex Technology	4622	820M bytes, unformatted	10½ in.	$45,250, w/controller	C-39
IBM	3375 A1/B1/D1	819.7M bytes, unformatted	14 in.	$36,040, w/o controller	C-38
Control Data Corp.	CDC 9775 FMD	679M bytes, formatted	14 in.	N/A	C-41
Harris Corp.	5662	675M bytes, formatted	5¼ in.	$31,950, w/controller	C-41
	HARRIS 5600	675M bytes, unformatted	5¼ in.	$32,000, w/controller	C-41
System Industries, Inc.	9775	675M bytes, formatted	14 in.	N/A	C-42
Storage Technology Corp.	8775	673M bytes, unformatted	14 in.	N/A	C-42
Toshiba Computer Products	T3285	673M bytes, formatted	N/A	$95,000, w/controller	C-42
Toshiba America, Inc.	MK182F	662M bytes, unformatted	N/A	N/A	C-42
Memorex Corp.	3652	635M bytes, unformatted	14 in.	N/A	C-41
National Advanced Systems	NAS 7360	635M bytes, unformatted	14 in.	N/A	C-41
Storage Technology Corp.	8650	635M bytes, formatted	14 in.	$51,355, w/o controller	C-42
NEC Information Systems	D1550	630M bytes, formatted	14 in.	$13,500, w/o controller	C-43
Prime Computer, Inc.	PRIME 4490	607M bytes, unformatted	14 in.	N/A	C-42
Data General Corp.	6214	602M bytes, unformatted	14 in.	$50,000, w/controller	C-41
Qualex Technology	3651	600M bytes, unformatted	14 in.	$36,500, w/controller	C-42
IBM	3370 A1/B1/A11/B11	571.3M bytes, unformatted	14 in.	$35,480, w/o controller	C-41
Burroughs Corp.	B9494-5	542M bytes, unformatted	14 in.	N/A	C-39
Control Data Corp.	CDC 9715 FSD-500	516M bytes, formatted	9 in.	N/A	C-41
Digital Equipment Corp.	RP07	516M bytes, unformatted	14 in.	$43,140, w/o controller	C-41
Century Data Systems, Inc.	MARKSMAN AMS 513	513.7M bytes, formatted	14 in.	$11,400, w/o controller	C-41
Digital Equipment Corp.	RP20	483.4M bytes, unformatted	14 in.	N/A	C-41
Qualex Technology	3641	480M bytes, unformatted	14 in.	$32,500, w/controller	C-42
Fujitsu America, Inc.	M2351	474.2M bytes, formatted	10½ in.	N/A	C-41
Harris Corp.	5360	474M bytes, formatted	10½ in.	$19,000, w/o controller	C-41
System Industries, Inc.	9751	474M bytes, formatted	10½ in.	N/A	C-42
National Memory Systems	NMS04	470M bytes, formatted	10½ in.	$9,500, w/o controller	C-42
Digital Equipment Corp.	RA81	456M bytes, unformatted	10½ in.	$19,000, w/o controller	C-41
Qualex Technology	4611	410M bytes, unformatted	10½ in.	$24,950, w/controller	C-42
Applied Peripheral Systems	4830-2	404.5M bytes, formatted	14 in.	$9,425, w/o controller	C-39
	4835-2	404.5M bytes, formatted	14 in.	$9,425, w/o controller	C-39
Burroughs Corp.	B9494-41	402M bytes, unformatted	14 in.	N/A	C-39
Fujitsu America, Inc.	M2294	355.5M bytes, formatted	14 in.	N/A	C-41
Control Data Corp.	CDC 9715 FSD-340	344M bytes, formatted	9 in.	N/A	C-41
Applied Peripheral Systems	4830-1	337.1M bytes, formatted	14 in.	$8,671, w/o controller	C-39
	4835-1	337.1M bytes, formatted	14 in.	$8,671, w/o controller	C-39
National Memory Systems	NMS03	335M bytes, formatted	14 in.	$8,500, w/o controller	C-41
Tecstor, Inc.	SERIES III-332	332M bytes, formatted	14 in.	$5,700, w/o controller	C-42
Ampex Corp.	CAPRICORN 330	330.3M bytes, formatted	14 in.	N/A	C-38
IBM	3350 A2/B2/C2	317.5M bytes, unformatted	14 in.	$53,340, w/o controller	C-41
Memorex Corp.	3650	317M bytes, unformatted	14 in.	N/A	C-41
NEC Information Systems	D1510	317M bytes, formatted	14 in.	$9,800, w/o controller	C-43
Storage Technology Corp.	8350	317M bytes, unformatted	N/A	$32,240, w/o controller	C-42
	8360	317M bytes, unformatted	14 in.	$37,235, w/o controller	C-42
Century Data Systems, Inc.	AMS 315	315.2M bytes, formatted	14 in.	$10,500, w/o controller	C-38
Tecstor, Inc.	SERIES III-315	315M bytes, formatted	14 in.	$5,600, w/o controller	C-42
Disc Tech One, Inc.	4300	301M bytes, formatted	14 in.	$6,000, w/o controller	C-41
IBM	3344 B2/B2F	279.5M bytes, unformatted	14 in.	$19,460, w/o controller	C-41
Texas Instruments, Inc.	DS 300	236.3M bytes, unformatted	14 in.	N/A	C-42
Northern Telecom, Inc.	MERCURY MFD/8210	214M bytes, unformatted	N/A	$8,590, w/controller	C-42
Megavault	MV212	212M bytes, formatted	8 in.	$6,020, w/o controller	C-41
Micropolis Corp.	1400 ANSI	200M bytes, formatted	8 in.	N/A	C-44
Tecstor, Inc.	SERIES III-199	199M bytes, formatted	14 in.	$5,000, w/o controller	C-44
Northern Telecom, Inc.	MERCURY MFD/8209	171M bytes, unformatted	N/A	$6,195, w/controller	C-44
Fujitsu America, Inc.	M2284	168.6M bytes, formatted	14 in.	N/A	C-43
Dictaphone Corp.	6681	168M bytes, unformatted	5¼ in.	N/A	C-43
National Memory Systems	NMS02	168M bytes, formatted	14 in.	$6,500, w/o controller	C-44
Tecstor, Inc.	SERIES III-166	166M bytes, formatted	14 in.	$4,650, w/o controller	C-44
Ampex Corp.	CAPRICORN 165	165.9M bytes, formatted	14 in.	N/A	C-42
Control Data Corp.	CDC 9715 FSD	165.9M bytes, formatted	9 in.	N/A	C-43
Emulex Corp.	CDC-9715	165.9M bytes, formatted	8 in.	N/A	C-43

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VENDOR	MODEL	CAPACITY	DIAMETER	PRICE	PAGE
Disc Tech One, Inc.	4160	165M bytes, formatted	14 in.	$5,000, w/o controller	C-43
Kennedy Co.	5160	165M bytes, formatted	14 in.	$5,750, w/o controller	C-43
Century Data Systems, Inc.	MARKSMAN M160	161M bytes, formatted	14 in.	$6,560, w/o controller	C-43
Control Data Corp.	CDC 9730-160 MMD	160M bytes, formatted	14 in.	NA	C-43
Emulex Corp.	CDC-9730-160	160M bytes, unformatted	14 in.	$8,985, w/o controller	C-43
	M2284	160M bytes, formatted	14 in.	$7,900, w/o controller	C-43
Micropolis Corp.	1400 SMD	160M bytes, formatted	8 in.	NA	C-44
System Industries, Inc.	9784	160M bytes, formatted	14 in.	NA	C-44
Priam Corp.	15450	158M bytes, formatted	14 in.	$3,440, w/o controller	C-44
Star Technologies	DART SUBSYSTEM	158M bytes, unformatted	14 in.	$9,900, w/controller	C-44
Prime Computer, Inc.	PRIME 4480	151M bytes, unformatted	14 in.	NA	C-44
Micropolis Corp.	1420 MI	148M bytes, formatted	8 in.	NA	C-44
Data General Corp.	6161	147M bytes, unformatted	14 in.	$24,000, w/controller	C-43
Prime Computer, Inc.	PRIME 4650	144M bytes, unformatted	14 in.	NA	C-44
Harris Corp.	5350	143.8M bytes, formatted	5¼ in.	$12,500, w/o controller	C-43
	5352	143.8M bytes, formatted	5¼ in.	$12,500, w/o controller	C-43
Nestar Systems, Inc.	122 PLAN 4000	137M bytes, unformatted	14 in.	$14,000, w/controller	C-44
NCR Corp.	6540	135M bytes, unformatted	14 in.	$10,800, w/o controller	C-44
Toshiba America, Inc.	MK186F	132.4M bytes, unformatted	8 in.	NA	C-44
Hewlett-Packard Co.	7914 P/R	132M bytes, unformatted	14 in.	$19,500, w/controller	C-43
Megavault	MVP132	132M bytes, formatted	8 in.	NA	C-43
Nixdorf Computer Corp.	8310-11	129M bytes, unformatted	14 in.	$10,320, w/o controller	C-44
Microdata Corp.	REFLEX-2	128.7M bytes, unformatted	14 in.	$17,900, w/controller	C-43
Alpha Data, Inc.	ATLAS	128M bytes, formatted	14 in.	$6,500, w/o controller	C-42
Northern Telecom, Inc.	MERCURY MFD/8206	128M bytes, unformatted	8 in.	$5,625, w/controller	C-44
Control Data Corp.	CERTAINTY 231 SERIES	126.4M bytes, unformatted	14 in.	$11,600, w/controller	C-43
	CERTAINTY 241 SERIES	126.4M bytes, unformatted	8 in.	$18,100, w/controller	C-43
Digital Equipment Corp.	RA80/RM80	121M bytes, unformatted	10½ in.	$14,000, w/o controller	C-43
Control Data Corp.	D3012	120M bytes, unformatted	8 in.	$14,500, w/controller	C-43
Cynthia Peripheral Corp.	D-160	120M bytes, unformatted	10½ in.	$4,000, w/o controller	C-43
Megavault	MV116	116M bytes, formatted	8 in.	$5,020, w/o controller	C-43
Priam Corp.	804	105M bytes, formatted	8 in.	$3,150, w/o controller	C-44
Star Technologies	DART SUBSYSTEM	105M bytes, unformatted	8 in.	$9,000, w/controller	C-44
Dictaphone Corp.	8651	100M bytes, unformatted	5¼ in.	NA	C-47
Nixdorf Computer Corp.	8330-1	100M bytes, unformatted	14 in.	$10,105, w/o controller	C-49
Tecstar, Inc.	SERIES III-100	100M bytes, formatted	14 in.	$4,500, w/o controller	C-51
Toshiba America, Inc.	MK184F	92.7M bytes, unformatted	8 in.	NA	C-51
Northern Telecom, Inc.	MERCURY MFD/8204	86M bytes, unformatted	8 in.	$4,985, w/controller	C-49
NEC Information Systems	D2246	85M bytes, formatted	8 in	$2,200, w/controller	C-49
Quantum Corp.	Q2080	85M bytes, unformatted	8 in.	$3,865, w/o controller	C-50
Fujitsu America, Inc.	M2312	84.4M bytes, formatted	8 in.	NA	C-47
	M2280	84.3M bytes, formatted	14 in.	NA	C-47
Chrislin Industries, Inc.	CI-1280-WW	84M bytes, unformatted	8 in.	$8,995, w/controller	C-45
Dictaphone Corp.	8680	84M bytes, unformatted	5¼ in.	NA	C-47
Memorex Corp.	214	84M bytes, formatted	8 in.	$3,675, w/o controller	C-48
National Memory Systems	NMS01	84M bytes, unformatted	8 in.	$7,000, w/o controller	C-48
Megavault	MV83	83M bytes, formatted	8 in.	$4,610, w/o controller	C-43
Tecstar, Inc.	SERIES III-83	83M bytes, formatted	14 in.	$4,400, w/o controller	C-51
Kennedy Co.	5380	82.9M bytes, formatted	14 in.	$4,595, w/o controller	C-48
	7380	82.9M bytes, formatted	8 in.	$3,995, w/o controller	C-48
Burroughs Corp.	B9493-80	80M bytes, unformatted	14 in.	NA	C-45
Century Data Systems, Inc.	MARKSMAN M80	80M bytes, formatted	14 in.	$5,030, w/o controller	C-45
Control Data Corp.	CDC 9410-8 FINCH	80M bytes, formatted	8 in.	$2,050, w/o controller	C-48
	CDC 9730-[illegible]	80M bytes, formatted	14 in.	NA	C-45
	CDC 9730-[illegible]	80M bytes, unformatted	14 in.	NA	C-45
CVM Systems, Inc.	M80-F	80M bytes, formatted	8 in.	$5,800, w/o controller	C-48
Innovative Data Technology	F-480	80M bytes, unformatted	5¼ in.	NA	C-47
Scientific Micro Systems	AFWT-11	80M bytes, formatted	8 in.	$5,000, w/controller	C-50
Century Data Systems, Inc.	C2075	77.8M bytes, formatted	8 in.	$4,525, w/o controller	C-45
Data General Corp.	6160	73M bytes, unformatted	14 in.	$18,000, w/controller	C-43
Harris Corp.	5330	72.5M bytes, formatted	5¼ in.	$6,500, w/o controller	C-47
Professional Micro Systems	PMS 72	72M bytes, formatted	5¼ in.	$5,995, w/o controller	C-50
Vertex	V170	72M bytes, formatted	5¼ in.	NA	C-51
Memorex Corp.	514	70M bytes, formatted	5¼ in.	$2,210, w/o controller	C-48
Priam Corp.	7050	70M bytes, formatted	8 in.	$2,450, w/o controller	C-50
U.S. Design Corp.	CSS 870	70M bytes, unformatted	8 in.	$8,000, w/controller	C-51
Priam Corp.	6650	68M bytes, formatted	14 in.	$2,235, w/o controller	C-48
Star Technologies	DART SUBSYSTEM	68M bytes, unformatted	8 in.	$7,500, w/controller	C-50
Cybertron Corp.	CHD 11-80	67M bytes, unformatted	8 in.	$7,995, w/controller	C-46
Hewlett-Packard Co.	7912 P/R	65.6M bytes, unformatted	14 in.	$17,000, w/controller	C-47
IBM	3310 A1/A2/B1/B2	64.5M bytes, unformatted	210 mm	$11,570, w/controller	C-47
Megavault	MV62	62M bytes, formatted	8 in.	$4,130, w/o controller	C-43
Prime Computer, Inc.	PRIME 4640	62M bytes, unformatted	14 in.	NA	C-50
Control Data Corp.	D3006	60M bytes, unformatted	8 in.	$8,355, w/controller	C-43
	D4004	60M bytes, unformatted	8 in.	$10,800, w/controller	C-43
Innovative Data Technology	F-360	60M bytes, unformatted	5¼ in.	NA	C-47
Nestar Systems, Inc.	112 PLAN 4000	60M bytes, unformatted	8 in.	$10,000, w/controller	C-49
3M Co.	8533	60M bytes, formatted	8 in.	$5,200, w/o controller	C-51

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VENDOR	MODEL	CAPACITY	DIAMETER	PRICE	PAGE
Cybernetron Corp.	CHD 11/60	56M bytes, unformatted	8 in.	$7,995, w/controller	C-46
	CHD-11/80	56M bytes, unformatted	8 in.	$7,995, w/o controller	C-46
Onyx & Ithl, Inc.	8760	55.6M bytes, unformatted	8 in.	N/A	C-49
Sperry Corp.	8450	54M bytes, unformatted	14 in.	$30,000, w/o controller	C-50
Professional Micro Systems	PMS 54	54M bytes, formatted	5¼ in.	$4,995, w/controller	C-50
Rodime Corp.	RO208	53.3M bytes, formatted	5¼ in.	N/A	C-50
Micropolis Corp.	1304	51.9M bytes, formatted	5¼ in.	$1,450, w/o controller	C-48
Evotek Corp.	ET-5840	51.6M bytes, formatted	5¼ in.	$3,175, w/o controller	C-47
Vertex	V150	51.4M bytes, formatted	5¼ in.	$2,350, w/o controller	C-51
Control Data Corp.	CDC 9457 LARK	50M bytes, formatted	8 in.	N/A	C-48
Dictaphone Corp.	8650	50M bytes, unformatted	5¼ in.	N/A	C-47
Memorex Corp.	913	50M bytes, formatted	5¼ in.	$1,820, w/o controller	C-48
Fujitsu America, Inc.	M2311	48.2M bytes, formatted	8 in.	N/A	C-47
Megavault	MV48	48M bytes, formatted	8 in.	$4,200, w/o controller	C-48
Fujitsu America, Inc.	M2303	47.5M bytes, formatted	8 in.	N/A	C-47
Disctron, Inc.	DP400	46.4M bytes, formatted	8 in.	$1,540, w/controller	C-47
Atari Corp.	3046	46.3M bytes, formatted	5¼ in.	$3,800, w/o controller	C-45
PH-Associates, Inc.	MARK 46	46M bytes, formatted	5¼ in.	$4,416, w/controller	C-49
Micropolis Corp.	1223	45M bytes, formatted	8 in.	$2,360, w/o controller	C-48
Miltope Corp.	RDS4502	45M bytes, formatted	8 in.	$49,000, w/controller	C-48
Micropolis Corp.	1203 ANSI	44.6M bytes, formatted	8 in.	$2,060, w/o controller	C-48
Cyber Data Corp.	WAVE80	44M bytes, unformatted	8 in.	$6,000, w/controller	C-46
Megavault	MV44	44M bytes, formatted	8 in.	$3,820, w/o controller	C-48
Texas Instruments, Inc.	WD 800/43	43.2M bytes, unformatted	8 in.	N/A	C-51
Northern Telecom, Inc.	MERCURY MFD/8202	43M bytes, unformatted	8 in.	$3,455, w/controller	C-49
NEC Information Systems	D2230	42.5M bytes, formatted	8 in.	$2,235, w/controller	C-49
Core, Inc.	CORE 5116	42.4M bytes, unformatted	8 in.	$6,695, w/controller	C-46
Chrislin Industries, Inc.	CI-1240-WF	42M bytes, unformatted	8 in.	$5,795, w/o controller	C-45
Kennedy Co.	7340	41.4M bytes, formatted	8 in.	$3,200, w/o controller	C-49
Burroughs Corp.	B9493-40	40M bytes, unformatted	14 in.	N/A	C-45
Cameo Electronics, Inc.	SERIES 1000 PUMA	40M bytes, unformatted	8 in.	$6,995, w/controller	C-45
Cardiff Technology, Inc.	D240	40M bytes, formatted	NA	$2,200, w/controller	C-45
Control Data Corp.	D3004	40M bytes, unformatted	8 in.	$7,900, w/controller	C-46
	D4002	40M bytes, unformatted	5¼ in.	$9,300, w/controller	C-45
Century Data Systems, Inc.	MARKSMAN M40	40M bytes, formatted	14 in.	$3,090, w/o controller	C-49
Computer Automation, Inc.	45261-15	40M bytes, formatted	8 in.	$7,700, w/o controller	C-45
Computer Memories, Inc.	CM-6640	40M bytes, formatted	5¼ in.	$1,800, w/o controller	C-45
Control Data Corp.	CDC 9410-40 FINCH	40M bytes, formatted	NA	NA	C-48
Data Systems Design, Inc.	DSD 770-40	40M bytes, unformatted	5¼ in.	NA	C-48
Innovative Data Technology	D-240	40M bytes, unformatted	5¼ in.	$2,750, w/controller	C-47
	F-240	40M bytes, unformatted	5¼ in.	N/A	C-47
Kennedy Co.	6173	40M bytes, formatted	8 in.	$3,195, w/o controller	C-49
Miniscribe Corp.	5440	40M bytes, unformatted	5¼ in.	N/A	C-39
Quantum Corp.	Q540	40M bytes, formatted	5¼ in.	$2,300, w/o controller	C-50
	Q2040	40M bytes, formatted	8 in.	$8,315, w/o controller	C-50
Rodime Corp.	RO206	40M bytes, unformatted	5¼ in.	N/A	C-50
Wang Laboratories, Inc.	2280N-2	40M bytes, unformatted	14 in.	$18,000, w/o controller	C-51
Toshiba America, Inc.	MK181F	39.7M bytes, unformatted	8 in.	N/A	C-51
Evotek Corp.	ET-5830	38.7M bytes, formatted	5¼ in.	$2,775, w/o controller	C-47
Athenaeum Technology, Inc.	AEGIS 30	38.2M bytes, formatted	5¼ in.	$1,900, w/o controller	C-45
Onyx & Ithl, Inc.	7740	38.2M bytes, unformatted	8 in.	$2,000, w/o controller	C-49
	8740	38.2M bytes, unformatted	8 in.	N/A	C-49
Control Data Corp.	CDC 9515-5 WREN	36M bytes, formatted	5¼ in.	N/A	C-48
Priam Corp.	3450	35M bytes, formatted	8 in.	$1,950, w/o controller	C-48
U.S. Design Corp.	CSS 835	35M bytes, unformatted	8 in.	$7,000, w/controller	C-51
Micropolis Corp.	1303	34.6M bytes, formatted	5¼ in.	N/A	C-48
	1203 SA	34.3M bytes, formatted	8 in.	$1,900, w/o controller	C-48
Megavault	MV34	34M bytes, formatted	8 in.	N/A	C-48
Priam Corp.	3350	34M bytes, formatted	14 in.	$1,900, w/o controller	C-49
Stugart Associates, Inc.	SA 106	33.9M bytes, formatted	8 in.	N/A	C-50
Atari Corp.	3033	33M bytes, formatted	5¼ in.	$3,200, w/o controller	C-45
PH-Associates, Inc.	MARK 33	33M bytes, formatted	5¼ in.	$3,750, w/controller	C-49
Tecmar, Inc.	SHARE/33 EXPANSION	33M bytes, unformatted	5¼ in.	N/A	C-50
Univation, Inc.	HARD DISK	33M bytes, unformatted	5¼ in.	N/A	C-51
Control Data Corp.	CDC 9410-32 FINCH	32M bytes, formatted	5¼ in.	N/A	C-48
Davong Systems, Inc.	DS010-032	32M bytes, unformatted	5¼ in.	N/A	C-47
Evotek Corp.	ET-5540	31.2M bytes, formatted	5¼ in.	$2,400, w/o controller	C-47
Quentin Research, Inc.	QA-531	31M bytes, unformatted	5¼ in.	$3,195, w/o controller	C-50
Tandon Corp.	TM703	31M bytes, formatted	5¼ in.	N/A	C-50
IBM	5247 MODEL 012	30.8M bytes, unformatted	210mm	$8,810, w/o controller	C-47
Vertex	V130	30.8M bytes, formatted	5¼ in.	$1,850, w/o controller	C-51
Toshiba America, Inc.	MK80F-30	30.3M bytes, unformatted	8 in.	N/A	C-51
Control Data Corp.	D4001	30M bytes, unformatted	8 in.	$8,050, w/controller	C-45
CMC International	TARGA II	30M bytes, unformatted	5¼ in.	$1,595, w/controller	C-48
Memorex Corp.	512	30M bytes, formatted	5¼ in.	$1,430, w/o controller	C-48
Miniscribe Corp.	5330	30M bytes, formatted	5¼ in.	N/A	C-49
Quantum Corp.	Q530	30M bytes, formatted	5¼ in.	$2,000, w/o controller	C-50
	Q2030	30M bytes, formatted	8 in.	$2,940, w/o controller	C-50

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VENDOR	MODEL	CAPACITY	DIAMETER	PRICE	PAGE
Xebec	XEBEC-9730	*30M bytes, unformatted*	*5¼ in.*	*$4,000, w/controller*	*C-51*
Shugart Associates, Inc.	SA400II	*29M bytes, formatted*	*14 in.*	*N/A*	*C-59*
Digital Equipment Corp.	RK07	*28M bytes, unformatted*	*14 in.*	*$13,000, w/o controller*	*C-47*
Professional Micro Systems	PMS 27	*27M bytes, formatted*	*5¼ in.*	*$3,600, w/controller*	*C-58*
Micropolis Corp.	1202 ANSI	*26.8M bytes, formatted*	*8 in.*	*N/A*	*C-48*
	1222	*26.7M bytes, formatted*	*8 in.*	*N/A*	*C-48*
Memorex Corp.	324	*26.7M bytes, formatted*	*5¼ in.*	*N/A*	*C-48*
Ampex Corp.	PYXIS 27	*26.6M bytes, formatted*	*5¼ in.*	*N/A*	*C-44*
Data Management Labs, Inc.	1040	*26.2M bytes, unformatted*	*8 in.*	*$9,200, w/controller*	*C-48*
Apparat, Inc.	26 MB IBM HARD DISK	*26M bytes, unformatted*	*5¼ in.*	*$3,395, w/controller*	*C-44*
	26 MB RADIO SHACK DISK	*26M bytes, unformatted*	*5¼ in.*	*$2,499, w/controller*	*C-44*
Computer Memories, Inc.	CM-6426	*26M bytes, formatted*	*5¼ in.*	*$1,600, w/o controller*	*C-48*
Megavault	MV26	*26M bytes, formatted*	*8 in.*	*$3,490, w/o controller*	*C-47*
Evotek Corp.	ET-5820	*25.8M bytes, formatted*	*5¼ in.*	*$2,155, w/o controller*	*C-47*
Disctron, Inc.	D526	*25.5M bytes, formatted*	*5¼ in.*	*$895, w/controller*	*C-47*
NEC Information Systems	D2200	*25.5M bytes, formatted*	*8 in.*	*$2,575, w/controller*	*C-48*
Data Management Labs, Inc.	1041	*25.2M bytes, unformatted*	*8 in.*	*$18,200, w/controller*	*C-48*
Control Data Corp.	CDC 9410-24 FINCH	*24M bytes, formatted*	*8 in.*	*N/A*	*C-48*
Kennedy Co.	6172	*24M bytes, formatted*	*8 in.*	*$1,995, w/o controller*	*C-48*
Fujitsu America, Inc.	M2302	*23.7M bytes, formatted*	*8 in.*	*N/A*	*C-47*
Evotek Corp.	ET-5530	*23.4M bytes, formatted*	*5¼ in.*	*$1,975, w/o controller*	*C-47*
Memorex Corp.	102	*23.4M bytes, formatted*	*8 in.*	*$1,700, w/o controller*	*C-48*
Univation, Inc.	SIRIUS-COMPATIBLE DISK	*22M bytes, unformatted*	*5¼ in.*	*N/A*	*C-51*
Control Data Corp.	CDC 9415-3 WREN	*21M bytes, formatted*	*N/A*	*N/A*	*C-48*
Corvus Systems, Inc.	CORVUS 20	*21M bytes, formatted*	*5¼ in.*	*$4,495, w/controller*	*C-46*
Davong Systems, Inc.	DS010-021	*21M bytes, unformatted*	*5¼ in.*	*$3,595, w/controller*	*C-48*
NEC Information Systems	D5244	*21M bytes, formatted*	*5¼ in.*	*$1,410, w/controller*	*C-49*
Rodime Corp.	RO204	*21M bytes, unformatted*	*5¼ in.*	*$1,760, w/o controller*	*C-50*
Cybercircon Corp.	CHD 11-20	*20.8M bytes, unformatted*	*8 in.*	*$4,995, w/controller*	*C-53*
	CHD-11	*20.8M bytes, unformatted*	*8 in*	*$4,995, w/o controller*	*C-53*
Micropolis Corp.	1202 SA	*20.6M bytes, formatted*	*8 in.*	*N/A*	*C-53*
Ampex Corp.	PYXIS-20	*20M bytes, formatted*	*5¼ in.*	*N/A*	*C-51*
Cameo Electronics, Inc.	2020	*20M bytes, unformatted*	*5¼ in.*	*$2,295, w/controller*	*C-52*
Control Data Corp.	D3002	*20M bytes, unformatted*	*8 in.*	[illegible]	*D-52*
Century Data Systems, Inc.	MARKSMAN M20	*20M bytes, formatted*	*14 in.*	*$2,495, w/o controller*	*C-42*
Datapoint Corp.	20 MB	*20M bytes, unformatted*	*5¼ in.*	[illegible]	*C-53*
Megavault	MV20	*20M bytes, formatted*	*8 in.*	*N/A*	*C-48*
Memorex Corp.	323	*20M bytes, formatted*	*5¼ in.*	[illegible]	*C-55*
Micro Solid Systems	EZ 845	*20M bytes, unformatted*	*5¼ in.*	*$3,495, w/controller*	*C-48*
Miniscribe Corp.	4020	*20M bytes, formatted*	*5¼ in.*	*N/A*	*C-56*
Percom Data Corp.	PHD 20/20A	*20M bytes, unformatted*	*5¼ in.*	*$2,895, w/o controller*	*C-57*
PII-Associates, Inc.	MARK 20	*20M bytes, formatted*	*5¼ in.*	*$3,333, w/controller*	*C-57*
Professional Micro Systems	PMS 20	*20M bytes, formatted*	*5¼ in.*	*$2,895, w/controller*	*C-57*
Quantum Corp.	Q520	*20M bytes, formatted*	*5¼ in.*	*$1,700, w/o controller*	*C-57*
	Q2020	*20M bytes, formatted*	*8 in.*	*$2,415, w/o controller*	*C-57*
Summit Research, Inc.	QA-520	*20M bytes, unformatted*	*5¼ in.*	*$2,995, w/o controller*	*C-58*
ThoughtWorks, Inc.	HD 120	*20M bytes, unformatted*	*5¼ in.*	*$4,495, w/controller*	*C-59*
3M Co.	8432	*20M bytes, formatted*	*8 in.*	*$2,675, w/o controller*	*C-59*
Atari Corp.	3020	*19.8M bytes, formatted*	*5¼ in.*	*$2,600, w/o controller*	*C-52*
Onyx & IMI, Inc.	9820R	*19.4M bytes, unformatted*	*8 in.*	*N/A*	*C-57*
	7720	*19.1M bytes, unformatted*	*8 in.*	*$1,660, w/o controller*	*C-57*
Tandon Corp.	TM503	*19.1M bytes, formatted*	*5¼ in.*	*N/A*	*C-59*
Computer Memories, Inc.	CM-5619	*19M bytes, formatted*	*5¼ in.*	*$1,400, w/o controller*	*C-53*
Texas Instruments, Inc.	WD 808/18	*18.5M bytes, unformatted*	*8 in.*	*N/A*	*C-59*
Toshiba America, Inc.	MK80-F20	*18.2M bytes, unformatted*	*8 in.*	*N/A*	*C-59*
Syquest, Inc.	HD20	*18M bytes, unformatted*	*5¼ in.*	*$3,995, w/controller*	*C-53*
Onyx & IMI, Inc.	5018H	*18M bytes, formatted*	*5¼ in.*	*$995, w/o controller*	*C-57*
Polymorphic Systems	HD/18	*18M bytes, unformatted*	*5¼ in.*	*$8,995, w/controller*	*C-57*
Micropolis Corp.	1302	*17.3M bytes, formatted*	*5¼ in*	*$875, w/o controller*	*C-48*
Hewlett-Packard Co.	7908P/R	*16.5M bytes, unformatted*	*8 in.*	*$9,900, w/controller*	*C-54*
Irwin Magnetics, Inc.	416	*16M bytes, formatted*	*5¼ in.*	*$1,800, w/o controller*	*C-55*
	516	*16M bytes, formatted*	*5¼ in.*	*$2,500, w/o controller*	*C-55*
Tecmar, Inc.	SHARE/15 EXPANSION	*16M bytes, unformatted*	*5¼ in.*	*$3,195, w/controller*	*C-58*
XComp, Inc.	PHD 8 X 8	*16M bytes, unformatted*	*5¼ in.*	*$2,395, w/o controller*	*C-58*
Rodime Corp.	RO203	*15.7M bytes, unformatted*	*5¼ in.*	*$1,460, w/o controller*	*C-50*
Fujitsu America, Inc.	M2234	*15.7M bytes, unformatted*	*5¼ in.*	*N/A*	*C-54*
Evotek Corp.	ET-5520	*15.6M bytes, formatted*	*5¼ in.*	*$1,725, w/o controller*	*C-54*
Bering Industries, Inc.	BERING 4695	*15.5M bytes, formatted*	*5¼ in.*	*$6,990, w/controller*	*C-52*
IBM	5247 MODEL 011	*15.4M bytes, unformatted*	*210mm*	*$7,010, w/o controller*	*C-55*
NEC Information Systems	D5234	*15.2M bytes, unformatted*	*5¼ in.*	*$1,250, w/controller*	*C-50*
Apparat, Inc.	15 MB IBM HARD DISK	*15M bytes, unformatted*	*5¼ in.*	*$2,295, w/controller*	*C-44*
	15 MB RADIO SHACK DISK	*15M bytes, unformatted*	*5¼ in.*	[illegible]	*C-44*
Cameo Electronics, Inc.	2015	*15M bytes, unformatted*	*5¼ in.*	*$2,295, w/controller*	*C-52*
Data General Corp.	6222	*15M bytes, unformatted*	*8 in.*	*$5,600, w/controller*	*C-53*
Davong Systems, Inc.	DS010-015	*15M bytes, unformatted*	*5¼ in.*	[illegible]	*C-54*
Mountain Computer, Inc.	DOS-01-445-03	*15M bytes, unformatted*	*5¼ in.*	*$2,995, w/controller*	*C-58*
	DOS-01-[illegible]	*15M bytes, unformatted*	*5¼ in.*	*$2,995, w/controller*	*C-58*
	DOS-01-[illegible]	*15M bytes, unformatted*	*5¼ in.*	*$2,995, w/controller*	*C-58*

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VENDOR	MODEL	CAPACITY	DIAMETER	PRICE	PAGE
Percom Data Corp.	DHD 15/15A	15M bytes, unformatted	5¼ in.	$2,395, w/o controller	C-57
PH-Associates, Inc.	PSS-15B	15M bytes, unformatted	5¼ in.	$2,695, w/controller	C-57
Quentin Research, Inc.	QA-515	15M bytes, unformatted	5¼ in.	$2,695, w/o controller	C-57
Seagate Technology	ST-419	15M bytes, unformatted	5¼ in.	$1,100, w/o controller	C-58
Trak Microcomputer Corp.	COMMANDER 15	15M bytes, unformatted	5¼ in.	$25,400, w/controller	C-59
Trantor Systems Ltd.	TRANTOR TSL-T5	15M bytes, formatted	5¼ in.	$3,395, w/controller	C-59
VR Data Corp.	HARD DISK 3 (15MB)	15M bytes, formatted	5¼ in.	$1,449, w/o controller	C-37
Shugart Associates, Inc.	SA4004	14.5M bytes, formatted	14 in.	N/A	C-58
Tandon Corp.	TM603SE	14.4M bytes, formatted	5¼ in.	N/A	C-59
Corvus Systems, Inc.	CORVUS II	14M bytes, formatted	5¼ in.	$3,495, w/controller	C-53
Ampex Corp.	PYXIS 13	13.3M bytes, formatted	5¼ in.	N/A	C-51
Shugart Associates, Inc.	SA712	13.3M bytes, formatted	5¼ in.	N/A	C-58
Memorex Corp.	322	13.2M bytes, formatted	5¼ in.	$775, w/o controller	C-53
Computer Memories, Inc.	CM-6213	13M bytes, formatted	5¼ in.	$1,400, w/o controller	C-59
Evotek Corp.	ET-5810	12.9M bytes, formatted	5¼ in.	$1,675, w/o controller	C-54
Miniscribe Corp.	3012	12.8M bytes, formatted	5¼ in.	$80,700, w/o controller	C-58
Tandon Corp.	TM502	12.8M bytes, formatted	5¼ in.	N/A	C-58
Cogito Systems, Inc.	CG912	12.7M bytes, formatted	5¼ in.	$895, w/o controller	C-52
Shugart Associates, Inc.	SA612	12.7M bytes, formatted	5¼ in.	N/A	C-58
Redime Corp.	RO352	12.7M bytes, unformatted	3½ in.	$1,250, w/o controller	C-58
Toshiba America, Inc.	MK80-F10	12.1M bytes, unformatted	8 in.	N/A	C-58
Computer Memories, Inc.	CM-5412	12M bytes, formatted	5¼ in.	$1,200, w/o controller	C-53
Onyx & IMI, Inc.	5012H	12M bytes, formatted	5¼ in.	$950, w/o controller	C-57
Memorex Corp.	101	11.7M bytes, formatted	8 in.	$1,450, w/o controller	C-55
Disctron, Inc.	DP100	11.6M bytes, formatted	8 in.	$1,390, w/controller	C-54
Univation, Inc.	RAINBOW-COMPATIBLE	11.2M bytes, unformatted	5¼ in.	N/A	C-60
Texas Instruments, Inc.	WD 500	11M bytes, unformatted	5¼ in.	N/A	C-59
Onyx & IMI, Inc.	9810R	10.7M bytes, unformatted	8 in.	N/A	C-57
Shugart Associates, Inc.	SA1004	10.6M bytes, formatted	8 in.	N/A	C-58
Fujitsu America, Inc.	M2233	10.5M bytes, unformatted	5¼ in.	N/A	C-54
Redime Corp.	RO202	10.5M bytes, unformatted	5¼ in.	$1,225, w/o controller	C-58
Onyx & IMI, Inc.	7710	10.2M bytes, unformatted	8 in.	$1,450, w/o controller	C-57
NEC Information Systems	D5224	10.1M bytes, unformatted	5¼ in.	$1,180, w/controller	C-56
Apparat, Inc.	10 MB IBM HARD DISK	10M bytes, unformatted	5¼ in.	$1,995, w/controller	C-53
	10 MB RADIO SHACK DISK	10M bytes, unformatted	5¼ in.	$1,735, w/controller	C-53
Cameo Electronics, Inc.	2010	10M bytes, unformatted	5¼ in.	$2,295, w/controller	C-53
Central Data Corp.	CD001	10M bytes, unformatted	8 in.	$4,300, w/controller	C-53
Christin Industries, Inc.	CI-520	10M bytes, unformatted	5¼ in.	$3,995, w/controller	C-53
Computer Automation, Inc.	45261-03	10M bytes, formatted	8 in.	$5,700, w/o controller	C-53
Corona Data Systems	EXTERNAL PHD 10	10M bytes, unformatted	5¼ in.	$2,695, w/controller	C-53
	PERSONAL HARD DISK 10	10M bytes, unformatted	5¼ in.	$2,295, w/controller	C-53
	STAR FIRE 10	10M bytes, unformatted	5¼ in.	$2,695, w/controller	C-53
Datapoint Corp.	9313	10M bytes, unformatted	5¼ in.	$3,950, w/controller	C-54
	9315	10M bytes, unformatted	5¼ in.	$5,950, w/controller	C-54
Data Systems Design, Inc.	DSD 770-10	10M bytes, unformatted	5¼ in.	N/A	C-54
Davong Systems, Inc.	DS010-010	10M bytes, unformatted	5¼ in.	$2,595, w/controller	C-54
Digital Equipment Corp.	RD51	10M bytes, unformatted	5¼ in.	$2,985, w/controller	C-54
Micro Data Systems	EZ 835	10M bytes, unformatted	5¼ in.	$2,495, w/controller	C-53
Microscience International	MODEL HH612	10M bytes, formatted	5¼ in.	$1,999, w/o controller	C-55
Miniscribe Corp.	4010	10M bytes, formatted	5¼ in.	N/A	C-59
Mountain Computer, Inc.	DDS-01-445-02	10M bytes, unformatted	5¼ in.	$2,495, w/controller	C-56
	DDS-01-494-02	10M bytes, unformatted	5¼ in.	$2,495, w/controller	C-56
Percom Data Corp.	PHD 10/10A	10M bytes, unformatted	5¼ in.	$1,895, w/o controller	C-57
PH-Associates, Inc.	DSS-10B	10M bytes, unformatted	5¼ in.	$2,295, w/controller	C-57
Quantum Corp.	Q2010	10M bytes, formatted	8 in.	$1,950, w/o controller	C-57
Quentin Research, Inc.	QA-510	10M bytes, unformatted	5¼ in.	$2,395, w/o controller	C-58
Seagate Technology	ST-412	10M bytes, unformatted	5¼ in.	$930, w/o controller	C-58
Shugart Associates, Inc.	SA606	10M bytes, formatted	5¼ in.	N/A	C-58
Star Technologies	DART SUBSYSTEM	10M bytes, unformatted	8 in.	$4,500, w/controller	C-58
Tecmar, Inc.	SHARE/10 EXPANSION	10M bytes, unformatted	5¼ in.	$2,795, w/controller	C-59
ThoughtWorks, Inc.	HD 110	10M bytes, unformatted	5¼ in.	$2,995, w/controller	C-59
3M Co.	8431	10M bytes, formatted	8 in.	$2,345, w/o controller	C-59
Trak Microcomputer Corp.	COMMANDER 10	10M bytes, unformatted	5¼ in.	$2,200, w/controller	C-59
Trantor Systems Ltd.	TRANTOR TSL-10	10M bytes, formatted	5¼ in.	$2,895, w/controller	C-59
VR Data Corp.	HARD DISK 3 (10 MB)	10M bytes, formatted	5¼ in.	$1,249, w/o controller	C-60
Wang Laboratories, Inc.	6560	10M bytes, unformatted	14 in.	$9,000, w/o controller	C-60
	6560C	10M bytes, unformatted	8 in.	$9,000, w/o controller	C-60
XComp, Inc.	PHD 5 X 5	10M bytes, unformatted	5¼ in.	$2,195, w/o controller	C-60
Xebec	XEBEC 9710	10M bytes, unformatted	5¼ in.	$1,750, w/controller	C-60
Tandon Corp.	TM602SE	9.6M bytes, formatted	5¼ in.	N/A	C-59
	TM603	9.6M bytes, formatted	5¼ in.	N/A	C-59
Micropolis Corp.	1221	8.9M bytes, formatted	8 in.	$1,775, w/o controller	C-56
Lobo Systems, Inc.	1850A	8.2M bytes, unformatted	8 in.	$3,459, w/controller	C-55
Evotek Corp.	ET-5510	7.8M bytes, formatted	5¼ in.	$1,500, w/o controller	C-54
Commodore	D9090	7.5M bytes, formatted	5¼ in.	$3,495, w/o controller	C-52
Corvus Systems, Inc.	CORVUS 6	7M bytes, formatted	5¼ in.	$2,495, w/controller	C-53
AMI Electronics	RD5087-C-51	6.7M bytes, formatted	5¼ in.	$1,700, w/controller	C-51
	RD5087-C-I	6.7M bytes, formatted	5¼ in.	$1,700, w/controller	C-51

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VENDOR	MODEL	CAPACITY	DIAMETER	PRICE	PAGE
AM Electronics	RD5076-C-T	6.7M bytes, formatted	5¼ in.	$1,700, w/controller	C-51
Ampex Corp.	PYXIS 7	6.7M bytes, formatted	5¼ in.	N/A	C-51
Memorex Corp.	321	6.7M bytes, formatted	5¼ in.	$645, w/o controller	C-55
Shugart Associates, Inc.	SA706	6.6M bytes, formatted	5¼ in.	N/A	C-52
	SA604	6.6M bytes, formatted	5¼ in.	N/A	C-52
IDE Associates, Inc.	IDEADISK FIXED	6.4M bytes, formatted	3.9 in.	$1,750, w/controller	C-55
Miniscribe Corp.	2006	6.4M bytes, formatted	5¼ in.	$692, w/o controller	C-56
	2012	6.4M bytes, formatted	5¼ in.	$879, w/o controller	C-56
	3006	6.4M bytes, formatted	5¼ in.	$622, w/o controller	C-56
Tandon Corp.	TM501	6.4M bytes, formatted	5¼ in.	N/A	C-58
	TM602	6.4M bytes, formatted	5¼ in.	N/A	C-58
Cogito Systems, Inc.	CG906	6.3M bytes, formatted	5¼ in.	N/A	C-52
Control Data Corp.	CDC 9270-6 CRICKET	6.3M bytes, formatted	3½ in.	N/A	C-53
Diactron, Inc.	D507	6.3M bytes, formatted	5¼ in.	$555, w/controller	C-54
Computer Memories, Inc.	CM-5206	6M bytes, formatted	5¼ in.	$1,000, w/o controller	C-53
Onyx & Hill, Inc.	5906H	6M bytes, formatted	5¼ in.	$900, w/o controller	C-56
Professional Micro Systems	PMS 6	6M bytes, formatted	5¼ in.	$2,200, w/o controller	C-57
Datamax	DATA MAX WFD-1	5.5M bytes, unformatted	5¼ in.	$7,000, w/controller	C-53
Shugart Associates, Inc.	ASS002	5.3M bytes, formatted	8 in.	N/A	C-58
Rodime Corp.	RO201	5.2M bytes, unformatted	5¼ in.	$990, w/o controller	C-58
Fujitsu America, Inc.	M2231	5.2M bytes, unformatted	5¼ in.	N/A	C-54
Data Management Labs, Inc.	1010	5.1M bytes, unformatted	8 in.	$7,300, w/controller	C-53
NEC Information Systems	5214	5M bytes, unformatted	5¼ in.	$915, w/controller	C-56
Apparat, Inc.	5 MB IBM HARD DISK	5M bytes, unformatted	5¼ in.	$1,795, w/controller	C-52
	5 MB RADIO SHACK HARD DISK	5M bytes, unformatted	5¼ in.	$1,489, w/controller	C-52
Apple Computer, Inc.	PROFILE	5M bytes, unformatted	5¼ in.	$2,195, w/controller	C-52
Cameo Electronics, Inc.	2005	5M bytes, unformatted	5¼ in.	$2,295, w/controller	C-52
Commodore	D9060	5M bytes, formatted	5¼ in.	$2,995, w/o controller	C-52
Corona Data Systems	EXTERNAL PHD 5	5M bytes, unformatted	5¼ in.	$2,795, w/controller	C-53
	PERSONAL HARD DISK 5	5M bytes, unformatted	5¼ in.	$1,795, w/controller	C-53
Data General Corp.	6220	5M bytes, unformatted	8 in.	$4,175, w/controller	C-53
Davong Systems, Inc.	DS010-005	5M bytes, unformatted	5¼ in.	$2,095, w/controller	C-54
Digital Equipment Corp.	RD50	5M bytes, unformatted	5¼ in.	$2,695, w/controller	C-54
Disk Memory Technology, Inc.	RUGGED 5 MB WINCHESTER	5M bytes, unformatted	8 in.	$1,500, w/o controller	C-55
Micro Data Systems	EZ 825	5M bytes, unformatted	5¼ in.	$2,295, w/controller	C-55
Mountain Computer, Inc.	DDS-01-445-01	5M bytes, unformatted	5¼ in.	$1,995, w/controller	C-56
	DDS-01-482-01	5M bytes, unformatted	5¼ in.	$1,995, w/controller	C-56
	DDS-01-494-01	5M bytes, unformatted	5¼ in.	$1,995, w/controller	C-56
Percom Data Corp.	PHD 5/5A	5M bytes, unformatted	5¼ in.	$1,495, w/o controller	C-57
PH-Associates, Inc.	DSS-5B	5M bytes, unformatted	5¼ in.	$1,995, w/controller	C-57
Quentin Research, Inc.	QA-505	5M bytes, unformatted	5¼ in.	$2,195, w/o controller	C-57
Seagate Technology	ST-406	5M bytes, unformatted	5¼ in.	$840, w/o controller	C-58
	ST-506	5M bytes, unformatted	5¼ in.	$884, w/o controller	C-58
Syquest Technology, Inc.	SQ306S	5M bytes, unformatted	3.9in.	$800, w/o controller	C-58
ThoughtWorks; Inc.	HD 105	5M bytes, unformatted	5¼ in.	$2,495, w/controller	C-59
Trak Microcomputer Corp.	COMMANDER 5	5M bytes, unformatted	5¼ in.	[illegible]	C-59
Trantor Systems Ltd.	TRANTOR TSL-5	5M bytes, formatted	5¼ in.	$2,395, w/controller	C-59
VR Data Corp.	HARD DISK 3 (SINGLE 5MB)	5M bytes, formatted	5¼ in.	$995, w/o controller	C-60
Xebec	XEBEC-9705	5M bytes, unformatted	5¼ in.	$1,650, w/controller	C-60
	XEBEC-9800	5M bytes, unformatted	5¼ in.	$2,000, w/controller	C-60
Labo Systems, Inc.	950A	4.9M bytes, unformatted	5¼ in.	$2,675, w/controller	C-56
Computer Dynamics, Inc.	WIN-5	4.8M bytes, formatted	8 in.	$1,500, w/controller	C-61
Newlett-Packard Co.	9134A OPT. 010	4.8M bytes, unformatted	5¼ in.	$4,500, w/controller	C-64
	9134A	4.6M bytes, unformatted	5¼ in.	$3,500, w/controller	C-64
Disc Tech One, Inc.	SERIES 3306	4M bytes, unformatted	14 in.	$3,700, w/o controller	C-64
Star Technologies	DART SUBSYSTEM	3.4M bytes, unformatted	8 in.	$5,600, w/controller	C-58
Ibis Systems, Inc.	IBIS 5380-A4	2.5M bytes, unformatted	14 in.	$81,995, w/o controller	C-64
	IBIS 5380-AA4	2.5M bytes, unformatted	14 in.	$83,710, w/o controller	C-56
	IBIS 5380-B4	2.5M bytes, unformatted	14 in.	$68,020, w/o controller	C-56
	IBIS 5380-BB4	2.5M bytes, unformatted	14 in.	$71,120, w/o controller	C-56
IBM	5022 MODEL 3	1.2M bytes, unformatted	14 in.	$9,880, w/o controller	C-55
	5022 MODEL 4	1.2M bytes, unformatted	14 in.	$10,820, w/o controller	C-55
Nixdorf Computer Corp.	8350-X2	1.2M bytes, unformatted	N/A	$41,130, w/o controller	C-56
Mountain Computer, Inc.	DDS-01-482-02	1M bytes, unformatted	5¼ in.	$2,495, w/controller	C-56
United Peripherals, Inc.	UP-1690	600K bytes, formatted	14 in.	N/A	C-56
Newlett-Packard Co.	7911 P/R	28K bytes, unformatted	14 in.	$14,500, w/controller	C-54
Shugart Associates, Inc.	SA1104	N/A	8 in.	N/A	C-58

Floppy Disk Drives

Capacities over 3M bytes

AMLYN CORP.
5460
Disk Diameter: 5¼ in.
Plug Compatibility: Shugart SA 460
Capacity: 5M bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 88 msec
Mean Time Between Failure: 8,000 hours
Interface: Shugart SA 460
Price: $975, without controller
Distribution Method: OEM, Third-party
Number Installed to Date: 100-500
Date First Installed: September 19[illegible]
(See Vendor Profile Page V-2)

AMLYN CORP.
5850
Disk Diameter: 5¼ in.
Plug Compatibility: Shugart SA 850
Capacity: 8M bytes, formatted
Transfer Rate: 62K byte/sec
Average Access Time: 88 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Shugart SA 850
Price: $975, without controller
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000-[illegible]
Date First Installed: March 1982

AMLYN CORP.
A506
Disk Diameter: 5¼ in.
Capacity: 8M bytes, formatted
Transfer Rate: 62K byte/sec
Average Access Time: 88 msec
Mean Time Between Failure: 8,000 hours
Interface: [illegible]
Price: $995, without controller
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: March 1982

CORONA DATA SYSTEMS
STAR FIRE 5
Disk Diameter: 5¼ in.
Compatibility: Apple II, Franklin Ace
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $2,195, with controller
Number Installed to Date: 500-1,000
(See Vendor Profile Page V-9)

EX-CELL-O, INC.
RFS4510
Disk Diameter: 8 in.
Capacity: 16M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Ansi
Price: $1,350, with controller
Distribution Method: OEM
Date First Installed: 1979
(See Vendor Profile Page V-15)

HEATH CO.
Z37
Disk Diameter: 5¼ in.
Compatibility: Heath Z89, Z90
Capacity: 12M bytes, formatted
Average Access Time: 260 msec
Maximum Drives Per Controller: 3
Integral Controller: Yes
Price: $1,995, without controller, $2,294, with controller
Distribution Method: OEM
Date First Installed: 1979
(See Vendor Profile Page V-16)

HEATH CO.
Z207-41
Disk Diameter: 8 in.
Compatibility: Heath Z100
Capacity: 12M bytes, formatted
Average Access Time: 90 msec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $1,599, with controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: April 1983

HEATH CO.
Z207-42
Disk Diameter: 8 in.
Compatibility: Heath Z100
Capacity: 12M bytes, formatted
Average Access Time: 90 msec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $2,299, with controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: April 1983

KOMEGA CORP.
ALPHA-10
Disk Diameter: 8 in.
Capacity: 10M bytes, unformatted
Transfer Rate: 1,130K byte/sec
Average Access Time: 20 msec
Mean Time Between Failure: 14,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Sasi, SCSI
Price: $795, without controller, $1,745, with controller
Distribution Method: OEM
Number Installed to Date: 500-1,000
Date First Installed: October 1981
(See Vendor Profile Page V-20)

KOMEGA CORP.
BETA-5
Disk Diameter: 5¼ in.
Plug Compatibility: Omti 20C
Capacity: 5.2M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 15 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Seagate ST506, ST708
Price: $895, without controller
Distribution Method: OEM

PER SCI, INC.
299
Disk Diameter: 8 in.
Capacity: 3M bytes, formatted
Transfer Rate: 500K byte/sec
Mean Time Between Failure: 4,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Price: $1,685, without controller
Distribution Method: OEM
Number Installed to Date: More than 50,000
Date First Installed: 1977
(See Vendor Profile Page V-28)

PER SCI, INC.
299B HIGH SPEED
Disk Diameter: 8 in.
Capacity: 3M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 33 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Persci
Price: $2,495, without controller
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
Date First Installed: June 1975

TECMAR INC.
ESC-PAC
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Plug Compatibility: TI
Capacity: 10M bytes, unformatted
Transfer Rate: 62K byte/sec
Mean Time Between Failure: 8,000 hours
Interface: Seagate ST506
Distribution Method: Third-party
(See Vendor Profile Page V-36)

TECMAR, INC.
FLOPPY S/S SUBSYSTEM
Disk Diameter: 8 in
Compatibility: IBM Personal Computer
Capacity: 5M bytes, unformatted
Transfer Rate: 62K byte/sec
Mean Time Between Failure: 10,000 hours
Interface: Sasi
Price: $1,995, with controller
Distribution Method: Third-party

TRAK MICROCOMPUTER CORP.
C-2000A
Disk Diameter: 8 in.
Compatibility: Apple
Capacity: 3M bytes, formatted
Average Access Time: 89 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Shugart
Price: $2,000, with controller
Distribution Method: Third-party
Number Installed to Date: 500
Date First Installed: July 1982
(See Vendor Profile Page V-37)

TRAK MICROCOMPUTER CORP.
C-2000I
Disk Diameter: 8 in.
Compatibility: IBM
Capacity: 3M bytes, formatted
Average Access Time: 89 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Shugart
Distribution Method: Third-party
Number Installed to Date: 500
Date First Installed: July 1982

1M- to 3M-Byte Capacity

ALS CORP.
FD9830
Disk Diameter: 8 in.
Compatibility: HP 9830
Capacity: 1.2M bytes, unformatted
Transfer Rate: 44K byte/sec
Mean Time Between Failure: 3,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $3,675, with controller
Distribution Method: End user
Number Installed to Date: 39
Date First Installed: January 1982
(See Vendor Profile Page V-2)

ALS CORP.
FD9885
Disk Diameter: 8 in.
Compatibility: HP 9825, HP 9835, HP 9845
Capacity: 1.2M bytes, formatted
Transfer Rate: 44K byte/sec
Mean Time Between Failure: 3,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $3,450, with controller
Distribution Method: End user
Number Installed to Date: 22
Date First Installed: June 1982

ANADIGICS DIGITAL PERIPHERALS
[illegible]
Disk Diameter: 5¼ in.
Capacity: 2M bytes, unformatted
Average Access Time: 2 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: RS-232, RS-422
Price: $1,100, with controller
Distribution Method: OEM, Third-party
Number Installed to Date: Under 100
Date First Installed: 1983
(See Vendor Profile Page V-3)

BERING INDUSTRIES, INC.
Model 1370
Disk Diameter: 8 in.
Compatibility: HP
Plug Compatibility: HP 9895
Capacity: 2.4M bytes, unformatted
Transfer Rate: 48K byte/sec
Average Access Time: 174 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $4,990, with controller
Distribution Method: OEM
Date First Installed: February 1982
(See Vendor Profile Page V-5)

CALTEX, INC.
152 M
Disk Diameter: 8 in.
Capacity: 1.7M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 6 msec
Mean Time Between Failure: 17,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $830, without controller

Distribution Method: End user, OEM
Number Installed to Date: More than 50,000
Date First Installed: 1977
(See Vendor Profile Page V-5)

CANON U.S.A., INC.
MDD 422
Disk Diameter: 5¼ in.
Capacity: 2M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 100 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Price: $335, without controller
Distribution Method: OEM
Date First Installed: December 1982
(See Vendor Profile Page V-6)

CANON U.S.A., INC.
MDD 423
Disk Diameter: 5¼ in.
Capacity: 2M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 100 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Price: $370, without controller
Distribution Method: OEM
Date First Installed: December 1982

CENTRAL DATA CORP.
D2001
Disk Diameter: 8 in.
Capacity: 2M bytes, unformatted
Transfer Rate: 62K byte/sec
Mean Time Between Failure: 7,500 hours
(See Vendor Profile Page V-6)

CORE MICROTECH, INC.
877-2
Disk Diameter: 8 in.
Compatibility: Commodore CBM; Rockwell
Capacity: 1M bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $1,695, without controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: June 1978
(See Vendor Profile Page V-6)

CORE MICROTECH, INC.
C877-2
Disk Diameter: 8 in.
Compatibility: Commodore 64
Capacity: 1M bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $1,695, without controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: April 1983

CORVUS INDUSTRIES, INC.
CI-1220
Disk Diameter: 8 in.
Compatibility: DEC LSI-11/23, LSI-11/03
Capacity: 2M bytes, unformatted
Transfer Rate: 19K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Shugart
Price: $2,095, without controller; $2,695, with controller
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: February 1982
(See Vendor Profile Page V-6)

C. ITOH ELECTRONICS, INC.
FD-80T 5¼ INCH
Disk Diameter: 5¼ in.
Plug Compatibility: Mitsubishi
Capacity: 1.6M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Distribution Method: OEM
Date First Installed: September 1982
(See Vendor Profile Page V-7)

COMMODORE BUSINESS MACHINES, INC.
CBM 8050
Disk Diameter: 5¼ in.
Capacity: 1M bytes, formatted
Transfer Rate: 125K byte/sec
Price: $1,695, without controller
(See Vendor Profile Page V-7)

COMMODORE BUSINESS MACHINES, INC.
CBM 8250
Disk Diameter: 5¼ in
Capacity: 2M bytes, formatted
Transfer Rate: 125K byte/sec
Price: $2,195, without controller
Date First Installed: 1983

COMPUPRO CORP.
FLOPPY DISK SUBSYSTEM
Disk Diameter: 8 in.
Compatibility: Compupro S
Capacity: 2M bytes, unformatted
Transfer Rate: 500K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 13,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $3,295, with controller
Distribution Method: Third-party
Date First Installed: 1982
(See Vendor Profile Page V-7)

COMPUTER AUTOMATION, INC.
45119-02
Disk Diameter: 8 in.
Compatibility: CA Model 4; DEC LSI-2
Capacity: 2M bytes, formatted
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Shugart SA 800
Price: $3,240, without controller
Distribution Method: End user, OEM
Date First Installed: October 1979
(See Vendor Profile Page V-8)

CONTROL DATA CORP.
CDC 9406-4
Disk Diameter: 5¼ in.
Capacity: 1.6M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 12,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
(See Vendor Profile Page V-9)

DRIVETEC, INC.
320
Disk Diameter: 5¼ in.
Capacity: 2M bytes, unformatted
Transfer Rate: 500K byte/sec
Average Access Time: 118 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Shugart SA 400 Standard
Price: $495, with controller
Distribution Method: OEM
Number Installed to Date: 500-1,000
Date First Installed: June 1983
(See Vendor Profile Page V-13)

EX-CELL-O, INC.
RFD4000
Disk Diameter: 8 in.
Capacity: 1.6M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 6,000 hours
Integral Controller: No
Interface: Ansi
Price: $750, without controller
Distribution Method: OEM
Date First Installed: March 1979
(See Vendor Profile Page V-15)

HEWLETT-PACKARD CO.
9895A (DUAL)
Disk Diameter: 8 in.
Compatibility: HP 9825T, Series 80, Series 100, Series 200
Capacity: 2M bytes, unformatted
Transfer Rate: 26K byte/sec
Average Access Time: 179 msec
Mean Time Between Failure: 4,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: HP-IB, IEEE-488
Price: $5,910, with controller
Distribution Method: End user
Number Installed to Date: 500-1,000
(See Vendor Profile Page V-17)

HEWLETT-PACKARD CO.
9896A OPT.010 (SINGLE)
Disk Diameter: 8 in.
Compatibility: HP 9825T, Series 80, Series 100, Series 200
Capacity: 1.1M bytes, unformatted
Transfer Rate: 26K byte/sec
Average Access Time: 179 msec
Mean Time Between Failure: 6,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: HP-IB
Price: $4,580, with controller
Distribution Method: End user
Number Installed to Date: 500-1,000

IBM
4965
Disk Diameter: 8 in.
Compatibility: IBM
Capacity: 1.2M bytes, unformatted
Transfer Rate: 62K byte/sec
Date First Installed: August 1981
(See Vendor Profile Page V-17)

IBM
S246
Disk Diameter: 8 in
Compatibility: IBM
Capacity: 1.1M bytes, unformatted
Transfer Rate: 62K byte/sec
Date First Installed: August 1981

INFOTEX
FD9830
Disk Diameter: 8 in.
Compatibility: HP 9830
Capacity: 1.2M bytes, formatted
Transfer Rate: 20K byte/sec
Average Access Time: 38 msec
Integral Controller: No
Price: $3,675 without controller
Distribution Method: End user
(See Vendor Profile Page V-19)

INSTOR CORP.
INSTOR/SMDR
Disk Diameter: 8 in.
Capacity: 2M bytes, unformatted
Transfer Rate: 19K byte/sec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $5,500, with controller
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1982
(See Vendor Profile Page V-19)

Additional information provided for by vendor

RS-232C intelligent diskette storage system. Read/write IBM 3740 8-in. diskettes. Automatic Ascii/Ebcdic conversion. Single/double density. Capacity to 2.5M bytes. Used to record data from bar-code readers, modems, computers and other data capture devices. Interface to Prime, HP3000, DEC, DG, IBM Personal Computer, etc. Universal PBX SMDR call recorder. From $3500.

INSTOR CORP.
INSTOR/85
Disk Diameter: 8 in
Capacity: 2M bytes, unformatted
Transfer Rate: 19K byte/sec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $5,500, with controller
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: April 1983

INSTOR CORP.
INSTOR/85P
Disk Diameter: 8 in.
Compatibility: Prime 50 Series
Capacity: 2M bytes, unformatted
Transfer Rate: 19K byte/sec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $5,500 with controller
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: April 1983

Floppy Disk Drives

LOBO SYSTEMS, INC.
5101CA
Disk Diameter: 8 in.
Compatibility: Apple II+
Capacity: 1.1M bytes, unformatted
Transfer Rate: 63K byte/sec
Average Access Time: 91 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Shugart
Price: $1,625, with controller
Distribution Method: End user
Number Installed to Date: 500-1,000
Date First Installed: 1979
(See Vendor Profile Page V-00)

LOBO SYSTEMS, INC.
5202CA
Disk Diameter: 8 in.
Compatibility: Apple II+
Capacity: 2.2M bytes, unformatted
Transfer Rate: 63K byte/sec
Average Access Time: 91 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Shugart
Price: $1,925, with controller
Distribution Method: End user
Number Installed to Date: 500-1,000
Date First Installed: 1979

LOBO SYSTEMS, INC.
8202 CA
Disk Diameter: 8 in.
Compatibility: Apple II+
Capacity: 1.1M bytes, unformatted
Transfer Rate: 63K byte/sec
Average Access Time: 260 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Shugart
Price: $1,625, with controller
Number Installed to Date: 500-1,000
Date First Installed: 1979

MICRO PERIPHERALS, INC.
42
Disk Diameter: 8 in.
Compatibility: IBM Personal Computer
Capacity: 1.6M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 177 msec
Mean Time Between Failure: 9,200 hours
Integral Controller: No
Interface: Shugart
Price: $300, without controller
Distribution Method: Third-party
Date First Installed: October 1982
(See Vendor Profile Page V-24)

MICROPOLIS CORP.
1117-VI
Disk Diameter: 5¼ in.
Capacity: 2M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 160 msec
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Shugart SA 400
Distribution Method: OEM
Date First Installed: September 1982
(See Vendor Profile Page V-24)

MILTOPE CORP.
DD400 FLEXIBLE DISK DRIVE
Disk Diameter: 8 in.
Compatibility: Norden 11/70M; Roim 1600; Honeywell RL-6; Sperry NTDS
Capacity: 1M bytes, formatted
Transfer Rate: 62K byte/sec
Average Access Time: 83 msec
Mean Time Between Failure: 7,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes.
Interface: SMD
Price: $5,000, without controller; $9,100, with controller
Distribution Method: OEM
Date First Installed: 1977
(See Vendor Profile Page V-24)

MITSUBISHI ELECTRONICS AMERICA, INC.
M2894-63
Disk Diameter: 8 in
Capacity: 1.6M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Shugart SA 800 Series
Price: $600, without controller
Distribution Method: OEM
Date First Installed: 1980
(See Vendor Profile Page V-25)

MITSUBISHI ELECTRONICS AMERICA, INC.
M2894-63
Disk Diameter: 8 in.
Capacity: 1.6M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Shugart SA 800 Series
Price: $600, without controller
Distribution Method: OEM
Date First Installed: 1981

MITSUBISHI ELECTRONICS AMERICA, INC.
M4854
Disk Diameter: 5¼ in.
Capacity: 1.6M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Shugart
Price: $500, without controller
Distribution Method: OEM
Date First Installed: April 1982

MITSUBISHI ELECTRONICS AMERICA, INC.
M8455
Disk Diameter: 5¼ in.
Capacity: 2M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 94 msec
Mean Time Between Failure: 10,000 hours
Interface: Shugart
Price: $550, without controller
Distribution Method: OEM
Date First Installed: January 1983

NEC INFORMATION SYSTEMS, INC.
FD1165
Disk Diameter: 5¼ in.
Capacity: 1.6M bytes, unformatted
Transfer Rate: 500K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 24,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $525, with controller
Distribution Method: OEM, Third-party
Date First Installed: June 1982
(See Vendor Profile Page V-26)

PER SCI, INC.
277
Disk Diameter: 8 in.
Capacity: 1.5M bytes, formatted
Transfer Rate: 500K byte/sec
Mean Time Between Failure: 4,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Price: $1,150, without controller
Distribution Method: OEM
Number Installed to Date: More than 50,000
Date First Installed: 1975
(See Vendor Profile Page V-26)

PER SCI, INC.
277 HIGH SPEED
Disk Diameter: 8 in.
Capacity: 1.3M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 33 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Persci
Price: $1,595, without controller
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
Date First Installed: June 1975

QUME CORP.
QUMETRAK 242
Disk Diameter: 8 in.
Capacity: 1.6M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 8,500 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Ansi X3.60
Price: $415, without controller
Distribution Method: OEM
Number Installed to Date: More than 50,000
(See Vendor Profile Page V-30)

QUME CORP.
QUMETRAK 542
Disk Diameter: 8 in.
Capacity: 1.6M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 8,500 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Ansi X3.60
Price: $445, without controller
Distribution Method: OEM
Number Installed to Date: More than 50,000

SHUGART ASSOCIATES, INC.
SA850/851
Disk Diameter: 8 in.
Capacity: 1.6M bytes, formatted
Transfer Rate: 62K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 8,500 hours
Distribution Method: OEM
Date First Installed: June 1977
(See Vendor Profile Page V-32)

SHUGART ASSOCIATES, INC.
SA860
Disk Diameter: 8 in.
Capacity: 1.6M bytes, formatted
Transfer Rate: 62K byte/sec
Average Access Time: 89 msec
Mean Time Between Failure: 10,000 hours
Distribution Method: OEM
Date First Installed: February 1982

SONY COMMUNICATIONS PRODUCTS CO.
SS-701
Disk Diameter: 5¼ in.
Capacity: 1.1M bytes, unformatted
Transfer Rate: 63K byte/sec
Average Access Time: 365 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $1,100, with controller
Distribution Method: Third-party
Date First Installed: October 1982
(See Vendor Profile Page V-32)

TANDON CORP.
TM848-2
Disk Diameter: 8 in.
Capacity: 1.6M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Distribution Method: OEM
Date First Installed: April 1981
(See Vendor Profile Page V-34)

TEAC CORP. OF AMERICA
FD55-G
Disk Diameter: 5¼ in.
Plug Compatibility: Shugart
Capacity: 1.6M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 3 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: 3446 Connector
Price: $450, without controller
Distribution Method: End user
Date First Installed: October 1982
(See Vendor Profile Page V-34)

TOSHIBA AMERICA, INC.
ND-400
Disk Diameter: 8 in.
Plug Compatibility: Shugart
Capacity: 1.6M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 76 msec
Integral Controller: Yes
Distribution Method: OEM
Date First Installed: October 1982
(See Vendor Profile Page V-37)

TRAK MICROCOMPUTER CORP.
Compatibility: Zenith 100
Capacity: 2.4M bytes, unformatted
Transfer Rate: 63K byte/sec
Average Access Time: 89 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Ansi
Price: $1,990, without controller
Distribution Method: Third-party
Date First Installed: September 1982
(See Vendor Profile Page V-37)

TRAK MICROCOMPUTER CORP.
E-200GZ
Disk Diameter: 8 in.
Compatibility: Zenith Z100

Capacity: 1.2M bytes, unformatted
Transfer Rate: 63K byte/sec
Average Access Time: 89 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Ansi
Price: $845, without controller
Distribution Method: Third-party
Date First Installed: November 1982

TRAK MICROCOMPUTER CORP.
M-2000Z
Disk Diameter: 8 in.
Compatibility: Zenith Z100
Capacity: 1.2M bytes, unformatted
Transfer Rate: 63K byte/sec
Average Access Time: 89 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Ansi
Price: $1,199, without controller
Distribution Method: Third-party
Date First Installed: November 1982

UNIVATION, INC.
5¼ IN. FLOPPY EXTERNAL DRIVE
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer; DEC Rainbow 100; TI Professional
Capacity: 1.6M bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 300 msec
[illegible] 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Distribution Method: OEM, Third-party
Number Installed to Date: 100-500
[illegible]
(See Vendor Profile Page V-38)

UNIVATION, INC.
5 IN. FLOPPY [illegible]
Disk Diameter: 5 in.
Compatibility: IBM Personal Computer; DEC Rainbow 100; TI Professional
Capacity: 2.4M bytes, unformatted
Transfer Rate: 500K byte/sec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Distribution Method: OEM, Third-party
Number Installed to Date: Under 100
Date First Installed: February 1982

TEAC DATA CORP.
TANDON 100-1
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer; Tandy TRS-80/I, TRS-80/III
Capacity: 1.06M bytes, unformatted
Transfer Rate: 250K byte/sec
Integral Controller: No
Price: $250, without controller; $449, with controller
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000-5,000
Date First Installed: 1981
(See Vendor Profile Page V-39)

[illegible] TELEMATIC, INC.
MINI MATE-III-1.632 MB
Disk Diameter: 5¼ in.
Capacity: 1M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 12 msec
Integral Controller: No
Interface: RS232
Price: $3,195, without controller
Distribution Method: End user
Number Installed to Date: 500-1,000
Date First Installed: April 1982
(See Vendor Profile Page V-39)

WORLD STORAGE TECHNOLOGY
[illegible]
Disk Diameter: 8 in.
Capacity: 1.6M bytes, formatted
Transfer Rate: 62K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 6,000 hours
Integral Controller: No
Interface: Ansi X319.2
Price: $700, without controller
Distribution Method: OEM
Number Installed to Date: 30,000
Date First Installed: 1978
(See Vendor Profile Page V-39)

ZENITH DATA SYSTEMS
ZENITH Z-207-41
Disk Diameter: 8 in.
Compatibility: Zenith Z100
Plug Compatibility: IBM 3740
Capacity: 1.3M bytes, formatted
Average Access Time: 90 msec
Integral Controller: No
Interface: Zenith S-232
Price: $1,599, without controller
Distribution Method: Third-party
Date First Installed: April 1983
(See Vendor Profile Page V-40)

ZENITH DATA SYSTEMS
ZENITH Z-227-42
Disk Diameter: 8 in.
Compatibility: Zenith Z100
Plug Compatibility: IBM 3740
Capacity: 1.3M bytes, formatted
Average Access Time: 90 msec
Integral Controller: No
Interface: Zenith S-232
Price: $2,299, without controller
Distribution Method: Third-party
Date First Installed: April 1983

512K- to 1M-Byte Capacity

AMDEK
AMDISK III
Disk Diameter: 3 in.
Compatibility: IBM Personal Computer; Tandy TRS-80/III
Capacity: 1M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 55 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: [illegible]
Price: $598, without controller
Distribution Method: Third-party
Number Installed to Date: 100-500
Date First Installed: November 1982
(See Vendor Profile Page V-2)

AJR ELECTRONICS
223-C
Disk Diameter: 5¼ in.
Compatibility: Tandy TRS-80, TRS-80/I, TRS-80/III, Zenith
Capacity: 1M bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 3 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Shugart
Price: $499, without controller
Distribution Method: Third-party
Number Installed to Date: 500-1,000
Date First Installed: October 1982
(See Vendor Profile Page V-2)

ANALOG & DIGITAL PERIPHERALS
ADPI PORTA-DISK
Disk Diameter: 5¼ in.
Capacity: 1M bytes, unformatted
Transfer Rate: 200K byte/sec
Average Access Time: 500 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: RS-232, RS-422
Price: $850, with controller
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First Installed: [illegible]
(See Vendor Profile Page V-3)

ANALOG & DIGITAL PERIPHERALS
S-Z-SSC 2
Disk Diameter: 5¼ in.
Capacity: 1M bytes, unformatted
Average Access Time: 2 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: RS-232, RS-422
Price: $1,000, with controller
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: 1985

CALDISK, INC.
142 M
Disk Diameter: 8 in.
Capacity: 802K bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 6 msec
Mean Time Between Failure: 77,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $550, without controller
Distribution Method: End user, OEM
Number Installed to Date: 1,000-5,000
Date First Installed: 1984
(See Vendor Profile Page V-5)

CALDISK, INC.
143 M1
Disk Diameter: 8 in.
Capacity: 802K bytes, formatted
Transfer Rate: 62K byte/sec
Average Access Time: 6 msec
Mean Time Between Failure: 77,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $510, without controller
Distribution Method: OEM
Number Installed to Date: More than 50,000
Date First Installed: 1977

CALDISK, INC.
842 C
Disk Diameter: 8 in.
Compatibility: DEC PDP-8, PDP-11, LSI-11
Plug Compatibility: DEC RX01, RX02
Capacity: 802K bytes, Formatted
Transfer Rate: 625K byte/sec
Average Access Time: 6 msec
Mean Time Between Failure: 77,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $500 without controller
Distribution Method: End user, OEM
Number Installed to Date: 1,000-5,000
Date First Installed: 1974
(See Vendor Profile Page V-5)

CANON U.S.A., INC.
MDD 221
Disk Diameter: 5¼ in.
Capacity: 1M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 100 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: [illegible]
Price: $235, without controller
Distribution Method: OEM
Date First Installed: December 1982
(See Vendor Profile Page V-6)

[illegible] DATA CORP.
D2060
Disk Diameter: 8 in.
Plug Compatibility: Shugart 800, 850
Capacity: 1M bytes, unformatted
Transfer Rate: 62K byte/sec
Mean Time Between Failure: 7,500 hours
Integral Controller: No
Interface: Multibus
Price: $2,800, with controller
Distribution Method: Third-party
Date First Installed: January 1980
(See Vendor Profile Page V-6)

CORE MICROTECH, INC.
[illegible]
Disk Diameter: 3½ in.
Compatibility: Commodore CBM, Rockwell
Capacity: 592K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $995, without controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: June 1978
(See Vendor Profile Page V-6)

CORE MICROTECH, INC.
540-2
Disk Diameter: 5¼ in.
Compatibility: Commodore CBM, Rockwell
Capacity: 592K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 3[illegible]
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $875, without controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: June 1978

Floppy Disk Drives

CORE MICROTECH, INC.
877-1
Disk Diameter: 8 in
Compatibility: Commodore CBM, [illegible]
Capacity: 512K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $995, without controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: June 1978

CORE MICROTECH, INC.
[illegible]
Disk Diameter: 3½ in.
Compatibility: Commodore 64
Capacity: 592K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $995, without controller
Distribution Method: OEM
Date First Installed: April 1983

CORE MICROTECH, INC.
[illegible]
Disk Diameter: 5¼ in
Compatibility: Commodore 64
Capacity: 592K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $875, without controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: April 1983

CORE MICROTECH, INC.
[illegible]
Disk Diameter: 8 in.
Compatibility: Commodore 64
Capacity: 512K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $995, without controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: April 1983

COMARK CORP.
MF85DSS
Disk Diameter: 8 in
Compatibility: Intel 2021
Capacity: 1M bytes, formatted
Transfer Rate: 62K byte/sec
Average Access Time: 60 msec
Mean Time Between Failure: 20,000 hours
Integral Controller: No
Price: $3,295, without controller
Number Installed to Date: 100-500
Date First Installed: August 1979
(See Vendor Profile Page V-7)

COMARK CORP.
MF85DDS
Disk Diameter: 8 in.
Compatibility: IBM 3270
Capacity: 1M bytes, unformatted
Transfer Rate: 62K byte/sec
Average Access Time: 60 msec
Mean Time Between Failure: 20,000 hours
Integral Controller: No
Price: $3,495, without controller
Distribution Method: Third-party
Number Installed to Date: 100-500
Date First Installed: August 1979

COMARK CORP.
MF85DSS
Disk Diameter: 8 in
Compatibility: IBM 3270
Capacity: 1M bytes, formatted
Transfer Rate: 62K byte/sec
Average Access Time: 60 msec
Mean Time Between Failure: 20,000 hours
Integral Controller: No
Price: $2,995, without controller
Number Installed to Date: 500-1,000
Date First Installed: August 1979

COMPUTER AUTOMATION, INC.
83003-01
Disk Diameter: 8 in
Compatibility: CA Model 4, DEC LSI-2
Capacity: 512K bytes, unformatted
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Shugart SA 800
Price: $3,000, without controller
Distribution Method: End user, OEM
Date First Installed: 1976
(See Vendor Profile Page V-8)

CONTROL DATA CORP.
CDC [illegible]
Disk Diameter: 8 in.
Capacity: 800K bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 275 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
(See Vendor Profile Page V-9)

CONTROL DATA CORP.
CDC [illegible]
Disk Diameter: 5¼ in.
Capacity: 1M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 132 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $260, without controller
Distribution Method: OEM, Third-party
Number Installed to Date: 100-500

CONTROL DATA CORP.
CDC [illegible]
Disk Diameter: 5¼ in.
Capacity: 1M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 95 msec
Mean Time Between Failure: 12,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Distribution Method: OEM
Date First Installed: 1983

CYBERCHRON CORP.
CFD-211
Disk Diameter: 8 in.
Compatibility: DEC LSI-11, PDP-11
Capacity: 1M bytes, unformatted
Average Access Time: 150 msec
Mean Time Between Failure: 2,500 hours
Price: $2,995, without controller
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 500-1,000
Date First Installed: 1977
(See Vendor Profile Page V-10)

CYBERCHRON CORP.
CFD-221
Disk Diameter: 8 in.
Compatibility: DEC PDP 11/23
Plug Compatibility: DEC RXV 21
Capacity: 1M bytes, unformatted
Average Access Time: 83 msec
Mean Time Between Failure: 25,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $2,995, with controller
Distribution Method: End user, OEM
Number Installed to Date: 500-1,000
Date First Installed: 1977

DATAMAX
DATAMAX DFD-1
Disk Diameter: 5¼ in
Compatibility: Datamax UV-1, UV-1R
Capacity: 770K bytes, unformatted
Average Access Time: 250 msec
Maximum Drives Per Controller: 8
Integral Controller: Yes
Price: $1,685, with controller
Distribution Method: End user, Third-party
Number Installed to Date: Under 100
Date First Installed: January 1983
(See Vendor Profile Page V-10)

DATA SYSTEMS DESIGN, INC.
DSD 770 FLOPPY
Disk Diameter: 5¼ in.
Compatibility: Intel Multibus
Capacity: 1M bytes, unformatted
Average Access Time: 91 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Distribution Method: End user, OEM
(See Vendor Profile Page V-11)

DATA SYSTEMS DESIGN, INC.
DSD 880 FLOPPY
Disk Diameter: 8 in
Capacity: 1M bytes, unformatted
Transfer Rate: 20K byte/sec
Average Access Time: 174 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: DMA
Price: $3,895, with controller
Distribution Method: End user, OEM
Number Installed to Date: 1,200
Date First Installed: 1979

DICTAPHONE CORP.
6440
Disk Diameter: 5¼ in.
Compatibility: Dictaphone
Capacity: 982K bytes, unformatted
Transfer Rate: 1,000K byte/sec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Distribution Method: End user
Number Installed to Date: Under 100
(See Vendor Profile Page V-12)

DIGITAL EQUIPMENT CORP.
DEC RX02
Disk Diameter: 8 in.
Compatibility: DEC PDP-8, PDP-11, LSI-11
Capacity: 512K bytes, unformatted
Transfer Rate: 62K byte/sec
Average Access Time: 263 msec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $4,500, with controller
Distribution Method: End user, OEM
Number Installed to Date: More than 50,000
Date First Installed: August 1978
(See Vendor Profile Page V-13)

DIGITAL EQUIPMENT CORP.
[illegible]
Disk Diameter: 8 in.
Capacity: 512K bytes, unformatted
Transfer Rate: 31K byte/sec
Distribution Method: End user
Date First Installed: 1978

EX-CELL-O, INC.
[illegible]
Disk Diameter: 5¼ in.
Capacity: 1M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 94 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Ansi
Price: $410, without controller.
Distribution Method: OEM
Date First Installed: November 1981
(See Vendor Profile Page V-15)

EX-CELL-O, INC.
RFD965
Disk Diameter: 5¼ in
Capacity: 1M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 94 msec
Mean Time Between Failure: 12,000 hours
Integral Controller: No
Interface: Ansi
Price: $360, without controller
Distribution Method: OEM

EX-CELL-O, INC.
[illegible]
Disk Diameter: 8 in.
Capacity: 800K bytes, formatted
Average Access Time: 91 msec
Mean Time Between Failure: 6,000 hours
Integral Controller: No
Interface: Ansi
Price: $560, without controller
Distribution Method: OEM
Date First Installed: March 1979

EX-CELL-O, INC.
[illegible]
Disk Diameter: 8 in.
Capacity: 800K bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 6,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Ansi
Price: $1,195, with controller

Distribution Method: End user, OEM, Third-party
Date First Installed: September 1978

HEWLETT-PACKARD CO.
9121D (DUAL)
Disk Diameter: 3½ in.
Compatibility: HP 1000, Series 80, Series 100, Series 200
Capacity: 540K bytes, unformatted
Transfer Rate: 18K byte/sec
Average Access Time: 415 msec
Mean Time Between Failure: 20,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: HP-IB
Price: $1,775, with controller
Distribution Method: End user
Number Installed to Date: 10,000-50,000
(See Vendor Profile Page V-17)

HEWLETT-PACKARD CO.
82901M (DUAL)
Disk Diameter: 5¼ in.
Compatibility: HP Series 80, Series 100, Series 200
Capacity: 540K bytes, unformatted
Transfer Rate: 7K byte/sec
Mean Time Between Failure: 8 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: HP-IB
Price: $2,230, with controller
Distribution Method: End user
Number Installed to Date: 10,000-50,000

HONEYWELL, INC.
DRU 9608
Disk Diameter: 5¼ in.
Compatibility: Honeywell DPS 6
Capacity: 1M bytes, unformatted
Transfer Rate: 13K byte/sec
Average Access Time: 275 msec
Maximum Drives Per Controller: 2
Integral Controller: No
Interface: Shugart SA 400
Price: $1,100, without controller
Distribution Method: End user, Third-party
Date First Installed: April 1982
(See Vendor Profile Page V-17)

INFOTEK
[illegible]
Disk Diameter: 8 in.
Compatibility: HP 9885, HP 9831, HP 9835, HP 9845
Capacity: 1M bytes, formatted
Transfer Rate: 20K byte/sec
Average Access Time: 38 msec
Integral Controller: No
Price: $3,450, without controller
Distribution Method: End user, OEM
(See Vendor Profile Page V-19)

INNOTRONICS CORP.
[illegible]
Disk Diameter: 5 in.
Plug Compatibility: IBM 3740
Capacity: 512K bytes, unformatted
Transfer Rate: 500K byte/sec
Mean Time Between Failure: 30,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Anadex 1225
Price: $700, without controller; $1,700, with controller
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 10,000-50,000
Date First Installed: July 1974
(See Vendor Profile Page V-19)

LOBO SYSTEMS, INC.
8101CA
Disk Diameter: 8 in
Compatibility: Apple II+
Capacity: 570K bytes, unformatted
Transfer Rate: 63K byte/sec
Average Access Time: 266 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Shugart
Price: $1,325, with controller
Distribution Method: End user
Number Installed to Date: 500-1,000
Date First Installed: 1979
(See Vendor Profile Page V-22)

MATCHLESS SYSTEMS
SLIMLINE
Disk Diameter: 8 in
Compatibility: Matchless 800, IBM Personal Computer, Zenith Z37
Capacity: 985K bytes, unformatted
Transfer Rate: 62K byte/sec
Average Access Time: 91 msec
Integral Controller: No
Interface: MFM/M2FM
Price: $1,550, without controller
Distribution Method: OEM
Number Installed to Date: 500-1,000
Date First Installed: March 1982
(See Vendor Profile Page V-22)

MICRO PERIPHERALS, INC.
41
Disk Diameter: 8 in.
Compatibility: IBM Personal Computer
Capacity: 800K bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 177 msec
Mean Time Between Failure: 9,200 hours
Integral Controller: No
Interface: Shugart
Price: $250, without controller
Distribution Method: End user
Date First Installed: January 1983
(See Vendor Profile Page V-24)

MICRO PERIPHERALS, INC.
52
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 512K bytes, unformatted
Average Access Time: 83 msec
Mean Time Between Failure: 9,200 hours
Interface: Shugart
Date First Installed: 1979

MICRO PERIPHERALS, INC.
91
Disk Diameter: 5¼ in.
Capacity: 512K bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 120 msec
Mean Time Between Failure: 9,200 hours
Integral Controller: No
Interface: Shugart
Price: $190, without controller
Distribution Method: Third-party
Date First Installed: June 1980

MICRO PERIPHERALS, INC.
92
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 1M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 120 msec
Mean Time Between Failure: 9,200 hours
Integral Controller: No
Interface: Shugart
Price: $200, without controller
Distribution Method: Third-party
Date First Installed: December 1980

MICRO PERIPHERALS, INC.
[illegible]
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 512K bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 83 msec
Mean Time Between Failure: 9,200 hours
Integral Controller: No
Interface: Shugart
Price: $165, without controller
Distribution Method: Third-party
Date First Installed: March 1983

MICRO PERIPHERALS, INC.
901
Capacity: 512K bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 120 msec
Mean Time Between Failure: 9,200 hours
Integral Controller: No
Interface: Shugart
Price: $175, without controller
Distribution Method: Third-party
Date First Installed: April 1983

MICRO PERIPHERALS, INC.
902
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 1M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 120 msec
Mean Time Between Failure: 9,200 hours
Integral Controller: No
Interface: Shugart
Price: $190, without controller
Distribution Method: End user
Date First Installed: April 1983

MICROPOLIS CORP.
1115-IV
Disk Diameter: 5¼ in
Plug Compatibility: Micropolis 1015-IV, Tandon TM 100-4M
Capacity: 960K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 154 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Shugart SA 400
Price: $248, without controller
Distribution Method: OEM
Number Installed to Date: 250,000
(See Vendor Profile Page V-24)

MICROPOLIS CORP.
1115-V
Disk Diameter: 5¼ in.
Plug Compatibility: Shugart SA 410, Micropolis 1015-V
Capacity: 1M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 160 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Shugart SA 400
Price: $199, without controller
Distribution Method: OEM
Number Installed to Date: 250,000

MICROPOLIS CORP.
1115-VI
Disk Diameter: 5¼ in
Plug Compatibility: Shugart SA 460, Micropols 1015-IV
Capacity: 1M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 160 msec
Mean Time Between Failure: 8,500 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Shugart SA 400
Price: $248, without controller
Distribution Method: OEM
Number Installed to Date: 250,000

MICRO-SCI
A-143
Disk Diameter: 5¼ in.
Compatibility: Apple III
Plug Compatibility: Apple Disk III
Capacity: 572K bytes, unformatted
Average Access Time: 18 msec
Mean Time Between Failure: 9,500 hours
Maximum Drives Per Controller: 3
Integral Controller: No
Interface: Apple GCR
Price: $659, without controller
Distribution Method: Third-party
Number Installed to Date: 1,000
Date First Installed: June 1982
(See Vendor Profile Page V-24)

MICRO-SCI
PRO-140
Disk Diameter: 5¼ in.
Compatibility: Commodore 64
Plug Compatibility: Commodore
Capacity: 572K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 5 msec
Mean Time Between Failure: 9,500 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Parallel
Price: $659 without controller; $788, with controller
Distribution Method: Third-party
Date First Installed: 1983

MILTOPE CORP.
[illegible]
Disk Diameter: 8 in.
Compatibility: IBM 3740, IBM 4964
Capacity: 800K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 5 msec
Mean Time Between Failure: 77,000 hours
Maximum Drives Per Controller: 3
Integral Controller: Yes
Price: $16,000, with controller
Distribution Method: OEM
Date First Installed: 1978
(See Vendor Profile Page V-24)

MITSUBISHI ELECTRONICS AMERICA, INC.
M4853
Disk Diameter: 5¼ in.
Capacity: 1M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 94 msec
Mean Time Between Failure: [illegible]

Floppy Disk Drives

Integral Controller: No
Interface: Shugart
Price: $450, without controller
Distribution Method: OEM
Date First Installed: April 1982

MITSUBISHI ELECTRONICS AMERICA, INC.
M4851
Disk Diameter: 5¼ in.
Capacity: 1M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 94 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Shugart
Price: $450, without controller
Distribution Method: OEM
Date First Installed: April 1982

NCR CORP.
7646
Disk Diameter: 8 in.
Compatibility: NCR 9020, 9010
Capacity: 1M bytes, unformatted
Transfer Rate: 500K byte/sec
Average Access Time: 96 msec
Integral Controller: No
Price: $3,500, without controller
Distribution Method: End user
Date First Installed: 1982
(See Vendor Profile Page V-25)

NISSEI SANGYO AMERICA, LTD.
FB500
Disk Diameter: 5¼ in.
Capacity: 1M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 100 msec
Mean Time Between Failure: 10 000 hours
Integral Controller: No
Interface: Shugart SA 400
Price: $300, without controller
Distribution Method: OEM
Date First Installed: January 1983
(See Vendor Profile Page V-26)

NORTHWEST COMPUTER CORP.
8120
Disk Diameter: 8 in.
Compatibility: Nixdorf 8860
Capacity: 1M bytes, unformatted
Transfer Rate: 32K byte/sec
Average Access Time: 470 msec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $2,300, without controller
Distribution Method: End user
Number Installed to Date: 1,000-[illegible]00
(See Vendor Profile Page V-28)

QUME CORP.
QUMETRAK 592
Disk Diameter: 5¼ in.
Capacity: 1M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 95 msec
Mean Time Between Failure: 8,800 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Anal [illegible]
Price: $315, without controller
Distribution Method: OEM
Number Installed to Date: More [illegible]00
(See Vendor Profile Page V-30)

RANA SYSTEMS
ELITE THREE
Disk Diameter: 5¼ in.
Plug Compatibility: Apple Disk, Franklin USCI
Capacity: 652K bytes, formatted
Average Access Time: 150 msec
Mean Time Between Failure: 9,200 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $585, without controller
Distribution Method: Third-party
Number Installed to Date: 1,000-5,000
Date First Installed: February 1982
(See Vendor Profile Page V-30)

SEIDISEA SYSTEMS
SEMIDISK 4041
Compatibility: Tandy TRS 80/III
Capacity: 512K bytes, unformatted
Transfer Rate: 300K byte/sec
Average Access Time: 1 msec
Maximum Drives Per Controller: 16
Integral Controller: Yes
Price: $1,495, with controller
Distribution Method: End user
Number Installed to Date: 100-500
Date First Installed: March 1982
(See Vendor Profile Page V-32)

SHUGART ASSOCIATES, INC.
SA400
Disk Diameter: 5¼ in.
Capacity: 1M bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 158 msec
Mean Time Between Failure: 8,000 hours
Distribution Method: OEM
Date First Installed: March 1981
(See Vendor Profile Page V-32)

SHUGART ASSOCIATES, INC.
SA465
Disk Diameter: 5¼ in.
Capacity: 1M bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 94 msec
Mean Time Between Failure: 10,000 hours
Distribution Method: OEM
Date First Installed: October 1982

SHUGART ASSOCIATES, INC.
SA801/801R
Disk Diameter: 8 in.
Capacity: 800K bytes, formatted
Transfer Rate: 62K byte/sec
Average Access Time: 210 msec
Mean Time Between Failure: 8,000 hours
Distribution Method: OEM
Date First Installed: September 1975

SHUGART ASSOCIATES, INC.
SA810
Disk Diameter: 8 in.
Capacity: 800K bytes, formatted
Transfer Rate: 62K byte/sec
Average Access Time: 89 msec
Mean Time Between Failure: 10,000 hours
Distribution Method: OEM
Date First Installed: August 1982

SONY COMMUNICATIONS PRODUCTS CO.
OA-D32W
Disk Diameter: 3½ in.
Capacity: 1M bytes, formatted
Average Access Time: 350 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Distribution Method: OEM
Date First Installed: October 1983
(See Vendor Profile Page V-32)

SONY COMMUNICATIONS PRODUCTS CO.
SMI-7011
Disk Diameter: 3½ in.
Compatibility: Sony SMC 70
Capacity: 560K bytes, unformatted
Transfer Rate: 63K byte/sec
Average Access Time: 365 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $650, with controller
Distribution Method: Third-party
Date First Installed: October 1982

SONY COMMUNICATIONS PRODUCTS CO.
SMI-7013
Disk Diameter: 3½ in.
Capacity: 560K bytes, unformatted
Transfer Rate: 63K byte/sec
Average Access Time: 365 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Price: $775, with controller
Distribution Method: Third-party
Date First Installed: October 1982

STANDUN CONTROLS, INC.
MICRO-SCI-A142
Disk Diameter: 5¼ in.
Compatibility: Apple III
Capacity: 572K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 5 msec
Mean Time Between Failure: 9,500 hours
Integral Controller: No
Interface: Apple GCR
Price: $659, without controller
Distribution Method: OEM, Third-party
Date First Installed: April 1982
(See Vendor Profile Page V-33)

STANDUN CONTROLS, INC.
MICRO-SCI-647
Disk Diameter: 5¼ in
Compatibility: Commodore 64
Capacity: 572K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 5 msec
Mean Time Between Failure: 9,500 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Parallel access
Price: $479, with controller
Distribution Method: OEM, Third-party
Date First Installed: June 1983

TANDON CORP.
TM85
Disk Diameter: 3½ in.
Capacity: 875K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 70 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Distribution Method: OEM
Date First Installed: March 1983
(See Vendor Profile Page V-34)

TANDON CORP.
TM85
Disk Diameter: 5¼ in.
Capacity: 1M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Distribution Method: OEM
Date First Installed: March 1983

TANDON CORP.
TM100-4
Disk Diameter: 5¼ in.
Capacity: 1M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 9 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Distribution Method: OEM
Number Installed to Date: More than 50,000
Date First Installed: June 1976

TANDON CORP.
TM101-4
Disk Diameter: 5¼ in.
Capacity: 1M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Distribution Method: OEM
Number Installed to Date: More [illegible]00
Date First Installed: June 1976

TANDON CORP.
TM848-1
Disk Diameter: 8 in.
Capacity: 800K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Distribution Method: OEM
Date First Installed: April 1981

TEAC CORP. OF AMERICA
FD55-F
Disk Diameter: 5¼ in.
Plug Compatibility: Shugart
Capacity: 1M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 3 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: 3410 Connector
Price: $395, without controller
Distribution Method: End user
Date First Installed: March 1983
(See Vendor Profile Page V-34)

TOSHIBA AMERICA, INC.
ND-040
Disk Diameter: 5¼ in.
Plug Compatibility: Shugart
Capacity: 512K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 65 msec
Integral Controller: No
Interface: Shugart
Distribution Method: OEM
Date First Installed: October 1982
(See Vendor Profile Page V-37)

TOSHIBA AMERICA, INC.
ND-080
Disk Diameter: 5¼ in.
Compatibility: Shugart
Capacity: 1M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 79 msec
Integral Controller: No

Interface: Shugart
Distribution Method: OEM
Date First Installed: October 1982

TRAK MICROCOMPUTER CORP.
PC-2
Compatibility: IBM Personal Computer
Capacity: 640K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 100 msec
Mean Time Between Failure: 9,200 hours
Integral Controller: No
Interface: Ansi
Price: $495, without controller
Distribution Method: Third-party
Number Installed to Date: 500
Date First Installed: January 1983
(See Vendor Profile Page V-37)

TRAK MICROCOMPUTER CORP.
PC-4
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 640K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 100 msec
Mean Time Between Failure: 9,200 hours
Integral Controller: No
Interface: Ansi
Price: $495, without controller
Distribution Method: Third-party
Number Installed to Date: 500
Date First Installed: June 1983

WANG LABORATORIES, INC.
WITH-5
Disk Diameter: 8 in.
Compatibility: Wang 2200
Capacity: 750K bytes, unformatted
Price: $6,200, without controller
(See Vendor Profile Page V-39)

WESTERN TELEMATIC, INC.
DATA MATE-II-DUAL
Disk Diameter: 5¼ in.
Capacity: 656K bytes, unformatted
Transfer Rate: 1.2M byte/sec
Average Access Time: 12 msec
Integral Controller: No
Interface: RS-232
Price: $3,195, without controller
Distribution Method: End user
Date First Installed: January 1981
(See Vendor Profile Page V-39)

WESTERN TELEMATIC, INC.
MINI MATE-III
Disk Diameter: 5¼ in.
Capacity: 816K bytes, unformatted
Transfer Rate: 1.2M byte/sec
Average Access Time: 12 msec
Integral Controller: No
Interface: RS-232
Price: $1,995, without controller
Distribution Method: End user
Number Installed to Date: 500-1,000
Date First Installed: April 1982

WORLD STORAGE TECHNOLOGY, LTD.
FDD100-8
Disk Diameter: 8 in.
Capacity: 800K bytes, formatted
Transfer Rate: 62K byte/sec
Average Access Time: 91 msec
Mean Time Between Failure: 6,000 hours
Integral Controller: No
Interface: Ansi X319.2
Price: $600, without controller
Distribution Method: OEM
Number Installed to Date: 60,000
Date First Installed: 1975
(See Vendor Profile Page V-39)

WORLD STORAGE TECHNOLOGY, LTD.
FDD221-5
Disk Diameter: 5¼ in.
Capacity: 1M bytes, unformatted
Transfer Rate: 31K byte/sec
Average Access Time: 146 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Ansi X319.2
Price: $550, without controller
Distribution Method: OEM
Number Installed to Date: 20,000
Date First Installed: November 1981

ZENITH DATA SYSTEMS
ZENITH Z37
Disk Diameter: 5¼ in.
Compatibility: Zenith Z90
Capacity: 640K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 260 msec
Integral Controller: No
Price: $1,699, without controller
Distribution Method: Third-party
(See Vendor Profile Page V-40)

Capacities Under 512K Bytes

AEROCOMP, INC.
40 TRACK DOUBLE SIDED COMPLETE
Disk Diameter: 5¼ in.
Compatibility: Tandy TRS-80, IBM Personal Computer, TI 99-4A
Capacity: 250K bytes, unformatted
Average Access Time: 6 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Price: $279, without controller
Distribution Method: End user
Number Installed to Date: 10,000-50,000
(See Vendor Profile Page V-1)

AEROCOMP, INC.
40 TRACK SINGLE SIDED FLIPPY
Disk Diameter: 5¼ in.
Compatibility: Tandy TRS-80, IBM Personal Computer, TI 99-4A
Capacity: 125K bytes, formatted
Average Access Time: 6 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Price: $239, without controller
Distribution Method: End user
Number Installed to Date: 10,000-50,000

AEROCOMP, INC.
40 TRACK SINGLE SIDED COMPLETE
Disk Diameter: 5¼ in.
Compatibility: Tandy TRS-80, IBM Personal Computer, TI 99-4A
Capacity: 125K bytes, formatted
Average Access Time: 6 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Price: $199, without controller
Distribution Method: End user
Number Installed to Date: 10,000-50,000

AEROCOMP, INC.
80 TRACK DOUBLE SIDED
Disk Diameter: 5¼ in.
Compatibility: Tandy TRS-80, IBM Personal Computer, TI 99-4A
Capacity: 500K bytes, unformatted
Average Access Time: 6 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Price: $379, without controller
Distribution Method: End user
Number Installed to Date: 10,000-50,000

AEROCOMP, INC.
80 TRACK FLIPPY
Disk Diameter: 5¼ in
Compatibility: Tandy TRS-80, IBM Personal Computer, TI 99-4A
Capacity: 250K bytes, unformatted
Average Access Time: 6 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Price: $239, without controller
Distribution Method: End user
Number Installed to Date: 10,000-50,000

AEROCOMP, INC.
80 TRACK SINGLE SIDED COMPLETE
Disk Diameter: 5¼ in.
Compatibility: Tandy TRS-80, IBM Personal Computer, TI 99-4A
Capacity: 250K bytes, unformatted
Average Access Time: 6 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Price: $299, without controller
Distribution Method: End user
Number Installed to Date: 10,000-50,000

AEROCOMP, INC.
APPLE COMPATIBLE
Disk Diameter: 5¼ in
Compatibility: Apple II, Franklin
Capacity: 200K bytes, formatted
Average Access Time: 6 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: Yes
Price: $279, without controller; $369, with controller
Distribution Method: End user
Number Installed to Date: 10,000-50,000

AMDEK
AMDISK I
Disk Diameter: 3 in.
Compatibility: Apple II
Capacity: 286K bytes, unformatted
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Price: $295, without controller
Distribution Method: Third-party
Date First Installed: July 1983
(See Vendor Profile Page V-2)

AM ELECTRONICS
210-C
Disk Diameter: 5¼ in.
Compatibility: Tandy TRS-80/I, TRS-80/II, TRS-80/III, Zenith
Capacity: 500K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 6 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Shugart
Price: $450, without controller
Distribution Method: Third-party
Number Installed to Date: 1,000-5,000
Date First Installed: October 1982
(See Vendor Profile Page V-2)

AM ELECTRONICS
210-C
Disk Diameter: 5¼ in.
Compatibility: Tandy TRS-80/I, TRS-80/II, TRS-80/III, Zenith
Capacity: 125K bytes, formatted
Transfer Rate: 16K byte/sec
Average Access Time: 12 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Shugart
Price: $390, without controller
Distribution Method: Thirdparty
Number Installed to Date: 1,000

ANALOG & DIGITAL PERIPHERALS
E-Z-DISC 1
Disk Diameter: 5¼ in
Capacity: 250K bytes, unformatted
Average Access Time: 2 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: RS-232, RS-422
Price: $950, with controller
Distribution Method: OEM, Third-party
Number Installed to Date: Under 100
Date First Installed: 1983
(See Vendor Profile Page V-3)

ANALOG & DIGITAL PERIPHERALS
E-Z-DISC 2
Disk Diameter: 5¼ in
Capacity: 500K bytes, unformatted
Average Access Time: 2 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: RS-232, RS-422
Price: $1,000 with controller
Distribution Method: OEM, Third-party
Number Installed to Date: Under 100
Date First Installed: 1983

APPLE COMPUTER, INC.
DISK II
Disk Diameter: 5¼ in.
Compatibility: Apple II
Capacity: 140K bytes, unformatted
Transfer Rate: 125K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Integral Controller: No
Interface: Apple
Distribution Method: Third-party
Number Installed to Date: More than 51,000
(See Vendor Profile Page V-3)

APPLE COMPUTER, INC.
DISK III
Disk Diameter: 5¼ in.

Floppy Disk Drives

Compatibility: Apple III
Capacity: 140K bytes, unformatted
Transfer Rate: 125K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Apple
Distribution Method: Third-party
Number Installed to Date: More than 50,000

ATARI, INC.
1050
Disk Diameter: 5¼ in.
Compatibility: Atari
Capacity: 88K bytes, unformatted
Transfer Rate: 20K byte/sec
Average Access Time: 25 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Atari SIO
Price: $450, with controller
Distribution Method: Third-party
Date First Installed: May 1983
(See Vendor Profile Page V-4)

CORS MICROTECH, INC.
340-1
Disk Diameter: 3½ in.
Compatibility: Commodore CBM; Rockwell
Capacity: 296K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: [illegible]
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: June 1978
(See Vendor Profile Page V-6)

CORS MICROTECH, INC.
540-1
Disk Diameter: 5¼ in.
Compatibility: Commodore CBM; Rockwell
Capacity: 296K bytes, unformatted
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $595, without controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: June 1978

CORS MICROTECH, INC.
C340-1
Disk Diameter: 3½ in
Compatibility: Commodore 64
Capacity: 296K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Distribution Method: OEM
Date First Installed: April 1983

CORS MICROTECH, INC.
C540-1
Disk Diameter: 5¼ in
Compatibility: Commodore 64
Capacity: 296K bytes, unformatted
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $595, without controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: April 1983

COMMODORE BUSINESS MACHINES, INC.
CBM 4040
Disk Diameter: 5¼ in
Capacity: 340K bytes, formatted
Transfer Rate: 125K byte/sec
Maximum Drives Per Controller: 2
Date First Installed: 1981
(See Vendor Profile Page V-7)

COMMODORE BUSINESS MACHINES, INC.
CBM 2031
Disk Diameter: 5¼ in.
Capacity: 170K bytes, formatted
Transfer Rate: 125K byte/sec
Price: $595, without controller
Date First Installed: 1980

CONTROL DATA CORP.
CDC 9408
Disk Diameter:-5¼ in.
Capacity: 250K bytes, formatted
Average Access Time: 80 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $160, without controller
Distribution Method: OEM, Third-party
Number Installed to Date: More than 50,000
(See Vendor Profile Page V-9)

CONTROL DATA CORP.
CDC 9409
Disk Diameter: 5¼ in
Capacity: 500K bytes, formatted
Transfer Rate:,250K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Distribution Method: OEM

CONTROL DATA CORP.
CDC 9428
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 81 msec
Mean Time Between Failure: 12 000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $150, without controller
Distribution Method: OEM
Date First Installed: 1983

CONTROL DATA CORP.
CERTAINTY 210 SERIES
Disk Diameter: 8 in
Compatibility: IBM Series/1
Capacity: 246K bytes, unformatted
Transfer Rate: 32K byte/sec
Average Access Time: 160 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $2,950, with controller
Distribution Method: End user, OEM
Date First Installed: 1979

CROMEMCO, INC.
DDF
Disk Diameter: 5¼ in
Capacity: 390K bytes, unformatted
Transfer Rate: 25K byte/sec
Average Access Time: 150 msec
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $1,295, without controller; $2,135, with controller
Distribution Method: OEM, Third-party
Number Installed to Date: 100-500
Date First Installed: January 1981
(See Vendor Profile Page V-9)

DATA SYSTEMS DESIGN, INC.
DSD 440
Disk Diameter: 8 in.
Compatibility: DEC
Capacity: 500K bytes, unformatted
Transfer Rate: 20K byte/sec
Average Access Time: 296 msec
Mean Time Between Failure: 15,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: DMA
Price: $3,895, with controller
Distribution Method: End user, OEM
Number Installed to Date: 1,200
Date First Installed: 1979
(See Vendor Profile Page V-11)

DICTAPHONE CORP.
6430
Disk Diameter: 5¼ in.
Compatibility: Dictaphone
Capacity: 237K bytes, unformatted
Transfer Rate: 1M byte/sec
Mean Time Between Failure: 4,368 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Distribution Method: End user
Number Installed to Date: Under 100
(See Vendor Profile Page V-12)

DIGITAL EQUIPMENT CORP.
RX50
Disk Diameter: 5¼ in.
Compatibility: DEC Rainbow 100, Decmate II, Professional, Micro/PDP-11
Capacity: 409K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 164 msec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $995, with controller
Distribution Method: End user, OEM, Third-party
Number Installed to Date: More than 50,000
Date First Installed: September 1982
(See Vendor Profile Page V-13)

DIGITAL EQUIPMENT CORP.
RX01
Disk Diameter: 8 in.
Capacity: 256K bytes, unformatted
Transfer Rate: 31K byte/sec
Distribution Method: End user
Date First Installed: 1978

EX-CELL-O, INC.
RFD480
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 54 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Ansi
Price: $360, without controller
Distribution Method: OEM
Date First Installed: November 1981
(See Vendor Profile Page V-15)

EX-CELL-O, INC.
RFD481
Disk Diameter: 5¼ in.
Capacity: 250K bytes, formatted
Average Access Time: 54 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Ansi
Price: $305, without controller
Distribution Method: OEM
Date First Installed: November 1982

EX-CELL-O, INC.
RFD485
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 93 msec
Mean Time Between Failure: 12,000 hours
Integral Controller: No
Interface: Ansi
Price: $295, without controller
Distribution Method: OEM

EX-CELL-O, INC.
RFD486
Disk Diameter: 5¼ in.
Capacity: 250K bytes, formatted
Average Access Time: 93 msec
Mean Time Between Failure: 12,000 hours
Integral Controller: No
Interface: Ansi
Price: $235, without controller
Distribution Method: OEM

EX-CELL-O, INC.
RFD961
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 94 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Ansi
Price: $360, without controller
Distribution Method: OEM
Date First Installed: November 1982

EX-CELL-O, INC.
RFD966
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 94 msec
Mean Time Between Failure: 12,000 hours
Integral Controller: No
Interface: Ansi
Price: $295, without controller
Distribution Method: OEM

FOURTH DIMENSION SYSTEMS
FDS-40A
Disk Diameter: 5¼ in.
Compatibility: Apple II, Apple II+, Apple IIe
Capacity: 268K bytes, formatted
Average Access Time: 298 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Price: $205, without controller
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
(See Vendor Profile Page V-15)

FOURTH DIMENSION SYSTEMS
FDS-40AWC
Disk Diameter: 5¼ in.
Compatibility: Apple II, Apple II+, Apple IIe
Capacity: 286K bytes, formatted
Average Access Time: 298 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $280, with controller
Distribution Method: OEM
Number Installed to Date: 10,000-50,000

FOURTH DIMENSION SYSTEMS
S111-5
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer; Zenith; Tandy
Capacity: 320K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Price: $185, without controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000

FOURTH DIMENSION SYSTEMS
S111-8
Disk Diameter: 5¼ in.
Compatibility: IBM; Zenith; Tandy
Capacity: 320K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Price: $235, without controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000

FRANKLIN COMPUTER CORP.
ACE 10
Disk Diameter: 5¼ in.
Compatibility: Franklin; Apple II
Capacity: 143K bytes, unformatted
Average Access Time: 18 msec
Integral Controller: No
Price: $399, without controller
Distribution Method: End user
Date First Installed: April 1982
(See Vendor Profile Page V-15)

HEWLETT-PACKARD CO.
9121S (SINGLE)
Disk Diameter: 5¼ in.
Compatibility: HP 1000, Series 80, Series 100, Series 200
Capacity: 270K bytes, unformatted
Transfer Rate: 1K byte/sec
Average Access Time: 415 msec
Mean Time Between Failure: 24,500 hours
Maximum Drive Per Controller: 2
Integral Controller: Yes
Interface: HP-IB (IEEE-488)
Price: $1,200, with controller
Distribution Method: End user
Number Installed to Date: 10,000-50,000
(See Vendor Profile Page V-17)

HEWLETT-PACKARD CO.
9130A
Disk Diameter: 5¼ in.
Compatibility: HP 85
Capacity: 270K bytes, unformatted
Transfer Rate: 7K byte/sec
Average Access Time: 187 msec
Mean Time Between Failure: 24,000 hours
Maximum Drives Per Controller: 2
Integral Controller: No
Price: $860, without controller
Distribution Method: End user
Number Installed to Date: 1,000-5,000

HEWLETT-PACKARD CO.
9895 (SINGLE)
Disk Diameter: 5¼ in.
Compatibility: HP Series 80, Series 100, Series 200
Capacity: 270K bytes, unformatted
Transfer Rate: 7K byte/sec
Average Access Time: 187 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: HP-IB
Price: $1,520, with controller
Distribution Method: End user
Number Installed to Date: 1,000-5,000

IBM
4-INCH
Disk Diameter: 4 in.
Capacity: 358K bytes, formatted
Transfer Rate: 41K byte/sec
Price: $185, without controller
Date First Installed: January 1983
(See Vendor Profile Page V-17)

IBM
320KB
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 320K bytes, formatted
Price: $650, without controller
Date First Installed: January 1982

LOBO SYSTEMS, INC.
3101
Disk Diameter: 5¼ in.
Compatibility: Apple II+
Capacity: 143K bytes, unformatted
Transfer Rate: 16K byte/sec
Average Access Time: 298 msec
Maximum Drives Per Controller: 2
Price: $385, with controller
Distribution Method: End user
Number Installed to Date: 1,000-5,000
Date First Installed: 1979
(See Vendor Profile Page V-22)

LOBO SYSTEMS, INC.
3101-I
Disk Diameter: 5¼ in.
Compatibility: Apple
Capacity: 143K bytes, unformatted
Transfer Rate: 16K byte/sec
Average Access Time: 298 msec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $465, with controller
Distribution Method: End user
Number Installed to Date: 1,000-5,000
Date First Installed: 1979

MATCHLESS SYSTEMS
40 TRACK DD/DF
Disk Diameter: 5¼ in.
Compatibility: Matchless 800; IBM Personal Computer; Zenith Z37
Capacity: 250K bytes, formatted
Average Access Time: 6 msec
Integral Controller: No
Interface: MFM/M2FM
Price: $880, without controller
Distribution Method: OEM
Number Installed to Date: 500-1,000
Date First Installed: March 1982
(See Vendor Profile Page V-22)

MATCHLESS SYSTEMS
MT-800 (80 TRACK DD/DF)
Disk Diameter: 5¼ in.
Compatibility: Matchless 800, IBM Personal Computer; Zenith Z37
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 6 msec
Integral Controller: No
Interface: MFM/M2FM
Price: $1,029, without controller
Distribution Method: OEM
Number Installed to Date: 500-1,000
Date First Installed: March 1982

MICRO PERIPHERALS, INC.
S1
Disk Diameter: 5¼ in.
Compatibility: IBM
Capacity: 256K bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 83 msec
Mean Time Between Failure: 9,200 hours
Integral Controller: No
Interface: Shugart
Price: $150, without controller
Distribution Method: Third-party
Date First Installed: October 1978
(See Vendor Profile Page V-24)

MICRO PERIPHERALS, INC.
S01
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 256K bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 120 msec
Mean Time Between Failure: 7,200 hours
Integral Controller: No
Interface: Shugart
Price: $235, without controller
Distribution Method: End user
Number Installed to Date: 750,000
Date First Installed: October 1982

MICROPOLIS CORP.
1115-II
Disk Diameter: 5¼ in.
Plug Compatibility: Micropolis 1015-II; Tandon TM100-3M
Capacity: 480K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 154 msec
Mean Time Between Failure: 8,500 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Shugart SA 400
Price: $199, without controller
Number Installed to Date: 250,000
(See Vendor Profile Page V-24)

MICRO-SCI
A-2
Disk Diameter: 5¼ in.
Compatibility: Apple II, Apple II+, Apple IIe
Plug Compatibility: Apple Disk II
Capacity: 143K bytes, unformatted
Average Access Time: 18 msec
Mean Time Between Failure: 9,500 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Apple GCR
Price: $345, without controller; $445, with controller
Distribution Method: Third-party
Number Installed to Date: 40,000
Date First Installed: December 1981
(See Vendor Profile Page V-24)

MICRO-SCI
A-3
Disk Diameter: 5¼ in.
Compatibility: Apple III
Plug Compatibility: Apple Disk III
Capacity: 143K bytes, unformatted
Average Access Time: 18 msec
Mean Time Between Failure: 9,500 hours
Maximum Drives Per Controller: 3
Integral Controller: No
Interface: Apple GCR
Price: $379, without controller
Distribution Method: Third-party
Number Installed to Date: 1,000
Date First Installed: June 1982

MICRO-SCI
A-35
Disk Diameter: 5¼ in.
Compatibility: Apple II, Apple II+, Apple IIe
Plug Compatibility: Apple Disk II
Capacity: 164K bytes, unformatted
Average Access Time: 5 msec
Mean Time Between Failure: 7,500 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Apple GCR
Price: $379, without controller; $479, with controller
Number Installed to Date: 5,000
Date First Installed: January 1981

MICRO-SCI
A-70
Disk Diameter: 5¼ in.
Compatibility: Apple II, Apple II+, Apple IIe
Plug Compatibility: Apple Disk II
Capacity: 256K bytes, unformatted
Average Access Time: 5 msec
Mean Time Between Failure: 9,500 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Apple GCR
Price: $529, without controller; $629, with controller
Number Installed to Date: 1,000
Date First Installed: January 1981

MICRO-SCI
A-72
Disk Diameter: 5¼ in.
Compatibility: Apple III
Plug Compatibility: Apple Disk III
Capacity: 286K bytes, unformatted
Average Access Time: 5 msec
Mean Time Between Failure: 9,500 hours
Maximum Drives Per Controller: 3
Integral Controller: No
Interface: Apple GCR
Price: $529, without controller
Distribution Method: Third-party
Number Installed to Date: 1,000
Date First Installed: June 1982

MICRO-SCI
A-82
Disk Diameter: 5¼ in.
Compatibility: Apple II
Capacity: 230K bytes, unformatted

Floppy Disk Drives

Average Access Time: 5 msec
Mean Time Between Failure: 9,500 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Apple GCR
Price: $569, without controller; $669, with controller
Distribution Method: Third-party
Date First Installed: June 1983

MICRO-SCI
PRO-40
Disk Diameter: 5¼ in.
Compatibility: Commodore 64
Plug Compatibility: Commodore
Capacity: 164K bytes, unformatted
Average Access Time: 18 msec
Mean Time Between Failure: 9,500 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Parallel
Price: $299, without controller; $428, with controller
Distribution Method: Third-party
Date First Installed: September 1983

MICRO-SCI
PRO-70
Disk Diameter: 5¼ in.
Compatibility: Commodore 64
Plug Compatibility: Commodore
Capacity: 286K bytes, unformatted
Average Access Time: 5 msec
Mean Time Between Failure: 9,500 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Parallel
Price: $529, without controller; $652, with controller
Date First Installed: September 1983

MIDWEST SCIENTIFIC INSTRUMENTS, INC.
FD-8
Disk Diameter: 8 in.
Compatibility: MS 5901
Plug Compatibility: CDC 9404; Shugart 801
Capacity: 256K bytes, formatted
Average Access Time: 8 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: FD8
Price: $2,000, without controller
Distribution Method: End user
Number Installed to Date: 5,000.
Date First Installed: January 1978
(See Vendor Profile Page V-24)

MILTOPE CORP.
DD400
Disk Diameter: 8 in.
Compatibility: IBM 3740
Capacity: 400K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 6 msec
Mean Time Between Failure: 7,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $13,000, with controller
Distribution Method: OEM
Date First Installed: 1978
(See Vendor Profile Page V-24)

MITSUBISHI ELECTRONICS AMERICA, INC.
M4851
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 94 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Shugart
Price: $400, without controller
Distribution Method: OEM
Date First Installed: February 1983
(See Vendor Profile Page V-25)

MITSUBISHI ELECTRONICS AMERICA, INC.
MF351
Disk Diameter: 3½ in.
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 94 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Shugart
Price: $350, without controller
Distribution Method: OEM

NIXDORF COMPUTER CORP.
8540
Disk Diameter: 8 in.
Compatibility: IBM 3540
Capacity: 243K bytes, unformatted
Transfer Rate: 31K byte/sec
Average Access Time: 91 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $1,825, with controller
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1981
(See Vendor Profile Page V-26)

PERCOM DATA CORP.
AT-88 S1/A1/S2
Disk Diameter: 5¼ in.
Compatibility: Atari 400, 800
Capacity: 88K bytes, unformatted
Transfer Rate: 3K byte/sec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $749, with controller
(See Vendor Profile Page V-28)

PERCOM DATA CORP.
IBM 40 SERIES
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 320K bytes, unformatted
Transfer Rate: 31K byte/sec
Price: $549, without controller

PERCOM DATA CORP.
TFD 340N2/340N2
Disk Diameter: 5¼ in.
Compatibility: Tandy TRS-80/I
Capacity: 31K bytes, unformatted
Price: $1,099, without controller

PERSONAL MICRO COMPUTERS, INC.
PDD-420
Disk Diameter: 5¼ in.
Plug Compatibility: Shugart
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 100 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Shugart
Price: $295, without controller
Distribution Method: OEM
Date First Installed: March 1983

QUENTIN RESEARCH, INC.
AP-100
Disk Diameter: 5¼ in.
Compatibility: Apple II, Apple II+, Apple IIe
Capacity: 160K bytes, unformatted
Transfer Rate: 125K byte/sec
Average Access Time: 298 msec
Mean Time Between Failure: 8,500 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Apple
Price: $335, without controller; $400, with controller
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
Date First Installed: June 1982
(See Vendor Profile Page V-30)

QUME CORP.
QUMETRAK 142
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 160 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Shugart
Price: $185, without controller
Distribution Method: OEM
Number Installed to Date: More than 50,000
(See Vendor Profile Page V-30)

QUME CORP.
QUMETRAK 542
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 241 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Shugart
Price: $210, without controller
Distribution Method: OEM
Number Installed to Date: More than 50,000

RANA SYSTEMS
ELITE ONE
Disk Diameter: 5¼ in.
Compatibility: Franklin
Plug Compatibility: Apple
Capacity: 163K bytes, formatted
Transfer Rate: 300K byte/sec
Average Access Time: 84 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $285, without controller
Distribution Method: Third-party
Number Installed to Date: 10,000-50,000
Date First Installed: March 1982
(See Vendor Profile Page V-30)

RANA SYSTEMS
ELITE TWO
Disk Diameter: 5¼ in.
Plug Compatibility: Apple Disk; Franklin USC!
Capacity: 326K bytes, formatted
Average Access Time: 84 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $455, without controller
Distribution Method: Third-party
Number Installed to Date: 1,000-5,000
Date First Installed: December 1982

R-G-S DESIGNS, INC.
MINI TAUR
Disk Diameter: 5¼ in.
Compatibility: Apple II, Apple IIe, Apple II+; Franklin Ace 1000
Plug Compatibility: Apple Disk II
Capacity: 163K bytes, unformatted
Average Access Time: 180 msec
Mean Time Between Failure: 8,000 hours
Price: $350, without controller
Distribution Method: Third-party
Date First Installed: October 1982
(See Vendor Profile Page V-31)

R-G-S DESIGNS, INC.
MINI TAUR II
Disk Diameter: 5¼ in.
Compatibility: Apple II+, Apple IIe; Franklin Ace, Basis 108
Capacity: 163K bytes, unformatted
Average Access Time: 180 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Apple
Price: $359, without controller
Distribution Method: Third-party
Date First Installed: February 1983

R-G-S DESIGNS, INC.
SHUGART SA 455
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 93 msec
Mean Time Between Failure: 10,000 hours
Price: $375, without controller
Distribution Method: Third-party
Date First Installed: March 1983

R-G-S DESIGNS, INC.
TAUR II
Disk Diameter: 5¼ in.
Compatibility: Apple II, Apple IIe, Apple II+
Plug Compatibility: Apple Disk II
Capacity: 163K bytes, unformatted
Average Access Time: 28 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $300, without controller; $352, with controller
Distribution Method: Third-party
Number Installed to Date: 30,000
Date First Installed: June 1981

SANYO BUSINESS SYSTEMS CORP.
DFD-160 MINI, 160
Disk Diameter: 5¼ in.
Compatibility: Sanyo MBC-1000
Capacity: 320K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 281 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Price: $595, without controller
Distribution Method: Third-party
Number Installed to Date: More than 50,000
Date First Installed: April 1983
(See Vendor Profile Page V-31)

SANYO BUSINESS SYSTEMS CORP.
EFD-360
Disk Diameter: 5¼ in.
Compatibility: Sanyo MBC1000
Capacity: 320K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 281 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Shugart
Price: $1,295, without controller
Distribution Method: Third-party
Date First Installed: July 1982

SHUGART ASSOCIATES, INC.
SA200
Disk Diameter: 5¼ in.
Capacity: 250K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 358 msec
Mean Time Between Failure: 8,000 hours
Distribution Method: OEM
(See Vendor Profile Page V-32)

SHUGART ASSOCIATES, INC.
SA300
Disk Diameter: 3½ in.
Capacity: 500K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 158 msec
Mean Time Between Failure: 10,000 hours
Interface: SCSI; SMD; Seagate ST506; Trident
Distribution Method: OEM
Date First Installed: February 1983

SHUGART ASSOCIATES, INC.
SA400
Disk Diameter: 5¼ in.
Capacity: 250K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 275 msec
Mean Time Between Failure: 8,000 hours
Distribution Method: OEM
Date First Installed: September 1978

SHUGART ASSOCIATES, INC.
SA405
Disk Diameter: 5¼ in.
Capacity: 250K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 93 msec
Mean Time Between Failure: 8,000 hours
Distribution Method: OEM
Date First Installed: May 1982

SHUGART ASSOCIATES, INC.
SA410
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 158 msec
Mean Time Between Failure: 8,000 hours
Distribution Method: OEM
Date First Installed: February 1981

SHUGART ASSOCIATES, INC.
SA450
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 275 msec
Mean Time Between Failure: 8,000 hours
Distribution Method: OEM
Date First Installed: January 1980

SHUGART ASSOCIATES, INC.
SA455
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 93 msec
Mean Time Between Failure: 10,000 hours
Distribution Method: OEM
Date First Installed: October 1982

SONY COMMUNICATIONS PRODUCTS CO.
OA-D32V
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Average Access Time: 350 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $340, without controller
Distribution Method: OEM
Date First Installed: May 1983
(See Vendor Profile Page V-32)

SONY COMMUNICATIONS PRODUCTS CO.
SMI-7014 (ADD-ON DRIVE FOR 7011)
Disk Diameter: 3½ in.
Compatibility: Sony 7011
Capacity: 280K bytes, unformatted
Transfer Rate: 63K byte/sec
Average Access Time: 365 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Price: $500, without controller
Distribution Method: Third-party
Date First Installed: May 1981

SONY COMMUNICATIONS PRODUCTS CO.
OA-D31V
Disk Diameter: 3½ in.
Average Access Time: 365 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Integral Controller: No
Price: $340, without controller
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
Date First Installed: November 1981

STANDUN CONTROLS, INC.
MICRO-SCI-A2
Disk Diameter: 5¼ in.
Compatibility: Apple II, Apple II+, Apple IIe; Franklin Ace
Plug Compatibility: Apple Disk II
Capacity: 143K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 18 msec
Mean Time Between Failure: 9,500 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Apple GCR
Price: $345, without controller; $445, with controller
Distribution Method: OEM, Third-party
Date First Installed: June 1981
(See Vendor Profile Page V-33)

STANDUN CONTROLS, INC.
MICRO-SCI-A3
Disk Diameter: 5¼ in.
Compatibility: Apple II
Capacity: 143K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 18 msec
Mean Time Between Failure: 9,500 hours
Integral Controller: No
Interface: Apple GCR
Price: $379, without controller
Distribution Method: OEM, Third-party
Date First Installed: April 1982

STANDUN CONTROLS, INC.
MICRO-SCI-A40
Disk Diameter: 5¼ in.
Compatibility: Apple II, Apple II+; Franklin, Syscom BAS
Plug Compatibility: Apple Disk II
Capacity: 164K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 5 msec
Mean Time Between Failure: 9,500 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Apple GCR
Price: $379, without controller; $479, with controller
Distribution Method: OEM, Third-party
Date First Installed: June 1979

STANDUN CONTROLS, INC.
MICRO-SCI-A70
Disk Diameter: 5¼ in.
Compatibility: Apple II, Apple II+, Franklin, Syscom
Plug Compatibility: Apple Disk II
Capacity: 286K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 5 msec
Mean Time Between Failure: 9,500 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Apple GCR
Price: $529, without controller; $629, with controller
Distribution Method: OEM, Third-party
Date First Installed: June 1981

STANDUN CONTROLS, INC.
MICRO-SCI-A73
Disk Diameter: 5¼ in.
Compatibility: Apple III
Capacity: 286K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 5 msec
Mean Time Between Failure: 9,500 hours
Integral Controller: No
Interface: Apple GCR
Price: $529, without controller
Distribution Method: OEM, Third-party
Date First Installed: April 1982

STANDUN CONTROLS, INC.
MICRO-SCI-6414
Disk Diameter: 5¼ in.
Compatibility: Commodore 64
Capacity: 143K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 18 msec
Mean Time Between Failure: 9,500 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Parallel access
Distribution Method: OEM, Third-party
Date First Installed: June 1983

STANDUN CONTROLS, INC.
MICRO-SCI-6428
Disk Diameter: 5¼ in.
Compatibility: Commodore 64
Capacity: 286K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 5 msec
Mean Time Between Failure: 9,500 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Parallel access
Distribution Method: OEM, Third-party
Date First Installed: June 1983

TANDON CORP.
T100-2
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 25 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Distribution Method: OEM
Number Installed to Date: More than 50,000
Date First Installed: June 1976
(See Vendor Profile Page V-34)

TANDON CORP.
TM50
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 287 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Distribution Method: OEM
Date First Installed: March 1983

TANDON CORP.
TM100-1
Disk Diameter: 5¼ in.
Capacity: 250K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 25 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Distribution Method: OEM
Number Installed to Date: More than 50,000
Date First Installed: June 1976

TANDON CORP.
TM100-3
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Distribution Method: OEM
Number Installed to Date: More than 50,000
Date First Installed: June 1976

TANDY CORP.
TRS-80 2611-64
Disk Diameter: 5¼ in.
Compatibility: RS-3
Plug Compatibility: Shugart SA 400
Capacity: 186K bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 200 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $449, without controller
Distribution Method: Third-party
Number Installed to Date: More than 50,000
Date First Installed: July 1981
(See Vendor Profile Page V-34)

Floppy Disk Drives

TEAC CORP. OF AMERICA
FD-35
Disk Diameter: 3 in
Plug Compatibility: Shugart
Capacity: 250K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 3 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: 3410 Connector
Price: $298, without controller
Distribution Method: End user
Date First Installed: April 1983
(See Vendor Profile Page V-34)

TEAC CORP. OF AMERICA
FD55-A
Disk Diameter: 5¼ in.
Plug Compatibility: Shugart
Capacity: 250K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 6 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: 3410 Connector
Price: $298, without controller
Distribution Method: End user
Date First Installed: March 1982

TEAC CORP. OF AMERICA
FD55-B
Disk Diameter: 5¼ in
Plug Compatibility: Shugart
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 6 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: 3410 Connector
Price: $360, without controller
Distribution Method: End user
Date First Installed: March 1982

TEAC CORP. OF AMERICA
FD55-E
Disk Diameter: 5¼ in.
Plug Compatibility: Shugart
Capacity: 500K bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 3 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: 3410 Connector
Price: $360, without controller
Distribution Method: End user
Date First Installed: March 1982

TECHTRAN INDUSTRIES, INC.
980
Disk Diameter: 5¼ in.
Capacity: 200K bytes, formatted
Transfer Rate: 266K byte/sec
Average Access Time: 1 msec
Mean Time Between Failure: 2,100 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: RS-232C
Price: $1,485, with controller
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000-10,000
Date First Installed: April 1980
(See Vendor Profile Page V-36)

TECHTRAN INDUSTRIES, INC.
980XX
Disk Diameter: 5¼ in.
Capacity: 400K bytes, formatted
Transfer Rate: 266K byte/sec
Average Access Time: 1 msec
Mean Time Between Failure: 2,100 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: RS-232C
Price: $1,585, with controller
Distribution Method: OEM, Third-party
Number Installed to Date: 500-1,000
Date First Installed: October 1981

TECHTRAN INDUSTRIES, INC.
981
Disk Diameter: 5¼ in
Capacity: 200K bytes, formatted
Transfer Rate: 266K byte/sec
Average Access Time: 1 msec
Mean Time Between Failure: 2,100 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: RS-232C
Price: $1,985, with controller
Distribution Method: OEM, Third-party
Number Installed to Date: 5,000-10,000
Date First Installed: April 1980

TERMINAL DATA CORP.
B452000/10
Disk Diameter: 5¼ in.
Capacity: 125K bytes, unformatted
Transfer Rate: 125K byte/sec
Average Access Time: 100 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: Yes
Interface: RS-232
Price: $995, without controller
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: July 1982
(See Vendor Profile Page V-37)

TRAK MICROCOMPUTER CORP.
BEIO
Disk Diameter: 5¼ in.
Compatibility: Apple II, Apple III
Capacity: 143K bytes, unformatted
Average Access Time: 20 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Price: $300, without controller
Distribution Method: Third-party
Number Installed to Date: 1,000-5,000
Date First Installed: August 1982
(See Vendor Profile Page V-37)

TRAK MICROCOMPUTER CORP.
AT-D1
Disk Diameter: 5¼ in.
Compatibility: Atari
Capacity: 88K bytes, unformatted
Transfer Rate: 18K byte/sec
Average Access Time: 100 msec
Mean Time Between Failure: 9,200 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Atari
Price: $499, with controller
Distribution Method: Third-party
Date First Installed: July 1983

TRAK MICROCOMPUTER CORP.
AT-D2
Disk Diameter: 5¼ in.
Compatibility: Atari
Capacity: 176K bytes, unformatted
Transfer Rate: 31K byte/sec
Average Access Time: 100 msec
Mean Time Between Failure: 9,200 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Atari
Price: $499, with controller
Distribution Method: Third-party
Date First Installed: August 1983

TRAK MICROCOMPUTER CORP.
AT-D2 DOUBLE DENSITY
Disk Diameter: 5¼ in.
Compatibility: Atari 400, Atari 800, Atari 1500
Capacity: 500K bytes, unformatted
Average Access Time: 5 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $550, with controller
Distribution Method: Third-party
Date First Installed: May 1983

TRAK MICROCOMPUTER CORP.
AT-D2 SINGLE DENSITY
Disk Diameter: 5¼ in.
Compatibility: Atari 400, Atari 800, Atari 1500
Capacity: 250K bytes, unformatted
Average Access Time: 5 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $450, with controller
Distribution Method: Third-party

TRAK MICROCOMPUTER CORP.
AT-1
Disk Diameter: 5¼ in.
Compatibility: Atari
Capacity: 88K bytes, unformatted
Transfer Rate: 18K byte/sec
Average Access Time: 100 msec
Mean Time Between Failure: 9,200 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: Atari
Price: $429, with controller
Distribution Method: Third-party
Date First Installed: July 1983

TRAK MICROCOMPUTER CORP.
PC-1
Compatibility: IBM Personal Computer
Capacity: 320K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 100 msec
Mean Time Between Failure: 9,200 hours
Integral Controller: No
Interface: Ansi
Price: $375, without controller
Distribution Method: Third-party
Number Installed to Date: 1,000
Date First Installed: January 1983

TRAK MICROCOMPUTER CORP.
PC-3
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 320K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 100 msec
Mean Time Between Failure: 9,200 hours
Integral Controller: No
Interface: Ansi
Price: $375, without controller
Distribution Method: Third-party
Number Installed to Date: 200
Date First Installed: June 1983

TRAK MICROCOMPUTER CORP.
PI-1
Disk Diameter: 5¼ in.
Compatibility: Apple
Capacity: 143K bytes, unformatted
Average Access Time: 100 msec
Mean Time Between Failure: 9,200 hours
Integral Controller: No
Interface: Apple
Price: $299, without controller
Distribution Method: Third-party
Number Installed to Date: 3,000
Date First Installed: May 1981

TRAK MICROCOMPUTER CORP.
PI-2
Disk Diameter: 5¼ in.
Compatibility: Apple
Capacity: 163K bytes, unformatted
Transfer Rate: 300K byte/sec
Average Access Time: 100 msec
Mean Time Between Failure: 9,200 hours
Integral Controller: No
Interface: Apple
Distribution Method: Third-party
Date First Installed: July 1983

TRAK MICROCOMPUTER CORP.
PI-3
Disk Diameter: 5¼ in.
Compatibility: Apple
Capacity: 163K bytes, unformatted
Average Access Time: 100 msec
Mean Time Between Failure: 9,200 hours
Integral Controller: No
Interface: Apple
Distribution Method: Third-party
Date First Installed: September 1983

TRAK MICROCOMPUTER CORP.
Z-1
Disk Diameter: 5¼ in.
Compatibility: Zenith 100
Capacity: 320K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 100 msec
Mean Time Between Failure: 9,200 hours
Integral Controller: No
Interface: Ansi
Price: $375, without controller
Distribution Method: Third-party
Number Installed to Date: 1,500
Date First Installed: January 1983

TRAK MICROCOMPUTER CORP.
Z-3
Disk Diameter: 5¼ in.
Compatibility: Zenith 100
Capacity: 320K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 100 msec
Mean Time Between Failure: 9,200 hours

Integral Controller: No
Interface: Ansi
Distribution Method: Third-party
Number Installed to Date: 200
Date First Installed: 1983

[illegible] DATA CORP.
TANDON 100-2
Disk Diameter: 5¼ in
Compatibility: IBM Personal Computer, Tandy TRS 80-I, TRS 80-III
Capacity: 320K bytes, unformatted
Transfer Rate: 250K byte/sec
Integral Controller: No
Price: $350, without controller; $549, with controller
Distribution Method: OEM
Number Installed to Date: 500-1,000
(See Vendor Profile Page V-39)

WANG LABORATORIES, INC.
2270A-1
Disk Diameter: 8 in
Compatibility: Wang 2200
Capacity: 250K bytes, unformatted
Price: $3,200, without controller
(See Vendor Profile Page V-39)

WANG LABORATORIES, INC.
2270A-2
Disk Diameter: 8 in.
Compatibility: Wang 2200
Capacity: 500K bytes, unformatted
Price: $400, without controller

WESTERN TELEMATIC, INC.
DATA MATE-II-164K
Disk Diameter: 5¼ in
Capacity: 164K bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 12 msec
Integral Controller: No
Interface: RS-232
Price: $1,995, without controller
Distribution Method: End user
Number Installed to Date: 1,000-5,000
Date First Installed: May 1978
(See Vendor Profile Page V-39)

WESTERN TELEMATIC, INC.
DATA MATE-II-328K
Disk Diameter: 5¼ in
Capacity: 328K bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 12 msec
Integral Controller: No
Interface: [illegible]
Price: $2,195, without controller
Distribution Method: End user
Number Installed to Date: 1,000-[illegible]
Date First Installed: May 1978

WESTERN TELEMATIC, INC.
MINI MATE-III-204K
Disk Diameter: 5¼ in.
Capacity: 204K bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 12 msec
Integral Controller: No
Interface: [illegible]
Price: $1,475, without controller
Distribution Method: End user
Number Installed to Date: 500-1,000
Date First Installed: January 1979

WESTERN TELEMATIC, INC.
MINI MATE-III-408K
Disk Diameter: 5¼ in.
Capacity: 408K bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 12 msec
Integral Controller: No
Interface: RS-232
Price: $1,695, without controller
Distribution Method: End user
Number Installed to Date: 500-1,000
Date First Installed: January 1979

WORLD STORAGE TECHNOLOGY, LTD.
D FDD211-5
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Ansi X319.2
Price: $450, without controller
Distribution Method: OEM
Number Installed to Date: 50,000
Date First Installed: April 1982
(See Vendor Profile Page V-39)

WORLD STORAGE TECHNOLOGY, LTD.
FDD100-5
Disk Diameter: 5¼ in.
Capacity: 256K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 275 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Ansi X319.2
Price: $350, without controller
Distribution Method: OEM
Number Installed to Date: 400,000
Date First Installed: March 1977

WORLD STORAGE TECHNOLOGY, LTD.
FDD111-5
Disk Diameter: 5¼ in
Capacity: 250K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Ansi X319.2
Price: $350, without controller
Distribution Method: OEM
Number Installed to Date: 10,000
Date First Installed: November 1981

WORLD STORAGE TECHNOLOGY, LTD.
FDD[illegible]
Disk Diameter: 5¼ in.
Capacity: 265K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 275 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Ansi X319.2
Price: $280, without controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: March 1983

WORLD STORAGE TECHNOLOGY, LTD.
FDD121-8
Disk Diameter: 5¼ in.
Capacity: 500K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 146 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Ansi X319.2
Price: $450, without controller
Distribution Method: OEM
Number Installed to Date: 8,000
Date First Installed: April 1982

WORLD STORAGE TECHNOLOGY, LTD.
FDD200-5
Disk Diameter: 5¼ in
Capacity: 500K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 275 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Ansi X319.2
Price: $450, without controller
Distribution Method: OEM
Number Installed to Date: 20,000
Date First Installed: May 1978

WORLD STORAGE TECHNOLOGY, LTD.
FDD212-5
Disk Diameter: 5¼ in
Capacity: 500K bytes, formatted
Transfer Rate: 31K byte/sec
Average Access Time: 275 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Ansi X319.2
Price: $330, without controller
Distribution Method: OEM
Date First Installed: July 1983

ZENITH DATA SYSTEMS
ZENITH Z87 DUAL
Disk Diameter: 5¼ in.
Compatibility: Z90, Z89
Capacity: 100K bytes, unformatted
Average Access Time: 433 msec
Integral Controller: No
Price: $999, without controller
Distribution Method: Third-party
Date First Installed: 1981
(See Vendor Profile Page V-40)

Rigid Disk Drives

Capacities Over 500M Bytes

CONTROL DATA CORP.
271-10
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: IBM Series/1
Plug Compatibility: CDC Certainty
Capacity: 24G bytes, unformatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
[illegible]
Price: $22,000, with controller
Distribution Method: End user, OEM
(See Vendor Profile Page V-9)

EMULEX CORP.
[illegible]
Drive Type: Fixed
Disk Diameter: 14 in
Compatibility: DEC VAX-11, PDP-11, LSI-11
Capacity: 675M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 25 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: SMD
Price: $21,600, without controller
[illegible]
Date First Installed: October 1982
(See Vendor Profile Page V-14)

[illegible] LABORATORIES, INC.
[illegible]
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Compatibility: Wang 2200
Capacity: 804M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Interface: SMD
Price: $21,000, without controller
(See Vendor Profile Page V-39)

300M- to 500M-Byte Capacity

AMPEX CORP.
DM-9000
Disk Diameter: 14 in.
Capacity: 300M bytes, Formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
[illegible]
Integral Controller: Yes
[illegible]
Date First Installed: 1972
(See Vendor Profile Page V-2)

AMPEX CORP.
DM-9300
Drive Type: Removable
[illegible]
Capacity: 312M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 28 msec
[illegible]
Integral Controller: No
Interface: SMD
Price: $16 500, without controller
Distribution Method: OEM
Number Installed to Date: 10 000-50 000
Date First Installed: 1975

AMPEX CORP.
DM-9300AQ
Disk Diameter: 14 in
Capacity: 300M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SMD
Distribution Method: OEM
Number Installed to Date: 500-1,000
Date First Installed: 1980

BURROUGHS CORP.
[illegible]
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: Burroughs B5900, B6900, B7800, B7900
Capacity: 252M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 29 msec
Maximum Drives Per Controller: 16
Integral Controller: No
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: May 1983
(See Vendor Profile Page V-5)

CENTURY DATA SYSTEMS, INC.
TRIDENT T200
Drive Type: Removable
Disk Diameter: 14 in
Capacity: 208M bytes, formatted
Transfer Rate: 806K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
Integral Controller: No
Interface: Trident
Price: $12,500, without controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: 1976
(See Vendor Profile Page V-6)

CENTURY DATA SYSTEMS, INC.
TRIDENT T202
Drive Type: Removable
Disk Diameter: 14-in.
Capacity: 210M bytes, formatted
Transfer Rate: 806K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
Integral Controller: No
Interface: SMD
Price: $12,500, without controller
[illegible]
Number Installed to Date: Under 100
Date First Installed: 1982
(See Vendor Profile Page V-6)

CENTURY DATA SYSTEMS, INC.
TRIDENT T300
Drive Type: Removable
Disk Diameter: 14 in.
Capacity: 312M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
Integral Controller: No
Interface: Trident
Price: $13,900, without controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: 1976

CENTURY DATA SYSTEMS, INC.
TRIDENT T302
Drive Type: Removable
Disk Diameter: 14 in.
Capacity: 315M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
Integral Controller: No
Interface: SMD
Price: $13,900, without controller
[illegible]
Number Installed to Date: 1,000-5,000
Date First Installed: 1979

CENTURY DATA SYSTEMS, INC.
TRIDENT T306
Drive Type: Removable
Disk Diameter: 14 in
Plug Compatibility: CDC 9766, Ampex 9300A
Capacity: 315M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
Integral Controller: No
Interface: SMD
Price: $13,900, without controller
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: 1982

CENTURY DATA SYSTEMS, INC.
TRIDENT T536
Drive Type: Removable
Disk Diameter: 14 in
Capacity: 315M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
Integral Controller: No
Interface: SMD
Price: $16,000, without controller

COMPUTER AUTOMATION, INC.
[illegible]
Disk Diameter: 14 in.
Compatibility: CA Model 4, DEC LSI-2
Capacity: 300M bytes, Formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SMD
Price: $22,100, without controller
[illegible]
Date First Installed: June 1980
(See Vendor Profile Page V-8)

CONTROL DATA CORP.
CDC 9766 SMD
Drive Type: Removable
Disk Diameter: 14 in.
Capacity: 300M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
Integral Controller: No
Interface: SMD
Maximum Drives Per Controller: 16
Integral Controller: No
Interface: SMD
Distribution Method: OEM
Number Installed to Date: More than 50,000
(See Vendor Profile Page V-9)

CONTROL DATA CORP.
CERTAINTY 270-30 SMD
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: IBM Series/1
Plug Compatibility: CDC Certainty
Capacity: 240M bytes, unformatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
[illegible]
Integral Controller: Yes
Interface: SMD, IBM Series/1
Distribution Method: End user, OEM
Date First Installed: 1978

DATA GENERAL CORP.
6182
Drive Type: Removable
Disk Diameter: 14 in
Capacity: 277M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 43 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: DG Compatible
Price: $43,350, with controller
Distribution Method: End user, OEM
Date First Installed: November 1980
(See Vendor Profile Page V-10)

DATAPOINT CORP.
9331
Drive Type: Removable
[illegible]
Compatibility: Datapoint
Capacity: 202M bytes, unformatted
Transfer Rate: 1,290K byte/sec
Average Access Time: 30 msec
Integral Controller: No
Price: $17,000, with controller
[illegible]
(See Vendor Profile Page V-11)

DATAPOINT CORP.
9397
[illegible]
Compatibility: Datapoint
Capacity: 270M bytes, unformatted
Transfer Rate: 1,290K byte/sec
Average Access Time: 30 msec
Integral Controller: No
Price: $31,950, with controller
[illegible]

DIGITAL EQUIPMENT CORP.
RA60
Drive Type: Removable
[illegible]
Capacity: 205M bytes, unformatted
Transfer Rate: 2,000K byte/sec
Average Access Time: 50 msec
[illegible]
Integral Controller: Yes
[illegible]
Price: $15,000, without controller
[illegible]
Date First Installed: 1983
(See Vendor Profile Page V-13).

DIGITAL EQUIPMENT CORP.
RM05
Drive Type: Removable

Disk Diameter: 14 in
Compatibility: DEC VAX-11, PDP-11
Capacity: 256M bytes, unformatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 38 msec
Maximum Drives Per Controller: 8
Price: $34,000, without controller
Date First Installed: March 1980

EMULEX CORP.
CDC 4784
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: DEC VAX-11, PDP-11, LSI-11
Capacity: 300M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: SMD
Price: $14,920, without controller
Distribution Method: OEM
Date First Installed: October 1982
(See Vendor Profile Page V-14)

EMULEX CORP.
[illegible]
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: DEC VAX-11/750, VAX-11/780
Capacity: 474M bytes, formatted
Transfer Rate: 1,600K byte/sec
Average Access Time: 18 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: SMD
Price: $12,950, without controller
Distribution Method: OEM
Date First Installed: October 1982

HARRIS CORP.
5650
Drive Type: Removable
Disk Diameter: 14 in.
Compatibility: Harris
Capacity: 300M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 38 msec
Mean Time Between Failure: 4,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: IDC
Price: $19,500, without controller; $26,500, with controller
Distribution Method: End user
Number Installed to Date: 1,000-5,000
Date First Installed: March 1978
(See Vendor Profile Page V-16)

HEWLETT-PACKARD CO.
7935H/7925M
Drive Type: Fixed
Disk Diameter: 14 in.
Compatibility: HP Series 1000, 3000, 9000
Capacity: 404M bytes, unformatted
Transfer Rate: 1,000K byte/sec
Average Access Time: 35 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: HP-IB, IEEE-488
Price: $25,000, with controller
Distribution Method: End user, OEM
Number Installed to Date: [illegible]
Date First Installed: March 1983
(See Vendor Profile Page V-17)

HEWLETT-PACKARD CO.
7935H
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: HP Series 1000, 3000
Capacity: 404M bytes, unformatted
Transfer Rate: 1,000K byte/sec
Average Access Time: 35 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: HP-IB, IEEE-488
Price: $27,500, with controller
Distribution Method: End user
Number Installed to Date: 100-500
Date First Installed: April 1983

HONEYWELL, INC.
MSU 9604
Disk Diameter: 14 in
Compatibility: Honeywell DPS-6
Capacity: 256M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 38 msec
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Honeywell
Distribution Method: End user, Third-party
Date First Installed: 1977
(See Vendor Profile Page V-17)

IBM
3330 MODEL 11
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: IBM S/370, 4331, 4341
Capacity: 400M bytes, unformatted
Transfer Rate: 806K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 4
Price: $47,920, without controller
Date First Installed: January 1973
(See Vendor Profile Page V-17)

IBM
3333 MODEL 11
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: IBM S/370, 4331, 4341
Capacity: 400M bytes, unformatted
Transfer Rate: 806K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 5
Price: $56,450, without controller

MEMOREX CORP.
677-70
Drive Type: Removable
Disk Diameter: 14 in
Capacity: 206M bytes, formatted
Transfer Rate: 806K byte/sec
Average Access Time: 29 msec
Mean Time Between Failure: 2,500 hours
Integral Controller: No
Interface: SMD
Price: $10,500, without controller
Distribution [illegible]
Date First Installed: June 1981
(See Vendor Profile Page V-23)

MILTOPE CORP.
[illegible] SYSTEM
Drive Type: Fixed/Removable
Disk Diameter: 8 in.
Compatibility: Norden; DEC PDP-11, VAX-11; Roim 1600; Sperry NTDS, Honeywell RL-6
Capacity: 320M bytes, formatted
Transfer Rate: 922K byte/sec
Average Access Time: 83 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: Yes
Interface: SMD, DEC RM07, RM03; Sperry NTDS
Price: $20,000, without controller; $38,000, with controller
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: June 1982
(See Vendor Profile Page V-24)

SPERRY CORP.
8480
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: Sperry 110/10
Capacity: 358M bytes, unformatted
Transfer Rate: 2,097K byte/sec
Average Access Time: 46 msec
Price: $75,000, without controller
Distribution Method: End user
Date First Installed: [illegible]
(See Vendor Profile Page V-33)

SYSTEM INDUSTRIES, INC.
9766
Drive Type: Removable
Disk Diameter: 14 in.
Compatibility: DEC VAX-11/730, PDP-11; DG Nova, Eclipse
Capacity: 300M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 38 msec
Mean Time Between Failure: 4,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: SMD
Distribution Method: End user
Number Installed to Date: 1,000-5,000
Date First Installed: 1977
(See Vendor Profile Page V-34)

TELEFILE COMPUTER PRODUCTS, INC.
T3283
Drive Type: Removable
Disk Diameter: 5¼ in
Compatibility: Xerox Sigma, Telefile T-80
Capacity: 300M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 16
Integral Controller: Yes
Interface: SMD
Price: $22,000, with controller
Distribution Method: End user
Number Installed to Date: [illegible] 1,000
Date First Installed: 1975
(See Vendor Profile Page V-36)

WANG LABORATORIES, INC.
8586
Drive Type: Removable
Disk Diameter: 8 in
Compatibility: Wang OIS
Capacity: 275M bytes, unformatted
Price: $34,000, without controller
Distribution Method: End user
(See Vendor Profile Page V-39)

100M- to 200M-Byte Capacity

AMPEX CORP.
DM-900
Disk Diameter: 14 in
Capacity: 160M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: [illegible]
Distribution Method: OEM
Number Installed to Date: 500-1,000
Date First Installed: 1972
(See Vendor Profile Page V-2)

AMPEX CORP.
DM-9 [illegible]
Drive Type: Removable
Disk Diameter: 14 in
Capacity: 165M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 28 msec
Mean Time Between Failure: 5,000 hours
Integral Controller: No
Interface: SMD
Price: $10,370, without controller
Distribution Method: [illegible]
Number Installed to Date: 1,000-5,000
Date First Installed: 1977

BURROUGHS CORP.
B4841
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: Burroughs B900, B1000, B700
Capacity: 130M bytes, unformatted
Transfer Rate: 605K byte/sec
Average Access Time: 25 msec
Maximum Drives Per Controller: 8
Integral Controller: [illegible]
Distribution Method: End user
Number Installed to Date: 5,000-[illegible]
Date First Installed: June 1976
(See Vendor Profile Page V-5)

CENTRAL DATA CORP.
CENTAURI 200 SERIES CMD
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Compatibility: IBM Series/1
Capacity: 155M bytes, unformatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $14,040, with controller
Distribution Method: End user, OEM
Date First Installed: 1982
(See Vendor Profile Page V-9)

DATA [illegible] CORP.
8061
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: DG Nova, Eclipse
Capacity: 190M bytes, unformatted
Transfer Rate: 806K byte/sec
Average Access Time: 10 msec
Maximum Drives Per Controller: 4
Integral Controller: [illegible]
Interface: DG Compatible
Price: [illegible] with controller
Distribution Method: End user, OEM
Date First Installed: February 1979
(See Vendor Profile Page V-10)

DICOM INDUSTRIES
DICOM 403
Drive Type: Fixed/Removable
Disk Diameter: 5¼ in
Compatibility: DEC LSI-11
Capacity: 154M bytes, formatted

Rigid Disk Drives

Transfer Rate: 625K byte/sec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Seagate ST-506
Price: $10,000, with controller
Distribution Method: End user
Date First Installed: December 1982
(See Vendor Profile Page V-12)

DIGITAL EQUIPMENT CORP.
RP06
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: DEC PDP-11, VAX-11
Capacity: 176M bytes, unformatted
Transfer Rate: 806K byte/sec
Average Access Time: 38 msec
Maximum Drives Per Controller: 8
Price: $39,140, without controller
Date First Installed: April 1976
(See Vendor Profile Page V-13)

HEWLETT-PACKARD CO.
7925 M/S/H
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: HP Series 1000, 3000, 9845
Capacity: 120M bytes, unformatted
Transfer Rate: 1,100K byte/sec
Average Access Time: 36 msec
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: HP-IB, IEEE-46
Price: $22,050, without controller
Distribution Method: End user
Number Installed to Date: 5,000-10,000
Date First Installed: 1978
(See Vendor Profile Page V-17)

IBM
3330 MODEL 1,2
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: IBM 360, 370, 4331, 4341
Capacity: 200M bytes, unformatted
Transfer Rate: 806K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 5
Price: $33,670, without controller
Date First Installed: August 1971
(See Vendor Profile Page V-17)

IBM
3333 MODEL 1
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: IBM 360, 370, 4331-2 4341
Capacity: 200M bytes, unformatted
Transfer Rate: 806K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 1
Price: $42,200, without controller

MAXTOR CORP.
XT1105
Drive Type: Fixed
Disk Diameter: 5¼ in
Capacity: 105M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 11,000 hours
Interface: Seagate ST-506, ST-412
Price: $3,340, without controller
Distribution Method: OEM
Date First Installed: February 1983
(See Vendor Profile Page V-23)

MAXTOR CORP.
XT1140
Drive Type: Fixed
Disk Diameter: 5¼ in
Capacity: 140M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 11,000 hours
Integral Controller: No
Interface: Seagate ST-506, ST-412
Price: $4,290, without controller
Distribution Method: OEM
Date First Installed: February 1983

NCR CORP.
658
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: NCR 9300, 8500, 8600
Capacity: 182M bytes, unformatted
Transfer Rate: 806K byte/sec
Average Access Time: 38 msec
Price: $24,650, without controller
Distribution Method: End user
Number Installed to Date: 5,000-10,000
Date First Installed: 1975
(See Vendor Profile Page V-26)

NIXDORF COMPUTER CORP.
8330-11
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: Nixdorf 8890
Plug Compatibility: IBM 3330-11
Capacity: 200M bytes, unformatted
Transfer Rate: 806K byte/sec
Average Access Time: 29 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Nixdorf
Price: $19,170, without controller; $21,520, with controller
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1981
(See Vendor Profile Page V-26)

SANTA CLARA SYSTEMS, INC.
SABRINA
Drive Type: Fixed/Removable
Disk Diameter: 8 in
Compatibility: IBM Personal Computer, XT; Apple I, II, IIe,
Capacity: 120M bytes, unformatted
Transfer Rate: 500K byte/sec
Average Access Time: 60 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Sasi, Apple; IBM
Price: $6,100 to $16,252, with controller
Distribution Method: Third-party
Number Installed to Date: 500-1,000
Date First Installed: June 1981
(See Vendor Profile Page V-31)

SPERRY CORP.
8420
Drive Type: Removable
Disk Diameter: 14 in.
Compatibility: Sperry 1100/70
Capacity: 174M bytes, unformatted
Transfer Rate: 806K byte/sec
Average Access Time: 50 msec
Price: $19,000, without controller
Distribution Method: End user
Date First Installed: 1973
(See Vendor Profile Page V-33)

1M- to 100M-Byte Capacity

AMCODYNE, INC.
ARAPAHO 7110
Drive Type: Fixed/Removable
Disk Diameter: 8 in.
Compatibility: SMD
Plug Compatibility: CDC 9457
Capacity: 53M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 35 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: SMD
Price: $4,550, without controller
Distribution Method: OEM
Date First Installed: January 1983
(See Vendor Profile Page V-2)

AMPEX CORP.
DM-980
Drive Type: Removable
Disk Diameter: 14 in.
Capacity: 82M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 28 msec
Mean Time Between Failure: 5,000 hours
Integral Controller: No
Interface: SMD
Price: $9,379, without controller
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
Date First Installed: 1975
(See Vendor Profile Page V-2)

AMPEX CORP.
SUPER WINCHESTER DFR 932
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Capacity: 32M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Integral Controller: No
Interface: SMD
Price: $7,570, without controller
Distribution Method: OEM
Number Installed to Date: 5,000-10,000
Date First Installed: 1978

AMPEX CORP.
SUPER WINCHESTER DFR 964
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Capacity: 65M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Integral Controller: No
Interface: SMD
Distribution Method: OEM
Number Installed to Date: 1,000-10,000
Date First Installed: 1978

AMPEX CORP.
SUPER WINCHESTER DFR 906
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Capacity: 97M bytes, unformatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Integral Controller: No
Interface: SMD
Distribution Method: OEM
Number Installed to Date: 5,000-10,000
Date First Installed: 1978

ASTRONAUTICS CORP. OF AMERICA
STORAGE MODULE DISK DRIVE
Drive Type: Removable
Disk Diameter: 14 in
Capacity: 40M bytes, unformatted
Transfer Rate: 9,600K byte/sec
Average Access Time: 30 msec
Integral Controller: No
Distribution Method: End user
Number Installed to Date: 3,000
Date First Installed: 1979
(See Vendor Profile Page V-4)

ATHERTON TECHNOLOGY, INC.
AEGIS 10/10
Drive Type: Fixed/Removable
Disk Diameter: 5¼ in
Capacity: 38M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 35 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Seagate ST-506
Price: $1,300, without controller
Distribution Method: OEM
(See Vendor Profile Page V-4)

BALL CORP.
8DA50/MOD II
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: DG; DEC PDP-11; Point Four
Capacity: 50M bytes, formatted
Transfer Rate: 806K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 5,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SMD
Price: $6,900, without controller
Distribution Method: End user, OEM
(See Vendor Profile Page V-4)

BALL CORP.
8DA50/MOD I
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: DG; DEC PDP-11; Point Four
Capacity: 80M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 5,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Trident
Price: $8,000, without controller
Distribution Method: End user, OEM

BALL CORP.
BDA80/MOD II
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: DG; DEC PDP-11, Point Four
Capacity: 80M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 5,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SMD
Price: $8,300, without controller
Distribution Method: End user, OEM

BALL CORP.
BDA80/MOD III
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: DG; DEC PDP-11; Point Four
Capacity: 80M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 5,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SMD
Price: $8,500, without controller
Distribution Method: End user, OEM

BALL CORP.
BDA100/MOD II
Drive Type: Removable
Disk Diameter: 14 in.
Compatibility: DG; DEC PDP-11, Point Four
Capacity: 100M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 5,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SMD
Price: $9,000, without controller
Distribution Method: End user, OEM

CAMEO ELECTRONICS, INC.
[illegible] 10m LT81
Drive Type: Removable
Disk Diameter: 8 in.
Compatibility: Victor 9000; Franklin Ace; NEC Information Systems APC; Apple II
Capacity: 10M bytes, unformatted
Transfer Rate: 875K byte/sec
Average Access Time: 60 msec
Mean Time Between Failure: 6,000 [illegible]
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Disctron
Price: $5,995, with controller
Distribution Method: Third-party
Number Installed to Date: 100-500
(See Vendor Profile Page V-8)

CENTURY DATA SYSTEMS, INC.
TRIDENT T80
Drive Type: Removable
Disk Diameter: 14 in.
Capacity: 54M bytes, formatted
Transfer Rate: 806K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
Integral Controller: No
Interface: Trident
Price: $7,000, without controller
[illegible] OEM
Date First Installed: 1975
(See Vendor Profile Page V-6)

CENTURY DATA SYSTEMS, INC.
TRIDENT T80
Drive Type: Removable
Disk Diameter: 14 in
Capacity: 82M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 [illegible]
Integral Controller: No
Interface: Trident
Price: $7,900, without controller
Distribution Method: OEM
Number Installed to Date: 10,000-[illegible]
Date First Installed: 1975

CENTURY DATA SYSTEMS, INC.
TRIDENT T82
Drive Type: Removable
Disk Diameter: 14 in.
Capacity: 82M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
Integral Controller: No
Interface: SMD
Price: $7,900, without controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: 1979

[illegible] DATA PRODUCTS
VANGUARD-3
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Capacity: 20M bytes, unformatted
Average Access Time: 50 msec
Mean Time Between Failure: 5,000 hours
Integral Controller: Yes
Price: $6,000, without controller
Distribution Method: OEM
Number Installed to Date: 5,000-10,000
Date First Installed: 1978
(See Vendor Profile Page V-6)

COMPUTER AUTOMATION, INC.
45014-00
Disk Diameter: 14 in.
Compatibility: CA Model 4; DEC LSI-2
Capacity: 80M bytes, Formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SMD
Price: $14,800, without controller
Distribution Method: End user, OEM
Date First Installed: 1977
(See Vendor Profile Page V-8)

COMPUTER AUTOMATION, INC.
45236-32
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: CA Model 4; DEC LSI-2
Capacity: 32M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SMD
Price: $11,000, without controller
Distribution Method: End user, OEM
Date First Installed: June 1980

COMPUTER AUTOMATION, INC.
45236-64
Drive Type: Removable
Disk Diameter: 14 in.
Compatibility: CA Model 4, DEC LSI-2
Capacity: 64M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SMD
Price: $13,000, without controller
Distribution Method: End user, OEM
Date First Installed: June 1980

COMPUTER AUTOMATION, INC.
[illegible]
Drive Type: Removable
Disk Diameter: 14 in.
Compatibility: CA Model 4, DEC LSI-2
Capacity: 96M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
[illegible]
Price: $15,000, without controller
Distribution Method: End user, OEM
Date First Installed: June 1980

CONTROL DATA CORP.
CDC 9412 [illegible]
Drive Type: Removable
Disk Diameter: 8 in
Capacity: 80M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 25 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: SMD, LDI; ISI
[illegible] OEM
Number Installed to Date: Under 100
Date First Installed: 1983
(See Vendor Profile Page V-9)

CONTROL DATA CORP.
[illegible]
Capacity: 80M bytes, Formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 35 msec
[illegible]
10,000 hours
Maximum Drives Per Controller: 3
Integral Controller: No
Interface: Seagate ST506; FDI; LDI; ISI, ESD
[illegible] OEM
Date First Installed: October 1983

CONTROL DATA CORP.
CDC 9445 LARK
Drive Type: Fixed/Removable
Disk Diameter: 8 in.
Capacity: 16M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 42 msec
Mean Time Between Failure: 7,500 hours
Maximum Drives Per Controller: 4
Interface: SMD, LDI; ISI
Price: $2,345, without controller
[illegible] OEM
Number Installed to Date: 1,000-[illegible]
Date First Installed: 1981

CONTROL DATA CORP.
CDC 9448-32 CMD
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Capacity: 32M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 [illegible]
Maximum Drives Per Controller: 3
Integral Controller: No
[illegible]
Number Installed to Date: More than 50,000
Date First Installed: 1978

CONTROL DATA CORP.
[illegible]
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Capacity: 64M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
Maximum Drives Per Controller: 3
Integral Controller: No
Interface: SMD
[illegible]
[illegible] than 50 000
[illegible]

CONTROL DATA CORP.
CDC 9448-96 CMD
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Capacity: 96M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 [illegible]
Maximum Drives Per Controller: 3
Integral Controller: No
[illegible]
[illegible]
than 50,000
[illegible]

CONTROL DATA CORP.
CDC 9715 REMOVABLE STORAGE DRIVE
Drive Type: Removable
Disk Diameter: 9 in
Capacity: 82M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 8,000 [illegible]
[illegible]
Interface: SMD
[illegible] OEM
Number Installed to Date: 100-500
[illegible]

CONTROL DATA CORP.
CDC 9766 SMD
Drive Type: Removable
[illegible]
Capacity: 40M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 [illegible]
Maximum Drives Per Controller: 16
Integral Controller: No
Interface: SMD
Distribution Method: OEM
Number Installed to Date: More than 50 000
Date First Installed: 1973

Rigid Disk Drives

CONTROL DATA CORP.
CDC 9762 SMD
Drive Type: Removable
Disk Diameter: 14 in.
Capacity: 80M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
Maximum Drives Per Controller: 16
Integral Controller: No
Interface: SMD
Distribution Method: OEM
Number Installed to Date: More than 50,000
Date First Installed: 1973

CONTROL DATA CORP.
CERTAINTY 270-10 & 270-20
Drive Type: Removable
Disk Diameter: 14 in.
Compatibility: IBM Series/1
Plug Compatibility: CDC Certainty
Capacity: 63M bytes, unformatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: SMD
Price: $17,915, with controller
Distribution Method: End user, OEM
Date First Installed: 1978

CORE, INC.
CORE 5115
Drive Type: Removable
Disk Diameter: 8 in.
Compatibility: IBM 5110, 5120
Capacity: 10M bytes, unformatted
Transfer Rate: 875K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $6,995, with controller
Distribution Method: End user
Number Installed to Date: 100-500
Date First Installed: September 1982
(See Vendor Profile Page V-9)

CORE, INC.
CORE 5117
Drive Type: Fixed/Removable
Disk Diameter: 8 in.
Compatibility: IBM 5110, 5120
Capacity: 53M bytes, unformatted
Transfer Rate: 875K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $12,990, with controller
Distribution Method: End user
Number Installed to Date: 100-500
Date First Installed: September 1982

CYMI SYSTEMS, INC.
8.80
Drive Type: Removable
Disk Diameter: 14 in.
Compatibility: DEC PDP-11
Capacity: 50M bytes, formatted
Transfer Rate: 819K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 6,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: SMD
Price: $4,400, without controller
Distribution Method: Third-party
Number Installed to Date: 100-500
Date First Installed: 1981
(See Vendor Profile Page V-9)

CYNTHIA PERIPHERAL CORP.
D-120
Drive Type: Removable
Disk Diameter: 10½ in.
Compatibility: DEC; Tandy; Apple; IBM Personal Computer
Capacity: 10M bytes, unformatted
Transfer Rate: 920K byte/sec
Average Access Time: 50 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $2,000, without controller; $4,000, with controller
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
Date First Installed: 1978
(See Vendor Profile Page V-10)

CYNTHIA PERIPHERAL CORP.
D-140
Drive Type: Fixed/Removable
Disk Diameter: 10½ in.
Compatibility: DEC; Tandy; Apple; IBM Personal Computer
Capacity: 10M bytes, unformatted
Transfer Rate: 920K byte/sec
Average Access Time: 50 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Sasi
Price: $3,100, without controller; $4,900, with controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: 1981

CYNTHIA PERIPHERAL CORP.
D-556
Drive Type: Fixed/Removable
Disk Diameter: 5¼ in.
Compatibility: DEC; Tandy; Apple; IBM Personal Computer
Plug Compatibility: Seagate
Capacity: 21M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: Seagate
Price: $3,150, without controller; $4,000, with controller
Distribution Method: OEM
Number Installed to Date: 500-1,000
Date First Installed: 1983

DATAMAC PERIPHERAL PRODUCTS
DD6
Drive Type: Removable
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 70 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $1,995, with controller
Distribution Method: Third-party
(See Vendor Profile Page V-10)

DATAMAC PERIPHERAL PRODUCTS
DD12
Drive Type: Removable
Compatibility: IBM Personal Computer
Capacity: 12M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 70 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $2,295, with controller
Distribution Method: Third-party
Date First Installed: June 1982

DATAMAC PERIPHERAL PRODUCTS
DD18
Drive Type: Removable
Disk Diameter: 8½ in.
Compatibility: IBM Personal Computer
Capacity: 18M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 70 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $2,895, with controller
Distribution Method: Third-party
Date First Installed: June 1982

DATAPOINT CORP.
8310
Disk Diameter: 11
Compatibility: Datapoint
Capacity: 40M bytes, Unformatted
Transfer Rate: 163K byte/sec
Average Access Time: 75 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $7,850, with controller
Distribution Method: End user
Date First Installed: September 1980
(See Vendor Profile Page V-11)

DATAPOINT CORP.
9320
Drive Type: Removable
Disk Diameter: 11 in.
Compatibility: Datapoint
Capacity: 40M bytes, unformatted
Transfer Rate: 1,300K byte/sec
Average Access Time: 75 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $7,850, with controller
Distribution Method: End user
Date First Installed: September 1980
(See Vendor Profile Page V-11)

DATA SYSTEMS DESIGN, INC.
DSD 880
Drive Type: Fixed/Removable
Disk Diameter: 8 in.
Compatibility: DEC
Capacity: 31M bytes, unformatted
Transfer Rate: 204K byte/sec
Average Access Time: 65 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: DMA
Distribution Method: End user, OEM
Number Installed to Date: 1,000-5,000
Date First Installed: 1979
(See Vendor Profile Page V-11)

DATA SYSTEMS DESIGN, INC.
DSD 890
Drive Type: Fixed/Removable
Disk Diameter: 8 in.
Capacity: 31M bytes, unformatted
Transfer Rate: 397K byte/sec
Average Access Time: 65 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 3
Integral Controller: Yes
Interface: DMA
Price: $10,300, with controller
Distribution Method: OEM
Number Installed to Date: 100

DATRICON
8018
Drive Type: Fixed
Disk Diameter: 9 in.
Plug Compatibility: Diablo 44B; Shugart SA 850, SA 851
Capacity: 2M bytes, formatted
Average Access Time: 240 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $5,000, with controller
Distribution Method: End user
Number Installed to Date: 350
Date First Installed: January 1978
(See Vendor Profile Page V-12)

DATRICON
8018
Drive Type: Fixed
Disk Diameter: 9 in.
Compatibility: Rolm 1600; DG Nova, Eclipse
Plug Compatibility: Diablo 44B; Shugart SA 850, SA 851
Capacity: 5M bytes, formatted
Average Access Time: 240 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Ansi 1226, Sasi
Price: $7,500, with controller
Distribution Method: Third-party
Number Installed to Date: 50

DICTAPHONE CORP.
9620
Drive Type: Removable
Disk Diameter: 5¼ in.
Compatibility: Dictaphone
Capacity: 20M bytes, unformatted
Transfer Rate: 1,000K byte/sec
Mean Time Between Failure: 4,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Distribution Method: End user
(See Vendor Profile Page V-12)

DIGITAL DEVELOPMENT CORP.
80
Drive Type: Fixed
Disk Diameter: 12 in.
Capacity: 4M bytes, formatted
Transfer Rate: 1,000K byte/sec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Distribution Method: End user
(See Vendor Profile Page V-13)

DIGITAL DEVELOPMENT CORP.
750
Drive Type: Fixed
Disk Diameter: 14 in.

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[redacted]

Rigid Disk Drives

Capacity: 4M bytes, formatted
Transfer Rate: 1,000K byte/sec
Average Access Time: 8 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: Yes
Distribution Method: End user

DIGITAL DEVELOPMENT CORP.
9100
Drive Type: Fixed
Disk Diameter: 12 in.
Capacity: 9M bytes, formatted
Transfer Rate: 550K byte/sec
Average Access Time: 17 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Distribution Method: End user

DIGITAL DEVELOPMENT CORP.
A7310
Drive Type: Fixed
Disk Diameter: 12 in.
Capacity: 6M bytes, unformatted
Transfer Rate: 837K byte/sec
Average Access Time: 8 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Distribution Method: End user

DIGITAL DEVELOPMENT CORP.
M8000
Drive Type: Fixed
Disk Diameter: 12 in.
Capacity: 4M bytes, formatted
Transfer Rate: 550K byte/sec
Average Access Time: 17 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Distribution Method: End user

DIGITAL EQUIPMENT CORP.
RL01
Drive Type: Removable
Disk Diameter: 14 in.
Compatibility: DEC PDP-11, VAX-11, SYSTEM 20
Capacity: 5M bytes, formatted
Transfer Rate: 512K byte/sec
Average Access Time: 65 msec
Mean Time Between Failure: 5,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SDI
Price: $3,000, without controller
Distribution Method: End user
Number installed to Date: More than 50,000
Date First Installed: 1978
(See Vendor Profile Page V-13)

DIGITAL EQUIPMENT CORP.
RL02
Drive Type: Removable
Disk Diameter: 14 in.
Compatibility: DEC PDP-11, VAX-11, SYSTEM 20
Capacity: 10M bytes, unformatted
Transfer Rate: 512K byte/sec
Average Access Time: 65 msec
Mean Time Between Failure: 5,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SDI
Price: $3,900, without controller
Distribution Method: End user, OEM
Number Installed to Date: More than 50,000
Date First Installed: 1980

DIGITAL EQUIPMENT CORP.
RM02
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: DEC PDP-11
Capacity: 67M bytes, unformatted
Transfer Rate: 806K byte/sec
Average Access Time: 43 msec
Maximum Drives Per Controller: 8
Price: $22,500, without controller
Date First Installed: April 1978

DIGITAL EQUIPMENT CORP.
RM03
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: DEC System 10, System 20, VAX-11, PDP-11
Capacity: 67M bytes, unformatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 38 msec
Maximum Drives Per Controller: 8
Price: $22,500, without controller
Date First Installed: April 1977

DISCTRON, INC.
D514
Drive Type: Removable
Disk Diameter: 5¼ in
Capacity: 5M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 77 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Seagate ST-506, ST-706
Price: $655, with controller
Distribution Method: End user, OEM
Date First Installed: November 1982

DISCTRON, INC.
D519
Drive Type: Removable
Disk Diameter: 8 in.
Capacity: 19M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 60 msec
Mean Time Between Failure: 6,000 hours
Price: $775, with controller
Distribution Method: OEM
Date First Installed: November 1982

DSSA SYSTEMS CORP.
MICRO-MAGNUM 5/5
Drive Type: Fixed/Removable
Disk Diameter: 5¼ in.
Compatibility: Onti 20C, Western Digital WD 1001-DM
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST-506, ST-706
Price: $2,200, without controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: October 1982
(See Vendor Profile Page V-13)

DSSA SYSTEMS CORP.
MICRO-MAGNUM 5R
Drive Type: Removable
Disk Diameter: 5¼ in.
Compatibility: Onti 20C,Western Digital WD 1001-DM
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST-506
Price: $2,000, without controller
Distribution Method: OEM
Number Installed to Date: 500-1,000
Date First Installed: January 1983

EMULEX CORP.
CDC-ST10
Drive Type: Fixed/Removable
Disk Diameter: 8 in.
Compatibility: DEC VAX-11, PDP-11, LSI-11
Capacity: 82M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: SMD
Distribution Method: OEM
Date First Installed: January 1982

EMULEX CORP.
CDC-9762
Drive Type: Removable
Disk Diameter: 14 in.
Compatibility: DEC VAX-11, PDP-11, LSI-11
Capacity: 80M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: SMD
Price: $8,755, without controller
Distribution Method: OEM
Date First Installed: October 1982

FUJITSU AMERICA, INC.
M2301
Drive Type: Fixed
Disk Diameter: 8 in.
Capacity: 11M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 70 msec
Interface: Shugart SA 4000
Distribution Method: End user
(See Vendor Profile Page V-15)

GENIE COMPUTER CORP.
GENIE XS
Drive Type: Removable
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer, Apple II+, Tandy
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 35 msec
Mean Time Between Failure: 11,000 hours
Price: $2,295, without controller
Distribution Method: Third-party
(See Vendor Profile Page V-16)

GENIE COMPUTER CORP.
GENIE 5+5
Drive Type: Fixed/Removable
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer, Apple II+, Tandy
Capacity: 10M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 8
Integral Controller: No
Interface: Ansi Standard
Price: $3,995, without controller
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 100-500
Date First Installed: December 1982

GENIE COMPUTER CORP.
GENIE 5-10-15-20
Drive Type: Fixed/Removable
Disk Diameter: 5¼ in.
Compatibility: Apple II+, IBM Personal Computer
Capacity: 20M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 77 msec
Mean Time Between Failure: 10,000 hours
Price: $3,195, without controller
Distribution Method: Third-party

HEWLETT-PACKARD CO.
7906 M/S/MR/SR/H/HR
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Compatibility: HP 1000
Capacity: 19M bytes, unformatted
Transfer Rate: 938K byte/sec
Average Access Time: 33 msec
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: HP-IB, IEEE-488
Price: $13,000, without controller
Distribution Method: OEM
Number Installed to Date: 5,000-10,000
Date First Installed: January 1978
(See Vendor Profile Page V-17)

HEWLETT-PACKARD CO.
7920 M/S/H
Drive Type: Removable
Disk Diameter: 14 in.
Compatibility: HP Series 1000, 3000, 9845
Capacity: 50M bytes, unformatted
Transfer Rate: 1,100K byte/sec
Average Access Time: 33 msec
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: HP-IB, IEEE-488
Price: $19,000, without controller
Distribution Method: End user
Number Installed to Date: 1,000-5,000
Date First Installed: 1977

HONEYWELL, INC.
CDU 9636, 9638
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Compatibility: Honeywell DPS-6
Capacity: 67M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 38 msec
Integral Controller: No
Interface: Honeywell
Price: $16,000, without controller
Distribution Method: End user, Third-party
Date First Installed: 1978
(See Vendor Profile Page V-17)

IBM
3340 A2/B1/B2
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: IBM S/370, 4321, 4331, 4341
Capacity: 69M bytes, unformatted
Transfer Rate: 885K byte/sec

Average Access Time: 25 msec
Price: $8,600, without controller
(See Vendor Profile Page V-17)

IBM
5022 MODEL 1
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Compatibility: IBM 7
Capacity: 4M bytes, unformatted
Transfer Rate: 199K byte/sec
Price: $11,040, without controller
Date First Installed: January 1971

IBM
5022 MODEL 2
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Compatibility: IBM
Capacity: 4M bytes, unformatted
Transfer Rate: 199K byte/sec
Average Access Time: 126 msec
Price: $12,060, without controller
Date First Installed: January 1972

IBM
5322
Drive Type: Removable
Disk Diameter: 8 in.
Compatibility: IBM SYS 23
Capacity: 1M bytes, unformatted
Transfer Rate: 62K byte/sec
Date First Installed: August 1981

IDE ASSOCIATES, INC.
IDEADISK REMOVABLE
Drive Type: Removable
Disk Diameter: 3.9 in.
Compatibility: IBM Personal Computer
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 70 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $2,100, with controller
Distribution Method: End user
Number Installed to Date: 100-500
Date First Installed: January 1983
(See Vendor Profile Page V-17)

INNOVATIVE DATA TECHNOLOGY
R-120
Drive Type: Removable
Disk Diameter: 5¼ in.
Capacity: 20M bytes, unformatted
Transfer Rate: 50K byte/sec
Average Access Time: 25 msec
Mean Time Between Failure: 12,000 hours
Integral Controller: No
Interface: Seagate ST-506, ST-706
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: September 1983
(See Vendor Profile Page V-19)

MAXTOR CORP.
XT1065
Drive Type: Fixed
Disk Diameter: 5¼ in.
Capacity: 65M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 11,000 hours
Integral Controller: No
Interface: Seagate ST-506, ST-412
Price: $2,390, without controller
Distribution Method: OEM
Date First Installed: February 1983
(See Vendor Profile Page V-23)

MEMOREX CORP.
410
Drive Type: Fixed/Removable
Disk Diameter: 5¼ in.
Capacity: 12M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Seagate ST-506
Price: $1,800, without controller
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: February 1983
(See Vendor Profile Page V-23)

MEMOREX CORP.
415
Drive Type: Fixed/Removable
Disk Diameter: 5¼ in.
Capacity: 19M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Seagate ST-506
Price: $1,980, without controller
Distribution Method: OEM
Date First Installed: October 1983
(See Vendor Profile Page V-23)

MIDWEST SCIENTIFIC INSTRUMENTS, INC.
HD-8
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Compatibility: MSI 6800
Capacity: 10M bytes, formatted
Average Access Time: 5 msec
Mean Time Between Failure: 30,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $9,000, without controller; $10,000, with controller
Distribution Method: End user
Number Installed to Date: 300
Date First Installed: January 1976
(See Vendor Profile Page V-24)

MOHAWK DATA SCIENCES CORP.
MODEL 2172
Drive Type: Removable
Disk Diameter: 14 in.
Capacity: 2M bytes, unformatted
Transfer Rate: 195K byte/sec
Average Access Time: 70 msec
Integral Controller: Yes
Price: $7,712, with controller
Date First Installed: 1977
(See Vendor Profile Page V-25)

MOHAWK DATA SCIENCES CORP.
MODEL 2174
Drive Type: Fixed
Disk Diameter: 14 in.
Capacity: 20M bytes, unformatted
Transfer Rate: 889K byte/sec
Average Access Time: 20 msec
Integral Controller: Yes
Price: $11,900, with controller
Distribution Method: End user
Date First Installed: 1978

MOHAWK DATA SCIENCES CORP.
MODEL 2175
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Capacity: 78M bytes, unformatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 17 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $14,700 to $26,600, with controller
Date First Installed: 1980

MOTOROLA, INC.
M68KDE50-1
Drive Type: Fixed/Removable
Disk Diameter: 8 in.
Compatibility: Exormac; Wang VS68/2
Capacity: 50M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 42 msec
Mean Time Between Failure: 7,500 hours
Integral Controller: No
Interface: SMD
Price: $12,920, without controller
Distribution Method: OEM, Third-party
Date First Installed: July 1983
(See Vendor Profile Page V-25)

MOTOROLA, INC.
M68KDE96-1
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Compatibility: Exormac; Wang VS68/2
Capacity: 96M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Interface: SMD
Price: $18,920, without controller
Distribution Method: OEM, Third-party
Date First Installed: November 1980

MOTOROLA, INC.
M68KHDE16-1
Drive Type: Fixed/Removable
Disk Diameter: 8 in
Compatibility: Exormac
Capacity: 16M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 42 msec
Mean Time Between Failure: 7,500 hours
Integral Controller: No
Interface: SMD
Price: $7,500, without controller
Distribution Method: OEM, Third-party
Date First Installed: June 1982

MOTOROLA, INC.
M68KHDE32-1
Drive Type: Fixed/Removable
Disk Diameter: 8 in
Compatibility: Exormac, VS 68/2
Capacity: 32M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 4,000 hours
Integral Controller: No
Interface: SMD
Price: $12,920, without controller
Distribution Method: OEM, Third-party
Date First Installed: November 1980

MOTOROLA, INC.
MLD-16
Drive Type: Fixed/Removable
Disk Diameter: 8 in
Compatibility: VS 68/2
Capacity: 16M bytes, formatted

Remember to mention the *Computerworld Buyer's Guide* when contacting vendors.

COMPUTERWORLD
BUYER'S GUIDE

Rigid Disk Drives

Transfer Rate: 1,200K byte/sec
Average Access Time: 42 msec
Mean Time Between Failure: 7,500 hours
Integral Controller: No
[illegible]
Price: $7,500, without controller
Distribution Method: OEM, Third-party
Date First Installed: September 1982

NCR CORP.
[illegible]
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Compatibility: NCR 9020
Capacity: 9M bytes, unformatted
Transfer Rate: 313K byte/sec
Average Access Time: 48 msec
Integral Controller: Yes
Price: $10,500, without controller
Distribution Method: End user
Number Installed to Date: 20,000
Date First Installed: 1977
(See Vendor Profile Page V-26)

NCR CORP.
8530
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Compatibility: NCR 9300, 8500, 8600
Capacity: 81M bytes, unformatted
Transfer Rate: 163K byte/sec
Average Access Time: 38 msec
Maximum Drives Per Controller: 8
Integral Controller: Yes
Price: $13,500, without controller
Distribution Method: Third-party
[illegible] 7,000
Date First Installed: 1979

NCR CORP.
6566
Drive Type: Fixed
Disk Diameter: 14 in.
Compatibility: NCR 9020
Capacity: 9M bytes, unformatted
Transfer Rate: 322K byte/sec
Average Access Time: 70 msec
[illegible]: 2
Integral Controller: Yes
Price: $5,000, without controller
[illegible]: End user
Date First Installed: 1977

NIXDORF COMPUTER CORP.
8322
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Compatibility: Nixdorf 8860
Capacity: 26M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
[illegible]: 2
Integral Controller: Yes
Price: $12,520, without controller; $14,460, with controller
[illegible]: End user
[illegible]: 1,000-5,000
(See Vendor Profile Page V-26)

NIXDORF COMPUTER CORP.
8323
Drive Type: Fixed/Removable
[illegible]: 14 in
Compatibility: Nixdorf 8860
Capacity: 39M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $16,500, without controller; $18,500, with controller
Distribution Method: End user
Number Installed to Date: 1,000-5,000

NIXDORF COMPUTER CORP.
8324
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Compatibility: Nixdorf 8860
Capacity: 78M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $20,700 to $22,700, without controller
Distribution Method: End user
Number Installed to Date: 1,000-5,000

NIXDORF COMPUTER CORP.
8325
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: Nixdorf 8860
Capacity: 33M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $14,050, without controller; $15,800, with controller
Distribution Method: End user
Number Installed to Date: 1,000-5,000

NIXDORF COMPUTER CORP.
8326
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: Nixdorf 8860
Capacity: 66M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $17,050, without controller; $18,800, with controller
Distribution Method: End user
Number Installed to Date: 1,000-5,000

NIXDORF COMPUTER CORP.
8840/8
Drive Type: Fixed
Disk Diameter: 14 in
Compatibility: Nixdorf 8840
Capacity: 5M bytes, unformatted
Distribution Method: End user
Date First Installed: 1979

NIXDORF COMPUTER CORP.
8845/4
Drive Type: Fixed
Disk Diameter: 14 in.
Compatibility: Nixdorf 8845
Capacity: 33M bytes, formatted
[illegible]: End user
Date First Installed: February 1983

ONYX & IMI, INC.
5810R
Drive Type: Removable
[illegible]: 5¼ in
Compatibility: DEC LSI-11
Capacity: 10M bytes, unformatted
Transfer Rate: 500K byte/sec
Average Access Time: 35 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $9,500, without controller
Distribution Method: OEM, Third-party
Number Installed to Date: Under 100
Date First Installed: September 1982
(See Vendor Profile Page V-27)

ONYX & IMI, INC.
5820R
Drive Type: Removable
Disk Diameter: 5¼ in.
Compatibility: DEC LSI-11
Capacity: 20M bytes, unformatted
Transfer Rate: 500K byte/sec
Average Access Time: 35 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $10,400, without controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: 1982

ONYX & IMI, INC.
5840R
Drive Type: Removable
Disk Diameter: 5¼ in
Compatibility: DEC LSI-11
Capacity: 40M bytes, unformatted
Transfer Rate: 500K byte/sec
Average Access Time: 35 msec
[illegible]
10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $10,900, without controller
Distribution Method: OEM, Third-party
Number Installed to Date: Under 100

PERTEC COMPUTER CORP.
D3000
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Compatibility: Diablo; Caelus Memories, CDC Hawk
Plug Compatibility: DEC RK05; Diablo
Capacity: 12M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 35 msec
Mean Time Between Failure: 1,500 hours
[illegible]: 4
Integral Controller: No
[illegible]
Price: $5,275, without controller
[illegible]
Number Installed to Date: 30,000
Date First Installed: September 1972
(See Vendor Profile Page V-28)

PERTEC COMPUTER CORP.
D3000 EXTENSION
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Compatibility: DEC RK05; Diablo; CDC Hawk
Plug Compatibility: DEC RK05, Diablo, Caelus Memories
Capacity: 24M bytes, formatted
Transfer Rate: 250K byte/sec
Average Access Time: 35 msec
[illegible]: 1,500 hours
[illegible]: 4
Integral Controller: No
Interface: Pertec, Diablo
Price: $6,280, without controller
[illegible]: OEM

Number Installed to Date: 11,000
Date First Installed: September 1972

POLYMORPHIC SYSTEMS
MD/184
Drive Type: Fixed/Removable
Disk Diameter: 3.9 in
Compatibility: Polymorph 8813, [illegible]
Capacity: 23M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 70 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Seagate ST-506
Price: $5 995, with controller
Distribution Method: Third-party
Date First Installed: March 1983
(See Vendor Profile Page V-29)

PROFESSIONAL MICRO SYSTEMS
PMS 12
Drive Type: Fixed
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 12M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 90 msec
[illegible]
12,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Seagate ST-506
Price: $2 695, without controller
Date First Installed: May 1982
(See Vendor Profile Page V-29)

RELEVANCE MARKETING, INC.
DO4314-1
Drive Type: Removable
Compatibility: IBM 360, 370, 4300
Plug Compatibility: IBM 2314
Capacity: 29M bytes, formatted
Transfer Rate: 312K byte/sec
Average Access Time: 29 msec
[illegible]
Integral Controller: Yes
[illegible]
Price: $700, without controller
[illegible]
Number Installed to Date: 100-500
Date First Installed: September 1973
(See Vendor Profile Page V-31)

RODIME CORP.
RO351
Drive Type: Removable
Disk Diameter: 3½ in.
Compatibility: Seagate
Capacity: 6M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 12,000 hours
Integral Controller: No
Interface: Seagate ST-506
Price: $950, without controller
Distribution Method: Third-party
Date First Installed: April 1983
(See Vendor Profile Page V-31)

SANTA CLARA SYSTEMS, INC.
MINI MEGA
Drive Type: Fixed/Removable
Disk Diameter: 3.9 in.
Compatibility: IBM Personal Computer, XT, Apple II, IIe
Capacity: 20M bytes, unformatted

Transfer Rate: 500K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Apple, IBM
Price: $2,295 to $5,056, with [illegible]
Distribution Method: Third-party
Number Installed to Date: 500-1,000
Date First Installed: September 1981
(See Vendor Profile Page V-31)

SPERRY CORP.
8433
Drive Type: Removable
Disk Diameter: 14 in.
Compatibility: Sperry 1100/70
Capacity: 34M bytes, unformatted
Transfer Rate: 806K byte/sec
Average Access Time: 55 msec
Price: $27,000, without controller
Distribution Method: End user
(See Vendor Profile Page V-33)

SPERRY CORP.
8470
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Compatibility: Sperry 1100/70
Capacity: 89M bytes, unformatted
Transfer Rate: 2,097K byte/sec
Average Access Time: 23 msec
Price: $28,000, without controller
Distribution Method: End user
Date First Installed: September 1979

SYQUEST TECHNOLOGY, INC.
[illegible]
Drive Type: Removable
Disk Diameter: 3.9 in
Compatibility: IBM Personal Computer, DEC LSI-2
Capacity: 6M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 3 msec
Mean Time Between Failure: 11,000 hours
Integral Controller: No
Price: $995, without controller
Distribution Method: OEM, Third-party
Date First Installed: September [illegible]
(See Vendor Profile Page V-39)

[illegible]
9752
Disk Diameter: 14 in.
Compatibility: DEC VAX-11/730, PDP-11, DG Nova, Eclipse MV
Capacity: 80M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 38 msec
Mean Time Between Failure: 4,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: SMD
Distribution Method: [illegible]
Number Installed to Date: 5,000-10,000
Date First Installed: September 1974
(See Vendor Profile Page V-34)

TECMAR, INC.
CARTRIDGE TAPE EXPANSION
Drive Type: Removable
Disk Diameter: 3.9 in.
Compatibility: IBM Personal Computer.
Plug Compatibility: TI
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Mean Time Between Failure: 11,000 hours
Interface: Seagate ST-506
Price: $2,695, with controller
Distribution Method: Third-party
Date First Installed: May 1983
(See Vendor Profile Page V-36)

TELEFILE COMPUTER PRODUCTS, INC.
T3280
Disk Diameter: 5¼ in.
Compatibility: Xerox Sigma; Telefile T-80
Capacity: 80M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 16
Integral Controller: Yes
Interface: SMD
Price: $18,000, with controller
Distribution Method: End user
Number Installed to Date: 500-1,000
(See Vendor Profile Page V-36)

TEXAS INSTRUMENTS, INC.
DS 80
Drive Type: Removable
Compatibility: TI 990
Capacity: 62M bytes, unformatted
Maximum Drives Per Controller: 4
Integral Controller: No
Distribution Method: OEM
(See Vendor Profile Page V-37)

VERMONT RESEARCH CORP.
5017
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Compatibility: DEC PDP-11
Capacity: 52M bytes, unformatted
Transfer Rate: 673K byte/sec
Average Access Time: 45 msec
Mean Time Between Failure: 5,800 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $11,000, with controller
Distribution Method: [illegible]
Number Installed to Date: 100-500
Date First Installed: 1978
(See Vendor Profile Page V-38)

VERMONT RESEARCH CORP.
8010
Drive Type: Removable
Compatibility: DEC PDP-11
Capacity: 20M bytes, unformatted
Transfer Rate: 500K byte/sec
Average Access Time: 33 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: [illegible]
Price: $2,725, with controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: February 1983

VERMONT RESEARCH CORP.
8520
Drive Type: Fixed/Removable
Compatibility: DEC PDP-11
Capacity: 10M bytes, unformatted
Transfer Rate: 500K byte/sec
Average Access Time: 33 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $3,180, with controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: 1983

VR DATA CORP.
HARD DISK 3 (DUAL 10MB)
Drive Type: Fixed/Removable
Disk Diameter: 5.25.4
Compatibility: IBM Personal Computer; Tandy TRS-80/I, TRS-80/III, LNW 2
Capacity: 20M bytes, formatted
Transfer Rate: 312K byte/sec
Average Access Time: 135 msec
Mean Time Between Failure: 11,000 hours,
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST-506
Price: $1,599, without controller; $1,649, with controller
Distribution Method: OEM
Number Installed to Date: 500-1,000
(See Vendor Profile Page V-39)

VR DATA CORP.
HARD DISK 3 (DUAL 5MB)
Drive Type: Fixed/Removable
Disk Diameter: 5 25.4
Compatibility: IBM Personal Computer, Tandy TRS-80/I, TRS-80/III, LNW 2
Capacity: 10M bytes, formatted
Transfer Rate: 312K byte/sec
Average Access Time: 135 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST-506
Price: $1,590, without controller; $1,640, with controller
Distribution Method: OEM
Number Installed to Date: 500-1,000

VR DATA CORP.
HARD DISK 3 (DUAL 15MB)
Drive Type: Fixed/Removable
Disk Diameter: 5¼ in.
Compatibility: IBM, Tandy TRS-80/I, TRS-80/III
Capacity: 30M bytes, formatted
Transfer Rate: 312K byte/sec
Average Access Time: 135 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST-506
Price: $2,299, without controller; $2,349, with controller
Distribution Method: OEM
Number Installed to Date: 500-1,000

WANG LABORATORIES, INC.
[illegible]
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: Wang VS
Capacity: 75M bytes, unformatted
Transfer Rate: 1,300K byte/sec
Average Access Time: 30 msec
Interface: SMD
Price: $17,000, without controller
(See Vendor Profile Page V-39)

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Rigid Disk Drives

WANG LABORATORIES, INC.
2285V-3
Drive Type: Removable
Disk Diameter: 14 in
Compatibility: Wang VS
Capacity: 640K bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 25 msec
Price: $38,000, without controller
Date First Installed: January 1978

WANG LABORATORIES, INC.
2280-1
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Compatibility: Wang VS2200
Capacity: 26M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Interface: SMD
Price: $19,000, without controller

WANG LABORATORIES, INC.
2280-2
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Compatibility: Wang 2200
Capacity: 40M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Interface: SMD
Price: $20,000, without controller

WANG LABORATORIES, INC.
2280M-1
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Compatibility: Wang 2200
Capacity: 26M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Interface: SMD
Price: $17,000, without controller
Distribution Method: End user

WANG LABORATORIES, INC.
2280N-3
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Compatibility: Wang 2200
Capacity: 80M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Interface: SMD
Price: $19,000, without controller

WANG LABORATORIES, INC.
2280V-1
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Compatibility: Wang VS
Capacity: 30M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Interface: SMD
Price: $17,000, without controller
Distribution Method: End user
Date First Installed: January 1978

WANG LABORATORIES, INC.
2280V-2
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Compatibility: Wang VS
Capacity: 60M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Interface: SMD
Price: $18,000, without controller
Date First Installed: January 1978

WANG LABORATORIES, INC.
2280V-3
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Compatibility: Wang VS
Capacity: 90M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Interface: SMD
Price: $19,000, without controller
Distribution Method: End user
Date First Installed: January 1978

WANG LABORATORIES, INC.
6560A
Drive Type: Fixed/Removable
Disk Diameter: 8 in
Compatibility: Wang OIS
Capacity: 10M bytes, unformatted
Price: $9,000, without controller
Distribution Method: End user
Date First Installed: January 1975

WANG LABORATORIES, INC.
6560B
Drive Type: Fixed/Removable
Disk Diameter: 8 in
Compatibility: Wang OIS
Capacity: 5M bytes, unformatted
Price: $9,000, without controller
Distribution Method: End user
Date First Installed: January 1975

WANG LABORATORIES, INC.
6580-1
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Compatibility: Wang OIS 140
Capacity: 26M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Interface: SMD
Price: $17,000, without controller

WANG LABORATORIES, INC.
6580-2
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Compatibility: Wang OIS 140
Capacity: 53M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Interface: SMD
Price: $18,000, without controller

WANG LABORATORIES, INC.
6580-3
Drive Type: Fixed/Removable
Disk Diameter: 14 in
Compatibility: Wang OIS 140
Capacity: 80M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Interface: SMD
Price: $19,000, without controller
Distribution Method: End user

WANG LABORATORIES, INC.
MVP-F2
Drive Type: Fixed/Removable
Disk Diameter: 5¼ in.
Compatibility: Wang 2200
Capacity: 10M bytes, unformatted
Price: $8,725, without controller

WANG LABORATORIES, INC.
MVP-F3
Drive Type: Fixed/Removable
Disk Diameter: 5¼ in.
Compatibility: Wang 2200
Capacity: 10M bytes, unformatted
Price: $11,125, without controller

WESTERN DYNEX CORP.
SERIES 6000
Drive Type: Fixed/Removable
Disk Diameter: 14 in.
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 20 msec
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $2,100, without controller
Distribution Method: OEM
Number Installed to Date: 36,000
Date First Installed: January 1969
(See Vendor Profile Page V-39)

WESTERN DYNEX CORP.
WD505
Drive Type: Removable
Disk Diameter: 5¼ in
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 50 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST-506
Price: $495, without controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: March 1983

XCOMP, INC.
TOASTER
Drive Type: Removable
Disk Diameter: 3.9
Compatibility: IBM Personal Computer, XT, Apple II, III; Osborne; Kaypro
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 70 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: SMD; Seagate ST-506; SMR, SMS, CDS, CDR
Price: $2,995, without controller
Distribution Method: Third-party
Date First Installed: 1982
(See Vendor Profile Page V-39)

Capacities Over 700M Bytes

CONTROL DATA CORP.
CDC 9771 EXTENDED MODULE DRIVE
Disk Diameter: 14 in.
Capacity: 825M bytes, formatted
Transfer Rate: 1,800K byte/sec
Average Access Time: 16 msec
Mean Time Between Failure: 12,000 hours
Integral Controller: No
Interface: SMD
Distribution Method: OEM
Date First Installed: 1983
(See Vendor Profile Page V-9)

CONTROL DATA CORP.
CDC 33502 DIRECT STORAGE DRIVE
Disk Diameter: 14 in.
Compatibility: IBM, NAS; Amdahl
Plug Compatibility: IBM 3350
Capacity: 1,200M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 24 msec
Maximum Drives Per Controller: 32
Integral Controller: No
Price: $59,000, without controller
Distribution Method: End user
Number Installed to Date: 5,000-10,000
Date First Installed: 1979

CONTROL DATA CORP.
CDC 33750 DIRECT STORAGE DEVICE
Disk Diameter: 14 in.
Compatibility: IBM; NAS; Amdahl
Plug Compatibility: IBM 3375
Capacity: 1,630M bytes, formatted
Transfer Rate: 3,000K byte/sec
Average Access Time: 16 msec
Maximum Drives Per Controller: 32
Integral Controller: No
Price: $83,000, without controller
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: 1983

CONTROL DATA CORP.
CDC 33800 DIRECT STORAGE UNIT
Disk Diameter: 14 in.
Compatibility: IBM; MAS; Amdahl
Plug Compatibility: IBM 3380
Capacity: 2,520M bytes, formatted
Transfer Rate: 3,000K byte/sec
Average Access Time: 16 msec
Maximum Drives Per Controller: 32
Integral Controller: No
Price: $93,000, without controller
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: 1983

DELTA SYSTEMS, INC.
HP/D SERIES
Disk Diameter: 14 in.
Compatibility: CDC Cyber 6000
Plug Compatibility: CDC 885
Capacity: 2,500M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 5 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: CDC Channel
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: August 1983
(See Vendor Profile Page V-12)

IBIS SYSTEMS, INC.
IBIS 1400
Disk Diameter: 14 in.
Capacity: 1,409M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 16 msec
Mean Time Between Failure: 10,000 hours
Interface: Parallel
Price: $66,000, without controller
Distribution Method: OEM
(See Vendor Profile Page V-17)

IBM
3375 A1/B1/D1
Disk Diameter: 14 in.
Compatibility: IBM 370, 4341, 4331-2
Capacity: 819M bytes, unformatted
Transfer Rate: 1,859K byte/sec
Average Access Time: 19 msec
Maximum Drives Per Controller: 4
Price: $38,040, without controller
Date First Installed: March 1981

IBM
3380-A4/AA4/B4
Disk Diameter: 14 in.
Compatibility: IBM 370, 4341, 4331-2, 3030 Series
Capacity: 1,260M bytes, unformatted
Transfer Rate: 3,000K byte/sec
Average Access Time: 16 msec
Maximum Drives Per Controller: 4
Price: $98,640, without controller

INTERDSCIENCE SYSTEMS, INC.
CDC
Disk Diameter: 14 in.
Compatibility: Sperry 1100
Plug Compatibility: IBM 3350
Capacity: 1,270M bytes, formatted
Transfer Rate: 1,198K byte/sec
Average Access Time: 23 msec
Mean Time Between Failure: 4,000 hours
Maximum Drives Per Controller: 32
Integral Controller: Yes
Price: $53,000, without controller
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: June 1982
(See Vendor Profile Page V-20)

INTERSCIENCE SYSTEMS, INC.
STC
Disk Diameter: 14 in.
Compatibility: Sperry 1100
Plug Compatibility: IBM 3350
Capacity: 1,270M bytes, formatted
Transfer Rate: 1,198K byte/sec
Average Access Time: 23 msec
Mean Time Between Failure: 4,000 hours
Maximum Drives Per Controller: 32
Integral Controller: Yes
Price: $53,000, without controller
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: June 1982

NATIONAL ADVANCED SYSTEMS
NAS 7380
Disk Diameter: 14 in.
Compatibility: NAS 6000, 7000, 8600; IBM 370
Capacity: 2.5G bytes, unformatted
Transfer Rate: 3,000K byte/sec
Average Access Time: 16 msec
Integral Controller: Yes
Date First Installed: July 1983
(See Vendor Profile Page V-25)

NCR CORP.
8550
Disk Diameter: 14 in
Compatibility: NCR 8500, 8600
Capacity: 1,920M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 33 msec
Maximum Drives Per Controller: 8
Integral Controller: No
Price: $50,000, without controller
Date First Installed: 1980
(See Vendor Profile Page V-26)

QUALEX TECHNOLOGY
4822
Disk Diameter: 10½ in.
Compatibility: HP 3000
Capacity: 820M bytes, unformatted
Transfer Rate: 1,860K byte/sec
Average Access Time: 28 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: SMD
Price: $45,250, with controller
Distribution Method: End user
Date First Installed: September 1983
(See Vendor Profile Page V-30)

STORAGE TECHNOLOGY CORP.
8380
Disk Diameter: 14 in.
Compatibility: IBM 370/158, 3000 Series, 4341, 370/168
Plug Compatibility: IBM 3350
Capacity: 1,260M bytes, formatted
Transfer Rate: 3,000K byte/sec
Average Access Time: 16 msec
Maximum Drives Per Controller: 32
Integral Controller: Yes
Interface: IBM Compatible
Price: $70,170, without controller
Distribution Method: OEM
Date First Installed: March 1983
(See Vendor Profile Page V-33)

300M- to 700M-Byte Capacity

AMPEX CORP.
CAPRICORN 330
Disk Diameter: 14 in.
Capacity: 330M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 9,000 hours
Maximum Drives Per Controller: 16
Integral Controller: No
Interface: SMD
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: February 1982
(See Vendor Profile Page V-2)

APPLIED PERIPHERAL SYSTEMS
4830-1
Disk Diameter: 14 in.
Capacity: 337M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 17 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: SMD
Price: $8,671, without controller
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: March 1982
(See Vendor Profile Page V-3)

APPLIED PERIPHERAL SYSTEMS
4830-2
Disk Diameter: 14 in.
Capacity: 404M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 17 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: SMD
Price: $9,425, without controller
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: March 1982

APPLIED PERIPHERAL SYSTEMS
4835-1
Disk Diameter: 14 in.
Capacity: 337M bytes, formatted
Transfer Rate: 2,000K byte/sec
Average Access Time: 10 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: SMD
Price: $8,671, without controller
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: August 1982

APPLIED PERIPHERAL SYSTEMS
4835-2
Disk Diameter: 14 in
Capacity: 404M bytes, formatted
Transfer Rate: 2,000K byte/sec
Average Access Time: 10 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: SMD
Price: $9,425, without controller
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: August 1982

BURROUGHS CORP.
B9494-41
Disk Diameter: 14 in.
Compatibility: Burroughs B1000, B700
Capacity: 402M bytes, unformatted
Transfer Rate: 650K byte/sec
Average Access Time: 28 msec
Maximum Drives Per Controller: 8
Integral Controller: No
Distribution Method: End user
Number Installed to Date: 1,000-5,000
Date First Installed: June 1978
(See Vendor Profile Page V-5)

BURROUGHS CORP.
B9494-5
Disk Diameter: 14 in.
Capacity: 542M bytes, unformatted
Compatibility: Burroughs B4900, B7800, B7900
Transfer Rate: 1,200K byte/sec
Average Access Time: 22 msec
Maximum Drives Per Controller: 16

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Chicago/Art Kossack, Newt Barrett, Jean F. Brodeur, Chris Lee, (312) 827-4433
New York/Mike Masters, Doug Cheney, Ray Corbin, Joan Daly, Fred LoSapio, Gale M. Paterno, (201) 967-1350
Atlanta/Jeffrey Melnick, Mike Masters, (404) 394-0758
San Francisco/Bill Healey, Barry Milione, A.G. Germano, Theodora Franson, Ruth Gordon, Eileen Dunn, (415) 421-7330
Los Angeles/Bernie Hockswender, Bob Hubbard Beverly Raus, (714) 556-6480

Integral Controller: No
Distribution Method: End user
Number Installed to Date: Under 100

CENTURY DATA SYSTEMS, INC.
AMS 315 (ADVANCED MARKSMAN SERIES)
Disk Diameter: 14 in.
Plug Compatibility: CDC 9766, Ampex 9300A
Capacity: 315M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 25 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: SMD, Trident
Price: $10,500, without controller
Distribution Method: OEM, Third-party
Number Installed to Date: 100-500
Date First Installed: November 1982
(See Vendor Profile Page V-6)

CENTURY DATA SYSTEMS, INC.
MARKSMAN AMS 513
Disk Diameter: 14 in.
Capacity: 513M bytes, formatted
Transfer Rate: 1,280K byte/sec
Average Access Time: 25 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: SMD, Trident
Price: $11,400, without controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: 1983

CONTROL DATA CORP.
CDC 9715 FSD-340
Disk Diameter: 9 in.
Capacity: 344M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 20 msec
Mean Time Between Failure: 11,250 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: SMD
Distribution Method: OEM
Date First Installed: 1983
(See Vendor Profile Page V-9)

CONTROL DATA CORP.
CDC 9715 FSD-500
Disk Diameter: 9 in.
Capacity: 516M bytes, formatted
Transfer Rate: 1,600K byte/sec
Average Access Time: 20 msec
Mean Time Between Failure: 11,250 hours
Maximum Drives Per Controller: 4
Interface: SMD, ISI
Distribution Method: OEM
Date First Installed: 1983

CONTROL DATA CORP.
CDC 9775 FIXED MODULE DRIVE
Disk Diameter: 14 in.
Capacity: 679M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 25 msec
Mean Time Between Failure: 6,000 hours
Integral Controller: No
Interface: SMD
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: 1980

DATA GENERAL CORP.
8214
Disk Diameter: 14 in.
Capacity: 662M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 38 msec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: DG Compatible
Price: $50,000, with controller
Distribution Method: End user, OEM
Date First Installed: September 1982
(See Vendor Profile Page V-10)

DIGITAL EQUIPMENT CORP.
RA81
Disk Diameter: 10½ in.
Capacity: 456M bytes, unformatted
Transfer Rate: 2,200K byte/sec
Average Access Time: 36 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SDI, DSDF
Price: $19,000, without controller
Distribution Method: End user, OEM
Number Installed to Date: More than 50,000
Date First Installed: 1982

DIGITAL EQUIPMENT CORP.
RP07
Disk Diameter: 14 in.
Compatibility: DEC System 10, 20, Vax-11
Capacity: 516M bytes, unformatted
Transfer Rate: 2,160K byte/sec
Average Access Time: 31 msec
Maximum Drives Per Controller: 8
Price: $43,140, without controller
Date First Installed: July 1981

DIGITAL EQUIPMENT CORP.
RP20
Disk Diameter: 14 in.
Compatibility: DEC
Capacity: 483M bytes, unformatted
Transfer Rate: 1,198K byte/sec
Average Access Time: 33 msec
Maximum Drives Per Controller: 4
Date First Installed: April 1980

DISC TECH ENG, INC.
4300
Disk Diameter: 14 in.
Compatibility: DEC; DG; TI; PE
Capacity: 301M bytes, formatted
Transfer Rate: 1,278K byte/sec
Average Access Time: 38 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SMD
Price: $6,000, without controller
Distribution Method: OEM
Date First Installed: 1983
(See Vendor Profile Page V-13)

FUJITSU AMERICA, INC.
M2294
Disk Diameter: 14 in.
Capacity: 355M bytes, formatted
Transfer Rate: 1,010K byte/sec
Average Access Time: 27 msec
Maximum Drives Per Controller: 2
Interface: SMD
Distribution Method: End user
(See Vendor Profile Page V-15)

FUJITSU AMERICA, INC.
M2351
Disk Diameter: 10½ in.
Capacity: 474M bytes, formatted
Transfer Rate: 1,859K byte/sec
Average Access Time: 18 msec
Mean Time Between Failure: 10,000 hours
Interface: Modified SMD
Distribution Method: End user

HARRIS CORP.
S360
Disk Diameter: 10½ in.
Compatibility: Harris
Capacity: 474M bytes, formatted
Transfer Rate: 1,860K byte/sec
Average Access Time: 28 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: IDC
Price: $19,000, without controller; $26,000, with controller
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: February 1983
(See Vendor Profile Page V-16)

HARRIS CORP.
5662
Disk Diameter: 5¼ in.
Compatibility: Harris
Plug Compatibility: Harris 5662
Capacity: 675M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 33 msec
Mean Time Between Failure: 6,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: IDC
Price: $31,950, with controller
Distribution Method: End user
Number Installed to Date: 501-1,000
Date First Installed: February 1980

HARRIS CORP.
HARRIS 5600
Disk Diameter: 5¼ in.
Compatibility: Harris
Capacity: 675M bytes, unformatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 33 msec
Mean Time Between Failure: 6,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: IDC
Price: $32,000, with controller
Distribution Method: End user
Number Installed to Date: 100-500

IBM
3344 B2/B2F
Disk Diameter: 14 in.
Compatibility: IBM 370, 4321, 4331, 4341
Capacity: 279M bytes, unformatted
Transfer Rate: 885K byte/sec
Average Access Time: 25 msec
Maximum Drives Per Controller: 4
Price: $19,460, without controller
Date First Installed: February 1976
(See Vendor Profile Page V-17)

IBM
3350 A2/B2/C2
Disk Diameter: 14 in.
Compatibility: IBM 370, 4341, 4341
Capacity: 317M bytes, unformatted
Transfer Rate: 1,198K byte/sec
Average Access Time: 25 msec
Mean Time Between Failure: 4 hours
Price: $83,340, without controller
Date First Installed: January 1976

IBM
3370 A1/B1/A11/B11
Disk Diameter: 14 in.
Compatibility: IBM 4321, 4331, 4341, System/38
Capacity: 571M bytes, unformatted
Transfer Rate: 1,859K byte/sec
Average Access Time: 20 msec
Maximum Drives Per Controller: 4
Price: $35,480, without controller
Date First Installed: October 1979

MEGAVAULT
MV212
Disk Diameter: 8 in.
Capacity: 212M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 40 msec
Integral Controller: Yes
Interface: Ansi 1226, SCSI; SMD; Shugart SA 1000; Seagate ST512
Price: $6,525, without controller
Distribution Method: OEM
(See Vendor Profile Page V-23)

MEMOREX CORP.
3650
Disk Diameter: 14 in.
Compatibility: IBM
Capacity: 317M bytes, unformatted
Transfer Rate: 1,198K byte/sec
Average Access Time: 22 msec
Maximum Drives Per Controller: 8
Integral Controller: Yes
Distribution Method: End user
Date First Installed: 1977
(See Vendor Profile Page V-23)

MEMOREX CORP.
3652
Disk Diameter: 14 in.
Compatibility: IBM
Capacity: 635M bytes, unformatted
Transfer Rate: 1,198K byte/sec
Average Access Time: 23 msec
Maximum Drives Per Controller: 8
Integral Controller: Yes
Distribution Method: End user
Date First Installed: 1979

NATIONAL ADVANCED SYSTEMS
NAS 7380
Disk Diameter: 14 in
Compatibility: IBM
Plug Compatibility: IBM 3380
Capacity: 635M bytes, unformatted
Transfer Rate: 1,500K byte/sec
Average Access Time: 20 msec
Mean Time Between Failure: 50,000 hours
Integral Controller: No
Distribution Method: End user
Date First Installed: December 1982
(See Vendor Profile Page V-25)

NATIONAL MEMORY SYSTEMS CORP.
NMS03
Disk Diameter: 14 in.
Compatibility: DEC RSP Series, VAX-11/730, VAX-11/750, LSI-11/23
Capacity: 33MB bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 27 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: SMD
Price: $8,500, without controller; $11,500, with controller
Number Installed to Date: 9
Date First Installed: April 1983
(See Vendor Profile Page V-26)

Winchester Disk Drives

NATIONAL MEMORY SYSTEMS CORP.
NMS04
Disk Diameter: 10½ in
Compatibility: DEC PDP Series, VAX-11/730, VAX-11/750, DEC LSI-11/23
Capacity: 470M bytes, formatted
Transfer Rate: 1,859K byte/sec
Average Access Time: 17 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: SMD
Price: $9,500, without controller; $12,500, with controller
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: October 1982

NEC INFORMATION SYSTEMS, INC.
D1510
Disk Diameter: 14 in.
Capacity: 317M bytes, formatted
Transfer Rate: 1,230K byte/sec
Average Access Time: 20 msec
Mean Time Between Failure: 12,000 hours
Maximum Drives Per Controller: 16
Integral Controller: No
Interface: SMD
Price: $9,800, without controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: 1981
(See Vendor Profile Page V-26)

NEC INFORMATION SYSTEMS, INC.
D1558
Disk Diameter: 14 in.
Capacity: 630M bytes, formatted
Transfer Rate: 1,230K byte/sec
Average Access Time: 20 msec
Maximum Drives Per Controller: 16
Interface: SMD
Price: $13,500, without controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: 1982

NORTHERN TELECOM, INC.
MERCURY MFD/8210
Capacity: 214M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 20 msec
Maximum Drives Per Controller: 4
Interface: SMD
Price: $6,590, with controller
Distribution Method: OEM
Number Installed to Date: Under 100
(See Vendor Profile Page V-27)

PRIME COMPUTER, INC.
PRIME 4340
Disk Diameter: 14 in.
Compatibility: Prime 50 Series
Capacity: 607M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 25 msec
Integral Controller: Yes
Distribution Method: End user
(See Vendor Profile Page V-29)

QUALEX TECHNOLOGY
8341
Disk Diameter: 14 in.
Compatibility: HP 3000
Plug Compatibility: HP 7925, 7933
Capacity: 480M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 20 msec
Mean Time Between Failure: 6,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: SMD
Price: $32,500, with controller
Distribution Method: End user
Date First Installed: September 1983
(See Vendor Profile Page V-30)

QUALEX TECHNOLOGY
3651
Disk Diameter: 14 in.
Compatibility: HP 3000
Plug Compatibility: HP 7925, 7933
Capacity: 600M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 20 msec
Mean Time Between Failure: 6,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: SMD
Price: $36,500, with controller
Distribution Method: End user
Date First Installed: September 1983

QUALEX TECHNOLOGY
4811
Disk Diameter: 10½ in.
Compatibility: HP 3000
Capacity: 410M bytes, unformatted
Transfer Rate: 1,860K byte/sec
Average Access Time: 18 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 8
Interface: SMD
Price: $24,950; with controller
Distribution Method: End user
Date First Installed: September 1983

STORAGE TECHNOLOGY CORP.
8350
Compatibility: IBM 370, 3000 Series, 4341
Plug Compatibility: IBM 3350
Capacity: 317M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 25 msec
Maximum Drives Per Controller: 64
Integral Controller: Yes
Interface: IBM Compatible
Price: $32,240, without controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: March 1977
(See Vendor Profile Page V-33)

STORAGE TECHNOLOGY CORP.
8380
Disk Diameter: 14 in.
Compatibility: IBM 370, 3000 Series, 4341
Plug Compatibility: IBM 3350
Capacity: 317M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 18 msec
Maximum Drives Per Controller: 64
Integral Controller: Yes
Interface: IBM Compatible
Price: $37,235, without controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: September 1981

STORAGE TECHNOLOGY CORP.
8650
Disk Diameter: 14 in.
Compatibility: IBM 370, 3000 Series, 4341
Plug Compatibility: IBM 3350
Capacity: 635M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 23 msec
Maximum Drives Per Controller: 64
Integral Controller: Yes
Interface: IBM Compatible
Price: $51,355, without controller
Distribution Method: OEM
Number Installed to Date: 5,000-10,000
Date First Installed: May 1979

STORAGE TECHNOLOGY CORP.
8775
Disk Diameter: 14 in.
Capacity: 673M bytes, unformatted
Transfer Rate: 1,197K byte/sec
Average Access Time: 23 msec
Integral Controller: Yes
Interface: SMD
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: February 1982

SYSTEM INDUSTRIES, INC.
9751
Disk Diameter: 10½ in.
Compatibility: DEC VAX-11/730, PDP-11; DG Nova, Eclipse
Capacity: 474M bytes, formatted
Transfer Rate: 1,860K byte/sec
Average Access Time: 26 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: SMD
Distribution Method: End user
Number Installed to Date: 500-1,000
Date First Installed: July 1982
(See Vendor Profile Page V-34)

SYSTEM INDUSTRIES, INC.
9775
Disk Diameter: 14 in.
Compatibility: DEC VAX-11/780, PDP-11; DG Nova, Eclipse
Capacity: 675M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 38 msec
Mean Time Between Failure: 6,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: SMD
Distribution Method: End user
Number Installed to Date: 100-500
Date First Installed: November 1981

TECSTOR, INC.
SERIES III-315
Disk Diameter: 14 in.
Compatibility: CDC
Capacity: 315M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 29 msec
Mean Time Between Failure: 10,000 hours
Interface: SMD, CDC Interface
Price: $5,600, without controller
Distribution Method: OEM
(See Vendor Profile Page V-36)

TECSTOR, INC.
SERIES III-332
Disk Diameter: 14 in.
Compatibility: CDC
Capacity: 332M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 29 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: SMD, CDC Interface
Price: $5,700, without controller
Distribution Method: OEM

TELEFILE COMPUTER PRODUCTS, INC.
T1201
Disk Diameter: 14 in.
Compatibility: Xerox Sigma; Telefile T-80
Capacity: 673M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 23 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 16
Integral Controller: Yes
Interface: SMD
Price: $95,000, with controller
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: October 1982
(See Vendor Profile Page V-38)

TEXAS INSTRUMENTS, INC.
DS 250
Disk Diameter: 14 in
Compatibility: TI 990
Capacity: 238M bytes, unformatted
Integral Controller: No
Distribution Method: OEM
(See Vendor Profile Page V-37)

TOSHIBA AMERICA, INC.
MK182F
Capacity: 662M bytes, unformatted
Transfer Rate: 1,210K byte/sec
Average Access Time: 35 msec
Interface: SMD
Distribution Method: OEM
Date First Installed: December 1982
(See Vendor Profile Page V-37)

100M- to 200M-Byte Capacity

ALPHA DATA, INC.
ATLAS
Disk Diameter: 14 in.
Capacity: 128M bytes, formatted
Transfer Rate: 1,250K byte/sec
Average Access Time: 18 msec
Interface: SMD
Price: $6,500, without controller
Distribution Method: OEM
Date First Installed: May 1983
(See Vendor Profile Page V-2)

AMPEX CORP.
CAPRICORN 165
Disk Diameter: 14 in.
Capacity: 165M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 9,000 hours
Maximum Drives Per Controller: 16
Integral Controller: No
Interface: SMD
Distribution Method: OEM
Number Installed to Date: 500-1,000
Date First Installed: February 1982
(See Vendor Profile Page V-2)

CENTRAL DATA CORP.
D3012
Disk Diameter: 8 in
Capacity: 120M bytes, unformatted
Transfer Rate: 125K byte/sec
Average Access Time: 29 msec
Mean Time Between Failure: 6,000 hours
Integral Controller: No
Interface: Ansi
Price: $14,500, with controller
Distribution Method: Third-party
Date First Installed: January 1981
(See Vendor Profile Page V-6)

CENTURY DATA SYSTEMS, INC.
MARKSMAN M160
Disk Diameter: 14 in.
Capacity: 161M bytes, formatted
Transfer Rate: 1,280K byte/sec
Average Access Time: 50 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SMD
Price: $6,560, without controller; $6,700, with controller
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: 1982
(See Vendor Profile Page V-6)

CONTROL DATA CORP.
CDC 9715 FED
Disk Diameter: 9 in.
Capacity: 165M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 1,000 hours
Maximum Drives Per Controller: 4
Interface: SMD, MMD, CMC
Distribution Method: OEM
Date First Installed: 1983
(See Vendor Profile Page V-9)

CONTROL DATA CORP.
CDC 9730-160 SMD
Disk Diameter: 14 in.
Capacity: 160M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 6,000 hours
Maximum Drives Per Controller: 16
Integral Controller: No
Interface: SMD
Distribution Method: OEM
Number Installed to Date: 10,000-50,000

CONTROL DATA CORP.
CERTAINTY 231 SERIES MMD
Disk Diameter: 14 in
Compatibility: IBM Series 1
Plug Compatibility: IBM 7962; CDC Certainty
Capacity: 126M bytes, unformatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: SMD
Price: $11,600, with controller
Distribution Method: End user, OEM
Date First Installed: 1983

CONTROL DATA CORP.
CERTAINTY 241 SERIES MMD
Disk Diameter: 8 in.
Compatibility: IBM Series/1
Plug Compatibility: IBM 4962
Capacity: 126M bytes, unformatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $18,100, with controller
Distribution Method: End user, OEM
Date First Installed: 1983

CYNTHIA PERIPHERAL CORP.
D-160
Disk Diameter: 10½ in.
Compatibility: DEC, Tandy, Apple, IBM Personal Computer
Capacity: 120M bytes, unformatted
Transfer Rate: 920K byte/sec
Average Access Time: 50 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: SMD
Price: $4,000, without controller; $6,200, with controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: 1981
(See Vendor Profile Page V-10)

DATA GENERAL CORP.
6161
Disk Diameter: 14 in.
Capacity: 147M bytes, unformatted
Average Access Time: 38 msec
Maximum Drives Per Controller: 2
Interface: DG Compatible
Price: $24,000, with controller
Date First Installed: January 1982
(See Vendor Profile Page V-10)

DICTAPHONE CORP.
9681
Disk Diameter: 5¼ in.
Compatibility: Dictaphone
Capacity: 168M bytes, unformatted
Transfer Rate: 1,000K byte/sec
Mean Time Between Failure: 4,368 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Distribution Method: End user
(See Vendor Profile Page V-12)

DIGITAL EQUIPMENT CORP.
RA80/RM80
Disk Diameter: 10½ in.
Capacity: 121M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 33 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SDI, DSP
Price: $14,000, without controller
Distribution Method: End user, OEM
Number Installed to Date: More than 50,000
Date First Installed: 1982
(See Vendor Profile Page V-13)

DISC TECH CORP., INC.
4160
Disk Diameter: 14 in.
Compatibility: DEC, DG, TI, PE
Capacity: 165M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 38 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SMD, MMD
Price: $5,000, without controller
Distribution Method: OEM
(See Vendor Profile Page V-13)

EMULEX CORP.
CDC-9711
Disk Diameter: 8 in.
Compatibility: DEC VAX-11/730, PDP-11, LSI, VAX-11/750
Capacity: 165M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 60,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: SMD
Distribution Method: OEM
Date First Installed: October 1981
(See Vendor Profile Page V-14)

EMULEX CORP.
CDC-9730-160
Disk Diameter: 14 in.
Compatibility: DEC VAX, PDP-11, LSI-11
Capacity: 160M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: SMD
Price: $8,985, without controller
Distribution Method: OEM

EMULEX CORP.
M2284
Disk Diameter: 14 in.
Compatibility: DEC VAX-11/730, VAX-11/750, VAX-11/780
Capacity: 160M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 27 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: SMD
Price: $7,900, without controller
Distribution Method: OEM
Date First Installed: October 1982

FUJITSU AMERICA, INC.
M2284
Disk Diameter: 14 in.
Capacity: 168M bytes, formatted
Transfer Rate: 1,012K byte/sec
Average Access Time: 27 msec
Maximum Drives Per Controller: 2
Interface: SMD
Distribution Method: End user,
(See Vendor Profile Page V-15)

HARRIS CORP.
5350
Disk Diameter: 5¼ in.
Compatibility: Harris
Plug Compatibility: Harris 5600
Capacity: 143M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: IDC
Price: $12,500, without controller; $16,700, with controller
Distribution Method: End user
Number Installed to Date: 1,000-5,000
Date First Installed: March 1979

HARRIS CORP.
5352
Disk Diameter: 5¼ in.

HEWLETT-PACKARD CO.
7914 P/R
Disk Diameter: 14 in
Compatibility: HP 64000, 3000, 250 Series, 9000 Series
Plug Compatibility: HP-IB
Capacity: 132M bytes, unformatted
Transfer Rate: 1,000K byte/sec
Average Access Time: 8 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: HP-IB
Price: $19,500, with controller
Distribution Method: End user
Number Installed to Date: 500-1,000
Date First Installed: January 1983
(See Vendor Profile Page V-17)

HERMEST CO.
5160
Disk Diameter: 14 in.
Plug Compatibility: CDC 9760, 9730
Capacity: 165M bytes, formatted
Transfer Rate: 1,000K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: SMD, Pico Bus
Price: $5,750, without controller
Distribution Method: OEM
Date First Installed: September 1983
(See Vendor Profile Page V-21)

MEGAVAULT
MV116
Disk Diameter: 8 in.
Capacity: 116M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 45 msec
Integral Controller: No
Interface: Ansi 1226, SCSI, SMD, Shugart SA 1000, Seagate ST512
Price: 65,020, without controller
Distribution Method: OEM
(See Vendor Profile Page V-23)

MEGAVAULT
MVP132
Disk Diameter: 8 in.
Compatibility: CDC
Capacity: 132M bytes, formatted
Transfer Rate: 4,800K byte/sec
Average Access Time: 40 msec
Integral Controller: No
Interface: Ansi 1226, SCSI, SMD, Shugart SA 1000, Seagate ST512
Distribution Method: OEM

MICROBATA CORP.
REFLEX-2
Disk Diameter: 14 in
Compatibility: AVAC; DEC 32
Sequel
Capacity: 128M bytes, unformatted

Winchester Disk Drives

Transfer Rate: 1,185K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: SMD
Price: $17,900, with controller
Distribution Method: End user
Number Installed to Date: 1,000-5,000
(See Vendor Profile Page V-24)

MICROPOLIS CORP.
1400 ANSI
Disk Diameter: 8 in.
Capacity: 200M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 28 msec
Mean Time Between Failure: 12,000 hours
Maximum Drives Per Controller: 8
Integral Controller: No
Interface: Ansi 1226
Distribution Method: OEM
(See Vendor Profile Page V-24)

MICROPOLIS CORP.
1400 SMD
Disk Diameter: 8 in.
Capacity: 160M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 22 msec
Mean Time Between Failure: 12,000 hours
Maximum Drives Per Controller: 16
Integral Controller: No
Interface: SMD
Distribution Method: OEM
Date First Installed: July 1983

MICROPOLIS CORP.
1420 MI
Disk Diameter: 8 in.
Capacity: 148M bytes, formatted
Transfer Rate: 922K byte/sec
Average Access Time: 28 msec
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Micropolis
Distribution Method: OEM

NATIONAL MEMORY SYSTEM CORP.
NM502
Disk Diameter: 14 in.
Compatibility: DEC PDP Series, VAX-11/730, VAX-11/750, LSI-11/23
Capacity: 168M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 27 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: SMD
Price: $6,500, without controller; $9,500, with controller
Distribution Method: OEM
Number Installed to Date: 70
Date First Installed: September 1983
(See Vendor Profile Page V-26)

NCR CORP.
6540
Disk Diameter: 14 in.
Compatibility: NCR 8300, 8500, 8600
Capacity: 135M bytes, unformatted
Transfer Rate: 163K byte/sec
Average Access Time: 38 msec
Maximum Drives Per Controller: 8
Integral Controller: Yes
Price: $10,800, without controller
Distribution Method: Third-party
Number Installed to Date: 1,000
Date First Installed: 1980.
(See Vendor Profile Page V-26)

NESTAR SYSTEMS, INC.
#122 14-IN. PLAN 4000 FILE SERVER
Disk Diameter: 14 in
Capacity: 137M bytes, unformatted
Transfer Rate: 1,040K byte/sec
Average Access Time: 10 msec
Mean Time Between Failure: 25,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $14,000, with controller
Distribution Method: End user, OEM
Number Installed to Date: 100-500
Date First Installed: December 1982
(See Vendor Profile Page V-26)

NIXDORF COMPUTER CORP.
8310-11
Disk Diameter: 14 in.
Compatibility: Nixdorf 3310 Dual
Plug Compatibility: IBM 3310
Capacity: 129M bytes, unformatted
Transfer Rate: 885K byte/sec
Average Access Time: 27 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $10,320, without controller, $13,505, with controller
Distribution Method: End user
(See Vendor Profile Page V-26)

NORTHERN TELECOM, INC.
MERCURY MFD/820S
Disk Diameter: 8 in.
Capacity: 128M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 20 msec
Maximum Drives Per Controller: 4
Interface: SMD
Price: $5,625, with controller
Distribution Method: OEM
Number Installed to Date: Under 100
(See Vendor Profile Page V-26)

NORTHERN TELECOM, INC.
MERCURY MFD/820S
Capacity: 171M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 20 msec
Maximum Drives Per Controller: 4
Interface: SMD
Price: $6,185, with controller
Number Installed to Date: Under 100

PRIAM CORP.
504
Disk Diameter: 8 in.
Capacity: 105M bytes, formatted
Transfer Rate: 1,210K byte/sec
Average Access Time: 42 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Ansi X3T9.3, SMD, Priam
Price: $3,150, without controller; $3,670, with controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: May 1983
(See Vendor Profile Page V-29)

PRIAM CORP.
1845I
Disk Diameter: 14 in.
Capacity: 158M bytes, formatted
Transfer Rate: 1,040K byte/sec
Average Access Time: 45 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Ansi X3T9 3, SMD, Priam
Price: $3,440, without controller; $3,960, with controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: June 1981

PRIME COMPUTER, INC.
PRIME 4480
Disk Diameter: 14 in.
Compatibility: Prime 50 Series
Capacity: 151M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Integral Controller: Yes
Distribution Method: End user
(See Vendor Profile Page V-29)

PRIME COMPUTER, INC.
PRIME 4650
Disk Diameter: 14 in.
Compatibility: Prime 2250
Capacity: 144M bytes, unformatted
Transfer Rate: 1,040K byte/sec
Average Access Time: 40 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Distribution Method: End user

STAR TECHNOLOGIES
DART WINCHESTER SUBSYSTEM 105MB
Disk Diameter: 8 in.
Compatibility: DG Nova
Capacity: 105M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 45 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: DG Nova Bus
Price: $9,000, with controller
Distribution Method: Third-party
Date First Installed: January 1981
(See Vendor Profile Page V-33)

STAR TECHNOLOGIES
DART WINCHESTER SUBSYSTEM 158MB
Disk Diameter: 14 in.
Compatibility: DG Nova
Capacity: 158M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 45 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: DG Nova Bus
Price: $9,900 with controller
Distribution Method: Third-party
Number Installed to Date: 1,000-5,000
Date First Installed: January 1981

SYSTEM INDUSTRIES, INC.
1794
Disk Diameter: 14 in.
Compatibility: DEC VAX-11/730, PDP-11; DG Nova, Eclipse
Capacity: 160M bytes, formatted
Transfer Rate: 1,012K byte/sec
Average Access Time: 37 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: SMD
Distribution Method: End user
Number Installed to Date: 1,000-5,000
Date First Installed: August 1981
(See Vendor Profile Page V-34)

TECSTOR, INC.
SERIES III-166
Disk Diameter: 14 in.
Compatibility: CDC
Capacity: 166M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 29 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: SMD, CDC Interface
Price: $4,850, without controller
Distribution Method: OEM
(See Vendor Profile Page V-36)

TECSTOR, INC.
SERIES III-199
Disk Diameter: 14 in.
Compatibility: CDC
Capacity: 199M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 29 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: SMD, CDC Interface
Price: $5,000, without controller
Distribution Method: OEM

TOSHIBA AMERICA, INC.
MK167
Disk Diameter: 8 in.
Capacity: 132M bytes, unformatted
Transfer Rate: 1,210K byte/sec
Average Access Time: 35 msec
Integral Controller: No
Interface: SMD
Distribution Method: OEM
(See Vendor Profile Page V-37)

20M- to 100M-Byte Capacity

AMPEX CORP.
PYXIS 27
Disk Diameter: 5¼ in.
Capacity: 26M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: 12,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
Date First Installed: 1981
(See Vendor Profile Page V-2)

AVI PART, INC.
PAM-XM HARD DISK
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 26M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 8,000
MTBF
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: Sasi
Price: $3,395, with controller
Distribution Method: End user
Date First Installed: July 1983
(See Vendor Profile Page V-3)

AVPART, INC.
20-MB RADIO SHACK HARD DISK
Disk Diameter: 5¼ in.

Compatibility: Tandy
Capacity: 26M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $2,499, with controller
Distribution Method: End user
Date First Installed: July 1983

ATARI CORP.
3033
Disk Diameter: 5¼ in.
Capacity: 33M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $3,200, without controller
Distribution Method: End user
Date First Installed: October 1982
(See Vendor Profile Page V-4)

ATARI CORP.
3046
Disk Diameter: 5¼ in.
Capacity: 46M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $3,800, without controller
Distribution Method: End user
Date First Installed: December 1982

ATHENAEUM TECHNOLOGY, INC.
AEGIS 30
Disk Diameter: 5¼ in.
Capacity: 38M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 35 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $1,300, without controller
Distribution Method: OEM
Date First Installed: 1984
(See Vendor Profile Page V-4)

BURROUGHS CORP.
B9493-40
Disk Diameter: 14 in.
Compatibility: Burroughs B900, B90, CP9500
Capacity: 40M bytes, unformatted
Integral Controller: No
Distribution Method: End user
(See Vendor Profile Page V-5)

BURROUGHS CORP.
B9493-80
Disk Diameter: 14 in.
Compatibility: Burroughs B900, B90, CP 9500
Capacity: 80M bytes, unformatted
Integral Controller: No
Distribution Method: End user

CAMEO ELECTRONICS, INC.
MODEL 426 PLUS
Disk Diameter: 8 in.
Compatibility: Franklin Ace; NEC APL, Victor 9000, IBM Personal Computer
Capacity: 40M bytes, unformatted
Transfer Rate: 875K byte/sec
Average Access Time: 60 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Disctron
Price: $6 995, with controller
Distribution Method: Third-party
Number Installed to Date: 100-500
(See Vendor Profile Page V-6)

CARDIFF TECHNOLOGY, INC.
D240
Compatibility: Apple, IBM Personal Computer; Tandy TRS-80
Capacity: 40M bytes, formatted
Transfer Rate: 1,250K byte/sec
Average Access Time: 26 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 5
Integral Controller: No
Interface: Seagate ST506, Shugart SD
Price: $2,200, with controller
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: August 1983
(See Vendor Profile Page V-6)

CENTRAL DATA CORP.
D3004
Disk Diameter: 8 in
Capacity: 40M bytes, unformatted
Transfer Rate: 125K byte/sec
Average Access Time: 65 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Ansi
Price: $7,900, with controller
Distribution Method: Third-party
Date First Installed: January 1981
(See Vendor Profile Page V-6)

CENTRAL DATA CORP.
D3006
Disk Diameter: 8 in.
Capacity: 60M bytes, unformatted
Transfer Rate: 125K byte/sec
Average Access Time: 29 msec
Integral Controller: No
Interface: Ansi
Price: $8,355, with controller
Distribution Method: Third-party
Number Installed to Date: 5,000
Date First Installed: January 1981

CENTRAL DATA CORP.
D4001
Disk Diameter: 8 in.
Capacity: 30M bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 35 msec
Mean Time Between Failure: 7,500 hours
Integral Controller: No
Interface: Multibus
Price: $6,050, with controller
Date First Installed: January 1981

CENTRAL DATA CORP.
D4002
Disk Diameter: 5¼ in.
Capacity: 40M bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 35 msec
Mean Time Between Failure: 7,000 hours
Integral Controller: No
Interface: Multibus
Price: $9,300, with controller
Distribution Method: Third-party
Date First Installed: January 1981

CENTRAL DATA CORP.
D4004
Disk Diameter: 8 in
Capacity: 60M bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 35 msec
Mean Time Between Failure: 7,000 hours
Integral Controller: No
Interface: Multibus
Price: $10,800, with controller
Distribution Method: Third-party
Date First Installed: January 1981

CENTRAL DATA SYSTEMS, INC.
C2075
Disk Diameter: 8 in.
Plug Compatibility: CDC Lark II-94
Capacity: 77M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 6,000 hours
Maximum Drives Per Controller: 15
Integral Controller: Yes
Interface: SMD
Price: $4,525, without controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: April 1983
(See Vendor Profile Page V-6)

CENTURY DATA SYSTEMS, INC.
MARKSMAN M40
Disk Diameter: 14 in.
Capacity: 40M bytes, formatted
Transfer Rate: 960K byte/sec
Average Access Time: 65 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SMD
Price: $3,090, without controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: September 1980

CENTURY DATA SYSTEMS, INC.
MARKSMAN M80
Disk Diameter: 14 in
Capacity: 80M bytes, formatted
Transfer Rate: 960K byte/sec
Average Access Time: 50 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SMD
Price: $3,090, without controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: February 1982

CHRISLIN INDUSTRIES, INC.
CI-1240-WF
Disk Diameter: 8 in
Compatibility: DEC LSI-11/23, LSI-11/3
Capacity: 42M bytes, unformatted
Transfer Rate: 806K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: SMD
Price: $5,795, without controller; $6,995, with controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: January 1983
(See Vendor Profile Page V-7)

CHRISLIN INDUSTRIES, INC.
CI-1240-WFM
Disk Diameter: 8 in.
Compatibility: DEC LSI-11/23
Capacity: 64M bytes, unformatted
Transfer Rate: 806K byte/sec
Average Access Time: 30 msec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: SMD
Price: $8,995 with controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: January 1983

CMC INTERNATIONAL
TARGA II
Disk Diameter: 5¼ in
Compatibility: IBM Personal Computer; Intertec Superbrain; Zenith Z10-89, Z10-90
Capacity: 30M bytes, unformatted
Transfer Rate: 1,000K byte/sec
Average Access Time: 68 msec
Mean Time Between Failure: 8,500 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $1,595, with controller
Distribution Method: End user, Third-party
Number Installed to Date: 1,000-5,000
(See Vendor Profile Page V-7)

COMPUTER ANTENNA FARM, INC.
45261-15
Disk Diameter: 8 in.
Compatibility: CA Model 4; DEC LSI-II
Capacity: 40M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 85 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Shugart SA 1000
Price: $7,700, without controller
Distribution Method: End user, OEM
Date First Installed: September 1981
(See Vendor Profile Page V-8)

COMPUTER MEMORIES, INC.
CM-6426
Disk Diameter: 5¼ in.
Capacity: 26M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $1 600 without controller
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: January 1983
(See Vendor Profile Page V-8)

COMPUTER MEMORIES, INC.
CM-6640
Disk Diameter: 5¼ in
Capacity: 40M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No

Winchester Disk Drives

Interface: Seagate ST506
Price: $1,800, without controller
Distribution Method: OEM
Number Installed to Date: 100-500

CONTROL DATA CORP.
CDC 9410-24 FINCH
Disk Diameter: 8 in.
Capacity: 24M bytes, formatted
Transfer Rate: 800K byte/sec
Average Access Time: 42 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: SMD; FDI; LDI, ISI; SNA
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
(See Vendor Profile Page V-9)

CONTROL DATA CORP.
CDC 9410-32 FINCH
Disk Diameter: 5¼ in
Capacity: 32M bytes, formatted
Transfer Rate: 800K byte/sec
Average Access Time: 42 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Interface: SMD, FDI, LDI; ISI
Distribution Method: OEM
Number Installed to Date: 1,000-5,000

CONTROL DATA CORP.
CDC 9410-40 FINCH
Capacity: 40M bytes, formatted
Transfer Rate: 800K byte/sec
Average Access Time: 42 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: SA 1000; FDI; LDI
Distribution Method: OEM

CONTROL DATA CORP.
CDC 9410-8 FINCH
Disk Diameter: 8 in.
Capacity: 80M bytes, formatted
Transfer Rate: 800K byte/sec
Average Access Time: 42 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: SMD; FDI; LDI
Price: $2,050, without controller
Distribution Method: OEM
Number Installed to Date: 10,000-50,000

CONTROL DATA CORP.
CDC 9415-3 WREN
Capacity: 21M bytes, formatted
Transfer Rate: 600K byte/sec
Average Access Time: 45 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 3
Integral Controller: No
Interface: FDI, LDI, ISI; ESD
Distribution Method: OEM
Number Installed to Date: 500-1,000

CONTROL DATA CORP.
CDC 9457 LARK
Disk Diameter: 8 in.
Capacity: 50M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 35 msec
Mean Time Between Failure: 7,500 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: SMD, LDI, ISI
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: 1981

CONTROL DATA CORP.
CDC 9515-5 WREN
Disk Diameter: 5¼ in.
Capacity: 36M bytes, formatted
Transfer Rate: 635K byte/sec
Average Access Time: 45 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 3
Integral Controller: No
Interface: FDI; LDI, ISI, ESD
Distribution Method: OEM
Number Installed to Date: 500-1,000
Date First Installed: 1982

CONTROL DATA CORP.
CDC 9730-80 MMD
Disk Diameter: 14 in.
Capacity: 80M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 16
Integral Controller: No
Interface: SMD
Distribution Method: OEM
Number Installed to Date: 10,000-50,000

CONTROL DATA CORP.
CDC 9730-80A MMD
Disk Diameter: 14 in.
Capacity: 80M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 16
Integral Controller: No
Interface: SMD
Distribution Method: OEM
Number Installed to Date: 10,000-50,000

CORE, INC.
CORE 5110
Disk Diameter: 8 in.
Compatibility: IBM 5110, 5120
Capacity: 42M bytes, unformatted
Transfer Rate: 875K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $8,695, with controller
Distribution Method: End user
Number Installed to Date: 100-500
Date First Installed: September 1981
(See Vendor Profile Page V-9)

CORVUS SYSTEMS, INC.
CORVUS 20
Disk Diameter: 5¼ in.
Compatibility: Apple; IBM; TRS
Capacity: 21M bytes, formatted
Transfer Rate: 667K byte/sec
Average Access Time: 72 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $4,495, with controller
Distribution Method: Third-party
Number Installed to Date: 1,000-5,000
Date First Installed: January 1981
(See Vendor Profile Page V-9)

CVM SYSTEMS, INC.
M50-F
Disk Diameter: 8 in.
Compatibility: DEC PDP-11
Capacity: 80M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: SMD
Price: $5,800, without controller
Distribution Method: Third-party
Date First Installed: 1983
(See Vendor Profile Page V-9)

CYBERCHRON CORP.
CHD 11/60
Disk Diameter: 8 in.
Compatibility: DEC
Plug Compatibility: DEC RK07
Capacity: 58M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 38 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Ansi 1226
Price: $7,995, with controller
Distribution Method: End user, OEM
Number Installed to Date: 100-500
Date First Installed: 1980
(See Vendor Profile Page V-10)

CYBERCHRON CORP.
CHD 11/80
Disk Diameter: 8 in.
Plug Compatibility: DEC RM02
Capacity: 67M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 38 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $7,995, with controller
Distribution Method: End user, OEM
Number Installed to Date: 100-500
Date First Installed: 1980

CYBERCHRON CORP.
CHD-11/80
Disk Diameter: 8 in.
Compatibility: DEC LSI-11, PDP-11
Capacity: 56M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 33 msec
Mean Time Between Failure: 2,500 hours
Price: $7,995, without controller
Distribution Method: End user, OEM, Third-party
Number Installed to Date: Under 100
Date First Installed: 1982

CYBER DATA CORP.
WAVE80
Disk Diameter: 8 in.
Compatibility: IBM Personal Computer; Xerox 820; Cyber Data CD9300; IBM 370
Capacity: 44M bytes, unformatted
Transfer Rate: 120K byte/sec
Average Access Time: 70 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: LAN; IEEE 488
Price: $6,000, with controller
Distribution Method: End user
Number Installed to Date: 150
Date First Installed: April 1981
(See Vendor Profile Page V-10)

DATA GENERAL CORP.
6160
Disk Diameter: 14 in.
Capacity: 73M bytes, unformatted
Average Access Time: 38 msec
Maximum Drives Per Controller: 2
Interface: DG Compatible
Price: $18,000, with controller
Distribution Method: End user, OEM
Date First Installed: January 1982
(See Vendor Profile Page V-10)

DATA MANAGEMENT LABS, INC.
1040
Disk Diameter: 8 in.
Capacity: 26M bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 27 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $9,200, with controller
Distribution Method: Third-party
Number Installed to Date: 500-1,000
(See Vendor Profile Page V-10)

DATA MANAGEMENT LABS, INC.
1041
Disk Diameter: 8 in.
Capacity: 26M bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 27 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: Intel
Price: $18,200, with controller
Distribution Method: Third-party
Number Installed to Date: 500-1,000

DATA SYSTEMS DESIGN, INC.
DSD 770-40
Disk Diameter: 5¼ in.
Compatibility: Intel Multibus
Capacity: 40M bytes, unformatted
Transfer Rate: 542K byte/sec
Average Access Time: 65 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Distribution Method: End user, OEM
(See Vendor Profile Page V-11)

DATAVUE SYSTEMS, INC.
DataVue-621
Disk Diameter: 5¼ in.
Compatibility: Intel Personal Computer; Apple II, IIe, III; Osborne
Capacity: 21M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 40 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Seagate ST506
Price: $3,595, with controller
Distribution Method: OEM
Date First Installed: September 1983
Number Installed to Date: Under 100
Date First Installed: May 1983
(See Vendor Profile Page V-12)

Winchester Disk Drives

DAVONG SYSTEMS, INC.
DS010-032
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer, Apple II, IIe, III, Osborne
Capacity: 32M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 40 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Seagate ST506
Distribution Method: OEM
Number Installed to Date: Under 100

DICTAPHONE CORP.
6650
Disk Diameter: 5¼ in
Compatibility: Dictaphone
Capacity: 50M bytes, unformatted
Transfer Rate: 1,000K byte/sec
Mean Time Between Failure: 4,368 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Distribution Method: End user
(See Vendor Profile Page V-12)

DICTAPHONE CORP.
6651
Disk Diameter: 5¼ in
Compatibility: Dictaphone
Capacity: 100M bytes, unformatted
Transfer Rate: 1,000K byte/sec
Mean Time Between Failure: 4,368 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Distribution Method: End user

DICTAPHONE CORP.
6680
Disk Diameter: 5¼ in.
Compatibility: Dictaphone
Capacity: 84M bytes, unformatted
Transfer Rate: 1,000K byte/sec
Mean Time Between Failure: 4,368 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Distribution Method: End user

DIGITAL EQUIPMENT CORP.
RK07
Disk Diameter: 14 in.
Compatibility: DEC PDP-11
Capacity: 28M bytes, unformatted
Transfer Rate: 538K byte/sec
Average Access Time: 49 msec
Maximum Drives Per Controller: 8
Price: $13,000, without controller
Date First Installed: April 1978
(See Vendor Profile Page V-13)

DISCTRON, INC.
D526
Disk Diameter: 5¼ in.
Capacity: 25M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 77 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $895, with controller
Distribution Method: OEM
Date First Installed: November 1982
(See Vendor Profile Page V-13)

DISCTRON, INC.
DP400
Disk Diameter: 8 in.
Capacity: 46M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 60 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $1,540, with controller
Distribution Method: OEM
Date First Installed: May 1982

EVOTEK CORP.
ET-5330
Disk Diameter: 5¼ in
Capacity: 23M bytes, formatted
Transfer Rate: 1,032K byte/sec
Average Access Time: 8 msec
Mean Time Between Failure: 10 000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
Price: $1,975, without controller
Distribution Method: OEM
Date First Installed: January 1983
(See Vendor Profile Page V-15)

EVOTEK CORP.
ET-5340
Disk Diameter: 5¼ in.
Capacity: 31M bytes, formatted
Transfer Rate: 1,032K byte/sec
Average Access Time: 8 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Price: $2,400, without controller
Distribution Method: OEM
Date First Installed: January 1983

EVOTEK CORP.
ET-5820
Disk Diameter: 5¼ in.
Capacity: 25M bytes, formatted
Transfer Rate: 1,032K byte/sec
Average Access Time: 8 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
Price: $2,155, without controller
Distribution Method: OEM
Date First Installed: May 1983

EVOTEK CORP.
ET-5830
Disk Diameter: 5¼ in.
Capacity: 38M bytes, formatted
Transfer Rate: 1,032K byte/sec
Average Access Time: 8 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
Price: $2,775, without controller
Distribution Method: OEM
Date First Installed: May 1983

EVOTEK CORP.
ET-5840
Disk Diameter: 5¼ in.
Capacity: 51M bytes, formatted
Transfer Rate: 1,032K byte/sec
Average Access Time: 8 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Interface: Seagate ST506
Price: $3,175, without controller
Distribution Method: OEM
Date First Installed: May 1983

FUJITSU AMERICA, INC.
M2280
Disk Diameter: 14 in.
Capacity: 84M bytes, formatted
Transfer Rate: 1,012K byte/sec
Average Access Time: 27 msec
Maximum Drives Per Controller: 2
Interface: SMD
Distribution Method: End user
(See Vendor Profile Page V-15

FUJITSU AMERICA, INC.
M2302
Disk Diameter: 8 in.
Capacity: 23M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 70 msec
Interface: SA 4000
Distribution Method: End user
(See Vendor Profile Page V-15)

FUJITSU AMERICA, INC.
M2303
Disk Diameter: 8 in
Capacity: 47M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 70 msec
Interface: Shugart SA*4000
Distribution Method: End user

FUJITSU AMERICA, INC.
M2311
Disk Diameter: 8 in
Capacity: 48M bytes, formatted
Transfer Rate: 1,229K byte/sec
Average Access Time: 20 msec
Maximum Drives Per Controller: 2
Interface: SMD
Distribution Method: End user

FUJITSU AMERICA, INC.
M2312
Disk Diameter: 8 in.
Capacity: 84M bytes, formatted
Transfer Rate: 1,229K byte/sec
Average Access Time: 20 msec
Maximum Drives Per Controller: 2
Interface: SMD
Distribution Method: End user

HARRIS CORP.
S330
Disk Diameter: 5¼ in.
Compatibility: Harris
Plug Compatibility: Harris 5600
Capacity: 72M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: IDC
Price: $6,500, without controller; $8 900, with controller
Distribution Method: End user
Number Installed to Date: 1,000-5,000
Date First Installed: March 1979
(See Vendor Profile Page V-16)

HEWLETT-PACKARD CO.
7912 P/R
Disk Diameter: 14 in
Compatibility: HP 64000, 1000, 3000, 250 Series
Capacity: 65M bytes, unformatted
Transfer Rate: 1,000K byte/sec
Average Access Time: 8 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: HP-IB
Price: $17,000, with controller
Distribution Method: Shipped with Computer
Number Installed to Date: 5,000-10,000
Date First Installed: December 1982
(See Vendor Profile Page V-17)

IBM
3310 A1/A2/B1/B2
Disk Diameter: 210mm
Compatibility: IBM 4321, 4331
Capacity: 64M bytes, unformatted
Transfer Rate: 1,031K byte/sec
Average Access Time: 27 msec
Maximum Drives Per Controller: 4
Price: $5,510 to $11,570, with controller
Date First Installed: March 1979
(See Vendor Profile Page V-17)

IBM
5247 MODEL 012
Disk Diameter: 210mm
Compatibility: IBM 5322, 5324
Capacity: 30M bytes, unformatted
Transfer Rate: 1,250K byte/sec
Average Access Time: 40 msec
Price: $8,810, without controller
Date First Installed: September 1982

INNOVATIVE DATA TECHNOLOGY
F-140
Disk Diameter: 5¼ in
Capacity: 40M bytes, unformatted
Transfer Rate: 50K byte/sec
Average Access Time: 25 msec
Mean Time Between Failure: 12 000 hours
Integral Controller: No
Interface: Seagate ST506, ST706
Price: $2,750, with controller
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: 1983
(See Vendor Profile Page V-19)

INNOVATIVE DATA TECHNOLOGY
F-240
Disk Diameter: 5¼ in
Capacity: 40M bytes, unformatted
Transfer Rate: 50K byte/sec
Average Access Time: 25 msec
Integral Controller: No
Interface: Seagate ST506, ST706
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: 1983

INNOVATIVE DATA TECHNOLOGY
F-380
Disk Diameter: 5¼ in
Capacity: 80M bytes, unformatted
Transfer Rate: 50K byte/sec
Average Access Time: 25 msec
Mean Time Between Failure: 12 000 hours
Integral Controller: No
Interface: Seagate ST506, ST706
Distribution Method: End user

INNOVATIVE DATA TECHNOLOGY
F-480
Disk Diameter: 5¼ in.
Capacity: 80M bytes, unformatted
Transfer Rate: 50K byte/sec
Average Access Time: 25 msec
Mean Time Between Failure: 12 000 hours
Integral Controller: No
Interface: Seagate ST506, ST706
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: September 1983

Winchester Disk Drives

KENNEDY CO.
9380
Disk Diameter: 14 in
Plug Compatibility: CDC 9760, 9730
Capacity: 82M bytes, formatted
Transfer Rate: 1,000K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: SMD, Pico Bus
Price: $4,595, without controller
Distribution Method: OEM
Date First Installed: September 1981
(See Vendor Profile Page V-21)

KENNEDY CO.
6172
Disk Diameter: 8 in.
Capacity: 24M bytes, formatted
Transfer Rate: 800K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 10,000 hours
Interface: Ansi 1226; Ansi X3T9.3; SMD, Disc Bus
Price: $1,995, without controller
Distribution Method: OEM
Date First Installed: September 1979

KENNEDY CO.
6173
Disk Diameter: 8 in.
Capacity: 40M bytes, formatted
Transfer Rate: 800K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 10,000 hours
Interface: Ansi 1226; Ansi X3T9.3; SMD, Disc Bus
Price: $3,195, without controller
Distribution Method: OEM
Date First Installed: September 1981

KENNEDY CO.
7340
Disk Diameter: 8 in.
Plug Compatibility: CDC 9760, 9730
Capacity: 41M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Ansi X3T9.3; SMD; Pico Bus
Price: $3,200, without controller
Distribution Method: OEM
Date First Installed: June 1982

KENNEDY CO.
7380
Disk Diameter: 8 in.
Plug Compatibility: CDC 9760, 9730
Capacity: 82M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Interface: Ansi X3T9.3; SMD; Pico Bus
Price: $3,995, without controller
Distribution Method: OEM
Date First Installed: March 1983

MEGAVAULT
MV26
Disk Diameter: 8 in
Capacity: 26M bytes, formatted
Transfer Rate: 612K byte/sec
Average Access Time: 45 msec
Integral Controller: No
Interface: Ansi 1226, SCSI, SMD; Shugart SA 1000, Seagate ST512
Price: $3,490, without controller
Distribution Method: OEM
(See Vendor Profile Page V-23)

MEGAVAULT
MV34
Disk Diameter: 8 in
Capacity: 34M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 45 msec
Integral Controller: No
Interface: Ansi 1226; SCSI, SMD; Shugart SA 1000, Seagate ST512
Distribution Method: OEM

MEGAVAULT
MV44
Disk Diameter: 8 in
Capacity: 44M bytes, formatted
Transfer Rate: 812K byte/sec
Average Access Time: 45 msec
Integral Controller: No
Interface: Ansi 1226, SCSI, SMD; Shugart SA 1000, Seagate ST512
Price: $3,820, without controller
Distribution Method: OEM

MEGAVAULT
MV48
Disk Diameter: 8 in
Capacity: 48M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 45 msec
Integral Controller: No
Interface: Ansi 1226, SCSI, SMD, SA 1000, Seagate ST512
Price: $4,200, without controller
Distribution Method: OEM

MEGAVAULT
MV62
Disk Diameter: 8 in.
Capacity: 62M bytes, formatted
Transfer Rate: 812K byte/sec
Average Access Time: 45 msec
Integral Controller: No
Interface: Ansi 1226; SCSI; SMD; Shugart SA 1000; Seagate ST512
Price: $4,130, without controller
Distribution Method: OEM

MEGAVAULT
MV81
Disk Diameter: 8 in.
Capacity: 89M bytes, formatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 45 msec
Integral Controller: No
Interface: Ansi 1226, SCSI, SMD, Shugart SA 1800; Seagate ST512
Price: $4,610, without controller
Distribution Method: OEM

MEMOREX CORP.
102
Disk Diameter: 8 in.
Capacity: 23M bytes, formatted
Transfer Rate: 593K byte/sec
Average Access Time: 70 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: Shugart SA-4000
Price: $1,700, without controller
Distribution Method: OEM
Date First Installed: February 1982
(See Vendor Profile Page V-23)

MEMOREX CORP.
214
Disk Diameter: 8 in.
Capacity: 84M bytes, formatted
Transfer Rate: 1,229K byte/sec
Average Access Time: 20 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: SMD
Price: $3,675, without controller
Distribution Method: OEM
Date First Installed: June 1982

MEMOREX CORP.
324
Disk Diameter: 5¼ in.
Capacity: 26M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Seagate ST506
Distribution Method: OEM
Date First Installed: December 1983

MEMOREX CORP.
512
Disk Diameter: 5¼ in.
Capacity: 30M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 25 msec
Mean Time Between Failure: 1,100 hours
Integral Controller: No
Interface: Seagate ST506
Price: $1,430, without controller
Distribution Method: OEM
Date First Installed: November 1983

MEMOREX CORP.
513
Disk Diameter: 5¼ in.
Capacity: 50M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 25 msec
Mean Time Between Failure: 11,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $1,820, without controller
Distribution Method: OEM
Date First Installed: November 1983

MEMOREX CORP.
514
Disk Diameter: 5¼ in.
Capacity: 70M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 11,000 msec
Integral Controller: No
Interface: Seagate ST506
Price: $2,210, without controller
Distribution Method: OEM
Date First Installed: November 1982

METROPOLIS CORP.
1202 ANSI
Disk Diameter: 8 in
Capacity: 26M bytes, formatted
Transfer Rate: 922K byte/sec
Average Access Time: 42 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 8
Interface: Ansi 1226
Distribution Method: OEM
Date First Installed: September 1982
(See Vendor Profile Page V-24)

METROPOLIS CORP.
1203 ANSI
Disk Diameter: 8 in.
Capacity: 44M bytes, formatted
Transfer Rate: 922K byte/sec
Average Access Time: 42 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 8
Integral Controller: No
Interface: Ansi 1226
Price: $2,089, without controller
Distribution Method: OEM
Date First Installed: September 1982

METROPOLIS CORP.
1203 SA
Disk Diameter: 8 in.
Capacity: 34M bytes, formatted
Transfer Rate: 540K byte/sec
Average Access Time: 45 msec
Maximum Drives Per Controller: 4
Interface: Shugart SA 1000, SA 1100
Price: $1,900, without controller
Distribution Method: OEM
Date First Installed: August 1982

METROPOLIS CORP.
1222
Disk Diameter: 8 in.
Capacity: 26M bytes, formatted
Transfer Rate: 922K byte/sec
Average Access Time: 42 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Micropolis
Distribution Method: OEM
Number Installed to Date: 30,000
Date First Installed: June 1980

MICROPOLIS CORP.
1322
Disk Diameter: 8 in.
Capacity: 45M bytes, formatted
Transfer Rate: 922K byte/sec
Average Access Time: 42 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Micropolis
Price: $2,360, without controller
Distribution Method: OEM
Number Installed to Date: 30,000
Date First Installed: June 1980

METROPOLIS CORP.
1303
Disk Diameter: 5¼ in.
Capacity: 34M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 33 msec
Mean Time Between Failure: 13,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
Distribution Method: OEM
Date First Installed: April 1983

METROPOLIS CORP.
1304
Disk Diameter: 5¼ in.
Capacity: 51M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 33 msec
Mean Time Between Failure: 13,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
Price: $1,450, without controller
Distribution Method: OEM

MILTOPE CORP.
RD84502
Disk Diameter: 8 in.

Capacity: 45M bytes, formatted
Transfer Rate: 922K byte/sec.
Average Access Time: 42 msec
Mean Time Between Failure: 71,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $40,000, with controller
Distribution Method: OEM
Date First Installed: 1981
(See Vendor Profile Page V-24)

MINISCRIBE CORP.
5330
Disk Diameter: 5¼ in.
Capacity: 30M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST412
Distribution Method: OEM
Number Installed to Date: Under 100
(See Vendor Profile Page V-24)

MINISCRIBE CORP.
5440
Disk Diameter: 5¼ in.
Capacity: 40M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST412
Distribution Method: OEM
Number Installed to Date: Under 100

NATIONAL MEMORY SYSTEM CORP.
NMS01
Disk Diameter: 8 in.
Compatibility: DEC PDP Series, VAX-11 Series, LSI-11 Series
Capacity: 84M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 20 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: SMD
Price: $4,000 to $7,000, without controller
Distribution Method: OEM
Number Installed to Date: 90
Date First Installed: September 1982
(See Vendor Profile Page V-26)

NEC INFORMATION SYSTEMS, INC.
D2200
Disk Diameter: 8 in.
Capacity: 25M bytes, formatted
Transfer Rate: 1,198K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 12,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: SMD
Price: $2,275, with controller
Distribution Method: OEM
(See Vendor Profile Page V-26)

NEC INFORMATION SYSTEMS, INC.
D2230
Disk Diameter: 8 in.
Capacity: 42M bytes, formatted
Transfer Rate: 1,198K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 5
Integral Controller: Yes
Interface: SMD
Price: $2,235, with controller
Distribution Method: OEM
Date First Installed: June 1982

NEC INFORMATION SYSTEMS, INC.
D2246
Disk Diameter: 8 in.
Capacity: 85M bytes, formatted
Transfer Rate: 1,198K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 5
Integral Controller: Yes
Interface: SMD
Price: $2,200, with controller
Distribution Method: OEM
Date First Installed: June 1982

NEC INFORMATION SYSTEMS, INC.
D5244
Disk Diameter: 5¼ in.
Capacity: 21M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 5
Integral Controller: Yes
Interface: Seagate ST38
Price: $1,410, with controller
Distribution Method: OEM
Date First Installed: April 1983

NESTAR SYSTEMS, INC.
#112 8-IN. PLAN 4000 FILE SERVER
Disk Diameter: 8 in.
Compatibility: Apple II, III; IBM Personal Computer
Capacity: 60M bytes, unformatted
Transfer Rate: 806K byte/sec
Average Access Time: 8 msec
Mean Time Between Failure: 25,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $10,000, with controller
Distribution Method: End user, OEM
Number Installed to Date: 100-500
Date First Installed: December 1982
(See Vendor Profile Page V-26)

NIXDORF COMPUTER CORP.
8330-1
Disk Diameter: 14 in.
Compatibility: Nixdorf 8890
Plug Compatibility: IBM 3350
Capacity: 100M bytes, unformatted
Transfer Rate: 1,012K byte/sec
Average Access Time: 27 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $10,105, without controller; $13,290, with controller
Distribution Method: End user
(See Vendor Profile Page V-26)

NORTHERN TELECOM, INC.
MERCURY MFD/8202
Disk Diameter: 8 in.
Capacity: 43M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 20 msec
Maximum Drives Per Controller: 4
Interface: SMD
Price: $3,455, with controller
Distribution Method: OEM
Number Installed to Date: Under 100

NORTHERN TELECOM, INC.
MERCURY MFD/8204
Disk Diameter: 8 in.
Capacity: 86M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 20 msec
Maximum Drives Per Controller: 4
Interface: SMD
Price: $4,985, with controller
Distribution Method: OEM
Number Installed to Date: Under 100

ONYX & IMI, INC.
7740
Disk Diameter: 8 in.
Capacity: 38M bytes, unformatted
Transfer Rate: 648K byte/sec
Average Access Time: 50 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: Ansi X3T9.3; IMI Bus
Price: $2,000, without controller; $2,250, with controller
Distribution Method: OEM
Number Installed to Date: 1,000
Date First Installed: September 1980
(See Vendor Profile Page V-27)

ONYX & IMI, INC.
8740
Disk Diameter: 8 in.
Capacity: 38M bytes, unformatted
Transfer Rate: 648K byte/sec
Average Access Time: 50 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: Ansi X3T9.3
Distribution Method: OEM
Number Installed to Date: 10
Date First Installed: November 1982

ONYX & IMI, INC.
8760
Disk Diameter: 8 in.
Capacity: 55M bytes, unformatted
Transfer Rate: 648K byte/sec
Average Access Time: 50 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: Ansi X3T9.3
Distribution Method: OEM
Number Installed to Date: 60
Date First Installed: November 1982

ONYX & IMI, INC.
5040H
Disk Diameter: 5¼ in.
Compatibility: SCSI
Capacity: 40M bytes, formatted
Average Access Time: 68 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $990, without controller
Distribution Method: OEM
Date First Installed: June 1983

PII-ASSOCIATES, INC.
MARK 33
Disk Diameter: 5¼ in.
Compatibility: Northstar Advantage; Apple, IBM Personal Computer
Capacity: 33M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $3,795, with controller
Distribution Method: Dist. over 10M
Number Installed to Date: Under 100
Date First Installed: January 1983
(See Vendor Profile Page V-26)

PII-ASSOCIATES, INC.
MARK 46
Disk Diameter: 5¼ in.
Compatibility: Northstar Advantage; Apple, IBM Personal Computer; Tandy TRS-80
Capacity: 46M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $4,416, with controller
Distribution Method: Dist. over 10M, OEM
Number Installed to Date: Under 100
Date First Installed: January 1983

PRIAM CORP.
3350
Disk Diameter: 14 in.
Capacity: 34M bytes, formatted
Transfer Rate: 1,040K byte/sec
Average Access Time: 45 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Ansi X3T9.3; SMD; Fujitsu
Price: $1,900, without controller, $2,475, with controller
Distribution Method: OEM
Number Installed to Date: 1,000-10,000
Date First Installed: July 1979
(See Vendor Profile Page V-28)

PRIAM CORP.
3450
Disk Diameter: 8 in.
Capacity: 35M bytes, formatted
Transfer Rate: 800K byte/sec
Average Access Time: 42 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Ansi X3T9.3; SMD; Fujitsu
Price: $1,950, without controller, $2,475, with controller
Distribution Method: OEM
Number Installed to Date: 11,000-21,000
Date First Installed: July 1983

PRIAM CORP.
3650
Disk Diameter: 14 in.
Capacity: 68M bytes, formatted
Transfer Rate: 1,040K byte/sec
Average Access Time: 45 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Ansi X3T9.3; SMD; Fujitsu

Winchester Disk Drives

Price: $2,235, without controller, $2,755, with controller
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
Date First Installed: August 1980

[illegible]
7050
Disk Diameter: 8 in
Capacity: 70M bytes, formatted
Transfer Rate: 800K byte/sec
Average Access Time: 42 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Ansi X3T9.3, SMD, Prism
Price: $2,450, without controller; $2,970, with controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: January 1982

PRIME COMPUTER, INC.
[illegible]
Disk Diameter: 14 in.
Compatibility: Prime 2250
Capacity: 62M bytes, unformatted
Transfer Rate: 1,040K byte/sec
Average Access Time: 45 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Distribution Method: End user

PROFESSIONAL MICRO SYSTEMS
PMS 27
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 27M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: 12,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Seagate ST508
Price: $3,600, with controller
Distribution Method: Third-party
Date First Installed: May 1979
(See Vendor Profile Page V-29)

PROFESSIONAL MICRO SYSTEMS
PMS 54
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 54M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: 12,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Seagate ST506
Price: $4,995, with controller
Distribution Method: Third-party
Date First Installed: May 1979

PROFESSIONAL MICRO SYSTEMS
PMS 72
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 72M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: 12,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Seagate ST506
Price: $5,995, without controller
Distribution Method: Third-party
Date First Installed: May 1982

QUANTUM CORP.
Q530
Disk Diameter: 5¼ in
Plug Compatibility: Seagate ST412
Capacity: 30M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 45 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Seagate ST506
Price: $2,000, without controller
Distribution Method: OEM
Date First Installed: June 1983
(See Vendor Profile Page V-30)

QUANTUM CORP.
Q540
Disk Diameter: 5¼ in.
Plug Compatibility: Seagate ST412
Capacity: 40M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 45 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Seagate ST506
Price: $2,300, without controller
Distribution Method: OEM
Date First Installed: June 1983

[illegible]
[illegible]
Disk Diameter: 8 in.
Compatibility: Shugart SA 1000
Capacity: 30M bytes, formatted
Transfer Rate: 542K byte/sec
Average Access Time: 66 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Shugart SA 1000
Price: $2,940, without controller
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
Date First Installed: June 1981

QUANTUM CORP.
Q2040
Disk Diameter: 8 in.
Compatibility: Shugart SA 1000
Capacity: 40M bytes, formatted
Transfer Rate: 542K byte/sec
Average Access Time: 65 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Shugart SA 1000
Price: $3,315, without controller
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
Date First Installed: June 1981

[illegible]
Q2080
Disk Diameter: 8 in.
Plug Compatibility: Shugart SA 1000
Capacity: 85M bytes, unformatted
Transfer Rate: 542K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Shugart SA 1000
Price: $3,865, without controller
Distribution Method: OEM
Date First Installed: September 1981

QUENTIN RESEARCH, INC.
QA-531
Disk Diameter: 5¼ in.
Compatibility: Apple II, Apple II +, Apple IIe
Capacity: 31M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Price: $3,195, without controller
Distribution Method: OEM
Date First Installed: May 1983
(See Vendor Profile Page V-30)

RODIME CORP.
RO204
Disk Diameter: 5¼ in.
Capacity: 21M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: 12,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $1,760, without controller
Distribution Method: Third-party
Number Installed to Date: 5,000-10,000
Date First Installed: January 1982
(See Vendor Profile Page V-31)

RODIME CORP.
RO206
Disk Diameter: 5¼ in
Compatibility: Seagate ST506
Capacity: 40M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 50 msec
Mean Time Between Failure: 12,000 hours
Integral Controller: No
Interface: Seagate ST506
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 100-500
Date First Installed: February 1983

RODIME CORP.
RO208
Disk Diameter: 5¼ in.
Compatibility: Seagate ST506
Capacity: 53M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 50 msec
Mean Time Between Failure: 12,000 hours
Integral Controller: No
Interface: Seagate ST506
Number Installed to Date: 100-500
Date First Installed: February 1983

[illegible]
AFWT-11
Disk Diameter: 8 in.
Compatibility: DEC
Capacity: 80M bytes, formatted
Transfer Rate: 453K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 12,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
[illegible] Q-Bus
Price: $5,000, with controller
Distribution Method: OEM
Number Installed to Date: 5,000-10,000
Date First Installed: 1978
(See Vendor Profile Page V-31)

SHUGART ASSOCIATES, INC.
SA1106
Disk Diameter: 8 in.
Capacity: 33M bytes, formatted
Transfer Rate: 542K byte/sec
Average Access Time: 35 msec
Mean Time Between Failure: 8,000 hours
Distribution Method: OEM
(See Vendor Profile Page V-32)

SHUGART ASSOCIATES, INC.
SA4008
Disk Diameter: 14 in.
Capacity: 29M bytes, formatted
Transfer Rate: 887K byte/sec
Average Access Time: 65 msec
Mean Time Between Failure: 8,000 hours
Distribution Method: OEM
Date First Installed: March 1978

SPERRY CORP.
8450
Disk Diameter: 14 in
Compatibility: Sperry 1100/70
Capacity: 54M bytes, unformatted
Transfer Rate: 1,260K byte/sec
Average Access Time: 23 msec
Price: $30,000, without controller
Distribution Method: End user
Date First Installed: 1976
(See Vendor Profile Page V-33)

STAR TECHNOLOGIES
[illegible]
Disk Diameter: 8 in
Compatibility: DG Nova
Capacity: 68M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 45 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: DG Nova Bus
Price: $7,500, with controller
Distribution Method: Third-party
Number Installed to Date: 1,000-5,000
Date First Installed: January 1981
(See Vendor Profile Page V-33)

TANDON CORP.
TM703
Disk Diameter: 5¼ in.
Capacity: 31M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 39 msec
Mean Time Between Failure: 11,000 hours
Integral Controller: No
[illegible]
Date First Installed: January 1983
(See Vendor Profile Page V-34)

TEIKAN, INC.
[illegible]
EXPANSION
Disk Diameter: 5¼ in
Compatibility: IBM Personal Computer
Plug Compatibility: TI
Capacity: 33M bytes, unformatted
Transfer Rate: 625K byte/sec
Mean Time Between Failure: 8,000 hours
Interface: Seagate ST506
Distribution Method: Third-party
Date First Installed: June 1983
(See Vendor Profile Page V-36)

TECSTOR, INC.
SERIES III-42
Disk Diameter: 14 in.
Compatibility: CDC
Capacity: 83M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 29 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: SMD, CDC
Price: $4,400, without controller
Distribution Method: OEM
(See Vendor Profile Page V-36)

TECSTOR, INC.
SERIES III-160
Disk Diameter: 14 in.
Compatibility: CDC
Capacity: 100M bytes, formatted
Transfer Rate: 1,209K byte/sec
Average Access Time: 29 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: SMD, CDC
Price: $4,500, without controller
Distribution Method: OEM

TEXAS INSTRUMENTS, INC.
WD 800/43
Disk Diameter: 8 in.
Compatibility: TI 300, 600, 800
Capacity: 43M bytes, unformatted
Transfer Rate: 180K byte/sec
Average Access Time: 45 msec
Integral Controller: Yes
Distribution Method: OEM
(See Vendor Profile Page V-37)

[illegible]
8533
Disk Diameter: 8 in.
Capacity: 60M bytes, formatted
Transfer Rate: 933K byte/sec
Average Access Time: 29 msec
Mean Time Between Failure: 25,000 hours
Integral Controller: No
[illegible]
Price: $5,200, without controller
[illegible]
Number Installed to Date: 100-500
Date First Installed: June 1982
(See Vendor Profile Page V-00)

TOSHIBA AMERICA, INC.
MK80F-30
Disk Diameter: 8 in
Plug Compatibility: CDC
Capacity: 30M bytes, unformatted
Transfer Rate: 1,210K byte/sec
Average Access Time: 40 msec
Integral Controller: No
Interface: SMD
Date First Installed: May [illegible]
(See Vendor Profile Page V-37)

TOSHIBA AMERICA, INC.
[illegible]
Disk Diameter: 8 in.
Capacity: 39M bytes, unformatted
Transfer Rate: 1,210K byte/sec
Average Access Time: 35 msec
Integral Controller: No
Interface: SMD
Distribution Method: OEM

TOSHIBA AMERICA, INC.
[illegible]
Disk Diameter: 8 in.
Capacity: 92M bytes, unformatted
Transfer Rate: 1,210K byte/sec
Average Access Time: 35 msec
Integral Controller: No
Interface: SMD
Distribution Method: [illegible]
Date First Installed: December 1982

UNIVATION, INC.
5¼-IN. HARD DISK
Disk Diameter: 5¼ in
Compatibility: IBM Personal Computer
Capacity: 33M bytes, unformatted
Transfer Rate: 675K byte/sec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Distribution Method: OEM, Third-party
Number Installed to Date: Under 100
(See Vendor Profile Page V-38)

UNIVATION, INC.
SIRIUS COMPATIBLE 5¼-IN. HARD DISK
Disk Diameter: 5¼ in.
Compatibility: Victor 9000
Capacity: 22M bytes, unformatted
Transfer Rate: 675K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Distribution Method: OEM, Third-party
Number Installed to Date: Under 100
Date First Installed: July 1983

U.S. DESIGN CORP.
CSS 835
Disk Diameter: 8 in.
Compatibility: DEC Q-Bus, LSI-1, PDP-11, Intel Multibus
Plug Compatibility: DEC RK07
Capacity: 35M bytes, unformatted
Transfer Rate: 800K byte/sec
Average Access Time: 45 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Ansi 1226
Price: $7,000, with controller
Distribution Method: OEM, Third-party
Number Installed to Date: 350
Date First Installed: August 1982
(See Vendor Profile Page V-38)

U.S. DESIGN CORP.
CSS 870
Disk Diameter: 8 in.
Compatibility: DEC Q-Bus, LSI-1, PDP-11, Intel Multibus
Plug Compatibility: DEC RK07
Capacity: 70M bytes, unformatted
Transfer Rate: 800K byte/sec
Average Access Time: 45 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: [illegible]
Interface: Ansi 1226
Price: $8,000, with controller
Distribution Method: OEM, Third-party
Number Installed to Date: 350
Date First Installed: August 1982

VERTEX
V130
Disk Diameter: 5¼ in.
Capacity: 30M bytes, formatted
Transfer Rate: 625K byte/sec
Mean Time Between Failure: 11,000 hours
Integral Controller: No
Interface: Seagate ST506, ST412
Price: $1,850, without controller
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: April 1983
(See Vendor Profile Page V-38)

VERTEX
V150
Disk Diameter: 5¼ in.
Capacity: 51M bytes, formatted
Transfer Rate: 625K byte/sec
Mean Time Between Failure: 11,000 hours
Integral Controller: No
Interface: Seagate ST506, ST412
Price: $2,350, without controller
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: April 1983

VERTEX
V170
Disk Diameter: 5¼ in.
Capacity: 72M bytes, formatted
Transfer Rate: 625K byte/sec
Mean Time Between Failure: 11,000 hours
Interface: Seagate ST506, ST412
[illegible]
Number Installed to Date: Under 100
Date First Installed: April 1983

[illegible]
2280N-2
Disk Diameter: 14 in
Compatibility: Wang 2200
Capacity: 40M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 30 msec
[illegible]
Price: $18,000, without controller
(See Vendor Profile Page V-39)

XEBEC
[illegible]
Disk Diameter: [illegible] in.
Compatibility: IBM Personal Computer, Apple II, IIe, II+
Capacity: 30M bytes, unformatted
Transfer Rate: 600K byte/sec
Average Access Time: 50 msec
Mean Time Between Failure: 6,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Sasi
Price: $4,000, with controller
Distribution Method: [illegible]
[illegible]
Date First Installed: May 1983
(See Vendor Profile Page V-39)

Capacities Under 20M Bytes

AM ELECTRONICS
[illegible]
Disk Diameter: 5¼ in.
Compatibility: Apple II, IIe, II+
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 75 msec
[illegible]
10,000 hours

Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $1,700, with controller
Distribution Method: Third-party
Number Installed to Date: 100
(See Vendor Profile Page V-2)

AM ELECTRONICS
RD5067-C-I
Disk Diameter: 5¼ in
Compatibility: IBM Personal Computer
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 75 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $1,700, with controller
Distribution Method: Third-party
Number Installed to Date: [illegible]
Date First Installed: October 1982

AM ELECTRONICS
RD5078-C-T
Disk Diameter: 5¼ in.
Compatibility: Tandy TRS-80
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 75 msec
[illegible]
10,000 hours
[illegible]
Integral Controller: Yes
Interface: Seagate ST506
Price: $1,700, with controller
Distribution Method: Third-party
Number Installed to Date: 100
Date First Installed: October 1982

AMPEX CORP.
PYXIS T
Disk Diameter: 5¼ in
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: [illegible] hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
[illegible]
Number Installed to Date: 10,000-[illegible]
[illegible]
(See Vendor Profile Page V-2)

AMPEX CORP.
PYXIS 12
Disk Diameter: 5¼ in
Capacity: 13M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: [illegible] hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
[illegible]
Number Installed to Date: 10,000-50,000
Date First Installed: 1981

AMPEX CORP.
PYXIS 20
Disk Diameter: [illegible]
Capacity: 20M bytes formatted
Transfer Rate: 625K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: [illegible] hours
Maximum Drives Per Controller: 4

Winchester Disk Drives

Integral Controller: No
Interface: Seagate ST506
Distribution Method: OEM
Number Installed to Date: 10,000-[illegible]
Date First Installed: 1981

APPARAT, INC.
5-MB IBM HARD DISK
Disk Diameter: 5¼ in
Compatibility: IBM Personal Computer
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: Sasi
Price: $1,795, with controller
Distribution Method: End user
Date First Installed: July 1983
(See Vendor Profile Page V-3)

APPARAT, INC.
5-MB RADIO SHACK HARD DISK
Disk Diameter: 5¼ in
Compatibility: Tandy
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $1,489, with controller
Distribution Method: End user
Date First Installed: July 1983

APPARAT, INC.
[illegible] IBM HARD DISK
Disk Diameter: 5¼ in
Compatibility: IBM Personal Computer
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: Yes
Interface: Sasi
Price: $1,995, with controller
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: July 1983

[illegible]
10-MB RADIO SHACK HARD DISK
Disk Diameter: 5¼ in
Compatibility: Tandy
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 8,000 [illegible]
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $1,735, with controller
Distribution Method: End user
Date First Installed: July 1983

APPARAT, INC.
15-MB IBM HARD DISK
Disk Diameter: 5¼ in
Compatibility: IBM Personal Computer
Capacity: 15M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 8,000 [illegible]
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: Sasi
Price: $2,295, with controller
Date First Installed: July 1983

APPARAT, INC.
15-MB RADIO SHACK HARD DISK
Disk Diameter: 5¼ in
Compatibility: Tandy
Capacity: 15M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 8 000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $1,945, with controller
Distribution Method: End user
Date First Installed: July 1983

APPLE COMPUTER, INC.
PROFILE
Disk Diameter: 5¼ in
Compatibility: Apple III
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 95 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: Parallel
Price: $2,195, with controller
Distribution Method: Third-party
Number Installed to Date: 10,000-50,000
Date First Installed: November 1981
(See Vendor Profile Page V-3)

ATARI CORP.
3020
Disk Diameter: 5¼ in
Capacity: 19M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $2*600, without controller
Distribution Method: End user
Date First Installed: October 1982
(See Vendor Profile Page V-4)

BERING INDUSTRIES, INC.
BERING 4EH
Disk Diameter: 5¼ in.
Compatibility: HP
Plug Compatibility: HP 9895, 913X
Capacity: 15M bytes, formatted
Transfer Rate: 184K byte/sec
Average Access Time: 128 msec
Mean Time Between Failure: 10 000 hours
Maximum Drives Per Controller: 1
Integral Controller: No
Price: $6,990, with controller
Distribution Method: OEM
Date First Installed: September 1982
(See Vendor Profile Page V-5)

CAMEO ELECTRONICS, INC.
2005
Disk Diameter: 5¼ in
Plug Compatibility: Victor 9000; NEC APC
Capacity: 5M bytes, unformatted
Transfer Rate: 640K byte/sec
Average Access Time: 15 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $2,295, with controller
Distribution Method: Third-party
Number Installed to Date: 100-500
Date First Installed: September 1982
(See Vendor Profile Page V-6)

CAMEO ELECTRONICS, INC.
2010
Disk Diameter: 5¼ in
Compatibility: Victor 9000, NEC APC
Capacity: 10M bytes, unformatted
Transfer Rate: 640K byte/sec
Average Access Time: 15 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $2,295, with controller
Distribution Method: Third-party
Date First Installed: September 1982

CAMEO ELECTRONICS, INC.
2015
Disk Diameter: 5¼ in.
Compatibility: Victor 9000, NEC APC
Capacity: 15M bytes, unformatted
Transfer Rate: 640K byte/sec
Average Access Time: 15 msec
Mean Time Between Failure: 10 000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $2,295, with controller
Distribution Method: Third-party
Number Installed to Date: 100-500
Date First Installed: September 1982

CAMEO ELECTRONICS, INC.
2020
Disk Diameter: 5¼ in.
Compatibility: Victor 9000, NEC APC
Capacity: 20M bytes, unformatted
Transfer Rate: 640K byte/sec
Average Access Time: 15 msec
Mean Time Between Failure: 10 000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $2,295, with controller
Distribution Method: Third-party
Number Installed to Date: 100-500
Date First Installed: September 1982

CENTRAL DATA CORP.
D3001
Disk Diameter: 8 in.
Capacity: 10M bytes, unformatted
Transfer Rate: 125K byte/sec
Average Access Time: 65 msec
Mean Time Between Failure: 9,000 hours
Integral Controller: No
Interface: Ansi
Price: $4,300, with controller
Distribution Method: Third-party
Date First Installed: January 1981
(See Vendor Profile Page V-6)

CENTRAL DATA CORP.
D3002
Disk Diameter: 8 in.
Compatibility: Intel Multibus
Capacity: 20M bytes, unformatted
Transfer Rate: 125K byte/sec
Average Access Time: 65 msec
Mean Time Between Failure: 9,000 hours
Integral Controller: No
Interface: Ansi
Price: $4 800, with controller
Distribution Method: Third-party
Date First Installed: January 1981

CENTURY DATA SYSTEMS, INC.
MARKSMAN M20
Disk Diameter: 14 in
Capacity: 20M bytes, formatted
Transfer Rate: 960K byte/sec
Average Access Time: 65 msec
Mean Time Between Failure: 8 000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SMD
Price: $2,495, without controller
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
Date First Installed: September 1978
(See Vendor Profile Page V-6)

CHRISLIN INDUSTRIES, INC.
CI-520
Disk Diameter: 5¼ in.
Compatibility: DEC LSI-11/23, LSI-11/03
Capacity: 10M bytes, unformatted
Transfer Rate: 806K byte/sec
Average Access Time: 40 msec
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $3,995, with controller
Distribution Method: OEM
Date First Installed: April 1983
(See Vendor Profile Page V-6)

COGITO SYSTEMS, INC.
CG906
Disk Diameter: 5¼ in.
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 86 msec
Mean Time Between Failure: 4,000 hours
Integral Controller: No
Interface: Seagate ST412
Distribution Method: OEM
Date First Installed: June 1983
(See Vendor Profile Page V-7)

COGITO SYSTEMS, INC.
CG912
Disk Diameter: 5¼ in
Capacity: 12M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 4,000 hours
Integral Controller: No
Interface: Seagate ST412
Price: $895, without controller
Distribution Method: OEM
Date First Installed: June 1983

COMMODORE BUSINESS MACHINES, INC.
D9060
Disk Diameter: 5¼ in.
Capacity: 5M bytes, formatted
Price: $2,995, without controller
Date First Installed: 1983
(See Vendor Profile Page V-7)

COMMODORE BUSINESS MACHINES, INC.
D9060
Disk Diameter: [illegible] in.
Capacity: 7M bytes, formatted
Price: $3,495, without controller
Date First Installed: [illegible]

COMPUTER AUTOMATION, INC.
45261-03
Disk Diameter: 8 in.
Compatibility: CA Model 4; DEC LSI-2
Capacity: 10M bytes, formatted
Transfer Rate: 500K byte/sec
Average Access Time: 85 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Shugart SA 1000
Price: $5,700, without controller
Distribution Method: End user, OEM
Date First Installed: 1981
(See Vendor Profile Page V-8)

COMPUTER DYNAMICS, INC.
[illegible]
Disk Diameter: 8 in.
Compatibility: IBM Personal Computer; Heath 89, 90; Apple II
Capacity: 4M bytes, formatted
Transfer Rate: 537K byte/sec
Average Access Time: 14 msec
Mean Time Between Failure: 15,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: S-100 Bus, STD
Price: $1,500, with controller
Distribution Method: End user
Number Installed to Date: 500-1,000
Date First Installed: 1982
(See Vendor Profile Page V-8)

COMPUTER MEMORIES, INC.
CM-5206
Disk Diameter: 5¼ in.
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 77 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $1,000, without controller
Distribution Method: OEM
Number Installed to Date: 2,000
Date First Installed: July 1981
(See Vendor Profile Page V-8)

COMPUTER MEMORIES, INC.
CM-5412
Disk Diameter: 5¼ in.
Capacity: 12M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 77 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $1,200, without controller
Distribution Method: OEM
Number Installed to Date: 10,000
Date First Installed: July 1981

COMPUTER MEMORIES, INC.
CM-5819
Disk Diameter: 5¼ in.
Capacity: 19M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 77 msec
Mean Time Between Failure: 10,000 hours
Interface: Seagate ST506
Price: $1,400, without controller
Distribution Method: OEM
Number Installed to Date: 14,000
Date First Installed: July 1981

COMPUTER MEMORIES, INC.
CM-8213
Disk Diameter: 5¼ in.
Capacity: 13M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $1,400, without controller
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: January 1983

CONTROL DATA CORP.
CDC-9270-6 CRICKET
Disk Diameter: 3½ in.
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 117 msec
Mean Time Between Failure: 30,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
Distribution Method: OEM
Date First Installed: 1983
(See Vendor Profile Page V-9)

CORONA DATA SYSTEMS
EXTERNAL PHD 5
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer; Corona Personal Computer
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $2,795, with controller
Distribution Method: OEM
Number Installed to Date: 100-500
(See Vendor Profile Page V-9)

CORONA DATA SYSTEMS
EXTERNAL PHD 10
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer; Corona Personal Computer
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 14,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $2,695, with controller
Distribution Method: OEM
Number Installed to Date: 100-500

CORONA DATA SYSTEMS
PERSONAL HARD DISK I
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer; Corona Personal Computer
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $1,795, with controller
Distribution Method: OEM
Number Installed to Date: 500-1,000

CORONA DATA SYSTEMS
PERSONAL HARD DISK 10
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer; Corona
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $2,295, with controller
Distribution Method: OEM
Number Installed to Date: 500-1,000

CORONA DATA SYSTEMS
STAR FIRE 10
Disk Diameter: 5¼ in.
Compatibility: Apple II; Franklin Ace
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $2,695, with controller
Distribution Method: OEM
Number Installed to Date: 500-1,000

CORVUS SYSTEMS, INC.
CORVUS II
Disk Diameter: 5¼ in.
Compatibility: Apple; IBM; Tandy TRS-80
Capacity: 14M bytes, formatted
Transfer Rate: 667K byte/sec
Average Access Time: 72 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $3,495, with controller
Distribution Method: Third-party
Number Installed to Date: 5,000-10,000
Date First Installed: January 1980
(See Vendor Profile Page V-9)

CORVUS SYSTEMS, INC.
CORVUS II
Disk Diameter: 5¼ in.
Compatibility: Apple; IBM; Tandy TRS-80
Capacity: 7M bytes, formatted
Transfer Rate: 667K byte/sec
Average Access Time: 72 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $2,495, with controller
Distribution Method: Third-party
Number Installed to Date: 5,000-10,000
Date First Installed: January 1980
(See Vendor Profile Page V-9)

CROMEMCO, INC.
HDM
Disk Diameter: 5¼ in.
Capacity: 18M bytes, unformatted
Transfer Rate: 625K byte/sec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 3
Integral Controller: No
Price: $3,995, with controller
Distribution Method: OEM
Date First Installed: March 1983
(See Vendor Profile Page V-9)

CYBERCHRON CORP.
CHD 11-20
Disk Diameter: 8 in.
Compatibility: DEC PDP-11
Capacity: 20M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 38 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $4,995, with controller
Distribution Method: End user, OEM
Number Installed to Date: 100-500
Date First Installed: 1980
(See Vendor Profile Page V-10)

CYBERCHRON CORP.
CHD-11
Disk Diameter: 8 in.
Compatibility: DEC LSI-11, PDP-11
Capacity: 20M bytes, unformatted
Transfer Rate: 800K byte/sec
Average Access Time: 33 msec
Mean Time Between Failure: 2,000 hours
Price: $4,995, without controller
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 100-500
Date First Installed: 1980

DATA GENERAL CORP.
6220
Disk Diameter: 8 in.
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 65 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: DG Compatible
Price: $4,175, with controller
Distribution Method: End user, OEM
Date First Installed: August 1982

DATA GENERAL CORP.
6222
Disk Diameter: 8 in
Capacity: 15M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 65 msec
Integral Controller: Yes
Interface: DG Compatible
Price: $5,600, with controller
Distribution Method: End user, OEM
Date First Installed: August 1982

DATA MANAGEMENT LABS, INC.
1010
Disk Diameter: 8 in
Capacity: 5M bytes, unformatted
Transfer Rate: 250K byte/sec
Average Access Time: 27 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: Yes
Interface: Intel
Price: $7,300, with controller
Distribution Method: Third-party
Number Installed to Date: 1,000-1,500
(See Vendor Profile Page V-10)

DATAMAX
DATAMAX WFD-1
Disk Diameter: 5¼ in.
Compatibility: Datamax UV-1, UV-1/1
Capacity: 5M bytes, unformatted
Transfer Rate: 132K byte/sec
Average Access Time: 125 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $7,000, with controller
Distribution Method: Third-party
Number Installed to Date: 100-500
Date First Installed: June 1982
(See Vendor Profile Page V-10)

DATAPOINT CORP.
20 MB
Disk Diameter: 5¼ in.
Compatibility: Datapoint

Winchester Disk Drives

Capacity: 20M bytes, unformatted
Transfer Rate: 650K byte/sec
Average Access Time: 5 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $8,000, with controller
Distribution Method: End user
Date First Installed: September 1981
(See Vendor Profile Page V-11)

DATAPOINT CORP.
9313
Disk Diameter: 5¼ in
Compatibility: Datapoint
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 8 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $3,950, with controller
Distribution Method: End user

DATAPOINT CORP.
9315
Disk Diameter: 5¼ in
Compatibility: Datapoint
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 8 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $5,950, with controller
Distribution Method: End user
Date First Installed: October 1982

DATA SYSTEMS DESIGN, INC.
DSD 770-10
Disk Diameter: 5¼ in
Compatibility: Intel Multibus
Capacity: 10M bytes, unformatted
Transfer Rate: 542K byte/sec
Average Access Time: 70 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Distribution Method: End user, OEM
(See Vendor Profile Page V-11)

DAVONG SYSTEMS, INC.
DS010-006
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer; Apple II, IIe, III, Osborne
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 100 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Seagate ST506
Price: $2,095, with controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: March 1982
(See Vendor Profile Page V-12)

DAVONG SYSTEMS, INC.
DS010-015
Disk Diameter: 5¼ in
Compatibility: IBM Personal Computer, Apple II, IIe, III, Osborne
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 100 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $2,595, with controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: August 1982

DAVONG SYSTEMS, INC.
DS010-015
Disk Diameter: 5¼ in
Compatibility: IBM Personal Computer, Apple II, IIe, III, Osborne
Capacity: 15M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 100 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Seagate ST506
Price: $3,095, with controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: October 1982

DIGITAL EQUIPMENT CORP.
RD50
Disk Diameter: 5¼ in.
Compatibility: DEC Rainbow 10
Capacity: 5M bytes, unformatted
Transfer Rate: 5,000K byte/sec
Average Access Time: 170 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $2,695, with controller
Distribution Method: End user
Date First Installed: 1983
(See Vendor Profile Page V-13)

DIGITAL EQUIPMENT CORP.
RD51
Disk Diameter: 5¼ in.
Compatibility: DEC PROF 350
Capacity: 10M bytes, unformatted
Transfer Rate: 5,000K byte/sec
Average Access Time: 170 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $2,985, with controller
Distribution Method: End user
Date First Installed: 1983

DISC TECH ONE
SERIES 220
Disk Diameter: 14 in
Compatibility: DEC; DG; TI; PE
Capacity: 4M bytes, unformatted
Transfer Rate: 996K byte/sec
Average Access Time: 38 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: SMD
Price: $3,700, without controller
Distribution Method: OEM
Date First Installed: 1978
(See Vendor Profile Page V-13)

DISCTRON, INC.
D507
Disk Diameter: 5¼ in.
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 60 msec
Mean Time Between Failure: 6,000 hours
Integral Controller: Yes
Price: $555, with controller
Distribution Method: OEM
Date First Installed: November 1982
(See Vendor Profile Page V-13)

DISCTRON, INC.
DP100
Disk Diameter: 8 in
Capacity: 11M bytes, formatted
Transfer Rate: 875K byte/sec
Average Access Time: 60 msec
Mean Time Between Failure: 6,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $1,390, with controller
Distribution Method: OEM
Date First Installed: April 1981

DISK MEMORY TECHNOLOGY, INC.
RUGGED 5-MB 8-IN. WINCHESTER
Disk Diameter: 8 in.
Compatibility: DMT 601
Capacity: 5M bytes, unformatted
Transfer Rate: 315K byte/sec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $1,500, without controller; $3,000, with controller
Distribution Method: End user
Number Installed to Date: 500
Date First Installed: 1974
(See Vendor Profile Page V-13)

ENOTEK CORP.
ET-5510
Disk Diameter: 5¼ in.
Capacity: 7M bytes, formatted
Transfer Rate: 1,032K byte/sec
Average Access Time: 8 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
Price: $1,500, without controller
Distribution Method: OEM
Date First Installed: January 1983
(See Vendor Profile Page V-15)

ENOTEK CORP.
ET-5520
Disk Diameter: 5¼ in
Capacity: 15M bytes, formatted
Transfer Rate: 1,032K byte/sec
Average Access Time: 8 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
Price: $1,725, without controller
Distribution Method: OEM
Date First Installed: January 1983

ENOTEK CORP.
ET-5511
Disk Diameter: 5¼ in
Capacity: 12M bytes, formatted
Transfer Rate: 1,032K byte/sec
Average Access Time: 8 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
Price: $1,675, without controller
Distribution Method: OEM
Date First Installed: May 1983

FUJITSU AMERICA, INC.
M2231
Disk Diameter: 5¼ in.
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 95 msec
Interface: Seagate ST506, Shugart SA 4000
Distribution Method: End user
(See Vendor Profile Page V-15)

FUJITSU AMERICA, INC.
M2225
Disk Diameter: 5¼ in.
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 95 msec
Interface: Seagate ST506, Shugart SA 4000
Distribution Method: End user

FUJITSU AMERICA, INC.
M2234
Disk Diameter: 5¼ in.
Capacity: 15M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 95 msec
Interface: Seagate ST506, Shugart SA 4000
Distribution Method: End user

HEWLETT-PACKARD CO.
7906 H
Disk Diameter: 8 in.
Compatibility: HP 1000, 250, 9000, Series 200
Capacity: 16M bytes, unformatted
Transfer Rate: 538K byte/sec
Average Access Time: 50 msec
Integral Controller: Yes
Interface: HP-IB, IEEE-488
Price: $9,900, with controller
Distribution Method: End user
Date First Installed: September 1981
(See Vendor Profile Page V-17)

HEWLETT-PACKARD CO.
7911 P/R
Disk Diameter: 14 in
Compatibility: HP 1000, 3000, 250, 9000
Capacity: 28K bytes, unformatted
Transfer Rate: 1,000K byte/sec
Average Access Time: 35 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: HP-IB IEEE-488
Price: $14,500, with controller
Distribution Method: End user
Number Installed to Date: 1,000-5,000
Date First Installed: September 1981

HEWLETT-PACKARD CO.
9134A
Disk Diameter: 5¼ in.
Compatibility: HP Series 80, Series 100, Series 200, 9825T
Capacity: 4M bytes, unformatted
Transfer Rate: 50K byte/sec
Average Access Time: 168 msec
Mean Time Between Failure: 6,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: HP-IB, IEEE-488
Price: $3,500, with controller
Distribution Method: End user
Number Installed to Date: 1,000-5,000

HEWLETT-PACKARD CO.
9134A OPT. 010
Disk Diameter: 5¼ in.
Compatibility: HP 86, 87, Series 200
Capacity: 4M bytes, unformatted
Transfer Rate: 50K byte/sec
Average Access Time: 168 msec
Mean Time Between Failure: 6,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: HP-IB, IEEE-488
Price: $4,500, with controller
Distribution Method: End user
Number Installed to Date: 100-500

IBIS SYSTEMS, INC.
IBIS 5MS-44
Disk Diameter: 14 in.

Capacity: 2M bytes, unformatted
Transfer Rate: 375K byte/sec
Average Access Time: 16 msec
Mean Time Between Failure: 10,000 hours
Interface: Serial
Price: $81 995, without controller
Distribution Method: End user
(See Vendor Profile Page V-17)

IBIS SYSTEMS, INC.
IBIS 5380-AA4
Disk Diameter: 14 in.
Compatibility: IBM 3081, 3033
Capacity: 2M bytes, unformatted
Transfer Rate: 375K byte/sec
Average Access Time: 16 msec
Mean Time Between Failure: 10,000 hours
Interface: Serial
Price: $93,710, without controller
Distribution Method: Egd user

IBIS SYSTEMS, INC.
IBIS 5380-B4
Disk Diameter: 14 in.
Compatibility: IBM 3380
Capacity: 2M bytes, unformatted
Transfer Rate: 375K byte/sec
Average Access Time: 16 msec
Mean Time Between Failure: 10,000 hours
Interface: IBM
Price: $68,020, without controller
Distribution Method: End user

IBIS SYSTEMS, INC.
IBIS 5380-BB4
Disk Diameter: 14 in.
Compatibility: IBM 3380
Capacity: 2M bytes, unformatted
Transfer Rate: 375K byte/sec
Average Access Time: 16 msec
Mean Time Between Failure: 10,000 hours
Interface: IBM
Price: $71,120, without controller
Distribution Method: End user

IBM
5412 MODEL 2
Disk Diameter: 14 in.
Compatibility: IBM
Capacity: 1M bytes, unformatted
Transfer Rate: 199K byte/sec
Average Access Time: 269 msec
Price: $9,880, without controller
(See Vendor Profile Page V-17)

IBM
5022 MODEL 4
Disk Diameter: 14 in.
Compatibility: IBM
Capacity: 1M bytes, unformatted
Transfer Rate: 199K byte/sec
Average Access Time: 126 msec
Price: $10,820, without controller

IBM
5247 MODEL 011
Disk Diameter: 210 mm
Compatibility: IBM 5322, 5324
Capacity: 15M bytes, unformatted
Transfer Rate: 1,250K byte/sec
Average Access Time: 40 msec
Price: $7,010, without controller
Date First Installed: September 1982

IDE ASSOCIATES, INC.
IDEADISK FIXED
Disk Diameter: 3.9 in.
Compatibility: IBM Personal Computer
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 70 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Price: $1,750, with controller
Distribution Method: End user
Number Installed to Date: 100-500
Date First Installed: January 1983
(See Vendor Profile Page V-17)

IRWIN MAGNETICS, INC.
416
Disk Diameter: 5¼ in.
Capacity: 16M bytes, formatted
Transfer Rate: 54K byte/sec
Average Access Time: 33 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: Irwin
Price: $1,800, without controller; $2,800, with controller
Distribution Method: OEM
Date First Installed: 1981
(See Vendor Profile Page V-20)

IRWIN MAGNETICS, INC.
416
Disk Diameter: 5¼ in
Capacity: 16M bytes, formatted
Transfer Rate: 54K byte/sec
Average Access Time: 33 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 8
Integral Controller: Yes
Interface: Irwin
Price: $2,500, without controller; $3,700, with controller
Distribution Method: OEM
Date First Installed: 1981

LOBO SYSTEMS, INC.
950A
Disk Diameter: 5¼ in.
Compatibility: Apple II+
Capacity: 4M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 170 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: Seagate ST506
Price: $2,675, with controller
Distribution Method: End user
Number Installed to Date: 100-500
Date First Installed: 1982
(See Vendor Profile Page V-22)

LOBO SYSTEMS, INC.
1850A
Disk Diameter: 8 in.
Compatibility: Apple II+
Capacity: 8M bytes, unformatted
Transfer Rate: 538K byte/sec
Average Access Time: 70 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: Seagate ST506
Price: $3,459, with controller
Distribution Method: End user
Number Installed to Date: 100-500
Date First Installed: 1980

MEGAVAULT
MV20
Disk Diameter: 8 in.
Capacity: 20M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 45 msec
Integral Controller: No
Interface: Ansi 1226, SCSI, SMD; Shugart SA 1000; Seagate ST512
Distribution Method: OEM
(See Vendor Profile Page V-23)

MEMOREX CORP.
101
Disk Diameter: 8 in
Capacity: 11M bytes, formatted
Transfer Rate: 593K byte/sec
Average Access Time: 70 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: Shugart SA 4000
Price: $1,450, without controller
Distribution Method: OEM
Date First Installed: September 1980
(See Vendor Profile Page V-23)

MEMOREX CORP.
321
Disk Diameter: 5¼ in.
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $645, without controller
Distribution Method: OEM
Date First Installed: July 1983

MEMOREX CORP.
322
Disk Diameter: 5¼ in.
Capacity: 13M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $775, without controller
Distribution Method: OEM
Date First Installed: July 1983

MEMOREX CORP.
323
Disk Diameter: 5¼ in.
Capacity: 20M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $905, without controller
Distribution Method: OEM
Date First Installed: July 1983

MICRO DATA SYSTEMS
EZ 825
Disk Diameter: 5¼ in.
Compatibility: Zenith Z89; Xerox 1; S-100
Capacity: 5M bytes, unformatted
Transfer Rate: 500K byte/sec
Average Access Time: 125 msec
Mean Time Between Failure: 16,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $2,795, with controller
Distribution Method: Third-party
Number Installed to Date: 100-500
Date First Installed: December 1981
(See Vendor Profile Page V-24)

MICRO DATA SYSTEMS
EZ 845
Disk Diameter: 5¼ in.
Compatibility: Zenith Z89; Xerox 1; S-100
Capacity: 20M bytes, unformatted
Transfer Rate: 500K byte/sec
Average Access Time: 125 msec
Mean Time Between Failure: 16,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Price: $3,495, with controller
Distribution Method: Third-party
Number Installed to Date: 100-500
Date First Installed: July 1982

MICROPOLIS CORP.
1302 SA
Disk Diameter: 8 in
Capacity: 20M bytes, formatted
Transfer Rate: 540K byte/sec
Average Access Time: 45 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Shugart SA 1000, SA 1100
Distribution Method: OEM
Date First Installed: August 1982
(See Vendor Profile Page V-24)

MICROPOLIS CORP.
1221
Disk Diameter: 5¼ in.
Capacity: 8M bytes, formatted
Transfer Rate: 922K byte/sec
Average Access Time: 42 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Micropolis
Price: $1,775, without controller
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: June 1982

MICROPOLIS CORP.
1302
Disk Diameter: 5¼ in.
Plug Compatibility: Seagate ST506/ST412
Capacity: 17M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 33 msec
Mean Time Between Failure: 13,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
Price: $975, without controller
Distribution Method: OEM
Date First Installed: April 1983

MICROSCIENCE INTERNATIONAL
MSI-1 (model)
Disk Diameter: 5¼-in.
Capacity: 10M bytes, formatted
Transfer Rate: 725K byte/sec
Average Access Time: 55 msec
Mean Time Between Failure: 1,000 hours
Integral Controller: No
Interface: Seagate ST506

Winchester Disk Drives

Price: $1,999, without controller
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1982
(See Vendor Profile Page V-24)

[illegible]
2006
Disk Diameter: 5¼ in.
Plug Compatibility: Seagate ST412
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
[illegible]: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST412
Price: $692, without controller
[illegible]: OEM
[illegible]: More than 50,000
Date First Installed: December 1981
(See Vendor Profile Page V-24)

[illegible]
2012
Disk Diameter: 5¼ in.
Plug Compatibility: Seagate ST412
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST412
Price: $879, without controller
Distribution Method: OEM
[illegible]: More than 50,000
Date First Installed: December 1981

[illegible]
3006
Disk Diameter: 5¼ in.
Plug Compatibility: Seagate ST412
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST412
Price: $622, without controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: January 1983

[illegible]
3012
Disk Diameter: 5¼ in.
Plug Compatibility: Seagate ST412
Capacity: 12M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 155 msec
Mean Time Between Failure: 10,000 hours
[illegible]: 4
Integral Controller: No
Interface: Seagate ST412
Price: $80,700, without controller
Distribution Method: OEM
[illegible]: 1,000-5,000
Date First Installed: January 1983

[illegible]
4010
Disk Diameter: 5¼ in.
Plug Compatibility: Seagate ST412
Capacity: 10M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 120 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST412
Distribution Method: OEM
Number Installed to Date: More than 50,000
Date First Installed: June 1982

[illegible]
4020
Disk Diameter: 5¼ in
Plug Compatibility: Seagate ST412
Capacity: 20M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 120 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST412
Distribution Method: OEM
Number Installed to Date: More than 50,000
Date First Installed: June 1982

MOUNTAIN COMPUTER, INC.
DDS-01-445-01
Disk Diameter: 5¼ in.
Compatibility: Apple I, Apple II +
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST406
Price: $1,995, with controller
Distribution Method: End user
Date First Installed: October 1982
(See Vendor Profile Page V-25)

MOUNTAIN COMPUTER, INC.
DDS-01-445-02
Disk Diameter: 5¼ in.
Compatibility: Apple I, II +
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST412
Price: $2,495, with controller
Distribution Method: End user

MOUNTAIN COMPUTER, INC.
DDS-01-445-03
Disk Diameter: 5¼ in.
Compatibility: Apple I, II +
Capacity: 15M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST419
Price: $2,995, with controller
Distribution Method: OEM
Date First Installed: October 1982

MOUNTAIN COMPUTER, INC.
DDS-01-432-01
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 5M bytes, unformatted
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST406
Price: $1,995, with controller
Distribution Method: End user
Date First Installed: October 1982

MOUNTAIN COMPUTER, INC.
DDS-01-482-02
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 1M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST412
Price: $2,495, with controller
Distribution Method: End user

MOUNTAIN COMPUTER, INC.
DDS-01-482-03
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 15M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST419
Price: $2,995, with controller
Distribution Method: OEM
Date First Installed: October 1982

MOUNTAIN COMPUTER, INC.
DDS-01-492-02
Disk Diameter: 5¼ in
Compatibility: Apple III
Capacity: 15M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST419
Price: $2,995, with controller
Distribution Method: OEM
Date First Installed: October 1982

MOUNTAIN COMPUTER, INC.
DDS-01-494-01
Disk Diameter: 5¼ in.
Compatibility: Apple III
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST406
Price: $1,995, with controller
Distribution Method: End user
Date First Installed: October 1982

MOUNTAIN COMPUTER, INC.
DDS-01-494-02
Disk Diameter: 5¼ in.
Compatibility: Apple III
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST412
Price: $2,495, with controller
Distribution Method: End user
Date First Installed: October 1982

NEC INFORMATION SYSTEMS, INC.
[illegible]
Disk Diameter: 5¼ in.
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec.
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 5
Integral Controller: Yes
Interface: Seagate ST738
Price: $915, with controller
Distribution Method: OEM, Third-party
Date First Installed: April 1983
(See Vendor Profile Page V-26)

NEC INFORMATION SYSTEMS, INC.
[illegible]
Disk Diameter: 5¼ in
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 5
Integral Controller: Yes
Interface: Seagate ST738
Price: $1,180, with controller
Distribution Method: OEM, Third-party
Date First Installed: April 1983

NEC INFORMATION SYSTEMS, INC.
D5234
Disk Diameter: 5¼ in.
Capacity: 15M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 5
Integral Controller: Yes
Interface: Seagate ST738
Price: $1,250, with controller
Distribution Method: OEM, Third-party
Date First Installed: April 1983

[illegible]
8350-X2
Compatibility: IBM 4300, 3700 [illegible]
Plug Compatibility: IBM 3350
Capacity: 1M bytes, unformatted
Transfer Rate: 120K byte/sec
Average Access Time: 23 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Integrated
Price: $41,130, without controller; $46,710, with controller
Distribution Method: End user
Number Installed to Date: Under [illegible]
Date First Installed: 1981
(See Vendor Profile Page V-26)

ONYX & IMI, INC.
5006H
Disk Diameter: 5¼ in.
Capacity: 6M bytes, formatted.
Average Access Time: 68 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506

Price: $900, without controller; $1,285, with controller
Distribution Method: Third-party
Number Installed to Date: 5,000-10,000
Date First Installed: July 1982
(See Vendor Profile Page V-27)

ONYX & IMI, INC.
5012H
Disk Diameter: 5¼ in.
Plug Compatibility: CH 412
Capacity: 12M bytes, formatted
Average Access Time: 68 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $950, without controller; $1,335, with controller
Distribution Method: Third-party
Number Installed to Date: 5,000-10,000
Date First Installed: July 1982

ONYX & IMI, INC.
5018H
Disk Diameter: 5¼ in.
Capacity: 18M bytes, formatted
Average Access Time: 68 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $995, without controller; $1,380, with controller
Distribution Method: Third-party
Number Installed to Date: 5,000-10,000
Date First Installed: July 1982

ONYX & IMI, INC.
7710
Disk Diameter: 8 in.
Capacity: 10M bytes, unformatted
Transfer Rate: 648K byte/sec
Average Access Time: 35 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: Ansi X3T9.3, IMI Bus
Price: $1,450, without controller; $1,700, with controller
Distribution Method: OEM
Number Installed to Date: 20,000
Date First Installed: June 1978

ONYX & IMI, INC.
7720
Disk Diameter: 8 in.
Capacity: 19M bytes, unformatted
Transfer Rate: 648K byte/sec
Average Access Time: 35 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: Ansi X3T9.3, IMI Bus
Price: $1,650, without controller; $1,900, with controller
Distribution Method: OEM
Number Installed to Date: 15,000
Date First Installed: June 1979

ONYX & IMI, INC.
9810R
Disk Diameter: 8 in.
Compatibility: PE
Capacity: 10M bytes, unformatted
Transfer Rate: 500K byte/sec
Average Access Time: 35 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 1
Integral Controller: No
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: 1979

ONYX & IMI, INC.
9820R
Disk Diameter: 8 in.
Compatibility: PE
Capacity: 19M bytes, unformatted
Transfer Rate: 500K byte/sec
Average Access Time: 35 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 1
Integral Controller: No
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000-5,000
Date First Installed: 1979

PERCOM DATA CORP.
PHD 5/5A
Disk Diameter: 5¼ in.
Compatibility: Tandy TRS-80; IBM Personal Computer; Apple II
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Price: $1,495, without controller; $1,595, with controller
(See Vendor Profile Page V-28)

PERCOM DATA CORP.
PHD 10/10A
Disk Diameter: 5¼ in
Compatibility: Tandy TRS-80; IBM Personal Computer; Apple II
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Maximum Drives Per Controller: 4
Price: $1,895, without controller; $1,995, with controller

PERCOM DATA CORP.
PHD 15/15A
Disk Diameter: 5¼ in
Compatibility: Tandy TRS 80; IBM Personal Computer; Apple II
Capacity: 15M bytes, unformatted
Transfer Rate: 625K byte/sec
Maximum Drives Per Controller: 4
Price: $2,395, without controller; $2,495, with controller

PERCOM DATA CORP.
PHD 20/20A
Disk Diameter: 5¼ in
Compatibility: Tandy TRS 80; IBM Personal Computer; Apple II
Capacity: 20M bytes, unformatted
Transfer Rate: 625K byte/sec
Maximum Drives Per Controller: 4
Price: $2,895, without controller; $2,995, with controller

PH-ASSOCIATES, INC.
DSS-5B
Disk Diameter: 5¼ in.
Compatibility: Northstar
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $1,995, with controller
Distribution Method: End user, OEM
Date First Installed: May 1983
(See Vendor Profile Page V-28)

PH-ASSOCIATES, INC.
DSS-10B
Disk Diameter: 5¼ in.
Compatibility: Northstar Advantage; Apple, IBM Personal Computer; Tandy TRS-80
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $2,295, with controller
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First Installed: May 1983

PH-ASSOCIATES, INC.
MARK 20
Disk Diameter: 5¼ in.
Compatibility: Northstar Advantage; Apple, IBM Personal Computer; Tandy TRS-80
Capacity: 20M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 30 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $3,333, with controller
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First Installed: January 1983

PH-ASSOCIATES, INC.
DSS 15B
Disk Diameter: 5¼ in.
Compatibility: Northstar Advantage; Apple, IBM Personal Computer; Tandy TRS-80
Capacity: 15M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $2,695, with controller
Distribution Method: End user, OEM

POLYMORPHIC SYSTEMS
HD/18
Disk Diameter: 5¼ in.
Compatibility: Polymorph 8813, 8810
Capacity: 18M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 70 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Seagate ST506
Price: $3,995, with controller
Distribution Method: Third-party
Date First Installed: September 1982
(See Vendor Profile Page V-29)

PROFESSIONAL MICRO SYSTEMS
PMS 6
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: 12,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Seagate ST506
Price: $2,200, without controller
Date First Installed: May 1979
(See Vendor Profile Page V-29)

PROFESSIONAL MICRO SYSTEMS
PMS 20
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Capacity: 20M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: 12,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Seagate ST506
Price: $2,895, with controller
Distribution Method: Third-party
Date First Installed: May 1979

QUANTUM CORP.
Q520
Disk Diameter: 5¼ in.
Plug Compatibility: Seagate ST412
Capacity: 20M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 45 msec
Mean Time Between Failure: 10,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Seagate ST506
Price: $1,700, without controller
Distribution Method: OEM
Date First Installed: June 1981
(See Vendor Profile Page V-30)

QUANTUM CORP.
Q2010
Disk Diameter: 8 in.
Compatibility: Shugart SA 1000
Capacity: 10M bytes, formatted
Transfer Rate: 542K byte/sec
Average Access Time: 55 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Shugart SA 1000
Price: $1,950, without controller
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
Date First Installed: June 1981

QUANTUM CORP.
Q2020
Disk Diameter: 8 in.
Compatibility: Shugart SA 1000
Capacity: 20M bytes, formatted
Transfer Rate: 542K byte/sec
Average Access Time: 60 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: Shugart SA 1000
Price: $2,415, without controller
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
Date First Installed: June 1981

QUENTIN RESEARCH, INC.
QA-506
Disk Diameter: 5¼ in.

Winchester Disk Drives

Compatibility: Apple II, Apple II+, Apple IIe
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Price: $2,195, without controller
Distribution Method: OEM
Date First Installed: May 1983
(See Vendor Profile Page V-30)

QUENTIN RESEARCH, INC.
QA-510
Disk Diameter: 5¼ in.
Compatibility: Apple II, Apple II+, Apple IIe
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Price: $2,395, without controller
Distribution Method: OEM
Date First Installed: May 1983

QUENTIN RESEARCH, INC.
QA-515
Disk Diameter: 5¼ in.
Compatibility: Apple II, Apple II+, Apple IIe
Capacity: 15M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 80 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Price: $2,695, without controller
Distribution Method: OEM
Date First Installed: May 1983

QUENTIN RESEARCH, INC.
QA-520
Disk Diameter: 5¼ in.
Compatibility: Apple II, Apple II+, Apple IIe
Capacity: 20M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 40 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Price: $2,995, without controller
Distribution Method: OEM
Date First Installed: May 1983

RODIME CORP.
RO201
Disk Diameter: 5¼ in.
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: 12,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $990, without controller
Distribution Method: Third-party
Number Installed to Date: 5,000-10,000
Date First Installed: January 1983
(See Vendor Profile Page V-31)

RODIME CORP.
RO202
Disk Diameter: 5¼ in.
Compatibility: Seagate ST506
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Mean Time Between Failure: 90 hours
Integral Controller: No
Price: $1,225, without controller
Distribution Method: Third-party
Number Installed to Date: 5,000-10,000
Date First Installed: January 1982

RODIME CORP.
RO203
Disk Diameter: 5¼ in
Compatibility: Seagate ST506
Capacity: 15M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: 12,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $1,460, without controller
Distribution Method: Third-party
Number Installed to Date: 5,000-10,000
Date First Installed: January 1982

RODIME CORP.
RO352
Disk Diameter: 3½ in.
Compatibility: ST 506
Capacity: 12M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 12,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $1,250, without controller
Distribution Method: Third-party
Date First Installed: April 1983

SEAGATE TECHNOLOGY
ST406
Disk Diameter: 5¼ in.
Compatibility: Apple; HP; DEC
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
Price: $840, without controller
Distribution Method: OEM
(See Vendor Profile Page V-32)

SEAGATE TECHNOLOGY
ST412
Disk Diameter: 5¼ in.
Compatibility: Apple; HP; DEC
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
Price: $930, without controller
Distribution Method: OEM
Date First Installed: February 1982

SEAGATE TECHNOLOGY
ST419
Disk Diameter: 5¼ in.
Compatibility: Apple; HP; DEC
Capacity: 15M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
Price: $1,100, without controller
Distribution Method: OEM, Third-party

SEAGATE TECHNOLOGY
ST506
Disk Diameter: 5¼ in.
Compatibility: Apple; HP; DEC
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 4
Integral Controller: No
Interface: Seagate ST506
Price: $884, without controller
Distribution Method: OEM
Date First Installed: September 1980

SHUGART ASSOCIATES, INC.
ASS002
Disk Diameter: 8 in.
Capacity: 5M bytes, formatted
Transfer Rate: 542K byte/sec
Average Access Time: 70 msec
Mean Time Between Failure: 8,000 hours
Distribution Method: OEM
Date First Installed: April 1979
(See Vendor Profile Page V-32)

SHUGART ASSOCIATES, INC.
SA 604
Disk Diameter: 5¼ in.
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 99 msec
Mean Time Between Failure: 11,500 hours
Distribution Method: OEM

SHUGART ASSOCIATES, INC.
SA 606
Disk Diameter: 5¼ in.
Capacity: 10M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 99 msec
Mean Time Between Failure: 11,500 hours
Distribution Method: OEM

SHUGART ASSOCIATES, INC.
SA 612
Disk Diameter: 5¼ in.
Capacity: 12M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 99 msec
Mean Time Between Failure: 11,500 hours
Distribution Method: OEM

SHUGART ASSOCIATES, INC.
SA 706
Disk Diameter: 5¼ in.
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 99 msec
Mean Time Between Failure: 20,000 hours
Distribution Method: OEM

SHUGART ASSOCIATES, INC.
SA 712
Disk Diameter: 5¼ in.
Capacity: 13M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 99 msec
Mean Time Between Failure: 20,000 hours
Distribution Method: OEM

SHUGART ASSOCIATES, INC.
SA 1004
Disk Diameter: 8 in.
Capacity: 10M bytes, formatted
Transfer Rate: 542K byte/sec
Average Access Time: 70 msec
Mean Time Between Failure: 8,000 hours
Distribution Method: OEM

SHUGART ASSOCIATES, INC.
SA 4004
Disk Diameter: 14 in.
Capacity: 14M bytes, formatted
Transfer Rate: 887K byte/sec
Average Access Time: 65 msec
Mean Time Between Failure: 8,000 hours
Distribution Method: OEM
Date First Installed: March 1978

STAR TECHNOLOGIES
DART WINCHESTER SUBSYSTEM
1.6MB
Disk Diameter: 8 in
Compatibility: DG Nova
Capacity: 10M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 45 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: DG Nova Bus
Price: $4,500, with controller
Distribution Method: Third-party
Number Installed to Date: 1,000-5,000
Date First Installed: January 1981
(See Vendor Profile Page V-33)

STAR TECHNOLOGIES
DART WINCHESTER SUBSYSTEM
3.4MB
Disk Diameter: 8 in.
Compatibility: DG Nova
Capacity: 3.4M bytes, unformatted
Transfer Rate: 1,200K byte/sec
Average Access Time: 45 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Interface: DG Nova Bus
Price: $5,600, with controller
Distribution Method: Third-party
Number Installed to Date: 1,000-5,000
Date First Installed: January 1981

SYQUEST TECHNOLOGY, INC.
SQ306S
Disk Diameter: 3.5 in.
Compatibility: IBM Personal Computer; DEC LSI-2
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Mean Time Between Failure: 1,000 hours
Integral Controller: No
Price: $800, without controller
Distribution Method: OEM, Third-party
Date First Installed: October 1982
(See Vendor Profile Page V-33)

TANDON CORP.
TM501
Disk Diameter: 5¼ in.
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Integral Controller: No
Distribution Method: OEM
Date First Installed: January 1983
(See Vendor Profile Page V-34)

TANDON CORP.
TM502
Disk Diameter: 5¼ in.
Capacity: 12M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec

Mean Time Between Failure: 11,000 hours
Integral Controller: No
Distribution Method: OEM
Date First Installed: January 1983

TANDON CORP.
TM503
Disk Diameter: 5¼ in.
Capacity: 19M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 11,000 hours
Integral Controller: No
Distribution Method: OEM
Date First Installed: January 1983

TANDON CORP.
TM602
Disk Diameter: 5¼ in.
Capacity: 6M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 153 msec
Mean Time Between Failure: 11,000 hours
Integral Controller: No
Distribution Method: OEM
Date First Installed: September 1980

TANDON CORP.
TM602SE
Disk Diameter: 5¼ in.
Capacity: 9M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 210 msec
Mean Time Between Failure: 11,000 hours
Integral Controller: No
Distribution Method: OEM
Date First Installed: September 1980

TANDON CORP.
TM603
Disk Diameter: 5¼ in.
Capacity: 9M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 153 msec
Mean Time Between Failure: 11,000 hours
Integral Controller: No
Distribution Method: OEM
Date First Installed: September 1980

TANDON CORP.
TM603SE
Disk Diameter: 5¼ in.
Capacity: 14M bytes, formatted
Transfer Rate: 625K byte/sec
Average Access Time: 210 msec
Mean Time Between Failure: 11,000 hours
Integral Controller: No
Distribution Method: OEM
Date First Installed: September 1980

TECMAR, INC.
WINCHESTER SHARE/15 EXPANSION
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Plug Compatibility: TI
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 85 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Interface: Seagate ST506
Price: $2,795, with controller
Distribution Method: Third-party
Date First Installed: March 1982
(See Vendor Profile Page V-36)

TECMAR, INC.
WINCHESTER SHARE/15 EXPANSION
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer
Plug Compatibility: TI
Capacity: 16M bytes, unformatted
Transfer Rate: 625K byte/sec
Mean Time Between Failure: 8,000 hours
Integral Controller: Yes
Interface: Seagate ST506
Price: $3,195, with controller
Distribution Method: Third-party

TEXAS INSTRUMENTS, INC.
WD 500
Disk Diameter: 5¼ in.
Compatibility: TI 851
Capacity: 11M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 87 msec
Maximum Drives Per Controller: 8
Integral Controller: Yes
Distribution Method: Third-party
(See Vendor Profile Page V-37)

TEXAS INSTRUMENTS, INC.
WD 500/18
Disk Diameter: 8 in.
Compatibility: TI 300, 600, 800
Capacity: 18M bytes, unformatted
Transfer Rate: 1810K byte/sec
Average Access Time: 45 msec
Integral Controller: Yes
Distribution Method: OEM
Date First Installed: April 1982

THOUGHTWORKS, INC.
HD 105
Disk Diameter: 5¼ in.
Compatibility: Sanyo MBC Series; Zenith Z100; Xerox 820, Apple II
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $2,495, with controller
Distribution Method: Third-party
Number Installed to Date: 100-500
(See Vendor Profile Page V-37)

THOUGHTWORKS, INC.
HD 110
Disk Diameter: 5¼ in.
Compatibility: Sanyo MBC; Zenith Z100; Xerox 820; Apple II
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $2,995, with controller
Distribution Method: Third-party
Number Installed to Date: 100-500

THOUGHTWORKS, INC.
HD 120
Disk Diameter: 5¼ in.
Compatibility: Sanyo MBC; Zenith Z100, Xerox 820; Apple II
Capacity: 20M bytes, unformatted
Transfer Rate: 625K byte/sec
Mean Time Between Failure: 8,000 hours
Integral Controller: No
Interface: Seagate ST506
Price: $4,495, with controller
Distribution Method: Third-party
Number Installed to Date: 100-500
Date First Installed: 1982

3M CO.
8431
Disk Diameter: 8 in.
Capacity: 10M bytes, formatted
Transfer Rate: 933K byte/sec
Average Access Time: 65 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Ansi 1226
Price: $2,345, without controller
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: February 1981
(See Vendor Profile Page V-37)

3M CO.
8432
Disk Diameter: 8 in.
Capacity: 20M bytes, formatted
Transfer Rate: 933K byte/sec
Average Access Time: 65 msec
Mean Time Between Failure: 10,000 hours
Integral Controller: No
Interface: Ansi 1226
Price: $2,675, without controller
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: February 1981

TOSHIBA AMERICA, INC.
MK80-F20
Disk Diameter: 8 in.
Plug Compatibility: CDC
Capacity: 16M bytes, unformatted
Transfer Rate: 1,210K byte/sec
Average Access Time: 40 msec
Integral Controller: No
Interface: SMD
Date First Installed: May 1981
(See Vendor Profile Page V-37)

TOSHIBA AMERICA INC.
MK80-F10
Disk Diameter: 8 in.
Plug Compatibility: CDC
Capacity: 12M bytes, unformatted
Transfer Rate: 1,210K byte/sec
Average Access Time: 40 msec
Integral Controller: No
Interface: SMD
Distribution Method: OEM
Date First Installed: May 1981

TRAK MICROCOMPUTER CORP.
COMMANDER 5
Disk Diameter: 5¼ in.
Compatibility: Zenith 100; IBM Personal Computer
Capacity: 5M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 72 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $2,495, with controller
Distribution Method: Third-party
Number Installed to Date: 500
Date First Installed: November 1982
(See Vendor Profile Page V-37)

TRAK MICROCOMPUTER CORP.
COMMANDER 10
Disk Diameter: 5¼ in.
Compatibility: Zenith 100; IBM
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 72 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $2,200, with controller
Distribution Method: Third-party
Number Installed to Date: 500
Date First Installed: November 1982

TRAK MICROCOMPUTER CORP.
COMMANDER 15
Disk Diameter: 5¼ in.
Compatibility: Zenith 100, IBM Personal Computer
Capacity: 15M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 72 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $2,490, with controller
Distribution Method: Third-party
Number Installed to Date: 500
Date First Installed: November 1982

TRANTOR SYSTEMS LTD.
TRANTOR TSL-5
Disk Diameter: 5¼ in
Compatibility: Osborne 1, Executive; Apple II, Franklin Ace 100
Capacity: 5M bytes, formatted
Transfer Rate: 64K byte/sec
Average Access Time: 23 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: IEEE 48
Price: $2,395, with controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: 1982
(See Vendor Profile Page V-37)

TRANTOR SYSTEMS LTD.
TRANTOR TSL-10
Disk Diameter: 5¼ in
Compatibility: Osborne 1, Executive; Apple II, Franklin Ace 100
Capacity: 10M bytes, formatted
Transfer Rate: 64K byte/sec
Average Access Time: 23 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: IEEE 48
Price: $2,895, with controller
Distribution Method: OEM
Number Installed to Date: Under 100

TRANTOR SYSTEMS LTD.
TRANTOR TSL-15
Disk Diameter: 5¼ in
Compatibility: Osborne 1, Executive, Apple II, Franklin Ace 100
Capacity: 15M bytes, formatted
Transfer Rate: 64K byte/sec
Average Access Time: 23 msec
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: IEEE 48
Price: $3,395, with controller
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: 1982

UNITED PERIPHERALS, INC.
UP-1000
Disk Diameter: 14 in.

Winchester Disk Drives

Compatibility: HP 3000
Capacity: 600K bytes, formatted
Transfer Rate: 1,198K byte/sec
Average Access Time: 23 msec
Maximum Drives Per Controller: 4
Integral Controller: Yes
Distribution Method: End user
Date First Installed: June 1980
(See Vendor Profile Page V-38)

[illegible], INC.
RAINBOW-COMPATIBLE 5¼-IN. HARD DISK
Disk Diameter: 5¼ in.
Compatibility: DEC Rainbow 100
Capacity: 11M bytes, unformatted
Transfer Rate: 675K byte/sec
Average Access Time: 155 msec
Mean Time Between Failure: 8,000 hours
Integral Controller: Yes
Distribution Method: OEM, Third-party
Number Installed to Date: 100-500
Date First Installed: June 1983
(See Vendor Profile Page V-38)

[illegible] DATA CORP.
HARD DISK 3 (SINGLE 10 MB)
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer; Tandy TRS-80/I, TRS-80/III, LNW 2
Capacity: 10M bytes, formatted
Transfer Rate: 312K byte/sec
Average Access Time: 135 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $1,249, without controller; $1,399, with controller
[illegible]: OEM
[illegible]: 500-1,000
[illegible]: [illegible]
(See Vendor Profile Page V-39)

[illegible] DATA CORP.
HARD DISK 3 (SINGLE 15MB)
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer; Tandy TRS-80/I, TRS-80/III, LNW 2
Capacity: 15M bytes, formatted
Transfer Rate: 312K byte/sec
Average Access Time: 135 msec
[illegible]: 11,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: Seagate ST506
Price: $1,449, without controller; $1,599, with controller
[illegible]: OEM
[illegible]: 500-1,000
[illegible]: 1982

[illegible] DATA CORP.
HARD DISK 3 (SINGLE 5MB)
[illegible]: 5¼ in.
Compatibility: IBM Personal Computer; Tandy TRS-80/III, TRS-80/I, LNW 2
Capacity: 5M bytes, formatted
Transfer Rate: 312K byte/sec
Average Access Time: 135 msec
Mean Time Between Failure: 11,000 hours
Maximum Drives Per Controller: 2
[illegible]: Yes
Interface: Seagate ST506
Price: $995, without controller; $1,495, with controller
Distribution Method: OEM
Date First Installed: 1982

WANG LABORATORIES, INC.
8560
Disk Diameter: 14 in
Compatibility: Wang OIS
Capacity: 10M bytes, unformatted
Price: $9,000, without controller
Date First Installed: September 1975
(See Vendor Profile Page V-39)

WANG LABORATORIES, INC.
[illegible]
Disk Diameter: 8 in.
Compatibility: Wang OIS
Capacity: 10M bytes, unformatted
Price: $9,000, without controller
Distribution Method: End user
Date First Installed: September 1975

XCOMP, INC.
[illegible]
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer; XT, Apple II, III; Osborne; Kaypro
Capacity: 10M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 120 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: SMD, Seagate ST506; SMR, SMS, CDS, CDR
Price: $2,195, without controller
Distribution Method: Third-party
Date First Installed: September 1980
(See Vendor Profile Page V-39)

XCOMP, INC.
PHD 8 X 8
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer; XT; Apple II, III; Osborne; Kaypro
Capacity: 16M bytes, unformatted
Transfer Rate: 625K byte/sec
Average Access Time: 120 msec
Mean Time Between Failure: 8,000 hours
Maximum Drives Per Controller: 1
Integral Controller: Yes
Interface: SMD, Seagate ST506; SMR, SMS; CDS, CDR
Price: $2,395, without controller
Distribution Method: Third-party
Date First Installed: September 1980

XEBEC
XEBEC-9705
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer; Apple,II, Apple II+, Apple IIe
Capacity: 5M bytes, unformatted
Transfer Rate: 500K byte/sec
Average Access Time: 72 msec
Mean Time Between Failure: 6,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
[illegible]: [illegible]
Price: $1,650, with controller
[illegible]: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: January 1982
(See Vendor Profile Page V-39)

XEBEC
XEBEC 8710
Disk Diameter: 5¼ in.
Compatibility: IBM Personal Computer, Apple II, Apple IIe, Apple II+
Capacity: 10M bytes, unformatted
Transfer Rate: 600K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: 6,000 hours
Maximum Drives Per Controller: 2
Integral Controller: Yes
Interface: [illegible]
Price: $1,750, with controller
Distribution Method: OEM
Number Installed to Date: 1,000-5,000

XEBEC
XEBEC-9600
Disk Diameter: 5¼ in.
Compatibility: HP 3000, 80, 120, 250
Plug Compatibility: HP 9134
Capacity: 5M bytes, unformatted
Transfer Rate: 600K byte/sec
Average Access Time: 90 msec
Mean Time Between Failure: 6,000 hours
[illegible]: 2
Integral Controller: Yes
Interface: Seagate ST506, IEEE 488
Price: $2,000, with controller
Distribution Method: Third-party
[illegible]: 1,000
Date First Installed: June 1981

TAPE DRIVES

Index to Tape Drives By Technology and Speed

The index to tape drives has been designed to provide an overview of the products listed in this section of the buyer's guide. The products have been indexed according to which tape technology — cartridge, cassette or reel-to-reel — the drive utilizes. Products in each category are sorted by tape speed from fastest to slowest. In addition to tape speed, the index provides information on recording density, price and the page number in the section the full product listing is located.

The product listings for the tape drive section are broken down according to tape technology and, within each category, have been sorted by tape speed range. For cartridge and reel-to-reel tape drives the ranges are: those drives which have speeds over 100 in./sec, 51- to 100 in./sec and those drives with speeds under 50 in./sec. Cassette tape drive ranges start with drives which have tape speeds of over 46 in./sec, followed by the 26- to 45 in./sec and under 25 in./sec ranges. Within each range the products can be found in alphabetical order by vendor name.

Cartridge Tape Drives

VENDOR	MODEL	TAPE SPEED	RECORDING DENSITY	PRICE	PAGE
MegaTape Corp.	MODEL 300	200 in./sec	9600 bit/in.	$3,000	C-69
Qualex Technology	MODEL 3211	125 in./sec	6250 bit/in.	$43,950	C-69
Central Data Corp.	D4000	90 in./sec	N/A	$3,700	C-69
Nestar Systems, Inc.	PLAN 4000	90 in./sec	8000 bit/in.	$3,000	C-69
Northern Telecom, Inc.	FLASHBACK MTC-6100	90 in./sec	10000 bit/in.	$1,600	C-69
Gentex	410	90 in./sec	8500 bit/in.	$1,625	C-69
Raymond Engineering, Inc.	SERIES 6449 RAYCORDER	90 in./sec	1600 bit/in.	$895 to $1,095	C-69
Tallgrass Technologies Corp.	TG/4020	90 in./sec	8000 bit/in.	$2,195	C-70
	TG/4045	90 in./sec	8000 bit/in.	$2,495	C-70
Tektronix, Inc.	4924	90 in./sec	1600 bit/in.	$2,990	C-70
	4923	90 in./sec	1600 bit/in.	$2,600	C-70
Cipher Data Products, Inc.	525-CT FLOPPYTAPE	78 in./sec	6400 bit/in.	$300	C-69
Qualex Technology	MODEL 3271	75 in./sec	6250 bit/in.	$42,950	C-69
Data General Corp.	15MB TAPE SUBSYSTEM	60 in./sec	6400 bit/in.	N/A	C-69
	6231/6230	60 in./sec	6400 bit/in.	$5,500	C-69
3M Co.	HCD-75	60 in./sec	6400 bit/in.	$874	C-70
Computer Peripherals, Inc.	SENTINEL 92190	55 in./sec	8000 bit/in.	$1,500	C-69
	SENTINEL 92191	55 in./sec	8000 bit/in.	$1,500	C-69
Control Data Corp.	92190 ¼-in. TAPE DRIVE	55 in./sec	8000 bit/in.	$1,020	C-69
	92195 ¼-in. TAPE DRIVE	55 in./sec	8000 bit/in.	$1,275	C-69
Analog & Digital Peripherals	FEEDBACK 350/351	45 in./sec	1600 bit/in.	$2,550	C-70
Qantel Corp.	5231	45 in./sec	6400 bit/in.	$5,600	C-72
Kennedy Co.	6470	36 in./sec	6400 bit/in.	$2,000	C-71
Algo, Inc.	1200I	30 in./sec	1600 bit/in.	$2,200	C-70
	1200S	30 in./sec	1600 bit/in.	$2,200	C-70
Analog & Digital Peripherals	1100	30 in./sec	800 bit/in.	$175	C-70
	DC1/DC2 DATA TAPE SYS.	30 in./sec	800 bit/in.	$795	C-70
	BC 300	30 in./sec	1600 bit/in.	$1,150	C-70
	MINI DATA DRIVE DC100	30 in./sec	800 bit/in.	$270	C-70
Data Electronics, Inc.	FUNNEL	30 in./sec	6400 bit/in.	$1,952	C-70
	MICROTAPE-SLI	30 in./sec	6400 bit/in.	$800	C-70
	MICROTAPE-SLV	30 in./sec	6400 bit/in.	$900	C-70
	STREAMER	30 in./sec	10000 bit/in.	$1,421	C-70
Digi-Data Corp.	MODEL 70M	30 in./sec	6400 bit/in.	$2,290	C-70
	MODEL 70Q	30 in./sec	6400 bit/in.	$2,790	C-70
	MODEL 70R	30 in./sec	6400 bit/in.	$2,290	C-70
	MODEL 70S	30 in./sec	6400 bit/in.	$1,990	C-70
	SERIES 6400	30 in./sec	6400 bit/in.	$1,190	C-72
Digital Equipment Corp.	TU58	30 in./sec	800 bit/in.	$995	C-72
Electronic Processors, Inc.	EPI STR-STREAM	30 in./sec	6400 bit/in.	[illegible]	C-71
[illegible] Corp.	QIM-I/MIN	30 in./sec	N/A	N/A	D-71

Tape Drive Index

VENDOR	MODEL	TAPE SPEED	RECORDING DENSITY	PRICE	PAGE
Megalogic Corp.	QIM-I/MX	30 in./sec	1600 bit/in.	$3,200	C-72
Miltope Corp.	CR-300	30 in./sec	1600 bit/in.	$15,000	C-72
	CR-600	30 in./sec	800 bit/in.	$20,000	C-72
	MILITARIZED CR300 COMPACT	30 in./sec	1600 bit/in.	$10,000	C-72
Nestar Systems, Inc.	A-2401 CLUSTER/ONE MODEL A	30 in./sec	8000 bit/in.	$3,000	C-72
Prime Computer, Inc.	458X CARTRIDGE TAPE SLAVE	30 in./sec	6400 bit/in.	$4,500	C-72
	4581 CARTRIDGE TAPE DRIVE	30 in./sec	6400 bit/in.	$7,000	C-72
Qantex	150	30 in./sec	6400 bit/in.	$1,950	C-72
	450	30 in./sec	6400 bit/in.	$1,252	C-72
	650	30 in./sec	1600 bit/in.	$1,268	C-72
	2200	30 in./sec	6400 bit/in.	$3,700	C-73
3M Co.	DCD-1	30 in./sec	800 bit/in.	$534	C-73
	DCD-2	30 in./sec	1600 bit/in.	$886	C-73
Miltope Corp.	CR-600 CARTRIDGE RECORDER	25 in./sec	556 bit/in.	$12,000	C-72
Electronic Processors, Inc.	EPI STR-LINK III	18 in./sec	800 bit/in.	$1,504	C-72
	EPI STR-610	18 in./sec	800 bit/in.	$419	C-72
Qantex	200	15 in./sec	1600 bit/in.	N/A	C-72
	1000	15 in./sec	1600 bit/in.	$1,995	C-72
Analog & Digital Peripherals	FEEDBACK 340/344	N/A	1600 bit/in.	$2,395	C-73
Archive Corp.	SCORPION	N/A	8000 bit/in.	$800	C-73
	SIDEWINDER	N/A	8000 bit/in.	$800	C-73
	SUPER SIDEWINDER	N/A	8000 bit/in.	$800	C-73
Cipher Data Products, Inc.	420-CT QUARTERBACK	N/A	10000 bit/in.	$800	C-73
	540-CT	N/A	10000 bit/in.	$800	C-73

Cassette Tape Drives

VENDOR	MODEL	TAPE SPEED	RECORDING DENSITY	PRICE	PAGE
Tandberg Data Storage, Inc.	QIC-STAR MARK II 3309	90 in./sec	8000 bit/in.	$1,325	C-74
	QIC-STOR MARK II MODEL 3324	90 in./sec	8000 bit/in.	$1,500	C-74
	QIC-STOR MINI MARK 3314	90 in./sec	N/A	$1,500	C-74
	QIC-STOR MINI MARK 3319	90 in./sec	N/A	$1,575	C-74
	QIC-STOR 3304,3324,3204	90 in./sec	8000 bit/in.	$1,250	C-74
	QIC-STORE MINI MARK 3314	90 in./sec	N/A	$1,500	C-74
	QIC-STAR MARK II 3224, 3229	90 in./sec	8000 bit/in.	$1,500	C-74
	QUIC-STAR MARK II 3329	90 in./sec	8000 bit/in.	$1,575	C-74
Raymond Engineering, Inc.	SERIES 6440 RAYCORDER II	60 in./sec	800 bit/in.	$575 to $655	C-74
Analog & Digital Peripherals	ADPI BYTE BUCKET SYSTEM	45 in./sec	800 bit/in.	$1,095	C-74
	NCR-COMPAT DIGITAL SYSTEM	45 in./sec	800 bit/in.	$1,045	C-74
Altos Computer Systems	ALTOS MTU-2	30 in./sec	6400 bit/in.	$2,995	C-74
	ALTOS MTU-3	30 in./sec	6400 bit/in.	$2,995	C-74
	ALTOS MTU-4	30 in./sec	6400 bit/in.	$2,995	C-74
Kennedy Co.	6455	30 in./sec	6400 bit/in.	$1,000	C-74
Raymond Engineering, Inc.	WR-100	30 in./sec	6400 bit/in.	$1,175	C-74
	WR-1000	30 in./sec	10000	$1,500	C-74
Sayler Electronics International	4200-201 DIGITAL DRIVE	30 in./sec	1600 bit/in.	$875	C-74
	4200-204 DIGITAL DRIVE	30 in./sec	3200 bit/in.	$1,050	C-74
	4240 DIGITAL CASSETTE DRIVE	30 in./sec	3200	$1,475	C-74
3M Co.	DCD-3	30 in./sec	1600 bit/in.	$886	C-75
Dicom Industries	374-03	20 in./sec	500 bit/in.	$5,000	C-75
Memodyne Corp.	M-80	20 in./sec	800 bit/in.	$1,845	C-75
Techtran Industries, Inc.	MODEL 816A	20 in./sec	800 bit/in.	$1,045	C-75
	MODEL 817A	20 in./sec	800 bit/in.	$1,260	C-75
	MODEL 818A	20 in./sec	800 bit/in.	$1,610	C-75
	MODEL 822A	20 in./sec	800 bit/in.	$2,445	C-75
	MODEL 9500PRO	20 in./sec	800 bit/in.	$1,775	C-75
	MODEL 816	20 in./sec	800 bit/in.	$1,045	C-75
	MODEL 817	20 in./sec	800 bit/in.	$1,260	C-75
	MODEL 818	20 in./sec	800 bit/in.	$1,610	C-75
	MODEL 822	20 in./sec	800 bit/in.	N/A	C-75
Analog & Digital Peripherals	ADPI LG-1/LG-2	18 in./sec	800 bit/in.	$431	C-75
	LG-P PORTABLE MINI-CASSETTE	18 in./sec	800 bit/in.	$695	C-75
	PHILIPS MINI CASSETTE DRIVE	18 in./sec	N/A	$174	C-75
TEAC Corp. of America	MT-223/224	15 in./sec	1600 bit/in.	$300 to $500	C-75
	TEAC MT-2 MEMORY SYSTEM	15 in./sec	800 bit/in.	$300 to $500	C-75
Midwestern Instruments, Inc.	DIGITAL TAPE CASSETTE DRIVE	12 in./sec	800 bit/in.	$950 to $1,020	C-75
Braemar Computer Devices	CD-200 TAPE TRANSPORT	10 in./sec	800 bit/in.	$360	C-75
	CM-600A MINI TRANSPORT	10 in./sec	800 bit/in.	$155	C-75
	CM-600C MINI TRANSPORT	10 in./sec	800 bit/in.	$200	C-75

Tape Drive Index

VENDOR	MODEL	TAPE SPEED	RECORDING DENSITY	PRICE	PAGE
Brasseur Computer Devices	CS-400 TRANSPORT SYSTEM	10 in./sec	800 bit/in.	$525	C-75
	CTL-1000 TAPE LOADER	10 in./sec	800 bit/in.	$1,140	C-75
	LTD-800 LOGGER	10 in./sec	800 bit/in.	$325	C-75
William Palmer Industries	MTL-II MINI MEMORY SYSTEM	10 in./sec	800 bit/in.	$495	C-75
Electronic Processors, Inc.	DCR/10 DIGITAL RECORDER	10 in./sec	800 bit/in.	$2,400	C-76
	EPI STR-LINK IIA	4 in./sec	264 bit/in.	$1,887	C-75
Memodyne Corp.	EPI STR-410T	4 in./sec	264 bit/in.	$2,305	C-75
Raymond Engineering, Inc.	333C	3 in./sec	160 bit/in.	$980	C-75
Digital Laboratories, Inc.	MINI-RAYCORDER MODEL 6409	3 in./sec	800 bit/in.	$455 to $545	C-75
Memodyne Corp.	ACT-1200	2 in./sec	400 bit/in.	$1,000	C-75
Analog & Digital Peripherals	200 SERIES	1 in./sec	615 bit/in.	$395	C-75
Tandy Corp.	ADPI DISKLINE MPU SYSTEM	N/A	800 bit/in.	$798	C-75
	CCR-81	N/A	N/A	N/A	C-76

Reel-to-Reel Tape Drives

VENDOR	MODEL	TAPE SPEED	RECORDING DENSITY	PRICE	PAGE
Cipher Data Products, Inc.	M890/M891 CACHETAPE	240 in./sec	1600 bit/in.	$2,820	C-77
Amperif	SERIES 330A	200 in./sec	800 bit/in.	$23,000	C-77
	SERIES 330B	200 in./sec	800 bit/in.	$23,000	C-77
	SERIES 336	200 in./sec	1600 bit/in.	$26,000	C-77
Computer Peripherals, Inc.	ATS-1	200 in./sec	800 bit/in.	$20,000	C-77
Control Data Corp.	677-4	200 in./sec	800 bit/in.	$26,830	C-77
	679-4	200 in./sec	800 bit/in.	$27,375	C-77
	679-7	200 in./sec	1600 bit/in.	$33,510	C-77
IBM	3420 MODEL 7	200 in./sec	200 bit/in.	N/A	C-78
	3420 MODEL 8	200 in./sec	1600 bit/in.	$24,840	C-78
Interscience Systems	3470	200 in./sec	200 bit/in.	$26,000	C-78
	3670	200 in./sec	1600 bit/in.	$30,000	C-78
Masstor Systems Corp.	M420	200 in./sec	1600 bit/in.	N/A	C-78
Memorex Corp.	3227	200 in./sec	800 bit/in.	$26,000	C-78
	3228	200 in./sec	1600 bit/in.	$33,000	C-78
National Advanced Systems	77	200 in./sec	800 bit/in.	$24,000	C-79
	7420-88	200 in./sec	1600 bit/in.	$25,000	C-79
NCR Corp.	6370-801	200 in./sec	1600 bit/in.	$26,165	C-79
Renaissance Marketing, Inc.	AT3427	200 in./sec	800 bit/in.	$3,000 to $4,000	C-79
Storage Technology Corp.	3470	200 in./sec	200 bit/in.	$25,470	C-80
	3670	200 in./sec	1600 bit/in.	$26,312	C-80
	4670	200 in./sec	1600 bit/in.	$46,800	C-80
	4674	200 in./sec	1600 bit/in.	$20,850	C-80
Control Data Corp.	677-3	150 in./sec	556 bit/in.	$23,545	C-77
	679-3	150 in./sec	800 bit/in.	$24,090	C-77
	679-6	150 in./sec	1600 bit/in.	$31,540	C-77
Potter Instrument Co.	AT 1062	150 in./sec	800 bit/in.	$25,000	C-79
	SC 1081	150 in./sec	800 bit/in.	$25,000	C-79
Rosscamp Corp.	D-160 FAMILY	130 in./sec	8000 bit/in.	$1,700	C-79
Amperif	SERIES 34	125 in./sec	1600 bit/in.	N/A	C-77
	SERIES 334	125 in./sec	1600 bit/in.	$24,000	C-77
Burroughs Corp.	B9495-33	125 in./sec	1600 bit/in.	N/A	C-77
	B9495-83	125 in./sec	800 bit/in.	N/A	C-77
Cipher Data Products, Inc.	SERIES 900 VACUUM COLUMN	125 in./sec	800 bit/in.	$4,067	C-77
Digital Equipment Corp.	TU77	125 in./sec	800 bit/in.	$36,800	C-77
	TU78	125 in./sec	1600 bit/in.	$48,000	C-77
Fujitsu America, Inc.	M2432R	125 in./sec	800 bit/in.	$24,750	C-77
Harris Corp.	6730	125 in./sec	800 bit/in.	$52,000	C-77
Hitachi America, Ltd.	MT-153	125 in./sec	800 bit/in.	N/A	C-77
	MT-154	125 in./sec	800 bit/in.	N/A	C-78
	MT-155	125 in./sec	1600 bit/in.	N/A	C-78
	MT-156	125 in./sec	1600 bit/in.	N/A	C-78
Honeywell, Inc.	MTS/MT4 9626	125 in./sec	1600 bit/in.	$24,190 to $44,000	C-78
IBM	3420 MODEL 5	125 in./sec	200 bit/in.	$19,990	C-78
	3420 MODEL 6	125 in./sec	1600 bit/in.	$22,890	C-78
Interscience Systems	3450	125 in./sec	200 bit/in.	$24,000	C-78
	3650	125 in./sec	1600 bit/in.	$28,000	C-78
Kennedy Co.	9300	125 in./sec	N/A	$6,800	C-78
Memorex Corp.	3226	125 in./sec	1600 bit/in.	$30,000	C-78
	3261	125 in./sec	1600 bit/in.	$57,450	C-78
	3262	125 in./sec	1600 bit/in.	$89,200	C-78
	3265	125 in./sec	800 bit/in.	$24,100	C-78

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VENDOR	MODEL	TAPE SPEED	RECORDING DENSITY	PRICE	PAGE
Memorex Corp.	3266	125 in./sec	1600 bit/in	$24,100	C-79
Mesa Technology Corp.	4000	125 in./sec	800 bit/in	$33,950	C-79
	4001	125 in./sec	800 bit/in	$10,340	C-79
	4010	125 in./sec	800 bit/in	N/A	C-79
	4011	125 in./sec	800 bit/in	$10,340	C-79
Milltape Corp.	AT-1161	125 in./sec	800 bit/in	$35,000	C-79
	AT-1161 AUTOMATIC TREADING	125 in./sec	200 bit/in	$25,000	C-79
National Advanced Systems	7420-66	125 in./sec	1600 bit/in	$17,000	C-79
NCR Corp.	6370-601	125 in./sec	1600 bit/in	$25,160	C-79
Pertec Computer Corp.	T1000	125 in./sec	800 bit/in	$11,090	C-79
Sperry Corp.	UNISERVO 24	125 in./sec	800 bit/in	$54,720	C-79
	UNISERVO 28	125 in./sec	1600 bit/in	$24,750	C-79
	UNISERVO 36	125 in./sec	1600 bit/in	$29,500	C-79
Storage Technology Corp.	1950 SERIES	125 in./sec	800 bit/in	N/A	C-80
	1960 SERIES	125 in./sec	800 bit/in	N/A	C-80
	3450	125 in./sec	200 bit/in	$23,110	C-80
	3650	125 in./sec	1600 bit/in	$23,920	C-80
	4550	125 in./sec	800 bit/in	$56,200	C-80
System Industries, Inc.	9700-53 TAPE SYSTEM	125 in./sec	800 bit/in	N/A	C-80
Telex Computer Products	6200 SERIES	125 in./sec	800 bit/in	$10,000 to $12,000	C-80
	SERIES 80	125 in./sec	800 bit/in	$17,325	C-80
	TELEX-6253-66	125 in./sec	800 bit/in	$14,835	C-80
Renaissance Marketing, Inc.	SC2406	113 in./sec	800 bit/in	$1,200	C-79
Control Data Corp.	677-2	100 in./sec	556 bit/in	$19,165	C-77
	679-2	100 in./sec	800 bit/in	$19,710	C-77
	679-5	100 in./sec	1600 bit/in	$27,925	C-77
Cromemco, Inc.	TDS	100 in./sec	1600 bit/in	$995	C-80
Harris Corp.	6330	100 in./sec	1600 bit/in	$9,800	C-80
Information Development	4610-5	100 in./sec	1600 bit/in	$8,875	C-81
Mesa Technology Corp.	1012	100 in./sec	1600 bit/in	$6,445	C-82
	[illegible]	100 in./sec	1600 bit/in	$6,445	C-82
Pertec Computer Corp.	FS1000	100 in./sec	1600 bit/in	N/A	C-82
Qantel Corp.	5241	100 in./sec	1600 bit/in	$20,450	C-82
Memtec	420	90 in./sec	10000	N/A	C-81
	440	90 in./sec	N/A	N/A	C-82
	451 & 453	90 in./sec	10000 bit/in	$300	C-82
	510	90 in./sec	6400 bit/in	$350	C-82
	520	90 in./sec	10000 bit/in	$400	C-82
National Advanced Systems	7420-44	80 in./sec	1600 bit/in	$15,000	C-82
Logicraft	SERIES 32	75 in./sec	1600 bit/in	N/A	C-80
	SERIES 332	75 in./sec	1600 bit/in	$21,000	C-80
Ardent Computer Products	ARDENT 1000	75 in./sec	800 bit/in	$1,800	C-80
Burroughs Corp.	B9495-32	75 in./sec	1600 bit/in	N/A	C-80
Cipher Data Products, Inc.	MOD 11 VACUUM COLUMN	75 in./sec	800 bit/in	$4,490	C-80
Data General Corp.	4367	75 in./sec	1600 bit/in	$48,500	C-81
	6026	75 in./sec	800 bit/in	$16,000	C-81
Digi-Data Corp.	1840 MAGNETIC TAPE SYSTEMS	75 in./sec	800 bit/in	$5,175 to $6,375	C-81
Gaw Control Corp.	TDX/75 ISP DRIVE	75 in./sec	800 bit/in	$7,500	C-81
Harris Corp.	6696	75 in./sec	1600 bit/in	$24,600	C-81
	6720	75 in./sec	1600 bit/in	$39,900	C-81
Hewlett-Packard Co.	HP 7976A	75 in./sec	N/A	$44,440	C-81
Honeywell, Inc.	MTU 9609/9610/9614/9615	75 in./sec	800 bit/in	$11,500 to $17,960	C-81
IBM	3420 MODEL 3	75 in./sec	200 bit/in	$14,910	C-81
	3420 MODEL 4	75 in./sec	200 bit/in	$19,170	C-81
	4969 (7D)	75 in./sec	800 bit/in	$16,960	C-81
	4969 (7N)	75 in./sec	800 bit/in	$15,640	C-81
	4969 (7P)	75 in./sec	1600 bit/in	$16,170	C-81
Interdynamics Systems	3630	75 in./sec	1600 bit/in	$25,000	C-81
Kennedy Co.	9100	75 in./sec	200 bit/in	$5,850	C-81
	9400	75 in./sec	800 bit/in	$12,000	C-81
Milltape Corp.	SC1161 TAPE TRANSPORT	75 in./sec	200 bit/in	$40,000	C-82
NCR Corp.	6370-0401	75 in./sec	1600 bit/in	$21,935	C-82
Mizdorf Computer Corp.	8410-04	75 in./sec	800 bit/in	$12,595	C-82
	8420-02	75 in./sec	6250 bit/in	$16,750	C-82
Pertec Computer Corp.	T9000	75 in./sec	800 bit/in	$6,335	C-82
Prime Computer, Inc.	4522 TAPE SUBSYSTEM	75 in./sec	1600 bit/in	$18,500	C-82
	4529 MAGNETIC TAPE SLAVE	75 in./sec	800 bit/in	$14,000	C-82
	4550 MAG TAPE SUBSYSTEM	75 in./sec	1600 bit/in	$48,500	C-82
	4551 MAGNETIC TAPE SLAVE	75 in./sec	1600 bit/in	$23,000	C-82
Sperry Corp.	UNISERVO 22	75 in./sec	800 bit/in	$47,000	C-82
	UNISERVO 26	75 in./sec	1600 bit/in	$22,000	C-82
Storage Technology Corp.	1920	75 in./sec	800 bit/in	N/A	C-82
	3430	75 in./sec	200 bit/in	$18,140	C-83
	9630	75 in./sec	1600 bit/in	$20,756	C-83
Telex Computer Products	TELEX-6253-44	75 in./sec	800 bit/in	$14,635	C-83
3M	3410-3	50 in./sec	200 bit/in	N/A	C-84
	3411-3	50 in./sec	200 bit/in	$11,910	C-84

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VENDOR	MODEL	TAPE SPEED	RECORDING DENSITY	PRICE	PAGE
Prime Computer, Inc.	STREAMING ADD-ON 4661-2250	50 in. sec	1600 bit/in	$6,500	C-87
	STREAMING SYSTEM 4660-2250	50 in. sec	1600 bit/in	$11,000	C-87
Storage Technology Corp.	2920 TAPE SUBSYSTEM	50 in. sec	1600 bit/in	N/A	C-87
Telex Computer Products	TELEX-6253-33	50 in. sec	800 bit/in	$14,635	C-87
Cipher Data Products, Inc.	MOD 8/MOD 10	45 in./sec	800 bit/in	$2,626	C-83
	SERIES 100X COMPLIANCE ARM	45 in. sec	800 bit/in	$3,301	C-83
Colmputer Peripherals, Inc.	SPIRIT 9214X	45 in. sec	800 bit/in	$6,000	C-83
Control Data Corp.	MODEL 92144	45 in. sec	800 bit/in	$5 000	C-83
Digi-Data Corp.	SERIES 1740	45 in. sec	800 bit/in	$4,175 to $5,275	C-84
Gaw Control Corp.	TDX 1000	45 in. sec	800 bit/in	$6,500	C-84
Hayric Corp.	6646	45 in. sec	800 bit/in	$13 700	C-84
	6656	45 in. sec	800 bit/in	$20 100	C-84
Hewlett-Packard Co.	H-P 79708	45 in. sec	800 bit/in	$8 410 to $13,440	C-84
	H-P 79706	45 in. sec	1600 bit/in	$10 160 to $15,270	C-84
IBM	4969 (4D)	45 in. sec	800 bit/in	$13 020	C-84
	4969 (4N)	45 in. sec	800 bit/in	$11,720	C-85
	4969 (4P)	45 in. sec	1600 bit/in	$12,250	C-85
Information Development	4610-7	45 in. sec	200 bit/in	$8 875	C-85
	4610-9	45 in. sec	800 bit/in	$8 875	C-85
	4610-9-16	45 in. sec	1600 bit/in	$11,625	C-85
	4610-9-816	45 in. sec	800 bit/in	$12,125	C-85
Innovative Data Technology	TD-1054 IBM-PC	45 in. sec	1600 bit/in	$8,500	C-85
	TD-1054/PC-STP	45 in. sec	800 bit/in	$6,995	C-85
Kennedy Co.	9000	45 in. sec	200 bit/in	$4 600	C-86
Microdata Corp.	2686-DUAL DENSITY TAPE DRIVE	45 in. sec	800 bit/in	$2 000	C-86
NCR Corp.	6325-0101	45 in. sec	800 bit/in	$16 900	C-86
Nixdorf Computer Corp.	418	45 in. sec	800 bit/in	$13,330	C-86
	6330	45 in. sec	800 bit/in	$10 190	C-86
	8402	45 in. sec	800 bit/in	$14 000	C-86
	8706	45 in. sec	1600 bit/in	$16 120	C-86
	8708	45 in./sec	800 bit/in	$13,330	C-87
Pertec Computer Corp.	T6000	45 in./sec	800 bit/in	$5,380	C-87
	T8000	45 in. sec	800 bit/in	$5 380	C-87
Prime Computer, Inc.	4520 TAPE SUBSYSTEM	45 in. sec	800 bit/in	$18,000	C-87
	4527 MAGNETIC TAPE SLAVE	45 in./sec	800 bit/in	$13,500	C-87
Qantel Corp.	5215	45 in. sec	1600 bit/in	$12 450	C-87
Texas Instruments, Inc.	MT 1600 TAPE TRANSPORT	45 in./sec	1600 bit/in	$11,195	C-87
Memtec	250 B	40 in. sec	200 bit/in	$300	C-86
	250 BH	40 in. sec	200 bit/in	$900	C-86
Astronautics Corp.	MTU P/N-202621	38 in./sec	200 bit/in	$22,683	C-83
	MTU P/N-202622	38 in./sec	556 bit/in	$22 683	C-83
	MTU P/N-202623	38 in. sec	800 bit/in	$22,683	C-83
	MTU P/N-202624	38 in./sec	1600 bit/in	$33,317	C-83
Kennedy Co.	9832	38 in. sec	200 bit/in	N/A	C-85
Data General Corp.	6123/6125 TAPE SUBSYSTEM	30 in./sec	1600 bit/in	N/A	C-83
	6125	30 in. sec	1600 bit/in	$6,800	C-83
Digital Equipment Corp.	TU58	30 in. sec	800 bit/in	$995	C-84
	TU80	30 in. sec	1600 bit/in	$9,900	C-84
	TSV05	30 in./sec	1600 bit/in	$8 900	C-84
U.S. Design Corp.	DEI	30 in./sec	6400 bit/in	$2 000	C-87
AB Dick Co.	CIPHER STREAMING TAPE	25 in./sec	1600 bit/in	$6,500	C-83
Burroughs Corp.	B9498	25 in./sec	1600 bit/in	N/A	C-83
Computer Peripherals, Inc.	KEYSTONE 92181	25 in. sec	1600 bit/in	$4 000	C-83
	KEYSTONE 92185	25 in. sec	6250 bit/in	[redacted]	C-83
	KEYSTONE 92192	25 in./sec	1600 bit/in	$1,500	C-83
Control Data Corp.	KEYSTONE 92181	25 in./sec	1600 bit/in	$4,000	C-83
	KEYSTONE 92185	25 in. sec	1600 bit/in	$8,500	C-83
Datamagnetics, Inc.	MODEL 1600	25 in./sec	800 bit/in	$15,000	C-84
Datapoint Corp.	9584	25 in./sec	1600 bit/in	$12,500	C-84
Digi-Data Corp.	1640 MAGNETIC TAPE SYSTEMS	25 in./sec	800 bit/in	$3,600 to $4,800	C-84
	SERIES 1140	25 in./sec	800 bit/in	$3,350 to $4,550	C-84
	SERIES 2000 STREAMER	25 in./sec	3200 bit/in	$3,290 to $3,890	C-84
Hitachi America, Ltd.	MT-250	25 in. sec	1600 bit/in	N/A	C-84
IBM	3410-2	25 in./sec	200 bit/in	$4,365	C-84
	3441-2	25 in./sec	200 bit/in	$9,910	C-84
Information Development	4607-7	25 in. sec	200 bit/in	$8,575	C-85
	4607-9	25 in./sec	800 bit/in	$8,575	C-85
	4607-9-16	25 in./sec	1600 bit/in	$11,325	C-85
	4607-9-816	25 in./sec	800 bit/in	$11 825	C-85
	4608-7	25 in./sec	200 bit/in	$8,575	C-85
	4608-9	25 in./sec	800 bit/in	$8,575	C-85
	4608-9-16	25 in./sec	1600 bit/in	$11,325	C-85
	4608-9-816	25 in./sec	800 bit/in	$11,825	C-85
Kennedy Co.	9700	25 in./sec	200 bit/in	$3 650	C-86
	9800	25 in./sec	200 bit/in	$3,750	C-86
Mitron Systems Corp.	STD 1600	25 in./sec	800 bit/in	$11,750	C-87
Nixdorf Computer Corp.	6332	25 in./sec	1600 bit/in	$12,700	C-87

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VENDOR	MODEL	TAPE SPEED	RECORDING DENSITY	PRICE	PAGE
Mixdorf Computer Corp.	8401	25 in./sec	1600 bit/in.	$14,000	C-86
Northern Telecom	COOK ELECTRIC TAPE DRIVE	25 in./sec	800 bit/in.	$6,200 to $7,500	C-87
	COOK ELECTRIC DRIVE 2216	25 in./sec	1600 bit/in.	$7,000	C-87
Pertec Computer Corp.	T7000	25 in./sec	800 bit/in.	$3,800	C-87
Stratus Computer	T101	25 in./sec	1600 bit/in.	$9,500	C-87
Memodyne Corp.	765-8EP	20 in./sec	800 bit/in.	$1,275	C-86
Mixdorf Computer Corp.	8409	20 in./sec	1600 bit/in.	$8,765	C-86
Computer Peripherals, Inc.	KEYSTONE 92180	13 in./sec	1600 bit/in.	$3,850	C-83
Fujitsu America, Inc.	M2442A	13 in./sec	6250 bit/in.	$9,000	C-84
IBM	3410-1	13 in./sec	200 bit/in.	$3,365	C-84
	3411-1	13 in./sec	200 bit/in.	$7,910	C-84
	8809-2	13 in./sec	1600 bit/in.	$10,610	C-85
	[illegible]	13 in./sec	1600 bit/in.	$11,960	C-85
	8809-1A	13 in./sec	1600 bit/in.	$11,960	C-85
	8809-1B	13 in./sec	1600 bit/in.	$14,640	C-85
Kennedy Co.	6809	13 in./sec	1600 bit/in.	$3,850	C-88
Innovative Data Technology	TD-1012/IBM-PC	12 in./sec	1600 bit/in.	$6,495	C-85
	TD-1012/PC-STR	12 in./sec	1600 bit/in.	$4,995	C-85
Burroughs Corp.	B9495-82	N/A	800 bit/in.	N/A	C-88
Cipher Data Products, Inc.	F880 MICROSTREAMER	N/A	1600 bit/in.	$2,325	C-89
Kennedy Co.	1600	N/A	200 bit/in.	$6,000	C-88
	1610	N/A	200 bit/in.	$6,000	C-88

Tape Speeds Over 100 in./Sec

MAGATAPE CORP.
MODEL 300
Plug Compatibility: Cipher; Pertec
Tape Speed: 200 in./sec
Recording Density: 9,600 bit/in.
Data Tracks: 24 tracks
Capacity: 330M bytes, unblocked
Transfer Rate: 240K bit/sec
Media Width: ½ in.
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $3,000
Distribution Method: OEM
Number Installed to Date: 40
Date First Installed: October 1982
(See Vendor Profile Page V-22)

QUALEX TECHNOLOGY
MODEL 3211
Compatibility: HP 1000, 3000
Tape Speed: 125 in./sec
Recording Density: 6,250 bit/in.
Capacity: 100M bytes, blocked; 150M bytes, unblocked
Transfer Rate: 781K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $43,950
Distribution Method: End user
Number Installed to Date: 100-500
Date First Installed: June 1980
(See Vendor Profile Page V-30)

51- to 100 in./Sec Tape Speeds

CENTRAL DATA CORP.
D4000
Plug Compatibility: Cipher/Arc
Tape Speed: 90 in./sec
Data Tracks: 4
Capacity: 20M bytes, blocked
Media Width: ¼ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $3,700
Distribution Method: Third-party
Date First Installed: January 1981
(See Vendor Profile Page V-6)

CIPHER DATA PRODUCTS, INC.
525-CT FLOPPYTAPE
Tape Speed: 78 in./sec
Recording Density: 6,400 bit/in.
Data Tracks: 6
Capacity: 28M bytes, blocked; 32M bytes, unblocked
Transfer Rate: 500K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $300
Distribution Method: OEM
Date First Installed: October 1983
(See Vendor Profile Page V-6)

COMPUTER PERIPHERALS, INC.
SENTINEL 92190
Tape Speed: 55 in./sec
Recording Density: 8,000 bit/in.
Data Tracks: 11 tracks
Capacity: 48M bytes, blocked
Transfer Rate: 55K bit/sec
Media Width: ¼ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $1,500
Date First Installed: March 1982
(See Vendor Profile Page V-8)

COMPUTER PERIPHERALS, INC.
SENTINEL 92191
Tape Speed: 55 in./sec
Recording Density: 8,000 bit/in.
Data Tracks: 11 tracks
Capacity: 27M bytes, blocked
Transfer Rate: 55K bit/sec
Media Width: ¼ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $1,500
Distribution Method: OEM, Third-party
Number Installed to Date: Under 100
Date First Installed: May 1983

CONTROL DATA CORP.
92190 ¼-IN. TAPE CARTRIDGE DRIVE
Tape Speed: 55 in./sec
Recording Density: 8,000 bit/in.
Data Tracks: 11
Capacity: 487M bytes, blocked
Transfer Rate: 440K bit/sec
Media Width: ¼ in.
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $1,020
Number Installed to Date: 1,000
(See Vendor Profile Page V-9)

CONTROL DATA CORP.
92195 ¼-IN. CARTRIDGE TAPE DRIVE
Tape Speed: 55 in./sec
Recording Density: 8,000 bit/in.
Data Tracks: 11
Capacity: 45M bytes, blocked
Transfer Rate: 440K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $1,275
Distribution Method: OEM
Number Installed to Date: 200

DATA GENERAL CORP.
15MB CARTRIDGE TAPE SUBSYSTEM
Tape Speed: 60 in./sec
Recording Density: 6,400 bit/in
Data Tracks: 4
Capacity: 15M bytes, blocked; 17M bytes, unblocked
Transfer Rate: 48K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: Yes
Date First Installed: February 1982
(See Vendor Profile Page V-10)

DATA GENERAL CORP.
6231/6230
Compatibility: DG MP 20, 100, 6000, 8000, S/20, S/120, 2/2
Tape Speed: 60 in./sec
Recording Density: 6,400 bit/in.
Data Tracks: 4
Capacity: 15M bytes, blocked; 17M bytes, unblocked
Transfer Rate: 48K bit/sec
Media Width: ¼ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $5,500
Distribution Method: OEM, Third-party

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COMPUTERWORLD BUYERS GUIDE

Date First Installed: January 1983

HESTAR SYSTEMS, INC.
PLAN 4000
Plug Compatibility: Cipher; Archive
Tape Speed: 90 in./sec
Recording Density: 8,000 bit/in
Data Tracks: 9
Media Width: ¼ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $3,000
Number Installed to Date: 500-1,000
Date First Installed: 1981
(See Vendor Profile Page V-26)

NORTHERN TELECOM, INC.
FLASHBACK MTC-8100
Tape Speed: 90 in./sec
Recording Density: 8,000-10,000 bit/in
Data Tracks: 9, 12 track
Capacity: 45M bytes, blocked
Transfer Rate: 90K bit/sec
Media Width: ¼ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $1,600
Distribution Method: OEM
Date First Installed: June 1983
(See Vendor Profile Page V-26)

QANTEX DIVISION OF NORTH ATLANTIC INDUSTRIES
410
Tape Speed: 90 in./sec
Recording Density: 8,500 bit/in.
Data Tracks: 9
Capacity: 45M bytes, unblocked
Transfer Rate: 720K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $1,625
Distribution Method: End user
Date First Installed: 1983
(See Vendor Profile Page V-30)

QUALEX TECHNOLOGY
MODEL 3271
Compatibility: HP 1000, 3000
Tape Speed: 75 in./sec
Recording Density: 6,250 bit/in.
Capacity: 100M bytes, blocked; 150M bytes, unblocked
Transfer Rate: 469K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $42,950
Distribution Method: End user
Number Installed to Date: 100-500
Date First Installed: June 1980
(See Vendor Profile Page V-30)

RAYMOND ENGINEERING, INC.
SERIES 6440 CARTRIDGE RAYCORDER
Tape Speed: 90 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 4
Capacity: 2M bytes, blocked
Transfer Rate: 6K bit/sec
Media Width: ¼ in.

Drive Mechanism: Single motor
Streaming Capability: No
Price: $995 to $1,095
Distribution Method: OEM
Number Installed to Date: 500-1,000
Date First Installed: August 1981
(See Vendor Profile Page V-30)

TALLGRASS TECHNOLOGIES CORP.
TG/4020
Compatibility: IBM Personal Computer-XT
Plug Compatibility: Archive 9020B
Tape Speed: 90 in./sec
Recording Density: 8,000 bit/in.
Data Tracks: 4
Capacity: 20M bytes, blocked
Transfer Rate: 900K bit/sec
Media Width: ¼ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $2,195
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: July 1983
(See Vendor Profile Page V-34)

TALLGRASS TECHNOLOGIES CORP.
TG/9021
Compatibility: IBM Personal Computer XT
Plug Compatibility: Archive 9020B
Tape Speed: 90 in./sec
Recording Density: 8,000 bit/in.
Data Tracks: 9
Capacity: 45M bytes, blocked
Transfer Rate: 900K bit/sec
Media Width: ¼ in
Drive Mechanism: Capstan
Price: $2,495
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: July 1983

TEAC CORP.
4923
Tape Speed: 90 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 2
Capacity: 300K bytes, blocked
Transfer Rate: 30K bit/sec
Media Width: ¼ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $2,600
Distribution Method: End user
Number Installed to Date: 10,000
Date First Installed: January 1977
(See Vendor Profile Page V-36)

TEAC CORP.
4924
Tape Speed: 90 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 2
Capacity: 300K bytes, blocked
Media Width: ¼ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $2,990
Distribution Method: End user
Number Installed to Date: 5,000

3M CO.
HCD-75
Compatibility: DEC, Pertec
Tape Speed: 60 in./sec
Recording Density: 6,400 bit/in., 7,500 bit/in
Data Tracks: 16 tracks
Capacity: 67M bytes, blocked, 144M bytes, unblocked
Transfer Rate: 35K bit/sec
Media Width: ¼ in.
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $874
Distribution Method: OEM
Date First Installed: 1981
(See Vendor Profile Page V-37)

Tape Speeds Under 50 in./Sec

ALGO, INC.
1200
Tape Speed: 30 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 4
Capacity: 4M bytes, blocked
Transfer Rate: 20,000K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $2,200
Distribution Method: End user, Third-party
Number Installed to Date: 100-500
Date First Installed: December 1980
(See Vendor Profile Page V-1)

ALGO, INC.
1200E
Tape Speed: 30 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 4
Capacity: 4M bytes, blocked
Media Width: ¼ in.
Drive Mechanism: Single motor
Streaming Capability: No
Price: $2,200
Distribution Method: End user, OEM
Number Installed to Date: 500-1,000
Date First Installed: December 1980

ANALOG & DIGITAL PERIPHERALS
1100
Tape Speed: 30 in./sec
Recording Density: 800 bit/in., 1,600 bit/in.
Data Tracks: 1, 2
Capacity: 250K bytes, blocked
Transfer Rate: 48K bit/sec
Drive Mechanism: Single motor
Streaming Capability: No
Price: $175
Number Installed to Date: 500-1,000
Date First Installed: September 1982
(See Vendor Profile Page V-3)

ANALOG & DIGITAL PERIPHERALS
DC1/DC2 DATA CARTRIDGE TAPE DVE
Tape Speed: 30 in./sec
Recording Density: 800 bit/in., 1,600 bit/in.
Data Tracks: 1, 2
Capacity: 632K bytes, unblocked
Transfer Rate: 48K bit/sec
Media Width: ¼ in
Streaming Capability: No
Price: $795
Distribution Method: OEM, Third-party
Number Installed to Date: 100-500
Date First Installed: 1983

ANALOG & DIGITAL PERIPHERALS
DC 200
Tape Speed: 30 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 4
Capacity: 4M bytes, unblocked
Transfer Rate: 48K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $1,150
Distribution Method: End user, OEM
Number Installed to Date: 100-500
Date First Installed: 1981

ANALOG & DIGITAL PERIPHERALS
FEEDBACK 350/351
Tape Speed: 45 in./sec
Recording Density: 1,600 bit/in., 6,400 bit/in
Data Tracks: 4
Capacity: 10M bytes, blocked
Media Width: ¼ in.
Drive Mechanism: Single motor
Streaming Capability: No
Price: $2,550
Distribution Method: End user, OEM
Number Installed to Date: 100-500
Date First Installed: 1982

ANALOG & DIGITAL PERIPHERALS
MINI DATA CARTRIDGE DRIVE DC100
Tape Speed: 30 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Capacity: 500K bytes; blocked
Transfer Rate: 24K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $270
Distribution Method: End user, OEM
Number Installed to Date: 1,000-5,000
Date First Installed: 1981

DATA ELECTRONICS, INC.
Funnel
Plug Compatibility: Qantex; Digi-Data, Perex
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in
Data Tracks: 4
Capacity: 15M bytes, blocked; 17M bytes, unblocked
Transfer Rate: 24K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $1,952
Distribution Method: End user, OEM, Third-party
Date First Installed: 1978
(See Vendor Profile Page V-10)

DATA ELECTRONICS, INC.
MICROTAPE-SLI
Plug Compatibility: Qantex; Digi-Data, Perex
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in., 10,000 bit/in
Data Tracks: 4
Capacity: 10M bytes, unblocked
Transfer Rate: 24K bit/sec
Media Width: ¼ in.
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $2,290
Distribution Method: End user, OEM
Date First Installed: 1981

DATA ELECTRONICS, INC.
MICROTAPE-SLV
Plug Compatibility: Qantex, Digi-Data, Perex
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in., 10,000 bit/in
Data Tracks: 4
Capacity: 15M bytes, blocked, 17M bytes, unblocked
Transfer Rate: 24K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $800
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 500-1,000
Date First Installed: 1983

DATA ELECTRONICS, INC.
STREAMER
Plug Compatibility: Qantex; Digi-Data, Perex
Tape Speed: 30 in./sec
Recording Density: 10,000 bit/in
Data Tracks: 4
Transfer Rate: 90K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $1,421
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 1,000-5,000
Date First Installed: 1981

DIGI-DATA CORP.
MODEL 70M
Compatibility: Intel Multibus
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in
Data Tracks: 4
Capacity: 15M bytes, blocked, 17M bytes, unblocked
Transfer Rate: 50K bit/sec
Media Width: ¼ in.
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $2,290
Distribution Method: End user, OEM
Date First Installed: 1981
(See Vendor Profile Page V-12)

DIGI-DATA CORP.
MODEL 70Q
Compatibility: DEC, TM11
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in.
Data Tracks: 4
Capacity: 15M bytes, blocked, 17M bytes, unblocked
Media Width: ¼ in.
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $2,790
Distribution Method: OEM

DIGI-DATA CORP.
MODEL 70R
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in
Data Tracks: 4
Capacity: 15M bytes, blocked; 17M bytes, unblocked
Transfer Rate: 19,200K bit/sec
Media Width: ¼ in.
Drive Mechanism: Single motor
Streaming Capability: Yes

The latest word in computer peripherals...

...and the last word in disk backup.

The 525-CT FloppyTape is a new class of product that provides the last word in Winchester disk drive backup with its many unique design features. Using the standard 1/4-inch tape cartridge, this innovative device combines low cost, high capacity, and disk-type data accessibility to provide disk backup features with new meanings.

Low Price 1. Sells for appreciably less than any other device with comparable features. **2.** Priced at **$800** per unit in large OEM quantities.

High Capacity Storage 1. Stores 32 unformatted megabytes of data on a standard 1/4-inch tape cartridge. **2.** Allows one tape cartridge to replace up to 40 double-sided, double-density floppy disks.

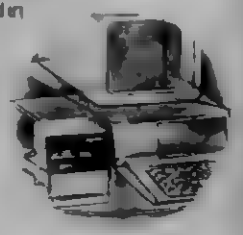
Floppy Disk Emulation 1. Configures a standard 1/4-inch tape cartridge with important floppy disk features such as random access to sectors and soft sector formatting. **2.** Allows in-place updating of information stored on the tape.

Immediate Integration 1. Attaches to standard floppy disk controllers. **2.** Provides plug compatibility with standard SA450 or SA850 interface connectors.

Space Saving Design 1. Packaged in the same compact form factor as the 5-1/4-inch floppy or Winchester disk drive. **2.** Designed with easy front panel loading and positive cartridge lock. **3.** Permits flat or side mounting.

So, let FloppyTape redefine your disk backup requirements. Next time you're in the market for the latest word in backup, just look it up, then hook it up.

For a Further Definition—Contact Cipher for a free 525-CT FloppyTape brochure, or for further information on other Cipher products.



cipher data products, inc.

10225 Willow Creek Road, P.O. Box 85170, San Diego, California 92138
Telephone. (619) 578-9100, TWX. 910-335-1251

CIPHER DATA PRODUCTS (UK) LTD.
Camberley, Surrey, England
Telephone 0276-682912
Telex: 858329

CIPHER DATA PRODUCTS S.A.R.L.
Paris, France
Telephone. (1) 668 87 87
Telex: 203935

CIPHER DATA PRODUCTS GmbH
Munich, West Germany
Telephone (089) 807001/02
Telex. 521-4094

Price: $2,290
Distribution Method: End user, OEM

DIGI-DATA CORP.
MODEL 705
Compatibility: Intel 8080/8085, Zilog Z80
Plug Compatibility: S-100 Bus
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in
Data Tracks: 4
Capacity: 16M bytes, blocked, 17M bytes, unblocked
Transfer Rate: 20K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $1,990
Distribution Method: End user, OEM

DIGI-DATA CORP.
SERIES 6400
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in
Data Tracks: 4
Capacity: 17M bytes, unblocked
Transfer Rate: 192K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $1,190
Distribution Method: OEM
Date First Installed: 1980
(See Vendor Profile Page V-00)

ELECTRONIC PROCESSORS, INC.
EPI STR-LINK III
Tape Speed: 18 in./sec
Recording Density: 800 bit/in
Data Tracks: 2
Capacity: 305K bytes, blocked
Transfer Rate: 2K bit/sec
Drive Mechanism: Single motor
Streaming Capability: No
Price: $1,504
Distribution Method: OEM
Date First Installed: 1982
(See Vendor Profile Page V-14)

ELECTRONIC PROCESSORS, INC.
EPI STR-STREAM
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in
Data Tracks: 4
Capacity: 17M bytes, unblocked
Transfer Rate: 24K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $1,452
Distribution Method: OEM
Date First Installed: September 1981

ELECTRONIC PROCESSORS, INC.
EPI STR-610
Tape Speed: 18 in./sec
Recording Density: 800 bit/in
Data Tracks: 2
Capacity: 336K bytes, unblocked
Transfer Rate: 2K bit/sec
Drive Mechanism: Single motor
Streaming Capability: No
Price: $419
Distribution Method: OEM

KENNEDY CO.
6470
Compatibility: DEC, Intel Multibus IBM
Tape Speed: 38 in./sec
Recording Density: 6,400 bit/in
Data Tracks: 10
Capacity: 51M bytes, blocked, 54M bytes, unblocked
Transfer Rate: 240K bit/sec
Media Width: ¼ in
Streaming Capability: Yes
Price: $2,000
Distribution Method: OEM
(See Vendor Profile Page V-21)

MEGALOGIC CORP.
QIM-I/MN
Tape Speed: 30 in./sec
Data Tracks: 2
Streaming Capability: No
(See Vendor Profile Page V-23)

MEGALOGIC CORP.
QIM-I/MX
Tape Speed: 30 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 4
Capacity: 3M bytes, blocked
Media Width: ¼ in
Streaming Capability: No
Price: $3,200
Distribution Method: End user
Date First Installed: January 1977

MILTOPE CORP.
CR-300
Tape Speed: 30 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 4
Capacity: 4M bytes, unblocked
Transfer Rate: 48K bit/sec
Media Width: ¼ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $15,000
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: September 1980
(See Vendor Profile Page V-24)

MILTOPE CORP.
CR-400
Tape Speed: 30 in./sec
Recording Density: 800 bit/in.
Data Tracks: 9
Capacity: 10M bytes, unblocked
Transfer Rate: 24K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $20,000
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: September 1976

MILTOPE CORP.
CR-500 CARTRIDGE RECORDER
Compatibility: IBM
Tape Speed: 25 in./sec
Recording Density: 556 bit/in., 800 bit/in., 1,600 bit/in.
Data Tracks: 7, 9
Capacity: 480K bytes, unblocked
Transfer Rate: 20K bit/sec
Media Width: 1/2 in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $12,000
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: 1976

MILTOPE CORP.
MILITARIZED CR-300 COMPACT RECORDER
Tape Speed: 30 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 1, 2, 4
Capacity: 3M bytes, unblocked
Transfer Rate: 192K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $10,000
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: 1977

MOSTAR SYSTEMS, INC.
A-2401 CLUSTER/ONE MODEL A
Plug Compatibility: Cipher Archive
Tape Speed: 30 in./sec
Recording Density: 8,000 bit/in
Data Tracks: 4
Media Width: ¼ in
Drive Mechanism: Capstan
Price: $3,000
Number Installed to Date: 500-1,000
Date First Installed: 1981
(See Vendor Profile Page V-26)

PRIME COMPUTER, INC.
458X CARTRIDGE TAPE SLAVE
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in.
Data Tracks: 4
Capacity: 15M bytes, blocked, 17M bytes unblocked
Transfer Rate: 192K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $4,500
Distribution Method: End user
Date First Installed: December 1982
(See Vendor Profile Page V-29)

PRIME COMPUTER, INC.
4581 CARTRIDGE TAPE DRIVE
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in
Data Tracks: 4
Capacity: 15M bytes, blocked, 17M bytes, unblocked
Transfer Rate: 192K bit/sec
Media Width: ¼ in.
Drive Mechanism: Single motor
Streaming Capability: No
Price: $7,000
Distribution Method: End user
Date First Installed: December 1982

QANTEL CORP.
5231
Compatibility: Qantel
Tape Speed: 45 in./sec
Recording Density: 6,400 bit/in
Data Tracks: 4
Capacity: 22M bytes, blocked
Transfer Rate: 288K bit/sec
Media Width: ¼ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $5,600
Distribution Method: Third-party
Number Installed to Date: 300
Date First Installed: January 1983
(See Vendor Profile Page V-30)

QANTEX DIVISION OF NORTH ATLANTIC INDUSTRIES
150
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in
Data Tracks: 4
Capacity: 13M bytes, blocked, 17M bytes, unblocked
Transfer Rate: 192K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $2,400
Distribution Method: Third-party
Number Installed to Date: 1,000-5,000
Date First Installed: September 1980
(See Vendor Profile Page V-26)

QANTEX DIVISION OF NORTH ATLANTIC INDUSTRIES
200
Tape Speed: 15 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 2
Capacity: 550K bytes, blocked, 1M bytes, unblocked
Transfer Rate: 48K bit/sec
Media Width: 15 in
Drive Mechanism: Single motor
Streaming Capability: No
Distribution Method: Third-party
Number Installed to Date: 10,000-50,000
Date First Installed: September 1977

QANTEX DIVISION OF NORTH ATLANTIC INDUSTRIES
450
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in
Data Tracks: 4
Capacity: 13M bytes, blocked, 17M bytes, unblocked
Transfer Rate: 192K bit/sec
Media Width: ¼ in.
Drive Mechanism: Single motor
Streaming Capability: No
Price: $1,450
Distribution Method: Third-party
Number Installed to Date: 10,000-50,000
Date First Installed: January 1981

QANTEX DIVISION OF NORTH ATLANTIC INDUSTRIES
650
Tape Speed: 30 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 4
Capacity: 3M bytes, blocked, 4M bytes, unblocked
Transfer Rate: 48K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: No
Distribution Method: Third-party
Number Installed to Date: 10,000-50,000
Date First Installed: September 1974

QANTEX DIVISION OF NORTH ATLANTIC INDUSTRIES
1000
Tape Speed: 15 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 2
Capacity: 550K bytes, blocked, 1M bytes, unblocked
Transfer Rate: 10K bit/sec
Media Width: 15 in
Drive Mechanism: Single motor

Streaming Capability: No
Price: $1,995
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 1,000-5,000
Date First Installed: January 1980

GANTEK DIVISION OF NORTH ATLANTIC INDUSTRIES
2200
Tape Speed: 30 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 4
Capacity: 3M bytes, blocked, 4M bytes, unblocked
Transfer Rate: 48K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $4,200
Number Installed to Date: 1,000-5,000
Date First Installed: January 1976

3M CO.
DCD-1
Tape Speed: 30 in./sec
Recording Density: 800 bit/in
Data Tracks: 1
Capacity: 168K bytes, unblocked
Transfer Rate: 2K bit/sec
Media Width: .15 in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $334
Distribution Method: OEM
Date First Installed: 1976

3M CO.
DCD-2
Tape Speed: 30 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 2
Capacity: 672K bytes, unblocked
Transfer Rate: 5K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $804
Distribution Method: OEM
Date First Installed: September 1973
(See Vendor Profile Page V-37)

Cartridge Drives With Unspecified Speeds

ANALOG & DIGITAL PERIPHERALS
FEEDBACK 340/344
Recording Density: 1,600 bit/in, 6,400 bit/in
Data Tracks: 4
Capacity: 15M bytes, unblocked
Media Width: ¼ in.
Drive Mechanism: Single motor
Streaming Capability: No
Price: $2,395
Distribution Method: End user, OEM
Number Installed to Date: 100-500
Date First Installed: June 1984
(See Vendor Profile Page V-3)

ARCHIVE CORP.
SCORPION
Recording Density: 8,000 bit/in.
Data Tracks: 4, 9
Capacity: 45M bytes, blocked; 48M bytes, unblocked
Transfer Rate: 90K bit/sec
Media Width: ¼ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $800
Distribution Method: OEM
Date First Installed: April 1983
(See Vendor Profile Page V-4)

ARCHIVE CORP.
SIDEWINDER
Recording Density: 8,000 bit/in
Data Tracks: 4
Capacity: 20M bytes, blocked, 21M bytes, unblocked
Transfer Rate: 90K bit/sec
Media Width: ¼ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $600
Distribution Method: OEM
Number Installed to Date: 20,000
Date First Installed: April 1981

ARCHIVE CORP.
SUPER SIDEWINDER
Recording Density: 8,000 bit/in
Data Tracks: 9
Capacity: 45M bytes, blocked; 48M bytes, unblocked
Transfer Rate: 90K bit/sec
Media Width: ¼ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $800
Distribution Method: OEM
Number Installed to Date: 5,000
Date First Installed: November 1982

CIPHER DATA PRODUCTS, INC.
472-CT QUARTERBACK
Recording Density: 10,000 bit/in
Data Tracks: 4
Capacity: 20M bytes, blocked
Transfer Rate: 1,200K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $800
Distribution Method: OEM
Date First Installed: 1981
(See Vendor Profile Page V-6)

CIPHER DATA PRODUCTS, INC.
345-CT
Recording Density: 10,000 bit/in
Data Tracks: 4
Capacity: 45M bytes, blocked
Transfer Rate: 200K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $800
Distribution Method: OEM
Date First Installed: October 1983

Cassette Tape Drives

Over 46 in./sec • 26- to 45 in./sec

Tape Speeds Over 46 in./Sec

RAYMOND ENGINEERING, INC.
SERIES 6440 RAYCORDER II
Tape Speed: 60 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 2
Capacity: 612K bytes, blocked
Transfer Rate: 3K bit/sec
Media Width: 15 in
Drive Mechanism: Dual motor
Streaming Capability: No
Price: $575 to $655
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: June 1981
(See Vendor Profile Page V-31)

TANDBERG DATA STORAGE, INC.
QIC-STAR MARK II 3309
Tape Speed: 90 in./sec
Recording Density: 8,000 bit/in.
Data Tracks: 9
Capacity: 45M bytes, blocked
Media Width: ¼ in.
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $1,325
Distribution Method: OEM
Date First Installed: April 1983
(See Vendor Profile Page V-34)

TANDBERG DATA STORAGE, INC.
QIC-STOR MARK II MODEL 3324
Tape Speed: 90 in./sec
Recording Density: 8,000 bit/in.
Data Tracks: 4
Capacity: 27M bytes, blocked
Transfer Rate: 300K bit/sec
Media Width: ¼ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $1,500
Distribution Method: OEM
Date First Installed: June 1982

TANDBERG DATA STORAGE, INC.
QIC-STOR MINI MARK 3314
Tape Speed: 90 in./sec
Data Tracks: 4
Capacity: 20M bytes, blocked
Media Width: ¼ in
Drive Mechanism: Dual motor
Streaming Capability: Yes
Price: $575 to $655
Distribution Method: OEM
Date First Installed: May 1983

TANDBERG DATA STORAGE, INC.
QIC-STOR MINI MARK 3215
Tape Speed: 90 in./sec
Data Tracks: 9
Capacity: 45M bytes, blocked
Media Width: ¼ in.
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $1,575
Date First Installed: April 1983

TANDBERG DATA STORAGE, INC.
QIC-STOR MARK I 3204, 3224, 3204
Plug Compatibility: Tandberg Qic-02
Tape Speed: 90 in /sec
Recording Density: 8,000 bit/in
Data Tracks: 4
Capacity: 27M bytes, blocked
Transfer Rate: 300K bit/sec
Media Width: ¼ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $1,250
Distribution Method: OEM
Date First Installed: June 1982

TANDBERG DATA STORAGE, INC.
QIC-STORE MINI MARK 3314
Tape Speed: 90 in./sec
Data Tracks: 4
Capacity: 20M bytes, blocked
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $1,500
Distribution Method: OEM
Date First Installed: May 1983

TANDBERG DATA STORAGE, INC.
QIC-STAR MARK II 3224, 3229
Tape Speed: 90 in./sec
Recording Density: 8,000 bit/in.
Data Tracks: 9
Capacity: 45M bytes, blocked
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $1,500
Distribution Method: OEM
Date First Installed: April 1983

TANDBERG DATA STORAGE, INC.
QIC-STAR MARK II 3229
Tape Speed: 90 in./sec
Recording Density: 8,000 bit/in.
Data Tracks: 9
Capacity: 45M bytes, blocked
Media Width: ¼ in.
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $1,575
Distribution Method: OEM
Date First Installed: April 1983

26- to 45 in./Sec Tape Speeds

ALTOS COMPUTER SYSTEMS
ALTOS MTU-2
Compatibility: Altos ACS8000-10, ACS8000-12, ACS8000-14
Plug Compatibility: DEI
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in.
Capacity: 24M bytes, blocked
Transfer Rate: 192K bit/sec
Media Width: ¼ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $2,995
Distribution Method: Third-party
Date First Installed: 1978
(See Vendor Profile Page V-2)

ALTOS COMPUTER SYSTEMS
ALTOS MTU-3
Compatibility: Altos ACS8600-12, ACS8600-14
Plug Compatibility: DEI
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in.
Transfer Rate: 24K bit/sec
Media Width: ¼ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $2,995
Distribution Method: Third-party

ALTOS COMPUTER SYSTEMS
ALTOS MTU-4
Compatibility: Altos ACS 586-10, ACS 586-14
Plug Compatibility: DEI
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in.
Transfer Rate: 24K bit/sec
Media Width: ¼ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $2,995
Distribution Method: Third-party
Date First Installed: 1983

ANALOG & DIGITAL PERIPHERALS
ADPI BYTE BUCKET CASSETTE SYSTEM
Tape Speed: 45 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 2
Capacity: 1M bytes, blocked
Transfer Rate: 24K bit/sec
Media Width: ¼ in.
Drive Mechanism: Hub Driven
Streaming Capability: No
Price: $1,095
Distribution Method: End user, OEM
Number Installed to Date: 500-1,000
Date First Installed: 1981
(See Vendor Profile Page V-3)

ANALOG & DIGITAL PERIPHERALS
NCR COMPATIBLE DIGITAL CASSETTE SYS
Tape Speed: 45 in /sec
Recording Density: 800 bit/in.
Data Tracks: 2
Capacity: 500K bytes, blocked
Media Width: ¼ in
Drive Mechanism: Hub Driven
Streaming Capability: No
Price: $1,045
Distribution Method: End user, OEM
Number Installed to Date: 100-500
Date First Installed: 1982

KENNEDY CO.
9432
Compatibility: DEC, Intel Multibus, IBM
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in.
Data Tracks: 4
Capacity: 21M bytes, blocked; 28M bytes, unblocked
Transfer Rate: 192K bit/sec
Media Width: ¼ in.
Drive Mechanism: Cartridge
Streaming Capability: Yes
Price: $1,000
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: September 1981
(See Vendor Profile Page V-21)

RAYMOND ENGINEERING, INC.
WR-100
Tape Speed: 30 in./sec
Recording Density: 6,400 bit/in.
Data Tracks: 4
Capacity: 10M bytes, blocked; 16M bytes, unblocked
Transfer Rate: 24K bit/sec
Media Width: 15 in
Drive Mechanism: Dual motor
Streaming Capability: Yes
Price: $1,175
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: February 1983
(See Vendor Profile Page V-30)

RAYMOND ENGINEERING, INC.
WR-1200
Tape Speed: 30 in./sec
Recording Density: 10,000
Data Tracks: 4
Capacity: 20M bytes, blocked
Transfer Rate: 24K bit/sec
Media Width: 15 in.
Drive Mechanism: Dual motor
Streaming Capability: Yes
Price: $1,500
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: February 1982

SAYLOR ELECTRONICS INTERNATIONAL
4200-201 DIGITAL CASSETTE DRIVE
Compatibility: DEC PDP-11, HP 9800
Tape Speed: 30 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 2
Capacity: 1M bytes, blocked; 1M bytes, unblocked
Transfer Rate: 4,800K bit/sec
Media Width: 15 in.
Streaming Capability: Yes
Price: $875
Distribution Method: End user, Third-party
Number Installed to Date: 5,000-10,000
Date First Installed: January 1974
(See Vendor Profile Page V-31)

SAYLOR ELECTRONICS INTERNATIONAL
4200-204 DIGITAL CASSETTE DRIVE
Compatibility: DEC PDP-11; HP 9800
Tape Speed: 30 in./sec
Recording Density: 3,200 bit/in.
Data Tracks: 2
Capacity: 2M bytes, blocked; 3M bytes, unblocked
Transfer Rate: 96K bit/sec
Media Width: 15 in.
Streaming Capability: Yes
Price: $1,050
Distribution Method: End user, Third-party
Date First Installed: January 1975

SAYLOR ELECTRONICS INTERNATIONAL
4200 DIGITAL CASSETTE DRIVE
Compatibility: DEC PDP-11; HP 9800
Tape Speed: 30 in./sec
Recording Density: 3,200 bit/in.
Data Tracks: 4
Capacity: 5M bytes, blocked; 7M bytes, unblocked
Transfer Rate: 96K bit/sec
Media Width: 15 in.
Streaming Capability: Yes
Price: $1,475
Distribution Method: End user, Third-party
Number Installed to Date: 1,050
Date First Installed: January 1978

Cassette Tape Drives

3M CO.
DCD-3
Tape Speed: 30 in./sec
Recording Density: 1,800 bit/in.
Data Tracks: 4
Capacity: 672K bytes, unblocked
Transfer Rate: 5K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $886
Date First Installed: 1973
(See Vendor Profile Page V-37)

Tape Speeds Under 25 in./Sec

ANALOG & DIGITAL PERIPHERALS
ADPI LG-1/LG-2
Tape Speed: 18 in./sec
Recording Density: 800 bit/in.
Data Tracks: 2
Media Width: ¼ in.
Drive Mechanism: Hub Driven
Streaming Capability: No
Price: $431
Distribution Method: End user, OEM
Number Installed to Date: 1,000-5,000
Date First Installed: September 1982
(See Vendor Profile Page V-3)

ANALOG & DIGITAL PERIPHERALS
LG-P PORTABLE MINI-CASSETTE
Tape Speed: 18 in./sec
Recording Density: 800 bit/in.
Data Tracks: 2
Capacity: 100K bytes, blocked
Media Width: ¼ in.
Drive Mechanism: Hub Driven
Streaming Capability: No
Price: $695
Distribution Method: End user, OEM
Number Installed to Date: 100-500
Date First Installed: September 1982

ANALOG & DIGITAL PERIPHERALS
PHILIPS MINI CASSETTE DRIVE
Tape Speed: 18 in./sec
Data Tracks: 2
Capacity: 230K bytes, unblocked
Transfer Rate: 10K bit/sec
Media Width: ¼ in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $174
Distribution Method: End user, OEM
Number Installed to Date: 5,000-10,000
Date First Installed: 1981

BRAEMAR COMPUTER DEVICES, INC.
CD-850 TAPE TRANSPORT
Tape Speed: 10 in./sec
Recording Density: 800 bit/in.
Data Tracks: 2
Capacity: 750K bytes, blocked, 1M bytes, unblocked
Transfer Rate: 16K bit/sec
Media Width: .15 in.
Drive Mechanism: Dual motor
Streaming Capability: No
Price: $360
Distribution Method: OEM
Date First Installed: 1970
(See Vendor Profile Page V-5)

BRAEMAR COMPUTER DEVICES, INC.
CD-600A MINI TRANSPORT
Tape Speed: 10 in./sec
Recording Density: 800 bit/in.
Data Tracks: 2
Capacity: 145K bytes, unblocked
Transfer Rate: 10K bit/sec
Media Width: .15 in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $155
Distribution Method: OEM
Date First Installed: 1976

BRAEMAR COMPUTER DEVICES, INC.
CM-600C MINI TRANSPORT
Tape Speed: 10 in./sec
Recording Density: 800 bit/in.
Data Tracks: 2
Capacity: 145K bytes, unblocked
Transfer Rate: 10K bit/sec
Media Width: .15 in.
Drive Mechanism: Single motor
Streaming Capability: No
Price: $200
Distribution Method: OEM
Date First Installed: 1980

BRAEMAR COMPUTER DEVICES, INC.
CD-400 TRANSPORT SYSTEM
Tape Speed: 10 in./sec
Recording Density: 800 bit/in.
Data Tracks: 2
Capacity: 1M bytes, unblocked
Transfer Rate: 16K bit/sec
Media Width: .15 in.
Drive Mechanism: Dual motor
Streaming Capability: No
Price: $525
Distribution Method: OEM
Date First Installed: 1970
(See Vendor Profile Page V-5)

BRAEMAR COMPUTER DEVICES, INC.
CTL-1060 TAPE LOADER
Compatibility: DG Nova
Tape Speed: 10 in./sec
Recording Density: 800 bit/in.
Data Tracks: 2
Capacity: 720K bytes, unblocked
Transfer Rate: 8K bit/sec
Media Width: .15 in.
Drive Mechanism: Dual motor
Streaming Capability: No
Price: $1,140
Distribution Method: OEM
Date First Installed: 1979

BRAEMAR COMPUTER DEVICES, INC.
LTD-650 LONG TERM DATA LOGGER
Tape Speed: 10 in./sec
Recording Density: 800 bit/in.
Data Tracks: 2, 4
Media Width: .15 in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $325
Date First Installed: 1979

BRAEMAR COMPUTER DEVICES, INC.
MTL-4 MINI CASSETTE MEMORY SYSTEM
Tape Speed: 10 in./sec
Recording Density: 800 bit/in.
Data Tracks: 2
Capacity: 145K bytes, unblocked
Transfer Rate: 10K bit/sec
Media Width: .15 in.
Drive Mechanism: Single motor
Streaming Capability: No
Price: $475
Distribution Method: OEM
Date First Installed: 1980

DICOM INDUSTRIES
374-03
Tape Speed: 20 in./sec
Recording Density: 500 bit/in.
Data Tracks: 2
Capacity: 500K bytes, blocked
Transfer Rate: 40K bit/sec
Media Width: .15 in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $5,000
Distribution Method: End user, OEM, Third-party
Date First Installed: November 1980
(See Vendor Profile Page V-12)

DIGITAL LABORATORIES, INC.
ACT-1200
Plug Compatibility: RS-232
Tape Speed: 2 in./sec
Recording Density: 400 bit/in.
Data Tracks: 1
Capacity: 100M bytes, blocked
Transfer Rate: 1,200K bit/sec
Media Width: 1/2 in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $1,000
Distribution Method: End user, OEM
Number Installed to Date: 500-1,000
Date First Installed: June 1975
(See Vendor Profile Page V-13)

ELECTRONIC PROCESSORS, INC.
EPI STR-LINK IIA
Tape Speed: 4 in./sec
Recording Density: 264 bit/in
Data Tracks: 1
Capacity: 180K bytes, unblocked
Transfer Rate: 120K bit/sec
Drive Mechanism: Single motor
Streaming Capability: No
Price: $1,897
Distribution Method: OEM
Date First Installed: 1977
(See Vendor Profile Page V-14)

ELECTRONIC PROCESSORS, INC.
EPI STR-410T
Tape Speed: 4 in./sec
Recording Density: 264 bit/in.
Data Tracks: 1
Capacity: 180K bytes, unblocked
Transfer Rate: 120K bit/sec
Drive Mechanism: Single motor
Streaming Capability: No
Price: $1,897
Date First Installed: 1977

MEMODYNE CORP.
200 SERIES
Tape Speed: 1 in./sec
Recording Density: 615 bit/in.
Data Tracks: 2
Drive Mechanism: Incremental
Streaming Capability: No
Price: $395
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
Date First Installed: 1971
(See Vendor Profile Page V-00)

MEMODYNE CORP.
335C
Tape Speed: 3 in./sec
Recording Density: 160 bit/in.
Data Tracks: 2
Capacity: 72K bytes, blocked
Drive Mechanism: Capstan
Streaming Capability: No
Price: $980
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
Date First Installed: 1974
(See Vendor Profile Page V-00)

MEMODYNE CORP.
M-80
Tape Speed: 20 in./sec
Recording Density: 800 bit/in.
Data Tracks: 2
Capacity: 500M bytes, blocked
Drive Mechanism: Head to tape
Streaming Capability: Yes
Price: $1,845
Distribution Method: OEM
Number Installed to Date: 5,000-10,000
Date First Installed: 1976
(See Vendor Profile Page V-00)

MINNESOTA INSTRUMENTS, INC.
DIGITAL TAPE CASSETTE SYSTEM
Compatibility: Bell & Howell; Tandy TSR-80; Sperry
Tape Speed: 12 in./sec
Recording Density: 800 bit/in.
Data Tracks: 2
Capacity: 540K bytes, blocked
Transfer Rate: 19K bit/sec
Media Width: .15 in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $950 to $1,020
Distribution Method: OEM
(See Vendor Profile Page V-34)

RAYMOND ENGINEERING, INC.
SERIES 1210/1600 SERIAL TAPE
Tape Speed: 3 in./sec
Recording Density: 800 bit/in
Data Tracks: 2
Capacity: 108K bytes, blocked
Media Width: .15 in
Drive Mechanism: Dual motor
Streaming Capability: No
Price: $450 to $500
Number Installed to Date: 10,000-50,000
Date First Installed: 1975
(See Vendor Profile Page V-30)

TEAC CORP. OF AMERICA
MT-223/224
Tape Speed: 15 in./sec
Recording Density: 1,00 bit/in.
Data Tracks: 2
Capacity: 760K bytes, blocked
Transfer Rate: 3K bit/sec
Media Width: ¼ in
Drive Mechanism: Servo
Streaming Capability: Yes
Price: $900 to $950
Distribution Method: OEM
(See Vendor Profile Page V-34)

TEAC-COMP. OF AMERICA
TEAC MT-3 MAG TAPE MEMORY SYSTEM
Tape Speed: 15 in./sec
Recording Density: 800 bit/in
Data Tracks: 1
Capacity: 400K bytes, blocked
Transfer Rate: 2K bit/sec
Media Width: ¼ in
Drive Mechanism: Slit-Disc Servo
Streaming Capability: No

Price: $300 to $500
Distribution Method: OEM
Date First Installed: 1972

TECHTRAN INDUSTRIES, INC.
815A
Tape Speed: 20 in./sec
Recording Density: 800 bit/in.
Data Tracks: 1
Capacity: 290K bytes, blocked
Media Width: 15 in
Drive Mechanism: Dual motor
Streaming Capability: No
Price: $1,045
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: August 1978
(See Vendor Profile Page V-36)

TECHTRAN INDUSTRIES, INC.
817A
Tape Speed: 20 in./sec
Recording Density: 800 bit/in
Data Tracks: 1
Capacity: 290K bytes, blocked
Media Width: .15 in
Drive Mechanism: Dual motor
Streaming Capability: No
Price: $1,260
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: August 1978

TECHTRAN INDUSTRIES, INC.
818A
Tape Speed: 20 in./sec
Recording Density: 800 bit/in.
Data Tracks: 1
Capacity: 290K bytes, blocked
Media Width: 15 in
Drive Mechanism: Dual motor
Streaming Capability: No
Price: $1,610
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: August 1978

TECHTRAN INDUSTRIES, INC.
822A
Tape Speed: 20 in./sec
Recording Density: 800 bit/in.
Data Tracks: 1
Capacity: 290K bytes, blocked
Media Width: 15 in.
Drive Mechanism: Dual motor
Streaming Capability: No
Price: $2,445
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: April 1979

TECHTRAN INDUSTRIES, INC.
9600PRC
Tape Speed: 20 in./sec
Recording Density: 800 bit/in.
Data Tracks: 2
Media Width: .15 in.
Drive Mechanism: Dual motor
Price: $1,775
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: October 1981

TECHTRAN INDUSTRIES, INC.
MODEL 816
Tape Speed: 20 in./sec
Recording Density: 800 bit/in.
Data Tracks: 2
Capacity: 145K bytes, blocked
Media Width: .15 in.
Drive Mechanism: Dual motor
Streaming Capability: Yes
Price: $1,045
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: August 1978

TECHTRAN INDUSTRIES, INC.
MODEL 817
Tape Speed: 20 in./sec
Recording Density: 800 bit/in.
Data Tracks: 2
Capacity: 145K bytes, blocked
Media Width: .15 in
Drive Mechanism: Dual motor
Streaming Capability: Yes
Price: $1,260
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: August 1978

TECHTRAN INDUSTRIES, INC.
MODEL 818
Tape Speed: 20 in./sec
Recording Density: 800 bit/in
Data Tracks: 2
Media Width: .15 in.
Drive Mechanism: Dual motor
Streaming Capability: Yes
Price: $1,610
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: August 1978

TECHTRAN INDUSTRIES, INC.
MODEL 822
Tape Speed: 20 in./sec
Recording Density: 800 bit/in
Data Tracks: 2
Media Width: .15 in.
Drive Mechanism: Dual motor
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: April 1979

WILLIAM PALMER INDUSTRIES
DCR/10 DIGITAL CASSETTE RECORDER
Plug Compatibility: TI Silent 700-
Tape Speed: 10 in /sec
Recording Density: 800 bit/in.
Data Tracks: 2
Capacity: 900K bytes, blocked; 1M bytes, unblocked
Transfer Rate: 10K bit/sec
Media Width: ¼ in.
Drive Mechanism: Single motor
Streaming Capability: No
Price: $2,495
Distribution Method: End user, OEM
Number Installed to Date: 500-1,000
Date First Installed: 1975
(See Vendor Profile Page V-39)

Cassette Drives Without Specified Tape Speeds

ANALOG & DIGITAL PERIPHERALS
ADPI DELUXE MPU CASSETTE SYSTEM
Recording Density: 800 to 1,000 bit/in
Data Tracks: 2
Capacity: 1M bytes, blocked
Transfer Rate: 8K bit/sec
Media Width: ¼ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $798
Distribution Method: End user, OEM
Number Installed to Date: 1,000-5,000
Date First Installed: 1979
(See Vendor Profile Page V-00)

TANDY CORP.
CCR-81
Compatibility: Tandy TRS-80/I, TRS-80/II, TRS-80/III
Data Tracks: 1
Media Width: ⅛ in.
Drive Mechanism: Capstan
Streaming Capability: No
Distribution Method: Third-party
Date First Installed: September 1982

Tape Speeds Over 100 in./Sec

AMPERIF
SERIES 34
Compatibility: S-U 1100
Tape Speed: 125 in /sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 15M bytes, unblocked
Transfer Rate: 781K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Date First Installed: 1983
(See Vendor Profile Page V-2)

AMPERIF
SERIES 330A
Compatibility: S-U 1100
Tape Speed: 200 in /sec
Recording Density: 800 bit/in
Data Tracks: 7
Capacity: 1M bytes, unblocked
Transfer Rate: 160K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $23,000
Distribution Method: End user
Date First Installed: 1979

AMPERIF
SERIES 330B
Compatibility: S-U 1100
Tape Speed: 200 in /sec
Recording Density: 800 bit/in., 1,600 bit/in.
Data Tracks: 9
Capacity: 3M bytes, unblocked
Transfer Rate: 320K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $23,000
Distribution Method: End user
Date First Installed: 1979

AMPERIF
SERIES 334
Compatibility: S-U 1100
Tape Speed: 125 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 15M bytes, unblocked
Transfer Rate: 781K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $24,000
Date First Installed: 1979

AMPERIF
SERIES 336
Compatibility: S-U 1100
Tape Speed: 200 in /sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 15M bytes, unblocked
Transfer Rate: 1,250K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $26,000
Distribution Method: End user
Date First Installed: 1979

BURROUGHS CORP.
B9495-33
Tape Speed: 125 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Transfer Rate: 780K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
(See Vendor Profile Page V-5)

BURROUGHS CORP.
B9495-83
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Transfer Rate: 200K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No

CIPHER DATA PRODUCTS, INC.
M890/M891 CACHETAPE
Tape Speed: 240 in /sec
Recording Density: 1,600 bit/in., 3,200 bit/in
Data Tracks: 9
Capacity: 48M bytes, blocked; 92M bytes, unblocked
Transfer Rate: 384K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $2,820
Distribution Method: OEM
Date First Installed: 1983
(See Vendor Profile Page V-6)

CIPHER DATA PRODUCTS, INC.
SERIES 900 VACUUM COLUMN
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $4,067
Distribution Method: OEM
Date First Installed: 1978

COMPUTER PERIPHERALS, INC.
ATS-1
Compatibility: IBM
Plug Compatibility: Vertec
Tape Speed: 200 in /sec
Recording Density: 800 bit/in., 1,600 bit/in , 6,250 bit/in.
Data Tracks: 9
Capacity: 180M bytes, unblocked
Transfer Rate: 1,250K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $20,000
Distribution Method: OEM
Number Installed to Date: 5,000-10,000
Date First Installed: 1976
(See Vendor Profile Page V-7)

CONTROL DATA CORP.
677-3
Compatibility: CDC Cyber Series
Tape Speed: 150 in./sec
Recording Density: 556 bit/in., 800 bit/in
Data Tracks: 7
Transfer Rate: 120K bit/in.
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $23,545
Distribution: End user
Date First Installed: 1978
(See Vendor Profile Page V-8)

CONTROL DATA CORP.
677-4
Compatibility: CDC Cyber Series
Tape Speed: 200 in./sec
Recording Density: 556 bit/in., 800 bit/in.
Data Tracks: 7
Transfer Rate: 160K bit/in.
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $26,830
Distribution: End user
Date First Installed: 1978

CONTROL DATA CORP.
679-3
Compatibility: CDC Cyber Series
Tape Speed: 150 in /sec
Recording Density: 800 bit/in , 1,600 bit/in
Data Tracks: 9
Transfer Rate: 240K bit/in.
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $24,090
Distribution: End user
Date First Installed: 1978

CONTROL DATA CORP.
679-4
Compatibility: CDC Cyber Series
Tape Speed: 200 in /sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Transfer Rate: 320K bit/in.
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $27,375
Distribution: End user
Date First Installed: 1978

CONTROL DATA CORP.
679-6
Compatibility: CDC Cyber Series
Tape Speed: 150 in./sec
Recording Density: 1,600 bit/in., 6250 bit/in.
Data Tracks: 9
Transfer Rate: 240K bit/in.
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $31,540
Distribution: End user
Date First Installed: 1978

CONTROL DATA CORP.
679-7
Compatibility: CDC Cyber Series
Tape Speed: 200 in./sec
Recording Density: 556 bit/in., 800 bit/in., 1,600 bit/in., 6250 bit/in.
Data Tracks: 9
Transfer Rate: 320K bit/in.
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $33,510
Distribution: End user
Date First Installed: 1978

DIGITAL EQUIPMENT CORP.
TU77
Compatibility: DEC VAX, PDP-11
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Transfer Rate: 200K bit/in.
Capacity: 40M bytes, blocked
Integral Controller: Yes
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $36,800
Distribution: End user
Date First Installed: 1978

DIGITAL EQUIPMENT CORP.
TU78
Compatibility: DEC VAX, PDP-11
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Transfer Rate: 200K bit/in
Capacity: 40M bytes, blocked
Integral Controller: Yes
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $36,800
Distribution: End user
Date First Installed: 1979

DIGITAL EQUIPMENT CORP.
TU79
Compatibility: DEC VAX, PDP-11
Tape Speed: 125 in /sec
Recording Density: 1,600 bit/in., 6,250 bit/in.
Data Tracks: 9
Transfer Rate: 781K bit/in
Capacity: 145M bytes, blocked
Integral Controller: Yes
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $48,000
Distribution: End user
Date First Installed: 1981

FUJITSU AMERICA, INC.
M2432R
Plug Compatibility: Storage Technology C-1900
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in., 6,250 bit/in.
[redacted]
Transfer Rate: 1,250K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $24,750
Distribution Method: OEM
(See Vendor Profile Page V-15)

HARRIS CORP.
6730
Compatibility: Harris 700, 600, 800
Tape Speed: 125 in /sec
Recording Density: 800 bit/in., 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 110M bytes, blocked
Transfer Rate: 781K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $52,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: July 1982
(See Vendor Profile Page V-16)

HITACHI AMERICA, LTD.
MT-183
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in

Reel-to-Reel Tape Drives

Over 100 ip./sec

Data Tracks: 9
Transfer Rate: 128K bit/in
Capacity: 50M bytes, blocked
Integral Controller: No
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Distribution: OEM
(See Vendor Profile Page V-17)

HITACHI AMERICA, LTD.
MT-154
Tape Speed: 125 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Transfer Rate: 500K bit/in
Capacity: 150M bytes, blocked
Integral Controller: No
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Distribution: OEM

HITACHI AMERICA, LTD.
MT-155
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Transfer Rate: 200K bit/in
Capacity: 50M bytes, blocked
Integral Controller: No
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Distribution: OEM

HITACHI AMERICA, LTD.
MT-156
Tape Speed: 125 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Transfer Rate: 780K bit/in
Capacity: 150M bytes, blocked
Integral Controller: No
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Distribution: OEM

HONEYWELL, INC.
[illegible]
Compatibility: Honeywell DPS/6
Tape Speed: 125 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 100M bytes, blocked, 180M bytes, unblocked
Transfer Rate: 780K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $24,190 to $44,000
Distribution Method: End user, Third-party
(See Vendor Profile Page V-17)

IBM
3420 MODEL 5
Compatibility: IBM S/370, 4321, 4331, 4341
Tape Speed: 125 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in.
Data Tracks: 7, 9
Capacity: 3M bytes, unblocked
Transfer Rate: 200K bit/sec
Drive Mechanism: Capstan
Price: $19,990
Distribution Method: End user
(See Vendor Profile Page V-17)

IBM
3420 MODEL 6
Compatibility: IBM S/370, 4321, 4331, 4341
Tape Speed: 125 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 15M bytes, unblocked
Transfer Rate: 780K bit/sec
Drive Mechanism: Capstan
Price: $22,890
Distribution Method: End user
Date First Installed: January 1973

IBM
3420 MODEL 7
Tape Speed: 200 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in
Data Tracks: 7, 9

IBM
3420 MODEL 8
Compatibility: IBM S/370, 4321, 4331, 4341
Tape Speed: 200 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 15M bytes, unblocked
Transfer Rate: 1,250K bit/sec
Drive Mechanism: Capstan
Price: $24,840
Distribution Method: End user
Date First Installed: January 1973

INTERSCIENCE SYSTEMS
3450
Compatibility: Sperry 1100
Plug Compatibility: STC 3450
Tape Speed: 125 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in., 16,000 bit/in
Data Tracks: 7, 9
Transfer Rate: 200K bit/in.
Capacity: 32M bytes, blocked
Integral Controller: No
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $24,000
Distribution: End user
Date First Installed: June 1975
(See Vendor Profile Page V-18)

INTERSCIENCE SYSTEMS
3470
Compatibility: Sperry 1100
Plug Compatibility: STC 3470
Tape Speed: 200 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in
Data Tracks: 7, 9
Transfer Rate: 220K bit/in.
Capacity: 32M bytes, blocked
Integral Controller: No
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $29,000
Distribution: End user
Date First Installed: June 1975

INTERSCIENCE SYSTEMS
3550
Compatibility: Sperry 1100
Plug Compatibility: STC 3650
Tape Speed: 125 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 7, 9
Transfer Rate: 780K bit/in.
Capacity: 100M bytes, blocked
Integral Controller: No
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $28,000
Distribution: End user
Date First Installed: June 1975

INTERSCIENCE SYSTEMS
3670
Compatibility: Sperry 1100
Plug Compatibility: STC 3670
Tape Speed: 200 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 7, 9
Transfer Rate: 1,250K bit/in
Capacity: 100M bytes, blocked
Integral Controller: No
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $30,000
Distribution: End user
Date First Installed: June 1975

KENNEDY CO.
9300
Compatibility: DG Nova, Eclipse, DEC PDP-11, LSI, PE
Tape Speed: 125 in./sec
Data Tracks: 9
Capacity: 46M bytes, unblocked
Transfer Rate: 200K bit/sec
Streaming Capability: No
Price: $6,800
Number Installed to Date: 5,000-10,000
Date First Installed: September 1977
(See Vendor Profile Page V-21)

MASSTOR SYSTEMS CORP.
M420
Plug Compatibility: IBM 3420
Tape Speed: 200 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Transfer Rate: 320K bit/sec
Drive Mechanism: Capstan
Distribution Method: End user, OEM
(See Vendor Profile Page V-22)

MEMOREX CORP.
3226
Compatibility: IBM 370/135
Plug Compatibility: IBM 3420-6
Tape Speed: 125 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 150M bytes, blocked
Transfer Rate: 780K bit/sec
Media Width: ½ in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $30,000
Distribution Method: End user
Number Installed to Date: 1,000-5,000
Date First Installed: January 1978
(See Vendor Profile Page V-23)

MEMOREX CORP.
3227
Compatibility: IBM 370/135
Plug Compatibility: IBM 3420-6
Tape Speed: 200 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Capacity: 150M bytes, blocked
Transfer Rate: 320K bit/sec
Media Width: ½ in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $26,000
Distribution Method: End user
Number Installed to Date: 500-1,000
Date First Installed: January 1979

MEMOREX CORP.
3228
Compatibility: IBM 370/135
Plug Compatibility: IBM 3420-6
Tape Speed: 200 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 150M bytes, blocked
Transfer Rate: 1,250K bit/sec
Media Width: ½ in.
Drive Mechanism: Single motor
Streaming Capability: No
Price: $33,000
Distribution Method: End user
Number Installed to Date: 1,000-5,000
Date First Installed: January 1979

MEMOREX CORP.
3261
Compatibility: IBM 370/135
Plug Compatibility: IBM 3420-6
Tape Speed: 125 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 150M bytes, blocked
Transfer Rate: 780K bit/sec
Media Width: ½ in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $57,450
Distribution Method: End user
Number Installed to Date: 100-500
Date First Installed: September 1982

MEMOREX CORP.
3262
Compatibility: IBM 370/135
Plug Compatibility: IBM 3420-6
Tape Speed: 125 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 150M bytes, blocked
Transfer Rate: 780K bit/sec
Media Width: ½ in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $89,200
Distribution Method: End user
Number Installed to Date: 100-500
Date First Installed: September [illegible]

[illegible]
3265
Compatibility: IBM 370/135
Plug Compatibility: IBM, 3420-6
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Capacity: 150M bytes, blocked
Transfer Rate: 200K bit/sec
Media Width: ½ in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $24,100
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: September 1982

MEMOREX CORP.
[illegible]
Compatibility: IBM 370 135
Plug Compatibility: IBM 3420-6
Tape Speed: 125 in /sec
Recording Density: 1,600 bit/in 6,250 bit in
Data Tracks: 9
Capacity: 150M bytes blocked
Transfer Rate: 780K bit/sec
Media Width: ½ in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $24 100
Number Installed to Date: 100-500
Date First Installed: September 1982

MESA TECHNOLOGY CORP.
4000
Compatibility: Multibus
Plug Compatibility: Telex
Tape Speed: 125 in./sec
Recording Density: 800 bit/in 1 600 bit in 6,250 bit/in
Data Tracks: 9
Capacity: 145M bytes, unblocked
Transfer Rate 630K bit/sec
Media Width. ½ in
Streaming Capability: No
Price: $33 950
Distribution Method: End user

MESA TECHNOLOGY CORP.
4001
Compatibility: Multibus
Plug Compatibility: Cipher
Tape Speed. 125 in sec
Recording Density: 800 bit/in 1 600 bit/in
Data Tracks. 9
Transfer Rate: 162K bit/sec
Streaming Capability: No
Price: $10,340
Distribution Method: End user
(See Vendor Profile Page V-23)

MESA TECHNOLOGY CORP.
4010
Compatibility: Unibus
Plug Compatibility: Telex
Tape Speed: 125 in./sec
Recording Density: 800 bit/in 1 600 bit/in 6,250 bit/in
Data Tracks: 9
Capacity: 145M bytes, unblocked
Transfer Rate: 630K bit/sec
Media Width: ½ in
Streaming Capability: No
Distribution Method: End user

MESA TECHNOLOGY CORP.
[illegible]
Compatibility: Unibus
Plug Compatibility: Cipher
Tape Speed: 125 in /sec
Recording Density: 800 bit/in 1,600 bit/in
Data Tracks: 9
Transfer Rate: 125K bit/sec
Media Width: ½ in.
Streaming Capability: [illegible]
Price: $10 340
Distribution Method: End user

MILTOPE CORP.
AT-1161
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in., 6,250 bit/in
[illegible]
Capacity: 100M bytes, blocked
Transfer Rate: 780K bit/sec
Media Width: ½ in
Drive Mechanism: Single motor
Streaming Capability: Yes
Price: $35 000
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: April 1970
(See Vendor Profile Page V-24)

MILTOPE CORP.
AT-1161 AUTOMATIC TREADING TAPE
Compatibility: IBM 240/3400, Norden, Rolm MIL, Litton 3050
Tape Speed: 125 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in., 6,250 bit/in.
Data Tracks: 7, 9
Capacity: 3M bytes, unblocked
Transfer Rate: 200K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $25 000
Distribution Method: OEM
Number Installed to Date: 1,000-5 000
Date First Installed: April 1970

NATIONAL ADVANCED SYSTEMS
77
Compatibility: IBM 370 Series
Plug Compatibility: IBM 3420-7
Tape Speed: 200 in./sec
Recording Density: 800 bit/in., 1600 bit/in.
Data Tracks: 7
Transfer Rate: 320K bit/sec
Drive Mechanism: Capstan
Streaming Capability: No
Price: $24 000
Distribution Method: End user
Date First Installed: January 1980
(See Vendor Profile Page V-25)

NATIONAL ADVANCED SYSTEMS
[illegible]
Compatibility: IBM 370 Series
Plug Compatibility: IBM 3420-6, 3430
Tape Speed: 125 in /sec
Recording Density: 1600 bit/in., 6250 bit/in
Data Tracks: 9
Transfer Rate: 780K bit/sec
Drive Mechanism: Capstan
Streaming Capability: No
Price: $17,000
[illegible] End user
Date First Installed: June 1983

NATIONAL ADVANCED SYSTEMS
7420-88
Compatibility: IBM 370 Series
Plug Compatibility: IBM, 3420-8
Tape Speed: 200 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Transfer Rate: 1250K bit/sec
Drive Mechanism: Capstan
Streaming Capability: No
Price: $25,000
Distribution Method: End user
Date First Installed: January 1980

NCR CORP.
8370-861
Compatibility: NCR V-Series
Tape Speed: 125 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in.
[illegible]
Capacity: 180M bytes, unblocked
Transfer Rate: 781K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $25 160
Date First Installed: April 1983
(See Vendor Profile Page V-26)

NCR CORP.
[illegible]
Compatibility: NCR V-Series
Tape Speed: 200 in /sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 180M bytes unblocked
Transfer Rate: 250K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $28,165
Distribution Method: End user
Date First Installed: January 1982

PERTEC COMPUTER CORP.
T1000
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 180M bytes, unblocked
Transfer Rate: 781K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $11 090
[illegible] OEM
Number Installed to Date: 13,000
Date First Installed: January 1977
(See Vendor Profile Page V-28)

PERTEC INSTRUMENT CO.
AT 1062
Compatibility: IBM
Tape Speed: 150 in /sec
Recording Density: 800 bit/in., 1,600 bit/in.
Data Tracks: 9
Transfer Rate: 24K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $25,000
Distribution Method: End user, OEM
(See Vendor Profile Page V-29)

PERTEC INSTRUMENT CO.
DC 1061
Tape Speed: 150 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Transfer Rate: 24K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $25,000
[illegible] End User, OEM
(See Vendor Profile Page V-29)

RENAISSANCE MARKETING, INC.
AT312
Plug Compatibility: IBM 3400
Tape Speed: 200 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
[illegible]
Media Width: ½ in
[illegible]
Streaming Capability: No
Price: $3,000 to $4,000
[illegible] Third-party
Date First Installed: 1973
(See Vendor Profile Page V-31)

RENAISSANCE MARKETING, INC.
SC2406
Plug Compatibility: IBM 2400 Series
Tape Speed: 113 in /sec
Recording Density: 800 bit/in., 1,600 bit/in.
Data Tracks: 9
Transfer Rate: 180K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $1,200
[illegible]
Third-party
Date First Installed: 1970

ROSSCOMP CORP.
D-160 FAMILY
Plug Compatibility: OIC-02
Tape Speed: 130 in /sec
Recording Density: 8,000 bit/in
Data Tracks: 24 tracks
Capacity: 160M bytes, blocked
Transfer Rate: 130K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $1 700
[illegible]
Date First Installed: 1982
(See Vendor Profile Page V-31)

SPERRY CORP.
[illegible]
Compatibility: Sperry 100-90 1100-[illegible]
Tape Speed: 125 in /sec
Recording Density: 800 bit/in 1,600 bit/in
[illegible]
Transfer Rate: 200K bit/sec
Media Width: ½ in
[illegible]
Streaming Capability: No
Price: $54 720
[illegible]
(See Vendor Profile Page V-33)

SPERRY CORP.
UNISERVO 28
Compatibility: Sperry 1100-90, 1100-80, 1100-60
Tape Speed: 125 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
[illegible]
Transfer Rate: 780K bit/sec
Media Width: ½ in
Drive Mechanism: Servo
Streaming Capability: No
Price: $24 750
Distribution Method: End user

SPERRY CORP.
UNISERVO 36
Compatibility: Sperry 1100-90, 1100-80, 1100-60
Tape Speed: 125 in./sec
Recording Density: 1,600 bit/in.
[illegible]
[illegible]
Transfer Rate: 1,250K bit/sec
[illegible]
[illegible]
Streaming Capability: No
[illegible]
[illegible]
Date First Installed: January 1978

Reel-to-Reel Tape Drives

Over 100 in./sec • 51- to 100 in./sec

STORAGE TECHNOLOGY CORP.
7830 SERIES
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in., 6,250 bit/in.
Data Tracks: 9
Capacity: 180M bytes, unblocked
Transfer Rate: 781K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Distribution Method: End user
Number Installed to Date: 5,000-10,000
Date First Installed: January 1980
(See Vendor Profile Page V-33)

STORAGE TECHNOLOGY CORP.
7840 SERIES
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in., 6,250 bit/in.
Data Tracks: 9
Capacity: 180M bytes, unblocked
Transfer Rate: 781K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Distribution Method: End user
Number Installed to Date: 5,000-[illegible]
Date First Installed: 1980

STORAGE TECHNOLOGY CORP.
3450
Compatibility: IBM 370, 303X, Amdahl V6, V7, V8
Plug Compatibility: IBM 3420-5
Tape Speed: 125 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in.
Data Tracks: 7, 9
Capacity: 45M bytes, blocked
Transfer Rate: 200K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $23,110
Distribution Method: End user
Number Installed to Date: 10,000-50,000
Date First Installed: September 1970

STORAGE TECHNOLOGY CORP.
3470
Compatibility: IBM 370, 303X; Amdahl V6, V7, V8
Plug Compatibility: IBM 3420-7
Tape Speed: 200 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in.
Data Tracks: 7, 9
Transfer Rate: 320K bit/sec
Streaming Capability: No
Price: [illegible]
Distribution Method: End user
Number Installed to Date: 10,000-[illegible]
Date First Installed: 1970

STORAGE TECHNOLOGY CORP.
3650
Compatibility: IBM 370, 303X; Amdahl V6, V7, V8
Plug Compatibility: IBM 3420-6
Tape Speed: 125 in./sec
Recording Density: 1,600 bit/in., [illegible]
Data Tracks: 9
Capacity: 170M bytes, blocked
Transfer Rate: 780K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $23,920
Distribution Method: End user
Number Installed to Date: 10,000-50,000
Date First Installed: April 1974
(See Vendor Profile Page V-00)

STORAGE TECHNOLOGY CORP.
3670
Compatibility: IBM 370, 303X, Amdahl V6, V7, V8
Plug Compatibility: IBM 3420-8
Tape Speed: 200 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in.
Data Tracks: 9
Capacity: 170M bytes, blocked
Transfer Rate: 1,250K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $26,312
Distribution Method: End user
Number Installed to Date: 10,000-[illegible]
Date First Installed: April 1974

STORAGE TECHNOLOGY CORP.
4350
Compatibility: IBM 370, 303X, Amdahl V6, V7, V8
Plug Compatibility: IBM, 3420-60
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in., 6,250 bit/in.
Data Tracks: 9
Capacity: 170M bytes, blocked
Transfer Rate: 780K bit/sec
Media Width: [illegible]
Drive Mechanism: Capstan
Streaming Capability: No
Price: $56,200
Distribution Method: End user
Number Installed to Date: 5,000-10,000
Date First Installed: May 1980

STORAGE TECHNOLOGY CORP.
4670
Compatibility: IBM 370
Plug Compatibility: IBM 3420
Tape Speed: 200 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 780M bytes, blocked
Transfer Rate: 3,000K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: [illegible]
Distribution Method: End user
Date First Installed: July 1983

STORAGE TECHNOLOGY CORP.
4674
Compatibility: IBM 370
Plug Compatibility: IBM 3420
Tape Speed: 200 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 780M bytes, blocked
Transfer Rate: 3,000K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $20,850
Distribution Method: End user
Date First Installed: July 1983

SYSTEM INDUSTRIES, INC.
9700-53 TAPE SYSTEM
Compatibility: DEC PDP-11, VAX
Plug Compatibility: DEC
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in., 6,250 bit/in.
Data Tracks: 8
Capacity: 175M bytes, blocked
Transfer Rate: 781K bit/sec
Media Width: ½ in
Drive Mechanism: Dual motor
Streaming Capability: No
Distribution Method: End user
(See Vendor Profile Page V-33)

TELEX COMPUTER PRODUCTS, INC.
6200 SERIES
Compatibility: Prime 650,750; DEC PDP, VAX, Tandon 1, 2
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in., 6,250 bit/in.
Data Tracks: 9
Capacity: 180M bytes, unblocked
Transfer Rate: 780K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $10,000 to $12,000
Distribution Method: OEM
Number Installed to Date: 9,000
Date First Installed: January 1978
(See Vendor Profile Page V-36)

TELEX COMPUTER PRODUCTS, INC.
SERIES 80
Compatibility: IBM 360, 370, 4300
Plug Compatibility: IBM 3420-6
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in., 6,250 bit/in.
Data Tracks: 9
Capacity: 180M bytes, unblocked
Transfer Rate: 781K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $17,325
Distribution Method: End user
Number Installed to Date: 1,700
Date First Installed: January 1980

TELEX COMPUTER PRODUCTS, INC.
TELEX 6353-85
Plug Compatibility: Pertec
Tape Speed: 125 in./sec
Recording Density: 800 bit/in., 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Media Width: ½ in
Drive Mechanism: Single motor
Streaming Capability: No
Price: $14,835
Distribution Method: OEM
Number Installed to Date: 5,000-10,000

51- to 100 in./Sec Tape Speeds

AMPERIF
[illegible]
Compatibility: S-U

Tape Speed: 75 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 15M bytes, unblocked
Transfer Rate: 468K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Date First Installed: 1983
(See Vendor Profile Page V-2)

AMPERIF
[illegible]
Compatibility: S-U 1100
Tape Speed: 75 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 15M bytes, unblocked
Transfer Rate: 468K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $21 000
Distribution Method: End user
Date First Installed: September 1979

ARDENT COMPUTER PRODUCTS, INC.
ARDENT 1000
Compatibility: DG Nova
Tape Speed: 75 in./sec
Recording Density: 800 bit/in
Data Tracks: 7, 9
Media Width: ½ in.
Streaming Capability: No
Price: $1,800
Distribution Method: OEM
(See Vendor Profile Page V-4)

BURROUGHS CORP.
B9495-32
Tape Speed: 75 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Transfer Rate: 468K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
(See Vendor Profile Page V-5)

CIPHER DATA PRODUCTS, INC.
MDC 11 VACUUM DRIVEN
Tape Speed: 75 in./sec
Recording Density: 800 bit/in 1,600 bit/in
Data Tracks: 9
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $4 490
Date First Installed: September 1971
(See Vendor Profile Page V-6)

CONTROL DATA CORP.
BT-4
Compatibility: CDC Cyber Series
Tape Speed: 100 in /sec
Recording Density: 556 bit/in., 800 bit/in.
Data Tracks: 7
Transfer Rate: 60K bit/in
Media Width: [illegible]
Drive Mechanism: Capstan
Streaming Capability: No
Price: $19,165
Distribution: End user
Date First Installed: September [illegible]
(See Vendor Profile Page V-7)

CONTROL DATA CORP.
679-2
Compatibility: CDC Cyber Series
Tape Speed: 100 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Transfer Rate: 160K bit/in
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $19,710
Distribution: End user
Date First Installed: 1978

CONTROL DATA CORP.
679-5
Compatibility: CDC Cyber Series
Tape Speed: 100 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Transfer Rate: 160K bit/in
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $27,925
Distribution: End user
Date First Installed: 1978

CROMEMCO, INC.
TD6
Compatibility: Cromemco 1, 2, 3
Tape Speed: 100 in./sec
Recording Density: 1,600 bit/in
[illegible]
Capacity: 40M bytes, blocked
Streaming Capability: Yes
Price: $7,995
Distribution Method: Third-party
(See Vendor Profile Page V-9)

DATA GENERAL CORP.
4307
Compatibility: DG
Tape Speed: 75 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 150M bytes, blocked, 180M bytes, unblocked
Media Width: ½ in
Drive Mechanism: Vacuum
Streaming Capability: No
Price: $48,500
Distribution Method: End user, OEM
Date First Installed: December 1979
(See Vendor Profile Page V-10)

DATA GENERAL CORP.
6026
Compatibility: DG
Tape Speed: 75 in./sec
Recording Density: 800 bit/in., 1,600 bit/in.
Data Tracks: 9
Capacity: 40M bytes, blocked
Media Width: ½ in.
Drive Mechanism: Vacuum
Streaming Capability: No
Price: $16,000
Distribution Method: End user, OEM
Date First Installed: October 1978

DIGI-DATA CORP.
1840 MAGNETIC TAPE SYSTEMS
Tape Speed: 75 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Capacity: 46M bytes, unblocked
Transfer Rate: 120K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $5,175 to $6,375
(See Vendor Profile Page V-12)

GAW CONTROL CORP.
TDX/75 ISP DRIVE
Compatibility: IBM 34
Plug Compatibility: Pertec, Kennedy
Tape Speed: 75 in./sec
Recording Density: 800 bit/in., 1,600 bit/in.
Data Tracks: 9
Capacity: 39M bytes, blocked, 44M bytes unblocked
Transfer Rate: 120K bit/sec
[illegible]
Drive Mechanism: Capstan
Streaming Capability: No
Price: $7,500
Distribution Method: End user
Number Installed to Date: 1,000-5,000
(See Vendor Profile Page V-15)

HARRIS CORP.
6330
Compatibility: Harris 600, 700, 800
Tape Speed: 100 in./sec
Recording Density: 1,600 bit/in.
[illegible]
Capacity: 30M bytes, blocked
Transfer Rate: 160K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $9,800
Distribution Method: End user
Number Installed to Date: 500-1,000
Date First Installed: June 1981
(See Vendor Profile Page V-16)

HARRIS CORP.
6696
Compatibility: Harris 600, 700, 800
Tape Speed: 75 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 9
Capacity: 30M bytes, blocked
Transfer Rate: 120K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $24,600
[illegible]
Number Installed to Date: 100-500
Date First Installed: January 1983

HARRIS CORP.
6720
Compatibility: Harris 700, 800, 900
Tape Speed: 75 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 110M bytes, blocked
Transfer Rate: 468K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
[illegible]
Price: $39,950
[illegible]
Number Installed to Date: 100-500
Date First Installed: January 1979

HEWLETT-PACKARD CO.
HP 7976A
Compatibility: HP 1000 A/L, 3000 III; 3000 30/33
Tape Speed: 75 in./sec
Data Tracks: 9
Streaming Capability: Yes
Price: $44,440
Distribution Method: End user
[illegible]
(See Vendor Profile Page V-17)

HONEYWELL, INC.
MTU 9509/9610/9614/9615
Compatibility: Honeywell DPS/6
Tape Speed: 75 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Capacity: 31M bytes, blocked, 46M bytes, unblocked
Transfer Rate: 120K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $11,500 to $17,960
[illegible]
Third-party
Date First Installed: 1979

IBM
3420 MODEL 4
Compatibility: IBM S/370, 4321, 4331, 4341
Tape Speed: 75 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in
[illegible]
Capacity: 15M bytes, blocked
Transfer Rate: 470K bit/sec
Drive Mechanism: Capstan
Price: $19,170
[illegible]
Date First Installed: January 1973
(See Vendor Profile Page V-17)

IBM
[illegible]
Compatibility: IBM S/370, IBM 4321, IBM 4331, IBM 4341
Tape Speed: 75 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in.
[illegible]
Capacity: 15M bytes, blocked
Transfer Rate: 470K bit/sec
Drive Mechanism: Capstan
Price: $19,170
[illegible]
Date First Installed: January 1973

IBM
4969 (7D)
Compatibility: IBM Series/1
Tape Speed: 75 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
[illegible]
Price: $16,960
[illegible]

IBM
4969 (7N)
Compatibility: IBM Series/1
Tape Speed: 75 in./sec
Recording Density: 800 bit/in
Data Tracks: 9
Transfer Rate: 60K bit/sec
[illegible]

IBM
4969 (7P)
Compatibility: IBM Series/1
Tape Speed: 75 in./sec
Recording Density: 1,600 bit/in., 6250 bit/in
[illegible]
Price: $16,170
Distribution Method: [illegible]

INFORMATION DEVELOPMENT & APPLICATIONS
4610-5
Plug Compatibility: HP-IB
Tape Speed: 100 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 9
Capacity: 28M bytes, blocked
Transfer Rate: 160K bit/sec
Media Width: ½ in
Streaming Capability: Yes
Price: [illegible]
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: May 1976
(See Vendor Profile Page V-18)

INTERSCIENCE SYSTEMS
3630
Compatibility: Sperry 1100
Plug Compatibility: STC 3630
Tape Speed: 75 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 7, 9
Transfer Rate: 470K bit/in
Capacity: 32M bytes, blocked
Integral [illegible]
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
[illegible]
[illegible]
Date First Installed: June 1975
(See Vendor Profile Page V-18)

KENNEDY CO.
9100
Compatibility: DG Nova, Eclipse, DEC PDP-11, LSI, PE
Tape Speed: 75 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in
[illegible]
Capacity: 46M bytes, unblocked
Transfer Rate: 120K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
[illegible]
Distribution Method: End user, OEM
Number Installed to Date: 10,000-50,000
Date First Installed: 1976
(See Vendor Profile Page V-21)

KENNEDY CO.
9400
Compatibility: DEC, DG
Plug Compatibility: Pertec, STC 6809
Tape Speed: 75 in./sec
[illegible]
1,600 bit/in., 6,250 bit/in.
Data Tracks: 9
Capacity: 180M bytes, unblocked
Media Width: ½ in
Drive Mechanism: [illegible]
Streaming Capability: No
Price: $12,000
Distribution Method: OEM

MENTEC
420
Tape Speed: 90 in./sec
Recording Density: 10,000 bit/in.
Data Tracks: 9
Capacity: 42M bytes, blocked
Transfer Rate: 450K bit/sec
Media Width: 15 in
Drive Mechanism: Reel to reel
Streaming Capability: Yes
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: August 1983
(See Vendor Profile Page V-23)

Reel-to-Reel Tape Drives

51- to 100 in./sec

MEMTEC
440
Tape Speed: 90 in./sec
Data Tracks: 9
Streaming Capability: Yes
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: August 1983

MEMTEC
451 & 453
Tape Speed: 90 in./sec
Recording Density: 10,000 bit/in
Data Tracks: 2
Capacity: 1M bytes, blocked
Transfer Rate: 450K bit/sec
Media Width: 15 in
Drive Mechanism: Reel to reel
Streaming Capability: Yes
Price: $300
Distribution Method: OEM
Number Installed to Date: 10,000-50,000
Date First Installed: 1979

MEMTEC
[illegible]
Tape Speed: 90 in./sec
Recording Density: 6,400 bit/in
Data Tracks: 4
Capacity: 12M bytes, blocked
Transfer Rate: 576K bit/sec
Media Width: 15 in.
Drive Mechanism: Reel to reel
Streaming Capability: Yes
Price: $350
Distribution Method: OEM
Number Installed to Date: 500-1,000
Date First Installed: August 1982

MEMTEC
520
Tape Speed: 90 in./sec
Recording Density: 10,000 bit/in.
Data Tracks: 4
Capacity: 20M bytes, blocked
Transfer Rate: 900K bit/sec
Media Width: 15 in
Drive Mechanism: Reel to reel
Streaming Capability: Yes
Price: $450
Distribution Method: OEM
Number Installed to Date: 1,000-5,000
Date First Installed: March 1983
(See Vendor Profile Page V-00)

MESA TECHNOLOGY CORP.
1912
Compatibility: Unibus
Plug Compatibility: Cipher
Tape Speed: 100 in /sec
Recording Density: 1,600 bit/in., 3,200 bit/in
Data Tracks: 9
Capacity: 46M bytes, unblocked
Transfer Rate: 150K bit/sec
Media Width: ½ in
Streaming Capability: Yes
Price: $8 445
Distribution Method: End user
(See Vendor Profile Page V-23)

MESA TECHNOLOGY CORP.
[illegible]
Compatibility: Multibus
Plug Compatibility: Cipher
Tape Speed: 100 in /sec
Recording Density: 1,600 bit/in., [illegible]
Data Tracks: 9
Capacity: 46M bytes, unblocked
Transfer Rate: 150K bit/sec
Media Width: ½ in
Streaming Capability: Yes
Price: $6'445
Distribution Method: End user

MILTOPE CORP.
SC1161 TAPE TRANSPORT
Compatibility: IBM 2400/3400
Tape Speed: 75 in./sec
Recording Density: 200 bit/in., 556 bit/in 800 bit/in
Data Tracks: 7, 9
Capacity: 1M bytes, unblocked
Transfer Rate: 100K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $40,000
Distribution Method: OEM
Number Installed to Date: 100-500
Date First Installed: 1978
(See Vendor Profile Page V-24)

NATIONAL ADVANCED SYSTEMS
[illegible]
Compatibility: IBM 370 Series
Plug Compatibility: IBM 3430, 3420-4
Tape Speed: 80 in /sec
Recording Density: 1,600 bit/in 6,250 bit/in
Data Tracks: 9
Transfer Rate: 500K bit/sec
Drive Mechanism: Capstan
Streaming Capability: No
Price: $15,000
Distribution Method: End user
Date First Installed: June 1983

NCR CORP.
8370-0401
Compatibility: NCR V-Series
Tape Speed: 75 in./sec
Recording Density: 1 600 bit/in
Data Tracks: 9
Capacity: 180M bytes, unblocked
Transfer Rate: 468K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $21 935
Distribution Method: End user
Date First Installed: April 1983
(See Vendor Profile Page V-26)

NIXDORF COMPUTER CORP.
8410-04
Compatibility: Nixdorf 8890
Tape Speed: 75 in./sec
Recording Density: 800 bit/in., 1,600 bit/in.
Data Tracks: 9
Capacity: 46M bytes, unblocked
Transfer Rate: 120K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $12,595
Distribution Method: End user
Number Installed to Date: Under [illegible]
Date First Installed: November 1981
(See Vendor Profile Page V-26)

NIXDORF COMPUTER CORP.
8420-02
Compatibility: Nixdorf 8890
Tape Speed: 75 in /sec
Recording Density: 6,250 bit/in.
Data Tracks: 9
Capacity: 180M bytes, unblocked
Transfer Rate: 470K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $16,750
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: June 1982

PERTEC COMPUTER CORP.
FS1000
Tape Speed: 100 in./sec
Recording Density: 1,600 bit/in., 3,200 bit/in
Data Tracks: 9
Capacity: 46M bytes, unblocked
Transfer Rate: 160K bit/sec
Media Width: ½ in
Drive Mechanism: Reel driven
Streaming Capability: Yes
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: December 1982
(See Vendor Profile Page V-28)

PERTEC COMPUTER CORP.
T9000
Tape Speed: 75 in /sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Capacity: 46M bytes, blocked
Transfer Rate: 120K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $6,335
Distribution Method: OEM
Number Installed to Date: 12 000
Date First Installed: January 1974

PRIME COMPUTER, INC.
4522 MAGNETIC TAPE SUBSYSTEM
Tape Speed: 75 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 9
Capacity: 46M bytes, unblocked
Transfer Rate: 120K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $18,500
Distribution Method: End user
Date First Installed: December 1980
(See Vendor Profile Page V-29)

PRIME COMPUTER, INC.
4529 MAGNETIC TAPE SLAVE
Tape Speed: 75 in./sec
Recording Density: 800 bit/in 1 600 bit/in
Data Tracks: 9
Capacity: 46M bytes, unblocked
Transfer Rate: 120K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $14 000
Distribution Method: End user
Date First Installed: December 1980

PRIME COMPUTER, INC.
4550 MAGNETIC TAPE SUBSYSTEM
Tape Speed: 75 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 9
Capacity: 180M bytes, unblocked
Transfer Rate: 469K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $48 500
Distribution Method: End user
Date First Installed: January 1981

PRIME COMPUTER, INC.
4551 MAGNETIC TAPE SLAVE
Tape Speed: 75 in /sec
Recording Density: 1,600 bit/in 6,250 bit in
Data Tracks: 9
Capacity: 180M bytes, unblocked
Transfer Rate: 469K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $23,000
Distribution Method: End user
Date First Installed: January 1981

QANTEL CORP.
5241
Compatibility: Qantel 64
Tape Speed: 100 in sec
Recording Density: 1,600 bit/in., 3,200 bit in
Data Tracks: 9
Capacity: 40M bytes, blocked
Transfer Rate: 160K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $20 450
Distribution Method: Third-party
Number Installed to Date: 50
Date First Installed: April 1983
(See Vendor Profile Page V-30)

SPERRY CORP.
UNISERVO 22
Compatibility: Sperry 1100-90, 1100-80 1100-60
Tape Speed: 75 in./sec
Recording Density: 800 bit/in., 1,600 bit/in.
Data Tracks: 9
Transfer Rate: 120K bit/sec
Media Width: ½ in.
Drive Mechanism: Servo
Streaming Capability: No
Price: $47,000
Distribution Method: End user
Number Installed to Date: 500
(See Vendor Profile Page V-33)

SPERRY CORP.
UNISERVO 26
Compatibility: Sperry 110-90, 110-80, 110-60
Tape Speed: 75 in /sec
Recording Density: 1600 bit/in., 6250 bit/in
Data Tracks: 9
Transfer Rate: 470K bit/sec
Media Width: ½ in
Drive Mechanism: Servo
Streaming Capability: No
Price: $22 000
Distribution Method: End user

STORAGE TECHNOLOGY CORP.
1920
Tape Speed: 75 in. sec
Recording Density: 800 bit/in., 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 180M bytes, unblocked
Transfer Rate: 469K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Distribution Method: End user
(See Vendor Profile Page V-33)

STORAGE TECHNOLOGY CORP.
3430
Compatibility: IBM 370, 303; Amdahl V6, V7 V8

Plug Compatibility: IBM 3420-3
Tape Speed: 75 in./sec
Recording Density: 200 bit/in., 556 bit/in , 800 bit/in , 1,600 bit/in
Data Tracks: 7, 9
Capacity: 45M bytes, blocked
Transfer Rate: 120K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $18,140
Distribution Method: End user
Number Installed to Date: 10,000-50,000
Date First Installed: September 1970

STORAGE TECHNOLOGY CORP.
3630
Compatibility: IBM 370, 303X; Amdahl
Plug Compatibility: IBM 3420-4
Tape Speed: 75 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 170M bytes, blocked
Transfer Rate: 470K bit/sec
Media Width: ½ in
Streaming Capability: Yes
Price: $20,756
Distribution Method: End user
Number Installed to Date: 10,000-50 000
Date First Installed: April 1974

TELEX COMPUTER PRODUCTS, INC.
TELEX-6253-44
Plug Compatibility: Pertec
Tape Speed: 75 in./sec
Recording Density: 800 bit/in , 1,600 bit/in , 6,250 bit/in
Data Tracks: 9
Media Width: ½ in.
Drive Mechanism: Single motor
Streaming Capability: No
Price: $14 635
Distribution Method: OEM
Number Installed to Date: 5,000-10,000
Date First Installed: November 1980
(See Vendor Profile Page V-36)

Tape Speeds Under 50 in./Sec

A. B. DICK CO.
CIPHER STREAMER TAPE
Tape Speed: 25 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Capacity: 40M bytes, blocked
Transfer Rate: 160K bit/sec
Media Width: ½ in
Drive Mechanism: Direct drive
Streaming Capability: Yes
Price: $6,500
Distribution Method: OEM
Number Installed to Date: 10
Date First Installed: July 1982
(See Vendor Profile Page V-1)

ASTRONAUTICS CORP. OF AMERICA
MTU P/N-202621
Tape Speed: 38 in./sec
Recording Density: 200 bit/in., 556 bit/in
Data Tracks: 7
Media Width: ½ in.
Price: $22,683
Distribution Method: End user
Date First Installed: 1979
(See Vendor Profile Page V-4)

ASTRONAUTICS CORP. OF AMERICA
MTU P/N-202622
Tape Speed: 38 in./sec
Recording Density: 556 bit/in , 800 bit/in
Data Tracks: 7
Media Width: ½ in.
Price: $22,683
Distribution Method: End user
Date First Installed: 1979

ASTRONAUTICS CORP. OF AMERICA
MTU P/N-202623
Tape Speed: 38 in /sec
Recording Density: 800 bit/in
Data Tracks: 9
Media Width: ½ in
Price: $22,683
Distribution Method: End user
Date First Installed: 1979

ASTRONAUTICS CORP. OF AMERICA
MTU P/N-202624
Tape Speed: 38 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 9
Media Width: ½ in.
Price: $33,317
Distribution Method: End user

BURROUGHS CORP.
B9498
Tape Speed: 25 in /sec
Recording Density: 1600 bit/in.
Data Tracks: 9
Transfer Rate: 160K bit/sec
Media Width: ½ in.
Drive Mechanism: Single motor
Streaming Capability: Yes
(See Vendor Profile Page V-5)

CIPHER DATA PRODUCTS, INC.
MOD 8/MOD 10 COMPLIANCE ARM
Tape Speed: 45 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $2,626
Distribution Method: OEM
Date First Installed: 1969
(See Vendor Profile Page V-6)

CIPHER DATA PRODUCTS, INC.
SERIES 100 COMPLIANCE ARM
Tape Speed: 45 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $3,301
Distribution Method: OEM
Date First Installed: 1970

COMPUTER PERIPHERALS, INC.
KEYSTONE 92161
Compatibility: IBM
Plug Compatibility: Vertec,
Tape Speed: 13 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 9
Capacity: 46M bytes, unblocked
Transfer Rate: 160K bit/sec
Media Width: ½ in
Drive Mechanism: Dual motor
Streaming Capability: Yes
Price: $3,850
Distribution Method: OEM
Number Installed to Date: 500-1,000
Date First Installed: March 1981
(See Vendor Profile Page V-8)

COMPUTER PERIPHERALS, INC.
KEYSTONE 92181
Compatibility: IBM
Plug Compatibility: Vertec
Tape Speed: 25 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 9
Capacity: 46M bytes, unblocked
Transfer Rate: 160K bit/sec
Media Width: ½ in
Drive Mechanism: Dual motor
Streaming Capability: Yes
Price: $4 000
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000-5,000
Date First Installed: March 1982

COMPUTER PERIPHERALS, INC.
KEYSTONE 92185
Compatibility: IBM
Plug Compatibility: Vertec
Tape Speed: 25 in./sec
Recording Density: 6,250 bit/in.
Data Tracks: 9
Capacity: 180M bytes, unblocked
Transfer Rate: 468K bit/sec
Media Width: ½ in
Drive Mechanism: Dual motor
Price: $8 500
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000-2,000
Date First Installed: May 1983

COMPUTER PERIPHERALS, INC.
KEYSTONE 92185
Compatibility: IBM
Plug Compatibility: Vertec
Tape Speed: 25 in /sec
Recording Density: 1,600 bit/in , 6,250 bit/in.
Data Tracks: 9
Capacity: 17M bytes, blocked
Transfer Rate: 468K bit/sec
Media Width: ½ in
Drive Mechanism: Dual motor
Streaming Capability: Yes
Price: $1,500
Distribution Method: OEM, Third-party
Number Installed to Date: 5,000-10,000
Date First Installed: March 1981

COMPUTER PERIPHERALS, INC.
SPIRIT 9214X
Compatibility: IBM
Plug Compatibility: Vertec
Tape Speed: 45 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Capacity: 46M bytes, unblocked
Transfer Rate: 720K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $6 000
Distribution Method: OEM, Third-party
Number Installed to Date: Under 100
Date First Installed: June 1979

CONTROL DATA CORP.
KEYSTONE 92181
Tape Speed: 25 in /sec
Recording Density: 1,600 bit/in
Data Tracks: 9
Capacity: 37M bytes, blocked, 46M bytes, unblocked
Transfer Rate: 160K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $4 000
Distribution Method: OEM
Number Installed to Date: 3 000
Date First Installed: June 1982
(See Vendor Profile Page V-9)

CONTROL DATA CORP.
KEYSTONE 92185
Tape Speed: 25 in /sec
Recording Density: 1,600 bit/in , 6,250 bit/in
Data Tracks: 9
Capacity: 123M bytes, blocked 180M bytes, unblocked
Transfer Rate: 469K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $8 500
Distribution Method: OEM
Date First Installed: 1982

CONTROL DATA CORP.
MODEL 92144
Tape Speed: 45 in /sec
Recording Density: 800 bit/in 1 600 bit/in
Data Tracks: 9
Capacity: 40K bytes, blocked
Transfer Rate: 72K bit sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $5,000
Distribution Method: OEM
Number Installed to Date: 1,000
Date First Installed: 1982

DATA GENERAL CORP.
6123/6125 MAG TAPE SUBSYSTEM
Plug Compatibility: IBM
Tape Speed: 30 in /sec
Recording Density: 1,600 bit/in
Data Tracks: 9
Transfer Rate: 48K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Date First Installed: January 1981
(See Vendor Profile Page V-10)

DATA GENERAL CORP.
6125
Compatibility: DG
Tape Speed: 30 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 9
Capacity: 20M bytes, blocked
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $3,000
Distribution Method: OEM
Date First Installed: February 1981

Reel-to-Reel Tape Drives

Under 50 in./sec

DATAMAGNETICS, INC.
MODEL 1600
Compatibility: IBM
Tape Speed: 25 in./sec
Recording Density: 800 bit/in.
Data Tracks: 7, 9
Capacity: 8M bytes, blocked
Transfer Rate: 40K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $15,000
Distribution Method: End user
Number Installed to Date: 50
Date First Installed: 1973
(See Vendor Profile Page V-10)

DATAPOINT CORP.
9584
Compatibility: Datapoint 8000
Tape Speed: 25 in./sec
Recording Density: 1600 bit/in.
Data Tracks: 9
Capacity: 5M bytes, blocked
Transfer Rate: 40K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $12,500
Distribution Method: End user
Date First Installed: May 1978
(See Vendor Profile Page V-11)

DIGI-DATA CORP.
SERIES 1140
Tape Speed: 25 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Capacity: 17M bytes, unblocked
Transfer Rate: 40K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $3,350 to $4,550
Distribution Method: End user, OEM
(See Vendor Profile Page V-12)

DIGI-DATA CORP.
SERIES 1740
Tape Speed: 45 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Capacity: 45M bytes, unblocked
Transfer Rate: 72K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $4,175 to $5,275
Distribution Method: End user, OEM
Date First Installed: September 1978

DIGI-DATA CORP.
SERIES 2000 STREAMER MAG TAPE DRIVE
Tape Speed: 25 in./sec
Recording Density: 3,200 bit/in.
Data Tracks: 9
Capacity: 92M bytes, unblocked
Transfer Rate: 200K bit/sec
Media Width: ½ in.
Drive Mechanism: Dual motor
Streaming Capability: Yes
Price: $7,200 to $8,690
Distribution Method: End user, OEM
Date First Installed: 1982

DIGITAL EQUIPMENT CORP.
TSV05
Compatibility: DEC PDP-11/23, PDP-11/23+
Tape Speed: 25 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Transfer Rate: 40K bit/in
Capacity: 28M bytes, blocked
Integral Controller: Yes
Media Width: ½ in.
Drive Mechanism: Streamer
Streaming Capability: Yes
Price: $8,900
Distribution: End user
Date First Installed: 1982

DIGITAL EQUIPMENT CORP.
TU58
Compatibility: DEC LSI-11/2, Micro PDP-11
Tape Speed: 30 in./sec
Recording Density: 800 bit/in
Data Tracks: 2
Transfer Rate: 3.7K bit/in.
Capacity: 262M bytes, blocked
Integral Controller: Yes
Media Width: 15 in
Drive Mechanism: Dual motor
Streaming Capability: No
Price: $995
Distribution: End user
Date First Installed: September 1980

DIGITAL EQUIPMENT CORP.
TU80
Compatibility: DEC VAX-11/780
Tape Speed: 25 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Transfer Rate: 160K bit/in
Capacity: 40M bytes, blocked
Integral Controller: Yes
Media Width: ½ in.
Drive Mechanism: Dual motor
Streaming Capability: Yes
Price: $9,900
Distribution: End user
Date First Installed: April 1983

FUJITSU AMERICA, INC.
M2442A
Plug Compatibility: Pertec
Tape Speed: 13 in./sec
Recording Density: 6,250 bit/in.
Data Tracks: 9
Transfer Rate: 625K bit/sec
Media Width: ½ in.
Drive Mechanism: Dual motor
Streaming Capability: Yes
Price: $9,000
Distribution Method: OEM
(See Vendor Profile Page V-15)

GAW CONTROL CORP.
TDX 1000
Compatibility: IBM 34
Plug Compatibility: Pertec, Kennedy
Tape Speed: 45 in./sec
Recording Density: 800 bit/in., 1600 bit/in
Data Tracks: 9
Capacity: 39M bytes, blocked; 39M bytes, unblocked
Transfer Rate: 72K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $8,500
Distribution Method: End user
(See Vendor Profile Page V-15)

HARRIS CORP.
6646
Compatibility: Harris 600, Harris 700, Harris 800
Tape Speed: 45 in./sec
Recording Density: 800 bit/in.
Data Tracks: 9
Capacity: 15M bytes, blocked
Transfer Rate: 36K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $13,700
Distribution Method: End user
Number Installed to Date: 0-100
Date First Installed: January 1983
(See Vendor Profile Page V-16)

HARRIS CORP.
6481
Compatibility: Harris 700, Harris 800, Harris 800
Tape Speed: 45 in./sec
Recording Density: 800 bit/in., 1,600 bit/in.
Data Tracks: 9
Capacity: 30M bytes, blocked
Transfer Rate: 72K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $20,100
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1983

HEWLETT-PACKARD CO.
HP 7970B
Compatibility: HP 1000 M/E/F, 3000 III
Tape Speed: 45 in./sec
Recording Density: 800 bit/in.
Data Tracks: 9
Capacity: 20M bytes, blocked; 23M bytes, unblocked
Transfer Rate: 36K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $8,410 to $13,440
Distribution Method: End user
(See Vendor Profile Page V-17)

HEWLETT-PACKARD CO.
H-P 7970E
Compatibility: HP 1000 A/L, 3000 III, 9835, 9845, 9000
Tape Speed: 45 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Capacity: 40M bytes, blocked; 46M bytes, unblocked
Transfer Rate: 72K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $10,160 to $15,270
Distribution Method: End user

HITACHI AMERICA, LTD.
MT-250
Compatibility: DEC VAX-11/780
Tape Speed: 25 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in.
Data Tracks: 9
Transfer Rate: 781K bit/in.
Integral Controller: Yes
Media Width: ½ in.
Streaming Capability: Yes
Distribution: OEM

IBM
3410-1
Compatibility: IBM S/370, 3031, 4321, 4331
Tape Speed: 45 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in.
Data Tracks: 7, 9
Transfer Rate: 40K bit/sec
Drive Mechanism: Single motor
Streaming Capability: No
Price: $3,350
Date First Installed: January 1972

IBM
3410-2
Compatibility: IBM S370, 3031, 4321, 4341
Tape Speed: 25 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in.
Data Tracks: 7, 9
Transfer Rate: 40K bit/sec
Drive Mechanism: Single motor
Streaming Capability: No
Price: $4,365
Date First Installed: January 1972

IBM
3410-3
Compatibility: IBM S370, 3031, 4331, 4341
Tape Speed: 50 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in.
Data Tracks: 7, 9
Drive Mechanism: Single motor
Streaming Capability: No
Date First Installed: January 1972

IBM
3411-1
Compatibility: IBM S370, 3031, 4321, 4331
Tape Speed: 13 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in.
Data Tracks: 7, 9
Transfer Rate: 20K bit/sec
Drive Mechanism: Single motor
Streaming Capability: No
Price: $7,910
Distribution Method: End user
Date First Installed: January 1972

IBM
3411-3
Compatibility: IBM S370, 3031, 4321, 4331
Tape Speed: 50 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in.
Data Tracks: 7, 9
Transfer Rate: 80K bit/sec
Drive Mechanism: Single motor
Streaming Capability: No
Price: $11,910
Distribution Method: End user
Date First Installed: January 1972

IBM
3441-2
Compatibility: IBM S370, 3031, 4321, 4341
Tape Speed: 25 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in.
Data Tracks: 7, 9
Transfer Rate: 40K bit/sec
Drive Mechanism: Single motor
Streaming Capability: No
Price: $2,510
Distribution Method: End user
Date First Installed: January 1972

IBM
4341 [1C]
Compatibility: IBM System/7
Tape Speed: 45 in./sec
Recording Density: 800 bit/in., 1,600 bit/in.
Data Tracks: 9
Transfer Rate: 72K bit/sec
Price: $10,000

IBM
4969 (4N)
Compatibility: IBM Series/1
Tape Speed: 45 in./sec
Recording Density: 800 bit/in.
Data Tracks: 9
Transfer Rate: 36K bit/sec
Price: $11,720
Distribution Method: End user

IBM
[illegible]
Compatibility: IBM Series/1
Tape Speed: 45 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Transfer Rate: 72K bit/sec
Price: $12,250

IBM
6809-2
Compatibility: IBM 4321, 4331
Tape Speed: 13 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Transfer Rate: 20K bit/sec
Streaming Capability: Yes
Price: $10,610
Distribution Method: End user
Date First Installed: January 1979

IBM
6809-3
Compatibility: IBM
Tape Speed: 13 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Transfer Rate: 20K bit/sec
Streaming Capability: Yes
Price: $11,960
Date First Installed: January 1979

IBM
6809-1A
Compatibility: IBM 4321, 4331
Tape Speed: 13 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Transfer Rate: 20K bit/sec
Streaming Capability: Yes
Price: $11,960
Distribution Method: End user
Date First Installed: January 1979

IBM
6809-1B
Compatibility: IBM 4321, 4331
Tape Speed: 13 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Transfer Rate: 20K bit/sec
Streaming Capability: Yes
Price: $14,640
Distribution Method: End user

INFORMATION DEVELOPMENT & APPLICATIONS
4607-7
Plug Compatibility: HP-IB
Tape Speed: 45 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in.
Data Tracks: 7
Capacity: 3M bytes, blocked
Transfer Rate: 20K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $6,575
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: [illegible]
(See Vendor Profile Page V-18)

INFORMATION DEVELOPMENT & APPLICATIONS
4607-9
Tape Speed: 25 in./sec
Recording Density: 800 bit/in.
Data Tracks: 7
Capacity: 3M bytes, blocked
Transfer Rate: 20K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $8,575
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: September 1978

INFORMATION DEVELOPMENT & APPLICATIONS
4607-9-16
Tape Speed: 25 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 7
Capacity: 7M bytes, blocked
Transfer Rate: 40K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $11,325
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: 1978

INFORMATION DEVELOPMENT & APPLICATIONS
4607-9-816
Tape Speed: 25 in./sec
Recording Density: 800 bit/in., 1,600 bit/in.
Data Tracks: 7
Capacity: 7M bytes, blocked
Transfer Rate: 40K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $11,825
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: 1976

INFORMATION DEVELOPMENT & APPLICATIONS
4608-7
Plug Compatibility: HP-IB
Tape Speed: 25 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in.
Data Tracks: 7
Capacity: 7M bytes, blocked
Transfer Rate: [illegible]
Media Width: ½ in.
Drive Mechanism: [illegible]
Streaming Capability: Yes
Price: [illegible]
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: [illegible]

INFORMATION DEVELOPMENT & APPLICATIONS
4608-9
Tape Speed: 25 in./sec
Recording Density: 800 bit/in.
Data Tracks: 9
Capacity: 7M bytes, blocked
Transfer Rate: 20K bit/sec
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $8,575
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: 1976

INFORMATION DEVELOPMENT & APPLICATIONS
4608-9-16
Tape Speed: 25 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Capacity: 14M bytes, blocked
Transfer Rate: 40K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $11,325
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: 1976

INFORMATION DEVELOPMENT & APPLICATIONS
4608-9-816
Plug Compatibility: HP-IB
Tape Speed: 25 in./sec
Recording Density: 800 bit/in., 1,600 bit/in.
Data Tracks: 9
Capacity: 14M bytes, blocked
Transfer Rate: [illegible]
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $11,825
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: 1976

INFORMATION DEVELOPMENT & APPLICATIONS
4610-7
Tape Speed: 45 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in.
Data Tracks: 7
Capacity: 14M bytes, blocked
Transfer Rate: 36K bit/sec
Media Width: ½ in
Drive Mechanism: [illegible]
Streaming Capability: Yes
Price: [illegible]
Distribution Method: End user
Number Installed to Date: [illegible]
Date First Installed: [illegible]

INFORMATION DEVELOPMENT & APPLICATIONS
4610-9
Plug Compatibility: [illegible]
Tape Speed: 45 in./sec
Recording Density: 800 bit/in.
Data Tracks: 9
Capacity: 14M bytes, blocked
Transfer Rate: [illegible]
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $8,875
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: September 1978

INFORMATION DEVELOPMENT & APPLICATIONS
4610-9-16
Plug Compatibility: HP-IB
Tape Speed: 45 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Capacity: 28M bytes, blocked
Transfer Rate: 72K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $11,625
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: 1976

INFORMATION DEVELOPMENT & APPLICATIONS
4610-9-816
Plug Compatibility: HP-IB
Tape Speed: 45 in./sec
Recording Density: 800 bit/in., 1,600 bit/in.
Data Tracks: 9
Capacity: 28M bytes, blocked
Transfer Rate: 72K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $12,125
Distribution Method: [illegible]
Number Installed to Date: [illegible] 100
Date First Installed: 1978

INNOVATIVE DATA TECHNOLOGY
TD-1012/PC-IBM-PC
Compatibility: IBM Personal Computer XT; Apple II, Apple III
Plug Compatibility: IEEE-488
Tape Speed: 12 in./sec
Recording Density: 1600 bit/in
Data Tracks: 9
Capacity: 30M bytes, blocked, 40M bytes, unblocked
Transfer Rate: 20K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $6,495
Distribution Method: End user
Number Installed to Date: 100-500
Date First Installed: September 1982

INNOVATIVE DATA TECHNOLOGY
TD-1012/PC-STR
Compatibility: IBM Personal Computer XT
Tape Speed: 12 in./sec
Recording Density: 1600 bit/in.
Data Tracks: 9
Capacity: 30M bytes, blocked, 40M bytes, unblocked
Transfer Rate: 160K bit/sec
Media Width: ½ in
Drive Mechanism: [illegible]
Streaming Capability: Yes
Price: $4,995
Distribution Method: End user
Number Installed to Date: 100-500
Date First Installed: [illegible]
(See Vendor Profile Page V-19)

INNOVATIVE DATA TECHNOLOGY
[illegible]-PC
Compatibility: IBM Personal Computer XT; Apple II, Apple III

Reel-to-Reel Tape Drives

Under 50 in./sec

Plug Compatibility: IEEE-488
Tape Speed: 45 in /sec
Recording Density: 1600 bit/in
Data Tracks: 9
Capacity: 30M bytes, blocked, 40M bytes, unblocked
Transfer Rate: 50K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $8,500
Number Installed to Date: 1,000-5,000
Date First Installed: September 1982

INNOVATIVE DATA TECHNOLOGY
TD-1054/PC-STP
Compatibility: IBM Personal Computer XT
Tape Speed: 45 in./sec
Recording Density: 800 bit/in , 1,600 bit/in
Data Tracks: 9
Capacity: 30M bytes, blocked; 40M bytes, unblocked
Transfer Rate: 50K bit/sec
Media Width: ½ in
Streaming Capability: No
Price: $6,995
Number Installed to Date: 1,000-5,000
Date First Installed: September 1982
(See Vendor Profile Page V-19)

KENNEDY CO.
6809
Compatibility: DEC, DG; Intel Multibus IBM
Plug Compatibility: Pertec Cipher
Tape Speed: 13 in /sec
Recording Density: 1,600 bit/in
Data Tracks: 9
Capacity: 46M bytes, unblocked
Transfer Rate: 160K bit/sec
Media Width: ½ in
Drive Mechanism: Plug
Streaming Capability: Yes
Price: $3,850
Number Installed to Date: 5,000-10 000
Date First Installed: April 1981
(See Vendor Profile Page V-21)

KENNEDY CO.
9000
Compatibility: DG Nova, Eclipse; DEC PDP-11, LSI, PE
Tape Speed: 45 in./sec
Recording Density: 200 bit/in., 556 bit/in , 800 bit/in., 1,600 bit/in.
Data Tracks: 7, 9
Capacity: 46M bytes, unblocked
Transfer Rate: 72K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $4 600
Distribution Method: End user, OEM
Number Installed to Date: 10,000-50,000
Date First Installed: 1972

KENNEDY CO.
9700
Compatibility: DG Nova, Eclipse; DEC PDP-11,LSI, PE
Tape Speed: 25 in./sec
Recording Density: 200 bit/in., 556 bit/in., 800 bit/in., 1,600 bit/in.
Data Tracks: 7, 9
Capacity: 11M bytes, blocked
Transfer Rate: 40K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $3,650
Number Installed to Date: 5,000-10,000
Date First Installed: 1972

KENNEDY CO.
9800
Compatibility: DG Nova, Eclipse, DEC PDP-11, LSI, PE
Tape Speed: 25 in /sec
Recording Density: 200 bit/in , 556 bit/in , 800 bit/in., 1,600 bit/in
Data Tracks: 7, 9
Capacity: 23M bytes, unblocked
Transfer Rate: 40K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $3,750
Distribution Method: End user, OEM
Number Installed to Date: 5,000-10,000
Date First Installed: 1972

KENNEDY CO.
9832
Compatibility: DG Nova, Eclipse; DEC PDP-11. LSI, PE
Tape Speed: 38 in /sec
Recording Density: 200 bit/in , 556 bit/in , 800 bit/in., 1,600 bit/in
Data Tracks: 7, 9
Capacity: 11M bytes, unblocked
Transfer Rate: 47K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Distribution Method: End user, OEM
Number Installed to Date: 500-1,000
Date First Installed: 1973

MEMODYNE CORP.
765-8EP
Tape Speed: 20 in./sec
Recording Density: 800 bit/in
Data Tracks: 2
Drive Mechanism: Dual motor
Streaming Capability: No
Price: $1,275
Number Installed to Date: 10,000-50,000
Date First Installed: 1975

MENTEC
M90 II
Tape Speed: 40 in./sec
Recording Density: 200 bit/in., 556 bit/in , 800 bit/in
Data Tracks: 1
Capacity: 315M bytes, blocked
Transfer Rate: 32K bit/sec
Media Width: 15 in
Drive Mechanism: Dual motor
Streaming Capability: Yes
Price: $300
Distribution Method: OEM
Number Installed to Date: More than 50,000
Date First Installed: 1972
(See Vendor Profile Page V-23)

MENTEC
M90 SH
Tape Speed: 40 in./sec
Recording Density: 200 bit/in., 556 bit/in , 800 bit/in.
Data Tracks: 1
Capacity: 315M bytes, blocked
Transfer Rate: 32K bit/sec
Media Width: 15 in
Drive Mechanism: Dual motor
Streaming Capability: Yes
Price: $900
Distribution Method: OEM
Number Installed to Date: 5,000-10,000
Date First Installed: 1977

MICRODATA CORP.
2686-DUAL DENSITY MAG TAPE DRIVE
Compatibility: Microdata Reality 47, Sequel VMS, Sovereign
Tape Speed: 45 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Capacity: 46M bytes, unblocked
Transfer Rate: 1,600K bit/sec
Media Width: ½ in.
Drive Mechanism: Tension arm
Streaming Capability: No
Price: $2,000
Distribution Method: End user, Third-party
Number Installed to Date: 5,000-10,000
Date First Installed: November 1973

MITRON SYSTEMS CORP.
STD 1600
Compatibility: IBM
Tape Speed: 25 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Capacity: 40M bytes, blocked
Transfer Rate: 40K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $11,750
Distribution Method: End user
Number Installed to Date: 500-1,000
Date First Installed: April 1980
(See Vendor Profile Page V-00)

NCR CORP.
6325-0101
Compatibility: NCR 9300, NCR V series
Tape Speed: 45 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Capacity: 46M bytes, unblocked
Transfer Rate: 72K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $16,900
Distribution Method: End user
Date First Installed: July 1983
(See Vendor Profile Page V-00)

NIXDORF COMPUTER CORP.
618
Compatibility: Nixdorf 8850/800
Tape Speed: 45 in./sec
Recording Density: 800 bit/in.
Data Tracks: 9
Capacity: 1M bytes, unblocked
Transfer Rate: 36K bit/sec
Streaming Capability: No
Price: $13,330
Distribution Method: End user
Number Installed to Date: 500-1,000
Date First Installed: 1980
(See Vendor Profile Page V-00)

NIXDORF COMPUTER CORP.
6330
Compatibility: Nixdorf 8860
Tape Speed: 45 in./sec
Recording Density: 800 bit/in.
Data Tracks: 9
Capacity: 20M bytes, blocked
Transfer Rate: 20K bit/sec
Drive Mechanism: Capstan
Streaming Capability: No
Price: $10,190
Distribution Method: End user
Number Installed to Date: 500-1,000
Date First Installed: 1978
(See Vendor Profile Page V-00)

NIXDORF COMPUTER CORP.
6331
Compatibility: Nixdorf 8860,
Tape Speed: 25 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Capacity: 30M bytes, blocked
Transfer Rate: 40K bit/sec
Drive Mechanism: Capstan
Streaming Capability: No
Price: $12,700
Distribution Method: End user
Number Installed to Date: 500-1,000
Date First Installed: 1978
(See Vendor Profile Page V-00)

NIXDORF COMPUTER CORP.
6401
Compatibility: Nixdorf 8870
Tape Speed: 25 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Transfer Rate: 40K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $14,000
Distribution Method: End user
Date First Installed: 1979
(See Vendor Profile Page V-00)

NIXDORF COMPUTER CORP.
8402
Compatibility: Nixdorf 8870
Tape Speed: 45 in./sec
Recording Density: 800 bit/in.
Data Tracks: 9
Transfer Rate: 36K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $14,000
Distribution Method: End user
Date First Installed: 1978

NIXDORF COMPUTER CORP.
8409
Compatibility: Nixdorf 8880
Tape Speed: 20 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Capacity: 46M bytes, unblocked
Transfer Rate: 120K bit/sec
Media Width: ½ in.
Streaming Capability: Yes
Price: $8,765
Distribution Method: End user

NIXDORF COMPUTER CORP.
8706
Compatibility: Nixdorf 8841
Tape Speed: 45 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Transfer Rate: 72K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $16,120
Distribution Method: End user
Date First Installed: February 1982

NIXDORF COMPUTER CORP.
8706
Compatibility: Nixdorf 8845
Tape Speed: 45 in./sec
Recording Density: 800 bit/in
Data Tracks: 9
Capacity: 19M bytes, unblocked
Transfer Rate: 36K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $13 330
Distribution Method: End user
Date First Installed: February 1982

NORTHERN TELECOM
COOK ELECTRIC TAPE DRIVE
Tape Speed: 25 in./sec
Recording Density: 800 bit/in
Data Tracks: 9
Capacity: 30M bytes, blocked
Transfer Rate: 20K bit/sec
Media Width: ½ in
Drive Mechanism: Multi-motor
Streaming Capability: No
Price: $6,200 to $7 500
Distribution Method: OEM
Date First Installed: January 1976
(See Vendor Profile Page V-27)

NORTHERN TELECOM
COOK ELECTRIC TAPE DRIVE-2216
Tape Speed: 25 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Capacity: 30M bytes, blocked
Transfer Rate: 40K bit/sec
Media Width: ½ in
Drive Mechanism: Multi-motor
Streaming Capability: No
Price: $7,000
Distribution Method: OEM
Date First Installed: January 1980

PERTEC COMPUTER CORP.
T6000
Tape Speed: 45 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Capacity: 46M bytes, unblocked
[illegible]
Drive Mechanism: Capstan
Streaming Capability: No
[illegible]
Number Installed to Date: 26,000
Date First Installed: January 1969
(See Vendor Profile Page V-28)

PERTEC COMPUTER CORP.
T7000
Tape Speed: 25 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Capacity: 11M bytes, blocked
[illegible]
Drive Mechanism: Capstan
Streamirig Capability: No
Price: $3,800
[illegible]
Number Installed to Date: 21,000
Date First Installed: January 1969

PERTEC COMPUTER CORP.
T9000
Tape Speed: 45 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Capacity: 46M bytes, unblocked
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $5,380
Distribution Method: OEM
Number Installed to Date: 26,000
Date First Installed: January 1973

PRIME COMPUTER, INC.
4520 MAGNETIC TAPE SUBSYSTEM
Tape Speed: 45 in./sec
Recording Density: 800 bit/in., 1,600 bit/in.
Data Tracks: 9
Capacity: 46M bytes, unblocked
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $18,000
Distribution Method: End user
Date First Installed: December 1980
(See Vendor Profile Page V-29)

PRIME COMPUTER, INC.
4527 MAGNETIC TAPE SLAVE
Tape Speed: 45 in./sec
Recording Density: 800 bit/in., 1,600 bit/in
Data Tracks: 9
Capacity: 46M bytes, unblocked
Transfer Rate: 72K bit/sec
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $13,500
Distribution Method: End user
Date First Installed: December 1980

PRIME COMPUTER, INC.
STREAMING MAG TAPE ADD-ON 4661-2250
Tape Speed: 50 in./sec
Recording Density: 1,600 bit/in., 3,200 bit/in
Data Tracks: 9
Capacity: 54M bytes, blocked; 92M bytes, unblocked
Transfer Rate: 160K bit/sec
Media Width: ½ in
Drive Mechanism: Servos
Streaming Capability: Yes
Price: $6,500
Distribution Method: End user
Date First Installed: July 1983

PRIME COMPUTER, INC.
STREAMING MAG TAPE SYSTEM 4660-2250
Tape Speed: 50 in./sec
Recording Density: 1,600 bit/in., 3,200 bit/in.
Data Tracks: 9
Capacity: 54M bytes, blocked; 92M bytes, unblocked
Transfer Rate: 160K bit/sec
Media Width: ½ in
[illegible]
Streaming Capability: Yes
Price: $11,000
[illegible]
Date First Installed: July 1983

QANTEL CORP.
[illegible]
Compatibility: Qantel 20, 40, 64
Tape Speed: 45 in./sec
Recording Density: 1,600 bit/in.
Data Tracks: 9
Capacity: 40M bytes, blocked
Transfer Rate: 72K bit/sec
[illegible]
Drive Mechanism: Capstan
Streaming Capability: No
Price: $12,450
Distribution Method: Third-party
Number Installed to Date: 3,000
Date First Installed: July 1977
(See Vendor Profile Page V-30)

STORAGE TECHNOLOGY CORP.
2920 TAPE SUBSYSTEM
Tape Speed: 50 in./sec
Recording Density: 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Capacity: 134M bytes, unblocked
Transfer Rate: 313K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Distribution Method: End user
Date First Installed: 1983
(See Vendor Profile Page V-33)

STRATUS COMPUTER
T101
Compatibility: Stratus 32
Tape Speed: 25 in./sec
Recording Density: 1,600 bit/in
Data Tracks: 9
Transfer Rate: 160K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: Yes
Price: $9 500
Distribution Method: End user
Date First Installed: February 1982
(See Vendor Profile Page V-33)

TELEX COMPUTER PRODUCTS, INC.
TELEX-8011 ST
Plug Compatibility: Pertec
Tape Speed: 50 in./sec
Recording Density: 800 bit/in., 1,600 bit/in., 6,250 bit/in
Data Tracks: 9
Media Width: ½ in
Drive Mechanism: Single motor Capstan
Streaming Capability: No
Price: $14,635
Distribution Method: OEM
Number Installed to Date: 5 000
Date First Installed: November 1980
(See Vendor Profile Page V-36)

TEXAS INSTRUMENTS, INC.
MT 1 600 TAPE TRANSPORT
Compatibility: TI Business System
Plug Compatibility: CDC
Tape Speed: 45 in. sec
Recording Density: 1,600 bit/in
Data Tracks: 9
Capacity: 5M bytes, unblocked
Media Width: ½ in.
Drive Mechanism: Capstan
Streaming Capability: No
Price: $11 195
Distribution Method: End user, OEM Third-party
Date First Installed: October 1982
(See Vendor Profile Page V-37)

U.S. DESIGN CORP.
DEI
Compatibility: DEC PDP-11
Tape Speed: 30 in. sec
Recording Density: 6,400 bit in
Data Tracks: 4 7
Capacity: 20M bytes, blocked, 22M bytes, unblocked
Transfer Rate: 192K bit/sec
Media Width: ¼ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $2 000
Distribution Method: OEM

Remember to mention the *Computerworld Buyer's Guide* when contacting vendors.

COMPUTERWORLD
BUYERS GUIDE

Number Installed to Date: 1,000
Date First Installed: June 1981
(See Vendor Profile Page V-00)

Tape Drives With Unspecified Tape Speeds

[illegible]
[illegible]
Recording Density: 800 bit/in , 1,600 bit/in
Data Tracks: 9
Transfer Rate: 120K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
(See Vendor Profile Page V-00)

CIPHER DATA PRODUCTS, INC.
F880 MICROSTREAMER
Recording Density: 1,600 bit/in 3 200 bit/in
Data Tracks: 9
Capacity: 46M bytes, blocked, 92M bytes, unblocked
Transfer Rate: 160K bit/sec
Media Width: ½ in
Streaming Capability: Yes
Price: $2 325
Distribution Method: OEM
Number Installed to Date: 10,000-50 000
Date First Installed: 1979
(See Vendor Profile Page V-00)

[illegible]
1 600
Recording Density: 200 bit/in , 556 bit/in , 800 bit/in
Data Tracks: 7, 9
Capacity: 11M bytes, unblocked
Transfer Rate: 2K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $6,000
Distribution Method: Third-party
Number Installed to Date: 5,000-10 000
Date First Installed: 1967
(See Vendor Profile Page V-00)

KENNEDY CO.
1610
Recording Density: 200 bit/in , 556 bit/in 800 bit/in
Data Tracks: 7, 9
Capacity: 23M bytes, unblocked
Transfer Rate: 2K bit/sec
Media Width: ½ in
Drive Mechanism: Capstan
Streaming Capability: No
Price: $6 000
Distribution Method: Third-party
Number Installed to Date: 1,000-5 000
Date First Installed: 1967

MEMORIES

Index to Memories By Device Type

The index to memory devices is designed to provide an overview of the products listed in this section of the buyer's guide and have been indexed according to whether they are add-in or add-on units. An add-in memory is a card or board that must be added to the CPU chassis, whereas an add-on memory is an external unit that is connected to the CPU by a cable. Within each category vendors are listed alphabetically with their products following in alphabetical order. In additon to the device type, the index contains information on technology used, word size (in bits), capacity (in bytes), price and the page number where the full product listing is located.

The listings for memory device listings have been divided into add-in and add-on memories and, within each category, whether they use MOS or non-MOS technology.

Add-In Memory Units

VENDOR	MODEL	TECHNOLOGY	WORD LENGTH (BITS)	MEMORY CAPACITY (BYTES)	PRICE	PAGE
Able Computer	SCAT/45	MOS	16	256K	$7,425	C-102
Action Computer	DPC 183	MOS	8	96K	[illegible]	[illegible]
	DPC 186	MOS	16	128K	$1,595	[illegible]
	DPC 816	MOS	8	128K	$1,995	C-102
	Z DPC 180	MOS	8	[illegible]	$950	[illegible]
Advanced Logic Systems, Inc.	CP/M CARD	MOS	8	64K	$399	C-102
Advanced Micro Devices, Inc.	AM 97/0000 SERIES-1 MEGABYTE	MOS	8	1M	[illegible]	C-102
	AM 97/0000 SERIES-128	MOS	8	128K	$740	[illegible]
	AM 97/0000 SERIES-256	[illegible]	8	256K	$1,250	C-102
	AM 97/0000 SERIES-32	[illegible]	8	32K	[illegible]	[illegible]
	AM 97/0000 SERIES-512	MOS	8	512K	$1,599	[illegible]
	AM 97/0000 SERIES-64	MOS	8	[illegible]	[illegible]	[illegible]
Aloyon, Inc.	64K OPTION	MOS	N/A	64K	$460	C-102
	MEX 5 (512K)	[illegible]	16	N/A	$1,325	C-102
Amdahl Corp.	5850/5840-32 MEG	[illegible]	128	N/A	$640,000	C-119
	5860-64MEG	N/A	128	85.5M	N/A	C-119
AMF Logic Sciences, Inc.	1/2 MB MEMORY BOARD	MOS	8	512K	$6,000	[illegible]
Andromeda Systems, Inc.	MEM11-128	MOS	16	256K	$950	[illegible]
	MEM11-16	MOS	16	[illegible]	$450	C-102
	MEM11-32	MOS	16	64K	$475	[illegible]
	MEM11-64	MOS	16	128K	$875	C-102
Apparat, Inc.	APPARAT-256K RAM CARD-64K	MOS	8	64K	$149	[illegible]
	APPARAT-512K RAM CARD-256K	MOS	[illegible]	256K	$381	C-102
	APPARAT-512K RAM CARD-384K	MOS	8	384K	$499	[illegible]
	APPARAT-512KB RAM CARD-64K	MOS	8	[illegible]	[illegible]	[illegible]
Applied Technology Ventures, Inc.	MEMORY UPGRADE	BOS	16	[illegible]	$7,500	[illegible]
Aries Electronics	32K STATIC RAM BOARD	MOS	8	32K	$289	C-102
	64K DYNAMIC RAMCARD	MOS	8	N/A	$195	C-102
	MULTI MEMORY BOARD	BOS	8	32K	$193	[illegible]
AST Research, Inc.	COMBO PLUS	MOS	16	256K	$395	[illegible]
	DISK ++	MOS	16	512K	$655	[illegible]
	MEGA PLUS II	MOS	16	512K	[illegible]	[illegible]
	MP SERIES	MOS	16	256K	[illegible]	[illegible]
Astrosystics Corp. of America	EPROM-2K INCREMENTS	MOS	8	2K	N/A	[illegible]
	RAM-2K INCREMENTS	MOS	8	2K	N/A	[illegible]
Axiom, Inc.	RAM DISK 128	MOS	8	128K	$360	[illegible]
	RAM POWER 32	MOS	8	32K	$80	[illegible]
	RAM POWER 48	[illegible]	8	48K	$150	C-103
	RAM POWER 128	MOS	8	128K	[illegible]	C-103
Bubbl-Tec	BBC-128	Bubble	8	128K	[illegible]	C-119
	GBI-1	Bubble	8	128K	[illegible]	C-119
	GBM-1	Bubble	8	32K	$700	[illegible]
	MBI-1	Bubble	8	512K	[illegible]	C-119
	PBS-1	Bubble	8	[illegible]	$1,900	C-119
	PBC-1	Bubble	8	128K	$500	C-119

Memory Index

VENDOR	MODEL	TECHNOLOGY	WORD LENGTH (BITS)	MEMORY CAPACITY (BYTES)	PRICE	PAGE
Bubbl-Tec	QBC-11/02	Bubble	8	128K	$750	C-119
	QBI-II	Bubble	8	512K	$3,500	C-119
	QSB-11	Bubble	8	120K	$1,700	C-119
	VBI-1	Bubble	16	1M	$6,400	C-119
	VMI-1	Bubble	16	256K	$1,900	C-119
California Computer Systems	2066-01	MOS	8	64K	$420	C-103
	2116-01	MOS	8	16K	$345	C-103
	2256-01	MOS	N/A	256K	$895	C-103
	8220-02	MOS	8	192K	$995	C-103
	2256	MOS	8	256K	N/A	C-103
	2066	MOS	8	64K	N/A	C-103
California Minicomputer	64K DRAM-A	MOS	32	1M	$7,000	C-103
	64K DRAM-B	MOS	32	2M	$1,100	C-103
Cambex Corp.	STOR/3000	MOS	64	12.2M	$8,500	C-103
	SUPER STOR 11M	MOS	16	1M	N/A	C-103
	SUPER STOR 700	MOS	32	1M	$2,395	C-103
Central Data Corp.	B1014	MOS	8	128K	$245	C-103
	B1020	MOS	8	128K	N/A	C-103
	B1020/128K	MOS	8	128K	$915	C-103
	B1020/32K	MOS	8	32K	$690	C-104
	B1020/64K	MOS	8	64K	$765	C-104
	B1020/96K	MOS	8	96K	$840	C-104
	B1027	MOS	8	512K	N/A	C-104
	B1027/128K	MOS	8	128K	$1,515	C-104
	B1027/256K	MOS	8	256K	$1,780	C-104
	B1027/384K	MOS	8	384K	$2,045	C-104
	B1027/512K	MOS	8	512K	$2,300	C-104
	B1035	CMOS	8	128K	N/A	C-119
	B1035 EPROM/RAM/EEPROM	CMOS	8	N/A	$715	C-119
	B1035/128K	CMOS	8	128K	$2,410	C-119
	B1035/32K	CMOS	8	32K	$945	C-119
	B1040	MOS	8	512K	N/A	C-104
	B1040/128K	MOS	8	128K	$1,195	C-104
	B1040/256K	MOS	8	256K	$1,410	C-104
	B1040/384K	MOS	8	384K	$1,630	C-104
	B1040/512K	MOS	8	512K	$1,845	C-104
Christin Industries, Inc.	CI-PCM	MOS	16	256K	$395	C-104
	CI-PCM+	MOS	8	512K	$795	C-104
	CI-S100	MOS	8	64K	$250	C-104
	CI-1123	MOS	16	256K	$495	C-104
	CI-1123+	MOS	16	1M	$595	C-104
	CI-8086	MOS	8	4M	$895	C-104
	CI-8086E	MOS	8	4M	$1,495	C-104
CIE Systems, Inc.	68 RAM-0002	MOS	16	256K	$1,600	C-104
Columbia Data Products, Inc.	256K MEMORY EXPANSION	MOS	8	256K	$445	C-104
Comark Corp.	MR 80	MOS	12	32K	$650	C-104
	MR 85	MOS	16	128K	$895	C-104
	MR 86	MOS	16	500K	$1,395	C-104
Communication Mfg. Co.	MEMORY MODULE!!!	MOS	8	128K	$8,000	C-104
Compugraphic Corp.	214982-504	MOS	8	512K	$823	C-105
	214982-501	MOS	8	128K	$587	C-105
	214982-502	MOS	8	256K	$565	C-105
CompuPro Corp.	RAM-17	MOS	8	64K	$599	C-105
	RAM-21	MOS	8	128K	$1,350	C-105
	RAM-22	MOS	8	256K	$1,795	C-105
Computer Automation, Inc.	44009	MOS	16	128K	$1,325	C-105
	53775	MOS	16	128K	$1,600	C-105
	53819	MOS	16	128K	$3,000	C-105
	53909	MOS	16	1M	$3,900	C-105
Computer Consoles, Inc.	5820/116	MOS	8	1M	$7,250	C-105
	5820/117	MOS	8	2M	$7,250	C-105
Computer Equipment Services	CP-AIMS SERIES 80	MOS	64	16M	$8,000	C-105
Computer Extension System, Inc.	VM 816	MOS	12	16K	$1,025	C-105
	VM 832	MOS	12	32K	$1,450	C-105
	VM 8128	MOS	12	128K	$2,500	C-105
	VML 1128P	MOS	16	64K	$995	C-105
	VRL 11	MOS	16	8K	$425	C-105
Contemporary Control Systems	S832	MOS	8	32K	$326	C-119
	S849	Bipolar	8	2K	$125	C-106
Control Systems, Inc.	192K MEMORY BOARD	MOS	8	64K	$185	C-106
Control Data Corp.	18251-2	MOS	60	2.4M	$25,000	C-106
	18651-1	MOS	60	2M	$160,000	C-106
	18551-4	MOS	60	4M	$175,000	C-106
	18351-4	MOS	60	4M	$100,000	C-106
	18251-4	MOS	60	4M	$50,000	C-106
	18751-1	Bipolar	60	2M	$320,000	C-119

Memory Index

VENDOR	MODEL	TECHNOLOGY	WORD LENGTH (BITS)	MEMORY CAPACITY (BYTES)	PRICE	PAGE
Cromemco, Inc.	16KZ	CMOS	8	16K	$495	C-119
	64KZ	CMOS	8	64K	$695	C-120
	256KZ	CMOS	16	256K	$1,295	C-120
	512MSU	CMOS	16	512K	$2,995	C-120
Cybernetics Corp.	CDM-7703	[illegible]	16	256K	$495	C-106
	CDM-8223	[illegible]	16	1M	$1,995	C-106
	CSM-8322	MOS/CMOS	N/A	128K	[illegible]	C-106
Data General Corp.	8384	MOS	16	32K	$3,475	C-106
	8385	MOS	16	64K	$4,130	[illegible]
	[illegible]	MOS	16	128K	$3,800	C-106
	[illegible]	[illegible]	16	256K	$6,600	C-106
	8736-N	[illegible]	18	256K	$2,000	C-106
	8736-R	[illegible]	18	256K	[illegible]	[illegible]
	ECLIPSE MV/1000 SYS MEMORY	MOS	32	16K	$72,000	[illegible]
	ECLIPSE MV/8000 II	[illegible]	32	[illegible]	$36,000	C-106
	MV/4000 MEMORY MODULE	[illegible]	32	2M	$9,000	[illegible]
	S/140 MEMORY MODULE	MOS	16	1M	[illegible]	[illegible]
	S/280 MEMORY MODULE	[illegible]	32	2M	$4,900	C-106
Datamac Peripheral Products	IDM-16 ADD-IN	MOS	16	16K	$50	C-106
Dataram Corp.	DR-14S	MOS	16	256K	$1,445	C-106
	DR-70S	MOS	16	512K	$9,860	[illegible]
	DR-114	Magnetic Core	16	64K	$3,340	C-120
	DR-114M	Magnetic Core	16	64K	$3,340	C-120
	DR-114SP	[illegible]	16	256K	$1,545	[illegible]
	DR-115	Magnetic Core	16	32K	$2,035	C-120
	DR-118	Magnetic Core	12	16K	$2,335	C-120
	DR-118A	Magnetic Core	12	32K	[illegible]	C-120
	DR-120	MOS	32	256K	$4,835	C-106
	DR-123	Magnetic Core	N/A	32K	$2,030	[illegible]
	DR-124	Magnetic Core	N/A	32K	$2,030	C-120
	[illegible]	Magnetic Core	8	256K	$7,865	C-120
	DR-144	MOS	16	256K	$1,700	[illegible]
	DR-175	MOS	32	256K	$1,045	[illegible]
	DR-178	MOS	32	512K	N/A	[illegible]
	DR-213	MOS	16	[illegible]	$2,745	[illegible]
	DR-214	MOS	N/A	1M	$2,755	[illegible]
	DR-215	[illegible]	16	256K	$1,075	C-106
	DR-225	MOS	16	1M	$8,250	C-106
	DR-240	[illegible]	16	1M	$5,385	C-106
	DR-244	MOS	N/A	1M	$3,020	C-107
	DR-275	MOS	32	1M	$3,135	C-107
	DR-278	MOS	32	2M	$4,815	C-107
	DR-330	MOS	32	2M	$10,600	C-107
	DR-680	MOS	16	1M	$4,200	C-107
	DR-716	[illegible]	16	32K	$2,445	C-120
	DR-717	Magnetic Core	16	64K	$3,980	C-120
	DR-1200	Magnetic Core	16	32K	$2,155	[illegible]
	DR-1235	MOS	16	[illegible]	$2,970	C-107
Data Storage Technology	DS11-256	[illegible]	16	256K	$1,200	C-107
	DS11BA-KE	[illegible]	16	1M	[illegible]	C-107
	DSV11-256	MOS	16	256K	[illegible]	C-107
	DSV11-64	MOS	16	64K	[illegible]	C-107
Davong Systems, Inc.	DEC ADD-IN MEMORY	MOS	8	256K	[illegible]	C-107
	EX	MOS	8	256K	$696	C-107
Denelcor, Inc.	ECL MEMORY, 1000	ECL	64	1M	$175,000	[illegible]
	MOS MEMORY, 8MB	MOS	[illegible]	8M	$200,000	C-107
Digidyne Corp.	D2128	MOS	16	128K	$1,100	C-107
	D2256	MOS	16	256K	$1,975	C-107
Digital Data Systems, Inc.	DDS 22A	MOS	16	512K	$1,365	C-107
	DDS 34B	MOS	18	1M	[illegible]	C-107
	DDS 55A	MOS	16	[illegible]	$2,900	C-107
	DDS 238S	MOS	16	1M	$5,000	C-107
	DDS 386	MOS	72	1M	$3,100	C-107
	DDS 389	MOS	72	2M	$4,400	C-107
	DDS 992	MOS	16	1,000M	$8,000	C-107
	DDS 995	MOS	16	1M	$8,000	C-107
	DDS 998	MOS	16	256K	$3,000	C-107
	DG 236	MOS	16	512G	$8,000	C-107
	MV 6000/8000	MOS	N/A	1M	$5,700	C-108
Digital Equipment Corp.	MS11	MOS	16	1M	$4,900	C-108
	MS730G	MOS	32	256K	$4,900	C-108
	MS750C	MOS	32	256K	$4,900	C-108
	MS780-FA	MOS	32	2M	$9,000	[illegible]
	MSV11-DD	MOS	16	64K	$500	C-108
Display Data Corp.	8101	MOS	8	64K	$2,000	C-108
D & N Micro Products, Inc.	64KCMOS-MEM	CMOS	8	64K	$500	C-120

Memory Index

VENDOR	MODEL	TECHNOLOGY	WORD LENGTH (BITS)	MEMORY CAPACITY (BYTES)	PRICE	PAGE
Decutel Olivetti Corp.	32K	MOS	16	32K	$200	C-108
	128K	MOS	16	128K	$600	C-108
Dual Systems Corp.	CMAN 16	CMOS	16	16K	$595	C-120
	CMAN 32	CMOS	16	32K	$695	C-120
	DMAN	NMOS	16	256K	$1,295	C-120
	EPROM	MOS	16	64K	N/A	C-108
Elite Corp.	512K MEMORY CARD	MOS	8	2M	$2,950	C-108
EMM Semi	BUBBLE MEMORY	Bubble	4	16M	$320,000	C-120
	MEGABYTE	Magnetic Core		15M	$220,000	C-120
	SEMS-16	Magnetic Core	18	32K	$7,000	C-120
	SEMS-20	Magnetic Core	18	64K	$9,000	C-120
	SEMS-21	Magnetic Core	18	128K	$12,000	C-120
ETI	8104	MOS	8	128K	$560	C-108
Eventide, Inc.	WKBP-4	MOS	16	1M	N/A	C-108
	WMAP-1	MOS	16	128K	$1,750	C-108
	WMAZ-4	MOS	16	512K	$3,500	C-108
Harris Corp.	003A	MOS	48	384K	$9,000	C-108
	003B	MOS	48	768K	$12,500	C-108
	003D	MOS	48	3M	$35,000	C-108
	003E	MOS	48	6.1M	$60,000	C-108
	2003C	MOS	48	1.5M	$18,500	C-108
Heath Co.	WH 88-16	MOS	8	64K	$115	C-108
	Z 205	MOS	16	256K	$900	C-108
Hewlett-Packard Co.	30418AR	MOS	16	1M	$12,000	C-108
	30078AR	MOS	16	128K	$2,500	C-108
	30008BR	MOS	16	256K	$3,750	C-108
	12789B	NMOS	16	256K	$6,320	C-121
	13307B	NMOS	16	N/A	$530	C-121
	12892B	NMOS	16	N/A	$530	C-121
	12731B	NMOS	16	N/A	$1,065	C-121
	12780H	NMOS	16	512K	$2,405	C-121
	12749H	NMOS	16	512K	$5,005	C-121
	12699H	NMOS	16	256K	$2,510	C-121
	12747H	NMOS	16	128K	$1,905	C-121
	12746H	NMOS	16	64K	$1,505	C-121
	12788H	NMOS	16	2M	$18,020	C-121
	12788A	NMOS	16	128K	$3,520	C-121
	12787D	NMOS	16	1M	$17,420	C-121
	12786D	NMOS	16	1M	$13,320	C-121
	12003A	NMOS	16	128K	$1,510	C-121
	12002B	NMOS	16	512K	$3,510	C-121
	12002A	NMOS	16	128K	$1,710	C-121
	12220C	NMOS	16	3M	$16,000	C-121
	12104C	NMOS	16	1M	$13,000	C-121
	12103F	NMOS	16	4M	$16,000	C-121
	12103D	NMOS	16	1M	$4,500	C-121
	97040A	NMOS	32	256K	$3,000	C-121
Honeywell, Inc.	CMC 9802	MOS	16	384K	$1,200	C-109
	CMM 9030	MOS	16	256K	$1,750	C-109
	CMM 9802	MOS	16	512K	$3,500	C-109
	CMM 9654	MOS	16	1024K	$12,000	C-109
	CMC 9690	MOS	32	2048K	$24,000	C-109
	CMM 8001	MOS	36	32M	$640,000	C-109
	CMM 8020	MOS	36	64M	$1,600,000	C-108
	CMM 8816	MOS	36	128M	$3,200,000	C-108
ICL, Inc.	3422	MOS	8	320K	$8,600	C-108
IMI Associates, Inc.	MPR SERIES	N/A	8	256K	$449	C-121
	XPR-X SERIES	N/A	8	256K	$479	C-121
	XPR-XX SERIES	N/A	8	256K	$569	C-121
	XPR-XXX SERIES	N/A	8	256K	$599	C-121
ims Industries Data Systems, Inc.	3000	MOS	32	16M	N/A	C-108
Intecnet	EMS	MOS	16	2M	$22,200	C-109
Interex, Inc.	1303-1/1360	Semiconductor	8	40K	$4,000	C-121
Intotech, Inc.	128K MEMORY MODULE	RAM	16	128K	N/A	C-108
	384K MEMORY MODULE	MOS	16	384K	N/A	C-109
Intotek	AM 25, AM 31	RAM	N/A	8K	$395	C-108
	AM 30	MOS	N/A	32K	$1,995	C-108
	AM 35	MOS	N/A	64K	$1,100	C-109
	AM 45/45B	MOS	N/A	128K	$1,895	C-109
Integrated Digital Products	MINIMATE	MOS	16	2M	N/A	C-108
Intel Corp.	ISBC 028A	MOS	8	128K	N/A	C-109
	ISBC 032A	MOS	8	32K	N/A	C-108
	ISBC 056A	MOS	8	64K	N/A	C-109
	ISBC 064 RAM MEMORY BOARD	MOS	8	64K	N/A	C-109
	ISBC 064A	MOS	8	64K	N/A	C-108
	ISBC 341	MOS	8	64K	N/A	C-109

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VENDOR	MODEL	TECHNOLOGY	WORD LENGTH (BITS)	MEMORY CAPACITY (BYTES)	PRICE	PAGE
Intel Corp.	1SBC 428 UNIVERSAL EXPANSION	MOS	8	512K	N/A	C-109
	ISBC 464 EPROM EXPANSION BOARD	MOS	8	64K	N/A	C-109
Interface Electronics, Inc.	OASIS	MOS	16	256K	$2,500	C-109
International Antex, Inc.	5000	MOS	8	547K	$1,200	C-109
	8211	MOS	N/A	64K	$265	C-109
	8212	MOS	8	64K	$295	C-110
Intersil Systems, Inc.	IBM 370 SERIES 158	CMOS	N/A	16M	N/A	C-121
	IBM 370 SERIES 168	NMOS	N/A	16M	N/A	C-121
	IBM 3000 3031	NMOS	N/A	16M	N/A	C-121
	IBM 3000/3032	NMOS	N/A	16M	N/A	C-121
	IBM 3000 3033	[illegible]	N/A	32M	N/A	C-122
	IMC-3 SERIES	MOS	16	256K	$1,500	C-110
	IMC-11/23	CMOS	16	32K	$575	C-122
	ISB-3216	CMOS	8	16K	$514	C-122
	ISB-321B	NMOS	8	16K	$328	C-122
	ISB-3220	CMOS	8	16K	$486	C-122
	ISB-324Q	MOS	8	64K	$429	C-110
	MCB-332	CMOS	8	[illegible]	$875	C-122
	MCB-364	CMOS	8	64K	$1,035	C-122
	MCB-512	MOS	8	512K	$1,570	C-110
	MCB-512X/2 MEG	MOS	8	2M	$2,000	C-110
IPL Systems, Inc.	1601	MOS	32	1M	$10,000	C-110
Ithaca Intersystems	256KDR	Bipolar	16	256K	$1,500	C-122
Locom Corp.	IBM 370/158	MOS	64	7 6M	N/A	C-110
	IBM 370 168	MOS	64	12 2M	N/A	C-110
	IBM 3031	MOS	64	6 1M	N/A	C-110
	IBM 3032	MOS	64	12 2M	N/A	C-110
	IBM 3033	MOS	64	24 5M	N/A	C-110
Lomac Data Products, Inc.	DYNAMIC	MOS	8	256K	$795	C-110
	STATIC	CMOS	8	128K	$1,200	C-122
Macrolink	2/1 MEGABYTE MEMORY EXPANSION	MOS	39	2M	N/A	C-110
	512KB 256KB	MOS	39	512K	N/A	C-110
	732 256KB MEMORY MODULE	MOS	32	256K	N/A	C-110
Macrotech International Corp.	128-ST	CMOS	8	128K	$1,232	C-122
	MAX-M	MOS	8	1M	$2,449	1100
	MAX-256	MOS	8	256K	N/A	C-110
	MAX-384	MOS	8	384K	$1,464	C-110
	MAX-512	MOS	8	512K	$8,303	C-110
	MAX-640	MOS	8	640K	$2,028	C-110
	MAX-768	MOS	8	768K	$2,165	C-110
	MAX-896	MOS	8	[illegible]	$2,307	C-110
Magnuson Computer Systems, Inc.	4500	MOS	32	1M	$10,000	C-110
	4600	MOS	32	1M	[illegible]	C-110
Maiscomp	ME-510	MOS	32	1M	$5,000	C-111
	MEX-515	MOS	32	1 5M	$7,300	C-111
	MEX-525	MOS	32	2 5M	$12,200	C-111
	MEX-535	MOS	32	3 5M	$17,100	C-111
	MEX-545	MOS	32	[illegible]	$22,000	C-111
	MEX-555	MOS	32	5 5M	$26,000	C-111
Measurement Systems & Controls	DMB-6400	MOS	8	64K	$695	C-111
	HDM-2800	MOS	8	128K	$1,295	C-111
	HDMC-2MEG	MOS	16	2M	$2,400	C-111
	HDMC-512	MOS	16	512K	$2,400	C-111
Memory Merchant	MM16K14	MOS	8	16K	[illegible]	C-111
	MM65K16S	MOS	8	64K	[illegible]	C-111
Microbar Systems, Inc.	DUAL BUS RAM BOARD DBR50-128K	MOS	8	128K	$1,455	C-111
	DUAL BUS RAM BOARD-256K	MOS	8	256K	$1,715	C-111
	DUAL BUS RAM BOARD-512K	MOS	8	512K	$2,275	C-111
Microdata Corp.	REALITY 4700 SERIES	MOS	8	512K	N/A	C-111
	SEQUEL VMS 3200	MOS	32	4M	N/A	C-111
	SOVEREIGN SERIES 7000	MOS	16	14 3M	N/A	C-111
Micro Memory, Inc.	MM-1103	Magnetic Core	16	16K	$990	C-122
	MM-1103/2	Magnetic Core	16	N A	$1,350	C-122
	MM-1103C	CMOS	16	32K	$650	[illegible]
	MM-1103D	MOS	16	256K	$650	C-111
	MM-1123C	CMOS	16	64K	$875	[illegible]
	MM-6800	Magnetic Core	8	8K	$725	C-122
	MM-6800/16	Magnetic Core	8	16K	$849	C-122
	MM-6800C	CMOS	8	32K	$595	C-122
	MM-6800/CT	CMOS	8	32K	$650	[illegible]
	MM-6800D 512KB	CMOS	16	512K	$1,150	C-122
	MM-6806D 64KB	MOS	8	64K	$350	C-111
	MM-8000C	CMOS	8	128K	$995	C-122
	MM-8080/16	Magnetic Core	8	16K	$849	C-122
	MM-80808	Magnetic Core	8	8K	[illegible]	C-122
	MM-8086	Magnetic Core	8	32K	$1,275	C-122

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Micro Memory, Inc.	MM-8086/16	Magnetic Core	8	16K	$875	C-123
	MM-8086C	[illegible]	8	64K	$825	C-111
	MM-8086D	[illegible]	8	512K	$895	C-111
	MM-8086E	MOS	8	512K	$1,495	C-111
	MM-68000C	CMOS	16	128K	$1,295	C-122
Microproducts	1040	[illegible]	N/A	12K	$100	C-123
[illegible]	APPLE II RAM CARD	MOS	8	16K	$100	C-111
	PC RAM CARD	MOS	8	256K	$350	C-111
	SYSTEM CARD	MOS	8	256K	$395	C-112
Mini-Computer Systems, Inc.	MICOS ILO 128	MOS	16	128K	$6,675	C-112
	MICOS ILO 256	MOS	16	256K	$7,500	C-112
	MICOS ILO 512	MOS	16	512K	$9,500	C-112
Monolithic Systems Corp.	MSC 3610	MOS	N/A	256K	$615	C-112
	MSC 3612	MOS	N/A	256K	$1,036	C-112
	MSC 3812	MOS	N/A	1M	$2,250	C-112
	MSC 4806	MOS	N/A	256K	$771	C-112
Morrow Designs, Inc.	64K STATIC RAM BOARD	MOS	8	64K	$500	C-112
	256K DYNAMIC RAM BOARD	MOS	8	256K	$1,000	C-112
Mostek Corp.	MK8003	MOS	16	256K	$3,000	C-112
	MK8015	MOS	16	256K	$1,280	C-112
	MK8016	MOS	N/A	512K	$1,408	C-112
	MK8018	MOS	16	256K	$2,800	C-112
	MK8022	MOS	18	256K	$890	C-112
	MK[illegible]	MOS	16	256K	$5,180	C-112
	MK8033	MOS	32	1M	$6,500	C-112
	MK8035	[illegible]	32	512K	$10,500	C-112
	MK8044	MOS	32	1M	$2,360	C-112
	MK8064	MOS	N/A	1M	$6,415	C-112
	MK8075	MOS	32	512K	$1,090	C-112
	MK8200	MOS	64	64M	$140,000	C-112
Motorola, Inc.	MMS 1132	MOS	16	256K	$800	C-112
	MMS 8512E	MOS	16	512K	$2,035	C-112
	MMS 8701	MOS	12	256K	$890	C-112
MPC Peripherals Corp.	AP-EP	MOS	N/A	32K	N/A	C-112
	AP-16 16K	MOS	N/A	64K	N/A	C-112
	AT-32 32K	MOS	N/A	32K	N/A	C-112
	BÜBDISK 128K	MOS	N/A	128K	N/A	C-113
	RAMTEXT 64K	MOS	N/A	64K	N/A	C-113
Mylex Digital Sciences, Inc.	5603 96K MEMORY BOARD	MOS	16	96K	$3,150	C-113
Nanodata Computer Corp.	HORIZ CONTROL STORE	Semiconductor	N/A	16K	N/A	C-123
	MAIN STORE	Semiconductor	18	N/A	N/A	C-123
	VERTICAL CONTROL STORE	Semiconductor	18	N/A	N/A	C-123
National Semiconductor Corp.	NS11L	MOS	16	256K	$785	C-113
	NS11M	MOS	16	1M	$1,895	C-113
	NS23L	MOS	16	64K	$325	C-113
	NS23M	MOS	16	256K	$525	C-113
	NS23R	MOS	16	1M	$1,995	C-113
	NS44F	MOS	16	512K	$1,350	C-113
	NS70/75	MOS	32	256K	$895	C-113
	NS753	MOS	32	1M	$1,695	C-113
	NS780	MOS	64	512K	$1,225	C-113
NCR Corp.	NCR 23C8	MOS	N/A	64K	N/A	C-113
	NCR 1400	MOS	N/A	425K	N/A	C-113
	NCR 2051	MOS	N/A	64K	N/A	C-113
	NCR 2055	MOS	N/A	64K	N/A	C-113
	NCR 2264	MOS	N/A	8K	N/A	C-113
	NCR 2316	MOS	N/A	16K	N/A	C-113
	NCR 2332	MOS	N/A	32K	N/A	C-113
	NCR 2333	MOS	N/A	32K	N/A	C-113
	NCR 2364	MOS	N/A	64K	N/A	C-113
	NCR 3400	MOS	N/A	4K	N/A	C-113
	NCR 7033	MOS	N/A	42K	N/A	C-113
	NCR 23128	MOS	N/A	128K	N/A	C-113
	NCR 23256	MOS	N/A	256K	N/A	C-113
	NCR 52001	MOS	N/A	1K	N/A	C-113
	NCR 52002	MOS	N/A	2K	N/A	C-113
	NCR 52004	MOS	N/A	4K	N/A	C-113
	NCR 52210	MOS	N/A	32K	N/A	C-113
	NCR 52211	MOS	N/A	64K	N/A	C-113
	NCR 52212	MOS	N/A	1K	N/A	C-113
	NCR 52801	MOS	N/A	32K	N/A	C-113
	NCR 52812	MOS	N/A	32K	N/A	C-113
[illegible]	BP0200	CMOS	16	16K	$1,300	C-123
	BP0220	CMOS	16	16K	$1,235	C-123
	BP0300	MOS	16	256K	$2,095	C-113
[illegible]	M8K BOARD	MOS	16	8K	$825	C-113

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New England Digital Corp.	M32K BOARD	MOS	16	32K	$2,500	C-114
Nixdorf Computer Corp.	8091	MOS	16	32K	$1,500	C-114
	8094	MOS	16	128K	$4,000	C-114
	9091	MOS	32	64K	[illegible]	C-114
	[illegible]	MOS	32	64K	$17,170	C-114
Norsk Data North American, Inc.	115	MOS	16	128K	$3,500	C-114
	116	MOS	16	256K	$5,000	C-114
	117	MOS	16	512K	$7,100	C-114
	MULTI-PORT MEMORY 101	MOS	16	512K	$17,000	C-114
	MULTI-PORT MEMORY 102	MOS	16	1M	$27,000	C-114
	MULTI-PORT MEMORY 122	MOS	16	128K	$6,000	C-114
	MULTI-PORT MEMORY 124	MOS	16	256K	$10,800	C-114
Octagon Computer Systems	128K STATIC RAMBOARD	MOS	16	128K	$1,095	C-114
	256K STATIC RAMBOARD	MOS	16	256K	$1,850	C-114
Paradyne Corp.	9360	MOS	32	256K	N/A	C-114
	9360-02	MOS	32	1M	N/A	C-114
PCE Systems	BSR 64/256	MOS	8	256K	$900	C-114
	BSR 256	MOS	8	256K	$900	C-114
PEBX, Inc.	MECC V-11	MOS	16	256K	$895	C-114
Phoenix Data, Inc.	MEM-1108	MOS	8	64K	$800	C-114
Pixcon, Inc.	SR2	MOS	8	64K	$475	C-114
	SR4C	MOS	8	64K	$475	C-114
	SR5	MOS	8	64K	$475	C-114
	SR25	MOS	8	128K	$660	C-114
	SB50	MOS	8	256K	$1,060	C-114
	SR512	MOS	8	512K	$1,995	C-115
	SR1000-128K	MOS	8	128K	$420	C-115
	SR1000-256K	MOS	8	256K	[illegible]	C-115
Plessey Microsystems	PSM 14A	MOS	8	1M	$3,525	C-115
	PSM 512A	MOS	8	512K	$1,200	C-115
	PSM 512P	MOS	8	512K	$1,100	C-115
	PSM 6463	CMOS	8	64K	$1,300	C-123
Plexus Computers	2008A	MOS	N/A	512K	$5,500	C-115
	[illegible]	MOS	N/A	1M	[illegible]	C-115
	2012A	MOS	16	512K	[illegible]	C-115
	2013A	MOS	16	1M	[illegible]	C-115
Point Four Data Corp.	LOTUS CACHE MEMORY	MOS	16	1M	$5,700	C-115
Prime Computer, Inc.	MMW1	MOS	32	1M	$15,000	C-115
	MMW2	MOS	32	2M	$15,500	C-115
	[illegible]	MOS	32	512K	$7,500	C-115
Quadram Corp.	QUAD 512+	MOS	8	512K	$895	C-115
	[illegible]	MOS	8	256K	$395	C-115
	QUADBOARD II	MOS	8	256K	$595	C-115
Quadri Corp.	CORE MEMORY MODULES	Magnetic Core	8	64K	$8,000	C-123
Questronics, Inc.	BWM-32	MOS	8	32K	$170	C-115
	EERAM-32	MOS	8	4K	$250	C-115
	EERAM-32P	MOS	8	32K	$250	C-115
	PRM-16	MOS	8	16K	$115	C-115
	SRAM-16	MOS	8	16K	$130	C-115
	SRAM-16P	MOS	8	32K	$270	C-115
Relational Memory Systems, Inc.	RMEN-16K	MOS	NA	16K	$466	C-115
	RMEN-32K	MOS	8	32K	$518	C-115
	RMEN-64K	MOS	8	64K	$640	C-116
	RMEN-128K	MOS	8	128K	$1,376	C-116
	RMEN-256K	MOS	8	256K	$1,480	C-116
Rexon Business Machines Corp.	128K MEMORY MODULE	MOS	16	128K	$750	C-116
R-G-S Designs, Inc.	BCS-100	MOS	8	16K	$49	C-116
	[illegible]	MOS	12	192K	$750	C-116
	[illegible]	MOS	8	256K	$400	C-116
R.H. Electronics,Inc.	SUPER RAM II	MOS	8	16K	$78	C-116
Nanda Electronics	ARES MODEL 2850	MOS	16	1M	$4,900	C-116
Ridge Computers	1MB MEMORY CARD	MOS	32	1M	$5,000	C-116
Saturn Systems, Inc.	ACCELERATOR 2	MOS	8	64K	$599	C-116
	NEPTUNE 64	MOS	8	64K	$249	C-116
	NEPTUNE 128	MOS	8	128K	$399	C-116
	NEPTUNE 192	MOS	8	192K	$499	[illegible]
	SATURN RAM CARD 32	MOS	8	32K	$219	C-116
	SATURN RAM CARD 64	MOS	8	64K	$349	C-116
	SATURN RAM CARD 128	MOS	8	128K	$499	[illegible]
	TITAN	MOS	8	576K	$695	C-116
SMC Saigem	8660	MOS	8	128K	$5,000	C-116
Smoke Signal Broadcasting	DPM-32	MMOS	8	32K	$1,000	C-123
	M-32-X	MMOS	8	32K	$395	C-123
	M-128-X	MMOS	8	256K	$995	C-123
	M-256-X	MMOS	8	256K	$1,295	[illegible]
	M-512-X	MMOS	8	512K	$1,695	C-123

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Sperry Corp.	2687-98	MOS	36	2M	$6,400	C-116
Synapse Computer Corp.	MSM-1000	MOS	32	1M	$14,000	C-116
Synertek	SY2169	MOS	4	4096K	N/A	C-117
	SY2167	MOS	1	16384K	N/A	C-117
	SY2149H	MOS	4	1024K	N/A	C-117
	SY2114A	MOS	4	1024K	N/A	C-117
	SY2112	MOS	4	256K	N/A	C-117
	SY2111	MOS	4	256K	N/A	C-117
	SY2101	MOS	4	256K	N/A	C-116
	SY2161	Silicon Gate	8	1M	N/A	C-123
	SY2168	Silicon Gate	4	4M	N/A	C-123
	SY2159	Silicon Gate	N/A	1M	N/A	C-123
	SY2158	Silicon Gate	8	1M	N/A	C-123
	SY2148H	Silicon Gate	4	1M	N/A	C-123
	SY2147H	Silicon Gate	1	4M	N/A	C-123
	SY2129	Silicon Gate	8	2M	N/A	C-123
Systems Group	DM 6400	MOS	8	64K	$377	C-117
	DMB 6400	MOS	8	64K	$415	C-117
	DMB6401	MOS	8	64K	$415	C-117
	HDM128	MOS	8	128K	$777	C-117
	HDM 2800	MOS	8	128K	$777	C-117
	HDMC 512	MOS	16	512K	$2,650	C-117
	HDMC512K	MOS	16	512K	$2,650	C-117
Tall Tree Systems	JRAM	MOS	8	512K	$800	C-117
Tarbell Electronics	256K-ASM	MOS	8	256K	$1,400	C-117
	MEM 64K-ABM	MOS	8	64K	$500	C-117
Technical Micro Systems	16K RAM/32K EPROM	MOS	16	32K	$595	C-117
Technico, Inc.	32K RAM BOARD	MOS	16	32K	$499	C-117
	192K RAM BOARD	MOS	16	192K	$1,299	C-117
Tecmar, Inc.	1ST MATE	MOS	8	256K	$389	C-117
	FORGET ME NOT	CMOS	8	32K	$995	C-123
TeleVideo Systems, Inc.	1603M	MOS	16	128K	$595	C-117
	ADDITIONAL MEMORY RAM	MOS	8	64K	N/A	C-117
Toshiba America, Inc.	BAG OF CHIPS	MOS	8	64K	$150	C-117
	RAMPACK 16	MOS	8	16K	$195	C-117
	RAMPACK 32	MOS	8	32K	$295	C-117
Translation Technical Memories	PINCOMM AS	MOS	16	128K	N/A	C-117
	PINCOMM HPS	MOS	16	512K	$3,000	C-117
	PINCOMM PS	MOS	16	128K	$945	C-117
	PINCOMM H6	MOS	16	64K	$720	C-118
	PINCOMM 23S	MOS	8	256K	$970	C-118
	PINCOMM 23S +	MOS	8	1M	$2,945	C-118
	PINCOMM 24S	MOS	16	1M	$2,895	C-118
	PINCOMM 44S	MOS	16	1M	$3,430	C-118
	PINCOMM 70S	MOS	32	256K	$995	C-118
	PINCOMM 730S	MOS	32	N/A	$2,800	C-118
	PINCOMM 750S	MOS	32	256K	$995	C-118
	PINCOMM 750S +	MOS	32	1M	$2,800	C-118
	PINCOMM 780S	MOS	64	256K	$995	C-118
	PINCOMM 780S +	MOS	64	2M	$4,800	C-118
	PINCOMM 780SX	MOS	32	1M	$2,800	C-118
Weapermicro Systems, Inc.	WIZARD PC MEMORY CARD	MOS	8	256K	N/A	C-118
Wintek Corp	MCM81	CMOS	8	2K	$189	C-123
	MRA16	MOS	8	16K	$299	C-118
Xicor	X2201A NOVRAM	MOS	4	1K	$15	C-118
	X2210 NOVRAM	MOS	4	N/A	N/A	C-118
	X2212 NOVRAM	MOS	4	1K	$12	C-118
	X2444 NOVRAM	MOS	16	N/A	N/A	C-118
	X2804 EEPROM	MOS	N/A	4K	$15	C-118
	X2816A EEPROM	MOS	8	16K	$28	C-118
Zendex Corp.	ZX-012	MOS	8	512K	$1,690	C-118
	ZX-012E	MOS	8	512K	$3,010	C-118
	ZX-028	MOS	8	128K	$780	C-118
	ZX-056	MOS	8	256K	$1,375	C-118
Zilog, Inc.	512K WITH PARITY	MOS	16	512K	$3,450	C-118
	512K ECC	MOS	16	512K	N/A	C-118
	1M	MOS	16	1M	$6,950	C-118
Zitel Corp.	CM-5150	MOS	16	128K	$3,500	C-118
	CM-5160-D128	MOS	16	256K	$4,500	C-118
	ZBC-0512	MOS	16	512K	$1,400	C-119
	ZMT-II	MOS	22	2M	$18,000	C-119
	ZMT-16	MOS	22	2M	$18,000	C-119
Zobex	ZM-256K	MOS	8	256K	$335	C-119
	ZMS-100	MOS	8	64K	$395	C-119

Add-On Memory Devices

VENDOR	MODEL	TECHNOLOGY	WORD LENGTH (BITS)	MEMORY CAPACITY (BYTES)	PRICE	PAGE
Advanced Digital Technology	VLS SERIES	MOS	8	4 5M	$1,295	C-123
	VLSC SERIES	MOS	8	1 5M	$1,295	C-123
Anatron, Inc.	ANSERAM	MOS	8	64K	$595	C-123
Apple Computer, Inc.	EXTENDED 64K CARD	MOS	8	64K	$170	C-124
Apotek, Inc.	AIC-256 MULTIFUNCTION	MOS	8	256K	$369	C-124
	AIM-256 EXPANSION	MOS	8	256K	$259	C-124
Axion, Inc.	RAM DISK 320	MOS	8	320K	$1,000	C-124
BGL Technology Corp.	SSD-301	MOS	16	300M.	$1 140	C-124
Bit 3 Computer Corp.	501	MOS	8	16K	$89	C-124
	520	MOS	8	32K	$70	C-124
Cambex Corp.	EXPANDA STOR II	MOS	16	3M	$17 000	C-124
Cedar Technology	Q-TIMER	CMOS	16	6K	$675	C-127
Cray Research, Inc.	SSD-1	MOS	24	65M	N/A	C-124
	SSD-2	MOS	24	128M	N/A	C-124
	SSD-3	MOS	64	256M.	N A	C-124
CTS-Fabritech, Inc.	698	TTD Lst Core	18	32K	N.A	C-127
	MMS 64	TTD Lst Core	18	64K	N/A	C-127
Data Corp.	DASA C-200	MOS	12	N/A	$995	C-124
Data Engineering, Inc.	C5501	MOS	32	32K	$4 000	C-124
	C5502	MOS	32	64K	$5 500	C-124
	C5503	MOS	32	128K	$9 500	C-124
	C5511	MOS	32	64K	$4 500	C-124
	C5512	MOS	32	64K	$6,000	C-124
	C5513	MOS	32	120K	$10,400	C-124
Datamac Peripheral Products	CDM 64-	MOS	16	64K	$339	C-124
	CDM 128	MOS	16	128K	$448	C-124
	CDM 192	MOS	16	192K	$577	C-124
	CDM 256	MOS	16	256K	$706	C-124
	DM 64	MOS	16	64K	$249	C-124
	DM 128	MOS	N/A	128K	$378	C-124
	DM 192	MOS	16	192K	$507	C-124
	DM 256	MOS	16	256K	$636	C-124
Datalram Corp.	BC-801	Magnetic Core	8	2M	$14,665	C-128
	BS-417	MOS	32	4M	$11,365	C-124
	BS-801	MOS	8	64M	$10,810	C-124
Digicomp Research Corp.	1/4 MEG MEMORY BOARD 128	NMOS	8	128K	$1,195	C-128
	1/4 MEG MEMORY BOARD 256	NMOS	8	256K	$1,395	C-128
	1/4 MEG MEMORY BOARD 64	NMOS	8	64K	$995	C-128
Digital Interface Systems, Inc.	990-110	MOS	16	24K	$600	C-124
Dynabyte	256K RAM BOARD	MOS	8	256K	$995	C-125
Edge Technology	MH1/CPU	MOS	N/A	22K	$2 100	C-125
Electro-Design, Inc.	RAM + 4	MOS	8	256K	$450	C-125
ETR Star Systems	SUPERSTAR	MOS	8	128K	$295	C-125
General Robotics Corp.	MLV-11	MOS	16	128K	$1,000	C-125
	MSV-11	MOS	16	64K	$500	C-125
	MSV-11Q	MOS	16	1M	$2,500	C-125
Independent Business Systems	SLAVENET 64	MOS	8	64K	N/A	C-125
Intel Corp.	INTEL 3800 MEMORY SYSTEM	MOS	8	64K	N/A	C-125
Intermem Corp.	INTERMEM 8330 MEMORY SYSTEM	MOS	64	256K	$825,000	C-125
	INTERMEM 8640 MEMORY SYSTEM	MOS	60	16M	$400,000	C-125
Legend Industries, Ltd.	18 SRC	CMOS	8	18K	$150	C-128
	64KC RAM	LSI	8	64K	$327	C-128
	128KDE	N/A	8	128K	$599	C-128
	S CARD	LSI	8	1M	$399	C-128
MW Research Corp.	BUSBOARD	MOS	9	512K	$350	C-125
Megalogic Corp.	PAM-I/ES	MOS	8	8K	$295	C-125
Memotech Corp	16K	MOS	8	16K	$50	C-125
	32K	MOS	8	32K	$100	C-125
	64K	MOS	8	64K	$150	C-125
Microcomputer Systems, Inc.	MSI-C712	CMOS	8	48K	$130	C-128
	MSI-C764	CMOS	8	64K	$150	C-128
	MSI-7712	MOS	8	48K	$125	C-125
Microtek	AMB 16	CMOS	8	16K	$109	C-128
	BAM 16	CMOS	8	16K	$100	C-128
	BAM 16 MN	CMOS	8	16K	$109	C-128
	BAM 64	CMOS	8	64K	$375	C-128
	BAM 128	CMOS	8	64K	$475	C-128
	HAL 256	CMOS	8	256K	$595	C-128
	Q-DISK	CMOS	8	64K	$529	C-128
	TI 64	CMOS	8	64K	$229	C-128
	VIM 0	NMOS	8	16K	$47	C-128

Memory Index

VENDOR	MODEL	TECHNOLOGY	WORD LENGTH (BITS)	MEMORY CAPACITY (BYTES)	PRICE	PAGE*
[illegible]	VIM 16	NMOS	8	16K	$99	C-128
Midwest Scientific Instruments	RAM-8K	MOS	8	8K	$150	C-125
	RAM 16K	MOS	8	16K	$450	C-125
	RAM-64K	MOS	8	64K	$1,000	C-125
	RAM-68K	MOS	8	8K	$350	C-125
Miltope Corp.	BMS-1000	[illegible]	8	512K	$15,200	C-128
Modular Computer Systems, Inc.	3695	MOS	16	512K	$5,000	C-125
Modutest Systems, Inc.	[illegible]	Magnetic Core	32	1K	$50,000	C-128
	MEGASTORE CORE	Magnetic Core	32	4M	$70,000	C-128
	MEGASTORE SEMI	Semiconductor	32	4M	$110,000	[illegible]
Mostek Corp.	MK8661	MOS	32	4M	$20,000	C-125
Motorola, Inc.	SYSTEM 3000	MOS	16	32.7M	$163,840	C-126
Mountain Computer, Inc.	16K RAM + CARD	MOS	8	16K	$189	C-126
National Micro Products, Inc.	UNIVERSAL PROCESSING DEVICE	MOS	8	[illegible]	$1,500	C-126
New England Digital Corp.	ENTENDED MEMORY BOARD	MOS	16	128K	N/A	C-126
Nixdorf Computer Corp.	6305-D	MOS	16	256K	[illegible]	[illegible]
	6305-F	[illegible]	16	512K	$12,000	C-126
Onyx Systems	C5001/MU	MOS	8	128K	$1,000	[illegible]
	C5002A	MOS	16	512K	$3,000	[illegible]
	C/8002	MOS	16	256K	$2,000	C-126
PEBX, Inc.	EC 320	[illegible]	32	2M	$9,000	C-126
Seattle Computer Products	RAM +	MOS	8	256K	$220	C-128
	RAM + 3	[illegible]	8	256K	$620	[illegible]
Sperry Corp.	2913-99	MOS	36	4M	$448,875	C-126
	3125-00	MOS	36	4M	$80,000	C-126
SSM Microcomputer Products, Inc.	MB 10	MOS	8	16K	[illegible]	[illegible]
	MB 32	MOS	8	32K	$425	C-128
	MB 64	MOS	8	N/A	$599	[illegible]
Standard Engineering Corp.	LS-060	MOS	18	4K	$1,500	[illegible]
Storage Technology Corp.	UNIVERSAL 370	MOS	N/A	64K	N/A	[illegible]
Stratus Computer	M100	MOS	16	2M	$10,000	C-126
	M102	MOS	16	2M	$6,000	[illegible]
Telefile Computer Products, Inc.	MODEL T3801	MOS	32	256K	$44,500	[illegible]
	MODEL T3802	MOS	32	512K	[illegible]	[illegible]
	MODEL T3803	MOS	32	1M	$57,610	[illegible]
	MODEL T3804	MOS	32	2M	$83,260	C-126
	MODEL T3822	MOS	32	512K	$54,540	C-126
	MODEL T3823	MOS	32	1M	$73,660	C-126
	MODEL T3824	MOS	32	2M	$90,760	C-127
	MODEL T3825	MOS	32	4M	$142,060	C-127
	MODEL T3843	MOS	32	1M	$104,620	C-127
	MODEL T3844	MOS	32	2M	$122,860	C-127
	MODEL T3845	MOS	32	4M	$157,060	C-127
	MODEL T3846	MOS	32	8.1M	[illegible]	C-127
Transware Corp.	M-8008	MOS	8	8K	$232	C-127
	M-8016	MOS	8	16K	[illegible]	C-127
Translate/Standard Memories	BUSCOMM 70S	MOS	N/A	3M	$8,790	C-127
U-Microcomputers, Inc.	U-RAM 128K	MOS	N/A	128K	$549	C-127
	U-RAM 16K	MOS	N/A	16K	$70	C-127
	U-RAM 32K	MOS	N/A	32K	$140	C-127
	U-RAM 64K	MOS	N/A	64K	$349	C-127
Univation, Inc.	DMB-64	[illegible]	8	448K	N/A	C-127
	DMB-192	MOS	8	448K	N/A	C-127
	[illegible]	MOS	8	448K	N/A	C-127
	IRM-64	MOS	8	64K	N/A	C-127
	IRM-64X	MOS	8	256K	N/A	C-127
	IRM-128X	MOS	8	256K	N/A	C-127
	IRM-192X	MOS	8	256K	N/A	C-127
	IRM-256C	MOS	8	256K	N/A	C-127
	IRM-256X	MOS	8	512K	N/A	C-127
	IRM-512C	MOS	8	512K	N/A	C-127
	VICTOR-128K	MOS	8	384K	N/A	C-127
	VSMB-128C	MOS	8	128K	N/A	C-127
	VSMB-256X	[illegible]	8	384K	N/A	C-127
	VSMB-384C	MOS	8	384K	N/A	C-127
Vicat Systems, Inc.	S150-19	ECC	8	[illegible]	$1,500	[illegible]
	S150-20	ECC	8	256K	$1,500	C-128
	S150-21	ECC	8	512K	$3,000	C-128
	S200-23	ECC	8	512K	$3,000	C-128
	S200-24	ECC	8	1M	$6,000	[illegible]
Xtal Corp.	SY90	MOS	16	16M	$45,000	C-127
	SY91	MOS	16	32M	$60,000	C-127
	SY92	[illegible]	16	4M	$20,000	C-127

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1.0 MB VAX 730
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DEC Mini	Dataram ADD-IN	Board Size	Maximum Capacity
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LSI-11	DR-215	dual	256 KB
LSI-11	DR-213	quad	1.0 MB
PDP®-11	DR-114S	hex	256 KB
PDP-11	DR-114SP	hex	256 KB
PDP-11	DR-214	hex	1.0 MB
PDP-11	DR-144	hex	256 KB
PDP-11	DR-244	hex	1.0 MB
VAX®-11/750 PDP-11/70	DR-175	hex	256 KB
VAX-11/750 VAX-11/730	DR-275	hex	1.0 MB
VAX-11/780	DR-178	extended hex	512 KB
VAX-11/780	DR-278	extended hex	2.0 MB
DECSYSTEM 2020®	DR-120	extended hex	256 KB

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DATARAM CORPORATION

Princeton Road
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Add-In Memory Devices

MOS Memories

ABLE COMPUTER
SCAT.45
Compatibility: DEC PDP-11/45, 11/50, 11/55
Device Type: RAM
Word Size Supported: 18-bit
Capacity: 256K bytes
Cycle Time: 330 nsec
Features: Expandable memory
Price: $7,425 to $24,750
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: 1978
(See Vendor Profile Page V-1)

ACTION COMPUTER
DPC 16
Compatibility: Discovery 500, 1600
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 96K bytes
Price: $1,295
Distribution Method: OEM, Third-party
Date First Installed: August 1983
(See Vendor Profile Page V-1)

ACTION COMPUTER
DPC 16
Compatibility: Discovery 500, 1600
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Price: $1,595
Distribution Method: OEM, Third-party
Date First Installed: 1981

ACTION COMPUTER
DPC 816
Compatibility: Discovery 500, 1600
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Features: Single-bit error correction
Price: $1,995
Distribution Method: OEM, Third-party
Date First Installed: September 1983

ACTION COMPUTER
Z DPC 180
Compatibility: Discovery 500, 1600
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Features: Single-bit error correction
Price: $950
Distribution Method: OEM, Third-party
Number Installed to Date: More than 50,000
Date First Installed: September 1979

ADVANCED LOGIC SYSTEMS, INC.
CP/M CARD
Compatibility: Apple II, IIe, II+
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 150 nsec
Price: $399
Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: May 1983
(See Vendor Profile Page V-1)

ADVANCED MICRO DEVICES INC.
AM 97/0000 SERIES-1 MEGABYTE
Compatibility: Intel Multibus
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 1M bytes
Price: $2,995
Distribution Method: Third-party
Date First Installed: July 1983

ADVANCED MICRO DEVICES INC.
AM 97/0000 SERIES-128
Compatibility: Intel Multibus
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Price: $740
Distribution Method: Third-party
Date First Installed: 1982

ADVANCED MICRO DEVICES INC.
AM 97/0000 SERIES-256
Compatibility: Intel Multibus
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 256K bytes
Cycle Time: 350 nsec
Price: $1,250
Distribution Method: Third-party
Date First Installed: 1982

ADVANCED MICRO DEVICES INC.
AM 97/0000 SERIES-32
Compatibility: Intel Multibus
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 32K bytes
Cycle Time: 350 nsec
Price: $660
Distribution Method: Third-party
Date First Installed: 1982

ADVANCED MICRO DEVICES INC.
AM 97/0000 SERIES-512
Compatibility: Intel Multibus
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 512K bytes
Cycle Time: 350 nsec
Price: $1,599
Distribution Method: Third-party
Date First Installed: 1982

ADVANCED MICRO DEVICES INC.
AM 97/0000 SERIES-64
Compatibility: Intel Multibus
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 64K bytes
Cycle Time: 350 nsec
Price: $460
Date First Installed: 1982

ALCYON, INC.
64K OPTION
Compatibility: Alcyon A68KPM
Device Type: DRAM
Capacity: 64K bytes
Price: $460
Distribution Method: OEM
Date First Installed: March 1983
(See Vendor Profile Page V-1)

ALCYON, INC.
MEX-3 (512K)
Compatibility: Alcyon A68KPM
Device Type: RAM
Word Size Supported: 16-bit
Features: Multiple-bit error detection
Price: $1,325
Distribution Method: OEM
Date First Installed: March 1983

AMF LOGIC SCIENCES, INC.
1/2 MB MEMORY BOARD
Compatibility: HSR 11A, HSR 11B
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 512K bytes
Cycle Time: 250 nsec
Features: Bit Addressable
Price: $6,000
Distribution Method: End user, OEM
Number Installed to Date: 500 - 1,000
Date First Installed: 1979
(See Vendor Profile Page V-2)

ANDROMEDA SYSTEMS, INC.
MEM11-128
Compatibility: DEC LSI-11
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 375 nsec
Price: $950
Number Installed to Date: 500 - 1,000
Date First Installed: 1978
(See Vendor Profile Page V-3)

ANDROMEDA SYSTEMS, INC.
MEM11-16
Compatibility: DEC LSI-11
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 32K bytes
Cycle Time: 375 nsec
Price: $450
Distribution Method: End user, OEM
Number Installed to Date: 500 - 1,000
Date First Installed: 1978

ANDROMEDA SYSTEMS, INC.
MEM11-32
Compatibility: DEC LSI-11
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 64K bytes
Cycle Time: 375 nsec
Price: $475
Distribution Method: End user
Number Installed to Date: 500 - 1,000
Date First Installed: 1978

ANDROMEDA SYSTEMS, INC.
MEM11-64
Compatibility: DEC LSI-11
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 375 nsec
Price: $875
Distribution Method: OEM, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: September 1978

APPARAT, INC.
APPARAT-256K RAM CARD-64K
Compatibility: IBM Personal Computer-XT
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 200 nsec
Features: Multiple-bit error detection
Price: $745
Date First Installed: 1983
(See Vendor Profile Page V-3)

APPARAT, INC.
APPARAT-512K RAM CARD-256K
Compatibility: IBM Personal Computer-XT
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 200 nsec
Features: Multiple-bit error detection
Price: $951
Date First Installed: April 1983

APPARAT, INC.
APPARAT-512K RAM CARD-384K
Compatibility: IBM Personal Computer-XT
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 384K bytes
Cycle Time: 200 nsec
Features: Multiple-bit error detection
Price: $499
Date First Installed: April 1983

APPARAT, INC.
APPARAT-512K RAM CARD-64K
Compatibility: IBM Personal Computer-XT
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Price: $195
Distribution Method: End user
Date First Installed: April 1983

APPLIED TECHNOLOGY VENTURES, INC.
MEMORY UPGRADE
Compatibility: ATV J100, ATV J200, ATV J300
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Price: $7,500
Distribution Method: End user
Date First Installed: June 1982
(See Vendor Profile Page V-3)

ARTEC ELECTRONICS
32K STATIC RAM BOARD
Compatibility: North Star, Vector Graphics
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 32K bytes
Cycle Time: 250 nsec
Features: Battery back-up
Price: $289
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: September 1977
(See Vendor Profile Page V-4)

ARTEC ELECTRONICS
64K DYNAMIC RAMCARD
Compatibility: Cromemco, North Star, Vector Graphics
Device Type: DRAM
Word Size Supported: 8-bit
Price: $185
Number Installed to Date: 100 - 500
Date First Installed: May 1983

ARTEC ELECTRONICS
MULTI MEMORY BOARD
Compatibility: Intel 8085A
Device Type: EPROM
Word Size Supported: 8-bit
Capacity: 32K bytes
Price: $193
Number Installed to Date: 100 - 500
Date First Installed: September 1978

AST RESEARCH, INC.
[illegible]
Capacity: 256K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction
Price: $395 to $695
Distribution Method: Third-party
Date First Installed: October 1982
(See Vendor Profile Page V-4)

AST RESEARCH, INC.
DISK + +
Compatibility: IBM Personal Computer-XT, Compaq
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Cycle Time: 200 nsec
Features: Interleaving
Price: $655 to $1,650
Distribution Method: Third-party
Number Installed to Date: 100 - 500
Date First Installed: April 1983

AST RESEARCH, INC.
MEGA PLUS II
Compatibility: IBM Personal Computer-XT, Compaq
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction
Price: $395 to $1,295
Distribution Method: Third-party
Number Installed to Date: 10,000 - [illegible]
Date First Installed: November 1982

AST RESEARCH, INC.
MP SERIES
Compatibility: IBM Personal Computer-XT, Compaq
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction
Price: $295 to $595
Distribution Method: Third-party
Number Installed to Date: 10,000 - [illegible]
Date First [illegible]: 1982

ASTRONAUTICS CORP. OF AMERICA
[illegible] 2K INCREMENTS
Compatibility: Astronautics Line Control
Device Type: EPROM
Word Size Supported: 8-bit
Capacity: 2K bytes
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First [illegible]: 1981
(See Vendor Profile Page V-4)

ASTRONAUTICS CORP. OF AMERICA
RAM-2K INCREMENTS
Compatibility: Astronautics Line [illegible]
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 2K bytes
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First [illegible]: 1980
(See Vendor Profile Page V-4)

AXLON, INC.
RAM DISK 128
Compatibility: Apple II
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 250 nsec
Price: $[illegible]
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: November 1982
(See Vendor Profile Page V-4)

AXLON, INC.
RAM POWER II
Compatibility: Atari 400, Atari 800
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 32K bytes
Cycle Time: 200 nsec
Price: $[illegible]
Distribution Method: Third-party
Number Installed to Date: More than 50,000
Date First Installed: November 1980

AXLON, INC.
RAM POWER 48
Compatibility: Atari 400
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 48K bytes
Cycle Time: 200 nsec
Price: $[illegible]
Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: October 1982

AXLON, INC.
RAM POWER 128
Compatibility: Atari 800
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 200 nsec
Price: $[illegible]
Distribution Method: Third-party
Number Installed to Date: 1,000 - [illegible]
Date First Installed: November 1980

CALIFORNIA COMPUTER SYSTEMS
2066
Compatibility: Calcomp 300/400; Slimline 3000, Cromemco CS3/CS2; Any S100 Bus
Device Type: DRAM
Word Size Supported: 8-bit.
Capacity: 64K Bytes
Cycle Time: 250 nsec
Distribution Method: Third-party
Number Installed to Date: 5,000-10,000
Date First Installed: October 1981
(See Vendor Profile Page V-6)

CALIFORNIA COMPUTER SYSTEMS
2066-01
Compatibility: Cromemco; Calcomp 300/400, Compupro; Morrow 2300
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 475 nsec
Price: $420
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000 - 5,000

CALIFORNIA COMPUTER SYSTEMS
2116-01
Compatibility: North Star Horizon; Calcomp 300/400; Compupro, Morrow 2300
Device Type: SRAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 310 nsec
Price: $345
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: September [illegible]

CALIFORNIA [illegible] SYSTEMS
2256
Compatibility: Calcomp 300/400, Slimline 3000; Any S100 Bus
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 300 nsec
Features: Parity
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: October 1982

CALIFORNIA [illegible] SYSTEMS
[illegible]-01
Compatibility: Calcomp-300/400; Compupro, North Star Horizon, [illegible]
Device Type: DRAM
Capacity: 256K bytes
Cycle Time: 370 nsec
Features: Multiple-bit error detection
Price: [illegible]
Distribution Method: OEM, Third-party

CALIFORNIA COMPUTER SYSTEMS
[illegible]
Compatibility: IBM Personal Computer, Calcomp 300,400, Compupro, Morrow 2300
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 192K bytes
Cycle Time: 335 nsec
Features: Multiple-bit error detection
Price: $995
Distribution Method: OEM, Third-party

CALIFORNIA MINICOMPUTER SYSTEMS
64K DRAM-A
[illegible]
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Cycle Time: 150 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, Interleaving, ECC
Price: $[illegible]
Distribution Method: End user
[illegible]
(See Vendor Profile Page V-6)

CALIFORNIA MINICOMPUTER SYSTEMS
64K DRAM-B
[illegible]
Word Size Supported: 32-bit
Capacity: 2M bytes
Cycle Time: 150 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, Interleaving, ECC
Price: $1,100
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 100 - 500
Date First Installed: 1981

CAMBEX CORP.
[illegible]
Compatibility: IBM 3158, 3168, [illegible]
Device Type: RAM
Word Size Supported: 64-bit
Capacity: 12.2M bytes
Price: $8,500
Distribution Method: End user, Third-party
(See Vendor Profile Page V-6)

CAMBEX CORP.
[illegible]
Compatibility: DEC PDP-11/24, PDP-11/44, PDP-11/XX
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Cycle Time: 450 nsec
Features: Battery back-up
Distribution Method: End user, OEM, Third-party
Number Installed to Date: Under 100
Date First Installed: January 1982

CAMBEX CORP.
[illegible]
Compatibility: DEC VAX-11/780, VAX-11/750, VAX-11/730
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Features: Interleaving
Price: [illegible]
Distribution Method: End user, OEM, Third-party
Number Installed to Date: Under [illegible]
Date First Installed: January 1982

[illegible] DATA [illegible]
B1014
Compatibility: Multibus
Device Type: PROM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Price: $[illegible]
[illegible]
OEM, Third-party
Date First Installed: 1979
(See Vendor Profile Page V-6)

[illegible] DATA [illegible]
B1020
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Cycle Time: 495 nsec
Features: Multiple-bit error detection
Distribution Method: OEM, Third-party
Date First Installed: November 1980

[illegible] DATA [illegible]
B1020/128K
Compatibility: Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Cycle Time: 495 nsec
Features: Single-bit error correction
Price: $[illegible]
[illegible]
OEM, Third-party
Number Installed to Date: 1,000 - 5,000

Add-In Memory Devices

Date First Installed: 1980

CENTRAL DATA CORP.
B1020 32K
Compatibility: Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 32K bytes
Cycle Time: 495 nsec
Features: Single-bit error correction
Price: $690
Distribution Method: End user, OEM, Third-party
Date First Installed: 1980

CENTRAL DATA CORP.
B1020/64K
Compatibility: Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 64K bytes
Cycle Time: 495 nsec
Features: Single-bit error correction
Price: $765
Distribution Method: End user, OEM, Third-party
Date First Installed: 1980

CENTRAL DATA CORP.
B1020 96K
Compatibility: Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Cycle Time: 495 nsec
Features: Single-bit error correction
Price: $840
Distribution Method: End user, OEM, Third-party
Date First Installed: 1980

CENTRAL DATA CORP.
B1027
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 512K bytes
Cycle Time: 375 nsec
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Distribution Method: Third-party
Date First Installed: January 1983

CENTRAL DATA CORP.
B1027/128K
Compatibility: Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Cycle Time: 375 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $1,515
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 100 - 500
Date First Installed: April 1983

CENTRAL DATA CORP.
B1027/384K
Compatibility: Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 384K bytes
Cycle Time: 375 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $2,045
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 100 - 500

CENTRAL DATA CORP.
B1027/512K
Compatibility: Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 312K bytes
Cycle Time: 375 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $2,300
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 100 - 500

CENTRAL DATA CORP.
B1040
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 512K bytes
Cycle Time: 345 nsec
Features: Battery back-up
Date First Installed: May 1983

CENTRAL DATA CORP.
B1040/128K
Compatibility: Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Cycle Time: 345 nsec
Features: Single-bit error correction
Price: $1,195
Distribution Method: End user, OEM, Third-party
Date First Installed: May 1983

CENTRAL DATA CORP.
B1040/256K
Compatibility: Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 12-bit
Capacity: 256K bytes
Cycle Time: 345 nsec
Features: Single-bit error correction
Price: $1,410
Date First Installed: May 1983

CENTRAL DATA CORP.
B1040/384K
Compatibility: Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 384K bytes
Cycle Time: 345 nsec
Features: Single-bit error correction
Price: $1,630

CENTRAL DATA CORP.
B1040/512K
Compatibility: Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 512K bytes
Cycle Time: 345 nsec
Features: Single-bit error-correction
Price: $1,845
Distribution Method: End user, OEM, Third-party
Date First Installed: May 1983

CHRISLIN INDUSTRIES, INC.
CI-PCM
Compatibility: IBM Personal Computer
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 400 nsec
Features: Battery back-up
Price: $395
Distribution Method: Third-party
Date First Installed: September 1981
(See Vendor Profile Page V-6)

CHRISLIN INDUSTRIES, INC.
CI-PCM +
Compatibility: IBM Personal Computer
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 512K bytes
Cycle Time: 400 nsec
Features: Battery back-up, Interleaving
Price: $795
Distribution Method: Third-party
Date First Installed: March 1982

CHRISLIN INDUSTRIES, INC.
CI-S100
Compatibility: S100
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 400 nsec
Features: Battery back-up, Interleaving
Price: $250
Distribution Method: OEM, Third-party
Date First Installed: September 1979

CHRISLIN INDUSTRIES, INC.
CI-1123
Compatibility: DEC PDP-11/23
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 400 nsec
Features: Battery back-up, Interleaving
Price: $475
Distribution Method: OEM, Third-party
Date First Installed: March 1979

CHRISLIN INDUSTRIES, INC.
CI-1123 +
Compatibility: DEC PDP-11/23
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Cycle Time: 400 nsec
Features: Battery back-up, Interleaving
Price: $595
Distribution Method: OEM, Third-party
Date First Installed: September 1981

CHRISLIN INDUSTRIES, INC.
CI-8086
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 4M bytes
Cycle Time: 400 nsec
Features: Battery back-up, Interleaving
Price: $995
Distribution Method: OEM, Third-party
Date First Installed: March 1980

CHRISLIN INDUSTRIES, INC.
CI-8086E
Compatibility: Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 4M bytes
Cycle Time: 400 nsec
Features: Battery backup, Multiple-bit error detection, Interleaving
Price: $1,495
Distribution Method: OEM, Third-party
Date First Installed: March 1983

CIE SYSTEMS, INC.
68 RAM-0002
Compatibility: CIE 680-20/30
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Features: Byte Parity
Price: $1,600
Distribution Method: OEM, Third-party
Date First Installed: 1982
(See Vendor Profile Page V-6)

COLUMBIA DATA PRODUCTS, INC.
[illegible] MEMORY EXPANSION
Compatibility: Colombia MPC
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 250 nsec
Features: Single-bit error correction
Price: $445 to $645
Distribution Method: OEM
Number Installed to Date: 2,000
Date First Installed: 1982
(See Vendor Profile Page V-7)

COMARK CORP.
MR 80
Device Type: SRAM
Word Size Supported: 12-bit
Capacity: 32K bytes
Cycle Time: 550 nsec
Features: Battery back-up
Price: $[illegible]
Distribution Method: End user, OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: July 1979
(See Vendor Profile Page V-7)

COMARK CORP.
MR 85
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 450 nsec
Features: Hidden Refresh
Price: $695
Distribution Method: End user, OEM
Number Installed to Date: 500 - 1,000
Date First Installed: February 1981

COMARK CORP.
MR 86
Device Type: DRAM
Word Size Supported: [illegible]
Capacity: 500K bytes
Cycle Time: 450 nsec
Features: Hidden Refresh
Price: $[illegible]
Distribution Method: End user, OEM
Number Installed to Date: 500 - 1,000
Date First Installed: April 1982

COMMUNICATION MANUFACTURING CO.
MEMORY MODULE III
Compatibility: CMC System 4000
Device Type: [illegible]
Word Size Supported: [illegible]

Capacity: 128K bytes
Price: $8,000
Distribution Method: End user, Third-party
Number Installed to Date: Under 100
Date First Installed: 1979
(See Vendor Profile Page V-7)

COMPUGRAPHIC CORP.
214982-504
Compatibility: Compugraphics
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 512K Bytes
Cycle Time: 150 nsec
Price: $[illegible]
Distribution Method: End User
Number Installed to Date: 4,000
Date First Installed: April 1982
(See Vendor Profile Page V-7)

COMPUGRAPHIC CORP.
214982-501
Compatibility: Compugraphics
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 150 nsec
Price: $[illegible]
Distribution Method: End user
Number Installed to Date: 4,000
Date First Installed: April 1982

COMPUGRAPHIC CORP.
214982-502
Compatibility: Compugraphics
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 150 nsec
Price: $565
Distribution Method: End user
Number Installed to Date: 4,000
Date First Installed: April 1982

COMPUPRO CORP.
RAM-17
Compatibility: Compupro System 816
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 120 nsec
Price: $[illegible]
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 10,000 - [illegible]
Date First Installed: 1980
(See Vendor Profile Page V-7)

COMPUPRO CORP.
RAM-21
Compatibility: Compupro System 816
Device Type: SRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Cycle Time: 70 nsec
Price: $1,350
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 10,000 - [illegible]
Date First Installed: September 1981

COMPUPRO CORP.
RAM-22
Compatibility: Compupro System S-81
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: [illegible]

Cycle Time: 120 nsec
Price: $1,795
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 100 - 500
Date First Installed: 1983

COMPUTER AUTOMATION, INC.
44001
Compatibility: Computer Automation
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 1,059 nsec
Price: $1,325
Distribution Method: OEM
Number Installed to Date: 200
Date First Installed: June 1981
(See Vendor Profile Page V-8)

COMPUTER AUTOMATION, INC.
53775
Compatibility: Computer Automation
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 58 nsec
Features: Battery back-up
Price: $1,600
Distribution Method: OEM
Number Installed to Date: 1,000
Date First Installed: January 1978

COMPUTER AUTOMATION, INC.
53819
Compatibility: Computer Automation
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 520 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $3,000
Distribution Method: [illegible]
Number Installed to Date: 100
Date First Installed: January 1982

COMPUTER AUTOMATION, INC.
53909
Compatibility: Computer Automation
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Cycle Time: 550 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $3,900
Distribution Method: OEM
Number Installed to Date: 50
Date First Installed: June 1982

COMPUTER CONSOLES, INC.
5820/116
Compatibility: Computer Consoles 520
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 1M bytes
Cycle Time: 410 nsec
Features: Single-bit error correction, Multiple-bit error detection, ECC
Price: $7,250
Distribution Method: End user
Date First Installed: January 1983
(See Vendor Profile Page V-8)

COMPUTER CONSOLES, INC.
5820/117
Compatibility: Computer Consoles 520
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 2M bytes
Cycle Time: 410 nsec
Features: Single-bit error correction, Multiple-bit error detection, ECC
Price: $7,250
Distribution Method: End user, **Number Installed to Date:** 20
Date First Installed: January 1983

COMPUTER EQUIPMENT SERVICES
CF-4000 Series 80
Compatibility: IBM 370/158, 370/168, 3031, 3032
Device Type: DRAM
Word Size Supported: 64-bit
Capacity: 16M bytes
Features: Single-bit error correction, Multiple-bit error detection
Price: $8,000
Distribution Method: End user
Number Installed to Date: 7,000
Date First Installed: April 1980
(See Vendor Profile Page V-8)

COMPUTER EXTENSION SYSTEM, INC.
VM 811
Compatibility: DEC LSI
Device Type: SRAM
Word Size Supported: 12-bit
Capacity: 16K bytes
Cycle Time: 350 nsec
Price: $1,025
Distribution Method: End user
Date First Installed: 1978
(See Vendor Profile Page V-8)

COMPUTER EXTENSION SYSTEM, INC.
VM 822
Compatibility: DEC LSI
Device Type: SRAM
Word Size Supported: 12-bit
Capacity: 32K bytes
Cycle Time: 350 nsec
Price: $1,450
Distribution Method: End user

COMPUTER EXTENSION SYSTEM, INC.
VM 8128
Compatibility: DEC LSI
Device Type: SRAM
Word Size Supported: 12-bit
Capacity: 128K bytes
Cycle Time: 275 nsec
Price: $7,500
Distribution Method: End user
Date First Installed: March 1983

COMPUTER EXTENSION SYSTEM, INC.
VM 1128P
Compatibility: DEC
Device Type: DRAM
Word Size Supported: 18 Bit
Capacity: 64K bytes
Cycle Time: 900 nsec
Features: On-board Parity
Price: $995
Distribution Method: End user
Date First Installed: May 1982

COMPUTER EXTENSION SYSTEMS, INC.
VRL 11
Compatibility: DEC LSI
Device Type: RAM/PROM/EEPROM
Word Size Supported: 16-bit
Capacity: 8K bytes
Cycle Time: 500 nsec
Price: $[illegible]
Distribution Method: End user
Date First Installed: December 1983

CONTEMPORARY CONTROL SYSTEMS, INC.
9452
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 32K bytes
Cycle Time: 250 nsec
Features: Bank Switching
Price: $325
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: January 1981
(See Vendor Profile Page V-9)

CONTROL DATA CORP.
18551-4
Compatibility: CDC Cyber 170-815 170-825
Device Type: RAM
Word Size Supported: 60-bit
Capacity: 4K bytes
Cycle Time: 1200 nsec
Features: Multiple-bit error detection
Price: $50,000
Distribution Method: End User
Date First Installed: 1982
(See Vendor Profile Page V-9)

CONTROL DATA CORP.
18551-4
Compatibility: CDC Cyber 170-835
Device Type: RAM
Word Size Supported: 60-bit
Capacity: 4K bytes
Cycle Time: 448 nsec
Features: Multiple-bit error detection, Single-bit error correction
Price: $[illegible]
Distribution Method: End User
Date First Installed: 1982

CONTROL DATA CORP.
18551-4
Compatibility: CDC Cyber 170-845, 176 [illegible]
Device Type: RAM
Word Size Supported: 60-bit
Capacity: 4K bytes
Cycle Time: 448 nsec
Features: Multiple-bit error detection, Single-bit error correction
Price: $175 000
Distribution Method: End User
Date First Installed: 1983

CONTROL DATA CORP.
18551-1
Compatibility: CDC Cyber 170-865
Device Type: RAM
Word Size Supported: 60-bit
Capacity: 2K bytes
Cycle Time: 200 nsec
Features: Multiple-bit error detection, Single-bit error correction
Price: $160,000
Distribution Method: End User
Date First Installed: 1981

CONTROL DATA CORP.
18551-2
Compatibility: CDC Cyber 170-815, 170-825
Device Type: RAM
Word Size Supported: 60-bit
Capacity: 248K bytes
Cycle Time: 1200 nsec
Features: Multiple-bit error detection, Single-bit error correction
Price: $25,000
Distribution Method: End User
Date First Installed: September 1982

Add-In Memory Devices

CONTROL SYSTEMS, INC.
192K MEMORY BOARD
Compatibility: IBM Personal Computer
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 150 nsec
Features: Single-bit error correction, Selectable Addressing
Price: $185
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: May 1982
(See Vendor Profile Page V-9)

CYBERNETICS CORP.
CCM-1701
Compatibility: DEC PDP-11/23
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 375 nsec
Price: $495
Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1975
(See Vendor Profile Page V-10)

CYBERNETICS CORP.
CCM-1721
Compatibility: DEC PDP-11/23
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Cycle Time: 375 nsec
Price: $1,995
Distribution Method: Third-party
Number Installed to Date: 100 - 500
Date First Installed: January 1982

DATA GENERAL CORP.
8384
Compatibility: DG Nova
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 32K bytes
Cycle Time: 400 nsec
Features: Interleaving
Price: $3,475
Distribution Method: Third-party
(See Vendor Profile Page V-10)

DATA GENERAL CORP.
8385
Compatibility: DG Nova 4/S
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 64K bytes
Features: Interleaving
Price: $4,130
Distribution Method: Third-party

DATA GENERAL CORP.
8386
Compatibility: DG Nova 4/X
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 400 nsec
Features: Interleaving
Price: $2,800
Distribution Method: Third-party
Number Installed to Date: 100 - 500

DATA GENERAL CORP.
8387
Compatibility: DG Nova 4/X
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 400 nsec
Features: Interleaving
Price: $6,600
Distribution Method: Third-party

DATA GENERAL CORP.
8736-N
Compatibility: DG 8733
Device Type: DRAM
Word Size Supported: 18-bit
Capacity: 256K bytes
Cycle Time: 500 nsec
Features: Single-bit error correction
Price: $2,000
Distribution Method: OEM
Date First Installed: June 1982

DATA GENERAL CORP.
8736-R
Compatibility: DG 8733, Desktop 20, Desktop 30
Device Type: DRAM
Word Size Supported: 18-bit
Capacity: 256K bytes
Cycle Time: 500 nsec
Features: Single-bit error correction
Price: $3,000
Distribution Method: OEM
Date First Installed: June 1982

DATA GENERAL CORP.
ECLIPSE MV/1000 SYS MEMORY
Compatibility: DG MV/10000, MV/4000
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 16K bytes
Cycle Time: 70 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, Interleaving
Price: $72,000
Distribution Method: End user

DATA GENERAL CORP.
ECLIPSE MV/8000 II
Compatibility: DG MV/8000II
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 8K bytes
Cycle Time: 110 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, Interleaving
Price: $95,000
Distribution Method: End user, OEM
Date First Installed: May 1980

DATA GENERAL CORP.
MV/4000 MEMORY MODULE
Compatibility: DG MV/4000
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 2M bytes
Cycle Time: 440 nsec
Features: Battery back-up, Multiple-bit error detection, Interleaving
Price: $9,000
Date First Installed: 1982

DATA GENERAL CORP.
S/140 MEMORY MODULE
Compatibility: DG S/140 DGC
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Cycle Time: 400 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection
Price: $3,500
Distribution Method: End user
Date First Installed: 1979

DATA GENERAL CORP.
S/280 MEMORY MODULE
Compatibility: DG S/280 DGC
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 2M bytes
Cycle Time: 450 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection
Price: $4,900
Distribution Method: End user, OEM
Date First Installed: 1982

DATAMAC PERIPHERAL PRODUCTS
DM-1E ADD-ON
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 16K bytes
Cycle Time: 330 nsec
Features: Multiple-bit error detection
Price: $50
Distribution Method: Third-party
Date First Installed: April 1982
(See Vendor Profile Page V-10)

DATARAM CORP.
DR-14E
Compatibility: DEC PDP-11
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Features: Single-bit error correction
Price: $1,445
Distribution Method: OEM
Date First Installed: 1978
(See Vendor Profile Page V-11)

DATARAM CORP.
DR-70E
Compatibility: Sperry V77-600,V7
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Features: Single-bit error correction
Price: $8,500
Distribution Method: OEM
Date First Installed: 1981

DATARAM CORP.
DR-114EP
Compatibility: DEC PDP-11
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Features: Single-bit error correction, CSR
Price: $1,545
Date First Installed: 1979

DATARAM CORP.
DR-120
Compatibility: DEC SYS 2020
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 256K bytes
Features: Single-bit error correction
Price: $4,800
Distribution Method: OEM
Date First Installed: 1979

DATARAM CORP.
DR-244
Compatibility: DEC PDP-11/44
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Features: Single-bit error correction, Interleaving
Price: $1,700
Distribution Method: OEM
Date First Installed: 1980

DATARAM CORP.
DR-175
Compatibility: DEC PDP-11/70, DEC VAX-11/750
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 256K bytes
Features: Single-bit error correction, Multiple-bit error detection
Price: $1,045
Distribution Method: OEM
Date First Installed: 1981

DATARAM CORP.
DR-175
Compatibility: DEC VAX-11/750, DEC PDP-11/70
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 256K bytes
Features: Single-bit error correction
Price: $1,045
Date First Installed: 1981

DATARAM CORP.
DR-178
Compatibility: DEC VX-11/780
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 512K bytes
Features: Single-bit error correction, Multiple-bit error detection
Date First Installed: 1980

DATARAM CORP.
DR-213
Compatibility: DEC LSI-11/25
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Features: Single-bit error correction
Price: $2,745
Distribution Method: OEM
Date First Installed: 1981

DATARAM CORP.
DR-214
Compatibility: DEC PDP-11/44, DEC PDP-11/24
Device Type: DRAM
Capacity: 1M bytes
Features: Single-bit error correction, CSR
Price: $2,755
Distribution Method: OEM
Date First Installed: 1981

DATARAM CORP.
DR-215
Compatibility: DEC LSI-11/23
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Features: Single-bit error correction
Price: $1,075
Distribution Method: OEM
Date First Installed: 1981

DATARAM CORP.
DR-225
Compatibility: DG Eclipse
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Features: Single-bit error correction
Price: $3,200
Distribution Method: OEM
Date First Installed: 1981

DATARAM CORP.
DR-Quad
Compatibility: DG Eclipse, DG Nova 4
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Features: Single-bit error correction
Price: $3,200

Distribution Method: OEM
Date First Installed: 1983

DATARAM CORP.
DR-244
Compatibility: DEC PDP-11/44
Device Type: DRAM
Capacity: 1M bytes
Features: Single-bit error correction, Multiple-bit error detection
Price: $3,020
Distribution Method: OEM
Date First Installed: 1981

DATARAM CORP.
DR-275
Compatibility: DEC VAX-11/730, DEC VAX-11/750
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Features: Single-bit error correction, Multiple-bit error detection
Price: $3,135
Distribution Method: OEM
Date First Installed: 1982

DATARAM CORP.
DR-278
Compatibility: DEC VAX-11/780
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 2M bytes
Features: Single-bit error correction, Multiple-bit error detection
Price: $4,815
Distribution Method: OEM
Date First Installed: 1983

DATARAM CORP.
DR-330
Compatibility: PE 3200
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 2M bytes
Price: $10,600
Distribution Method: OEM
Date First Installed: 1982

DATARAM CORP.
DR-680
Device Type: DRAM
Word Size Supported: 16-bit, 32-bit
Capacity: 1M bytes
Features: Single-bit error correction, CSR, Match Reads
Price: $4,200
Date First Installed: 1982

DATARAM CORP.
DR-1235
Compatibility: DG Nova 3/4, DG Nova 3/12, DG Nova 3D
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Features: Single-bit error correction
Price: $2,970
Date First Installed: 1979

DATA STREAM TECHNOLOGY
DS11-2M
Compatibility: DEC PDP-11, DEC LSI-11
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 350 nsec
Features: Battery back-up
Price: $1,200
Distribution Method: End user
Number Installed to Date: 500
Date First Installed: February 1981
(See Vendor Profile Page V-11)

DATA STORAGE TECHNOLOGY
DS11BA-CE
Compatibility: DEC PDP-11
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Cycle Time: 350 nsec
Features: Battery back-up
Price: $3,000
Distribution Method: End user
Number Installed to Date: 150
Date First Installed: January 1981

DATA STORAGE TECHNOLOGY
DSV11-2M
Compatibility: DEC LSI-11
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 350 nsec
Features: Battery back-up
Price: $550
Distribution Method: End user
Number Installed to Date: 250
Date First Installed: September 1981

DATA STORAGE TECHNOLOGY
DSV11-4M
Compatibility: DEC LSI-11
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 64K bytes
Cycle Time: 350 nsec
Features: Battery back-up
Price: $350
Distribution Method: End user
Number Installed to Date: 500
Date First Installed: June 1981

DAVONG SYSTEMS, INC.
DEC ADD-IN MEMORY
Compatibility: DEC Rainbow
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 410 nsec
Price: $549
Number Installed to Date: Under 100
Date First Installed: May 1983
(See Vendor Profile Page V-12)

DAVONG SYSTEMS, INC.
EX
Compatibility: IBM Personal Computer-XT
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 410 nsec
Price: $696
Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: December 1981

DENELCOR, INC.
MOS MEMORY, 8MB
Compatibility: Denelcor HEP 1+1000
Device Type: RAM
Word Size Supported: 64-bit
Capacity: 8M bytes
Cycle Time: 400 nsec
Features: Single-bit error correction, Interleaving, 8-Way Interleaving
Price: $200,000
Distribution Method: End user
Number Installed to Date: 1
Date First Installed: July 1983
(See Vendor Profile Page V-12)

DIGIDYNE CORP.
D2128
Compatibility: Digidyne S200
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 200 nsec
Features: Interleaving
Price: $1,100
Distribution Method: OEM
Number Installed to Date: 100
Date First Installed: January 1983
(See Vendor Profile Page V-12)

DIGIDYNE CORP.
D2128
Compatibility: Digidyne S200
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 200 nsec
Features: Interleaving
Price: $1,100
Distribution Method: OEM
Number Installed to Date: 100
Date First Installed: January 1983

DIGIDYNE CORP.
D256
Compatibility: Digidyne
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 200 nsec
Features: Interleaving
Price: $1,975
Distribution Method: OEM
Number Installed to Date: 100 - 500
Date First Installed: January 1983

DIGITAL DATA SYSTEMS, INC.
DCS 92A
Compatibility: DEC PDP-11
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Price: $1,825
Distribution Method: OEM
Number Installed to Date: 500
Date First Installed: 1979
(See Vendor Profile Page V-13)

DIGITAL DATA SYSTEMS, INC.
DDS 34B
Compatibility: DEC LSI-11/23
Device Type: RAM
Word Size Supported: 18-bit
Capacity: 1M bytes
Features: Single-bit error correction
Price: $2,130
Distribution Method: OEM
Number Installed to Date: 400
Date First Installed: January 1979

DIGITAL DATA SYSTEMS, INC.
DDS 55A
Compatibility: DEC PDP-11
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Features: Battery back-up, Single-bit error correction
Price: $2,900
Distribution Method: OEM
Number Installed to Date: 100
Date First Installed: 1980

DIGITAL DATA SYSTEMS, INC.
DDS 238S
Compatibility: DG Eclipse
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Features: Single-bit error correction, Multiple-bit error detection
Price: $3,000
Distribution Method: OEM
Number Installed to Date: 200
Date First Installed: 1980

DIGITAL DATA SYSTEMS, INC.
DDS 3M
Compatibility: VAC 11780, VAC 11730
Device Type: RAM
Word Size Supported: 72-bit
Capacity: 1M bytes
Features: Single-bit error correction, Multiple-bit error detection
Price: $3,100
Distribution Method: OEM
Number Installed to Date: 50
Date First Installed: 1981

DIGITAL DATA SYSTEMS, INC.
DDS 389
Compatibility: DEC VAX 11/780
Device Type: RAM
Word Size Supported: 72 Bit
Capacity: 2M bytes
Features: Single-bit error correction, Multiple-bit error detection
Price: $4,400
Distribution Method: OEM
Number Installed to Date: 50
Date First Installed: 1982

DIGITAL DATA SYSTEMS, INC.
DDS 992
Compatibility: Prime
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1,000M bytes
Features: Single-bit error correction
Price: $8,000
Distribution Method: OEM
Number Installed to Date: 50
Date First Installed: 1980

DIGITAL DATA SYSTEMS, INC.
DDS 9W
Compatibility: Wang VS 90, Wang VS 100
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Features: Single-bit error correction
Price: $7,000
Distribution Method: OEM
Number Installed to Date: 50
Date First Installed: 1980

DIGITAL DATA SYSTEMS, INC.
DDS 9W
Compatibility: Wang VS50, Wang VS 80
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Features: Single-bit error correction
Price: $3,000
Distribution Method: OEM
Number Installed to Date: 50
Date First Installed: 1980

DIGITAL DATA SYSTEMS, INC.
DG 238
Compatibility: DG Eclipse
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Features: Single-bit error correction, Multiple-bit error detection
Price: $8,000
Distribution Method: OEM
Number Installed to Date: 300
Date First Installed: September 1978

Add-In Memory Devices

DIGITAL DATA SYSTEMS, INC.
MV 4000/5000
Compatibility: DG Eclipse
Device Type: RAM
Capacity: 1M bytes
Features: Single-bit error correction, Multiple-bit error detection
Price: $5 700
Distribution Method: OEM
Number Installed to Date: 20
Date First Installed: January 1983

DIGITAL EQUIPMENT CORP.
M211
Compatibility: DEC PDP-11/44
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Cycle Time: 200 nsec
Features: Battery back-up, Single-bit error correction
Price: $4,900
Distribution Method: End user
Date First Installed: October 1982
(See Vendor Profile Page V-13)

DIGITAL EQUIPMENT CORP.
M8120C
Compatibility: DEC VAX-11/730
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 256K bytes
Cycle Time: 200 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection
Price: $4,900
Date First Installed: June 1982

DIGITAL EQUIPMENT CORP.
M8750C
Compatibility: DEC VAX-11/750
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 256K bytes
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection
Price: $4,900
Distribution Method: End user
Date First Installed: July 1982

DIGITAL EQUIPMENT CORP.
M8780 PA
Compatibility: DEC VAX-11/780
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 2M bytes
Cycle Time: 200 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, Interleaving
Price: $9,000
Distribution Method: End user
Date First Installed: 1983

DIGITAL EQUIPMENT CORP.
MS11-DD
Compatibility: DEC PDP-11/24, DEC PDP-11/29, DEC PDP-11/03
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 64K bytes
Cycle Time: 200 nsec
Features: Battery back-up, Single-bit error correction
Price: $500
Distribution Method: End user, OEM

DISPLAY DATA CORP.
8101
Compatibility: Display Series 800
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 100 nsec
Features: Multiple-bit error detection
Price: $2,000
Distribution Method: End user
Number Installed to Date: 350
Date First Installed: June 1982
(See Vendor Profile Page V-13)

DOCUTEL OLIVETTI CORP.
32K
Compatibility: Olivetti M20
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 32K bytes
Cycle Time: 250 nsec
Price: $200
Distribution Method: Third-party
Date First Installed: 1982
(See Vendor Profile Page V-13)

DOCUTEL OLIVETTI CORP.
128K
Compatibility: Olivetti M20
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 250 nsec
Price: $600
Distribution Method: Third-party
Date First Installed: June 1982

DUAL SYSTEMS CORP.
EPROM
Device Type: EPROM
Word Size Supported: 16-bit
Capacity: 64K bytes
Cycle Time: 500 nsec
Distribution Method: End user, OEM, Third-party
Date First Installed: July 1980
(See Vendor Profile Page V-14)

ELITE CORP.
512K MEMORY CARD
Compatibility: Motorola VME/10, Elite Consultant
Device Type: RAM
Word Size Supported: 8-bit, 16-bit, 32-bit
Capacity: 2M bytes
Cycle Time: 390 nsec
Features: Multiple-bit error detection
Price: $2,950
Distribution Method: End user
Number Installed to Date: 30
Date First Installed: June 1983
(See Vendor Profile Page V-14)

ETI MICRO
8104
Compatibility: Intel Multibus
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 100 nsec
Price: $500
Distribution Method: OEM
Number Installed to Date: 100 - 500
Date First Installed: July 1982
(See Vendor Profile Page V-14)

EVENTIDE, INC.
WKBP-4
Compatibility: HP 9816/9826, HP 9836
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Distribution Method: End user
Date First Installed: 1981
(See Vendor Profile Page V-15)

EVENTIDE, INC.
WMAP-1
Compatibility: HP 9845B/C/T
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Price: $1,750
Distribution Method: End user
Date First Installed: September 1979
(See Vendor Profile Page V-15)

EVENTIDE, INC.
WMAZ-4
Compatibility: HP 9845B/C/T
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Price: $3,500
Distribution Method: End user
Date First Installed: 1981

HARRIS CORP.
003A
Device Type: RAM
Word Size Supported: 48
Capacity: 384K bytes
Cycle Time: 335 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $9,000
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: February 1983
(See Vendor Profile Page V-16)

HARRIS CORP.
003B
Device Type: RAM
Word Size Supported: 48
Capacity: 768K bytes
Cycle Time: 335 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $12,500
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: February 1983

HARRIS CORP.
003D
Device Type: RAM
Word Size Supported: 48
Capacity: 3M bytes
Cycle Time: 335 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $35,000
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: February 1983

HARRIS CORP.
003E
Device Type: RAM
Word Size Supported: 48
Capacity: 6.1M bytes
Cycle Time: 335 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $60,000
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: February 1983

HARRIS CORP.
2003C
Device Type: RAM
Word Size Supported: 48
Capacity: 1.5M bytes
Cycle Time: 335 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $18,500
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: February 1982

HEATH CO.
WH 88-16
Compatibility: Heath CO H89
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Price: $115
Distribution Method: End user
Date First Installed: 1980
(See Vendor Profile Page V-16)

HEATH CO.
E 996
Compatibility: Heath H100
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Price: $800
Distribution Method: End user
Date First Installed: January 1983

HEWLETT-PACKARD CO.
30008BR
Compatibility: HP 3000
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K Bytes
Features: Two Bit Error Correction
Price: $7750
Distribution Method: End User
Date First Installed: 1979
(See Vendor Profile Page V-17)

HEWLETT-PACKARD CO.
30078AR
Compatibility: HP 3000 Series 2
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Features: Multiple Bit Error Detection
Price: $2,500
Distribution Method: End User
Date First Installed: 1978

HEWLETT-PACKARD CO.
30418AR
Compatibility: HP 3000
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1M byte
Features: Multiple-bit error detection, Single bit error correction
Price: $12,000
Distribution Method: End User

HONEYWELL, INC.
CMM 8816
Compatibility: Honeywell DPS 88/81, 88/82
Device Type: DRAM
Word Size Supported: 36-bit
Capacity: 128,000K bytes
Cycle Time: 750 nsec
Features: Multiple-bit error detection, Single-bit error correction, Interleaving
Price: $3,200,000
Distribution Method: End User
Date First Installed: June 1983
(See Vendor Profile Page V-17)

HONEYWELL, INC.
CMM 8020
Compatibility: Honeywell DPS 8/52, 8/62, 8/70
Device Type: DRAM
Word Size Supported: 36-bit
Capacity: 64,000K
Cycle Time: 750 nsec
Features: Multiple-bit error detection, Single-bit error correction
Price: $1,600,000
Distribution Method: End User
Date First Installed: 1980

HONEYWELL, INC.
CMM 9001
Compatibility: Honeywell DPS 8/20, 8/44, 8/47, 8/49
Device Type: DRAM
Word Size Supported: 36-bit
Capacity: 32,000K bytes
Cycle Time: 750 nsec
Features: Multiple-bit error detection, Single-bit error correction, interleaving
Price: $640,000
Distribution Method: End user

HONEYWELL, INC.
CMC 9690
Compatibility: Honeywell DPS 6/90
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 2,048K bytes
Features: Multiple-bit error detection, Single-bit error correction
Price: $24,000

HONEYWELL, INC.
CMC 9614
Compatibility: Honeywell DPS 6
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1024 K bytes
Features: Battery back-up, Multiple-bit error detection, single-bit error correction
Price: $12,000

HONEYWELL, INC.
CMM 9003
Compatibility: Honeywell DPS 640
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Features: Multiple-bit error detection, Single-bit error correction
Price: $3,500

HONEYWELL, INC.
CMM 9002
Compatibility: Honeywell Micro System 620
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Features: Multiple-bit error detection, Single-bit error correction
Price: $1,750

HONEYWELL, INC.
CMC 9610
Compatibility: Honeywell Micro System 610
Technology: MOS
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 384K bytes
Price: $1,200

ICL, INC.
3422
Compatibility: ICL System 25
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 320K bytes
Features: Battery back-up, Multiple-bit error detection
Price: $4,500
Distribution Method: Third-party
Number Installed to Date: 6,000
Date First Installed: October 1980
(See Vendor Profile Page V-17)

[illegible] DATA SYSTEMS, INC.
9000
Compatibility: [illegible]
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 16M bytes
Cycle Time: 315 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, Interleaving, 16 Ports to memory
Distribution Method: End user, OEM, Third-party
Number Installed to Date: Under 100
Date First Installed: August 1983
(See Vendor Profile Page V-18)

INCOMNET
EMS
Compatibility: Incomnet Lotus
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 2M bytes
Cycle Time: 300 nsec
Features: Single-bit error correction
Price: $22,200
Distribution Method: Third-party
Date First Installed: July 1983
(See Vendor Profile Page V-18)

INFOTEC, INC.
128K ADD-ON MEMORY MODULE
Compatibility: Infotec Control Center 3
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 750 nsec
Features: Multiple-bit error detection
Distribution Method: Third-party
Date First Installed: June 1983
(See Vendor Profile Page V-19)

INFOTEC, INC.
384K ADD-ON MEMORY MODULE
Compatibility: Infotec Control Center II
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 384K bytes
Cycle Time: 750 nsec
Features: Multiple-bit error detection
Distribution Method: Third-party
Date First Installed: June 1983

INFOTEK
AM 25, AM 31
Compatibility: HP 9825, HP 9831
Device Type: RAM
Capacity: 8K bytes
Price: $500
Distribution Method: End user
Date First Installed: 1977
(See Vendor Profile Page V-19)

INFOTEK
AM 30
Compatibility: HP 9830
Device Type: RAM
Capacity: 32K bytes
Price: $1,250
Distribution Method: End user
Date First Installed: 1977

INFOTEK
AM 35
Compatibility: HP 9835
Device Type: RAM
Capacity: 64K bytes
Price: $1,100
Distribution Method: End user
Date First Installed: 1980

INFOTEK
AM 45/45B
Compatibility: HP 9845
Device Type: RAM
Capacity: 128K bytes
Price: $1,895
Distribution Method: End user
Date First Installed: 1981

INTEGRATED [illegible] PRODUCTS
MINIMATE
Compatibility: DG Nova
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 2M bytes
Cycle Time: 800 nsec
Features: Battery back-up, Single-bit error correction
Distribution Method: OEM
Number Installed to Date: 450
Date First Installed: May 1979
(See Vendor Profile Page V-19)

INTEL CORP.
ISBC 028A
Compatibility: Intel C Multibus, Intel System/330
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Cycle Time: 500 nsec
Features: Battery back-up, Single-bit error correction
Distribution Method: Third-party
Date First Installed: 1980
(See Vendor Profile Page V-19)

INTEL CORP.
ISBC 032A
Compatibility: Intel C Multibus, Intel System/330
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 32K bytes
Cycle Time: 406 nsec
Features: Battery back-up, Single-bit error correction
Distribution Method: Third-party
Number Installed to Date: 10,000
Price: $2,800
Date First Installed: 1980

INTEL CORP.
ISBC 056A
Compatibility: Intel C Multibus, Intel System/330
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 256K bytes
Cycle Time: 500 nsec
Features: Battery back-up, Single-bit error correction
Distribution Method: Third-party
Date First Installed: 1980

INTEL CORP.
ISBC 064 RAM MEMORY BOARD
Compatibility: Intel C Multibus, Intel System/330
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Price: $1,595
Capacity: 64K bytes
Cycle Time: 600 nsec
Features: Protection
Distribution Method: Third-party
Number Installed to Date: 10,000 - 50,000
Date First Installed: 1978

INTEL CORP.
ISBC 064A
Compatibility: Intel C Multibus, Intel [illegible]
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 64K bytes
Cycle Time: 450 nsec
Features: Battery back-up, Single-bit error correction
Distribution Method: Third-party
Date First Installed: 1980

INTEL CORP.
ISBC 341
Compatibility: Intel ISBC 8086, Intel ISBC 86
Device Type: RAM/EPROM
Word Size Supported: 8-bit, 16-bit
Capacity: 64K bytes
Distribution Method: [illegible]
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1981

INTEL CORP.
[illegible] EXPANSION
Compatibility: Intel System 86/330
Device Type: SRAM/ROM EPROM
Word Size Supported: 8-bit, 16-bit
Capacity: 512K bytes
Cycle Time: 225 nsec
Features: Battery back-up
Distribution Method: Third-party
Number Installed to Date: 5,000 - 10,000
Date First Installed: 1980

INTEL CORP.
[illegible] BOARD
Compatibility: Intel System 86/330
Device Type: EPROM
Word Size Supported: 8-bit, 16-bit
Capacity: 64K bytes
Cycle Time: 35 nsec
Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000

INTERFACE ELECTRONICS, INC.
OASIS
Compatibility: DG S140
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 400 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $2,500
Distribution Method: [illegible]
Number Installed to Date: 6
Date First Installed: July 1982
(See Vendor Profile Page V-19)

[illegible] INTERNATIONAL ANTEX, INC.
5000
Compatibility: IBM Personal Computer
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 547K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $1,200
Distribution Method: OEM, Third-[illegible]
Date First Installed: [illegible]
(See Vendor Profile Page V-20)

INTERNATIONAL ANTEX, INC.
5211
Compatibility: Apple
Device Type: RAM
Capacity: 64K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: [illegible]
Distribution Method: OEM, Third-[illegible]

Add-In Memory Devices

Date First Installed: October 1982

INTERNATIONAL ANTEX, INC.
8212
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $295
Distribution Method: OEM, Third-party
Date First Installed: October 1982

INTERSIL SYSTEMS, INC.
[illegible]
Compatibility: DG Nova 3
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 700 nsec
Price: $1,500
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1978
(See Vendor Profile Page V-20)

INTERSIL SYSTEMS, INC.
[illegible]
Compatibility: Zilog Z80, Intel 8085
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 400 nsec
Features: On-board Refresh
Price: $429
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000 - [illegible]
Date First Installed: January 1982

INTERSIL SYSTEMS, INC.
[illegible]
Compatibility: Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 512K bytes
Cycle Time: 660 nsec
Features: Single-bit error correction
Price: $1,570
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000 - [illegible]
Date First Installed: June 1980

INTERSIL SYSTEMS, INC.
MCB-512X/2 MEG
Compatibility: Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 2M bytes
Cycle Time: 430 nsec
Features: Single-bit error correction
Price: $2,000
Date First Installed: August 1983

IPL SYSTEMS, INC.
1601
Compatibility: IPL System 4400 SER
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Cycle Time: 500 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $10,000
Distribution Method: End user
Date First Installed: May 1980
(See Vendor Profile Page V-20)

LOCOM CORP.
IBM 370/158
Compatibility: IBM 370/158
Device Type: RAM
Word Size Supported: 64-bit
Capacity: 7.6M bytes
Cycle Time: 460 nsec
Features: Single-bit error correction, Multiple-bit error detection
Distribution Method: OEM, Third-party
Date First Installed: March 1980
(See Vendor Profile Page V-22)

LOCOM CORP.
IBM 370/168
Compatibility: IBM 370/168
Device Type: RAM
Word Size Supported: 64-bit
Capacity: 12.2M bytes
Cycle Time: 320 nsec
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Distribution Method: OEM, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: March 1980

LODOM CORP.
IBM 3031
Compatibility: IBM 3031
Device Type: RAM
Word Size Supported: 64-bit
Capacity: 6.1M bytes
Cycle Time: 345 nsec
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Distribution Method: OEM, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: March 1980

LOCOM CORP.
IBM 3032
Compatibility: IBM 3032
Device Type: RAM
Word Size Supported: 64-bit
Capacity: 12.2M bytes
Cycle Time: 320 nsec
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Distribution Method: OEM, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: March 1980

LOCOM CORP.
IBM 3033
Compatibility: IBM
Device Type: RAM
Word Size Supported: 64-bit
Capacity: 24.5M bytes
Cycle Time: 285 nsec
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Distribution Method: OEM, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: March 1980

LOMAS DATA PRODUCTS, INC.
DYNAMIC
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 256K bytes
Cycle Time: 350 nsec
Features: Single-bit error correction
Price: $795
Distribution Method: Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: January 1982
(See Vendor Profile Page V-22)

MACROLINK
2/1 MEGABYTE MEMORY EXPANSION
Compatibility: PE 3200
Device Type: RAM
Word Size Supported: 39-bit
Capacity: 2M bytes
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Distribution Method: End user, OEM
Date First Installed: 1981
(See Vendor Profile Page V-22)

MACROLINK
512KB/256KB
Compatibility: PE 3220, PE 3240
Device Type: RAM
Word Size Supported: 39-bit
Capacity: 512K bytes
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Distribution Method: End user, OEM
Date First Installed: 1981

MACROLINK
732 256KB MEMORY MODULE
Compatibility: PE 732
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 256K bytes
Cycle Time: 250 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection
Distribution Method: End user, OEM
Date First Installed: 1980

MACROTECH INTERNATIONAL CORP.
MAX-M
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 1M bytes
Cycle Time: 300 nsec
Features: Single-bit error correction
Price: $2,449
Distribution Method: OEM
Number Installed to Date: [illegible]
Date First Installed: March 1983
(See Vendor Profile Page V-22)

MACROTECH INTERNATIONAL CORP.
MAX-256
Compatibility: S100
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 256K bytes
Cycle Time: 300 nsec
Features: Single-bit error correction
Distribution Method: OEM
Number Installed to Date: 300
Date First Installed: March 1983

MACROTECH INTERNATIONAL CORP.
MAX-384
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 384K bytes
Cycle Time: 300 nsec
Features: Single-bit error correction
Price: $1,464
Distribution Method: OEM
Number Installed to Date: 200
Date First Installed: March 1983

MACROTECH INTERNATIONAL CORP.
MAX-512
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 512K bytes
Cycle Time: 300 nsec
Features: Single-bit error correction
Price: [illegible]
Number Installed to Date: 200
Date First Installed: March 1983

MACROTECH INTERNATIONAL CORP.
MAX-640
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 640K bytes
Cycle Time: 300 nsec
Features: Single-bit error correction
Price: $2,028
Distribution Method: OEM
Number Installed to Date: 700
Date First Installed: March 1983

MACROTECH INTERNATIONAL CORP.
MAX-768
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 768K bytes
Cycle Time: 300 nsec
Features: Single-bit error correction
Price: $2,165
Distribution Method: OEM
Number Installed to Date: 200
Date First Installed: March 1983

MACROTECH INTERNATIONAL CORP.
MAX-896
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 896K bytes
Cycle Time: 300 nsec
Features: Single-bit error correction
Price: $2,307
Distribution Method: OEM
Number Installed to Date: 200
Date First Installed: March 1983

MAGNUSON COMPUTER SYSTEMS, INC.
4500
Compatibility: Magnuson M/80 3X
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Features: Single-bit error correction, Multiple-bit error detection
Price: $10,000
Distribution Method: End user
Number Installed to Date: [illegible]
Date First Installed: July 1978
(See Vendor Profile Page V-22)

MAGNUSON COMPUTER SYSTEMS, INC.
4800
Compatibility: Magnuson M 80/4X
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Cycle Time: 150 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $10,000
Distribution Method: End user
Number Installed to Date: 400
Date First Installed: March 1980

Add-In Memory Devices

MASSCOMP
ME-510
Compatibility: Masscomp MC-500
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Cycle Time: 500 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $5,000
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First Installed: November 1982
(See Vendor Profile Page V-22)

MASSCOMP
MEX-515
Compatibility: Masscomp MC-500
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 1.5M bytes
Cycle Time: 500 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $7,300
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First Installed: December 1982

MASSCOMP
MEX-525
Compatibility: Masscomp MC-500
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 2.5M bytes
Cycle Time: 500 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $12,200
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First Installed: December 1982

MASSCOMP
MEX-535
Compatibility: Masscomp MC-500
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 3.5M bytes
Cycle Time: 500 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $17,100
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First Installed: December 1982

MASSCOMP
MEX-545
Compatibility: Masscomp MC-500
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 4.5M bytes
Cycle Time: 500 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $23,000
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First Installed: December 1982

MASSCOMP
MEX-555
Compatibility: Masscomp MC-500
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 5.5M bytes
Cycle Time: 500 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $26,000
Distribution Method: End user, OEM
Number Installed to Date: Under 100
Date First Installed: December 1982

MEASUREMENT SYSTEMS & CONTROLS, INC.
DMB-4400
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 330 nsec
Price: $695
Distribution Method: OEM, Third-party
Date First Installed: 1979
(See Vendor Profile Page V-23)

MEASUREMENT SYSTEMS & CONTROLS, INC.
HDM-2800
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 330 nsec
Features: Battery back-up
Price: $1,295
Distribution Method: OEM
Date First Installed: 1979

MEASUREMENT SYSTEMS & CONTROLS, INC.
HDMC-2MEG
Compatibility: Multibus
Device Type: Cache
Word Size Supported: 16-bit
Capacity: 2M bytes
Cycle Time: 330 nsec
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Price: $2,400
Distribution Method: OEM, Third-party
Date First Installed: August 1983

MEASUREMENT SYSTEMS & CONTROLS, INC.
HDMC-512
Device Type: Cache
Word Size Supported: 16-bit
Capacity: 512K bytes
Cycle Time: 330 nsec
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Price: $2,400
Distribution Method: OEM, Third-party
Date First Installed: August 1983

MEMORY MERCHANT
MM16K14
Device Type: SRAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 150 nsec
Price: $198
Distribution Method: End user, OEM, Third-party
Date First Installed: March 1981
(See Vendor Profile Page V-23)

MEMORY MERCHANT
MM65K16S
Device Type: SRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 150 nsec
Price: $498
Distribution Method: End user, OEM, Third-party
Date First Installed: September 1981

MICROBAR SYSTEMS, INC.
DUAL BUS RAM BOARD-128K
Compatibility: Intel 330X
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Cycle Time: 450 nsec
Features: Interleaving
Price: $1,455
Distribution Method: OEM
Number Installed to Date: 100 - 500
Date First Installed: 1981
(See Vendor Profile Page V-23)

MICROBAR SYSTEMS, INC.
DUAL BUS RAM BOARD-256K
Compatibility: Intel 330X
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 256K bytes
Cycle Time: 450 nsec
Features: Interleaving
Price: $1,715
Distribution Method: OEM
Number Installed to Date: 100 - 500
Date First Installed: 1981

MICROBAR SYSTEMS, INC.
DUAL BUS RAM BOARD-512K
Compatibility: Intel 330X
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 512K bytes
Cycle Time: 450 nsec
Features: Interleaving
Price: $2,275
Distribution Method: OEM
Number Installed to Date: 100 - 500
Date First Installed: 1981

MICRODATA CORP.
REALITY 4700 SERIES
Compatibility: Microdata 4700
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 512K bytes
Cycle Time: 800 nsec
Features: Battery back-up, Single-bit error correction
Distribution Method: End user, Third-party
Number Installed to Date: 5,000 - 10,000
Date First Installed: November 1979
(See Vendor Profile Page V-24)

MICRODATA CORP.
[illegible]
Compatibility: Microdata, Sequel
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 4M bytes
Cycle Time: 600 nsec
Features: Battery back-up, Single-bit error correction
Distribution Method: End user, Third-party
Date First Installed: January 1981

MICRODATA CORP.
SOVEREIGN SERIES 7000
Compatibility: Microdata
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 14.3M bytes
Cycle Time: 200 nsec
Features: Single-bit error correction, Interleaving
Distribution Method: End user
Number Installed to Date: 1,000
Date First Installed: July 1982

MICRO MEMORY, INC.
MM-11[illegible]
Compatibility: DEC LSI-11
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 275 nsec
Price: $650
Distribution Method: End user, OEM
Number Installed to Date: 500 - 1,000
Date First Installed: 1981
(See Vendor Profile Page V-24)

MICRO MEMORY, INC.
MM-6800D 64KB
Compatibility: Motorola 6800 Bus
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 450 nsec
Price: $350
Number Installed to Date: 500 - 1,000
Date First Installed: 1980

MICRO MEMORY, INC.
MM-8086C
Compatibility: Intel Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 64K bytes
Cycle Time: 220 nsec
Features: Battery back-up, Calendar-Clock
Price: $825
Distribution Method: End user, OEM
Number Installed to Date: 500 - 1,000
Date First Installed: 1[illegible]

MICRO MEMORY, INC.
MM-8086D
Compatibility: Intel Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 512K bytes
Cycle Time: 400 nsec
Price: $[illegible]
Distribution Method: End user, OEM
Number Installed to Date: 5,000 - [illegible]00

MICRO MEMORY, INC.
MM-8086E
Compatibility: Intel Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 512K bytes
Cycle Time: 500 nsec
Features: Single-bit error correction
Price: $1,495
Distribution Method: End user, OEM
Number Installed to Date: 500 - 1,000
Date First Installed: 1982

MICROSOFT
APPLE II [illegible]
Compatibility: Apple II
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 350 nsec
Price: $100
Distribution Method: Third-party
Date First Installed: January 1981
(See Vendor Profile Page V-24)

MICROSOFT
PC RAM CARD
Compatibility: IBM Personal Computer
Device Type: RAM
Word Size Supported: 8-bit

Add-In Memory Devices

Capacity: 256K bytes
Cycle Time: 200 nsec
Price: $350 to $875
Distribution Method: Third-party
Date First Installed: January 1982

MICROSOFT
SYSTEM CARD
Compatibility: IBM Personal Computer
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 200 nsec
Price: $395 to $625
Distribution Method: Third-party
Date First Installed: January 1983

MINI-COMPUTER SYSTEMS, INC.
MICOS ILO 128
Compatibility: Mini-Computer Micos
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 500 nsec
Features: Single-bit error correction
Price: $6,675
Distribution Method: Third-party
Number Installed to Date: 75
Date First Installed: January 1981
(See Vendor Profile Page V-24)

MINI-COMPUTER SYSTEMS, INC.
MICOS ILO 256
Compatibility: Mini-Computer Micos
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 500 nsec
Features: Single-bit error correction
Price: $7,500
Distribution Method: Third-party
Number Installed to Date: 100
Date First Installed: January 1981

MINI-COMPUTER SYSTEMS, INC.
MICOS ILO 512
Compatibility: Mini-Computer Micos
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Cycle Time: 500 nsec
Features: Single-bit error correction
Price: $9,500
Distribution Method: Third-party
Number Installed to Date: 25
Date First Installed: January 1981

[illegible] SYSTEMS CORP.
MSC 3810
Compatibility: DEC VAX 11-780
Device Type: RAM
Capacity: 256K bytes
Cycle Time: 375 nsec
Features: EDAC Compatible
Price: $615
Distribution Method: OEM, Third-party
Number Installed to Date: 5,000 - 10,000
(See Vendor Profile Page V-25)

MONOLITHIC SYSTEMS CORP.
MSC 3812
Compatibility: DEC VAX 11/750
Device Type: RAM
Capacity: 256K bytes
Cycle Time: 700 nsec
Features: EDAC
Price: $ [illegible]
Number Installed to Date: 5,000 - 10,000

MONOLITHIC SYSTEMS CORP.
MSC 3812
Compatibility: DEC VAX 11-750
Device Type: RAM
Capacity: 1M bytes
Cycle Time: 700 nsec
Features: EDAC Compatible
Price: $2,250
Number Installed to Date: 5,000 - 10,000

MONOLITHIC SYSTEMS CORP.
MSC 4806
Compatibility: DEC LSI/23
Device Type: RAM
Capacity: 256K bytes
Cycle Time: 560 nsec
Features: Parity CSR
Price: $771
Number Installed to Date: 5,000 - 10,000
Date First Installed: 1977

MORROW DESIGNS, INC.
64K STATIC RAM BOARD
Device Type: SRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 64K bytes
Cycle Time: 200 nsec
Price: $500
Distribution Method: Third-party
Number Installed to Date: 4,000
Date First Installed: January 1981
(See Vendor Profile Page V-25)

MORROW DESIGNS, INC.
256K DYNAMIC RAM BOARD
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 256K bytes
Cycle Time: 200 nsec
Price: $1,000
Number Installed to Date: 200
Date First Installed: June 1983

MOSTEK CORP.
MK8003
Compatibility: DG Nova 3
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 700 nsec
Features: Single-bit error correction
Price: $3,000
Distribution Method: End user, OEM, Third-party
(See Vendor Profile Page V-25)

MOSTEK CORP.
MK8015
Compatibility: DEC PDP-11
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 425 nsec
Features: Multiple-bit error detection, Interleaving
Price: $1,280
Distribution Method: End user, OEM, Third-party

MOSTEK CORP.
MK8016
Compatibility: DEC VAX 11/780
Device Type: DRAM
Capacity: 512K bytes
Features: Single-bit error correction, Multiple-bit error detection
Price: $1,400
Distribution Method: End user, OEM, Third-party

MOSTEK CORP.
MK8018
Compatibility: DG Nova 4, Eclipse
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 750 nsec
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Price: $2,800
Distribution Method: End user, OEM, Third-party

MOSTEK CORP.
[illegible]
Compatibility: DEC LSI-11
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 944 nsec
Features: Battery back-up, Multiple-bit error detection
Price: [illegible]
Distribution Method: End user, OEM, Third-party

MOSTEK CORP.
MK8024
Compatibility: DG Eclipse
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 1,200 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error [illegible]
Price: $5,180
Distribution Method: End user, OEM, Third-party

MOSTEK CORP.
MK8033
Compatibility: DG MV/8000
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Features: Multiple-bit error detection, Interleaving
Price: $6,500
Distribution Method: End user, OEM, Third-party
Date First Installed: 1982

MOSTEK CORP.
[illegible]
Compatibility: PE 3200, PE 3250, PE 3230, PE 3240
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 512K bytes
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection
Price: $10,500
Distribution Method: End user, OEM, Third-party

MOSTEK CORP.
MK8044
Compatibility: DEC PDP-11/44
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Cycle Time: 1,170 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, Interleaving
Price: $2,360
Distribution Method: End user, OEM, Third-party

MOSTEK CORP.
MK8064
Device Type: ROM
Capacity: 1M bytes
Cycle Time: 375 nsec
Price: $6,415
Distribution Method: End user, OEM, Third-party
Date First Installed: 1983

MOSTEK CORP.
MK8075
Compatibility: DEC PDP 11/70, DEC VAX 11/750
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 512K bytes
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Price: $1,090
Distribution Method: End user, OEM, Third-party

MOSTEK CORP.
[illegible]
Device Type: DRAM
Word Size Supported: 64-bit
Capacity: 64M bytes
Cycle Time: 400 nsec
Price: $140,000

[illegible], INC.
MMS 1132
Compatibility: DEC LSI II
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 500 nsec
Features: Battery back-up
Price: $800
Distribution Method: OEM, Third-party
Date First Installed: 1981
(See Vendor Profile Page V-25)

MOTOROLA, INC.
MMS 8512E
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Cycle Time: 550 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection
Price: $2,035
Distribution Method: OEM, Third-party
Date First Installed: 1981

MOTOROLA, INC.
MMS 8701
Device Type: DRAM
Word Size Supported: 12-bit, 16-bit
Capacity: 256K bytes
Cycle Time: 420 nsec
Features: Battery back-up
Price: [illegible]
Distribution Method: OEM, Third-party
Date First Installed: 1982

MPC PERIPHERALS CORP.
AP-EP
Compatibility: Apple II
Device Type: EPROM
Capacity: 32K bytes
Distribution Method: Third-party
(See Vendor Profile Page V-25)

MPC PERIPHERALS CORP.
[illegible]
Compatibility: Apple II
Device Type: RAM
Capacity: 64K bytes
Distribution Method: Third-party

MPC PERIPHERALS CORP.
AT-32 32K
Compatibility: Atari 400, Atari 800
Device Type: RAM

Capacity: 32K bytes
Distribution Method: Third-party

MPC PERIPHERALS CORP.
RAMYEXT 64
Compatibility: Apple IIE
Device Type: RAM
Capacity: 64K bytes
Distribution Method: Third-party

MYLEX DIGITAL SCIENCES, INC.
3803 96K MEMORY BOARD
Compatibility: Mylex 3000
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 96K bytes
Cycle Time: 800 nsec
Features: Battery back-up
Price: $3,150
Distribution Method: End user
Number Installed to Date: 500 - 1,000.
Date First Installed: 1977
(See Vendor Profile Page V-25)

NATIONAL SEMICONDUCTOR CORP.
NS11L
Compatibility: DEC PDP-11
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 450 nsec
Features: Battery back-up
Price: $785
Distribution Method: End user, OEM
Date First Installed: August 1979
(See Vendor Profile Page V-26)

NATIONAL SEMICONDUCTOR CORP.
NS11U
Compatibility: DEC PDP-11
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Cycle Time: 450 nsec
Features: Battery back-up
Price: $1,895
Distribution Method: End user, OEM
Date First Installed: July 1981

NATIONAL SEMICONDUCTOR CORP.
NS23L
Compatibility: DEC LSI-11, PDP-11/03, LSI-11/2, LSI-11/23
Device Type: RAM
Word Size Supported: 16-bit, 18-bit, 22-bit
Capacity: 64K bytes
Cycle Time: 1,000 nsec
Features: Battery back-up
Price: $325
Distribution [illegible] OEM
Date First Installed: September 1980

NATIONAL SEMICONDUCTOR CORP.
NS23M
Compatibility: DEC LSI-11/23
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 1,000 nsec
Features: Battery back-up.
Price: $525
Distribution Method: End user, OEM
Date First Installed: July 1981

NATIONAL SEMICONDUCTOR CORP.
NS23R
Compatibility: DEC PDP-11/23, LSI-11, PDP-11 Series
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Cycle Time: 1,000 nsec
Features: Battery back-up
Price: $1,995
Distribution Method: End user, OEM
Date First Installed: September 1982

NATIONAL SEMICONDUCTOR CORP.
NS44F
Compatibility: DEC PDP-11
Device Type: RAM.
Word Size Supported: 16-bit
Capacity: 512K bytes
Cycle Time: 450 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, Interleaving
Price: $1,350
Distribution Method: End user, OEM
Date First Installed: August 1981

NATIONAL SEMICONDUCTOR CORP.
NS75
Compatibility: DEC PDP-11/70, VAX-11/750
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 256K bytes
Cycle Time: 500 nsec
Features: Battery back-up, Single-bit [illegible]
Price: [illegible]
Distribution Method: End user, OEM
Date First Installed: May 1981

NATIONAL SEMICONDUCTOR CORP.
NS753
Compatibility: DEC VAX-11/730, VAX-11/750
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Cycle Time: 500 nsec
Features: Battery back-up, Single-bit error correction
Price: $1,895
Distribution Method: End user, OEM
Date First Installed: October 1982

NATIONAL SEMICONDUCTOR CORP.
NS780
Compatibility: DEC VAX-11/780
Device Type: RAM
Word Size Supported: 64-bit
Capacity: 512K bytes
Cycle Time: 425 nsec
Features: Battery back-up
Price: $1,225
Distribution Method: End user, OEM
Date First Installed: July 1980

NCR CORP.
NCR 23C64
Device Type: ROM
Capacity: 64K bytes
Cycle Time: 250 nsec
Features: Mask Programmable
Distribution [illegible] OEM
(See Vendor Profile Page V-26)

NCR CORP.
NCR [illegible]
Device Type: EPROM
Capacity: 425K bytes
Distribution Method: OEM

NCR CORP.
NCR 2051
Device Type: EPROM
Capacity: 64K bytes
Cycle Time: 3,500 nsec
Distribution Method: OEM

NCR CORP.
NCR 2055
Device Type: EPROM
Capacity: 64K bytes
Cycle Time: 3,500 nsec

NCR CORP.
NCR 2364
Device Type: ROM
Capacity: 8K bytes
Cycle Time: 100 nsec

NCR CORP.
NCR 2316
Device Type: ROM
Capacity: 16K bytes
Cycle Time: 450 nsec
Features: Mask Programmable
Distribution Method: OEM

NCR CORP.
NCR 2332
Device Type: ROM
Capacity: 32K bytes
Cycle Time: 450 nsec
Features: Mask Programmable
Distribution Method: OEM

NCR CORP.
NCR 2364
Device Type: ROM
Capacity: 32K bytes
Cycle Time: 450 nsec
Features: Mask Programmable
Distribution Method: OEM

NCR CORP.
NCR 23C
Device Type: ROM
Capacity: 64K bytes
Cycle Time: 450 nsec
Features: Mask Programmable
Distribution Method: OEM

NCR CORP.
NCR 2460
Device Type: EPROM
Capacity: 4K bytes
Cycle Time: 900 nsec
Distribution Method: OEM

NCR CORP.
NCR 7033
Device Type: EPROM
Capacity: 42K bytes
Distribution Method: OEM

NCR CORP.
NCR 23128
Device Type: ROM
Capacity: 128K bytes
Cycle Time: 300 nsec
Features: Mask Programmable
Distribution Method: OEM

NCR CORP.
NCR 23256
Device Type: ROM
Capacity: 256K bytes
Cycle Time: 450 nsec
Features: Mask Programmable
Date First Installed: [illegible]

NCR CORP.
NCR [illegible]
Device Type: NVRAM
Capacity: 1K bytes
Cycle Time: 300 nsec
Distribution Method: OEM
Date First Installed: November 1983

NCR CORP.
NCR 52002
Device Type: NVRAM
Capacity: 2K bytes
Cycle Time: 300 nsec
Distribution Method: OEM
Date First Installed: November 1983

NCR CORP.
NCR [illegible]
Device Type: NVRAM
Capacity: 4K bytes
Cycle Time: 300 nsec
Distribution Method: OEM
Date First Installed: December 1983

NCR CORP.
NCR [illegible]
Device Type: NVRAM
Capacity: 32K bytes
Cycle Time: 300 nsec
Distribution Method: OEM

NCR CORP.
NCR 52211
Device Type: NVRAM
Capacity: 64K bytes
Cycle Time: 300 nsec
Distribution [illegible] OEM

NCR CORP.
NCR [illegible]
Device Type: NVRAM
Capacity: 1K bytes
Cycle Time: 300 nsec
Date First Installed: September 1983

NCR CORP.
NCR [illegible]
Device Type: EEPROM.
Capacity: 32K bytes
Distribution [illegible] OEM

NCR CORP.
NCR 52832
Device Type: EEPROM
Capacity: 32K bytes
Distribution [illegible] OEM
Date First Installed: September 1983

NEC INFORMATION SYSTEMS
BP0300
Compatibility: [illegible]
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 650 nsec
Features: Single-bit error correction Multiple-bit error detection
Price: $2,095
Number Installed to Date: 1,000
Date First Installed: 1981
(See Vendor Profile Page V-26)

NEW ENGLAND DIGITAL CORP.
MBK BOARD
Compatibility: New England Digital
Device Type: SRAM
Word Size Supported: 16-bit
Capacity: 8K bytes
Features: Interleaving
Price: $825
Distribution Method: OEM

Add-In Memory Devices

Number Installed to Date: 500 - 1 000
Date First Installed: 1977
(See Vendor Profile Page V-26)

NEW ENGLAND DIGITAL CORP.
[illegible] BOARD
Compatibility: New England Digital
Device Type: SRAM
Word Size Supported: 16-bit
Capacity: 32K bytes
Features: Interleaving
Price: $2,500
Distribution Method: OEM
Number Installed to Date: 100 - 500
Date First Installed: 1982

NIXDORF COMPUTER CORP.
8091
Compatibility: Nixdorf 8870
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 32K bytes
Features: Battery back-up, Single-bit error correction
Price: $1,500
Distribution Method: End user
Date First Installed: 1979
(See Vendor Profile Page V-26)

NIXDORF COMPUTER CORP.
[illegible]
Compatibility: Nixdorf 8870
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Features: Battery back-up
Price: $4 000
Distribution Method: End user

NIXDORF COMPUTER CORP.
[illegible]
Compatibility: Nixdorf 8890
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 64K bytes
Cycle Time: 500 nsec
Features: Single-bit error correction, Multiple-bit error detection, Interleaving, Automatic memory
Price: $8,585
Distribution Method: End user
Number Installed to Date: Under [illegible]
Date First Installed: November 1981

NIXDORF COMPUTER CORP.
8092
Compatibility: Nixdorf 8890
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 64K bytes
Cycle Time: 500 nsec
Features: Single-bit error correction, Multiple-bit error detection, Interleaving, Autorqabc memory
Price: $17,170
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: November 1981

NORSK DATA NORTH AMERICAN, INC.
115
Compatibility: Norsk 100
Device Type: RAM
Word Size Supprrted: 16-bit
Capacity: 128K bytes
Features: Battery back-up, Single-bit error correction, Interleaving
Price: $3 500
Distribution Method: End user
(See Vendor Profile Page V-26)

NORSK DATA NORTH AMERICAN, INC.
116
Compatibility: Norsk 100
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Features: Battery back-up, Single-bit error correction, Interleaving
Price: $5,000
Distribution Method: End user

NORSK DATA NORTH AMERICAN, INC.
117
Compatibility: Norsk 100
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Features: Battery back-up, Srigle-bit error correction, Interleaving
Price: $7,100
Distribution Method: End user, OEM

NORSK DATA NORTH AMERICAN, INC.
MULTI-PORT MEMORY 101
Compatibility: Norsk 500
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Features: Battery back-up, Single-bit error correction, Interleaving
Price: $17 000
Distribution Method: End user, OEM

NORSK DATA NORTH AMERICAN, INC.
MULTI-PORT MEMORY 102
Compatibility: Norsk 500
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Features: Battery back-up, Single-bit error correctidn, Interleaving
Price: $27,000
Distribution Method: End user, OEM

NORSK DATA NORTH AMERICAN, INC.
MULTI-PORT MEMORY 122
Compatibility: Norsk 500
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Features: Battery back-up, Single-bit error correction, Interleaving
Price: $6,000
Distribution Method: End user, OEM

NORSK DATA NORTH AMERICAN, INC.
MULTI-PORT MEMORY 124
Compatibility: Norsk 500
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Features: Battery back-up, Single-bit error correction, Interleaving
Price: $10,800
Distribution Method: End user, OEM

OCTAGON COMPUTER SYSTEMS
128K STATIC RAMBOARD
Compatibility: Octagon CPU 8/16
Device Type: SRAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Features: Single-bit error correction
Price: $1,095
Distribution Method: Third-party
Number Installed to Date: 125
Date First Installed: May 1983
(See Vendor Profile Page V-27)

OCTAGON COMPUTER SYSTEMS
256K STATIC RAMBOARD
Compatibility: Octagon CPU 8/16
Device Type: SRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Features: Single-bit error correction
Price: $1,850
Distribution Method: Third-party
Number Installed to Date: 150
Date First Installed: May 1983

PARADYNE CORP.
[illegible]
Compatibility: Paradyne Response
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 256K bytes
Cycle Time: 185 nsec
Features: Single-bit error correction
Distribution Method: End user, OEM
Date First Installed: 1981
(See Vendor Profile Page V-27)

PARADYNE CORP.
[illegible]-02
Compatibility: Paradyne Response
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Cycle Time: 185 nsec.
Features: Single-bit error correction
Distribution Method: OEM
Date First Installed: 1981

PCE SYSTEMS
[illegible]
Compatibility: CCS
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 295 nsec
Price: $900
Distribution Method: OEM
Number Installed to Date: Under 100
Date First Installed: 1981
(See Vendor Profile Page V-28)

PCE SYSTEMS
[illegible]
Compatibility: PCE System Voyager
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 95 nsec
Price: $900
Distribution Method: Third-party
Number Installed to Date: 50
Date First Installed: August 1981

PEEK, INC.
MECC V-11
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes.
Cycle Time: 550 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection
Price: [illegible]
Distribution Method: OEM
Number Installed to Date: 100 - 500
Date First Installed: January 1981
(See Vendor Profile Page V-28)

PHOENIX DATA, INC.
[illegible]-11S
Compatibility: DEC PDP-11, LSI-11, VAX-11/780, Gould SEL 32
Technology: CCD
Device Type: RAM/ROM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 10 nsec
Features: Interleaving, Expansion memory
Price: $800
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: May 1978
(See Vendor Profile Page V-28)

PSCS ON, INC.
SR2
Compatibility: Alpha Micro AM100
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 64K bytes
Cycle Time: 250 nsec
Features: Bank Selection
Price: $475
Distribution Method: Third-party
Number Installed to Date: 5,000 - 10 000
Date First Installed: 1978
(See Vendor Profile Page V-28)

PSCS ON, INC.
SMHC
Compatibility: Cromemco System 2, Cromemco System 3
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 64K bytes
Cycle Time: 250 nsec
Features: Bank Selection
Price: $475
Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: September [illegible]

[illegible], INC.
[illegible]
Compatibility: Alpha Micro AM100, AM100L, AM100T, S100
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 64K bytes
Cycle Time: 250 nsec
Features: Bank Selection
Price: $475
Distribution Method: Third-party
Number Installed to Date: 1,000 - [illegible]
Date First Installed: June 1982

[illegible], INC.
SR25
Compatibility: Alpha Micro AM100, AM100L, AM100T, S100
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Cycle Time: 250 nsec
Features: Bank Selection
Price: $500
Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: June 1982

[illegible], INC.
SR50
Compatibility: Alpha Micro AM100, AM100L, S100, Morrow
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 256K bytes
Cycle Time: 250 nsec
Features: [illegible]
Price: $1,060
Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: June [illegible]

PIGEON, INC.
[illegible]
Compatibility: Alpha Micro AM100, AM100L, AM1007, S100
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 512K bytes
Cycle Time: 250 nsec
Features: Single-bit error correction, Multiple-bit error detection, Bank Selection
Price: $1,995
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: May 1983

PIGEON, INC.
[illegible]
Compatibility: Alpha Micro AM1000
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Cycle Time: 250 nsec
Features: Bank selection
Price: $420
Distribution Method: Third-party
Date First Installed: July 1983

PIGEON, INC.
SR1000-256K
Compatibility: Alpha Micro AM1000
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 256K bytes
Cycle Time: 250 nsec
Features: Bank selection
Price: $835
Distribution Method: Third-party
Date First Installed: July 1983

PLESSEY MICROSYSTEMS
[illegible]
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit, 32-bit
Capacity: 1M bytes
Cycle Time: 500 nsec
Features: Single-bit error correction, Error logging
Price: $3,525
[illegible]
Number Installed to Date: 200
(See Vendor Profile Page V-29)

PLESSEY MICROSYSTEMS
[illegible]
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 512K bytes
Cycle Time: 450 nsec
Features: Multiple-bit error detection, Error logging
Price: $1,200
[illegible]
Number Installed to Date: 5,000

PLESSEY MICROSYSTEMS
[illegible]
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 512K bytes
Cycle Time: 340 nsec
Features: Single-bit error correction, Error logging
Price: $1,100
Distribution Method: OEM
[illegible]
Date First Installed: March 1982

PLEXUS COMPUTERS
2008A
Compatibility: Plexus P/25, Plexus [illegible]
Device Type: RAM
Capacity: 512K bytes
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection
Price: $5,500
Distribution Method: OEM
Number Installed to Date: 500 - 1,000
Date First Installed: September 1982
(See Vendor Profile Page V-29)

PLEXUS COMPUTERS
2008A
Compatibility: Plexus P/25, Plexus P/40
Device Type: RAM
Capacity: 1M bytes
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection
Price: $9,500
[illegible] OEM
Number Installed to Date: 500 - 1,000
Date First Installed: September 1982

PLEXUS COMPUTERS
2012A
Compatibility: Plexus P/35, Plexus [illegible]
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection
Price: $5,500
Distribution Method: OEM
Number Installed to Date: 500 - 1,000
Date First Installed: September [illegible]

PLEXUS COMPUTERS
2013A
Compatibility: Plexus P/35, Plexus P/60
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection
Price: $9,500
Distribution Method: OEM
Number Installed to Date: 500 - 1,000
Date First Installed: September 1982

POINT FOUR DATA CORP.
LOTUS CACHE MEMORY
Compatibility: Point Four Mark 4, DG Nova, Point Four
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Cycle Time: 800 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error [illegible]
Price: $5,700
[illegible]
[illegible]
(See Vendor Profile Page V-29)

PRIME COMPUTER, INC.
MMW-1HMB
Word Size Supported: 32-bit
Capacity: 512K bytes
Cycle Time: 130 nsec
Features: Multiple-bit error detection, single-bit error correction, interleavng
Price: $7,500
[illegible]
Date First Installed: June 1981
(See Vendor Profile Page V-29)

PRIME COMPUTER, INC.
[illegible]
Word Size Supported: 32-bit
Capacity: 1M byte
Cycle Time: 130 nsec
Features: Multiple-bit error detection, Single-bit error correction
Price: $10,500
Distribution Method: End User
Date First Installed: June 1981

PRIME COMPUTER, INC.
MMW2-2MB
Word Size Supported: 32-bit
Capacity: 2M bytes
Cycle Time: 84 nsec
Features: Multiple-bit error detection, Single-bit error correction
Price: $15,500
[illegible]
Date First Installed: July 1982

QUADRAM CORP.
[illegible]
Compatibility: IBM Personal Computer
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 512K bytes
Cycle Time: 400 nsec
Features: Multiple-bit error detection
[illegible]
Distribution Method: Third-party
Date First Installed: 1982
(See Vendor Profile Page V-30)

QUADRAM CORP.
QUADBOARD
Compatibility: IBM Personal Computer
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 400 nsec
Features: Multiple-bit error detection
Price: $395
Distribution Method: Third-party
Date First Installed: 1982

QUADRAM CORP.
QUADBOARD II
Compatibility: IBM Personal Computer
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 400 nsec
Features: Multiple-bit error detection
[illegible]
Distribution Method: Third-party
Date First Installed: 1982

[illegible]
SWM-32
Device Type: EERAM
[illegible]
Capacity: 32K bytes
Features: Interleaving
Price: $170
[illegible]
OEM, Third-party
[illegible]
5,000
(See Vendor Profile Page V-30)

[illegible]
EERAM-32
Device Type: EERAM
Word Size Supported: 8-bit
Capacity: 4K bytes
Features: Interleaving
Price: $250
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 1,000 - [illegible]
Date First Installed: 1980

[illegible]
EERAM-32P
Device Type: EERAM
Word Size Supported: 8-bit
Capacity: 32K bytes
Features: Interleaving
Price: $250
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 1,000 - [illegible]
Date First Installed: [illegible]

[illegible]
PRM-16
Device Type: PROM
Word Size Supported: 8-bit
Capacity: 16K bytes
Features: Interleaving
Price: $115
[illegible]
OEM, Third-party
Number Installed to Date: 1,000 - [illegible]
[illegible]

QUASITRONICS, INC.
[illegible]
Device Type: SRAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Features: Interleaving
Price: $130
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1980

QUASITRONICS, INC.
SRAM-16P
Device Type: SRAM
Word Size Supported: 8-bit
Capacity: 32K bytes
Features: Interleaving
Price: $270
[illegible]
OEM, Third-party
[illegible] - 5,000
Date First Installed: 1980

RELATIONAL MEMORY SYSTEMS, INC.
RMEN-16K
Compatibility: Intel Multibus
Device Type: DRAM
Capacity: 16K bytes
Cycle Time: 300 nsec
Price: $466
Distribution Method: [illegible]
Number Installed to Date: 250
Date First Installed: January 1978
(See Vendor Profile Page V-30)

RELATIONAL MEMORY SYSTEMS, INC.
RMEN-32K
Compatibility: Intel Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 32K bytes
Cycle Time: 300 nsec
Price: $518
Distribution Method: [illegible]

Add-In Memory Devices

Number Installed to Date: 250
Date First Installed: January 1978

RELATIONAL MEMORY SYSTEMS, INC.
RMEN-64K
Compatibility: Intel Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 64K bytes
Cycle Time: 300 nsec
Price: $640
Distribution Method: OEM
Number Installed to Date: 500
Date First Installed: January 1978

RELATIONAL MEMORY SYSTEMS, INC.
RMEN-128K
Compatibility: Intel Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Cycle Time: 300 nsec
Price: $1,376
Distribution Method: OEM
Number Installed to Date: 250
Date First Installed: 1978

RELATIONAL MEMORY SYSTEMS, INC.
RMEN-256K
Compatibility: Intel Multibus
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 256K bytes
Cycle Time: 300 nsec
Price: $1,480
Distribution Method: OEM
Number Installed to Date: 250
Date First Installed: January 1978

REXON BUSINESS MACHINES CORP.
128K MEMORY MODULE
Compatibility: Rexon RX 100, Rexon RX 400
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 700 nsec
Features: Parity
Price: $750
Distribution Method: Third-party
Number Installed to Date: 1,000
Date First Installed: June 1982
(See Vendor Profile Page V-31)

R-G-S DESIGNS, INC.
BCS-100
Compatibility: Apple II
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 375 nsec
Price: $49
Distribution Method: Third-party
Number Installed to Date: 20,000
Date First Installed: September 1981
(See Vendor Profile Page V-31)

R-G-S DESIGNS, INC.
BCS-10200
Compatibility: IBM Personal Computer
Device Type: DRAM
Word Size Supported: 12-bit
Capacity: 192K bytes
Cycle Time: 375 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $750
Distribution Method: Third-party
Number Installed to Date: 100 - 500
Date First Installed: February 1982

R-G-S DESIGNS, INC.
MORAM
Compatibility: IBM Personal Computer
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 375 nsec
Features: Single-bit error correction
Price: $400
Distribution Method: Third-party
Date First Installed: June 1983

R.H. ELECTRONICS, INC.
SUPER RAM II
Compatibility: Apple II Plus
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 150 nsec
Price: $78
Distribution Method: End user, Third-party
Number Installed to Date: 10,000 - 50,000
Date First Installed: 1979
(See Vendor Profile Page V-31)

RIENDA ELECTRONICS
ARES MODEL 2250
Compatibility: DG Nova, Eclipse, Point Four Mark 5/8
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection
Price: $4,900
Distribution Method: OEM, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: April 1982
(See Vendor Profile Page V-31)

RIDGE COMPUTERS
1MB MEMORY CARD
Compatibility: Ridge 32
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Cycle Time: 375 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $5,000
Distribution Method: End user, OEM
Number Installed to Date: 50
Date First Installed: September 1982
(See Vendor Profile Page V-31)

SATURN SYSTEMS, INC.
ACCELERATOR 2
Compatibility: Apple II, Apple II+, Apple IIe
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 150 nsec
Price: $599
Distribution Method: Third-party
Number Installed to Date: 5,000 - 10,000
Date First Installed: April 1983
(See Vendor Profile Page V-31)

SATURN SYSTEMS, INC.
NEPTUNE 64
Compatibility: Apple IIe
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 200 nsec
Features: Bank switching
Price: $249
Distribution Method: Third-party
Number Installed to Date: 100 - 500
Date First Installed: June 1983

SATURN SYSTEMS, INC.
NEPTUNE 128
Compatibility: Apple IIe
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 200 nsec
Features: Built-in 80 COL
Price: $399
Distribution Method: Third-party
Number Installed to Date: 100 - 500
Date First Installed: June 1983

SATURN SYSTEMS, INC.
NEPTUNE 192
Compatibility: Apple IIe
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 192K bytes
Cycle Time: 200 nsec
Price: $499
Distribution Method: Third-party
Number Installed to Date: 100 - 500
Date First Installed: June 1983

SATURN SYSTEMS, INC.
SATURN RAM CARD-32
Compatibility: Apple II, Apple II+, Apple IIe
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 32K bytes
Cycle Time: 200 nsec
Features: Bank switching
Price: $219
Distribution Method: Third-party
Number Installed to Date: 5,000 - 10,000
Date First Installed: June 1981

SATURN SYSTEMS, INC.
SATURN RAM CARD 64
Compatibility: Apple II, Apple II+, Apple IIe
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 200 nsec
Price: $349
Distribution Method: Third-party
Number Installed to Date: 5,000 - 10,000
Date First Installed: March 1982

SATURN SYSTEMS, INC.
SATURN RAM CARD 128
Compatibility: Apple II, Apple IIe, Apple II+
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 200 nsec
Features: Bank switching
Price: $399
Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: February 1982

SATURN SYSTEMS, INC.
TITAN
Compatibility: IBM Personal Computer
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 576K bytes
Cycle Time: 410 nsec
Features: Single-bit error correction, Bank switching
Price: $695
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: July 1983

SMC SEIKOSHA
MBX
Compatibility: Seiko 8810
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 180 nsec
Price: $5,000
Distribution Method: Third-party
Number Installed to Date: 2,500
Date First Installed: October 1982
(See Vendor Profile Page V-32)

SPERRY CORP.
1117-60
Compatibility: Sperry 1100-60
Device Type: RAM
Word Size Supported: 36-bit
Capacity: 2M bytes
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Price: $6,400
Distribution Method: End user
Number Installed to Date: 1,200
Date First Installed: 1979
(See Vendor Profile Page V-33)

SYNAPLE COMPUTER CORP.
MSM-1000
Compatibility: Synapse N+1
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Cycle Time: 800 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, Interleaving
Price: $14,000
Distribution Method: End user, OEM
Number Installed to Date: 15
Date First Installed: December 1982
(See Vendor Profile Page V-33)

SYNERTEK, INC.
SYM64-SERIES
Device Type: ROM
Word Size Supported: 8-bit
Capacity: 8192K bytes
Cycle Time: 200 nsec
Number Installed to Date: 200
Date First Installed: January 1978

Synertek, Inc.
3001 Stander Way
San Jose
Santa Clara, CA 95054 -
(408) 988-5600

Major Market: Component and Computer Manufacturer
Target Industries: Computer Manufacturers and OEM
Contacts:
Head of Marketing: Mel Phelps
Established: 1973
Number of Employees: 2500
Geographic Coverage: International

SYNERTEK, INC.
SY2101
Compatibility: AMD
Device Type: RAM
Word Size Supported: 4-bit

Add-In Memory Devices

Word Size Supported: 4-bit
Capacity: 256K bytes
Cycle Time: 500 nsec

SYNERTEK, INC.
SY2111
Compatibility: AMD
Device Type: RAM
Word Size Supported: 4-bit
Capacity: 256K bytes
Cycle Time: 500 nsec

SYNERTEK, INC.
[illegible]
Compatibility: AMD
Device Type: RAM
Word Size Supported: 4-bit
Capacity: 256K bytes
Cycle Time: 500 nsec

SYNERTEK, INC.
SY2114A
Compatibility: AMD; TI; Motorola; Intel
Device Type: RAM
Word Size Supported: 4-bit
Capacity: 1024K bytes
Cycle Time: 100 nsec

SYNERTEK, INC.
SY2149H
Compatibility: AMD; Intel; Hitachi, TI
Device Type: RAM
Word Size Supported: 4-bit
Capacity: 1024K bytes
Cycle Time: 45 nsec

SYNERTEK, INC.
SY2167
Compatibility: Fujitsu; Intel; Hitachi; TI
Device Type: RAM
Word Size Supported: 1-bit
Capacity: 16,384K bytes
Cycle Time: 55 nsec

SYNERTEK, INC.
SY2169
Compatibility: Fujitsu; Intel; TI
Device Type: RAM
Word Size Supported: 4-bit
Capacity: 4096K bytes
Cycle Time: 50 nsec

SYSTEMS GROUP
DM 6400
Compatibility: IEEE-696
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 250 nsec
Price: $377
Distribution Method: Third-party
Number Installed to Date: 10,000 - 50,000
Date First Installed: January 1979
(See Vendor Profile Page V-34)

SYSTEMS GROUP
DMB 6400
Compatibility: IEEE696
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 250 nsec
Features: Bank Selectable
Price: $415
Distribution Method: Third-party
Number Installed to Date: 10,000 - 50,000

SYSTEMS GROUP
DMB6400
Compatibility: S100
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 250 nsec
Price: $415
Distribution Method: Third-party
Number Installed to Date: 20,000
Date First Installed: June 1980

SYSTEMS GROUP
HDM128
Compatibility: S100
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 250 nsec
Features: Single-bit error correction, [illegible]
Price: $777
Distribution Method: Third-party
Number Installed to Date: 5,000
Date First Installed: January 1981

SYSTEMS GROUP
HDM 2800
Compatibility: IEEE-696
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 250 nsec
Features: Battery back-up
Price: $777
Distribution Method: Third-party
Number Installed to Date: 10,000 - 50,000
Date First Installed: January 1981

SYSTEMS GROUP
HDMC 512
Compatibility: IEEE-796
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Cycle Time: 250 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $2,650
Distribution Method: Third-party
Date First Installed: June 1983

SYSTEMS GROUP
HDMC512K
Compatibility: Multibus
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Cycle Time: 20 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $2,650
Distribution Method: Third-party
[illegible] to Date: 500
Date First Installed: June 1983

TALL TREE SYSTEMS
JRAM
Compatibility: IBM Personal Computer-XT, Compaq
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 512K bytes
Cycle Time: 275 nsec
Price: $800
Distribution Method: End user, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: February 1982
(See Vendor Profile Page V-34)

TARBELL ELECTRONICS
256K-ASM
Compatibility: S100
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 256K bytes
Cycle Time: 225 nsec
Features: Single-bit error correction
Price: $1,400
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: July 1982
(See Vendor Profile Page V-34)

TARBELL ELECTRONICS
MEM 64K-ASM
Compatibility: S100
Device Type: SRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 64K bytes
Cycle Time: 70 nsec
Price: [illegible]
Number Installed to Date: Under 100
Date First Installed: July 1982

TECHNICAL MICRO SYSTEMS
[illegible]
Compatibility: TI 990 Family, TI TMS 9900
Device Type: RAM/SRAM/EPROM
Word Size Supported: 16-bit
Capacity: 32K bytes
Cycle Time: 450 nsec
Features: DSLCT RAM/EPROM
Price: $595
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: 1981
(See Vendor Profile Page V-36)

TECHNICO, INC.
[illegible]
Compatibility: Technico TI32
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 32K bytes
Features: Battery back-up
Price: $499
Distribution Method: [illegible]
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1977
(See Vendor Profile Page V-36)

TECHNICO, INC.
192K RAM BOARD
Compatibility: Technico TI32
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 192K bytes
Features: Battery back-up
Price: $1,299
Distribution Method: End user
Date First Installed: [illegible]

TECMAR, INC.
"IBT MATE"
Compatibility: IBM Personal Computer-XT, Compaq, TI PROF.
Device Type: RAM
Word Size Supported: [illegible]
Capacity: 256K bytes
Cycle Time: 425 nsec
Features: Single-bit error correction
Price: [illegible]
Distribution Method: [illegible], Third-party
Date First Installed: September [illegible]
(See Vendor Profile Page V-36)

TELEVIDEO SYSTEMS, INC.
1603M
Compatibility: Televideo 1603
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Price: $595
Distribution Method: OEM
Date First Installed: March 1983
(See Vendor Profile Page V-36)

TELEVIDEO SYSTEMS, INC.
ADDITIONAL MEMORY RAM
Compatibility: Televideo 803
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Distribution Method: OEM

TOSHIBA AMERICA, INC.
RAQ DP [illegible]
Compatibility: Toshiba T300
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Price: $150
Distribution Method: Third-party
Number Installed to Date: Under 100
Date First Installed: June 1983
(See Vendor Profile Page V-37)

TOSHIBA AMERICA, INC.
RAMPACK 16
Compatibility: Toshiba T100 Portable
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Features: Battery back-up
Price: $195
Distribution Method: Third-party
Date First Installed: February 1983

TOSHIBA AMERICA, INC.
RAMPACK 32
Compatibility: Toshiba T100 Portable
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 32K bytes
Features: Battery back-up
Price: [illegible]
Distribution Method: Third-party
Date First Installed: May 1983

TRENDATA CORP.
PINCOMM AS
Compatibility: General Automation 16/10, 16/220
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 500 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection
Distribution Method: Third-party
(See Vendor Profile Page V-38)

TRENDATA CORP.
PINCOMM HPS
Compatibility: HP 1000 Series
Device Type: RAM
Word Size Supported: [illegible]
Capacity: 512K bytes
Cycle Time: 500 nsec
Features: Single-bit error correction
Price: $3,000
Distribution Method: Third-party

TRENDATA CORP.
PINCOMM PS
Compatibility: DEC PDP-11
Device Type: MOS
Word Size Supported: [illegible]
Capacity: 128K bytes
Cycle Time: 450 nsec
Features: Single-bit error correction
Price: $945

Add-In Memory Devices

TRENDATA CORP.
PINCOMM 16
Compatibility: Honeywell Series 60, DPS-6
Device Type: DRAM
Word Size Supported: 16-bit, 24-bit
Capacity: 64K bytes
Cycle Time: 500 nsec
Features: Single-bit error correction
Price: $720
Distribution Method: Third-party

TRENDATA CORP.
PINCOMM 23S
Compatibility: DEC LSI-11/23, LSI-11, PDP-11/23, PDP-11/3
Device Type: RAM
Word Size Supported: Dual 8 Bit
Capacity: 256K bytes
Cycle Time: 470 nsec
Features: Battery back-up, Parity
Price: $970
Distribution Method: Third-party

TRENDATA CORP.
PINCOMM 23S +
Compatibility: DEC PDP-11/23, Micro-11, PDP-11/23S, LSI-11/23
Device Type: RAM
Word Size Supported: Dual 8-bit
Capacity: 1M bytes
Cycle Time: 470 nsec
Features: Battery back-up, Single-bit error correction
Price: $2,945
Distribution Method: Third-party

TRENDATA CORP.
PINCOMM 24S
Compatibility: DEC PDP 11/24
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Cycle Time: 450 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection
Price: $2,895
Distribution Method: Third-party

TRENDATA CORP.
PINCOMM 44S
Compatibility: DEC PDP 11/44
Device Type: RAM
Word Size Supported: Dual 16-bit
Capacity: 1M bytes
Cycle Time: 525 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, ECC
Price: $3 430
Distribution Method: Third-party

TRENDATA CORP.
PINCOMM 70S
Compatibility: DEC PDP 11/70
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 256K bytes
Cycle Time: 650 nsec
Features: Battery back-up, ECC
Price: $995

TRENDATA CORP.
[illegible] 730
Compatibility: DEC VAX 11/730
Device Type: RAM
Word Size Supported: 32-bit
Cycle Time: 650 nsec
Features: Battery back-up, ECC
Price: $2,800

TRENDATA CORP.
PINCOMM 750S
Compatibility: DEC VAX 11/750
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 256K bytes
Cycle Time: 800 nsec
Features: Battery back-up, ECC
Price: $995
Distribution Method: Third-party

TRENDATA CORP.
PINCOMM 750S +
Compatibility: DEC VAX 11/750
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Cycle Time: 650 nsec
Features: Battery back-up, ECC
Price: $2,800
Distribution Method: Third-party

TRENDATA CORP.
PINCOMM 780S
Compatibility: DEC VAX-11/780
Device Type: RAM
Word Size Supported: 64-bit
Capacity: 256K bytes
Cycle Time: 530 nsec
Features: ECC
Price: $995
Distribution Method: Third-party

TRENDATA CORP.
PINCOMM 780S +
Compatibility: DEC VAX-11/780, VAX-11/782
Device Type: RAM
Word Size Supported: 64-bit
Capacity: 2M bytes
Cycle Time: 530 nsec
Features: Battery back-up, ECC
Price: $4 800
Distribution Method: Third-party

TRENDATA CORP. PINCOMM 780SX
Compatibility: DEC VAX-11/780
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Cycle Time: 500 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $2,800
Distribution Method: Third-party
Date First Installed: July 1983

WESPERMICRO SYSTEMS, INC.
WIZARD PC MEMORY CARD
Compatibility: IBM
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 200 nsec
Features: Multiple-bit error detection
Distribution Method: OEM, Third-party
(See Vendor Profile Page V-39)

WINTEK CORP.
MRA16
Compatibility: Wintek 44 Pin Bus
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 450 nsec
Price: $[illegible]
Distribution Method: End user, OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1975
(See Vendor Profile Page V-39)

XICOR
X2201A NOVRAM
Device Type: NOVRAM
Word Size Supported: 4-bit
Capacity: 1K bytes
Cycle Time: 300 nsec
Price: $15
Distribution Method: OEM
Number Installed to Date: More than 50,000
Date First Installed: May 1980
(See Vendor Profile Page V-39)

XICOR
X2210 NOVRAM
Device Type: NOVRAM
Word Size Supported: 4-bit
Cycle Time: 300 nsec
Distribution Method: OEM
Number Installed to Date: 500,000
Date First Installed: June 1981

XICOR
X2212 NOVRAM
Device Type: NOVRAM
Word Size Supported: 4-bit
Capacity: 1K bytes
Cycle Time: 300 nsec
Price: $12
Distribution Method: OEM
Number Installed to Date: 500,000
Date First Installed: June 1981

XICOR
X2444 NOVRAM
Device Type: NOVRAM
Word Size Supported: 16-bit
Cycle Time: 300 nsec
Distribution Method: OEM
Number Installed to Date: 2,000
Date First Installed: April 1983

XICOR
X2816A EEPROM
Device Type: EEPROM
Capacity: 4K bytes
Cycle Time: 300 nsec
Price: $15
Number Installed to Date: 60,000
Date First Installed: November 1982

XICOR
X2816A EEPROM
Device Type: EEPROM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 300 nsec
Price: $[illegible]
Distribution Method: OEM
Number Installed to Date: 200,000
Date First Installed: July 1982

ZENDEX CORP.
ZX-012
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 512K bytes
Cycle Time: 600 nsec
Features: Single-bit error correction
Price: $1,690
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1983
(See Vendor Profile Page V-40)

ZENDEX CORP.
ZX-012E
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 512K bytes
Cycle Time: 460 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $3,010
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1983

ZENDEX CORP.
ZX-028
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 600 nsec
Features: Single-bit error correction
Price: $780
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1983

ZENDEX CORP.
ZX-056
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 600 nsec
Features: Single-bit error correction
Price: $1,375
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1983

ZILOG, INC.
1 MEG
Compatibility: Zilog System 8000 Models 21, 31, 11
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1,024K
Features: Multiple-bit error detection, Single-bit error correction
Price: $6,950
Distribution Method: End User, OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1981
(See Vendor Profile Page V-40)

ZILOG, INC.
512K
Compatibility: Zilog System 8000 Models 11, 21, 31
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Features: Multiple-bit error detection, Single-bit error correction
Distribution Method: End User
Date First Installed: 1981

ZILOG, INC.
512K With Parity
Compatibility: Zilog System 8000 Models 11, 21, 31
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Features: Multiple-bit error detection
Price: $3,450
Distribution Method: End user, OEM
Date First Installed: 1981

ZITEL CORP.
CM-5150
Compatibility: DG Eclipse
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 500 nsec
Features: Single-bit error correction, High Speed Cache
Price: $3,500
Distribution Method: End user
Number Installed to Date: 500 - 1,000
Date First Installed: September 1980
(See Vendor Profile Page V-40)

ZITEL CORP.
[illegible]
Compatibility: DG Nova
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 500 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, Memory management
Price: $4,500
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: September 1980

ZITEL CORP.
ZBC-0512
Compatibility: Intel Multibus
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Cycle Time: 400 nsec
Features: Single-bit error correction
Price: $1,400
Distribution Method: End user
Number Installed to Date: 150
Date First Installed: January 1982

ZITEL CORP.
ZMT-II
Compatibility: Tandon Nonstop II
Device Type: DRAM
Word Size Supported: 22-bit
Capacity: 2M bytes
Cycle Time: 400 nsec
Features: Single-bit error correction
Price: $18,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: September 1982

ZITEL CORP.
ZMT-16
Compatibility: Tandon Nonstop I
Device Type: DRAM
Word Size Supported: 22-bit
Capacity: 2M bytes
Cycle Time: 400 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $18,000
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: January 1982

[illegible]
ZM-256K
Compatibility: IBM Personal Computer
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 400 nsec
Features: Single-bit error correction
[illegible]
Distribution Method: Third-party
[illegible]
Date First Installed: January 1982
(See Vendor Profile Page V-40)

ZOBEX
ZMS-100
Compatibility: S100
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 400 nsec
[illegible]
Price: $395
Distribution Method: Third-party
Number Installed to Date: [illegible]
Date First Installed: January 1980

Add-In Memories Using Other Technologies

AMDAHL CORP.
[illegible]
Compatibility: Amdahl 5840, 5850
Technology: NMOS
Device Type: RAM
Word Size Supported: 128-bit
Cycle Time: 300 nsec
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Price: $640,000
Distribution Method: End user
Date First Installed: August 1983
(See Vendor Profile Page V-2)

AMDAHL CORP.
5860-64MEG
Compatibility: Amdahl 5860
Technology: NMOS
Device Type: RAM
Word Size Supported: 128
Capacity: 65.5M bytes
Cycle Time: 300 nsec
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Distribution Method: End user
Date First Installed: August 1982

BUBBL-TEC
BBC-128
Compatibility: Intel Multibus
Technology: Bubble
Device Type: Bubble
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 1,000 nsec
Features: Multiple-bit error detection
Price: $1,600
[illegible]
Date First Installed: August 1982
(See Vendor Profile Page V-5)

BUBBL-TEC
QBI-1
Technology: Bubble
Device Type: Bubble
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 1,000 nsec
Features: Multiple-bit error detection
Price: $1,300
Distribution Method: OEM
Date First Installed: March 1982

BUBBL-TEC
QBM-1
Technology: Bubble
Device Type: Bubble
Word Size Supported: 8-bit
Capacity: 32K bytes
Cycle Time: 1,000 nsec
Features: Multiple-bit error detection
[illegible]
[illegible]
Date First Installed: February 1982

BUBBL-TEC
MBI-1
Compatibility: Intel Multibus
Technology: Bubble
Device Type: Bubble
Word Size Supported: 8-bit
Capacity: 512K bytes
Cycle Time: 1,000 nsec
Features: Multiple-bit error detection
Price: [illegible]
Distribution [illegible] **OEM**
Date First Installed: August 1982

BUBBL-TEC
[illegible]
Technology: Bubble
Device Type: Bubble
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 1,000 nsec
Features: Multiple-bit error detection
Price: $1,900
Distribution Method: OEM
Date First Installed: June 1982

BUBBL-TEC
PBC-1
Technology: Bubble
Device Type: Bubble
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 1,000 nsec
Features: Multiple-bit error detection
Price: $500
Date First Installed: June 1982

BUBBL-TEC
QBC-11/02
Compatibility: DEC LSI-11
Technology: Bubble
Device Type: Bubble
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 1,000 nsec
Features: Multiple-bit error detection
[illegible]
[illegible]
Date First Installed: June 1982

BUBBL-TEC
QBI-11
Compatibility: DEC LSI-11
Technology: Bubble
Device Type: Bubble
Word Size Supported: 8-bit
Capacity: 512K bytes
Cycle Time: 1,000 nsec
Features: Multiple-bit error detection
[illegible]
[illegible]
Date First Installed: June 1982

BUBBL-TEC
QSB-11
Compatibility: DEC LSI-11
Technology: Bubble
Device Type: Bubble
Word Size Supported: 8-bit
Capacity: 120K bytes
Cycle Time: 1,000 nsec
Features: Multiple-bit error detection
Price: $1,700
Distribution Method: [illegible]
Date First Installed: February 1982

BUBBL-TEC
[illegible]
Technology: Bubble
Device Type: Bubble
Word Size Supported: 16-bit
Capacity: 1M bytes
Cycle Time: 1,000 nsec
Features: Multiple-bit error detection
[illegible]

BUBBL-TEC
[illegible]
Technology: Bubble
Device Type: Bubble
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 1,000 nsec
Features: Multiple-bit error detection
Price: $1,900

CENTRAL DATA CORP.
B1035
Technology: CMOS
Device Type: RAM/EEPROM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Features: Battery back-up
Date First Installed: March 1983
(See Vendor Profile Page V-6)

CENTRAL DATA CORP.
B1085 EPROM/RAM/EEPROM
Technology: CMOS
Device Type: RAM/EEPROM
Word Size Supported: 8-bit, 16-bit
Features: Battery back-up
Price: $715
Distribution Method: End user
OEM Third-party
Date First Installed: April 1983

CENTRAL DATA CORP.
[illegible]
Compatibility: Multibus
Technology: CMOS
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Cycle Time: 295 nsec
Features: Battery back-up
Price: $2,410
Date First Installed: April 1983
(See Vendor Profile Page V-6)

CENTRAL DATA CORP.
[illegible]
Compatibility: Multibus
Technology: CMOS
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 32K bytes
Features: Battery back-up
Price: $945
Distribution Method: End user
OEM Third-party
Date First Installed: April 1983

CONTEMPORARY CONTROL SYSTEMS, INC.
S849
Device Type: PROM SRAM
Word Size Supported: 8-bit
Capacity: 2K bytes
Cycle Time: 250 nsec
Price: $125
Distribution Method: End user
Number Installed to Date: Under [illegible]
Date First Installed: June 1982
(See Vendor Profile Page V-9)

CONTROL DATA CORP.
18751-1
Compatibility: CDC Cyber 170-875
Technology: Bipolar
Device Type: RAM
Word Size Supported: 60-bit
Capacity: 2,000K bytes
Cycle Time: 75 nsec
Features: Multiple-bit error detection, Single-bit error correction
[illegible]
[illegible]
[illegible]
(See Vendor Profile Page V-9)

CROMEMCO, INC.
16KZ
[illegible]
Technology: CMOS
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 200 nsec
[illegible]
Distribution Method: Third-party
Date First Installed: 1980
(See Vendor Profile Page V-9)

Add-In Memory Devices

CROMEMCO, INC.
64KZ
Compatibility: S100
Technology: CMOS
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 100 nsec
Price: $695
Distribution Method: Third-party
Date First Installed: 1981

CROMEMCO, INC.
256KZ
Compatibility: S100
Technology: CMOS
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 150 nsec
Price: $1,295
Distribution Method: Third-party
Date First Installed: 1982

CROMEMCO, INC.
[illegible]
Compatibility: S100
Technology: CMOS
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Cycle Time: 150 nsec
Price: $2,995
Distribution Method: Third-party
Date First Installed: 1982

CYBERNETICS CORP.
CSM-8322
Compatibility: DEC PDP-11/23
Technology: MOS/CMOS
Device Type: EPROM
Capacity: 128K bytes
Features: Battery back-up
Price: $650
Distribution Method: Third-party
Number Installed to Date: 100 - 500
[illegible]
(See Vendor Profile Page V-10)

DATARAM CORP.
DR-114
Compatibility: DEC PDP-11
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 64K bytes
Price: $3,340
Distribution Method: OEM
Date First Installed: 1977
(See Vendor Profile Page V-11)

DATARAM CORP.
DR-114M
Compatibility: DEC PDP-11
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 64K bytes
Features: Single-bit error correction
Price: $3,340
Distribution Method: OEM
Date First Installed: 1977

DATARAM CORP.
DR-115
Compatibility: DEC LSI-11
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 32K bytes
Features: Single-bit error correction
Price: $2,030
Distribution Method: OEM
Date First Installed: September 1978

DATARAM CORP.
DR-118
Compatibility: DEC PDP-8/E,F
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 12-bit
Capacity: 16K bytes
Features: Single-bit error correction
Price: $2,335
Distribution Method: OEM
Date First Installed: 1975

DATARAM CORP.
DR-118A
Compatibility: DEC PDP-8/A
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 12-bit
Capacity: 32K bytes
Features: Single-bit error correction
Price: $3,085
Distribution Method: OEM

DATARAM CORP.
DR-125
Compatibility: DG Nova 3/4, Nova 3/12, Nova 3D
Technology: Magnetic Core
Device Type: RAM
Capacity: 32K bytes
Price: $2,030
Distribution Method: OEM

DATARAM CORP.
DR-126
Compatibility: DG Nova 2/4, Nova 2/10
Technology: Magnetic Core
Device Type: RAM
Capacity: 32K bytes
Price: $2,030
Distribution Method: OEM
Date First Installed: 1975

DATARAM CORP.
DR-128
Compatibility: Modcomp II
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 256K bytes
Features: Single-bit error correction
Price: $7,865
Distribution Method: End user
Date First Installed: 1976

DATARAM CORP.
DR-716
Compatibility: PE 50,55,70, 74,7/16, 7/32,8/32
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 32K bytes
Features: Single-bit error correction
Price: $2,445
Distribution Method: OEM
Date First Installed: 1975

DATARAM CORP.
DR-717
Compatibility: PE 50,55,70, 8/32, 8/16
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 64K bytes
Features: Single-bit error correction
Price: $3,890
Distribution Method: OEM
Date First Installed: 1976

DATARAM CORP.
DR-1200
Compatibility: DG Nova 1200, Nova 1210, Nova 1220, Nova 1230
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 32K bytes
Price: $2,155
Distribution Method: OEM
Date First Installed: 1973

GENELCOR, INC.
ECL MEMORY, 1000
Compatibility: Denelcor H1000
Technology: ECL
Device Type: RAM
Word Size Supported: 64-bit
Capacity: 1M bytes
Cycle Time: 50 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $175,000
Distribution Method: End user
Number Installed to Date: 35
Date First Installed: February 1982
(See Vendor Profile Page V-12)

D&H MICRO PRODUCTS, INC.
64KCMOS-MEM
Compatibility: OSI C2/C3/C4, 200 Series, 300 Series
Technology: CMOS
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 150 nsec
Price: $500
Distribution Method: End user, Third-party
Number Installed to Date: 100 - 500
Date First Installed: June 1983
(See Vendor Profile Page V-13)

DUAL SYSTEMS CORP.
CMAN 16
Technology: CMOS
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 16K bytes
Cycle Time: 400 nsec
Features: Battery back-up
Price: $500
Distribution Method: End user, OEM, Third-party
Date First Installed: July 1980
(See Vendor Profile Page V-14)

DUAL SYSTEMS CORP.
CMAN 32
Technology: CMOS
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 32K bytes
Cycle Time: 400 nsec
Features: Battery back-up
Price: $900
Distribution Method: End user, OEM, Third-party
Date First Installed: July 1980

DUAL SYSTEMS CORP.
DMAN
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 660 nsec
Features: Single-bit error correction
Price: $1,200
Distribution Method: End user, OEM, Third-party
Date First Installed: December 1980

EMM/SESCO
MEGABYTE
Compatibility: SEMS Memory Bus
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 15M bytes
Cycle Time: 2,000 nsec
Price: $220,000
Distribution Method: End user
Number Installed to Date: 100 - 500
Date First Installed: January 1978
(See Vendor Profile Page V-14)

EMM/SESCO
SEMS-18
Compatibility: SEMS Memory Bus
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 18-bit
Capacity: 32K bytes
Cycle Time: 900 nsec
Price: $7,000
Number Installed to Date: 10,000 - 50,000

EMM/SESCO
[illegible]
Compatibility: SEMS Memory Bus
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 18-bit
Capacity: 64K bytes
Cycle Time: 900 nsec
Price: $9,500
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000

EMM/SESCO
SEMS-21
Compatibility: SEMS Memory Bus
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 18-bit
Capacity: 128K bytes
Cycle Time: 900 nsec
Price: $12,500
Distribution Method: End user
Number Installed to Date: 10,000 - 50,000

EMM/SESCO
BUBBLE MEMORY
Compatibility: SEMS Memory Bus
Technology: Bubble
Device Type: Serial
Word Size Supported: 4-bit
Capacity: 16M bytes
Price: $30,000
Distribution Method: End user
Number Installed to Date: Under 100
Date First Installed: January 1983

HEWLETT-PACKARD CO.
97040A
Compatibility: HP 9000 Series 500
Technology: NMOS
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 256K bytes
Cycle Time: 110 nsec
Features: Multiple-bit error detection, Single-bit error correction
Price: $3,000
Distribution Method: End User
Date First Installed: November 1982
(See Vendor Profile Page V-17)

HEWLETT-PACKARD CO.
12103D
Compatibility: HP 1000 A Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 1M byte
Cycle Time: 454 nsec
Price: $4,500

Distribution Method: End User
Date First Installed: June 1983

HEWLETT-PACKARD CO.
12103F
Compatibility: HP 1000 A Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 4M bytes
Cycle Time: 454 nsec
Price: $16,000
Distribution Method: End User
Date First Installed: June 1983

HEWLETT-PACKARD CO.
12104C
Compatibility: HP 1000 A Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 2048K bytes
Cycle Time: 500 nsec
Price: $13,000
Distribution Method: End User
Date First Installed: March 1982

HEWLETT-PACKARD CO.
12220C
Compatibility: HP 1000 A Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 3M bytes
Cycle Time: 181 nsec
Features: Multiple-bit error detection, Single-bit error correction
Price: $16,000
Date First Installed: November 1982

HEWLETT-PACKARD CO.
12002A
Compatibility: HP 1000 L Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Price: $1,710
Distribution Method: End User

HEWLETT-PACKARD CO.
12002B
Compatibility: HP 1000 L Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Price: $3,150
Distribution Method: End User

HEWLETT-PACKARD CO.
12003A
Compatibility: HP 1000 L Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Price: $1,510
Distribution Method: End User

HEWLETT-PACKARD CO.
12788D
Compatibility: HP 1000 E Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 1024K bytes
Cycle Time: 665 nsec
Price: $13,320
Distribution Method: End User
Date First Installed: 1976

HEWLETT-PACKARD CO.
12787D
Compatibility: HP 1000 E Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 1024K
Cycle Time: 735 nsec
Price: $17,420
Distribution Method: End User
Date First Installed: 1976

HEWLETT-PACKARD CO.
12788A
Compatibility: HP 1000 E/F Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 128K
Cycle Time: 420 nsec
Price: $3,520
Distribution Method: End User
Date First Installed: 1978

HEWLETT-PACKARD CO.
12788H
Compatibility: HP 1000 E/F Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 2048K bytes
Cycle Time: 420 nsec
Price: $18,020
Distribution Method: End User
Date First Installed: 1978

HEWLETT-PACKARD CO.
12746H
Compatibility: HP 1000 E/F Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 64K bytes
Cycle Time: 420 nsec
Price: $1,520
Distribution Method: End User
Date First Installed: 1978

HEWLETT-PACKARD CO.
12747H
Compatibility: HP 1000 E/F Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 665 nsec
Price: $2,280
Distribution Method: End User
Date First Installed: 1976

HEWLETT-PACKARD CO.
12699H
Compatibility: HP 1000 E/F Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Price: $2,510
Distribution Method: End User

HEWLETT-PACKARD CO.
12749H
Compatibility: HP 1000 E/F Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 512K
Cycle Time: 665 nsec
Price: $5,005
Distribution Method: End User
Date First Installed: 1976

HEWLETT-PACKARD CO.
12780H
Compatibility: HP 1000 E/F Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Price: $2,405
Distribution Method: End User

HEWLETT-PACKARD CO.
12731A
Compatibility: HP 1000 E/F Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Price: $1,065
Distribution Method: End User

HEWLETT-PACKARD CO.
12803B
Compatibility: HP 1000 E/F Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Price: $330
Distribution Method: End User

HEWLETT-PACKARD CO.
13307B
Compatibility: HP 1000 E/F Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Price: $1,185
Distribution Method: End User

HEWLETT-PACKARD CO.
12789B
Compatibility: HP 1000 E/F Series
Technology: NMOS
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256-bit
Cycle Time: 735 nsec
Price: $5,215
Distribution Method: End User
Date First Installed: 1976

IDE ASSOCIATES, INC.
MPR SERIES
Compatibility: IBM Personal Computer,XT
Technology: PCDOS
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 410 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, Interleaving
Price: $449
Distribution Method: End User
Date First Installed: December 1982
(See Vendor Profile Page V-17)

IDE ASSOCIATES, INC.
XPR-X SERIES
Compatibility: IBM Personal Computer,XT
Technology: PCDOS
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 410 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, Interleaving
Price: $539
Distribution Method: End user
Date First Installed: December 1982

IDE ASSOCIATES, INC.
XPR-XX SERIES
Compatibility: IBM Personal Computer,XT
Technology: PCDOS
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 410 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, Interleaving
Price: $569
Distribution Method: End user
Date First Installed: December 1982

IDE ASSOCIATES, INC.
XPE-XX SERIES
Compatibility: IBM Personal Computer,XT
Technology: PCDOS
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 410 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, Interleaving
Price: $599
Distribution Method: End user
Date First Installed: December 1982

INFORMEL INC.
1303-1/1360 FEATURE A
(PSRC)
Compatibility: Inforex 1303-1
Technology: Semiconductor
Device Type: MOS
Word Size Supported: 8-bit
Capacity: 40K bytes
Features: Battery back-up
Price: $4,000
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1973
(See Vendor Profile Page V-18)

INTERSIL SYSTEMS, INC.
IBM 370 SERIES 158
Compatibility: IBM 370/158
Technology: CMOS
Device Type: RAM
Capacity: 16M bytes
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Distribution Method: OEM
Date First Installed: 1978
(See Vendor Profile Page V-20)

INTERSIL SYSTEMS, INC.
IBM 370 SERIES 168
Compatibility: IBM 370/168
Technology: NMOS
Device Type: RAM
Capacity: 16M bytes
Features: Single-bit error correction, Multiple-bit error detection Interleaving
Distribution Method: OEM
Date First Installed: 1978

INTERSIL SYSTEMS, INC.
IBM 3000/3031
Compatibility: IBM 3000/3031
Technology: NMOS
Device Type: RAM
Capacity: 16M bytes
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Distribution Method: OEM
Date First Installed: 1978

INTERSIL SYSTEMS, INC.
IBM 3000/3032
Compatibility: IBM 3000/3032
Technology: NMOS
Device Type: RAM
Capacity: 16M bytes
Features: Single-bit error correction, Multiple-bit error detection, Interleaving

Add-In Memory Devices

Distribution Method: OEM
Date First Installed: 1978

INTERSIL SYSTEMS, INC.
[illegible]
Compatibility: IBM 3000/3033
Technology: NMOS
Device Type: RAM
Capacity: 32M bytes
Features: Single-bit error correction, Multiple-bit error detection, Interleaving
Distribution Method: OEM
Date First Installed: 1978

INTERSIL SYSTEMS, INC.
IMC-11/23
Compatibility: DEC LSI-11
Technology: CMOS
Device Type: SRAM
Word Size Supported: 16-bit
Capacity: 32K bytes
Cycle Time: 450 nsec
Price: $575
Distribution Method: OEM, Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: January 1981

INTERSIL SYSTEMS, INC.
[illegible]
Technology: CMOS
Device Type: SRAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 230 nsec
Features: Battery back-up
Price: $514
Distribution Method: OEM, Third-party
Number Installed to Date: 100 - 500
Date First Installed: September 1980

INTERSIL SYSTEMS, INC.
[illegible]
Technology: NMOS
Device Type: SRAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 560 nsec
Features: Switch Selectable
Price: $328
Distribution Method: OEM, Third-party
Number Installed to Date: 100 - 500
Date First Installed: January 1982
(See Vendor Profile Page V-20)

INTERSIL SYSTEMS, INC.
[illegible]
Technology: CMOS
Device Type: SRAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 230 nsec
Features: Battery back-up
Price: $486
Distribution Method: OEM, Third-party
Number Installed to Date: 100 - 500

INTERSIL SYSTEMS, INC.
MCB-332
Compatibility: Multibus
Technology: CMOS
Device Type: SRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 32K bytes
Cycle Time: 500 nsec
Features: Battery back-up
Price: $875
Distribution Method: OEM, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: June 1981

INTERSIL SYSTEMS, INC.
MCB-364
Technology: CMOS
Device Type: SRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 64K bytes
Cycle Time: 270 nsec
Features: Battery back-up
Price: $1,035
Distribution Method: OEM, Third-party
Number Installed to Date: 100 - 500
Date First Installed: January 1983

ITHACA INTERSYSTEMS
256KDR
Compatibility: S100
Technology: Bipolar
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction
Price: $1,500
Distribution Method: Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: January 1981
(See Vendor Profile Page V-20)

LOMAS DATA PRODUCTS, INC.
STATIC
Technology: CMOS
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Cycle Time: 130 nsec
Features: Battery back-up
Price: $1,200
Distribution Method: Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: July 1982
(See Vendor Profile Page V-22)

MACROTECH INTERNATIONAL CORP.
128-ST
Compatibility: S100
Technology: CMOS
Device Type: SRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Cycle Time: 70 nsec
Features: Battery back-up
Price: $1,232
Distribution Method: OEM
Number Installed to Date: 300
Date First Installed: December 1982
(See Vendor Profile Page V-22)

MICRO MEMORY, INC.
MM-1103C
Compatibility: DEC LSI-11
Technology: CMOS
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 32K bytes
Cycle Time: 220 nsec
Features: Battery back-up
Price: $650
Distribution Method: End user, OEM
Number Installed to Date: 100 - 500
Date First Installed: 1982
(See Vendor Profile Page V-24)

MICRO MEMORY, INC.
MM-1123C
Compatibility: DEC LSI-11
Technology: CMOS
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 64K bytes
Cycle Time: 220 nsec
Features: Battery back-up, Clock/Calendar
Price: $875
Distribution Method: End user, OEM
Number Installed to Date: 100 - 500
Date First Installed: 1982

MICRO MEMORY, INC.
MM-6800C
Compatibility: Motorola 6800 Bus
Technology: CMOS
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 32K bytes
Cycle Time: 250 nsec
Features: Battery back-up
Price: $595
Number Installed to Date: 500 - 1,000
Date First Installed: 1982

MICRO MEMORY, INC.
[illegible]
Compatibility: Motorola 6800 Bus
Technology: CMOS
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 32K bytes
Cycle Time: 250 nsec
Features: Battery back-up, Clock/Calendar
Price: $650
Number Installed to Date: 100 - 500
Date First Installed: 1982

MICRO MEMORY, INC.
MM-6800D 512KB
Compatibility: Motorola 68000
Technology: CMOS
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Cycle Time: 400 nsec
Features: Clock/Calendar
Price: $1,150
Distribution Method: End user, OEM
Number Installed to Date: 100 - 500
Date First Installed: 1982

MICRO MEMORY, INC.
MM-8000C
Compatibility: Intel Multibus
Technology: CMOS
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Cycle Time: 250 nsec
Features: Battery back-up
Price: [illegible]
Distribution Method: End user, OEM
Number Installed to Date: 500 - 1,000
Date First Installed: September 1982

MICRO MEMORY, INC.
[illegible]
Compatibility: Motorola 68000
Technology: CMOS
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 250 nsec
Features: Battery back-up, Clock/Calendar
Price: $1,295
Distribution Method: End user, OEM
Number Installed to Date: 500 - 1,000
Date First Installed: September 1981

MICRO MEMORY, INC.
[illegible]
Compatibility: DEC LSI-11
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 16K bytes
Features: Non-volatile
Price: $990
Distribution Method: End user, OEM
Number Installed to Date: 1,000 - [illegible]
Date First Installed: 1976

MICRO MEMORY, INC.
MM-1103/2
Compatibility: DEC LSI-11
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 16-bit
Features: [illegible]
Price: $1,350
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1977

MICRO MEMORY, INC.
MM-6800
Compatibility: Motorola 6800 Bus
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 8K bytes
Features: Non-volatile
Price: $725
Distribution Method: End user, OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1977

MICRO MEMORY, INC.
[illegible]
Compatibility: Motorola 6800 Bus
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Features: Non-volatile
Price: $[illegible]
Date First Installed: 1978

MICRO MEMORY, INC.
[illegible]
Compatibility: Intel Multibus
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Price: $[illegible]
Distribution Method: End user
Number Installed to Date: [illegible] 1,000
Date First Installed: 1978

MICRO MEMORY, INC.
MM-8080B
Compatibility: Intel Multibus
Technology: Magnetic Core
Device Type: [illegible]
Word Size Supported: [illegible]
Capacity: 8K bytes
Price: $790
Distribution Method: End user, OEM
Number Installed to Date: 1,000 - [illegible]
Date First Installed: 1979

MICRO MEMORY, INC.
MM-8085
Compatibility: Intel Multibus
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: [illegible]
Price: $1,275

Add-In/Add-On Memory Devices

Capacity: 32K bytes
Price: $1,275
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1980

MICRO MEMORY, INC.
MM-8086/16
Compatibility: Intel Multibus
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 16K bytes
Price: $875
Distribution Method: End user, OEM
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1980

MICROPRODUCTS
1040
Compatibility: Apple II
Technology: Bipolar
Device Type: ROM
Capacity: 12K bytes
Cycle Time: 250 nsec
[illegible]
Number Installed to Date: 3,000
Date First Installed: May 1982
(See Vendor Profile Page V-24)

NANODATA COMPUTER CORP.
HORIZONTAL CONTROL STORE
Compatibility: Nanodata QM-1B
Technology: Semiconductor
Device Type: RAM
Capacity: 16K bytes
Cycle Time: 80 nsec
Features: Single-bit error correction, Multiple-bit error detection
Distribution Method: End user
Number Installed to Date: [illegible]
Date First Installed: 1974
(See Vendor Profile Page V-25)

NANODATA COMPUTER CORP.
MAIN STORE
Compatibility: Nanodata QM-1B
Technology: Semiconductor
Device Type: RAM
Word Size Supported: 18-bit
Cycle Time: 80 nsec
Distribution Method: End user
Number Installed to Date: 100
Date First Installed: 1919

NANODATA COMPUTER CORP.
VERTICAL CONTROL STORE
Compatibility: Nanodata QM-1B
Technology: Semiconductor
Device Type: RAM
Word Size Supported: 18-bit
Cycle Time: 80 nsec
Distribution Method: End user
Number Installed to Date: [illegible]
Date First Installed: 1974

NEC INFORMATION SYSTEMS
BP0200
Compatibility: Multibus
Technology: [illegible]
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 16K bytes
Cycle Time: 600 nsec
Features: Battery back-up
Price: $1,300
Distribution Method: End user, OEM, Third-party
Number Installed to Date: 1,000 - 5,000
Date First Installed: 1980
(See Vendor Profile Page V-26)

NEC INFORMATION SYSTEMS
BP0220
Compatibility: Multibus
Technology: CMOS
Device Type: PROM
Word Size Supported: 16-bit
Capacity: 16K bytes
Cycle Time: 600 nsec
Features: Battery back-up
Price: $1,235
Distribution Method: OEM, Third-party
Number Installed to Date: 500 - 1,000
Date First Installed: 1981

PLESSEY MICROSYSTEMS
PSM 6483
Compatibility: Multibus
Technology: CMOS
Device Type: SRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 64K bytes
Cycle Time: 200 nsec
Features: Battery back-up, Data Retention
Price: $1,300
Distribution Method: OEM
Number Installed to Date: 2,000
Date First Installed: January 1981
(See Vendor Profile Page V-28)

QUADRI CORP.
CORE MEMORY MODULES
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 64K bytes
Cycle Time: 650 nsec
Price: $8,000
Distribution Method: End user
Number Installed to Date: 10,000 - 50,000
(See Vendor Profile Page V-30)

SMOKE SIGNAL BROADCASTING
DPM-32
Compatibility: Chieftain
Technology: MMOS
Device Type: SRAM
Word Size Supported: 8-bit
Capacity: 32K bytes
Price: $1,000
Distribution Method: Third-party
Number Installed to Date: 50
Date First Installed: July 1982
(See Vendor Profile Page V-32)

SMOKE SIGNAL BROADCASTING
M-32-X
Compatibility: Chieftain
Technology: MMOS
Device Type: SRAM
Word Size Supported: 8-bit
Capacity: 32K bytes
Price: $350
Distribution Method: Third-party
Number Installed to Date: 3,000
Date First Installed: January 1980

SMOKE SIGNAL BROADCASTING
M-128-X
Compatibility: Chieftain
Technology: MMOS
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Price: $995
Distribution Method: Third-party
Number Installed to Date: 200
Date First Installed: April 1982

SMOKE SIGNAL BROADCASTING
M-256-X
Compatibility: Chieftain
Technology: MMOS
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Price: $1,295
Distribution Method: Third-party
Number Installed to Date: 400
Date First Installed: April 1982

SMOKE SIGNAL BROADCASTING
M-512-X
Compatibility: Chieftain
Technology: MMOS
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 512K bytes
Price: $1,895
Distribution Method: Third-party
Number Installed to Date: 200
Date First Installed: April 1982

SYNERTEK, INC.
SY2128
Compatibility: AMD, Fujitsu, NEC, TI
Technology: Silicon Gate
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 2,048K bytes
Cycle Time: 100 nsec

SYNERTEK, INC.
SY2128
Compatibility: AMD, Fujitsu, NEC, TI
Technology: Silicon Gate
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 2,048K bytes
Cycle Time: 100 nsec

SYNERTEK, INC.
SY2147H
Compatibility: TI, NEC, Intel, AMD
Technology: Silicon Gate
Device Type: RAM
Word Size Supported: 1-bit
Capacity: 4096K bytes
Cycle Time: 35 nsec

SYNERTEK, INC.
SY2148H
Compatibility: AMD, Intel, Hitachi, TI
Technology: Silicon Gate
Device Type: RAM
Word Size Supported: 4-bit
Capacity: 1024K bytes
Cycle Time: 45 nsec

SYNERTEK, INC.
SY2158
Compatibility: Mostek
Technology: Silicon Gate
Word Size Supported: 8-bit
Capacity: 1024K bytes
Cycle Time: 120 nsec

SYNERTEK, INC
SY2159
Compatibility: Mostek
Technology: Silicon Gate
Device Type: RAM
Capacity: 1024K bytes
Cycle Time: 120 nsec

SYNERTEK, INC.
SY2168
Compatibility: Fujitsu, Intel, TI
Technology: Polysilicon Gate
Device Type: RAM
Word Size Supported: 4-bit
Capacity: 4096K bytes
Cycle Time: 55 nsec

SYNERTEK, INC.
SY2101
Technology: Double polysilicon gate
Word Size Supported: 8-bit
Capacity: 1024K bytes
Cycle Time: 100 nsec

TECMAR, INC.
FORGET ME NOT
Compatibility: IBM Personal Computer-XT Compaq TI PROF
Technology: CMOS
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 32K bytes
Cycle Time: 200 nsec
Features: Battery back-up Single-bit error correction
Price: $995
Distribution Method: OEM, Third-party
Date First Installed: February 1981
(See Vendor Profile Page V-36)

WINTEK CORP.
MCM81
Compatibility: Wintek 44 Pin Bus
Technology: CMOS
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 2K bytes
Cycle Time: 450 nsec
Features: Battery back-up
Price: $189
Distribution Method: End user, OEM
Date First Installed: 1977
(See Vendor Profile Page V-39)

Add-On MOS Memories

ADVANCED DIGITAL TECHNOLOGY
VLS SERIES
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 4.5M bytes
Cycle Time: 440 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, Dynamic Memory
Price: $1,[illegible]
Distribution Method: End user, OEM
(See Vendor Profile Page V-1)

ADVANCED DIGITAL TECHNOLOGY
VLSC SERIES
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 1.5M bytes
Cycle Time: 440 nsec
Features: Battery back-up, Single-bit error correction, Multiple-bit error detection, Dynamic Memory
Price: $1,[illegible]
Distribution Method: End user, OEM

[illegible]
ANSERAM
Compatibility: [illegible]
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction

Add-On Memory Devices

Price: $595
Distribution Method: OEM, Third-party
(See Vendor Profile Page V-3)

APPLE COMPUTER, INC.
EXTENDED 64K CARD
Compatibility: Apple IIe
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 500 nsec
Price: $170
Distribution Method: OEM, Third-party
(See Vendor Profile Page V-3)

APSTEK, INC.
AIC-256 MULTI FUNCTION CARD
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 210 nsec
Features: Single-bit error correction
Price: $369
Distribution Method: End user, Third-party
(See Vendor Profile Page V-3)

APSTEK, INC.
[illegible] MEMORY EXPANSION
Compatibility: IBM PC-XT
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 210 nsec
Features: Single-bit error correction
Price: $259
Distribution Method: End user, Third-party
Date First Installed: May 1982

[illegible], INC.
[illegible]
Compatibility: Apple II, II+, IIe, III
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 320K bytes
Cycle Time: 200 nsec
Features: Battery back-up
Price: $1 000
Distribution Method: Third-party
Date First Installed: November 1981
(See Vendor Profile Page V-4)

BGL TECHNOLOGY CORP.
SSD-301
Compatibility: PE
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 300M bytes
Cycle Time: 560 nsec
Features: Battery back-up, Single-bit error correction
Price: $1,140
Distribution Method: End user
Date First Installed: January 1983
(See Vendor Profile Page V-5)

BIT 3 COMPUTER CORP.
501
Compatibility: Apple II, Atari 800
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 200 nsec
Price: $[illegible]
Distribution Method: Third-party
Number Installed to Date: 1,000 - [illegible],000
(See Vendor Profile Page V-5)

BIT 3 COMPUTER CORP.
526
Compatibility: Apple II, Atari 800
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 32K bytes
Cycle Time: 200 nsec
Price: $70
Number Installed to Date: 1,000 - 5,000

CAMBEX CORP.
EXPANDA STOR II
Compatibility: DEC PDP-11
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 3M bytes
Features: Battery back-up, Single- and multiple-bit error detection
Price: $17,000
Distribution Method: End user, OEM, Third-party
Date First Installed: June 1981
(See Vendor Profile Page V-6)

CRAY RESEARCH, INC.
SSD-1
Compatibility: Cray XMP, 1M
Device Type: RAM
Word Size Supported: 24-bit
Capacity: 65M bytes
Cycle Time: 100 nsec
Features: Single-bit error correction, Multiple-bit error detection
Distribution Method: End user
Date First Installed: 1983
(See Vendor Profile Page V-9)

CRAY RESEARCH, INC.
SSD-2
Compatibility: Cray XMP, 1M
Device Type: RAM
Word Size Supported: 24-bit
Capacity: 128M bytes
Cycle Time: 100 nsec
Features: Single-bit error correction, Multiple-bit error detection
Date First Installed: 1983

CRAY RESEARCH, INC.
SSD-3
Compatibility: Cray XMP, 1M
Device Type: RAM
Word Size Supported: 64-bit
Capacity: 256M bytes
Cycle Time: 100 nsec
Features: Single-bit error correction, Multiple-bit error detection
Distribution Method: End user

DASA CORP.
DASA C-300
Device Type: RAM
Word Size Supported: 12-bit
Features: Battery back-up, Single-bit error correction, Interleaving
Price: $[illegible]
Distribution Method: End user
Number Installed to Date: 1,000 - 5,000
(See Vendor Profile Page V-10)

DATA ENGINEERING, INC.
C5504
Compatibility: Gould 3255, 3275
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 32K bytes
Cycle Time: 600 nsec
Price: $4,000
Distribution Method: End user, OEM
Date First Installed: June 1981
(See Vendor Profile Page V-10)

DATA ENGINEERING, INC.
C5502
Compatibility: Gould 3255, 3275
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 64K bytes
Cycle Time: 600 nsec
Price: $5,500
Distribution Method: End user
Date First Installed: June 1981

DATA ENGINEERING, INC.
C5503
Compatibility: Gould 3255, 3275
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 128K bytes
Cycle Time: 600 nsec
Price: $9,500
Distribution Method: End user, OEM

DATA ENGINEERING, INC.
C5511
Compatibility: Gould 3255, 3275
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 64K bytes
Cycle Time: 300 nsec
Price: $4,500
Distribution Method: End user
Number Installed to Date: 100 - 500

DATA ENGINEERING, INC.
C5512
Compatibility: Gould 3255, 3275
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 64K bytes
Cycle Time: 300 nsec
Price: $6,000
Distribution Method: End user
Date First Installed: June 1981

DATA ENGINEERING, INC.
C5513
Compatibility: Gould 3255, 3275
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 120K bytes
Cycle Time: 300 nsec
Price: $10,400
Distribution Method: End user, OEM
Number Installed to Date: 100 - 500

DATAMAC PERIPHERAL PRODUCTS
CDM 64
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 64K bytes
Cycle Time: 330 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $329
Distribution Method: Third-party
Date First Installed: April 1982
(See Vendor Profile Page V-10)

DATAMAC PERIPHERAL PRODUCTS
CDM 128
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 330 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $448
Distribution Method: Third-party

DATAMAC PERIPHERAL PRODUCTS
CDM 192
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 192K bytes
Cycle Time: 330 nsec
Features: Single-bit error correction, Multiple-bit error detection

Price: $577
Distribution Method: Third-party

DATAMAC PERIPHERAL PRODUCTS
CDM 256
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 330 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $706

DATAMAC PERIPHERAL PRODUCTS
DM 64
Compatibility: IBM PC
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 64K bytes
Cycle Time: 330 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $249
Distribution Method: Third-party

DATAMAC PERIPHERAL PRODUCTS
DM 128
Compatibility: IBM PC
Device Type: RAM
Date First Installed: April 1982

DATAMAC PERIPHERAL PRODUCTS
DM 192
Compatibility: IBM PC
Capacity: 128K bytes
Cycle Time: 330 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $378
Distribution Method: Third-party
Date First Installed: April 1982

DATAMAC PERIPHERAL PRODUCTS
DM 256
Compatibility: IBM PC
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 330 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: $536
Distribution Method: Third-party

DATARAM CORP.
BB-417
Compatibility: DEC PDP-11/70
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 4M bytes
Features: Single-bit error correction, Multiple-bit error detection
Price: $11,360
Distribution Method: OEM
(See Vendor Profile Page V-11)

DATARAM CORP.
BB-801
Compatibility: IBM PC/AT
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 64M bytes
Features: Single-bit error correction
Price: $10,810
Distribution Method: OEM

DIGITAL INTERFACE SYSTEMS, INC.
980-110
Compatibility: TI TM 990

Device Type: EPROM
Word Size Supported: 16-bit
Capacity: 24K bytes
Features: Single-bit error correction
Price: $600
Distribution Method: End user
(See Vendor Profile Page V-13)

DYNABYTE
15MK RAM BOARD
Compatibility: Monarch 6600, 6900
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 256K bytes
Features: Single-bit error correction
Price: $995
Distribution Method: OEM
Number Installed to Date: 2,000
(See Vendor Profile Page V-14)

EDGE TECHNOLOGY
MH1/CPU
Compatibility: IBM
Device Type: RAM/ROM
Capacity: 22K bytes
Features: Editing
Price: $2,100
Distribution Method: End user, Third-party
Date First Installed: December 1982
(See Vendor Profile Page V-14)

ELECTRO-DESIGN, INC.
RAM + 4
Compatibility: IBM PC-XT
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 200 nsec
Features: Battery back-up
Price: $450
Distribution Method: End user
Number Installed to Date: 250
Date First Installed: March 1983
(See Vendor Profile Page V-14)

ETR STAR SYSTEMS
SUPERSTAR
Compatibility: ETR Star 1, Star 2
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 4 nsec
Features: Single-bit error correction
Price: $295
Distribution Method: Third-party
Number Installed to Date: 150
Date First Installed: January 1983
(See Vendor Profile Page V-15)

GENERAL ROBOTICS CORP.
MSV-11
Compatibility: DEC LSI-11
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Cycle Time: 275 nsec
Price: $1,000
Distribution Method: OEM
(See Vendor Profile Page V-15)

GENERAL ROBOTICS CORP.
MSV-11
Compatibility: DEC LSI-11
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 64K bytes
Cycle Time: 275 nsec
Features: Battery back-up
Price: $400
Distribution Method: OEM

GENERAL ROBOTICS CORP.
MSV-11Q
Compatibility: DEC LSI-11
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 1M bytes
Cycle Time: 275 nsec
Features: Single-bit error correction
Price: $2,500
Distribution Method: OEM
Date First Installed: 1983

HEWLETT-PACKARD CO.
82909A
Compatibility: HP 86B, 87A, 86B
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Price: $395
Distribution Method: End User
Number Installed to Date: 30,000
Date First Installed: April 1982
(See Vendor Profile Page V-17)

HEWLETT-PACKARD CO.
82903A
Compatibility: HP 85A
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Price: $195
Distribution Method: End User
Number Installed to Date: 100,000

HEWLETT-PACKARD CO.
82909A
Compatibility: HP 85, 87X, 87XM
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 128K bytes
Price: $595
Distribution Method: End User
Number Installed to Date: 40,000

HEWLETT-PACKARD CO.
97040A
Compatibility: HP 9000
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 128K
Cycle Time: 55 nsec
Features: Single- and multiple-bit error detection, Memory healing
Price: $3,000
Distribution Method: End User
Date First Installed: November 1982

HEWLETT-PACKARD CO.
98256
Compatibility: HP Series 200
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Features: Battery back-up, Multiple-bit error detection
Price: $1,000
Distribution Method: End User
Number Installed to Date: 30,000

INDEPENDENT BUSINESS SYSTEMS, INC.
MAYBELL 64
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Distribution Method: End User
(See Vendor Profile Page V-18)

INTEL CORP.
INTEL 3800 MEMORY SYSTEM
Compatibility: IBM 370/168, 303X
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Features: Single- and multiple-bit error correction, Interleaving
Distribution Method: End user
(See Vendor Profile Page V-19)

INTERMEM CORP.
INTERMEM 8330 MEMORY SYSTEM
Compatibility: Cray 1A, 1S, XMP
Device Type: DRAM
Word Size Supported: 64-bit
Capacity: 256K bytes
Cycle Time: 250 nsec
Features: Single- and multiple-bit error correction, Interleaving
Price: $825,000
Distribution Method: End user
(See Vendor Profile Page V-20)

INTERMEM CORP.
INTERMEM 9640 MEMORY SYSTEM
Compatibility: CDC 7030, 7040
Device Type: RAM
Word Size Supported: 60 Bit
Capacity: 16M bytes
Cycle Time: 100 nsec
Features: Single- and multiple-bit error correction, Interleaving
Price: $400,000
Distribution Method: End user

LMW RESEARCH CORP.
BUSBOARD
Compatibility: IBM PC
Device Type: RAM
Word Size Supported: 9
Capacity: 512K bytes
Cycle Time: 250 nsec
Price: $350
Distribution Method: Third-party
Date First Installed: 1982
(See Vendor Profile Page V-22)

MEGALOGIC CORP.
PAM-I/ES
Compatibility: Intel Multibus
Device Type: RAM/PROM
Word Size Supported: 8-bit
Capacity: 8K-bytes
Price: $295
Distribution Method: End User
Date First Installed: 1979
(See Vendor Profile Page V-23)

MEMOTECH CORP.
16K
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 200 nsec
Price: $80
Distribution Method: Third-party
Number Installed to Date: 2,000
Date First Installed: 1981
(See Vendor Profile Page V-23)

MEMOTECH CORP.
32K
Compatibility: TS 1000, ZX 81
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 32K bytes
Cycle Time: 200 nsec
Price: $100
Distribution Method: Third-party

MEMOTECH CORP.
64K
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 200 nsec
Price: $150
Distribution Method: Third-party

MICROCOMPUTER SYSTEMS, INC.
MSI-7712
Device Type: PROM/SRAM
Word Size Supported: 8-bit
Capacity: 48K bytes
Cycle Time: 400 nsec
Price: $125
Distribution Method: End user
Number Installed to Date: 100 - 500
(See Vendor Profile Page V-23)

MIDWEST SCIENTIFIC INSTRUMENTS, INC.
RAM-8K
Compatibility: MSI 6500
Device Type: EPROM
Word Size Supported: 8-bit
Capacity: 8K bytes
Cycle Time: 250 nsec
Features: Battery back-up
Price: $150
Distribution Method: End user
Number Installed to Date: 200
(See Vendor Profile Page V-24)

MIDWEST SCIENTIFIC INSTRUMENTS, INC.
RAM-16K
Compatibility: MSI 6800
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 250 nsec
Features: Battery back-up
Price: $450
Distribution Method: End user
Number Installed to Date: 2,000

MIDWEST SCIENTIFIC INSTRUMENTS, INC.
RAM-64K
Compatibility: MSI 6800
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 250 nsec
Features: Battery back-up
Price: $1,000
Distribution Method: End User
Number Installed to Date: 500

MIDWEST SCIENTIFIC INSTRUMENTS, INC.
RAM-68K
Compatibility: MSI
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 8K bytes
Cycle Time: 250 nsec
Features: Battery back-up
Price: $350
Distribution Method: Dealer, Employee
Number Installed to Date: 1,000

MODULAR COMPUTER SYSTEMS, INC.
3995
Compatibility: Classic 25, 45, 55, 75
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Cycle Time: 500 nsec
Features: Single-bit error correction
Price: $5,000
Distribution Method: End user, OEM
(See Vendor Profile Page V-25)

MOSTEK CORP.
MK9851
Compatibility: DEC PDP-11/70
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 4M bytes
Cycle Time: 850 nsec
Features: Battery back-up, Interleaving
Price: $20,000
(See Vendor Profile Page V-25)

Add-On Memory Devices

MOTOROLA, INC.
SYSTEM 2000
Device Type: DRAM
Word Size Supported: 16/32/64-bit
Capacity: 32.7M bytes
Features: Multiple-bit error detection, Interleaving
Price: $163,840
Distribution Method: OEM, Third-party
Date First Installed: 1981
(See Vendor Profile Page V-25)

MOUNTAIN COMPUTER, INC.
16K RAM/ROM CARD
Compatibility: Apple IIe, Lisa, Information Analyst
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Price: $189
Distribution Method: End user, OEM, Third-party
(See Vendor Profile Page V-25)

NATIONAL MICRO PRODUCTS, INC.
UNIVERSAL PROCESSING DEVICE
Compatibility: Zilog Z80
Device Type: SRAM
Word Size Supported: 8-bit
Capacity: 448K bytes
Cycle Time: 250 nsec
Features: Battery back-up
Price: $1,500
Distribution Method: Third-party
Date First Installed: April 1983
(See Vendor Profile Page V-26)

NEW ENGLAND DIGITAL CORP.
EXTENDED MEMORY BOARD
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 128K bytes
Features: Interleaving
Distribution Method: OEM
(See Vendor Profile Page V-26)

NORDEN COMPUTER CORP.
N865-16
Compatibility: Nexdort 8860
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 120 nsec
Features: Battery back-up, Single-bit error correction
Price: $6,000
Distribution Method: End user
Number Installed to Date: 2,500
(See Vendor Profile Page V-26)

NORDEN COMPUTER CORP.
N865-8
Compatibility: Nexdort 8860
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Cycle Time: 120 nsec
Features: Battery back-up, Single-bit error correction
Price: $12,000
Distribution Method: End user

ONYX SYSTEMS
C5001/MU
Compatibility: Onyx C5001MU
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 250 nsec
Features: Single-bit error correction
Price: $1,000
Distribution Method: Third-party
Number Installed to Date: 500
(See Vendor Profile Page V-27)

ONYX SYSTEMS
C5002A
Compatibility: Onyx C5002A
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 512K bytes
Cycle Time: 166 nsec
Features: Single-bit error correction
Price: $3,000
Distribution Method: Third-party
Date First Installed: May 1983

ONYX SYSTEMS
C/8002
Compatibility: Onyx C8002
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 256K bytes
Cycle Time: 166 nsec
Features: Single-bit error correction
Price: $2,000
Distribution Method: Third-party
Number Installed to Date: 2,600

PEBX, INC.
EC 220
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 2M bytes
Cycle Time: 400 nsec
Features: Battery back-up, Single- and multiple-bit error detection
Price: $9,000
Distribution Method: OEM
Date First Installed: January 1981
(See Vendor Profile Page V-28)

SEATTLE COMPUTER PRODUCTS
RAM
Compatibility: IBM PC
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction
Price: $220 to $520
Distribution Method: Third-party
Number Installed to Date: 10,000
(See Vendor Profile Page V-32)

SEATTLE COMPUTER PRODUCTS
RAM + 3
Compatibility: IBM PC
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction
Price: $620
Distribution Method: Third-party
Number Installed to Date: 1,000

SPERRY CORP.
2103-48
Compatibility: Sperry 1180
Device Type: RAM
Word Size Supported: 36-bit
Capacity: 4M bytes
Features: Single- and multiple-bit error detection, Interleaving
Price: $448,875
Distribution Method: End user
Number Installed to Date: 500
(See Vendor Profile Page V-33)

SPERRY CORP.
3125-00
Compatibility: Sperry 1100-90
Device Type: RAM
Word Size Supported: 36-bit
Capacity: 4M bytes
Features: Single- and multiple-bit error detection, Interleaving
Price: $80,000
Distribution Method: End user

SSM MICROCOMPUTER PRODUCTS, INC.
MB 16
Compatibility: S100
Device Type: SRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 16K bytes
Cycle Time: 250 nsec
Price: $299
Distribution Method: Third-party
(See Vendor Profile Page V-33)

SSM MICROCOMPUTER PRODUCTS, INC.
MB 32
Compatibility: S100
Device Type: SRAM
Word Size Supported: 8-bit
Capacity: 32K bytes
Cycle Time: 150 nsec
Features: Battery back-up
Price: $425
Date First Installed: 1982

SSM MICROCOMPUTER PRODUCTS, INC.
MB 64
Compatibility: S100
Device Type: SRAM
Word Size Supported: 8-bit
Cycle Time: 150 nsec
Features: Battery back-up
Price: $599
Date First Installed: 1982

STANDARD ENGINEERING CORP.
LSI-005
Compatibility: DEC LSI-11, PDP-11
Device Type: RAM
Word Size Supported: 16-bit
Capacity: 4K bytes
Cycle Time: 500 nsec
Price: $1,500
Distribution Method: End user, OEM
Date First Installed: 1981
(See Vendor Profile Page V-33)

STORAGE TECHNOLOGY CORP.
UNIVERSAL 370
Compatibility: Intersil 370/158, 303X
Device Type: RAM
Capacity: 64K bytes
Features: Multiple-bit error detection, Extended Memory
Distribution Method: End user
Number Installed to Date: 2,500
(See Vendor Profile Page V-33)

STRATUS COMPUTER
M100
Compatibility: Stratus 32
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 2M bytes
Cycle Time: 375 nsec
Features: Battery back-up, Single- and multiple-bit error detection, Interleaving
Price: $10,000
Distribution Method: End user
Number Installed to Date: 150
(See Vendor Profile Page V-33)

STRATUS COMPUTER
M102
Compatibility: Stratus 32
Device Type: DRAM
Word Size Supported: 16-bit
Capacity: 2M bytes
Cycle Time: 375 nsec
Features: Battery back-up, Single- and multiple-bit error detection, Interleaving
Price: $6,000
Distribution Method: End user
Number Installed to Date: 75

TELEFILE COMPUTER PRODUCTS, INC.
MOS MODEL T3801
Compatibility: Xerox Sigma, Telefile
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 256K bytes
Cycle Time: 375 nsec
Features: Battery back-up, Single- and multiple-bit error detection
Price: $44,500
Distribution Method: End user, OEM
(See Vendor Profile Page V-36)

TELEFILE COMPUTER PRODUCTS, INC.
MOS MODEL T3802
Compatibility: Xerox Sigma; Telefile
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 512K bytes
Cycle Time: 375 nsec
Features: Battery back-up, Single-bit error correction
Price: $49,060
Distribution Method: End user, OEM

TELEFILE COMPUTER PRODUCTS, INC.
MOS MODEL T3803
Compatibility: Xerox Sigma, Telefile
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Cycle Time: 375 nsec
Features: Battery back-up, Single- and multiple-bit error detection
Price: $57,610
Distribution Method: End user, OEM

TELEFILE COMPUTER PRODUCTS, INC.
MOS MODEL T3804
Compatibility: Xerox Sigma; Telefile
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 2M bytes
Cycle Time: 375 nsec
Features: Battery back-up, Single- and multiple-bit error detection
Price: $83,260
Distribution Method: End user, OEM

TELEFILE COMPUTER PRODUCTS, INC.
MOS MODEL T3822
Compatibility: Xerox Sigma; Telefile
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 512K bytes
Cycle Time: 375 nsec
Features: Battery back-up, Single- and multiple-bit error detection
Price: $54,540
Distribution Method: End user, OEM

TELEFILE COMPUTER PRODUCTS, INC.
MOS MODEL T3823
Compatibility: Xerox Sigma; Telefile
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Cycle Time: 375 nsec
Features: Battery back-up, Single-

and multiple-bit error detection
Price: $73,660
Distribution Method: End user, OEM

TELEFILE COMPUTER PRODUCTS, INC.
[illegible] MODEL T3824
Compatibility: Xerox Sigma; Telefile
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 2M bytes
Cycle Time: 375 nsec
Features: Battery back-up, Single- and multiple-bit error detection
Price: $90,760
Distribution Method: End user, OEM

TELEFILE COMPUTER PRODUCTS, INC.
[illegible] MODEL T3824
Compatibility: Xerox Sigma; Telefile
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 4M bytes
Cycle Time: 375 nsec
Features: Battery back-up, Single- and multiple-bit error detection
Price: $142,060
Distribution Method: End user, OEM

TELEFILE COMPUTER PRODUCTS, INC.
[illegible] MODEL T3843
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 1M bytes
Cycle Time: 375 nsec
Features: Battery back-up, Single- and multiple-bit error detection
Price: $104,620
Distribution Method: End user, OEM

TELEFILE COMPUTER PRODUCTS, INC.
[illegible] MODEL T3844
Compatibility: Xerox Sigma; Telefile
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 2M bytes
Cycle Time: 375 nsec
Features: Battery back-up, Single- and multiple-bit error detection
Price: $122,860
Distribution Method: End user, OEM

TELEFILE COMPUTER PRODUCTS, INC.
[illegible] MODEL T3845
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 4M bytes
Cycle Time: 375 nsec
Features: Battery back-up, Single- and multiple-bit error detection
Price: $157,060
Distribution Method: End user, OEM

TELEFILE COMPUTER PRODUCTS, INC.
[illegible] MODEL T3846
Device Type: DRAM
Word Size Supported: 32-bit
Capacity: 8.1M bytes
Cycle Time: 375 nsec
Features: Battery back-up, Single- and multiple-bit error detection
[illegible]

TRANSWAVE CORP.
M-8008
Device Type: SRAM
Word Size Supported: 8-bit
Capacity: 8K bytes
Features: Battery back-up, Single-bit error correction
Price: $232
Distribution Method: End user
(See Vendor Profile Page V-37)

TRANSWAVE CORP.
M-8016
Device Type: SRAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Features: Battery back-up, Single-bit error correction
Price: $306
Distribution Method: End user

TRENDATA CORP.
MUSICOMM 700
Compatibility: DEC PDP-11/70
Device Type: RAM
Capacity: 3M bytes
Cycle Time: 700 nsec
Features: Battery back-up, Single- and multiple-bit error detection, ECC
Price: $8,790
Distribution Method: Third-party
(See Vendor Profile Page V-38)

U-MICROCOMPUTERS, INC.
U-RAM 128K
Device Type: RAM
Capacity: 128K bytes
Cycle Time: 128 nsec
Price: $549
Distribution Method: Third-party
(See Vendor Profile Page V-38)

U-MICROCOMPUTERS, INC.
U-RAM 16K
Compatibility: Apple II, IIe, II+
Device Type: RAM
Capacity: 16K bytes
Price: [illegible]

U-MICROCOMPUTERS, INC.
U-RAM 32K
Device Type: RAM
Capacity: 32K bytes
Price: $140
Distribution Method: Third-party

U-MICROCOMPUTERS, INC.
U-RAM 64K
Device Type: RAM
Capacity: 64K bytes
Price: $349
Distribution Method: Third-party

[illegible]
DMB-64
Compatibility: DEC Rainbow
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 448K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction
Distribution Method: OEM, Third-party
(See Vendor Profile Page V-39)

[illegible]
DMB-192
Compatibility: DEC Rainbow
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 448K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction
Distribution Method: Third-party

[illegible]
DMC-448
Compatibility: DEC Rainbow
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 448K bytes
Cycle Time: 200 nsec

UNIVATION, INC.
IRM-64
Compatibility: IBM PC
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction

UNIVATION, INC.
IRM-64X
Compatibility: IBM PC
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction
Distribution Method: Third-party

UNIVATION, INC.
IRM-128X
Compatibility: IBM PC
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction
Distribution Method: Third-party

[illegible]
IRM-192X
Compatibility: IBM PC
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction
Distribution Method: Third-party

UNIVATION, INC.
IRM-256C
Compatibility: IBM PC
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction
Distribution Method: Third-party

[illegible]
IRM-256X
Compatibility: IBM PC
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 512K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction
Distribution Method: Third-party

[illegible]
IRM-512C
Compatibility: IBM PC
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 512K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction
Distribution Method: Third-party

[illegible]
[illegible]
Compatibility: Victor 9000
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 384K bytes
Cycle Time: 200 nsec
Distribution Method: Third-party

[illegible]
VSMB-128C
Compatibility: Victor 9000
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle [illegible]

UNIVATION, INC.
[illegible]
Compatibility: Victor 9000
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 384K bytes
Cycle Time: 200 nsec
Distribution Method: Third-party

UNIVATION, INC.
VSMB-384C
Compatibility: Victor 9000
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 384K bytes
Cycle Time: 200 nsec
Distribution Method: Third-party

ZITEL CORP.
SY81
Device Type: DRAM
Word Size Supported: 16- to 88-bit
Capacity: 16M bytes
Cycle Time: 350 nsec
Features: Battery back-up, Single- and multiple-bit error detection
Price: $45,000
Distribution Method: End user
(See Vendor Profile Page V-40)

ZITEL CORP.
SY91
Device Type: DRAM
Word Size Supported: 16- to 88-bit
Capacity: 32M bytes
Cycle Time: 500 nsec
Features: Battery back-up, Single- and multiple-bit error detection
[illegible]

ZITEL CORP.
[illegible]
Device Type: SRAM
Word Size Supported: 16- to 88-bit
Capacity: 4M bytes
Cycle Time: 100 nsec
Features: Battery back-up, Single- and multiple-bit error detection
Price: $20,000

Add-On Memories Using Other Technologies

COBAR TECHNOLOGY
[illegible]
Compatibility: DEC LSI-II
Technology: CMOS
Device Type: RAM/EPROM
Word Size Supported: 16-bit
Capacity: 6K bytes
Price: $271
Distribution Method: Third-party
(See Vendor Profile Page V-7)

CTS FABRITEK, INC.
599
Compatibility: DEC PDP-11
Technology: TTD List-Core
Device Type: RAM
Word Size Supported: 18-bit
Capacity: 32K bytes
Cycle Time: 650 nsec
Distribution Method: OEM
[illegible] to Dec: 1,000
(See Vendor Profile Page V-9)

CTS FABRITEK, INC.
MM5 64
Compatibility: DEC PDP-11
Technology: TTD List Core
Device Type: RAM

Add-On Memory Devices

Word Size Supported: 18-bit
Capacity: 64K bytes
Cycle Time: 650 nsec
Distribution Method: OEM
Number Installed to Date: 50

DATARAM CORP.
DC-801
Compatibility: Intel SBC-80
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 8-bit, 16-bit
Capacity: 2.0M bytes
Features: Single-bit error correction
Price: $14,665
Distribution Method: OEM
(See Vendor Profile Page V-11)

[illegible]
MEMORY BOARD 128
Technology: NMOS
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 128K bytes
Cycle Time: 125 nsec
Price: $1,195
Distribution Method: OEM
(See Vendor Profile Page V-[illegible])

[illegible]
MEMORY BOARD 256
Technology: NMOS
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 256K bytes
Cycle Time: 125 nsec
Price: $1,395

[illegible]
MEMORY BOARD 64
Technology: NMOS
Device Type: DRAM
Word Size Supported: 8-bit, 16-bit
Capacity: 64K bytes
Cycle Time: 125 nsec
Price: [illegible]

LEGEND INDUSTRIES, LTD.
[illegible]
Compatibility: Apple II
Technology: CMOS
Device Type: SRAM
Word Size Supported: 8-bit
Capacity: 18K bytes
Cycle Time: 200 nsec
Features: Battery back-up
Price: $150
Distribution Method: Third-party
Number Installed to Date: 10,000
(See Vendor Profile Page V-22)

LEGEND INDUSTRIES, LTD.
[illegible]
Compatibility: Apple II
Technology: LSI
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 200 nsec
Price: $327
Number Installed to Date: 10,000

LEGEND INDUSTRIES, LTD.
128KDE
Compatibility: Apple II, Apple III
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 128K bytes
Cycle Time: 200 nsec
Price: $599
[illegible] to Date: 10,000

LEGEND INDUSTRIES, LTD.
S'CARD
Compatibility: Apple II, III, Lisa
Technology: LSI
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 1.0M bytes
Cycle Time: 200 nsec
Price: $399

LEGEND INDUSTRIES, LTD.
TRIM
Compatibility: Apple II, III, Lisa
Technology: LSI
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 1.0M bytes
Cycle Time: 200 nsec
Price: $399
Date First Installed: April 1983

MICROCOMPUTER SYSTEMS, INC.
MSI-C712
Technology: CMOS
Device Type: PROM/SRAM
Word Size Supported: 8-bit
Capacity: 48K bytes
Cycle Time: 400 nsec
Price: $130
Distribution Method: End user
Number Installed to Date: 100 - 500
(See Vendor Profile Page V-23)

MICROCOMPUTER SYSTEMS, INC.
MSI-C754
Technology: CMOS
Device Type: PROM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 400 nsec
Features: Battery back-up
Price: $150
Date First Installed: 1983

MICROTEK
AMB 16
Compatibility: Atari 400, Atari 800
Technology: CMOS
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 200 nsec
Price: $109
Distribution Method: Third-party
Number Installed to Date: 75,000
(See Vendor Profile Page V-24)

MICROTEK
BAM 16
Compatibility: Apple II, Franklin Ace
Technology: CMOS
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 200 nsec
Price: $109
Number Installed to Date: 50,000

MICROTEK
BAM 16 MN
Compatibility: Apple II, Apple II+
Technology: CMOS
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 200 nsec
Price: $109
Number Installed to Date: 50,000

MICROTEK
BAM 64
Compatibility: Apple, Franklin
Technology: CMOS
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 200 nsec
Price: $375
Number Installed to Date: 2,000

MICROTEK
BAM 128
Compatibility: Apple; Franklin
Technology: CMOS
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 200 nsec
Price: $475
Number Installed to Date: 4,000

MICROTEK
HAL 256
Compatibility: IBM PC; TI
Technology: CMOS
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Cycle Time: 200 nsec
Features: Single-bit error correction, Multiple-bit error detection
Price: [illegible]
Number Installed to Date: 5,000

MICROTEK
Q-DISK
Compatibility: Apple II; Franklin 1000
Technology: CMOS
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 200 nsec
Price: [illegible]
Number Installed to Date: 4,000

MICROTEK
TI 64
Compatibility: TI 994
Technology: CMOS
Device Type: DRAM
Word Size Supported: 8-bit
Capacity: 64K bytes
Cycle Time: 200 nsec
Price: [illegible]
Number Installed to Date: 2,000

MICROTEK
VIM 0
Compatibility: Commodore Vic 20
Technology: NMOS
Device Type: EPROM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 250 nsec
Price: $47
Number Installed to Date: 3,000

MICROTEK
VIM 16
Compatibility: Commodore Vic 20
Technology: NMOS
Device Type: EPROM
Word Size Supported: 8-bit
Capacity: 16K bytes
Cycle Time: 250 nsec
Price: [illegible]
Number Installed to Date: [illegible]

[illegible]
[illegible]
Compatibility: Norden PDP-11M; DEC PDP-11
Technology: Bubble
Device Type: Bubble
Word Size Supported: 8-bit
Capacity: 512K bytes
Features: Single-bit error correction
Price: $15,200
[illegible]
(See Vendor Profile Page V-24)

MODUTEST SYSTEMS, INC.
ARM9
Compatibility: Modutest MOD9
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 1K bytes
Cycle Time: 750 nsec
Price: $50,000
Distribution Method: End user
(See Vendor Profile Page V-25)

MODUTEST SYSTEMS, INC.
MEGASTORE CORE
Compatibility: Modutest MOD9
Technology: Magnetic Core
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 4.0M bytes
Cycle Time: 750 nsec
Price: $70,000
Date First Installed: 1972

MODUTEST SYSTEMS, INC.
MEGASTORE SEMICONDUCTOR
Compatibility: Modutest MOD9
Technology: Semiconductor
Device Type: RAM
Word Size Supported: 32-bit
Capacity: 4.0M bytes
Cycle Time: 750 nsec
Price: $110,000
Date First Installed: 1972

WICAT SYSTEMS, INC.
S150-16
Compatibility: Wicat S150, S160
Technology: ECC
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Features: Single-bit error correction
Price: $1,500
[illegible]
(See Vendor Profile Page V-39)

WICAT SYSTEMS, INC.
S150-64
Compatibility: Wicat S150, S160
Technology: ECC
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 256K bytes
Features: Single-bit error correction
Price: [illegible]

WICAT SYSTEMS, INC.
S155-21
Compatibility: Wicat S150/155
Technology: ECC
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 512K bytes
Features: Single-bit error correction
Price: [illegible]

WICAT SYSTEMS, INC.
S200-21
Compatibility: Wicat S200/220
Technology: ECC
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 512K bytes
Features: Single-bit error correction
Price: $3,000

WICAT SYSTEMS, INC.
S200-24
Compatibility: Wicat S200/220
Technology: ECC
Device Type: RAM
Word Size Supported: 8-bit
Capacity: 1.0M bytes
Features: Single-bit error correction
Price: [illegible]

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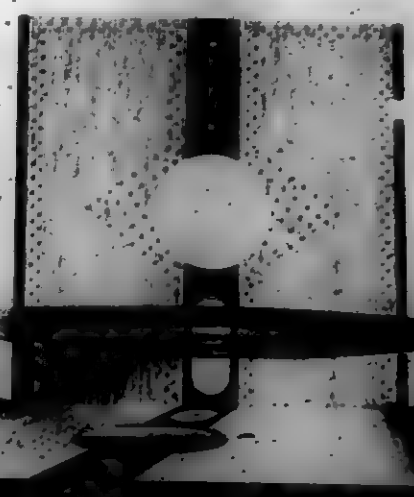

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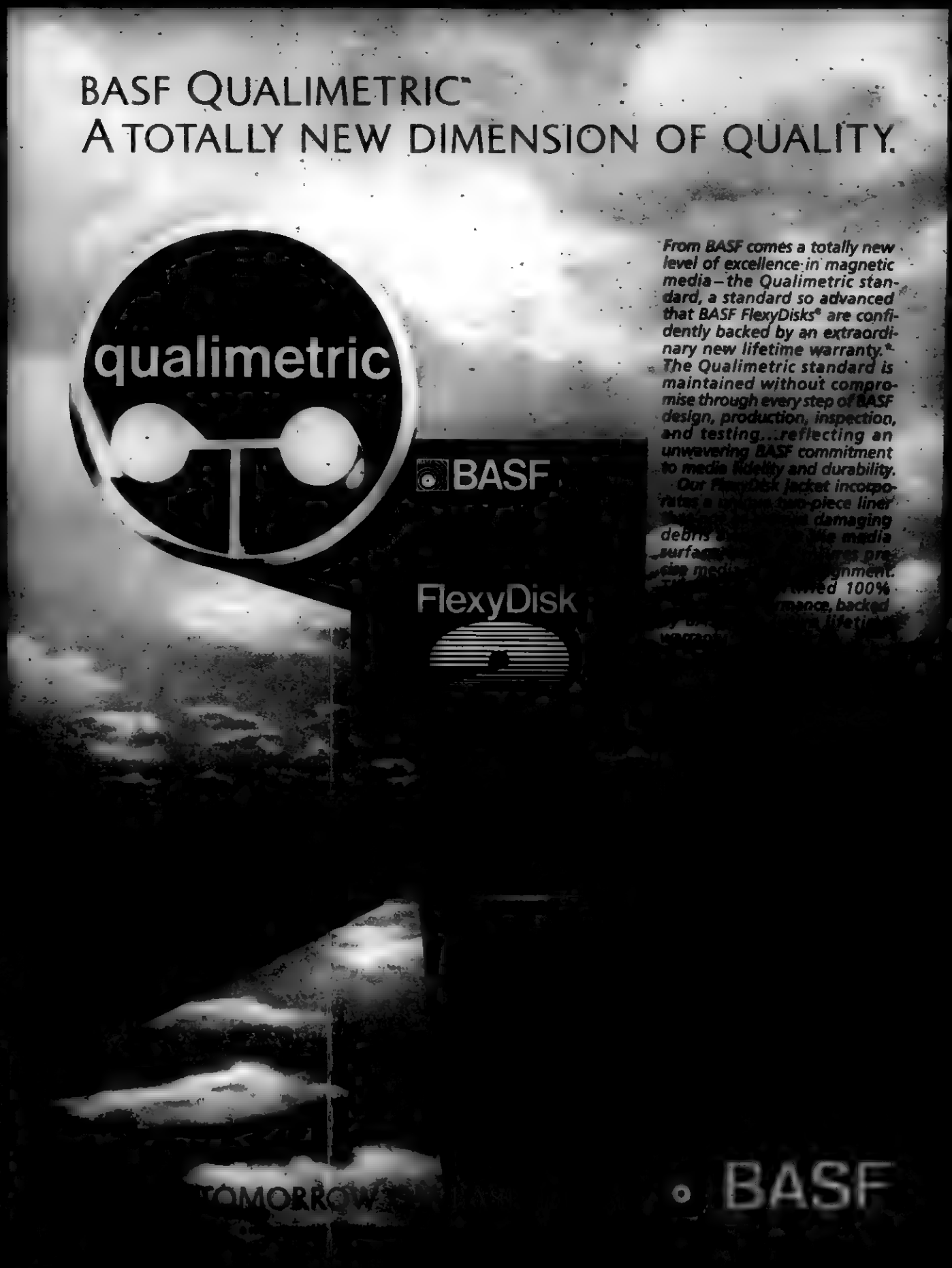
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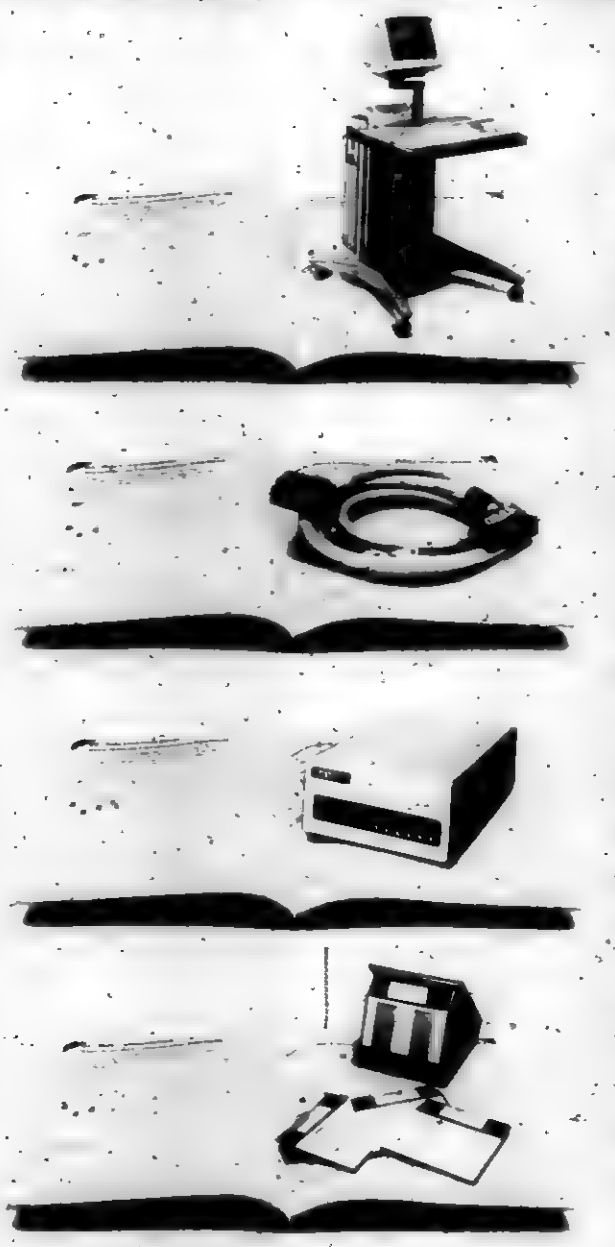

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1. I have access to the following DIGITAL computer(s): _____

_____

_____

2. DIGITAL Operating System(s) in use: _____

_____

_____

Digital Equipment Corporation Circulation Department MK01 W83 Continental Blvd Merrimac NH 03054

GR

digital

Suppliers

ALABAMA

COMPUTER SUPPLIES
4001 2nd Ave South
Birmingham, AL 35222
(205) 592-4230
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons, Disk Packs; Diskettes; Tapes
Contacts:
Head of Sales: Bill Philips
Geographic Coverage: National
Year Established: 1976
Number of Employees: 15

GTS COMPUTER SYSTEMS, INC.
3529 7th Ave. S.
Birmingham, AL 35222
(205) 252-9446
Major Market: Software House; Systems House OEM; Data Services (Service Bureau); Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Distribution; Retail; Manufacturing; Banking
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Marketing: Jim Byrne
Head of Software: Mark Kajdos
Head of Customer Service: Jack Harrison
Geographic Coverage: National
Year Established: 1968
Number of Employees: 28

MID AMERICAN DATA PRODUCTS
Computer Supplies
P.O. Box 1541
Birmingham, AL 35201
(205) 592-4230
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: End User
Product Lines: Forms, Ribbons; Disk Packs; Diskettes; Tapes; Furniture; Flooring; Cassettes
Contacts:
Head of Marketing/Sales: Bobby Smith
Head of Customer Service: Debbie Douglas
Geographic Coverage: International
Year Established: 1978
Number of Employees: 10

ARIZONA

COMPUTER CONCEPTS
4011 W. Clarendon
Phoenix, AZ 85019
(602) 233-9084
Major Market: Miscellaneous Computer Supplies
Target Industries: End users; Business
Product Lines: Furniture
Contacts:
Head of Marketing: Jerry Regan
Head of Sales: Michael Filippazzo
Head of Engineering: Randy Wilds
Geographic Coverage: National
Year Established: 1975
Number of Employees: 30

ROCK ROY, INC.
7741 East Gray Rd
Scottsdale, AZ 85260
(602) 998-1577
Major Market: Software House, Miscellaneous Computer Supplies
Product Lines: Disk Savers, devices
Contacts:
Head of Marketing: Howard Friedman
Head of Software: Robert Siegling
Head of Customer Service: Marilyn Poulson
Geographic Coverage: International
Year Established: 1980
Number of Employees: 5

CALIFORNIA

ALPHA COMPUTING SUPPLY, INC.
9625 Mason Ave.
Chatsworth, CA 91311
(213) 882-9818
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms, Ribbons; Disk Packs; Diskettes; Tapes; Furniture; labels
Net Sales: $100,000 - $500,000 (1982)
Contacts:
Head of Marketing/Sales: Todd Reichert
Geographic Coverage: International
Year Established: 1972
Number of Employees: 8

AMERICAN NATIONAL SUPPLY CORP. (ANSCO)
1243 W. 134th St.
P O Box 2259
Gardena, CA 90247
(213) 532-7780
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Ribbons; Disk Packs; Diskettes; Tapes, Furniture; Cleaning Devices
Geographic Coverage: National
Year Established: 1969
Number of Employees: 25

AMPEX CORP.
Magnetic Tape
401 Broadway
Redwood City, CA 94063
(415) 367-2011
Major Market: Component and Peripheral Manufacturing; Miscellaneous Computer Supplies
Target Industries: Disk Drive Manufacturing
Product Lines: Disk Packs
Contacts:
Head of Marketing: Richard Antonio
Geographic Coverage: International
Year Established: 1959
Number of Employees: 2,200

ANVIL CASES, INC.
4128 Temple City Blvd.
P.O. Box 888
Rosemead, CA 91770
(213) 575-8614
Major Market: Miscellaneous Computer Supplies
Product Lines: Travel cases
Contacts:
Head of Marketing/Customer Service: Ralph Hoopes
Geographic Coverage: International
Year Established: 1952
Number of Employees: 140

ASSOCIATED DATA SUPPLY CO.
1831 Centinela Ave.
Santa Monica, CA 90404
(213) 453-8822
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Banking
Product Lines: Forms; Ribbons; Disk Packs, Diskettes; Tapes; Furniture; Audio/Video Cas
Net Sales: $1 Million - $5 Million (1982)
Geographic Coverage: Regional
Year Established: 1971
Number of Employees: 12

ATHANA, INC.
2730 Monterey St.
Torrance, CA 90503
(213) 775-3741
Major Market: Miscellaneous Computer Supplies
Product Lines: Disk Packs; Diskettes, Cartridges
Contacts:
Head of Marketing: Bradley Liszt
Geographic Coverage: International
Year Established: 1971
Number of Employees: 250

AUT COMPUTER PRODUCTS, INC.
Suite 100
20675 S. Western Ave.
Torrance, CA 90501
(213) 533-1244
Major Market: Miscellaneous Computer Supplies
Target Industries: OEM; Distribution
Product Lines: daisy print; wheels
Geographic Coverage: International
Year Established: 1978
Number of Employees: 12

BELL & HOWELL
COM Products
16691 Hale Ave.
Irvine, CA 92714
(714) 641-1050
Major Market: OEM Peripherals/ Terminals; Software House; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Banking; Service Bureau; Insurance; General Industry
Target Applications: COM
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes
Contacts:
Head of Marketing: Michael Teague
Head of Sales: R. Manahrian
Head of Engineering: John Scarborough
Head of Customer Service: H. Hedfeld
Geographic Coverage: International
Year Established: 1974
Number of Employees: 85

BONANZA COMPUTER SUPPLIES, INC.
457 McGlincey Lane
Campbell, CA 95008
(408) 377-6811
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms, Ribbons; Disk Packs; Diskettes; Tapes; Furniture; Cables, Binders
Net Sales: $100,000 - $500,000 (1981)
Contacts:
Head of Marketing/Sales: Michael Branch
Geographic Coverage: International
Year Established: 1981
Number of Employees: 12

BUSINESS INFORMATION SYSTEMS
2428 Foothill Blvd.
La Crescenta, CA 91214
(213) 245-3691
Major Market: Software House; Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Distribution; Retail; Manufacturing
Target Applications: Full Integrated Systems; Sales, Accounting
Product Lines: Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Marketing: Richard L. Sloan
Head of Sales: Rick Rickling
Head of Software: Daniel R. Hoeffih
Head of Engineering: Thomas Privitell
Geographic Coverage: Regional
Year Established: 1971
Number of Employees: 60

BST PRODUCTS, INC.
17152 Armstrong Ave.
Irvine, CA 92714
(714) 660-1386
Major Market: Miscellaneous Computer Supplies
Product Lines: Sheet feeders
Envelope feeders
Contacts:
Head of Marketing: Richard L. Given
Geographic Coverage: International
Number of Employees: 50

CELTIC TECHNOLOGY, INC.
6363 Variel Ave.
Woodland Hills, CA 91367
(213) 884-6787
Major Market: Peripheral Manufacturing; Miscellaneous Computer Supplies
Target Applications: Graphics; PC Systems
Product Lines: film
Contacts:
Head of Marketing: Morgan Walker
Head of Engineering: Richard Gerlach
Year Established: 1982
Number of Employees: 25

CHALLENGE COMPUTER SUPPLIES, INC.
1007 Elwell Court
Redwood City, CA 94303
(415) 980-1500
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes
Net Sales: $1 Million - $5 Million (1981)
Geographic Coverage: West of Mississippi
Year Established: 1980
Number of Employees: 20

CHECKS-TO-GO
8384 Hercules St.
La Mesa, CA 92041
(619) 460-4975

Major Market: Miscellaneous Computer Supplies
Target Industries: Small Businesses, Medical; Accounts
Product Lines: Forms
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing: Dan Welty
Geographic Coverage: International
Year Established: 1979
Number of Employees: 45

COAST COMPUTER SUPPLIES
16 Pameron Way
Novato, CA 94947
(415) 883-8709
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms, Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Geographic Coverage: International
Year Established: 1979
Number of Employees: 10

COMPU-RITE CORP.
6010 Yolanda Ave.
Tarzana, CA 91356
(213) 996-5111
Major Market: Miscellaneous Computer Supplies
Product Lines: Ribbons; WP cartridges
Net Sales: $1 Million - $5 Million (1982)
Geographic Coverage: International
Year Established: 1973
Number of Employees: 50

COMPUTER FURNITURE & ACCESSORIES, INC.
515 W. 132nd St.
Gardena, CA 90248
(213) 327-7710
Major Market: Miscellaneous Computer Supplies; Furniture Supplier
Product Lines: Furniture
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing: Lee Kennedy
Geographic Coverage: National
Year Established: 1979
Number of Employees: 20

COMPUTER PARTS EXCHANGE (CPX)
19821 Nordhoff St.
Northridge, CA 91324
(213) 709-4003
Major Market: Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Third Party Maintainance, Large End User; OEM; System House
Target Applications: Maintenance
Product Lines: Ribbons; Disk Packs; Diskettes; Print Wheels
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Marketing: Bob MacGonigal
Head of Sales: Don Jarret
Geographic Coverage: International
Year Established: 1976
Number of Employees: 64

DAISY WHEEL RIBBON CO., INC.
Suite 401
9375 Archibald Ave.
Cucamonga, CA 91730
(213) 932-1061
Major Market: Miscellaneous Computer Supplies
Target Industries: Retail; Wholesale; Dealers
Target Applications: Dealers
Product Lines: Ribbons; Tapes; Daisy wheels; Cartridges
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing/Sales: Stephen Baer
Geographic Coverage: International
Year Established: 1980
Number of Employees: 23

DATA AIRE, INC.
7442 Orangewood Ave.
Garden Grove, CA 92641
(714) 891-3471
Major Market: Miscellaneous Computer Supplies
Product Lines: Air Conditioning
Contacts:
Head of Marketing/Sales: Don Henry
Head of Engineering: Sal Almilli
Geographic Coverage: International
Year Established: 1979

DATA DEVICES INTERNATIONAL
20235 Bahama St.
Chatsworth, CA 91311
(213) 998-2900
Major Market: Maintenance/Other Services; Miscellaneous Computer Supplies
Product Lines: Tape cleaners.
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing: Donna Schmidt
Head of Engineering: Joseph Spitzer
Geographic Coverage: International
Year Established: 1973
Number of Employees: 45

DATA EQUIPMENT SUPPLY
Microcomputer
8315 Firestone Blvd.
Downey, CA 90241
(213) 923-9361
Major Market: OEM Peripherals/ Terminals; Software House; Systems House OEM; Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Ribbons, Tapes
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Marketing: Jackson Bliss
Head of Sales: Steve Westmoreland
Geographic Coverage: National
Year Established: 1950
Number of Employees: 15

DATACO CORP.
479 Elder Ave.
Sand City, CA 93955
(408) 899-4686
Major Market: Miscellaneous Computer Supplies
Product Lines: Tapes; Cassette storage; Tape splice
Contacts:
Head of Sales: Judy Hooper
Head of Engineering: Steve Jurden
Geographic Coverage: International
Year Established: 1976
Number of Employees: 12

DAYTON - FORRESTER ASSOCIATES, INC.
8740 Shirley Ave.
Northridge, CA 91324
(213) 701-0127
Major Market: Systems House; Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Small Business; Manufacturing, Trucking; Medical
Target Applications: Small Business, Inventory Control
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing/Sales: N. L. Eyster
Head of Software: P. Parris
Geographic Coverage: Regional
Year Established: 1971
Number of Employees: 12

DEVORE DATA PRODUCTS CO.
1500 Martin Ave.
Santa Clara, CA 95050
(408) 980-1366
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture; microfilm
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Marketing: Chuck Volwiler
Geographic Coverage: National
Year Established: 1966

DREXLER TECHNOLOGY CORP.
2557 Charleston Road
Mountain View, CA 94043
(415) 969-7277
Major Market: Miscellaneous Computer Supplies
Target Industries: DP; Component Manufacturing; Semiconductor
Target Applications: Optical storage
Product Lines: Tapes; optical disc; cards
Net Sales: $5 Million - $25 Million (1982)
Geographic Coverage: International
Year Established: 1968
Number of Employees: 200

DYSAN CORP.
5201 Patrick Henry Drive
Santa Clara, CA 95050
(408) 988-3472
Major Market: Miscellaneous Computer Supplies
Product Lines: Disk Packs; Diskettes; Magnetic Media
Net Sales: More than $100 Million (1981)
Contacts:
Head of Customer Service: Abby Douglas
Geographic Coverage: International
Year Established: 1973
Number of Employees: 3,000

ELECTRONICS SYSTEMS FURNITURE
17129 S. Kingsview Ave.
Carson, CA 90746
(213) 538-9801
Major Market: Miscellaneous Computer Supplies
Target Industries: OEM; Dealers
Product Lines: Furniture
Contacts:
Head of Marketing: John Atchison
Head of Sales: Lans Dupree
Geographic Coverage: National
Year Established: 1975
Number of Employees: 32

ESCOM PRODUCTS, INC.
12919 Alcosta Blvd.
San Ramon, CA 94583
(415) 820-1256
Major Market: OEM (Computer Systems); Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Retail, Legal
Target Applications: Data Entry
Product Lines: Forms
Net Sales: $500,000 - $1 Million (1981)
Contacts:
Head of Marketing/Sales: Rod Winchell
Head of Engineering: Charles Lingal
Head of Customer Service: Bob Castillon
Geographic Coverage: International
Year Established: 1978
Number of Employees: 14

FRANKLIN COMPUTER SYSTEMS
715 Freemont
S. Pasadena, CA 91030
(213) 441-3123
Major Market: Software House; Systems House OEM; Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: CPA; Legal; Ambulance Service, Architects
Target Applications: Client and General Accounting; Property Management
Product Lines: Forms; Ribbons; Disk Packs
Net Sales: $1 Million - $5 Million (1982)
Geographic Coverage: National
Year Established: 1974
Number of Employees: 20

FUNCTIONAL OFFICE FURNITURE, INC.
1281 Anderson Drive
San Rafael, CA 94901
(415) 457-4143
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Office; Computer
Product Lines: Furniture
Geographic Coverage: National
Year Established: 1974
Number of Employees: 6

GATES ACOUSTEMIT, INC.
P.O Box PP
Santa Rosa, CA 95403
(800) 358-9122
Major Market: Miscellaneous Computer Supplies
Target Industries: WP; Telecommunications
Target Applications: Sound reduction
Product Lines: Sound reduction; Cabinets
Net Sales: $5 Million - $25 Million (1981)
Geographic Coverage: International
Year Established: 1948
Number of Employees: 110

GENERAL RIBBON CORP.
P.O. Box 447
Chatsworth, CA 91311
(213) 709-1234

Suppliers

Major Market: Miscellaneous Computer Supplies
Target Industries: Dealers; OEM
Product Lines: Ribbons
Net Sales: $25 Million - $100 Million (1982)
Contacts:
Head of Marketing: Marvin Van Voy
Head of Sales: Michael Cooke
Head of Software: Pam Scyphers
Head of Engineering: Larry Thomas
Geographic Coverage: National
Year Established: 1929
Number of Employees: 350

GERARD PICK MICRO-COMPUTER SYSTEMS
[illegible]
Santa Monica, CA
(213) 459-5596
Major Market: OEM Peripherals-Terminals; Systems House OEM; Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Net Sales: $100,000 - $500,000 [illegible]
Geographic Coverage: California
Year Established: 1980
Number of Employees: 3

HEAD COMPUTER PRODUCTS, INC.
9614 Cozycroft Ave.
Chatsworth, CA 91311
(213) 789-9000
Major Market: Miscellaneous Computer Supplies
Product Lines: Diskettes; Drive Cleaning Kits
Geographic Coverage: International
Year Established: 1981
Number of Employees: [illegible]

HOFFMAN COMPUTER PRODUCTS
1720 Flower Ave.
Duarte, CA 91010
(213) 303-1571
Major Market: [illegible]
Computer Supplies
Product Lines: Diskettes
Contacts:
Head of Sales: Robert Richards
Geographic Coverage: National
Year Established: [illegible]
Number of Employees: 30

HOLLANDER OFFICE PRODUCTS
[illegible]
1 Duesenberg Drive
Thousand Oaks, CA 91362
[illegible]
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture; print wheels
Contacts:
Head of Marketing: Don Maroney
Geographic Coverage: International
Year Established: 1978
Number of Employees: 50

ICO-RALLY CORP.
2575 E. Bayshore Road
Palo Alto, CA 94303
(415) 856-9900
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Manufacturing
Contacts:
Head of Marketing: Robert Hamilton
Head of Engineering: Steven Metzgar
Geographic Coverage: International
Year Established: 1967
Number of Employees: 86

INMAC
2465 Augustine Drive
Santa Clara, CA 95051
(408) 727-1970
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes
Contacts:
Head of Marketing: Bob Harris
Geographic Coverage: International
Year Established: 1976
Number of Employees: 100

INNOVATIVE COMPUTER PRODUCTS
9174 Deering Ave.
Chatsworth, CA 91311
(213) 998-2400
Major Market: Miscellaneous Computer Supplies
Product Lines: Cleaning Kits; Diskette drive
Contacts:
Head of Marketing: A. H. Packard
Head of Sales: Carl Holder
Geographic Coverage: International
Year Established: 1976
Number of Employees: 60

JENSEN ENGINEERING, INC.
1859 Hampton Way
Santa Rosa, CA 95407
(707) 544-9450
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; Acoustical-[illegible], Dust covers
Contacts:
Head of Marketing: Olga Thill
Head of Engineering: Bob Sharp
Geographic Coverage: International
Year Established: 1973
Number of Employees: 85

LIGHTNING ELIMINATION ASSOCIATES
12516 Lakeland Road
Santa Fe Springs, CA 90670
(213) 944-0916
Major Market: Miscellaneous Computer Supplies; Support equipment
Product Lines: Electrical distributors; equipment
Net Sales: $1 Million - $5 Million [illegible]
Contacts:
Head of Marketing: Hal Proppe
Head of Sales: Al Rich
Geographic Coverage: International
Year Established: 1971
Number of Employees: 50

MAGNETRONICS INTERNATIONAL, INC.
16926 S. Keegan Ave.
Carson, CA 90746
(213) 603-0151
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms
Net Sales: $1 Million - $5 Million (1982)
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 15

MEDIA RECOVERY OF CALIFORNIA, INC.
7322 Valjean Ave.
Van Nuys, CA 91406
(213) 782-8978
Major Market: Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Data processing
Product Lines: Ribbons; Disk Packs; Diskettes; Tapes
Geographic Coverage: Ca
Year Established: 1974
Number of Employees: 24

MEDIA SYSTEMS TECHNOLOGY
17991 Fitch
Irvine, CA 92714
(714) 957-0240
Major Market: Peripheral and Office Equipment Manufacturing; Software House; Data Services (Service Bureau); Miscellaneous Computer Supplies
Target Industries: Manufacturing; Banking; Education
Product Lines: Diskettes
Contacts:
Head of Marketing/Sales: Irv Hamlin
Head of Software: Eric Kadison
Head of Engineering: Dave Sudden
Head of Customer Service: Andy Zirpi
Geographic Coverage: International
Year Established: 1979
Number of Employees: 60

MEMORY MEDIA PRODUCTS
17032 Murphy Ave.
Irvine, CA 92714
(714) 863-1101
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Ribbons; Disk Packs; Diskettes; Tapes
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing/Sales: Edward Conti
Head of Engineering: John R. Creech Jr.
Geographic Coverage: National
Year Established: 1972
Number of Employees: 42

MICROSETTE CO.
[illegible]
Mountain View, CA 94043
(415) 968-1604
Major Market: Miscellaneous Computer Supplies
Target Industries: Computer; Magnetic Media
Product Lines: [illegible]
Contacts:
Head of Marketing/Sales: Ron Troxel
Geographic Coverage: National
Year Established: 1978
Number of Employees: 20

NETPORT DIRT DATA SERVICES, INC
317 Saratoga Ave.
Los Gatos, CA [illegible]
[illegible]
Major Market: Software House; Systems House; Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: [illegible]; Manufacturing; Civil Engineering
Target Applications: Inventory Control; Earthwork Systems
Product Lines: Forms; Ribbons; Disk Packs; Tapes
Net Sales: $100,000 - $500,000 (1981)
Geographic Coverage: Regional
Year Established: 1979
Number of Employees: 4

NORMAN MAGNETICS, INC.
2431 S. Anne St.
Santa Ana, CA 92704
(714) 557-7662
Major Market: Miscellaneous Computer Supplies
Target Industries: OEM
Product Lines: Disk Packs
Net Sales: $5 Million - $25 Million [illegible]
Contacts:
Head of Marketing: Linda M. Price
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 11

PACIFIC COMPUTER SUPPLY, INC.
[illegible]
Redwood City, CA 94063
(415) 366-0353
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Ribbons; Diskettes; Tapes, Furniture
Contacts:
Head of Marketing: John Sanchez
Geographic Coverage: International
Year Established: 1978
Number of Employees: 11

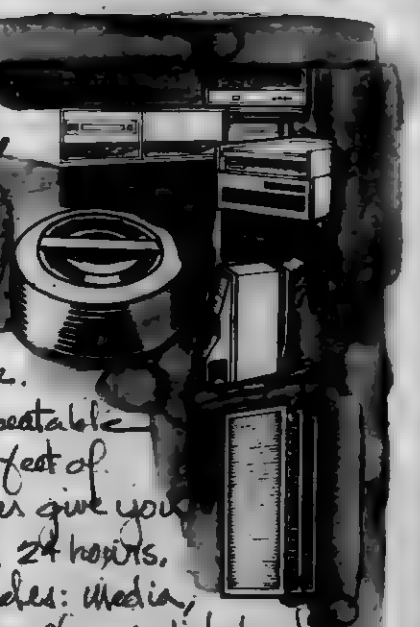
PARAGON BUSINESS FORMS, INC.
Suite 325
5530 Corbin Ave.
Tarzana, CA 91356
(213) 992-6469
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms
Geographic Coverage: National
Year Established: 1965
Number of Employees: 12

PERSONAL [illegible] CO.
[illegible]
San Francisco, CA 94140
(415) 431-5557
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Education; End User
Product Lines: Ribbons
Geographic Coverage: National
Year Established: 1982
Number of Employees: 3

QUIET DESIGNS, INC.
3250-1 Keller St.
Santa Clara, CA 95050
(408) 980-1010
Major Market: [illegible]
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: [illegible]
Product Lines: Ribbons; Disk Packs; Diskettes; Tapes; Furniture; Formatted diskettes
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing: Don Potten
Head of Sales: Marlene Fernandez
Head of Software: Laree Baker
Head of Customer Service: Marlene Fernandez
Geographic Coverage: International

CPX á la Carte

THE FOURTH-PARTY MAINTENANCE CO.



Total support capability..
Only at CPX will you find one source for everything you need to keep your disk drive on line. With every order, you get a whole menu of unbeatable **SERVICE** and **QUALITY**. Our 40,000 sq. feet of facilities and multi-million dollar inventories give you **FAST SHIPMENT** - almost always within 24 hours. Our stock of new disk drive consumables includes: media, spares, subassemblies and the largest inventory of new disk heads, alignment packs and absolute filters anywhere. And, if there's a particularly scarce part we don't have in stock, our **FREE** Locator Task Force will find it for you! That's SERVICE, CPX Style!

CPX's great line of **QUALITY** accessories:

* DISKETTES - CPX + DYSAN
* DISK HEAD CLEANING KITS
* PRINTWHEELS
* PRINTWHEEL CLEANING KITS
* PRINTER RIBBONS

CPX total support includes **REPAIR** of complete disk DRIVES and sub-assemblies -- disk heads, circuit cards and head positioners with **FAST TURNAROUND**. Mechanical subassemblies -- motors and spindles -- are **REFURBISHED** and returned within 5 days! This service includes bench and system testing and a full 90-day warranty, effective from the First day of use!

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Combined multi-product user discounts bring even lower costs to CPX products and services. Your CPX REP. has details.

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Our international blanket export license permits direct shipment world wide.

IF YOU DON'T SEE WHAT YOU NEED, CALL US !!!

CPX
THE FOURTH-PARTY MAINTENANCE CO

CORPORATE OFFICE:
19821 Nordhoff St. · Northridge, CA: 91324
Phone: (213) 341-3793 · Telex 18-1537
N.W. REGION: (201) 756-8040 · S.W. REGION: (713) 661-3424

Suppliers

Year Established: 1977
Number of Employees: 21

QUIETPRINT, INC.
P.O. Box 11067
Santa Rosa, CA 95406
(707) 527-8180
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; Acoustical Hood, Sound Covers
Geographic Coverage: International
Year Established: 1978
Number of Employees: 70

RUSS BASSET CO.
8189 Byron Road
Whittier, CA 90606
(213) 945-2445
Major Market: Miscellaneous Computer Supplies
Target Industries: Micrographics
Product Lines: Furniture; Cabinets for micrographics
Geographic Coverage: International
Year Established: 1961
Number of Employees: 80

RGB DESIGNS
3375 Woodward Ave.
Santa Clara, CA 95050
(408) 748-0400
Major Market: Peripheral Manufacturing; Miscellaneous Computer Supplies
Target Industries: Distributors/Dealers
Product Lines: Furniture
Geographic Coverage: International
Year Established: 1982
Number of Employees: 15

[illegible] SYSTEMS
4044 N. Freeway
P.O. Box 15967
Sacramento, CA 95852
(916) 920-4044
Major Market: Office Equipment Manufacturing; Software House; Systems House OEM; Dealer/Distributor, Maintenance/Other Services; Miscellaneous Computer Supplies
Product Lines: Ribbons; Disk Packs; Diskettes; Tapes; Furniture; Flooring
Contacts:
Head of Marketing: Wendy Reeve
Geographic Coverage: Regional
Year Established: 1968
Number of Employees: 500

SCAN-TRON CORP.
3398 East 70th St.
P.O. Box 5340
Long Beach, CA 90805
(213) 633-4051
Major Market: Peripheral Manufacturing; Miscellaneous Computer Supplies
Product Lines: Forms
Contacts:
Head of Marketing: R. E. Stewart
Geographic Coverage: National
Year Established: 1972
Number of Employees: 150

SERCOMP CORP.
20721 Superior St.
Chatsworth, CA 91311
(213) 341-1660
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Ribbons; Disk Packs; Diskettes; Tapes; printwheels
Net Sales: $5 Million - $25 Million (1980)
Contacts:
Head of Marketing: Angelo Simone
Head of Sales: John Marthens
Geographic Coverage: International
Year Established: 1978
Number of Employees: 85

SIGNAL DATA PROCESSING, INC.
5580 Cherry Ave.
Long Beach, CA 90805
(213) 531-4450
Major Market: Data Services (Service Bureau); Miscellaneous Computer Supplies
Product Lines: Forms
Geographic Coverage: Regional
Year Established: 1971
Number of Employees: 225

SNYDER ELECTRONICS, INC.
2082 N. Lincoln Ave.
Altadena, CA 91001
(213) 794-7139
Major Market: Miscellaneous Computer Supplies
Product Lines: Photoelectric eyes, sensors
Geographic Coverage: National
Year Established: 1952
Number of Employees: 7

STANTRON
6914 Beck Ave.
N. Hollywood, CA 91605
(213) 875-0800
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; Cabinets
Contacts:
Head of Marketing/Sales: Guy Tessier
Geographic Coverage: International
Year Established: 1952
Number of Employees: 130

STROUD RESOURCES CORP.
Stroud & Associates
2022 N. Chester Ave.
Bakersfield, CA 93308
(805) 399-5284
Major Market: Software House; Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Cooperatives; Agriculture; Industrial; Manufacturing
Product Lines: Forms, Ribbons; Disk Packs, Diskettes; Tapes; Furniture; Flooring
Geographic Coverage: West
Year Established: 1980
Number of Employees: 9

SYSTEMS FURNITURE CO.
2727 Maricopa St.
Torrance, CA 90503
(213) 533-1212
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; Housing, Consoles
Contacts:
Head of Sales: Bill Weiss
Geographic Coverage: National
Year Established: 1971
Number of Employees: 200

SCM CORP.
Walton Printing Co.
6400 Artesia Blvd.
Buena Park, CA 90620
(714) 523-3200
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms
Net Sales: $25 Million - $100 Million (1982)
Contacts:
Head of Marketing: Ronald Macholtz
Geographic Coverage: West Coast
Year Established: 1955
Number of Employees: 200

SRW COMPUTER COMPONENTS CO., INC.
18385 Bandilier Circle
Fountain Valley, CA 92708
(714) 963-5500
Major Market: Miscellaneous Computer Supplies
Product Lines: Mag tape package
Geographic Coverage: International
Year Established: 1978

THE BATE JAMISON CARLYLE CORP.
2049 Century Park E.
30th Floor
Los Angeles, CA 90067
(213) 277-4562
Major Market: OEM Computer Systems and Peripherals-Terminals; Software House; Systems House OEM; Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Communications; Banking, Oil
Target Applications: Communications
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Net Sales: $25 Million - $100 Million (1982)
Contacts:
Head of Marketing: Richard Rose
Head of Sales/Software: Woody Bates
Head of Engineering: Richard Smith
Geographic Coverage: International
Year Established: 1970
Number of Employees: 150

THE SUPPLY DEPOT, INC.
290 Easy St.
Unit 4
Simi Valley, CA 93065
(805) 583-0504
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing/Sales: Nick Terani
Geographic Coverage: International
Year Established: 1978
Number of Employees: 17

TOOR FURNITURE CORP.
Suite 14
4935 McConnell Ave.
Los Angeles, CA 90066
(213) 821-1255
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture
Net Sales: $500,000 - $1 Million (1982)
Geographic Coverage: International
Year Established: 1976
Number of Employees: 10

TRACE SYSTEMS, INC.
1928 Old Middlefield Way
Mtn. View, CA 94043
(415) 964-3115
Major Market: Peripheral Manufacturing; Miscellaneous Computer Supplies
Target Industries: Small Industries; Educational
Product Lines: printer sound; enclosure
Contacts:
Head of Marketing/Sales: James Page
Head of Customer Service: Sandy Heckel
Geographic Coverage: National
Year Established: 1981
Number of Employees: 15

TRIMM INDUSTRIES
11939 Sherman Rd.
N. Hollywood, CA 91605
(800) 423-2024
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture
Contacts:
Head of Sales: Phil Drachman
Geographic Coverage: International
Year Established: 1928
Number of Employees: 100

ULTRA MAGNETICS TECHNOLOGY, INC.
7 Hangar Way
Watsonville, CA 95076
(408) 728-7777
Major Market: Miscellaneous Computer Supplies
Product Lines: Diskettes
Contacts:
Head of Marketing: Steve Ferketich
Head of Sales: Bill O'Brien
Geographic Coverage: National
Year Established: 1981
Number of Employees: 170

UVP, INC.
5100 Walnut Grove Ave.
San Gabriel, CA 91778
(213) 285-3123
Major Market: Miscellaneous Computer Supplies
Target Industries: Electronics; Scientific
Product Lines: support equip
Contacts:
Head of Marketing: Bob Sinek
Geographic Coverage: International
Year Established: 1932
Number of Employees: 150

VAN GILD CORP.
16735 E. Johnson Drive
City of Industry, CA 91745
(213) 961-7211
Major Market: Miscellaneous Computer Supplies
Target Industries: Computer Manufacturing; Systems House
Product Lines: Comp Enclosures; Accust covers
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing: Mark Vanlandingham
Head of Sales: Steve Holland
Head of Engineering: Ron Dain
Geographic Coverage: International
Year Established: 1964
Number of Employees: 15

VARNER GRAPHICS CORP.
9787 Olive Lane
Santee, CA 92071

(619) 448-3060
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms
Net Sales: $25 Million - $180 Million (1982)
Contacts:
Head of Marketing/Sales: Tom Soquard
Geographic Coverage: National
Year Established: 1949
Number of Employees: 1,030

VERBATIM CORP.
323 Soquel Way
Sunnyvale, CA 94086
(408) 245-4400
Major Market: Peripheral Manufacturing; Miscellaneous Computer Supplies
Product Lines: Diskettes; Tapes
Contacts:
Head of Marketing: Harry Fekkes
Head of Sales: Scott Cochran
Geographic Coverage: International
Year Established: 1969
Number of Employees: 1,800

VIRCO MANUFACTURING CORP.
15134 S. Vermont Ave.
P.O. Box 44846
Los Angeles, CA 90044
(213) 532-3570
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture
Geographic Coverage: International
Year Established: 1950
Number of Employees: 2,000

VISU-FLEX CO.
7633 Bequette Ave.
Pico Rivera, CA 90660
(213) 949-9591
Major Market: Miscellaneous Computer Supplies
Target Applications: Microfiche
Product Lines: Furniture; Fiche Packaging; Fiche Storage
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Sales: Michael Krawczyk
Geographic Coverage: International
Year Established: 1971
Number of Employees: 35

[illegible]
5845 Uplander Way
Culver City, CA 90230
(213) 410-1444
Major Market: Miscellaneous Computer Supplies
Target Industries: Computer Manufacturers
Product Lines: Tape streamer
Contacts:
Head of Marketing: Keith Ulel
Head of Sales: Whitney Lynn
Head of [illegible]: Tim Eiland
Geographic Coverage: International
Year Established: 1982
Number of Employees: 35

WESCAN INSTRUMENTS, INC.
[illegible] South Blvd
[illegible], CA [illegible]
(408) 727-3519
Major Market: Peripheral Manufacturing; Miscellaneous Computer Supplies
Target Industries: Scientific
Product Lines: Forms; pens

Contacts:
Head of Marketing: Tom Jupille
Geographic Coverage: International
Year Established: 1971
Number of Employees: 20

WESPERCORP
Wesperline
14321 New Myford Road
Tustin, CA 92680
(714) 730-6250
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; Cabinets
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Marketing/Sales: Charles Geiger
Geographic Coverage: International
Year Established: 1978
Number of Employees: 140

WEST COAST BUSINESS PRODUCTS, INC.
Suite 207
6920 Hayvenhurst Ave.
Van Nuys, CA 91406
(213) 989-5533
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: WP; DP
Product Lines: Ribbons; Diskettes; magnetic media; print wheels
Net Sales: $1 Million - $5 Million (1981)
Geographic Coverage: International
Year Established: 1976
Number of Employees: 10

WEST COAST COMPUTER EXCHANGE, INC.
11309 Folsom Blvd.
Rancho Cordova, CA 95670
[illegible]
Major Market: OEM Computer Systems and Peripherals/Terminals; Software House; Systems House OEM; Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Banking; Education; Retail; Engineering
Target Applications: Accounting; Research
Product Lines: Forms; Disk Packs; Diskettes; Tapes
Net Sales: $5 Million - $25 Million (1981)
Geographic Coverage: International
Year Established: 1978
Number of Employees: 30

WESTERN COMPUTER SUPPLY CO.
820-H Los Vallecitos
San Marcos, CA 92069
(619) 744-8250
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes
Geographic Coverage: National
Year Established: 1978
Number of Employees: 12

WORDEX CORP.
1965 Adams Ave.
San Leandro, CA 94577
(415) 568-6796
Major Market: Miscellaneous Computer Supplies
Product Lines: Ribbons; Magnetic media; Printwheels
Net Sales: $1 Million - $5 Million [illegible]

Contacts:
Head of Sales: Jerry Pappalardo
Geographic Coverage: International
Year Established: 1974
Number of Employees: 40

XEROX MAGNETICS
150 Charcot Ave
San Jose, CA 95131
(408) 262-4136
Major Market: [illegible]
Computer Supplies
Product Lines: Disk Packs
Geographic Coverage:

XIDEX CORP.
P.O. Box 418
Sunnyvale, CA 94086
(415) 965-7350
Major Market: Miscellaneous Computer Supplies
Product Lines: Diskettes; Micrographics, Supplies
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing/Sales: Glen Mezher
Head of Sales: Glen Mezher
Geographic Coverage: International
Year Established: 1969
Number of Employees: 600

COLORADO

ASPEN RIBBONS, INC.
1700 N. 55th St.
Boulder, CO 80301
(303) 444-4054
Major Market: Miscellaneous Computer Supplies
Target Industries: Wholesale; OEM
Product Lines: Ribbons
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing/Sales: Peter C. Williams
Head of Engineering: William Schiffmacher
Head of Customer Service: Dianne Gendreau
Geographic Coverage: International
Year Established: 1976
Number of Employees: 80

BROWN DISC MANUFACTURING, INC.
1015 Garden of the Gods Road
Colorado Springs, CO 80907
(303) 593-1015
Major Market: Miscellaneous Computer Supplies
Target Industries: [illegible] manufacturing, OEM
Product Lines: Diskettes
Contacts:
Head of Marketing/Sales: Bill Michalenko
Head of Engineering: Bob Pretko
Geographic Coverage: International
Year Established: 1981
Number of Employees: 120

COMPUTER PRODUCTS & SYSTEMS, INC.
755 S. Federal Blvd.
Denver, CO 80219
(303) 922-5882
Major Market: Miscellaneous Computer Supplies
Product Lines: Disk Packs; Diskettes; Tapes; Flooring; Labels; A/C Systems
Geographic Coverage: Wyoming, Colorado
Year Established: 1958
Number of Employees: 6

DAKOTA GRAPHICS, INC.
9655 W. Colfax
Lakewood, CO 80215
(303) 237-0406
Major Market: Data Services (Service Bureau); Miscellaneous Computer Supplies
Target Industries: Eng.
Product Lines: Aperture cards; Micro film supplies
Computer
Head of Sales: Dean A. Ward
Geographic Coverage: International
Year Established: 1946
Number of Employees: 30

ENGINEERED DATA PRODUCTS
470 E. 76th
Denver, CO 80229
(303) 289-4676
Major Market: Office Equipment Manufacturing, Miscellaneous Computer Supplies
Target Applications: Media Storage
Product Lines: Furniture, media storage equipment
Contacts:
Head of Marketing/Sales: Mr. C. Folden
Head of Engineering: Mr. W. Atkinson
Geographic Coverage: International
Year Established: 1975
Number of Employees: 50

INPUT-EZ CORP.
7330 S. Alton Way
Unit E
Englewood, CO 80112
(303) 779-5571
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; Terminal Stands
Net Sales: $500,000 - $1 Million (1981)
Contacts:
Head of Marketing: Martin Mann
Geographic Coverage: International
Year Established: 1980
Number of Employees: 10

OFFICE PRODUCTS INTERNATIONAL
P.O. Box 26339
Denver, CO 80226
(303) 279-9341
Major Market: Miscellaneous Computer Supplies
Product Lines: Ribbons; printwheels
Geographic Coverage: International
Year Established: 1975
Number of Employees: 35

SAMSONITE CORP.
Contract Furniture
[illegible] E. 40th Ave.
Denver, CO 80216
(303) 373-6134
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; CRT stands, Terminal stands
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Marketing: Robert Raichle

Suppliers

Geographic Coverage: International
Year Established: 1951
Number of Employees: 1,000

TOTAL BUSINESS SYSTEMS, INC.
3470 S Broadway
Englewood, CO 80110
(303) 762-8430
Major Market: Software House, Systems House OEM; Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Financial, Construction
Target Applications: File management, WP
Product Lines: Ribbons, Disk Packs; [illegible]
Net Sales: $500,000 - $1 Million (1982)
Contacts:
Head of Marketing: Marj Nickum
Head of Engineering: Anthony Racz
Head of Customer Service: Lisa Racz
Geographic Coverage: Denver
Year Established: 1961
Number of Employees: 15

CONNECTICUT

STA-TEK, INC.
Danver Division
1813 Dixwell Ave
Hamden, CT 06514
(203) 288-6666
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; Microfilm
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Sales: R. W. D'Angelo
Geographic Coverage: National
Year Established: [illegible]
Number of Employees: 40

MAGNETIC INFORMATION SYSTEMS, INC.
415 Howe Ave
Shelton, CT 06484
(203) 735-8477
Major Market: Miscellaneous Computer Supplies
Product Lines: Diskettes; Cassettes
Contacts:
Head of Marketing/Engineering: Vince Rucco
Geographic Coverage: International
Year Established: 1976
Number of Employees: 12

MULTIFORMS, INC.
480 Kings Highway Cut-off
P.O Box 971
Fairfield, CT 06430
(203) 255-9800
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms; Custom Continous; Data entry form
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Marketing/Sales: Lou Cervini
Head of Engineering: Craig Ellenbogen
Head of Customer Service: Gary Spadoni
Geographic Coverage: Regional
Year Established: 1954
Number of Employees: 60

TRANSCIENCE INDUSTRIES, INC.
179 Ludlow St
Stamford, CT 06902
(203) 327-7810
Major Market: Miscellaneous Computer Supplies
Target Industries: OEM; Dealer, Distributor
Product Lines: security system
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Marketing: Douglas W. Sherman
Head of Engineering: Manfred Davis
Geographic Coverage: International
Year Established: 1970
Number of Employees: 98

XEROX CORP.
Headquarters
800 Longridge Road
P.O Box 1600
Stamford, CT 06904
(203) 329-8700
Major Market: Computer, Terminal, Peripheral, Office Equipment Manufacturing; Software House, Systems House OEM, Maintenance/Other Services, Miscellaneous Computer Supplies
Target Industries: Government; General Business
Product Lines: Forms, Ribbons
Net Sales: More than $100 Million (1981)
Contacts:
Head of Customer Service: John V. Titsworth
Geographic Coverage: International
Year Established: 1906
Number of Employees: 121,000

FLORIDA

ATLANTIC DATA FURNITURE PRODUCTS, INC.
4507 W. Alva Ave.
Tampa, FL 33614
(813) 879-3504
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; Tape Library
Contacts:
Head of Marketing: John Kellogg
Head of Sales: Steve Lipton
Geographic Coverage: National
Year Established: 1978
Number of Employees: 26

BETTER BUSINESS FORMS, INC.
6201 80th Ave. N.
P.O Box 250
Pinellas Park, FL 33565
(813) 223-2568
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms, Ribbons; Disk Packs; Diskettes; Tapes
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Marketing: Greg [illegible]
Head of Engineering: Joe Baker
Geographic Coverage: Regional
Year Established: 1960
Number of Employees: 260

BUSINESS EQUIPMENT & SUPPLY
3645 Fowler St.
Ft. Meyers, FL 33901
(813) 939-4554
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs, Diskettes; Tapes; Furniture
Net Sales: $500,000 - $1 Million (1982)
Contacts:
Head of Marketing: Clifford Warden
Geographic Coverage: Florida
Year Established: 1962
Number of Employees: 14

COMPUTER SUPPLY CORP.
1365 N. W. 159 St.
Miami, FL 33169
(305) 620-6400
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons, Diskettes; Furniture; Media products
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Sales: Tom Crawford
Geographic Coverage: Florida
Year Established: 1975
Number of Employees: 15

MEDIA SERVICE GROUP
Suite 300
15 E. Merritt Island Causeway
First National Bank Building
Merritt Island, FL 32952
(305) 453-5003
Major Market: Systems House OEM; Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Small Business
Product Lines: Forms; Ribbons; Diskettes
Geographic Coverage: [illegible]
Year Established: 1982
Number of Employees: 5

NATIONAL DATA PRODUCTS, INC.
8510 Sunstate
Tampa, FL 33614
(813) 886-6661
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Banks; [illegible]
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture; Flooring
Contacts:
Head of Marketing: Howard Sellars
Geographic Coverage: National
Year Established: 1972
Number of Employees: 200

ROYAL BETA, INC.
2199 Garden St.
P.O Box 2745
Titusville, FL 32780
(305) 267-1960
Major Market: Computer Manufacturing, OEM Computer Systems, Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Manufacturing; Small Business
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Marketing: Gene Kelly
Head of Software: Chuck Brosser
Head of Customer Service: Perry Fisch
Geographic Coverage: International
Year Established: 1979
Number of Employees: 22

VALBRO BUSINESS FORMS
37 N. Boyd
Winter Garden, FL 32787
(305) 656-2331
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms
Contacts:
Head of Marketing: Bert Valdes
Geographic Coverage: National
Year Established: 1937
Number of Employees: 50

GEORGIA

CURTIS 1000, INC.
1000 Curtis Drive
Smyrna, GA 30080
(404) 436-6155
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs, Diskettes; Tapes; Letterheads; Envelope printing
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: R. A. Woollacott
Geographic Coverage: National
Year Established: 1882
Number of Employees: 2,000

LABEL ARTISTS, INC.
5430 Ponce De Leon Ave.
P.O Box 1245
Stone Mountain, GA 30083
(404) 934-8040
Major Market: Miscellaneous Computer Supplies
Target Applications: Printing labels.
Product Lines: Computer labels
Net Sales: $1 Million - $5 Million (1982)
Geographic Coverage: National
Year Established: 1980
Number of Employees: 20

UNITED ENGINEERING CO., INC.
980 Johnson Ferry Road
Atlanta, GA 30342
(404) 256-4871
Major Market: Miscellaneous Computer Supplies; Manufacturer's Rep
Target Industries: Government; Airlines, Scientific
Product Lines: Support equipment for computer room
Contacts:
Head of Marketing: E. William Vester
Geographic Coverage: Regional
Year Established: 1964
Number of Employees: 6

WOODBURY BUSINESS FORMS, INC.
101 Industrial Blvd.

La Grange, GA 30240
(404) 882-2977
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms
Geographic Coverage: National
Year Established: 1954
Number of Employees: 180

IDAHO

BOISE CASCADE CORP.
1 Jefferson Square
Boise, ID 83728
(208) 384-6161
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Furniture, Paper, Packaging
Net Sales: Over $100 Million (1982)
Contacts:
Head of Marketing: Jon H. Miller
Geographic Coverage: International
Year Established: 1957
Number of Employees: 28,300

COMPUTERIZED DATA, INC.
Suite 201
718 N. Skyline
Idaho Falls, ID 83402
(208) 529-8576
Major Market: Software House; Miscellaneous Computer Supplies
Product Lines: Forms
Net Sales: $500,000 - $1 Million (1982)
Geographic Coverage: International
Year Established: 1981
Number of Employees: 3

IOWA

MID-AMERICA SUPPLY CO., INC.
1548 N.W. 86th St.
Des Moines, IA 50311
(515) 225-3866
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms, Disk Packs; Tapes, Furniture; Flooring
Net Sales: $500,000 - $1 Million (1982)
Geographic Coverage: National
Year Established: 1971
Number of Employees: 5

RING KING VISIBLES, INC.
Muscatine, IA 52761
(319) 263-8144
Computer Supplies
Product Lines: Furniture; Floppy files, Stands; Binders
(1982)
Geographic Coverage: International
Year Established: 1971
Number of Employees: 125

ILLINOIS

ADVANCE ACCESS GROUP, INC.
Suite 315
2200 S. Main St.
Lombard, IL 60148
(312) 629-5600
Computer Supplies
Product Lines: Storage units; Antistatic mats
Contacts:
Head of Customer Service: Bette Baumbeck
Geographic Coverage: International
Year Established: 1974
Number of Employees: 12

AMBASSADOR OFFICE EQUIPMENT, INC.
1590 Touhy Ave
Elk Grove Village, IL 60007
(312) 228-5700
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms, Ribbons; Disk Packs; Diskettes, Tapes; Furniture, Flooring
Geographic Coverage: Chicago area
Year Established: 1974
Number of Employees: 100

AMCO ENGINEERING CO.
3801 N. Rose St.
Schiller Park, IL 60176
(312) 671-6670
Major Market: Maintenance/Other Services; Miscellaneous Computer Supplies
Product Lines: Furniture; Enclosures
Contacts:
Head of Marketing: Robert Komarek
Head of Sales: Floyd Johnson
Geographic Coverage: National
Year Established: 1943
Number of Employees: 230

AMERICAN INTELLIGENT MACHINES
175 Halfday Road
P.O. Box 48
Lincolnshire, IL 60069
(312) 634-0076
Major Market: OEM Computer Systems; Software House; Systems House OEM, Data Services (Service Bureau), Dealer/Distributor, Maintenance/Other Services, Miscellaneous Computer Supplies
Target Applications: Business systems; Accounting systems
Diskettes, Tapes
Contacts:
Head of Marketing: Susan Tharp
Head of Software: S.Smith
Geographic Coverage: International
Year Established: 1975

AVERY INTERNATIONAL CO.
Agner Co.
426 S. Clinton St.
Chicago, IL 60607
(312) 427-7414
Major Market: Miscellaneous
Product Lines: Forms; Indexes; Guides
Net Sales: $25 Million - $100 Million
(1982)
Contacts:
Head of Marketing: Philip Corse
Geographic Coverage: International
Year Established: 1909
Number of Employees: 800

ACCO INTERNATIONAL, INC.
U.S. Division
770 S. Acco Plaza
Wheeling, IL 60090
(312) 541-9500
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; Retention furniture for mag media
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: R. D. Stamm
Geographic Coverage: International
Year Established: 1907
Number of Employees: 1,000

ACL, INC.
1960 E. Devon
Elk Grove Village, IL 60007
(312) 981-9212
Major Market: Miscellaneous Computer Supplies
Product Lines: Anti-static products
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing: Stephen A. Halperin
Geographic Coverage: National
Year Established: 1953
Number of Employees: 10

AM INTERNATIONAL, INC.
Corporate Headquarters
130 E. Randolph St.
Chicago, IL 60601
(312) 565-2800
Major Market: Terminal, Peripheral, Communications Equipment Manufacturing, OEM Computer Systems and Peripherals/Terminals; Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Engineering, Manufacturing
Target Applications: OCR, Graphics, CAD
Product Lines: Forms; Ribbons,
Year Established: 1924
Number of Employees: 12,000

BRETFORD MANUFACTURING
9715 Soreng Ave
Schiller Park, IL 60176
(312) 678-2545
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Sales: David Petrick
Geographic Coverage: International
Year Established: 1948

BRITTAIN CORP.
Des Plaines, IL 60018
(312) 635-5200
Major Market: Miscellaneous Computer Supplies
Target Industries: Engineering; Architecture
Product Lines: CAD Supplies
Contacts:
Head of Engineering: Ron Blaur
Geographic Coverage: International
Number of Employees: 300

FELLOWES MANUFACTURING CO.
Eichner Systems
1789 Norwood Ave.
Itasca, IL 60143
(312) 893-1600
Major Market: Miscellaneous Computer Supplies
Product Lines: Storage devices
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Marketing: Thomas Schultz
Geographic Coverage: International
Year Established: 1925
Number of Employees: 39

JAMES METAL PRODUCTS CO.
James System Division
2929 N. Oakley Ave
Chicago, IL 60618
(312) 472-2611
Major Market: Peripheral, Office Equipment Manufacturing, Miscellaneous Computer Supplies
Product Lines: Furniture
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Marketing: W. K. Hollander
Head of Engineering: L. Patterson
Geographic Coverage: International
Year Established: 1890
Number of Employees: 26

MAGNETIC SHIELD
Perfection Mica Co
740 N. Thomas Drive
Bensenville, IL 60106
(312) 766-7800
Computer Supplies
Product Lines: Carrying case for mag media
Contacts:
Head of Marketing: Gerald Sodaro
Geographic Coverage: National
Year Established: 1941
Number of Employees: 45

MICROSEAL CORP.
2000 Lewis Ave
Zion, IL 60099
(312) 872-1666
Major Market: Software House; Miscellaneous Computer Supplies
Product Lines: Micrographics, Supplies
Contacts:
Geographic Coverage: International
Year Established: 1960
Number of Employees: 50

MOORE BUSINESS FORMS, INC.
U.S. Forms
1205 Milwaukee Ave.
Glenview, IL 60025
(312)
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms
(1981)
Geographic Coverage: International
Year Established: 1882
Number of Employees: 12,000

NATIONAL RICE CORP.
297 Carlton
Carol Stream, IL 60188
(312) 682-0001
Major Market: Miscellaneous Computer Supplies
Target Industries: WP, DP
Product Lines: Ribbons; Disk Packs,

Suppliers

Diskettes; Tapes; Furniture; Paper; Printwheels
Geographic Coverage: International
Year Established: 1982
Number of Employees: 75

OFFICE ELECTRONICS, INC.
122 W. 22nd St.
Oak Brook, IL 60521
(312) 655-6400
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms; Tab cards
Contacts:
Head of Sales: William Heidemann
Geographic Coverage: Regional
Year Established: 1956
Number of Employees: 300

OFFICE SUITES, INC.
359 N. Wells St.
Chicago, IL 60610
(312) 467-6290
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; Wall
Net Sales: $5 Million - $25 Million (1981)
Geographic Coverage: Natignal
Year Established: 1967
Number of Employees: 250

PERFECT PLASTIC PRINTING CORP.
136 Official Road
P.O. Box 124
Addison, IL 60101
(312) 543-7680
Major Market: Miscellaneous Computer Supplies
Target Industries: Banking
Product Lines: Mag stripe cards
Contacts:
Head of Marketing: R. J. Hildreth
Geographic Coverage: National
Year Established: 1964
Number of Employees: 100

PRYOR CORP.
Computer Supplies
400 N. Michigan Ave.
Chicago, IL 60611
(312) 614-5650
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Contacts:
Head of Marketing: George Porter
Geographic Coverage: Regional
Year Established: 1921
Number of Employees: 320

QUILL CORP.
100 S. Schelter Road
Lincolnshire, IL 60069
(312) 634-4800
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes
Contacts:
Head of Marketing: Don Hoff
Geographic Coverage: National
Year Established: 1934
Number of Employees: 300

REMOTE COMPUTING SUPPLIES
3415 Hickory Trail
Downers Grove, IL 60515
(312) 964-7500
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture; Paper Holding devices; Antistatic mats
Net Sales: $100,000 - $500,000 (1982)
Geographic Coverage: National
Year Established: 1969
Number of Employees: 3

SHEPARD GROUP CO.
Suite 603
6 N. Michigan Ave.
Chicago, IL 60602
(312) 346-7090
Major Market: Peripheral and Office Equipment Manufacturing, Systems House OEM; Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Printwheels
Contacts:
Head of Marketing: Ralph Birdsong
Geographic Coverage: National
Year Established: 1979
Number of Employees: 20

STAR FORMS, INC.
4414 River Drive
Milne, IL 61265
(309) 797-1389
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms
Net Sales: $25 Million - $100 Million (1981)
Contacts:
Head of Marketing: Jeff Gilfilan
Head of Sales: Carr Summers
Geographic Coverage: National
Year Established: 1959
Number of Employees: 150

TAPE RESEARCH, INC.
150 Chicago St.
Cary, IL 60013
(312) 639-0585
Major Market: Peripheral Manufacturing, Miscellaneous Computer Supplies
Product Lines: Tapes; Floppy Disk Media
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Marketing: Dennis Gotsch
Geographic Coverage: International
Year Established: 1975
Number of Employees: 55

TRI, INC.
150 Chicago St.
Cary, IL 60013
(312) 639-0585
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Ribbons; Diskettes; Tapes
Contacts:
Head of Marketing: Dennis Gotsch
Geographic Coverage: International
Year Established: 1975
Number of Employees: 50

UARCO, INC.
W. County Line Road
Barrington, IL 60010
(312) 381-7000
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture; Paper Holding devices; Antistatic mats
Contacts:
Head of Marketing: L. S. Richards
Head of Sales: B. H. Moses
Geographic Coverage: National
Year Established: 1894
Number of Employees: 4,500

UARCO, INC.
Uarco Computer Supplies
121 N. Ninth St.
P.O. Box 948
Dekalb, IL 60115
(800) 435-0713
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms, Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Contacts:
Head of Marketing: Lois S. Richards
Head of Sales: Richard C. Meara
Geographic Coverage: National
Year Established: 1980

WABASH DATA TECH, INC.
2 Continental Towers
1701 Golf Road
Rolling Meadow, IL 60008
(312) 593-6363
Major Market: Peripheral Manufacturing; Miscellaneous Computer Supplies
Product Lines: Diskettes; Tapes
Contacts:
Head of Marketing: Joseph Ganley
Geographic Coverage: International
Year Established: 1981
Number of Employees: 50

WALLACE COMPUTER SERVICES, INC.
4600 W. Roosevelt Road
Hillside, IL 60162
(312) 449-8600
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Tapes; Furniture; Labels
Contacts:
Head of Sales: J. Schwan
Geographic Coverage: National
Year Established: 1925
Number of Employees: 2,000

WILSON JONES CO.
6150 W. Touhy Ave.
Chicago, IL 60648
(312) 774-7700
Major Market: Systems House OEM; Miscellaneous Computer Supplies
Target Applications: Accounting
Product Lines: Forms; Furniture; Office supplies; Binders
Contacts:
Head of Marketing/Sales: James A. Yeas
Year Established: 1907

INDIANA

CORNELIUS BUSINESS FORMS & SYSTEMS
Suite 315
3435 Emmerson Way, N.
Indianapolis, IN 46226
(317) 545-4240
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms, Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Sales: David Cornelius
Geographic Coverage: Indiana
Year Established: 1900
Number of Employees: 12

DONSORE CORP.
2400 Sterling Ave.
P.O. Box 1289
Elkhart, IN 46515
(219) 293-0621
Major Market: Miscellaneous Computer Supplies
Target Industries: Business
Product Lines: Furniture
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Sales: Gary H. Beals
Head of Engineering: Roy W. Fink
Geographic Coverage: National
Year Established: 1961
Number of Employees: 200

WILLAMETTE INDUSTRIES, INC.
Business Forms
6451 Saguaro Court
Indianapolis, IN 46268
(317) 297-3033
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms
Net Sales: More than $100 Million (1981)
Geographic Coverage: International
Year Established: 1969
Number of Employees: 8,200

KANSAS

DILLARD, INC.
625 Adams St.
Kansas City, KS 66105
(913) 621-6700
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Sales: Thomas R. Hyland
Head of Engineering: Bob Wehner
Geographic Coverage: International
Year Established: 1886
Number of Employees: 200

THE WOOD WORKS
11th and Haskel
P.O. Box 407
Lawrence, KS 66044
(913) 842-7797
Major Market: Miscellaneous Computer Supplies
Target Industries: Micro users
Product Lines: Furniture
Contacts:
Head of Marketing: Dan Coester
Geographic Coverage: National
Year Established: 1980
Number of Employees: 15

KENTUCKY

EAGLES COMPUTER FORMS
620 Lane Allen Road
P.O. Box 11490

Lexington, KY 40504
(606) 277-4111
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms
Contacts:
Head of Marketing: R. C. Fuller
Geographic Coverage: U.S. and Canada
Year Established: 1978
Number of Employees: 40

MASSACHUSETTS

ATANT, INC.
P.O. Box A
Concord, MA 01742
(617) 369-0660
Major Market: Miscellaneous Computer Supplies
Target Industries: Education; Hospitals, General Industry
Product Lines: Photo ID equipment
Contacts:
Head of Sales: Michael Hanson
Geographic Coverage: National
Year Established: 1963
Number of Employees: 14

ATS CASES
25 Washington Ave.
Natick, MA 01760
(617) 653-5724
Major Market: Miscellaneous Computer Supplies
Product Lines: computer cases
Geographic Coverage: National
Year Established: 1975
Number of Employees: 12

BUSINESS PRODUCTS UNLIMITED
1235 Adams St.
Dorchester, MA 02124
(617) 296-0090
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture; Mag charting system
Geographic Coverage: Greater Boston
Year Established: 1969
Number of Employees: 40

BASF SYSTEMS CORP.
Crosby Drive
Bedford, MA 01730
(617) 271-4000
Major Market: Peripheral Manufacturing; Miscellaneous Computer Supplies
Product Lines: Disk Packs; Diskettes; Tapes
Net Sales: Less than $100,000 (1981)
Contacts:
Head of Marketing/Sales: John J. Heallon
Geographic Coverage: National
Year Established: 1961
Number of Employees: 1,100

CYBERNETICS BUILDING TECHNOLOGY
77 Dragon Court
Woburn, MA 01888
(617) 935-4600
Major Market: Data Services (Service Bureau); Miscellaneous Computer Supplies
Target Industries: Military; Computer Manufacturers
Product Lines: Non Electronic; Static Control
Contacts:
Head of Marketing/Sales: Jerry Karr
Head of Engineering: Pete Bixler
Head of Customer Service: Roger Emma
Geographic Coverage: International
Year Established: 1961
Number of Employees: 475

COMPUTER-LINK CORP.
Media Equipment Sales
40 Ray Ave.
Burlington, MA 01803
(617) 272-7400
Major Market: Miscellaneous Computer Supplies
Target Industries: IBM Installations
Product Lines: Disk/Cart Inspectors; Tape Degausser
Contacts:
Head of Marketing: Roger Gates
Head of Sales: R. Donald Blackburn
Head of Engineering: David Goldman
Geographic Coverage: International
Year Established: 1968
Number of Employees: 130

DATA FORMS CO., INC.
28 Travis St.
Boston, MA 02134
(617) 783-2330
Major Market: Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Small business; Medical business
Target Applications: Timesharing; Financial, Education, Medical
Product Lines: Forms, Ribbons; Disk Packs; Diskettes; Mag tape
Contacts:
Head of Sales: Ken Oshner
Geographic Coverage: Regional
Year Established: 1965
Number of Employees: 105

DATA PACKAGING CORP.
Computer Sales
205 Broadway
Cambridge, MA 02139
(617) 868-6200
Major Market: Miscellaneous Computer Supplies
Product Lines: Disk Packs; Storage
Net Sales: $25 Million - $100 Million (1981)
Contacts:
Head of Marketing: Jackie Bridges
Head of Sales, Gene Hull
Geographic Coverage: International
Year Established: 1946
Number of Employees: 450

DENNISON KYBE CORP.
132 Cavary St.
Waltham, MA 02254
(617) 899-0012
Major Market: Peripheral Manufacturing; Miscellaneous Computer Supplies
Target Industries: Distribution, Manufacturing
Product Lines: Disk Packs; Tapes; Diskettes; Cleaning and Test Equipment
Net Sales: $5 Million - $25 Million (1981)
Contacts:
Head of Marketing: Richard K. Hurley
Geographic Coverage: International
Year Established: 1980
Number of Employees: 340

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DENNISON NATIONAL
1 Water St.
P.O. Box 791
Holyoke, MA 01041
(413) 539-9811
Major Market: Government, Computer and Office Equipment Manufacturing; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs, Diskettes; Tapes, Furniture, Filing Accessories
Net Sales: $25 Million - $100 Million (1981)
Contacts:
Head of Marketing: Richard McCarthy
Geographic Coverage: National
Year Established: 1844
Number of Employees: 2,000

DFS COMPUTER FORMS
P.O. Box 643
Townsend, MA 01469
(617) 448-6167
Major Market: Government, Computer Supplies
Target Industries: Small Business; Software Houses
Product Lines: Forms
Contacts:
Head of Sales: Don Gordon
Head of Software: Ron Richard
Geographic Coverage: National
Year Established: 1981
Number of Employees: 35

GREAT BARRINGTON, MA.
Rt. 71
P.O. Box 149
Great Barrington, MA 01230
(800) 292-6625
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Paper, Ribbons, Disk Packs; Diskettes, Tapes, Furniture, Flooring, printwheels
Geographic Coverage: International
Year Established: 1977
Number of Employees: 15

IDENTIFICATION SYSTEMS
4 High St.
Acton, MA 01720
(617) 263-2111
Major Market: Manufacturing, Computer Supplies
Product Lines: Mag stripe card; Photo ID cards
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing: Marie Bellen
Geographic Coverage: International
Year Established: 1972
Number of Employees: 25

INTERNATIONAL DISPLAY EQUIPMENT CORP.
1 Worcester Road
Natick, MA 01760
(617) 237-7010
Major Market: Miscellaneous

Suppliers

Computer Supplies
Target Industries: Manufacturing; Education; Lodging
Product Lines: Partitions; Display [illegible]
Net Sales: $100,000 - $500,000 (1981)
Contacts:
Head of Marketing/Sales: Robert Keeley
Head of Customer Service: Martin Rabinovitz
Geographic Coverage: Regional
Year Established: 1967
Number of Employees: 6

MANCHESTER EQUIPMENT CO., INC.
P.O. Box 1406
Manchester, MA 01944
(617) 526-4912
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: End User; Minis
[illegible]: [illegible]
Product Lines: Forms; Ribbons; Disk Packs; Diskettes
Net Sales: $5 Million - $25 Million
[illegible]
Contacts:
Head of Marketing: Aaron Reibstein
Geographic Coverage: National
Year Established: 1971
Number of Employees: 100

NEW ENGLAND WORD PROCESSING, INC.
84 Cummings Park
Woburn, MA 01801
(617) 938-1900
Major Market: Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Product Lines: Ribbons; Diskettes
Net Sales: $500,000 - $1 Million (1981)
Geographic Coverage: New England
Year Established: 1980
Number of Employees: 10

NEWMAR, INC.
55 Salem St.
Lynnfield, MA 01940
(617) 245-7960
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Geographic Coverage: National
Year Established: 1965
Number of Employees: 16

NORTHEAST DATA PROCESSING SUPPLIES, INC.
8 Blanchard Road
Burlington, MA 01803
(617) 272-7158
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Ribbons; Disk Packs; Diskettes; Tapes; Furniture; Labels
Geographic Coverage: Regional
Year Established: 1974
Number of Employees: 8

OMNI RESOURCES CORP.
58 Howe Ave.
Millbury, MA 01527
(617) 799-0197
Major Market: Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Software Houses; Dealers; Publisher
Product Lines: Diskettes
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing: C. J. Anand
Geographic Coverage: International
Year Established: 1981
Number of Employees: 20

PERICOMP CORP.
14 Huron Drive
Natick, MA 01760
(617) 237-4052
Major Market: Computer Manufacturing; Software House; Systems House OEM; Miscellaneous Computer Supplies
Target Industries: Tape Users
Target Applications: Accounting; Inventory Control; Planning
Product Lines: Tapes, Cassettes
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing: John Fleming
Geographic Coverage: International
Year Established: 1971
Number of Employees: 35

PRECISION HANDLING DEVICES, INC.
63 S. Main St.
Assonet, MA 02702
(617) 644-5282
Major Market: Component Manufacturing; OEM Peripherals/Terminals; Miscellaneous Computer Supplies
Target Industries: Computer Printers
Product Lines: Paper feeders
Contacts:
Head of Marketing/Customer Service: John Morelli
Head of Engineering: Leo Kerivan
Geographic Coverage: International
Year Established: 1974
Number of Employees: 100

SCOPUS CORP.
333 Aiken St.
P.O. Box 1437
Lowell, MA 01853
(617) 454-8033
Major Market: Maintenance/Other Services; Miscellaneous Computer Supplies; Disc and Tape Refurbishing
Target Industries: Insurance; Banking; Manufacturing
Product Lines: Disk Packs; Tapes
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Marketing: William H. Dwyer
Head of Sales: John R. Trask
Geographic Coverage: National
Year Established: 1971
Number of Employees: 200

SENTINEL COMPUTER PRODUCTS
Division of Packaging Industry Group, Inc.
130 North St.
Hyannis, MA 02601
(617) 775-5220
Major Market: Miscellaneous Computer Supplies
Product Lines: Diskettes; Diskette Jackets
Contacts:
Head of Marketing: Peter McGurik
Geographic Coverage: International
Year Established: 1980

THE BROKERS OF NEW ENGLAND, INC.
45 Central St.
Norwood, MA 02062
(617) 769-4060
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Sales: Rick Mansfield
Geographic Coverage: Regional
Year Established: 1974
Number of Employees: 12

UNITED TECHNICAL PRODUCTS, INC.
32 S.W. Industrial Park
Westwood, MA 02090
(617) 326-7611
Major Market: Miscellaneous Computer Supplies
Target Industries: Computer manufacturers
Product Lines: Flooring; anti-static mat; products
Contacts:
Head of Marketing/Sales: Thomas Zogby
Head of Engineering: William Klein
Head of Customer Service: Joan [illegible]
Year Established: 1977
Number of Employees: 12

WRIGHT LINE, INC.
160 Goldstar Blvd.
Worcester, MA 01606
(617) 852-4300
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Disk Packs; Diskettes; Tapes; Furniture; Data Banks; Comp Acc
Net Sales: $25 Million - $100 Million (1982)
Contacts:
Head of Marketing: Wayne Clemens
Head of Software: James Young
Head of Engineering: David Wright
Head of Customer Service: Thomas Londergan
Geographic Coverage: International
Year Established: 1934
Number of Employees: 950

MARYLAND

AIRFLOW CO.
19950 Laytonsville Road
Gaithersburg, MD 20879
(301) 948-5000
[illegible]: Miscellaneous
Computer Supplies
Contacts:
Head of Marketing: Owen Thomas
Head of Sales: Henry Cousineau
Geographic Coverage: International
[illegible]
Number of Employees: 115

ATLANTIC [illegible] CORP.
Interstate Park
P.O. Box 100
Williamsport, MD 21795
(301) 223-8900
[illegible]:
Computer Supplies
Product Lines: Furniture
Net Sales: $1 Million - $5 Million (1981)
Geographic Coverage: National
Year Established: 1964
Number of Employees: 30

[illegible], INC.
1055 First St
Rockville, MD 20850
(301) 340-3300
Major Market: Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: R & D
Product Lines: Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Marketing: Arleen Chafitz
Head of Engineering: Gerry Cain
Geographic Coverage: Maryland; Virginia; Washington, DC
Year Established: 1971
Number of Employees: 30

CHAMPION DATA PRODUCTS, INC.
28-Q Industrial Park Drive
St. Charles, MD 20601
(301) 843-6980
Major Market: Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Federal government; Commercial attorneys; General business
Product Lines: Ribbons; Disk Packs; Diskettes; Tapes; Test Equipment
Geographic Coverage: Metropolitan Washington Area
Year Established: 1981
Number of Employees: 4

[illegible] SYSTEMS, INC.
Media Division
[illegible]
[illegible], MD 20850
(301) 881-2044
Major Market: Maintenance/Other Services; Miscellaneous Computer [illegible]
[illegible]: Tapes
Geographic Coverage: National
[illegible]
Number of Employees: 100

KLEEN STRIKE, INC.
9167 Red Branch Road
Columbia, MD 21045
(301) 997-5868
[illegible]:
Computer Supplies
Product Lines: Ribbons
Contacts:
Head of Sales/Customer Service: Sylvia Moore
Head of Engineering: Leonard Streigh
Geographic Coverage: International
[illegible]
Number of Employees: 35

[illegible] INDUSTRIES, INC.
Magnetic Media Products
4015 Sandy Spring Road
Burtonsville, MD 20866
(301) 384-1300
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Government; Manufacturing; Legal; Associations
Product Lines: Forms, Ribbons; Disk Packs; Diskettes; Tapes;

Toners, Developers, Print Wheels
Net Sales: $1 Million - $5 Million (1982)
[illegible]
Head of Marketing/Sales: Gabriel Najar
Head of Customer Service: Leigh Tran
Geographic Coverage: National
Year Established: 1976
Number of Employees: 8

TATE [illegible] PRODUCTS
[illegible] Montevideo Road
Jessup, MD 20794
(301) 799-4200
Major Market: Miscellaneous Computer Supplies; Access Flooring Manufacturing
Product Lines: Flooring
Net Sales: $25 Million - $100 Million (1981)
Contacts:
Head of Marketing: Del Birch
Head of Sales: Bill Morrill
Head of Software: Al Kiesling
Head of Engineering: Ronald Anderson
Head of Customer Service: Thomas Kidd
Geographic Coverage: International
Year Established: 1965
Number of Employees: 400

TESSCO, INC.
Bud Information Systems
101 Lakefront Drive
Cockeysville, MD 21030
(301) 628-5300
Major Market: Miscellaneous Computer Supplies
Target Industries: Dealers
Product Lines: Diskettes
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing: Jack Armstrong
Geographic Coverage: National
Year Established: [illegible]
Number of Employees: 20

MICHIGAN

AMERICAN SEATING CO.
Contract Prod./ Office Systems
901 Broadway
Grand Rapids, MI 49504
(616) 456-0600
[illegible]
Computer Supplies
Product Lines: Furniture; Office systems
Contacts:
Head of Marketing: Richard N. Keener
Head of Sales: Fred Sheldon
Head of Software: Ron Donahue
Head of Engineering: Robert Knopp
Head of Customer Service: George Cook
Geographic Coverage: International
Year Established: 1930
Number of Employees: 1,300

AZTECA [illegible], INC.
Azteca Computer Systems
[illegible] Lone Pine Road
A/200
West Bloomfield, MI [illegible]
[illegible] 626-1564

Major Market: OEM Computer Systems and Peripherals/Terminals; Software House; Systems House OEM; Dealer/Distributor; [illegible]
Miscellaneous Computer Supplies
Target Industries: Manufacturing; Financial; Education
Target Applications: Maintainence and Program Training; Educational Development
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture; Flooring; File Systems
Net Sales: Less than $100,000 (1981)
Contacts:
Head of Marketing: Larry G. Bager
Head of Sales: William C. Inch
Head of Customer Service: James E. Inch
Geographic Coverage: International
Year Established: 1960
Number of Employees: 20

COMMUNICATIONS ELECTRONICS
Computer Products Division
[illegible] Phoenix Drive
P.O. Box 1002 Dept. CW
Ann Arbor, MI 48106
(313) 994-4444
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Military; Government, Manufacturing; Retail
Product Lines: Forms; Disk Packs; Diskettes; Tapes; Furniture
Geographic Coverage: International
Year Established: 1971
Number of Employees: 15

EAGLE DATA [illegible]
[illegible] S. Broad St.
Holly, MI 48442
[illegible] 634-[illegible]
Major Market: Miscellaneous Computer Supplies
Product Lines: Acoustic Covers
Contacts:
Head of Sales: Ruth Frogner
Geographic Coverage: National
Year Established: 1979

GENERAL INFORMATION [illegible], INC.
[illegible] 209
3415 Roger Chaffee S.E.
Grand Rapids, MI 49508
[illegible] 247-[illegible]
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms, Ribbons; Disk Packs; Diskettes; Tapes
Net Sales: $500,000 - $1 [illegible] (1981)
Geographic Coverage: Regional
Year Established: 1974
Number of Employees: 50

HAWORTH, INC.
One Haworth Center
[illegible], MI [illegible]
[illegible] 393-[illegible]
[illegible]
Computer Supplies
Target Industries: Large offices
Product Lines: Furniture
Net Sales: More than $100 Million (1982)
Contacts:
Head of Sales: Jim Meyer
Head of Customer Service: Jerry Commijun
Geographic Coverage: International
Year Established: 1975
Number of Employees: 1,300

HERMAN MILLER, INC.
8500 Byron Road
Zeeland, MI 49464
(616) 772-3300
Major Market: Miscellaneous Computer Supplies; Office Furniture
Product Lines: Furniture
Geographic Coverage: International
Year Established: 1909
Number of Employees: 3,000

PACKARD INDUSTRIES, INC.
1515 U.S. 31 N.
Niles, MI 49120
(616) 684-2550
[illegible]
Computer Supplies
Product Lines: Furniture
Net Sales: $1 Million - $5 Million (1981)
Contacts:
[illegible]
Geographic Coverage: International
Year Established: 1965
Number of Employees: 50

THE SHAW-WALKER CO.
Furniture
P.O. Box 209
Muskegon, MI 49443
(616) 722-7211
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture
Contacts:
Head of Marketing: Phil Fleming
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 900

WESTINGHOUSE ELECTRIC CORP.
Furniture Systems
4300 36th St. S.E.
Grand Rapids, MI 49508
(616) 949-1050
[illegible]
Computer Supplies
Product Lines: Furniture; Chairs
Contacts:
Head of Marketing: James Stein
Head of Sales: M. Jurewicz
Geographic Coverage: International
Year Established: 1960

MINNESOTA

BLACKBOURN, INC.
10150 Crosstown Circle
Eden Prairie, MN 55344
(612) 944-7010
Major Market: Peripheral Manufacturing; Miscellaneous Computer Supplies
Target Industries: Education; Software, Religion, Video
Product Lines: Floppy storage devices
Net Sales: [illegible]
Geographic Coverage: National
Year Established: 1980
Number of Employees: 160

BSG CORP.
7674 Washington Ave. S.
Minneapolis, MN 55344
(944) 8180
Major Market: Software House; Systems House OEM; [illegible]
Miscellaneous Computer Supplies
Target Industries: Finance/banking; Retail, Software/Hardware OEM; Banking
Target Applications: [illegible]
Product Lines: Floppy file albums; Dust covers
[illegible]
Head of Marketing: Robert Pellegrino
Head of Sales: [illegible]
Head of Software: George L. Kuhn
Geographic Coverage: National
Year Established: 1980
Number of Employees: 50

C.T.S., INC.
P.O. Box 367
Wyoming, MN 55092
(612) 462-3550
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; Sound enclosure
Geographic Coverage: National
Year Established: 1981
Number of Employees: 7

CONWED CORP.
Interior Products
[illegible] Cleveland Dr.
P.O. Box 43237
St. Paul, MN 55164
(612) 221-1104
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; partitions
Net Sales: [illegible]
(1982)
Contacts:
Head of Customer Service: Don Fetterer
Geographic Coverage: International
Year Established: 1922
Number of Employees: 300

DELUXE CHECK PRINTERS, INC.
Deluxe Computer Forms
530 R. Wheeler
[illegible]
St. Paul, MN 55164
[illegible] 483-[illegible]
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Business; Banks; Homemakers
Target Applications: Payroll; Accounting
Product Lines: Forms, Diskettes; Furniture; Disc storage; Devices
Contacts:
Head of Marketing: Andrew Hallock
Geographic Coverage: National
Year Established: 1981
Number of Employees: 100

LOGISAM COMPUTER PRODUCTS
7720 Bush Lake Road
[illegible], MN [illegible]
(612) 831-1616
Major Market: Software House; Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Net Sales: [illegible]
(1982)
Contacts:
Head of Marketing: Larry Scheaf
Geographic Coverage: National

Suppliers

Year Established: 1968
Number of Employees: 150

[illegible] CO., INC.
8101 Tenth Ave N
Minneapolis, MN 55427
(612) 545-0401
Major Market: Component Manufacturing; Miscellaneous Computer Supplies
Product Lines: Maintenance; Products
Net Sales: $25 Million - $100 Million (1982)
Contacts:
Head of Marketing: Marvin Kronfeld
Geographic Coverage: International
Year Established: 1952
Number of Employees: 700

PROBLEM SOLVERS
12725 Dupont Ave. S.
Burnsville, MN 55337
(612) 894-6230
Major Market: Software House; Systems House OEM, Dealer/Distributor, Miscellaneous Computer Supplies
Target Industries: Wholesale; Maintenance; Equipment Maintenance
Product Lines: Forms; Ribbons; Disk Packs; Furniture; Cabling
Geographic Coverage: National
Year Established: 1980
Number of Employees: 4

TELE-TERMINALS, INC.
7008 Northland Drive
Minneapolis, MN 55428
(612) 536-6000
Major Market: OEM Computer Systems and Peripherals/Terminals; Software House; Systems House OEM, Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Education; Government; Non Profit
Target Applications: Data Networks, OA, WP
Product Lines: Ribbons; Disk Packs; [illegible]
Net Sales: $5 Million - $25 Million (1981)
[illegible]
Head of Marketing: Charles Zimmer
Head of Software: Jeff Swanson
Geographic Coverage: National
Year Established: 1969
Number of Employees: 70

[illegible] CHEMICAL CORP.
21480 Heath Ave.
[illegible]
Lakeville, MN 55044
(612) 469-3405
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; Acoustical Enclosures
Net Sales: $5 Million - $25 Million (1981)
Geographic Coverage: International
Year Established: 1972
Number of Employees: 150

[illegible], INC.
P O Box 799
Hopkins, MN 55343
[illegible]
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Furniture; Sound Enclosure
Contacts:
Head of Sales: Tom Mickelson
Geographic Coverage: National
Year Established: 1978
Number of Employees: 13

WAHL AND WAHL, INC.
4405 E Lake St.
Minneapolis, MN 55406
(612) 721-3366
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes, Tapes; Furniture; Flooring
Net Sales: $5 Million - $25 Million (1982)
[illegible]
Head of Sales: Jack Mahoney
Geographic Coverage: Regional
Year Established: 1934
Number of Employees: 125

3M CO.
Static Control Systems
3M Center 225-4S
St. Paul, MN 55144
(612) 733-1110
Major Market: Miscellaneous Computer Supplies
Target Applications: Static Control
Product Lines: Static Control; Antistatic Mats
Contacts:
Head of Marketing: Philip V. [illegible]
Head of Sales: Michael E. Martin
Geographic Coverage: International
Year Established: 1982

MISSISSIPPI

BESCO-BUSINESS EQUIPMENT & SUPPLY CO.
Highway 45 N.
P O Box 1217
Columbus, MS 39701
(601) 328-6860
Major Market: Systems House OEM; Dealer/Distributor, Maintenance/Other Services; Miscellaneous Computer Supplies; [illegible]
Target Industries: Medical; Garment Manufacturing
Product Lines: Forms; Ribbons; Disk Packs; Diskettes, Tapes; Furniture
Net Sales: $5 Million - $25 Million (1981)
Contacts:
Head of Sales: Bertrum Jenkins
Geographic Coverage: Mississippi, N W Alabama
Year Established: 1956
Number of Employees: 105

MISSOURI

[illegible] CO.
3041 Locust St.
St. Louis, MO 63103
(314) 535-1414
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Flooring; Storage Racks
Geographic Coverage: National
Year Established: 1920
Number of Employees: 117

SELCO, INC.
3222 N. Highway 67
Florissant, MO 63033
(314) 837-1211
Major Market: Systems House OEM; Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Wholesale; Credit; Equipment Rental; Distribution
Product Lines: Forms; Ribbons; Disk Packs; Diskettes, Tapes; Furniture; Office Supplies
Net Sales: $100,000 - $500,000 (1981)
[illegible]
Head of Marketing: George C. Dewey
Geographic Coverage: National
Year Established: 1977
Number of Employees: 8

TIFFANY STAND AND FURNITURE CO.
Suite 750
9666 Olive Blvd.
St. Louis, MO 63132
(314) 991-1700
Major Market: Miscellaneous Computer Supplies
Target Industries: Retail; Wholesale
Product Lines: Computer Furniture; Office Machine Stands
Geographic Coverage: National
Year Established: [illegible]
Number of Employees: 200

NEBRASKA

DATA DOCUMENTS, INC.
4205 S. 96th St.
Omaha, NE 68127
(402) 339-0900
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Cards; [illegible]
Net Sales: More than $100 Million (1982)
Geographic Coverage: National
Year Established: [illegible]
Number of Employees: 1,500

SPECTRONICS CORP.
4645 Hartley
Lincoln, NE 68504
(402) 467-3652
Major Market: Miscellaneous Computer Supplies
Product Lines: Fire and Security [illegible]
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Marketing: John Damke
Head of Sales: Bruce Steyer
Geographic Coverage: International
Year Established: 1971
Number of Employees: 23

NEW HAMPSHIRE

COVER CRAFT CORP.
12 Columbia Drive
P.O. Box 555
Amherst, NH 03031
(603) 889-6811
Major Market: Miscellaneous Computer Supplies
Product Lines: Flooring; Vinyl Covers; Antistatic Mats
[illegible]
Head of Marketing/Sales: Terry Pratt
Geographic Coverage: International
Year Established: 1974
Number of Employees: 35

EDP SUPPLY CO.
24 Keewaydin Drive
Salem, NH 03079
(603) 893-6118
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture; Flooring
[illegible]
Head of Marketing/Sales: Ed Downing
Head of Engineering: Robert Faulkner Jr.
Head of Customer Service: Terry Forgue
Geographic Coverage: Regional
Year Established: [illegible]
Number of Employees: 15

HEBRIA CORP.
Computer Products
44 Franklin St.
Nashua, NH 03061
(603) 880-2323
Major Market: Miscellaneous Computer Supplies
Product Lines: Disk Packs; Diskettes; cartridges
Net Sales: $25 Million - $100 Million (1982)
[illegible]
Head of Marketing/Sales: Sherman [illegible]
Geographic Coverage: International
Year Established: [illegible]
Number of Employees: 650

[illegible] GROUP
Simon St.
Nashua, NH 03061
[illegible]
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; [illegible]
Net Sales: $25 Million - $100 Million (1981)
[illegible]
Head of Marketing: Paul Arruda
Geographic Coverage: Eastern U.S.
Year Established: 1948
Number of Employees: 400

SUN RESEARCH, INC.
Mayday
Old Bay Road
[illegible]
New Durham, NH 03855
(603) 859-7110
Major Market: Component [illegible] Peripherals
Manufacturing; Dealer/Distributor; Miscellaneous Computer Supplies
[illegible]
[illegible]
(1982)
Contacts:
Head of Sales: Michael Mathieson
Head of Engineering: James Belisle
Geographic Coverage: International
Year Established: 1970
Number of Employees: 50

THE MAINE MANUFACTURING CO.
Data-Mate
46 Bridge St.
P.O. Box 408
Nashua, NH 03061
(603) 882-5142
Major Market: Miscellaneous Computer Supplies
Target Industries: OEM; Systems houses, ISO
Product Lines: Furniture
Geographic Coverage: International
Year Established: 1874
Number of Employees: 130

THE MORLEY CO.
909 Islington St.
P.O. Box 629
Portsmouth, NH 03801
(603) 436-5430
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms, Ribbons; Disk Packs, Diskettes, Tapes, Furniture; Forms holding equipment
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Sales: Frederick Taylor
Geographic Coverage: Regional
Year Established: 1890
Number of Employees: 45

NEW JERSEY

ANITEC IMAGE CORP.
1 Paragon Drive
Montvale, NJ 07645
(201) 573-6900
Major Market: Miscellaneous Computer Supplies
Product Lines: Graphic film
Contacts:
Head of Sales: Ben Hannebrink
Geographic Coverage: International
[illegible]
Number of Employees: 900

AC MANUFACTURING CO. (EDPAC)
[illegible]
Cherry Hill, NJ 08034
(609) 428-9800
Major Market: Miscellaneous Computer Supplies, Build[illegible]
Product Lines: Cooling systems
Contacts:
Head of Sales: Art Behnke
Geographic Coverage: International
[illegible]
Number of Employees: 400

BOORUM & PEASE CO.
801 Newark Ave.
Elizabeth, NJ 07208
(201) 352-8800
Major Market: Miscellaneous [illegible]
Product Lines: Forms; Data binders
Net Sales: $25 Million - $100 Million (1982)
Contacts:
Head of Sales: Clark J. Horan
Geographic Coverage: National
[illegible]
Number of Employees: 1,000

BUSINESS MACHINE SUPPLY, INC.
2 Ludlow Drive
Trenton, NJ 08638
(609) 883-5198
Major Market: Miscellaneous Computer Supplies
Product Lines: Ribbons; Ribbon cart; Spools
Net Sales: $1 Million - $5 Million (1981)
[illegible]
Head of Customer Service: Debbie Brophy
Geographic Coverage: National
Year Established: 1967
Number of Employees: 12

COMPUTER MAINTENANCE CORP.
111 Enterprise Ave. S.
Secaucus, NJ 07094
(201) 866-6400
Major Market: OEM Computer Systems, Dealer/Distributor; Maintenance/Other Services, Miscellaneous Computer Supplies
Target Industries: Distribution; Manufacturing
Product Lines: Ribbons, Disk Packs; Diskettes, Tapes, Furniture, Power Regulation
Net Sales: $1 Million - $5 Million (1981)
[illegible]
Head of Marketing: Joseph F. Riggs
Head of Sales: Anthony Mazza
Head of Engineering: Richard Intile
Head of Customer Service: Earle Kuzzig
Geographic Coverage: Regional
Year Established: 1977
Number of Employees: 41

CURRAN SUPPLIES CORP.
38 River Edge Road
River Edge, NJ 07661
(201) 967-7300
Major Market: Miscellaneous Computer Supplies
Target Industries: Plotting; Graphics
Product Lines: Plotter Pens, Paper
Net Sales: $100,000 - $500,000 (1982)
Contacts:
Head of Marketing: Richard J. Curran
Head of Sales: Louis J. Martin
[illegible]
Number of Employees: 5

CURTIS YOUNG CORP.
[illegible]
Pennsauken, NJ 08110
(609) 665-6650
Major Market: Miscellaneous Computer Supplies
Product Lines: Ribbons, Ink Rolls
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Marketing/Sales: Susan Kallen
Head of Customer Service: Peter [illegible]
Geographic Coverage: International
Year Established: 1953
Number of Employees: 125

DPI
Users Group
77 Park Street
Ridgefield Park, NJ 07660
(212) 772-0551
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Contacts:
Head of Marketing/Sales: Arthur [illegible]
Geographic Coverage: International
Year Established: 1975
Number of Employees: 8

DABURN ELECTRONICS CABLE CORP.
70 Oak St.
Norwood, NJ 07648
(201) 768-5400
Major Market: Component Manufacturing, Miscellaneous Computer Supplies
Product Lines: Wire; Shrinkable cable
[illegible]
Head of Customer Service: Kathy Lupardi
Geographic Coverage: International
[illegible]
Number of Employees: 45

DATA CLEAN CORP.
99 Highway 35
Keyport, NJ 07735
(201) 787-2564
Major Market: Maintenance/Other Services, Miscellaneous Computer Supplies
Product Lines: Cleaning Kits
[illegible]
(1982)
Geographic Coverage: National
[illegible]
Number of Employees: 34

DATA RESEARCH ASSOC.
[illegible]
Englewood, NJ 07631
[illegible]
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
[illegible]
Disk Packs, Diskettes, Tapes
[illegible]
(1981)
[illegible]
Head of Marketing/Sales: Steve [illegible]
Geographic Coverage: International
Year Established: 1974
Number of Employees: 100

FLOPPY DISK SERVICES, INC.
741 Alexander Road
Princeton, NJ 08540
(609) 799-4440
[illegible]
Miscellaneous Computer Supplies
Target Industries: General Public
Product Lines: Enclosures
Geographic Coverage: National
Year Established: 1979
Number of Employees: 8

JTC CORP.
649 Rahway Ave.
Union, NJ 07083
(201) 688-1700
[illegible]
Miscellaneous Computer Supplies
Target Industries: Banking; Insurance, Manufacturing
[illegible]
(1981)
Contacts:
Head of Marketing: Jack Connolly
Geographic Coverage: Regional
Year Established: 1954
Number of Employees: 250

MADISON BUSINESS FORMS, INC.
16 Gloria Lane
Fairfield, NJ 07006
(201) 575-0700
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Medical, Banking; [illegible]
[illegible]
Disk Packs, Diskettes, Tapes
Net Sales: $1 Million - $5 Million (1981)
[illegible]
Head of Sales: J. Green
Geographic Coverage: Regional
[illegible]
Number of Employees: 35

[illegible]
Computer Products
60 Oxford Drive
Moonachie, NJ 07074
(201) 440-8020
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
[illegible]
Geographic Coverage: International
Year Established: 1971
Number of Employees: 127

MICROFILM ENTERPRISES, INC.
12 New Dover Road
East Brunswick, NJ 08816
(201) 257-5225
Major Market: Miscellaneous Computer Supplies
Target Industries: General Industry
Target Applications: Microfilm
[illegible]
Microfilm supplies
Net Sales: $500,000 - $1 Million (1981)
Geographic Coverage: International
Year Established: 1973
Number of Employees: 11

MONROE SYSTEMS FOR BUSINESS
[illegible]
[illegible]
Morris Plains, NJ 07950
(201) 540-7300
Major Market: Computer and Office Equipment Manufacturing; OEM Computer Systems, Software House, Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Banking, Accounting
Target Applications: Financial
Product Lines: Forms, Ribbons; [illegible]
[illegible]
(1981)
Contacts:
Head of Marketing: Robert McGraw
Geographic Coverage: International
Year Established: 1912
Number of Employees: 3,300

MUIRHEAD, INC.
1101 Bristol Road
Mountainside, NJ 07092
(201) 233-6010
Major Market: Communications Equipment Manufacturing, Miscellaneous Computer Supplies
Target Industries: Newspaper; Printing
Product Lines: Paper
Contacts:
Head of Marketing: Holmes Bailey
Head of Sales: Kenneth McKenna

Geographic Coverage: International
Year Established: 1954
Number of Employees: 80

NATIONAL RIBBON CORP.
2131 Bethel Ave.
P.O. Box 575
Pennsauken, NJ 08110
(609) 663-6111
Major Market: Miscellaneous Computer Supplies
Target Industries: DP; WP; OA
Product Lines: Ribbons
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Sales: Martin Kaplan
Geographic Coverage: International
Year Established: 1978
Number of Employees: 50

PRC COMPUTER PRODUCTS, INC.
475 Boulevard
Elmwood Park, NJ 07407
(201) 796-6600
Major Market: Miscellaneous Computer Supplies
Target Industries: Computers; Film
Product Lines: Disk cases
Contacts:
Head of Sales: Kathy Sutherland
Geographic Coverage: National
Year Established: 1958
Number of Employees: 45

RAPID FORMS, INC.
501 Benigno Blvd
Bellmawr, NJ 08031
(609) 933-0480
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms
Contacts:
Head of Marketing: Keith Mahler
Geographic Coverage: National
Year Established: 1941
Number of Employees: 91

RELIANCE PLASTICS & PACKAGING DIVISION
225 Belleville Ave.
Bloomfield, NJ 07003
(201) 748-2222
Major Market: Miscellaneous Computer Supplies
Target Industries: Software
Product Lines: Packaging; Binders
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Marketing: Marion Burleigh
Geographic Coverage: National
Year Established: 1966
Number of Employees: 25

SMALL BUSINESS COMPUTERS, INC.
[illegible]
Rt 73
Green Tree Executive Campus
Marlton, NJ 08053
(609) 983-5510
Major Market: Software House; Dealer/Distributor, Miscellaneous Computer Supplies
Target Industries: Manufacturing; Distribution
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture; Flooring
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Marketing: Michael Buhler
Head of Software: Irv Otto
Geographic Coverage: Pennsylvania, New Jersey
Year Established: 1979
Number of Employees: 20

STACOR CORP.
285 Emmet St
Newark, NJ 07114
(201) 242-6600
Major Market: Miscellaneous Computer Supplies
Product Lines: Tape storage,
[illegible]
Contacts:
Head of Sales: Robert Sutton
Geographic Coverage: International
Year Established: 1940
Number of Employees: 200

STC SYSTEMS, INC.
Headquarters Office
4 North St.
Waldwick, NJ 07463
(201) 445-5050
Major Market: OEM (Computer Systems); Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Distributors
Target Applications: Publishing; Lumber, Electrical; Apparel
Product Lines: Disk Packs; Tapes
Net Sales: $5 Million - $25 Million (1981)
[illegible]
Head of Marketing: Robert Bearden
Head of Software: Marshall Epstein
Head of Engineering: David Amsterdam
Head of Customer Service: Tom Fontanazza
Geographic Coverage: National
Year Established: 1969
Number of Employees: 118

THE SHAW-WALKER CO.
Forms
57 E. Willow St
Millbourne, NJ 07041
(201) 379-7600
Major Market: Miscellaneous Computer Supplies
Target Industries: Small Business
Target Applications: Accounting Systems; Filing Systems
Product Lines: Forms
[illegible]
Head of Marketing: Phil S. Fleming
Head of Sales: Bob McNeilage
Head of Software: Dave Beisswanger
Geographic Coverage: National
Year Established: 1981
Number of Employees: 25

THE SILLCOCKS-MILLER CO.
310 Snyder Ave.
Berkeley Heights, NJ 07922
(201) 665-0300
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms
Net Sales: $5 Million - $25 Million (1981)
Contacts:
Head of Marketing: Ted Touster
Geographic Coverage: International
Year Established: 1910
Number of Employees: 150

THE TELNIPE CO.
P.O. Box 575
Upper Saddle River, NJ 07458
(201) 327-9100
Major Market: Miscellaneous Computer Supplies
Target Industries: Electronics, Communications; Data Processing; Field Service
Product Lines: Contamination control
Geographic Coverage: International
Year Established: 1963
Number of Employees: 150

TRANSNET CORP.
1945 Rt. 22
Union, NJ 07083
(201) 688-7800
Major Market: Software House; Dealer/Distributor, Maintenance/Other Services, Miscellaneous Computer Supplies
Product Lines: Forms, Ribbons; Disk Packs; Diskettes; Tapes, Furniture
Net Sales: $5 Million - $25 Million (1981)
Contacts:
Head of Marketing: Clarence J. Reed
Head of Sales: Robert Ryan
Head of Engineering: Jay Smolyn
Geographic Coverage: National
Year Established: 1969
Number of Employees: 60

UNITED DATA PRODUCTS CORP.
18-01 Pollitt Drive
P.O. Box 903
Fairlawn, NJ 07410
(201) 796-0800
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms
[illegible]
Head of Sales: Al Slade
Head of Customer Service: Edward Koenig
Geographic Coverage: Regional
Year Established: 1950
Number of Employees: 350

WORD PROCESSING PERIPHERALS & SUPPLY CO., INC.
Suite G
One Industrial Way
Eaton Town, NJ 07724
(201) 389-1600
Major Market: Software House; Systems House OEM; Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Banking; Retail, Engineering; Manufacturing
Target Applications: Legal
Product Lines: Ribbons, Furniture; Acoustic covers, Daisy wheels
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing: Linda Brennan
Head of Sales: James J. Brennan
Geographic Coverage: Regional
Year Established: 1980
Number of Employees: 11

WORTHINGTON DIAGNOSTIC SYSTEMS, INC.
[illegible]
Freehold, NJ 07728
(800) 631-2142
Major Market: Terminal Manufacturing; OEM Computer Systems; Systems House OEM; Maintenance/Other Services, Miscellaneous Computer Supplies
Target Industries: Medical
Target Applications: Chemical analysis
Product Lines: Forms
[illegible]
Head of Marketing: Gerald Moss
Geographic Coverage: International
Year Established: 1972
Number of Employees: 400

ZIYAD, INC.
100 Ford Road
Denville, NJ 07834
(201) 627-7606
Major Market: OEM Peripherals/Terminals; Maintenance/Other Services, Miscellaneous Computer Supplies, Manufacturing; Sheet
[illegible]
Target Industries: WP OEM; Printer distributors
Product Lines: sheet feeder
Net Sales: $5 Million - $25 Million (1982)
[illegible]
Head of Sales: Robert Frankel
Head of Engineering: Ludwig Kapp
Geographic Coverage: National
Year Established: 1980
Number of Employees: 200

Additional information provided for by vendor

Products available through: AES Data, Compucorp, Datapoint, Dictaphone, Diablo Systems, Exxon Office Systems, Harris, Hewlett-Packard, Micom, Lanier, M/A-Com, Alanthus Data, NBI, NCS, Philips Information Systems, Raytheon Data Systems, Royal Business Machines, Syntrex, Terminals Unlimited, Wang Laboratories — Contact Ziyad if your vendor is not listed

Ziyad markets a full line of cut sheet paper feeders for word and data processing systems. The Ziyad Z-200 and Z-300 provide two paper trays to handle various sizes and weights of paper. Audible and visible signals inform operator of paper-out and misfeed conditions. Z-300 feeds envelopes and captures inside address of letter and prints on envelope.

NEW YORK

AVDEC CORP.
115 Henry St
Freeport, NY 11520
(516) 546-2272
Major Market: Miscellaneous Computer Supplies
Target Industries: Education; Medical
Product Lines: computer locks
Net Sales: Under $100,000 (1982)
Geographic Coverage: National
[illegible]
Number of Employees: 2

AVM CORP.
[illegible]
609 N. Long Beach Road

Rockville Center, NY 11570
(516) 764-1222
Major Market: Miscellaneous Computer Supplies
Target Industries: Manufacturing
Product Lines: Furniture; Compulocker
Net Sales: $25 Million - $100 Million (1982)
Contacts:
Head of Marketing: Joe Totman
Geographic Coverage: International
Year Established: 1959
Number of Employees: 2,000

BANCROFT BUSINESS FORMS, INC.
24 W 25th St
New York, NY 10010
(212) 924-4424
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms
Contacts:
Head of Marketing: J. Meller
Geographic Coverage: National
Number of Employees: 8

BARDON SATON ALLEN CORP.
Koroctype Division
67 Kent Ave.
Brooklyn, NY 11211
(212) 782-2601
Major Market: Office Equipment Manufacturing, Miscellaneous Computer Supplies
Target Industries: Dealers; Processors; OEM
Product Lines: Ribbons; Film, Fabric, Ribbons
Net Sales: $25 Million - $100 Million (1981)
Contacts:
Head of Marketing: William Glover
Geographic Coverage: International
Year Established: 1955
Number of Employees: 500

BENJAMIN ELECTROPRODUCTS, INC.
75 Austin Blvd.
Commack, NY 11725
(516) 543-5200
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Tapes; Cleaning Kits
Contacts:
Head of Marketing/Sales: Stuart Cane
Head of Customer Service: Robin Lentz
Geographic Coverage: International
Year Established: 1955
Number of Employees: 75

COMPUTER RIBBON SPECIALISTS
P.O Box 724
Hicksville, NY 11802
(516) 822-5581
Major Market: Miscellaneous Computer Supplies
Target Industries: Stationary; Computer Products distributors
Product Lines: Ribbons; Cartridges; Cassettes
Contacts:
Head of Marketing/Sales: Ernie Wunderman
Geographic Coverage: International
Year Established: 1926
Number of Employees: 80

CREEK ELECTRONICS CO.
Pilgrim Electric Co.
29 Cain Drive
Plainview, NY 11803
(516) 420 8989
Major Market: Miscellaneous Computer Supplies
Target Industries: Computer
Product Lines: Power conditioner, Outlet strips
Contacts:
Head of Marketing: John Alden
Head of Sales: Tom Avilio
Geographic Coverage: International
Year Established: 1978
Number of Employees: 20

DATA LINE ASSOCIATES
1423 Corkling Ave.
Utica, NY 13503
(315) 738-1082
Major Market: OEM Peripherals/ Terminals, Miscellaneous Computer Supplies
Product Lines: Ribbons; Disk Packs; Diskettes, Tapes
Geographic Coverage: National
Year Established: 1980
Number of Employees: 3

DATAFILE LIMITED
5 Beekman St.
New York, NY 10038
(212) 962-6863
Major Market: Miscellaneous Computer Supplies
Target Industries: Insurance; Banking; Brokerage
Product Lines: Furniture
Geographic Coverage: International
Year Established: 19[illegible]
Number of Employees: 4

DATAREX SYSTEMS, INC.
3907 Genesee St.
Buffalo, NY 14225
(716) 633-1031
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Disk Packs, Diskettes, Tapes, Furniture; Sound Covers
Geographic Coverage: International
Year Established: 1982
Number of Employees: 7

DAVIS FORMS & SUPPLIES
53 Park Place
New York, NY 10007
(212) 732-9200
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms, Furniture
Geographic Coverage: Metropolitan New York City
Year Established: 1979
Number of Employees: 15

DENNISON MONARCH SYSTEMS, INC.
Macarthur Ave.
New Windsor, NY 12550
(914) 562-3160
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; Stands; Cabinets
Contacts:
Head of Marketing: Parke McCarthy
Head of Engineering: Bill Mutchler
Geographic Coverage: International
Year Established: 1946
Number of Employees: 125

ELECTRIC WASTEBASKET CORP.
145 West 45 St.
New York, NY 10036
(212) 997-1700
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Finance; Banking; Retail, Engineering
Product Lines: Cabinet; Switches
Contacts:
Head of Marketing: Morris Golde
Head of Sales: William Golde
Geographic Coverage: National
Year Established: [illegible]
Number of Employees: 100

GAYLORD BROS., INC.
P.O. Box 4901
Syracuse, NY 13221
(315) 457-5070
Major Market: Software House; Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Library; Education
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Contacts:
Head of Engineering: Jim Dokoupil
Head of Customer Service: Peggy Trinca
Geographic Coverage: International
Number of Employees: 300

GRAPHIC CONTROLS CORP.
189 Van Rennselaer St.
P.O Box 1272
Buffalo, NY 14240
(800) 828-1535
Major Market: Component Manufacturing, Miscellaneous Computer Supplies
Product Lines: Forms; Tester; Plotter paper
Geographic Coverage: International
Year Established: 1957
Number of Employees: 1,000

HI-TECH, INC.
2107 Liberty Drive
P.O Box 290 LPO
Niagara Falls, NY 14304
(716) 283-6464
Major Market: Miscellaneous Computer Supplies
Product Lines: Computer room air conditioner
Net Sales: $1 Million - $20 Million (1982)
Contacts:
Head of Marketing/Sales: Graham Wheeler
Head of Engineering: Walter Mecozzi
Geographic Coverage: International
Year Established: 1974
Number of Employees: 75

INKED SPECIALTIES CO., INC.
[illegible] 6th Street
Brooklyn, NY 11211
(212) 782-1005
Major Market: Miscellaneous Computer Supplies
Product Lines: Ribbons
Net Sales: $1 Million - $5 Million (1982)
Geographic Coverage: International
Year Established: 1964
Number of Employees: 24

JE CHAPLIN ASSOCIATES, LTD.
Suite 907
11 Broadway
New York, NY 10004
(212) 483-9685
Major Market: Software House, Dealer/Distributor, Maintenance/Other Services, Miscellaneous Computer Supplies
Target Industries: Banking, Brokerage
Product Lines: Forms, Ribbons, Disk Packs, Diskettes Tapes Furniture magnetic media
Net Sales: $500,000 - $1 Million (1981)
Geographic Coverage: New Jersey New York, Connecticut
Year Established: 1980
Number of Employees: 42

MAGNETIC TECHNOLOGIES, INC.
1 Fulton Ave
Hempstead, NY 11550
(516) 486-7700
Major Market: Dealer/Distributor, Miscellaneous Computer Supplies
Target Industries: Banking
Product Lines: Forms, Ribbons, Disk Packs, Diskettes, Tapes, Furniture, Flooring
Net Sales: $500,000 - $1 Million (1982)
Contacts:
Head of Marketing/Sales: Timothy Johnson
Head of Software/Customer Service: Beatrice Heller
Head of Engineering: Steve Schafer
Geographic Coverage: National
Year Established: 1978
Number of Employees: 12

MAYON LOCK CO., INC.
401 E 74th St
New York, NY 10021
(212) 628-4222
Major Market: Miscellaneous Computer Supplies, Locks
Target Industries: Commercial Office Furniture
Product Lines: Computer locks
Net Sales: $100,000 - $500,000 (1982)
Geographic Coverage: National
Year Established: 1970
Number of Employees: 6

MEAD-HATCHER, INC.
752 Military Road
Buffalo, NY 14216
(716) 877-1185
Major Market: Office Equipment Manufacturing, Miscellaneous Computer Supplies
Product Lines: Forms transport, Filing equipment
Contacts:
Head of Marketing: William Crawford
Head of Sales: Robert Hall
Geographic Coverage: International
Year Established: 1911

MONTEC INDUSTRIES, INC.
P O Box 698
Ogdensburg, NY 13669
(315) 425-1255
Major Market: Component Manufacturing, Miscellaneous Computer Supplies
Product Lines: Humidity regulators
Contacts:
Head of Marketing/Sales: Gary Berlin
Geographic Coverage: National
Year Established: 1974

OFFICE COMMUNICATIONS
33 N. Madison Ave

Suppliers

(914) 356-4631
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes, Tapes; Furniture; Acoustic Covers
Geographic Coverage:

OPTIMUM TESTED PRODUCTS, INC.
30 Jefryn Blvd. W.
Deer Park, NY 11729
(516) 586-8300
Major Market: Miscellaneous Computer Supplies
Target Industries: OEM; Dealers; [illegible]
Product Lines: Ribbons
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Marketing: Frank Gemellaro
Head of Engineering: Robert A. [illegible]
Head of Customer Service: Paula Kulynych
Geographic Coverage: International
Year Established: 1974
Number of Employees: 115

OS TARGET PRODUCTS
32 Cherry Lane
Floral Park, NY 11001
(212) 343-0838
Major Market: Miscellaneous Computer Supplies
Target Industries: Dealers; Resellers
Product Lines: Forms Tractors; [illegible]
Geographic Coverage: National
Year Established: 1982
Number of Employees: 3

PERFECT IMAGE MATERIALS CO.
80 Engineers Drive
Hicksville, NY 11801
(516) 681-2800
Major Market: Miscellaneous Computer Supplies
Product Lines: Ribbons; Disk Packs; Diskettes
Geographic Coverage: Regional
Year Established: 1974
Number of Employees: 5

PREFERRED COMPUTER TRADING CORP.
P O Box 677
Forest Hills, NY 11375
(212) 261-6300
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries:
Banking/Financial; Airlines
Product Lines: Ribbons; Disk Packs; Diskettes, Tapes; Ink Rollers; Thermal Paper
Contacts:
Head of Sales: Susan Skolnik
Head of Customer Service: Walter James
Geographic Coverage: National
Year Established: 1981
Number of Employees:

PROGRAMS UNLIMITED
125 S. Service Road
Jericho, NY 11753
(516) 997-0800
Major Market: Systems House OEM, Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Business
Target Applications: Business, POS
Product Lines: Forms; Ribbons, Disk Packs; Diskettes, Tapes, Furniture; Flooring
Contacts:
Head of Marketing: Dennis Wilcox
Geographic Coverage: National
Year Established: 1980
Number of Employees: 25

SCOTT-HEALEY ASSOCIATES, INC.
Executive Park Tower
Albany, NY 12203
(518) 458-1512
Major Market: OEM Peripherals/ Terminals, Software House, OEM Systems House; Data Services (Service Bureau); Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Manufacturing; Equipment Dealers
Target Applications: Industrial Control
Product Lines: Forms, Ribbons; Disk Packs, Diskettes; Tapes
Net Sales: $100,000 - $500,000 (1981)
Contacts:
Head of Marketing: Chris Andrews
Head of Sales/Software: Joel Scott
Geographic Coverage: Regional
Year Established: 1977
Number of Employees: 10

SOUNDCOAT CO., INC.
1 Burt Drive
Deer Park, NY 11729
(516) 242-2200
Major Market: Maintenance/Other Services; Miscellaneous Computer Supplies
Product Lines: Noise control; [illegible]
Net Sales: $5 Million - $25 Million (1082)
Contacts:
Head of Marketing: Carl Wolaver
Geographic Coverage: International
Year Established: 1961
Number of Employees: 100

SPECTRUM M.I.R., LTD.
213 Beach 68th St.
Rockaway Beach, NY 11693
(212) 634-0500
Major Market: Miscellaneous Computer Supplies
Target Industries: Banking
Product Lines: Mag ink remover
Contacts:
Head of Sales: Frank Brunner
Year Established: 1967
Number of Employees: 5

SUPREME EQUIPMENT AND SYSTEMS CORP.
170 53rd St.
Brooklyn, NY 11232
(212) 492-7777
Major Market: Miscellaneous Computer Supplies
Product Lines: Storage equipment
Net Sales: $25 Million - $100 Million (1982)
Contacts:
Head of Marketing: Sharon Krutzel
Geographic Coverage: International
Year Established: 1951
Number of Employees: 800

SYSTEMS MANUFACTURING CORP.
13 Broad St.
Binghamton, NY 13904
(607) 723-6344
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; DP accessories
Contacts:
Head of Marketing: Carl Backus
Head of Sales: Richard Burchill
Geographic Coverage: National
Year Established: 1945
Number of Employees: 115

TAPESWITCH CORP. OF AMERICA
100 Schmitt Blvd.
Farmingdale, NY 11735
(516) 694-6312
Major Market: Miscellaneous Computer Supplies
Target Industries: Safety, Security
Product Lines: Ribbons, ribbon switches; safety mats
Contacts:
Head of Sales: Richard Kessler
Geographic Coverage: International
Year Established: 1956
Number of Employees: 100

TAYLOR-MERCHANT CORP.
212 W 35th St
New York, NY 10001
(800) 223-6694
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Ribbons; Disk Packs; Diskettes; Tapes, Furniture; Cables; Magmedia
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing; Lawrence T. Turner
Geographic Coverage: National
Year Established: 1951
Number of Employees: 27

TEALTRONIC OF AMERICA, INC.
254 W. 31st St.
New York, NY 10001
(212) 597-1160
Major Market: Software House; Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Banking; Wholesale
Target Applications: General Ledger; Commercial Loan; Mortgage Accounting, Business
Product Lines: Forms; Ribbons; Disk Packs; Diskettes, Furniture
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Sales: Jack Roth Jr.
Head of Engineering: James Harris
Head of Customer Service: Mr. Denis Donahue
Geographic Coverage: New YOrk, New Hersey, Connecticut
Year Established: 1968
Number of Employees: 130

THE COMPUTER ACCESSORIES CO.
20 Boat Lane
Port Washington, NY 11050
(516) 767-0366
Major Market: Miscellaneous Computer Supplies
Target Applications: Protection of computer terminals
Product Lines: Terminal covers; protective covers
Net Sales: $100,000 - $500,000 (1982)
Contacts:
Head of Marketing: Gloria C. Carlin
Geographic Coverage: National
Year Established: 1979
Number of Employees: 10

TDK ELECTRONICS CORP.
12 Harbor Park Drive
Port Washington, NY 11050
(516) 625-0100
Major Market: Miscellaneous Computer Supplies
Product Lines: Tapes
Contacts:
Head of Marketing: Frank Kramer
Head of Sales: Ed Pessara
Geographic Coverage: International
Year Established: 1931
Number of Employees: 150

UNITED BUSINESS EQUIPMENT CORP.
97 Stone St.
Buffalo, NY 14212
(716) 893-2722
Major Market: Miscellaneous Computer Supplies
Target Industries: Banking; DP; OA
Product Lines: Furniture, Multi media cabinetry
Net Sales: $1 Million - $5 Million (1982)
Geographic Coverage: International
Year Established: 1962
Number of Employees: 30

UNITED BUSINESS FORMS CO.
17 Battery
New York, NY 10004
(212) 558-6761
Major Market: Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Banking, [illegible]
Product Lines: Forms; Disk Packs; Diskettes; Tapes, Burstors; Collators
Net Sales: $500,000 - $1 Million (1982)
Contacts:
Head of Marketing: David Drummond
Geographic Coverage: International
Year Established: 1980
Number of Employees: 8

UNIVERSAL MICROFILM CORP.
150 Fifth Ave.
New York, NY 10011
(212) 741-1525
Major Market: Dealer/Distributor; [illegible]
Miscellaneous Computer Supplies
Target Industries: Banking, [illegible]
Contacts:
Head of Marketing/Sales: Robert J. Seery
Head of Customer Service: James [illegible]
Geographic Coverage: New York, New Jersey, Connecticut
Year Established: 1971
Number of Employees: 50

VENTURA CORP.
415 Bayview Ave.
Amityville, NY 11701
(516) 842-1000

Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Ribbons; Disk Packs; Diskettes; Tapes
Geographic Coverage: National
Year Established: 1977
Number of Employees: 5

XEROX CORP.
Business Systems Group
Xerox Square
Rochester, NY 14644
(716) 423-4205
Major Market: Terminal, Peripheral and Office Equipment Manufacturing; Miscellaneous Computer Supplies
Target Applications: Reprographics
Product Lines: Forms; Ribbons; Paper
Geographic Coverage: National

NORTH CAROLINA

DURA-LINE
Rt. 2, Box 39A
Flat Rock, NC 28731
(704) 692-3612
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Banking; Insurance; Corporations
Product Lines: Ribbons
Net Sales: $500,000 - $1 Million (1982)
Contacts:
Head of Sales: Ihet Hoots
Geographic Coverage: Regional
Year Established: 1972
Number of Employees: 22

ISAC PANEL CO.
216 Pine St.
High Point, NC 27262
(919) 882-8136
Major Market: Component Manufacturing; Miscellaneous Computer Supplies
Product Lines: Tapes; Tape racks
Net Sales: $1 Million - $5 Million (1981)
Geographic Coverage: International
Year Established: 1960
Number of Employees: 45

SECOR CORP.
Data Communications Group
489 Selcor Park
Hickory, NC 286030489
(704) 324-3801
Major Market: Maintenance/Other Services; Miscellaneous Computer Supplies
Product Lines: Fiber optics; Copper cables
Contacts:
Head of Marketing/Sales: W.-B. Bielawski
Geographic Coverage: International
Year Established: 1977
Number of Employees: 1,200

OHIO

COMPUTER RESOURCES, INC.
4520 W. 130th St.
Cleveland, OH 44135
(216) 362-1020
Major Market: Miscellaneous Computer Systems
Product Lines: Disk Packs; Diskettes
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Marketing: John E. McRedmond
Head of Sales: Bruno Demeomo
Head of Engineering: H. Emmerich
Geographic Coverage: National
Year Established: 1967
Number of Employees: 100

OAK SUPPLY CORP.
2155 Chaka Road
Cleveland, OH 44136
(216) 238-0102
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms, Ribbons; Disk Packs, Diskettes; Furniture
Geographic Coverage: Regional
Year Established: 1963
Number of Employees: 40

F.F. FURNITURE SYSTEMS, INC.
East Dennick Ave.
Youngstown, OH 44501
(216) 746-7271
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing/Sales: Richard Strong
Geographic Coverage: International
Year Established: 1902
Number of Employees: 800

FLOATING FLOORS, INC.
795 Berdan Ave.
P.O. Box 6627
Toledo, OH 43612
(419) 476-8772
Major Market: Miscellaneous Computer Supplies
Product Lines: Flooring
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Sales: Wayne Crooks
Head of Engineering: Tom Lutz
Geographic Coverage: International
Year Established: 1955
Number of Employees: 75

GRAPHIC LAMINATING, INC.
Datacode
5122 St. Clair Ave.
Cleveland, OH 44103
(216) 881-2100
Major Market: Miscellaneous Computer Supplies
Target Industries: Manufacturing
Product Lines: Data collection cards
Contacts:
Head of Marketing/Sales: Roger Turvey
Head of Engineering: Ken Starek
Head of Customer Service: Debbie Ferello
Geographic Coverage: International
Year Established: 1970
Number of Employees: 50

HAMILTON SORTER CO.
5138 Production Drive
Fairfield, OH 45014
(513) 874-9496
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture
Geographic Coverage: International
Year Established: 1966
Number of Employees: 80

KAPPEX SYSTEMS, INC.
P.O. Box 171
Marietta, OH 45750
(614) 374-9300
Major Market: Miscellaneous Computer Supplies
Target Industries: Retail; Warehousing, Wholesalers
Target Applications: Fire protection
Product Lines: Insulated files
Net Sales: $25 Million - $100 Million (1981)
Contacts:
Head of Marketing: Arthur H. Jones
Geographic Coverage: International
Year Established: 1978
Number of Employees: 700

LUDLOW COMPOSITES
2100 Commerce Drive
Fremont, OH 43420
(419) 332-5531
Major Market: Miscellaneous Computer Supplies
Product Lines: Flooring; Anti-static mats
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing: R. G. Monckton
Head of Sales: T. W. Whitaker
Head of Engineering: D. C. Johnson
Head of Customer Service: T. E. Schmidt
Geographic Coverage: International
Year Established: 1868
Number of Employees: 3,300

MEDIA SERVICES, INC.
7520-Clover Ave.
Building 7
Mentor, OH 44060
(216) 942-3300
Major Market: Systems House OEM, Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms
Contacts:
Head of Customer Service: Tamera Orosz
Geographic Coverage: Regional
Year Established: 1978
Number of Employees: 10

MILLER KNIFE CO.
8245 Industrial Parkway
P.O. Box 1428
Fremont, OH 43411
(419) 877-5352
Major Market: Office Equipment Manufacturing; Miscellaneous Computer Supplies
Product Lines: Rack Mount
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Sales: Thomas Lyons
Head of Engineering: Ralph McClellan
Head of Customer Service: Barbara Arnold
Geographic Coverage: National
Year Established: 1961
Number of Employees: 150

NCR CORP.
Systemedia Group
9095 Washington Church Road
Miamisburg, OH 45342
(513) 445-5000
Major Market: Miscellaneous Computer Supplies; Business forms and suppliers
Target Industries: Computer Users; Banking; General Business
Product Lines: Forms; Ribbons; Disk Packs, Diskettes, Tapes
Number of Employees: 2,300

PAN AMERICAN BUSINESS SYSTEMS, INC.
7299 Dixie Road
Cincinnati, OH 45215
(513) 772-6300
Major Market: Miscellaneous Computer Supplies
Product Lines: Ribbons; Cartridges
Contacts:
Head of Marketing: Lowell Cook
Geographic Coverage: International
Year Established: 1960
Number of Employees: 100

REYNOLDS & REYNOLDS CO.
115 Commerce St.
P.O. Box 1005
Dayton, OH 45401
(513) 443-2000
Major Market: Computer Manufacturing; Software House; Systems House OEM, Miscellaneous Computer Supplies
Target Industries: Automobile; Medical, Contractor; Truck Dealerships
Target Applications: Accounting; Dealerships
Product Lines: Forms
Net Sales: More than $100 Million (1981)
Contacts:
Head of Engineering: Harry Nicholson
Geographic Coverage: National
Year Established: 1866
Number of Employees: 2,500

SOUNDFOLD INTERNATIONAL, INC.
3704 Wilmington Pike
P.O. Box 2128
Dayton, OH 45429
(513) 228-3773
Major Market: Office Equipment Manufacturing, Miscellaneous Computer Supplies, Acoustical Wallcovering
Target Industries: Computer Centers, Banking, Medical, Offices
Product Lines: Acoustic Panels
Net Sales: $100,000 - $500,000 (1982)
Contacts:
Head of Marketing: Tom Milner
Head of Sales/Engineering: Tony Sickels
Head of Customer Service and Manager
Geographic Coverage: International
Year Established: 1968
Number of Employees: 10

STANDARD REGISTER CO.
P.O. Box 1167
Dayton, OH 15401
(513) 220-4184
Major Market: OEM Computer Systems, Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Medical; Industrial
Target Applications: Healthcare; Industrial
Product Lines: Forms; Form handling equipment

Suppliers

Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: Robert Plunkett
Geographic Coverage: International
Year Established: 1912
Number of Employees: 4,370

SCM ALLIED PAPER, INC.
Business Forms Division
P.O. Box 125 W.C. Branch
Dayton, OH 45449
(513) 866-7421
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms; Paper
Net Sales: More than $100 Million (1982)
Contacts:
Head of Marketing: H. R. Freeland
Geographic Coverage: National
Year Established: 1890
Number of Employees: 1,000

VIARDEX SYSTEMS, INC.
Victor Systems and Equipment
Rt. 7 Reno
P.O. Box 171
Marietta, OH 45750
(614) 374-9300
Major Market: Miscellaneous Computer Supplies
Product Lines: Tapes; Furniture; Filing Systems, Cabinets; Record Covers
Net Sales: $25 Million - $100 Million (1981)
Geographic Coverage: International
Year Established: 1978
Number of Employees: 500

OKLAHOMA

[illegible] STATE BUSINESS FORMS, INC.
P.O. Box 9
Dewey, OK 74029
(918) 534-1280
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs
Contacts:
Head of Sales: Connie Maness
Geographic Coverage: National
Year Established: 1960
Number of Employees: 300

INTERNATIONAL TURN-KEY SYSTEMS
Suite 171
1302 Sovreign Row
Oklahoma City, OK 73108
(405) 946-3342
Major Market: OEM Computer Systems; Software House; Data Services (Service Bureau); Miscellaneous Computer Supplies
Target Industries: Oil-Gas; Mining; Horse Ranching
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Net Sales: $1 Million - $5 Million (1981)
Geographic Coverage: National
Year Established: 1977
Number of Employees: 18

MAGNETIC MEDIA, INC.
10126 E. 55th Place
Tulsa, OK 74145
(918) 664-2255
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Tapes; Magnetic computer cartridges
Geographic Coverage: National
Year Established: 1975
Number of Employees: 35

OREGON

TRANSPORTATION DATA EXCHANGE (TDE)
1732 N. W. Quinby
P.O. Box 10391
Portland, OR 97210
(503) 220-2600
Major Market: Software House; Systems House OEM; Data/Computer Service; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Motor freight; Transportation
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Marketing/Sales: Fred McDonnal
Head of Software/Customer Service: Sid Gregory
Geographic Coverage: National
Year Established: 1980
Number of Employees: 45

PENNSYLVANIA

AF SYSTEMS, INC.
5422 Lena St.
Philadelphia, PA 19144
(215) 925-6969
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Furniture
Net Sales: $500,000 - $1 Million (1981)
Contacts:
Head of Marketing/Sales: Vincent Firth
Geographic Coverage: National
Year Established: 1978
Number of Employees: 30

COMPUTER SUPPORT SERVICES, INC.
38 N. 2nd St.
P.O. Box 500
Lewisburg, PA 17837
(717) 524-4424
Major Market: Software House; Systems House OEM, Data Services (Service Bureau); Miscellaneous Computer Supplies
Target Industries: Manufacturing; Banking; Trucking; Construction
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Net Sales: $500,000 - $1 Million (1982)
Contacts:
Head of Marketing/Sales: Delmar Ritter
Geographic Coverage: Regional
Year Established: 1973
Number of Employees: 11

GENERAL BUSINESS SYSTEMS
475 Adams Ave.
Philadelphia, PA 19120
(215) 722-8200
Major Market: Miscellaneous Computer Supplies
Target Industries: Insurance; Banking; Industry
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Form Handling Equipment **Net Sales:** $500,000 - $1 Million (1982)
Geographic Coverage: Regional
Year Established: 1958
Number of Employees: 5

HUNT MANUFACTURING CO.
Lit-Ning Products
1405 Locust St.
Philadelphia, PA 19102
(215) 732-7700
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; Acoustic Covers
Geographic Coverage: National

[illegible] SYSTEMS, INC.
P.O. Box 330
Oakmont, PA 15139
(412) 828-9270
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture
Contacts:
Head of Customer Service: John Sabatini
Geographic Coverage: National
Year Established: 1981
Number of Employees: 300

JG FURNITURE SYSTEMS
121 Park Ave.
Quakertown, PA 18951
(215) 536-3353
Major Market: Miscellaneous Computer Supplies
Target Industries: Business
Product Lines: Furniture
Contacts:
Head of Marketing/Sales: Harvey Waxman
Geographic Coverage: International
Year Established: 1930

LITTON BUSINESS SYSTEMS, INC.
Cole Business Furniture
640 Whiteford Road
P.O. Box 4000
York, PA 17405
(717) 854-1545
Major Market: Miscellaneous Computer Supplies
Target Industries: Dealers
Product Lines: Forms; Furniture; Cards
Contacts:
Head of Marketing: Gary H. Beals
Head of Sales: Peter A. Beier
Head of Engineering: William Winemiller
Head of Customer Service: Thomas Keesey
Geographic Coverage: National
Year Established: 1925
Number of Employees: 1,500

PAPER MANUFACTURERS CO.
Paper Products
9800 Bustleton Ave.
Philadelphia, PA 19115
(215) 673-4500
Major Market: Miscellaneous Computer Supplies
Target Industries: Banking; Retail
Product Lines: Forms; paper products
Geographic Coverage: National
Year Established: 1901
Number of Employees: 150

[illegible], INC.
103 Yost Blvd.
Pittsburgh, PA 15221
(412) 829-2100
Major Market: Software House; Systems House OEM; Miscellaneous Computer Supplies
Target Industries: Insurance
Target Applications: Policy Filing
Product Lines: Forms, Ribbons; Disk Packs, Diskettes; Furniture, Dust covers,; CRT turntables
Net Sales: $5 Million - $25 Million (1981)
Contacts:
Head of Marketing: J. C. Thompson
Head of Sales F. Grebowski
Head of Software: D. L. Ross
Head of Customer Service: J. D Welbly
Geographic Coverage: International
Year Established: 1975
Number of Employees: 90

ROYAL PIONEER INDUSTRIES, INC.
Castor & Armingo Ave.
Philadelphia, PA 19134
(215) 289-6050
Major Market: Miscellaneous Computer Supplies
Product Lines: Microfilm Packaging
Geographic Coverage: National
Year Established: 1880
Number of Employees: 400

TECHNOLOGY PRODUCTS, INC.
1060 Rt. 309
Montgomeryville, PA 18936
(215) 646-5515
Major Market: Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: OEM; Manufacturing
Target Applications: Computer security; Electric office security equipment
Product Lines: Security Locks
Geographic Coverage: National
Year Established: 1980
Number of Employees: 10

[illegible] SYSTEMS, INC.
Suite 516
One Bala Plaza
Bala Cynwyd, PA 19004
(215) 667-9680
Major Market: Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Legal; Banking; Insurance; Manufacturing
Product Lines: Filing Systems; Diskettes
Contacts:
Head of Sales: Harold Hollander
Year Established: 1976
Number of Employees: 30

YBI OFFICE FURNITURE SYSTEMS, INC.
[illegible]
Lititz, PA 17543

(717) 626-3200
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture; Acoustic Covers
Contacts:
Head of Marketing: Mike Weaver
Geographic Coverage: National
Year Established: 1982
Number of Employees: 200

RHODE ISLAND

PROCESS AUTOMATION CORP.
1018 Waterman Ave.
P.O. Box 4156
E. Providence, RI 02914
(401) 434-2762
Major Market: OEM Computer Systems and Peripherals/Terminals; Software House; Systems House OEM; Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Manufacturing; Retail
Target Applications: Communications; Custom Software; Accounting
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes
Net Sales: $100,000 - $500,000 (1981)
Geographic Coverage: Regional
Year Established: 1970
Number of Employees: 168

SOUTH CAROLINA

THE SYSTEMS FIRM
Software Brokerage/Services
314 E. Bridge St.
P.O. Box 123
St. Matthews, SC 29135
(803) 656-4475
Major Market: OEM Computer Systems and Peripherals/Terminals; Software House; Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Wholesale; Manufacturing; General Business; Retail
Target Applications: Order Entry; Inventory Control; General Accounting; Payroll
Product Lines: Diskettes
Geographic Coverage: International
Year Established: 1981
Number of Employees: 2

SOUTH DAKOTA

SYSCOM
Schwans Sales Enterprises, Inc.
P.O. Box 130
Mitchell, SD 57301
(605) 996-8200
Major Market: Miscellaneous Computer Supplies
Product Lines: Disk Packs; Diskettes; Tapes; Data cartridges; Magnetic cards
Contacts:
Head of Sales: Rick Van Hoover
Geographic Coverage: International
Year Established: 1980
Number of Employees: 200

TENNESSEE

PELIKAN, INC.
200 Beasley Drive
Franklin, TN 37064
(615) 790-6171
Major Market: Miscellaneous Computer Supplies
Target Industries: WP; Printing; DP
Product Lines: Ribbons
Contacts:
Head of Marketing: Chander Kanal
Head of Sales: Kevin Adrian
Geographic Coverage: National
Year Established: 1978
Number of Employees: 400

TEXAS

COMPUTER ROOM EQUIPMENT, INC.
Suite I
4530 W. 34th St.
Houston, TX 77092
(713) 688-6159
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: DP
Product Lines: Flooring; air condition
Net Sales: $500,000 - $1 Million (1982)
Geographic Coverage: Texas
Year Established: 1981
Number of Employees: 5

COMPUTER ROOMERS, INC.
9219 Viscount Row
Dallas, TX 75247
(214) 630-0280
Major Market: Miscellaneous Computer Supplies
Product Lines: Furniture
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Marketing: Mary Ann Mitcham
Geographic Coverage: National
Year Established: 1975
Number of Employees: 60

COMPUTERIZED BUSINESS SYSTEMS, INC.
2108 W. Freeway
Fort Worth, TX 76102
(817) 332-1610
Major Market: Systems House OEM; Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Small Business
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Software: Mark Peden
Geographic Coverage: Regional
Year Established: 1978
Number of Employees: 24

DAISYTEK
1251 Columbia
Richardson, TX 75081
(214) 783-8712
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Dealers
Product Lines: Ribbons; Diskettes; WP supplies
Contacts:
Head of Marketing: Dick Jackson
Geographic Coverage: National
Year Established: 1977
Number of Employees: 60

DATAMARC
1251 Columbia
Richardson, TX 75081
(214) 783-1691
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Envelope feeder; Forms tractor
Contacts:
Head of Sales: Frank Humphries
Geographic Coverage: National
Year Established: 1979
Number of Employees: 60

ENNIS BUSINESS FORMS, INC.
107 N. Sherman St.
Ennis, TX 75119
(214) 875-3811
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms
Net Sales: $25 Million - $100 Million (1982)
Geographic Coverage: National
Year Established: 1909
Number of Employees: 1,800

GRAHAM MAGNETICS, INC.
6625 Industrial Park Blvd
N. Richland Hills, TX 76118
(817) 281-9450
Major Market: Miscellaneous Computer Supplies
Target Industries: Banking; Communications
Target Applications: DP
Product Lines: Tapes, Cleaning Kits
Net Sales: $25 Million - $100 Million (1982)
Contacts:
Head of Marketing: Herb Schantz
Head of Sales: Art Field
Geographic Coverage: International
Year Established: 1965
Number of Employees: 750

HEXCO, INC.
Hexco Building, Highway 39 S.
Hunt, TX 78024
(512) 238-4404
Major Market: Miscellaneous Computer Supplies
Target Industries: IBM Users
Product Lines: Debugging Rules
Contacts:
Head of Marketing: Linda Tarrant
Geographic Coverage: National
Year Established: 1967
Number of Employees: 6

MEDIA RECOVERY, INC.
1435 Round Table Road
Dallas, TX 75247
(214) 630-9625
Major Market: Peripheral Manufacturing; Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Manufacturing
Product Lines: Ribbons; Disk Packs; Tapes
Contacts:
Head of Marketing: J. Ricciardi Jr.
Head of Sales: D. MacElroy
Geographic Coverage: International
Year Established: 1971
Number of Employees: 70

MIDWEST MAGNETICS
Suite 1433
13773 N. Central Expressway
Dallas, TX 75243
(214) 235-9551
Major Market: Miscellaneous Computer Supplies
Product Lines: Ribbons; Disk Packs; Diskettes, Tapes
Geographic Coverage: National
Year Established: 1979
Number of Employees: 10

MOORE PAPER CO.
100 Hogan St.
Houston, TX 77009
(713) 228-9191
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Gas; Manufacturing
Product Lines: Forms; Disk Packs; Diskettes, Tapes
Contacts:
Head of Sales: Jim Atherton
Geographic Coverage: Texas
Year Established: 1935
Number of Employees: 320

PERMA PRODUCTS CO.
P. O. Box 24728
Dallas, TX 75224
(214) 298-4225
Major Market: Miscellaneous Computer Supplies
Product Lines: Storage Containers
Geographic Coverage: International
Year Established: 1954
Number of Employees: 120

ROYAL SEATING CORP.
1110 Industrial Blvd.
P.O. Box 753
Cameron, TX 76520
(817) 697-6421
Major Market: Office Equipment Manufacturing, Miscellaneous Computer Supplies
Product Lines: Furniture
Net Sales: $5 Million - $25 Million (1981)
Contacts:
Head of Sales: Lorraine Moore
Geographic Coverage: National
Year Established: 1969
Number of Employees: 150

TEL-TEX, INC.
2825 W. 11th
Houston, TX 77008
(713) 868-6000
Major Market: Communications Equipment Manufacturing; OEM Peripherals/Terminals; Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Product Lines: Forms, Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Net Sales: $5 Million - $25 Million (1981)
Contacts:
Head of Marketing: Thomas Folger

Suppliers

Head of Engineering: John Foley
Geographic Coverage: Regional
Year Established: 1[illegible]
Number of Employees: 75

TRANSCONTINENTAL DISTRIBUTORS
Suite 118
313 Dakota St.
San Antonio, TX 78203
(512) 224-0817
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Marketing: Horace Ortega
Geographic Coverage: Texas
Year Established: 1[illegible]
Number of Employees: 7

UNIVERSITY COMPUTING CO.
UCC Tower
Exchange Park
Dallas, TX 75235
(214) 353-7100
Major Market: OEM Computer Systems and Peripherals/Terminals; Software House; Data Services (Service Bureau); Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Cross Industry
Product Lines: Forms, Ribbons; Disk Packs; Diskettes; Tapes
Net Sales: More than $100 Million (1981)
Contacts:
Head of Marketing: J. Allan Hufft
Head of Sales: Alan Huff
Head of Software: Wally Yost
Head of Engineering: Hugo Birrer
Head of Customer Service: Roger Pierpoint
Geographic Coverage: International
Year Established: 1963
Number of Employees: 1,750

WALLACE COMPUTER SERVICE
Omarco
1801 W. Masonic Drive
P.O. Box 701
Brenham, TX 77833
([illegible]) [illegible]
Major Market: Miscellaneous Computer Supplies
Product Lines: Ribbons
Geographic Coverage: National
Year Established: 1972

UTAH

ASSOCIATED BUSINESS PRODUCTS
1[illegible] West 2100 S.
Salt Lake City, UT 84115
([illegible]) [illegible]
Major Market: Software House; Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Ribbons; Diskettes
Geographic Coverage: Utah, Wyoming, Idaho
Year Established: 1975
Number of Employees: 68

TBM (TYPE-A-LINE BUSINESS MACHINES), INC.
1[illegible] E. Tucker St.
Salt Lake City, UT 84111
(801) 521-5310
Major Market: OEM Computer Manufacturing; Software House; Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Auto Parts, Manufacturing, Legal, Medical
Target Applications: Accounting
Product Lines: Forms, Ribbons; Disk Packs, Diskettes, Tapes, Furniture
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Sales: Greg O. Bowen
Geographic Coverage: Regional
Year Established: 1962
Number of Employees: 20

VIRGINIA

ACCOUNTING SUPPLIES AND SYSTEMS, INC.
P.O. Box 21
Falls Church, VA 22046
(703) 379-9849
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms, Ribbons, Disk Packs, Diskettes, Tapes; Furniture; Flooring
Contacts:
Head of Marketing/Sales: Nancy Malmros
Head of Engineering: H. G. Anderson
Geographic Coverage: National
Year Established: 1[illegible]
Number of Employees: 100

DATASTRIP CORP.
1575 Avon St.-Extension
Charlottesville, VA 22901
([illegible]) [illegible]
Major Market: Miscellaneous Computer Supplies
Product Lines: Index Products
Geographic Coverage: International
Year Established: 1[illegible]
Number of Employees: 35

FREEDAY NATIONAL CORP.
13854 Park Center Road
Herndon, VA 22071
(703) 435-0100
Major Market: Software House; Miscellaneous Computer Supplies
Target Industries: Banking
Product Lines: Credit cards
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Marketing: Ann Carter
Geographic Coverage: National
Year Established: 1[illegible]
Number of Employees: 85

WISCONSIN

MEDIA MANAGEMENT & MAGNETICS, INC.
3725A N. 126th St.
Brookfield, WI 53005
(414) 783-5423
Major Market: Dealer/Distributor; Miscellaneous Computer Supplies
Product Lines: Forms; Ribbons; Disk Packs; Diskettes; Tapes; Furniture
Contacts:
Head of Marketing: Carrie Gingras
Geographic Coverage: National
Year Established: 1977
Number of Employees: 10

E-WAY
740 S. Commerce St.
Sheboygan, WI 53081
(414) 457-4833
Major Market: Miscellaneous Computer Supplies
Target Industries: Computer; Office; Resort, Dormitory
Product Lines: Furniture
Net Sales: $5 Million - $25 Million (1982)
Contacts:
Head of Marketing: Don Schackmuth
Head of Sales: Don Schackmuth
Geographic Coverage: National
Year Established: 1[illegible]
Number of Employees: 300

SHADE INFORMATION SYSTEMS, INC.
P.O. Box 730
Green Bay, WI 54305
(414) 498-8300
Major Market: Miscellaneous Computer Supplies
Target Industries: Fortune 500
Product Lines: Forms
Geographic Coverage: National
Year Established: 1[illegible]
Number of Employees: 300

SPACESAVER CORP.
1450 Janesville Ave
Fort Atkinson, WI 53538
(414) 563-6362
Major Market: Miscellaneous Computer Supplies
Target Industries: Insurance; Finance, Medical; Manufacturing
Target Applications: Vault tape storage, Printout storage
Product Lines: High density; Mobile storage
Contacts:
Head of Sales: Peter J. Boswell
Head of Engineering: John A. Sattel
Head of Customer Service: Richard Chayka
Geographic Coverage: International
Year Established: 1[illegible]
Number of Employees: 75

SYCOM
Data-Plan
3817 W. Beltline Highway
P.O. Box 7947
Madison, WI 53707
(608) 271-1133
Major Market: OEM Computer Systems and Peripherals/Terminals; Systems House OEM; Data Services (Service Bureau); Miscellaneous Computer Supplies
Target Industries: Medical; Dental; Optometric
Product Lines: Forms; Ribbons; Disk Packs, Diskettes; Tapes; Furniture;
Net Sales: $5 Million - $25 Million (1981)
Contacts:
Head of Marketing/Sales: Denis Greyczyk
Head of Software: William Arthur
Head of Engineering: Lawrence Dewey
Head of Customer Service: [illegible]
Thompson
Geographic Coverage: International
Year Established: 1964
Number of Employees: 160

VANNER GRAPHICS CORP.
12600 Robin Lane
P.O. Box 344
Brookfield, WI 53005
(414) 781-7300
Major Market: Miscellaneous Computer Supplies
Product Lines: Forms
Net Sales: $1 Million - $5 Million (1982)
Contacts:
Head of Sales: Steve Otto
Geographic Coverage: National
Year Established: 1947
Number of Employees: 65

WYOMING

NATIONAL DATATEC, INC.
4202 W. Yellowstone
Casper, WY 82601
(307) 265-6888
Major Market: Software House; Systems House OEM; Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Architecture; Medical, Legal, Banks
Target Applications: General Accounting
Product Lines: Forms; Ribbons; Disk Packs, Diskettes; Tapes, Furniture; Flooring
Contacts:
Head of Marketing: Guy Montgomery
Head of Sales: Robert Wise
Head of Engineering: Ray Gollob
Geographic Coverage: Wy
Year Established: 1[illegible]
Number of Employees: 14

PERIPHERAL CONTROLLERS

Index to Peripheral Controllers By Device Controlled

The peripheral controller index is designed to provide an overview of the products contained in this section of the buyer's guide. Products are indexed according to the type of peripheral device controlled — cassette/cartridge tape drives, display terminals, floppy disk drives, magnetic tape drives, memories, plotters, printers, reel-to-reel tape drives and teleprinters. Within each category, vendors are listed alphabetically with their products following in alphabetical order by name or numerically by model number. In addition to device type, the index contains information on the price of the product and the page number in the section the full product listing is located.

The product listings for controllers have been arranged in alphabetical order by vendor name and product.

Cartridge/Cassette Drive Controllers

VENDOR	MODEL	PRICE	PAGE
Adaptive Data & Energy Systems	TAPELINK	$484	D-43
Alloy Computer Products	DMB-1	$850	D-43
	DRS-232	$1,150	D-44
	PCBACK-UP	$1,395	D-44
American Computer Hardware Corp.	UPC	$1,000 to $2,000	D-44
Applied Systems Corp.	PERIPHERAL CONTROLLER	$2,000	D-46
Aviv Corp.	TFC 903-GCR ¼-IN CARTRIDGE	$1,850	D-46
Ball Electronic Systems Division	3120	$3,500	D-46
	3180	$4,400	D-47
Central Data Corp.	81026	$310	D-48
Ciprico, Inc.	PICOMATE	$1,313	D-48
	RIMFIRE 44 (COMBINATION)	$1,795	D-49
	RIMFIRE 44T	$1,665	D-49
	RIMFIRE 75 (COMBINATION)	$1,745	D-49
	RIMFIRE 75T	$1,130	D-49
Datum, Inc.	10MB CARTRIDGE CONTROLLER 45112	$1,250	D-52
	20MB CARTRIDGE CONTROLLER 40060	$5,500	D-52
	20MB CARTRIDGE CONTROLLER 45312	[illegible]	D-53
	CARTRIDGE DISK CONTROLLER 4009	[illegible]	D-53
Dilog	DQ330	$1,445	D-55
Diáplays Unlimited	MODEL 2000	$800	D-55
Distributed Logic Corp.	CARTRIDGE TAPE CONTROLLER DQ330	$1,445	D-55
GEN/COMP, Inc.	MODEL 2041	$425	D-56
	MODEL 3021	$500	D-56
Giddings & Lewis, Inc.	PC409	$2,500 to $9,000	D-57
Information Products Systems	IPS 3210	$10,500	D-58
Iomega Corp.	IOMEGA ALPHA-10 SUB-SYSTEM	$1,080	D-58
Konan Corp.	ENHANCER	$1,175	D-60
Measurement Systems & Controls, Inc.	CTC-2900	$385	D-62
OMTI	10F	$695	D-65
Rlanda Electronics	2400 DISK DRIVE CONTROLLER	$1,600	D-67
	2570 DISK DRIVE CONTROLLER	$3,100	D-67
Scientific Micro Systems	FWT01180	$4,500	D-68
Telcon Industries, Inc.	DATAMAX	$8,000 to $70,000	D-70
Transwave Corp.	K8070	NA	D-72
	K8073B X CALIBUR	NA	D-72
	TC2	NA	D-72
Weaparcorp	DC-220	NA	D-72
	DC-230	NA	D-72
	TC-160	NA	D-72
	TC-170	NA	D-72
	TC-180	NA	D-72
Zilog, Inc.	SYSTEM 8000 MODEEL 31	$31,950	D-74
	SYSTEM 8000 MODEL 11	$14,950	D-74
	SYSTEM 8000 MODEL 21	$22,950	D-74

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Display Terminal Controllers

VENDOR	MODEL	PRICE	PAGE
Able Computer	DH'DM	$3,750	D-43
	Q DH	$1,950	D-43
Advanced Logic Systems, Inc.	COLOR II	$179	D-43
	DISPATCHER	$139	D-43
	SMARTERM II	$179	D-43
Agile Corp.	LC 36	$995	D-43
	LC 3000	$1,595 to $2,995	D-43
Altek Corp.	AC 90SD	$9,000 to $10,500	D-44
American Computer Hardware Corp.	UPC	$1,000-to $2,000	D-44
Ampak Business Systems, Inc.	624006-1	$3,995	D-44
Applied Dynamics International	SELECTABLE I	$875	D-44
Applied Systems Corp.	PERIPHERAL CONTROLLER	$2,000	D-44
Astronautics Corp. of America	COLORGRAPHIC TERMINAL	$20 000	D-44
	LINE CONTROL UNIT (LCU)	$32,000	D-44
Burroughs Corp.	B91	$18,000	D-47
	B92	$21,000	D-47
	B93	$18,000	D-47
	B96	$38,000	D-47
	CP 9558	$29,400	D-47
	CP 9582	$45,000	D-47
Callan Data Systems	GRAPHICS CONTROLLER	$1,450	D-48
Codata Systems Corp.	SCC 0800	$13,500	D-49
Comark Corp.	MS534 SERIAL COMMUNICATIONS CONT	$550	D-49
Computer Communications Specialists, Inc.	TASK/1000	$1,995	D-49
Computer Extension System, Inc.	SLC 11	$550	D-49
	SLJL 11	$395	D-50
	SLZ 11	$1,190	D-50
Control Systems	ARTIST BOARD I	$3,195	D-50
	ARTIST BOARD II	$1,595	D-50
Cromemco, Inc.	IOP, QDRT	$1,090	D-50
Cybermation, Inc.	CFC150	$105,000	D-51
	CYB-400	$18,500	D-51
Data Plus, Inc.	202 SERIES	$900	D-51
	300-10	$1,300	D-51
	350	$3,600	D-51
	805-2	$1,600	D-51
Decision Data Computer Corp.	5751-01 CLUSTER CONTROLLER	$2,300	D-53
Delta Systems, Inc.	HP/C	N/A	D-54
D.E.M.	R245	$1,425	D-54
	R350	$8,000 to $10,000	D-54
	R650	$1,425	D-54
Digital Laboratories, Inc.	ESP-1	$395	D-54
	TLC-1	$245	D-54
Digitus Corp.	VOICE I/O MODULE	N/A	D-54
	VT10	$5,500	D-55
[illegible] Unlimited	MODEL 1000	$2,900	D-55
	MODEL 2000	$800	D-55
	MODEL 3000	$1,200	D-55
D & N Micro Products, Inc.	MODEL 1200	$2,995	D-56
	MODEL 2400	$3,495	D-56
	MODEL 2400-16	$6,095	D-56
Essex Engineering Co.	SX 1107	$9,000	D-56
GEN/COMP, Inc.	MODEL 2031	$500	D-56
	MODEL 2041	$425	D-56
	MODEL 3021	$500	D-56
Giddings & Lewis, Inc.	PC400	$2,500 to $9,000	D-57
	PC409	$2,500 to $9,000	D-57
Harvey Hubbel, Inc.	MICROMITE 402	$1,000	D-57
	MICROMITE-403	$3,000 to $5,000	D-57
Honeywell, Inc.	VTS-7710	$10,385	D-57
Houdaille Industries	FABRIPOINT V	$26,000	D-57
IBM	2701 DATA ADAPTOR UNIT	N/A	D-58
	3274	N/A	D-58
	3705-80 COMMUNICATIONS	N/A	D-58
	3705-II	N/A	D-58
	3725-I	N/A	D-58
	INTEGRATED COMMUNICATIONS	N/A	D-58
Imagraphix, Inc.	CHINESE CHARACTER GENERATOR	$5,000	D-58
	IPX DISPLAY CONTROLLER	$1,500	D-58
Indocomp, Inc.	IND-1900	$840	D-58
Infolink	MODEL 5123	$25,000 to $80,000	D-58
Information Products Systems	IPS 7803	$10,500	D-58
John Bell Engineering	82-018 VIDEO TERMINAL BOARD	$199	D-58

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VENDOR	MODEL	PRICE	PAGE
KLC Corp.	100	$5,000	D-59
	200	$3,500	D-59
	500	$3,500	D-59
KMW Systems Corp.	3270 SERIES II	$6,500	D-59
	HASP/3770 SERIES II	$4,550	D-59
Lee Data Corp.	306 REMOTE SYSTEM	$5,212	D-60
	308 REMOTE SYSTEMS	$7,057	D-60
	310 REMOTE SYSTEM	$12,361	D-60
	320 LOCAL SYSTEM CONTROLLER	$14,056	D-60
	321 LOCAL/REMOTE SYS CONTROLLER	$16,556	D-60
	410 3270/ASYNCH REMAT	$14,820	D-60
	420 LOCAL/ASYNCH SYSTEM	$19,520	D-60
	421 LOCAL/REMOTE PLUS	$21,964	D-60
Local Data, Inc.	DATALYNX/3270	$1,450	D-60
	DATALYNX/3274	$6,000	D-60
	DATALYNX/3780	$1,750	D-60
	INTERLYNX/3278	$1,395	D-60
Lomas Data Products, Inc.	OCTAPORT	$325	D-60
Management Assistance, Inc.	110	$16,990	D-60
	210	$28,280	D-60
	310	$52,835	D-60
	510	$50,065	D-60
	580	N/A	D-61
	710	$66,970	D-61
	810	$125,929	D-61
MDB Systems, Inc.	MBI-49-TTY	$650	D-61
	MDL-11	$825	D-61
	MDL-11W	$795	D-61
	MLSI-DLVII	$475	D-61
	MLSI-DLVII-F	$350	D-61
	MLSI-DLVII-FX	$385	D-61
	MULTIPLE I/O BOARD/MDB-M10B-A	$400	D-61
	PASLA 1 MDB-47-102	$450	D-62
MDS Trivex	MODEL 8074	$4,950	D-62
Memorex Corp.	2074 SNA/SDLC	N/A	D-62
	2076	N/A	D-62
Mental Logic Laboratories	BGP-444	$1,500	D-62
Methods Corp.	DISPLAY CONTROLLER U 400	$11,950	D-63
	DISPLAY CONTROLLER U 500	$16,950	D-63
Mossley Associates, Inc.	MRC-1	$6,995	D-64
	MRC-2	$14,995	D-64
	MRC-1600	$3,695	D-64
Mostek Corp.	MDX-CPU3	$695	D-64
	MDX-CPU4	$375	D-64
	MDX-DEBUG	$400	D-64
	MDX-EPROM/VART	$190	D-64
	MDX-5102	$213	D-64
	RADIUS	$2,995	D-64
	SDE-COMBO	$1,195	D-64
	SDE-OEM-80E	$859	D-64
	VME-SBC	$1,395	D-64
	VME-510	$925	D-64
Multi-Systems	R/L1	$1,500 to $3,000	D-64
	R/L2	$2,000 to $6,000	D-64
National Semiconductor Corp.	TERMINAL CLUSTER CONTROLLER	$11,000	D-64
Peripheral Technology, Inc.	BLC-8228	$800	D-64
	SCAT 1	$795	D-65
	SCAT 2101	$995	D-65
	SCAT 2501	$2,995	D-65
Prescom, Inc.	3274	$6,995	D-65
	3275	$2,500	D-66
	CC 3276	$3,350	D-66
	EM 3276 BISYNCHRONOUS	$2,600	D-66
Rastel-Stilgo, Inc.	MODEL 4274 LOCAL CLUSTER CONTROLLER	$7,000 to $18,000	D-67
	MODEL 4274 REMOTE CLUSTER	$7,000 to $18,000	D-67
Raster Technologies	THE MODEL ONE/25	$10,000 to $20,000	D-67
	THE MODEL ONE/40	$10,000 to $20,000	D-67
	THE MODEL ONE/65	$10,000 to $20,000	D-67
Raytheon Co.	PTS-2900	$2,700	D-67
	RDS-2074	$8,100	D-67
	RDS-2076	$2,750	D-67
Ramex Corp.	TRANSLATOR 5/9/13/17/21/25/33	$4,950 to $18,950	D-67
Rienda Electronics	2600	$1,900	D-67
Scientific Micro Systems	FD0500	$900	D-68
Systech, Inc.	MTI-800A/1600A	$1,895	D-70
Systems Research, Inc.	CP 3680	$75,000	D-70
Tandem Computers, Inc.	6303	$3,600	D-70
Tarbell Electronics	3033 CPU I/O BOARD	$450	D-70

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VENDOR	MODEL	PRICE	PAGE
Tarbell Electronics	4044 4SRP	$450	D-70
Tentronics, Inc.	DATA CUE II	$10,000	D-70
Telcon Industries, Inc.	DATAMAX	$8,000 to $70,000	D-70
Telectronic, Inc.	ML644	$850	D-70
Telex Computer Products, Inc.	MODEL 174-1	$5,000	D-70
	MODEL 174-2	$8,500	D-70
	MODEL 274	N/A	D-70
	MODEL 276 DISPLAY	$5,900	D-70
Terni-Tronics	3270-4	$2,995	D-72
	3270-6	$2,895	D-72
Transware Corp.	K8070	N/A	D-72
	K8073B X CALIBUR	N/A	D-72
	TC2	N/A	D-72
TRT Data Products	DATA CONCENTRATOR	$50,000	D-72
	DATA ROUTER	$8,000	D-72
	DATA SELECTOR	$8,000	D-72
Tymshare, Inc.	ASE 9601	$4,000	D-72
	ASE 9605	$5,500	D-72
Vermont Research Corp.	4401	$4,365	D-72
Zendex Corp.	ZX-118 QUAD SERIAL	$1,495	D-73
Zilog, Inc.	SYSTEM 8000 MODEL 31	$31,950	D-74
	SYSTEM 8000 MODEL 11	$14,950	D-74
	SYSTEM 8000 MODEL 21	$22,950	D-74

Floppy Disk Drive Controllers

VENDOR	MODEL	PRICE	PAGE
Action Computer	MPC100	N/A	D-43
Adaptive Data & Energy Systems	ST506/SA400	$677	D-43
Advanced Electronics Design, Inc.	FLEX 02	$1,220	D-43
	WINC 05	$1,995	D-43
	WINC 05-8	$1,995	D-43
	WINC 08	$2,630	D-43
Aerocomp, Inc.	DOUBLE DENSITY CONTROLLER	$139	D-43
Altek Corp.	AC 90SD	$9,000 to $10,500	D-44
Andromeda Systems, Inc.	WDC11	$2,000	D-44
Applied Systems Corp.	PERIPHERAL CONTROLLER	$2,000	D-46
Astronautics Corp. of America	KVDT WORD PROCESSOR	$18,000	D-46
Benson, Inc.	GRAPHWARE 1000	$750	D-47
BSL Technology Corp.	BTC-102	$750	D-47
Bytronix Corp.	M650	$1,200	D-48
California Computer Systems	2422-01	$395	D-48
	2422-02	$595	D-48
Callan Data Systems	MULTIBUS FLOPPY DISK CONTROLLER	$750	D-48
Candid Logic, Inc.	101636	$230	D-48
Central Data Corp.	B1015	$375	D-48
	B1015/2001	$4,195	D-48
	B1015/D2000	$2,735	D-48
CGRS Microtech, Inc.	C340-2	$199	D-48
	C540-1	$199	D-48
	C877-1	$199	D-48
Cadata Systems Corp.	FDC-0100	$420	D-49
Comark Corp.	MF85	$695	D-49
Computable Computer Corp.	FDC 5/8	$495	D-49
CompuPro Corp.	DISK 1	$495 to $595	D-49
Computime	FDC-1	$275	D-50
Data Systems Design, Inc.	4140	$1,250	D-52
	5215	$1,295	D-52
	5217	$1,295	D-52
	6217	$1,295	D-52
	7215	$1,295	D-52
	7217	$1,295	D-52
	DSD 4140	$1,250	D-52
	MULTIBUS 5215	$1,295	D-52
	MULTIBUS 7215	$1,295	D-52
Datasystems Corp.	FLOPPY DISK CONTROLLER 5510	$1,100	D-52
Data Technology Corp.	DTC520A	$500	D-52
	DTC535A	$500	D-52
	DTC900	$775	D-52
Dilog	DQ409	$1,095	D-55
Displays Unlimited	MODEL 2000	$800	D-55

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VENDOR	MODEL	PRICE	PAGE
Distributed Logic Corp.	FLOPPY DISK-ANSI I/O DO619	N/A	D-55
	FLOPPY DISK-SA800/850I/O DO419	N/A	D-55
D & N Micro Products, Inc.	MODEL 2400	$3,495	D-56
GEM/COMP, Inc.	MODEL 2400-16	$6,095	D-56
	MODEL 2041	$425	D-56
	MODEL 3021	$500	D-56
	MODEL 3052	$1,200	D-56
General Robotics Corp.	RXV21	$1,100	D-57
Greco Systems	Z2800	$195	D-57
Hendelle Industries	FABRIPOINT V	$26,000	D-57
Indocomp, Inc.	IND-1672 FLOPPY DISK CONTROLLER	$960	D-58
Inner Access Corp.	SCSI-1	$150	D-58
Intel Corp.	ISBC 204	$780	D-59
	ISBC 208	$1,085	D-59
	ISBX 218A	$540	D-59
Interphase Corp.	SDC 2203	$1,795	D-59
Intersil Systems, Inc.	ISB-3401 FLOPPY DISK	N/A	D-59
Ithaca Intersystems	FDC-2	$650	D-59
Jade Computer Products, Inc.	DOUBLE D	$395	D-59
Konan Corp.	TAISHO	$895	D-60
LNW Research Corp.	SYSTEM EXPANSION II	$399	D-60
Lobo Systems, Inc.	LCA-22	$599	D-60
Lomas Data Products, Inc.	LDP-72	$275	D-60
MDB Systems, Inc.	WINCHESTER/FLOPPY CTRL/MLSI-WFCII	$1,995	D-62
Measurement Systems & Controls, Inc.	FDC-2800	$408	D-63
Micro Technology, Inc.	MX	N/A	D-63
	MXV21	N/A	D-63
	MXV22	N/A	D-63
	MXV22M	N/A	D-63
	MXV42G	N/A	D-63
Milrope Corp.	DC400	$7,800	D-63
	DC401	$7,800	D-63
Morrow Designs	DJ/DMA	$600	D-64
Mostek Corp.	MDX-FLP2	$450	D-64
	SDE-COMBO	$1,195	D-64
	SDE-FLP-80E	$955	D-64
	VME-FDC	$1,250	D-64
Motorola, Inc.	KVM 21	$3,125	D-64
	M68KVM20	$2,500	D-64
National Semiconductor Corp.	BLC-8222	$800	D-64
	BLC-8224	$800	D-64
OMTI	20D	$350	D-65
	MODEL 10B	$695	D-65
Palm Beach Computers, Inc.	INTEGRAL	$495	D-65
PCE Systems	FDC 800	$480	D-65
Per Sci, Inc.	1070	$595	D-65
	1170	$1,050	D-65
Pioneer Peripheral Systems	XC31	$915	D-66
	XCV31	$860	D-66
Prism Corp.	SMART	$340	D-66
	SMART-T	N/A	D-66
Prometheus Products	APPLESURANCE	$125	D-66
Quentin Research, Inc.	AP120	$65	D-67
Rana Systems	RANA CONTROLLER CARD	$145	D-67
Scientific Micro Systems	FD0302-M	$500	D-68
	FD0500	$900	D-68
	FD0507-M	$700	D-68
	FWD0101	$2,400	D-68
	FWD0106	$2,100	D-68
	FWD1101	$2,400	D-68
	FWD1106	$2,100	D-68
	FWD5001	$1,400	D-68
	FWD8001	$1,500	D-68
	FWD8006	$1,400	D-68
SD Systems, Inc.	FWII	$695	D-68
	VERSAFLOPPY II	$400	D-68
S. Goldman Co.	PM-3001	$730	D-68
	PM-3010	$750	D-68
Shugart Associates, Inc.	SA1403	$1,003	D-68
	SA1403D	$961	D-68
	SA1403D-1	$961	D-68
	SA1403E	$961	D-68
	SA1420A	$487	D-68
	SA1603	$461	D-68
	SA1620	$416	D-68
Signal Designs, Inc.	SDI-FLOPPY	$220	D-68
Sigma Information Systems, Inc.	SDC-RXV21	$871	D-68
Smoke Signal Broadcasting	DCB-4A	$549	D-68

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VENDOR	MODEL	PRICE	PAGE
Smoke Signal Broadcasting	DCB-4E	$695	D-69
	PSA-1	$1,450	D-69
Sorrento Valley Associates	MEGAFLX MXH853	$349	D-69
Spectra Logic Corp.	SPECTRA 10	$2,600	D-69
	SPECTRA 30	$1,150	D-69
	SPECTRA 36	$1,350	D-69
Systems Group	FDC-2800	$408	D-70
Systems Research, Inc.	CP 3680	$75,000	D-70
Tarbell Electronics	1011 SINGLE DENSITY FLOPPY	$325	D-70
	2022-DOUBLE DENSITY FLOPPY	$495	D-70
TEAC Corp. of America	FC-55	$400	D-70
Telcon Industries, Inc.	DATAMAX	$8,000 to $70,000	D-70
Terminal Data Corp.	SYSTEM 2000/26	$895	D-70
	SYSTEM 2000/10	$895	D-72
Transwave Corp.	K8070	N/A	D-72
	K8073B X CALIBUR	N/A	D-72
	TC2	N/A	D-72
Univation, Inc.	FLOPPY DISK CONTROLLER ICF-5 & 8C	$295	D-72
Vista Computer Co., Inc.	A800 DOUBLE DENSITY	$265	D-72
Western Digital Corp.	WD1002 WINCHESTER/FLOPPY	N/A	D-73
Zendex Corp.	ZBX-218B	$480	D-73
	ZX-200A	$1,500	D-73
	ZX-203	$2,795	D-74
	ZX-205	$506	D-74
	ZX-208A	$980	D-74
Zilog, Inc.	SYSTEM 8000 MODEL 31	$31,950	D-74
	SYSTEM 8000 MODEL 11	$14,950	D-74
	SYSTEM 8000 MODEL 21	$22,950	D-74

Magnetic Tape Device Controllers

VENDOR	MODEL	PRICE	PAGE
Alloy Computer Products	CP-8000	$895	D-43
	DMB-1	$850	D-43
	DP-8000	$1,050	D-44
	DS-100	$650	D-44
	DZ-80B	$600	D-44
	IDXS-100	$950	D-44
	LSI-50	$1,195	D-44
	OSBU-1A	$950	D-44
Altek Corp.	AC 90SM	$7,000 to $250,000	D-44
American Computer Hardware Corp.	UPC	$1,000 to $2,000	D-44
Applied Systems Corp.	PERIPHERAL CONTROLLER	$2,000	D-46
Ardent Computer Products, Inc.	MAGNETIC TAPE CONTROLLER T1000	$2,000	D-46
Astronautics Corp. of America	LINE CONTROL UNIT (LCU)	$32,000	D-46
Atex, Inc.	ATEX	N/A	D-46
Aviv Corp.	TEC 712	$3,500	D-46
	TEC 822-NRZI/PE	$3,500	D-46
	TFC 705/715 GCR	$9,450	D-46
	TFC 706-GCR TRIDENSITY	$9,850	D-46
	TFC 805/815 GCR TRIDENSITY	$8,725	D-46
	TFC 806 GCR TRIDENSITY	$9,100	D-46
	TFC 832-STREAMING COUPLER	$1,850	D-46
	TFC 922-NRZI/PE	$3,500	D-46
Bytronix Corp.	M525	$1,200	D-48
Ciprico, Inc.	RIMFIRE 38A (COMBINATION)	$1,895	D-48
	RIMFIRE 45 (COMBINATION)	$1,895	D-49
	TAPEMASTER	$1,688	D-49
Comark Corp.	MT80	$1,296	D-49
	MT86	$1,295	D-49
Cray Research, Inc.	BMC-4	$75,000	D-50
Cybermation, Inc.	CYB-400	$1,500	D-51
Data Engineering, Inc.	CC660	$5,000	D-51
Dataplex, Inc.	201 MICROSTREAMER	$6,500	D-51
Dataram Corp.	T03	$1,950	D-51
	T04/C	$1,500	D-51
	T04/D	$2,800	D-51
	T05/C	$1,980	D-51
	T34/T	$3,670	D-51
	T35/C	$1,980	D-51
	T36	$2,700	D-52

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VENDOR	MODEL	PRICE	PAGE
Dataram Corp.	T37	[illegible]	D-53
Data Systems Design, Inc.	MULTIBUS 5215	$1,295	D-53
	MULTIBUS 7215	[illegible]	D-53
Datum, Inc.	MAG TAPE CONTROLLER 1018	$3,625	D-53
	MAG TAPE CONTROLLER 1919	[illegible]	D-53
	MAG TAPE CONTROLLER 1041	$3,280	D-53
	MAG TAPE CONTROLLER 1046	$3,850	D-53
	MAG TAPE CONTROLLER 1050	$2,675	D-53
	MAG TAPE CONTROLLER 1060,1070	[illegible]	D-53
	MAG TAPE CONTROLLER 1512	$2,550	D-53
	MAG TAPE CONTROLLER 1542	$2,250	D-53
	MAG TAPE ADAPTER 35012	$1,600	D-53
	TM11 1521	[illegible]	D-53
	TM11 ADAPTER 35020	$1,550	D-53
	TM11 ADAPTER 35021	$1,550	D-53
	TM11 CONTROLLER 1020	$3,400	D-53
	TM11 CONTROLLER 1520A	$2,850	D-53
	TM11 CONTROLLER 1520AV	$2,875	D-53
	TM11 CONTROLLER 15330	[illegible]	D-53
	TS11 ADAPTER 35032	[illegible]	D-53
Davong Systems, Inc.	HARD DISK CONTROLLER-E	$1,995	D-53
	HARD DISK CONTROLLER-I	$1,845	D-53
Delta Systems, Inc.	HP/T	N/A	D-54
Digi-Data Corp.	70M	N/A	D-54
	70Q	N/A	D-54
	70R	N/A	D-54
	70S	N/A	D-54
	HP1000M/E/F IF	$2,000	D-54
	HS NCI	$1,500	D-54
	QCI	$1,485	D-54
	UCI	$1,500	D-54
Dilog	DQ120	[illegible]	D-55
	DQ132	$2,050	D-55
	DU120	$1,895	D-55
	DU130	$1,550	D-55
Displays Unlimited	MODEL 2000	$800	D-55
Distributed Logic Corp.	TAPE DRIVE COUPLER DX130	$1,550	D-55
	TAPE DRIVE COUPLER DX132	$2,050	D-55
DP-Tek, Inc.	9220	$3,995	D-56
Dylon Corp.	1015B	$6,995	D-56
	1025A	$6,996	D-56
	1030A	$5,695	D-56
Emulex Corp.	SC01	N/A	D-56
Gow Control Corp.	TF160	$1,300	D-56
	TF800	$1,100	D-56
	TF816	$1,700	D-56
GEN/COMP, Inc.	MODEL 2041	$425	D-56
	MODEL 3021	$500	D-56
Honeywell, Inc.	MTP-0610	$29,400 to $73,752	[illegible]
	MTP-8000	$28,060	[illegible]
IDEX Computer Corp.	STC-100	$2,200	[illegible]
Information Development & Applications	4600	$4,495	D-56
Information Products Systems	IPS 3200	$5,000	D-56
	IPS 5000	$14,000	D-56
	IPS 7016	$14,500	D-56
	IPS 7803	$10,500	D-56
Inner Access Corp.	SCSI-1	$150	D-56
Intel Corp.	iSBX 217B	$495	D-56
Interphase Corp.	SDC 2203	$1,795	D-56
KLC Corp.	300	$8,000	D-56
KMW Systems Corp.	HASP/3770 SERIES II	$4,550	D-56
Konan Corp.	ENHANCER	$1,175	D-56
Macrolink	201800 STREAMER TAPE ADAPTER	$1,225	D-56
MDB Systems, Inc.	TAPE CONTROLLER/MDB-TM11	$2,950	D-62
	TAPE CONTROLLER/MLSI-TM11	N/A	D-62
Megatape Corp.	CIM-1/MN	$325	D-62
	CIM-1/MX	$895	D-62
	TIM-1/MX	$895	D-62
Memtec	M1000 COMPANION CONTROLLER	$495	D-62
	M1100 COMPANION	$250	D-62
	M1200	$250	D-62
Milltape Corp.	TC-NTDS	$27,500	D-63
	TC-X	$20,000	D-63
	TC11	$20,000	D-63
	TC400	$23,100	D-63
Minicomputer Technology	2410	$2,200	D-63
	2414	$2,800	D-63
	[illegible]	$2,200	D-63

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VENDOR	MODEL	PRICE	PAGE
Minicomputer Technology	2425	$2,800	D-63
NCR Corp.	6325	$17,000	D-64
	6370-0401	$56,122	D-65
	6370-0601	$59,347	D-65
	6370-0801	$33,900	D-66
Pleasey Peripheral Systems	TC11B	$2,800	D-66
Rienda Electronics	1939 MAG TAPE CONTROLLER	$9,980	D-67
	2200 MAG TAPE CONTROLLER	$1,600	D-67
	2570T MAG TAPE CONTROLLER	$1,600	D-67
Rexcomp Corp.	C160	$1,750	D-68
	C161	$950	D-68
	C162	N/A	D-68
	C163	$199	D-68
Spectra Logic Corp.	SPECTRA 20	$3,200	D-68
	SPECTRA 21	$3,200	D-68
	SPECTRA 25	$2,250	D-68
	SPECTRA 26	$3,200	D-69
Stratus Computer	T-100	$5,500	D-69
Sysgen	SC-3000	$1,000	D-70
Systech, Inc.	STC-4400	$795	D-70
System Industries, Inc.	9700	$35,200 to $39,900	D-70
Systems Group	CPC-29	$385	D-70
Tandem Computers, Inc.	3202	$4,800	D-70
	3206	$6,100	D-70
Telcon Industries, Inc.	DATAMAX	$8,000 to $70,000	D-70
Transwave Corp.	K8070	N/A	D-72
	K8073B X CALIBUR	N/A	D-72
	TC2	N/A	D-72
TRT Data Products	DATA ROUTER	$8,000	D-72
	DATA SELECTOR	$6,000	D-72
U.S. Design Corp.	MODEL 2250	$4,995	D-72
Weepercorp	TAPE DIMENSION III	$1,995	D-72
	TC-110	N/A	D-72
	TC-120	N/A	D-73
	TC-130	$3,410	D-73
	TC-131	N/A	D-73
	TC-140	N/A	D-73
	TC-151	N/A	D-73
Weepermicro Systems, Inc.	TAPE DIMENSION III	$1,983	D-73
	TC131	$3,300	D-73
Xylogics, Inc.	472	$1,795	D-73
Zilog, Inc.	SYSTEM 8000 MODEEL 31	$31,950	D-74
	SYSTEM 8000 MODEL 11	$14,950	D-74
	SYSTEM 8000 MODEL 21	$22,950	D-74

Memory Device Controllers

VENDOR	MODEL	PRICE	PAGE
Applied Dynamics International	SELECTABLE I	$875	D-46
Applied Systems Corp.	PERIPHERAL CONTROLLER	$2,000	D-46
Bytek Computer Systems Corp.	MULTIPROGRAMMER SYSTEM S-15F	$945	D-47
	MULTIPROGRAMMER SYSTEM S-15P	$645	D-47
	MULTIPROGRAMMER SYSTEM S-15R	$445	D-48
Computime	64K STATIC RAMBOARD	$325	D-50
	CT256	$550	D-50
Consolint	SS-SER	$444	D-50
	SS-1000	$349	D-50
Cybermation, Inc.	CYB-400	$18,500	D-51
Data Engineering, Inc.	ASYNCHRONOUS MEMORY PORT C2172	$6,000	D-51
	C/514	$12,000	D-51
	INTERNAL MEMORY CONTROLLER C2192	$6,000	D-51
	SYNCHRONOUS MEMORY PORT C2162	$6,000	D-51
Datasystems Corp.	DMA CONTROLLER DLP1132	$2,150	D-62
	LINE PRINTER CONTROLLER DLP1200	$650	D-62
Dynamo Systems, Inc.	DSI-ASYNCH	$385	D-63
Gaw Control Corp.	TF816	$1,700	D-64
GEN/COMP, Inc.	MODEL 2041	$425	D-64
	MODEL 3021	$500	D-64
General Robotics Corp.	MLVII	$1,000	D-67
	MSVII	$500	D-67
	MSVII-Q	$2,500	D-67

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VENDOR	MODEL	PRICE	PAGE
Giddings & Lewis, Inc.	PC400	$2,500 to $9,000	D-57
Honeywell, Inc.	MSP-0611	[illegible]	D-57
Houdaille Industries	FABRIPOINT V	$26,000	D-57
Ikor Technology, Inc.	HRG	$1,900	D-58
	HRG-2	$3,600	D-58
	MPC/FRG	$8,000	D-58
Lomas Data Products, Inc.	LDP-256K	$795	D-60
	RAM67	$1,200	D-60
PCE Systems	BSR256	$1,000	D-65
Telcon Industries, Inc.	DATAMAX	$8,000 to $70,000	D-70
Transwave Corp.	K8070	N/A	D-72
	K8073B X CALIBUR	N/A	D-72
	TC2	N/A	D-72
Vermont Research Corp.	4107	$3,340	D-72
	4108	$3,575	D-72
	4401	$4,365	D-72
	4402	$3,770	D-72
	4404	$3,575	D-72
	4410	$3,170	D-72
Zilog, Inc.	SYSTEM 8000 MODEEL 31	$31,950	D-74
	SYSTEM 8000 MODEL 11	$14,950	D-74
	SYSTEM 8000 MODEL 21	$22,950	D-74

Plotter Controllers

VENDOR	MODEL	PRICE	PAGE
Agile Corp.	MODEL 5267	$2,500	D-43
American Computer Hardware Corp.	UPC	$1,000 to $2,000	D-44
Applied Systems Corp.	PERIPHERAL CONTROLLER	$2,000	D-46
Benson, Inc.	GRAPHWARE II	$10,000 to $12,000	D-47
	GRAPHWARE 1000	$750	D-47
	GRAPHWARE 2000	$20,000	D-47
Cybermation, Inc.	CFC150	$105,000	D-51
	CYB-400	$18,500	D-51
Displays Unlimited	MODEL 2000	$800	D-55
GEN/COMP, Inc.	MODEL 2041	$425	D-56
	MODEL 3021	$500	D-56
Houdaille Industries	FABRIPOINT V	$26,000	D-57
Indocomp, Inc.	IND-1900	$840	D-58
KMW Systems Corp.	GRAPHICS VECTOR PROCESSOR-VP20	$12,000 to $15,000	D-59
	GRAPHICS VECTOR PROCESSOR VP10	$5,000 to $12,000	D-59
	GRAPHICS VECTOR PROCESSOR VP30	$19,500	D-59
	HASP/3770 SERIES II	$4,550	D-60
MDB Systems, Inc.	INCREMENTAL PLOTTER CTRL/MDB-XYII	$1,250	D-61
	PRINTER PLOTTER CONTROL/MDB-LVII	$1,450	D-62
	PRINTER PLOTTER CONTROL/MLSI-LVII	$975	D-62
	X-Y INCREMENTAL PLOTTER CONTROLLER	$700	D-62
Mectek Corp.	MDX-5102	$213	D-64
Mosiet Zeta Corp.	6300	N/A	D-65
	ZETA C63	$43,800 to $57,800	D-65
Systems Research, Inc.	CP 3680	$75,000	D-70
Telcon Industries, Inc.	DATAMAX	$8,000 to $70,000	D-70
Versatec, Inc.	IXX INTERFACES	N/A	D-72
	RANDOM ELEMENT PROCESSOR	N/A	D-72
	VECTOR TO RASTER CONVERTOR	N/A	D-72
Zilog, Inc.	SYSTEM 8000 MODEEL 31	$31,950	D-74
	SYSTEM 8000 MODEL 11	$14,950	D-74
	SYSTEM 8000 MODEL 21	$22,950	D-74

Printer Controllers

VENDOR	MODEL	PRICE	PAGE
Able Computer	VMZ/LP	$1,595	D-43
ACC	IF-11/9700	$15,000	D-43

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VENDOR	MODEL	PRICE	PAGE
Adaptive Data & Energy Systems	PRINTLINK	$500	D-43
Advanced Logic Systems, Inc.	DISPATCHER	$139	D-43
	PRINTERMATE	$99	D-43
Agile Corp.	LC-36	$995	D-43
	LC-3000	$1,595 to $2,995	D-43
	MODEL 5287	$2,500	D-43
American Computer Hardware Corp.	UPC	$1,000 to $2,000	D-44
Ampak Business Systems, Inc.	624006-1	$3,995	D-44
	624006-2	$4,995	D-44
	624006-3	$7,895	D-44
	624006-4	$9,750	D-44
	624006-5	$13,950	D-44
	624006-6	$23,000	D-44
Applied Dynamics International	SELECTABLE I	$875	D-46
Applied Systems Corp.	COMMUNICATIONS CONTROLLER ASC/80	$2,500	D-46
	PERIPHERAL CONTROLLER	$2,000	D-46
Ardent Computer Products, Inc.	LINE PRINTER CONTROLLER L1000	$1,000	D-46
	LINE PRINTER CONTROLLER L1100	$1,300	D-46
	LINE PRINTER CONTROLLER L1300	$1,500	D-46
Astronautics Corp. of America	KEYBOARD VIDEO DISPLAY	$28,000	D-46
	LINE CONTROL UNIT (LCU)	$32,000	D-46
B2B Corp.	BPI-80	$1,295	D-47
	CSI-51	$995	D-47
	DGC-40	$995	D-47
	DGC-50	$2,000	D-47
	HPC-21	[illegible]	D-47
	HPC-30	$2,595	D-47
	HPC-33	$2,595	D-47
	HPI-33	$2,595	D-47
	IBI-34	$2,595	D-47
	IBI-76	$2,595	D-47
	LPC-03	$595	D-47
	LPC-11	$795	D-47
	LPC-20	$2,595	D-47
	NPC-20	$1,500	D-47
Bit 3 Computer Corp.	DUAL-COMM CARD	$249	D-47
Cardamation Co.	11AP	$520	D-48
	11GP	$520	D-48
	21AP	$470	D-48
	21CP	$470	D-48
	21DP	$470	D-48
	21GP	$470	D-48
Cedata Systems Corp.	SCC 0600	$13,500	D-49
Comark Corp.	MS534 SERIAL COMMUNICATIONS CONT	$550	D-49
Comber Corp.	C1718	$4,800	D-49
	C3900	$5,800	D-49
	C4748	$4,800	D-49
	C6768	$7,200	D-49
	C7900	$7,200	D-49
	CX27	$9,050	D-49
Computer Communications Specialists, Inc.	TASK/1000	$1,995	D-49
Computer Extension System, Inc.	LPC 8	$495	D-49
	LPC 11	$525	D-49
	LPCL 11	$375	D-49
	SLC 11	$550	D-49
	SLJL 11	$395	D-50
Conselink	MS-PP32	$249	D-50
	MS-PP64	$299	D-50
	MS-PS16	$249	D-50
	MS-PS32	$279	D-50
	MS-PS64	$329	D-50
	MS-SP16	$249	D-50
	MS-SP32	$279	D-50
	MS-SP64	$329	D-50
	MS-SS16	$259	D-50
	MS-SS32	$289	D-50
	MS-SS64	$339	D-50
	MS PP16	$219	D-50
	SS-SER	$444	D-50
	SS-1000	$349	D-50
	SS MEM	$159	D-50
Cromemco, Inc.	IOP, QDRT	$1,090	D-50
	PR1	$245	D-50
	TRT	$345	D-50
Cybernation, Inc.	CFC150	$105,000	D-51
	CYB-400	$18,500	D-51
Data Engineering, Inc.	CC420	$3,000	D-51
	P4390	$800	D-51

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VENDOR	MODEL	PRICE	PAGE
Beta Plus, Inc.	805-2	$1,600	D-51
Datasouth Computer	DS120 TERMINAL CONTROLLER BOARD	$750	D-52
Datasystems Corp.	DMA CONTROLLER DLP1132	$2,150	D-52
	LINE PRINTER CONTROLLER DLP11	$625	D-52
	LINE PRINTER CONTROLLER DLP1100	$375	D-52
	LINE PRINTER CONTROLLER DLP1200	$650	D-52
	LINE PRINTER CONTROLLER DLP3300	$1,825	D-52
Datum, Inc.	LINE PRINTER CONTROLLER 95060	$2,150	D-53
Davong Systems, Inc.	DSI-ASYNCH	$385	D-53
Decision Data Computer Corp.	5751-01 CLUSTER CONTROLLER	$2,300	D-53
Delta Systems, Inc.	HP/P	$32,000	D-54
Digital Associates Corp.	3111 PDP/11/VAX PRINTER	N/A	D-54
	HP 3000/33 - HP 3000/64	N/A	D-54
	HP 3000/I/II/III PRINTER	N/A	D-54
	MODEL 3211 IBM SERIES I	N/A	D-54
	MODEL 4140 PRINTER CONTROLLER	N/A	D-54
	PROTOCOL INTERFACE 7130	N/A	D-54
	PROTOCOL INTERFACE 7140	N/A	D-54
	REMOTE LINE PRINTER SYSTEM	N/A	D-54
	RS-232 INTERFACE 7110	N/A	D-54
Digital Laboratories, Inc.	MICROMATRIX II	[illegible]	D-54
	MULTISPOOL	$995	D-54
Digitus Corp.	SASA CONTROLLER	$220	D-54
Displays Unlimited	MODEL 2000	$800	D-55
	MODEL 3000	$1,200	D-55
DP-Tek, Inc.	94-D	$400	D-56
	94-P	$375	D-56
	94-S	[illegible]	D-56
	94-WP	$495	D-56
	8304	$1,950	D-56
	9449	$495	D-56
	IMPRINT/3	$1,195	D-56
	MODEL 8303	$1,550	D-56
Essex Engineering Co.	SX 1107	$9,000	D-56
GEN/COMP, Inc.	MODEL 2024	$525	D-56
	MODEL 2041	$425	D-56
	MODEL 3021	$500	D-56
General Electric Co.	9610	$3,815	D-57
	9615	$3,940	D-57
General Robotics Corp.	LPVII QBUS COMPATIBLE	$250	D-57
Giddings & Lewis, Inc.	PC400	$2,500 to $9,000	D-57
	PC409	$2,500 to $9,000	D-57
Honeywell, Inc.	URP-0600	$26,585	D-57
	URP-8001	$6,500	D-57
	URP-8004	$4,000	D-57
	VTS-7710	$10,385	D-57
Houdaille Industries	FABRIPOINT V	[illegible]	D-57
IBM	2701 DATA ADAPTOR UNIT	N/A	D-58
	3274	N/A	D-58
	3705-80 COMMUNICATIONS	N/A	D-58
	3705-II	N/A	D-58
	3725-I	N/A	D-58
	INTEGRATED COMMUNICATIONS	N/A	D-58
Ideographix, Inc.	CHINESE CHARACTER GENERATOR	$5,000	D-58
	IPX PRINTER CONTROLLER	$1,500	D-58
Indecomp, Inc.	IND-1900	$840	D-58
Innovative Electronics, Inc.	MC 40/10	$1,070	D-58
	MC 40/20	$1,070	D-58
	MC 40/40	$795	D-58
	MC 40/50	$845	D-58
	MC 40/60	$770	D-58
	MC 40/70	$820	D-58
	MC 40/80	$770	D-58
Instrumentation Technology Systems	9341	$940	D-59
Intron Corp.	6507	$10,000	D-59
	6512	$10,000	D-59
	6579	$7,500	D-59
	6580	$7,500	D-59
	INTEGRAL CONTROLLER	$10,000	D-59
KLC Corp.	400	$6,000	D-59
KMW Systems Corp.	3270 SERIES II	$6,500	D-59
	GRAPHICS VECTOR PROCESSOR-VP20	$12,000 to $15,000	D-59
	GRAPHICS VECTOR PROCESSOR VP10	$5,000 to $12,000	D-59
	GRAPHICS VECTOR PROCESSOR VP-30	$19,500	D-59
	HASP/377D SERIES II	$4,550	D-60
Linn Research Corp.	SYSTEM EXPANSION II	$399	D-60
Local Data, Inc.	DATALYNX/3270	$1,450	D-60
	DATALYNX/3274	$6,000	D-60

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VENDOR	MODEL	PRICE	PAGE
Local Data, Inc.	DATALYNX/3780	$1,750	D-60
	INTERLYNX/3287	$1,750	D-60
Lomas Data Products, Inc.	OCTAPORT	$325	D-60
Macrolink	201105	$725	D-60
Management Assistance, Inc.	110	$16,990	D-60
	210	$28,280	D-60
	310	$52,835	D-60
	510	$50,065	D-60
	580	NA	D-61
	710	$66,970	D-61
	810	$125,929	D-61
	HIGH SPEED CONTROLLER	$2,500	D-61
	PARALLEL DEVICE CONTROLLER	$2,000	D-61
MDB Systems, Inc.	LINE PRINTER CONTROL/MBI-49-LPC	$1,995	D-61
	LINE PRINT CONTROLLER/MDB-46-206	$990	D-61
	LINE PRINTER CONTROL/MDB-LP11-A	$1,250	D-61
	LINE PRINTER CONTROL/MDB-4034	$750	D-61
	LINE PRINTER CONTROL/MDB-42XX	$1,500	D-61
	LINE PRINTER CONTROLLER/MDB-LPII	$750	D-61
	LINE PRINTER CTRL/MDB-4034-A	$995	D-61
	LINE PRINTER CONTROL/MDVS-HP-LPC	$850	D-61
	LINE PRINT CONTROLLER/MLSI-LPII-A	$650	D-61
	LINE PRINTER CONTROLLER/MLSI-LPII	$475	D-61
	MBI-49-TTY	$650	D-61
	MDL-11	$825	D-61
	MDL-11W	$795	D-61
	MLSI-DLVII	$475	D-61
	MLSI-DLVII-F	$350	D-61
	MLSI-DLVII-FX	$385	D-61
	MULTIPLE I/O BOARD/MDB-M10B-A	$400	D-61
	PASLA 1 MDB-47-102	$450	D-62
MDS Trivex	MODEL 8074	$4,950	D-62
Memorex Corp.	2074 SNA/SDLC	NA	D-62
	2076	NA	D-62
Mental Logic Laboratories	DG1-42/52	$400	D-62
	DG1-44/54	$500	D-62
	DG1-46/56	$250	D-62
	DG1-ADL	$300	D-62
	DG1-44B/54B	$800	D-62
	DGI-41/51	$500	D-62
	DGI-43/53	$550	D-62
	DGP-44/54	$1,200	D-62
	DGP-64T	$1,200	D-62
	DGP-444	$1,500	D-62
Minicomputer Technology	2410	$2,200	D-63
	2414	$2,800	D-63
Moseley Associates, Inc.	MRC-1	$6,995	D-64
	MRC-2	$14,995	D-64
Mostek Corp.	MDX-CPU3	$695	D-64
	MDX-PIO	$195	D-64
	MDX-5102	$213	D-64
	VME-SBC	$1,395	D-64
	VME-510	$925	D-64
Multi-Systems	R/L1	$1,500 to $3,000	D-64
	R/L2	$2,000 to $6,000	D-64
	TERMINAL CLUSTER CONTROLLER	$11,000	D-64
NCR Corp.	647-P001	$2,258	D-64
	6320-2401	$2,650	D-64
	6420-2101	$2,650	D-65
	6420-2301	$2,650	D-65
	6420-3202	$2,650	D-65
	6420-601	$2,650	D-65
	6420-P002	$2,650	D-65
Practical Peripherals, Inc.	INLINE	$299	D-66
	MICROBUFFER E	$159	D-66
	MICROBUFFER II	$219	D-66
	MICROBUFFER II PLUS	$259 to $349	D-66
Precesch, Inc.	3274	$6,995	D-66
	CC 3276	$3,350	D-66
	EM 3276 BISYNCHRONOUS	$2,600	D-66
Prometheus Products	GRAPHITTI	$125	D-66
Qantel Corp.	4804	$1,500	D-66
Quality Computer Service	BIG BLUE	$595	D-66
Quality Micro Systems, Inc.	DATA PRODUCTS SERIES	$2,495	D-67
	MAGNUM SERIES CONTROLLERS	$2,395 to $3,495	D-67
	QMS 6310/34	$1,695	D-67
	QMS SERIES	$1,995	D-67
	QUIC-GRIP	NA	D-67

VENDOR	MODEL	PRICE	PAGE
Reed-Stipe, Inc.	MODEL 4274 LOCAL CLUSTER CONTROLLER	$7,000 to $18,000	D-67
	MODEL 4274 REMOTE CLUSTER	$7,000 to $18,000	D-67
Raytheon Co.	PTS-2000	$2,700	D-67
	RDS-2074	$6,100	D-67
	RDS-2076	$2,750	D-67
Renaissance Technology	PARALLEL BUFF-ET	$219 to $299	D-67
	PC BUFF-ET	$249 to $329	D-67
	SERIAL BUFF-ET	$219 to $299	D-67
Rianda Electronics	1200 LINE PRINTER CONTROLLER	$420	D-67
	2600	$1,900	D-67
	2700LP	$800	D-67
	2710LP	$1,300	D-67
Southern Systems, Inc.	DEC PDP-11 9060	N/A	D-68
Spur Products Corp.	S1403	$15,000	D-68
SSM Microcomputer Products, Inc.	AIO-II	$225	D-68
	APPLC	$129	D-68
Systech, Inc.	MLP-2000 DUAL LINE	$650	D-70
Tandem Computers, Inc.	3401	$2,800	D-70
Tarbell Electronics	4044 4SRP	$450	D-70
Tektronics, Inc.	DATA CUE II	$10,000	D-70
Telcon Industries, Inc.	DATAMAX	$8,000 to $70,000	D-70
Telectronic, Inc.	ML644	$850	D-70
Teleray	MICROTENN	$1,200	D-70
Telex Computer Products, Inc.	MODEL 174-1	$5,000	D-70
	MODEL 174-2	$8,500	D-70
	MODEL 274	N/A	D-70
	MODEL 276 DISPLAY	$5,900	D-70
Term-Tronics	3270-4	$2,995	D-72
	3270-5	$2,895	D-72
Transnava Corp.	K8070	N/A	D-72
	K8073B X CALIBUR	N/A	D-72
	TC2	N/A	D-72
TRT Data Products	DATA CONCENTRATOR	$50,000	D-72
Tymshare, Inc.	ASE 9601	$4,000	D-72
	ASE 9605	$5,500	D-72
Weaponmore Systems, Inc.	BPO	$179	D-73
	EBI	$139 to $195	D-73
	IBM SPOOLER CARD P	$289	D-73
	IBM SPOOLER CARD SP	$349	D-73
	IPI	$87	D-73
	SBO	$249	D-73
Westrey OEM Products	MODEL 6500	$260	D-73
Zilog, Inc.	SYSTEM 8000 MODEEL 31	$31,950	D-74
	SYSTEM 8000 MODEL 11	$14,950	D-74
	SYSTEM 8000 MODEL 21	$22,950	D-74

Reel-to-Reel Tape Drive Controllers

VENDOR	MODEL	PRICE	PAGE
Adaptec, Inc.	ACB-4000	$200	D-43
	ACB-5000	[illegible]	D-43
	ACB-5500	$300	D-43
	AIC-100	$100	D-43
Adaptive Data & Energy Systems	GYPSY P	$1,378	D-43
	GYPSY 5	$1,378	D-43
	ST506	$532	D-43
	ST506/SA400	$677	D-43
Advanced Digital Corp.	HDC-1001-5	$450	D-43
	HDC-1001-8	$450	D-43
Advanced Electronics Design, Inc.	WINC 05	$1,995	D-43
	WINC 05-8	$1,995	[illegible]
	WINC 08	$2,630	D-43
Alloy Computer Products	IDXS-100	$950	D-44
Alpha Data, Inc.	ADC-II	$3,850	D-44
	ADC-NB	$2,750	D-44
Amdahl Corp.	6680 MODEL 2	$77,300	D-44
Ampex	5046	$83,760	D-44
Andromeda Systems, Inc.	WDC11	$2,060	D-44
Applied Systems Corp.	PERIPHERAL CONTROLLER	$2,000	D-45
Ardent Computer Products, Inc.	10 MB DISK CONTROLLER D1000	$1,800	D-46
	IMBEDDED SMD/CMD DISK D3000	$4,000	D-46

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VENDOR	MODEL	PRICE	PAGE
Ardent Computer Products, Inc.	SMD/CMD DISK D2000	$6,000	D-46
Astronautics Corp. of America	LINE CONTROL UNIT (LCU)	$32,000	D-46
Aviv Corp.	DEC 907 LSI-11 Q-BUS	$2,850	D-46
	DFC 607-VAX 750 CMIBUS	$8,200	D-46
	DFC 807 PDP-11 UNIBUS	$2,850	D-46
	DFC 808-PDP-11 UNIBUS	$3,600	D-46
Ball Electronic Systems Division	3170	$4,000	D-46
	3255	$5,000	D-47
Braegen Corp.	BR11	N/A	D-47
	BR750	N/A	D-47
	BR1630	$11,000	D-47
Bytronix Corp.	B234 DISC CONTROLLER	$1,068	D-48
	B450 DISC CONTROLLER	$1,450	D-48
	M234	$1,200	D-48
	M450	$1,200	D-48
	M525	$1,200	D-48
California Computer Systems	2832	$1,425	D-48
Callan Data Systems	CWC-796	$1,395	D-48
Control Data Corp.	B1023	$530	D-48
	B1026	$310	D-48
Ciprico, Inc.	RIMFIRE 38A COMBINATION	$1,895	D-48
	RIMFIRE 38AD	$1,603	D-48
	RIMFIRE 44 COMBINATION	$1,795	D-49
	RIMFIRE 44D	$1,603	D-49
	RIMFIRE 45 COMBINATION	$1,895	D-49
	RIMFIRE 50D	$2,295	D-49
	RIMFIRE 75 COMBINATION	$1,745	D-49
Codata Systems Corp.	SMD WINCHESTER	$1,365	D-49
	ST 506	$1,335	D-49
Compatable Computer Corp.	HDC 5/8	$795	D-49
CompuPro Corp.	DISK 2/SELECTOR CHANNEL	$795 to $895	D-49
	DISK 3	$795 to $890	D-49
Control Data Corp.	CONTROL DATA 38800	$46,000 to $63,620	D-50
Cray Research, Inc.	DCU-3	$125,000	D-50
	DCU-4	$70,000	D-50
Cynthia Peripheral Corp.	2100	$1,100	D-51
	2101	$900	D-51
Data Engineering, Inc.	CC550	$7,500	D-51
	CC551	$8,400	D-51
Datamac Peripheral Products	DISK CONTROLLER	N/A	D-51
Dataplex, Inc.	MODEL 102 PRIAM CONTROLLER	$8,662	D-51
[illegible] Corp.	S04/A	$2,650	D-51
	S04/A1	$2,650	D-51
	S04/B	$2,650	D-51
	S04/D	$2,650	D-51
	S34/A	$3,705	D-51
	S34/D	$3,705	D-51
Data Systems Design, Inc.	5215	$1,295	D-52
	5217	$1,295	D-52
	6217	$1,295	D-52
	7215	$1,295	D-52
	7217	$1,295	D-52
	MULTIBUS 5215	$1,295	D-52
	MULTIBUS 7215	$1,295	D-52
Datasystems Corp.	DISK CONTROLLER 5121	$1,995	D-52
	DISK CONTROLLER 5122	$1,995	D-52
Data Technology Corp.	DTC101D	$675	D-52
	DTC510A	$440	D-52
	DTC520A	$500	D-52
	DTC535A	$500	D-52
	DTC540	$895	D-52
	DTC600	$775	D-52
	DTC615	$430	D-52
	DTC703	$775	D-52
	DTC900	$775	D-52
	DTC5150	$475	D-52
Datum, Inc.	CARTRIDGE DISK CONTROLLER 4009	$3,725	D-53
	SMD DISK CONTROLLER 65012	$3,500	D-53
	SMD DISK CONTROLLER 65020	$4,800	D-53
	SMD DISK CONTROLLER 65020V	$5,750	D-53
	SMD DISK CONTROLLER 65021	$4,800	D-53
	SMD DISK CONTROLLER 65027	$7,750	D-53
	SMD DISK CONTROLLER 65030	$2,800	D-53
	SMD DISK CONTROLLER 65031	$2,700	D-53
Davong Systems, Inc.	HARD DISK CONTROLLER-E	$1,995	D-53
	HARD DISK CONTROLLER-I	$1,845	D-53
	MULTIFUNCTION BOARD	$595	D-53
Delta Systems, Inc.	HP/D	N/A	D-54

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VENDOR	MODEL	PRICE	PAGE
Digital Development Corp.	DMC	$2,000	D-54
	DMS-RF11	$7,600	D-54
	DMS16	$3,900	D-54
Dilog	DQ100	$1,520	D-55
	DQ202A	$2,450	D-55
	DQ214	$2,295	D-55
	DQ215	$2,395	D-55
	DQ228	$3,150	D-55
	DQ404	$2,050	D-55
	DQ413	$2,050	D-55
	DQ414	$2,050	D-55
	DQ604	$1,395	D-55
	DQ614	$1,895	D-55
	DQ615	$2,095	D-55
	DQ634	$2,095	D-55
	DU100	$1,520	D-55
	DU215	$2,695	D-55
	DU218	$2,595	D-55
Distributed Logic Corp.	DISK CONTROLLER-SMDI/O DX200 SERIES	$2,395 to $3,150	D-55
	DISK CONTROLLER-ST506I/O DQ600 SER.	$1,895 to $2,095	D-56
	DISK CONTROLLER DQ400 SERIES	$1,895 to $2,050	D-55
D & N Micro Products, Inc.	MODEL 2400-16	$6,095	D-56
Emulex Corp.	SC02	$1,900	D-56
	SC03	N/A	D-56
	SC11	N/A	D-56
	SC12	N/A	D-56
	SC21	N/A	D-56
	SC31	N/A	D-56
	SC70	N/A	D-56
	SC750	N/A	D-56
[illegible], Inc.	MODEL 2041	$425	D-56
	MODEL 3021	$500	D-56
	MODEL 3052	$1,200	D-57
General Robotics Corp.	MWV11	$2,000	D-57
	SMVII	$2,500	D-57
Honeywell, Inc.	MSP-0612	$64,375	D-57
	MSP-8000	$46,800	D-57
	MSP-8001	$64,375	D-57
	MSP-8002	$64,375	D-57
Ibis Systems, Inc.	5880-3	$65,050	D-57
	5880-33	$126,848	D-58
Inner Access Corp.	SCSI-1	$150	D-58
Integrated Solutions, Inc.	RL101	$995	D-59
Intel Corp.	ISBC 215G	$1,500	D-[illegible]
	ISBC 220	$2,500	D-[illegible]
Interphase Corp.	MAVERICK SMD PC 80	[illegible]	D-[illegible]
	SMD 2180	$1,995	D-59
	SMD 2181	$2,050	D-[illegible]
	SMD 2199	$2,250	D-59
Intertec	DSC-144	$2,995	D-59
Ithaca Intersystems	HDA	[illegible]	D-59
Konan Corp.	DAVID JR.	[illegible]	D-60
	DGC-100	$395	[illegible]
	SMC-100	$998	D-60
	SMC-200	$565	[illegible]
	TAISHO	$895	D-60
Macrolink	201200	$3,475	D-60
MDB Systems, Inc.	DISK CONTROLLER/MDB-RM11-Q	$2,800	D-61
	DISK CONTROLLER/MLSI-RM11	$2,800	D-61
	DISK CONTROLLER 1MDB-RM11-H	$3,508	D-61
	WINCHESTER/FLOPPY CTRL/MLSI-WFCII	$1,995	D-61
Measurement Systems & Controls, Inc.	HDC-2900	$408	D-62
Micro Technology, Inc.	MLV11	N/A	D-63
	MLV11M	N/A	D-63
Milltope Corp.	RK07	$18,000	D-63
Minicomputer Technology	2410	$2,200	D-63
	2414	$2,800	D-63
	2420	$2,200	D-63
	2425	$2,800	D-63
	EQC 22	$3,800	D-63
	EDC 24	$3,600	D-63
	SMC 12	$3,400	D-63
	SMC 902	$2,900	D-63
	SMC 903	$3,000	D-63
	SMV 15	$3,400	D-63
	TDC 802	$2,800	D-63
	TDC 803	$2,800	D-63
Monitor Dynamics, Inc.	HDC1010	$500	D-63

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VENDOR	MODEL	[illegible]	PAGE
Monitor Dynamics, Inc.	HDC1012	$500	D-63
	HDC1013	$500	D-63
	HDC2000	$550	D-63
Morrow Designs	HDC/DMA	$600	D-64
	HDCA-4	$695	D-64
Mostek Corp.	MDX-SASI	$169	D-64
	VME-SASI	$1,250	D-64
Mountain Computer, Inc.	IBM HARD DISK CONTROLLER	$450	D-64
NCR Corp.	6530	$4,100	D-65
	6539 I/O LINK ADAPTOR	$6,500	D-65
	6559 I/O LINK ADAPTOR	$18,500	D-65
	6589 I/O LINK ADAPTOR	$18,530	D-65
OMTI	10G	$565	D-65
	20C-1	$275	D-65
	20D	$350	D-65
	20D-1	$350	D-65
	MODEL 10A	$565	D-65
	MODEL 10B	$695	D-65
	MODEL 20C	$275	D-65
	MODEL 20C-2	$275	D-65
	MODEL 20L	$215	D-65
Onyx & IMI, Inc.	7000 SERIES EIGHT INCH DISK DRIVE	NA	D-65
	C5H	$385	D-65
Palm Beach Computers, Inc.	INTEGRAL	$495	D-65
PCE Systems	FDC-4000	$895	D-65
Plessey Peripheral Systems	DC02A	$3,900	D-66
	DC06A	$3,900	D-66
	DC11A	$1,345	D-66
	DCV06A	$3,160	D-66
	DCV11A	$1,095	D-66
	DCVQ2A	$3,160	D-66
Prism Corp.	SMART-E	$520	D-66
Quality Computer Service	BIG BLUE	$595	D-66
	DSK 62	$2,499	D-66
	DSK 63	$2,799	D-66
	DSK 64	$4,499	D-66
	DSK 65	$2,999	D-66
	DSK 67	[illegible]	D-66
	DSK 68	$7,999	D-66
Rhanda Electronics	2500 DISK DRIVE CONTROLLER	[illegible]	D-67
	2570 DISK DRIVE CONTROLLER	[illegible]	D-67
	2910 DISK DRIVE CONTROLLER	$1,900	D-68
Rosecomp Corp.	C160	$1,750	D-68
	C163	$199	D-68
Scientific Micro Systems	FWD0101	$2,400	D-68
	FWD0106	$2,100	D-68
	FWD1101	$2,400	D-68
	FWD1106	$2,100	D-68
	FWD5001	$1,400	D-68
	FWD8001	$1,500	D-68
	FWD8006	$1,400	D-68
SD Systems, Inc.	FWII	$895	D-68
S. Goldman Co.	PM-3010	$750	D-68
Shugart Associates, Inc.	SA1401	$612	D-68
	SA1401-1	$612	D-68
	SA1403	[illegible]	D-68
	SA1403D	$861	D-68
	SA1403D-1	$861	D-68
	SA1403E	$861	D-68
	SA1410A	$299	D-68
	SA1420A	$487	D-68
	SA1601	$366	D-68
	SA1603	$481	D-68
	SA1610	$312	D-68
	SA1620	$416	D-68
Sigma Information Systems, Inc.	SDC-RLV12	$871	D-68
Spectra Logic Corp.	SPECTRA 10	$2,600	D-69
	SPECTRA 12	$2,700	D-69
	SPECTRA 14	$3,100	D-69
	SPECTRA 15	[illegible]	D-69
	SPECTRA 16	$2,600	D-69
	SPECTRA 20	$3,200	D-69
	SPECTRA 21	$3,200	D-69
	SPECTRA 25	$2,250	D-69
	SPECTRA 30	$1,150	D-69
	SPECTRA 36	[illegible]	D-69
	SPECTRA 48	[illegible]	D-69
Stratus Computer	D-100	[illegible]	D-69

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VENDOR	MODEL	PRICE	PAGE
Syogen	SC-1000/SC-2000	$1,000	D-69
	SC-2100/SC-2200	$1,000	D-69
	SC-2101	$1,000	D-69
	SC-2111	$1,000	D-69
	SC-2131	$1,000	D-69
	SC-2201	$1,000	D-69
	SC-3000	$1,000	D-70
System Industries, Inc.	3100	$13,000 to $23,500	D-70
	6100	$11,500 to $19,000	D-70
	9900	$14,300 to $25,000	D-70
Systems Group	HDC-2900	$408	D-70
Systems Research, Inc.	CP 3680	$75,000	D-70
Tandem Computers, Inc.	3106	$10,500	D-70
Telcon Industries, Inc.	DATAMAX	$9,000 to $70,000	D-70
U.S. Design Corp.	MODEL 3450	$9,995	D-72
Vermont Research Corp.	8421	$2,275	D-72
	SASI	$1,000	D-72
Wespercorp	DC-221	N/A	D-72
	DC-231	N/A	D-72
	DC-231A	N/A	D-72
	DC-251	N/A	D-72
	TC-30	$1,435	D-73
	TC-50	$1,435	D-73
Western Digital Corp.	WD1002 WINCHESTER/FLOPPY	N/A	D-73
	WD1010 WINCHESTER CONTROLLER	N/A	D-73
	WD1050 SMD CONTROLLER	N/A	D-73
XComp, Inc.	CD/S	$700	D-73
	SG/S	$600	D-73
	SM/S	$700	D-73
	ST/S	$600	D-73
Xylogics, Inc.	440	$2,295	D-73
	450	$2,295	D-73
Zeitz Communications, Inc.	VOICE ENCODER	$5,000	D-73
Zendex Corp.	ZX-203	$2,795	D-74
Zilog, Inc.	SYSTEM 8000 MODEL 31	$31,950	D-74
	SYSTEM 8000 MODEL 11	$14,950	D-74
	SYSTEM 8000 MODEL 21	$22,950	D-74

Teleprinter Controllers

VENDOR	MODEL	PRICE	PAGE
Applied Dynamics International	SELECTABLE I	$875	D-48
Applied Systems Corp.	PERIPHERAL CONTROLLER	$2,000	D-[illegible]
Displays Unlimited	MODEL 2000	$800	D-56
GEN/COMP, Inc.	MODEL 2024	$525	D-56
	MODEL 2041	$425	D-56
	MODEL 3021	$500	D-56
Houdaille Industries	FABRIPOINT V	$26,600	D-57
Indocomp, Inc.	IND-1900	$840	D-60
MDB Systems, Inc.	MBI-49-TTY	$650	D-61
	MDL-11	$825	D-61
	MDL-11W	$795	D-[illegible]
	MLSI-DLVII	$475	D-61
	MLSI-DLVII-F	$350	D-61
	[illegible]	$385	D-61
	MULTIPLE I/O BOARD/MDB-M10B-A	$400	D-61
	PASLA 1 MDB-47-102	$450	D-61
Rianda Electronics	2600	$1,900	D-67
Systems Research, Inc.	CP 3680	$75,000	D-70
Telcon Industries, Inc.	DATAMAX	$8,000 to $70,000	D-70
Transverse Corp.	K8070	N/A	D-72
	K8073B X CALIBUR	N/A	D-72
	TC2	N/A	D-72
Zilog, Inc.	SYSTEM 8000 MODEL 31	$31,950	D-74
	SYSTEM 8000 MODEL 11	$14,950	D-74
	SYSTEM 8000 MODEL 21	$22,950	D-74

Other Controllers

VENDOR	MODEL	PRICE	PAGE
Adaptive Data & Energy Systems	GYPSY P	$1,378	D-43
Alloy Computer Products	ITS-PC	$1,000	D-44
	ITS-50	$1,000	D-44
	ITS-80	$1,000	D-44
	ITS-100	$1,000	D-44
	OSTU-C	$750	D-44
	TMD-1	$1,800	D-44
	TRS-232	$1,800	D-44
Altek Corp.	AC 90C	$600 to $1 500	D-44
	AC 90SM	$7,000 to $250,000	D-44
American Computer Hardware Corp.	UPC	$1,000 to $2,000	D-44
Amperif	5012	$73,090	D-44
Applied Dynamics International	SELECTABLE I	$875	D-46
Astronautics Corp. of America	KEYBOARD VIDEO DISPLAY	$28,000	D-46
	LINE CONTROL UNIT (LCU)	$32,000	D-46
California Computer Systems	2834	$9,500	D-48
Coastal Data Products	MODEL 2000	$2,100	D-48
	MODEL 3000	$3,100	D-49
Computer Communications Specialists, Inc.	TASK/1000	$1,995	D-49
Computer Identics Corp.	LDP-5	$12,000 to $75,000	D-49
	LDP-5M	$12,000 to $75,000	D-50
	MANUFACTURING TRANSACTION	$12,000 to $75,000	D-50
	SORT-A-PAC	$12,000 to $75,000	D-50
Computime	CT102	$99	D-50
Data Engineering, Inc.	P3500	$56,000	D-51
Data Systems Design, Inc.	5215	$1,295	D-52
	5217	$1,295	D-52
	6217	$1,295	D-52
	7215	$1,295	D-52
	7217	$1,295	D-52
Digital Laboratories, Inc.	PC-29	$1,350	D-54
Digitor Corp.	ELEVATOR ANNOUNCER I	$2,000	D-54
	ELEVATOR ANNOUNCER II	$500	D-54
Dilog	DQ130	$1,550	D-54
	DQ132	$2,050	D-55
	DU130	$1,550	D-55
GEN/COMP, Inc.	MODEL 2023	$1,350	D-56
	MODEL 2025	$700	D-56
General Digital Industries, Inc.	DMA-700	$3,495	D-57
General Robotics Corp.	DRVII	$250	D-57
	STV11	$1,500	D-57
Heurikon Corp.	MLZ-VDC	$2,975	D-57
Honeywell, Inc.	DIP-3600	$26 585	D-57
	URP-8001	$6,500	D-57
	URP-8002	$4 000	D-57
Ideographix, Inc.	IPX KEYBOARD CONTROLLER	$2,000	D-58
Information Products Systems	IPS 7016	$14,500	D-58
MDB Systems, Inc.	CARD READER CONTROL/MDB 4016	$1,100	D-61
	CARD READER CONTROL/MDB-46-235	$875	D-61
	CARD READER CONTROLLER/MDB-CR11	$875	D-61
	CARD READER CONTROL/MLSI-CR11	$850	D-61
	INCREMENTAL PLOTTER CTRL/MDB-XYII	$1,250	D-61
	PAPER TAPE CONTROL/MDB-PC11	$750	D-61
	PAPER TAPE CTRL/MLSI-PCII	$750	D-62
	PRINTER PLOTTER CONTROL/MDB-LVII	$1,450	D-62
Mental Logic Laboratories	DG1-08	$1,200	D-62
	DG1-063	$1,200	D-62
	DGP-64	$1,200	D-62
	DGP-444	$1,500	D-62
National Semiconductor Corp.	BLC-8229	$800	D-64
Raster Technologies	THE MODEL ONE/25	$10,000 to $20,000	D-67
	THE MODEL ONE/40	$10,000 to $20,000	D-67
	THE MODEL ONE/65	$10,000 to $20,000	D-67
Rlanda Electronics	2600	$1,900	D-67
Smoke Signal Broadcasting	PSA-1	$1,450	D-69
Syogen	SC-2100/SC-2200	$1,000	D-69
	SC-3000	$1,000	D-70
	SC-4000	$300	D-70
Tandem Computers, Inc.	3401	$2,800	D-70
TRT Data Products	DATA ROUTER	$8,000	D-72

ABLE COMPUTER
DH/DM
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: DEC PDP-11
Units Controlled: 16
Programmable: Yes
Price: $3,750
(See Vendor Profile Page V-1)

ABLE COMPUTER
Q/DH
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: DEC PDP-11
Units Controlled: 16
Programmable: Yes
Price: $1,950

ABLE COMPUTER
[illegible]
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Dataproducts, Centronics
Units Controlled: 1
Programmable: Yes
Price: $1,595

ACC
IF-11/9700
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: DEC VAX-11, PDP-11; Xerox 9700, 8700
Units Controlled: 1
Programmable: No
Price: $15,000
(See Vendor Profile Page V-1)

ACTION COMPUTER
[illegible]
Controller Type: Add-in, Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Discovery 500, 1600
Units Controlled: 1
Programmable: Yes
(See Vendor Profile Page V-1)

[illegible]
ACB-4000
Controller Type: Add-on
Device Controlled: Rigid disk drives
Units Controlled: 2
Programmable: No
Price: $200
(See Vendor Profile Page V-1)

ADAPTEC, INC.
ACB-5500
Controller Type: Add-on
Device Controlled: Rigid disk drives
Units Controlled: 4
Price: $300

ADAPTEC, INC.
ACB-5900
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Shugart SA1000
Units Controlled: 4
Price: $400

ADAPTEC, INC.
AIC-100
Controller Type: Add-in
Device Controlled: Rigid disk drives
Programmable: Yes
Price: $100

ADAPTIVE DATA & ENERGY SYSTEMS

OFFSET P
Controller Type: Add-on
Device Controlled: Rigid disk drives, Streamer Tape
Specific Equipment Supported: Priam 3450, 7050, 3350, 6650
Units Controlled: 5
Programmable: No
Price: $1,378
(See Vendor Profile Page V-1)

Additional information provided for by vendor

Adaptive Data & Energy Systems (ADES) Peripheral controllers SCSI to disks, tapes, printers, links and other special controllers for disk with ¼-in. streamer backing.

ADAPTIVE DATA & ENERGY SYSTEMS
EXPEY II
Controller Type: Add-on
Device Controlled: Rigid disk drives
Units Controlled: 5
Programmable: No
Price: $1,378

ADAPTIVE DATA & ENERGY SYSTEMS
PRINTLINK
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics
Units Controlled: 4
Programmable: Yes
Price: $500

ADAPTIVE DATA & ENERGY SYSTEMS
ST506
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: No
Price: $532

ADAPTIVE DATA & ENERGY SYSTEMS
ST506/SA400
Controller Type: Add-in
Device Controlled: Floppy disk drives, Rigid disk drives
Units Controlled: 4
Programmable: No
Price: $677

ADAPTIVE DATA & ENERGY SYSTEMS
TAPELINK
Controller Type: Add-in
Device Controlled: Cassette-/Cartridge Devices
Specific Equipment Supported: Archive; Wangtek; Cipher; Tandberg
Units Controlled: 1
Price: $484

ADVANCED DIGITAL CORP.
[illegible]
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: Yes
Price: $450
(See Vendor Profile Page V-1)

ADVANCED DIGITAL CORP.
[illegible]
Controller Type: Add-in
Device Controlled: Rigid disk [illegible]
Units Controlled: 4
Programmable: Yes
Price: $450

ADVANCED ELECTRONICS DESIGN, INC.
FLEX 01
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Qume
Units Controlled: 2
Programmable: Yes
Price: $1,220
(See Vendor Profile Page V-1)

ADVANCED ELECTRONICS DESIGN, INC.
WINC 05
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: Seagate, Rodine
Units Controlled: 2
Programmable: Yes
Price: $1,995

ADVANCED ELECTRONICS DESIGN, INC.
[illegible]
Device Controlled: Floppy disk drives, Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $1,995

ADVANCED ELECTRONICS DESIGN, INC.
WINC 08
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: Qume, Fujitsu
Units Controlled: 2
Programmable: Yes
Price: $2,630

ADVANCED LOGIC SYSTEMS, INC.
COLOR II
Controller Type: Add-in
Device Controlled: Display terminals
Specific Equipment Supported: RGB
Units Controlled: 1
Programmable: No
Price: $179
(See Vendor Profile Page V-1)

ADVANCED LOGIC SYSTEMS, INC.
[illegible]
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Units Controlled: 1
Programmable: No
Price: $139

ADVANCED LOGIC SYSTEMS, INC.
PRINTERMATE
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics
Units Controlled: 1
Programmable: No
Price: $99

ADVANCED LOGIC SYSTEMS, INC.
SMARTERM II
Controller Type: Add-in
Device Controlled: Display terminals
[illegible]
Programmable: No
Price: $179

AEROCOMP, INC.
DOUBLE DENSITY CONTROLLER
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Radio Shack
Units Controlled: 1
Programmable: No
Price: $139
(See Vendor Profile Page V-1)

AGILE CORP.
LG-36
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Burroughs Poll-Select
Units Controlled: 1
Programmable: No
Price: $995
(See Vendor Profile Page V-1)

AGILE CORP.
LC-3000
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: HP MTS-3000
Units Controlled: 3
Programmable: No
Price: $1,595 to $2,995

AGILE CORP.
MODEL 5287
Controller Type: Add-on
Device Controlled: Printers, Plotters
Units Controlled: 1
Programmable: No
Price: $2,500
(See Vendor Profile Page V-1)

ALLOY COMPUTER PRODUCTS
CP-8000
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC Terminal
Units Controlled: 1
Programmable: No
Price: $[illegible]
(See Vendor Profile Page V-1)

ALLOY COMPUTER PRODUCTS
DMS-1
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives, Cassette/Cartridge Devices
Specific Equipment Supported: DEI
Units Controlled: 1

Controllers

Programmable: Yes
Price: $850

ALLOY COMPUTER PRODUCTS
DP-8000
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEI
Units Controlled: 1
Price: $1,050

ALLOY COMPUTER PRODUCTS
DRS-232
Controller Type: Add-on
Device Controlled:
Cassette/Cartridges Devices
Specific Equipment Supported: DEI
Units Controlled: 1
Programmable: Yes
Price: $1,150

ALLOY COMPUTER PRODUCTS
DS-12
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEI
Units Controlled: 1
Programmable: No
Price: $650

ALLOY COMPUTER PRODUCTS
DZ-80B
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEI
Units Controlled: 1
Programmable: No
Price: $600

ALLOY COMPUTER PRODUCTS
IDXS-100
Controller Type: Add-in
Device Controlled: Rigid disk drives, Magnetic Tape Drives
Specific Equipment Supported: DEI, Micropolis
Units Controlled: 1
Programmable: No
Price: $950

ALLOY COMPUTER PRODUCTS
ITS-PC
Controller Type: Add-in
Device Controlled: Microstreamer
Specific Equipment Supported: Cipher
Units Controlled: 1
Programmable: No
Price: $1,000

ALLOY COMPUTER PRODUCTS
ITS-M
Controller Type: Add-in
Device Controlled: Microstreamer
Specific Equipment Supported: Cipher
Units Controlled: 1
Programmable: No
Price: $1,000

ALLOY COMPUTER PRODUCTS
ITS-80
Controller Type: Add-in
Device Controlled: Microstreamer
Specific Equipment Supported: Cipher
Units Controlled: 1
Programmable: No
Price: $1,000

ALLOY COMPUTER PRODUCTS
LSI-50
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: CDC Sentinel
Units Controlled: 1
Programmable: No
Price: $1,195

ALLOY COMPUTER PRODUCTS
QSSU-1A
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEI Funnel
Units Controlled: 1
Programmable: No
Price: $950

ALLOY COMPUTER PRODUCTS
QSTU-C
Controller Type: Add-in
Device Controlled: Microstreamer
Specific Equipment Supported: Cipher
Units Controlled: 1
Programmable: No
Price: $750

ALLOY COMPUTER PRODUCTS
PCBACK-UP
Controller Type: Add-in
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: Digidata
Units Controlled: 1
Programmable: No
Price: $1,395

ALLOY COMPUTER PRODUCTS
TMC-1
Controller Type: Add-in
Device Controlled: Microstreamer
Specific Equipment Supported: Cipher
Units Controlled: 1
Programmable: No
Price: $1,800

ALLOY COMPUTER PRODUCTS
TMS-233
Controller Type: Add-on
Device Controlled: Microstreamer
Specific Equipment Supported: Cipher
Units Controlled: 1
Programmable: Yes
Price: $1,800

ALPHA DATA, INC.
ADC-II
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Alphadata, DEC PDP-11
Units Controlled: 3
Programmable: No
Price: $3,[illegible]
(See Vendor Profile Page V-2)

ALPHA DATA, INC.
ADC-4S
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: DG Series 234, Eclipse, Alphadata
Units Controlled: 1
Programmable: No
Price: $2,750

ALTEK CORP.
AC 90C
Controller Type: Add-on
Device Controlled: Graphic
Specific Equipment Supported: Altek
Units Controlled: 1
Price: $500 to $1,500
(See Vendor Profile Page V-2)

ALTEK CORP.
AC 9080
Controller Type: Add-on
Device Controlled: Display terminals, Floppy disk drives
Units Controlled: 2
Programmable: No
Price: $9,000 to $10,500

ALTEK CORP.
AC 9084
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives, Digitizing Tablet
Specific Equipment Supported: Altek
Units Controlled: 1
Programmable: No
Price: $7,000 to $250,000

AMDAHL CORP.
6880 MODEL 2
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Amdahl 6280
Units Controlled: 16
Programmable: No
Price: $77,300
(See Vendor Profile Page V-2)

AMERICAN COMPUTER HARDWARE CORP.
UPC
Controller Type: Add-on
Device Controlled: Printers, Display terminals, Plotters, Magnetic Tape Drives, Cassette/Cartridges Devices, Card Reader
Units Controlled: 2
Programmable: No
Price: $1,000 to $2,000
(See Vendor Profile Page V-2)

AMPAK BUSINESS SYSTEMS, INC.
824006-1
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Dataproducts, Centronics, Xerox
Units Controlled: 4
Programmable: No
Price: $3,995
(See Vendor Profile Page V-2)

AMPAK BUSINESS SYSTEMS, INC.
824006-2
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Centronics
Units Controlled: 1
Programmable: No
Price: $4,995

AMPAK BUSINESS SYSTEMS, INC.
824006-3
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Dataproducts
Units Controlled: 1
Programmable: No
Price: $7,895

AMPAK BUSINESS SYSTEMS, INC.
824006-4
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Dataproducts
Units Controlled: 1
Programmable: No
Price: $9,750

AMPAK BUSINESS SYSTEMS, INC.
824006-5
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Dataproducts, Centronics
Units Controlled: 1
Programmable: No
Price: $13,950

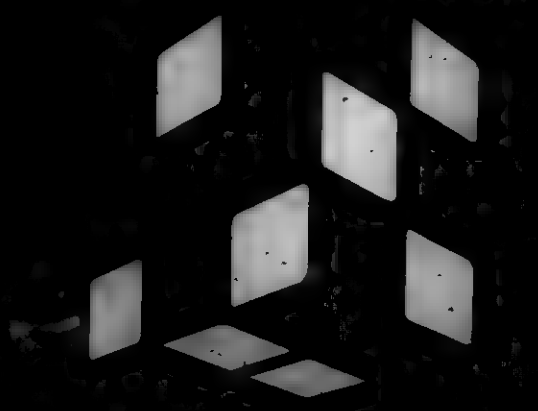
AMPAK BUSINESS SYSTEMS, INC.
824006-6
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Xerox 2700
Units Controlled: 2
Programmable: No
Price: $23,000

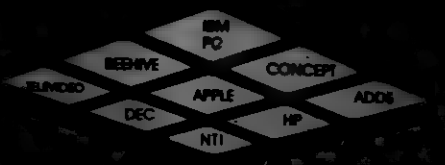
AMPERIF
5000
Controller Type: Add-on
Specific Equipment Supported: Amperif SSD 434, Amperif SSD 1782
Units Controlled: 8
Programmable: No
Price: $73,090
(See Vendor Profile Page V-2)

AMPERIF
5046
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Amperif 84502, Masstor
Units Controlled: 32
Programmable: No
Price: $41,700

ARCHIMEDES SYSTEMS, INC.
WDC11
Controller Type: Add-in
Device Controlled: Floppy disk drives, Rigid disk drives
Units Controlled: 4
Programmable: No

ASCII Terminals and Printers Connected
To 3270 SNA SYLD





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Controllers

Price: $2,000
(See Vendor Profile Page V-3)

APPLIED DYNAMICS INTERNATIONAL
SELECTABLE I
Controller Type: Add-on
Device Controlled: Printers, Teleprinters, Display terminals, Memory Devices, Keyboard
Specific Equipment Supported: LSI, DEC, Hazeltine
Units Controlled: 16
Programmable: Yes
Price: $875
(See Vendor Profile Page V-3)

APPLIED SYSTEMS CORP.
COMMUNICATIONS CONTROLLER
ASC-SI
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: IBM 4300, 3080X, System 38
Units Controlled: 8
Programmable: Yes
Price: $2,500
(See Vendor Profile Page V-3)

APPLIED SYSTEMS CORP.
PERIPHERAL CONTROLLER
Controller Type: Add-in, Add-on
Device Controlled: Printers, Teleprinters, Display terminals, Floppy disk drives, Rigid disk drives, Plotters, Magnetic Tape Drives, Cassette/Cartridges Devices, Memory Devices
Specific Equipment Supported: DEC VAX-11; IBM 4300, 3080X, 11/70
Units Controlled: 4
Programmable: Yes
Price: $2,000

ARDENT COMPUTER PRODUCTS, INC.
FD MB DISK CONTROLLER D1366
Controller Type: Add-in, Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Micro 44
Units Controlled: 4
Programmable: No
Price: $1,800
(See Vendor Profile Page V-4)

ARDENT COMPUTER PRODUCTS, INC.
SMD/CMD DISK CONTROLLER D3000
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: No
Price: $4,000

ARDENT COMPUTER PRODUCTS, INC.
LINE PRINTER CONTROLLER
L1000
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Syntronix, Dataproducts
Units Controlled: 1
Programmable: No
Price: $1,000

ARDENT COMPUTER PRODUCTS, INC.
LINE PRINTER CONTROLLER
L1100
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Syntronix, Dataproducts
Units Controlled: 1
Programmable: No
Price: $1,300

ARDENT COMPUTER PRODUCTS, INC.
LINE PRINTER CONTROLLER
L1300
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Printronix, Syntronix
Units Controlled: 1
Programmable: No
Price: $1,500

ARDENT COMPUTER PRODUCTS, INC.
MAGNETIC TAPE CONTROLLER
T1000
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Pertec
Units Controlled: 8
Price: $2,000

ARDENT COMPUTER PRODUCTS, INC.
SMD/CMD DISK D1000
Controller Type: Add-on
Device Controlled: Rigid disk drives
Units Controlled: 4
Price: $5,000

ASTRONAUTICS CORP. OF AMERICA
COLORGRAPHIC TERMINAL
Controller Type: Add-in
Device Controlled: Display terminals
Units Controlled: 1
Programmable: Yes
Price: $20,000
(See Vendor Profile Page V-4)

ASTRONAUTICS CORP. OF AMERICA
KEYBOARD VIDEO DISPLAY
Controller Type: Add-in
Device Controlled: Printers, Optical Scanners
Specific Equipment Supported: Intel, Tempest, Prism
Units Controlled: 2
Programmable: Yes
Price: $28,000

ASTRONAUTICS CORP. OF AMERICA
KYBY WORD PROCESSOR
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart
Units Controlled: 2
Programmable: No
Price: $18,000

ASTRONAUTICS CORP. OF AMERICA
LINE CONTROL UNIT (LCU)
Controller Type: Add-in
Device Controlled: Printers, Display terminals, Rigid disk drives, Magnetic Tape Drives, Card Reader
Units Controlled: 15
Programmable: No
Price: $32,000

ATEX, INC.
ATEX
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Kennedy
Units Controlled: 1
Programmable: Yes
(See Vendor Profile Page V-4)

AVIV CORP.
DEC 907 LSI-11 Q-BUS
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 2
Programmable: Yes
Price: $2,850
(See Vendor Profile Page V-4)

AVIV CORP.
DFC 607-VAX 780 CMBUS
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC VAX-11/750
Units Controlled: 4
Programmable: Yes
Price: $8,200

AVIV CORP.
DFC 807 PDP-11 UNIBUS
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC PDP-11
Units Controlled: 4
Programmable: Yes
Price: $2,850

AVIV CORP.
DFC 903-PDP-11 UNIBUS
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC PDP-11
Units Controlled: 4
Programmable: Yes
Price: $3,600

AVIV CORP.
TFC 712
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DG Nova, Eclipse
Units Controlled: 8
Programmable: Yes
Price: $3,500

AVIV CORP.
TFC 922-NRZI
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC PDP-11/VAX
Units Controlled: 8
Programmable: Yes
Price: $3,500

AVIV CORP.
TFC 922-NRZI/PE
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC PDP-11/VAX
Units Controlled: 8
Programmable: Yes
Price: $3,500

AVIV CORP.
TFC 706-GCR TRIDENSITY
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DG Nova, Eclipse
Units Controlled: 4
Programmable: Yes
Price: $8,450

AVIV CORP.
TFC 805/815 GCR TRIDENSITY
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC PDP-11/VAX
Units Controlled: 4
Programmable: Yes
Price: $8,735

AVIV CORP.
TFC 806 GCR TRIDENSITY
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC PDP-11/VAX
Units Controlled: 4
Programmable: Yes
Price: $8,100

AVIV CORP.
TFC 852-STREAMER COUPLER
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC PDP-11/VAX
Programmable: Yes
Price: $1,850

AVIV CORP.
TFC 903-GCR 1/4 CARTRIDGE
Controller Type: Add-in
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: DEC LSI-11
Units Controlled: 2
Programmable: Yes
Price: $1,850

AVIV CORP.
TFC 922-NRZI/PE
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 8
Programmable: Yes
Price: $3,500

BALL ELECTRONIC SYSTEMS DIVISION
3120
Controller Type: Add-in
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: Wangco, Pertec, Cipher
Units Controlled: 4
Programmable: No
Price: $3,500
(See Vendor Profile Page V-4)

BALL ELECTRONIC SYSTEMS DIVISION
3151
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Dynex Series 800, Diablo Series 40, Wangco
Units Controlled: 4
Programmable: No
Price: $4,000

BALL ELECTRONIC SYSTEMS DIVISION
[illegible]
Controller Type: Add-in
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: Wangco, Cipher, Pertec
Units Controlled: 4
Programmable: No
Price: $4,400

BALL ELECTRONIC SYSTEMS DIVISION
[illegible]
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: No
Price: $5,000

BDS CORP.
BPI-80
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Dataproducts, Centronics, Printronics
Units Controlled: 1
Programmable: Yes
Price: $1,295
(See Vendor Profile Page V-4)

BDS CORP.
CSI-51
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Dataproducts, Printronics, Centronics
Units Controlled: 1
Programmable: Yes
Price: $995

BDS CORP.
DGC-40
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Dataproducts, Centronics, Printronics
Units Controlled: 1
Programmable: Yes
Price: $995

BDS CORP.
[illegible]
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Printronics, Dataproducts, Centronics
Units Controlled: 1
Programmable: Yes
Price: $2,000

BDS CORP.
HPC-21
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Printronics, Centronics, Dataproducts
Units Controlled: 1
Programmable: Yes
Price: $995

BDS CORP.
HPC-30
Controller Type: Add-in
Device Controlled: [illegible]
Specific Equipment Supported: [illegible]
Dataproducts, Printronics, [illegible]
Units Controlled: 1
Programmable: Yes
Price: $2,595

BDS CORP.
HPC-33
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Printronics, Centronics, Dataproducts
Units Controlled: 1
Programmable: Yes
Price: $2,595

BDS CORP.
HPI-33
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Dataproducts, Centronics, Printronics
Units Controlled: 1
Programmable: Yes
Price: $2,595

BDS CORP.
IBI-34
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Printronics, Centronics, Dataproducts
Units Controlled: 1
Programmable: Yes
Price: $2,595

BDS CORP.
IBI-76
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Printronics, Centronics, Dataproducts
Units Controlled: 1
Programmable: Yes
Price: $2,595

BDS CORP.
LPC-03
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Dataproducts, Centronics, Printronics
Units Controlled: 1
Programmable: Yes
Price: $595

BDS CORP.
LPC-11
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Dataproducts, Printronics, Centronics
Units Controlled: 1
Programmable: Yes
Price: $795

BDS CORP.
LPC-20
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Dataproducts, Centronics, Printronics
Units Controlled: 1
Programmable: Yes
Price: $2,595

BDS CORP.
NPC-20
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Dataproducts, Centronics, Printronics
Units Controlled: 1
Programmable: Yes
Price: $1,500

BENSON, INC.
GRAPHWARE II
Controller Type: Add-in, Add-on
Device Controlled: Printers
Specific Equipment Supported: Benson
Units Controlled: 1
Programmable: No
Price: $10,000 to $12,000
(See Vendor Profile Page V-5)

BENSON, INC.
GRAPHWARE 1000
Controller Type: Add-on
Device Controlled: Floppy disk drives, Plotters
Specific Equipment Supported: Benson 9000 Series
Units Controlled: 2
Programmable: No
Price: $750

BENSON, INC.
GRAPHWARE 2000
Controller Type: Add-on
Device Controlled: Plotters
Specific Equipment Supported: Benson 9000 Series
Units Controlled: 2
Programmable: No
Price: $20,000

BGL TECHNOLOGY CORP.
[illegible]
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart 800, 850, 810, 860
Units Controlled: 2
Programmable: Yes
Price: $750
(See Vendor Profile Page V-5)

[illegible]
DUAL-CORE [illegible]
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 2
[illegible]
Price: $249
(See Vendor Profile Page V-5)

BRAGEN CORP.
BR11
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC PDP-11, VAX-11/730
Units Controlled: 4
[illegible]
(See Vendor Profile Page V-5)

BRAGEN CORP.
BR750
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC, DEC VAX-11/750
Units Controlled: 8
Programmable: No

BRAGEN CORP.
BR1630
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC, DEC PDP-11/70, VAX11/780, System 10
Units Controlled: 4
Programmable: Yes
Price: $11,000

BURROUGHS CORP.
B91
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Burroughs
Units Controlled: 4
Programmable: Yes
[illegible]
(See Vendor Profile Page V-5)

BURROUGHS CORP.
B92
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Burroughs
Units Controlled: 4
Programmable: Yes
Price: $21,000

BURROUGHS CORP.
B93
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Burroughs
Units Controlled: 4
Programmable: Yes
Price: $18,000

BURROUGHS CORP.
B96
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Burroughs
Units Controlled: 4
Programmable: Yes
Price: $36,000

BURROUGHS CORP.
CP 9558
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: [illegible]
Programmable: Yes
Price: $29,400

BURROUGHS CORP.
CP 9582
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Burroughs
Units Controlled: 58
Programmable: Yes
Price: $45,000

BYTEX COMPUTER SYSTEMS CORP.
[illegible]
15F
Controller Type: Add-on
Device Controlled: Memory Devices
Specific Equipment Supported: Intel, Fujitsu, National Semiconductor,Fairchild
Units Controlled: 1
Programmable: Yes
[illegible]
(See Vendor Profile Page V-5)

BYTEX COMPUTER SYSTEMS CORP.
[illegible]
Controller Type: Add-on
Device Controlled: Memory Devices
Specific Equipment Supported:

Controllers

Intel, National Semiconductor, Fujitsu, Fairchild
Units Controlled: 1
Programmable: Yes
Price: $645

SYTEK COMPUTER SYSTEMS
MULTIPROGRAMMER SYSTEM S-15R
Controller Type: Add-on
Device Controlled: Memory Devices
Specific Equipment Supported: Intel, Fujitsu, National Semiconductor, Fairchild
Units Controlled: 1
Programmable: Yes
Price: $445

BYTEWIDE CORP.
DISC CONTROLLER
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: DG 4234
Units Controlled: 4
Programmable: No
Price: $1,068
(See Vendor Profile Page V-5)

BYTRONIX CORP.
DISC CONTROLLERS
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC
Units Controlled: 4
Programmable: No
Price: $1,450

BYTRONIX CORP.
M234
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Micron System
Units Controlled: 2
Programmable: No
Price: $1,200

BYTRONIX CORP.
M450
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Micron System
Units Controlled: 2
Programmable: No
Price: $1,200

BYTRONIX CORP.
M525
Controller Type: Add-on
Device Controlled: Rigid disk drives, Magnetic Tape Drives
Specific Equipment Supported: Micron System
Units Controlled: 2
Programmable: No
Price: $1,200

BYTRONIX CORP.
M650
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Micron System
Units Controlled: 2
Programmable: No
Price: $1,200

CALIFORNIA COMPUTER SYSTEMS
2422-81
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 4
Programmable: No
Price: $395
(See Vendor Profile Page V-6)

CALIFORNIA COMPUTER SYSTEMS
2422-82
Device Controlled: Floppy disk drives
Units Controlled: 4
Programmable: No
Price: $595

CALIFORNIA COMPUTER SYSTEMS
2832
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Qume, Shugart, Disktron
Units Controlled: 2
Programmable: Yes
Price: $1,425

CALIFORNIA COMPUTER SYSTEMS
2834
Controller Type: Add-in
Device Controlled: Streamer Tape
Specific Equipment Supported: Archive
Units Controlled: 1
Programmable: No
Price: $9,500

CALLAN DATA SYSTEMS
CWC-796
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: No
Price: $1,395
(See Vendor Profile Page V-6)

CALLAN DATA SYSTEMS
GRAPHICS CONTROLLER
Controller Type: Add-in
Device Controlled: Display terminals
Specific Equipment Supported: Calan
Units Controlled: 1
Programmable: Yes
Price: $1,450

CALLAN DATA SYSTEMS
MULTIBUS FLOPPY DISK CONTROLLER
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 4
Programmable: No
Price: $750

CARDINAL LOGIC, INC.
101636
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Tandon, Shugart
Units Controlled: 14
Programmable: Yes
Price: $230
(See Vendor Profile Page V-6)

CARDAMATION CO.
11AP
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: DEC PDP-11, LA-120, LA 180
Units Controlled: 1
Programmable: No
Price: $520
(See Vendor Profile Page V-6)

CARDAMATION CO.
11GP
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: DEC PDP 11, GE Terminet
Units Controlled: 1
Programmable: No
Price: $520

CARDAMATION CO.
21AP
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: DEC LSI-11, LA-120, LA180
Units Controlled: 1
Programmable: No
Price: $470

CARDAMATION CO.
21CP
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: DEC LSI-11, Centronics
Units Controlled: 1
Programmable: No
Price: $470

CARDAMATION CO.
21DP
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Dataproducts, DEC LSI-11
Units Controlled: 1
Programmable: No
Price: $470

CARDAMATION CO.
21GP
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: DEC LSI-11, GE Terminet
Units Controlled: 1
Programmable: No
Price: $470

CENTRAL DATA CORP.
B1015
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Tandon
Units Controlled: 4
Programmable: Yes
Price: $371
(See Vendor Profile Page V-6)

CENTRAL DATA CORP.
B1015/2001
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Tandon
Units Controlled: 4
Programmable: Yes
Price: $4,195

CENTRAL DATA CORP.
B1015/D2000
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart 850/800
Programmable: Yes
Price: $2,735

CENTRAL DATA CORP.
B1023
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Ansi, Priam
Units Controlled: 4
Programmable: Yes
Price: $530

CENTRAL DATA CORP.
B1504
Controller Type: Add-on
Device Controlled: Rigid disk drives, Cassette/Cartridges Devices
Specific Equipment Supported: IMI, Archive
Units Controlled: 6
Programmable: No
Price: $310

CGRS MICROTECH, INC.
C340-2
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: CGRS
Programmable: Yes
Price: $199
(See Vendor Profile Page V-6)

CGRS MICROTECH, INC.
C345-1
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: CGRS
Units Controlled: 3
Programmable: Yes
Price: $199

CGRS MICROTECH, INC.
C371-1
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: CGRS
Units Controlled: 3
Programmable: Yes
Price: $199
(See Vendor Profile Page V-6)

CIPRICO, INC.
PICOMATE
Controller Type: Add-in
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: Kennedy 6450, 6455
Units Controlled: 2
Programmable: Yes
Price: $1,313
(See Vendor Profile Page V-7)

CIPRICO, INC.
RAID 5A CONTROLLER
Controller Type: Add-in
Device Controlled: Rigid disk drives, Magnetic tape drives
Specific Equipment Supported: Priam
Units Controlled: 4
Programmable: Yes
Price: $1,995

CIPRICO, INC.
RIMFIRE 38AD
Controller Type: Add-in

Controllers

Device Controlled: Rigid disk drives
Specific Equipment Supported: Priam
Units Controlled: 4
Programmable: Yes
Price: $1,603

CIPRICO, INC.
RIMFIRE 44 (COMBINATION)
Controller Type: Add-in
Device Controlled: Rigid disk drives, Cassette/Cartridges Devices
Specific Equipment Supported: Archive QIC2, Cipher QIC24
Units Controlled: 12
Programmable: Yes
Price: $1,795

CIPRICO, INC.
RIMFIRE 44D
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 8
Programmable: Yes
Price: $1,603

CIPRICO, INC.
RIMFIRE 44T
Controller Type: Add-in
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: Archive QIC2, Cipher QIC24
Units Controlled: 4
Programmable: Yes
Price: $1,665

CIPRICO, INC.
RIMFIRE 45 (COMBINATION)
Controller Type: Add-in
Device Controlled: Rigid disk drives, Magnetic tape drives
Units Controlled: 12
Programmable: Yes
Price: $1,895

CIPRICO, INC.
RIMFIRE 500
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: Yes
Price: $2,295

CIPRICO, INC.
RIMFIRE 75
(COMBINATION)
Controller Type: Add-in
Device Controlled: Rigid disk drives, Cassette/Cartridges Devices
Specific Equipment Supported: 3M HCD 72/90
Units Controlled: 12
Programmable: Yes
Price: $1,745

CIPRICO, INC.
RIMFIRE 75T
Controller Type: Add-in
Device Controller
Cassette/Cartridges Devices
Specific Equipment Supported: 3M HCD 72/90
Units Controlled: 4
Programmable: Yes
Price: $1,130

CIPRICO, INC.
TAPEMASTER
Controller Type: Add-in
Device Controlled: Magnetic tape drives
Units Controlled: 8
Programmable: Yes
Price: $1,688

COASTAL DATA PRODUCTS
MODEL 2000
Controller Type: Add-on
Device Controlled: Smart Clock
Units Controlled: 256
Programmable: No
Price: $2,100
(See Vendor Profile Page V-7)

COASTAL DATA PRODUCTS
MODEL 3000
Controller Type: Add-on
Device Controlled: Smart Clock
Units Controlled: 256
Programmable: No
Price: $3,100

CODATA SYSTEMS CORP.
FDC-0100
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Tandom
Units Controlled: 4
Programmable: Yes
Price: $420
(See Vendor Profile Page V-7)

CODATA SYSTEMS CORP.
HDC 0600
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Units Controlled: 16
Programmable: Yes
Price: $13,500

CODATA SYSTEMS CORP.
HDC WINCHESTER
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Cocos 3300
Units Controlled: 4
Programmable: Yes
Price: $1,365

CODATA SYSTEMS CORP.
ST Adv
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Seagate, Atari
Units Controlled: 4
Programmable: Yes
Price: $1,320

COMARK CORP.
MF85
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart, Qume, CDC
Units Controlled: 4
Programmable: Yes
Price: $350
(See Vendor Profile Page V-7)

COMARK CORP.
MULTI-SERIAL CONNECTIONS CONT
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Units Controlled: 4
Programmable: Yes
Price: $550

COMARK CORP.
MT80
Controller Type: Add-on
Device Controlled: Magnetic tape drives
Specific Equipment Supported: Digidata, Cipher, Kennedy, Pertec
Units Controlled: 8
Price: $1,295

COMARK CORP.
MT96
Controller Type: Add-on
Device Controlled: Magnetic tape drives
Units Controlled: 8
Programmable: Yes
Price: $1,295

COMBUR CORP.
C1718
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Dataproducts, Xerox, CDC, D-PRT
Units Controlled: 1
Programmable: No
Price: $1,821
(See Vendor Profile Page V-7)

COMBUR CORP.
C1800
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Xerox, CDC, Dataproducts, D-PRT
Units Controlled: 1
Programmable: No
Price: $5,600

COMBUR CORP.
C4748
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Dataproducts, CDC, Xerox, D-PRT
Units Controlled: 1
Programmable: No
Price: $4,800

COMBUR CORP.
C8768
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: CDC, Dataproducts, D-PRT, Xerox
Units Controlled: 1
Programmable: No
Price: $1,900

COMBUR CORP.
CPU
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: CDC, Xerox, Dataproducts, D-PRT
Units Controlled: 1
Programmable: No
Price: $7,200

COMBUR CORP.
CRT
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: CDC, Xerox, Dataproducts, D-PRT
Units Controlled: 1
Programmable: No
Price: $9,050

COMPATABLE COMPUTER CORP.
FDC 5/8
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart, Quantum, Tandon
Units Controlled: 4
Programmable: Yes
Price: $495
(See Vendor Profile Page V-7)

COMPATABLE COMPUTER CORP.
HDC 5/8
Controller Type: Add-on
Device Controlled: Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $795

COMPUPRO CORP.
DISK 1
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 4
Programmable: Yes
Price: $495 to $595
(See Vendor Profile Page V-7)

COMPUPRO CORP.
MULTI SELECTOR CHANNEL
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Fujitsu
Units Controlled: 4
Programmable: Yes
Price: $795 to $895

COMPUPRO CORP.
DISK 3
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Seagate 500, Shugart SA1100
Units Controlled: 4
Programmable: Yes
Price: $795 to $890

COMPUTER COMMUNICATIONS SPECIALISTS, INC.
TASK/1000
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Units Controlled: 10
Programmable: Yes
Price: $1,995
(See Vendor Profile Page V-8)

COMPUTER EXTENSION SYSTEM, INC.
LPC 8
Controller Type: Add-in
Device Controlled: Printers
Price: $475
(See Vendor Profile Page V-8)

COMPUTER EXTENSION SYSTEM, INC.
LPC 11
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: Yes
Price: $495

COMPUTER EXTENSION SYSTEM, INC.
LPCL 11
Device Controlled: Printers
Specific Equipment Supported: DEC LPV 11
Units Controlled: 1
Programmable: Yes
Price: $375

COMPUTER EXTENSION SYSTEM, INC.
SLC 11
Controller Type: Add-in

Controllers

Device Controlled: Printers, Display [illegible]
Specific Equipment Supported: DEC DL-11E
Units Controlled: 1
Programmable: Yes
Price: $550

COMPUTER EXTENSION SYSTEM, INC.
SLJL 11
Controller Type: Add-in
Device Controlled: Printers, Display [illegible]
Specific Equipment Supported: DEC DLV-11J
Units Controlled: 4
Programmable: Yes
Price: $395

COMPUTER EXTENSION SYSTEM, INC.
SLZ 11
Controller Type: Add-in
Device Controlled: Display terminals
Specific Equipment Supported: DEC DZ-11
Units Controlled: 8
Programmable: Yes
Price: $1,190

COMPUTER IDENTICS CORP.
LDP-5
Controller Type: Add-on
Device Controlled: Bar Code [illegible]
Specific Equipment Supported: Compudent; Motorola 6800, 68000
Units Controlled: 12
Programmable: No
Price: $12 000
(See Vendor Profile Page V-8)

COMPUTER IDENTICS CORP.
LDP-SM
Controller Type: Add-on
Device Controlled: Bar Code [illegible]
Specific Equipment Supported: [illegible]
Units Controlled: 80
Programmable: No
Price: $12,000 to $75,000

COMPUTER IDENTICS CORP.
MANUFACTURING TRANSACTION
Controller Type: Add-on
Device Controlled: Scanners
Specific Equipment Supported: [illegible]
Units Controlled: 160
Programmable: No
Price: $12,000 to $75,000

COMPUTER IDENTICS CORP.
SORT A-PAC
Controller Type: Add-on
Device Controlled: Bar Code [illegible]
Specific Equipment Supported: [illegible]
Units Controlled: 160
Programmable: No
Price: $12,000 to $75,000

COMPUTIME
[illegible]
Device Controlled: Memory Devices
Price: $325
(See Vendor Profile Page V-9)

COMPUTIME
CT102
Controller Type: Add-on
Device Controlled: Clock/Calendar
Units Controlled: 4
Price: $99

COMPUTIME
CTZM
Controller Type: Add-on
Device Controlled: Memory Devices
Price: $550

COMPUTIME
FDC-1
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: IBM System 34, 3740
Programmable: No
Price: $275

CONSOLINK
MS-PP32
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Epson, IBM, Okidata
Units Controlled: 1
Programmable: No
Price: $249
(See Vendor Profile Page V-9)

CONSOLINK
MS-PP64
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Epson, Okidata, IBM
Units Controlled: 1
Programmable: No
Price: $299

CONSOLINK
MS-PP16
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Epson, IBM, Okidata
Units Controlled: 1
Programmable: No
Price: $249

CONSOLINK
MS-PP32
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Epson, IBM, Okidata
Units Controlled: 1
Programmable: No
Price: $279

CONSOLINK
MS-PSM
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Epson, IBM, Okidata
Units Controlled: 1
Programmable: No
Price: $329

CONSOLINK
MS-SP16
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Epson, IBM, Okidata
Units Controlled: 1
Programmable: No
Price: $249

CONSOLINK
MS-SP32
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Epson, IBM, Okidata
Units Controlled: 1
Programmable: No
Price: $279

CONSOLINK
MS-SP64
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Epson, IBM, Okidata
Units Controlled: 1
Programmable: No
Price: $329

CONSOLINK
MS-SS16
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Epson, IBM, Okidata
Units Controlled: 1
Price: $259

CONSOLINK
MS-SS32
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Epson, IBM, Okidata
Units Controlled: 1
Programmable: No
Price: $289

CONSOLINK
MS-SS64
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Epson, IBM, Okidata
Units Controlled: 1
Programmable: No
Price: $339

CONSOLINK
MS PP16
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: No
Price: $219

CONSOLINK
SS-SER
Controller Type: Add-in
Device Controlled: Printers, Memory [illegible]
Units Controlled: 4
Programmable: No
Price: $444

CONSOLINK
SS-1000
Controller Type: Add-on
Device Controlled: Printers, Memory Devices
Specific Equipment Supported: Epson, IBM, Okidata
Units Controlled: 4
Programmable: No
Price: $349

CONSOLINK
SS MEM
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 2
Programmable: No
Price: $159

CONTROL DATA CORP.
CONTROL DATA 38500
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC 33501, 3375
Units Controlled: 32
Programmable: Yes
Price: $46,000 to $63,620
(See Vendor Profile Page V-9)

CONTROL SYSTEMS
ARTIST BOARD I
Controller Type: Add-in
Device Controlled: Display terminals
Specific Equipment Supported: IBM Personal Computer
Units Controlled: 1
Programmable: Yes
Price: $3,195
(See Vendor Profile Page V-9)

CONTROL SYSTEMS
ARTIST BOARD II
Controller Type: Add-in
Device Controlled: Display terminals
Specific Equipment Supported: IBM Personal Computer
Units Controlled: 1
Programmable: Yes
Price: $1,595

CRAY RESEARCH, INC.
BMC-4
Controller Type: Add-in
Device Controlled: Magnetic tape drives
Units Controlled: 4
Programmable: No
Price: $75,000
(See Vendor Profile Page V-9)

CRAY RESEARCH, INC.
DCU-3
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC
Units Controlled: 4
Programmable: No
Price: $125,000

CRAY RESEARCH, INC.
DCU-4
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC
Units Controlled: 4
Programmable: No
Price: $70,000

CROMEMCO, INC.
IOP, QDRT
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Diablo 630, Centronics 351, Data Products, NEC 7710
Units Controlled: 4
Programmable: Yes
Price: $1,090
(See Vendor Profile Page V-9)

CROMEMCO, INC.
PR1
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics 703, Qume, NEC 5500Q, NEC 7700Q
Units Controlled: 2
Programmable: No
Price: $245

CROMEMCO, INC.
TRY
Controller Type: Add-in
Device Controlled: Printers.

Specific Equipment Supported: Centronics 703, Okidata ML82, Epson MX80
Units Controlled: 4
Price: $345

CYBERNATION, INC.
CPC150
Controller Type: Add-on
Device Controlled: Printers, Display terminals, Plotters
Specific Equipment Supported: DEC PDP-11
Programmable: Yes
Price: $105,000
(See Vendor Profile Page V-10)

CYBERNATION, INC.
CYB-460
Controller Type: Add-on
Device Controlled: Printers, Display terminals, Plotters, Magnetic tape drives, Memory Devices
Specific Equipment Supported: Okidata, DEC PDP
Programmable: Yes
Price: $18,500

CYNTHIA PERIPHERAL CORP.
2100
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Cynthia Peripheral D-100 Series
Units Controlled: 2
Programmable: Yes
Price: $1,109
(See Vendor Profile Page V-10)

CYNTHIA PERIPHERAL CORP.
2181
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Cynthia Peripheral D-100 Series
Units Controlled: 1
Programmable: Yes
Price: $900

DATA ENGINEERING, INC.
ASYNCHRONOUS MEMORY PORT C2172
Controller Type: Add-in
Device Controlled: Memory Devices
Specific Equipment Supported: Gould
Units Controlled: 1
Programmable: No
Price: $6,000
(See Vendor Profile Page V-10)

DATA ENGINEERING, INC.
C/514
Controller Type: Add-in
Device Controlled: Memory Devices
Specific Equipment Supported: Harris 6024/5
Units Controlled: 1
Programmable: Yes
Price: $12,000

DATA ENGINEERING, INC.
CC420
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Harris
Units Controlled: 1
Programmable: No
Price: $3,000

DATA ENGINEERING, INC.
CC550
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Harris 6024/4, 6024/5, 6024/7
Units Controlled: 4
Programmable: No
Price: $7,500

DATA ENGINEERING, INC.
CC551
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Harris 6024/4, 6024/5, 6024/7
Units Controlled: 2
Programmable: No
Price: $8,400

DATA ENGINEERING, INC.
CC560
Controller Type: Add-in
Device Controlled: Magnetic tape drives, Memory Devices
Specific Equipment Supported: Harris 6024/4, 6024/5, 6024/7
Units Controlled: 4
Programmable: No
Price: $6,000

DATA ENGINEERING, INC.
INTERNAL MEMORY CONTROLLER C2182
Controller Type: Add-in
Device Controlled: Memory Devices
Specific Equipment Supported: Gould
Units Controlled: 1
Programmable: No
Price: $4,000

DATA ENGINEERING, INC.
P3500
Controller Type: Add-on
Device Controlled: Card Punch
Specific Equipment Supported: Harris
Units Controlled: 1
Programmable: Yes
Price: $6,700

DATA ENGINEERING, INC.
P4390
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Gould
Units Controlled: 1
Programmable: No
Price: $800

DATA ENGINEERING, INC.
SYNCHRONOUS MEMORY PORT C2162
Controller Type: Add-in
Device Controlled: Memory Devices
Specific Equipment Supported: Gould
Units Controlled: 1
Programmable: No
Price: $4,000

DATAMAC PERIPHERAL PRODUCTS
DISK CONTROLLER
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: IBM Personal Computer, Columbia
Units Controlled: 4
(See Vendor Profile Page V-10)

DATAPLEX, INC.
201 MICROSTREAMER
Controller Type: Add-in
Device Controlled: Magnetic tape drives
Specific Equipment Supported: Cipher F880
Units Controlled: 4
Price: $6,500
(See Vendor Profile Page V-11)

DATAPLEX, INC.
MODEL 102 PRIAM CONTROLLER
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Priam
Units Controlled: 4
Price: $8,850

DATA PLUS, INC.
202 SERIES
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Xtel 315, Siemens
Units Controlled: 2
Programmable: Yes
Price: $900

DATA PLUS, INC.
300-10
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Xtel 315, Siemens
Units Controlled: 2
Programmable: Yes
Price: $1,200

DATA PLUS, INC.
350
Controller Type: Add-on
Device Controlled: Display terminals
Units Controlled: 4
Programmable: Yes
Price: $1,800

DATA PLUS, INC.
805-2
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Units Controlled: 1
Programmable: Yes
Price: $1,500

DATARAM CORP.
S04/A
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 2
Programmable: Yes
Price: $2,650
(See Vendor Profile Page V-11)

DATARAM CORP.
S04/A1
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 2
Programmable: Yes
Price: $2,650

DATARAM CORP.
S04/B
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 2
Programmable: Yes
Price: $2,650

DATARAM CORP.
S04/D
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 2
Programmable: Yes
Price: $2,650

DATARAM CORP.
S34
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC PDP-11, DEC VAX
Units Controlled: 4
Programmable: Yes
Price: $3,705

DATARAM CORP.
S34/D
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC PDP-11, DEC VAX
Units Controlled: 4
Programmable: Yes
Price: $3,705

DATARAM CORP.
T03
Controller Type: Add-in
Device Controlled: Magnetic tape drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 4
Programmable: Yes
Price: $1,950

DATARAM CORP.
T04/C
Controller Type: Add-in
Device Controlled: Magnetic tape drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 4
Programmable: Yes
Price: $1,500

DATARAM CORP.
T04/D
Controller Type: Add-in
Device Controlled: Magnetic tape drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 4
Programmable: Yes
Price: $2,800

DATARAM CORP.
T05/C
Controller Type: Add-in
Device Controlled: Magnetic tape drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 4
Programmable: Yes
Price: $1,980

DATARAM CORP.
T34/T
Controller Type: Add-in
Device Controlled: Magnetic tape drives
Specific Equipment Supported: DEC PDP-11, DEC VAX
Units Controlled: 4
Programmable: Yes
Price: $3,670

DATARAM CORP.
T35/C
Controller Type: Add-in

Controllers

Device Controlled: Magnetic tape drives
Specific Equipment Supported: DEC PDP-11, DEC VAX
Units Controlled: 4
Programmable: Yes
Price: $1,980

DATARAM CORP.
T36
Controller Type: Add-in
Device Controlled: Magnetic tape drives
Specific Equipment Supported: DEC PDP-11, DEC VAX
Units Controlled: 4
Programmable: Yes
Price: $2,700

DATARAM CORP.
T37
Controller Type: Add-in
Device Controlled: Magnetic tape drives
Specific Equipment Supported: DEC PDP-11, DEC VAX
Units Controlled: 4
Programmable: Yes
Price: $2,900

DATASOUTH COMPUTER
DS128 TERMINAL CONTROLLER BOARD
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: DEC LA36
Units Controlled: 1
Programmable: Yes
Price: $750
(See Vendor Profile Page V-11)

DATA SYSTEMS DESIGN, INC.
4140
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 2
Programmable: Yes
Price: $1,250
(See Vendor Profile Page V-11)

DATA SYSTEMS DESIGN, INC.
7215
Controller Type: Add-in
Device Controlled: Floppy disk drives, Rigid disk drives, Stream Tape
Specific Equipment Supported: STD 506, Archive
Units Controlled: 5
Programmable: Yes
Price: $1,295

DATA SYSTEMS DESIGN, INC.
7217
Controller Type: Add-in
Device Controlled: Floppy disk drives, Rigid disk drives, Stream Tape
Specific Equipment Supported: Seagate ST-506, Shugart SA-850, Archive
Units Controlled: 5
Programmable: Yes
Price: $1,295

DATA SYSTEMS DESIGN, INC.
DSD 5140
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: DEC
Units Controlled: 2
Price: $1,250

DATA SYSTEMS DESIGN, INC.
MULTIBUS 7215
Controller Type: Add-in
Device Controlled: Floppy disk drives, Rigid disk drives, Magnetic tape drives
Specific Equipment Supported: DEC
Units Controlled: 2
Price: $1,295

DATA SYSTEMS DESIGN, INC.
MULTIBUS 7215
Controller Type: Add-in
Device Controlled: Floppy disk drives, Rigid disk drives, Magnetic tape drives
Specific Equipment Supported: DEC
Units Controlled: 2
Price: $1,295

DATASYSTEMS CORP.
DISK CONTROLLER 5121
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 4
Programmable: Yes
Price: $1,595
(See Vendor Profile Page V-11)

DATASYSTEMS CORP.
DMA CONTROLLER 5123
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 4
Programmable: Yes
Price: $1,995

DATASYSTEMS CORP.
DMA CONTROLLER DLP1122
Controller Type: Add-in
Device Controlled: Printers, Memory Devices
Specific Equipment Supported: DEC VAX
Units Controlled: 2
Programmable: Yes
Price: $2,150

DATASYSTEMS CORP.
FLOPPY DISK CONTROLLER 5110
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: DEC LSI-11, DEC RXV21
Units Controlled: 2
Programmable: Yes
Price: $1,100

DATASYSTEMS CORP.
LINE PRINTER CONTROLLER DLP11
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: DEC PDP-11
Units Controlled: 1
Programmable: No
Price: $625

DATASYSTEMS CORP.
LINE PRINTER CONTROLLER DLP1100
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: DEC LSI-11
Units Controlled: 1
Programmable: No
Price: $375

DATASYSTEMS CORP.
LINE PRINTER CONTROLLER DLP1200
Controller Type: Add-in
Device Controlled: Printers, Memory Devices
Specific Equipment Supported: DG Nova, Eclipse
Units Controlled: 1
Programmable: Yes
Price: $650

DATASYSTEMS CORP.
LINE PRINTER CONTROLLER DLP3300
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: IBM Series/1
Units Controlled: 1
Programmable: Yes
Price: $1,825

DATA TECHNOLOGY CORP.
DTC101D
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Fujitsu 2300 Series
Units Controlled: 2
Programmable: Yes
Price: $575
(See Vendor Profile Page V-11)

DATA TECHNOLOGY CORP.
DTC510A
Controller Type: Add-on
Device Controlled: Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $440

DATA TECHNOLOGY CORP.
DTC520A
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $500

DATA TECHNOLOGY CORP.
DTC521A
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $500

DATA TECHNOLOGY CORP.
DTC540
Controller Type: Add-on
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: Yes
Price: $895

DATA TECHNOLOGY CORP.
DTC600
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC Finch
Units Controlled: 4
Programmable: Yes
Price: $775

DATA TECHNOLOGY CORP.
DTC615
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC Wren-3
Units Controlled: 2
Programmable: Yes
Price: $450

DATA TECHNOLOGY CORP.
DTC703
Controller Type: Add-on
Device Controlled: Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $775

DATA TECHNOLOGY CORP.
DTC900
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $775

DATA TECHNOLOGY CORP.
DTC950
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $475

DATUM, INC.
20MB CARTRIDGE CONTROLLER 15112
Controller Type: Add-in
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: DG
Units Controlled: 4
Programmable: Yes
Price: $1,250
(See Vendor Profile Page V-12)

DATUM, INC.
20MB CARTRIDGE CONTROLLER 40080
Controller Type: Add-on
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: Sperry UYK 20

Units Controlled: 4
Programmable: Yes
Price: $5,500

DATUM, INC.
[illegible] CARTRIDGE CONTROLLER 45312
Controller Type: Add-in
Device Controlled: Cassette/Cartridge Devices
Specific Equipment Supported: DG
Units Controlled: 4
Programmable: Yes
Price: $2,695

DATUM, INC.
CARTRIDGE DISK CONTROLLER 4009
Controller Type: Add-on
Device Controlled: Rigid disk drives, Cassette/Cartridge Devices
Specific Equipment Supported: Rolm 1602, 1603
Units Controlled: 4
Programmable: Yes
Price: $3,725

DATUM, INC.
LINE PRINTER CONTROLLER 35060
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Sperry UYK 20
Units Controlled: 4
Programmable: Yes
Price: $2,150

DATUM, INC.
MAG TAPE CONTROLLER 1016
Controller Type: Add-on
Device Controlled: Magnetic tape drives
Specific Equipment Supported: Rolm CBX
Units Controlled: 4
Programmable: Yes
Price: $3,625

DATUM, INC.
MAG TAPE CONTROLLER 1019
Controller Type: Add-in
Device Controlled: Magnetic tape drives
Specific Equipment Supported: Rolm 1602, 1603
Units Controlled: 4
Programmable: Yes
Price: $3,825

DATUM, INC.
MAG TAPE CONTROLLER 1061
Controller Type: Add-on
Device Controlled: Magnetic tape drives
Specific Equipment Supported: HP 21 MX
Units Controlled: 4
Programmable: Yes
Price: $3,200

DATUM, INC.
MAG TAPE CONTROLLER 1040
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Varian 47XX
Units Controlled: 4
Programmable: Yes
Price: $3,850

DATUM, INC.
MAG TAPE CONTROLLER 1060
Controller Type: Add-on

Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: IBM Series/1
Units Controlled: 4
Programmable: Yes
Price: $2,675

DATUM, INC.
MAG TAPE CONTROLLER 1060, 1070
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Sperry UYK 20
Units Controlled: 4
Programmable: Yes
Price: $5,500

DATUM, INC.
MAG TAPE CONTROLLER 1010
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DG
Units Controlled: 4
Programmable: Yes
Price: $2,900

DATUM, INC.
MAG TAPE CONTROLLER 1042
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Prime Data T & S Series
Units Controlled: 4
Programmable: Yes
Price: $2,250

DATUM, INC.
MAG TAPE ADAPTER 25012
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DG
Programmable: Yes
Price: $1,850

DATUM, INC.
[illegible] DISK CONTROLLER 60012
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: DG
Units Controlled: 4
Programmable: Yes
Price: $3,500

DATUM, INC.
SMD DISK [illegible]
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC PDP-11
Units Controlled: 4
Programmable: Yes
Price: $4,800

DATUM, INC.
SMD DISK CONTROLLER 60026V
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC VAX 11
Units Controlled: 4
Programmable: Yes
Price: $5,750

DATUM, INC.
SMD DISK CONTROLLER 60021
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 4
Programmable: Yes
Price: $4,[illegible]

DATUM, INC.
SMD DISK CONTROLLER 60027
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC PDP-1170
Units Controlled: 4
Programmable: Yes
Price: $7,750

DATUM, INC.
SMD DISK CONTROLLER 60030
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC PDP-11
Units Controlled: 4
Programmable: Yes
Price: $2,800

DATUM, INC.
SMD DISK CONTROLLER 60031
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 4
Programmable: Yes
Price: $2,700

DATUM, INC.
TM11 1521
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 4
Programmable: Yes
Price: $2,800

DATUM, INC.
TM11 ADAPTER 35030
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC PDP-11
Programmable: Yes
Price: $1,550

DATUM, INC.
TM11 ADAPTER 25021
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC LSI-II
Programmable: Yes
Price: $1,550

DATUM, INC.
TM11 CONTROLLER 1520
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC PDP-11
Units Controlled: 4
Programmable: Yes
Price: $3,400

DATUM, INC.
TM11 CONTROLLER 1520A
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC PDP-11
Units Controlled: 4
Programmable: Yes
Price: $2,850

DATUM, INC.
TM11 CONTROLLER 1520AV
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC VAX
Units Controlled: 4
Programmable: Yes
Price: $2,875

DATUM, INC.
TM11 CONTROLLER 1520I
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC PDP-11
Units Controlled: 4
Programmable: Yes
Price: $2,370

DATUM, INC.
TS11 ADAPTER 25032
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC VAX
Programmable: Yes
Price: $2,050

DAVONG SYSTEMS, INC.
DSI-ASYNCH
Controller Type: Add-in
Device Controlled: Printers, Memory Devices
Units Controlled: 2
Programmable: Yes
Price: $385
(See Vendor Profile Page 12)

DAVONG SYSTEMS, INC.
HARD DISK CONTROLLER-E
Controller Type: Add-on
Device Controlled: Rigid disk drives, Magnetic Tape Drives
Specific Equipment Supported: CMI, Cipher
Units Controlled: 3
Programmable: Yes
Price: $1,995

DAVONG SYSTEMS, INC.
HARD DISK CONTROLLER-I
Controller Type: Add-on
Device Controlled: Rigid disk drives, Magnetic Tape Drives
Specific Equipment Supported: CMI, Cipher
Units Controlled: 1
Programmable: Yes
Price: $1,845

DAVONG SYSTEMS, INC.
MULTIFUNCTION BOARD
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DAVONG, IBM
Programmable: Yes
Price: $595

DECISION DATA COMPUTER CORP.
[illegible]
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: IBM 5250; Decision Data 3751, 3791, Series 600
Units Controlled: 9
Price: [illegible]
(See Vendor Profile Page V-12)

Controllers

DELTA SYSTEMS, INC.
HP/C
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Delta Systems
Programmable: Yes
(See Vendor Profile Page V-12)

DELTA SYSTEMS, INC.
HP/D
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: STC
Units Controlled: 16
Programmable: Yes

DELTA SYSTEMS, INC.
HP/P
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Xerox
Units Controlled: 1
Programmable: Yes
Price: $32,000

DELTA SYSTEMS, INC.
HP/T
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: STC
Units Controlled: 16
Programmable: Yes

D.G.M.
R245
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Sweda L45
Units Controlled: 26
Programmable: No
Price: $1,425
(See Vendor Profile Page V-12)

D.G.M.
R350
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Sweda L50
Units Controlled: 11
Programmable: No
Price: $8,000 to $10,000

D.G.M.
R850
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Sweda L45, L50
Units Controlled: 31
Programmable: No
Price: $1,425

DIGI-DATA CORP.
7IR
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Digidata
Units Controlled: 4
Programmable: No
(See Vendor Profile Page V-12)

DIGI-DATA CORP.
7IC
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Digidata
Units Controlled: 2
Programmable: No

DIGI-DATA CORP.
70R
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Digidata
Units Controlled: 4
Programmable: No

DIGI-DATA CORP.
70S
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Digidata
Units Controlled: 8
Programmable: No

DIGI-DATA CORP.
HP1000M/E/F IF
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Digidata
Units Controlled: 4
Programmable: No
Price: $2,000

DIGI-DATA CORP.
HS NCI
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Digidata
Units Controlled: 8
Programmable: No
Price: $1,500

DIGI-DATA CORP.
QCI
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Digidata
Units Controlled: 8
Programmable: No
Price: $1,485

DIGI-DATA CORP.
UCI
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Digidata
Units Controlled: 8
Programmable: No
Price: $1,500

DIGITAL ASSOCIATES CORP.
4111 PDP/11/VAX PRINTER
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Dataproducts, Centronics
Units Controlled: 1
Programmable: No
(See Vendor Profile Page V-12)

DIGITAL ASSOCIATES CORP.
HP 3000/33 - HP 3000/64
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported:
Units Controlled: 1
Programmable: No

DIGITAL ASSOCIATES CORP.
HP 3000/I/II/III PRINTER
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: D-PRT 1260, 1210, Dataproducts B Series, Centronics Series
Units Controlled: 1
Programmable: No
(See Vendor Profile Page V-12)

DIGITAL ASSOCIATES CORP.
MODEL 3211 IBM SERIES I
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: No

DIGITAL ASSOCIATES CORP.
MODEL 4140 PRINTER CONTROLLER
Controller Type: Add-on
Device Controlled: Printers
Units Controlled: 1
Programmable: No

DIGITAL ASSOCIATES CORP.
PROTOCOL INTERFACE 7130
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Centronics, Dataproducts
Units Controlled: 1
Programmable: Yes

DIGITAL ASSOCIATES CORP.
PROTOCOL INTERFACE 7140
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Centronics, Dataproducts
Units Controlled: 1
Programmable: Yes

DIGITAL ASSOCIATES CORP.
REMOTE LINE PRINTER SYSTEM
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Dataproducts
Units Controlled: 2
Programmable: Yes

DIGITAL ASSOCIATES CORP.
RS-232 INTERFACE 7115
Controller Type: Add-on
Device Controlled: Printers
Units Controlled: 1
Programmable: No

DIGITAL DEVELOPMENT CORP.
DMC
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Digital Development 750
Units Controlled: 1
Programmable: No
Price: $2,000
(See Vendor Profile Page V-13)

DIGITAL DEVELOPMENT CORP.
DMS-RF11
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Digital Development 6090, 9100, A7311, A7312
Units Controlled: 4
Programmable: Yes
Price: $7,600

DIGITAL DEVELOPMENT CORP.
DMSTE
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Digital Development
Units Controlled: 1
Programmable: No
Price: $3,900

DIGITAL LABORATORIES, INC.
ESP-1
Controller Type: Add-on
Device Controlled: Display terminals
Units Controlled: 4
Programmable: Yes
Price: $395
(See Vendor Profile Page V-13)

DIGITAL LABORATORIES, INC.
MICROMATRIX II
Controller Type: Add-on
Device Controlled: Printers
Units Controlled: 8
Programmable: Yes
Price: $995

DIGITAL LABORATORIES, INC.
MULTISPOOL
Device Controlled: Printers
Units Controlled: 1
Programmable: Yes
Price: $995

DIGITAL LABORATORIES, INC.
PC-25
Controller Type: Add-in
Device Controlled: Keypunch
Specific Equipment Supported: IBM
Units Controlled: 2
Programmable: Yes
Price: $1,350

DIGITAL LABORATORIES, INC.
TLC-1
Controller Type: Add-on
Device Controlled: Display terminals
Units Controlled: 3
Programmable: No
Price: $245

DIGITUS CORP.
ELEVATOR ANNOUNCER I
Controller Type: Add-on
Device Controlled: Bar Code Reader
Programmable: Yes
Price: $2,200
(See Vendor Profile Page V-13)

DIGITUS CORP.
ELEVATOR ANNOUNCER II
Controller Type: Add-on
Device Controlled: Bar Code Reader
Programmable: Yes
Price: $500

DIGITUS CORP.
SASA CONTROLLER
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: NEC Daisywriter
Units Controlled: 1
Programmable: Yes
Price: $395

DIGITUS CORP.
VOICE I/O MODULE
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported:

NEC 8000
Programmable: Yes

DIGITUS CORP.
VT10
Controller Type: Add-in
Device Controlled: Display terminals
Units Controlled: 1
Programmable: Yes
Price: $5,500

DILOG
DQ100
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Diablo, Pertec, CDC
Units Controlled: 8
Programmable: No
Price: $1,520
(See Vendor Profile Page V-13)

DILOG
DQ120
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Pertec, Digidata, Kennedy, Cipher
Units Controlled: 4
Programmable: No
Price: $1,895

DILOG
DQ130
Controller Type: Add-in
Device Controlled: Tape Streamer
Units Controlled: 8
Programmable: No
Price: $1,550

DILOG
DQ132
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives, Tape Streamer
Units Controlled: 8
Programmable: No
Price: $2,050

DILOG
DQ202A
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC, Ampex, Fujitsu
Units Controlled: 2
Programmable: No
Price: $2,450

DILOG
DQ214
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC, Ampex, Fujitsu
Units Controlled: 2
Programmable: No
Price: $2,295

DILOG
DQ215
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC, Ampex, Fujitsu
Units Controlled: 2
Programmable: No
Price: $2,395

DILOG
DQ228
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC, Ampex, Fujitsu
Units Controlled: 2
Programmable: No
Price: $3,150

DILOG
DQ330
Controller Type: Add-in
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: Kennedy
Units Controlled: 2
Programmable: No
Price: $1,445

DILOG
DQ404
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Fujitsu, Memorex, Shugart
Units Controlled: 2
Programmable: No
Price: $2,050

DILOG
DQ409
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart, Micropolis, Tandem
Units Controlled: 2
Programmable: No
Price: $1,095

DILOG
DQ413
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Priam
Units Controlled: 2
Programmable: No
Price: $2,050

DILOG
DQ414
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Priam
Units Controlled: 2
Programmable: No
Price: $2,050

DILOG
DQ604
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Seagate, Shugart, Rodime, fMT
Units Controlled: 2
Programmable: No
Price: $1,395

DILOG
DQ614
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Shugart, Seagate, Rodime, fMT
Units Controlled: 2
Price: $1,895

DILOG
DQ615
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Vertex, Maxtor, Atari, Evotek
Units Controlled: 2
Programmable: No
Price: $2,095

DILOG
DQ634
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DMA
Units Controlled: 2
Programmable: No
Price: $2,095

DILOG
DU100
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Diablo, Pertec, CDC
Units Controlled: 8
Programmable: No
Price: $1,520

DILOG
DU120
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Pertec, Kennedy, DEC, Cipher
Units Controlled: 4
Programmable: No
Price: $1,895

DILOG
DU130
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives, Tape Streamer
Units Controlled: 8
Programmable: No
Price: $1,550

DILOG
DU215
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC, Ampex, Fujitsu
Units Controlled: 2
Programmable: No
Price: $2,095

DILOG
DU218
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC, Ampex, Fujitsu
Units Controlled: 4
Programmable: No
Price: $2,595

DISPLAYS UNLIMITED
MODEL 1000
Controller Type: Add-in
Device Controlled: Display terminals
Specific Equipment Supported: CDC
Programmable: No
Price: $2,900
(See Vendor Profile Page V-13)

DISPLAYS UNLIMITED
MODEL 2000
Controller Type: Add-on
Device Controlled: Printers, Teleprinters, Display terminals, Floppy disk drives, Plotters, Magnetic Tape Drives, Cassette/Cartridges Devices
Units Controlled: 8
Price: $800

DISPLAYS UNLIMITED
MODEL 3000
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Programmable: No
Price: $1,200

DISTRIBUTED LOGIC CORP.
CARTRIDGE TAPE CONTROLLER DQ330
Controller Type: Add-in
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: Kennedy 6450
Units Controlled: 2
Programmable: Yes
Price: $1,445
(See Vendor Profile Page V-13)

DISTRIBUTED LOGIC CORP.
DISK CONTROLLER-SMD I/O DX200 SERIES
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC, Fujitsu, Kennedy
Units Controlled: 4
Programmable: Yes
Price: $2,395 to $3,150

DISTRIBUTED LOGIC CORP.
DISK CONTROLLER-ST506 I/O DQ600 SER.
Controller Type: Add-in
Device Controlled: Rigid disk drives.
Specific Equipment Supported: Minscribe, Rodine, Seagate, Shugart
Units Controlled: 2
Programmable: Yes
Price: $1,895 to $2,095

DISTRIBUTED LOGIC CORP.
DISK CONTROLLER DQ400 SERIES
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $1,895 to $2,050

DISTRIBUTED LOGIC CORP.
FLOPPY DISK-ANSI I/O DQ619
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Cannon, Memorex, Micropolis, Pertec
Units Controlled: 2
Programmable: Yes

DISTRIBUTED LOGIC CORP.
FLOPPY DISK-SA800/850 I/O DQ418
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart, Pertec, BASF, Micropolis
Units Controlled: 2
Programmable: Yes

DISTRIBUTED LOGIC CORP.
TAPE DRIVE COPULER DX130
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Ampex, Cipher, CDC, Kennedy
Units Controlled: 8
Programmable: Yes
Price: $1,550

DISTRIBUTED LOGIC CORP.
TAPE DRIVE COUPLER DX132
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives

Controllers

Specific Equipment Supported: Ampex, Cipher CDC Kennedy
Units Controlled: 4
Programmable: Yes
Price: $2,050

D&N MICRO PRODUCTS, INC.
MODEL 1200
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Adds, Viewpoint, TVI
Units Controlled: 4
Programmable: Yes
Price: $2,995
(See Vendor Profile Page V-13)

D&N MICRO PRODUCTS, INC.
MODEL 2400
Controller Type: Add-on
Device Controlled: Display terminals, Floppy disk drives
Specific Equipment Supported: Adds, Viewpoint, TVI
Units Controlled: 4
Programmable: Yes
Price: $3,495

D&N MICRO PRODUCTS, INC.
MODEL 2400-16
Device Controlled: Display terminals, Floppy disk drives, Rigid disk drives
Specific Equipment Supported: TVI, Adds
Units Controlled: 4
Programmable: Yes
Price: $6,095

DP-TEK, INC.
81-D
Controller Type: Add-on
Device Controlled: Printers
Units Controlled: 1
Programmable: No
Price: $400

DP-TEK, INC.
94-P
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Centronics
Units Controlled: 1
Programmable: No
Price: $375

DP-TEK, INC.
94-S
Controller Type: Add-on
Device Controlled: Printers
Units Controlled: 1
Programmable: No
Price: $475

DP-TEK, INC.
94-WP
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Qume Sprint 9, Sprint 11, Diablo 630, Dataproducts D55
Units Controlled: 1
Programmable: No
Price: $495

DP-TEK, INC.
9304
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Okidata
Units Controlled: 1
Programmable: Yes
Price: $1,950

DP-TEK, INC.
9220
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Cipher
Units Controlled: 1
Programmable: Yes
Price: $3,995

DP-TEK, INC.
9448
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Datapoint, Dataproducts, Centronics
Units Controlled: 1
Programmable: No
Price: $495

DP-TEK, INC.
IMPRINT/3
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Okidata
Units Controlled: 1
Programmable: Yes
Price: $1,195

DP-TEK, INC.
MODEL 9301
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Okidata
Units Controlled: 1
Programmable: Yes
Price: $1,550

DYLON CORP.
1015B
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Units Controlled: 4
Programmable: No
Price: $6,995
(See Vendor Profile Page V-14)

DYLON CORP.
1025A
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: HP
Units Controlled: 4
Programmable: No
Price: $5,995

DYLON CORP.
1030A
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: HP 7970B
Programmable: No
Price: $5,695

EMULEX CORP.
SC01
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 2
(See Vendor Profile Page V-14)

EMULEX CORP.
SC02
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 2
Programmable: Yes
Price: $1,900

EMULEX CORP.
SC03
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC LSI-11
Units Controlled: 2
Programmable: Yes

EMULEX CORP.
SC11
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC PDP-11
Units Controlled: 4

EMULEX CORP.
SC12
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC PDP-11
Units Controlled: 2

EMULEX CORP.
SC21
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC 9760, Fujitsu 2312, Ampex 93160
Units Controlled: 4

EMULEX CORP.
SC31
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Priam 3350, CDC 9762, Fujitsu 2351, Memorex 659
Units Controlled: 4

EMULEX CORP.
SC70
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC 9766, Memorex 659, Ampex 93160, STC 8775
Units Controlled: 4

EMULEX CORP.
SC750
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC 9762, Fujitsu 2312, STC 8775, Ampex Capricorn
Units Controlled: 4

ESSEX INTERNATIONAL CO.
EE 1102
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Essex, C-Itoh
Units Controlled: 63
Programmable: Yes
Price: $9,000
(See Vendor Profile Page V-14)

GAW CONTROL CORP.
TF150
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Dilog, DEC, CPC
Units Controlled: 4
Programmable: No
Price: $1,300
(See Vendor Profile Page V-15)

GAW CONTROL CORP.
TF800
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Dilog, DEC
Units Controlled: 4
Price: $1,100

GAW CONTROL CORP.
TF816
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives, Memory Devices
Specific Equipment Supported: Dilog, DEC
Units Controlled: 4
Programmable: No
Price: $1,700

GEN/COMP, INC.
MODEL 2023
Controller Type: Add-in
Device Controlled: Paper Tape Punch
Specific Equipment Supported: DEC PDP-11
Units Controlled: 2
Price: $1,350

GEN/COMP, INC.
MODEL 2024
Controller Type: Add-in
Device Controlled: Printers, Teleprinters
Specific Equipment Supported: DEC LP-11, LA-11
Units Controlled: 1
Programmable: Yes
Price: $525
(See Vendor Profile Page V-15)

GEN/COMP, INC.
MODEL 2025
Controller Type: Add-in
Device Controlled: Card Reader
Specific Equipment Supported: Documation M200
Units Controlled: 1
Programmable: Yes
Price: $700

GEN/COMP, INC.
MODEL 2031
Controller Type: Add-in
Device Controlled: Display terminals
Specific Equipment Supported: Teletype Bell 103
Units Controlled: 1
Programmable: Yes
Price: $500

GEN/COMP, INC.
MODEL 2041
Controller Type: Add-in
Device Controlled: Printers, Teleprinters, Display terminals, Floppy disk drives, Rigid disk drives, Plotters, Magnetic Tape Drives, Cassette/Cartridges Devices, Memory Devices
Units Controlled: 1
Programmable: Yes
Price: $425

GEN/COMP, INC.
MODEL 3021
Controller Type: Add-in

Device Controlled: Printers, Teleprinters, Display terminals, Floppy disk drives, Rigid disk drives, Plotters, Magnetic Tape Drives, Cassette/Cartridges Devices, Memory Devices
Specific Equipment Supported: DG Nova
Units Controlled: 2
Programmable: No
Price: $500

GEN/COMP, INC.
MODEL 3053
Controller Type: Add-in
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: DG Nova, Eclipse
Units Controlled: 4
Programmable: Yes
Price: $1,200

GENERAL DIGITAL INDUSTRIES, INC.
DMA-700
Controller Type: Add-in
Device Controlled: OCR
Specific Equipment Supported: DEC PDP-11, DEC VAX
Units Controlled: 2
Programmable: Yes
Price: $3,495
(See Vendor Profile Page V-15)

GENERAL ELECTRIC CO.
[illegible]
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: GE
Units Controlled: 6
Programmable: No
Price: $3,815
(See Vendor Profile Page V-15)

GENERAL ELECTRIC CO.
[illegible]
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: GE
Units Controlled: 6
Programmable: No
Price: $3,940

[illegible] ROBOTICS CORP.
DRVII
Controller Type: Add-in
Device Controlled: Digital Output
Units Controlled: 1
Programmable: No
Price: $250
(See Vendor Profile Page V-15)

GENERAL ROBOTICS CORP.
LPVII DEUS COMPATIBLE
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Dataproducts, Printronics
Units Controlled: 1
Programmable: No
Price: $250

[illegible] ROBOTICS CORP.
MLVII
Controller Type: Add-in
Device Controlled: Memory Devices
Units Controlled: 1
Programmable: No
Price: [illegible]

[illegible] ROBOTICS CORP.
MSVII
Controller Type: Add-in
Device Controlled: Memory Devices
Units Controlled: 1
Programmable: No
Price: $500

GENERAL ROBOTICS CORP.
MSVII-Q
Device Controlled: Memory Devices
Units Controlled: 1
Programmable: No
Price: $2,500

GENERAL ROBOTICS CORP.
MWV11
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 1
Programmable: No
Price: $2,000

GENERAL ROBOTICS CORP.
RXV21
Device Controlled: Floppy disk drives
Units Controlled: 1
Programmable: No
Price: $1,100

GENERAL ROBOTICS CORP.
SMVII
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 1
Price: $2,500

GENERAL ROBOTICS CORP.
STVII
Controller Type: Add-in
Device Controlled: Stream Tape
Units Controlled: 1
Programmable: No
Price: $1,500

GIDDINGS & LEWIS, INC.
PC400
Controller Type: Add-on
Device Controlled: Printers, Display terminals, Memory Devices
Specific Equipment Supported: TVI, EPI, Microline
Programmable: Yes
Price: $2,500 to $9,000
(See Vendor Profile Page V-16)

GIDDINGS & LEWIS, INC.
PC4[illegible]
Controller Type: Add-on
Device Controlled: Printers, Display terminals, Cassette/Cartridges Devices
Specific Equipment Supported: TVI, EPI, Microline, GTEK
Programmable: Yes
Price: $2,500 to $9,000

GRECO SYSTEMS
Z2800
Controller Type: Add-on
Device Controlled: Floppy disk [illegible]
Units Controlled: 2
Programmable: Yes
Price: $195
(See Vendor Profile Page V-16)

HARVEY HUBBEL, INC.
MICROMITE 402
Controller Type: Add-on
Device Controlled: Display terminals
Units Controlled: 2
Price: $1,000
(See Vendor Profile Page V-16)

HARVEY HUBBEL, INC.
MICROMITE [illegible]
Controller Type: Add-on
Device Controlled: Display terminals
Units Controlled: 2
Programmable: No
Price: $3,000 to $5,000

HEURIKON CORP.
HLZ-VDC
Controller Type: Add-in
Device Controlled: Monitors
Units Controlled: 1
Programmable: Yes
Price: $2,975
(See Vendor Profile Page V-16)

HONEYWELL, INC.
MSP-0611
Controller Type: Add-on
Device Controlled: Memory Devices
Specific Equipment Supported: MPI
Units Controlled: 16
Programmable: No
Price: $52,000
(See Vendor Profile Page V-17)

HONEYWELL, INC.
MSP-0618
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: MPI
Units Controlled: 32
Programmable: No
Price: $64,375

HONEYWELL, INC.
MSP-8000
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: MPI
Units Controlled: 16
Programmable: No
Price: $46,800

HONEYWELL, INC.
MSP-8001
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: MPI
Units Controlled: 32
Programmable: No
Price: $64,375

HONEYWELL, INC.
MSP-8002
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: MPI
Units Controlled: 32
Programmable: No
Price: $64,375

HONEYWELL, INC.
MTP-0610
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: MPI, STC
Units Controlled: 8
Programmable: No
Price: $29,400 to $73,752

HONEYWELL, INC.
MTP-8000
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: STC, MPI
Units Controlled: 8
Programmable: No
Price: $26,060

HONEYWELL, INC.
URP-[illegible]
Controller Type: Add-on
Device Controlled: Printers, Card [illegible]
Specific Equipment Supported: Honeywell Bull System
Units Controlled: 8
Programmable: No
Price: $26,585

HONEYWELL, INC.
URP-8001
Controller Type: Add-in
Device Controlled: Printers, Card Readers
Specific Equipment Supported: Honeywell Bull System
Units Controlled: 2
Programmable: No
Price: $6,500

HONEYWELL, INC.
URP-8002
Controller Type: Add-in
Device Controlled: Card Units
Specific Equipment Supported: Honeywell Bull System
Units Controlled: 2
Programmable: No
Price: $4,000

HONEYWELL, INC.
URP-8004
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Honeywell Bull System
Units Controlled: 2
Programmable: No
Price: $4,000

HONEYWELL, INC.
VTS-7710
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Honeywell DPS 6
Units Controlled: 4
Programmable: No
Price: $10,385

HOUDAILLE INDUSTRIES
FABRIPOINT V
Controller Type: Add-in
Device Controlled: Printers, Teleprinters, Display terminals, Floppy disk drives, Plotters, Memory [illegible]
Units Controlled: 1
Programmable: Yes
[illegible]
(See Vendor Profile Page V-17)

IMEX COMPUTER CORP.
STC-100
Controller Type: Add-on
Device Controlled: Magnetic Tape [illegible]
Specific Equipment Supported: Pertec, Kennedy, Cipher
Units Controlled: 4
Programmable: No
Price: $2 200
(See Vendor Profile Page V-17)

[illegible] SYSTEMS, INC.
5880-3
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Ibis 5880-AA4

Controllers

Units Controlled: 15
Programmable: No
Price: $65,050
(See Vendor Profile Page V-17)

IBS SYSTEMS, INC.
5880-33
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Ibs 5880-BB4
Units Controlled: 32
Programmable: No
Price: $126,848

IBM
2701 DATA ADAPTOR UNIT
Controller Type: Add-on
Device Controlled: Printers, Display
Specific Equipment Supported: IBM 360, 370, 22-85, 30X, 195, 4300
Units Controlled: 4
Programmable: No
(See Vendor Profile Page V-17)

IBM
3274
Device Controlled: Printers, Display terminals
Specific Equipment Supported: IBM 360, 370, 4300, 30XX
(See Vendor Profile Page V-17)

IBM
3705-80 COMMUNICATIONS
Device Controlled: Printers, Display terminals
Specific Equipment Supported: IBM 370 30XX
Units Controlled: 16
Programmable: Yes

IBM
3705-II
Controller Type: Add-on
Device Controlled: Printers, Display
Specific Equipment Supported: IBM
Programmable: Yes

IBM
3725-I
Controller Type: Add-in
Device Controlled: Printers, Display
Specific Equipment Supported: IBM 370, 30XX, 4331, 4341
Programmable: Yes

IBM
INTEGRATED COMMUNICATIONS
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Specific Equipment Supported: IBM 4321 4331
Units Controlled: 8
Programmable: No

IDEOGRAPHIX, INC.
CHINESE CHARACTER GENERATOR
Controller Type: Add-on
Device Controlled: Printers, Display
Specific Equipment Supported: Conrac, Centronics
Units Controlled: 4
Programmable: No
Price: $5,000
(See Vendor Profile Page V-17)

IDEOGRAPHIX, INC.
IPX DISPLAY CONTROLLER
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Conrac SNA14
Units Controlled: 1
Programmable: Yes
Price: $1,500

IDEOGRAPHIX, INC.
IPX KEYBOARD CONTROLLER
Controller Type: Add-on
Device Controlled: Keyboard
Specific Equipment Supported: Ideographics
Units Controlled: 4
Programmable: Yes
Price: $2,000

IDEOGRAPHIX, INC.
IPX PRINTER CONTROLLER
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics, Dataproducts
Units Controlled: 1
Programmable: Yes
Price: $1,500

IKIER TECHNOLOGY, INC.
HRG
Device Controlled: Memory Devices
Specific Equipment Supported: Ikier HRG
Units Controlled: 1
Programmable: Yes
Price: $1,900
(See Vendor Profile Page V-18)

IKIER TECHNOLOGY, INC.
HRG 2
Controller Type: Add-in
Device Controlled: Memory Devices
Specific Equipment Supported: Ikier HRG 2
Units Controlled: 1
Programmable: Yes
Price: $3,600

IKIER TECHNOLOGY, INC.
MPC/FRG
Controller Type: Add-in
Device Controlled: Memory Devices
Specific Equipment Supported: Ikier MPC/FRG
Units Controlled: 1
Programmable: Yes
Price: $8,000

INDOCOMP, INC.
IND-1672 FLOPPY DISK CONTROLLER
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: MPIR, Shugart
Units Controlled: 4
Programmable: No
Price: $960
(See Vendor Profile Page V-18)

INDOCOMP, INC.
IND-1900
Controller Type: Add-on
Device Controlled: Printers, Teleprinters, Display terminals, Plotters
Specific Equipment Supported: Gauto SPC 16
Units Controlled: 4
Programmable: No
Price: $840

INFOLINK
MODEL 5123
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Infolink 1510, 1550, 5040, 5048, 5700
Units Controlled: 4
Programmable: Yes
Price: $25,000 to $80,000

INFORMATION DEVELOPMENT & APPLICATIONS, INC.
4800
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Cipher
Units Controlled: 4
Programmable: Yes
Price: $4,495
(See Vendor Profile Page V-18)

INFORMATION PRODUCTS SYSTEMS
IPS 3200
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: PE 3200, STC, Telex
Units Controlled: 8
Programmable: No
Price: $5,000
(See Vendor Profile Page V-19)

INFORMATION PRODUCTS SYSTEMS
IPS 3210
Controller Type: Add-on
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: PE 3200, STC, Telex
Units Controlled: 8
Programmable: No
Price: $10,500

INFORMATION PRODUCTS SYSTEMS
IPS 3600
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Raytheon 500, Telex, STC
Units Controlled: 8
Programmable: No
Price: $14,000

INFORMATION PRODUCTS SYSTEMS
IPS 7010
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives, CPU
Specific Equipment Supported: DEC PDP-11/70, STC, Telex
Units Controlled: 8
Programmable: No
Price: $14,500

INFORMATION PRODUCTS SYSTEMS
IPS 7050
Controller Type: Add-on
Device Controlled: Display terminals, Magnetic Tape Drives
Specific Equipment Supported: DEC VAX-11/780, VAX-11/750;STC, Telex
Units Controlled: 8
Programmable: No
Price: $10,500

INNER ACCESS CORP.
ICSI-1
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives, Magnetic Tape Drives
Specific Equipment Supported: Iomega, Shugart
Units Controlled: 1
Price: $150
(See Vendor Profile Page V-19)

INNOVATIVE ELECTRONICS, INC.
MC 40/10
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: IBM 2780, 3780; Teletype 40
Units Controlled: 1
Programmable: No
Price: $1,070
(See Vendor Profile Page V-19)

INNOVATIVE ELECTRONICS, INC.
MC 40/20
Controller Type: Add-in
Device Controlled: Printers.
Specific Equipment Supported: Burroughs, Teletype 40
Units Controlled: 1
Programmable: No
Price: $1,070

INNOVATIVE ELECTRONICS, INC.
MC 40/30
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics, Teletype 40
Units Controlled: 1
Programmable: No
Price: $795

INNOVATIVE ELECTRONICS, INC.
MC 40/40
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Dataproducts Teletype 40
Units Controlled: 1
Programmable: No
Price: $845

INNOVATIVE ELECTRONICS, INC.
MC 40/50
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Teletype 40
Units Controlled: 1
Programmable: No
Price: $770

INNOVATIVE ELECTRONICS, INC.
MC 40/70
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Teletype 40
Units Controlled: 1
Programmable: No
Price: $820

INNOVATIVE ELECTRONICS, INC.
MC 40/80
Controller Type: Add-in

Device Controlled: Printers
Specific Equipment Supported: HP, Teletype 40
Units Controlled: 1
Programmable: No
Price: $770

[illegible] INSTRUMENTATION TECHNOLOGY SYSTEMS
9341
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Dataproducts 2230-2260, 2310-2440, 2470-2550
Units Controlled: 1
Programmable: No
Price: $940
(See Vendor Profile Page V-19)

INTEGRATED SOLUTIONS, INC.
RL101
Controller Type: Add-on
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: No
Price: $995
(See Vendor Profile Page V-19)

INTEL CORP.
ISBC 204
Controller Type: Add-in
Device Controlled: Floppy disk [illegible]
Units Controlled: 2
Programmable: Yes
Price: $780
(See Vendor Profile Page V-19)

INTEL CORP.
ISBC 208
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 4
Programmable: Yes
Price: $1,065

INTEL CORP.
ISBC 215G
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: Yes
Price: $1,500

INTEL CORP.
ISBC 220
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: Yes
Price: $2,500

INTEL CORP.
ISBX 217B
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: 3M HDC-75
Units Controlled: 4
Programmable: Yes
Price: $495

INTEL CORP.
ISBX 218A
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 4
Programmable: Yes
Price: $540

INTERPHASE CORP.
MAVERICK SMD PC 80
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: IBM Personal computer
Units Controlled: 2
Programmable: No
Price: $1 895
(See Vendor Profile Page V-20)

INTERPHASE CORP.
SDC 2203
Controller Type: Add-in
Device Controlled: Floppy disk drives, Magnetic Tape Drives
Units Controlled: 4
Programmable: No
Price: $1,795

INTERPHASE CORP.
[illegible] SMD 2181
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: No
Price: $1,995

INTERPHASE CORP.
SMD 2181
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: No
Price: $2,050

INTERPHASE CORP.
SMD 2190
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: No
Price: $2,250

INTERSIL SYSTEMS, INC.
ISB-3401 FLOPPY DISK
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: IBM 3740 System 34
Units Controlled: 4
(See Vendor Profile Page V-20)

INTERTEC
DSC-144
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: DSD 144 CDC
Units Controlled: 3
Programmable: No
Price: $2,995
(See Vendor Profile Page V-20)

INTRON CORP.
8507
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Jupiter 7, AED 767
Units Controlled: 1
Programmable: No
Price: $10,000
(See Vendor Profile Page V-20)

INTRON CORP.
8512
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: AED 512
Units Controlled: 1
Programmable: No
Price: $10,600

INTRON CORP.
8579
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: IBM 3279
Units Controlled: 1
Programmable: No
Price: $7,500

INTRON CORP.
8580
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: [illegible]
Units Controlled: 1
Programmable: Yes
Price: $7 500

INTRON CORP.
INTEGRAL CONTROLLER
Controller Type: Add-on
Device Controlled: Printers.
Units Controlled: 1
Programmable: No
Price: $10,000

IOMEGA CORP.
[illegible]
Controller Type: Add-in
[illegible]
Cassette/Cartridges Devices
Specific Equipment Supported: Iomega Alpha 10, Slave Driver
Units Controlled: 4
Programmable: Yes
Price: $1,080
(See Vendor Profile Page V-20)

ITHACA INTERSYSTEMS
FDC-2
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart 801, 851, Qume, Micropolis, Seagate
Units Controlled: 4
Programmable: Yes
Price: $650
(See Vendor Profile Page V-20)

[illegible]
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Pham, Shugart, Seagate, Olivetti
[illegible]
Programmable: Yes
Price: $300.
(See Vendor Profile Page V-20)

JADE COMPUTER PRODUCTS, INC.
DOUBLE D
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart
Units Controlled: 4
Programmable: Yes
Price: $395
(See Vendor Profile Page V-20)

JOHN BELL ENGINEERING
[illegible]
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: NTSC
[illegible]
Price: $1[illegible]
(See Vendor Profile Page V-21)

KLC CORP.
100
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Four Phase
Units Controlled: 2
Programmable: Yes
Price: $5,000
(See Vendor Profile Page V-21)

KLC CORP.
200
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: IBM
Units Controlled: 1
Programmable: Yes
Price: $3,500
(See Vendor Profile Page V-21)

KLC CORP.
300
Controller Type: Add-in, Add-on
Device Controlled: Magnetic Tape, Drives
Specific Equipment Supported: PE, Pertec, Kennedy
Units Controlled: 4
Programmable: No
Price: $8,000

KLC CORP.
400
Controller Type: Add-in, Add-on
Device Controlled: Printers
Specific Equipment Supported: Dataproducts, Centronics
Units Controlled: 1
Programmable: No
Price: $6,000

KLC CORP.
500
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Burroughs
Units Controlled: 1
Programmable: Yes
Price: $3,500

KMW SYSTEMS CORP.
3270 SERIES II
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: LSI, TVI, ADDS TEK
Units Controlled: 8
Programmable: No
Price: $6,500
(See Vendor Profile Page V-21)

KMW SYSTEMS CORP.
GRAPHICS VECTOR PROCESSOR-VP20
Controller Type: Add-on
Device Controlled: Printers, Plotters
Specific Equipment Supported: Benson, Calcomp, Versatek, Matrix
Units Controlled: 2
Programmable: Yes
Price: $12,000 to $15,000

KMW SYSTEMS CORP.
GRAPHICS VECTOR PROCESSOR VP10
Controller Type: Add-on
Device Controlled: Printers, Plotters
Specific Equipment Supported: Benson, Calcomp, Versatek, Matrix
Units Controlled: 2
Programmable: Yes

Controllers

Price: $5,000 to $12,000

KMW SYSTEMS CORP.
GRAPHICS VECTOR PROCESSOR VP-30
Device Controlled: Printers, Plotters
Units Controlled: 2
Programmable: Yes
Price: $19,500

KMW SYSTEMS CORP.
[illegible] 3770 SERIES II
Device Controlled: Printers, Display terminals, Plotters, Magnetic Tape Drives
Units Controlled: 8
Programmable: No
Price: $4,550

KONAN CORP.
DATA 2B
Controller Type: Add-on
Device Controlled: Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $3[illegible]
(See Vendor Profile Page V-21)

KONAN CORP.
DSC-150
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Seagate
Units Controlled: 2
Programmable: Yes
Price: $595

KONAN CORP.
ENHANCER
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives, Cassette/Cartridges Devices
Specific Equipment Supported: Cipher, CDC, Percomp
Units Controlled: 8
Programmable: Yes
Price: $1,175

KONAN CORP.
SMC-100
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC 9448, Lark
Units Controlled: 4
Programmable: No
Price: $998

KONAN CORP.
SMC-200
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC 9448, Lark
Units Controlled: 2
Programmable: No
Price: $[illegible]

KONAN CORP.
TMS-10
Controller Type: Add-in
Device Controlled: Floppy disk drives, Rigid disk drives
Units Controlled: 8
Price: $895

LEE DATA CORP.
300 REMOTE SYSTEM
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Lee Data
Units Controlled: 8
Programmable: No
Price: $5,212
(See Vendor Profile Page V-21)

LEE DATA CORP.
300 REMOTE SYSTEMS
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Lee Data
Units Controlled: 16
Programmable: No
Price: $7,057

LEE DATA CORP.
310 REMOTE SYSTEM
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Lee Data
Units Controlled: 32
Programmable: No
Price: $12,361

LEE DATA CORP.
320 LOCAL SYSTEM CONTROLLER
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Lee Data
Units Controlled: 32
Programmable: No
Price: $14,056

LEE DATA CORP.
321 LOCAL/REMOTE SYS CONTROLLER
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Lee Data
Units Controlled: 32
Programmable: No
Price: $16,556

LEE DATA CORP.
410 3270/ASYNCH REMAT
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Lee Data
Units Controlled: 32
Programmable: No
Price: $14,820

LEE DATA CORP.
420 LOCAL/ASYNCH SYSTEM
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Lee Data
Units Controlled: 32
Price: $19,520

LEE DATA CORP.
421 LOCAL/REMOTE PLUS
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: Lee Data
Units Controlled: 32
Programmable: No
Price: $21,964

LNW RESEARCH CORP.
SYSTEM EXPANSION II
Controller Type: Add-in
Device Controlled: Printers, Floppy disk drives
Specific Equipment Supported: Radio Shack
Units Controlled: 4
Programmable: Yes
Price: $399
(See Vendor Profile Page V-22)

LOBO SYSTEMS, INC.
LCA-22
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart
Units Controlled: 4
Programmable: Yes
Price: $5[illegible]
(See Vendor Profile Page V-22)

LOCAL DATA, INC.
DATALYNX/3270
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Units Controlled: 2
Programmable: Yes
Price: $1,450
(See Vendor Profile Page V-22)

LOCAL DATA, INC.
DATALYNX/3274
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Units Controlled: 9
Programmable: Yes
Price: $6,000

LOCAL DATA, INC.
DATALYNX/3780
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Units Controlled: 2
Programmable: Yes
Price: $1,750

LOCAL DATA, INC.
INTERLYNX/3278
Controller Type: Add-on
Device Controlled: Display terminals
Units Controlled: 1
Programmable: No
Price: $1,395

LOCAL DATA, INC.
INTERLYNX/3287
Controller Type: Add-on
Device Controlled: Printers
Units Controlled: 1
Programmable: Yes
Price: $1,750

LOMAS DATA PRODUCTS, INC.
LDP-72
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 4
Programmable: Yes
Price: $[illegible]
(See Vendor Profile Page V-22)

LOMAS DATA PRODUCTS, INC.
LDP-256K
Controller Type: Add-in
Device Controlled: Memory Devices
Programmable: No
Price: $[illegible]

LOMAS DATA PRODUCTS, INC.
OCTAPORT
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Units Controlled: 8
Programmable: Yes
Price: $325

LOWER DATA PRODUCTS, INC.
RAM67
Controller Type: Add-in
Device Controlled: Memory Devices
Price: $1,200

MACROLINK
201105
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: PE
Units Controlled: 1
Programmable: No
Price: $725
(See Vendor Profile Page V-22)

MACROLINK
201200
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: PE
Units Controlled: 4
Programmable: No
Price: $3,475

MACROLINK
201500 STREAMER TAPE ADAPTER
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: PE
Units Controlled: 4
Programmable: No
Price: $1,225

MANAGEMENT ASSISTANCE, INC.
110
Controller Type: Add-in
Device Controlled: Printers, Display [illegible]
Specific Equipment Supported: Basic Four
Units Controlled: 16
Programmable: No
Price: $16,990
(See Vendor Profile Page V-22)

MANAGEMENT ASSISTANCE, INC.
210
Controller Type: Add-in
Device Controlled: Printers, Display [illegible]
Specific Equipment Supported: Basic Four
Units Controlled: 16
Programmable: No
Price: $26,280

MANAGEMENT ASSISTANCE, INC.
310
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Basic Four
Units Controlled: 16
Programmable: No
Price: $52,835

MANAGEMENT ASSISTANCE, INC.
510
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Basic Four
Units Controlled: 16
Programmable: No
Price: $50,085

MANAGEMENT ASSISTANCE, INC.
580
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Basic Four
Units Controlled: 4
Programmable: No

MANAGEMENT ASSISTANCE, INC.
710
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Basic Four
Units Controlled: 32
Programmable: No
Price: $66,970

MANAGEMENT ASSISTANCE, INC.
810
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Basic Four
Units Controlled: 64
Programmable: No
Price: $125,929

MANAGEMENT ASSISTANCE, INC.
HIGH SPEED CONTROLLER
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Basic Four
Units Controlled: 24
Programmable: No
Price: $2,500

MANAGEMENT ASSISTANCE, INC.
PARALLEL DEVICE CONTROLLER
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Basic Four
Units Controlled: 1
Programmable: No
Price: $2,000

MDB SYSTEMS, INC.
CARD READER CONTROL/MDB-4018
Controller Type: Add-in
Device Controlled: Card Reader
Specific Equipment Supported: Documation M200, M600; Truedata
Units Controlled: 1
Programmable: No
Price: $1,100
(See Vendor Profile Page V-23)

MDB SYSTEMS, INC.
CARD READER CONTROL/MDB-48-235
Controller Type: Add-in
Device Controlled: Card Reader
Specific Equipment Supported: Documation M200, M600, True Data
Units Controlled: 1
Programmable: No
Price: $875

MDB SYSTEMS, INC.
CARD READER CONTROLLER/MDB-CR11
Controller Type: Add-in
Device Controlled: Card Reader
Specific Equipment Supported: Documation M200, M600; Truedata
Units Controlled: 1
Programmable: No
Price: $875

MDB SYSTEMS, INC.
CARD READER CONTROL/MDB-CR11-I
Controller Type: Add-in
Device Controlled: Card Reader
Specific Equipment Supported: Documation M200, M600, Truedata
Units Controlled: 1
Programmable: No
Price: $850

MDB SYSTEMS, INC.
DISK CONTROLLER/MDB-RM11-C
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC 9715, 9762; Fujitsu 2312, 2284; STC 8775; Kennedy 5380
Units Controlled: 2
Programmable: Yes
Price: $2,800

MDB SYSTEMS, INC.
DISK CONTROLLER/MLSI-RM11
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC 9715, 9762; Fujitsu 2312, 2284; STC 8775, Kennedy 5380
Units Controlled: 2
Programmable: Yes
Price: $2,800

MDB SYSTEMS, INC.
DISK CONTROLLER 1/MDB-RM11-H
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC 8715, 9762; Fujitsu 2312, 2284; STC 8775; Kennedy 5380
Units Controlled: 4
Programmable: Yes
Price: $3,500

MDB SYSTEMS, INC.
INCREMENTAL PLOTTER CTRL/MDB-XY8
Controller Type: Add-in
Device Controlled: Plotters, Incremental X-Y
Specific Equipment Supported: Calcomp 500, Houst
Units Controlled: 1
Price: $1,250

MDB SYSTEMS, INC.
LINE PRINTER CONTROL/MBI-49-LPC
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics, Dataproducts, Printronix
Units Controlled: 1
Price: $1,995

MDB SYSTEMS, INC.
LINE PRINT CONTROLLER/MDB-48-206
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics, Dataproducts, Printronix
Units Controlled: 1
Price: $990

MDB SYSTEMS, INC.
LINE PRINTER CONTROL/MDB-LP11-A
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: No
Price: $1,250

MDB SYSTEMS, INC.
LINE PRINTER CONTROL/MDB-4034
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics, Dataproducts, Printronix, Xerox 2700
Units Controlled: 1
Programmable: No
Price: $750

MDB SYSTEMS, INC.
LINE PRINTER CONTROL/MDB-4034
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics, Dataproducts, Printronix
Units Controlled: 1
Programmable: No
Price: $1,500

MDB SYSTEMS, INC.
LINE PRINTER
CONTROLLER/MLSI-LPII
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics 100, 300, Dataproducts; Printronix, Xerox 2700
Units Controlled: 1
Programmable: No
Price: $750

MDB SYSTEMS, INC.
LINE PRINTER CTRL/MDB-4034-A
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: No
Price: $995

MDB SYSTEMS, INC.
LINE PRINTER CONTROL/MDB-HP-LPC
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics, Dataproducts, Printronix
Units Controlled: 1
Programmable: No
Price: $850

MDB SYSTEMS, INC.
LINE PRINT CONTROLLER/MDB-LPII-A
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: No
Price: $650

MDB SYSTEMS, INC.
LINE PRINTER
CONTROLLER/MLSI-LPII
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics, Dataproducts, Xerox 2700, Printronix
Units Controlled: 1
Programmable: No
Price: $475

MDB SYSTEMS, INC.
MBI-49-TTY
Controller Type: Add-in
Device Controlled: Printers, Teleprinters, Display terminals
Specific Equipment Supported: IBM 3101, Soroc, Lear Siegler, TI 810
Units Controlled: 1
Price: $650

MDB SYSTEMS, INC.
MDL-11
Controller Type: Add-in
Device Controlled: Printers, Teleprinters, Display terminals
Specific Equipment Supported: DEC VT100, VT1; Lear Siegler; Televideo, C-Itoh
Units Controlled: 1
Programmable: No
Price: $825

MDB SYSTEMS, INC.
MDL-11W
Controller Type: Add-in
Device Controlled: Printers, Teleprinters, Display terminals
Specific Equipment Supported: DEC VT100, VT1, Lear Siegler; Televideo; C-ITOH
Units Controlled: 1
Programmable: No
Price: $795

MDB SYSTEMS, INC.
MLSI-DLVII
Controller Type: Add-in
Device Controlled: Printers, Teleprinters, Display terminals
Specific Equipment Supported: DEC VT100, VT1, Lear Siegler; IBM 3101, Televideo
Units Controlled: 1
Programmable: No
Price: $475

MDB SYSTEMS, INC.
MLSI-DLVII-F
Controller Type: Add-in
Device Controlled: Printers, Teleprinters, Display terminals
Specific Equipment Supported: DEC VT100, VT1, Lear Siegler; Televideo, C-Itoh
Units Controlled: 1
Programmable: Yes
Price: $350

MDB SYSTEMS, INC.
MLSI-DLVII-FX
Controller Type: Add-in
Device Controlled: Printers, Teleprinters, Display terminals
Specific Equipment Supported: DEC VT100, VT1; IBM 3101, Lear Siegler; Soroc
Units Controlled: 1
Programmable: Yes
Price: $385

MDB SYSTEMS, INC.
MULTIPLE I/O BOARD/MDB-4119-A
Controller Type: Add-in
Device Controlled: Printers, Teleprinters, Display terminals
Specific Equipment Supported: Soroc, Lear Siegler, Televideo, IBM 3101
Units Controlled: 1
Programmable: No
Price: $400

MDB SYSTEMS, INC.
PAPER TAPE CONTROLLER
PC11
Controller Type: Add-in
Device Controlled: Paper Tape Reader

Controllers

Specific Equipment Supported: Remex, Eeco, Digitronix
Units Controlled: 1
Programmable: No
Price: $750

MDB SYSTEMS, INC.
PAPER TAPE CTRL/MLSI-PCII
Controller Type: Add-in
Device Controlled: Paper Tape Read
Specific Equipment Supported: Remex, Eeco, Digitronix
Units Controlled: 1
Price: $750

MDB SYSTEMS, INC.
PASLA 1 MDB-47-102
Controller Type: Add-in
Device Controlled: Printers, Teleprinters, Display terminals
Specific Equipment Supported: Soroc, Lear Siegler, C-Itoh, TI
Units Controlled: 1
Programmable: Yes
Price: $450

MDB SYSTEMS, INC.
PRINTER PLOTTER CONTROL/MDB-LVII
Device Controlled: Plotters, Printer Plotter
Specific Equipment Supported: Versatec; Trilog T1100-A; Houst 8411-A, 84
Units Controlled: 1
Price: $1,450

MDB SYSTEMS, INC.
PRINTER PLOTTER CONTROL/MLSI-LVII
Controller Type: Add-in
Device Controlled: Plotters
Specific Equipment Supported: Versatec, Trilog T1100-A; Houst 8411-A, 84
Units Controlled: 1
Price: $975

MDB SYSTEMS, INC.
TAPE CONTROLLER/MDB-TM11
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Pertec, Kennedy
Units Controlled: 4
Programmable: Yes
Price: $2,950

MDB SYSTEMS, INC.
TAPE CONTROLLER/MLSI-TM11
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Pertec

MDB SYSTEMS, INC.
WINCHESTER/FLOPPY CTRL/MLSI-WFCII
Controller Type: Add-in
Device Controlled: Floppy disk drives, Rigid Disk drives
Specific Equipment Supported: Tandon 5 Flow, Seagate, Shugart, Quantum
Units Controlled: 4
Price: $1,995

MDB SYSTEMS, INC.
X-Y INCREMENTAL PLOTTER CONTROLLER
Controller Type: Add-in
Device Controlled: Plotters
Specific Equipment Supported: Calcomp 500, Houst
Units Controlled: 1
Programmable: No
Price: $700

MDS TRIVEX
MODEL 8074
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: IBM 3270, MDS Trivex
Units Controlled: 32
Programmable: No
Price: $4,950
(See Vendor Profile Page V-23)

MEASUREMENT SYSTEMS & CONTROLS, INC.
CTC-2900
Controller Type: Add-in
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: 3M
Units Controlled: 1
Programmable: Yes
Price: $385
(See Vendor Profile Page V-23)

MEASUREMENT SYSTEMS & CONTROLS, INC.
FDC-2800
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 1
Programmable: Yes
Price: $408

MEASUREMENT SYSTEMS & CONTROLS, INC.
HDC-2900
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 10
Programmable: Yes
Price: $408

MEGALOGIC CORP.
QIM-1/MN
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Qantex
Units Controlled: 1
Programmable: No
Price: $325
(See Vendor Profile Page V-23)

MEGALOGIC CORP.
QIM-1/MX
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Qantex
Units Controlled: 8
Programmable: Yes
Price: $895

MEGALOGIC CORP.
TIM-1/MI
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: IDT
Units Controlled: 8
Programmable: Yes
Price: $892

MEMOREX CORP.
2074 SNA/SDLC
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: IBM 3270
Units Controlled: 32
Programmable: Yes
(See Vendor Profile Page V-23)

MEMOREX CORP.
2076
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: IBM 3270
Units Controlled: 8
Programmable: No

MEMTEC
M1000 COMPANION CONTROLLER
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Memtec
Units Controlled: 4
Programmable: No
Price: $495

MEMTEC
MT100 COMPANION
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Memtec
Units Controlled: 4
Programmable: No
Price: $250

MEMTEC
MT200
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Memtec
Units Controlled: 4
Programmable: No
Price: $350

MENTAL LOGIC LABORATORIES
DG1-46
Controller Type: Add-in
Device Controlled: Card Punch
Specific Equipment Supported: IBM 235
Units Controlled: 1
Programmable: No
Price: $1,200
(See Vendor Profile Page V-23)

MENTAL LOGIC LABORATORIES
DG1-063
Controller Type: Add-in
Device Controlled: Card Punch
Units Controlled: 1
Price: $1,200

MENTAL LOGIC LABORATORIES
DG1-42/52
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: DEC PDP-8
Units Controlled: 1
Price: $400

MENTAL LOGIC LABORATORIES
DG1-44/54
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: No
Price: $500

MENTAL LOGIC LABORATORIES
DG1-46/56
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: DEC LSI-11
Units Controlled: 1
Programmable: No
Price: $750

MENTAL LOGIC LABORATORIES
DG1-ADL
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: No
Price: $300

MENTAL LOGIC LABORATORIES
DG1-448/648
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: No
Price: $800

MENTAL LOGIC LABORATORIES
DGI-41/51
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: DEC PDP-11
Units Controlled: 1
Programmable: No
Price: $500

MENTAL LOGIC LABORATORIES
DGI-43/53
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: DG Nova
Units Controlled: 1
Programmable: No
Price: $550

MENTAL LOGIC LABORATORIES
DGP-44/54
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: No
Price: $1,200

MENTAL LOGIC LABORATORIES
DGP-64
Controller Type: Add-on
Device Controlled: Card Reader
Units Controlled: 1
Price: $1,200

MENTAL LOGIC LABORATORIES
DGP-64T
Controller Type: Add-on
Device Controlled: Printers
Units Controlled: 1
Price: $1,200

MENTAL LOGIC LABORATORIES
DGP-444
Controller Type: Add-on

Device Controlled: Printers, Display terminals, Card Reader
Units Controlled: 3
Programmable: No
Price: $1,500

METHEUS CORP.
DISPLAY CONTROLLER U 400
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: DEC
Units Controlled: 1
Programmable: No
Price: $11,950
(See Vendor Profile Page V-23)

METHEUS CORP.
DISPLAY CONTROLLER U 600
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: DEC
[illegible]
Programmable: No
Price: $16,980

MICRO TECHNOLOGY, INC.
MLV11
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Quantum 2000 Series, Shugart SA1000
Units Controlled: 2
Programmable: No
(See Vendor Profile Page V-24)

MICRO TECHNOLOGY, INC.
MLV11M
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Rodime, Seagate 412, IMI 2012H, CMI 5412
Units Controlled: 2
Programmable: No

MICRO TECHNOLOGY, INC.
MX
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: DEC PDP-11; Shugart 850, 800
Units Controlled: 2
Programmable: No

MICRO TECHNOLOGY, INC.
MXV21
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart 800, 850
Units Controlled: 2
Programmable: No

MICRO TECHNOLOGY, INC.
MXV22
Controller Type: Add-in
Device Controlled: Floppy disk [illegible]
Specific Equipment Supported: Shugart SA850, SA800, DEC PDP-11
Units Controlled: 2
Programmable: No

MICRO TECHNOLOGY, INC.
MXV22M
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart 96-TRI; SA-460
Units Controlled: 2
Programmable: No

MICRO TECHNOLOGY, INC.
MXV42C
Controller Type: Add-in
Device Controlled: Floppy disk [illegible]
Specific Equipment Supported: Shugart SA800, SA460, SA850
Units Controlled: 4
Programmable: No

MILTOPE CORP.
DC400
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Miltope
Units Controlled: 2
Programmable: No
Price: $7,800
(See Vendor Profile Page V-24)

MILTOPE CORP.
DC401
Controller Type: Add-on
Device Controlled: Floppy disk [illegible]
Specific Equipment Supported: Miltope
Units Controlled: 2
Programmable: No
Price: $7,800
(See Vendor Profile Page V-24)

MILTOPE CORP.
RK07
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Miltope RD45
Units Controlled: 2
Programmable: No
Price: $18,000

MILTOPE CORP.
TC-NIXE
Controller Type: Add-on
Device Controlled: Magnetic Tape [illegible]
Specific Equipment Supported: Miltope AT1161
[illegible]
Programmable: No
Price: $27,500

MILTOPE CORP.
TC-X
Controller Type: Add-on
Device Controlled: Magnetic Tape [illegible]
Specific Equipment Supported: Miltope
[illegible]
Programmable: Yes
[illegible]

MILTOPE CORP.
TC11
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC PDP-11, Miltope AT1161
Units Controlled: 4
[illegible]

MILTOPE CORP.
TC400
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Miltope AT1161, IBM
Units Controlled: 4
Programmable: No
Price: $23,100

MINICOMPUTER TECHNOLOGY
[illegible]
Controller Type: Add-in
Device Controlled: Printers, Rigid disk drives, Magnetic Tape Drives
Specific Equipment Supported: Archive, Cipher, Centronics, DG Nova
Units Controlled: 8
Programmable: No
[illegible]
(See Vendor Profile Page V-24)

MINICOMPUTER TECHNOLOGY
2414
Controller Type: Add-in
Device Controlled: Printers, Rigid disk drives, Magnetic Tape Drives
Specific Equipment Supported: DG Nova, Eclipse, Archive, Priam
Units Controlled: 9
[illegible]

MINICOMPUTER TECHNOLOGY
2420
Device Controlled: Rigid disk drives, Magnetic Tape Drives
Specific Equipment Supported: DG Nova, Eclipse, Priam
Units Controlled: 8
Programmable: No
Price: $2,200

MINICOMPUTER TECHNOLOGY
[illegible]
Controller Type: Add-in
Device Controlled: Rigid disk drives, Magnetic Tape Drives
Specific Equipment Supported: Priam, Cipher, Tandberg, DG
Units Controlled: 10
Programmable: No
Price: $2,800

MINICOMPUTER TECHNOLOGY
[illegible]
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DG
Units Controlled: 4
Programmable: No
Price: $3,800

MINICOMPUTER TECHNOLOGY
[illegible]
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC
Units Controlled: 2
Programmable: No
Price: $3,600

MINICOMPUTER TECHNOLOGY
SMC 12
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DG
Units Controlled: 4
Programmable: No
Price: $3,400

MINICOMPUTER TECHNOLOGY
SMC 902
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DG
Units Controlled: 2
Programmable: No
Price: $2,900

MINICOMPUTER TECHNOLOGY
SMC 903
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: PE
Units Controlled: 2
Programmable: No
Price: $3,000

MINICOMPUTER TECHNOLOGY
SMV 15
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC
Units Controlled: 2
Programmable: No
Price: $3,400

MINICOMPUTER TECHNOLOGY
TDC 802
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DG, CDC
Units Controlled: 4
Programmable: No
Price: $2,800

MINICOMPUTER TECHNOLOGY
TDC 803
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC, PE
Units Controlled: 4
Price: $2,800

MONITOR SYSTEMICS, INC.
HDC1010
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Shugart SA 4000, SA 1000; Seagate ST506, ST412
Units Controlled: 2
Programmable: Yes
Price: $500
(See Vendor Profile Page V-25)

MONITOR SYSTEMICS, INC.
HDC1012
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $500

MONITOR SYSTEMICS, INC.
HDC1013
Controller Type: [illegible]
Device Controlled: Rigid disk drives
Specific Equipment Supported: Evotec, Atari, CDC, Maxtor
Units Controlled: 2
Programmable: Yes
Price: $500

MONITOR SYSTEMICS, INC.
HDC2000
Controller Type: Add-on

Controllers

Device Controlled: Rigid disk drives
Specific Equipment Supported: Shugart SA 4000, SA 1000; Seagate ST506, ST412
Units Controlled: 2
Programmable: Yes
Price: $550

MORROW DESIGNS
DJ/DMA
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart
Units Controlled: 4
Programmable: No
Price: $600
(See Vendor Profile Page V-25)

MORROW DESIGNS
HDC/DMA
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Seagate ST506
Units Controlled: 4
Programmable: No
Price: $600

MORROW DESIGNS
HDCA-4
Device Controlled: Rigid disk drives
Specific Equipment Supported: Shugart SA4008, Fujitsu
Units Controlled: 4
Programmable: No
Price: $695

MOSELEY ASSOCIATES, INC.
[illegible]-1
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: ADDS Viewpoint, Teletype 43
[illegible] 2
Programmable: Yes
Price: $6 995
(See Vendor Profile Page V-25)

MOSELEY ASSOCIATES, INC.
[illegible]-2
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Programmable: Yes
Price: $14,995

MOSELEY ASSOCIATES, INC.
[illegible]
Controller Type: Add-on
Device Controlled: Display terminals
Programmable: Yes
Price: $3,695

MOSTEK CORP.
MDX-CPU3
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Centronics
[illegible] 3
Programmable: Yes
[illegible]
(See Vendor Profile Page V-25)

MOSTEK CORP.
MDX-CPU4
Controller Type: Add-on
Device Controlled: Display terminals
[illegible] 1
Programmable: Yes
Price: $375

MOSTEK CORP.
MDX-DEBUG
Controller Type: Add-in
Device Controlled: Display terminals
Units Controlled: 1
Programmable: Yes
Price: $400

MOSTEK CORP.
MDX-EPROM/VART
Controller Type: Add-in
Device Controlled: Display terminals
Units Controlled: 1
Programmable: Yes
Price: $190

MOSTEK CORP.
MDX-FLP2
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 4
Programmable: Yes
Price: $450

MOSTEK CORP.
MDX-PIO
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics
Units Controlled: 1
Programmable: Yes
Price: $195

MOSTEK CORP.
MDX-SASI
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 1
Programmable: Yes
Price: $150

MOSTEK CORP.
MDX-5102
Controller Type: Add-in
Device Controlled: Printers, Display terminals, Plotters
Units Controlled: 1
Programmable: Yes
Price: $213

MOSTEK CORP.
RADIUS
Controller Type: Add-on
Device Controlled: Display terminals
Units Controlled: 1
Programmable: Yes
Price: $2,995

MOSTEK CORP.
[illegible]-COMBO
Controller Type: Add-in
Device Controlled: Display terminals, Floppy disk drives
Units Controlled: 4
Programmable: Yes
Price: $1,195

MOSTEK CORP.
[illegible]-FLP-80E
Controller Type: Add-in
Device Controlled: Floppy disk drives
[illegible] 4
Programmable: Yes
[illegible]

MOSTEK CORP.
SDE-OEM-80E
Controller Type: Add-in
Device Controlled: Display terminals
Units Controlled: 1
Programmable: Yes
[illegible]

MOSTEK CORP.
VME-FDC
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 4
Programmable: Yes
Price: $1,250

MOSTEK CORP.
VME-SASI
Controller Type: Add-on
Device Controlled: Rigid disk drives
Units Controlled: 1
Programmable: Yes
Price: $1,250

MOSTEK CORP.
VME-SBC
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Units Controlled: 2
Programmable: Yes
Price: $1,395

MOSTEK CORP.
VME-510
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Units Controlled: 4
Programmable: Yes
[illegible]

MOTOROLA, INC.
KVM 21
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 4
Programmable: No
Price: $3,125
(See Vendor Profile Page V-25)

MOTOROLA, INC.
[illegible]
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 4
Programmable: No
Price: $2,500

MOUNTAIN COMPUTER, INC.
IBM HARD DISK CONTROLLER
Controller Type: Add-in
Device Controlled: Rigid disk drives
[illegible]
Units Controlled: 1
Programmable: No
[illegible]
(See Vendor Profile Page V-25)

MULTI-SYSTEMS
R/L1
Controller Type: Add-in
Device Controlled: Printers, Display terminals
[illegible] TI 940; DEC VT-100; Televideo 925, [illegible]
Units Controlled: 14
Programmable: Yes
Price: $1,500 to $3,000
(See Vendor Profile Page V-25)

MULTI-SYSTEMS
R/L2
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Specific Equipment Supported: TI 940; DEC VT100; Televideo 925, 950; Hazeltine
Units Controlled: 20
Programmable: Yes
Price: $2,000 to $6,000

MULTI-SYSTEMS
TERMINAL CLUSTER CONTROLLER
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: TI 940; DEC VT100; Televideo 925, 950; Hazeltine
Units Controlled: 16
Programmable: Yes
Price: $11,000

NATIONAL SEMICONDUCTOR CORP.
SLC-8222
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart, Siemens FD100-8, Qume Datatrack
[illegible] 4
Programmable: Yes
Price: $800
(See Vendor Profile Page V-26)

NATIONAL SEMICONDUCTOR CORP.
SLC-8224
Controller Type: Add-in
Device Controlled: Floppy disk drives
[illegible]
Shugart, Qume FD100-8, [illegible]
Units Controlled: 4
Price: $800
(See Vendor Profile Page V-26)

NATIONAL SEMICONDUCTOR CORP.
SLC-8228
Controller Type: Add-in
[illegible]
Units Controlled: 1
Programmable: Yes
[illegible]

NATIONAL SEMICONDUCTOR CORP.
SLC-8229
Controller Type: Add-in
Device Controlled: Dot Matrix
Units Controlled: 1
Programmable: Yes
Price: $800

NCR CORP.
647-P001
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics
Units Controlled: 1
[illegible]
(See Vendor Profile Page V-26)

NCR CORP.
6320-2401
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics
Units Controlled: 1
Price: $2,850

NCR CORP.
6325
Controller Type: Add-in

Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Computer Peripherals
Units Controlled: 2
Programmable: No
Price: $17,000

NCR CORP.
6370-0401
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Computer Peripherals
Units Controlled: 4
Programmable: No
Price: $56,122

NCR CORP.
6370-0601
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Computer Peripherals
Units Controlled: 4
Programmable: No
Price: $59,347
(See Vendor Profile Page V-00)

NCR CORP.
6370-0801
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Computer Peripherals
Units Controlled: 4
Programmable: No
Price: $33,900

NCR CORP.
6420-2101
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics
Units Controlled: 1
Programmable: No
Price: $2,650

NCR CORP.
6420-2301
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics
Units Controlled: 1
Programmable: No
Price: $2,650

NCR CORP.
6420-3202
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics
Units Controlled: 1
Programmable: No
Price: $2,650

NCR CORP.
6420-601
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics
Units Controlled: 1
Programmable: No
Price: $2,650

NCR CORP.
6420-P002
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics
Units Controlled: 1
Programmable: No
Price: $2,650

NCR CORP.
6530
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $4,100
(See Vendor Profile Page V-00)

NCR CORP.
6539 I/O LINK ADAPTOR
Controller Type: Add-on
Device Controlled: Rigid disk drives
Units Controlled: 8
Programmable: No
Price: $6,500

NCR CORP.
6559 I/O LINK ADAPTOR
Controller Type: Add-on
Device Controlled: Rigid disk drives
Units Controlled: 8
Programmable: No
Price: $18,500

NCR CORP.
6589 I/O LINK ADAPTOR
Controller Type: Add-on
Device Controlled: Rigid disk drives
Units Controlled: 8
Price: $18,530

NICOLET ZETA CORP.
8300
Controller Type: Add-in
Device Controlled: Plotters
Specific Equipment Supported: Nicolet Zeta 3653SX
Units Controlled: 1
Programmable: Yes
(See Vendor Profile Page V-28)

NICOLET ZETA CORP.
ZETA C83
Controller Type: Add-in
Device Controlled: Plotters
Specific Equipment Supported: Nicolet Zeta 3610, 5400
Units Controlled: 1
Programmable: Yes
Price: $43,800 to $57,800

OMTI
10F
Controller Type: Add-in, Add-on
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: Diectron DP100/400, Quantum Q2000, Shugart SA1000
Units Controlled: 4
Programmable: Yes
Price: $695
(See Vendor Profile Page V-27)

OMTI
10G
Controller Type: Add-in, Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Diectron 100/400
Units Controlled: 4
Programmable: Yes
Price: $565

OMTI
20C-1
Controller Type: Add-in, Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Maxtor X-X 1000
Units Controlled: 2
Programmable: Yes
Price: $275

OMTI
20D
Controller Type: Add-in, Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $350

OMTI
20D-1
Controller Type: Add-in, Add-on
Device Controlled: Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $350

OMTI
MODEL 10A
Controller Type: Add-in, Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Shugart SA1000, Quantum Q2000
Units Controlled: 4
Programmable: Yes
Price: $565

OMTI
MODEL 10B
Controller Type: Add-in, Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: Quantum, Shugart
Units Controlled: 4
Programmable: Yes
Price: $695

OMTI
MODEL 20C
Controller Type: Add-in, Add-on
Device Controlled: Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $275

OMTI
MODEL 20C-2
Controller Type: Add-in, Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Evotek 5800
Units Controlled: 2
Programmable: Yes
Price: $275

OMTI
MODEL 20L
Controller Type: Add-in, Add-on
Device Controlled: Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $215

ONYX & IMI, INC.
7000 SERIES EIGHT INCH DISK DRIVE
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: IMI 7000 Series
Units Controlled: 1
Programmable: No
(See Vendor Profile Page V-27)

ONYX & IMI, INC.
CSH
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: IMI 5000H
Units Controlled: 2
Programmable: No
Price: $395

PALM BEACH COMPUTERS, INC.
INTEGRAL
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: Tandon TM100-400, MPI 92-93-94-9, Shugart, Seamars
Units Controlled: 4
Programmable: No
Price: $495
(See Vendor Profile Page V-27)

PCE SYSTEMS
BBR256
Device Controlled: Memory Devices
Units Controlled: 4
Programmable: Yes
Price: $1,000
(See Vendor Profile Page V-28)

PCE SYSTEMS
FDC 800
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart 801, Shugart 810/860 SE
Units Controlled: 4
Price: $480

PCE SYSTEMS
FDC-4000
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Shugart SA4000, Fujitsu M2303BE
Units Controlled: 1
Price: $695

PERIPHERAL TECHNOLOGY, INC.
SCAT 1
Controller Type: Add-in
Device Controlled: Display terminals
Specific Equipment Supported: TVI 925, 950
Units Controlled: 1
Programmable: No
Price: $795
(See Vendor Profile Page V-28)

PERIPHERAL TECHNOLOGY, INC.
SCAT 2101
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: IBM 3274, PTI
Units Controlled: 1
Programmable: Yes
Price: $995

PERIPHERAL TECHNOLOGY, INC.
SCAT 2301
Controller Type: Add-on
Device Controlled: Display terminals
Specific Equipment Supported: IBM 3274, PTI
Units Controlled: 5
Programmable: Yes
Price: $2,995

PER SEL, INC.
1670
Controller Type: Add-on

Controllers

Device Controlled: Floppy disk drives
Specific Equipment Supported: Persci 277, 299B
Units Controlled: 8
Programmable: No
Price: $595
(See Vendor Profile Page V-28)

PER SEI, INC.
1170
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Persci 277, 299B
Units Controlled: 8
Programmable: No
Price: $1,050

PLESSEY PERIPHERAL SYSTEMS
DC02A
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: No
Price: $3,900
(See Vendor Profile Page V-29)

PLESSEY PERIPHERAL SYSTEMS
DC11A
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: PE
Programmable: No
Price: $1,345

PLESSEY PERIPHERAL SYSTEMS
DC11A
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: PE
Programmable: No
Price: $1,345

PLESSEY PERIPHERAL SYSTEMS
DCV06A
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 2
Programmable: No
Price: $3,160

PLESSEY PERIPHERAL SYSTEMS
DCV11A
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: PE
Programmable: No
Price: $1,095

PLESSEY PERIPHERAL SYSTEMS
DCV02A
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: No
Price: $3,160

PLESSEY PERIPHERAL SYSTEMS
TC11B
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Kennedy 9000, 9100
Units Controlled: 4
Programmable: No
Price: $2,600

PLESSEY PERIPHERAL SYSTEMS
XC31
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart
Units Controlled: 2
Programmable: No
Price: $915

PLESSEY PERIPHERAL SYSTEMS
XCV31
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart
Units Controlled: 2
Programmable: No
Price: $950

PRACTICAL PERIPHERALS, INC.
INLINE
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Centronics
Units Controlled: 1
Programmable: No
Price: $259
(See Vendor Profile Page V-29)

PRACTICAL PERIPHERALS, INC.
MICROBUFFER E
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Epson, IBM Personal Computer
Units Controlled: 1
Programmable: No
Price: $159

PRACTICAL PERIPHERALS, INC.
MICROBUFFER II
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics
Units Controlled: 1
Programmable: No
Price: $219

PRACTICAL PERIPHERALS, INC.
MICROBUFFER II PLUS
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: Yes
Price: $259 to $349

PRESEARCH, INC.
3274
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Specific Equipment Supported: IBM 3275
Units Controlled: 32
Programmable: Yes
Price: $4,xxx
(See Vendor Profile Page V-29)

PRESEARCH, INC.
3275
Controller Type: Add-in
Device Controlled: Display terminals
Specific Equipment Supported: IBM 3275
Units Controlled: 1
Programmable: No
Price: $2,500

PRESEARCH, INC.
CC 3276
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Specific Equipment Supported: IBM 3276
Units Controlled: 2
Programmable: No
Price: $3,350

PRESEARCH, INC.
EM 3276 BISYNCHRONOUS
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Specific Equipment Supported: IBM 3276
Units Controlled: 2
Programmable: No
Price: $2,600

PRIAM CORP.
SMART
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Priam Winchester
Units Controlled: 4
Price: $340
(See Vendor Profile Page V-29)

PRIAM CORP.
SMART-E
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Priam
Units Controlled: 4
Price: $520

PRIAM CORP.
SMART-T
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Qume, Archive, Priam
Units Controlled: 4

PROMETHEUS PRODUCTS
APPLESURANCE
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Apple
Units Controlled: 2
Programmable: No
Price: $125
(See Vendor Profile Page V-29)

PROMETHEUS PRODUCTS
GRAPHTI
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics
Units Controlled: 1
Price: $125

QANTEL CORP.
4804
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Qantel, Dataproducts, Teletype, Diablo
Units Controlled: 81
Price: $1,500
(See Vendor Profile Page V-30)

QUALITY COMPUTER SERVICE
BIG BLUE
Controller Type: Add-on
Device Controlled: Printers, Rigid disk drives
Specific Equipment Supported: Centronics
Units Controlled: 1
Programmable: Yes
Price: $595
(See Vendor Profile Page V-30)

QUALITY COMPUTER SERVICE
DSK 62
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Epson QX10, Canon AS10, TI Professional
Units Controlled: 4
Programmable: Yes
Price: $2,499

QUALITY COMPUTER SERVICE
DSK 63
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Epson QX10, Canon AS10, TI Professional
Units Controlled: 4
Programmable: Yes
Price: $2,799

QUALITY COMPUTER SERVICE
DSK 64
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Epson QX10, Canon AS10, TI Professional
Units Controlled: 4
Programmable: Yes
Price: $4,499

QUALITY COMPUTER SERVICE
DSK 65
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Epson QX10, Canon AS10, TI Professional, IBM
Units Controlled: 4
Programmable: Yes
Price: $2,999

QUALITY COMPUTER SERVICE
DSK 67
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Epson QX10, Canon AS10, TI Professional, IBM
Units Controlled: 4
Programmable: Yes
Price: $4,999

QUALITY COMPUTER SERVICE
DSK 68
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Epson QX10, Canon AS10, TI Professional

Units Controlled: 4
Programmable: Yes
Price: $7,999

QUALITY MICRO SYSTEMS, INC.
DATA PRODUCTS SERIES
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Dataproducts D50, B300, M200, B600
Units Controlled: 1.
Programmable: Yes
Price: $2,495
(See Vendor Profile Page V-30)

QUALITY MICRO SYSTEMS, INC.
MAGNUM SERIES CONTROLLERS
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Printronics P300, P600, MUP
Units Controlled: 1
Programmable: Yes
Price: $2,395 to $3,495

QUALITY MICRO SYSTEMS, INC.
QMS 6310/34
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Diablo 630
Units Controlled: 1
Programmable: Yes
Price: $1,995

QUALITY MICRO SYSTEMS, INC.
QMS SERIES
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Printronics P300, Printronics P600, Printronics MUP
Price: $1,995

QUALITY MICRO SYSTEMS, INC.
QUIC-QNP
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: Yes

QUENTIN RESEARCH, INC.
AP120
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Apple II, IIe
Units Controlled: 2
Programmable: No
Price: $85
(See Vendor Profile Page V-30)

RACAL-MILGO, INC.
MODEL 4274 LOCAL CLUSTER CONTROLLER
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Milgo 4278, 4550
Units Controlled: 16
Programmable: Yes
Price: $7,000 to $18,000
(See Vendor Profile Page V-30)

RACAL-MILGO, INC.
MODEL 4274 REMOTE CLUSTER
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Milgo 4278, 4295, 4550, 4285
Units Controlled: 16
Programmable: Yes
Price: $7,000 to $18,000

RANA SYSTEMS
RANA CONTROLLER CARD
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Apple, Rana
Units Controlled: 4
Price: $145
(See Vendor Profile Page V-30)

RASTER TECHNOLOGIES
THE MODEL ONE/25
Controller Type: Add-on
Device Controlled: Display terminals, Color Graphics
Units Controlled: 1
Programmable: Yes
Price: $10,000 to $20,000
(See Vendor Profile Page V-30)

RASTER TECHNOLOGIES
THE MODEL ONE/40
Controller Type: Add-on
Device Controlled: Display terminals, Color Graphics
Units Controlled: 1
Programmable: Yes
Price: $10,000 to $20,000

RASTER TECHNOLOGIES
THE MODEL ONE/65
Controller Type: Add-on
Device Controlled: Display terminals, Color Graphics
Units Controlled: 1
Programmable: Yes
Price: $10,000 to $20,000

RAYTHEON CO.
PTS-2000
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Raytheon R2078, R2079, R2187, R2189
Units Controlled: 32
Price: $2,700
(See Vendor Profile Page V-30)

RAYTHEON CO.
RDS-2074
Controller Type: Add-in, Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: 3274
Units Controlled: 32
Programmable: Yes
Price: $6,100
(See Vendor Profile Page V-30)

RAYTHEON CO.
RDS-2076
Controller Type: Add-in, Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: IBM 3276
Units Controlled: 32
Programmable: Yes
Price: $2,750

RENAISSANCE TECHNOLOGY
PARALLEL BUFF-ET
Device Controlled: Printers
Specific Equipment Supported: Centronics Parallel, Apple, Atari, NEC
Units Controlled: 1
Programmable: No
Price: $219 to $299
(See Vendor Profile Page V-31)

RENAISSANCE TECHNOLOGY
PC BUFF-ET
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: IBM Personal Computer
Units Controlled: 1
Programmable: No
Price: $249 to $329

RENAISSANCE TECHNOLOGY
SERIAL BUFF-ET
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: IBM Personal Computer
Units Controlled: 1
Price: $219 to $299

RENEX CORP.

TRANSLATOR RT 5/8/12/17/21/25/33
Controller Type: Add-on
Device Controlled: Printers, Teleprinters, Display terminals, Plotters
Specific Equipment Supported: Over 100 models of asynchronous terminals
Price: $4,950 to $18,950

RENEX CORP.
6901 Old Keene Mill Road
Springfield, VA 22150
(703) 451-2200

Major Market: Terminal, Peripheral, Communications Equipment Manufacturing, OEM Peripherals/Terminals, Maintainance/Other Services
Target Industries: Computer Manufacturers and IBM users
Contacts:
Head of Marketing/Sales: Mike McCall
Established: 1975
Number of Employees: 25
Geographic Coverage: International
Net Sales: $2.1 Million (1982)

RIANDA ELECTRONICS
1200 LINE PRINTER CONTROLLER
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Printronix
Units Controlled: 1
Programmable: Yes
Price: $420
(See Vendor Profile Page V-31)

RIANDA ELECTRONICS
1930 MAG TAPE CONTROLLER
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: STC 1906
Units Controlled: 4
Programmable: Yes
Price: $8,980

RIANDA ELECTRONICS
2200 MAG TAPE CONTROLLER
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Cipher F910
Units Controlled: 1
Programmable: No
Price: $1,600

RIANDA ELECTRONICS
2400 DISK DRIVE CONTROLLER
Controller Type: Add-in
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: CDC 9755
Units Controlled: 4
Programmable: No
Price: $1,800

RIANDA ELECTRONICS
2500 DISK DRIVE CONTROLLER
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Fujitsu 2351
Units Controlled: 4
Programmable: Yes
Price: $3,800
(See Vendor Profile Page V-31)

RIANDA ELECTRONICS
2570 DISK DRIVE CONTROLLER
Controller Type: Add-in
Device Controlled: Rigid disk drives, Cassette/Cartridges Devices
Specific Equipment Supported: CDC 9755
Units Controlled: 5
Programmable: Yes
Price: $3,100

RIANDA ELECTRONICS
2570T MAG TAPE CONTROLLER
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Archive Sidewinder
Units Controlled: 1
Programmable: No
Price: $1,600

RIANDA ELECTRONICS
2600
Controller Type: Add-in
Device Controlled: Printers, Teleprinters, Display terminals, Real Time Clock
Specific Equipment Supported: Printronix Printer, Teletype Teleprinter, Televideo Terminal
Units Controlled: 16
Programmable: No
Price: $1,900

RIANDA ELECTRONICS
2700LP
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Printronix
Units Controlled: 1
Programmable: Yes
Price: $800

RIANDA ELECTRONICS
2710LP
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Printronix
Units Controlled: 1

Controllers

Programmable: Yes
Price: $1,300

RIANDA ELECTRONICS
[illegible] DISK DRIVE CONTROLLER
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Priam, Priam, Micropolis, Cipher Quarterback
Units Controlled: 4
Programmable: Yes
Price: $1,900

ROSSCOMP CORP.
C160
Controller Type: Add-on
Device Controlled: Rigid disk drives, Magnetic Tape Drives
Specific Equipment Supported: Rosscomp D160, Shugart SA 1000, Quantum Q2000
Units Controlled: 4
Price: $1,750
(See Vendor Profile Page V-31)

ROSSCOMP CORP.
C161
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Rosscomp
Units Controlled: 1
Price: $650
(See Vendor Profile Page V-31)

ROSSCOMP CORP.
C162
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Rosscomp D160
Units Controlled: 1

ROSSCOMP CORP.
C163
Controller Type: Add-on
Device Controlled: Rigid disk drives, Magnetic Tape Drives
Specific Equipment Supported: Shugart SA 1000, Quantum Q2000
Units Controlled: 3
Price: $199

SCIENTIFIC MICRO SYSTEMS
FD0302-M
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart SA400
Units Controlled: 3
Programmable: Yes
Price: $500
(See Vendor Profile Page V-31)

SCIENTIFIC MICRO SYSTEMS
FD0500
Controller Type: Add-in
Device Controlled: Display terminals, Floppy disk drives
Specific Equipment Supported: Shugart 800 12/850, Pertec 511, Memorex 550/552, Qume Data Trax
Units Controlled: 4
Price: $900

SCIENTIFIC MICRO SYSTEMS
FD0507-M
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart SA4001/SA4, SA410, SA4, Wangco 82, MPI 51/52, 91/
Units Controlled: 3
Programmable: Yes
Price: $700

SCIENTIFIC MICRO SYSTEMS
FWD0101
Controller Type: Add-in
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: DEC RX02, RX02; IBM 3740, 2/2D
Units Controlled: 4
Programmable: Yes
Price: $2,400

SCIENTIFIC MICRO SYSTEMS
FWD0106
Controller Type: Add-in
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: Seagate ST 506/412; Shugart SA 410/460, SA 810/860
Units Controlled: 4
Programmable: Yes
Price: $2,100

SCIENTIFIC MICRO SYSTEMS
FWD1101
Controller Type: Add-in
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: DEC RX02
Programmable: Yes
Price: $2,400

SCIENTIFIC MICRO SYSTEMS
FWD1106
Controller Type: Add-in
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: Seagate ST 506/412; Shugart SA 410/460, SA 810/860
Units Controlled: 4
Programmable: Yes
Price: $2,100

SCIENTIFIC MICRO SYSTEMS
FWD5001
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: Shugart 1403, 800, 850
Units Controlled: 4
Programmable: Yes
Price: $1,400

SCIENTIFIC MICRO SYSTEMS
FWD6001
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: Shugart 800, 850, 1403
Units Controlled: 4
Programmable: Yes
Price: $1,500

SCIENTIFIC MICRO SYSTEMS
FWD8006
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: Seagate
Price: $1,400

SCIENTIFIC MICRO SYSTEMS
FWD8006
Controller Type: Add-in
Device Controlled: Floppy disk drives, Rigid disk drives
Units Controlled: 4
Programmable: Yes
Price: $1,400

SCIENTIFIC MICRO SYSTEMS
FWTD1150
Controller Type: Add-on
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: Kennedy
Units Controlled: 1
Programmable: No
Price: $4,500

SD SYSTEMS, INC.
FWII
Controller Type: Add-in
Device Controlled: Floppy disk drives, Rigid disk drives
Units Controlled: 4
Programmable: No
Price: $595
(See Vendor Profile Page V-31)

SD SYSTEMS, INC.
VERSAFLOPPY II
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 4
Programmable: No
Price: $400

S. GOLDMAN CO.
PM-3001
Controller Type: Add-on
Device Controlled: Floppy disk drives
Units Controlled: 8
Programmable: Yes
Price: $730
(See Vendor Profile Page V-32)

S. GOLDMAN CO.
PM-3010
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Units Controlled: 8
Programmable: Yes
Price: $750

SHUGART ASSOCIATES, INC.
SA1401
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Shugart
Units Controlled: 4
Programmable: No
Price: $612
(See Vendor Profile Page V-32)

SHUGART ASSOCIATES, INC.
SA1401-1
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Shugart
Units Controlled: 4
Programmable: No
Price: $612

SHUGART ASSOCIATES, INC.
SA1403
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: Shugart
Units Controlled: 4
Price: $1,000

SHUGART ASSOCIATES, INC.
SA1403D
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: Shugart
Units Controlled: 4
Programmable: No
Price: $861

SHUGART ASSOCIATES, INC.
SA1403D-1
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: Shugart
Units Controlled: 4
Programmable: No
Price: $861

SHUGART ASSOCIATES, INC.
SA1403E
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: Shugart
Units Controlled: 4
Programmable: Yes
Price: $861

SHUGART ASSOCIATES, INC.
SA1410A
Device Controlled: Rigid disk drives
Specific Equipment Supported: Shugart
Units Controlled: 4
Programmable: Yes
Price: $[illegible]

SHUGART ASSOCIATES, INC.
SA1420A
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: Shugart
Units Controlled: 4
Programmable: Yes
Price: $487

SHUGART ASSOCIATES, INC.
SA1601
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Shugart
Units Controlled: 4
Programmable: Yes
Price: $366

SHUGART ASSOCIATES, INC.
SA1603
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Units Controlled: 4
Programmable: Yes
Price: $461

SHUGART ASSOCIATES, INC.
SA1610
Device Controlled: Rigid disk drives
Specific Equipment Supported: Shugart
Units Controlled: 4
Programmable: Yes
Price: $312

SHUGART ASSOCIATES, INC.
SA1620
Controller Type: Add-on
Device Controlled: Floppy

disk drives, Rigid disk drives
Specific Equipment Supported: Shugart
Units Controlled: 4
Programmable: Yes
Price: $416

SHUGART ASSOCIATES, INC.
SA1620
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: Shugart
Units Controlled: 4
Programmable: Yes
Price: $416

SIGMA DESIGNS, INC.
SDI-FLOPPY
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Tandon TM100-2
Units Controlled: 4
Price: $220
(See Vendor Profile Page V-32)

SIGMA INFORMATION SYSTEMS, INC.
SDC-RLV12
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: Yes
Price: $871
(See Vendor Profile Page V-32)

SIGMA INFORMATION SYSTEMS, INC.
SDC-RXV21
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 2
Programmable: Yes
Price: $871

SMOKE SIGNAL BROADCASTING
DCB-4A
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 4
Programmable: Yes
Price: $549
(See Vendor Profile Page V-32)

SMOKE SIGNAL BROADCASTING
DCB-4E
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 4
Price: $695

SMOKE SIGNAL BROADCASTING
PSA-1
Controller Type: Add-in
Device Controlled: Floppy disk drives, Tape Streamers
Specific Equipment Supported: Sasi, Priam, Archive
Units Controlled: 30
Programmable: Yes
Price: $1,450

SORRENTO VALLEY ASSOCIATES
MEGAFLX MXH863
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Apple II, III
Units Controlled: 1
Programmable: Yes
Price: $349
(See Vendor Profile Page V-32)

SOUTHERN SYSTEMS, INC.
DEC PDP-11 9060
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Dataproducts 2200
Units Controlled: 1
(See Vendor Profile Page V-32)

SPECTRA LOGIC CORP.
SPECTRA 10
Controller Type: Add-in, Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: CDC, Fujitsu, Ampex
Units Controlled: 4
Programmable: Yes
Price: $2,600
(See Vendor Profile Page V-32)

SPECTRA LOGIC CORP.
SPECTRA 12
Controller Type: Add-in, Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC, Fujitsu, Ampex
Units Controlled: 4
Programmable: Yes
Price: $2,700

SPECTRA LOGIC CORP.
SPECTRA 14
Controller Type: Add-in, Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC, Fujitsu, Ampex
Units Controlled: 4
Programmable: Yes
Price: $3,100

SPECTRA LOGIC CORP.
SPECTRA 15
Controller Type: Add-in, Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC, Fujitsu, Ampex
Units Controlled: 2
Programmable: Yes
Price: $2,000

SPECTRA LOGIC CORP.
SPECTRA 16
Controller Type: Add-in, Add-on
Device Controlled: Rigid disk drives, Magnetic Tape Drives
Specific Equipment Supported: CDC, Fujitsu, Ampex
Units Controlled: 4
Programmable: Yes
Price: $2,800

SPECTRA LOGIC CORP.
SPECTRA 20
Controller Type: Add-in, Add-on
Device Controlled: Rigid disk drives, Magnetic Tape Drives
Specific Equipment Supported: CDC, Fujitsu, Ampex
Units Controlled: 12
Programmable: Yes
Price: $3,200

SPECTRA LOGIC CORP.
SPECTRA 21
Controller Type: Add-in, Add-on
Device Controlled: Rigid disk drives, Magnetic Tape Drives
Specific Equipment Supported: CDC, Fujitsu, Ampex
Units Controlled: 8
Programmable: Yes
Price: $3,200

SPECTRA LOGIC CORP.
SPECTRA 25
Controller Type: Add-in, Add-on
Device Controlled: Rigid disk drives, Magnetic Tape Drives
Specific Equipment Supported: CDC, Fujitsu, Ampex
Units Controlled: 6
Programmable: Yes
Price: $2,250

SPECTRA LOGIC CORP.
SPECTRA 26
Controller Type: Add-in, Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: CDC, Fujitsu, Ampex
Units Controlled: 8
Programmable: Yes
Price: $3,200

SPECTRA LOGIC CORP.
SPECTRA 30
Controller Type: Add-in, Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: CDC, Fujitsu, Ampex
Units Controlled: 4
Programmable: Yes
Price: $1,150

SPECTRA LOGIC CORP.
SPECTRA 36
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: CDC, Fujitsu, Ampex
Units Controlled: 4
Programmable: Yes
Price: $1,350

SPECTRA LOGIC CORP.
SPECTRA 46
Controller Type: Add-in, Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC, Fujitsu, Ampex
Units Controlled: 4
Programmable: Yes
Price: $3,300

SPUR PRODUCTS CORP.
S1403
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: IBM 1403
Units Controlled: 1
Price: $15,000
(See Vendor Profile Page V-33)

SSM MICROCOMPUTER PRODUCTS, INC.
AIO-II
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: Yes
Price: $225
(See Vendor Profile Page V-33)

SSM MICROCOMPUTER PRODUCTS, INC.
APPLC
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: Yes
Price: $129

STRATUS COMPUTER, INC.
D-100
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Priam
Units Controlled: 4
Programmable: No
Price: $6,500
(See Vendor Profile Page V-33)

STRATUS COMPUTER, INC.
D-104
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC
Units Controlled: 4
Programmable: No
Price: $9,000

STRATUS COMPUTER, INC.
T-100
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Cipher
Units Controlled: 1
Programmable: No
Price: $5,500

SYSGEN
SC-1000/SC-2000
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Archive, DEI, Cipher, Rosscomp
Units Controlled: 4
Programmable: No
Price: $1,000
(See Vendor Profile Page V-33)

SYSGEN
SC-2100/SC-2200
Controller Type: Add-in
Device Controlled: Rigid disk drives, Streaming Tape
Specific Equipment Supported: Archive, DEI, Cipher, Rosscomp
Units Controlled: 4
Programmable: No
Price: $1,000

SYSGEN
SC-2101
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: No
Price: $1,000

SYSGEN
SC-2111
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: No
Price: $1,000

SYSGEN
SC-2131
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 4
Programmable: No
Price: $1,000

SYSGEN
SC-2201
Controller Type: Add-in

Controllers

Device Controlled: Rigid disk drives
Units Controlled: 4
Price: $1,000

SYSGEN
SC-3000
Controller Type: Add-in
Device Controlled: Rigid disk drives, Streaming Tape
Specific Equipment Supported: CDC, Fujitsu
Units Controlled: 2
Programmable: No
Price: $1,000

SYSGEN
SC-3000
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Units Controlled: 2
Price: $1,000

SYSGEN
SC-4000
Controller Type: Add-in
Device Controlled: Streaming Tape
Units Controlled: 4
Programmable: No
Price: $1,000

SYSGEN
SC-4000
Controller Type: Add-in
Device Controlled: Streaming Tape
Specific Equipment Supported: Archive
Units Controlled: 1
Programmable: No
Price: $300

SYSTECH, INC.
MLP-3000 DUAL LINE
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Centronics
Units Controlled: 2
Programmable: No
Price: $850
(See Vendor Profile Page V-33)

SYSTECH, INC.
MTI-900A/1600A
Controller Type: Add-in
Device Controlled: Display terminals
Units Controlled: 16
Programmable: No
Price: $1,895

SYSTECH, INC.
STC-4400
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Cipher, Archive, DEI
Programmable: No
Price: $795

SYSTEM INDUSTRIES, INC.
3100
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC 9762,9775; Fujitsu 2284
Units Controlled: 4
Programmable: Yes
Price: $10,500 to $28,500
(See Vendor Profile Page V-34)

SYSTEM INDUSTRIES, INC.
8100
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC 9762, 9766; Fujitsu 2284
Units Controlled: 4
Programmable: Yes
Price: $11,500 to $19,000

SYSTEM INDUSTRIES, INC.
9700
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: STC 1953
Units Controlled: 4
Programmable: Yes
Price: $35,200 to $39,900

SYSTEM INDUSTRIES, INC.
9900
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC 9762, 9766, Fujitsu 474
Units Controlled: 8
Programmable: Yes
Price: $14,300 to $25,000

SYSTEMS GROUP
DFC-2
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEI
Units Controlled: 1
Price: $385
(See Vendor Profile Page V-34)

SYSTEMS GROUP
FDC-2800
Controller Type: Add-in
Device Controlled: Floppy disk drives
Units Controlled: 4
Programmable: Yes
Price: $408

SYSTEMS GROUP
HDC-2800
Controller Type: Add-in
Device Controlled: Rigid disk drives
Units Controlled: 2
Programmable: Yes
Price: $408

SYSTEMS RESEARCH, INC.
CP 3680
Controller Type: Add-on
Device Controlled: Teleprinters, Display terminals, Floppy disk drives, Rigid disk drives, Plotters
Specific Equipment Supported: Burroughs B20-900, B30-900, B40-900
Programmable: Yes
Price: $75,000
(See Vendor Profile Page V-34)

TANDEM COMPUTERS, INC.
3106
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Tandem
Units Controlled: 8
Price: $10,500
(See Vendor Profile Page V-34)

TANDEM COMPUTERS, INC.
3202
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Ampex, Kennedy
Units Controlled: 2
Programmable: No
Price: $4,800

TANDEM COMPUTERS, INC.
3206
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Telex
Units Controlled: 2
Price: $6,100

TANDEM COMPUTERS, INC.
3401
Controller Type: Add-in
Device Controlled: Printers, Card Readers
Units Controlled: 2
Price: $2,600

TANDEM COMPUTERS, INC.
6303
Controller Type: Add-in
Device Controlled: Display terminals
Units Controlled: 2
Price: $3,600

TARBELL ELECTRONICS
1011 SINGLE DENSITY FLOPPY
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart, Qume
Units Controlled: 4
Price: $325
(See Vendor Profile Page V-34)

TARBELL ELECTRONICS
2022-DOUBLE DENSITY FLOPPY
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart, Qume
Units Controlled: 4
Price: $495

TARBELL ELECTRONICS
2032 CPU I/O BOARD
Controller Type: Add-in
Device Controlled: Display terminals
Units Controlled: 2
Programmable: Yes
Price: $435

TARBELL ELECTRONICS
4044 4SRP
Device Controlled: Printers, Display terminals
Units Controlled: 4
Programmable: No
Price: $400

TEAC CORP. OF AMERICA
FC-55
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Teac FD-55A, B, Teac FD-55G, F
Units Controlled: 4
Price: $400
(See Vendor Profile Page V-34)

TEKTRONIX, INC.
DATA CUE II
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Units Controlled: 2
Programmable: Yes
Price: $10,000
(See Vendor Profile Page V-34)

TELCON INDUSTRIES, INC.
DATAMAX
Controller Type: Add-on
Device Controlled: Printers, Teleprinters, Display terminals, Floppy disk drives, Rigid disk drives, Plotters, Magnetic Tape Drives, Cassette/Cartridges Devices, Memory Devices
Specific Equipment Supported: Shugart, Centronics
Units Controlled: 64
Price: $8,000 to $70,000
(See Vendor Profile Page V-34)

TELEGRAPHICS, INC.
ML644
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Units Controlled: 1
Programmable: Yes
Price: $500
(See Vendor Profile Page V-34)

TELERAY
MICROTERM
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Diginech, HP
Units Controlled: 1
Programmable: Yes
Price: $1,200
(See Vendor Profile Page V-36)

TELEX COMPUTER PRODUCTS, INC.
MODEL 174-1
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Telex
Units Controlled: 8
Price: $3,000
(See Vendor Profile Page V-36)

TELEX COMPUTER PRODUCTS, INC.
MODEL 174-2
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Telex
Units Controlled: 16
Price: $4,000

TELEX COMPUTER PRODUCTS, INC.
MODEL 274
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Telex
Units Controlled: 32
Programmable: Yes

TELEX COMPUTER PRODUCTS, INC.
MODEL 276 DISPLAY
Controller Type: Add-in, Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Telex, IBM
Units Controlled: 7
Price: $5,900

TERMINAL DATA CORP.
SYS 2000/20
Controller Type: Add-in

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network data communications

INNOVATIVE ELECTRONICS, INC.

Controllers

Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart SA400
Units Controlled: 7
Programmable: Yes
Price: $995
(See Vendor Profile Page V-37)

TERMINAL DATA CORP.
SYSTEM 2000/10
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart SA400
Units Controlled: 7
Programmable: Yes
Price: $895
(See Vendor Profile Page V-37)

TERM-TRONICS
ETP-4
Controller Type: Add-on
Device Controlled: Printers, Display terminals
Specific Equipment Supported: GE 2120, Termtronic
Units Controlled: 24
Programmable: No
Price: $2,995
(See Vendor Profile Page V-37)

TERM-TRONICS
8220-8
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Specific Equipment Supported: GE, Termtronic
Units Controlled: 8
Programmable: No
Price: $2,895

TRANSWAVE CORP.
K8070
Controller Type: Add-on
Device Controlled: Printers, Teleprinters, Display terminals, Floppy disk drives, Magnetic Tape Drives, Cassette/Cartridges Devices, Memory Devices
Programmable: Yes
(See Vendor Profile Page V-37)

TRANSWAVE CORP.
K8073B X CALIBUR
Controller Type: Add-on
Device Controlled: Printers, Teleprinters, Display terminals, Floppy disk drives, Magnetic Tape Drives, Cassette/Cartridges Devices, Memory Devices
Programmable: Yes

TRANSWAVE CORP.
TC2
Controller Type: Add-on
Device Controlled: Printers, Teleprinters, Display terminals, Floppy disk drives, Magnetic Tape Drives, Cassette/Cartridges Devices, Memory Devices
Programmable: Yes
(See Vendor Profile Page V-37)

TRY DATA PRODUCTS
DATA CONCENTRATOR
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Units Controlled: 64
Programmable: Yes
Price: $30,000
(See Vendor Profile Page V-38)

TRY DATA PRODUCTS
DATA ROUTER
Controller Type: Add-on
Device Controlled: Display terminals, Magnetic Tape Drives, Tape Readers
Units Controlled: 16
Programmable: Yes
Price: $8,000

TRY DATA PRODUCTS
DATA SELECTOR
Controller Type: Add-in, Add-on
Device Controlled: Display terminals, Magnetic Tape Drives
Units Controlled: 16
Programmable: Yes
Price: $8,000

TYMSHARE, INC.
ASE 9601
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Printronics
Units Controlled: 32
Programmable: No
Price: $4,000
(See Vendor Profile Page V-38)

TYMSHARE, INC.
ASE 9605
Controller Type: Add-in
Device Controlled: Printers, Display terminals
Specific Equipment Supported: Printronics
Units Controlled: 32
Programmable: No
Price: $5,500

UNIVATION, INC.
FLOPPY DISK CONTROLLER ICF-8 & 8C
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Tandon, Siemans, Datamac
Units Controlled: 4
Programmable: No
Price: $295
(See Vendor Profile Page V-38)

U.S. DESIGN CORP.
MODEL 2250
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEI Funnel
Units Controlled: 4
Programmable: Yes
Price: $4,995
(See Vendor Profile Page V-38)

U.S. DESIGN CORP.
MODEL 3450
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Pluto
Units Controlled: 4
Programmable: Yes
Price: $3,995

VERMONT RESEARCH CORP.
4107
Controller Type: Add-on
Device Controlled: Memory Devices
Specific Equipment Supported: VRC 4016, VRC 4040, Gauto SPC 16/40
Units Controlled: 1
Programmable: No
Price: $3,340
(See Vendor Profile Page V-38)

VERMONT RESEARCH CORP.
4108
Controller Type: Add-on
Device Controlled: Memory Devices
Specific Equipment Supported: VRC 4016, VRC 4040, PE Interdata
Units Controlled: 1
Programmable: No
Price: $3,575

VERMONT RESEARCH CORP.
4401
Controller Type: Add-on
Device Controlled: Display terminals, Memory Devices
Specific Equipment Supported: VRC 4016, VRC 4040, DEC PDP
Units Controlled: 2
Programmable: No
Price: $4,365

VERMONT RESEARCH CORP.
4402
Controller Type: Add-on
Device Controlled: Memory Devices
Specific Equipment Supported: VRC 4016, VRC 4040, DEC PDP 8E
Units Controlled: 1
Programmable: No
Price: $3,770

VERMONT RESEARCH CORP.
4424
Controller Type: Add-on
Device Controlled: Memory Devices
Specific Equipment Supported: VRC 4016, VRC 4040, DG Nova Series
Units Controlled: 1
Programmable: No
Price: $3,575

VERMONT RESEARCH CORP.
4410
Controller Type: Add-on
Device Controlled: Memory Devices
Specific Equipment Supported: VRC 4016, VRC 4040, Modcomp Classic 5/E
Units Controlled: 1
Programmable: No
Price: $3,170

VERMONT RESEARCH CORP.
8421
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: VRC MOD 8010, MOD 8520; DEC PDP 11/70
Units Controlled: 1
Programmable: No
Price: $2,275

VERMONT RESEARCH CORP.
SASI
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: VRC 8010, 8520
Units Controlled: 8
Programmable: No
Price: $1,000

VERSATEC, INC.
DX INTERFACES
Controller Type: Add-on
Device Controlled: Plotters
Specific Equipment Supported: HP, PE, IBM, DG
Units Controlled: 4
Programmable: No
(See Vendor Profile Page V-38)

VERSATEC, INC.
RANDOM ELEMENT PROCESSOR
Controller Type: Add-on
Device Controlled: Plotters
Specific Equipment Supported: HP, PE, IBM, DG
Units Controlled: 4
Programmable: No

VERSATEC, INC.
VECTOR TO RASTER CONVERTER
Controller Type: Add-on
Device Controlled: Plotters
Specific Equipment Supported: HP, PE, IBM, DG
Units Controlled: 4
Programmable: No

VISTA COMPUTER CO., INC.
A800 DOUBLE DENSITY
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart
Units Controlled: 2
Programmable: No
Price: $295
(See Vendor Profile Page V-38)

WESPERCORP
DC-220
Controller Type: Add-in
Device Controlled: Cassette/Cartridge Devices
Specific Equipment Supported: DG
Units Controlled: 4
(See Vendor Profile Page V-39)

WESPERCORP
DC-221
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DG
Units Controlled: 4

WESPERCORP
DC-230
Controller Type: Add-in
Device Controlled: Cassette/Cartridge Devices
Specific Equipment Supported: DEC
Units Controlled: 8

WESPERCORP
DC-231
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC
Units Controlled: 4

WESPERCORP
DC-231A
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC
Units Controlled: 4

WESPERCORP
DC-251
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC
Units Controlled: 2

WESPERCORP
TAPE DIMENSION III
Controller Type: Add-on

Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC PDP-11, VAX
Units Controlled: 4
Programmable: No
Price: $1,983

WESPERCORP
TC-30
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC PDP-11, VAX
Units Controlled: 8
Programmable: No
Price: $1,435

WESPERCORP
TC-50
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: DEC PDP-11, DEC
Units Controlled: 8
Programmable: No
Price: $1,435

WESPERCORP
TC-110
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: IBM
Units Controlled: 4

WESPERCORP
TC-120
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DG
Units Controlled: 8

WESPERCORP
TC130
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DG
Units Controlled: 8
Programmable: No
Price: $3,410

WESPERCORP
TC-131
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC
Units Controlled: 8

WESPERCORP
TC-140
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: PE
Units Controlled: 4

WESPERCORP
TC-151
Controller Type: Add-in
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC
Units Controlled: 8

WESPERCORP
TC-160
Controller Type: Add-in
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: DEC
Units Controlled: 8

WESPERCORP
TC-170
Controller Type: Add-in
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: DG
Units Controlled: 8

WESPERCORP
TC-180
Controller Type: Add-in
Device Controlled: Cassette/Cartridges Devices
Specific Equipment Supported: DEC
Units Controlled: 8

WESPERMICRO SYSTEMS, INC.
EPO
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Price: $179
(See Vendor Profile Page V-39)

WESPERMICRO SYSTEMS, INC.
EBI
Controller Type: Add-in
Device Controlled: Printers
Specific Equipment Supported: Epson
Units Controlled: 1
Programmable: No
Price: $139 to $195

WESPERMICRO SYSTEMS, INC.
IBM SPOOLER CARD P
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: No
Price: $289

WESPERMICRO SYSTEMS, INC.
IBM SPOOLER CARD SP
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: No
Price: $349

WESPERMICRO SYSTEMS, INC.
IPI
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: No
Price: $87

WESPERMICRO SYSTEMS, INC.
SBO
Controller Type: Add-in
Device Controlled: Printers
Units Controlled: 1
Programmable: No
Price: $249

WESPERMICRO SYSTEMS, INC.
TAPE DIMENSION III
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC PDP-11 Series, VAX-11 Series
Units Controlled: 4
Programmable: Yes
Price: $1,983

WESPERMICRO SYSTEMS, INC.
TC131
Controller Type: Add-on
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: DEC PDP-11, VAX
Units Controlled: 8
Programmable: Yes
Price: $3,300

WESTERN DIGITAL CORP.
WD1002 WINCHESTER/FLOPPY
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Specific Equipment Supported: Seagate ST506, Shugart SA450
Units Controlled: 7
(See Vendor Profile Page V-39)

WESTERN DIGITAL CORP.
WD1010 WINCHESTER CONTROLLER
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Seagate ST506, Shugart SA1000
Units Controlled: 1
(See Vendor Profile Page V-39)

WESTERN DIGITAL CORP.
WD1050 SMD CONTROLLER
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC

WESTREX OEM PRODUCTS
MODEL 8500
Controller Type: Add-on
Device Controlled: Printers
Specific Equipment Supported: Westrex 800 Series
Units Controlled: 1
Programmable: No
Price: $200
(See Vendor Profile Page V-39)

XCOMP, INC.
CD/S
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Western Dynex N800, Ampex DM, Microdata, CDC Hawk
Units Controlled: 4
Programmable: Yes
Price: $700
(See Vendor Profile Page V-39)

XCOMP, INC.
SG/S
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Shugart 1000 Series, Quantum
Units Controlled: 1
Programmable: Yes
Price: $600

XCOMP, INC.
SM/S
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC Phoenix, CDC Lark, BASF, Priam 3350
Units Controlled: 1
Programmable: Yes
Price: $700

XCOMP, INC.
ST/S
Controller Type: Add-on
Device Controlled: Rigid disk drives
Specific Equipment Supported: Miniscribe, Rodime, CMI, Seagate
Units Controlled: 1
Programmable: Yes
Price: $600

XYLOGICS, INC.
440
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: CDC, Fujitsu, Ampex
Units Controlled: 4
Programmable: Yes
Price: $2,295
(See Vendor Profile Page V-40)

XYLOGICS, INC.
450
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Fujitsu, CDC, Ampex
Units Controlled: 4
Programmable: Yes
Price: $2,295

XYLOGICS, INC.
472
Device Controlled: Magnetic Tape Drives
Specific Equipment Supported: Pertec, Kennedy, CDC, Cipher
Units Controlled: 8
Programmable: Yes
Price: $1,795

ZAIAZ COMMUNICATIONS, INC.
VOICE ENCODER
Controller Type: Add-in
Device Controlled: Rigid disk drives
Specific Equipment Supported: Rodime 406
Units Controlled: 4
Programmable: Yes
Price: $5,000
(See Vendor Profile Page V-40)

ZENDEX CORP.
ZBX-2188
Controller Type: Add-in
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart SA801, SA400
Units Controlled: 4
Programmable: Yes
Price: $480
(See Vendor Profile Page V-40)

ZENDEX CORP.
ZX-116 QUAD SERIAL
Device Controlled: Display terminals
Units Controlled: 4
Programmable: Yes
Price: $1,495

ZENDEX CORP.
ZX-200A
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart SA801
Units Controlled: 4
Programmable: Yes
Price: $1,500

Controllers

ZENDEX CORP.
ZX-203
Controller Type: Add-on
Device Controlled: Floppy disk drives, Rigid disk drives
Units Controlled: 4
Programmable: Yes
Price: $2,795

ZENDEX CORP.
ZX-205
Controller Type: Add-on
Device Controlled: Floppy disk drives
Specific Equipment Supported: Shugart SA801, SA400
Units Controlled: 4
Programmable: Yes
Price: $506

ZENDEX CORP.
ZX-208A
Controller Type: Add-on
Device Controlled: Floppy disk [illegible]
Specific Equipment Supported: Shugart SA801, SA400
Units Controlled: 4
Programmable: Yes
Price: [illegible]

ZILOG, INC.
SYSTEM 8000 MODEL 21
Controller Type: Add-on
Device Controlled: Printers, Teleprinters, Display terminals, Floppy disk drives, Rigid disk drives, Plotters, Magnetic Tape Drives, Cassette/Cartridges Devices, Memory Devices
Units Controlled: 24
Programmable: Yes
Price: [illegible]
(See Vendor Profile Page V-40)

ZILOG, INC.
SYSTEM 8000 MODEL 11
Controller Type: Add-on
Device Controlled: Printers, Teleprinters, Display terminals, Floppy disk drives, Rigid disk drives, Plotters, Magnetic Tape Drives, Cassette/Cartridges Devices, Memory Devices
Units Controlled: 8
Programmable: Yes
Price: $14,950
(See Vendor Profile Page V-40)

ZILOG, INC.
SYSTEM 8000 MODEL 21
Controller Type: Add-on
Device Controlled: Printers, Teleprinters, Display terminals, Floppy disk drives, Rigid disk drives, Plotters, Magnetic Tape Drives, Cassette/Cartridges Devices, Memory Devices
Units Controlled: 24
Programmable: Yes
Price: [illegible]

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When you equip your central and branch offices with EMT 9165 digital facsimile transceivers from 3M, you aren't just getting easy-to-use fax machines that will work with all of your present Group I, II, and III equipment. You're also getting an automated facsimile network that can slash your long-distance transmission costs dramatically through their advanced productivity-enhancing features.

The EMT 9165's dual polling mode is a good example. It lets you do either of two things: (1) poll other Group III machines in the usual way, or (2) send traffic to and obtain documents from other EMT 9165s with a single call to each machine, so that you eliminate the added expense of double phone calls.

3M's EMT 9165 also helps to lower communication costs by providing a detailed audit trail through two types of status reports, including one that supplies a department or personal ID number for each call.

Other major features include: Automatic time and date stamping of incoming and outgoing traffic. Alphanumeric display for prompting casual operators and to help in programming the machine for "one-button" operation. Two-digit ID numbers as passwords, if required.

Special Applications: Modular design 3M-I computer store-and-forward system that interfaces with data networks and supporting protocols such as SNA, HDLC and X.25.

For details on the new EMT-9165 and the full line of 3M electronic message terminals, call 1-800-328-1684 toll-free. (In Minnesota, 1-800-792-1072.) In Canada, call 1-800-268-9055. Operator 11. Or mail the coupon to: 3M Business Communication Products Division, 3M Center, Building 216-2N, P.O. Box 33600, St. Paul, MN 55144 Attn. G. Collins.

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COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

eekly Newspaper Second-class postage paid at Framingham, Mass. and additional mailing offices ©1983 by CW Communications/Inc.

$44/year October 10, 1983 Vol. XVII, No. 41

al Express to Deliver facsimile In Two Hours

By Katherine Hafner
CW Staff

MEMPHIS, Tenn. — Despite its reign over the increasingly competitive overnight delivery market, Federal Express Corp. is still taking risks. The billion-dollar company is planning a new service: a two-hour guaranteed delivery of documents via facsimile transmission.

Dubbed Gemini, the service is expected to go into operation next year between April and July, and with it Federal Express fully expects to find customers willing to pay a premium price for two-hour delivery when they were satisfied with overnight delivery before that and a first-class postage stamp before that.

Chuck Winston, senior vice-president of Federal's Electronic Products Division, said the company does not consider the service facsimile transmission, but "document processing."

"We decided never to get into the fax business in the way it exists today because we don't believe it's right for us," he said. "We're offering full document processing that changes each bit of information on the page into

(Continued on Page 10)

Inside

For the third time in recent months, NCR Corp. has been ordered to pay damages to a user of its minicomputers. **Page 2.**

• • •

Fortune Systems Corp. called a press conference last week to announce two new systems. In a surprise move, the company also revealed that it had replaced its president and co-founder. **Page 4.**

• • •

Claiming that it will free those Fortune 1,000 users enslaved by their IBM mainframes, Spartacus Computers, Inc. has introduced an IBM 370-compatible distributed processor. **Page 4.**

• • •

Control Data Corp. has unveiled a processor that can be linked to its Cyber 170 supercomputers to attain speeds up to 16G operation/sec. **Page 8.**

• • •

The U.S. Postal Service has finally implemented its nine-digit Zip Code. **Page 11.**

• • •

The Computer and Business Equipment Manufacturers Association has rejected direct government planning and intervention in the economy. **Page 91.**

• • •

Office Image Processor, Gateway to IBM Nets Introduced by Wang

By Jim Bartimo
CW Staff

LOWELL, Mass. — Calling them "the most important products in the company's history," Wang Laboratories, Inc. last week announced an imaging processor that can be used to digitize entire documents and store them in a computer's memory and a variety of communications software.

The software, which includes a gateway to IBM networks, can be used to send digitized images to both Wang and non-Wang computer systems, as well as make connections to other vendor environments.

Also introduced were: an upgrade to Wang's word processing software, an applications development tool, a relational data base and documentation for its word processing document format options for the Wang Professional Computer (see stories on Page 6).

The Wang Professional Image Computer uses a camera to scan images from a document and digitizes those images. Once digitized, the image can be displayed, stored, retrieved, altered, merged with text and communicated. It is said to be the first office system to incorporate imaging technology in its design.

As part of the Professional Computer line, the PIC includes a desktop camera-like scanner to digitize images from a sheet of paper, a high-resolution monitor and a desktop thermal printer. The system is designed to handle information that includes pictures, handwritten notes, margin notations on correspondence, drawings and text.

The PIC system is said to be fully integrated with the Wang VS/IIS, VS/Alliance, OIS and Alliance lines of office computers. The image processor ranges in price from $14,965 to $26,730, depending on options added, and will be available in February 1984.

Working in concert with the PIC and also introduced was the Wang Office, a series of network-based software applications for Wang systems said to provide time and task management, communications and information management tools. The Wang Office includes electronic mail, directory services, time management and file management, a Wang spokesman said.

Available on the VS, OIS, Alliance

(Continued on Page 6)

CW Photo by L. Haber

Not Your Everyday Bargain

A cash-and-carry "yard sale" was held by Digital Equipment Corp.'s Computer Museum in Marlboro, Mass., one Sunday earlier this month. On sale at the indoor event — at prices as low as 25 cents and as high as $300 — were items that included old disk drives, magnetic tape handlers and cash registers that were duplicates or overstock from the museum collection. The $300 item was a 1967 vintage PDP-8 processor.

The museum made about $1,000 from the sale, which was attended by some 125 people.

The museum will close in December in preparation for a move to downtown Boston's Museum Wharf, where it will reopen in the fall of 1984. The proceeds from the yard sale will be used to defray the cost of the move.

New Rates Filed by AT&T Would Cut Interstate Bills

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — AT&T filed new interstate rates last week that could become effective as early as Jan. 1 if they are approved by the Federal Communications Commission. The rate changes would lop about $2 billion off what users are now paying for interstate Message Toll Service and Wats.

However, the changes also call for increasing private line rates by approximately $400 million, so the net reduction in user bills would be about $1.6 billion.

But since the new FCC-mandated surcharges for access to the long-distance network could add $3.3 billion to users' communications costs next year, users could end up paying more rather than less than what they pay now. And if pending legislation is enacted, business users' bills would be even greater (see story on Page 9).

The $400 million added to private line rates represents an average increase of 15.3%. This increase is partly due to the private line access charge, which amounts to $25/mo per line termination. Without the access charge, the average increase in private line rates is 9.4%, said a spokesman for AT&T Communications (formerly the Long Lines Division).

The private line rate changes vary widely. At one extreme is an 85% increase in monthly and installation charges for telegraph-grade service. At the other extreme is a 38% decrease for 56K bit/sec Dataphone Digital Service.

Generally, the rate reductions have been loaded onto the high-bit-rate, longer distance offerings — where AT&T faces the greatest competition and/or expects to attract the most new business. For example, while monthly rates for 56K bit/sec DDS (without the surcharge or installation charges) will drop 39.4%, similar charges for 2,400 bit/sec DDS will increase 65.3%.

There is also wide variation within each of the service categories.

(Continued on Page 8)

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Second-class postage paid at Framingham, Mass. and additional mailing offices. Computerworld (ISSN 0010-4841) is published weekly except February 21, August 15 and 22, three times in August, October 3rd issue, September 19 issues and a single combined issue for the last week in December and the first week in January by CW Communications, Inc. Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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Subscriptions: 1 yr. $25 — 2 yrs. $45 — 3 yrs. $65 in U.S. 1 yr. $40 — 2 yrs. $75 — 3 yrs. $100 in Canada, Central & So. America — $140 a year Europe — $160 a year all other countries — $240 a year surface delivery. Four weeks notice required for change of address. Please allow six weeks for new subscription service to begin.

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I-8150 User to Get $54,700

NCR Again Ordered to Pay User

By Bill Laberis
CW Staff

GREENVILLE, S.C. — A court-appointed arbitrator has ordered NCR Corp. to pay $54,700 in damages to a South Carolina user of its I-8150 minicomputer.

This marks the third time in recent months that NCR has been ordered to pay damages to users of its minicomputers as apparent sales misrepresentations from the late 1970s continue to haunt the business computer maker.

Meanwhile, in Boston, a consumer electronics chain filed a $5.6 million suit against NCR, claiming the company fraudulently induced the chain into buying a turnkey business system that never worked as promised.

In the South Carolina case, an arbitrator awarded $54,700 to WANS Anderson Radio, Inc. — essentially the amount that the radio station owner/user paid for an I-8150 minicomputer and associated programming and maintenance costs — plus unspecified legal fees. In granting the award, the arbitrator brushed aside NCR's contention that the user's problems resulted from the inability of a third-party software vendor to make the system work as represented by NCR.

Briefs filed by WANS' attorney, Theodore S. Stern of Greenville, S.C., contend that WANS had contracted with NCR in March of 1978 for the I-8150 system and that NCR had agreed to program the system for the user's specific needs, namely, to automate the radio station's commercial scheduling and billing.

The briefs claim that NCR said it would provide a turnkey system and would handle the programming chores itself. "A complete staff of trained, experienced NCR programmers is available to ensure the successful installation of WANS' system," WANS claimed NCR wrote in its original proposal.

But after WANS signed the so-called Universal Agreement — a contract clause in most vendor-user contracts remanding damage complaints to arbitration — NCR said it would not perform the programming, WANS claimed. Rather, NCR recommended Contract Data Systems, Inc. (CDS) and backed up its recommendation in writing, assuring WANS that NCR had "been working with CDS for about six months and . . . had very good success," WANS claimed.

CDS, however, had been incorporated for only three months at the time the letter was written and "had barely scratched the surface in NCR programming," WANS claimed. WANS backed up its claim of misrepresentation with an affidavit from another I-8150 user: Install, Inc. of Simpsonville, S.C. Install's treasurer, Margaret Spradlin, said that NCR also promised her company a turnkey system including software, but informed Install on the day the contract was signed that CDS would provide programming services. Spradlin said Install is considering a similar suit against NCR, claiming that only two of five programs promised by NCR and CDS proved functional.

WANS, meanwhile, said it unplugged its I-8150 in May 1980 after CDS abandoned efforts to program the system a second time.

The award to WANS was the third arbitrator's ruling against NCR in recent months. In August, an arbitrator ordered NCR to pay an 8200 minicomputer user $484,000 in damages relating to charges of breach of contract and misrepresentation [CW, Sept. 5]. In June, an arbitrator ordered NCR to pay $216,000 to an I-9040 user [CW, Aug. 1], and a year ago, a U.S. Appeals Court ordered NCR to pay $2.3 million to an 8200 user, The Glovatorium, which proved it had been defrauded by NCR in the sale of the business system.

The Boston Case

In the $5.6 million suit filed last month in U.S. District Court in Boston, Underground Camera, Inc., a 16-store retail chain, claimed the 8200 system it contracted to buy in November of 1979 for $163,000 has never performed as promised by NCR, despite the addition of a second 8200.

The five-count suit alleged that NCR understated the chain's DP needs while overstating the capabilities of its 8200 system. The suit further alleges that NCR has established a "sham company" in NCR Credit Corp. in order "to shield its parent, NCR, from liability."

Attorneys from neither party could be reached for comment before press time.

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President Of Fortune Forced To Resign

By David Myers
CW New York Bureau

NEW YORK — In a dramatic attempt to shed its reputation as a beleaguered small-computer maker, Fortune Systems Corp. last week replaced its "aggressive, very flamboyant" president and co-founder, Gary B. Friedman, and unveiled a series of multiuser computer systems aimed at a market niche above the IBM Personal Computer.

The announcement that Friedman was gone came unexpectedly at a press conference held to announce the new systems. Fortune Vice-President of Planning Homer Dunn — another founder of the California firm — revealed that Friedman, 49, had resigned under pressure from the company's board of directors. Friedman had been scheduled to make an appearance at the press conference.

David Caplan, a former vice-president at Perkin-Elmer Corp. who has been with Fortune only since July, was named acting president of the company.

Dunn cited "a disagreement over management style" as the reason for Friedman's sudden exit. Asked by reporters to define "style," Dunn replied, "Gary [Friedman] was a very aggressive, very flamboyant leader. That's what you need to get going. But when you become a company with many employees and a nationwide distribution network, other characteristics become more important."

Contacted by telephone last week, Friedman said, "If I didn't [resign], I probably would have been fired." Fortune's founder explained he felt control over the company was slowly being taken away from him by the firm's board of directors.

Friedman did, however, stress that his sudden vacancy is not an indication the firm is in any kind of financial difficulty. His departure "had nothing to do with the health of the company," he stated.

New Products Overshadowed

The announcement of Friedman's departure stole attention at the press conference from the product introductions, which included an entry-level computer, the Professional System, a more powerful multiuser processor called the Extended Performance processor — both of which were designed to be lower end members of Fortune's Model 32:16 family of processors — and a new operating system (see box). Company executives were at obvious pains to make it clear that Fortune Systems had taken a new direction to reverse two straight quarters of financial losses.

Fortune lost just over $3 million on sales of a little over $12 million in the second quarter ended July 1. The company has said it expects to report a third-quarter loss as well, but Dunn declined to say if Fortune anticipates a loss in its final quarter as well as for the year.

"The company has experienced some setbacks in the past," Dunn said. To recover from those setbacks, he announced that the company would no longer sell its equipment through "storefront retailers" and expects to increase both the volume of sales and the percentage of its business from large national accounts.

Dunn blamed the overwhelming market acceptance of IBM's Personal Computer for Fortune's lack of success with dealers. "Imagine trying to get their attention [once the IBM machine came out]. We had to change our focus to the more sophisticated retailers and value-added distributors," Dunn said.

In addition, the vice-president of planning said the company's housecleaning had been completed with the hiring of six new technical managers in the past half-year. This was done to "beef up" its technical management team and correct the errors in technical execution that had shown up in earlier versions of Fortune equipment, according to Dunn.

One of those new appointees was 56-year-old Caplan, formerly Fortune's senior vice-president of technical operations and now acting president of the company. Caplan had been the vice-president of Perkin-Elmer's Computer Systems Division until he was "recruited specifically to manage the company's technical operations," Dunn told reporters. "He wants to be chief engineer and doesn't want to be [permanent] president."

Fortune's board of directors has launched a search for a replacement for Friedman, Dunn said.

Fortune Releases Two Systems

NEW YORK — The systems unwrapped here last week by Fortune Systems Corp. included:

- The entry-level Professional System, which offers up to 512K bytes of random-access memory and 16K bytes of read-only memory. Intended for small businesses, the Professional System is equipped with either a 10M- or 20M-byte hard disk backed up by an 800K-byte floppy. Single-user system costs begin at $7,995.
- The multiuser Extended Performance (XP) system, which can support as many as 13 workstations and comes outfitted with either a 20M- or 30M-byte hard disk backed up by an 800K-byte floppy. The XP is configured with a standard 512K bytes of memory, expandable to a 1M-byte maximum. In its basic version with a 20M-byte hard disk, the XP costs $12,995.

The Professional System series of processors is said to be completely hardware- and software-compatible with Fortune System's higher end Model 16:32 computer.

Fortune Systems also unveiled a Unix-like operating system dubbed For-Pro, which is derived from Bell Laboratories' Version 7 and System III Unix codes.

Fortune Systems is home-based at 300 Harbor Blvd., Belmont, Calif. 94002.

Distributed Processor Works With IBM, Compatible CPUs

By Ed Scannell
CW Staff

BOSTON — Claiming that it will free those Fortune 1,000 users enslaved by their IBM mainframes, Spartacus Computers, Inc. last week unwrapped an IBM 370-compatible distributed processor that can be networked with both IBM and plug-compatible mainframes.

Possessing approximately the same processing power as IBM's 4331 Model Group 2 mainframe, Spartacus' K102 reportedly allows users to download and run without modification programs compatible with IBM's 4300, 30 series and 3080 series mainframes in the VM environment.

The 32-bit Spartacus system communicates with IBM and compatible mainframes through a vendor-developed networking system called Knet, described by one company executive as "similar in scope" to IBM's Systems Network Architecture.

Knet is based on the Transmission Control Protocol and Internet Protocol (TCP/IP), a networking architecture introduced last year that is capable of carrying large amounts of data via value-added networks. It was developed to replace the Network Control Protocol, which functions with the U.S. Department of Defense's Arpanet network and is being considered as a possible standard for the military [CW, Feb. 15, 1982].

Allows More Flexibility

According to Spartacus, TCP/IP allows users more flexibility in configuring a range of communicating media including binary synchronous lines, channel-to-channel adapters and local-area networks including Xerox Corp.'s Ethernet, which reportedly allows the K102 to be connected to non-IBM devices offered by at least 30 different vendors.

Through Knet, the K102 can connect as many as 10 IBM Personal Computers to communicate asynchronously with IBM mainframes at a cost of $10,000 per station, Spartacus said.

Spartacus' KOS/VM operating system, a streamlined version of IBM's VM/370 Release 6 operating system, features support for logical devices and full screen applications. The company said it streamlined VM/370 by taking out code that supported outdated IBM hardware devices such as IBM's 2305 drum plotter and 2311 disk drive.

KOS is made compatible with existing programs through 3270 simulation, which Spartacus effected by building two features into the system. The first function was added to the System/370 Diagnose instruction to permit a virtual machine running under KOS to act as a control unit for a logical 3270-type terminal. The second feature is a simulator subsystem that sets up a logical 3270-type device for each Ascii terminal logged on to KOS.

Whenever KOS is asked to direct data to one of the 3270 devices, it instead sends data to a memory location in the simulator virtual machine. The simulator then translates the 3270 operations into a form appropriate for the Ascii terminal.

A typical K102 configuration consists of 1M byte of internal memory (expandable to 2M bytes), 64K bytes of random-access memory, a 75M-byte Winchester disk drive, two I/O processors, serial communications adapters, power supply and the Universal System/IBM 370 instruction set. The Ethernet adapter and controller is optional.

Unlike the 4331 and other competing mainframes, the K102 plugs into a regular wall outlet, eliminating the need for raised computer floors. Because the system requires less power to run, the need for air conditioning is also eliminated. This permits users to place the system in the office instead of the computer room, according to George McQuilken, Spartacus president. McQuilken maintained that "the office of the future is not in the computer room."

McQuilken said the K102 system is particularly targeted at those Fortune 1,000 firms with large investments in IBM architecture, programs, data bases, training and staff. "Until now, these users had two choices that amounted to a dilemma: Either innovate and sacrifice compatibility, or stay compatible and forsake innovation," he said, touting the K102 as a viable alternative.

The K102 is priced between $65,000 and $95,000, depending on configuration, and is expected to be available Dec. 1. Spartacus is at 5 Oak Park Drive, Bedford, Mass. 01730.

Security Cited As DOD Splits Arpanet in Two

WASHINGTON, D.C. — In a move to combat illegal penetration of its computer systems, the U.S. Department of Defense (DOD) last week split its Arpanet computer network into two segments — one for military users and the other for access by civilians.

The two newly created networks will be known as Milnet, which will be used to interconnect classified computer sites, and R&Dnet, which will serve unclassified sites.

The split was necessary, according to DOD, because of the increasing sophistication of those who try to penetrate computer security. DOD said it also plans to require that individuals dialing into either network over public telephone lines present a password before being granted access to files.

The issue of computer security is "going to grow," said Deputy Under Secretary of Defense Donald Latham. "There will be more of these hackers, and we're going to have to deal with their increasing sophistication."

Formally known as the Advanced Research Projects Agency network, Arpanet was built in 1969 to interconnect computer sites working on DOD-related research and development, classified as well as unclassified. It was the world's first packet-switched network and ultimately interconnected 300 computers in the U.S. and Europe.

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Wang Unwraps Image Processor for Office Use

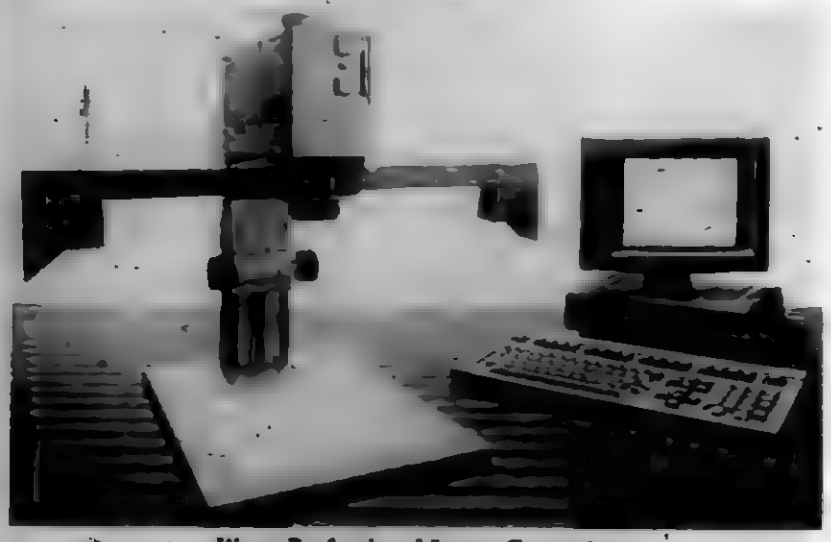
(Continued from Page 1)

and Professional Computer systems, features of the Wang Office range in price from $400 to $95,000 depending on the machine and configuration selected. Most will be available in the second quarter of 1984.

The Information Distribution System (IDS) is a family of software products said to provide a pathway between Wang VS systems and an IBM or IBM-compatible host over an IBM 3270 Systems Network Architecture or Binary Synchronous Communications network.

"IDS creates a single integrated network for sharing and merging information between an IBM host and Wang VS systems," said Frederick A. Wang, executive vice-president and chief development officer for Wang. "It offers the best of both worlds to companies [that] have purchased equipment from IBM and Wang."

Two types of communications are possible with the IDS software: communications among VS systems through an IBM host and communications between VS systems and the mainframe host in the form of store-and-forward service. Prices for the IDS software, which will be available in March 1984, range from $18,300 to $58,000.



Wang Professional Image Computer

IDS fits in with Wang's newly announced communications strategy — Wang Systems Networking (WSN). WSN is not a product, but an umbrella term describing networking products that link Wang systems and provide gateways to other environments such as Ansi X.25. WSN products are layered similarly to the International Standards Organization's Open Systems Interconnect reference model, a spokesman said.

More information on these announcements is available from Wang, One Industrial Ave., Lowell, Mass. 01851.

Wang Also Upgrades, Adds To Software Repertoire

BOSTON — In addition to its office automation and networking announcements, Wang Laboratories, Inc. also made several software announcements here last week, including an upgrade to Wang's word processing software, an application development tool and a relational data base.

The company also released documentation containing information on the firm's word processing document format, which can eventually be used to integrate office automation products under a single standard, a spokesman said.

The WP Plus is an integrated word processing editor that is an option for the Wang OIS, VS and Alliance office systems. Features of WP Plus include the integration of text and graphics, split-screen editing, multi-column editing, revision marks, an "Undo" feature to correct unwanted edits, footnotes, scientific typing, foreign language support, 250-char.-wide document support, an 8,000-page document capacity, spelling verification and an on-line training package.

Available in June 1984, WP Plus will cost $2,000 for the initial license fee.

Also introduced was the Wang Professional Application Creation Environment (Pace), said to be a full-function, fourth-generation software system that encompasses all aspects of application development and includes data base, screen and report definition.

Pace combines into a single integrated environment the flexibility of a relational data base management system and data dictionary with form-driven, nonprocedural user interfaces, according to a spokesman for the vendor. The complete package will be available for $34,000 in June.

The company also announced the availability of license agreements for its Word Processing Systems Communication Specification (WPS-CS) and the Wang Information Transfer Architecture (Wita). This announcement is intended to open the office automation marketplace to Wang's current word processing document standards.

The information will be provided in the form of manuals that contain the document data stream information. WPS-CS is available for a license fee of $500; Wita, available in June, will also cost $500.

More information on these products is available from Wang, located at One Industrial Ave., Lowell, Mass. 01851.

Wang Micro Gains Variety Of Options

BOSTON — Wang Laboratories, Inc. announced here last week that it has added a Wangnet option, Cobol Level II, wider chassis and Digital Equipment Corp. VT100 emulation to its Professional Computer.

The Wangnet Professional Computer Service option is said to allow users to connect Wang Professional Computers directly to Wangnet, providing high-speed communications over broadband cable. Available in March 1984, the option is priced at $800 with a $10 monthly maintenance fee.

The Level II Cobol Programming Environment, developed by Micro Focus of Santa Clara, Calif., is a compiler and program development utility also available for the Professional Computer. Users can write Ansi '74 Level II programs for the Professional Computer with the utility. It is available for a license fee of $1,500, and other features will increase the price.

The expanded chassis on the Professional Computer provides three additional expansion slots on the base system unit. With the eight-slot chassis, users can reportedly add greater capabilities to the Professional Computer, including the Professional Image Computer (see related story). Available in January, it will sell for a base price of $2,945.

The VT100 emulation software allows the Wang Professional Computer to act as an asynchronous terminal in a DEC host environment using leased or dial-up lines and to perform remote interactive on-line processing. Available in January, the package will cost $200.

More information on these announcements is available from Wang, One Industrial Ave., Lowell, Mass. 01851.

Corrections

A chart accompanying "Micro Explosion Forces T/S Vendors to Refocus" [CW, Sept. 12] mistakenly identified the CSTS and CSTS II operating systems available on Computer Sciences Corp.'s CSTS service as products of Sperry Corp. The two operating systems are proprietary products of Computer Sciences Corp.

The Model 274C controller from Telex Corp. [CW, Sept. 26] supports 32 devices, not 320 devices.

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New Interstate Rates Could Go Into Effect Jan. 1

(Continued from Page 1)

Monthly charges for 9,600 bit/sec DDS, for example, will be reduced an average of 3.9%, but the charge for a Denver-to-Chicago DDS circuit will drop 14.2% (from $1,898/mo to $1,626/mo).

The following are sample rate comparisons for other services included in last week's tariff filing:

- MTS: A 69-mile, 5-minute daytime call from New York City to New Haven, Conn., now costs $2.05; it would cost $1.84 under the new tariff.

The same call between New York and Los Angeles, now $2.70, would cost $2.45.

- Wats: The proposed tariff reduces average rates 6.9% if the access surcharge is included and 10.7% if it is not. A San Francisco-area Wats customer whose calls total 80 hour/mo and are made during the business day to the East Coast now pays $1,420.05/mo for service; under the proposed tariff, he would pay $1,296.65.

A similar customer in Chicago, calling near Chicago, now pays $251.15; under the new tariff, he would pay $252.65.

- Voice-grade private line service: A New York City-to-Pittsburgh, Pa., circuit now costs $528.06; the new rate would be $653.20.

A similar 3,000-mile circuit, which now costs $2,331.10, would be priced at $2,003.00.

Balance of Rates

AT&T announced its proposed long-distance rates at a press conference here which was attended by several of the technicians who wrote the tariff. One of those technicians said that a business user now spending as little as $15/mo per line for dial-up long-distance service could save enough in reduced MTS rates to balance the increase generated by the access surcharge.

On that note, AT&T Communications President Morris Tanenbaum, the featured speaker at the press conference, issued a warning to Congress that proposed legislation effecting a delay or elimination of access charges "would force us to revise our plans to cut long-distance rates and thus deny these rate reductions [to] our customers.

"Indeed," Tanenbaum said, "we [would] need to consider rate increases."

Overall Rate Changes for Private Line Services*

	Percent Change With Special Access Surcharge	Percent Change Without Special Access Surcharge	
	Recurring and Installation Charges	Recurring and Installation Charges	Recurring Only
Voice Grade	16.9	9.8	7.5
DDO Total	(3.9)	(6.7)	(8.2)
DDC 2.4	74.3	80.4	65.3
DDC 4.8	18.8	15.5	12.9
DDC 9.6	0.5	(2.4)	(3.9)
DDC 56	(38.0)	(38.8)	(36.4)
TDC	34.9	14.0	4.9
Telegraph Grade	85.0	76.0	76.0
Wideband Data	(7.5)	(8.2)	(8.2)
Program Television	**	42.5	32.0
CCSA	**	12.0	12.0
SCAN	**	19.8	19.8
EPSCS	**	16.4	10.0
PL Category Overall	15.3	9.4	7.3

* Without Demand Effects
** Special Access Surcharge Not Applicable
() Denotes Negative Amount

Source: AT&T

CDC Unwraps Two Processors to Boost Speed of Cyber 170 Supercomputers

MINNEAPOLIS — Control Data Corp. last week unwrapped two versions of a multiparallel processor that, when linked to its Cyber 170 Series 800 supercomputers, is said to increase computational speeds up to 16G operation/sec in a 64-processor configuration.

The Cyberplus processor is an enhanced commercial version of the company's Advanced Flexible Processor parallel system that has been used exclusively for specialized government and military applications. The company said it plans to use Cyberplus in numerically intensive commercial and scientific applications such as manufacturing, medical research and the analysis of seismic data.

CDC attributes Cyberplus' processing speed to the use of its ring architecture permitting the interconnection of up to 16 processors, which forms a high-speed communications channel, the company contended.

A spokesman said the ring architecture allows each processor to read and write each ring at a sustained rate of 800M bit/sec. Therefore, the spokesman explained, a multiple-processor system is capable of an interprocessor transfer rate of 1.6G bit/sec multiplied by the number of processors. Up to four rings, or 64 processors, can be attached to one Cyber 800.

The internal architecture of the system permits multiple computational streams of data to be constructed and executed in parallel. For example, the change algorithm for image processing running on Cyberplus is about 100 times faster than on CDC's 7600 system, the spokesman related.

The primary Cyberplus system in a multiprocessor configuration operates in 8-, 16-, and 32-bit integers, while a second system operates in 64-bit floating point. Each processor contains 256K 64-bit words of memory, which is expandable to 512K 64-bit words.

The basic version of Cyberplus, which includes a 16-bit integer unit and 256K words of memory, is priced at $735,000. When purchased with all available options, the system costs $1.6 million.

First deliveries of the system will begin in the third quarter of 1984 from Cyberplus Product Marketing, through P.O Box 0, Minneapolis, Minn. 55440.

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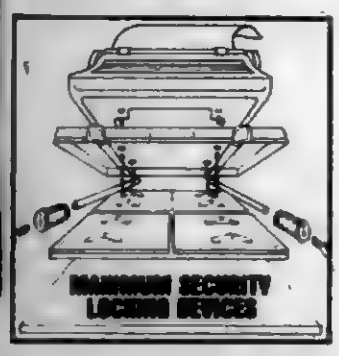

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IBM User Group Slates Meeting Oct. 22-26 at Phoenix Hilton

CHICAGO — Common, the IBM user group, will hold its Fall 1983 Conference at the Phoenix Hilton from Oct. 22 to Oct. 26.

A highlight of the conference will be several presentations on the introduction of the IBM Personal Computer into the corporate setting. IBM will provide information on the latest technical aspects of its product.

'Our Staff Has Accused You of impersonating a DP Manager.'

Among the speakers at the conference will be Lou Veltri of Software Plus, Inc.; Tom Longman from The Systems Center, a Texas firm; Steve Papermaster of MCM Systems of Texas; Don Chapin of CBIS Corp. in New York City; and Ron Berry of Peerless Engineering in California.

Preregistration fees are $100 for members and $160 for nonmembers. On-site registration fees are $130 for members and $180 for nonmembers.

Further information on the users group meeting is available from David G. Lister, Administrative Director, Suite 1717, 435 N. Michigan Ave., Chicago, Ill. 60611.

But AT&T Issues Strong Warning

Congress Mulling Bills Barring Access Charge

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — The charges that users may have to pay to access long-distance, dial-up and private line services beginning next January were submitted to the Federal Communications Commission (FCC) on Friday, Sept. 30. The following Monday, AT&T filed inter-Local Access and Transport Area (Lata) tariffs covering long-distance, dial-up and private line usage charges.

Whether these rates will be implemented, however, is questionable. They all assume that beginning Jan. 1, residential users will pay a surcharge of $2/mo per line and business users will pay up to $6/mo.

Shortly before the tariffs were filed, the U.S. Senate Commerce Committee approved a bill barring imposition of the surcharge on residential users, as well as on business subscribers leasing single lines until Jan. 1, 1986. Similar legislation had been passed by the House of Representatives Telecommunications Subcommittee.

AT&T officials have warned that if this legislation is enacted, all of the recently filed rates are likely to be revised, resulting in a reduction of long-distance charges (making them lower than the ones filed) and an increase in the remaining access charges.

Two Payment Types

The access charge tariffs filed Sept. 30 cover two types of payments: the $2/mo or $6/mo surcharge end users would pay directly to their local carriers beginning Jan. 1, and the surcharge the local telephone companies would collect from each long-distance carrier with which they interconnect. Since the long-distance carriers would pass this second charge onto their customers, end users would actually pay both fees.

The two sets of charges are designed to reimburse local telephone companies for the costs they incur in providing access to inter-Lata transmission facilities — for example, the circuits provided by AT&T, MCI Communications Corp., Southern Pacific Communications Co. and other interstate carriers. The access facilities supplied by the local carriers include local loops, which connect subscribers to nearby switching centers, and other circuits running between each switching center and the interexchange carrier's network termination point — the so-called point of presence.

Today, long-distance access charges are reimbursed through payments collected by local telephone companies entirely from interexchange carriers (who include the payments in their charges to end users). The new scheme would replace the present one on Jan. 1.

Altogether, the nation's 1,540 telephone operating companies would collect about $20 billion annually under the access charge tariffs filed late last month. Approximately $2.1 billion would come from residential users and $1.2 billion from business users; the rest would be paid by interexchange carriers and passed onto their customers.

Since end users would pay some access charges directly, and the charges would be imposed on all customers of local telephone companies — including those who make no long-distance calls — less would have to be collected from long-distance charges, so AT&T has been able to propose lower rates for some offerings. Its competitors almost certainly will follow suit once the new AT&T tariff is implemented.

The usage charges proposed by AT&T last week would reduce its rates for dial-up, long-distance voice-grade service an average of 10.5%; Wats rates would drop an average of 6.9% and the toll-free 800 service would increase an average of 1.3%. Private line rates would rise an average of 15%. (All of these percentages reflect the related access charges.)

But there is wide variation within most of the categories. For example, usage rates for 2,400 bit/sec Dataphone Digital Service (DDS) would increase 74%, while 56K bit/sec DDS would cost 38% less.

If the pending legislation is enacted, there will be no surcharge on residential users and possibly none on single-line business customers for at least two years. Bell and independent local telephone companies, as a result, would lose most of the $3.3 billion to be collected directly from end users.

To make up for this loss, the local carriers would have to charge their other customers — multiline business users and interexchange carriers — higher access fees for Message Toll Service/Wats. The carriers would then pass on these increases to the users of interexchange services.

In addition to inter-Lata network access, business users also will have to pay for access to the intra-Lata network, which encompasses much of today's intrastate transmission facilities. The latter charges have not been firmly established yet.

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Federal Express Planning Fax-Based Delivery

(Continued from Page 1)

digital signals and processes it right there."

The types of documents delivered through Gemini (whose name is likely to change when the service hits the marketplace) will include "any form of graphics that people want urgently sent," such as engineering drawings, advertising layouts and legal documents.

Federal Express officials are unwilling to disclose details of the Gemini project to the press until its formal announcement several months from now, but in interviews with people close to the project, including several Federal Express employees, *Computerworld* has confirmed the following facts:

- Federal's investment in Gemini is an estimated $100 million, with an additional $10 million expected to go toward a heavy advertising campaign on a par with the award-winning ads for overnight delivery.
- The transmission machines will be built by NEC America, Inc. and custom-tailored to Federal's needs. In late 1982, Federal purchased 1,000 machines, and last month the company signed a second contract, which is expected to put the total number of machines in excess of 2,000. The machines will reside at Federal Express dispatch centers throughout the country and at customer sites where there is a high volume of use.
- The transmissions, which will travel via telephone lines and satellite, can reproduce between 15 and 30 page/min at speeds as high as 56K bit/sec or as low as 2,400 bit/sec.

As with its existing service, high-volume Gemini customers will be offered attractive discounts. In fact, such customers will have the option of leasing a machine from Federal Express for several hundred dollars, with a small charge for each transmission, thus bypassing the pickup side of the equation.

If a customer is transmitting to someone else leasing a fax machine from Federal, then pickup and delivery is eliminated completely.

Given the limitations of facsimile transmission posed by incompatibility among machines and poor resolution, business facsimile is generally regarded as nothing particularly impressive. But according to David Guthrie, a stock market analyst at Morgan Keegan and Co., Inc. in Memphis, Tenn., facsimile a la Gemini should solve these problems with a combination of logistical and technical wizardry.

Neither NEC nor Federal will comment freely on the technical details of the project but, according to Guthrie, who has been tuned in to Gemini since its inception, the quality of reproduction with the new service is very high with resolution at 400 line/in.

Unlike most documents that emerge from a fax machine on chemically treated paper, the Federal Express product will be on regular white paper, looking like a high-quality photocopy, Guthrie said.

Detailed pricing for the service is not yet established, and Federal Express restricts its comments on this score to an assurance that Gemini pricing will be "competitive" with such services as the $25 four-hour delivery announced by MCI Communications Corp. last month.

But both Federal Express employees and market analysts have confirmed that while the price of transmitting a 10- to 12-page document could range from $10 for overnight delivery to $100 for two-hour international delivery (along with the company's regular overnight service, Gemini will extend to Western Europe by mid-1984), the average price for a two-hour delivery of 10 to 12 pages is expected to be about $40.

Will Market for Gemini Develop? That's Key Issue, Analysts Say

Whether Federal Express Corp.'s electronic document transmission service will be as successful as its overnight delivery is a matter of educated guesses among market analysts and industry consultants.

The key question appears to be whether Federal will be able to create a solid market for Gemini.

"Federal Express created a new market out of nothing with its overnight delivery," commented Walter Ulrich, president of Walter E. Ulrich Consulting, Inc. in Houston. "The company is going to put its promotional budget behind this. And remember its history of excellent ads."

As Ulrich sees it, "the only really interesting question is whether people will use it."

Federal Express is "certainly taking some risk in that there's substantial capital investment involved," commented David Guthrie, vice-president of research for Morgan Keegan and Co. in Memphis, Tenn. "I think usage of the service will accelerate as the public becomes more aware that it's available.

"We like the skepticism, though," Guthrie added. "It creates opportunity."

While some assert that facsimile transmission is a dull technology and Federal Express will sooner or later find itself with 2,000 obsolete fax machines, others believe Federal is demonstrating tremendous foresight with its investment in facsimile.

As one source close to Gemini put it, "With fax technology getting so good, it's only a matter of time before others figure out that facsimile is really where the market is."

Honeywell and IBM Users-Troubled By The High Cost of Terminals?

The Intelligent Multi-Device Interface Unit Could Be The Answer

HERE'S HOW IT WORKS

The TEC MZ-80 IMIU is a microprocessor based communications computer designed to connect a variety of ASCII CRTs to a host system over a high-speed line. In a rackmount or attractive desktop-size unit, the IMIU combines all of the following features:

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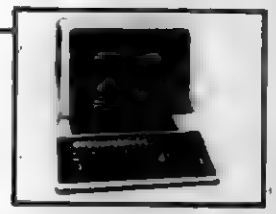

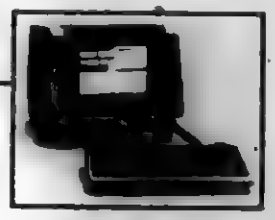

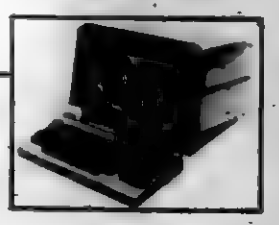

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HONEYWELL HOST SYSTEM ENVIRONMENT

The MZ-80 IMIU offers flexibility and power to users of all types of Honeywell computer systems that use VIP protocol. The MZ-80 provides a VIP-7700 compatible interface for up to 32 serial RS-232 devices such as CRTs, printers, Teletypes, etc. All devices share one synchronous line to the host, yet each device may have a different "personality" provided by driver programs in the IMIU.

IMIU software can also provide complete emulation of the VIP-7700 and compatible terminals such as the ITT-Courier 700 (including its functional extensions). This capability provides the Honeywell user with the features of the VIP-7700, using ASCII terminals costing substantially less. In this mode, up to 16 terminals are supported.

IBM HOST SYSTEM ENVIRONMENT

The MZ-80 IMIU also offers cost and configuration advantages to users of IBM binary synchronous (Bi-sync) protocol. In this environment, the IMIU appears to be an IBM-3271 cluster controller using any of a large selection of less expensive ASCII terminals to emulate actual IBM-3270 terminals. IBM-328x compatible printers are also supported. In emulation mode, up to 28 devices are supported. IBM SNA/SDLC capability will be available in late 1983.

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Use Remains Voluntary

Nine-Digit Zips Finally Under Way

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — After seven years of planning, programming, debate and delay, the U.S. Postal Service (USPS) has finally implemented its nine-digit Zip Code program.

On Oct. 1, the USPS began sorting mail by the longer numbers at approximately 55 of its largest mail processing centers that have the automated equipment needed to handle the nine-digit Zip Codes. USPS said approximately 1% of first class mail already carries the longer numbers. In 1982, post offices handled some 62.2 billion first class cards and letters.

Although the initial volume is small, USPS expects to handle about 12 billion pieces of first class mail with the new codes in the first year of its "Zip + 4" program.

USPS is counting on a rate discount recommended late last month by the independent Postal Rate Commission and adopted by the USPS board of governors last week to stimulate use of the new Zip Codes. The discount equals one-half cent per piece for presorted letters delivered to the post office in groups of at least 500, and nine-tenths of one cent for each piece in nonpresorted lots of 250 or more letters.

There are approximately 35 million of the new codes, which are based largely on existing five-digit numbers and expand the Zip Code system to allow USPS to sort mail to the individual mail carrier route, not just the individual post office, and target it down to the sides of separate street blocks and individual buildings on the routes. By using new optical character readers (OCR) and bar code readers, the Postal Service believes the new numbers will significantly increase postal automation and economies.

Aimed at Business

As with the five-digit Zip Codes, use of the longer numbers remains strictly voluntary and is aimed at volume business mailers. To ensure that remains the case, legislation pending in Congress would prohibit USPS from making the codes mandatory or encouraging general use of the new codes through advertising.

Postmaster General William Bolger has said he supports "legislation to allay any fears" about the program, according to a USPS spokesman, who noted that nonbusiness first class mail "is a very slim percentage" of the total mail volume.

But for congressional intervention, the Zip + 4 program would have been implemented 2½ years ago. In mid-1981, Congress passed a bill delaying the program until this month because of concern the longer numbers would be made mandatory or advertised so heavily that individuals might feel they should convert to their use.

Also, House and Senate postal service committees feared the post office was rushing into the new program without having sufficiently tested the new machinery required to sort the new codes and without reliable cost-effectiveness figures to demonstrate adequately that the USPS would indeed save money through the program.

At the end of September, Congress' General Accounting Office (GAO) completed a study of the program and reported there are still "some uncertainties" about the performance of the new equipment. The OCR machines will read the Zip Codes and print a bar code on each envelope, which will be read by new bar code readers and sent on to the appropriate mail carrier for delivery.

But the Postal Service assured the GAO that the problems are common to start-up operations and are being corrected; USPS said it firmly believes "the equipment will perform up to expectations." Despite its concerns, the GAO concluded: "None of the uncertainties or needed improvements identified by GAO warrants a delay in the start of the program."

The primary concern for mailers is whether or not the rate discount is sufficient to recoup the costs of converting to the longer numbers. The Postal Service makes available computer tapes that can be matched against a firm's mailing lists to convert to the nine-digit zips. Additional costs of programming files for the longer numbers through purchased or in-house software make conversion attractive only to large mailers, the Postal Service acknowledged.

The Postal Service originally recommended only the half cent per 500 presorted letters discount and said that would make conversion economically sensible for mailers with only four mailings per year to each address on its list. This figure was based on a projected conversion cost of 2 cents per address and one year to recover conversion costs.

Seminar to Treat Micro Control

FRAMINGHAM, Mass. — A seminar for auditing and controlling micro and personal computers and addressing their impact on business is being offered by MIS Training Institute, Inc. here.

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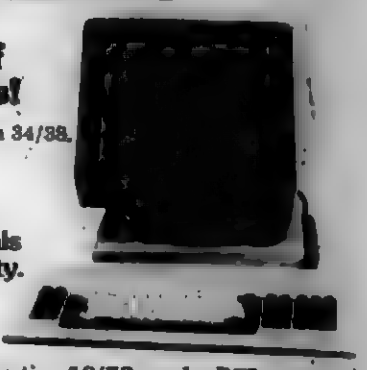

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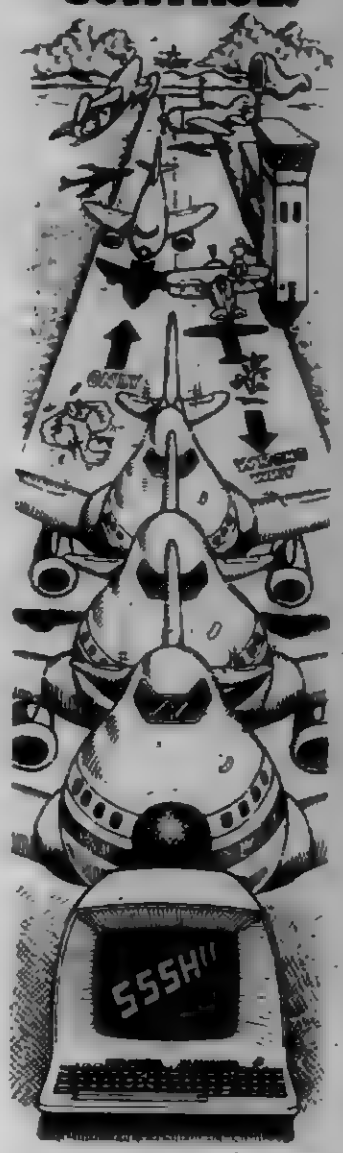

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Psychologists Offer DP Consulting

Erasing the High Anxiety From Computing

By Lynn Haber
CW Staff

LA JOLLA, Calif. — If a friend or business associate tactfully suggested therapy to cure your company's data processing performance ills, what would you say?

"You can have the most expensive, high-quality computer equipment installed by experts and have it work perfectly — but, if your staff is too frightened to use it, it doesn't do you much good," said Dr. W. Mark Lassleben, psychologist and partner of Transition Associates (TA), a high-technology management consulting firm here.

The Webster dictionary defines phobia as an exaggerated, usually inexplicable and illogical fear of a particular object or class of objects. What occurs when a phobia arises within the environment of modern computer technology?

"The way computer phobia interferes in the work place is that people avoid situations where they can be successful. People miscommunicate, which causes all sorts of problems up and down the organizational structure. We feel that this is an area that's been neglected in the high-technology field," Lassleben said.

"There are a lot of people who have awfully high expectations of computers. They've got this million dollars worth of equipment, but it's not working the way they hoped it would have, not because there's anything wrong with the machine, but because these people are afraid to use it or because they don't know how to communicate with each other any better than before they had the machines. The human factor has over and over again put limitations, in a variety of ways, on very sophisticated equipment," he added.

Dr. Lassleben and Dr. Thomas F. McDonald of TA have been consulting with people in high-technology industries for the past three years. Both have backgrounds in psychological training.

Their firm works with people who are automating their offices and using new technology as a part of their work situations.

"All the work we do at TA is related to high technology, computers or other information processing types of systems and, particularly, the human element involved — how people work with these machines, how people work with each other as a result of working with these machines," Lassleben said.

"We work with a variety of people-oriented type managers who are having to interface their old or new work force as a whole with a new generation of machines. Actually, the principles of the machinery aren't very much more complicated, but people are so awed and overwhelmed by even the word computer, they think 'I can't handle that,' and they have this fearful reaction, just like somebody who's been burned by a book of matches and is faced with striking a match again," Lassleben said.

At Iowa State University, a graduate student and full-time data processing trainer recently completed his master's degree thesis in which he attempts to construct a measure for computer anxiety.

"I have an interest in computer anxiety because I work in training people in data processing. I was aware that certain people showed a lot of apprehension when confronting computers," Matthew M. Maurer said.

"What my test can be used for, in conjunction with observation, is to identify people who are having these problems, including those people already in the industry. I think computer anxiety affects a person's general feeling of well-being about his job satisfaction," he said.

Because there is very little literature that addresses technophobia anxieties, the staff at TA relies on self-reporting and other measures of anxiety.

"There are a lot of common measures of anxiety that are readily adaptable to the computer environment. It's a fairly old concept," Lassleben said.

"There are a number of solutions, largely individual in nature. You try to figure out where the anxiety is coming from and why. You do that on an individual basis, sometimes on a person-by-person basis, and sometimes you find that there's a familiar theme within a certain business. And the basic strategy in overcoming any anxiety is to introduce the person into the situation that causes the anxiety in a slow, methodical manner, step by step," Lassleben said. "There are some special tricks and twists that come up in high technology, but gradually you do the same kind of thing you do with any other sort of phobia."

According to Lassleben, the greatest obstacle in getting executives to admit that they're having business-related problems that go beyond technology is that most executives don't view people problems as important or remediable.

"We've learned a great deal from the Japanese recently. People are starting to think more seriously, executives especially, about the human factor in the work place, and that satisfied employees do make a difference in the products that are turned out at the end of the line," he said.

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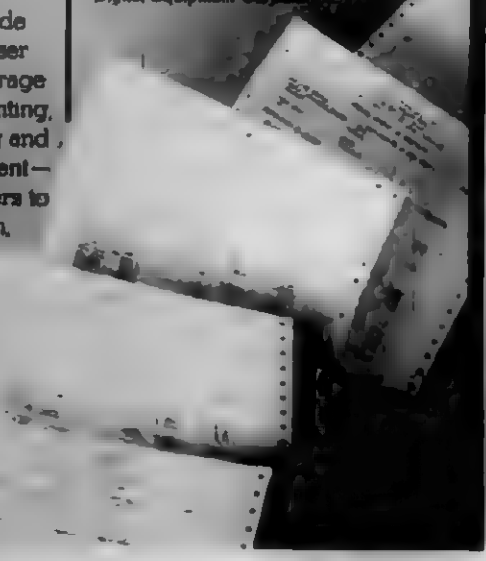

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Endorsed by DPMA

Second DP Fraud Bill Reaches House

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The Data Processing Management Association (DPMA) has given qualified endorsement of legislation that, while primarily directed at curbing credit card fraud, would also make computer fraud a federal crime.

The Counterfeit Access Device and Computer Fraud Act would set penalties of up to $10,000 in fines, 10 years in prison or both for anyone who uses or conspires to use "a computer with intent to execute a scheme to defraud." The bill, H.R. 3570, would also authorize the U.S. Secret Service to investigate computer and credit card fraud.

At a Sept. 29 hearing on the bill before the House Judiciary Subcommittee on Crime, DPMA International Vice-President Robert A. Hoadley pointed to the association's support for the better known Federal Computer Systems Protection Act, H.R. 1092, sponsored by Rep. Bill Nelson (D-Fla.) and now under consideration in the House and, in a companion bill, in the Senate.

"We believe H.R. 3570, as a means of attacking the burgeoning crime of credit card fraud, is a valuable tool in the hands of federal prosecutors," Hoadley said. He added that "to the extent that the language in H.R. 3570 relating to computer crime will not conflict with the more comprehensive prohibitions contained in H.R. 1092, we would have no hesitancy in supporting it."

Hoadley said DPMA "will leave it to the parliamentary experts in the Congress to determine whether, if both bills become law, they will complement or inhibit each other."

August Bequai, attorney and computer crime expert, also testified in favor of the bill. Bequai said it makes sense to group credit card and computer fraud together. "The very survival of the cashless society depends on the security of its computers.

"Legislation in the area of [electronic funds transfer systems] should, by necessity, address two issues: counterfeit access devices and threats to the computers that run the system," according to Bequai.

He also said that professional criminals have entered the credit card fraud market. "The real concern, however, is that these same criminals may increasingly turn their attention to the computers that make the cashless society a reality."

Universities Must Be Wary Of Vendors Bearing Gifts

By Katherine Hafner
CW Staff

Not ordinarily one to look a gift horse in the mouth, Doug Van Houweling, vice-provost for computing and planning at Carnegie-Mellon University in Pittsburgh, Pa., has turned down a vendor donation or two. "If a grant appears that it wouldn't fit into our overall system, we can't really accept it," Van Houweling explained.

Accepting a vendor grant or donation may appear easy on the surface, but Carnegie-Mellon and other recipients of large donations must go through a comprehensive planning process before receiving vendor-donated equipment.

"The hardware for a computer system is usually the smallest part of the cost of running it over a five-year period," commented Leonard Bosack, director of Stanford University's computer facilities. "Maintenance and people are the real costs. So we're rather reluctant to take on only hardware, as it requires a substantial commitment from the university."

Both Stanford and Carnegie-Mellon like to be given six months to a year in preparation time before the actual arrival of donated equipment. At MIT, "some things we'll accept without any notice, and others we try to stage over a significant period of time," said James Bruce, the school's director of information processing. MIT's $70 million partnership with Digital Equipment Corp. and IBM will take five years to implement.

Raising the necessary funds from industry, government and alumni to meet the training and support demanded by large donations is "a crusade of monumental importance," commented Andries Van Dam, chairman of computer science at Brown University, which recently received a $15 million donation from IBM and 50 Apple Computer, Inc. Lisa microcomputers. Brown plans to provide workstations with communications capabilities to each student, staff and faculty member by 1990.

"We think the Brown experiment is sufficiently novel and compelling that we'll be able to raise a significant amount of money," Van Dam added. "In that sense, the $15 million from IBM is a bellwether."

In addition to the tremendous sums of money that must be raised to support vendor-donated equipment, there are such issues as providing security to mainframe-based information and the machines themselves.

"Security is something we'll be grappling with," commented Van Dam. "We have all kinds of sensitive information on our mainframe."

"No one is going to walk off with a DEC [VAX] 750," MIT's Bruce said in response to a question on physical security. "But an IBM Personal Computer is very easy to walk off with." MIT will "probably bolt the [Personal Computer] box down to the desk and use electronic circuitry to detect when it's been unplugged."

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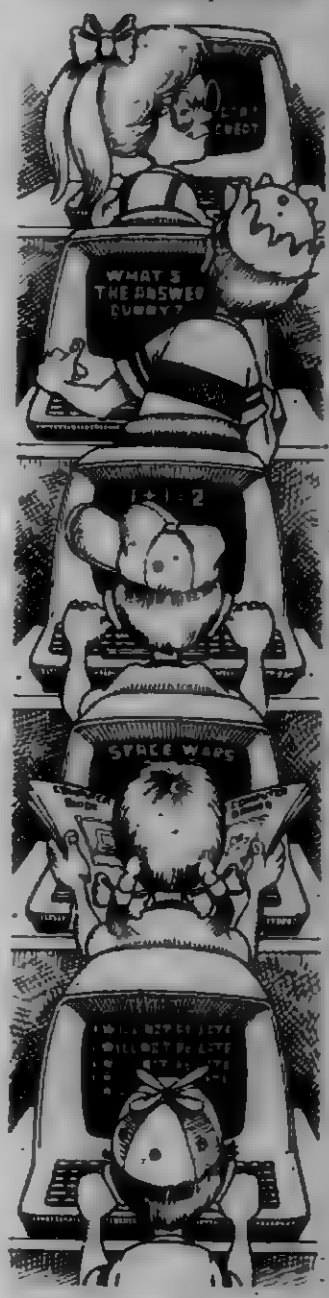

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Both Promise, Problems Seen for Future Systems

By Tom Henkel
CW Staff

Tomorrow's computer systems could reportedly offer from 200 to 1,000 times the performance of current systems. But while many experts contend such systems may be as few as 10 years away, others predict that peripherals with new technology to support those systems may not be ready by then.

Even currently available systems, such as supercomputers produced by Cray Research, Inc. and Control Data Corp., challenge current disk drive capabilities, noted Dr. Alan Gottlieb, associate professor of computer science at the Courant Institute of New York University (NYU). And larger commercially oriented processors may also require bigger, faster disk drives to support the increased I/O activity brought on by large data bases and multiprocessing environments.

Users of scientific and commercial processors have traditionally had different needs when it comes to processor technology. The same is true for disk technologies. Users of large-scale scientific processors typically must have the ability to read large blocks of generally sequential data into a system. For those users, increasing the speed at which data can be transferred from the disk to the system can be beneficial, according to James N. Porter, publisher of the "Disk/Trend Report," an annual marketing publication on the disk drive industry.

Commercial users, on the other hand, tend to access data in a random fashion. For them, getting the information from the disk to the system faster is not as important as speeding up the seek time or the process of looking for data stored on disks, according to Porter.

Currently, users of large-scale scientific processors appear to be hardest hit by the lack of improved disk drive technology. Porter said supercomputer users have had some success in improving transfer rates by using parallel-track disk drives or units that can read and write several disk tracks over one channel at one time.

But Dr. James F. Decker, special assistant to the director of the Office of Energy Research with the U.S. Department of Energy, noted that as systems become larger, severe bottlenecks may develop if new disk drives or disk drive alternatives are not developed.

Since there are only about 100 domestic users of supercomputers, Decker said there has not been a strong incentive for peripheral vendors to spend research and development funds to produce innovative ways of storing data. Since commercial users are not quite as desperate for new disk technologies, big system vendors like IBM are not in a hurry to make dramatic improvements in disk storage, Porter added.

For the foreseeable future, Porter maintained, disk drives for both commercial and scientific systems will be based on the same fundamental technology, namely media-coated disks, which rotate at high speeds under read/write heads. The short-term enhancements to disk technology, such as parallel-track drive technology and perpendicular recording, may improve both seek time and transfer rates, but will use the same basic disk technology, Porter said.

Optical Disks Show Promise

Optical disks, which use a laser to write and retrieve information, show promise for large system data storage, but initial optical disk products have offered frame or picture-oriented storage, as opposed to data storage, noted James Gasbarro, a member of the research staff at Xerox Corp. in Palo Alto, Calif.

The rapidly falling cost of system memory may provide users with the best hedge against bottlenecks caused by disk drives.

By bringing more data into main memory with one read/write operation, users can reduce the number of times their systems have to request information from a disk drive, explained Peter Nelson, supervisor of the computing center at Bell Laboratories.

Scientific users have the problem of getting data from a disk drive to main memory quickly enough to meet the processor's demands. NYU's Gottlieb noted one promising way of writing more disk-stored data into main memory is to amplify all the tracks of a given disk cylinder with one read/write operation. This could transfer massive amounts of data into main memory. Gottlieb noted that declining main memory costs may make it more economical to move massive amounts of data into a system and allow the applications software to use only what is necessary.

But Gottlieb also said electrical interference can be a problem in moving data from many disk tracks at one time.

Commercial users can also make greater use of main memory for improving data transfer. However, Nelson pointed out that bringing more data into main memory requires modification of many commercial applications programs. The programs, he said, have to be altered to look for needed data in main memory, rather than request the information from a disk drive.

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Alleged Cracking of Depositor Code Sparks Denials From Swiss Banks

By John Gallant
CW Staff

NEW YORK — Allegations that French customs officials used powerful military computers to snare French citizens who may secretly hold illegal Swiss bank accounts have sparked denials from an official here of one of Switzerland's largest banks.

The dispute revolves around an article published in a satirical French weekly, *Le Canard Enchaine*, claiming that customs authorities, with the aid of military cryptographers, used computers to crack several coded lists reputedly containing the names of 5,000 French citizens holding accounts valued at F175 million, or about $21 million, in the Union des Banques Suisse (UBS).

The report further claims that French officials are searching out those account holders and have already extracted admissions from a number of residents in exchange for a promise of lenient treatment.

If reports concerning the cracked code-lists prove correct, it may spell trouble for Swiss banks in general which have an almost legendary reputation for impenetrability and can not afford to admit to vulnerability to foreign tax authorities.

But, according to a senior bank officer here, that report is false. "The fact is that this is utter nonsense," said H.R. Kuchler, senior vice-president of UBS's New York branch. "The article is totally false. The periodical that this report appeared in is less than reputable. It is not my idea of objective media."

However, French authorities are claiming to have pierced the mists of secrecy surrounding the identities of UBS depositors. A spokeswoman for the French consulate here confirmed that reports had appeared in both the *Le Monde* newspaper and in dispatches from Agence France Presse containing statements about the affair made by Henri Emmanuelli, the French Secretary of State to the Minister of the Economy, Finance and Budget.

Illegal Deposits

According to the spokeswoman, Emmanuelli was quoted recently as saying that customs officials had identified an unspecified number of French citizens who had illegally deposited capital in the UBS in Switzerland. He indicated that lists seized by customs officers had been decoded, and through them officials had already identified at least F175 million in illegally deposited capital. Emmanuelli made those statements during a press conference in Bordeaux, France.

The press reports stated that while Emmanuelli would neither confirm nor deny the information in the *Le Canard Enchaine* article, he did confirm that an unnamed number of the account holders identified thus far had already admitted to the offense. The spokeswoman said the consulate had received no official government statement on the matter, and she could not confirm how the lists had been obtained or whether military cryptographers using computers had aided customs authorities in breaking the code.

However, a *New York Times* report quotes Emmanuelli as saying the lists were decoded by "computer experts who know their jobs."

But, UBS's Kuchler claimed the code-breaking scheme is a smoke screen. "If they claim to have cracked the code, I would have to say that is a lie. There is simply no code to break. Our account numbers are not coded. They are simply a means of identifying our account holders. There are no such lists singling out residents of one particular country. There are no lists which contain account numbers and names together. If they are actually making these statements, it is almost criminal."

Further, Kuchler said, "We assume that the French customs authorities, who we feel have used some very questionable methods in looking after their residents, must have collected their own information in other ways and have made up this story. The French must have compiled these so-called lists piecemeal through questionable tactics. You cannot crack lists that don't exist. If this is not a fabrication, I don't know what it is."

A spokesman for the Swiss consulate here would not confirm details of the story, but he added that in speaking with UBS officials he was told that the report was no more than a bluff..

CAM-I Meet Set for Nov. 8

ARLINGTON, Texas — Computer Aided Manufacturing-International Inc. (CAM-I) has announced that its 12th annual meeting will be held in the Westin Galleria Nov. 8-10 in Dallas. The theme of the meeting will be "From Concepts to Reality — Through CAM-I."

The meeting reportedly will show how major achievements can be realized through joint developments of new manufacturing systems. The opening speaker for the session will be Charles F. Rule, who is special assistant to the U.S. assistant attorney general.

Rule will reportedly convey his department's thoughts on how joint research and development can speed development and subsequent industrial explosion, a conference spokesman said.

The fee for admission is $350 for members; $450 for nonmembers. Additional information is available from CAM-I, located at Suite 1107, 611 Ryan Plaza Drive, Arlington, Texas 76011.

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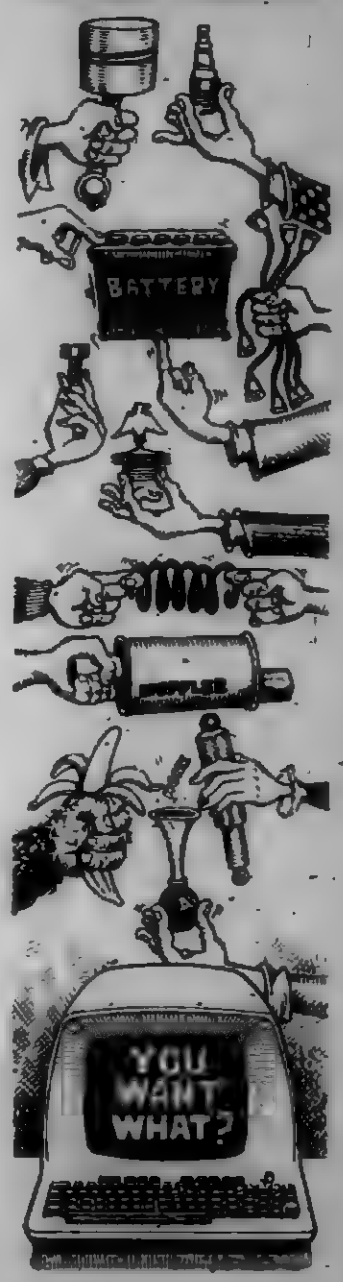

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International Report

FROM THE CW INTERNATIONAL NEWS NETWORK

JAPAN

TOKYO — Hitachi Ltd. has reportedly developed a high-speed element based on Josephson junction technology that boasts a switching time of 5.6 picoseconds. However, the materials used in the junction area at this stage in development consume too much electrical power to make the technology commercially feasible at present, the company said.

TOKYO — Three of Japan's major computer vendors introduced three personal computers here last week, all aimed at the large corporate consumer market. Matsushita Electric Co. unveiled the CF-2000, which will be available in late October for $235. Hitachi Ltd. unwrapped its H-1 portable system, which will be available at the end of November for $270. Sony Corp. announced the HB-55, priced at $235 and also slated for delivery at the end of November.

SWEDEN

STOCKHOLM — Bostel is the name of Swedesoft's recently introduced Cobol-based business language compiler, which is intended for corporate users on a variety of systems. Bostel, which stands for Business-Oriented Structure Emphasizing Language, runs on mainframes, minicomputers and micros, according to the vendor, allowing for distributed processing within an organization. Pricing on Bostel begins at $700 for Digital Research, Inc.'s CP/M and Microsoft, Inc.'s MS-DOS operating system environments. Swedesoft is based at Wellington 33, S-111 24 Stockholm, Sweden.

WEST GERMANY

PADERBORN — Nixdorf Computer AG's Workstation 8810, unveiled during the Hanover Fair here, has gone into mass production. The 8810 is a personal computer that can be used as a stand-alone machine or in conjunction with larger Nixdorf systems, the vendor said.

MUNICH — Techno Venture Management Co. is a new venture capital group that has been founded here by Siemens AG, the Matuscha Group, TA Associates of Boston and Advent Management of London. The company is reportedly seeking start-ups, holding companies and companies specializing in communications technology, data processing, automation, electronics and medical and biological technologies.

CHINA

BEIJING — An IBM Personal Computer-compatible microcomputer has been jointly introduced here by Beijing Wire Communications and the Ministry of the Electronics Industry. The product, called Great Wall 100, is said to be completely compatible with IBM Personal Computer software and to support Chinese character processing. The micro comes with an Intel Corp. 8088 microprocessor, 256K bytes of random-access memory, 40K bytes of read-only memory, two 320K-byte, 5¼-in. floppy disk drives, a high-resolution green phospher CRT and a parallel printer adapter. The memory is reportedly expandable to 1M byte, and a math processor can be incorporated to process 8-, 16-, 32- and 64-bit integrals, a spokesman said. Applications packages now available for this machine reportedly include a data base management system, word processing, statistics, financial, editing and graphics.

BEIJING — The Beijing Institute for Software Research and Training was officially established here Oct. 4. The goal of the institute is to promote computer applications and to train software personnel, a spokesman said. The institute is being co-funded by the United Nations Funding System for Science and Technology Development and the Chinese government.

FRANCE

PARIS — During a recent meeting with French electronic industry and ministry officials, President Francois Mitterand outlined France's objective to become the third leading world power in the production of electronics, trailing the U.S. and Japan. Mitterand stated that France will have invested $18 million in this area during the 1983-87 period, derived from industry and state sources. The president of France is also pushing high technology into the public school system and backing educational television promoting the use of microcomputers.

PARIS — TRT, the French subsidiary of Philips Information Systems, Inc., has unveiled a fifth-generation, manufacturer-independent Systems Network Architecture-compatible communications network here. The product, called Sopho-Net, is said to handle all protocol conversions to interconnect any existing computers, word processors and terminals on the market and to integrate both public and local networks. Its non-hierarchical structure is said to guarantee security from failure. Philips, with the help of AT&T, has taken its first major step into the telecommunications market with Sopho-Net, a spokesman said. The next step will be a local-area network product called Sopho-Lan, a token ring passing local-area network that will handle voice, data and images through frequency multiplexing.

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Speech Mixed With Optimism, Realism

Hawke Keynotes Australia DP Meet

International News

By Susan Coleman
Australasian CW

MELBOURNE, Australia — An opening ceremony, which included laser beam light displays accompanied by computer-synthesized music and a host of other computer-driven audiovisuals, kicked off the 10th Annual Australian Computer Conference held here last week. But the real star of the show, according to attendees, was Australian Prime Minister Robert Hawke, who keynoted the event with a speech mixed with optimism and realism.

While Hawke's participation in the conference was read earlier as a formal government endorsement to the computer industry here, he was not overly hopeful about the federal government allotting more funds to support the development of an Australian computer industry. Instead, he dwelled mainly on the need to educate school children in the use of computers. Furthermore, he emphasized the honing of human skills needed for Australia "to retain its place in world standard of living rankings," rather than on any specific strategy for competing in world markets with locally produced hardware and software.

"Training the work force to maximize the benefits of more sophisticated capital processes is of fundamental importance. ... Heavy investment in education and training is an investment in our future," Hawke declared.

Hawke went on to reiterate the moves the federal government had made in recent months to spawn growth in the national computer industry, including the 100% tax incentive for venture capital investments in high-technology areas [CW, Oct. 3].

Hawke maintained that a lack of venture capital, as well as a shortage of managerial expertise among those in high-technology enterprises, has traditionally prevented Australia from developing in this area. The tax scheme begins to address these problems, he said.

Furthermore, Hawke expressed concern that the Australian computer industry achieve its maximum contribution to the economy, but at the same time claimed that it was self-defeating for the government to commit itself to maintaining the commercial use of "key technologies."

"It is in neither the community's nor the industry's interest to move down a track which locks the government into continuing rounds of assistance aimed at ensuring the continued utilization of technologies where adjustment to changing technologies should be encouraged," he said.

Coleman is the editor of Australasian Computerworld.

NBS Says DES to Continue In Force Through End of 1986

WASHINGTON, D.C. — The National Bureau of Standards (NBS) last month said the federal Data Encryption Standard (DES) will continue in force at least through the end of 1986. NBS also said it is considering adopting a Pascal standard for federal use.

The DES, when first adopted as a federal information processing standard (Fips) in early 1977, called for a five-year review. Having solicited and reviewed comments on the standard during the last year, NBS said the standard has been affirmed for continued use and will be reviewed again beginning on or before Jan. 15, 1987.

At the same time, the bureau said it is considering adopting as a federal standard the American National Standard Institute (Ansi) standard for the Pascal programming language. The standard was developed jointly by Ansi and the Institute of Electrical and Electronics Engineers. It would be added to the existing federal standards, which include Minimal Basic, Fortran and Cobol.

NBS has requested comments on adopting Pascal as a federal standard. Comments on Pascal should be submitted before Dec. 12 to Director, Institute for Computer Sciences and Technology, Attention: Proposed Fips for Pascal, Room A200, Administration Building, NBS, Washington, D.C. 20234.

Users Meet Set For Oct. 14-16 On UCSD Pascal

SAN DIEGO — The UCSD Pascal User's Society (Usus) will hold its semiannual national meeting at the Hyatt Regency Crystal City in Arlington, Va., Oct. 14-16.

Tom DeMarco, computer scientist, lecturer and author, will be the keynote speaker for Usus. His talk is titled "Data Flow Computing." The meeting will also feature two free tutorials, "The P-System — How to Use It Better" and "Introduction to UCSD Pascal," as well as technical presentations and demonstrations.

Registration at the door is $35. More information is available from Information Systems, Inc., Suite 200, 1901 N. Ft. Meyer Drive, Rosslyn, Va. 22209.

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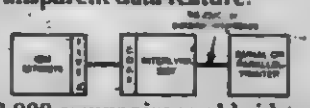

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Small Schools Retraining Educators

Colleges Scramble to Beat DP Teaching Shortage

By Peter Bartolik
CW Staff

While large colleges scramble to sign up as teachers the few computer scientists awarded Ph.D. degrees each year, some small colleges are turning to programs that retrain educators from other fields.

There are too few computer science educators with Ph.D.s [CW, Sept. 19] to fill the needs of large prestigious colleges. That limits the number of students that may be enrolled in such programs and could be a contributing factor to a projected shortage of computer scientists and electrical engineers [CW, July 11].

What is bad for large institutions, however, is much worse for smaller colleges, according to educators interviewed by *Computerworld*.

There are some 2,000 four-year colleges with enrollments under 5,000 that are edged out of the Ph.D. marketplace by bigger, more prestigious schools, according to Dr. William Mitchell, chairman of the computing science department at the University of Evansville, Ind., and 1983 editor of *Interface, The Computer Education Quarterly*.

Estimates indicate that over the past six or seven years only about 200 to 250 doctoral degrees have been awarded each year to computer scientists, and less than 100 of those scientists accept academic appointments.

There are several thousand openings for computer science teachers among some 3,000 departments of mathematical science, according to Dr. Ed Dubinski, who recently started a retraining program in computer science at Clarkson College of Technology in Potsdam, N.Y.

Over the next two years, some 200 non-computer science educators from small colleges will have been retrained to teach undergraduate computer science courses. "Small colleges can't compete for the traditionally trained computer science educator," Mitchell said. This past summer, Evansville awarded 14 masters of science degrees in computer education to the first class of a two-summer, intensive retraining program for educators from other disciplines [CW, May 3, 1982].

Also started this past summer was an Evansville-modeled degree program at the University of Memphis (Tenn.). According to Dr. Stanley Franklin, the program was initially designed to meet the needs of junior and four-year colleges in Tennessee's public higher education system, but was expanded when few in that system met the prerequisites, and publicity in a newsletter prompted applications from other states.

The Clarkson program is based on the experiences of a similar program at Cambridge University in England, Dubinski said, and is designed for educators "at small, quality liberal arts colleges where they will be essentially the only people teaching computer science."

The program was initially designed for 30 people, but an experimental program was added with applicants who were considered over-qualified for the original curriculum; next summer, 120 educators will be participating in the two-year program.

Providing the inspiration to at least the Evansville and Memphis programs was a then unique experiment that began during the summer of 1979 at the University of South Carolina.

The program was geared toward small South Carolina colleges after a state report indicated a widening gap between the need for computer specialists and the ability to train them, according to Dr. Carter Bays, director of the program. "The smaller schools could not even find a computer scientist," he said.

Bays set up a program wherein a master of science degree could be earned during three intensive summer periods. From 40 applicants, 25 educators were selected; 17 completed the program, and another two joined in mid-course. A second phase began in the summer of 1982 with 14 students, and two more joined this summer.

Statistics on the South Carolina program are currently being evaluated and will soon be published.

Retraining in Computer Science Requires Highly Motivated Teacher

College-level educators seeking retraining in the computer science field must be highly motivated in order to undergo the intensive training provided by the four programs recently examined by *Computerworld* (see related story).

During the three summers in the University of South Carolina's program, participants can expect to work 18 to 22 hours a day for nine weeks straight, according to Dr. Carter Bays, director of the program. "Within those nine weeks we give a big dose of the first three courses in our graduate sequence, which is normally spread out over 15 weeks," he said.

At Clarkson College of Technology, Potsdam, N.Y., Dr. Ed Dubinski said students can expect to work 10 to 12 hours a day, seven days a week for eight weeks. All the programs require applicants to have completed a full-level programming course. Even after sampling the world of computing, students in the University of Evansville (Ind.) program are warned by Dr. William Mitchell, "You need still to measure the psychological and emotional price which you are about to pay."

Mitchell and Dr. Stanley Franklin of the University of Memphis (Tenn.) caution that their programs are not equivalent to "traditional" masters-level programs in computer science, but rather are compressed programs designed to fulfill the need for undergraduate teachers at small colleges.

Graduates of his program, Mitchell said, "would have dubious security in a large university; as soon as someone more qualified came along, they would be eased out." On the other hand, he noted, small colleges are more likely to expand a department to make way for a newly acquired computer education asset.

Students in the first group of Clarkson's program had their tuition, room and boarding expenses — $7,200 for two summers — funded by a grant from the Alfred P. Sloan Foundation, and Dubinski hopes for future funding. But expenses can range from approximately $1,500 a summer at South Carolina to almost $4,000 for tuition alone at Evansville.

In addition to the time commitment during the summer, all the programs require work during the regular school year. Evansville and Clarkson require students to teach a class and complete a project.

South Carolina will not begin a new course until the summer of 1985, but the other three schools intend to offer new programs next year. Memphis will enroll about 20 students and Evansville about 25.

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Conferees Exhorted to Embrace Quality in Software Development

By Robert Batt
CW West Coast Bureau

SOUTH LAKE TAHOE, Calif. — The quality ethic is largely missing when it comes to software development in the U.S., according to Joseph Podolsky, information systems manager at Hewlett-Packard Co.

Addressing an Education Consortium Executive Conference here, sponsored by software consultants Kapur & Associates, Inc., Podolsky said quality is very often treated as a secondary issue to meeting target dates.

"Somehow as an industry we seem satisfied with 'nice tries' instead of insisting on doing it right from the beginning in all parts of the project with a determination to do even better next time," he told the audience of data processing executives.

Even where quality guidelines exist, Podolsky continued, DP managers fail to insist on compliance and have given programmers permission not to care as much about quality because of the stress on meeting target dates.

The HP manager outlined some current quality procedures and mechanisms and noted their deficiencies. Testing, for example, is not a disciplined activity, he asserted. Rather, it is carried out in a haphazard way, often under deadline pressure and usually by the programmer who wrote the code, thereby building in an inevitable bias to gloss over defects.

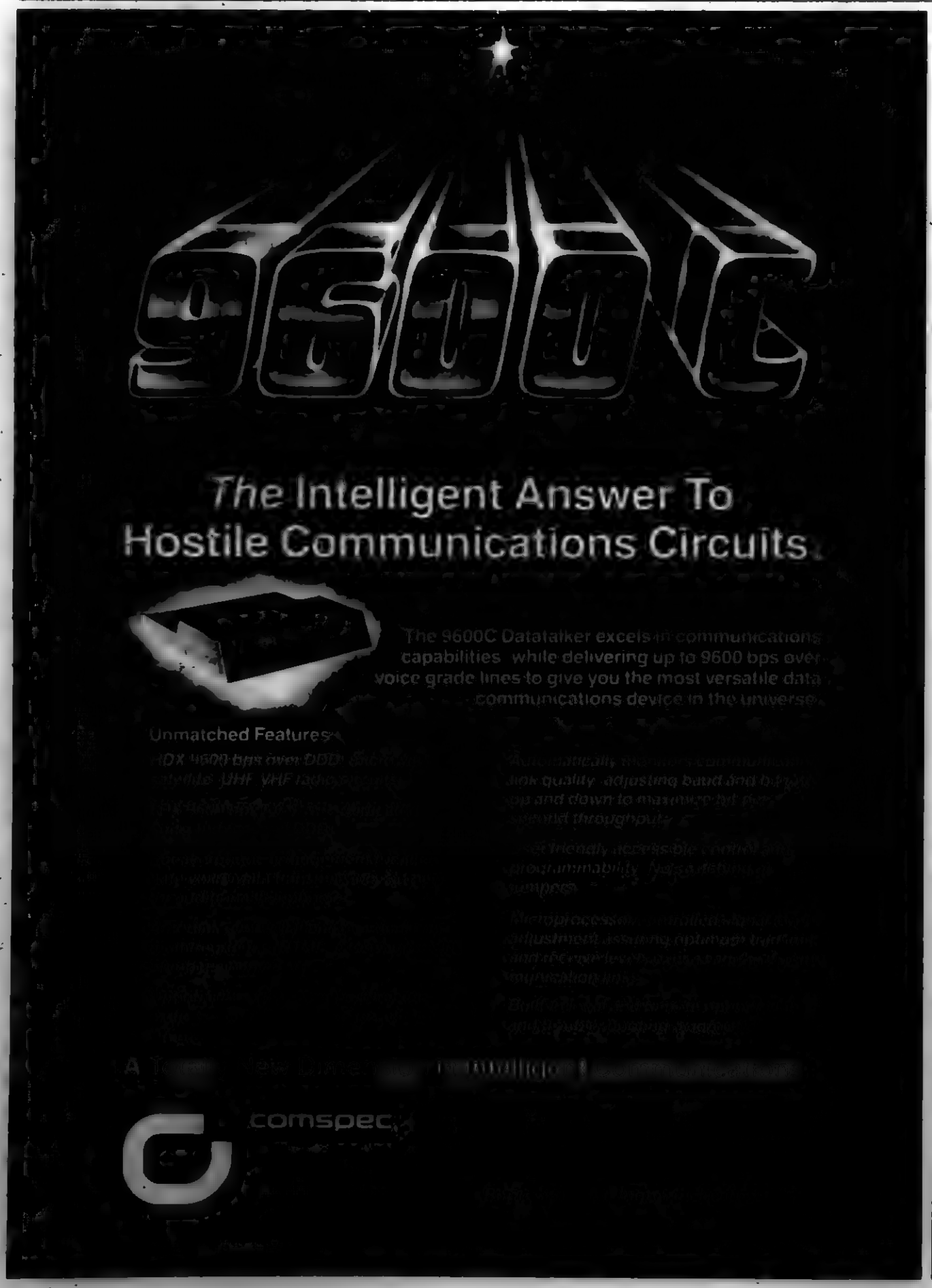
"Testing usually results in 'fixes' rather than rewriting the program. These fixes often cause patches, which make the system prone to future failure and subsequently more difficult to modify," Podolsky added.

Testing, he claimed, rarely addresses the noncoding aspects of system development. In addition, documentation is often not updated to reflect fixes, and knowledge gained during testing is seldom made available to all who might profit from it. The same criticisms, he said, can be made against quality-control procedures such as inspections, walk-throughs, application generators and formal mathematical proofs.

Podolsky enumerated a number of steps needed to achieve consistent quality in software development:

- A commitment to quality should be the overriding objective.
- In the design process, software developers should define the attributes desired for the system as well as the functional specifications and then select the best practices for achieving each attribute.
- Once established, these standards should be used throughout the development process with inspections to determine conformity to the standards via code, walk-throughs and inspections.
- As knowledge increases, the technical standards should be evaluated and enhanced, and feedback should be sought whenever possible.

"In achieving a far higher level of quality in software development, what will be required is an attitude of compliance with, and caring for, standards, rather than the current defensive posture and attempts to hide errors," Podolsky concluded.



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Importance of Data Security Campaign Stressed

By Robert Batt
CW West Coast Bureau

SOUTH LAKE TAHOE, Calif. — There is good reason for data processing managers to be worried about threats to the continuity and integrity of information, a security specialist has warned.

Doug De Vries, computer security manager at Hewlett-Packard Co., said protection, detection and recovery procedures are vital components if an effective data security campaign is to be mounted within an organization.

Speaking here at the recent Education Consortium Executive Conference, sponsored by software consultant Kapur & Associates, Inc., De Vries said taking measures to protect information assets should be viewed as part of prudent management procedures.

"Computer security is a growing problem because of the increasing business dependence on DP. Vital corporate assets are involved as distributed systems using micros and networks become more complex. The question facing us as an industry is whether . . . we are prepared to take reasonable steps to protect ourselves from real threats," he said.

The impact of a breach of data security can be serious, De Vries told an audience primarily composed of DP managers. It can result in customer dissatisfaction, cash flow problems, a backlog of data and physical products and a resulting work load imbalance.

"Because of this, DP managers need to plan for deliberate security breaches and natural disasters. They must consciously choose protection based on the level of risk, rather than close their eyes and hope disaster will not strike," he said.

Evaluation Needed

In determining the appropriate level of security, he asserted, managers should evaluate the role of computer systems in their companies; the asset value of DP resources; the impact of downtime, including the number of people affected; and the business effect on the organization.

De Vries outlined a number of steps that managers should take in developing a data security plan.

- First, assign a manager whose sole focus in the corporation is to monitor and ensure security.
- Second, clarify who is responsible for what in the area of security, and make it broadly known throughout the organization.
- Third, issue written policies, institute DP audits and evaluate their effectiveness. Without this step, De Vries cautioned, data security will probably not happen.
- Fourth, have the management information systems director receive regular reports from the data security manager.

The need, De Vries said, is to analyze, decide on and implement data security controls for the company as a whole and for specific data centers and programming groups.

"You should develop a data security team which includes key players from different parts of the organization. This way you will have a much better chance of getting a policy for data security that is actually implemented," he told the conference attendees.

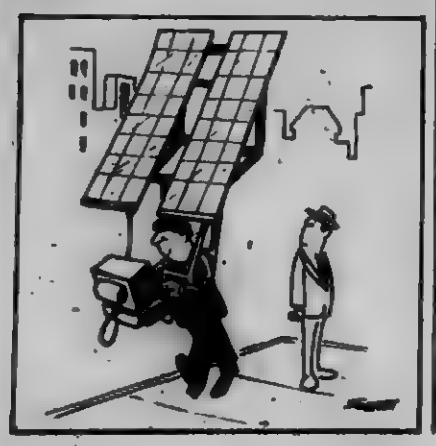
It is important, he added, to rate the probability of information being vulnerable and to protect it to the appropriate degree. In doing this, he suggested, it is useful to identify the attributes of a would-be saboteur or thief, which usually include a knowledge of how to write programming code, access to sensitive equipment, specific knowledge of a site and a motivation to succeed.

IEEE Video Meet Slated to Discuss Bell Labs R&D

PISCATAWAY, N.J. — A video conference sponsored by the Institute of Electrical and Electronics Engineers (IEEE) on Bell Laboratories' communications research and development will be televised via satellite on Dec. 6.

The conference will feature one-way video and two-way audio, with Michael Lesk of Bell Labs opening the program with a discussion of software algorithms. Evelyn Hu, also of Bell Labs, will address fabrication processing of microelectronics, and Paul Shumate of Bell Labs will speak on photonics.

Registration is $130 for IEEE members and $180 for nonmembers, with more information available from IEEE, 445 Hoes Lane, Piscataway, N.J. 08854



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Where Do Business Analysts Fit?

Q Recently, a new DP manager was brought in from the outside. The first thing he did was reorganize the department. My organization, the systems group, remained intact, but he hired two users as business analysts. They were assigned the responsibility for needs analysis and feasibility studies, and they report directly to him. These activities were formerly my responsibility.

Neither of the business analysts has a DP background, and both are continually asking my people for help. I am trying to accommodate the reorganization, but frankly, now we're spending more time on these tasks than before, when we did it all ourselves.

A I'm not aware of any business analysts groups with such limited responsibilities. This type of organization works well as an integrated function where business analysts complement the function of systems analysts from needs analysis through the design process. Why limit the involvement of the business analysts to a few activities when their expertise can be helpful in all phases of systems development?

Give the present organization three months to succeed. If it becomes apparent that the organization has failed in its present format, suggest a more integrated and extensive involvement for the business analysts.

Q I have been assigned the unenviable task of documenting many programs that have never before been documented and have been repeatedly patched and modified. The systems in question have no user manuals, and the original authors are no longer working here.

How would you suggest that I approach this difficult task?

A I'm not convinced that you should be documenting these particular programs at all. Documenting old programs can be enormously time-consuming, not to mention frustrating. I would suggest that you at least address the possibility of starting from scratch; it may be less expensive in the long run. Programs that were developed and are subsequently maintained without documentation are usually poorly designed to begin with.

If you feel that you must proceed, you and your boss need to ask yourselves a question: "What is the expected life of the systems involved?" As a rule of thumb, document undocumented systems if the system is expected to remain operational for at least two more years. If you anticipate replacing these systems within two years, make the best of what you have.

If the decision is to document, don't be as rigorous as you would for a new program. Extract critical documentation items from your existing methodology.

Q In addition to my responsibilities as DP education coordinator, I've been assigned responsibility for end-user education. My first attempt at end-user education was a failure. We announced and scheduled an eight-hour APL course to be presented on two consecutive mornings. There were nine confirmed reservations, and two students showed up. Several called in and said they would try to make the second session.

I canceled the course and have not rescheduled it or any other end-user program. Several users have asked me to try it again. Any advice on how to encourage end-user participation in these programs?

A By canceling the APL course, you made a tactical error. You turned away two people who had adjusted their schedules for an opportunity to learn APL. The best way to encourage future participation is to:

- Do a good job in presenting the material.
- Get some satisfied customers in the user community.

Complete the next course if only one person attends. Consider it an investment in user relations.

Before you decide on the future end-user offerings, get end users involved in the decision making. Invite their feedback on program alternatives. People are more willing to participate if they feel a part of the activity.

Let me turn this issue over to the readers. What other approaches have you used to encourage end-user participation in education programs?

Long, president of Long and Associates, is a consultant, lecturer and author in the field of information services. If you have a question you'd like him to address, send it to Larry Long, Editorial Department, Computerworld, P.O. Box 880, Framingham, Mass. 01701.

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Parole List Error Outrages Officials, Public

By John Gallant
CW Staff

ATLANTA — When Billy Isaacs' name appeared incorrectly among the names of 7,000 prisoners eligible for early parole from the state prison system, the error stirred dark memories of one of the most vicious crimes in Georgia history.

The mistake also made officials of the state Board of Pardons and Paroles wish they had been more careful in designing the computer program that generated the list.

According to Silas Moore, spokesman for the board, the Department of Offender Rehabilitation's Sperry Corp. 1182 mainframe was programmed simply to print out a list of all inmates who had yet to serve one-third of their sentences, the amount of time a convict must serve to be considered for the standard parole program. The board accesses the criminal justice data base, which includes inmates' records, through interactive terminals linked to the mainframe.

Thus, Isaacs' name appeared on the list of prisoners to be considered for release under the state's early parole program. Convicted in 1973, according to Moore, Isaacs had served less than one-third of his sentence at the maximum security facility Georgia State Prison at Reidsville.

In July, the board sent the list to judges and district attorneys, as required by law, to solicit their comments before reviewing each case. When some of the criminal justice officials saw Isaacs' name among the candidates, they were outraged that the 25-year-old felon was to be considered for early parole. They raised a fuss that the local press was quick to parlay into headlines.

Isaacs was given a 40-year sentence for armed robbery and burglary in exchange for testimony that sent his brother, Carl Isaacs, his half-brother, Wayne Carl Coleman, and George Elder Dungee to death row in connection with the 1973 slayings of six members of the Ned Alday family.

The victims were systematically executed at their home in Donalsonville, Ga., according to Moore. With Billy Isaacs' testimony, Moore said, the three men were the first to be sentenced to death under Georgia's 1973 capital punishment law.

In addition, according to Moore, Isaacs was sentenced to two consecutive 30-year prison terms in Maryland for second-degree murder and kidnapping.

Ironically, the inclusion of Isaacs' name among the candidates to be considered for early parole was a mistake because he was already eligible for review within the regular parole program, a fact that incensed officials.

Georgia law stipulates that any inmate serving seven or more years, regardless of the length of sentence, is eligible for regular parole — a nuance that the Board of Pardons and Paroles programmer failed to incorporate in the list-generating program. Isaacs had already been denied parole twice, in 1980 and 1981, and was scheduled to appear before the board again in 1984, according to Moore.

'Simply a Human Error'

"You have to understand, his name is very well-known around here," Moore said. "That was quite unfortunate. The lists lent themselves to misunderstanding. Officials seized on Isaacs' name and released it to the media. That raised quite a fuss. It was simply a human error. The person who wrote the program simply dealt with those inmates who had served less than one-third of their sentences."

The error caused such an uproar that Moore said the board won't publish another list. "This was definitely a one-time thing. People were very unreceptive. It was so misunderstood that we don't plan to put out another," he said. One Georgia district attorney has filed suit to force the board to continue publishing the information. Moore said the question will have to be decided in light of the new state constitution that went into effect July 1.

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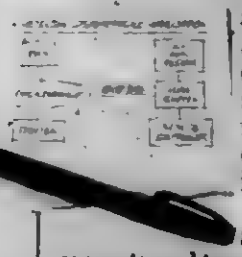

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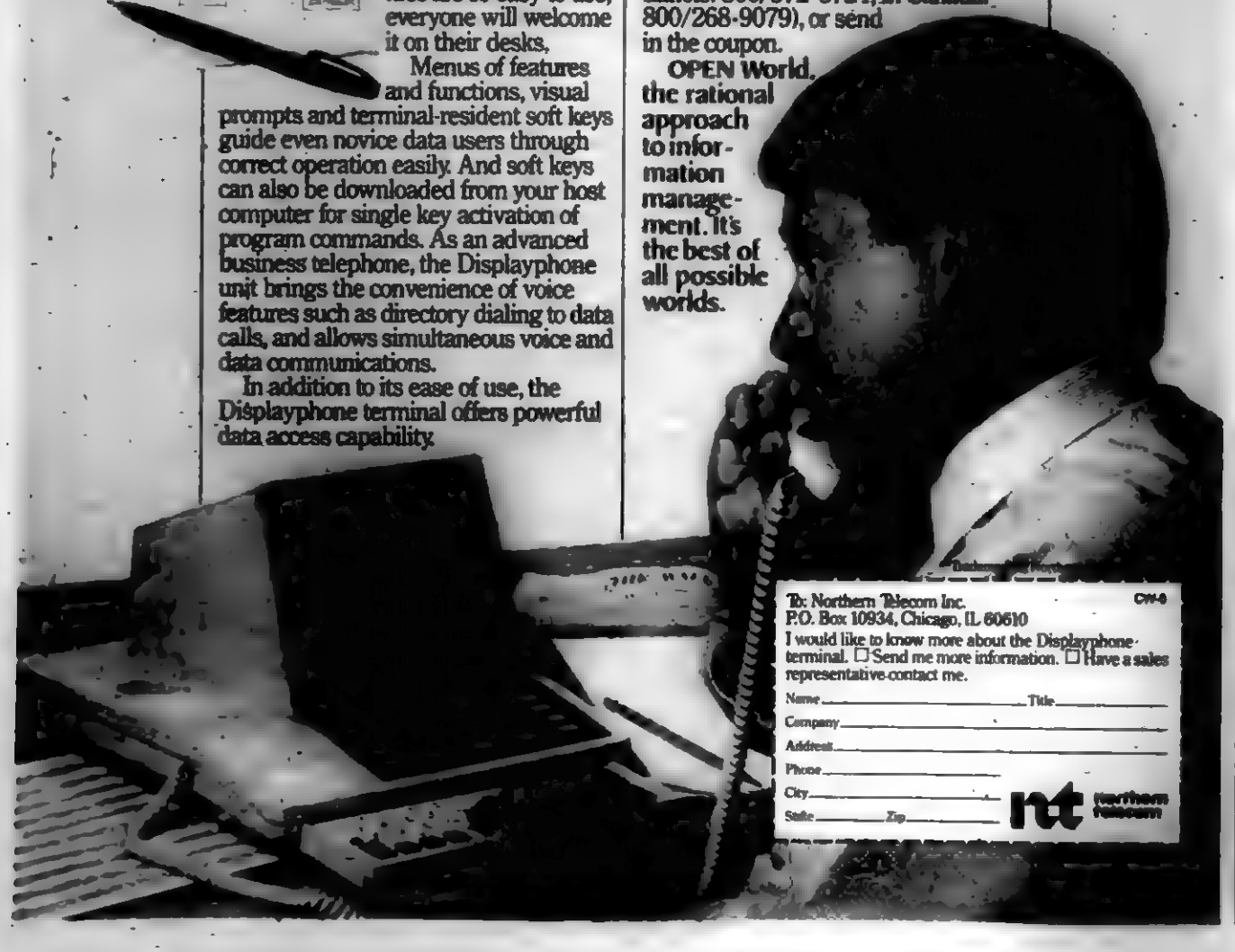

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PRODUCT SPECIFICATION

Terminal Type
Will replace DEC VT 100, VT 101, VT 102 & VT 131

Ergonomic Characteristics
Tilt, Swivel
Detached low-profile (DIN) keyboard
High-contrast green phosphor
Non-reflective surfaces
Non-volatile set-up

Display
[illegible] resolution 14" CRT standard
24 x 80 or 132 column format
Viewing area - (14 inch monitor) 9.88" (25.0 cm) wide by 6.8" (16.3 cm) high
Character size - 80 column - .088" (2.24mm) wide by .204" (5.18mm) high
128 unique symbols - 94 alpha-numerics, 32 special symbols
7 x 10 matrix with 2 lower case descenders in 9 x 12 window
Selectable 132 column x 24 line display mode with 5 x 9 character dot matrix
Attributes - blank/low intensity, blink, reverse and underline
Programmable, double width character line or double width/height character line
Smooth scroll
Line drawing graphics
Cursor, selectable as box or blinking underline

Monitor Performance
Green phosphor - 14 inch (35.6 cm) diagonal±1% geometry
Dot frequency, 22MHz
19.5 KHz horizontal frequency
50/60 Hz non-interlaced refresh

Keyboard
Low profile to European standard
83 Key detached keyboard with sculptured typewriter style and auxiliary numeric pad including period, comma, minus and enter
Typematic
Four function keys
Audible keyclick (operator selectable)
Seven visual indicators
Editing function - Tab, insert line, delete line, insert character, delete character, clear, home and back tab
Upper/lower case with all caps light
Local print

Communication Interface
RS232C/current loop
X on, X off protocol (operator selectable)
Full duplex compatible with WE modem #103A, 212A
Baud rate - selectable 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, 19,200
Parity - selectable odd, even, 1 or 0
Word length 7 or 8 bits

Auxiliary Interface
RS232C compatible
Bi-directional
Remote control - on line without display, auto print, line print, page print
Baud rate - selectable 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, 19,200

System Oriented Features
Multimode - local, interactive, split page, line and partial page
Self diagnostics
Numeric pad alternates as function pad
Tabbing by column and by fields
Horizontal "split screen"
Data compression operation
X on/X off protocol
Smooth scroll
National character sets (option)
Full editing command set with protected fields

Physical Characteristics
Mechanical
Height - 15 inches (38.1 cm)
Width - 18½ inches (47.3 cm)
Console depth - 15⅞ in. (40.3 cm)
Keyboard depth - 8½ in. (21.8 cm)
Weight - 35 lbs. (15.9 kg)

Electrical
Power consumption - 48 watts
Power input selectable - 115 ±10% and 230±10% (50 - 60 Hz±1%)

Environmental
Temperature - 10° C to 40° C
Humidity - up to 90% relative non-condensing
Shock - 50g in 3 axis (in container)
Vibration - 10 to 30 Hz (in container)

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At White House Conference

Reagan Calls for High Tech to Up Productivity

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — President Reagan recently joined business executives and other high-ranking government officials in calling for use of new technologies, particularly computers and communications, to increase productivity in the U.S.

Speaking at the recent White House Conference on Productivity here, Reagan said that although the rate of productivity improvement has slowed in this country, there are still areas of the economy with increasing productivity.

"We think of those first computers, which could cost up to a million dollars and were so big they filled a room — a big room.

"Today a computer chip that performs the same functions can fit in the palm of your hand and costs under $10. That's productivity," he said.

The conference, held at the State Department, culminated months of preparation, including four regional conferences on productivity topics held earlier this year.

'Unique Opportunity'

One of those conferences, convened in Pittsburgh, Pa., August 2-4, considered private sector initiatives to increase productivity. Its final report concluded, in part, that "information management provides a unique and potentially significant opportunity to improve productivity."

"Information handling technologies are not limited to replacing manual paper systems — as important as that may be — but also involve a fundamental transformation of how companies do their business and what their business is," the report stated.

"Instead of creating automation task forces, companies should be establishing task forces on how the harnessing of modern information technology is going to transform fundamentally what they do."

Stressing that point at the recent meeting here, conference chairman C. Jackson Grayson, chairman of the American Productivity Center in Houston, said improving information handling "has to be a top priority of this nation to improve productivity."

The two-day conference brought together several hundred representatives of industry, academia, labor and government.

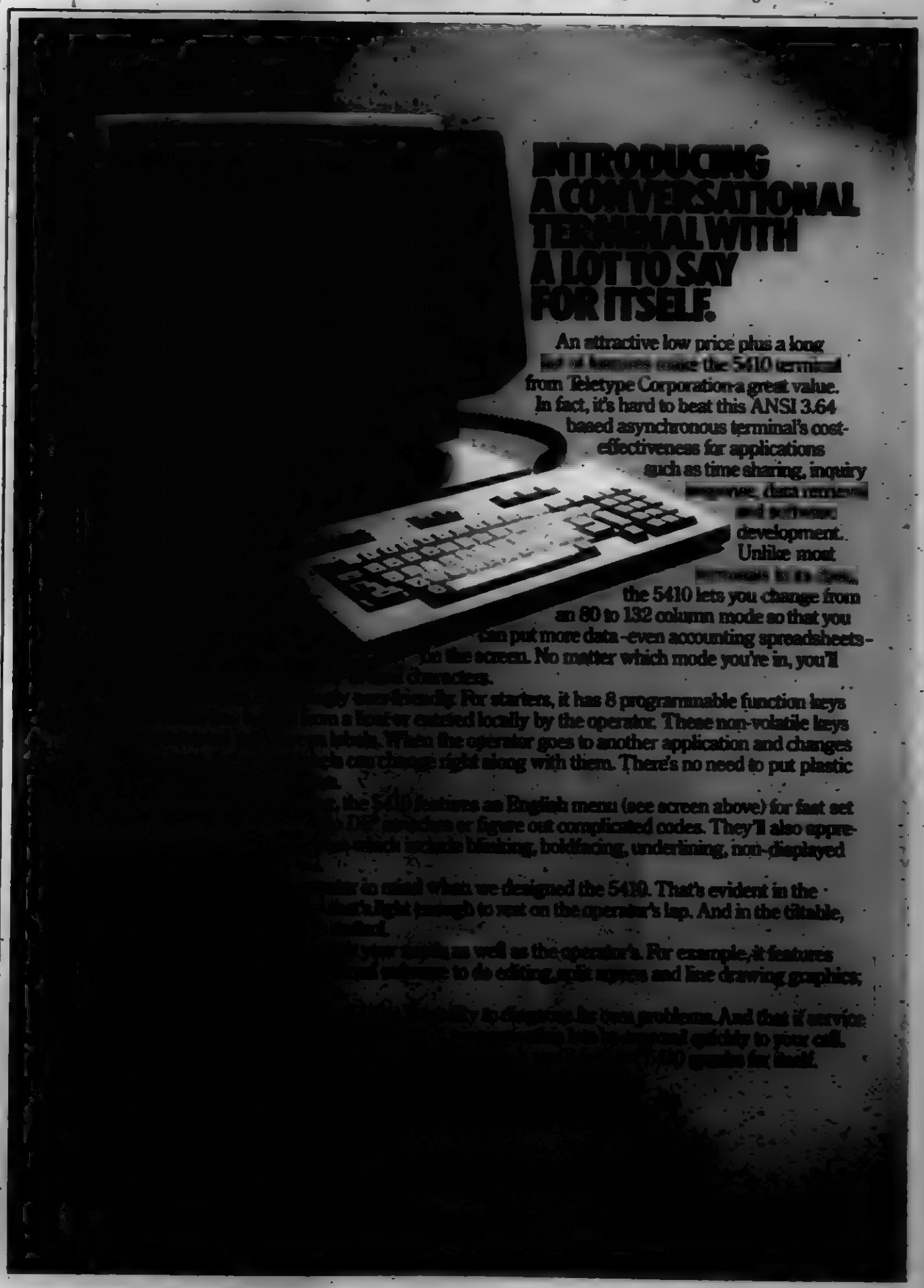
Getting a big push from the White House, the meeting featured the participation of a number of high-ranking administration officials, including Secretary of State George P. Shultz, Treasury Secretary Donald T. Regan, Commerce Secretary Malcolm Baldridge and Labor Secretary Raymond J. Donovan.

During an early panel discussion on technology, Geoffrey Place, vice-president for Research and Development at Proctor & Gamble Co., voiced what was to become a conference theme, saying "new technology will work to enhance productivity in all sectors" of the economy.

General Electric Co. (GE) Executive Vice-President James A. Baker, however, was more cautious about the impact of technology, stating that many firms have "indulged in high-tech snobbery" and "are falling all over themselves" to create a high-tech veneer without fully integrating automation into their operations.

Despite this rush to high technology on a superficial basis, Baker said, "our machines are old, our processes in some cases primitive." In short, he said, our productivity "is a disgrace."

GE, recognizing that "technology is the steroids we must take to compete against the brute muscle of foreign cheap labor," has invested $1.5 billion in the last three years to "bring Silicon Valley to our factories," according to Baker.



With all the clamor about personal computers, a fundamental fact is often overlooked: some simply *work* better than others.

Consider the COMPAQ Portable.

A computer will make you more productive. A computer will make you more efficient. You hear it everywhere. But you don't hear about which computer actually *works* best.

A computer isn't magic. It's a tool. And just like other tools, some computers work better than others.

The COMPAQ™ Portable is a combination of 20th-century electronics and 19th-century pragmatism. It simply does personal computing better. Here's why.

Works in more places

You don't do all your thinking in one place. Why have a computer that stays in one place?

The COMPAQ Portable has all the capabilities of a large desktop computer. But now those capabilities can go where you go.

You can move it from office to office to share its resources. You can move it into the conference room to answer questions when and where they come up.

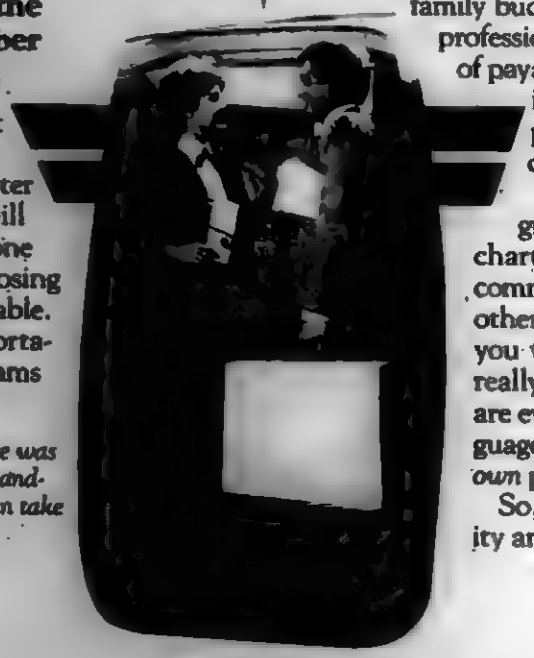
With the COMPAQ Portable, you can be as productive in your hotel room or your lake house as in your own office. It's a reliable companion on a business trip. It's a powerful sales aid in your customer's office.

What's more productive than a computer? A computer that works for you in more places.

Works with the greatest number of programs

The most important consideration when you choose a computer is "what programs will it run?" And that's one more reason for choosing the COMPAQ Portable.

The COMPAQ Portable runs more programs than any other portable. In fact, it runs more than most non-portables. That's because it runs all the popular programs written for the IBM® Personal Computer. There are hundreds of them. They are available in computer stores all over the country, and they run without any modification, right off the shelf.



The COMPAQ Portable was designed to fit under a standard airline seat so you can take it on business trips.

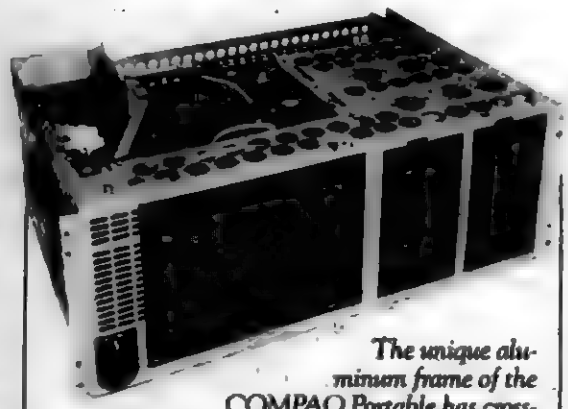
Imagine the power of a *portable* word processor. There are dozens of different word processing programs available for the COMPAQ Portable.

Planning, problem-solving, and "what-ifs" are a cinch with a variety of popular electronic spreadsheet programs. The COMPAQ Portable runs them all.

There are accounting programs for anything from computerizing your family budget to full-scale professional management of payables, receivables, inventory, and payroll for your company.

There are programs for making charts and programs for communicating with other computers. Or if you want something really specialized, there are even program languages for writing your *own* programs.

So, you get portability and you don't give up problem-solving power. The combination adds up to the most useful personal computer on the market today.

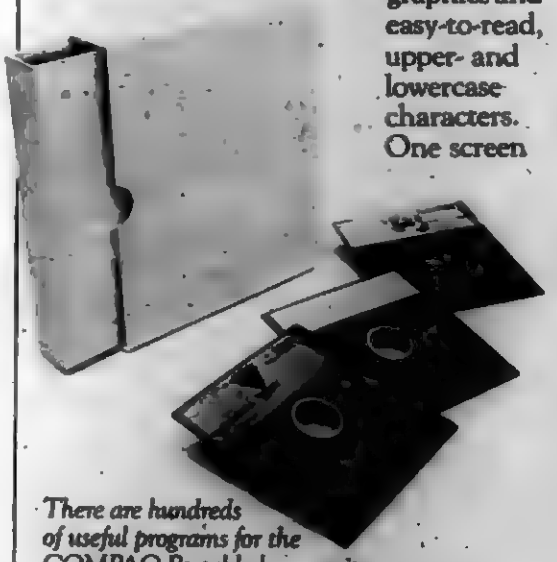


The unique aluminum frame of the COMPAQ Portable has cross-members that strengthen it front-to-back, side-to-side, and top-to-bottom. It's a design practice commonly used in race cars.

Works better because it's easy to read

The display screen of the COMPAQ Portable measures nine inches diagonally. It shows a full "page width" of 80 characters on a line so tasks like word processing are easier. And those characters are big enough to read even if you're leaning back in your chair.

The display shows both high-resolution graphics and easy-to-read, upper- and lowercase characters. One screen for all the information. With some personal computers, including the IBM, you can have either the graphics or the legible characters, but you can't have both unless you buy two different displays.



There are hundreds of useful programs for the COMPAQ Portable because it runs all the popular programs written for the IBM.

Incidentally, computer prices are often quoted without a display. The display of the COMPAQ Portable is built in, of course.

Add-on options make it work the way you work

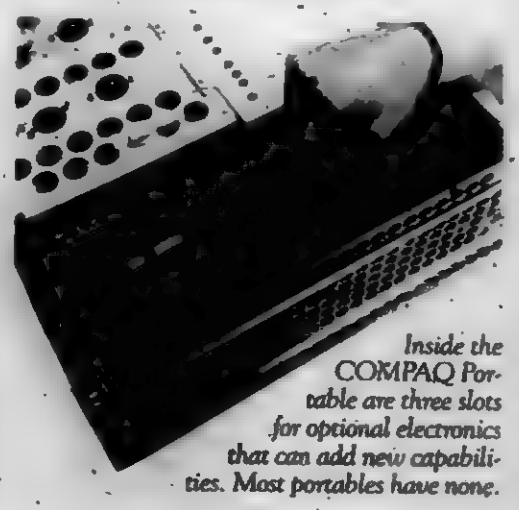
Inside the COMPAQ Portable are three open slots. Electronic devices called expansion boards fit those slots and give the COMPAQ Portable new powers.

Just like the programs, expansion boards designed for the IBM work with the COMPAQ Portable, so there are dozens available right now. With them, you can make your personal computer more personal.

Want to check a stock price? Or look up something in The New York Times Information Service? One expansion board enables the COMPAQ Portable to handle those communications over ordinary phone lines.

Want to use your company's central computer files while you're on a trip? There are boards that allow the COMPAQ Portable to communicate with a variety of large mainframe computers.

Other boards let you hook up controllers for computer games or increase memory capacity. Still others let you connect personal computers in a network so several people in your office can share the same information.



Inside the COMPAQ Portable are three slots for optional electronics that can add new capabilities. Most portables have none.

Works better because it's tough enough for the road

Portable doesn't just mean smaller. Portable means tough, too.

The COMPAQ Portable was built to withstand the hard knocks of constant travel. An aluminum frame within the case completely surrounds the computer's working components. Each disk drive is mounted in rubber shock absorbers instead of being bolted directly to the frame.

To test internal components, the COMPAQ Portable was subjected to impacts of 40 G's *while running a program*. After impacts on each side, there was no internal damage and the program was still running. Without error.

Computers are for getting rid of worries, not giving you new ones.

Designed to help you work better, too

The COMPAQ Portable was designed to *feel* good.

Specifications

Software
- ☐ Runs all the popular programs written for the IBM PC

Memory
- ☐ 128K bytes RAM
- ☐ Expandable to 640K bytes

Storage
- ☐ One 320K-byte minifloppy disk drive, second drive optional

Display
- ☐ 9-inch (diagonal) monochrome screen
- ☐ 25 lines by 80 characters
- ☐ Upper- and lowercase, high-resolution text characters
- ☐ High-resolution graphics

Expansion board slots
- ☐ Three IBM PC-compatible slots

Interfaces
- ☐ Parallel printer interface
- ☐ RGB color monitor interface
- ☐ Composite video monitor interface
- ☐ TV RF modulator interface
- ☐ Communications interface optional

Physical specifications
- ☐ Totally self-contained and portable
- ☐ 20"W × 8½"H × 16"D

The keyboard is detached so it can fit into your most comfortable working position.

The keyboard cable remains connected at all times. So you don't have to unpack it and hook it up every time your use your computer.

Because the display is built in, the COMPAQ Portable makes a neat, small package on your desk, instead of a big obstacle you have to talk around. The built-in display also avoids the usual cable clutter because there's no need for separate cables for the display.

The COMPAQ Portable even has an electronically synthesized sound to create the familiar keyclick of a typewriter. With a simple keyboard command you can adjust the volume to suit the level of background noise in your office.

The added usefulness is free

The COMPAQ Portable can do what desktop computers do and do it in more places. But it doesn't cost any more than an ordinary desktop.

In fact, it costs hundreds less than a comparably equipped IBM or Apple® III. The COMPAQ Portable comes standard with one disk drive and 128K bytes of memory, both of which are usually extra-cost options. A second disk drive and additional memory are available to make your COMPAQ Portable even more powerful.

The bottom line is this—you just can't buy a more practical, useful, productive computer. Before you decide on a computer, you owe it to yourself to compare the COMPAQ Portable.

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Rising Unemployment, Recession Cited

Japanese Labor Unions Reconsidering Contracts

By Patricia Keefe
CW Staff

Rising unemployment and a recession that has finally hit home are forcing Japanese labor unions to reconsider their previous policies of full cooperation with factory management on automation plans. As a result, Japanese factory workers are moving from "psychological" contracts with management for lifetime employment to legal contracts guaranteeing that jobs will not be lost to automation, according to Yoshi Tsurumi, a professor of international business at Baruch College in New York.

This viewpoint was expressed by several U.S. specialists on Japan, robotics and labor relations and was the thrust of recent reports and surveys taken by Japanese government and union officials (see story Page 33).

Specialists such as Frank Stafford, professor of economics of the University of Michigan, and Japanese organizations like the All Japan Federation of Electric Machine Workers' Unions (Denki Roren), predict that factory automation will have a substantial impact on Japan's labor and employment levels.

'Serious Vulnerability'

Heavy reliance on automation has created a "serious vulnerability" in Japan, according to Stafford. He predicted a dramatic period of transition for producers and workers over the next 15 years, similar to the scope of the agricultural revolution that occurred in the U.S. during the 1920s. As Japan becomes more automated, it will produce more goods cheaply, pushing down prices, wages and total revenues, threatening to collapse the economy, he said.

Traditionally, during an economic downswing, Japanese management shares wage cuts and freezes with workers, Tsurumi said. Instead of layoffs, workers split the available hours, resulting in shorter work weeks. In the past, management introduced automation during periods of expanding production, softening the impact through attrition and the reassignment of workers to actual and "paper" jobs, Tsurumi added.

But a slow growth rate over the past two years has forced companies to "tighten up" their number of employees. As a result, the feeling among Japanese workers that they will have a lifetime job with one company is being threatened, he said.

Because robots reportedly eliminate some unskilled jobs, such as painting and welding in auto factories, a Denki Roren survey is said to show a downward trend in the hiring of full-time, female high-school graduates, a traditional recruiting field.

Denki Roren estimates at least 50,000 workers, slightly more than 13%, have been replaced by robots, but Tsurumi dismisses that figure as a "red herring." Nonetheless, Denki Roren and other Japanese unions are beginning to push for agreements aimed at protecting workers from what reportedly is viewed as an "alarming trend of robotization."

While the organization of Japan's unions by company rather than industry precludes any overnight change, some unions, such as auto workers at a Nissan Motor Co. plant outside of Tokyo, have succeeded in executing what some call a model technology agreement for other unions.

The accord reportedly requires "consultation between labor and management," including discussion of the anticipated impact on employees — before the introduction of labor-saving automation — and prohibits the company from laying off workers because of new technology. Nissan promises not to "downgrade jobs, wages or working conditions" and agrees to retrain affected workers.

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Access to Corporate Data

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Robots Seen Replacing Workers on Japan's Shop Floors

By Patricia Keefe
CW Staff

Japan is one of the leading consumers of robotics in the world, according to the Japan Industrial Robot Association, which estimates there are at least 100,000 robots currently in place on production lines in Japan. That figure is expected to rise to between one million and three million robots by 1989, a period of time in which slow economic growth is expected in Japan, analysts say.

In contrast, according to the Robot Institute of America (RIA), there were approximately 5,000 industrial robots installed in the U.S. The RIA estimates growth to between 80,000 and 100,000 robots by the end of the decade. Moreover, RIA President Walter K. Weisel warned of a "rude awakening soon on the part of labor when they wake up and find that thousands of jobs on the assembly line are being replaced by ... robots" [CW, Sept. 19].

A November 1982 survey of 10,000 firms with more than 100 employees undertaken by Japan's Ministry of Labor reportedly revealed that as many as 60% of Japanese manufacturing firms have installed industrial robots or other computer-aided production equipment. Of the remaining manufacturers, 6.6% were reported to have said they plan such additions within the next three years.

The ministry's conclusion is said to suggest that these firms are not necessarily looking for cuts in production costs to keep a competitive edge, but rather to gain precision and higher quality in their products.

In October 1982, the All Japan Federation of Electric Machine Workers' Unions (Denki Roren) sent questionnaires to 474 union offices; 47% responded. In addition, it chose five companies per type of industrial output, including heavy electric machinery and semiconductors, interviewing employees on the shop floor.

The results reportedly showed that 93% of the workshops surveyed in the electric machinery industry have installed some form of microelectronic equipment. Of these, another 60% reported a drop in the number of employees required as a result of automation.

Cutting Work Force

For example, Mitsubishi Heavy Industries Ltd., Japan's top maker of large machinery, reportedly plans to cut its 58,000-member work force by 9% by 1986.

Denki Roren reportedly has estimated that of the 370,000 employees covered by the survey, at least 50,000, or 13%, have lost their jobs to automation. Those affected are women, middle-aged and elderly workers. Estimates of Denki Roren's membership range from 380,000 to 570,000.

Currently, the Japanese manufacturing work force is said to stand at 13.7 million. If industry estimates on the use of robots are correct, there could be substantially fewer jobs by the end of the decade, according to Japanese unions, who claim that the average robot can do the work of three to four people.

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CSI Meet To Be Held On Nov. 7

NEW YORK — A new graduate program for seasoned practitioners and nine general sessions will highlight the 10th Annual Computer Security Conference to be presented at the New York Penta Hotel here Nov. 7-9 by the Computer Security Institute (CSI).

According to CSI, the two-day graduate program for experienced practitioners will feature six special sessions, and the keynote speaker will be Seymour Papert of MIT.

Registration fees are $545 for CSI members and $595 for nonmembers; one-day seminar registration is $175 for members and $196 for nonmembers. Further information is available from CSI, located at 43 Boston Post Road, Northborough, Mass. 01532.

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Designer Sees Adaptability Key to Ada's Future Success

By Paul Gillin
CW Staff

PARIS — The success of Ada as a commercial programming language will be due to its adaptability to the "software engineering" concept that is generating interest as an alternative to linear programming methods.

"I personally believe that of all the attributes of Ada, this [type of] support of the software components will have the greatest impact on its use," said Jean D. Ichbiah, president and general director of Alsys in La Celle Saint Cloud, France, and leader of the team that designed the U.S. Department of Defense-sponsored programming language.

"With separate components programmed in Ada, several independent teams can develop applications, and other teams with no relation to them can use those applications," Ichbiah told a large crowd at the International Federation for Information Processing (Ifip '83) Conference held here last week.

Although Ada has received a lukewarm reception from the Cobol-intensive business community, Ichbiah noted that software engineering, which involves breaking a large program down into smaller modules that are designed separately, is an ideal application of Ada's "package" structure. This feature allows the programmer to define groups of logically related items and separate the user interface from the program module. Only the interface is visible to the user, and the two parts can be compiled separately, he said.

Although this structure presents some limitations to creative programmers, it limits the potential damage of internal errors and protects against deliberate or inadvertent tampering, he noted. Shielding the program structure is also far more desirable for the user who typically wants only a guarantee that the program will function. "You shouldn't pollute your user with information about the body of the program," he said.

The "hidden body" of Ada comprises groups of related subprograms and private data types that are transparent to the user. Subprograms may include mathematical functions and private data types, which are internal properties available only to the subprogram bodies.

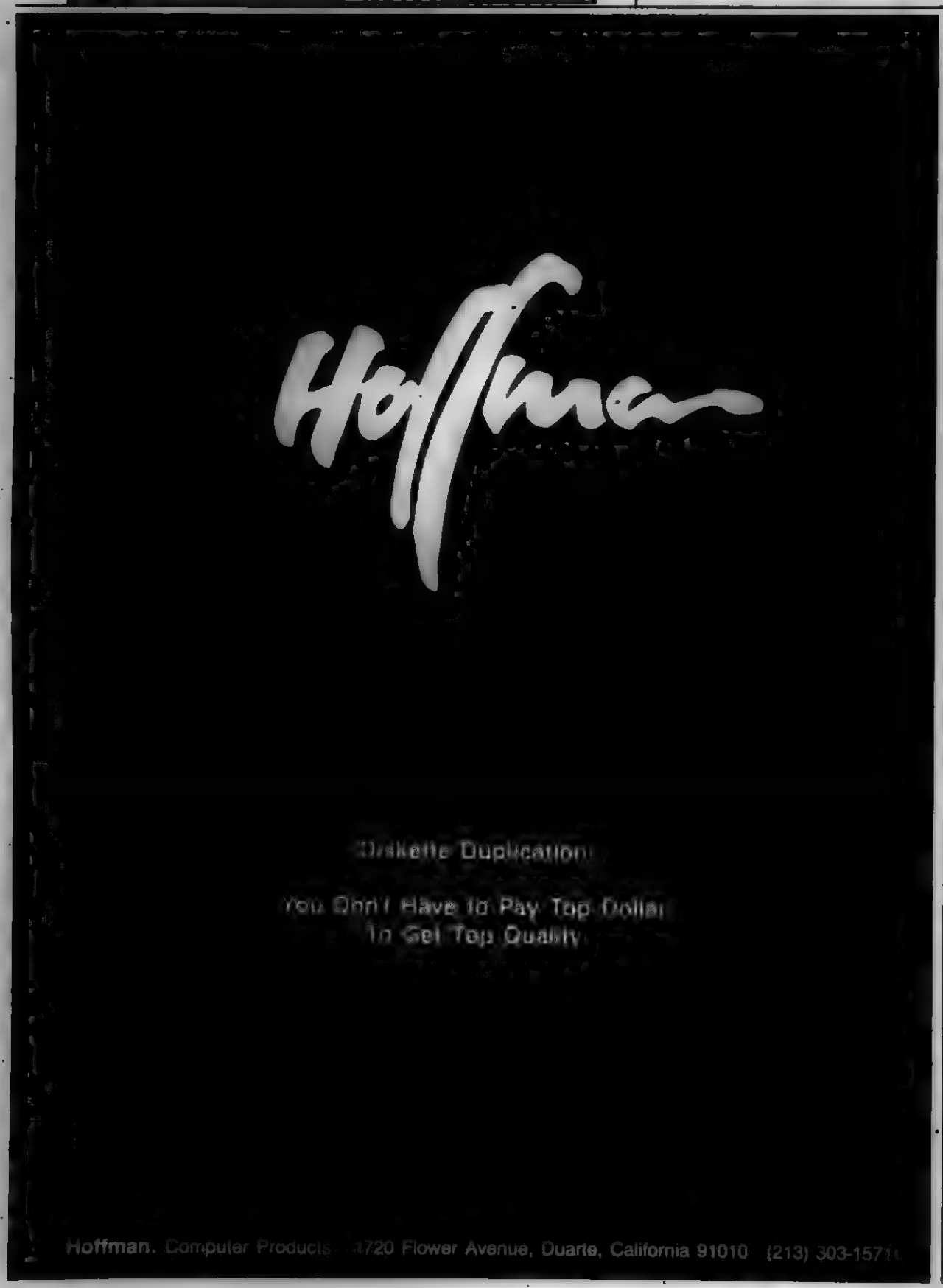
Because the program tables cannot be accessed directly from outside the package, validation and test are made dramatically simpler, Ichbiah said. It is necessary only to validate the text of the package rather than consider all the other programs that can access its tables.

Ada also includes facilities to generate generic program units that can be viewed as extensions of subprogram parameters, he said. This makes program text smaller and easier to read and limits the possibility of clerical errors. Another feature of Ada that makes it useful for distributed development is its separate compilations of software components. This function makes it easier to break large programs down into more manageable parts.

Once a common interface is defined, program parts can be developed and compiled separately with the interface resident separately. This ensures that recompilation does not affect the interface, he noted.

Ada features also automatically update the program library upon compilation, he said. With languages like Fortran and Pascal, "every time you submit a compilation you produce the same listings and reports," he said.

"With Ada, when you submit a compilation, the compiler has access to a program library and it produces an updated program library. This also lets you check which units are using the obsolete version."



On Ada, Data Communications

Two Teleconferences Announced

ROCKVILLE, Md. — The Institute for Advanced Technology will hold two teleconferences: "Ada — Its Practical Applications" on Nov. 14 and "Data Communications Update" on Dec. 5.

The program on Ada will focus on features of the Ada language including packaging, tasks, generics, exceptions, overloading and user-defined data types and demonstrations of validated Ada compilers.

The seminar will be presented at a level appropriate for technical managers, a vendor spokesman said.

The "Data Comunications Update" will feature seminar leader Gary Zielke.

The update will focus on current developments and standards and explore future trends in data communications.

The seminar is recommended for DP managers, operations personnel, systems analysts and network personnel, according to the vendor spokesman.

The fee is $195 per person per seminar.

Further information is available from the Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Video Training Series Targets Novice Users of SAS Package

NORTHBROOK, Ill. — Array, Inc. has announced a video training series for the beginning user of the SAS statistical analysis and data management software package offered by SAS Institute, Inc.

The course, developed in conjunction with Advanced Systems, Inc. (ASI) of Arlington Heights, Ill., is designed to show users how to develop SAS programs, modify data, produce reports through SAS procedures, generate fundamental SAS statistics, maintain SAS data sets and format data and handle both SAS and OS files.

The course is geared toward the user community and assumes no prior knowledge of SAS.

Rental price for the video training program, which will be distributed through ASI, is between $50 and $100, depending on the size of the lease. More information is available from ASI, 2340 S. Arlington Heights Road, Arlington Heights, Ill. 60005. Information on in-house education is available from Array, 2005 Center Ave., Northbrook, Ill. 60062.

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Payroll provides up-to-date costs of specific tasks for every department in your company. Employee master files for salary, hours and other payroll items are easy to maintain. User-friendly prompts provide the customer with complete instructions for each procedure. Up to nine deduction types for each employee. Multiple payroll data reports including check register, QTD 941s and 10 other reports. Runs payroll for 99 companies and for any combination of companies. Provides void check register. Stores YTD and QTD data. Takes negative deductions from paychecks.

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Helps to Speed Patient Diagnosis

Hospital Cures Backlog With Hard Disk System

WINTER HAVEN, Fla. — Installing a hard disk system was the right prescription for a hospital pathology staff's record backlog here. In addition to providing greater access to the now computerized files, the system helps to speed patient diagnosis and aid the department in its day-to-day duties.

Intrigued by computers several years ago, Carol Staninger, a certified professional secretary at Winter Haven Hospital, saw their potential for compiling and cross-referencing patient records.

She began taking courses in computer technology at nearby Polk Community College, which allowed non-profit organizations to use its computers after hours, at cost, in the hope that these organizations would discover what computers could accomplish.

Although Staninger learned a great deal, years passed before the community-supported hospital could consider an outlay for all the equipment it needed.

"We began with a [Wang Laboratories, Inc.] Wang-writer to test what word processing could do for us," Staninger said. However, the pathology department "was really waiting for a hard disk system that would have the massive capacity we needed to manage records going back 30 years and covering 150,000 surgical cases," she added.

The department found the system it was looking for in the stand-alone Wang Alliance 250, currently configured with an 80.4M-byte disk drive, a 35 char./sec daisywheel printer and two Wang Ergo II archiving workstations.

Three pathologists are on the staff of the 600-bed hospital. They also serve, on a rotating schedule, two other area hospitals with a total of 820 beds. Their schedule is worked out months in advance on the Alliance, which also has calendar and electronic mail capabilities not yet in use at the hospital.

Stores Pathology Records

The system is also used to enter all the hospital's surgical pathology records, a work load that includes some 8,000 surgical cases a year, 15,000 cytology entries, 120 bone marrow reports and documents on about 35 autopsies, Staninger said.

In addition to keeping up with the day-by-day work load, Staninger and assistant Lisa Rizer enter the hospital's massive backlog of files into the Alliance system. "Although we still keep hard-copy records, we're spending much less time shuffling papers now," Staninger reported.

Computerized records provide the staff with easier access as well. The user-friendly system gives the entire office team instant access to critical information, according to Staninger. "All we had before were electric typewriters, but the switch was easy," she said.

"Now, we each spend about four hours a day entering data, and it's a breeze. Thanks to the Alliance's functional programming, we can enter each of our 60 to 70 daily cytology reports, for example, using only 10 keystrokes each, instead of 100, Staninger said.

Hospital personnel also like Alliance's security, which requires a password to get into the system and separate passwords to access different libraries and documents. "In the medical field, patient privacy is a prime concern," Staninger said.

She added that the 80,000-word spelling function is a particular boon to hospital word processing operators, who constantly encounter foot-long medical terms. In addition to a main dictionary, the Alliance 250 system allows each user to develop a personal dictionary of special words.

Alliance's word processing capability is used to facilitate consulting and to expedite medical correspondence. "The doctors dictate into tape recorders. Then we transcribe, edit and print," Staninger said.

She has developed about 20 libraries in the Alliance system. Each doctor and each of the two computer operators has one. The others are used for consulting, autopsy, bone marrow and surgical pathology.

"Speed and accuracy are important everywhere in a hospital, but nowhere are they more necessary than in the pathology department. When you can quickly and certainly tell a mother that her three-year-old child's tumor was benign, that's what it's all about," Staninger said.

Computer Law Institute To Meet Nov. 3 in N.Y.

NEW YORK — Computer Law Institute will hold a seminar here Nov. 3-5 focusing on the legal issues of computing, including recent developments in software copyright laws.

At the conference, a panel of attorneys and computer experts will talk about the registering of computer programs, major systems acquisitions, hardware maintenance and performance, antitrust and leasing and protection of data bases.

Two workshops, one addressing the problems of acquiring, licensing and maintaining mass-distributed software and the second examining techniques of financing and developing major software systems, will also be included in the agenda.

Daniel T. Brooks of Computer Law Advisers, Springfield, Va., is chairman of the program, which will be held at Marriott's Essex House in New York City.

The registration fee for the program, including the course handbook, is $375. For persons unable to attend the conference, the book can be purchased for $35.

Further information is available from Nancy B. Hinman, Practising Law Institute, 810 Seventh Ave., New York, N.Y. 10019.

DEC Group Set for Oct. 17

BOSTON — The annual Digital Equipment Corp. System 1022/1032 Users Group Conference is scheduled to be held here Oct. 17-19.

In addition to discussion of the System 1022 data base management system (DBMS) for the Decsystem-10 and -20 mainframes, the conference will focus on the newly released System 1032 DBMS for DEC's VAX-11.

The conference registration fee is $165. More information is available from the Software House, which is located at 1105 Massachusetts Ave., Cambridge, Mass. 02138.

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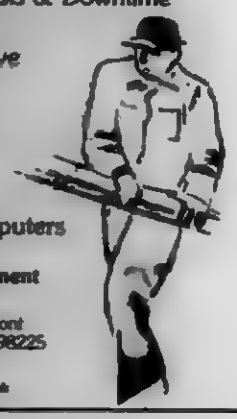

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Portable Proves Invaluable Aid to Paramedics

JAMESTOWN, N.Y. — The recent installation of a personal computer on the dashboard of a paramedic ambulance here has been an invaluable aid in providing emergency medical assistance to area residents, according to the ambulance service's director of emergency medical services.

Utilizing Radio Shack's TRS-80 Model 100 portable computer, the Chatauqua County Ambulance Service is able to rush patient information to ambulance staff as they speed to an emergency.

The Model 100 stores the names, addresses and health problems of more than 1,000 patients served in the area.

Helps Medics Prepare

"When dispatch asks you to respond, they usually just give you an address. Based on that information, the computer allows us to know who is there and what medical emergency to prepare for before we arrive at a scene," said Peter Bonadonna, director of emergency medical services for the Chatauqua County Ambulance Service. Full patient medical files are accessed in the ambulance and consulted before arriving at an emergency scene.

"Having this information in advance allows us to concentrate on taking care of a person. The crew is finding it an invaluable aid, particularly with serious patients," he said.

A more complete medical history is stored for those high-risk patients who already have used the ambulance or potential patients who have given their medical records to the ambulance service as a precaution.

Bonadonna said he selected the Model 100 computer because of its small size, built-in programs, full-size keyboard and battery operation.

While neither Bonadonna nor his staff had computer experience, he said they learned to operate the personal computer in just a few hours.

Stores Instructions

In addition to storing patient information, expanded use of the computer allows the ambulance service to store instructions, keep an inventory of medications and use the function keys programmed to serve as individual message boards for ambulance staff.

"My staff really likes it, too. We've become very dependent on it," he said.

Bonadonna initiated the use of the computer and paid for it himself. His inspiration came from several hospital emergency rooms that use computers to store patient health records.

The TRS-80 Model 100 has built-in software, a built-in modem and a full-size typewriter keyboard. Five programs are contained in 32K bytes of read-only memory. The personal computer measures 2 in. by 11⅞ in. by 8½ in. and weighs approximately 4 lb. It can be powered by four batteries or an ac adapter for approximately 20 hours of operation. The unit has built-in nickel cadmium batteries that maintain the computer's memory for up to 30 days.

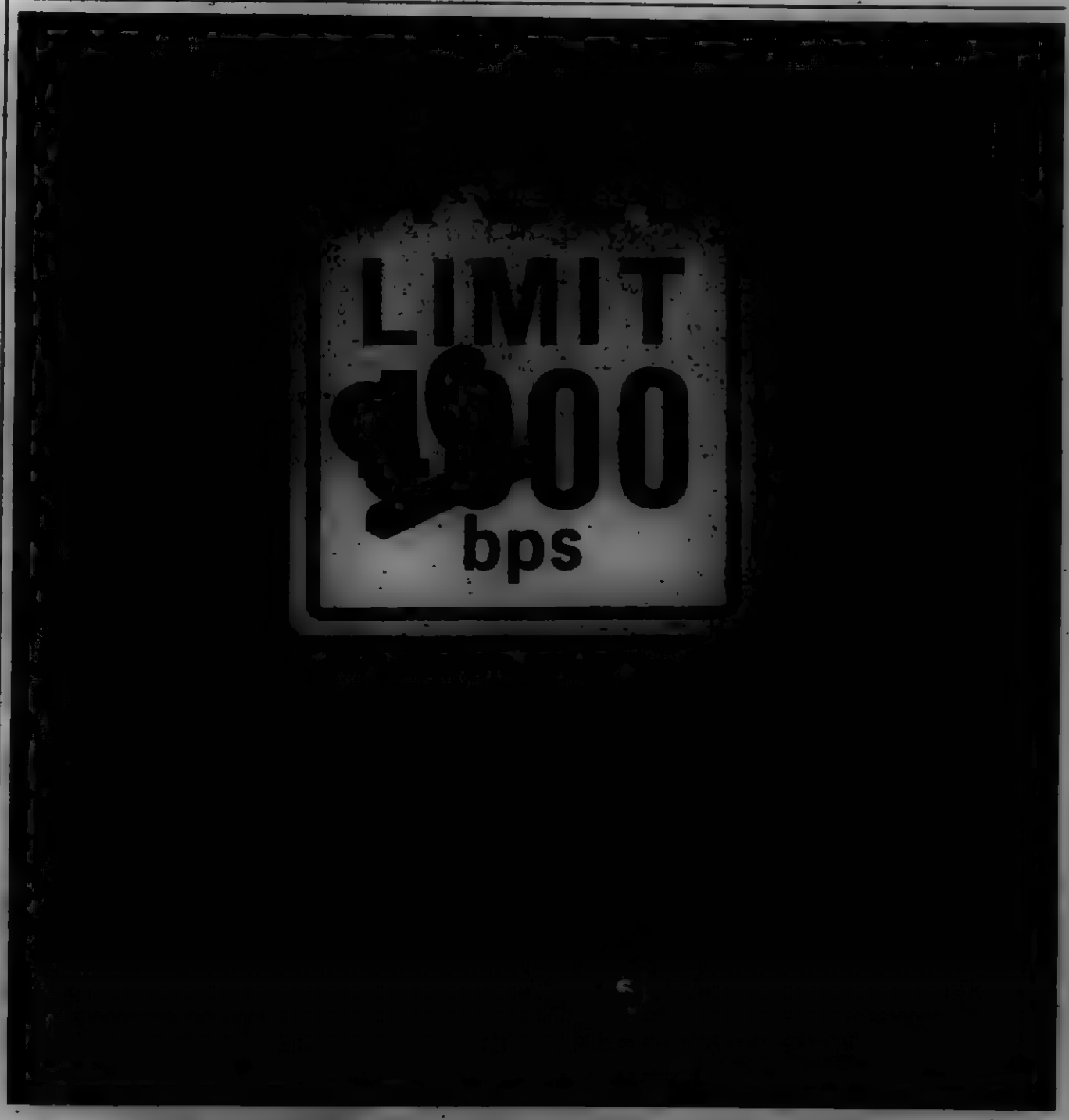
Guide Cites Safeguards For Systems

BABYLON, N.Y. — Pilot Books has published Phillip G. Elam's "Checklist/Guide For Assessing Data Processing Safeguards," a guide to protecting mainframes, terminals and data processing workstations from loss, malfunction and misuse.

The publication includes a checklist to aid organizations in assessing the quality of procedures for protecting the DP facility and evaluating disaster contingency planning.

The guide includes coverage of fire and water hazards, access control, personnel, hardware and software security, files documentation and data protection and various facets of disaster planning.

Priced at $5.95 per copy, the guide is available from Pilot Books, which is located at 103 Cooper St., Babylon, N.Y. 11702.



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Calendar

Week of Oct. 23

Oct. 24-25, Chicago — **CICS/VS Performance and Tuning.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Oct. 24-26, Carmel, Calif. — **Managing Information Services.** Contact: American Management Associates, 135 W. 50th St., New York, N.Y. 10020.

Oct. 24-26, Boulder, Colo. — **Local-Area Networks.** Contact: Seminar Broker, Mary Willard, 3213 W. 1133 Ave., Broomfield, Colo. 80020.

Oct. 26-27, New York — **The 1983 Marketing Conference.** Contact: The Conference Board, Inc., P.O. Box 4026, Church St. Station, New York, N.Y. 10249.

Oct. 26-27, Chicago — **Recovery/Restart.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Oct. 26-27, Anaheim, Calif. — **Software Productivity.** Contact: The Education Foundation of the Data Processing Management Association, Department SP, P.O. Box 3608, 3420 Kashiwa St., Torrance, Calif. 90510.

Oct. 26-28, New York — **SAS Applied Time Series Analysis and Forecasting Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Oct. 26-28, Atlanta — **Unix.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Oct. 26-28, Boston — **SNA and Today's Telecommunications Environments.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

Oct. 26-28, Washington, D.C. — **How to a Build and Use a Data Information Resource Directory.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

Oct. 26-28, Burlington, Mass. — **Network Communications Protocols.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Oct. 26 - Nov. 1, Geneva, Switzerland — **Italtel at Telecom '83.** Contact: Vera Gandi, External Relations, Italtel, Via A. di Tocqueville, 13, 20154 Milano, Italy.

Oct. 27, New York — **CBX Evaluation and Selection.** Contact: Marilyn Chasteen, The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

Oct. 27-28, San Jose, Calif. — **Office Automation: The Hardware, the Software, the Systems.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

Oct. 27-28, New York — **The Fourth-Generation Systems and Languages.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Oct. 27-28, Dallas — **IMS/VS Dump Reading.** Contact: Data Base Management, Inc., 1075 Tolland Tnpk., Manchester, Conn. 06040.

Oct. 27-28, Los Angeles — **Local-Area Networks.** Contact: Techtran, 72 Cummings Point Road, P.O. Box 10212, Stamford, Conn. 06904.

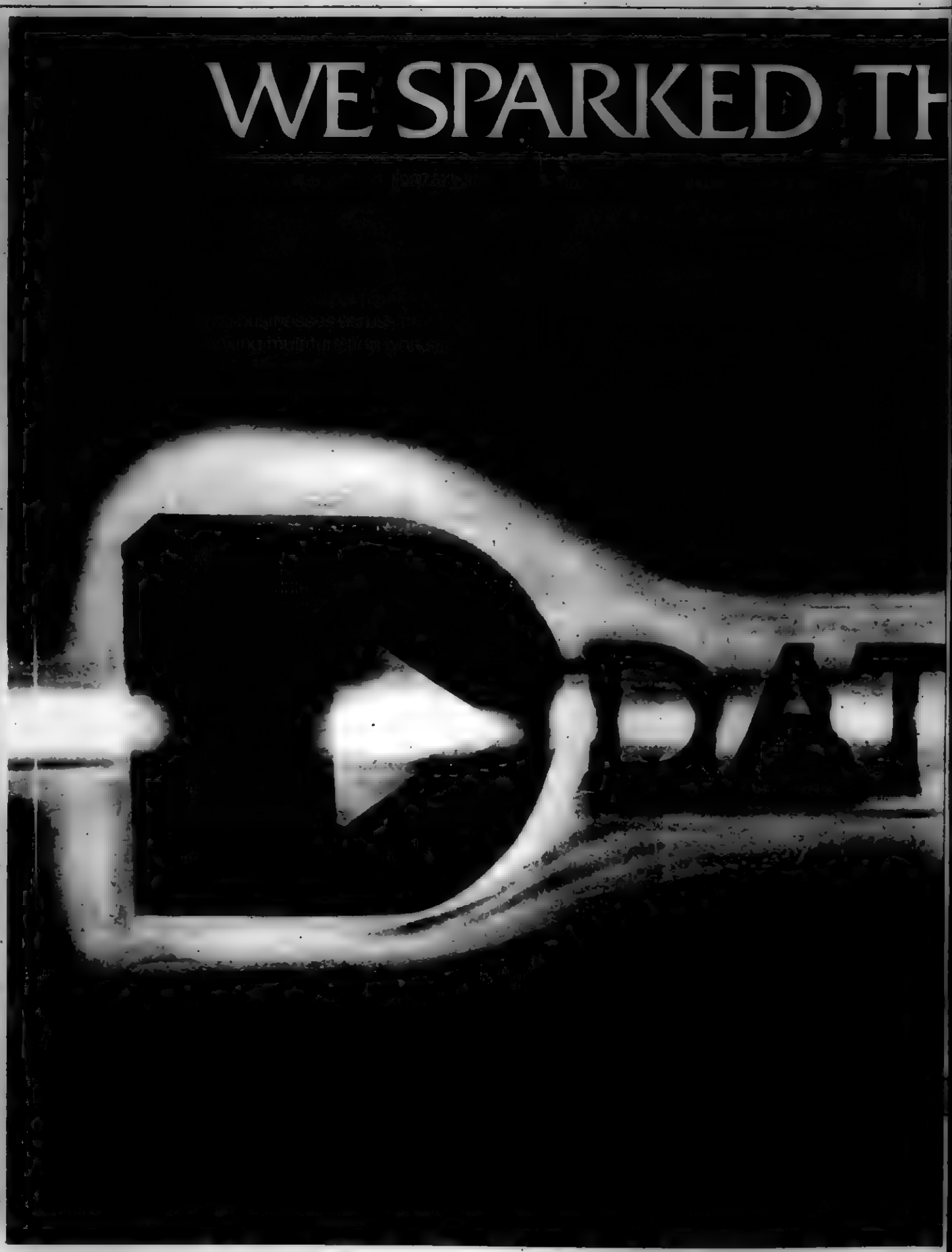
Oct. 27-28, Cary, N.C. — **SAS Color Graphics Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Oct. 27-30, Washington, D.C. — **Mid-Atlantic Computer Show and Office Equipment Exposition.** Contact: Computer Expositions, Inc., P.O. Box 3315, Annapolis, Md. 21403.

Oct. 28, Anaheim, Calif. — **Structured Systems Development.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Oct. 28 in Cleveland.

Oct. 28-29, Chicago — **Data Communications: Advanced Concepts, Products and Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held Oct. 31 - Nov. 1 in San Francisco.

Oct. 28-30, San Francisco — **Applefest/San Francisco.** Contact: Northeast Expositions, 822 Boylston St.,



Calendar

Chestnut Hill, Mass. 02167.

Week of Oct. 30

Oct. 30 - Nov. 2, Baltimore — **The 32nd Annual International Conference and Business Exposition of Data Processing Management Association (DPMA).** Contact: Conference Manager, DPMA International, 505 Busse Highway, Park Ridge, Ill. 60068.

Oct. 31 - Nov. 1, Santa Clara, Calif. — **Voice-Meets-Data Conference.** Contact: Donna Bonyun, Dataquest, Inc.,1290 Ridder Park Drive, San Jose, Calif. 95131.

Oct. 31 - Nov. 1, Milwaukee — **Structured Systems Development.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Oct. 31 - Nov. 1, Baltimore — **Digital Private Automatic Branch Exhange.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

Oct. 31 - Nov. 1, Monterey, Calif. — **How to Manage Data and Information as a Resource.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

Oct. 31 - Nov. 2, Washington, D.C. — **Data Communications: Effective Network Design.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Oct. 31 - Nov. 2, Chicago — **Structured Analysis for Users.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Oct. 31 - Nov. 2, Chicago — **Intech '83 Integrated Office Technology Conference and Exposition.** Contact: Integrated Office Technology Conference and Exposition, National Productions, Inc., 9418 Annapolis Road, Lanham, Md. 20706.

Oct. 31 - Nov. 2, Los Angeles — **Ergonomics Legislation and Standards in Europe.** Contact: Richard P. Koffler, The Koffler Group, Suite 200, 3029 Wilshire Blvd., Santa Monica, Calif. 90403. Also being held Oct. 31 - Nov. 2 in Boston.

Oct. 31 - Nov. 2, San Francisco — **IBM Teleprocessing Software: An Introduction to Concepts, Systems and Applications.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

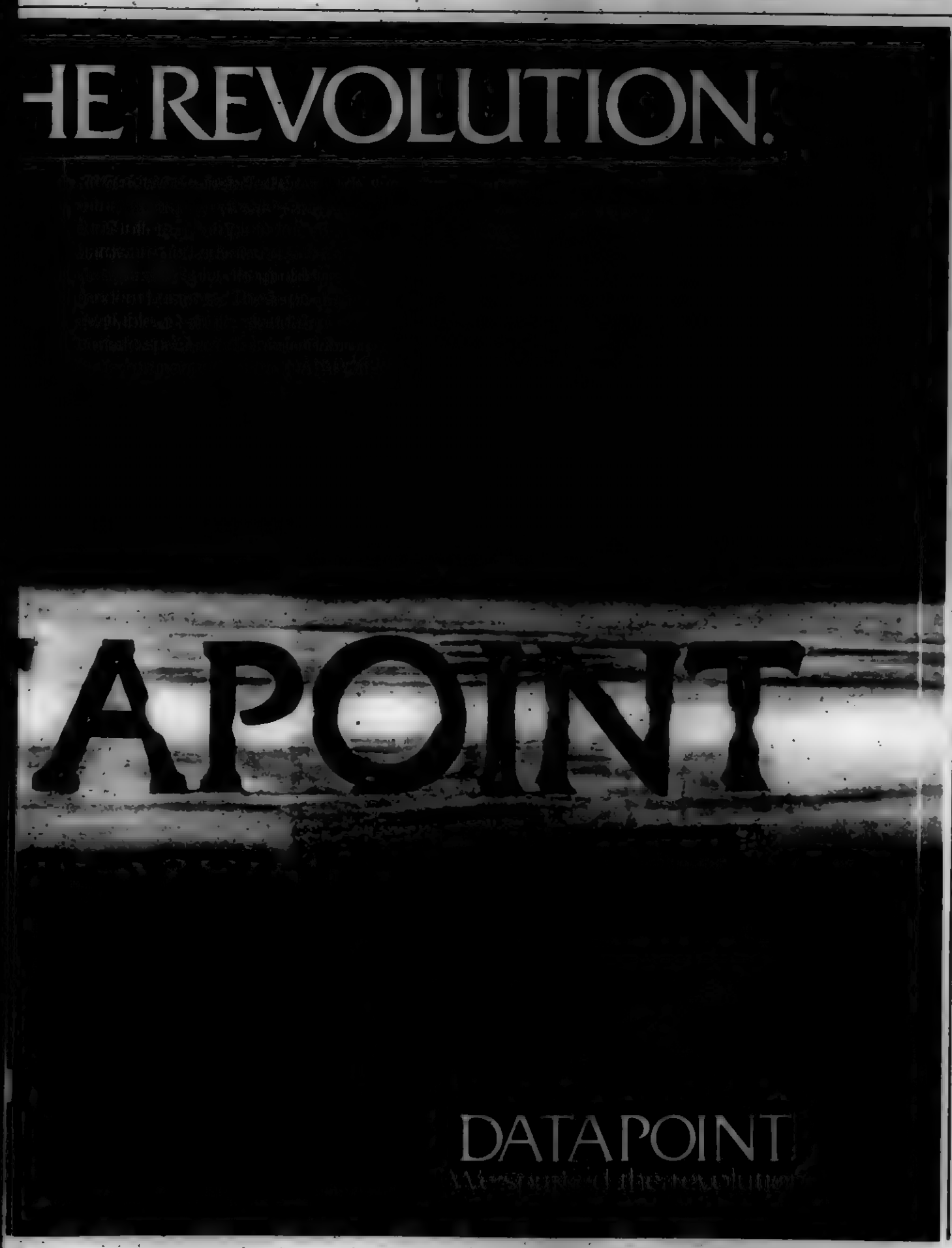
Oct. 31 - Nov. 2, Atlanta — **DL/1 Application Programming.** Contact: Data Base Management, Inc., 1075 Tolland Tnpk., Manchester, Conn. 06040.

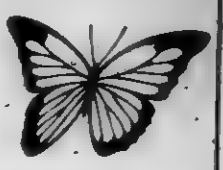
Oct. 31 - Nov. 2, Chicago — **Data Communications for Microcomputers: Acquisition Applications and Implementations.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Oct. 31 - Nov. 2, San Francisco — **Distributed Systems Designs: Micros to Mainframes.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Oct. 31 - Nov. 3, Fort Lee, N.J. — **CICS/VS Logic and Debugging.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024. Also being held Oct. 31 - Nov. 3 in Los Angeles.

Oct. 31 - Nov. 4, Kansas City, Mo. — **Structured Systems Design/Structured Program Design Combined Course.** Contact: Georganna Carson, Ken Orr and Associates, Inc., 1725 Gage Blvd., Topeka, Kan. 66604.





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Nonimpact Printer Tech Saves Insurer Money

TAMPA, Fla. — Relatively low cost and the potential for expansion of printing capabilities led an international independent insurance agency based here to purchase a printer utilizing a recent development in nonimpact printing technology.

Poe & Associates, a publicly held corporation listed over the counter and on the National Association of Securities Dealers automatic quotation system, is an independent insurance agency organization with 1982 gross revenues exceeding $25 million. Its offices and subsidiary companies across the U.S., in London and Puerto Rico serve a primary market of professional liability, casualty and health coverage for professionals and trade associations and for commercial risks.

The company required speedy, quality print capability for its normal DP needs in accounts receivable, general ledger, financial reporting, financial statements, daily invoicing and monthly statements for its more than 200,000 customers. But Poe & Associates also wanted to save money on its direct mailing costs.

Douglas K. Hudson, vice-president of corporate services, said that new business development by Poe & Associates is heavily dependent on generating leads via direct mail to potential customers.

"We feel we will be able to save 40% on direct mail to potential customers," Hudson said, when asked about the decision to take delivery of the first Mercurion 1 from Southern Systems, Inc. of Fort Lauderdale, Fla.

Introduced last year [CW, Oct. 25], the Mercurion 1 is a 60 page/min nonimpact printer using a new technology — ion deposition imaging. High-speed output has for several years been dominated by more expensive techniques such as xerography and laser xerography. The Southern Systems process uses multiple ion beams to charge a dielectric drum; which is then toned.

Chris Frissell, supervisor of programming, said the Mercurion was installed in late March. Having recently acquired an IBM 4341 running under DOS/VSE with 4M bytes of memory, the DP department saw an opportunity to use the relatively low-priced printer to meet the company's expansion needs.

"This opens up large areas for us, such as advertising," he said. "We [in the DP shop] will be able to send out letters that previously went through a [contracted] printer."

Impact Printer Used

The IBM output is also directed to a Southern Systems 600 line/min impact printer that has been dedicated to special forms, customer statements and invoices, Frissell said. Both printers interface with the IBM through Southern Systems' dual port controller, the 32/5.

Large savings — expected from the Mercurion's use of 8½- by 11-in. cut-form sheets — was the major motivation for selecting the ion deposition printer. Cut-form paper is reportedly 50% less expensive than the continuous-form computer paper the shop previously used and is now the standard for all reports.

The Mercurion was installed "with no problem" in three to four hours, but there were some initial bugs in both hardware and software, Frissell recalled. However, he said, Southern Systems personnel "worked very diligently to correct the problems speedily."

The printer has lived up to promotional promises to this point, Frissell said. "But we haven't really pushed it to the limits right yet," he added.

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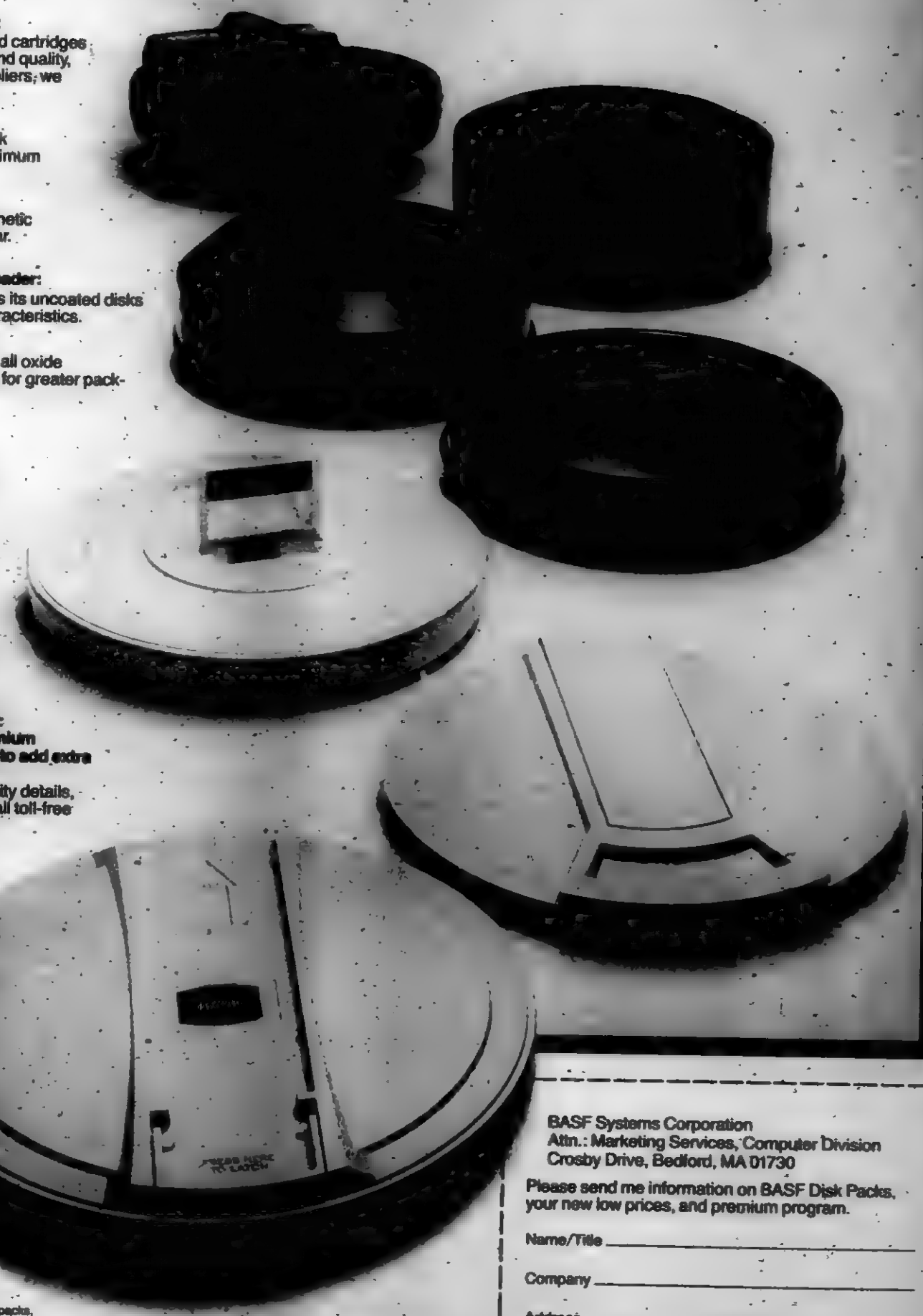

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EDITORIAL

Silence Might Cost Them

An alarming trend is cropping up in the telecommunications industry at a particularly distressing time for users — budget time.

The trend became especially evident in San Diego at last month's Tele-Communications Association annual meeting when NEC Telephones, Inc. introduced its Neax 2400 Information Management System private branch exchange.

The company waxed poetic for about 20 minutes at a press conference on Neax's capabilities, which range from packet switching to local-area networking to information store and forwarding. NEC continued to pontificate on the system's communications, facsimile features and nonblocking architecture before bringing out the champagne.

There was one piece of information, however, that NEC refused to give: the price of the system.

In cases such as these, it would be easy to accept the oft-cited reasoning that because the system in question is an expandable, multifunction system, no one price would be totally accurate.

It would be an easy excuse to accept if most other PBX manufacturers did not give a clue to pricing through descriptions of typical configurations. But they do. Configurations may include the number of lines, terminals, users and any other pertinent information that may qualify the approximate price.

Another vendor also attempted to withhold pricing information recently at a New York press conference. Southern New England Telephone Co. released its Sonecor System 2001 integrated voice and data office system (which, by the way, includes an OEM NEC switching system). After considerable pressure was applied by the press, an approximate price was given.

These are dangerous precedents, especially for users who are now in the midst of planning their budgets. With so many third-generation and superintegrated PBXs coming out, many users may be estimating line items on their 1984 budgets for new phone/office systems.

There is no reason that users should have to call in a vendor and arrange a two-hour or longer sales presentation for themselves and senior management in order to learn a simple price range. Users need to compare systems by some typical configuration prices to plan for the coming year and to determine what vendor should be given a request for proposal.

By withholding prices from the press and, subsequently, the users, vendors also do themselves a disservice. They may ace themselves out of the sales race before it even starts.

While the catch phrase for pricing is often "We're competitive," most users assume that what vendors are really saying is that old line: "If you have to ask how much it costs, you can't afford it."

DATA PAST

Five Years Ago
Oct. 9, 1978

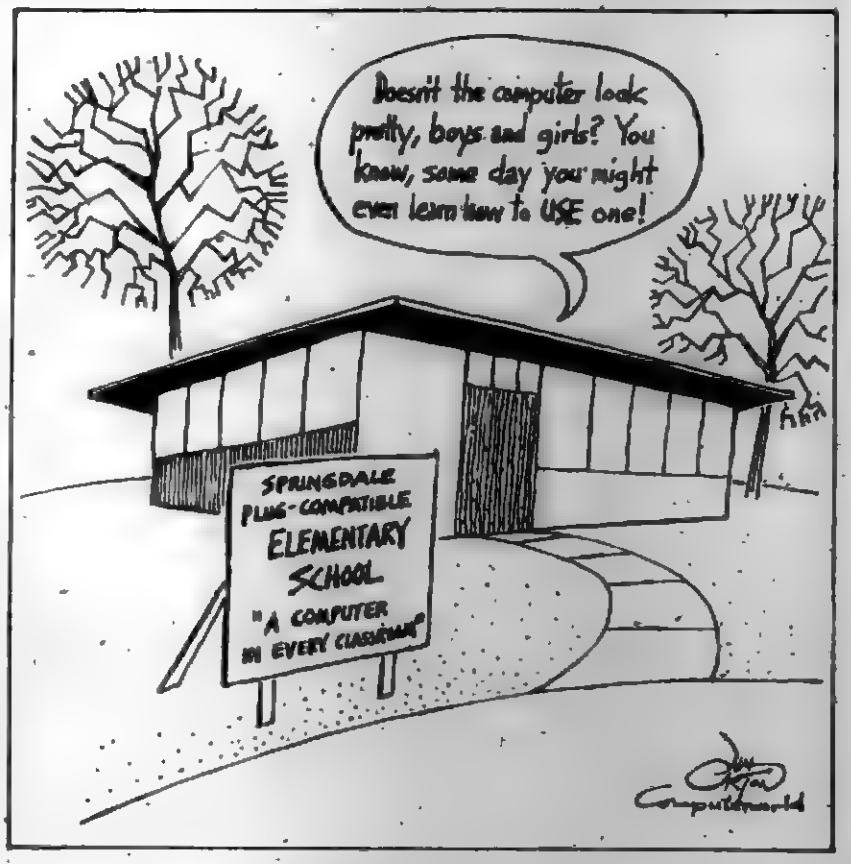
WHITE PLAINS, N.Y. — IBM jumped headfirst into distributed processing with the announcement of the 8100, a system that featured 64K-bit technology and aggressive pricing.

The system was one of the first from IBM to come completely un-bundled.

Ten Years Ago
Oct. 10, 1973

SACRAMENTO, Calif. — Then-Gov. Ronald Reagan signed into law a bill making certain software permanently exempt from taxation as tangible, personal property.

Only those programs that are basic operating programs were to be taxed. Excluded from taxation were processing programs.



LETTERS

'Technical Maturity'

The article "Hacking: Mark of Genius or Plain Theft?" [CW, Sept. 12] was very upsetting. It, along with other related articles, implied a now-aren't-you-a-clever-child attitude toward those with the "technical maturity ... to prove their technological manhood." Most, we're assured, are good Jedi knights (like Luke Skywalker), though a few are "misdirected" or (worse) "antagonized" when faced with "police state" and "authoritarian" attitudes.

In my 15 years in data processing, I've been fortunate to work on lots of different projects in about 15 data centers. One of the skills I've developed is the ability to learn to use a data center quickly, to become effective with a short learning curve. This really does mean much in terms of producing effective applications systems.

What I like to consider to be better marks of technical maturity are the disciplines I've developed as I've struggled to design, develop, install, implement, maintain, modify and transfer systems. The technique, or ability, to accomplish work also requires a professional attitude, which includes a set of ethics such as:

- Computer resources are real, bought and paid for for use in company business only.
- A user's/customer's systems/data belong to him and are not to be treated trivially.
- The user/customer must believe and trust your judgment, competence, honesty and integrity.

So am I to believe that I should show my technical maturity by breaking into some private or government data center? Do I list on my resume after hardware/software experience data centers I have accessed? Do I forget that I have seen well-meaning but dumb DPers suspended or canned for activities significantly less serious than those of the hackers? Do I want the public's general perception of my profession colored by these white-collar thieves? Do I want to hire these geniuses and struggle not only with the normal new-hire problems but also teach ethics and morality? Do I gently ask such people what they're looking for as they browse through my files so that we can ooh and ah over the intrinsic beauty of my company's financial data?

Diana M. Voisin
Garden Grove, Calif.

Put Them in Jail

Geoffrey Goodfellow, SRI International, Inc. researcher and self-proclaimed hacker, is wrong when he says in the article "Hacking: Mark of Genius or Plain Theft?" [CW, Sept. 12] that hackers are "responsible" and "admirable."

If the kids in my neighborhood take my car for a joyride because they have unrecognized mechanical and driving talents, they should be put in jail. If they enter my office or home just for "innocent activities like browsing" through my property, they are criminals and should be punished.

It's true that the crime is greater if damages ensue. It's also true that I am at fault if I don't have locks on my car, home or office. However, unauthorized entry into my car, home or computer system is always wrong because the possibility of damages is always present. At best, unauthorized access to computer systems comprises theft of services.

It is the height of irresponsibility for *Computerworld* to print an article so biased toward the intruders. It is ridiculous for SRI's Goodfellow to say "erecting barriers ... is ... the wrong approach to take."

Steve Dibner
St. Louis, Mo.

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1. BUSINESS/INDUSTRY (Circle One)
End Users
10 Manufacturer (other than computer)
20 Finance/Insurance/Real Estate
30 Medicine/Law/Education
40 Wholesale/Retail Trade
50 Business Service (except DP)
60 Government—State/Federal/Local
65 Public Utility/Communication Systems/Transportation
70 Mining/Construction/Petroleum/Refining
75 Other User _____

80 Manufacturer of Computers, Computer-related Systems or Peripherals
85 Computer Service Bureau/Software/Planning/Consulting
90 Computer/Peripheral Dealer/Distributor/Retailer
95 Other Vendor _____

2. OCCUPATION/FUNCTION (Circle One)
11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Financial Officer
21 Director/Manager/Supervisor DP/MIS Services
22 Director/Manager of Operations/Planning/Administrative Services
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
35 OA/WP Director/Manager/Supervisor
38 Data Comm Network/Systems Mgmt
41 Engr/Scientific/R&D/Tech Mgmt
51 Mfg Sales Reps/Sales/Marketing Mgmt
60 Consulting Mgmt
70 Medical/Legal/Accounting Mgmt
80 Educator/Journalist/Librarian/Student
90 Other _____

3. COMPUTER INVOLVEMENT (Circle all that apply)
Types of equipment with which you are personally involved either as user, vendor or consultant
A. Mainframes/Superminis
B. Minicomputers/Small Business Computers
C. Microcomputers/Desktops
D. Communications Systems
E. Office Automation Systems

READER COMMENTARY/Jay BloomBecker

And a Little Child Shall Lead Them

'As the highways were to Jack Kerouac, so are the electronic pathways of computer networks for many people, not just a few geniuses. DP networks represent a new diversion, a new direction and a new approach to finding status or self-worth for many.'

News item:

MILWAUKEE (UPI) — One of the youths who tapped into the government's nuclear weapons laboratory computer in Los Alamos, N.M., will testify Monday before a congressional panel looking into computer security problems. Neal Patrick, 17, will appear before the House Committee on Science and Technology.

Fantasy:

Neal Patrick is a strange figure to listen to; as unexciting a "criminal" as one might ever see. He was like a gopher in a field as he hitchhiked along the electronic highways called computer networks. He had stuck his nose up here and there, not knowing where he'd arrived before he got there.

Not brilliant or rich, no weirdo or monk, he's your average upwardly mobile kid who bought the messages of those who said computers are the coming thing (the plastic of *The Graduate*). He smirked and confessed to the assembled congressional multitude that "hacking" was not all that big a thing.

It was this, how commonplace he made everything seem, that made Patrick's testimony so scary. "Unauthorized access" was the term the congressmen who drafted computer crime legislation used to describe the use of other people's computers. Hitchhacking, one southern senator had joked.

But as the highways were to Jack Kerouac, so are the electronic pathways of computer networks for many people, not just a few geniuses. DP networks represent a new diversion, a new direction and a new approach to finding status or self-worth for many.

Millions upon millions of teenagers could be doing this right now, Carl Sagan was to enthuse later before the same congressional committee that had heard Patrick. It could be the biggest nuisance since joyriding, John Warner of the National Alliance of Parent Teacher Associations warned.

The congressional hearings got surprisingly good ratings in the video channel stations that carried them. Not since Kefauver were such interesting situations the subject matter of congressional consideration: computer widows, psychiatrists with practices limited to "computer alienation" and "addiction removal therapy" and even a few "psychic storm troopers" who offered more strenuous behavioral therapies called "deprogramming."

And oddly enough, people heard what the young man was saying and began to push for change.

People "on the phone" listened most wisely. It did not take long for a number of businesses that depended on computer networking to react to the fact that many teenagers "had their numbers."

Devices to identify and limit the phones that could be used to access a computer system became annoyingly commonplace. Call-back machines, sophisticated password systems and even voiceprint and "computerprint" technology cost us plenty, but had assured that many systems could offer their users some security.

Privacy concerns had been met with the increased use of encryption so that even if information was read, it could not be understood. Demand climbed for sophisticated programs to govern carefully and monitor reliably all the entries made into crucial computer systems.

Laws were passed, not only updating our criminal codes, but also creating civil liabilities for those "data custodians" who failed to protect adequately the personal data under their care.

At first, there had been an outcry by Steven Wallace of the Data Custodians of America. But once the Uniform Limitation of Liability for Up-to-Standard Computer Systems Law had passed; they, too, consented to the logic of liability. They might grumble about having to keep data protections up to necessary standards, but it sure was better than the agony of a lawsuit.

People were surprisingly more comfortable with the use of computers as they became evermore commonplace and as the antisocial uses of computers became rare, thanks to the high technical level of our protections.

More Responsible Attitudes

The children who had learned the language of computers and communications first, and demonstrated how easily they could be used for mischief, had led the adults of society to more responsible attitudes. And the adults decided it was about time to return the favor. Reversing a long trend, adults began to lead children once again. Parents began expecting children to be loving and respectful.

The President's Commission on Conscience in Computing chose moral leaders and teachers from the country's cream of the crop and set them to work. They met and sought ways to teach right and wrong in the computer age.

"What is conscience?" they debated, much as Plato did centuries ago. "And how do you program it into a programmer?" his modern counterparts wondered.

But with public relations (finely honed by earlier Swedish efforts to teach citizens about computer vulnerability), with hoopla and hope, the commission had begun.

Respect, and even awe, grew for the power of computing and the responsibility that went along with that power.

Others were learning to apply the same learning to genetic engineering, psychopharmacology and nuclear energy.

Citizens no longer feared for their privacy. Audiences no longer snickered inside when they heard about computer crimes.

And all this because a child showed them how simple it was to use a computer.

Reality:

How far is this fantasy from reality? It depends on you.

BloomBecker is director for the National Center for Computer Crime Data in Los Angeles.

HUMAN CONNECTION/Jack Stone

They Don't Make 'Em Like They Used to

Recent developments of hand-carried computers have been impressive, but until manufacturers of portables find ways to cut their weight or the suppliers of "laps" toss some decent word processing and file management software into their read-only memories, my desires for portability, at least, will not be met.

In the meantime, I'll have to lug the trusty Processor Technology Sol 20 around in my car, an approach that isn't all that bad. After all, the Sol was among the best in its heyday of the late '70s, and it surely has done the job for many of its aficionados.

My continued operational use of the machine proves, without any doubt, that the half-life of a small computer is a lot longer than 18 months, although making it run does involve some unique methodologies.

Weird Graphics

Early in 1980, I began noticing a peculiar display when I powered up. Instead of the routine cursor, there appeared a string of weird graphics plastered all over the screen. And the graphics were stuck there; they would not disappear for love or money when I tried to reboot.

I was able to clear them off, finally, after powering up and down a few times. But as time wore on, the graphics showed up more often, and soon the power-switching procedure did not help at all. I found myself removing the cover, pulling the memory and disk controller boards, vacuuming them and cleaning the contacts with alcohol. After replacement, the graphics were nowhere to be seen, and I was able to resume writing at my usual frenetic pace.

Continual transport did not seem to hurt the machine too much, except once when I piled too much luggage on top of it, bending the metal case inward and shorting ouf a few circuits. Of course, there are not a great many repairmen around to service my equipment; in fact, I can only find one in the greater metropolitan Washington, D.C., area.

In the summer of 1981, the Byzantine graphics started haunting me again at JPL-time, but cleaning the boards did not make them disappear. I'm not much on thermodynamics, but it seemed to me that the chips were running awfully hot, perhaps through age, and that the teensy fan could not keep enough cool air flowing.

So I took a flyer on the notion that some chips were not properly seated because their little feet were crinkled from temperature extremes. I promptly proceeded to push them carefully into their sockets by applying equal and constant pressure on them from my two index fingers.

The 200-Chip Mark

The procedure was not too debilitating to begin with, but when I passed the 200-chip mark, I started to feel weak. After finishing, I was exhausted, but my juices were flowing, so I summoned that last ounce of strength to re-JPL and voila — my cursor was back on the screen, clear and bright as ever. A consuming feeling of satisfaction came to my senses, the same that is acquired after successfully debugging a complicated program or after a widely erupting wisdom tooth is extracted.

I thought that the JPL graphics were gone forever, but no such luck. It turned out that they reappeared every time I powered up, and my index fingers were taking a terrible beating.

After some intensive research, I discovered some alternatives — first, the eraser tip of a pencil and then the metal bottom of a chemical marker. But it started to get to me, and I found myself reseating the chips by gently hashing them with a small hammer.

Then last winter, I implemented a new generation JPL approach, which has been extremely successful: I keep the machine running continuously with the covers off. Of course, when I must transport the machine, I always carry my hammer to start computer operations after arrival at the destination.

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LETTERS

Misleading Info

I was disappointed to read Jack Stone's article "Some Tips for Negotiating DP Contracts" [CW, Sept. 12]. Stone's article contains inaccurate and misleading information on NEC Information Systems, Inc.'s price promotion campaign for its Advanced Personal Computer (APC).

While Stone asserts that the promotion was put together by resellers, it was not. It was developed by NEC and as such, does not represent a "massive unloading." Dealers of NEC equipment are not in fire-sale mode.

Second, the deduction that the hardware must be valued at $548 if the software is worth $2,200 is incorrect. The APC is priced competitively with other advanced 16-bit computers that offer features similar to those marketed by IBM and Apple Computer, Inc.

In addition, Stone's conclusion that the software must be overpriced if the hardware is worth more than $548, is incorrect. The system, bundled with operating system and five applications programs, includes Micropro International Corp.'s Wordstar, Mailmerge and Spellstar, Ashton-Tate's Dbase II and Sorcim Corp.'s Supercalc and Millionaire software. This combination, if purchased separately, would cost $4,948. The promotional tag of $2,748 is the normal list price of the base system alone.

NEC can offer substantial discounts because it is able to negotiate huge bulk purchases from software vendors also interested in the advantages of such a promotion. The bundling of software and hardware is not unique to NEC. Companies such as Zenith Data Systems Corp.; Cromemco, Inc.; Televideo Systems, Inc.; Sanyo Business Systems Corp.; and NCR Corp. run similar promotions.

Lynda Welsh
Account Executive
Public Relations
Ingalls Associates, Inc.
Boston, Mass.

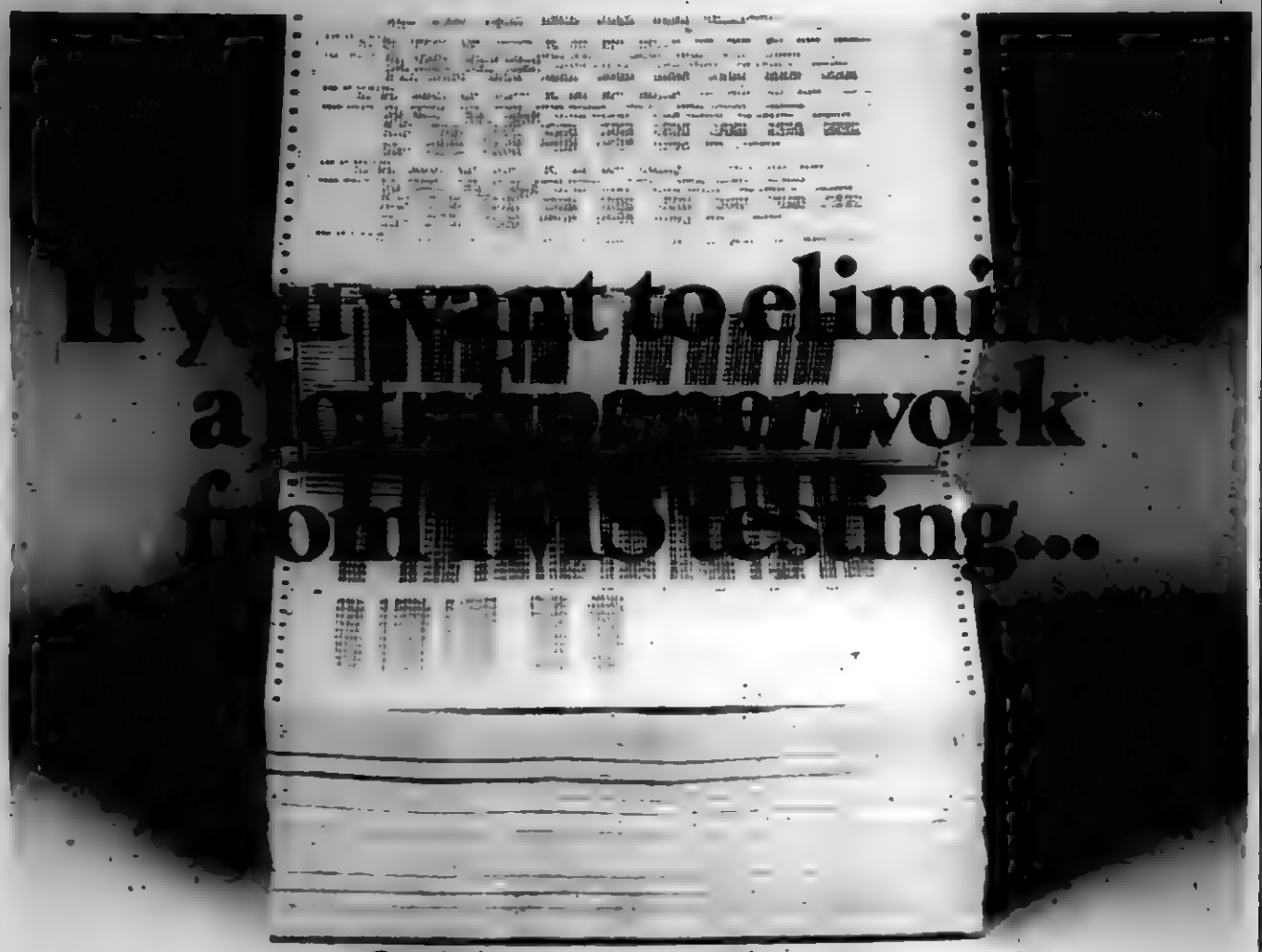
Programs' Life Spans

The article "Study Finds IBM Sites Toss 10 Months' Software Yearly" [CW, Aug. 22] was of special interest to me. In November 1977, I reported at Guide on a similar study of several large IBM mainframe sites, most of them inside IBM. In that study, I reported observing an effective long-term program retention rate just under 20% of all new programs written. The report from Techtran Industries, Inc. apparently found the same thing from a larger and more recent sample.

I have repeatedly been asked, "What will be the impact of new development techniques, interactive applications and improved tools?" Others, upon hearing the results of the study, seemed inclined to believe that their installations were different.

The Techtran study strongly bears out that the installations are not unique. With the high death rates of programs that are suggested by these studies, it is time to question the anecdotal "evidence" that programs live long and fruitful lives.

Robert C. Kendall
Hopewell Junction, N.Y.



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HEWLETT PACKARD

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THE DATA CENTER

Easing the Impact of DBMS Installations on

When issues involved in the selection, development and implementation of a data base management system (DBMS) are considered, it is often the case that too little time and attention are devoted to the impact of the installation of the DBMS upon the data center function.

Usually, the requirement to take into consideration — that is, the necessity to provide increased hardware resources to support the DBMS — is given attention, but the effect on the continuing operation of the data center in terms of changes for the data center staff is often ignored.

While the benefits of DBMS, particularly to the management information systems (MIS) client base — if a fourth-generation programming language is being offered and actively used — can be great and will indeed open many new vistas to members of those client areas, the role of the data center function becomes more complex.

The data center function, under the DBMS, moves from that of having to deal with systems that have failed — often a serious, but rather independent (in terms of the total operation) problem — to that of attempting to deal with the much more far-reaching (global) issues of a failed DBMS.

As progress is made with the installation of the DBMS, the degree of seriousness inherent in the failure of the DBMS also grows. Thus, an increased degree of responsibility and complexity are loaded onto the data center staff.

Data Center Staff

What does such a circumstance mean for the data center staff? It means that these people will be forced to develop additional skills, to understand better the importance of the work they do and to appreciate better the serious complications that can occur as a result of errors within the data center.

These errors will jeopardize not only the smooth functioning of the DBMS, but the entire data center operation. The installation and burgeoning growth of the DBMS in the organization raises the visibility of the data center one more notch.

Just as there was a learning curve associated with the advent of on-line processing (remember the problems some computer operators had understanding the absolute requirement to keep the teleprocessing network in service?), there is a data center learning curve in the movement to the use of a DBMS.

Good planning, communication and cooperation between the data center and the DBMS staff can help mitigate the problems encountered in the transition to the DBMS environment and can shorten the time required to stabilize the DBMS environment.

Must Be Operational

As the success of the DBMS grows and as more of the organization's data is placed under it, the more crucial it becomes that the DBMS always be operational and the data be available. Errors in the data center, particularly in operations, that impair the smooth functioning of the DBMS will very quickly be felt throughout the organization.

The requirement for strong, effective control of the DBMS and for those in the data center to appreciate that need and to accept the necessary constraints required to assure the quality of the DBMS function must not be minimized. It is important to establish, early on, just who has responsibility and authority for the various functions of the DBMS. Once this authority and responsibility have been established, appropriate controls and re-

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Data Centers Requires Planning, Cooperation

porting systems must be put in place to assure the continuation of the operation in the best possible manner.

Of course, political and territorial disputes can be anticipated. Such disputes are, to some extent, healthful in that they often raise important considerations that might otherwise be overlooked.

In addition, the existence of such differences, provided they are kept within realistic bounds, can help generate a dynamism that can be channeled to move the organization forward.

Conversely, improperly controlled, such exercises can take time and attention from other important DBMS issues. That which is clearly in the best interest of the particular organization must be determined, the appropriate decisions made, and then everyone, losers as well as winners, must support the effort.

Primary responsibility for the DBMS must reside with the data base administration function. Like it or not, the data center must understand that in issues involving the DBMS, the data base administration group, not the data center, must make the required decisions.

If the environment is allowed to develop so that the data center can engage in protracted second guessing of the data base administration group or in moving ahead in the data base area on its own, difficulty is certain to follow.

The benefits to be found in the implementation and use of a DBMS to the entire organization, not just to MIS, can be substantial. However, the DBMS environment can be a somewhat fragile one, and it must be appropriately managed. This is simply one more example of the myriad changes we in MIS (and, ultimately, our MIS clients) face, and we must accommodate those changes as best we can.

There are more than sufficient examples of the failure to manage properly the MIS function. Because the DBMS offers new territory, the opportunity to improve on the rather dismal MIS management record can and should be improved. In the process of moving to such a goal, the need to appreciate the effect on the data center, in all aspects, must not be overlooked.

Murray is director of management information services for Ray-O-Vac Corp., Madison, Wis. He is responsible for worldwide MIS activities. Murray has 21 years of DP experience, 10 of which have been devoted to the management of data centers.

'Primary responsibility for the DBMS must reside with the data base administration function. Like it or not, the data center must understand that in issues involving the DBMS, the data base administration group, not the data center, must make the required decisions.'

LETTERS

Nothing New

Regarding the article "Help Wanted: DP Execs Turn to Liberal Arts" [CW, July 11], in 1966, IBM Canada had a hiring policy that was similar to that described in the article. As far as I know, it still does.

I graduated with a B.A. in English literature with a philosophy minor and was hired by IBM that year. Others were hired with degrees in geography and history. Recently, someone with a Ph.D. in French was hired.

IBM's policy was to consider any candidate with a university degree. Liberal arts graduates were not specially recruited, but they were not excluded in favor of those with technical degrees. (Those with computer science degrees have in recent years had an edge over other graduates.)

The article does not seem to me to reflect any change in the environment.

Bruce Feuier
Rothmans of Pall Mall Ltd.
Don Hills, Ont., Canada

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READER COMMENTARY/ Thomas J. Zarecki

Help Wanted: Applications-Oriented Personnel

Industry is looking for DP employees with strong applications skills, according to trends identified by a special committee formed by DeVry, Inc., a technical education organization.

Periodically, DeVry brings together industry experts to review and suggest revisions in the curricula offered by the company's 10 campuses. During a recent review of the computer science for business program, industry experts cited a shortage of applications-oriented entry-level personnel in their data processing operations.

Companies previously attacked the problem through extensive (and expensive) in-house training programs. Unfortunately, such programs provided the firms with highly skilled technicians who were unfamiliar with business procedures and communications. The experts surveyed by DeVry found this short-term approach unacceptable in an era of long-term thinking to change trends in technology.

Generalist vs. Specialist

As the complexity of computer systems increases, the computer generalist may become extinct, replaced by the specialist. The future, according to the experts, belongs to those who apply their skills to one particular area of operations or one language.

Technical educators realize the ramifications held by new trends and current business personnel requirements. They look to job placement records to attract potential students.

From this recent evaluation, DeVry noted the particularly strong demand for qualified personnel in these seven applications areas:

Off-the-Shelf Packages. One result of the software boom is the growing number of software packages purchased by business, particularly in the accounting field. The trend has led to a reduced demand for those able to create programs and a growing need for those who can modify and manipulate software to meet a company's individual requirements. The experts indicated this field offers immediate growth for maintenance and rework applications programmers, as employees currently handling these tasks are being promoted to other positions and responsibilities.

Minicomputers. Distributed data processing, using minicomputers linked to a mainframe in a network configuration, is becoming increasingly popular. In fact, microcomputer growth currently outpaces that of mainframes. Those who understand and are able to work with minicomputer networks will find their skills in demand.

Microcomputers. Microcomputers are rapidly becoming a supplement to large mainframe systems. Microcomputers handle smaller tasks and free mainframes to handle major problems. As a result, systems are being developed to allow mainframe files to be loaded into the smaller units. Graduates skilled in both types of computers may find growing opportunities as a result of this link.

Large and Small Shops. Growth in smaller computer systems is greater than that in larger operations. Even though internal growth in mainframes should be between 10% and 20% in the next 10 years, an estimated 80% of mainframe budgets cover maintenance, again providing an opportunity for those with the right skills.

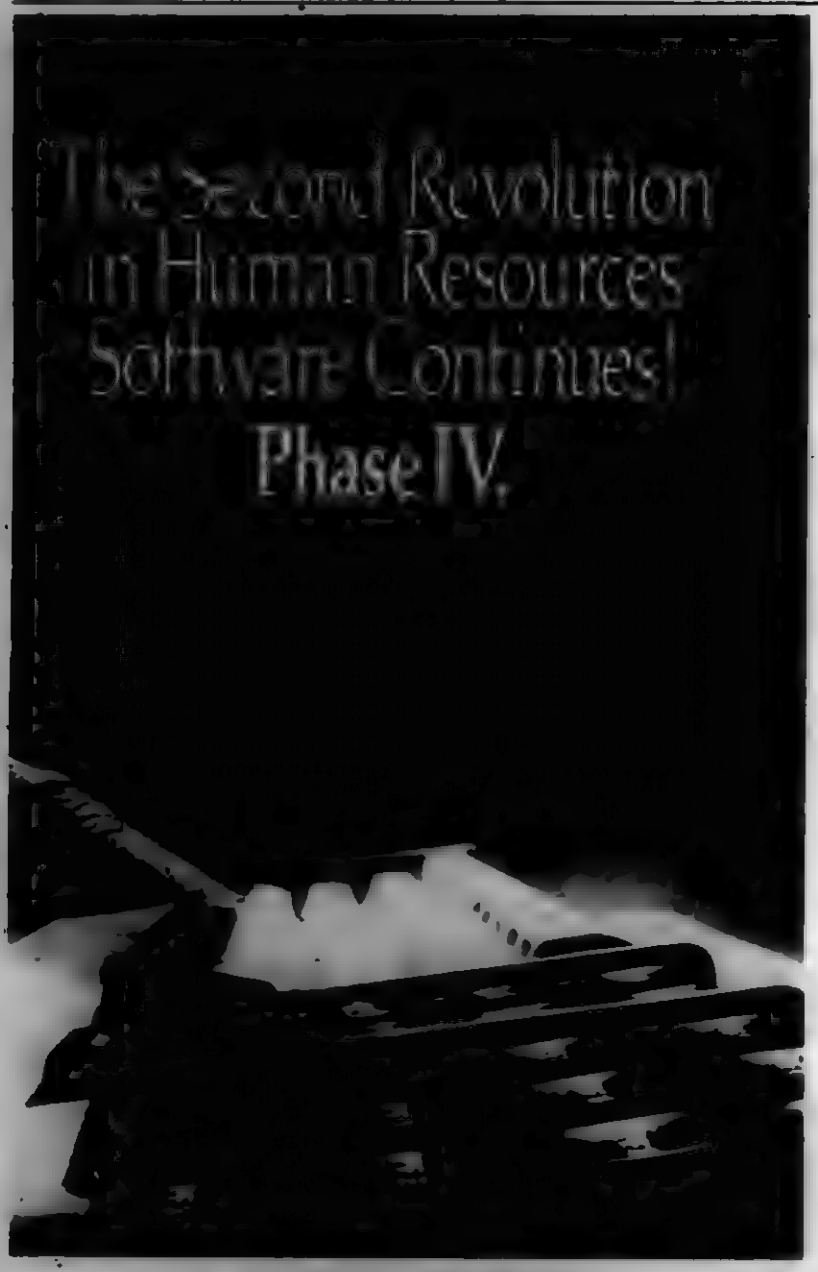
Interactive Systems. Interactive systems, especially those with data communications networks, are becoming quite popular. Such systems reduce hardware costs and allow data processing centers to function as service centers, providing a variety of users with a variety of operations. Experience with such a system is essential for a potential employee.

New Program Development. Even with the growing use of off-the-shelf software, certain applications require specific programs. With the lowered cost of hardware, programming time has become the most expensive aspect of system design. Simplified coding brings the cost down, opening a world of opportunity to graduates with the proper skills.

Programming Languages. Cobol is still the primary language for businesses, with enhanced Basic versions gaining in popularity among microcomputer users. Since languages are often determined by the system's manufacturer, the experts suggested students closely monitor industry trends.

Students should be prepared to work with a variety of systems. To take advantage of available resources, companies favor a trend toward "total information centers," employing a variety of hardware, software and programming levels.

Zarecki is manager of computer science curriculum development at DeVry, Inc.



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State Keeps Pace With Application Generator

DOVER, Del. — Beginning in 1978, the state of Delaware's Department of Health and Social Services (DHSS) recognized the need to modernize computer services to keep up with current needs.

An updated system was needed to respond to increasing service demands, deliver client services more cost-efficiently, recoup child support revenue for the state and comply easily with changes in federal and state regulations, according to Reese E. Robinson, executive assistant for Management Services at DHSS.

With a limited budget and a low state salary structure, a means had to be found to implement an agencywide, full-function information system. After DHSS analyzed the economics, the development personnel availability and time frame, it made a strategic proposal to the governor to establish a small data center within the agency.

The recommendation was not to attempt to convert the old batch systems being run at the state's central data processing site, but rather to select an application generator that would allow key members of the eventual user community to do much of the system design and implementation, Robinson said.

In November 1981, the governor authorized the establishment of such a center for DHSS, slated to serve the six state hospitals, various community clinics, welfare and food stamp programs, foster care-protective services and child support enforcement, as well as other agency projects.

DHSS ordered an IBM 4341, selected a vacant hospital wing for a computer center and let contracts for renovation, management assistance and basic application planning. The basic implementation tool was IBM's Patient Care System-Application Development System (PCS-ADS) application generator, with extensions from PCI Systems, Inc. of Cincinnati.

The processor and MVS system software were implemented in March 1982. In April, the Patient Accounting/Client Tracking (Pact) system — the heart of the integrated, departmentwide information system — was initiated.

By August, Pact was in the final stages of pilot test; the other three major applications were into or ending their

(Continued on Page 57)

Auditing Tool Supports IBM's CICS/VS

OVERLAND PARK, Kan. — HLE Systems, Inc. has announced the release of CICS Telescope II, an auditing tool designed to monitor the use of on-line terminals. It is designed to support IBM's Version 1, Release 5 of CICS/VS for the DOS/VSE operating system.

The system is said to capture all information entered and displayed on a CICS terminal for later processing by a batch print program. According to the company, multiple terminals can be dynamically selected and audited during the execution of CICS. The system also includes a status display program to show usage statistics and current terminals being audited.

CICS Telescope II is available with source code and documentation at $2,000 for a permanent license.

Further information is available from HLE Systems, P.O. Box 4714, Overland Park, Kan. 66204.

For DOS/VSE, VM/CMS, OS/MVS Sites

Release of CA-Universe Out

JERICHO, N.Y. — Computer Associates International, Inc. has announced Release 1.1 of CA-Universe, a relational data base management system for IBM DOS/VSE, VM/CMS and OS/MVS sites.

According to a spokesman, the new release offers extended screen design and development facilities and enhances Help functions for end users and programmers. The release allows CA-Universe to be shared across multiple CPUs and accessed from different operating systems.

The package is said to include an extended applications interface, which allows the CA-Universe relational query language to be embedded in Cobol, PL/I, assembler and CA-Earl programs.

The company said that performance has been improved on a systemwide basis by 24% to 30%, with the reduction of I/O processes and paging. The release reportedly features online Help functions and extended mathematical facilities, in addition to editing facilities compatible with standard Cobol editing formats. Output data can be generated dynamically, based on computations performed on existing fields.

CA-Universe is available for $110,000 for DOS/VSE and VM/CMS users and for $140,000 for OS/MVS users.

More information is available from Computer Associates International, which is located at 125 Jericho Tnpk., Jericho, N.Y. 11753.

Informatics Announces 'Mark V' CICS Version

CHICAGO — Informatics General Corp. announced recently a CICS version of its Mark V IMS applications generation system and an option to simplify source code for the firm's maintenance and support customers.

According to an Informatics spokesman, Version 4.1 of Mark V in both CICS and IMS versions includes output of a design manual on request with every generated application. The document reportedly includes overall summaries on screen-to-screen flow, data base usage, a field reference index and summaries for each individual screen.

Programmers using the latest release can write subroutines that simplify program development, allowing them to put common processing requirements into modules for reuse, a spokesman said.

Other added features include PL/I support for IMS/DC which, Informatics said, allows users to communicate with PL/

(Continued on Page 52)

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Wang Enhances 'HRMS'

LOWELL, Mass. — Wang Laboratories, Inc. has introduced Inter-Pay, a major enhancement to its Human Resource Management System (HRMS) software package.

The release is a tool developed to automate payroll functions that typically involve manual processing.

Inter-Pay was designed to automate out-of-cycle payrolls. According to industry research, payroll errors occur so commonly that manual check processing has become a standard procedure for each pay period.

Payment errors and omissions usually are not discovered until after a payroll has been completed, necessitating manual processing of certain checks in lieu of a costly and time-consuming rerun of an entire payroll.

Inter-Pay enables users to create payments and perform all necessary tax calculations without user intervention, other than selecting the employee file and acknowledging the payment or reversal by using a program-specified function key. It can also be used to produce supplementary and bonus payrolls more easily and quickly, a spokesman said.

Last April, Wang released Multi-View, the first enhancement to the HRMS. Multi-View serves as a single, standardized report generator designed to maximize timely management reporting and productivity.

The one-time license fee for the HRMS package, including Inter-Pay and Multi-View, is $40,000.

More information on the HRMS package is available from Wang Laboratories, 22 Alpha Road, Chelmsford, Mass. 01824.

Trak Monitor Supports IBM

MILLBRAE, Calif. — The Bridge, Inc. has announced Trak, an on-line project management system for IBM CICS/VS or TSO users.

Trak was designed to help managers monitor project status and resources from small maintenance functions to major development projects, the vendor said.

The system operates with IBM's DOS operating system. Most of the programs are written in Cobol.

Trak is priced at $8,000, and lease plans are available from The Bridge, 199 California Drive, Millbrae, Calif. 94030.

Informatics Offers CICS For 'Mark V'

(Continued from Page 51)

l subroutines and provides more flexible branching capabilities for ease of programming. Additionally, programmers are able to put Mark V libraries on IBM 3380 disks, the spokesman said.

Release 4.1 is available free of charge to all current Mark V users who are parties of Informatics annual improvement maintenance and support agreement. The CICS version is priced at $24,000 for DOS and $36,000 for OS.

The Mark V Programmer's Workbench simplifies the source code for the applications generation system, the company spokesman said. It is currently operational under IBM's Interactive System Productivity Facility/Program Development Facility.

Subscribers to Informatics' annual improvement maintenance and support service will receive the option at no charge. It can also be delivered on special order for $200 plus shipping from Informatics' Software Products Group, which can be reached through P.O. Box 1452, Canoga Park, Calif. 91304.

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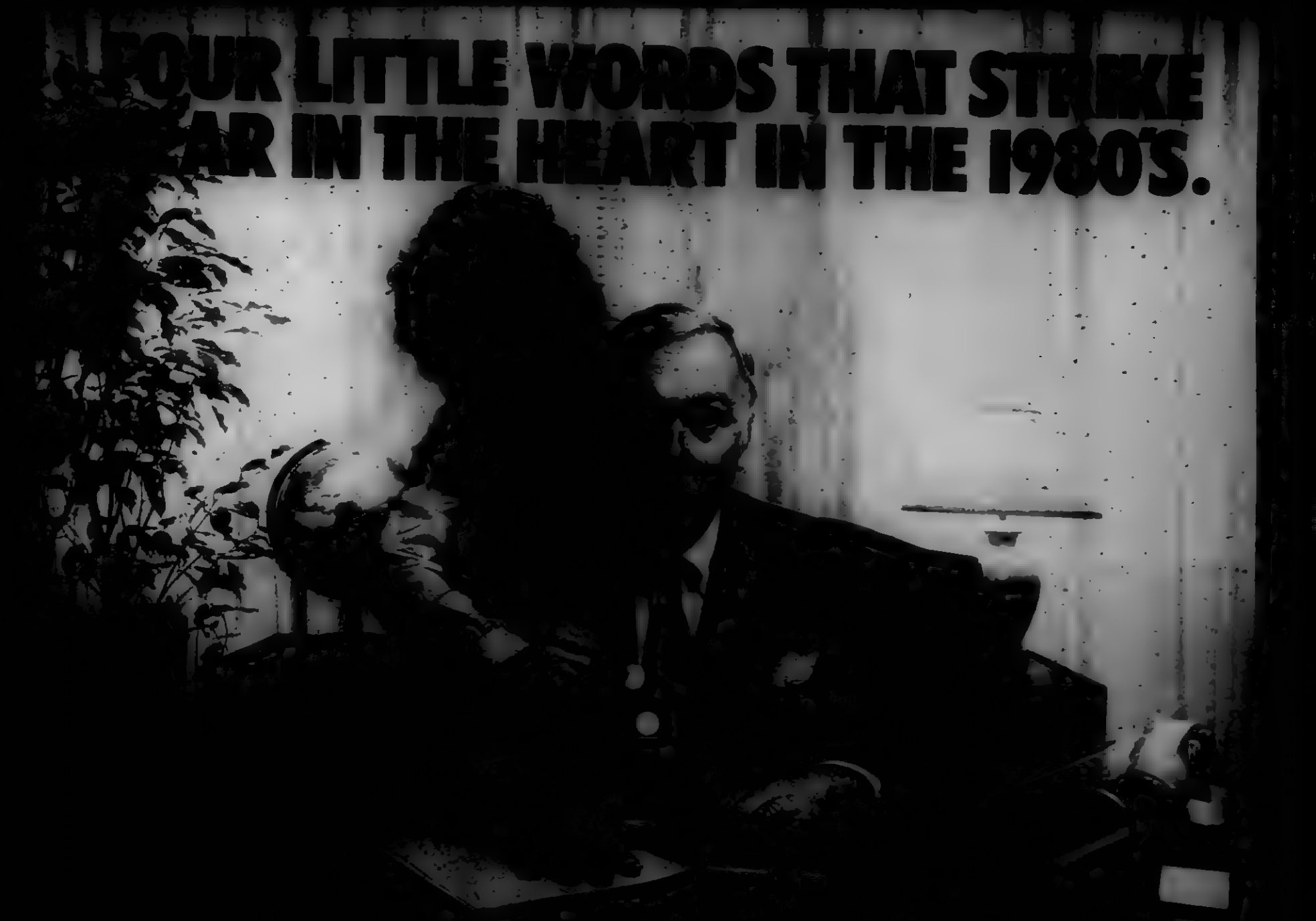

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'Base MRP,' 'SPC' Packages Out in Dibol for DEC PDP-11

MONTROSE, Calif. — Mini-Computer Business Applications, Inc. has released the Base Material Requirements Planning (Base MRP) and Standard Product Costing (SPC) packages in Dibol for the Digital Equipment Corp. PDP-11 running under the RSTS/E operating system.

The SPC package is said to interface with the company's inventory management and bill of material processor packages to maintain standard and estimated costs for manufacturing and accounting management. The package tracks value-added costs at each level of the bill of material and separates both standard and current costs into material, labor, fixed burden and variable burden costs. The company reports that the package allows "what-if" cost analysis.

The Base MRP package with master scheduling is reportedly designed to introduce small and medium-size manufacturing companies to the essentials of MRP. The package supports time-phased requirements generation for all levels of the user's product structure.

Source code licenses for the packages are available at $3,000 each for use on the first computer from Mini-Computer Business Applications, 2441 Honolulu Ave., Montrose, Calif. 91020.

System/38 Utility Unveiled

OAK BROOK, Ill. — Michaels, Ross and Cole Ltd. has announced the MRC-Manager, Version 1.1, which the company describes as an IBM System/38 utility designed to allow nontechnical managers to access System/38 information. It is for use on the System/38 Control Program Facility Release 5.0.

According to a company spokesman, Version 1.1 of the MRC-Manager makes use of the System/38's Release 5.0 data access method, yielding improved response for users. The package is said to be self-documenting.

The system is comprised of four modules: MRC-Dictionary describes the data base to the MRC-Manager system; MRC-Reporter allows report writing; MRC-Grapher accommodates graph creation; and MRC-Retriever handles on-line retrieval of information. The company said MRC-Manager allows media-independent query capabilities to management or staff personnel. All modules in the MRC-Manager series are said to allow multifile access, and a high-level security subsystem is integrated to the System/38's security to provide protection.

Each of the MRC-Manager modules is priced at $1,140. Additional information is available from Michaels, Ross and Cole, Suite 501, 1301 W. 22nd St., Oak Brook, Ill. 60521.

'IFS' Designed For Integration Of Accounts

INDIANAPOLIS — The Indiana National Bank has introduced the Integrated Financial System (IFS), said to provide for the integration of all major customer accounting systems on-line.

The total system includes demand deposit application (DDA), the customer information file (CIF) and the time deposit application (TDA).

The integrated data base systems are supported by IBM's IMS DB/DC environment and provide processing on either the IBM 30 series or Amdahl Corp. host computers using IBM's MVS operating system.

According to the vendor, IFS benefits include interapplication communications, improved information both for internal and customer use, ease-of-product development and improved expense control.

A complete software package costs $500,000. Alone, CIF costs $100,000; CIF/TDA costs $250,000; and CIF/DDA costs $350,000. Further information is available from The Indiana National Bank, One Indiana Square, Indianapolis, Ind. 46266.

System Targets Inventory Stats, Runs on DPS 6

CINCINNATI — Blue Chip Financial Systems Co. has announced the release of its parts inventory and purchase order system operating on the Honeywell, Inc. Level 6 DPS 6 minicomputer under the Geos Model 400 operating system.

Designed for use by warehouse personnel, the menu-driven on-line system features inventory/purchasing statistics such as vendor performance, inventory usage and parts number purchasing history, according to a vendor spokesman.

Additional features of the system include the ability to assign and cross-reference a company and vendor part, establish minimum and maximum stocking levels and automatically generated purchase orders for unfilled requisitions, according to the vendor.

Priced at $15,000, the system is available from Blue Chip Financial Systems, which is located at 6680 Dixie Highway, Fairfield, Ohio 45014.

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Program Offers Cobol File Documentation

WASHINGTON, D.C. — Information Concepts, Inc. has released Cobconv, a program to provide documentation and conversion of IBM Cobol file descriptions, which is said to reduce Cobol file description conversion time.

According to the company, the system is comprised of a series of modules that parse the Cobol file description, create comprehensive documentation and produce input statements to be used with other languages. The main module is said to read and parse any valid IBM Cobol file description, and it produces a table of the file layout which can be used as technical documentation.

Other modules are available to generate input statements for the file description that can be used with other languages. Currently supported languages and packages include PL/I; Fortran, RPG, SAS and Easytrieve. Cobconv is said to support all Cobol input file description constructs.

The package is available in three formats; as a stand-alone module, as the SAS procedure Proc Copylib and as an interactive module under VM/CMS and TSO controlled through the SPF dialog management facility. The main module and documentation capability are available for a perpetual license fee of $1,550. Each language or package generation capability costs an additional $300.

More information is available from Information Concepts, Inc., Suite 600, 1110 Vermont Ave., Washington, D.C. 20005.

System Helps Delaware Modernize

(Continued from Page 51)

conceptual design stages. Those applications included the Delaware Client Information System; the Child and Youth Center Information System (Cycis); and the Automated Child Support Enforcement System.

Users designed the systems, while consultants assisted with the implementation and augmented the staff of three applications programmers. Prototyping was used extensively, and structured development methodology was rigorously adhered to, Robinson said.

"Using the application generator eliminated significant portions of the detail design phase and the entire coding phase except for complex functions, such as benefits computation, which can best be performed in Cobol," said Frances S. Abernathy, president of Abernathy Business Consultants, Inc. of Rockville, Md., and project director on her firm's management services contract with DHSS. "Its use also facilitated all testing phases."

During pilot testing of Pact with the Master Client Index and installation of the client tracking system, work began on implementing two additional Pact applications — the immunization registry and the hypertension tracking systems. These were all developed in parallel with detail design and prototyping of the Cycis, which has both Case Management and Resource Management components, Abernathy noted.

The big DP productivity gain was in the small amount of professional resource needed, since the majority of the personnel resource used in definition, design and development phases were from the user organization, she said.

"More of the people resources were applied in the design phase than under traditional development, primarily because of the prototyping performed in this phase, while the actual development phase was reduced because the expansion of the prototype to complete the functional system was easier," Abernathy said.

The test phase is in pilot testing and acceptance testing, which have reduced resource requirements, Robinson added.

"The performance and stability of the system have shown to be excellent, now that the system is under load," Abernathy said. "PCS-ADS compiles directly into object code, with apparently a very small — maybe 10% — penalty compared to quality-written Cobol. Furthermore, it is easy to debug and enhance."

'Adders' Mapping Aid Enhanced

ATLANTA — Rendeck Corp. recently announced Release 2.3 of its Adders Mapping product, an on-line map generator and programmer productivity aid for CICS users.

The product features a map prototyping facility, enabling viewing and demonstration of prototypes of applications. Fields reportedly can be filled with likely data, and the flow from screen to screen can be demonstrated to end users prior to any programming being run; additionally, hard-copy printouts can be created for documentation.

The price of a perpetual license for the product is $3,000 for systems running under IBM's DOS/VSE and $5,000 for those running under IBM's OS/VSI and MVS. Rendeck is located at Suite 7211, 72 Perimeter Center E., Atlanta, Ga. 30346.

On March 31st, 1983,
IBM announced that its new operating system, MVS/XA, was available for general release.

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'Aide' System Develops Business Applications

CAMBRIDGE, Mass. — Oasys, Inc. has announced the Aide system for high-productivity business application development on Digital Equipment Corp. VAX-11 systems operating under VMS.

According to the company, application programmers can develop business applications in Aide in one-tenth the time required using Cobol. The applications are said to be readable and easy to maintain and can be transported with no modification to a variety of minicomputer and microcomputer systems.

The company said Aide is written entirely in C and also runs on Prime Computer, Inc, computers operating under Primos and on a variety of Motorola, Inc. 68000-based microcomputers. The package contains the following integrated productivity components: data manager, procedure language and interpreter, procedure editor, interactive debugger, error monitor, form master editor, data input editor, report writer, security system, foreign procedure interface and menu-driven access.

The Aide package is available for $9,500 from Oasys, 60 Aberdeen Ave., Cambridge, Mass. 02138.

Applied Software Unveils Full Screen Editor

PALM BEACH GARDENS, Fla. — Applied Software, Inc. has introduced FSE+, an editor, data set manager and job output previewer facility for IBM's TSO environment.

FSE+ is a full screen editor with integrated file listing, JES sysout previewing, file management facilities and split-screen support.

The full screen editor supports files with logical record lengths up to 4,096 and customer-defined tuning parameters to control the amount of virtual storage used. Both disk and virtual storage edit work files are supported, according to the vendor.

The software supports all IBM 3270 series terminals operating under Tcam or Vtam with MVS, SVS and MVT operating systems.

The monthly lease charge is $220, which includes full software support and maintenance, the vendor said.

Further information is available from Applied Software, which is located at Suite 250, 840 U.S. Highway 1, P.O. Box 13027, N. Palm Beach, Fla. 33408.

Enhancement To 'Proc-Secure' Announced

CALEDONIA, N.Y. — Systems Associates, Inc. recently announced an enhanced release of its Proc-Secure, Version II package, a menu-driven security system that is said to enhance the IBM System 34/36 System Support Program security by providing security block-out at the procedure level.

With the product, use of the protected procedures will reportedly be restricted to secured user IDs, allowing sensitive procedures to reside on departmental menus.

Protection can also reportedly be designated to procedures such as Remove to restrict use to knowledgeable personnel.

Priced at $150, the system is available from Systems Associates through P.O. Box 64, Caledonia, N.Y. 14423.

FSS Consulting Develops System For IBM CPUs

NEW YORK — A sales and marketing distribution system (SMDS) designed for medium to large manufacturing companies using an IBM 370 or a larger series mainframe has been developed by FSS Consulting Corp.

SMDS is an on-line system that operates under DOS or OS in a standard IBM CICS network environment. It uses standard Cobol integrated with a Vsam relational data base structure.

Designed as a modular system, SMDS handles such functions as order entry, customer service, credit checking, inventory control, warehouse location, pick and pack, invoicing, traffic and distribution, return goods, promotional allocations, materials manufacturing, accounts receivable, security, sales and marketing and end-of-day reporting.

Minimum hardware requirement for SMDS is an IBM 370, 4300 series or 30 series mainframe with 100K bytes of main storage and a tape drive for backup storage, according to the vendor.

The price of the system depends on the number of modules desired. A complete system with all modules, including 100 days of on-site support for installation and training, source code and procedural documentation, costs $400,000 from FSS at 100 Park Ave., New York, N.Y. 10017.

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'Microforesight' Delivers CPU-Micro Tie

NORCROSS, Ga. — A decision support package that is said to deliver full compatibility between a mainframe and the IBM Personal Computer has been announced by Information Systems of America, Inc. (ISA).

According to the vendor, Microforesight is the micro version of Foresight, its decision support system for various mainframes.

Both mainframe and microcomputer versions are written in English and operate on the same command structure.

The base price of Microforesight is $2,000. More information is available from ISA at 6855 Jimmy Carter Blvd., Norcross, Ga. 30071.

Videotex Service To Offer Reports On Commodities

NEW YORK — Merrill Lynch Futures, Inc, announced here recently that it will provide daily market research data on 10 key commodities through Agridata Network/Agristar, an agricultural videotex service operated by Agridata Resources, Inc.

Users equipped with personal computers, word processors and videotex displays can access the service by modems through local or toll-free telephone lines from anywhere in the U.S. and more than 2,000 cities around the world, a spokesman for Agridata said.

The network features a total of 25 information sources, including the Des Moines Register, the Commodity News Service and Associated Press.

The service fees include an annual membership fee of $399, which includes software interface, an on-line charge of $25 per hour and fees ranging up to $1 to access a particular report.

The service is retailed through Radio Shack stores. Further information is available from Agridata Resources, located at 205 W. Highland Ave., Milwaukee, Wis. 53203.

McAuto Tool Said to Support IBM Terminals

ST. LOUIS — The McDonnell Douglas Automation Co. (McAuto) said its interactive graphics software will now support IBM's graphics terminals.

The Stradis/Draw package for modeling structured systems will now run on IBM Models 3278 and 3279 as well as its original Tektronix, Inc. 4112 and 4113 supporting terminals, the company said.

The graphics software runs on IBM mainframes under the MVS/TSO or VM/CMS operating systems.

Price is $50,000. It is now available from McAuto, located in St. Louis, Mo. 63166.

Running Under VMS

'Vsort' Release Unveiled for VAX-11

LEXINGTON, Mass. — Evans Griffith and Hart, Inc. has announced the release of Version 3 of Vsort, its fast sort package running under VMS on Digital Equipment Corp.'s VAX-11 computers.

The release is said to sort large files 20% to 50% faster than was possible under the initial release of Vsort. Vsort reportedly handles fixed-record-length, relative, sequential and Ross/V files with support for both span and nonspan records. Version 3 also sorts huge records, which the company said can be as large as 64K bytes for user-managed records.

The updated version is also said to feature support for user-written comparison routines. Vsort accepts user-written record comparison routines that are compatible with the VAX-11 sort.

Version 3 of Vsort is available for $2,500 from Evans Griffith at 55 Waltham St., Lexington, Mass. 02173.

Graph Utility Out for System/38

OAK BROOK, Ill. — Michaels, Ross and Cole Ltd. has announced MRC-Grapher, Version 1.1, described as an IBM System/38 graph utility for use with the MRC-Query series. It is designed for use with the IBM System/38 control program facility Release 5.0.

According to the company, MRC-Grapher allows nontechnical managers to access System/38 information. It is reported that MRC-Grapher works with MRC-Dictionary and makes use of the System/38 Release 5.0 data access method.

The MRC-Grapher module is available for $1,140, as are the other modules, according to the vendor. Additional information is available from Michaels, Ross and Cole, located at Suite 501, 1302 W. 22nd St., Oak Brook, Ill. 60521.

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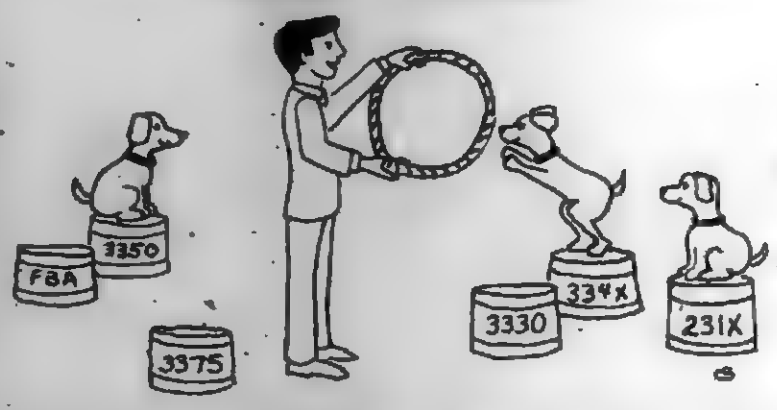

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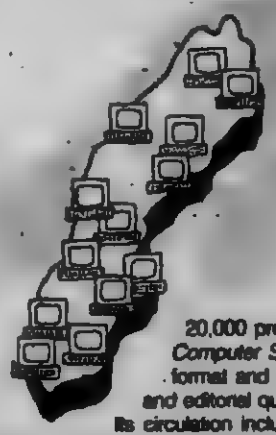

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'Diskus' Studies Disk Usage For IBM System/34 Shops

ELK GROVE VILLAGE, Ill. — Information Specialists, Inc. has made available the Disk Utilization System (Diskus), which the company said allows System/34 users to analyze disk usage by cost center and/or application.

The vendor said Diskus users can generate reports and graphs to manage their disk requirements. The system is said to maintain automatically such information as date file attributes last changed, maximum number of records in a file and date attained and file efficiency percentages. File efficiency data can be calculated based on current records in a file or on maximum records, and graphs can be printed to provide comparative "snapshots."

Diskus is written in RPG-II with full Help support, and the package is said to allow the user to enter file description, cost center or department and application for each file and library independent of file group names.

The package can be purchased for a one-time fee of $175, which includes source code and run book and company's "Guide to Successful Disk Management." Information Specialists is located at 2399 Deyon Ave., Elk Grove Village, Ill. 60007.

'Paxnet' System Announced For IBM, Intel

NORTH EASTON, Mass. — Phoenix Software Associates Ltd. is touting its Paxnet system as the first local-area network software to provide a true distributed processing environment for the IBM Personal Computer and other Intel Corp. 8086-based computers.

Operating under Microsoft, Inc.'s MS-DOS, Paxnet is said to offer compatibility with both Unix and mixed MS-DOS/Unix environments running on such local-area network hardware as Ethernet and Arcnet. The company said Paxnet allows the sharing of devices and unrestricted files on a system, including up to 255 individual Personal Computers, printers or gateways to other networks. The system is said to be ideally suited to support and control the sharing of data in departmental configurations.

According to the company, a user's access to computer resources is not limited to those available at his workstation because Paxnet turns each node into a window on the entire network and on any other networks connected to it. The system allows access to any unrestricted disk file or program in any disk drive on the system from any point in the network. Further, the system allows users to employ any device on the system, including remote disk drives and stand-alone peripherals.

Software programs can be stored in centralized places and can be downloaded to any computer on demand. Users can share programs, which may be easily updated.

A limited license for the Paxnet system is available for $250,000 for builders of large local-area networks. A license for 500 nodes is available for $50,000, plus $50 for each node beyond 500. The basic Paxnet license can be obtained for $10,000 plus $200 per node from Phoenix Software Associates through P.O. Box 207, North Easton, Mass. 02356.

Canadian Firms Targeted By Data Bases

MISSISSAUGA, Ont. — Canada Systems Group Ltd. (CSG) has introduced two new data base systems, the Canadian Federal Corporations and Directors (CFCD) file and the Calura file containing data gathered by Statistics Canada under the Corporations and Labour Unions Returns Act.

The CFCD file is said to be based on corporate filings made to Consumer and Corporate Affairs Canada by all 135,000 federally incorporated companies. It contains the name, location, details of incorporation, reported revenues, assets and earnings for the last two fiscal years as well as the names and addresses of all company directors.

The Calura file reportedly contains the names of all holding and held companies in Canada with ownership percentages in a tiered format. Both data bases are available by using CSG Text Search, a flexible keyword text retrieval system.

The cost to access each of the data bases is $80 per connect hour, with no start-up or minimum fee. Information is available from CSG Product Sales Directorate, 90 Sparks St., Ottawa, Ont. Canada K1P 5B4.

IBM Micro Gets 'Window'

CUPERTINO, Calif. — Amber Systems has issued window-management software to serve as an applications programming tool for IBM's Personal Computer and compatible equipment.

Dubbed the VSI Window 255, the package is aimed at applications programmers developing software for IBM's micro.

The software is said to support multiple and overlapping screens on the Personal Computer. The vendor described it as a runtime-software library accessible to programmers using DOS.

The Window 255 requires 11K bytes of hard disk space and works with color and monochrome boards. Assembly language, C and compiled Basic can link the software to an applications package.

Amber said Pascal and Unix interfaces will also be announced.

Priced at $295, the package is now available from Amber Systems at 811 Alderbrook Lane, Cupertino, Calif. 95014.

Fixed Asset System Runs on IBM System/34, 36

DALLAS — Executive Technology Data Systems, Inc. has announced the availability of the Fixed Asset Accounting System for the IBM System/34 and System/36.

According to the company, the system was designed to make data entry and file maintenance easy for the non-DP user. The operator is able to input and update all data through specially formatted CRT screens. The system is said to incorporate both depreciation and Asset Cost Recovery System (ACRS) asset schedules, as well as amortization schedules.

The company said that, for the fixed asset depreciation/ACRS schedules, the system features multi-schedule on-line data entry, unlimited preliminary schedule processing and reports useful in preparing tax returns. The package is menu-driven and oriented to the accountant user.

The package is said to allow up to 999 locations per schedule, up to 99 asset classes per location and 9,999 assets per class. Reports include depreciation totals, investment credit recapture information and basis reduction information.

The Fixed Asset Accounting System is available for $1,500 on System/36 and $1,350 on System/34. Executive Technology Data Systems is located at Suite 120; 17440 Dallas Pkwy., Dallas, Texas 75252.

Users Group Issues Mumps Primer

COLLEGE PARK, Md. — A revised primer on the Mumps programming language is available from the Mumps Users Group here.

Mumps Primer: An Introduction to the Interactive Programming Language of the Future is the second edition intended to serve beginning students and programmers.

The primer is priced at $12 for users group members and $15 for non-members from Mumps Users Group, Suite 308, 4321 Hartwick Road, College Park, Md. 20740.

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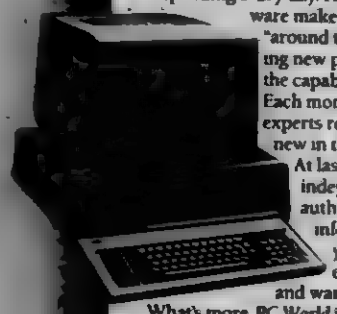

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Micro Notes

Quality Information Systems, Inc. (QIS) has announced **Qtime**, a data base management system for 16-bit microcomputers. Qtime is a fully automatic, menu-driven, multiuser software package, written in Cobol. The software runs on Microsoft, Inc.'s MS-DOS and the Unix operating system, with at least 256K bytes of memory and a hard disk.

Two versions of Qtime are available. Qtime Executive costs $695, and Qtime Designer costs $995 from QIS, Suite 505, Honeywell Center, 2801 Buford Highway N.E., Atlanta, Ga. 30329.

Micrographics Technology Corp. has announced an adapter module for the IBM Personal Computer and Personal Computer XT that is said to replace three IBM adapters and provide hardware interrupt logic and other graphics capabilities.

The **Mastergraphics 1 Adapter** reportedly replaces IBM's Monochrome Display and Parallel Printer Adapter, Color/Graphics Monitor Adapter and Parallel Printer Adapter. It quadruples the display storage of IBM adapters from 16K to 64K bytes, increases active colors from four to 16 and allows 640- by 200-pixel 16-color resolution and 768- by 340-pixel monochrome resolution, according to the vendor.

The adapter retails for $579 from Micrographics at 1820 McCarthy Blvd., Milpitas, Calif. 95035.

Computalker Consultants has made available **TASSM** and **S320**, a software development package enabling Digital Research, Inc. CP/M and Apple Computer, Inc. Apple II users to develop and test software for the Texas Instruments, Inc. TMS320 digital signal processor chip.

According to a company spokesman, the package will allow CP/M and Apple II users to write, assemble and debug programs for the TMS320 in the CP/M and Apple II environments. TASSM is an absolute addressing assembler that is source-compatible with TI's AMPL assembler and EVM board. In addition, S320 provides complete interactive software simulation of TM6320.

TASSM and S320 are priced at $190 each, with software update support available for $50 a year. Information can be obtained from Computalker, 1730 21st St., Santa Monica, Calif. 90404.

Star Software Systems is offering **The Accounting Partner**, a new accounting system for the IBM Personal Computer.

The Accounting Partner will run on any Digital Research, Inc. CP/M, CP/M 86; Microsoft, Inc. MS-DOS; or IBM PC-DOS computer and requires a minimum 56K random-access memory, two disk drives or hard disk, a 24- by 80-char. video display with cursor addressing and a printer with 132 columns. The company said the package is the first low-cost, complete accounting system for the IBM Personal Computer marketplace.

The package, priced at $395, includes general ledger, payroll and accounts payable and receivable. More information is available from Star Software Systems, 20600 Gramercy Place, Torrance, Calif. 90501.

Graphic Software, Inc. has announced the availability of the **Chartman** series of business graphics software for the IBM Personal Computer.

The package, which is menu- and input-form-driven, produces monochrome or multicolored horizontal and vertical bar charts, two- or three-dimensional pie charts and other presentation-quality graphics.

Chartman I and II provide high-resolution display, print charts on the IBM Personal Computer printer or Epson America, Inc.MX80 and 100 printers with Graftrax option and plot on Hewlett-Packard Co. HP 7470 two-pen and HP 7220 eight-pen plotters. Chartman III is similar to Chartman I, but offers fewer charts and graphs. Chartman IV offers intricate organizational charts, a statistical curve-fitting feature and high-end graphics such as color bleeding.

Each module is available separately, with Chartman I priced at $325, Chartman II at $380, Chartman III at $200 and Chartman IV at $300. An enhanced module, Super Chartman II, is priced at $425. Additional information on the Chartman series is available from Graphic Software, 1972 Massachusetts Ave., Cambridge, Mass. 02140.

Southern Computer Systems, Inc. has announced the release of the **Datalock** software package designed to provide data protection for most 8- and 16-bit microcomputers running Digital Research, Inc. CP/M or Microsoft, Inc. MS-DOS.

According to the company, Datalock provides a reliable method of protecting files so that only those who know a combination code may access the file. The combination can be any alphanumeric string from one to 80 characters.

The package, available on 8-in. and 5¼-in. diskettes, is priced at $95. More information is available from Southern Computer Systems, 2304 12th Ave. N., Birmingham, Ala. 35234.

Control Data Corp. has made available the **Computer Literacy Series**, a comprehensive Plato-language computer literacy curriculum for use on the Control Data 110 microcomputer and the Apple Computer, Inc. Apple IIe microcomputer.

The series consists of 22 Plato-language-based courses on topics ranging from languages to computer principles and computer applications such as data file management, word processing and spreadsheet languages.

Each course is priced at $79.95. Information is available from Control Data, Public Relations Department, Box 0, Minneapolis, Minn. 55440.

Multilink supports as many as eight CRTs attached to serial ports on the IBM Personal Computer to create a multiuser, multitasking operating system. Compatible with IBM's PC-DOS 1.1 Release 2, the product requires one copy of DOS and approximately 24K bytes of memory overhead for a three-user system. Priced at $199, it is available from The Software Link, Inc., 6700 23-B Roswell Road, Atlanta, Ga. 30328.

CBX86, a source file cross-reference utility for Digital Research, Inc.'s CBasic, provides cross-reference of variables and line numbers, CBasic statements, CBasic functions and string and numeric literals for systems compatible with the IBM Personal Computer and Digital Research, Inc.'s CP/M 86. A user license fee is priced at $49.95 and is available from Systems Consultants, P.O. Box 116126, Carrollton, Texas 75011.

Micro notes

Parameter Driven Software Northwest, Inc. has introduced the **Medallion Collection**, its series of standardized software packages for use with the Convergent Technologies, Inc. microcomputer series. The Medallion Collection, developed by Timberline Systems, Inc. of Portland, Ore., consists of five accounting packages and two productivity tools designed for users with little or no computer experience. The accounting packages are payroll, accounts receivable, inventory, accounts payable and general ledger with financial reporting. Spreadsheet and Custom Reporter are the productivity tools.

The Spreadsheet package is available for $395, and the payroll and general ledger modules are priced at $895. The remaining modules will be available this month, the vendor said. More information can be obtained from Parameter Driven Software Northwest, 10550 S.W. Allen Blvd., Beaverton, Ore. 97005.

Computer Editype Systems has released the **Magicbind** system for Digital Research, Inc. CP/M-based word processors, which is said to augment the capabilities of existing word processing programs. The package offers basic WP functions such as bold facing, underlining, accenting and superscripting, in addition to over 70 print formatting functions, text editing aids and file processing capabilities.

The package, written in assembly language, is priced at $250. More information is available from Computer Editype Systems, 509 Cathedral Pkwy. 10A, New York, N.Y. 10025.

Constech, Inc. has announced the Micos I software series for construction cost management for use with any mini or microcomputer running under a Unix-based operating system. Micos I, which is designed to assist construction managers in controlling and managing construction project costs, is said to be the first microcomputer-based cost estimating system to offer a composite data base of over 15,000 construction items, providing current and historical costs for labor, material and equipment.

The Micos I, available in January 1984, is priced at $35,000 for both hardware and software. More information on the package can be obtained through Constech, 8615 Freeport Pkwy., P.O. Box 610669, Dallas-Ft. Worth Airport, Texas 75261.

High Technology Software Products, Inc. is touting its **Net-Works II** system as an electronic bulletin board for business and home users of the Apple Computer, Inc. Apple II and Franklin Computer Corp. Ace microcomputers. The system lets "callers" send private mail, post and peruse public bulletins and receive programs or text files. Business users can send messages to individuals and distribute memos to local and regional offices. The Net-Works II can also be used as a message center and allows the operator to customize eight general-interest bulletin boards.

More information on the package, which is priced at $99, is available from High Technology Software Products, P.O. Box 60406, 1611 N.W. 23rd, Oklahoma City, Okla. 73146.

Technical Analysis Corp. has announced that it will begin including a **file transfer program** as a standard feature of its Irma Personal Computer-to-IBM 3270 interface. The software will enable users with Irma installed in their IBM Personal Computer, Personal Computer XT or Personal Computer-compatible machines to transfer files between the microcomputers and mainframes through a direct, native-mode coaxial connection to 3270 controllers. The file transfer function operates under standard TSO Edit or VM/CMS Xedit modes and does not require special software on the mainframe.

The company plans to include the file transfer program in all Irma shipments in October. The Irma package is priced at $1,195, and users who have already purchased it will be upgraded with the file transfer program at no cost, according to a company spokesman. Further information can be obtained by writing Director of Sales, Technical Analysis, 120 W. Wieuca Road N.E., Atlanta, Ga. 30042.

Miroda Software Engineering has made available a new job control/program generator for use with IBM OS and DOS-type operating systems. The general purpose **Genprep-1** application generator system is designed to produce installation-specific job streams and programs from a library of general-purpose functions and control statements. The company says the system is self-contained and requires no modification to any existing software systems.

Genprep-1 is available with a permanent license for $3,000, including two years of maintenance and updates. Information about the system can be obtained from the Products Manager, Miroda Software Engineering, P.O. Box 10089, Chicago, Ill. 60610.

Applied Intelligence, Inc. has introduced **PC/NOS**, a networking software package designed to support microcomputers based on the Digital Research, Inc. CP/M 2.2 or Microsoft, Inc. MS-DOS 2.0 operating systems. According to the company, the package will enable an organization to connect all its microcomputers that are Zilog, Inc. Z80-based CP/M types, IBM Personal Computers or IBM-compatible, allowing them to communicate with one another and to access files anywhere on the network.

The package is available for a one-time license fee of $100,000 plus a royalty for each workstation attached to the network. The average per-workstation royalty is said to be $7.50. Each of the four modules may be purchased separately from Applied Intelligence, located at 2101 Landings Drive, Mountain View, Calif. 94043.

D&B Computing Services, a company of The Dun & Bradstreet Corp., has announced three micro-based support packages for the IBM Personal Computer. **Beamit**, priced at $50, is an intelligent micro-mainframe data transfer product that formats data to the target Personal Computer; **Bee**, priced at $50, enables Personal Computer terminals to emulate a Beehive International, Inc. DM20 terminal; and **NPL-N**, priced at $2,000, is a nonprocedural data management package. The vendor is located at 187 Danbury Road, Wilton, Conn. 06897.

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Packet-switched networks built by BBN Communications link companies with offices around the world.

Just because we're the networking leader, don't think for a minute that we're resting on our accomplishments. Our R and D effort is one of the largest in the industry, with major programs in protocol development, network control, and future network applications. And, of course, our customers receive the full benefits of every breakthrough we make.

We're the networking leader.

Fifteen years ago, we pioneered packet-switching technology to build the Arpanet, the world's first packet-switched computer network. Today, Arpanet supports 10,000 users and over 300 different computers in the United States and Europe, and the technology we invented for it has become a cornerstone of the data communications industry.

As the networking leader, our customers include major financial, manufacturing, and industrial corporations from all over the world. Recently we've even been selected to build and run the U.S. Defense Department's major new computer network, the Defense Data Network.

So if you're tired of all the squawking, consider BBN Communications. We think it's about time you got your network, and some peace and quiet, too.

For a brochure on our complete networking capabilities, contact BBN Communications Corporation, 33 Moulton Street, Cambridge, MA 02238, (617) 497-2800.

BBN Communications Corporation

Random Notes

Sperry, Digicon Develop Seismic Processing System

HOUSTON — A seismic processing system developed jointly by Sperry Corp. and Digicon Geophysical, Inc. is available for use on the Sperry 1100 series of computers.

The Disco 1100 system handles each seismic processing function as an independent module. The user specifies the modules and the order in which they are to be applied. Output can be generated to a plotter, magnetic tape or graphics display terminal at desired points in the processing sequence, the companies explained.

Throughout the processing, the Disco 1100 system retains critical parameters, such as depth-point geometry, velocity, statics, elevation tape numbers and processing history for every seismic line processed. This information allows the user to display and compare the effects of even small alterations in processing or parameters.

An entry-level Disco 1100 system, consisting of a Sperry 1100/70 mainframe, floating-point system array processor and plotter/controller, is priced at $1,090,000. Larger configurations, extending up to the Sperry 1100/90 and to 16 million words of main storage, are possible. The system will be available in January through Digicon at 3701 Kirby Drive, Houston, Texas 77098.

Shipping Firms Get Tool To Handle DP Operations

MIAMI — Syscom, Inc. has placed on the market a software package intended to handle the data processing operations of shipping firms.

Known as the Shipper, the package is capable of automatic calculation of tariffs and freight charges, as well as written customer service quotations.

It runs on IBM Systems/34 and 36 and reportedly will be available for other hardware in the future.

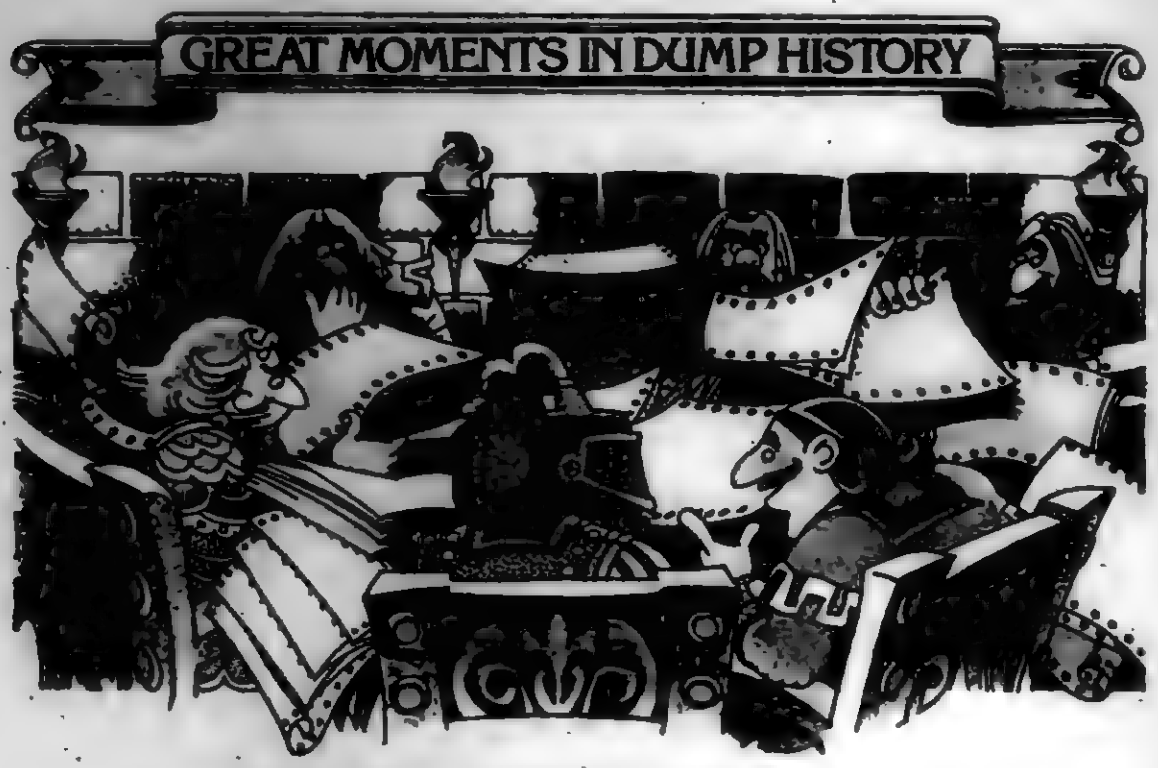
Price of the package is $18,000. It is now available from Syscom at 10300 Sunset Drive, Miami, Fla. 33173.

Point 4 Offers Course Series On Iris Structures, Formats

IRVINE, Calif. — Point 4 Data Corp. has introduced the Iris File Clinic, an eight-hour course package providing instruction and information on the internal data structures and formats of all types of Iris files.

The package on audio cassette tape is supported by documentation including reference manuals and course workbook and is designed to enable more efficient use of the Iris system in multiuser time-sharing and multitask processing environments, the vendor said.

The price is $250 through December, and the course is available from Point 4 Data Corp., 2569 McCabe Way, Irvine, Calif. 92714.



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Ticker Service Offers Users Market Stats

NEW YORK — The Monchik-Weber Corp., which specializes in information services for the financial community, has added several features to its formatted real-time ticker service.

The real-time service, which provides subscribers with continuous transmission of updated information on stocks, options, financial futures and options on futures and indexes, now includes data on market statistics and indexes as well as two additional pricing features.

Subscribers can now receive market statistics such as up, down and net tick; number of issues traded; and trade volume and dollar volume for major stock and option exchanges. In addition, as exchanges begin reporting and trading new indexes, the Monchik-Weber service will process and transmit that data, including calculations for the major indexes themselves and updated prices, the company said.

Two Pricing Products

Two pricing products have also been added by Monchik-Weber. The custom-generated ticker is a selective ticker whose parameters are defined by the user. This ticker allows users to receive pricing information on preselected issues. This selection can be made on the basis of exchange, issue type and individual ticker symbol.

The 20-min delayed ticker, which runs on 9,600 bit/sec lines, is designed for companies that distribute pricing information to individual investors. It offers data that is consistently 20 min behind market prices, the company said.

Prices for the Monchik-Weber formatted real-time ticker service range from $1,200/mo to $4,000/mo, depending on the number of features selected, according to a spokesman for the vendor. The custom-generated ticker costs $5,000 for the initial setup, plus an additional $500/mo.

More information can be obtained from Monchik-Weber, which is located at 11 Broadway, New York, N.Y. 10004.

Compatible With Ethernet, SNA

Intelligent Net Interface Unit Unveiled

SANTA CLARA, Calif. — Ungermann-Bass, Inc. has announced the Net/One Personal Connection, an intelligent network interface unit (NIU), which is compatible with Xerox Corp.'s Ethernet local-area network and IBM's Systems Network Architecture (SNA).

The Net/One Personal Connection can be used with microcomputers manufactured by IBM and Texas Instruments, Inc. and is an extension of the firm's Net/One local-area network. The Net/One Personal Connection allows users to share information and resources and integrate them with other corporate resources, such as an IBM host processor, using IBM's SNA.

The Net/One Personal Connection is based on the Personal NIU, a plug-in board that reportedly extends the range of the firm's Net/One and handles all the communications tasks that can consume a large percentage of the host CPU's resources.

Microcomputers configured with the Personal NIU can run any applications programs under Microsoft, Inc.'s MS-DOS operating system without modification. In addition, applications can be shared across the network, the vendor said.

The Net/One Personal Connection features SNA gateways, which allow users to access mainframe-based application programs. The SNA gateways are equipped with emulation software that enables microcomputers to appear as IBM 3274 controllers, 3278 printers or 3287 printers.

Available in January 1984, the Personal NIU will cost $850, including MS-DOS networking commands on a 5¼-in. diskette. Print server and disk server software packages, called Printshare and Diskshare, will cost $500 each, the vendor said. Ungermann-Bass is located at 2560 Mission College Blvd., Santa Clara, Calif. 95050.

Proper RFP Preparation Critical To PBX Telephone System Purchase

By Jim Bartimo
CW Staff

SAN DIEGO — When purchasing a private branch exchange (PBX) telephone system, it is absolutely essential to prepare a request for proposal (RFP) properly. But many telecommunications managers do not submit to vendors the type of RFP that will get them the system they need, according to James R. Gordon of the Nashville, Tenn., consulting firm, TCS Communications Consultants.

Gordon laid down some guidelines for preparing an RFP in the purchase of a PBX at the Tele-Communications Association annual meeting held here recently. "You need to organize the purchasing process," he said, "even if you end up buying a system on gut feelings."

The real reason for sending out RFPs is to create consistency in decision making at the installation site, to assess organizational needs, to become part of the corporate planning process and to score political points, Gordon said.

"A lot of telecommunications managers complain that they're not involved in company goals," Gordon said. "The preparation of an RFP allows you to go and talk to people about what they need. We don't just live in a purely technical world — we also live in a political world."

Before the RFP is even drawn up, a needs analysis must be conducted. This process should investigate the present situation, short and long-term needs, specialized department needs and call traffic growth.

"From the time you begin work on the RFP to the time you install your system is going to be about two years," Gordon said. "Don't expect your system to reflect the RFP exactly unless your company is completely stagnant in those two years."

Preparing an RFP is essentially giving vendors instructions on how to present their products. The RFP itself should ask for information on such PBX options as automatic route selection, call-detail recording, the cable plan and the traffic pattern, Gordon said. The RFP also should ask specifically about system architecture, the system schematic, the equipment room and system management. It should ask for detailed procedures, a completion date and a training plan.

Once the RFP is sent out and vendors start to respond, they should be called in to a "preproposal, one-on-one" meeting. The manager should work with the vendors in meeting the specifications of the RFP before meeting with a vendor a second time to hear its bid.

Once all the bids are in and a vendor is selected, contract negotiations begin, and the installation is planned. "The two biggest reasons for a PBX failing in an organization is that the contract wasn't negotiated correctly or the installation wasn't planned well," Gordon said.

IBM Compatibility For DCA Nets Added With Tools

NORCROSS, Ga. — Digital Communications Associates, Inc. (DCA) has added two IBM-compatible communications packages to its Integrated Network Architecture (INA).

The Binary Synchronous Communications Transport System (INA/BTS) transports synchronous data formatted under the IBM 3270 Binary Synchronous Communications (BSC) protocol. Features include host selection in a binary synchronous environment, transmission of both 3270 synchronous and asynchronous data through the same telephone line, elimination of poll/response through the network and more efficient satellite links, the vendor said.

INA/BTS supports remotely attached 3270 control units and their associated displays, keyboards, printers and ancillary devices. Each INA/BTS unit manages either one or two synchronous communications links using the 3270 BSC protocol.

(Continued on Page 66)

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Reduced by $100

Price Cut on Freedom 100 Terminal

SAN FRANCISCO — Liberty Electronics Co. has announced a $100 price reduction on its Freedom 100 video display terminal, from $595 to $495.

According to a vendor spokesman, the pricing move was made in response to some economies of scale in manufacturing.

The Freedom 100, first shipped in September 1982, features a 12-in. green phosphor display with a 24-line by 80-col. data display and a 25th status line, 7- by 9-dot matrix characters with descenders, 128 Ascii characters, 15 graphics characters and a five-position tilt screen.

Emulation modes for the Televideo Systems, Inc. Televideo 910, Hazeltine Corp. 1420, Applied Digital Data Systems, Inc. Regent 25 and Lear Siegler, Inc. ADM 3A/5 are standard on the Fredom 10, a spokesman said

Price breaks for volume orders are 10 to 24 terminals for $470 each; 25 to 99 terminals, $445; 100 or more terminals, $420.

The Freedom 100 comes with a six-month limited warranty. Extended warranties are available, according to the vendor.

Additional information is available from Liberty Electronics, 100 Clement St., San Francisco, Calif. 94118.

Display Station Fits IBM 3270

MILPITAS, Calif. — The Braegen Corp. has introduced the Model 8521 display station compatible with the IBM 3270 system.

The 8521 has a small footprint and low-profile keyboard, a 15-in. screen which displays 24 lines by 80 characters and a 25th status line.

The 8521 display features Braegen's Softkey security system, which allows managers to assign a keyword or code for access to each terminal in environments where security is a concern.

The cost is $1,700 from The Braegen Corp., 525 Los Coches St., Milpitas, Calif. 95035.

Systems Consultants Links IBM Micro, Datapoint Mini

CARROLLTON, Texas — Systems Consultants, Inc., a five-year-old consulting firm specializing in mini and microcomputer systems, has announced its first personal computer-minicomputer communications link software.

The software reportedly links the IBM Personal Computer to any Datapoint Corp. minicomputer host system.

The software package, called PC/Link, allows the Personal Computer user to use the system as a Datapoint 8200 CRT workstation and provides a path for data file transfer between the host Datapoint system and the user's Personal Computer system disks.

According to the vendor, the PC/Link software is designed for simplicity of use and allows configuration to meet each Personal Computer user's communications requirements. Also included in the software is a "log file" feature and security protection; both features aid in data file movement management and control.

The PC/Link, available immediately, is priced at a one-time-use license fee of $2,500 per Datapoint network. The package includes one Datapoint resident host module and unlimited copies of the Personal Computer module, subject to the terms of the software license, plus one copy of the Personal Computer user's guide.

The PC/Link is the first in a series of personal-minicomputer communications products planned. The next package will be software with the same features and data communications capabilities for use on Apple Computer, Inc. Apple II and Apple IIe personal computer systems. More information is available from Systems Consultants through P.O. Box 116126, Carrollton, Texas 75011.

Communications Packages Boast IBM Compatibility

(Continued from Page 65)

Each of the INA/BTS links may operate at speeds up to 9.6K bit/sec with a maximum aggregate speed of 19.2K bit/sec. Each link connects the INA network either to an IBM host communications control unit or to an IBM 3270 terminal.

The Asynchronous Terminal Controller (INA/ATC) allows asynchronous Ascii teminals to communicate with an IBM or compatible processor using 3270 BSC or Systems Network Architecture (SNA) protocols. The Ascii terminals can be connected directly to the DCA network, or they can operate remotely.

INA/ATC features include: asynchronous terminal access to IBM application software normally requiring a 3270 terminal, an interface for up to 24 asynchronous terminals connected to a host processor over a synchronous line operating at up to 9,600 bit/sec and the ability to have terminals geographically dispersed.

Other features include the ability to designate any number of ports as IBM 3287-style printers and support for a local copy feature, which allows the buffer of one device to be copied into the buffer of any other device attached to the INA/ATC.

The INA/BTS costs from $995, and the INA/ATC from $8,950, the vendor said from 303 Technology Park, Norcross, Ga. 30092.

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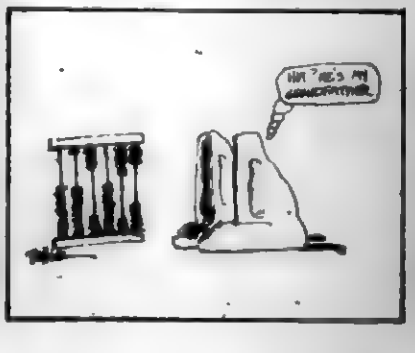

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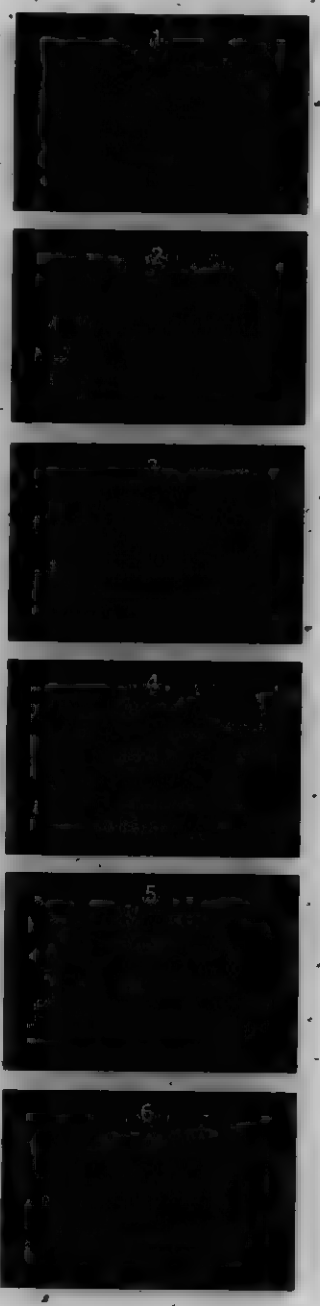

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Raytheon Unveils 3270-Compatible Products

BOSTON — A product line of IBM 3270-compatible displays, printers and control units was announced here recently by Raytheon Data Systems Co.

The PTS-1000/4000 products introduced include three interactive displays, three control units and five printers.

The product line is the result of two years of research and development, according to a company spokesman, who said further announcements are scheduled during the next 12 months as the company "aggressively" pursues the IBM 3270 and office automation markets. The vendor stressed the application of ergonomics in the design of the products and the electric typewriter-size footprint of the terminals.

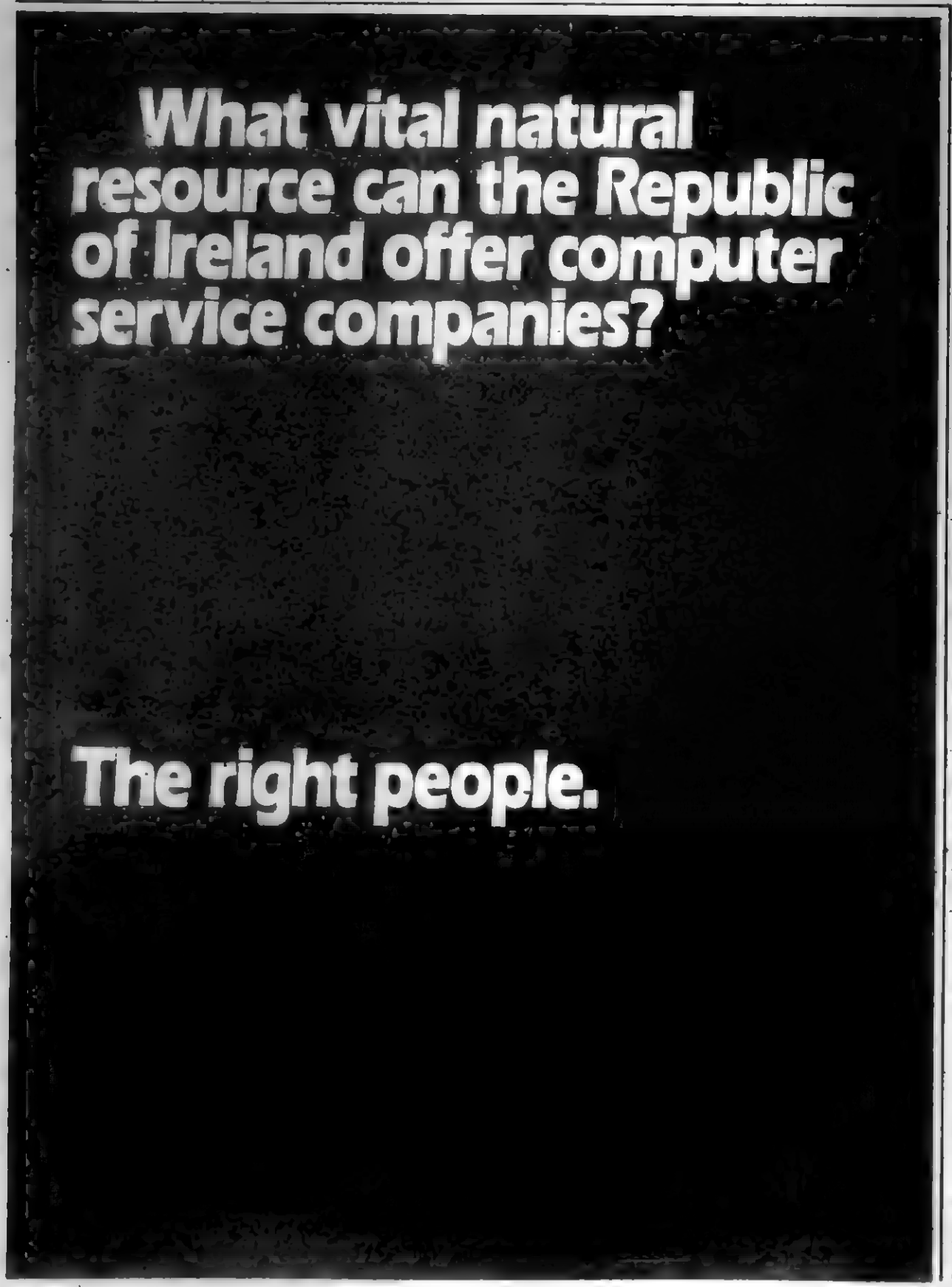
The three displays are Intel Corp. 8085 microprocessor-based with 24K bytes of read-only memory. A 12-in. diagonal monochrome terminal, the R1078-X, has 48K bytes of random-access memory (RAM) and is said to be compatible with the IBM 3178 and 3278-2 display terminals; the 15-in. R4078-X monochrome terminal, compatible with the IBM 3278, and the 13-in. R4079 color terminal, compatible with the IBM 3279-2A and 3279-3A models, both have 64K bytes of RAM.

A display terminal/control unit, designated R1076, is said to be compatible with the IBM 3276 control unit and IBM 3178 display terminal and supports up to seven display and printer terminals using IBM 3276 communications protocol. The R1074 large cluster control unit supports as many as 32 display and printer terminals using IBM 3274 communications protocol. The R4074 supports both 3276 and 3274 protocols with a dedicated line or channel communications attachment and is said to offer additional capabilities including local format storage, extended memory, increased communication speeds and local channel attachment.

Printer support includes an R4185 screen printer, R4187 matrix printer, R4189 line printer and R4188 correspondence printer. All system components reportedly offer three coaxial cabling options — star, multidrop and coaxial multiplexing — operating in IBM's Binary Synchronous Communications and Systems Network Architecture environments as well as airline link control environments.

The systems are available for purchase, and short-term leases of one, two or three years are offered. A typical small cluster remote system, with four displays and one 150 char./sec matrix printer, is priced from $13,170.

The vendor is located at 1415 Boston-Providence Tnpk., Norwood, Mass. 02062.



H & A Package Guards Remote, Central Series/1

SAN FRANCISCO — H & A Computer Products, Inc. has announced the release of a communications package for the IBM Remote Series/1 Series (RSS), which protects the remote as well as the central Series/1 from unauthorized access.

The new package allows a centralized Series/1 to access any number of remote Series/1s and, via menu selection, transfer programs and data files or execute programs on the remote Series/1 from a terminal of the central Series/1.

According to the vendor, bit strings transmitted over the communications line are different each time a password is used, foiling any effort to decipher and use them to gain unauthorized access to a Series/1.

RSS runs with IBM's EDX operating system and is available for $3,500, the vendor said. More information is available from H & A Computer Products, Inc., Suite 204, 30 Hoteling Place, San Francisco, Calif. 94111.

Cosystem Fits Micros Using MS-DOS System

SUNNYVALE, Calif. — Cygnet Technologies, Inc. has announced the Cosystem, a microprocessor-based voice and data communications system for users of IBM's Personal Computer or other microcomputers using Microsoft, Inc.'s MS-DOS operating system.

The Cosystem can function both independently and synergistically with microcomputers using MS-DOS. The unit features simultaneous voice and data desk-to-desk teleconferencing over normal telephone lines. The unit can also be used to send and receive electronic mail and to perform intelligent telephone features such as speed-dial, last number and automatic redial from an extended directory. Also included are programmable function keys and automated private branch exchange calling functions, the vendor said.

The Cosystem with a 300 bit/sec modem costs $1,495. A 1,200 bit/sec modem version of the Cosystem costs $1,845, the vendor said from 1296 Lawrence Station Road, Sunnyvale, Calif. 94089.

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With Graphics Terminal, Display Station

Envision Beefs Up Color Terminal Product Line

SAN JOSE, Calif. — Envision Corp. has added a text/graphics terminal and a graphics display station to its line of color terminal products.

The Envision 215 color text/graphics terminal, designed for business and scientific applications, is a 13-in. terminal with color graphics and alphanumeric capabilities. It has 640-by-409 pixel resolution and can display eight colors from a palette of 64. Compatible with Digital Equipment Corp.'s VT100, the Envision 215 has a 16K-by-16K address space and graphics drawing primitives for vectors, complex polygons and graphics characters.

The Envision 239 color graphics display station, with a 19-in. screen, local graphics processing capabilities and high-resolution color display, is designed for use in tabletop or rack-mount configurations for computer-aided design and manufacturing, engineering and process control applications, the company said. It features user-definable symbols, hardware zoom and pan, local display list processing and a 4,096-color palette from which 16 colors can be displayed simultaneously. The 239 is compatible with the DEC VT100 and the Tektronix, Inc. 4105.

Options for both products include a graphics tablet or mouse and an RS-170 interface for large-screen projection systems or photographic hard-copy systems. In addition, both terminals are compatible with the Envision 430 vector printer.

The Envision 215 is available now for an introductory price of $2,990. After November, it will be priced at $3,450. The Envision 239, which will be available in October, costs $9,450 in single quantities. Envision is located at 631 River Oaks Pkwy., San Jose, Calif. 95134.

Communications Processor Features Terminal Emulation

MIAMI — Innovative Electronics, Inc. recently announced a communications processor said to convert a Digital Equipment Corp. VT100-compatible terminal into a full-function IBM 3277-1, 3277-2, 3278-1 or 3278-2 terminal communicating with an IBM host using the Ebcdic binary synchronous communications protocol.

The MC-80/600-1 communications processor reportedly emulates an IBM 3274-51C communications controller. It performs full screen mapping, and data displayed on the asynchronous Ascii terminal will be the same as that which appears on an IBM 3277/3278-type terminal, with virtual screen sizes of 480, 960 and 1,920 char., according to a spokesman for the vendor.

The product is said to include extensive on- and off-line diagnostics; diagnostics are provided through a seven-segment display.

Base price for the unit is $1,495. Further information is available from Innovative Electronics, which is located at 4714 N.W. 165th St., Miami, Fla. 33014.

Product Allows Password Safety From Modem

SANTA CLARA, Calif. — Ven-Tel, Inc. has introduced a product that allows password security from the modem itself.

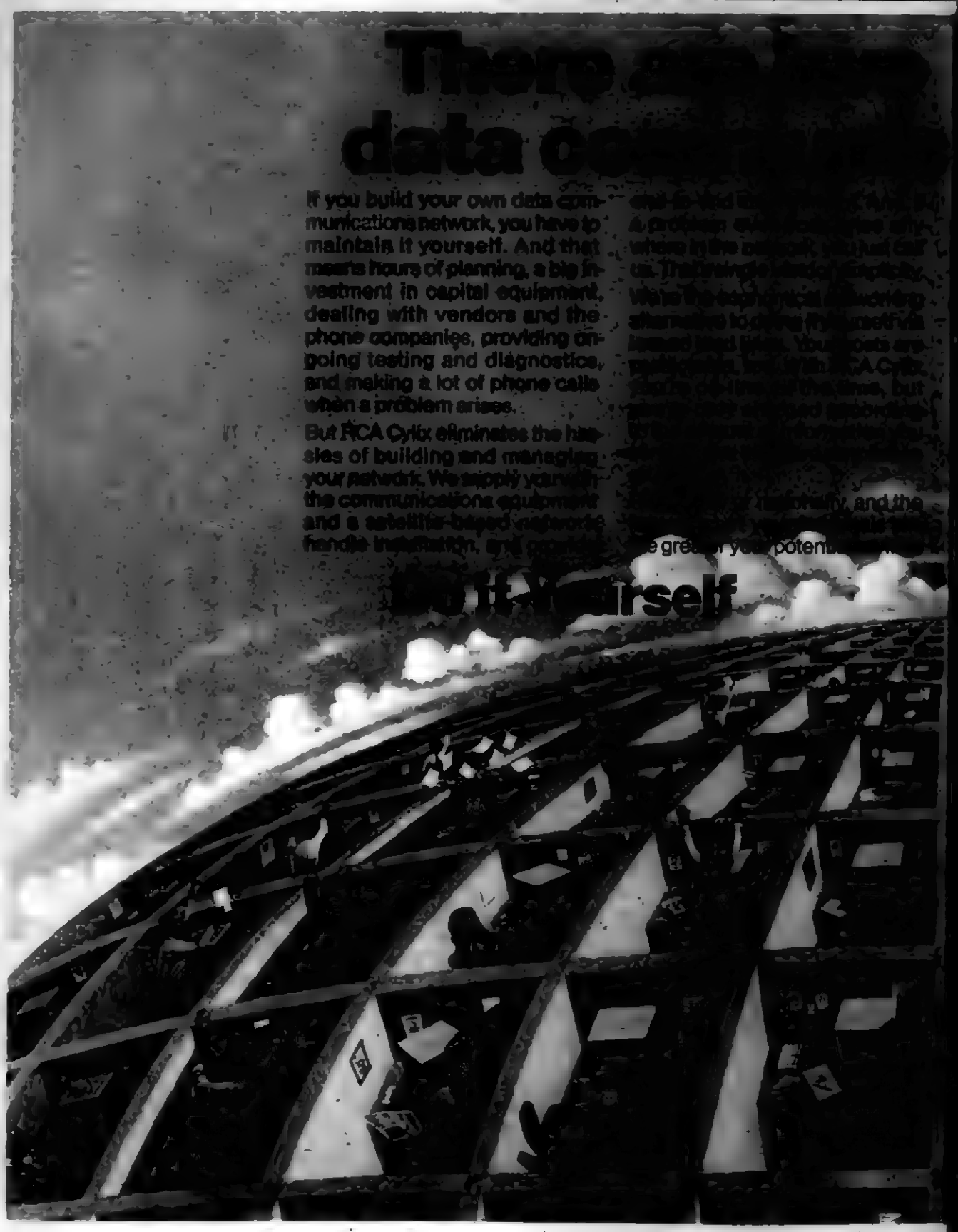
Called the 212 Security Plus, it provides two levels of password security — one for the operator and the other for the supervisor. No call can be made without one of the passwords.

The operator password permits the user to see only the name assigned to the nine destinations stored in the modem's battery back-up memory. The supervisory password is necessary for the user to examine, modify or delete any of the telephone numbers, passwords, account numbers or other information stored in the modem, according to a spokesman for Ven-Tel.

Greater security is also possible by using the Security Plus command structure. In addition to hiding passwords, parts of passwords may be required, callback requests may be embedded, cross-check responses provided and other sophisticated security routines incorporated into the logon procedure.

The modem also provides an integral activity timer that resets the modem after five minutes of system inactivity.

The 212 Security Plus is priced at $675. Further information is available from Ven-Tel, which is located at 2342 Walsh Ave., Santa Clara, Calif. 95051.



System for Voice, Data Management Unveiled

DALLAS — Stonehouse & Co. has introduced a software system for voice and data telecommunications management.

Management of Network Income, Expense and Service (Monies) was developed for the Wells Fargo Bank of San Francisco.

The system runs on standard IBM mainframe computers under IBM's CICS and reportedly requires no special compufer systems, software experts or special terminals.

It is written in Ansi-standard Cobol using command-level CICS. Coding techniques follow standard industry practice and file organization.

Monies includes menu-driven screens, on-line file maintenance, on-line reporting, system modularity and, independence, an automatic built-in access security system and complete file backup and restore procedures.

The major areas of communications affected are the following:

- Order entry — automates the placing and tracking of orders for equipment and services by using a central catalog.
- Inventory — allows the communications manager to know exactly what telephone, data and computer equipment is in stock, through queries by a variety of classifications.
- Billing — automation of the billing process, giving the manager an accurate way of reconciling vendor invoices to actual equipment and service usage.
- Corporate information directory — a way to keep track of personnel, their office locations and telephone numbers.
- Network analysis — a module that reads the call history data and provides summaries of network usage by switch and trunk group.
- Availability management — a network control center application that automates the handling and reporting of the diagnosis, dispatching and problem-resolution functions on voice and data networks.

Monies modules range from $35,000 to $250,000. The system is also available on a lease basis. More information is available from Stonehouse at Suite 400, 4100 Spring Valley, Dallas, Texas 75234.

ID Systems Offers Family Of Graphics Terminals

HILLIARD, Ohio — ID Systems Corp. has announced a family of ultra high-resolution graphics terminals said to offer dual-display architecture and high speed. Resolution is 1,280 by 480 pixels on a 14-in. screen.

The ID-200 family is reportedly being offered at a cost competitive with low-resolution graphics terminals now being marketed. It is also said to be the first terminal to perform both polygon-fill and seed-fill with fill-until and fill-while algorithms.

Features include NTSC compatibility, 16 levels of zoom, instantaneous hardware pan, display of up to eight windows simultaneously, a palette of eight to 16 colors, 10[7] user-selectable graphics pattern elements, 128 downloadable fonts that allow users to create their own characters, display list memory and a display writing rate of up to 1.24 million pixel/sec.

Prices for the ID-200 family start at $3,800. ID Systems is located at 4089 Leap Road, Hilliard, Ohio 43026.

Four Terminals Boast Graphics, Ergonomics

CAMBRIDGE, Mass. — Westward Technology, Inc. has announced four graphics terminals that are reportedly ergonomically designed.

The 1015 was designed for applications where a high-resolution display is not critical. With a 640 by 490-pixel resolution, the 15-in. monochrome display of the 1015 is suited for educational, numerical control and business graphics applications. The unit is compatible with Tektronix, Inc. 4010 and 4012 series terminals. The unit also has Digital Equipment Corp. terminal compatibility. The 1015 costs from $3,250, the vendor said.

The 2015 has a 15-in. desktop display, and the 2019W is a 19-in. workstation. The units were developed for engineering, architectural or finite element analysis applications. The units feature a 1,024 by 784-pixel resolution, and both terminals feature a scrolling multipage text memory. Options for the 2015 or 2019W include a high-speed vector generator and a range of local graphics commands. The 2015 costs from $6,250, and the 2019W costs $10,950.

The 2014C 14-in. color terminal features 16 displayable colors from a palette of 4,096 colors. The unit costs from $5,760 from 5 Cambridge Center, Cambridge, Mass. 02142.

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Elcom Systems Offers Commcard

Single-Card Communication Out

CORONA, Calif. — Elcom Systems Peripherals, Inc. has introduced its ESP Datanetcomm Communications Cards (Commcard) said to incorporate IBM 2480 and 3780 communications controllers, IBM 3270 Binary Synchronous Communications and asynchronous RS-232C communications into one card.

The Apple Computer, Inc. Apple II, Apple II+, and Apple IIe microcomputers reportedly can communicate with any mainframe, minicomputer or microcomputer using the protocols. The cards are also said to support transmissions based from floppy disks, hard disks and local-area networks.

The cards contain their own Zilog, Inc. Z80 microprocessor, I/O control, erasable programmable read-only memory and random-access memory. The ESP Commcard II for the Apple II is priced at $995, and the ESP Commcard III for the Apple II is priced at $1,195. Elcom Systems Peripherals is located at Suite A, 439 Harrison St., Corona, Calif. 91720.

Defender II Safeguards Data Bases

PALO ALTO, Calif. — Digital Pathways, Inc., manufacturer of microprocessor-based communications systems, has introduced the Defender II, its next generation dial-up system for computer-access control and management.

Defender II guards against unauthorized data base entry by providing an automated dial-in, call-back procedure allowing access only through authorized telephones.

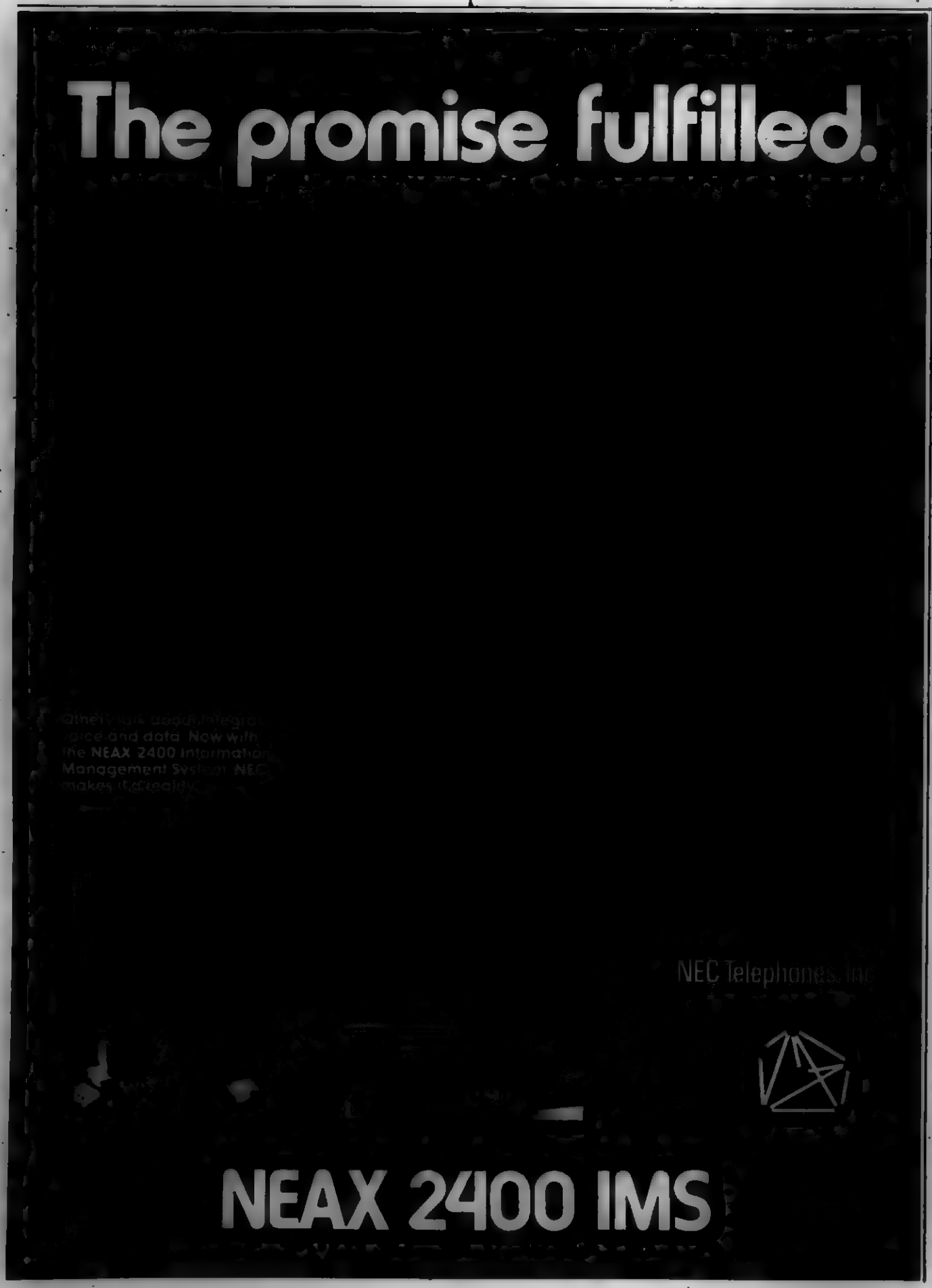
It also provides a variety of management, diagnostic and network control features, including an audit trail of all transactions, least-cost telephone routing, prioritized queuing, status reporting and preventive diagnostic procedures.

Defender II design is based on Digital Pathways' proprietary bus-controlled 212A modems. Up to 48 of the modems are packaged in each 19-in.-high rack-mounted cabinet with Intel Corp. multibus modularity. Connection between the telephone system and computer ports requires no software modification. Up to 16 independent computer dial-up facilities can be included in one Defender II installation.

A user has the option of accessing Defender II by using a Touch-Tone telephone or a conventional keyboard.

When it is determined that the identification number is valid (three false tries activate an alarm), the system retrieves the user's access parameters from its battery-supported memory. The parameters include which computers may be accessed, phone number, baud rate, priority, user classification and account number.

The basic Defender II can support more than 1,000 users with virtually unlimited expandability through the use of additional memory boards. A typical 48-modem system costs about $800/line, field-installed. Adapters are available for other modems at $200/line. More information is available from Digital Pathways at 1060 E. Meadows Circle, Palo Alto, Calif. 94303.



WHAT'S THE FUTURE OF MICROS IN YOUR ORGANIZATION?

Turn to "The Micro Mission" this fall and get the future mapped out for you.

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This November, *Computerworld* will give you an Extra! you can't afford to miss. Not if you plan to take advantage of the hundreds of possibilities micros give you. You'll get articles, interviews, applications stories, tutorials, market data, and advice from the experts — a whole issue of *Computerworld Extra!* devoted to "The Micro Mission." And it will come in the mail at the end of November as a bonus issue! You don't have to do a thing. Just look at what's coming to you:

You'll get an examination of the politics of microcomputers in organizations; a roundtable discussion by DP/MIS experts dealing with a wide range of topics relating to personal computers — from selection to implementation. And, there'll be a whole article devoted to how large companies deal with training personnel to use personal computers.

You'll get articles on:

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- Networking personal computers into the corporate database
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Analyzer, Recorder Added To Atlantic's Test Gear

ALEXANDRIA, Va. — Atlantic Research Corp. has added the Interview 3600 Protocol Analyzer and Selective Data Recorder and the Interview 4600 Protocol Analyzer and Interactive Test System to the company's line of data communication test equipment.

Both products reportedly feature Ansi X.25 menu-driven capability, allowing the user to select frame and packet by name for analysis or for test message generation.

Standard features on the 4600 (and optional for the 3600) include the remote transfer of test and data samples, storage of up to 100 tests on a cartridge and menu-designed rules for protocol development.

The 3600 is priced at $11,000, and the 4600 costs $16,000. More information is available from the vendor at 5390 Cherokee Ave., Alexandria, Va., 22314.

Terminal Fits DEC VT100

TEWKSBURY, Mass. — Visual Technology, Inc. has announced a display terminal said to be compatible with Digital Equipment Corp.'s VT100 and VT102. Also, the terminal can support Tektronix, Inc. 4010/4014-compatible graphics by the addition of a graphics card that plugs directly into the main printed-circuit board, the vendor said.

Standard features on the display terminal include all VT100 and VT102 basic features, a 14-in. P31 (green) phosphor screen, tilt/swivel display, low-profile (DIN standard) keyboard and eight (shift 16) programmable function keys stored in nonvolatile memory.

The graphics option card reportedly provides 768- by 293-pixel resolution on a 50Hz/60Hz noninterlaced display.

Various printers, plotters and digitizers are supported via the RS-232C buffered auxiliary port. The list price for the Visual 102 is $1,095; the graphics option card costs $895. Visual Technology is located at 540 Main St., Tewksbury, Mass. 01876.

IBM Micro Linked to Honeywell

ORANGE, Calif. — Insurance Technology Consultants (ITC) has announced the Asynchronous Communications Emulator (ACE), an IBM Personal Computer-to-Honeywell, Inc. network communications link.

According to the vendor, the software allows IBM's Personal Computer or Personal Computer XT to be used as a processing node in a Honeywell distributed processing network by emulating a Honeywell VIP 7200 or 7201 terminal.

ACE features use of a standard Honeywell terminal interface.

ACE costs $495. ITC is located at Suite F, 1437 W. Palmyra, Orange, Calif. 92668.

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Entry Station Announced For IBM Micro

RALEIGH, N.C. — Barr Systems, Inc. has introduced Barr/Hasp, a remote job entry station for the IBM Personal Computer.

Barr/Hasp provides access to large computers using established languages and simultaneously transmits and receives straight into IBM's MVS/Job Entry Subsystem 2 and 3 and VM/Remote Spooling Communications Subsystem, bypassing the Time Sharing Option and Conversational Monitoring System, the vendor said.

The package includes a synchronous communications adapter board, software and a user's guide. The software is menu-driven. The hardware supports interrupt-driven I/O for IBM's Binary Synchronous Communications, Synchronous Data Link Control and Ansi X.25 protocols in both full- and half-duplex modes.

Barr/Hasp requires 64K bytes of memory, IBM's PC/DOS operating system, 80-col. screen display and one diskette drive.

The package is available for $750 from Barr Systems, Suite 315, 2500 Blue Ridge Road, Raleigh, N.C. 27607.

Tape Subsystems Aid Data Users

WINCHESTER, Mass. — Blackhole Technology, Inc. has recently announced a line of magnetic tape subsystems said to provide data collection users with the necessary tools to meet their communication requirements.

The RS-232F Communication Interface subsystems feature hardware- and software-selectable parameters, support for translation mode and variable write block sizes.

The rack-mountable cabinets reportedly support either single-density or double-density drives and are said to have the capacity to receive data while writing to the tape drive and to transmit data while reading from the tape drive.

Prices start at $2,495, and delivery is 30 to 45 days, the vendor said.

Blackhole Technology is located at 225 East St., Winchester, Mass. 01890.

Part One

IN DEPTH

Locking Up The Mainframe

'Band-Aid' security can't patch up vulnerable systems.

By Robert P. Campbell

The highly publicized system penetrations and abuses this summer raise unsettling questions about computer security. Were these sensitive systems that failed to use available security tools and techniques . . . or well-defended systems that fell prey to sophisticated attack?

While there is a tendency to write off these incidents as part of the "high-tech rite of passage" for bright kids with computers (akin to "hot wiring" autos a few generations ago), there are longer term concerns. For how long can patchwork security inspired by an emergency safeguard a system? When will vendors build in sufficient architectural controls?

No matter how the questions are answered, computer security continues to be basically a management problem. And data processing management will surely spend a great deal of time assessing recent events for its corporate management and users.

Most organizations do not recognize that very few systems are *not* sensitive or critical. As a result, they do not have a comprehensive security policy with which to define the sensitivity of their information or the critical nature of their processing. Potential business impact or harm to people served by and dependent upon the system is not adequately analyzed.

Lacking this understanding, most organizations fail to apply currently available physical and logical security controls to their sensitive and critical systems. If applied, they are often incompletely implemented, poorly monitored or improperly managed.

Much security is based upon an implied ignorance of the technology on the part of everyone except the system "operators" who have privileged access. Users are expected not to have this knowledge. But the spread of personal computing is developing a level of computer literacy in the general public that renders ignorance an invalid defense.

This computer literacy has dramatically altered the nature of the threat. No longer composed of a few well-informed and improperly motivated individuals, the group of potential abusers has expanded tremendously.

Most system architectures considered "untrustworthy" for Department of Defense (DOD) purposes have security gaps that could be exploited by both outsiders and insiders. Computers have been designed to operate in a "friendly" or benign environment. The technology of system security is moving slowly from the needs of a batch environment to those of online, real-time operations and fully networked environments. Many

ILLUSTRATION BY KRISTIE VANVALKENBURGH

IN DEPTH

patches, add-ons and "Band-Aids" are being used to enhance security, but there is still a long way to go before systems can effectively distribute and integrate security control across a networked environment.

Physical security for systems is still much needed. Overall logical security is such that we still cannot — or prudently *should* not — put terminals in "hostile" or unprotected environments except under highly restricted circumstances (for example, a limited-function automated teller machine or a restricted data entry device, such as a credit card reader).

The need for physical or environmental security is draining resources and inhibiting application of the technology. At the same time, we are taking unwarranted risks as sensitive and critical systems proliferate.

Early Efforts

Unfortunately, the potential for our current security problems has been known for years. We are watching a predicted scenario play itself out.

Concerns about potential security problems had their basis in the late 1950s and early '60s. Some of the earliest organized efforts to deal with security problems were those of the federal government. The DOD had long since recognized the need for physical security and in the late '60s began focusing on system security problems with a project called "Adept-50," which attempted to enhance security on the IBM 360.

The potential for our current security problems has been known for years. We are watching a predicted scenario play itself out.

At the same time, a Defense Science Board task force was chartered to study and recommend appropriate computer security safeguards that would protect classified information in a multiaccess, resource-sharing computer system. The task force report, "Security Controls for Computer Systems," now commonly referred to as the Rand or Ware Report is considered to be a classic work and still valid today.

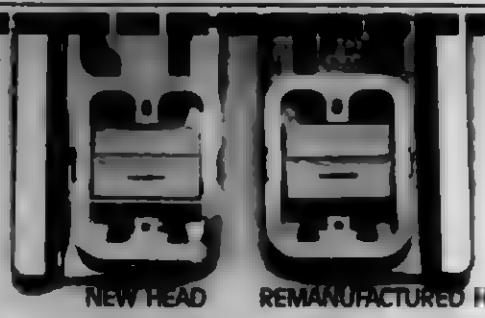
In the early '70s, DOD conducted studies of existing computer architectures and identified "generic" flaws in them. Armed with this knowledge, DOD set out to enhance the security features of the Honeywell, Inc. Gcos operating system, then being used as the backbone of its command and control network. This effort not only produced the enhanced Honeywell Multics operating system, which was quickly subverted by a penetration effort conducted by the Air Force, but it also confirmed the growing belief that security retrofit — the "Band-Aid" approach — is costly, shortsighted and largely ineffective.

Realizing that security had to be engineered into systems as a primary design objective, DOD focused its research and development activities on building more secure systems from scratch. DOD concentrated on defining security policy-based specifications and using formal development methodologies that could form the basis for later development of more secure or trustworthy computer systems.

Realizing that it could not undertake the development of this technology by itself, the DOD embarked in the late '70s upon its Computer Security Initiative, intended to transfer to business and the computer manufacturers that which it had learned about secure systems technology.

Through the DOD-sponsored Computer Security Technical Consortium, vendors and manufacturers of computers were invited to use these materials and also to submit documentation on the architectural design of their equipment for evaluation in accordance with DOD design criteria. Most architectures are currently considered by DOD to be "untrustworthy" in terms of their ability to safeguard sensitive information in a multiaccess, resource-sharing computing environment. In 1981, the DOD Computer Security Center was established to extend this initiative, evaluate security enhancements and promote transfer of secure systems technology into industry.

Throughout this cycle, DOD's security needs have been viewed as unique to its operations and of little commercial value to the private sector. An actual or at least perceived lack of demand and, therefore,



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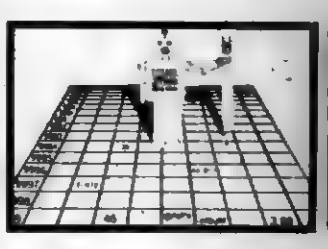

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of economic viability for security-enriched products in the private sector has seriously hampered development of this technology.

Therefore, high-security defense systems have had to achieve much of their security through isolation and dedication, a practice not economically viable in the commercial environment. Many of the operational modes and configurations being used in the commercial sector would not be acceptable to the Department of Defense. In light of what we are now seeing, it is timely to ask if these system security and integrity needs are truly unique to "special" DOD requirements or whether they apply to the commercial sector as well.

On the commercial side, security efforts have been less farsighted, generally focusing upon specific corrections to short-term problems and manifesting themselves in such popular products as physical access control devices, systems access control packages, audit software and evaluation techniques, telecommunications intercept/call-back devices and the like.

Occasionally, concerned special interest groups, such as DP auditors, security specialists, communicators, privacy proponents and bankers, have held special workshops looking to future security needs and attempting to develop problem statements, prepare security guidelines and, in a few instances, research agendas directed toward longer term problems. On the whole, however, efforts in the commercial sector have lacked the mechanisms and perspectives to look past short-term security needs.

With this historical perspective and the incidents of the "Summer of '83" fresh in our minds, what can we expect to see as enhancements to the security of sensitive and critical systems? Is there truly congruence between the security needs in the traditional defense environment and those of the business world? Can these needs be satisfied and, if so, how and when?

Statement of Security Needs

To understand how the state of security must evolve, it would be useful to focus on a general set of capabilities that systems should possess to satisfy current and future needs. The following paragraphs present a statement of need and describe the current state of the art and where we need to go.

1. People/objects attempting to access computers can be positively or reliably identified.

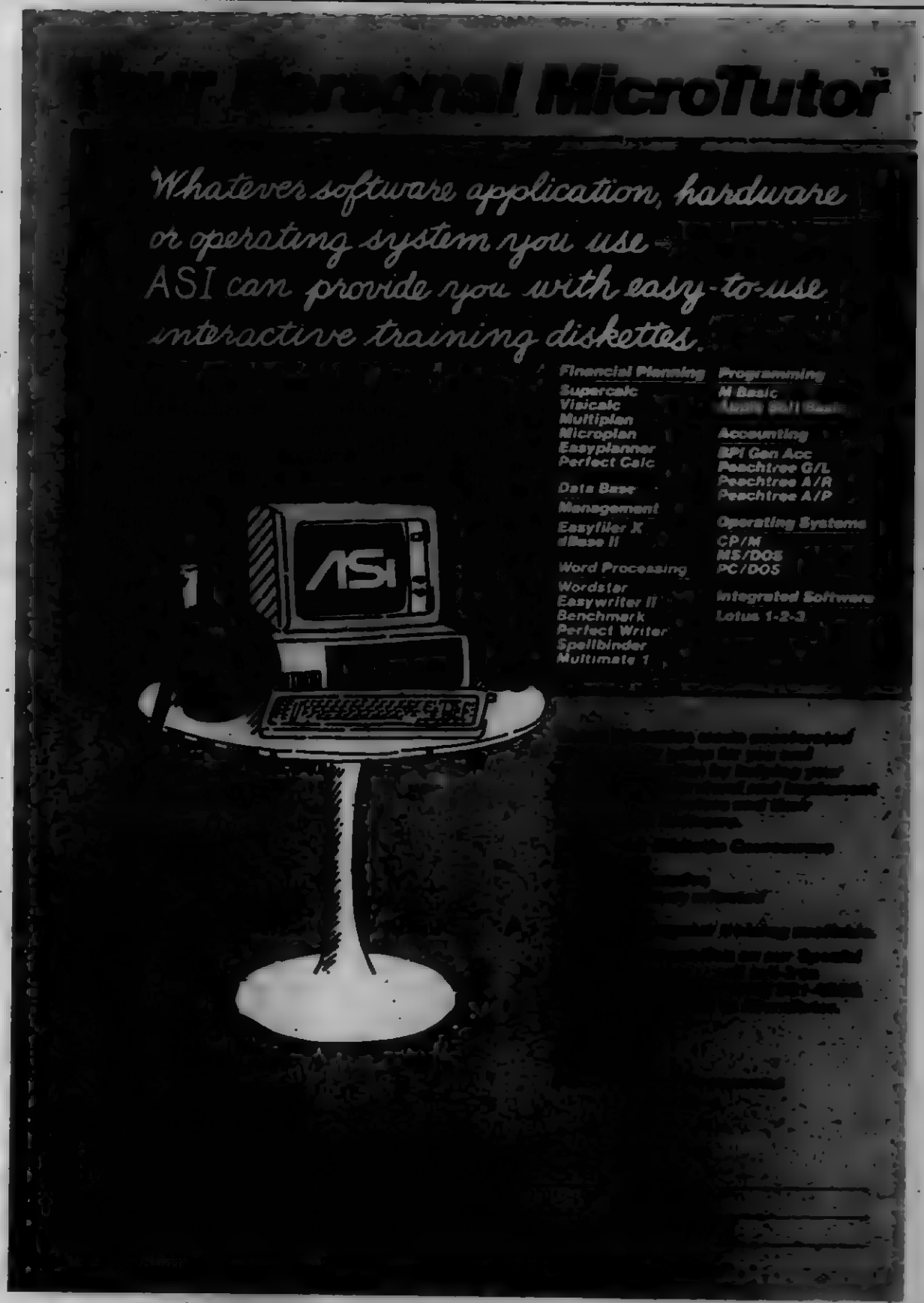
The need. Each person, system or system component seeking access must be identified to our system. Access authorization is a positive process in which each and every user must be predefined to the system and then must undergo positive verification of identity prior to being allowed access.

Current capability. Logical system access control is currently based on relatively simple identification numbers and password schemes. These provisions are generally proprietary "add-ons" to the basic control features provided by the manufacturer and, as add-ons, have limits to the extent of enhancement they can offer. The effectiveness of password schemes is currently restricted by difficulty in their administration, limitations on human ability to accommodate their complexity and difficulty in detecting their compromise. The more user-friendly they are, the lower the level of security they provide.

Some new approaches, based on such concepts as fingerprint identification, signature verification, hand geometry, voice prints and eyeball vein patterns are undergoing experimentation and starting to reach the market.

Other products on the market require the system to dial back a user at a predetermined telephone number as part of the verification process.

Outlook. The key limitation is the inability to ensure positive personal identification. While there has been considerable effort in recent years to develop identification systems based on matching of personal characteristics, these systems are still expensive and impractical to use in high-volume, time-constrained situations. In addition, there are fairly serious privacy implications in registering such personal information in systems of



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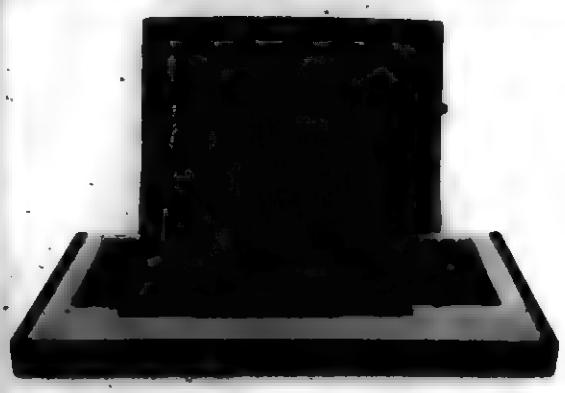

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The result? Vastly improved call coverage, better information flow, no unanswered phone calls, no missed messages, *no more pink slips.*

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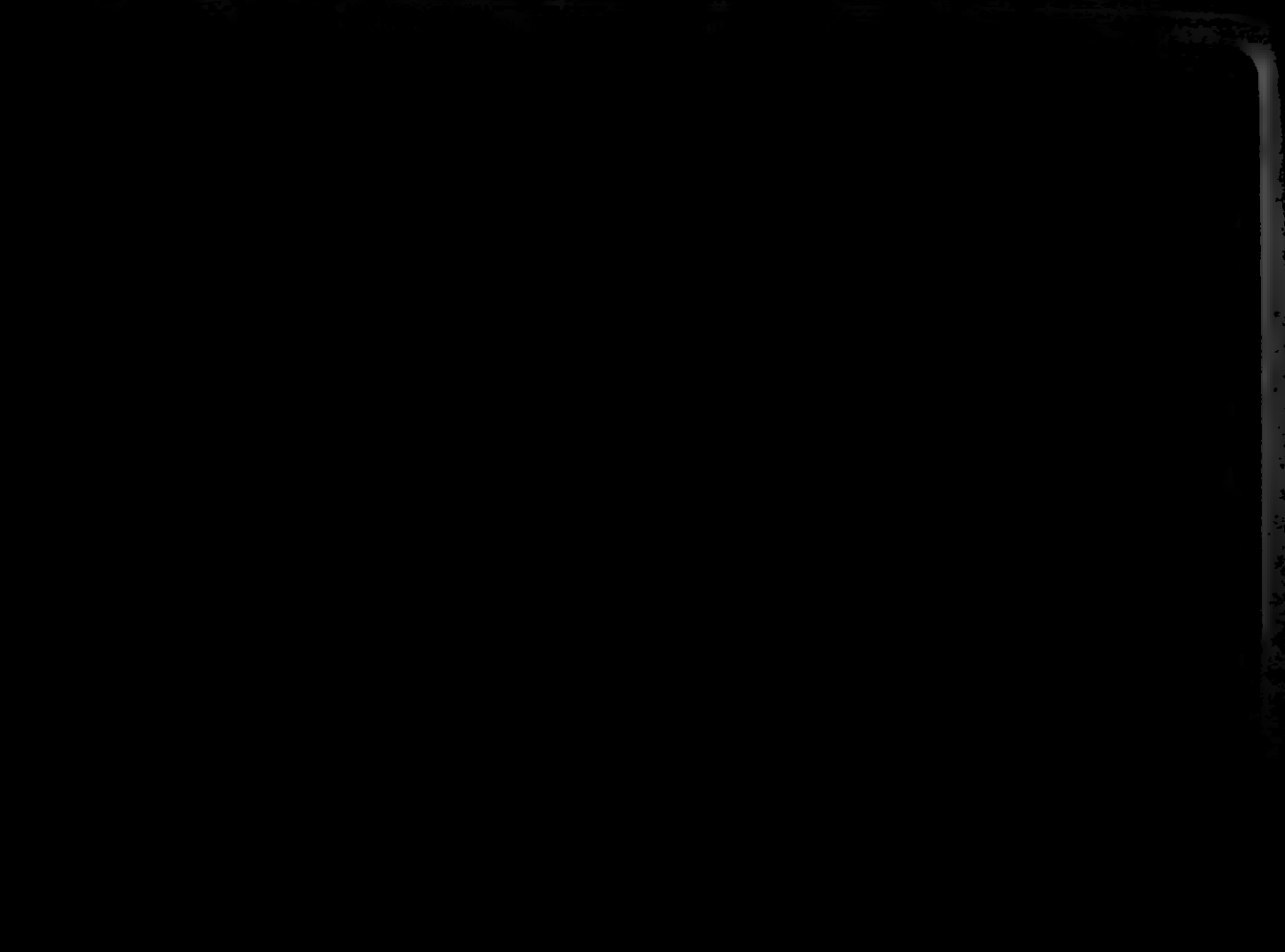

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possibly low security and integrity.

In the short to mid term, we can expect to see the use of "smart" cards and keys as an answer to current limitations in credit cards. These devices will have embedded microprocessors that can carry intelligence useful in the identification process. To assist further in overcoming the lack of positive personal identification, the identification and control process will be distributed. The individual, the identification mechanism possessed by the individual (the smart card or key), the terminal being used for the communication and the communication means itself will all play a role in the process.

In addition to individual identification mechanisms, smart cards and keys will link the user to a terminal. To facilitate this control process, more and more terminals may use embedded tamperproof chips that will transmit unique identifiers when queried.

2. Once accessing, persons/objects will be restricted to particular functions; separation of users can be reliably assured.

The need. Once access to the system has been granted, users will be subjected to positive control that will reasonably prevent unauthorized activities, thus effectively addressing the problem of authorized users exceeding their privileges. In addition, system "operators," ascribed a high degree of privilege, can be reasonably prevented from exceeding that authority. Users can be isolated from one another by system-logical controls. Programs can be prevented from leaking sensitive data to unauthorized users or programs.

Current capability. Today's architectures are based upon the commonly accepted practice of granting broad authority to large classes of users. Authorities for access to data bases and files are gradually becoming more granular, moving from file to record to data element. Within the current state of the art, this increased granularity of control exacts a proportionately more severe performance penalty. Most architectures are based on a two-domain operating mode — supervisory and user — which may be limited in ability to enforce the degree of security and control required in multiuser, resource-sharing networked environments.

Dynamic allocation and sharing of resources brings about timing and control problems that could result in implied or often inadvertent sharing of privileged data and resources. Confinement problems, wherein it is not possible to ensure that privileged data is not leaked to another user or resource, will cause increasingly severe problems in separating user and data.

Shortcomings in control and accountability in the activities of system operators and users in privileged mode have spawned a generation of highly specialized DP auditors dedicated to developing the mechanisms to audit privileged activities, detect abuse of privilege and enforce accountability.

Basic operating system functions are being distributed or reallocated to highly specialized processors designed to support preprocessing, communications or data base-intensive applications. These processors are also serving to distribute the control hierarchy of the overall system. Depending on the specifics of their interface, this approach can either strengthen or weaken security.

Another mechanism for confining or channeling users, thereby limiting their potential access to system resources, is that of menus and transaction systems. With menus, remote users are carefully guided step by step through the system to the resources and functions they are authorized to use.

Some limited capability to use encryption to ensure compartmentation of sensitive data within larger data bases is available, but this encryption has not enjoyed widespread acceptance because of lack of recognition of its need and also the potential complexity and increased overhead associated with its use.

Our ability to build high-integrity software and certify that it possesses the necessary security and control attributes is extremely limited. We not only cannot certify software, but we are just at the inner limits in such

LOCKING UP

technologies as quality assurance, testing, verification and validation.

Outlook. The eventual inability of system vendors to attest to the "degree" of security afforded by their systems will pose a long-term problem. An analogy lies in the experience of vendors of encryption devices, which have their basis in proprietary algorithms. These vendors' inability to reveal their algorithm and provide specific proof of its degree of resistance to attack helped promote development of the government's Data Encryption Standard (DES) and the metrics for validating its implementation.

With increasing emphasis on the liability aspect of systems and analysis of risk, more attention will be given to the development of metrics for evaluating the security attributes of specific system architectures.

One of the current major shortcomings in security technology is the inability formally to specify, validate, verify and certify sensitive software. Rather than build software with generalized capability, state-of-the-art security aspires to produce software that will do only what it is supposed to do and no more. The quest for certifiable software is hampered by the fact that few users today have the capability to provide reasonable statements of security requirements against which developers can act with confidence. Most system specifications contain few, if any, security-relevant items.

Despite this situation, considerable work has been performed over the past eight to 10 years in the development of formal system development tools. This formalism is based upon the preparation of a statement of security requirements, which are then subjected, for example, to extensive model analysis so as to produce a formal security policy model. The model is then subjected to extensive design proving techniques, leading to both top-level and second-level specifications, which are developed using formal specification languages such as Special, Injo or Gypsy.

The next step involves formal verification of the specifications, after which programs are generated and the code proven and verified using such tools as a code proof monitor and a programming language editor. Mathematical verification of lines of coding is the eventual goal of this effort.

These tools are evolving based on a principle of verification from level to level that specifications and codings are consistent with basic requirements. This process will map requirements from step to step on through code verification, formal proofs and eventual certification.

Currently, formal automated verification of the security attributes of sensitive software is limited to about 1,000 lines of code and is being focused on areas of security relevance. This reference monitor concept, in which all security-relevant functions are isolated in a kernel, which is then protected and verified, has been the area most researched.

Worthy of mention at this point are the activities of the DOD Computer Security Center, which has been chartered to promote the development of more trustworthy systems and to evaluate the suitability of systems to process sensitive defense information. The center has developed evaluation criteria for a Trusted Computing Base (TCB) which recognize four basic levels of security capability ranging from untrustworthy (thus in need of extensive physical and environmental protection) to trustworthy (capable of logical enforcement of all security requirements necessary to support processing of multiple levels of information sensitivity).

Within the TCB and its hierarchical levels (D-minimal protection; C-discretionary protection; B-mandatory protection; A-verified protection), few of today's systems provide A- or B-level protection. The DOD Computer Capital Center maintains and publishes an Evaluated Products List of selected industry- and government-developed trusted computer systems and computer products for government use.

The Computer Capital Center also issues periodic bulletins on the status of products currently under evaluation.

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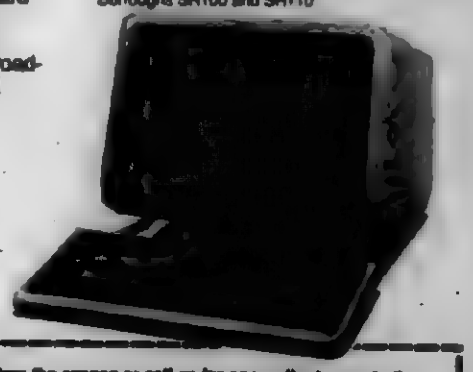
The Visual 383 is compatible with the Visual 420, Burroughs SR100 and SR110



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IN DEPTH

For the past 10 to 15 years, these defense security needs have been viewed by industry as unique to defense, with little or no commercial value. This perception has seriously hampered development of this technology. Experience is now showing that these capabilities are not unique but have general applicability to needs of the commercial environment.

Lacking the capability to develop this technology itself, Defense has had to operate its sensitive systems in isolation and with severe operational limitations. Lacking this technology, commercial systems will be operating under conditions of high vulnerability for an extensive period of time.

3. Violations of systems security can be detected (real-time or after-the-fact), documented and prosecuted.

The need. All attempts, successful or unsuccessful, to gain unauthorized access to the system and/or unauthorized use of specific facilities can be detected. The mechanisms for such detection must also be protected from unauthorized access and safeguarded in such a manner as to prevent manipulation. Such mechanisms must satisfy legal requirements for entry as evidence into a court of law.

Current capability. Most systems provide journals and logs that collect data about system performance. Software to manipulate this data and provide meaningful performance information to security personnel is less readily available. Software to flag violations, in real-time, is also not readily available. Most add-on security software packages provide only limited reporting capability, although this situation is improving.

DP auditors are developing methods for performing in-depth audits of operating system performance through manipulation of data collected in system journals and logs as well as through the use of selected system utilities.

Understanding of how to develop and implement specific controls in an application environment is limited. DP auditors have the best appreciation of application controls, but they usually prefer to maintain independence from the control specification process. There are no accepted and comparable skill fields (such as control specialist) in the data processing field, which is hindering development of application controls.

Outlook. As demand increases, audit software will evolve with more sophisticated capabilities. The "add-on" capability will be less desirable than that developed by the vendor as part of the operating system capability, although there may be problems with the acceptability of that information from an audit perspective. This perceived lack of integrity will eventually be overcome by designing journals and logs to be tamperproof and protected from unauthorized access.

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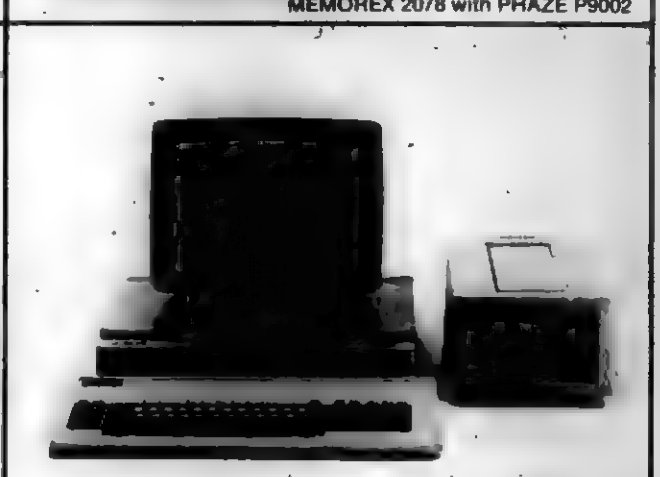

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in aircraft, they must be protected from unauthorized access in order to provide an unimpeachable source of performance data needed to document unauthorized access or use.

More trustworthy software, besides preventing unauthorized activities, will also be better able to detect and sound the alarm — in real-time, if necessary — in cases of suspected security violations. In the interim, we will probably see development of "security officer stations" that will facilitate both performance of security functions and monitoring of system activities.

Following are but a few of the functions likely to be integrated into such a station: a capability to assist in monitoring access control software; managing passwords, keywords, access numbers; reviewing states of authorization mechanisms; manipulating system journal/log data; determining status of highly sensitive files; developing and maintaining contingency plans; and performing risk analysis .

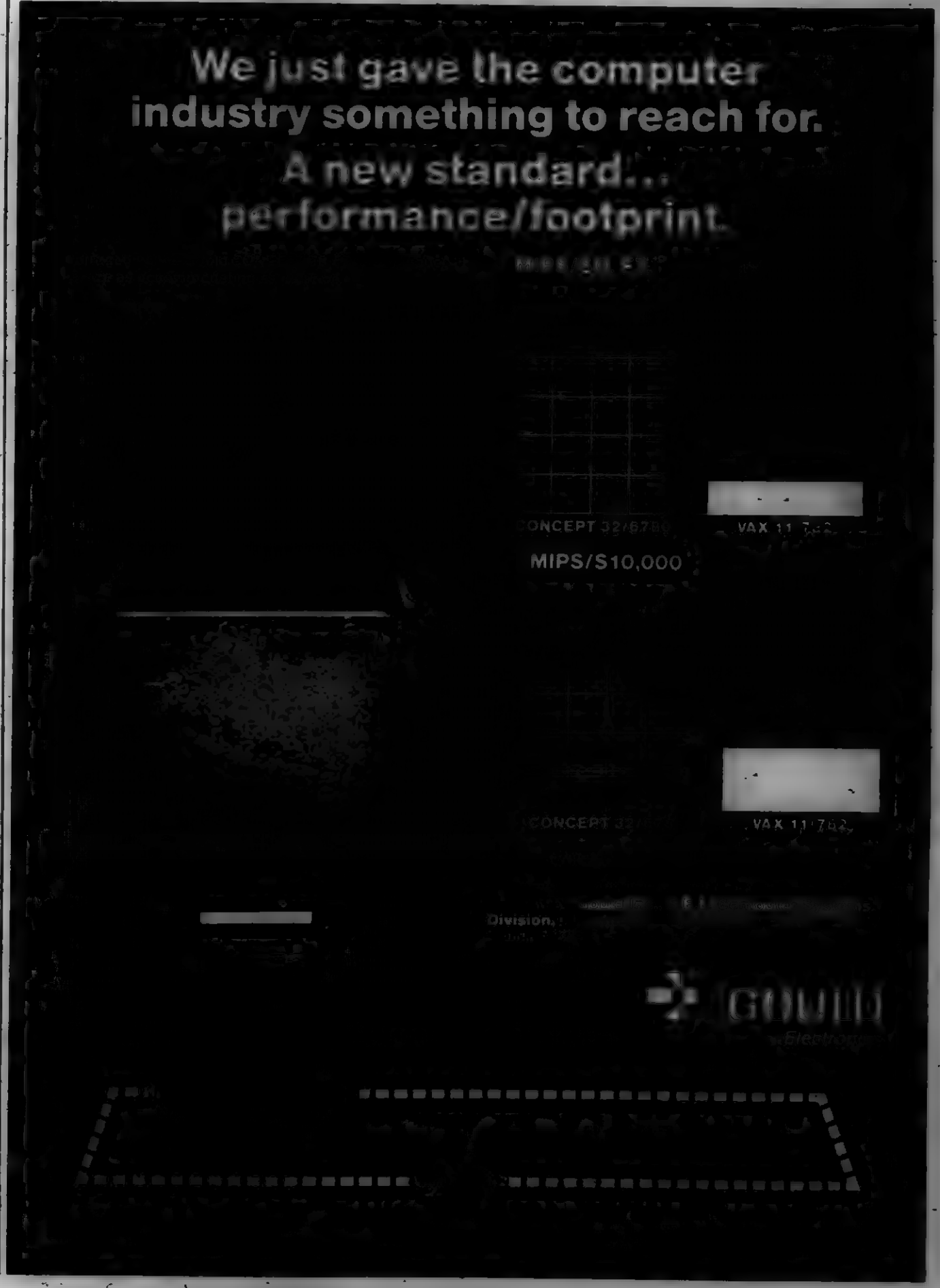
4. Messages between users and computers can be kept secret and protected against tampering, if necessary.

The need. Confidentiality and integrity of messages between individuals and/or systems can be assured. This security must be provided end to end, from originator to recipient, with verifiable proof that the confidentiality and integrity have not been breached.

Current capability. Products to protect the confidentiality of digital communications through encryption have been available for years, ranging in price from less than $1,000 to more than $10,000 per device. With promulgation in 1977 of its DES, the federal government attempted to provide an algorithm for encryption that would be open and public, verifiable and would promote interoperability/compatibility between devices. Despite initial criticism regarding its ability to withstand concentrated attack, the DES is gaining increasing acceptance.

The DES has been adopted for standard use by both the American National Standards Institute (Ansi) and the American Bankers Association (ABA). Recent comparisons have shown DES-based products to be significantly lower in price than non-DES, although market influences may not yet have come to bear on non-DES products. Ansi and ABA have further adopted the DES as the basis for their recently issued Financial Institution Message Authentication Standard, intended to ensure integrity of sensitive message traffic (such as wire transfers), where tampering, not confidentiality, is the primary concern.

The current generations of both encryption and authentication products are still considered to be too expensive (two devices are needed for each link) to apply to any but the most sensitive links. There are other problems, since these products are primarily suited for synchronous, link-to-link communications, whereas user needs are oriented to asynchronous, end-to-end



environments where continuous protection must be provided from originator to recipient.

These shortcomings also highlight the issues of interoperability and lack of compatibility between products, as well as problems of encryption key management (since both sender and receiver must have the same key) across a complex, multiuser, networked environment. The solution to key management problems has been thought to lie in evolution of a public key encryption system, wherein two keys — a public key (published and available for anyone to use to correspond secretly with the holder) and a secret key (held only by the recipient) — would facilitate communications between two parties. Once encrypted in the public key, the message could only be decrypted by the holder of the secret key.

Unfortunately, a leading public key encryption scheme was recently "broken," and the controversy surrounding it has inhibited — at least temporarily — its widespread use.

Outlook. This area is evolving faster than any of the other major areas of need. As users develop more accurate statements of need, the market will respond with more suitable products.

Over the next one to three years, we will see the next generation of encryption/authentication products. These products will be oriented to dial-up access to asynchronous, public and value-added networks. There will still be serious interoperability and key management limitations. Prices will drop significantly below $1,000 per unit.

Some of these early products will also offer enhanced individual and/or terminal identification capability through the use of smart cards or keys. Authentication capabilities will still be oriented toward the needs of the banking industry (primarily wholesale banking), but other limited nonbanking message authentication capabilities will begin to evolve.

In the three- to five-year period, a second generation of encryption/authentication products will come on the market. The products will emphasize standardization, interoperability and key management in their architectures. Costs for individual devices will drop to less than $500 for a basic capability. Their application will reflect more of a "system" approach, looking to end-to-end needs. Upgradability from the previous generation of capabilities will be an issue.

An unknown quantity in this area will be the role of public key encryption systems. While it is likely that such systems will come on the market, their use may be limited until their qualities can be certified, either through experience or development of a testing metric.

5. Both hardware and software can be made tamperproof.

The need. Hardware and software can be developed in such a way that their design can be certified and protected against unauthorized change. Any unauthorized

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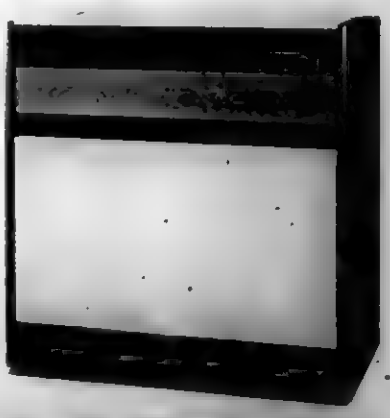

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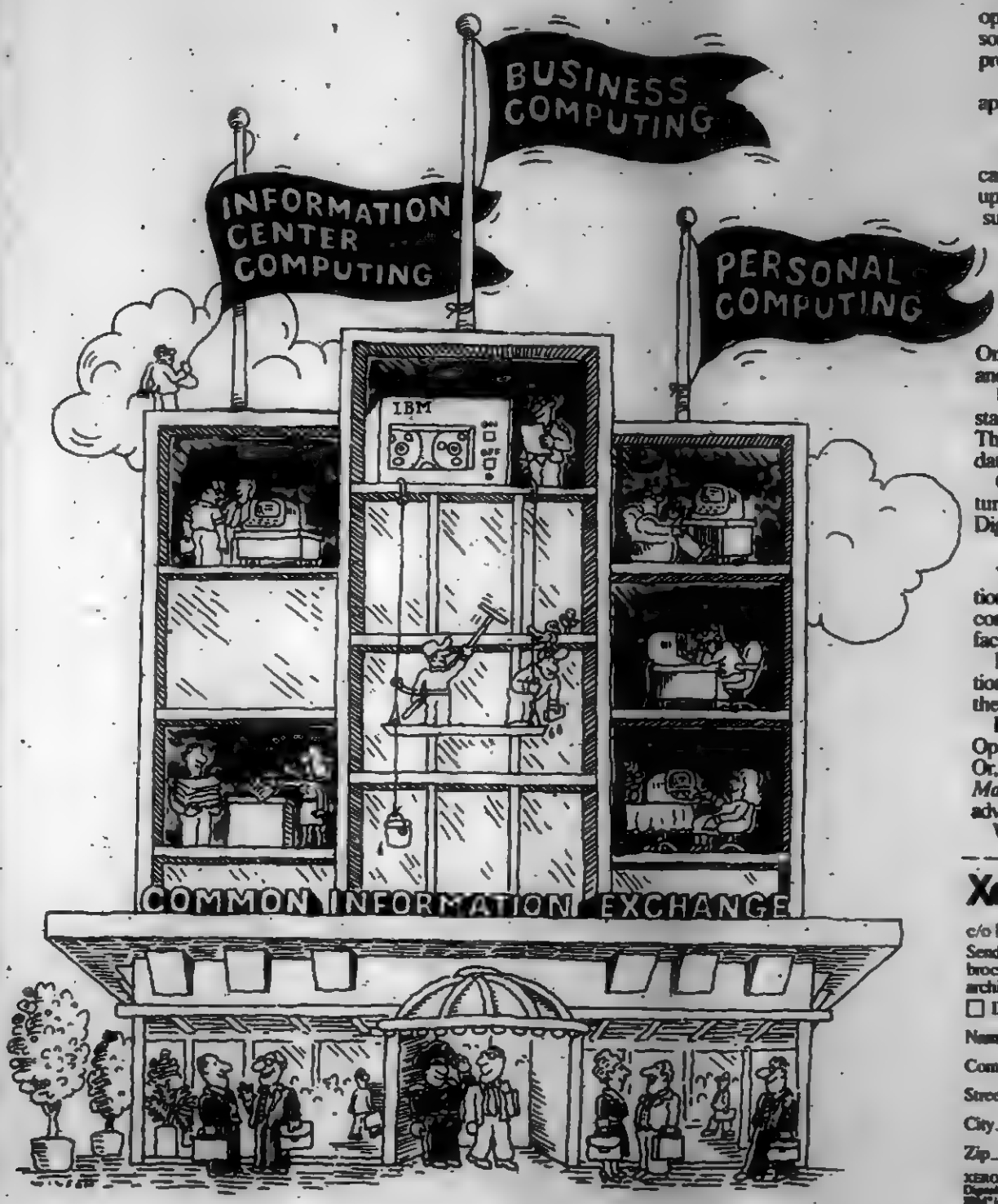

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change to certified hardware or software will be easily detectable.

Current capability. Because of the physical state of hardware, control in its development and manufacturing is somewhat more advanced than that in software. Computer-assisted design and manufacturing techniques, combined with statistical and electronic verification, allow a much higher degree of confidence to be assigned to the resultant product.

Protection against unauthorized change is less well advanced and generally attained through use of locked or sealed cabinets. Once access has been gained to a sealed cabinet for the purpose of maintaining or changing components, the cabinet is usually resealed and verified. Where high equipment integrity is demanded, such as in the computers supporting the space shuttle system, this type of physical protection is used. Equipment integrity precautions of this nature are intended to guard against deliberate or inadvertent changes to the equipment.

On the software side, the current state of the art generally lies in the use of libraries for cataloging operational programs and restricting privileged access to the software through administrative controls and passwords. Some verification of cataloged software to detect unauthorized change can be performed using specialized code comparators (generally not those provided as operating system utilities). These, however, remain basically primitive.

Software integrity solutions are also found, to a certain extent, in the use of read-only memory (ROM), programmable read-only memory (Prom) and erasable programmable read-only memory (Eprom), which can provide some solution to the problem of code alteration, but not necessarily against the substitution problem. Firmware is more expensive than software to produce, but it offers better protection against tampering — particularly if it cannot be reprogrammed or otherwise changed.

Another variant of the tamperproof requirement concerns interference with the processing through spurious radiation, electronic corruption or even intentional jamming. While not tampering in the sense being discussed here, this type of outside interference could result in loss of processing integrity. Since this is more a reliability problem, it will be discussed as a reliability requirement.

Outlook. Hardware integrity and assurances against tampering remain uncertain at this time. This issue is currently not a large security concern and will probably be one of the last frontiers to be addressed. Eventually, however, the electronic characteristics or "signature" of a hardware configuration will likely be measurable and material deviations from these parameters detectable, thereby signaling possible tampering.

Verifiable subcomponents or limited electronic verification of key components and greater use of firmware will likely precede this development. In the meantime, physically secured cabinets will suffice until software integrity issues are addressed and the physical component — hardware — becomes an unacceptably weak link.

Greater use of ROM, Prom and Eprom for highly sensitive or critical functions of limited scope will be a more frequent, but nevertheless interim, safeguard against tampering. It is more likely, however, that attention will first go to software protection. These protections will be implemented through such means as encryption of the program until it is invoked or through an authenticator, similar to a "checksum," which will be derived based upon the characteristics of the program. Unauthorized changes to the software will then also change the computed authenticator, thereby immediately revealing the loss of integrity. Under these circumstances, controls over the change process would be mandatory. These same mechanisms apply to protection of data bases in which encryption or authentication is used to "seal" all or portions of the data base when not being actively processed.

Here the fine line between the access and authorization control issues (specifications one and two above)

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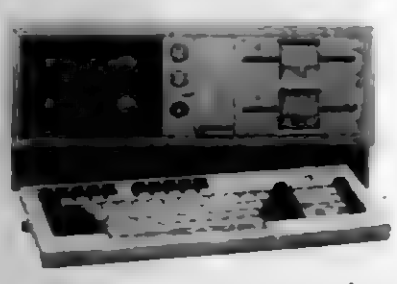

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grows thin. The ability to ensure this integrity during processing will be difficult and become increasingly so as more extensive use is made of adaptive programs, reentrant code and artificial intelligence techniques. Dynamic allocation of application resources will make this verification of integrity more difficult.

Software development, verification and validation and certification technologies are less well developed. Formal development methodologies and tools are evolving at a relatively slow pace, as we move from free-form environments to those using these formal development methodologies and highly structured design approaches. Some progress is being made in the federal government to apply formal or hierarchical methodologies and formal proof mechanisms to the development of more secure systems, but these are currently effectively limited to a few thousand lines of code.

Certification of software is not yet practical in today's environment. While we are developing more effective tools for use in software verification and validation, the much more stringent and rigorous certification process is further ahead. Verification and validation, through the use of software analyzers, code comparators and formal testing techniques, are moving the technology incrementally toward eventual certification.

6. Systems can be designed with high reliability and survivability.

The need. Critical systems, their supporting components and key facilities shall be designed so that supported organizations and users will not feel serious effects when the systems are unavailable.

Current capability. Increasing attention to reliability needs over the years has resulted in significant enhancements in our ability to provide uninterrupted computing power. Fault-tolerance objectives have focused primarily upon hardware and the likelihood of component/intercomponent failure. "Mean time between failure" (MTBF) and "mean time to repair" (MTTR) are terms used to describe the measures of fault tolerance in system components. As dependence on computers has increased, so have demands for fault-tolerant systems.

Fault tolerance has been steadily raised first through engineering of individual components for greater reliability and then through the provision of redundancy for highly critical elements. Reliability demands are spawning specialized product lines featuring "fail-safe" or "non-stop" system processing capabilities. These are provided through redundancy in hardware, software and data base, using techniques such as "shadow" or "mirrored" processing and filing.

In the applications software area, more extensive use of checkpoint/restart/recovery techniques in critical applications provides increased reliability. Specific critical components (for example, volatile memory) are being provided with limited backup capability (motor generators, uninterruptible power supplies) so as to continue or preserve already processed data or provide graceful component degradation.

Organizations will increasingly find that limited short-term backup and recovery planning alternatives will highlight longer term system and network survivability issues, which must be resolved through strategic planning.

Another reliability factor over which there is increasing concern relates to the impact of microminiaturization of components and the requirements for more protection from electromagnetic interference (EMI) or pulses (EMP). While traditionally considered to pertain only to military applications that need to survive in electronic warfare environments, EMI- and EMP-related problems may

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Kansas	Wichita	October 12	California	San Jose	November 8
Michigan	Grand Rapids	October 12	Colorado	Denver	November 9
New York	New York	October 12	Massachusetts	Boston	November 9
Texas	Houston	October 12	North Carolina	Raleigh	November 9
Missouri	Kansas City	October 13	Rhode Island	Providence	November 10
Wisconsin	Madison	October 20	Virginia	Richmond	November 15
Maryland	Baltimore	October 25	Massachusetts	Worcester	November 22
Wisconsin	Milwaukee	October 25			
South Carolina	Columbia	October 26	Canada	Edmonton, Alberta	October 27
Texas	San Antonio	October 26	Puerto Rico	San Juan	November 3
Florida	Jacksonville	November 1			

IN DEPTH

be coming into the commercial environment. There seems to be a relationship between the lower power/pulse requirements of microminiaturized components and the increasingly intense electromagnetic environment. While less power is needed for miniaturized processors, that power must be of a higher quality.

There is mounting evidence of potential problems with both power and spurious radiation in the newest generation of commercial air transports. Aviation technology is rapidly turning more and more aircraft control functions over to computers as pilots fly aircraft not through direct manual or even hydraulic controls, but through the computers. This "fly-by-wire" mode places exceptional reliance upon the computer. Various unexplained computer malfunctions, loss of data and function, as well as losses of power, signal a need for caution in this area. The use of powerful portable computers onboard commercial aircraft is slowly being banned as concern over these unexplained phenomena grows.

Beyond the reliability issue is that of survivability.

Component and system redundancies do not guard against catastrophic failure or unacceptable delays in processing. These require sufficient facility redundancy to support critical processing and can be accomplished through such means as dual processing facilities, load-leveling or dynamic allocation of processing across multiple facilities, or operational standby facilities.

Extensive networking and telecommunications has developed haphazardly so far, with the trend toward integration of communications facilities lending, at least temporarily, to the increased vulnerability. Except for backup for specific links (dial backup), most internal telecommunications networks lack survivability through alternate routing. Systems using extensive telecommunications support generally have not evolved with system backup capabilities.

Outlook. Because of various pressures (regulatory, legal and operational), most organizations will have to develop some type of disaster recovery capability within the next three to five years.

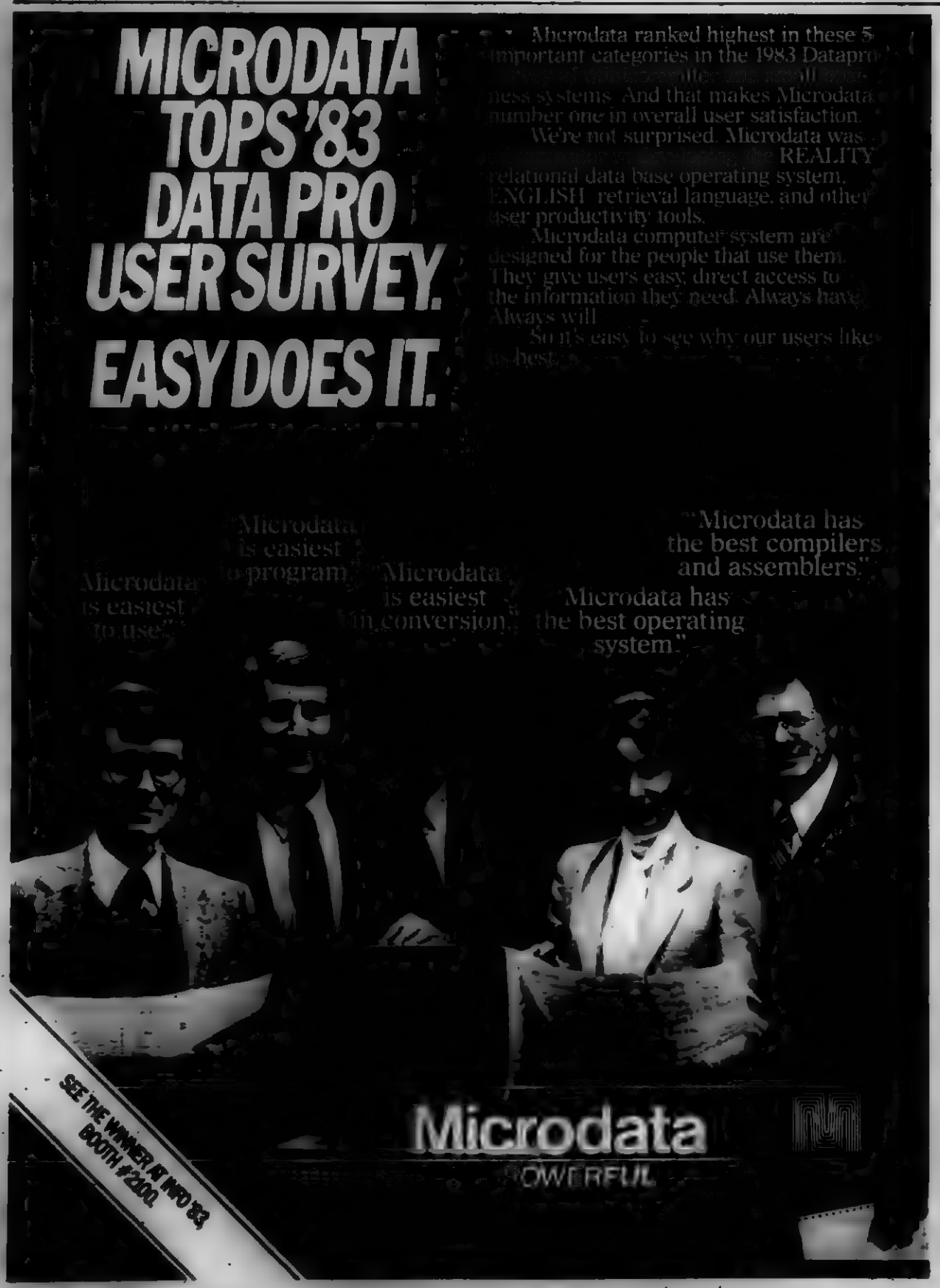
For organizations with large, integrated computing systems, this process itself will take three to five years to accomplish as major problems, issues and complex planning tasks are resolved.

Organizations will increasingly find that limited short-term backup and recovery planning alternatives will highlight longer term system and network survivability issues, which must be resolved through strategic planning.

A veritable explosion in communications technology over the next five to eight years will offer many alternative communications options, thus focusing upon systems backup needs. Extensive applications systems redesign will be required in order to implement such techniques as distributed processing, load leveling and broader "mirroring" or "shadowing" across multiple, physically dislocated processes.

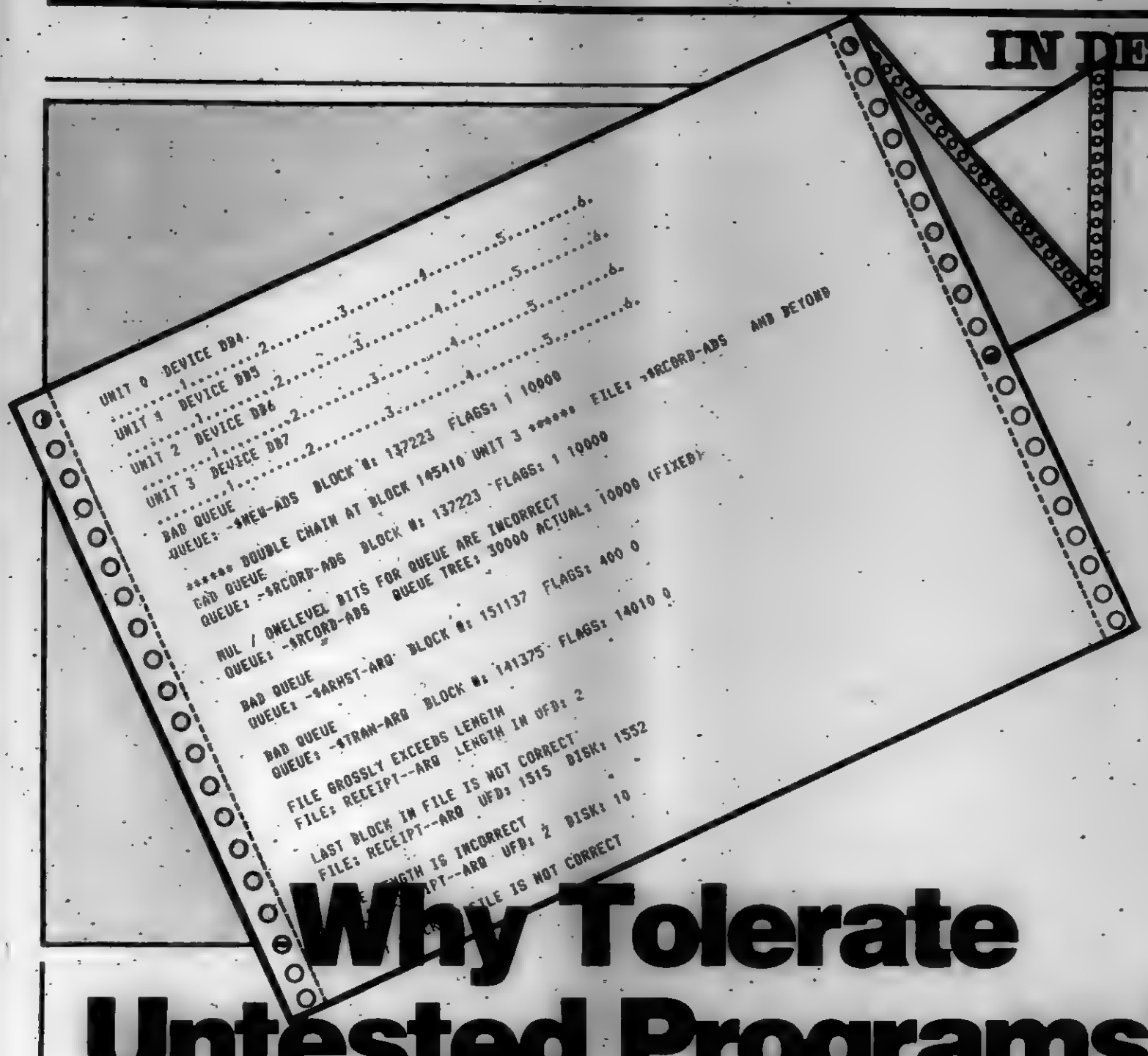
The EMI/EMP problem will become more challenging as the ambient level of electronic clutter increases, largely because of the explosion in the use of microprocessor-based technology. Attention to component isolation and shielding needs will receive more design emphasis.

In this first installment, we have looked at the current state of computer security technology, presented a capabilities-based statement of need and assessed where we are in relation to those needs. In the next installment, we will delve into the prospects for the future, how long it will take this secure technology to become available, what forces and influences will bring it about and, finally, what can be done — what you can do — to help bring it about.



About the Author

Robert Campbell is president of Advanced Information Management, Inc., a Woodbridge, Va., consulting firm specializing in computer and telecommunications security, privacy and audit. He has more than 20 years' experience in data processing, security and audit in both government and industry.



Why Tolerate Untested Programs?

By James H. Bradley

Half of all software development costs (or one-fourth of life-cycle costs) are spent on testing software after it is coded. Nevertheless, internal and external clients all too often take delivery of a seriously flawed product.

Cost-effective testing begins at the first moment of conception, continues throughout the life cycle and influences every tool of analysis, design, implementation and maintenance. The doctrine that "All testing is in the reverse sequence of specification" produces only disasters, such as the air traffic control system.

Top-down methods can be perverted into a separation of authority from responsibility. A lack of thorough, objective walk-throughs or political manipulation of walk-throughs is a reliable early sign of disaster, for the testing process has already gone awry. When the analysis is called complete, ask to see the test report.

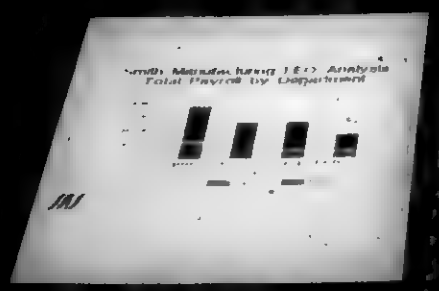
The resulting costs of software errors can be reduced by systematic, scientific, nondogmatic use of modern tools accompanied by management practices designed to account costs to their true causes and to provide working conditions free from noise and distractions. Never buy a piece of code built on a Monday.

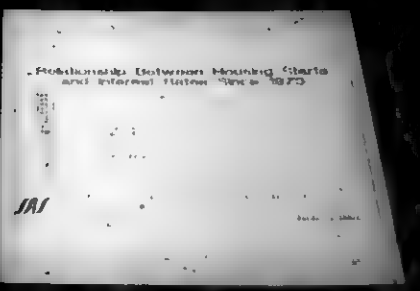
Professionally used, traditional structured analysis and system specification are valuable because one can simulate some key elements largely on paper or as prototype versions on a machine. In the hands of unqualified people, such powerful tools produce great disasters.

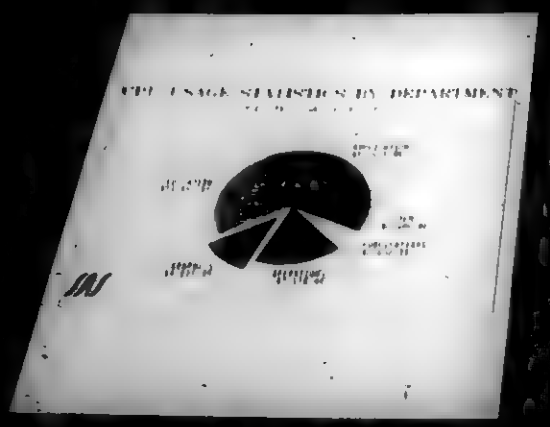
There can never be any universal rules or methods for software; methods are guidelines, not gods. Structured analysis is often supplemented by structured design, which is still influenced by the artifical tree structure of the flow of control enforced by current commercial compiler systems. However, code can be designed and implemented for systematic, perpetual ease of testing via a few simple software tools that require no special job control language, no special compilation or link loading, no tripling of execution time and memory and little special documentation.

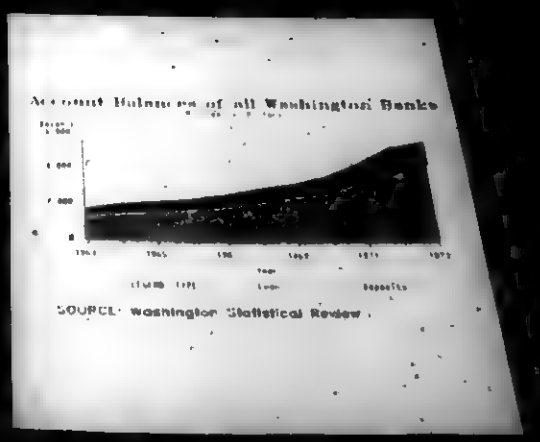
Under these conditions, debugging for localized, individually identifiable bugs becomes a systematic procedure. Obviously, some bugs are neither local nor clearly identifiable; it is a simple truth in much of mathematics, engineering and science that given an algorithm, one can immediately provide a practical case in which it fails.

The basic tools of structured





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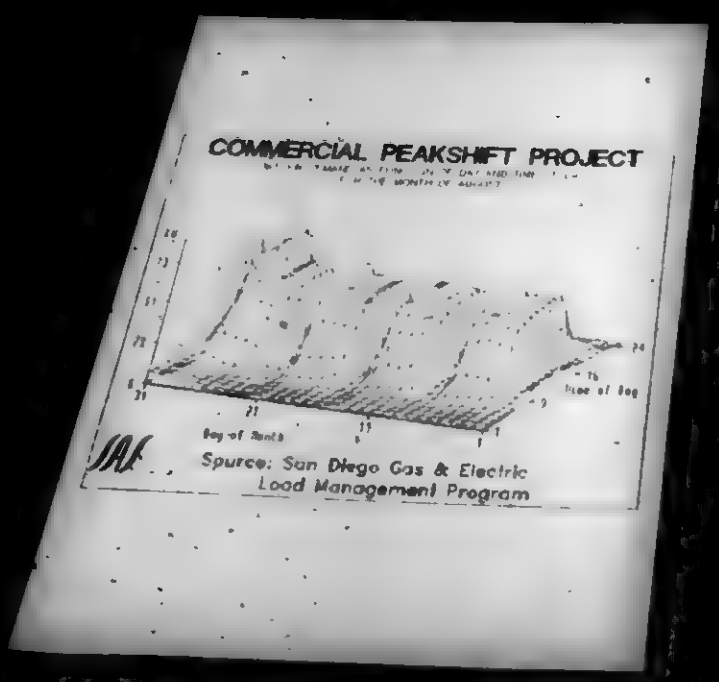
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IN DEPTH

analysis and system specification include the graphical tools of data flow diagrams (or engineering equivalents) for data in motion, entity-relationship diagrams to describe the logical roles of data at rest and state transition diagrams to describe the logical modes of operation. For each (possibly generic) data flow, process, entity, relationship, state and state transition there is basically a corresponding textual definition (which can be tabular or a Boolean diagram, in certain cases).

In addition, certain classes of entity or process may be systematically omitted for clear simplicity, as though in a view, projection or selection. For example, a plant monitoring system may be omitted or shown by some conventional symbol or the availability of Help menus may be left out by convention among the analysts and users.

Further, conditional diagrams often depict only one (or a few) mode(s) of operation. Precedence/antecedence diagrams (Perts) are used for partially ordered steps. The aim is unambiguity, ease of human comprehension and debugging by means of paper simulations. Beware of novices who seek to replace three pages of simple engineering diagrams and documentation with 10,000 pages of data flow dictionaries and repetitious mini-specifications.

Structured methods are also beneficial in reducing the high rate at which software wears out beyond repair.

Some companies in engineering simulation cut the costs of testing, documentation and maintenance through software tools of widely varying competence. These include:

- A computer data base (from a rigid report generator such as the Sperry Corp. Mapper to a fully relational system) for variable names, synonyms, descriptions, definitions and memory locations in global storage blocks.
- A preprocessor for code to insert documentation of inputs and outputs, build functionally equivalent definitions of each global storage block and replace synonyms in the code.
- One or more interactive scanning and/or assignment tools, basically to read and/or write any variable by its symbolic name with no perceptible disturbance to normal execution (under tight security if necessary; it is a DP auditor's nightmare).
- An event manager or simulation executive architecture to handle queues, flags, semaphores, cyclic execution, panel triggers, internal triggers and the distribution of events to interested parties.
- Basically one execution counter per module, monitorable by the scanning tool.
- Basically one execution flag per module to enable/inhibit execution.
- Basically one normal/stub flag per module to select normal vs. simple stub code.
- Basically having each module write all its outputs into one (or two) dedicated global storage block(s). Conversely, each storage block is written by only one module.
- Naming conventions so that each compiler name shows the software subsystem that computes that variable.
- Basically a unique source for each variable, except for some semaphores, tables of attributes and other special cases. This principle is not necessarily valid in compilers and operating systems.
- A careful integration plan resembling the Yourdon, Inc. doctrine of "usable versions," but also allowing separate tests of subsystems and of partially integrated systems even when the top-level discrete control is not yet operational.
- Flags to allow testing of first- and second-level backup code or other spare parts for software.
- Flags for a selective execution trace and/or selective dump of data.

In addition, many current operating systems and compilers provide facilities to test loop limits, test subscript ranges, trace execution, selectively dump, inhibit transfers and insert pauses. Special JCL, compilation, link loading, memory requirements and file linkage cost money; the error rate in failure to remove obsolete diagnostics is not negligible, and if the apparatus is ever needed again, it

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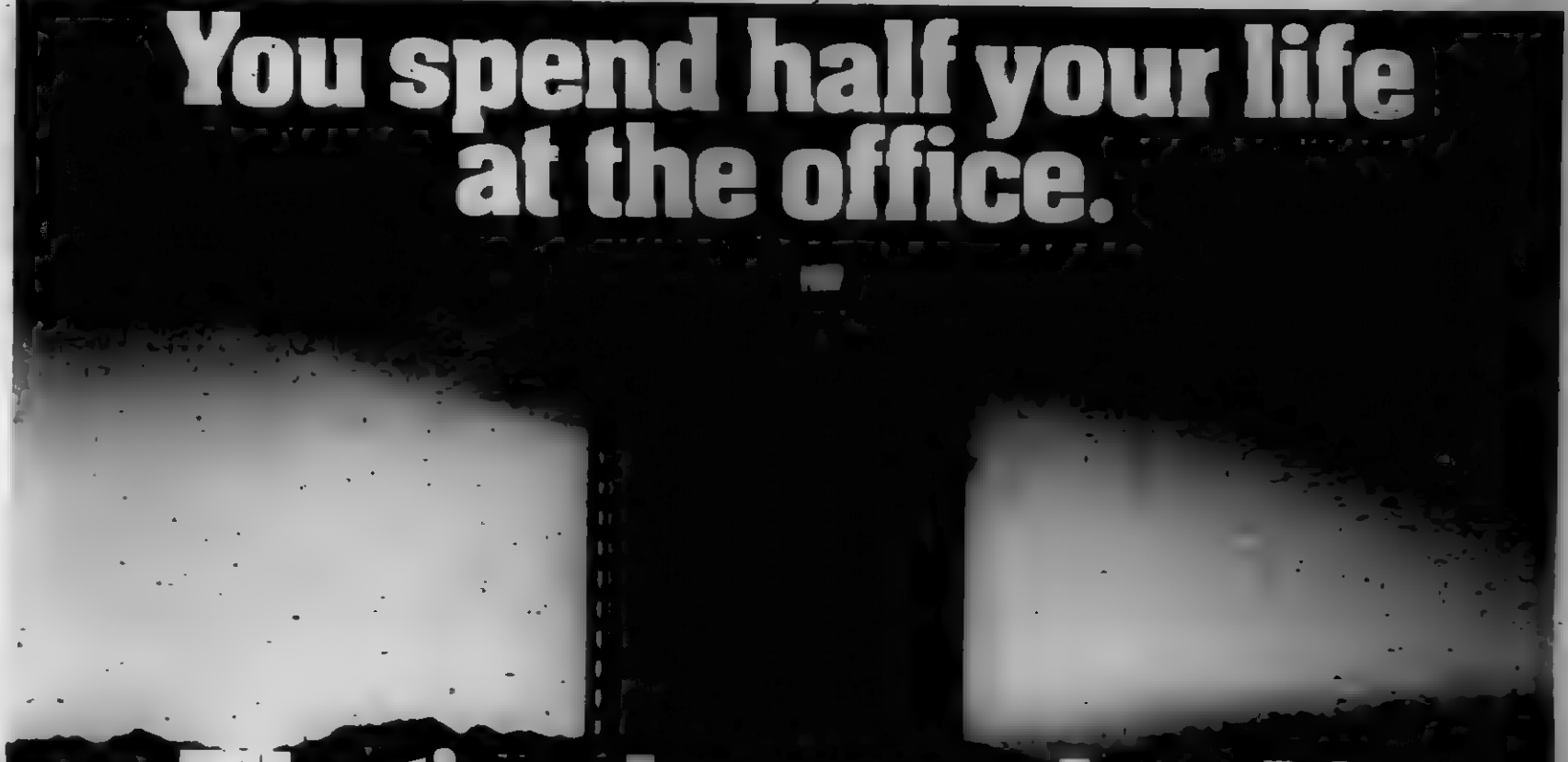

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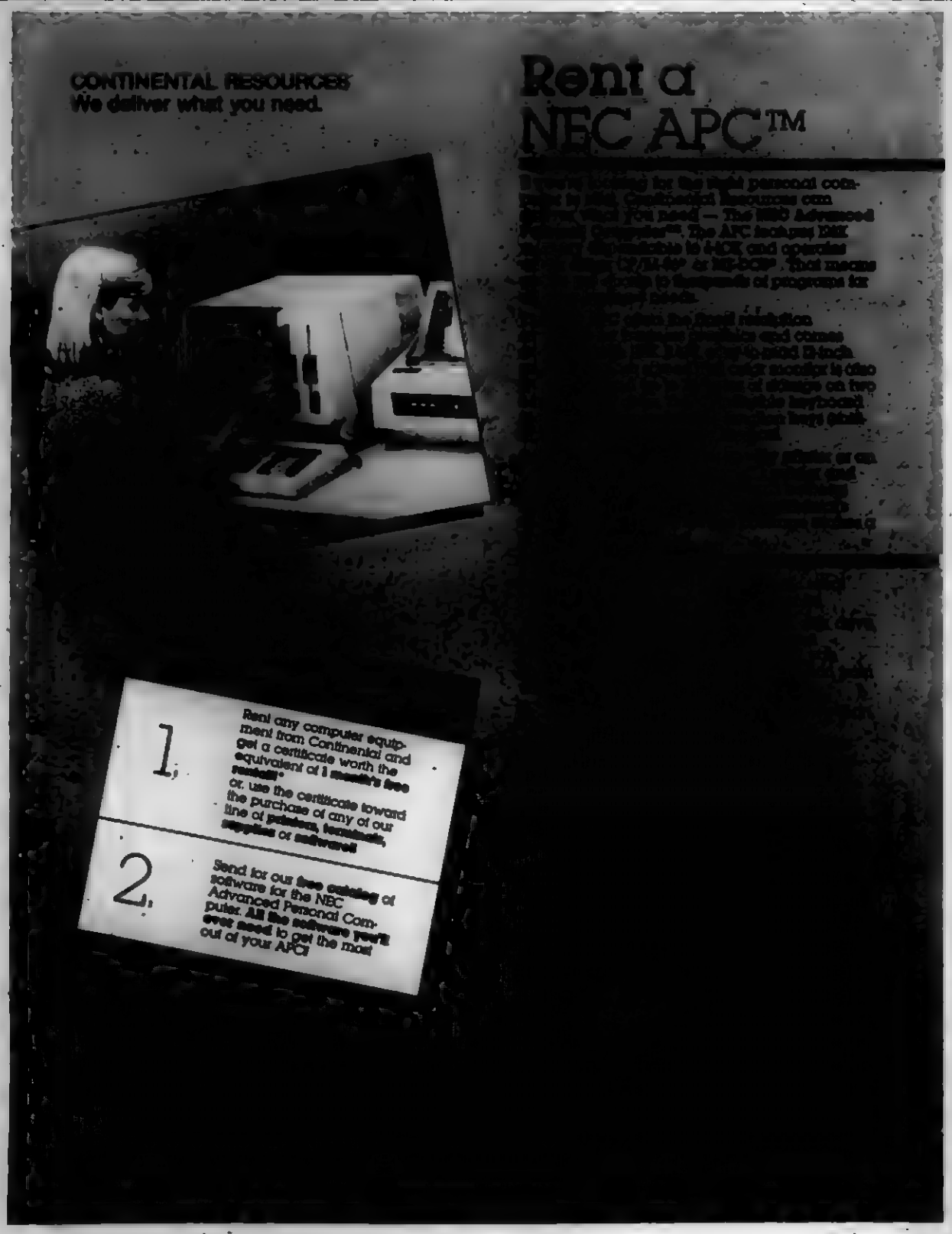
has to be put back by hand (some systems allow conditional JCL and/or compilation).

Most current operating systems and some compilers have one or more commands such as INCLUDE (file name), so that one file of code and/or commentary can be part of several modules and/or specifications and/or manuals. In some systems, graphics can be printed along with text.

To my knowledge, software is the only risk for which monetary insurance cannot be purchased today. Ask vendors to quote separately for such insurance. Seek quotations on the open market. Insist that the future suppliers of software insurance break down their charges according to vendors and products. Even private aviation and mountain sports qualify for insurance coverage at a price. Computer hardware is insurable.

Do everything managerially possible to charge back the true cost of bugs to their originators. Give top-level management an accurate view of the costs of each defective piece of software. Which vendors offer adequate cost-recovery warranties on their software? Which vendors state mean time between failures and mean time to repair? Which vendors leave previous releases available? Which vendors demand enormous, unascertainable detail of each failure in their unmodular systems?



Which vendors use good techniques of information hiding or information insulation? Which vendors allow users to generate selective trace, dumps and other execution-time diagnostics? Which vendors provide prompt, accurate, informative bulletins of known bugs or limitations? Do you have sensible, contractual acceptance tests? Do you have penalty clauses and premium clauses based on performance?

Sir Isaac Newton (of apple fame) first showed that spare parts must be built into reliable software and shipped with the original product. He was concerned not only with failures of his pencil-and-paper processor, but also with erroneous algorithms, unforeseen special cases and fundamental problems of accuracy, computability, computational complexity, forward error recovery and other such phenomena which are steadily growing in economic importance to data processing.

Basically, reputable software has from 0% to 5% of the executed code merely checking for things that should never happen, such as the acceptability of inputs and the consistency of outputs (audits or controls, in the terminology of Al Brill's new *Building Controls Into Structured Systems*).

Good methods can be found in a multitude of ancient textbooks on manual data processing and on work with mechanical desk calculators. On the other hand, genuine spare parts for software are executed only when some bug or problem is detected in the normal code. Often, previous releases of the same software are used as first and second backup spare parts; thus, the additional development cost of reliable software varies from a few percent in compilers and elementary data processing to 500% in the subtlest mathematical tasks. The additional costs in memory for code range from nothing to 10%, depending upon the application; the average is probably around 2%.

The spare parts in reliable software are testable only by means of special bypass flags, unless the normal code is indeed inadequate. Thus, the doctrines of 100% testing or of executing every line of code, propounded by some consultants, refer only to *unreliable* code. On the other hand, pay a rational price for the insurance of reliable software; ignore snake-oil merchants who say that you *could* be struck by a meteor.

Since the 1950s, fault-tolerant, reliable software with spare parts has been used by Bell Laboratories (in the electronic switching systems), the University of Newcastle-on-Tyne and the Michigan Terminal System, among others. Forward error recovery (discard unresolvable problems to a maintenance file, as in telephone switching) and backward error recovery (go back and try again, possibly with a spare parts algorithm) are treated in many textbooks. Several good papers are in *Current Trends in*

Programming Methodology (R.T. Yeh, editor, Prentice-Hall, 1977, four volumes).

Predictable Results?

There is a myth that all test results are predictable and are based on the analysis and specification. Consider, however, the Eight-Queens Problem; to place eight queens (or n queens) on an 8-by-8 chessboard so that no two are on the same row, column or diagonal. There are 92 solutions and 16.8 million nonsolutions, a few of which are related to special cases of the Seven-Queens or Nine-Queens Problem (354 solutions and 387 million nonsolutions).

Testing is based on facts that *cannot be exploited* in the analysis, design or implementation; any rotation or flip of the board produces another solution. The work to predict all the test results by hand is unthinkable. The N-Queens Problem is merely a simple teaching prototype of tasks in scheduling and switching.

Almost all scheduling tasks (operating systems, elevators, sales staff, truck packing, telephone routing, disk seeking) are of the intractable class called "nonpolynomial complete."

The algorithms used are heuristic; whereas they work well on the average, some of them can produce disastrous results in rare cases that nobody can predict, explain or cure. Obviously an unfeasible schedule is unacceptable, and an elevator that goes to the wrong floor is not working. Yet normally nobody can predict the test results for timing, sequence, average efficiency or worst-case performance of scheduling algorithms.

Accounting and many branches of engineering use tests of invariants — quantities that should not change — such as assets minus net inflows. Some such fiscal controls may be permanently embedded in the code, but others are used only for testing, depending on the cost. Sorting algorithms and some branches of statistics test by means of consistency, but the details are not predictable.

Nuclear reactor calculations and many other branches of chemistry and physics use tests for self-consistency almost exclusively. Local error estimates are routine in economic models and other tasks in ordinary differential equations. An engineering package once caused a building to have only half the necessary number of steel beams; a simple test by back-substitution would have revealed the bug (is the purported solution of the equations really a solution?).

One hundred percent prediction of test results is hardly ever economical even in the rare cases when it is feasible. The actual testing of software, even in elementary data processing, has been grievously degraded by the false doctrine of 100% predictable test results. Of course, the test results should not be totally unpredictable either.

Do everything managerially possible to charge back the true cost of bugs to their originators. Give top-level management an accurate view of the costs of each defective piece of software.

Basic treatments of systematic testing are given in various publications and classes, in the well-known text *The Art of Software Testing* (by G.J. Myers, Wiley, 1979) and in *Software System Testing and Quality Assurance* (by B. Beizer, Van Nostrand, 1983). These include path tests (of every line of code), condition coverage, the prohibitive (and unfeasible in reliable code) decision/condition and multiple-condition coverages, equivalence classes (cases that should be handled similarly), boundary value tests (separations between equivalence classes), loops with bypass/1 pass/2 passes/typical/maximum/maximum - 1/maximum + 1, stress

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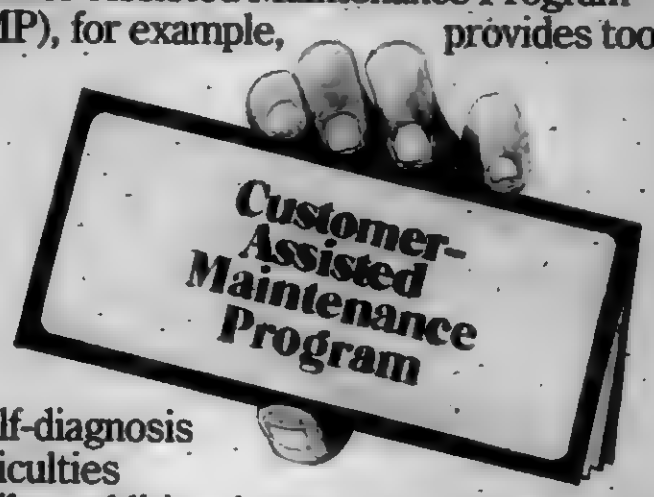

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tests (high system loads), bad inputs, excess inputs, too few inputs, null inputs, mixed-up delimiters, wrong sequences of inputs and so on.

Design strategies to facilitate testing are usually classified as top-down (build the boss on the artificial structure chart first), bottom-up (build from the bottom with drivers) or sandwich (build from top and bottom and hope to meet in the middle).

A variant on top-down methods is the doctrine of usable versions, in which the user sees some workable functions very early, and stubs are progressively replaced. However, we can now modify the method of usable versions by judicious use of an antisandwich method, in which one starts in the middle and builds both up and down, producing workable functions as early as possible.

For example, one could test a deposit to a checking account at the same time as tests of the grant of a swing loan, even though the boss transaction center (to sort out classes of transaction) was just a skeleton driver module. Analogously, many subordinate functions can produce usable output even though the central transform of a discrete sequential controller (for example, a turbine runup/runback controller) does not yet exist.

Many functions of an autopilot can be tested without the global guidance along a sequence of preprogrammed checkpoints constituting a flight of 10,000 kilometers.

In short, design strategies for ease of testing are now to be regarded as only locally top-down or locally bottom-up, including up-then-down or inverted horseshoe paths and down-then-up paths for utility modules.

The antisandwich method makes substantial use of state transition logic. Especially if one has a reasonable system of execution flags and an interactive scanning/assignment tool (to reduce the use of stubs and drivers), tests of the state transition logic can often be made in parallel with other tests. In fact, reasonable tools allow a high degree of parallelism in the testing of modules that do not interact directly. The method of decouplable merger, discussed below, provides even more flexibility.

Another point about testing is that Myers' concept of equivalence classes is neither rigorous nor exhaustive. For example, trigonometric functions of an angle or interest on a bank account (presumably calculated by logarithms and antilogarithms) should vary smoothly. Testing should look for unintended jumps and unsmooth slopes within supposed equivalence classes, in conjunction with provable properties that were not used in the implementation, such as the identity: $\sin(A + B) = \sin A \cos B + \cos A \sin B$.

Many codes in statistics, ordinary differential equations and graphics (among others) compute the boundary values between equivalence classes; thus the tester cannot, for practical purposes, know in advance where the boundaries are. Good, powerful, general-purpose packages should not be prohibited simply because subtlety is needed to test them effectively.

Now one can bring together the tools and methods mentioned throughout this article, plus a few more, into the method of design for perpetual testability. Most of these tools exist in some environments, but beware of claims that they are off-the-shelf products. Perpetually testable code is usually organized in several classes of execution under one or more executives. The executive does little except call other modules on the basis of their execution flags while acting as an event manager to distribute interesting events. The execution of each module (subject to its main flag) may be:

1. Cyclic, at several different but simply related frequencies.
2. Externally triggered, internally triggered or both (event-oriented).
3. Piecewise cyclic for models which, once started, must run until an event stops them.
4. Interrupt-driven.
5. Self-retriggered; but replicate code is usually better.
6. Directly invoked by other code, usually in a table-driven mode.
7. Queued.
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9. Various combinations, adaptations, wrinkles and bypasses on the above classes.

Basically each module has one execution counter, one flag for normal- vs.-stub functions, possibly some flags for input/output trace and dumps and one dedicated global storage area or two for all its outputs and internal memories. Each variable has one source, except for flags, semaphores, initialization mechanisms and attribute-collectors in compilers; the handling of masked data structures such as queues and stacks is usually via utility access routines. All the global storage blocks are accessible via an interactive, cyclic scanning/assignment tool capable of handling prestored files of commands.

Design strategies to facilitate testing are usually classified as top-down (build the boss on the artificial structure chart first), bottom-up (build from the bottom with drivers) or sandwich (build from top and bottom and hope to meet in the middle).

The spare parts, if any, are testable via special flags; however, state transition logic rarely has any spare parts beyond a few error-blocking interlocks and maybe forward/backward error-recovery facilities. Utility functions and anything else possible are built as black boxes or abstract machines performing defined functions through adequately designed and documented interfaces essentially independent of the data layouts. The details of linkage via global storage blocks are handled by a code preprocessor. As the last tool for maximal flexibility in integration plans, one has the method of decouplable merger.

In decouplable merger, module A is eventually to send its outputs to modules B, C, D and so on via global storage block G1. On a certain date early in the implementation phase, an exact copy G2 of G1 is made in different memory locations. Thereafter, modules B, C, D and so on use G1 as their input, and the definition of G1 is changed only at the convenience of its users (all additions replace spares at the end; nothing is deleted).

Module A uses G2, which is changed solely at the convenience of its user (who keeps in touch with the creators of B, C, D and so on).

When integration begins, a special routine with its own execution flag maps G2 into G1. The data transfer from A to B, C, D and so on can be turned on or off any number of times. When integration is complete, the sequence of names in G1 is brought into agreement with G2; G2 is abolished, along with the special transfer routine. All modules (A, B, C, D and so on) are recompiled at this time. One simple extension is that the special transfer routine may not be abolished, so that G1 and G2 always exist. Variations upon the theme of decouplable merger can be created for more subtle cases.

Nightmare of Bureaucracy

Permanent testability has nothing to do with the fallacy that every test must be repeated after every change to the code. Such a doctrine is a very expensive nightmare of bureaucracy and demoralization. The repetition of every test is clearly relevant only to unreliable software.

Permanent testability is supported by antibugging, which I have extended from Ed Yourdon's *Techniques of Program Structure and Design* (Prentice-Hall, 1976). Some techniques are the use of checksums, checkvalues, flags and invariants that are likely to become incorrect if code or data are damaged. Error-detecting or correcting codes are used in some cases.

Some reliable software uses one or more "batons," "keys," or "relay runners," which are periodically checked for validity to detect improper jumps. Permanent execution traces, selective dumps and execution counters have been mentioned

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before. Forward and backward error recovery can be supplemented, in certain cases only, by methods of successive approximation for the solution of equations. Al Brill's *Building Controls into Structured Systems* (Yourdon, 1983) covers many topics that are illustrated by the following anecdotes.

A large money fund has table-driven software which, at each transaction (and once a month), lists all transactions by means of a January starting balance, a journal of transaction codes and a journal of transaction amounts. I happened to have performed an unusual transaction to correct an accidental overpayment to a retirement account. One day, months later, the master table of valid transaction codes was changed to eliminate the code for my unusual transaction. Consequently, the next monthly statement was wrong, retroactively, for months.

No human was notified of the discrepancy. Apparently the books still balanced. The ordinary staff is denied access to the relevant files and history. The money fund declined to engage me as a software consultant, but they did correct my account. The auditors, a most prestigious firm, had not noticed the lack of fiscal controls.

Later I learned of a bank that each night simply discarded the discrepancy file from its journal; even the data processing manager was not allowed to find out what bugs it might reveal.

At least software should force the existence and nature of discrepancies to come to human attention.

Systematic Debugging

Finally we come to systematic debugging (for local bugs), supported by all the tools of perpetual testability and antibugging.

Systematically use data flow diagrams and connectivity diagrams to trace the possible causes of erroneous values, bearing in mind the alternative that an error in the data masking arrangements may create symptoms remote from the true cause.

Predict other possible discrepancies that might arise from the same postulated cause. For example, if gross wages are incorrect, then probably net wages, income taxes and Social Security taxes will also be wrong.

Partition possible causes, use the permanent stub code and partition again. For example, when a fan in my office would not work on the end of an extension cord, I plugged another appliance into the extension cord and the fan directly into a wall socket. Turn off the execution flags of modules that generate suspected data items, and drive their outputs by means of an interactive scanning/assignment tool.

If a module is not being executed, its execution counter should not change, and the assignment tool should be able to give any values to its outputs.

On the other hand, if a module is being executed, then its counter should change and it should overwrite its outputs (or some of them). Some scanning tools automatically highlight, flash or display in a different color the names and current values of variables (from a specified list) that have recently changed.

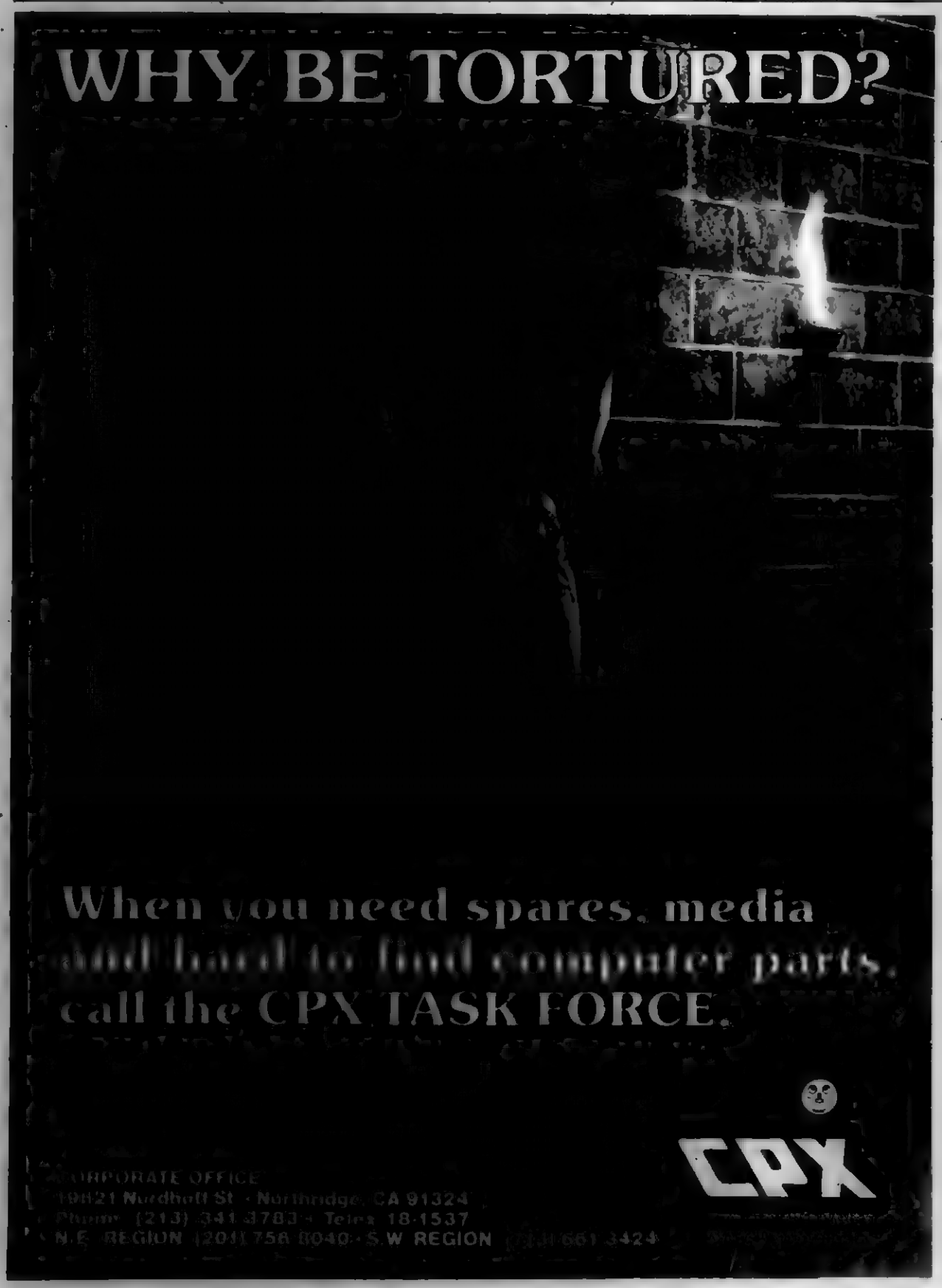
Debugging is no longer a black art; now it is one of the most systematic parts of the experimental sciences.

Why tolerate untested programs? There is no reason to do so. Shift the costs back to the budgets of their true causes. Remember that bugs come in flocks; noise, interruptions, telephones, paging systems and disruptive management may be the real source of your problems.

About the Author

James Bradley is an independent consultant and teacher, an instructor for Yourdon, Inc. and an adjunct professor at the New Jersey Institute of Technology. He has more than 20 years' experience in engineering, scientific and general software.

Bradley specializes in structured methods as well as auxiliary software such as relational data bases, code preprocessors, executives for various classes of invocation, software devices to read/write any variable concurrently with execution of software under test and translators for simulation languages.



COHESION

A Means to Data Base Flexibility

By William R. Durell

The return on investment or cost effectiveness of a data processing system is directly related to its life span and maintainability. To increase system life span and decrease future maintenance costs, we have adopted techniques to maximize the modularity or flexibility of systems and program design. However, we must also develop techniques to maximize the modularity and flexibility of data bases and other data structures used by data processing systems. Data cohesion is one such technique.

To understand data coupling and cohesion, we must first understand process coupling and cohesion.

The term "process" means something that acts upon data. A process transforms, computes or manipulates data. In physical terms, a process is a program, submodule or subroutine.

Structured analysis and design methodologies advocate the design of data processing systems composed of many small cohesive modules. A cohesive module is a process with one and only one function. The purpose of a cohesive module can be described in one to two paragraphs of documentation. In terms of Cobol, a cohesive module is one whose procedure division normally consists of 100 or fewer lines of code.

There are several benefits of process cohesion. Process cohesion minimizes the coupling between programs, which simplifies the structure of the system and makes it easier to identify programs via their functions. Thus, it is easier to locate and modify specific functions within a system, and future program maintenance expenditures are reduced. Also, by minimizing program coupling, it is easy to reuse a given process elsewhere in a system. We can more easily clone cohesive programs from one system to another.

The same principle applies to data structures. We should create data structures based upon a series of simple, cohesive data elements. A cohesive data element has one and only one purpose. If the definition of a data element cannot be stated in one or two simple sentences, then it is not cohesive. A cohesive data element mimimizes the coupling between itself and other data elements. In a record or segment, there should be no linkage among nonkey data elements. Nonkey data elements should only be coupled with key data elements. This stricture is identical to the principle of third normal form.

By maximizing data element

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cohesion and minimizing data element coupling, we design more modular, reusable and portable data structures.

Following is an example of data coupling and cohesion:

Data element: VAC-PAY-YTD-HR-EMP.

Description: The total yearly vacation wages paid to an hourly employee.

Is this a cohesive data element? No. This data element not only contains an earning amount, but also describes the type of earning (VAC or vacation).

Let us decompose or modularize the data element. VAC-PAY-YTD-HR-EMP becomes the two data elements: PAY-TYPE-CODE and PAY-YTD-HR-EMP.

The definitions for these two data elements are as follows:

Data element: PAY-TYPE-CODE.

Description: A code that identifies the category of wages paid to an employee. Examples are regular pay, sick pay, vacation pay and overtime pay.

Data element: PAY-YTD-HR-EMP.

Description: The yearly earning amount for an hourly employee. Refer to PAY-TYPE-CODE for a list of all possible earning codes.

Is PAY-YTD-HR-EMP a cohesive data element? No.

This data element contains information about both an earning amount and the period of time when this amount was earned.

Let us decompose or modularize this data element. PAY-YTD-HR-EMP becomes TIME-PERIOD-CODE and PAY-HR-EMP.

The definitions for these two data elements are as follows:

Data element: TIME-PERIOD-CODE.

Description: A code that indicates a time span.

Examples are: weekly (week-to-date or WTD), monthly (month-to-date or MTD), quarterly (quarter-to-date or QTD) and annual (year-to-date or YTD).

Data element: PAY-HR-EMP.

Description: The amount of wages paid to an hourly employee. PAY-TYPE-CODE identifies the type of wage this amount reflects. TIME-PERIOD-CODE identifies the time span covered.

Is PAY-HR-EMP a cohesive data element? No. This data element contains information about both an earning amount (PAY) and the type of employee (HR or hourly).

Let us decompose this data element. PAY-HR-EMP becomes PAY-AMOUNT and EMP-CLASSIFICATION-CODE.

The definitions for these two data elements are as follows:

Data element: PAY-AMOUNT.

Description: The amount of wages paid to an employee. PAY-TYPE-CODE identifies the type of wage this amount reflects. TIME-PERIOD-

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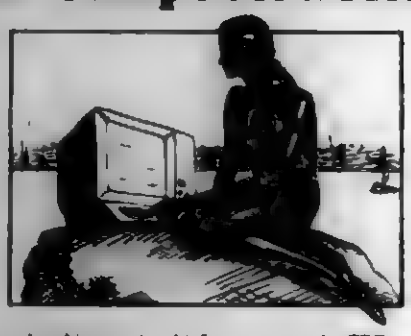

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CODE identifies the time-span covered.

Data element: EMP-CLASSIFICATION-CODE.

Description: Identifies the type of employee. Examples are hourly (H), salary exempt (E) or salary nonexempt (N).

In summary, the original data element VAC-PAY-YTD-HR-EMP has been decomposed or modularized into these four data elements: EMP-CLASSIFICATION-CODE, TIME-PERIOD-CODE, PAY-AMOUNT and PAY-TYPE-CODE.

Why is it advantageous to decompose VAC-PAY-YTD-HR-EMP and create four separate data elements? Below is a discussion of the benefits of designing cohesive data elements.

A. Reduction in future maintenance costs. Using the above example, let us assume that John Doe is an hourly employee and is being promoted (or reclassified) to a salaried employee. Thus, we must change John's classification (EMP-CLASSIFICATION-CODE) from H to E, but we must also zero-out VAC-PAY-YTD-HR-EMP and move these wages to VAC-PAY-YTD-SAL-EMP.

We must change the contents of three data elements. If we had created the four separate data elements named above, we would only need to change the contents of one data element (EMP-CLASSIFICATION-CODE) from H to E.

The data element maintenance described above included changes to only one type of earning (vacation). If John Doe had several different earnings (sick pay, holiday pay, jury duty pay) on his employee record, this maintenance effort would increase significantly. Thus, by designing data structures composed of cohesive data elements, we reduce the future maintenance cost of data processing systems.

B. Reduction in total number of data elements. By designing highly cohesive data elements, we can significantly reduce the total number of data elements.

Using the example data element VAC-PAY-YTD-HR-EMP, let's demonstrate the difference in the total number of data elements based upon cohesive vs. noncohesive data element design.

Using the noncohesive approach, we must create separate data elements for each combination of earning type and time period. Assuming that John Doe is an hourly employee, the following data elements would be required to store his necessary vacation pay information:

VAC-PAY-WTD-HR-EMP
VAC-PAY-MTD-HR-EMP
VAC-PAY-QTD-HR-EMP
VAC-PAY-YTD-HR-EMP

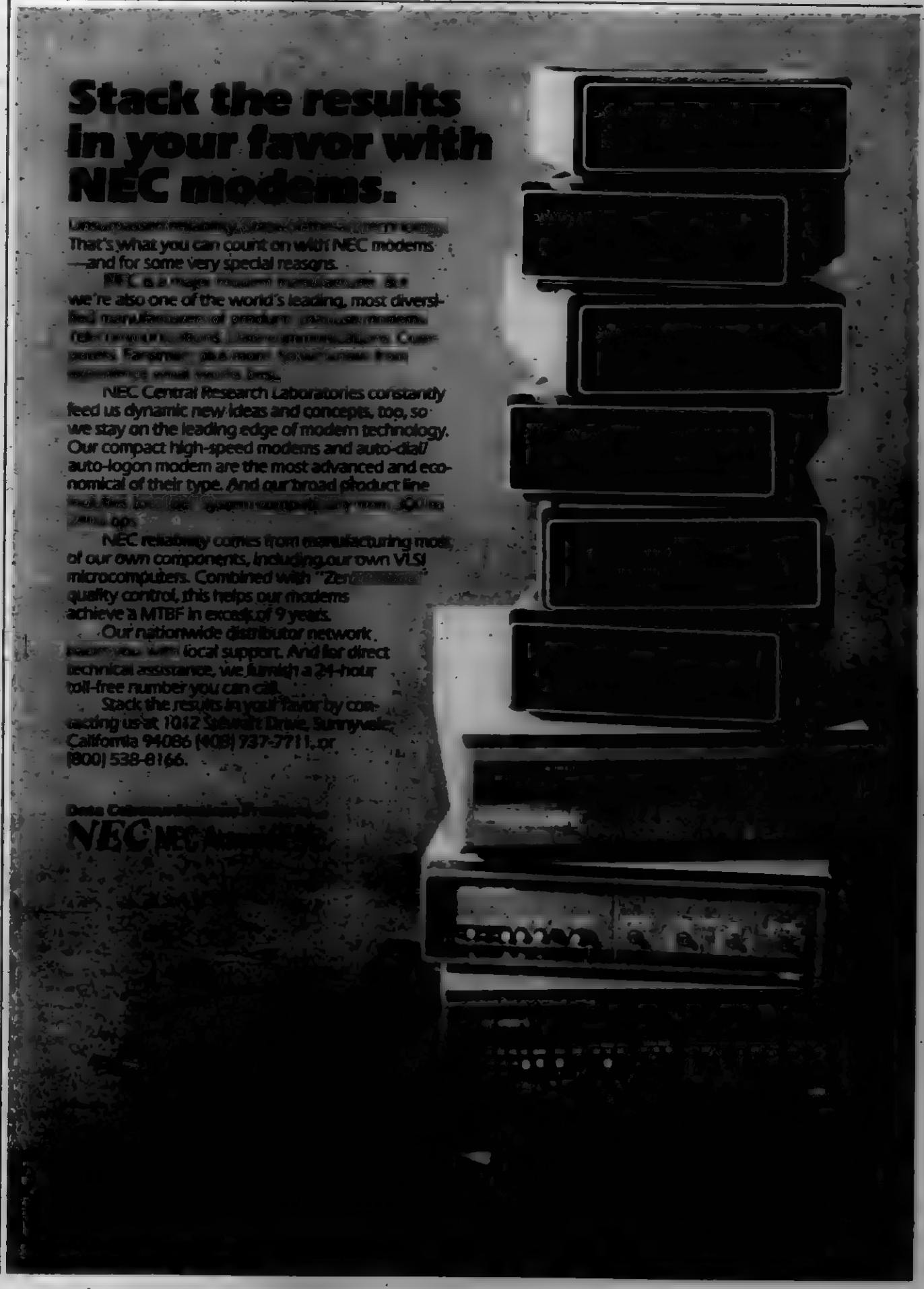
If John had a total of 20 different pay types, we must create and define in the data dictionary 80 data elements.

Using the cohesive data element design philosophy, we need to design and document only four:

PAY-TYPE-CODE
TIME-PERIOD-CODE
PAY-AMOUNT
EMP-CLASSIFICATION-CODE

Thus, the ratio between noncohesive and cohesive data elements is 80:4.

C. Increase in the "span"



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or usefulness of data elements. The data element TIME-PERIOD-CODE is a highly cohesive, modular and effective data element. As demonstrated earlier, by designing this data element, we were able to reduce the total number of noncohesive data elements in the payroll system by a factor of 20. However, the data element TIME-PERIOD-CODE can also be used by any other nonpayroll system or program that needs a data element to indicate a time span.

Thus, by creating this cohesive data element and using it for all applicable programs and systems, there can be a significant reduction in the total number of data elements used in an organization.

D. Increase in the modularity or flexibility of the data design. By designing cohesive data elements whose domain or role (values) can be codified, we are increasing the flexibility or modularity of the data element. For example, the data element PAY-TYPE-CODE could have the following values: R = regular pay, S = sick pay, V = vacation pay and H = holiday pay.

Let us assume that a company decided that employees are now eligible for pay while attending the funeral of a family member. If we had not designed the data element PAY-TYPE-CODE, we would have to create and document several new data elements to accommodate this change in company policy.

By using PAY-TYPE-CODE, we only need to add an extra value or role to this data element: B = bereavement pay.

In summary, it is important to consider the modularity or flexibility of data elements when designing systems. Unless systems and data bases are constructed from a foundation of cohesive data elements, the modularity or flexibility of the entire system will be compromised.

About the Author

William R. Durell is president and founder of Data Administration, Inc., a Cypress, Calif., company specializing in all aspects of information resource management.

In his 12 years in data processing, Bradley has designed several software systems that automated many of the traditional clerical functions peformed by data administrators. He conducts public seminars on data administration throughout the U.S.‡

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A Checklist For Acquiring Applications Packages

By Dan Kamoji

The most judicious way to approach the process of acquiring an applications software package is to break the task into its four basic stages and develop a checklist of procedures for each part.

I. Developing acceptance criteria. The more thorough the work at this point, the easier and more successful the process of selecting and implementing the package. Acceptance criteria should be based on, but not limited to, the following considerations:

1. Describe the problem to be solved, the environment for the solution and the basic functions to be performed by the package. Express the problem in terms of inputs, calculations, outputs and volumes.

2. Specify what the package needs to do to solve the problem and what specific features the package needs to have. List hardware and operating system capabilities, file sizes and run times.

3. List required reports, file contents, inquiry capabilities, report generators, data base file structures (if applicable) and any other desirable features.

4. Specify required arithmetic capabilities. If you are looking at a payroll package, for example, make sure it meets with federal, state and local tax regulations.

5. Require that the package produce all essential reports and be designed so that new report formats can be developed easily to meet changing company needs.

6. List any applicable government regulatory procedures and agencies, legal requirements and industry standards that the package should accommodate.

7. Keep in mind that the package should be flexible enough to accommodate fast-changing industry needs.

8. If applicable, specify multinational considerations, like foreign currency conversion capabilities and foreign currency editing requirements.

9. Require that the package be easy to install and use, allowing for easy set-up of new files and updates and maintenance to existing ones.

10. Spell out quantity and frequency of vendor maintenance. Mention any foreseen restrictions for vendor support.

11. List interface requirements for existing systems and procedures. Also note any interface requirements between the package and production libraries (source and object).

12. Describe any required special features, such as graphics output or special check formats or reports for one-time use.

13. If the package is required to have features for comparing budgets and so forth, specify them.

14. If the package must run both on the mainframe and smaller computers or multiple mainframes, state that requirement.

15. Describe hardware needs, including possible conversions.

16. Note any desired high-level programming language interfaces, program design and construction standards, documentation needs, service code availability, recovery/backup capabilities, transaction logging and auditing facilities and security provisions.

17. Write down file architecture, processing or turnaround constraints (response time).

II. Selecting the software package. Many sources are available to assist in

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the search for suitable vendors, including industry directories and research firms, computer and software journals, newspapers and magazines.

1. Narrow the number of vendors to be contacted by finding out which have packages that seem to suit your specific needs.

2. After reviewing the sources and selecting vendors to be contacted, send for product information. It may be helpful to attend one or more of the free seminars arranged by most vendors.

3. Review all vendor information thoroughly to determine which vendors and packages most completely meet acceptance criteria developed during the first stage.

What support will the vendor provide? How much on-site technical assistance is supplied under the vendor's standard contract? What specific qualifications will those support people have?

4. Eliminate vendors or packages that do not meet acceptance criteria in the most needed details.

5. While evaluating the packages, establish and weigh carefully how many of the acceptance criteria are fulfilled by each. Also note any information that exceeds the requirements.

6. Ask the questions listed below with reference to each package:

a) Does the basic function of the package meet your needs? Are its capabilities consistent with the requirements of your application?

b) Is a version of the package available for use on your make and model of computer? How much core storage is required? How many disk drives, tape units, card readers and punches and/or printers? Which models of each?

c) What are the software requirements? Will it interface properly with your I/O control routines and other related software facilities?

d) Can it produce the reports you need?

e) Is its performance adequate?

f) How flexible is the package? Are its input, output and processing capabilities flexible enough to accommodate changing requirements? Does it include I/O and computational capabilities beyond present needs?

g) In what form is the package delivered?

For security reasons, some packages are marketed only in object-language form. Whenever possible, a source deck and source-language listing should be acquired.

h) How difficult will installation be? What changes will need to be made in existing systems, procedures and forms? How many people will be affected, and what type of training or orientation will they need?

i) Will the package be easy to use? Is it designed for straightforward operation on your system, with well-documented operating procedures? Are the input forms and instructions for preparing them clear and efficient?

j) Is adequate documentation provided?

k) What support will the vendor provide? How much on-site technical assistance is supplied under the vendor's standard contract? What specific qualifications will those support people have? What is the cost and availability of additional assistance if required?

If you are going to be under maintenance contract with the vendor, you may limit the extent of changes you make to the package.

However, when considerable backup from the vendor is necessary, specify ahead of time a delivery or support date for fulfilling the changes needed. You should get a realistic estimated date from the vendor. To verify how realistic that "promised" date is, ask the vendor how many programmers or analysts or technical staff it is assigning

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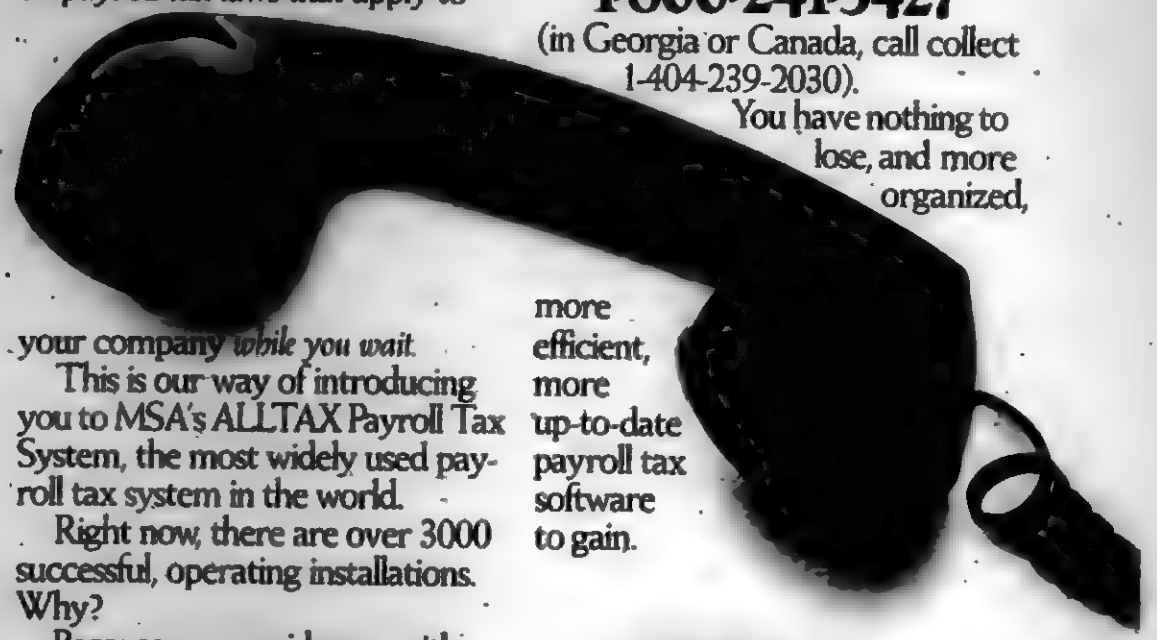

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BUYER'S CHECKLIST

to support your company's requirements.

l) What is the operational status of the package? When, where, by whom and for what purpose was it originally developed? When was the first user installation completed? How many companies are currently using the package?

m) What is the total cost of acquiring and using the package? This figure should include both the direct cost (that is, the price of the package itself) and the indirect costs that may be incurred in modifying the package to fit your requirements, changing existing systems and procedures, training personnel, converting files, installing and checking out the package, operating the package on a production basis and maintaining it after installation.

n) What financial arrangements are offered? Is the package available for outright sale, lease or both? What are the specific terms and conditions for each plan?

Are there any objectionable constraints upon use or modification of the package or upon the sale of services based on its use?

7. Be sure that the vendor's people will be readily available to keep the system up and running over the long term and that they will keep the package up-to-date with necessary enhancements.

In this connection, the vendor's maintenance policy and warranty, not only in regard to the package being considered but in regard to new releases and enhancements, should be reviewed.

8. Examine carefully what kind of initial and continuing education the vendor provides and at what cost. The training should be available on all levels, from introductory to advanced, for users and technical personnel.

9. Contact other users of the package to check on the quality and response time of the customer service department.

Check with the vendor about the hours of the department, whether knowledgeable personnel will answer the phone and whether service people are on call.

10. Meetings should be arranged with other user groups to discuss merits and faults of the applications packages. Such groups should consist of end users and data processing personnel. The existence of an active, growing user group indicates that the vendor is responsive to user needs.

11. The package and vendor should have good user references. Through these references, package performance can be measured in a production environment. The vendor may provide some names of users or user groups. But other users and groups should also be contacted to provide a more accurate evaluation.

The following questions may be included as a checklist when soliciting information from current users:

a) When was the package installed?

b) How long did it take to get the package up and producing?

c) Does the package function as the vendor promised?

d) What are your experiences with the vendor's service department?

e) How is the documentation?

Ask other specific questions about the limitations, delays, errors and

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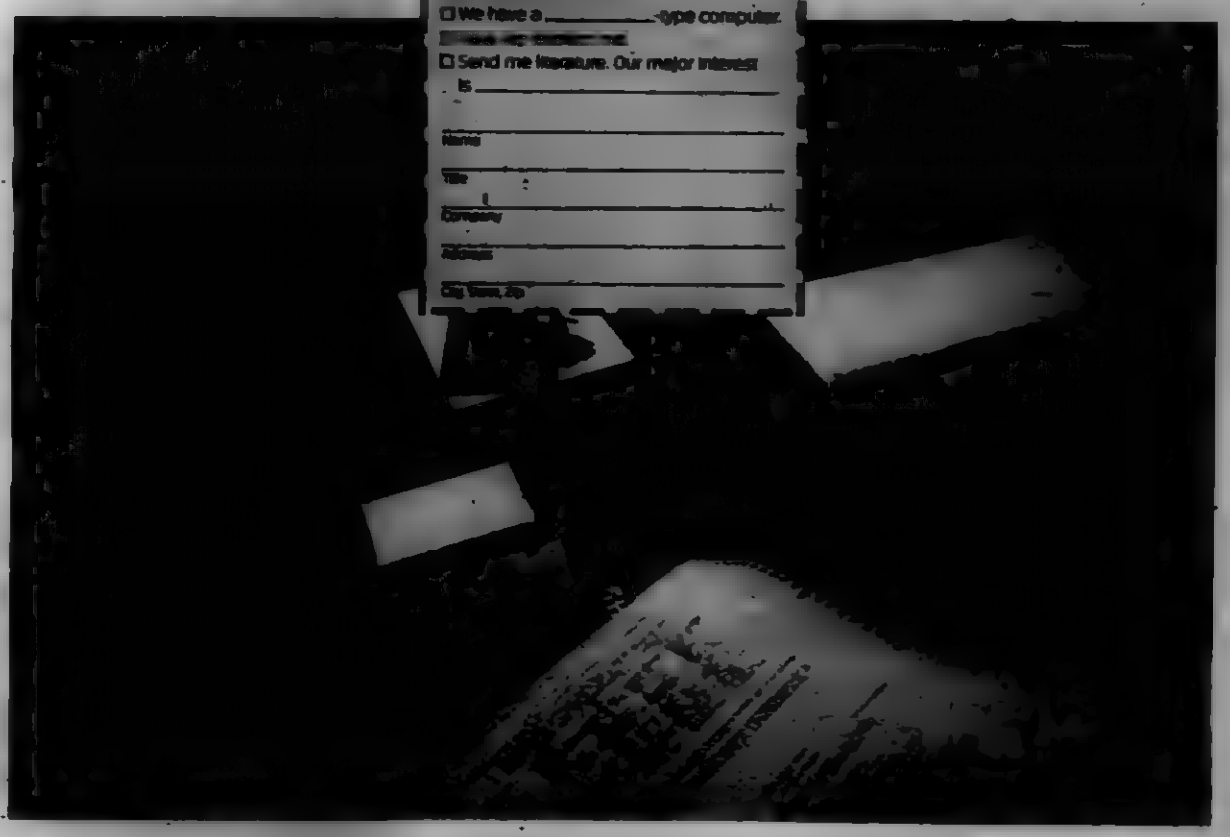


IN DEPTH

any other problems they have encountered:

a) What in-house modifications were required?

b) How much assistance did the vendor supply?

c) How could or should the package be improved?

d) What is the overall performance and throughput level?

If possible, visit the user site(s) to see the package in a production environment. A visit also gives you a better feel about the users' response to the package and the vendor.

12. Check to see whether the vendor location nearest you has technical staff or only sales representatives.

13. Check the vendor's financial stability. Obtain a Dun & Bradstreet Co. report or a financial statement.

14. Get an idea of the range in the vendor's product line. If the company supplies a complete range of software packages, you may benefit if you intend to automate other functions. Packages from the same vendor often have a consistency in approach and often interface with each other. This feature is significant in cases where a change in one application considerably affects other areas. Price discounts are often available if multiple packages are purchased from the same vendor.

15. Make sure that you receive the most up-to-date package release available and that future enhancements will be made available. Also make sure that if modifications are needed, the vendor will assist your technical staff in identifying and making necessary changes and that this provision will not affect future support.

16. Consider the many variables in analyzing costs. The terms of the lease, terms on expiration of the lease, price of installation and costs of each of the services supplied should be carefully analyzed and compared with other packages and vendors. During cost analysis, the following questions should be asked:

a) What price structures are available?

b) What is included in the purchase or lease price?

c) Is there additional cost for multiple installations?

d) What is the length of the warranty?

e) Is there a cost for maintenance during and/or after the warranty period?

f) Are there additional costs (manuals, support, improvements, training)?

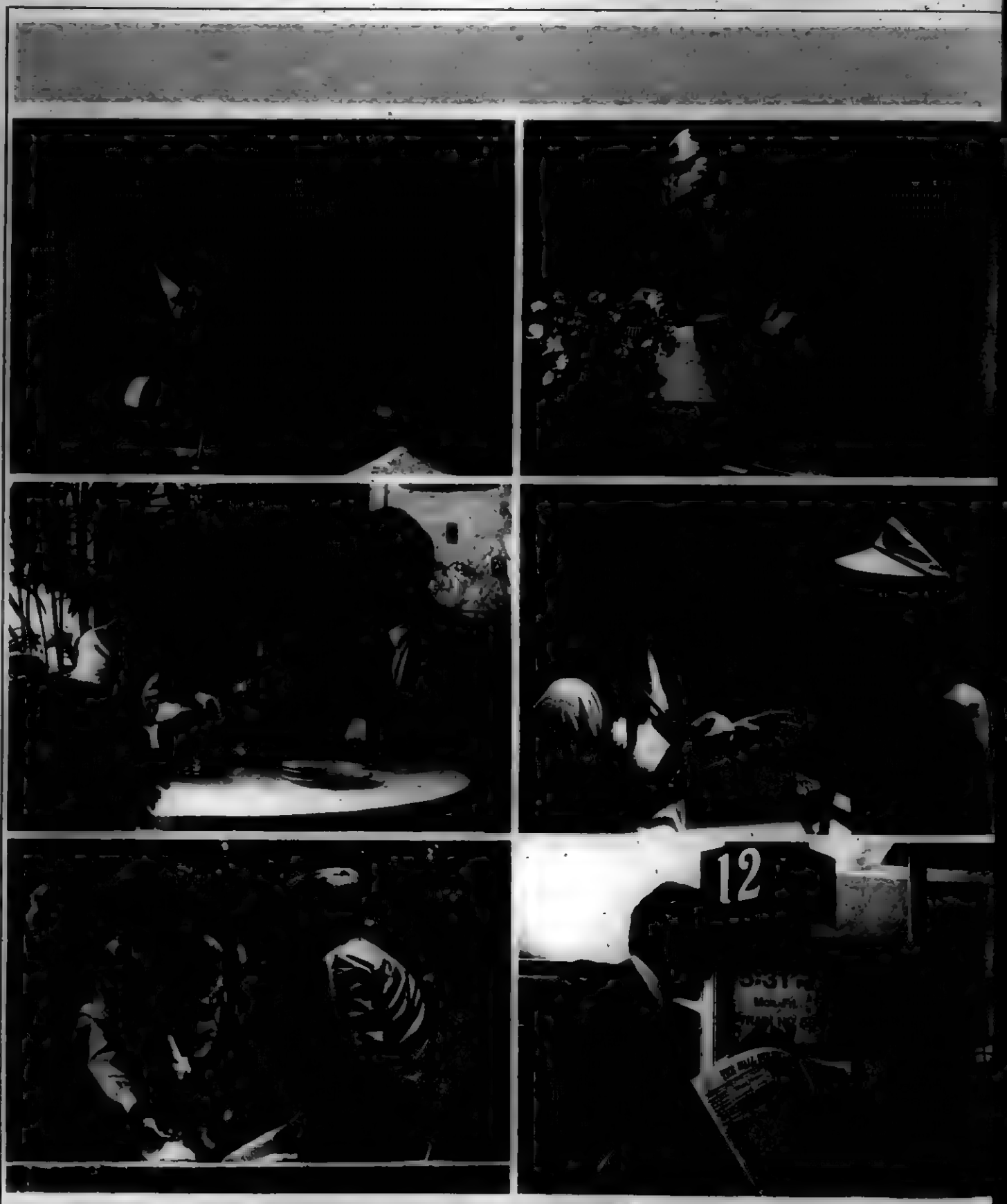
g) What costs are associated with future hardware upgrades?

17. Ask the vendor and the user groups about the limitations of the system.

18. If we are interested in a specific function, we should not only ask the vendor "Does the package do it?" but also "How does the package do it?"

19. If a package does not meet a few criteria but is good enough in all other respects, discuss with the vendor the significance of those items and whether or not the package can be modified to fulfill those few particular criteria.

20. Consider the feasibility of preparing and running benchmark tests on your own system. The tests are a



A BUYER'S CHECKLIST

very convincing way of assuring the suitability of a package. However, designing a really meaningful test, preparing the input data and evaluating the results can be an expensive, time-consuming process. The benchmark test may be waived in cases where the package is widely used and has received strongly positive references from its users or user groups.

Conducting benchmark tests on your own computer may prove costly. The vendor may provide demo systems or a site for benchmark tests. However, there should be some evidence of how the new package functions.

21. Draw up a memorandum with a summary of the different packages evaluated and the reasons for selecting the particular package and vendor. The selected package should perform the necessary functions and satisfy your acceptance criteria. Be sure to consider not only the cost of the package itself, but all the accompanying indirect costs: modifications, installation, conversion, training, maintenance, documentation, machine time and so on.

22. Finally, choose a package.

III. Developing a contract. Contracts with the vendors of software packages are usually preprinted affairs and may be similar from vendor to vendor. However, when the vendor makes certain promises as to the package's capability and its support, you should ask him to put them in writing, and those clauses should be included in the negotiated contract with financial penalty for nonfulfillment.

You need a contract especially for those occasions when something goes wrong. There is no substitute for a contract that clearly and specifically sets out the responsibilities, requirements, obligations and resources of each party, stipulating what will happen in case of breach of promise.

You should establish what the reasonable tests are with respect to installation, uptime, crashes, response time and the like.

The process is difficult if the salesman whose commission is at stake does the negotiating. If possible, he should not be one of the principal negotiators.

The contract should place full liability for costs and lost profits on the vendor.

A contract for the selected package should be developed and refined to reflect both the user company's and vendor's needs. The contract lawyer for your company should be encouraged to

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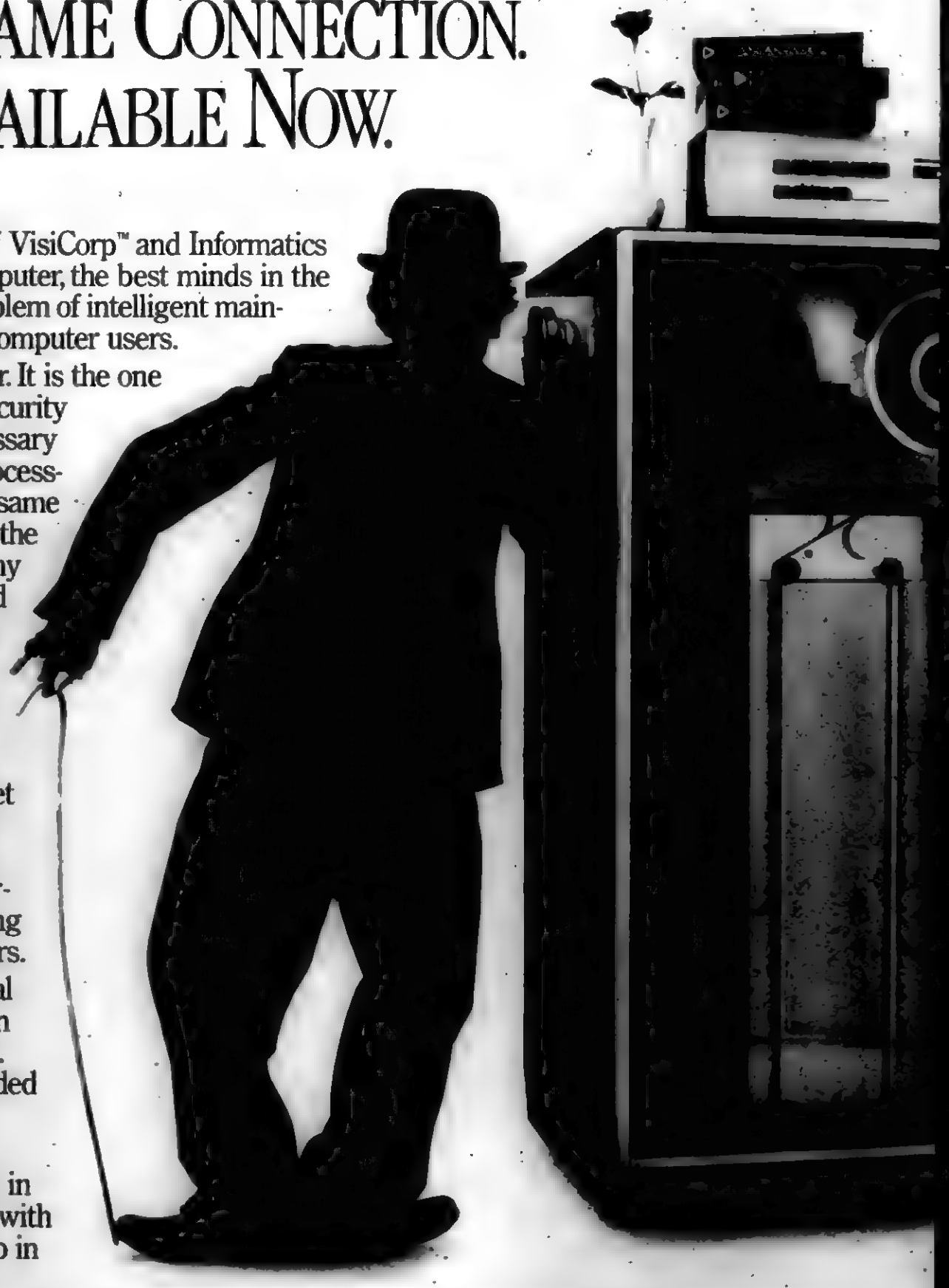

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The effort required to install an application software package successfully should not be underestimated: developing interfaces, making decisions on options, training, developing and implementing manual support procedures all fall in the installation stage.

play an active role in this process. The contract should be signed only after his approval.

While drafting a contract, the parties should include a clause or a paragraph pertaining to each of the items mentioned below, as appropriate and feasible:

a) What are the specific requirements or expectations for the package?

b) What are the performance levels to be achieved after the package is installed and in full operation?

c) What, if any, extraordinary specifications must the package meet?

d) What are the purchase or lease or license prices?

e) What are the payment terms? Present these in table or list form.

f) What are the warrant conditions?

g) What, if any, waivers are there, and if they apply only in specific circumstances, what are those circumstances?

h) What financial penalties will be levied for nonperformance of the package? If the package fails to perform as specified by the vendor or agreed upon by your company, not only should the vendor agree to rectify the weakness, but also financial penalties should be levied on the vendor for the existence of the weakness, as well as for the vendor's delay in rectifying it beyond a reasonable period of time.

If the vendor fails to provide adequate and timely support for maintenance needs that may arise in the future, financial penalties should be specifically levied.

i) What method will there be for terminating the contract? If the contract is terminated because of nonfulfillment of the contract by the vendor, the payment of the penalty levied on the vendor should be ascertained before the contract is terminated.

j) Not only should penalties be levied on the vendor for failure of the package or for failure to offer support or to meet other contractual obligations, but also the penalties should be specified for each period (a day, a week and so on) during which such failure or nonfulfillment extends.

k) Whenever possible, source code should be obtained along with object code with reference to the package selected.

l) The requirements of both emergency and ongoing vendor support should be specified.

m) Conditions for vendor-supplied training and documentation not only at the time of purchase but on an ongoing basis, including enhancements, should be mentioned. Financial penalties may be specified for failure to meet such conditions.

n) Every module of the software package being leased should be listed. Program names should be specifically mentioned. Specific manuals of documentation, processing of flows, operational documentation, all processing documentation, should be listed by name.

o) Delivery date(s) should be mentioned in the contract. Financial penalties should be levied for failure to meet the delivery date.

The penalty should specify amount to be paid per specified period of time after the delivery date has passed.

Support dates and software fix dates should be stipulated in the contract (within how many hours or days after the vendor is notified of the problem will it provide effective support and/or carry out the necessary software changes). Financial penalties should be levied on the vendor for failure to fulfill such a need for support.

p) If necessary, the contract should contain a clause stating that the most recent release will be delivered.

q) Specify all ownership rights.

r) Establish what would happen if the vendor went out of business.

s) Specify the amount of installation assistance, including training, you expect from the vendor. The more the vendor is involved, the better.

t) Especially in cases where it can be proved that profits were lost because the vendor's package failed to perform as promised or because the vendor's support did not meet the deadline as agreed beforehand, the losses so incurred should be directly passed on to the vendor. In other words, the contract should provide for reimbursement from the vendor in cases of failure or delay in performance.

IV. Installing the package and

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The company also has established a Technology Council of key executives throughout the industry to advise on acquisitions.

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IN DEPTH

conducting a postinstallation review. Thorough test procedures should be specified to ensure that the installation has been successful.

Make sure that the software is operating as it should after one full cycle, at least.

The effort required to install an application software package successfully should not be underestimated: developing interfaces, making decisions on options, training, developing and implementing manual support procedures all fall in the installation stage. This stage requires the close cooperation of the data processing staff, vendor's installation team and users. If the process is skillfully handled, the rewards far outweigh the effort.

You should not let the vendor off the hook until the package operates at peak efficiency, has delivered bug-free results during at least one complete processing cycle and has been fully integrated into the overall operational environment.

Depending upon the complexity of the package and the environment in which it must operate, the installation phase may take anywhere from one day to many months. The vendor will usually consider the installation complete when it has supplied the promised documentation, provided the agreed-upon training and succeeded in making the package run on your system.

However, you should not let the vendor off the hook until the package operates at peak efficiency, has delivered bug-free results during at least one complete processing cycle and has been fully integrated into the overall operational environment.

After the package has been operational for a while, a review should be conducted as to performance of the package as well as the vendor, not only with reference to the acceptance criteria initially formulated, but also with reference to the contract.

Application software packages generally result in more efficient use of operational and decision-making resources. This improvement usually results in cost benefits, but they is hard to quantify. The costs may also be compared against such benefits as improved clerical efficiency, quicker availability of information, cost avoidance and the specific advantages related to the application under review.

Check the results. A package can represent a significant capital expenditure and a vital cog in company operations. Its performance should be carefully measured to make sure the package is being used effectively and is delivering everything for which you bargained.

Any significant limitations or deficiencies in the package should be identified and plans made for overcoming them.

Finally, a report on the vendor's performance and reliability should be prepared and filed for future reference.

About the Author

Dan Kamoji is an information systems standards analyst with Merchants National Bank in Indianapolis.

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IBM Cuts Price Of 4701 Controllers, Increases Storage Of High-End 4701

WHITE PLAINS, N.Y. — IBM last week reduced the price of add-on storage for its 4701 Finance Communication System controllers while at the same time announcing it has increased the storage capacity of its high-end 4701 controller by 75%.

The price of the 128K-byte storage feature is $1,250, compared with the two 64K-byte increments that listed for $3,170. A spokesman noted that by adding the 128K-byte machine storage increments, 4700 users can increase the capacity of the 4701 Model 2 to 896K bytes — an increase of 384K bytes.

The base machine storage capacity has also been raised from 192K to 256K bytes, an IBM said.

The 4701 Model 1's base machine storage capacity remains at 192K bytes, the spokesman said. However, the device is available in storage configurations of 256K, 384K and 512K bytes. The Model 1 can be upgraded to a Model 2, the company said, with 256K, 384K, 512K, 640K or 768K bytes of machine storage.

The company also unveiled an adapter, called the X.21, that can be used with both switched and nonswitched networks.

First shipments of the 4701 Model 2, with more than 512K bytes of machine storage, are scheduled for December of this year.

Model 1 controllers, shipped after Sept. 20 of this year, must be configured with 192K, 256K, 384K or 512K bytes of storage. Existing orders for 320K- or 448K-byte machines will be shipped as 384K-byte or 512K-byte configurations, respectively, the IBM spokesman pointed out.

More information on the price reductions, as well as the memory upgrades and the controller, is available from IBM at 900 King St., Port Chester, N.Y. 10573.

Optical Firm Keeps Eye On Goods With DP Service

FLUSHING, N.Y. — An on-site, minicomputer-based computing service has helped a manufacturer and importer of ophthalmic eye wear to monitor inventory and improve its cash flow.

The Styl-Rite Optics (SRO) Group manufactures and imports eye wear under various brand names, producing about 100 different frame designs for distribution nationally to optical wholesalers, chain retail optical stores and optical laboratories.

These designs translate into as many as 1,400 separate units, manufactured at SRO's U.S. plant or imported, that must be controlled throughout the process — from manufacturing through order picking to distribution. To blur matters even more, a portion of SRO's approximately $12 million in annual sales includes prescription lenses, which must also be tracked from order entry through distribution.

During the late 1970s, the privately owned company, located here, considered computerizing to monitor its inventory, sales and receivables. It looked for a way to computerize SRO's basic accounting functions without buying a computer.

But instead of either entering into a long-term lease or buying, SRO found another alternative to automation. It decided in mid-1981 to use a computing service, Automatic Data Processing, Inc. (ADP) of Clifton, N.J., partly because ADP made computer equipment available without requiring a long-term agreement and partly because the on-site, interactive business accounting system offered by ADP allowed SRO to see clearly what was happening to its business.

SRO went on-site with ADP in early 1982, after six months as a batch process payroll customer. The on-site system installed at SRO's headquarters consists of a minicomputer, five CRT terminals and two high-speed printers, which allows the firm to process data internally, yet have the data transmitted via dedicated phone lines to the regional ADP computing center for continual monitoring. Answers to the company's questions about accounts receivable or inventory, for example, come back via terminal screens or hard-copy management reports printed at SRO's location.

Although the computing capacity for SRO's system is located at the regional ADP facility, the optical firm has memory storage capacity on-site of 5 million digits of data, which can be retrieved on a random basis. That kind of power gives the company virtually unlimited room to grow with the system, according to Jerome J. Pomerance, president of SRO.

During installation, ADP trained the SRO employees who would operate the system, avoiding the expense of adding clerical help to deal with business growth and hiring programmers as well. ADP has

(Continued on Page 78)

AM-1000 Version Offers Users More Memory

IRVINE, Calif. — Alpha Micro, Inc. has unveiled a version of its AM-1000 multiuser micro-based system said to offer users twice the memory of and increased disk storage over previous versions.

The AM-1000E reportedly offers 256K bytes, expandable to 512K bytes, and a standard 30M-byte, 5¼-in., high-speed Winchester drive for data storage. Additional Winchester disk subsystems may be added to provide up to 120M bytes of storage.

Other features include the vendor's proprietary Amos operating system; a 5¼-in. floppy diskette or the vendor's video cassette recorder option for backup; Motorola, Inc.'s 16/32-bit 68000 processor; three serial ports; support for up to seven users simultaneously plus a printer; and the ability to run Alpha Micro's Alphacalc spreadsheet and Alphawrite WP packages.

A basic version of the multiuser, multitasking system costs $15,000 from Alpha Micro, Suite 4060, 2049 Century Park E., Los Angeles, Calif. 90067.

Multi-Micro CPU Architectures Examined

By Kevin Fischer
Special to CW‡

For years, multiuser capabilities for computer systems have been touted for their potential contributions to productivity, return on investment in computer hardware and, in general, the ability to do more tasks with the same equipment.

The rapid decrease in the price/performance ratio of systems has not changed this viewpoint. In fact, the availability of low-cost computing resources has even spurred the development of new multiuser architectures, which are now yielding new highs in user performance at even more reasonable costs.

The first multiuser capabilities were successfully implemented in the mainframe world in an effort to distribute the resources and data bases of these costly machines to as many users as possible. By the mid-'70s, most minicomputers offered multiuser capability for considerably less investment per user than was available previously. And by 1980, multiuser capabilities were introduced on relatively inexpensive microcomputer-based systems.

'Problems can occur . . . when the demand for system resources exceeds the ability of a system to respond to user requests. . . . In fact, it is not unusual for a microcomputer-based, time-sliced system to come to its knees with the addition of just a third or fourth user to the system.'

All of these solutions were based on the use of time-sliced or time-sharing operating systems technology to achieve multiuser capabilities. In such systems, any single user has concurrent access to system resources with other users. Problems can occur, however, when the demand for system resources exceeds the ability of a system to respond to user requests. This creates excessive response time delays to task requests and, in general, defeats the whole purpose of multiuser systems in that users cannot get their tasks executed in a reasonable amount of time.

The response time problem becomes especially critical in lower cost, lower performance systems. In fact, it is not unusual for a microcomputer-based, time-sliced system to come to its knees with the addition of just a third or fourth user to the system.

Multiuser Solutions

The current widespread availability of low-cost microprocessor hardware and the attractiveness of multiuser capabilities have spurred a number of manufacturers to develop a variety of viable micro-based multiuser solutions.

These solutions involve the creation of new computer system architectures employing two or more microprocessors to share the work load and improve response to user requests without greatly increasing overall hardware costs.

Two basic multimicroprocessor architectural concepts are now evolving and are competing for market share. One concept is a loosely coupled architecture in which several microprocessors, each with

(Continued on Page 76)

DMA Cartridge Disk Drive to Target Desktops

GOLETA, Calif. — DMA Systems Corp. has announced that Comdex — to be held in Las Vegas Nov. 28-Dec. 2 — will be the forum for the introduction of the new DMA 360, a removable, half-high, 5¼-in. Winchester cartridge disk drive for desktop and personal computers.

A company spokesman said the DMA 360 will offer increased system reliability and data integrity in addition to improved access times and transfer rates over floppy disk drives. DMA said the device will feature a 7.5M-byte Ansi-standard Winchester disk cartridge and will offer an average access time of 98 msec. Error rates will be equal to those of conventional Winchester disk drives.

The company said DMA 360 will include a 30-sec purge cycle and an extensive air filtration system along with fully retracted heads that are dynamically loaded. The spokesman said the device will offer users the reliability associated with conventional Winchester disk drives as well as the convenience of removable media.

The product is also expected to feature on-board microprocessor firmware that permits users to format a blank cartridge when it is inserted into the drive. Once formatted, these cartridges will be interchangeable with all DMA 360 drives. The DMA 360 will offer a pull-out top drawer and an angular, spring-loaded sleeve for disk loading and cartridge positioning. It will be compatible with the standard ST506 interface, form and power requirements.

The DMA 360 is scheduled for evaluation-order shipment in the first quarter of 1984 and will be priced at $500 in OEM quantities, the firm said.

More information is available from DMA Systems, 601 Pine Ave., Goleta, Calif. 93117.

Telex 286F Tabletop Daisywheel Unveiled

TULSA, Okla. — Telex Computer Products, Inc. has announced an 80 char./sec daisywheel tabletop printer said to feature letter-quality printing and interchangeable print wheels.

The Telex 286F printer reportedly accommodates both plastic and metallized print wheels with either 127 or 96 characters. The bidirectional unit is plug-compatible with IBM's 3287 and attaches to either a Telex 174, 274C or 276 or an IBM 3274 or 3276 controller.

The printer's operator console configures line spacing of six or eight line/in. with 10 or 12 char./in.

The Telex 286F is priced at $5,350 from Telex, 6422 E. 41st St., Tulsa, Okla. 74135.

Victor 9000 Newsletter Available

ATLANTA — A newsletter for users of Victor Technologies, Inc.'s personal computer, the Victor 9000, began publication here in September.

"Sivic-9000" reportedly includes features on new software and hardware releases, user reviews, interviews, articles describing user installations and other articles.

Charter subscriptions are available for $24 a year from "Sivic-9000," which is located at Suite 456, 3277 Roswell Road N.E., Atlanta, Ga. 30326.

Examining the Concept Of Multiuser Architectures

(Continued from Page 75)

its own dedicated memories, are linked together over a high-speed communications bus.

Second Concept

The second is a closely coupled architecture in which each of several microprocessors shares a portion of a common memory bank.

Both architectures employ a master/slave scheme, where one processor is dedicated to handling system resources and overhead, such as disks, printer and communications links, while the others process individual user tasks. Since "slave processors" are freed from system overhead, their performance approaches that of a single-user system.

However, similarities between the two architectures end here, with the closely coupled architecture yielding significantly higher throughput and performance than the loosely coupled alternatives, primarily because of the functional differences in interprocessor communications.

Loosely Coupled Designs

For example, in loosely coupled designs, individual tasks are commonly downloaded from the master processor to the slaves via the communications bus.

This communication, no matter how efficient, delays actual task execution significantly over that encountered in a closely coupled architecture in which interprocessor communications is accomplished through simple block memory moves from master to slave or redefinition of the slave memory addressing boundaries. Usually both of these operations can be accommodated in a few memory cycles.

Since closely coupled architectures eliminate both the need for complex bus contention electronics and the duplication of many large memory banks throughout the system, they cost less to build and, therefore, deliver the best price/performance ratios for the two alternatives.

Fischer is vice-president of engineering for Compupro Corp., Oakland Airport, Calif.

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Benetics Offers Micro-Based Turnkey System

MOUNTAIN VIEW, Calif. — Benetics Corp. has introduced Charlie, a turnkey health care claims administration system that the company said delivers claims processing capabilities on a microcomputer that were previously available only on mainframe systems.

Using a version of the Unix operating system commercially adapted to provide superior performance for I/O-intensive operations, the system includes Benetics' custom-designed claims administration software, a Zentec, Inc. 8000 terminal and a Plexus Computers, Inc. P/60 supermicrocomputer. The company said the elements of the system provide fast, block-mode, multiuser claims processing and data analysis capabilities.

The system is said to be aimed at third-party administrators, self-insuring organizations and commercial insurance companies that need to automate the paper-intensive process of keeping files on employees' health care claims.

The Plexus P/60 is equipped with an Motorola, Inc. 68000 CPU and a Z8000 disk controller, plus an additional Z8000 I/O controller for every eight terminals. The company said it developed an application monitor for Unix, which was designed to provide reliability and ease of operation by non-technical users. The claims processing software is written in the C language.

The company said the software's windowing features allow data entry, file research and instruction screens to be displayed on the screen simultaneously. Charlie is reportedly capable of increasing the productivity of claims examiners by at least 100% to 200%, and the data collection capabilities are said to provide more information on which to base long-range cost containment decisions.

The system is available with installation, training and support at prices beginning at $175,000. More information is available from the vice-president of sales and marketing, Benetics, 335 E. Middlefield Road, Mountain View, Calif. 94043.

Firm Targets Apple Micros With CAD-1

NEWTON, Pa. — Chessell-Robocom Corp. has introduced the Robographics CAD-1 computer-aided design (CAD) system for use with Apple Computer, Inc. Apple II+ and IIe microcomputers.

The CAD-1 reportedly produces scaled, technical drawings and custom graphics, such as building plans, mechanical drawings, schematics and flowcharts.

A complete turnkey configuration including plotter is available starting at $4,920 and is said to emulate CAD installations costing over $15,000. Features include a precision hand-held controller to draw to exact dimensions.

The CAD-1 software only, including controller and user manual, costs $1,095. Chessell-Robocom is located at Suite 2B, 125 Pheasant Run, Newton, Pa. 18940.

Versatec Out With Printer

SANTA CLARA, Calif. — The Versatec, Inc. V-80 printer can be used as part of an engineering or graphics workstation with the IEEE-488 interface from Versatec.

The V-80 prints bills of materials, schedules and listings up to 1,000 line/min on roll or fan-fold paper. It permits plotting of data formatted for 100 or 200 point/in., printing of up to 256 characters, character underline and a selection of character sets and fonts. The V-80 can replace an impact printer and pen plotter and can serve as a shared-output device for a network of IEEE-488 stations.

The IEEE-488 interface is mounted on a single printed circuit board and comes with a 2.5-meter cable. OEM prices begin at $7,444 from Versatec at 2710 Walsh Ave., Santa Clara, Calif. 95051.

Mohawk 21/10 Gets More Memory, SDLC

PARSIPPANY, N.J. — Mohawk Data Sciences Corp. has announced several enhancements to its Series 21 single-station distributed data processing system, the Model 21/10, including increased memory, Synchronous Data Link Control (SDLC) communications and an 80 char./sec printer.

Memory enhancements include a doubling of main memory to 256K bytes and the addition of 5M to 15M bytes of fixed disk storage. In addition, double-sided, double-density diskettes with 1M-byte capacity allow the single-station user to compile with high-level languages formerly available only on disk-based multistation systems.

The 21/10, which formerly offered only byte-level asynchronous and bisynchronous communications channels, now also allows use of SDLC bit-level communications protocol. SDLC offers reduced turnaround time, inherent conversational mode, total data transparency and full-duplex capabilities, the firm said.

The 80 char./sec printer is a dot matrix model with a 96-char. graphics set. The single-station system also supports 40, 45 and 120 char./sec printers.

The Series 21 single-station distributed system ranges in price from $6,000 to $20,000 from Mohawk Data Sciences at 7 Century Drive, Parsippany, N.J. 07054.

Optical Lens Site Uses DP Service

(Continued from Page 75)
continued to provide system monitoring, software updating, maintenance and diagnostic support when necessary.

"One of our major concerns was to have as smooth an installation as possible," said Ray Hyman, SRO's executive vice-president. "We are a service-oriented business, even though we're a manufacturer, and we cannot afford an interruption in that service. A service firm itself, ADP understood our needs."

SRO processes between 200 and 250 invoices every business day. Prior to the ADP system, all invoicing and inventory processing was done manually, using automated billing machines and a battalion of clerical help. "Before we went on the ADP system, there really was no good way of telling how long it took to process an order completely," Pomerance said. "Now I'd say that the picking of an order alone is 40% to 50% faster, and we're able to number sequentially the items picked. Record keeping and inventory control in our business, being a quasi-medical industry, is very important," he added.

Because an invoice does not necessarily produce payment within 30 days — customers pay within the range of 30 to 75 days — SRO requires help with its accounts receivable. On the second work day of the month, SRO statements, which average 1,700 monthly, are mailed out, offering an early-payment discount incentive. This discount, built into the ADP system, has been responsible for improving the company's cash flow.

SRO also receives a series of monthly and weekly management reports that provide the company and its sales force with insights into customer activity.

"We really feel that everything promised was delivered. The training was first-class. Our people were guided through the system expertly. And we were surprised at the ease with which the system was installed," Hyman said.

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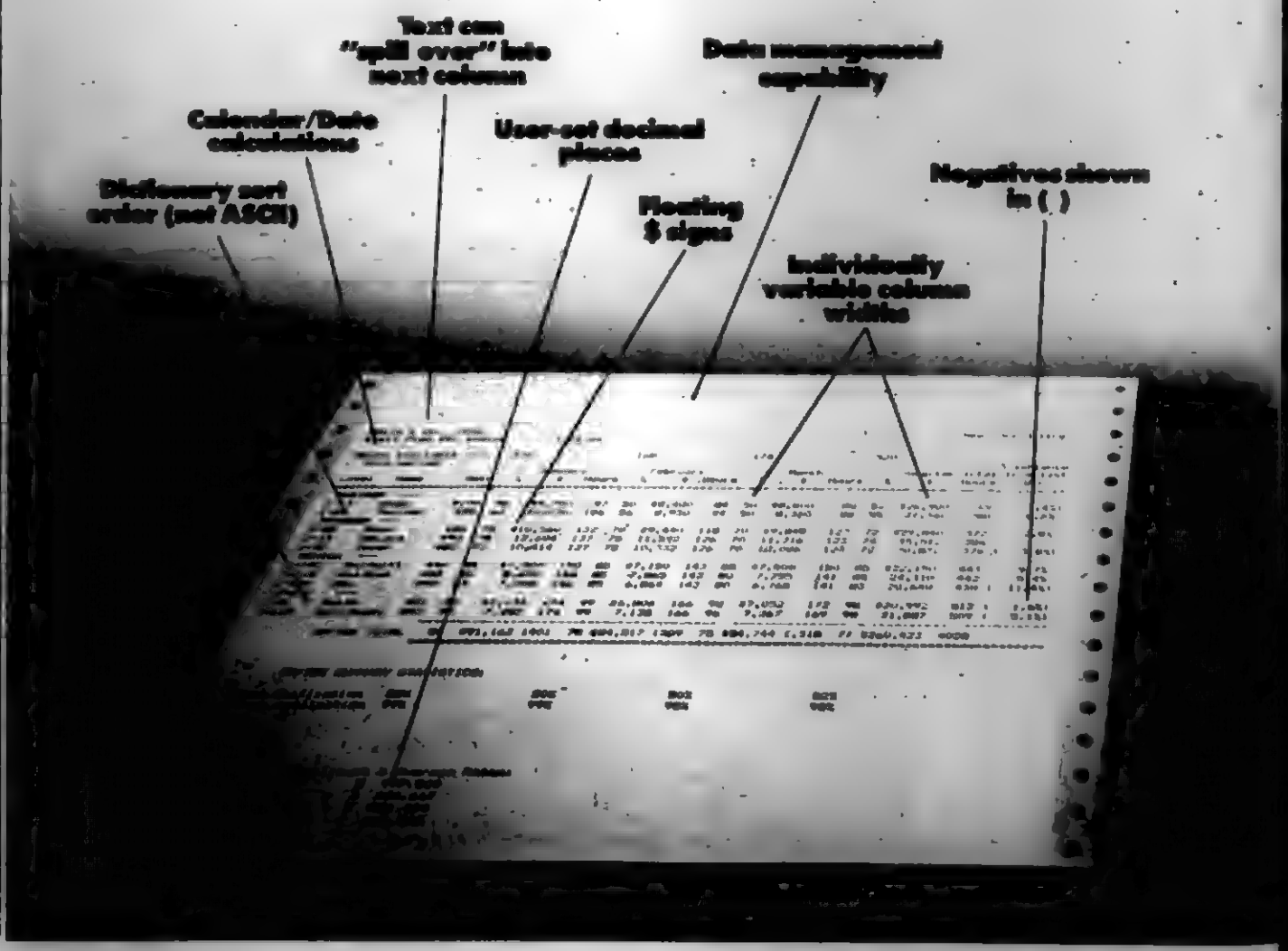

Winnie Disk Option Backs TI Professional Computer

DALLAS — Texas Instruments, Inc. has announced a 10M-byte Winchester disk option for TI's Professional Computer that doubles users' data and program storage capabilities.

The 10M-byte disk reportedly is compatible with the 1.25 version of Microsoft, Inc.'s MS-DOS operating system and fits inside the system unit.

Suggested retail for the 10M-byte Winchester is $2,295 and includes both the controller board and diagnostics software package. A limited quantity of the 5M-byte disk currently being used with the system is also available at the reduced price of $1,795.

TI can be reached through P.O. Box 402430, Dallas, Texas 75265.

Built Around NS16032 Chip

High-Speed CPU Supports Intel

GOLDEN, Colo. — Unidot, Inc. recently announced a high-speed central processor built around a National Semiconductor Corp. NS16032 chip and designed for high-performance users in an Intel Corp. Multibus environment.

The Unidot UB3050 was designed with 8K bytes of cache memory with an access time reported to be 45 nsec.

The NS16032 has full 32-bit internal arithmetic and an instruction set suitable for higher level languages, a Unidot spokesman said.

The Intel Multibus interface provides support for up to 16M bytes of memory using 24-bit addressing and will also accommodate smaller systems with support for 16 and 20 bits.

Other features include two asynchronous/synchronous serial ports with RS-232C interface, battery-backed time-of-day clock, programmable real-time clock, memory management unit, floating point processor and up to 32K bytes of programmable read-only memory.

Single board price is $3,995. Further information is available from Unidot, Suite 231, 602 Park Point Drive, Golden, Colo. 80401.

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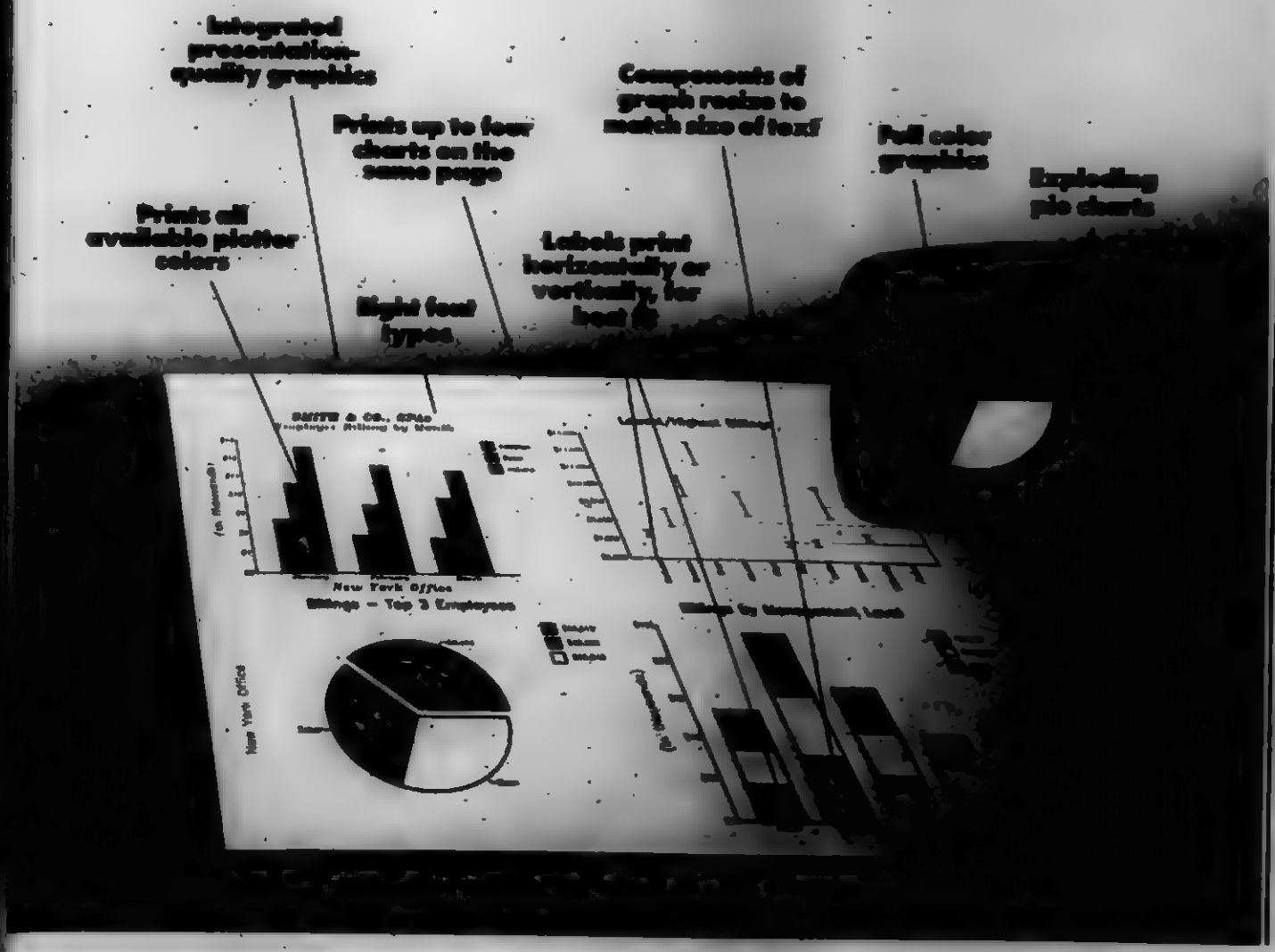

Micro Entry Designed For Credit

ATLANTA, Mich. — Creditor Resources, Inc. (CRI) has announced the release of the Loan-Pro 1000, the latest in its series of microcomputer systems designed for credit unions.

The Loan-Pro 1000 system is said to feature an OSM Computer Corp. Zeus multiprocessor microcomputer, which is expandable up to 128M bytes of high-speed disk storage and capable of providing up to 32 separate terminal users access to a wide range of software.

A typical Loan-Pro 1000 system consists of four terminals, one printer and one communications port with word processing, spreadsheet and Loan-Pro software. It costs $765/mo, including installation, staff training and maintenance. CRI is located at Suite 717, 4350 Georgetown Sq., Atlanta, Ga. 30338.

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Configuration Options Out For APS-Microcomposer

NEWBURY PARK, Calif. — Autologic, Inc. has announced several configuration options, including a 120M-byte disk storage device, to enhance its APS-Microcomposer.

Autologic said disk storage may be selected in configurations providing three 20M-byte disk storage units for a total of 60M bytes on-line or three 40M-byte disk units for a total of 120M bytes. APS-Microcomposers installed with 40M-byte disk storage can be increased with either a 20M-byte or 40M-byte disk storage attached to the base unit, and APS-Microcomposers installed with 20M-byte disk storage can be increased with a 20M-byte unit.

The vendor also announced a streaming tape drive for archival storage and a circuit board designed to convert a workstation into a preview monitor.

Each 20M-byte disk storage unit is priced at $10,000 and the 40M-byte unit at $17,000. The magnetic streaming tape drive, with controller, is priced at $10,750, and the preview option board is priced at $2,500. More information can be obtained from Autologic, 1050 Rancho Conejo Blvd., Newbury Park, Calif. 91320.

Debut of 2187A Expands Family Of Intel RAMs

SANTA CLARA, Calif. — Intel Corp. has introduced the second product in its family of integrated random-access memories (RAM).

The 2187A 64K-bit integrated RAM is a high-density random-access memory organized as 8,192 words by 8 bits. Designed for synchronous applications where arbitrary wait states or system delays are not allowed, the 2187A features a refresh row-address counter and multiplexer on the chip, a power-down automatic refresh mode and extended cycle operation, Intel said. It includes access times of 250, 300 and 350 nsec.

The price of the 2187A integrated RAM is $19.95 in quantities of 1,000 from Intel's Literature Department at 3065 Bowers Ave., Santa Clara, Calif. 95051.

Micro Offered With Winnie For 100% Backup

HUNTINGTON BEACH, Calif. — Advanced Digital Corp. (ADC) has announced the Super Star microcomputer system, an S-100-based system with a removable cartridge Winchester drive providing 100% backup.

With the removable cartridge, the user reportedly can store data equaling 50 floppy diskettes on one 5¼-in., industry-standard 5M-byte cartridge, a spokesman for the company said. Combined with Super Star's standard 5M-byte fixed Winchester drive, they provide 10M bytes of on-line storage and backup, according to the vendor.

Super Star's features include Digital Research, Inc.'s CP/M operating system, expandability and service for up to four or more users, a 48 track/in. floppy disk drive and switch-selectable 110V/220V power supply, the vendor said.

In a single-user application, Super Star's suggested retail price is $4,800. For multiuser applications, the vendor's Super Slave single-board slave processors are priced at $575 each, according to the spokesman for the vendor.

ADC is located at 5432 Production Drive, Huntington Beach, Calif. 92649.

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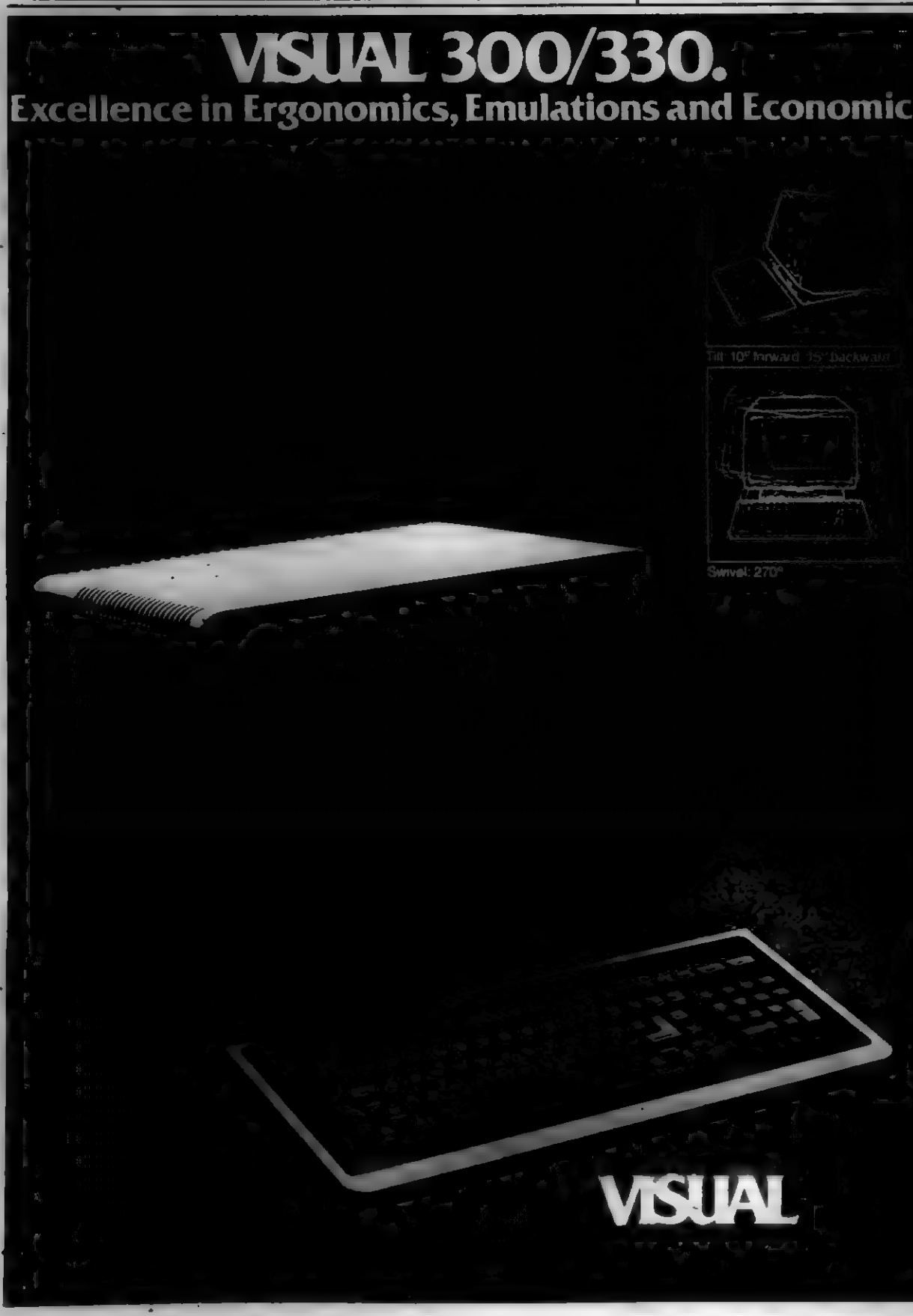

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Implications Changing Industry

De Facto Standard Propels Micros

By Stanley S. Shein
Special to CW‡

The microcomputer revolution is even more revolutionary than was the introduction of minicomputers.

What's revolutionary is that the vast majority of the microcomputer manufacturers decided to design their computers to use the same operating system — Digital Research, Inc.'s CP/M — thus creating a de facto standard. For the first time, a user can take a program out of one computer and put it into another as easily as moving a cassette tape from a car stereo to a home stereo. The implications are already changing the industry:

- We can afford to write a really good piece of software for $100,000 and sell it for as little as $1,000 if we know we have the chance to sell it many times.
- Virtually all of the nonconforming manufacturers have announced that they either will have CP/M models or they will sell a board to allow users to run CP/M on their micros.
- Anyone who buys (or owns) a small computer using a proprietary operating system has an Edsel on his hands.

Probably the most important single upheaval is the universal operating system CP/M. It makes it possible to buy and maintain entire software systems for a fraction of the total cost of development and maintenance and to create a mass market for the creation, publishing, distribution and evaluation of thousands of new software products.

The micro revolution means several things:

- Ease of installation. First-time users can be up and running in a few days. Training is minimal since the programs are very tutorial (user friendly). Companies already operating large computers often face add-on expenses in excess of $100,000 and installation periods of a year to install a new application that can be done overnight on a micro for as little as $15,000.
- Makes hardware a commodity. Given its small size and a standard operating system, computer hardware now becomes a commodity with interchangeable components. It is now possible (really preferable) to buy a computer system as one hitherto bought a stereo — getting the best terminal, printer, central processor and even the best software for each application.
- Maintenance. Thanks to reduced size and interchangeability, the field service staff can actually swap out the offending terminal or central processor with another unit, using only a screwdriver, and have the user up and running in a matter of minutes (not so with minis or mainframes).
- CP/M limitations. Apple Computer, Inc.'s Apple and Radio Shack's TRS-80 are 8-bit personal computers with limited software and hardware capabilities. Large, well-known computer companies such as IBM and DEC have gone to great pains to limit the capabilities of these personal computers to avoid displacing their own proprietary-based, more profitable minicomputers. CP/M effectively makes the computer a commodity. The big computer manufacturer doesn't like this and continuously tries to keep the customer locked into a particular computer. The proprietary approach utilizes operating systems and other software to accomplish this.

CP/M is a single-user system. MP/M (also from Digital Research) provides a limited multiuser capability of two to three users.

However, there are CP/M-compatible multiuser systems — including systems with up to 15 terminals, 300 million characters of disk with tape backup — which out-perform minis costing $40,000 more and utilizing CP/M software.

Until recently, Unix usage was confined to larger computers. The exploding availability of 32-bit supermicros will allow current users of large minis and mainframes to get new computer systems at only slightly higher costs than CP/M users pay.

Shein is president of Management Techniques, Inc. in Boston.

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According to IWP Survey

Upper Management Lacks OA Training

WILLOW GROVE, Pa. — One of the key methods for gaining acceptance of office automation is to train employees to feel comfortable with equipment and applications software. Unfortunately, most organizations provide standard training programs only for word processing operators and not for principals or upper management.

This is the conclusion of a recent survey conducted by the International Information/Word Processing Association (IWP) here.

"Although current information processing systems include much more than simply word processing, most organizations provide standard training programs only for word processing operators and not for principals, including upper management," the survey concluded.

Approximately 69%, or 650 of the 946 people who responded to the IWP poll, said their organizations provide standard training programs for word processing operators, while only 25% provide a standard training program for principals and only 8% provide a standard program for upper management.

According to the survey, the majority of word processing operators receive between 10 and 50 hours of training per year. Many others indicated that operators receive up to 100 hours per year. By comparison, other users of office automation equipment receive little, if any, training.

"Principals who are being trained generally receive zero to 10 hours of training," the survey noted. "There was also a large percentage who did not answer the question, and it is assumed that the companies of these respondents offer little, if any, training to principals."

Debra Haverson, the author of the study, said it is "not surprising" that word processing operators are receiving more training, since word processing is still the dominant area of office automation.

"Most companies, however, are beginning to realize that others must accept and learn to use automated equipment in their work environments," the survey noted.

According to the survey, the growth of the integrated office and increased use of executive workstations will demand that companies alter their approach to training management.

"People will need to acquire basic computer skills to keep up in the office of the future, and IWP has no doubts that companies will respond to these needs," the survey noted.

"I think standard is the key word here," said Haverson. "With so many personal computers in the office, users are getting support and training, but it is not standardized.

Haverson was optimistic, however, and added that based on her interviews, "there is definitely a trend toward a standard training program for popular programs such as [Visicorp's] Visicalc.

The IWP survey is available for $25 from the association at 1015 N. York Road, Willow Grove, Pa. 19090.

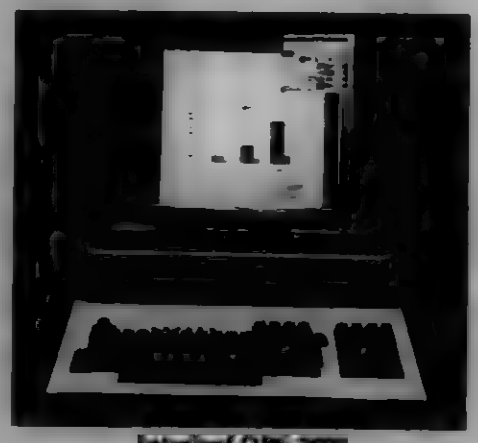
Publishing System Includes Laser Printer, Graphics Controller

BOSTON — Interleaf, Inc. has introduced a computer-aided publishing system said to produce illustrated documents with multiple-font word processing, business graphics, diagramming and laser printing.

OPS-2000 reportedly enables a user at a stand-alone workstation to create, edit, compose and produce copies of illustrated documents containing both text and graphics.

The system is said to be compatible with the word processing systems for the IBM Personal Computer, IBM-compatible microcomputers and Wang Laboratories, Inc. word processors.

(Continued on Page 84)



Interleaf OPS-2000

Four-Phase Unveils Maestro to Assist In Producing Code

CUPERTINO, Calif. — Four-Phase Systems, Inc. has introduced an integrated hardware/software office automation system designed for programmers, systems analysts, technical writers and other software development personnel in producing code and documentation for host mainframes.

The Maestro supports all phases of soft-

(Continued on Page 87)

Voice Messaging to Increase In Popularity, Managers Say

By Jim Bartimo
CW Staff

SAN DIEGO — The average business call lasts five to seven minutes, but less than a minute of that time is spent on business. The remaining time is dedicated to small talk and other dialogue.

For that reason, voice messaging systems that deliver a short, concise message will not degrade the quality of telephone communications, according to George Plotzke, district manager of market planning for AT&T Information Systems, Inc.

Plotzke and Emil Wang, group product manager for Rolm Corp., reviewed the issues of voice messaging and office productivity at the Tele-Communications Association annual meeting held here recently.

Voice messaging systems have been cropping up in the communications marketplace since the inception of the private branch exchange (PBX). The combined computer power of the PBX and messaging system allows recorded voice messages to be stored and forwarded to users who are away from their desks or already on other calls.

"In the next several years, voice messaging will be a standard feature on all PBXs," Wang said. The reason? "Studies show that half the time I call you, you

(Continued on Page 84)

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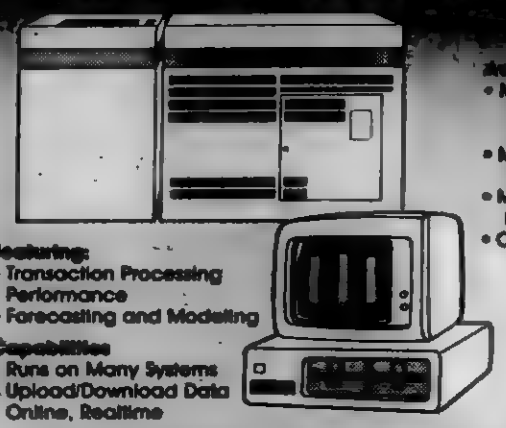

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Voice Messaging Seen Increasing in Popularity

(Continued from Page 83)

won't be there," Wang said.

Current manual messaging systems are seldom used to their fullest potential today because people do not trust humans to take messages accurately, Plotzke said. "Only 9% of the people leave a complete enough message to let the receiver take some action without calling back," he said, citing an AT&T study.

The same study revealed that "voice mail can displace 12% of paper mail received today," Plotzke said. Both also warned that users may begin to overuse a voice mail system and hinder productivity as well as enhance it.

Another issue in voice messaging is that it infringes on the DP department's territory.

"You're going to have to integrate the two departments," according to Plotzke.

While this new technology is aimed at increasing productivity, Plotzke said that the AT&T study found it impossible to measure productivity accurately.

The only measure that Plotzke said is useful is that of production time, pointing out that "if [Revlon, Inc.] can make a lipstick in six months instead of nine, they have achieved a gain in productivity."

Plotzke said that his voice messaging saves him an hour per day and will save most people half an hour per day of telephone conversation.

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Interleaf Unveils OPS-2000 System For Publishing

(Continued from Page 83)

The system includes a laser printer with graphics controller and a Motorola, Inc. 68010 microprocessor-based workstation with CRT terminal. The printer reportedly operates at 10 page/min, and the workstation itself is said to include 1M byte of main memory, a 31M-byte Winchester disk drive, a 20M-byte streaming cartridge tape drive and a bit-mapped screen displaying black on white with a resolution of 800 by 1,000 pixels. The system also includes a cursor-driving mouse.

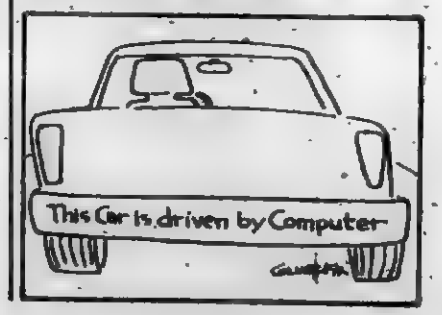
The Interleaf terminal, keyboard and mouse are provided by Sun Microsystems, Inc. of Mountain View, Calif., and the printer is from Imagen Corp., also of Mountain View, according to a vendor spokeswoman.

OPS-2000 can produce documents of up to 1,200 pages, while providing the user with the capability to receive printed output at any time during the editing process, the spokeswoman said. Documents can reportedly contain text in multiple typefaces and type sizes, numerical data in tabular form, business charts and diagrams drawn on the screen.

The system features automatic pagination and a document editor said to enable a user to change the format of a document by issuing single commands.

Graphics functions in the software include data-driven business graphics such as pie and bar charts.

Available 30 to 60 days after receipt of order, the OPS-2000 is priced at $60,000. More information is available from Interleaf at 955 Massachusetts Ave., Cambridge, Mass. 02139.



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Ethernet Gets Spreadsheet, Language Capability

PALO ALTO, Calif. — Xerox Corp. has announced additional software for its Ethernet local-area network that is said to include an electronic spreadsheet and the availability of Japanese and Russian language capability.

Also announced was a 42M-byte disk drive for increased storage on the 8010 microcomputer and a software enhancement for electronic printing, filing and mailing.

The electronic spreadsheet reportedly allows users to handle such spreadsheet operations as forecasts and operating budgets. A large display reportedly allows users to show a full year of data; with 55 rows at column-width size.

Announced last April and now available, the Japanese and Russian language capability reportedly allows users to mix text in any combination of 10 languages: English, Japanese, German, French, Spanish, Italian, Swedish, Portuguese, Greek and Russian.

Available Nov. 1, the spreadsheet program costs $300. The Russian software is provided for the 8010 system at no extra cost. The Japanese software costs $1,200 for typing logic and $800 for display fonts and Japanese dictionary. The 42M-byte disk drive is priced at $21,055.

Xerox's Office Systems Division is located at 3333 Coyote Hill Road, Palo Alto, Calif. 94304.

Canon USA Offers FAX-300 Facsimile Series

LAKE SUCCESS, N.Y. — Canon USA recently introduced its FAX-300 series of desktop digital facsimiles.

The Group III transceivers, which the company claims feature the latest in digital facsimile technology, offer transmission capability in the 20-sec range and are compatible with Group II facsimiles, allowing for communications with a broad range of equipment. The Group III transceivers are said to be capable of sending a message across the country in 22 seconds, and they provide that speed at a per-unit cost that is comparable to the cost of slower 40-sec facsimiles, the firm said.

The FAX-330 is equipped with Canon's Automatic Background Control Function and can differentiate between colored background and text or drawings. The system is said to "white out" automatically background colors for enhanced readability and the clearest possible facsimiles.

The FAX-320E is said to offer everything the FAX-330 offers plus additional features for increased versatility. It offers both enlargement and reduction capabilities and can enlarge as much as 33% with resolution increased from 200 by 200 line/in. to 272 by 261 line/in. for easier reading.

The retail price of the FAX-330 is $4,495 and $5,995 for the FAX-320E. Both units will be available from Canon facsimile dealers in October.

More information is available from The Rowland Co., Inc., 415 Madison Ave., New York, N.Y. 10017.

Electronic Mail Debuts for Users Of DEC PDP-11s

RICHMOND, Va. — Horizon Data Systems has introduced an electronic mail and filing system for Digital Equipment Corp. PDP-11 minicomputers running under the RT-11 and TSX-Plus operating systems.

Quick-Mail can reportedly write, edit, send, read and print messages. The system also reportedly supports "things-to-do" lists as well as personal calendars reminding users of important meetings and other events.

Small files such as utility subroutine source code can reportedly be archived, annotated and extracted when needed. Bulletin boards on the system announce price changes, bug fixes and other items of general interest.

Priced at $650 for a single CPU, Quick-Mail is available from Horizon Data Systems at 1901 Wildflower Terr., Richmond, Va. 23233.

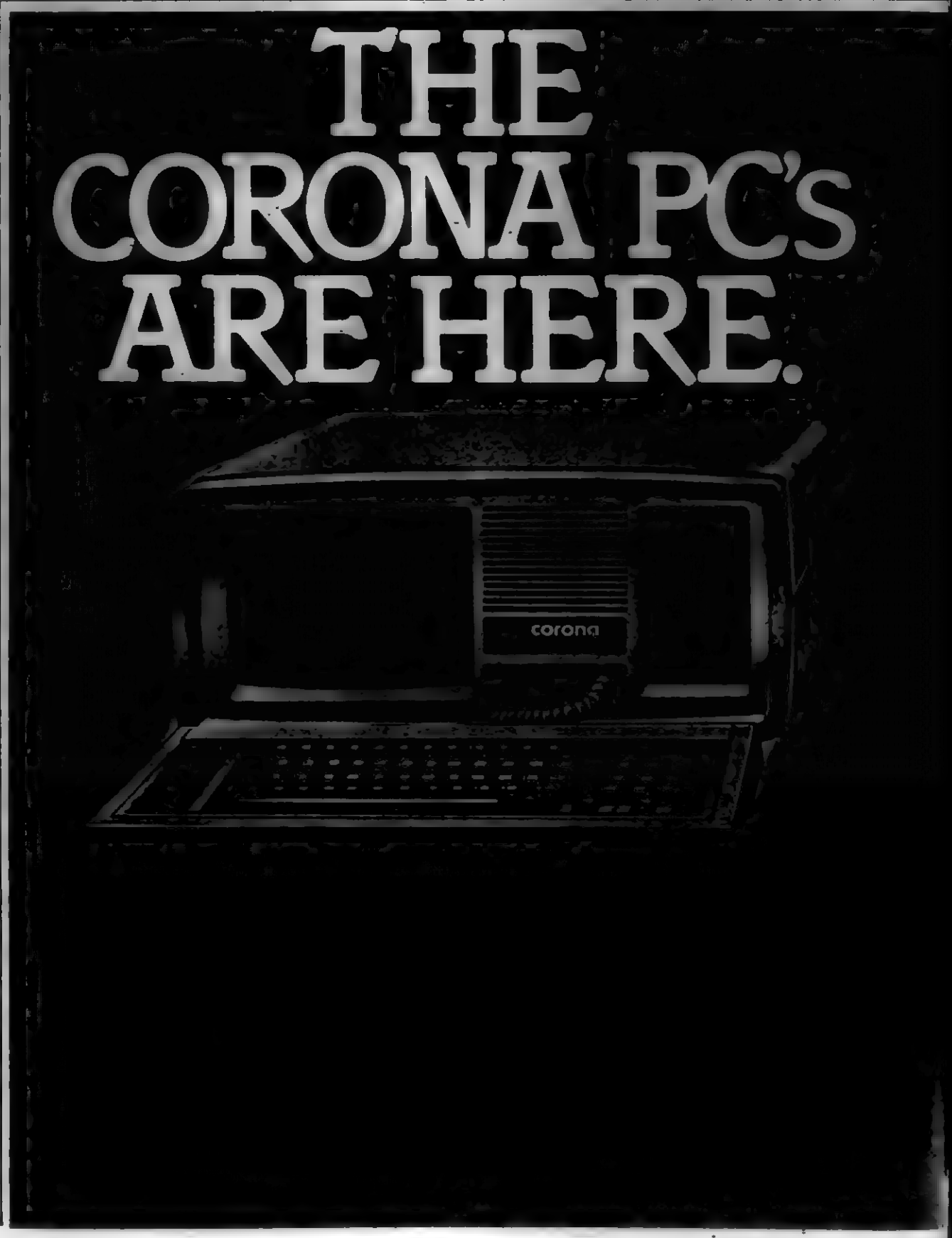
Feature Converts IBM Typewriter

RYE BROOK, N.Y. — IBM announced that its electronic typewriters, the Model 65 or Model 85 can be used as letter-quality printers for the IBM Personal Computer with an attachment feature from IBM.

Consisting of a circuit board installed in the typewriter and a 6½-ft cable connecting it to the computer, the feature allows either typewriter to operate as a 15.5 char./sec printer.

The IBM 65/85 Personal Computer attachment, including software and field installation of the circuit board and cable, costs $345.

IBM Information Systems Group is headquartered at 900 King St., Rye Brook, N.Y. 10573.



Teleconferencing Seminars

Details Released on 1984 'Teleforum' Series

RIDGEFIELD, Conn. — Just as you were growing comfortable with terms such as telecommute, telecopy and teleprocessing, here's a new one to ponder: Teleforum.

At a "national press conference" conducted via teleconference last week, N. Dean Meyer and Associates, Inc. announced its second year of office automation seminars, so conveniently located that attendees need travel no farther than the nearest speaker phone.

The Office Automation Teleforum Series is a series of miniconferences with the audience scattered throughout the U.S. and Canada, all hooked together over telephone lines for managers to exchange ideas and listen to wisdom from the likes of Wang Laboratories, Inc.'s Fred Wang and Dr. Robert M. Metcalfe, inventor of Xerox Corp.'s Ethernet.

Sponsor Status

To participate in the seminar, users must pay $1,750, which confers sponsor status upon you and allows any of your company members to attend the program.

The 1984 Teleforum Series is divided into three sections: "The Maturing of Office Automation," "IBM Personal Computer Systems and Applications" and a series for vendors called "Alternative Images of Future Offices." The sections will be comprised of five two-hour sessions, each with a principal speaker.

Each session has between 130 and 150 "attendees" at 16 separate locations. Of course, allowing everyone to participate actively would create havoc, so each location delegates a group spokesman.

"Not having to travel is one of the most attractive features of the Teleforum Series," commented Thomas Billadeau, president of Office Systems Consulting Group, Inc. in Cambridge, Mass., and co-host of the vendor series.

The first series on office automation will begin in March 1984, along with the series on IBM Personal Computers. There will be a two-hour session every other month.

More information is available from N. Dean Meyer and Associates, 233 Mountain Road, Ridgefield, Conn. 06877.

Maestro Aids In Producing Host CPU Code, Documentation

(Continued from Page 83).

ware development from system specifications through final release, a vendor spokesman said. It also provides word processing/text processing, electronic mail; automatic calculator, information retreival and project management.

Syntax menus are available for Cobol, Fortran, PL/I and other languages. Reserved and key words are generated with a single keystroke to reduce compilation errors, a spokesman said.

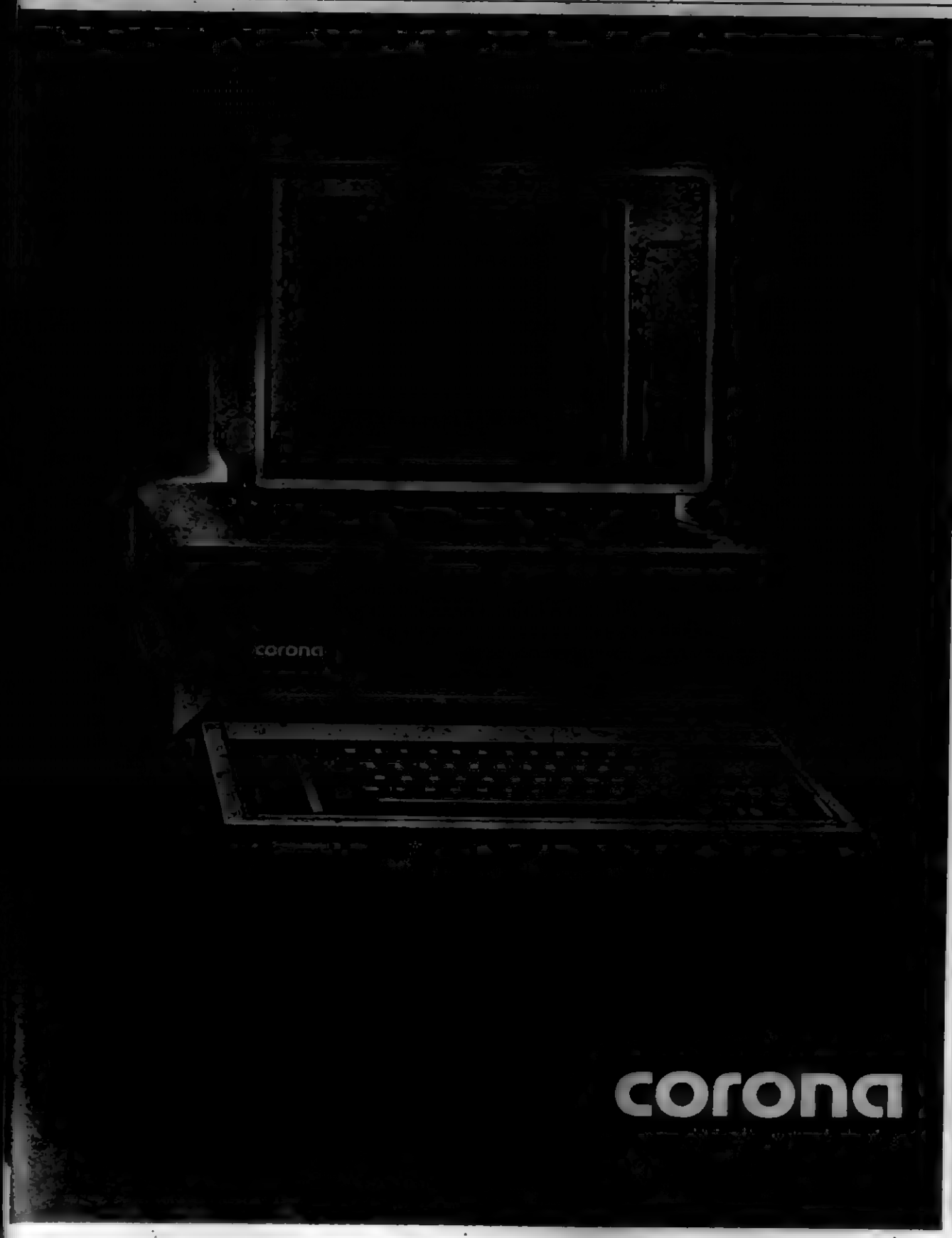
Supports 24 Workstations

The system can support up to 24 workstations. The workstations can reportedly communicate with each other or with IBM or compatible mainframes. The system also supports both batch and interactive communications with mainframes from Sperry Corp., Honeywell, Inc. and Control Data Corp., a spokesman said.

The cost of a standard configuration consisting of a CPU, 480K bytes of random-access memory, 24 workstations, disk controller, two 67.5M-byte disk drives, 450 line/min printer, two communications controllers and software license is approximately $197,000.

Monthly maintenance and installation fees are charged separately, the spokesman noted.

More information on the system is available from Four-Phase, 10700 N. De Anza Blvd., Cupertino, Calif. 95014.



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Cbema Rejects Government Intervention

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The Computer and Business Equipment Manufacturers Association (Cbema) has issued an industrial policy position paper rejecting direct government planning and intervention in the economy.

"Attempts to legislate or massively regulate what should be marketplace decisions can lead to a confused and stagnant economy, periodically and seriously disrupted by changes in political philosophies," according to Cbema.

Cbema spokeswoman Charlotte LeGates said the document will be used to represent the association's views on Capitol Hill and to the public in general. She said Cbema "will be doing a great deal more" work with legislators on this issue.

The position paper was presented Sept. 28 at Cbema's annual fall meeting here. At that time, the association, which represents 42 firms, including all the major computer hardware manufacturers, also said it has opened its membership to companies dealing in software and telecommunications products.

LeGates said the move will make the association "more representative" of the computer industry as a whole. "A large percentage of our current member companies' revenues are from software," so "it made less and less sense" to exclude software firms, she explained.

The Cbema industrial policy statement said the U.S. already has a de facto industrial policy, consisting of "the sum of all laws, regulations and judicial decisions that govern the way we do business, the way the marketplace grows and changes and the way the domestic and international marketplaces interact."

Although it rejected direct government intervention in the name of industrial policy, the document said the association does support "improvements to government policies that create broad incentives for business expansion" through:

- **Tax policy.** Cbema said tax policy should encourage capital formation and growth, extend rapid depreciation benefits to

(Continued on Page 94)

In Wake of Losses

Modcomp Cuts Work Force by 14%

FORT LAUDERDALE, Fla. — After two consecutive quarters of losses in 1983 and an 85% profit decline in the last quarter of 1982, Modular Computer Systems, Inc. (Modcomp) has slashed its work force by 14% or 170 workers.

For the most part, those affected by the reduction in force are white-collar professionals in every department except sales, the systems maker said. Most discharged workers will receive full salary and benefits for at least two months, although a company spokesman said it is unlikely they will be rehired in the near future.

Commenting on the discharges, Gabriel A. Rosica, president and chief executive officer, said they were "necessitated by the continued declining level of orders the company has experienced and the fact that the company's overhead structure had been established in anticipation of improved order rates that haven't materialized."

Rosica also said, "These factors have combined to produce operating losses which can't be sustained indefinitely. Therefore, this reduction should help minimize such losses in the near term and put the company back on track for a return to profitability."

Otherwise, Rosica said, the company will initiate cost control measures, including the subleasing of about 168,000 square feet of factory and office space.

Modcomp has also hired a new sales director and consolidated customer service and manufacturing operations in one site. Rosica said the company will announce new products at year's end and will gear up its product advertising campaign in anticipation of the announcements.

Modcomp lost $550,000 in the second quarter of this year compared with a $583,000 profit the same period a year earlier.

In what may well have been a first, McCormick & Co., Inc. President Hillsman Wilson used a computer terminal to touch off a small explosion at a ground breaking in Hunt Valley, Md.

Shakeout: More Myth Than Reality?

By David C. Dykstra
Special to CW‡

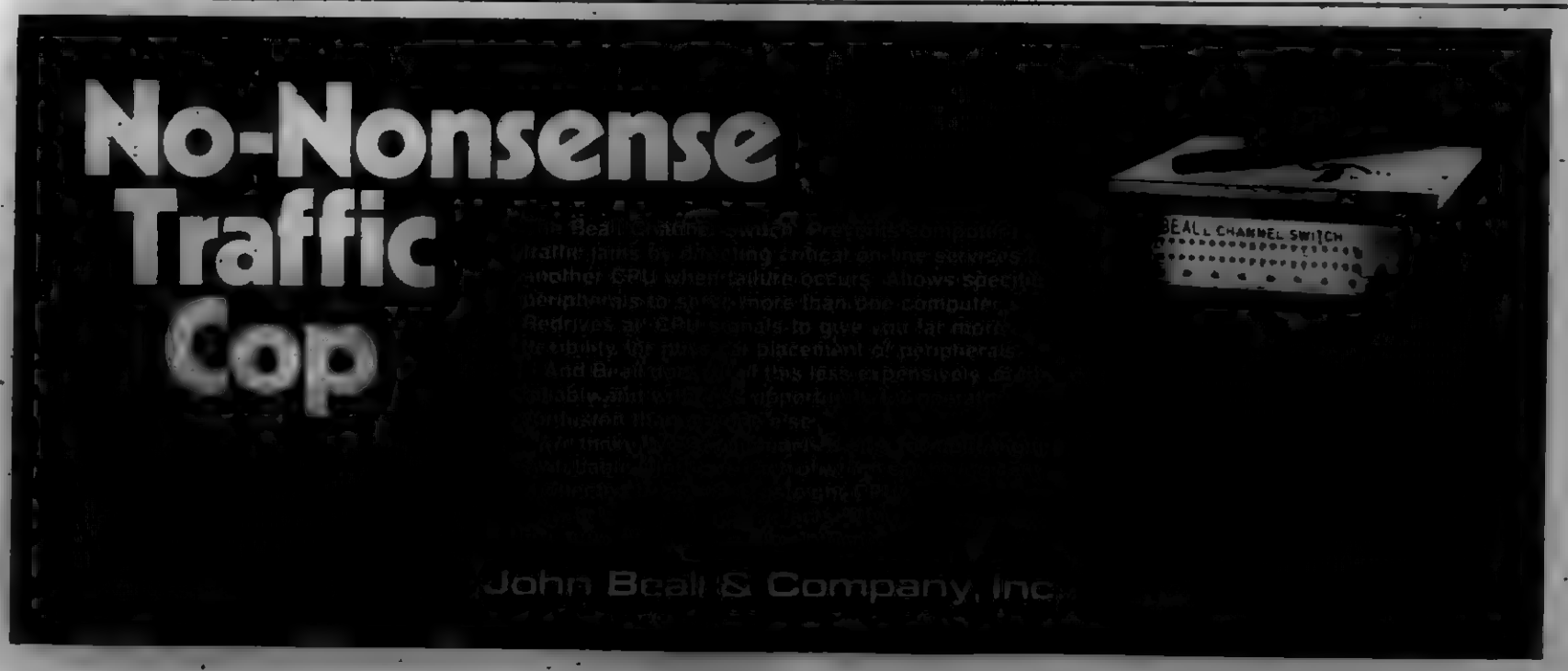
The biggest myth concerning the computer industry is that "there will be a major shakeout of computer companies and only a few companies will survive."

Analysis

Various versions of this quote have been stated by experts and printed in the media for the past 20 years. The number of companies, however, has increased every year. Many computer companies have failed, but every failure has been replaced with two or more new companies.

Many of the experts predicting the shakeout relate the.

(Continued on Page 92)



Rumors of Shakeout Seen Greatly Exaggerated

(Continued from Page 91)

computer industry to the automobile industry. The computer industry, however, is more analogous to the entire vehicle industry than the more narrow automobile industry. Even the automobile industry discovered that manufacturer-owned stores could not compete with independent dealers.

There are now over 500 companies making basic computer units. There are over 2,000 companies making computer peripherals and supplies. There are more than 10,000 businesses providing computer products and services, including software. There are many independent contractors and software developers in the new computer "cottage" industry.

Why are the experts and media predicting a shakeout? Obviously, the larger, established firms would like the public to believe this so that consumers will favor these firms. Many professionals in the computer field cannot, or by choice do not, keep up with the rapid changes in available products. The safe recommendations are for them to favor the products of the largest companies.

In addition, many of the large professional firms and educational institutions are establishment-oriented. They do not believe that the freewheeling, entrepreneurial, seat-of-the-pants planning style of many new companies can develop and support technologically advanced quality products.

Many of the best small business computer products come from newer companies, not from IBM and the other large companies. Nearly every purchaser of computer products compares the product he purchases against the large companies' products.

Formidable Marketing

The newer small companies are also up against the large companies' formidable selling techniques and pressures. The small companies, therefore, could not exist if they did not have better products.

The U.S. computer industry volume is currently $125 billion per year. This is comprised of $90 billion in product and service sales and $35 billion relating to in-house programming by larger organizations. In 1982 the industry increased 25% over 1981 while the country was in a recession. More of this growth came from the newer and smaller companies than from the larger, long-established companies.

Although IBM's percentage growth over the past decade has not matched the industry (reflecting a decrease in market share), each year its dollar increase in annual sales has been greater than the total sales of the second largest firm in the industry. The majority of IBM's sales are from the very large, multimillion dollar computers.

Obviously, large percentages of growth become more difficult as size increases.

Also, the larger companies have the majority of their business in the more mature industries or industry segments that do not grow as fast as many of the newer industries or segments.

The current fast-growing segments of the computer industry are small computers, software and services. Small computers are receiving a lot of attention, but they currently represent less than 10% of the industry's product sales.

The larger companies, therefore, must continue to emphasize the larger computers. Product development and sales of smaller computers have received their impetus from the newer, smaller companies.

As the cost of computers continues to decline while performance increases, the variety of applications will increase. The niches in the computer manufacturing area will be comprised of many special-purpose computers.

Dykstra is an independent DP and office automation consultant and president of Easy Data Corp. of Newport Beach, Calif.

Qantel Files For Reversal

BOSTON — Qantel Corp. has filed an appeal in the U.S. Circuit Court of Appeals seeking to overturn a lower court judgment ordering the company to pay a systems distributor $4.9 million in damages and fees.

The appeal will likely postpone a resolution of the case until some time next year. The lower court found Qantel had acted improperly in executing a distribution contract with Computer Systems Engineering, Inc., of Burlington, Mass.

The same court last month denied Qantel a retrial, issuing a strongly worded statement condemning Qantel for its conduct in the matter.

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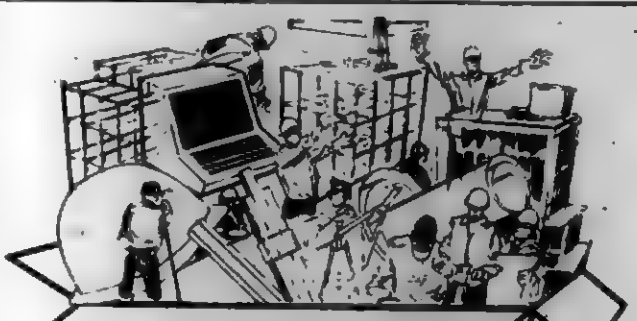
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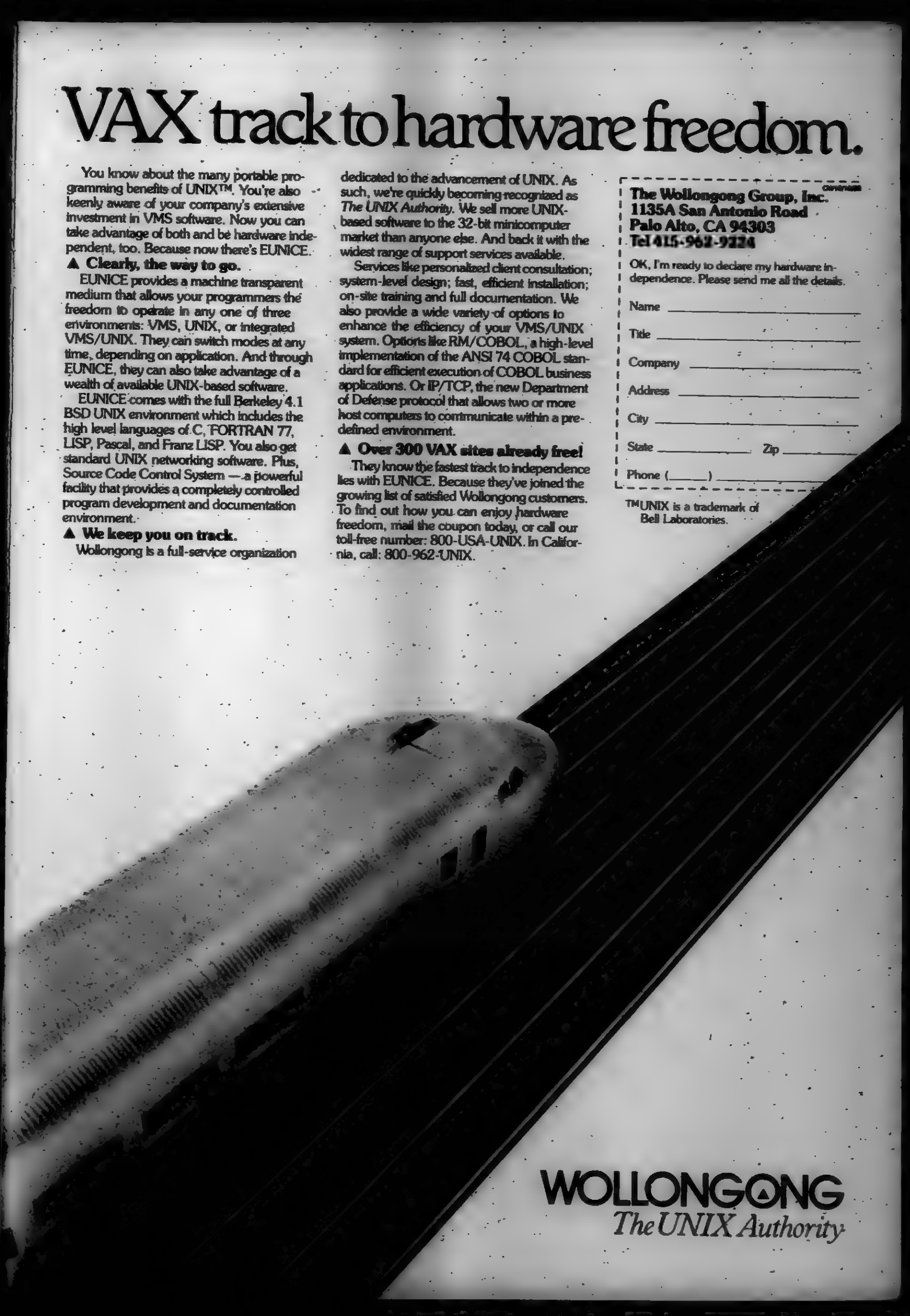

WOLLONGONG
The UNIX Authority

AM International Files Plan

CHICAGO — Business graphics equipment maker AM International, Inc. here late last month filed its proposed plan of reorganization with the U.S. Bankruptcy Court, although the principal aspects of the plan have not yet met with its creditors' approval.

The plan, subject to creditor, shareholder and court approval, provides for a combination cash and common stock settlement of debts.

The cash portion would come from funds already accumulated by the company, the pending termination of its comprehensive retirement plan, about $50 million from secured borrowings and the sale of common stock for $5 million to the employee stock ownership plan.

Further, according to the plan, allowed administrative and priority claims, allowed unsecured claims of less than $750 and secured prepetition claims would be satisfied in their full amounts.

AM International employs more than 10,000 workers.

The company posted sales of $558 million in fiscal 1983.

Cbema Paper Rejects Direct Intervention

(Continued from Page 91)

high-technology industries and promote investment in research and development.

Also, the association said, tax policy should not subject overseas earnings of U.S. firms to double taxation.

It should, however, help expand international markets by creating a Domestic International Sales Corp. alternative that is legal under the General Agreement on Tariffs and Trade, according to the association.

• **Research and development.** The paper said R&D policy should encourage and not inhibit joint R&D ventures in the private sector.

It should support advanced research projects "where there is a defined national need and where technology requirements and costs are beyond the practical commercial horizon," the paper stated.

• **Trade policy.** Trade policy, Cbema said, should promote mutually open markets by avoiding protectionist legislation, oppose "unfair" foreign government actions to protect domestic producers from competition and discourage trading partners from creating barriers to high-technology trade to foster domestic industries.

Trade policy should also "achieve a balance between export controls and export enhancement programs" and include specific export incentives.

Protecting investments in software development should be accomplished by government support of a new international treaty if software is judged inadequately protected under current agreements.

• **Technology policy.** The government should "help ease the transition to new work technologies and emphasize training workers for emerging jobs," according to Cbema, which called training a "joint responsibility of government and industry."

The association also said "technology policy should emphasize improvements in scientific and technical education."

It should, in addition, "provide information and scientific fact about work place technologies while avoiding unnecessary interference in employer/employee relations," Cbema said.

• **Telecommunications policy.** The government should "endorse competition and avoid imposing regulation on currently unregulated areas," the paper said. Also, the association maintained, telecommunications policy should support universal service while supporting cost-based pricing for telecommunications services, "encourage industry to offer the widest possible variety of enhanced services" and "promote international policies that foster growth and provide maximum flexibility in offerings."

Computer Interruptus

Midnight. And you wish you would be left in the dark. But miles away in the DP Department, a misplaced DD override, an invalid concatenation, or some other equally obscure JCL error brought production to a standstill.

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IP/TCP Internet Protocol Transmission Control Protocol is the newly adopted Department of Defense standard which provides a set of cooperative processes allowing two or more host computers to communicate.

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Reprieved at 11th Hour

House, Senate Extend Export Act

WASHINGTON, D.C. — The Export Administration Act received a 14-day reprieve just before it was to expire Sept. 30.

Both the House and Senate passed a 14-day extension of the act that places restrictions on high-technology exports to Eastern bloc countries.

Wayne Abernathy, a staff member with the Senate Banking Committee, said early last week that prospects for passage of the bill were "fair." However, with the Senate scheduled at press time to recess on Oct. 7 for 10 days, it seemed quite likely that a further extension would be required to maintain the provisions of the law.

Substantial differences between House and Senate versions of the bill to renew the act must still be reconciled after initial passage and subsequently must be submitted to both chambers for approval of any compromise that is reached.

Several industry groups have lobbied for months seeking an easing of export restrictions that are said to hinder the international competitiveness of American business.

Exec Demand Still Rising, Report Finds

PALO ALTO, Calif. — The demand for high-technology executives continued to boom in the third quarter this year, growing 47% compared with the same period last year, according to Korn/Ferry International, a management search firm.

Demand for executive talent is particularly strong in the semiconductor area, which this year awoke from the recessionary doldrums of 1982, according to Korn/Ferry's 47th Quarterly National Index of Executive Vacancies.

The index is based on a survey of 750 of Korn/Ferry's clients and examines positions paying in excess of $75,000 per year.

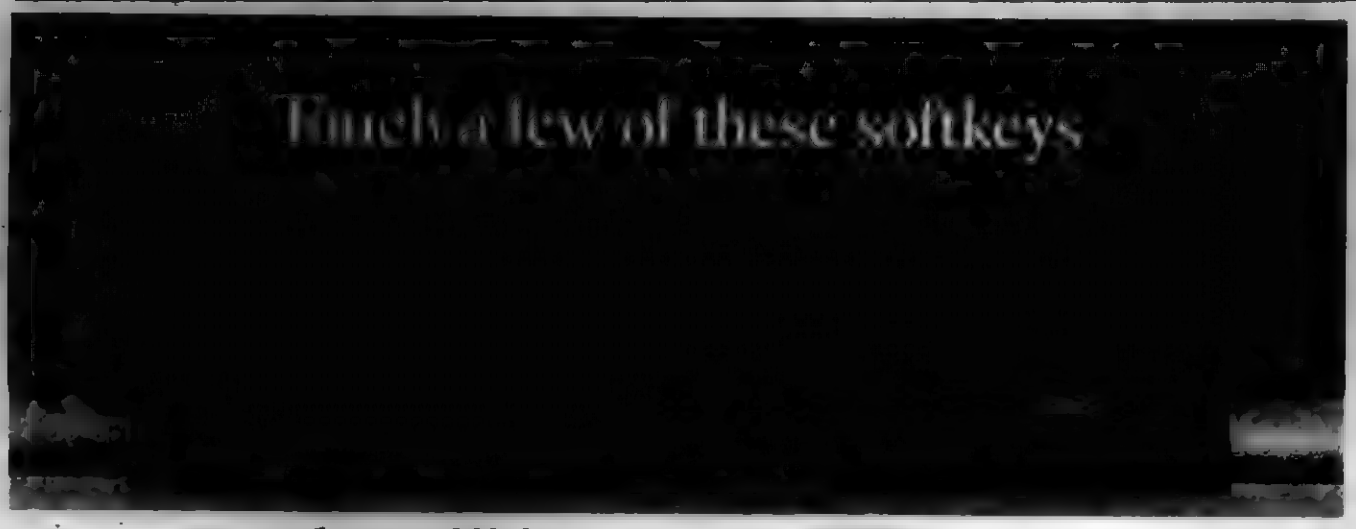
On the other hand, the home and personal computer markets are the sole soft spot in terms of executive demand, as consumers appear to be waiting for an industry shakeout and lower prices, the index showed.

Executives in greatest demand were those in general management, marketing and sales and finance. "The move to add marketing and sales managers is consistent with a recovery in which companies are beginning to launch new product lines and planning for expansion," the survey noted.

"The increase in demand for human resources officers points to intensification of company efforts to better manage and use personnel."

The East Coast continued to post the dominant share of executive hiring with 36% of the total, up from 33% the same period last year, the index showed. The West Coast followed closely with 35%, down from 38%, and the Southeast registered a sharp increase in demand to 10% from 7%, led by recruiting in financial services.

More information on the survey is available from Korn/Ferry, which is located at 277 Park Ave., New York, N.Y. 10172.



and you'll know why HP's new Protocol Analyzer could pay for itself the next time you have a network problem.

Perhaps it's time you took control of your datacomm problems. The minute one of your datacomm interfaces crashes, you're faced with more than inconvenience. A bill for service calls, as you play "vendor roulette" trying to locate the problem, can run into thousands of dollars. If you're faced with a down network, it can cost a hundred times that.

Take control with HP's new 4955A Protocol Analyzer. Its softkey-guided interface lets you troubleshoot your datacomm problems *before* you call in repair personnel. And you can monitor, simulate and trigger from 50 bps to 72 kbps. Avoid vendor fingerpointing by quickly diagnosing DCE/DTE malfunctions and isolating the fault yourself. Nonintrusively monitor network traffic to catch protocol glitches before they turn into full scale problems. Save time bringing new datacomm equipment on-line simulating modems, line, CPU, and/or terminals.

Multiple display formats are dedicated to identifying protocol problems easily at the physical interface, frame, and packet levels. In one format, the 4955A will give you *data simultaneous with lead transitions* so you can see handshaking faults at once.

The HP 4955A supports the major protocols and standard data codes. But what about your own unique protocols and architectures? Our datacomm-enhanced BASIC lets you program sophisticated test routines and perform higher-level protocol analysis. Create statistical displays (tables, graphs, histograms) and perform detailed message manipulation for your own network needs. Add to that the capability of printer output and you have permanent, long-term records of performance. Your efficiency is improved for network planning and expansion.

Communications debugging and trouble-shooting are done quickly and easily either on-line or in a post-processing mode. The 63 triggers, the most extensive in the industry, enable you to trap real time so you can catch elusive problems. The intelligent 128K-character capture memory saves you time by eliminating idles without sacrificing timing information. And you've just increased your real data storage!

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In fact, so easy you're presented only with valid choices every time you select a menu setup or change. You don't have to memorize cryptic syntax.

The HP 4955A Protocol Analyzer. It speaks your language. It speaks your network's language. It's your key to rapidly solving network problems in the datacommunications marketplace.

For a technical data sheet, write to Hewlett-Packard, Literature Distribution, 1820 Embarcadero Rd., Palo Alto, California 94304 or for more information, call your local HP sales office listed in the telephone directory white pages. Ask for an HP Instruments Field Engineer.

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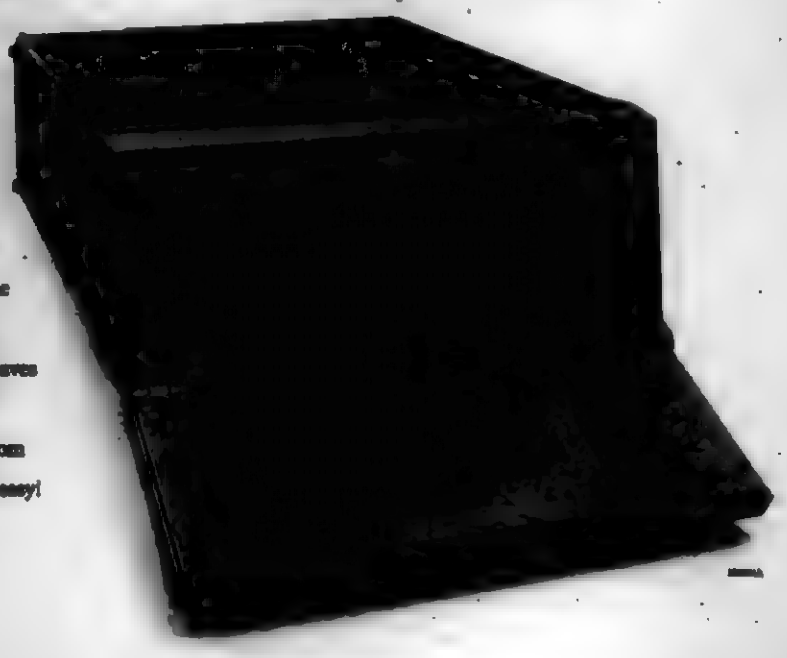

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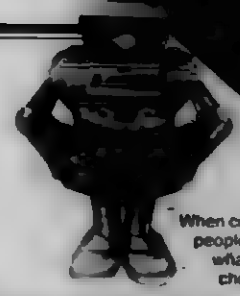
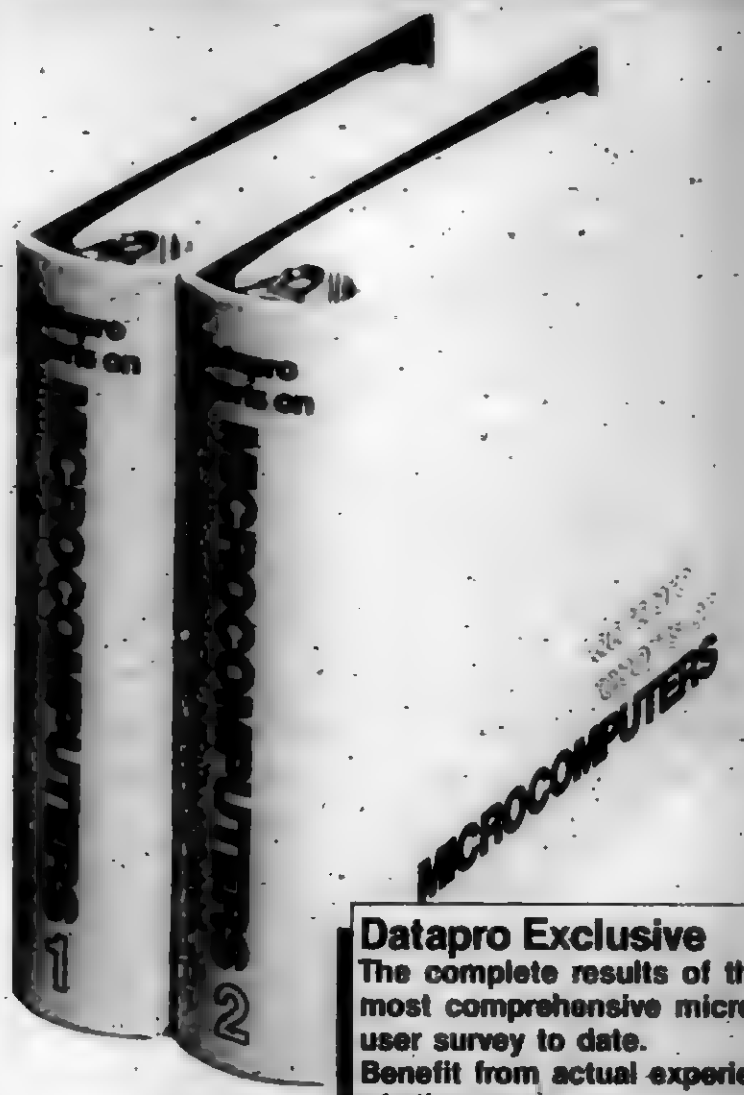


When computer-minded people want to know what's new they check with us.



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National Semiconductor Posts Sales, Profit Gains

SANTA CLARA, Calif. — National Semiconductor Corp. continued to show the renewed strength of the chip industry through the summer as it reported gains in both sales and profit for the first quarter ended Sept. 18.

The firm posted sales of $432 million, compared with $350 million a year ago, and profit of nearly $11 million or 41 cents per share, compared with $60,000 during the same period a yeas earlier. Company officials said both the components and digital systems segments of the business achieved significant operating improvements in the quarter.

Charles Sporck, president and chief executive officer, said, "The company attained the strongest order rates at any point in its history. Increased orders within the semiconductor division have resulted in longer lead times and stronger prices for some products."

Honeywell to Form Trading Firm For Companies Selling Abroad

MINNEAPOLIS — Honeywell, Inc. announced it will establish a trading company to offer marketing and distribution services to companies that wish to sell high-technology products abroad.

Honeywell High-Tech Trading, Inc. will sell through the parent's current distributors and sales agents in Europe, Latin America, the Middle East, Africa and Asia and will also use Honeywell offices in 29 countries to expedite distribution.

The new venture will be headed by Biorn Biornstad, formerly Honeywell Europe's vice-president, who will serve in his new capacity as president and general manager. Biornstad said the company will serve small to medium-size firms looking to export high-technology products and services, as well as the worldwide customers for those products. The company's strategy is to facilitate the exporting and importing of client products worldwide and, at the same time, to expand the market for all Honeywell products in those countries where Honeywell does not have affiliated companies, Biornstad added.

Honeywell High-Tech will be organized as a separate corporation, wholly owned by Honeywell and governed by a nine-member board of Honeywell executives. It will initially employ about 120 people, mostly drawn from other Honeywell operations, to handle finance, administration, marketing, purchasing and transportation support functions.

Companies interested in the service can obtain information from Honeywell at its main offices here.

Study: Most CRTs Sold Directly to End User

WELLESLEY, Mass. — The majority of CRT terminal shipments are being sold directly to the end user, according to a recent study by Venture Development Corp (VDC).

The study, titled "The Alphanumeric CRT Terminal Industry III: A Strategic Analysis," found that over 50% of dumb and smart terminals are being shipped directly to the end user.

The management consultant firm also found that the majority of these terminals were being shipped by systems manufacturers such as IBM, Digital Equipment Corp. and Hewlett-Packard Co.

The majority of terminals being sold to the noncaptive market segment are sold through dealer/distributors. These vendors distribute their terminals through various dealers and distributors, according to the study.

The study is available for $2,790, a VDC spokesman said from One Washington St., Wellesley, Mass. 02181.

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Non-Telecommunications Components

Fiber Optics Mart Seen Breaking New Ground

NEW YORK — Fiber optics technology has proven itself in commercial communications such as telephone trunk connections, but another set of applications is about to become viable, according to a recent market study by Frost and Sullivan, Inc. based here.

Short-haul applications of fiber optics in computer systems, instrumentation, process control, medicine, local-area networks and the military will generate $475 million in annual component sales by 1990, up from only $47 million last year, according to the 255-page report, "The Non-Telecommunications Fiber Optics Component Market."

Components required for these users are not the same as those needed for telecommunications. While laser diodes are preferred for long-distance applications, light-emitting diodes are sufficient for lower data transmission rates in most short-haul uses, the study reported.

The military/aerospace segment of this market will be the largest, worth $200 million in 1990, up from $30 million in 1982. The process and machine control market is second with $80 million in sales expected in 1990, up from $6 million last year.

The computer segment, comprising computer-to-computer, computer-to-terminal and intracomputer uses, will grow from $5 million to $70 million and biomedical applications from $3 million to $50 million during the same period. The commercial/business segment, including both networks and intramachine use, will increase to $45 million from $2 million, according to the study.

The consumer market, which includes automotive applications, was valued at only $1 million in 1982 but will skyrocket to $30 million in 1990.

The leaders in this market are considered to be Honeywell, Inc., Hewlett-Packard Co. and Motorola, Inc.

The study is available for $1,250 from Frost & Sullivan, 106 Fullerton St., New York, N.Y. 10038.

Masscomp's 32-Bit Mini Captures Industrial Award

CHICAGO — *Industrial Research and Development*, an international journal of research, development and quality assurance, has granted its Industrial Research 100 Award to Masscomp, based in Littleton, Mass., for the company's MC-500 32-bit multiprocessor-based computer system.

The award, created to honor the 100 most significant technological advances of the year, was presented at the International Research 100 Awards banquet held here at the Museum of Science and Industry. The Masscomp system was chosen along with products from companies such as Eastman Kodak Co., Exxon Corp., Ford Motor Co. and General Electric Co.

According to Masscomp, the MC-500 minicomputer was designed to help scientists, engineers and other users acquire, analyze and display graphs and images of data in order to monitor experiments and other real-time processes. Among the applications running on the MC-500 system are medical imaging, clinical and engineering laboratory research, computer-aided design and engineering, industrial and experimental process control, seismic research in energy exploration and stress and vibration testing.

Micro Add-Ons Focus of Report

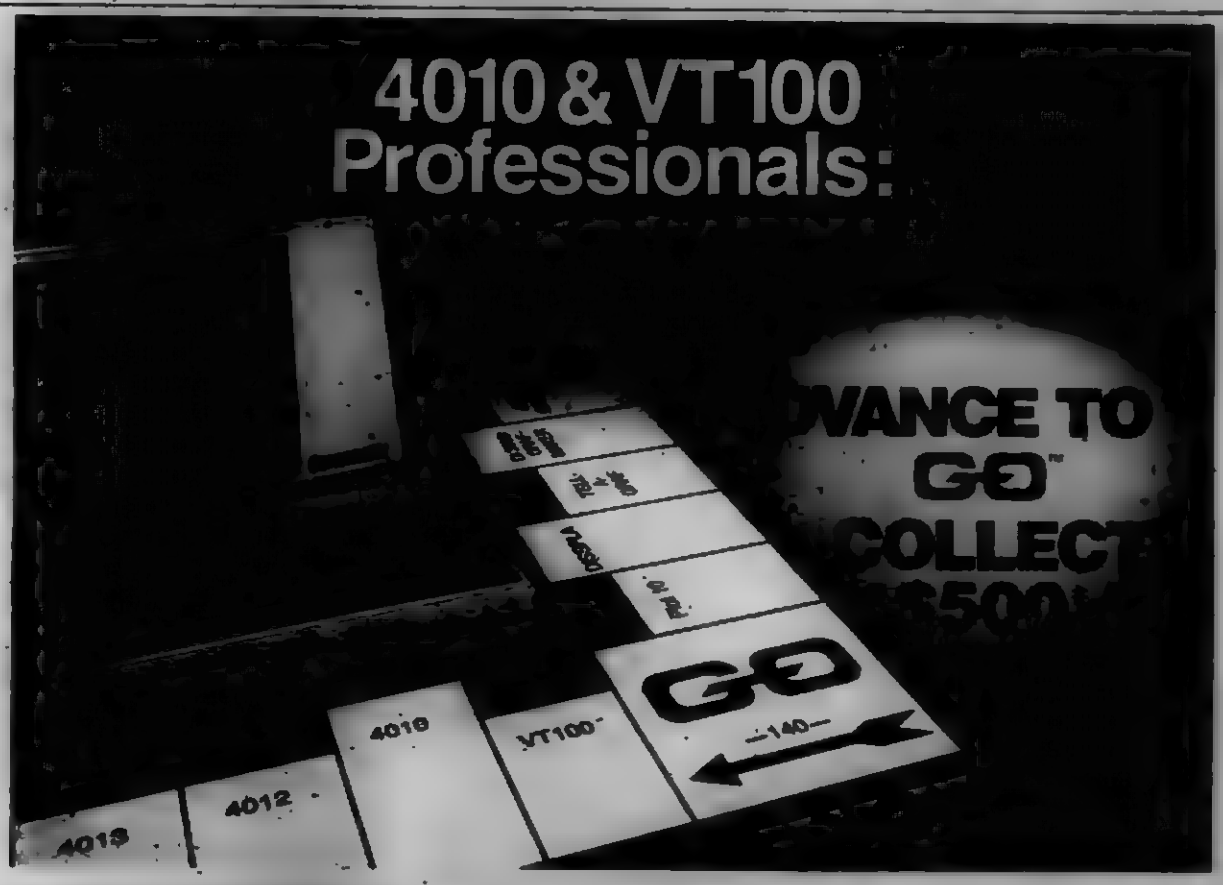
NEW YORK— Personal computer users spend an average of $1,027 on peripheral equipment and other add-on hardware the first year after purchasing their systems, according to a report from Frost & Sullivan, Inc.

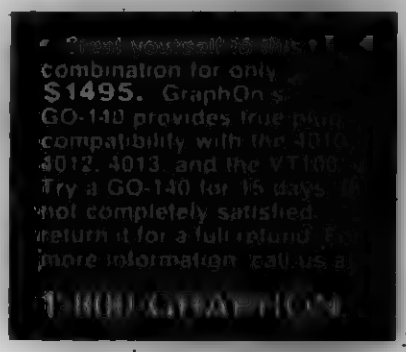
The report, "The Personal Computer Hardware Add-On Device Market," said this adds up to a $900 million market for manufacturers of add-on microcomputer hardware, with the 1986 market likely to be in excess of $4 billion.

A printer is by far the most popular add-on item, with 15% of personal computer users having already bought one and another 11% anticipating such a purchase. The next most popular after-market item is the standard 5¼-in. floppy disk drive, with 11% of computer users buying one in the first year and another 8% anticipating future purchases.

Additional memory, most often 32K bytes, was acquired by 9% of buyers after the initial micro purchase, the report noted.

The 228-page report is priced at $1,275 from Frost & Sullivan, 106 Fulton St., New York, N.Y. 10038.





We stand behind a product that respects your software investment, whether it's Plot 10, DISSPLA, TELL-A-GRAF, DI3000/GRAFMAKER, SAS/GRAPH, or any other 4010-compatible package. Your computer won't know your GO-140 from the Tektronix or DEC terminals it emulates, so costly system software modifications vanish.

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Don't compromise your eyes

Uncompromising display quality. Smooth scrolling without smear. The GO-140 comes standard with a short-persistence, P31 phosphor on a dark background, non-glare CRT. Display flicker is eliminated by a 60Hz non-interlaced screen refresh.

The GO-140 presents a faithful representation of images created for the 4010. Circles look like circles, without distortion. That's because the GO-140 graphics format of 512 × 390 pixels is an exact 1:2 scaling of the 4010 display coordinates. Transfer your images exactly into hard copy on popular dot matrix printers.

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Go for performance

Go for user-selectable features the competition left out. Like graphics and alphanumeric communication at up to 19.2K baud; status line; block fill, selective erase and image complement; non-volatile programmable function keys and much more. The GO-140 does all this with a single board, which minimizes connectors and maximizes reliability in a way not possible with retrofits and other two-board emulations.

Discover how the GO-140 lets you tap the synergy between graphics and alphanumerics. With effortless switching between environments under user and/or host control, we've freed your hands, eyes and mind to solve problems. GO™ for it. You'll be glad you did.

*Standard unit price for the GO-140 is $1995. $1495 price (normal quantity 100 price) is offered on the following terms:
1) Limit of one per location or customer.
2) Valid P.O. (net 30 days) or cash in advance required.
3) Price is FOB factory.
4) Offer valid in U.S. only.
5) Offer expires December 31, 1983.

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2255H Martin Avenue
Santa Clara, CA 95050

ICCS Opens Institute to Fill DP Education Gap

NEW YORK — In an effort to fill what the company describes as the "gap that currently exists in computer education," International Computers and Communication Systems, Inc. (ICCS) has opened the Sequoia Computer Institute.

The Sequoia Institute, the first of what ICCS expects will be a nationwide network of computer education institutes for training computer professionals, will offer six-month full-time and one-year part-time certificate degree programs in entry-level programming, scientific programming, telecommunications programming, data base systems programming and systems analysis and advanced programming techniques.

Dr. Dina Bedi, president and founder of the institute, said Sequoia's philosophy will be to provide students with direct access to the most extensive and technologically advanced computer hardware systems available and to maintain a teaching staff of professionals employed in the computer field.

Bedi said the institute will be equipped with an in-house IBM 4341 with telecommunication facilities to permit lab work from off-site terminals and IBM 3278 terminals for lab sessions, assigned projects and student practice. The school will have access to a Prime Computer, Inc. 550 supermini and is expecting delivery of a Digital Equipment Corp. VAX-11/750 system.

Sequoia's faculty will include industry professionals from institutions such as Brookhaven Laboratories, Bell Laboratories and Manufacturers Hanover Trust Co.

Classes at Sequoia, which is licensed by the New York State Department of Education, will begin on a monthly basis, with tuition set at $3,400. The institute is located at 10 E. 21st St., New York, N.Y. 10010.

Mobile Phone May Prove Windfall

NORWALK, Conn. — Federal Communications Commission (FCC) regulatory decisions may give the nation's telephone companies a $5 billion windfall in the implementation of cellular radio-telephone, according to a recent report from International Resource Development, Inc. (IRD).

IRD claimed current FCC rulings will give the Bell operating companies a one- to two-year lead time in implementing service in most major cities. Cellular radio-telephone is a new technology that will allow users to communicate with one another using mobile and portable phones.

The FCC has authorized two cellular systems per city, one of which has been allocated to the regular "wireline" telephone company, while the second is open to any qualified "nonwireline" bidder, principally the Radio Common Carriers, who currently supply mobile radio services.

So Few Applicants

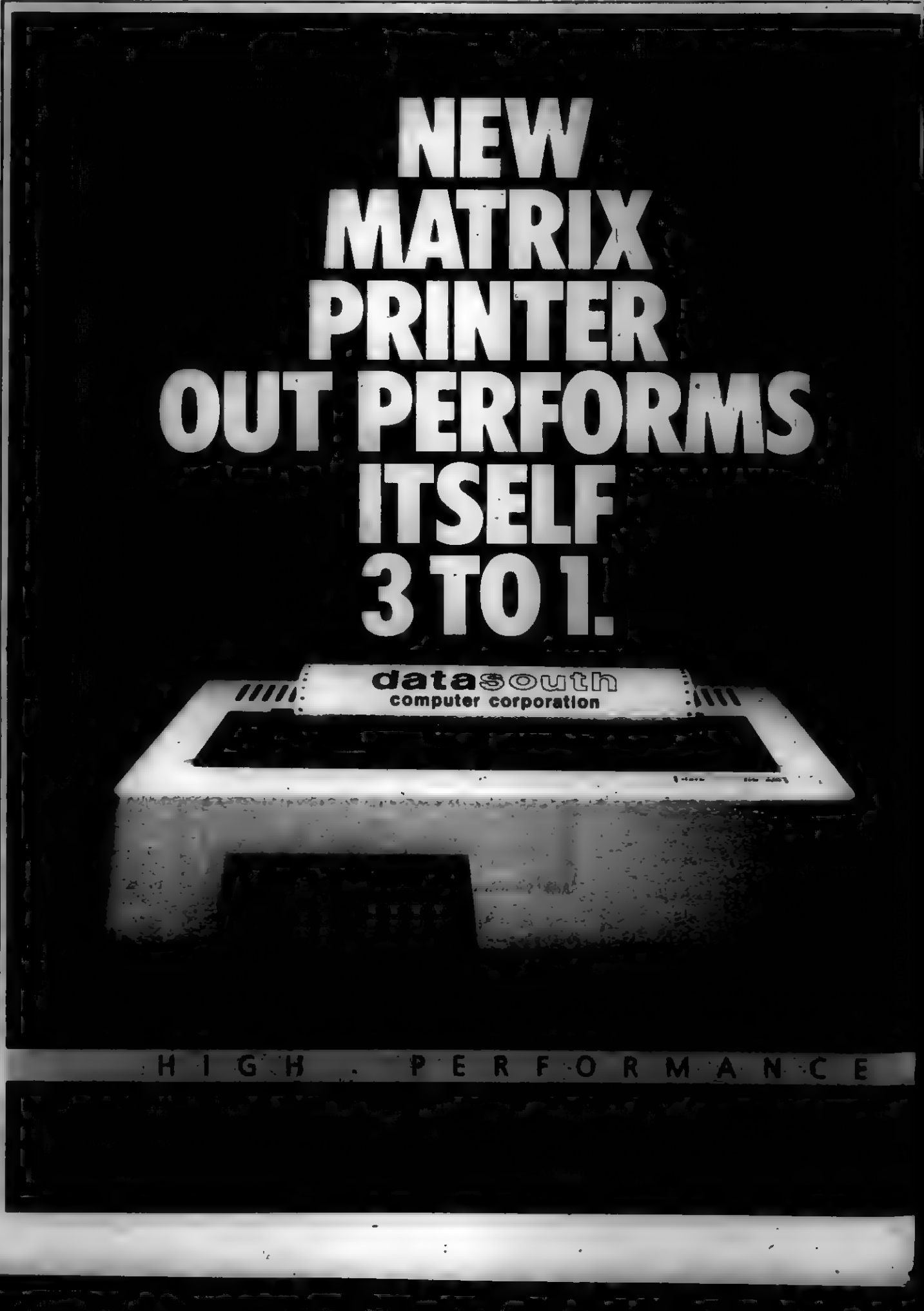
The wireline carriers, the report said, have cut deals to divide the licenses in each city because there are so few wireline applicants (less than two per city) and are ready to implement the service now.

The nonwireline carriers, however, it added, are likely to undergo lengthy comparative hearings in most cities because there are five to 10 applicants per city. This could result in a lead of 700,000 users, worth $5 billion in revenues to the telephone companies during the next decade, IRD reported.

The report is priced at $1,850 and is available from IRD at 30 High St., Norwalk, Conn. 06851.

Correction

NCR Corp. is actively marketing both its V-8500 and V-8600 series systems. It was incorrectly reported in the Sept. 26 issue of *Computerworld* that the company was replacing the V-8500 with the V-8600.



IBM Predicted to Grow Fourfold in 10 Years

By Robert Batt
CW West Coast Bureau

SAN FRANCISCO — IBM will grow more than fourfold over the next 10 years, reaching revenues of $176 billion by 1993, according to The Gartner Group, Inc., a data processing market research firm.

'There is a war going on in the marketplace, and it is predictable that IBM is going to win a lot of the battles. In fact ... IBM could afford to take a dive in one area of the market and still survive handily in terms of its bottom-line profit.' Mark Ludwig, vice-president of the Gartner Group, Inc.

Speaking here at the opening session of the IBM Futures Conference, Mark Ludwig, vice-president at Gartner, said that by the early 1990s, IBM will account for 2% of the U.S. gross national product.

With an estimated annual average growth rate of 16%, Big Blue, he said, can expect to reap pretax profits of $14 billion in 1986, rising to $25 billion in 1991.

Traditional IBM business sectors, such as mainframes, are expected to grow 12% a year, rising from $27 billion this year to more than $84 billion in 1993, he added.

Ludwig told his audience of users and vendors: "To grow at such a rate IBM must become a new company in some ways. One mechanism for accomplishing this growth is diversification into product areas such as personal computers and telecommunications carriers."

The latter, he noted, was already a $200 million business, employing just 500 people, a ratio of $400,000 for every employee, and with an expected growth rate of 40% a year over the next few years.

Total revenues of IBM's independent business units, Ludwig added, are expected to rise from the current $3 billion to $20 billion over the next decade.

Implications of Growth

The implication of this growth pattern, he asserted, is that IBM is going to absorb some of the revenues of current competitors such as Digital Equipment Corp., Wang Laboratories, Inc., Hewlett-Packard Co., Data General Corp., Prime Computer, Inc. and some of the major Japanese manufacturers.

"There is a war going on in the marketplace, and it is predictable that IBM is going to win a lot of the battles. In fact, by growing at the rates predicted, IBM could afford to take a dive in one area of the market and still survive handily in terms of its bottom-line profit," Ludwig contended.

In contrast to some other pundits who credit IBM's success to its marketing prowess, Ludwig asserted that manufacturing, not marketing, will be the most important key to IBM's future growth.

"IBM is basically a manufacturing-driven company. It is almost unbeatable because it is essentially a low-cost producer that uses every channel of distribution it can get its hands on. To simply say that IBM is a marketing-oriented company doesn't tell the whole story," he asserted.

As a case in point, he maintained, IBM's product cycles have dropped to an average of three years, after being seven years a short while ago. "This trend is very important as the cost of capital increases. IBM is able to double the number of its shipments and improve capacity by shortening product life cycle. It can therefore respond to competitors such as DEC far more quickly."

Ludwig cited as an example of this trend the IBM Personal Computer, which took only 18 months from its conception to its first deliveries.

Nevertheless, he conceded, to grow at the pace predicted, IBM has been forced to adopt practices that hitherto were shunned.

INTRODUCING THE NEW DS220 MULTI-MODE MATRIX PRINTER

In the beginning was the Datasouth DS180. A printer that *defined* high performance printing, with a balance of high technology design and mechanical simplicity. A high throughput printer that produced clean hardcopy under the most severe conditions.

Now there's the Datasouth DS220. A printer that raises those high performance standards and applies Datasouth technology to multiple printing tasks—all at one time.

The Datasouth DS220 redefines high performance for multimode printing the way the DS180 did for data quality printing.

For speed, the DS220 combines a 220 CPS print speed with servo-controlled logic seeking and high-speed tabbing over blank spaces. This allows the DS220 to zip instantly from one printable character to the next. In side-by-side tests of real-task performance—not just spec-sheet comparisons—the DS220 out performs its rivals time after time.

For correspondence, the DS220 uses its 40 CPS bi-directional NLQ mode to form characters with the precision and clarity you would expect from a word processing printer.

And for graphics, the DS220 adds high performance artistry to popular microcomputer applications programs through high-resolution, dot-addressable output. Sharp new details emerge from business charts and graphs, and from engineering drawings.

The sum is even more than three printers in one. The DS220 offers a total of eleven different pitches and fonts along with seven international character sets. Plus non-volatile space for up to 64 do-it-yourself characters for downloading from the host computer.

And those are just the printing capabilities. In other respects, the DS220 outperforms not just itself but virtually every other printer on the market. Its front panel programming sets new standards in user friendly printer ergonomics. Its four digit LED display and push button panel allow programming of over fifty features, with a minimum of fuss and confusion. Those features include a variety of interface and communications selections that allow compatibility with a wide range of mini and microcomputers. And the DS220 handles six part forms with its adjustable tractor feed, as well as cut sheets and letterhead with its friction feed.

Best of all, the DS220 advances all the engineering, design and mechanical virtues established by its forerunner, the DS180. In the Datasouth tradition, the DS220 is made to run virtually nonstop in a wide variety of applications.

Test drive three high performance printers in one—the multimode DS220.

Call for details and the name of your nearest Datasouth sales/service distributor.

Simulated output shown. Call or write to Datasouth for samples of actual output.

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Prime, Convergent To Boost Ties

NATICK, Mass. — Prime Computer, Inc. announced it will strengthen its ties with Convergent Technologies, Inc. with the purchase of as much as $150 million worth of Convergent's products for Prime's professional workstation.

The products, details of which were not disclosed, will become an integral part of Prime's distributed systems strategy, Prime said.

Convergent Technologies sells its 16- and 32-bit microprocessor-based systems to the mainframe vendor market.

Included in the agreement are stock purchase warrants.

Privately Owned Federal Shop

GSA Cuts Ribbon on Micro Store

WASHINGTON, D.C. — With the aid of a robot named "Plus," Gerald P. Carmen, administrator of the General Services Administration (GSA), recently cut the ribbon to celebrate the opening of the first privately owned microcomputer and software retail store for the federal government.

Office Technology Plus, which is located at GSA headquarters here, is owned and operated by a consortium of high-technology firms headed by The Math Box, Inc., which operates a chain of retail computer stores in the Washington/Baltimore area. Other companies represented in the consortium are M/A-Com Sigma Data, MAI/Sorbus Service, Software Centres International, Moore Business Center and PC Telemart.

Carmen conceived the store as a way for the federal government to benefit from productivity increases reflected in the private sector by the development of microcomputer technology and software publishing. Opened on a pilot basis in August, Carmen said the store had received orders in excess of $782,000 by mid-September from government agencies such as the Departments of Interior, Treasury and Transportation, in addition to the Navy, the White House, the Executive Office of the President, the Senate and the Federal Bureau of Investigation.

According to Avner Parnes, president of The Math Box, the retail outlet is "the solution to the confusion in buying and using microcomputers both in the U.S. government and the private sector." Parnes said that each company involved in the venture is an expert in its particular field: hardware, software, service, training and supplies.

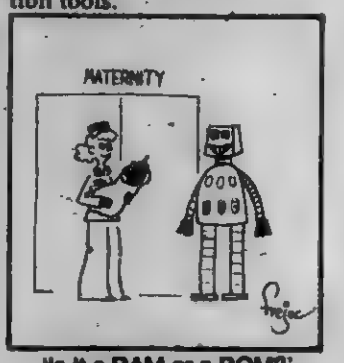
The GSA estimates there will be one million microcomputer users in the federal government within the next six years. The GSA plans to open 12 additional stores to accommodate federal offices throughout the country.

Horizon, DEC Reach Software Pact

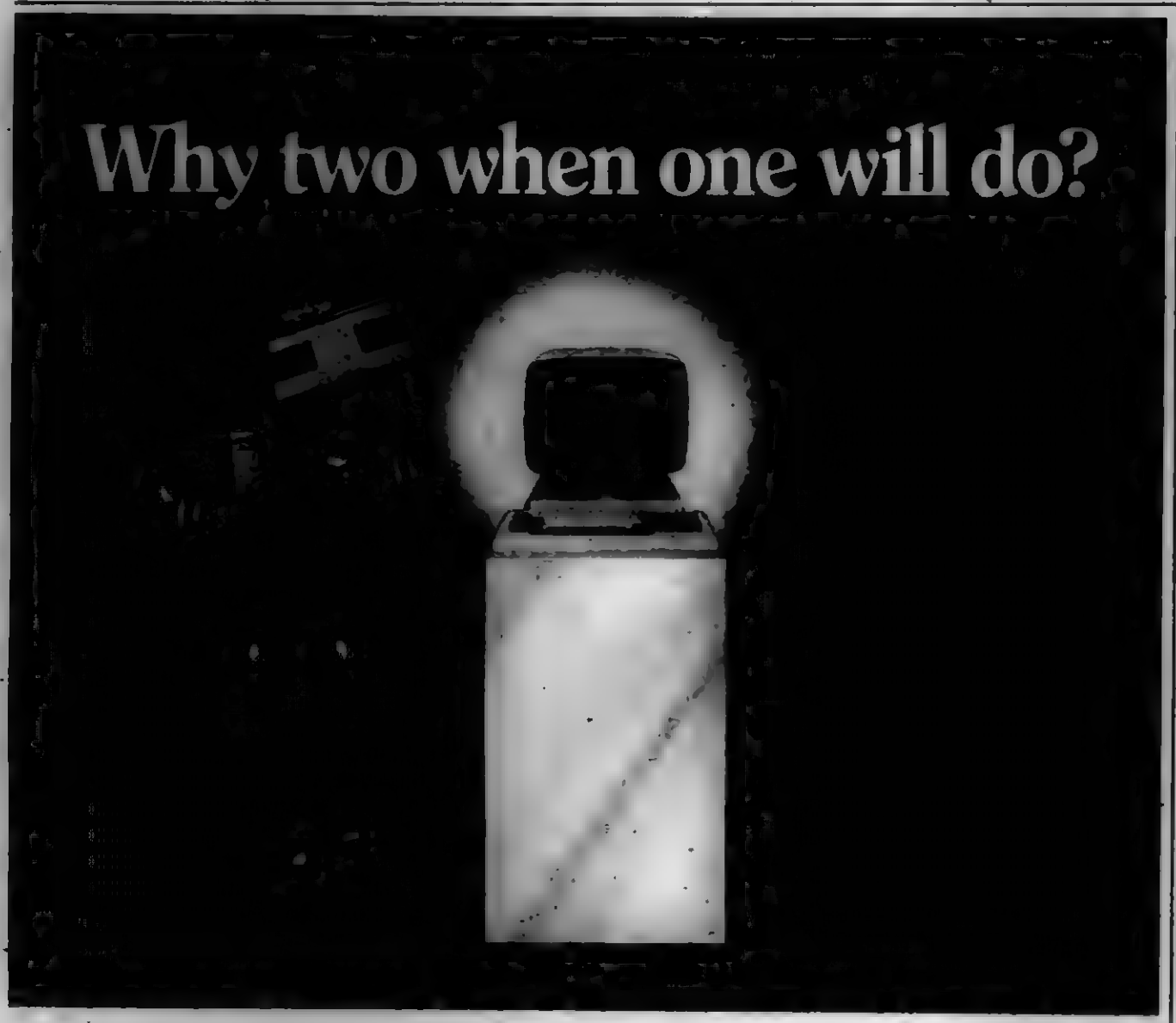
SAN FRANCISCO — Horizon Software Systems, Inc. and Digital Equipment Corp. have reached an agreement whereby Horizon has become the exclusive supplier of DEC-certified office automation software for DEC computers using the Unix operating system, Horizon said.

Machines included in the agreement are the PDP-11, VAX superminicomputer series and Professional personal computer line.

Terms of the agreement dictate that DEC will manufacture and distribute Horizon's integrated series of Unix-based office automation tools.



'Is it a RAM or a ROM?'



Lee Data's universal terminal system design provides access to both 3270 and VT100 applications.

Now with Lee Data's new 3270/Async Communication System (Series 400) you can eliminate the cost and inconvenience of needing separate displays for access to 3270 and VT100 applications.

The Lee Data universal terminal system approach is another innovative Lee Data design that allows a single Lee Data display to access applications and data from an IBM CPU, a non-IBM system such as DEC, H-P or Prime, and timesharing services. And a simple command entered from the display keyboard is all that is required to switch from 3270 to VT100 operating mode and back again. What could be easier?

The Series 400 System incorporates a new hybrid approach to system operation that is simpler and more efficient than protocol conversion. This approach allows a Lee Data controller to provide dedicated 3270 and VT100 processors for concurrent, but independent application access.

In addition, a single Lee Data controller provides you 3270 compatibility via either a remote BSC or SNA/SDLC or a local SNA or non-SNA interface, as well as 1 to 16 RS232C ports for your asynchronous application needs. Line speeds available are from 300 to 19,200 BPS.

The Series 400 System also provides you support for up to 32 devices, including Lee Data's unique All-In-One display that offers dynamic selection of 4 screen sizes—three 80-column and one 132-column. Lee Data's 3279-compatible color displays and a full line of printers are also available as part of the 32-device complement.

3270 and VT100 capabilities combined in a single terminal system—a reality with the new 3270-plus-Async system from Lee Data.

Discover what our system can do for your company's terminal network. Call our system specialists toll free:

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LCS™ covers the spectrum of program management with three synergistic products—PANVALET, PANEXEC, and O-W-L. To manage software resources more effectively, PANVALET stores, maintains and protects source programs from unauthorized access. PANEXEC provides the same functions for executable programs, offering audit trail and cross-reference information while tracking program activity. Together PANVALET and PANEXEC form a network of organization and control for your source program and executable libraries, and offer the basis for on-line change management.

With the addition of O-W-L on-line development capabilities can be added to the superb control of LCS™. Human-engineered for natural dialogue between man and machine, O-W-L offers multi-level security for your source program library, and features a full complement of prompts and text-editing facilities. Blending productivity with control, O-W-L brings an entirely new dimension to the LCS™ concept.™

Like all of our peak performance products, LCS™ is backed with the conscientious service, responsive training, award-winning documentation, and active user group support that has become Pansophic's trademark. Simply send in the coupon below for complete information and a personal demonstration of the LCS™ package. We promise you a display of program management that yields productivity and control . . . today, tomorrow, and for years to come.

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Supershorts

The investment banking firm of Donaldson, Lufkin and Jenrette has been engaged by **Computer Devices, Inc.** to seek an equity investor or purchaser for the company. Preliminary conversations with several firms are already in progress, according to a company spokesman.

• • •

Graphic Software Systems, Inc. has announced a program to distribute software device drivers to graphics peripheral equipment manufacturers. Drivers for the Microsoft, Inc. MS-DOS and the Visicorp Visi are available, and drivers for Unix should be available soon.

• • •

IBM will market the IBM Personal Computer Instructional System (PCIS) developed by **Computer Systems Research, Inc.** PCIS allows users with no programming experience to create, present and administer computer-aided instruction courses on the IBM Personal Computer.

• • •

The Marketing and Statistics program of the **Computer and Business Equipment Manufacturers Association (Cbema)** has compiled the *Computer and Business Industry Market Data Book*. The book contains an analysis of industry facts and figures covering the last 22 years, collected from surveys and from industry and government sources. The *Industry Market Data Book* costs $350 per copy prepaid or $300 each for two or more copies. It is available for $300, or $250 each for two or more copies if ordered before Oct. 31. It can be ordered from Cbema at Suite 500, 311 First St. N.W., Washington, D.C. 20001.

• • •

Apple Computer, Inc. and nine software companies have begun a joint marketing program designed to increase the ability of retail computer dealers to meet the needs of small-business customers. More than 15 products are included in the pilot program, launched in conjunction with Apple's current small-business promotion, which includes the Apple IIe and Apple III computer packages and new software for small businesses and professionals.

• • •

Digital Equipment Corp. and **Horizon Software Systems, Inc.** have announced an agreement under which Horizon will be the exclusive supplier of DEC-certified office automation software for DEC machines using the Unix operating system. DEC will manufacture and distribute the Horizon Software System, an integrated series of Unix-based office automation tools designed for both experienced and inexperienced users.

• • •

Bell & Howell Service Co. has been named exclusive authorized third-party maintenance supplier for **Printek, Inc.**

• • •

National Semiconductor Corp. has announced plans to build a 125,000 sq ft research and development facility adjacent to its corporate headquarters in Santa Clara, Calif. The project is expected to cost $75 million.

• • •

Advanced Systems, Inc. will market video courses for IBM software developed by **Amdahl Corp.** and a series of courses from **Digital Equipment Corp.** covering computers in business.

• • •

Quasar Systems Ltd. of Canada will convert its Powerhouse line of fourth-generation application development software for use on **Data General Corp.'s** 32-bit Eclypse MV/Family Systems. The Powerhouse products will be marketed by Quasar Systems under the Data General Independent Software Vendor program.

• • •

System Industries, Inc. plans to establish a $4 million facility in Dublin. The operation, System Industries Network Storage, will be located at Ireland's Industrial Development Authority advance factory and will produce memory storage products.

• • •

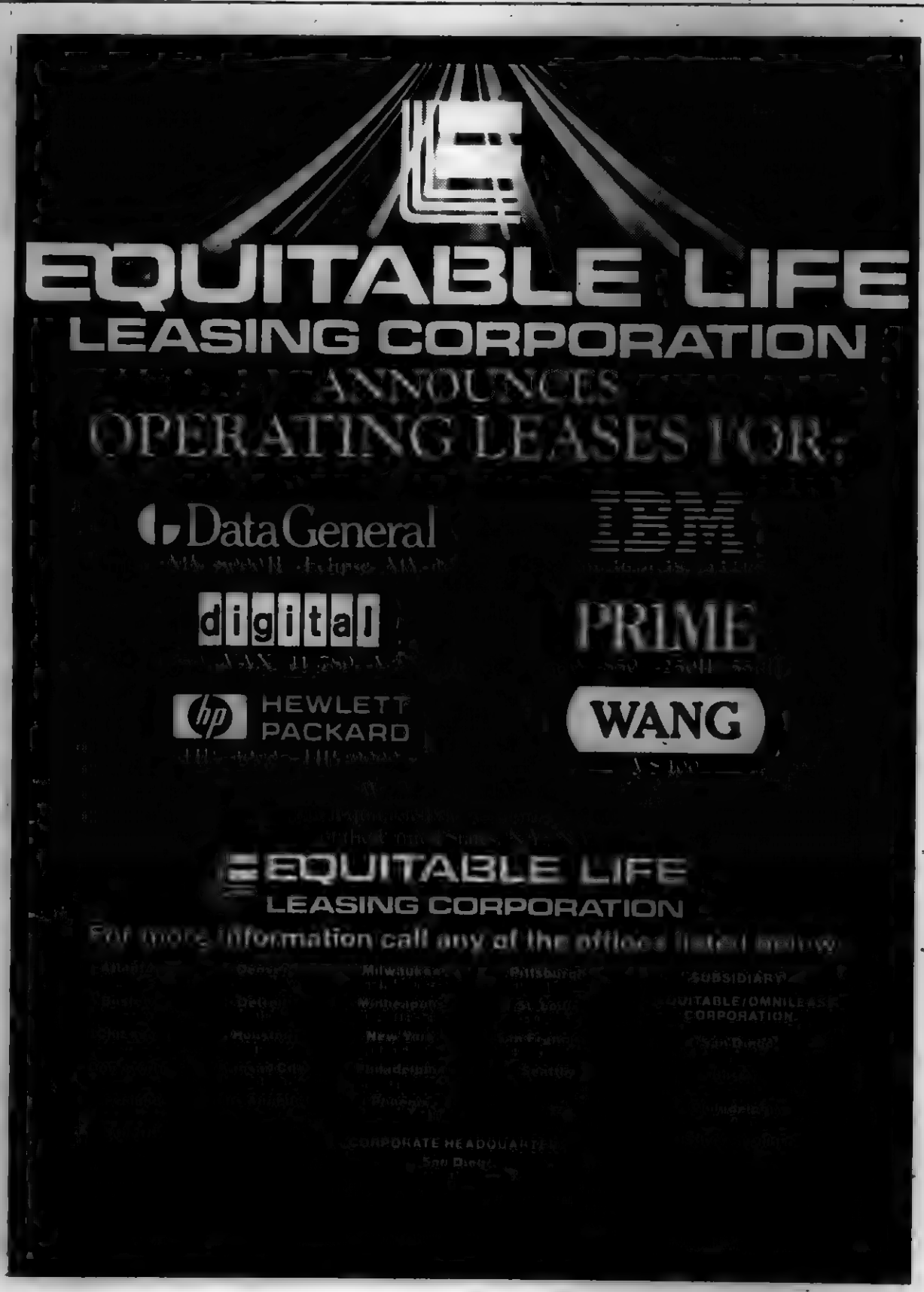
Delta Data Systems Corp. has formed a sales and marketing unit, Terminal Product Sales, to concentrate on computer terminal sales and development. Vice-President Philip H. Gallo will head up the unit.

• • •

Masscomp has signed a joint venture agreement with **Lanpar Technologies, Inc.** establishing **Masscomp Canada, Inc.** The new company has exclusive manufacturing and distribution rights in Canada for all present and future Masscomp products.

• • •

Software Design Associates, Inc. has established a new division, SDA-Micro/Support, Inc., to provide training and support to corporate users of the IBM Personal Computer and Personal Computer XT.



Forecasts & Findings

PBX Market Saturated

The private branch exchange (PBX) market is mature and, in terms of market penetration, relatively saturated. However, sales of PBX equipment will continue to dwarf all other competing communication signal-routing methods for the foreseeable future, according to a recent report on the industry's future over the next five years.

The growth in installed bases of PBX is not likely to exceed a 4% annual rate over the next five years, and replacements will account for the bulk of PBX shipments, but total annual value of shipments will grow by more than $2 billion over the next three years at an annual rate of 12.8%, according to "The PBX Industry: A Strategic Analysis." Local-area net equipment shipments will grow at an annual rate of 66% through 1985, but will only increase market share from the current 2% to 9%.

The 115-page report is available for $2,790 from Venture Development Corp., 1 Washington St., Wellesley, Mass. 02181.

IBM: Toward Integration

Over the next three to five years, IBM will consolidate its equipment into a more truly integrated family of products, limiting the money-making opportunities that have enabled hundreds of companies to profit by taking advantage of the incompatibility among IBM products, according to a report released recently by The Yankee Group.

"Impact: IBM" predicts IBM over the next six to 18 months will enhance its Personal Computer family's capabilities as multifunctional communicating workstations, expand and improve IBM data terminal emulation and introduce a board that will allow the Personal Computer to run a 370 instruction set and operate as a VM workstation. Over the next one to two years, the report said, IBM will ease Personal Computers and other intelligent terminals into high-end applications and reduce prices for the 3278. In two to three years, IBM will introduce "personal" terminals with artificial intelligence and a higher priced scientific model of the 370-based instruction set terminal, according to the study.

The report, to be presented in three volumes, is available for $1,250 from The Yankee Group, 89 Broad St., Boston, Mass. 02110.

Turnkey Sales Booming

Sales of mini and microcomputer turnkey systems amounted to $7 billion last year and will rise to $26 billion in 1987, according to a report by Frost & Sullivan, Inc. analyzing six representative applications markets.

"The Mini-Microcomputer Turnkey Engineering Systems Market" analyzes the seismic exploration, laboratory analysis, energy management, image processing, typesetting and agriculture markets, which it said were cumulatively worth about $900 million last year and will total $2.9 billion in 1987. The agriculture market will experience the fastest growth, jumping from about $7.5 million last year to $140 million in 1987, the report predicted.

The 228-page report, No. 1208, is available for $1,275 from Frost & Sullivan, 106 Fulton St., New York, N.Y. 10038.

Graphics Spurring Growth

The availability of bit-mapped graphics displays at reasonable costs will spur a fivefold increase in the business graphics market by 1987, with improved display technology and advances in software and output shifting business graphics from an optional extra to an essential feature on multifunctional business computers, according to a recently released market report.

The report, "Management Workstation Graphics," said that lower marginal costs of providing graphics support on multifunctional systems has stimulated demand in that segment at the expense of dedicated graphics systems. Graphics displays will lead the total business graphics market with shipments climbing from $1.3 billion in 1982 to more than $10 billion in 1987, according to the study. Business graphics software alone is predicted to be a $1.8 billion market by 1987.

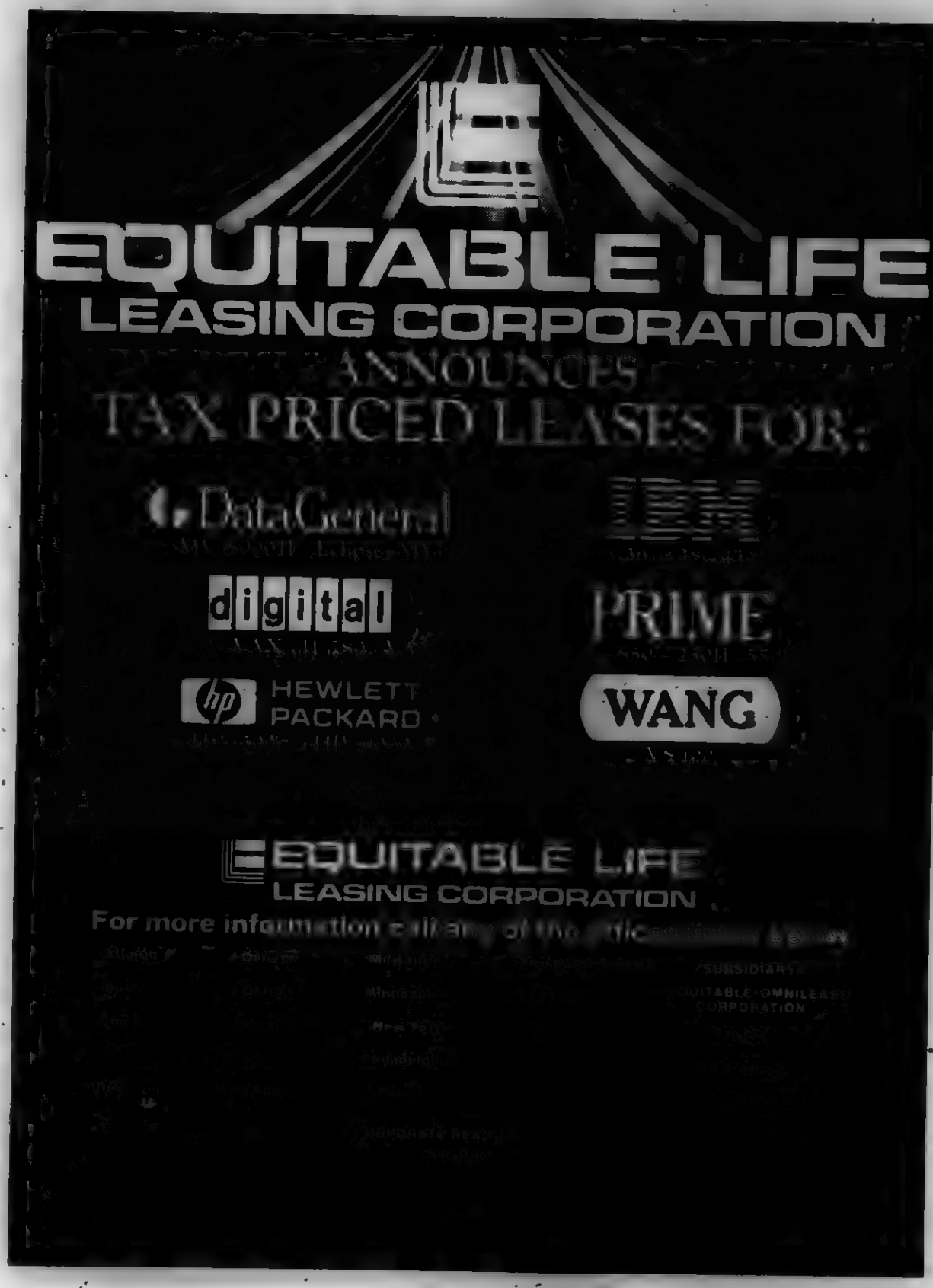
The report is priced at $1,695 and is available from Advanced Resources Development, 28A Park St. Station, Medfield, Mass. 02052.

Nonimpact Printers Down

A market study predicts more disappointments than market successes in the nonimpact printer field over the next 10 years, as low-cost daisywheel and matrix-impact printers capture the interest of office automation networks. However, ultrafast IBM 3800 and Xerox Corp. 9700 electrophotographic printers have reportedly established solid positions at the top end of the market.

Initial high prices of nonimpact printers combined with plummeting costs of daisywheel printers led to "embarrassing failures" in the industry, according to "Nonimpact Printers in the U.S.," although the report expects growth from $900 million in 1983 to $1.7 billion by 1993.

Priced at $985, the report is available from International Resource Development, Inc., 30 High St., Norwalk, Conn. 06851.



Executive Corner

• **Ben P. Ragusa** has been promoted to corporate executive vice-president at Lanier Business Products, Inc.

• **Ernest A. Carlson** has been named vice-president of sales at Pixel Computers, Inc.

• **Daryl A. Ferguson** has been promoted to vice-chairman of Technicom International, Inc.

• **Richard J. Tata** has been appointed vice-president of manufacturing at Advanced Matrix Technology, Inc.

• **Charles R. Jones** has been appointed vice-president, external affairs, for AT&T Communications, the AT&T organization that will provide long-distance and international services after the Bell System divestiture on Jan. 1.

• **Maurice G.T. Bailey** has been named vice-president of sales and marketing, and **Robert B. Bellman** has been named director of software at Scott Systems, Inc.

• **Thomas B. Towers**, former vice-president of marketing at Visicorp, has been named president and chief executive officer of Knoware, Inc.

• **Dr. Ray S. Moore** has been appointed vice-president of engineering for Interlan, Inc.

• **Donald J. Webster** has been elected senior vice-president of technology for Communications International, Inc.

• **David T. Bailey** and **James H. Kilpatrick** have been appointed to senior vice-presidents, and **Ronald L. Aldrich** has been promoted to vice-president at Policy Management Systems Corp.

• **Philip Schneider**, a former Western Union, Inc. vice-president, has been named a senior vice-president at Fairchild Industries, Inc.

• **Jan F. Ahart** has been elected vice-president and treasurer at Datapoint Corp.

• **Jerry W. Gaskin** has been elected vice-president and controller of Gould, Inc.

• **Mark E. Goldman** has been appointed vice-president, marketing and sales, for Florida Data Corp.

• **C. William Ferguson** has joined Sorcim Corp. as vice-president, sales.

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Mergers & Acquisitions

Computer Products, Inc., Fort Lauderdale, Fla., has acquired **Quantum Systems, Inc.** of New Orleans for an undisclosed number of Computer Products common shares. Quantum will operate as a unit of Computer Products' Measurement and Control Systems Division.

Sterling Software, Inc., Dallas, has acquired **Pacesetter Systems, Inc.**, also of Dallas, in exchange for 250,000 shares of Sterling Software common stock valued at $4.7 million.

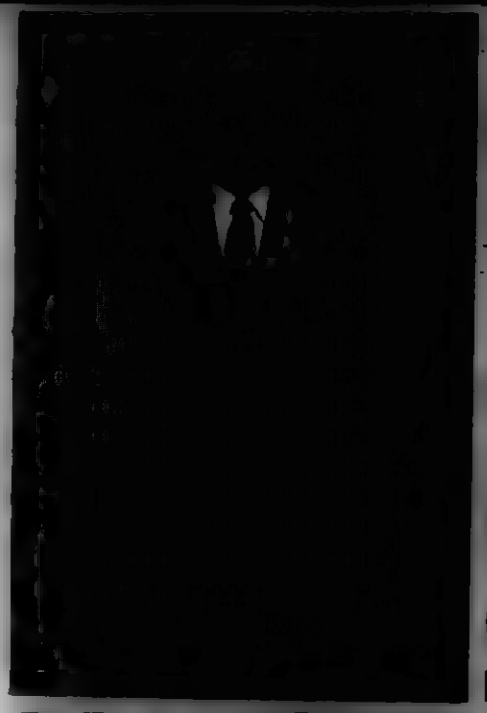
Endata, Inc., Nashville, Tenn., has acquired the **Micrographics Division of Computeristics, Inc.** for approximately $1 million in cash.

Peat, Marwick, Mitchell & Co. has acquired the assets of **The Catalyst Corp.**, a software developer. Terms of the acquisition were not disclosed.

Science Management Corp. has announced an agreement in principle to acquire **Intech Systems Corp.** of Dallas.

Computone Systems, Inc., Atlanta, has signed a letter of intent to merge under a pooling of interest basis with **MCT Information Systems** and **The Computer Room**, both of Albany, N.Y., in exchange for Computone Stock valued at $4 million. MCT and The Computer Room will operate as a joint company under the same management.

Wyly Corp., Dallas, has completed acquisition of **Open Systems, Inc.** of Minneapolis for $15 million in cash. Open Systems will operate as a Wyly subsidiary. Wyly has also signed a letter of intent to acquire **Financial Software of America, Inc.** of Winter Park, Fla.



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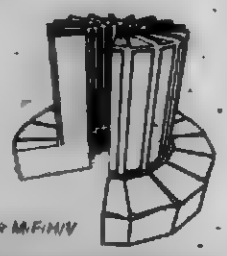

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A true phenomenon occurs when brilliant engineering minds meet the challenge of a technological society. It's happening at Amdahl Communications Systems Division where we design and manufacture industry leading digital data communications networks.

Senior Software Engineers/ Technical Services

We have 3 openings for Sr. Software Engineers to provide technical leadership roles in support of network concentrator products. You will investigate and correct software problems with and make enhancements to communications protocols and network control. You will also provide technical assistance to sales publications, training and field support personnel.

3-5 years experience in software development or support is required. Background in the following: Communication protocols, realtime software, X.25, Assembly language and PASCAL is desired. Microprocessor experience preferred. BSCS/BSEE preferred.

Senior Systems Programmer

The selected candidate will implement and maintain software development facilities and tools running under UNIX. Other duties include implementing and maintaining communications facilities.

3-5 years systems experience is required for this position. Knowledge of UNIX, PASCAL and UNIX software development and maintenance aids (SCCS and MAKE) is desirable.

Your contribution to Amdahl's growth will be awarded with a top salary and progressive benefits package which includes company-paid insurance, stock purchase and savings plans. Become a part of the Amdahl Phenomenon by rushing your resume to **J. Keller** or calling us at **(800) 421-2331**. From California please call **(213) 822-3202**.

Dept. CW 10/10
2500 Walnut Avenue
Marina del Rey, CA 90291

amdahl COMMUNICATIONS SYSTEMS DIVISION
Equal Opportunity Employer

SENIOR SYSTEMS PROGRAMMERS

In Phoenix, Arizona

Our card operations center located in Phoenix, Arizona is seeking individuals with a minimum of two years experience as a Systems Programmer in an IBM environment.

Openings require expertise in one or more of the following areas:

ACF
IMS DB/DC
MVS
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American Express is interested in discussing employment opportunities which involve responsibility for system software generation, installation, maintenance, enhancements and problem resolution.

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Hardware: IBM 3081 (3), 3033 (2) and 3032 (2).

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Qualified applicants may call (602) 964-1733 for further information or send a resume and salary history.

American Express
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K-Products is a national leader in the promotional products industry with a history of rapid growth. We have two openings for candidates experienced in an IBM 370 or 4300 environment with command level COBOL proficiency.

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We offer a competitive salary, comprehensive benefits, profit sharing and the opportunity to work in a IBM 4341, CICS 1.5 environment.

Send your resume including salary history to Personnel Dept.

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HP 3000

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Qualified applicants should send resume to: SYSTEMS ANALYST, P.O. Box 7157, San Francisco, CA 94120. EEO-AA.

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Los Angeles, CA 90010

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(Southern California)

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Will develop and perform computer based 6 degree of freedom dynamic simulations to define the integrated weapon system performance in areas such as navigation, flight path control, terrain following/avoidance and weapon delivery. Using simulations and analyses will develop baseline and tolerance limited performance capabilities of airborne weapons systems equipped with sophisticated digitally controlled avionics. Requires 4 or more years experience in analysis of dynamic systems using advanced digital control theory and the ability to develop modularized and well documented digital computer based simulations. A BS in EE, Physics or Math is required.

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Requires an avionics equipment engineer to be responsible for digital computer subsystems design and computer vendor technical management. Will ensure all technical requirements are met including performance and interface/integration/compatibility with all avionic/non-avionic subsystems within cost and schedule restraint. Must have 10 years experience in avionic subsystem design including 5 years in a digital avionic computer design which includes hardware, computer and non-computer interface and software integration. A BS or MS in Engineering, Physics or Math is required.

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Requires an experienced VAX 11/780 system programmer to develop a computer system for high technology -in real and non-real time applications. This senior level position requires 5 years experience with DEC software/processors and a BS in computer science or electrical engineering.

Selected candidates will receive excellent salaries and a wide variety of benefits. Please send your resume to:

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Pico Rivera, CA 90660-9977

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Data 3 Systems, Inc.
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With sales up 19% overall this year to more than $100 million, we can offer challenging positions now and in the future that involve manufacturing, financial, sales and marketing applications in both mainframe on-line technology and the Information Center environment.

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GENERAL QUALIFICATIONS FOR ALL POSITIONS LISTED BELOW:

Each of these positions requires a Bachelor's or higher degree in computer science, business or accounting, experience in medium- to large-scale IBM mainframe environments, strong ability in DOS/VSE, OS, CICS, Data Base Management, and COBOL/On-Line; well-developed skills in verbal/written communication and organization, a teamwork orientation; sensitivity to the service needs of end-users, and a stable employment history. An understanding of fourth-generation language techniques would be a plus.

MANAGER, SYSTEMS DEVELOPMENT

You'll supervise a Systems Group of 18-20 in developing and implementing packaged-based software for all Company operations. Required background includes at least 8 years' progressive recent responsibility for developing/managing multiple-application system projects, a good understanding of systems design methodology, thorough knowledge of user operations and related problems, and complete current familiarity with the industry. Recent experience with installing packaged-based application systems a plus.

SR. ANALYSTS and PROJECT LEADERS

In either capacity, you'll act as liaison between users and Information Systems resources, specify and design systems, and oversee Analysts and Programmers in projects through the implementation phase. You must have a minimum of 6 years' experience in application systems and 2 or more in systems design, state-of-the-art knowledge of the computer industry, hands-on implementation experience involving data base and data communications in a manufacturing-oriented environment, and the ability to handle multiple projects. An MBA and programming experience are both pluses.

SR. PROGRAMMER/ANALYSTS

Assignments include detailed program design, coding, testing and debugging, as well as the documentation and implementation of on-line commercially-oriented information systems. Occasional systems specification and design tasks will be necessary. At least 5 years' experience in COBOL program design, coding and testing is essential. In addition, your qualifications will be assessed for the depth of your background in DOS/VSE, DBMS, direct access techniques, virtual systems, CRT drivers, structured methodologies, conversational programming and related areas.

INFORMATION CENTER CONSULTANT

Consult with users and participate in detailed program design, coding, testing and debugging, and in the documenting/implementing of interactive decision support systems using personal computers and mainframe technology. You'll need 6 or more years' programming experience demonstrating extensive user interface. We are also seeking as much background as possible in IBM mainframe operating systems, DBMS, virtual systems, CRT drivers, structured programming, conversational programming, etc. An MBA, NOMAD and personal computer experience would all be advantages.

DATA BASE ADMINISTRATOR

You'll be involved with utilizing the DBMS facilities to design, control and analyze use of the Company's data resources; defining physical data structures and logical views of data sets; and ensuring data security, data base backup/recovery, and the elimination of redundancies. Your 6 or more years' programming experience must include at least a year of systems software and 2 in developing data base-oriented application systems.

SYSTEMS PROGRAMMERS

Among your responsibilities will be maintaining operating and data base systems, monitors, assemblers and utility programs; supporting applications programming; utilizing, planning and evaluating hardware/software; and modifying/creating software per Company needs. To qualify, you must have a minimum 6 years' experience with technical systems support, with a year or more in Assembly language programming.

OPERATIONS SUPERVISOR

Your responsibilities will cover computer processing activities on all three shifts. This will more specifically involve assuring effective data control, computer scheduling and processing; developing/maintaining complete computer operation instructions; and other related duties. A minimum of 5 years of operations experience is necessary as are 2 or more years as a supervisor in a multi-shift environment.

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Positions require a minimum of 5 years programming experience to include COBOL and strong software development skills with the ability to work independently.

Programmer/Analysts

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Positions require incumbent to perform SA and design new or modified existing computer-based user oriented systems. You will have 3 years strong financial systems analysis experience and a minimum of 5 years programming or related technical data processing knowledge.

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Joining Link will not only insure you a dynamic career but also a lifestyle with all the advantages of both urban and suburban living. Located midway between Houston and Galveston, the Clear Lake area offers every imaginable recreational and educational possibility within close proximity. Salaries are competitive and we offer a very comprehensive benefits program. To start your career with Link, please send a detailed resume in confidence to: Patricia Records, Department 653-LINK FLIGHT SIMULATION DIVISION, 2224 Bay Area Blvd., Houston, Texas 77058. An Equal Opportunity Employer M/F/H/V.

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MANAGEMENT INFORMATION SYSTEMS

Harvest States Cooperatives, a leading agri-business cooperative, is seeking qualified MIS professionals in the following positions:

PROJECT MANAGER

The ideal candidate will possess developed leadership and planning skills, preferably with financial data processing background. Must have on-line/data base development experience in an MVS environment. Will have multi-project responsibilities.

HARDWARE/COMMUNICATIONS ANALYST

Responsibilities include data network analysis, design and implementation, component selection and acquisition, network performance and mainframe configuration management. The qualified candidate will have at least 3 years network design experience plus familiarity with SNA and IBM hardware.

Harvest States offers the challenge and growth associated with newly developed systems, competitive salary, and complete benefit program. For confidential consideration, please forward resume and salary expectations to: Harvest States Cooperatives, Employee Relations Department, P.O. Box 43394, St. Paul, Minn. 55164

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Data Processing

It has been said many times, but is very true, that people are the most important asset of any organization. In the case of Gold Circle, this truism certainly applies. Our success to date has been possible only through the efforts of our talented and dedicated Gold Circle team. Our ambitious objectives for continued growth are feasible only through attracting the highest caliber of data processing professionals to fill new openings in our company.

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Within our technical services area, we have an opportunity for a **Sr. Systems Programmer.** The successful candidate will have the opportunity to participate in the review, evaluation and implementation of hardware and software enhancements. Other key functions will include performance management and operating systems support.

Requirements for this position include a minimum of 3-4 years experience with a large scale IBM mainframe in an MVS environment as a Systems Programmer, and experience in installation of software products using SMP 4. Capacity planning and MVS tuning experience are highly desirable. Excellent oral and written communication skills are also necessary.

DATA BASE ADMINISTRATION

We are looking for a proven **Data Base Analyst** with at least 2 years experience in IMS DB/DC, COBOL and programming on a large IBM mainframe. Experience in TSO/SPF, ADF, and ACF 2 would be a plus.

This position reports to our Manager of Data Administration and is responsible for the application and enforcement of standards required for both batch and on-line data base applications. Additional duties include performing application analysis and design of physical data bases including their security, dictionary documentation, backup/recovery and tuning.

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Government Electronics Group
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Systems

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You will be responsible for the installation and maintenance of systems software including evaluating and proposing enhancements to backup, security and other systems procedures; and the design, testing, implementing and documentation of specialized software, standards and procedures.

We require 3 years of experience with MVS/SP, NCP, TSO/SPF, CICS, VSAM, JES2 and VTAM. Experience with IDMS, Panvalet, FDR, SyncSort, TLMS and manufacturing/financial systems would be a plus. BS degree in Computer Science and formal technical training or the equivalent experience necessary.

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SR. SYSTEMS PROGRAMMER • MVS SUPPORT to $40K
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SR. SYSTEMS PROGRAMMER • SNA SUPPORT to $40K
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Min 4 yrs Analysis and Design of Data Processing Systems -- Project involvement, user interface, verbal & written communication skills Ability to understand, evaluate & solve org problems ANALYTICAL ABILITY.

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Programmer/ Analysts

Be accountable for programming and systems support functions. To qualify, you should have at least 3½ years experience with an in-depth knowledge of COBOL, JCL and INTERACT WILBUR or SUPERWILBUR. Previous experience in financial systems is desirable.

APL offers excellent compensation and top corporate benefits. Expedite resume with salary history to R.L. Ardrey, American President Lines, Ltd., 1950 Franklin St., Oakland, CA 94612. Responses will be limited to requests for interview. The company will not consider resumes without salary history. We are an equal opportunity employer m/f/h.

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SR. SYSTEMS PROGRAMMER

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Six years of experience in data processing, at least four of which were as a Systems Programmer. Bachelor's degree in computer science or related technical field or an Associate's degree plus two years experience in data processing and a demonstrated knowledge of computer operations, programming, and systems software. Knowledge of macro assembly language programming at an advanced level. Knowledge of a high level programming language such as PL/1 or COBOL. Systems analysis training or experience desirable. Experience in performance monitoring desirable. Demonstrated ability to communicate well orally and in writing. Demonstrated ability to install, troubleshoot and maintain IBM's MVS/SP or MVS/XA operating systems.

Qualified candidates should send a resume detailing education, training, work history, DP equipment, language experience and salary requirements to Personnel Department, BURROUGHS WELLCOME CO., P.O. Box 1887, Greenville, N.C. 27834. Applications will be accepted until October 31st.

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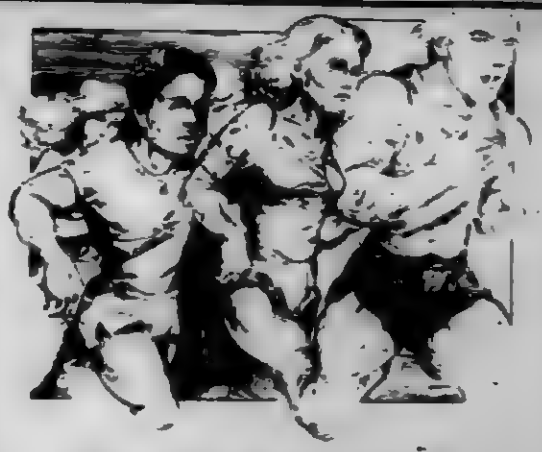

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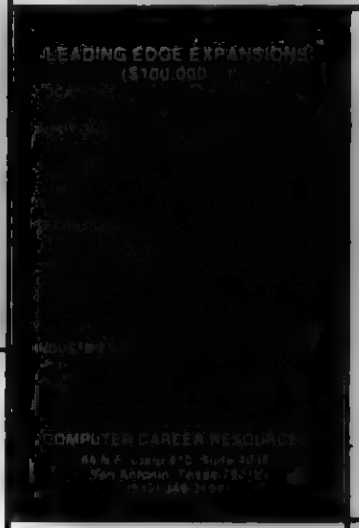

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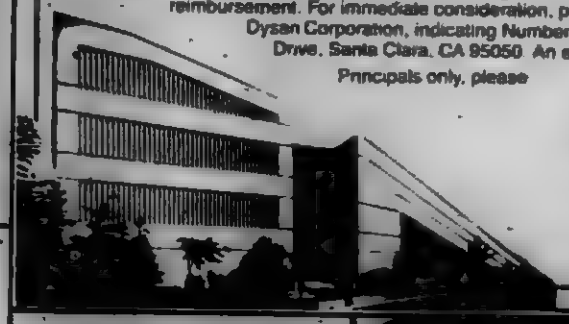

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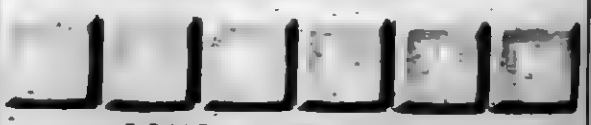

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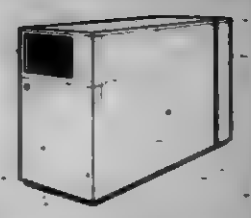

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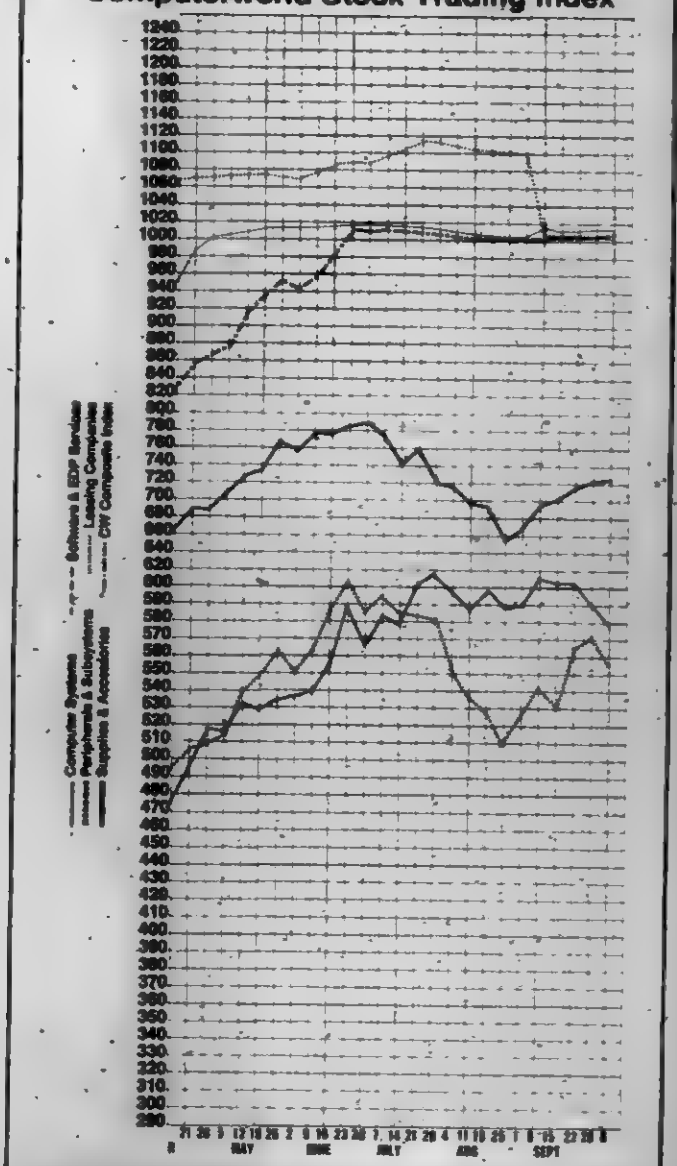

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, OCTOBER 5, 1983

All statistics compiled computed and formatted by TRADE QUOTES INC Cambridge Mass. 02139

	1982-83 RANGE	CLOSE OCT 5 1983	WEEK NET CHNGE	WEEK PCT CHNGE
COMPUTER SYSTEMS				
D ALPHA MICRO SYSTEMS	12- 24	14	-2 1/4	-13.8
B APPLE COMPUTER INC	9 28	9 3/8	+ 1/4	+2.6
A APPLIED DIGITAL	6- 20	18 1/2	+1 1/4	+7.3
N APPLE COMPUTER INC	21- 64	22 1/2	- 5/8	-2.6
N AT&T	84- 74	85 1/2	+ 1/8	+0.1
N BURROUGHS CORP	29- 98	92 5/8	+1 1/2	+1.7
D COMPUTER AUTOMATION	7- 17	8	+ 5/8	+8.4
- COMPUTER CONSOLES	8- 24	19 1/4	+ 3/8	+1.9
N CONTROL DATA CORP	21- 61	37 1/2	+ 1/2	+0.9
N CRAY RESEARCH TECHNOL	22- 41	22 1/8	-2 3/4	-11.0
N DATA GENERAL CORP	20- 92	44 1/2	- 1/8	-0.2
N DATA GENERAL CORP	24- 82	79	-5	-6.2
N DATAPOINT CORP	11- 36	23	+1 3/8	+6.3
* DELTA DATATRONIX	42-172	102	+8.	+7.7
N DIGITAL EQUIPMENT	65- 178	102	+8.	+8.7
N PRIME COMPUTER	6 16	14 3/4	+ 1/8	+0.8
- PRIME COMPUTER ASSOC	9- 15	- 1/4	-6 1/2	-43.1
N SCIENTIFIC DATA SYST	16- 44	35	- 1/8	-0.3
- WANG LABORATORIES	23- 41	36 1/8	+1 1/8	+3.3
- WANG LABORATORIES	3- 16	15 3/4	- 1/2	-3.4
N WANG INC	34- 46	32 5/8	+ 1/2	+1.5
- WANG INC				
N WANG LABORATORIES	26- 91	37 3/4	-1	-2.5
N WELLS FARGO COMPUTER	22- 48	42	-1 1/4	-2.8
- XEROX CORP	60-127	122 1/2	+1 1/2	+1.2
N XEROX	57 131	131 1/8	+2 3/8	+1.8
D ZILOG INC	9- 14	7 3/4	- 3/4	-8.8
N WANG LABORATORIES CLASS	12- 21	18 1/4	- 1/2	-2.9
N A B COM INC	22- 38	29 3/4	-1 3/4	-4.8
N ADVANCED COMP SYSTEMS	7- 9	7 7/8	+ 0	0.0
N MANAGEMENT ASSIST	9- 18	11 1/4	+ 3/4	+7.1
N MATHEMATICA (CLASS)	67- 77	77 3/8	+2 3/8	+3.2
N MICRO D & COMPUTER SYS	6- 16	10 3/8	-2 3/8	-18.8
N NATIONAL DATA CP	10- 19	15	+ 7/8	+6.1
N NO BRAINER [illegible]	82-148	144 1/2	-3 1/2	-2.4
- [illegible]	82 [illegible]	94 5/8	-2 3/8	-2.1
-	28 130	130	+1 3/4	+1.3
- [illegible]	17- 37	30 1/2	+ 3/8	+1.2
- [illegible]	11 20	18 3/8	- 5/8	-3.3
- [illegible]	24- 68	68	0	0.0
- [illegible]	10 37	36 1/2	+1 1/8	+3.1
- [illegible]	37- 89	38 1/8	+ 5/8	+1.6
D TELEVIDEO SYSTEMS	15- 41	17 7/8	+1	+5.9
N TEXAS INSTRUMENTS	71-178	118		-0.3
- UNIVERSITY COMPUTING CO	3- 18	3 1/8	- 1/2	-13.7
A WANG LABS INC	3- 62	39 7/8	+1 7/8	+5.0
A WANG LABS INC	11- 62	39	+1 3/4	+4.1
N WESCO CORP	35- 90	49 1/8	+2 1/8	+4.5
LEASING COMPANIES				
D ADAMS HARMAN GROUP	11- 32	31 3/4	+2	+6.7
- COMPUTEX INC	3 42	38 5/8	+ 1/8	+0.3
- COMPUTER LEASING SVS	3- 18	17 1/4	-1 1/2	-14.8
A TRW INC	34- 49	36 5/8	+ 1/8	+0.7
N U.S. LEASING	18- 47	38	-1 7/8	-4.8

T-THIS WEEK (ONE) AMERICAN; P-PACIFIC; B-BOSTON; I-INTERNATIONAL; M-MIDWEST; O-OVER-THE-COUNTER
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	1982-83 RANGE	CLOSE OCT 5 1983	WEEK NET CHNGE	WEEK PCT CHNGE
SOFTWARE & EDP SERVICES				
B ADVANCED COMP TECH	1- 8	4	- 1/2	-11.1
B ADVANCED SYSTEMS INC	6- 22	17	- 3/4	-4.2
D AGS COMPUTERS INC	7- 35	22 1/2	-2	-7.8
D AMERICAN SOFTWARE	21- 31	27 3/4	0	0.0
N AMACOMP INC	8- 23	9 7/8	0	0.0
- ANALYSTS INTL CORP	5- 20	15 1/4	+2 1/4	+17.3
A APPLIED DATA RES	8- 27	20 7/8	+1 7/8	+9.9
D ASK COMPUTER SYSTEMS	6- 21	19 3/4	+1	+5.0
B AUTRAD INC COM (NO)	1- 9	8 1/8	- 1/4	-3.7
B AUTOMATIC DATA PROC	21- 64	37 3/4	+ 3/8	+1.0
A B CGA COMPUTER ASSOC	9- 16	18 3/8	+ 7/8	+5.0
- COMPUTER ASSOC INT L	6- 25	23	- 7/8	-3.6
B COMPUTER HORIZONS	8- 20	12	+ 1/2	+4.3
B COMPUTER NETWORK	8- 10	7 1/8	- 3/4	-9.5
N COMPUTER SCIENCES	11- 23	17 5/8	- 3/8	-2.0
B COMPUTER TASK GROUP	8- 22	15 3/8	- 1/4	-1.5
D COMPUTER LEASE	2- 21	15 7/8	- 1/4	-1.4
B COMPUTONE SYSTEMS	7- 28	7 1/2	+ 1/4	+3.4
B CONSECO CORP	7- 20	8 1/8	-1	-10.8
D CONTRACT	7- 13	10 3/4	0	0.0
N CULLINET SOFTWARE	12- 30	44 1/2	+2 1/4	-0.8
D CYCARE SYSTEMS INC	8- 27	20 1/2	0	0.0
B ELECTRONIC DATA SYST	10- 42	38 1/2	+ 3/8	+0.9
N ELXSI SYSTEM INC	27 93	46 1/8	- 1/2	-1.0
N GENERAL ELECTRIC CO	65 98	98 3/8	+2 1/8	+2.2
N GTE CORP	38- 48	48 1/8	+1 1/2	+3.4
N INFONETICS INC	10- 34	24 1/8	-1	-3.8
B INFORMATION SYSTEMS COM	25- 43	33 3/4	+2 1/8	+6.7
B KEANE ASSOCIATES	8- 19	10	- 1/8	-1.2
A LOGICON	8- 30	26 1/8	+1 1/2	+5.4
B MCI COMMUNICATIONS	15- 34	15 5/8	- 1 1/2	-13.7
D MDBT ASSOCIATES INC	8- 33	32 1/2	+ 1/8	+0.7
L MATHEMATICA & DP CORP	12 32	15 1/2	+ 1/2	+3.3
B MICRO SYSTEMS INC	23- 56	48 1/2	- 1/8	-0.3
D MONCHIK WEBER CP	10- 22	12	-2 3/4	-18.6
B NATIONAL DATA CORP	8- 25	15 5/8	- 5/8	-3.8
D ON-LINE SOFTWARE INT	19- 27	23	-1 1/2	-11.8
B PANSOPHIC SYSTEMS	8 30	23 7/8	-1 1/2	-5.9
B PLANNING RESEARCH	8- 21	15 1/2	- 1/8	-0.7
D PRIME COMPUTER CP	19- 35	29 3/8	- 1/8	-0.4
B PROGRAMMING & SYS	1- 8	6 7/8	- 1/2	-6.7
D REMARK & REYNOLD	17 53	41 3/8	-3 1/4	-7.3
D SEL CORP	11- 28	21 1/2	- 3/4	-3.4
J SHARED MEDICAL SYST	13- 43	40 1/2	-2 7/8	-6.6
A SCIENTIFIC COMPUTERS	9- 14	12	- 1/4	-2.1
D SMP WANG AG	9- 17	10 3/4	- 7/8	-7.5
N SYSTEMS INC	2- 31	15	-2 5/8	-12.1
A UNI CORP	9- 18	13 3/4	- 5/8	-4.3
B UNITY CORP	7- 17	12 7/8	+1 1/8	+10.7
COMPONENTS				
N ADVANCED MICRO DEV	13- 38	31 1/8	- 5/8	-1.9
D ADV E SEMICONDUCTOR	18- 34	21 3/4	+1 1/2	+4.8
N ANALOG DEVICES INC	18- 42	41 1/8	- 1/8	-0.3
D ANALOGIC CORP	23- 37	23	-2 1/2	-9.8
N APPLIED MAGNETICS CP	18- 37	30 1/8	-1 1/8	-3.6
N STRATOS	18 37	30 1/8	-1	-3.2
PERIPHERALS & SUBSYSTEMS				
P AM INTERNATIONAL	5 9	7 3/4	-1 1/8	-23.0
A ANDERSON JACOBSON	5- 26	11 7/8	+ 1/8	+1.4
B AUTO-TROL TECHNOLOGY	9- 28	23	- 1/4	-1.1
B DAKSEC INC	7- 22	10 3/8	- 1/2	-4.6
A HEWLETT INTL	4- 15	8 1/2	- 1/8	-1.4
A HOU BENANAV & WEN	9- 60	57 1/4	+2 3/4	+5.0
B CAMBEX CORP	2- 8	2 1/4	0	0.0
N CENTRONICS DATA COMP	8- 28	24 3/8	- 1/4	-1.0
A CITEC CORP	6- 22	16 1/8	+ 1/8	+0.8
B COMPUTRONICS	2- 24	8 1/8	- 3/8	-4.4
SUPPLIES & ACCESSORIES				
A AMERICAN [illegible]	11 33	32	- 1/8	-0.3
A BARRY WRIGHT	11 [illegible]	[illegible]	+ 1/8	+1.1
A DUPLEX PRODUCTS INC	12 [illegible]	[illegible]	+ 1/8	+1.0
A GRAPH SAL FORMS	6 [illegible]	[illegible]	+ 1/8	+2.1
A [illegible] COMPANY	10- [illegible]	[illegible]	+ 1/8	+1.7
B MOORE CORP LTD	26 41	40 1/8	-1 1/8	-2.7
B STANDARD REGISTER	11 24	24		0.0
A WALLACE BUS FORMS	11 34	33	+ 3/8	+1.1

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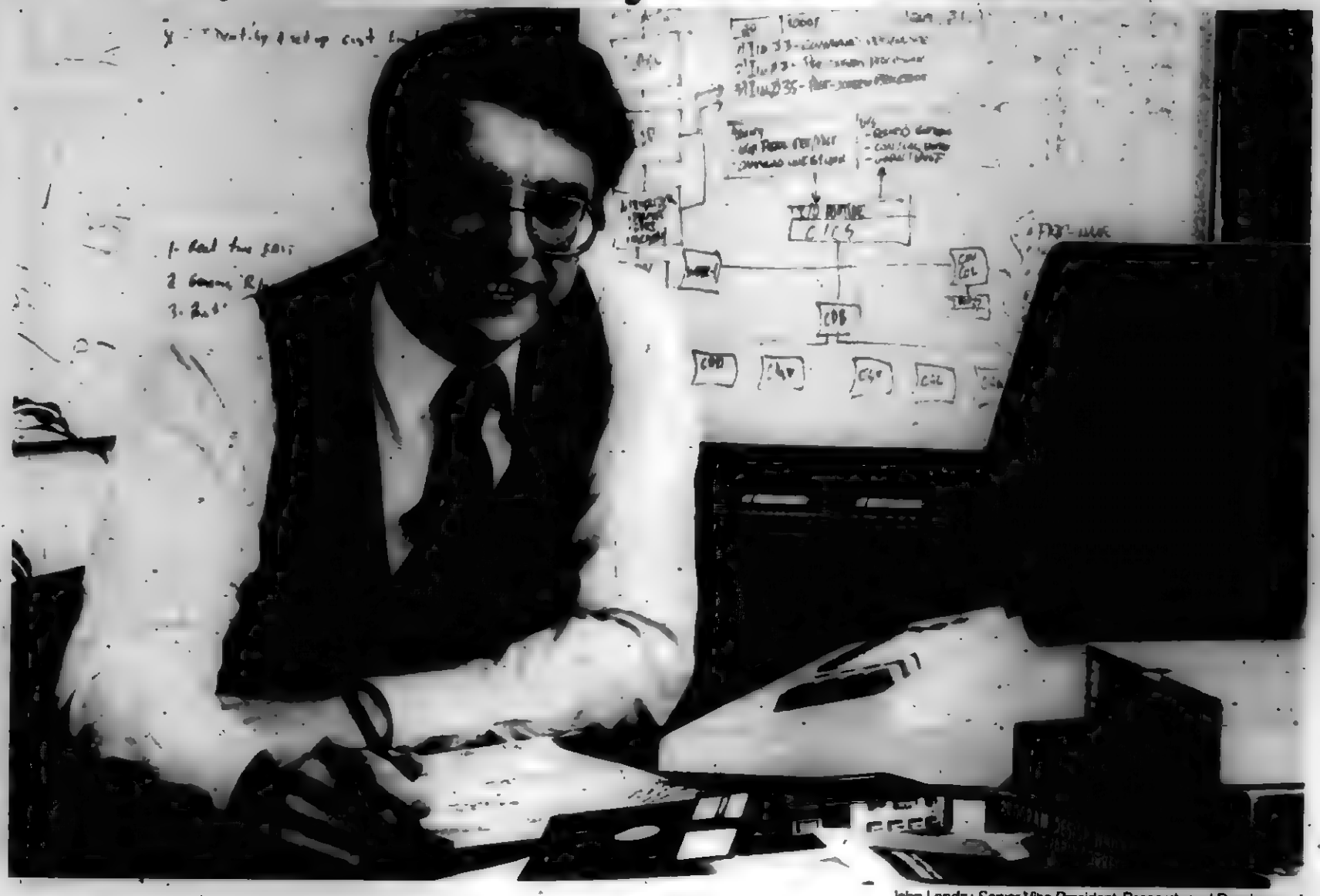

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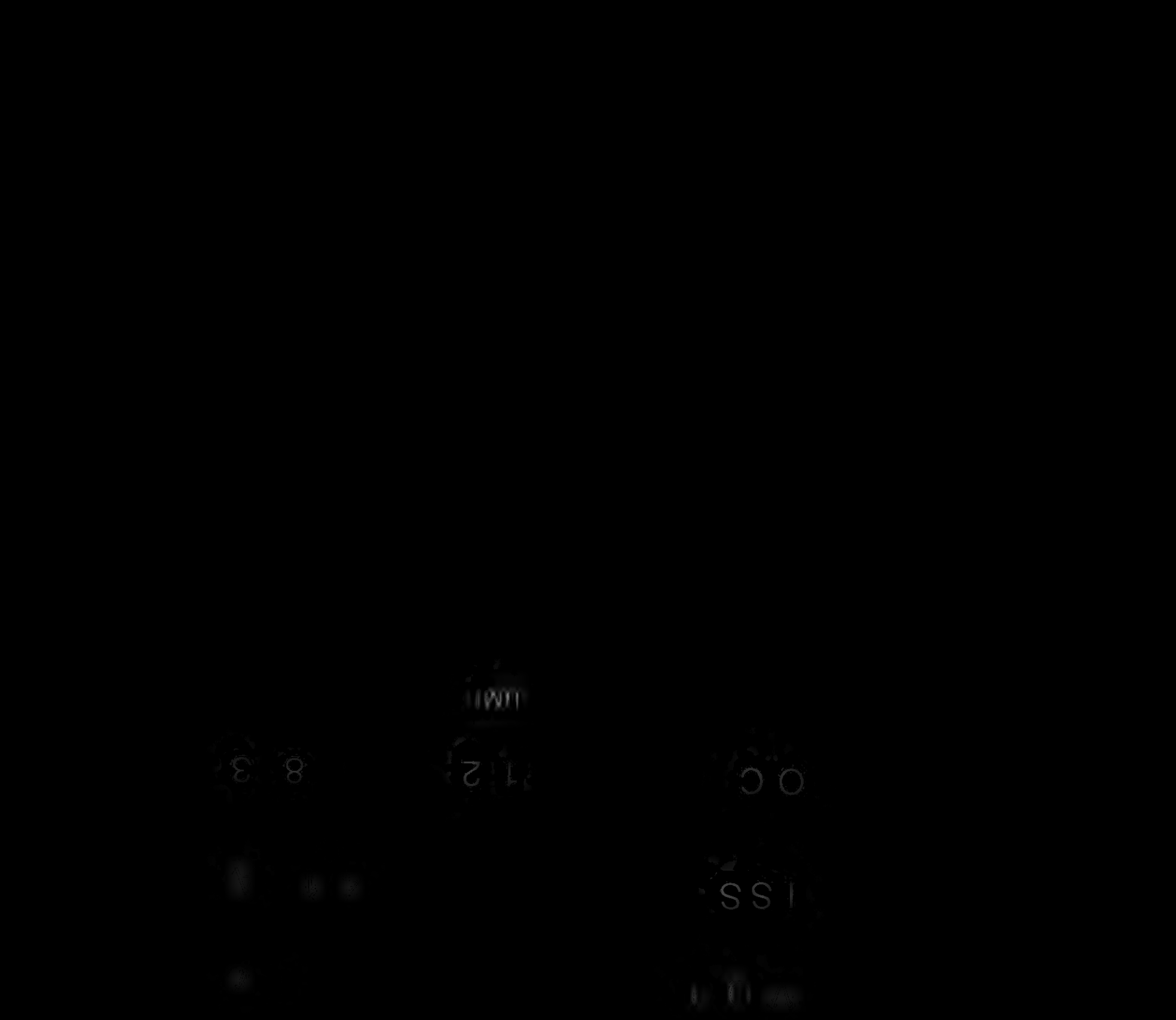
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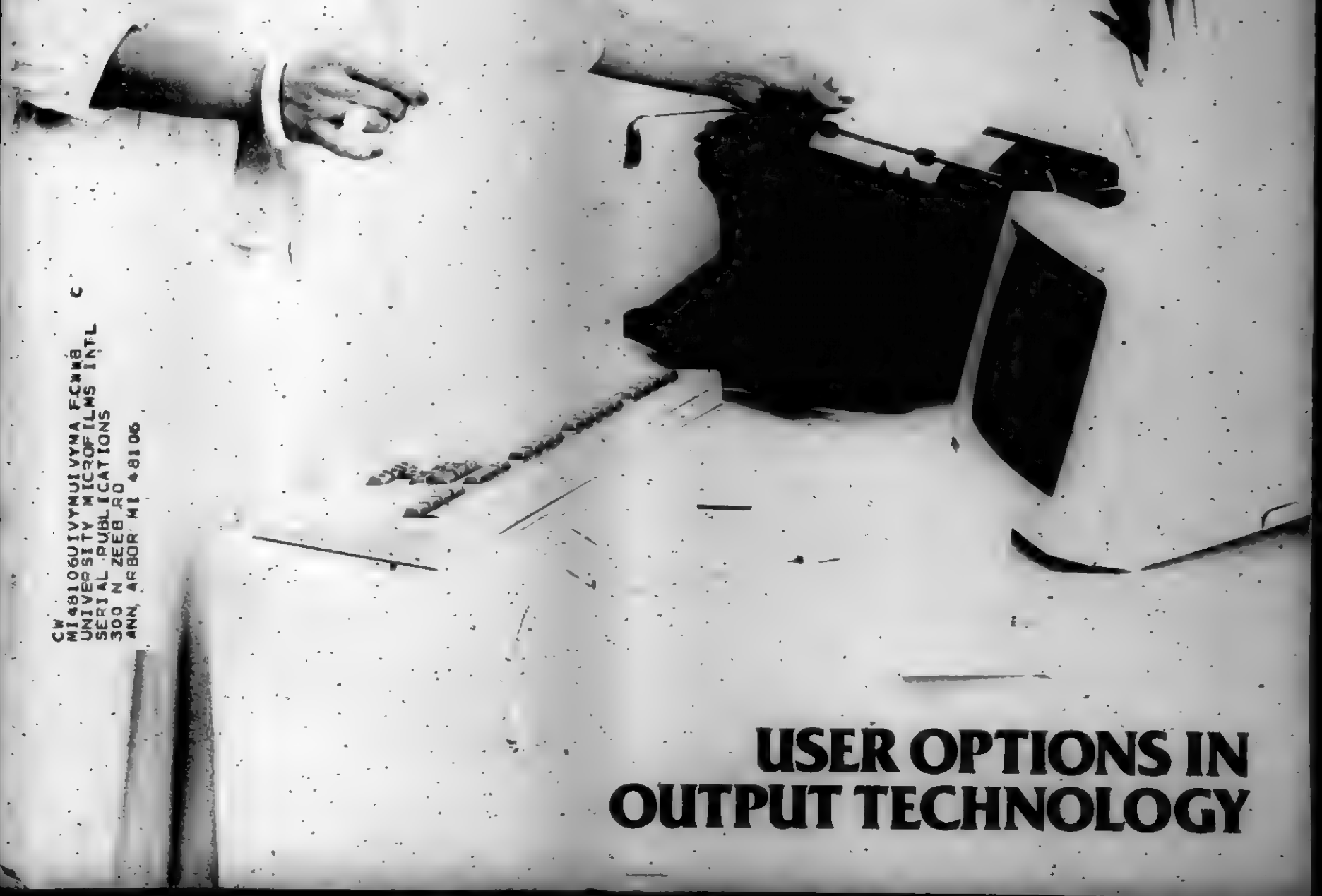
Computerworld

OCT. 12, 1983
VOL. 17, NO. 41A

OFFICE AUTOMATION



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USER OPTIONS IN OUTPUT TECHNOLOGY

At last, help for companies wrestling with the problems created by personal computers.

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DP managers use a variety of terms to describe the arrival of so many different personal computers on the business scene. But the *feeling* is always the same.

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Linking time-tested existing systems to the new developing technologies may be the most effective way to implement OA in your organization.
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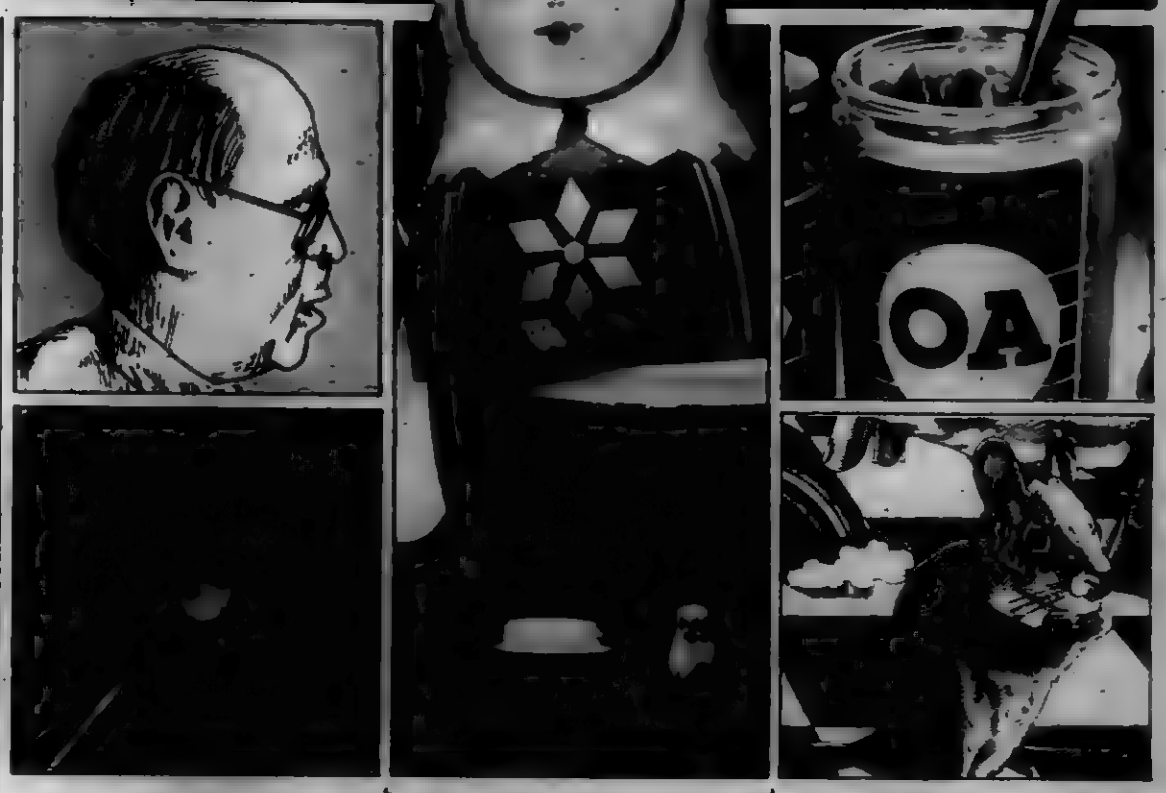

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Box 880, 375 Cochituate Road,
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Second-class postage paid at Framingham, Mass., and additional mailing offices PN127420. *Computerworld* (ISSN-0010-4841) is published weekly except February (5 issues), April (5 issues), May (5 issues), June (5 issues), August (7 issues), September (5 issues), October (7 issues), November (6 issues), December (4 issues) and a single combined issue for the last week in December and the first week in January by CW Communications/Inc., Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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Computerworld subscription prices: $1.50 a copy; U.S. — $44 a year; Canada, Central & So. America — $110 a year; Europe — $165 a year; all other countries — $245 a year (airmail service). *Computerworld OA* prices, $5.00 a copy; $12.00 a year. Four weeks notice is required for change of address. Please allow six weeks for new subscription service to begin.

Computerworld can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. *Computerworld* is indexed; write to Circulation Dept. for subscription information.

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POSTMASTER: Send Form 3579 changes of address to Computerworld Circulation Dept., Box 880, 375 Cochituate Road, Framingham, MA 01701.

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COMMENT

A lot of people are missing the boat on office automation. Whether it's despite all the hype or because of it, too many people are confused, unaware or misled in the area of OA. Some have only a vague, general idea of how to automate office procedures and an even more vague idea of what's supposed to happen when these procedures are automated. Others think OA is really part of communications, which shows a lack of understanding of both communications and office technologies. Communications technologies are needed to integrate office technologies; they act as a catalyst, certainly. However, just as telecommunications includes more than the office, so does OA encompass a great deal more than communications.

Still others view OA as a specific technology or group of products — for example, microcomputers. These people are not seeing the forest for the trees, however, and are missing what's happening in terms of real, long-lasting changes in organizations around the country.

Office automation — end-user computing — is spreading into every office. There is no getting away from it. At an earlier time, employers found it difficult to accept the idea of air conditioning offices to encourage greater productivity among employees, but now it is a forgone conclusion. Similarly, the telephone was originally a user-unfriendly device with not enough people "on line;" now times have changed, and the telephone is a predetermined necessity in home and office — sometimes even in car or plane. So is office automation. So is the widespread use of computing technologies in the everyday jobs of noncomputer people.

As computer literacy rises, as computer transparency increases and as information demand magnifies, employees in every office will be working with automation.

It is essential to realize that OA is a process, not only a combination of products. It is an evolving force reshaping the manner in which organizations conduct their business. This kind of change is not going to happen overnight or even in a 12-month span. What is occurring is widespread organizational change that is going to affect everyone. In organizations like banks or insurance companies, it would be impossible to conduct business by other than automated means; soon it will be just as unthinkable for other kinds of organizations not to use automation in order to maintain a competitive advantage. People won't be adopting OA all at once. But even though it may be a slow transition, it is an inevitable one.

LETTERS

More Etiquette

I found your article on electronic mail etiquette ["Forum," CW OA, Aug. 17] interesting, although I do have a few suggestions of my own to add.

Our electronic mail system offers options to both answer and forward any responses to messages received.

The "answer" capability does not repeat the original message, whereas the "forward" capability does. If the receiver would like to respond with a simple answer, such as yes or no, using the forward feature is recommended.

Even if, as suggested in your article, the original sender has kept a copy of the messages he has sent, it still may be difficult to figure out what question is being answered. Perhaps several have been asked.

Electronic messaging is more appropriate for contact outside one's immediate work area. Personal contact remains effective for the person sharing your office or one nearby, especially if a prompt reply is needed.

New users seem particularly prone to frivolous messages. They should be cautioned to resist this: Users who have found electronic mail an effective tool will resent the sudden intrusion of numerous messages like, "Hi, how are you? I just got on the electronic mail system."

I hope you will find these thoughts useful.

Lorie Strong
Western Electric Co.
Bellaire, Texas

Not Overkill

Congratulations on the August 17 issue of *Computerworld OA* — well written, informative and worthwhile. Articles I thought particularly excellent were the Toffler interview, "Conquering Microphobia," "Protecting Your Data" and "The Micro/Mainframe Link."

I disagree with reader Eugene Smith's assessment [CW OA, Aug. 17]. A dozen or so short articles, with summaries and good highlighting is not "information overkill."

It's very easy for the reader to pick and choose.

Michael H. Agranoff
Data Security Administrator
The Hartford Insurance Group
Hartford, Conn.

Do You Like OA?

If so, write and tell us. If not, tell us about that, too. Send comments to The Editor, *Computerworld OA*, Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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NEWSBRIEFS

LOWELL, Mass. — Wang Laboratories, Inc. has signed a $10 million agreement with Boston-based Bolt Beranek & Newman, Inc. to design and build a wide-area network, or a system to link its computers over phone lines. A packet-switching system capable of handling wide-area networking will be set up in 199 cities next year, according to a Wang spokesman.

The agreement apparently ends speculation that Wang was interested in purchasing a company that could provide them with wide-area network capabilities. Shortly before this agreement, Wang purchased 530,800 shares (or about 6%) of Tymshare, Inc., the Cupertino, Calif., company that links computers in different cities.

Wang then sold the shares on the open market, earning $4.3 million in the transaction as a result of a rise in the value of the stock caused by anticipation that Wang might acquire the company.

HAYWARD, Calif. — The Osborne Computer Corp. has filed for bankruptcy after a meteoric rise within the computer industry. Osborne laid off virtually its entire work force, which had peaked at more than 1,000 in April 1983. This followed an unsuccessful search for an organization to acquire the firm before it filed for Chapter 11 in Oakland, Calif.

The financial decline of Osborne was swift. A pioneer in the portable computer field, Osborne had reportedly sold $100 million worth of its portables in 1982 and was viewed as a darling in the industry. Sales dropped dramatically, however, in early 1983 when a promised new product was not delivered and the portable computer field became crowded with competitors like Kaypro, Inc. and Compaq Computer Corp. with its IBM-compatible machine.

Osborne's financial woes increased when a $4.5 million law suit was brought against it by two Silicon Valley computer-parts makers, Testology, Inc. and PH Components, Inc., both of San Jose.

The suit charged that Osborne failed and refused to pay for certain computer circuit boards, disk drives and other computer-component parts.

KANSAS CITY, Mo. — "Word processing is not a monolithic phenomenon which bodes either all evil or all good for all secretaries. Some people will profit enormously by automation, while others will suffer greatly."

This and other significant points were made at a two-day symposium, Secretary Speakout '83: The Professional Secretaries International (PSI) Research and Education Foundation, in Boston last March. A 20-page digest of that event is now available from PSI.

The digest covers such issues as implementation of office automation, the secretary's role in evaluating and recommending equipment and the restructuring of jobs. The report is available for $2 from PSI, 2440 Pershing Road, G-10, Kansas City, Mo. 64108.

DALLAS — VMX, Inc., the Richardson, Texas-based voice message communications maker, has filed suit against Voicemail International of Santa Clara, Calif. and Voicetek Corp. of Newton, Mass., for alleged infringement of the patent on VMX' Voice Message Exchange system. The Voice Message Exchange system, reportedly the original digital voice store-and-forward system, was invented by VMX' chairman and founder, Gordon Matthews.

VMX is aggressively defending its patent, the company said, and has previously filed a similar suit against Commterm, Inc. That suit was settled by the granting of a royalty-bearing license on the VMX patent to Commterm.

WASHINGTON, D.C. — Federal spending for information technology in 1983 will top $25 billion, according to a report from the International Data Corporation (IDC). In the report "Federal Market Spending Analysis: 1983-1985," IDC predicts a 20% annual compounded growth rate in the federal market for information technology.

Of the $21 billion spent in 1982, $9.1 billion was spend on facility management, $7.8 billion on telecommunications and $3.6 billion in DP equipment and services.

The report is available for $995 from IDC's Federal Division, Suite 240, 1500 Planning Research Drive, McLean, Va. 22102.

NORWALK, Conn. — Bitter competition and "kamikaze" pricing wars are forecast in the portable and transportable computer markets. This is the prediction of a 215-page report from International Resource Development, Inc. (IRD), a Norwalk market research firm.

The report said that "at least half of the current manufacturers of portables will be acquired, out of business or in niche markets within three years."

The report is available for $1,650 from IRD, 30 High St., Norwalk, Conn. 06851.

LOWELL, Mass.— Wang Laboratories, Inc. has acquired Dictronics Publishing, Inc., the software publisher of the Random House and Oxford dictionaries and *Roget's International Thesaurus*. The acqui-

There's nothing special about this file.

NEWSBRIEFS

sition was accomplished through the merger of Dictronics with a wholly owned subsidiary, Wang Electronic Publishing.

Wang said it plans to use the acquisition in future product offerings in order to allow office systems to use sophisticated software programs that will correct spelling and grammar or write business letters. Wang now holds exclusive electronic publishing rights to all editions of the *Random House Dictionary*, the *Concise Oxford Dictionary of English*, *Roget's International Thesaurus* and many other reference journals. Wang plans to sell rights to the reference software to other computer manufacturers.

For more information, contact Wang Laboratories, Inc., One Industrial Ave., Lowell, Mass. 01851

MAYNARD, Mass.— Digital Equipment Corp. and Trilogy Limited have entered into a joint agreement in which DEC has agreed to acquire an option to license advanced semiconductor technology from Trilogy.

DEC also agreed to acquire preferred stock in Trilogy representing a 9% equity interest in the new company. Digital will pay $25 million for the stock and the license option.

The announcement was made by Ken H. Olsen, president of DEC and Dr. Gene Amdahl, chairman of Trilogy Limited.

SANTA MONICA, Calif.— By 1986, more than 4.4 million displays and personal computers will be used to generate business graphics, according to a recent study by the International Data Corp.'s (IDC) Pacific Technology Center. The IDC report, "Trends in Computer Generated Business Graphics," pointed out that applications for computer-generated business graphics range from personal decision support to publication-quality presentation.

Leading users report that decision support and internal presentations represent the major motivation for use of computer-generated business graphics and that top and middle managers are the major users of graphics, according to IDC. The report is available for $2,500 from IDC's Pacific Technology Center, Suite 101, 1448 15th St., Santa Monica, Calif. [illegible]

CUPERTINO, Calif.— Hewlett-Packard Co. has signed an agreement with Intecom, Inc. to cover certification of HP 3000 business computers and HP data terminals for interconnection through Intecom private branch exchanges (PBX).

The accord with HP is to include Intecom's IBX Integrated Business Systems, which can provide voice and data services for up to 12,000 users in a single monolithic system.

HP has recently announced similar certification agreements with Northern Telecom, Inc. and Rolm Corp. and has said other leading telecommunications firms will be involved in certification testing

MEDFORD, N.Y. — Applied Management Services, a consulting and publishing firm specializing in IBM hardware and software, has published "Inside IBM." The 142-page study reportedly analyzes the latest products, services and strategies IBM is planning to implement for the '80s.

Among the topics covered are IBM's new organizational structure, IBM and AT&T, IBM's technical advances and new price strategies.

The report costs $90 from Applied Management Services, Box 350, Medford, N.Y. 11763.

WILLOW GROVE, Pa. — Although managers are most concerned with justifying and implementing office automation systems, employees are concerned more with how automation directly affects them and their work. This is the finding of a 132-page study, "The Office Revolution: Strategies for Managing Tomorrow's Work Force," conducted by Dr. Harold T. Smith for the Administrative Management Society.

The report by Smith, a professor at Brigham Young University, was the first of a four-part research project sponsored by the Administrative Management Society Foundation. In that report, Smith surveyed more than 4,000 managers, authorities and employees to provide information about managing human resources in the office of the 1990s.

The second part of the foundation's research project has just been launched. That report, which will focus on key environmental factors affecting the productivity of the office work force, is being conducted by Wilbert O. Galitz, a consultant specializing in human factors in the office.

The Smith report is available for $14.95 from the Administrative Management Society Foundation, 2360 Maryland Road, Willow Grove, Pa. 19090.

PLYMOUTH, Mich. — As micro technology speed and applications increase, the need for enhanced security of these systems will also increase.

To meet this need, Computer Protection Systems, Inc. has published a special report, "Managing Microcomputer Security," a 190-page report covering a wide variety of security of microcomputers in the business environment.

The report is available for $25 from Computer Protection Systems, Inc., 711 W. Ann Arbor Trail, Plymouth, Mich. 48170.

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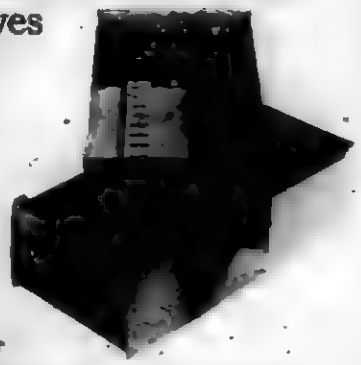

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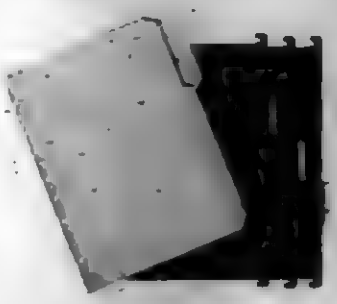

Supreme Equipment & Systems Corporation

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Whether you realized it or not, this is the PC local network you've been holding out for.

Let's face it. If you manage the information systems in your company, you're one of the few people with enough foresight to ask the really tough questions about shiny new PC enhancements and capabilities.

So when your personal computer users started clamoring for a local network, we know just what you said.

"What about data integrity? Why do we have to commit to so much at once? Is it easy to expand the network?"

You probably even asked about multi-vendor compatibility and, as far as your personal computer users are concerned, a lot of other silly questions.

The sensible solution. Ethernet.

Considering the slow, proprietary networks put out for PCs, it's no wonder you held out for a more sensible solution.

And now it's here. EtherSeries: a family of integrated hardware and software local networking products specifically designed for personal computers. It's available right now for the IBM PC, with Apple and other popular personal computers not far behind.

The key to EtherSeries as an integrated solution for your networking concerns lies at its very core. Ethernet.

That's right, Ethernet. The network adopted worldwide by more than thirty of the computer industry's biggest companies. And the network that can give you undreamed-of productivity from your people, equipment, and best of all, your money.

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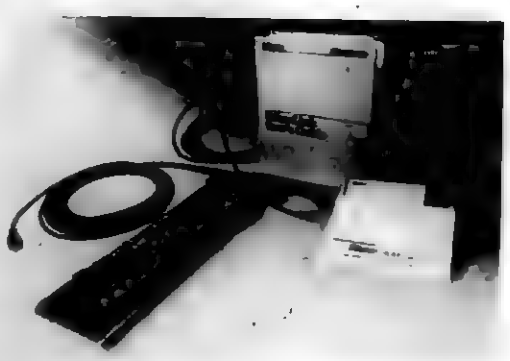

exchange of files at an amazing 10 Mbps transfer rate. And they can do all this without ever leaving their workstations, using just standard IBM DOS commands.

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Blessing Or Burden?

What effect is OA having on jobs? How do workers themselves feel about the technology?

By Glenn Rifkin

Perhaps nothing in the computer industry has stirred up as much discussion as office automation. The technical issues, in themselves a subject for intense debate, are but a small fraction of the moral, social and humanistic questions being raised about the office of the future.

As vendors laud their products and businesses search for more efficient pathways to the bottom line, the office worker, the key player in this drama, is often lost in the resulting shuffle. However, that seems to be changing. Although technology has clearly found an irreversible place in today's office, the concerns of the office workers themselves are being trumpeted loudly by labor unions, trade organizations and the national press.

To some, OA represents a major threat to office workers, women in particular. Office systems have been accused of taking away jobs, deskilling

job functions and being the cause of several serious health hazards. Others look at OA as the salvation for organizations mired in paperwork and bureaucratic communication breakdown. Office automation, they say, will create greater efficiency and save millions of dollars in the process.

As usual, the truth lies partially on both sides of the fence. Secretaries, clericals and typists — a group traditionally without a voice in management decisions — have either embraced the new technology as a welcome aid or have resigned themselves to yet another obstacle in their already tenuous career paths. It is clear that, love it or hate it, OA is a now a reality, and office workers have little hope of stopping it. It is also clear that the success of automating the office depends not on the machines themselves, but on how management and the DP department handle implementation, training and support.

Karen Nussbaum, director of 9 to 5, the National Association of Working Women, has been outspoken on the office workers' role in OA. The major concerns fall into two categories: the design of the machine and the design of the job. The design of the machine, critical to the worker's health and safety the worker, is a solvable problem, she said. Nevertheless, it is serious, because the problems "are not being corrected." CRTs have been accused of causing eye problems, backaches and neckaches, headaches and, possibly, birth defects.

Nussbaum pointed out that a recent National Research Council report (sponsored by the National Institute for Occupational Safety and Health [Niosh]) absolved CRTs of causing serious eye problems. The report concluded that about 40% of the machines on the market are now ergonomically correct for use. "That leaves the majority that aren't," Nussbaum stated.

Along with the labor unions, 9 to 5 has been accused of using the OA issue as a recruitment tool to unionize office workers. Lynn Stern, director of member services for the Computer and Communications Industry Association, claimed that the unions play on the fears of office workers who may not have a great store of knowledge about CRTs. "People are becoming frightened when there is no real cause for fear. No one has demonstrated any long-term ill effects from CRTs," Stern said. "From what I've read, you'd think backache was introduced into the work place by the CRT."

Though the health effects of CRTs continue to generate controversy, the more serious problem is the design of the job, Nussbaum said. Automation has lead to the reorganization of work along the lines of the factory model of the past. "Jobs that used to have variety and some exercise of judgment — and I mean even the very low-level clerical jobs — are now being broken down into their smallest possible components. New jobs are being created that repeat one task over and over again," she remarked.

Proponents of OA, like DeAnne Rosenberg, a management training consultant in Lexington, Mass., believe better jobs have been created. They argue that, far from being a threat, advances in technology are freeing office workers to take on greater responsibility in their jobs. "Some people are afraid and intimidated by the technology, but the vast majority love it. It takes away the scut work and gives people time to handle more challenging projects," she pointed out.

Recent office worker surveys tend to back up a positive outlook on OA. Kelly Services, the Troy, Mich., temporary agency,

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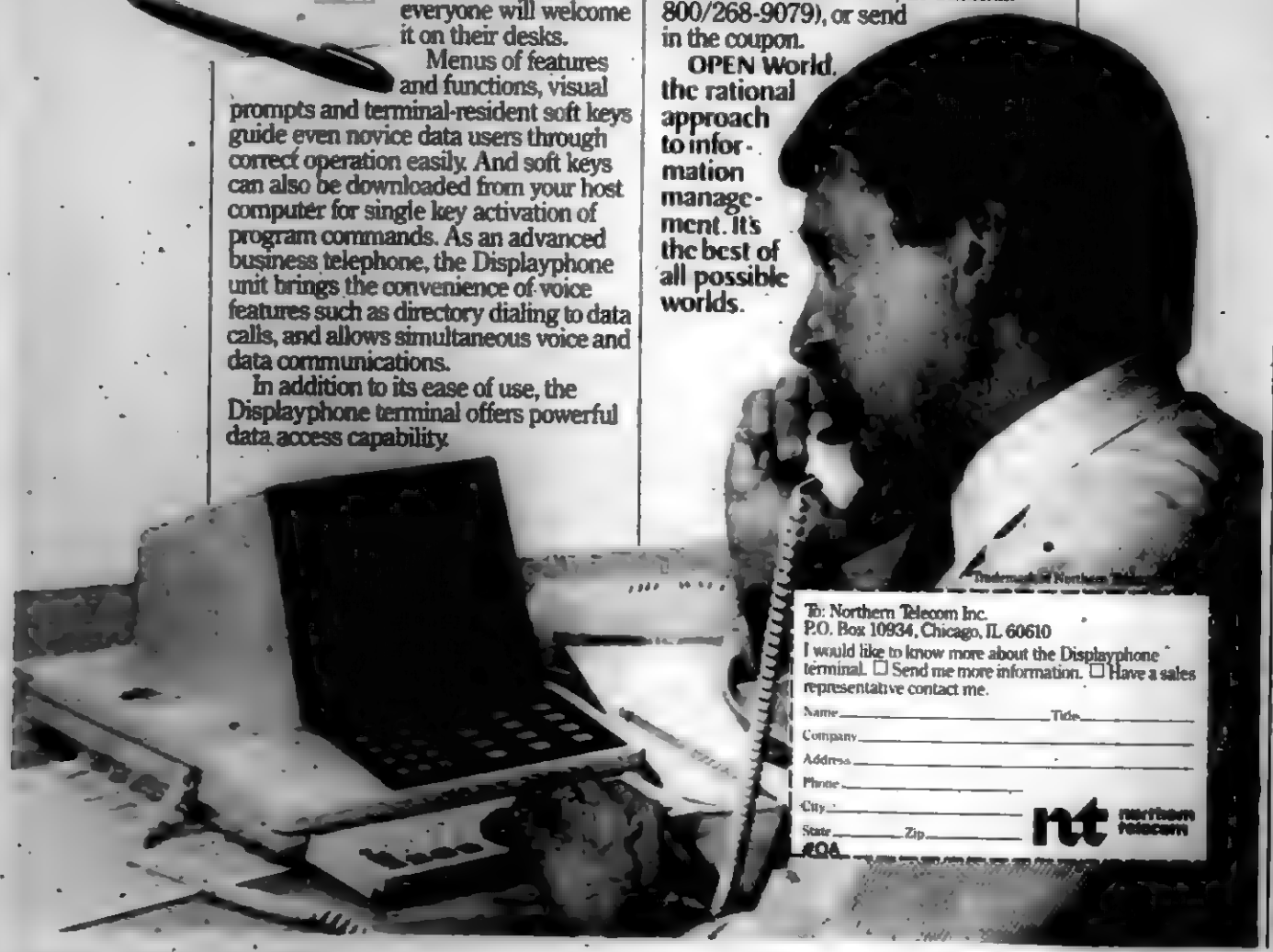

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has published "How Office Workers View Automation," a survey of nearly 500 office workers in Fortune 1300 firms. According to the Kelly report, three-quarters of the respondents felt their new skills enabled them to exercise greater responsibility and 90% said their new skills improved their overall position on the job. Although one in four said the job had become more routine since the introduction of the new equipment, 94% believed the skills opened up new opportunities for advancement.

Another recent survey, handled jointly by Minolta Corp. and the Professional Secretaries International Research and Educational Foundation, produced similar findings. According to that report, 87% of secretaries surveyed felt OA had a positive effect on their profession, and 72% said OA will provide more time for secretaries to spend at more challenging and responsible activities.

Susan Schron has been with the Continental Bank of Chicago for nine years. An administrative secretary in the personnel department, Schron was on hand for the implementation of technology. Though not consulted about the coming machinery, Schron had heard about other sections of the bank that were automated. When the DP people brought in the word processing system, they also trained a few people "on the basics." Optional sessions were offered for further training and Schron took advantage of those.

"The system really helped," she stated. "It has speeded up communications, which is sometimes difficult in a bank. It has also eliminated a lot of paperwork that had bogged us down."

Diane L. Bartley, a secretary at the Bank of New England, added, "I couldn't work in today's market without office automation. It has enhanced my professional skills as well as broadened my job market possibilities."

The surveys and individual accolades, however, do not erase the serious problems that have been encountered. Several states have introduced bills on CRT safety to their legislatures, and workers' compensation awards for CRT-related illnesses have already been handed out.

Office workers have become more vocal about the drawbacks automation has brought to their jobs.

A billing clerk at a Boston hospital admitted that information is more accessible with the technology, but said she was unhappy to learn her work is being monitored by the machine she uses. Not informed that such monitoring was taking place, she learned from a monthly report that her output was under scrutiny. "This has pulled me further away from management. It doesn't take into account the other 10 million things I do around here," she said.

At a Boston-area travel agency, a reservation supervisor who sits at her terminal all day has noticed eyestrain and backaches as well as occasional headaches. She said her job would be impossible without the computer, but more job variance is needed to disrupt the monotony. She pointed out that management gave little or no thought to implementation of the technology when it was brought in. Now, because of the vocal response of employees, management is giving more consideration to the structure of the office.

Industrial psychologist Steven Sauter of the University of Wisconsin's department of preventive medicine found, in his Niosh-sponsored research, that CRT users reported less individual control over their jobs than did non-users. They reported less ability to make independent decisions and felt less capable of taking action.

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In addition, CRT users reported less control over the tempo of their work — the machine had taken control of the pacing. CRT users were also more bothered by environmental factors, such as design of the work place.

Dr. Roslyn Feldberg, a visiting scholar at Radcliffe College, has looked into the issue of job loss. Though serious job loss due to automation is more likely in the future, she said, she has already seen evidence of the disappearance of many traditional clerical positions. "It's hard to monitor it. It happens in a piecemeal manner and tends not to get noticed. The Prudential Insurance field office in Boston was closed, for example, when the DP department made it possible to recentralize the organization." Feldberg remarked that new kinds of jobs will appear with the technology, but that the key question is whether the displaced workers will get the new jobs.

Of course, OA affects more than the support staff. Professionals and managers have faced some of the same questions about automation as secretaries and clericals. Though their rung on the corporate ladder makes them less likely to face the ergonomic dilemmas, their role in the organization is certainly changing with the advent of technology.

Marvin Gross, manager of electronic installations for Metropolitan Life Insurance Co., is optimistic. The role of middle management, he explained, will increase and spread out. Rather than being a collector of data, the mid-level manager will do more analysis of data as the group under his control expands.

There is fear, however, that middle management may be hit by job loss as well. Nussbaum has heard what she called "rhetoric" about "eliminating the middle of the employment profile. One management consultant says the idea is to move $30,000-a-year work onto $10,000-a-year desks."

Nussbaum's organization is keeping a close eye on that trend because they fear it would create an even more polarized work force. "There would be a relatively small group of professional managers at the top and a larger group of deskilled workers at the bottom and no way to bridge that gap," she noted.

If these lamentable scenarios prove accurate, it will be due to lack of direction from upper management and the DP department. The experts tend to agree that a thoughtful and well-directed implementation of OA equipment will bring the desired results. Organizations that report the most positive results are the ones that involve the end users in the implementation process as much as possible.

Deborah Owens, a management engineer for the Children's Hospital Medical Center of Akron, Ohio, reported that the "task team" brought together to direct the automation of their offices included the hospital's management engineer, the director of DP, the director of purchasing, and an experienced word processor user. The word processor user, it turned out, "was the most important member of the team. Only a true operator could evaluate the software in terms of sophistication of features and capabilities and the user-friendliness of the system."

The people being affected need to be brought into the decision-making process, added Rosenberg. They often resist simply because they don't know what is going on.

Training and support after the system is installed is also crucial. Sharon Danaan, a senior rater for a Boston insurance company, explained that a system was installed in her office with no consultation. A supervisor and one other employee were sent to the company's home office for training. The pair was supposed to return and teach the other members of the office. The system, filled with bugs, has never run properly and "the frustration and irritation it has caused has far outweighed any potential value."

'New jobs will appear, but will the displaced workers get them?'

Radcliffe's Feldberg said companies are usually reluctant to allow more than one or two people to be out of the office for training at any one time. Having one member teach all the others usually doesn't work; that person is not a teacher and inevitably cannot answer all questions. Exacerbating the situation is management, which expects immediate productivity on the new equipment. The result is increased stress and displeasure with the technology. Organizations with the most success are those that establish in-house training centers for employees and those that bring the vendor in for consultation and training.

The vendor may, in fact, be the white knight on the OA battleground. Nussbaum stated emphatically that vendors can have a tremendous impact on behalf of the office worker. "We would like very much to increase our dialogue with the vendors. We can give them a view from the real user — not the client, but the woman who types on the machine eight to 10 hours a day."

The larger vendors are starting to listen. IBM reportedly has a 75-person ergonomics staff to address human interface questions. Hewlett-Packard Co. is launching an awareness campaign next year for its marketing people so they can provide one-on-one information to customers. At Data General Corp., all OA products go through stringent design and comfort tests, according to Frank Pinto, director of marketing support: "Not only do we offer training, but it is a requirement for a customer to take DG-supplied training."

Under Dr. Charles Abernethy, manager of human factors, Digital Equipment Corp. has taken a hard look at European standards, which are far more stringent than those of this country. DEC has addressed both the physical and mental problems the equipment has caused. The company is creating its terminals with anti-glare screens, tilt and swivel arms and specially designed keyboards, he said. In fact, DEC is designing its own office furniture. Abernethy's group works hand in hand with DEC's product designers to ensure "fluid interaction" for the user. He said the vendor does have a responsibility for advising how best to use the equipment.

As OA spreads, the synergy between vendor, customer and end user will determine the ultimate acceptance and efficiency of the installed system. Efforts to organize office workers continue as labor unions look to the European model as an example of what unity can bring to the work place. Office workers agree the technology would be more than welcome as long as their concerns are addressed and corrected.

"We do want to use the machines," Nussbaum stated. "The machines are good and can be a benefit, but only under the proper management." OA

Rifkin is a staff writer for Computerworld OA.

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Corporate Moves With Micros

ILLUSTRATION BY RON CHIRONNA

Most major corporations are finding they can no longer avoid developing a corporate strategy for microcomputers. The pressure to set policy comes from two main sources within these large organizations: users who purchase micros on their own and forward-thinking management and DP executives who realize the growth of micro use should not go unattended.

In developing a strategy for effective utilization of microcomputers, corporate management faces many problems, including:

- Training relatively unsophisticated and nontechnical users to operate microcomputers effectively.
- Coordinating the processing of information at hundreds of different locations rather than at a few carefully controlled and administered processing sites.
- Ensuring the integrity and security of data created by microcomputers — data that is less secure and more available to personnel who may want to utilize it in a manner detrimental to the corporation. How can

By Frank D. Girard

organizations successfully address the issue of micro use? One way is to develop a plan that integrates microcomputing within the framework of the firm's overall business and information processing goals.

After an organization reviews its current information processing and business environment, a three-phase approach to developing this plan can be helpful: introduce microcomputer concepts to user departments; develop user operating guidelines; develop overall policies and procedures for effective management, from a corporate perspective, of the development and use of micros. The following checklist points out some key areas in the development of operating guidelines for microcomputer users within a large organization:

☐ ***What will be the primary objectives of microcomputer use in the organization?***

These objectives might include providing improved support for executive decision making, increasing the volume of clerical work performed with existing staff or improving the organization's competitive position in the marketplace.

☐ ***In which areas of the organization will microcomputers be utilized?***

Factors that might influence this decision are the potential impact on bottom-line profits; the urgency of the need to provide microcomputer support; the implementation cost for utilizing micros within specific areas; and the visibility to top management if areas selected for implementation are pilot test sites for microcomputing.

☐ ***How will users be trained?***

Will they be self-trained by means of vendor-supplied documentation? Will they be trained internally by the organization's training department? Or will training be supplied by the new breed of firm that specializes in microcomputer training? What will the training cost, and how will its effectiveness be assessed?

☐ ***What corporate resources will be supplied to the microcomputer users?***

What resources will be supplied for maintaining systems, evaluating new microcomputer software, diagnosing problems and assisting in the many other areas where microcomputer users will require assistance? Will micro resources be supplied by the DP department, the administrative department or another area of the organization?

☐ ***How will communications be handled?***

How can internal and external developments within the micro area be effectively communicated to users? How can duplication of individual user efforts in developing software or programs be prevented?

Several corporations have addressed this issue by establishing corporate computer user groups, microcomputer newsletters, technical libraries and even their own stores where users can shop for and evaluate hardware and software that have been approved for corporate purchase.

☐ ***How will software and hardware evaluation and selection be handled?***

Will users be permitted to purchase their own micro hardware and software from a local computer store? If so, the result may be a lot of incompatible equipment, which would prevent computers from communicating with each other and from efficiently accessing data maintained on other mainframe computer systems. This purchasing pattern also could result in higher acquisition costs by not taking advantage of the combined purchasing power of the corporation.

Factors that could be used to evaluate hardware and software are capacity requirements; extent of vendor support; availability and quality of help functional incorporated in software; completeness and quality of system documentation and system and software training materials; software operating mode, such as menu-driven vs. command-driven software; the extent to which the software utilizes special hardware function keys; and the transferability of data to other software packages.

☐ ***Who will be responsible for data, program and system backup?***

What approach will be utilized to provide adequate back-up facilities for micro programs, data and individual systems so that key processing functions can be performed when system problems occur?

☐ ***Who will respond to user and technical problems?***

When users experience problems with microcomputer hardware and software, how will these problems be addressed?

Several corporations have an internal consulting group to assist in addressing these problems. In addition, many corporations have established a help desk manned by a knowledgeable individual who responds to requests for as-

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sistance. Such an approach often includes maintaining a log of user and technical problems so that the use of micros and related problems can be reviewed and monitored periodically.

☐ ***Will employees be permitted to take advantage of contracts and computer discounts negotiated by the corporation in purchasing micros for their own use?***

For larger organizations, these discounts can amount to 20% or more. Permitting employees to use corporate discounts for microcomputer purchases can help them to become more knowledgeable about their computers.

The above areas are only a few examples of issues that must be addressed in developing effective operating guidelines for microcomputer users. In addition to these user guidelines, important policy and procedural issues must be addressed if a corporate framework for managing the use of micros is to be established.

These management guidelines include the following:

☐ ***How will data communications be handled?***

Will the corporation's micros be equipped with modems, which permit these systems to access, update and communicate with each other? If microcomputer data communications is permitted, will the organization allow micros to access and update mainframe data? How can the security and integrity of this type of processing be ensured? Will micros be permitted to access on-line information services such as Dow Jones and Dialog? How will the on-line access and communications costs related to these services be controlled?

☐ ***How can the use of micros be audited to ensure that data created on these systems is authorized, accurate and complete?***

The use of micros presents a unique set of auditing problems which cannot always be addressed by conventional computer auditing techniques.

☐ ***Will microcomputer users be permitted to develop their own custom computer programs?***

If these programs are not properly documented and developed and if the programmer leaves the organization at a future date, the effort that went into developing the program may be of no value. Other users will have no method to maintain the program effectively.

☐ ***How will microcomputers be integrated into the organization's corporate information system?***

The corporate information system may include mainframe computers, minicomputers, word processors and corporate communications networks.

How will it be determined when a microcomputer is more suitable than a mainframe computer for a business application?

☐ ***How will microcomputer hardware be maintained?***

Industry estimates indicate that outside maintenance contfacts for micros can cost from 20% to 30% of the initial purchase price of the equipment.

☐ ***What will be the policy on portables?***

Will the corporation purchase portable computers for executives to use while traveling? What criteria will be used to authorize a user's purchase of such equipment? How will all micros owned by the corporation be physically controlled to discourage theft of these devices from the organization?

☐ ***Will micros be used as competitive weapons?***

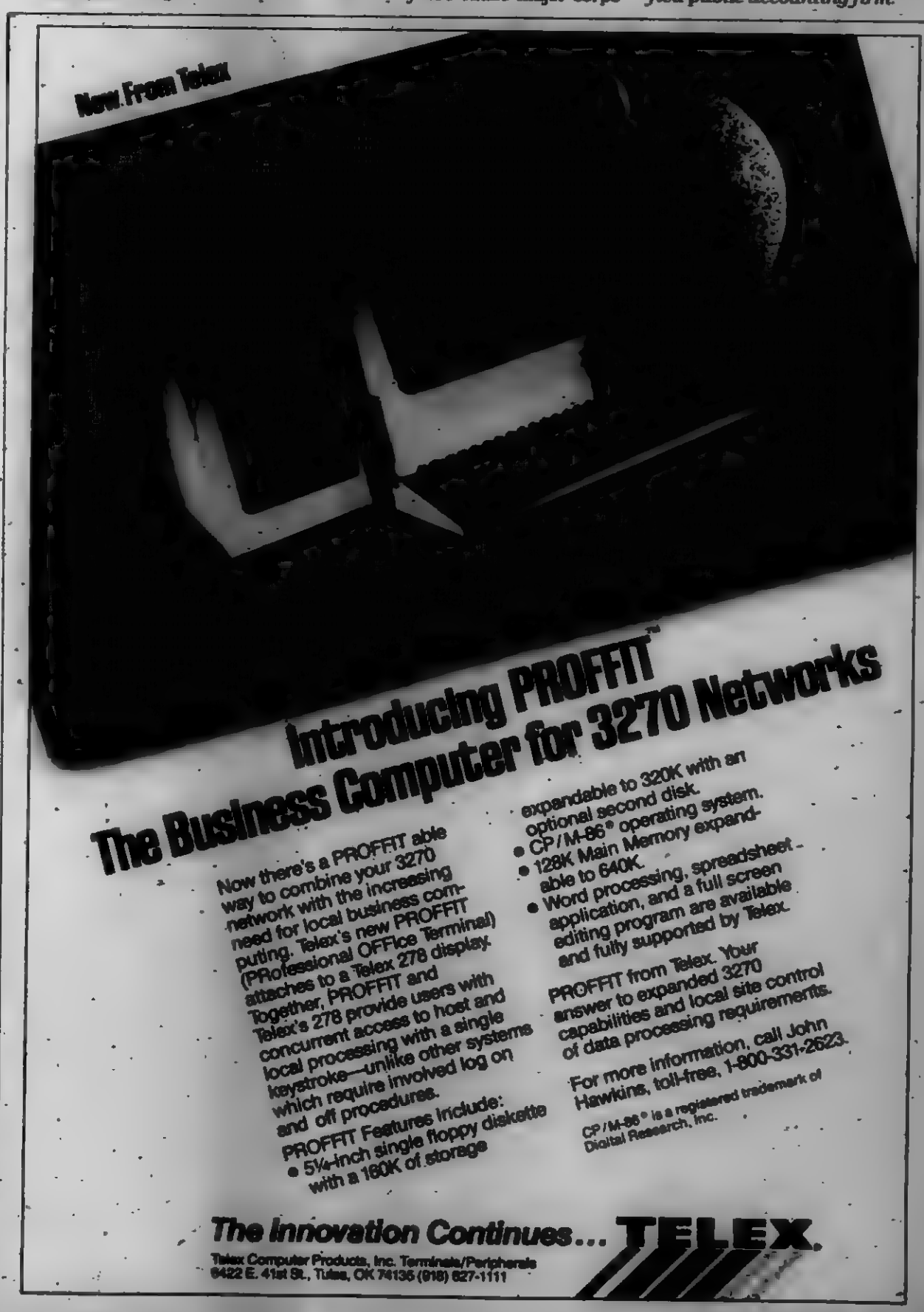
Will the corporation utilize micros outside of the organization as a marketing tool — for example, by providing them to corporate customers as an added-value service?

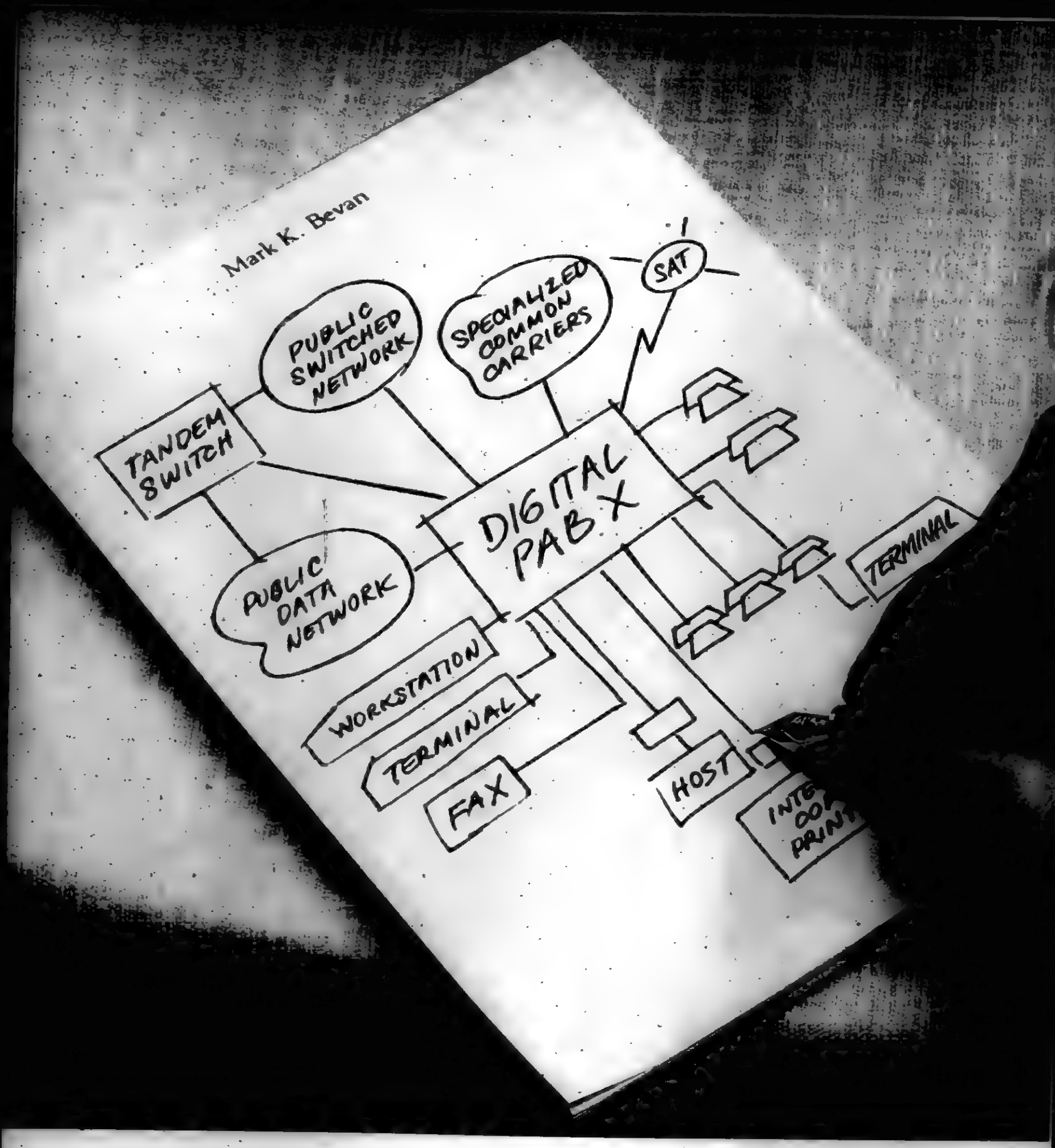
Several major banks offer microcomputers to personal banking customers to provide banking at home. Other banks are offering micros to corporate customers to assist them in more effectively managing their cash flow by permitting access to commercial customers' cash management accounts.

In summary, the era of microcomputing has arrived at the doorstep of major corporations. Will the problems that result over the next 10 years cause major corporations to look back with regret, or will the opportunities provided by microcomputers revolutionize American business in a positive way?

The answer won't be found in the capabilities of microcomputer hardware and software. Rather, it lies in the approach that corporations take today, in developing a well-conceived plan to promote the effective use of this new technology. OA

Girard is an OA consultant in the Data Systems Technical Consulting Services Group of the New York offices of Ernst and Whinney, an international certified public accounting firm.





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packages (and the concurrent CP/M operating system); multiprocessing is generally not employed at the microcomputer level because of the limitations of most current microprocessors.

In a multitasking environment, the processing power of the unit is shared among multiple applications on a one-at-a-time basis. The user works on one application with the processing power of the desktop computer directed to that application. The user may stop work, suspending the actual processing of the application while he switches to another application. Because of the speed involved, the suspension of processing is often totally transparent to the user.

In a multiprocessing scenario, the processing power is split among applications. All applications appear to the user to be processed simultaneously. The processor is in fact still processing them one by one, but alternating instructions from each just enough to process them as jobs.

An analogy of multiprocessing could be based on the circus performer who sets a series of spinning plates in motion. The performer must move from plate to plate, setting each in motion, then returning to each to give it enough of a push to keep it spinning till he is able to return with the second, third and fourth pushes and so on.

Visualizing how application windows would work in both types of environments helps to illustrate the differences between multitasking and multiprocessing. In a multitasking environment, one application (or more) appears in freeze-frame, while another single application is live in another window. With multiprocessing, all of the windows, representing more than one application, are live.

Decreasing memory prices — which encourage the utilization of fixed-disk options — and increasing processor speeds will continue to spur the incorporation of the multitasking capability into desktop computer hardware and software. In addition, the increasing use and availability of 256K-byte microprocessors will encourage the incorporation of multiprocessing capabilities at the desktop computer level.

Hardware/software requirements: The hardware and software required to make the integrated software operational varies by package. Those at the higher levels of integration have more specific hardware requirements in terms of processor speed, mass memory and so on. How providers of integrated software address each of these issues illustrates the diversity in the definition of the term "integrated."

Although categorizing can be hazardous, particularly in as fast-paced a market as desktop computer software, the Yankee Group has established four categories of integrated software:

Decreasing memory prices — which encourage the utilization of fixed-disk options — and increasing processor speeds will continue to spur the incorporation of multitasking into desktop hardware and software.

- Hardware/software integrateds.
- Software integrators.
- Integrated software.
- Associated software.

The hardware/software integrateds are epitomized by Apple's Lisa; their systems (both hardware and software) have an extremely tight, synergistic relationship. In Lisa's case, the operating system is proprietary, and applications that can be performed are limited to those initially provided by the vendor or developed by a third party under license.

In either case, the required adherence to a proprietary operating system means the hardware/software integrateds are essentially closed systems.

Data General Corp. and Honeywell, Inc., with their Desktop Generation Series and Microsystems 6/10 and 6/20 respectively, have sidestepped this problem by split-

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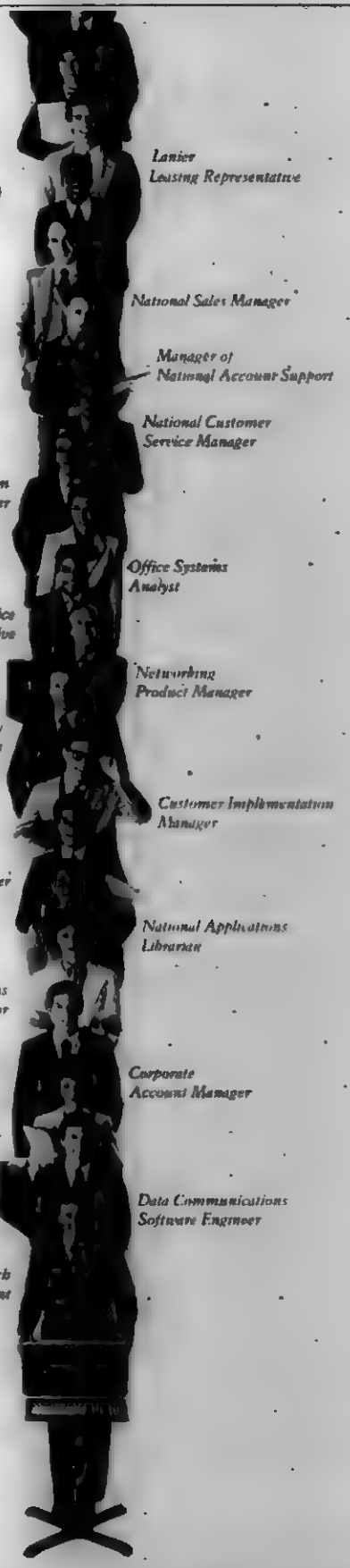

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ting their operating environment. Each of these units supports an operating system proprietary to the company and compatible with its minicomputer line. Their software and hardware therefore are highly integrated, which ensures file compatibility at both the desktop level and above, as well as a common-user interface throughout the product line.

What opens these systems is that each also supports industry-standard operating systems — CP/M and MS-DOS — that allow the desktop computers to take advantage of vast quantities of available applications software written by third parties.

The advantage to the user of a hardware/software integrated unit is the guaranteed common command structure and total file compatibility of applications. In addition, the safety of single vendor sourcing means that, if something is wrong, only one vendor is to blame. With hardware/software integrated units from minicomputer vendors, the benefits of a coherent family of processing units is also achieved.

The desktop computer with only a proprietary operating system might not become a standard with high-volume sales. In that case, vendor software development may lag, and third parties may lose the interest and incentive necessary to develop applications.

Some entry-level desktop computer users not partial to a certain minicomputer family may be confused by the seeming myriad of hardware and software choices. They may adopt the hardware/software integrateds, such as Lisa, as the safest route to desktop computing. However, the desktop computer with only a proprietary operating system might not become a standard with high-volume sales. In that case, vendor software development may lag, and third parties may lose the interest and incentive necessary to develop applications.

The user must be willing to accept the limitations imposed by a restricted set of embedded applications software and be content to wait until the vendor or licensees are ready to provide additional applications he may want.

The hardware/software integrateds provide a multitasking capability: in the case of Lisa, two or more applications can be run concurrently. More than one application can be worked on, each viewed on a single screen in a series of windows. Graphics-based guidance and selection by pointing by means of a mouse are user-interface devices designed to make desktop computer usage easier. These user interfaces were first used in Xerox Corp.'s Star to address the ease-of-use issue. The importance of that issue is evident in the adoption of these devices by the hardware/software integrateds. However, the incorporation of these interfaces into the less pricey desktop computers is and will continue to be a result of the greater availability of memory and faster processing.

The use of graphics-based guidance is more advanced in Lisa than in the DG and Honeywell examples. Their strength lies in their file compatibility with other members of their product families, something Lisa fails to provide.

The software integrators provide an environment that is at least hardware-independent, unlike the software integrateds, which are tied to hardware and a proprietary operating system. Software integrators function with industry-standard, not-proprietary, operating systems — for example, CP/M, MS-DOS and, soon, Xenix for the 8-, 16- and 32-bit processors.

In theory, software integrators can accept an unlimited number of applications packages — possibly from diverse sources — and run them concurrently. Therefore, these software integrators provide an open system in contrast to the software integrateds' closed system.

Windowing capability is a feature the software integrators share with the integrateds. Files are transferable between applications that can be performed concurrently. To varying degrees, the

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software integrators also provide a common command structure or consistent user interface and are supported by specific hardware requirements. The principal examples of software integrators are Visicorp.'s Vision and Quarterdeck Software's Desq, each of which requires 256K bytes and a rigid disk. These two examples illustrate that, even within the neat yet general category of software integrators, distinctions exist. The distinctions reflect the raison d'etre of each of the providing companies.

Visicorp., of San Jose, Calif., touts Vision as an applications environment, not an operating system. Vision is alleged to be independent of both machine and operating system, sitting on top of the operating system and providing a nesting place for a variety of applications packages to be run concurrently. Initially, it will be offered for the IBM Personal Computer, Wang Laboratories, Inc.'s and Texas Instruments, Inc.'s Professional Computers and one of Digital Equipment Corp.'s desktop computers.

Is Vision open or closed? Theoretically, it is open — applications that can be run under Vision are not limited by the hardware/software configuration, except for memory requirements of each application. However, in order for third-party software vendors to link with Vision, certain Visicorp. specifications must be met. No data transfer is possible between applications without it.

Vision's windowing capability allows the multiple applications being performed to be visible on one screen concurrently. Its "consistent user interface" uses a mouse and nine English commands. A bar of commands sits at the bottom of the screen, plus commands unique to each application in every window. Initial applications supported are spreadsheet, WP, data management and graphics, all from the Visi-stable of applications packages. Visicorp. is, after all, in the applications software business. Therefore, the applications of the host house will come up first and will be more synergistically integrated.

Vision was introduced in November 1982, with promises of availability by summer of 1983. Currently, Vision is not expected to ship until at least late fall of this year. In designing Vision as it has, Visicorp. has attempted to trade on its rather impressive reputation and to consolidate its hold on a huge installed base of Visi applications users. By providing a means of linking all Visi applications together, Vision extends the life of individual single-application packages in an increasingly integrated desktop computer world. The licensing of third-party software vendors (plus provision of development tools and so on) can help to extend the life of existing Visi products by expanding the applications line.

Desq, from Quarterdeck Software, Inc. in Santa Monica, Calif., is a software integrator that uses its lack of a software installed base to its advantage. Instead of trying to protect its past revenue base, Quarterdeck is seeking to be a universal link.

Quarterdeck claims Desq will offer users the ability to integrate their favorite MS-DOS-based off-the-shelf applications packages — regardless of their source — into a common-command, multitasking vehicle. This ambitious plan makes Desq the ultimately open system. Like Vision, Desq allows users proficient in certain applications packages (or from companies that have standardized on certain software formats) to bring that expertise with them into the integrated environment. This means familiar command formats resident in those packages can be used or, with Desq, intercepted by the Desq program and front-ended by a common set of Desq commands. Quarterdeck claims to be able to handle any package that runs under MS-DOS, except those whose performance is somehow tied to actual hardware. According to Gary Pope, Quarterdeck's executive vice-president and founder, the firm has successfully tried about 70 packages in-house.

Desq provides another interesting feature, which results from its "artificial intelligence-like" language, said to be similar to Smalltalk and Lisp. It allows the system to learn functions as performed by the user, to be stored and reused — a sort of program-as-you-go feature. It allows the system to truly mimic the way a user works. This kind of almost porous software that accepts its program content from the user will be an increasingly important feature of desktop computer software.

Windows and mice are also a feature of the Desq system, but the keyboard can be used equally well.

In terms of hardware requirements, Desq is not much different from Vision. It, too, requires 256K bytes and, minimally, a 5M-byte disk. Quarterdeck introduced Desq at Comdex — Spring in Atlanta in April and promised its release for September of this year. Company sources now schedule the release for October — just like Vision.

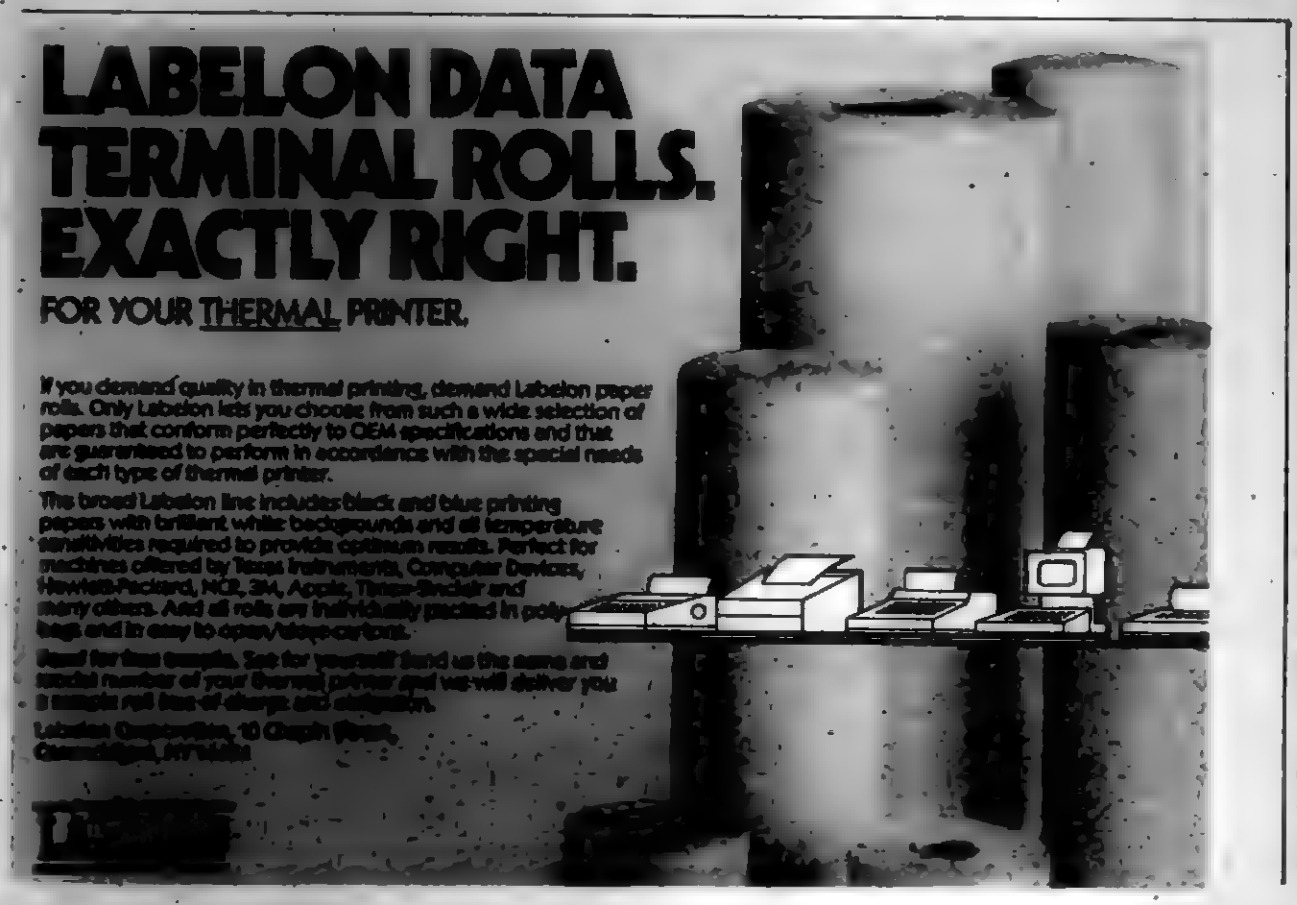
Of the two announced software integrators, Desq's approach may be the best immediate solution to the complexity of today's desktop computer software market. Its proclaimed ability to support a myriad of products reflects the diversity of currently available software packages and the trouble users now face in integrating them. However, both Desq and Vision still have to prove their merit in actual operation. Questions exist as to how Desq's close to universal approach can retain the nuances of individual packages it supports.

In the hardware/software integrateds, software and hardware are bundled. In the software integrators, the software serves as the integrating repository for a variety of single application packages.

Integrated Software: Two currently available integrated software packages meet the criteria assigned to our category of the same name. Their physical integration, common command structures and internally compatible files place these two packages in the category of integrated software.

MBA from Context Management Systems, Inc. (Torrance, Calif.) and 1-2-3 from Lotus Development Corp. (Cambridge, Mass.) offer a given set of applications resident on a single disk. This differs from examples of the two previous groups: In the hardware/software integrateds, software and hardware are bundled; in the software integrators, the software offering serves as the integrating repository for a variety of single application packages.

By basing its offerings on a single disk, each of these integrated software packages addresses a major ease-of-use issue. The user is not required to swap diskettes with each application change —



The computer that ate Milwaukee.

It all happened so fast.

I had just finished lunch with my good friend and competitor, Lubner, an up and coming programmer analyst, who's company had just installed a new computer.

A state-of-the-art whiz that, according to Lubner, packed more memory than a bull elephant with enlarged frontal lobes.

"But what was to become of all that information, all that media that was sure to result?" I queried.

He laughed when I suggested he consider Wright Line's system of information media management. More specifically, Wright Line's latest thinking on work-in-process filing.

Later that afternoon, Lubner was not laughing. Milwaukee was not laughing. The unthinkable had happened. Printouts were devouring garbage trucks. Program listings were victimizing street lamps. It was madness.

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time-consuming and possibly error-prone process, but a necessary one with nonintegrated software. These integrated software packages also offer the advantage that all files are internally compatible and a common command and help structure is provided.

However, the software that is available to the user is limited in this type of system to a given set. Therefore, although one of the criteria for desktop computer product purchase — ease of use — is met, the other — software availability — is not addressed.

Priced at $695, MBA offers spreadsheet, graphics, data management and some WP (8,000 characters). At $495, 1-2-3's principal application is spreadsheet, which is enhanced with graphics and limited data management capabilities. The 1-2-3 WP is basically nonexistent and will be added later this year. Given the fact that WP closely follows spreadsheet as the second most frequently performed application, this capability is a necessity. Because the applications set is limited in both cases, these integrated software vendors provide closed systems.

Both integrated software packages are seeking to make their offerings, if not open, at least less closed. Lotus in particular is working to connect 1-2-3 to the outside world — to the service bureau offerings of ADP Network Services via ADP's Datapath and to corporate mainframes through its relationship with McCormack & Dodge Corp.'s Interactive PC. In both cases, data resident elsewhere can be downloaded into 1-2-3 at the desktop level, manipulated and uploaded, without reformatting.

Although both MBA and 1-2-3 are single-disk-based, closed applications systems using internally consistent user interfaces, some significant differences do exist. Under MBA, applications are performed concurrently and can be viewed simultaneously in a series of windows. Lotus' 1-2-3 performs its applications serially and does not use windows, although it is very easy to switch between spreadsheet and graph.

The multitasking vs. single-tasking approaches manifest themselves in different hardware requirements. MBA requires 256K bytes; 1-2-3 requires only 128K (Release 1A, which is compatible with the IBM PC-XT and several other computers and peripherals requires 192K). Both require two double-sided disk drives.

Both of these packages are mouse-free and rely on keyboard commands, mnemonics and highlighting for commands. Both come with tutorial/demonstration disks.

Associated Software: Associated software is the final form of the so-called integrated software discussed here. The term "associated" reflects the loose degree of applications integration provided by package vendors. As with previously categoried offerings, some applications are more closely associated than others.

High-end associated software is defined as a series of individual applications packages (usually from the same vendor) that share a common user interface. In addition, a common file structure allows the transference of data between applications that run either serially or concurrently. Low-end associated software can be defined as a series of applications packages — again, usually from a single vendor — that share file compatibility potential, which can be loosed through a utility program.

Microsoft Corp.'s Multi-Tool expert systems will probably be the most closely related high-end associated software offerings. Two are currently available, Financial Statement and Budget, and are billed as "powerful additions" to Microsoft's best-selling Multiplan electronic worksheet. Both can run on Apple II, II+ and IIe with 64K bytes and one disk drive, or under MS-DOS with 128K bytes.

Each type of integrated software provides utility for the broad spectrum of desktop computer users today.

The associated nature of the software provides a file transfer capability and a common command structure, in an effort to promote follow-on sales to a user base familiar with the applications vendor's general modus operandi. This group consists of users with whom Microsoft has developed a reputation for reliability — a large group, given the prevalence of Apple and MS-DOS-based desktop computers.

Multi-Tool Word is another addition to the Multi-Tool series, with the same hardware requirements. It differs from the previous two in its heavy use of a mouse for selecting and executing commands. An expert level allows the user to abandon the mouse and utilize command keys. This package also provides up to eight windows within its single WP application for viewing a series of documents and moving text among them. Multi-Tool Word can also incorporate printed files from Multiplan and other Multi-Tool application packages.

With its reliance on the mouse, Multi-Tool Word is a step toward an advanced hardware version of other Multi-Tool applications packages. They will most likely be designed to run under a 3.0 version of MS-DOS, providing multitasking capabilities, windowing, mouse cursor control and possibly icon graphics. These features will increase the hardware requirements, no doubt to include 256K bytes and a hard disk.

Each type of integrated software discussed provides utility for the broad spectrum of desktop computer users today. None of them may prove to be long-term solutions for integrated desktop computer applications. Based as it is on a prevalent, industry-standard operating system and providing a compatibility and a common interface for a large number of diverse applications packages, Desq may be the short-term solution to software integration. This could be true particularly in cases of user proficiency or some substantial user investment in diverse software, according to the Yankee Group.

For the long term, two of the abovementioned types, reflecting different market populations, may have greater success. In larger organizations, certain hardware/software integrateds may provide the best solution. These are the hardware/software integrateds that combine a proprietary operating system with an industry-standard operating system, thereby providing file compatibility, common user interface and a large amount of available software at and above the desktop processing level. Examples are Data General, Honeywell and, before too long, IBM.

Hardware/software integrateds without a bridge between their proprietary operating system and the industry standards or an additional processing level to communicate with will find themselves with a dearth of applications software. For this reason, Apple may elect to support MS-DOS with Lisa before the end of 1983.

For smaller organizations where requirements for communications to internal mainframes and minis is not an issue, the software integrateds may provide the best solution. The software integrateds could provide a core applications package — spreadsheet, WP, graphics, data management — with a receptacle for an industry-specific applications package. These packages would be written by third parties, to be loaded in by the user. In addition, links to outside data bases such as those being pursued by 1-2-3 could provide access to additional data. Again, a common command and help structure would be provided and file compatibility ensured.

In both cases, how successfully the issues of user interface, help and file compatibility are addressed will determine the market success of the integrated software. OA

Carr is a consultant at the Yankee Group, a consulting firm based in Boston.

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Chicago, IL	November 15
Chicago/Oakbrook, IL	October 13
Cleveland, OH	November 15
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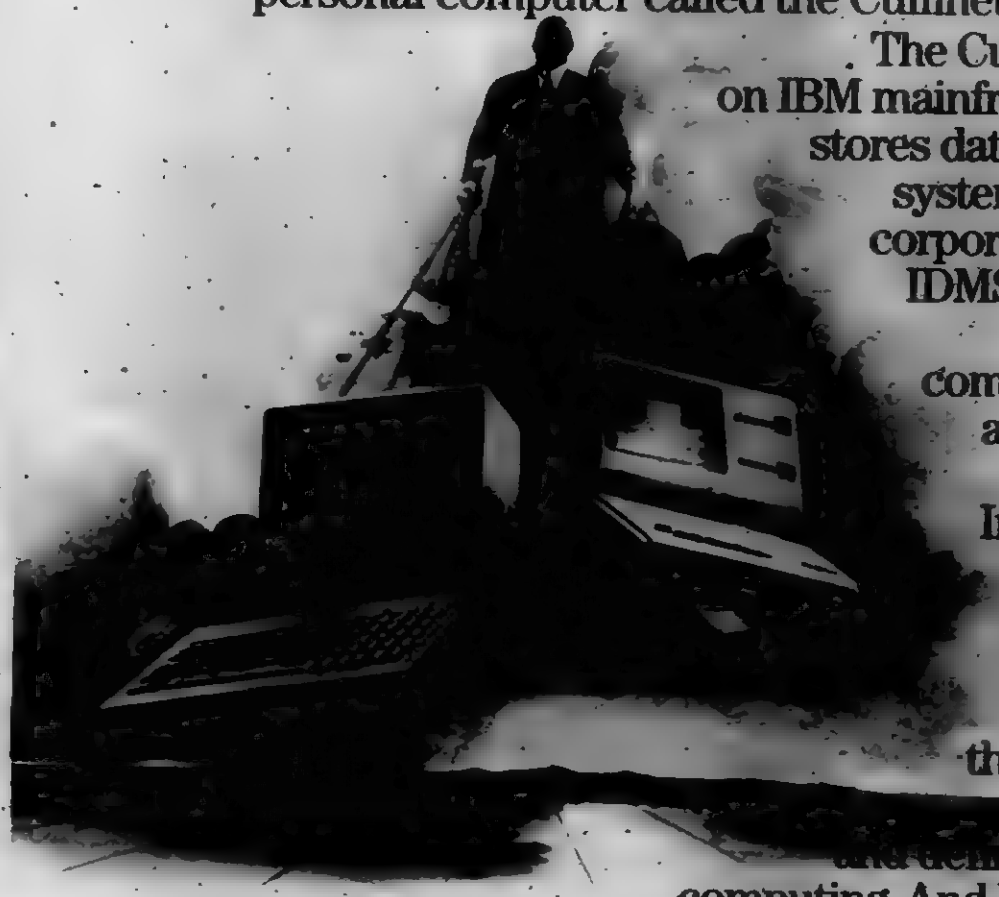

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Harris Heads Into The Office

It is hard to imagine a $1.4 billion company having an identity problem, but for Harris Corp., the Melbourne, Fla.-based information technology giant, its lack of visibility may be the largest stumbling block in a vigorous quest for a share of the office automation market.

Despite having built a strong and respected reputation in the communications, semiconductor and government systems markets, Harris has been a stranger in the office. Several years ago, it became clear to Dr. Joseph A. Boyd, Harris' chairman and chief executive officer, that the company would have to recreate its image and redefine its strategy in order to become an integrated information processing systems vendor. Boyd targeted the automated office as a key to survival in that arena.

Unfortunately for Harris, the company had everything but an office product. The attempt to design and market a word processing system met with dismal failure; at least two major WP development projects, reportedly out of tune with the current market, had to be scrapped before introduction. The current offering, the Series 9000 Office System, has looked good to industry analysts, but, given the fact that it is

BY GLENN RIFKIN

already a year overdue and still in the beta test stage, there is strong feeling that it may be too little too late.

However, Boyd has thrown Harris' resources behind the 9000 (it cost more than $30 million to develop) and believes strongly in the product. To speed up Harris' entry into the office market, Boyd engineered an unexpected merger with Lanier Business Products, Inc., a leading low-end WP vendor. Barring unforeseen obstacles, that merger should be formalized later this month.

Though the Lanier merger has drawn a great deal of attention in the industry, it has not produced any rave reviews. Some industry analysts believe the deal has potential because it combines Harris' technical expertise and good reputation at the high end with Lanier's vast sales and distribution channels at the user level. Others are openly skeptical: "People who think this is a perfect marriage are naive," said Tom Billadeau, president of the Office Systems Consulting Group. "First of all, Harris doesn't have a product out there yet; second, Lanier's sales force has won no prizes going to the large Fortune 1000 companies. They won't be much help with the large organizations."

Concern is also being expressed about how the merger will be managed. Initially, Harris plans no changes and will let Lanier operate as an independent sector under its current management. Boyd expects to utilize Lanier's 700-member sales force to introduce the Series 9000 in January or February.

"Properly nurtured, the deal can do them well," said John Murphy, vice-president of Advanced Office Concepts. "But can it be nurtured properly? I look at the Burroughs-Redactron merger. Redactron was a major factor in the word processing market and after the merger they disappeared. They were buried. The key to the success of this deal is the integration of peopleware."

Whether or not the merger meets Harris' expectations, a larger question remains: Can Harris, at this stage of the game, become a major player in the OA marketplace? Company officials are guardedly optimistic. Jack C. Davis, senior vice-president of the information systems sector, admitted that Harris is a company in transition, but said the Lanier merger is an example of the transition, not the cause of it.

"We wouldn't be doing it if we didn't think we could," remarked Davis about Harris' foray into the office market. "We have been transitioning this company over a long period of time rather successfully. We moved from a printing company to an electronics company, and people said that couldn't be done either. I say our record is pretty good."

In fact, Harris' divestiture of its highly successful printing business earlier this year raised a few eyebrows. That business had been responsible for nearly 25% of Harris' revenues in 1982; selling it cut off the last remaining ties to the company's roots. Having begun in 1895 as a printing business, Harris decided the future looked brightest in the information processing field and set its course accordingly.

Although the Lanier merger has drawn a great deal of attention in the industry, it has not produced any rave reviews.

"Selling the printing business was the correct move. Either you're strictly in the technology business or you're a conglomerate. Sperry and Honeywell have shown the problems trying to do that," said Stephen McClellan, vice-president of Salomon Brothers, Inc., a New York financial analyst firm. "It's time Harris concentrated on technology."

In fact, Harris has been concentrating on technology for some time. Harris has had major success stories in many of their other businesses, including data terminals, satellite and telephone communications, semiconductors and superminicomputers. Davis pointed out that most Fortune 500 companies have some Harris equipment (an estimated 60,000 Harris terminals are installed with 6,000 customers). Operating in an autonomous, decentralized mode, each of the company's 25 divisions has been able to carve out significant niches in its respective markets. The mandate now, however, is to pull these resources together to offer a total integrated information processing capability to customers.

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Davis said that with Harris' strengths in all these areas and the pending introduction of the Series 9000, the company is ready to tackle the heavy OA hitters. "It may be characterized as a gamble, but it's a nonoptional gamble. If you're going to be in this business, you've got to have all these elements and be able to tie them together. We've got to transition to a much broader marketing and sales company than we have been and move away from some of these niche markets."

Therein lies the rub. Many industry analysts believe it will be very difficult for any newcomers to squeeze past the barriers IBM, Digital Equipment Corp. and Wang Laboratories, Inc. machines represent in the office mart. Can Harris unveil both a solid product and an impeccable marketing scheme quickly enough to gain a significant market share? Many information systems managers take the stance that unless a company has a vastly innovative product to offer, it's better to stick to names you know.

"Just because you have the individual pieces, doesn't guarantee that you end up with a masterpiece in the end. Their success is contingent upon how much of a market share they go after," said Billadeau. "Will they give IBM, DEC and Wang a run for their money? The answer to that is no."

Added McClellan, "They're not only late, they're also going into the market with relatively small weapons. It's a big risk because office automation is a capital-intensive market. They figure to play a small role at best."

Boyd said that Harris, through its data terminals business, has established a positive presence with DP and management information systems managers and that, combined with the $400 million Lanier office products base, should provide an acceptable name in the market. Boyd is assuming that Lanier's sales force, already familiar with the office market, can be trained to sell Harris' high-end systems along with the Lanier stand-alone line.

Harris, in fact, is taking a stance of compatibility, not head-to-head competition in the office. The Series 9000 is being constructed to coexist and interact with both IBM and Wang in the office environment; the aim is not to displace IBM or Wang, but to add Harris. Indeed, the new system was designed using many of the best features of Harris' competitors, according to J.R. Hughes, manager of product marketing for the distributed office systems division. The Series 9000 is not just a WP product, said Hughes, but was developed with communications and networking in mind.

Based on multiple 16-bit micros, the Series 9000 utilizes Harris' own Nodal Operating System (NOS), which is a multitasking, distributed processing system with integral network support features. Designed with a layered architecture, the 9000 reportedly will be capable of operating in a stand-alone environment as well as a clustered setting with total hardware/software compatibility. It will also have document exchange capabilities with both IBM and Wang word processors, according to its vendor.

The series is scheduled to include the 9010 Standalone Word Processor, the 9015 Professional Computer, the 9020 Mini Cluster, the 9050/9060 Cluster Systems and the 9070 Network Systems. Prices will range from $9,500 for the stand-alone system up to $84,000 for a typical cluster with eight workstations and four printers, according to Harris.

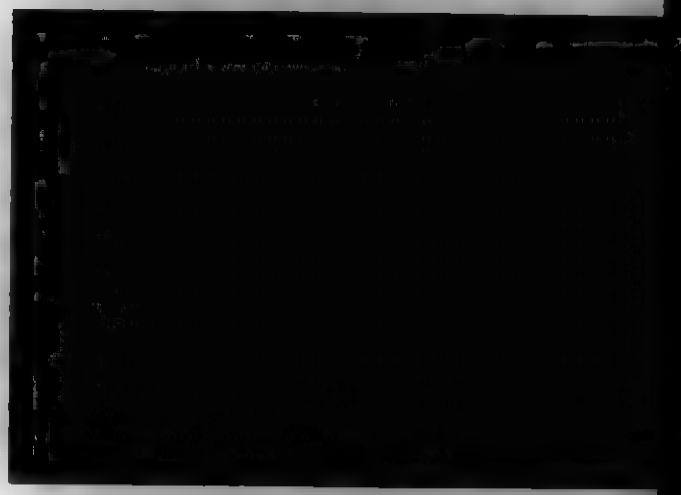
Most important to the success of the Series 9000, in Harris' view, is that it serves as the basis for communications and networking products. Under the direction of Walt Frederickson, vice-president of technology, the company is developing local-area networks — baseband, broadband and private branch exchange (PBX) — which will provide gateways to wide-area communications links using protocols such as 2780/3780 and 3270/SNA. The local-area network, generically named Hnet, is scheduled for early 1984. The company said it plans to adhere to IBM standards until the international OSI standards are adopted. At that time, it will offer gateways to all the major public and proprietary networks.

"There's no single answer to the network question," said Frederickson. "We'll see multiple networks in the business environment whether we like it or not. Ours is designed to link people together in the way they really work by integrating work groups and also providing bridges to other work groups."

Harris has also expanded its already successful entry into the PBX market by announcing a digital PBX product that can reportedly be used as a data or voice port.

According to Davis, the Series 9000 is unique in its architectural concept and its integration of WP and DP with the networking capabilities. Boyd pointed out that the 9000 concept will serve as the

IF YOU'RE CONSIDERING CONSIDER



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R:base is also very forgiving. It's very hard to make a mistake. That's because commands are simple English expressions—like SELECT, PROJECT, WITH, WHERE, FROM, etc. Dates and dollar amounts are written normally: 11/16/83;

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foundation for Harris' products for the next 10 years.

McClellan of Salomon Bros. observed that the 9000 seems to be competitive with other products in the marketplace, but doesn't "leapfrog" anything either. "The question is, Can they market it? I have to be somewhat skeptical about that."

"I don't think they're going to be very innovative," stated Murphy of Advanced Office Concepts, "but they don't have to be. They need good, solid products and the ability to coexist in the IBM mainframe and PC world. This game is not run by the technology, but by marketing and functionality at the user level."

As Harris is well aware, its clearest path to the office is through organizations where it has an established reputation with its other technologies. It has a solid and growing presence in the government and defense industries and impeccable credentials as a telecommunications manufacturer. A recently announced 48-bit superminicomputer should enhance its position in that market, and its new Cmos 16-bit microprocessor should bolster a sagging semiconductor business. Jim Oyler, vice-president of marketing for the information systems sector, pointed out that these businesses give Harris varied entries into organizations and a chance to show how Harris can tie it all together.

'Office automation, despite all the publicity, is still in its infancy. The acquisition of Lanier buys us time; it might have taken five years to get to the position we now have.'

According to Davis, those strengths have been a mixed blessing. Harris, he said, can't afford to be known as just a computer company or just a semiconductor company. It must be viewed as a broad-based communications and information processing company. "The sophisticated buyer who is installing those superminis and interfacing them with networks understands what we're about. What we have to do is get known better by the knowledge worker."

This scenario will eventually work in Harris' favor, according to Boyd. Office systems and office users are becoming more and more sophisticated and DP people are increasingly called upon for advice. "That's going to help us get in the door. Then it's up to us to prove we can deliver," he said.

Harris doesn't intend to leave anything to chance. There will be a significant increase in spending on product development along with sales and marketing reaching up to 12% of sales revenues, according to Boyd. The company, heretofore conservative in its advertising, will take an aggressive stance in that area. Industry analysts agreed Harris is financially equipped to confront the office challenge. Along with steady revenues from its other successful businesses, Harris added $250 million to its coffers from the sale of the printing business. The Lanier merger was accomplished via a stock swap to avoid biting into that cache of cash.

Harris has suffered seven consecutive quarters of declining profits, but McClellan attributed that to the cyclical nature of the technology business. Harris, he added, is "still a healthy, deep and strong company — very sound financially."

Though the skeptics about the Lanier merger and Harris' entry into the OA market are many, the company believes there is time to have an impact. "Office automation, despite all the publicity, is still in its infancy. The acquisition of Lanier buys us time; it might have taken five years to get to the position we now have," said Oyler. "We are buying an irreplaceable mechanism for distribution."

Harris, with its core products, the ability to tie those products together and a strong service and support commitment, is going to be a force, Davis added. It is simply a matter of whether Harris will be "great and dominant or just good." OA

Rifkin is a staff writer for Computerworld OA.

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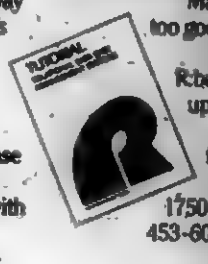

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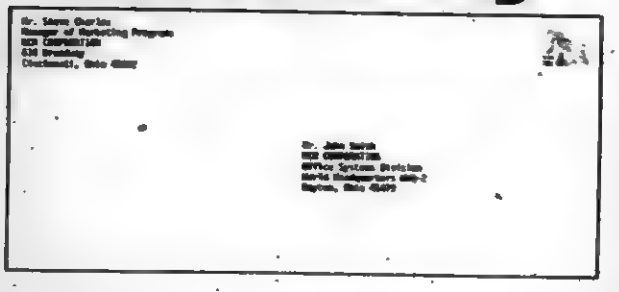

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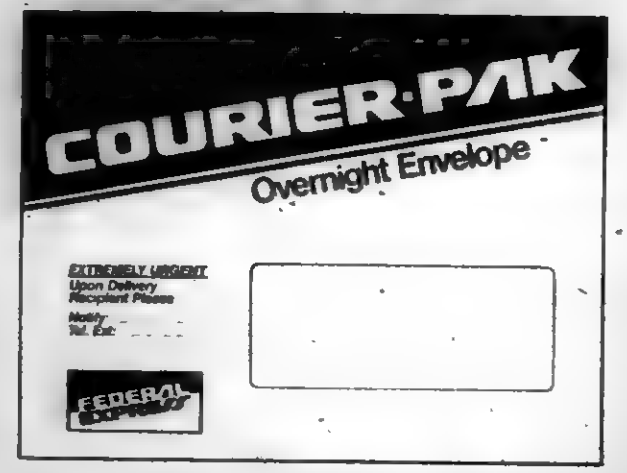

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OA FOCUS: OUTPUT TECHNOLOGY

Office technology is developing at rapid-fire speed. However, that doesn't mean that the more traditional and time-proven technologies should be abandoned. The successful manager will be one who can integrate existing equipment and systems and adapt them to new products. This "OA Focus" pinpoints some output technologies like micrographics that can work with the newer, more sophisticated tools that you will be encountering soon.

Micrographics 37
Business Graphics 45
OCR and Electronic Mail 49
Optical Disks 53
CAR and Micros 57

The genius of Team Xerox.

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The 8010 professional workstation has always been known as a computer of dazzling capabilities, especially in its graphics, information processing and document preparation.

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Its full 17" bit-mapped screen lets you view two full pages simultaneously and open up to six documents at a time without covering up a previous document.

It's also the only workstation that can create and print documents in more than a dozen languages, including Russian and, for the first time, Japanese (Katakana, Hiragana and Kanji).

While other workstations may use Xerox innovations like the mouse, icons, windows, property sheets and combined text and graphics, the 8010 simply does more with them.

For example, the 8010's extensive software is fully integrated, to allow you to work with text and graphics simultaneously. You can draw a flowchart right in the middle of a full page of text without having to resort to a separate program and limited buffer "scratchpad" or "clipboard."

In terms of capabilities, ease of use and overall value, the 8010 would have to be considered the stellar workstation in the industry.

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MICROGRAPHICS

BY JOHN O. FRISVOLD

Like orange juice (which isn't just for breakfast any more), micrographics can now be found in situations where it was undreamed of in the past.

The information systems manager who will be able to organize a more integrated computer system for his organization is one who knows where current micrographic technology has come from, understands what's ahead for it and can see how it dovetails with systems already here or on the advanced office horizon.

Micrographics remains the technology for low-cost, space-saving information storage. Unlike any other accepted storage medium for copied documentation, it provides accurate, tamperproof recording and storage of evidentiary documentation such as legally sensitive deeds, warranties, contracts and checks. But, does micrographics really belong in the world of office automation?

PHOTO © 1983 MORT ÅBRAHAM, CONGRAF INC

Yes, it does. For example:

• A California bank's international operations office with 250 client banks worldwide finds that a stand-alone computer-assisted-retrieval (CAR) system for microfilm records saves space, is easy to operate, is fast and will save $12,200 annually over a 10-year period.

• A paper company's southern operations switched to electronic filing in records management. Productivity increased (overtime in accounts payable alone was cut by several hundred hours) and working conditions improved (because 37 file cabinets were eliminated).

Indeed, the new micrographics systems and their compatibility with other technologies are changing the ways records are stored, retrieved, displayed and reproduced. Today's state-of-the-art reader/printer, for example, can produce dry prints in seven widths and 10 push-button-selected lengths; can utilize 14 automated search modes (with accommodations for future modes, as well); and offers the option of on-line operation with a mainframe or mini system.

The computer can order up to 250 concurrent searches, each specifying cartridge number, frame address, size and number of prints and the name of the requester. If you prefer, you can opt instead for a manual-search version of the same unit, with odometer indexing only. Either way, the reader/printer can use any cartridge from its manufacturer, any Ansi cartridge or any open reel of 16mm microfilm, even those produced on early systems. This top-end reader/printer is not unique in its ability to marry micrographics and computers.

At the recent convention of the Association for Information and Image Management (formerly the National Micrographics Association), presentations from both large and small companies focused on computer-assisted-retrieval (CAR). This hybrid combines the speed and accuracy of computer intelligence with the low-cost, mass storage capacity of micrographics. In a stand-alone CAR system, the micrographic portion of the system is driven by a minicomputer. Receiving its direction from a software program, the computer directs the micrographic unit to indexing and retrieving microfilmed documents in a matter of seconds. Because the system is completely under the control of the operating department and works as a stand-alone for its specific use, no liaison with a mainframe is required.

An on-line CAR system links the system's micrographic capacities directly to a centralized computer. These systems are justified when used in data base applications large enough to warrant total dedication of the central computer.

According to recent statistics, CAR systems seem to be divided fairly equally among manufacturing firms, governmental bodies, service industries and insurance/finance institutions. In the government sector, the federal government takes the largest credit for CAR usage, followed by state and city governments.

Applications such as order entry, accounts payable/receivable files, mortgage and installment loans and invoicing make up nearly 50% of today's CAR installations. Credit card and bank-by-phone application files and military and police records account for another 20% of CAR usage; the remaining 30% is divided among student loan files, personnel files, medical record files and miscellaneous applications.

CAR systems offer the following advantages:

• Marked reductions can be made in the labor-intensive tasks of sorting, filing and retrieving paper documents.

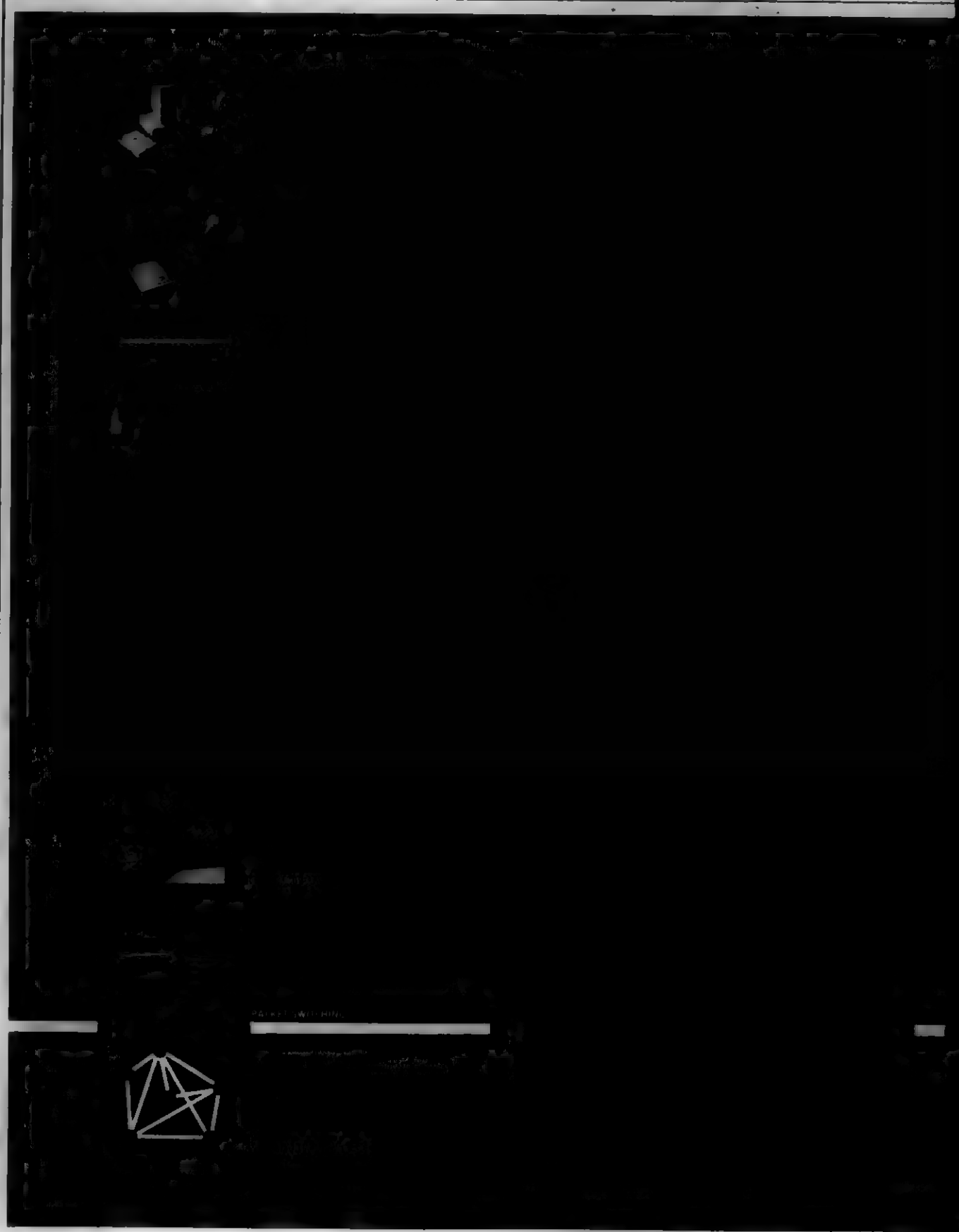
• Storage costs run less than one-tenth the cost of storage on magnetic materials like disk or tape. Because microfilm stores images in the same appearance as the original document, the user is generally accustomed to the format.

• With electronic indexing, misfiling of randomly microfilmed documents is nearly impossible.

When a communications interface is used between computer and microfilm units, a software program directs the search on the microfilm retrieval unit, eliminating all but a minimum of human intervention and increasing search accuracy.

In CAR systems, searches can result in one specific microfilm document or many. When a communications interface is used, the microfilm retrieval unit is automatically controlled to retrieve all frames in any cartridges that answer an information request.

CAR systems are primarily for medium-size to large users — offices where people must handle heavy volume quickly and productively. However, vendors are now seeing how some of the same capabilities in systems more suitable to the smaller volume application can be repackaged for smaller user. These capabilities



include filing-space savings of up to 95%; elimination of misfiling errors, lost files or misplaced files; efficient storage; low-cost, high-speed duplication and mailing of document images; ready retrieval; and easier document security.

However, micrographics offers more than ease of use; in cost considerations, it more than matches the most advanced technologies. The trend is toward simplicity, and typical products include the new tabletop microfilm cameras, which are operated very much like small copiers. Instead of full-size copies on paper, their product is a 16mm microfilm image. With internal film processing, no extra plumbing or wiring is required. Output is a filmstrip, generally of related subject matter; strips can be inserted easily into a jacket and become usable in an easily updatable microfiche format.

With a small, relatively inexpensive microfilm camera, the volume of microfilming need not be high in order to be practical and cost-effective. The copier approach permits the creation of microfilm in a single step, eliminating the two or three steps necessary with higher volume cameras having external processing, number encoding and other sophisticated features.

Other small-office microfilm systems are also in the works, such as low-cost, simple rotary and planetary cameras and simplified retrieval systems.

Besides CAR, another development that integrates the speed of electronics and mass-document storage capabilities is the special disk. These laser-written disks contain scanned images of 25,000 to 30,000 documents each, with extremely fast electronic retrieval. Targeted for widespread use by 1985, optical disk technology is viewed as a breakthrough in storage and retrieval. This higher cost technology will provide fast access to voluminous records.

Currently, auxiliary digital memory applications are receiving considerable attention, as well. One particular system, the direct read and write (Draw) optical recording system, features semiconductor laser scanning of a disk rotating at high speed. A higher intensity is used for recording than for reading.

Document input scan rates of 15 pages per minute are proposed; twice that rate is projected as techniques are refined. The Draw unit will record a digital frame for each page. The major attribute of the Draw system is random access to any frame immediately after recording, in contrast with the serial searches required for micrographic systems.

Pioneering installations are proposed for applications involving a million-page file where immediate access is essential. The cost probably will be in the million-dollar range. A number of basic material research problems will be needed to bring these systems into a cost/performance range for widespread usage.

Computer-output-microfilm (COM) can be a valuable tool to help DP managers cope with the growth in demand for automated information. A highly significant advantage of COM centers around the sophisticated software available for so many systems. With microprocessor control of format, job accounting, operator implementation, forms control and many other operational elements, modern COM systems can provide output that line printers or page printers cannot.

Micrographics offers more than ease of use; in cost considerations, it more than matches the most advanced technologies.

Basically, any output — alphanumeric or graphics — that a computer system can generate can instantly be put in fiche format or on a 16mm microform, with a wide variety of type sizes and fonts, special forms and special treatments such as highlighting and indexing. These features are generally presented in an extremely user-friendly manner, with a plain-English tutorial software package that guides the COM operator in setting up a job.

COM systems offering on-line capabilities provide still further advantages to users needing real-time output on microfilm. Typically, on-line output configurations simulate line printers or tape controllers to the computer system output.

Among present applications showing signs of major growth are outputs familiar in government, commerce and industry: price lists, parts lists, technical manuals, engineering drawings and statistical tabulations.

The promise fulfilled.

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The micropublishing techniques that make the production and distribution of these kinds of data quick, efficient, economical and eminently competitive are nourished by COM.

An application where COM may soon be felt is that of sysouts — the dumps of computer memory loads of data or programs for analysis or archiving. Another potential growth area is in businesses like insurance, where quantities of similar yet unique data outputs are required.

Considering costs, the advantages of COM are quite dramatic: Page printer hardware costs 1½ to two times more than hardware for many COM systems, and supplies run at least three times more on a page printer, according to users' reports.

It is axiomatic that the storage and distribution costs of paper-produced reports are many times those for microfiche duplication, storage and distribution. And these disparities will continue to increase as the volume of traffic increases.

We're barely viewing the tip of the iceberg. What lies ahead in the world of information management? Asked to project a potential information management scenario for 1990, one industry analyst conjectured:

• Record capture by intelligent microimage cameras with on-line or off-line processing will be in place. Data from the records will be captured to generate subsequent computer data bases including record location addresses. Access to the records on film will be provided either by COM printout of the indexes or by on-line inquiry via terminal, and transfer of addresses into an intelligent microimage reader/printer terminal. Microforms from both COM and document microimage cameras will be sent to the central microform file or to local files as directed by program control.

• COM applications will expand to include not only direct or off-line output of computer reports but also output from word processors for input to micrographic storage systems. Retrieval in these systems will be aided by computer-generated indexes or access to the computer data base.

• In some applications, graphics terminals will access the central microimage storage device. Microimages can be retrieved under program control, scanned and transmitted in less than five seconds. Prints can be obtained from integral printers, from an adjacent intelligent copier or from high-speed digital facsimile units at remote locations.

• Stand-alone micrographic filing systems will be in use for small office or departmental operations. These systems will use intelligent microimage cameras for data/record capture. Microprocessors will be combined with magnetic memories for file management and for storing the index and retrieval algorithms. Intelligent microimage reader/printers will be used for retrieval.

• A series of data bases connected primarily by program logic, with access by a variety of intelligent terminals, will be in broad usage.

Such a *Star Wars* scenario indicates that there is no single, best information management solution for every application or business. In actual implementation, the scales will be tipped by human factors and a heavy weight on grass roots acceptance.

Our objective is to improve human productivity, always keeping in mind that computers process data. People process information. OA

Frisvold is vice-president of 3M Co.'s Office Systems Division, based in St. Paul, Minn.

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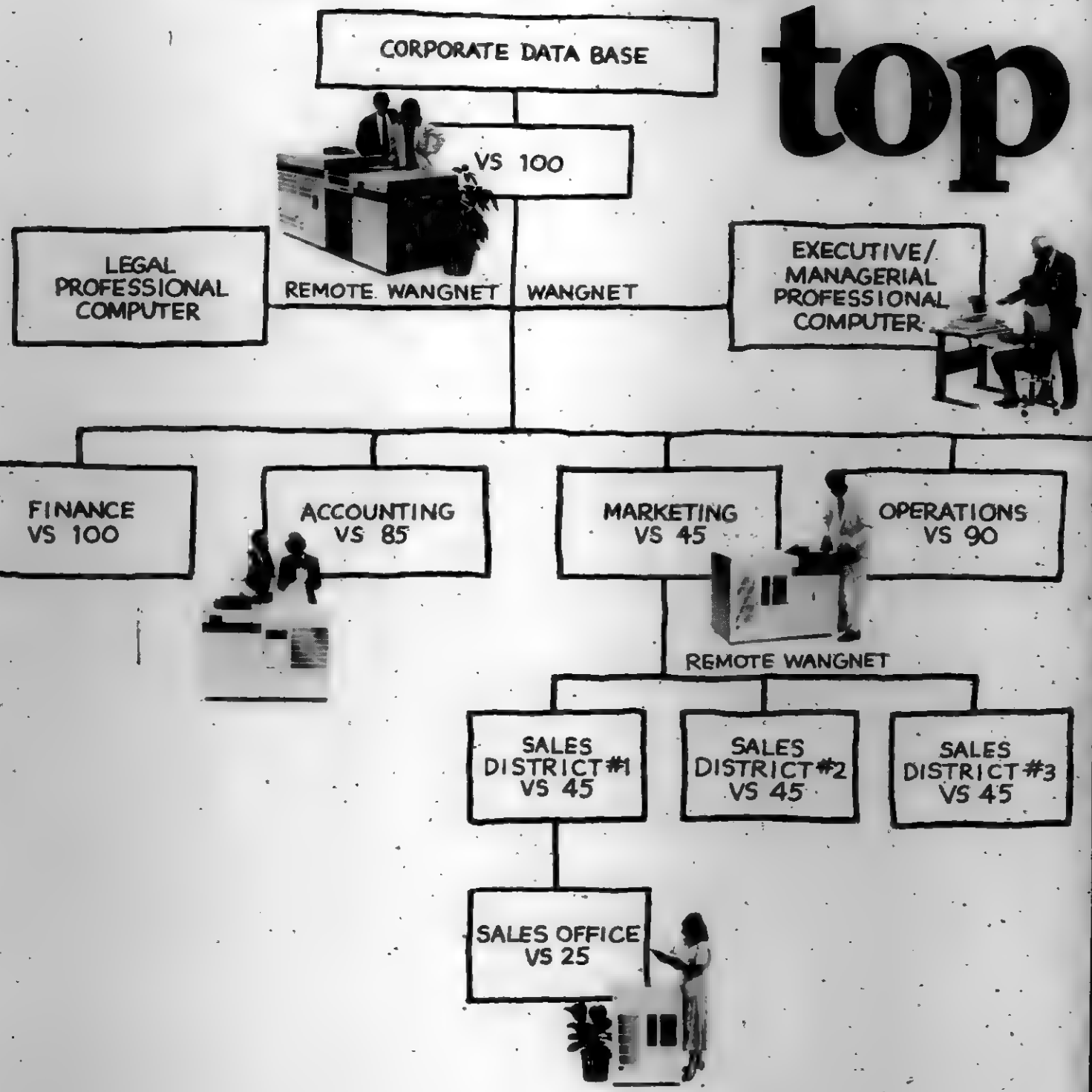

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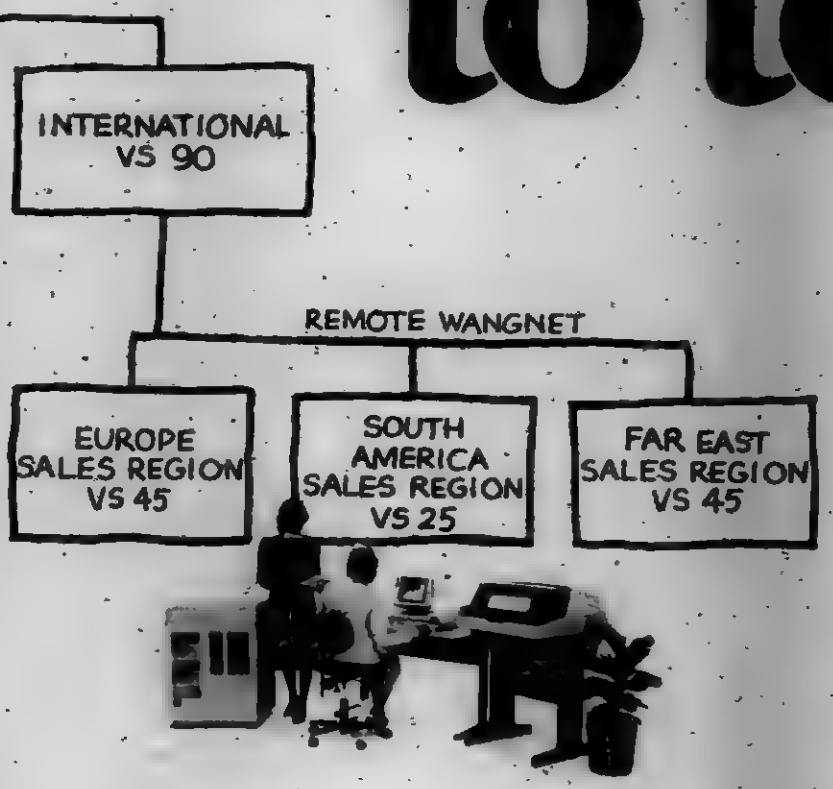
computers compatible to bottom, bottom to top.



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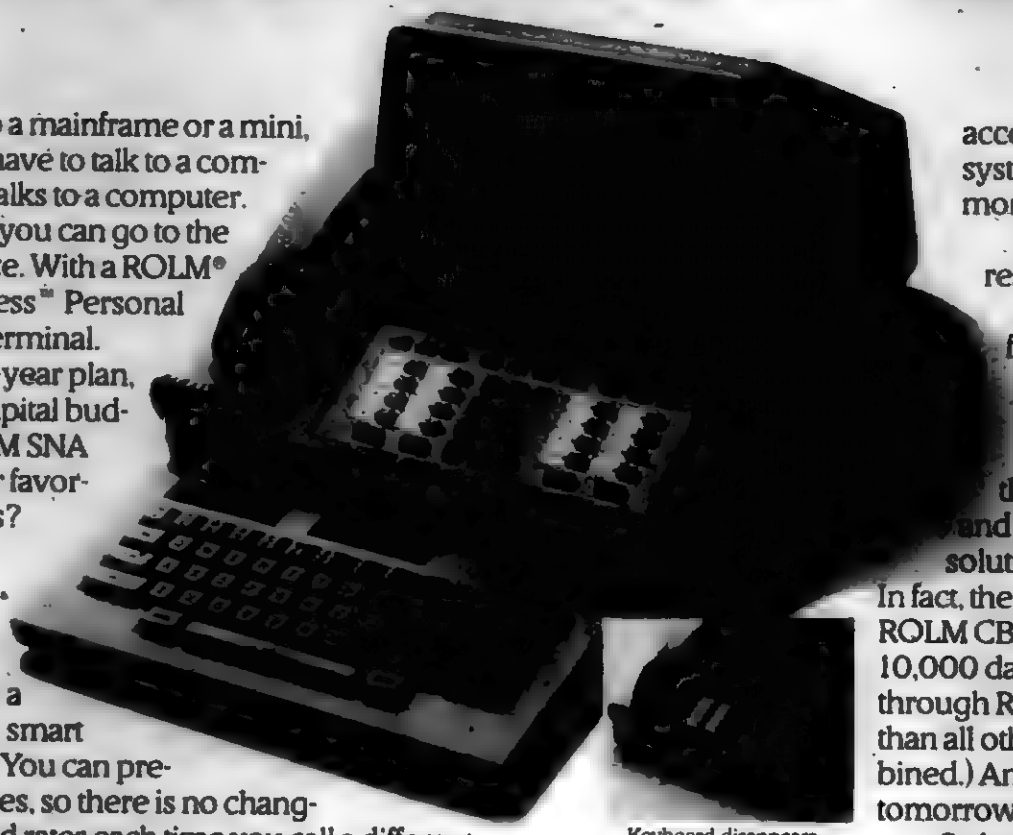

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BUSINESS GRAPHICS

BY BRYAN BUTLER

The optimum vehicle for management information is graphics — it provides concise summaries of the most relevant information in a format that is both visually appealing and easily understood by others. Graphics can shorten meetings, enhance communication and help managers make better decisions. More than 60% of a manager's time is spent in meetings, and many more hours are spent preparing for them by reading analyzing voluminous amounts of data and published reports. In addition to summarizing and executing the plans discussed in these meetings, managers must constantly update facts and figures to keep up with change.

(Continued on Page 48)

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Business Graphics Applications

By Raymond Jacques

Computer business graphics creates graphical output, including bar charts, line charts, pie charts and textual description to represent the data required by the businessman.

The most common means of recording a computer business graph currently is by using a flatbed plotter. This device uses a small table to hold a piece of graph paper in place while a computer controlled pen draws a graph on the paper. The computer-controlled arm draws all the lines on the graph in each of the colors, one at a time. When all the lines of one color are drawn, the arm puts that colored pen back in the pen holder and then picks up another color. The usual method to display a graph prior to recording it is on a graphics display terminal. A graphics display terminal is capable of representing various figures and shapes as well as numbers.

There are six key methods of recording the output of business graphics commonly used in corporations:

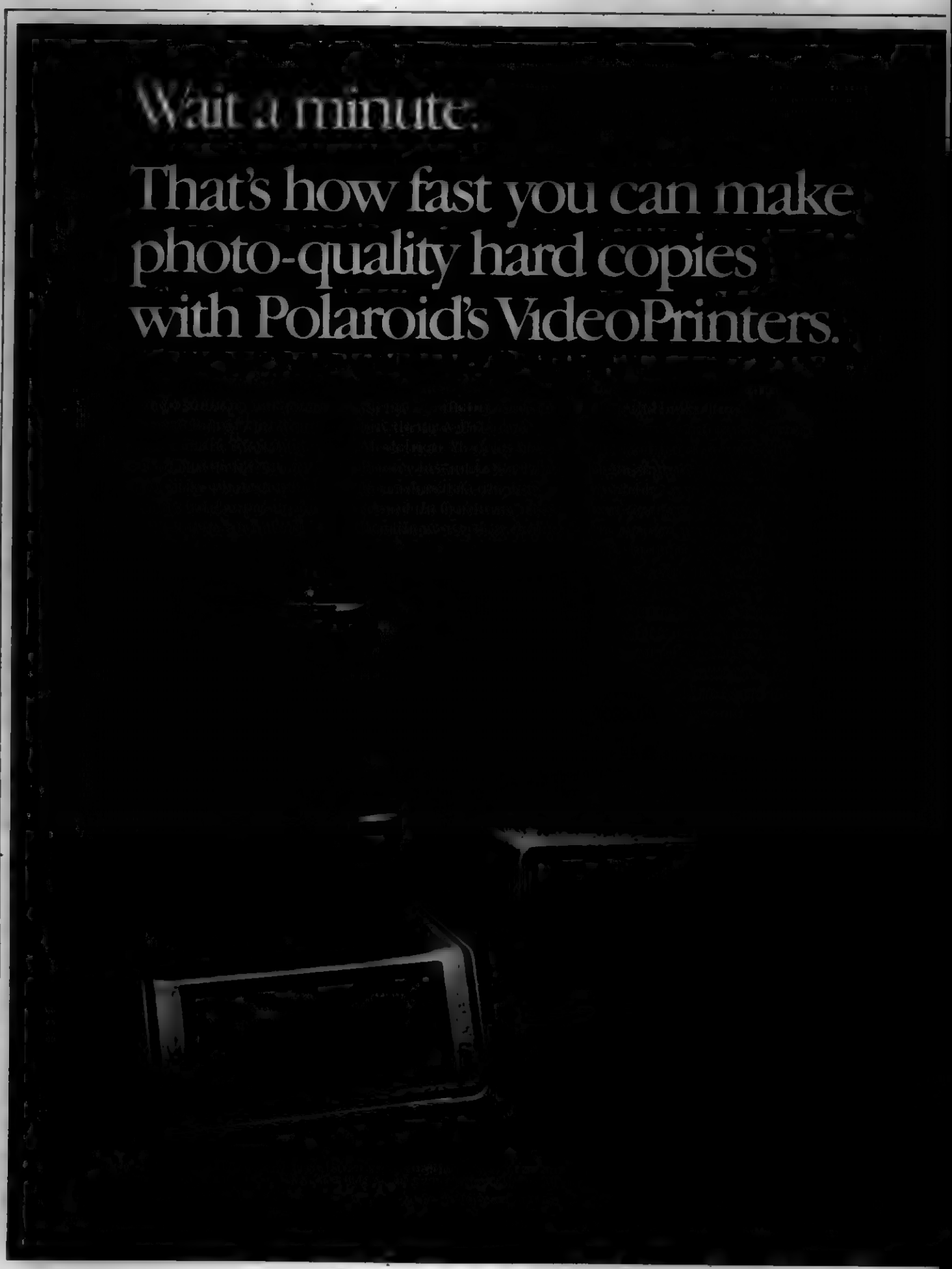
• ***Plots of business data on paper.*** This is the type of graphics referred to in the section above. In this type of graph, the computer is producing a plot of business data that would normally be done by the business executive himself with paper, colored pencils and a ruler.

• ***Plots made on color transparencies.*** Color transparencies are produced on the same plotter as the paper plots, but a special type of transparency material is substituted instead of paper. Pens are also used with quick-drying, nonsmear ink. Transparencies prepared this way are a superior alternative to flip charts in most situations.

• ***High-quality 35mm color slides.*** A high-quality 35mm slide is used for presentations where the occasion warrants the extra cost of providing the best quality visuals available. An example of this type of situation would be a presentation to the board of directors. The cost of having this type of slide prepared by a service bureau could cost $75 to $100 each. The cost of preparing the same slide using an in-house service would be approximately $35.

• ***"Peer quality" 35mm slides.*** These are used in situations that require the use of a 35mm slide, but don't warrant the cost of the high-quality slides. This slide would be used for presentations, usually within the company, to management at the same level as the presenter. The main difference is that the resolution of the image on the slide is not as sharp as the more expensive slides. Often, this type of slide does not offer as many options for colors, lettering styles or artistic options as the more expensive slide. However, the slide produced this way can be an effective means of communicating business data at about 10% of the cost of the premium slides.

• ***Interactive user-oriented graphics.*** These are used as an aid in communications between the computer and the user. An example would be in an application where the computer would be asking the user a series of questions in order to obtain information for a survey — for example, where the computer is surveying users about the type of breakfast they had that day. The computer uses graphics to illustrate the choices that may be selected, such as an egg, cereal or milk. The computer then analyzes the nutri-



tional value of the breakfast and tells the user whether or not his breakfast met minimum daily nutritional requirements.

• ***Geographical mapping.*** The computer can draw maps of cities, states and so on, showing key geographic features and superimposing a graphical summary of some key business data, such as market share.

The use of computer-generated business graphics can be of benefit in several ways:

• **Quality.** Computer-generated business graphics look better than graphs created by hand by a statistician, clerk or artist. The quality of the lettering is better, since the style is consistent and there usually are several options available. The graphs of bars and pie charts drawn by the computer are very accurate and neat. If your graphs require more complex grid lines and scaling, computer-generated graphics can do them accurately and consistently.

Some graphics packages allow for options in drawing artistic shapes that would be very time consuming if done by the average clerk. For example, a three-dimensional effect for bar charts or pie charts can be very effective and easily created by computer-generated graphics.

• **Cost.** An important benefit of computer-generated graphics is the savings in the cost vs. an equivalent graph done by hand. For example, a computer-generated color graph of a typical business graph consisting of bar charts would probably cost about $10 if done by a graphics service operated for internal use within a company. If an artist took one hour to generate the equivalent graph at an internal charge rate of $30 per hour, the equivalent graph would cost $30.

• **Turnaround.** The computer has the ability to create a graph very quickly. One major application is for use in tracking meetings. Typically, the format for the data and graphs for use in a meeting is predetermined and stays almost constant from one meeting to the next. If the graphs are to be prepared by the computer, the format of the graphs can be set up in the computer long before the deadline for the meeting.

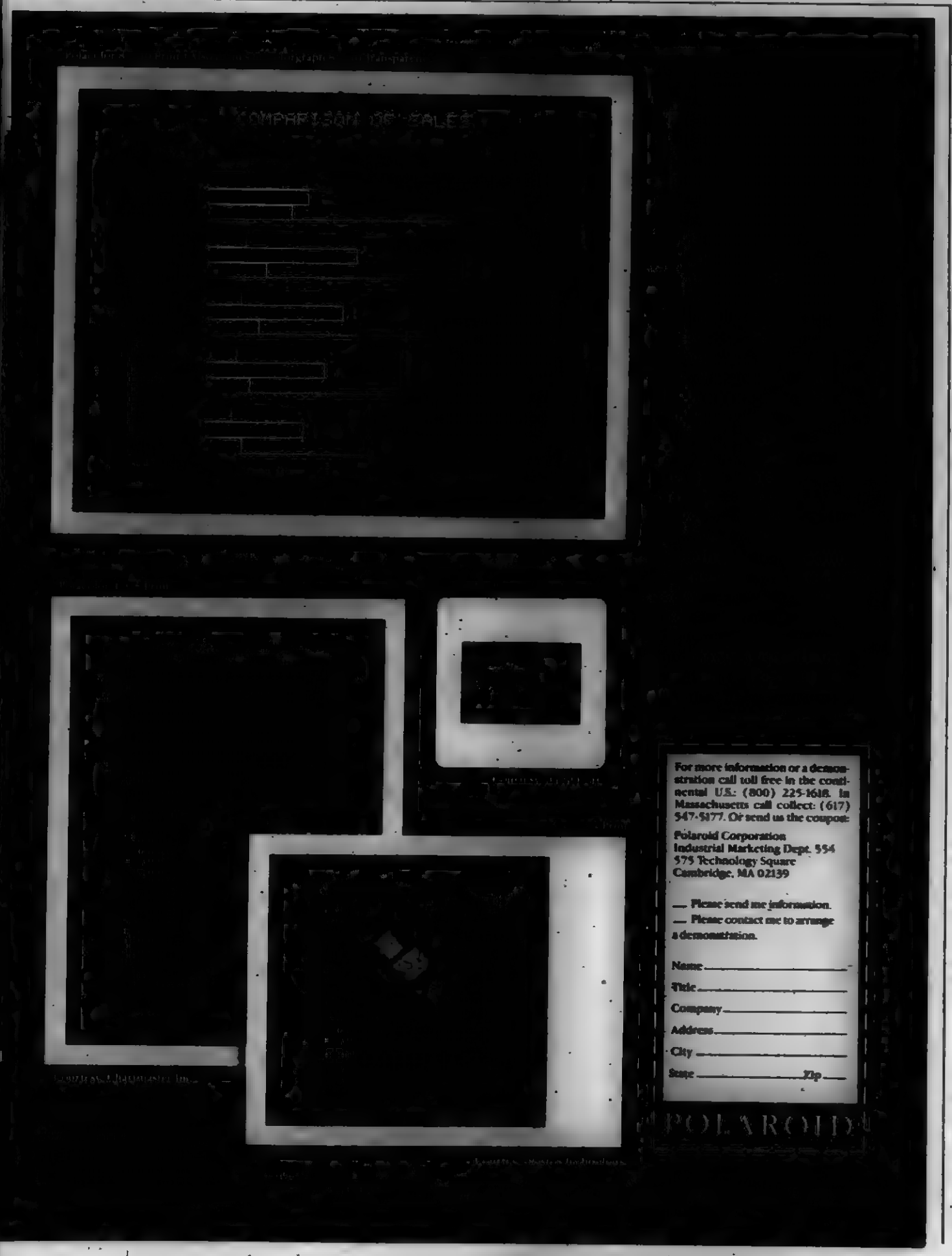
The design of the graphs can be reviewed and modified beforehand, if necessary. When the data is available, all that is required is to update the data in the description of the graph and the graphs can be plotted. The actual time it takes to plot a typical business graph is about 10 minutes.

• **Accuracy.** Most computer graphics packages do the "scaling" for graphs automatically. For example, if you are using bars to represent monthly sales, the height of the bars is computed by the graphics package and the bar is drawn exactly to the correct height. This is one of the reasons why computer business graphics are inherently more accurate than hand-drawn graphics.

The other reason is that the computer assumes the burden of most of the rest of the detailed drawing, labeling and so on associated with creating a graph.

• **Get the Point Across.** Graphs simply are a much more effective way of communicating business data than the alternatives, which normally mean tabular business reports. It is much easier using business graphics to interpret the meaning of business data, analyze the trends and interrelationships and draw conclusions. CA

Jacques is manager of management systems at General Mills in Minneapolis. The preceding was excerpted from a talk given at the recent National Computer Graphics conference, and was printed with permission from the National Computer Graphics Association.



(Continued from Page 45)

Although managers spend only about 8% of their time analyzing data, that time accounts for most of their effectiveness. An analytical aid that quickly shows trends, relationships, comparisons and exceptions will be very valuable to those managers. For example, it is much easier to grasp a company's competitive position by means of a multicolored pie chart than through several pages of statistics detailing where each division stands against competitors. Not only is graphics information more readily communicated and easier to analyze, there is also less likelihood that the relevant information will be misunderstood. Recent studies indicate information can be communicated up to 60,000 times faster in graphics form than in written form.

In the past, the cost of the traditional and usually time-consuming conversion of data into graphics has been prohibitive for many organizations. Now, however, graphics capability on all sizes of computers, especially the versatile desktop microcomputer, has brought this important business tool literally to the fingertips of thousands of managers. With the computer coupled to graphics software, today's manager not only has the analytical and communication benefits described, but can, with a few keystrokes, simulate new scenarios and create graphics representations of a string of future "what ifs."

A small slice of business life can illustrate these advantages. A manager arrives at the office at 9:15 a.m. and learns that, in less than two hours, he is scheduled to meet with the vice-president in charge of operations and the group's marketing director to give a presentation of a sales expense forecast for the next six months. The manager goes to the terminal and calls up last year's figures for the same period. Luckily, chart projections using sales growth of 10%, 30% and 50% with adjustments for various incremental increases and decreases have already been developed. Using these figures, the manager substitutes more recent estimates and produces termnal screen views with more accurate and realistic projections. He loads 8½-by-11-inch transparency media into the multipen, multicolor pen plotter linked to the computer. By 10:45 a.m. a dozen transparencies are ready. So is the manager — ready to make a presentation.

Managers can certainly make good use of graphics reproduced on their computer screens, but they can do even more with hard copies presented on transparencies or paper. Hard-copy devices such as plotters provide a permanent, transportable record, both for storage and presentation.

High-resolution plotters capable of small precise pen movements that will create smooth curves, characters and diagonal lines are the best choice for business graphics. Repeatability is also important. The plotter pen must return precisely to its starting point in order to define exact lines and to close circles. A good test of plotter's repeatibility is to check the alignment of bars and pie charts on a series of consecutive plots. If the edges of the charts match each other precisely, the graphics output will be professional-presentation quality.

Other important checkpoints are pens and paper. Pens come in three basic tip styles: fiber-tip, liquid-ink and roller ball. Pen widths can vary from narrow-tips for drawing grids, tick marks and small labels to wide tip pens that generate bold titles, heavy lines and filled-in areas. Graphs should be drawn on plotter paper or overhead transparency film. Standard bond paper's coarse surface can wear down the pen's point.

One of the biggest boons to the prospective user of business graphics is the growing availability of graphics software packages which not only simplify creation of a variety of graphs, charts and other drawings on a computer screen, but also provide the necessary signals to drive plotters or other hard-copy devices. The best of this software is strongly user-friendly so that the user only has to define or designate the type of chart or graph desired, specify colors and make sure that all the variable data has been input.

Graphics software is being developed by computer and plotter manufacturers as well as a legion of independent firms and individuals. Most programs are available through dealers and distributors that carry computer hardware and peripheral devices.

The microcomputer, combined with user-friendly graphics software and devices like pen plotters, is offering an economical and professional art department right at managers' desks. The office of the future will be still living in the past unless graphics capability is included. OA

Butler is product manager of Hewlett-Packard Co.

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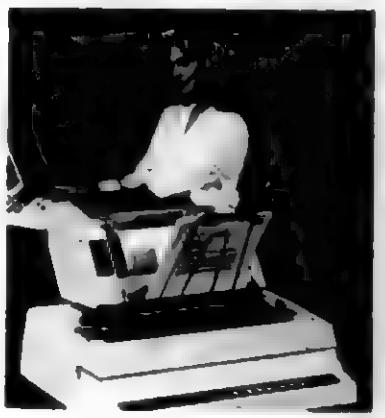

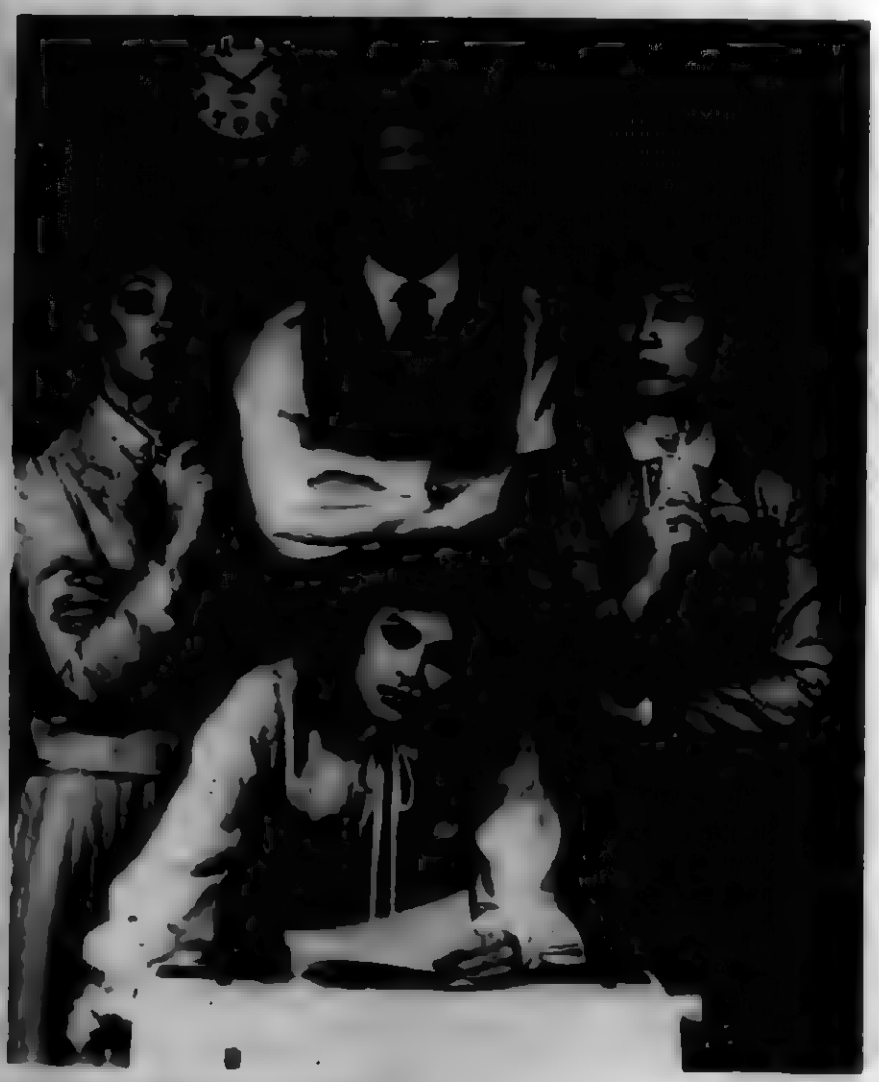

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OCR AND ELECTRONIC MAIL

BY PETER F. POLIZZANO

Electronic mail systems are proliferating in business offices around the country and are expected to continue to do so for years to come. The causes of this popularity are not difficult to understand. Conventional postal delivery, private hand-delivery carriers and even public telephone services cannot keep pace with business demands for message-handling systems that combine speed, assured delivery and reliability. The promise of steady growth in electronic mail for many business applications (and even for personal use) is already quite evident. The term "electronic mail" generally refers to various techniques for sending messages electronically by entering them through computers or other automated systems and transmitting them to remote terminals by means of telephone lines, data networks or space satellites. At the

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receiving end, the message may be held on file for delayed delivery; immediately printed out and distributed as conventional physical mail; read on video terminals; or even converted to audio speech by means of speech synthesizers.

With recent advances in both software and hardware, electronic mail promises to become more efficient and more reliable than either conventional postal mail deliveries or standard voice telephone calls. Electronic mail messages can be transmitted simultaneously to many different locations where the messages can be stored and delivered to the recipient without delay. Contrast this situation with the frequent call-backs and frustrations now common.

Electronic mail can take many forms — Telex, TWX, communicating word and data processors and computer networks. These systems share the ability to transmit messages and text rapidly and reliably between two or more terminals by means of electronic links. Unlike more conventional message-handling systems, these messages are not delayed significantly in transit and the sender is secure in the knowledge that the message will reach the recipient.

Corporate managers who decide to establish electronic mail systems usually want to increase message-handling speed and efficiency while reducing overhead costs. Unfortunately, any new system that offers such positive benefits can be hampered by unforeseen problems which, if not corrected, can negate all the promised benefits. In the case of electronic mail, such problems usually involve an uneven flow of work to the center resulting in input bottlenecks, rekeyboarding errors and lack of compatibility between sending and receiving systems such as word processors.

OCR scanners can head off problems relating to the input and formatting of messages and the interfacing of dissimilar types of information processing and communications equipment.

Optical character recognition (OCR) systems may offer managers of electronic mail systems a way to cope with these problems. An OCR scanner is a device that can "read" information originally typed on a standard office typewriter or high-quality information processing printer. It then transfers the information it has read to various types of information processing systems, such as word and data processors and electronic message systems. With the scanner, messages and text can be input 50 times faster and much more accurately than when an operator manually rekeys the information at the workstation.

Necessary routing information can be added by the communications operator, who is no longer burdened with time-consuming rekeying. Instead, OCR converts most standard typewriters within the entire office complex into input terminals for the message center. As a result, the OCR scanner eliminates input bottlenecks. The personal secretary can now type an executive's correspondence, memos or reports, which then will be scanned and entered into the processor without the inadvertent errors commonly found when rekeyboarding.

The most advanced scanners offer these major benefits:

- Higher productivity: In some instances, productivity of an electronic message processor can be increased by as much as 400% through elimination of redundant, time-consuming and potentially error-prone rekeying.
- Reduced costs/labor: The tremendous improvements in speed and accuracy reduce office costs and labor.
- Expandability: By virtue of its processing speed and multiple ports, the scanner can accommodate future increases in work loads without any need for additional processing terminals or personnel.
- Fast turnarounds: By eliminating retyping and by using all available typewriters as input stations, OCR allows documents to be completed in a fraction of the time normally required. Peak work loads, common to communications operations, can be dealt with quickly.
- Better internal control: Because original material can be typed at the source, the material is likely to be more accurate. Priorities can be set by the individual executive without concern for outside influences, and absolute deadlines can be met with confidence.
- Media conversions: The latest OCR scanners can read text printed on one system and transmit it to one or more other systems that are not directly compatible with each other. Also, many scanners are capable of feeding scanned information to five different information processors, each requiring different protocols and code sets. With a modem, an intelligent scanner can be made to telecommunicate with any number of devices, both within an office complex and between remote offices.

Managers now planning to install electronic mail systems might want to evaluate the combination of special features and cost benefits characteristic of more advanced OCR systems. The scanner can play a vital role in heading off potential problems relating to the input and formatting of messages and the interfacing of dissimilar types of word/data processors or other information processing and communications equipment. These problems can seriously cripple an electronic mail system if they are not recognized and remedied prior to full operation.

Electronic mail as used here refers to communications techniques such as Telex, TWX, and communicating word/data processors. Virtually all the message and text traffic takes place in alphanumeric (nongraphics) form; therefore, most of this traffic can be accomplished with word/data TWX CBM (nonfacsimile) equipment. All these systems have the ability to transmit messages and text rapidly and reliably between two or more individuals by means of electronic links. Unlike conventional postal and telephone services, these messages are not delayed and are assured of reaching the recipient.

The following is a brief description of the application of a fully featured OCR scanner to each of these types of electronic mail:

- **Word Processors:** Clusters or networks of word processor workstations can be used to edit and format original textual materials and then transmit this information within a company or between remote locations outside the company. Within this network may operate a variety of word processors from different manufacturers, such as IBM, Wang Laboratories, Inc., Xerox Corp., Digital Equipment Corp., Lanier Business Products, Inc., NBI, Inc. and many others.

In this type of application, lack of attention to the input and interface problem can destroy the benefits of the system. For example, in a typical organization, letters, memos and reports are typed by administrative assistants and secretaries for executives and managers located throughout the building. These typed pieces are then relayed to the WP center and rekeyed into the system. After the message has been formatted, edited and approved, it can be transmitted electronically to one or more remote WP stations.

However, at least some word processors in this network may be a mix from different vendors and therefore not immediately compatible for direct communications.

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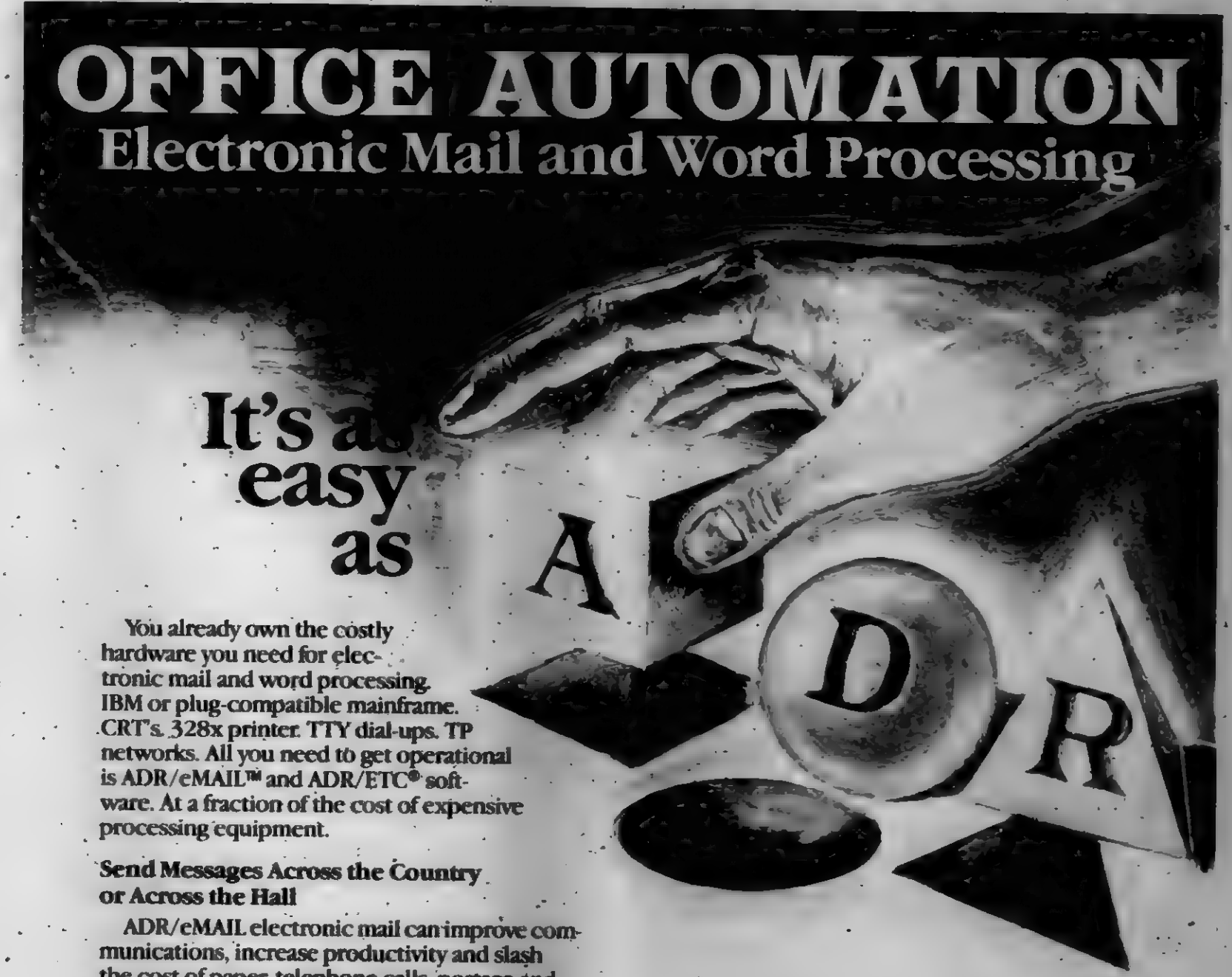

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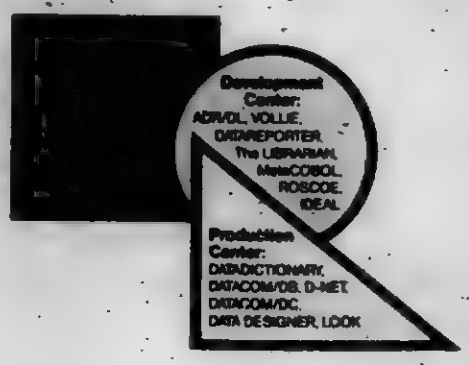

APPLIED DATA RESEARCH

The one vendor software solution

Such a solution also necessitates a heavy commitment to employee training — different procedures will have to be learned for different devices. Additional operating time will invariably occur as well.

This interface problem is very real, but so is the input and format problem. A word processor cannot perform its primary mission of manipulating text while that text is being entered via the keyboard. At a typical corporate workstation, as much as 75% of a word processor's work-day hours are devoted to data entry; only a quarter of the time remains available for textual work. This is not only a tremendous waste of time and money; it can also lead to serious input bottlenecks.

An advanced OCR scanner can alleviate the input problem. One week's typing can be entered into the system in only one hour, with a resulting increase of throughput of as much as 300% or 400%. With an OCR scanner, text typed on standard single-element typewriters and daisywheel, ink jet and laser printers can then be scanned directly into the processors with no need to rekey, reformat or code-transcribe.

Not every OCR scanner can solve the interface problem, and potential users should make careful comparisons of available options.

Telex: Along with TWX, Telex is a relatively low-cost system with relatively slow transmission rates; text is limited to uppercase letters.

In practice, a message is entered at the keyboard at one terminal by a slow process that produces a punched paper tape. The paper tape containing the text is read in the paper-tape reader, and the resultant electrical signals are eventually transmitted by telephone lines to another terminal, which then prints a hard copy of the message. The keyboarding is a slow process (3 char./sec) and the transmission is also slow (10 char./sec).

In an OCR system, the original typed message is quickly scanned and either a paper tape is punched or the electrical signals emanating from the OCR scanner are fed into a message processor for eventual Telex transmission. The speed of transmission (10 char./sec) may be the same, but the text is on its way in 1/40 of the time.

Computer-Based Message Systems: These systems include existing in-house computer terminals that can provide the electronic mail function over internal private networks. A related technique involves remote computing and message time-sharing services.

As with word processors, advanced OCR scanners can ease the input bottleneck problem. The interface problem may not be a major factor because compatibility is normally designed into the communications network.

A series of remote terminals or small data processors from different vendors may be able to communicate directly with a central processor or with each other. However, more often than not, incompatibility exists. An OCR scanner that can solve the incompatibility problem will once again prove its worth many times over.

OCR Cost Analysis: Obviously, the cost of an OCR scanner depends on how well it suits the user's application. Regardless of the initial price, the true value of a scanner depends on its effectiveness to the user over the lifetime of its operation. A scanner with a higher initial price and wider range of capabilities may go far toward helping the user make his overall information processing operation more productive with the same or even lower overhead.

When the shift is made from manual keyboards to an OCR scanner, one scanner working with one workstation can often do the work of four workstations without a scanner — an increase of 400% in overall proceseor productivity. Today's advanced scanners can input more than 300 pages an hour, compared with a proficient typist's capacity of six to 10 pages an hour.

To state it more dramatically, in one hour one scanner can handle the volume of input that otherwise would require one full week. This pace is 50 times faster than the manual method, at a fraction of the cost and with much higher accuracy. In fact, the latest scanners offer error rates as low as one error in 300,000 characters.

An advanced OCR scanner can play an important role in resolving input bottlenecks in many business electronic mail systems. In most electronic mail setups, an OCR scanner may also prove useful in creating communications compatibility among diverse and otherwise incompatible communications equipment. By helping to improve the overall productivity of these message systems, OCR can contribute to one goal of most cost-conscious companies — maintaining maximum efficiency with the least possible overhead. CA

Poltzzano is division vice-president of Compuscan, Inc., in Fairfield, N.J.

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OPTICAL DISKS

BY DAVID A. NADEAU

Optical disk technology offers users tremendous potential as a future mass storage medium for data and images. At this point, however, it is just that — a future technology. When optical disks do become practical on a commercial basis, they will necessarily be merged with other technologies and incorporated into other systems; they will not act as a stand-alone medium.

As technology develops, information users will still have a variety of systems from which to choose. Optical disks will surely be one of them, but others — some based on today's technology — also will serve.

Optical disk technology is an important development, however. A single disk surface can store 5,600M bytes of information. If the average document contains about 4 million bits (pixels) of

PHOTO © 1988 MORT RAINBOW, CONGRAF INC.

information, this disk could hold more than 100,000 pages of information — the rough equivalent of 2,000 floppy disks or 50 magnetic tapes.

Why are document images needed when electronic or magnetic storage media are available? For two primary reasons:

▪ Studies indicate that only about 5% of the information contained on a document is ever entered into a computer data base. That leaves a significant amount of detail that must be stored elsewhere — traditionally on microfilm.

• Some features that occur on an original document — signatures, drawings and graphics, for example — cannot be entered into an alphanumeric data base. Easily captured on microfilm, these details are much more difficult and expensive to store electronically. Therefore, an alternative storage medium is needed. Optical disk poses promise as that image storage medium; for the near term, however, microfilm will probably continue to fill this need.

Optical disk technology clearly offers potential. Nevertheless, if technology leapfrogs from microfilm to optical disk without an interlocking technology, today's microfilm-based image/data bases simply would not be able to interact with optical disk systems. Users would be forced into a situation where they would either have to operate two separate, incompatible systems or encounter enormous conversion costs.

Instances could occur where users would want two distinct storage media. For example, it might be realistic to store an image on optical disk for the period of anticipated high retrieval — perhaps 90 days. For long-term storage, the image could be retained on microfilm to let users take advantage of microfilm's low-cost, long-term storage capability. However, without an interlocking technology to form a bridge between microfilm and optical disk, users would still have two separate, incompatible systems.

Such a bridge offers users two advantages: the ability to make all existing microfilm image bases interactive and compatible with optical disks and the ability to intermix the two media in a single, total system, using various media for different purposes.

Users would either have to operate two incompatible systems or encounter enormous conversion costs.

The technology that forms this bridge is called microimage transmission. Simply stated, this is the ability to electronically scan an image on microfilm, convert that image to a digitized bit stream and then transmit that image to a distant location for viewing on a CRT screen or for other forms of image processing.

The development of microimage transmission is based largely on current technologies and existing equipment, one of which is microfilm. An understanding of how conventional microimage retrieval systems work might offer some perspective. Today's advanced microfilm systems — called computer-assisted retrieval (CAR) systems — use a computer data base to store a microimage file address for each specific image. The corresponding image has an image mark alongside it on the microfilm.

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When a user needs an image, the computer is queried. The item address number is displayed on a CRT screen or, if the system is online, the computer automatically drives the microimage retrieval terminal to find the right image on the microfilm. The terminal actually finds the requested image by counting down the correct number of image marks.

This technique is fast and accurate, but it has drawbacks. The manual element has not been eliminated. Although the computer electronically directs the microimage terminal to the correct image, an operator must physically locate the correct microfilm magazine and load it into the microimage terminal. In addition, when the image is displayed on the screen of the microimage terminal, the user cannot transmit it to any remote locations. The operator must make a paper copy of the image and send it to remote locations.

Microimage transmission would eliminate both of these drawbacks and would make possible a whole host of added benefits. Not only would the manual interface be eliminated, but also the following advantages would be achieved:

- A microfilm image could be transmitted to distant locations.
- A central microfilm file could be made accessible to remote users through a network connecting an organization's departments at one site or even at distant locations.
- Both images and alphanumeric information could be accommodated for simultaneous display on a screen.
- The image and related data could be processed.

The key to any microimage transmission system will lie in the ability to electronically scan a photographic image and convert it into electronic information. For this reason, a practical microimage transmission system would need the capability to computer-scan a microimage at high speed and to generate the corresponding bit stream. This scan technology could be employed in smaller manual systems or in fully automated files containing millions of document images.

In the automated files, robotic technology could be used to select the appropriate magazine and insert it into a scanner. A computer would tell the robotic device which magazine to select and, when the magazine was in the scanner, which image to locate and scan. The image would then be transmitted to a remote location and displayed on a high-resolution CRT.

Although the fundamental reason for developing the technology is the need to transmit the image, a range of other possibilities are opened up by the technique of converting an image to an electronic signal. When the image exists as an electronic bit stream, it can be read by a computer and

The key to any microimage transmission system will lie in the ability to scan a photographic image electronically and convert it into electronic information.

processed. In addition to merely displaying the image on a CRT, users could enlarge or reduce it. Selected areas of the image could be viewed or printed. In fact, a user could request several images at once. The scanner would convert the various images to electronic signals and store them in a buffer. The document images could be viewed on a high-resolution CRT screen, which might also display some pertinent alphanumeric data alongside the document image.

Because the buffer can hold several document images, a user can "thumb" back and forth between individual images. The user can even change or add computer data to the screen and then make a paper copy of the entire screen, showing the original image and the amendments. In essence, users will have greater flexibility in

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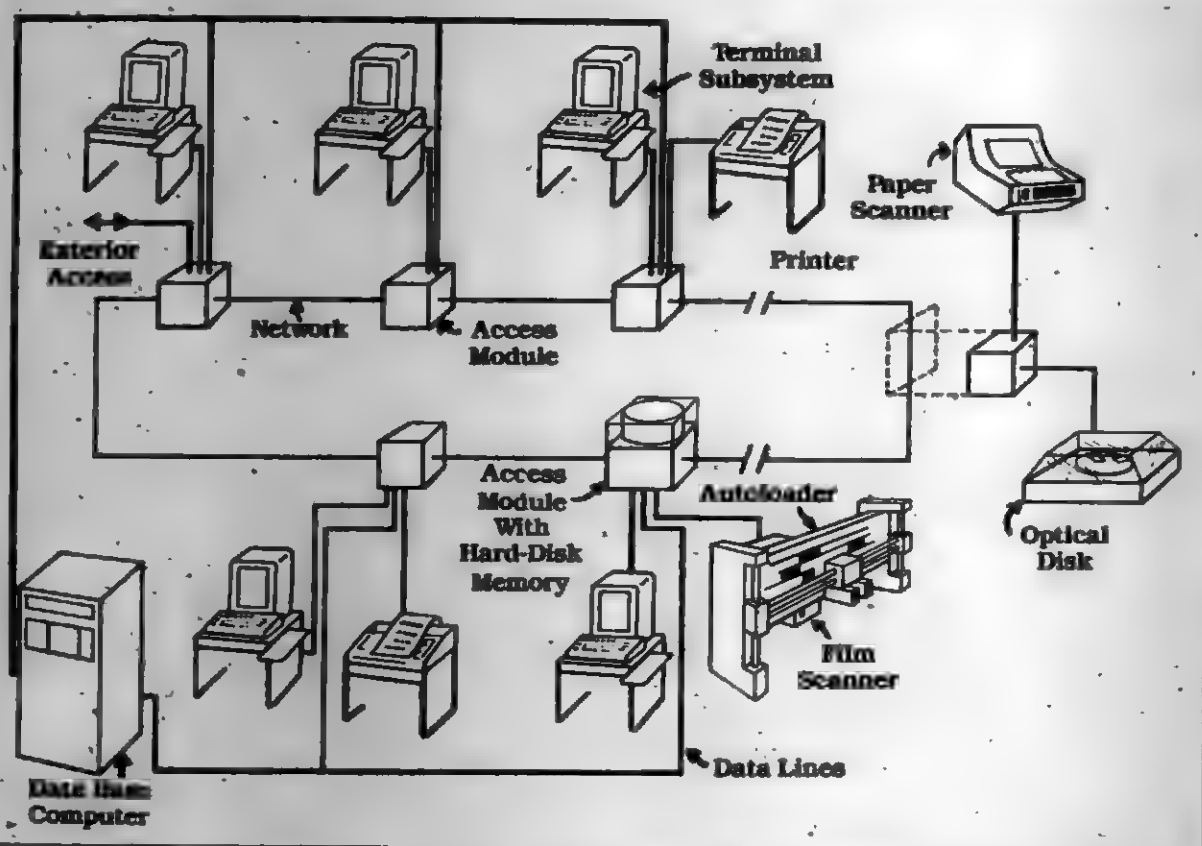

Combining new technology with proven systems, microimage transmission is both a stand-alone system and a bridge to later use of optical disks. As in computer-assisted retrieval, the data base computer (either a dedicated minicomputer or a mainframe computer) will store the index to a microfilm file and control retrieval. An autoloader and film scanner, built into the same unit, will replace the manual film files in use today. Data streams — from both the autoloader/scanner and the computer — will be transmitted to the requesting terminal over a local-area network.

User terminals will be similar to today's intelligent terminals with one major exception: They will have high-resolution CRTs to permit viewing of fine details in the document images. The terminals also will be able to manipulate the images, enlarging or reducing them, dropping out unwanted detail, and permitting sections of them to be printed out on high-resolution printers. The terminals also will display both image data and computer data at the same time, permitting the operator to access all information needed at a single workstation.

As technology is developed, the optical disk unit will be able to be placed into the network. Microimage transmission and optical disk technology will not be mutually exclusive; the two will be able to exist side by side.

terms of processing the image and corresponding data. Microfilm will no longer be merely a static storage medium.

Microimage transmission will make everything happen faster than it does today, and productivity will be greatly improved in the process. Many manual tasks will be eliminated. Instead of working with several pieces of equipment (a roll film reader, a CRT terminal, perhaps even a microfiche reader), a user can accomplish all data and image retrieval via one terminal.

A wide range of information-handling systems will benefit from microimage transmission. In the initial years, however, those who benefit most will typically be organizations with large image/data bases, either microfilm or paper-based. The nature of work done in these organizations normally requires frequent retrievals, with many users accessing the same image/data base. In these cases, the microimage transmission system will cost-justify itself with the same labor savings common to today's users of advanced CAR microfilm systems.

The heart of any microimage transmission system, however, is that vital and familiar computer index employed in today's CAR systems. When this index is joined with microimage transmission, not only do users gain the ability to access the central file from remote locations, they also are able to enhance and manipulate those images.

Beyond this intermediate step of microimage transmission, optical disk offers image and data storage flexibility and potential. Because that technology also employs an electronic scanning capability, it will be interactive with microimage transmission. This total information system can be visualized as a series of interconnecting triangles. One corner of the base represents nondigital, permanent information, with microfilm and paper as the storage media. At the opposite corner of the base is permanent information stored in digital form, either on magnetic media or optical disk. The third aspect of the system comprises the temporary display of information on a high-resolution CRT.

At the center is the transmission medium through which all components of the system interact. Here the information is captured and relayed to other parts of the system, with gateways possibly offering access to and from other networks.

In the not-too-distant-future, a user can sit at a single high-resolution CRT terminal and call up various images — regardless of whether they are stored on microfilm, optical disk, or magnetic media. All will be compatible and interactive. OA

Nadeau is director, Electronic Imaging Systems, at Eastman Kodak Co., Rochester, N.Y.

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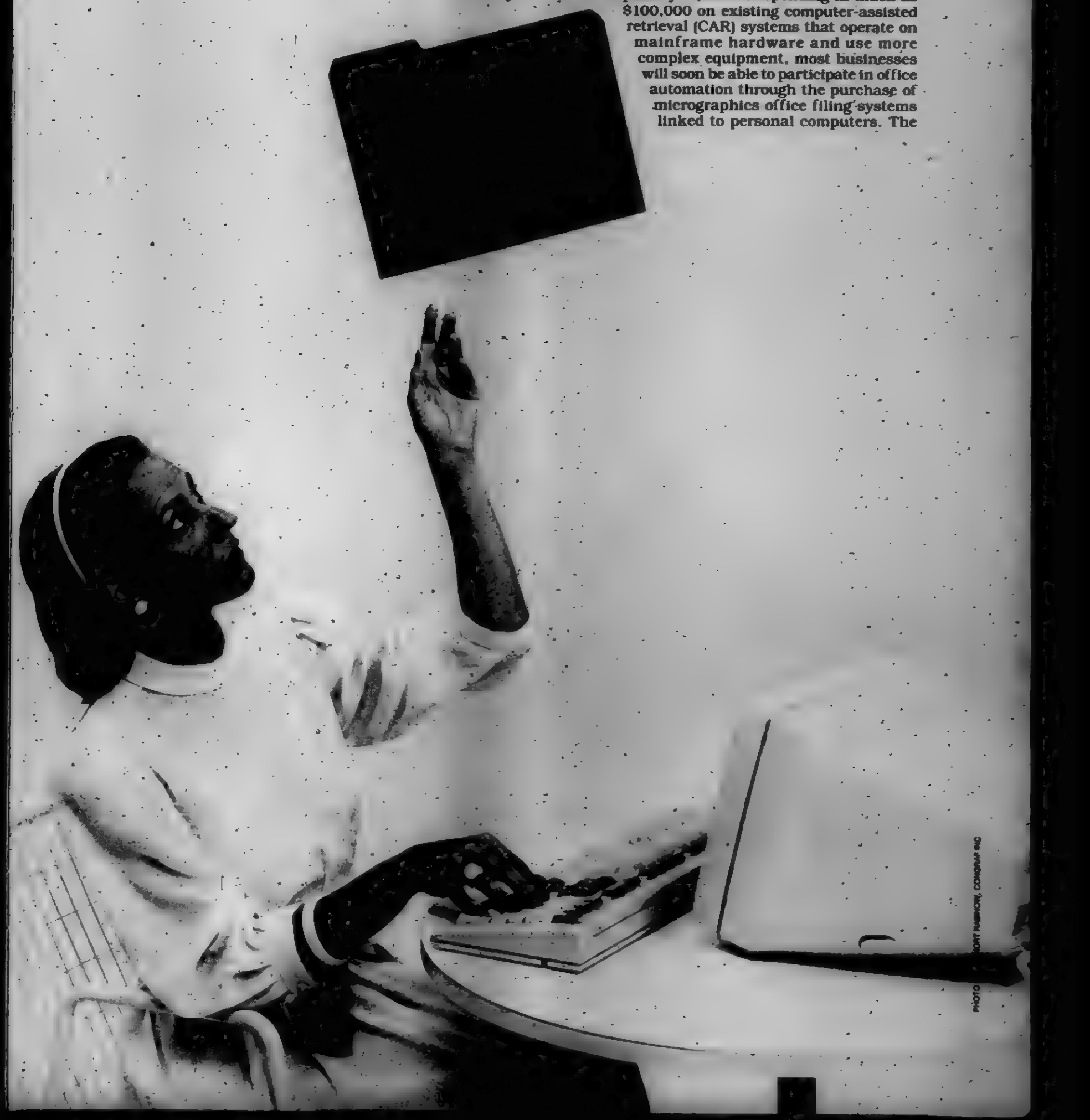
CAR AND MICROS

BY DAVID T. BOGUE

By the end of this year, software programs now under development will make microform image-based document storage and retrieval an affordable option in any office setting. A number of personal computer models already on the market will serve as the key to this new capability. Instead of spending as much as $100,000 on existing computer-assisted retrieval (CAR) systems that operate on mainframe hardware and use more complex equipment, most businesses will soon be able to participate in office automation through the purchase of micrographics office filing systems linked to personal computers. The



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Manufacturer	Model	Reduction	Film Size Output	Document Size (in.)	Approximate Cost
Alos Micrographics Corp.	Recorder 24 Step & Repeat	24x	105mm by 148mm cutsheets	8.5 x 12	$ 5,000-$10,000
Canon USA, Inc.	161G-B	24x	16mm roll film	10 x 15	$ 5,000
Data Conversion Inc.	ROM 6100	24x, 42x	16mm stripe	8.5 x 14	$ 5,000-$10,000
Fuji Photo-Film USA, Inc.	Micro 1200	28x	16mm stripe	10 x 14	$14,000
	SR 900	40x	16mm roll film	checks to letter size to 9 wide	$ 6,500

Figure 1. Office Microfilming Systems Camera-Processors

entire system will cost as little as $20,000. What is ahead for CAR systems? One example, a special personal computer software package available under the Pick operating system, is currently being developed by Acctex Info Systems Corp. for use in CAR applications. The program is intended to operate eventually on IBM Personal Computer, Osborne Computer Corp. and Apple Computer, Inc. Lisa hardware.

Ultimately, the entire CAR configuration will include use of the personal computer for micrographics-based document storage and retrieval indexing, an office microfilming camera/processor system for recording document images on rollfilm or fiche and an automatic micrographics retrieval unit for displaying film images stored in cartridges.

Initially, the new software package will facilitate the linking of an IBM or IBM-compatible personal computer with a mini or mainframe system for downloading of data and other automatic document storage and retrieval functions. Later, software refinements will allow CAR to be used with most stand-alone micro systems, after data is extracted from mini or mainframe operations. In all cases, a formatted screen will be employed for data entry, with input of word assignments to identify each document to be stored. The program will also help manage proper input by teaching users how to enter data through use of a menu prompting system.

The primary purpose of the computer in a CAR system will be to retain the description and address (location) of each record to be stored, either by file number, file name or a combination of descriptors. The first component of the CAR system is a microfilming camera for document image capture. This could be a flow, step and repeat or planetary camera. As the document image is recorded, a sequence number may be imprinted on the filmed image. After processing, the document film is loaded into a cartridge and indexed by roll number, sequence and date.

The sequence number, which now functions as a location address when combined with the roll or file number, is entered in the computer by an operator at the data capture station. This information is transferred from the microfilm image and is input along with all necessary document descriptors. Alternatively, the location and indexing information could be entered into the computer from the paper document itself during the data entry step.

When a particular record is required, the computer prompts the user to enter the descriptors or search parameters that describe the document. For example, assume the user is a lawyer who requires a document concerning litigation between the plaintiff, Monark, and the defendant, Orion. After entering Monark and Orion as parameters via the keyboard, the user receives a message from the computer indicating that there are 3,000 hits, or documents relating to Monark vs. Orion. The lawyer doesn't want to look at all 3,000 documents; he can narrow the search by adding other descriptors for the specific information he needs.

The lawyer keys in additional data; he is interested only in documents that relate to the period from February 1976 through August 1976. The computer responds in turn that 100 documents meet these requirements. Because 100 documents are still too many to look through, the lawyer specifies that the documents refer to men named Petty, Weeks or Clayton. In response to these parameters, the computer indicates that only five documents meet all requirements.

The search is then halted and the user is prompted by his terminal to load a specific cartridge of film into the retrieval device (microfilm reader). After the correct cartridge is loaded, the device, under computer control, moves the film to the correct image location; the lawyer's document image is then displayed on the reader screen. If required, a paper copy can be generated. The cartridge is then rewound by the retrieval device and the user replaces it in the cartridge file.

A personal computer-driven CAR system will offer many advantages in a broad number of information management applications. These applications may range from maintenance of correspondence, accounting and credit files to upkeep of insurance claims processing and customer service records systems.

The following benefits in improved productivity and cost-effectiveness can be expected with CAR:

- Reduction in costly file storage space.
- Increase in data (document image) retrieval speed and response time.
- Control of head count by minimizing clerical manpower for file maintenance.
- Improvement in overall document file integrity, security and organization.

In addition, the personal computer itself will offer special advantages in efficient management of business information. The hardware/software combination will overcome the limitations of storing indexing data on computer systems developed primarily for on-line purposes. At the same time, networking with other personal computers will also be possible. This will facilitate a sharing of the document index with a number of separate workstations. Records indexing (input) and image-capture (microfilming) will be controlled in one central area, therefore duplicate microfilm can be issued quickly and conveniently to many data access locations.

As companies grow, various personal computer multitask software packages — encompassing word processing, spreadsheet, decision support and graphics capabilities — may be combined with local-area networking. This could lead smaller businesses into more extensive OA on a transitional

Manufacturer	Model	Microform Used	Interface	Approximate Unit Cost
Eastman Kodak Co.	IMT 150	16mm cartridges 2,000 - 5,000 image/cart.	Computer terminal interface	$14,000
Consolidated Micrographics Inc.	Model 95	Microfiche cartridge 2,880 - 9,000 image/cart.	RS-232C interface	$ 3,930
Information Design	ADC-3AC	Microfiche cartridge 2,880 - 9,500 image/cart.	Computer interface MPU control system	$ 3,000 $ 4,000
Ioot	M-380 automatic reader	Ultrastrip cartridge up to 100,000 image/cart.	RS-232C interface	$ 9,000
3M Co.	Model 900 EP6000 page search	16mm cartridges 2,000 - 5,000 image/cart.	PBT systems interface MPU controller	$10,000

Figure 2. Interfaceable Micrographics Retrieval Units

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There are currently 15,000 installed computers on 12,000 sites in Mexico. These include mainframes, medium and small computers as well as personal computers. Experts forecast the sale of small, medium and large computers to grow at an average annual increase of 20% during the 1980s, despite Mexico's current economic problems. Minicomputers will be in great demand since they are small, affordable and efficient. U.S. manufacturers have maintained a 80% market share for the past three years with sales of over $182 million. *Computerworld/Mexico* can bring your message to 10,000 key-decision makers in the Mexican computer community. Published on alternate Mondays, *Computerworld/Mexico* covers all the latest developments in hardware, software and terminals in addition to data processing and computer related subjects. Its goal is to provide useful information to data processing professionals throughout Mexico and Central America.

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Soon personal computers will probably also be able to download active data to generate production of computer output microfilm (COM) as part of CAR operations. This process would be accomplished by recording digitized information directly on floppy or Winchester disks and effecting its transfer to magnetic tape run on mainframe computers connected to COM production equipment, either in-house or through a service bureau arrangement. Figure 1 lists some camera-processors available from major manufacturers.

Automatic retrieval units already on the market have the ability to contain from 8,000 to 150,000 pages of information on microfilm, and they can be interfaced to a number of personal computers. Figure 2 lists some of these units.

As an alternative to building a CAR system that immediately incorporates an automatic retrieval unit, the user may choose to purchase microfilm reader/viewers that are not computer driven. If this choice is made, location of the desired data is still computer directed, but actual retrieval of the required document image is effected through a desktop film box/file system. With this option, the cost of the retrieval end of CAR can be held under $400. Microfilm reader/viewers are available — in hand-held, portable and desktop models — from NMI, Microdesign, Inc., Micron Corp., Datagraphix, Inc. and Alos Micrographics Corp.

The selection of a CAR system requires a careful evaluation of the type of files to be used and an understanding of how the user needs to access desired records. The activity level of the file should be determined as well as the physical characteristics of the documents. The capabilities of the available CAR systems must then be matched to the specific requirements of each application.

Regardless of application requirements, the following traits are desirable in any CAR system:

• User-friendly software. The software should be simple enough for personnel to learn and operate. (The new personal computer software under development was designed to meet this need).

• Flexibility. The CAR system should be able to retrieve images on a microfilm retrieval/viewer device best suited to the user's requirements. And, when necessary, the CAR system should be able to communicate with other computers to take advantage of indexing data that may already be available.

• Modular growth capabilities. Software and storage capacities should be expandable to meet current and anticipated needs.

• Rapid retrieval characteristics. System performance may suffer when maximum file sizes are in use. The system should be powerful enough to meet retrieval speed requirements even under a maximum work load. Multiple search parameters should be provided to increase retrieval power.

• Reliable operation. The reliability of the total system should be evaluated, including computer, software performance, camera and retrieval units. Available service support and backup capabilities for the system should be investigated.

By careful selection, users can obtain a CAR system that will provide immediate cost-effective access to vital business information. CA

Bogue is vice-president of advanced technology at Zytron, a microfilm product services organization in Menlo Park, Calif.

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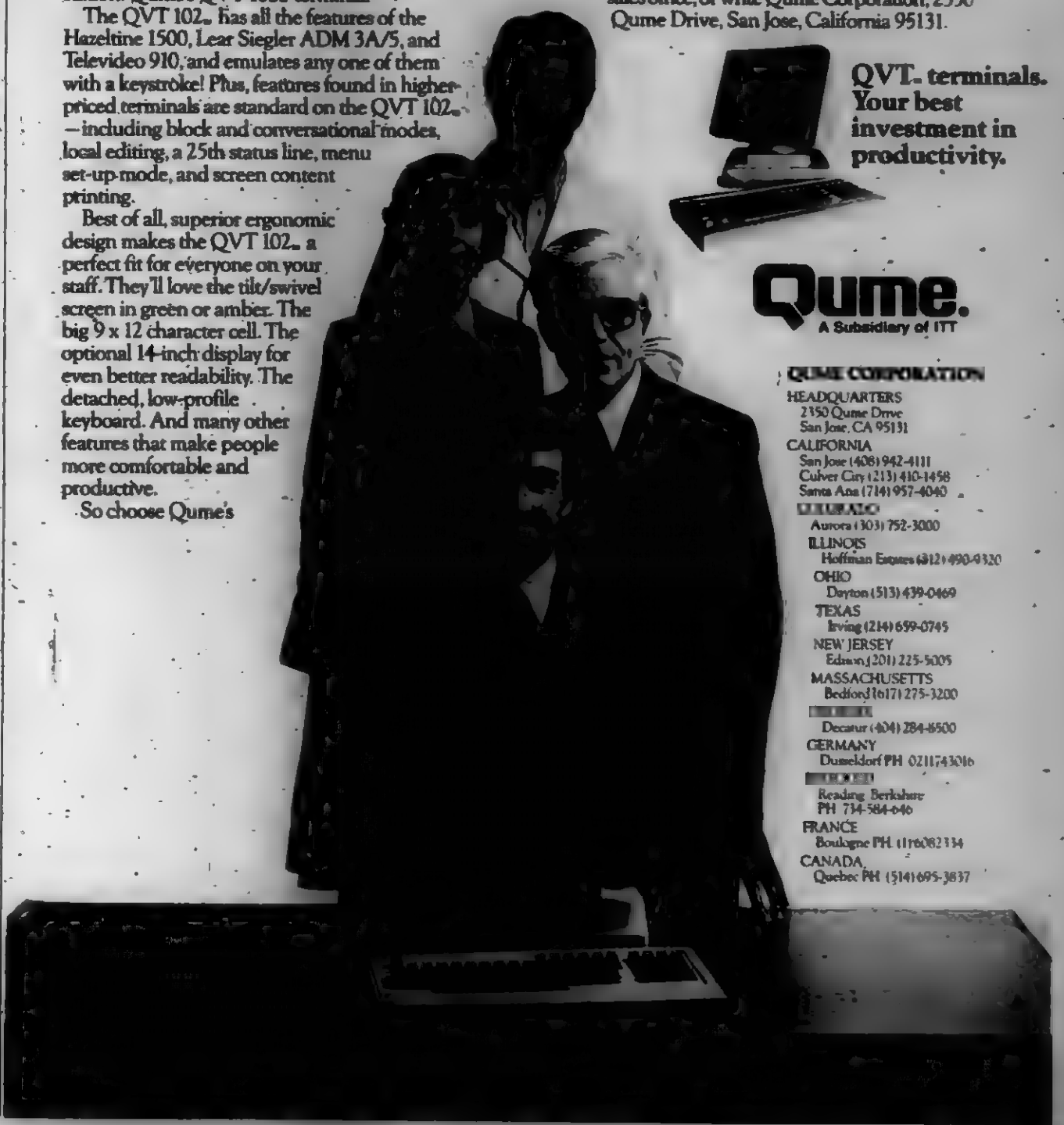

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Unix Spreads

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Into the Office

BY GLENN RIFKIN

Unix, Bell Laboratories, Inc.'s ubiquitous operating system, is at the center of a growing storm of controversy. At the same time Unix is being heralded as the de facto standard for the 16- and 32-bit minicomputer and microcomputer market, its rise in popularity has brought a great deal of cynicism from its detractors.

Among the questions that stir debate is where Unix will fit in the office environment. Proponents feel that Unix and office automation are like peanut butter and jelly, a perfect match. Others believe that the user public is being misinformed and that, in its present state, Unix just can't accommodate the end-user arena.

"Unix looks like the best chance we have for a multiuser, business-oriented office operating system that will run across different brands of computers," said Jean Yates, president of Yates Ventures, a Los Altos, Calif., consulting firm. "However, that doesn't mean it's great. It's not that wonderful, but there's really no alternative."

Talking to a programmer, Yates would certainly get an argument. Designed by programmers for programmers at Bell Labs in 1969, Unix has been termed "elegant" and "versatile." "As a programmer's interface, it's beautiful. It's clean and it doesn't get in your way," Bob Marsh, chairman of Plexus Corp. and director of the Unix/Usr Group, said.

If numbers tell the story, Unix proponents are making their presence felt. As of December 1982, Unix had made its way into more than 5,000 educational, governmental and commercial installations and those figures are growing daily. According to Yates Ventures, commercial sales of Unix and its many look-alikes on the market will total 95,000 units valued at $2.1 billion in 1983. By 1986, Yates predicts an installed base of 1.3 million units, sales of 500,000 units for 1986, with a total market value of $6 billion.

An interactive, multiuser, multitasking operating system, Unix combines many features no other operating system can boast, according to its boosters. In addition to its flexible kernel (the core of the operating system responsible for handling basic system functions), it has a hierarchical file system, which bypasses much of the file and program manipulation and maintenance needed in other systems. Unlike the cumbersome, interrelated programs with the jumble of commands of other operating systems, the Unix system is a set of small, separate modules, each of which can be used without affecting the operation of the others.

Unix has a unique shell command language which also serves as a programming language that provides an interface to the operating system. The shell structure allows the user to avoid programming completely by using Unix commands in the form of pipes and shell scripts instead. Its flexible design has been called ideal for developing software applications.

Unix also has a selection of interactive debuggers and more than 100 utilities (or tools) for file and string manipulation. It is transportable across hardware architectures, and this ability to run on micros, minis and mainframes is considered Unix' number one attraction. Although most operating systems were designed to be married to a certain piece of hardware, Unix was designed to be easily customized to both hardware and applications. Its ability to communicate not only across architectures but also across vendor brands makes Unix an invaluable asset in the multivendor environment of the office, according to Unix proponents.

In addition, Unix has the advantage of being a time-tested product. Bell Labs has implemented several versions of Unix over more than a decade of varied use. "It's a mature system," said Dr. Charles Popper, manager of advanced systems and planning for Lehman Bros. Kuhn and Loeb in New York. "The bugs are out of it."

Until January of this year, AT&T refused to sell and support the Unix system, which it considered a technology and not a commercial product. However, for a minimal charge, AT&T did provide Unix to universities and research facilities during the 1970s. Its multiuser, multitasking format made Unix ideal for those settings, and students and professors built on and enhanced it in a myriad of ways. Having used Unix in school, the former students brought their desire for the product to their work environments and Unix' popularity began to soar.

Despite its army of admirers, Unix is not beloved by everyone. It has been criticized as being extremely unfriendly to anyone other than programmers; of no use for real-time processing; lacking applications software; lacking enough power to handle complex office systems; and not being properly supported by its vendor, AT&T. "There's tremendous potential out there, and the idea of

portability is very appealing," Yates, who has authored five books on Unix, said. "But the actual implementation is not happening as rapidly as we might like — the single biggest stumbling block being the Bell System."

According to Yates, Bell must offer better support. In January, Western Electric announced System V, its first commercial version of Unix, but in Yates' view it simply isn't enough. For example, System V throws out a "grab bag" of 400 utilities and programs and says "pick among them." The experienced user likes it that way, but the business user "is just totally confused," she pointed out. "The systems integrator or the Fortune 1500 companies have to spend a lot of time and energy fixing the product."

'System V throws out a "grab bag" of 400 utilities and programs and says "pick among them." The experienced user likes it that way, but the business user is totally confused.'

Major OA vendors have also expressed skepticism about Unix' place in the office. Wang Laboratories, Inc., for example, simply does not believe Unix will be the dominant operating system in the office of the '80s. According to Charlie Johnson, Wang's director of product marketing for computer systems, vendors selling Unix for the office have added as much code onto the basic Unix as there is Unix itself. Having been designed for system-level developers, he said, Unix is not friendly at all to the end user.

Johnson said he believes Unix won't provide enough power in a multiuser environment. "People who have delusions of having 20 workstations on a 68000 running Unix will see there just is not enough power."

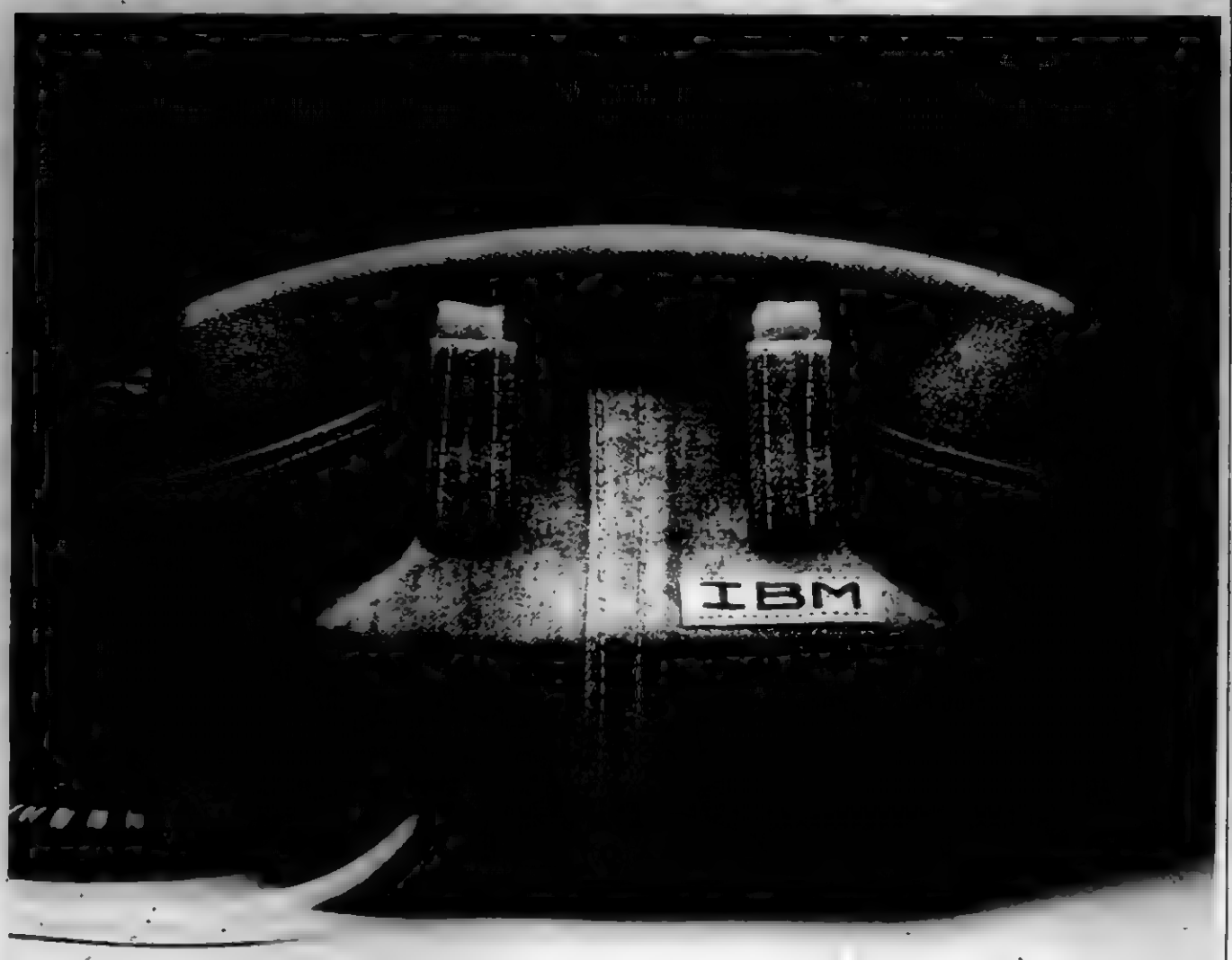
Unix' transportability is also a "misconceived" notion," he said and added that highly transportable versions exist, but they run in the C language only. There aren't many programmers out there who know C.

"If Unix is going to be a standard in the office," Johnson stated, "it's got a long way to go. As free-standing Unix, it's questionable whether it will get there at all."

Digital Equipment Corp. has also questioned Unix' place in the office. Dec recently came out with its own version of the product called V7M-11 after nearly 14 years of refusing to acknowledge Unix. Despite the fact that Unix had been created to run on DEC minicomputers, the company "took a while recognizing it was not the university toy it started out to be," according to Bernie Toth, Unix products marketing manager for DEC.

As interest in Unix soared, DEC finally accepted its inevitability. "Since we were a major supplier of systems using Unix," he said, "it made sense to get involved." Despite its grudging acknowledgment of Unix, DEC still holds firm that Unix is not the operating system for its office products. DEC's office products are not Unix-based and there are no plans to change that.

"Unix is really terrific for the techie. But in the



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office, there is too much to do to make it user-friendly," Toth said.

Unix is also weak in networking capabilities and data base management systems, according to its critics. Toth feels that end users in the office shouldn't have to be concerned with the operating system at all. The tools built upon that system should hide it.

From AT&T's point of view, the criticisms are misplaced and currently unfounded. According to Bell Labs, when Unix was being developed, it was considered a technology, not a product, and therefore wasn't going to be treated and supported as a commercial entity. With the coming divestiture, the company felt the time was right to explore the market created by third parties. For the first time, the Unix system offered outside Bell is the same as that used inside.

Catherine Brooks, a supervisor in the Applications Planning Group at Bell Labs, said Unix provides an ideal environment for developing office systems. Tools such as electronic mail and calendaring have been successfully incorporated into Unix. Bell Labs has automated its offices for professional workers using Unix, she said, although certain specialized extensions were done internally.

Unix has a strong text editing capability with its NROFF and TROFF functions, according to Brooks, and provides additional packages such as TBL (for producing tables) and EQN (as an equation processing function). Unix' Writers Workbench, a software editing tool, is also available as an option on System V.

With divestiture on the horizon and AT&T looming as a formidable player in the information systems game, Unix appears to have the momentum to overcome most of the criticism. Though the major vendors would be happy to go on selling their proprietary operating systems and let the compatibility issue creep along, Unix, its backers believe, is already approaching standard status.

"Meanwhile, Unix has increased monstrously. The variety and quantity of Unix-based office automation products continues to grow and gives an alternative to major vendor-developed solutions."

Pyramid recently announced a Unix-based 32-bit supermini called the 90X. According to Madren, it was simply a business decision to go with Unix. Other superminis are available with proprietary software from the manufacturers while Unix, with its growing aggregation of software and its position as a standard, is becoming more and more attractive to the user community.

With divestiture on the horizon and AT&T looming as a formidable player in the information systems game, Unix appears to have the momentum to overcome most of the criticism.

"I've heard those objections for five years now," said Frank Madren, vice-president of marketing for Pyramid Technology Corp. "As you approach the OA problem, any one vendor is almost swamped. They can't be all things to all people. Unix provides an alternative because it gives the OA user the ability to pick and choose software," he said.

Applications software, once considered a scarce commodity for Unix, is being produced at a frenetic pace as Unix gains popularity. "It feeds on itself," said David Kaplan, senior vice-president of technical operations for Fortune Systems, Inc.

Fortune, with its Unix-based 32:16 microcomputer, is just one of a growing list of manufacturers that have chosen Unix. According to Yates Ventures, more than 70 hardware vendors currently produce Unix-based products, and that number will reach 100 by next year.

"The old-line manufacturers have a big stake in their proprietary products," said Plexus' Marsh, "but a lot of the office automation companies are announcing OA products based on Unix. People will use Unix in the OA area as a way to tie old products into the new technologies. Unix just has too many right things going for it."

DP managers exposed to Unix tend to agree. Albert V. Filippini, senior systems analyst for Commercial Union Insurance in Boston, pointed out that Commercial Union has been running Unix since 1975, having received one of the first licenses from Bell.

Commercial Union uses Unix in both a DP and an OA environment and it has met with tremendous acceptance from the user population. Currently, 150 users employ the Unix-based system for electronic mail, communications, financial applications and a local-area network. "Time-sharing and OA have just blossomed here because of all the wonderful things we can do," Filippini stated. "Unix supports the total electronic office. We even run lunch menus on it."

Filippini conceded that, because of lack of support from Bell, he had to assume those responsibilities over the years. However, as a programmer, he had little trouble with that task. "I think Unix is the best thing since sliced bread. I can see, from a user's standpoint, what the problems might be, but you can make Unix user-friendly enough so they won't even know they're using it."

Popper, of Lehman Bros. Kuhn and Loeb, said he is convinced Unix is destined to be the dominant operating system in the next decade. Lehman Bros. has three Unix-based Zilog, Inc. System 8000s and 10 Fortune 32:16s supporting word processing and professional workstation applications in place of personal computers.

Unix could be improved in such areas as real-time processing, he said, but any major changes would detract from its strength as a de facto standard. Customization might be better, but it would be much more expensive. "Unix' advantages in the OA environment are its modularity and its ability to plug OA products from different vendors together. It's not easy to take the Lotus 1-2-3 product and marry it to your word processing and other data bases. We've already done it with Unix."

For Yates, the enchantment with Unix comes as no surprise. She claims she was at the head of the pack in support of Unix in 1979. Her current cynicism comes from her clients — small start-up companies to large manufacturers — that have had continuing headaches with the product.

"I constantly hear 'it's going to be important and going to be the operating system of the '80s, but boy, is it a pain to get working and boy, do you get no support from Bell.' There are companies who, since '79, have been promoting, selling, educating and advertising Unix and begging Bell for support — and it still hasn't happened. Since the vendor of Unix isn't making the moves they need to make and the product needs so many fixes, a great deal of unnecessary money and energy is being spent getting the product to market. It's very frustrating," she said.

Despite her objections, Yates admits that Unix has captured a lot of industry hearts. At its best, Unix appears to be the long-sought-after answer to many in the office market.

"It does work for office automation," said Commerical Union's Filippini. "We're living proof of it. Our secretaries have been using Unix for four or five years now and I wouldn't want to tell them they couldn't have it anymore." OA

Rifkin is a staff writer for Computerworld OA.

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What's Happening At IBM?

What's on IBM's drawing board is always of interest. Here's a sample of what might be coming.

By August L. Kelsch

Certain products now in development may have a significant impact on work being done in offices around the country. The following includes some of the technologies particularly related to IBM sites.

Software: Currently available software tools (and those in development) can help principals create grammatically correct documents without their secretaries' guidance.

Proofer: Proofer was a spelling-checker program used at the IBM Thomas J. Watson Research Center for approximately four years. Each word in a document was matched against a dictionary provided to check its spelling. Program output was a list of unmatched words (potential misspellings), suggested correct spellings and a copy of the original text with the unmatched words highlighted. Proofer also allowed users to provide their own dictionary, which could include frequently used proper names as well as technical and other specialized terms not found in an ordinary dictionary.

Current Spelling Checkers. Proofer was the forerunner of the current

ILLUSTRATION BY RICH TENNANT

spelling checkers in the IBM Displaywriter and 8100/DOSF system. Because the production versions of Proofer use separate dictionaries for roots, prefixes and suffixes, they offer reduced storage space requirements and an accelerated checking process.

The spelling checker provided in the 8100/DOSF system can accommodate 120,000 words; the basic dictionary is provided by IBM and can be expanded by system users to contain names as well as technical terms, acronyms or abbreviations. When mismatches are found, the program highlights the words and suggests probable correct spellings. Users also have an option to enter their own corrections, although the system usually provides the correct spelling.

In addition to locating grammatical errors, Epistle detects poor writing style.

One disadvantage of the spelling checker is that any word that is properly spelled, but misused, is not regarded as an error (for example, principle and principal, immanent and imminent). Regardless of this shortcoming, spelling checkers correct most errors.

Epistle. An experimental software project at the Thomas J. Watson Research Center, Epistle ensures a text's grammatical correctness by parsing each sentence; that is, breaking a sentence into its components for analysis. First, each word is matched against a dictionary to verify its spelling, although the wrong words may be matched. Epistle then retrieves (from the dictionary) codes that describe the word by, for example, its part of speech (such as noun, verb, pronoun), tense, person, number and case.

Epistle attempts to build a parse tree of the sentence according to approximately 250 grammatical rules. If the program succeeds, the sentence is grammatically correct. If the sentence cannot be parsed correctly on the first attempt, the program continues, using relaxed rules. Once the sentence is parsed, the relaxed rules allow the program to locate and diagnose the errors as well as suggest corrections.

In addition to locating grammatical errors, Epistle detects poor writing style. Epistle, which has been used in a laboratory environment for approximately two years, should be available in an experimental version when a program rewrite is completed. The current version uses 4M bytes of memory and an average of 10 CPU-seconds per sentence for a 3033 running under VM/370. The rewrite is expected to use considerably less CPU time and to require approximately 500K bytes of memory. If marketed, Epistle will probably run on a host system; it is unlikely that a product using so many resources will ever operate on a word processing system.

Terminals: Certain basic capabilities are prerequisites for a principal's workstation; others can be added later.

There are three primary requirements.

First, a principal's workstation must provide access to host services and data bases. If principal productivity is to improve while information is to be relayed electronically instead of by paper, principals must at least have read-only access to the online corporate data bases related to their responsibilities. Newly developed

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support software for the principal must reside at the host level. This software will have large memory requirements, require powerful CPUs, or will have to access centralized text files or host data bases. In addition, principals must still access existing host services (for example, TSO, CMS and a conventional host-resident application system).

A principal's workstation must also be able to access those office services provided at the shared-logic system level. In the IBM 8100/DOSF system (with Disoss located at the host), a principal's mailbox, follow-up and message files and WP software are located at the 8100. Many future principal support services will also be implemented at this level. Finally, a principal's workstation must provide personal computing services.

The demand for personal computing will continue to increase as personal computers become more powerful, additional software is available and prices continue to fall. The average principal is currently more interested in personal computing than in such automated office services as electronic mail. A workstation that does not include personal computing will compete with a personal computer for desk space. Because of its obvious and immediate value, however, the personal computer will likely win such a contest.

The second-generation principal workstation must be integrated with the principal's telephone; provide a dot-addressable display (probably color) for charts, graphs and drawings; and include the ability to annotate text documents with voice. Eventually, the principal's workstation may incorporate video and allow voice recognition for instructions, commands and text creation.

Although no completely acceptable terminals are currently available, several products are presented in the following sections.

IBM. IBM's primary product is the conventional CRT. With the 8100/DOSF system used at the shared-logic level and an 8775 CRT, 3270 access is provided to host systems. WP software on the 8100 and follow-up files and mailboxes. The CRT has no personal computing capability and is expensive for widespread use as a terminal for principals.

Northern Telecom, Inc. Displayphone — an integrated telephone and CRT with a full keyboard — may have considerable market potential because of its price; in quantity, it can be purchased for approximately $1,500. This offering, however, can only talk to a host as a dial-up asynchronous terminal. It cannot emulate a 3270 or access WP software, and it has no personal computing capability.

Datavox Communications, Inc. Datavox offers an integrated CRT, full keyboard and telephone. This product's primary advantage over the Displayphone is that it fully emulates an SNA 3270 and can access the host. If connected to an 8100, the terminal can access the host in pass-through mode as well as mailboxes and follow-up files on the 8100. Because it does not emulate a 3732, this offering cannot access WP software and does not have personal computing capability.

Xerox Corp. Star, a sophisticated terminal that uses graphics, has personal computing capability

A workstation that does not include personal computing will compete with a personal computer for desk space.

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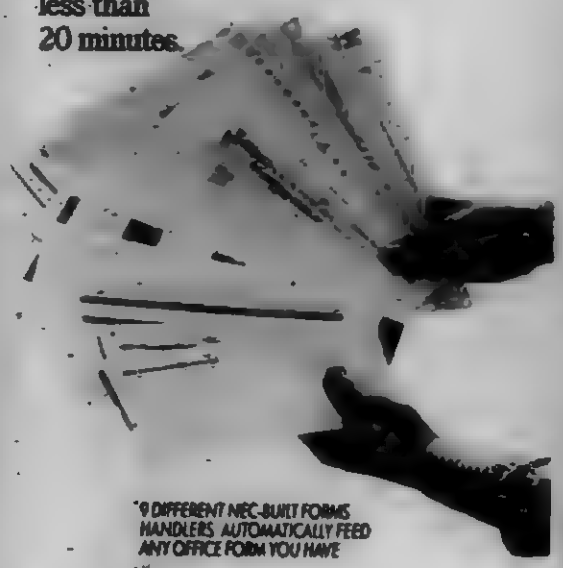

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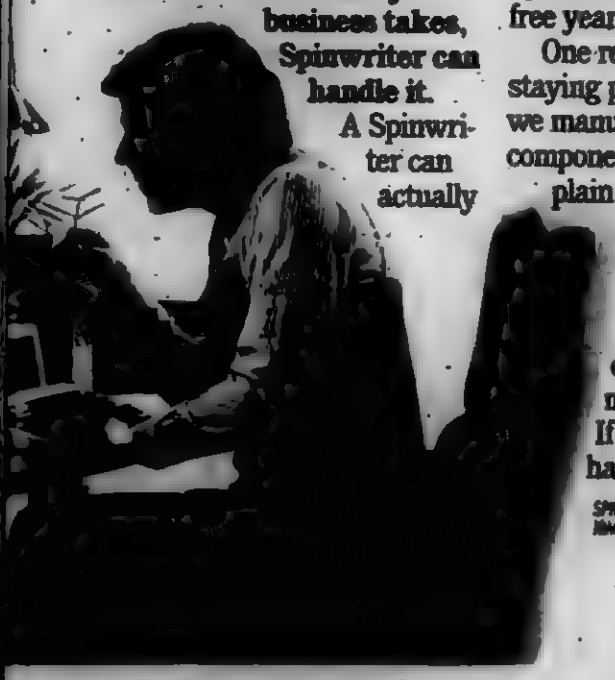

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and WP software. If connected into an Ethernet local-area network, it can access mail, files and other office services.

This terminal's greatest disadvantage is cost; the most expensive personal computer is approximately half the price of a Star terminal.

Personal Computers. In addition to offering personal computing, many of these terminals permit access to the host as dial-up asynchronous terminals, and some can emulate an SNA 3270. In the author's research, no personal computer was found to include good WP software or to provide the terminal with the emulation needed to access existing systems (the IBM 8100/DOSF).

Forecasts and Prototypes. As an example of future workstations, the first-generation IBM principal terminal will likely be a personal computer that is modified to access host computers as an SNA 3278 attached to an IBM 3274 or 3276 controller and to access a shared-logic WP system and emulate the appropriate terminal. A personal computer that is modified to attach to the 8100 loop specifically and that can emulate both a 3278 and 3732 will provide full host, WP and Disoss-based office service access while retaining its full personal computing capability.

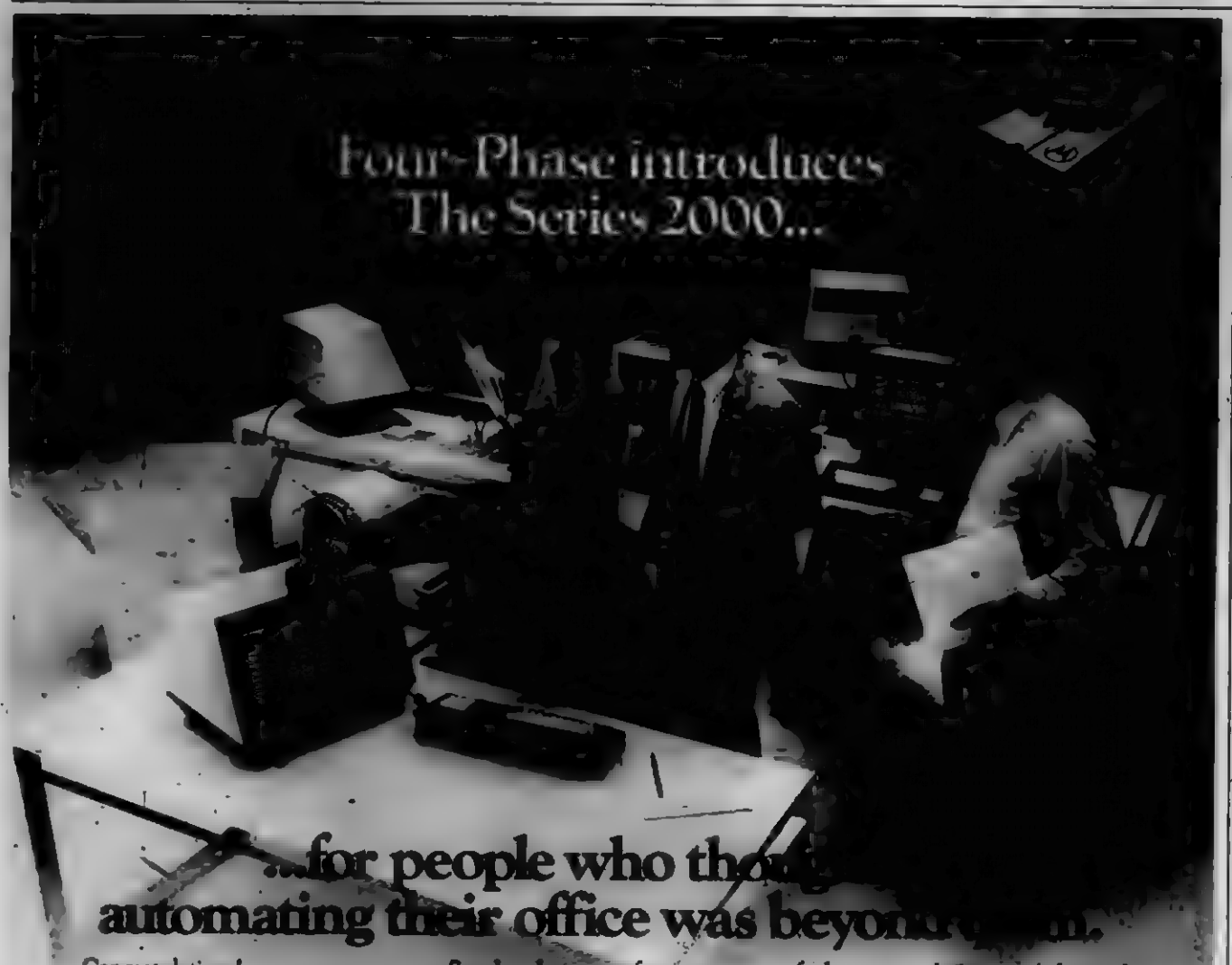
The IBM Research Laboratory has developed several professional workstations that are classified under the generic title "9 to 5." Each workstation — designed to the needs of specific professionals — is a desk with built-in electronics and devices. The "9 to 5" has up to three CRTs, five microprocessors and data communications capabilities and storage. Depending on the principal's needs, the CRTs range from the conventional 3270s to large-screen, fully dot-addressable graphics displays. Although it is unlikely that the current "9 to 5" version will be offered as a product, the project is providing IBM with insight into what capabilities a principal workstation must have.

The first-generation IBM principal terminal will likely be a personal computer modified to access host computers.

Automatic Filing: Today when a document is electronically filed in a system like Disoss, the indexing must be specified. The filing criteria can be author (sender), recipients, copied parties, date, title or document names, subject and keywords selected from the text. This decision is usually at the discretion of the individual responsible for filing. The filing criteria are usually minimized because all such information must be rekeyed, even though this data has been keyed as part of the document.

Because the advent of principal terminals will necessitate the retrieval of documents by both senders and recipients, the documents should be filed under all criteria. This is accomplished easily if the system automatically files the documents and selects the criteria. Initially, the problem of selecting the filing criteria by program seems enormous. It would be unrealistic to require a format that places copy lists, sender's name, subject and date into prescribed locations, since individuals and organizations tend to prefer their own formats. Not even a rigid set of rules can make all documents fit a standard format.

If a document is run against a spelling checker, the words indicated as possible misspellings (not true errors) can be used as



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words, dates (regardless of how they are expressed), words beginning with a capital letter (if not at the beginning of a sentence) and all underscored words. Such modifications would add the words from the title, each proper noun and date to the list of words selected. Although such a program might select many keywords, the document would be filed once, with an index entry for each keyword. Since each individual would choose different keywords, too many keywords are probably better than too few. Automatic filing programs can be expected in the near future.

Integrated Text and Graphics: The principal may also soon benefit from the use of integrated text and-graphics systems. Examples of such systems currently under development are the IBM Janus and Sherpa projects.

IBM's research project Janus is primarily a formatter similar to DCF or Script/VS; it uses general mark-up language (GML) tags. The Janus formatter differs from others, however, because it is interactive (a batch run is not required). Janus uses two displays: one CRT is a 3270 that shows the GML, and the other is a large, completely points-addressable graphics CRT that displays the document's actual appearance. As the operator pages one CRT, the other keeps pace with it; both screens use the same GML. The displayed document should appear exactly as it will on paper, including text charts, special symbols or type, photographs, special type and logos. A change to the document is immediately reflected on the screen.

Portions of a document can be enlarged, reduced, or moved by using a keyboard and joystick. For example, an 8-by-10-in. drawing can be input to the system, named, displayed, reduced to approximately 2 by 2½ in. and inserted into the middle of a column of text on a multicolumn 8½-by-11-in. page. Janus retains text in character-encoded form and nontext in digitized form; it can intermix both. By retaining character-encoded text, such other systems as text-editing software, spelling checkers and possibly Epistle can be run against the text. Text and digitized data are maintained in separate modules. Digitized data modules can be established from input scanners or programs that generate graphs or line drawings; encoded text is taken from page readers, keyboards or text files.

The primary display in Janus is a completely dot-addressable, large-screen CRT. IBM is experimenting, however, with a completely dot-addressable, laser-activated liquid-crystal display that is potentially more cost-effective and may permit some limited color.

Although Janus is not a well-integrated single system, the current version is valuable in many specialized text applications.

While Janus is innovative, it still requires an inexpensive printing device that has completely dot-addressable output. The printing device must include a duplex printing capability; handle intermixed character-encoded data, digitized images and various fonts; and print multiple, precollated document copies. Project Sherpa — a microcomputer whose memory has a single plug connection to an IBM 6670 communicating copier — is such a printer. The Sherpa box controls the 6670's laser and converts it into a completely dot-addressable printer. Sherpa permits the 6670 to be used as an input-scanner and dot-addressable printer. This project is expected to be offered as a product in the near future because of its obvious benefit.

Sherpa's ability to drive any raster-scan device permits its use with a variety of devices. For example, IBM is experimenting (independent of the Sherpa project) with a four-color, drop-on-demand ink-jet printer that is potentially drivable by Sherpa, whose quality is impressive.

As a result of an IBM contract with Mitel, Inc., IBM presumably will enter office voice communications with an electronic PBX. Such a PBX will possibly be based on 8100 technology combined with a 64K-byte chip and Mitel-supplied voice technology.

IBM will probably also announce a local-area network based on its submission to IEEE, although such an announcement may follow IEEE's ruling on its acceptability as a standard. When the local-area network is announced, most IBM support for the higher-level protocols will likely be in the Systems Network Architecture (SNA) environment, with the local-area network protocol operating at the physical layer in SNA. Within the next five years, voice recognition may be developed for use with commands or instructions to an office system terminal. The ability to dictate text to a WP system, however, is probably at least 10 years away.

IBM may introduce voice-annotated text shortly after its private branch exchange (PBX) is announced. The PBX could tie a voice store-and-forward system (Series/1-based ADS system) and a text delivery system (the Disoss 8100 combination) to provide voice-annotated soft-copy text.

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Kelsch is a senior technical specialist on the special projects staff reporting to the vice-president of computer and communications services at Eastern Airlines, Miami. Kelsch has more than 27 years' experience in all facets of DP and is currently a member of The Guide Futures Steering Committee.

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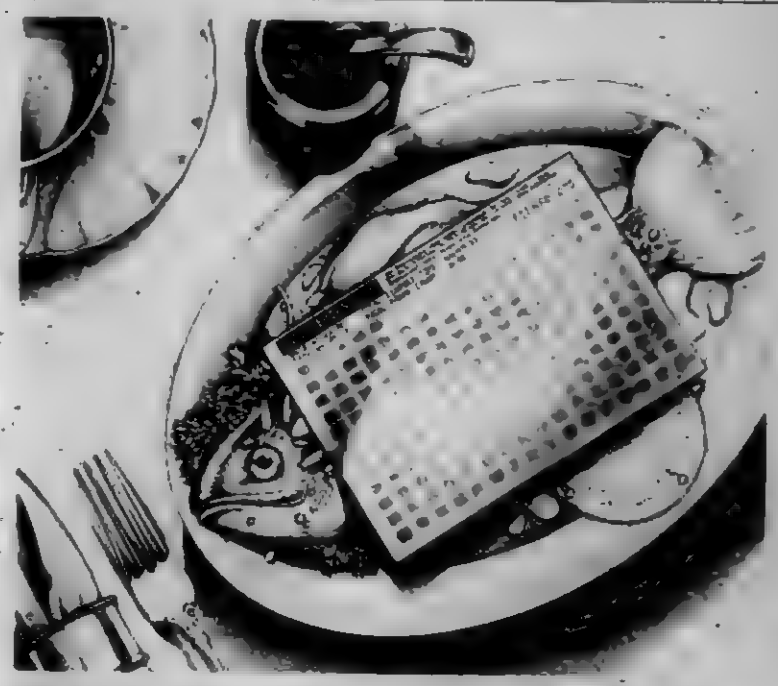

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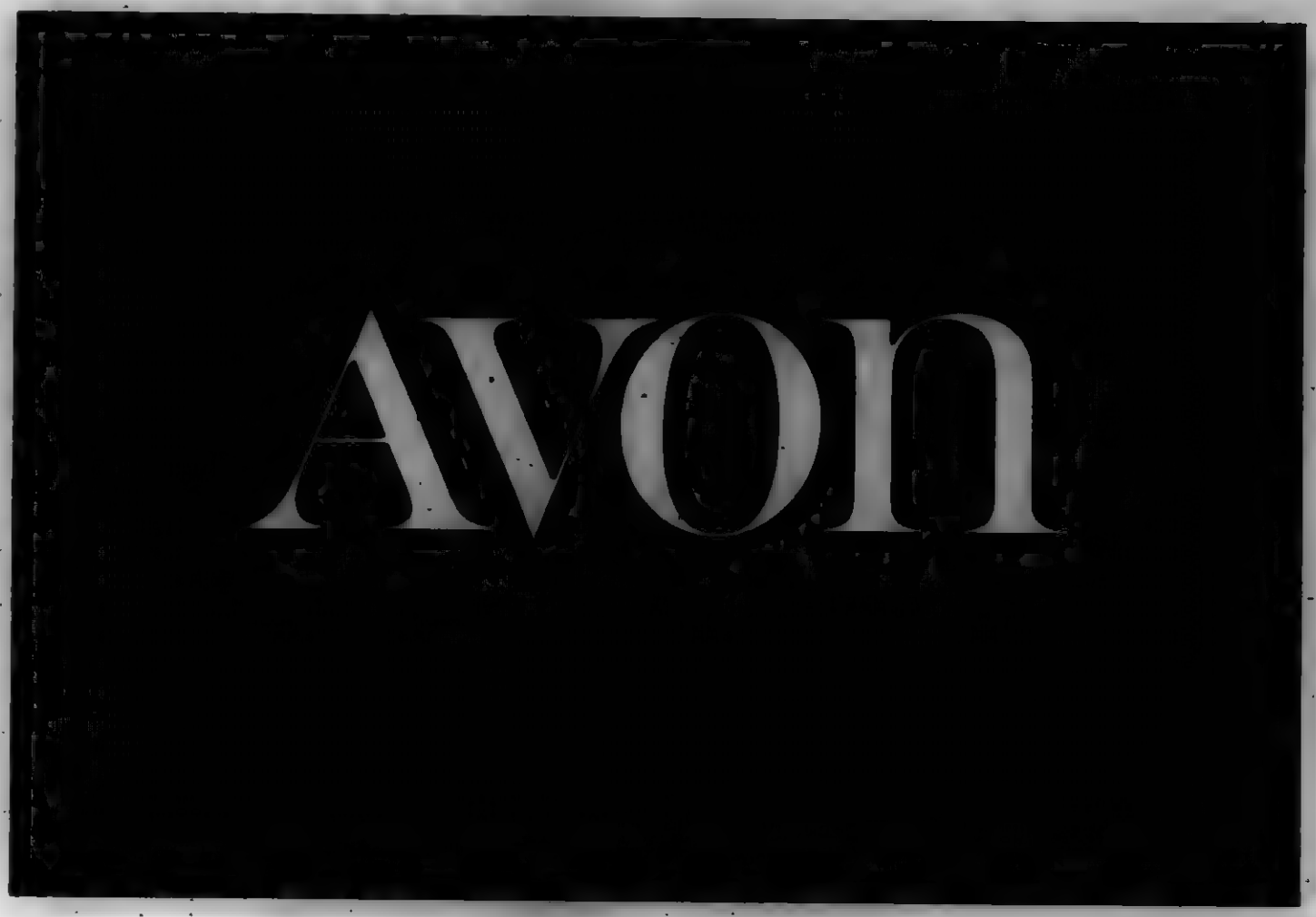

With 1.3 million door-to-door sales reps needing home office support, Avon has had to call on OA in a big way.

By Glenn Rifkin

In 1886, when David McConnell sent out the first Avon lady to ring America's doorbells, he probably had no idea what he'd started. For the time, his ideas were considered radical. Instead of selling the usual door-to-door fare like books or snake oil, McConnell's new company sold cosmetics. Instead of traveling salesmen, Avon had local women selling to their neighbors and friends.

Nearly 100 years later, McConnell's innovative idea has become a legendary fixture in American industry. Avon Products, Inc. is now a $3 billion corporation with 30,000 employees, offices in 32 countries and more than 1.3 million representatives selling Avon merchandise around the world.

In order to support this enormous direct selling network, Avon has taken a strong initiative in communications and office systems. With a solid mandate from the executive level and a user population that simply can't get enough, Avon's office automators are just trying to stay one step ahead of the demand.

And as Avon prepares to move its corporate headquarters from Manhattan to brand new facilities in Rye, N.Y., beginning in 1984, that demand has already increased dramatically. The potential of a new building, able to be designed and integrated from scratch, has whetted OA appetites from the executive suite to the word processing department.

John M.Hart, manager of office systems at Avon, pointed out that the enthusiasm for OA was not always this high. In fact, office automation at Avon made its initial entry with a small, single project in 1979 when the company decided to internalize and automate its letter-writing capabilities. The company needed frequent and rapid communications with its 400,000 U.S. sales representatives. Avon had an outside vendor sending all those letters, to the tune of about $500,000 annually.

Hart and his boss, Tom Byrnes, director of communications and office systems, agreed Avon should standardize on a single vendor. They settled on Wang Laboratories, Inc. and, for the letter-writing process, chose the Wang WP-30 system. Initially, the letter-writing procedure was only marginally successful. "We weren't able to impact a lot with three operators and eight printers," Hart said. The next step was to create an interface with Avon's IBM mainframe. That successful interface solved the throughput problem, but an output medium was still needed. After nearly 400 telecommunications experiments, the group successfully interfaced the

Wang system with an IBM 6670 laser printer. Hart said he believes Avon was possibly the first to accomplish that linkup.

Upon installation of the system, the group increased its output from 1,200 letters per month to the current 16,000 letters per day. After more than four years of successful use, the Wang WP-30 system is being replaced by the Wang VS system. When that is installed, two IBM 6670s will be able to do concurrent processing, and Hart predicted the system will turn out 30,000 letters per day by the first quarter of 1984.

In the four years since the letter-writing project was initiated, OA has spread widely throughout corporate headquarters, six U.S. locations and 32 international offices. Virtually every department from the controller's office to the treasurer's department uses WP, office information systems or personal computers for report-writing, file maintenance, tracking, training and countless other applications. Although unwilling to reveal the total OA budget, he said OA expenditures will grow significantly with the move to Rye.

The information services department, part of the DP department, has acted in an advisory role to anyone seeking a system. Working under Rainer Paul, vice-president of information services, Byrnes and his group of managers meet weekly to discuss the many requests, agree on the solutions and dispense the work to the proper people.

Many of the systems are based on WP, but Hart pointed out that the applications quickly go beyond that. "What's happening in many cases is that we're putting in systems for specific functions; along with that function, the group gets electronic mail, calendaring, messaging, tickler files and all the other management support systems. They won't be required to use all those applications, but we will train and support them on the systems. Hopefully, through that kind of encouragement, they will use it."

Apparently, the encouragement has already paid off. The user environment has changed dramatically at Avon over the past three years. According to Hart, the users know exactly what they want and it's much more of a participatory situation now. He also produced a 20-minute videotape, using Avon employees as the actors, to explain what OA will do for the company and the individual. The tape, shown to groups throughout the company, has assuaged many of the fears that OA sometimes generates.

Increased user involvement has significantly streamlined the work for the nine members of Hart's group. Rather than becoming totally immersed in each project, Hart's people can determine the needed system, put together cost-justification and route the idea for approval without doing a step-by-step analysis. This has allowed his staff to concentrate on more complex projects.

For example, they are currently putting together a product development system that will tie together five departments. Product development usually takes about two years from idea to market. "During that two years, you can imagine how many decisions are made, how many times they are revised and how much information is passed around," Hart said. "Three of the departments came to us separately and asked for help. We looked at what they were doing and realized these people were working on the same thing. We found the five key departments and are now putting together a loop. We anticipate there will be as many as 24 departments that will share

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Information services believes it can save Avon several million dollars by putting in this system. As OA has proliferated at Avon, management has supported the concepts, but has sought cost-justification for all systems installed. That, however, is not rigid. It's very rare for a system not to get a good return on investment (Avon normally expects a two-year return on investment), according to Hart. However, if the business application is essential, it will be installed, cost-justified or not. Despite that, for Byrnes cost-justification is the biggest challenge to OA implementation. If a system saves a professional a half hour per day, will that time-savings translate into dollars or staff reduction, he asked. "It is difficult at times to explain the intangibles to management — that the technology will help do a better job. What they see is that we're spending a ton of money on it, and they want to know what it will do."

Information services believes it can save Avon several million dollars by putting in this system.

Management's skepticism has not, however, caused any serious delays in implementation. In fact, information services has grown so rapidly it has outgrown the Manhattan headquarters. Ed Rochotte, an Avon consultant on communications, pointed out that most of the implementation delays have been caused by Avon's landlords. Before anything can be installed, written permission must be received from the building's owners. The automators, therefore, are quite happy to be moving to facilities owned by the company.

The move to Rye will be accomplished in various phases over a span of several years. Avon has 15 more years on its lease in Manhattan, so the top executives will remain there indefinitely. The first phase of the move will involve 600 people, including information services.

Hart has already initiated a pilot project for Rye that will provide an opportunity to preview Avon's office of the future. The pilot, which will initially affect about 100 employees, includes technology and applications that were impossible to institute in Manhattan. He said it will give Avon a chance to see whether OA will do what it's been advertised to do — specifically, whether the technology translates into bottom-line savings.

The pilot has also provided Avon the chance to expand its OA program to a two-vendor environment. For the pilot, Avon turned instead to Digital Equipment Corp. Byrnes said DEC's ability to tie together equipment from many vendors enticed them to the Maynard, Mass. company.

The initial pilot includes both the DEC All-In-One system and the Decmate II personal computer tied to a VAX minicomputer in the Rye facility. The pilot involves six Avon departments and has attracted much attention from the executive level, including several requests for involvement in the pilot. Hart said that attention is welcome because those people ultimately make the final OA decisions.

The information services group hasn't sat back waiting for the move to Rye, however. The goal, according to Byrnes and Hart, is to provide access to the technology for anybody who needs it and to get end users to understand what that technology can do for them. Three years ago, the DP department initiated a technology task force comprised of six corporate officers whose mandate is to fund experiments, pilot programs and to "get things going."

During the past year, the OA push has taken off. A company-wide technology fair was held for employees in July 1982. Henry Mah, manager of personal computing, organized the fair, in which 23 vendors displayed their wares and more than 1,600 Avon employees got hands-on experience — many for the first time. The response, Mah said, was overwhelming. To meet the resulting demand for more information, he opened the Creative Learning Center.

The center, which contains virtually every major personal computer on the market, has served as a training site for more than 600 employees since its inception. Employees can get training for both business-related and personal interests. "I went in one day and saw the chef from the executive dining room taking a personal

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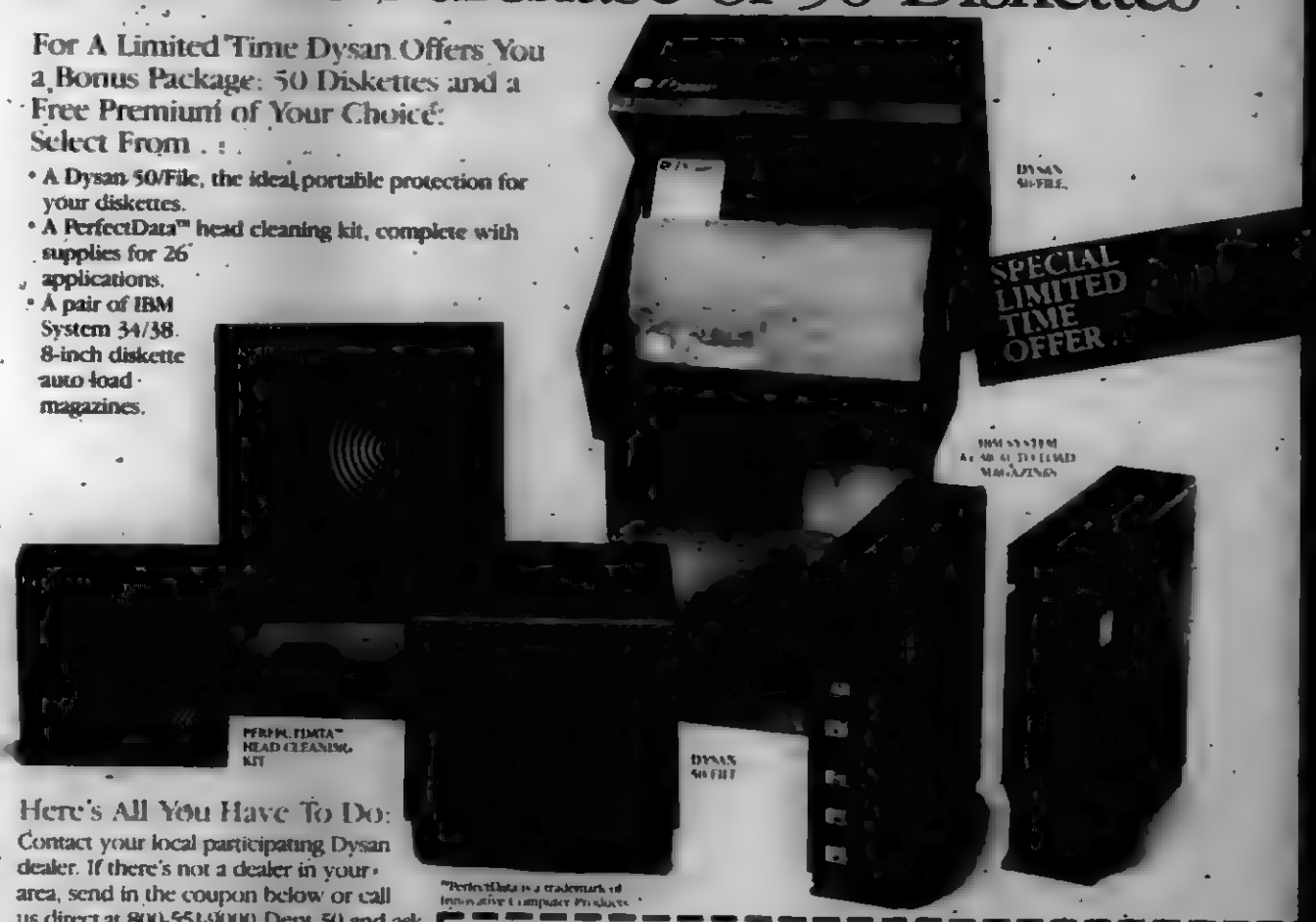

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computer course on an Apple," Hart said. "It's wide open."

The center has been so successful that the concept is being expanded to include most of Avon's worldwide facilities. A personal computer users group has also developed which Mah hopes to tie into the center.

Mah is also responsible for Avon's information center, which offers time-sharing facilities off a Burroughs 5900 mainframe. With personal computer training, the information center, and the IBM mainframe environment, Avon's users now have three choices to get on line.

"We used to do a lot of handholding," Hart said. "They expected a person to come with the personal computer. The fair really changed that. It really lit the fuse around here."

"DP is not the bad guy around here anymore," added Mah. "The employees feel good about doing the work themselves. We are definitely setting the trend."

Under Mah's direction, Avon has standardized its personal computer environment with the Eagle, IBM and Apple. Any requests for purchase of a personal computer must be approved by Mah. "The bulk of the use is for spreadsheet, data base management and word processing. We're installing about one per day and the demand is unlimited," he said. The Eagle is currently being field tested; if the tests prove successful, all 2,500 district managers at Avon will have Eagles on their desks.

As the personal computer makes its presence felt at Avon, the information services department is looking for the best ways to tie all this computing power together. Rochotte has spearheaded a search for a local-area network to install in the Rye facility, a search that has thus far been fruitless.

"We've looked at everything — Ethernet, Wangnet and others — and we haven't seen anything we wanted. We're hoping somebody will have what we're looking for soon. We're running a spare length of twisted pair in Rye so we can install the network when we find what we want," Rochotte said.

Avon is keeping an eye open for virtually anything that will help link people together with technology. Videoconferencing, video disks and videotex are three areas now receiving a closer look. Videotex is especially attractive to Avon because the direct-selling giant is "vitally interested in shop-at-home services. We look at OA and if there is anything at all that can be related to Avon, we go after it. There are no holds barred," Hart said. "We like to stay ahead of the technology, but we don't need to be pioneers. We want proven systems," Byrnes added.

Avon is also concerned that these proven systems receive the proper service and support. When a mix of vendors is involved, the potential problem arises of where the responsibility lies should something go wrong. The information services people don't want that responsibility to be dumped on the end user.

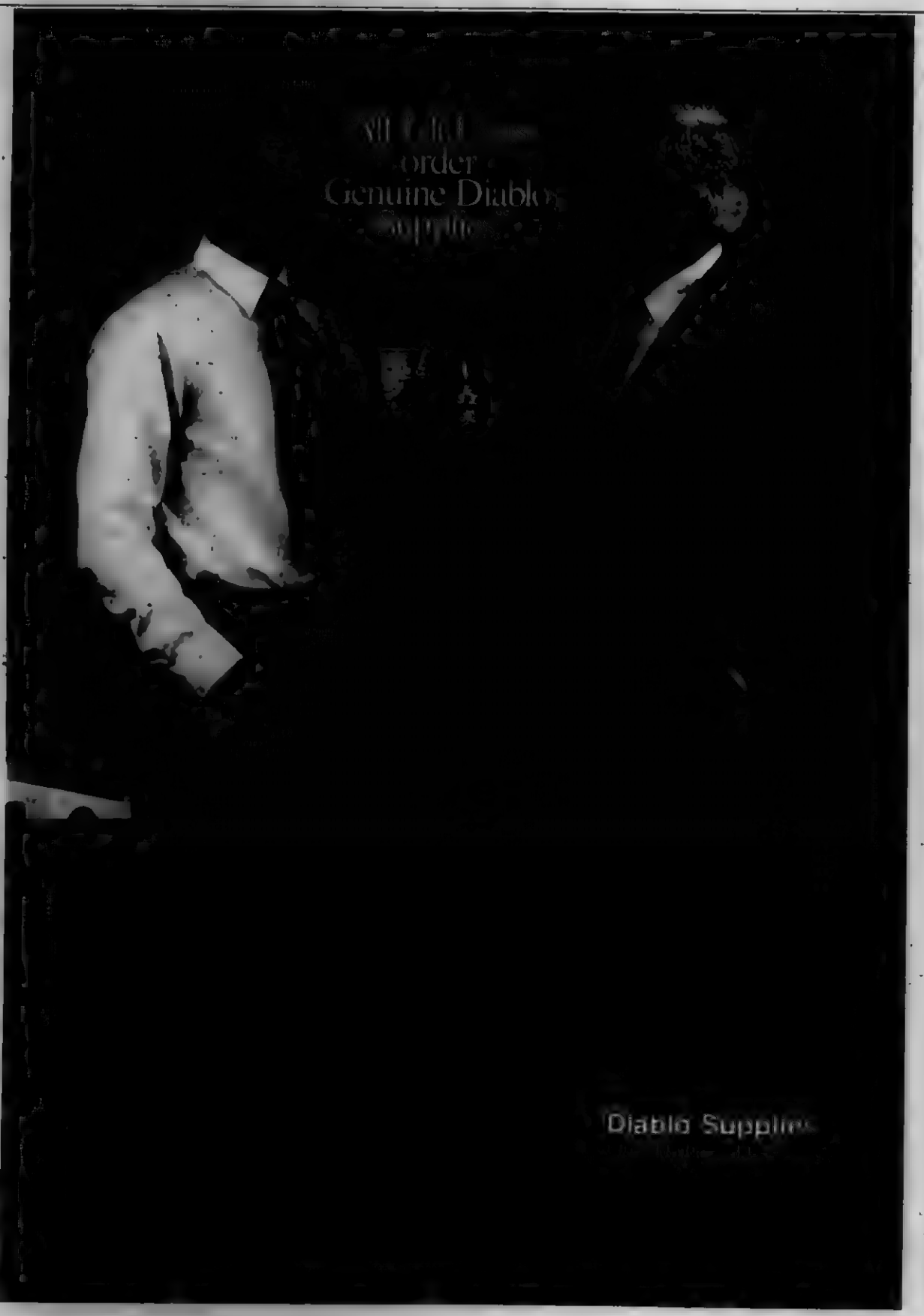
'We look at OA and if there is anything at all that can be related to Avon, we go after it.'

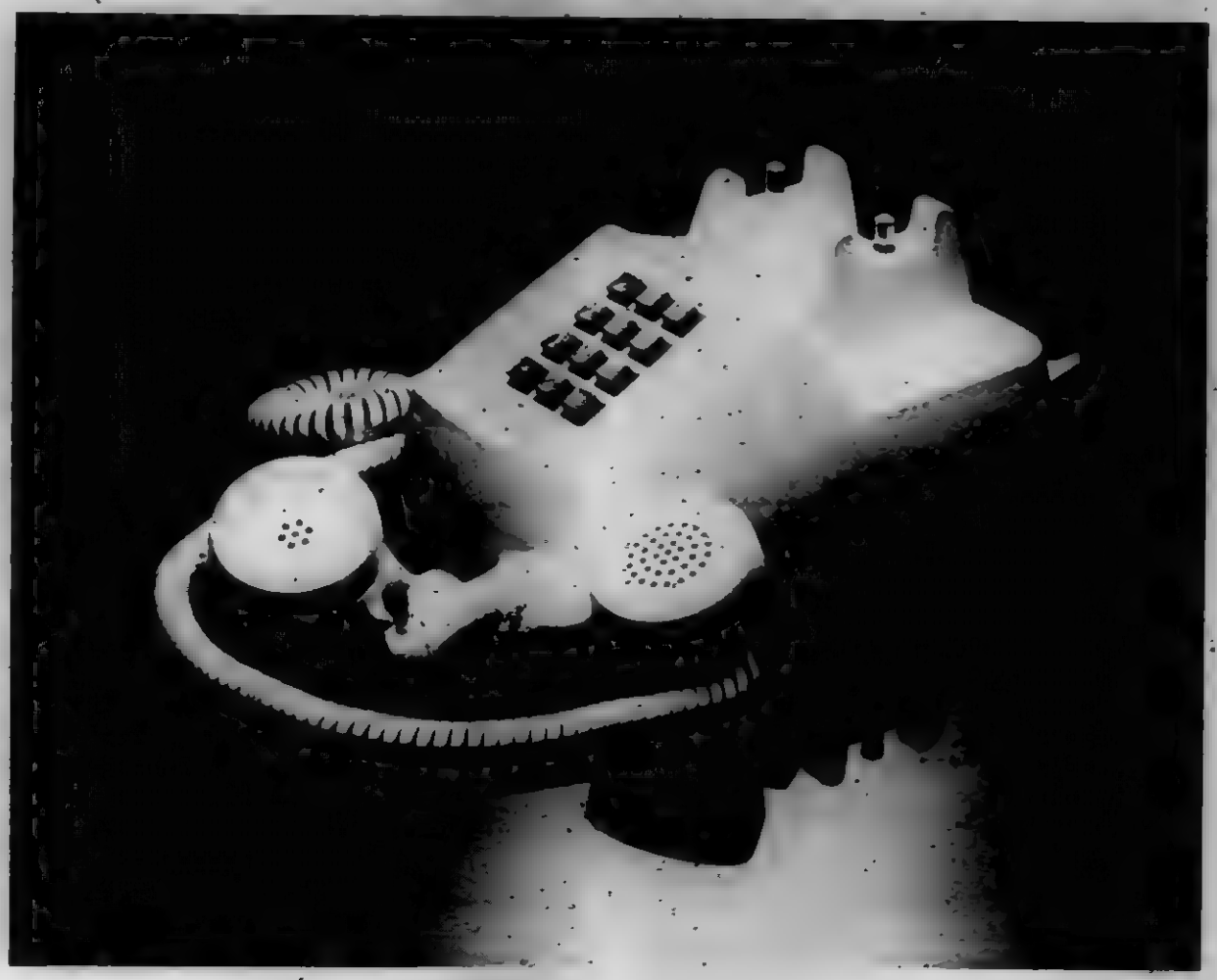
The spread of computing power through office automation has also caused great concern about data security. Mah pointed out that access to corporate data bases is going to be limited to time-sharing users downloading from the mainframe. From time-sharing, the user will get only summary data. A user who wants to download to a personal computer will need vice-presidential approval.

"We've made a big commitment to security. There haven't been problems yet, but we want to make sure that none come up," Byrnes said

In reality, the single biggest problem Avon's office automators face is keeping up with the demand. Management, for example, is so supportive that it is almost too supportive, said Hart. Having been on line to the IBM mainframe for years, and having seen the automation of Avon's factories, the company's executives are as anxious as anyone to reap the rewards of OA. "Instead of saying, 'Why did you do this?' they are asking, 'Why aren't you doing this?' I can't work fast enough for them," said Hart. "It's a tremendous atmosphere here."OA

Rifkin is a staff writer with Computerworld OA.





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Telefailure Or Telefuture?

Voice message systems haven't taken off yet. With the right idea, however, they can be of benefit.

By Steve Glagow and Walter Ulrich

In 1980, forecasts said store-and-forward voice systems would take the world by storm. Three years later, probably only 100 or so installations exist — and many of those are just pilot systems. Although voice mail systems do have a place in most businesses, the original expectations were often naive; implementors did not have a full understanding of how voice mail should be most effectively introduced.

This article will discuss why voice mail is important and how it should be implemented. It will also list product characteristics of several voice mail vendors and provide evaluation criteria for the selection of voice mail systems.

Briefly, voice mail systems are computer-based systems designed to store voice messages digitally. The sender enters a voice message by means of a telephone handset. The natural voice is then converted from analog to digital and stored on a disk or another storage device. Normally, 32K bits of storage are required for each second of human speech. Messages

	Price Range	Year Founded	First Shipped	Companies Using System	Maximum/Maximum Ports	Users per System	Maintenance	Control Reports	Networking	Interface With PBX	Class of Service Restriction	Out-Dialing Local And Long Distance
VMX	$ 14,000 - $525,000	1980	May 1980	105 Pilot or rental, 25 installations	June '83 (8-64) 16-64	500-6,000	Remote (remote diagnostic)	Yes	Yes	Yes	Yes	
IBM	Hardware only $ 99,000 $219,000	1924	September 1981 (announced)	NA	1-10	100-1,000	Yes, nationwide by IBM	Yes	No	Yes	Yes	Yes
Wang	$125,000 - $246,000	1951	1981-1983	NA	4-32	200-4,800	Yes, Wang OIS145 remote diagnostic	Yes	Fall '83 Wangnet	Yes	No	Yes, unlimited
EVX	$160,000 - $220,000	1978	1981	NA	2-32	500-5,000	Nationwide via ITT self diagnostic with UPS & modem	Yes	No, future	Yes	Yes, user controlled	Yes
Rolm	$ 70,000 -	1969	1983	4 (Beta test sites)	8-16	100-800	Yes	Yes	Yes, through PBX	Yes	Yes	No
Voicetek	$ 49,500 - $169,500	NA	NA	NA	2-32	100-2,000	Yes (remote diagnostic)	Yes	No. (X.25 possible early '84)	Yes	Yes, limited	No, fall '83
Voice Mail International	$ 85,000 - [illegible]	1980	Late 1983	—	4-16 Vax-based 256 ports 1984 April	200-5,000	Yes (by December)	Yes	End of year	Yes	Yes	Yes, restricted on service 20 digit

In almost every organization, ample opportunities exist to use voice mail technologies to solve a specific information or communications need.

are then forwarded to recipients through either a mailbox system or a call-back system. In the mailbox system, a recipient telephones into the voice mail system, enters a password and plays back the message. In a call-back system, the voice mail system actually dials the recipient's telephone number; when contact is made, it plays back the message.

Because the systems are computer-based, the person receiving the voice message can review it and then decide whether to replay it, save it for later, discard it or forward it to another party. Voice messages can also be edited. Furthermore, a voice message can be recorded once and sent to several people at the same time.

Voice mail systems receive their commands in the form of tones generated when the keys on a standard 12-key telephone pad are pushed. Pushing the right key will inform the system you are ready to record a message or instruct the system to stop recording, skip backward or skip forward when replaying a message. All voice mail systems help the user remember which keys to push. Some provide templates that fit neatly over the telephone face. In others, the system actually prompts the user with the choice of keys that can be played next. Several systems offer a combination of both.

No special terminals are necessary. The system can be used from the office, from the home and while traveling. It provides convenient communication and preserves the natural tone and inflection of the speaker's original message.

Voice messaging has not grown as fast as was predicted three years ago. Its lackluster performance has been attributed to the sluggish economy, lack of user-friendliness, user fears of being recorded and the relatively high cost of early systems. Each of these reasons has played its part. More important, however, the early systems were marketed in the wrong direction.

Productivity was the popular buzz word among business people in 1980, and voice mail systems were marketed to improve the overall productivity of the office. Typical cost-justification scenarios had to calculate how many minutes of each person's time were wasted on the telephone. The time that could be saved by using voice mail was then multiplied by some hourly rate. The net results, plus other general office productivity improvements, were calculated. From that figure, the amortized cost of the store-and-forward voice system was deducted; the result was the net benefit. The numbers often looked impressive, but there was really no way to tie down the benefits and measure the results. The benefits were incremental rather than specific.

In addition, voice mail pilot projects were not always convincing. The number of users in a pilot was usually quite small; without a significant threshold of users on the system, most communications still had to be done using traditional methods. When a voice mail user checks his mailbox for several days and finds no incoming messages, he is easily discouraged. Small pilots are not a fair test and, as might be expected, the results from some were less than spectacular. Even though voice mail systems have real strengths in the general office environment, pilots are not a satisfactory approach for introducing them into the business community.

In the computer industry, an analogy can be seen in the first computers, which were not designed to improve technical productivity. They were designed to perform some specific ballistic calculations that were otherwise overwhelming. Early business computers weren't designed to improve business productivity. They were sold to meet a specific application requirement — more often than not, accounting. Computers were sold successfully in the '50s not because of some inherent improvement or benefit, but because they met the needs of specific applications.

Voice mail should be sold the same way. The marketing of store-and-forward systems should be done on an application-specific basis. In almost every organization, ample opportunities exist to use these technologies to solve a specific information or communication need.

The following statements describe a number of applications well suited to voice mail:

- **"One individual to many" or "many individuals to one."** If one person must reach several people in a short time, or if a large number of people are trying to reach a few people in a short time, voice mail should be seriously considered.
- **Telephone tag.** Voice mail is a good candidate when people have a hard time reaching each other for specific, time-critical applications.
- **Brief messages.** Voice mail is

	Intramessage Delivery Option	Message Desk	Future Delivery	Edit Functions	Broadcast Abilities	Time/Date Stamp	Receipt Acknowledged	Message Forward	Help Keys or Audio Prompt	Speed Control	Security Levels	Maximum Message Length	Widows By Name
	Voice mail calls user	Yes	Yes (set for [illegible] '83)	Stop, start 10 seconds backup, 10 seconds forward	[illegible]	Yes	Yes	Yes	Audio prompting	No	12-digit access, 5-digit security	Unlimited (by adding)	No
	Yes	Yes, but not set up for outside calling	Yes	Yes, includes all	10 by 10	User [illegible]	Yes	Yes	Audio help keys	Yes	8-digit access, 4-digit security	[illegible] seconds unlimited	Yes
	Yes, very good	Yes	Yes	[illegible]	32 by 8 maximum	No	No	Yes	Audio prompting	No	[illegible]-digit ID, 5-digit password	[illegible] minutes unlimited	No
	Yes, via outdial light on phone	Yes, call forward to EVX or operator control	No	Start, stop	20 people on list, replay to next list, unlimited	Yes	No, yes in R&D	Yes	Yes, audio with help key	No	4- to 6-digit access, 2-digit security, 6-digit forward	EVX 100 7 [illegible] only. [illegible]	No
	No	Yes	No	Yes	50 by 10, 500 maximum	Yes	Yes	Yes	Yes	No	[illegible]-digit access 8-digit security	[illegible]	No
	No, fall '83	Yes, attendant transfer only	Yes	No, replay only	Unlimited	No	No	Yes	Audio prompting	No	12-digit access, 5-digit security, account code	Unlimited	No
	Yes, user controlled	Yes	Yes, up to 9 days in advance, retry on delivery	No edit before send (but could program)	256 maximum	Not announced, will be part of button	Yes	No	Audio prompting	Replay only	7-digit access and security levels	Unlimited	Yes

In selecting a voice mail system, a user should weigh each criterion according to its ability to fill a particular need within the company.

particularly suitable for brief and simple messages. In addition, voice mail can be used as a voice "bulletin board," where longer messages are quickly distributed to a large number of people.

• **One-way messages.** Voice mail can be used to give answers to requests or to request information. Voice mail is not well suited, however, for complex exchanges of information, such as negotiations or lengthy discussions.

Developed by Gordon Matthews, the first voice mail system was marketed by VMX, Inc. (formerly ECS Telecommunications, Inc.). Over the past three years, several new vendors have either introduced or announced voice store-and-forward products. On the basis of feature, function, quality, marketing know-how and price, voice mail is highly competitive. In fact, some vendors that were contemporaries of VMX have recently gone out of business.

The proper selection of a voice mail system is extremely important. Different systems have different strengths and weaknesses, which should be matched to the needs of the user company. A system that would be successful in one organization could be an outright failure in another.

Selection should be based on a variety of criteria. To demonstrate how the selection process works, I have selected a sample of several voice mail vendors and rated their products by these criteria. The list of vendors is in no way meant to be complete. Furthermore, depending on the circumstances, additional criteria might be added in making a selection for a specific client. Nonetheless, this should provide a starting point for doing a voice mail analysis.

Twenty-five selection criteria were developed, and seven vendors were evaluated on how well they met each criterion: VMX, Inc., Wang Laboratories, Inc., EVX, Rolm Corp., IBM, Voice Mail International and Voicetek Corp.

In selecting a voice mail system, a user should weigh each criterion according to its ability to fill a particular need within the company. Each vendor performs a similar criterion with a slight variance.

The following is a list of selection criteria and definitions applied in the evaluation:

• **Costs:** Voice mail systems range from $50,000 to $500,000.

• **Number of Ports:** Voice mail systems can start with as few as two ports and have as many as 256 ports. (Ports are used for incoming trunks and other peripheral equipment such as printers.)

• **User Range:** User range is the minimum and maximum users a system can support, both initially and upon completed implementation. Some systems provide for as few as 100 users; others can support up to 20,000 people.

• **Maintenance:** The ability of the voice mail vendor to supply maintenance for the recommended voice mail system, hardware and software.

• **Control Reports:** Voice mail systems generate valuable reports, including accounting functions and various other business-related reports. These reports could be used by a system administrator for maintenance and billing.

• **Networking:** The ability of the system to network or communicate to other voice mail or DP equipment. This could be an important criterion if the company has multiple locations.

• **Interface with Private Branch Exchange (PBX) System:** Voice mail systems are capable of interfacing with PBX systems, using either analog or digital technology.

• **Class of Service Restrictions:** Class of service restrictions is the capability of the voice mail system to monitor and control out-dialing and other services the system has, either limiting or enabling a user to utilize all services of the voice mail system. Restrictions are important in separating specific uses for different employees.

• **Out-Dialing:** Out-dialing is the ability of the voice mail system to automatically-dial an outside call (local or long distance) to deliver a user's voice mail message to another user or nonuser of the voice mail system. This function would be especially helpful in contacting a nonuser or user during nonbusiness hours or weekends when people tend to fail to call their voice mailboxes.

• **Intraoffice Message Delivery:** Intraoffice message delivery is the ability of the system to autodial a user at his station (extension) or a call-forwarded number to deliver a message left in the mailbox. This option should be user controlled. This function would deliver the message immediately or at a prespecified time directly to the addressee's phone.

• **Message Desk:** With the message desk option, an operator attendant can transfer a voice mail message from a nonuser, or an outside user can establish a voice mail message in the system. This would be important if nonusers want to use the message system.

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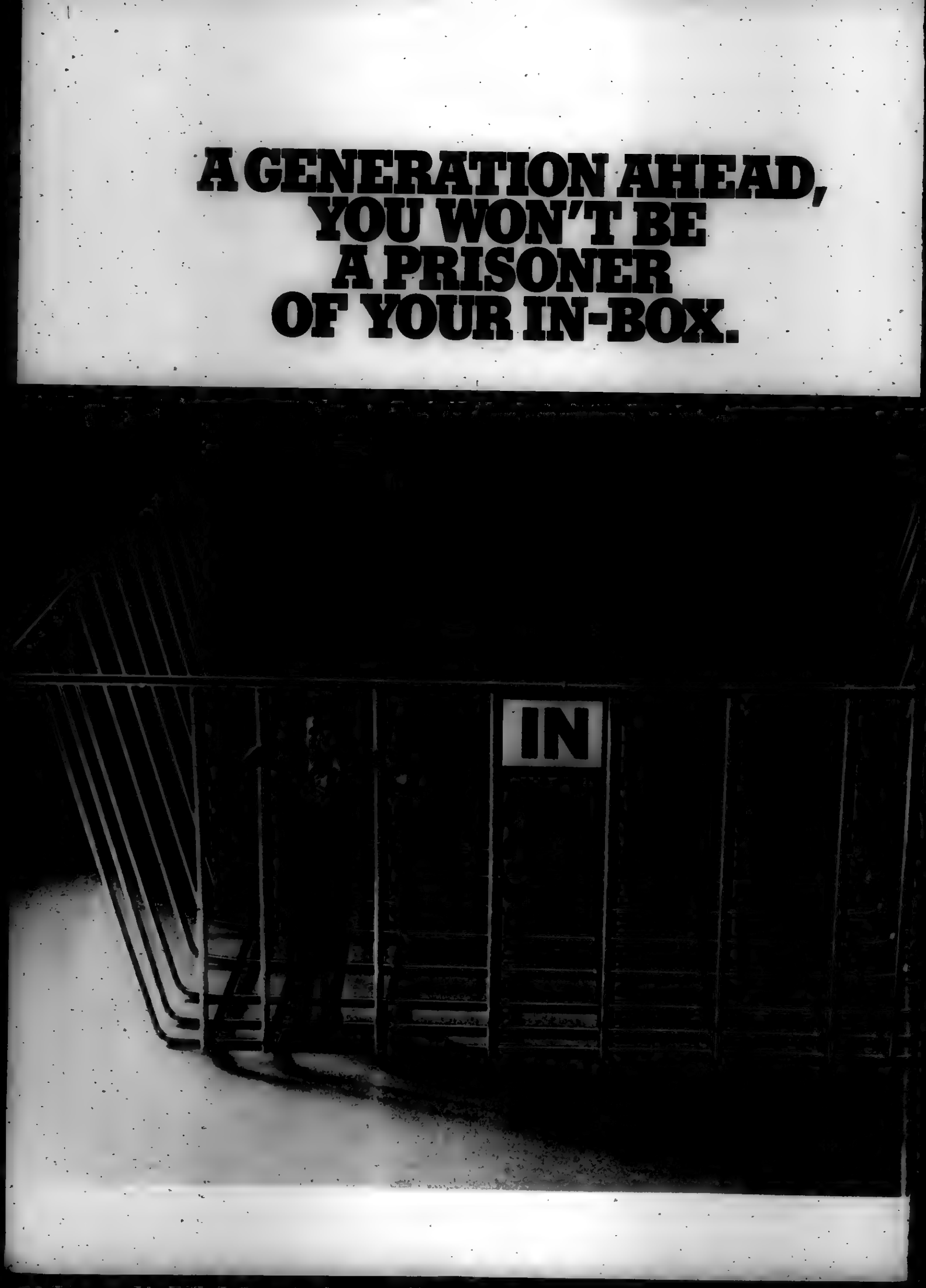

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• **Future Delivery**: This capability lets a user create a message and send it at a predetermined future time to another user of the system, either by dropping it into a mailbox or by out-dialing it. This function would be used with out-dialing and intraoffice message delivery. By using night rates, the capability could offer big savings on long-distance messages. It also offers help with time-zone problems and can call and remind a user of a meeting or appointment.

Edit Functions: Edit functions include stop, start, skip forward, skip backward, delete, reply, add and subtract. The edit function is important for new users who want to become at ease with leaving a recorded message. The user could replay a message and edit it until he becomes comfortable with it. This function is important when numerics are being quoted, and the receiving user may want to stop, replay or slow down.

• **Broadcast Abilities**: Broadcast abilities allow one message to be directed to multiple users and can be a big time saver in announcing a meeting.

• **Time Stamp/Date Stamp**: The time stamp or date stamp describes the ability of the voice mail system to embed a time and date that can be called up by a user to determine when a message was directed to him.

• **Receipt Acknowledgement**: Receipt acknowledgement is the ability of the voice mail system to notify a sender that a user has responded to his message. The benefit offered is proof of delivery.

• **Message Forwarding**: Through message forwarding, a user who has received a message can send it to another user of the system and the user can also add dialog to the first message. This is similar to memo passing.

• **Help Keys or Audio Prompting**: Help keys allow users to request help from the system when problems occur. Audio prompting is the ability of the voice mail system to prompt the user from initial sign-on of the system, through voice mail send and receive, to termination of voice mail use. Everyone will forget a command at one point or another, and this tool helps a user to get started.

• **Speed Control**: With speed control, the user can slow down and speed up the received message. This is a high-end edit function.

• **Security Levels**: Through security levels, the voice mail system can restrict access to the system by requiring an access code and a follow-up security code. The security code should be optional. This will protect the information being passed.

• **Message Length**: Messages can range from a minimum of 30 seconds to an almost indefinite length.

• **Welcome by Name**: This capability lets the system recognize a user by either his access or his security code and establish a verbal recognition by "saying" the user's name. This functions as an assurance you are in your own mailbox.

In summary, the general productivity benefits of voice mail systems are important and real, but the introduction of voice mail systems will depend upon selecting the right applications. Voice mail system selection is dependent upon several criteria, and the system must be matched to the neeeds of the organization. Implementation and training are also critical and must be carefully considered.

It is a complex undertaking, but one that is essential for the technological development of many companies. OA

Glagow is a consultant with Walter E. Ulrich Consulting and Ulrich is president of Walter E. Ulrich Consulting, a Houston-based management and technology consulting firm.

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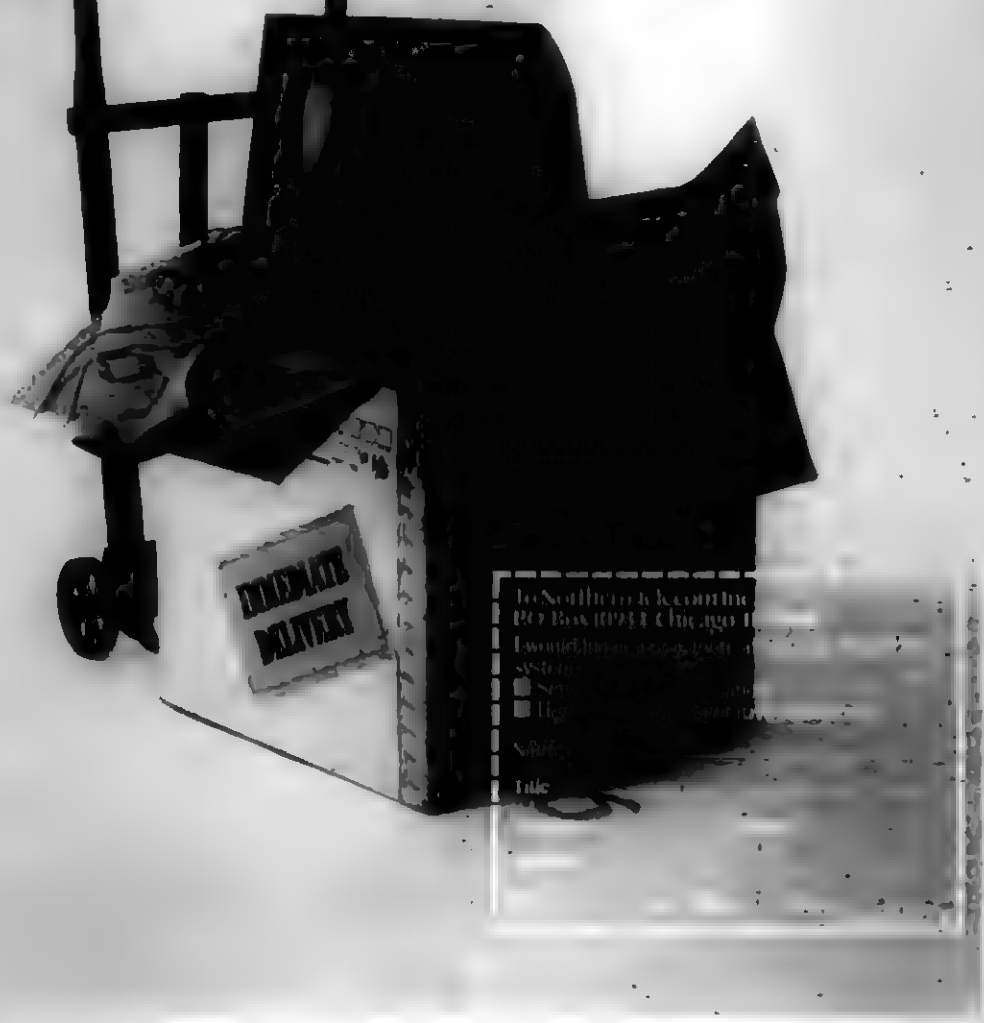

TECHNOLOGY

LOWELL, Mass. — An entry-level 32-bit minicomputer designed for small to medium-size office environments has been introduced by **Wang Laboratories, Inc.**

The VS 85 is aimed at users who require extra processing power, but lack the office space required by a 32-bit system, Wang said.

The VS 85 includes the 32-bit architecture found in the VS 90 and VS 100, a disk storage capacity of more than 5G bytes, support of 32 concurrent users and an optional cache memory for improved performance. It costs $63,000 from Wang at One Industrial Ave., Lowell, Mass. 01851.

SAN JOSE, Calif. — **Altos Computer Systems, Inc.** has introduced the Altos-Net II system to provide transparent remote file access and remote processor execution in a Unix environment.

The system reportedly saves users substantial disk space by sharing files and provides the benefit of powerful Unix commands throughout the network. It also runs multiuser applications on the network without modification.

The Altos-Net II system supports both the Ethernet local-area net and Altos' proprietary twisted-pair cabling net hardware and costs $495 per CPU from Altos, 2641 Orchard Parkway, San Jose, Calif. 95134.

WOODLAND HILLS, Calif. — Execustation, a processing service that integrates microcomputers with user data on its mainframes has been announced by **Informatics General Corp.** The service links micros at user sites with an Informatics data center in Fairfield, N.J. and was designed for managers in Fortune 1500 companies, major financial institutions and the federal government who have no DP experience.

Execustation software is available for $200 per copy to users who meet the standard monthly minimum charge for mainframe processing of $300 from the firm at 21031 Ventura Blvd., Woodland Hills, Calif. 91364.

WESTBORO, Mass. — A protocol converter that reportedly provides a low-cost easy entry to IBM environments via coaxial cluster controller connection for any Ascii terminal, micro, portable computer or other device, was introduced by **3R Computers, Inc.**

The Avatar PA1000 Protocol Converter connects to an IBM 3274/3276 cluster controller that supports IBM bisynchronous control or systems network architecture/systems data link control environments.

It also permits access to asynchronous hosts and to public information or time-sharing services, locally or remotely. The Avatar PA1000 is priced at $995 from 3R Computers, 18 Lyman St., Westboro, Mass. 01581.

ALLEN, Texas — **Intecom, Inc.** has introduced the Integrated Business Exchange (IBX) S/10, as part of the IBX family of voice/data communication switches. The introduction of the IBX S/10 expands the IBX family to cover line sizes ranging from 250 lines to 12,000 lines. The IBX S/10 reportedly features full voice feature set ranging from individual station features to least-cost alternate routing; full software support for upcoming equal access requirements due to Bell System restructuring; and nonblocking simultaneous voice/data transmission.

The IBX S/10 costs $700 to $1,100 per line depending on network configurations and options from Intecom, Inc., 601 Intecom Drive, Allen, Texas 75002.

PRINCETON, N.J. — **Applied Data Research, Inc.** (ADR) released ADR/Ideal, reportedly the first functionally complete fourth-generation application development system.

Ideal combines relational data base management with an active data dictionary, fourth-generation language, comprehensive workstation environment and facilities for managing the entire application life cycle. Ideal operates in an IBM 370, 4300, 30 series and PCM environments.

Permanent licenses for Ideal are priced at $75,000 for OS sites and $50,000 for DOS sites from ADR, Rt. 206 and Orchard Road, CN-8, Princeton, N.J. 08540.

PALO ALTO, Calif. — **Hewlett-Packard Co.** has announced a display terminal and a word processing workstation. The HP 2625A dual-system display can operate on both HP and IBM systems simultaneously and offers optional HP WP capabilities. The HP 2625A emulates an IBM 3276/78 display station. The HP 2628A is a dedicated word processor that provides WP, DP and graphics.

The HP 2625A is priced at $3,495 and the HP 2628A at $3,195.

HP also introduced two laser printers, the HP 2687A desktop text printer for $12,000 and the larger HP 2688A text and graphics printer for $29,950. A high-performance, six-pen graphics plotter for users of business and professional personal computers was also introduced costing $1,895. HP also lowered the price on its two-pen model by 30%.

Both plotters are reportedly compatible with personal computers from Apple Computer, Inc., IBM and other vendors.

For more information contact Hewlett Packard, 1820 Embarcadero Rd., Palo Alto, Calif. 94303. OA

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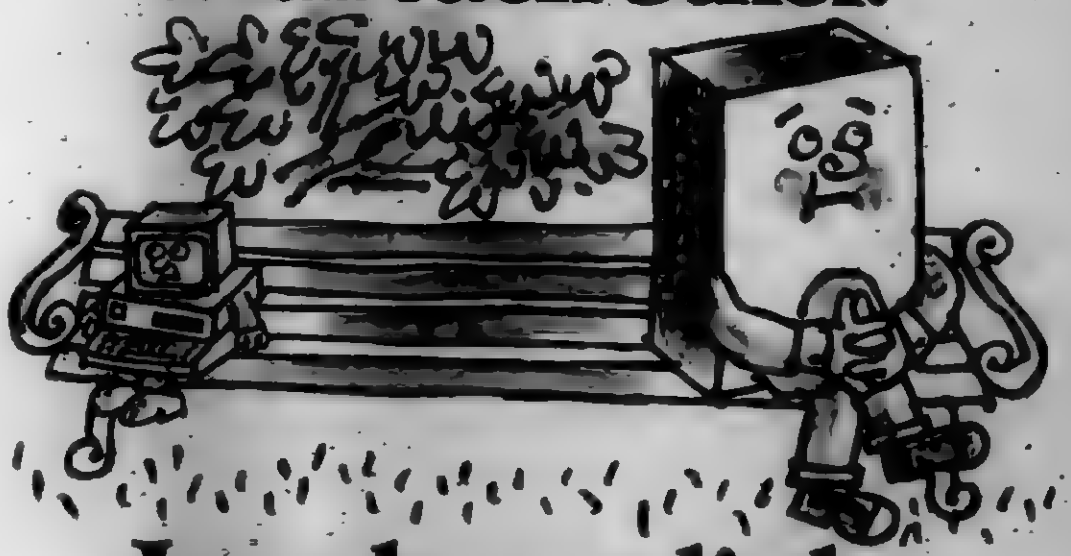

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CALENDAR

Oct. 10-13, New York — **Information Management Exposition and Conference (Info '83)**. Contact: Clapp & Poliak, 708 Third Ave., New York, N.Y. 10017.

Oct. 12-13, San Francisco — **The Changing Role of the PBX**. Contact: Probe Research, Inc., P.O. Box 590, Morristown, N.J. 07690.

Oct. 17-19, Saddlebrook, N.J. — **Personal Computing and Networking**. Also, Oct. 24-26, Hartford. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Oct. 17-19, New York — **Improving Office Productivity: Principles and Practices**. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Oct. 18, Boston — **Artificial Intelligence**. Also Nov. 1, Los Angeles; Nov. 8, New York; Nov. 28, San Francisco; and Dec. 13, Washington, D.C. Contact: Yourdon, 1133 Avenue of the Americas, New York, N.Y. 10036.

Oct. 17-19, Dallas — **Personal Computers: Strategies for Managing**. Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Oct. 19-21, Toronto — **Local-Area Networks**. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Oct. 24-25, Arlington, Va. — **Dbasell — Data Management for Microcomputers**. Also, Oct. 26-27, Baltimore; Nov. 7-8, Los Angeles; and Nov. 9-10, San Diego. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Oct. 25-26, New York — **1984 Impact of Divestiture on Users and Vendors**. Also, Nov. 14-15, Chicago. Contact: The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

Oct. 27, New York — **CBX Evaluation and Selection**. Also, Nov. 8, Chicago. Contact: The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

Oct. 30-Nov. 2, Baltimore — **DP Management Association's International Conference and Business Expo (DPMA)**. Contact: DPMA, 505 Busse Highway, Park Ridge, Ill. 60068.

Oct. 31, Los Angeles — **Ergonomics Legislation and Standards in Europe**. Also, Nov. 2, Boston. Contact: Krause & Co., 1325 Columbus Ave. Cottage, San Francisco, Calif. 94133.

Nov. 1-3, Washington, D.C. — **The 1983 Federal Office Automation Conference**. Contact: National Council on Education for Information Strategies, P.O. Box N, Wayland, Mass. 01778.

Nov. 1-3, Chicago — **Intech '83**. Contact: National Trade Productions, Inc., 9418 Annapolis Road, Lanham, Md. 20706.

Nov. 7-8, New York — **Office Systems and the Role of the Personal Computer**. Contact: The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

Nov. 8-10, New York — **Directions in Office Systems and Professional Computing: Which Way to Turn?** Contact: Hammer/Seybold Executive Forum, Suite 801, 44 Bromfield St., Boston, Mass. 02108.

Nov. 14-17, San Francisco — **IMC '83**. Contact: The International Information Management Congress, P.O. Box 34404, Bethesda, Md. 20817.

Nov. 29-Dec. 1, Kihei, Hawaii — **Future of Optical Storage, Videodisks and Computers to the Year 2000**. Contact: Technology Opportunity Conference, P.O. Box 14817, San Francisco, Calif. 94114.

Dec. 1-2, New York — **Telecommunications Strategic Planning Methodologies**. The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

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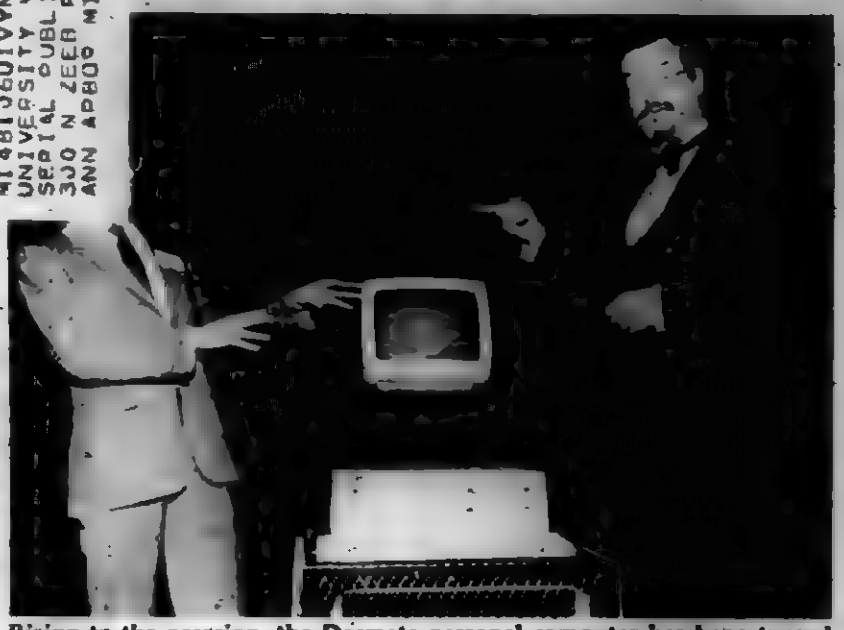
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper — Second-class postage paid at Framingham, Mass. and additional mailing offices ©1983 by CW Communications/Inc.

y; $44/year — October 17, 1983 — Vol. XVII, No. 42



Rising to the occasion, the Decmate personal computer has been turned into an office workstation, Digital Equipment Corp. announced at Info '83 last week. DEC made the announcement with the help of magician Harry Blackstone, who added levity to the press conference as Henry Ancona, the product group manager of DEC's Office and Information Systems Groups, helped out.

Software Announcements Dominate Info '83 Debuts

By Paul Gillin
CW Staff

NEW YORK — Software announcements dominated the product introductions at the 10th International Information Management Exposition & Conference held here last week. Among them:

• Frey Associates, Inc. introduced an artificial intelligence query language for Digital Equipment Corp. VAX-11 superminicomputers that allows users to enter plain English commands for data retrieval, sorting, logical comparisons and calculations.

Called The Management Information System (Themis), the product is said to understand a basic vocabulary of more than 900 commonly used English words. Working from that base, users can "teach" the system to understand a virtually unlimited number of words, Frey claimed. Definitions may be cataloged at the user or system level, allowing different us-

(Continued on Page 8)

Coverage of Info '83 continues on Pages 19 through 36.

OA Steals Some Of Limelight

By Katherine Hafner
CW Staff

NEW YORK — Announcements of new office products stole some of the limelight from software products last week at the 10th International Information Management Exposition & Conference, with communications offerings few and far between.

Two local-area networks were announced, Northnet from General Binding Corp. and Wordlink from Wordplex Corp.

Northnet reportedly consists of a cable linking GBC System 9 desktop microcomputers, printers and disk drives. According to GBC, Northnet features "multidirectional" flow and independent station connections. A manager oversees network operations using a terminal called the "server station," allowing individual workstations to communicate with other stations on the network.

Each workstation on Northnet can

(Continued on Page 10)

Minis, Micros In Cameo Role

By Ed Scannell
CW Staff

NEW YORK — While software and office automation vendors made most of the product introductions at last week's 10th International Information Management Exposition & Conference, a handful of minicomputer and microcomputer vendors also brought out systems here.

Among the larger system introductions was Nixdorf Computer Corp.'s Model 10, which extends the company's 8890 Information System family downward. The company said the Model 10 was developed for decentralized applications and can be

(Continued on Page 9)

Inside

Comdisco, Inc. vigorously objected to a report in *Barron's* last week that suggested the computer leasing giant is facing disaster. **Page 5.**

• • •

More resumes enhanced by "artful lying" are crossing DP managers' desks, they told *Computerworld*. **Page 6.**

• • •

The civil lawsuit accusing Hitachi Ltd. of stealing IBM trade secrets ended in a settlement that gives the U.S. vendor extraordinary powers to monitor the Japanese vendor's future product developments. **Page 7.**

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Democrats in the U.S. House of Representatives have pulled the plug on a controversial immigration bill. **Page 11.**

• • •

The first fruits of the IBM-Rolm Corp. joint development agreements have made their appearance. **Page 73.**

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A Canadian vendor crossed the Rainbow Bridge into the U.S. with a distributed system based on a local-area network. **Page 95.**

• • •

If you go to Las Vegas next month for Comdex, keep your eyes open for a personal computer that features a built-in local network and is compatible with the IBM micro. **Page 105.**

Tymshare Dons Gloves, Enters DEC's Arena

By Tom Henkel
CW Staff

CUPERTINO, Calif. — Tymshare, Inc. has made its debut as a vendor of stand-alone systems with the announcement of a 36-bit processor and operating system that is application-compatible with Digital Equipment Corp. Decsystem mainframes running under the Tops-20 operating system.

The value-added communications reseller claims to have set its sights on the mainframe market that it said DEC gave away. DEC announced last May that it had scrapped a plan to develop a follow-up product to the Decsystem-10 and Decsystem-20 [CW, May 30].

Instead of developing a larger 36-bit machine, DEC suggested Decsystem users migrate to its VAX-11 line of 32-bit superminicomputers, a process that requires software conversion. According to Tymshare, the System 26KL it has introduced can run applications programs developed for Tops-20 without conversion

The System 26KL, which will be demonstrated for the first time next

(Continued on Page 4)

AT&T Deregulation Good For Users, Says Big Retailer

By Peter Bartolik
CW Staff

CHICAGO — Deregulation of AT&T "is a positive thing, at least from the standpoint of the user," according to the corporate telecommunications manager of the Montgomery Ward & Co. retail chain.

Speaking to the National Retail Merchants Association's 25th Annual Retail Systems, Technology and Communications Conference, Fred W. Livingstone related how he has used the deregulation situation to reorganize voice and data communications in the sixth largest U.S. retail organization.

The session Livingstone addressed was titled "Minimizing the Effects of Deregulation," but he said the subject should be maximizing deregulation. "Generally speaking, deregulation is going to increase the competitive environment in telecommunications," he said. It will also "bring out of [Bell Laboratories] the technology we've all been waiting for."

CW Photo by P. Bartolik

The deregulation of AT&T "will allow me to come out from underneath lease agreements that are too long," Montgomery Ward's Fred W. Livingstone told the NRMA.

The current situation also presents an opportunity to "alter company

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Second class postage paid at Framingham, Mass., and additional mailing offices. Computerworld (ISSN 0010-4841) is published weekly, except February 21, April 11, May 16, August 29, October 17, August 31, November 28, December 19, January 2, 1984, and a single combined issue for the last week in December and the first week in January by CW Communications, Inc. Box 880, 375 Cochituate Road, Framingham, Mass. 01701

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Wang's PIC: Major Commitment To Image Processing Technology

By Jim Bartimo
CW Staff

A new buzzword has begun making its way into the office: image processing.

Once confined to OEMs with a technology in search of an application, image processing is the digitization of printed words and pictures. The technology gained new respectability this month when Wang Laboratories, Inc. announced its Professional Image Computer (PIC) as part of its Professional Computer line, putting those digitized images on the screen and ultimately on a network for transmission and manipulation [CW, Oct. 10].

Wang's announcement was the first major commitment by an office vendor to this technology, although smaller vendors have released similar products without the networking capability.

Like most new technologies, image processing is only in the development stages and probably is not yet ideal for most users, according to office automation experts contacted by *Computerworld* after the Wang announcement. Problems faced by the PIC include the large amount of memory it requires, a lack of applications and the absence of any optical character recognition (OCR) capability.

"This particular product is interesting, but the people who need it won't find it cost-effective because of the storage," said Thomas Billadeau, president of The Office Systems Consulting Group, Inc. in Cambridge, Mass. "You must remember that Wang is putting voice on magnetic media. With voice, data and image, you'd have to change Winchester disks every 10 minutes."

One possible and probably inevitable addition to image processing will be another developing technology — optical storage disks. Since image processing requires so much disk space on which to store images, the capability to store billions of bytes that is offered by optical media will come in handy.

But "it's going to be an awfully long time before optical disks are available across the Wang product line," Billadeau said. "Some of the people at the PIC announcement thought that magnetic media costs were coming down enough to make it affordable, and that's just not true."

So who needs image processing?

One vertical market that has been clearly identified by Wang is the insurance industry. This sector, Billadeau observed, has a need to copy signatures and send copies of insurance policies to customers.

However, the director of research at International Data Corp. in Framingham, Mass., pointed out another reason: "We grow up thinking that books have words and pictures, and we feel very adult when we read our first book without pictures," said Thomas Elliott. "In business, we get more childish and we want more pictures again. The PIC is just a way to integrate pictures with data.

"You have to think of these products as part of the facsimile market," Elliott continued. "I think the PIC is aimed at the same person who was going to use the [Xerox Corp. advanced micro workstation] Star — the knowledge-worker."

According to the head of the Boston Society of Wang Users, the PIC is too expensive and requires too much memory space on disk. "We have 151 Wang workstations, so I'd be hard pressed to get another one," said T. Allan Trick, who is word processing coordinator for The Christian Science Center in Boston.

"The announcement that was more important was WP Plus. It was really the first major upgrade to [Wang's] word processing since they started," Trick said.

Trick also said that the PIC would be more useful if the words within the movable blocks of text could also be manipulated. In its current form, blocks of text and pictures or graphics can be moved, but the text cannot be edited as it can with an OCR system that digitizes each character separately.

One consultant who agreed with that observation was John J. Xenakis, whose Framingham, Mass., company bears his name. "I think PIC's real usefulness lies in an OCR capability," Xenakis said. "I'm kind of surprised they didn't include it now because the technology makes it doable. Once they can do that, they'll really have something."

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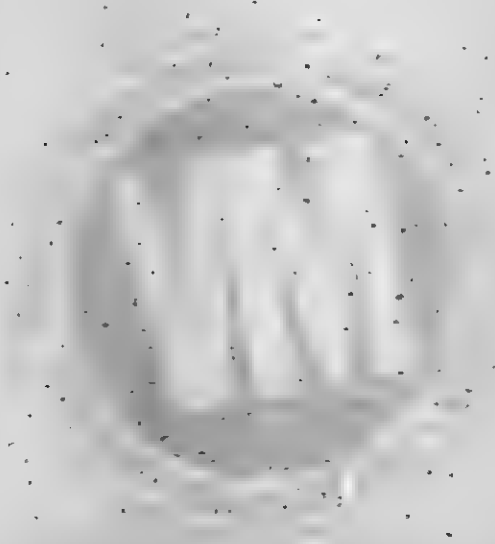

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Amdahl Center to Test IBM, Compatible CPUs

By Jeffry Beeler
CW West Coast Bureau

SUNNYVALE, Calif. — Amdahl Corp. last week formally marked the opening of a specialized data center that will reportedly allow IBM and IBM-compatible processors to be evaluated and compared in realistic production settings.

The opening was highlighted by the release of the data center's first two benchmark reports, both of which contain the latest relative performance ratings for the Amdahl 5860 and the IBM 3081 Model Group K mainframe.

One of the reports describes how the operation of the two machines compares in a TSO environment running under MVS/SP 1.3.0. The other document covers the results of a similar benchmark test conducted in an IMS/VS 1.2 environment.

In the TSO study, the 5860 was found to support an 18% to 20% greater work load than its IBM counterpart. In the MVS/IMS test, the Amdahl product was credited with processing approximately 3% more transactions than the 3081K, according to Thomas McKenna, Amdahl's director of product marketing.

Together, the two recently completed benchmark test results contradict the widely held view that the IBM processor outperforms its Amdahl equivalent, McKenna said.

Comparisons at Ampec

Both comparisons of the 3081K and the 5860 took place in the recently established Amdahl Performance and Evaluation Center (Ampec), which the company described as an extension of its existing benchmarking facility. Equipped with four CPUs, 80 spindles of disk storage and assorted IBM-compatible software products, Ampec can reportedly simulate a wide variety of typical Amdahl processing environments with great precision. The purpose of the simulation is to allow the company to measure accurately the performance of identically configured IBM and Amdahl mainframes and then compare the results.

Thus far, the center's efforts at performance evaluation and comparison have been limited to just two systems — the 5860 and the 3081K — and two software environments, MVS/TSO and MVS/IMS. But in the near future, Amdahl plans to broaden the scope of Ampec's testing activities to cover products like the IBM 3081J, 3380, 3725 and their Amdahl counterparts.

The company also plans to widen its performance evaluations and comparisons to embrace additional software environments, including VM/CMS, MVS/CICS and MVS/XA, McKenna said. Results of the VM/CMS, MVS/CICS and MVS/XA tests are expected to be released during the fourth quarter of this year, the first quarter of next year and the second quarter, respectively.

Amdahl regards its product testing center as a significant advance over traditional benchmarking procedures, which typically use the concept of execution speed as their main measure of processor power. By running rival products side by side in simulated production environments, Ampec will dispel much of the fog that has surrounded past CPU evaluations and will greatly increase the precision of the resulting performance comparisons, McKenna said.

First Two Studies

In Ampec's first two product evaluation studies, Amdahl compared the performance of a 16M-byte, 16-channel 5860 with a similarly configured 3081K. The first test took place in an IMS/VS environment featuring 14 direct-access storage device (Dasd) channels and 65 Dasd spindles; the second took place in a TSO setting with the same number of channels and 70 spindles.

In the IMS study, the number of terminals remained constant while the 5860 and 3081K processed an identical work load ranging from 10.2 to 34.1 transaction/sec. At up to 25 transaction/sec, the two machines provided almost exactly the same CPU response times.

But as the work load increased beyond the 25 transaction/sec mark, the performance difference between the 5860 and the 3081K steadily widened, with the Amdahl mainframe holding the edge. Neither processor was able to accommodate more than 35 IMS transaction/sec.

In the TSO test, Amdahl arrived at its relative performance ratings by gradually increasing the number of concurrent users on the two machines until their average CPU response times exceeded one second. By the time it passed the company's response-time limit, the 5860 was supporting 300 simultaneous users, compared with 250 for the 3081K.

Honeywell Touts DP/Process Control Unit, But Admits DP Integration Not Yet Ready

By Tom Henkel
CW Staff

PHOENIX — Claiming to have laid the groundwork for a computer system capable of integrating plant floor information with the data stored in a company's mainframes, Honeywell, Inc. last week unveiled the TDC 3000.

In its current state, the TDC 3000 is basically a process control system, admitted James Verrant, vice-president and general manager of Honeywell's Process Management Systems Division. But he noted that the TDC 3000 includes the Local Control Network, a local-area network that can be used to integrate process control information with other, previously separate plant functions, such as production scheduling, inventory control maintenance and administration.

All that is necessary to link the TDC 3000 with systems performing DP functions is a series of applications programs that allow the user to extract TDC 3000 information and put it into a useful form. While Verrant admitted that developing the applications is not a trivial task, he said Honeywell is already working with two beta users of the TDC 3000 system to develop the software.

Verrant would not say when the TDC 3000 could be linked to DP systems.

The TDC 3000 consists of various controllers that monitor and control processes. Data from the controllers is standardized and transmitted through the Local Control Network to storage modules. The storage modules, which consist of banks of Winchester disk drives, can be accessed by various devices, including Honeywell DPS 6 and DPS 8 processors using Honeywell's Distributed Systems Architecture or IBM's Systems Network Architecture, Verrant said.

The TDC 3000 has an extremely broad purchase price ranging from $100,000 to $10 million. Verrant said, however, that a typical system will cost between $200,000 and $500,000.

The first TDC 3000 systems will be available in the fourth quarter, Honeywell said. Honeywell's Process Management Systems Division is located at 16404 N. Black Canyon Highway, Phoenix, Ariz. 85023.

Tymshare Offers DEC-Compatible CPU

(Continued from Page 1)

week at the Dexpo/West conference in Las Vegas, is available with 512K to 8M 36-bit words of main memory (about 2M to 20M bits) and claims a processing speed of approximately 1.9 million instructions per second. The system occupies about 20% of the space of DEC's top-of-the-line Decsystem-2060 processor and, according to John F. Swarbrick, Tymshare's vice-president of computer systems and support, consumes a fraction of the power required to operate the 2060.

The System 26KL uses the Tymcom 20 operating system, which Swarbrick said is compatible with Tops-20. In addition, the system is microprogrammable, which allows customers to develop special microcode. This, Swarbrick said, can reduce the runtime for customized applications.

By adding an interface board, the System 26KL can communicate through a variety of public and private networks, including Tymshare's Tymnet, networks compatible with Xerox Corp.'s Ethernet and the U.S. Department of Defense's Arpanet/Milnet.

The System 26KL is roughly equivalent in performance to the Decsystem-2050. It offers approximately 1.4 times the performance of the smaller Decsystem-2040 processor and operates at about 80% the speed of the 2060, according to Swarbrick.

Tymshare is working on a larger version of the 26KL, which reportedly will offer greater performance than the Decsystem-2060, Swarbrick said, estimating that the processor will probably be available in one or two years.

Marketing to Tops-20 Users

The 26KL central processor was developed using transistor-to-transistor logic circuitry and is manufactured by Foonly, Inc., a Mountainview, Calif., OEM. The rest of the system will be integrated by Tymshare using specialized components, according to Robert Liberman, Tymshare's department manager for operating systems.

Tymshare will market the 26KL to approximately 2,000 users of the Tops-20 operating system. The 26KL can be used as a second processor for users running out of space on their existing systems, Swarbrick said.

Tymshare's nationwide hardware maintenance service for DEC and DEC-compatible systems will handle maintenance on the system, which ranges in price from $275,000 to $350,000, depending on configuration.

Tymshare is located at 20705 Valley Green Drive, Cupertino, Calif. 95014.

IPL Delays Shipments Of Dual-Processor 4480

WALTHAM, Mass. — IPL Systems, Inc. has delayed first shipments of its dual-processor 4480 system for several months to give the firm time to iron out unspecified problems with the system.

IPL announced the 4480 last February [CW, Feb. 14] as a parallel processing system that would be compatible with IBM's 370-era systems software. The systems were originally slated to begin shipping in September, but an IPL spokesman cited a conglomeration of what he termed "minor" problems as the reason the firm delayed first shipments.

First 4480 shipments are now scheduled to begin sometime before the end of the year, the spokesman said, but he did not elaborate.

Word of the shipment delay came along with an announcement from IPL that the firm expects to post a $1.1 million loss for the third quarter ending Oct. 1. IPL attributed the loss to market uncertainty stemming from anticipation of IBM's announcement of a high-end addition to its 4300 line of processors.

Lessor's Accounting Practices Questioned

Comdisco Rebuts Report Suggesting Trouble

By Bill Laberis
CW Staff

CHICAGO — A published report implying that the accounting practices of computer leasing giant Comdisco, Inc. could result in overstated earnings has provoked strong rebuttals from the leasing industry while rattling the skeleton of the OPM Leasing Services, Inc. scandal.

The report appeared last week in *Barron's* financial weekly and suggested that internal and external forces are mixing to create a potential disaster scenario for Comdisco as well as other third-party lessors. Meanwhile, the report stated, company officers, including founder and Chairman Kenneth Pontikes, have gone on a Comdisco stock-selling spree in the past two years, getting rich in the process.

After publication of the report, Comdisco's stock lost nearly 37% of its paper value in one frenzied day of trading last Monday, falling from $38 to $24 per share.

To allay fears of stockholders and users, Comdisco issued a lengthy memorandum last Wednesday claiming its accounting practices are within the purview of federal rules and regulations. The memorandum stated further that Comdisco, presently the No. 1 computer lessor, is well positioned for future growth in the leasing field, despite the aggressive posturing of IBM's leasing subsidiary, the IBM Credit Corp.

"Basically, the *Barron's* article was extremely misleading, a malicious attack based on half-truths and information taken entirely out of context," Pontikes said in a telephone interview last week. "We're a publicly held company audited by one of the Big Eight [Peat, Marwick, Mitchell & Co.]; how could our books be out of order the way [*Barron's*] suggests they might?"

According to *Barron's*, a portion of Comdisco's earnings includes the anticipated residual value (the market value of a system when it comes off lease) of some leased equipment. Assuming a worst case scenario, the report stated that if all Comdisco's leased equipment had a zero residual value, the company's net worth "would vanish."

Thus, because residual values cannot be predicted exactly, Comdisco could be reporting earnings it will never see. Those earnings totaled nearly $30 million in 1982 and have been growing at a 100% clip for the past few years.

In its shareholder memorandum, Comdisco claimed that the amount of residual value it has carried on its balance sheet has historically been about half the actual market value of equipment coming off term lease. In other words, the memo indicates that Comdisco, if anything, has understated earnings.

Ghost of OPM?

But just the suggestion of questionable accounting practices drew a shudder from the Computer Dealers and Lessors Association (CDLA), whose members have fought to regain respectability for their industry following the OPM leasing scandal, a $500 million swindle that landed its founders in jail.

"With loose implication, *Barron's* tried to draw vague comparisons with OPM, I suppose," said James Benton, executive director of the CDLA. "OPM was out-and-out fraud. The way Comdisco handles its books, and the other lessors, is all 100% aboveboard, and they've got the external auditors to back them up."

Benton said that the so-called wraparound, tax-leveraged leases common today have "saved users and investors millions of dollars."

Benton's sentiments were echoed by Richard Forsythe, president of the CDLA and chairman of Forsythe/McArthur Associates, and other CDLA members interviewed last week. Forsythe said many of the larger lessors carry residual values on their balance sheets — all within federal guidelines. He said further that there is no similarity between generally accepted accounting practices in the leasing industry and the OPM scandal, "although I'm afraid some people might make that connection because of the hatchet job done by *Barron's*."

The *Barron's* report further stated that IBM Credit Corp. will dethrone Comdisco as the leading computer lessor and will force Comdisco to take dangerous financial risks to stay afloat. While many analysts agree that IBM Credit Corp. will become the biggest lessor, they also state that there will be plenty of business left for the third-party lessors.

"IBM Credit Corp. has grown by leaps and bounds in the last year, but a lot of that growth came from the parent company — which is phasing itself out of leasing — not out of the pockets of the CDLA people," said Charles Greco, who tracks residual values and the leasing business for International Data Corp. in Framingham, Mass. "The Credit Corp.'s share of the market is growing, but the third-party guys are doing better, too."

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DP Managers Say False Resumes Common

By John Gallant
And Lynn Haber
CW Staff

At first glance, the resume looks too good to be true.

The candidate attended the best schools, worked for reputable firms and has exactly the background and experience you are looking for. But something sounds a warning bell in your mind. A little digging and you discover that the candidate for that all-important position in your DP organization has "artfully lied" on his resume — overstated or exaggerated his education, qualifications or his experience.

If you are fortunate, you'll find this out before you make him an offer. If not, the mistake may cost your company more than just his salary.

If you are familiar with this scenario, you are not alone. Two-thirds of the 21 top-level DP executives contacted recently by *Computerworld* in an informal telephone survey said they had encountered artful lying by job candidates. Surprisingly, however, less than one-quarter of those executives felt that resume embellishment posed a major problem.

Only two of the DP executives queried had encountered applicants who lied outright on their resumes. More often, candidates had puffed up their qualifications or income to put themselves in line for higher paying positions. Eager to move up the ladder in a DP organization, or hoping for the chance to work with an advanced system, they stretch the truth, claiming to have "headed" project teams or "designed" new hardware or software.

"The problem is that we advertise artificially in this field. The criterion for a good employee is fast learning. But we advertise for people with years of experience with specific hardware or software. People who want a chance to work with the system are willing to fudge on their resumes to get inside. We haven't encountered much outright lying, but expansion, that's another thing," said Frank Schlier, director of information systems for the Washington, D.C.-based American Bankers Association (ABA).

"Anyone who doesn't overstate [his] income, now that's unusual," said Robert C. Maughan, executive director of information services for Arthur Young and Co. in New York City. "According to most resumes, they've encountered every operating system, every programming language and everything else. In my opinion, when they say they've worked on [an IBM] 4341 system, it means they bumped into it one day and now they're experts."

Stephen Asakawa, vice-president of computer center administration for City National Bank in Los Angeles, agreed. "Mostly, it's a gross exaggeration of experience. I'll give you a typical example. I received a resume that listed four years of CICS application experience. The candidate had used CICS applications, but he didn't know the first thing about coding in CICS. Maybe the candidate read a manual, and now he claims expertise in that area."

According to DP executives, the problem stems both from intense competition for top management information system positions and from the use of loosely defined terms tossed casually about in the industry.

"Resumes often state qualifications that are interpretations of certain words," observed R.L. Pitcher, director of information systems for Cambridge, Mass.-based Arthur D. Little, Inc.

Worsening Situation

While only five of the executives said artful lying on resumes poses a major problem for their firms, nine claimed the situation is getting worse. City National Bank's Asakawa said, "I have seen more of it lately. But that may be because I look more closely for it now."

John Smart, vice-president for data processing services for Sysco Corp. in Houston, "would have to say that it is increasing, especially on resumes prepared by individuals. People tend to get frustrated when they find they aren't as smart as they think they are."

And Schlier added, "I think it's going to get worse as long as we continue writing employment ads for specific equipment and software. We're asking for things that aren't relevant to the job. As a result, people who've leaned up against the machine are going to say they have experience with it."

According to Guy Edwards, vice-president of information services for Philadelphia-based Provident Mutual Life Insurance Co., the situation will worsen. "As it becomes more of a buyer's market, applicants will tend to stretch the truth more. If you hire through blind resumes, you're going to face 50% of the candidates overstating."

Four of the DP chiefs blamed much of the problem on employment agencies who fail to verify resumes. George Gautney, vice-president of computer services at Amtrak's Washington, D.C., headquarters, said, "The potential for an increased problem is there, especially with consultants and contractors who escalate the qualifications of individuals. I won't call it lying, but it is certainly stretching the truth."

Michael Long, group vice-president for information systems for Fidelity Union Life Insurance Co. in Dallas, went further. Recruitment agencies, he said, "don't screen individuals to see what level of expertise they've really achieved. It probably causes us to do more interviewing than we'd like. We have to do more interviews to find out what's really there."

"Agencies are trying to move a lot of people fast," Arthur D. Little's Pitcher added. "They're letting people with three or four years' experience think they're qualified to demand a higher position or to use a bigger title."

In contrast, one company now relies almost totally on personnel agencies to avoid resume embellishment. Sysco's Smart said, "We are cognizant of this problem, so we've confined ourselves to using two reputable national recruiters who do screening for us."

One-third of the respondents to *Computerworld's* survey claimed to have circumvented the problem through training programs or by promoting from within, both of which decrease reliance on outside hiring. "We have dropped into hiring most people through a work-study program at a university here," Edwards said. "We know who we're working with. I've found that this produces a 100% correlation between what we thought we were hiring and what we got."

George DiNardo, senior vice-president for information management and research for Mellon Bank in Pittsburgh, Pa., said, "The rest of the world may have that problem, but we don't. Checking the veracity of resumes is a waste of my time, so I get my employees right out of college. I don't hire retreads, and I don't hire other people's problems."

"We generally hire our own people," Arthur Young and Co.'s Maughan said. "We've been very unsuccessful with going out and hiring people. You try to hire for one position, and you have to interview a slew of people. The chances are that to get the person you want, you have to go through two or three hirings."

A majority of the DP executives contacted employ an intensive interviewing process, involving both management and technical people, in order to screen prospective employees.

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Supreme Court Nixes Review

WASHINGTON, D.C. — The U.S. Supreme Court last week refused to review lower court rulings that found AT&T guilty of violating the Sherman Antitrust Act. But the plaintiff in the case, MCI Communications Corp., also lost its bid to prevent reconsideration of a record $1.8 billion fine levied on the telephone company.

Three years ago, a federal district court in Chicago found against AT&T for 10 of 15 antitrust violations charged by MCI. The specialized carrier, AT&T's most aggressive competitor, was awarded $1.8 billion in damages.

Last year, on appeal, two of the 10 violations were erased, including the charge that the phone company had engaged in predatory pricing. Because a significant part of the penalty rested on this charge, the appeals court sent the whole question of damages back to the district court for a new trial. MCI and AT&T then appealed to the Supreme Court.

John Worthington, MCI's senior vice-president, said last week that he expects the district court retrial to begin next spring. Pointing out that business has been "a hell of a lot better than we thought it would be" since the original fine was announced three years ago, Worthington indicated that MCI will ask for higher damages.

IBM, Hitachi Settle Civil Suit Out of Court

By Jeffry Beeler
CW West Coast Bureau

SAN FRANCISCO — A year-old civil lawsuit accusing Hitachi Ltd. of stealing IBM trade secrets has ended in an out-of-court settlement that gives the U.S. vendor extraordinary powers to monitor its Japanese competitor's future product developments.

Under the settlement, IBM has gained the right to scrutinize any new Hitachi systems product whose first customer shipment occurs between now and Oct. 1, 1988. The main aim of the proposed inspections is to prevent Hitachi from using the IBM technology it acquired as a result of a 1982 trade-secrets theft scheme, according to an IBM press spokesman.

The settlement also calls for the creation of a three-member arbitration board that will referee the product inspections and resolve potential quarrels. If, for example, the two companies disagree about whether a future Hitachi offering incorporates stolen IBM trade secrets, the dispute will be referred to the committee within 30 days.

Another 30 days will then be available to the arbitration panel to settle the argument and make its ruling known. Both vendors are required to treat the committee's decisions as final, according to legal papers that IBM and Hitachi filed jointly in U.S. District Court Oct. 6.

Participating on the board will be John Bertram, president of IBM's General Products Division in nearby San Jose, Calif., and Takeo Miura, board director and group executive of Hitachi's Computer Group. The panel will also include a chairman, whose selection requires both companies' approval. The chairman will be named no later than Nov. 4, the court papers said.

Other provisions of the Oct. 6 settlement require Hitachi to pay all of IBM's civil suit legal fees and to return any trade secrets it has already stolen from the industry giant or may acquire in the future.

In addition to permitting IBM to examine every new Hitachi systems module during the coming five years, the settlement calls on the Japanese firm to surrender all of its accompanying documentation, including product specifications and user manuals.

Submitted before U.S. District Court Judge Spencer Williams, the settlement finally ends Hitachi's involvement in a trade-secrets theft case that first burst on the scene more than 15 months ago. The case resulted last year in criminal indictments against Hitachi, Mitsubishi Electric Corp. and more than 20 of their employees or agents, all of whom were accused of conspiring to transport stolen IBM trade secrets to Japan.

Among the targets of the alleged theft attempt were documents describing 370 Extended Architecture, workbooks detailing the 3080 series' hardware design and source code for MVS/SP Version 2.

On Sept. 16, 1982, IBM compounded Hitachi's legal predicament by naming the Japanese vendor as a defendant in a civil suit that mirrored the criminal charges already facing the firm. Also named in the suit were Hitachi's U.S. business partner, National Advanced Systems, Inc. (NAS), and its parent company, National Semiconductor Corp. The civil litigation against National Semiconductor and NAS, a supplier of Hitachi-manufactured IBM-compatible processors, is unaffected by the Oct. 6 settlement, the IBM spokesman noted.

Among other things, the Sept. 16 legal action called on Hitachi to return stolen IBM trade secrets and sought to prevent the Tokyo-based company from using the technology in its future products.

Last February, Hitachi pleaded guilty to the criminal charges facing it and received the maximum penalty of a $10,000 fine. But although the guilty plea ended the criminal phase of Hitachi's legal troubles, the civil suit persisted, with both sides initially holding out little hope for an out-of-court settlement.

After several months of additional negotiation, however, the IBM vs. Hitachi civil action was finally settled Oct. 6. Among its other repercussions, the agreement is expected to result in the dismissal of a countersuit that Hitachi filed against IBM July 1 in Tokyo. The Japanese litigation in effect constituted a refusal by Hitachi to return and to forego use of the technology the firm had already pleaded guilty to stealing from IBM.

Ansi X3 Committee Seeks Members

WASHINGTON, D.C. — The American National Standards Institute (Ansi) X3 Standards Planning and Requirements Committee Data Base Study Systems Study Group is seeking additional members to help plan and develop a family of standards for data base systems.

The project includes investigating and coordinating projects using an architectural framework for data base standards.

Those interested in joining the committee can contact committee chairman John W. Young Jr. at NCR Corp., 9900 Old Grove Road, San Diego, Calif. 92131.

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Software Dominates Info Debuts

(Continued from Page 1)

ers to maintain a library of personal definitions.

The product requires either VAX-11 Datatrieve or Oracle Corp.'s Oracle data base management system. It costs $24,500 from Frey at Chestnut Hill Road, Amherst, N.H. 03031.

University Computing Co. (UCC) released a Report Processing and Tracking (RPT) component for its UCC-7 Automated Production Control System for IBM MVS operating systems. The new subsystem provides the facilities for a data center to manage batch production output information, UCC said.

On-line facilities provide both inquiry and update capabilities to the report distribution data. A report archival function negates the need to rerun a job to recreate a lost report.

The introductory price of the subsystem is $9,500 from UCC at UCC Tower, Exchange Park, Dallas, Texas 75235.

NCR Corp. announced a link which allows users of its Decision Mate V microcomputer to transfer and receive data from either NCR's advanced 9300 system or its medium- to large-scale V-series mainframes.

A File Extract Facility (FEF) utility permits selection and extraction of data elements or fields from the data base for output to a sequential data file. The file can be sent via the File Transport Facility (FTF) to an NCR personal computer.

The FEF and FTF are each expected to sell for $1,000/mainframe, although NCR stressed that final pricing has not yet been determined. More information is available from NCR, Dayton, Ohio 45479.

Applied Data Research, Inc. (ADR) introduced software for generating computer-based training materials that integrates videotape/disk technology with IBM Personal Computers. ADR/Adroit (ADR Online Interactive Training) allows users to simulate software applications normally run on IBM 3270 terminals and incorporates high-resolution graphics and video programs.

Courses can be created with a text and graphics editor, and videotape materials can be incorporated into the course, activated by the Personal Computer. The system is priced at $3,000 to $4,000 per Personal Computer and requires 128K bytes of memory. Interactive video requires the use of a red, green and blue video monitor. ADR is located at CN-8, Rt. 206 and Orchard Road, Princeton, N.J. 08540

Interactive Images, Inc. (III) and ADR also announced an agreement to develop jointly and market ADR and III products to support touch-screen workstations designed around III's Easel software. Easel allows users to create and manipulate application programs by touching visual color images on a touch-sensitive screen. ADR and III will develop Easel software extensions to ADR/Dataquery, ADR/Empire and ADR/email.

III also announced that Easel will be available on the IBM Personal Computer XT. A typical configuration includes a 14-in. color monitor with touch-sensitive screen, graphics display controller, co-processor with 512K bytes of random-access memory, serial communications port and Easel software. The price ranges from $2,000 to $6,000, depending on configuration. III is located at 21 Olympia Ave., Woburn, Mass. 01801.

A set of integrated information center software for DEC VAX-11 and Data General Corp. Eclipse computers was announced by Creative Consulting Corp. International (3CI). Called Infocen, the package combines a relational data base management system, forms, color graphics, statistics, reports, electronic messages and user-definable commands.

The Relational-Plus data base management system combines hashing techniques and relational storage technology. The query processor is self-tutorial at all levels. User-definable command tables make it possible to redefine permanently or temporarily command verbs and data set names.

Prices range from $29,500 to $59,500, depending on options selected from 3CI, which is based at Solar Office Plaza, 155 W. Harvard, Fort Collins, Colo. 80525.

Goal Systems International, Inc. announced Vsamaid/XP, a Vsam tuning facility intended to address problems of poor performance, poor direct-access storage device space utilization and limited management facilities. The product reduces wasted disk space through the use of mathematical algorithms. A modeling facility helps to determine optimum virtual storage allocation.

The permanent license price for IBM OS/VS users is $5,040. The price for DOS/VSE users is $3,080. Goal is home-based at 5455 N. High St., Columbus, Ohio 43214.

A micro-mainframe communications software package that boasts faster communications start-up was announced by Comshare, Inc. Microseek provides users of the IBM Personal Computer and Personal Computer XT asynchronous communications capability with mainframe hosts.

The product includes file transfer with optional error detection and correction, terminal emulation, a library of files for automatic connection to mainframe hosts and the ability to automate repetitive Personal Computer/host tasks, a spokesman said.

The product requires 96K bytes of memory and one disk drive with an RS-232 interface and asynchronous communications board and modem. It costs $200 per copy.

Microseek-Plus, including the mainframe file transfer program for error checking and five copies of Microseek, costs $3,500 plus a $525 annual maintenance fee. Comshare is located at 3001 S. State St., Ann Arbor, Mich. 48106.

MCBA, Inc. announced that its line of packaged software applications will be available on a variety of microcomputers. The products include accounts payable, accounts receivable, base materials requirements planning, bill of material processor, customer order processing, fixed assets and depreciation, general ledger, inventory management, job costing, labor performance, mailing list, payroll, purchase order and receiving, shop floor control, standard product costing and standard product routing.

Prices range from $600 to $2,000, depending on operating system. MCBA is at 2441 Honolulu Ave., Montrose, Calif. 91020.

Phoenix Computer Corp. announced Release 6.2 of Falcon, an on-line data entry system for IBM MVS, VS/1, DOS/VSE and DOS/MVT (VSE) operating systems. The system now includes a conversion facility that enables the user to transfer formats automatically from IBM's Video/370 data entry system to Falcon.

Other new features include a range-checking feature, table maintenance facility and job-submit feature. Purchase price on DOS systems is $19,500 and on MVS systems is $24,500.

Phoenix also announced a printer support facility for its Condor on-line program development system for DOS, DOS/VSE, DOS/MVT(VSE) and Edos/VS operating systems. Through Printer Remote Interface Support Module (Prism), Condor users at IBM 3270-type terminals can retrieve output from operating system spooler queues and send it to IBM 3280-, 1403- or 3211-compatible local or remote printers.

Prism is available in a stand-alone version for $6,000 or as part of Condor, which costs $19,500. Phoenix is located at 11949 Jefferson Blvd., Culver City, Calif. 90230.

Info '83 Focuses on Business Plan

By Ed Scannell
CW Staff

NEW YORK — Keeping pace with the DP manager's elevated role in the corporate decision-making process, organizers of last week's 10th International Information Management Exposition & Conference (Info '83) here made "Tying the Information System Into the Business Plan" the theme of the four-day event.

In the days when computers were used primarily for accounting applications, the chief financial officer usually decided whether to buy computer equipment. But as computer applications have broadened, corporations began relying more on the DP or information systems manager to pick the system that would best accommodate their growing needs.

"Computers didn't tie in with the overall business plan in the past. But now you can't put a proper business plan together if you are not taking the information system into consideration," Leo Bowser said, show manager for Info '83.

The titles of many Info '83 sessions supported the show's theme — "Using Information Technology to Improve Strategic Business Management" and "Strategic Use of Information Systems in the Business," for example.

"A lot of other shows today, such as Comdex, are aimed at the systems integrator. But our goal here is to go after the people in charge of purchasing and using these systems, not the people designing them," Bowser said.

Despite some stormy weather and the fact that the show opened on Columbus Day, Info '83 drew slightly more than last year's 40,250 attendees. This year, 350 vendors exhibited and demonstrated their products and services, compared with 293 last year; besides U.S. vendors, companies from Japan, the UK, Canada and Israel displayed wares.

While the IBM, Digital Equipment Corp. and AT&T exhibits attracted the usual hordes, Wang Laboratories, Inc.'s Professional Image Computer, introduced two weeks ago, grabbed the attention of most show goers.

Office automation and software vendors dominated this year's show in terms of product introductions. Full details of those announcements begin on Page 1.

Xerox Covers Bets, Buys Osborne Parts

ROCHESTER, N.Y. — Calling it a hedge against "the possible demise" of Osborne Computer Co., Xerox Corp.'s Service Group here has bought up an undisclosed amount of Osborne parts and promised to provide repair work on the portable computers for anyone who holds an Osborne warranty.

Despite swirling rumors last week that Xerox planned to buy the cash-strapped San Francisco maker of portable computers, spokesmen for Xerox maintained that the company had no interest in bailing out Osborne. Xerox's interest, it said, is confined to continuing the service pact it entered into 18 months ago with Osborne.

Osborne filed for protection from its creditors under Chapter 11 of the Federal Bankruptcy Act last month. Under the agreement announced last week, Xerox promised to pick up Osborne's warranties on its Osborne/1 and Executive/1 computers, provided owners buy an additional one-year service contract from Xerox.

Osborne President Robert Jaunich said that the agreement is "important at this time because of the financial difficulties being experienced by Osborne. The assurance it provides of continuing service support should help to stabilize the market for Osborne personal computers and restore customer confidence."

However, a Xerox spokesman admitted that his company considered the agreement a "hedge against Osborne's possible demise." The spokesman also warned that non-Xerox customers should not expect to obtain Osborne parts from Xerox if Osborne should go out of business.

Mini, Micro Vendors Show New Units at Info

(Continued from Page 1)

used as a CPU in networks based on IBM's Systems Network Architecture.

Compatible with the other three members of the Information System family, the Model 10 simultaneously supports asynchronous, bisynchronous and IBM Systems Data Link Control protocols, a spokesman said. The processor can be field-upgraded to the level of higher end 8890 models and is supported by Nixdorf and IBM operating systems such as Nidos/VSE, DOS/VE, SSX/VSE and VM.

The Model 10 features integrated disk and tape drives and is equipped with communications adapters controlled by independent microprocessors. The system is available immediately for $37,000.

Nixdorf is home-based at 300 Third Ave., Waltham, Mass. 02154.

Supermini From Basic Four

Management Assistance, Inc.'s (MAI) Basic Four Information Systems Division unveiled a 32-bit business system that will be a part of the firm's 8000 series. The system is expected to compete in the commercial marketplace against the offerings of IBM, Digital Equipment Corp. and Hewlett-Packard Co.

The system comes in three different models priced between $50,000 and $500,000. The MAI 8010 contains a single processor while the 8020 and 8030 models contain two and three processors, respectively. The 8030 supports as many as 100 terminals at a cost of approximately $4,000 per workstation.

A typical 8030 configuration will cost $210,000, a spokesman said. Basic Four is located at 14101 Myford Road, Tustin, Calif. 92680.

Micro Introductions

While most microcomputer vendors have decided to wait for next month's Comdex show to introduce systems, several manufacturers announced both desktop and portable systems.

Philips Information Systems, Inc. unwrapped a 32-bit multiuser supermicrocomputer that is user-programmable and provides data base management capabilities at the workstation level, according to the company. The Information Processing System (IPS) is compatible with the Unix operating system and with Philips' series of workstations.

The IPS holds up to 4M bytes of internal storage and up to 500M bytes of disk storage; it supports as many as 30 of Philips' universal workstations. The system is available immediately from Philips at 4040 McEwen, Dallas, Texas 75234.

Xerox Portable

A surprise hardware announcement, made late in the show, was Xerox Corp.'s 5-lb portable microcomputer that fits into a briefcase. The Xerox 1810 is dual-processored, incorporating both 8- and 16-bit chips compatible with Microsoft, Inc.'s MS-DOS and Digital Research, Inc.'s operating systems.

The unit holds up to 64K bytes of storage, has an LCD screen and operates up to 10 hours on rechargeable nickel-cadmium batteries.

The cost of the unit is $2,195. Xerox can be reached at Xerox Sq. 006, Rochester, N.Y. 14644.

Rair Computer Corp. unveiled its Black Box 3/60S, a 16-bit microcomputer aimed primarily at OEMs and technical users. Based around Intel Corp.'s 8088 microprocessor, the 3/60S features 256K bytes of random-access memory and interfaces with up to 16 terminal, peripheral and data communications devices through an RS-232 serial port.

The desktop unit supports the Digital Research MP/M 86 multiuser operating system as well as a variety of 16-bit programming and applications software. List price of the basic system, which holds 1M byte of memory, is $9,750. Rair is at 4101 Burton Drive, Santa Clara, Calif. 95050.

Portable Systems

Both Computer Transceiver Systems, Inc. and Microoffice Systems Technology, Inc. took the wraps off portable systems. Computer Transceiver's portable entry is called the Execuport XL series and features both Intel's 16-bit 80186 processor and Zilog, Inc.'s 8-bit Z80 processor. The system runs under Microsoft's MS-DOS operating system.

The XL's basic configuration holds 128K bytes of memory, features a 9-in. by 5-in. green phosphor screen and dual 5¼-in. floppy disks that store 400K bytes of formatted data. Software options for the system include the MP/M operating system.

Priced at $3,295, the dual processor system is available now from Computer Transceiver, E. 66 Midland Ave., Paramus, N.J. 07652.

Microoffice's 100/Roadrunner will be sold to both the high-volume end-user and OEM markets. The notebook-size system's screen displays eight 80-char. lines and features removable cartridges.

Software packages available for the system include a text editor, spreadsheet, Basic language, appointments manager and terminal communications. The cost of the CP/M-compatible system is $1,895.

Microoffice is headquartered at 35 Kings Highway E., Fairfield, Conn. 06430.

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2) Kevin selected the content of these books based on an analysis of the tasks normally required of an applications programmer. That's why these books contain everything of use to the average programmer and very little that isn't. That's also why the books give substantial coverage to job-control language. The DOS book covers DOS and DOS/VS, the OS book covers MFT, MVT, VS1, and VS2.

3) The books are organized in the most effective way possible for a programming course. Quite simply, a complete subset of BAL is presented in the first three chapters of the book. After this, all material is organized by function (debugging, table handling, subroutine linkage, etc.). As a result, the student always sees the relationships of the parts.

4) Each book contains dozens of complete program listings. They start with card-to-printer programs and end with programs that create and retrieve direct files. In between there are listings for routines and programs that perform code translations and input validations, set up the linkage between mainline modules and subprograms, load and use tables in storage, create and retrieve sequential and ISAM files, and so on. In our experience, these listings, more than any other factor, determine whether or not a course is effective. And they are the missing ingredient in most assembler language courses.

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General Manager
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Office Products Grab Some of Info '83 Spotlight

(Continued from Page 1)

reportedly maintain confidential files, and the network is said to include an electronic mail option.

Priced at $4,400 per workstation, which includes a 16-bit node serving also as a file server, Northnet is available from GBC at 1500 Broadway, New York, N.Y. 10036.

Wordplex's Wordlink local-area network reportedly permits up to 16 electronic typewriters to be linked to a single Wordplex 80-4 information processor via telephone voice-grade cable.

The processor reportedly performs text editing functions on documents that have already been stored, with a capability for simultaneous receiving of documents from the workstations. Electronic typewriters that can be used on the network must have an RS-232C communications port.

Priced at $450 per node, Wordlink is available from Wordplex at 141 Triunfo Canyon Road, Westlake Village, Calif. 91361.

Xerox Endorses Fax

Xerox Corp. endorsed facsimile technology with a new desktop facsimile terminal that it said can communicate with computers and be integrated into office networks.

The Xerox Telecopier 295 digital facsimile transceiver can reportedly receive computer information for printing or redistribution to other fax units located anywhere in the world. It is compatible with other Group 3 facsimile devices, Xerox said.

The unit's two major options include an RS-232C interface port and a facility that permits product compatibility with lower speed Group 1 and Group 2 fax machines.

The 294 carries a base price of $4,600. More information is available from the Xerox Office Products Division, 1341 W. Mockingbird Lane, Dallas, Texas 75247.

Decmate Moves Into Office

Digital Equipment Corp. made its mark at Info '83 with the transformation of its Decmate personal computer into an office workstation with two software enhancements and a price reduction.

The Decmate Office Workstation integrates word processing, personal computing and communications capabilities with a new logon processor file called Easycom and a word processing conversion utility called WPS Convert, according to a vendor spokesman.

The workstation is priced at $4,735, which includes the system unit, a monitor and keyboard and the software capabilities. It is covered by DEC's recently announced 90-day, on-site service plan [CW, Oct. 3].

DEC is located at 146 Main St., Maynard, Mass. 01754.

Nixdorf Terminal

Nixdorf Computer Corp. last week introduced its 8810 Professional Workstation, which serves as an intelligent terminal tied into a range of Nixdorf systems or which can be used in stand-alone mode.

As an interactive terminal, the 8810 reportedly connects to the Nixdorf 600 series distributed system. Tied to an 8870 Data Processing System, the workstation reportedly has access to application programs for banking and commercial applications.

The 8810 includes a 12-in. amber-on-black display with an 80 char./sec printer.

The 8810 is priced at approximately $4,000. More information is available from Nixdorf at 300 Third Ave., Waltham, Mass. 02154.

Lee Data Controller

Topping the list of communications products was Lee Data Corp., with a dual-host controller said to feature a dual remote-host access capability that increases the functional capabilities of individual display stations in a system.

The Model 311 controller reportedly contains two remote communications interfaces operating concurrently to enable display stations to switch between one of two selected IBM or compatible mainframes.

The 311 can also reportedly be configured to provide application redundancy or host backup capabilities and operates in any IBM protocol Binary Synchronous Communications (BSC) or Systems Network Architecture/Synchronous Data Link Control (SNA/SDLC) combination, supporting up to 32 display stations and printers.

Priced at $14,215, the controller is available from Lee Data at 7075 Flying Cloud Drive, Minneapolis, Minn. 55344.

Also introduced last week was a protocol converter from Three R Computers, Inc.

The PA1000 is said to provide entry to IBM environments via a coaxial cluster controller connection for any Ascii terminal, personal computer, portable computer or other device.

Connecting to an IBM 3274/3276 cluster controller supporting BSC or SNA/SDLC environments, the PA1000 reportedly permits access to asynchronous hosts, public information services or time-sharing services.

Priced at $995, the PA1000 is available from Three R Computers at 18 Lyman St., Westboro, Mass. 01581.

Why Fairchild Industries didn't go with a fly-by-night software company.

Many of the world's leading manufacturers rely on MIMS Manufacturing Software from General Electric Information Services Company.

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Why?

Electronics Industry Relieved

House Democrats Put Immigration Bill on Ice

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The manpower-starved electronics industry got a reprieve recently when Democrats in the U.S. House of Representatives pulled the plug on a controversial immigration bill that would have limited availability of foreign technical workers.

The Immigration Reform and Control Act, now apparently on the shelf for at least another year, was also viewed by civil liberties advocates as a great threat to personal privacy in this country. The bill called for a worker identification system, which some feared would be a de facto national ID system [CW, May 30].

The bill, which has passed the Senate twice, was headed for House consideration when Speaker Thomas P. O'Neill (D-Mass.) early this month decided not to let it come up for debate this year. Because of the controversial nature of the legislation, it is not likely to be reintroduced in 1984, an election year.

The bill's centerpiece was a provision to penalize employers who knowingly hire illegal aliens. Hispanic groups feared employers would resist hiring Hispanics and other minorities to make sure no illegal aliens got jobs.

O'Neill noted the opposition to the bill from Hispanic groups and said he feared President Reagan, although claiming to support the bill, would veto it to curry favor in the U.S. Hispanic community.

Rep. Robert Garcia (D-N.Y.), chairman of the House Hispanic Caucus, hailed the action of "our great speaker Thomas 'Tip' O'Neill," but other members of the House and Senate who have worked on the legislation for years strongly denounced the move as a blatant Democratic attempt to attract Hispanic votes. Rep. Dan Lungren (R-Calif.) rose in the House to exclaim that "the stench from the rotting carcass of arrogant political partisanship lies heavily on the air of this chamber today."

The White House, which has criticized certain portions of the bill, reiterated its support for the legislation and said it hopes O'Neill will reconsider his decision to withhold it from House debate.

The electronics industry, however, reacted with a sigh of relief. As considered in the Senate, the bill would have required all graduating foreign students to return home for two years before they could seek jobs in the U.S.

The House version would have permitted the Secretary of Labor to waive that provision for alien degree holders who received job offers in certain areas considered to have manpower shortages. The electronics industry had labored long and hard to have the bill amended to include that waiver but was also loath to accept any government regulation of its hiring practices.

Now that the bill has been temporarily shelved, "it will be business as usual," remarked Pat Hill Hubbard, American Electronics Association vice-president for engineering education. It will still be hard to fill all of the industry's manpower needs, "but at least that issue is not going to be compounded" by government regulation, she told *Computerworld* last week.

"Illegal immigration is a real serious issue," she said, but added that the foreign student provision "was always misplaced" because it is an issue of legal immigrants and not illegal aliens, the main target of the immigration reform bill.

"The immigration bill was going to cause problems for us" even with the House amendment, Hubbard said. She noted the matter most likely will come up again and said the association is "hoping we don't lose ground" when it does.

Privacy Concerns

Just as the employer sanction provision alarmed the Hispanic community, it was also cause for concern among privacy advocates. In order to hold employers accountable for hiring illegal aliens, the government would have to provide a secure and reliable way for employers to identify workers eligible to hold jobs in the U.S.

The bill would have directed the administration to develop such a system, and one method discussed would be to issue ID cards, backed by a computerized data base accessible by employers that could be checked to verify employment eligibility. The government estimated this type of system would cost almost $2 billion in the first five or six years alone.

Privacy advocates argued that the system would be too expensive, too difficult to enforce and plagued by fraud. In addition, the system plan is seen by opponents as a national ID system that could be misused by government agencies.

used by goverment agencies. The White House also said it did not approve of this provision but it had concluded the need for immigration law reform outweighed the privacy concerns.

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International Report

FROM THE CW INTERNATIONAL NEWS NETWORK

AUSTRALIA

SYDNEY — Australia's largest private bank, Westpac Banking Corp., has ordered a triple-processor Tandem Nonstop II System and Base 24 software from Tandem Computer, Inc. Westpac is thought to be the first private bank here to make a commitment to on-line customer services similar to those already offered by state banks. It is also the first bank to use Tandem equipment.

BRAZIL

MANAUS — Secretary of the Treasury Ernane Galveas assured the executive secretary of Brazil's Special Department of Informatics that information technology is high on the list of government priorities for importation. To facilitate further the flow of technology in and out of Brazil, the government has established a duty-free port here.

CHINA

BEIJING — China is developing highly sophisticated computer technology for military purposes, but lagging far behind in general application of computers, according to Wambil Lee, a lecturer from the University of Hong Kong who recently visited here. Lee urged the Chinese to buy general-purpose computers from foreign vendors instead of trying to invent their own. China can learn and copy from the equipment, Lee said, arguing that there is no guarantee that the computers China produces itself will be as good as those already on the market.

FRANCE

PARIS — More information has leaked out about the French postal, telephone and telegraph (PTT) administration's intention to produce a microcomputer version of its Minitel videotex terminals. PTT sources report that two solutions are being considered: the development of a completely new series of Minitel terminals that include keyboards, CRTs and peripherals; and an upgrade of the existing Minitel terminals by equipping them with 8-bit configurations. All of these modules would then be connected with a bus developed by PTT. The PTT rumors sent French microcomputer vendors scrambling for the contract. Meanwhile, Apple Computer, Inc. is expected to announce a universally applicable board to connect its Apple II micros to videotex environments.

ITALY

MILAN — After a recent summit meeting of the IRI — Italy's industrial and government-policy officials — the vice-chairman of Italy's national telephone organization known as SIP, along with the director of Italcable, Italy's International and Intercontinental Telecommunications Service, resigned from their offices. Gianfranca Mossetto, the former SIP vice-chairman, sharply criticized SIP management and policy, arguing that increasing phone rates is not the answer to problems at SIP. Giovanni Pinto, the former director of Italcable, reportedly resigned his office because of deeply rooted but unspecified differences with the IRI.

JAPAN

TOKYO — Toshiba Corp. has introduced a 32-bit superminicomputer for engineering and laboratory automation called the Tosbac Data System 600/40, along with an application system called the Super Drafting System. These products, which will be available in January, will be priced at $56,000 and $108,000, respectively.

TOKYO — Sord Computer Corp. has enhanced its 8-bit microcomputer, the M 243. The improvements include a doubling in the system's processing speed, the ability to connect three terminals and Japanese word processing capability. The standard system, which includes a keyboard, two floppy disks and a CRT, is priced from $2,956.

SWEDEN

STOCKHOLM — Asea, the Swedish electrical, nuclear and robotics giant, has unveiled its first "seeing" industrial robot. The system consists of a television camera, a computer and the robot itself. Through advanced image-recognition technology, the robot can reportedly recognize the pieces it needs to manipulate in a factory assembly-line environment. The machine is said to be capable of recognizing up to 99 different objects.

WEST GERMANY

MUNICH — Siemens AG has expanded its 7500 series of systems with the introduction of two additional families: 7550-X, which will include three models; and 7570-X, which will consist of four systems. The performance of the company's proprietary BS 2000 operating system on the new products will reportedly reach 7 million instructions per second, which is approximately 50% greater than with previous models. The systems are scheduled to be available by next summer.

The Suit and Chip proudly debut their baby.

"To look at it, would you guess it has the power of an IBM mainframe?"

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AT&T's Brown Urges Congress to Stay FCC Plan

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — "It's too late for Congress to have second thoughts" about deregulation of the telephone industry, AT&T Board Chairman Charles Brown told every member of the House of Representatives and Senate earlier this month in a letter sent to persuade them not to enact pending legislation modifying the Federal Communications Commission's (FCC) access charge plan.

The FCC plan shifts costs from long-distance communications users to all users by charging for access to AT&T's long-distance network. It has enabled AT&T to propose substantial reductions in several of its interstate rates [CW, Oct. 10] — a reduction that will disappear, the company has said, if the legislation is enacted.

A major reason for the pending legislation is congressional concern that rates will increase to a point where universal telephone service will be jeopardized. However, in a letter to the FCC, AT&T Assistant Vice-President William R. Stump offered evidence reportedly showing that the FCC's pro-competitive policies and the impending divestiture of the telephone company will not increase rates for local ratepayers.

Stump's key point was that although divestiture reportedly has generated "over $9 billion" in rate increase requests from local telephone companies, "some $2 billion is actually carrier access charges, not customer charges." But even if this fact is ignored, the $9 billion plus in increases, if all of them were granted, would increase residential rates "7% to 12%, or about $1.65/mo, assuming the midpoint of the range," Stump told the commission.

Referring to a recent analysis of residential usage in five states, six months before and after large increases were authorized, Stump said the studies show it is "absurd" to argue that the pending rate increases, if granted, will lead to a significant reduction in the number of residential subscribers.

Besides shifting costs from long-distance users to all telephone network subscribers, the FCC's access charge decision also has changed the shares assigned to telephone and nontelephone interstate carriers. Under the present system, which will end Jan. 1 if the access charge plan is implemented on schedule, interstate telephone carriers — consisting chiefly of AT&T Communications — pay a "separations/settlements" charge to each local telephone company, which subsidizes the latter's costs. Other common carriers pay a similar but smaller fee for inferior access; that fee is generally known as the Exchange Network Facilities for Interstate Access arrangement.

Under the FCC's new plan, this differential will drop considerably, according to the other common carriers, and leave them at a competitive disadvantage. "The very survival of the [other common carrier] industry is threatened," the eight largest carriers told the FCC early this month.

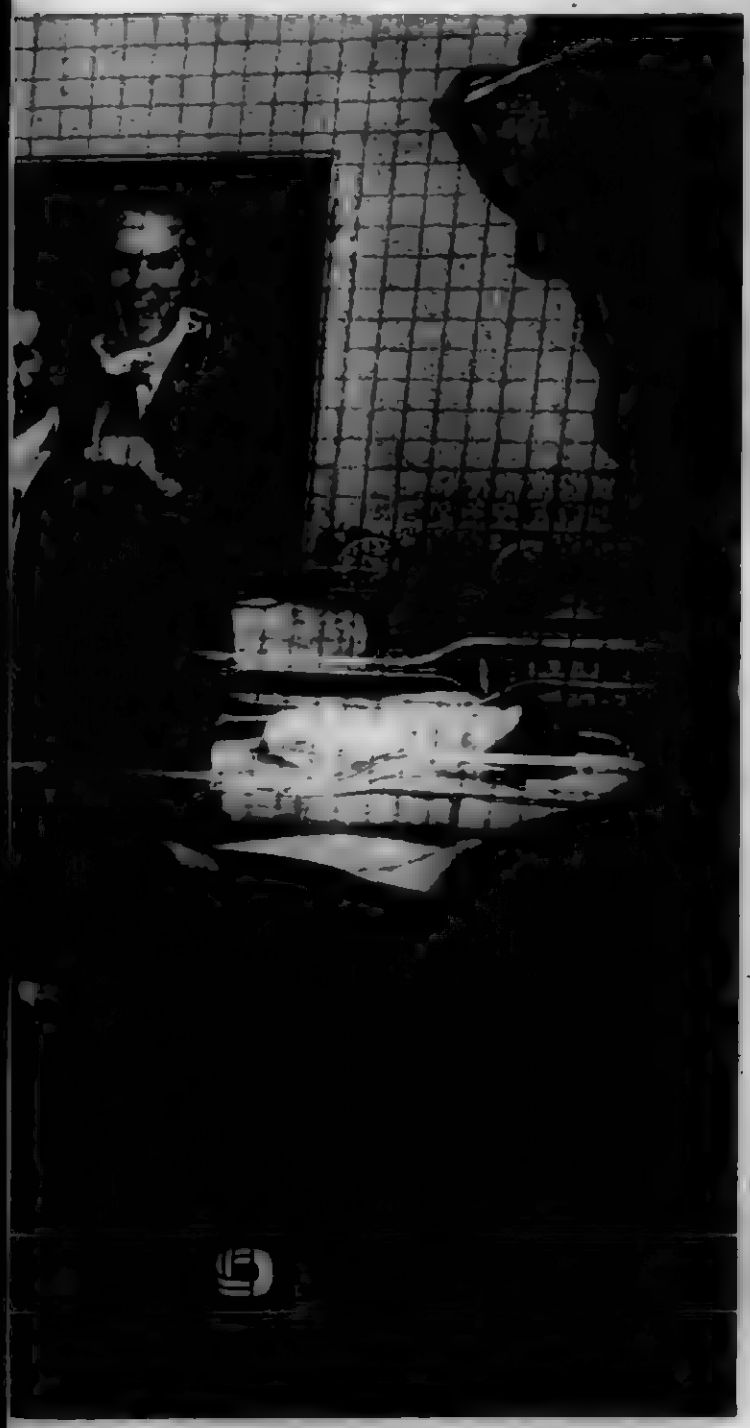
Other Actions On Access Plan

WASHINGTON, D.C. — In other actions related to the Federal Communications Commission's (FCC) access surcharge decision:

- AT&T told the FCC earlier this month that the existing separations/settlements process "can no longer function as currently designed following divestiture." Redesigning it "would impose tremendous costs on the Bell operating companies and AT&T," the company said in reply to petitions filed by Western Union Telegraph Co., the Association of Data Communications Users and others that seek a delay of several months in imposition of the access surcharge plan.
- An intrastate access surcharge system similar to the one developed by the FCC for interstate services has been adopted by the Iowa Commerce Commission. Beginning Dec. 1, a $2/mo surcharge will be imposed on each residential line and a $6 surcharge on each business line. In addition, the commission has added 3 cents per minute to the charge for each intrastate call.
- MIT Director of Telecommunications Morton Berlan told the FCC earlier this month that it will cost MIT an extra $800,000 if the commission does not modify its access charge decision to reduce the surcharge levied on Centrex-CO users. The basic problem is that the surcharge is imposed on each access line; Centrex-CO users, since they have many more access lines, pay considerably more than private branch exchange users.
- Dr. Alfred Kahn, economic adviser to President Carter and former chairman of the New York Public Utilities Commission, called the FCC's access charge plan "an intelligent decision, a moderate decision and a courageous decision." In hearings earlier this month before the Joint Economic subcommittee, Kahn said that while the present subsidy paid by long-distance users toward support of local telephone networks has served a useful social purpose, it is too large.

A 'personal mainframe' no less.

The Chip chimed in. "It is a personal mainframe that provides greater productivity for the individual user, enhances the performance of existing applications, leverages a company's investment in IBM systems and software, and provides access to sophisticated, modern computing environments such as FOCUS™ and RAMIS II™



—and all at a price affordable by the single user.

We were talking with the Suit and the Chip at their new headquarters in Trumbull, Connecticut. They founded Canaan Computer Corporation in 1981. Prior to that, the Suit, Bob Bernard, was the founder of National CSS, a leader in the development of commercial timesharing. The Chip, Nicli Pisarro, was a major technical contributor there. We asked what makes the Canaan Computer stand out of the teeming mass of new computers.

CMS user freed at last.

"It's simple," explained the Suit. "Recent developments like multi-window graphics and Ethernet™ are giving some buyers of new computers vastly increased capabilities. But as far as the IBM mainframe user has been concerned, these new powers don't exist. The CMS user has had to be satisfied with decade-old technology. With the introduction of the Canaan Computer, that CMS user can now have it all."

Multi-window graphics, dedicated interactivity.

"What we have done," said the Chip, "is develop a machine that provides these state-of-the-art capabilities, and runs the user's IBM mainframe programs with no changes required. So, for the very first time, CMS users, or even non-users who want to take advantage of all that IBM software, can have very high-resolution graphics, networking for shared resources, super interactivity, more computing power than they can ever get on a shared centralized computer—and all in a package the size of a two-drawer file cabinet."

Multi-window graphics, local area networking, a dedicated processor for each user: is there anything else you want the business community to know, we asked?

"Yes," said the Suit. "Our address. So they can write or call for more information. Or to order a machine—they're ready for delivery now. It's Canaan Computer Corporation, 39 Linderman Drive, Trumbull, Connecticut 06611 [redacted] Ask for the Suit."

CANAAN

User Sees Positive Side to AT&T Deregulation

(Continued from Page 1)

perspectives — to prove . . . that telecommunications is a resource to be managed to increase the revenue potential of your corporation and [that] it's not just an expense."

Deregulation should really not alter the goals of a communications manager, according to Livingstone. "What Montgomery Ward is doing is no different from what we would have done without deregulation — provide cost-effective telecommunications services for our corporation."

But when he joined the organization one year ago from Rockwell International Corp., Livingstone said, Montgomery Ward "was designed to work with a monopoly. In essence, we said to Bell, 'Go on out there and engineer a system, tell us how much it will cost and we will contract it.'"

That attitude has changed, he added, and the decision has been made to purchase telecommunications services and products on a competitive basis. The retail chain's communications equipment is outdated and overpriced, but "deregulation will allow me to come out from underneath lease agreements that are too long."

CW At NRMA

Montgomery Ward's strategy, according to Livingstone, who worked in DP for eight years before spending another eight years in telecommunications, includes developing in-house resources that were once left to AT&T's personnel. Those resources, he said, include expertise in network design and analysis, inventory management, change management and billing management. Regulatory and tariff management is addressed through a consulting group that has hired a firm to keep track of tariffs nationwide. And in the area of planning and control, "We've used deregulation as an excuse to get [the resources] we need."

Concerns in the corporation, he said, include the changing vendor environment, the increased number of marketing entities and the product technology explosion.

Livingstone said the situation provides opportunities for internal reorganization; controlling expenditures; upgrading functionality and efficiency; using the company's leverage to induce such things as volume discounts and favorable maintenance agreements; and positioning networks to minimize tariff vulnerability, merge voice and data and add value-added services.

He also advised automating internal functions such as ordering, billing verification, inventory management and optimization. "You'll have the ability to react quickly," he noted.

Justice Leaves CAB to Probe Airline Nets

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The U.S. Department of Justice, having completed the first phase of its investigation into computerized airline reservation systems, said recently it agrees with the Civil Aeronautics Board (CAB) that industrywide regulation is needed.

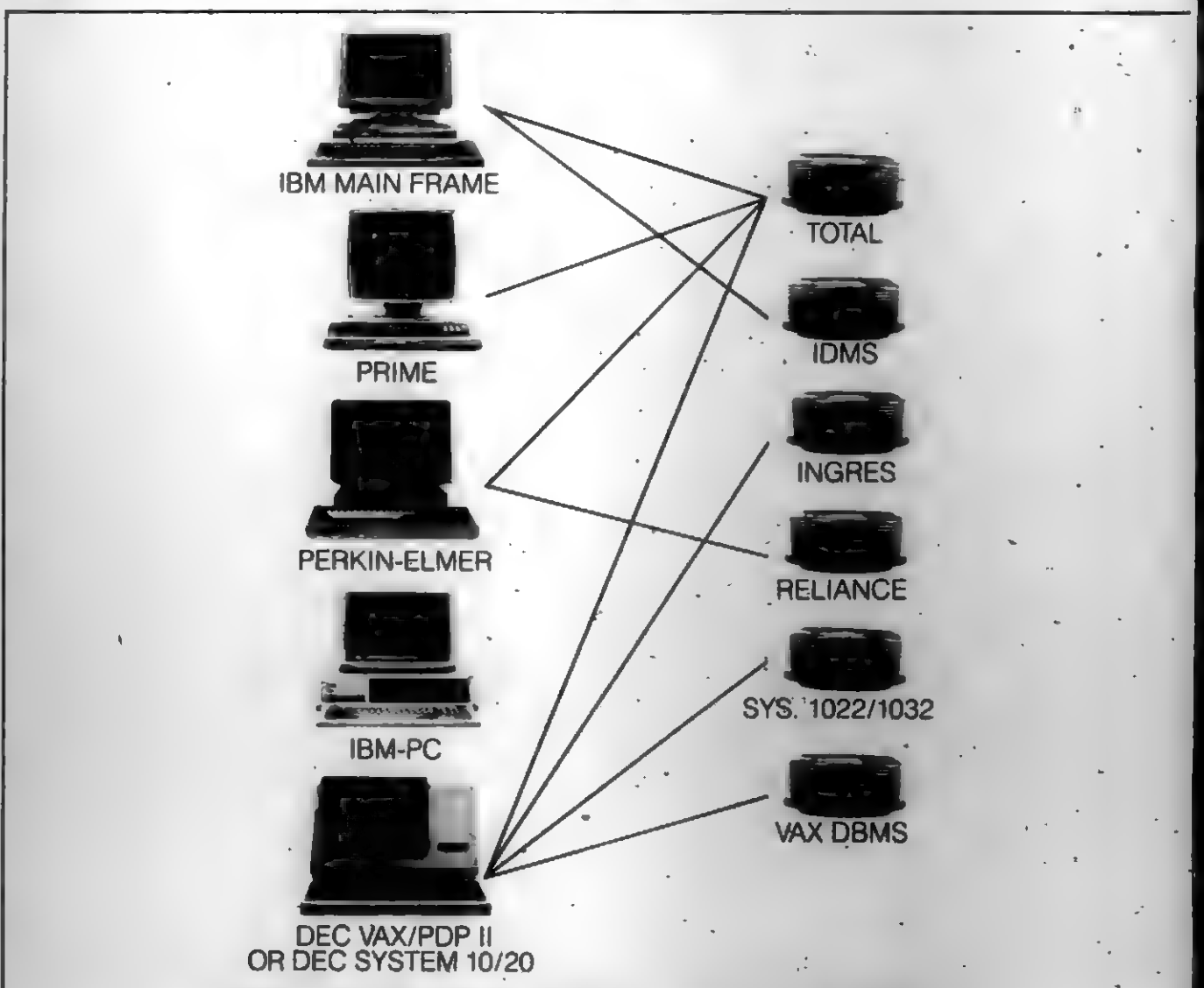
But the department backed away from an earlier stance that the investigation should be primarily handled within the Justice Department and said it would cooperate with the CAB's current effort to develop those regulations.

Both agencies have been investigating complaints that the providers of the computerized airline reservation systems are using them in anticompetitive ways. American Airlines and United Airlines, which through their Sabre and Apollo networks control most of the more than $20 billion in annual computerized reservation business in this country, have vigorously denied that their systems are used to stifle competition in any way.

The CAB, however, decided recently that specific regulations are needed to guide the use of the computer systems and has requested public comments, due today, on its effort to develop those rules by early next year [CW, Aug. 15].

The Justice Department, which is continuing its own investigation, had asked the CAB in April to hold off and allow the department to take the lead in this inquiry [CW, May 2]. In an Oct. 5 filing with the CAB, however, Justice Department Antitrust Chief William F. Baxter said his office will cooperate with the CAB rule-making procedure and defer acting on its own until the CAB action has been completed.

The agency also revealed that it has interviewed more than 100 people and reviewed more than 100,000 pages of documents. The Justice Department said it needed more time to put this material in a format to help the CAB and requested an additional month to deliver its comments for the CAB inquiry. The department said it will file "comprehensive, substantive comments and proposed rules in this proceeding."



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Fears High Rate Increases

Consultant Cites Problems in AT&T Breakup

By Peter Bartolik
CW Staff

CHICAGO — The compressed time frame of the pending Bell system divestiture is leading certain interests "to try to take advantage of the situation," according to a consultant who is studying the situation for some of the largest retail chains in the country.

William Page Montgomery, vice-president of the consulting firm of Economics and Technology, Inc., pointed out several problems in the current process during a meeting last week at the National Retail Merchants Association's (NRMA) 25th Annual Retail Systems, Technology and Communications Conference. Montgomery's firm represents several large corporations, including Montgomery Ward & Co., Inc., helping them to keep track of tariff requests and to file rate arguments before regulatory agencies.

Telephone companies at the state level, Montgomery told the NRMA, are "mirroring" rate requests that have been filed with the Federal Communications Commission (FCC). "A lot of local telephone companies are telling states [regulatory agencies] that their rates [for certain intrastate services] must be the same as those filed with the FCC for interstate services. . . . The result would turn out to be a bigger rate increase than would otherwise be," he declared.

CW At NRMA

Bills being considered by Congress that would alter aspects of divestiture by AT&T contain provisions that would place taxes on the development of alternatives to Bell operating company services, according to Montgomery. "We see these bills as a vehicle to tax business and in particular to tax new technology."

The legislation being considered is supported by consumer groups that have "a misconstruction of the facts about what will happen" and by smaller telephone companies that over the years have obtained lucrative rate provisions they want to protect, Montgomery claimed. "In some states, they make out like bandits," he added.

Montgomery said his firm maintains a data base on telephone tariffs, and recent submissions will probably double the size of that data base. It is too early to analyze how all the rate requests will impact business, he added.

His firm is advising clients not to devote any resources in the remaining months of this year on telecommunications systems. "The dust is settling," he said. "Wait a little longer, and you'll be able to see more clearly in terms of management planning issues."

Most of the impact of divestiture is becoming clearer, he added, except for the impact of surcharges on data networks. "This is an area that we're going to have to look at carefully in terms of planning," he said. But Montgomery thinks surcharges are one area that will be changed because of widespread opposition.

Cable TV Bill Reaches House

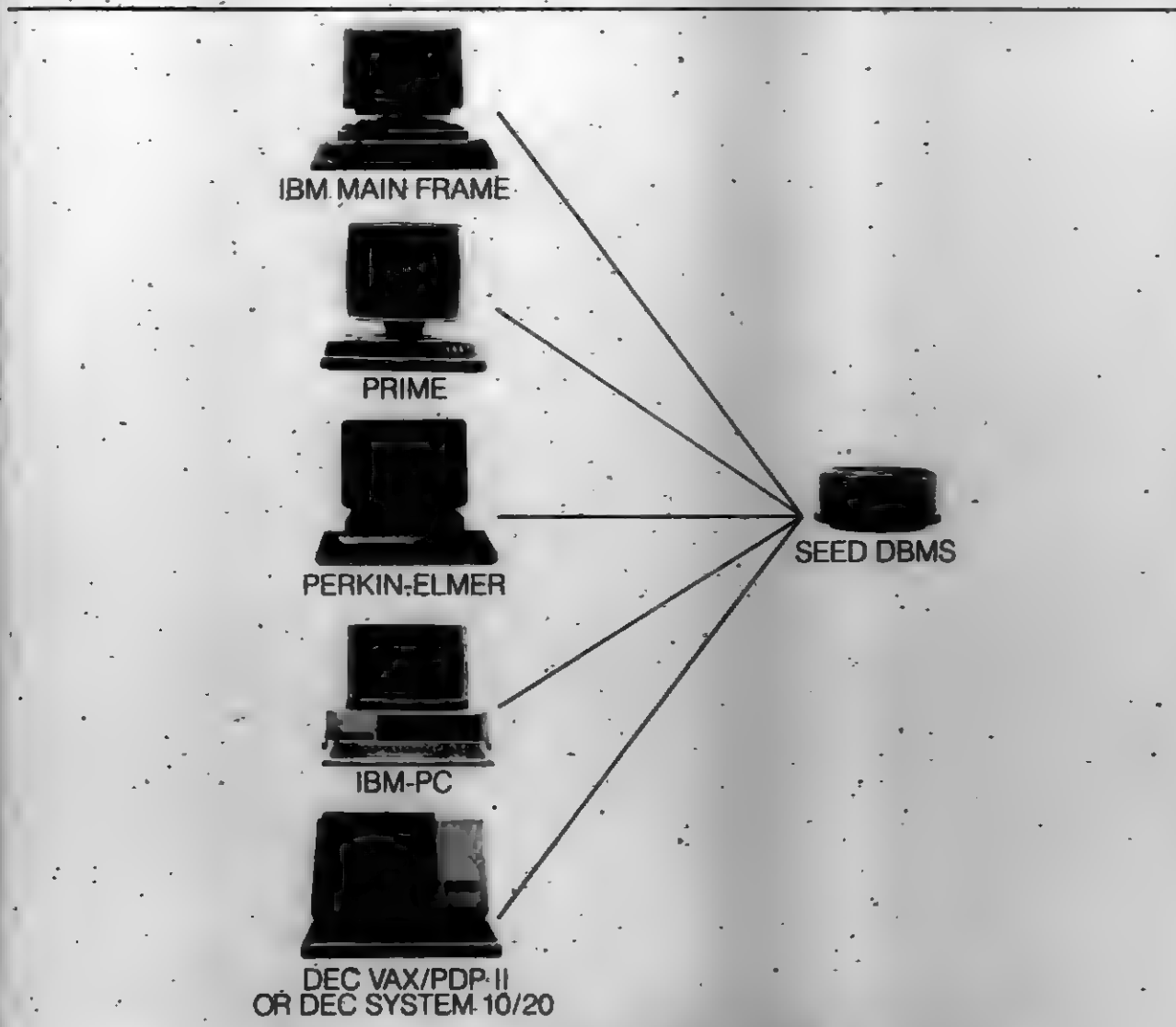
WASHINGTON, D.C. — A cable TV bill permitting regulation-free bypass of the telephone network was unveiled in the House of Representatives earlier this month.

If cable TV operators are allowed to offer data transmission services free of regulation, users in a number of cities might be able to communicate with intercity networks without having to go through their local telephone systems.

However, telecommunications legislation pending in both the House and the Senate still would require users of such bypass facilities to help support their local phone companies. The legislation imposes a surcharge on any circuit that can be used in place of local exchange facilities.

The legislation introduced in the House last week by Telecommunications Subcommittee Chairman Tim Wirth (D-Colo.) — H.R. 4103 — has 22 cosponsors, enough to get it passed by the subcommittee. But neither Rep. John Dingell (D-Mich.), chairman of the parent House Commerce Committee, nor Rep. James T. Broyhill (R-N.C.), its ranking minority member, has endorsed the bill. Subcommittee hearings are scheduled to begin late this month.

One provision of H.R. 4103 "prohibits common carrier or utility regulation of cable systems offering data transmission services," a subcommittee spokeswoman explained. This provision reportedly is similar to language in a cable TV bill (S. 66) passed by the Senate last summer over the opposition of AT&T and the National Association of Regulatory Utility Commissioners.



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EFT Acceptance, Direction Debated

By Peter Bartolik
CW Staff

CHICAGO — The presence of an electronic funds transfer (EFT) capability at or near the retail checkout counter is rapidly growing and seemingly accepted in the retail industry. But questions remain about the type of technology that will dominate, the ownership of equipment and who will make a profit.

Differing views about what direction the technology and consumer retailer acceptance will take emerged during a panel discussion and an interview held here last week at the National Retail Merchants Association's 25th Annual Retail Systems, Technology and Communications Conference.

Recent studies — including one from the Federal Reserve System indicating consumer acceptance of debit cards — and development of shared automated teller machine (ATM) networks into national EFT access systems seem to have sparked increasing vendor and user interest in EFT at the retail level. Throughout the year, press releases have come at a furious pace announcing experiments in direct-debit point-of-sale (POS), automated gasoline dispensers that will accept credit and debit cards and supermarket and convenience store chains locating ATMs on site.

"There seems to be some consensus that [EFT] is going to be the wave of the future and eventually is going to happen," declared Steve Clarkson, systems support manager and EFT coordinator for Lucky Stores Corp. "But the question is how will it happen; who will own the equipment — banks, retailers or a third party — and who pays for it?"

Helen Tepperman, vice-president and manager of business services for Wells Fargo Bank, said her organization already offers direct-debit POS to bank customers shopping at Livingston Brothers, Inc. women's fashion stores in northern California and at Shell Oil Co. gasoline stations. It recently entered into Interlink, a shared POS system, with four other major banks in California. But, she said, the big question remains consumer acceptance.

Tepperman said banks have acclimated consumers to "float," whereby payments on purchases are deferred for up to 45 days, and consumers also have questions about security. When a question arises on a credit card purchase, the consumer refuses to pay, and either the retailer or the bank extending credit is "out" the money; with a debit card purchase, however, "if you rip the money out of the consumer's account, it is going to be his life insurance payment that bounces next month."

Wells Fargo, according to Tepperman, is relying on heavy consumer education campaigns and promotion gimmicks — such as discounts on purchases — to convince consumers to do business on a direct-debit basis.

Third-Party Services

Doug Brooking, president of Comet Corp. and its third-party switching service, Cashex, which connects retailers to banks, said retailers might be well-advised to select a third-party system rather than contract with a bank or purchase their own system.

CW At NRMA

Success of direct-debit POS, Brooking said, depends on large volume, must be profitable and must be accepted by consumers. Part of that acceptance, he said, depends upon customers of various banks being able to access funds at the same grocery store.

"You don't want customers to perceive that you're pushing a particular banking institution," he said.

Helene Duffy, principal of the consulting firm of Duffy & Duffy, which was instrumental in merging shared regional ATM nets into the national ATM net now known as Nationet, has long urged bankers to get their EFT act together before somebody else steps in. At last week's discussion, she seemed to concede that bankers may have missed the boat.

"You have a host, a variety of approaches to move into EFT areas; there are some 200 shared ATM networks around the country, and many of them have switches. Retailers might even decide to buy ATMs and link them into those switches," she said.

She referred to the recent announcement made by Publix Supermarket, Inc. in Florida that it will establish both ATM and direct-debit POS systems in the statewide grocery chain.

CW Photo by P. Bartolik

EFT may be a sure thing, but major questions remain to be answered, Steve Clarkson said.

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—Bob Frankston, President, Software Arts (Wellesley, Massachusetts)

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Stresses Training, Support for End Users

Exec Outlines Sears Roebuck's Plan for Micros

By Peter Bartolik
CW Staff

CHICAGO — Providing end-user computing capability where it is required is the "mission" of data processing professionals at the Sears, Roebuck & Co. retail organization.

Robert L. Wieseneck, national manager of Systems Planning and Information Services for the retail giant, told a session at the National Retail Merchants Association's 25th annual Retail Systems, Technology and Communications Conference that the growth in end-user computing has just begun and urged DP professionals to contribute.

"Your DP department can make the greatest contribution by offering planning and gaining the respect of end users," Wieseneck said.

At Sears, a decision was made in 1981 to offer direction with regard to the proliferation of microcomputers. Without such direction there would have been chaos, Wieseneck said.

"Our mission was to provide all of the end users' necessary tools," he said.

Sears selected one microcomputer for corporate use, the IBM Personal Computer, and established training and support services for users.

"That allows us to better integrate with existing office systems," Wieseneck said.

CW At NRMA

Sears presently has 100 integrated office systems in use and plans for more than 500 by next summer.

Wieseneck's department has also established similar services for end users with regard to mainframe computers.

Sears' Information Services Department is organized into two groups: mainframe support and micro support.

The mainframe support group has trained 300 end users who have developed 500 applications; the micro support group, according to Wieseneck, has trained 800 end users who have trained another 400 people to use the Personal Computer for specific packages.

According to Wieseneck, an information services manager develops, promotes and monitors systems, while information services consultants each develop expertise on a particular software product. The consultants identify user requirements, recommend hardware, coordinate long-term planning and administer software.

In the mainframe area, the program runs formal classes in basic and advanced computing, with hands-on training and instant instructor assistance; an information services user guide has been published; and a menu-driven approach to accessing data has been implemented.

On the micro side, employees "from every area and job description" have been educated on the Personal Computer; all end users initially were trained to use Visicorp's Visicalc and lately have been trained with Lotus Development Corp.'s Lotus 1-2-3; a micro newsletter provides information on new products and programs that have been written by other Sears end users and are distributed by the Information Services Department.

The biggest challenge ahead, Wieseneck said, is to offer communications as end users seek access to other end users and to the mainframe environment.

"The trend in end-user computing has just begun and will continue to grow," he said. "End users contribute to that growth. Most users are no longer afraid of computers — they are fascinated."

Workshops To Target DP Crime

SAN FRANCISCO — The International Association of Computer Crime Investigators is holding a three-day workshop on computer crime here this week at Golden Gate University. The workshop will be repeated in Chicago on June 6-8, in New York on Sept. 19-21 and in Washington, D.C. on Sept. 26-28.

The workshop is designed for investigators, prosecutors, security officers, electronic data processing auditors, attorneys and other officers responsible for protecting company assets. Its purpose is to provide the investigator with effective tools for case planning, evidence gathering and identification, use of expert witnesses and case presentation.

The registration fee is $425. A 20% discount will be available for single organizations that register three or more members.

Additional information is available from the International Association of Computer Crime Investigators, Suite 8F, 1100 Gough St., San Francisco, Calif. 94109.

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Opportunities Seen Bleak for Retail DPers

By Peter Bartolik
CW Staff

CHICAGO — Successful DP professionals in the retail industry who hope to move up to general management positions face long odds, burdened with corporate perceptions that they are specialists.

That was the bleak observation delivered by a chief executive officer in the keynote address last week at the 25th annual meeting of the National Retail Merchants Association's Retail Systems, Technology and Communicatons Conference.

Carroll E. Ebert, chairman and chief executive officer of Carson Pirie Scott & Co., said that retail corporations tend to select key executives first from the ranks of operations personnel. "The contoller and financial executive also appears to have the inside track," he said.

CW At NRMA

Speaking to a large audience dominated by management information systems personnel, Ebert declared, "Your ability to move up and out into general management is probably frustrated."

DP professionals in the corporate environment are generally considered to be specialists and are not considered to be merchants, according to Ebert.

He said the key factor in promotion to upper executive management positions is the quality of "being a good merchant."

The credentials of top executives "usually reflect a career with a long string of rapid promotions . . . typically in buying areas," Ebert said. "Management of that area of a company is almost totally precluded to the management of information services."

While conceding the difficulty, Ebert said, "There should be opportunities for managers of your skills to move into finance and operations."

He recommended that DP executives consider educational improvement, such as obtaining a master's degree in business administration.

On the job, DP professionals who hope to move up "should think and act as major store executives . . . [and] try to be an important resource to the personnel executive, operations executive and finance executive." They should also personally involve themselves in the conceptualization, development and implementation of all new information systems.

DP hopefuls face a similar problem to women executives hoping to climb the corporate ladder. Ebert noted, "There are not enough of them in the top ranks today."

DP executives should try and "infiltrate" the ranks of corporate networks by developing their subordinates.

"Looking forward, I see a spectacular opportunity for you," Ebert told his audience. "You are unusually blessed with paying the highest starting salaries. Pick carefully and look for potential corporate presidents. Hire these people and train them and work with personnel management to transfer them in the first three to five years to the areas of finance and operations."

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Common Meet Slated for Oct. 22

CHICAGO — Common, the IBM user group, will hold its Fall 1983 Conference at the Phoenix Hilton from Oct. 22 to Oct. 26.

A highlight of the conference will be several presentations on the introduction of the IBM Personal Computer into the corporate setting. IBM will provide information on the latest technical aspects of its product.

Among the speakers at the conference will be Lou Veltri of Software Plus, Inc.; Tom Longman from The Systems Center, a Texas firm; Steve Papermaster of MCM Systems of Texas; Don Chapin of CBIS Corp. in New York City; and Ron Berry of Peerless Engineering in California.

Preregistration fees are $100 for members and $160 for nonmembers. On-site registration fees are $130 for members and $180 for nonmembers.

Further information on the users group meeting is available from David G. Lister, Administrative Director, Suite 1717, 435 N. Michigan Ave., Chicago, Ill. 60611.

VSE Users Group To Elect Officers

WALTHAM, Mass. — The New England Users of VSE, a group of technical systems support staff within the IBM DOS/VSE user community, will hold elections for officers on Nov. 30.

The group, which focuses on how to use, support and evaluate IBM operating systems, holds monthly meetings. The meetings include a discussion and a forum for users to share problems, solutions and shortcuts.

More information about the group is available from its president, Terry Spalding, at the New England Journal of Medicine, 1440 Main St., Waltham, Mass 02254.

More Vendors Eye Asynch-3270 Compatibility

By Ed Scannell
CW Staff

NEW YORK — With an increasing number of Fortune 1,000 firms complementing their IBM mainframes with superminicomputers made by companies such as Digital Equipment Corp. and Data General Corp., several terminal manufacturers attending this year's 10th International Information Management Exposition & Conference (Info '83) said they have added or plan to add asynchronous communications abilities to their IBM 3278-compatible terminals.

In the not-too-distant past, the only way the 3278 and compatible terminals could communicate with an IBM mainframe was bisynchronously. This meant 3278 users were captives of the IBM environment and unable to access the data bases of the asynchronous non-IBM superminis and mainframes.

However, the demand from many Fortune 1,000 companies for the distributed processing capabilities of the DEC and DG superminis has recently become so great that makers of 3270-compatible terminals feel they can no longer ignore it.

The first and so far only vendor to bring to market a 3278-compatible terminal system with asynchronous communications abilities is Lee Data Corp. The company introduced its first asynchronous 3278-compatible terminal, the Series 400 terminal system, earlier this year.

'Target Customer'

"Our target customer is the guy that has five mainframes in one building. We can give him the capability to go outside the IBM world to other vendors' systems," Frederic Sweeny, Lee Data's senior vice-president of marketing, said during an interview at Info '83. Sweeny reported that Lee Data has accounts with 70 of the Fortune 500 companies.

Lee Data's Series 400 can communicate with the DEC VAX-11 supermini as well as with the Decsystem-10 and Decsystem-20 mainframes by emulating DEC's VT52, VT100 and VT132 terminals. Sweeny said Lee Data also plans to make its terminal systems compatible with Hewlett-Packard Co. and DG superminis.

Lee Data has been able to add capabilities to its 3270-compatible terminals without sacrificing any compatibility, Sweeny claimed. Besides asynchronous communications, another capability not available on the 3270 is the ability to download files from all 370-compatible mainframes, manipulate that data locally and send it back to either the IBM mainframe or to a DEC mainframe.

Lee Data unwrapped its latest asynchronous 3270-compatible product, the Model 311 dual-host controller, here at Info '83. The 311 contains two remote communications interfaces that operate concurrently, enabling display stations to switch freely between one of two IBM or IBM-compatible mainframes.

According to a spokesman for Lee Data, this capability should increase cost savings by doubling the range of host applications that can be accessed by one terminal op-

Sweeny said Lee Data provides its controller unit, which plugs directly into the back of "any 4300 series and

CW at Info

up mainframe," to two of its competitors, Raytheon Data Systems Co. and Racal-Milgo, Inc., through OEMs.

However, it does not provide those two firms with the proprietary software that will allow their systems to communicate asynchronously, according to Sweeny.

Bert Hochfeld, marketing director for Raytheon, said his firm is currently working on putting asynchronous communications abilities up on its 3270-compatible terminal system. However, he could not say whether such a product would actually be available.

Likewise, a Racal-Milgo spokesman said his firm is "looking into" making its

(Continued on Page 24)

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One Unified Strategy

Users Told Both Micros, Mainframes Need DSS

By Paul Gillin
CW Staff

NEW YORK — Users who are puzzling over whether to implement decision support systems (DSS) on a mainframe or a microcomputer should consider doing both, according to a speaker at the 10th International Information Management Exposition & Conference (Info '83) held here last week.

CW at Info

Chris Brown, a product manager at EPS International, Inc. in Windham, N.H., said the strong trend toward linking micros to mainframes will underscore the need for a DSS strategy that encompasses both kinds of hardware. A distributed DSS, as he termed it, uses micros for financial modeling and data manipulation and then passes the data to the mainframe for more complex modeling not available on micro packages.

One EPS client company implemented the concept after selecting a mainframe DSS and forming appropriate support and user groups. The onslaught of micros forced the company to revamp entirely its DSS strategy to make up for differences in response time, training and complexity.

The company revised its strategy "to use single tools for single problems," Brown said. The three-tiered structure uses Lotus Development Corp.'s Lotus 1-2-3 spreadsheet, graphics and data base package at the micro level for local modeling.

The company also uses EPS' Micro FCS with a tie to the mainframe to handle medium-size applications. Problems that require more intensive computing resources are run on the mainframe using FCS-EPS, a large DSS tool.

Distributed DSS presents some new problems, Brown conceded. Redundancy of data and effort is a concern, as is the loss of control and security at the corporate level.

Incompatibility of different micros can be a problem if the micro-buying strategy is not well articulated and increased support and training are required to familiarize the users with the new structure.

However, distributed DSS reduced time-sharing costs and opened the computers to a much wider base of users, he noted. Current trends in DSS also seem inevitably to lead to a structure in which both kinds of computing are incorporated.

Three Categories

Three categories of distributed DSS are in common use today, Brown observed. One uses spreadsheets on the micro with a separate mainframe-based DSS. This is a relatively inexpensive structure with a large user base and a great deal of idea-sharing between users. However, the incompatibility of the two systems means that files must go through a conversion process to be transferred to the mainframe, the users must learn two different languages and the mainframe DSS features are not available on the micro.

A second strategy uses an identical subset of the mainframe DSS on the micro with a direct communications link and full screen data entry. This structure eliminates the language and incompatibility problems and offers improved flexibility; however, it also extends a great deal of power to users who may not require it.

A third scenario incorporates a micro-style product offered by a mainframe vendor. Such a product typically offers a wider range of mainframe-like features but is usually not completely compatible with the mainframe DSS, Brown said. The user usually cannot transfer all aspects of the micro spreadsheet to the mainframe and has to learn a communications procedure to begin to do so, he concluded.

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Don't Rush Into DSS Arena, DP Managers Say

By Paul Gillin
And David Myers
CW Staff

NEW YORK — Slow and steady wins the race. At least that was the view toward decision support systems (DSS) voiced by DP managers interviewed at random at the 10th International Information Management Exposition & Conference (Info '83) held here last week.

Most of the managers are either in the initial stages of implementing a DSS or are actively looking at tools to provide such support to the users. However, none is rushing headlong into the DSS arena, most preferring to let the wishes of users drive the process.

AFG Industries, Inc. of Kingsport, Tenn., "already has DSS but [does not] have a corporate definition as such," according to Robert Glick, vice-president of management information systems (MIS). Although a coherent strategy for formulating DSS has not been determined at AFG, Glick is interested in "setting out on the micro those things that are portions of DSS without calling them 'DSS' — things like spreadsheets."

However, Dave Redd, AFG programming manager, noted that management is more concerned with reducing the applications backlog than with defining DSS strategies.

"We've installed 15 major applications in the past 18 months, which is probably more than the company has done in the previous five years, and it still isn't enough," he said.

Glick added, "We have to have DSS, but it may not be under that name." He is considering using back-end hardware to tie the users into the corporate data base.

Growing Into One

Although his company has no DSS up-and running, Richard D. Tuschick, manager of data systems and services at UNC Naval Products in Uncasville, Conn., said his company is "not necessarily behind. We're growing into one.

"We don't jump into something just because it's trendy. It's got to have a hard payback," Tuschick said.

Tuschick called DSS "more talk than action" in the industry, "mainly because of the expense involved." His company's strategy is to "take smaller steps to get up to a fully integrated DSS. We will be acquiring pieces to fill specific voids and meet immediate needs at a lot less cost."

Bendix Electrical Components of Sidney, N.Y., has had a DSS running for seven months, primarily in the areas of accounting, finance and employee relations. Roy D. Straka, manager of MIS operations, also believes DSS at this stage is more talk than action. "I personally believe it's a trend [created] by vendors to sell hardware and software," he said.

Like many companies, General Electric Co. in Pittsfield, Mass., "doesn't have something called DSS. We have something that provides information to managers from the mainframe," according to Lee Woodry, manager of systems and staff support.

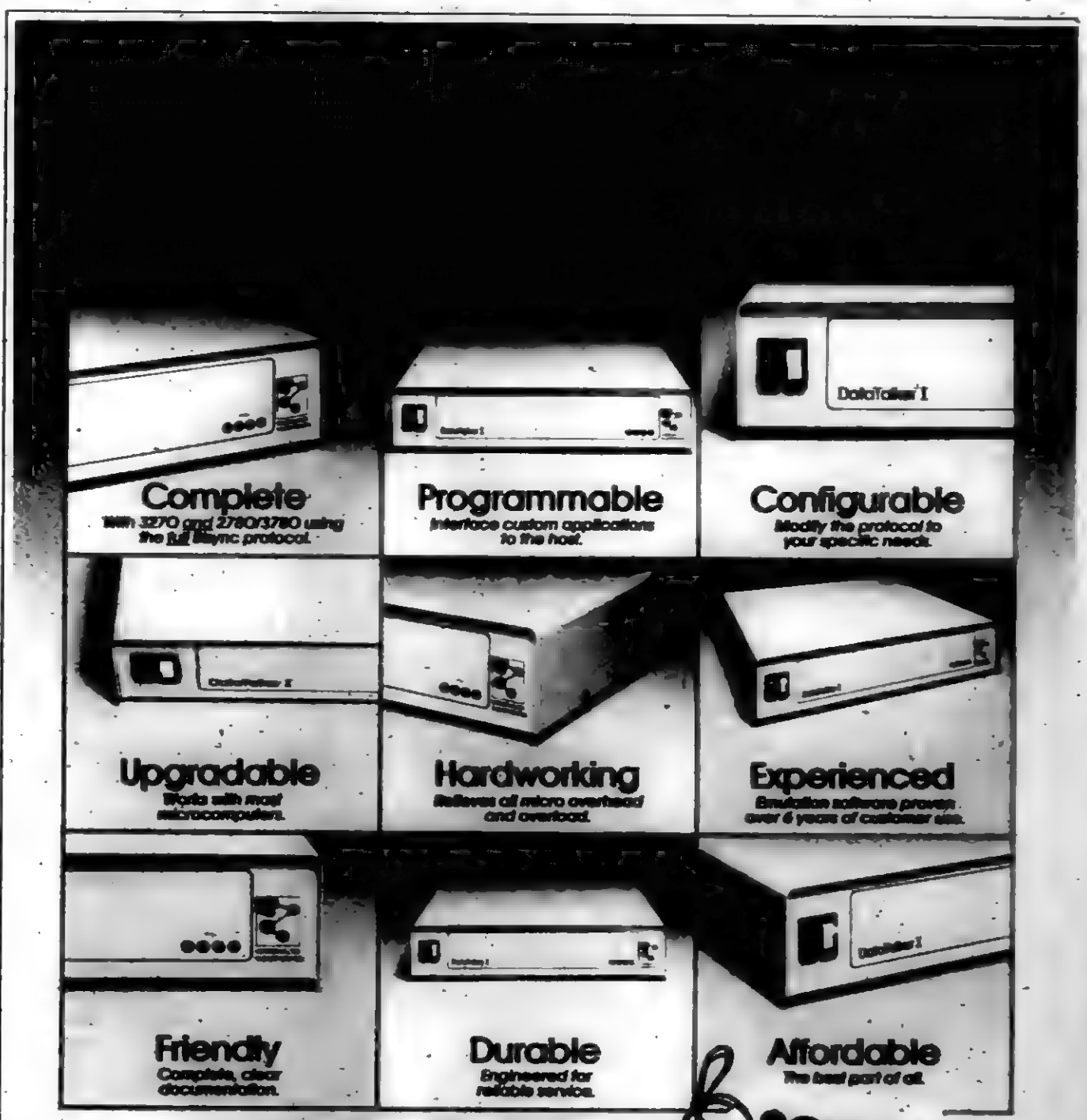
The company is using terminals connected to a minicomputer that acts as a pass-through to the mainframe to retrieve data from the data base.

Woodry said that the location's manager of financial planning and analysis has been pushing for a more formal DSS, but "I haven't been able to get a general manager to push for it."

CW at Info

Coming to Info '83 to "get a survey of what's out there," Woodry said he was impressed by the proliferation of IBM Personal Computers at most companies. "Nearly everybody is using them," he remarked.

A "total solution" may be in the cards for the DSS needs at CBS Radio, a division of CBS in New York. "We see the need coming down the pike because of the proliferation of [IBM Personal Computers]," Steven G. Peppard, director of MIS, said.



Seven of 10 Managers Polled Plan Local Nets

By Katherine Hafner
CW Staff

NEW YORK — When asked a year ago whether they had concrete plans for installing a local-area network, most DP managers would likely have answered no.

But an informal floor survey of information systems managers at last week's 10th International Information Management Exposition and Conference (Info '83) here indicated that the local-area network is finding its way into an increasing number of offices.

Seven out of 10 people questioned said they have either installed a local-area network or have definite plans to install one in the next few months. And the most frequently cited reason for installing a local-area network is the advantage gained from a shared-resource environment.

Thomas A. McWalters, vice-president of systems and data processing at the Chase Manhattan Bank in New York City, said his office is in the process of installing a local-area network, and he expects it to be finished this year. With a local-area network, McWalters expects to save the cost of expensive cabling while enhancing communications.

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W. T. Rush, a partner at Coopers & Lybrand in New York, expects to install a local-area network within a year. His company is looking to a local-area network for its flexibility, providing "a wide variety of terminals with the ability to access each other," he said.

"We've had a local-area network for two years," commented Thomas Stryker, vice-president of operations at Barnett Bank Trust in Jacksonville, Fla., where a Datapoint Corp. Arcnet is in place. "Our local-area network has put processing power right in the users' hands, while data can go directly to the source."

But as for whether local-area networks will ever be truly pervasive, Stryker, among others, has his doubts: "I think there's a place for local-area networks, but I'm not sure what that place is. With so many personal computers entering the office, it's difficult to say. But personal computers can't truly share information; they can only pass it."

Others, such as Hal Womersley, vice-president for data processing at Academy Insurance Group, Inc., said local-area networks may have their place, but it is not with his firm. "We don't really need to go from CRT to CRT," Womersley said. "Local-area nets belong in companies with a strong centralized system that are more oriented toward office automation than large data bases on mainframes."

Links Seen On the Rise

(Continued from Page 19)

3270-compatible terminal systems asynchronous, but he declined to say when that capability would be deliverable.

"Fortune 1,000 firms want one terminal that can access multiple mainframes. Of the Fortune 1,000 companies, about 900 have VAX systems," noted Fred Schlaffer, vice-president of research and development for the Westboro, Mass.-based Three R Computers, Inc.

Schlaffer's firm introduced a protocol converter that allows access to IBM environments via a coaxial cluster controller connection for any Ascii terminal.

Asked why IBM has been slow to react to its customers' needs to hook up with DEC and DG supermini's, Schlaffer said he suspects IBM is waiting for the DECs and DGs of the computer industry to come to the bi-synchronous world instead of waiting for IBM to commit to the asynchronous world.

"IBM has never offered any support for asynchronous. [It] doesn't want . . . DEC and [Prime Computer, Inc.] to be able to access its equipment," Schlaffer speculated.

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Three Factors Seen Critical in Micro Integration

By Ed Scannell
CW Staff

NEW YORK — Large corporations planning to equip all levels of staff and line management with microcomputers should carefully consider how they are going to integrate the micros into their particular corporate environments.

This advice was dispensed during a panel discussion called "Personal Computers in Large Companies" at last week's 10th International Information Management Exposition & Conference (Info '83) here.

CW at Info

According to session chairman Alan Goldberg, director of management advisory services for the Detroit-based Deloitte Haskins & Sells, management information systems (MIS) personnel must consider three important factors when integrating large numbers of microcomputers into their organizations: hardware, software and communications.

The first hardware dilemma MIS directors must solve is whether they need an 8- or 16-bit system, Goldberg contended. "If you have an application that you think needs more than 128K [bytes] of memory, you will need a 16-bit system," he said.

Once that decision has been made, MIS directors must then decide from which one of the 100 or so microcomputer manufacturers they want to purchase their systems. Goldberg said companies planning to place very large orders will probably have to buy from more than one vendor. "For instance, [Hewlett-Packard Co.'s HP 150] is a good engineering machine; IBM's Personal Computer is a good general-purpose machine; and [Wang Laboratories, Inc.'s Professional Computer] is good at word processing," he observed.

CW Photo by L. Hatay

Rick Inatome told Info '83 attendees that the products appearing to be de facto standards today may be quickly overtaken by their competitors.

However, Goldberg added, perhaps the most important consideration in selecting a vendor is knowing that it will be around for a few years to support the micros.

The third hardware issue that must be addressed is media. Goldberg suggested that companies purchasing systems from a number of manufacturers make sure they can transfer disks back and forth among the machines. "When there is no [media] compatibility, there can only be trouble," he warned.

Market Share

Rick Inatome, president of Computer Mart, based in Troy, Mich., said it is important that MIS directors in the process of selecting the proper hardware, software and communications be aware of the market share each product holds. Inatome suggested that MIS directors purchase products they can "standardize around."

However, he counseled session attendees, products appearing to be de facto standards today, such as Visicorp's Visicalc spreadsheet, may be quickly overtaken by their competitors.

For example, Inatome said Visicalc for a long time held approximately 70% of the spreadsheet market, but recently dropped to a 59.8% share. And while its competitor, Lotus Development Corp.'s Lotus 1-2-3, only has 8.3% of the market; "it is clear we are seeing the emergence of something that might be considered a standard. Today there are more Lotus 1-2-3s being sold than Visicalcs."

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Make Fourth-Generation Language Easy to Use, Attendees Advised

CW at Info

By Paul Gillin
CW Staff

NEW YORK — Success in implementing an end-user computing environment using a fourth-generation language is contingent upon understanding the limitations of the language and upon writing the proper routines for users to extract and manipulate data, a consultant in fourth-generation languages said here last week.

Speaking to a session at the 10th International Information Management Exposition & Conference (Info '83), Hugh W. Ryan, a partner in the technical service organization at Arthur Andersen & Co. in Chicago, also stressed the need to make use of the language as easy as possible, even if it means initially sacrificing some security measures.

Ryan helped to implement Management Decision Systems, Inc.'s Express fourth-generation language at Northwest Industries, Inc., a Chicago holding company which boasts that 95% of its computing resources are devoted to end-user computing.

Ryan said it was possible to use a standard development model to install the fourth-generation system, but that some modifications were necessary.

Data Design First

The first involved switching the data design and system design functions so that data design was done first. "We found we can't ask the [system design] questions we've always asked because the user requirements change too quickly," Ryan noted. "The users may configure a system that then goes back and changes their requirements. Also, what the users want in one place may not be what they want in another."

Northwest found that the solution was contained in the fourth-generation languages, most of which "have internal data structuring assumptions that impose a data design. The implication for you is to know what that design is and work around it."

Some designs are inherently network-oriented while others are hierarchical, Ryan said. Thus, knowing what structure is used by that language can help the DP department make a better decision about whether a fourth-generation language is appropriate.

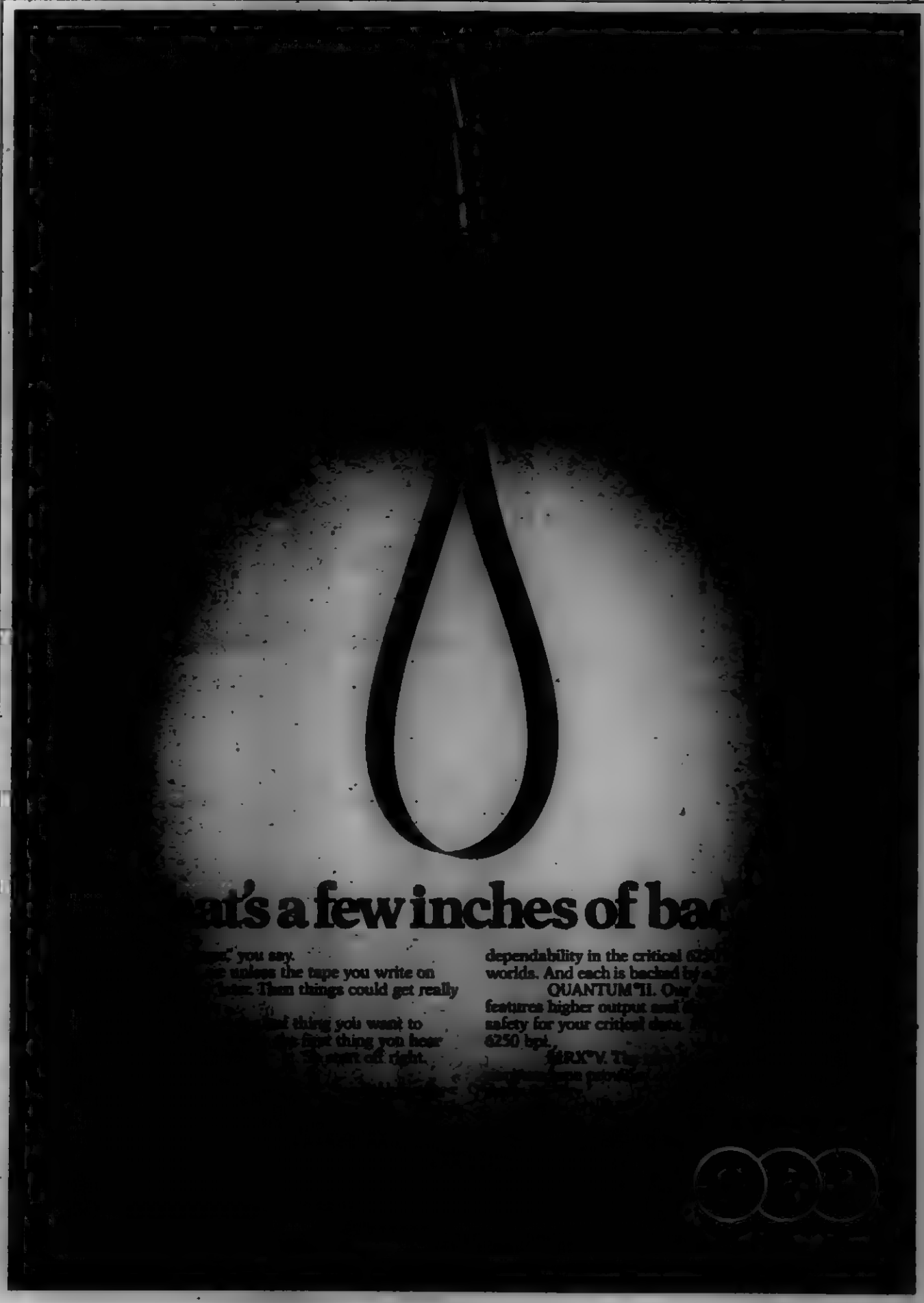
Designers ran into the same problems in designing a technical architecture. "The fourth-generation language imposes a technical architecture assumption on you," Ryan said. "The approach again is not to go around that assumption, but to conform to it."

Using Express, the designers found that the best approach was to set up a corporate data bank that was separate from the transactional data base. Data is extracted from the production tables at various machines on a regular basis using a data delivery system that includes translation tables, table maintenance, the data bank, data manager, support rou-

(Continued on Page 28)

CW Photo by L. Hafner

"In the early stages, you don't want to be concerned with security. You just want to get the users using," Hugh W. Ryan of Arthur Andersen & Co. told an Info '83 audience.



Tips Given on Fourth-Generation Language Use

(Continued from Page 27)

tines and a dialogue manager.

The data bank actually consists of a set of routines written to meet the needs of various users. "If you try to pull from the common data store, users will get bored very quickly," he said.

However, Ryan noted that the data delivery system is built in a third-generation language. "Fourth-generation languages don't easily handle these high-volume delivery systems," he said. "This creates a problem because if the user has to move across new data cells, it has to be done at third-generation language levels."

Validation and security should at first be handled in the data delivery mechanism of the new system, he advised. Although this may mean sacrificing some security features at first, "you don't want your users stepping through four commands just to get into the data base," he said. "In the early stages, you don't want to be concerned with security. You just want to get the users using."

Ryan stressed that systems design using a fourth-generation language should be accomplished with the help of an expert in the language being used. This can save time lost in needless design. "There are situations in which you don't need a valid design. You can just get down to the terminal and build the application."

The consultant is also a vital player during the implementation process, Ryan observed. He compared fourth-generation languages with early versions of IBM's IMS, in which bugs and system quirks were not always covered in reference materials. The expert can prevent the system from being shut down for hours while implementors scour the documentation for a solution to a problem, he said.

The last stage of the development cycle — testing — often has to be imposed upon the users, Ryan concluded. "Consistently users look at the data and say it's OK if it looks all right," he said. "That's not very acceptable to DP."

Testing procedures and measures have to be defined and endorsed by DP, although their value is not perceived by users.

Efta Elects Officers

WASHINGTON, D.C. — Mary-Pat Cottrell, vice-president of Citytrust in Bridgeport, Conn., will succeed Paul Hefner, vice-president of First Interstate Bancorp in Los Angeles, as chairman of the board of the Electronic Funds Transfer Association (Efta) here, the organization announced recently.

The association also announced the reelection of William R. Moroney as president and secretary and Timothy Dietz as treasurer. Dietz is a partner in the Washington, D.C., office of Price Waterhouse & Co., and Moroney is chief executive officer of Efta.

Albert A. Irato, executive director of the Matrix Financial Network in New York, was elected vice-chairman of the board.

Efta was founded in 1977 at the close of the two-year term of the congressionally mandated National Commission on Electronic Fund Transfers.

In 1981, the Electronic Money Council merged with Efta, forming what the association said is the only multi-industry electronic funds transfer organization in the country.

Efta also announced the election of six new members of the board of directors: Bruce Burchfield, president of Cirrus Systems of Oak Brook, Ill.; Stephen Cole, division head of electronic banking for First National Bank of Chicago; Joseph Denaro, vice-president for corporate credit for Zayre Corp. of Framingham, Mass.; John Farnsworth, senior vice-president of Chemical Bank in New York; Marilyn Gosz, director of financial systems for Fujitsu Systems of San Diego; and Robert Mooney, president of JC Penney Systems Services.

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Front-End Prototype Focuses on User

Speaker Outlines Applications Building Concept

By Paul Gillin
CW Staff

NEW YORK — Data processing departments have become expert at developing systems to specifications, but not at creating applications that impact the end user, Richard A. Carpenter, a vice-president at Index Systems, Inc., a consulting firm in Cambridge, Mass., said here last week.

The solution to that situation, according to Carpenter, lies in using an evolutionary development methodology that draws heavily on prototyping to build systems that meet user needs at the end — rather than at the beginning — of the development life cycle.

Speaking at a session at the Information Management Exposition & Conference (Info '83), Carpenter outlined an evolutionary methodology that includes a layered concept of building applications. The concept is based upon a realization that the information systems structure in most organizations is divided into three parts:

CW at Info

- The "back office" is the set of administrative and operation activities that monitor and translate real-world events into data form.
- The data base is the abstract of the real world that is relevant to the business.
- The front end is that data that is useful by any end user.

"Any information system requires close integration between these elements, both in flow forward from the back office to the data base to the front end and from the front end back about information that's in the data base," Carpenter said.

CW Photo by L. Heller

Richard A. Carpenter advocates an evolutionary development methodology that draws heavily on prototyping to build systems that meet user needs.

Current prototyping tools address a piece of the structure but not all of it, he said. Fourth-generation languages tend to focus on the front end, data management tools sit on the data base and teleprocessing monitors and screen facilities are in the back office. However, all the tools are moving in the direction of providing a more complete function, he noted.

"Conceptually, we want to build a front-end prototype that shows the user a window into that part of the data base and lets the user decide if that's what he wants," Carpenter said. After the prototype is constructed,

(Continued on Page 30)

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Scrolling	Standard Scrolling	Smooth, Jump or Horizontal Scrolling Split Screen	Smooth or Jump Scroll Split Screen
Transmission Mode	Conversation Mode	Conversation or Block Mode	Conversation or Block Mode
Editing	Limited	Full Editing & Protected Fields	Full Editing & Protected Fields
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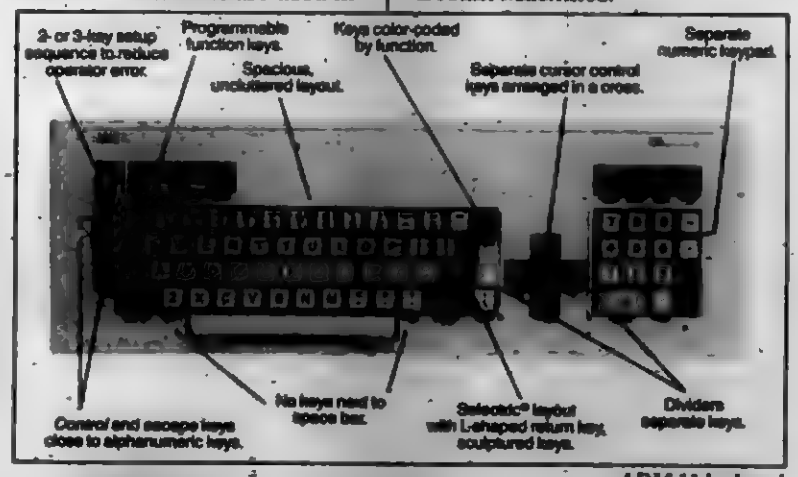

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Front-End Prototype Stresses User's Needs

(Continued from Page 29)

the analyst/builder creates the system nucleus, which is the operational back-office material that populates and supports the front-end prototype. System evolution involves repeating this task several times to layer the system to meet the user's expectations.

Carpenter stressed that prototyping should be thought of as one tool in the development methodology arsenal and not as a methodology in itself. "The front-end prototype is data obtained by extracts," he said. "It's operationally useful, low cost and quick."

The final application ideally should be data base-centered, segmented into the three parts of the information systems structure, integrated and evolutionary, he said. To achieve this, a standard systems architecture should be defined for the information systems structure as a whole.

"If the group can agree on a standard architecture, a great deal of value can come from that by avoiding reinventing the wheel every time a new system comes along," he said.

The architecture can include such factors as specifications for data base access, dialogue management and data validation.

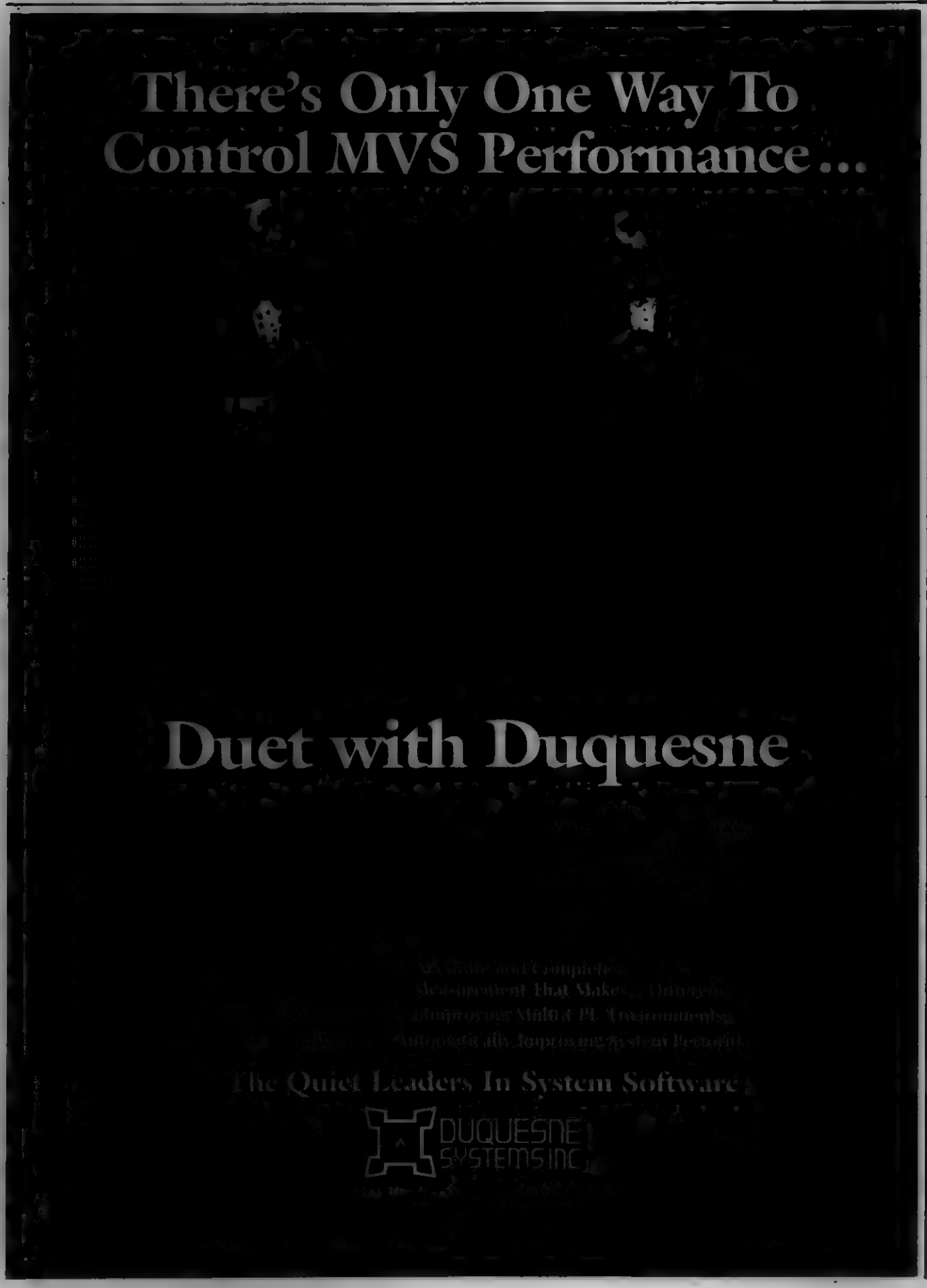
The DP shop next needs to agree on the application environment, including hardware, operating system, data base, fourth-generation languages and tools and facilities that are available, he said. "In most organizations, there's a collection of tools and utilities that provide overlapping islands and some gaps," he said. "A lot of time is spent figuring out what we are and aren't going to use."

Defining the application environment allows the analyst/builder to focus on the front-end prototype rather than the tools, he said.

The third area an information systems organization needs to define is the application development methodology, or the "how to" of design strategies. The most important segment of this is problem formulation, which should answer five critical questions: What is important about the problem to be solved? What is the system scope that is needed to answer the problem? What are the key segments? How does one proceed? What are the major obstacles to success?

To answer the last question, the developer and user need to identify key technical and responsibility issues. The goal is to identify everything that could possibly go wrong with the system and prepare a response to each one, Carpenter said.

The remaining stages of the development methodology should follow a similar approach of building a prototype and system nucleus with each stage scheduled to take a maximum of six to 12 weeks.



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LAS VEGAS — The Interface Group, Inc. will sponsor the fifth annual Comdex/Fall conference Nov. 28 to Dec. 2 at the Convention Center here. This year's conference will also include exhibitions at the Convention Center's newly opened West Hall and three nearby hotels: the Las Vegas Hilton, the Sahara and the Riviera.

About 1,500 companies are planning to have exhibits at the show, and The Interface Group projects this year's attendence will be about 75,000.

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DP Managers Say DSS Needed To Tie Together Corporate Micros

By David Myers
CW New York Bureau

NEW YORK — Talk of decision support systems (DSS) dominated last week's 10th International Information Management Exposition & Conference (Info '83) here. As personal computers sprout up throughout corporate organizations, the need to string them together by means of DSS takes on more and more importance, data processing managers told their fellows at two Monday sessions in the New York Coliseum.

"The whole personal computer environment is one we have to deal with effectively — and we have to understand it," Joseph E. Armstrong, director of information processing at the Mars Corp., explained.

The proliferation of personal computers will create dozens of "independent systems" within a corporation, according to Richard P. Bonzagni, director of marketing at Management Decision Systems, Inc. Bonzagni said individual computer users within an organization will almost "be going off and starting new departments."

Pulling them together into an integrated system will be the challenge facing the corporate DP manager, Bonzagni said.

Forbade Micro Buying

One large U.S. oil company forbade its department heads to buy personal computers for that very reason. Amerada Hess Corp., whose DSS has been up and running for nearly a year and a half, is "just now letting [personal computers] show up in a very controlled way," said John Gannon, Hess' director of management information systems. "Frankly, we wouldn't let them proliferate throughout our company because we were afraid of losing control."

Corporate DP managers must control access to the company's DSS, too, Armstrong warned. "On-line data base access is what everyone wants, whether he needs it or not," according to Armstrong.

James T. Beattie, manager of marketing and sales systems for Savin Corp., believes four points need to be kept in mind by anyone devising a DSS for a company:

- DSS is an "evolutionary process. Your goals will have to be moving targets," Beattie said. However, he cautioned DP managers to try to come up with a system that will recoup its cost within three years.
- The success of the DSS must be measured by the impact of management decisions made with its help, Beattie said.
- DSS is "no easy trip." Those who install one must be ready for a raft of problems.
- The system must be fully planned out to be successful. "If you try to react to DSS, you'll find yourself with a lot of different microcomputers floating around your company," Beattie said.

Savin's own decision support arrangement has been christened Stars, for Sales Tracking and Reporting Sys-

(Continued on Page 34)

CW at Info

Joseph E. Armstrong

James T. Beattie

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Position in Mart Called Key to Business Strategy

By Ed Scannell
CW Staff

NEW YORK — Formulating a proper business strategy depends not only on a company's internal cost and resource utilization factors, but also on the position and quality of its products in the marketplace relative to its competition's.

This contention was made by three speakers representing the Cambridge, Mass.-based Strategic Planning Institute (SPI) at a session titled "Using Information Technology to Improve Strategic Business Management." The session was held here last week as part of the 10th International Information Management Exposition & Conference (Info '83).

The three SPI speakers — Augustus van Nievelt, director; Bradley Gale, director of research; and Joaquim Brandco, manager of application software development — emphasized that all too often companies base their business strategies on information that is oriented toward accounting convention, the income statement and the balance sheet.

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"It's important to know how you stack up against the competition," Gale asserted, "but you won't find out through the balance sheet. Product quality, market share and productivity as compared to the competition is what determines your chances for success."

Gale said there are three important concepts involved in collecting information in these three areas for use in formulating a business strategy: the strategic business unit (SBU), the served market and the competitors.

Gale defined an SBU as a distinct set of products or services that serves a specific group of customers and competes against a well-defined set of competitors.

CW Photo by L. Heller

"It's important to know how you stack up against the competition, but you won't find out through the balance sheet," Bradley Gale told attendees at Info '83.

When focusing on SBUs, Gale underlined, the most important thing for managers to know is how the competition is affecting the SBU's financial performance.

A served market, according to Gale, is a niche within the total market.

Companies can best serve their niche markets first by offering a suitable product for their segment and, second, by making the kind of marketing effort that ensures their products will reach that segment, he said.

In light of the major advances made in information technology over the past few years, managers today can more easily obtain and apply information concerning the quality and market position of their competitors' products, Gale said.

He cited his firm's Profit Impact of Market Strategy (Pims) program as one example of how managers can more easily obtain and apply this kind of strategic information.

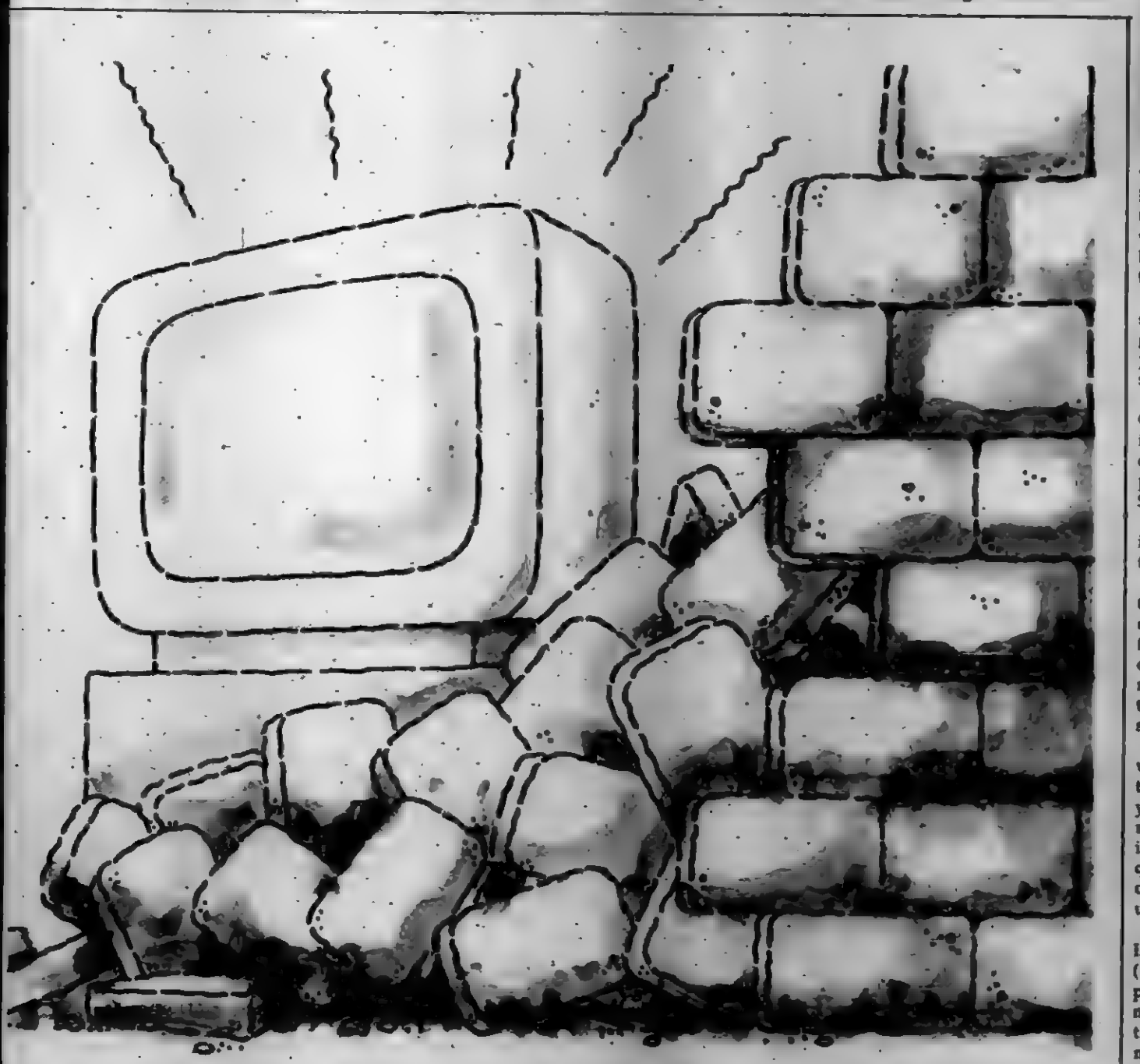
The Pims program is a data base that provides a base of information for its member companies developing or improving a business plan.

Each member company contributes information in a coded format about its own business experience to the data base.

The SPI staff then analyzes this information to discover general "laws" that determine what business strategy, in what kind of competitive environment, produces what kind of performance, according to Gale.

To date, several hundred member corporations have

(Continued on Page 34)



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Overcoming Human Obstacles Seen Key to Implementing OA Strategy

By Katherine Hafner
CW Staff

NEW YORK — Implementing office automation strategies is often a matter of overcoming human obstacles.

This is the opinion of Dr. Michael Zisman, president of Integrated Technologies, Inc. in King of Prussia, Pa. Addressing an audience here last week at the Information Management Exposition & Conference (Info '83), Zisman said that OA is an evolving definition, an elusive goal — and, he maintained, the office of the future will always be just that.

Strictly speaking, Zisman said, OA is the utilization of computer-based systems to enhance the effectiveness and productivity of personnel working in the office. "But whatever you call it, we all need to reconcile ourselves to the fact that it's all OA — delivering computer capability to the end user."

CW at Info

"To suggest that OA isn't happening is rubbish," Zisman asserted. "We're installing systems at a rate no one would have thought of years ago."

Nevertheless, the obstacles to the implementation of integrated office systems in a multivendor setting are manifold, and they affect vendors, implementors and end users alike, Zisman warned. "The challenge now is to move toward the integrated office system, either within or across vendors."

And as vendors keep coming out with products, it's harder and harder to create and maintain compatibility, he added. Moreover, vendors suffer from being unsure of user requirements, while "crying out to understand what people need."

A combination of poor human communication and "oversell" work to foster a lack of understanding. As a possible remedy, Zisman suggested asking specific questions of the vendor. But "the onus is on you to be extremely precise," Zisman reminded his audience.

Finally, Zisman suggested, specific strategies should be developed for planning, technology integration and control.

CW Photos by L. Hallin

Michael Zisman

'The Party Is Over,' Consultant Says of OA

By Katherine Hafner
CW Staff

NEW YORK — Does office automation have a future?

Ask that question of Michael Hammer, president of Hammer & Co., Inc. in Cambridge, Mass., and his answer will be brutally frank: "Let's face it. The party is over. Reality is setting in."

Such was Hammer's diagnosis of the state of office automation when he addressed attendees of the Information Management Exposition & Conference (Info '83) here last week.

"On the whole, we have to rethink our basic assumptions," Hammer asserted. Eschewing cost/benefit analyses for justifying office automation systems, Hammer suggested the focus shift instead to functionality.

"What managers and professionals should really do is think about the systems and how to use them. Multifunctional workstations in themselves are no good," Hammer said. "What you need is informational tools such as spreadsheets and financial modeling and data base tools."

The path to the office of the future is, in Hammer's view, an incremental one. "The reason personal computers are so successful is that you can buy them one piece at a time," he maintained.

According to Hammer, the "healthy people don't get OA because it's the thing to do, but because they have a problem they need solved. Leaders in office automation are not Fortune 500 organizations, but smaller companies which are big paper pushers, like law and governmental organizations."

Where is OA heading?

"We're not looking at administrative but business support of office automation. What we're really interested in is what OA will do for our business," Hammer said.

Hammer sees office automation as an investment — and not necessarily a cost-effective one. The rewards of office automation will eventually be seen in increased revenue from improved customer service and better resource utilization, he said. r said.

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October 7, 1983

DSS Targeted at Info '83

(Continued from Page 32)

tem. The unique setup measures salesmen's accomplishments not in terms of how many Savin copiers they must sell in a year or of how many dollars they must bring in, but rather in terms of how many "activities" — customer contacts, follow-ups, product demonstrations — it takes to clinch a sale.

"By starting with his [a sales representative's] productivity goals, you can back into the number of activities he has to perform in order to reach them," Beattie told attendees at the conference.

To do this, Savin hooked up personal computers in each of its sales branches, "putting control of the system in local hands," Beattie explained.

Although Savin's experience is thus the polar opposite of Amerada Hess', both companies decided to go with Comshare, Inc.'s System W in setting up their decision support systems.

Business Strategy Discussed

(Continued from Page 33)

contributed about 200 variables covering close to 2,500 businesses.

According to Gale, Pims allows companies to establish profitability benchmarks so they can "reality-test" their business plans and to delineate tactics successfully used by the data base's look-alike companies trying to achieve similar goals.

Joaquim Branco

Giving testimony to the value of Pims and other data bases like it in formulating business strategies, Robert Saslaw, director of planning for TRW, Inc., said he sees Pims as a "mythical consultant that is objective and has a perfect memory."

Saslaw said he has used Pims in applications involving competitive analysis, plan verification, residual-value calculations, acquisitions analysis and portfolio analysis.

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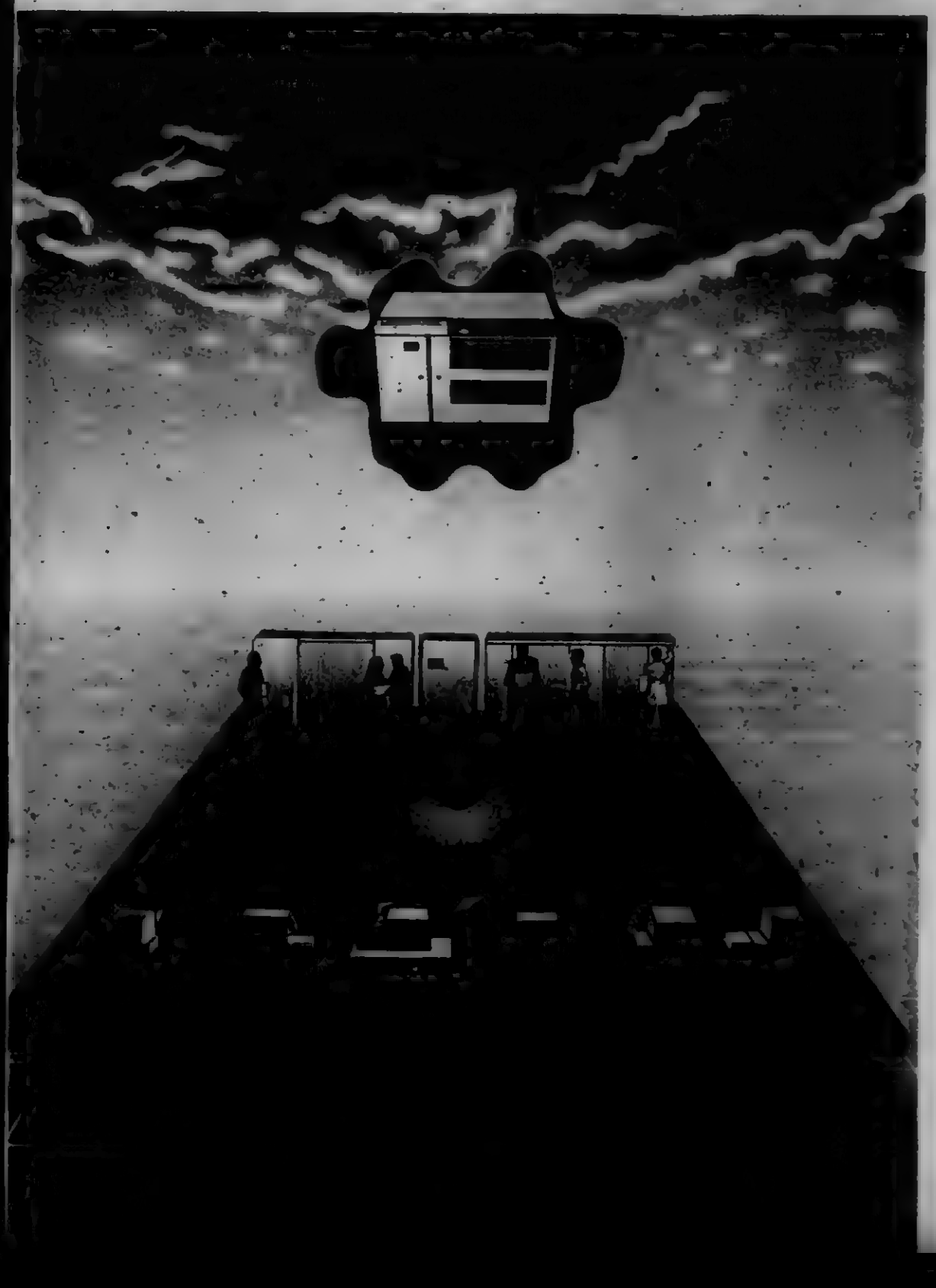

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Contel Chief Outlines Growth Of DP, Telecommunications

By Katherine Hafner
CW Staff

NEW YORK — If Howard Frank's "information map" were superimposed on a map of the U.S., the computer would end up smack in the middle, somewhere in the vicinity of Missouri.

Addressing attendees of the 10 International Information Management Show & Exposition (Info '83) here last week, the president of Great Neck, N.Y.-based Contel Information Systems, Inc. said that even "the early computer landscape" had the computer in the center of the picture.

Frank divided the information map into four quadrants, ranging from conduits to contents on one axis and from products to services on another. A book, for example, represents content, and the paper on which it is printed represents a conduit. The U.S. Postal Service is strictly a conduit-oriented service, while professional services are content-oriented.

The computer, he said, encompasses all of these elements.

Sketching the evolution of telecommunications, Frank cited the gradual overlap of content- and conduit-oriented products and services. As technology has brought about the merger of computing and communicating in the 1970s, "we began to discover networks and computers could work together, and we began to attach locally smart processors and terminals to networks."

Today's telecommunications networks are part of an entire distributed data processing system, Frank said, with local intelligence at the terminal, the controller, the periphery of the network, the front-end processor and the host.

"We're continuing to move into a world where intelligence is inevitable," Frank said. "If today's networks are smart, tomorrow they'll be even smarter."

Even the location of intelligence is an issue of economics, Frank said. "The issue of where to put it has become more an issue of economics than capability. Expensive implies centralized and cheap implies distributed."

"Today the network and the computer are inseparable," Frank asserted. "A pattern has been established that has moved the world's largest corporations."

"In 1990, communications networks as we know them today will look like old hat," Frank continued. "Communications, data processing and office automation are going to converge as information management in 1990."

In his prognosis, Frank pointed to "a very interesting confrontation between a deregulated AT&T and IBM," with IBM's acquisition of 15% of Rolm Corp. and AT&T's diversification.

Frank pointed to others, such as Xerox Corp. and NCR Corp., who have managed to close the gap between computers and other, less central offerings. "With products like Ethernet, Xerox has bridged the gap between being a copying company and a true computer company," he observed.

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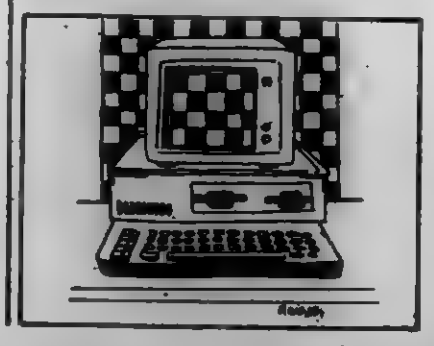

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Software Boosts Collection Firm's Recovery Rate

HOUSTON — Debtors beware! One of the largest collection agencies in the country is better able to service its clients now with the help of a data compression system that allows the company to squeeze more information into its mainframe data base.

Founded in 1957, GC Services Corp. here serves client companies through a nationwide network of 36 collection centers. Based on the number of accounts handled, the amount of money collected and the firm's high recovery percentage, GC Services is reportedly one of the largest collection agencies in the U.S. today.

That success, according to Daniel Parfimowicz, assistant director of data processing, is due in large part to the sophisticated DP and computer systems the company has had in place since 1968.

The firm employs an IBM 4341 Model Group 2 CPU with IBM 3370 and 3375 hard disk drives and uses the DOS/VSE operating system under VM utilizing Cobol and assembly language with CICS, Vsam and DL/1 data bases.

The system handles an average of 20,000 transactions daily, according to Parfimowicz. Through dumb terminals and modems, debt collectors in the remote collection centers can access any file on the mainframe for inquiry.

But, Parfimowicz said, the problem his DP facility faced was a shortage of disk storage space. The company has two master files — a mail effort file and a telephone effort file — which are used as collection tools. The files maintain information on active debtors, including the name and address of each debtor in addition to the debtor's payment history and a continuing record of collection activity.

However, the lack of disk storage prevented the firm from storing both master files on the system. "Only our telephone effort file was on disk. Our mail file was on tape and had become too time-consuming to access. Because this was a list of active debtors, it was desirable to put the mail-effort data on-line so that we could handle client inquiries better," Parfimowicz said.

Believing that account records could be more readily accessed on-line, GC Services decided to transfer the information on mail efforts from tape to disk. That decision posed a problem, though.

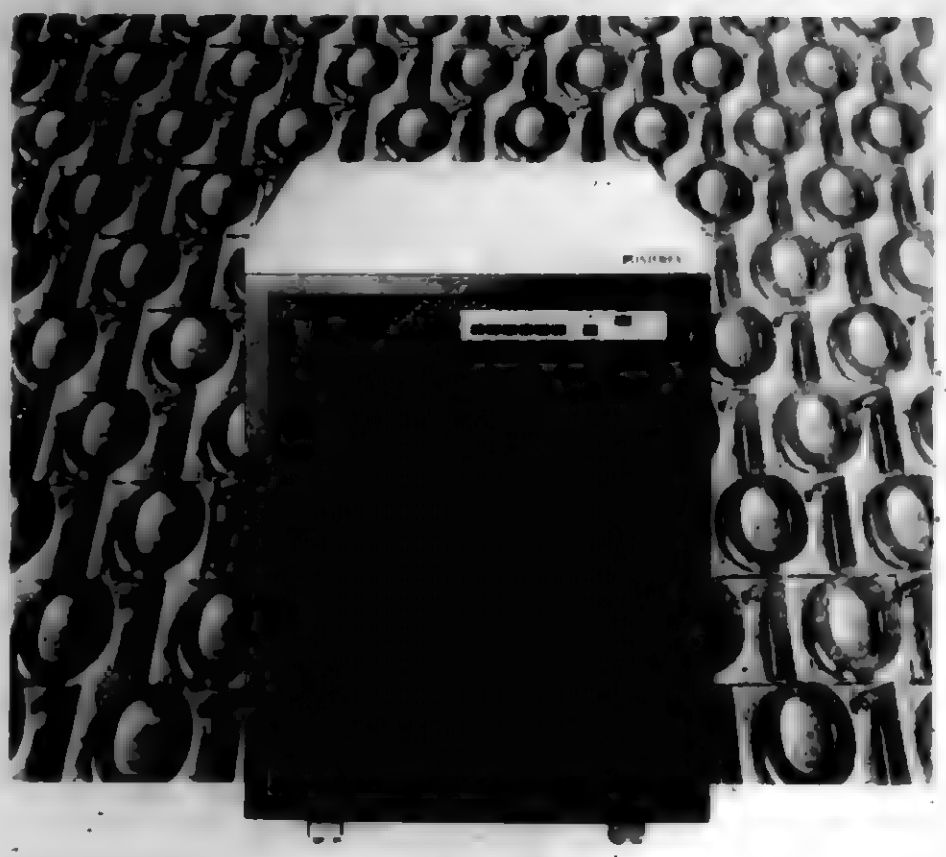
"The tape file was large, consisting of records for more than four million accounts. When we attempted to put the data on-line we found that we were unable to transfer the entire file because the telephone effort file had taken up so much direct-access storage device space," Parfimowicz explained.

Convinced that account records could be more easily accessed on-line, the company decided to investigate the options available for obtaining more disk space. Parfimowicz settled on Informatics General Corp.'s Shrink file compression system. "We chose Shrink to compress our telephone efforts file," Parfimowicz said. "By utilizing this software system we were able to cut the space needed by the existing data in half, making it possible for us to create an on-line mail effort file."

That decision has resulted in more than just increased disk storage. "We've upgraded the service we provide to our clients substantially since implementing the file compression system," Parfimowicz explained. "With the additional disk space created, we've been able to put all the files we need on-line. Now client inquiries are handled in five to 10 minutes. That's a real savings compared to the average two to five days it took to pull the same information from microfiche files before."

The Shrink system also resulted in cost savings. "We didn't have to buy any disks, and that was a real savings. By putting the data on-line we were also able to forego the tedious task of searching microfiche files. That reduced the staff required to handle customer inquiries. At a cost of $500 a month, I feel Shrink has paid for itself."

THE NEXT GENERATION



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Bank Cuts Costs With Switch From Data Entry to On-Line

TRUMBULL, Conn. — After eliminating a time-consuming, multistep data entry method and replacing it with an on-line system, a bank here is providing better service for its more than 600,000 customers.

The Union Trust Bank data center is responsible for processing daily transactions originating at eight remote departments in New Haven, Norwalk and Stamford, Conn. In the past, according to Judy Bridgeman, manager of data entry, the keypunch system required that source documents be sent to the data center for keying to cards or diskette before being transferred to tape and input to the IBM 4341 mainframe.

In addition to departmental needs, the data center processes the daily transactions of the bank's 59 branch offices. Hiring additional keypunch operators and leasing additional equipment seemed unavoidable in light of a projected increase in the data processing work load. Leasing costs were already in excess of $36,000 a year, and larger jobs such as payroll were sent to a contract data entry firm for processing at an additional cost of more than $12,000 yearly.

According to Bridgeman, the only solution was to move to an on-line system. That system was implemented in early 1980 and has been successful in keeping costs in line, assisting in the growth of the bank's business development and providing remote locations with independent end users.

With TSI International, Inc.'s Key/Master package, data entry is now in the hands of individual departments, each of which is able to enter data directly from its location. Thus, production costs have been maintained because increases in equipment and personnel were unnecessary and leasing costs have been cut in half.

Through the on-line system, independent end users in each department now have access to the reports they need when they need them. More importantly, the data entry staff is able to concentrate solely on processing the bank's daily transactions.

An added bonus is that the potential for lost documentation and for security breaches has been eliminated. Because data is no longer transferred between departments and locations for processing, security has improved. And, with independent end users in control of and responsible for their own data, errors can be detected and corrected by those most familiar with that data.

Key/Master is used by the bank for more than 60 applications, including installment loans, savings accounts and personnel. Union Trust has implemented some applications of its own, such as an Individual Retirement Account reporting system and various financial control operations.

Bridgeman said the Key/Master system has relieved the "heads-down" monotony of data entry and, in addition to eliminating punched-card-related problems, the system's screen formats have given operators a new understanding of the banking functions they accommodate. Along with Key/Master's verification routines, that new interest has led to improved operator productivity and data accuracy.

Ultimately, though, it is the bank's customers who have benefited most. Because remote departments are responsible for their own data entry, the data center staff can concentrate on processing new accounts every night. "If you open a bank account today, you want to use your money tomorrow," Bridgeman said. "Key/Master has enabled us to provide our customers with more timely information and services."

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Seminar Schedule

State	City	Date	State	City	Date
California	San Diego	November 2	[redacted]	Providence	November 10
California	San Jose	November 9	South Carolina	[redacted]	October 26
Florida	Jacksonville	November 1	Texas	San Antonio	October 26
Maryland	Baltimore	October 25	Virginia	[redacted]	November 15
Massachusetts	Boston	November 9	Wisconsin	[redacted]	October 20
Massachusetts	Worcester	November 22	[redacted]	Milwaukee	October 25
New Mexico	Albuquerque	November 2			
New York	Garden City	November 1	Canada	Edmonton, Alberta	October 27
North Carolina	Raleigh	November 9	Puerto Rico	San Juan	November 3
Pennsylvania	Philadelphia	November 3			

Vendors Pledge $18.5 Million

Berkeley CAD Center Rescued

By John Gallant
CW Staff

BERKELEY, Calif. — Threatened by cramped facilities and state funding that withered on the vine, the University of California at Berkeley's computer-aided design center — renowned for its research in the field of integrated circuit chip design — has been saved by an $18.5 million gift pledged by a consortium of high-technology firms.

The consortium, which includes IBM, Hewlett-Packard Co. and Digital Equipment Corp., rescued the center with donations of $10 million in computer equipment and an $8.5 million construction grant for a new design and manufacturing facility that is expected to open by late 1984, according to Prof. Alberto Sangiovanni Vincentelli, vice-chairman of the Department of Electrical Engineering and Computer Science.

According to Vincentelli, HP has already agreed to donate approximately $3 million in equipment that includes HP 9000 and HP 9836 workstations. In addition, Tektronix, Inc. plans to donate an unspecified number of its Magnolia workstations.

Vincentelli also said that IBM is considering a "multimillion-dollar donation" and DEC is studying a grant of "$4 million to $5 million in equipment, including a few VAXs and a number of VAX-11/730 workstations." He said DEC has scheduled an announcement for some time in November. According to Donald Pederson, chairman of the department at Berkeley, IBM will make a decision on equipment donation within the next year.

The school currently operates three VAX-11/780 superminicomputers and one VAX-11/750 supermini in addition to an HP 3000 system and individual workstations manufactured by a variety of firms.

The $8.5 million building grant will be used to add a new level to the four-story structure that houses the present research facilities. To be known as the CAD/CAM (computer-aided design and manufacturing) Consortium, the new center will be devoted entirely to research in computer-aided design.

"With this new facility, we can expand our program in CAD/CAM and do more advanced research," Vincentelli said. "This will give us a tremendous opportunity to grow and to attract qualified students."

Vincentelli, who is also admissions director for the program, said there are currently 90 to 100 graduate students attending the center, which has a staff of four full-time and 15 part-time faculty. With the expanded facilities, he expects the program to accommodate 200 students.

Along with Carnegie-Mellon University in Pittsburgh, Pa., Berkeley has been recognized by the Semiconductor Research Corp. (SRC) as one of two "centers of excellence" in the U.S. for its use of computers in designing integrated circuits. The SRC, a nonprofit subsidiary of the Semiconductor Industry Association, is a cooperative research financing organization formed in early 1982 by 13 major U.S. electronics firms.

Because most of the 15 companies that make up the consortium which has pledged aid to the Berkeley center are also members of the SRC, Vincentelli said, they have contributed twice to advanced research at Berkeley. In November 1982, the SRC contributed $1.75 million to Berkeley and Carnegie-Mellon for research in computer-aided design of integrated circuits [CW, Nov. 29, 1982].

The 15 members of the consortium are IBM; Advanced Micro Devices, Inc.; Bell Laboratories; DEC; General Electric Co.; Harris Corp.; HP; Hughes Aircraft Co.; Intel Corp.; National Semiconductor Corp.; Schlumberger Foundation; SRC; Tektronix, Inc.; Texas Instruments, Inc.; and Xerox Corp.

Vincentelli said that under the arrangement worked out with the consortium — each member industry will be allowed to maintain one full-time adviser to work with students and faculty at the CAD/CAM design center — both Berkeley and the companies will benefit.

"They will have direct access to all of our research work. From their viewpoint, Berkeley is the best center for computer-aided design. So, they will have access to the most advanced research being done in this field. For our benefit, these firms will give us real-life situations to work within and real-life problems to solve," Vincentelli said.

The university will retain all rights to products developed at the center, but the participating firms will be free to incorporate the technology for industrial use.

The center's faculty began the search for new funding two years ago when cramped facilities threatened the school's preeminence in computer-aided research. "We simply couldn't fit in our department anymore. We couldn't accommodate any new equipment due to our lack of space," he said.

The faculty first approached officials of the University of California system, who approved the center's expansion plans and set aside development funds. But when the state's fiscal crisis delayed that funding indefinitely, supporters formed a committee to petition industry for aid.

Chaired by Dr. C. Lester Hogan of Palo Alto, Calif.-based Fairchild Camera and Instrument Corp., the committee's entreaties were answered by the consortium.

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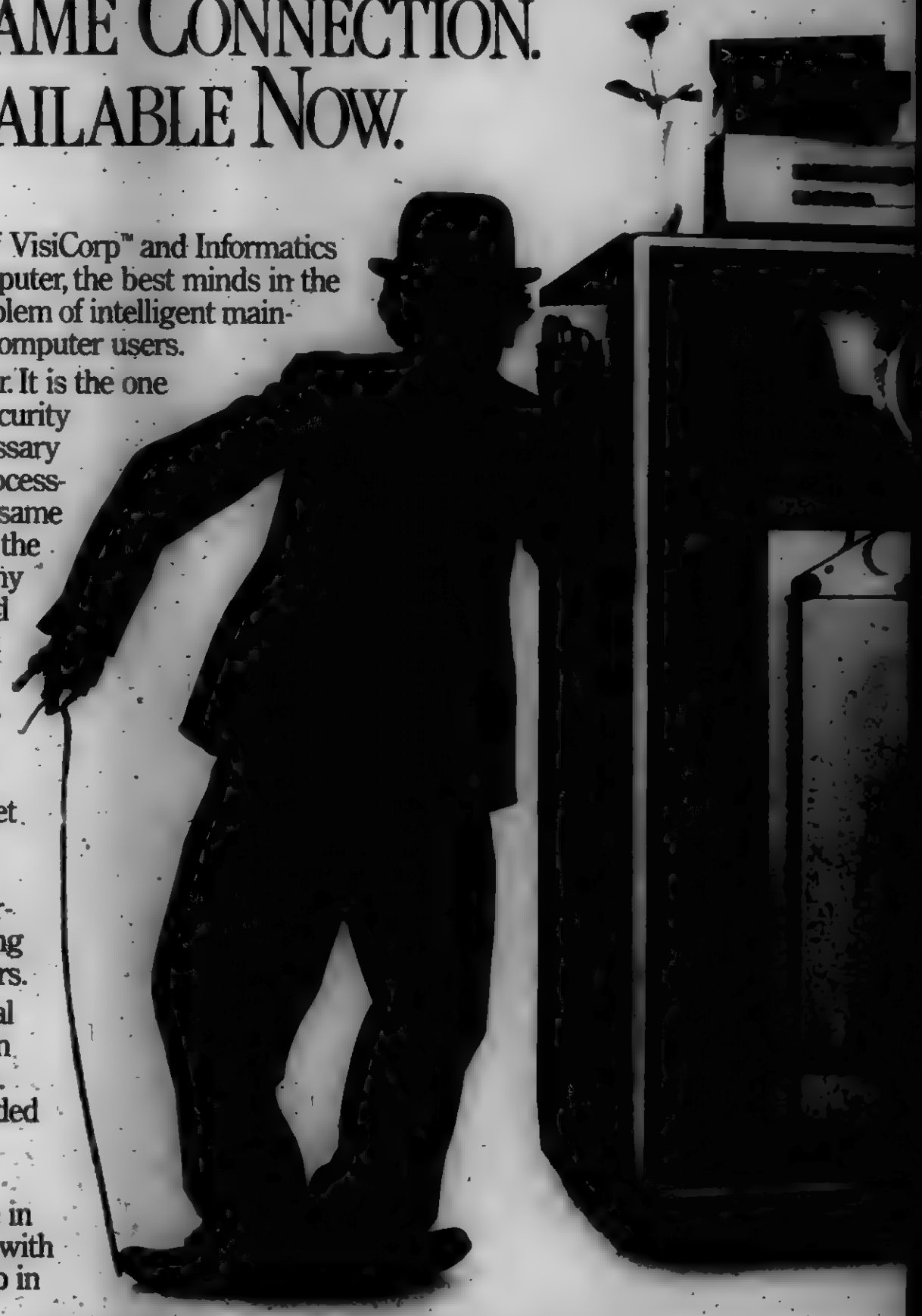

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Calendar

Week of Oct. 30

Nov. 1, New York — **CICS/VS Concepts and Facilities.** Contact: Teltech, 39 Broadway, New York, N.Y. 10006.

Nov. 1, Dallas — **The D/FW Users Group Vendor Fair.** Contact: Nancy Gilley, The Ryan Co., 505 Ryan Plaza Drive, Arlington, Texas 76011.

Nov. 1-3, Washington, D.C. — **Local-Area Networks: Concepts, Technology and Products.** Contact: Technology Concepts, Inc., 730 Boston Post Road, Sudbury, Mass. 01776. Also being held Nov. 8-10 in San Francisco and Nov. 15-17 in Boston.

Nov. 1-3, San Francisco — **Debugging for Application Programmers.** Contact: Southern Training Corp., Suite 1030, SCN Center, Columbia, S.C. 29201.

Nov. 1-3, Washington, D.C. — **Data Communications: Network Design and Optimization.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Nov. 1-3, Washington, D.C. — **Federal Office Automation Conference.** Contact: Federal Office Automation Conference Housing Bureau, Suite 250, 1575 Eye St. N.W., Washington, D.C. 20005.

Nov. 1-4, Los Angeles — **Data Base Management Systems — Mini, Micro and Distributed Application.** Contact: Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405.

Nov. 1-4, Minneapolis — **Data Communications: Components, Systems and Networks.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Nov. 1-4, Palo Alto, Calif. — **Defining Software Requirements, Specifications and Tests.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held Nov. 29-Dec. 2 in Boston.

Nov. 1-4, Lincoln, Neb. — **Structured Requirements Definition.** Contact: Georganna Carson, Ken Orr and Associates, Inc., 1725 Gage Blvd., Topeka, Kan. 66604. Also being held Nov. 15-18 in San Antonio, Texas, and Nov. 28-Dec. 2 in Atlanta.

Nov. 1-4, Baltimore — **Practical Structured Techniques for Software Design and Coding.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held Nov. 15-18 in Palo Alto, Calif.

Nov. 1-4, Washington, D.C. — **Software Project Management.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held Nov. 15-18 in Los Angeles and Nov. 29-Dec. 2 in Boston.

Nov. 1-4, Boston — **Hands-On Pascal Workshop.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045.

Nov. 2-4, Chicago — **Automated Application Design: Product Concepts and Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 2-4, Atlanta — **Component Three.** Contact: Rita Louderback, 2900 Chamblee-Tucker Road, Building 16, Atlanta, Ga. 30341.

Nov. 2-4, Chicago — **SNA and Today's Telecommunications Environments.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held Nov. 16-18 in New Brunswick, N.J.

Nov. 2-4, San Diego — **Micro and Personal Computers: Technology and Application.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Nov. 2-4, Andover, Mass. — **Imaging Industries.** Contact: Institute for Graphics Communication, 375 Commonwealth Ave., Boston, Mass. 02115.

Nov. 2-4, Monterey, Calif. — **The Fifth Symposium on Automation Technology in Engineering Data Handling and CAD/CAM.** Contact: Donna Davidson, Automation Technology Institute, Inc., P.O. Box 242, Pebble Beach, Calif. 93953.

Nov. 2-4, Arlington, Va. — **SAS Basics Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511

Nov. 2-4, New York — **Evaluating, Selecting and Using Computer Software Packages.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 2-4, Los Angeles — **Lamond on IBM.** Contact: Cap Gemini Sogeti/USA Group, 9045 N. Deerwood Drive, P.O. Box 23767, Milwaukee, Wis. 53223. Also being held Nov. 8-10 in New York.

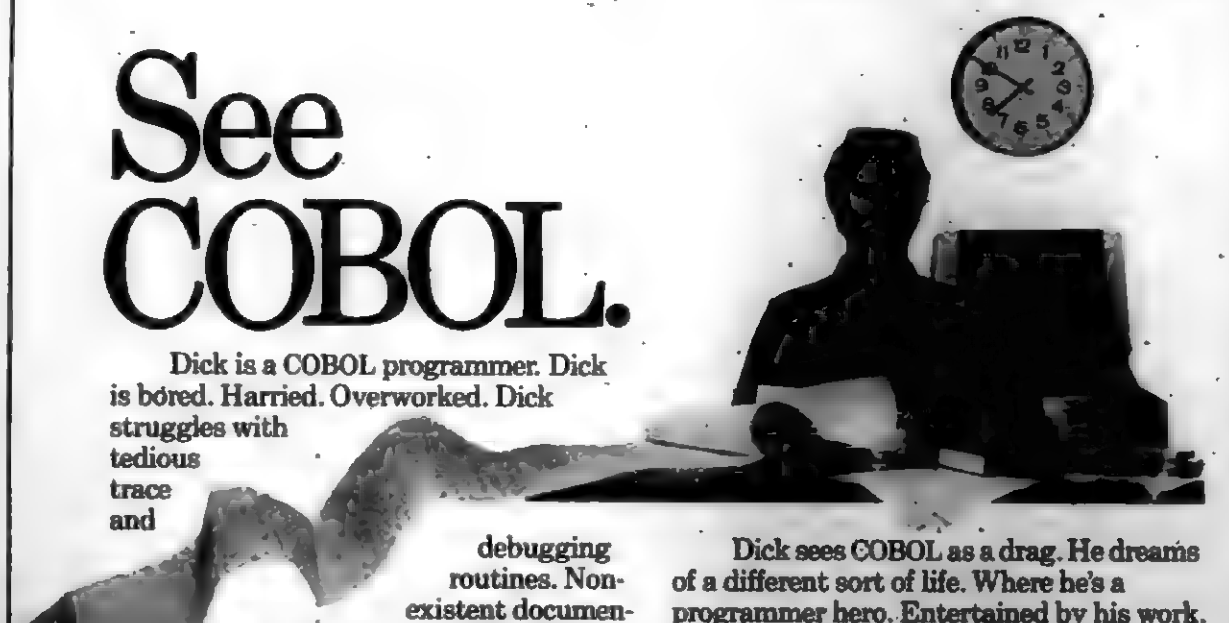
Nov. 2-4, Dallas — **SAS Computer Performance Evaluation Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Nov. 2-4, San Francisco — **The Personal Computer: Strategies for Managing.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held Nov. 9-11 in New York and Nov. 28-30 in Philadelphia.

Nov. 2-4, Monterey, Calif. — **How to Build and Use a Data and Information Resource Directory.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

Nov. 2-4, Chicago — **Fundamentals of Data Processing.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

See COBOL.



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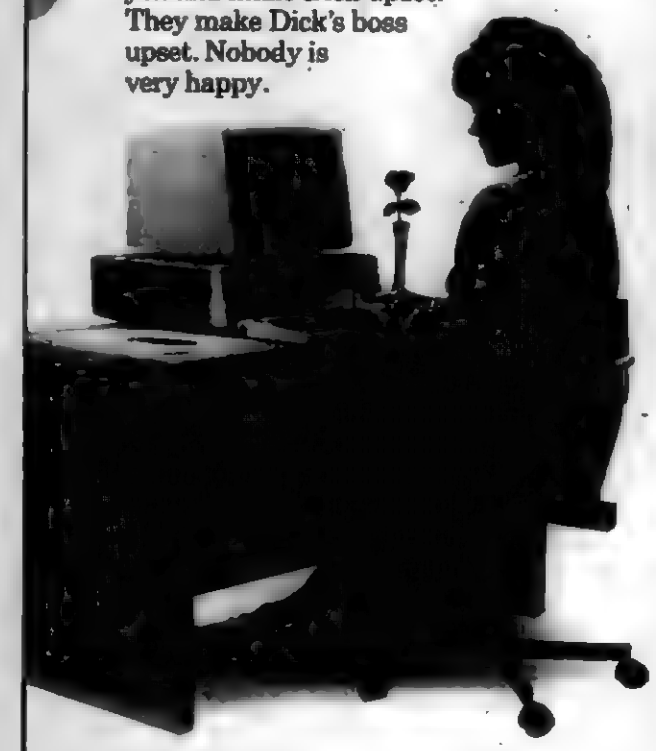

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Calendar

Nov. 3-4, New York — **Datapro Update: Data Communications Today.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 3-4, Cleveland — **Applying the New Tools for Profit and Cash Flow Planning: Graphics and Personal Computers.** Contact: Matthew Malok, The American Institute of Certified Public Accountants, 1211 Ave. of the Americas, New York, N.Y. 10036. Also being held Nov. 7-8 in Wichita, Kan., Nov. 22-23 in Philadelphia and Nov. 29-30 in Chicago.

Nov. 3-4, San Francisco — **IBM Systems Network Architecture: A Master Plan for Teleprocessing.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 3-4, Andover, Mass. — **Computer Operations Management.** Contact: University of Lowell, Continuing Education, One University Ave., Lowell, Mass. 01854.

Nov. 3-4, San Francisco — **Local-Area Networks: Equipment and Systems.** Contact: Architecture Technology Corp., P.O. Box 24344, Minneapolis, Minn. 55424. Also being held Nov. 8-9 in Washington, D.C., and Nov. 10-11 in Phoenix.

Nov. 3-4, San Francisco — **Writing Skills for the DP Professional.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held Nov. 17-18 in Orlando, Fla., and Nov. 28-29 in Boston.

Nov. 3-4, Newport Beach, Calif. — **Office Automation: The Hardware, the Software, the Systems.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held Nov. 17-18 in Boston.

Nov. 3-4, Boston — **Digital Private Automatic Branch Exchange.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held Nov. 14-15 in San Diego and Nov. 17-18 in Dallas.

Nov. 3-5, New York — **Computer Law Institute.** Contact: The Registrar, Practicing Law Institute, 810 Seventh Ave., New York, N.Y. 10019.

Nov. 3-6, Worcester, Mass. — **The New England Computer Show and Sale.** Contact: Chevalier Associates, Inc., 297 Turnpike Road, Westborough, Mass. 01581.

Nov. 4, Dayton, Ohio — **Personal Computers in the Business Environment.** Contact: Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138. Also being held Nov. 4 in South Bend, Ind.; Nov. 28 in Vancouver, B.C.; Nov. 29 in Seattle; and Nov. 30 in Spokane, Wash.

Nov. 5-6, San Diego — **The Fourth Annual San Diego Computer Fair.** Contact: San Diego Computer Society, P.O. Box 81577, San Diego, Calif. 92138.

Week of Nov. 6

Nov. 6-8, Andover, Mass. — **Three-Dimensional Imaging Techniques.** Contact: The Institute for Graphics Communications, 375 Commonwealth Ave., Boston, Mass. 02115.

Nov. 6-9, Athens, Ga. — **Improving Productivity Through Electronic Technology.** Contact: Nancy Italia, Italia and Co. (PSI International Symposium), Suite 350, 2700 Cumberland Pkwy., Atlanta, Ga. 30339.

Nov. 7, Boston — **IMS Concepts and Facilities.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 7, Washington, D.C. — **State-of-the-Art Microcomputers.** Contact: Associated Information Managers, Suite 4705, 1776 E. Jefferson St., Rockville, Md. 20852.

Nov. 7-8, Baltimore — **Dbase II.** Contact: The Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705. Also being held Nov. 9-10 in San Diego.

Nov. 7-8, New York — **Beyond System/34.** Contact: Techtran, 72 Cummings Point Road, P.O. Box 10212, Stamford, Conn. 06904.

Nov. 7-8, New York — **Office Systems and the Role of the Personal Computer.** Contact: Marilyn Chasteen, The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

Nov. 7-8, San Francisco — **Computer Networks: Protocols, Standards and Compatibility.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 7-8, Los Angeles — **Advanced Office Automation for the 1980s.** Contact: Software Institute of America, 339 Salem St., Wakefield, Mass. 01880. Also being held Nov. 14-15 in New York.

Nov. 7-8, New York — **System/34 Migration: Is It All Down Hill From Here?** Contact: Techtran, 72 Cummings Road, P.O. Box 10212, Stamford, Conn.06904. Also being held Nov. 17-18 in Chicago.

Nov. 7-8, Los Angeles — **Advanced Configuration Management.** Contact: The Technical Marketing Society of America, Seminars, Dept: ACM, P.O. Box 3608, 3420 Kashiwa St., Torrance, Calif. 90510. Also being held Nov. 14-15 in Palo Alto, Calif., and Nov. 17-18 in Newport Beach, Calif.

(Continued on Page 46)

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Calendar

(Continued from Page 45)

Nov. 7-8, Chicago — **Personal Computers: Programming in Basic.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 7-8, Dallas — **Quality Assessment of Analysis and Design.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 7-9, Denver — **Data Communications: An Introduction to Concepts and Systems.** Contact: Datpro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 7-9, Washington, D.C. — **Micro and Personal Computers: Technology and Applications.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Nov. 7-9, Washington, D.C. — **Office Automation for Increased Management Productivity.** Contact: The Institute for Professional Education, Suite 303, 1515 N. Court House Road, Arlington, Va. 22201.

Nov. 7-9, Dallas — **DP Disaster Recovery Seminar.** Contact: EDP Security, Inc., 181 West St., Waltham, Mass. 02154.

Nov. 7-9, Boston — **Systems Analysis and Design: Concepts and Effective Practices.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 7-9, Chicago — **Structured Testing.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Nov. 7-9, San Francisco — **Automated Applications Design: Product Concepts and Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 7-9, Boston — **Structured Analysis for Users.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Nov. 7-9 in Houston.

Nov. 7-9, Washington, D.C. — **Auditing Advanced DP Systems: A Total Systems Approach.** Contact: The Institute for Professional Education, Suite 303, 1515 N. Court House Road, Arlington, Va. 22201.

Nov. 7-9, New York — **Information Systems Modeling Analysis and Planning.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 7-9, Dallas — **DP for Senior Executives.** Contact: Ed Green, Executive Education Center, Peat, Marwick, Mitchell and Co., 810 Seventh Ave., New York, N.Y. 10019.

Nov. 7-9, New York — **Introduction to Computer Concepts.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 7-9, Chicago — **Data Base Management Systems: Concepts and Guidelines.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 7-9, New York — **Data Base Management Systems: A Comparative Analysis of General-Purpose Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 7-9, New York — **Basic Systems Analysis.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 7-9, Arlington, Va. — **Principles of Regression Analysis Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Nov. 7-9, New York — **Computer Awareness: Basic Concepts, Compatibility and Terminology.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 7-9, Houston — **Project Leadership Laboratory.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 7-9, San Francisco — **Structured Testing Seminar.** Contact: McCabe and Associates, Inc., Suite 111, Twin Knolls Professional Park, 5501 Twin Knolls Road, Columbia, Md. 21045.

Nov. 7-9, Washington, D.C. — **Introduction to Office Automation: Concepts, Technology and Applications.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 7-9, Anaheim, Calif. — **Focus.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 7-9, Chicago — **Office Automation: Strategic Planning, Design and Implementation.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

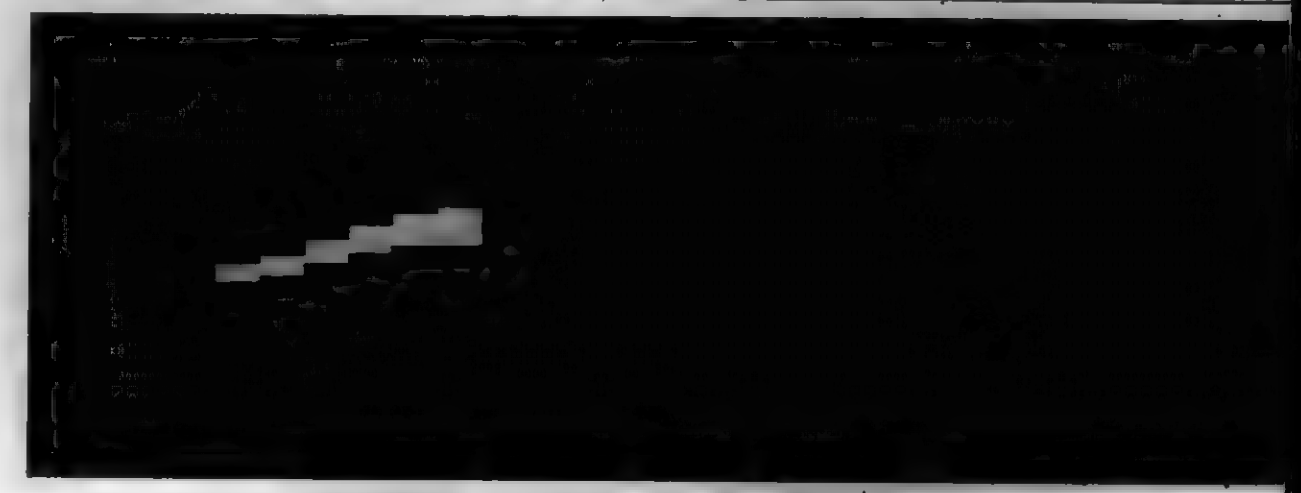
Nov. 7-10, Nashville, Tenn. — **The 1983 TSI International Information Exchange User Conference.** Contact: Jackie Baio, Information Exchange, 187 Danbury Road, Wilton, Conn. 06897.

Nov. 7-9, Washington, D.C. — **Electronic Spreadsheets.** Contact: The Institute for Professional Education, Suite 303, 1515 N. Court House Road, Arlington, Va. 22201.

Nov. 7-9, San Francisco — **Advanced Communications and Network Engineering.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 7-10, Arlington, Va. — **Japanese Fifth-Generation Computer Technology.** Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.

Nov. 7-10, New York — **CICS On-Line Application Design.** Contact: Yourdon, Inc., 1133 Ave. of the



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Calendar

Americas, New York, N.Y. 10036.

Nov. 7-10, Birmingham, Ala. — **Project Management.** Contact: Brandon Systems Institute, 4720 Montgomery Lane, Bethesda, Md. 20814.

Nov. 7-11, San Francisco — **Structured Programming Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 7-11, Chicago — **Computer Software and Applications Conference (Compsac '83).** Contact: IEEE Computer Society, P.O. Box 80452, Worldway Postal Center, Los Angeles, Calif. 90080.

Nov. 7-11, Atlanta — **Information Modeling Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Nov. 7-11 in Seattle.

Nov. 7-11, Sunnyvale, Calif. — **Financial Analysis for Capacity Management.** Contact: Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Nov. 7-11, Boston — **Project Planning and Control.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Nov. 7-11 in Columbus, Ohio.

Nov. 7-11, New York — **Structured Analysis/Design Workshop.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011.

Nov. 7-11, Pittsburgh, Pa. — **Systems Analysis Workshop.** Contact: Brandon Systems Institute, 4720 Montgomery Lane, Bethesda, Md. 20814. Also being held Nov. 14-18 in Toronto.

Nov. 7-11, Houston — **CICS/VS Command Level.** Contact: Kaaren Perez, Comped, 10 E. 21st St., New York, N.Y. 10010.

Nov. 7-11, Sunnyvale, Calif. — **Structured Analysis for Real-Time Systems.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 7-11, Columbus, Ohio — **Structured Analysis and Design Workshop.** Contact: Kaaren Perez, Comped, 10 E. 21st St., New York, N.Y. 10010. Also being held Nov. 11-14 in New York and Nov. 28-Dec. 12 in Chicago.

Nov. 7-11, Sunnyvale, Calif. — **Ada Software Engineering Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 8, Chicago — **CBX Evaluation and Selection.** Contact: Marilyn Chasteen, The DMW Group, 2020 Hogback Road, Ann Arbor, Mich. [illegible]

Nov. 8-9, San Francisco — **The Fourth-Generation Data Management Software.** Contact: Software Institute of America, 339 Salem St., Wakefield, Mass. 01880. Also being held Nov. 14-15 in Washington, D.C.

Nov. 8-10, San Francisco — **Data Communications Concepts.** Contact: Suzane Galliart, Memorex Customer Education, M/S 03-16, 3393 Octavius Drive, Santa Clara, Calif. 95051.

Nov. 8-10, San Diego — **Sytek and San Diego State University's (SDSU) Second Broadband Local-Area Network Conference.** Contact: Mark Hall, SDSU/Sytek Conference, 1225 Charleston Road, Mountain Valley, Calif. 94043.

Nov. 8-10, San Francisco — **Local-Area Networks: Concepts, Technology and Products.** Contact: Technology Concepts, 730 Boston Post Road, Sudbury, Mass. 01776. Also being held Nov. 15-17 in Boston.

Nov. 8-10, Detroit — **CICS/VS Internals for Systems Programmers.** Contact: Betty Bruce, Goal Systems International, Inc., 5455 N. High St., Columbus, Ohio 43214.

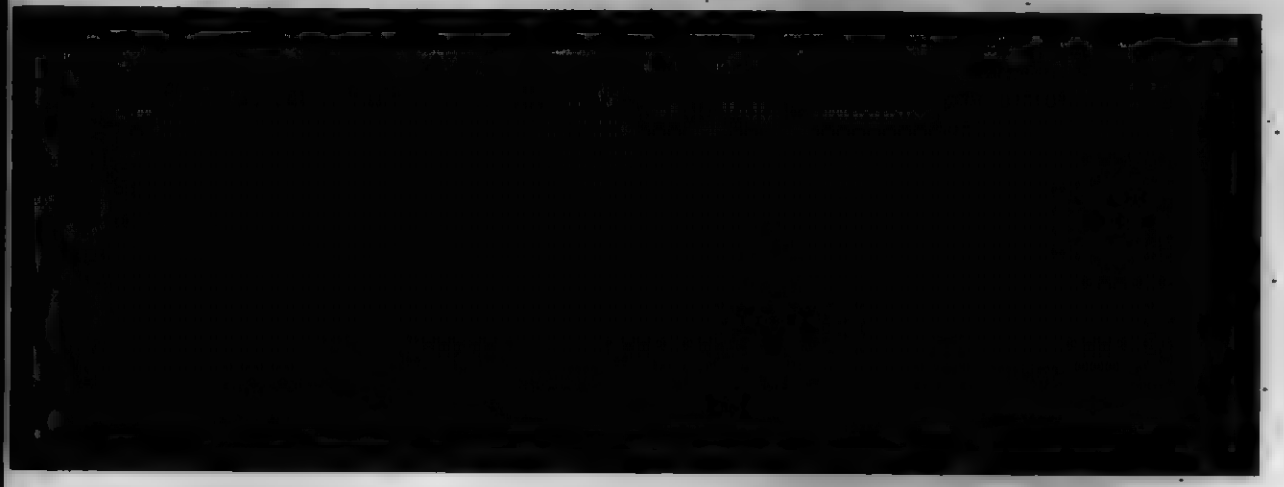
Nov. 8-10, Andover, Mass. — **Business Applications for Computer Graphics.** Contact: Institute for Graphics Communication, 375 Commonwealth Ave., Boston, Mass. 02115.

Nov. 8-10, London — **Software/Expo Europe.** Contact: On-line Conferences Ltd., Pinner Green House, Ash Hill Drive, Pinner HA5 2AE, Middlesex, England.

Nov. 8-10, New York — **The Hammer/Seybold Executive Forum: Directions in Office Systems and Professional Computing.** Contact: Cheryl McManamy, Seybold Publications, Inc., Suite 801, 44 Bromfield St., Boston, Mass. 02108.

Nov. 8-10, Dallas — **CAM-I's 12th Annual Meeting and Technical Conference.** Contact: CAM-I, Inc., Conference Services, Suite 1107, 611 Ryan Plaza Drive, Arlington, Texas 76011.

Nov. 8-10, Arlington, Va. — **SAS Processing Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.



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EDITORIAL

Stay Tuned

The concept of office automation — unlike many other concepts in the computer industry — is finally being backed up by a bevy of products and productivity aids.

In recent weeks, we have seen the introduction of such new technologies as image processing from Wang Laboratories, Inc.; an electronic mail network from MCI Telecommunications Corp.; and an advanced optical storage disk storage system from Storage Technology Corp.

Each of these announcements represents a new direction for office workers in the way they carry out their daily duties. Image processing of documents will allow insurance and financial institutions to process their forms more efficiently, while electronic mail will allow all of us to communicate more effectively.

The potential of optical disk storage boggles the mind with its capacity of 4G characters per disk — setting the stage for an office with few or no file cabinets.

Private branch exchange systems are also knocking on the office door as the AT&T divestiture forces businesses to become their own phone companies. As voice technology comes in, some data technologies, such as local-area networks, may be forced out the back door or at least more closely scrutinized.

High-end microcomputers such as Apple Computer, Inc.'s Lisa and integrated software packages such as Visicorp's Visi On for the IBM Personal Computer (due to be released this month) throw office automation into the same frenzy the rest of the computer industry is feeling with the decision of which machine/package is best for word and data integration.

But the challenge in office technology will be the successful implementation and use of these new products. The 1984 Office Automation Conference to be held in February in Los Angeles will present no fewer than 45 sessions designed to help managers in this goal.

Office technology will continue to evolve and develop along with the rest of the industry as new technologies are routed directly to the desktop. Which technologies will survive?

Stay tuned.

'Land Ho!'

DATA PAST

Five Years Ago
Oct. 16, 1978

DETROIT — Thirty-three members of this city's Police Department were fingered by a crime-fighting computer project and charged with welfare fraud.

The 33, all women, were indicted after their names surfaced in a computer match that compared Police Department records with Michigan's welfare rolls.

— — —

NEWTON, Mass. — Data General Corp. expanded the Eclipse family's range of distributed processing applications when the company broadened the minicomputer line by adding two systems — one at the high end and another at the low end.

DG intended the entry-level system — designated the Eclipse C/150 — primarily for small, dedicated applications at the regional offices of Fortune 500 firms.

Ten Years Ago
Oct. 17, 1973

TULSA, Okla. — Judge A. Sherman Christensen admitted his "computation of antitrust damages against IBM involved substantial error."

In the unusual move, Christensen said he would grant IBM a motion either to amend the finding he issued in the telex-IBM case or else to grant IBM a new trial on the issue of damages.

— — —

WASHINGTON, D.C. — A bill calling for a Federal Privacy Board to protect individuals against "improper, incorrect or unauthorized compilation or dissemination of information" from computerized data banks was introduced into Congress by 27 members of the House of Representatives.

The bill, H.R. 9786, was considered a companion measure to the Federal Privacy Act.

LETTERS

The '414' Group

After spending two months actively not reading any press covering the "414" group in Milwaukee, I was finally tipped off my edge when my eye caught the article "Teenage Hacker Lectures House on DP Security" [CW, Oct. 3]. It was enough that they had committed a crime. It was a farce that, as experts, they were given the floor of the U.S. House of Representatives.

I am 24 years old, an information systems designer, and I am recognized in my own little circle just as most of us would have it be. I, too, hacked at one time, but the 20-hour workweek of 414er Neal Patrick would pale next to my more than 100-hour weeks.

But the big difference between him and me seems to be that he sees no rules to the challenge and seeks it at the expense of others. I, on the other hand, had some element of respect for other people.

My one pleasure was to hear that Patrick was baited with a Star Trek program by the People at Security Pacific Bank. Touche! It brings to mind what is both a memory and a confession.

Only once have I performed a malicious act using a computer, and it was directed at a disrespectful hacker who had hacked once too often. I wrote a program that, when loaded, disabled user interrupts and then cycled through each of the user's files, first displaying its name and then purging it from the system.

For a finale, the program purged itself, its audit trail and then logged off (the program destroyed itself twice during testing).

After completing my program, I saved it under the name "Star Trek" and then posted a letter in the electronic bulletin board telling my victim about a great new version of the classic game. He fell for it.

An amateur hacker always falls for it.

Bart Wolther
New York, N.Y.

DP Crime Legislation

The editorial "Just Another Kid" [CW, Sept. 19] expressed *Computerworld*'s view on legislation dealing with computer crimes.

As an avid reader of *Computerworld*, I find it difficult to believe that a periodical that has provided professional reporting on the increasing number of computer-related fraud and abuse incidents (the majority of which were not the electronic joyriding that was characterized) would present such a set of postulates on this serious subject.

If *Computerworld* further evaluates its position on the matter of computer crime, I believe it will find a growing number of voices from the industry and professional societies that support the need for federal computer crime legislation.

Moreover, these groups are providing positive support by suggesting specific language and/or objectives for the pending federal legislation (H.R. 1092 and S. 1733).

While it is true that most information system managers know the old adage "An ounce of prevention is worth a pound of cure," it is expected that crimes of fraud, theft or interference perpetrated on interstate data communications systems will continue and will only be mitigated by greater utilization of user-specified controls and security mechanisms, together with specific legislation that prescribes the unauthorized access, interception, use, modification and/or destruction of computer data bases, systems and networks.

Henry M. Kluepfel
Mendham, N.J.

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LECHT ON SCIENCE/Charles P. Lecht

Supercomputers: More Than Just for Defense

This is the third of a three-part series on supercomputer development in the U.S.

If it were solely a question of critical needs in the national security and defense areas, we could not afford to be anything other than first in supercomputer development. Right off the bat, then, we can see that some government funding of such a program is mandatory, not to say inevitable. But what level of support are we talking about? Should Uncle Sam underwrite all development costs? I say no: But he may have to unless the supercomputer establishment confesses that supercomputers have a commercial marketplace.

Unfortunately, the fact that supercomputers today are widely viewed as little more than super "number crunchers" contributes to their being yet more unjustly perceived as the overpriced, hybrid offspring of souped-up calculators and Pac-Man-like games, in the playing of which greater and greater quantities of taxpayer dollars stand to be gobbled up at lightning speed to no known end.

This rather simplistic misconception carries with it the unflattering corollary that scientists who use supercomputers are no more than extravagantly self-indulgent electronic game freaks, driven by an eccentric compulsion to beat one another at "flops" (floating point operations per second) or "lips" (logical inferences per second). It's no wonder that there is debate over whether supercomputers should be made at all, let alone over who should bear the costs of their development.

Pure Research Bias

That some earnest spokesmen at the National Security Agency/Los Alamos National Laboratory Conference on the frontiers of supercomputing (Los Alamos, N.M., Aug. 15-19, 1983) voiced the opinion that there were, in fact, no viable commercial uses for supercomputers is clearly attributable to their natural and unsurprising biases as pure research scientists.

But others, both in and out of government, so clearly took up this position out of pure self-interest that the goal of the meeting — namely, to achieve consensus on how to proceed with supercomputer development in America — suffered. Their avowed arguments for full government subsidization of supercomputer development, all based on their contention that there is no commercial marketplace for these devices, will backfire.

Historically, the exertions of such people have been responsible for lessening the American public's support for anything so far removed from its perceived, day-to-day interests. Should this happen again now, it would be tragic. It would cause needless delay in our realization of the supercomputer's fantastic benefits, have a decidedly adverse impact upon the U.S. economy and cause a whole lot of other bad things to happen, too.

The future role of supercomputers in helping to secure and hold the commercial high ground is already perfectly obvious. The amount of raw computer systems power, of which the supercomputer stands to be our epoch's most significant multiplier, is a key factor in protecting and extending whatever advantages we have been able to gain thus far in the vital arenas of trade and commerce in a world "gone electronic." This alone should cause us to conclude that private, as well as government, investment in supercomputers is warranted.

But there are many other reasons supporting a decision in favor of private investment, some having to do with more immediate rewards in other sectors — rewards that may only be obtained via supercomputer-based activities.

Such benefits, once fully appreciated, would leave only the most penurious, short-sighted stockholder/taxpayer feeling the need to deny the funds required.

Robust Market Potential

A beautiful and robust marketplace potential is emerging for these devices, and for the powers they offer, wherein there is no shortage of incentives for investment. All the major components of our increasingly service-based economy rely upon commensurately increased automation for their growth. Education, financial services, entertainment, library science, marketing, you name it: Current systems are unable to handle the burgeoning work load in such areas.

New, faster symbolic and numeric processors are needed; and while some gains may be made by tying current systems together, more spectacular results will be achieved only by increasing the power in the bases of all systems — the chip (memory and logic) and the software.

We must create memories so large that their attendant processor systems remain incapable of filling them up in their (the processors') "lifetimes." These processors must be built to operate such memories in a way that makes information storage and retrieval virtually instantaneous.

Furthermore, they must be endowed with powers of reasoning — the ability to induce, infer and analogize — such that life's most urgent questions, those bearing on the improvement of man's lot, can be put to them and solved. Software must be created that allows us considerable latitude in how we communicate our wishes to supercomputer systems and can exercise judgment when we do so ambiguously, generating no malignant contradictions in the process.

Supercomputer applications can so enrich our lives that I foresee an endlessly receptive marketplace for their "products." In the medical field alone, great financial savings (not to mention the obvious benefits of a long and healthy life) are achievable; our commitment to support the application of the supercomputer to work in such fields as this furnishes us with our most compelling arguments for combined private and government funding. These are arguments that the overwhelming majority of Americans can understand.

For example, now inhibiting discovery of a cure for certain types of

(Continued on Page 51)

HUMAN CONNECTION/Jack Stone

ACM Meeting to Tackle DPer Obsolescence

For the very latest insights into the research addressing the problems of out-of-date DPers, you should consider attending the upcoming conference of the Association for Computer Machinery's (ACM) Special Interest Group on Computer Personnel Research, scheduled for Nov. 17-18 at the McIntire School of Commerce at the University of Virginia in Charlottesville, Va. I believe that this event marks the first time that the obsolescence issue has been addressed head-on and represents another milestone achievement in the leadership of this forward-thinking organization.

I had the opportunity to preview some of the papers that will be presented and thought it might be useful here to provide brief abstracts of those that seemed particularly interesting:

● "The Information Center as a Middle Ground in Offsetting Personnel Obsolescence," by Herman Hoplin.

The need for realignment and updating specialists and developing methodologies to offset obsolescence has, in part, arisen from the reluctance of many organizations to permit decentralization of DP operations — even in the face of growing backlogs and users malcontent with DP services.

The strong trend to microcomputers has not only forced organizational changes, but created voids in the work force and generated obsolescence in existing technical staff who were attempting to perform an applications role for which they were ill-prepared.

Organizational changes toward an information center as the middle ground between the computer organization and the users offer great promise to realign the work force and create dual career paths.

The primary purpose of the paper is to present the profound impact of the information center on organizations and individuals, the concept's congealing force that is now patterning organizations forged around user interfaces and environments and the dramatic effect of evolving an organization essentially with an innovative and effective mechanism for merging the organization and function islands of information systems and services.

● "Stress in the Information Systems Professional," by John M. Ivancevich, H. Albert Napier and James C. Wetherbe.

This paper describes recent research dealing with the occupational stress levels among information systems personnel and was based upon a self-report stress and health behavior instrument completed by 580 respondents in 18 corporations in the U.S.

The data indicated that various job factors are perceived as stressful by the respondents, but the levels reported were not as excessive as had been found in studies of other occupational groups. To clarify stress profiles, the data was also examined on the basis of position held, service years and sex.

● "A New Breed of Computer Professional — The Information Specialist," by Donald L. Davis.

Increasing concerns on how to provide managers with the right information for decision making has led to broader acceptance of the decision support system (DSS) concept and other new organization ideas. In turn, there is a growing need for a new category of computer professional, the information specialist — someone who works closely with the decision maker.

One of the information specialist's major tasks is to assemble the hardware and software from the DSS generator that may be required for a specific DSS.

The job may require many of the characteristics of systems analyst and designer, programmer, operator, communications specialist, operations analyst, human factors specialist and staff adviser.

● "Supervision in Management Information Systems: A Call for Research," by Robert P. Bostrom and G. Nicholas Hopkins.

Personnel turnover, applications backlogs, employee dissatisfaction and low productivity are only some of the problems faced by information systems managers. This paper suggests a link between these and other pervasive problems and the quality of supervision received by information specialists and proposes several research issues that ought to be addressed.

READER COMMENTARY/Robert W. Hassett

Some Procedures for Copyright Registration

This article deals with copyrights in computer programs. The standard procedure for registering a copyright in a computer program is described below, the advantages and disadvantages of registration are discussed, and alternatives to the standard registration procedures are addressed.

The copyright registration process can be broken down into three steps:

- Telephone the U.S. Copyright Office hot line for forms at (202) 287-9100, and ask for form "TX." You should receive the form in the mail in about one week.
- Place a "copyright notice" on each copy of the program. The word "copyright," followed by the year of first "publication" and the name of the owner, is a sufficient copyright notice. "Publication" consists of distribution of copies of the program to the public by sale, license or otherwise.

An example of a sufficient notice is: "Copyright 1983 Computsoft, Inc."

- Complete and forward form "TX," along with a check for $10 and one copy of a printout of the program, including the title page with the notice, to the Copyright Office address, which is provided on the form. If the program is longer than 50 pages, provide only the first and last 25 pages of the program together with the title page, including the notice of copyright. The middle portions of the program are thereby deemed registered.

Clients frequently ask about treating a number of different programs as one program. The thought behind this is that they can use programs that are not confidential for the first and last 25 pages preserving the confidentiality of the remainder.

Processing of these applications is now taking approximately 16 weeks.

Personnel in the Copyright Office are very helpful in answering questions concerning procedures. Their number is (202) 287-8700. Getting through to this number takes about two weeks.

Two Advantages

There are two advantages to registration:

- Registration is required before filing a lawsuit for copyright infringement. Valuable time can be lost after an infringement has occurred while the owner is registering the program.
- As a general rule, unless a program has been registered before an infringement begins, the owner is not allowed to recover attorney fees or certain statutorily determined damages in a lawsuit for that infringement. In that situation, the owner may recover only his actual damages and the infringer's profits (not included in the actual damages) resulting from the infringement. Proving the actual damages and the infringer's profits in court can be difficult and expensive.

There are two disadvantages to standard registration. Both result from the fact that whenever a computer program is registered and "published" (publication includes the sale or licensing of copies), the portions of the program provided to the Copyright Office are then available for examination by the public. In most situations, the disadvantages far outweigh the advantages.

The first disadvantage is that other persons can then utilize the program without the permission or knowledge of the owner. If only the ideas, and not the language of the program, are utilized, this action would not be illegal and could not be stopped even if the owner knows of the use.

The second disadvantage involves state law. Under the law of most states, confidential and unique technical in-

(Continued on Page 52)

If you work for one of these companies...

A E Staley Manufacturing Co
After Six, Inc
Agway, Inc
Airline Pilots Association
Aldrich Chemical
Allied Fidelity
Amerada Hess Corp
Anchor Hocking Corporation
Anderson-Clayton & Co
ARD Corporation
Atlanta Newspapers
Atlantic National Bank of Florida
Banco Provincial
BancOhio Corp
Bank of Liechtenstein
Bank of New York
Bank of Oklahoma
Bendix Heavy Vehicle Systems Group
Big Bear Stores Co
Blue Cross/Blue Shield of Delaware
Blue Cross/Blue Shield of Oregon
Bobbie Brooks
Bonner & Moore
Borg-Warner Chemicals
British Midland Airways
Brown Forman Corp
W Atlee Burpee Company
Butler Shoe Corp
Carolina Power and Light Co
Central Freight Lines, Inc.
Central Mortgage & Housing Corp
Central Texas Iron Works
Cervecera Nacional
Chantiers de L Atlantique
Chesebrough-Pond's, Inc
Chicago Rawhide Manufacturing Co
Cincinnati Cordage
City National Bank
City of Los Angeles
City of Phoenix
City of Tucson
City of Winnipeg
Clark Equipment Co
Clarke Transport Canada, Inc
Codex Corp
Colgate Palmolive Company
Computer Data Systems, Inc
Computer Resources, Inc
Consolidated Diesel
Continental Minnesota
Comwood Corp
Copeland Corp
Cotton States Mutual Insurance Co
Credit Agricole de l'Aisne
Croft Metals
Cryovac, Div of W R Grace
Cybernetics Systems, Inc
Deposit Guaranty National Bank
Detroit Osteopathic Hospital
D-M-E Co
Dodson Insurance Group
Drummond Coal Co
Dutchess Community College
Eaton-Limited
Electronic Data Systems
Emory University Hospital
ERG-Raffinerie Garronne
Executive Life Insurance Co
Fiat Belgium
Fiat Suisse
Fiat UK Ltd
First Jersey Bank
First Mississippi National Bank
First National Bank of Commerce
First National Bank of Tuskaloosa
Flagship Services Corp
Florida Public Service Commission
Ford Werke AG
GAF Corporation
Gilbert/Commonwealth Assoc
Gold Kist
Grand Rapids Public Schools
Grand Trunk Western Railroad
Grinnell Fire Protection Systems
GTE
Guarantee Trust Traders Group
H H Robertson Co
Hartford National Bank
Henkel Italiana
Hoover Worldwide Corp
Hutzler Brothers Co
Imperial Life Assurance Co of Canada
Indal Limited
Industrial Life
Institute for Scientific Information
Internal Revenue Service
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Kay Jewelers, Inc
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National Auto and Casualty Co
National Geographic Society
National Life of Canada
National Old Line Insurance Co
New York Airbrake Co
New Zealand Industrial Gas
Norstar Data Services, Inc
Northeast Bankshare Association
Northern Electric
Northern Michigan University
Noxell Corporation
O M Scott & Sons Co
Orange and Rockland Utilities
Peachtree Doors, Inc
Peerless Importers
Pennsylvania Dept. of Public Welfare
Pfizer, Inc
Philippine Airlines
Phillips-Van Heusen Corporation
Pioneer Bank
Plan Services, Inc.
Poughkeepsie Savings Bank
Prestolite Division of Eltra
Raffinerie Del Po
Radiotelevisione Italiano
Royal Canadian Mounted Police
Reliance Insurance Co.
Rheinlans Versicherung AG
Rhode Island College
Royal Insurance Company of Canada
Safeway Canada
St Elizabeth Hospital
St Francis Hospital
St John Medical Center
SI Handling System, Inc
SONAT Offshore Drilling, Inc
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Tacoma Public Schools
Teacher Retirement System of Texas
Teachers Insurance & Annuity Association
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CPU _____ Oper Sys. _____ TP Mon. _____

The Supercomputer's Commercial Marketplace

(Continued from Page 49)

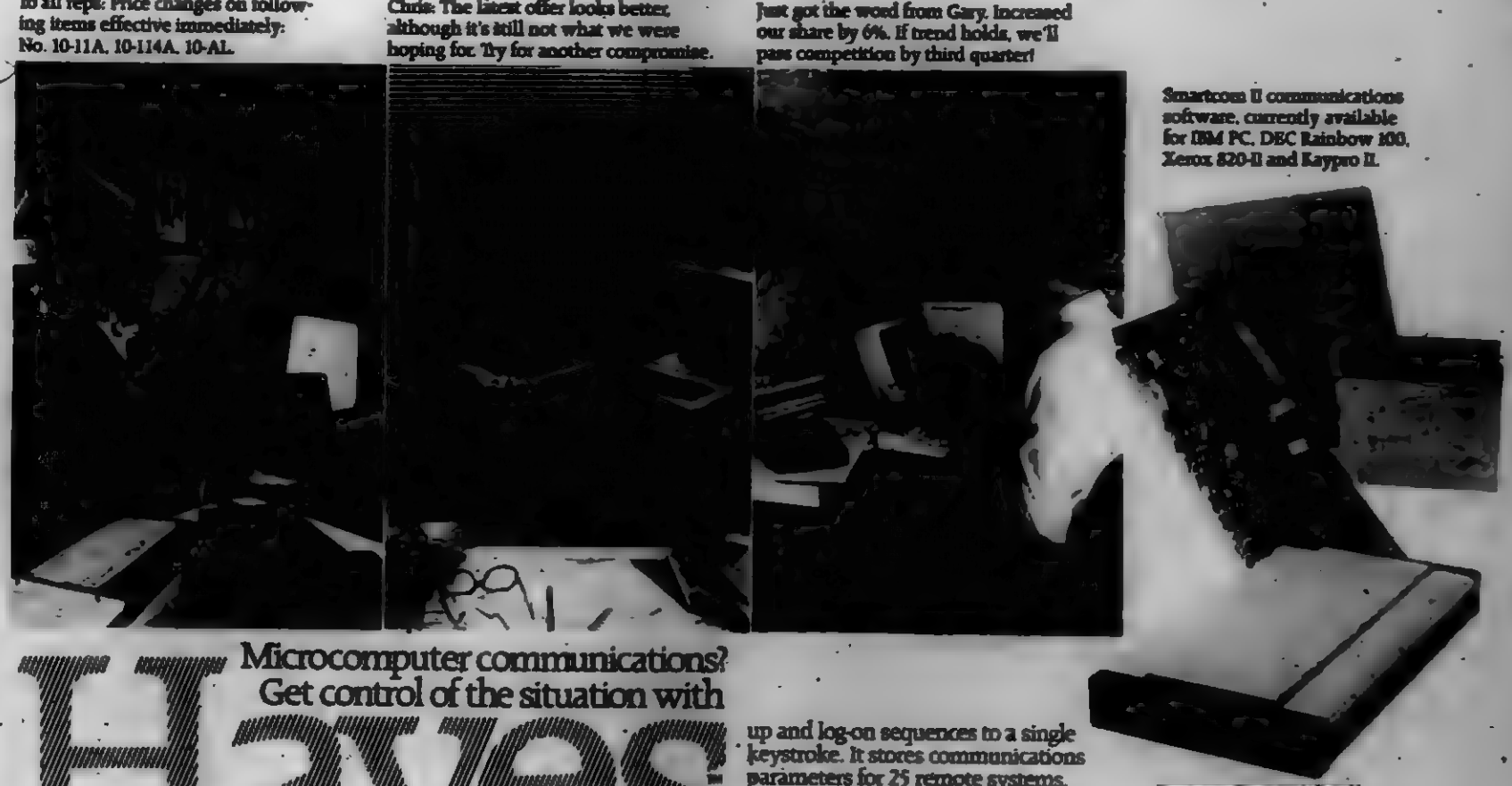
cancer is our inability to gather and process the massive volumes of data needed to clarify our view of our biological selves and to create the simulations needed to conduct experiments quickly. Improved CAT scanning via supercomputer image processing, allowing us to see what would otherwise remain unseeable, should speed our development of such cures decisively. The same could be expected in the case of other major diseases for which there now exist no cures.

I'm not saying that supercomputers alone can effect cures, but they are essential to the discovery process; in their speed and versatility resides the hope of breakthroughs.

The list of commercial applications awaiting improved numeric and symbolic supercomputers is as endless as we care to imagine. Better airframe design through electronic wind tunnel simulations will lead to lower manufacturing costs and safer transportation for business trips and holidays. Petrochemical research will yield cheaper and safer fossil fuels; the same can be said of nuclear energy. Better economic modeling could alleviate the unhappier consequences of imbalances in the supply/demand equation. Better structural modeling would yield manifold benefits to our architects, bridge builders and city planners. Better weather prediction techniques could save us from catastrophic surprises.

That our government must participate in helping to create supercomputers, especially our early ones, is not unreasonable. The positive effects of its involvement will be felt by all of us: We must, perforce, endorse it. Pleas for government subsidies, however, will be met with a friendlier countenance if we base them not upon the absence of a commercial marketplace, but upon the certainty of its presence.

Lecht is chairman of Lecht Sciences, Inc., a New York-based think tank specializing in computer and communications technologies.



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The lower-priced Smartmodem 300 is ideal for local data swaps and communicates at 300 bps. A built-in speed selector on Smartmodem 1200 automatically detects transmission speeds (110, 300 or 1200 bps).

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Smartmodem 1200 for all computers with an RS-232C interface; Smartmodem 1200B plug-in board for the IBM PC.

Smartmodem Specifications
Low Speed Data Format. (Smartmodem 1200 and Smartmodem 300) Serial, binary, asynchronous; 7 or 8 data bits; 1 or 2 stop bits; odd, even or no parity; (0-300 bps)
High Speed Data Format. (Smartmodem 1200) Serial, binary, asynchronous; 7 data bits, 1 or 2 stop bits; odd, even or fixed parity; or 8 data bits, 1 or 2 stop bits, no parity; (1200 bps)
Dialing Capability: Touch Tone® and rotary dial pulse dialing
Command Buffer: 40 characters
Commands: (answer/originate with Smartcom II software) A - Immediate answer; A/ Repeat last command; C Transmitter Carrier; D Dial command, including tempone dialing, waiting for second dial tone, auto-dialing and other features; E Local echo; F Full/half duplex; H Switch hook; M Audio monitor; O On Line; P Pulse dialing; Q Quiet mode; R Reverse originate-answer mode; S ? = Set commands speed, escape code character, number of rings to answer on; or S? Checks operational parameters above; T Touch Tone dialing; V Verbal result codes
Result Codes: (can be numeric/verbal) 0/OK Command line ok; 1/Connect Carrier detected; 2/Ring Phone is ringing; 3/No Carrier Carrier lost or never heard; 4/Error Error in command line; 5/Connect 1200 Carrier detected at 1200 bps (Smartmodem 1200 only)
Audio Monitor: Two-inch speaker with volume control
Rear Panel: On-off switch, power jack, RS-232C connector, modular phone jack connector, volume control
Operation: Full or half duplex
Data Rate: 0-300 bps and 1200 bps for Smartmodem 1200; 0-300 bps for Smartmodem 300
Interface: RS-232C
Intelligence: Z8™ microprocessor with 4K byte control program for Smartmodem 1200; Z8 microprocessor with 2K byte control program for Smartmodem 300
Modem Capability: Bell System 103 or 212A compatible originate or answer mode for Smartmodem 1200; Bell System 103 compatible originate or answer mode for Smartmodem 300
Receive Sensitivity: -9dBm for Smartmodem 1200; -45dBm for Smartmodem 300
Transmit Level: -10dBm
Registration: FCC registered for direct connect to the nationwide phone system. Connects with modular jacks RJ11W, RJ11C, RJ21W, RJ21C, RJ31W, RJ31C
Power Pack: U.L. listed 120VAC, 60Hz, 13.5VAC output.
Size: 1.5" × 5.5" × 9.0"

Some Copyright Registration Procedures

(Continued from Page 50)

formation is considered to constitute a trade secret. Any person having a confidential relationship with the owner of a program — including employees and, if specified by contract, licensees and other customers — is prohibited from using, duplicating or disclosing the owner's trade secrets.

Trade-secret protections are in some ways broader than copyright protections in that trade-secret law protects both the expression of ideas, in the form of a program or otherwise, and the ideas themselves. Copyright laws generally protect only the wording of the program.

On the other hand, trade-secret protections apply only so long as the ideas are disclosed only to those persons whose knowledge is essential. With the exception of disclosures obtained illegally, any dissemination of the information to other persons not having a relationship of confidence with the owner eliminates any and all trade-secret protections. A sure way to make public and, thereby, destroy the trade-secret status of all, or a substantial portion, of a program is to register the program.

In spite of trade-secret laws, preserving copyright protections is desirable because confidentiality and, thus, trade-secret status, can so easily be lost inadvertently. Thus, with respect to computer programs, copyright laws should be thought of as a backup to trade-secret law.

'Notice of Copyright'

Registration is not required to preserve a copyright. All that is required is that prior to "publication" (including sale or licensing) a "notice of copyright" be placed on the program.

Usually, the owner who places a notice of copyright on his material is required to deposit that material with the Library of Congress even if the copyright is not registered. However, computer programs that are published only in machine-readable form are not subject to this requirement. So copyright and trade-secret protections may be preserved simultaneously.

Aside from the time delay caused by this requirement, registration will require the deposit with the Copyright Office of at least a substantial portion of the program, resulting in a loss of confidentiality of those portions. Thus, suing for infringement is a lot like cutting off grain sales to the Soviets. The registration necessary prior to suing the infringer results in the program being made available to the public, which is likely to be more detrimental to the owner than the suit is to the infringer.

There is a solution to this problem. The Copyright Office has issued regulations providing that in certain situations, "special relief" will be granted that will preserve the confidentiality of materials deposited. The problem is that no one knows under what circumstances this relief is applicable.

The Copyright Office is currently accepting comments concerning this procedure. In the meantime, where it is considered sufficiently important, it is certainly reasonable to request such special relief in registering copyrights in computer programs.

If any of the ideas in this article is applicable to your company's computer programs, it is recommended that you discuss these matters with your attorney. There are three reasons why such discussion is advisable:

- Trade-secret laws vary from state to state. The law in your state may be different from the law discussed.
- There are many exceptions to the rules that have been discussed. An exception may make the discussion inapplicable to your situation.
- The law in this area is continually being changed. Changes in the law may require strategies different from those suggested here. In most cases, the time and expense of obtaining such legal advice will be minimal.

Hassett is an attorney at Gort, Hassett, Shannon & Slater in Atlanta, Ga.

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GETTING AHEAD IN DP/Donald J. Berardo

Improve Your Place in DP With 'Egograms'

In sports, and in life, you need to think about who the players are if you want to do well in the game. People have positions and titles that allow them many benefits because of their positional authority. You cannot buck them or their positions directly, for you will undoubtedly lose in the end. The best you can do to help your upward mobility is to learn to identify the games and the structure as best you can so that you can become a much better player.

In order to position yourself better as a star player in the game, you'll have to make some basic assumptions about who is in power, their heirs apparent and why they are there.

To start the process, ask yourself "Who are the most powerful people in my area?" "Powerful" is defined as anyone who can directly impact your salary, job functions, status, promotability and fireability.

After you've developed this list, make some "egograms" — short, descriptive statements about the critical players that will become your scorecard.

For example: Joe S. — Three years with the company, now senior analyst of accounting/applications. Generally dresses very well and is married and lives in the same town as the boss. Has two junior analysts under him. Has been in DP for about six years and probably earns $19,000. Does not socialize too much with the staff and always goes to lunch with the "biggies." Gets most vocal in project start-ups and wrap-ups.

Develop as many egograms as you can for the power players in your area. Test all of your assumptions by further observations to get as accurate a description as possible. What other facts or facets can you identify about these people? After you have a full scorecard that describes all the players, it is time for your review.

Spot Patterns

Try to spot the patterns. What factors consistently show up in the egograms of the successful people? Is it their technical skills? Their appearance and public speaking?

Each company's DP area will stress different aspects of an individual's personal/technical abilities as its success criteria. You have to determine what is important to the people who control your future.

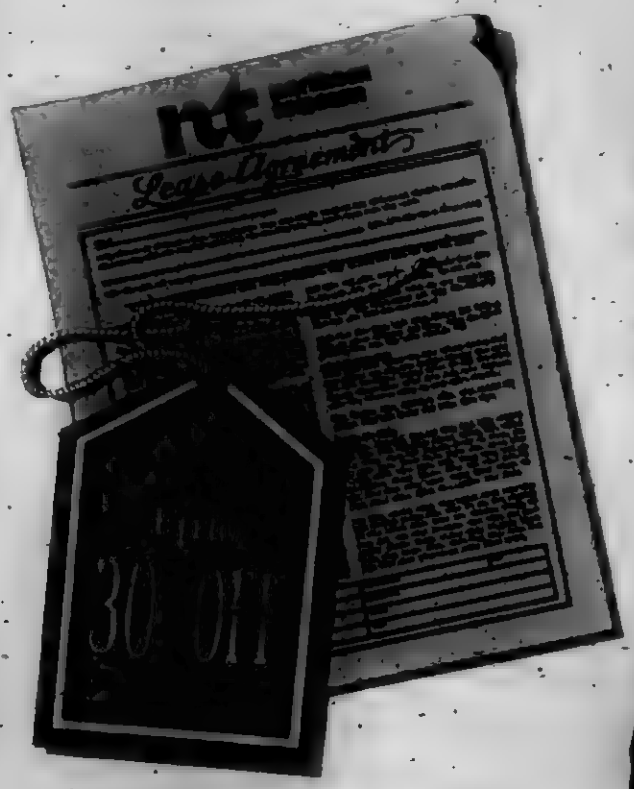
I am not suggesting that you become someone who you are not, but only that you must be able to adapt to the demands of the world surrounding you at work.

If you find that you cannot change your playing style to succeed in the game, then you may have to accept the results. You may not move from where you are in responsibilities or rewards.

But if you can effectively see your own strengths, assess the areas that need development and apply your energies to the most critical factors, then you can become a much more knowledgeable and successful player.

Berardo is a management counselor and career therapist. He is vice-president with the Meld Group in West Hartford, Conn., publishers of a monthly newsletter on management development.

'I Can't Go Any Farther — My Cordless Telephone Only Has a Range of 150 Feet.'



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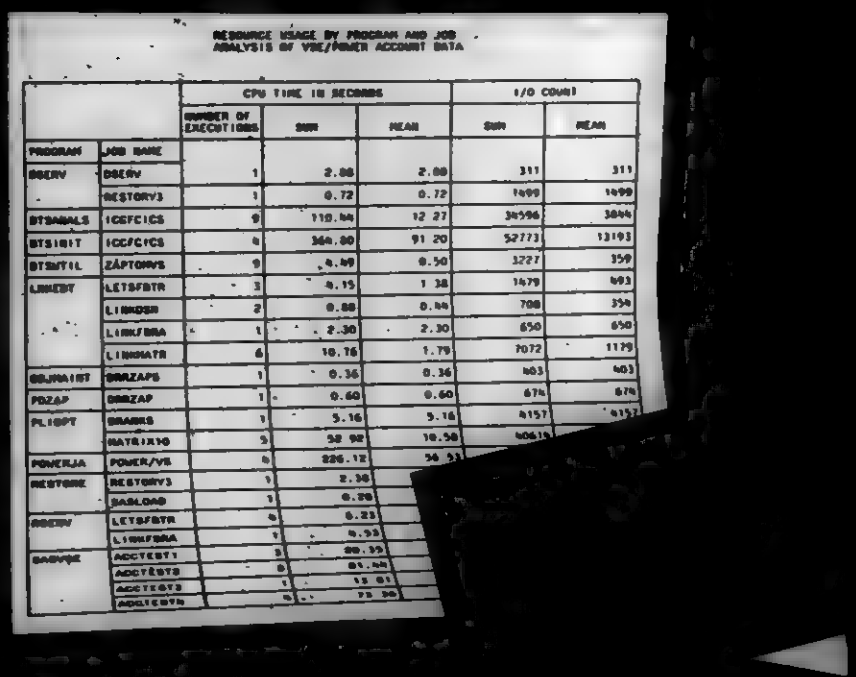
RESOURCE USAGE BY PROGRAM AND JOB
ANALYSIS OF VSE/POWER ACCOUNT DATA

		CPU TIME IN SECONDS			I/O COUNT	
		NUMBER OF EXECUTIONS	SUM	MEAN	SUM	MEAN
PROGRAM	JOB NAME					
DBERV	DBERV	1	2.88	2.88	311	311
	RESTORV3	1	0.72	0.72	1499	1499
BTSABALS	ICCFCICS	9	110.44	12 27	34596	3844
BTSIBIT	ICCFCICS	6	364.80	91 20	52773	13193
BTSMTIL	ZAPTOMVS	9	4.49	0.50	3227	359
LINKEDT	LETSFBTR	3	4.15	1 38	1479	493
	LINKDSR	2	0.88	0.44	708	354
	LINKFBRA	1	2.30	2.30	650	650
	LINKMATR	6	10.76	1.79	7072	1179
OBJMAINT	SMAZAPS	1	0.36	0.36	403	403
PDZAP	SMAZAP	1	0.60	0.60	674	674
PLIOPT	SMARKS	1	5.16	5.16	4157	4157
	MATRIX10	5	52 92	10.58	40615	
POWERJA	POWER/VS	6	226.12	36 31		
RESTORE	RESTORV3	1	2.36			
	BASLOAD	1	0.28			
ASCIN	LETSFBTR	6		0.23		
	LINKFBRA	1		0.33		
SASVSE	ADCYEST1	2		89.33		
	ADCYEST2	6		85.44		
	ADCYEST3	1		15 01		
	ADCYEST4	6		73 30		

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SAS saves time.

DP Must Leverage Programmer Productivity

By Bryan D. Stolle
Special to CW‡

Timely and accurate information has become the lifeblood of many organizations, yet the process of creating, manipulating and accessing this crucial resource is often the most unproductive aspect of these organizations.

The training and specialization required to design and operate an automated system excludes non-DP professionals from its management. As a consequence, DP shops have been burdened with the responsibility for most of the information systems in an organization, often without the corresponding authority and control.

Responsibility without control creates an antagonistic environment. DP management time is wasted in external conflict with various end-user groups. Also, the battle that ensues every time a new hardware, software or personnel acquisition is requested discourages needed enhancements.

Significant numbers of DP shops are also locked into decade-old programming languages. They gradually sink into a morass of project backlogs, impromptu end-user report requests and maintenance of excessive or undocumented code. Sloppily written, poorly documented and superficially tested programs are released to end users only to return to the backlog queue for corrections.

Management of the total environment with overall productivity and efficiency must enter the DP management philosophy. More importantly, top management must support this effort and provide the necessary authority as well as the responsibility.

Data base management systems (DBMS), application generators and fourth-generation languages have all been developed to address some of these problems. These systems allow one program to do the job of many similar programs specific to applications throughout the user community. Nonprocedural data base languages allow users to create applications with a few easily followed commands. Lastly, impromptu report requests are handled easily by report generators.

(Continued on Page 58)

Provides Information Center Reporting

'Imagine' Targets CICS/VS Environments

CAMBRIDGE, Mass. — Multiplications, Inc. has announced Imagine, an information center reporting and querying system for IBM CICS/VS environments.

Imagine features an entirely menu-driven architecture for specifying queries or reports. The specifications can then be executed on-line under CICS or in batch. A logical view of data for end users without modifying or reformatting existing files is also featured.

Imagine directly reads existing IBM Vsam, Isam or sequential files and integrates them into an informational data base to provide a logical view of data. Data conversion or added overhead is not required, a spokesman said. There are no limitations on the number of files that may be logically joined to create tabular views of the same data base. Logical views of the same data may be customized to each user group.

The product also permits a system administrator to control user access to data and computing resources, the spokesman said. Security facilities control data access by file, field, field value, report and logical view for each user.

An integrated print management system allows report specifications and output to be stored under individual user passwords or defined as system reports and made available to all users.

Imagine is fully integrated with Accolade, Multiplications' CICS application development system. Imagine is available on IBM OS/MVS, OS/VS1, DOS/VSE and DOS/MVT versions and executes in conjunction with CICS/VS Releases 1.5 or 1.6. The DOS/VSE version will be available Jan. 1.

Until Jan. 1, a perpetual license costs $41,650 for the OS version and $31,500 for the DOS version. After Jan. 1, the price increases to $59,500 for OS, $45,000 for DOS. Multiplications is at 1050 Massachusetts Ave., Cambridge, Mass. 02138.

DEC Announces Packages for VAX

CONCORD, Mass. — Digital Equipment Corp. has introduced two VAX-11 software products for commercial and industrial ventures.

The VAX-11 Application Control and Management System (ACMS) product set is a two-part software package for development and execution of transaction processing applications. The VAX-11 Data Base Management System (DBMS) Version 2 is a new version of the DBMS with added security features, enhanced performance and improved control utilities.

The VAX-11 ACMS is a fourth-generation language facility intended to reduce the life cycle costs of designing, developing, controlling and maintaining applications.

The ACMS product set is the sixth component in the VAX information architecture and interacts with the other five to manage applications in

(Continued on Page 56)

Modules Operational On IBM 4361

GREENBELT, Md. — Martin Marietta Data Systems, Inc. has announced that five of its Modular Application System (MAS) products will be fully operational on IBM's new 4361 Model Groups 4 and 5.

They are: MAS-Manufacturing, MAS-Payroll, MAS-Personnel, MAS-Decision Support and MAS-Project Management.

MAS-Manufacturing is priced between $25,000 and $179,000; MAS-Payroll from $19,000 to $39,000; and MAS-Personnel between $19,000 and $73,000. Martin Marietta is located at 6303 Ivy Lane, Greenbelt, Md. 20770.

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VAX-11 Software Targets Commercial Ventures

(Continued from Page 55)

volving many users and large data bases. It reportedly provides a consistent, menu-driven operator interface for application execution, ensuring data base integrity and minimizing the use of system resources.

Implementation in an ACMS environment reduces complex applications to small steps. It uses existing VAX-11 information architecture to handle portions of the application and ACMS tools for the remainder.

The VAX-11 ACMS product set comprises two components: VAX-11 ACMS/AD, for developing applications; and VAX-11 ACMS, for monitoring and controlling execution of applications developed with VAX-11 ACMS/AD as well as those developed with existing VMS tools.

The VAX-11 ACMS/AD portion of the product set, used primarily by application designers and programmers, replaced most traditional application code with structured, high-level definitions, resulting in smaller programs with greater ease of implementation and maintenance.

The VAX-11 ACMS portion of the product set supplies the operational environment for ACMS/AD-defined tasks as well as other existing applications running under the VMS operating system. It enables creation and changing of menus for task selection, control of user and terminal access to ACMS applications and menus and allocation of system resources.

The VAX-11 ACMS product set, including both development and execution software, is priced at $15,000. The VAX-11 ACMS component is also offered separately for $5,500.

The VAX-11 ACMS/AD component will be available separately only as an application development upgrade package where a VAX-11 ACMS license is already present. The price is $10,000.

Version 2 of the VAX-11 DBMS provides a security schema in addition to the data base schema, application subschema and storage schema under the earlier version. The security schema controls the user's ability to execute data manipulation language verbs, to modify data items and to access record instances.

The VAX-11 DBMS system license, with full support, documentation and media, is priced at $20,000. A runtime-only version of the VAX-11 DBMS, which executes applications developed with the complete development version, is also available after purchase of a full DBMS system license for a fee of $4,000.

The Version 2 and the VAX-11 DBMS runtime system will be ready in January. More information is available from DEC, 200 Baker Ave., Concord, Mass. 01742.

Forth/370 Out For IBM CPUs

FREDERICK, Md. — Ward Systems Group has introduced an interactive micro language for IBM mainframes.

Forth/370 was designed for IBM and IBM-compatible mainframe users. It runs under either VM/CMS or MVS/TSO with program compatibility to many micro Forth systems.

Forth/370 disk files are compatible with and can be accessed by the host operating system. Files can be edited either by the Forth editor or by the CMS or TSO editor. It also contains an assembler.

The system is available on a 30-day free trial and may be used on all of a firm's CPUs for a one-time charge of $1,350. Source code is also available.

More information is available from Ward Systems at 8013 Meadowview Drive, Frederick, Md. 21701.

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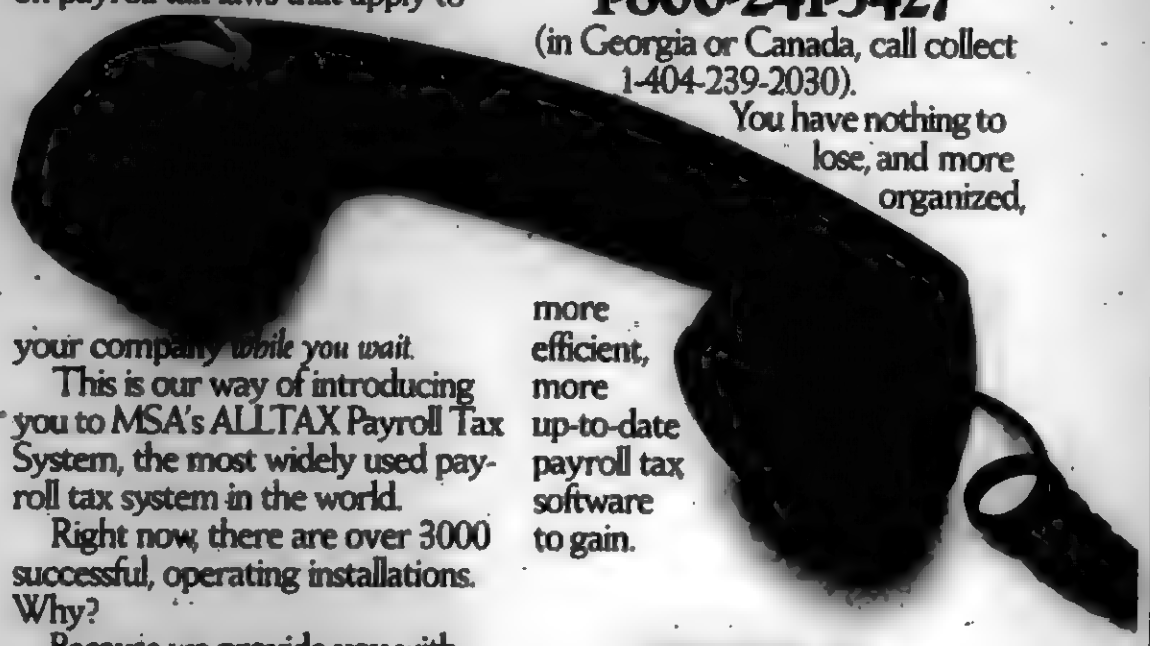

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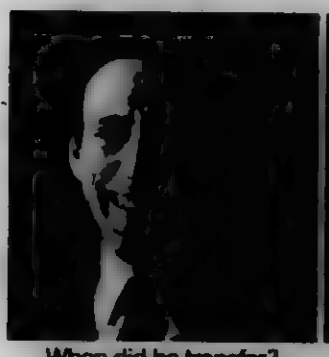
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Software Tools Announced for DEC VAX-11

PHOENIX — Data Base Systems Corp. has announced the Transact and Entry software tools for the Digital Equipment Corp. VAX-11 system running VMS.

The packages utilize VAX/VMS native-mode architecture and provide access to all VAX-11 RMS functions, a spokesman said. The products are said to improve productivity in applications development for both programmers and nonprogrammers and offer extended functionality and program efficiency.

Transact is said to develop, maintain, operate and administer on-line transaction processing for specific user applications.

It is menu-driven and can be used as a stand-alone system or by analysts and application developers for implementing complex transaction systems.

Entry is said to be a comprehensive general-purpose data entry facility that allows nonprogrammers to create, maintain, operate and administer a data entry operation. It provides menu-driven interactive development and actual data input operation, screen definition, screen linking, key verification, editing and table verification.

Each package is priced at $12,500, according to the company.

Data Base Systems is located at 1846 E. Camelback Road, Phoenix, Ariz. 85016.

Candle's 'Epilog/MVS' Enhanced With Page Data Set Statistics

LOS ANGELES — Candle Corp. has announced Version 200 of its installation performance management system, Epilog/MVS.

Version 200 reportedly provides enhanced resource information to include page data set statistics, a user-controllable automatic analysis feature displaying information about relevant resources.

Another enhancement is the System Performance Navigator, which allows a user to navigate through historical information on service levels, work loads, response time, degradation causes and resources, a spokesman said.

Epilog/MVS runs on any IBM and compatible computer operating under the MVS or MVS/XA operating systems. It is priced at $19,500 from Candle, Suite 2404, 10880 Wilshire Blvd., Los Angeles, Calif. 90024.

DP Must Learn to Leverage Programmer Productivity

(Continued from Page 55)

DP management gains a great deal of control over the entire environment with these tools. An even greater benefit, though, is that this environment can be easily integrated. Equally important, the productivity and efficiency of enhancements and maintenance becomes more cost-effective.

While DBMS and other fourth-generation tools have gone a long way toward improving productivity, problems still remain. The inefficiencies of excessive and redundant programs and data have been replaced by the need for extensive and specialized know-how and design skills.

The complexities of most current DBMS offerings require considerable investments in new training and detailed data base design studies.

Another problem is in the area of integration. It is not uncommon for a DP shop to spend considerable resources to integrate software packages into a DBMS. Often the individual application could have been produced more efficiently as a stand-alone system.

It is also not uncommon for a project to be well under way before it is discovered that the DBMS cannot provide the needed level of sophistication to complete the project without performing major DBMS enhancements. DP management must be certain it thoroughly understands its needs and requirements before a software package is procured.

Problems experienced by the end user must also be addressed. Although they claim to be "English-like," many DBMS query and report generator systems are still very cryptic and inflexible. Often, integration between end-user application programs and software tools is less than transparent, at times requiring complex manipulations and the transfer of data and information. The result is that the end-user becomes frustrated, placing his needs right back into the DP department's lap.

These problems and others have spurred the drive toward artificial intelligence concepts and capabilities in both the user interface "front end" and the data management "back end."

The integration of data-driven functions, a natural English interface and a transparent self-generating DBMS illustrates an approach to fifth-generation information systems.

The DP professional of the future will be concerned with designing information system processes as opposed to software. This "ultimate" in programmer and end-user productivity leverage is a most welcome development.

Stolle is marketing director at Technical Systems Associates in Houston.

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Maintains Independent Data Dictionary

Sourcerer I Fits Honeywell Large-Scale Systems

NEW YORK — Scientific & Business Systems, Inc. (SBS) has announced the availability of an on-line systems development environment for Honeywell, Inc. large-scale systems.

Sourcerer I, a product of Galler Automation Industries, Inc., is said to maintain an extensive system-independent data dictionary. It also enables composition of CRT forms, generates source program routines and provides on-demand system and program documentation.

A spokesman said the product's data dictionary, forms generation and source generation capabilities eliminate the need to redefine system elements even when creating additional systems. The data dictionary provides a central cross-referenced bank of information containing all parts of the system, so that any part can be amended as an independent entity and properly assembled into each application program which requires it. It maintains file, record and data element definitions and allows for multiple relationships, so that a single generic data element can reside in multiple records.

The forms generator allows application forms to be painted. Variable fields are then uniquely related to data elements in the data dictionary. Stand-alone applications programs may be assembled from the cross-referenced components.

Sourcerer I is available for immediate delivery to users of Honeywell's DPS 8 or Level 66 systems operating under Honeywell's Geos 8 and DM4/TP operating environments. The price is $25,000 from SBS, 2067 Broadway, New York, N.Y. 10023.

Four-Function 'Utilities/38' Announced for System/38

RUTHERFORD, N.J. — Software Plus, Inc. has announced the release of Utilities/38, a four-function utilities package for the IBM System/38.

The package includes Menu Management (MM/38), Value Display Utility (VDU/38), Financial Analysis Utility (FA/38) and Graphics Utility (Graph/38).

According to the vendor, MM/38 relieves the data processing department of the programming required to set up individual user menus. User menus can be tailored in more detail and with less effort. The cost is $2,000.

VDU/38 provides data processing departments with the ability to define associated value to data and eliminates external editing requirements. It is priced at $1,750.

Using income statement and balance sheet information, FA/38 automatically generates four major financial reports, including source and use of funds, financial trend analysis, common size analysis and Dun & Bradstreet Corp. Key Business Ratios. The cost is $850.

With Graph/38, standard formats of information can be transformed into graphics displays. It will illustrate these values as well as report the sales results in numerical terms, the vendor said. It is priced at $500.

The price for all four packages is $3,800. More information is available from Software Plus, Meadows Office Complex 301, Rt. 17 N., Rutherford, N.J. 07070.

Relate/3000 Enhanced For HP 3000

SANTA CLARA, Calif. — CRI has introduced a menu system enhancement to Relate/3000, a relational data base management system for Hewlett-Packard Co. HP 3000 series computers.

The fill-in-the-blank menu system uses a front-end facility that allows novice users to create and manipulate data bases, create custom reports and generate color graphics and plots, a spokesman said.

Each menu provides the user with complete instructions and a self-guiding layout. Utilizing true character mode I/O, only the characters that need to be processed are processed.

The menu system operates with Relate/3000 Version 4.30 on all HP 3000 series computers under the MPE operating system. Relate/3000 is available for purchase starting at $9,950; the menu system is listed at an introductory price of $3,500 through November.

Thirty-day product evaluations are available from the vendor. More information is available from CRI, 5333 Betsy Ross Drive, Santa Clara, Calif. 95054.

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Provides CICS Attachment

Enhanced Help Facility Unveiled

TORRANCE, Calif. — Data 21 has announced a new version of its on-line help facility development and processing system known as Help Display Facility (HDF) 1.2. The system reportedly provides for the programmerless on-line, real-time creation and maintenance of multilevel on-line help facilities which can be attached to IBM CICS applications, accessed on-line with the HDF display function and printed in manual form.

At the same time, Data 21 also announced the Remote Print Facility-Extended (RPF-E) 1.3, a CICS spooling system for users of IBM's DOS/VSE operating system.

Version 1.2 of the HDF allows the user to define HDF command characters from any character on the user's keyboard. In addition, Data 21 has extended its variable substitution processing to include the Terminal Control Table User Area, which can be defined to HDF while variable names can be employed on help screens, a spokesman for the company explained. These names are replaced with the variable data they represent whenever the HDF screen is displayed.

In Version 1.3 of RPF-E, a batch interface to the Vsam ESDS spool file complements the RPF-E on-line interface. Batch programs can write reports directly to RPF-E bypassing IBM's Power/VSE, or a batch copy utility can be run to transfer reports from Power/VSE to RPF-E. Coupled with RPF-E's hot printer support, batch as well as on-line programs can have output automatically routed to CICS printers, or the output can be retrieved at the user's discretion, the spokesman said.

Reports can be routed to an IBM Personal Computer's disk for off-line printing or directly to the Personal Computer's printer. Also, data in the Personal Computer can be uploaded to the host system with RPF-E.

Help Display Facility 1.2 is available at the introductory license fee of $1,050, while the Remote Print Facility-Extended 1.3 costs $4,200. Data 21 is located at Suite 300-5, 3868 Carson, Torrance, Calif. 90503.

On-Line Protection System Debuts for CICS Level 1.4

NEW YORK — Cornell Computer Corp. has introduced a computer on-line protection system designed for IBM CICS Level 1.4 or higher.

Aegis controls access to accounting and financial files, customer lists and employee records, a spokesman said. It also controls which operators and terminals may access specific files and programs. The hours and days that operators and terminals are permitted to enter the system are predetermined by the manager of computer security.

Each operator is assigned a password, and no one can sign on without it. The security manager determines which files and programs each operator will be permitted to use and to what data each terminal will have access.

The system features formatted security, a sign-on screen with darkened password field, save and restore functions, automatic sign-off interval for each terminal and a log of all maintenance activities.

Aegis is designed so that all unsuccessful attempts at sign-on at a particular time are recorded by names and passwords, as well as the times and locations of such attempts.

Aegis is sold at a one-time price of $17,500 with discounts for multiple sites or CPUs. A maintenance contract is available for $1,750 for one year or $3,000 for two years. Under the maintenance agreement, all future enhancements are provided at no cost, and the warranty is extended for the full term of the agreement. Cornell Computer is located at 363 Seventh Avenue, New York, N.Y. 10001.

Data Utility Announced For Wang VS

WHEATON, Ill. — Generated Systems, Inc. has announced Dataryte IV, a data validation utility for the Wang Laboratories, Inc. VS Minicomputer.

According to the company, the system is designed to interface with the data entry programs created by Wang's EZFormat utility. The package is said to store edit rules on an edit tape file, not embedded in program logic, so nontechnical personnel can make changes to edit rules. This approach is said to reduce the complexity of data entry programs, standardize and centralize edit control and allow the users direct access to the validation process.

Dataryte was established for on-line use, but can also be used in a batch run. It can be utilized for mass change or simple report generation in a batch mode, the company said. The system is said to allow users to examine each field within a transaction or record and report exceptions, deviations or omissions, and users can test for an unlimited number of specific values and/or ranges of val-

The system is written primarily in Cobol with two small assembler subroutines. It is priced at $3,000 for a single CPU, with multiple CPU discounts available from Generated Systems, 209 N. Hale St., Wheaton, Ill. 60187.

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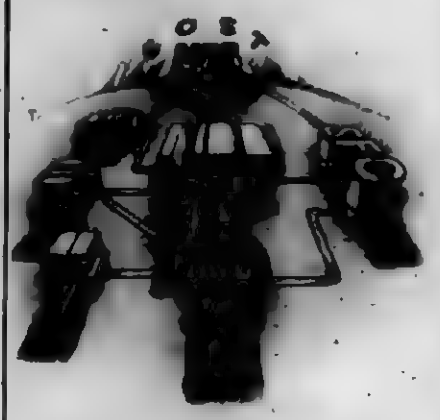

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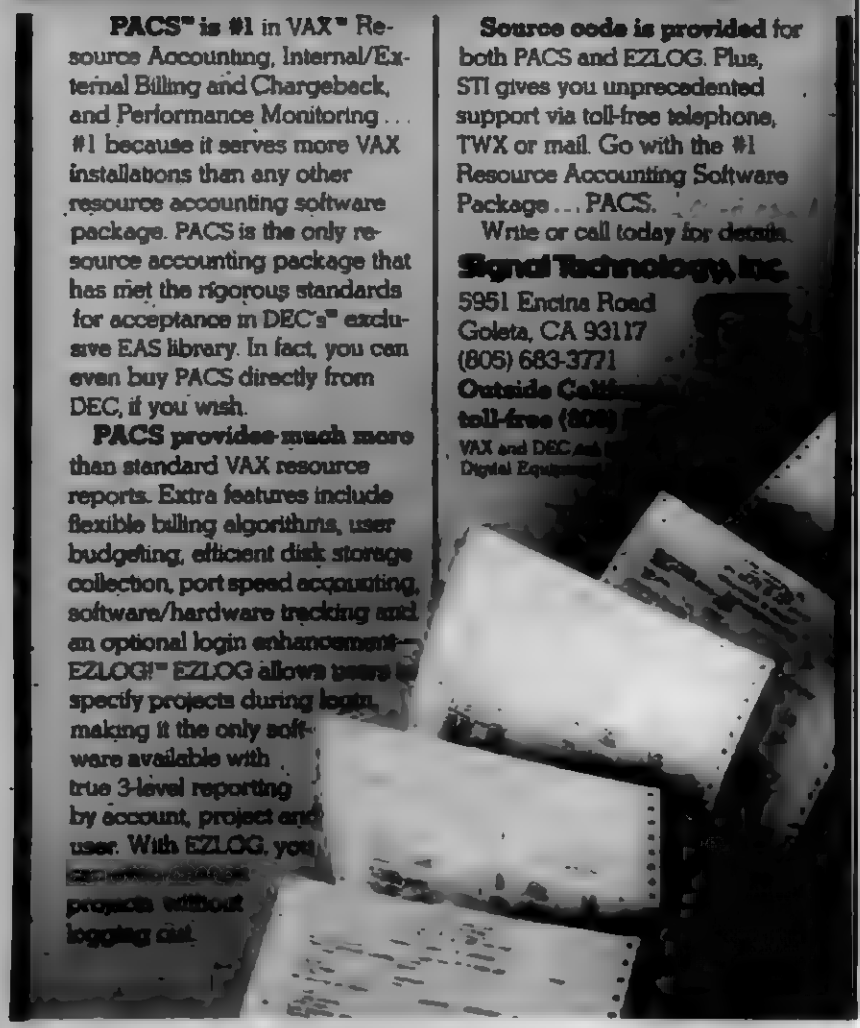

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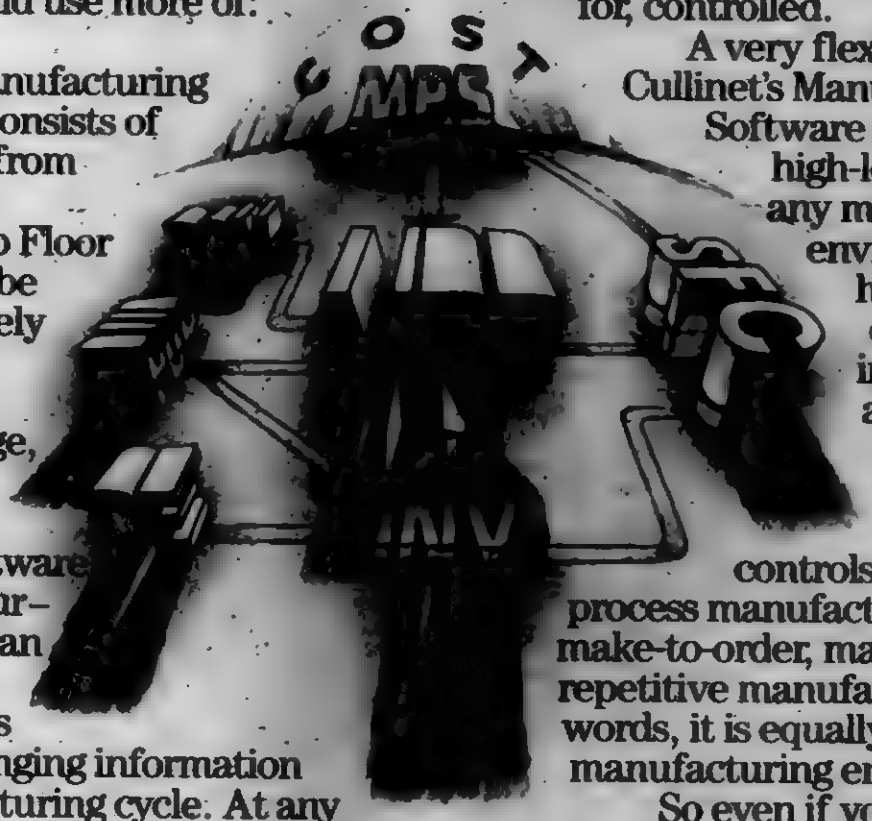

A very flexible system, Cullinet's Manufacturing Software can bring high-level control to any manufacturing environment however unique or personal your individual style and approach. It can provide single or multi-plant controls. Control for process manufacturing, make-to-order, make-to-stock, or repetitive manufacturing. In other words, it is equally capable in any manufacturing environment.

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For more information or to attend a seminar on Cullinet's Manufacturing Software, see the adjacent page.

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'Arsap' Management System Updated to Run on PDP-11s

RIVERDALE, Md. — Arsap, the resource management and chargeback system for Digital Equipment Corp. computers from Gejac, Inc., has been updated to run on PDP-11s using the recently released RSX-11M 4.1 operating system.

Arsap is a computer resource management system that provides users with reports on various aspects of data center operations. Available for use with other DEC operating systems including RSTS, RSX-11M, RSX-11M-Plus and VAX/VMS, Arsap can be used to compare resource utilization in shops with multiple operating systems, a Gejac spokesman said.

With Arsap, users can be prompted for a project-identification and password upon logon, and the terminal session can be allocated to a specific project and account. System utilization reports can be generated for each terminal, showing the activity on each terminal, when the terminal is used and the amount and type of resources consumed. The reports are presented in graphics as well as numeric format, the company said.

In addition, utilization reports can be produced by shift and may include such information as CPU usage, disk space, number of logons, connect time, memory utilization and device I/Os. Invoicing can be generated by user or by project.

Arsap for RSX-11M is available for a one-time license fee of $2,995. Existing Arsap for RSX-11M users who are under Gejac's maintenance and enhancements service may receive the updated version at no charge. Arsap users not under the service can purchase the update for $1,198 from Gejac through P.O. Box 188, Riverdale, Md. 20737.

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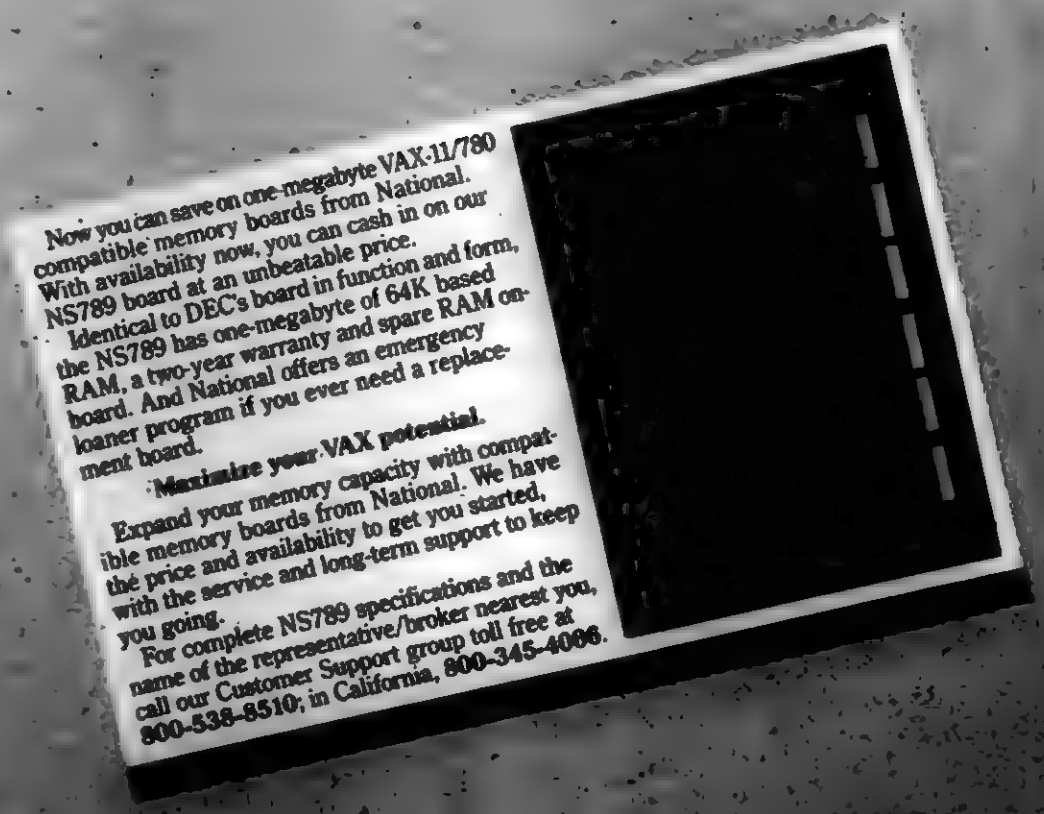

Buffer Control Of Computronics Targets Prime

WOOD DALE, Ill. — Computronics has announced Input Buffer Control software, which is said to provide a buffer-control capability for data coming into a Prime Computer, Inc. system on any asynchronous communications line.

The software is useful for connecting Prime computer systems to microcomputers, local-area networks or other high-speed equipment, and the system is said to resolve the difficulties that these devices can cause when sending data faster than the Prime system can accept it, a spokesman said. A program is provided that allows the system manager to control the buffer thresholds when the software decides that the buffer is nearly full or empty. The buffer-control feature can be enabled or disabled on a line-by-line basis.

The system is available for all Prime 50 series systems and will also work on the Prime 400 and 500. The package is priced at $600, including a one-year warranty and all new releases. Information is available from Computronics, 130 N. Ash, Wood Dale, Ill. 60191.

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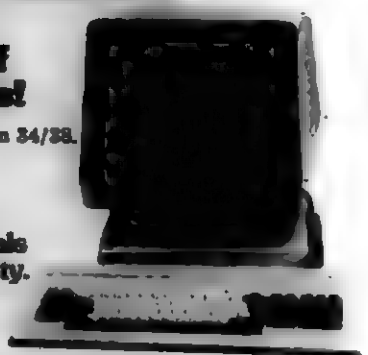

Buy, lease or rent Esprit Executive 10/78s from MTI and get low-cost ASCII terminals with IBM keyboard compatibility.

MTI's combination of Esprit Executive 10/78s and a PCI protocol converter allows these terminals to perform IBM 3278 applications with no software changes. (And one protocol converter can accommodate up to seven terminals. Think of the savings!) The Executive 10/78 features a non-glare, 80-character by 24 line display, an additional reference line, tilt and swivel. The low profile sculptured keyboard is identical to IBM 3278 keyboard layouts. No operator re-training is necessary.

MTI is an authorized distributor of PCI protocol converters as well as the most desirable ASCII terminals and printers. And MTI field sales engineers provide on-site consultation to show you how to design the most cost-effective terminal system.

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Firm Offers Service to Test Integrity of Banks' Systems

ATLANTA — Computer Based Solutions, Inc. has announced Data Security Test to test the integrity of bank computer systems against crime.

The service includes direct consultant time and use of a survey, which includes direct as well as peripheral considerations in measuring the protection of a computer system. Specifically, it covers software (applications, systems and security), host computers, satellite computers, micros, terminals, automatic teller machine passwords, data communications, wire transfers, employee background investigations, DP auditing, documentation, training, disaster recovery planning, physical security, encryption, manual procedures, library procedures, management involvement and organization structure, according to the vendor.

The service costs $10,000.

Further information is available from Computer Based Solutions, Suite 1148, 3390 Peachtree Road N.E., Atlanta, Ga. 30326.

Multitask Aims Accounting Tool At Leasing Use

WELLESLEY, Mass. — Multitasking Systems, Inc. has introduced Flexx, an accounting management system geared to the leasing industry.

Flexx performs accounting and financial functions in the areas of fixed asset accounting, general ledger, accounts payable and receivable, payroll, time accounting and credit applications, according to the vendor.

The system does not require learning another language, and each operator can create his own program, the vendor said.

Flex runs under Data General Corp.'s DOS and EOS; Digital Equipment Corp.'s VMS; Wang Laboratories, Inc.'s VS; and Point 4 Data Corp.'s Iris operating systems.

The price ranges from $21,000 to $95,000.

Further information is available from Multitasking Systems at Suite 301, 177 Worcester St., Wellesley, Mass. 02181.

ICP Announces Directories

INDIANAPOLIS — International Computer Programs, Inc. (ICP) recently announced a series of software directories that concentrate on individual business categories.

The six volumes of ICP Software Directories concentrate on banking, business planning, financial services, graphics, insurance and office automation.

ICP also announced ICP Quicksearch, a 24-hour hot line to ICP's data base of software products, service and vendor information.

The directories are sold separately, ranging from $19 each. Further information is available from International Computer Programs, 9000 Keystone Crossing, P.O. Box 40946, Indianapolis, Ind. 46240.

Nasa Unit Offers Archival System

ATHENS, Ga. — Cosmic, the software dissemination center of the National Aeronautics and Space Administration (Nasa), has released the Arch file archival system, which is said to provide for off-line storage and retrieval of arbitrary files on a Digital Equipment Corp. VAX-11 system.

According to Cosmic, Arch can handle any one of the three types of Files-11 formats: indexed, sequential and relative.

The user can add comments to explain actions and maintain file history.

The package is said to offer several features which aid the user in searching the archived file to eliminate dearchiving to locate a specific file.

An internal Help facility provides assistance in all phases of the Arch system, according to the vendor.

Arch is said to incorporate privileged management functions, including commands that initialize or restore the special disk directory, recalculate the index of files and locate files in the disk directory which are not known to the system.

Arch source code is available for $975.

Further information is available from Cosmic at 112 Barrow Hall, University of Georgia, Athens, Ga. 30602.

Report Writer Fits VAX-11

SUNNYVALE, Calif. — NCA Corp. has announced the availablity of the Fast Inquiry System (FIS), an interactive report writer, for its Maxcim system on Digital Equipment Corp.'s VAX-11 series of computers.

Maxcim is an integrated manufacturing/financial software system for the planning, analysis and control of manufacturing operations.

It runs on DEC VAX-11 and PDP-11 computers, according to the vendor. FIS is an addition to the existing Inquiry function and decision support system for management reporting.

FIS is integrated as a function on Maxcim's 'X' menu.

Additional features of FIS include a full command-file interface facility, format control and an on-line calculation capability (including subtotals and totals).

FIS is available for $4,000 from NCA, 388 Oakmead Pkwy., Sunnyvale, Calif. 94086.

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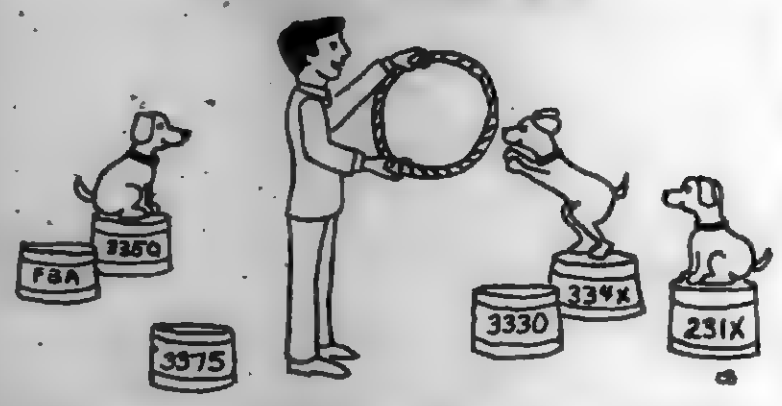

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HCGS Joins DEC Terminals With Tektronix Software

BURLINGTON, Mass. — Texprint, Inc. has announced Host Computer Graphics Software (HCGS), which the company said makes software written for Tektronix, Inc. Plot 10, 4010 and 4014 graphics usable on Digital Eqipment Corp.'s dot-matrix printer/plotter terminals.

The company said HCGS provides low-cost, high-resolution color hard-copy output of charts, diagrams, maps, formatted reports, and other text and graphics data. It is said to eliminate the requirement of reprogramming software written for Tektronix systems into a DEC-compatible bit-map graphics structure by allowing Plot 10, 4010 and 4014 call-type applications to produce color text and graphics hard copy on the Decolor LA 120, and in black-and-white on Decplot and other DEC dot-matrix printer/plotters.

It is written in Fortran and is supplied in source form for DEC computer systems or any Ansi- or Ascii-compatible system running Fortran.

HCGS kits are available at $895 for color and $795 for black-and-white from Texprint, 8 Blanchard Road, Burlington, Mass. 01803.

Micro-Based Programs Offer Management Training

COCONUT GROVE, Fla. — Thoughtware, Inc. has announced the first in a series of personal computer-based learning programs called Thoughtware.

Thoughtware offers professional management training on a personal computer.

The program is said to combine paper-based and audiovisual instruction courses with computer-aided instruction.

Thoughtware is programmed for use with the IBM Personal Computer and hard disk XT models and employs an authoring language called Alice (Authoring Language for Interactive Computer-based Education), which enables users to design programs without familiarity with complex programming languages, according to the vendor.

The system incorporates color graphics and animation and is interactive with a built-in assessment capacity that allows each individual to compare performance with national norms, according to a vendor spokesman.

The first two series to be introduced will be Management Diagnostics and Management Training, each designed for either individual or group use by managers at all levels, the vendor said.

Thoughtware is said to apply generic management training to real-life situations.

The programs are priced from $350 to $450 each, according to the vendor.

Thoughtware is located at Suite 1000A, 2699 S. Bayshore Drive, Coconut Grove, Fla. 33133.

Classes Aimed At IBM Users

RUTHERFORD, N.J. — Software Plus, Inc. has announced two 10-week classes this fall for beginning and advanced users of the IBM System/3, System/34 and System/38.

The classes, which cost $750 for registration and books, will be taught at the Software Plus office at the Meadows Office Complex in Rutherford, N.J., according to the vendor.

"Inside the System/38," the introductory course, will run Nov. 8 through Jan. 17.

The course is said to concentrate on establishing a working familiarity with the System/38 through hands-on experience.

The advanced class will run from Nov. 10 through Jan. 19, the company said.

The advanced class is designed for users with one to two years System/38 experience, according to the company.

Software Plus is located at Meadows Office Complex, 301 Rt. 17 N., Rutherford, N.J. 07070.

Medical Records System Out

WAUKESHA, Wis. — Computer Resources and Technology, Inc. has introduced Problex, a physician hands-on, problem-oriented medical records software system for use with IBM System/34 and System/36 hardware.

The package is said to organize medical records and eliminate duplication of records entries. It organizes records into easily updated chronological tables of contents/synopsis that can be retrieved in minutes through cross-referenced codes. The company said security features have been included.

The system is said to provide immediate access to patient identification information, present condition and therapies and dates of visits. Printed records such as hospital admissions, medical insurance reports, prescriptions and consultation records can be generated automatically by the computer from the information entered to the medical record. Problex can be integrated with the Medical Billing Management System software system developed by the company.

The package is priced at $12,300 from Computer Resources and Technology, 20100 W. Greenfield, Waukesha, Wis. 53186.

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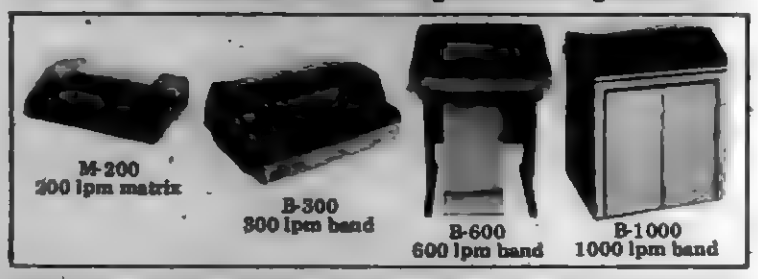

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Data Base System Targets Life Insurance Industry

CHICAGO — Pride-Tech Corp. has announced Life-D/B Insurance System software, a data base system designed for the insurance industry.

The system, which the company said is compatible with any minicomputer or mainframe that supports Cobol, is said to be an integrated data base designed around a high-level language developed by the firm to enable users to install, modify and upgrade the system easily. The system provides processing support for the issuing of new business and the ancillary functions required for submission to in-force policy processing.

The package offers elimination of data redundancy, simplification of data access, full availability of information in report formats, a single master file data storage concept and application processing support modules. The Life-D/B Insurance System is said to support the following life insurance products: universal life, term, whole life, retired lives reserve, current value assumption products, endowments and fixed and variable annuities.

According to the company, the high-level language — D/B-L — has reduced the need for trained system specialists. The simplicity of the language is said to be in its reduction in the overall code required to make program changes and test them on-line without interrupting the system.

Life-D/B is priced at $150,000. Further information is available from Pride Tech, Suite 2504, 505 N. Lake Shore Drive, Chicago, Ill. 60611.

Software Plus Offers Package For System/38

RUTHERFORD, N.J. — Software Plus, Inc. has introduced Human Resources/38, its latest applications software package designed specifically for the IBM System/38.

Human Resources/38 has six modules. The functions include:

- Applicant Tracking — Equal Employment Opportunity (EEO) information, applicant profile, job title and interview data.
- Personnel Demographics — employee roster, employee profile, EEO reports, turnover analysis, holiday and vacation schedules and termination roster.
- Benefits Reporting — insurance premium analysis, internal pension reporting, dependent tracking, thrift plan reporting and eligibility roster.
- Compensation Reporting — salary administration, salary reporting, job evaluation records and performance appraisals.
- Administrative Reports — manpower reporting, budget comparisons, salary comparisons, current retirees and pension census.
- Fleet System — lease expense analysis, lease payment analysis, expense records and insurance data.

According to the vendor, the program allows human resource managers to use terminology with which they are familiar. The system has built-in security features, yet allows users to design their own security.

The Human Resources/38 currently offers 60 reports but has the capability to expand beyond that to meet user needs.

The system is priced at $30,000 from Software Plus at 301 Rt. 17 N., Rutherford, N.J. 07070.

RCA Introduces News Service To Telex Users

NEW YORK — RCA Global Communications, Inc. has introduced its own news and information services for U.S. and overseas telex customers.

Hotline offers world news and stock quotations. Reports from major financial centers around the world — including Zurich, London, Sydney and Frankfurt — form the basis for the financial information.

The service is the result of an agreement reached with the Associated Press (AP), which will provide and constantly update the information. Based on the system's use, AP provides additional sections of information and special interest articles.

Through a separate agreement with Bunker Ramo Corp., stock quotations are available. The cost of the service is the price of a telex, a spokesman said.

More information is available from RCA Global Communications at 60 Broad St., New York, N.Y. 10004.

Integration Tool For SB-5 Bows

ELMWOOD PARK, N.J. — Business Controls Corp. (BCC) has developed an optional software module to integrate its SB-5 automated Cobol software development system with the System 1022 data base management system (DBMS) from Software House, Inc.

With the integration module installed, SB-5 automatically accesses the System 1022 data base as required for new program development and program maintenance. Subroutine calls and working storage section definitions are correctly generated automatically, a spokesman said.

The System 1022 DBMS is used with Digital Equipment Corp.'s Decsystem-10 and -20 mainframe computer systems. Versions of SB-5 are available for DEC's PDP-11 and VAX minicomputers as well as for the mainframes.

The price for SB-5 without an integration module ranges from $12,000 to $32,000 depending on the target computer system. The SB-5/1022 Integration Module option is priced at $5,000.

Further information is available from BCC, 507 Boulevard, Elmwood Park, N.Y. 07407.

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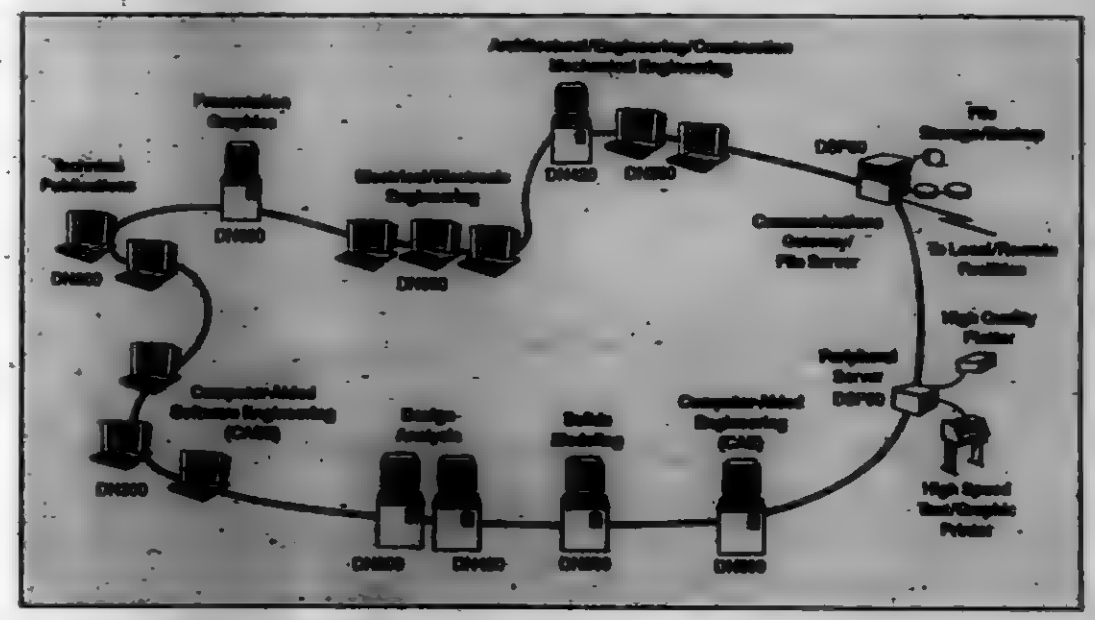

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Micro Notes

Version 1.1 of **Number Cruncher** for the IBM Personal Computer, XT and compatible microcomputers includes a data base management system, information management, text editing, applications generation and spreadsheet functions and is priced at $395. A paycheck-preparer module is priced at $89.95 and is also available through Pyramid Data Ltd., P.O. Box 10116, Santa Ana, Calif. 92711.

Datacure, a utility program for microcomputers running Digital Research, Inc.'s. CP/M 2.2 and Pickles & Trout, Inc.'s V2.2E operating systems, rebuilds files on diskettes that have gone bad. Priced from $99, the program is available from Colorado Online Systems, Inc., 40 Balfour Lane, Ramsey, N.J. 07446.

An advanced management decision simulation program emphasizing business use of personal computers has been released for use on Osborne Computer Corp.'s Osborne 1 and IBM's Personal Computer. Each round of the **Desim/2** program involves as many as 65 decisions related to marketing, production and financing. The program is priced at $12,000, and more information is available from Trans-Global Management Systems, Inc., 73 Columbia Road, Arlington, Mass. 02174.

The **R:Base Series 4000** is said to be a relational data base management system that can interface with mainframe data bases, Microsoft Corp.'s Multiplan, Ashton-Tate's Dbase II and is compatible with Lotus Development Corp.'s Lotus 1-2-3, Visicorp.'s Visicalc and Micropro International Corp.'s Wordstar. It requires 265K bytes of memory and operates on IBM's PC-DOS; Microsoft's MS-DOS; Convergent Technologies, Inc.'s Ctos; Burroughs Computer Corp.'s Btos; and Unix. It is priced at $495, and an extended report writer is also available at $150 from Microprim, Inc., 1750 112th Ave., N.E., Bellevue, Wash. 98004.

Lantech Systems, Inc. has released **Unetix**, a multitask operating system compatible with Unix. Stand-alone and networking versions of the package are available for Intel Corp. 8086 or 8088-based micros, including IBM's Personal Computer. The stand-alone version includes a Microsoft, Inc. MS-DOS emulator. The first networking version is a distributed file system; a virtual file system for very large network installations is due by the end of the year. Unetix costs $99 from the vendor at 9635 Wendell Road, Dallas, Texas 75243.

Visicalc IV, by Visicorp, combines in one package standard Visicalc along with graphics, sorting, spreadsheet management and user-defined commands. The program runs on IBM's Personal Computer. It sells for $250 from 2895 Zanker Road, San Jose, Calif. 95134.

Personal Bibliographic Software, Inc. has developed a word processing and data base program for compiling formatted bibliographies. The **Personal Bibliographic System** was developed by Victor Rosenberg, associate professor of library science at the University of Michigan. It is priced at $250 from the vendor through P.O. Box 4250, Ann Arbor, Mich. 48106.

The Small Computer Co., Inc. has introduced an add-on package, named **Smallware**, for the data base manager it created for Radio Shack. The package is made up of four programs, each sold separately. "Forms," selling for $125, prepares invoices. "Transfer" relays programs and data; it is priced at $150 for transfers between computers with the same size diskette or at $200 between computers with 5¼ and 8-in. diskettes. "Archives," available for $150, removes inactive records and transfers them. "Prosort," also costing $150, selects and sorts records. The package can be obtained from the vendor at 230 W. 41st St., New York, N.Y. 10036.

GM Enterprises, Inc. has put on the market a word processing program for the Basis 108 computer Entitled **Word Palette**, the software will perform mass mailings and labelings in addition to text-editing functions. It will edit nine pages of text at a time. It lists for $250 from the vendor at 10404 Carryback Circle, Dallas, Texas 75229.

Intesoft, a series of integrated decision-support programs from Schuchardt Software Systems, Inc., is designed for the IBM Personal Computer and compatible machinery. The software is said to allow first-time users to build their own business programs. The series is made up of five products: a relational data base management system; an interactive applications generator; a financial spreadsheet; a time-and-records manager; and a job scheduling, resource allocation program. Each product can be bought separately. The entire series costs $1,329 from the vendor at 515 Northgate Drive, San Rafael, Calif. 94903.

Peachtree Software, Inc. has repackaged its **Business Graphics System** for the IBM Personal Computer and Zenith Data Systems Corp. Z-100 micro. The program has also been revised to include full-color documentation with a tutorial, reference guide, installation booklet and reference card. It retails for $295 from the vendor at 3445 Peachtree Road N.E., 8th Floor, Atlanta, Ga. 30326.

Fox & Geller, Inc. has published a stand-alone graphics program called **Grafox** for the IBM Personal Computer. The full-color software draws information from any Basic file or via the data interchange format. It requires single-keystroke commands to produce bar, pie, pie-bar and line charts. Selling for $295, the product can be obtained from the vendor at 604 Market St., Elmwood Park, N.J. 07407.

The Information People have introduced the **Disc Jockey**, a disk file management system for Organizer II, the company's operator interface and menu generator. The new module helps the user catalog his disk and copy, move, erase and rename files. The system runs under Digital Research, Inc.'s CP/M 80, CP/M 86, MP/M 80 and MP/M 86 operating systems. The price is $149 from 443 Hudson Ave., Newark, Ohio 43055.

Sofstar, Inc. has introduced the **Business Planning Tool** (BPT) to help the user create budgets, forecasts and business plans in the income-statement and balance-sheet format. According to the vendor, the user is not required to learn any programming commands or special symbols.

BPT was designed for the IBM Personal Computer and requires 128K random-access memory and one disk drive. The price is $195, and it is available from 13935 U.S. Highway 1, Juno Beach, Fla. 33408.

The Metasoft Corp. has announced the **Financial Planner**, a three-dimensional spreadsheet, and **Graphics**, a color graphics draw package.

The spreadsheet package allows the user to choose between conventional, wide-document or easy-to-use pages and contains its own programming language. The graphics package will generate pie and bar charts and graphs that can be intermingled with text. The package supports zooming, filling, freehand draw and multiple line choice. Multiple printers and plotters are supported.

Both packages are available for the IBM Personal Computer and Personal Computer XT. Graphics is also available for Victor Business Products, Inc.'s 9000 and Nippon Electric Co. Ltd.'s APC. The Financial Planner costs $395, and Graphics costs $600. Further information is available from Suite E, 711 E. Cottonwood Lane, Casa Grande, Ariz. 85222.

BPI Systems has introduced **General Accounting, Accounts Receivable and Accounts Payable** accounting software for users of Apple Computer, Inc.'s Lisa. Some features of the software include a query or Help screen, BPI's Disk Document Manager and Background printing feature and utilization of Lisa's graphics mouse technology.

The price is $595 each. Further information is available from 3423 Guadalupe, Austin, Texas 78705.

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Locking Up The Mainframe

Eventually, business will recognize it is cost-effective to embed more security into systems rather than to continue sinking money into environmental controls.

By Robert P. Campbell

How do we make the transition from today's security environment to the level of capability we want? What is the cycle of change and what are the forces that will bring it about?

In last week's article, we looked at the current state of computer security technology, presented a statement of need and discussed where we are in relation to those needs. This concluding installment will delve into the prognosis — how long it will take to achieve the required level of security and the major influences in this cycle of change.

There are six basic categories of desired capabilities:

Access control. People or objects attempting to access computer systems can be positively or reliably identified.

Process control integrity. Once granted access, people or objects will be restricted to particular functions; separation of users can be reliably assured.

Auditability. Violations of systems security can be detected (real-time or after the fact).

Message confidentiality, integrity. Messages between users and computers can be kept secret and protected against tampering, if necessary.

Tamperproofing. Both the hardware and software can be made tamperproof.

Reliability, survivability. Critical systems and supporting components can be designed so that users will not feel serious effects when those systems are unavailable.

The industry has already invested 15 years in solving security-related problems. The period during which these new security capabilities will evolve may extend another 15 to 20 years.

Estimated development times for improvements in security technology have generally been understated. For example, in the late 1970s, the Department of Defense (DOD) security kernel technology seemed imminent, but except for a few specialized implementations, it has not yet come up to expectations.

The box on In Depth/2 attempts to portray, for each of the requirements, relative progress (on a scale of one to 10) and the number of years remaining to achieve an acceptable level of capability.

Four primary forces will bring about changes in the overall state of security for our systems: the threat

ILLUSTRATION BY KRISTE VANWALKENBURGH

environment, legal influences, economic influences and public influences.

We can reasonably expect the threat to sensitive and critical systems to escalate as computer dependence deepens. The more important the functions being automated or supported by automation, the more susceptible these systems will become to abuse and misuse. Two key elements influencing the "threat question" are motivation and opportunity.

There is no reliable evidence to indicate that motivation for abuse or misuse of computer systems is increasing significantly, although the moral and ethical implications of recent abuses by youthful hackers should be cause for alarm. Despite ambiguities in the law or lack of understanding of the law regarding electronic etiquette and acceptable behavior, there should be concern about the failure of ethics and morality to blunt this rash of youthful electronic rummaging.

Investigation into the hacker problem shows that publicity and education on the legal and ethical issues of hacking can deter all but the hard-core practitioners. This hard core, however, with its underground organization and zeal for "beating the system," will continue to be a serious threat. In the short term, there is potential for hacking or electronic rummaging to rival the citizens band radio fad of the '70s in intensity.

	1	2	3	4	5	6	7	8	9	10	Years to Attain
Access Control						X					8-10
Process Control Integrity				X							15-20
Auditability					X						8-10
Message Confidentiality, Integrity							X				5-8
Tamperproofing				X							5-8
Reliability, Survivability					X						8-10

Relative progress (on a scale of one to 10) in computer security.

Hacker response to the 414s has been mixed, showing not only an increased level of apprehension but also a dramatic increase in the number of electronic hacker bulletin boards. Every modem-equipped home computer has the potential to become a bulletin board. The schoolboy rummaging through the electronic pathways takes advantage of opportunity; the hard-core hacker, on the other hand, purposefully goes after particular targets. The 414s generally did not know which systems they had penetrated until after the fact.

"Friendly" systems are heavily dependent upon the proper behavior of system users and operators for security and protection. Large numbers of people have extraordinary or privileged access to sensitive and critical systems, too often without adequate accountability. As these systems become more sensitive and critical and dependency increases, the more frequently we can expect to find people motivated to misuse them in pursuit of personal gain.

Not to be misjudged is the potential for increased criminal activity as that small percentage of the population recognizes the potential for gain. We can expect to see a significant increase in the number of offenders, with decreasing average dollar loss. There will still be individually high losses. Industrial and foreign espionage will increase as technology transfer motivates theft of trade secrets, software and data.

The second element of the equation is the "opportunity" element. As computerization increases, so will the opportunities for abuse — unfortunately, at a much faster rate than the security technology or our application of it. Basic security technology, as well as our ability to implement and enforce adequate control and accountability, lag substantially behind overall systems technology. The more sensitive and critical the functions that are computerized, the more these opportunities will arise.

The bottom line will likely be an escalation of the threat over the next few years. As the use of networking and teleprocessing has increased, hackers are finding ways to weave their way through these networks, getting to the front door and, in some cases, into poorly defended systems. We can expect more sophis-

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LOCKING UP — PART 2

ticated attacks against operating systems and internal controls as passwords and other fallible barriers continue to be penetrated and fall short of defensive needs.

This second wave of attack will draw attention to the lack of integrity of internal controls. Major changes to internal control structures, more effective internal separation and compartmentation will be required to counter this type of attack.

The legal aspects of computer security problems will eventually be a strong motivating influence toward developing more secure technology. While most attention is currently being given to the criminal aspects of computer abuses, it is likely that civil action will have an equally important effect on long-term security problems.

Twenty-one states have passed specific computer crime bills directed to the special needs of prosecuting computer abuse and misuse, but there has been no corresponding legislation at the federal level. The Federal Computer Systems Protection Act (currently H.R. 1092), pending for five years, has not yet been passed by Congress. At issue is whether the existing body of law is fully adequate for both the crime and the punishment. At issue also is a potential conflict over jurisdiction between the states and the federal government.

Finally, there are also concerns over the imprecision of the proposed legislation, which fails to define such key terms as "computer." Some observers fear that such imprecision might lead to misapplication or abuse of the legislation itself (for example, to prosecute minor offenses by children).

It is also being argued that the proposed legislation focuses upon the instrument rather than the object of the crime: the computer rather than the information, its tangible and intellectual properties and individual rights. While there is a certain truth to this argument, the body of law regarding information, its sensitivity and value, as well as its intellectual properties, is even less well-defined.

Twenty-one states have passed laws directed to the special needs of prosecuting computer abuse and misuse, but there has been no corresponding legislation at the federal level. The Federal Computer Systems Protection Act has been pending for five years.

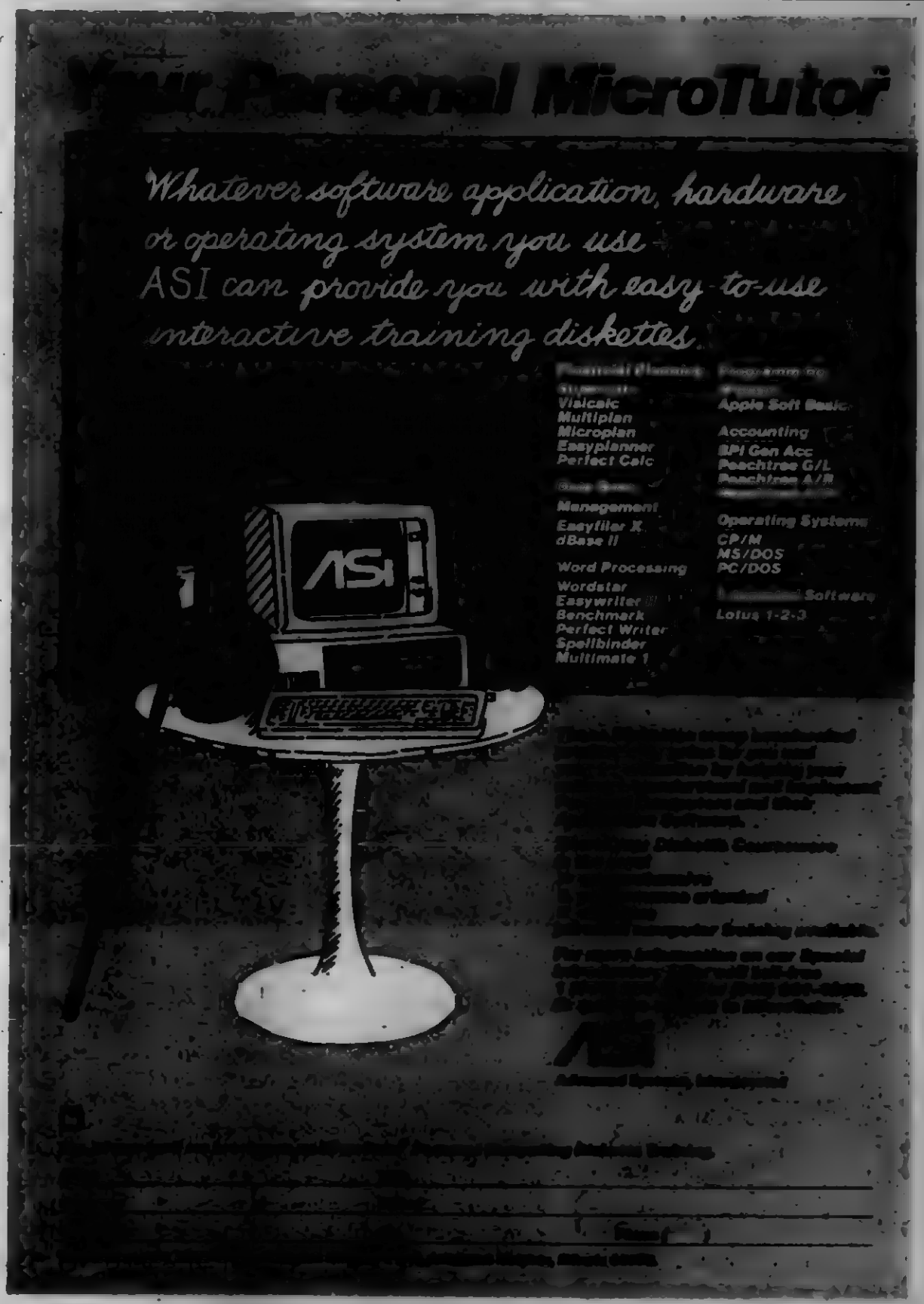
More Prosecutions

Prior to 1982, few states with computer crime laws had exercised them. By this summer, however, substantial numbers of cases were being brought to the state courts, with six cases alone in the county of Los Angeles.

The prosecution and deterrent value of the pending Federal Computer Systems Protection Act will likely cause the legislation to be passed once Congress resolves its definitional, evidentiary and jurisdictional problems. As both the federal government and states develop enhanced investigatory and prosecutorial tools and gain experience with rules of evidence and interpretations by the courts, the initial legislation will be clarified, amended and enhanced.

While these issues are being argued, computer abuses, such as the Milwaukee 414s' transgressions, are being tolerated — and, in some cases, almost glorified by the press and in movies. And the courts are handing out light jail sentences. Computer crimes are being looked upon as crimes against large impersonal institutions rather than against individuals, which thus can be easily absolved by the institution.

Popular opinion, it seems, heavily favors man in the man-machine conflict, applying little more than a slap on the hand to offenders. There is also a strong trend developing to



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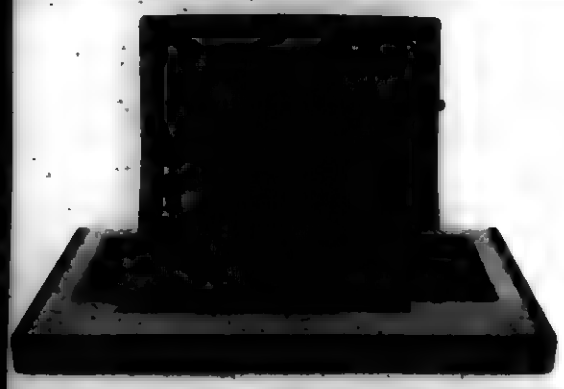

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LOCKING UP — PART 2

cover such losses with insurance or — as was the case with retail crime and shoplifting during the '70s — to pass losses on to the consumer as a cost of doing business. These actions both run counter to the need to prevent rather than mitigate the abuse.

Computer crime laws will also draw attention to the civil or liability aspects of computer insecurities. We can expect to see individual and/or class-action suits. For example, stockholders might sue a corporation that had to devalue its assets and stock because of computer fraud-related losses. Another scenario might find stockholders filing suit because loss of highly sensitive trade secrets seriously hurt the corporate balance sheet. Liability of the corporation and its officers to protect its assets and resources, such as imposed by the Foreign Corrupt Practices Act, will similarly be tested.

Drawing Battle Lines

Civil damage suits will also test the concepts of legal responsibility and culpability. It will be interesting to see how the courts attempt to determine responsibility and assign liability for damages. Who will be at fault? The user for not providing better security for a terminal? The corporation for not providing better security for the system? The equipment manufacturer because of alleged flaws in the security design and integrity of the computer system?

To date, little public scrutiny has fallen upon the system development process — its formalism, security design and integrity mechanisms and, in general, the ability of the system to resist or defend against penetration.

Even today the liability battle lines are being drawn. Vendor advertisements in major national magazines are establishing the notions that "privacy begins at home" and "computers don't steal, people do." In its equipment lease agreement, one major vendor very clearly spells out that the lessee bears full responsibility for all aspects of system security — and thus all damages resulting from the system's use or misuse.

Clearly, as liability issues are tested in the courts, all parties — the end users, corporations providing computer-based services and the manufacturers of computers and related systems — will be forced to look more deeply at their own responsibilities and act accordingly.

Economics has always been the key inhibitor to developing more secure computer technology and will continue to be for a number of years. Computer vendors cannot afford to invest in extensive security redesign of their products because of a lack of market demand. Encryption products are a good example. One vendor of an encryption mechanism for protecting resident data bases has reportedly taken an economic bath as a result of its investment in that technology. Another pioneering vendor of communications encryption devices has recently dropped out of the market, citing lack of demand for its product. In both cases, need for the product was not the issue. The economics were such that corporations would not pay the price — or, rather, they were willing to accept the risk.

It has long been recognized that the lower the level of security designed into a system, the greater the

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LOCKING UP — PART 2

environmental security required in order to create the necessary "friendly" conditions. Similarly, the more secure the system, the lower the level of environmental security required. The key, then, is to transfer as much security as possible from the external or environmental controls to the internal or system control mechanisms.

Organizations are investing increasingly large sums in both creating and managing the security environment. Eventually, as this investment — sunk costs, really — grows, the efficacy of moving as much control as possible back into the computer will become clear. Right now, few if any meaningful security requirements are being placed upon system vendors.

Eventually, security will become a viable product. Once organizations learn to translate business and consumer security needs into requirements for the vendors, the marketplace will find the stimulus to respond.

The recent rash of computer break-ins and abuses has caused experts to estimate that computer security ought to receive as much as 5% and certainly no less than 1% of the annual DP budget. Among the Fortune 500 companies with DP budgets that range up to $300 million and $500 million per year, this recommendation could amount to $15 million to $25 million annually. The price tag for corporate security could approach billions annually.

Eventually, security will become a viable product. Once organizations learn to translate business and consumer security needs into requirements for the vendors, the marketplace will find the stimulus to respond. With "corporate America" energized to the problem, progress in developing more trustworthy systems will be rapid.

Public Influences

A large, yet unknown factor in this cycle of change is the attitude of the general public. Thus far, the major influences have been institutional — from government and large corporations. However, the real security goals and design objectives must be focused upon the migration of computer technology into the home. It is conceivable that home computers will assume such functionality as to become just as sensitive and critical to the individual as to the large institution.

Therein lies the problem's true urgency. Break-ins involving average citizens' home computers are liable to be reality within the next five years. The spectre of the "wired" society, with individuals or institutions breaking into home computers and invading each other's privacy, is indeed chilling. The average citizen will not be able to afford the extensive physical and environmental controls that are currently required and will be needed for the foreseeable future.

Computer literacy will become a strong motivating influence. As the public becomes more knowledgeable about computing technology, awareness of inherent security problems will increase, and situations that

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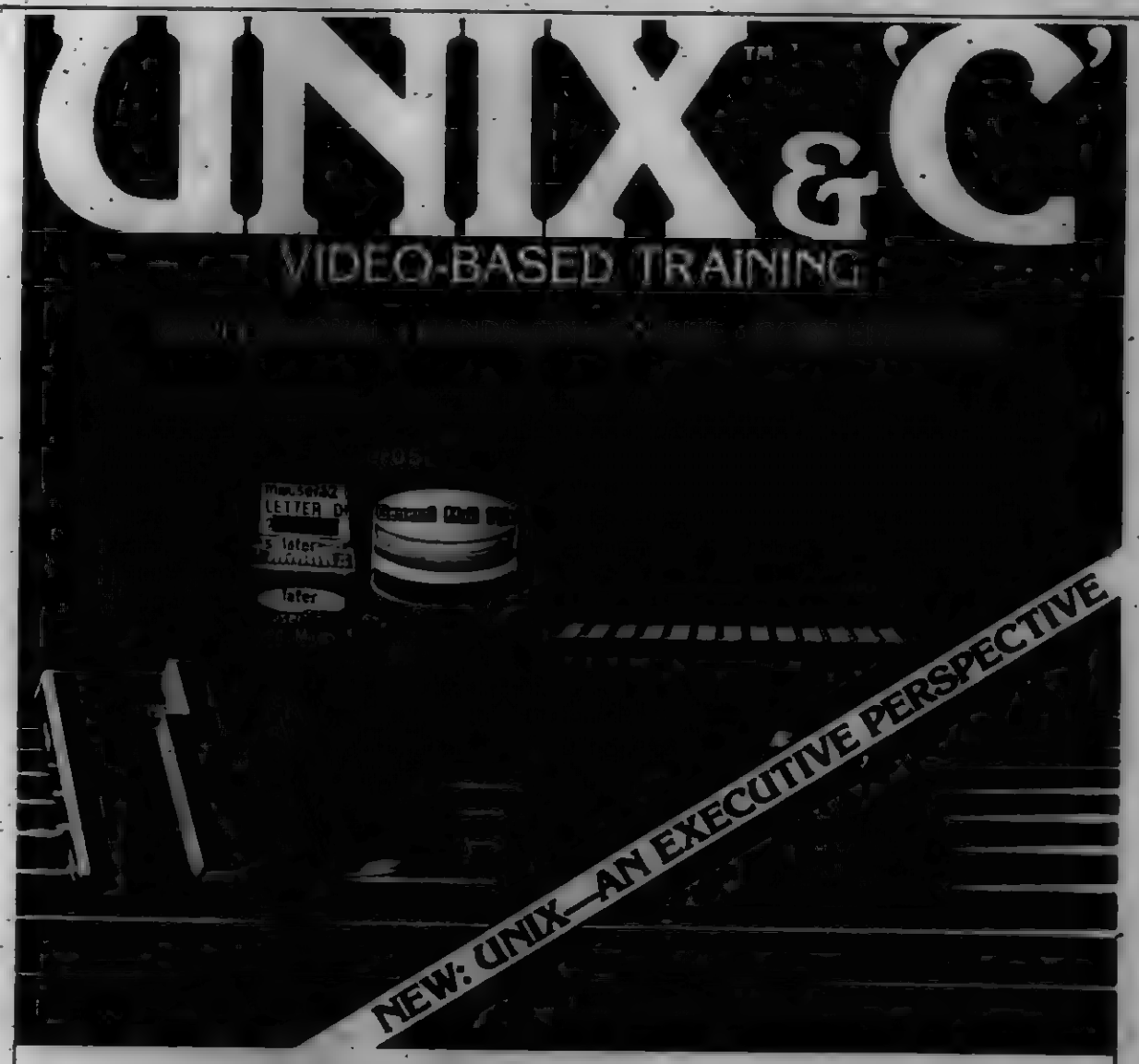

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were acceptable in the large institutional environment will become unacceptable in the home. Thus, migration of computing into the home will similarly accelerate the migration of security into the system architecture. Public demand for more trustworthy architecture could easily become the most effective motivator.

Several conclusions can be drawn regarding the history of security and its apparent future:

1. Our institutional knowledge and awareness of potential computer security problems are incomplete and fragmented. Executive, legislative and judicial bodies are simply not adequately informed.

2. Our national knowledge and awareness of potential computer security problems are similarly incomplete and fragmented. While special-interest groups — data processing, industrial security, privacy, audit, social science, technology, banking, insurance and so forth — have all met to discuss these problems, there has been no common vehicle for pulling their diverse interests and issues together in order to satisfy common needs.

3. As a nation, we are much too irresponsible in handling information. We underestimate its value and misunderstand its sensitivities.

4. As a nation, we have the most advanced application of the technology but perhaps one of the less-developed perceptions of "informatiques." While we have the most to gain through application of the technology, we may also have the most to lose.

Congress appears to be the only body that can act in the public interest to circumvent the economic barriers that have inhibited development of more secure computer technology.

A Charge to Congress

The potential magnitude of computer security problems urges a stronger level of government intervention and regulation. From the struggles of the federal government and DOD over the past decade and a half, it is reasonable to conclude that the problem has been greater than they were able to handle.

Congress appears to be the only body that can act in the public interest to circumvent the economic barriers that have inhibited development of more secure computer technology. Congress should encourage this work in the following ways.

First, it should pass the proposed Federal Computer Systems Protection Act. This legislation will provide not only adequate tools for prosecution but also serve as a major deterrent. The law will focus on the need for improved investigative capability and techniques, one of the major current shortcomings in our ability to prose-

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cute criminal acts.

Second, Congress must address the basic problem that is allowing organizations to provide inadequate protection for sensitive and critical computer systems. Our laws governing information, its ownership, sensitivity and value, as well as custodial responsibilities, are ill-suited for the electronic age and must be updated. The chaotic situation in the areas of copyright, patent and theft of software and data exemplifies this need.

Third, Congress must provide additional incentives for the computer industry to develop new generations of trustworthy technology that apply advanced techniques to security design, verification, validation and product certification. It can encourage more aggressive research and development through incentives such as special tax benefits and revision of antitrust, patent and copyright laws to permit pooling and joint venturing of funds and resources. These incentives will be particularly important to such efforts as supercomputer development.

Fourth, Congress must ensure adequate funding for government computer security programs, including support to research and development. The federal policy (Office of Management and Budget circular A-71, TM 1, published in 1978) has been a paper tiger because too few resources and too little management emphasis have been put into it.

In addition, the government's primary computer security standards body, the Institute for Computer Science and Technology of the National Bureau of Standards, was almost eliminated in the last budget deliberations. Moreover, the government has a limited capability to train, retain and provide career incentives to qualified computer security people.

Fifth, Congress must act to ensure that the public understands the moral and ethical issues surrounding the technology during this period of vulnerability. Public education programs and support to professionalism programs in the form of grants and formal recognition are imperative.

The Institute for Certification of Computer Professionals is the only body in the profession to have policed its membership by withdrawing certification for violation of its code of ethics.

Finally, Congress must make sure that it is fully cognizant of the potential seriousness of these problems. Current congressional hearings on computer and communications security are producing "astounding revelations" that are really neither astounding nor revelations. The course of these hearings indicates that Congress is again in danger of not being adequately informed on security issues.

Three years ago, I called upon Congress to charter 1) a joint industry/government blue-ribbon panel to assess our strategic national vulnerability caused by dependence upon untrustworthy computer systems and 2) a nonprofit computer security foundation to act as a focal point for the creation, integration and validation of a

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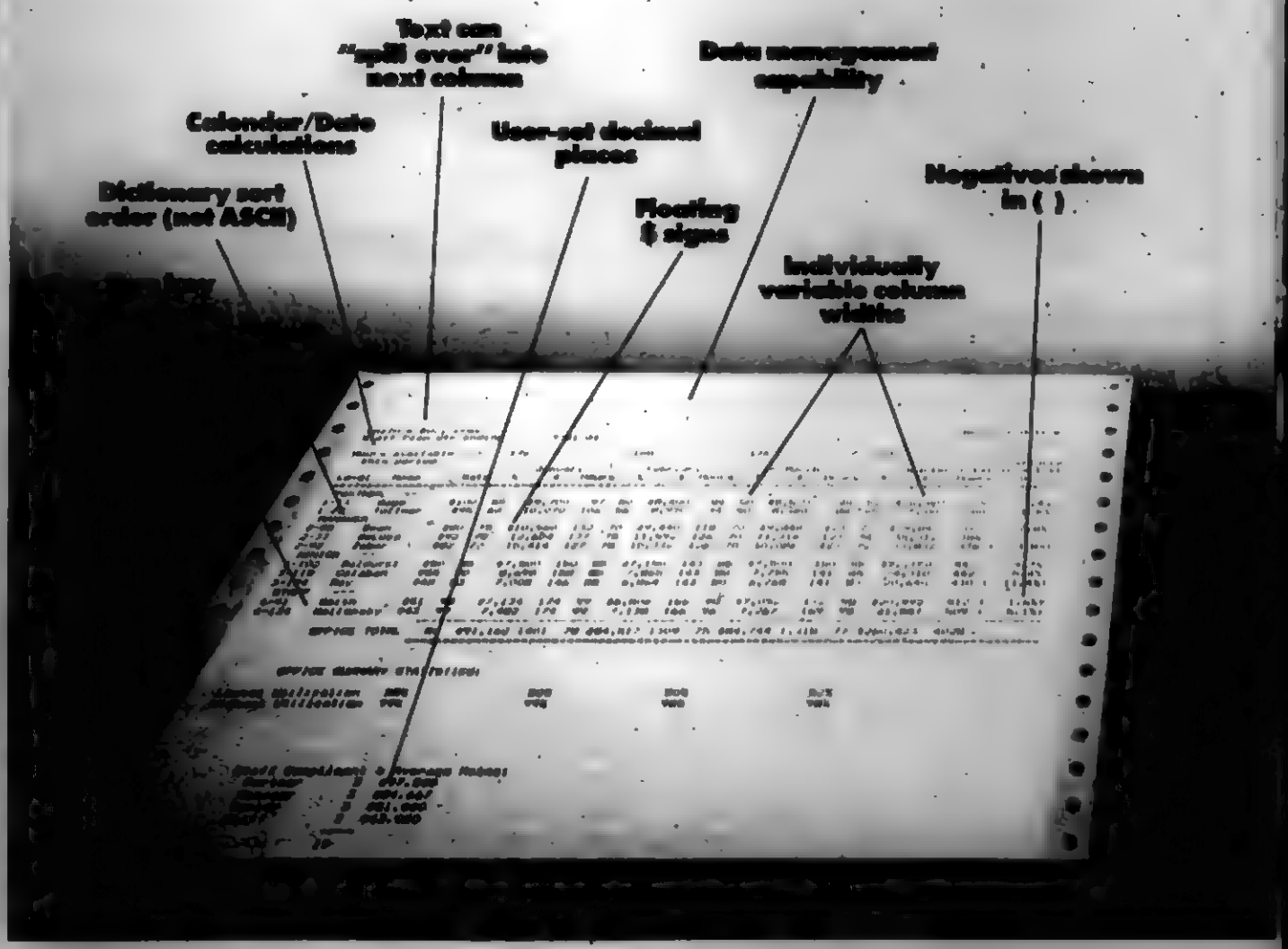

LOCKING UP — PART 2

IN DEPTH

comprehensive computer security requirements agenda.

Regarding the blue-ribbon panel, most assessments that have been made of the problem have been at too low a level and have grossly underestimated the potential. The problem and its implications may be too serious for anybody other than Congress to assess. Congress should empower a special committee for this purpose.

The computer security foundation, as an independent body without vested interests, would be a valuable instrument to bring about necessary security improvement. Little progress has been made in closing the vulnerability gap since this foundation was proposed three years ago. Rosy predictions that trustworthy systems are just around the corner are unsubstantiated. At the current level of commitment, a decade or more could go by before this trustworthy technology finds its way into the general marketplace.

A Charge to Management

Government and industry must do a better job of identifying security needs so that their data processing staffs and the industry can act to fill them. Unless these security enhancements are demanded and develop economic viability, they will not come about without extraordinary impetus from the federal government.

The computer security problem, while technically based, continues to be a management problem. Senior management is not adequately informed of the deep security implications of the evolving corporate information resource base. As a result, vast investments in computing resources are being made with little if any specified security attributes. Companies are applying after-the-fact or retrofitted security, using the "add-ons" currently available from the marketplace. Business is operating in a highly reactive mode.

Companies must look beyond these short-term reactionary needs and deal with the long-term causes. Management must question the status quo and, where appropriate, refuse to tolerate the risk. Senior management should require that all new systems and acquisitions be accompanied by an assessment of system sensitivity and criticality and an appropriately detailed statement of security requirements.

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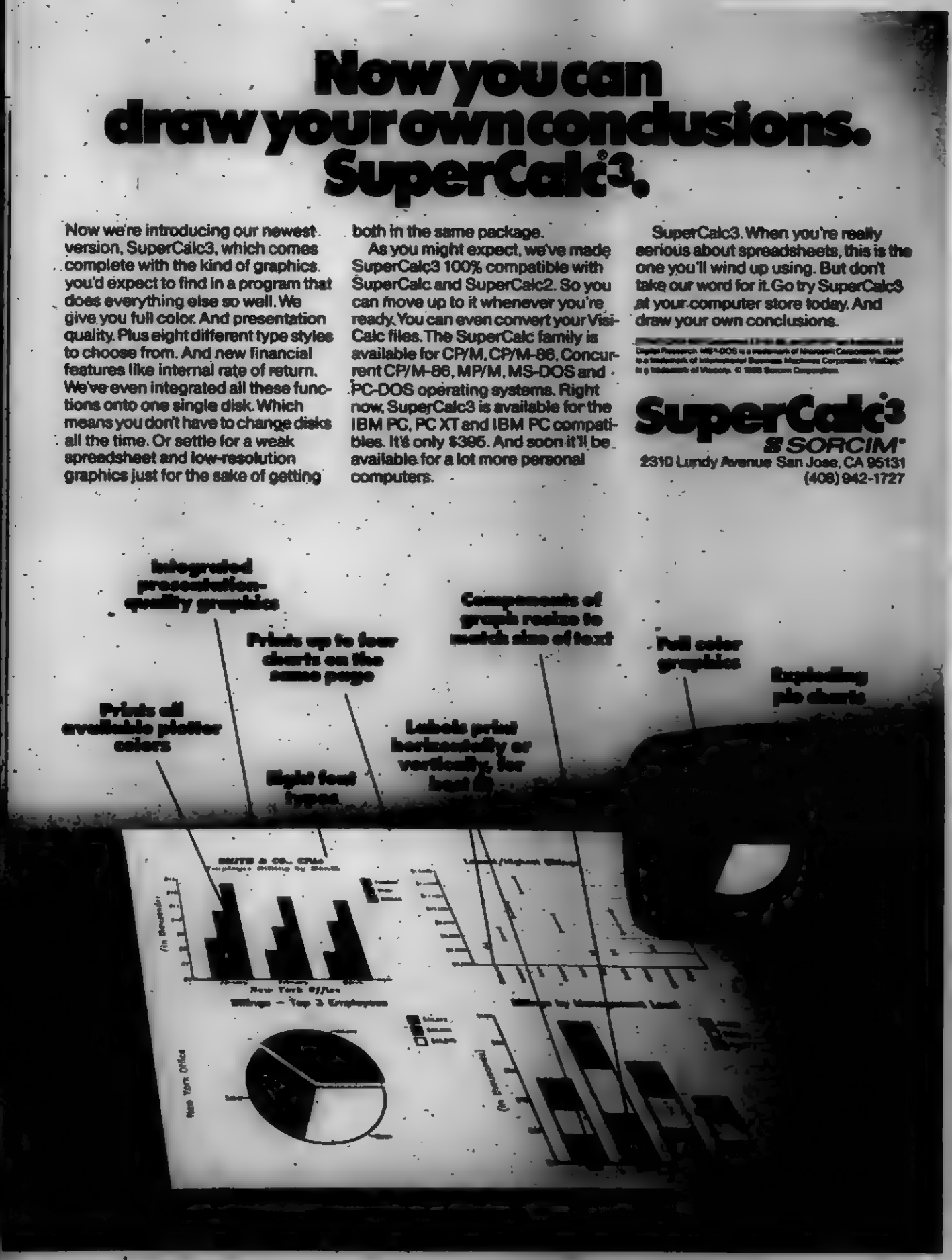
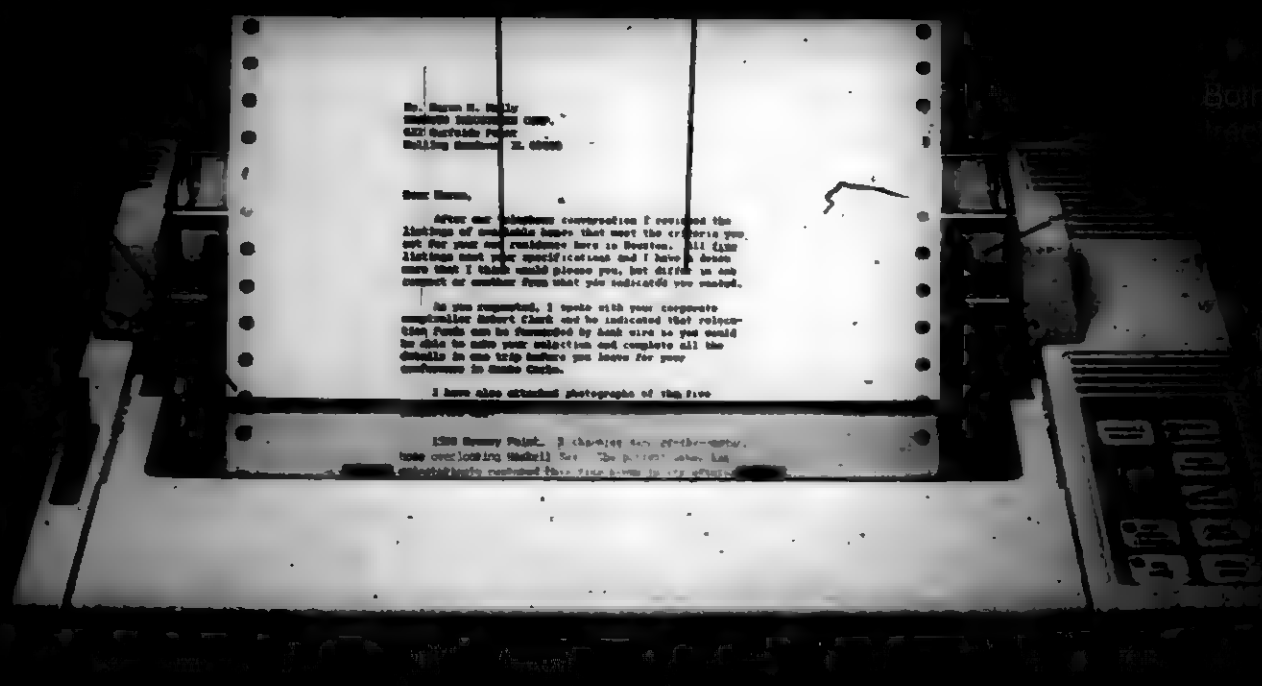


About the Author

Robert Campbell is president of Advanced Information Management, Inc., a Woodbridge, Va., consulting firm specializing in computer and telecommunications security, privacy, audit and contingency planning. The company's services are oriented to banking, financial services and other major Fortune 500 industries.

Campbell has more than 20 years' experience in data processing, security and audit in both government and industry.

He is currently president of the Institute for Certification of Computer Professionals and serves on the editorial advisory boards of the Computer Security Journal *(U.S.),* Computer Fraud and Security Bulletin *(UK) and* Corporate Fraud Bulletin *(UK).*



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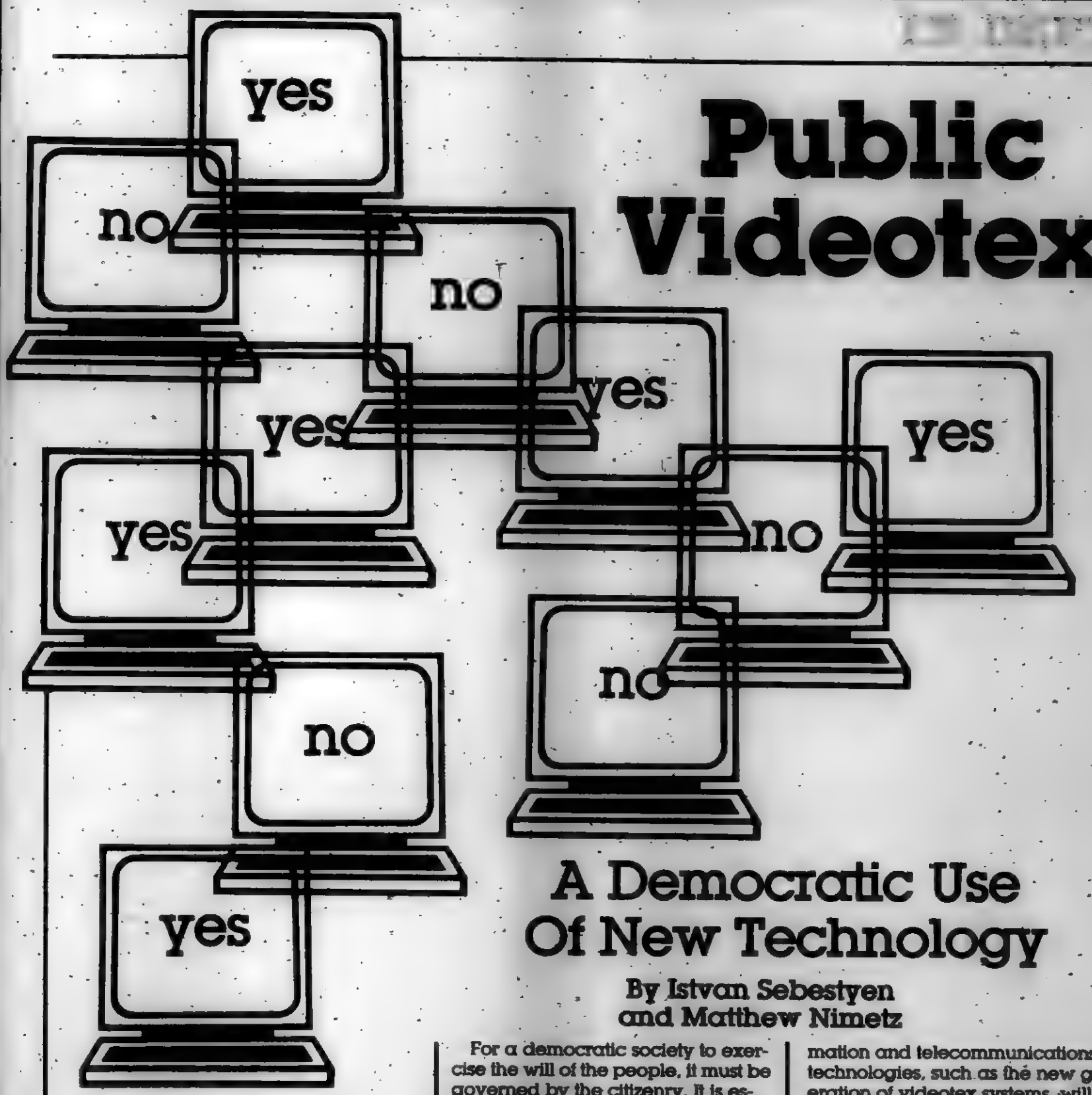

Public Videotex

A Democratic Use Of New Technology

By Istvan Sebestyen and Matthew Nimetz

For a democratic society to exercise the will of the people, it must be governed by the citizenry. It is essential that the flow of information between those who govern and those who are governed is secured. While it is assured that certain groups with a common interest (political bodies, churches, associations and so on) can make their voice heard through the mass media, it is still relatively difficult for the individual citizen to contribute on a regular basis to the flow of information between rulers and ruled, except for a "yes" or "no" every two, four or five years at election time.

Consideration should be given to introducing a system that gives due weight to the voice of the individual in a constant manner as policy is formulated and implemented by government. We believe that information and telecommunications technologies, such as the new generation of videotex systems, will soon provide valuable tools for expressing public opinion. At present, systems with such applications do not exist on any national level, except experimentally. But not much imagination is needed to foresee that within the next few years, such systems could be built and introduced on a wide basis.

It is because of this potential that engineers, media experts, industry representatives and other groups should join with politicians and legal experts to discuss and predict what this type of system could mean for society. With this article, we try to take the first step in that direction.

In order that we keep in touch with reality, the focus of our investigation will be special applications

IN DEPTH

of the new-generation videotex systems that support public opinion expression, such as an electronic "speakers corner," "notary public," "ombudsman" and electronic polling and voting. By "new-generation videotex systems," we mean a nationwide public system, such as will be introduced in the Federal Republic of Germany and Austria in 1984. These systems will be equipped with intelligent videotex decoders, such as the Austrian Mupid, which is already on trial in Austria, the Federal Republic of Germany, the UK and elsewhere. Mupid is rented from the Austrian postal, telephone and telegraph authority (PTT) for about $5 per month.

In our context, public videotex systems are really nothing more than an inexpensive — preferably packet-switched — computer network allowing mass computer networking applications for daily life. Uses include various information retrieval and transaction functions: flight schedules and reservations and, perhaps, payment, through a cheap home terminal. Such terminals may use the home TV set as an output device, combined with a cheap dedicated intelligent videotex decoder (basically a dedicated personal computer) and linked to suitable telecommunications channels — a telephone in most cases.

The intelligent videotex decoder allows for all the above components to be combined into an intelligent home terminal of a sophisticated but inexpensive computer network and, in addition, functions as a stand-alone personal computer.

Public-key cryptosystems and videotex. Videotex and public-key cryptosystems are relatively new concepts that emerged during the late 1970s (for a basic explanation, see In Depth/23).

New-generation videotex systems use alphanumeric keyboards and intelligent videotex decoders (basically dedicated personal computers, such as Mupid), which extend the original functions of videotex user terminals tremendously. Not only can information frames be retrieved and simple transactions (such as booking) be performed, but telesoftware frames (special information frames) can also be downloaded into the local processor of the intelligent decoder and executed. Through this philosophical change in the use of videotex, a whole new range of applications has been created.

One example of such a new application is the public-key cryptosystems, to be implemented on videotex by means of intelligent videotex decoders. Thus, from the technical point of view, videotex applications using public-key cryptosystems are made possible by the introduction of intelligent videotex terminals, the use of telesoftware, the standard videotex message-sending service and, in some applications, the use of a videotex gateway, which is really nothing more than a link between a specially programmed third-party computer, such as a bank computer, and the basic videotex computer network. Through this gateway, videotex users can access these third-party computers for special videotex applications, such as home banking.

Public-key cryptography is based on the suggestion of Whifield Deffie and Martin Hellmann (both from Stanford University) to break with traditional schemes of using the same encryption/decryption key for coding and decoding secret messages. They suggested using different keys for the encoding and decoding processes so that it would be possible to reveal the encryption key publicly, while still keeping the appropriate decryption key secret (Figure 1).

In this way, secure one-way communications could be established. Anyone could create and send a secret message to the owner of the decryption key (secret key) without having to fear that his message could be decrypted by anyone else but the

(Continued on In Depth/21)

Corresponding encryption/decryption key pairs should have the following properties:

1. Ds(Ep(M))=M — Encrypting (E) of message 'M' with public key 'p,' then transmitting and decrypting (D) with secret key 's' should result in the original message. This is essential for secure messaging.

2. Dp(Es(M))=M — Encrypting the message with secret key 's,' then transmitting and decrypting with the public key 'p' should result also in the original message. This is essential for authentication.

3. Publicly revealing encryption and decryption procedures and the so-called public keys does not allow individuals to find out easily the secret key of a particular user of the system. This is needed for secure messaging and authentication.

4. Public and secret key pairs should be easy to generate.

Figure 1

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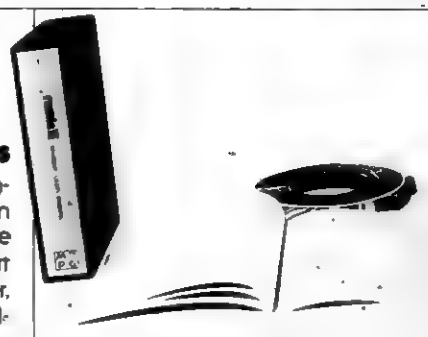

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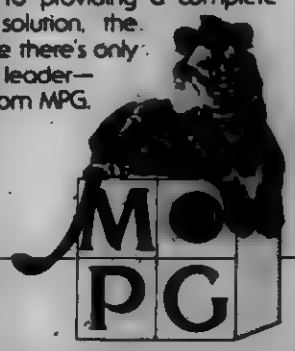

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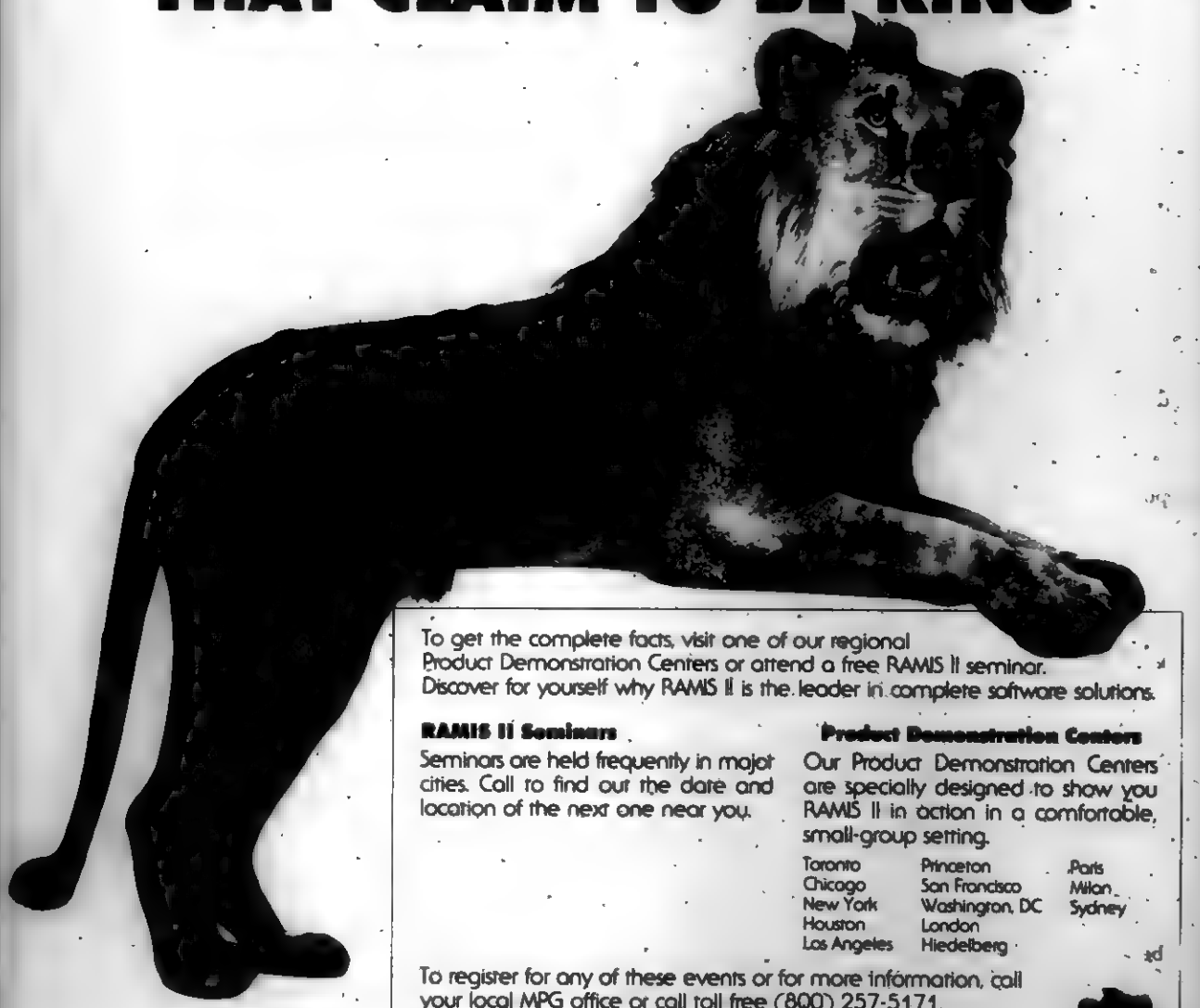

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(Continued from In Depth/16)

owner of the secret key. In order to have two-way (person-to-person) communications, everyone participating in the public-key system must possess and keep his individual, secret decryption key while announcing publicly his encryption key. That encryption key is used by the rest of the community when secret messages are to be addressed and sent to him.

The usefulness of linking public-key cryptography to videotex, from the technical points of view, should already be obvious:

1. The encryption keys (public keys) of users for public access can ideally be put on public videotex information frames as a "public-key directory," whereas decryption keys have to be kept secretly at the videotex user's location.

2. The message-sending capability of videotex can be ideally used for sending the coded messages.

3. The telecommunications software programs needed for encryption and decryption of messages are to be stored as information frames on the videotex system as well and are to be downloaded into the intelligent videotex terminal for execution when messages are to be encoded or decoded.

4. Certain administrative types of functions, such as administration of keys and keeping track of transactions, can also be solved with relative ease by videotex networks.

The reason we are interested in cryptography, and especially public-key cryptosystems, is that this technique — if linked to a public videotex system equipped with gateway and intelligent videotex decoders — could provide many basic services that will be needed in a future information society.

The fact that public-key cryptosystems with the novel property of publicly revealing an encryption key (in our case, on videotex) do not thereby reveal the corresponding decryption key has some important consequences, which should be spelled out separately:

1. Couriers or other secure means are not needed to transmit keys, since a message can be encrypted using an encryption key that was publicly revealed earlier by the intended recipient. Only he can decipher the message, since only he knows the corresponding decryption key (see Figure 2a on In Depth/24).

Thus, for the distribution of encryption keys, an "insecure" channel, such as a

(Continued on In Depth/24)

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IN DEPTH

The Basic Forms of Videotex Systems

One-way videotex broadcasts in a cyclical manner the data frames stored on a central computer. In the medium called teletext, either the vertical blanking intervals of traditional TV programs are used or dedicated separate channels, such as TV cable channels.

Different types of videotex decoders are used as teletext terminals. The decoder is usually built into the TV set, and a person uses a numerical key pad to select information frames (maximum 1,000 characters per frame) to be picked out from the information cycle by the decoder and displayed on an ordinary TV. Since the amount of information on teletext is limited to only a few hundred frames, not much local intelligence is built into the standard teletext decoders.

Teletext systems are widely used. Users in Austria already number approximately 130,000. In our view, the medium's strongest application is linked to normal TV programs, such as subtitling or information for the hearing impaired.

Such systems are already widely used. Teletext users in Austria already number approximately 130,000. In our view, the medium's strongest application is linked to normal TV programs, such as subtitling or information for the hearing impaired.

The amount of information cycled on full-channel teletext systems is considerably larger, up to about 50,000 frames, a considerable amount of data. Thus, in such cases, intelligent videotex decoders (basically dedicated personal computers) have to be used to utilize the data presented in the most appropriate way.

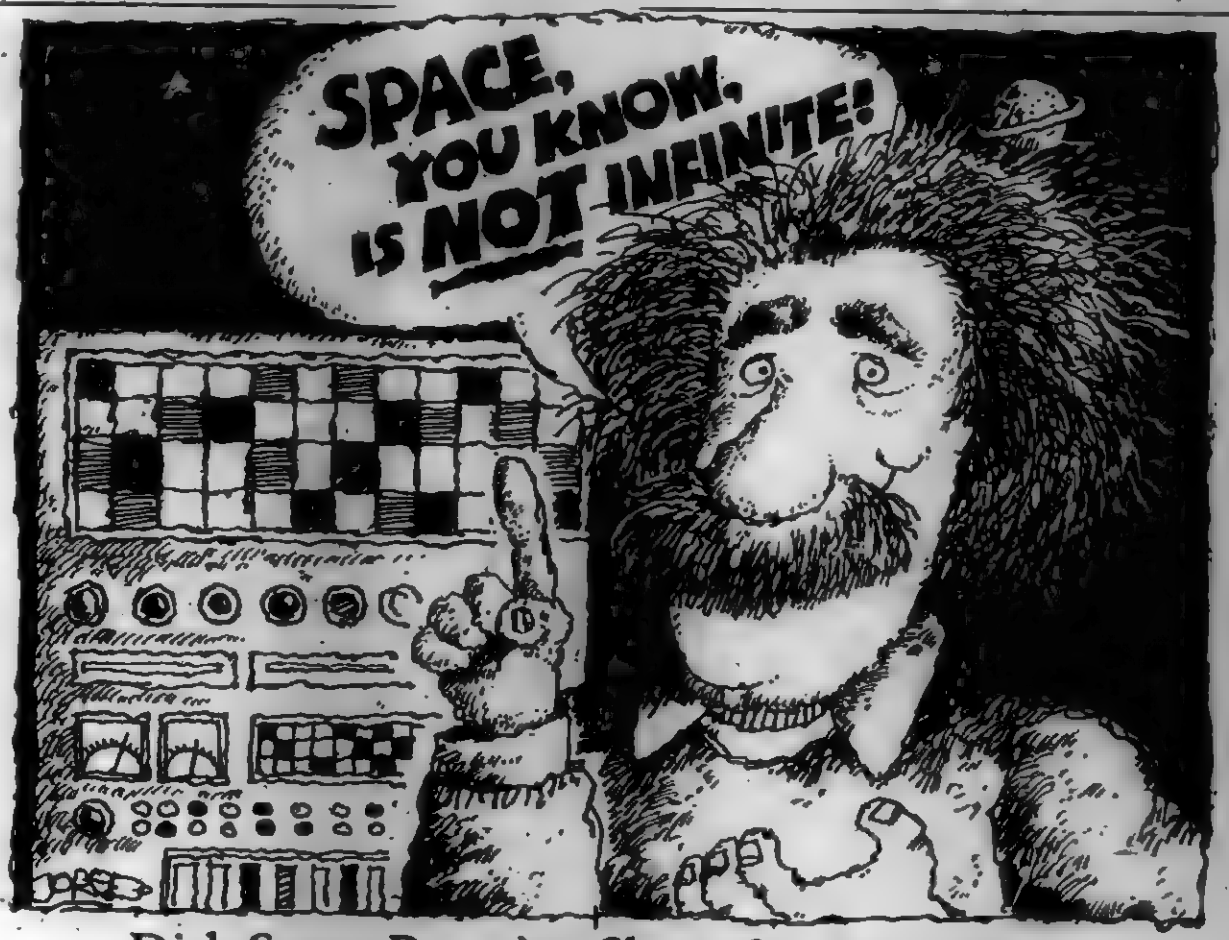
Interactive Versions

Two-way videotex systems — often called viewdata in Europe — are also built on computers storing data frames, similar to the one-way videotex systems, except that communication between the system and the user is based on interactive (individual) communication as opposed to teletext's broadcast communication.

The telecommunications medium used for interactive communications is the traditional telephone network, the emerging data networks and the upcoming two-way cable networks. Two-way videotex systems have advantages over one-way systems for certain applications, such as individual message sending, booking and transactions. In the future, one-way and two-way systems are likely to converge so that they supplement each other rather than compete.

At present, different types of two-way videotex systems are in use. The earliest type of videotex systems, such as the British Prestel, use modified TV sets with built-in videotex decoders as user terminals. They are equipped with numerical key pads allowing the user to search for any frame in the Prestel "information tree" by numbers.

The standard public-switched telephone network is used as the telecommunications medium between the videotex information center and the user through a serial interface in the TV set and a low-speed asynchronous modem.



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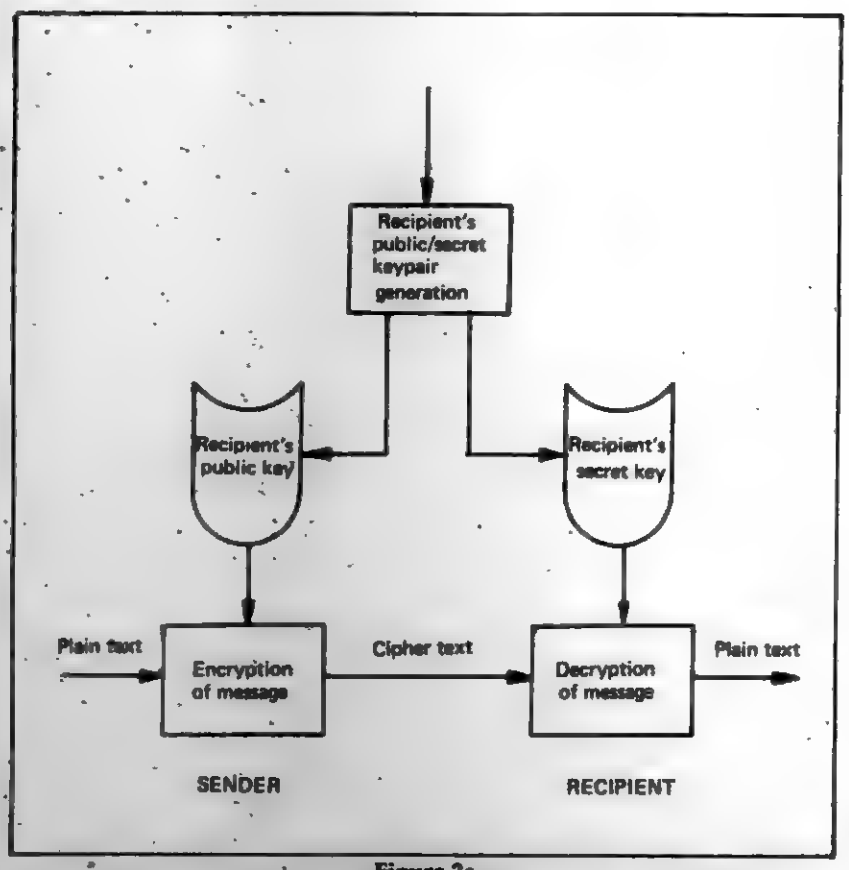

Figure 2a

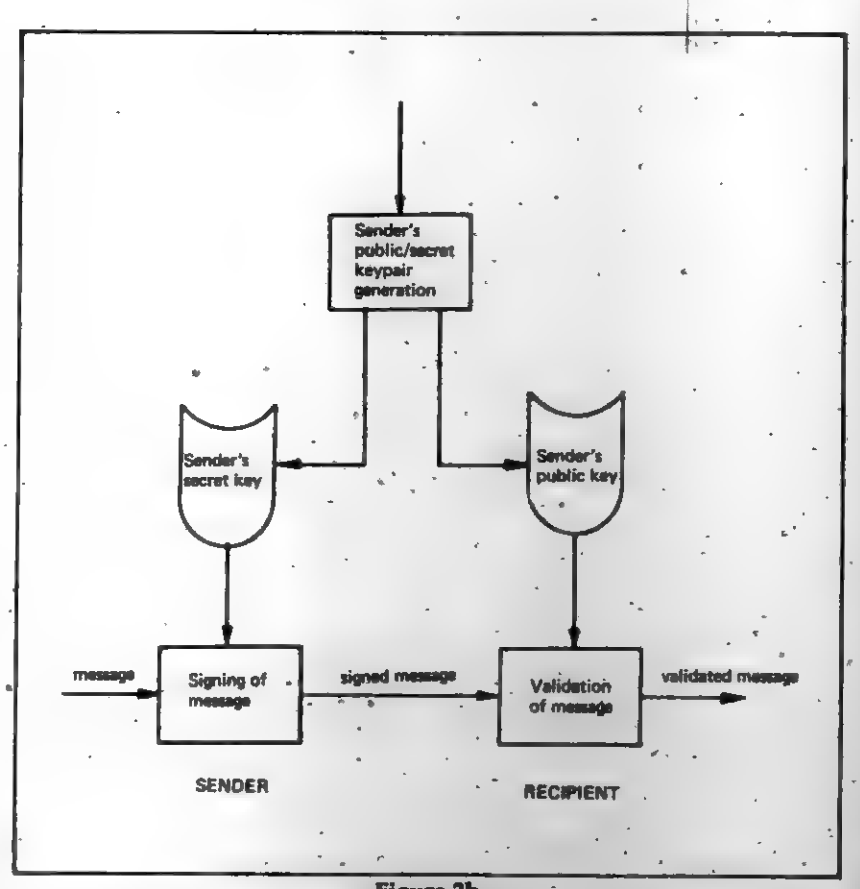

Figure 2b

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(Continued from In.Depth/21)

videotex data base (the public-key directory), is ideal.

Nonetheless, privacy of messages can still be guaranteed since a potential "wiretapper" who gets hold of the transmitted encrypted message only sees "garbage" (the ciphertext), which makes no sense to him since he does not know how to decrypt it.

2. As a special use of public-key systems, a message can be "signed" using the privately held secret key. Anyone can verify this signature using the corresponding publicly revealed key in the "public-key directory" of videotex. Signatures cannot be forged, and a signer cannot later deny the validity of his signature. This feature has obvious applications in electronic mail, electronic funds transfer, electronic voting or "electronic contracts" (Figure 2b). If electronic message sending and transaction systems based on videotex are partly to replace the existing paper mail and other transaction systems, "signing" an electronic message is fundamental and must be possible.

An electronic signature must be message-dependent as well as signer-dependent. Otherwise, the recipient could modify the message before showing the message-signature pair to a judge. Or he could attach the signature to any message whatsoever, since it is impossible to detect electronic "cutting and pasting."

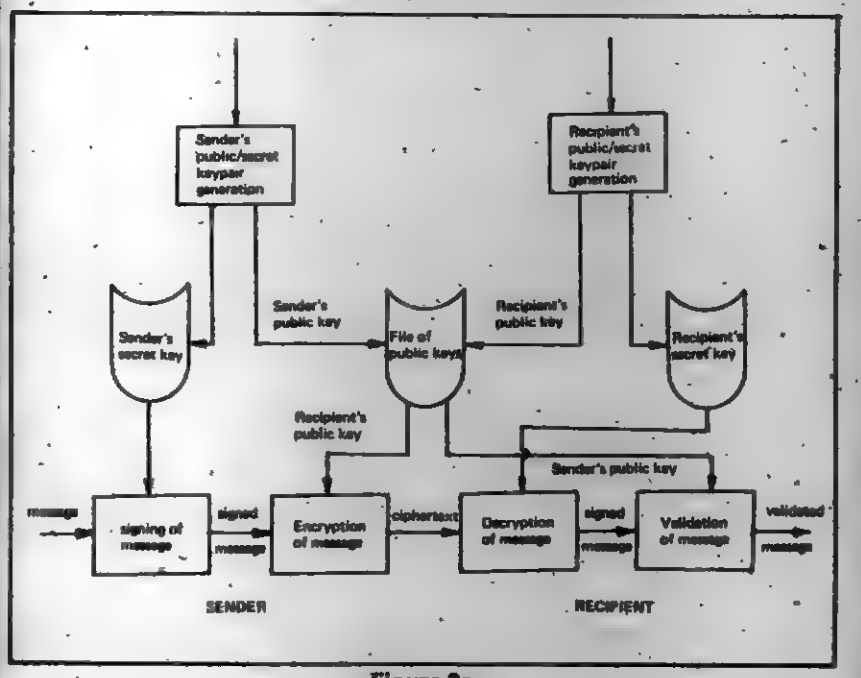

Figure 2c

These conditions can be fulfilled by a public-key cryptosystem. When sending a signed message, the sender uses his own secret key (known only to him) to "compute" his "signature." This coded message can be decrypted by the recipient by using as a decryption key the public key of the sender found in the "public-key directory," which is, as we have seen above, also used when encoded messages are sent to him. If the decoded message is meaningful, then the recipient of the message has the proof that it originated from the sender.

3. "Signed" messages can obviously also be sent "secretly" from sender to recipient, if the sender encodes his "signed" message (through his own secret key) according to the public key of the recipient looked up in the videotex public-key directory (Figure 2c). Such a message transmitted by the message-sending service of videotex can, as we have seen above, only be decoded by the addressee.

To enable public-key systems to be used for signature, it has to be ensured that the encryption/decryption key pairs used allow subsequent coding and encoding (or vice versa) of each message without changing the original context of the message.

We believe that public-key cryptosystems can be widely used in videotex networks for a number of novel applications. In what follows, we only mention a few possibilities, some of which are linked with the expression of individuals in public opinion.

Public opinion expression. An "electronic speakers corner" can easily be implemented, even on most of the present, first-generation videotex systems. A prerequisite is to appoint or accept a special information provider who is willing to function as an electronic speakers corner. Anyone who then wants his voice to be heard can send his message to the information provider through the message-sending (note: only with full alphabetical keyboard) service of videotex or through the response frame capability of the videotex textframes.

It is then the function of the speakers corner to put the received message on his information frames. The question of what or what not to put up — thus to exercise a kind of censorship function — is a key issue on how the electronic speakers corner would function. (At this point, it should be mentfoned that by accepted convention at Speakers Corner in Hyde Park in London, the Queen and the Royal family, for example, may not be abused.)

Information frames on public opinion could be kept on the system for a designated time period. Some information frames could also be supplemented by response frames to ask for public reaction to a specific issue. For example, a citizen claiming there is a need to build a road that bypasses his village could seek support for his appeal from fellow villagers through the response frames.

The speakers corner would, of course, cost money to operate. To cover expenses, the operator of the videotex services — for example, the PTT — might be required by law to provide the electronic speakers corner service. In a similar situation, cable TV operators in the U.S. are often required as a condition of their franchise to offer the public citizen channel free of charge. The amount, frequency and type of information for which citizens might use this free videotex information channel would need to be clearly established by law or regulation.

Electronic voting. A simple type of electronic voting and public opinion polling is also possible on existing first-generation videotex systems with or without a full alphabetic keyboard. The information provider performing the public opinion polling or voting could put up questionnaire-type response frames on the system. Subscribers looking up the frames of this special information provider could then fill in and send back the appropriate response frames.

If the information provider had an intelligent videotex terminal, such as Mupid, he could then process the collected response frames, for example, to produce integrated final statistics to show polling and voting results. This technique may not, however, be sufficient under all

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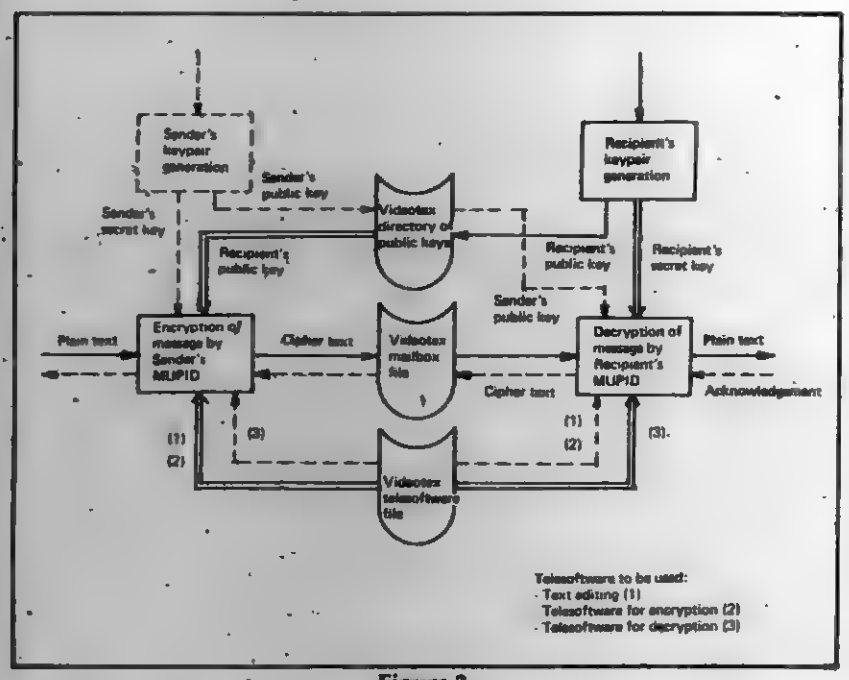

Figure 3

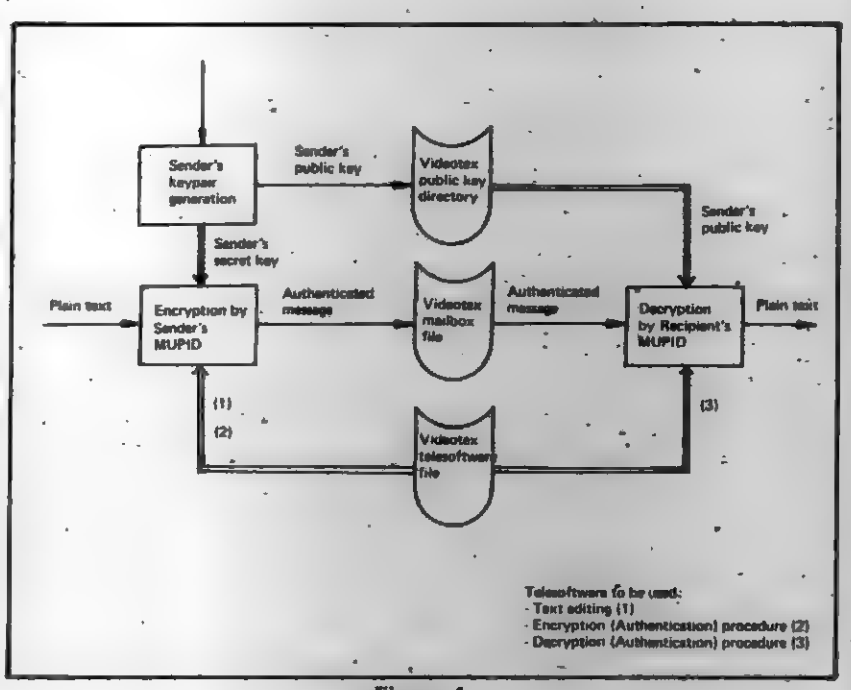

Figure 4

conditions. Polling and voting through response frames is linked to a specific user identification and password, but not to individual people. For example, the International Institute for Applied Systems Analysis is listed as one subscriber on the Austrian videotex system. It would be a similar case with a family, where in Europe the head of the family is usually by law the subscriber.

The videotex system therefore can only distinguish a particular subscriber and not the individual users working under that subscriber identification. For this reason, no guarantee is provided by the system, for example, to identify whether a new car that was ordered through videotex was ordered by the father who really wants a new car or by his children who just thought it would be nice to own.

The same is true, of course, for public polling or voting, when individual family members may have different opinions and certainly have separate votes. In order to gain further identification, then, usually one of the questions asked on a response frame is the name of the person filling it in. There is, however, no way for the system to check whether this type of identification is authentic, and in many applications, especially voting, authentication is essential. As already mentioned, one way to solve the authentication problem is by public-key cryptosystems.

Secret message sending is also often a required need for certain transactions — for example, the message between a customer and his bank. For this reason, even though any traditional computer transaction system or videotex provides a certain degree of data security, additional measures to increase the level of security — for example, through cryptography — are always welcome. To introduce cryptography on videotex systems through public-key cryptosystems is one potential way, especially if intelligent videotex decoders, such as Mupid, are used.

In many cases, both authentication and secrecy are required. In the case of voting, the vote has to be authentic. There must be assurance that the vote has come from the person to whom it was ascribed and that it is a valid vote (that is, that the vote has been placed only once and not later or earlier than it should have been).

The content of the vote, however, should remain hidden from the authentication-checking process. Nobody else should know or be able to find out, for example, whether Franz Joseph Strauss voted for the SPD (it is purely his private affair). Also, at the second stage, when the content of all votes are revealed and the valid votes are added up, again no one should be able to recognize that a given "yes" for the SPD actually came from Franz Joseph Strauss.

In principle, all these requirements can be implemented using public-key cryptosystems. How these basic functions can be implemented on videotex is shown in Figures 3, 4 and 5. Text editing, encryption and description of messages are performed locally by intelligent videotex decoders. The programs and encryption keys needed are downloaded from the videotex system.

In the figures, we show the videotex public-key directory and the videotex telesoftware file separately for better understanding, but these are stored on standard information frames. Messages are sent to the receivers' mailboxes in a store-and-forward manner through the standard message-sending function of videotex. Actually, the following applications are built on the basic functions shown in Figures 3 through 5.

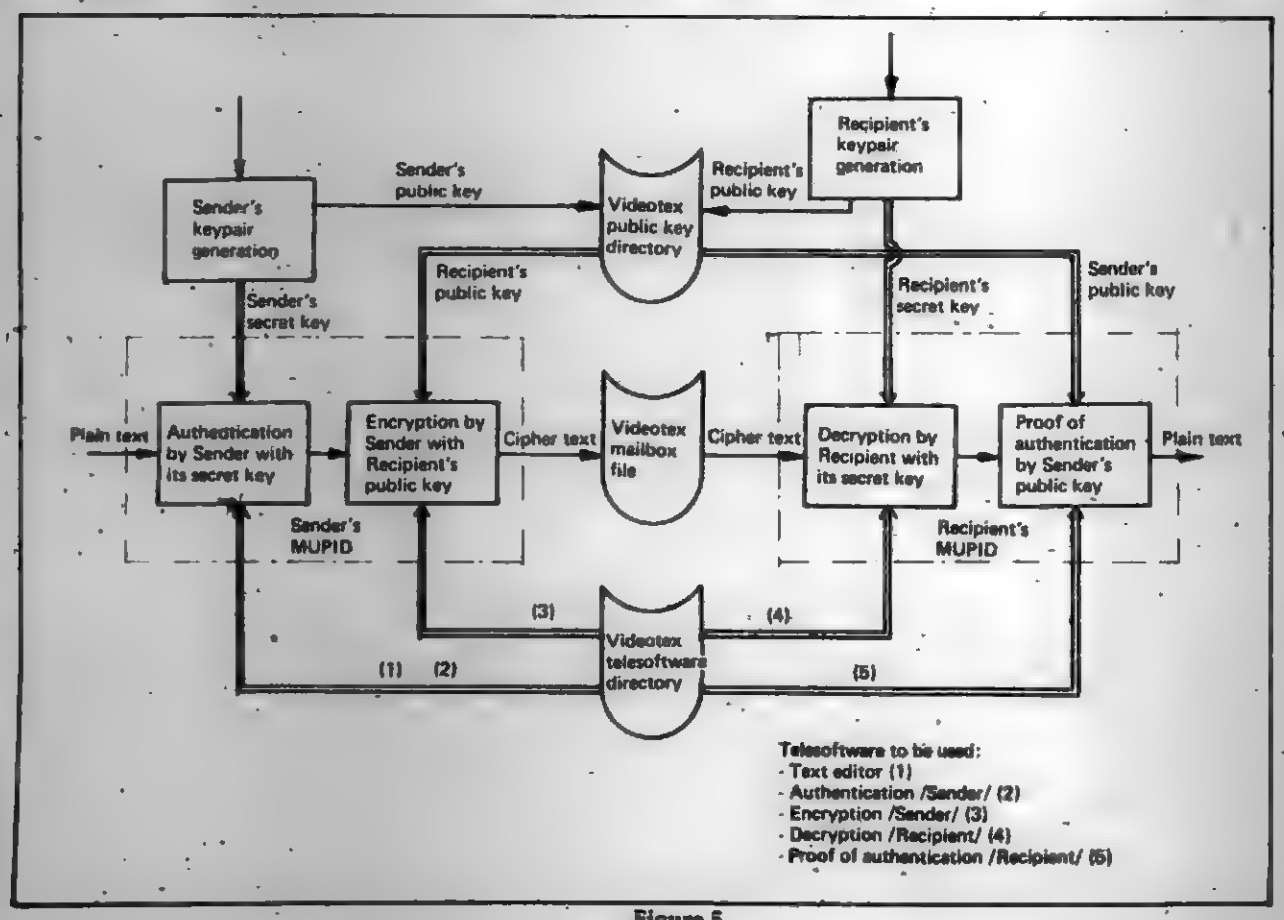

Figure 5

IN DEPTH

In this whole process, there are a few critical technical points that have yet to be solved properly. One problem is the distribution of the secret private keys. First, appropriate key pairs have to be generated, preferably by the key administrator. This function could best be accomplished on a dedicated third-party computer linked to the videotex network. The public keys can be put on the videotex system in a public file by the key administrator. The secret key then has to be forwarded to the subscriber who wants to receive crypted messages or send authenticated messages.

The problem here is that if sent through the "insecure" videotex message channels, this information, in principle, could be wiretapped by a third party. One possibility would be to pick up the private key in person from the key administrator. This option is certainly secure, but then one particular beauty of the public-key system, the flexible change of crypto-keys, is lost. Another possibility would be to pick up in person a crypto-key that is only used for the distribution of keys between administrator and user. In this way, the request for new keys would have been authorized both by this special key and the old private key — the new key would be sent through the special key. The likelihood of both keys being stolen is far less than for just tapping the private key.

A third possibility might be for the key administrator to send out in a random way special pages containing various unused private-key options; each key would get an identification number. If a user wants to change his private key, he simply selects one of the upcoming private keys, which he stores locally, and informs the key administrator through the public key which key he has selected as the private key.

A fourth possibility could be that this selected key is used only temporarily between user and key administrator to establish a secure temporary channel through which the user would finally receive his private key.

A completely different method of key distribution would result if the generation of public-key pairs could be performed locally by every user. In this case, the user would simply retain his secret private key and only submit his newly generated public key to the key administrator. In this fashion, the "dangerous" distribution of private keys from the key administrator could be avoided. The key administrator would first check that the submitted public key does not already belong to another subscriber, in which case it would be necessary for an alternative key pair to be generated and submitted.

This checking procedure could be done by a third-party computer. Even if the list of subscribers stored in the system is large (say, millions of subscribers), special programming techniques can easily be arranged so that the checking procedure is fast. One known technique, for instance, could be to list the public keys in increasing order; then, by using a binary searching technique, it would be simple to find out quickly if the same key already exists or not.

Estimates have shown that a 50-digit key could be broken by the fastest algorithms and machines of today in approximately 3.9 hours; 75-digit keys would take 104 days; 100 digits, 74 years; and 200-digit keys, 3.8 times 10⁶ years (3.8 billion years).

There are certainly many technical problems associated with this technique; for example, the key length would need to be as long as possible, not only to provide increased security but also to make the creation of new, unoccupied key pairs by the subscriber easier. Another problem to solve is key generation itself, which is a rather long, complicated, number-crunching process.

The number of key distribution

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M8650-00	16 BIT FLIP-FLOP DC OUTPUT	295	50%	147
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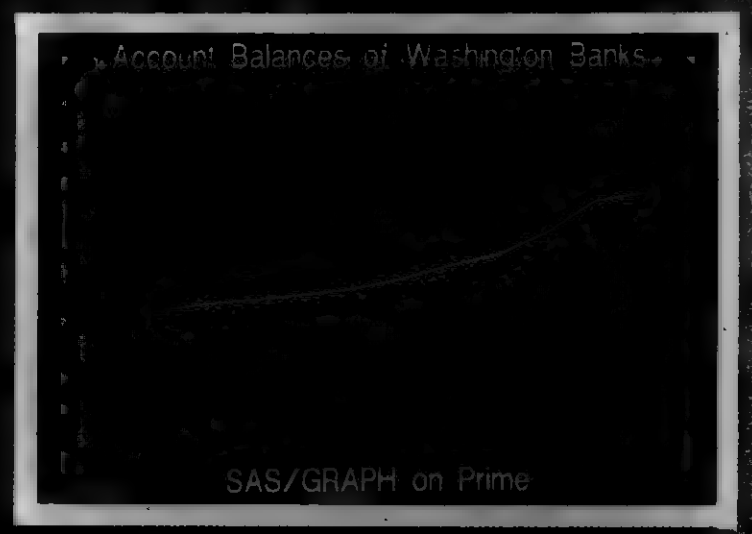

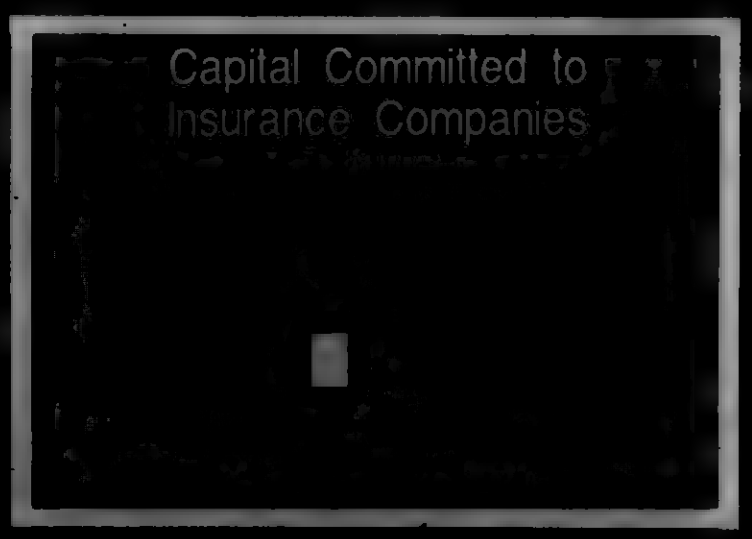

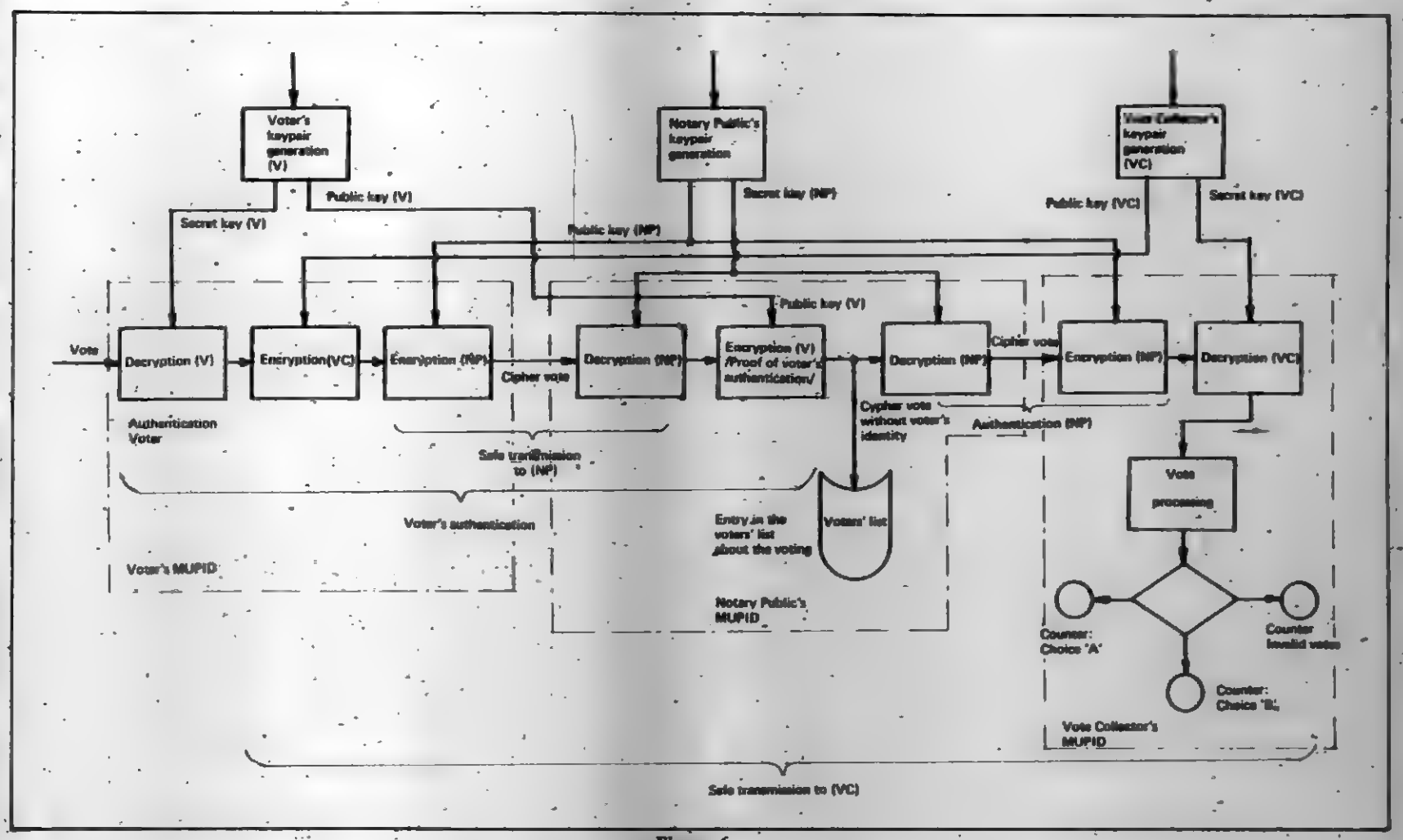

Figure 6

options is rather broad. The question is how far it is worth going in this process. Another problem is the processing capability of the intelligent video-decoder. Let us assume that the problem of key distribution is solved. According to the Rivest, Shamir and Adleman article, "A Method Obtaining Digital Signatures and Public-Key Cryptosystems" (in *Communications of the ACM*), the length of the keys used determines whether an "enemy cryptanalyst" would be able to break the method in a reasonable time period. The authors' estimates have shown that a 50-digit key could be broken by the fastest algorithms and machines of today in approximately 3.9 hours; 75-digit keys would take 104 days; 100 digits, 74 years; and 200-digit keys, 3.8 times 10^9 years (3.8 billion years).

Common sense suggests that even for the most sensitive daily applications, 75- to 100-digit keys would be sufficient. At present, however, it would be a cumbersome and time-consuming problem for microcomputers to process 75- to 100-digit keys. Mupid, for example, even with its floating-point-Basic version, can only handle 12-digit keys in the simplest programming form.

There is, however, hope on the horizon. Reportedly, microcomputer encryption/decryption software based on the public-key principle is already on the market using a 77-digit key. The software operates on Zilog Z80 microcomputers under Digital Research, Inc.'s CP/M system. The time needed to generate the encryption and decryption keys ranges from 15 minutes to four hours. The message encryption and decryption take about one minute plus the necessary disk access time. Ron Rivest, one of the fathers of the RSA public-key cryptosystem, and his colleagues are reportedly working on a single-chip implementation of the system that can be used on a microprocessor bus, which should be able to process about 150 characters per second. It seems, therefore, possible.

Electronic voting. A possible elec-

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IN DEPTH

tronic voting system built on new-generation videotex is shown in Figure 6 (on In Depth/31), although only the basic functions and links are represented. In order not to overcomplicate the chart, we have left out the videotex information files containing the appropriate piece of telesoftware needed for encryption/decryption procedures, the file of public keys and the videotex mailboxes.

As mentioned earlier, in electronic voting we have three major "actors": the voter community, a kind of "notary public" (or election board) and a so-called "vote collector." The functions of the notary public include maintaining the list of voters, checking the validity of voters and making entries in the voter's list that a vote was made by a certain voter and so forth. The notary public must also make sure that the votes are authentic and are received in time. He should not, however, be aware of the content ("yes" or "no") of the vote.

Aggregation of the votes should be done independently by a vote collector. The vote collector should basically be a third-party computer that counts the results and prepares various statistics instantaneously. The vote collector must, of course, know the content of each individual vote, but should not know who voted what. All these basic functions can be fulfilled by public-key cryptosystems as shown in Figure 6.

In our voting system, the voter's intelligent videotex decoder provides for the authentication of the voter by use of his private key, then allows the user to vote in an interactive way. It encrypts the actual vote ("yes" or "no") with the public key of the vote collector and then makes sure that the whole message, that is, his authentication (name and digital signature) and the encrypted vote, is received by the notary public safely. To achieve this, the whole voting package is encrypted with the public key of the notary public that only he can decrypt. The actual transfer of the vote is done through the message-sending service of videotex.

To process the votes, the notary public either has to use intelligent videotex decoders or, perhaps, videotex decoders combined with a third-party computer. His first function is to decrypt the votes with his private key and then to check the authentication of the voter by using the public key. If proof of user authentication is gained and the vote is formally correct, an entry then has to be made onto the voter's list to ensure that the voter does not vote again on the same issue.

At this point, the content of the vote and the identity of the voter have to be separated so that only the encrypted vote content is sent over with the videotex message service to the vote collector. In order to prove that this vote was correctly administrated by the notary public, the notary public must use his own private key to authenticate the message and perhaps even put a time stamp on it. Also, at this point, an additional encryption would assure that the transmission from the notary public to the vote collector is done secretly. This action, however, seems to be unnecessary because the actual content of the vote is still encrypted.

The vote collector is also based on an intelligent videotex decoder, and an external computer would perform the following functions: First, it checks whether the messages received were authorized by the notary public; second, it encodes the actual content of the vote with its private key and performs the vote counting and preparation of the various voting statistics. With this step, the voting chain is closed.

Since the entire process is fully computerized, any type of voting can be performed without major preparation once the whole system is set up. A national system can be installed with the technology available today.

Electronic feedback. In addition, electronic voting technically could offer other aspects on a completely new horizon, namely, voting with feedback. What do we understand this new concept to mean?

In control theory, there are two classes: control with and without feedback. In both systems, certain control actions are taken on one side in order to change the behavior of the system. The basic difference is

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that in a system with feedback, certain measured characteristics of the behavior of the controlled system are fed back to the controller in order to allow for adjustment in the controlling process. In a system without feedback, the controller takes controlling action on the assumption that the system will obey his controlling measures. This assumption, however, does not always come true.

A typical example taken from daily life which covers both systems is one's own daily bath. In a control system without feedback, one regulates the temperature and volume of the water in advance through the water tap with the aim, say, that after five minutes the bath is filled with sufficient water at the right temperature. All of us have certainly experienced occasions when this assumption did not work; either the water was far too hot or too cold or the quantity of water was insufficient or excessive. For this reason, a control with feedback provides much better results. One can check from time to time whether the temperature and level of the water in the bath are right.

In terms of elections, of course, the system is much more complex (Figure 7). The system to be controlled is the voting process. The controllers of the system are the individual voters, whose controlling functions are summed up in the system. The output is the aggregated results of the voting. No such voting system yet exists in which the results are fed back directly into the voting process. One of the reasons is certainly the technical difficulties encountered in doing so efficiently.

Rudimentary voting systems that do try to take feedback of a first election step into account are implemented in a number of countries. For example, in France, presidential elections are divided into two steps.

There is, however, no known system where the actual results are available to the voters during the election process where voters could modify their votes as long as the voting deadline is not past. In an electronic system as described above, this feedback would be technically possible. This set-up could mean that in a given election in which the expected results are not a simple "yes" or "no," voters would have better control over the voting process than they do today.

Here we take the election system,

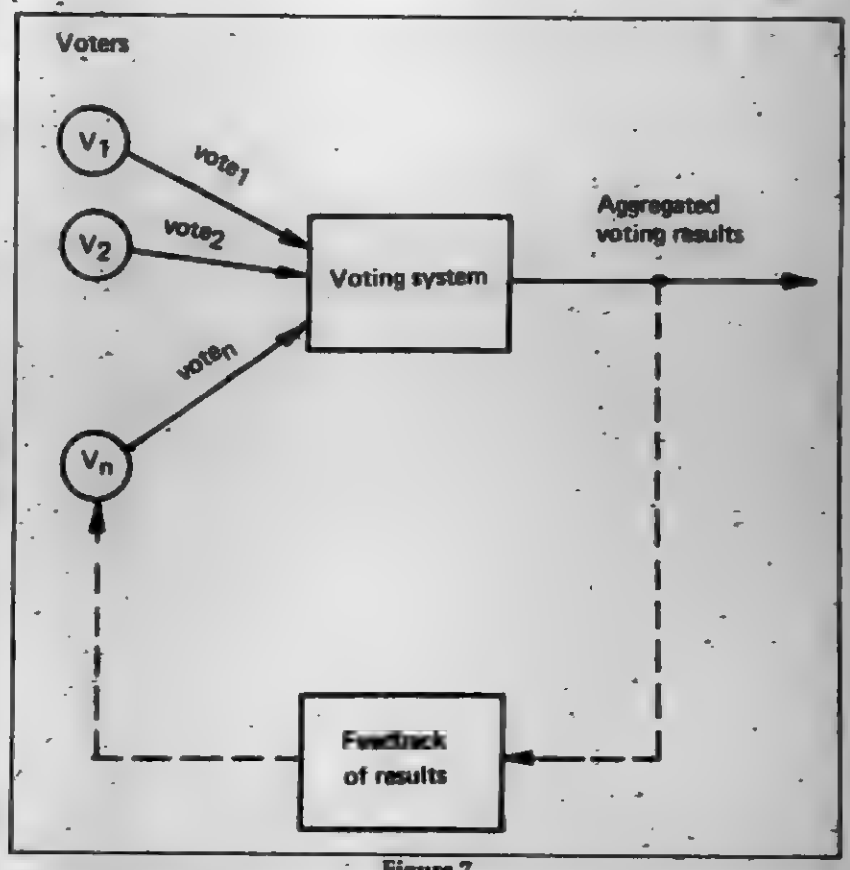

Figure 7

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IN DEPTH

of West Germany as an example. Every voter has two votes.

With his first vote, he can elect a person to represent the local community in the Bundestag for the next four years. The election process is simple. The candidate who receives the most votes wins. He is, in most cases, a member of a given political party, whose policies he will likely follow during the next term.

The second vote in this system counts in the general elections. A voter places his vote for a given party, thus basically controlling the "strength of representation" of that party in the new Bundestag. These two votes are at present the only rudimentary means available to any voter. As long as the answer is just a simple "yes" or "no," this system is fine. However, the nature of the real questions asked is much more complex and their number far more than two. In a parliament with several political parties, each with different but slightly overlapping programs, the actual questions might better be put as follows:

1. Which of the parties should be represented in the parliament and should most likely form the government? (In the Bundestag, those parties with less than 5% of the vote may not even be represented.)

2. How strongly should those parties that are elected be represented in the parliament?

For a great number of voters in the 1983 election, for example, the question was not a matter of whether they wanted to vote for party A or B, but rather, whether parties A, B, C, D and so on should even be represented and, if so, how strongly. In an interactive voting system, these questions could indirectly be asked and answered by the voters. One of the present-day fears in elections is that even after time-, resource- and energy-consuming campaigns, no real decision is reached because according to the voting results, no one government with a ruling majority can be formed.

This situation is usually deemed to be undesirable both for the party concerned and for the voter. But because of the lack of feedback in the election process, it could easily happen and does happen.

A second concern during the recent West German election campaign was those "lost" votes, which because of the 5% limit clause, could have unforeseen effects on the election process. If, for example, the smallest party now represented, the so-called "Greens," had received 6% fewer votes than they did, then the conservative party (CDU-CSU) would have obtained a majority and there would have been no necessity for creating a coalition with the Liberals. The representation share of the "left" would also have actually been severely influenced.

In an interactive system, the voters could have influenced whether the "Greens" should be "in" or "out" and if "out," who should have gotten the votes instead.

How could such a system really work? Let us take the following very simple

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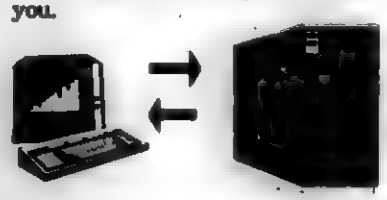

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scenario: An election starts at 6 a.m. on a particular day, but using the electronic voting system of videotex, some votes could have been sent to the notary public a few days earlier. Voting, as described above, could be done at home. Now let us assume that there is no feedback on the election progress before noon in order to "set the stage," but that after noon, voters could get information on the voting results through the national videotex system or some other media. Thus, every voter would have the chance to modify his vote before the close of the election.

There is good reason to assume that a stable interactive voting system could, in principle, be designed and implemented if there were a political consensus supporting this approach.

In the U.S., some interaction occurs because voting concludes and is tabulated in the Eastern states while voting is still taking place in the West's later time zones. In the 1980 election, President Jimmy Carter conceded defeat before the polls closed in the West. Political analysts believe this action influenced Democratic voters to stay home, which led to the defeat of some Democratic candidates in those states.

By this point, careful readers will have many serious questions. Yes, an interactive voting system is a complex system with dynamic behavior. In order to design a stable system with functioning feedback, the rules of control science have to be applied, and the dynamic system behavior and feedback mechanism have to be fully understood and entirely under control. This task is very complex and goes beyond the scope of this article. But there is good reason to assume that such a stable interactive voting system could, in principle, be designed and implemented if there were a political consensus supporting this approach.

Such a system could be fully implemented in the next 20 to 30 years for full penetration, provided we start to think now about how these issues and problems could be investigated and resolved and consider all the technical problems. It would seem worthwhile to carry out pilot projects on a local rather than national basis.

Thought need also be given to the political implications of such systems — whether voting will be encouraged or discouraged; whether certain classes of voters will benefit disproportionately by an interactive system; whether an interactive system will cause distortions or otherwise negatively affect the sense of equal participation; or whether a combinated system of traditional ballot plus electronic ballots for those choosing the new system will be feasible for a transitional period.

Electronic opinion polling. Technically, electronic public opinion polling is not much different from secure message sending, with or without authentication or the mechanism presented for electronic voting. Its main advantage over the presently used techniques would be that it could allow for public opinion polling results to be more quickly and frequently collected and on a larger scale than practiced today.

At present, there are still many problems associated with public opinion polling. Very often there are insufficient resources available to obtain truly representative public opinion, and usually the time span is too short to obtain decent results. It is almost technically impossible to obtain solid public opinion polling results on any current issue in two or three days at acceptable costs.

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market penetration of videotex, the citizens who could be involved easily in public opinion polling could be much larger than today. Similar to electronic voting, processing of the data can be done instantaneously, almost automatically and practically without any cumbersome data preparation.

If this instrument is applied correctly, it may provide a most valuable and powerful tool for those who are (or should be) really interested in the public's opinion.

Electronic ombudsman. The "electronic ombudsman" concept obviously does not mean that complaints could be received and investigated automatically by new information and telecommunications technologies, only that these new tools could considerably help.

The technical solution for an electronic ombudsman is rather obvious. Through the ombudsman's public key, everyone could send secret messages to him, which could either be signed through private keys or be kept anonymous. It is not possible to send an anonymous message in the present videotex systems. But should such a function be required, another independent body — let's call it the "public's representative" — could be established to put messages in an anonymous form.

The messages could be encrypted as well. The sender encodes his message according to the ombudsman's public key and sends it to the public's representative for "anonymization."

The public representative would then remove the sender's name when transmitting the message to the ombudsman. The public's representative would, of course, not necessarily be able to read the content of the message.

Problems and prospects. There are many problems to be solved before one could actually start with the above applications. From the technical point of view, an electronic speaker's corner could be started any time; only the *modus operandi*, the legal status and the costs need to be clarified.

As far as electronic voting is concerned, we are not ready at this point, even from a technical point of view, to start, but there can be little doubt that all the hardware and software problems could be solved in the near future.

We estimate that a fully operational system could be set up in about two or three years' time.

The actual problems lie in a different area. First, the user penetration of such systems takes time. Market penetration to 80% of all households in the U.S. for new media were:

- Radio in 19 years.
- Black-and-white television set, nine years.
- Color television set, 25 years.
- Telephone, 72 years.
- Cable television, projected at 73 years. The penetration of videotex, the cheap computer network for daily life, on the market will certainly not take place any more quickly than the fastest of the above media.

For this reason, our guess would be that at least one generation (25 years) would be required to achieve an acceptable level of videotex coverage so that instant voting could be possible from virtually every household.

If full user penetration is not achieved, then a possible political concept of "more direct democracy by the citizens through new information and telecommunications technologies" could also not be achieved.

Those people who for some reason do not have easy access to videotex terminals (because they cannot afford it, because they live in remote areas with an insufficient telecommunications infrastructure, or because they do not want it) would not have an equal ability to participate with those people who do own them. We estimate that the shortest time horizon possible for full penetration and introduction of such systems would be one generation — and then, only for the most developed parts of the world. Until then, electronic voting could become one of the election alternatives, such as voting by mail or at polling booths. But its full impact would, of course, not be felt or really gained in respect to a

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more direct democracy.

In the moderately developed and less-developed countries, the penetration period is, of course, even longer. Thus, unforeseen conflicts may arise. Let us assume that more public participation and direct democracy is desired in two given countries in a future information society and that one is well-developed and the other not. Is this not yet another source of difference between rich and poor?

Another possible conflict situation could be the following. Imagine a well-developed country in which more public participation in government and more direct democracy were technically possible, but the present establishment wishes to retain the status quo in governing and restricts the introduction of technologies that would allow more citizen participation.

This situation may lead to political conflicts and changes in dynamics between government and governed.

In general, in any information-rich society with the appropriate technical infrastructure for direct democracy and public participation in governing, it will be important to consider:

1. The domain of those issues in which decisions should be made jointly with the public through increased direct democracy.

2. The domain of those issues where the opinion of the individual is requested and the results of the public polling are publicly announced but the final decisions are taken by the appropriate governmental bodies.

3. Finally, the domain where decisions are taken solely by the government without asking for public opinion (for example, in some national security questions).

Determination of the above domains could prove to be a major issue in an election campaign, depending on how each party would handle these questions if it won power.

In public-key cryptosystem applications (such as secure message sending, authentication, public opinion polling, electronic voting and so on), the administration of the public keys will also be of major importance.

In the case where the encryption/decryption key pairs are generated by the key administrator, then the administrator — and, in principle, only he — will be in a position to control all information and transactions flowing through the system.

In some countries, this control might simply not be acceptable. For these countries, the system whereby the keys are generated by the user and only the encryption key is forwarded to the key administrator might prove to be more acceptable.

However, even then the administration of the encryption keys is so important that some countries may decide in public systems that the administration of public keys should be a government monopoly, say, the PTT or some central governmental agency. In other countries, a commission somewhat independent of the government might inspire greater confidence.

Vulnerability is also a problem issue. If banking transactions, electronic voting and so forth are performed by means of public-key systems, then the vulnerability of the system and especially of the key administration is of utmost importance. A terrorist attack on a single key administration center could seriously affect the daily life of society in a way similar to the effect that a poison attempt on a city's water supply by terrorists or lunatics would have.

All in all, there are plenty of problems to be solved.

About the Authors

Istvan Sebestyen is a research scholar at the International Institute for Applied Systems Analysis in Laxenburg, Austria. He is also a guest professor at the Technical University of Graz, Austria. He concentrates in the field of new-generation videotex systems, especially intelligent videotex terminals.

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Achieving The Promise Of the DBMS

By Carol E. Shulman

If you've ever shopped for a data base management system (DBMS), you've been promised that it will reduce data redundancy, permit more effective data sharing and provide independence among programs and data. Further, you were told that these advantages would lead to lower operating costs, lower maintenance costs, more rapid response to new requirements and an improved decision support climate.

Who could resist these tempting benefits? They strike at the heart of what most shops recognize to be some of their most important problems. Yet, although a good DBMS can theoretically yield these benefits, few users have actually achieved them.

To ensure integration and controlled redundancy, data base architectures must be planned at a high level before parceling out detailed design and implementation at the project level. This is rarely done.

Shared data bases, even at the project level, must be designed differently from application-specific files. Most DBMS users continue to use the same analysis and design methods as they used without DBMS and thus have produced one data base per application instead of multipurpose, shared data bases.

DBMS purchasers rarely have a true picture of their needs before they buy. As a result, they select a tool that turns out to be inadequate once the true needs are discovered.

The data base concept is often misunderstood and oversold. Common misconceptions include the belief that an organization should develop one gigantic corporate data base, that a DBMS will have an immediate positive impact and that it is easy to design and implement data bases that will be shared by many end users and applications.

The barriers to the effective use of a DBMS are far more political and cultural than they are technical. Effective use of a DBMS requires often dramatic shifts in the role of technicians, end users and management. It probably requires changes to the organizational structure, including the creation of some new positions. It definitely requires a lot of education. Basic disagreements about what data means, what data is required and what the priorities should be must be overcome. These barriers cannot be easily surmounted without firm, public support from upper management. And it requires the dedication of far more resources than just the DBMS purchase price. These needs are rarely addressed when a DBMS is acquired.

Most of these problems arise because the user is not really aware of certain key, hidden assumptions implied by a DBMS and the benefits it offers:

- Data is a resource separate from the programs and users who currently access it, and as such, it requires management in its own right. "Management" should be as broadly defined for data as for other corporate assets. That is, data must be planned for, acquired, monitored and controlled, just as financial assets, physical plant and human resources are managed.
- It is technically possible to design data bases that can be used for many purposes.
- It is politically, culturally and organizationally possible to plan for, design, implement and maintain shared data bases.

It is possible to ensure that these

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assumptions are valid for a particular organization. Taking the time to do so increases the probability that the benefits from a DBMS will be realized. The prerequisites for data base success include:

1) Adopt the "information resource management" (IRM) philosophy and make it very visible.

2) Modify the approach to systems planning and design to include the analysis of data in its own right.

3) Establish an adequately staffed and funded data administration function with the responsibility and authority for managing data resources.

4) Acquire the proper tools, which include not only a DBMS with certain key features, but also two or three other pieces of information management software.

The IRM Philosophy

There must be widespread agreement that information is an important corporate asset and that shared data bases are a corporate goal. Until this consensus occurs, people will not recognize the need to put data through the same kind of management cycle that other resources routinely require.

There are several vehicles for developing this consensus, and the most successful ones begin by winning over top management. Some proven ways of doing this are:

- Provide some concrete examples of how the business has been affected adversely because of a lack of this orientation. For example, survey the data used by three to five applications that are central to the business and determine the extent of data redundancy and inconsistency. Try to assign costs to these problems and report findings to upper management. Or, report on two or three important decision support applications requests that proved difficult or impossible to satisfy because of unintegrated, inconsistent data. In other words, make management aware of the business impact via concrete examples it will understand and appreciate.
- Help managers educate themselves. Send them to a data base seminar or assemble a reading list of convincing articles and books. This approach works best if managers are already motivated to learn more about these issues.
- Apply some of the information planning, analysis and control techniques discussed below on a pilot basis and publicize their success. This is most effective if the pilot application has had past difficulties because of unintegrated, redundant and/or inconsistent data — and when its success is important to the people to be convinced.
- It is often true that one or two influential senior executives are more appreciative of these issues or are more receptive to learning about them. Find one, sell to him and get his help selling to the other executives whose support you require.

Help managers educate themselves. Send them to a data base seminar or assemble a reading list of convincing articles and books. This approach works best if managers are already motivated to learn more about these issues.

Once the necessary senior management understanding and commitment has been garnered, make it visible to others. Some ways this has been accomplished include:

- A statement of the philosophy in the annual report, corporate mission statement, business plan and so on.
- Articles and/or interviews with a senior manager in an in-house organization.
- Formal announcement via internal company meetings.

This type of publicity is most effective when accompanied by publicity about corresponding actions taken, such as the formation of a high-level IRM steering committee,

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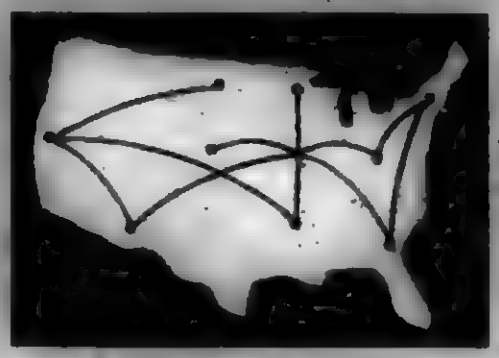

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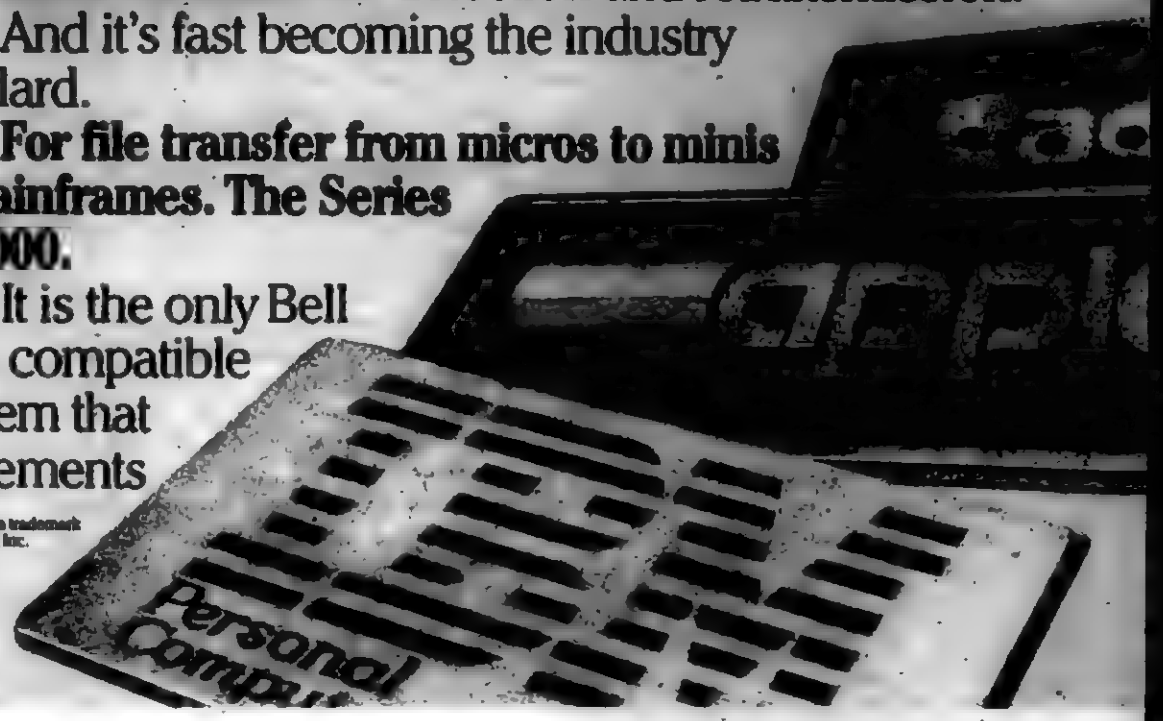

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the appointment of a highly placed data administrator or the allocation of budget for IRM personnel and tools. Other actions that reflect commitment include the selection of formal assignments or IRM responsibilities to upper management, end users and management information systems (MIS) personnel.

If data is to be treated as an independent resource, organizations must adopt methods for its planning, acquisition, monitoring, maintenance and retirement or replacement. There are well-tested approaches to these needs.

The more nettlesome issues are political, such as deciding who should be responsible for maintaining data timeliness and integrity in an environment where many users share the same data.

Planning is best accomplished via the construction and analysis of a model of the business' activities and the information required to perform them. This model is supplemented or extended by a corporate information architecture. This architecture identifies entities — persons, places, things and events — about which data is required; shows how they interrelate — for example, that a vendor supplies many parts or that a customer is served by one sales rep; and shows how they can be grouped into subject data areas containing information that is often used together when performing business activities. These models can and should reflect not only the current business, but also foreseeable future activities.

The best known methodologies in this area are IBM's Business Systems Planning, which is weak on the data architecture side and is sometimes insufficiently detailed to draw project boundaries with confidence, and James Martin's strategic data planning methodologies, which are a part of a approach he calls information engineering.

Acquisition in the systems world translates to detailed design and implementation. While many popular systems design methods work just fine for processes, most neglect data as something independent of applications or programs. The body of techniques for designing and implementing data bases as independent resources is called data modeling.

The good methods heavily emphasize the use of "normalized" or "third normal form" data structures because they are inherently more stable and flexible. Data modeling techniques flesh out some project-size portion of the data architecture defined during planning, adding specific attributes and interest for specific purposes, revealing new entities and associations. The result is a "logical model" or "conceptual schema" that is independent of any particular implementation technology. The conceptual schema is then translated into a structure supported by a given DBMS or file access method and then implemented.

Monitoring and maintenance in a systems context encompasses data entry, validation, updating, extraction, backup, auditing and so on. This is the phase of the data resource life cycle that is directly addressed by a DBMS. A good DBMS contains facilities to assist the user with all aspects of this phase and can indeed make it more productive and cost-effective. The more nettlesome issues are political, such as deciding who should be responsible for maintaining data timeliness and integrity in an environment where many users share the same data.

Data Administration

These techniques for information resource management work best if someone is explicitly assigned the responsibility for carrying them out. This is usually accomplished through establishment of a data administration function. Ideally, this

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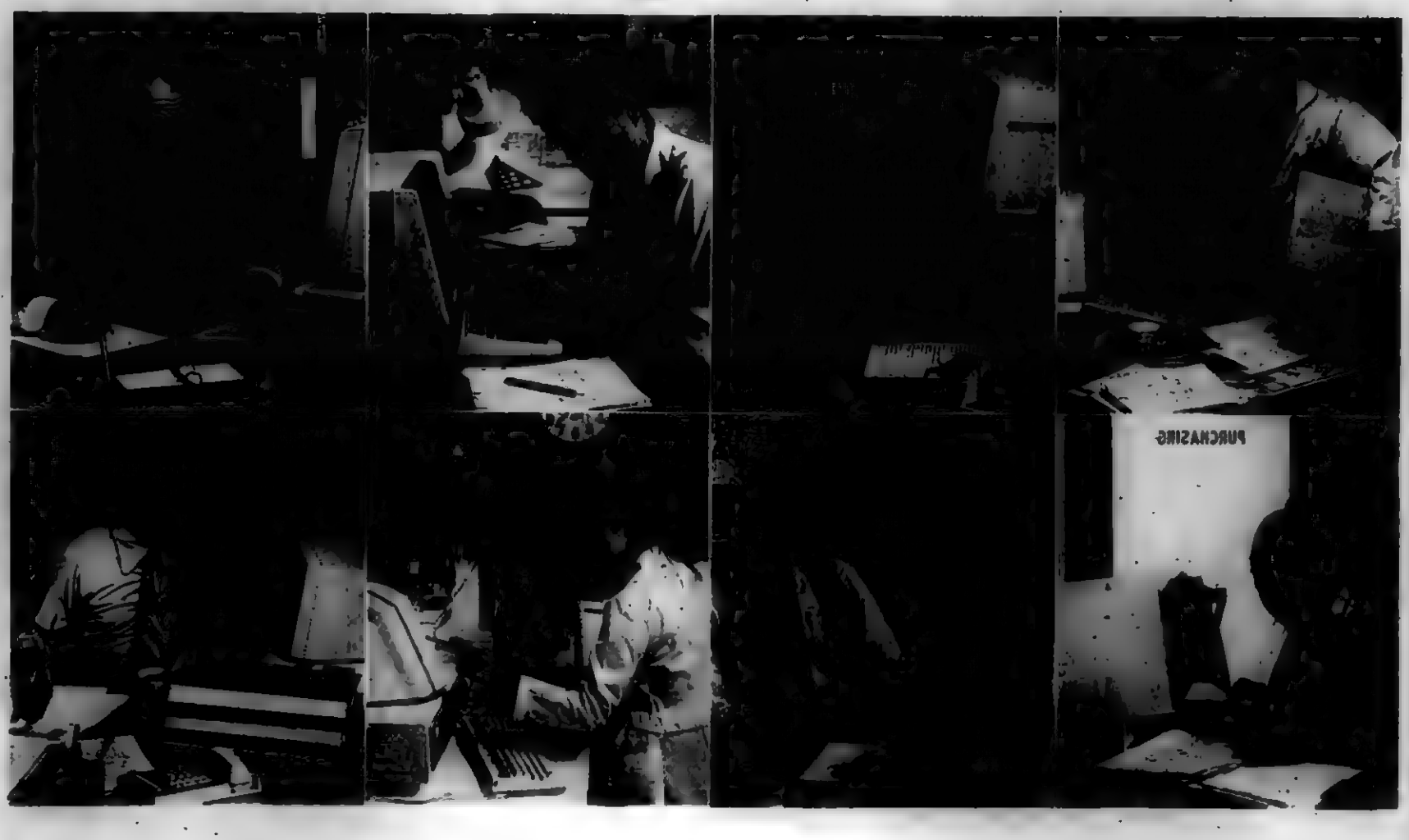

function is independent of the existing systems organization, and its senior manager has a title consistent with other senior resource managers.

In practice, this placement rarely occurs immediately; the function is created in the MIS organization and migrates up and out over time as it proves itself. User management must have explicit responsibility for supporting data administration; user managers are experts in the business and the data it requires, and the data administrator cannot function effectively without their continuous involvement.

The data administration staff will typically include the data administrator (department head); one or more data analysts, who develop the corporate architecture and associated detailed logical schemas; one or more data base administrators (DBA) responsible for designing, implementing and tuning the actual data bases; and one or more clerks, who maintain the data dictionary.

Acquire Proper Tools

Information resource managers cannot function effectively as "barefoot cobbler's children." They must manage vast amounts of data about data, and for that job they will need automated tools:

- An enterprise modeling tool to support planning.
- A detailed modeling tool to support logical data modeling.
- A data dictionary in which to record accepted entity, data item and association names, definitions, valid values, security constraints, users, uses and so on.
- A DBMS with the right features.

The planning tool should permit entry, update, analysis and review of both the activity and the entity models upon which plans are based. Ideally, it will also tie these model elements to others, such as corporate problems and goals, operating locations, formal organizational structures, project definitions, and requirements. Its analysis capability should include support for clustering entities into subject data areas, distribution decision making, project boundary identification, project prioritization and support for checking the internal completeness and consistency of the models.

The logical design tool should assist in the derivation of normalized structures. (Much of normalization should be automated because it is very tedious to do manually). Most modeling tools rely on some notion of a "user view," which is a statement of localized information requirements for a specific purpose and/or user. These are then combined and normalized, and the redundancies are netted out. The result is a detailed, nonredundant structure that supports all given user-view requirements.

The tool should facilitate iterative refinement of the design and should provide both graphics and tabular reports. Ideally, it will also assist in converting the logical structure into schemata compatible with hierarchical,

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network and relational DBMS and will be integrated with the data dictionary and the planning tool.

The data dictionary should provide a robust structure for storing information about entities and attributes at all three levels: planning, logical design and implementation/operation. It should permit recording of entity and attribute names, aliases, definitions, valid values and interrelationships. It should allow storage of physical characteristics such as field length and type. It should help to keep track of where data is used, by whom and for what. It should allow reflection of security and audit constraints. It should facilitate "where-used" and impact analysis and have good search and extraction capability. Ideally, it will be tightly coupled to the DBMS and thus provide capabilities like automatic data validation, security enforcement and calculation of derived values.

The DBMS itself should offer maximum independence of data and programs. That is, there should be few kinds of data structure changes that require recoding of programs that used the old structure; the DBMS should help in easily restructuring and identifying programs that may be affected. Its underlying model (hierarchical, network or relational) should be readily compatible with the corporate data architecture. (Note that hierarchical systems almost never are.)

It should be able to handle problems associated with multiple users, which implies deadlock resolution capability; strong access security; performance tuning aids; access and change logging by user; support for a large number of subschemata; and interfaces with a variety of host languages, file access methods, inquiry and reporting tools and so on.

It should assist in maintaining data integrity — which implies strong data validation facilities — audit trails and restart/recovery utilities. It should free the user from having to know the details of physical data structure to access the data. That is, it should provide relatively automatic data base navigation.

Data base management systems solve a large piece of the technical puzzle of how to control data resources. However, to achieve the true potential they offer requires organizational commitment, new analytic methods, new organizational structures and more tools than just a DBMS. It also requires patience. It takes several years of orchestrated development to achieve shared, nonredundant, stable data bases.

Before buying a DBMS, consider developing at least a portion of an enterprise model and corporate information architecture. This exercise can be invaluable in identifying DBMS requirements and making good use of the product you choose.

About the Author

Carol E. Shulman is director of marketing for Database Design, Inc. in Ann Arbor, Mich., a consulting, education and software firm specializing in information resource management.

SCIENCE/SCOPE

Landsat 4 is being used to study toxic waste disposal sites in the northern part of San Francisco Bay. NASA scientists are using data from the Earth resources satellite to study water quality, stress on vegetation, land use, soils, surface geology, and topography around more than 20 existing and abandoned disposal sites. One objective is to determine criteria for buffer zones around the sites. Providing data is Landsat's multispectral scanner, an imaging instrument built by Hughes Aircraft Company and its Santa Barbara Research Center subsidiary.

Military commanders who previously relied on second-hand information now can get vital data instantly through a new communications terminal. The ground-based terminal is connected to a display console to show surveillance information provided by E3A early-warning radar aircraft and the Joint Tactical Information Distribution System (JTIDS). Unlike previous terminals, which are operated as part of a full command and control network, the new terminal can give second- and third-echelon commanders the situation in their immediate vicinity. The new Hughes terminal, called a Stand-Alone, can be transported easily and set up in an existing facility, or installed in a small shelter or command vehicle.

A network of small "smart" radios will let U.S. troops and their commanders know where they and friendly forces are located at all times. With the Position Location Reporting System (PLRS), combat troops will no longer have to seek landmarks to pinpoint their location. PLRS automatically supplies position and navigation data in digital form through a computerized communications network that displays data on a small hand-held box. PLRS units can be mounted on vehicles, aircraft, and helicopters. All units serve as automatic relay stations, so that units far away from a master station can stay in touch regardless of terrain or weather. Hughes is producing PLRS for the U.S. Army and Marine Corps.

Much as a TV picture is made, the newest U.S. weather satellite can create a full portrait of Earth in about 18 minutes. GOES-6 (Geostationary Operational Environmental Satellite) views the western U.S. and the Pacific from its orbital slot 22,300 miles above the equator. While the satellite's antennas remain fixed and pointed toward Earth, its body spins at 100 rpm for gyroscopic stability. Housed in the spinning portion is the picture-taking instrument, which makes a west-east scan of Earth one line at a time. On each scan, the instrument's mirror steps down 1/100th of a degree. Some 1,800 scans are needed for a full-disc image of Earth. Hughes built GOES-6 for the National Oceanic and Atmospheric Administration as part of the World Weather Watch project.

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NMS System Improves Management Of Networks

NASHVILLE, Tenn. — Northern Telecom, Inc. has introduced Network Management System (NMS) to improve control and administration of data communications networks. NMS is compatible with most existing data network controls and management systems and permits expansion as new products enter the market. It is an integrated, modular processing system that allows for centralized control of the switching, test and performance subsystems that handle data network test and control functions, a vendor spokesman said.

NMS allows both local and remote control of fault detection, problem isolation and service restoration. The system's Master Control System makes extensive use of color and graphics and analyzes and stores network data based on priorities determined by the user, a vendor spokesman said.

The price for NMS ranges from $100,000 to $1 million, depending on the configuration. Each system is tailored to the user's individual needs. More information is available from Northern Telecom at 259 Cumberland Bend, Nashville, Tenn. 37228.

Availability of TMMS Marks First IBM-Rolm Cooperative

SANTA CLARA, Calif. — Rolm Corp. recently announced the availability of the IBM Telephone Message Management System (TMMS) on the Rolm VLCBX private branch exchange (PBX) — marking the first integration of products between the two companies since the announcement of a joint product development agreement in June.

TMMS enables businesses requiring personal telephone answering capability to provide callers with information about an employee who is out of the office. When users leave the work place, they enter information concerning their destination, phone number, estimated time of return and other information.

The attendant can enter messages that users can retrieve from terminals throughout the work site, a Rolm spokesman said.

Integrating the messaging system with the PBX is said to enhance the capabilities of TMMS. For example, when a user is away from the desk, the PBX forwards calls to the TMMS attendant and automatically displays the user's profile on the attendant's terminal.

The attendant then can input messages into TMMS for callers or transfer the callers to the Rolm Phonemail voice messaging system so they can leave their own private recorded voice messages.

With either decision, the PBX notifies the called users that a message is waiting by activating the message-waiting indicator/lamp, which is standard on Rolm telephones, the spokesman said.

"This is the first concrete example of Rolm and IBM cooperative efforts, and we look forward to many more," according to Bob Maxfield, Rolm executive vice-president and general manager of the Office Systems Division.

Further Rolm/IBM design and development ventures will be forthcoming, a Rolm spokesman said. These projects will include efforts to define and support standards for communications among central computers and office equipment such as PBXs, telephones, terminals and personal computers.

Rolm will market the TMMS system through its own operating companies and independent distributors. It will be available on the VLCBX system beginning in October of 1984.

The suggested end-user price for a 200-user system including message display station will be approximately $115,000, Rolm said from 4900 Old Ironsides Drive, Santa Clara, Calif. 95050.

To Triple Termination of SDLC Lines

NCR Comten Unveils 3650 Models

ST. PAUL, Minn. — NCR Comten, Inc. has announced models of the Comten 3650 front-end and remote communications processor said to allow the unit to terminate up to three times the number of IBM Synchronous Data Link Control communications lines at the processor and support two hosts without an expansion cabinet.

In addition to the newly designed processor, two models of the Comten 3650, Models R8 and S8, were announced to support up to 16 communications lines, 512K bytes of memory and two hosts.

The models will be available in early 1984 with prices starting at $41,000 for a Comten 3650 configured as a front-end or remote communications processor with 256K bytes of storage, operator console, IBM channel program loader and communications interface for four communications lines.

Further information can be obtained from NCR Comten, which is located at 2700 Snelling Ave. N., St. Paul, Minn. 55113.

FCC Chairman Explains Effect of AT&T Breakup

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — For anyone trying to understand the complex situation now facing communications users anticipating the breakup of AT&T, the testimony of Federal Communications Commission (FCC) Chairman Mark Fowler at a recent House of Representatives hearing is a good place to start.

Analysis

Appearing late last month before the House government operations subcommittee, Fowler explained that mainly because of regulatory constraints, AT&T and other telephone carriers have had to charge too much for long-distance service. As a result, they have lost business to lower priced competitors such as MCI Communications Corp.

To right this imbalance, Fowler said, the FCC has removed the chief regulatory restraint — the requirement that long-distance users pay a substantial percentage of local telephone costs. Under the FCC's much-discussed access charge plan, these costs will be borne by local as well as long-distance users.

Fowler stressed that this

(Continued on Page 92)

Western Union Providing Teletex Between U.S. and West Germany

UPPER SADDLE RIVER, N.J. — Western Union Telegraph Co. announced recently that it has begun providing Teletex service both domestically and between the U.S. and West Germany.

Teletex, developed in West Germany and introduced there in 1981, combines text typing and processing with automatic memory communications, a company spokesman said. It reportedly operates at 2,400 bit/sec, about 45 times faster than standard telex message transmission, and is said to deliver a one-page message from one terminal to another within seven seconds, either domestically or overseas.

According to Thomas Mathai, Western Union vice-president of Office Message Services, "Teletex service represents the latest advance in electronic mail, combining high-speed communications with memory and text editing capabilities."

Announced last year (CW, Aug. 30, 1982), the service may also transmit and receive messages between any of the 1.5 million telex subscribers throughout the world through interconnection with Western Union's Worldwide telex service.

The service reportedly conforms to all CCITT international standards for message transmission. A Western Union spokesman said that several terminal vendors have introduced terminals that comply with CCITT standards.

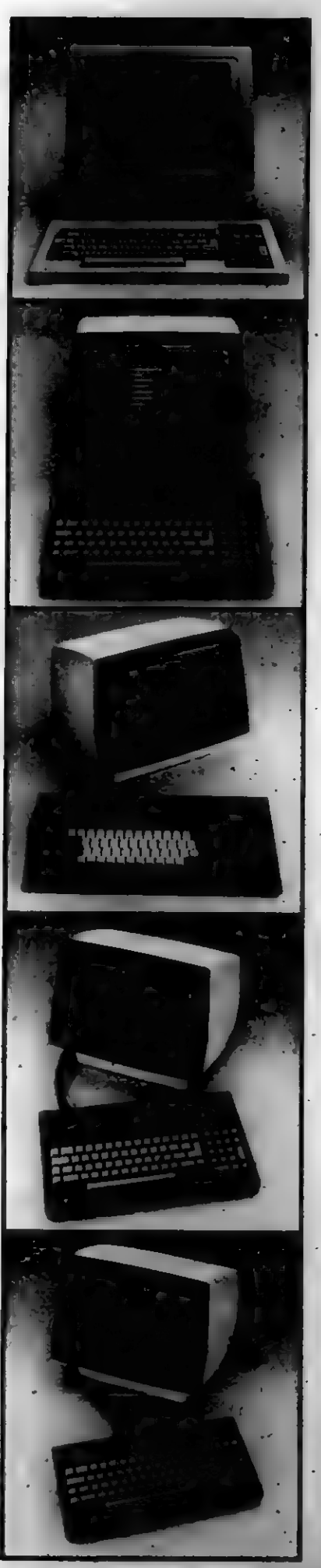
The switching equipment for the service is a Siemens Corp. Electronic data switching circuit switch located in New York. That equipment reportedly establishes real-time connections between Teletex-compatible word processors or electronic typewriters located in the U.S. or overseas. Additionally, the switch buffers speed difference, converts code and routes messages originated from a Teletex terminal to domestic and overseas telex stations.

Using a compatible terminal, messages can be composed and stored in memory for immediate or later transmission to the memories of other Teletex machines, the spokesman said. Terminals will automatically acknowledge receipt of incoming messages and store them so that typing need not be interrupted.

Western Union said the first commercial user is Siemens Medical Labs of Walnut Creek, Calif., which transmits messages to the company's Medical Systems Group in Erlangen,

(Continued on Page 75)

ADDS STACKS UP BEST



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Interface to Mainframes

Package Provides IBM Micro Link

TORRANCE, Calif. — Local Data Co. has announced Filelynx/3278 software, which interfaces an IBM Personal Computer to IBM mainframes, providing fully automatic file and transfer and 3278 emulation at up to 9,600 bit/sec.

The software allows users to transfer an entire file to or from the IBM mainframe automatically. File transfer support is flexible, allowing a variable number of lines per screen to be transferred, along with support for formatted screen applications, a vendor spokesman said.

Filelynx/3278 works exclusively with Local Data protocol converters and requires a minimum of one serial card, 64K bytes of memory and any version of IBM's PC-DOS operating system. The price is $200.

Local Data is located at Suite 706, 2701 Toledo St., Torrance, Calif. 90503.

Net System Monitors PBX Output

ATLANTA — Contel Data Services Corp. has announced a network management system for monitoring output from digital central offices and private branch exchanges/private automatic branch exchanges (PBX/PABX).

The Network Management and Administration Center (Nemac) system is a package comprised of software, services and a Honeywell, Inc. DPS 6 superminicomputer, a spokesman said.

According to the vendor, central office types currently monitored include Northern Telecom, Inc.'s DMS 10, DMS 100, DMS 100/200 and SL-1 Digital PABX; Stromberg-Carlson's DCO; and Nippon Electric Co.'s NEAX-61.

A typical application monitoring 10 central offices or PABXs would cost about $450,000. More information is available from Contel Data Services, 245 Perimeter Center Pkwy., Atlanta, Ga. 30346.

Teletex Available Overseas

(Continued from Page 73)

West Germany.

Users of the service will be charged a $300 monthly fee and usage costs of 85 cents per single page and 35 cents per additional page domestically and $1.34 per single page and 84 cents per additional page between the U.S. and West Germany.

More information is available from Western Union at One Lake St., Upper Saddle River, N.J. 07458.

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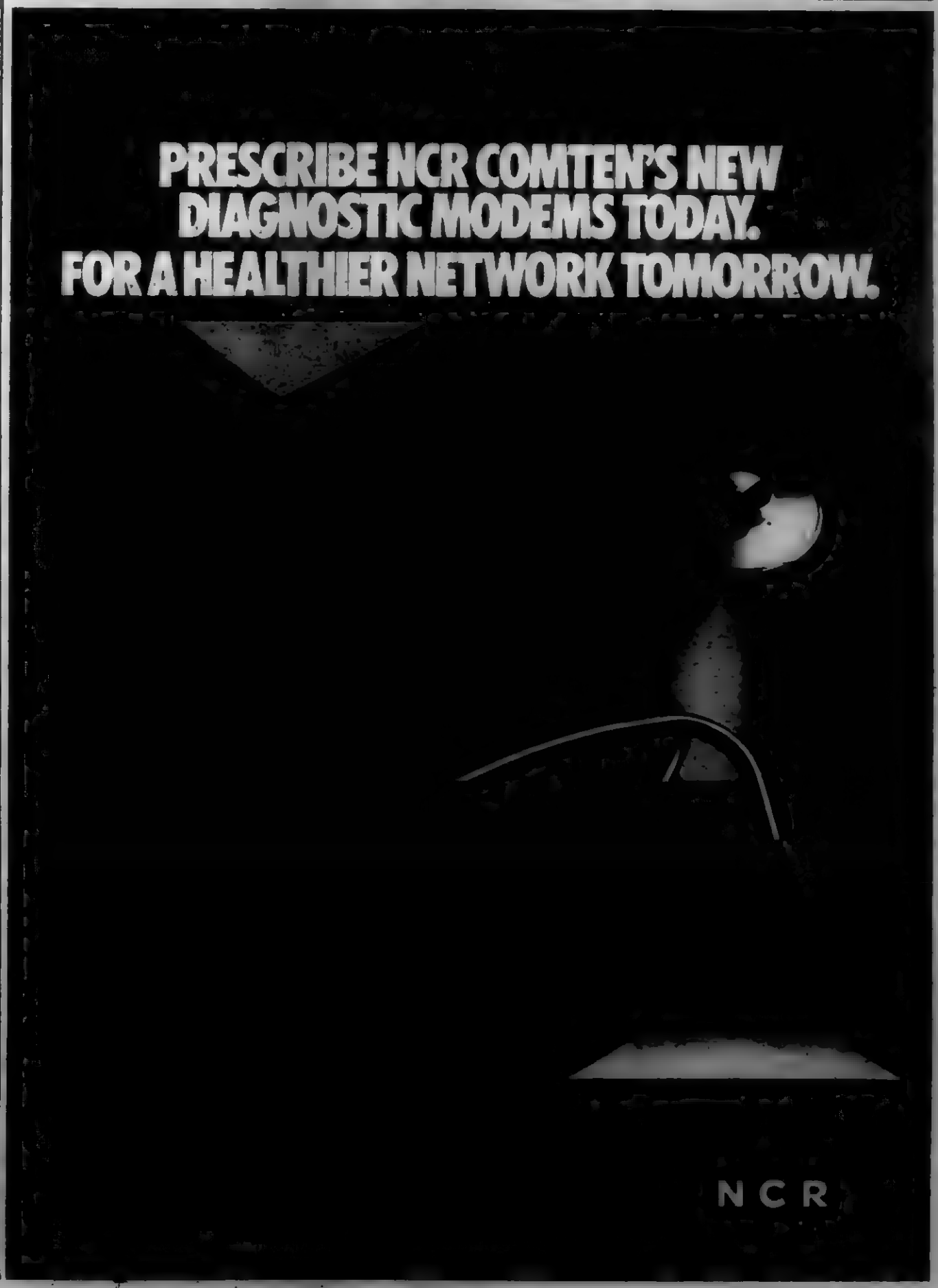

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DataTech Introduces

Modem Released For Metro Areas

WHEELING, Ill. — Gandalf Data, Inc. has introduced a 9,600 bit/sec medium-distance modem designed for metropolitan point-to-point data transmission.

The LDM 409 is an autoequalized, microprocessor-controlled medium-distance modem designed to meet synchronous, full-duplex data transmission requirements at 9,600 bit/sec within metropolitan areas.

It operates in constant carrier mode on four-wire voice grade lines or four-wire loaded or unloaded twisted pairs. Diagnostic loopbacks, a test pattern generator and error detector are provided for testing, a vendor spokesman said.

The LDM 409 will be ready for shipment in December and is priced at $1,175, the vendor said. Gandalf Data is located at 1019 S. Noel, Wheeling, Ill. 60090.

For Use With AT&T's DDS
Codex Offers Data Service Units

MANSFIELD, Mass. — Codex Corp. recently announced two data service units designed for use with AT&T's Dataphone Digital Service (DDS), as well as two multiple modem "nest" enclosures for the 5000 series of card modems and an automatic calling modem.

The firm also unveiled a cable multiplexer for use with IBM 3270 display systems.

The 8500B Data Service Unit (DSU) is said to be the functional equivalent of the Bell Laboratories DSU 500, offering an additional feature of switch-selectable synchronous data rates of 2,400 bit/sec, 4,800 bit/sec and 9,600 bit/sec. For high-speed communications, a company spokesman said, the 8556 DSU operates at a synchronous data rate of 56K bit/sec.

The 5016R modem enclosure reportedly houses up to 16 modems and an automatic calling unit in 5¼ inches of vertical rack space and has a maximum power consumption of 30W. The 5008R modem enclosure is said to provide high-density packaging of Bell 208A/B and 212A card modems and occupies seven inches of vertical space in a standard 19-in. electrical equipment rack.

The 5212/Automatic Calling Unit (ACU) modem reportedly has the capability to communicate with any personal computer, dumb Ascii terminal or front-end processor. The vendor said it incorporates all the software needed for a full range of communications capabilities.

Prices for the products are: 8500B, $725; 8556, $810; 5016R, $750; 5008R, $1,500; and the 5212/ACU is available for $645.

The cable multiplexer reportedly supports up to 32 type-A IBM terminals and printers over a single coaxial cable to an IBM 3274 controller. In a point-to-point configuration, the multiplexer reportedly combines data from a 3274 controller via a single coaxial cable.

Terminals can reportedly be placed up to 2,952 ft from the cable multiplexer unit and linked to another unit located up to an additional 4,920 ft away.

Priced at $1,100 for a stand-alone unit and $3,350 for the 32-port unit, a spokesman said, the multiplexer is available from Codex, which is located at 20 Cabot Blvd., Mansfield, Mass. 02048.

Lear Siegler Unveils ADM 12

ANAHEIM, Calif. — Lear Siegler, Inc. has introduced a video display terminal said to fill the niche between the company's ADM 11 and ADM 24E.

The ADM 12 is said to feature a tilt-and-swivel mechanism that allows the operator to direct the screen, a low-profile keyboard and long-coiled cord.

The ADM 12 reportedly can store data in a horizontal 158-col. by 24-line format, which can be scrolled back and forth across the screen. Word processing applications are handled by the vertical 80-col. by 48-line page. The terminal is also said to provide 16 programmable, nonvolatile function keys, which can be shifted to perform 32 functions.

Priced at $895, the terminal is available from Lear Siegler at 714 N. Brookhurst St., Anaheim, Calif. 92803.

Gilnet Enables Users to Communicate With IBM JES2, JES3, Compatibles

READING, Pa. — Gilbert/Commonwealth has announced the availability of Gilnet, a remote job entry workstation system, to those who need to communicate with computer systems.

The system supports IBM's MVS operating system and can run up to 99 simultaneous workstations in one MVS address space. Each workstation emulates one card reader, one printer, a card punch and a console. The system communicates with IBM JES2, JES3 and compatible services.

The price is $10,000 from Gilbert/Commonwealth, P.O. Box 1498, Reading, Pa. 19603.

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Integration Theatre

INTECH '83 features a new concept in session presentation with this theater-in-the-round approach. The Integration Theater is a unique and special format ideally suited for the world-class speakers and the panels and sessions to be held here. These internationally renowned consultants and their topics include:

- Dr. Michael Hammer, President, Hammer & Co.
  "Managing Micros in the Corporate Information System"
- Arnold Roberts, President, ADC Associates
  "Selecting a Personal Business Computer"
- David Friend, Special Consultant
  "Graphics: New Management Solutions"
- Will Zachman, VP, Technology Assessment, IDC
  "Microprocessor Impact on Systems and Uses"
- Dr. Howard Frank, President, ConTel Information Systems, Inc.
  "Local Networks: Before You Get One"
- Dr. Howard Morgan, Chairman, Advanced Office Concepts
  "Solving DP/WP Integration Problems"
- Edward Horrell, President, Mitchell & Horrell, Inc.
  "Integration through CBX Technology"
- Dr. John McQuillan, President, McQuillan Consulting, Inc.
  "Strategic Planning for Integration — Who, How, When & Why"
- Harry Newton, President, The Telecom Library
  "Personal Career Advancement Through Embracing Office High Technology"

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David Friend,
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Will Zachman, VP
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- *"Satellite Networks"*
- *"Network Intelligence"*
- *"The Multifunction Workstation"*
- *"Pilot Projects: Corporate PC Acceptance"*
- *"MIS — OA: Resolving the Conflicts"*

Edmund B. Fitzgerald, President of Northern Telecom, Ltd. will speak on "Business Integration — the Vision and the Reality."

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Keynote Speaker:
John Diebold — internationally acknowledged expert and founder and chairman of the Diebold Group, Inc. Mr. Diebold will speak on "Integration: A Corporate Effort."

Exhibits

There will be over 400 exhibits by leading information companies with the latest vendor architecture and technologies available. Special time is set aside for conference attendees to view all the exhibits and talk first-hand to the vendors.

Here are just some of the fine companies you can expect to see exhibiting at INTECH '83: Apple Computer, Inc., Applied Data Research, Inc., AT & T Information System, Inc., Computer Automation, Cullinet Software, Inc., Data General Corporation, Datapoint Corporation, Digital Equipment Corporation, Exxon Office Systems, Inc., Grid Systems Corporation, ITT World Communications, Inc., Lanier Business PRoducts, Inc., Lee Data Corporation, NCR Corporation, Prolink Corporation, and Telautograph Corporation.

Exhibit hours are 12:00-6:00 p.m. Tuesday, 10:00 a.m.-6:00 p.m. Wednesday, and 10:00 a.m.-5:00 p.m. Thursday.

In-Depth Tutorials

On October 31 some of the nation's leading consultants take the platform for a full day's formal instruction. These four concurrent in-depth tutorials include lecture notes, lunch and a reception with the speakers.

A — *"Corporate PC Management"* — Dr. Michael Hammer, Hammer & Co.

B — *"Advanced CBX Applications"* — Edward Horrell, Mitchell & Horrell

C — *"Local Area Networks"* — Dr. Ken Thurber & Dr. Harvey Freeman, Architecture Technology Corp.

D — *"Strategic OA Planning"* — Dr. John McQuillan, McQuillan Consulting

Each of these tutorials promises to provide a hard-hitting look at areas that are essential to the success of every information systems oriented executive.

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Package Allows TI Micro to Act as Workstation

DALLAS — Texas Instruments, Inc. has announced a software emulation package said to allow the TI Professional Computer to act as a workstation in a TI Business System series minicomputer configuration. The program allows the TI Professional Computer to emulate a standard 931 video display terminal on a Business System 300, 600 or 800 series minicomputer.

The TI Professional Computer can be attached to a Business System through either a direct-connect, switched or dedicated link. It requires a minimum of 128K bytes to run the emulation, plus a communication card for direct connect, and either an internal modem or a communication card with an external modem for a switched or dedicated link.

Both Ascii text and binary files can be transferred between stations, according to a vendor spokesman. Applications written for the Professional Computer cannot be run on the Business System's host computer, and vice versa, but programs may be stored in any location and transferred to a compatible system for execution.

The 931 emulator runs under the Microsoft, Inc. operating system MS-DOS 1.25 and sells for $150. Users with a current TI software subscription agreement can receive the emulation software built in to the DX10 3.6 and Dnos 1.2 Business Systems operating systems at no extra charge. Information is available through TI's Data Systems Group, P.O. Box 402430, H-671, Dallas, Texas 75240.

UTX-1200/5000 Family Enhanced

ST. LOUIS — United Technologies Communications Co. has announced a data enhancement for its UTX-1200/5000 family of telecommunications systems, as well as smaller and larger configurations of its UTX-1001 simultaneous voice and data systems.

The data enhancement, designated the UTX-1200/5000D, provides transparent use of the private branch exchange wiring for data transmission through a universal information channel called the Info/TAP. The Info/TAP device accepts a minimum of three RJ-11 modular jacks from either digital telephones or data interface devices.

Concurrent with this enhancement, United Technologies has released a software package which allows a UTX-1200/5000 user to continue to use its multifunction telephones and standard analog telephones.

New capabilities of the package include digital trunking, forced account codes and an intercom and buzz feature, according to a spokesman for the vendor.

The new configurations in the simultaneous voice and data series include the UTX-501, which provides businesses requiring between 100 and 350 lines with simultaneous voice and data capabilities. The system runs on ac power and has a maximum of 512 ports.

The cost of the data enhancement for the UTX-1200/5000, which will be available in the third quarter of 1984, ranges from $600 to $800 per installed line, depending on system configuration and software. The UTX-1001, UTX-501 and UTX-1001E all cost between $700 and $1,000 per installed line depending on configuration and software and are available immediately from United Technologies at 12101 Woodcrest Executive Drive, St. Louis, Mo. 63141.

Preston Scientific Unveils Conversion System

ANAHEIM, Calif. — Preston Scientific has introduced a high-speed, multichannel, analog-to-digital conversion system that features 1-Mhz conversion rates, 15-bit resolution and multiplexing capabilities for up to 128 channels.

Designated the GMAD1A-15B, the rack-mounted system is available for both single and multichannel applications. It is equipped with a sample-and-hold amplifier and can be ordered with as many as eight simultaneous sample-and-hold channels in a single chassis or up to 128 channels in a multiple-channel system.

In addition, the multichannel GMAD1A-15B can include from 16 to 128 channels of single-ended or differential analog signal multiplexing.

The GMAD1A-15B can be assembled in synchronously driven analog-to-digital converter-per-channel configurations. The basic system costs approximately $10,000 from Preston Scientific, 805 E. Cerritos Ave., Anaheim, Calif. 92805.

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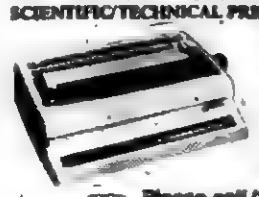

NCP Smart Box I - the Displaywriter printer interface emulates IBM 5218 Printer. It requires no hardware or software changes to attach these printers to the Displaywriter main printer port number 0.

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For High-Performance Graphics Mart

Range of Displays Announced

CAMBRIDGE, Mass. — Westward Technology, Inc. has announced a range of displays aimed at the high-performance graphics terminal market.

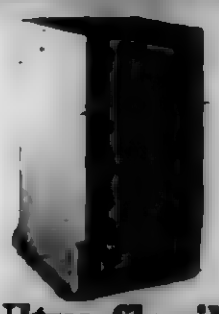
The 1015 has been developed for applications where the quality of display is very important but high resolution is not critical, such as education, numerical control and business graphics, the vendor said.

All the displays are adjustable for viewing-position angle and tilt, and the detached keyboards and joysticks incorporate palm rests. Some options include hard-copy devices, tablets, joysticks and additional local graphics processing power.

Options for the 2015 and 2019W include a high-speed vector generator and a range of high-level local graphics commands.

The 1015 costs $3,250, the 2015 is priced at $6,250, and the 2019W costs $10,950. Further information is available from Westward Technology, 5 Cambridge Center, Cambridge, Mass. 02142.

Save 50% on your communications cost.



Avanti's new T1 UltraMux.

It lets you take maximum financial advantage of low-cost T1 tariffs. Using UltraMux, you can replace up to 128 lines with one T1 line. Plus, you can have additional voice circuits, increased data transmission rates and more capabilities, too.

The UltraMux sends voice, data and video in any combination. That means the UltraMux can handle your telephone communications, data transfers and video teleconferencing. The system's high bandwidth, up to 10 Mbps, means you can use satellite, private microwave and fiber optic communications links now and T1C and T2 links as they become available.

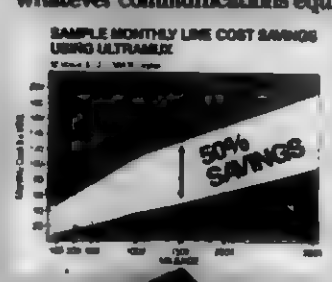
Ultra flexible.

Select the exact channel configuration you need; up to 64 synchronous or voice channels; 128 asynchronous channels. Maximum channel speed can go as high as 8.2 Mbps, and you can digitize voice at 16 or 32 Kbps.

If your communications mix changes at different times of the day or night, UltraMux can automatically change to match your required configuration. And for maximum utility, dynamic channel allocation assigns bandwidths only when needed.

The UltraMux has centralized point-to-point or network-wide control. So, from anywhere in the system you can monitor and test the entire system or its individual components, perform complete reconfiguration or change any operating parameter.

The UltraMux is flexible enough to expand as you do. Its modular interface works with whatever communications equipment you now use, and can easily adapt to future needs as well.



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This graph shows some typical monthly line cost savings using Avanti's T1 UltraMux. Depending on your usage you can easily save up to 50% or more.

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Location A Location B

Mileage (if known) _____

Type of circuit	Speed	Number of circuits	Monthly cost (if known)
Voice	XXXXX		
Data Sync ☐ Async ☐			
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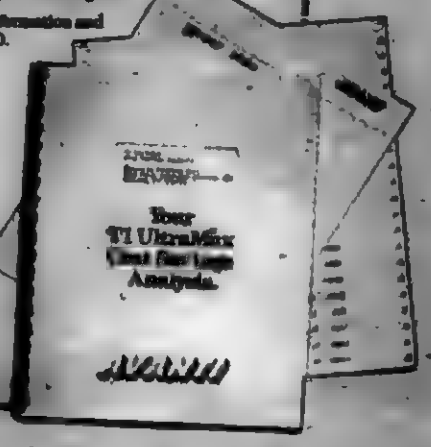


Release 6.2 Of Falcon Unveiled

CULVER CITY, Calif. — Phoenix Computer Corp. has announced Release 6.2 of Falcon, an on-line data entry system designed to run under IBM's MVS, VS/1, DOS/VS(E) and DOS/MVT (VSE) operating systems.

The new facility allows users to transfer formats via tape rather than through the process of manually reentering the formats.

A range checking feature allows users to specify a range for numerical data. A new table maintenance facility allows data entry operators to have data values automatically substituted from predefined data tables.

Table maintenance also provides the user with a listing of all resident tables and statistics on the amount of memory allocated to tables, the number of bytes in use and the number of bytes still available for use.

The price of the system is $19,500. Further information is available from Phoenix Computer, 11949 Jefferson Blvd., Culver City, Calif. 90230.

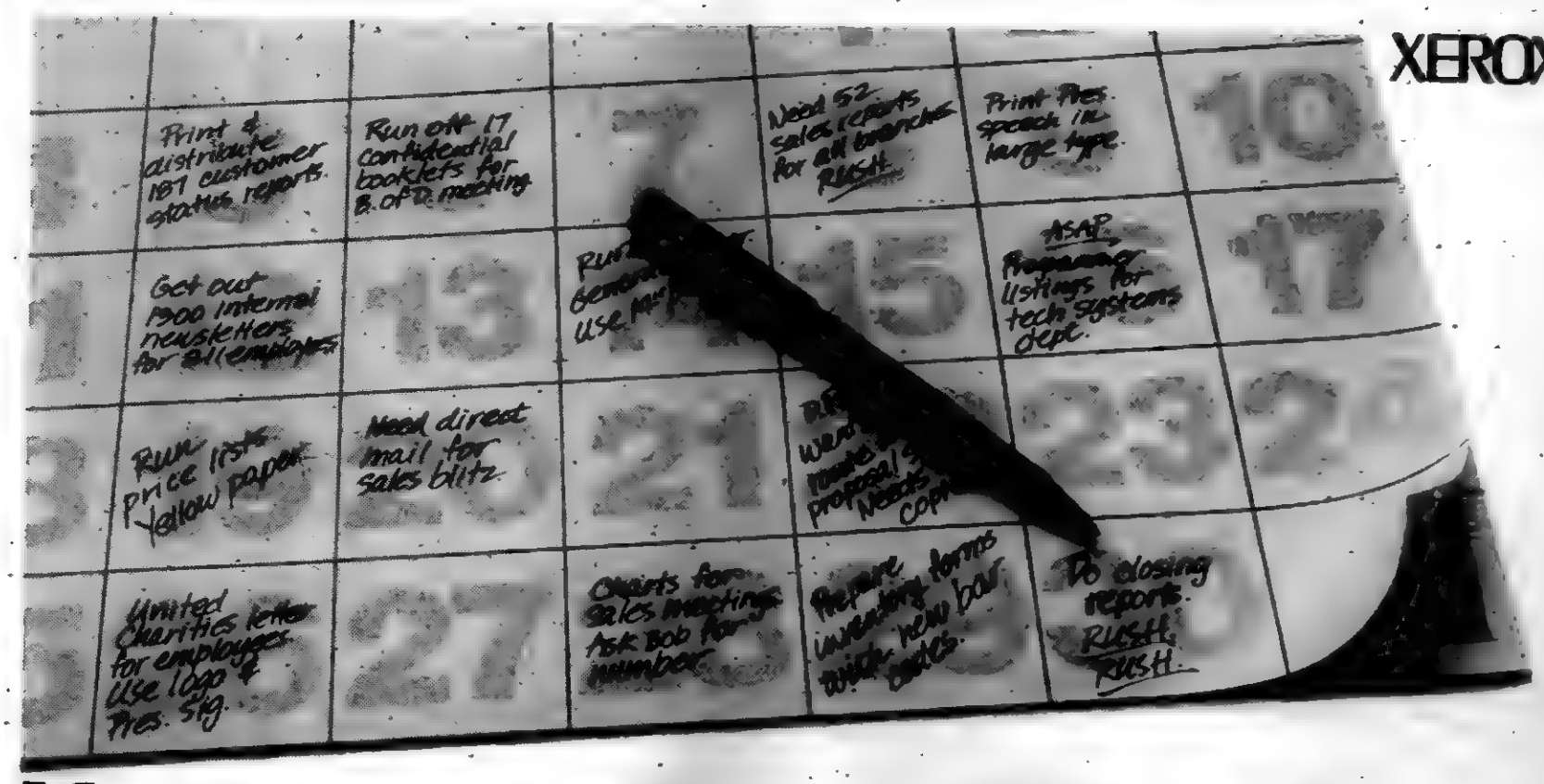
Plessey Unit Introduced

IRVINE, Calif. — An eight-color terminal said to emulate Digital Equipment Corp.'s VT100 and VT52 terminals was recently announced by Plessey Peripheral Systems, Inc.

The vendor said that by using color in 64 programmable combinations, the Plessey PT-600 improves user response time, shortens training time and simplifies graphics and data sorting.

It reportedly combines video features such as variable-speed smooth scroll, split-screen and window erase with functional capabilities such as hexadecimal key pad mode, a vendor spokesman said.

The terminal is priced at $2,995 by the Distributor Products Division, Plessey Peripheral Systems, 2632 Du Bridge Ave., Irvine, Calif. 92714.



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*This offer is only available through our standard lease plans. It expires on December 31, 1983.

Provides Data Base Access

'DG/Gate,' 'DG/Blast' Announced

WESTBORO, Mass. — Data General Corp. recently announced a software package enabling users of its systems to gain access to public data bases and another package said to allow low-cost file transfers among DG computers and between many popular microcomputers.

DG/Gate is a terminal emulation package enabling users of DG systems to access public data bases as well as other DG systems and other computers with DG/Gate software, a company spokesman said. The package functions on DG's Rdos, AOS, AOS/VS and Desktop Computer operating systems.

DG/Blast software runs under Rdos, AOS and AOS/VS and reportedly allows file transfers among computers using the product. The vendor said it also permits file transfers between DG/Blast-equipped computers and other vendors' computers that are running Communications Research Group, Inc.'s Blast utility along with Digital Research, Inc.'s CP/M 80 or CP/M 86 or Microsoft Corp.'s MS-DOS.

DG/Gate is priced at $150 for Desktop Generation units and from $1,000 for other systems; DG/Blast is priced at $200 for Desktop Generation units and from $1,000 for other systems. Delivery is 60 days, and more information can be obtained from Data General, Small Business Systems Division, 4400 Computer Drive, Westboro, Mass. 01580.

Teltone Modem Allows Users To Enter Data Via Touch-Tone

KIRKLAND, Wash. — Teltone Corp. has introduced a smart modem that allows users to enter computer data from a remote Touch-Tone telephone without using a terminal, as well as accepting standard computer-to-computer data transmissions.

The Teleport 300 modem also accepts a sophisticated password security system to prevent unauthorized access. It is compatible with the Bell 103 protocol and offers standard features such as auto/answer/originate.

Conventional computer-to-computer data transmissions are possible at terminal data speeds ranging from 75 to 9,600 bit/sec.

A user can also call into the system from any Touch-Tone telephone, enter a log-on password via push button code and enter data into the computer system using Teleport 300's DTMF-Ascii conversion capability, a vendor spokesman said.

The Teleport 300 will be available in late December at a price of $349 from Teltone at 10801 120th St. N.E., Kirkland, Wash. 98033.

Bytex Offers ISCC Option For Autoswitch

FRAMINGHAM, Mass. — Bytex Corp. has announced the Intelligent System Control Console (ISCC) option for the Autoswitch system.

ISCC utilizes the IBM Personal Computer XT with a 320K-byte floppy disk, a 10M-byte hard disk and a color CRT console.

Features include a menu/function key control, extensive security functions based upon user ID logon, preprogrammed command sequences initiated by a single function key, time-based commands, event/alarm-based command, multiple backup configuration storage and on-line event and user file storage.

The price is $12,900. More information is available from Bytex at 2 California Ave., Framingham, Mass. 01701.

Coders Enhance Transmissions Of Satellites

SAN DIEGO — M/A-COM Linkabit, Inc. recently announced a family of forward error correction coder/decoders said to improve satellite transmission system performance significantly by lowering the energy required to achieve high performance.

The Convolutional encoder/Viterbi decoder families reportedly enable European single-channel-per-carrier earth stations to achieve low bit error rates that enable the use of smaller antennas and smaller power amplifiers, the vendor said.

The units start at $3,950. Further information is available from M/A-COM Linkabit, 3033 Science Park Road, San Diego, Calif. 92121.

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Chattanooga, TN	Nov. 15
Chicago, IL	Nov. 15
Cleveland, OH	Nov. 15
Columbus, OH	Nov. 16
Corpus Christi, TX	Nov. 15
Detroit, MI	Nov. 3
Green Bay, WI	Nov. 22
Greensboro, NC	Nov. 17
Greenville, SC	Nov. 16
Harrisburg, PA	Nov. 22
Knoxville, TN	Nov. 2
Lexington, KY	Nov. 2
Madison, WI	Nov. 1
Meadowlands, NJ	Nov. 30
Memphis, TN	Nov. 3
Minneapolis, MN	Nov. 1
Milwaukee, WI	Nov. 23
Minneapolis, MN	Nov. 29
Montgomery, AL	Nov. 10
New Haven, CT	Nov. 9
New York, NY	Nov. 9
Oakland, CA	Nov. 18
Orange County, CA	Nov. 16
Orlando, FL	Nov. 10
Ottawa, ONT	Nov. 24
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Pittsburgh, PA	Nov. 1
Portland, OR	Nov. 1
Quebec City, PQ	Nov. 28
Regina, SASK	Nov. 15
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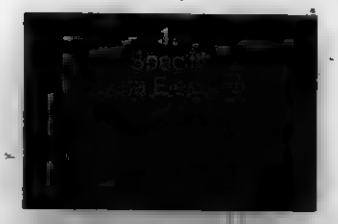

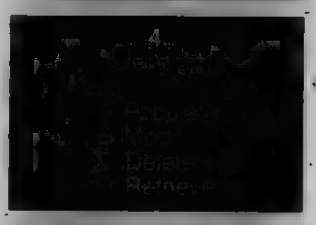

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ADP Autonet Introduces Data Transportation Service

ANN ARBOR, Mich. — Automatic Data Processing Network Services, Inc. (ADP Autonet) has announced its Autowats data transportation service, a host interface arrangement.

The service was designed to eliminate the host interface equipment charges that low-end users find difficult to justify, the vendor said.

Some features of the service include features of the Autonet public data network, such as local dial-up access by terminal users and fully error-corrected network data transmissions.

Autowats is available in all Autonet domestic access cities and supports terminal speeds up to 1,200 bit/sec. Charges are based on a monthly access fee and an hourly usage rate that includes connect and data transmission.

Further information is available from ADP, 175 Jackson Plaza, Ann Arbor, Mich. 48106.

Atlas Release 2 Announced

PRINCETON, N.J. — Mathematica Products Group, Inc. has announced Release 2 of its Atlas data communications monitor, featuring simplified programming and support of the vendor's Ramis II fourth-generation language.

Release 2 also offers support for IBM's Vtam and Btam networks, as well as IBM's Systems Network Architecture. The monitor is designed for use in the IBM DOS/VSE operating system environment, according to a vendor spokeswoman.

Priced at $28,000, Atlas is available from Mathematica Products Group through P.O. Box 2392, Princeton, N.J. 08540.

Autobaud Plus Fits Prime Systems

WOOD DALE, Ill. — Computronics, Inc. has introduced Autobaud Plus, said to allow a Prime Computer, Inc. system to determine the bit/sec rate that a terminal is using.

Autobaud Plus features the support of all Prime 50 series systems, a spokesman said. Autobaud Plus can reportedly be used with any Bell-compatible 212 series, Racal-Vadic, Inc. 3400 series or other multispeed modems.

Autobaud Plus can also reportedly be used with 300, 1,200 and 2,400 bit/sec modems. It costs $110 from 130 N. Ash, Wood Dale, Ill. 60191.

Protocom P2500 Out for Users Of Uniscope

STAMFORD, Conn. — Protocom Devices, Inc. recently announced a packet assembler/disassembler said to enable users of Sperry Corp.'s Uniscope to access Ansi X.25 packet-switched networks.

The Protocom P2500 reportedly has four physical ports permitting the connection of 40 devices using the Uniscope protocol. Features include advanced data streaming, network security techniques and a full set of error-detection and correction features, a spokesman said.

The P2500 is priced at $9,500. More information is available from Protocom Devices, 287 Atlantic St., Stamford, Conn. 06901.

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As an added plus for CN '84 attendees . . . your chance to win the DEC Rainbow.

Dial-Up Link Transmits Data From France

SAN JOSE, Calif. — A French electric company has established an intercontinental dial-up link to the U.S. for high-speed data transmission through the Anderson Jacobson, Inc. subsidiary in France.

The link uses an Anderson Jacobson 4048 full-duplex, dial-up modem with statistical multiplexer at both ends of the line and makes high-speed full-duplex operation over two-wire lines possible, the vendor said.

The unit costs $24.95 and is available from Anderson Jacobson, 521 Charcot Ave., San Jose, Calif. 95131.

Display Station Out, Compatible With IBM 3270

COSTA MESA, Calif. — MDS Trivex has introduced the 8078 Model 5 display station, which is plug-compatible with the IBM 3270 and can reportedly be connected to a Trivex 8074, an IBM 3274 or 3276 controller.

Standard features include a Sunflex glare-reducing screen filter, the choice of a 75- or 87-key keyboard and the ability to function in a bisynchronous or IBM Systems Network Architecture/Synchronous Data Link Control environment, according to a spokesman for the vendor.

The price for the 8078 Model 5 is $2,350, the vendor said. It is available from MDS Trivex, 3180 Red Hill Ave., Costa Mesa, Calif. 92626.

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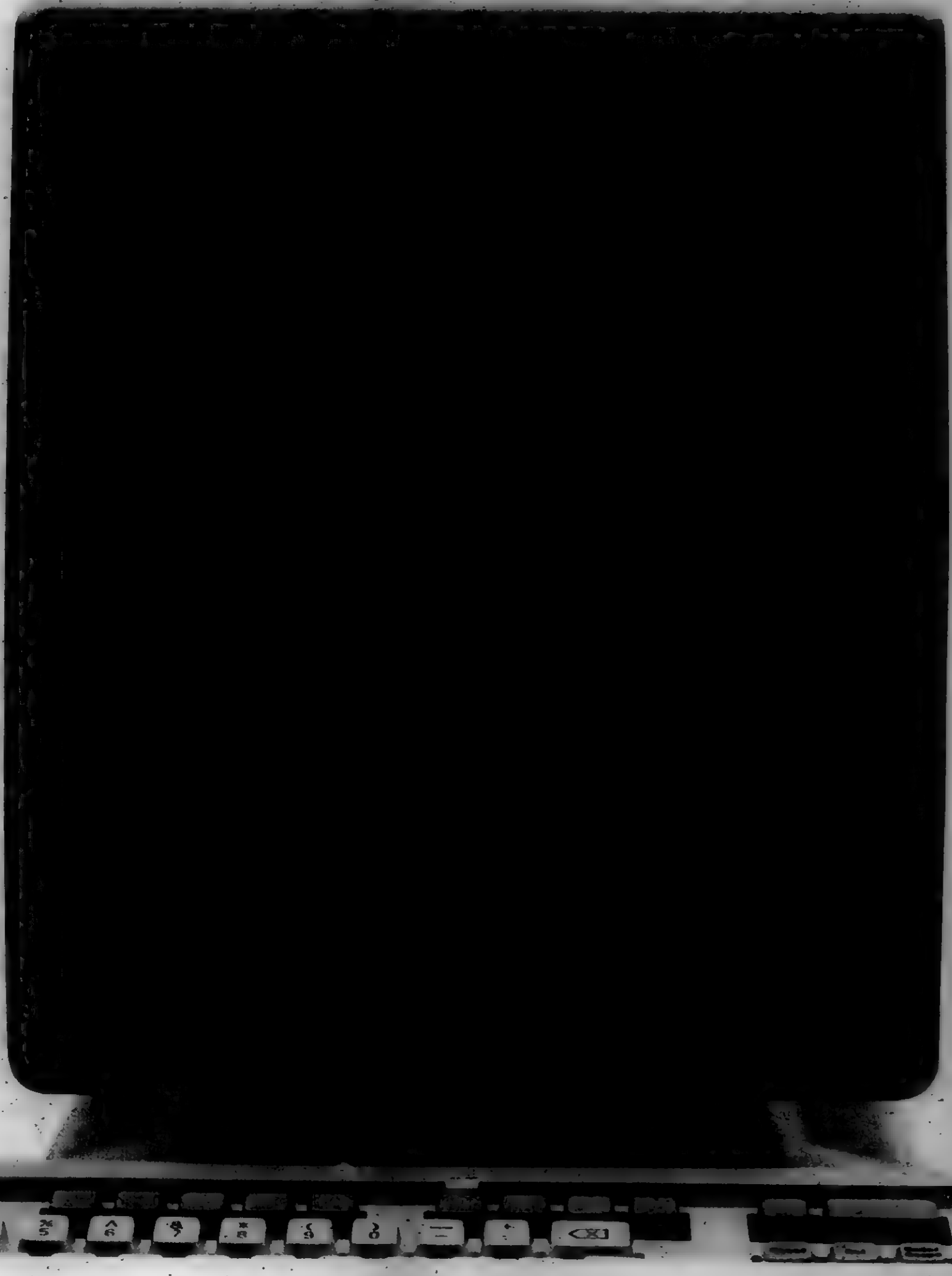

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What to Expect From AT&T Breakup: FCC Chief

(Continued from Page 73)

1984 by between 10% and 15% for all residential customers and businesses," he told the subcommittee, chaired by Rep. Glenn English (D-Okla.).

The FCC chairman neglected to mention that the transfer of local exchange access costs from long-distance to local users also will enable AT&T Communications (formerly AT&T Long Lines Division) to gain ground on its competitors.

Today, about 2.5% of the long-distance contribution to local exchange service comes from other common carriers, such as MCI, that carry approximately 5% of the long-distance traffic. Under the FCC's access charge plan, this contribution increases to 3.3% next Jan. 1.

Since it will have to contribute less, AT&T should be able to charge its customers less; the other common carriers, on the other hand, will be paying more and will have to charge more. This shift is particularly significant since the access facilities which local telephone carriers make available to the carriers will not begin to improve until 1985, and it will be at least a couple of more years before the improvements are widespread.

There is a good deal of evidence to suggest that AT&T will benefit far more from the FCC's plan than will its customers. Fowler, in his recent appearance before the English subcommittee, talked at length about the reduced long-distance rates which the plan will generate.

"Our staff estimates that as a result of this shift in cost recovery, interstate long-distance rates should decrease in 1984 by between 10% and 15%," he said. But whether costs actually come down that much for business users, who are intended to be the chief beneficiaries, appears unlikely at the moment. AT&T's newly proposed long-distance rates will reduce charges about $2 billion [CW, Oct. 10], but the FCC-mandated access surcharge on Message Toll Service (MTS) — as in dial-up interstate telephone service circuits — will total an estimated $3.3 billion in 1984.

Private-Line Rates to Rise

While AT&T has proposed substantial cuts in its MTS usage charges, private-line usage rates would rise an average of 15.3%. For certain popular business services, the increase would be far greater.

One way that users might mitigate these increases is by migrating to facilities that bypass the telephone network. However, the FCC plan discourages that option by imposing a surcharge on leased lines which connect a user to long-distance net facilities.

Pending legislation goes even further. A House of Representatives bill imposes a surcharge on "any transmission facilities or services used as a substitute for voice-grade or equivalent transmission facilities or services," and a Senate measure contains similar language. As a result, wideband circuits such as Dataphone Digital Service, technically capable of being carved up into voice circuits, are subject to the surcharge.

Fowler told the subcommittee that some curbs on bypass are necessary, because without them "large interstate toll users . . . can avoid the public network." He added, however, that congressional efforts to broaden the bypass tax "could hinder technological development and impede productivity in the telecommunications industry."

Actually, there is a question whether any tax on bypassers is necessary. Just because a business user has to pay more to the telephone company for long-distance service will not automatically cause him to migrate to another supplier. In many cases, his existing long-distance traffic is traveling over circuits that also carry local message traffic, and it would be uneconomical to reduce the latter even if the cost of the former might be reduced.

Another consideration is the cost of building bypass facilities; relatively few companies can justify such an investment. Leasing facilities from a bypass carrier would get around that problem, but few such carriers are actually operating today.

The big argument for taxing bypassers is that the number of nontelephone bypass carriers is likely to grow significantly in the next few years. But slapping a surcharge on the alternate facilities and artificially increasing their price is believed to be inconsistent, considering that the FCC access surcharge plan and the pending legislation are both ostensibly aimed at benefiting users, not telephone companies.

Another approach might be to insist that the local carriers build competing facilities that would employ microwave, cable and the other high bit-rate technologies that are currently being employed by the bypassers.

Alpha Unwraps Software Version For Apple IIe

BURLINGTON, Mass. — The Alpha Software Corp. has brought out a version of its Apple Computer, Inc.-to-IBM software that supports the Apple IIe.

Alpha said the program, which transfers data files between the Apple II and IBM's Personal Computer, is now compatible with Apple's communications card and the CCS 7110 card from California Computer Systems, Inc.

It is currently available for $250, according to a spokesman from Alpha, which is located at 12 New England Executive Park, Burlington, Mass. 01803.

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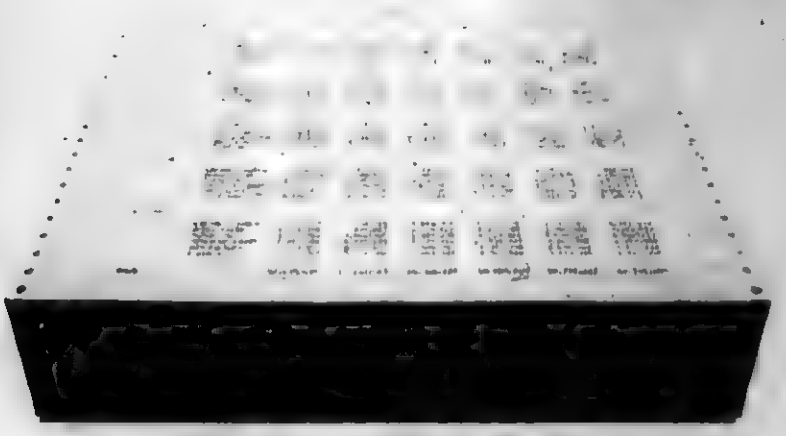

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Kaufman Unveils Converter Supporting Varied Devices

MOUNTAIN VIEW, Calif. — Kaufman Research Manufacturing, Inc. has introduced a modular protocol converter said to support many types of asynchronous devices on from one to eight channels, each with its own microprocessor.

The Model 870 converts IBM Binary Synchronous Communications protocols, including Systems Network Architecture/Synchronous Data Link Control, into asynchronous, emulating the IBM 3270 cluster controller. The Model 871 converts Sperry Corp. Uniscope protocol into asynchronous, emulating the Univac UTS 400.

A microprocessor on each channel gives the advantages of faster asynchronous conversion, which is especially important in the Univac model because of timing constraints, and the capability of support for 256 terminals per host by the Model 870 and 248 terminals per port by the Model 871.

Cost of a basic system, including on-line interface, is $3,395. Each additional module costs $700. An optional adapter, priced at $50, makes the system rack mountable. More information is available from the vendor at 145 E. Dana St., Mountain View, Calif. 94041.

Multiplexer Cuts Costs By Combining Voice and Data

CHERRY HILL, N.J. — Datatel, Inc. has introduced the DCP9100, a multiplexer that reportedly reduces communications costs by combining up to 48 voice and data lines over a single telephone communications carrier facility.

Datatel's microprocessor-controlled T1 multiplexer data channels may be synchronous or asynchronous at speeds as high as 896,000 bit/

The DCP9100 includes test and monitoring capabilities as standard equipment.

Test pattern generators and detectors facilitate troubleshooting without the need for external test equipment, a spokesman for the company said.

Prices for the DCP9100 multiplexer start at $3,200 for the base unit, the vendor said. Each input channel costs $325 per end, with delivery in 30 to 45 days.

Additional information is available from Datatel, which is located at Cherry Hill Industrial Center, 1998 Springdale Road, Cherry Hill, N.J.

Network Meet Set For Nov. 2-3

NEW YORK — A two-day seminar on data communications network alternatives is scheduled for Nov. 2-3 at the Plaza Hotel here by Probe Research, Inc.

The seminar, titled "New Data Communications Network Alternatives," will explore the demand for data communications.

The seminar registration fee is $795. More information is available from Probe Research through Box 590, Morristown, N.J. 07960.

HP's 3000 Line Gets Reporting Capability

READING, Pa. — The Dash Group, Inc. has announced the PMS/3000 system, which the company said provides reporting capability to monitor and control private branch exchange (PBX) utilization for users of Hewlett-Packard Co.'s HP 3000 line of computer systems.

According to the company, input to the system comes from a PBX, which generates message accounting information.

The company said the reports are designed to locate problem areas quickly, and the system capabilities include reporting on extension usage including department summaries, reporting on usage of trunk lines and trunk groups, exception reporting, call detail reporting and long-distance detail reporting and lost call summaries.

The cost for the PMS/3000 system is $10,000, including training and maintenance.

Information is available from Dash Group, P.O. Box 8666, Reading, Pa. 19603.

PBX Conference Dates Scheduled

NEW YORK — A "Private Branch Exchange (PBX) Strategy Conference" sponsored by the marketing service group at S&R Consultants Ltd. will be held here Oct. 4-5 and in San Francisco Oct. 12-13.

The conference will feature analysis of leading PBX systems on the market. Conference leaders will be S&R's John Madrid of the marketing programs and services group; Spencer Rice, president of Futuristic Communications Consultants, Inc.; and Allan Sulkin, senior partner at S&R Consultants Ltd.

The registration fee for the conference is $695. More information is available from S&R Consultants, Suite 303E, 200 Park Ave., New York, N.Y. 10166.

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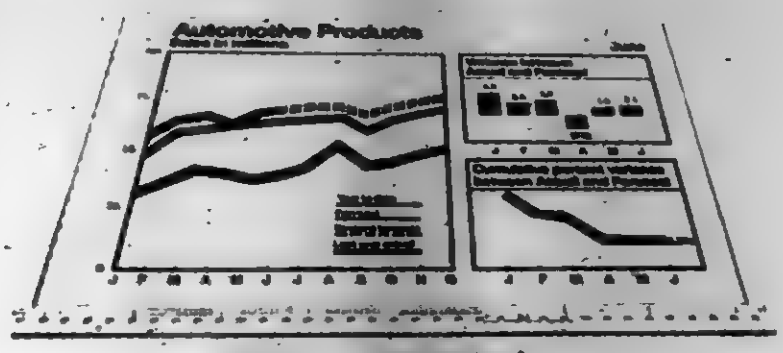

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Canadian Net-Based Unit Debuts in U.S.

NEW YORK — A four-year-old Canadian maker of electronic components made its first U.S. appearance as a computer vendor here last week, unveiling a distributed system based on a local-area network.

Dy-4 Systems of Ottawa introduced the system it calls Dynasty, a setup that will support up to 64 workstations connected to 4,000 feet of cable and running on three operating systems. The product will make its formal debut at Comdex in November.

Garry Dool, president of the $5 million company, said the firm's success as a maker of semiconductor-on-thermoplastic-on-dielectric circuits — a gating device favored by the process control industry — had encouraged it to fashion a whole system around its board-level component.

"Where the rest of the people are trying to bring the micro up to the capability of a system, we brought the mainframe down," Dool boasted.

The distributed network will run on Digital Research, Inc.'s CP/M 2.0, Unix Version 3 and Microsoft, Inc.'s MS-DOS, Dy-4 executives said.

The company, which has installed 76 of the systems, with all but one of them in its home country of Canada, is gunning at a market of systems integrators, especially those with customers in education, government, business and the process control industry.

But Dool was quick to add that the vendor looks at large corporation DP managers as in-house systems integrators.

"They are a special case of systems integrator, but to our minds they are still systems integrators. The people who pay them are the end users," Dool said.

Even so, the company plans to engage in only a "very limited" direct sales campaign, Dool admitted. Still, Dy-4 has opened a sales office in Campbell, Calif., headed up by Carlo Bruno, former marketing director at Zilog, Inc.

David Thomas, the firm's systems researcher, explained the new product as "a distributed operating system which you may package with our boxes or you may package with IBM [Personal Computer] boxes. We're not in the business of selling cable," he said.

Dool added that the system would soon support Digital Equipment Corp. personal computers as well. "We don't foresee adding [Apple Computer, Inc.]. The demand just isn't there," he said.

System users share data storage and peripherals such as printers and modems, Thomas said. Each workstation can run its own operating software, independent of the network, he added.

"The backbone of the system is [Corvus Systems, Inc.] Omni-Net. We go through Omni-Net hardware," Dool said. Though Omni-Net is a Corvus Systems product, Dy-4 manufactures the interface card to create the network.

A typical setup, with 32 stations and 192K bits of memory, will sell for $25,000 a station. Availability of the multiple operating system version will be in January.

Dy-4, a private company that raised $2.5 million in its third investment drive last May, is based in Ottawa.

Boasts High-Density Recording Tech

CCG Offers Tape Subsystems

COSTA MESA, Calif. — California Computer Group, Inc. (CCG) has introduced two magnetic tape subsystems said to feature high-density group coded recording technology, which packs data at 6,250 bit/in.

Designed to be integrated into Digital Equipment Corp., Data General Corp., Texas Instruments, Inc., Perkin-Elmer Corp. or Hewlett-Packard Co. minicomputers, the subsystems reportedly offer savings in cost per 1M byte of backup data storage.

The drives are interfaced through a variety of controllers, including those made by Emulex Corp.; Western Peripherals, Inc.; Rianda; Spectra Logic Corp.; Macrolink, Inc.; or Dylon Corp. The choice of controller is determined by both the CPU host and by the price/performance criteria the user requires, the vendor said.

The two subsystems are the Storage Technology Corp. (STC) Model 2920 Avalanche dual-density drive (1,600/6,250 bit/in.) and the Kennedy Co.'s tridensity Model 9400 (800/1,600/6,250 bit/in.)

Single-unit pricing for the STC 2920-based subsystem starts at $11,300. The Kennedy 9400-based subsystem starts at $12,100 in single units. CCG is located at Suite G-10, 3303 Harbor Blvd., Costa Mesa, Calif. 92626.

The Minicomputer's Future: Will It Survive?

By Efrem G. Mallach
Special to CW‡

My sixth-grader used a Radio Shack TRS-80 to review state capitals last year. The mother of one of his best friends writes articles on a Xerox Corp. 820. Moving several steps up the scale, we see the Synapse Computer Corp. N+1, Convergent Technologies, Inc. Megaframe and their ilk supporting hundreds of on-line users. The micro seems to be everywhere.

However, the massive supercomputers are not endangered. There will always be jobs that consume all available power and users who can afford to run them. Large mainframes are not an issue.

The question that is usually asked concerns minicomputers. What is their future? Can they survive? To find out, let's go back a few years.

'All else being equal, as you put more elements on a chip, the elements slow down. As a result, the mini can be more powerful than the micro. . . . However, micros will be more cost-effective where they suffice.'

Minis arose in the mid-1960s during a search for the simplest combination of logic modules that could do reasonable computations. The answer was generally a clean architecture. It may have lacked many features of higher priced systems, but was extremely cost-effective where it sufficed.

A decade later, the same attitude sparked the micro revolution. As technology made logic cheaper, minis had grown more complex. They didn't get fat and lazy — there was too much competition for that to happen — but they were no longer the simplest possible computing device. There was room for a new player to slide under them, and the micro did.

A microprocessor is a single integrated circuit that contains all the logic circuits of a central processor. It has tens of thousands, or perhaps a few hundred thousand, individual circuit elements. It was designed for the sole purpose of executing programs coded in a particular instruction set. Used for that, a microcomputer, as we'll use the term here, is a computer that uses a microprocessor as its CPU.

A mini, on the other hand, has a CPU that's built up of more general-purpose elements. Rearrange them and you can get a

(Continued on Page 100)

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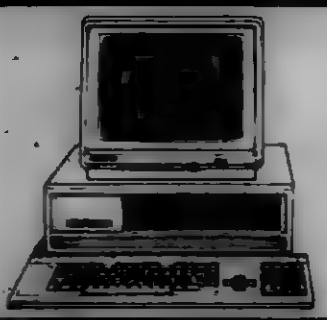
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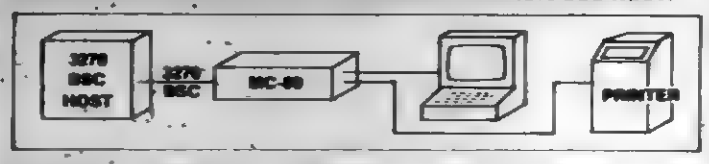

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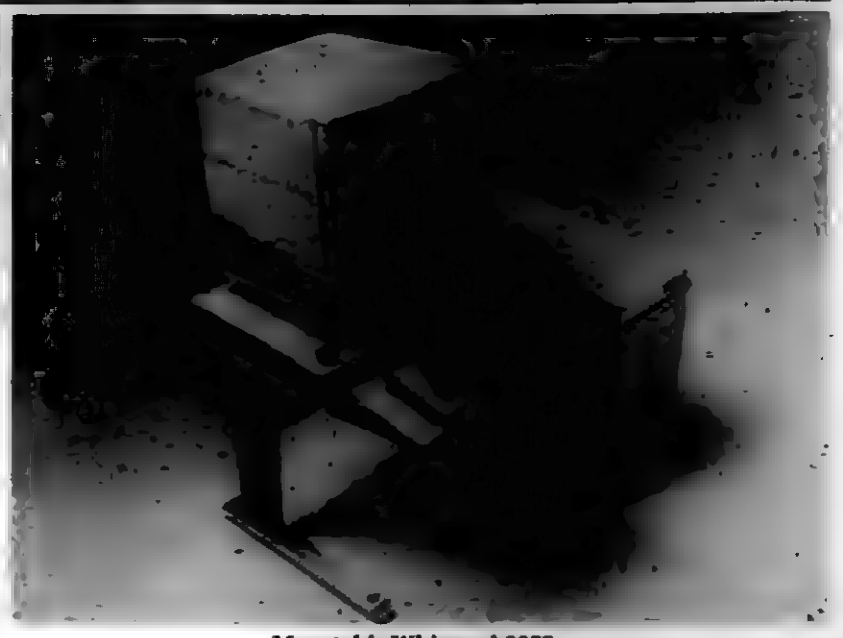

Megatek's Whizzard 3355

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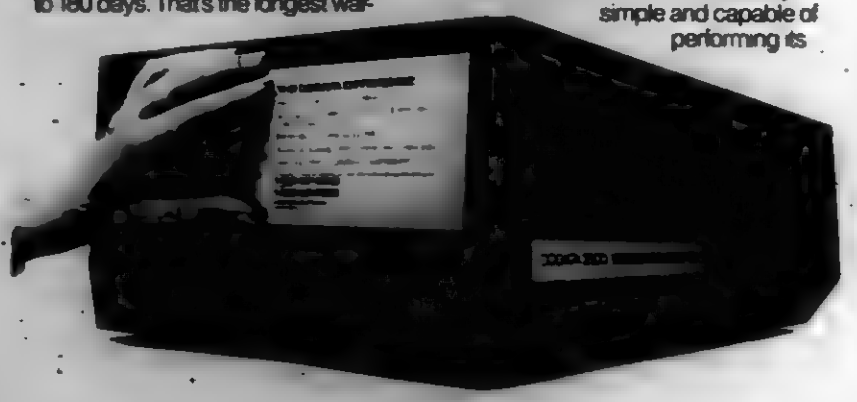
An expanded CODATA 3300, with 84 megabytes of disc storage, is priced at $13,500. The 3300 is also available as a 12-megabyte system for as low as $7,800.



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Megatek Offers Graphics System, Price Reductions

SAN DIEGO — Megatek Corp. has announced the Whizzard 3355, a medium-priced, two-dimensional graphics system said to offer a direct migration path to functional three-dimensional applications.

Also announced were price reductions, effective immediately, on its Whizzard 7200 computer graphics system and 1645 and 1650 desktop design terminals. The vendor described the price cuts as "aggressive positioning to increase market share."

The Whizzard 7200 family of graphics systems, which includes five models, has been reduced approximately 20% in price.

Because of the wide range of options available, prices for the systems vary.

The 1650 engineering terminal, previously priced at $14,900, now costs $9,900. The 1645 is now priced at $8,900, down from $13,900.

The Whizzard 3355 reportedly provides a full range of graphics functions with a high-resolution, color raster display and built-in, real-time dynamic transformation power, combined with Digital Equipment Corp.'s VT100 emulation for addressing nongraphics functions. It is software-compatible with the Whizzard 1600 and Whizzard 7200 families through Megatek's Wand and Template software.

The system features Megatek's Graphics Engine; the vendor's local processor with host interface, which supports local memory management, user tasks and high-speed data transfer; and a resident 16-bit microprocessor with local random-access memory to offload the host computer.

Also, it can locally perform the complex graphics transformations needed for rotating two-dimensional displays, as well as translations, continuous scale, zooming and windowing, the vendor said.

The Whizzard 3355 is priced at $22,500, with first shipments scheduled to begin in the first quarter of 1984.

Megatek is located at 9605 Scranton Road, San Diego, Calif. 92121.

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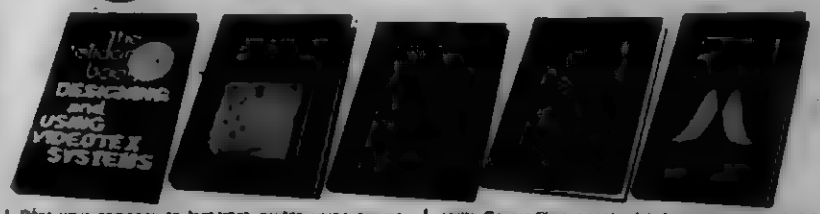

THE TELIDON BOOK: DESIGNING AND USING VIDEOTEX SYSTEMS, David Godfrey and Ernest Chang, editors
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COMPUTER SYSTEM ARCHITECTURE, Second Edition, M. Morris Mano
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DIGITAL AND DATA COMMUNICATION SYSTEMS, Martin S. Roden
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DIGITAL, ANALOG, AND DATA COMMUNICATIONS, William Sunema
This guide to the technical details of the telephone network examines modulation methods, PCM terminal equipment, pulse transmission, the Nyquist criteria, error detection, correction techniques, and protocols.
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DISCRETE SYSTEM SIMULATION, William G. Bulgren
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Catch problems early, reduce costs, and increase profits with this guide to successful design review. Features a workable design of large, complex on-line data base systems.
Publisher's price: $28.95 **(30130-2** DPBS price: $20.99

Today's Computer Languages . . .

ADA: AN ADVANCED INTRODUCTION, Narain Gehani
Focuses on the novel aspects of ADA and provides fully-tested examples, along with suggestions for stepwise refinement and good programming style.
Publisher's price: $18.95 **(30300-2** DPBS price: $14.69

PROGRAMMING CONCEPTS (A SECOND COURSE WITH EXAMPLES IN PASCAL), William B. Jones
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Publisher's price: $22.95 **(72997-9** DPBS price: $17.21

IBM BASIC FOR BUSINESS AND HOME, Robert Funkhouser
Cuts through the mass of details in the IBM PC manuals and shows you how to write programs for home or business use and how to develop new applications.
Publisher's price: $18.95 **(R-3918-8** DPBS price: $15.46

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STRUCTURED COBOL REPORT WRITER: A PROGRAMMER'S PRODUCTIVITY TOOL, George W. Yukoff and David Schechter
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Publisher's price: $24.95 **(R-7697-8** DPBS price: $18.71

APPLE II PROGRAMMER'S HANDBOOK, R. Vile
Describes effective programming techniques in the most common Apple programming languages. Includes complete programs and applications in graphics, education, and entertainment.
Publisher's price: $24.95 **(30939-5** DPBS price: $18.71

CP/M ASSEMBLY LANGUAGE PROGRAMMING, Kam Barbier
A self-teaching guide to the details of microcomputer hardware, its operating system, and assembly language programming using any microcomputer that runs CP/M.
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A PROGRAMMER'S NOTEBOOK: UTILITIES FOR CP/M-80, David E. Cortesi
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A "user-friendly" introduction to BASIC emphasizing top-down techniques and structured programming.
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Publisher's price: $21.95 **(R-8431-3** DPBS price: $15.46

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Ideal for new computer users and experienced professionals. Puts over 1,000 computer definitions at your fingertips. Clear illustrations and cross-references help demystify the jargon.
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Publisher's price: $32.50 **(37873-6** DPBS price: $22.75

OFFICE AUTOMATION PRIMER: HARNESSING INFORMATION TECHNOLOGIES FOR GREATER PRODUCTIVITY, C. Mullins and T. West
A step-by-step guide to planning, installing, and evaluating office automation systems, from analyzing your needs to dealing with vendors, gathering data, and estimating costs.
Publisher's price: $19.95 **(R-8108-6** DPBS price: $14.69

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SMALL BUSINESS COMPUTERS: A GUIDE TO EVALUATION & SELECTION, R. Ishiku
Learn to evaluate and select small computers with greater ease and confidence. Covers important management decisions regarding feasibility, economics, and installation.
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THE VISICALC APPLICATIONS BOOK, Jack Grushcow
How to use VisiCalc in six key business areas: credit control, financial statement analysis, forecasting, budgeting, cash management, and portfolio management.
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CP/M-Based Micro Unveiled

SUNNYVALE, Calif. — Televideo Systems, Inc. has introduced an 8-bit Digital Research, Inc. CP/M-based personal computer equipped with a high-capacity Winchester disk drive and powerful graphics functions.

The TS803H system reportedly is suitable for a variety of applications in small and medium-size businesses. In addition to its capabilities as a stand-alone system, the TS803H can be linked to other 8- and 16-bit Televideo microcomputers in the vendor's Personal Computer Network.

System features include a Zilog, Inc. Z80A microprocessor; 64K bytes of random-access memory, expandable to 128K; two RS-232 serial ports for a modem and printer; and a half-height 5¼-in. Winchester disk drive with 10M bytes of storage along with a 500K-byte, half-height 5¼-in. floppy disk drive. Also included is Digital Research's GSX-80 graphics driver software, a high-resolution, 640- by 240-pixel display on a 14-in. display and a CP/M-80 operating system.

The TS803H is priced at $3,995, which includes word processing, electronic spreadsheet and business graphics software applications, according to a vendor spokesman. Televideo Systems is located at 1170 Morse Ave., Sunnyvale, Calif. 94086.

Optical Scanner Said To Fit Any CAD/CAM

ENGLEWOOD, Colo. — Xyztek Corp. announced a combination high-speed, high-resolution optical scanner and pen plotter said to complement any computer-aided design and manufacturing (CAD/CAM) system.

In addition, to enhance the usability of the product, Scan-Writer, Xyztek has developed a very high-speed multiprocessor computer, the Maxima 16.

Scan-Writer reportedly permits large-format engineering drawings, maps and photos to be directly entered into a computer system. This data may then be vectorized into various CAD/CAM formats for further processing and then replotted using the eight-color plotting capabilities of the system. Features include six minutes or less to scan an "E"-size drawing, 1,000 line/in.

Although Scan-Writer can be interfaced directly to a host computer, it may be advantageous to preprocess the data through Maxima 16 due to the high speed and large volume of data generated by Scan-Writer, the vendor said. Each Maxima 16 module is in itself a stand-alone computer offering eight user serial interfaces supporting up to 1M bit/sec transfer rates with a selection of multiple protocols. Implemented in parallel under the Xyztek's Xyzrtix operating system, 16 modules in tandem reportedly provide a high-speed and flexible computer.

Maxima 16 features are said to include 16 million instructions per second computer speed, 8M to 80M bytes of local memory, 128 users, virtual memory, user-selectable speeds and Quad Bus architecture to increase system bandwidth effectively.

The Scan-Writer is priced at less than $100,000. The price of the Maxima 16 ranges from $8,600 to $200,000, depending on configuration. Xyztek is located at Suite B-7, 8000 E. Prentice Ave., Englewood, Colo. 80111.

'Bill, Have You Lost Your Restart Capabilities?'

Dataserver Systems Simplify Winnie Integration Into Nets

SAN JOSE, Calif. — Priam Corp. has introduced two Dataserver microcomputer systems designed to simplify the integration of its Winchester disk drives into high-performance, multiuser computer networks.

Each Dataserver subsystem supports up to four Priam Winchester disk drives in any combination of formats — 5¼-, 8- or 14-in. disk sizes — with data rates up to 1.2 million bit/sec.

Two auxiliary ports permit the interface of the disk drives with other peripherals such as floppy disk and tape drives.

The Dataserver subsystem offers logical addressing, extensive formatting control, defect management, complete error recovery and concurrent processing.

The first version of the Dataserver, designated model DS101, is available immediately as a single-board subsystem and is priced at $875 in OEM quantities. The second version, dubbed the DS201, will be available before the end of the year and will include the Intelligent Peripheral Interface, the proposed Ansi standard for high-performance systems.

More information is available from the vendor at 20 W. Montague Expwy., San Jose, Calif. 95134.

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Lease a Codex Cable Multiplexer
for your IBM 3274 system.
It can link up to 32 terminals
with a single cable.

With Standard Software Execution

Firm Offers Four-User Multiprocessor Micro

HAYWARD, Calif. — Compupro Systems, Inc. has introduced a four-user multiprocessor microcomputer system said to feature concurrent execution of both 8- and 16-bit industry-standard software.

In addition, it announced that it has enhanced its unlimited licensing agreement with Digital Research, Inc. by adding concurrent CP/M 86 as an option to the Compupro System 816 microprocessor product line. The operating system will be called Concurrent CP/M 8-16.

The Compupro 10 is reported to be the first in a series of Compupro business computers that departs from the vendor's traditional IEEE 696 orientation. The new product is aimed at commercial organizations that have been using traditional minicomputer and microcomputer systems as well as personal computers in multiuser and networked environments.

Features include closely-coupled master/slave architecture; a dedicated central Intel Corp. 8088 processor with 768K bytes of main memory; seven serial ports, including a modem port; a Centronics Data Computer Corp. printer port; 384K bytes of solid-state disk memory; and dual 96-track/in., 5¼-in. floppy disks storing 2M bytes.

In a standard Compupro 10 configuration, each user terminal has access to its own 8-bit Zilog, Inc. Z80B processor, each with its own 64K byte random-access memory. The fully integrated package allows concurrent multitasking operation of both 8-bit and 16-bit programs under an enhanced version of Compupro's MP/M 8-16.

The Compupro 10 is priced at $4,995, excluding terminals, and is covered by the vendor's 12-month warranty.

Compupro is located at 3506 Breakwater Court, Hayward, Calif. 94545.

Utility Users Get Portables For Billing, Collecting Data

BIRMINGHAM, Ala. — Utility industry users may prepare bills and collect data in the field with two portable computers from Immediate Business Systems.

The PBM500 is a 10-lb unit with 256K bytes of nonvolatile bubble memory. It has a 40-char. electro-fluorescent display and a self-contained 140 line/min printer, which prints a customized bill in a user-designed format.

The PBM150 has 256K bytes of memory, a full alphanumeric keyboard, 80-char. liquid crystal display and weighs 3 lbs.

Both units operate under extremes of temperature and humidity, according to the company, and may be used in a turnkey fashion with a central computer. A total system with multiple PBM portable computers can range from $50,000 to $500,000 depending on the configuration. Immediate Business Systems can be reached through P.O. Box 2165, Birmingham, Ala. 35201.

IMP Micro Line To Meet Variety Of System Needs

SAN MARCOS, Calif. — Electro Design, Inc. has introduced its line of IMP personal computer systems designed for hobbyists as well as the business and scientific communities.

The IMP line is designed to allow users to purchase a system with hardware and software customized to fit their needs, a spokesman said. With a selection of CPUs, memories, drivers and special-purpose boards and peripherals, IMP systems can be configured to operate with many software packages to meet a variety of applications needs.

Three versions of the IMP system, which differ in their chassis capacity to accommodate boards and disk drives, are available: the six-slot IMP-6; the IMP-12, which contains 12-slots; and the IMP-18, with an 18-slot capacity. The IMP-12 provides mounting for two half-height floppy disk drives, while the IMP-18 can accommodate four such drives.

Optional add-on products include floppy or hard disk drives with capacities from .360M bytes to 30M bytes, black-and-white or high-resolution color monitors and high-speed and letter-quality printers.

The IMP personal computers range in price from $2,100 to $7,000, depending on the configuration chosen. Information can be obtained from the Director of Marketing, Electro Design, 960 Rancheros Drive, San Marcos, Calif. 92069.

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IBM 3274 system users no longer have to pull individual cables each time they add or relocate terminals.

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Despite Micro Revolution, Minicomputers

(Continued from Page 95)
different instruction set, a different mini.

At any given time, there will be a limit to the power of a microprocessor. First, there are limits to how many elements can be squeezed onto one chip. The limits are increasing, but they will continue to exist. Second, there are limits to the speed of the elements. These limits work against each other; all else being equal, as you put more elements on a chip, the elements slow down.

As a result, the mini can be more powerful than the micro. A CPU built of several dozen chips can have more, and faster, circuits than the single-chip micro. However, micros will be more cost-effective where they suffice. Every element of a micro is designed for just one purpose, whereas the more general components in a mini cannot be exploited as fully. For one thing, the number of components on a chip may be limited by the number of pins the chip has. This number is on the order of several dozen. If chip designers try to escape this problem by connecting the components to each other within the chip, there is a good chance that the result will be only a partial fit to the need. With more and more circuit elements on a supposedly "general-purpose" chip, the likelihood is that a smaller and smaller fraction will be useful.

Region Grows

As technology evolves, the region in which micros are more cost-effective grows. The boundary separating them from minis moves up in cost and capacity. Five years ago, micros were limited to single-user systems. Today, many microcomputers support four to eight users entering data, running business applications or updating a shared data base. Multimicro lash-ups, such as Convergent Technologies' Megaframe, can support far more.

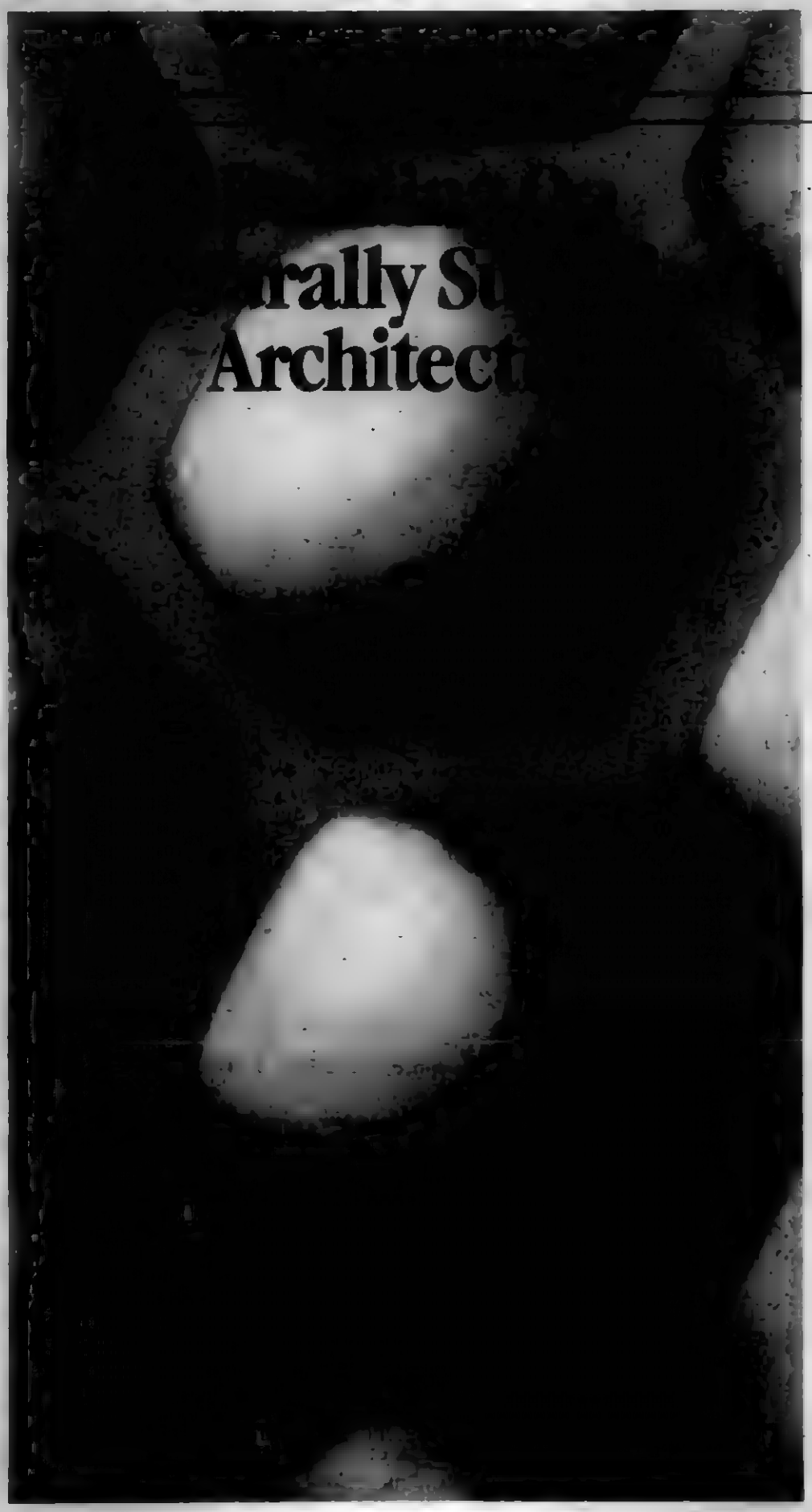
However, supermicro technology is not simple or cheap. A supermicro chip cannot be built in a garage. The investment in designers, design support tools and fabrication equipment amounts to many millions of dollars. No company takes such sums lightly. This limits supermicros to very high-volume products. If you just need a few, or a few hundred, developing a custom supermicro doesn't make economic sense.

Even though very large-scale integrated (VLSI) technology realizes its potential most fully in microprocessors, minis are not completely denied its benefits. Semiconductor firms have produced chips that are quite complex, but still useful in a wide range of minis. Four examples:

- The bit slice — This incorporates several bits' worth of arithmetic, logic and register storage. A popular bit slice, Advanced Micro Devices, Inc.'s (AMD) 2901, incorporates 16 registers plus arithmetic and logic functions — all 4 bits wide. To get a 16-bit mini, wire four together. Bit slices are intended to work that way: you get 16-bit carries, shifts and so on. Several other devices besides the AMD 2901 are available. Bit slices are economically viable because they can be used in many different mini designs. No single mini application would justify the chip's development cost, but as a group they all do.

The next step beyond the bit slice may well be the reduced instruction set computer (Risc). It is under development at the University of California at Berkeley, by David Patterson and his colleagues. A Risc is a microprocessor that executes a very simple instruction set at blinding speeds. It can be programmed to interpret other instruction sets, such as those of several existing minis. Used in this fashion, it is both a micro in its own right and a minicomputer implementation vehicle.

- The programmable logic array (PLA) — PLAs permit good fractional utilization of chips with very many gates. In addition to the gates themselves, a PLA includes a systematic interconnection scheme. A process akin to.



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The Terminal/System Architects

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Still Seen as Viable Choice for 1983 Users

creating a read-only memory chip is used to create specific interconnection patterns. PLAs were factors in the cost-effectiveness of "superminis" such as Digital Equipment Corp.'s VAX-11/750 and Data General Corp.'s Eclipse MV/8000.

● I/O support circuits — Several integrated circuits have been developed to handle common peripheral devices and communications links. The Usart, for universal synchronous-asynchronous receiver-transmitter, is a good example of the latter. These chips reduce controller complexity much as bit slices reduce CPU complexity.

● The microprocessor — Even with Usarts and their relatives, controllers still need control. A simple micro can be a cost-effective alternative to many hard-wired logic circuits. Once in place, it can be programmed to take on more and more jobs.

This leaves us with this scenario: Micros are moving up. Where they can do the job, they are the technology of choice. Minis use large-scale integrated technology to retail good cost-effectiveness as complete systems. They are succeeding at a level above the fastest commonly available micros. Industry consultant Sandra Steere Bell said, "Supermicros will be the performers of choice for the corporate environment after 1984." She continued, "The corporate environment is beginning to appreciate nonproprietary operating systems and the ability of micro makers to react quickly to new technology. In addition, integrated software and efficient interconnect software — two major present gaps — are coming." Despite this, there are several reasons why a 1983 user might opt for the mini:

● The required performance level is above what micros can offer. Multimicro systems make sense for some applications, but not for all.

● The mini architecture is optimized for a specialized application. At any performance level, micros will steadily become more and more cost-effective than minis. Eventually, this technology edge will overcome the mini's potential advantage of specialization. The key word here is "eventually." For some applications, "eventually" could be many years away.

● Software compatibility is important. This can refer to a vendor's investment in systems software or to a user's investment in applications. The sum of these factors can perpetuate a technologically outdated product for years, to the genuine mutual satisfaction of both its vendor and its users.

● You can't tell them apart. If it looks like a mini, works like a mini and runs like a mini, who cares what's inside? Systems such as the DEC PDP-11/24, the Honeywell, Inc. DPS 6/40 and others use micros as the heart of their CPU. They are fully compatible with their minicomputer siblings — in software, packaging, I/O busing and every other way.

Cost-Effective Results

In this article, we have defined them as micros. To the user, definitions don't matter — results do. These systems offer cost-effective results. In this regard, minis are defending themselves against the micro onslaught by assimilating the invader. Eventually, micros will be accepted as simply the right way to design most computers. Then we can stop worrying about the definitions and get on with the job.

Some mini vendors have real concerns about the future. They see the micro trend imposing a few "standard" architectures on everyone. If that's the case, what will happen to their beloved 19-bit instruction set? And how about all that software written for it?

The answer is simple. Many proprietary low-end instruction sets will go the way of the dinosaur, just as ½-in. magnetic tape and round holes in punched cards once did. Univac didn't lose its identity when it switched to 80-col. cards with rectangular holes. System vendors don't have to

(Continued on Page 102)

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DEC to Service Non-DEC Products

MAYNARD, Mass. — Digital Equipment Corp. has announced that for the first time, the company will service selected non-DEC products incorporated into DEC computer systems. The equipment to be supported includes printers, disks, tapes, controllers and communications interfaces.

Among the non-DEC products the company will service are selected Printronix, Inc. and Data Products printers, Control Data Corp. and DSD disks, Kennedy Co. tape drives, Emulex Corp. and Westpercorp controllers and Able Computer, Inc. communications equipment. Responding to customer demands, the company intends to expand its service plans for this type of equipment in DEC-based systems during the next 12 months, a spokesman said.

A DEC spokesman stressed that DEC is not endorsing the purchase of competitive products nor is it acting as the service agent of vendors that sell those products. For noncompeting equipment, however, DEC may become a service agent, subject to agreements.

When acting as a service agent for other manufacturers, DEC commits to provide installation, warranty and maintenance services for the vendor's hardware sold onto DEC systems.

The first of DEC's service representative agreements for another manufacturer's noncompeting equipment is with Ampex Corp.'s Memory Products Division for mainframe memory.

DEC is located at 146 Main St., Maynard, Mass. 01754.

THE LATEST INNOVATION IN DATA BASE SOFTWARE.
IS HARDWARE.
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Mini Forecast To Survive Rise of Micro

(Continued from Page 101)

lose their identities when they adopt a standard micro. IBM didn't lose its identity when it chose the Intel Corp. 8088 microprocessor for its Personal Computer. The way in which the whole system is put together will still distinguish one vendor from another.

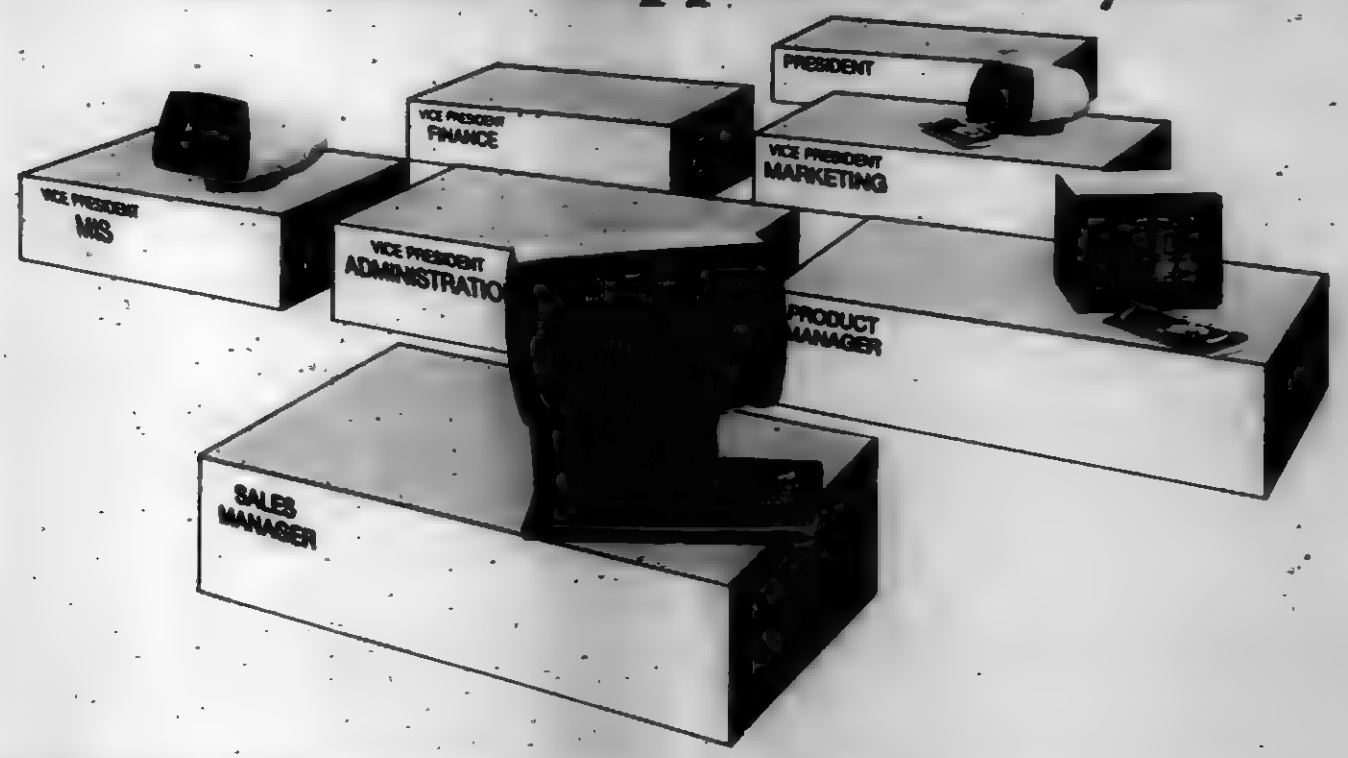
A few vendors, those with very high-volume products and semiconductor development resources, will put their proprietary instruction sets on micros. IBM, DEC, DG, Honeywell, Hewlett-Packard Co. and perhaps others have such micros today. Does this give them an edge over smaller firms using generally available chips? Not necessarily. It does let them use existing software for a few more years. It also ties up funds that could be used to develop networking software or intelligent graphics workstations.

Meanwhile, though, users don't have to worry. Technological improvements can only benefit them. The real issue is how well the job gets done and at what cost. Users who concentrate on that question will find that the technology will take care of itself.

Mallach is general manager, Northeast Division, of General Systems Group, a software and systems consulting firm. In addition, Mallach is associate professor of computer science at Worcester Polytechnic Institute and contributing editor, System Architecture.

WHAT'S THE FUTURE OF MICROS IN YOUR ORGANIZATION?

Turn to "The Micro Mission" this fall and get the future mapped out for you.



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This November, *Computerworld* will give you an Extra! you can't afford to miss. Not if you plan to take advantage of the hundreds of possibilities micros give you. You'll get articles, interviews, applications stories, tutorials, market data, and advice from the experts — a whole issue of *Computerworld Extra!* devoted to "The Micro Mission." And it will come in the mail at the end of November as a bonus issue! You don't have to do a thing. Just look at what's coming to you:

You'll get an examination of the politics of microcomputers in organizations; a roundtable discussion by DP/MIS experts dealing with a wide range of topics relating to personal computers — from selection to implementation. And, there'll be a whole article devoted to how large companies deal with training personnel to use personal computers.

You'll get articles on:

- The types of peripherals available for setting up an overall system
- Word processing software for personal computers
- An evaluation of spreadsheet software for personal computers
- Networking personal computers into the corporate database
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DLB Unveils EW-300 Economist's Workstation

WELLESLEY, Mass. — DLB Computer Systems, Inc. has announced the EW-300 Economist's Workstation, a hardware-software system which combines a 32-bit mini, a disk storage subsystem, a data base management package, a data analysis and graphics package and a one-year subscription to an economic and financial time-series data bank.

At the same time, DLB introduced Packrat, the data base management package included with the EW-300.

The EW-300 Workstation is based on Apollo Computer, Inc.'s DN-300, a graphics-oriented desktop computer with 1M byte of main memory. The workstation also includes 34M bytes of on-line Winchester disk storage and access to Apollo Computer's 12M bit/sec Domain local-area network. Through the network, an EW-300 can become part of a shared resource environment, DLB Computer said.

Packrat, the interactive time-series data base management system included with the EW-300, is also available for use on the Apollo Computer Domain series microcomputer. The Packrat package can be used to create a data base of 5M to 20M bytes, load time-series data, modify or update data and retrieve information previously stored.

The Packrat system can operate on a variety of data series including corporate financial statistics, securities market price and volume data, production statistics and government indices.

The EW-300 workstation also includes the Easymodeler interactive statistical analysis and graphics package, which allows the user to access information stored in a Packrat data base, as well as to transform, analyze and graph such data.

Also included in the EW-300 system is a one-year subscription to a subset of Citibank's Citibase data bank of U.S. economic and financial data.

The complete EW-300 workstation is priced at $38,500. The Packrat data base package alone costs $3,500 per Apollo Domain node. Further information is available from DLB Computer Systems at Suite 309, One Hollis St., Wellesley, Mass. 02181.

Decision Data Will Service Select TI Systems, Peripherals

HORSHAM, Pa. — Decision Data Computer Corp. has announced that its Customer Service Division will provide nationwide on-site field service and depot repair of Texas Instruments, Inc.'s 990/10, 990/12 and DS990 computer systems and peripherals.

In addition, Decision Data will offer maintenance on a full range of compatible peripherals, including disk drives and controllers, printers and display units.

The acquisition last year of the hardware maintenance business of International Micor Systems has enabled Decision Data to combine its maintenance capabilities and resources with Micor's TI experience.

Decision Data's Customer Service Division is located at 400 Horsham Road, Horsham, Pa. 19044.

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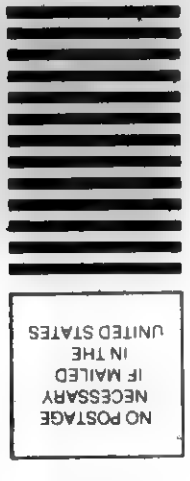

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IBM-Compatible Micro Boasts Local Net

SAN JOSE, Calif. — An IBM Personal Computer-compatible personal computer with a built-in local-area network will be introduced at Comdex in Las Vegas, by Santa Clara Systems, Inc. and will sell for approximately $1,300, it was announced recently.

The PCterminal functions as an intelligent terminal on the Personal Computer network, PCnet, which already has been announced by Santa Clara Systems. PCnet users can add PCterminals instead of Personal Computers to increase the number of user stations, a vendor spokesman said.

An optional floppy disk drive allows users to run programs locally as well as over the network. Also included with the system is a monitor, a keyboard, an Intel Corp. 8088 microprocessor, serial and parallel interfaces, four expansion slots for peripheral cards, 256K bytes of random-access memory and a connection for an optional 5¼-in. floppy disk drive.

Santa Clara's PCterminal

"We're playing up the networking terminal aspect of it, but it can be used as a stand-alone IBM-compatible computer with the addition of a disk drive," a Santa Clara Systems spokesman said.

The PCterminal is said to run programs under the IBM DOS operating system and the Santa Clara Systems version of Microsoft, Inc.'s MS-DOS — SCS-DOS. A proprietary network protocol is said to allow the PCterminal to initialize its operating system from the remote floppy disk of a Personal Computer or hard disk.

Using this network protocol, the system can communicate in the network without its own floppy disk drive. The system picks one Personal Computer in the network and shares its peripheral devices. Up to 16 PCterminals can be connected to one Personal Computer or Personal Computer XT on the network.

PCnet has a transmission rate of 1M bit/sec and allows machines to be linked with several thousand others through an adapter board and software. PCnet is built into PCterminal, according to a vendor spokesman.

The PCterminal also features "remote execution," which allows a user on one terminal to run a command on another terminal or Personal Computer as if the command had been entered on the second computer's keyboard. With this feature, one computer can act as an execution server for other computers or terminals in the network.

First customer shipments of the system will be in the second quarter of 1984. The price will be $1,295 for the PCterminal with the built-in networking. PCnet is available separately for $695, a vendor spokesman said.

More information is available from Santa Clara Systems, which is located at 1860 Hartog Drive, San Jose, Calif. 95131.

Processor Serves as Net Device, Data Communications Terminal

ATLANTA — Lanier Business Products, Inc. has introduced a professional computer said to serve as a network device and data communications terminal as well as a stand-alone unit.

The Lanier Business Processor 1000 can reportedly be linked with other individual workstations in the Lanier Business System 5000 network. In addition, the computer is said to communicate with existing office systems using an IBM 3270 Systems Network Architecture 3780 communications capability.

Lanier 1000 users may use Lanier's One-Step word processing package, which includes EZ-Task, EZ-Spell, Greek Scientific, Lanier Business Basic, data manager, graphics and networking, according to a spokesman for the vendor.

In addition to the computer's own software, Digital Research, Inc.'s CP/M and Microsoft, Inc.'s MS-DOS operating systems are supported by the computer. Software options include Peachtree Software, Inc.'s Peachcalc electronic spreadsheet and Peachtext word processing package.

The Lanier 1000 is priced at $2,995, the spokesman said, from Lanier, which is located at 1700 Chantilly Drive N.E., Atlanta, Ga. 30324.

Interface Fits IBM, TI Micros, Compatible With Xerox Net

SANTA CLARA, Calif. — Ungermann-Bass, Inc. has introduced a network interface unit (NIU) for IBM and Texas Instruments, Inc. personal computers said to be compatible with Xerox Corp.'s Ethernet local-area network.

Based on the vendor's Net/One local-area network systems, the Net/One Personal Connection is said to allow personal computer users to share information and integrate it with IBM hosts via IBM's Systems Network Architecture (SNA).

Personal computers configured with the unit can reportedly run any applications programs under Microsoft, Inc.'s MS-DOS operating system without modification. The Net/One Personal Connection also features SNA gateways allowing the personal computers to emulate IBM 3274 controllers or 3278 terminals and 3287 printers.

Priced at $850, the Personal NIU includes MS-DOS networking commands. The vendor's Printshare and Diskshare software on 5¼-in. diskettes is priced at $500 per server from 2560 Mission College Blvd., Santa Clara, Calif. 95050.

Firm Announces IBM Interface

WALTHAM, Mass. — An interface to connect IBM Personal Computers and Personal Computer XTs to the Proteon Associates, Inc. Pronet local-area network was recently announced by Proteon.

Pronet is a 10M bit/sec token-passing ring for use in networks up to several kilometers in length with up to 255 nodes. The IBM Personal Computer and Personal Computer XT interface will allow users to transfer files, under Microsoft, Inc.'s MS-DOS operating system, within networks of IBM Personal Computers and to and from mainframe computers.

The interface costs $595 from Proteon, 24 Crescent St., Waltham, Mass. 02154.

Exxon Arm Adds To Facsimile Line

STAMFORD, Conn. — Exxon Office Systems Co., a division of Exxon Corp., has added to its line of facsimile products a digital transceiver that can reportedly communicate with other units at a rate of 40 sec/page.

The Exxon 2210 Qwip unit is said to be compatible with most 3 min/page facsimile machines and reportedly serves as a satellite to the company's "hub" product, the 2310 Qwip. The new unit is also reportedly compatible with the 2310 machine, while offering similar transmission quality, according to an Exxon spokesman.

The unit costs about $3,000 from 777 Long Ridge Road, Stamford, Conn. 06902.

Extension Gives IBM Micro Users Transferring Capabilities to CPUs

KING OF PRUSSIA, Pa. — Integrated Technologies, Inc. has announced an extension of its Soft-Switch system to permit users of the IBM Personal Computer to transfer word processing documents to an IBM or compatible mainframe for archiving, translating and forwarding to other word processors.

Using Softword Systems, Inc. Multimate word processing program, documents can reportedly be transferred to other word processors by inserting the appropriate location codes when the Soft-Switch menu requests them. According to a vendor spokesman, Soft-Switch transmits the document without need for intervention by either receiving or sending operators.

Soft-Switch is priced at $20,000, and Multimate costs $5,000, according to the spokesman. More information is available from Integrated Technologies, which is located at 200 N. Warner Road, King of Prussia, Pa. 19406.

Directory to Provide Listings for Fax Users

NEW YORK — A cooperative effort among major facsimile manufacturers is bringing together a facsimile users' directory, which will list the corporations' facsimile machine locations and telephone numbers, it was announced by Greenfield Information Services.

In addition to machine locations and phone numbers, the directory will list compatibility information, hours in use, backup phone numbers and individual contact names.

The companies cooperating in the preparation of the list include NEC America; Canon; Panafax; Pitney Bowes, Inc.; Sharp; 3M Corp.; and Xerox Corp. The first edition of the directory will be published in early 1984 and will appear annually thereafter, according to a spokesman for the group.

The price of the directory will be $40. More information is available from Greenfield Information Services, 551 Fifth Ave., New York, N.Y. 10176.

Panafax Announces Option For MV-3000 Fax Machine

WOODBURY, N.Y. — Panafax Corp. has announced the availability of an option for its MV-3000 facsimile machine that is said to allow the unit to utilize packet-switched networks, providing communications with various types of electronic office equipment.

The option, called the X.25 packet-switched network option, reportedly eliminates errors in copy received from faulty telephone lines and provides users with the ability to translate and transmit hard-copy information from a facsimile format into a digital format used by computers.

The X.25 option costs $2,200; the MV-3000 machine costs $6,250 from Panafax, 185 Froehlich Farm Blvd., Woodbury, N.Y. 11797.

Northern Telecom Adds Capability To OA Systems

NASHVILLE, Tenn. — Northern Telecom, Inc. has announced a personal computing capability package for its Models 585, 565 and 445 office information systems.

The Northern Telecom personal computing option is compatible with all integrated data processing, word processing and communications capabilities of the system.

Users can add the personal computing option to Northern Telecom's multiterminal systems, eliminating the need for additional stand-alone personal computers.

The price of the option package is $1,495.

More information is available from Northern Telecom, 259 Cumberland Bend, Nashville, Tenn. 37228.

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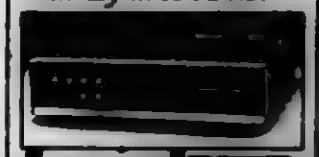

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E-Mail System Operates With IBM Host

GREENVILLE, S.C. — Steel Heddle, Inc. has introduced an electronic mail system said to operate with any IBM host computer operating with IBM's CICS operating environment, IBM's Basic Mapping system software and IBM's Vsam filing method.

The Wizard Mail system reportedly features optional automatic hard-copy printout of each message, confidential message recognition, message priority assignments, display status of mail sent, stored message file and message security via password.

Menu-driven Wizard Mail can be used on all terminals with access to the host computer system and requires no special training or installation, the vendor said. Priced at $495, Wizard Mail is available through Steel Heddle, P.O. Box 1867, Greenville, S.C. 29602.

Loma to Sponsor Meet Oct. 17-19

NEW ORLEANS — Life Office Management Association's (Loma) Operations and Systems Division will sponsor its fifth administrative services conference here Oct. 17-19.

Designed for life company managers responsible for their companies' word processing, micrographics, records management, printing and reproduction and office systems, the conference will feature two general sessions and several workshops.

At the opening session, Robert Kalthoff, president of Access Corp., will discuss the use of application and document-based optical mass memory systems.

Registration for the conference costs $135 for Loma members and $200 for nonmembers. More information is available from Loma at 100 Colony Sq., Atlanta, Ga. 30361.

Top U.S. Firms Take High Road To Scotland With Micro Plants

By Tom Henkel
CW Staff

EDINBURGH — At least three major U.S. systems manufacturers have established, or are currently establishing, microcomputer manufacturing facilities in Scotland in efforts to meet the growing demands of users in Europe and the UK.

IBM, which has used its Greenock, Scotland base as a manufacturing and warehousing center since the early 1950s, has opened a second 96,000-sq-ft manufacturing facility to produce both Personal Computer and Personal Computer XT processors.

In addition, this April IBM opened what it claims is one of the most fully automated materials distribution centers in the world. The center, which is largely controlled by Series/1 minicomputers, is being used to store and distribute parts and materials to IBM facilities throughout the UK and Europe, noted Alex Wilson, plant director.

While IBM declined to say how many microcomputers the Greenock plant is capable of producing, observers estimated the plant is capable of manufacturing between 30,000 and 50,000 micros per quarter.

Digital Equipment Corp. plans to use its 300,000-sq-ft manufacturing facility in Ayr, Scotland, as an assembly plant for the firm's line of microcomputers. Gerry Smith, manufacturing operations manager, explained that less than 5% of the Ayr

(Continued on Page 110)

SEMICONDUCTOR FORECAST SUMMARY
1983–1986

(Shipments in Millions of Dollars)

	1982	82–83 Change	1983	83–84 Change	1984	84–85 Change	1985	85–86 Change	1986
TOTAL SOLID STATE									
U S A Total	5605 6	+ 17%	6558	+ 25%	8212	+ 22%	10,011	+ 21%	12 068
O.E M	4433 5	+ 14%	5062	+ 26%	6375	+ 22%	7770	+ 21%	9383
Distributor	1172 1	+ 28%	1496	+ 23%	1837	+ 22%	2241	+ 20%	2685
Western Europe	2797 2	+ 7%	2995	+ 18%	3530	+ 19%	4191	+ 15%	4832
Japan	408 2	+ 13%	480	+ 17%	539	+ 15%	618	+ 13%	700
Other International	564 0	+ 44%	814	+ 35%	1096	+ 25%	1371	+ 22%	1670
WORLDWIDE TOTAL	9374 9	+ 15 5%	10 827	+ 24%	13 377	+ 21%	16 191	+ 19%	19 270
PRODUCT SUMMARY									
TOTAL ICs	6898 9	+ 18%	8134	+ 28%	10 418	+ 25%	13 004	+ 22%	15 871
TOTAL DISCRETE	2476 0	+ 9%	2693	+ 10%	2959	+ 8%	3187	+ 7%	3399

QUARTERLY COMPARISONS

	1st Qtr/Change*	2nd Qtr/Change*	3rd Qtr/Change*	4th Qtr/Change*	Total/Change**
1982	2259 −3%	2439 + 8%	2326 − 5%	2349 + 1%	9375 + 1 1%
1983	2324 1%	2627 + 13%	2803 + 7%	3073 + 10%	10.827 + 15 5%
1984	3170 + 3%	3392 + 7%	3360 − 1%	3455 + 3%	13.377 + 24 %

* % change from previous quarter
** % change from previous year

Source: SIA

SIA Sees Semi Shipments Doubling in Value by 1986

By Robert Batt
CW West Coast Bureau

SANTA CLARA, Calif. — Total shipment values of semiconductor components in 1986 will be almost double those of 1982, with a projected growth to $126 billion within 10 years, according to figures released by the Semiconductor Industry Association (SIA).

At its Seventh Annual SIA Forecast Dinner held here recently, the association predicted that 1983 shipments by U.S. and Euorpean semiconductor manufacturers will reach approximately $10.8 billion, a 15.5% increase over last year, when the industry experienced the most severe recession in its history.

Growth rates for 1984 through 1986, the SIA added, are expected to be even greater — a 24% growth in 1984 to $13.4 billion, followed by a 21% jump in 1985 and a 19% jump in 1986 to reach $19.3 billion. The statistics were prepared for the SIA by the Semiconductor Trade Statistics Program.

Presenting the forecast at the annual dinner, Jerry Sanders, chief executive of Advanced Micro Devices, Inc., said boom times are again in store for the semiconductor industry. "After a two-year lull in which the industry has been characterized by price cutting, we are now beginning a new high growth period," he told his audience.

According to the SIA forecast, the most dynamic growth rates will be in integrated circuits, which represented nearly 74% of total solid-state sales in 1982. Shipments of integrated circuits are expected to increase 18% this year for a total value of $8.1 billion. Subsequent yearly increases, the forecast added, are expected to be between 22% and 28% with integrated circuits representing more than 80% of total solid-state sales by 1986.

As for discrete devices, the forecast predicted sales of $2.7 billion in 1983, a 9% increase compared with a year ago.

In his speech, Sanders cited specific areas of the industry that are expected to witness especially high growth rates over the next few years. Digital Cmos, he said, is expected to increase 33% in shipment

(Continued on Page 108)

CCI Betting on Office of Future For Success of Next Venture

By Bill Laberis
CW Staff

ROCHESTER, N.Y. — Can a company that has earned its fortune providing the telephone industry with computerized directory assistance systems make a dent in the hotly competitive office automation market?

The management at Computer Consoles, Inc. (CCI) is betting it can. And CCI is backing its bet with a belief that the office of the future will demand a full measure of fault-tolerant systems operating in a Unix-like environment.

Last month, the company announced the formation of its Office Systems Group, headquartered in Reston, Va., and led by 37-year-old former Intel Corp. executive John E. McNulty. Although the group will account for only about 10% of CCI's $70 million-plus revenues this year, company officials are confident that sales of office products will outstrip those from the telephone side within four years — while the telephone business continues to grow 25% per year.

"Of course the markets are very different," said Vaemond Crane, CCI president and chief operating officer, comparing the captive telephone market and the more competitive office automation arena. "But we'll be building off the technological experience we've gained with the phone companies. It's the applications that matter in the market."

To accomplish its heady office automation ambitions, CCI has endowed Office

(Continued on Page 112)

John McNulty

AMD Tops Record in Second Quarter

SUNNYVALE, Calif. — Earnings, revenues and new orders all topped previous records at Advanced Micro Devices, Inc. (AMD) in the second quarter, as the company reported earnings of $12 million or 21 cents per share on sales of $128 million.

The earnings tripled the earnings of the same period a year ago and represented a 50% increase over first-quarter earnings. Sales were up 49% over the $86 million mark posted the same period a year ago.

New orders in the period soared to $208 million, reflecting the renewed vitality within the semiconductor industry. Bookings at AMD more than doubled the pace set a year ago, the company reported.

W.J. Sanders III, president and chief executive officer, said, "The record new order activity, which remains at boom proportions, continued unabated through the traditionally slow summer months. Though initially led by personal computer manufacturers' need for microprocessors and related peripheral circuits, the recovery is now spreading to include our more traditional customers in the professional computation and communication universe in all geographic sectors of the market."

Zenith Data Inks Pact to Provide U.S. Air Force, Navy With Micros

GLENVIEW, Ill. — Zenith Data Systems Corp. has received a contract from the U.S. Air Force and Navy for delivery of up to 6,000 desktop microcomputers and associated peripherals and software over the next three years. The contract has an estimated value of more than $29 million.

Under the terms of the contract, Zenith will supply its Z-100 microcomputers, which will be integrated with other Department of Defense computer systems. The company will supply its dual 16- and 8-bit Z-100s, 60% of which will be equipped with Winchester disk drives, Zenith said.

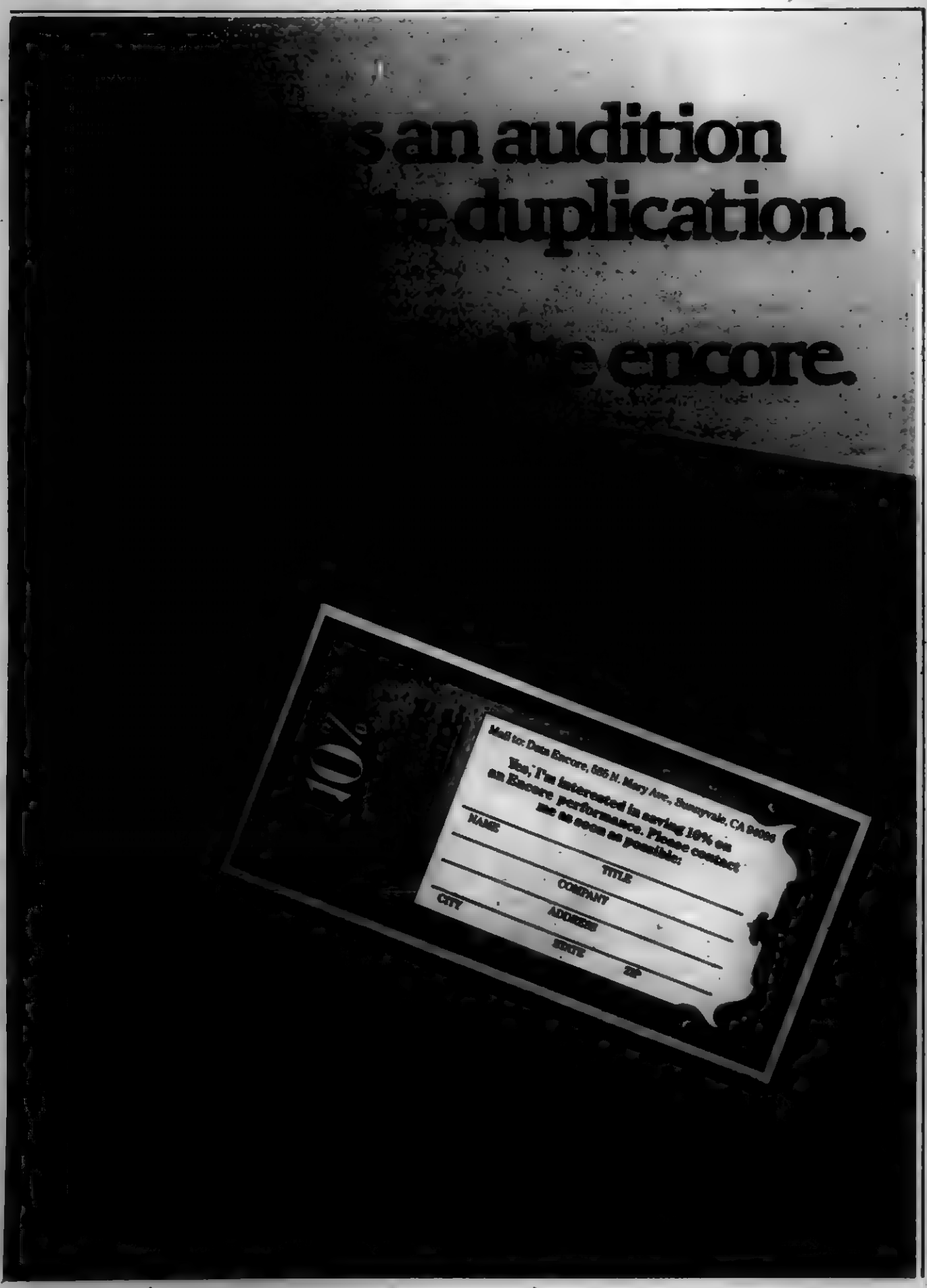
The Z-100 family of microcomputers was designed for financial management and other administrative applications and has been available commercially for a year.

Computer Consoles Group To Develop OA Products

ROCHESTER, N.Y. — Computer Consoles, Inc. has established an office systems group to develop integrated hardware and software products for the office market, the company announced recently.

The new division will be based in Reston, Va., and will build on the company's telphone systems technology to develop integrated information systems incorporating word and data processing, file management, electronic mail and administrative and decision support functions, according to a spokesman for the company.

Products from the division will have a number of features, the company spokesman said, including integrated software, the Unix operating system and fault-tolerant capabilities.



Semi Mart Predicted To Boom

(Continued from Page 107)

value during 1983, for total sales of $810 million, with subsequent yearly increases of between 40% and 43% through 1986.

Dramatic growth, he added, will also be seen in digital bipolar products with sales of transistor-to-transistor logic-Schotty logic large-scale integration (LSI) circuits expected to total $506 million in 1983, a 53% increase over 1982; sales growth for this product line, he said, is expected to increase between 34% and 50% per year through 1986.

"The demand for microprocessors and peripherals combining LSI/VLSI bipolar, MOS and Cmos technologies is the area of greatest potential for growth and represents a major shift in the marketplace. It is the domestic industry's area of greatest strength. We lead international competitors, and we must continue to make substantial research and development investments in order to retain our technological edge in the future," he asserted.

The SIA forecast said growth of semiconductor sales in the U.S. will continue to outpace that of Europe and Japan. However, Sanders voiced some frustration at the difficulties of competing in the Japanese marketplace. "Although industry shipments for Japanese consumption are forecast to grow at a modest rate year to year, we are by no means satisfied with our level of market penetration. While we have kept the doors open to Japanese manufacturers in good times and bad, Japan has closed its doors to us except in boom times," he complained.

Sanders said that while the Japanese market is estimated to grow from $4.5 billion to $8 billion over the next three years, the U.S. share of that market is expected to continue falling.

Japanese Seen Dominating Some DP Sectors by 1987

NEW YORK — Japanese manufacturers will dominate some sectors of the U.S. information processing market by 1987, according to a recent report from Frost & Sullivan, Inc.

The report, "Japanese Penetration into the U.S. Communications, Data Processing and Office Equipment Markets," says the U.S.-information processing market is under Japanese "attack" as relentless as the camera, automobile and stereo industries have already experienced. Fujitsu Ltd., Nippon Electric Co. and Hitachi Ltd. have captured nearly half the U.S. market for advanced memory chips not by dumping, but by providing high quality, the report stated.

The report forecasts enormous gains in market share by Japanese exporters in the following segments:

- Among CPUs, micros will feel the brunt of Japanese strength, as that nation's share of the U.S. market jumps from 1% in 1983 to 30% in 1987.
- Japan will capture 45% of the floppy disk drive market and 35% of dot matrix printers by 1987.
- In office products, Japanese manufacturers will increase their domination of the copier market from 80% to 95% and up their facsimile machine share from 54% to 85% in the 1983-87 forecast period.
- Heaviest communications market impact will be felt in the private branch exchange area, where Japan's share of the U.S. market will jump from 15% to 32%.
- Even software will feel the sting, as Japanese systems software captures 23% of the market by 1987, up from less than 0.5% today.

Detailed penetration forecasts are developed through in-depth analyses of the U.S. competitive climate today for mainframes, minis and micros, word processing systems, communications equipment and semiconductors, alongside corporate profiles of 11 leading Japanese companies and their joint ventures.

The study is available for $1,250 from Frost & Sullivan, 106 Fulton St., New York, N.Y. 10038.

USPS Gives EDS Net Contract

DALLAS — Electronic Data Systems Corp. (EDS) has been awarded a seven-year contract by the U.S. Postal Service (USPS) calling for an automated solution using a network of minicomputers and microcomputers to support functions associated with airborne mail. The contract is worth an estimated $200 million.

The cornerstone of the project is a process control system that will coordinate the tasks of dispatch, planning, weighing and coding of mail pieces and assignment to airline carriers, the company said.

The USPS moves an estimated 1.6 billion pounds of mail by air annually, and the imminent phasing out of the Civil Aeronautics Board places total responsibility on the USPS.

The first year of the contract is valued at $39 million, after which a six-year agreement for optional hardware and maintenance could increase the contract to the $200 million figure.

Commenting on the contract award, Gary J. Fernandes, EDS corporate vice-president, said, "Recognizing that productivity improvements have led to increased competition from the private sector, the Postal Service has massive plans to automate its services. Our task will be to help accomplish this goal by providing the system engineering, the equipment and the expertise to bring these elements together quickly and economically."

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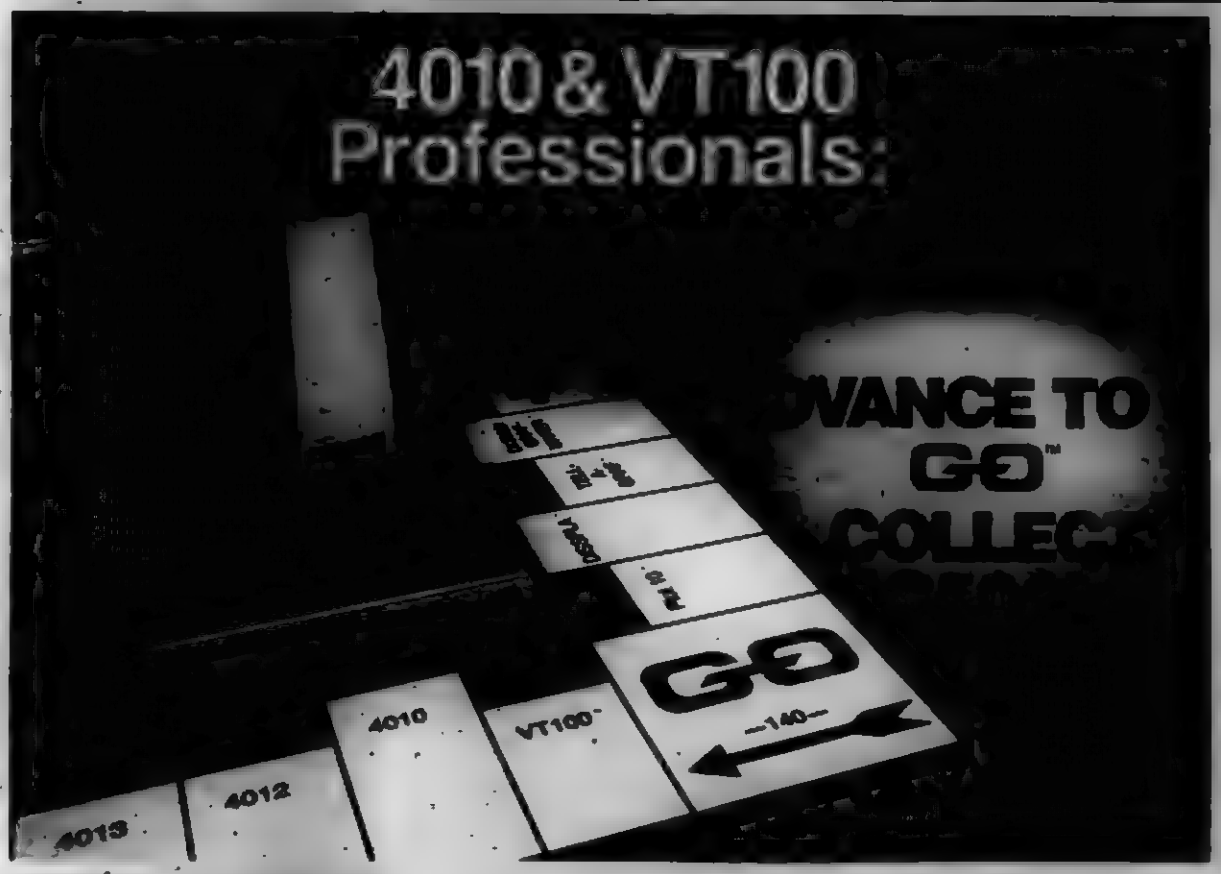

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Telecommunication Services

NCR, ICI Start Venture

DAYTON, Ohio — NCR Telecommunications Services, a subsidiary of NCR Corp., has entered into a joint venture with Interstate Communications, Inc. (ICI) of West Point, Ga., to market long-distance telephone, data transmission and other telecommunication services to businesses in major metropolitan cities in the U.S.

The new venture, Heritage Communications Corp., will build on the respective products of both companies in offering a range of competitively priced telecommunication services, NCR said. Heritage will offer ICI's Touch & Save long-distance service, which utilizes NCR's nationwide switching network.

The service is initially being marketed in the San Francisco area and will be expanded to New York in early 1984.

According to NCR Telecommunications President G. James Bracknell, Heritage "brings to the business telecommunication services market the expertise of a major computer manufacturer and a regulated telephone carrier ... to offer cost-effective ... telecommunications services to a broad range of business customers."

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Tek's new 4170 Local Graphics Processing Unit helps you conserve host power while you build on a central data base. The 4170 provides up to 896K RAM for CP/M-86-based standalone programming and pre- or post-processing on any 4100 Series terminal.

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Firms Take High Road To Scotland

(Continued from Page 107)

facility is currently being used for microcomputer assembly, with the rest of the plant being used as a final test and assembly facility for customized minicomputer systems.

Smith explained the Ayr facility is now being retooled for use as a microcomputer manufacturing facility. The first microcomputer to be produced at the site will be the low-end PC100, or Rainbow microcomputer. The plant will also produce the larger PC350 and the Decmate word processing system, Smith said.

DEC plans to begin its first shipments of microcomputers in the spring of 1984, Smith explained, so many of the 540 employees at the Ayr plant will be retrained to perform manufacturing, as opposed to testing functions. Wang Laboratories, Inc. is currently building an 85,000-sq-ft manufacturing facility on the campus of Scotland's Stirling University. Scheduled for completion by next May, the facility is being built mainly for assembly of the firm's Professional Computer, according to John Dolan, general manager of Wang Laboratories in Scotland. He said Wang manufactures larger systems at a similar assembly plant in Ireland.

Dolan said the Scotland facility will give Wang an advantage over Japanese manufacturers in supplying micros to the UK and Europe, because the Sterling plant also makes use of local suppliers.

All three projects are being aided with funding by the Scottish Development Agency, a government bureau aimed at attracting business ventures to Scotland. The agency offers financial incentives, such as grants, tax breaks and equity loans to established and start-up firms.

U.S. Semiconductor Success Linked to Broad Consensus

By Robert Batt
CW West Coast Bureau

SANTA CLARA, Calif. — The future success of the U.S. semiconductor industry will depend on the willingness of manufacturers to work together, according to Robert Noyce, vice-chairman of Intel Corp.

Speaking at the Seventh Annual Semiconductor Industry Association (SIA) Forecast Dinner here recently, Noyce said the common denominator for successful industry efforts in the past has been consensus.

"Our future success will depend on broadening this consensus and forging new constructive programs based on broader industry coalitions," he told his audience of 750 industry executives.

Characterizing this approach as "the coming of age for semiconductors," Noyce outlined a number of strategies and priorities to be followed over the next few years.

"We consider it imperative that the U.S. semiconductor industry gain true access to the large and rapidly growing Japanese market. Repeated efforts over the past 20 years have been frustrated, and the industry's approximate 10% market share hardly demonstrates the relative competitiveness of the two industries," he stated.

Noyce warned that if U.S. companies continue to be frustrated in their marketing efforts in Japan, the SIA will consider seeking legal remedies. "In our view, more is at stake here than the interests of the U.S. and Japan. If the U.S. can achieve an open and equitable bilateral trading environment, then this success model will be communicated to Europe and the Third World and, in due course, be emulated," he said.

Noyce also cautioned against "hard-liners" in the U.S. who want to place greater restraints on the export of sensitive high technology out of fear that it will get into Soviet hands.

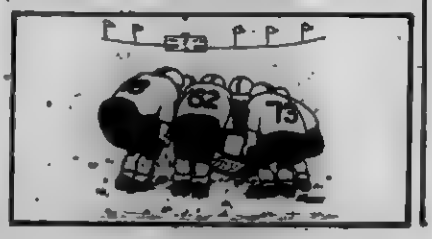
The SIA case, he argued, is embodied in the concept of a comprehensive operations license for multinational corporate technology transfers "based on corporate self-discipline rather than bureaucratic licensing controls."

On the contentious issue of the research and development tax credit, Noyce asserted it must be extended, made permanent and liberalized.

Of particular importance, he said, is increased tax credit for company contributions to university research, since, he claimed, a strengthened research partnership between industry and universities is essential.

"Antitrust exemption for joint research and development is necessary for the semiconductor industry to continue to expand its basic research activities and maintain world-class competitiveness. Individual firms cannot support extensive basic research because the 'capture ratio' of costs to benefits is uneconomic. Joint research expands the capture ratio," he contended.

Noyce said increased protection must also be afforded to intellectual property. No company, he maintained, will be willing to invest $50 million in new microelectronic research if predatory copies can duplicate the microcode and other critical design parameters and market the product at a fraction of the innovator's price. The SIA solution, he said, is to pass legislation that defines unauthorized copying as illegal under U.S. copyright laws.



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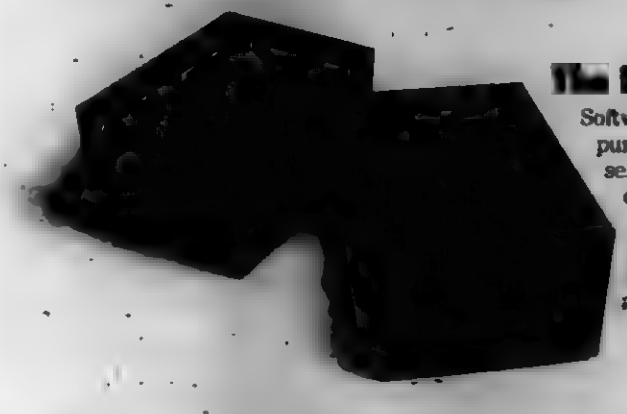

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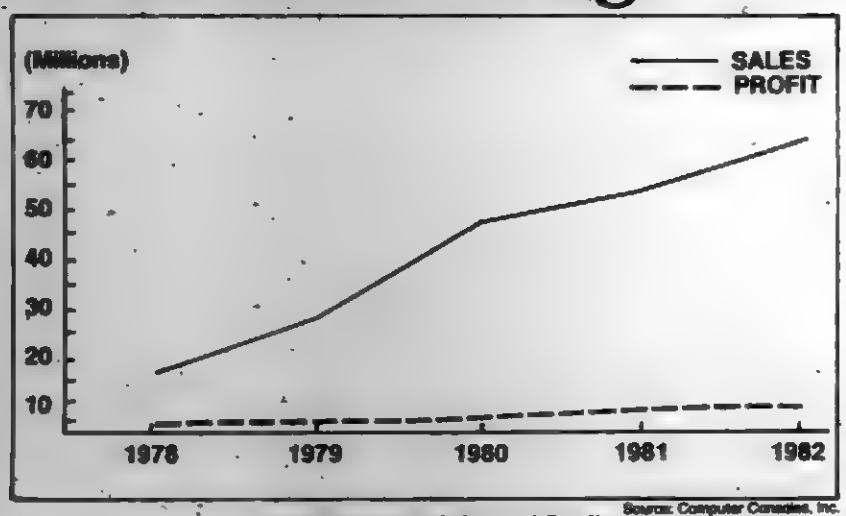

CCI's Five-Year Sales and Profit

(Continued from Page 107)

Systems with its dedicated sales force. Third-party distributors will handle the bulk of international sales, but the domestic sales force will provide the primary market thrust.

The sales force will initially target specific vertical market segments, such as the legal market, which CCI has already penetrated. The federal government is another prime target, which company officials believe will be among the first areas to embrace fully office automation as a means of cutting its labor-intensive overhead.

On the technology side, CCI is committed to its Unix-like operating software and fault-tolerant hardware base, powered by the Motorola, Inc. 68000 microprocessor. The Unix capabilities will allow CCI's users to pick and choose from the wealth of applications software written for Unix systems.

Office Systems' first product, Officepower, is aimed at the heart of the office automation market, integrating word processing, electronic mail, file management, telephone messaging and spreadsheets. Systems Network Architecture capabilities will also be provided so as not to exlude CCI from the formidable installed base of IBM.

In 1982, CCI spent a whopping 22% of revenues on research and development. Both the sales effort and CCI's product development will be bolstered by an $80 million stock issue planned for the end of the year.

But for all its ambitions and its healthy balance sheet (profit of $7.4 million on $63 million in sales in 1982), CCI remains in the minds of many familiar with it as another of the phone industry's captive suppliers. As company president Crane put it, "We need a lot more corporate visibility because we have a corporate image problem . . . Our strategy is to be niche-oriented — you can't be everything to everybody unless you're IBM."

The chore of changing this image problem will fall largely on the shoulders of McNulty, vice-president and general manager of Office Systems. McNulty emphasized that CCI is not moving away from its traditional strengths in making its office thrust, but merely applying a proven and transferrable skill to another, potentially more lucrative market.

Fault-tolerant capabilities will become a chief selling point for CCI's systems in the office market, McNulty said, as the number of computer users in the paperless office of the future grows. Declining costs of hardware will make it possible for users to purchase fault-tolerance capabilities at a 10% to 15% premium, he predicted.

CCI is spending "big bucks" in getting Office Systems up and running, McNulty said. "We really have all the flexibility of a start-up. We know this end of the business is not going to be easy."

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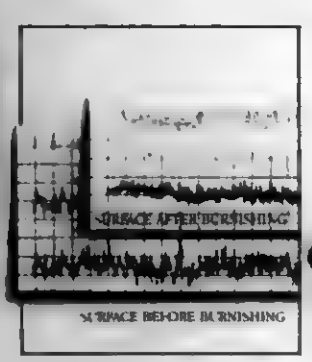

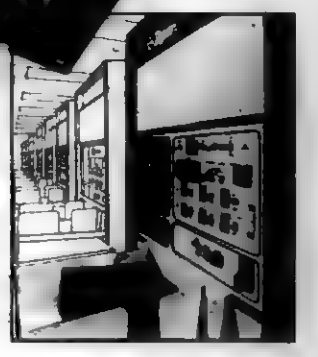

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Study: OA Units Not Being Mixed

NEW YORK — The number of vendors in office automation (OA) may change drastically over the coming decade, but the big names of today will remain the big names of tomorrow, according to a new study by Frost & Sullivan, Inc.

The report, "The Office Automation Market in the U.S.," indicates that customers are staying with their vendors' products rather than integrating different systems and soft-

The report forecasts that by 1992, annual OA purchases will increase to $37.6 billion from $6.8 billion in 1982 (in constant dollars).

The study is available for $1,275 from 106 Fulton St., New York, N.Y. 10038.

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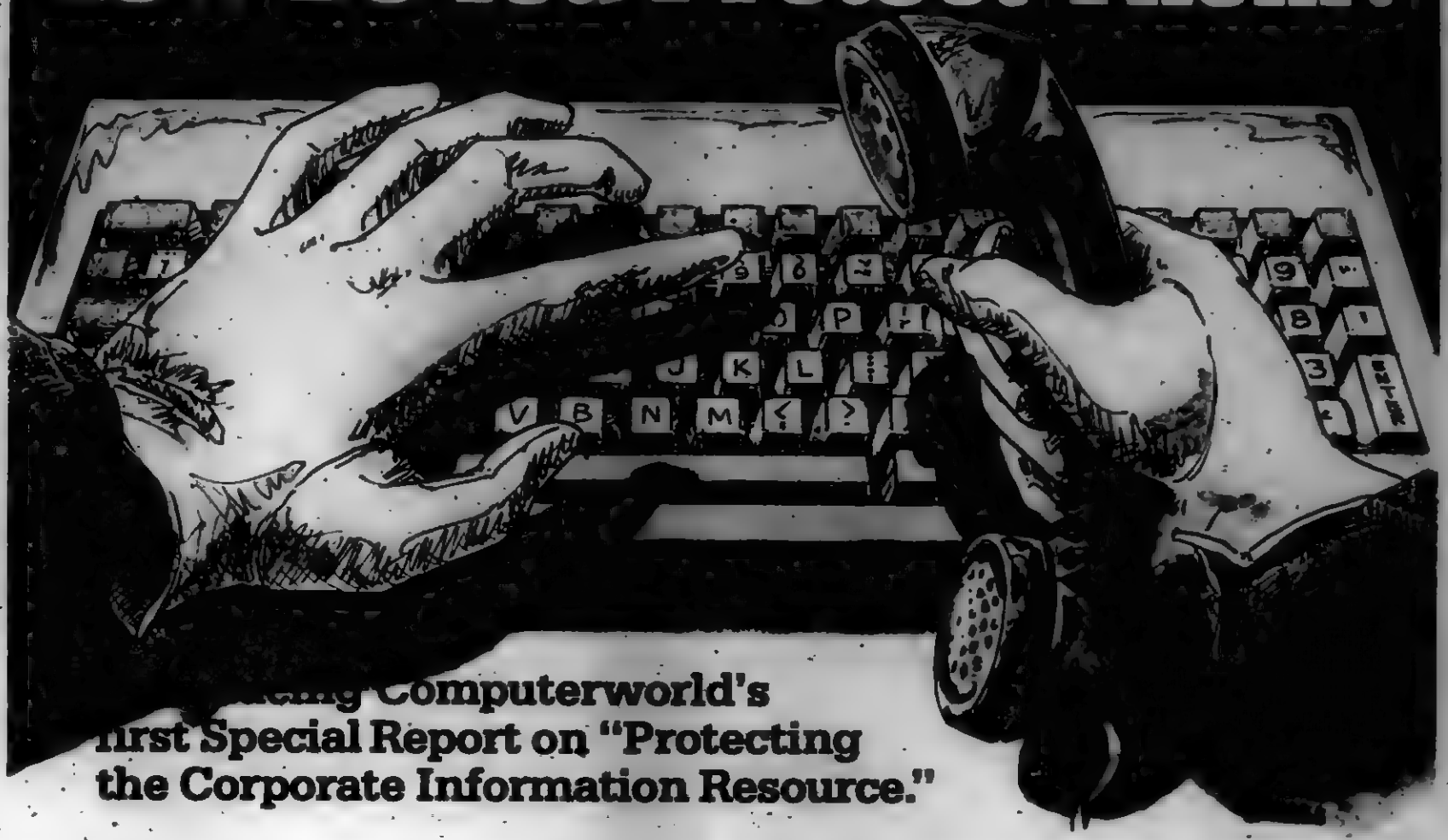

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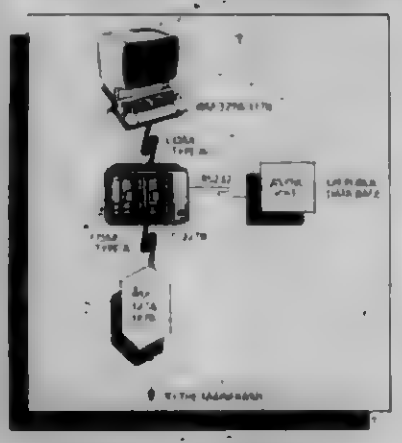

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Up close and personal, a technician checks the splicing of an optical fiber made by GTE Corp.'s elastomeric splicing system. The system, said by GTE to be faster and cheaper than any other fusion technique, will be shown at the upcoming Telecom '83 show in Geneva.

Exec: IBM Software Strategy To Change Significantly

By Robert Batt
CW West Coast Bureau

SAN FRANCISCO — IBM's software strategy is based on a gradual evolution that will add up to significant changes over the next 10 years, a software company executive said here recently.

Speaking at a conference to discuss IBM's future directions, Martin Sprinzen, vice-president of technical services at Candle Corp., said Big Blue's long-established MVS/370 architecture is dying a slow death and will be replaced by the new MVS/XA.

"Clearly MVS/XA is IBM's strategic operating system of the future, but by slowly evolving it, the MVS we will see in 10 years' time may be a lot different from the MVS of today," he told his audience of data processing professionals.

Need to Know Requirements

One of the problems with software development, he asserted, is that to forecast trends there accurately, pundits need to know what software users will require in five years' time. "The future is dependent to a large degree on human psychology."

However, he ventured, it is clear that IBM is moving toward running MVS more at the high end of its product range, while leaving low-end computing in the domain of VM.

Included among the problems Sprinzen cited for the demise of MVS/370 and the rise of MVS/XA were: virtual storage limitations, concerns by both IBM and users about the reliability of the 370 product, the greater number of devices that can be attached using MVS/XA and IBM's apprehension about the growing popularity of fault-tolerant computing systems from competitors such as Tandem Computers, Inc.

Conversion problems to the new architecture, he predicted, will be minimal. Further, XA will contribute greatly to the reduction of I/O bottlenecks, he said. "For example, using XA, each I/O function on the IBM 3380 will take 30% less time."

New releases of XA, he predicted, will be announced in quick succession by IBM and will feature full access method support and further virtual storage constraint relief.

"With the advent of MVS/XA, IBM is creating standard interfaces between various components. This will allow a user to change totally one side of a standard interface without changing the other side. In fact, by the end of the decade we may well see systems where operators are redundant except in dealing with critical breakdowns," he remarked.

This is not to say that MVS/XA will be without problems for users, Sprinzen stressed. The "human maintenance problem," he predicted, will get worse as more applications are added on-line. He warned that the security and integrity of data will also be of major concern, and there will be a greater use of encryption devices.

MVS/XA will also face competition, particularly from Japanese fifth-generation systems competing with some of the artificial intelligence functions that may run under MVS, Sprinzen predicted.

Future of VM

Turning to the future of VM, Sprinzen contended that VM/XA will not be a strategic software direction for IBM, although he predicted there will be VM/XA products to utilize more fully dynamic channel subsystems, 31-bit addressing facilities and quad processing.

He also suggested that IBM will keep VM more up to date with MVS in the future, with a MVS/VM interface, additional microcode assists and improved Systems Network Architecture support.

IMS, he added, will be taken in the direction of a totally integrated approach to distributed data bases, with the emphasis remaining on the high-end market and including 24-hour-a-day operations, quick restart facilities, production data bases and large networks using Vtam with up to 25,000 terminals.

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Purchase Decisions

Reliability of a machine, the available features or functions and ease of use are the primary influences on a purchase decision, according to "Office Automation Survey: Analysis of Acquisition and Use of Office and Communications Equipment" by Venture Development Corp. (VDC). Price is only a secondary factor when a company is selecting this equipment, the report found.

VDC cautioned manufacturers against the use of a "price pitch" to move advanced office products, even though such a tactic has strong short-term appeal. Few companies take the high road and emphasize product benefits, according to one VDC analyst, who added that far too many sell strictly on "price, price, price." One reason cited for an emphasis on price is the very real price declines said to have characterized electronics products. However, VDC suggested that rather than trying to generate enthusiasm simply because of these price declines, manufacturers should emphasize greater product value.

The report costs $1,850 from VDC, which is located at One Washington St., Wellesley, Mass. 02181.

Electronics on the Rise

Based on the numbers — a $13 billion domestic market still growing at nearly 12% a year — U.S. producers of electronic components may be tempted to envision a tide of unlimited potential sweeping them well into the 1990s, according to "U.S. Semiconductor & Other Electronic Components Markets" by Predicasts, Inc. Supporting this belief, the report predicted electronics will remain one of the world's fastest growing industries for at least another decade.

However, the firm cautioned, navigating the tide will become increasingly difficult. Increased foreign competition, tightening price pressures and ever-changing product requirements were cited as the chief

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reasons why producers will have to stay on their toes to remain competitive. Licensing agreements with foreign producers and technology sharing among U.S. companies reportedly are two ways domestic firms are preparing for the market share battle. Also, the government will be pressured to help U.S. producers remain competitive. But relatively free trade will result in a $10 billion trade deficit by 1995.

The study is priced at $1,400. Predicasts is located at 11001 Cedar Ave., Cleveland, Ohio 44106.

Processor Mart Hot

Communications and network processors have evolved to represent the most dynamic and lucrative segment of the explosive U.S. data communications industry. By 1986, this rapidly expanding market will top $1.5 billion, reflecting a compound annual growth rate of 21.2%, according to "Network Processors and Gateways" by Creative Strategies International, Inc. (CSI).

Although message-switching systems and network controllers represent the highest growth — and most sophisticated — segments of the market for communications processors, according to the report, the market's strength stems primarily from large-volume front-end and remote concentrator sales. However, the network controller and statistical multiplexers will compete with remote concentrators over the next several years, retarding the growth of that segment, the study said. In addition, CSI indicated that product distinctions are rapidly blurring as heightened competitive pressures lead to increased communications processor power and versatility, thus overlapping functions.

The report is available for $1,450 from CSI, Suite 275, 4340 Stevens Creek Blvd., San Jose, Calif. 95129.

IBM Tough on PCMs

IBM is getting tougher on European competitors who try to ride into the marketplace on its coattails with plug-compatible manufacturers' (PCM) equipment, according to "The IBM Market in Europe" by Frost & Sullivan, Inc. As such, the best hope for such suppliers lies in establishing a market niche in which they will be seen as providing more complete products than the market leader, the report said.

Behind this trend are shortened product life cycles and more aggressive marketing by IBM, Frost & Sullivan reported. Another spur is said to be increasing competition from Japan and the newly liberated AT&T Information Systems, Inc. operation, all of which is inspiring "intense activity in terms of product development, entry to new markets, more flexible pricing policies and a cooperative attitude toward secondary suppliers."

At stake is a market for DP hardware products worth nearly $6 billion in 1982 shipments, whose annual values are expected to pass $16 billion by 1987. Further, the report predicted that over $63 billion in equipment will be shipped over the 1983-87 period.

The study is priced at $1,600 from Frost & Sullivan, located at 106 Fulton St., New York, N.Y. 10038.

Pitney Bows Out Of WP Market

STAMFORD, Conn. — Three years after it entered the word processing market with the acquisition of Artec International, Pitney Bowes, Inc. has announced plans to discontinue its line of WP equipment due to operating losses suffered.

Canceling the line will result in a reduction of third-quarter earnings by more than $22 million or 57 cents per share, the company said.

Commenting on the decision, George B. Harvey, company president and chairman, said, "We can see a more profitable future . . . by increasing investments in our core businesses where we have strengths that give us major opportunities for excellent and sustained growth with improved profitability."

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Austria Looking for U.S. High-Tech Investment

By David Myers
CW New York Bureau

NEW YORK — The coalition government of Austrian Chancellor Fred Sinowatz has begun to fish for high-tech American companies to invest in the land of Mozart, Strauss and Freud.

Finance Minister Herbert Sacher, in New York recently for the opening session of the United Nations, met with reporters at the Metropolitan Club here and asked them to deliver his plea to U.S. companies in search of European manufacturing sites.

"Not manufacturing in the sense of assembly, but rather in the sense of research and development requiring a high degree of engineering and know-how," Sacher clarified. Austria boasts 70 technical colleges graduating 3,000 engineers a year, he said.

Austria thus joins Ireland and Scotland, two nations that got a jump on the rest of Europe, in campaigning for U.S. manufacturing investment in the Old World.

Sinowatz's government is dangling subsidized loans at 5% to 6% interest covering up to half the cost of a company's investment in Austria, as well as cash grants of up to $7,000 per job created plus tax deductions, according to Robert F. Karl, managing director of the Austrian Industrial Cooperation and Development Co.

The Austrian computer market is still small, Karl admitted — 1,200 mainframes and between 5,000 and 6,000 small to medium-size computers, with 85% of the equipment coming from the U.S. But that market is growing at a rate of 25% a year, he added.

"Austria is behind," Sacher allowed. "But we expect to catch up rapidly over the next few years."

Austrian citizens at the press gathering told *Computerworld* that while automatic teller machines are popping up throughout the country, most offices in Austria have yet to be automated.

No computers are at present being manufactured in Austria, though there is some semiconductor fabrication and passive component-making in the country, Karl said.

Sacher sang the praises of his nation's economy, saying "price stability is the motto of Austrian economic policy" and "the time lost in strikes can be counted in minutes."

But under questioning by reporters, Sacher acknowledged the Viennese government's policies restrict the flow of data between computers in Austria and computers in any other European nation.

"It's not protectionist. It's considered a protection of the individual against the misuse of data. However, the rules in Austria on data flow are so strict that even the government suffers. I am anxious to change this," Sacher said through a translator.

Micros Seen As Opportunity To Dispel Myth

By Robert Batt
CW West Coast Bureau

SAN FRANCISCO — Managers of information services should use the opportunity presented by the growth of personal computers to dispel the notion that data processing is sacred turf.

This was the message delivered to a group of DP professionals here recently at the Third Annual Conference on Personal Business Computers sponsored by the National Institute for Management Research.

Speaking at the conference on the subject of "MIS and DP Department Opportunities in the Personal Business Computer World," Mimi Will, professor of business and information processing at Foothill College, Los Altos Hills, Calif., said DPers have the choice of regarding personal computers as a problem or as an opportunity.

"One opportunity for MIS is to dissolve the notion that data processing is sacred turf and that there are 'haves' and 'have nots' regarding information," she asserted.

DP departments, Will added, must be far more willing to have individual interactions with end users.

"DP managers are in a position to manage change far more readily than end users because they have control over the corporate data base. If they give up these rights and privileges they will have lost the game to the [personal business computer] users.

"At the same time," she added, "DP professionals need to take many more risks than they have and follow their intuitive sense of what needs to happen rather than simply rely on a computer printout to make decisions. To do this will require feedback from end users, which means being willing to work with them on an individual basis," she stressed.

End users, she remarked, want fast solutions to problems; to implement effective responses, DPers must surround themselves with a strong base of people with different disciplines.

"The people problems relating to personal computers are the most critical ones to solve. MIS managers need policies which have widespread support among users, otherwise users will sabotage the systems in place and try to get around the ground rules," she warned.

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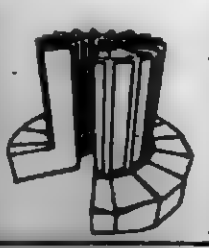

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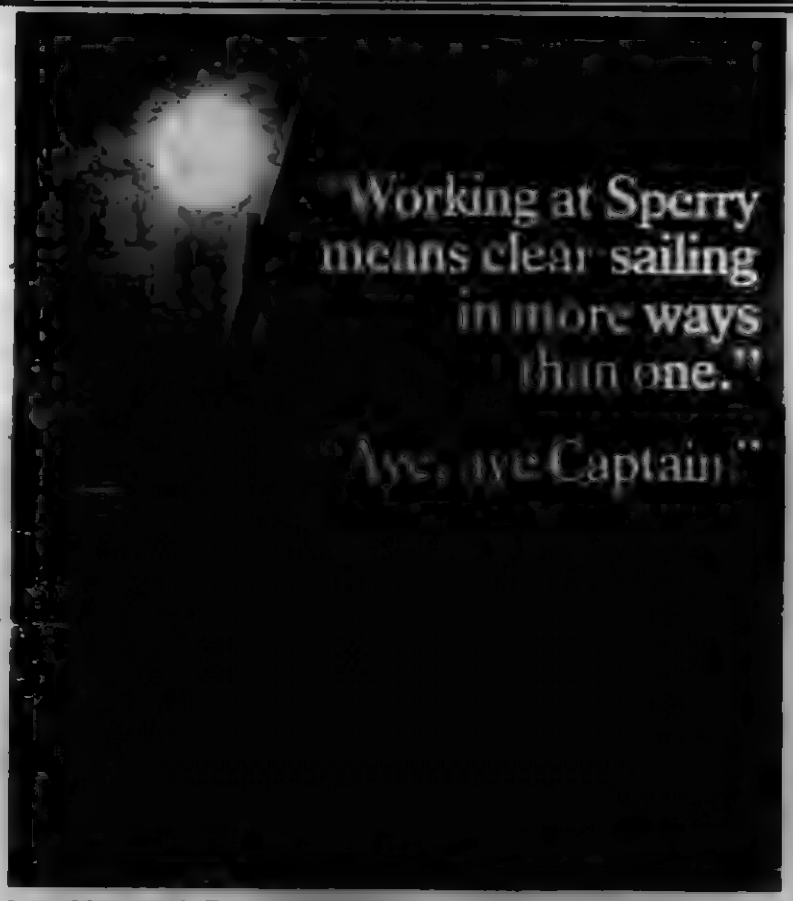

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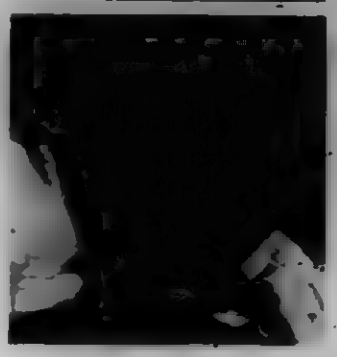

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IBM System/38 Programmer Analyst

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Managerial and technical position supervising the data processing function, including overall systems analysis and hardware/software evaluations. Requires B.S. in computer science, 5 years progressively responsible experience in computer programming and systems analysis and design. Minimum 2 years supervisory experience. Univac 90/40 computer. Reports to finance director. 1983 salary range $30,756 to $36,864 per year depending on qualifications. Apply by October 28, 1983 to:

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Ex-Cell-O Manufacturing Systems Company, a leader in the machine tool industry, is seeking a highly qualified person for the position of Software Systems Engineer. The successful candidate should possess 3-5 years experience with flexible manufacturing systems, software development and implementation. An appropriate degree is preferred. If you are seeking a challenging career with high growth potential in the machine tool industry we would like to hear from you. Send inquires to:

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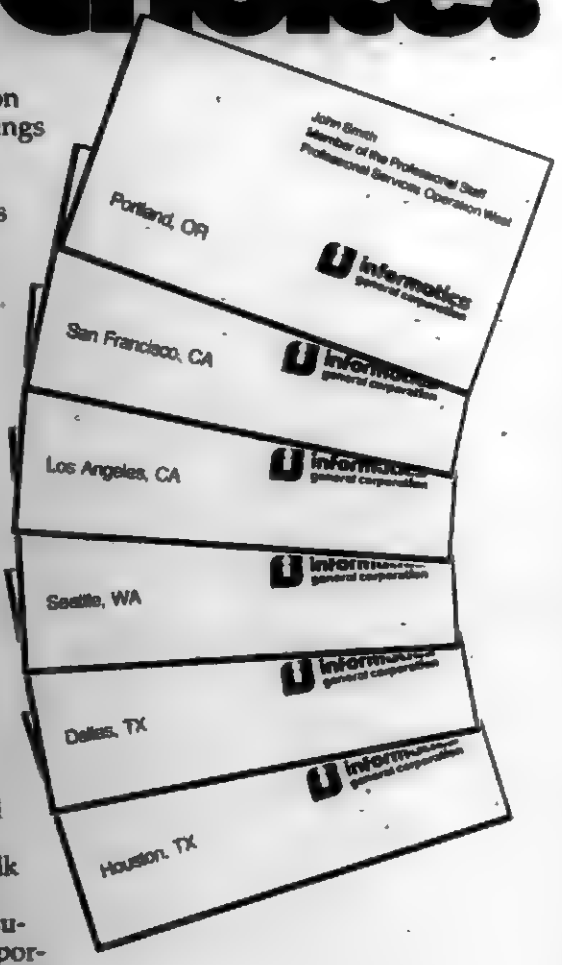

You can join Informatics' Professional Staff at the location of your choice. We have openings for DP Professionals with growth-oriented technical and consulting skills. Requirements include at least two years of experience on large-scale IBM systems using COBOL or PL/1. It's a plus if you also have experience in IMS, MARK IV or CICS.

Informatics has completed twenty successful years of providing professional services for systems development and consulting projects. Present activity includes development assignments on major state-of-the-art systems for a variety of application areas. The most advanced development techniques are emphasized for all assignments.

If you are interested in a professional career, pick a card for the location of your choice. Call toll free 800-527-4631 to talk with us. In Texas, call collect 214-669-0831. Or send your resume to Informatics General Corporation, 9441 LBJ Freeway, Suite 410, Dallas, TX 75243. We are an equal opportunity employer.

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We are searching for a person who will be able to perform sysgens on a VM/VSE System, install various program products, apply maintenance, prepare workload and diagnose problems. A minimum of 5 years' experience on IBM Mainframe and a working knowledge of Assembler is required. A degree in one of the sciences is preferred.

Programmer/Analysts

These positions require a minimum of 2-4 years experience to maintain in-place systems and to design and implement large new complex systems. Candidates must be able to provide systems and program guidance to functional/user areas. In addition, selected candidates will determine requirements, develop internal specifications, participate in coding, documentation and implementation.

All applicants must have knowledge of writing, testing and implementing programs of moderate complexity in COBOL preferably on an IBM 3031 Mainframe. More experienced candidates should have knowledge of project planning and control data base concepts. Knowledge of on-line and structured programming is desirable as well as familiarity with VSAM, CICS, DOS/VS, or DOS/VSE.

Combine your special personal and professional resources with a leader—StrideRite. If you have the talent and ambition it takes to fit into our dynamic team, send your resume and salary history to Tom McAuliffe, Sr. Personnel Administrator, at the address below. At StrideRite we'll give you all the growing room you need to fit you for success.

StrideRite

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You must be capable of preparing documents for management review and approval, contain oral and written skills for communicating with outside vendors and internal management. Predefined career objectives and a willingness to become involved in all aspects of teleprocessing (i.e., voice, data, fax, etc.) a must.

An understanding of Personal Computer's protocol conversion, CICS, JES, TSO, CMS, and NCCF operation is an additional. Future mobility into networking software a definite.

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Attn: Robert T. Kendra
P.O. Box 231
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EOE M/F

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- a clinical laboratory system,
- hospital and clinical pharmacy systems,
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All software is written in a compiled form of BASIC for a VAX 11/780 computer. Candidates should have a BS in Computer Science, Mathematics or an equivalent technical discipline and two to five years of experience.

Salary depends upon qualifications and experience. Send resume (if possible, grade transcript) to: Ms Joanne Fox, 1001 West 10th St., Indpls., IN 46202

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•SALES Excellent opportunities for exceptionally aggressive and creative Sr. Sales Representatives to assume responsibility for selling MODEL 204 Database Management System and related components. You'll be offering an excellent product in a rapidly expanding marketplace, with a highly incentive-oriented compensation plan with NO CAP. Positions are available in Houston, Los Angeles, Denver, Rochester, NY, New Jersey, Pittsburgh, Stamford and Hartford, CT, and Orlando, FL for professionals with a minimum of 3 years' successful experience selling IBM compatible software products. An International Sales position is also available, based in Cambridge, MA.

•PRODUCT SUPPORT Technical Consultants are needed to provide pre- and post-sales support for MODEL 204 DBMS. Your responsibilities will include pre-sales presentations, analysis of user requirements, benchmarks, customer training, and installation. These positions involve travel and may be based in Cambridge, New York, New Jersey, Philadelphia, Pittsburgh, Washington, DC, Dallas, Houston, Chicago, Los Angeles, and San Francisco. Requires experience in IBM Systems/Applications software, with emphasis on operating systems, database, and teleprocessing.

•INTERNATIONAL PRODUCT SUPPORT Key roles for talented individuals to assume direct responsibility for contributing to revenue growth and customer satisfaction through pre- and post-sales support of MODEL 204. You will participate in and direct proposal presentations, trials/benchmarks, analysis of user requirements, product installation, and customer training. Positions involve international travel, including Japan, Australia and Europe. Knowledge of database design concepts, hands-on applications experience, and marketing orientation are essential. Requires a minimum of 3-5 years' IBM Systems/Applications software background with heavy emphasis in operating systems, database (MODEL 204, IMS, IDMS, ADABAS, etc.) and TP (CICS, VTAM, TCAM, BTAM) Strong communication/presentation skills vital, foreign language skills a plus.

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•DEVELOPMENT Challenging opportunities for energetic and creative Sr. Software Engineers to design, develop and implement "features of the future" for MODEL 204 DBMS. Requires solid experience with IBM assembly language (BAL) and systems development, as well as knowledge of IBM operating system internals

•CUSTOMER SUPPORT We need polished professionals to provide technical support to customers for all MODEL 204 versions and related updates. You'll participate in design, development, and maintenance of various support-tool database applications, including occasional travel to customer sites to offer support and training. To succeed, you'll need a minimum of 2 years' experience in User/Customer support, with solid knowledge of DBMS, JCL and IBM applications, or strong systems experience. Good interpersonal and communication skills are essential. BS in Engineering or Computer Science or equivalent preferred

•SOFTWARE QA An exciting opportunity to get involved with developing test plans and procedures, creating test tools, and assisting the development staff in testing new releases of the world's fastest growing DBMS. You'll also participate in developing Development & Technical Services Department standards. A minimum of 1-3 years' DBMS experience is preferred, and background in a vendor environment is ideal. Software QA experience and BS/MS in Computer Science or equivalent required

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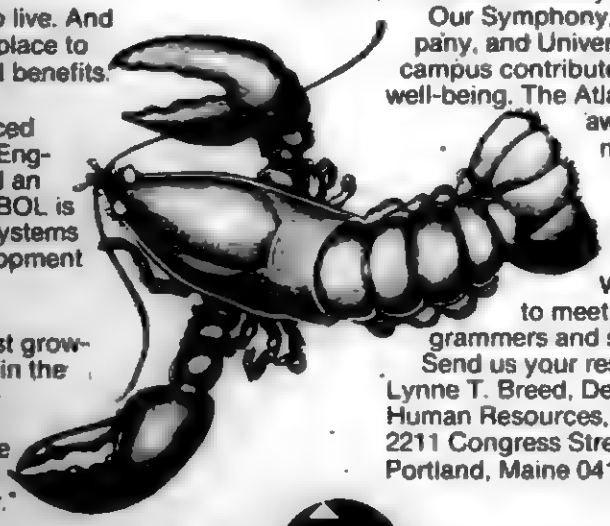
Unionmutual is one of the fastest growing life insurance organizations in the country, a Fortune 50 insurance company with over $3 billion in assets. And for seven years, we've sold more Long Term Disability coverage than any other insurer.*



A dynamic city
Portland, our home office location, has seen remarkable growth including a $5 million public library, a new Art Museum Building, and the Cumberland County Civic Center. Our Symphony, Stage Company, and University of Maine campus contribute to our cultural well-being. The Atlantic is seconds away, skiing minutes away and Boston only two hours away.

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We're anxious to meet crackerjack programmers and systems analysts. Send us your resume. Write to Lynne T. Breed, Dept CW-10/83 Human Resources, Unionmutual, 2211 Congress Street, Portland, Maine 04122.

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Jack Edwards Associates

INFORMATION SYSTEMS PROFESSIONAL

International firm providing full service information systems consulting has an opening in Salt Lake City for an experienced information systems professional. Position requires a mix of technical, managerial and marketing skills. The ideal candidate would have large systems experience, business systems planning experience, knowledge of state-of-the-art office automation requirements, and strong project management skills. Advanced degree and experience in proposal preparation would be a definite plus. Submit resume and salary history to M. Barrett of Arthur Young, 50 South Main, Suite 1400, Salt Lake City, UT, 84144 or call 801) 328-7711

SYSTEMS PROGRAMMER/ DATABASE MANAGER

Michael Reese Hospital and Medical Center, a leading Chicago health care and research institution is currently seeking a seasoned professional to provide systems programming and database support for our large-scale online Hospital Information System. This high-visibility position will provide technical and planning support for our TECHNICON medical information system.

The qualified candidate will have experience in the generation and maintenance of the DOSVSE operating system as well as hands-on experience with the TECHNICON system. In addition, familiarity with 4300 series hardware, DOSVSE utilities, and performance tuning is required. VM experience is a definite plus.

Michael Reese offers an excellent salary and benefit package in addition to the challenges and rewards of this unique opportunity. Interested candidates should submit a confidential resume and salary requirements to:

Anne Brill
Employment Manager
Michael Reese Hospital and Medical Center
Lake Shore Drive at 31st Street
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CUSTOMER REPRESENTATIVE.

Harris Corporation is seeking a Customer Representative for the Corporate Information Center. The position offers an opportunity to expand one's skills in systems analysis, project management, and managing customer accounts for the Center. We require 4 or more years with a large scale MVS or VM Information Center, involved in business programming or systems analysis. Familiarity with JES3, TSO, or VM/CMS is required. Knowledge of FOCUS, SAS, IDMS, IFPS, INFO or similar packages is an advantage. Bachelor's degree is required with an MBA a plus.

Located on Florida's Space Coast, Harris Corporation is Florida's largest industrial employer. You will earn a nationally competitive salary as a member of our highly professional team. For confidential consideration, please forward your resume to: **Information Center Staffing, Harris Corporation, Melbourne, FL 32919.**

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(ANTICIPATED OPENINGS FOR COMPUTER PERSONNEL)

SYSTEM NETWORK COMPUTER CENTER

PROGRAMMER/ANALYSTS. Beginning level. College degree (or equivalent experience) in an area relating to data processing. Upper level. Must have facility in Basic Assembly Language and FORTRAN plus strong programming background. Preference will be given to applicants with experience in microcomputers, supervisor computers (e.g., VAX's), VM/CMS, and MVS/TSO.

SYSTEM PROGRAMMER. College degree in an area with strong analytical requirements. Preference will be given to applicants with experience in interfacing MVS operating systems to supervisor systems (e.g., VAX's) and in general support of supervisor systems.

Send confidential resumes by October 31, 1983, to:

Dr. John M. Tyler
System Network Computer Center

PERSONNEL INFORMATION SYSTEMS

ASSISTANT TO DIRECTOR FOR PERSONNEL INFORMATION SYSTEMS. Bachelors degree in Business Administration or related fields with extensive computer experience, preferably in higher education administration. Equivalent experience in personnel information computer processing may be substituted for Bachelors degree. Competence in computer programs languages required, preferably in SAS, BQL, MARK IV, and/or COBOL. Good communication skills a must. Salary is commensurate with qualifications. Send resume by October 31, 1983, to:

SEARCH - ASSISTANT TO DIRECTOR
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Analyst Programmer—Requires BS in Computer Science, Mathematics or related area. Must have minimum 3 years experience using FORTRAN and COBOL in a financial, statistical project environment. We are seeking a self-starter who will be a project leader in the client, project support area.

Applications Programmer—Requires AAS or BS in Data Processing or Computer Science with 2 years experience in a FORTRAN and COBOL application environment. Must have data base background. Duties include detail program design, program coding, testing and documentation. Univac 1100 experience a plus.

Systems Programmer—Requires BS in Computer Science or Engineering with minimum 2 years experience on DEC VAX equipment. Duties include performing system manager functions on multiple DEC VAX systems by providing technical support on VMS and other DEC software [illegible].

Microcomputer Coordinator—Expansion of microcomputers in the firm require the addition of an individual with minimum 2 years experience using mainframe and microcomputers. Experience to include application of microcomputers involving engineering and/or financial problems. Must have a BS in Computer Science, Engineering or Economics. Knowledge of FORTRAN and BASIC a must.

We offer competitive starting salaries and a comprehensive benefits package. For confidential consideration, send resume with salary history to C. S. Martens, Black & Veatch, Engineers-Architects, P.O. Box 8405, Dept. CW1010, Kansas City, Missouri 64114.

Black & Veatch Engineers-Architects

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Interested applicants should send resume to Personnel Director, 4200 Congress Ave., Lake Worth, Florida 33461.

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Maintenance Technician
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Our current multi-system network consists of 2 IBM 3033's, a 3083 and a future 3081. We're running MVS, VM and OS/VS1 with SNA, VTAM, CICS, NCP, NCCF/NPDA. We also have IBM Personal Computers, remote printers and remote 3705 terminals.

Requirements for this position include experience with VTAM internals, NCP internals and the ability to read MVS Dumps.

For more information call Dave Ward at **(800) 538-8460, extension 4736** from outside California. From California call **(408) 749-4736 COLLECT.** Or send your resume to **Advanced Micro Devices, Dept. CW-1017, MS-67, 901 Thompson Place, P.O. Box 3453, Sunnyvale, California 94088.** An equal opportunity employer.

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American Airlines

DATA PROCESSING PROFESSIONALS

To maintain our position as a leader in the airline industry requires the best professionals available. We have the following immediate and future openings at the designated locations.

PARS/ACP Programmer Analysts

Position requires one or more years programming experience in a PARS/ACP environment, a good working knowledge of assembler language and airline control/PARS concepts. A working knowledge of SABRETALK is desired. Responsibilities include problem analysis, program specifications, coding and testing of SABRE application software supporting marketing and flight systems.

Degree preferred. Openings exist in Tulsa and Dallas.

IMS Programmer Analysts

Position requires one or more years of IMS applications development experience using structural methodologies preferably Yourdon. Responsibilities include problem analysis, development of program specifications, coding, testing, and documentation preparation. A good working knowledge of IMS, PLI and JCL required.

Degree preferred. Openings exist in Tulsa and Dallas.

Data Base Analysts/Support

Position requires three years program and design experience and minimum of one year DBA physical/logical design experience. A degree is preferred as well as experience in TSO/SPF and IMS utilities.

Openings in Tulsa.

ACP/TPF Systems Programmers

Position requires three or more years experience in ACP/TPF operating systems internals and indepth knowledge of assembler language, VM/CMS required. Responsibilities involve development of state of the art ACP/TPF enhancements, Applications Development tools, and Data Base Support utilities. Provides support to a multiprocessor, ACP environment.

Openings exist in Tulsa.

VM Performance Analyst/Capability Planning

Position requires two years experience in VM software or VM performance management, and working knowledge of VM/370 system software. Good written and oral communication skills, and a degree are desired. Responsibilities involve the analyzing, monitoring and establishing the workload guidelines for VM processor complex.

Openings exist in Tulsa.

Engineers, Communication Systems

Openings exist in two areas. The respective qualifications are:

One year minimum experience in Process Control with a knowledge of Forth, and two years experience with minicomputer hardware and assembler language required. Knowledge of DEC and CAI preferred. Positions involve engineering airline automated baggage systems.

Three years experience with Communications Network Design. Knowledge of Asynchronous, Synchronous, Protocols and SNA/SDLC required. Positions involve engineering new communications systems including design testing and implementation.

Both positions require two years technical writing experience including functional specs, acceptance tests and evaluation reports. Degree in field of Data Processing or Telecommunications desired.

Positions are located in Tulsa.

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Experience with medium and high speed data circuits and related equipment supporting a large on-line telecommunications system is required. Successful candidates will work with all types of analog and digital test equipment including the latest automated test facilities utilizing micro processor equipped modems supporting a large on-line data communications system.

Openings exist in Tulsa, Los Angeles, Cincinnati and Hartford.

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Personnel Resources
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California Federal, one of the nation's largest financial institutions, has immediate openings for high-caliber technical support personnel. Our systems include multiple Sperry 1100/80 and IBM 3083 computers, installed at our new Service Center in Rosemead, California.

Advanced Software Specialist (OS-1100) Provide operating system support to Sperry 1100/80 computers. Experienced in SYSGEN's, TCF application, and panic dump analysis.

Advanced Software Specialist (CMS/TELECON) Provide TELCON support to five 95 Sperry DCP/40's, controlling 100+ branch network and 300+ in-house terminal system. Experienced in TELCON and CMS support.

Transaction Processing Group Leader Minimum of six years' maintaining or enhancing Sperry 1100 Control Software. Fluent in COBOL and 1100 Assembler. Minimum of two years' technical supervisory experience.

Data Base Group Leader Experience with hierarchical data base management systems in a large business environment. Minimum two years' technical supervisory experience required.

Senior Data Base Specialist (DMS-1100) Minimum of four years' experience using and maintaining DMS-1100. Experience with IBM data base products desirable.

Senior Systems Programmer (CICS) Three to five years' systems and programming experience in current CICS software products, such as CICPARS, DLI, MRO, BC, PA II, OMEGAMON CICS. Experience in network products such as ACF/VTAM and ACF/NCP a plus.

Applications Support Analyst Provide technical support to applications programmer/analysts. Heavy COBOL experience in a transaction processing/data base management environment required. Responsible for second-level problem resolution.

Senior Programmer Analyst Responsible for host-to-teller machine interfaces. Minimum four years' COBOL programming experience. Knowledge of a major vendor's Assembler is desired.

Programmer/Analyst Responsible for host-to-teller machine interfaces. Minimum two years' COBOL programming experience.

Senior Hardware Specialist Assist the supervision of all installation and maintenance activities. Extensive knowledge of Sperry (1100 series) or IBM large-scale, multiprocessor hardware configurations, lay-outs, and diagnostic techniques mandatory.

Senior Performance Analyst Experience with System Control Software on Sperry 1100 or IBM 303X systems. Solid performance analysis experience which includes the use of system modeling.

Advanced Software Specialist (MAPPER) Provide MAPPER support, including MAPPER GENs. Plan, test, and implement new releases of MAPPER, and other system processors, as assigned. Knowledge of COBOL, SSG, and ASM required.

Manager, Network Department Responsible for the design and maintenance of a network supporting nearly 1,000 devices. A management track record, with a minimum of 6 years' experience in DP communications is mandatory.

If you are qualified and are interested in working in a dynamic and professional environment, we would like to talk to you.

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Software Company
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Candidates, preferably muslims will be required to travel throughout SAUDI ARABIA. Both positions are offered on a one year-contract basis, attractive tax free salary and free accomodation. Applicants should send resume including address and telephone numbers of references together with copies of diplomas to the following:

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At the Corporate level you will provide direction for the introduction and installation of newly developed hardware, and also give work guidance to the Equipment Planning Department. Requires 5-8 yrs. DP experience, which must include central processors, capacity planning, equipment acquisition, configuration design, development of EDP equipment plan, financial analysis, and knowledge of 370 systems architecture.

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Jackson County, OR. Salary Range: P/A $17,282 - $22,468. SA $24,034 - $28,275. P/A requires Bach. degree and 1½ yrs. exp. SA requires Bach. Degree and 3 yrs. exp. Prefer IBM System 36 and RPG III training and exp. Scope includes analyzing, designing, programming and maintaining user applications. Ability to coordinate and communicate with user is critical. Send resume to **County Administrative Office, Jackson County Courthouse, Medford, Oregon 97501** EOE. Deadline: Open.

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Gaston County, NC, population 165,000, is now recruiting for a Data Processing Director. This position requires extensive experience in Data Processing Management, including experience in Systems Analysis, Computer Programming, and Computer Center Operations using Burroughs computers in a state or local government environment. Graduation from a 4-year college or university, with a degree in Computer Science or a related field, or an equivalent combination of experience and training. Salary is $30,800 with good fringe benefits. Closing date November 9, 1983. For further information or send resume to: Mrs. Elena McCarley, Personnel Director, P.O. Box 1578, Gastonia, NC 28053-1578. Telephone (704) 866-3844. EO/AA employer.

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IBM environment: MVS/TSO, VM/CMS, IDMS DB/DC, SAS, and FOCUS.

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The qualified candidate will have 3-5 years programming experience with some design and analysis exposure. Some working knowledge of IBM 30XX, TSO IDMS, FORTRAN, COBOL and Statistical and Mathematical programming is required. A Bachelor's degree in a quantitative field is a must.

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Candidates for this position should possess a Bachelors degree in design architecture (or equivalent), with 3-5 years CADD supervisory or program development experience including a thorough knowledge of CADD design processes. Excellent interpersonal communication skills with the ability to motivate and direct this function within a collaborative participative environment is vital for success. Position also requires frequent contact with vendors, developmental and service personnel.

CADD
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Reporting to the Program Manager, this position is responsible for planning, developing and implementing CADD support software within the marketing CADD program. The Analyst will insure current and long term hardware needs, serve as the primary point of contact for user design personnel, and coordinate communication with CADD vendors for all hardware and software needs. Trains and assist CADD design administrators and analysts in programming and system procedures, and in addition maintain thorough familiarity with state-of-the-art CADD hardware and software technology within the industry.

Candidates should possess a Bachelor's degree in computer science, business administration, mathematics (or equivalent) and 3-5 years CADD related systems design background. Design or architectural experience preferred with the ability to relate to all levels of management and staff.

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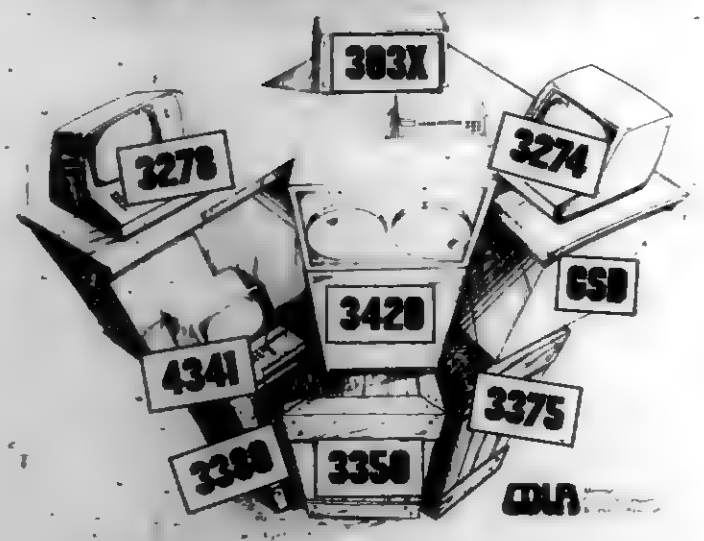

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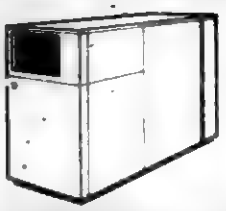

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1. Title of Publication: Computerworld
2. Date of filing: October 3, 1983
3. Frequency of issue: weekly, except: February (5 issues), April (5 issues), May (5 issues), June (5 issues), August (7 issues), September (5 issues), October (7 issues), November (6 issues), December (4 issues) and a single combined issue for the last week of December and the first week of January.
3a. No. of issues published annually: 53
3b. Annual subscription price: $44.00
4. Location of known office of publication: 375 Cochituate Road, Box 880, Framingham, MA 01701 (Middlesex County).
5. Location of the headquarters of general business offices of the publishers: 375 Cochituate Road, Box 880, Framingham, MA 01701.
6. Names and addresses of the publisher, editor and managing editor: Publisher, Patrick J. McGovern, 5 Speen St., Framingham, MA 01701 Editor, John C. Whitmarsh, 375 Cochituate Road, Box 880, Framingham, MA 01701. Managing Editor, Rita Shaor, 375 Cochituate Road, Box 880, Framingham, MA 01701.
7. Owner: International Data Group, 5 Speen St., Framingham, MA 01701.
8. Known bondholders, mortgages and other security holders owning or holding 1% or more of total amount of bonds, mortgages or other securities: International Data Group, 5 Speen St., Framingham, MA 01701.
9. For completion by nonprofit organizations authorized to mail at special rates: Not applicable.
10. Extent and nature of circulation:

	Average No. Copies Each Issue During Preceding 12 Months	Actual No. Copies of Single Issue Published Nearest to Filing Date
A. Total number of copies printed (net press run)	133,631	136,789
B. Paid circulation		
1. Sales through dealers and carriers, street vendors and counter sales	None	None
2. Mail subscriptions	122,416	124,811
C. Total paid circulation	122,416	124,811
D. Free distribution by mail, carrier or other means, samples, complimentary and other free copies	7,264	8,345
E. Total distribution (Sum of C and D)	129,680	133,156
F. Copies not distributed		
1. Office use, left over, unaccounted, spoiled after printing	3,951	3,613
2. Returns from news agents	None	None
G. Total (Sum of E, F1 and 2 — should equal net press run shown in A)	133,631	136,789

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Computerworld can be purchased on 35 mm microform through University Microfilms Int. Periodical Entry Dept. 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. Computerworld's indexed: write to Circulation Dept. for subscription information.

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All statistics compiled, computed and formatted by TRADE QUOTES INC. Cambridge Mass. 02139

CLOSING PRICES WEDNESDAY, OCTOBER 12, 1983

	1982-83 RANGE (1)	CLOSE OCT 12 1983	WEEK NET CHANGE	WEEK PCT CHANGE
COMPUTER SYSTEMS				
ALPHA MICROSYSTEMS	24 13 1/2	13 1/2	+ 1/2	+3.8
ALTOS COMPUTER SYST	8- 28	6 1/2	- 1/2	-12.0
ARDAC, CORP	8- 30	16	- 1/2	+2.7
APPLE COMPUTER INC	78- 82	23 1/8	- 3/8	+0.1
AT&T	60- 70	64 3/4	-1 1/4	-1.5
BURROUGHS CORP	28- 94	93 1/4	+ 5/8	+1..
COMPUTER AUTOMATION	7 7	7 5/8	- 3/8	-4.8
COMPUTER CONSOLES	8- 28	18 3/4	- 1/2	-2.5
CONTROL DATA CORP	74- 82	91 1/8	+ 3/8	+0.7
CONVERGENT TECHNOL	19- 41	19 1/8	-3	-13.9
CRAY RESEARCH INC	20- 92	48 5/8	+4 1/8	+9.2
DATA GENERAL CORP	24- 82	74 7/8	- 1/8	+0.1
DATAPOINT CORP	11 36	29 7/8	-1 1/8	-4.1
DIGITAL EQUIPMENT	82-132	100 3/4	+1 1/4	+1.2
ECCO INC	8- 18	15 1/4	- 1/2	-3.2
ELECTRONIC ASSOC.	9- 15	9 3/8	+ 3/8	+9.1
FLOATING POINT SYST	18- 44	36 3/8	+2 3/8	+3.9
FOXBORO	22- 62	37 1/2	+ 3/4	+2.0
GENERAL AUTOMATION	5- 16	11 3/8	+ 5/8	+5.8
GOULD INC	21- 44	31 3/8	+ 3/4	+2.2
HARRIS CORP	20- 51	37 7/8	-1 1/8	+0.3
HEWLETT-PACKARD CO	27 48	41 3/4	- 1/4	+0.6
HONEYWELL INC	60-131	126 3/4	+1 1/4	+0.8
IBM	97-134	132-3/8	+1 1/2	+1.1
IPL SYSTEMS INC	8- 18	7 1/2	- 1/8	-3.2
LANIER BUSINESS PROD	12- 21	19 1/2	+ 1/4	+1.3
M/A-COM INC	22- 38	28	- 3/4	-2.6
MADISON COMP SYSTM	2- 5	7/8	0	0.0
MANAGEMENT ASSIST	7- 18	12	+ 3/4	+6.6
MATSUSHITA ELEC(ADR)	47- 73	74 7/8	-2 1/2	-3.2
MEDUSA COMPUTER SYS	8- 16	9 3/4	-1 3/8	-12.6
MOHAWK DATA SCI	10- 18	14 3/8	- 5/8	-4.1
MOTOROLA INC	82-148	141 3/8	-2 1/8	-1.5
NAT L SEMICONDUCTR	22 60	55 1/2	+ 7/8	+1.6
NCR	28-135	122 1/2	+2 1/2	+1.0
PERKIN ELMER	17- 37	34 7/8	- 5/8	-1.7
PRIME COMPUTER INC	11- 30	16 3/4	- 1/8	+0.7
SPERRY CORP	21- 47	45	-1	-2.1
TANDEM COMPUTERS INC	14- 38	38 1/8	- 3/8	-1.0
TANDY CORP	37- 65	38 1/4	+ 1/8	+0.3
TELEVIDEO SYSTEMS	14- 61	14 1/8	-3 3/4	-20.9
TEXAS INSTRUMENTS	71-170	122 7/8	+6 7/8	+5.9
VECTOR GRAPHICS INC	3- 14	3 7/8	+ 3/8	+26.0
WANG LABS "B"	13- 62	38	+2 1/8	+5.9
WANG LABS "C"	13 62	37	+1	+2.7
XEROX CORP	39- 56	48 1/8	+3	+6.8
LEASING COMPANIES				
BOOTHE FINANCIAL CP	11- 28	24	+5 1/4	+7.0
CORDISCO INC	7- 42	24 1/4	-14 3/8	-37.2
CONTINENTAL INFO SYS	3- 15	10 1/2	-1 3/4	-14.2
DPF INC	5- 13	12 3/4	- 7/8	-6.8
U.S. LEASING	18- 47	38 1/8	- 3/4	-1.9

	1982-83 RANGE (1)	CLOSE OCT 12 1983	WEEK NET CHANGE	WEEK PCT CHANGE
SOFTWARE & EDP SERVICES				
ADVANCED COMP TECH	1 0	0	0	0.0
ADVANCED SYSTEMS INC	6- 22	19 3/4	+ 3/8	+46.0
AGS COMPUTERS INC	7- 22	20 5/8	+1 1/8	+4.7
AMERICAN SOFTWARE	2(23)	23	-2 3/4	-8.8
AMICOM INC	9- 20	9	- 7/8	-8.8
BASIC/FOUR CORP	9- 22	13 1/4	-2	-13.1
APPLIED DATA RES.	6- 39	32 3/4	+1 7/8	+6.1
ASK COMPUTER SYSTEMS	8- 21	18 1/2	1/4	-1.3
AUTOMATIC DATA PROC	21 44	39	+1 3/8	+3.7
BGS COMPUTER ASSOC	5- 17	15 1/2	7/8	-5.3
COMPUTER ASSOC INT L	6- 35	28 3/4	- 1/4	-1.0
COMPUTER SCIENCES	8- 24	13	+1	+8.3
COMPUTER HORIZONS	4- 10	9	- 1/8	-1.7
COMPUTER VISION	11 37	18 1/8	+ 1/2	+2.8
COMPUTER TASK GROUP	4 12	10 1/2	- 1/8	-1.2
COMPUTER NETWORK	2- 22	12 1/2	-3 1/8	-18.4
COMPUTERVISION	6- 18	8 1/2	-1	-10.3
COMPUTER CORP	7- 26	8	- 1/4	-3.0
COMPUTRONE	7- 13	10 7/8	+ 1/8	+1.1
[illegible]	12 51	50 1/8	2 1/4	+5.4
DATA 3 SYSTEMS INC	3- 27	22 4/8	0	0.0
DIGITAL DATA SYST	4- 47	41	+1 1/2	+3.7
ADGEN SYSTEMS INC	29- 53	42	-8 1/8	-15.1
[illegible]	41 44	43 1/8	-2 1/8	-3.8
SYS 2 38	30- 68	60 1/2	- 3/4	1.6
[illegible]	14- 34	26 1/8	+ 1/8	+0.4
[illegible]	5- 63	28 1/8	+2 1/2	+7.4
[illegible]	6- 15	12	0	0.0
[illegible]	6- 34	25 1/2	+ 1/8	+0.5
MCI COMMUNICATIONS	12 36	12 3/4	-2 7/8	-18.3
[illegible]	6- 33	31 1/8	-1 1/8	-3.5
MATHEMATICA NJP WPT	17 22	18 1/2	-1	-5.4
MICRO SYSTEMS INC	24- 54	47 1/8	+ 3/8	+0.8
MICHIGAN MICRO CP	14- 22	18 3/4	-2 1/8	-10.7
NATIONAL DATA CORP	9- 24	18 7/8	-1 1/4	-6.2
ON-LINE SOFTWARE INT	19 27	18 1/2	-1 1/2	-7.1
[illegible]	8- 36	24 1/2	+ 7/8	+3.8
PLANNING RESEARCH	6- 23	19 3/8	+ 1/8	+1.6
POLICY MGMT SYSTM CP	19- 39	29	- 3/4	-2.5
[illegible]	1- 6	6 3/4	- 1/2	-7.2
REYNOLDS & REYNOLDS	17- 53	50 3/4	+2	+4.3
RI. CORP	31- 34	31 1/2	-1	-3.0
SHARED MEDICAL SYST	13- 62	54 1/2	-1	-1.8
SCIENTIFIC COMPUTERS	6- 18	11 1/4	- 3/8	-3.2
SOFTWARE AG	9- 67	10	- 3/4	-6.9
F PRIMUS INC	12- 34	21 3/4	+2 1/4	+11.8
VMS CORP	9- 18	13 1/8	- 5/8	-4.5
WYLY CORP	7- 17	15 3/4	- 5/8	-3.8
COMPONENTS				
ADVANCED MICRO DE.	3- 39	21 3/4	+ 1/8	+0.6
ASM D SEMICONDUCTOR	12- 26	23	+1 1/4	+3.8
ANALOG DEVICES INC	10- 62	61 1/8	+1 1/8	+2.8
ANALOGIC CORP	22 27	23	+1	+4.3
APPLIED MAGNETICS CP	19- 37	30 1/2	+ 1/8	+0.4
TYRADYNE	14- 38	37 1/8	+1	+2.7
PERIPHERALS & SUBSYSTEMS				
AM INTERNATIONAL	2- 9	4 1/8	+ 1/2	+13.3
ANDREWS JACOBSON	9- 28	11	- 7/8	-7.3
AUTO-TROL TECHNOLOGY	9- 23	22 1/8	- 1/2	-2.1
CANCTEC INC	7- 33	13	+2 1/8	+15.2
DCHIVE INT'L	6- 15	8 1/2	+1	+10.5
DOLT-BERANEK & NEW	9- 66	52 1/8	+4	+8.0
CARBOX CORP	2- 4	2 3/8	+ 1/8	+5.3
CENTRONICS DATA COMP	8- 28	22 1/8	-2 3/8	-10.6
CETEC CORP	4- 12	10 7/8	- 1/4	-2.2
COMMTRONICS	2- 30	9 1/2	+ 1/8	+2.7

	1982-83 RANGE (1)	CLOSE OCT 12 1983	WEEK NET CHANGE	WEEK PCT CHANGE
COMPUTER DEVICES INC	2- 21	4 3/8	- 1/8	-16.6
COMPUTER TRANSCEIVER	4 12	6 1/8	-1 1/8	-15.8
COMPUTERVISION CORP	10- 97	62 3/8	- 1/8	-0.2
CONRAC CORP	17 30	17 7/8	- 3/8	-2.0
DATAPRODUCTS CORP	10 41	14	-1 1/8	-10.0
DATARAM CORP	5- 12	10 3/4	+ 1/8	+1.1
DATA WATCH CORP	13- 47	22	- 1/2	-2.2
DATUM INC	7- 17	11 3/4	+ 1/8	+1.1
DECISION DATA COMPUT	3- 15	3 1/8	- 1/8	-3.8
DOCUTEL OLIVETTI	13- 35	15 1/2	+ 1/2	+3.3
ELECTRONIC M & M	8- 18	14 7/8	- 1/8	-1.9
[illegible]	10- 64	61	- 1/8	-0.5
GERBER SCIENTIFIC	6- 21	9 3/8	+ 1/8	+2.3
GRAPHIC SCIENCES	4- 10	8	- 1/8	-1.5
GREAT SOUTHWEST INC	1 4	1 1	- 1	-25.0
HAZELTINE CORP	4- 9	5 1/8	- 1/8	-2.4
ICOT CORP	2- 11	4 1/8	+ 1/8	+6.0
INFORMATION INTL INC	1 7	4	-1	-20.0
INTEL CORP	21- 61	57 1/8	+1 1/8	+2.1
IPL SYSTEMS INC	4 10	7 1/2	- 1/8	-3.2
LANIER ELECTRONICS	7 10	12 1/8		-0.8
MEGADATA CORP	3- 10	7 1/8	- 1/8	-1.7
MEI DATA CORP	10- 37	18	+1 1/8	+6.2
MOHAWK CORP	4- 14	9	+ 1/8	+1.3
MITRON OPTICAL CORP	2 10	3 1/8	+ 1/8	+4.1
MC AMERICAN MOLDED	6- 21	12 1/2	+1	+8.6
MOHAWK MICRO SYSTEMS	22- 80	43	- 1	-2.3
OMNI	3- 6	3		0.0
PARADYNE CORP	14- 57	8	- 1/8	-1.5
PENRIL CORP	3- 14	11 1/2	+ 1/8	+1.1
PHOENIX AMERICAN INC	3 8	4 1/8	- 1/8	-2.9
PLESSEY CO (ADR)	47 81	71 1/2	- 1/2	-0.6
PRINTRONIX INC	20 34	21	- 1/8	-0.5
QANTEX CORP	11 29	15 1/8		0.0
RAYTHEON CO	43 78	66 1/8	- 1/8	-0.1
RECOGNITION EQUIP	8 14	13	- 1/2	-3.7
ROLM CORP	8 60	48	- 1/2	-1.0
SANDERS ASSOCIATES	20-121	47 1/8	-2 1/8	-4.3
[illegible]	11- 0	7 0	- 1/8	-1.7
SCANTRON CORP	11- 18	12 1/8	- 1/8	-1.0
SCIENTIFIC ATLANTA	15 33	17	- 3/8	-2.2
STORAGE TECHNOLOGY	14- 37	18 1/4	- 1/8	-0.6
SYKES DATATRONICS	6 19	7 1/8		0.0
SYSTEMS & COMPUTECH	2- 9	3 1/4	- 1/8	-3.7
[illegible]	7- 17	11 3/8	+ 1/8	+1.1
TAB PRODUCTS CO	6 34	23 1/8	- 1/8	-0.5
TANDON CORP	17 29	24 1/8	-3 1/2	-12.6
TEC INC	8- 12	7 1/8	+ 1/8	+1.7
TELEMATIC INC	24 62	52 3/4	+1 1/4	+2.4
TELEX	9 32	31 7/8	+1 5/8	+5.1
TESDATA SYSTEMS CP	3- 17	11 1/2	- 1/8	-1.1
TIMEPLEX INC	7- 29	22	- 3/8	-1.7
VISUAL TECHNOLOGY	8- 28	18	+1	+5.9
SUPPLIES & ACCESSORIES				
AMERICAN BUS FORMS	11- 33	22 1/8	- 3/8	-1.7
BARRY WRIGHT	13- 31	24	- 1/8	-0.5
BURLEN PRODUCTS INC	12- 26	23 5/8	- 1/2	-2.1
ENNIS BUS. FORMS	8- 23	24 3/4	+1 1/4	+5.3
3M COMPANY	46- 80	68 1/4	- 3/4	-1.0
MOORE CORP LTD	28- 51	49 3/4	- 1/2	-1.1
STANDARD REGISTER	11 38	32 3/4	- 3/4	-2.3
WALLACE BUS FORMS	11- 30	24	+3	+13.1

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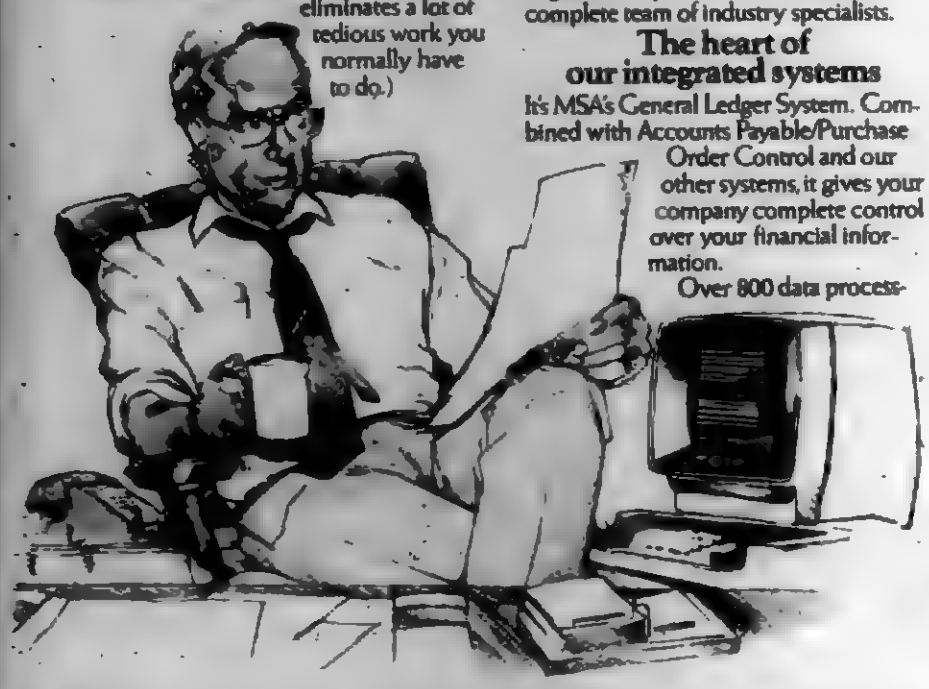

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1. Can you offer us a complete range of software systems designed to work together?
Or will we have to piece together a patchwork of systems?

2. Are your systems just record keepers, or can they really help us make decisions?
Can we pull together information from any of our integrated systems? In exactly the form we want it?

3. Can you provide business software for both mainframe and microcomputers?
Do you develop this software yourself or do you simply market it for another company?

4. Are your systems truly online so all of our information is current?
How many of your systems are online? How secure are they?

5. Will my company have to be the one that discovers the bugs in your brand new system?
Just how long have your systems actually been used, and how have they been tested?

6. Will you update your systems as technology advances and regulations change?
What are some of your most recent updates? Will you keep us current on regulatory changes?

7. Do your systems really do everything you say they will?
Or will we have to change them or add to them to get the features we want?

8. How long have you been in business?
What are your revenues? What is your growth record? Where will your company be five years from now?

9. How many systems has your company installed?
How many of these were installed in the past six months? How many of your earlier customers are still using —and liking—your systems?

10. Do your financial systems handle unlimited foreign currencies?
Do your financial systems use a common set of currency exchange rates?

11. Can you link our executives' computers directly to the mainframe—so they can get their own information?
Is that software available right now?

12. How will you make sure our own people thoroughly understand your system?
Do you have educational centers near us, or will we have to travel all the way across the country to find one? Will you be there to help during installation and after?

13. How many of your people specialize in software for my industry?
How many accountants work for you? Human resource specialists? Manufacturing experts?

14. Do your systems have built-in features that make them easier to use?
What happens if someone needs help figuring out a feature? Do you have online documentation that's easy to understand?

15. As my business changes will your system be flexible enough to change with it?
Or will we have to pay a lot to revamp it? Or even regenerate it?

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NEWSPAPER

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper — Second-class postage paid at Framingham, Mass. and additional mailing offices ©1983 by CW Communications/Inc.

$44/year — October 24, 1983 — Vol. XVII, No. 43

Inside

...erruns on major fed...cessing contracts have come to light in a little-publicized study. **Page 2.**

• • •

Equipment belonging to 15 alleged computer hackers in 13 cities was recently seized by the FBI. **Page 5.**

• • •

If you're a business communications user, you won't have to pay the $6 monthly surcharge on each long-distance telephone access line until April 3. Action by the Federal Communications Commission last week also delayed the massive rate revisions proposed by AT&T. **Page 6.**

• • •

Digital Equipment Corp. stock plunged last week after the company announced first-quarter earnings will be sharply below projections. **Page 8.**

• • •

Computer matching is raising privacy questions again. **Page 12.**

• • •

In the race to make and market the 256K-bit dynamic RAM chip, Western Electric is running ahead of the U.S. team and Hitachi is out in front of the Japanese team, a market research firm says. **Page 83.**

• • •

IBM Takes Wraps Off Two Micros Capable of Accessing Mainframes

IBM was busy last week. In addition to introducing two microcomputers, Big Blue took the wraps off:

- *Its biggest mainframe yet, a new version of the 3084 (Page 9).*
- *A new top-of-the-line machine for the 8100 series (Page 9).*
- *Enhancements to its office systems that link previously incompatible machines and allow them to run under MVS and DOS/VSE (Page 11).*
- *For the System/38, both communications enhancements and support for the Personal Computer XT (Page 10).*

By Tom Henkel
CW Staff

NEW YORK — Set on appeasing the needs of corporate microcomputer users, IBM last week announced enhanced versions of both its Personal Computer and its Personal Computer XT that allow users to access information stored in IBM mainframes.

The two micros announced by IBM at a press conference here are:

- The Personal Computer XT/370, which allows users to connect to a host processor operating under the VM/CMS operating system. The micro can also locally process VM/370 applications in up to 4M bytes of virtual memory.

In addition, IBM announced a control program for the XT/370 that the vendor said permits users to run "many [370, 4300 series and 30 series] programs unchanged on their desktops using familiar program languages and command procedures."

- The IBM 3270 Personal Computer, or the 3270-PC, which lets users tap the power of multiple host processors while retaining local microcomputer capabilities. The unit offers users the ability to run concurrently up to seven applications, four of which can emanate from a larger host such as 4300 or 3080 series processors.

The Personal Computer XT/370 is basically an XT micro with three additional circuit boards. The first board gives the XT the ability to emulate an IBM 3277 Model 2 display station; it also allows users to connect XT micros to an IBM 3774 controller. The second board provides an additional 524K bytes of real memory and the ability to store up to 4M bytes of information virtually. The third board includes a specialized Intel Corp. 8087 microprocessor to perform floating-point operations and two Motorola, Inc. 68000 micro

(Continued on Page 10)

DEC Shows Micro Version Of 32-Bit VAX Supermini

By Ed Scannell
CW Staff

HUDSON, Mass. — Claiming it signals the completion of its VAX engineering strategy begun six years ago, Digital Equipment Corp. last week unwrapped here the first micro-based implementation of its 32-bit superminicomputer.

Using a subset of the VAX architecture, the Microvax I is said to have 35% of the processing power of the high-end VAX-11/780 and is compatible with some of the programs used by other members of the VAX family. The desktop system represents the first step toward putting the VAX on a chip, DEC said.

In addition to Microvax I, DEC announced:

- The VAX-11/725, a repackaged version of its low-end VAX-11/730, which is expected to compete against engineering systems made by Apollo Computer, Inc. and Sun Microsystems, Inc.
- Operating system software including Vaxelan, a VMS-compatible development and execution system for the VAX-11/725, 730 and 750; Micro VMS, a general-purpose subset of VMS designed specifically for the Microvax I; and Ultrix, a native Unix-compatible system that initially will be used with Microvax systems.
- A downward extension of its System Building Block configuration program, this one aimed at its VAX-11/730. Its menu consists of building blocks for the system kernel (CPU), a system storage device, a load device, a communications device, a console terminal and software and services.

Microvax I is best suited for industrial machine and process control applications, where it will support as many as eight users simultaneously, according to a DEC spokesman. It will also be marketed as both a multiuser and a single-user system for business and scientific environments.

Holding 512K bytes of internal

(Continued on Page 8)

Doubles Price/Performance

Tandem Tops Line With 32-Bit Non-Stop

By Jeffry Beeler
CW West Coast Bureau

CUPERTINO, Calif. — Tandem Computers, Inc. last week expanded its Non-Stop line of fault-tolerant systems with a 32-bit mainframe that reportedly provides twice the price/performance of its largest sister CPU and cuts transaction processing costs by up to 50%.

In announcing its Non-Stop TXP system, Tandem also cut the prices of its existing Non-Stop II by as much as 23% and its 2M-byte add-on memory board by 21%.

Depending on the application, a typical TXP system can process 2.2 to 2.75 times more transactions each second than a comparably equipped Non-Stop II, a Tandem spokesman said. In a maximum configuration of 16 processors, the 32-bit system reportedly performs 50 to 100 on-line transaction/sec.

Moreover, the spokesman said, as many as 14 of these 16-processor configurations can be tied together through a fiber-optic link to produce a local complex of 224 CPUs capable of processing hundreds and even thousands of transactions per second.

According to Tandem, the TXP's expandability and computing horsepower suit the system for emerging applications like integrated retail banking, videotex and factory automation. In all of these applications, on-line transaction processing volumes are already huge and are expected to grow rapidly even larger in

(Continued on Page 6)

Vendors Scrambling for Piece Of Fault-Tolerant Systems Mart

By Bill Laberis
CW Staff

Industry Spotlight

Start with an on-line transaction processing market predicted to top $20 billion in annual sales within three years. Add some startling advances in commercially available, low-cost, 32-bit microprocessors. Then spike the mixture with some heady entrepreneurs and healthy slugs of venture capital.

The result is a fault-tolerant systems market that has grown from one principal supplier — Tandem Computers, Inc. — to over a dozen such companies in three years.

Generally speaking, a fault-tolerant system is one that can withstand a broad range of failures without corruption of data or disruption of operations. Although few vendors in the fault-tolerant market have shipped systems to date (the ones that have are Tandem; August Systems, Inc.; Stratus Computer, Inc.; Synapse Computer Corp.; and Computer Consoles, Inc.), several are gearing up for announcements in 1984.

(Continued on Page 18)

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Second-class postage paid at Framingham, Mass., and additional mailing offices. Computerworld (ISSN 0010-4841) is published weekly except February (5 issues) April (5 issues) May (5 issues) June (5 issues) August (4 issues) September (5 issues) October (5 issues), November (4 issues) December (4 issues) and a single combined issue for the last week in December and the first week in January by CW Communications Inc. Box 880, 375 Cochituate Road, Framingham, Mass. 01701

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$1.50 a copy. U.S. — $40 a year. Canada, Central & So. America — $110 a year. Europe — $105 a year. all other countries — $225 a year (surface) or $275 (air). Four weeks notice is required for change of address. Please allow six weeks for new subscription service to begin.

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Little-Publicized Federal Study Finds Major Cost Overruns in TP Contracts

By Peter Bartolik
CW Staff

WASHINGTON, D.C. — A study of major teleprocessing contracts awarded by federal agencies has revealed major cost overruns — by 13,468% on one relatively low-cost contract — caused by factors ranging from poor management to inadequate performance standards.

The study was conducted by the U.S. General Accounting Office (GAO) in response to a request by Rep. Jack Brooks (D-Texas), chairman of the House of Representatives Committee on Government Operations. Brooks first requested review of teleprocessing in January 1982 after learning of major cost overruns in contracts awarded to Boeing Computer Services Co. by both the U.S. Navy and the U.S. Army.

The GAO review of those two contracts has led to "recompeting" of both, a Pentagon spokesman told *Computerworld* recently, adding that new contracts should be awarded soon.

The GAO reviewed 28 of the largest teleprocessing services contracts "representing a broad range of agencies, vendors and contract types," GAO Acting Director W. D. Campbell wrote in a report released last summer, but not publicized. The GAO found that for fiscal 1982, 11 of 17 competitive contracts for which data was available for analysis were awarded for a total of $36.1 million, but will actually cost more than $165.8 million. Eight "sole-source," or noncompetitive, contracts were not measurable, but the GAO pointed out that "sole-source contracts are generally not as cost-effective as competitive contracts."

Of the 11 contracts with reported overruns, four were placed with Boeing, three with Computer Sciences Corp. and one each with Martin Marietta Data Systems, Inc., ADP Network, Inc., National Data Corp. and McDonnell Douglas Automation Co.

The cost overrun of 13,468% was experienced with a contract given by the Department of Defense's National Defense University to Boeing. The contract was projected to have a system life cost of $165,721, but actually cost over $269,000 a year and is projected to have a true system life cost of $1.3 million.

Boeing Contract Overrun

A Boeing contract for the Army's "Request-Retain" service for recruiting support was originally estimated at $8.49 million over a five-year system life, but actually cost $18.8 million during fiscal 1982, according to the GAO. The Pentagon spokesman said $53.8 million has been expended to date.

The contract between Boeing and the Navy, also for recruiting support, was estimated at an annual cost of $523,969, but cost $3.5 million in its first year, the GAO said. The Pentagon said $9.6 million has been expended to date.

A contract awarded to Computer Sciences Corp. by the U.S. Department of Health and Human Services was estimated at $1.83 million for one year, but cost an estimated $2.5 million in 1982.

The government, according to the report, is not even able to pinpoint exactly how much was spent in 1982 for teleprocessing services, instead estimating that between $154 million and $164 million was expended. Under one method of awarding contracts where agencies negotiate directly with vendors and are billed directly, rather than contracting through the U.S. General Services Administration (GSA), "the only method GSA has at present of tracking [spending] . . . is through voluntary reports from the vendors," the GAO report said.

The major problems, according to the GAO, are inadequate benchmarks of projected use upon which contracts are bid and, in several cases, "unbalanced pricing," whereby low rates are bid on benchmark services, but higher service rates are bid on areas that are not properly computed into government estimates.

A staff member for the House Committee on Government Operations said it has not been decided whether the report will lead to hearings, "but it's obvious there are problems." Walter Anderson, senior associate director for the GAO, told *Computerworld* that "basically, [agency] benchmarks are not sufficient. . . . I think the government agencies have got to rethink themselves."

The GAO has recommended that agencies retain monthly use data for establishing future benchmarks, seek to replace noncompetitive contracts, be required to adopt new accounting techniques and bill end users for services and change procedures to require earlier reporting of overruns.

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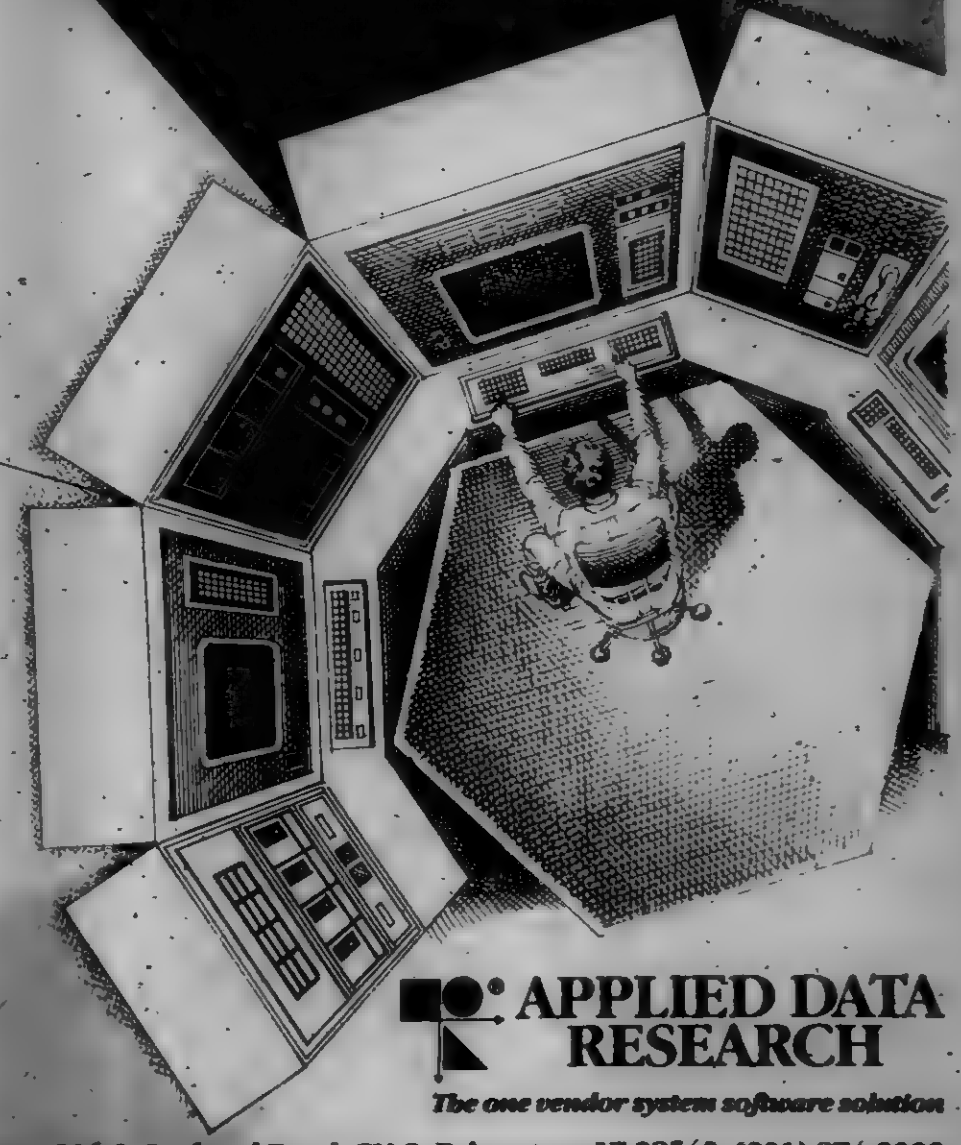

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Hackers Could Undermine Confidence In Federal Agencies, House Panel Told

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Beyond the embarrassment that federal agencies are feeling from recent claims that computer hackers have been wandering at will through government systems, there is growing fear here that these incidents portend problems far greater than those of data security.

"If computer hackers pose a danger, it is that their activities may undermine the confidence of the public in our ability to protect the data that is essential to the operation of agency programs," the Office of Management and Budget's (OMB) Deputy Director Joseph R. Wright Jr. last week told a House of Representatives subcommittee. "Individuals may fear that others will be able to examine their tax records; corporations may fear that competitors will be able to uncover important information about their operations or manufacturing processes."

This might also affect the quality of information furnished the government by citizens, Wright said, "thereby eroding the integrity of our data bases."

Rep. Dan Glickman (D-Kans.), chairman of the House Science and Technology Subcommittee on Transportation, Aviation and Materials, said the problem goes beyond security threats from outside to include threats from within government agencies. "We want to make sure this data is secure . . . and it cannot be violated from the outside or by the government itself," he said.

Glickman's subcommittee is scheduled to resume its hearing on this subject today. Later this week, a Senate subcommittee will continue its round of hearings on computer security in the federal government.

The government at all levels is scrambling to assure the public and Congress that it views computer security with deadly seriousness. Even the supersecret, supershy National Security Agency (NSA) was willing to put in an appearance before Glickman's panel last week to discuss NSA efforts to improve the availability of secure hardware and software.

Melville H. Klein, director of the Defense Department Computer Security Institute run by the NSA, said he has been authorized to double his current staff of 100 people in the next two years. He told the subcommittee that the institute benefits both the government and the public because the results of computer security evaluations it performs on hardware and software products are available to the public.

Warren G. Reed, director of the Information Management and Technology Division at the General Accounting Office, which has been hounding federal agencies about lax security measures for years, told the subcommittee that "serious shortfalls" continue in all aspects of government information security. "We have found policy gaps, serious management deficiencies . . . [and] inadequate internal audit capabilities," he said. "Because of these shortfalls, information system losses continue to occur due to accidental and intentional causes."

Speaking for the National Bureau of Standards, which is responsible for developing government information processing standards, Acting Director John W. Lyons said "there is a wide range of straightforward and relatively inexpensive solutions to the computer security problems faced by businesses, government, universities and individuals. Between 80% and 90% of the problems . . . could easily be avoided by using available administrative procedures and technology."

Clearer Laws On DP Access Asked by FBI

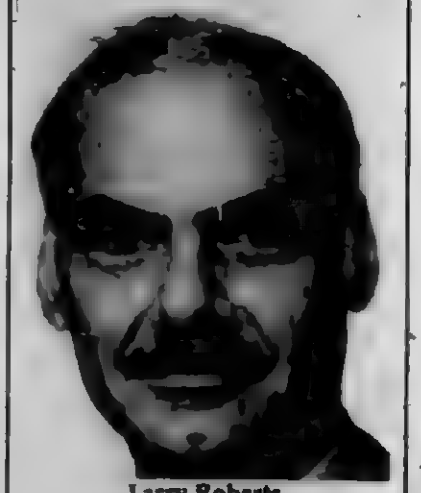
WASHINGTON, D.C. — The Federal Bureau of Investigation said last week that federal law should be clarified to penalize both those who access computer systems without authorization and those who fail to report being victimized.

Although a number of states have statutes prohibiting the type of unauthorized computer system access practiced by some computer hackers, there is no federal law to prosecute those who do so but do not damage or steal information from systems.

"Right now there is a void in the law," FBI Deputy Assistant Director Floyd I. Clarke said last Monday in testimony before the House of Representatives Science and Technology Subcommitee on Transportation, Aviation and Materials, which is looking into computer security and crime. "Our experience indicates that certain legal issues involving computer-related crime could be clarified, particularly the definition of property in the sense of a computer program having its own clearly defined inherent value, and the issue of trespass."

Despite that loophole, Clarke, head of the FBI's Criminal Investigations Division, told the subcommittee that the bureau has not had "any significant problems in prosecution of computer-related crime under already existing statutes over which we have jurisdiction, such as the fraud by wire statute."

Asked by the subcommittee if the FBI is aware of a growing problem of computer crimes against federal government agencies, Clarke said there is inadequate data on computer crime to answer the question. Kier T. Boyd, head of the FBI's Technical Services Division, said the agency has asked its field offices investigating recent complaints of hacker activity to check all seized equipment and documents for evidence of any access of government systems.



Larry Roberts

Nets' Developer Blames Systems

BURLINGAME, Calif. — Larry Roberts — the man who developed two of the networks that, according to the Federal Bureau of Investigation, were abused by 15 computer hackers — believes that the security problems lie not in the networks themselves, but rather in the computer systems.

Roberts, now president of the worldwide courier service DHL Corp. here, became known as the father of packet switching when from 1967 to 1973 he helped develop the U.S. Department of Defense's (DOD) Arpanet, the first packet-switched network. In the 1970s, Roberts founded and headed Telenet Communications Corp., a public packet-switched network company that was later sold to GTE Corp.

Since the most recent occurrence of computer hacking is thought to have taken place over the Telenet network and at least one hacker is thought to have accessed DOD computers through Arpanet, Roberts is uniquely qualified to comment on what problems are leading to so much illegal computer tampering.

"It's unfortunate that the attention focuses on the networks when that's not the issue," Roberts told *Computerworld* last week. "If the network did too much to prevent people from getting on, there wouldn't be the thousands of users there are now.

"Anybody can have access to a network if he pays his bills, so [system] users have to provide their own security. It would be presumptuous of the network to provide security."

Roberts said he anticipated security problems such as the ones arising today when he was developing Arpanet. He conducted experiments and found that unauthorized users could misuse the network. Roberts warned computer users to take precautions, and "some of the 50 to 100 computer organizations took our advice; others didn't."

There are two ways to discourage computer hacking, according to Roberts. "The best treatment is to crack down on hackers occasionally, as [the FBI is] doing, and to have the computer people realize it is their security problem."

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FBI Seizes Gear of 15 Suspected DP Hackers

By Jim Bartimo
CW Staff

Federal Bureau of Investigation agents armed with search warrants recently confiscated equipment belonging to 15 alleged computer hackers in 13 cities. The hackers are suspected of tapping into computers at organizations that include the U.S. Department of Defense (DOD) and the National Aeronautics and Space Administration (Nasa).

The FBI said it confiscated the computers and communications equipment of the 15 — none of whom was charged with a crime — after they allegedly used GTE Telenet Corp.'s public packet-switched network to access the systems illegally. Based in Vienna, Va., the network provides such services as the Telemail electronic mail service to an estimated 200,000 terminal users and 2,000 computer systems in more than 300 U.S. cities and 50 foreign countries.

The 15 alleged intruders on Telemail were detected during routine monitoring by Telenet, according to a statement released by the firm. The FBI was notified immediately, and password procedures were changed to make access more difficult, according to GTE Telenet spokeswoman Claudia Houston.

The FBI is only in the investigative stages of its case and will not be ready to prosecute under wire fraud laws for several months. "There were 15 people raided; I don't know that 15 people actually broke in," said FBI spokesman James Mull of the bureau's Alexandria, Va., office. "They're not all kids like a lot of the newspapers have reported. Some of them are adults."

Nasa, a Telemail subscriber, last week confirmed reports that unauthorized entry into the space agency's systems was possible. System security has since been beefed up; but a Nasa spokesman said no damage or file deletions had yet been found.

"I heard that one of the kids destroyed tons of files," said Bill O'Donnell, Nasa public affairs officer, "but we haven't found anything wrong. The most he could have destroyed is one day's work."

One of the hackers whose home was raided is 18-year-old Dennis Warner Jr. of Tucson, Ariz., who admits to being a computer enthusiast but denies accessing any proprietary government information. Warner told *Computerworld* last week that he has had contact with a computer hacker who claimed to have accessed the DOD's Arpanet network.

Warner, who repairs aircraft components as his livelihood, claimed that he was given a free trial password to Telemail by a fellow user of Compuserve, Inc.'s bulletin board user message exchange. Warner said he believed that the user was a Telemail representative.

Warner accessed Telemail approximately six times in late July using his Radio Shack TRS-80 Model 1 microcomputer. He said it was not until after he was raided by the FBI that he learned the password given to him on Compuserve was not a legitimate trial offer.

Warner said he has communicated with many of the people who claim to have accessed computer systems and were raided by the FBI. One such hacker calls himself "The Wizard of Arpanet" because he claimed that he accessed the DOD's Arpanet network. The DOD recently divided Arpanet into two networks to avoid such hacking [CW, Oct. 10].

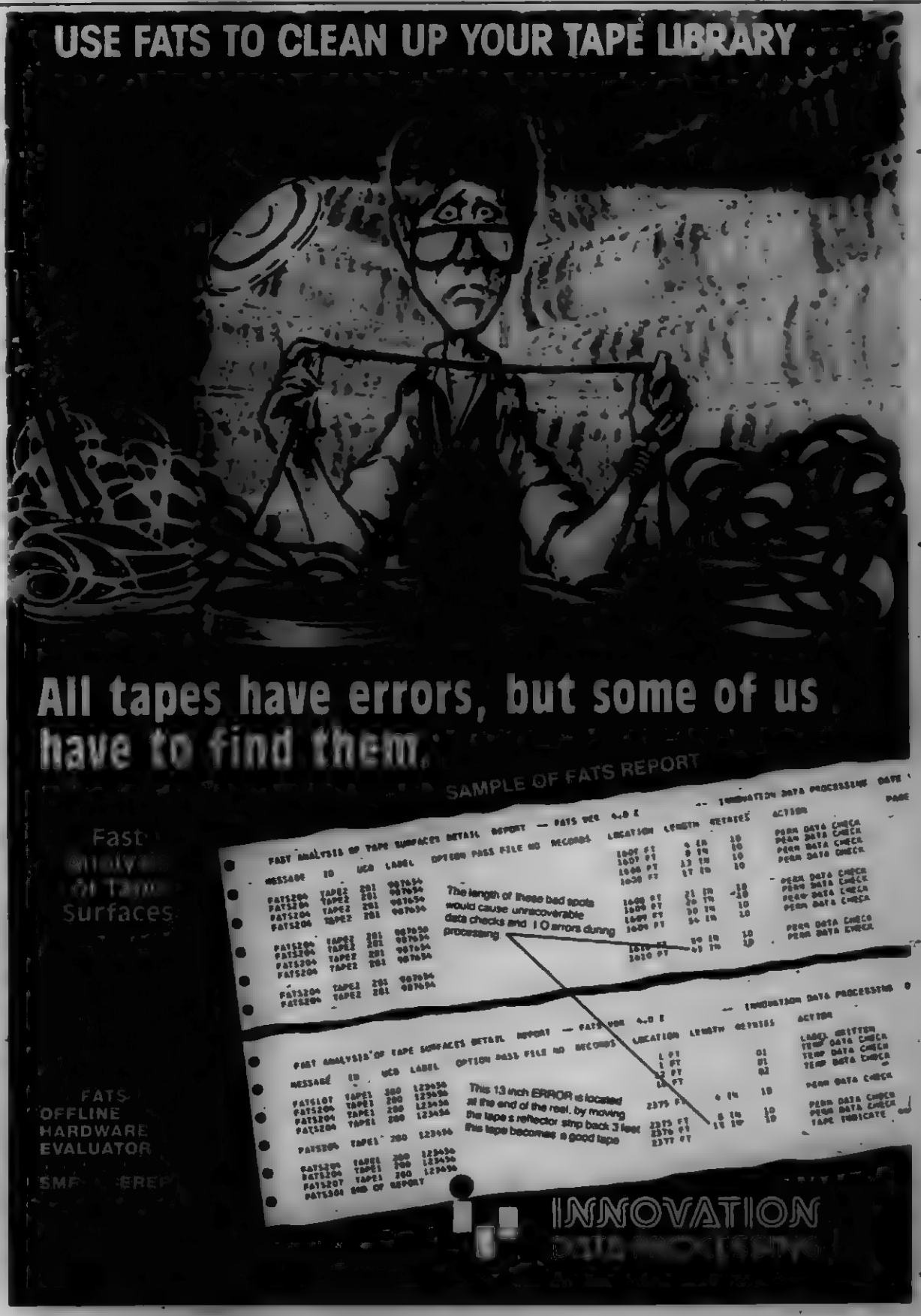
The Wizard was identified in the *Detroit Free Press* as 14-year-old Eric Stajda of Detroit. "That kid in Detroit deserved to get caught," Warner said. "He was crazy. He would say on an open-line [bulletin board] conversation on Compuserve that he had broken into a DOD computer."

House Set to Get DP Crime Bill

WASHINGTON, D.C. — An extremely tough federal computer crime bill that calls for mandatory fines and prison terms was set for introduction in the U.S. House of Representatives last week.

The bill, short and to the point, would mandate fines up to $100,000 and/or jail terms up to 10 years for anyone using a computer without the consent of its owner. It would bring federal prosecution down on whomever "willfully uses a computer capable of being programmed or reprogrammed in the course of normal operations in a manner not authorized by the owner of that computer . . . if such use affects interstate or foreign commerce."

Charlotte Casey, an aide to Rep. Lawrence Coughlin (R-Pa.), sponsor of the bill, said that Coughlin hoped to have the bill introduced by the end of last week. The congressman has also agreed to cosponsor the Federal Computer Systems Protection Act, introduced earlier by Rep. Bill Nelson (D-Fla.). The difference between the two bills is that the Coughlin bill, besides being much shorter and devoid of the lengthy definitions of the Nelson bill, provides penalties twice as stiff and would make it impossible for a judge to suspend the sentence, offer probation or make the jail term run concurrently with other terms a violator may face.



FCC Delays Start of New Rates, Access Charge

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Saying that there are "many substantial and controversial issues" yet to be resolved, the Federal Communications Commission (FCC) last week delayed until April 3 a massive revision of local and long-distance communications rates that AT&T and the Bell operating companies wanted to go into effect Jan. 1.

The commission also deferred its access charge plan, which drastically alters the way local telephone companies are reimbursed for providing access to the long-distance network.

For business communications users, the two actions deferred a monthly surcharge of up to $6 on each access line connecting their premises with the local telephone network and a monthly surcharge of $25 per termination on private lines leased from local telephone companies. The actions also delayed AT&T's proposed rate changes — both increases and decreases — for Message Toll Service, Wide Area Telecommunications Services (Wats) and interstate private line service.

The deferral of the access charge plan raised the question of what would happen to existing tariffs after Jan. 1. Jerald N. Fritz, acting chief of the FCC's Tariff Division, agreed that the "division of revenues" process underlying those tariffs will have to be altered, but said AT&T could make the changes by changing the computer programs that determine how much AT&T Communications, formerly its Long Lines Division, pays local telephone companies for access service.

The question about existing tariffs was asked at a press briefing held in New York last Wednesday by AT&T on a different matter. "It's not possible to continue the division of revenues process as is," answered AT&T Board Chairman Charles Brown, adding that "conceivably" this process can be modified. But Brown said it is too soon to estimate what it would cost or low long it would take.

Brown said he was "astonished" by the FCC's action, which "throws our existing plans awry."

Reason for Delays

In a press release issued last Tuesday, the FCC said it acted because of questions raised in the more than 200,000 pages of tariffs filed by AT&T and the Bell operating companies Oct. 3. There are "many substantial and controversial issues which must be resolved," and the originally proposed Jan. 1 effective date did not allow enough time to review them.

If the review process is completed before April 3, the FCC will "consider" an early termination of its orders suspending the revised tariffs and access charges. However, FCC rules allow a five month delay — meaning until the beginning of June.

Observers suspect that the FCC actions were motivated at least partly by politics. Intense opposition has developed in Congress to the access charge plan, primarily because it will raise telephone rates for many residential users. The observers say it is possible that the FCC will order the phone company to make deeper long-distance rate cuts after it finishes reviewing the Oct. 3 filing.

Rates for business users are also likely to be affected by the FCC review. "AT&T has proposed substantial increases in its private-line rates and a complete restructuring of its private-line tariffs," the FCC release explained: "These changes must be closely scrutinized to determine whether they are lawful."

The observers pointed out that possibly the most interesting possibility raised by last week's FCC action is that the commission, after going through those 200,000 pages of tariff filings and struggling with all of the unresolved questions, will be forced to repeat the whole exercise. Two bills pending in Congress would bar for at least two years the imposition of surcharges on residential telephone customers.

AT&T Expecting Lower Earnings

NEW YORK — AT&T announced here last week that it is decreasing the value of its telephone equipment and network facilities assets and making other accounting changes that will reduce the company's 1983 earnings by $5.2 billion, or $5.50 per share.

The changes were necessitated by the impending breakup of the Bell system and AT&T's entry into competitive markets, Board Chairman Charles Brown said at a press briefing here

The changes will not have any impact on the assets, income or equity of any of the divested Bell operating companies. "It merely clears up AT&T's balance sheet as we prepare to enter a new era," Brown said.

AT&T Rivals Free to Raise Rates

WASHINGTON D.C. — Long-distance telephone carriers in competition with AT&T will no longer have to request permission from the Federal Communications Commission (FCC) to raise their rates, the FCC decided last week.

Companies such as MCI Communications Corp. and GTE Corp. will not have to justify their increases to the FCC. In contrast, AT&T must continue to notify the FCC of price changes for its basic service 90 days prior to their taking effect.

Long-distance carriers other than AT&T will still be regulated to the point that they must charge nondiscriminatory rates, and the FCC will still investigate any unfair pricing allegations.

The commission also asked for public comment on how AT&T should be regulated in the future.

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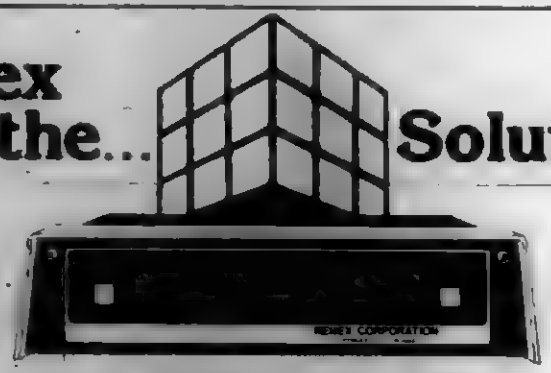

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Non-Stop TXP Unveiled

(Continued from Page 1)

the near future.

Like the 16-bit Non-Stop II, the TXP ensures uninterrupted access to system resources and supports Tandem's Guardian control program as well as the company's Encompass data base management facility. The just-introduced system also operates with the same peripherals, runs the same application packages and fits in the same cabinet as the Non-Stop II, the spokesman noted. The TXP's resulting compatibility with existing hardware and software enables the 32-bit system and the Non-Stop II to be intermixed in the same installation, he pointed out.

Tandem credited the TXP's performance edge over the Non-Stop II partly to the 32-bit system's internal design features, some of which include dual data paths and dual 16-bit arithmetic logic units (ALU). The Non-Stop II, by contrast, incorporates only one data path and one ALU.

Using the TXP's 64-bit memory accessing capability, each of the system's data paths and ALUs reportedly manipulates 32 bits at a time.

A second reason for the TXP's superior processing power is the system's improved machine cycle time — 83 nsec compared with 100 nsec for the Non-Stop II, the spokesman said. Other factors contributing to the TXP's improved performance over existing Tandem offerings include the system's 32-bit native-mode addressing feature and its unusually large supply of high-speed cache memory.

Each TXP processor comes equipped with 64K bytes of cache, to which the system can reportedly gain access in 83 nsec. In recent tests of the TXP, the information necessary to execute a given instruction was found to reside in cache memory about 98% of the time, the spokesman said.

The result is that the system's read/write memory cycle of 400 nsec, which is identical to that of the Non-Stop II, is effectively reduced to 116 nsec, the spokesman explained.

The TXP's 32-bit native-mode addressing capability gives the system a 1G-byte virtual memory capacity per processor, according to Tandem.

A basic TXP configuration, including dual 2M-byte processors, four 128M-byte disk subsystems, power supplies, the Guardian operating system and the Encompass data base management facility, costs $328,550.

In the wake of Tandem's latest price cuts, a similarly configured Non-Stop II system and a 2M-byte memory expansion board now cost $195,000 and $22,000, respectively.

First customer shipments of the TXP will begin next month from Tandem at 19333 Vallco Pkwy., Cupertino, Calif. 95014.

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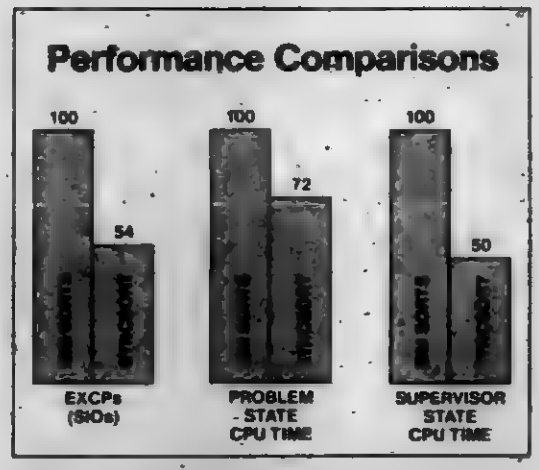

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DEC Eyes Lower Earnings; Stock Plummets

By Peter Bartolik
CW Staff

Digital Equipment Corp. last week shook Wall Street and raised questions about the company's stability after it announced that first-quarter earnings will be sharply below projections. The news caused DEC's stock to plummet more than 21 points in one day alone on the New York Stock Exchange.

Several other major vendors, despite impressive earnings reports, also saw the value of their stock drop as investors apparently lost faith in the computer industry. IBM stock dropped $3 on Tuesday, but recovered by $1.75 on Wednesday during a broad market decline.

DEC announced Tuesday that its quarterly earnings report, due out tomorrow, is expected to show earnings of 25 cents to 35 cents per share, far below the "flat" earnings that investment analysts have been predicting since late August. Earnings for the same period last year were $56.8 million, or $1.02 per share, on revenues of $927 million, and this week's report is expected to show a 65% to 76% drop, DEC said.

The financial update was announced at about 2 p.m. Tuesday, just hours after the company announced the Microvax I, and caused a turnover of almost three million DEC shares on the exchange. The price of DEC stock dropped $21 to close at $79.28, a far cry from the high of $132 reached this past March.

The decline continued Wednesday with the price dropping another $6.75.

DEC said the lower earnings and revenues resulted from smaller than expected shipments of personal computers and from the inability to manufacture and ship new products, which include the Micro-PDP/11 and two new disk storage devices for minicomputers and superminicomputers.

Mark A. Steinkrauss, manager of investor relations for the second largest computer vendor, told *Computerworld* that DEC "didn't [publicly] quantify the shortfall in [terms of] units or dollars." He said the decision to announce the lowered expectations was made after the numbers became "firm enough" to indicate the problem.

"As painful an experience as it was," he said, the company felt it should be "professional" and make an announcement "rather than have data leak out."

Wall Street financial analysts had cooled on DEC's prospects for the first quarter after the release of the fiscal 1983 report showing the first decline in profits in 13 years [CW, Aug. 15]. Stephen K. Smith, an analyst with Paine Webber Mitchell Hutchins, had revised his projection for first-quarter earnings from $1.48 per share in early August to $1.11 per share in late August.

Smith continued to favor DEC stock as other analysts stopped recommending it, but now, he said, DEC faces "a tough couple of quarters," and he has lowered his fiscal year 1984 earnings estimate of $7.40 per share to $3 or $4 per share and dropped 1985 projections of $10.50 per share to $8 per share.

Smith said the disk problem, which he earlier had thought was resolved, probably hurt revenues "as a lot of packages couldn't go out the door." He said DEC still has a lot of strength and many products that will be successful, such as the Microvax, but DEC built expense levels too high this year.

Two industry analysts contacted by CW differed sharply in their analyses of the situation.

Peter Lowber, DEC watcher at The Yankee Group, downplayed the impact of DEC's showing in the personal computer market and pointed the finger at "missed opportunities and laggard management." He suggested that recent personnel losses may have played a role and said DEC "needs to reorganize marketing and maybe bring new people in."

Jack Hart of International Data Corp., on the other hand, said, "Clearly, the personal computer line results have been disappointing and under plan; they really have not shipped as many as they had hoped. . . . I wonder about whether the [personal computer] product line is going to be the success they think it is."

Moreover, he added, "One major factor that I think has been overlooked is that in the last four to six months, they have gone through some very major reorganizations."

Lowber believes the company is lacking in many areas that will affect it over the long term. He said DEC should develop third-party software agreements and reevaluate the markets at which DEC aims its products.

Lowber also said DEC should never have allowed competitors to catch up with the high-end VAX-11/780. "It's been two years since DEC upgraded their high end, and it will be three years next year," he noted.

Knowles to Steer Lexidata

BILLERICA, Mass. — Lexidata Corp. last week announced that it had picked former Digital Equipment Corp. executive Andrew C. Knowles to become president and chief executive officer of the graphics terminal and engineering workstation manufacturer based here.

Knowles was instrumental in marketing DEC's PDP-11 minicomputers and, more recently, its personal computer line before becoming the sixth DEC vice-president to jump ship in the last two years.

He will replace Ralph T. Linsalata, who will remain a member of Lexidata's board of directors and serve as a special consultant to the company. Linsalata issued a statement saying the hiring of Knowles and of Ross Belson as senior vice-president of operations will "provide the strong management foundation necessary to build a significant company in the graphics terminal and engineering workstation business."

DEC Introduces Microvax I

(Continued from Page 1)

memory, the $9,995 version of the desktop unit was designed for runtime and memory-only applications and does not include disks. With DEC's 5¼-in., 10M-byte RD51 Winchester disk subsystem and RX50 dual floppy diskette drive, which handles up to 800K bytes, the system costs $13,880.

The Microvax I CPU is packaged in two boards (not including the memory board) that reside in adjacent slots in the system's backplane. One module features the 32-bit data path, microsequencer and control store, while the second board contains memory management and a cache module that supplies the logic for interfacing the Q-bus to the internal VAX architecture.

Microvax is expected to be delivered by March.

A VAX for Open Offices

The VAX-11/725, which DEC is billing as its lowest cost Unibus-compatible system, uses the same processor as the VAX-11/730, but sports the company's 52M-byte RC25 disk subsystem, also introduced last week. About the size of a two-drawer filing cabinet, the 725 is half the height of the 730 and should fit under most office desks or tables, DEC said. It was designed specifically for open-office locations.

DEC said it plans to use the low-end system to support technical workstations and as a multiuser system for general-purpose applications in industry, government and education.

As a multiuser system, the 725 supports as many as eight users at once for applications involving software development, order entry, inventory control and scientific word processing.

DEC is offering three versions of the VAX-11/725, which range in price from $24,950 to $36,800. The system is scheduled for delivery next month.

Software Additions

The Vaxelan software serves as a subsystem to DEC's VMS operating system for developing applications in real-time control and distributed environments. Vaxelan applications are written in a native-mode version of Pascal.

Completed applications can be downloaded across network links or transferred to target systems by disk or tape, the DEC spokesman noted.

Licenses for the development system start at $8,200. A runtime license is $100, DEC said from 146 Main St., Maynard, Mass. 01754.

New Top-of-the-Line 8100 Features 6M-Byte Memory

By Tom Henkel
CW Staff

NEW YORK — IBM last week capped its 8100 series of distributed processors with a new top-of-the-line machine that offers 2.4 times the performance of the 8140 Model C processor and up to 6M bytes of main memory, three times the capacity of the 8140C.

At a press conference here, the company also announced updates of the 8100's two operating systems, DPPX/SP and DPCX.

The newly introduced 8150 employs the same dyadic architecture — two closely coupled processors — that IBM uses on its larger 3081 processors. The two processors can share processing and I/O work loads, increasing system availability and reliability, IBM said.

The 8150 features very large-scale integration design in its circuitry. The machine employs bipolar logic chips — a first in the industry, according to IBM — which allow a packing density of 3,000 to 5,000 circuits per chip.

In addition to the 6M bytes of main memory, IBM reportedly added to the 8150 a storage management technique that incorporates a logical storage area of 16M bytes.

Operating System Updates

Release 2 of the DPPX/SP operating system, developed specifically for the 8150, features a shadow file capability that duplicates a primary disk file on a backup file and improved user access to data through an indexed file management capability, according to IBM.

Moreover, with Release 2, users of IBM Displaywriter word processors and Scanmaster 1 high-speed facsimile machines can access information in a host through an 8100 pass-through function.

Release 2 also features an enhanced communications network management function that provides an 8100-generated alert to the host when a problem develops with an attached terminal, line or modem. Finally, included in Release 2 is the ability to process up to 16 batch jobs concurrently, IBM said.

Highlights of DPCX Release 4 include ease-of-use features that permit users to assign commands, procedures or programs to special-function keys so they can be invoked by a single keystroke. An enhanced data stream compatibility facility enables a user to alternate between host applications and local applications without having to sign off one system and log onto another.

Release 4 also alerts the host processor of problems in the distributed network.

Besides updating the two operating systems, IBM enhanced its Distributed Office Support Facility (DOSF) for the 8100. With Release 4 of DOSF, the office system capability of DPCX, users of office workstations can automatically capture and store data in the 8100 processor. As a result, office workers creating documents with DOSF can incorporate information from the host processor into their documents.

The 8150 is available in three models: the B20, B40 and B60 with 2M, 4M and 6M bytes of main memory, respectively. The purchase prices for the units range from $115,000 to $145,000; first shipments are scheduled to begin in June.

Both operating system upgrades are available for a monthly fee or a one-time charge. The monthly charge for DPPX/SP Release 2 is $760, and the one-time charge is $19,600. It will be available in June.

DPCX Release 4 costs $414/mo or $6,900. DOSF Release 4 costs $704/mo or $12,300. Both DPCX Release 4 and DOSP Release 4 will be available in February.

IBM Configures 96M-Byte 3084; Its Biggest Mainframe Yet

NEW YORK — IBM last week extended its top-of-the-line 3084 by configuring a system with a maximum main memory capacity of 96M bytes instead of 64M bytes.

IBM said the new system, the 3084 Model Q96, offers a growth path for users of the recently announced 3081 Model K48 processor. The 3084 is basically two closely coupled sets of dyadic 3081 processors; two 48M-byte 3081 K48 processors essentially make up a 3084 Model Q96.

The price of upgrading a K48 to a Q96 is $3,465,000.

For current users of the 64M-byte 3084, the Model Q64, IBM said it will take about eight hours to upgrade in the field to a Q96. This upgrade costs $640,000.

The cost for upgrading the 48M-byte 3084 processor, the Model Q48, to the Q96 is $960,000. The upgrade from a Model Q32 to a Q96 costs $1,280,000.

Like the 32M-, 48M- and 64M-byte versions of the 3084, the 3084 Model Q96 runs under IBM's MVS/SP Version-2 operating system.

First customer shipments of the K48-to-Q96 upgrades will begin in the second quarter of 1984; the Q64-to-Q96 upgrade will begin shipping in the third quarter.

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Latest IBM Micros Target Corporate Users

(Continued from Page 1)

processors both to reproduce and to emulate segments of the 370 instruction set.

The XT/370 reportedly offers roughly half the internal performance of the 4321, the smallest IBM 4300 series processor, an IBM spokesman noted.

Three Workstations in One

The control program for the XT/370, known as Virtual Machine/Personal Computer (VM/PC), gives the micro CMS functions along with VM/SP capabilities. This, IBM contends, makes the XT/370 three workstations in one — it can function as a standard Personal Computer XT, as a 370 VM/CMS workstation or as an IBM 3277 display terminal connected to a host processor.

The XT/370 will be available in the second quarter of 1984. The purchase price of the micro with 10M bytes of fixed disk storage is $8,995. With 20M bytes of storage, the unit costs $11,690.

Current users of the IBM Personal Computer XT can upgrade their processors to XT/370 configurations for $3,790, IBM said.

Seven Windows

The 3270 Personal Computer reportedly displays information simultaneously in up to seven user-defined windows. The windows can contain information both from host processors and from the local Personal Computer.

Up to four windows can be devoted to displaying information from host processors such as an IBM 4300 series or 30 series machine.

While some knowledge of IBM 370-era operating environments is necessary to use either the XT/370 or the 3270-PC in conjunction with a host processor, the 3270-PC includes a control program with a self-teaching diskette called Helper for less experienced users.

The 3270-PC is available with a newly announced high-resolution, eight-color display unit, the 5272, which enables the user to highlight specific windows or data within windows, according to IBM.

Like the XT/370, the 3270-PC uses IBM's PC DOS 2.0 operating system when it is used as a microcomputer.

Three Models

The 3270-PC is available in three standard models with main memory ranging from 256K to 640K bytes.

The Model 2 offers 256K bytes of main memory, one dual-sided diskette drive and printer adapter for $4,290. The mid-range Model 4 offers all the Model 2 features plus a second dual-sided diskette drive and a 64K-byte memory expansion option that provides a total of 320K bytes of main memory; it is priced at $5,319.

The top-of-the-line 3270-PC, the Model 6, contains the basic features of the Model 2 plus a 10M-byte fixed disk drive and a 64K-byte memory enhancement, offering a total main memory capacity of 320K bytes. It costs $7,180.

The 5272 color display costs $995, and the 3270-PC control program, which includes the Helper facility, is available for a one-time fee of $300.

A 3270-PC file transfer program product, which transfers bulk data to and from a host processor running VM/SP or MVS/TSO, costs $600.

Deliveries of the 3270-PC and related products will begin in the first quarter of 1984, IBM said.

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IBM Offers Enhancements For System/38

NEW YORK — IBM last week extended communications and office support for its System/38 small business system. Some of the announcements also affect the smaller System/36 and System/34 processors.

The announcements include:

- Display Station Passthrough software that allows a System/38 user to use Systems Network Architecture (SNA) to access two or more System/38 processors at remote locations. Available next September, the no-charge feature also includes automatic routing to handle user logon and security clearances for intermediary systems in an SNA network.

- Software that allows a System/38 operating in an SNA/Synchronous Data Link Control (SDLC) environment to emulate the 3270 CRT terminal. This will also be available next September on a no-charge basis.

- The capability to attach a Personal Computer XT to a System/38, System/36 and System/34 through a 5250 display terminal emulation program. The support program and some hardware adapters cost $893. IBM also announced a Host Support Utility that allows the System/38, System/34 and System/36 to support the PC DOS Release 2.0 operating system used on the Personal Computer XT. Both products will be available this December.

- Enhancements to the Office/38 line of program products that offer directory list management and direct link support to text management. There is no charge for either enhancement, both of which are available now.

IBM Disoss, Profs Updates Link Different Office Units

By Tom Henkel
CW Staff

NEW YORK — IBM came one step closer to linking previously incompatible office machines last week when it announced enhancements to its Distributed Office Support System (Disoss) and Professional Office System (Profs).

In addition, IBM enhanced its Systems Network Architecture to allow office machines to communicate with a host processor.

At a press conference held here at its new Gallery of Science and Art, IBM said it has nearly realized its 1980 statement of intent to link office systems. With the latest announcement, IBM provided support for the exchange of letters, memos and other documents among IBM 8100 and 5520 distributed processing systems and the Displaywriter word processor by:

- Giving Disoss the ability to run under the MVS and DOS/VSE operating systems through IBM's SNA. This is made possible by an enhancement to SNA called Systems Network Architecture Distributed Services (Snads) which, according to IBM, "provides the framework for document distribution among various systems."
- Providing Release 2 of Profs, IBM's VM host-based office software, and Release 2 of the Host-Displaywriter Document Interchange (HDDI). The two releases provide extended Displaywriter support for text and data processing applications.
- Announcing an updated release of the Distributed Office Support Facility (DOSF) that allows 8100 users to exchange documents with the Displaywriter and 5520.
- Offering a new release of the 5520 Administrative Processing Program 5611-SS2. Release 3 implements the Snads distribution connection between the 5520 and Disoss.
- Announcing a Disoss/Professional Support Program that extends Disoss functions to users of the IBM 3270 line of CRT terminals.

Disoss Version 3 Release 2 allows 8100, 5520 and Displaywriter users to take advantage of the newly announced Snads capabilities. The initial license fee for Version 3 Release 2 costs $4,000 for sites running under MVS and $1,500 for DOS/VSE. The monthly charge for the new release is $1,300 for MVS and $500 for VSE. For customers qualifying for the IBM's Distributed System Licensing Option (DSLO), the initial license charge is $3,000 (MVS) and $1,125 (VSE). The monthly DSLO charge is $975 for MVS and $375 for VSE.

Release 2 of Profs offers users enhanced proofreading services, additional control file aids, more administrative aids, improved distribution services, note functions, document printing functions and additional data base management functions. Its initial license fee is $4,000 and $600/mo. Under DSLO, Profs Release 2 costs $3,000 for the initial fee and $450/mo.

Release 2 of HDDI allows Profs users to exchange documents and offers Displaywriter users help screens and menus for Profs. HDDI Release 2 is scheduled for delivery in April and costs $1,000 for the initial fee and $250/mo.

The 5520 Administrative Processing Program 5611-SS2 supports both final form and revisable form document interchange between the 5520, Displaywriter and 8100. In addition, it allows attachment of the newly announced Personal Computer XT/370 to 5520 systems and supports emulation of 3270 terminals on the 5520.

There is a one-time license charge of $10,500 or a monthly charge of $389 for Program 5611-SS2, available next October.

DOSF Release 4 gives 8100 users enhanced automated text processing capabilities plus additional data processing functions. It will be available in February for $12,300 and $704/mo. Under DSLO, the new release costs $10,455 and $598/mo.

The Disoss/Professional Support package provides Disoss document distribution, library and applications services support to users of 3270 terminals and the newly announced 3270-PC. With the package, 3270 users can create, edit, print and distribute final form documents in the same format as users of 8100, 5520 or Displaywriter systems.

The package is available for an initial license fee of $5,700 for MVS users and $3,100 for VSE users. It will be available next month.

Looking like something out of a science fiction movie, an IBM Selective Sequence Electronic Calculator, the first computer to combine electronic computation with stored instructions, dwarfs two pig-tailed visitors to IBM's Gallery of Science and Art at 590 Madison Ave. in New York, where IBM last week held the press conference announcing two new microcomputers (Page 1) and several other products. The machine, which was the state of the art in 1947, has more than 12,000 vacuum tubes and 21,000 electromechanical relays. It is one of more than 300 devices on display at the museum in an exhibit entitled "Innovation in IBM Computer Technology." The exhibit, which spans five decades of computer innovation, is free and open to the public through Nov. 19.

IBM Introductions Seen Escalating Market Struggle

By Tom Henkel
CW Staff

IBM last week dropped a bomb on the microcomputer market, further clouded its role in distributed processing and unveiled what may prove a key piece in its rumored local-area network strategy.

The introduction of two microcomputers that can run mainframe application software appears to have complicated the issue of IBM mainframe compatibility for competing vendors in the microcomputer market. Prior to IBM's introduction of the Personal Computer XT/370 and the 3270 Personal Computer, other microcomputer vendors could claim compatibility with IBM mainframes by altering their micros to operate as dumb IBM 3270 terminals.

Now IBM has added another dimension to mainframe compatibility — the ability to access host processor applications in the VM/CMS operating environment and concurrently use those applications with programs running under PC-DOS, the primary operating system for IBM's Personal Computers, noted Frank Gens, an analyst with The Yankee Group research firm in Boston.

But while access to mainframe processors may prove a boon to fairly sophisticated users, such as systems developers, it currently means little to the executive operating a Personal Computer, said Dr. John Bennett, corporate director of data processing at United Technologies Corp. in Hartford, Conn. "I don't see an executive using VM," Bennett said.

And even if an executive was willing to learn how to work with VM, the DP department may not want to let him access mainframe-based applications. Moreover, Bennett said, it is hard to justify the approximately $10,000 cost of a micro with the ability to access a host processor when dumb 3270 terminals cost less than $4,000.

But Gens said mainframe compatibility is only the beginning of a new era of microcomputer capabilities. The announcement of the Personal Computer XT/370 and 3270 Personal Computer will spark the establishment of a swarm of software development houses offering VM-compatible programs that can be used to integrate microcomputer and mainframe data. Those programs, he theorized, will be much easier to use than VM and will give the user fairly easy access to mainframe data.

Gens contended that IBM is forcing developers of microcomputer software into its home court. He explained that while PC-DOS is based on an almost industry-standard operating system (Microsoft, Inc.'s MS-DOS), VM is strictly under IBM control.

Impact of the 8150

In addition to sending shock waves through the microcomputer community, IBM's announcements last week demonstrated new support for its 8100 line of processors. After introducing the new-technology 8150 — a dyadic processor complex employing very large-scale integration technology and bipolar chips — IBM called the 8100 line its "primary host-managed distributed data and office processing system."

The 8150 appears to be IBM's closest attempt at offering a nonstop processor, noted long-time 8100 supporter William Ackerman, president of DPX, Inc., a Cupertino, Calif., consulting firm.

But to many industry watchers, the 8150 is a phoenix rising from the ashes. The 8100 series has been upstaged since several months after its 1979 introduction, when IBM announced the popular 4300 series of processors. In addition, while the 8100 has always been billed by IBM as a distributed processing system, the 4300 series and, to some degree, the System/38 offer the same capabilities.

Jack Hart, an IBM watcher with International Data Corp. in Framingham, Mass., observed that IBM has spent millions developing the 8100 and its two operating systems, DPPX and DPCX. He suggested that IBM has made too big an investment in the 8100 product line to kill it off.

But Ackerman disagreed. In an interview last week, he said the announcement of the 8150 as well as new versions of DPPX and DPCX support his contention that the 8100 line plays a pivotal role in IBM's 1980 statement of intent to integrate office functions with data processing.

IBM may have offered a glimpse of the future with the enhancements it made last week to the Distributed Office Support System (Disoss) and the Professional Office System (Profs). The enhancements allow the 8100 and 5520 distributed processing systems and Displaywriter word processors to communicate with each other.

The enhancements also offer a link to mainframe processors through Systems Network Architecture Distribution Services (Snads). Gens said Profs, Disoss and Snads could work together to form the basis of IBM's rumored local-area network.

Study: VDT Users Suffer More Than Nonusers

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — A survey of video display terminal users has confirmed reports that users suffer more vision problems, headaches, muscle strain, backaches, stress and other ills than nonusers.

The 2½-year study could not, however, verify claims from some VDT users that they may suffer reproductive problems or develop cataracts as a result of terminal use, Dr. Arthur L. Frank, the study's director, told a U.S. House of Representatives Education and Labor Subcommittee last Tuesday.

The study's findings are not inconsistent with earlier VDT use studies, which have confirmed increased health problems among users, but have found no proof that permanent physical damage is caused by the machines themselves. A recent National Academy of Sciences report, for example, concluded that ergonomic deficiencies in VDT job design may be causing health complaints, but that VDT use does not cause eye disease or damage [CW, July 18].

Reporting on the most recent study, which was financed by the Newspaper Guild and surveyed Guild members in six U.S. cities, Frank said VDT users lost more time from work than did nonusers, missing more than one-half day more on the average in a two-year period than nonusers.

"While a small difference," he said, "if this is multiplied by the millions of workers involved, the dollar cost in lost-time wages is quite large." More than seven million American workers now use VDTs, according to one estimate, and the figure could reach 40 million by 1990.

Based on 1,000 questionnaires returned from the six cities surveyed, Frank, professor and chairman of the Department of Preventive Medicine and Environmental Health at the University of Kentucky's College of Medicine, presented the following findings of his study to the Health and Safety Subcommittee:

- "VDT users suffered more from deteriorated vision, eye strain, eye irritation, red eyes and blurred vision than nonusers."
- "VDT users, more than nonusers, suffered from neck pain, shoulder pain and low back pain." This finding, he said, "could not be explained by chance."
- "Headaches were significantly more frequent among VDT users."
- "VDT workers reported being more irritable, having trouble sleeping, having trouble getting up and feeling overworked."
- VDT users also reported "more often problems of stress and physical design at the work place. VDT users noted more often than nonusers problems with reflections, improper brightness, how one sits and poor equipment."

Frank continued that among women responding to the survey, there "was no evidence of premature birth, infant mortality or effect upon the menstrual cycle with VDT use." He said "no conclusions can be drawn with regard to reproductive effects and VDT exposure since the number of birth defects and miscarriages was insufficient in this [survey] population."

Similarly, the number of respondents precluded arriving at any firm conclusion about possible development of cataracts from VDT use, Frank said. He called for additional research on the effects of VDTs and recommended that "an interim standard on work breaks be instituted" in the meantime.

Subcommittee Chairman Rep. Joseph M. Gaydos (D-Pa.) said the panel will "remain sensitive and alert" to the possible problems of VDT use and may hold additional hearings to make "a substantive evaluation of the progress in this area."

Newspaper Guild President Charles A. Perlik Jr. told the subcommittee the union is following up the Frank study with "detailed ophthalmological examinations and the gathering of related information" in the six cities surveyed.

Reagan Invokes Powers to Retain Export Controls

WASHINGTON, D.C. — President Reagan has invoked national emergency powers to keep in effect U.S. export controls, which lapsed Oct. 14 with Congress still unresolved on renewing the Export Administration Act.

The act, which provides the government with the authority to license U.S. exports, expired Sept. 30, but was extended to mid-October by the House and Senate. After the president's action, Congress last week resumed debate on renewing the export law without the deadline pressure.

Reagan invoked the International Emergency Economic Powers Act to keep the controls in place, saying that "in the absence of controls, foreign parties would have unrestricted access to [U.S.] commercial products, technology and technical data, posing an unusual and extraordinary threat to national security, foreign policy and economic objectives critical to the United States."

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Draft Records to Find Absent Fathers

Plan Renews Debate Over Use of Data Matching

By John Gallant
CW Staff

WASHINGTON, D.C. — A plan to use draft registration records to ferret out fathers dodging child support responsibilities has renewed debate over whether computer matching is a legitimate tool for improving government efficiency or an unwarranted invasion of privacy.

In November, the Selective Service System will begin periodically comparing its computerized draft registration records against a list of absent fathers with child support obligations provided by the Office of Child Support Enforcement (OCSE), a division of the U.S. Department of Health and Human Services. The Selective Service records contain information on some 11 million men between the ages of 18 and 23 who have filed with the agency since draft registration was reinstated in July 1980.

When computers at the federal Joint Computer Center at Great Lakes, Ill., encounter hits, or matches between the two lists, the information in the draft registration files will be forwarded to the OCSE to help the agency track down the delinquent fathers, according to Selective Service spokeswoman Joan Lamb. Because the Selective Service relies on data from other federal agencies, such as the Social Security Administration, to uncover those who fail to register for the draft, the agency sees this project as a chance to return the favor, Lamb said.

> *'People wrongly become the target of an investigation. Their employer will get a letter stating that, while the government isn't saying anyone is guilty, the person is under investigation. And though the person may be subsequently cleared, very often his or her employer is never notified of that.'*

"In the interest of equity, we feel we have to do this," Lamb said. "Given that we depend on other agencies, we feel that it's only fair to give them access to our information. The guy who isn't supporting his child is making sure that the taxpayer has to, and that costs the government a lot of money."

But the director of the American Civil Liberties Union's Privacy Project called that rationale "absurd." What the Selective Service is doing, Norma Rollins said, "is making a circular argument. Those initial exchanges of information that the reciprocation is supposedly based on are objectionable also."

The problem, Rollins said, is that "there are errors in the program or in the data provided," so "there are a lot of incorrect hits." When this happens, "people wrongly become the target of an investigation. Their employer will get a letter stating that, while the government isn't saying anyone is guilty, the person is under investigation. And though the person may be subsequently cleared, very often his or her employer is never notified of that.

"There is absolutely no due process involved in the searches undertaken with computer matching."

Warned Rollins, "Because computer technology has boomed, we're creeping toward total government knowledge of all we do. We start by searching through the records of scofflaws and gradually ease into wider access to private information."

Not Alone in Concern

Rollins is not alone in her concern over the growing government use of computer matching. Ronald L. Plesser, former general counsel of the Privacy Protection Study Commission, said in a recent interview, "I don't oppose computer matching totally, but I am troubled that there is no institutional control within the government on this issue.

"The people employing computer matching say that the federal Privacy Act of 1974 is the protector of citizens, but there are loopholes in that legislation that you could drive a truck through," he remarked.

"The government obviously needs computers and telecommunications for information exchange, but when you get into areas like matching agency files against bank records, you have to beware," Plesser cautioned.

"There are absolutely no guidelines to follow. If someone in the government came up to you on the street and demanded to see your bank account, that would obviously be an illegal search and seizure. But, if the government can get that information from a computer, somehow that seems to sanitize it, to legitimize it."

Both Lamb and Rollins admitted that the computer matching done by the Selective Service-OCSE will probably produce little data that is useful. Lamb observed that the pool of youthful draft registrants is unlikely to contain many delinquent fathers.

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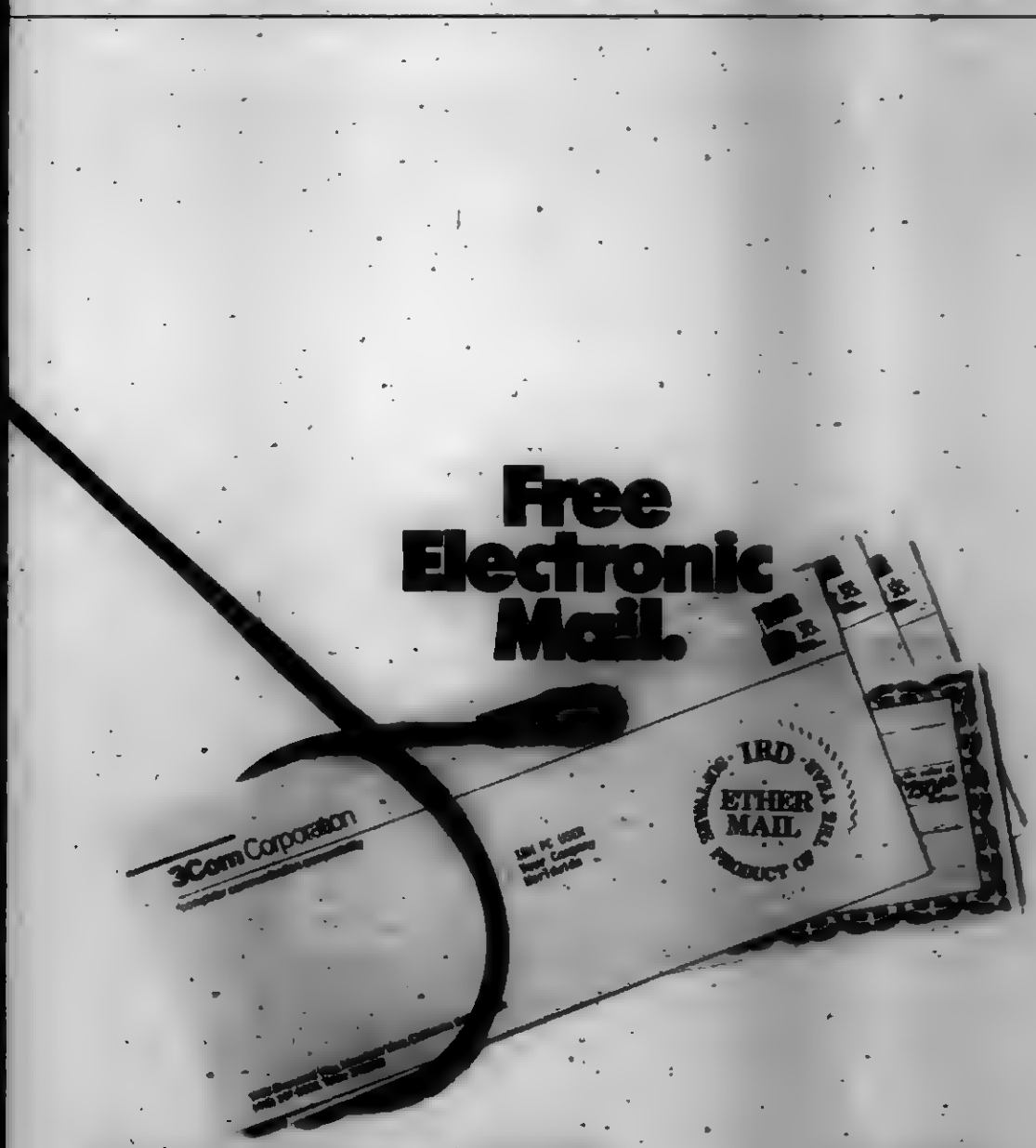

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Exec Urges Plan to Align DP, Business Strategies

By Paul Gillin
CW Staff

WASHINGTON, D.C. — The data base administration function needs dramatic restructuring if management information systems executives hope to align overall DP functions with business needs.

That was the message that Gene Altshuler, data base specialist and principal at Peat, Marwick, Mitchell & Co., delivered here last week at the Conference on Data Administration and Control of Data Bases. Altshuler proposed that many companies would do well to establish a three-tiered information planning and control structure that "links business strategy with automation strategy."

Information planning and control comprises three basic elements, Altshuler said. Systems architecture administers the data administration functions at the macro level, looking broadly at the business environment and recommending systems that can be integrated with it. "It has the functional user interface that looks down the road at what has to be done and plans the relationships of major systems to other major systems," Altshuler explained.

'User Translators'

This level is also responsible for creating systems acceptance criteria that are more realistic than simply asking the user to sign-off on a sheaf of documents. Systems architects are basically "user translators" who are supported by programmers who can turn their translations into useful code, he said.

This function is also responsible for performing feasibility studies, but with enough business savvy to explain the intangible benefits of a project to management.

Altshuler stressed that the current state of information systems development tends to promote good programmers to the task of dealing with users. Lacking that familiarity with the broader requirements of a business strategy, "we get a programmer setting corporate policy with a coding pencil," he said.

Unfortunately, the employees who will be least available in the future are those "who can interact with the users and extract their basic needs." But Altshuler indicated that information architecture will be critical to the data base administration function in future years.

The second major area of information planning and control is the automation planning and control function, which handles the more technical requirements of the DP installation, Altshuler said. These include coordinating automation plans with requirements set forth in the high-level "enterprise model" of basic business needs; establishing operational plans for automation; planning communications facilities; quality assurance; data administration in the "classic" sense; and project management and control.

Too many of these responsibilities are currently borne at the "factory floor" level under the data administration function, Altshuler said. To be effective, a central control function is needed to coordinate the factory and let it write code. Variances from schedule and quality assurance are better handled by those who can communicate well with the users.

The third branch of information planning and control is the research and development function. This group looks at new mainframe and peripheral devices, systems and applications software and fourth-generation technologies for possible use in the corporation, he said.

Altshuler noted that information planning and control does not provide for end users' control of their own data, a concept he said is "disastrous" in many organizations. Rather, "it separates planning and control of data from its technical function." If an organization is not satisfied with its data base administration function, "I'm advising you to split it up," he concluded.

CW Photo by P. Gillin

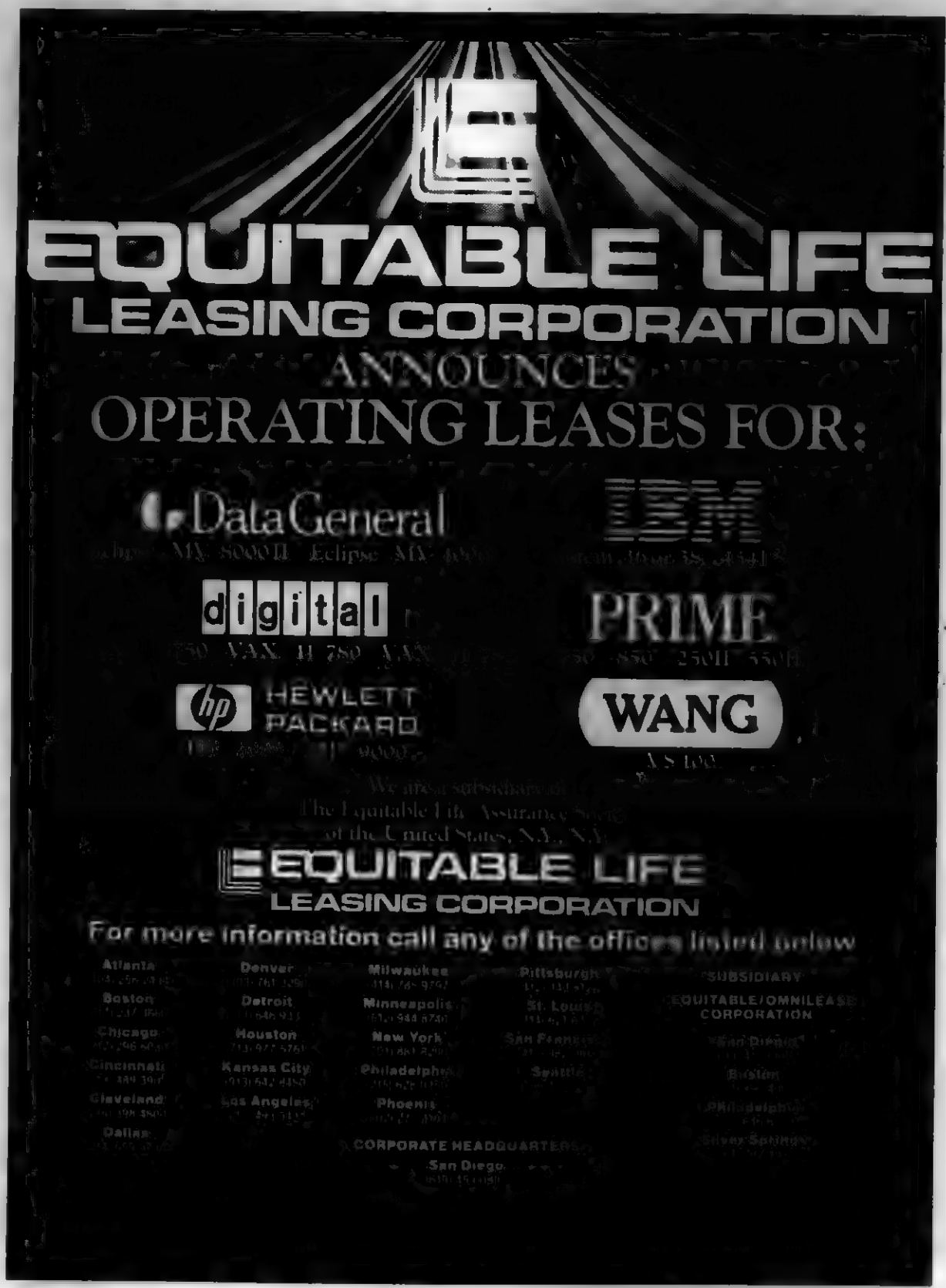
A data base administration structure that "links business strategy with automation strategy" was proposed last week by Gene Altshuler.

Financial Planners To Meet Nov. 17

OVERLAND PARK, Kan. — "Taming the Microcomputer Revolution," the 1983 Midwest Conference for Financial Planners, will be held Nov. 17 at the Johnson County Community College here.

The conference fee is $50 for advance registration and $60 for registration after Nov. 1.

More information can be obtained from Johnson County Community College's Continuing Education Department, 12345 College at Quivira Blvd., Overland Park, Kan. 66210.



Demonstration Described at Conference

Cullinet's IDMS/R Gets High Marks in Preview

By Paul Gillin
CW Staff

WASHINGTON, D.C. — A consultant who has used Cullinet Software, Inc.'s yet-to-be-publicly demonstrated IDMS/Relational (IDMS/R) data base management system (DBMS) last week gave the product qualified approval as a relational DBMS.

Concluding a session on relational DBMS at the Conference on Administration and Control of Data Bases here, William Casey, president of Systemcraft, Inc., said that the product is better than any existing relational DBMS he has seen for building production applications.

While he has long been skeptical about the ability of "third-generation" DBMS like IDMS to provide the ease-of-use functions of relational models in production settings, Casey's experience with IDMS/R, which he worked with last month, has changed his mind. IDMS/R "behaves like a relational DBMS," but has the powerful features of the network-model IDMS, Casey said.

Casey's experience with IDMS/R and other DBMS that have been extensively rewritten to incorporate relational features has convinced him that it is possible to perform a relational retrofit on a "traditional" DBMS and achieve better performance than from a true relational model, he said.

Noting that he had worked for Cullinet for seven years until 1980, Casey said that nevertheless he had been skeptical about Cullinet's ability to build a relational view on top of the network IDMS architecture and achieve the benefits of both. However, a demonstration convinced him that the goal was achievable, he said.

"I thought I'd find things I didn't like, and I was surprised," he conceded.

According to Casey, two features of IDMS/R make it preferable for production applications to "true relational" products like Oracle Corp.'s Oracle and Relational Technology, Inc.'s Ingres: The data dictionaries are "much better," and the integrity safeguards are more comprehensive.

Casey prefaced his remarks by stating that third-generation DBMS have succeeded by virtue of features that were initially thought not to be significant.

These include integrity aids like backup and recovery and application building aids like data dictionaries and screen painters. However, traditional DBMS have suffered from their inability to provide a logical data view that is acceptable to the end user.

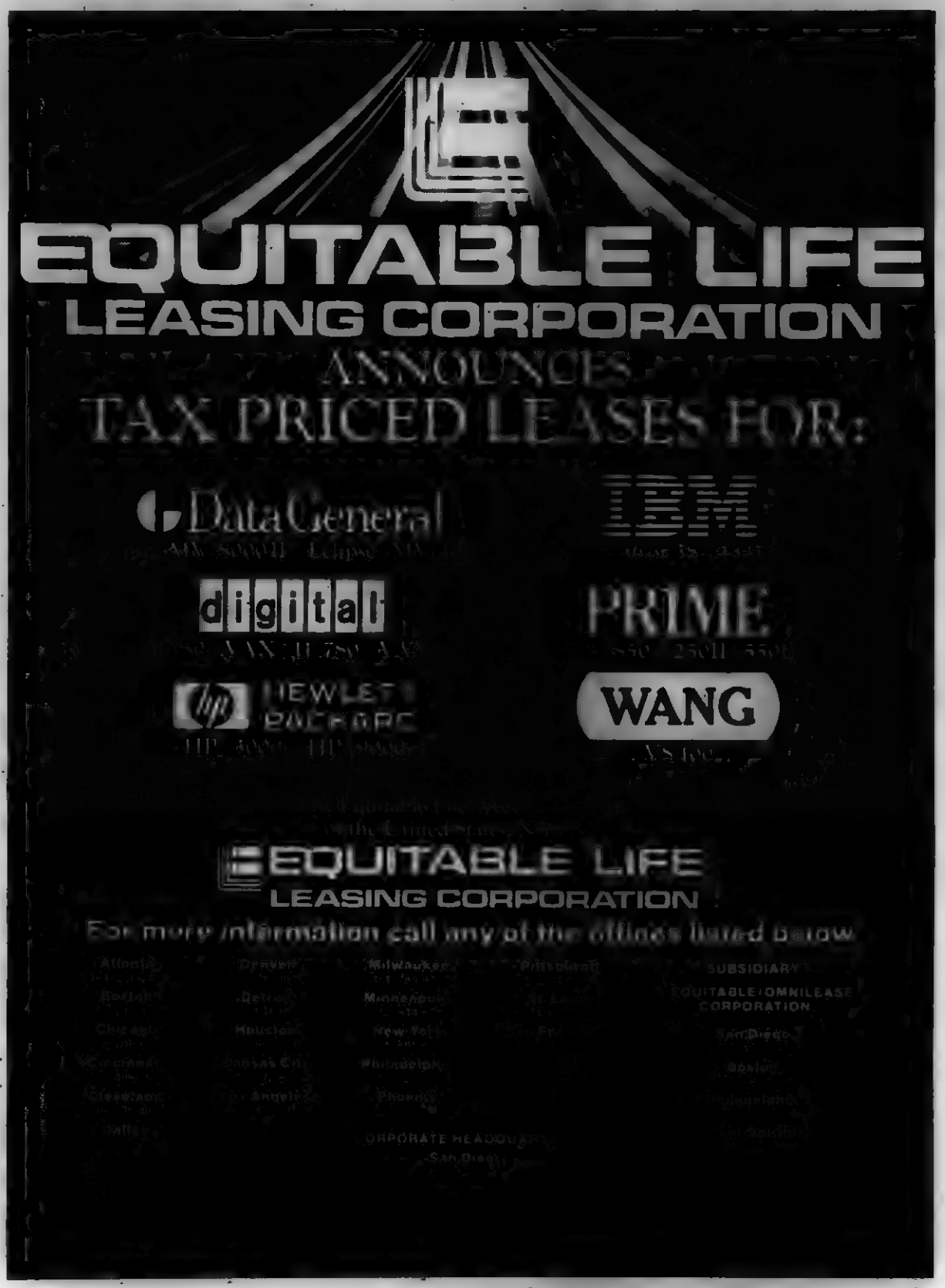
Relational systems evolved from a "top-down" approach that started with the logical view, eschewed hard pointers and provided powerful facilities for performing joins and dynamically creating tables. However, the relational products fell short in the quality of data dictionaries they provided, security features and provisions for concurrency control, Casey said.

True relational systems have undergone "a lot of retrofitting" to provide lockout protection and concurrency control, but the results have been largely unsatisfactory, he observed.

In the meantime, several third-generation DBMS suppliers have "entirely rewritten" their systems in the last five years to provide these features.

As a result, the third-generation systems are better suited to production applications under a relational interface, Casey said. He stressed that systems like IDMS/R cannot be called "truly relational," but asserted that purity of definition is not as significant as quality of results.

Rather, the real question is whether the system acts relational as opposed to whether it is truly relational. On that score, the third-generation DBMS turns in a strong performance, Casey said.



Three Locations Chosen to Host DPMA Seminars

TORRANCE, Calif. — The Education Foundation of the Data Processing Management Association (EFDPMA) will hold a two-day seminar on "Software Quality Assurance and Verification and Validation" Nov. 28-29 in Atlantic City, N.J.; Dec. 5-6 in Washington, D.C.; and Dec. 12-13 in Boston.

The seminar will be presented by Raymond J. Rubey, technical director at Softech, Inc. It will focus on reviewing design inputs and processes, preparing test plans and procedures, establishing audit trails for problem fixes and following up and managing software change control boards.

The registration fee for the seminar is $465 for DPMA members and $495 for others.

Further information is available from EFDPMA Seminars, Department SQA, 3420 Kashiwa St., P.O. Box 3608, Torrance, Calif. 90510.

Datacomm Briefs

Committee Questions Reality of Bypass Threat

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — The "bypass threat" may be more rhetorical than real, the U.S. Senate Commerce Committee suggested earlier this month in a report on S. 1660, a pending bill that would levy surcharges on those who bypass the dial-up telephone network in favor of other transmission services.

The Commerce Committee's argument leaned heavily on an article in the May 1982 *Bell Laboratories Record*. The committee noted that the *Record* viewed bypass " 'more as a concern than a threat,' " because " 'it's hard to beat the price' " of local-exchange services.

The Commerce Committee report pointed to the ubiquity of the local-exchange network and the fact that large companies are skeptical about the performance of emerging bypass technologies and suppliers. Because of these factors, the committee insisted that S. 1660 would not encourage bypass, at least in the near future.

S. 1660, which is now awaiting a final vote on the Senate floor, is one of two bills which is opposed by AT&T and others, including most business users. The second bill, H.R. 4102, was debated last week within the House Commerce Committee.

AT&T opposes the bills not because of the bypass surcharge, but because they would charge only business users — not residential users — for access to the long-distance telephone network. Legislatively induced increases in communications charges for business users, AT&T argues, will cause a massive migration to alternate facilities.

Moreover, enactment of the legislation would force AT&T to revise its recently filed long-distance tariffs, an expensive, time-consuming process that would prolong customer confusion and delay completion of AT&T divestiture.

FCC Pushes Up Date Again in Tariff Changes

WASHINGTON, D.C. — Tariff changes promising lower costs for at least some users of AT&T's wideband digital services were again deferred by the Federal Communications Commission (FCC) last week. The effective date is now Nov. 7 instead of Oct. 23.

The tariff changes — originally slated to become effective Aug. 24 — implement a June FCC decision (Docket 81-216) ordering the phone company to:

- "Unbundle" (separate) its charges for digital channels and the attached interfaces, usually referred to as channel service units (CSU) or network channel terminating equipment (NCTE).
- Allow the use of independently made terminal interfaces.

AT&T filed the changes last July. Customers who continue using CSUs and NCTE supplied by the phone company would pay at least as much as before, but those leasing unbundled channels would pay considerably less.

For example, the channel-only rate for high-capacity Terrestrial Digital Circuits Service, also known as "Accunet T1.5," would be $120/mo less than the present charge for a channel plus NCTE. Under the new schedule, if the user wants the NCTE, he pays an additional $170/mo.

For Dataphone Digital Service, the bundled service — channel plus interface — now costs $99.65/mo to $908/mo, depending on speed. Under the new tariff, the channel-only rate ranges from $65.05 to $873.40/mo and the CSU/NCTE, if acquired from the phone company, costs an additional $37.40/mo.

The FCC's Common Carrier Bureau last month sent AT&T a long list of questions concerning the tariff changes, and the phone company replied Oct. 11. According to an FCC representative, the tariff is being delayed until Nov. 7 to give the bureau more time to review the reply.

It is widely anticipated that as soon as the new tariff becomes effective, independent manufacturers will unveil NCTE/CSUs at prices below those charged by AT&T. This competition is expected to force down the phone company's prices.

SBS Voices Opposition To AT&T's Billing Plan

WASHINGTON, D.C. — Satellite Business Systems (SBS) recently told the Federal Communications Commission (FCC) that it opposes an "optional billing arrangement" for users of AT&T's Enhanced Private Switched Communications Service (EPSCS), because "effectively, the shared EPSCS network becomes a 'mini-public-switched network' that [offers] per-minute call rates less than half those" of AT&T's Message Toll Service (MTS).

Under the proposed plan, scheduled to become effective Nov. 30, charges for EPSCS service components used in common would be shared. According to SBS, this "would result in the creation of an offering equivalent to MTS."

SBS is particularly upset about the documentation AT&T filed to support its proposal, which it alleged is inadequate. The phone company is "seeking to restructure substantially its EPSCS offering in a manner that avoids commission scrutiny," contended SBS. If the proposal is approved, SBS said, the change will encourage AT&T to submit similar proposals involving other services, thereby "negating" FCC rules designed to ascertain the reasonableness of rates and terms before they are implemented.

MCI Communications Corp. also told the FCC it opposes the EPSCS proposal, pointing out that shared and reduced rates would be offered only to those EPSCS users who lease interexchange connecting facilities from AT&T.

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Chattanooga, TN	Nov. 15
Chicago, IL	Nov. 15
Cleveland, OH	Nov. 15
Columbus, OH	Nov. 18
Corpus Christi, TX	Nov. 16
Detroit, MI	Nov. 3
Green Bay, WI	Nov. 22
Greensboro, NC	Nov. 17
Greenville, SC	Nov. 16
Harrisburg, PA	Nov. 22
Knoxville, TN	Nov. 2
Lexington, KY	Nov. 2
Madison, WI	Nov. 1
Meadowlands, NJ	Nov. 30
Memphis, TN	Nov. 3
Merrimack, NH	Nov. 1
Milwaukee, WI	Nov. 23
Minneapolis, MN	Nov. 29
Montgomery, AL	Nov. 10
New Haven, CT	Nov. 9
New York, NY	Nov. 9
Oakland, CA	Nov. 16
Orange County, CA	Nov. 16
Orlando, FL	Nov. 10
Ottawa, ONT	Nov. 24
Piscataway, NJ	Nov. 1
Pittsburgh, PA	Nov. 1
Portland, OR	Nov. 1
Quebec City, PQ	Nov. 30
Regina, SASK	Nov. 15
Springfield, MA	Nov. 15
Springfield, MO	Nov. 17
St. Louis, MO	Nov. 30
Tampa, FL	Nov. 29
Toronto, ONT	Nov. 3
Vancouver, BC	Nov. 30
Washington, DC	Nov. 22
Winnipeg, MAN	Nov. 29

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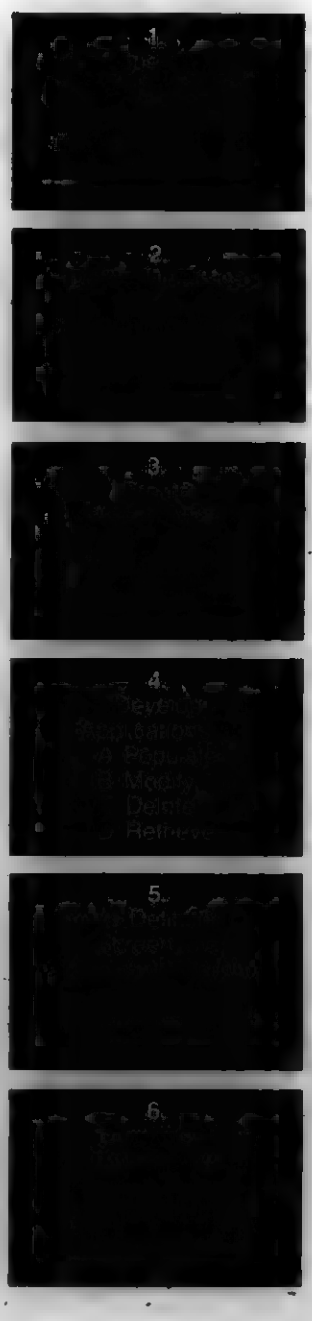

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Problems Brewing for Fault-Tolerant Vendors

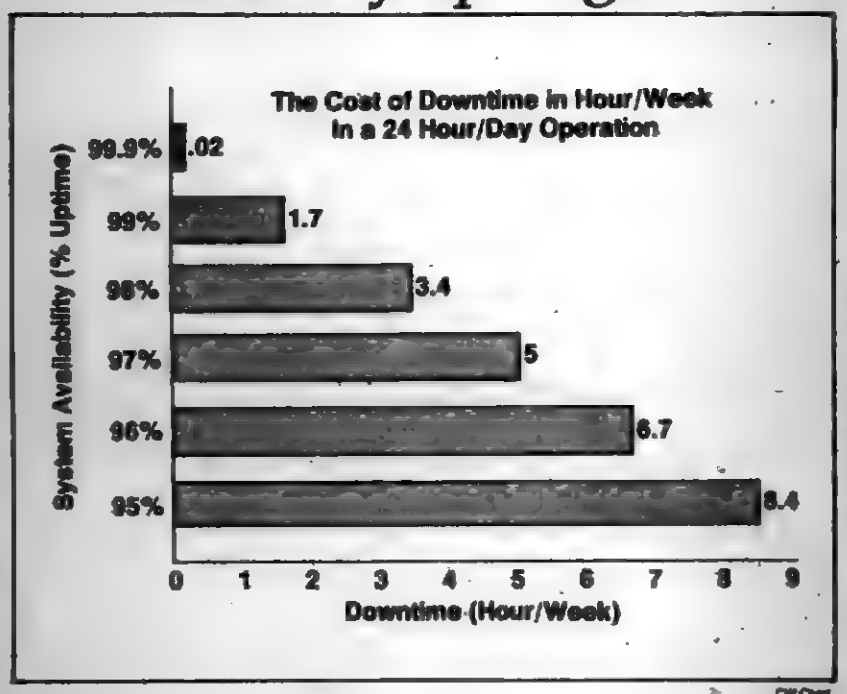
(Continued from Page 1)

Aided by the great technical difficulty that traditional mainframers have encountered in adding fault tolerance to existing product lines, feisty start-ups and venerable "oldtimers" like Tandem (founded in 1974) seem headed for blue-sky futures. But problems have begun bubbling to the surface, adding some confusion and uncertainty to the brewing fault-tolerant pot.

While there is no shortage of innovative architectural approaches to providing fault tolerance (see story Page 19), there is a very limited number of OEMs — maybe a dozen — currently buoying the fault-tolerant market. Because most fault-tolerant system makers lack any sizable end-user sales capabilities, the competition for OEMs is growing increasingly heated — "cutthroat," in the words of one market analyst.

Also, while the traditional computer makers have largely shunned the fault-tolerant market, their customers are increasingly being drawn to applications and operating environments requiring fault-tolerant features. So it is generally conceded that within a few years, major vendors like IBM and Digital Equipment Corp. will offer redundant, fault-tolerant features in a number of mainstream systems. Indeed, many analysts believe that successive generations of IBM and DEC systems may offer complete fault-tolerant architectures without excluding users from the wealth of applications software already written for their systems.

Industry Spotlight



The on-line transaction processing and office automation markets that most fault-tolerant players have targeted are now dominated by the traditional vendors. Users in these markets have made prodigious investments in applications software to run on the hardware of IBM, DEC, Burroughs Corp. and the like, none of which can be used on the machines of the fault-tolerant makers, according to Omri Serlin, a research consultant in Los Altos, Calif.

"This transaction processing market is a very, very difficult place to sell into, especially when you are not compatible with IBM or DEC architectures," Serlin said. "The market potential is huge, but sales are tough — getting tougher, I believe."

Finally, while hardware problems in providing fault tolerance have largely been ironed out, most system failures are software-related. A tremendous and costly effort must be made in software development to produce systems that are truly fault tolerant.

"A great challenge to the fault-tolerant companies lies in the implementation of high reliability without degrading CPU performance or overburdening application programmers," said Richard J. Matlack, president of Infocorp, a Cupertino, Calif., research firm. "This can be a very expensive undertaking for a small company."

The potential pitfalls notwithstanding, the sheer enormity and growth of the market segment requiring fault-tolerant capabilities is likely to continue to attract new vendors, while coaxing existing companies into the fault-tolerant arena. As Serlin put it, "The need for increased reliability will truly be tremendous in the near future. In a fault-tolerant market of the size most people foresee, there will be room for many good companies."

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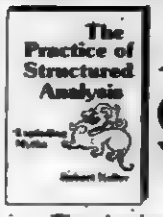

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FAULT-TOLERANT MARKET — KEY PLAYERS AND THEIR PRODUCTS

Company and Address	Product Name	Status	CPU Type	Operating Software	Mode of Recovery After Failure	Target Markets	Price Range
August Systems, Inc. Tigard, Ore.	Series 30 Series 300	Shipping Since October 1981	Intel 8086s Running Same Code in Fault-Tolerant Mode	Jointly Developed Proprietary System (Trigard+Tridac)	Uses "Voter" and Triplicating CPUs; Programs Held in Main Memory	Process Control And Communication Control	$55,000+(30) $86,000+(30I
Computer Consoles, Inc. Rochester, N.Y.	Power 5/55	Customer Shipment by Year's End	As Many as Eight Motorola 68000s	Proprietary Unix Look-Alike Called Perpos-P (Perpetual Processing OS)	All Major Components Fully Redundant and Operating Simultaneously	Office Automation, Federal Government	$180,000+
Parallel Computers, Inc. Santa Cruz, Calif.	Not Available	Prototype: Plan To Ship in First Quarter 1984	Motorola 68000-Based	Unix	Utilizes Tightly Coupled Multi-Processors to Avoid "Warm Backups" and Checkpointing	General Business Market	Not Available
Sequoia Systems, Inc. Marlboro, Mass.	Not Available	Prototype	Motorola 68000-Based	Enhanced Version of Unix	Self-Checking Hardware and Operating System Controller Recovery	On-Line Transaction Processing	$133,000+
Stratus Computer, Inc. Natick, Mass.	Stratus/32	Shipping Since January 1982	Up to 32 Processing Modules in Ring Network; Motorola 68000-Based	Proprietary System Called Virtual Operating System (VOS)	Solidly Hardware-Based; Each Board Has Two Sets of Logic Components, and All Components Are Self-Checking	On-Line Transaction Processing and Office Automation	$140,000+
Synapse Computer Corp. Milpitas, Calif.	N+1	Shipping Since May 1983	As Many as 28 Motorola 68000-Based CPUs Tightly Coupled Using a 32-Bit Bus to Share Memory	Proprietary System Called Synthesis	Available Working Processor Picks Up Checkpointed Transaction in Shared Memory	Transaction Processing; Financial Community	$340,000 to $4.3 Million
Tandem Computers, Inc. Cupertino, Calif.	Nonstop I+II	Shipping Since 1976	Proprietary 16-Bit CPU Architecture; Up to 225 Processors Can be Linked via Fiber Optics	Proprietary System Called Guardian	Parallel Process in Working CPU Picks Up Last Good Transaction Via Tandem's Dynabus	On-Line Transaction Processing	$200,000+
Tolerant Systems Corp. San Jose, Calif.	Eternity	Will Ship in Second Quarter 1984	Based on National Semiconductor Corp. 32032	Berkeley 4.1 Version of Unix	Load Shared by Multiple Processors Within Each of Up to 15 Modules	Transaction Processing	$100,000+

CW Chart

No 'Me-Too' Systems in Fault-Tolerant CPU Market

By Bill Laberis
CW Staff

"What's amazing to me is the wide range of solutions becoming available for the same problem, namely providing fault tolerance at a reasonable cost," said Omri Serlin, president of the Los Altos, Calif., consulting firm of Itom International Co. "It's hard to say who has the best architecture. Actually, not that many have faced the test of the market to enable making any comparisons."

Unlike the personal computer market, which is increasingly crowded with "me-too" vendors, the burgeoning fault-tolerant market is characterized by considerably more product differentiation. The dozen or so vendors purporting to be fault-tolerant systems makers, few of which have shipped anything to date, generally address slightly different market segments with varied approaches to fault tolerance.

What follows are characteristics of several vendors' fault-tolerant machines:

Tandem Nonstop II. The undisputed market king of fault tolerance today, Tandem Computers, Inc. was the pioneer of nondisruptive, on-line repair. Tandem just last week introduced its first 32-bit entry; the following comments therefore refer to the products composing Tandem's present installed base of nearly 4,000 processors.

The Nonstop II can contain up to 16 loosely coupled, 16-bit processor modules, with processors interconnected by two independent 13M-byte buses — the highly regarded Dynabus. Using the proprietary Guardian operating system, Dynabus makes the multiprocessor architecture virtually transparent to the applications programmer, a major breakthrough achieved two years ago with software facilities, most notably Pathway and TMF.

Industry Spotlight

Each processor in a Tandem system is paired with another processor, which assumes the whole processing load should the first processor fail. Each processor continually informs the other what it is doing by sending so-called "I'm alive" messages across the bus. This communication, called checkpointing, enables the backup processor to fill in for its failed partner within two seconds of a reported failure.

But checkpointing has its drawbacks. It is a drain on processor resources and results in some system degradation.

On the plus side, the Tandem approach works well in distributed environments because the independent processors can be scattered throughout a network while maintaining fault tolerance within the whole system.

Synapse N+1. Unlike the Nonstop, the Synapse Computer Corp. N+1 is a tightly coupled system featuring a shared memory linked to a high-speed bus. The system gets its name from its basic design, which adds on extra Motorola, Inc. 68000-based processors to a system with 'N' processors, the design theory being that the requirements of fault tolerance can be met with one extra of each type of resource.

The Synapse multiprocessors appear as single processors to applications programmers. The proprietary Expansion Bus consists of independent buses that have an aggregate transfer rate of 64M byte/sec, with each bus representing a backup for the other. The system is said to permit relatively easy expansion.

Stratus/32. Considered to have the most hardware-intensive approach to fault tolerance, Stratus Computer, Inc.'s 32-bit architecture essentially quadruples all major hardware components. Each processor board contains two 68000 processors and a hardware comparator, which analyzes the performance of subsystems running in synchronization.

Should the comparator detect a fault from subsystems running in sync, the faulty board is isolated from the rest of the system, while the remaining duplexed board carries on the processing. When the faulty board is repaired, it is reinserted and automatically synchronized with its partner.

Here again, modular expansion to up to 32 processing modules is reportedly accomplished easily. As one study put it, "Stratus offers one of the more cost-effective, fault-tolerant solutions because of its heavy reliance on off-the-shelf hardware, which is rapidly declining in cost."

Computer Consoles Power 5/55. After selling fault tolerance to the telephone directory assistance market, Computer Consoles, Inc. is now targeting the office automation area. The 68000-based system consists of processors connected to a duplexed local-area network (instead of a high-speed bus), also attached to disk controllers.

Perhaps most interesting about the Power 5/55 is its ability to support multiple versions of a data base while allowing users to read from or write to any disk. In addition, full connectivity among processors and other system components yields de facto processor duplication.

Tolerant Systems Eternity. Tentatively scheduled for mid-1984 shipment, Tolerant Systems Corp.'s Eternity system will be based on flexible System Building Blocks (SBS), with each block capable of performing in any of three functions — applications, communications or file service. Based on National Semiconductor Corp.'s 32032 microprocessor, Eternity will employ a version of Unix operating software, fast gaining popularity among fault-tolerant system makers because of its applications flexibility.

MIT Program Combines Technology, Business

CAMBRIDGE, Mass. — The MIT master's program in the management of technology was organized to serve the increasing needs of industry and government for technological leadership and to educate today's key technology managers, explained Edward B. Roberts, program director and the David Sarnoff Professor of Management of Technology.

The one-year program is divided into three semesters and is taught by both professors of management and professors of technology. Among the technological issues covered by the program are emerging technologies, the legal issues of biotechnologies, supervising technical people, technical planning and project management, government regulations and industrial policy, said Rick Bullen, a partner in Bullen Management Co. of New York.

In addition to the permanent staff, the course incorporates "countless special guests" and field trips to industrial sites, according to Bullen and Elliot Blackman, both members of the first graduating class.

Blackman, a senior scientist at Bolt, Beranek & Newman, Inc. prior to joining NEC Electronics U.S.A., Inc. as a project manager, added that the program "provided technical skills and tools of business, including the ability to *do*, not just manage people."

Despite the emphasis on technology, Bullen received "more of a business education than you'd expect, which turned out to be good." However, he and Julian Nikolchev, a technology consultant with SRI International, Inc.'s Technology Management Innovation Center, agreed that the management aspects of the program are better geared toward students who had held some managerial or leadership positions.

Without this background, students "probably would not perceive the need for some aspects [of the program] or understand how to employ it unless they had to cope with it," Bullen said. Also, he warned the program "was probably not that great as a stepping-stone for those wishing to escape from a purely technical track in their career to a purely managerial [track]."

In addition to the structure of the program, the graduates derived a great deal of knowledge from their interaction with each other, which "wears well over time," Blackman said. The students represented a wide range in age, training and professional backgrounds.

"It was really rewarding," agreed Carol Lemlin, a former engineer and now a software manager for Teradyne, Inc. Her classmates "developed an *espirit de corps* to cope with the intensity" of the program, Lemlin said, adding that she represented the bottom of her class in terms of technical experience (five years). Most of her classmates had 10 years of experience or more.

The graduates also emphasized that the MIT program will cost students at least a year out their personal and professional lives. "You have to consider that you'll be replaced in your job," Bullen warned. And tuition and living expenses combined can easily run at least $25,000 to $27,000 for a single adult.

Nonetheless, the career advancement benefits offered by the program were considered well worth the investment by the graduates recently interviewed by *Computerworld*, all of whom appeared pleased with the end results of their studies — new jobs with increased responsibility, visibility and pay.

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Holders of MBA Alternative Discuss the Results

By Patricia Keefe
CW Staff

CAMBRIDGE, Mass. — A number of technical professionals have advanced to key decision-making positions despite their lack of an MBA or other advanced business credentials. All are recent graduates of MIT's two-year-old master's program in technology management, which combines business and management theory with a technical focus.

In recent interviews, however, some of the program's graduates told *Computerworld* that it had not been easy to get those jobs because the concept behind the program is so new that many people do not understand it.

The master's degree program, conducted jointly by the School of Engineering and the Sloan School of Management, focuses on the management of technology and technological innovation. "The program offers a viable and long-overdue alternative to an MBA program for the technical professional whose career path demands increasing management responsibility on the technical side of the organization," explained Edward B. Roberts, program director and David Sarnoff Professor of Management of Technology.

Those who enter the program must possess an undergraduate science or engineering degree and five to 10 years' working experience. Typically, the graduates interviewed were self-sponsored, possessed undergraduate degrees in physics, engineering or mathematics and had worked 10 years in their fields. Nearly all had started their careers in purely technical positions, later moving into leadership roles that increasingly required an understanding of people and project management.

Some students, like Rick Bullen, a former department manager at Ford Aerospace and Communications Corp., simply found themselves "doing technical management with no formal training in it." Bullen is now a partner in Bullen Management Co., an investment firm in New York City. "I wasn't interested in an MBA program per se, although I had looked at them 10 years earlier," he explained.

The "depth and breadth" of the MIT program surpassed that of some two-year industrial management programs, he added.

Other students, like Elliot Blackman, now a project manager with NEC Electronic USA, Inc., and Julian Nikolchev, a former mechanical engineer who now works as a technology consultant for SRI International Inc.'s Technology Management Innovation Center, wanted to gain a better understanding of the business side of their work and had considered MBA programs, but chose the MIT degree for its focus on technol-

These and other graduates entered the program having either considered or committed themselves to not returning to their old jobs. Alumnus Ken Miller entered the MIT program after noticing he was not being considered for some positions because he lacked "an advanced business credential of the MBA type." Or, as Teradyne, Inc.'s software manager Carol Lemlin explained, "My career wasn't maturing fast enough."

'More Broad-Based'

"The program has helped make me more broad-based," Nikolchev said, adding that he now knows better how he "fits into the corporate base." However, corporations do not appear to have as clear an idea of how the MIT graduates fit into the company picture.

"It's hard to convince some recruiters that they can benefit from a program that integrates technology and management," Blackman said.

Also, the recession may have made some companies leery of deviating from traditional MBAs, believes Miller, a product engineering manager with Duracell, Inc.

Nearly all the graduates complained that job interviewers tended to see them as people with either technical or business skills. In addition, many of the interviewers were younger and possessed less experience than their prospective employees. High-level managers, according to Nikolchev, are more likely to "see the importance of [your] skills and know how to utilize them."

More information about MIT's advanced degree in the management of technology is available from Program Manager Jane Morse, MIT, E52-125, 50 Memorial Drive, Cambridge, Mass. 02139.

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What Makes a Good OA Consultant?

Q I would like to plan for a career as a DP consultant specializing in office automation.

I have four years of experience in planning and am currently involved with minis and micros in office automation. What are the rewards and pitfalls for consultants in office automation?

A The demand for *good* office automation consultants is and will remain high. The problem is that anyone who has sold, used or seen an IBM Displaywriter has become a consultant and proclaimed himself an expert in office automation. As a result, the good consultants have a tough time convincing confused buyers of their worth.

An OA consultant should have a specialized expertise to market. The good ones will have an in-depth knowledge of how to integrate existing computer-based systems with the various facets of office automation.

The most difficult problems faced by office automation consultants are not technological. They are computerphobic — the reluctance of secretaries to part with their typewriters, management's resistance to learning keyboarding skills and top management's doubt that office automation deserves a higher priority.

If you have the technological skills and the ability to integrate and if you can successfully cope with these attitudes, the rewards are high. The most common pitfall is to sell expertise that you don't have. Sooner or later you have to produce.

Q I am looking for a position that will allow me to apply my previous experience in DP management and systems analysis to the social and human problems of automation. Specifically, I'm interested in work related to the analysis and development of national policies with regard to computer technology. Do you have any suggestions about where I can start?

A The time is ripe for some meaningful legislation on computer technology. Our national policies and laws are inadequate to deal with the abuse of this technology. During the next several years, our legislators must come to grips with the paucity of laws and policies regarding computer technology.

Much-needed technology-related legislation has been given a low priority because legislators and their staffs address those areas in which they have interest and expertise. People on Capitol Hill have admitted serious knowledge deficiencies in computer-related areas, but to date have done little to remedy the situation. I'm optimistic that some senator or representative will view your application favorably and, perhaps, use your expertise as a springboard to enacting new legislation.

Q I am writing to you about your answer to a reader who wanted to set up a DP library. Your suggestions for basic services were useful, but you didn't mention the real key to organizing a productive DP library.

The first thing to be done is to hire a professional librarian whose master of library science degree has provided knowledge of both library services and data processing.

You can't expect a promoted operator to perform the functions you suggested with any degree of competence. If, as you say, "The importance of the information resources library cannot be overstated," then it would seem worth having the job done by a qualified person.

A I responded to a question about how to set up an information resources library, not who to hire. Your point is well taken, though a bit oversimplified.

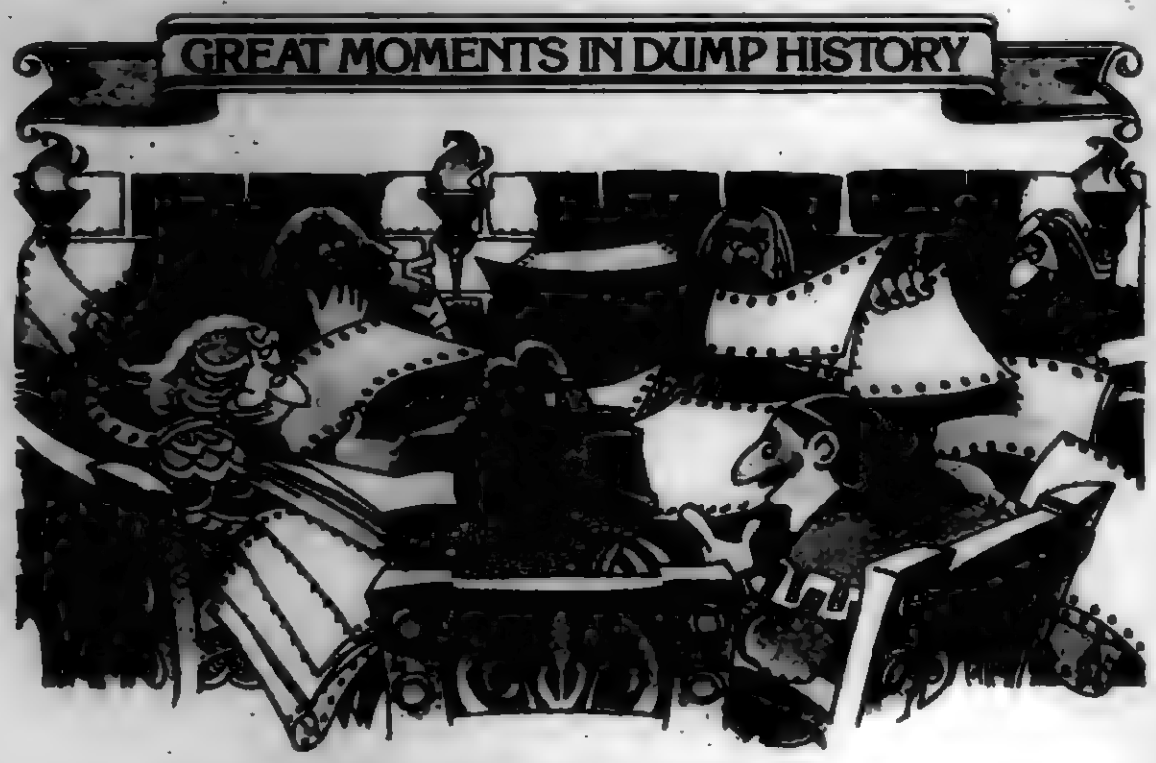
Just as programmers are somewhat reluctant to transfer from management information systems (MIS) to functional area departments, formally educated librarians are reluctant to consider positions in MIS. I polled a half dozen recent library science graduates. In reality, the extent of their formal DP education is more awareness than "knowledge."

Two things need to happen before library specialists become an integral part of MIS.

First, library science curricula need to devote more time to MIS topics.

Second, MIS managers need to be made aware of what a well-run information resources library means to effectiveness and productivity.

Long, president of Long and Associates, is a consultant, lecturer and author in the field of information services. If you have a question you'd like him to address, send it to Larry Long, Editorial Department, Computerworld, P.O. Box 880, Framingham, Mass. 01701.



Trying to read these hex dumps is like pulling a sword out of a stone.

Knights of the Dump Table

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Managers on the Move

CHARLES W. CURRIER, ROBERT J. FERRARI and REBECCA L. DELUCA have been appointed to new positions within the data processing department at GTE Lighting Products in Danvers, Mass.

Currier was named data center manager. He joined GTE in 1966 and since that time has held a number of DP and finance posts. From 1976 to 1980, he was project supervisor of financial applications; most recently he served as DP program manager for marketing and finance. He graduated from Chamberlayne Junior College in Boston and attended Merrimack College in North Andover, Mass.

Ferrari has been named DP program manager/marketing and finance, replacing Currier. He joined GTE in 1976 as a computer programmer and has held a number of related positions since that time. In 1981, he was promoted to project supervisor and earlier this year to DP program manager. Ferrari graduated from Northeastern University in Boston with a B.S. in business administration. He also recently received an MBA from Rivier College, Nashua, N.H.

DeLuca has been named DP program manager for billing and price/policy, succeeding Ferrari. She joined GTE in 1980; prior to that, she was with American Optical Corp. She received a B.A. degree in mathematics from the University of New Hampshire.

Charles W. Currier

Robert J. Ferrari

Rebecca L. DeLuca

Thomas C. Minard

Roger G. Bast

Paul Pavloff

•••

THOMAS C. MINARD has been promoted to manager of computer services for National Grange Mutual Insurance Co. (NGM) in Keene, N.H. In his new position, he will be responsible for all NGM computer services, which include data file management, security, contingency planning, hardware systems, computer processing and distribution.

Minard began his career with NGM in 1973 as a management trainee. He has held a number of different positions in the premium accounting department including billing manager and, most recently, production control manager for data center operations.

He graduated from Keene (N.H.) State College with a bachelor's degree in education and recently earned a bachelor's degree in science as a business major from Franklin Pierce College, Rindge, N.H.

•••

ROGER G. BAST has been appointed manager of corporate computing facilities for Air Products and Chemicals, Inc. in Allentown, Pa. Bast will manage all computing services in the company's information services organization.

Bast joined Air Products in 1972. He was manager of management sciences prior to his recent appointment.

He holds both a B.S. and M.S. degree in management sciences from Lehigh University, Bethlehem, Pa.

•••

PAUL PAVLOFF has joined Kimberly-Clark Corp. in Neehan, Wis., as a senior staff vice-president with responsiblity for management information services and business systems.

Pavloff was formerly with Armco, Inc., where he was corporate director of information resources management. Prior to that he was vice-president in charge of management information services at Champion International Corp. Pavloff earned a BBA in accounting from the University of Pittsburgh (Pa.).

•••

WAYNE A. CALLEN was recently named vice-president of data processing at Great American Federal Savings and Loan Association in Whitehall, Pa. He is overseeing all the in-house data center's DP operations.

Callen, who has been with Great American since 1973, was formerly assistant vice-president in the same department.

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10 Manufacturer (other than computer)
20 Finance/Insurance/Real Estate
30 Medicine/Law/Education
40 Wholesale/Retail Trade
50 Business Service (except DP)
60 Government—State/Federal/Local
65 Public Utility/Communication Systems/Transportation
70 Mining/Construction/Petroleum/Refining
75 Other User
Vendors
80 Manufacturer of Computers, Computer-related Systems or Peripherals
85 Computer Service Bureau/Software/Planning/Consulting
90 Computer/Peripheral Dealer/Distributor/Retailer
95 Other Vendor

2. OCCUPATION/FUNCTION (Circle One)
11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Financial Officer
21 Director/Manager/Supervisor DP/MIS Services
22 Director/Manager of Operations/Planning/Administrative Services
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
35 OA/WP Director/Manager/Supervisor
36 Data Comm Network/Systems Mgmt
41 Engr/Scientific/R&D/Tech Mgmt
51 Mfg Sales Reps/Sales/Marketing Mgmt
60 Consulting Mgmt
70 Medical/Legal/Accounting Mgmt
80 Educator/Journalist/Librarian/Student
90 Other

3. COMPUTER INVOLVEMENT (Circle all that apply)
Types of equipment with which you are personally involved either as user, vendor or consultant
A. Mainframes/Superminis
B. Minicomputers/Small Business Computers
C. Microcomputers/Desktops
D. Communications Systems
E. Office Automation Systems

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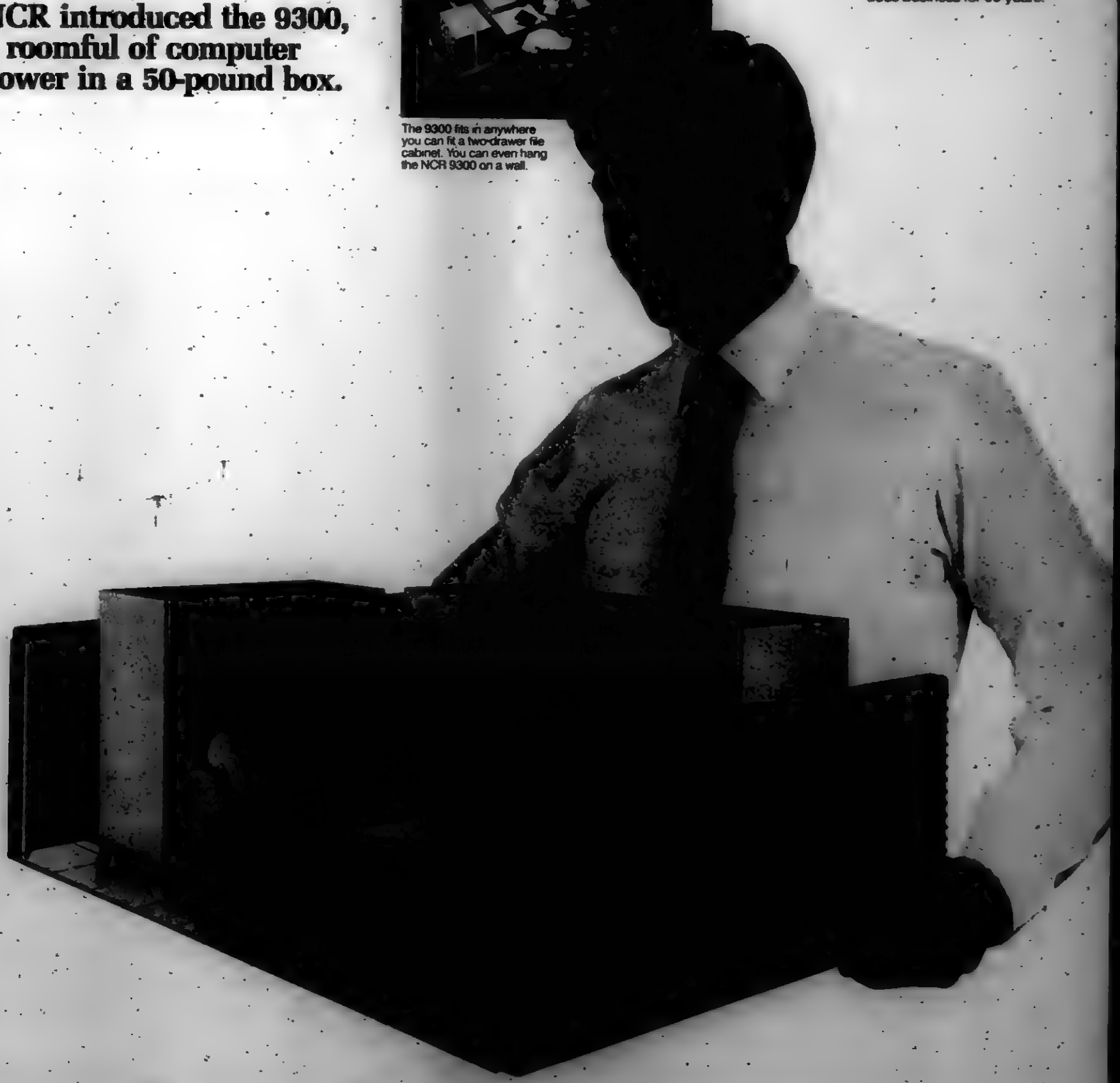

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GSA Study Outlines Initiatives To Handle End-User Computing

WASHINGTON, D.C. — Because there are 18,000 general-purpose computers in the federal government and because about 210,000 personal computers will be installed by the end of this year, the U.S. General Services Administration's (GSA) Office of Information Resources Management has set forth some initiatives to deal with the management problems that end-user computing may bring. The initiatives are spelled out in a recently released report titled "Managing End-User Computing in the Federal Government."

As part of a governmentwide program, the GSA will provide transitional leadership in the implementation of end-user computing through its Managed Innovation Program. The program, which is scheduled for complete implementation by the end of 1984, has been established to head off problems commonly associated with a sudden influx of end-user computing.

Among the problems cited by the study are data incompatibility, a loss of data control, a loss of data security and an inefficient use of data.

Buyer's Guide Planned

To ensure that federal agencies purchase hardware and software "at favorable prices and in a timely manner," the GSA will develop a buyer's guide for equipment and software procurement and a simplified road map of government regulations. The buyer's guide will provide a better method "to distribute information concerning equipment and software to the thousands of functional managers in the government," according to the study.

The road map of regulations will be a step-by-step "how to" document to deal with the government's complex rules and policies.

Also under development by the GSA to assist federal agencies are commercially operated computer stores in government buildings and a local data network policy to solve incompatibility problems, according to the study.

"At the present time," the study said, "the federal government manages all information systems and their technology with processes developed over the past 15 years.

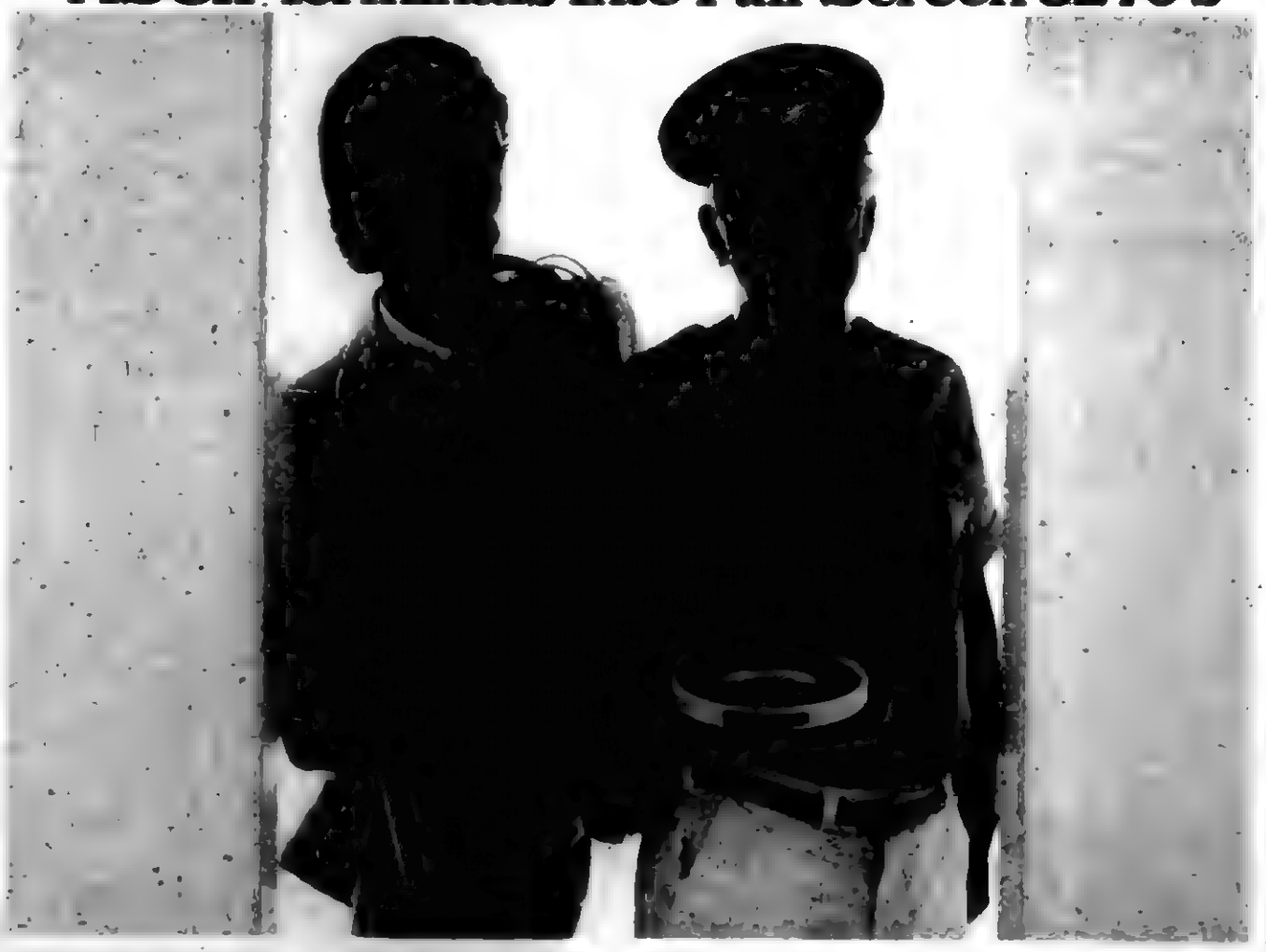
"End-user technologies, particularly personal computers, need to be managed somewhat differently than large, complex and costly ADP systems," the study said.

Government agencies were also urged by the report to identify prospective classes of uses and users. The formation of compatible special interest groups is encouraged by the report, as are support structures to assist novice users.

Although warning against premature standards that could do more harm than good, the study advocated that agencywide standards for hardware and software be considered.

Also suggested was the development of a strategic plan for end-user computing, as well as a review process, a program for user assistance and education.

Two Ways Of Transforming Micros & ASCII Terminals Into Full Screen 3270's



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Wanted: Your Thoughts On Applications Software

Faced with tight deadlines, large backlogs and slim programming budgets, many DP installations are turning to packaged applications to provide a quick and cost-effective solution.

In the Jan. 30 issue of *Computerworld*, a Special Report on "Applications Software Packages" will look at the issue of choosing and modifying packaged applications to fit particular business needs.

Your input for this special section is welcome. Articles should be in the form of tutorials that offer advice or opinions on specific topics (but are not product-specific) or in the form of application stories that describe your experiences with particular products.

Articles should be four to six pages, typed and double-spaced. Longer articles will be given lower priority and may be heavily edited. Black-and-white photographs as well as camera-ready artwork are welcome.

The deadline for all submissions is Wednesday, Nov. 30.

Further information and a one-page listing of guidelines and possible topics can be obtained from John Gallant, Staff Writer. Manuscripts should be sent to him at *Computerworld*, P.O. Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

ACM's Annual Conference To Get Under Way Today

NEW YORK — Sen. Frank R. Lautenberg (D-N.J.) will deliver the keynote address at the Association for Computing Machinery's (ACM) Annual Conference, which opens here today at the Sheraton Centre Hotel. Lautenberg's address will focus on the role of government in promoting the use of computers in education, science and business.

A special Educators Program will feature three days of panels and prepared papers. The chancellor of the New York City school system will speak on "Introducing Computers in the Classroom."

Other topics of discussion for this program include "Implementing a Computer Program in the Classroom," "Funding Computers in the Classroom" and "Assessing Computers in the Classroom."

The conference will also feature technical sessions, an exhibit of computers and computer-related products and the Fourth World Computer Chess Championship.

Registration fees are $120 for members, $160 for nonmembers and $25 for students. Additional information on the conference is available by contacting the ACM, which is located at 11 W. 42nd St., New York, N.Y. 10036.

ICCP Chooses Baltimore For 10th Anniversary Meet

CHICAGO — John Swearingen, director of technical services for the U.S. Senate's Rules and Administration Committee, will keynote the Institute for Certification of Computer Professionals' (ICCP) 10th Anniversary Celebration. The celebration will be held in Baltimore on Nov. 3.

Swearingen will speak on "The Real World of Certification," an ICCP spokesman said. He cochaired the Computer Foundation Organizing Committee which led to the establishment of ICCP by eight national and international computer societies in August 1973 and served as the institute's first president.

As international vice-president of the Data Processing Management Association, Swearingen developed the Certificate in Data Processing program which was initiated in 1962.

Reservations for the ICCP 10th anniversary dinner may be made by mailing a check for $25 payable to ICCP, 35 E. Wacker Drive, Chicago, Ill. 60601.

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Nov. 15 Cincinnati, OH; Irvine, CA; Memphis, TN; Kansas City, KS; Providence, RI
Nov. 16 Denver, CO; Rochester, NY; Orlando, FL; Dallas, TX; Cherry Hill, NJ
Nov. 17 Columbus, OH; Phoenix, AZ; Miami, FL; Philadelphia, PA
Nov. 28 Worcester, MA; Buffalo, NY; Richmond, VA; Seattle, WA; Pittsburgh, PA; Nashville, TN; Milwaukee, WI
Nov. 30 Boston, MA; Cleveland, OH; Detroit, MI
Dec. 1 St. Louis, MO; Grand Rapids, MI
Dec. 5 White Plains, NY
Dec. 6 Los Angeles, CA; Minneapolis, MN
Dec. 8 Chicago, IL
Jan. 10 Houston, TX
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Nov. 16 Denver, CO; Rochester, NY; Orlando, FL; Dallas, TX; Cherry Hill, NJ
Nov. 17 Columbus, OH; Phoenix, AZ; Miami, FL; Philadelphia, PA
Nov. 29 Worcester, MA; Buffalo, NY; Richmond, VA; Seattle, WA; Pittsburgh, PA; Nashville, TN; Milwaukee, WI
Nov. 30 Boston, MA; Cleveland, OH; Detroit, MI
Dec. 1 St. Louis, MO; Grand Rapids, MI
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International Report

FROM THE CW INTERNATIONAL NEWS NETWORK

AUSTRALIA

ARTARMON, N.S.W. — In the wake of Osborne Computer Corp.'s financial collapse in the U.S., Osborne's Australian subsidiary has closed its doors and is selling off all its assets. Richard Graham, managing director of Osborne Computer Corp. Pty. Ltd., said the order to shut down came as a surprise, but the U.S. parent company apparently wants to liquidate as many assets as possible.

BRISBANE — Mincom Pty. Ltd. made its move into the U.S. software market with the introduction of its Integrated Mine Management System for the coal mining industry. The package, which Mincom developed for Prime Computer, Inc.'s Prime 750 and 850 computers, is being modified to run on IBM 4300 and 30 series machines.

CANBERRA — The leader of a visiting delegation from the Japanese Software Industry Association (JSIA) announced that there are many opportunities for Australian software sales in Japan. Kazuro Fujimoto, president of JSIA, said Japan needs more packaged application software and systems generators to help correct the island nation's huge dependence on custom-built software. He also called for the establishment of a Western Pacific Basin Association for the exchange of information.

HOBART, Tasmania — A feasibility study under way here is examining the potential establishment of an Australian National Computing Center in Tasmania. The Tasmanian government and the head of the UK National Computing Center are jointly coordinating the project.

CHINA

BEIJING — The recent 1983 International Conference on Chinese Information Processing illustrated China's strides in Chinese character processing. A high-speed laser printing technique developed at Beijing University, as well as 34 different Chinese-made information systems, was on display at the event, sponsored by the Chinese Information Processing Society.

BEIJING — China is planning to install a computerized traffic control system within the next year. According to the contract specifications, the system must be suitable for a city with a population of up to one million people and must include a well-equipped control center, 360 traffic light controls and the ability to handle 100,000 automobiles. Negotiations are presently being conducted with both Chinese and foreign vendors.

ENGLAND

LONDON — British businesses are slow to embrace new technology, according to a recent study conducted by PA Technology, a division of PA Consulting, Inc. The survey, which polled 100 British firms, showed that only 45% of these companies had introduced a new product within the past year. In addition, half said they were dissatisfied with the speed of their new product development efforts.

FRANCE

PARIS — The French software house Erli has introduced an interactive natural language software package that reportedly enables IBM data base users to query the computer in French. The software, called Saphir, is being compared to IBM's Intellect package.

PARIS — The French Minister of Industry, Laurent Fabius, recently implemented a series of government policies to help French computer-aided design and manufacturing and robotics vendors, which he believes will help French industry in general. He announced that $13 million is being targeted toward research and development efforts in these areas.

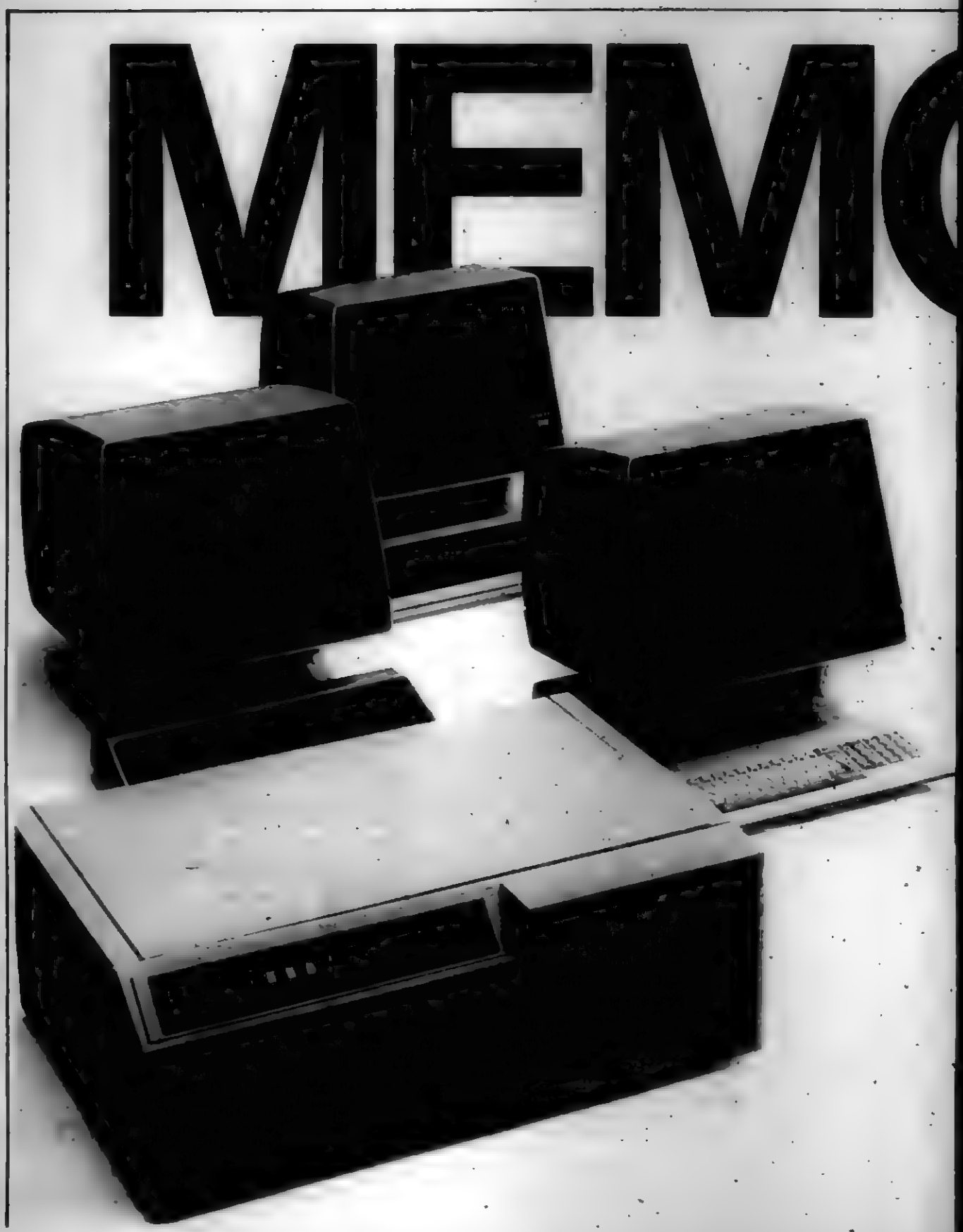
JAPAN

TOKYO — Nippon Electric Co., Ltd. and NEC Home Electronics Ltd. have jointly released the PC-9801F and the PC-100 series, two 16-bit personal computers that are each priced at $2,765. The PC-9801F is an enhanced version of the PC-9801 and reportedly achieves twice the latter's processing speed; it includes a display, two floppy disk drives, an 8-16-bit CPU and keyboard. The PC-100 Series features a mouse, keyboard, color display and two floppy disk drives.

TOKYO — Apple Computer Japan, Inc. and Canon Sales Co. have signed a contract that will allow Canon to sell Apple microcomputers. Canon plans to establish a dedicated Apple sales force of 100 people in Japan.

TOKYO — Canon, Inc. has introduced an image processing system

(Continued on Page 31)



State DP Centers Back to Work Day After Fire

By Peter Bartolik
CW Staff

OLYMPIA, Wash. — A severe blaze in a state agency building here earlier this month threatened two computer centers that service client groups across the state. While some offices in the building were displaced, one of the computer centers was back in operation the same day, and the other was back on-line the day after.

Fire was discovered at the Washington Department of Social and Health Services at about 5:45 a.m. Oct. 12, according to Jack D. Morris, chief of the Office of Information Systems. By 6:30 a.m., Morris said, the Sperry Corp. 1100/83 in the east wing of the building had been powered down to protect data and covered with plastic to prevent water damage.

An orderly "pulled the plug" on the IBM 3043 in the west wing, and there was some file damage, according to Morris.

The fire started on the third floor of the northwest wing of the building, which has a total of eight wings containing some 1,200 to 1,400 workers. "It was a very bad fire that totally wiped out two wings of the building," Morris told *Computerworld* the day after the conflagration.

The Sperry 1100/83 was powered up and back in service by 2 p.m. the day of the fire, he said. The file damage to the IBM was recoverable through backup storage, and that system was back in service by 3 p.m. the next day.

There was water damage to some terminals located in the building. Morris said that efforts were under way to determine which had been damaged and would need to be replaced.

International Report

(Continued from Page 30)

called the Canon Compound Electronic File System that reportedly combines microfilm and optical disk technologies. The system consists of a controller, document reader, optical disk drive, laser beam printer, electronic micro scanner and a refined electronic photo display that enables operators to use both 7.4G-bit optical disk and microfilm as recording media. The system will be made available during the fourth quarter of 1984 for around $42,000.

SWEDEN

STOCKHOLM — Sweden's ambivalent attitude toward government use of large data bases was evidenced here recently over a proposed census and address system called Fobalt, which is under consideration. The Fobalt data base would be comprised of information taken from a number of different data bases, a practice that is frowned upon by the Swedish data protection agency called Datainspektionen. The data base is being pushed by Sten Johansson, the head of the Swedish Central Statistics Bureau, who reportedly wields much influence with inner-party circles. Because of the far-reaching implications and big-brother overtones of such a data base, the Fobalt question will be decided by the Swedish parliament.

STOCKHOLM — The International Federation for Information Processing has established a special committee on DP security and has elected Swedish consultant Kristian Beckman to be the committee's first chairman. Beckman said one of the committee's initial tasks will be to promote DP security education, and the University of Stockholm here has already volunteered to develop a university-level security program.

WEST GERMANY

MUNICH — Computer-aided design and manufacturing (CAD/CAM) will play a major role during the Systems '83 conference currently taking place here. There will be a simultaneous congress paralleling the main fair on CAD in manufacturing. Insiders feel CAD/CAM and graphics will be as important in this decade as was the development of business applications during the 1970s.

Directory Details 1984 Info Sources

WASHINGTON, D.C. — The Information Industry Association is offering prepublication copies of its annual directory, "Information Sources 1984."

Subjects covered in the publication include abstracting services, business information, clearinghouses, computer software, consulting services, data base processors and vendors, document acquisition, education and training, forecasting, government information, literature searching, market research, networking, teletext and videotex.

The publication costs $39.95 until Feb. 29 and $49.50 after that date from the Information Industry Association, Suite 400, 316 Pennsylvania Ave. S.E., Washington, D.C. 20003.

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Info '83 Seminar Targets Selection of DP Systems

By Lynn Haber
CW Staff

NEW YORK — To help ease the confusion that many businesses face when confronting the vast computer product market, a seminar on "Selecting a Business Data Processing System" was offered for the fifth year in a row at the recent 10th International Information Management Exposition & Conference (Info '83) here.

"Buying a computer is not something for an amateur," and "first-time users should rely on professional advice and assistance," David A. Anderson, a senior consultant for Verbit & Co. of Bala-Cynwyd, Pa., told an audience of about 30 business executives from manufacturing, distribution and nonprofit organizations. "This will increase your success rate from 15% to 20% to 80%, 90% or 100%."

He also explained that a business must have "good reasons" for wanting to computerize and that investment in a data processing system is not for everyone.

Some of the benefits of computerizing, according to Anderson, include improved clerical productivity, faster order processing, faster billing, improved payables processing, improved inventory control, improved product planning, improved warehousing and distribution control and improved control of sale efforts.

Warns Against Expecting Miracles

Anderson explained how computers are a tool to supply better information and help solve problems, but warned prospective investors against expecting miracles from modern technology.

"Computers are a tool," he said, "but if your house isn't in order before you computerize, you are going to be frustrated by bringing in a computer." He then went on to the define the "Gigo" theory — garbage in/garbage out.

The checklist of events and a discussion of their relevance to selecting the right data processing system included: a comparison of micros and minis; a look at various vendor approaches to selecting applications software; the turnkey or OEM approach versus the multiple vendor approach to buying a minicomputer system; and how to computerize — procedural selection steps from needs assessment to negotiating and signing an agreement.

Anderson said the key to buying a data processing system is buying an application software package.

"People often buy their system backward. They say they want this manufacturer's product or that one's. . . . First you have to know what you want your system to do," Anderson said.

Turnkey or OEM Approach

For first-time buyers interested in purchasing a minicomputer system, Anderson recommended the turnkey or OEM approach because it entails less effort for the buyer to deal with one entity that supplies both hardware and software and because there is a greater guarantee that the hardware and software will be compatible.

According to Anderson, buyers looking for immediate financial gratification from investment in a computer system, which "by the time you bring it in ends up double the original estimate costs," will be disappointed.

"You're almost never going to be able to cost-justify purchasing a computer," Anderson said. "The real area of savings will be in the future."

Presenting a case study of data processing system selection was Gerard F. Haubrich, director of finance for the city of Pleasantville, N.J.

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–From a James Martin Seminar

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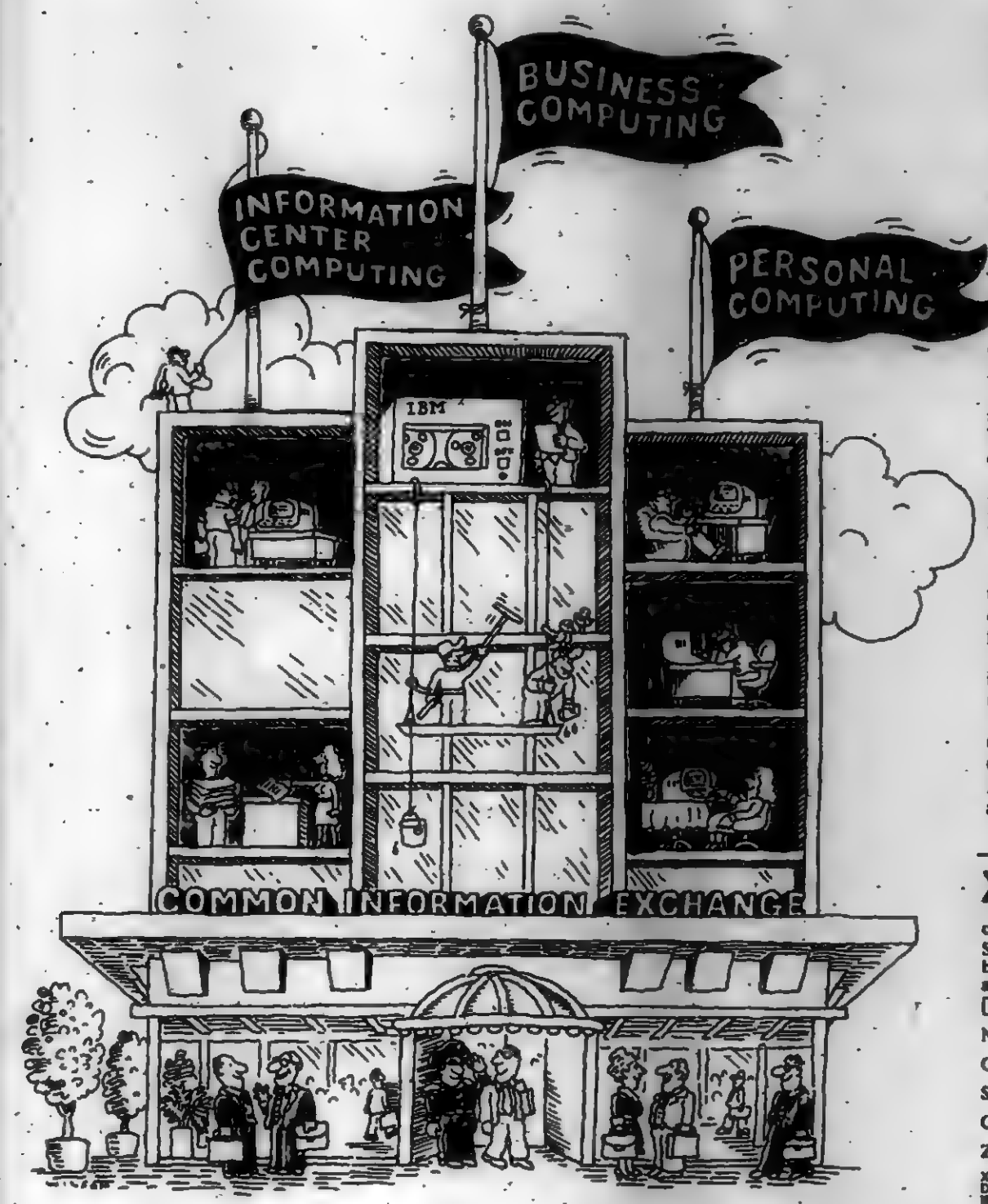

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Railway Makes Tracks With New Systems Concept Building on Existing System

TOPEKA, Kan. — To meet the competitive pressures and changes in operating procedures that have resulted from deregulation in the railroad industry over the past few years, the Santa Fe Railway has implemented a new information systems concept — known as Plus — that builds upon the railway's extensive user-developed system.

"Plus" is not an acronym, but springs from Santa Fe President and Chief Executive Officer Larry Cena's challenge to the Information Systems Department to develop a DP system that combines the best features of other railroads' systems as well as the capabilities needed to remain competitive through the 1990s.

Plus is a linking and an integration of several existing DP systems — the Mechanical Equipment Control System (Mecs), Operations Xpeditor (OX) and Division Operations Center (DOC) — into a massive central data bank that can be readily accessed by all railroad departments, according to its developers.

The OX system is the key component of Plus at the local level. Consultant James Martin has studied OX in detail and said, "If you want an example of how data processing must be done in 1990, take a look at the Santa Fe OX project."

Essential to Operation

Developed in the mid-1970s by a small team of operating department personnel, OX utilizes the Sperry Corp. Mapper software and is basically used by the operating department personnel to generate real-time information relating to freight yards and intermodal terminals. The OX system — which creates waybills, stores van records and records the arrival and departure of trains — is essential to the operation of the railroad. "Without OX," said W. L. Paul, vice-president of information systems, "Santa Fe would be buried in paper."

Mecs is the mechanical department's computerized system for keeping track of car and locomotive maintenance. Used at all maintenance points, Mecs provides a complete history of all repairs to cars and locomotives, down to individual components. This information allows the mechanical department to make better decisions regarding choice of equipment vendors and scheduling of maintenance routines.

The DOC concept is being tested at Winslow, Ariz., and Clovis, N.M. When it is fully implemented, it will provide computer-assisted dispatching of trains across the system as well as computer-assisted calling of train and yard crews.

"The OX, Mecs and DOC computers generate tremendous amounts of raw, real-time data regarding the operation of the railroad," Paul said. "All of this data, in the future, will be fed into the Plus central computers here, which will transform it into historical data bases for use by other Santa Fe data processing systems, such as those covering revenue and car accounting."

The Plus+Bill system, which went on-line last summer, was the first step in providing this integrated data base. The goal of the Plus+Bill system is to produce a consistent, accurate waybill the first time data is entered into the OX system. Unless the raw waybill data is totally accurate, it will be impossible for the central Plus computers to relate it accurately to other areas, such as train movement and accounting.

"For many years, we have had difficulties with the spelling of customer names and locations on waybills," said Steve Anderson, assistant to the director of Plus. "With Plus+Bill, we have set up a master list of all customers and all locations. When a customer name and location is entered, it will be checked against that master list and rejected if it is not correct."

Also, with the Plus+Bill system, the computer will verify that the freight car number, date and hour of entry are correct, among many other checks. "With this system, it will be impossible to leave any blanks or make any mistakes with a waybill," Anderson said. "The Plus+Bill system just will not accept faulty waybill information."

Essential to Accounting System

The Plus+Bill system is essential to the Plus Revenue Accounting System, which is due to be on-line in 1984. With that system, as soon as a waybill is entered, it will be transferred to a file containing a one-year history of all similar moves. The system will check the revenue generated from the past moves and give an estimate for the revenue from the current move. This will eventually make possible daily revenue and profit reports, a capability that no other railroad has.

Another major component of Plus, due to be on-line this winter, will be Plus Train Movement, designed to aid trainmasters and yardmasters in much the same way the DOC system will assist dispatchers.

When fully implemented, virtually every Santa Fe department is expected to benefit from Plus. The operating department will be able to take advantage of modernized train movement and car distribution systems. Plus will give the accounting department virtually automatic handling of contract shipments and will permit the department to redesign completely the revenue accounting system. The mechanical department will find its capabilities expanded by integrating its Mecs system with the Plus Train Movement. For traffic and executive department personnel, Plus will mean instant access to a huge pool of information on operations, including daily cost and revenue estimates.

"But the biggest winners will be our shippers," Paul said. "We will be able to offer them greater reliability in train movement, smoother handling of contracts and accounts, improved car location data and better expediting of time-sensitive loads."

CHARTS

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Survey Shows Small N.Y. Firms Increasing Computerization Level

By David Myers
CW New York Bureau

NEW YORK — One quarter of the New York metropolitan area's small businesses now use a computer in financial management, and 84% of them say they have benefited from that usage, according to a survey released here by Chemical Bank.

William H. Wulfing, vice-president and director of small business for the bank, said the study of 1,047 firms in the city and its outlying counties shows that Big Apple small businesses have reached a higher level of computerization than previous studies had shown.

"What it [the survey] says is that small businesses are moving at a somewhat more accelerated pace toward computerization. After suffering through the recession and finding themselves still here, they have learned a vital lesson. The usefulness of computerization has come alive for them," Wulfing said.

Small businesses still lag three to five years behind larger $50-million-and-up companies, Wulfing added.

According to the survey performed this summer by Research & Forecasts, Inc., 40% of businesses in the metropolitan area with sales between $500,000 and $5 million expect to add a computer in the near future, while 34% of the business owners surveyed said they expect to buy a machine for use at home. Another 15% of those responding said they hope to have a computer both at work and at home.

Of those whose computers are already installed, 25% said they use the machines for financial management, 17% said they use the computers in manufacturing and 9% said they are used in staffing.

Wulfing said that as a result of the study Chemical Bank has been reassured it needs to keep offering equipment financing to New York's small businesses.

But the bank's vice-president said Chemical would never get into the business of recommending computers to prospective buyers.

"We don't want to present ourselves as systems specialists. We won't recommend accountants and we won't recommend computers. We want them [business owners] to make their own independent decision," Wulfing said.

Foy to Hold Chair At Marist College

POUGHKEEPSIE, N.Y. — The man who gave his name to Marist College's endowed chair in computer science will be the first professor to hold the chair, the college has announced.

Richard L. Foy, former president of the four-year liberal arts school here, is holding the Foy Chair in computer science for the 1983-1984 academic year. Foy, a Ph.D. in applied mathematics and computing from New York University, is now vice-president for finance and administration at Boyden Associates in New York.

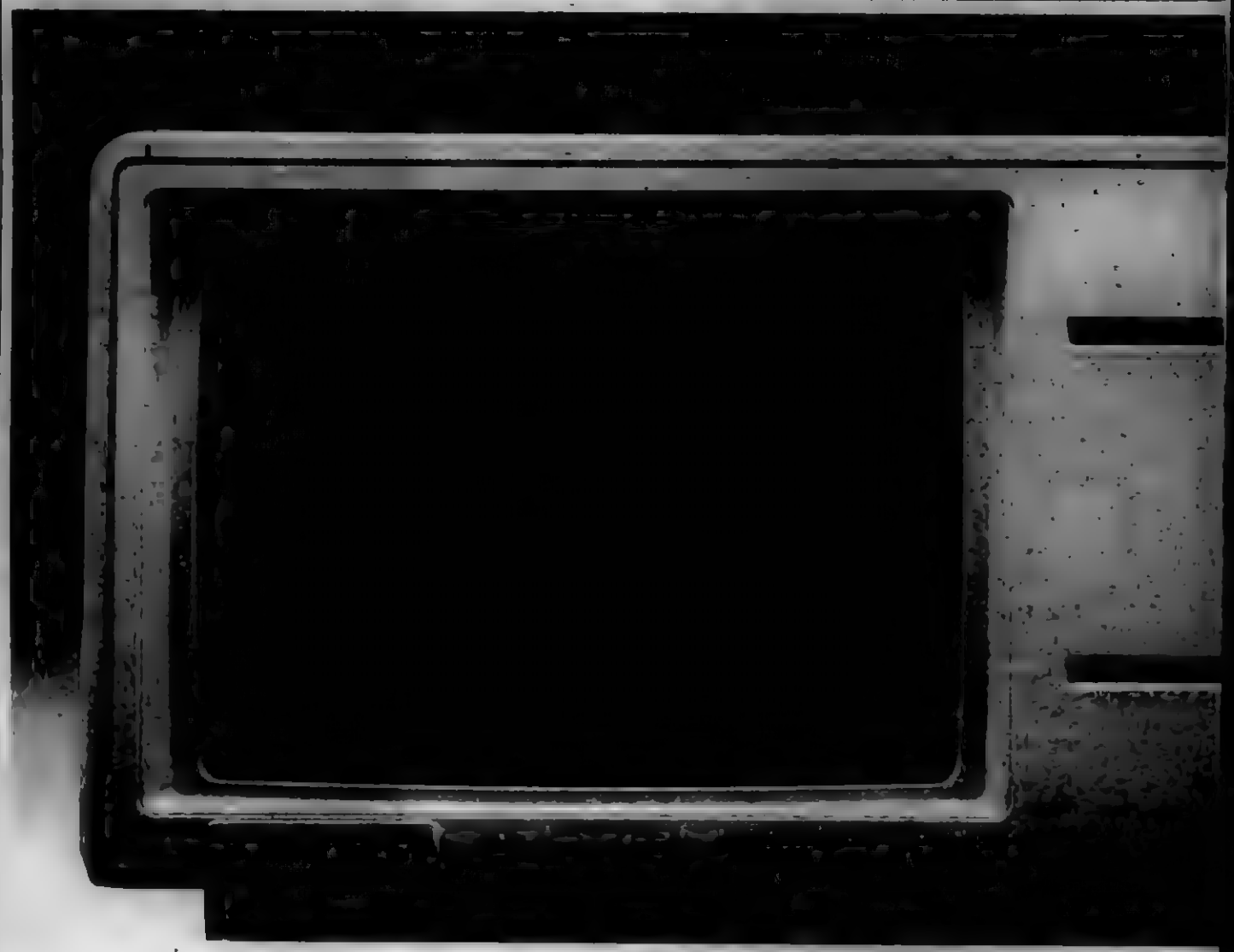
The chair, endowed for $600,000, was set up to attract computer experts to teach the college's 300 computer science majors and master's-level students to do their own research.

Seminar on Voice-Data Link Slated for Nov. 17-18

BETHESDA, Md. — A seminar on "Voice-Data Integration and the Digital Private Branch Exchange," sponsored by Phillips Publishing, Inc. and ICA Telemanagement, Inc., will be held Nov. 17-18 at the Vista Hotel in Washington, D.C.

The seminar's special feature will be a half-day session focusing on the new generation of integrated voice-data executive workstations. Participants will be given the opportunity to compare the features and functionalities of the new equipment.

The registration fee is $495 from Phillips Publishing, Suite 1200N, 7315 Wisconsin Ave., Bethesda, Md. 20814.



Apple's new Lisa® is the world's most powerful personal computer.

Its 32-bit MC68000 microprocessor gives it the processing capability of a mid-range mainframe.

It also has one million bytes of internal memory. And, with a 5-Megabyte hard disk, more than 15 times the on-line mass storage of standard microcomputers.

Given these most imposing credentials, one could get the impression Lisa was designed solely to scare one's socks off.

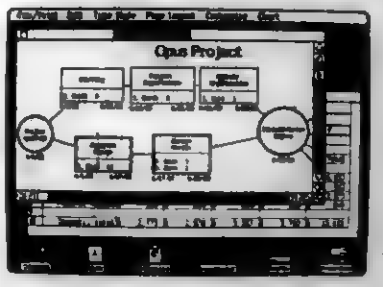
On the contrary.

What makes Lisa totally revolutionary is that, for the first time, all this phenomenal power is contained in a business computer you can learn to use in under 30 minutes.

200 years of hard work made it easy.

To tell Lisa what to do, all you have to do is point.

But achieving this simple concept required a totally new approach to software and 200 person-years of development.



Lisa's revolutionary software lets users perform several applications simultaneously, even "cut" and "paste" them together. The powerful project management program seen here is a Lisa exclusive.

Lisa replaces complex computer commands with symbols familiar to anyone who's ever worked at a desk.

Even someone who's never touched a computer before can learn Lisa in under half an hour. Versus the 20 hours or more required to unriddle conventional PCs.

To information managers, that means dramatically reduced training time and increased productivity.

But people don't just learn faster on Lisa, they also work faster. Each of Lisa's powerful applications* use symbols and commands common to all. So with little practice, users can move from LisaCalc to LisaGraph to LisaWrite without missing a beat. Or use them all at once, "cutting" information from one program and "pasting" it directly into another.

DBMS Quickens Response Time for County

SACRAMENTO, Calif. — Only a few years ago, computer services in the county government here were causing more problems than they were solving.

Cumbersome batch-oriented centralized systems were leading more and more county departments to acquire their own minicomputers. The results were predictable. Data was scattered in duplicate files on incompatible systems; revisions on one system were not passed on to others; and even the stand-alone applications only rarely measured up to expectations.

But software packages have changed all that. County officials credit packages from Software AG of North America, Inc., including its Adabas data base management system (DBMS), with giving them access to up-to-date central records and enabling them to develop new systems and services.

Steve Crane, a senior analyst programmer, noted that the county is using the Software AG products "for almost all our on-line activities in the voter election areas — for example, everything from working with files of our 450,000 registered voters to maintaining street files and precinct district files."

Before the installation of the DBMS, county government computer users were happy to go from a batch to an interactive environment, but were unhappy about the system's response time, according to county systems analyst Stan Rose.

"We were using Isam files, and with a quarter of a million records or more, response time for our on-line systems deteriorated rapidly." A DBMS was the obvious solution.

"We opted for Adabas for [two] reasons. One, [its] flexibility allowed for the easy design of logical record structures. Two, the controlled access to the data and the ad hoc ability of a query language [met our] particular needs."

Rose also praised the system's choice of access methods.

"We began our on-line programs in Cobol, and in the criminal justice area especially we wanted to keep it that way," Rose said. The Software AG package permitted the county to do this by writing call statements, he pointed out.

Warrant Program

One example of the improved services made possible by the county's use of Software AG products is the warrant-of-arrest program installed 2½ years ago in the sheriff's and county marshal's offices.

Prior to installation, warrants had been inventoried in several places in both offices as well as in the police departments of several cities within the county.

All too often suspects were arrested more than once on a single warrant, resulting in a raft of lawsuits against the county.

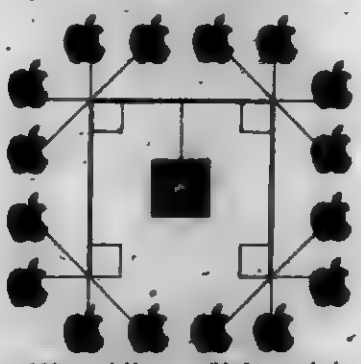
With the new system in place, the warrants are located centrally, with remote terminals installed for direct query access. "Since we got the system up, the county has never arrested a person twice on the same warrant," Rose boasted.

The existence of a common pool of systems and data is permitting Sacramento to County to provide computer services that were previously not cost-effective. "In one case, the probation department needed a certain system, but didn't have money in the budget to do it. Yet given the data we already had elsewhere in the criminal justice area, we determined that we could meet a real need just by adding two more dates and some indicators," Rose recalled.

As a result, the county has created one big user group on government payrolls. "Once we centralized the DP functions, we essentially created a giant user group out of all the various agencies, which meets every month. Slowly, the users started talking with one another, crossing boundaries they previously wouldn't. Sharing data, getting the benefits of other departments' updates, is bringing them together in a whole new way," Rose noted.

There's even a program — LisaProject — that lets you use the mouse to chart the progress of complex projects, automatically recalculating when deadlines or resources change.

On paper, Lisa is just as exceptional. With its dot matrix and daisy wheel printers, it produces printed materials just as you see them on the screen.



AppleNet, available soon, will let Lisas and other Apples share information, and costly peripherals.

Powerful connections.

Any Lisa system can become part of a powerful Lisa network through AppleNet, our own low-cost local area network.

It will enable a user to transfer documents from one department to another, so they can be rapidly reviewed. Or modified. Or passed on to other Lisas.

The same network will allow Lisas to branch out to other Apples. Or share disks, printers and other costly peripherals.

Using the LisaTerminal program, Lisas can tie into mini, mainframe and other personal computers by emulating VT 100-type terminals. Or, using the Apple Cluster Controller, it can also emulate 3270-type terminals.

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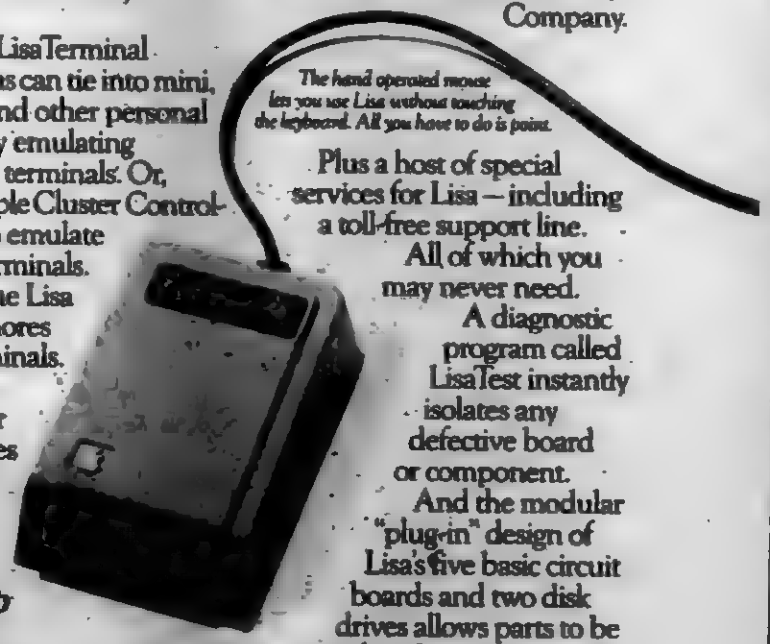

The hand operated mouse lets you use Lisa without touching the keyboard. All you have to do is point.

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A diagnostic program called LisaTest instantly isolates any defective board or component.

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For the whole story, call our National Accounts Program at (800) 538-9696.

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With more programs on the way, Lisa's library now includes LisaCalc electronic spreadsheet, LisaList data base, LisaWrite word processing, LisaGraph business graphics, LisaDraw presentation graphics, LisaProject electronic project management and LisaTerminal data communications. For information regarding corporate purchases through our National Account Program, call (800) 538-9696. In Canada, call (800) 268-7796 or (800) 268-7637. Or write to Apple Computer Inc., MIS/EDP Marketing Dept., 20525 Mariani Ave., Cupertino, CA 95014. ©1983 Apple Computer Inc.

Conference to Target Micro/Mini Financial Applications

CHICAGO — The Micro/Mini Financial Applications Conference will be held Dec. 5-6 at the Hyatt Regency O'Hare here by the Financial Managers Society, Inc. (FMS) and the Association of Information Managers (AIM).

General session speaker Robert Lang, editor of *Microbanker*, will present an overview of the microprocessor industry. Financial and accounting software, microprocessors, departmental data networks and financial industry automation are some of the topics that will be discussed by 21 speakers during the two-day conference.

The conference reportedly will feature more than 16 exhibits displaying micro and mini applications that facilitate asset and liability management, budgeting, investments, spreadsheets, financial reporting, projections, portfolio analysis and pro forma modeling. In addition, hands-on demonstrations of micro and minicomputers will be offered.

Registration fees are $250 for FMS and AIM members and managing officers and $350 for nonmembers.

More information on the conference is available from FMS, 111 E. Wacker Drive, Chicago, Ill. 60601.

Data Training Conference Scheduled for San Francisco

SAN FRANCISCO — The fourth annual Data Training Conference and Exposition — Data Training '83 — will be held here at the San Francisco Hilton and Tower Dec. 11-15.

The conference is sponsored by *Data Training*, a monthly newspaper for information trainers, and will feature three keynote speakers. Richard N. Bolles, author of the best-selling career change and job-hunting book, *What Color Is Your Parachute?*, will speak on the topic of "Data Training and the Whole Person." Jan Margolis, director of personnel development at Bristol-Myers Co., will discuss corporate strategies for change, and Edward Yourdon, chairman of the educational software and consulting firm, Yourdon, Inc., will offer observations on "megatrends" within the data processing field.

The conference will also feature eight full-day workshops on topics such as "Developing a Computer-based Training Strategy," "How to Author Better Computer-based Training Programs," "Technical Training," "How to Write Good User Documentation," "Managing the DP/User Interface," "Job Control Language for Data Processing Professionals" and "Instructor Skills."

In addition, 60 sessions will be held to cover data processing training from a variety of angles. Among the session topics will be "DP Training Management," "User Training," "Computer-based Training," "Training for Technical People," "Microcomputer Training," "Office Automation Training" and "The Information Center."

According to the sponsor, more than 85 companies will exhibit computer and data processing training products and services, including training programs, books, multimedia equipment and hardware and software services.

Admission is $475 for the full conference. Further information is available from Conference Manager, Data Training '83, 176 Federal St., Boston, Mass. 02110.

Data Interchange Set for December

WASHINGTON, D.C. — Sponsored by the Transportation Data Coordinating Committee, the 15th National Data Systems Forum and Exhibit, dubbed "The World of Electronic Data Interchange Part II," will be held here Dec. 13-14 at the Washington Hilton.

According to the sponsor, the forum will address the technology of computer and communications industries that facilitates the electronic interchange of data for intercompany transactions.

Keynote addresses will be offered by John F. Magee, president and chief executive officer of Arthur D. Little, Inc., and J. M. Hewitt, general manager of the IBM Information Network.

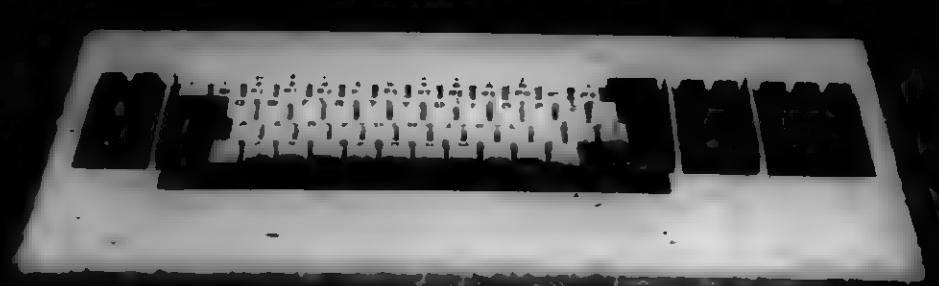
Magee will speak on "Transacting Business Electronically," and Hewitt will address "The Role of the Information Networks."

Forum workshops will cover a range of topics including "Warehouse Information Network Standards," "Data Interchange in Banking and Finance," "Network Services," "Communications Support for Data Interchange," "Electronic Transmission of Text and Graphics" and "EDI Software for Data Interchange," according to the sponsor.

The registration fee for the forum is $250.

More information is available from the Transportation Data Coordinating Committee, Suite 606, 1101 17th Street N.W., Washington, D.C. 20036.

The Control Concepts CC-3276 terminal has upset Telex, Teletype, Raytheon and Courier.



It wasn't even a contest. That's because Control [illegible] in its CC-3276 SNA compatible terminal—clearly the most affordable stand-alone controller/display station on the market today. The CC-3276 features the SDLC protocol for use in remote offices, which eliminate clamoring for interactive access to your SNA network. It also features the only [illegible] that [illegible] Control Concepts System.

Engineers make system start-up fast and easy. The CC-3276 also comes with a separately addressable printer port as standard equipment, and can be teamed with almost any asynchronous printer for use with 3287.

Try to find a comparable model for the same price. It simply can't be done. For high quality, [illegible] and cost effectiveness, you need look no further than the Control Concepts CC-3276. Any competition knows it. For further information call toll free 1-800-468-3078.

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Modeling Program Predicts Flow of Black Gold

GOLDEN, Colo. — A company here has taken modern technology to the oil fields to help keep that black gold flowing.

A division of Smith International Inc., Smith Energy Services specializes in improving oil and gas-well production through a technique known as hydraulic fracturing. With the aid of a computerized modeling system operating on a Digital Equipment Corp. VAX-11/780 superminicomputer, Smith Energy's engineers are now able to determine quickly the exact steps necessary to improve output at wells owned by a variety of clients, including Shell Oil, Amoco and Exxon.

Hydraulic fracturing involves forcing a thick, jelly-like fluid into existing well bores at extremely high pressure to create hundreds of new fractures in the surrounding rock structure. After sand is forced into the fractures for support, the fluids are removed, and oil or gas seeps through the sand adding new output to the existing wells of client companies.

Manual Expenses

In the past, Smith Energy's engineers relied on time-consuming manual calculations to predict the cost and the expected additional output that would result from the fracturing process.

Now, engineers can draft a proposal for prospective clients in only a few hours with a modeling program developed on the DEC system. The performance results are evident in both improved prediction capabilities and an increase in sales.

"We have found that there is a definite correlation between the number of proposals we write and the amount of business we do," said Ray Wood, manager of information services. "This is a very competitive business and getting the extra number of proposals out has helped us considerably."

At the heart of Smith Energy's computerized modeling system is the VAX-11/780 with 4M bytes of main memory, three RP07 disk drives with 512M bytes of storage each, two TU78 tape drives, one 1,000 line/min printer, 64 VT125 terminals, 10 color plotters and 10 remote printers.

The system runs under the VAX/VMS operating system.

Technicians program in Fortran, Cobol and Basic utilizing Berkeley, Calif.-based Relational Technology, Inc.'s Interactive Graphics and Retrieval System (Ingres), a relational data base package, with support utilities and the Precision Visual Graphics Program (PVI3000) from Precision Visual Graphics of Boulder, Colo.

The company also purchased accounts payable and general ledger application programs from Software International of Andover, Mass.

In choosing the VAX, financial risk was a major consideration for Smith Energy. "Looking at our potential growth, we needed something that would allow us to expand our processing capability without overextending ourselves financially," Wood said. "We did not want to buy excess processing capacity. We knew that with this system we could

(Continued on Page 40)

Smith Energy technician receives proposal at a remote district office a few moments after completion by headquarters engineers.

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Modeling System Predicts Flow of Black Gold

(Continued from Page 39)
install a second VAX-11/780 if and when it was needed."

That consideration proved to be critical. The company had expected to double in size by 1986, but due to the oil industry slowdown, Smith Energy's growth has not been as rapid.

When evaluating computer systems, Smith Energy narrowed the field to the IBM 4341, the VAX-11/780 and a combination of the Hewlett-Packard Co. 3000 Series 44.

The combination package was passed over because of slow intercomputer communications and because applications in one system could not access the data base in the other.

According to Wood, the VAX was chosen because it provided "about 1½ the performance at about one half the cost of the IBM 4341 proposed configuration." In addition, Wood said, the VAX offered superior scientific and engineering software, with more than adequate business and financial software.

In addition to well modeling, the system supports interactive management information reporting, inventory control for more than 10,000 items at six locations, on-line financial record keeping and electronic mail and video functions.

To accommodate communications between the company's headquarters here and its six district offices in four states, where inventory and equipment for the hydraulic fracturing process are located, Smith Energy uses the Digital Communications Associates, Inc. DCA3500 front-end processor with four Dataphone II multidrop trunks, which operate at 4,800 bit/sec over a leased data network.

Each district office has two on-line VT125 terminals from DEC, an eight-color plotter and a low-speed printer.

According to Wood, the first phase of proposal drafting for a prospective client involves modeling a well to determine the material, equipment and procedures to be employed. Sales engineers enter physical data about the well, such as location, casing size, depth and formation characteristics. The computer predicts the proper fluid for use in the fracturing process, the pumping pressure required and the theoretical outcome of the well-stimulation procedure.

Engineers can alter the models on-line in order to make "what if" analyses and, when the optimum well-stimulation process has been determined, the recommendation is printed along with eight-color graphics charts of the data.

The predictions must be accurate, Wood said, because the wrong procedure could totally disrupt a drilling project costing $5 million or more.

"In the second phase of proposal drafting, we take all this information and draw up a bid for the fracturing project. The bid outlines what a customer can expect in terms of additional output, in barrels, for the well. We have been able to combine the modeling function with very high-quality graphics to make a complete presentation package. It's also very accurate. Our customers have been quite pleased with the results," Wood said.

With the system, which was installed in April 1982, one engineer in a district office can prepare several recommendations in one day, or he can transmit the data back to the company's headquarters where a colleague can draft a proposal and send it back to the district office. If the company has modeled a nearby well, the engineer can draw on data already in the data base, adding only specific information about the new well.

Seminar to Address Ways of Reducing Backlog

WOODLAND HILLS, Calif. — Management consultant Atwater, Lantz, Hunter and Co. is sponsoring a seminar on "Reducing the Backlog" as part of its Systems Methodology Round Table series.

The session will be held Dec. 5-6 at the Marriott Biltmore Hotel in Santa Barbara, Calif.

The focus of the two-day meet will be on the most serious problems facing management information systems (MIS) in the opinion of senior management.

The aim of the round table is to have attendees help one another develop strategies for reducing backlog, according to the consulting firm.

The facilitators of the seminar will be D. Christopher Noonan of Coopers & Lybrand and Kenneth Lantz of Atwater, Lantz, Hunter.

Discussion will include reviewing how much backlog has built up; examining possible remedies such as productivity aids, information centers, the use of microcomputers and prototyping; and helping each participant outline a plan for tackling his backlog.

Attendance is limited to 30 people, each of whom must be either a vice-president or director of MIS or hold the title of systems development manager.

Registration costs $625, which includes meals, but does not include hotel accommodations, a spokesman said.

More information is available from Atwater, Lantz, Hunter at Suite E, 22458 Ventura Blvd., Woodland Hills, Calif. 91364.

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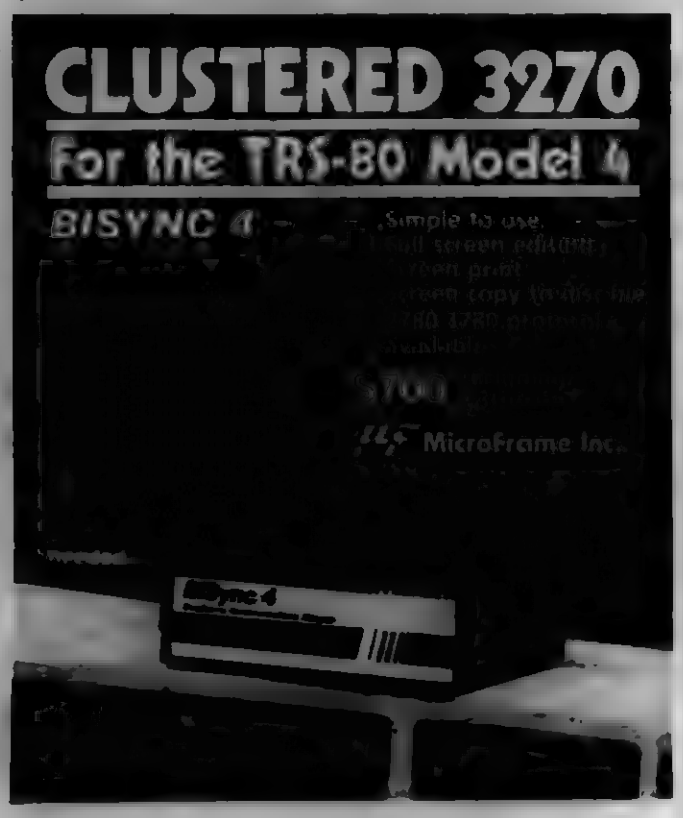

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Builder Moves to New Accounts Payable System

McCOMB, Miss. — Clearly, Croft Metals, Inc. was asking more of its accounts payable software package than it could handle.

"Our accounts payable system was an added-to, mixed-in, quick-and-dirty system that we developed ourselves. It didn't have the capability to match purchase orders, invoices and receiving documents with one another, and that was something we really wanted," Accounting Manager Joseph Abbott said of the software that ran on an IBM 4341 mainframe. "Aside from offering access to vendor and invoice numbers, the system gave little breakdown of details."

The old system had been used by Croft Metals, a national manufacturer of aluminum home-building products, to store voucher information and produce payment checks. But because of its minimal reporting and storage capabilities, it had to be replaced with a package that could meet the company's expanding needs — one that could match purchase orders, invoices and receiving documents, provide access to stored information and perform standard maintenance of all accounts payable records.

The company chose University Computing Co.'s (UCC) Accounts Payable System (APS) with purchase order control because, Abbott said, "aside from meeting all our requirements better than packages from other vendors, [UCC's APS] was the first of those we reviewed to offer an on-line system. We could see that an on-line system would be easier to operate and would offer access to more information."

Batch System Procedure

In the past, the batch system procedure for processing the company's accounts payable began with clerks who manually produced the transactions on paper forms twice each week. The data was then batched and keypunched, and if errors were found, corrections were made and keypunching was repeated. Finally, checks were processed.

Now, those clerks process the almost 2,000 payable invoices each month using the APS system, which was installed in June 1982. After invoice and order information is entered on-line, the system checks for duplication, performs the three-way match and sends errors to a suspense file for correction. Before any checks are written, a trial payment report is produced for Abbott's approval.

"A daily listing of checks to be mailed out was available with the old system," Abbott said, "but it was produced only after the checks had been processed. With the old system, I had the ability to hold a check back from payment, but I could not have a check produced if a transaction had inadvertently been overlooked. Now, I have that capability."

Abbott said the on-line capability of the system has lightened the clerical work load in the payables department. Because accounting clerks who used to write transactions manually now key in information on-line, two keypunch operators have been freed for other duties.

"APS requires that clerks balance each transaction before continuing to the next. This has eliminated at least 75% of all errors made on-line," Abbott said.

The APS package offers an extensive set of standard reports, with a number of variations. For example, the system allows Abbott to sequence the daily invoice register of all invoices entered or paid in three ways: daily totals in gross and net amounts, totals by accounting period and totals for a pay period. With this information, Abbott can determine whether the gross number of transactions agrees with the information from the general ledger and whether the paid amount matches the results from these reports.

Among the other standard reports are a repeat payments report, a trial balance report of all account payables outstanding at the end of the month, a cash requirement report to project the number of vouchers to be paid during the month, an account distribution report and an employee expense report. An APS report writer feature allows users to control report content, format, sequences, totals and logic.

Despite some initial apprehension, Abbott said his accounting staff is growing accustomed to the automation of their functions. "Once they realized that these systems prevent them from making major mistakes, they had no problems adapting. Once the staff got over the initial nervousness, they realized it could do a lot for them."

With the help of UCC consultants, Croft Metals recently enhanced APS to utilize better the system's three-way matching feature. "APS accepts purchase order information for later comparison to invoice and receiving data," Abbott explained. "But, Croft Metals works on a standard cost system, and the accounting department must handle variances. The enhancement we created takes entries off the invoice and nets them together to see if they conform to the purchase order. A standard charge may be 75 cents, for example, but the voucher will show entries for the 65 cents we pay and the 10 cents we discount. The system can now accept these figures to verify the addition on the entered invoices."

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Calendar

Week of Nov. 6

Nov. 8, Newton Lower Falls, Mass. — **Computer Security vs. Computer Crime — A Practical Approach.** Contact: Dan Leonard, EDP Auditors Association, Inc., P.O. Box 516, Boston, Mass. 02102.

Nov. 8-10, New York — **The 10th Annual Computer Security Conference.** Contact: Computer Security Institute, 43 Boston Post Road, Northbourgh, Mass. 01532.

Nov. 8-11, Cary, N.C. — **Introduction to Data Processing Using SAS (OS) Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Nov. 8-11, San Francisco — **Data Communications: Components, Systems and Networks.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Nov. 8-11, New York — **CICS/VS System Design.** Contact: Kaaren Perez, Comped, 10 E. 21st St., New York, N.Y. 10010. Also being held Nov. 14-17 in Dallas.

Nov. 9-10, Hartford, Conn. — **Focus Data Base Design.** Contact: Data Base Management, Inc., 1075 Tolland Tnpk., Manchester, Conn. 06040.

Nov. 9-10, Washington, D.C. — **Understanding Modern PBX Systems.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Nov. 9-10, New York — **World Update '84.** Contact: Marilyn Chasteen, The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

Nov. 9-10, New York — **Crisis 1984: PBX vs. Centrex.** Contact: The Eastern Management Group, 520 Speedwell Ave., Morris Plains, N.J. 07950.

Nov. 9-10, New York — **Advanced Vsam.** Contact: Data Base Management, Inc., 1075 Tolland Tnpk., Manchester, Conn. 06040.

Nov. 9-11, San Francisco — **Data Communication: Effective Network Design.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 9-11, Washington, D.C. — **Cryptography and Data Security.** Contact: Hellman Associates, Inc., 299 California Ave., Palo Alto, Calif. 94306.

Nov. 9-11, New York — **Telecommunications Management: Cost Reduction Techniques.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 9-11, St. Louis — **Industrial Robots Course.** Contact: The Program Coordinator, The Center for Productivity Technologies, Suite 200, 28551 Southfield Road, Southfield, Mich. 48076.

Nov. 9-11, San Francisco — **Microcomputers: A Guide to Selection and Applications.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 9-11, Parsippany, N.J. — **MVS Dump Debugging.** Contact: Chubb Institute, 8 Sylvan Way, Parsippany, N.J. 07054.

Nov. 9-11, New York — **Data Communications for Microcomputers: A Guide to Selection and Applications.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075

Nov. 9-11, San Francisco — **Computer Operations Management: Effective Techniques.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 9-11, New York — **Introduction to Telecommunications.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Nov. 9-11, New York — **Computer Performance Measurements and Capacity Planning: Tools and Techniques.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 10, Philadelphia — **Building Blocks for Office Automation.** Contact: Career Designs, P.O. Box 535, Sicklerville, N.J. 08081.

Nov. 10-11, Chicago — **Personal Computers: A Hands-On Experience.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 10-11, Boston — **Software Engineering.** Contact: Battelle Seminars and Studies Program, 4000 N.E. 41st St., P.O. Box C-5395, Seattle, Wash. 98105. Also being held Nov. 17-18 in Seattle.

Nov. 10-11, Boston — **Data Base Strategies.** Contact: Techtran, 72 Cummings Point Road, P.O. Box 10212, Stamford, Conn. 06904. Also being held Nov. 14-15 in Philadelphia.

Nov. 10-12, Boston — **The Fifth Annual Northeast Computer Show and Software Exposition.** Contact: Northeast Expostions, 822 Boylston St., Chestnut Hill, Mass. 02167.

Nov. 10-13, Los Angeles — **The Third Annual Los Angeles Computer Showcase Expo.** Contact: The Interface Group, 300 First Ave., Needham, Mass. 02194.

Nov. 11-17, St. Thomas, Virgin Islands — **The Information Systems Consultants (ISC) First Annual International Micro, Mainframe, Office Automation Conference and Exhibit.** Contact: ISC, C.L. Grasser, Conference Consultant, Suite 908, 1390 Market St., San Francisco, Calif. 94102.

Nov. 12-14, Lake Buena Vista, Fla. — **Society of Telecommunications Consultants, Inc. 1983 Fall Conference.** Contact: Society of Telecommunications Consultants, Suite 1410, One Rockefeller Plaza, New York, N.Y. 10020.

Nov. 12-19, New York — **Vsam: Performance Design and Fine Tuning.** Contact: Women in Data Processing, Inc., Suite 2008, 310 Madison Ave., New York, N.Y. 10017.

Nov. 12-19, New York — **CICS Debugging.** Contact: Women in Data Processing, Inc., Suite 2008, 310 Madison Ave., New York, N.Y. 10017.

Week of Nov. 13

Nov. 14, San Francisco — **IBM CICS/VS Concepts and Guidelines.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 14, Toronto — **Unix Training.** Contact: Human Computing Resources Corp., 10 Saint Mary St., Toronto, Canada M4Y 1P9.

Nov. 14, Chicago — **IBM System/36 and System/38 Seminars.** Contact: DGC, Inc., 1450 Preston Forest Sq., Dallas, Texas 75230. Also being held Nov. 21 in New York and Nov. 28 in Atlanta.

Nov. 14-15, Boston — **Personal Computers in the Corporate Data Base.** Contact: The American Institute for Professional Education, Car-

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negie Building, 100 Kings Road, Madison, N.J. 07940. Also being held Nov. 28-29 in San Fancisco.

Nov. 14-15, Chicago — **1984 Impact of Divestiture on Users and Vendors.** Contact: Marilyn Chasteen, The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

Nov. 14-15, Atlanta — **Optimizing Long-Distance Services.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Nov. 14-15, Washington, D.C. — **Local-Area Networks: Selection Guidelines.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 14-15, Philadelphia — **Changing Data Base Strategies.** Contact: Techtran, 72 Cummings Point Road, P.O. Box 10212, Stamford, Conn. 06904.

Nov. 14-15, Boston — **Software: A Legal Briefing for DP Professionals.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held Nov. 17-18 in San Francisco.

Nov. 14-15, New York — **Voice Mail and Messaging Systems: How to Select, Implement and Manage.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Nov. 14-15, New York — **Introduction to Unix.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011.

Nov. 14-16, Atlanta — **Data Communications: An Introduction to Concepts and Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 14-16, Washington, D.C. — **Managing Proliferation of Small Computers.** Contact: The Institute for Professional Education, Suite 303, 1515 N. Court House Road, Arlington, Va. 22201.

Nov. 14-16, Chicago — **Distributed Systems Designs: Micros to Mainframes.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 14-16, New York — **A Telecommunications Survival Spreadsheet.** Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.

Nov. 14-16, San Francisco — **Microcomputers: Tools of Today and Tomorrow.** Contact: The Institute for Professional Education, Suite 303, 1515 N. Court House Road, Arlington, Va. 22201.

Nov. 14-16, San Francisco — **Successful Use of Mini-computers.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 14-16, Parsippany, N.J. — **Vsam in Cobol.** Contact: Chubb Institute, 8 Sylvan Way, Parsippany, N.J. 07054.

Nov. 14-16, Washington, D.C. — **Systems Analysis and Design.** Contact: The Institute for Professional Education, Suite 303, 1515 N. Court House Road, Arlington, Va. 22201.

Nov. 14-16, Dallas — **Systems Analysis and Design: Concepts and Effective Practice.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 14-16, College Park, Md. — **Computer Workload Characterization and Performance Evaluation.** Contact: Conferences and Institutes Program, University of Maryland University College, University Blvd. at Adelphi Road, College Park, Md. 20742.

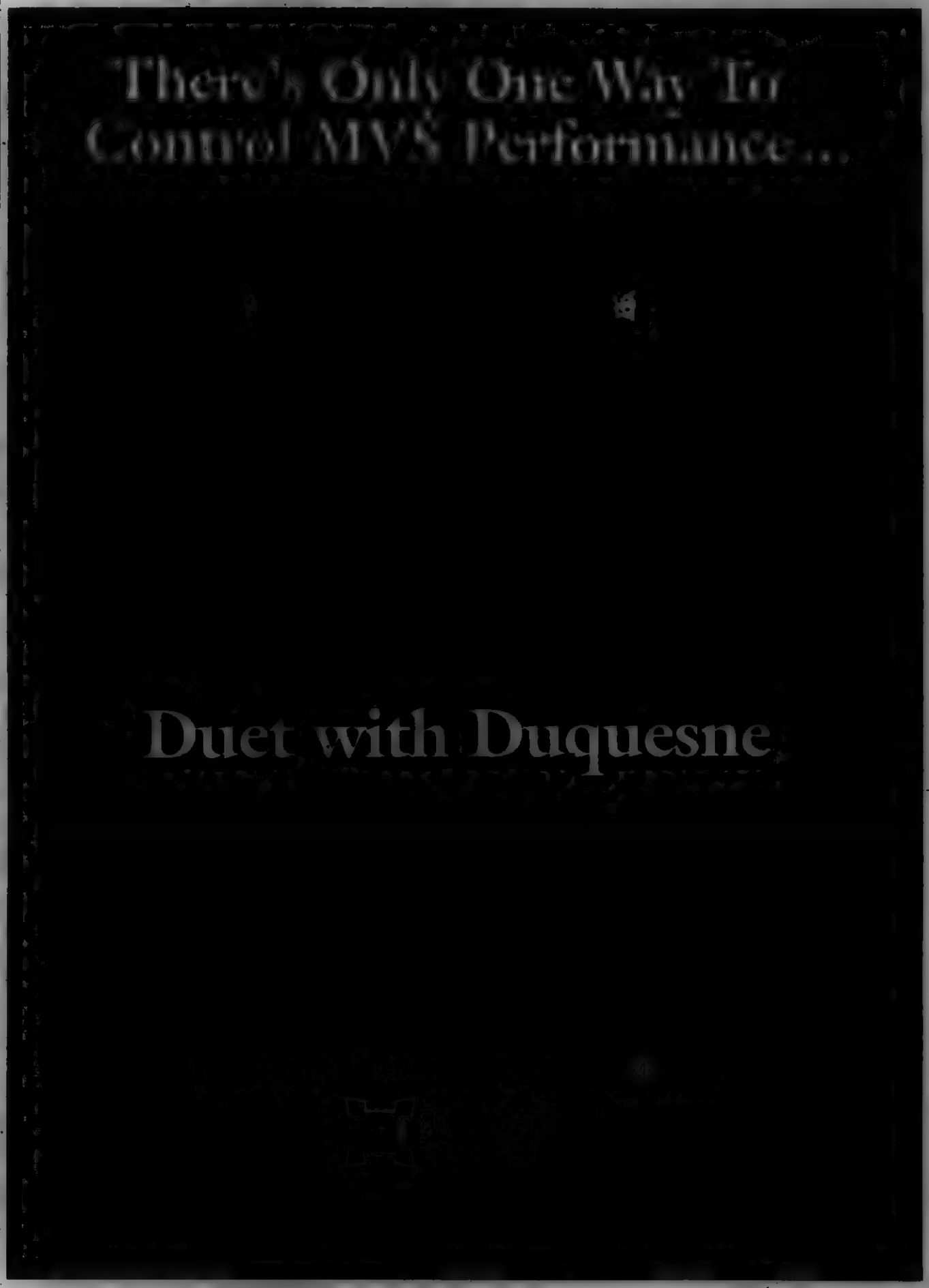
Nov. 14-16, Washington, D.C. — **Data Dictionaries: Concepts, Contents and Uses.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

Nov. 14-16, Phoenix — **Data Communication Systems.** Contact: The Institute for Professional Education, Suite 303, 1515 N. Court House Road, Arlington, Va. 22201.

Nov. 14-16, Indianapolis — **Systems Project Management.** Contact: Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

Nov. 14-16, New York — **Data Administration: Successful Techniques.** Contact:

(Continued on Page 44)



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(Continued from Page 43)

Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 14-16, Atlanta — **IMS/VS Message Format Services.** Contact: Data Base Management, Inc., 1075 Tolland Tnpk., Manchester, Conn. 06040.

Nov. 14-16, Los Angeles — **Computer Awareness: Basic Concepts, Compatibility and Terminology.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 14-16, Washington, D.C. — **Project Management, a Practical Workshop.** Contact: The Institute for Professional Education, Suite 303, 1515 N. Court House Road, Arlington, Va. 22201.

Nov. 14-16, Parsippany, N.J. — **Job Control Language.** Contact: Chubb Institute, 8 Sylvan Way, Parsippany, N.J. 07054.

Nov. 14-16, San Francisco — **SAS Basics Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Nov. 14-16, Washington, D.C. — **DP Project Management: A Practical Approach.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 14-16, New York — **Managing Information Services.** Contact: American Management Associations, 135 W. 50th St., New York, N.Y. 10020.

Nov. 14-16, New York — **CICS/VS Command Level Debugging.** Contact: Teltech, 39 Broadway, New York, N.Y. 10006.

Nov. 14-17, San Francisco — **Data Base: Administration and Control Workshop.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Nov. 14-17, Detroit — **Factory Electronics Conference and Exhibition.** Contact: Intertec Communications, Inc., 2909 Ocean Drive, Oxnard, Calif. 93030.

Nov. 14-17, Boston — **Developing Integrated Purchasing/Accounts Payable Systems.** Contact: American Management Associations, 135 W. 50th St., New York, N.Y. 10020.

Nov. 14-17, Dallas — **Structured Analysis Workshop.** Contact: Kaaren Perez, Comped, 10 E. 21st St., New York, N.Y. 10010. Also being held Nov. 28-Dec. 1 in Boston.

Nov. 14-17, Boston — **Software Engineering with Ada.** Contact: The U.S. Professional Development Institute, Software Engineering with Ada, Department ABC-DEF, 1805 Powder Mill Road, Silver Spring, Md. 20903.

Nov. 14-17, San Francisco — **The International Information Management Congress (IMC) Conference and Exposition.** Contact: IMC '83, P.O. Box 34404, Bethesda, Md. 20817.

Nov. 14-18, Oakbrook, Ill. — **Software Development Performance Engineering.** Contact: Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Nov. 14-18, New York — **Hands-On Unix System Workshop.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011.

Nov. 14-18, Boston — **Advanced Structured Analysis.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 14-18, Vancouver, British Columbia — **Advanced Systems Analysis.** Contact: Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

Nov. 14-18, Chicago — **Advanced Structured Analysis.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 14-18, Houston — **Structured Data Base Design Workshop for 1983.** Contact: Learmonth and Burchett Management Systems, Inc., Suite 320, Dresser Tower, 601 Jefferson, Houston, Texas 77002.

Nov. 14-18, Washington, D.C. — **Basic Systems Analysis.** Contact: Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

Nov. 14-18, Portland, Ore. — **Structured Analysis/Design Workshop.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011.

Reagan to Address OA Meet Via Videotape

WASHINGTON, D.C. — A videotaped address by President Reagan emphasizing the importance of office automation in improving government efficiency will highlight the 1983 Federal Office Automation Conference, which is slated to be held at the new Convention Center here Nov. 1-3.

Prepared specifically for the conference, Reagan's message will accompany an address by Craig L. Fuller, assistant to the president for Cabinet affairs. Fuller's address is expected to expand on the conference theme of "Office Automation: Making It Work."

Both presentations will highlight the administration's use of office automation as a means of achieving its goal of making government more businesslike.

According to Morris Edwards, program chairman of the Federal Office Automation Conference, the administration's first step in this area was the creation of the Grace Commission to aid the government in adopting business practices from the private sector.

In addition, the government has enacted "Reform '88" to encourage standardization of management information systems throughout federal agencies.

This fall, the White House will link all Cabinet-level departments and nine major independent agencies through a full-scale electronic mail network — to be known as the "Executive Office Data Link" — which will be designed to expedite communications between the Executive Office of the president and more than 200 top-level federal executives.

The conference's three-day program will feature sessions on planning, implementing and managing office automation as well as a number of technology briefings on equipment and trends in the field. The conference will also feature an office automation exposition, according to the sponsor.

The cost to attend the full conference is $350. Information is available from the National Council for Education on Information Strategies through P.O. Box N, Wayland, Mass. 01778.

Conference On Robotics Set for Nov. 8

DETROIT — A two-day conference on "Robotics: The Human Factors" will be held Nov. 8-9 at the offices of the Engineering Society of Detroit (ESD). Sponsors include ESD, The Robot Institute of America (RIA) and the Business Attraction and Expansion Council of the Greater Detroit Chamber of Commerce.

The conference will examine the adjustments faced by humans when robots are installed in the work place. Specific topics will include trends affecting the introduction of robots, conditions that shape company policies on automation, ensuring safe robot installations and how a commitment to robotics affects a company's organizational structure.

Registration fees for members of RIA and other sponsoring organizations are $110 for one day and $170 for two days. For nonmembers fees are $125 for one day and $195 for two days.

Registration information is available from Robert C. Schultz, Educational Consultant, ESD, 100 Farnsworth, Detroit, Mich. 48202.

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In terms of operator comfort the 970 has no equal. The keyboard with ten-key accounting pad is ergonomically designed with a naturally contoured palm rest and sculpted keys. The non-glare 14 inch screen allows maximum readability in either the 80 or 132 column format. And you can display double-high, double-wide characters on the same fatigue-free background we've been applauded for throughout the industry. Screen tilt adjusts at a touch to further fight operator discomfort.

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EDITORIAL

The Bypass Question

A major premise of last December's Federal Communications Commission decision to levy a charge on business and residential telephone users for access to the long-distance network — and also a major premise of two communications bills now pending in Congress — is that bypass technology threatens universal telephone service. According to this argument, if telephone rates increase significantly, business users will migrate in droves to bypass services, forcing residential users to pay a bigger share of local telephone exchange costs.

To discourage the migration, the FCC and key policymakers in Congress want to impose surcharges on bypass circuits and services. But if the underlying premise is wrong, the surcharges would also be wrong.

In its report earlier this month on S. 1660, one of the two pending communications bills, the Senate Commerce Committee suggested that the danger of bypass may be more rhetorical than real. Because of the local exchange's ubiquity and relatively low cost, and because some bypass technology and most bypass suppliers do not have adequate track records, it is unclear whether business users will desert the local dial-up network en masse to escape increased rates, the committee said.

But in the course of reaching this conclusion, the committee ignored another one that seems even more important: Even if higher telephone rates cause most business users to seek alternative transmission services, why is it assumed that local telephone companies will lose this business?

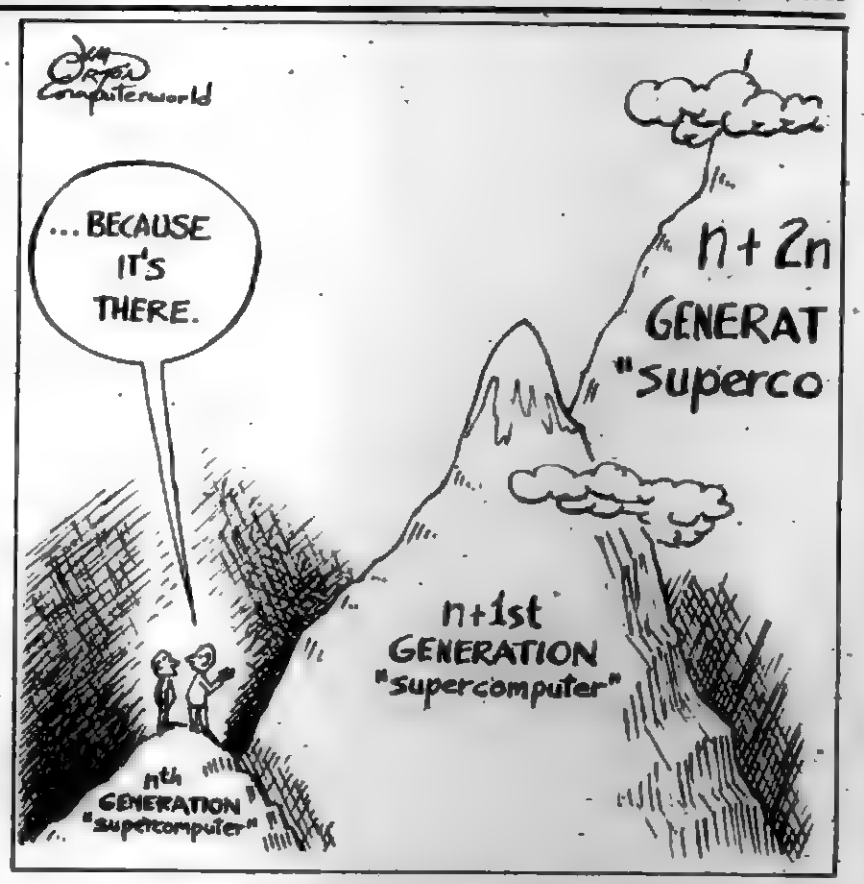
Several Bell operating companies have requested FCC authorization to build and to operate digital termination systems, one popular form of bypass. Several telephone companies — Pacific Telephone Co., Southern Bell and Southern New England Telephone Co. — are greatly expanding their high bit-rate transmission facilities and services. Since most of these companies currently have greater resources and/or credibility than do vendors of bypass services, why do users have to pay a tax to increase the advantage of the former over the latter?

There's a lesson here for users as well as policymakers.

If the legislation now in Congress does not pass, large companies will benefit more than any other group of users. This is largely because AT&T's recently filed long-distance tariff grants whopping discounts to those users that lease wideband circuits connecting widely separated points.

The new tariff is based on the FCC's December access charge plan. AT&T said that if the plan is changed by Congress, then it will have to increase its rates. So it is understandable that the International Communications Association, which represents large corporate telecommunications users, is working hard to torpedo the legislation.

The ICA, however, could do more for its members by supporting the legislation in exchange for eliminating the bypass tax. For years, ICA members have been complaining about their inability to get satisfactory service from AT&T because of its dominant market position. They now have a chance to put their mouths where their money is.



LETTERS

Defending Privacy

The U.S. Bureau of the Census would like to make one very important point after reading the editorial "Silent Watchers" [CW, Sept. 12].

Under no circumstances can any government agency, official or private company obtain access to information about individual people or separate businesses from Census records.

The sale or release of respondent names or addresses is explicitly forbidden by law. Census employees are under severe penalties of fines and imprisonment if they break this confidentiality. And the bureau has an outstanding record of defending this privacy.

James E. Gorman
Chief
Public Information Office
U.S. Bureau of the Census
Washington, D.C.

Exchange Values, Skills

We have created the information age and changed the world. "We" includes anyone with more than a few years of experience grappling with any aspect of information.

We have two responsibilities as adult members of this society and active participants in the information technology revolution. First, we must continue to advance the technology, broaden its dissemination and reduce its cost.

Second, we absolutely must teach society, and particularly the young, our skills, our values and our emotional commitment to our work.

Like many in this industry, I've been fortunate to have had several mentors. Most young people today will have none.

To be successful, a mentor takes a personal interest in the achievement and development of his pupil. How many pupils do you have? How are your pupils doing?

If we are to avoid disaster, we all must assume our ethical responsibility to exchange our values and our skills with others.

How is this to be done? Certainly with our collective talent we can solve this information problem. But do we have the commitment?

Richard Brown
Robert Half, Inc.
Washington, D.C.

Too Much Theory

The article "DP's Catch-22: A Lack of Qualified Teachers" [CW, Sept. 19] decries the lack of qualified teachers.

The article describes how universities are cutting back on the number of students allowed into computer science classes because of a lack of qualified Ph.D.s.

The real problem is that the universities have the mistaken idea that a Ph.D. is required to teach the subject. The fact of the matter is that too many of the students have too little practical training and too much theory.

Professional people with practical experience can solve the problem if the universities redefine what is required to be qualified.

Robert J. Bauhs
Manager
Management Information Systems
NL Sperry-Sun/NL Industries, Inc.
Sugar Land, Texas

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. Letters may be edited for purposes of brevity and clarity. Letters should be addressed to Editor, *Computerworld*, 375 Cochituate Road, P.O. Box 880, Framingham, Mass. 01701.

THE DATA CENTER/John P. Murray‡

Addressing Education Needs of DP Staff

I was visiting a large organization in the Madison, Wis., area, and as I toured the data center, one of the operations supervisors stopped me and asked when I was going to do an article about the need to pay appropriate attention to the education needs of the data center staff. "When you publish something about the need for increased attention to education for data center personnel, I take it right into my boss: It gives me a chance to push for increased education for me and for my people," he said.

In order to put myself right with data center people, I will offer some comments on data center education needs.

The changes that are occurring as a result of the advances in information processing technology in the management information systems (MIS) client areas are dramatic. These changes are being given increased attention not only from writers concerned with information processing issues, but from any number of other areas.

As has been the case with much of the history of information processing, the impact of these changes on those who work in the data center are, to a great extent, being overlooked.

'Everyone who has a job in an organization's data center should be taking a hard look not only at what is occurring in his installation (his MIS department may not be doing anything), but also at what is occurring in the information processing world at large.'

Changing Functions

The data center environment will undergo as much change as any other area as a result of the burgeoning growth and rapid change of information processing techniques. Some rather obvious, yet often overlooked, aspects of these changing functions can help to illustrate this point:

- Many of the manual aspects of the data center effort are disappearing. Changing of disk packs is no longer necessary, or even possible, with fixed head disk drives. Punched cards are, to varying degrees, being phased out.

It will take a while, but the punched card will disappear. Centralized data entry functions, through the use of very straightforward software packages, are being distributed to the client areas. Increased use of on-line processing means, in time, less tape processing and, therefore, less of a need for tape mounting and tape library control functions.

- Batch processing, with its heavy requirement for tight data center control and intervention, is giving way to on-line, client-controlled processing. The information center is an excellent example of this change.
- The introduction of data base management systems often removes various aspects of control of the processing environment from the data center to the data base management function of the MIS department.
- It seems realistic to assume that much of the control of the processing environment now being managed by computer operators will, in the future, be placed under the control of operating software. This will probably not come about soon, but it is likely to happen. The remote operation feature of the IBM 4321 would appear to represent a step in this direction.

Serious Problem?

If all this is happening, does it indicate the existence of serious problems for those now working in the data center?

The answer is no, provided these people begin to give serious consideration to the occurrence of these changes and if they begin to prepare themselves in order to continue to make a strong contribution in the changed information processing environments that will evolve.

The most serious problem these people face is in becoming complacent and allowing the technology to pass them by. Data center employees are not alone in this regard; programming, as we know it today, is also an endangered species.

Everyone who has a job in an organization's data center should be taking a hard look not only at what is occurring in his installation (his MIS department may not be doing anything), but also at what is occurring in the information processing world at large.

Using the knowledge obtained from such an investigation, data center employees should then begin to give serious consideration to where future opportunities are to be found. This will take some time and effort, however. Simply to ignore what is occurring will result in a dead-end job.

Some Considerations

Some of the considerations are:

- Will new opportunities open up within the data center staff?
- What new opportunities exist for people with data center skills and experience outside the data center — for example, in the MIS department or in other areas of the organization?
- Regardless of where they may become available, what skills will these jobs require?
- How can we go about the process of developing these required skills?

A serious discussion about the subject with your supervisor may help begin the process of determining your future. You should not procrastinate: Time and events have a way of passing us by if we are not alert.

Don't overlook the fact that your management and your organization are often more than willing to help you to learn and to help you to grow. After all, competent, highly motivated employees are difficult to find and to keep.

You have already proved your value to the organization, and now you should work to capitalize on that value. Remember, to a great extent, your future is what you make it.

Murray is director of management information services for Ray-O-Vac Corp., Madison, Wis. He is responsible for worldwide MIS activities. Murray has 21 years of DP experience, 10 of which have been devoted to the management of data centers.

HUMAN CONNECTION/Jack Stone‡

DP 'Doers' Should Be Encouraged, Rewarded

My article on motivation, "Hard Work, Self-Study Sometimes Pay Off," [CW, Aug. 8] drew some interesting responses from readers. William A. Delaney, president of Analysis and Computer Systems, Inc., located in Bedford, Mass., was one such reader.

"I read your recent article with interest, and I agree with what you say," he said. "The self-motivated and dedicated individual generally rises, like cream, to the top of the organization bottle. It always has been so and will continue to be, I hope, in spite of the general tendency in education and commerce today to homogenize the group in trying to make everyone the same. All are not the same.

"There's an old saying in business that goes something like this: 'In any organization, 10% of the people do 90% of the work.' From over 30 years in the work force, I can testify to the truth of that statement. Sales managers report that 20% of their salesmen get 80% to 90% of all sales for their companies.

"Are they born under a lucky star? Do things come easy for them? Some say so, but they are wrong. The harder you work, the 'luckier' you get. That's another old truism that bears repeating now and then.

Human Element

"The human element, the individual, is by far the most important factor in the success of any venture. The self-motivated, self-disciplined and dedicated person will, one way or another, get his job done and done well. He seems to have inner resources to call upon when necessary, and he does it time and time again.

"As described in the article, such a person may eventually leave the job where he had worked so hard, because his immediate supervisor holds him back.

"Sometimes this happens to many hard-working and motivated people. Some lazy or less dedicated superior in middle management tries to put the lid on the fireball because the manager mistakenly looks upon him as a threat who will flash past the manager to higher positions if higher authority ever recognized what it had in this very valuable person.

Reward Them

"Top management would be well advised to recognize and reward such people early on, to encourage them and to motivate them further. They are very valuable people to have around.

"Their energy and dedication can be catching, as others try to keep up with them. They are like yeast in bread — they make the whole loaf rise. They are called the 'doers.'

"Unfortunately, sometimes such people get turned off or they go elsewhere when they do not receive adequate recognition and reward for such high dedication and performance. It's like loyalty: You cannot buy it at any price. That's what makes it so precious.

"However, when you recognize that you are getting it freely and willingly, you certainly can and should reward such a person.

"It's a happy combination of circumstances that makes the recognition and reward not only a smart business decision, but correct from a ethical position as well.

Better Under Pressure

"These doers also have one other very important characteristic. When the pressure is on, they get better. Others tend to call in sick or request reassignment or even suddenly resign when things get difficult. Any manager can tell you that he spends half of his time shielding and protecting his people from outside pressures or distractions so they can work undisturbed.

"Pressure doesn't bother the doers; he seems to thrive on it.

"Come payday, the doer doesn't seem to do any better than his less dedicated peers or superiors. The doer gets his sense of dedication long before we ever meet him.

"Three cheers for such people. They are pure gold."

Letters to Stone should be addressed to him at P.O. Box 33699, Washington, D.C. 20033.

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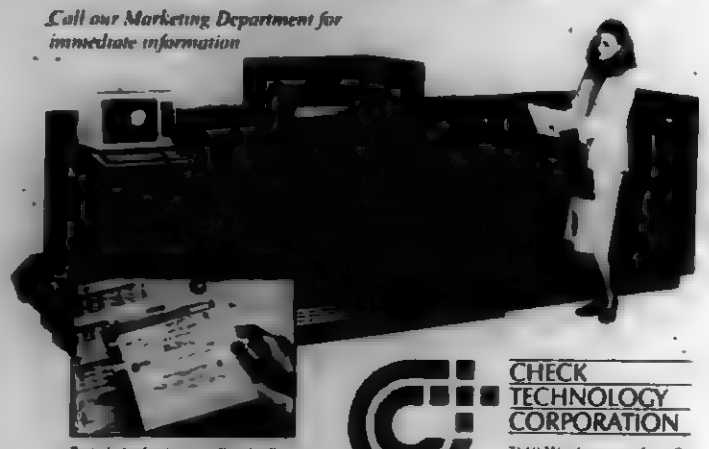

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LETTERS

Prosecute Them

I am extremely upset after reading the article "Hacking: Mark of Genius or Plain Theft?" [CW, Sept. 12].

In answer to the question posed in the headline, the answer unequivocally is plain theft.

The *Star Wars* verbiage, "Dark Side of the Force," clearly illustrates that Geoffrey Goodfellow, SRI International, Inc. researcher, lives in a world of fantasy. It is pure fantasy to feel that a person should not be responsible for his actions. This applies to all trespassers and especially to "hackers."

Goodfellow states that he was a hacker at one time. Perhaps the fact that he so willingly admits to unethical, if not illegal, behavior explains his attitude that these trespassers are simply satisfying their intellectual curiosity.

He states that they intend no harm. Would he feel the same way if one of the "teenage loners that is not appreciated by his parents, teachers and peers" took his automobile for a joyride? Would he feel the same way if his personal privacy were encroached upon by a voyeur peering through the windows of his home? Would he feel the same way if someone ran up charges on his credit cards or telephone?

Goodfellow's statements that if hackers are detected, we should "attempt to befriend them," is ridiculous. The proper attitude is to prosecute them. I feel reasonably confident that Don Parker, also of SRI, would not have the same benevolent feelings if hackers penetrated SRI's system. If Goodfellow is burglarized, will he attempt to befriend the burglar to "find out exactly what he was looking for?"

Processing resources are paid for by companies at a great expense, and they have the exclusive right to determine who may or may not use these resources. The unauthorized use of property is wrong. This applies to Goodfellow's personal property as well as to the property of all the companies that have computers.

His statement that if we erect barriers to the hackers, they will see it as a challenge, and it will in all likelihood cause the hackers to become vindictive and cause irreparable harm makes me respectfully request that the name of my company be withheld to protect it from those individuals that Goodfellow admires so much.

J.W. Savage
Data Security Administrator
Northridge, Calif.

Invasion of Privacy

The article "Hacking: Mark of Genius or Plain Theft?" [CW, Sept. 12] states that "In truth, most hackers are a reasonably responsible, admirable bunch whose actions are motivated mainly by curiosity and seldom pose a serious threat to the objects of their scrutiny."

Therein lies the basic problem with modern society — the belief that anything is OK as long as nobody gets hurt and/or you don't get caught.

Fundamentally, personal or industrial-commercial privacy is being invaded. Hackers have no more right to their "harmless" activities than the Peeping Tom, the party-crasher or the person who steals another's property beause "he's rich and can afford it." All hacking on someone else's property is wrong, period.

The problem exists not only with hackers, but with everyone who shares the belief that it's OK if no one gets hurt.

W.C. Gelsleichter
Kingston, N.Y.

Breaking But Not Entering

The amount of space *Computerworld* devotes to "hacking," and the reactions of its readers, never ceases to amaze me. Typical is Bennet N. Babcock's letter: "What they are really doing is breaking and entering" [CW, Sept 26].

There, in a nutshell, is the whole misunderstanding. These kids are entering all right, but certainly not breaking, because there is nothing to break in nine out of 10 systems. If Babcock goes on vacation with the doors to his house open and the key in his motorboat, he will have a hard time getting a conviction on silver thieves or joyriding kids. How would Babcock feel about his bank if it left the doors to the safe unlocked?

Yet, for decades, DP managers, aided and abetted by an irresponsible computer industry, have left billions of dollars' worth of information sitting in their data banks in clear Ascii or Ebcdic. Unscrambled, the data is daily being broadcast over satellites to anybody who bothers to tune in.

These folks should be grateful to hackers for pointing out their errors before somebody serious (like the Internal Revenue Service or the Mafia) takes advantage of them.

Experts assure me that security measures against hacker access cost no more than $2 per terminal.

Max Schindler
Prime Technology, Inc.
Boonton, N.J.

Defining 'Hacker'

I am aware that *Computerworld* has no need to bother with small details such as the meaning of a word, but people who break into computer systems are not called "hackers" — they are called criminals.

A hacker is merely a programmer who is completely in tune with computers and is capable of programming almost intuitively (whatever that means), a person who can sit down at a terminal and write a well-structured, readable and efficient program that might take a lesser soul a week to write. A hacker is not, per se, a criminal.

A hacker is also not necessarily a "Silicon Valley guy," the sort of person who puts up a cot in the computer room so as to spend more time at his work and life — the computer. Some hackers are like this, and this has led people to believe that this is what a hacker is.

Peter da Silva
Houston, Texas

SA

■■■

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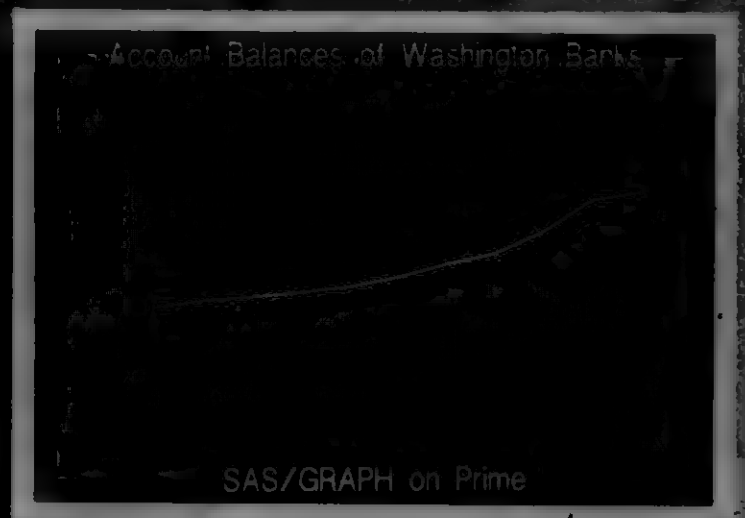

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READER COMMENTARY

The Ongoing Debate Over DP Certification:

According to *Computerworld*'s editorial "Stop Dangling Carrots" [CW, Sept. 9], "In an industry filled to overflowing with acronyms and cryptic abbreviations, two three-letter terms — CDP [Certificate in Data Processing] and CCP [Certificate in Computer Programming] — are currently the source of much debate. And for good reason."

The Institute for Certification of Computer Professionals (ICCP) agrees that the whole issue of certification should be the "source of much debate." And it would hope that the criticism that arises in the debate would be objective and constructive. References for the statement regarding "much debate" would be appropriate, but certification is really a non-issue.

The editorial also states, "Unfortunately, although the idea behind the tests and certification — to instill professionalism within the data processing industry — is a good one, reliance on a single test and a paper award to achieve that goal is a bit optimistic, if not impossible."

The ICCP has never represented its tests as the sole measure of professionalism. Nor has it claimed that certification is any better than any of the other elements of professionalism. The ICCP's recent position papers very specifically attempt to dispel that myth: "ICCP recognizes, as part of its charter, the promotion of professional development through certification and related programs. . . . ICCP recognizes that certification alone is not a complete measure of professional competence."

In addition, the ICCP's charter documents and its publication "Certification and You" emphasize that certification is but one activity in a professionalism spectrum that includes job definition, curriculum development, accreditation standards, formal education, testing and certification, continuing education and self-assessment and recertification.

Necessary Resources

The editorial goes on to say that "In fact, the ICCP recently conceded that it 'lacks the necessary resources' to keep its certification programs up to date with the highly volatile information systems industry [CW, Aug. 29]."

It is not a fact that the ICCP conceded it lacks the resources to keep its certification programs up to date. Neither the CW Aug. 29 story nor the position paper on which it is based make any reference to a concession regarding keeping its certification programs up to date. The news release on the position paper states, "ICCP presently monitors the currency of its two certification examinations. The CDP council updates one of the five sections of the CDP examination every year, while the CCP council reviews and updates the CCP exam content every two years."

The ICCP's position paper press release clearly states, "Recognizing that multiple certifications will be developed for the computing and information systems profession and closely related fields, the ICCP position paper acknowledges that some of these programs will be developed by ICCP and some will not, because the institute lacks the necessary resources."

Why has CW, as the watchdog of the industry, failed to inquire as to how the ICCP keeps its tests and certifications current?

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- Surveys of 10,000 directors of management information systems (MIS)/DP.
- Questionnaires to new and old certificate holders.
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Tests Not Sole Measure of Professionalism

pants to question generation sessions.

With regard to the ICCP's "lack of resources," it should be pointed out that the ICCP was created and given a charter without the resources to do the whole job. That has been a fact since Day One. Other than fees paid by candidates for examinations (and the examinations are not money-makers) and limited assistance from its constituent societies, the ICCP has no financial resources.

According to the editorial, "As a remedy, the organization suggested a number of alternatives to the single-test, single-award system; chief among them is a so-called Capstone certification that would recognize professionals 'who have distinguished themselves through outstanding accomplishment and demonstrated knowledge' — a sort of Academy Award for lifetime achievement."

The reference to the "so-called Capstone certification" was taken out of context. Both the position paper and news release clearly state that "ICCP recognizes a need for a Capstone designation that should be earned according to a well-defined combination of certification, education and documented accomplishment."

Categories of Certification

The paper then identifies a certification architecture that can be specified with four major categories of certification:

- Capstone.
- Specialist — data entry, computer security and telecommunications.
- General — the ICCP CDP and CCP.
- Entry-Level — directed toward persons first entering the computing and information systems professions.

In other words, the Capstone designation was suggested as a culminant designation after the other requirements had been achieved.

Extreme liberties have been taken with the ICCP's efforts to define an overall architecture for testing and certification within the profession. The ICCP believes that all levels of skill within the profession should be subjected to some type of knowledge testing. It is seeing a proliferation of certification (data entry, computer security) and other testing (aptitude, predictive skills validation) that all fit within the fabric of professionalism.

There are people within the industry and profession who are seriously concerned with this situation. They are looking ahead to the day, not yet here, when the industry has to stand accountable to its employees and the public for the skills and credentials of its practitioners.

The CW editorial states, "Perhaps the ICCP and other organizations that promote data processing certification, like the Data Entry Management Association, should take a harder look at data processing professionalism before promoting certificates, gold stars and merit badges that do little besides inflate a resume."

'Extreme liberties have been taken with the ICCP's efforts to define an overall architecture for testing and certification within the profession: The ICCP believes that all levels of skill within the profession should be subjected to some type of knowledge testing. It is seeing a proliferation of certification . . . and other testing . . . that all fit within the fabric of professionalism.'

The ICCP's Strategic Planning Committee has already taken a hard look at the overall professionalism picture. It rejects the implication here that the ICCP promotes certification above all and that it is downplaying the other essential elements of professionalism.

The ICCP's charter and other documentation clearly state that its piece of the overall professionalism picture (job definition, curriculum development, accreditation standards, formal education, testing and certification, continuing education, and self-assessment and recertification) is certification/recertification. The ICCP's constituent societies have repeatedly and very clearly reaffirmed this focus. Therefore, all other professionalism activities are beyond the ICCP's charter.

A casual perusal of its basic documents would have made this obvious — to wit, "ICCP has never claimed

(Continued on Page 52)

What vital natural resource can the Republic of Ireland offer computer service companies?

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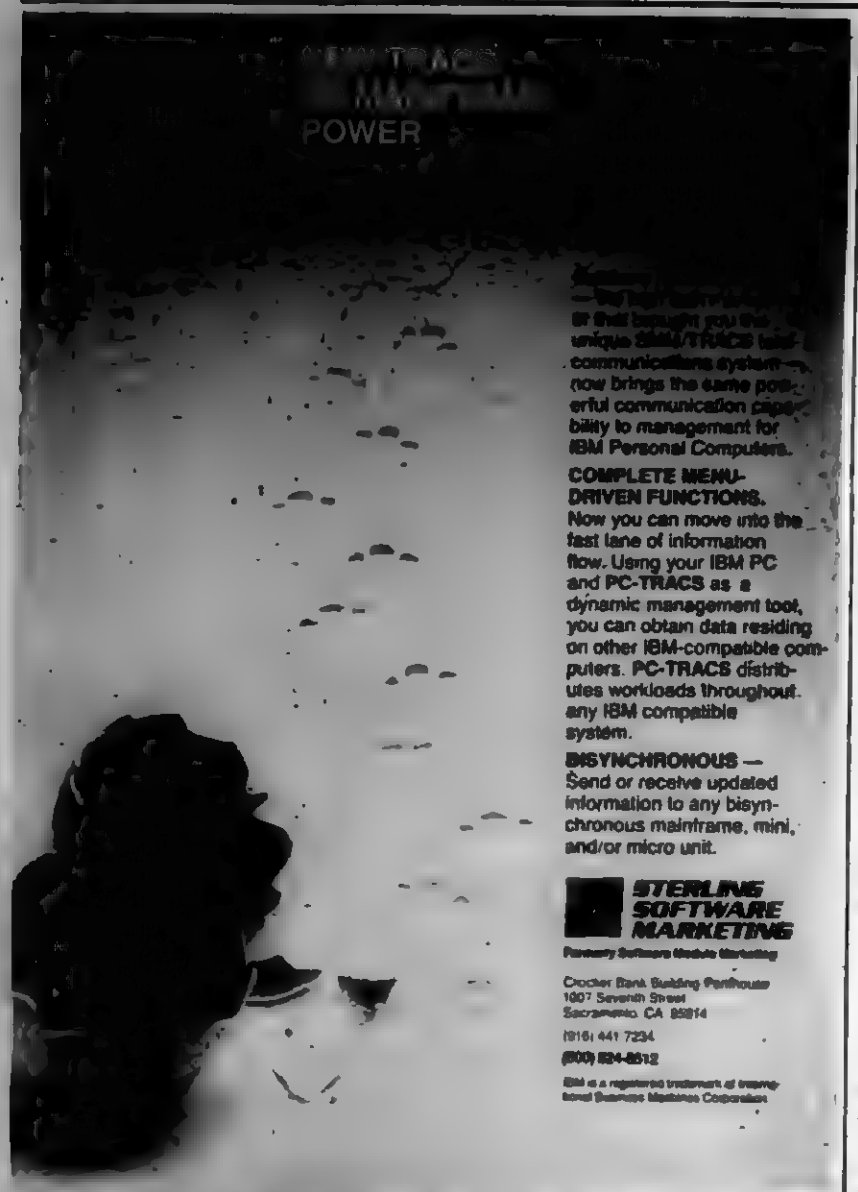

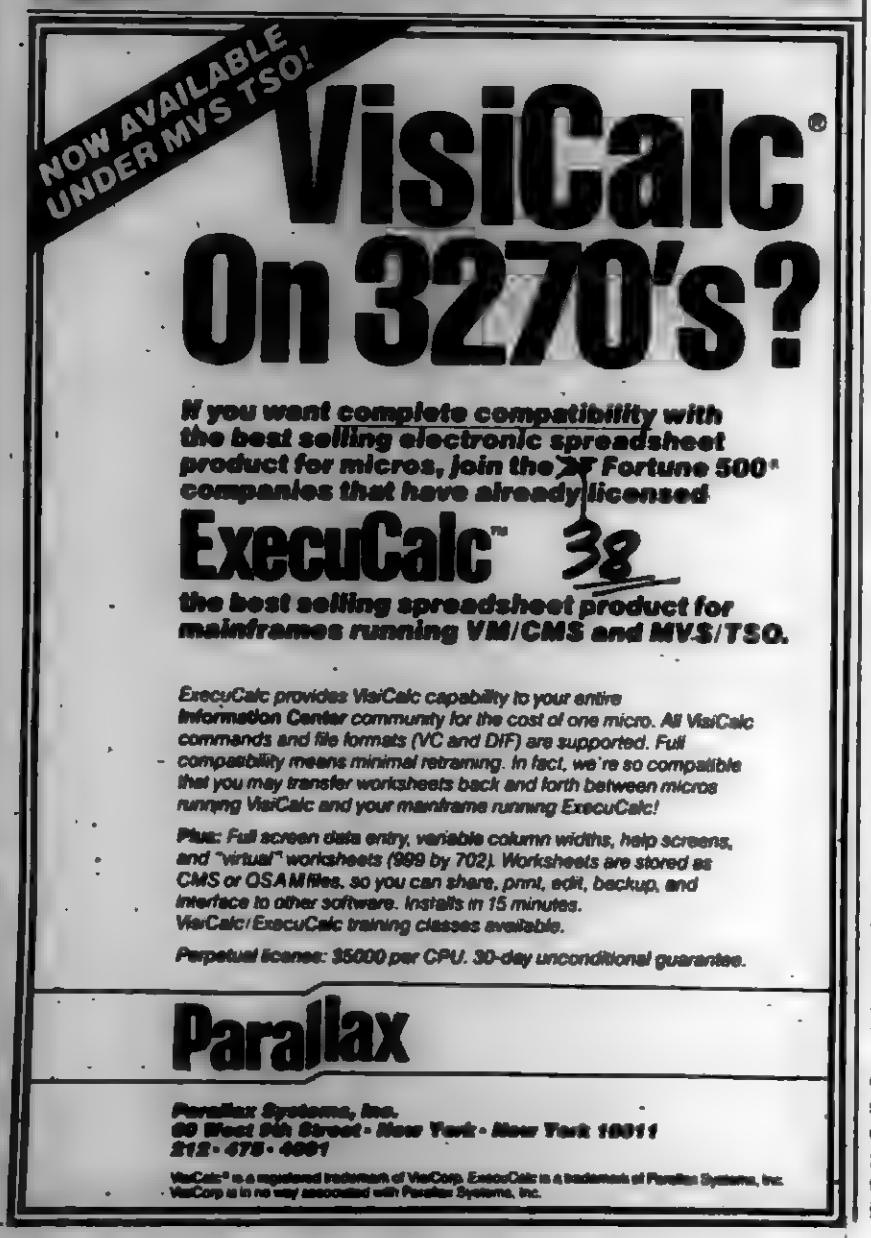

Examining DP Certification

(Continued from Page 51)

that certification tests measure competence of computing personnel ... certification alone is not a measure of competence ... ICCP recognizes, as part of its charter, the promotion of professional development through certification programs."

Among the ICCP's other certification-related contributions to professionalism are the areas of codes of ethics and standards of good practice. The ICCP has repeatedly voiced the need for the profession to develop workable standards of good practice to provide the mechanisms for self-policing. Of all the organizations representing the profession, the ICCP is the only one to have policed its members and withdrawn a certification.

A significant point here is that despite the fact that the ICCP has been chartered to develop certification programs for the profession, other organizations are developing exams outside of the ICCP's charter. This is where the ICCP's financial resource limitations impact. Consequently, it is seeing a wide variance in the nature of certifications.

Full-Time Educators

The editorial continues, "These organizations might perform more of a service if they were to take the helm as full-time educators, stressing the benefits of continuing education and work experience rather than the carrot of a paper certificate. They might even join forces with the many universities and colleges across the country that have successfully altered their business data processing programs to keep up with the fast pace of computer technology or have started programs that lead to graduate degrees in information processing and [MIS]."

The ICCP's board of directors is comprised of a cross-section of the computing and information systems profession — educators representing small colleges and large universities, computer engineering societies, business, industry and government.

Of the half-dozen standard curricula available in computer and information systems, the ICCP board members were heavily involved in the development of at least three of them. William W. Cotterman of Georgia State University (GSU) in Atlanta was chairman of GSU's information systems department when he chaired the ICCP certification council that developed the three CCP certification examinations (business, scientific and systems programming specializations). He is now secretary of the ICCP and represents the Association for Computing Machinery (ACM) on the board of directors. Cotterman served on the standard curriculum committee that developed the report on "Information Systems Curriculum Recommendation for the '80s: Undergraduate and Graduate Program," published in 1982, Vol. 25, No. 11 in the communications of the ACM.

Joyce Currie Little of the math and computer science department, Towson State University in Baltimore, chaired the committee that wrote the recommendations and guidelines for the associate-level degree curriculum in computer programming. She represents ACM on the ICCP board of directors.

Richard Austing, a former chairman of the CCP council, was one of the editors of "Curriculum '78: Recommendations for the Undergraduate Program in Computer Science," published in March 1979 in the communications of the ACM.

According to the editorial, "the companies doing the hiring obviously have little faith in certification programs. This is demonstrated by their lack of support for the ICCP's efforts."

The ICCP acknowledges that for individuals with DP skills, it is currently a seller's market. Demand far exceeds supply and evidently will for some time. Under those circumstances, who needs certification? The individual does not need it to get a job and, with so few people available, employers have been happy just to get a warm body. Individuals are seeking certification only for individual improvement, personal assessment, professional commitment or any number of similar self-motivated reasons.

Who Needs Certification?

But who really does need certification? Those dependent upon the products and services rendered by the computing and information systems industry — the corporate consumer and the general public.

The ICCP is encouraged by increasing corporate support of its programs. Johnson & Johnson, State Farm Mutual Auto Insurance Co., All-State Insurance and Pacific Northwest Bell Telephone all render support in encouraging participation and reimbursing the cost of the test, and all review materials for successful certification candidates.

State agencies in Illinois and Washington accept the CDP in lieu of a master's degree in their hiring practices, and Tennessee Technology University and Salt River Project Corp. in Tempe, Ariz., accept the CDP in lieu of a bachelor's degree.

A number of colleges and universities, including Millikin University in Decatur, Ill., and the University of the District of Columbia, accept the CDP as a terminal qualification for teaching courses in computer information systems. The Naval Postgraduate School in Monterey, Calif., requires its students in information systems to sit for the CDP exam prior to graduation. Two recent ads in *The Wall Street Journal*, advertising for MIS positions, required an "MBA or CDP certificate" for job qualification. There probably is a great deal more support of certification.

Naturally, the ICCP would like to see more support. What business support there is, however, is overwhelmingly more than that provided by the DP industry. If the DP industry is getting nothing from the ICCP, then it is receiving exactly what it has put into it. The industry has consistently rebuffed the ICCP's pleas for financial assistance.

The editorial concludes that "Professionalism is not something that can be tested, awarded or hung on a wall."

The ICCP says "Amen."

Campbell is president of the ICCP in Chicago.

Global Software Extends Its 'General Ledger System'

RALEIGH, N.C. — Global Software, Inc. has announced Quick Close, Profit Planning and Budgeting, Real-Time Reporter and On-Line Graphics as additions to its General Ledger System.

Quick Close allows the accountant to make real-time adjustments and update the accounting reports with the adjusted figures. The on-line Profit Planning and Budgeting provides the financial analyst with the ability to perform "what-if" planning, a spokesman said. In addition, the system offers forecasting techniques such as time series and bivariate regression analysis in an interactive mode.

The Real-Time Reporter offers both the specification and execution of reports on-line. Some features include cloning (propagating existing reports with minor changes) and scanning (reviewing desired reports through the screen).

The Graphics feature was designed to interface with the IBM Graphical Data Display Manager and offers line graphs, scatter-plot graphs and bar charts, the vendor said.

The software runs on IBM's 360, 370, 4300 series and 30 series mainframes. The price ranges from $3,500 to $12,000.

Further information is available from Global Software, located at 1009 Spring Forest Road, Raleigh, N.C. 27609.

'Ingres/Net' Provides Access to Remote VAXs

BERKELEY, Calif. — Relational Technology, Inc. (RTI) has introduced Ingres/Net, a software package that is said to give users of the company's Ingres relational data base management system (DBMS) distributed access to remote data bases on any Digital Equipment Corp. VAX-11 superminicomputer in a network connected by Decnet.

Ingres/Net allows functions to be distributed, a spokesman said. Applications can run on the user's local system, and the Ingres DBMS can run remotely, enabling communication costs to be reduced and response times to be improved. Ingres can be used to distribute and share data over many computers in a local or remote network.

RTI said the user does not see the network but only needs to specify the node and data base name. Features include automatic DBMS process creation and deletion, automatic remote logon/logoff and security checking, automatic message management and automatic error handling.

User interfaces such as Ingres/Reports, Ingres/Graphics, Ingres/Query and Ingres/Applications-by-forms can be used to display, update or retrieve data stored on any VAX-11 in a network, the spokesman said.

RTI said Ingres/Net will soon be available for Motorola, Inc. 68000-based microcomputers supporting Ingres in the Unix environment. Enhancements will also give VAX-11s

(Continued on Page 54)

Study Sees Stronger Data Base Demand

By Paul Gillin
CW Staff

NEW YORK — Current annual expenditures for on-line data base services are far below potential, and growth in data base usage will average 47% over the next five years, according to a study released by Frost & Sullivan, Inc.

"On-Line Data Base Systems Market in the U.S." predicted that substantial growth potential exists in the areas of education, accounting, law, banking, consulting, insurance and light manufacturing. There appears to be little need for additional data bases in the areas of engineering and medicine.

Data bases with the largest user audiences are currently in the areas of chemistry, education, medicine, general statistics, demographics and technology, the survey said. However, it noted that many users are unaware of the amount and range of information now available on-line.

Dissatisfaction with network transmission services could hamper the growth of certain on-line data bases, the report warned. Most of the more than 500 users who responded to the survey were dissatisfied with the quality of their network transmission services. In the professional/research market in particular, which relies heavily upon outside networks, this problem could inhibit growth, the survey said.

The survey confirmed that the intermediary or researcher is the primary user of data base services in most organizations. However, the report predicted that advancement in microcomputer technology will shift the information retrieval function slowly to the end users.

Variety of Support Services

In line with this, vendors are cultivating this new user base with a variety of support services. They include:

- User-friendly software for search and retrieval.
- Extensive user-training programs.
- On-line document ordering services.
- Private data base services, which allow users to compare and interrelate internal and external data.

There were approximately 1,150 data bases on-line by the end of 1982, with the last four years seeing the most spectacular rate of growth, the report noted. The next five years will see expansion and refinement of existing data bases with less emphasis on the creation of new data bases.

The growth and refinement of transmission services, such as GTE Telenet Communications Corp.'s Telenet and Tymshare, Inc.'s Tymnet, will directly influence the growth of data base usage, the report predicted. Tymnet's recent announcement of plans to expand its packet-switching service to 150 additional cities could add thousands of potential users to the on-line data base world.

Significant growth is possible in the full-text data base market. Technological advances in data conversion, storage and delivery systems will make the production of full-text data bases more economical for print publishers. Numeric data bases should continue to expand steadily. However, bibliographic data base production should slow down considerably, the report predicted.

Currently, there are many different players in the on-line data base market. However, as the industry matures, the field will consolidate somewhat, and larg-

(Continued on Page 54)

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'File Transfer Utility' Unwrapped For Series 700 PWS From Lee Data

MINNEAPOLIS — Lee Data Corp. has announced the enhanced File Transfer Utility for the company's Series 700 Personal Workstation (PWS), which is said to add IBM-compatible personal computing capability to existing IBM 3278 and 3178-compatible terminals manufactured by Lee Data.

The bidirectional mainframe-to-PWS file transfer capabilities provide users with software tools to transfer either text or transparent data in a variety of IBM operating environments. Those environments are: DOS/VSE using ICCF; DOS/VSE with CICS; MVS using TSO Edit; MVS/OS1 with CICS; MVS with TSO; and VM/CMS with the Type or Xedit utilities.

The package is said to be designed as a two-level utility that allows users to select from company-supplied transfer routines or to create their own file transfer routines with Lee Data-supplied tools. Those routines are said to be for users with minimal mainframe or PWS software knowledge. With the company-supplied tools, Lee Data said most host environments can be addressed for mainframe-to-PWS file transfer.

The package is available for a one-time charge of less than $1,000 at the host end and a one-time per terminal charge of $125 per CRT. Lee Data is located at 7075 Flying Cloud Drive, Minneapolis, Minn. 55344.

General Ledger Update Out for IBM System/34, 36

ROCKPORT, Mass. — Para Research, Inc. has announced Release 1.4 of the General Ledger Financial System for the IBM System/34 and System/36.

According to the company, the new release is suited to both single and multicompany businesses. Among the enhancements is the strategic ratio management module for analysis of financial position based on general ledger balances. The module is said to produce 30 ratios used to determine financial position, including quick ratio, financial leverage ratio, debt to equity ratio, inventory turnover and the du Pont model.

The company said the General Ledger System can process multiple companies, each with a different chart of accounts, different financial statements and different fiscal calendars.

It also allows users to design a variety of financial statements and balance sheets, and income statements can be printed with current figures compared to the previous year and budget.

Financial statements can also be printed with current figures given as a percentage of another line item, and each company on the system may use a different line item for the comparison.

The system is said to interface with other Para Research accounting software such as accounts payable, accounts receivable, payroll and fixed assets.

The new release is priced at $1,200. More information is available from Para Research, which is located at Whistlestop Mall, Rockport, Mass. 01966.

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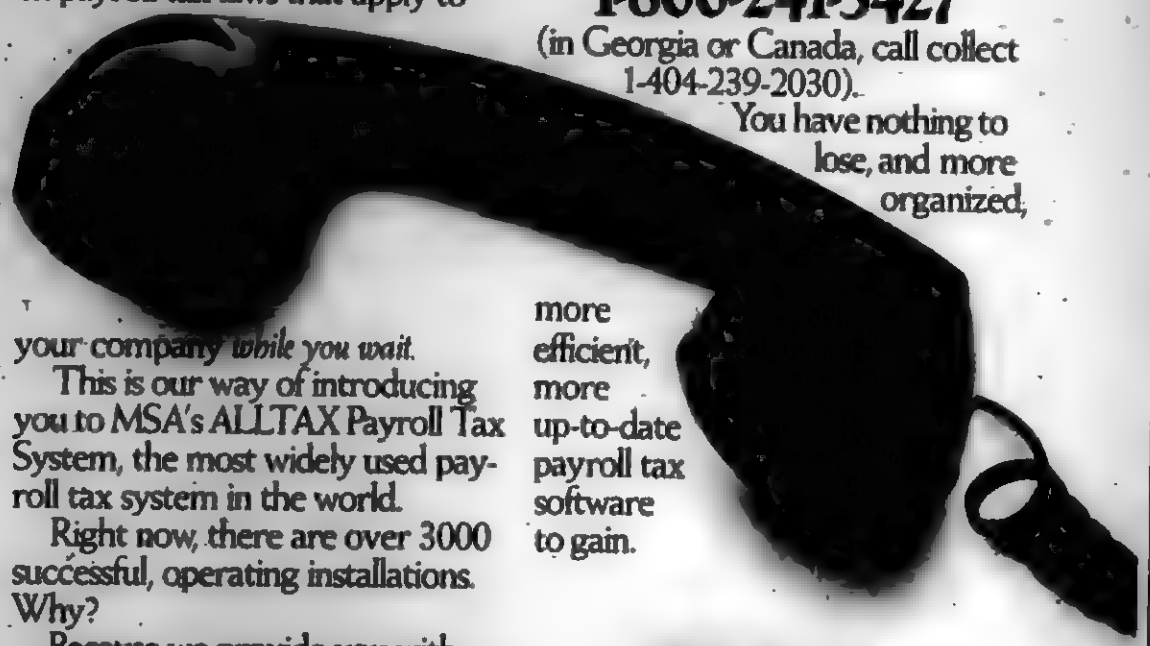

MSA
The Software Company
Management Science America, Inc.

Study Covers Data Base Mart

(Continued from Page 53)

er vendors will become dominant, the report concluded. There is already a tendency among professional/analytical and professional/research producers to acquire and expand into new markets.

On-Line Specialized Data Bases

More publishing companies will enter the field of on-line specialized data bases. Producers with specialized products in strong market areas will develop on-line delivery systems to distribute their data bases and those of small producers in their market category, the report predicted. The authors also predicted more joint data base production efforts between print publishers and on-line vendors.

However, there are still opportunities for small producers of numeric data in the professional/analytical market segment. Major producers will concentrate more on providing powerful data management and decision support systems, relying on small vendors for data base production and expansion.

The 286-page report costs $985 from Frost & Sullivan, located at 106 Fulton St., New York, N.Y. 10038.

RTI Introduces 'Ingres/Net'

(Continued from Page 53)

running under either the VMS or Unix operating systems transparent access to remote data bases.

Ingres/Net is available to Ingres users at a cost of $5,000 for a supported license for the first node. Additional nodes cost $2,500 each for an unsupported license from 2855 Telegraph Ave., Berkeley, Calif. 94705.

On-Line Testing Utility Out For CICS, Total Users

MISSION VIEJO, Calif. — LRB Systems, Inc. has announced the Total Utility File Facility (Tuff), an on-line testing and debugging utility for users of IBM's CICS and Cincom Systems, Inc.'s Total data base management system.

Tuff allows the user to view and update on-line records in Total, display data base statistics, check and repair broken chains, perform record and file searches and delete records and chains, the vendor said.

The price of the utility is $3,975. Further information is available from LRB Systems at Suite B-155, 25108 Marguerite Pkwy., Mission Viejo, Calif. 92692.

At Info Management Expo

Prices of Omnilink Modules Out

NEW YORK — On-Line Software International, Inc. announced the price schedule for its Omnilink modules during the recent Information Management Conference & Exposition here.

The modular CICS application provides for transfer of files from mainframes to IBM Personal Computers, document exchange with the Wang Laboratories, Inc. word processors and other messaging and filing.

Prior to Nov. 30, the three modules can be purchased as a package for $35,000 for IBM OS systems and $28,000 for DOS systems. After Nov. 30, the prices will be $52,000 for OS and $40,000 for DOS.

Purchased individually, Omnilink PC Link for File Transfer costs $30,000 for OS systems and $24,000 for DOS systems; Omnilink Document Exchange costs $23,000 for OS and $17,000 for DOS; and Omnilink Electronic Mail is priced at $35,000 under OS and $28,000 under DOS.

More information is available from On-Line Software International located at Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

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*Source of data: Independent Reader Survey, July, 1983

Software Series Offered For IBM System/34, System/36

WINTER PARK, Fla. — Westmoreland Systems, Inc. has announced the following software for the IBM System/34 and System/36:

- 3D Doc 34/36 — Data dictionary documentation that includes data dictionary, flow charting and nested procedure exploder. The price is $750.
- Autodoc 34/36 — Similar to the 3D Doc but without the data dictionary, the product includes on-line user instructions and an indicator usage program. It is priced at $500.
- Calendar Scheduling 34/36 — Organizes appointments, deadlines and meetings according to date and time. The price of the scheduling software is $300.
- Doc-U-Find 34/36 — Instant location of contracts and documents organized by key words. The price of this product is $300.
- Report Right 34/36 — A report generator. It carries a $1,550 price tag.
- Letter Resources II — A word processor for Systems 34, 36 and 38. The price is $1,550.

Further information on the products is available from Westmoreland Systems, Suite 1, P.O. Box 2726, 228 Park Ave. N., Winter Park, Fla. 32790.

MSA Accounts Receivable Runs Under Cullinet IDMS

ATLANTA — Management Science America, Inc. (MSA) has announced an accounts receivable system that runs under Cullinet Software, Inc.'s IDMS data base management system.

The system is an on-line, real-time update system that provides accounts receivable and credit management tools, which include on-line exception reporting of past-due and over-credit accounts, a detailed statistical payment history for order approval and payment trend analysis and automatic generation of maintenance of credit lines. Sales revenue accounting and cash application entries can be journalized for automated entries to general ledger.

The price ranges from $50,000 to $120,000 from MSA, 3445 Peachtree Road N.E., Atlanta, Ga. 30326.

IBM Users Get Coding Assist

SIOUX FALLS, S.D. — Carriers Service Bureau, Inc. has announced a programming aid for IBM System/34 and System/36 users that reportedly assists programmers in writing and modifying computer procedures and programs written in RPG-II.

Procscan reportedly is designed to read the procedures and programs within a certain user library and to list the data files accessed and used by each procedure and program. A spokesman said the product enables users to identify which files, procedures or programs need to be accessed in order to complete program development and modification.

The product is available for $95 from Carriers Service Bureau, 3421 Hovland Ave., Sioux Falls, S.D. 57107.

CIC Introduces Benefits System

NORTH HOLLYWOOD, Calif. — California Interactive Computing, Inc. (CIC) has introduced an automated system designed to determine permanent disability benefits for workers' compensation. The system runs on Pick & Associates, Inc.'s Pick operating system on a variety of computers.

CIC's Permanent Disability Rating System (PDRS) quantifies the elements while incorporating an override function that allows the examiner to inject subjective judgments into the rating process, a spokesman said.

When a worker's disability progresses to a permanent level, he receives a rating that is expressed as a percentage of loss, which is a reflection of his inability to perform duties in the same manner as before the disability.

The percentage is then converted to the number of weeks' benefits to which the claimant is entitled at the weekly permanent disability rate.

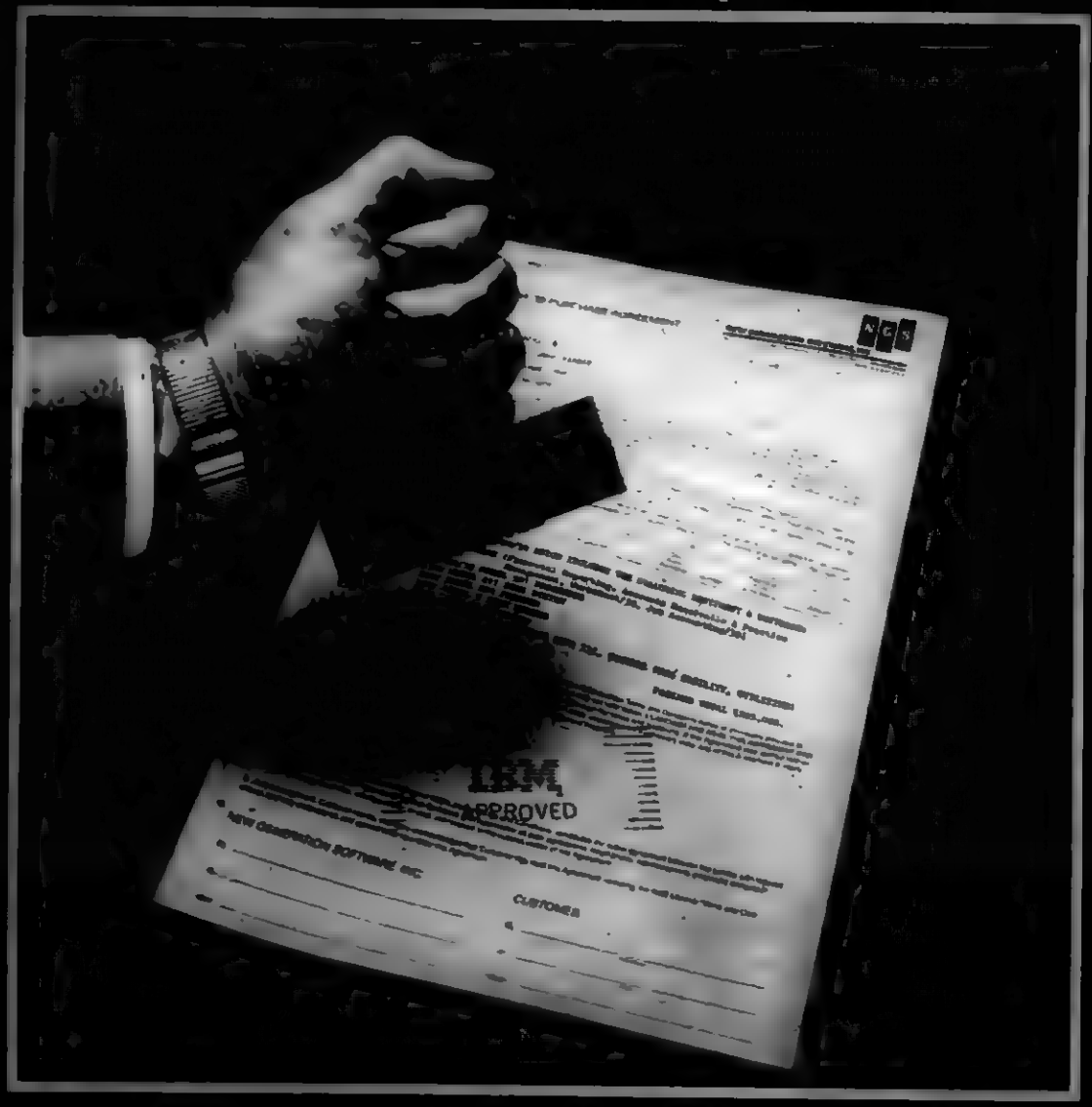
The PDRS is based on tables stored in its data base, which comprises approximately 70 programs. At any point the examiner can override the system calculations and inject subjectivity to allow for individual variations from the schedule.

The examiner inputs the body part affected, the medical report data, the age of the worker and the occupational data. The program then cross-references all the factors.

The PDRS includes special features that alert the examiner to factors such as overlapping work restrictions and multiple disability ratings and instruct the examiner how to proceed.

CIC's PDRS is available at a price of $11,000 from the vendor at 12517 Chandler Blvd., North Hollywood, Calif. 91607.

GEE THANKS, IBM!



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System Targets Medical Uses

ATLANTA — American Computer Tech, Inc. and Cybermed Systems have jointly announced the MedMaster medical system for retention of patient medical information.

Running on IBM minicomputers, the system begins on the System/23 Datamaster, which can accommodate 4,000 active patients with an initial cost of $16,000.

The hardware can grow to a 30M-byte fixed disk (120,000 patients) with four terminals and eight printers, which costs $40,000 with software.

Further information is available from American Computer Tech, Suite 134, 4250 Perimeter Park S., Atlanta, Ga. 30341.

Package Extends HP Protocol Tool

PALO ALTO, Calif. — Hewlett-Packard Co. has introduced software for its HP 4955A protocol analyzer.

The Option 004 eliminates some features not required in communications and network design centers, a spokesman said. The new application software package extends the capabilities of the HP 4955A, both standard and Option 004, by adding specialized protocol decode and display software. With the package, it can decode IBM's Systems Network Architecture, Digital Equipment Corp.'s DDCMP and HP's HPDLC protocols. Network monitoring can also be done.

The HP 4955A Option 004 eliminates one tape drive and the field-service pouch from the HP 4955A. The configuration includes the data-code application program for creating 5-, 6-, 7- and 8-bit custom data codes already standard with the HP 4955A.

The HP 4955A Option 004 configuration is priced at $17,880 with delivery eight weeks after receipt of order. The Basic language option is reduced from $2,015 to $1,200.

The standard HP 4955A protocol analyzer, which includes the new protocol decode tape, is priced at $18,680, a price reduction of $2,270. The HP 18144A protocol decode tape is available at $250 to upgrade previously purchased HP 4955As.

More information is available from HP at 1820 Embarcadero Road, Palo Alto, Calif. 94303.

DG Introduces Version of Mumps For WP on AOS Operating System

WESTBORO, Mass. — Data General Corp. has introduced the Mumps System, an interpretive language designed for execution of programs that retrieve and manipulate string data from random-access data bases.

Mumps is an Ansi-standard implementation of Mumps, which offers word processing, office automation, communications and the Mumps language on the same system. It operates under the company's AOS and AOS/VS operating systems.

The product was designed to run on the vendor's Eclipse computers, the Eclipse/MV family and selected models of Desktop Generation computers.

The initial license fee for AOS/VS Mumps is $10,000, and subsequent licenses are $7,500. For AOS Mumps, the initial license fee is $9,000, and subsequent licenses are $7,000, the vendor said.

Further information is available from Data General, 4400 Computer Drive, Westboro, Mass. 01580.

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'Hilo-2' Ready For IBM, Prime

CONCORD, Mass. — Genrad, Inc. recently announced that its Hilo-2 high-speed logic design simulator, introduced earlier this year for Digital Equipment Corp.'s VAX-11 systems, is now available for varied systems manufactured by IBM, Apollo Computer, Inc. and Prime Computer, Inc.

A logic software simulation system, Hilo-2 reportedly aids in the engineering, design verification and testing of digital electronics in semi-custom integrated circuits.

The package includes language for functional modeling, gate-level and functional-level logic design simulations, timing verification and fault simulation for test validation, according to a Genrad spokesman.

Prices for typical systems packages range from $18,000 for Apollo computers to $145,000 for IBM computers. More information may be obtained from Genrad, 300 Baker Ave., Concord, Mass. 01742.

Prices Reduced On 'APL*Plus/2000'

ROCKVILLE, Md. — STSC, Inc. recently announced 60% to 70% price reductions on its APL*Plus/2000 systems for Digital Equipment Corp.'s VAX-11 computer series.

License prices for the systems now start at $4,600, which includes PL/I source code.

Further information can be obtained from STSC, which is located at 2115 E. Jefferson St., Rockville, Md. 20852.

Has Personal Computer Link

Firm Announces Financial System

SUNNYVALE, Calif. — Data Design Associates has announced the General Ledger Financial Control System.

The company said the system's personal computer interface provides data in the format required by any personal computer software product that can access the data base of a mainframe computer. This is said to allow users to utilize products supplied by a number of microcomputer software companies, enabling corporate clients to integrate their mainframes with micros without limiting them to one particular type.

The system is said to incorporate English-like commands, a personal computer interface and on-line date entry and inquiry, which allows users to customize terminal screens without affecting the programs. The system will automatically produce documentation reflecting changes, a spokesman said.

The system includes an Automatic Interface module (DD-AIM) and a Statement Analysis Reporting module (DD-Star). The company's Data Mapping Facility (DMF) concept provides external tables to allow users to define input to the system as well as master file layouts.

Installations of the General Ledger Financial Control System will begin the first quarter of 1984, with a base price between $60,000 and $86,000. Data Design Associates is located at 1279 Oakmead Pkwy., Sunnyvale, Calif. 94086.

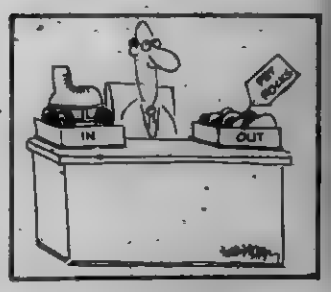
'PC/Focus' Enhanced For Micro

NEW YORK — Information Builders, Inc. has announced Version 8.0 of PC/Focus, an applications development package for users of IBM Personal Computers. The package is a complete implementation of Focus, the firm's application development, file query and data manipulation package for IBM mainframes.

With Version 8.0 of PC/Focus, up to 16 separate Focus data bases can be relationally joined for ad hoc query and reporting. Data bases can be joined with a single command that provides the user with access to all data fields in the files, the vendor said.

In addition, Version 8.0 also provides an improved PC/Focus communications link called Dial. Using a series of menus, Dial enables Personal Computer users to communicate with mainframe Focus for uploading or downloading data, the vendor said.

PC/Focus is a stand-alone package which requires a minimum of 512K bytes of main memory and a 5M-byte hard disk. Version 8.0 costs $1,595 for a single copy, the vendor said from 1250 Broadway, New York, N.Y. 10001.



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Henco 'Info' Gets Color Graphs

WALTHAM, Mass. — Henco Software, Inc. has announced a relational graphics management package that is said to integrate Info, Henco's relational data management system and fourth-generation language, with full- color graphs.

Called Info-Versagraph, the menu-driven product offers high-level integration with Info, a spokesman said. Graphs can be plotted from ad hoc figures entered at the time of graph creation, from data in existing Info data files or from a combination of both sources.

Using Info interactive query facilities, the contents of an Info data file can be regrouped so the desired elements are singled out for graphics, the spokesman said. A single command invokes Info-Versagraph.

The facility includes a library of over 100 predefined graph templates (plotforms). When a standard plotform is selected, Info-Versagraph displays a series of prompts for title, legend, text and plot data items. Prompts also ensure that the correct data is entered for each graph in plotforms with more than one graph element.

Standard plotforms can be defined for all system users, and local plotforms can be created for a single user or department, the spokesman said. A menu-driven subsystem allows modification or creation of new plotforms to be performed.

A variety of graphic output devices are supported. Info-Versagraph is compatible with Prime Computer, Inc. systems with Info Revision 9. Availability on the Harris Computer Corp. VOS series and Digital Equipment Corp. VAX-11 series computers is scheduled for 1984.

The product is priced at $10,000 for Prime 150 through 9950 systems and $8,200 for Prime 2250 systems from Henco at 100 Fifth Ave., Waltham, Mass. 02154.

'DNA-4' Available on DG

WESTBORO, Mass. — Data General Corp. has announced the availability of Exact Systems and Programming Corp.'s DNA-4 information management control system on DG's Eclipse, Microeclipse and Desktop Generation systems.

DNA-4 includes a data base manager capable of supporting relational, network, hierarchical and associative data models, an applications development facility and utilities.

It operates under DG's Rdos, AOS and AOS/Virtual Storage operating systems and is priced from $2,000 to $63,000, depending on hardware, from DG's Information Systems Division, 4400 Computer Drive, Westboro, Mass. 01581.

Module Links Geisco Mail Net To System/34

WALTHAM, Mass. — Orion Software, Inc. has announced the CMGQ/34 (Communication Module for Geisco Quik-Comm) software package, which connects the IBM System/34 to the General Electric Information Service Co.'s (Geisco) Quik-Comm Worldwide Electronic Mail Network.

CMGQ/34 allows a user at a System/34 5251 terminal to both create and receive electronic mail telemessages using a private mailbox on the System/34. Under screen format control, a user can input a message, memo, letter or document and "address" it to any individual or distribution list of individuals who are authorized Quik-Comm users. Messages received from Quik-Comm are placed in the user's private mail- box, where they can be reviewed, printed, rerouted and/or filed in single or multiple files for future referencing purposes, the vendor said.

The cost is $2,400. Further information is available from Orion Software, Suite 200, 400-2 Totten Pond Road, Waltham, Mass. 02154.

Accounting Tool Operates on Pick

NORTH HOLLYWOOD, Calif. — An integrated accounting software package that is portable across hardware running Pick & Associates, Inc.'s Pick operating system has been announced by Omnar Corp.

Called the Omnar Controller, the package is designed to generate customized reports in the areas of general ledger, time and billing-practice management, accounts receivable and spreadsheet. The package also includes a program that allows an IBM Personal Computer to access the data base of a Pick-based host computer and download data.

The product is said to use English commands to format reports without reprogramming. Data movement and updates are done in real-time. With Omnar Controller, certified public accounting firms can prepare budgeting reports by division, department or profit center; track operational and accounting data; analyze and chart business trends; evaluate investment opportunities; and project cash flow, a spokesman said.

The price ranges from $4,500 to $20,000, depending on hardware and Controller enhancements, from Omnar, Suite 100, 12517 Chandler Blvd., North Hollywood, Calif. 91607.

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Note: InSci systems operate in IBM 370, 43XX, 30XX and compatible environments, and are TP monitor independent

Micro Notes

Pixel Computer, Inc. has announced an additional three programming languages, Lisp, Mumps and Office Manager Software, Inc.'s **Tom Basic** for the Pixel 80 computer system. The software includes an artificial-intelligence language, an embedded data base processor and application language for medical environments and a version of Basic for Wang Laboratories, Inc. computers.

The price for the new languages ranges from $600 to $2,000. Further information is available from 260 Fordham Road, Wilmington, Mass. 01887.

Transparent Data Systems, Inc. has announced **Ugraf**, a business graphics utility software program for 16-bit systems. The software allows the user to generate analytical bar, pie, line, scatter and surface graphs for management presentations, financial applications and sales literature using existing files, the vendor spokesman said.

Ugraf runs under Digital Research, Inc.'s CP/M 86, CP/M and MP/M II and Cromemco, Inc.'s C-DOS operating systems. The software costs $495 and is available from 15066 Los Gatos-Almaden Road, Los Gatos, Calif. 95030.

SPSS, Inc. has introduced **SPSS/Pro**, a microcomputer version of the company's SPSS system on the Digital Equipment Corp. Professional 350. The system is said to offer transformation, selection and reporting facilities from plots and tables to research and statistical procedures. SPSS/Pro is a member of DEC's Classified Software Program and sells for $595 from SPSS's Marketing Department, Suite 3000, 444 N. Michigan Ave., Chicago, Ill. 60611.

Action Computer Enterprise, Inc. has announced the availability of **DPC/OS 3.0**, an operating system supporting Digital Research, Inc.'s CP/M Plus in a multiple-user environment running on Action's multiuser, multiprocessing combination 8- and 16-bit Discovery microcomputers. The company said DPC/OS 3.0 will not run out of dynamic memory and that private drives have been implemented for enhancements of on-line maintenance, arbitrary drive reassignment, password protection and fully independent directory sizes. The retail price is $595 from Action Computer, 430 N. Halstead St., Pasadena, Calif. 91107.

A software package that is said to enable high-speed transfer of text and program code between dissimilar computers and operating systems has been announced by U.S. Digital Corp.

The **Copylink** package adds downline loading and other networking features to personal computers, a spokesman said. It includes local data and program transfers between computers using 8-in. and 5¼-in. diskette formats and supports transfers between Microsoft Corp.'s MS-DOS and Digital Research, Inc.'s CP/M operating systems.

The package is priced at $99 from U.S. Digital, 5899-D S.E. International Way, Milwaukie, Ore. 97222.

Intelligent Software, Inc. has announced that its new series of educational software — **Intelligent Tutor** — is available for shipment. The series is for the IBM Personal Computer, Commodore Business Machines, Inc. Commodore 64, Apple Computer, Inc. Apple II and Radio Shack TRS-80 microcomputers. The series is designed to help students improve comprehension in all areas of high school mathematics. Each package is priced separately, with Algebra I, Geometry, Algebra II and Trigonometry and Advanced Topics priced at $49.95 and SAT Math priced at $69.95. The five may be purchased together for $199.95 from Intelligent Software, 9609 Cypress, Munster, Ind. 46321.

Today's Future Consultants has announced the **Today's Future Mail** system, which the company said enables desktop computer users to use the Electronic Originated Mail (E-Com) service offered by the U.S. Postal Service. The system is available for most computers using Basic by Microsoft, Inc., including Radio Shack's Models 1, 2, 3, 4, 12 and 16, Osborne Computer Corp. computers and the IBM Personal Computer and Personal Computer XT. The package is priced at $395 from Today's Future, through P.O. Box 29251, San Antonio, Texas 78229.

Digital Research, Inc. has introduced the **Graphics Systems Extension (GSX)** software for the IBM PC-DOS and Microsoft, Inc. MS-DOS operating systems. GSX is said to extend an operating system to include graphics I/O functions, and it allows graphics applications programs to be moved from one computer to another. The retail price of the package is $90 for the 16-bit version and $75 for the 8-bit version from Digital Research, 160 Central Ave., Pacific Grove, Calif. 93950.

Alpha Micro, Inc. has made available its **Alphacalc** financial software package for the company's line of multiuser, multitasking microcomputer systems. The multiuser package is said to help prepare cost estimates, financial statements and projections, budget preparations, present-value calculations, cash flow analysis and sales forecasts. The package is priced between $300 and $900.

The company also announced that the **Fortran 77** language is now available across its entire microcomputer line, allowing mainframe and minicomputer applications to be executed on Alpha Micro systems. The package is available for approximately $1,400. Alpha Micro is located at 17332 Von Karman Ave., Irvine, Calif. 92714.

Microdata Corp. has introduced **Realcalc**, an electronic spreadsheet software package that makes available financial planning tools and data base access to users of the company's Reality and Sequel business computer systems.

The package accommodates basic financial analysis in addition to divisional reporting, sales projections, cash flow analysis and "what if" investigation. It is said to offer users access to any element of information from the Reality relational data base system.

The package is priced at $1,595 from Microdata, 17481 Red Hill Ave., Irvine, Calif. 92714.

Epson America, Inc. has announced version 1.18 of **Valdocs**, an integrated word processing software package for the company's QX-10 personal computer. The new version is said to include underlining, variable line spacing and bar-graph shading. This most recent version

(Continued on Page 64)

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Micro Notes

(Continued from Page 61)

is said to provide Televideo Systems, Inc. 920 terminal emulation as a setup option and runs any Digital Research, Inc. CP/M software configured for the QX-10. The Valdocs software comes with the QX-10 personal computer, which is priced at $2,995 from Epson America, 20355 Hawthorne Blvd., Torrance, Calif. 90503.

The Small Computer Company, Inc. has announced the following add-on products for Radio Shack's Profile Plus data base management software:

● **Advanced File Definition** with **Shuffle** enables information to be edited and rearranged on a screen with few keystrokes. The price is $200.

● **Transfer** moves programs and data between Radio Shack's TRS-80 computer. The price is $150 for transfers between computers with the same diskette sizes or $200 between computers with 5¼- and 8-in. diskettes.

● **Display** shows what a report will look like on screen before printing and costs $50.

● **Proform** reduces the time it takes to format a diskette. The price is $50.

● **Quikback** provides fast diskette backups and costs $50.

● **Quikback** with **Format** offers both Proform and Quikback and costs $75.

Three Small Computer products with math-related features include:

● **Eight-Line Reports** with **Math** increases the two-line limit on reports to eight lines and defines math formulas, including averaging, for up to five reports. The price is $150.

● **Math Upgrade** for **Profile Forms** is an extension to Profile Forms that lets information from records be printed on a page of up to 66 lines or 11 in. by 13 in. The price is $100.

● **Math 64** increases the usual 16 math formulas per data file to 64 and costs $150.

The software runs on Radio Shack's TRS-80 Model 2/12. Further information is available from Suite 1200, 230 W. 41st St., New York, N.Y. 10036.

Response, Inc. has announced the following products:

● **PC/Coder** is a utility set of programs operating on the IBM Personal Computer or Personal Computer XT, with two diskette drives, 128K bytes of memory and IBM's PC-DOS operating system. The price is $450.

● **PC/Banker-CEO Module Update-Farm Finance** is designed to handle the financial records associated with a farm or farm-related business for the IBM Personal Computer with at least 192K bytes of memory and two double-sided, double-density diskette drives or the IBM Personal Computer XT. This application requires Lotus Development Corp.'s Lotus 1-2-3 access system (included in CEO) and IBM's DOS 1.1 or DOS 2.0 operating system. The price is $750.

● **General Accounting** is an integrated set of general accounting modules that may be used individually or together with complete interfacing between modules. Modules include accounts receivable, accounts payable, payroll, general ledger and inventory with point of sale. The modules are designed for users of the IBM Personal Computer XT with at least 128K bytes of memory, or the IBM Personal Computer with an expansion unit of 10M bytes or 20M bytes or a Personal Computer with a non-IBM disk compatible with PC-DOS 2.0. The cost per module is $650 from Response at 608 2nd St., P.O. Box 66, Jackson, Minn. 56143.

BPI Systems has introduced the following products:

● **Accounts Payable System** for Texas Instruments, Inc.'s Professional Computer with two floppy diskette drives or one floppy diskette and a Winchester hard disk drive. The price is $395. Versions are also available for Apple Computer, Inc.'s Apple II, Commodore Business Machines, Inc.'s 8032 and Digital Equipment Corp.'s Decmate II computers.

● **Church Management System** for IBM's Personal Computer XT with two 320K byte floppy diskette drives or a fixed disk. The price is $795. Versions are also available for Apple Computer, Inc.'s Apple II Personal Computer with two or three disk drives.

● **Personal Accounting System** for the IBM Personal Computer XT with two 320K-byte diskette drives or an IBM Personal Computer XT. The system allows definition of assets, liabilities, net worth, income and expenses. The price is $195. Versions are available for Sanyo Business Systems Corp.'s 1000, 2000 and 3000 computers.

● **General Accounting System** for Apple Computer, Inc.'s Apple IIe micro with 64K bytes of random-access memory, two Apple II diskette drives with a controller for DOS 3.3. The system can be used with a single floppy diskette drive and a fixed disk. The system also runs on an Apple II+ personal computer with an 80-col. card. The price is $395.

● **Business Analyst System** for Apple Computer, Inc.'s Apple II+ with two diskette drives and controller card for DOS 3.3. The price is $195.

● **Speed Reading System** for Apple Computer, Inc.'s personal computers. The price is $195.

Additional information is available from BPI Systems at 3423 Guadalupe, Austin, Texas 78705.

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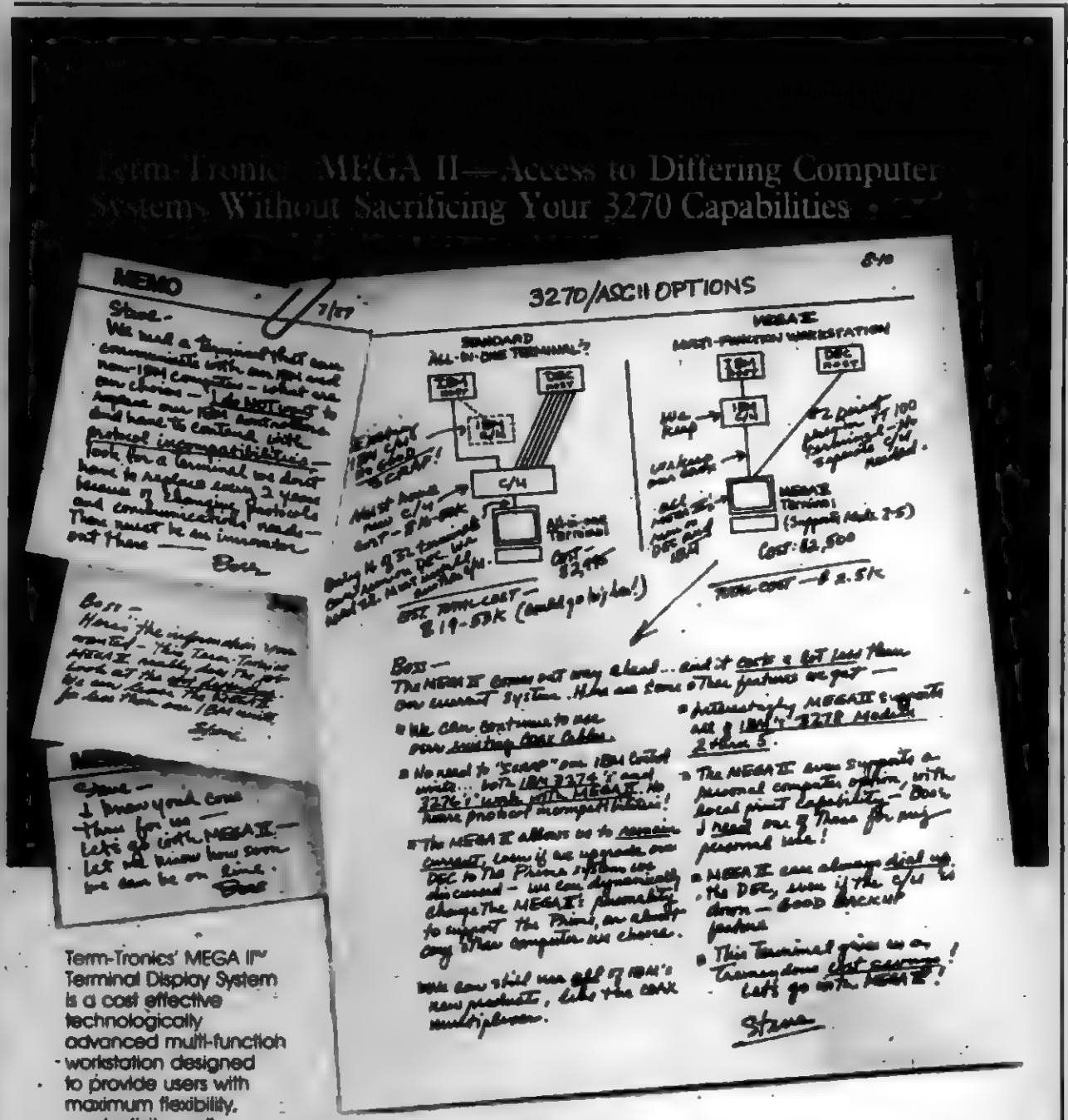

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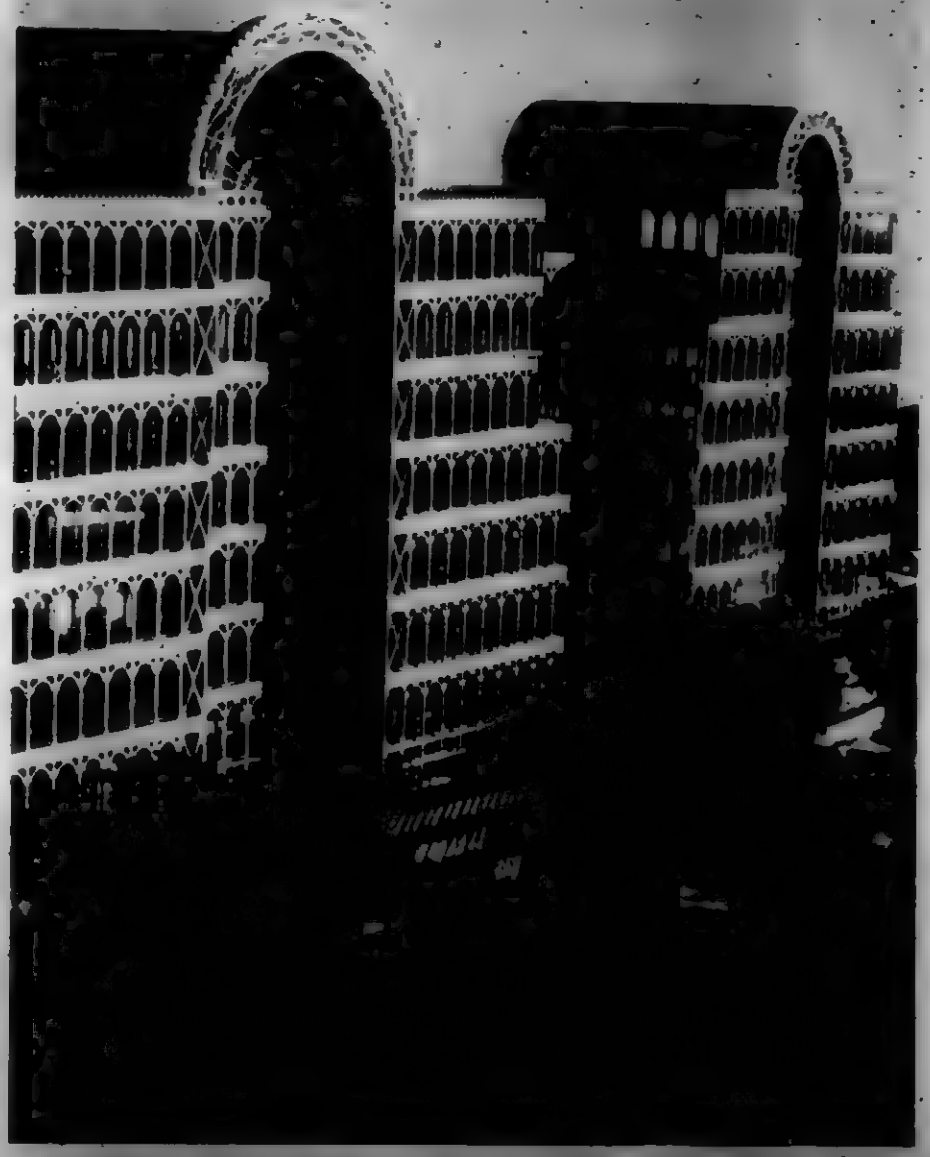

Dallas, Boston Break Ground on 'Computermarts'

But . . .

Is there business for both?

Which vendors will lease space?

Will DP managers save time?

Boscom

IN DEPTH

By Matthew Allen

Great Britain hosted the first world's fair, the Exhibition of Industry of All Nations, in 1851. By order of Queen Victoria and Prince Albert, the Great Exhibition was to be the symbol of the emerging Industrial Revolution. The showcase for nearly 14,000 exhibitors' best technology was the Crystal Palace, itself a grand manifestation of England's industry with a touch of fairy tale thrown in.

Designed by horticulturist Joseph Paxton, the Crystal Palace was a stunning achievement combining ironworking with the fanciful use of glass, not dreary Dickensian brick and stone.

Manufactured goods and artwork were displayed throughout 18 acres of floor space from May 1 to Oct. 11 and viewed by some six million people. The American section, thought at the time to be somewhat spare and certainly lacking in display sophistication, nevertheless impressed visitors with its radical new repeating pistol called the Colt revolver, Charles Goodyear's miraculous applications of vulcanized rubber and Cyrus McCormick's efficient grain reaper. Some press accounts took note then that America was on its way to being a technological force.

Artist's Conception of Boscom Registration Area

Indeed, 130 years later, America will attempt to inherit the legacy of the Crystal Palace with a monument to technology of its own, the Infomart. In fact, in keeping with the historical analogy, its design will be based on Paxton's original drawings.

Announced in September 1981 by Dallas-based developer Trammell Crow Co., Infomart will provide year-round display space in Dallas for makers of computer and telecommunications equipment. Buyers will be brought to them through special horizontal and vertical applications shows. The goal is to shorten buying cycles and save marketing costs in a complex, competitive business marked by rapid innovation.

This simple yet radical approach to marketing for information processing has already been tested by Trammell Crow for other industries. Only blocks away from Infomart, near the downtown area, Crow's Dallas Market Center operates trade marts for such industries as apparel and home furnishings.

The computermart idea has also attracted others, most notably the developers of the Boscom complex, a renovation of Boston's Commonwealth Pier structure, scheduled to open in mid-1985, about six months after Infomart (see facing page).

The Trammell Crow development, which broke ground May 25, will provide about one million square feet of permanent leasable showroom space plus an underground parking garage and exhibit hall.

The intent is to establish an environment in which buyers can scan a manufacturer's entire line of offerings at their leisure and learn about the newest developments and applications in a "learning center" offering regularly scheduled classes.

The Infomart will not strive to be

(Continued on In Depth/4)

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Boscom 'Selling a Program Concept'

Though at least a dozen other computer trade marts have been announced or rumored in San Francisco, Montreal, Atlanta, Toronto and other cities, Boscom and Infomart are the only ones off the drawing board.

Boscom intends to refurbish the Commonwealth Pier building at a cost of $165 million. The Commonwealth Pier was constructed in 1914 and was the largest such structure in the world at the time. Howard Miller, Boscom's chief executive officer, describes it as "an 80-story building lying on its side."

Boscom's plan is to gut the structure and transform it into a mart with 1.3 million square feet of space, including 500,000 square feet of leasable showroom space, a 130,000-square-foot exhibition hall and 60,000 square feet of auditorium and meeting space. The opening is scheduled for May 1985.

The project is being backed by FMR Corp., a financial services firm that manages about $20 billion in various funds and has renovated several Boston office buildings. Permanent financing has not yet been procured, but FMR has supplied about $15 million so far to get construction started, Miller says.

Lease rates have risen from $22.50 per square foot annually to $35 since the project was announced in January 1982. About 20% of the 500,000 feet of showroom space is under firm lease for a minimum of three years, with IBM and Xerox Corp. renting the most space at about 28,000 feet apiece. Other smaller tenants to date include Corvus Systems, Inc., Ask Computer Systems, Inc. and Epson America, Inc. Another 20%, Miller says, has been assigned under letters of intent. "I don't think you can ever say you're on schedule [with leasing]," Miller observes, "but with 20% leased at this point, we're pretty much on track."

Like Infomart, Boscom plans to bring a steady stream of homogenous groups before the tenants to cut the length of the selling cycle. So far, the organization has planned nine vertical and horizontal programs with guidance from an education advisory board that includes MIT math professor Seymour Papert, Yankee Group president Howard Anderson and Harvard Business School professor F. Warren McFarlan.

Miller believes Boscom's narrowly focused educational programs will set it apart from Infomart, which also has a line-up of conferences dealing with specific applications and industries. Infomart hopes to capitalize on having industry groups in Dallas for shows at its other nearby trade marts. "They're primarily selling real estate," Miller says. "We're selling a program concept. We're not asking people to drop in just because they're in Boston for another show."

Conference attendees will be shuttled across Boston Harbor from Logan International Airport to Boscom in enclosed water taxis.

Boscom projects one million visitors during the first year of operation. About 60% are expected to come from within a radius of 400 miles, but "we honestly think we'll have a worldwide audience," Miller says.

Miller intends to break even operationally from day one, relying exclusively on lease revenues to pay all costs. Fees from various training classes that will be offered will be used to expand the curriculum.

A visitor to Boscom will be given a magnetic-strip card encoded with his name and company. He will use the card to activate one of several hundred terminals that will display Boscom's layout, tenant list and program schedules. He can also make appointments with specific tenants via the terminals. When he does visit a showroom, the tenant will run his card through a reader, adding him to a prospective-client data base.

"We're going to try to keep the vendor from having to meet with two doctors, two lawyers and an Indian chief all in one day by bringing in specific groups," Miller says. "That way the tenants will have time to prepare the appropriate systems to best meet those specific needs."

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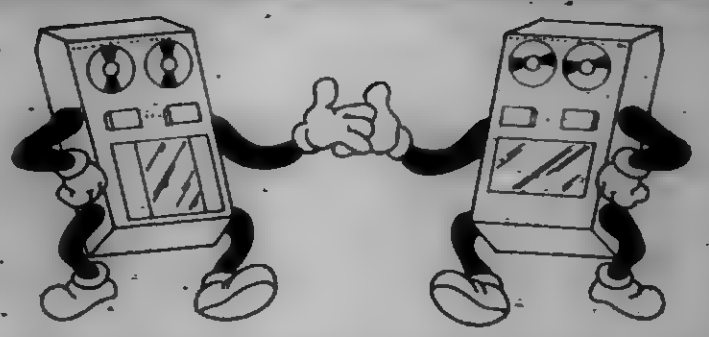

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IN DEPTH

(Continued from In Depth/2)

another distribution channel, but rather, an enhancement of existing ones. Only manufacturers, not distributors, can lease space. Actual sales will be prohibited on premises. Instead, a centralized data base will provide tenants with profiles of every buyer who walks through the doors for further qualification by the appropriate sales office.

The theoretical benefits are one-stop shopping for buyers and a steady stream of high-quality prospects for vendors. The idea seems simple enough — until you try to explain it to a vendor long accustomed to attending the standard trade shows and making cold calls.

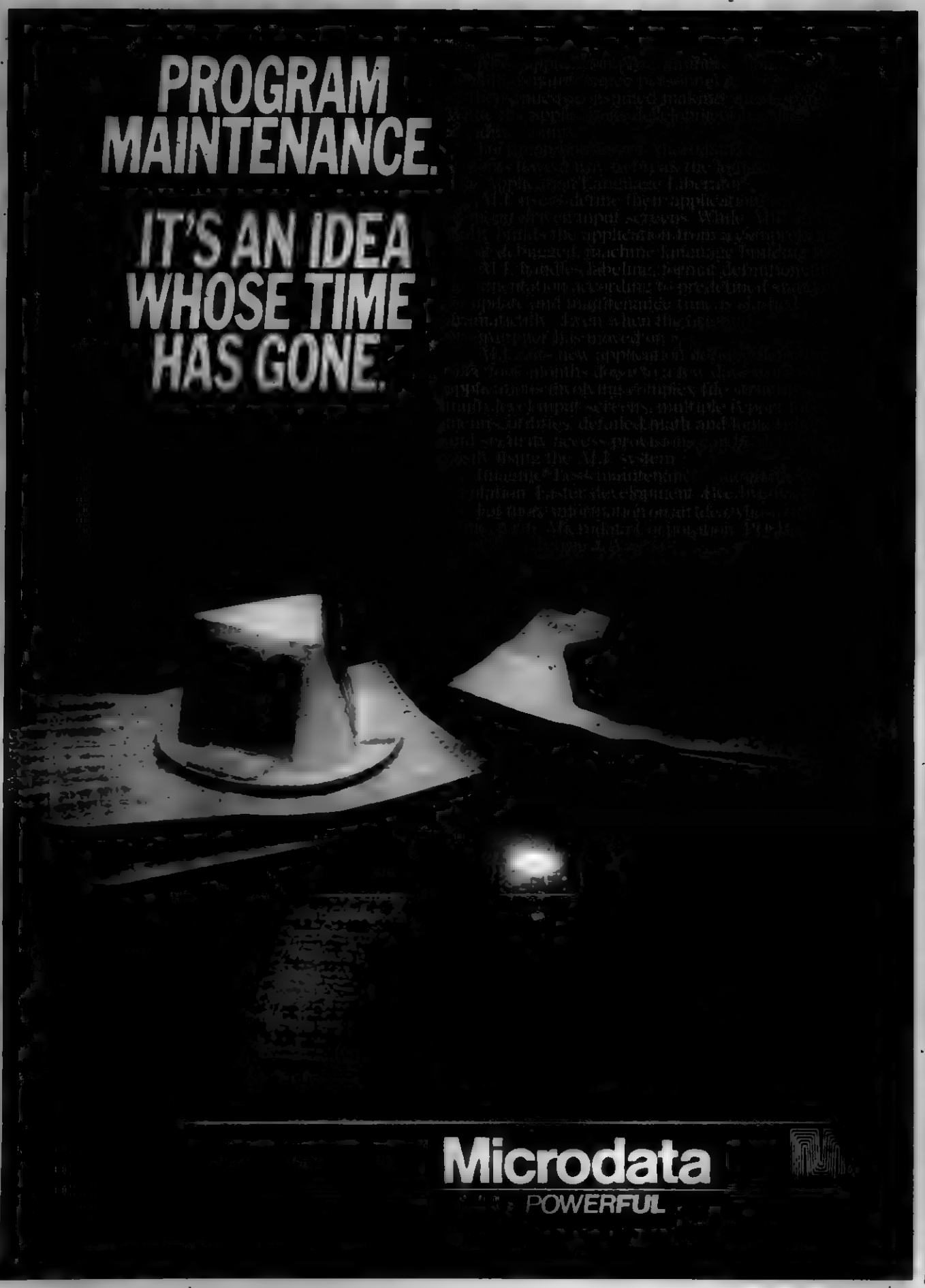
Infomart President Bill Winsor has had to overcome two major hurdles. Since the development will be the world's first facility with this kind of high-tech marketing strategy, there is no template for judging the plan's strengths and weaknesses. Basically, Trammell Crow Co., through financing from Citicorp, is plunking down about $92 million on a highly educated guess that Infomart will work. In addition, the Dallas Market Center is not a familiar name in the data processing industry.

The theoretical benefits are one-stop shopping for buyers and a steady stream of high-quality prospects for vendors.

Trammell Crow Sr., the patriarch of a group of companies that now has $6 billion in gross assets and controls more than 133 million square feet of commercial property in 60 U.S. markets, had the glimmer of an idea for such a computer trade mart some 16 years ago during a conversation with H. Ross Perot, founder of the half-billion-dollar Electronic Data Systems Corp. They pondered the idea, and Perot concluded it wouldn't work then because the equipment filled rooms, cost too much and appealed to only a few applications. In addition, the field of possible tenants was small — just IBM and a few others.

But one event changed the thinking of developers — the emergence of the microprocessor in the early 1970s. The computer on a chip has led to stand-alone desktop computing power that encompasses virtually everyone as a potential user. Yet it has touched off cost reductions that threaten the financial stability of dozens of vendors as they struggle to reach the unsophisticated — even unwilling — potential customer. Therein lies Infomart's mission: to cut the cost per lead, reducing pressure on margins.

Three years ago, Trammell S. Crow, the founder's son and chairman of the board of the Dallas Market Center, which operates seven other trade marts, decided to research the idea further to determine if the time was indeed right. He studied a



IBM VAR

IN DEPTH

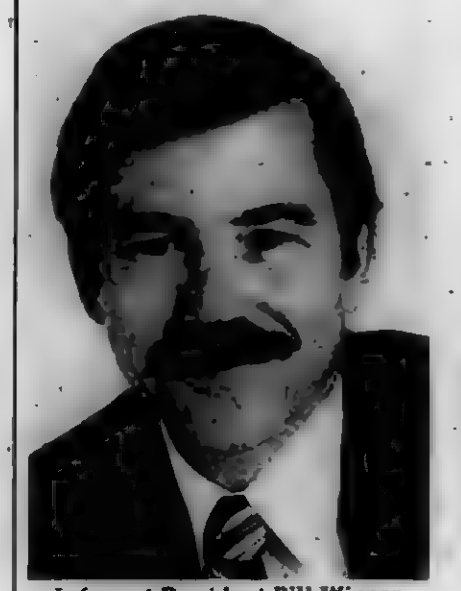
number of trade shows and conferences, the closest cousins to a computermart. Their biggest shortcoming is the enormous expense of moving personnel and equipment to a temporary location to catch the fleeting attention of a frenzied attendee.

"An 8-foot by 10-foot space at a trade show typically costs $8 to $12 per square foot for just a few days," says Bill Wozencraft, president of Canamex Ltd., a Dallas marketing consultancy that has leased Infomart space to offer on a time-share basis to small Canadian companies. "And trade shows are like shooting up in the air with a shotgun — you just hope you hit something."

"An 8-foot by 10-foot space at a trade show typically costs $8 to $12 per square foot for just a few days. And trade shows are like shooting up in the air with a shotgun — you just hope you hit something."

The decision to forge ahead was supported by a market research study last year of 12 distribution channels and 100 users with at least 250 employees. Of the respondents, 82% said they would be willing to travel more than 500 miles to a mart. Second, they typically observed it would be "a way to get away from the hassles of being called upon by so many salesmen."

At first, it appeared that Infomart would have competition in its own backyard. The Boston-based real-estate firm of Leggat McCall and Werner, Inc. announced almost simultaneously a 500,000-square-foot facility at Las Colinas, a posh commercial-residential development a few miles



Infomart President Bill Winsor

west of Dallas. But in August of last year, Leggat realized that two such facilities could not possibly survive in such close proximity.

The location of the Infomart in the midst of the other trade marts and about 6,000 hotel rooms, most built by Crow as well, armed the Infomart with two powerful marketing tools: a well-established infrastructure that would appeal to potential buyers and considerable potential for Infomart to schedule buyers' conferences concurrently with appropriate trade shows at the other marts.

Crow and Leggat briefly considered a joint venture but could not come to terms, leaving Infomart to go it alone in Dallas. As of Oct. 1, 40% of Infomart's space is under firm lease at prices ranging from $22.50 to $30 per square foot annually, depending on the amount leased. Another 40% is in final negotiations, including 24,000 feet for Xerox Corp. Recently, AT&T Information Systems signed a lease for 15,000 square feet.

Glaringly conspicuous is the absence of IBM, which has signed up for about 28,000 square feet at Boscom. Winsor is quick to add that Infomart's negotiations with IBM have intensified, and he has reasonable expectations of signing the company

One industry analyst observes

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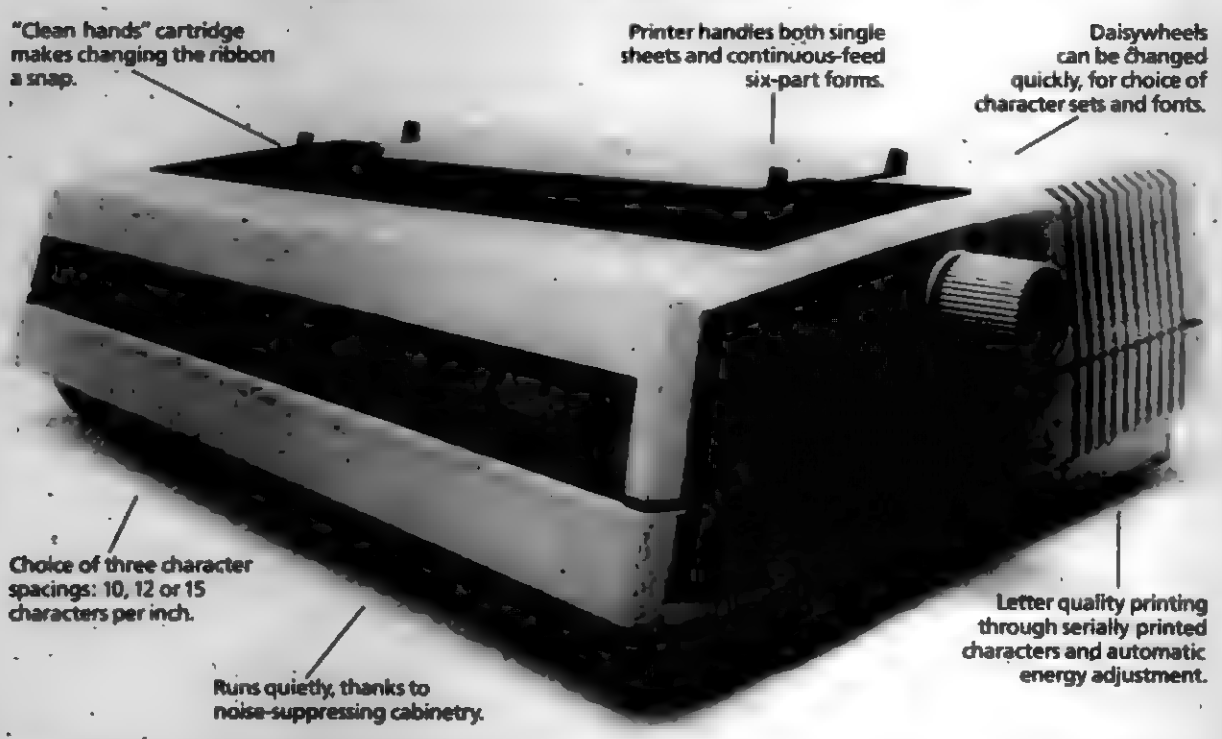

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that it is critical to have IBM as a tenant, much as it is for a shopping mall to sign Bloomingdale's or Sakowitz as an anchor. Since the Infomart has signed AT&T, the analyst believes IBM won't be far behind.

Fred Fishman, a senior marketing support administrator with IBM's national-accounts division, is involved in the trade-mart negotiations. He explains that when IBM signed its lease with Boscom last November, the company thought "Boscom best met our needs. But it has been a year since then, and we think Infomart has made a lot of progress. Our point of view is different now. We're continuing to look at Infomart and other developments."

Fishman says that IBM's lease with Boscom contains certain preconditions that he has "no doubt" will be met. "We didn't ask for any special guarantees, but we wanted to make sure that as time went on, the quality of the facility wouldn't change."

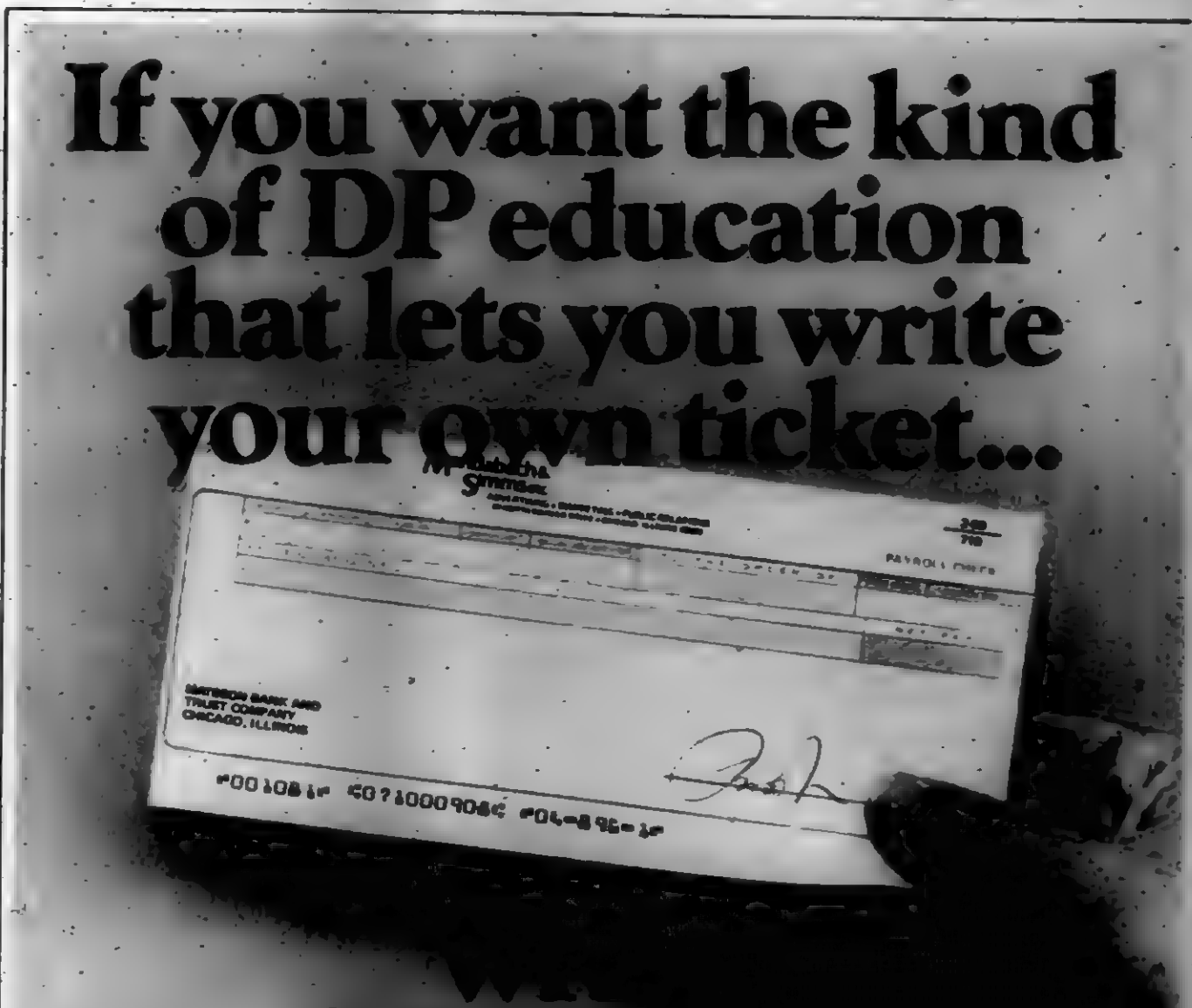
Asked if the preconditions required certain other companies to participate, Fishman declined to comment.

Xerox was intrigued enough with the concept to lease about 21,000 square feet at Boscom in addition to the letter of intent to lease at Infomart. Franklyn Thiebaud, the newly appointed manager of market-center operations for Xerox, says the challenge for both marts will be to keep a continual parade of buyers going through the doors to make such an expensive strategy worthwhile.

"It's one thing to bring 50,000 people to the National Computer Conference for a couple of days. It's quite another to provide a steady flow of qualified users," he says. "On the other hand, we are looking for ways to access qualified incremental prospects."

Infomart's approach to keeping the faucet turned on is a series of user conferences aimed at both horizontal and vertical markets determined by study of the largest industries most reliant on information processing.

"We investigated the penetration level of computers in 23 industries that are the top [gross national product] producers," Winsor explains. "Farming was at the top of the list in terms of being a virginal market, but we



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knew that would be too difficult to sell to. The top six industries in terms of availability of hardware and software were financial, medical, legal, insurance, wholesale distribution and retailing."

And Infomart's schedule of conferences and trade shows, numbering nearly 100 so far, includes six vertical shows aimed at those industries.

Six horizontal conferences include financial planning, local-area networking, industrial automation and applications of the personal computer to Fortune 1,000 companies. In addition, Infomart is hoping to attract major trade shows for its exhibition hall, though some of those may become endangered species if the concept works as well as intended.

"There are at least 30 major shows," notes Jerome Dreyer, president of the Association of Data Processing Service Organizations, Inc. (Adapso) and a member of Infomart's board of directors along with Adm. Bobby Inman, who heads Microelectronics and Computer Technology Corp. in Austin.

"Shows are very expensive to attend, but companies can't afford not to go because their competition could get a leg up on them," says Dreyer. "The main thing the Infomart will have over the trade shows is its educational program. In the long run, it has the potential to cut down the number of shows."

One market researcher adds that the mart concept should prove superior to trade shows because "the business is so complex now with so many products that many facilities aren't big enough anymore to house everything. And users are just coming away from shows more confused than ever. Marts should be able to control that confusion through the thematic nature of their conferences and their less hectic environment."

Xerox's Thiebaud sees trade marts as a way to access the increasing levels of management that are becoming involved in buying decisions. In the old days of mainframes, vendors knew that data processing administrators were the ones to approach for a sales pitch. "But now we're talking about distributed processing, networks that involve several departments and people of varying levels of sophistication in their knowledge of computers," Thiebaud says. "It's much harder now to get a straightforward decision. The buying cycle is much more complex."

These market pressures have changed attitudes among makers about showing their products in close quarters with one another. "Five years ago, a vendor would have said, 'No way am I going to have a showroom next to my competitor,' " one industry observer says. "Now, because of networking and compatibility issues, they realize they had better be next to each other to catch any business."

One might assume that small companies would be the ones to benefit most from an Infomart or Boscom because they could, theoretically, get the most for their

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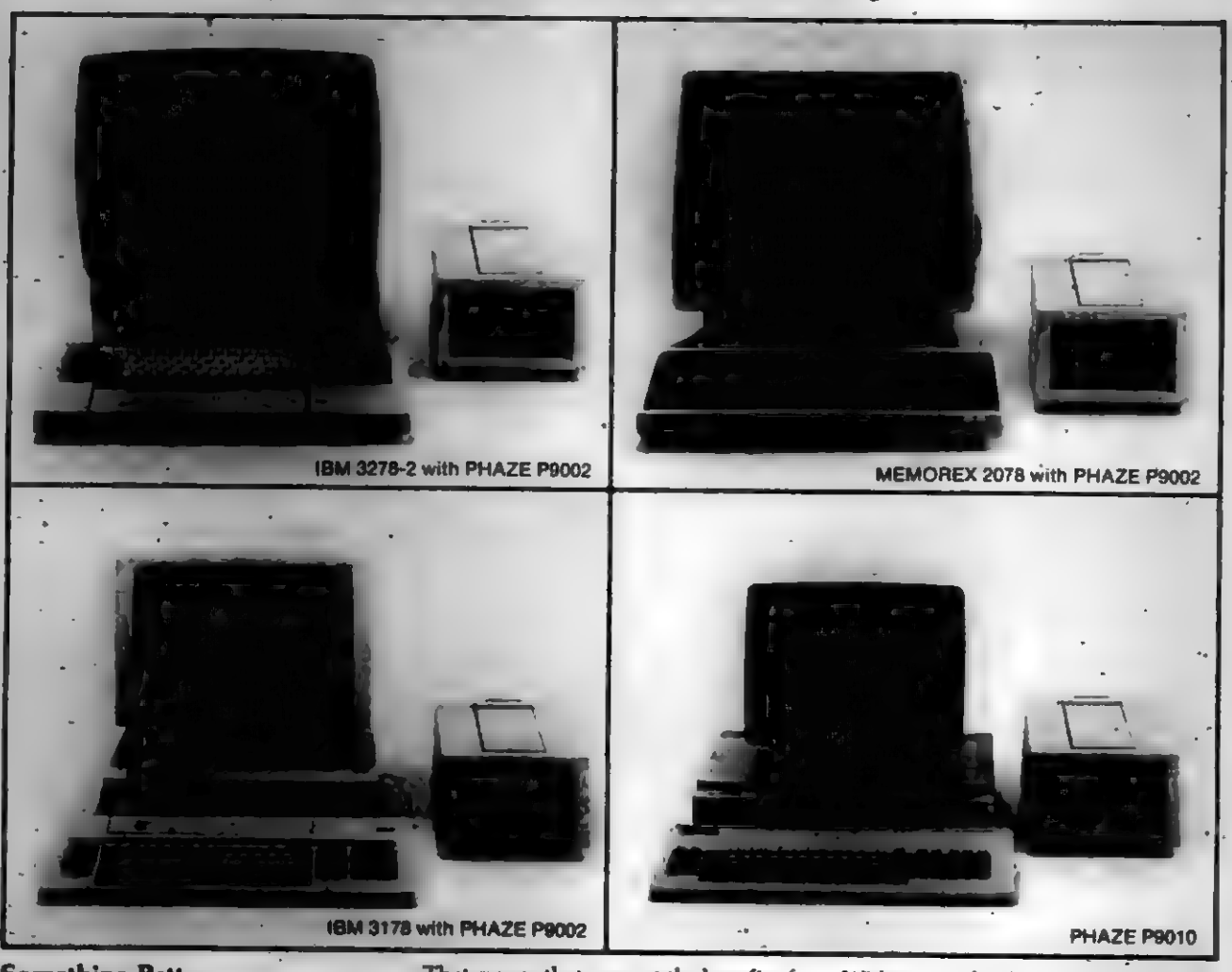

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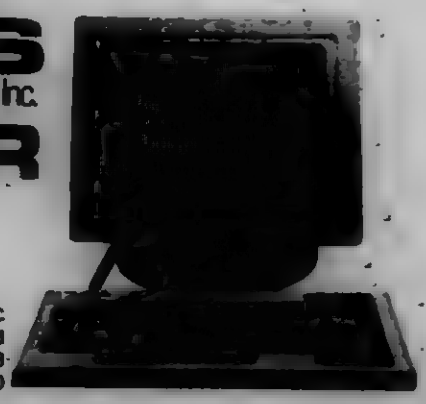

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marketing dollar. But large companies will be able to show off their most sophisticated technologies, such as satellite networking and teleconferencing. And some companies are using Infomart as a base for regional offices or extensions to existing facilities in Dallas.

Infomart expects to derive about 50% of its revenues from leases and the rest from training classes, trade shows and other support services.

A user will pay a set fee to visit the Infomart. He will register by answering a detailed buyer's profile aimed at determining what his business is, his experience with data processing, what equipment he may have already and what his specific needs are. His name will be recorded on a magnetic-strip card he will carry with him, from which vendors can compile a list of prospect clients who visit them. Then tenants can retrieve full profiles of these visitors from Infomart's registration data base to qualify further these prospects.

If a visitor wishes, he can make an appointment to see a specific vendor's display.

Registered visitors can then attend a 10-minute video seminar explaining how to use the Infomart, including its Learning Center, which will have courses costing $45 to $75 that deal with everything from very generalized concepts to the latest applications in, say, military telecommunications.

A visitor can then walk up to a simple terminal and access the list of tenants that have the equipment in which he is interested. Then he is free to wander the reincarnation of the Crystal Palace.

Infomart's exterior will be composed of a white aluminum framework supporting highly reflective silver glass panes. Because the structure will be far lighter than the original granite design, fewer interior structural supports are needed, providing more meeting-room space. Its modular design will allow it to expand eventually from seven levels to up to 15.

Infomart tenants can retrieve full profiles of their visitors from the registration data base to qualify those prospects further.

The architects are pondering use of a system of louvers for the semicircular central atrium's skylight. The louvers automatically could track the sun, providing a variety of lighting conditions that can be carefully controlled to result in energy savings. The construction should be quicker than the original design, according to Chris Leyenberger, one of Trammell Crow's architects involved in the project. "That's because the framework will more or less snap together. We're trying to figure out what to do with the skylight in the event that more levels are added."

Construction crews have started pouring the 257 foundation piers that must be more than 100 feet deep to provide enough support in the event the structure does expand to 15 stories.

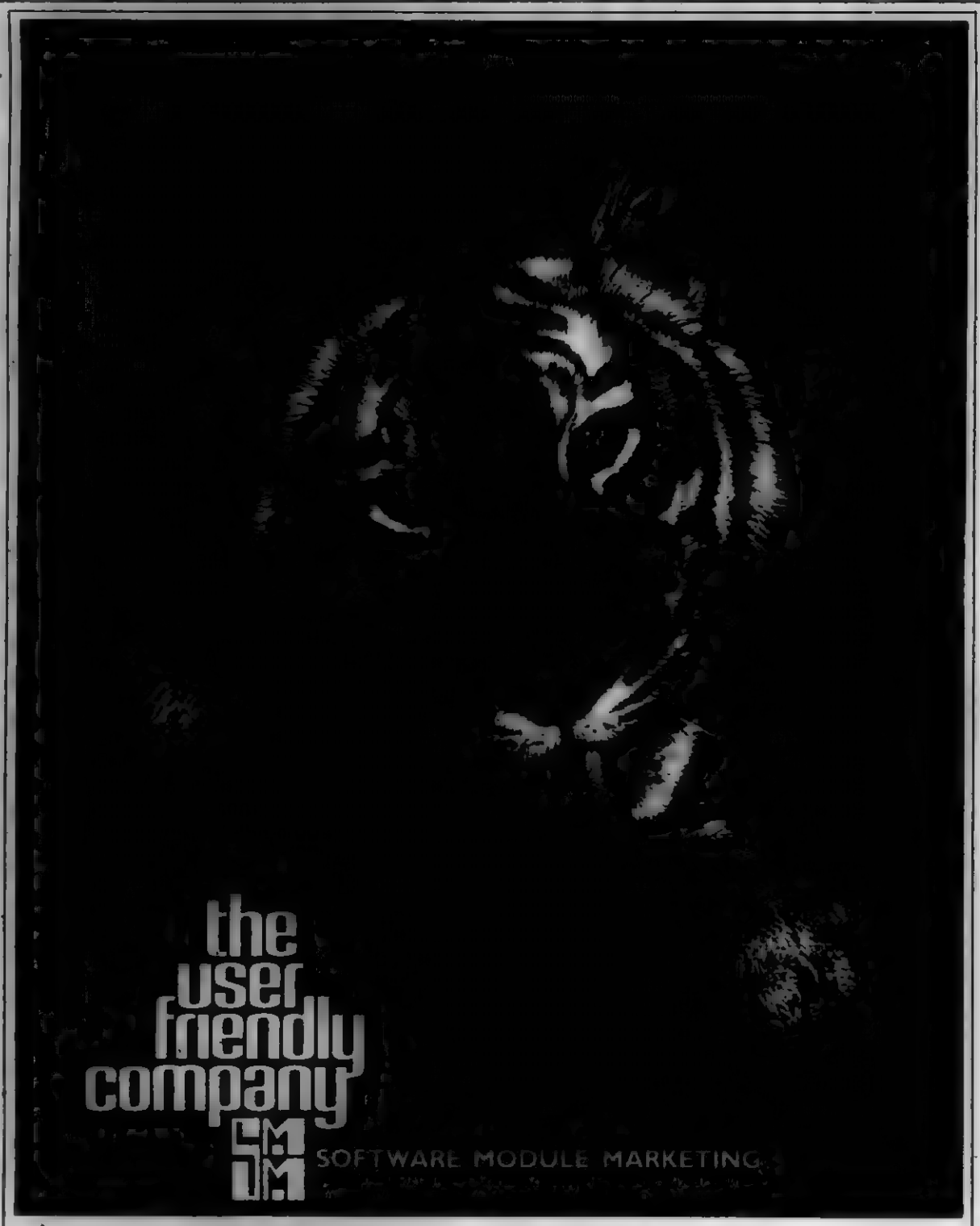
At this early stage, Infomart and Boscom are vigorous rivals. Infomart was announced 3½ months before Boscom and is well under construction. Boscom held its groundbreaking ceremony Sept. 14.

Boscom is quick to point out that it has signed IBM as a tenant, while Infomart has not. And any mention that Infomart has a more central geographic location draws the response that "within a 400-mile radius of Boscom is the world's largest installed base of computers."

But if Franklyn Thiebaud is right, all this competitive posturing isn't necessary. "They are geographically removed enough from one another that they should be able to attract separate audiences. I think ultimately probably four to eight of these trade marts could be supported on a regional basis."

About the Author

Matthew Allen is a Dallas-based freelance writer who specializes in high-technology articles.



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Producing Reports Managers Really Use

By Alexandra J. Rand

Managers typically use less than half of the information they receive from computer-based information systems. Some research suggests the percentage is even lower.

Most managers openly admit they do not understand much of the output they receive. Often, information they claim is unavailable actually exists but is simply not formatted in a useful way. Managers are turning to personal computers and creating rough, but controllable, mini-management information systems rather than taking advantage of the far more powerful and exacting systems that exist to serve them.

Why the apparent rift between managers and their management information systems? The most compelling explanation is that business managers still find most computer-based reports cryptic, confounding and too time-consuming to use.

These managers are accustomed to receiving the information they need through informal, highly personalized, verbal reports from subordinates and associates. The data provided is typically rough and highly aggregated but easy to understand and directly applicable to pending business decisions.

Most computer-based documents offer excessively long, abstract, tabular arrays of figures with few if any cues to help the manager quickly extract and interpret the information he needs. This mismatch between managers' information expectations and the typical content and format of computer-based reports dramatically undermines the impact of management information systems.

The mission of MIS is to help the organization achieve its business objectives by contributing to the quality and effectiveness of business decision making. As the MIS function begins to mature, a key challenge facing alert MIS directors will be to develop ways to provide existing information to decision makers in more understandable and value-transparent formats.

What determines if business managers actually use computer-based reports? A type of "net value" formula seems to approximate the test put to MIS documents by managers. The net value of a particular report is determined by estimating the "costs" associated with using the report (time, effort, frustration and so on) and "subtracting" these costs from the potential gain of having the information contained in the report.

This formula provides important clues about the likely behavior of managers when it comes to

IN DEPTH

computer-based reports. Unless the information in a particular report is perceived to be terrifically relevant and needed, its potential usefulness will not win out over any degree of difficulty or discomfort associated with using the report.

The net value concept holds an important lesson for MIS professionals. If your organization's computer-based management reports are like most — lengthy, not especially well-organized or lacking consistent labels and helpful graphics — odds are they are not being used by your company's decision makers. In fact, the reports are probably being dismissed as not worth the effort required.

Typically, the final format of documents is predominately a product of machine-like considerations. Ease of data entry and simplicity and efficiency of computation determine the organization and sequence of data.

To make a fuller contribution to the organization, an MIS director's strategy should be to maintain, or preferably increase, the perceived usefulness of each product while substantially reducing the costs (time, effort and frustration) associated with using them.

Let's take a closer look at the criteria that determine the usefulness of computer-based reports.

Standards of Usefulness

Relevance. Are the focus and content of the report directly relevant to decisions that I will be making?

Scope, level of detail and information structure. Does the report encompass the needed range of data, at a level of aggregation to make it most meaningful to me?

Reliability and validity. Where does the information come from? Is the source data verifiable?

Accuracy. Does the data have an acceptable level of variation?

Timeliness. Does the information reflect the most current data?

Because any one of these dimensions can be decisive to a manager's evaluation, MIS directors need to be certain that a particular report measures up against each criterion. Most reports already fare reasonably well on the technical questions of reliability and accuracy. And most organizations have made significant progress in gathering and processing information in a timely way.

Reports typically get into trouble in the most fundamental issues of content and data structure. Commonly, the data is not clustered or structured in a way that makes it immediately meaningful to business managers. Problems in the range of data, the way the data is aggregated and the overall relevance of the information to business decisions reflect critical flaws in the development effort.

These problems may be traced to the well-publicized "cultural gulf" between business managers and technical specialists. Their difference in goals, orientation toward time and basic interpersonal styles may mean that the two parties never quite get together on the specific results they are out to achieve.

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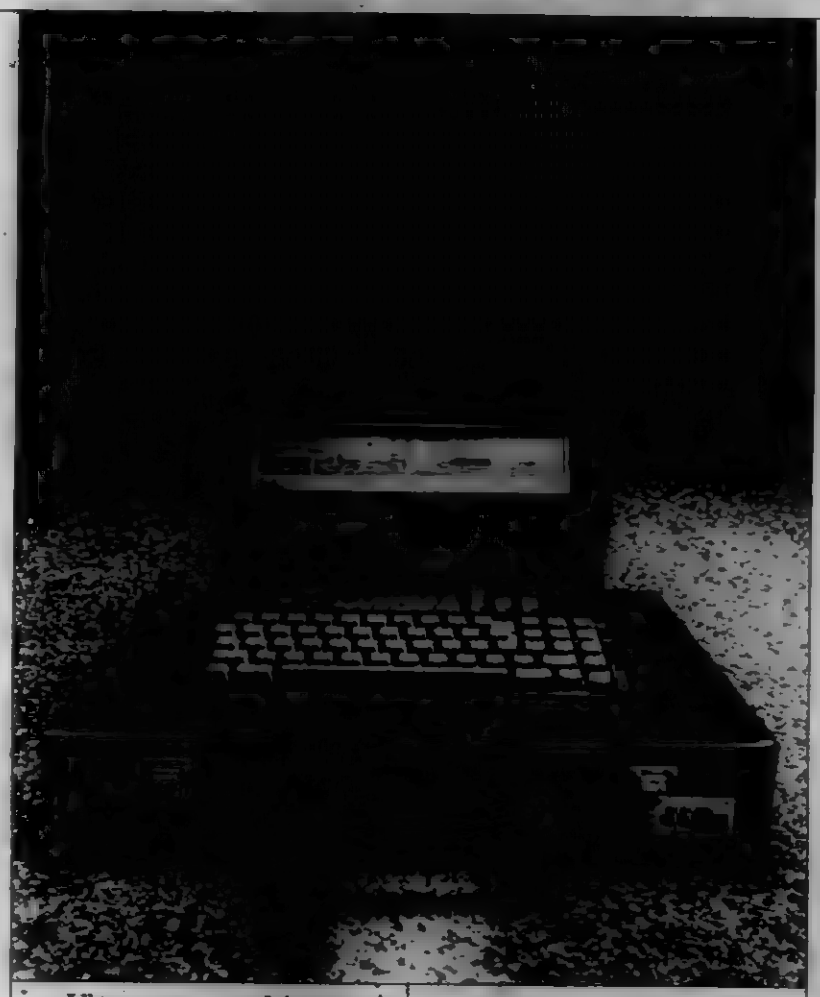

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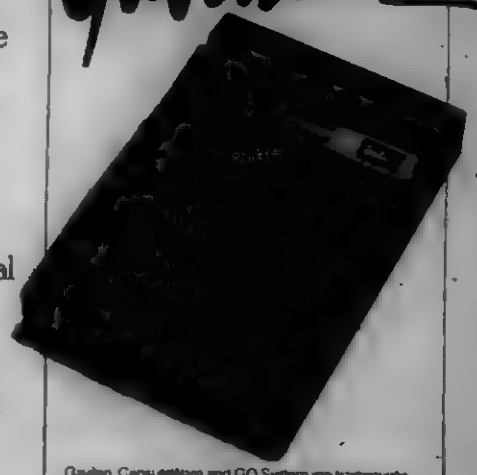

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In addition to making certain that a report fully measures up to the five dimensions of usefulness, MIS directors should also consider factors outside of the report itself that can influence a manager's perception of its products' value. Subjective factors that actively shape managers' perceptions include the overall reputation of MIS in the company, top management's stand toward computer-based data and the results of past experiences using reports. If these factors are all positive, a given manager is much more likely to find greater value in the reports provided.

If your organization's computer-based management reports are like most — lengthy, not especially well-organized or lacking consistent labels and helpful graphics — odds are they are not being used by your company's decision makers.

To increase the perceived usefulness of its products, MIS must continue to improve its standing and reputation within the company, all the while improving the usefulness of its reports.

The standards for determining whether a report is perceived to be easy to use are somewhat more straightforward:

Organization. Can I immediately determine the arrangement of the data and the location of any given piece of information?

Sequencing. Is the data ordered according to its importance, and are numbers that I need to use in combination located together?

Labeling. Are there labels, titles, headings, legends and descriptions to help me understand the information?

Layout. Is the data easy and pleasing to examine?

Graphics. Are there charts and graphs to help me recognize trends and spot variances?

The net value concept suggests that these dimensions, which traditionally have been treated as cosmetic by some data professionals, contribute mightily to whether a report is actually used. In fact, most reports fail simply because the costs associated with using them — the time, effort and a sense of incompetence — outweigh the potential gains the manager believes the information might offer.

Problems in the range of data, the way the data is aggregated and the overall relevance of the information to business decisions reflect critical flaws in the development effort.

There are a number of reasons that computer-based reports rarely measure up against the standards of usableness. Typically, the final format of documents is predominately a product of machine-like considerations. Ease of data entry and simplicity and efficiency of computation determine the organization and sequence of data.

The need for extensive labeling and the addition of charts and graphs to lend meaning to disparate numbers are often lost to technical specialists, whose primary orientation is simply capturing the required data. And finally, few programmers or systems analysts are trained in how to best lay out data for maximum readability and ease of comprehension.

The most usable report is one that is completely "transparent." An experienced business manager should be able to pick up a report and understand the data it includes without

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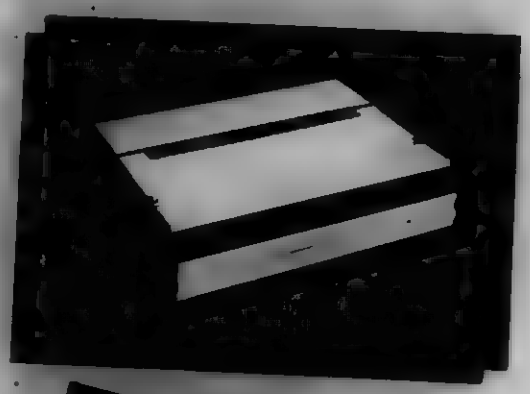

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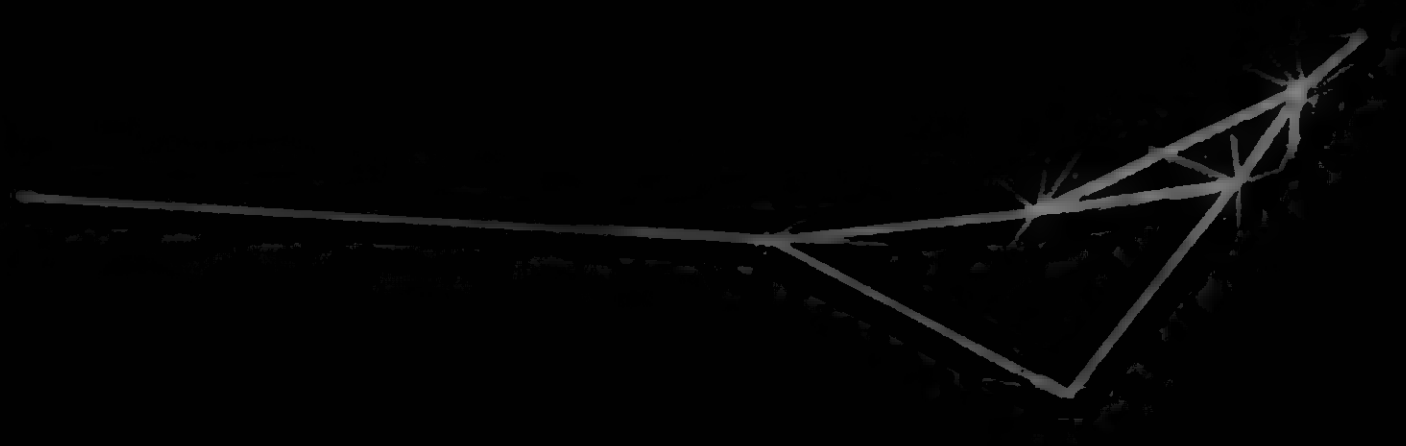

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Trailways faced a challenge recently. They wanted to improve cash management, the accuracy of pricing and scheduling, and the efficiency of their terminal operations.

So they came to Honeywell, and together we worked out a solution based on our microSystem 6/10. Now, at the touch of a button, ticket agents can see schedules, routes and rates for thousands of Trailways' destinations. The possibility of error is all but eliminated. The system even prints the tickets automatically.

Trailways' managers will benefit by having faster access to data. For example, the system facilitates interline accounting and furnishes feedback on marketing campaigns—a critical edge in a newly deregulated environment.

What's more, the microSystem 6/10 is easy to use, easy to program, and compatible with the Honeywell minicomputer and mainframe host at Trailways' home office. (Only Honeywell has total instructional set compatibility for micros, minis and mainframes.)

The microSystem 6/10 has 512K of memory. More than enough to handle the vast amounts of rate/schedule data Trailways must store, as well as information on daily transactions.

And the system is a snap to install, reliable, and backed up by Honeywell's nationwide service organization.

Information control. That's what keeps Big Red rolling.

For more information on the microSystem 6/10 and the advantages of full-line compatibility, call 800-328-5111, ext. 2708 (In Minnesota, call collect 612-870-2142, ext. 2708) or write Honeywell Inquiry Center, 200 Smith Street (MS 440), Waltham, MA 02154.

Together, we can find the answers.

Honeywell

IN DEPTH

any special training or explanation. A number of strategies have been demonstrated to increase that transparency.

Shortening reports - by eliminating overflow detail or by having the extra data available in an optional appendix is almost always appropriate, because excessive length immediately hurts usefulness. Adding a data summary page and a detailed table of contents greatly helps most reports. Ordering data according to its relative importance and, further, sequencing according to how managers actually use the data are very important.

Adding a simple flowchart to show the data components and their relationships can help guide the manager through the report. A consistent labeling system, ideally one that also depicts the structure of the data, is essential. Finally, including charts and graphs greatly improves the ease and speed of using the report. Pie charts and bar graphs can immediately reveal trends and highlight variances important to business decision making.

Rating Your Reports

In order to improve the net value of your reports, start by determining how they currently measure up. That means determining in considerable detail how reports are currently perceived by managers. A special survey instrument, called the Report-Rater, has been developed to measure swiftly and accurately the perceived usefulness of any type of computer-based report. This survey can be administered either in pencil-and-paper format or on-line.

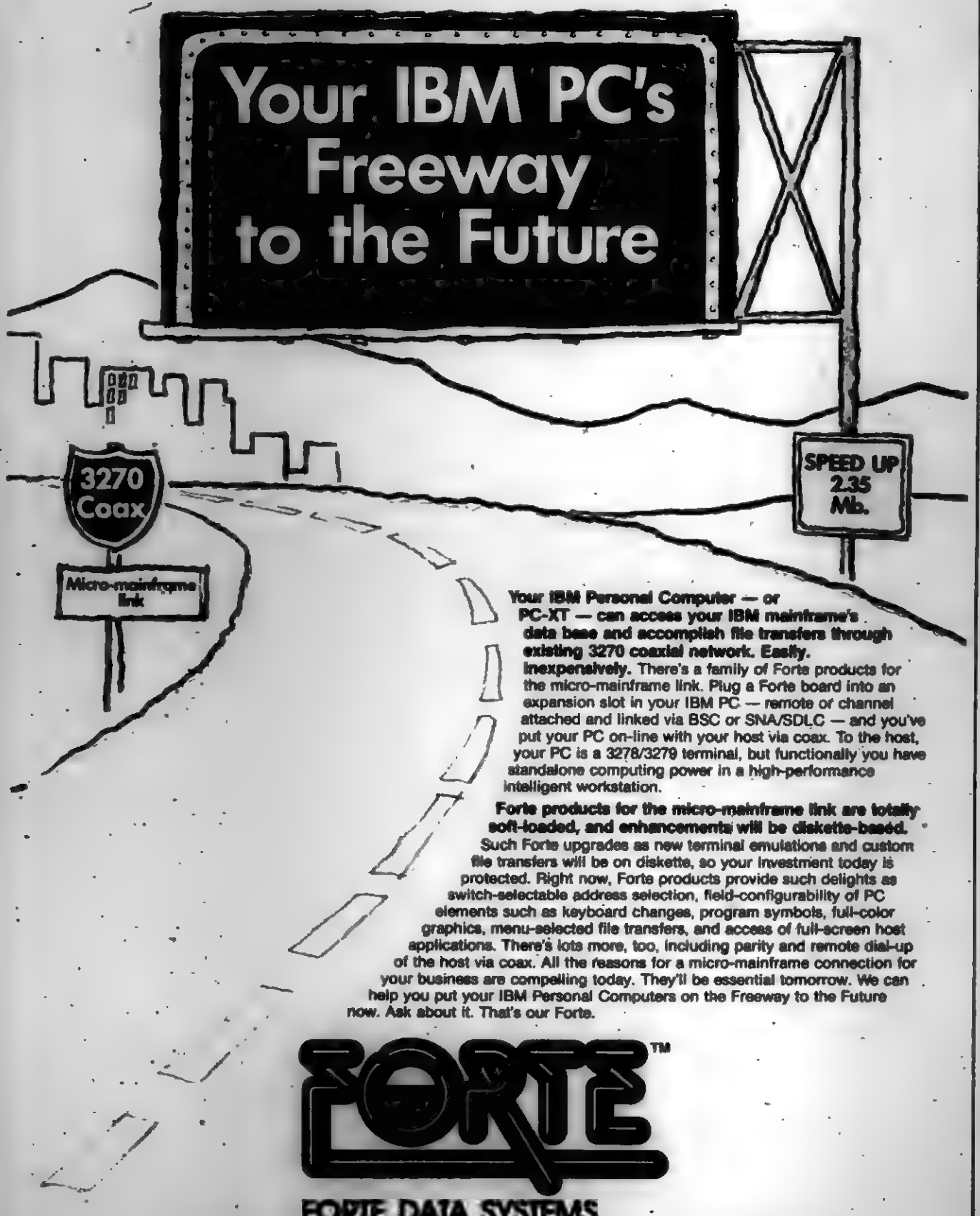
Adding a simple flowchart to show the data components and their relationships can help guide the manager through the report. A consistent labeling system, ideally one that also depicts the structure of the data, is essential.

One-on-one interviews with a representative sample of managers is another successful technique for determining how your reports are perceived. These discussions need to be carefully structured around key questions of usefulness if they are to provide the highly specific data needed to make tangible improvements.

Management information systems can make a far greater contribution to organizations if MIS professionals work aggressively to improve the net value of their products. To ensure that the data you gather, process, print and distribute genuinely enhances business decision making, increase the perceived usefulness of your reports and decrease the perceived costs associated with using them.

About the Author

Alexandra Rand is a principal of Internal & External Communication, a Santa Monica, Calif.-based consulting firm dedicated to helping corporations improve their management information documents.



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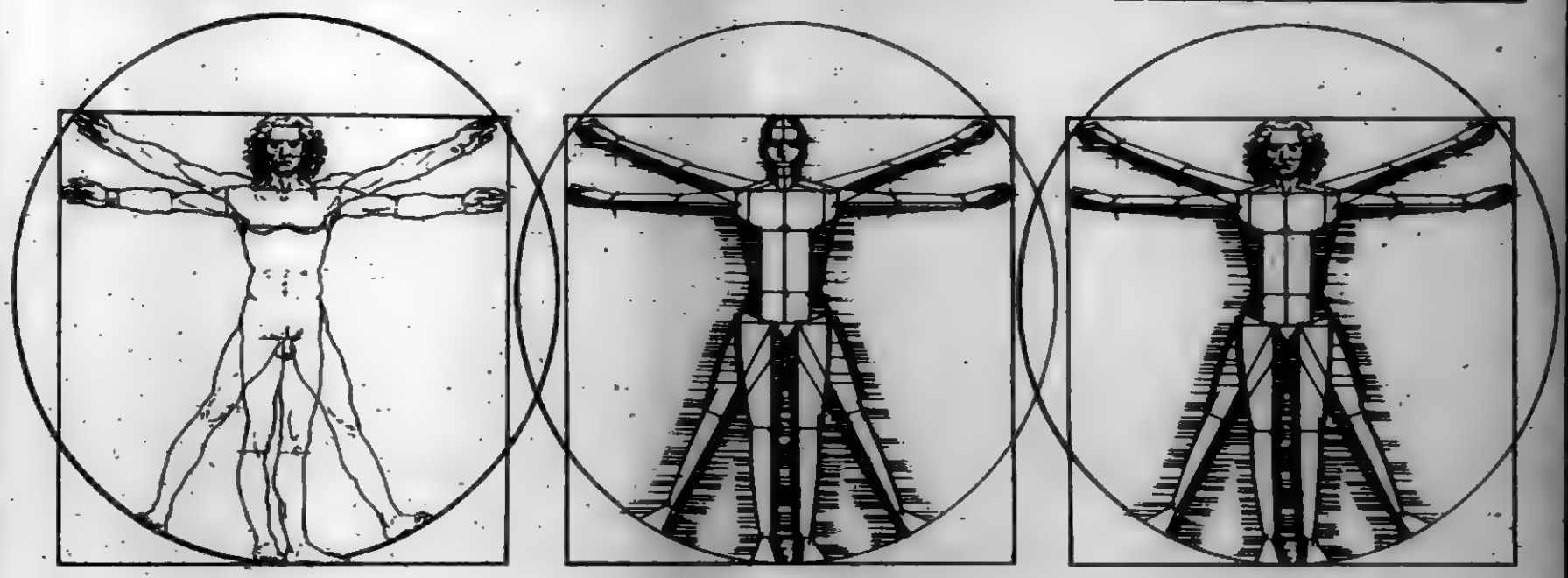


Artificial Intelligence And the Business Manager

By David B. Hertz

Once it was the small business proprietor who possessed virtually all the facts about his operation. The larger the enterprise, the longer the data took to get to the top. But information systems have turned the curve of availability upside down.

The dilemma is that the Fortune 1000 executive may have too much data too soon. His problem lies in turning it into usable information.

Artificial intelligence (AI) may promise one resolution of the executive's dilemma. Knowledge resides in the facts; mining that knowledge for more effective competition, smoother operations and better planning is a major goal of AI knowledge scientists and engineers. They believe the right kind of computer programs will turn the tide of data from an uncontrollable flood to an orderly, productive stream.

Digital Equipment Corp., for example, uses an expert system for configuring its VAX systems. Orders for DEC systems come to the company salesmen in a wide variety of requirements. The task of configuring a system to meet the individual company's order requires bits and pieces of knowledge residing in heads, data files or manuals throughout the manufacturing and assembly operation.

DEC's Expert System Configurator (Xcon) lets salesmen deal directly with the configuration at the customer level, connecting them directly with the technical editors' knowledge.

Before Xcon was developed, technical editors in the manufacturing departments reviewed all orders for correctness and order completeness. Mistakes in parts or components could make the entire system inoperable after testing; it might not meet desired requirements at the customer's site.

Through Xcon, the technical editors themselves gain access to a knowledge base that was constructed by mining the knowledge of the best configuration experts and putting it into an intelligent computer program.

Expert systems such as Xcon are written in rule-based languages. These languages are oriented toward symbolic manipulation; The programmer can code directly the terms of the problem (for example, the various components of a configuration and customer requirements) in English. Xcon was written in OPS-5, which has the advantage of language generality. It is relatively easy in OPS-5 to tailor the design of an expert system.

Expert systems are defined as computer programs that perform specialized, professional tasks at a level equivalent to that of human experts. Xcon was designed to be a configuration "expert." They are also called; in AI jargon, "knowledge-based" systems, "intelligent computer assistants" or "expert advisers."

What happens in such rule-based systems? A set of rules, such as: "If a customer requirement calls for data communications, then the configuration must include a communications card (an action statement). If a communications card is used, then a modem must be used." There are more than 2,000 such rules that permit Xcon to produce a customer-tailored configuration.

If-then statements form patterns that can be matched by the descriptions in memory, resulting in a set of

(Continued on In Depth/22)

IN DEPTH

From Early Research to Practical Results

AI has been a topic of scientific study for more than a quarter century. Its originators believed that the growing power of computer memories and calculating ability could be turned to deal with the language symbols and representations people use in thinking and problem solving. Its ambitions were vast and, as in any new field, its actual accomplishments modest. However, as information about the power of computers and their ability to manipulate symbolic representations of the world has increased, practical results have now become a reality.

The research scientists who pioneered in this field had the goal of developing computational models of perceiving and thinking about some parts of the real world that would approximate human beings in similar situations. More recently, the more pragmatic and engineering-oriented goal of designing computer programs to solve problems normally requiring human intelligence and expertise has come to the fore — without regard to whether the programs duplicate human mental processes.

The process of understanding how to design and build an artificial intelligence machine started with the concept that the mind was an enormously efficient digital computational apparatus. Attempts were made to analyze neural processes as though the brain were a network of digital devices similar to a computer.

Today it is generally agreed that the brain does not operate this way. Advances in a number of fields began to provide suggestions, first as to how the mind might work, but much more important, how some aspects of the mind might be imitated by smart machines.

In the early 1950s, predictions were made that machines would soon be able to duplicate the thinking processes of the brain. For example, there was to be a "universal language translator," which would permit the rapid — and semantically correct — translation of written material (or perhaps even speech) from any one language to another. Most of such predictions have still not been realized. But since the work began, some have come up to or surpassed their authors' fondest guesses. A belated but clear example is the progress made in chess-playing programs.

At least some progress has been made in each of the following areas:

1. Mechanical translation of languages.
2. Game playing — chess, checkers, backgammon and so on.
3. Proving theorems in mathematics.
4. Symbolic manipulation of mathematical expressions.
5. Visual reading of written material.
6. Visual recognition of pictures and forms.
7. Hearing and understanding spoken language.
8. Speaking machines.
9. Learning from outside stimuli to change programs.
10. Creating natural language texts.
11. Creating analogies from one area of knowledge to another.

Taken together, the successes in each of these areas provide a clearer picture of what is meant by the "intelligent machine." The computer can go beyond the solution of algorithms to deal with heuristics and thus come closer to being an executive's intelligent helper.

It is intuitively apparent that a computerized robot painting machine that "visually" recognizes dif-

The Suit and Chip proudly debut their baby.

"To look at it, would you guess it has the power of an IBM mainframe?"

The Suit beckoned us closer. "For the VM/CMS users, and there are some 600,000 of them concentrated in big business, financial institutions and government, this little baby means new life for their existing programs and applications."

Future Directions for AI Research

ferent parts as they come down the assembly line, adjusts its painting program accordingly, follows the parts properly, signals when a misplaced or incorrect part comes into view and generally performs "intelligently" is doing something more than storing, adding, multiplying and dividing numbers. By the 1970s, such machines had begun to be programmable in the newly developed list-processing languages, of which Lisp was the most important and the one universally used today.

These languages permitted the machine to point to numbers of symbols. For example, one whole set of such symbols (the names of all customers for a given product, for example) could be substituted in place of the name of that product in a list of products in another list, permitting the development of knowledge-based systems that could engage in "sensible" dialogue with an inquiring manager.

Among such knowledge-based systems were Dendral, which could infer possible molecular structures from an input of mass spectrograms; various chess playing programs, such as the current machine champion, Belle; medical diagnosis programs, such as Internist II, Caduceus and Mycin; mineral exploration programs; various computer-aided instruction programs; and computer-aided architectual and engineering design programs.

Smart computer programs generally fall into two categories.

The first includes those that imitate human physical faculties; the machine does ordinary human tasks, ranging from simple to complex. For example, the automatic telephone voice tells callers they "have reached a nonworking number."

The second category may include some of the ordinary tasks but will also have broader objectives that require the working out of complicated combinations of inputs to provide "expert" physical or informational responses (chess playing, spotting incorrect or misplaced parts, making medical diagnoses or working out data from core samples in mineral exploration).

The key to these latter capabilities is that a programmable computer, of whatever size, is itself a model of an intelligent machine. Aside from limitations of memory and considerations of program efficiency (Lisp is not an efficient programming language because it demands large amounts of memory storage and processing time), all standard digital computers are formally the same and can imitate at various levels any other machine.

Artificial intelligence is in itself a formal system of rules that manipulate symbols in a computer's memory based upon the input symbols it receives. It follows, then, that any computer of appropriate size and with arrangements for handling various input modules can be programmed to be an intelligent device, to either imitate human physical activity or to help managers attack problems and issues with expert analysis.

A particular computer hardware configuration, by virtue of its cascading programs from the high-level language the executive may use on his personal computer down to the binary machine code, is the equivalent of any number of machines. (By "cascading" we mean that a symbol in one program can call on another entire program within the device.) Of course, manufacturers design cascades to make machines cheaper to build and easier to operate by virtue of the chosen program languages.

(Continued on In Depth/22)

A 'personal mainframe' no less.

The Chip chimed in: "It is a personal mainframe that provides greater productivity for the individual user, enhances the performance of existing applications, leverages a company's investment in IBM systems and software, and provides access to sophisticated, modern computing environments such as FOCUS™ and RAMIS II™

—and all at a price affordable by the single user.

We were talking with the Suit and the Chip at their new headquarters in Trumbull, Connecticut. They founded Canaan Computer Corporation in 1981. Prior to that, the Suit, Bob Bernard, was the founder of National CSS, a leader in the development of commercial time-sharing. The Chip, Nick Pisarro, was a major technical contributor there. We asked what makes the Canaan Computer stand out of the teeming mass of new computers.

CMS user freed at last.

"It's simple," explained the Suit. "Recent developments like multi-window graphics and Ethernet™ are giving some buyers of new computers vastly increased capabilities. But as far as the IBM mainframe user has been concerned, these new powers don't exist. The CMS user has had to be satisfied with decade-old technology. With the introduction of the Canaan Computer, that CMS user can now have it all."

Multi-window graphics, dedicated interactivity.

"What we have done," said the Chip, "is develop a machine that provides these state-of-the-art capabilities, and runs the user's IBM mainframe programs with no changes required. So, for the very first time, CMS users, or even non-users who want to take advantage of all that IBM software, can have very high-resolution graphics, networking for shared resources, super interactivity, more computing power than they can ever get on a shared centralized computer—and all in a package the size of a two-drawer file cabinet."

Multi-window graphics, local area networking, a dedicated processor for each user: is there anything else you want the business community to know, we asked?

"Yes," said the Suit. "Our address. So they can write or call for more information. Or to order a machine—they're ready for delivery now. It's Canaan Computer Corporation, 39 Lindeman Drive, Trumbull, Connecticut 06611 [redacted] Ask for the Suit."

CANAAN

IN DEPTH

(Continued from In Depth/19)

actions appropriate to the rule or rules being interpreted (or matched). Actions will modify the working memory, which is keeping track of the status of the developing configuration. Different subsets of rules are satisfied on each cycle as the machine tackles, one by one, the customer requirements. There is no ordering of the rule memory; all rules are evaluated on every cycle. When more than one rule is satisfied on a cycle, the interpreter uses a set of conflict-resolution strategies to decide which rule to apply.

All of DEC's VAX family system orders are configured by the Xcon AI system. DEC has described the following benefits as a result of having accurate and fast configurations:

1. An increased order throughput rate.

2. Reduction in costs and delay attributable to errors (that were inevitable previously).

3. Better use of materials, since the system readily accepted constraints on component availability.

4. Better use of personnel, through redeployment of the highly skilled senior technicians to the most difficult tasks not suitable for Xcon.

5. Fast reduction of component requirements data to effective purchasing and manufacturing information.

Expert systems combine the knowledge of experts in whatever field is involved (business, medicine, engineering) with AI methods for the programming of reasoning. The power of an expert system does not come from the power of the rule-matching or inference programs (the "inference engine," in AI jargon) but from the knowledge-based rules.

A production system program for inferences from the knowledge base takes the if-then rules and produces the "action" recommendations the program finds appropriate. Putting together the knowledge base and constructing the rules is a slow process, but AI researchers are speeding it up with new programming tricks. The 2,000 rules in Xcon match most of the current U.S. experience, but the Japanese are proposing to build systems with 20,000 rules by 1990 in the Institute for New Generation Computer Technology (Icot) project.

In *The Fifth Generation* (Addison-Wesley), Edward Feigenbaum and Pamela McCorduck point out that the Japanese are embracing expert systems research enthusiastically. Fujitsu, Hitachi and Nippon Electric are among the companies taking part. Crisis management systems, involving critical decisions that must be made quickly, are a high priority among the areas being tackled by these companies. One Japanese firm, according to Feigenbaum and McCorduck, estimates a worldwide market of 10,000 systems just for handling electric power network crises.

AI has been chosen as the theme of the U.S. pavilion at the 1985 World Exposition in Tsukuba, Japan. More than 20 million people are expected to visit this world's fair. American industry will be exhibiting AI-related developments and innovations in 30,000 of the 60,000 square feet of the U.S. exhibition building.

AI systems are increasingly being applied to diagnosing equipment

New Directions For AI Research

(Continued from In Depth/21)

As memories have become cheaper and as Lisp-like languages and programs that permit more complex cascading become increasingly efficient, the intelligent machine is available for top management functions. Applications lie in planning, marketing, production and distribution, not only for robotization, but also for inventory, production and sales control; in sharpening up the marketing function; and in designing business unit and overall competitive and product strategies.

Personal computers available to integrate these functional and top management decision structures now have large and inexpensive memory spaces. The enhancement of intelligence by decision support systems will soon be a necessity to match the sharpness of the competitor who is there already.

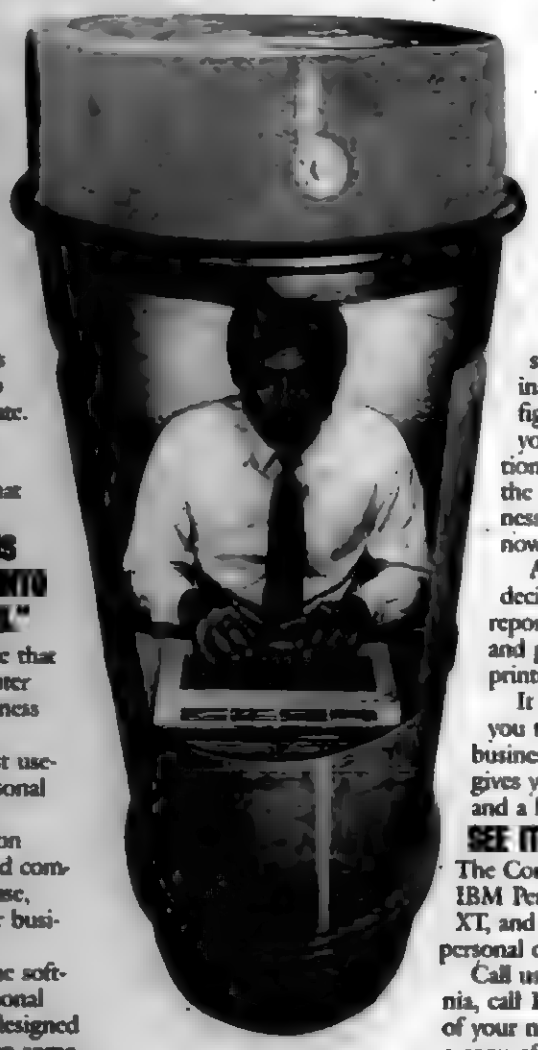
WHAT THE HECK IS AN EXECUTIVE WORKSTATION?

A lot of people have the wrong idea of how you should use a personal computer. And fancy phrases like "executive workstation" only hide the benefits of personal computing under a cloud of tech-babble.

The fact is, instant information and a computer on every desktop don't always mean bigger profits and more efficient workers.

Because when "non-computer people" use personal computers in business, the *software* they use is always more important than the hardware that's used with it.

But sometimes this software's just too hard to use, or can't do the job. Or it's already out-of-date. All of which confuses the same people it should be helping. We'd like to clear up some of that confusion.



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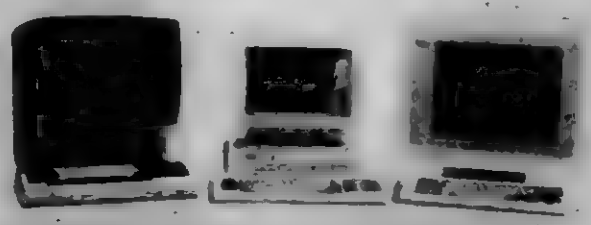

TOWER SYSTEMS INTERNATIONAL

Advanced Software Powered by Tower.

problems. General Electric Co. has developed a computer-aided troubleshooting system, Cats-1, for electric locomotives, a major GE product line.

The system was developed by GE's Knowledge-Based Systems Group and was designed for routine operations on the shop floor, embodying the knowledge of many of its experts. Cats-1 has about 550 rules now and will ultimately contain more than 1,500 to handle locomotive repair shop problems.

The system will diagnose those problems and provide specific action plans to deal with them. This type of system is expected to become widespread for assembly line and manufacturing operations.

Expert systems provide not only diagnosis and plans for taking action, but also clear-cut explanations of the reasons the computer program is proposing them. For this reason, GE is also using Cats-1 as a training tool — as an "explanation tool" — not merely to supply computer output directions for taking the steps necessary to repair a locomotive.

AI is also being applied to programming itself. It is likely that computerized programming "assistants" will become a major area for expert program development.

At a recent European conference on software, researchers reported on an intelligent data management system to overcome the problems of limited memories in minicomputers and microcomputers that ordinarily require complicated overlaying techniques and common data blocks.

With an intelligent program such as this one developed and implemented on Wang Laboratories, Inc. hardware by E. Backx and J.P. Rammant of Catholic University in Leuven, Belgium, programmers can rapidly handle complex problems. Written in Basic, the "smart" system uses a structured data access method that stores all input arrays on an external hard disk. The system keeps track of input, editing and additions. Pointers and names replace the usual dimensioned matrices. Virtual pages are allocated dynamically in the various program modules without intervention, storing results in the pages for easy postprocessing.

A program has even been developed to find the rules an expert (or novice) is using to make decisions even if he isn't quite sure why he is making them. Called a "rule-inducing program," developed by Dr. Donald Michie at Scotland's Edinburgh University, it is neat and compact, written in Pascal and formatted to run directly on the IBM Personal Computer or Apple Computer, Inc. Apple II. It permits the user to enter sets of sentences (logical or numerical), each containing observed or chosen values for a set of specific attributes. The entries may be either logical or integer values.

The expert enters his decisions for each combination of attributes and values. If the decisions are made by a reasonable set of rules, whether the expert knows them explicitly or not, the

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system will analyze the examples and produce rules that fit. It will automatically deal with redundancies and provide rules that contain only the dominant attributes, taking into account inconsistencies among the examples.

For instance, an inspector in a manufacturing test program where a certain number of tests are performed (and either passed or failed) may decide what faults are implied in the patterns of the tests passed or failed. He may not know his set of logical rules for his decisions. The program will find the rules for him from the pattern inherent in the examples it is given. As many as 20 attributes (here, tests) and any sensible number of examples may be used.

Recently, Joel D. Goldhar, dean of the School of Business Administration, Illinois Institute of Technology, called the "factory of the future" a cross between a chemical process plant and a computer system in which the output peripherals are machine tools and robots rather than printers and terminals. Effective use of new AI and robotization technology requires new organization structures, marketing and management styles, exploring rapid design changes, variety and alternative distribution systems.

James Albus of the National Bureau of Standards, has outlined an "automatic factory" concept: eight-level robot control architecture that is used to tie together dynamic interactions between control, sensory processing, modeling and planning. This network architecture addresses the interface and communication issues in an automated machine shop.

In the 1980s, such systems will give business, institutional and government executives continuing analyses for tactical and strategic decisions, developed in the context of a management-decision-support network.

The executives and their managers will use friendly, intelligent computer systems programmed to provide ongoing review of performance against plan and of alternative courses of action in their areas of responsibility. Along with these simulations for varying time intervals (from one day — for a production schedule for a special order, for example — to many years for a capital spending plan), such systems will communicate general and specific instructions to appropriate managers to implement the chosen alternatives or change previous plans.

Organizationally separate plans can be consolidated into sets of coordinated and consistent overall options. The proposed plans, along with their benefits and risks, will be presented to the appropriate executive (at whatever level) through his personal computer — the "chief of staff," so to speak, of managerial computers that tie into his.

This process will be available to managers at all levels, operating on the information and alternatives provided from subordinate and coordinate data bases, plus instructions from above. The top executive can proceed with his planning knowing that once a plan is decided, operations should go forward in accordance with previously determined and programmed policies (just as a military commander assumes that each unit under his command will act according to previously established tactical doctrines).

Proposed plans, along with their benefits and risks, will be presented to the appropriate executive (at whatever level) through his personal computer — the "chief of staff," so to speak, of managerial computers that tie into his.

Not Infallible

Decision-oriented software programs can make mistakes just as humans do. Therefore, the decision systems for any organization must be

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IN DEPTH

designed to operate in tandem with human beings, who must be provided with key data and mechanisms for taking control if, in their judgment, the computer is making a significant error.

With this command, control and communications network of personal computers, the executive can question managers individually or in groups, as well as obtain additional data from staff departments or from outside agencies. His own input, suggestions and decisions during the planning and implementation stages may be communicated to appropriate individuals. This input will provide continuing control of the plan development, preventing it from going off track as so often happens when planners are isolated from the decision makers and implementers. And, of course, the same decision support system becomes an implementation support system, monitoring accomplishment against plan.

As AI moves to commercial and industrial applications, the scientific and medical applications of recent years will seem like child's play.

Flexible system network architectures allow the information flow to adapt to real organizations and the needs of their people instead of making the organization conform to the system's structure. The networks can connect and use the many informal peer relationships that often bypass the authority structure. They permit a wide scope of managerial control, varying from central direction of information flows to loosely coupled arrangements.

No single approach will fit all organizations. But different application structures can coexist and may be effective within the same basic planning structure.

Given the enormous (and growing) capacity of chips and memories, increasing transactional speeds and easy interconnectability, computers in a network can perform tasks that are light-years beyond today's usual applications. But it will be up to users and applications developers to lead the way: Executives and DP managers will, in effect, have to be the systems architects. As AI moves to commercial and industrial applications, the scientific and medical applications of recent years will seem like child's play.

But there is no dearth of organizations willing to take on the challenge. Companies like Teknowledge, Inc. of Palo Alto, Calif. (formed in 1981), Cognitive Systems, Inc. in New Haven (1982) and newly formed Syntelligence, Inc. in Menlo Park, Calif. have been started by AI scientists to take advantage of corporate America's growing awareness of the possibilities inherent in intelligent computer systems. Peter Hart, president of Syntelligence, hopes to be among the first to apply AI to "hard," nontechnical business applications, primarily for insurance and financial institutions. A recent list of companies in the field included 20.

DEC, Symbolics, Inc. and Xerox Corp. are among the manufacturers with plans to enhance their present symbolic and relational processing computers, and all plan to offer new and more readily programmable machines in 1984 for the AI community.

About the Author

David Hertz is a distinguished professor in the School of Business of the University of Miami in Coral Gables, Fla. He serves as director of the university's Intelligent Computer Systems Research Institute.

He was formerly a director in the New York office of McKinsey & Co., Inc. for 20 years. Prior to joining McKinsey, he directed operations research at Arthur Andersen & Co.

Hertz is the author of Artificial Intelligence and the Executive Mind, *scheduled for publication this year by John Wiley & Sons.*

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THE IDLE, INDISPENSABLE MICRO

Even if a manager turns to his personal computer for only 30 minutes a day, increased productivity can justify costs.

By William F. Zachmann

The remarkable success of personal computers over the past year or two caught many industry participants by surprise. Various attempts to assess the dimensions and implications of the phenomenon have given rise to quite contradictory views.

On the one hand, some would have us believe that the ongoing wave of personal computers sold through computer stores will radically change everything from the way major operational systems are built in large organizations to the equipment and software distribution patterns of the information industry. Extreme proponents of this view go so far as to proclaim the mainframe computer effectively "dead" and see manufacturer direct sales dwindling away in favor of computer store channels of distribution.

Others, however, have more recently begun to question whether the recent popularity of personal computers amounts to much more than a fad, a kind of expensive "Hula Hoop" craze. Proponents of this view claim that personal computers really aren't very useful, remain idle most of the time, will not significantly affect the way operational systems are built in large organizations and will soon fade into the background as their relatively insignificant value, compared with their costs, is recognized.

While a personal computer may not be helpful to everyone, there is little question that the vast majority of managers and professionals can be significantly aided by a personal computer in doing their jobs better and more productively. Those who claim otherwise do not have a very good grasp of the real capabilities of a personal computer appropriately configured with adequate software.

Spreadsheet software such as Visicorp's Visicalc, Microsoft, Inc.'s Multiplan or Lotus Development Corp.'s 1-2-3 is relatively easy to learn and use. Anybody who needs to prepare a budget or a profit plan will find the task much

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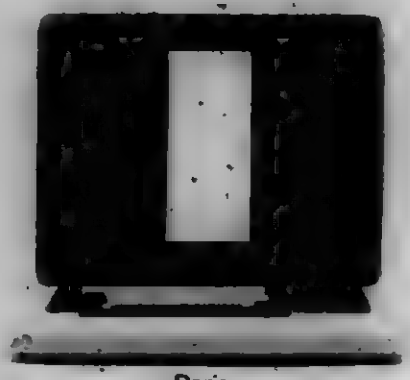

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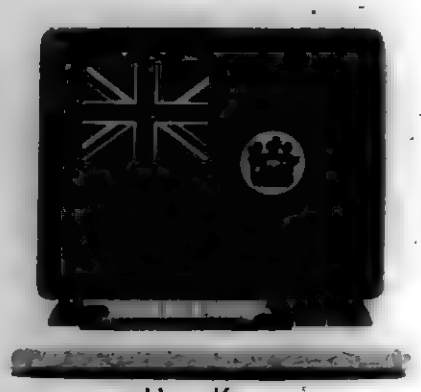

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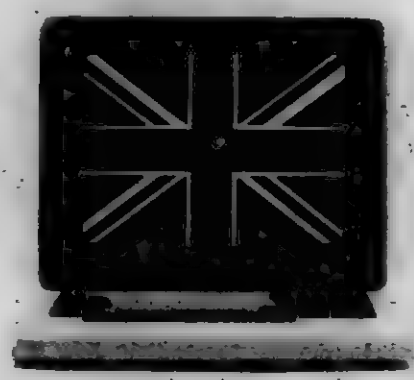

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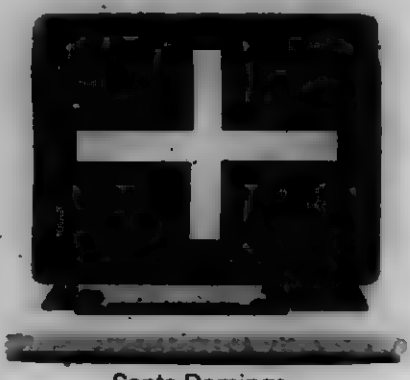

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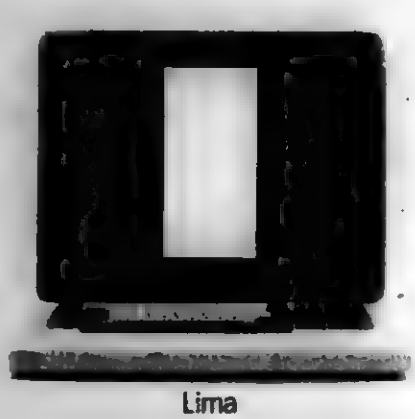

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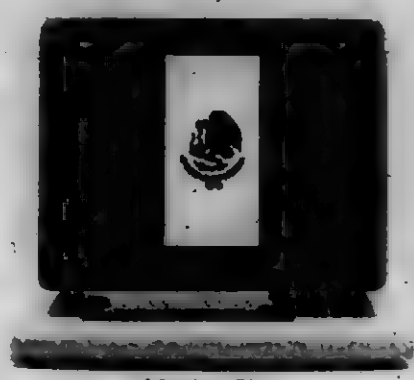

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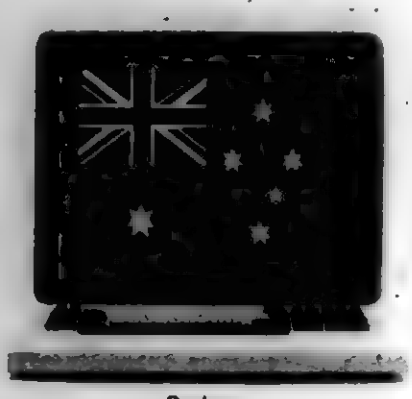

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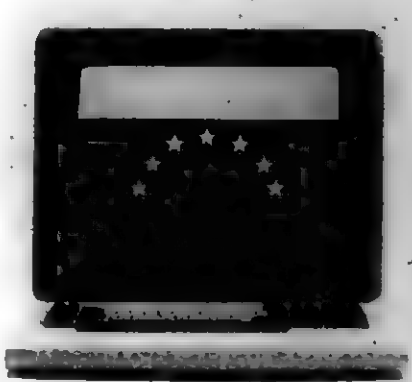

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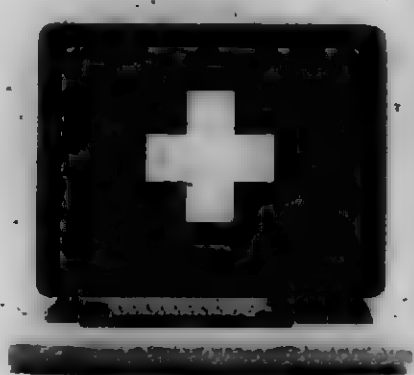

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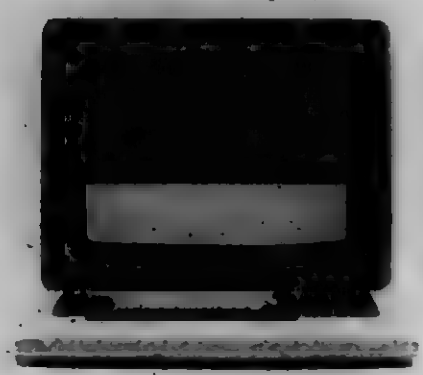

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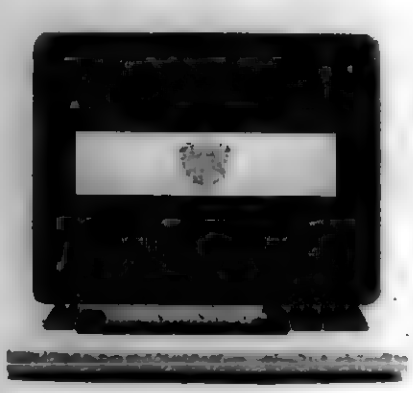

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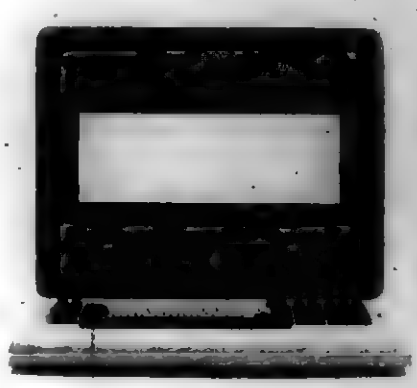

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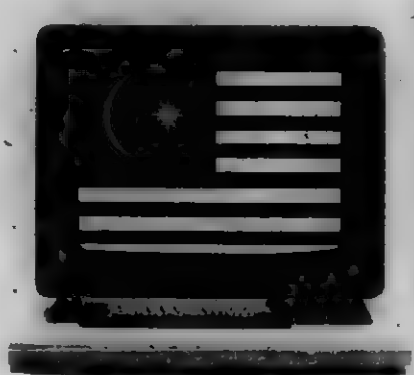

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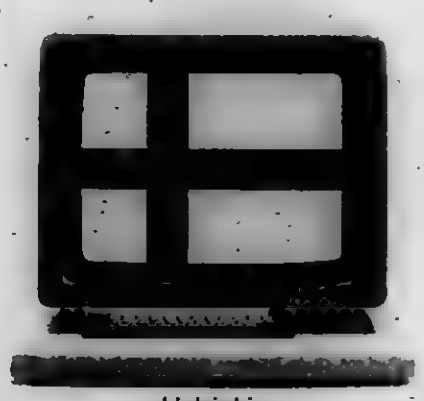

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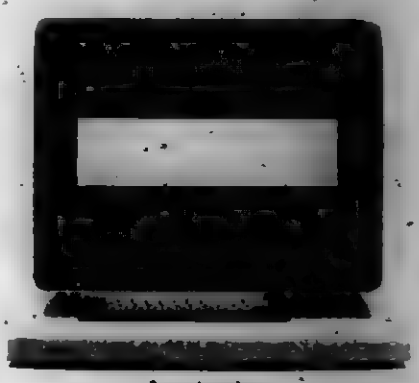

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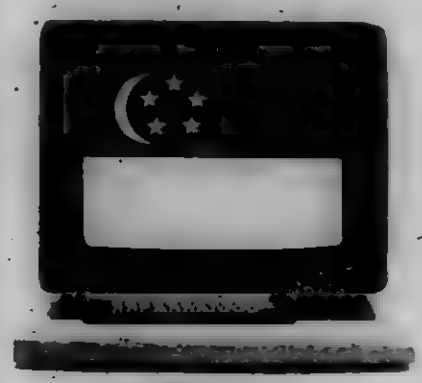

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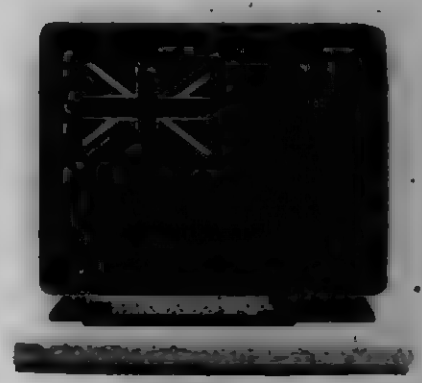

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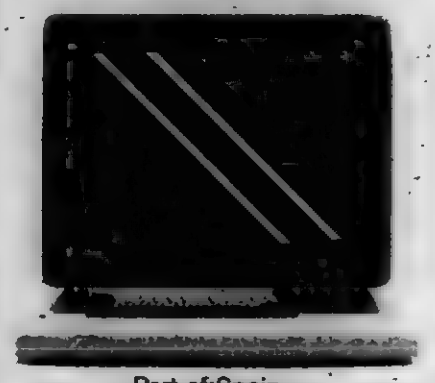

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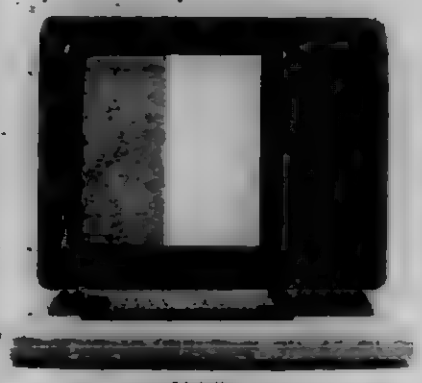

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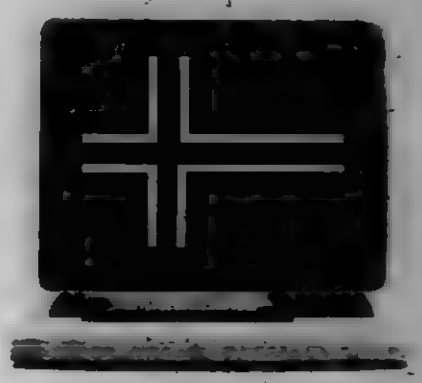

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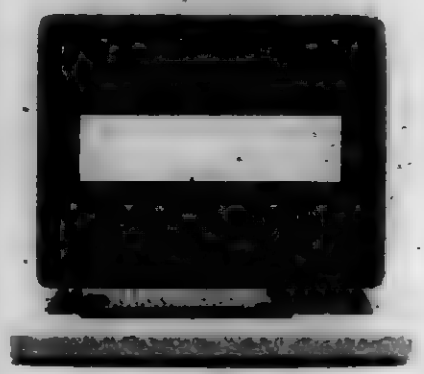

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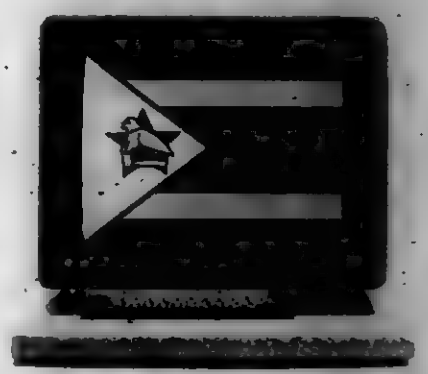

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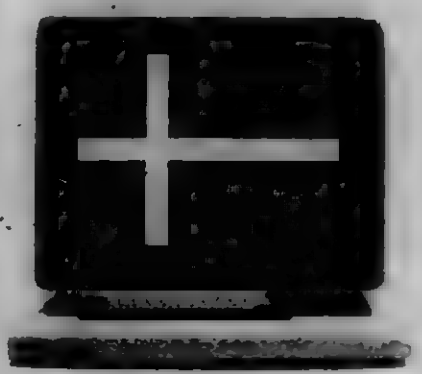

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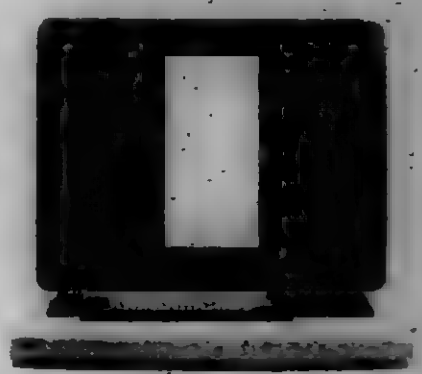

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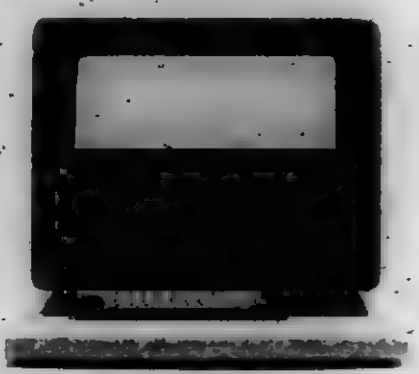

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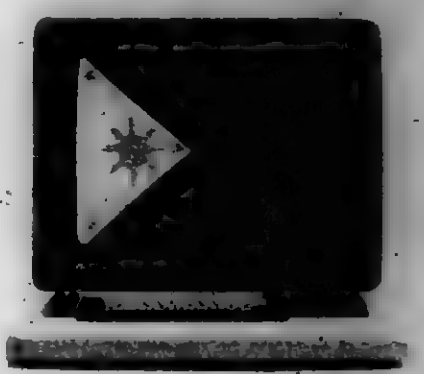

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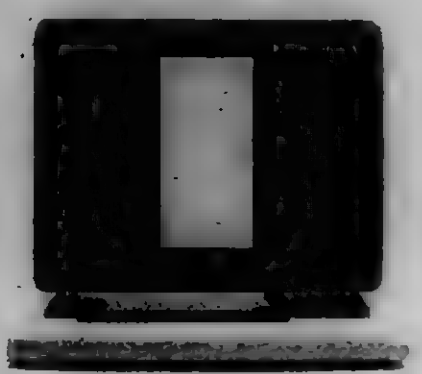

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easier with a personal computer and spreadsheet software.

A second major use of personal computers is for word processing. Newer software like Multimate offers word processing capabilities for personal computers comparable in functionality to dedicated word processors. The number of personal computers used for word processing now exceeds the number of dedicated word processing terminals installed. Users include many managers and professionals.

Data base management systems, as well as small business accounting, graphics, scientific and engineering applications and a growing number of specialty applications are readily available for personal computers. These provide useful and productive tools, mastery of which is well within the grasp of capable individuals who are not, however, computer specialists.

Finally, the ability of a personal computer, with appropriate interface cards and software, to emulate nearly any terminal device permits the user to gain telecommunications capabilities with a personal computer at modest incremental costs.

Only a Beginning

The current generation of software has already made the personal computer a very useful tool. Yet it is only the beginning. The amount of talent and resources directed toward software development for personal computers has expanded enormously over the past year or two. This effort is beginning to result in the growing availability of more and more powerful software, including general "tools" packages as well as vertical applications software.

The most widely used data base management, graphics, word processing, spreadsheet and other packages of a year or two ago are already under siege by more capable competitors offering packages with more features, greater ease of use and lower prices. The extremely competitive environment for software ensures a continued leapfrogging of capabilities with successive product introductions.

Some of the most important product introductions over the next few years are likely to be for new types of software products for personal computers. Artificial intelligence, expert systems and adaptive systems research will provide the foundation for developing software that will be both more capable and easier to use than the present generation.

A major arguing point of the recent wave of debunkers of personal computers is the indisputable fact that a typical personal computer in a corporate environment is used by its owner only a small proportion of the time. From this fact, the conclusion is derived that corporations are wasting an enormous amount of resources through the use of personal computers.

The relevant issue is not whether the personal computer is used 24 hours a day, but what it does to improve productivity. The expense impact of a personal computer is small compared with the burdened expense of managers and professionals today. For example, if the personal computer, used an hour a day, allows someone to accomplish what might have taken a whole day without it, then there can be little question of wasted resources.

With large mainframe systems costing millions of dollars, the virtues of getting as much use out of them as possible are obvious. In a typical large installation, one attempts to keep the data center supplied with just enough capacity to do the job, and relatively high usage rates are desirable.

The applicability of that type of resource management to personal computers is by no means obvious, however. A manager or professional will often not use his desk or telephone more than a portion of the time. That does not constitute a valid reason for not giving him a desk and telephone or for having him share a desk or telephone.

The only relevant question is whether the personal computer helps its user to be sufficiently more productive, thereby justifying its cost. There is no question that in a very great many cases, the answer is clearly "yes." And not only can the

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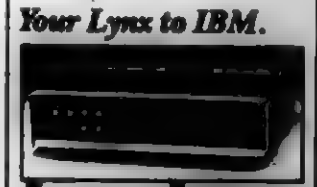

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micro provide a much quicker route to a result, but it gives the user a means of doing some things that he simply could not do manually.

Despite the clear utility of personal computers in business and professional applications, they will not obsolete large mainframe systems or radically change the way major operational systems are designed and developed. They will open some significant new opportunities and as a consequence make the development of large systems a bit more complex. But these will be evolutionary rather than revolutionary developments.

For the most part, personal computers will function as their name implies — as personal tools. As an extension of this function, a major requirement will be for access to data that is maintained as part of operational systems. Hardware and software to support such access will be of considerable importance.

All of that, however, will have only incidental impact on the basic nature of the operational systems themselves. In other words, the use of personal computers as personal tools will be in addition to, rather than instead of traditional operational systems.

There are two primary areas in which personal computers will open new opportunities in developing large operational systems:

1. Use of personal computers already installed to give managers and professionals planned access to newly developed or updated operational systems.

2. Employment of the local intelligence capabilities of personal computers in distributed applications.

As the number of personal computers continues to grow, new operational systems will be designed to accommodate valid access to data. Along with this, tie-ins to generalized software tools in personal computers as well as specialized software for them to support operational system links will be developed. These will not require that major operational systems be fundamentally altered but will imply explicitly building in "hooks" for micro access.

In a somewhat more limited set of operational systems of the future, personal computers will be more completely designed into the system. In cases of this type, the basic system design will make use of the personal computer capabilities and substantial resident software will be developed as part of the operational system. Over the next few years, however, this development will be much more likely to displace minicomputers or small business computers that might otherwise have been similarly employed than it will be to directly diminish the role of the mainframe.

Just as it is very much premature to proclaim the death of the mainframe, it is also premature to proclaim the ascendancy of the retail store that specializes in selling computers as the runaway winner for personal computer distribution. There is no question that computer retail stores are here to stay and that they have profoundly altered the way "computers" are sold. But there are also good reasons for thinking that the total share of market (in dollars as well as in units) for specialty retail stores in the distribution of personal computers is topping out and will tend to decline somewhat over the next few years.

First, there is absolutely no question that the high unit volumes of relatively inexpensive systems have moved out of computer specialty stores and into consumer goods mass merchandise stores. These include department stores like Macy's, discount chains like Lechmere Sales, high-fidelity audio dealers, camera stores and even drug stores and hardware stores. This development is not entirely confined to the extreme low-end systems either. A considerable number of these outlets are carrying systems with average prices in the $3,000 to $5,000 range.

In addition, while a significant number of large user organizations do deal with computer retail specialty stores (especially the larger chains), that pattern may change significantly. Vendors' renewed direct sales aggressiveness in large accounts and users' interest in obtaining maximum discounts create a situation ripe for more direct sales.

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IN DEPTH

traditional office equipment dealers in computer equipment sales as well as aggressive mail-order dealers will also eat into the distribution shares moving through retail computer stores. As smaller users become more sophisticated, the larger discounts available through mail-order channels become increasingly attractive. And as better third-party (for small users) or in-house (for large users) service alternatives become available, willingness to pay what amounts to a price premium to "full-service" retail computer stores will diminish.

Supply-Limited Market

To a considerable extent, the market for personal computers and components actively in demand is supply-limited at the present time. Best-selling models like the IBM Personal Computer still require a wait for certain models (such as the XT) or features (such as the IBM color monitor) in many areas. Popular second-source accessories like expansion boards and add-on disks are just ramping up to broad production and availability.

There is a bit of a glut-or-famine phenomenon at present. Unpopular models sit at uncomfortable inventory levels collecting dust while customers sign up on waiting lists for more popular equipment. This situation presently operates in favor of the larger retail specialty chains like Computerland and Sears, who have the clout with manufacturers to obtain the desired goods.

Within the next six to 12 months, however, the supply-to-demand ratio of the more popular systems and accessories is likely to come more into balance. Wider availability of the most popular systems combined with the need to move stagnant inventories of less popular models will inevitably lead to price cutting.

One of the most remarkable phenomena in recent months has been the dizzying fall in the prices of the extreme low-end systems (accompanied, in many cases, by equally dizzying drops in earnings expectations and stock prices for the vendors involved). Atari Corp., Texas Instruments, Inc., Commodore Business Machines, Inc., Sinclair/Timex, Coleco and even (though to a lesser degree) Tandy Corp. and Apple Computer, Inc. have participated in what might be thought of as a very aggressive price war for low-end systems.

For the reasons stated above, that war will spread, over the next year, upward to the middle-range personal computer systems currently with average system prices of $2,500 to $7,500 or so. The earnings pain that has been felt by vendors in the low-end market will quite soon be shared by vendors in the middle range as well.

New Generation of Systems

Another element in the competitive environment over the next year or so will be the growing availability of more capable systems. To some degree this will involve more Motorola 68000-based systems running Unix/Xenix. AT&T's almost certain entry with systems of its own early in 1984 will also be a factor.

The most important developments will come, however, with a growing flood of new systems (including some from IBM, or should we say "iBM") that will be based on the newer Intel Corp. parts: the 188/186 and the 286. These will sufficiently raise system capability, rendering the current generation of machines effectively obsolete, at least at present price levels. In addition, by mid-1984 or so we should also be seeing portables using Cmos implementations of the 8086 architecture (with the 80C86 from Harris).

Users will continue to see more capability for lower prices. But these changes will also add to the misery of those vendors who have been unable to gain sufficient airspeed to leave the ground before the end of the runway.

About the Author

William Zachmann is vice-president, technology assessment, at International Data Corp., an information industry market and technology research firm headquartered in Framingham, Mass.

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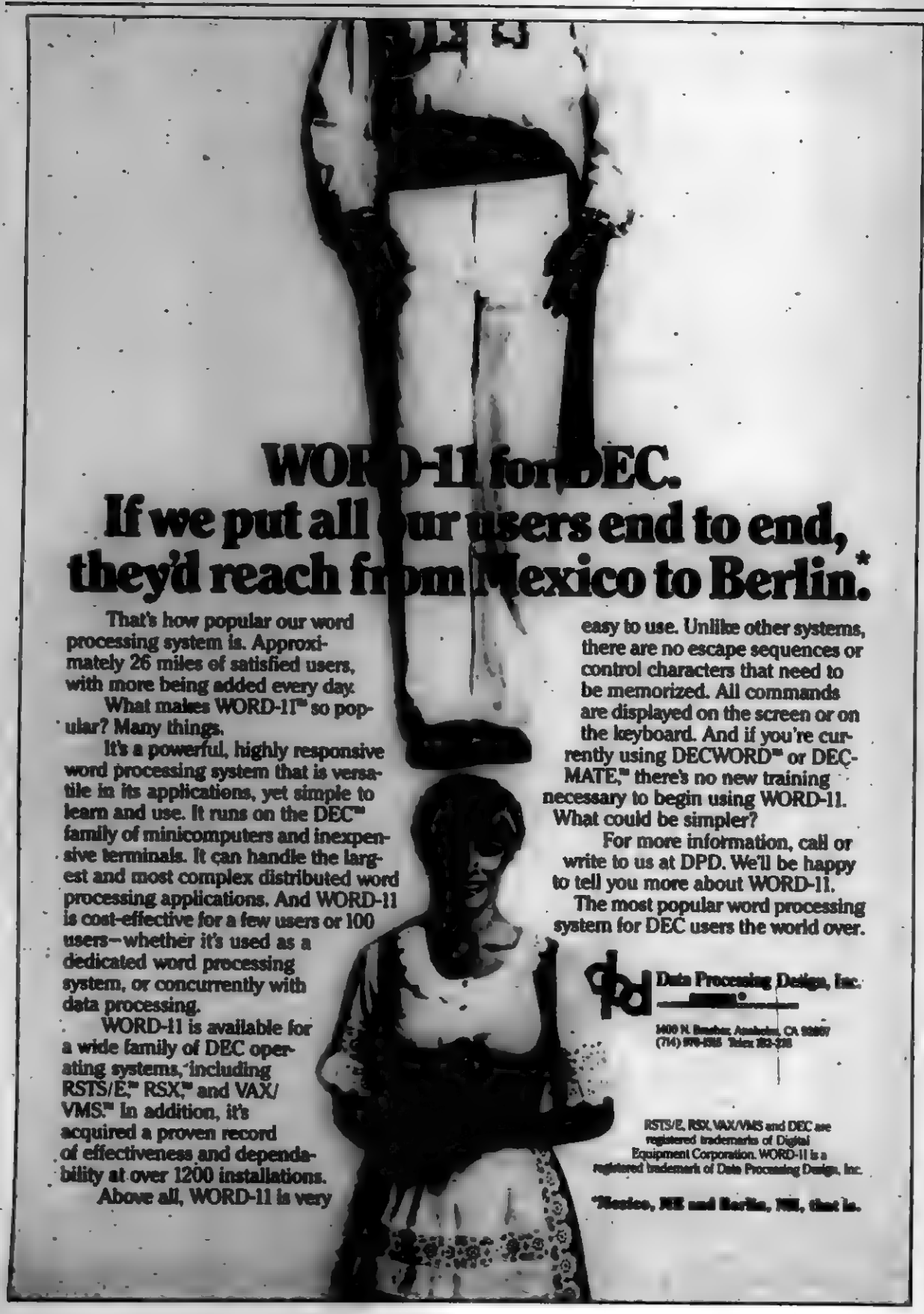


System Eliminates Terminal Cables By Using AC Wiring Already in Place

The following article originally appeared in Computerworld Japan. *It was provided to* Computerworld *by the CW International News Network.*

TOKYO — Computer users entrenched in a mesh of computer terminal wiring might find a solution to their problem in a system recently introduced here that relies on electrical wiring.

It now appears possible to connect a computer and terminals without the trouble of installing dedicated wiring. With the use of an electrical wiring system, which is already in place in private residences and office buildings here, a computer can be connected to terminals.

"As long as there is a . . . power source, connecting a computer and terminals with existing electrical wiring can be accomplished," claimed a spokesman from Fuji System Resources Co. Ltd., developer of the concept.

Although the connections are confined to function within the same transformer system, within one building, for example, the obvious advantage is that no new wiring is necessary, and the terminals can be scattered in a variety of places around the building so long as there is a wall plug socket handy, Fuji explained.

Computers are usually connected with their terminals through electrical wiring, telephone wiring, ultra-short wave and so on. The Fuji product is said to establish the connection through the ordinary electric wiring already in place.

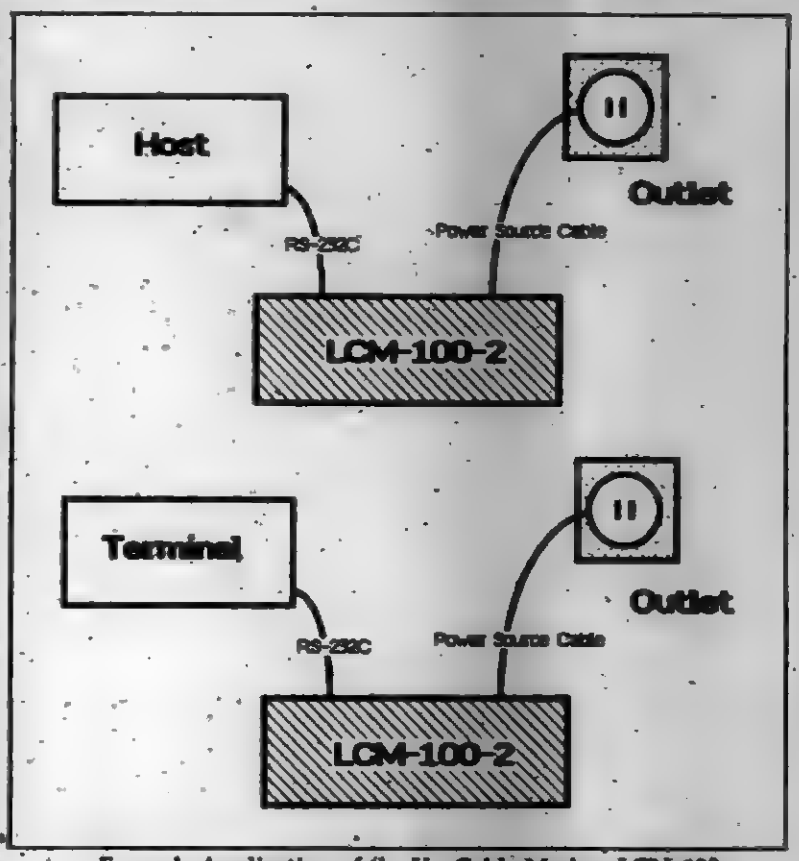
As outlined in the adjacent figure, the connection is completed by simply inserting the plug into the wall plug socket through a modem (LCM-100, manufactured by Communications Research, Inc. of the U.S.). Since the interface used is the standard RS-232C, the new product can be used immediately, as long as the computer system is equipped with the RS-232C.

One modem is necessary on the data communication side, on the computer, for example, and another on the terminal side, so that a pair of modems must be employed. One pair of modems enables both sending and receiving of data.

The modem contains two communications terminals, one for the electrical wiring and the other for the RS-232C, and carries out the transfer of the frequency shift key (FSK) data. The FSK signals pass through the electrical wiring and then can be picked up from any of the ac wall plug sockets within a building.

The communicable distance is about 196 ft.; however, the distance can be further extended

(Continued on Page 68)



Example Application of the Un-Cable Modem LCM-100

DEC Offers Products To Enhance Ethernet

MAYNARD, Mass. — Communications hardware and software said to increase the capabilities of Xerox Corp.'s Ethernet local-area network have been released by Digital Equipment Corp. The products are said to enable DEC's LSI-11 microcomputers, PDP-11 minicomputers and VAX-11 superminicomputers to communicate under Phase IV Decnet.

The new offerings include an interface to connect DEC's line of Q-Bus microcomputers, three Ethernet communications servers, a remote fiber-optic repeater, software packages to support the hardware and an enhanced version of its Observer network monitoring software.

The Deqna communications controller links LSI-11 and PDP-11 microcomputers using the Q-Bus architecture to Ethernet, providing network designers with low-cost system nodes to Phase IV implementations. It operates at 10M bit/sec to as many as 1,023 devices on the Ethernet cable, a DEC spokesman said.

Available in early 1984, the controller will cost $1,150.

Communications servers that link DEC's Phase IV Ethernet implementations to other networks, including Ansi X.25 packet-switched and IBM Systems Network Architecture, also increase the resources available to the nodes on a network, DEC claimed.

The Decnet router server will link Phase IV implementations with other Phase IV and Phase III Decnet networks. The gateways and routers will be available in 1984 for between $17,000 and $26,995.

(Continued on Page 68)

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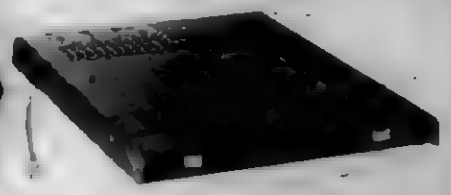

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From Avanti

LDX-100 Converts PBX

NEWPORT, R.I. — Avanti Communications Corp. has announced the LDX-100 local data transmission unit for use in conjunction with private branch exchange (PBX) systems.

The LDX-100 is said to convert existing PBXs to provide voice and data communications capabilities, allowing personal computers, word processors and asynchronous or intelligent terminals to communicate with each other or with a CPU over existing telephone wiring.

The company said that by utilizing the switching and contention capability of a PBX in conjunction with the LDX-100, the user can implement a combined voice and data switched local-area network.

The unit can be connected either via single line or via multiline key systems using standard modular plugs. The LDX-100 is either synchronous or asynchronous, full or half duplex, and it operates at up to 9,600 bit/sec. Because the same PBX ports are used for voice and data, there is no additional PBX capacity consumed with the system.

The system can be purchased as a desktop unit for placement under a telephone or as a rack-mount module for computer room use. It is priced at $849.

Further information is available from Avanti Communications at Aquidneck Industrial Park, Newport, R.I. 02840.

Graphics Display Terminal Supports Business Users

TOKYO — The Japan Computer Corp. has announced the NJC-M1000, a graphics display terminal for business graphics, graphics information retrieval, computer-aided design and manufacturing or computer-aided education applications.

The NJC-M1000 comes in a package featuring a nonglare green screen (an amber screen is optional), separate step-sculptured, low-profile keyboard and optional tilt-and-swivel pedestal.

Other features include a 12-in. high-resolution CRT with a 640- by 486-dot resolution, three communications ports, emulation for Tektronix, Inc. 4010 and 4014 terminals and an optional Digital Equipment Corp. VT100 emulator.

The NJC-M100 costs $1,995. More information is available from Japan Computer at the Naito Building, Nihonbashi, Hamacho 2-25-1, Chuo-ku, Tokyo 103, Japan.

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Net Management System Announced

MONTGOMERYVILLE, Pa. — An integrated network analysis and management system was announced recently by the Network Control Division of Digilog, Inc.

Called Nams, the system is said to provide alarm notification, centralized diagnostic control and critical path control of every element in a data communications network.

A central management controller reportedly provides the central site control system of Nams and will support up to 16 color CRT terminals. Data base storage with information on all the elements in the network is stored on 40M bytes of hard disk, with an additional 10.6M removable disk for historical statistics, software updates and data base information backup, according to a spokesman for the vendor.

A network access switch offers fast test access and switching functions for RS-232C, V.25 and four-wire analog circuits, the vendor spokesman said.

Prices start at about $68,000 from Digilog, 1370 Welsh Road, Montgomeryville, Pa. 18936.

Tools Upgrade Ethernet

(Continued from Page 65)

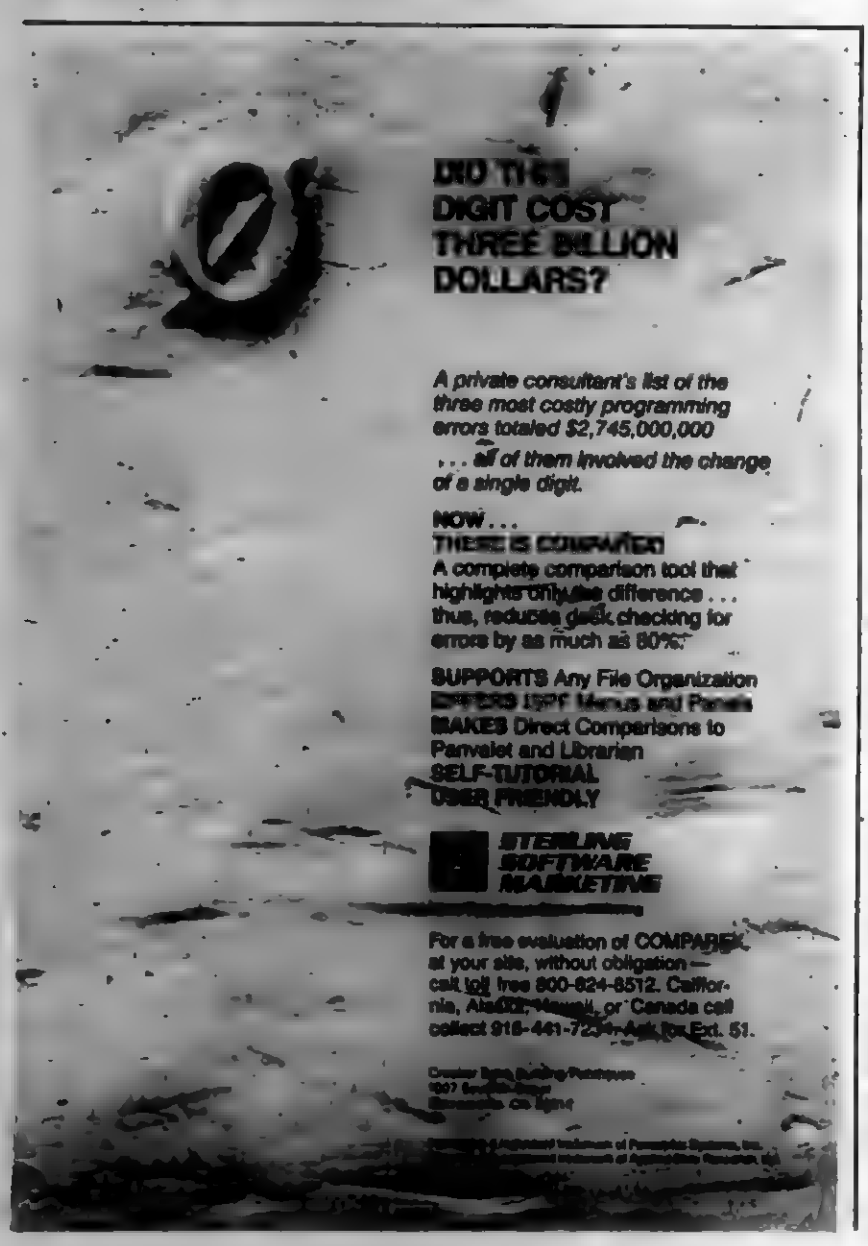
A repeater to allow Ethernet configurations of up to 1,000 meters through a fiber-optic link was also introduced. The remote repeater can be used in harsh environments and is said to be immune to electrical and electronic noise. It can also be used to configure a single, connected local-area network in two buildings.

The repeater is scheduled for shipment in the spring of 1984 and will cost $4,400.

Phase IV Decnet software products for the line of PDP-11 Unibus and Q-Bus computers is said to provide large network and Ethernet support for DEC's minicomputers and microcomputers. New versions of the RSX-11M, RSX-11S and RSX-11M-Plus operating systems have Phase IV support and will also operate on Phase II networks, it was announced.

Both Deqna and Deuna, a communications controller DEC released earlier, are supported by the operating system versions and will support more than 1,000 nodes of network communications. A new version of the Observer network monitoring system running on RSX-11M and RSX-11M-Plus is said to allow a network manager to monitor the performance of Phase IV and Phase III networks.

The software prices range from $1,500 to $4,000. More information is available from DEC, Maynard, Mass. 01754.



System Boasts Communications For Micros

IRVING, Texas — Envax Systems, Inc. has announced the Communication Co-Processor, which the company said will provide communications for personal computers by relieving the communications function from the personal computer.

According to the company, the product allows access to Direct Distance Dialing, Teletypewriter exchange service, Telex and other networks and can send mailgrams. The product is designed for use with the IBM Personal Computer, the Xerox Corp. 820 system and the Texas Instruments, Inc. personal computer. Software for systems from Wang Laboratories, Inc. and Digital Equipment Corp. systems is also available.

The system is said to allow personal computers to transmit messages from disk to the Envax system for transmission, and messages received can be archived on disk. It allows files and messages to be listed on the display, printer or remote terminal, a vendor spokesman said.

The standard unit has 16K bytes of memory and internal modems for the required network and is priced starting at $1,395. Information is available from Envax Systems, 3330 Stovall, Irving, Texas 75061.

System Utilizes Existing Wire

(Continued from Page 65)

depending on individual circumstances, Fuji said. In a certain case, a distance of 787 ft. is actually covered for a 9,600 bit/sec setup.

The maximum communication speed is 9,600 bit/sec, Fuji explained. Furthermore, it is not necessary to match the bit/sec rates of the transmitting side and the receiving side. Thus, the system can respond to a much wider range of communication speeds when compared to the conventionally employed modems.

Also, due to the utilization of two frequency bands of the electrical wiring, it is possible to transmit and receive the data simultaneously.

When there are noise intrusions in the electrical wiring — especially when a copying machine is hooked up to the wiring system — an eraser can be inserted to eliminate the noise. A copying machine or other source of noise is first connected to the eraser, which is then plugged to the power source wall socket.

The price of one pair of the Modem LCM-100s is $1,192, and the erasers are priced at $193 a piece. With the LCM-100, four modems will be necessary both on the terminal side and on the computer side if four terminals are to be connected.

A new modem, LCM-400, is scheduled to be introduced by the end of October to enable connection of four terminals by setting one modem on the computer side. It will be cheaper and more convenient for users to employ the LCM-400 when a number of terminals must be connected to a computer, the vendor added.

Fuji System Resources is based in Shinbashi, Tokyo.

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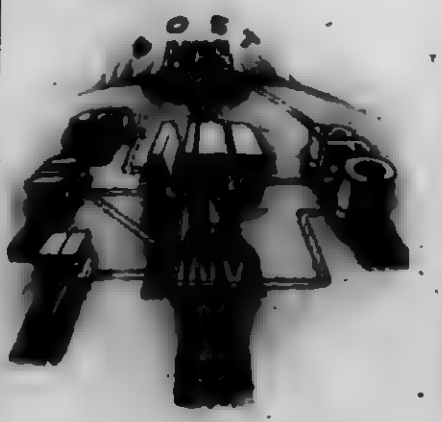

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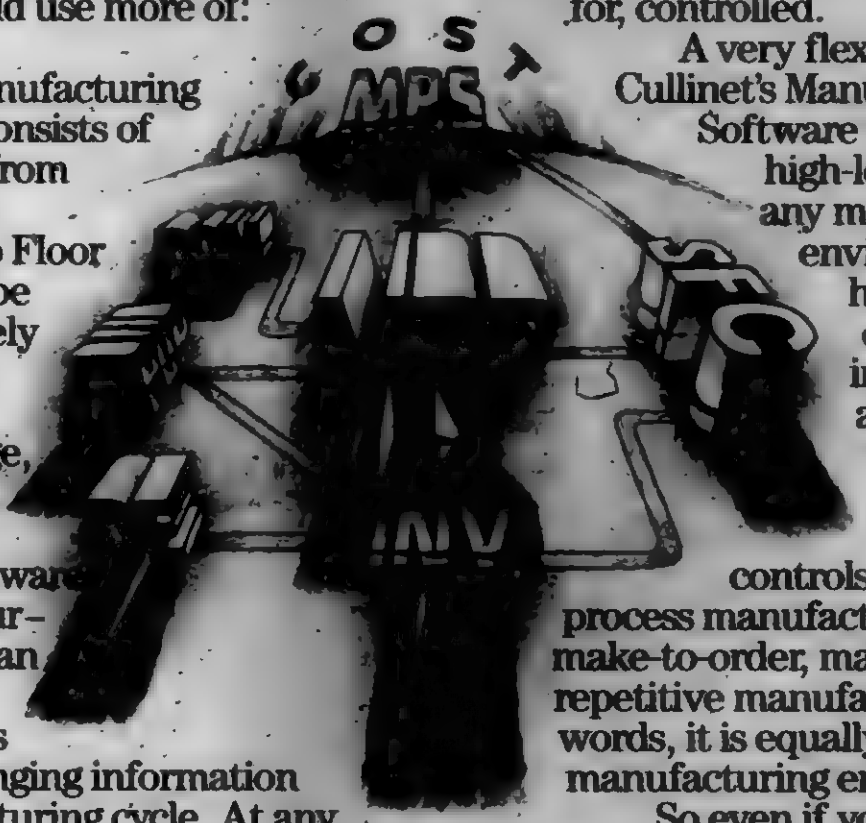

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Seven Modems, Control System Unveiled

Paradyne Announces Release of 10 Products

LARGO, Fla. — Paradyne Corp. has introduced 10 new products: seven modems, a network management control system, a multiplexer and a packet switching system.

The modems include an MP-14.4 modem with an integral microprocessor-based statistical multiplexer, said to be capable of multiplexing up to 16 channels and supporting aggregate data rates of up to 28.8K bit/sec; the MPX series of 2,400, 4,800 and 9,600 bit/sec diagnostic signal-processing modems; the Analysis 5500 series network management control system; and the Challenger 2,400, 4,800 and 9,600 signal-processing modems.

The DCX-T1 time-division multiplexer was also announced. The multiplexer is said to be capable of combining input from 48 devices into one location and transmitting over a single T-1 carrier.

The PDN5200 packet switching system is said to be based on virtual circuit architecture and features implementation of the ITT Consultative Committee packet.

The MPX 2,400 is priced at $950, the MPX 4,800 at $2,000 and the MPX 9,600 at $3,400. Prices for the network management products start at $20,000 and vary according to specific configurations. The packet switching system ranges from under $100,000 to over $1 million with expansions.

Information is available from Paradyne through Box 1347, 8550 Ulmerton Road, Largo, Fla. 33540.

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Modem, Mux Introduced By Rixon

SILVER SPRING, Md. — Rixon, Inc. has announced the R14.4 multiplexing modem and the DCX817 statistical multiplexer.

The R14.4 was designed to operate at 14.4K bit/sec over four-wire private lines. Applications include basic single-port and point-to-point multiplexing, the vendor said.

The vendor said the R14.4 can increase throughput because of a quadrature amplitude modulation scheme which assures performance on channels with a wide range of amplitude and delay characteristics. Forward error correction and a continuously adaptive amplitude and delay equalizer assure overall performance.

The R14.4 costs $9,950. The point-to-point version costs $8,950 and is field upgradable to a multiplexing modem, the vendor said.

The firm also announced the DCX817 statistical multiplexer. The unit offers two-channel binary synchronous support, which is statistically multiplexed with asynchronous channels. The DCX817 adds support for the Hewlett-Packard Co. HP 3000 protocol and provides for in-band/out-of-band conversion of flow control as well as a local echo capability.

The price of the DCX817 is $1,600. Additional information is available from Rixon, which is located at 2120 Industrial Pkwy., Silver Spring, Md. 20904.

Modem Fits DEC VT100s

HALESITE, N.Y. — The Remark Datacom Division of Telebyte Technology, Inc. has announced the availability of its Model 72D, a short-haul modem designed to be used with the Digital Equipment Corp. series of VT100 CRT terminals.

The modems are said to allow the VT100-type terminals to operate at up to 19.2K bit/sec while being located as much as one mile from the computer.

Full-duplex bit/sec operation is accomplished using two twisted pins, one pair for each direction, up to two miles. As the transmission speed is decreased, the distance is extended out to a maximum of 10 miles at 1,200 bit/sec.

The Model 72D is priced at $130 from the Remark Datacom Division of Telebyte Technology, 148 New York Ave., Halesite, New York 11743.

Cable Mux Fits 3270s

MANSFIELD, Mass. — Codex Corp. has announced a cable multiplexer for use with IBM 3270 display systems.

The cable multiplexer reportedly supports up to 32 Type-A IBM terminals and printers over a single coaxial cable to an IBM 3274 controller. In a point-to-point configuration, the multiplexer reportedly combines data from a 3274 controller via a single coaxial cable.

Terminals can reportedly be placed up to 2,952 feet from the cable multiplexer unit and linked to another unit located up to an additional 4,920 feet away.

Priced at $1,100 for a stand-alone unit and $3,350 for the 32-port unit, the multiplexer is available from Codex at 20 Cabot Blvd., Mansfield, Mass. 02048.

Codex Offers Unit Series

MANSFIELD, Mass. — Codex Corp. has announced its 8500 series data service units designed for operation with the AT&T Dataphone Digital Service Network.

The 8500 series is reportedly designed for use with both point-to-point and multipoint operating environments. Both models feature diagnostics, including various loop-backs as standard test modems.

For network testing and fault isolation, each unit reportedly includes a built-in test pattern generator. For high-speed communications, the Codex 8556 operates at a synchronous rate of 56K bit/sec, according to a vendor spokesman.

Priced at $725 for the 8500B and $810 for the 8556 high-speed unit, the products are available from Codex at 20 Cabot Blvd., Mansfield, Mass. 02048.

IBM Modems Out for Large Net Users

RYE BROOK, N.Y. — A rack-mounted modem and multimodem enclosure designed for large telecommunications networks were announced recently by IBM.

The IBM 3868 rack-mounted modem used with the IBM 3866 enclosure is said to make it possible to house up to 72 modems in a standard 19-in. cabinet. Extended diagnostics for more precise problem determination is featured in the modem, according to IBM.

Communications speeds for the four modems of the [illegible] are:

- Model 1 — 2,400 bit/sec over point-to-point or multipoint, nonswitched lines. Its price is $2,550.
- Model 2 — 4,800 bit/sec over point-to-point, nonswitched lines. It carries a $3,340 price tag.
- Model 3 — 9,600 bit/sec over point-to-point, nonswitched lines. Its price is $5,000.
- Model 4 — 9,600 bit/sec over multipoint, nonswitched lines. Its price is $5,000.

The 3866 enclosure is available with power and cooling facilities.

It also features up to 12 modem pack slots.

The enclosure is available for $485 for the Model 1 and $1,020 for the Model 2.

First customer shipments will be in the second quarter of 1984, according to an IBM spokesman.

More information is available from the vendor's Information Systems Group at 900 King St., Rye Brook, N.Y. 10573.

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Display Terminal Compatible With IBM System/34, 36, 38

GAITHERSBURG, Md. — Printer Systems Corp. (PSC) has announced the 4051 display terminal, compatible with IBM System/34, 36 and 38.

The 4051 has a nonglare screen that tilts 30 degrees up and 15 degrees down for viewing while standing or sitting. It is said to have a 55% lower power consumption than the IBM 5251 display station.

Because less heat is generated, the need for a cooling fan in the terminal is eliminated, the vendor said.

The terminal features an automatic dimming feature, which allows the screen to dim if the keyboard is not used for about 10 minutes.

Additional features include block or underline cursor style, a keyboard that can operate either with an audible click or silently and an N-key rollover that allows the operator to type at maximum speed.

The terminal costs $1,995 from Printer Systems Corp., P.O. Box 6020, Gaithersburg, Md. 20877.

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For 56K Bit/Sec Users

Firm Unveils Data Security Unit

SAN DIEGO — M/A-Com Linkabit, Inc. has announced the LC76CF, a data security unit for users of 56K bit/sec circuits.

The LC76CF uses the National Bureau of Standards Data Encryption Standard (DES) to protect data transmitted over synchronous communications links. The equipment works with data rates from 1.2K to 100K bit/sec. By using the DES in a 1-bit cypher feedback mode, the LC76CF gives the user a transparent cryptographic device that is also self-synchronizing. The unit operates independently of data format and character set used, the vendor said.

The LC76CF was designed to operate in fault-tolerant networking situations. The unit fits into a standard 19-in. rack and occupies 7 in. of vertical space. The unit is available in three configurations: single channel, dual-channel per chassis and redundant with automatic fail-over on detection of a fault condition, the vendor said.

The single-channel configuration costs $8,900; the dual-channel and redundant configurations cost $15,800. Quantity discounts are available.

M/A-Com Linkabit is located at 3033 Science Park Road, San Diego, Calif. 92121.

Password System Debuts

SANTA CLARA, Calif. — Ven-Tel, Inc. has announced the 212 Security Plus system to provide password security from the modem.

The system is said to provide two levels of password security, one for the operator and another for the supervisor. No calls are permitted without one of the passwords. The operator password permits the user to see only the name assigned to the nine destinations stored in the modem's battery backed-up memory. The supervisory password is needed for users to examine, modify or delete any of the telephone numbers, passwords, account numbers or other information stored in the modem.

The modem is said to provide an integral activity timer which resets the modem after five minutes of inactivity. The system is priced at $675, and information may be obtained from Ven-Tel at 2342 Walsh Ave., Santa Clara, Calif. 95051.

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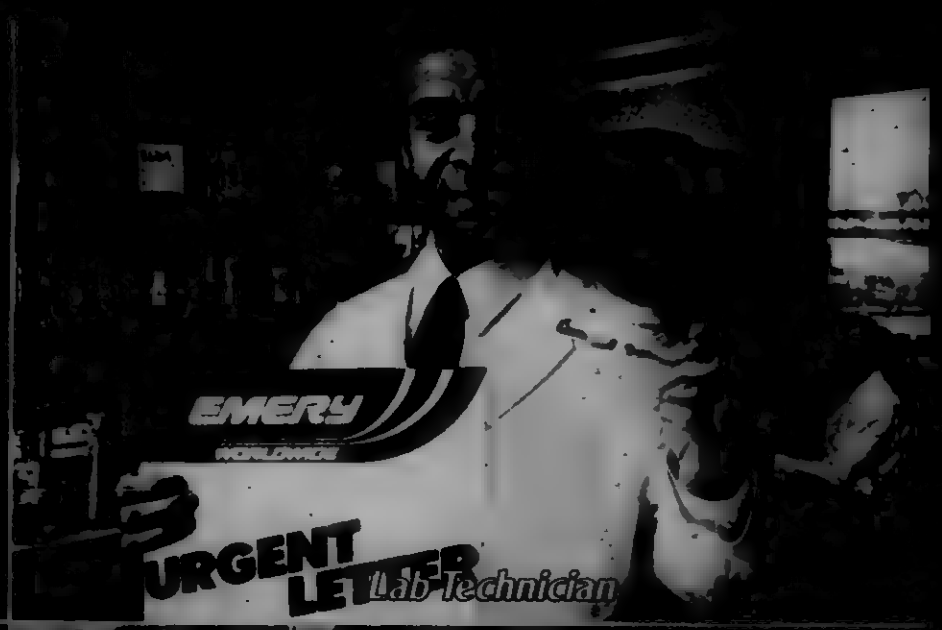

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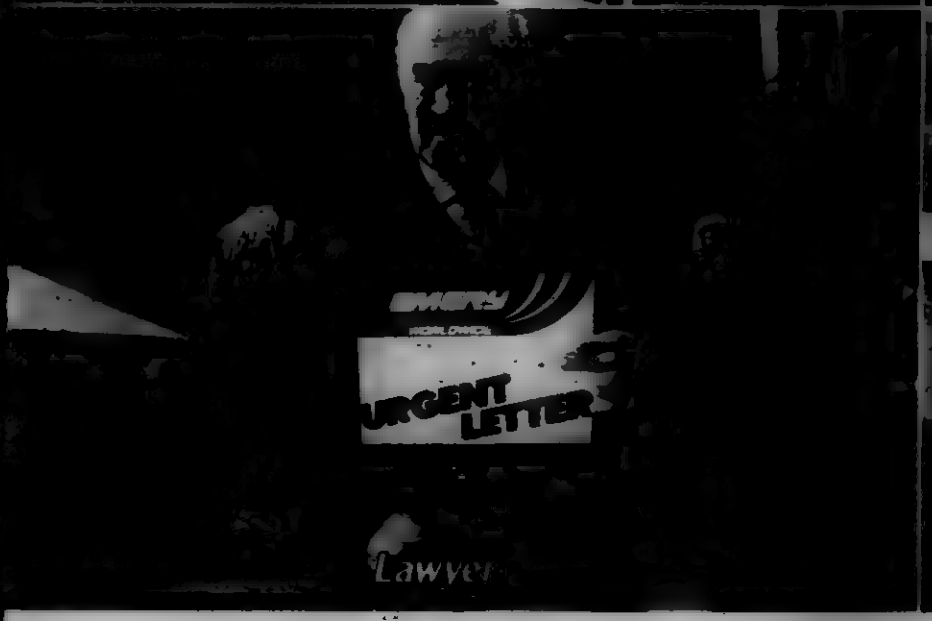

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Transmission System Bows

WESTBURY, N.Y. — Math Associates, Inc., a manufacturer of fiber-optic transmission systems, has announced an eight-channel fiber-optic system designed to transmit contact closures and low-speed digital data in an industrial environment.

Using a single fiber-optic cable between the transmitters, the transmission system — called the XC/RC-1000 — transmits eight channels, which may be mixed by the user over distances of 3,000 or more meters, the vendor said.

Digital speeds of 4,800 bit/sec per channel, or .5A per contact closure (fully isolated) may be accommodated by the system. Operation power is 7 Vdc to 28 Vdc or 6.3 Vac to 18 Vac.

LED indicators show the status of each channel, the vendor said.

The transmission system costs $990 per transmitter/receiver pair. More information is available from Math Associates' Fiberlink Division, which is located at 2220 Shames Drive, Westbury, N.Y. 11590.

Transaction Concentrator From Noakes Introduced

IRVING, Texas — Noakes Data Communications, Inc. has announced the Transaction Concentrator System, which is said to be a multichannel protocol converter and data collector.

According to the company, the system allows a wide range of serial communication equipment to interface with one or more central hosts. It can handle code conversion, line interface and controls and is said to reduce input and output overhead for the host computer.

The system microprocessor, when connected to the host computer, can interface with up to eight line processor/adaptors, and each line adaptor may have its own protocol conversion that can handle four serial data lines.

The company said the system has host interface, three serial channels, real-time clock and floppy disk interface and is priced from $6,295. Further information is available from Noakes Data Communications, 3330 Stovall, Irving, Texas 75061.

GDC Announces Four Additions To Product Line

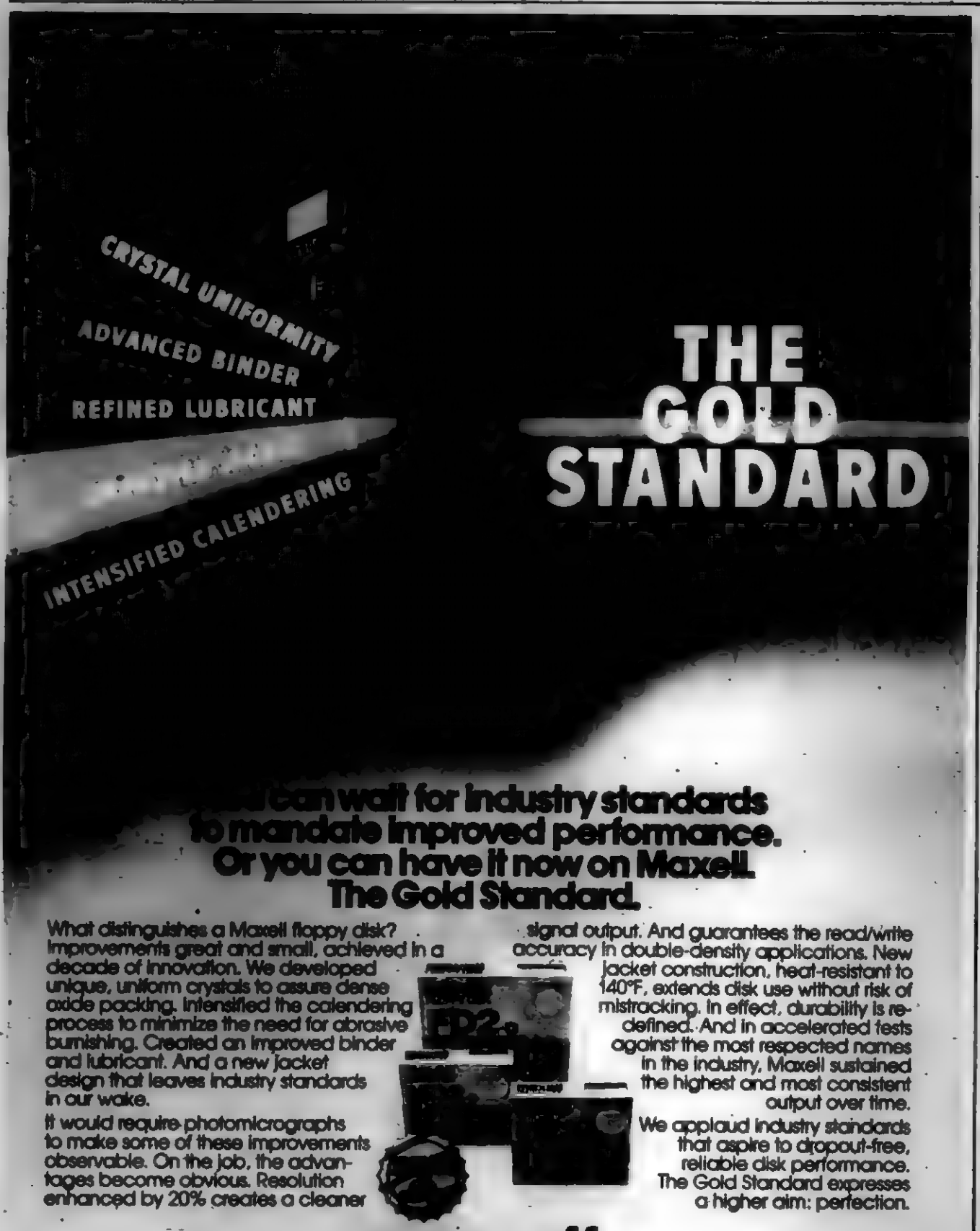
DANBURY, Conn. — General Datacomm Industries, Inc. (GDC) has announced the following additions to its product line:

- The GSU-500A Data Service Unit offers direct connect capability to managers whose system utilizes telephone company-provided Dataphone Digital Service (DDS), without requiring an external channel service unit (CSU).

Network control is accomplished with an optional Diagnostic Receiver Card, according to a spokesman. With this option, the GSU-500A will respond to addressable diagnostic commands from a GDC NDC-20 Network Controller or a GDC Netcon Network Management System Controller. It will cost approximately $995.

- The Datacomm 500A/56K Data Service Unit was designed to enable it to be used as a direct connect device with its own internal CSU circuitry or for connection to the DDS network through a telephone company-proviced CSU. The price is $1,050.
- The Datacomm 9600EP high-speed modem features 9,600 bit/sec operation, fallback rates of 4,800 and 7,200 bit/sec and CCITT compatibility for domestic and international applications. It costs approximately $2,640.
- The Gen/Net 1261 is a data concentrator designed to multiplex four or eight asynchronous terminals over a single communications link. The approximate price for four channels is $1,330 and for eight channels, $2,090.

Additional information is available from General Datacomm Industries, which is located at One Kennedy Ave., Danbury, Conn. 06810.



Small Businesses: Is Low Price Of Micros Worth It In Long Term?

By James D. Lewis
Special to CW‡

In the small business market, microcomputers have only one advantage over minis. That advantage, of course, is price. It is a short-term advantage that often translates into a long-term disadvantage for both user and vendor.

Unlike the home or personal computer market (where once the computer is purchased, the user does not know what applications it can be used for to justify the cost), in the business computer mart the user has a multitude of applications for the computer. In fact, it appears that no matter how big the computer system, the uses will totally eclipse the computer's resources.

Everything that the small business manager does is very integrated. His decisions are based on the total pictures rather than on separate entities of the business. Even the decision to purchase a computer system is not based on what it can do without regard to how the economy is treating the business, what the customers of the business will think and how the staff will fit the computer system.

Most small business purchases are totally controlled by upper management and are usually made to process information. Because upper management tends to see beyond the mere processing of information to what the information can do to enrich the business decisions, and because of the integration mentioned above, one- or two-function micro systems have definite disadvantages compared with the mini.

(Continued on Page 76)

National Semi Unwraps 32-Bit Monolithic Microprocessor

NEW YORK — National Semiconductor Corp. recently unveiled here what it claims is the industry's first 32-bit monolithic microprocessor. . .

Designed to manipulate large data bases, the NS32032 has a 32-bit architecture both internally and externally. The chip is expected to be used in engineering workstations, business and professional computers, integrated office systems, computer-aided design and manufacturing systems and intelligent terminals.

Because it shares the same internal architecture, the NS32032 is both hardware- and software-compatible with the other two chips in the vendor's NS16000 series, the NS08032 and NS16032.

Like other members of the NS16000 family, the NS32032 was made using Xmos technology. National Semi claimed a potential for operating frequency in excess of 10 MHz.

The chip is packaged in the 68-pin, Jedec B ceramic leadless chip carrier. This package occupies approximately 1 sq in. of board space, about 65% of the area required by an equivalent dual-in-line package, a spokesman said.

In quantities of 100 or more, each chip costs $220. By 1985, high-volume pricing is expected to be in the $20 to $60 range. National Semi is located at 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

IBM Micro Basis For Turnkey

SAN FRANCISCO — During the recent annual convention of the Independent Insurance Agents of America here, Agency Management Systems, Inc. (AMS) announced a turnkey agency management and marketing microcomputer system based on IBM's Personal Computer and AMS' software that was previously developed for use on the IBM Series/1.

AMS is owned by an open-ended consortium that is presently comprised of six major insurance companies, according

(Continued on Page 76)

Morrow Micro Based On Hard Disk, Z80

SAN LEANDRO, Calif. — Morrow Designs, Inc. has unwrapped a hard-disk-based microcomputer that holds 11M bytes of storage and runs programs compatible with Digital Research, Inc.'s CP/M operating system.

Aimed at the independent businessman, the Morrow MD11 is built around Zilog, Inc.'s Z80 microprocessor, has 128K bytes of random-access memory (RAM), 8K bytes of read-only memory, a 400K-byte floppy disk drive used to back up the hard disk, a parallel Centronics Data Computer Corp. port for easy printer hookup and three serial ports.

A spokesman said two of the three serial ports are standard RS-232 ports with the third capable of operating in any one of several modes, including a high-speed RS-432 port running at 500K bit/sec and a bi-synchronous mode allowing the MD11 to communicate with IBM mainframes.

The MD11 comes bundled with eight software packages. The CP/M operating system allows the MD11 to address more than 64K bytes of RAM as well as Microsoft, Inc.'s version of Basic 80 and Bazic, which is compatible with North Star Computers, Inc. Basic.

Application packages include New Word word processing, Logicalc financial spreadsheet, Correct-It spelling checker, Personal Pearl data base manager and the Quest Bookkeeper System.

The terminal that comes standard with the systems has a 12-in. screen that displays 24, 80-char. lines.

The MD11 is priced between $2,800 and $5,000, Morrow Designs said from 600 McCormick St., San Leandro, Calif. 94577.

Flex Diskette Targets Portable Micros

SANTA CLARA, Calif. — Dysan Corp. has announced the Flex Diskette, its first 3¼-in. microfloppy disk designed for use with portable and other microcomputer systems.

The disk reportedly offers a data storage capacity of 1M byte, equal to the capacity of a 5¼-in. flexible disk at one-third the size. The upgraded performance level of the disk is represented by a bit-packing density of 9,000 bit/in. and 140 track/in.

Plug-in-compatible with 5½-in. diskettes, the Flex Diskette was developed with a metal hub said to improve stability and performance of the disk. It was designed with the same media coating standard that is utilized in 1.6M-byte and 3.3M-byte advanced 5¼-in. disk drives.

Guaranteed 100% bit-error-free, suggested retail price for a box of five Flex Diskettes, with 512K-byte capacity each, is $21.50, a spokesman said. Dysan is located at 5201 Patrick Henry Drive, Santa Clara, Calif. 95050.

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Micros vs. Minis: What's the Real Advantage?

(Continued from Page 75)

In this same vein, the mini would compare unfavorably with the supermini and the supermini with the mainframe. There is only one factor that causes a break in this logic and stops all small busiñesses that can afford it from having mainframes installed. That factor is cost. Thus we can narrow our discussion to minis vs. micros.

Marketing considerations will always dictate how computers are packaged for the business user. This translates to designing computers so that when growth requires more computer power, the business is faced with a purchase of full system replacement rather than mere additional pieces to the existing boxes.

This is apparent when one realizes that a micro with a Digital Equipment Corp. PDP-11/23 in the package of the DEC Professional 350 is priced at less than $10,000. However, packaged as a mini, the price of a full system is greater than $20,000.

Forget About Conversion

There is no way to get from the Professional to the PDP-11 without replacing all peripherals. Thus, when the small business advances from a micro to a mini, the micro should probably be used for some other task within the organization rather than being considered as a system that can be converted into a more powerful mini.

Although the micro had the advantage when a company first began to use a computer, once the company outgrows the system, it ends up purchasing a mini anyway. If this growth could have been predicted, the mini should have been purchased in the beginning, saving all the headaches of getting from here to there. My experience says that this growth can be predicted.

It is rare when a first-time user will believe that he is going to outgrow something as powerful as some of the micros that are on the market today. But he will, because even the best executives today don't realize how important all information, known and unknown, is to every business decision. Once this is realized and the company measures the time its staff has to input information to the computer, the small disk (less than 30M bytes) and the limited number of terminals (less than four) are great obstacles to overcome. Someday, there won't even be a make-believe line between minis and micros, but that will only mean that cost will not be the dividing factor between the two. When this is a reality, micros as we know them today will lose their advantages.

The vendor stands on the other side of the transaction when a small business purchases a computer system. What advantage do micros have over minis from this point of view? And what does that mean to the purchaser? And why should this be important to the purchaser anyway?

Small businesses have learned very quickly that if a computer is to be integrated into a company, whoever does a better selling it should be ready to support it throughout its life. Small businesses have neither the desire nor the time and ability to be self-supporting. The vendor then wins the duties of support by default.

The importance of support to the small business market means that the vendor has to receive enough profits from his sale and support activities to remain in business. In most cases, profits are directly related to the purchase price. The smaller the price, the less the profit.

Think about how long a strong technical person making $20,000 to $40,000 per year can spend with a computer system that contributed only $2,000 to the selling company's profits. The answer usually means little or no support. The purchasing company then has to hire the support or not realize the full potential from its computer system. When comparing the original purchase prices of minis and micros, the overall cost may be close to breaking even.

Of course, from the selling company's point of view, volume is the answer to the above paradox. The more systems sold, the more profits. Micros, with their lower cost, are easier to sell. Thus, the vendor would be able to make as much selling micros as minis. However, from the purchaser's side of the transaction, the more customers there are to support, the less time and talent there is to spend on each one.

What, then, are the advantages of any one type of computer over another type for the serious small business purchaser? The advantage is always where it is with any other business purchase. The transaction has to contain the following elements to be a good decision:

- The purchased resource has to have more potential than what is believed to be needed, if company growth is involved:
- The computer has to offer as much upward growth as possible, even if the above is true.
- The vendor has to be willing and able to give as much support as needed. Multiply expected needs by four.
- The vendor has to get a fair price for a good product to make the above come true.

Lewis is president of Iowa-based Specialty Computer Services, Inc.

Turnkey Based on Micro

(Continued from Page 75)

to a company spokesman.

AMS Micro reportedly features AMS marketing and management software packages bundled into the IBM Personal Computer and running under IBM's PC-DOS operating system. It also features a color monitor with visual prompts, a streamer cassette tape for backup and windowing capabilities enabling the user to view multiple elements on the screen simultaneously, the spokesman said.

The package includes accounting, billing, client services, diary, word processing, query and marketing capabilities in addition to a mouse that enables information to be located and manipulated on the screen without using the keyboard, according to AMS. All programs are written in Cobol.

The microcomputer package includes a 160 char./sec multimode matrix printer with draft and letter-quality print capability, 256K bytes of internal memory, a 35M-byte disk drive that is expandable to more than 100M bytes and full interfacing capabilities.

The package is priced at approximately $15,000. More information is available from AMS, Suite 300, 150 Interstate N., Atlanta, Ga. 30339.

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TI's Micro With 12K Bytes Of On-Chip ROM Unveiled

DALLAS — Texas Instruments, Inc. has unwrapped what it claims is the first 8-bit, single-chip microcomputer with 12K bytes of on-chip, read-only memory (ROM).

The TMS70120 reportedly can store a complete, 12K-byte applications program without the need for any external ROMs, buffers or latches. By reducing the chip count for applications in the 4K- to 12K-byte program range, the microcomputer can help lower the cost, power consumption, weight and space requirements of many 8-bit applications, the vendor claimed.

Moreover, the TMS70120's large on-chip memory is said to free up the 20 or more general-purpose I/O lines usually required to interface a microcomputer with off-chip ROMs. This reportedly gives designers greater flexibility to enhance an application by interfacing the TMS70120 to various peripherals.

Other features include 128K bytes of random-access memory, 64K bytes of address space and 32 individual I/O lines. Fabricated using Nmos technology, the device operates from a single 5V supply and costs $11.05. TI can be reached through P.O. Box 401560, Dallas, Texas 75240.

Telex Computer Announces Daisywheel

TULSA, Okla. — Telex Computer Products, Inc., has introduced an 80 char./sec daisywheel printer that features interchangeable printwheels and produces letter-quality output.

The Telex 286F is a bidirectional printer that accommodates both plastic and metal printwheels of either 127 or 96 characters and is plug-compatible with IBM's 3278 terminal. It also can be attached to either a Telex 174/274C/276 or IBM 3274/3276 controller.

The printer's operator console configures line spacing of 6 or 8 line/in., with 10 or 12 char./in.

Independent microprocessors control all printwheels, carriage and paper-feed mechanisms, as well as providing extensive diagnostic routines for rapid-fault isolation, the vendor said.

The Telex 286F is priced at $5,350, with the first deliveries scheduled to begin this month. Further information is available from Telex Computer Products, which is located at 6422 E. 41st St., Tulsa, Okla. 74135.

Facit Option Out For Its 4542, 4544

NASHUA, N.H. — Facit, Inc. has announced the Plot 10, a plotter/printer option for the firm's 4542 two-color and 4544 multicolor printers.

The option allows the printers to switch from graphics functions, such as grey-scale scanning, to high-performance DP printing, such as conventional text. In addition, the unit has the ability to mix plot and text modes, according to the vendor.

The Plot 10 also provides an interface to the firm's Facit 5162 front-end processor. This, the vendor said, provides additional plotting capabilities to the firm's 4544 and 4542 printers. The 5162 interface also includes a 8K-byte printer input buffer, the vendor said.

The 4542 with the plotter/printer option costs $3,900. The 4544 with with the plotter/printer option costs $4,600. More information about the Plot 10 is available from Facit at 235 Main Dunstable Road, Nashua, N.H. 03061.

Disk Drive Holds 600K Bytes On Single Flexible Cartridge

SANTA ANA, Calif. — A flexible disk drive said to be the smallest in the computer industry and capable of storing up to 600K bytes of data on a single 3-in. flexible disk cartridge has been introduced here by Janome Sewing Machine Co., Ltd. of Tokyo.

The Janome MFD-80 Micro Flexible Drive reportedly is fully plug- and format-compatible with standard 5¼-in. minifloppy disk drives. It is also compatible with minifloppy mounting enclosures, so up to four drives can be placed vertically in a 5¼-in. footprint.

The drive is said to record double-density and double-sided on the standard 3-in. disk cartridge at 100 track/in. Capacities are specified for the MFD-80 at 250K byte/side or 500K byte/disk, using the standard 40 track/side mode. Using all 48 tracks reportedly boosts capacity to 300K byte/side or 600K byte/disk.

The high-torque, indirect-drive motor provides fast disk start times, but with lower drive currents and heat generation, the vendor said.

The MFD-80 is priced at $125 each in OEM quantities. Further information is available from The Allen Group at Suite 108, 2030 E. Fourth St., Santa Ana, Calif. 92705.

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Bits & Pieces

Quantex Reduces Prices On 7000 Family Printers

HAUPPAUGE, N.Y. — The Qantex Division of North Atlantic Industries, Inc. has announced across-the-board price reductions for its 7000 family of dot matrix printers, now that the latest addition to the product line, the Model 7020, is in full production.

As models have been added to the printer family, the company has established prices in accordance with the functionality of each model, as well as passing along savings realized from manufacturing efficiencies, the vendor said.

Effective immediately, list pricing will be: $1,495 for the Model 7020; $1,695 for the Model 7030; and $1,795 for the Model 7040. The Qantex Division is located at 60 Plant Ave., Hauppauge, N.Y. 11788.

Circuit Board Will Connect IBM's Micro and CDC's ISI

FORT WORTH, Texas — Ribigital Electronic, Inc. (REI) has announced a circuit board said to connect the IBM Personal Computer with Control Data Corp.'s Industry Standard Interface (ISI) for disk drives. It breaks the 1G barrier and increases data integrity for the Personal Computer, the vendor said.

REI has designed two versions of its ISI adapter module for the Personal Computer. The Model 927 is a program I/O version that has been tested with the CDC 9050 and 9056 control modules and will be available in January. It costs $395.

The Model 9270 is a direct-memory access version, is also available in January and costs $495. Both versions support multiple control modules, mix or match.

REI is located at 3612 W. Vickery Blvd., Fort Worth, Texas 76107.

Overland Data's Controller Targets IBM Micro

EL CAJON, Calif. — Overland Data, Inc. has announced the Model TC-PC nine-track tape controller for the IBM Personal Computer.

Capable of reading and writing ½-in. magnetic tape, the unit accommodates speeds up to 125 in./sec and transfers data at up to 200K byte/sec. Interrupt processing during data transfer is allowed through the use of direct memory access, a spokesman said.

The Model TC-PC is compatible with most nine-track formatted tape drives, including those from Cipher Data Products, Inc.; Innovative Data Resources, Inc.; Kennedy Co.; Pertec Computer Corp.; Control Data Corp.; and Datum, Inc. It is available with interconnect cables and software for $770 plus shipping.

Overland is at 1425 Monte Rico Drive, El Cajon, Calif. 92021.

Ribbons, Printwheels Fit Xerox Diablo, 800 Printers

CHICAGO — At the 1983 National Office Products Association Convention here recently, Qume Corp. introduced Superstrike ribbons and printwheels for use on Xerox Corp.'s Diablo printers and 800 series printers.

The supplies are reportedly available for use on the Diablo Hytype I, Hytype II, Diablo 630 and 800 series. The printwheels reportedly feature IBM-style typefaces and will be available in 10 different type styles; elite and manifold typefaces will be released in December.

Prices for the printwheels start at $4.20 each in gross shipments, and ribbons start at $3.80 each in gross shipments. Further information is available from Qume, 2350 Qume Drive, San Jose, Calif. 95131.

Adaptec's Chip Set Supports Seagate Technology Interface

MILPITAS, Calif. — Adaptec, Inc. has announced immediate support for capability for Seagate Technology, Inc.'s ST412 high-end 5¼-in. Winchester drive interface.

Customers selecting Adaptec's ACS-1000 Winchester controller chips reportedly can build ST412 interface controller boards, which operate at a 10M bit/sec data transfer rate. This doubles the data rate of Seagate Technology's original ST506 interface, the vendor said.

The ACS-1000 chip set is said to include the vendor's AIC-100 Winchester controller chip, the AIC-250 encoder/decoder chip and the AIC-300 buffer controller chip.

The ACS-1000 chip set costs $210 each from Adaptec, 1625 McCarthy Blvd., Milpitas, Calif. 95035.

Software Engineering Tool Runs on Nastec Workstation

TOPEKA, Kan. — A computer-aided software engineering tool for the Nastec Corp. Case 2000 workstation was announced recently by Nastec and Ken Orr & Associates, Inc.

Documentorr reportedly automates the preparation and maintenance of complete design documentation for Ken Orr & Associates' Data Structured Systems Development (DSSD) methodology. It produces a comprehensive set of interactive menus that allows users to organize system design documentation in the DSSD methodology life cycle.

A user license for Documentorr costs $2,500 per workstation, and annual maintenance is $1,500 from Ken Orr & Associates, 1725 Gage Blvd., Topeka, Kan. 66604.

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Rack-Mountable

Winnie Supports DPS 6, Level 6

SCHILLER PARK, Ill. — Knaus Systems, Inc. has announced a Winchester disk drive for users of Honeywell, Inc. DPS 6 and Level 6 processors.

The Parrot is rack-mountable with four units in a 60-in. cabinet or two units in a 30-in. cabinet. The 10½-in. drive weighs 110 lb and is said to be virtually maintenance-free.

It reportedly is cartridge module disk plug-compatible and software compatible to 256M bytes of storage module disk (SMD).

The Parrot's maximum storage capacity is 315M bytes and is compatible with Honeywell's Mass Storage Unit 9604 with 256M bytes of SMD, a spokeswoman said. Its sealed fixed disk guards against head crashes.

The Parrot comes standard with dual port, address mark, rack mount slides and terminator and costs $15,990.

Knaus Systems can be reached at 9950 W. Lawrence Ave., Schiller Park, Ill. 60176.

Minifloppies Boast Variety Of Storage

TORRANCE, Calif. — Comrex International, Inc. has introduced a family of minifloppy diskettes said to feature a variety of storage capacities for use with microcomputers and word processors using 5¼-in. diskettes.

Available in three capacities, the Comrex diskettes reportedly provide users with the flexibility of choosing the exact storage density and surfaces they need. The Model CR-10005 offers the capability of recording on a single disk surface and with single density. The Model CR-10010 offers single-sided, double-density recording, the vendor said. Double-sided, double-density recording is featured on the Model CR-10015. All are guaranteed for five years.

Also available is a premium diskette, the Model CR-10020, with double-sided, double-density recording and a lifetime guarantee.

The diskettes are configured with a soft-sectored format, a single index hole, 48 track/in. density and 40 tracks for each recording surface.

Ten-pack prices are $29.95 for the Model CR-10005, $44.95 for the Model CR-10010, $49.95 for the Model CR-10015 and $59.95 for the CR-10020. Comrex International is at 3701 Skypark Drive, Torrance, Calif. 90505.

Boschert Offers XL750 Switchers

SUNNYVALE, Calif. — Boschert, Inc., a manufacturer of switching power supplies in the 25W to 1500W range, has a new family of 750W enclosed multioutput switching power supplies.

The XL750 line of switchers is designed for computer systems, transaction processing systems and superminicomputers. It features Boschert's proprietary proportional drive and current mode design.

The XL750 line is available now at prices ranging from $656 to $825 in quantities of 250. More information is available from Boschert at 384 Santa Trinita Ave., Sunnyvale, Calif. 94086.

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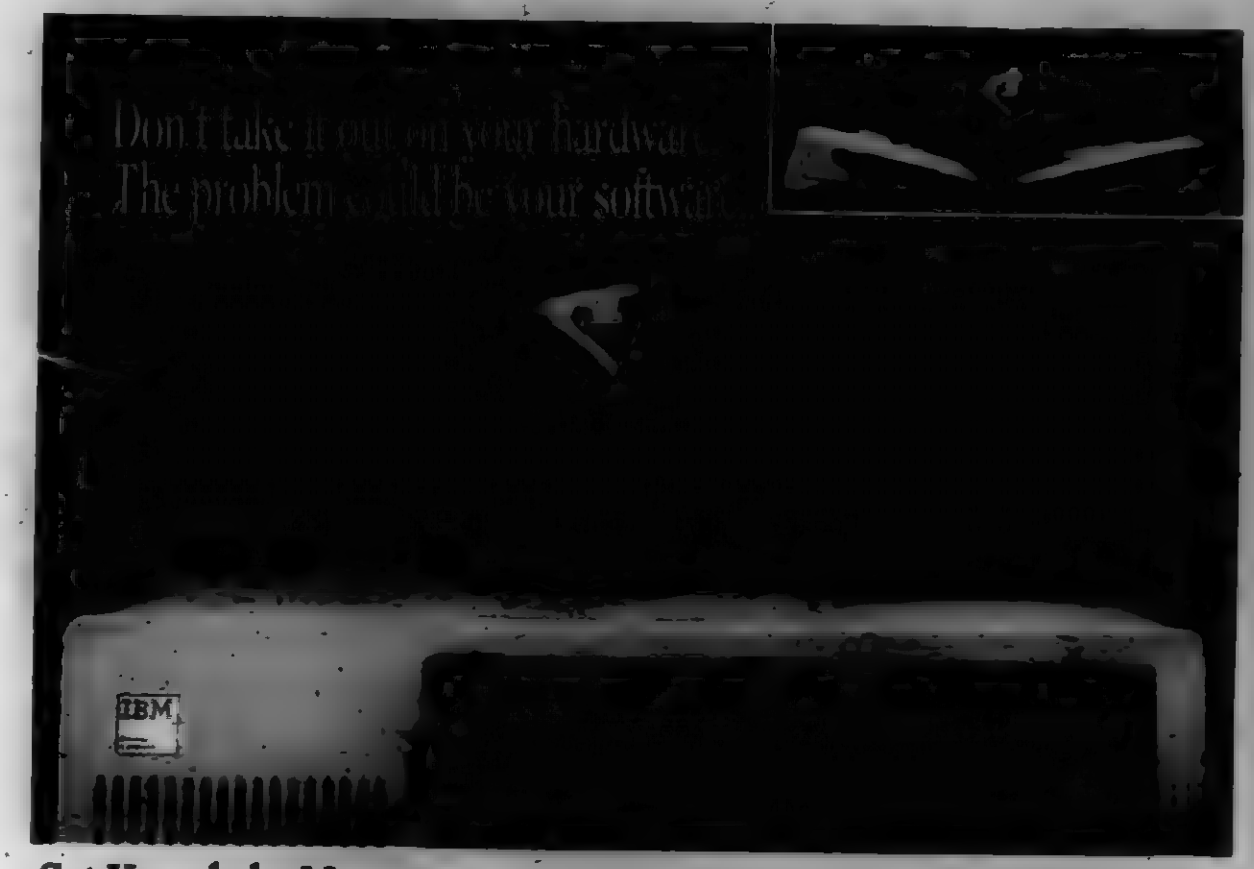

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VAX/Unix Combination Released as Turnkey

FREMONT, Calif. — Voelker-Lehman Systems, Inc. is offering a turnkey system combining Digital Equipment Corp.'s VAX-11/750 superminicomputer with the Unix operating system.

A company spokesman said the VAX/Unix implementation is suited for image processing and multiuser software development applications.

The system costs between $80,000 and $160,000 depending on the configuration.

Further information on the turnkey is available from Voelker-Lehman at 44160 Old Warm Springs Blvd., Fremont, Calif. 94538.

Memory Board Out for VAX

CARROLLTON, Texas — Mostek Corp. has announced the Mostek MK8076 add-in memory board for the Digital Equipment Corp. VAX-11/730 and VAX-11/750 minicomputers. This memory board, which the company said is a direct replacement for the DEC M8750 memory board, features a storage capacity of 1M byte. The Mostek board utilizes 64K dynamic random-access memories (RAM) that are upgradable with 256K dynamic RAMs that boosts the potential memory capacity to 4M bytes on a single array card, Mostek said.

Additional features include a data transfer rate of 39 bit/sec, an on-line/off-line switch and three LEDs indicating board access, power and on-line/off-line status. The board also supports battery backup operation, Mostek said.

Single quantity pricing for the Mostek MK8076 memory board is $2,450, with quantity discounts available from Mostek at 1215 W. Crosby Road, Carrollton, Texas 75006.

Shufflebuffer Announced

BALA-CYNWYD, Pa. — Interactive Structures, Inc. has released Shufflebuffer, a printing buffer that performs mix and merge printout operations previously available only by using software or scissors and paste.

Shufflebuffer can shuffle text, graphics, spreadsheet information and other computer-generated material into any combination for printing, plotting or telephone transmission. Applications include mailing lists, letter mergings, preparation of personalized form letters and other repeated or rearranged material. Shufflebuffer reportedly lets all of the user's programs work together, effectively bringing software integration to the smallest microcomputer.

The product has two additional modes of operation: the standard "dumb buffer" function of the first in, first out printing of material that does not need rearranging or reprinting, and Bypass, which interrupts a long printout in order to produce a separate document on an immediate basis.

Shufflebuffer is an enhanced version of Interactive Structures' Pipeline, the first random-access printing buffer on the peripherals market. It reportedly features front panel controls to permit stacking and is narrow enough to fit beneath a disk drive unit.

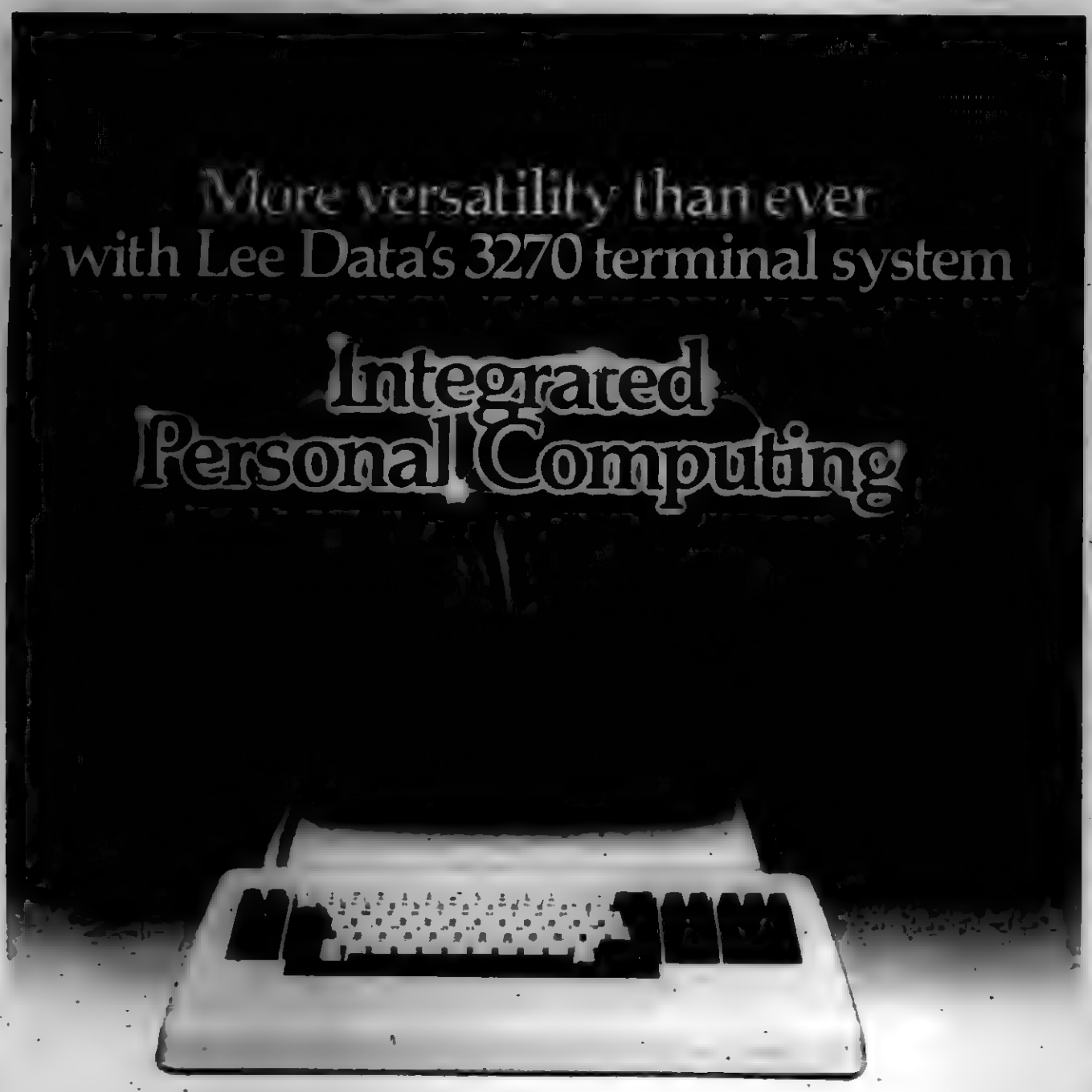
More information is available from the vendor at 146 Montgomery Ave., Bala-Cynwyd, Pa. 19004.

Keyboard Fits IBM Micro

NORCROSS, Ga. — The Keytek Division of Elco Corp. has announced the Inductric, a low-profile keyboard which is compatible with the IBM Personal Computer.

The unit is available with a synchronous or asynchronous RS-232 format. Features include familiar key replacement, microprocessor-based electronics and solid-state inductive switches. Included with the keyboard is an interconnect cable for use with either the Personal Computer or serial TTL Ascii systems, the vendor said.

The keyboard costs $250. Keytek is at 6424 Warren Drive, Norcross, Ga. 30093.



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Reliability, Not Price Seen First Priority In OA Equipment

WELLESLEY, Mass. — When a company is selecting office and communications equipment, price is only a secondary consideration, according to a report published recently by Venture Development Corp. (VDC) here.

The study, titled "Office Automation Survey: Analysis of Acquisition and Use of Office and Communications Equipment" concluded that the reliability of a machine, the available features or functions and ease of use are the primary influences on a purchase decision.

Companies participating in the survey indicated that office automation equipment should be of good quality and require modest staff training time. "Only after these criteria are met does price become a decisive factor," the study noted.

Two Major Concerns

When adding new office products, such as a personal computer or word processor, and new communications products, such as facsimile equipment or a private branch exchange system, companies participating in the survey noted two overriding concerns that influence purchase decision: Will new products perform as expected and can the costs of desired equipment be kept within budget?

The survey found that businesses have relatively modest budgets for the purchase of office and communications equipment. Firms with over $5 million in annual revenue allow less than one half of 1% of their budget for office or communications equipment purchases each year.

"Few companies are in a position to completely overhaul their office automation environment," the study concluded. "Most add products incrementally to ones they already have."

The authors of the survey cautioned manufacturers against the use of a "price pitch" to sell advanced products, "even though such a tactic has strong short-term appeal."

According to the study, vendors tend to emphasize price so strongly because of the "very real price declines that have characterized electronics products." Rather than try to generate enthusiasm simply because of price declines, manufacturers should emphasize greater product value.

The 175-page hardbound study costs $1,850 from VDC, One Washington St., Wellesley, Mass. 02181.

E-Mail to Win Hearts Of Offices by '87: Study

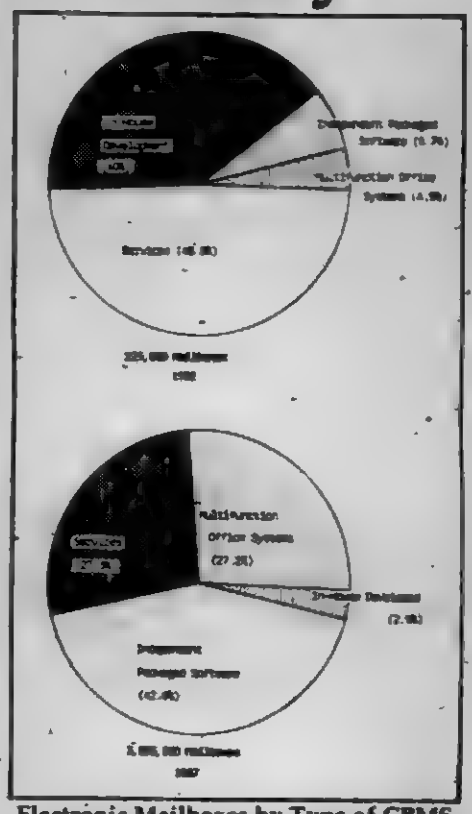
FRAMINGHAM, Mass. — Electronic mail is about to be accepted into the office after years of teetering on the edge of widespread acceptance, according to "Electronic Mail," a recently released report from International Data Corp. (IDC) located here.

Concentrating on computer-based message systems (CBMS), IDC predicted that electronic mailboxes would increase at a compound annual rate of 68% from 1982 to 1987, increasing from 225,000 in 1982 to just more than three million in 1987.

The report identified four major sources of electronic mail:

- Service providers such as GTE Corp. and ITT that currently account for 48.8% of the mailboxes but will shrink to 27.3%.
- In-house developed software, which currently supports 40% of the mailboxes, but will lose importance as the result of better, commercially available packages and account for only 2.9% of the mailboxes in 1987.
- Independent packaged software currently providing 6.7% of the mailboxes — a figure that is expected to grow to 42.6% by 1987.
- Multifunction office systems currently accounting for 4.5% of the mailboxes, but expected to grow to be the near equal of independent software. This category will grow to 27.2% in 1987.

"Electronic mail is useful, and people are getting used to the idea of it with all the personal computers and terminals out there," according to the study's author, Thomas R. Elliott, who is director of research at IDC.



Electronic Mailboxes by Type of CBMS

(Continued on Page 82)

Wang Training Method for WP Uses Optical Laser Video Disk

LOWELL, Mass. — Wang Laboratories, Inc. has announced a training method for Wang word processing users that uses optical laser video disk computer-assisted instruction.

The Wang Interactive Learning System (Wils) is said to provide user-controlled training in the full range of basic word processing skills — from screen and keyboard introduction through such advanced skills as merge printing. It consists of word processing instruction courseware on video disks, system software and training documentation.

The system will allow users to receive interactively instructions and demonstrations presented by an instructor on a TV screen and practice actual word processing operation directly at the workstation. Wils

(Continued on Page 82)

The Wang Interactive Learning System provides training via video disk.

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OA Packages Out for UX16-20 Micro

PHOENIX — The Systems Division of SGS Semiconductor Corp. has introduced a set of office automation software packages for its UX16-20 multiuser microcomputer running its Sunix operating system.

Menu is a menu-driven software package said to guide inexperienced users through Sunix and application packages available from SGS. These include Word, a word processor, and Telex Plus, a package for sending telex messages. Other packages are RM/Cobol, a business language package, and Unify, a data base management package.

All packages will be available in December from an SGS sales representative or sales office. The prices of the packages are Word, $1,295; Menu, $695; Telex Plus, $995; RM/Cobol, $1,250; and Unify, $2,995.

More information on these products is available from the company at 1000 E. Bell Road, Phoenix, Ariz. 85022.

Northern Telecom Announces Storage Unit for Desktop Model 503

MINNEAPOLIS — Northern Telecom, Inc. has announced the addition of a 10M-byte hard disk storage unit for use with its Model 503 desktop office information system.

The storage unit, designated the 5010, is a self-contained storage subsystem housed in the same cabinet used for the existing system, a spokesman said. It reportedly contains one 5¼-in. floppy disk for program load and backup and one 5¼-in. Winchester hard disk drive for storage. The floppy disk provides approximately 800K bytes of storage.

The unit contains its own power supply and logic cards and is electronically connected to the storage unit over a shielded ribbon cable, according to the vendor.

The storage unit is available for $3,780. More information may be obtained through Northern Telecom, Data Park, P.O. Box 1222, Minneapolis, Minn. 55440.

E-Mail to Win Over Offices

(Continued from Page 81)

Other reasons cited by the report for increased user acceptance of electronic mail is the improvement in the price/performance ratio of the components.

The user-friendliness of CBMS software is another contributing factor as is the growing standards effort, IDC said.

IDC also identified several reasons why users will find CBMS better than other messaging systems such as voice and paper. One of the attributes of CBMS is that the user can leave a message without having to know where the intended recipient is before or after standard business hours, "largely relieving time-window constraints for communicators," the study said.

In addition, a time-sensitive message intended for several recipients can be distributed more efficiently through a CBMS than through other systems, according to the report.

The report is available for $2,500 from IDC, Five Speen St., Framingham, Mass. 01701.

Wang Introduces Training Method

(Continued from Page 81)

is not a simulation, a Wang spokesman said.

Wils can be used with the following Wang systems: the OIS 115-3 and 115-4, the OIS 130A-E, the OIS 140, the OIS 145 or any VS system with integrated word processing.

The user can control the pace and sequence of training by using the existing keypad located on a standard Wang combined workstation. These keys allow the user to pause, review course material already covered or skip ahead to train on any system function.

Wils is available for $5,000, which does not include the optical laser video disk player, the color video monitor or the Wang workstation.

More information is available from Wang, One Industrial Ave., Lowell, Mass. 01851.

DM Data Cites Major Contenders

Race to Produce 256K-Bit Chip Heats Up

By Robert Batt
CW West Coast Bureau

PALO ALTO, Calif. — The race to produce and market the 256K-bit dynamic random-access memory (RAM) chip is heating up as U.S., Japanese and European manufacturers battle it out to obtain market dominance.

According to DM Data, Inc., a Scottsdale, Ariz.-based market research firm, 17 semiconductor companies are now in a position to be one of the four or five major worldwide suppliers of the new chip, with quantities expected to exceed 500 million devices a year by 1988.

The technology, DM Data stated, is at the sampling stage, with newcomer Western Electric leading a pack of U.S. companies that includes Motorola, Inc., Texas Instruments, Inc., Intel Corp. and National Semiconductor Corp.

On the Japanese side, Hitachi Ltd. is thought to be out in front, with Fujitsu Ltd. and Nippon Electric Co. in close attendance. The British company Inmos, backed by government funds, and Siemens Corp. of West Germany are the European contenders.

"Assuming that the usual electrical specifications such as speed match the market demands, the winners will be determined by their approach to the design, the use of redundancy and the resultant die size," claimed Howard Dicken, president of DM Data.

Shakeout by Late '84?

For this product with die sizes in the range of 50,000 to 75,000 square mils (thousandths of an inch), the wafer-probe yields in full production will initially range from 5% to 20%.

According to Dicken, to improve the effective die yield and lower the cost, most vendors are using redundancy, making extra columns of memory available that can be programmed to replace defective components. This is accomplished by adding extra columns of memory cells and applying some type of laser programming to switch to the good sections.

The extra testing and reprogramming adds to the manufacturing cost of the wafer, Dicken said, and eventually there is a trade-off between this added cost and yield improvements. Dicken asserted the cost of manufacturing will become prohibitive for several companies, and he predicted a shakeout in the market by late 1984.

"Although several Japanese companies are ahead in offering samples now, the first designs on the market are not always the final leaders," he warned.

The companies to watch, Dicken added, are those gambling on starting with a nonredundant design. "If their initial yields are high enough, they will eliminate the retooling costs and have a one- to two-year lead on the experience curve for that design," he explained.

(Continued on Page 86)

Things Not Going Well This Year for IPL

By Tom Henkel
CW Staff

WALTHAM, Mass. — Sagging sales and technical problems with a new processor have made 1983 a year Steve Ippolito may want to forget.

Ippolito's firm, IPL Systems, Inc., is expecting to post its third straight quarterly loss for the period ending Oct. 1. The loss, which the firm estimates will be about $1.1 million, comes on the heels of IPL's announcement that it will delay first shipments of its recently announced IBM-compatible 4480 processor [CW, Feb. 14] until glitches with the parallel processor are resolved.

Joking in a recent interview that it would be hard for things to get much worse, Ippolito admitted his firm may have made some mistakes over the past year. "But even if we had done everything perfectly, there would still have been a loss," Ippolito said, noting that the IBM-compatible business is cyclical and firms have to be ready to take the good years with the bad.

Until 1983, IPL was riding high on 24 straight profitable quarters ending in 1982, when the firm finished off the year with net earnings of $277,000. But business took a downturn in 1983. The first quarter, IPL posted a $247,000 net loss. The second quarter brought a $327,000 net loss.

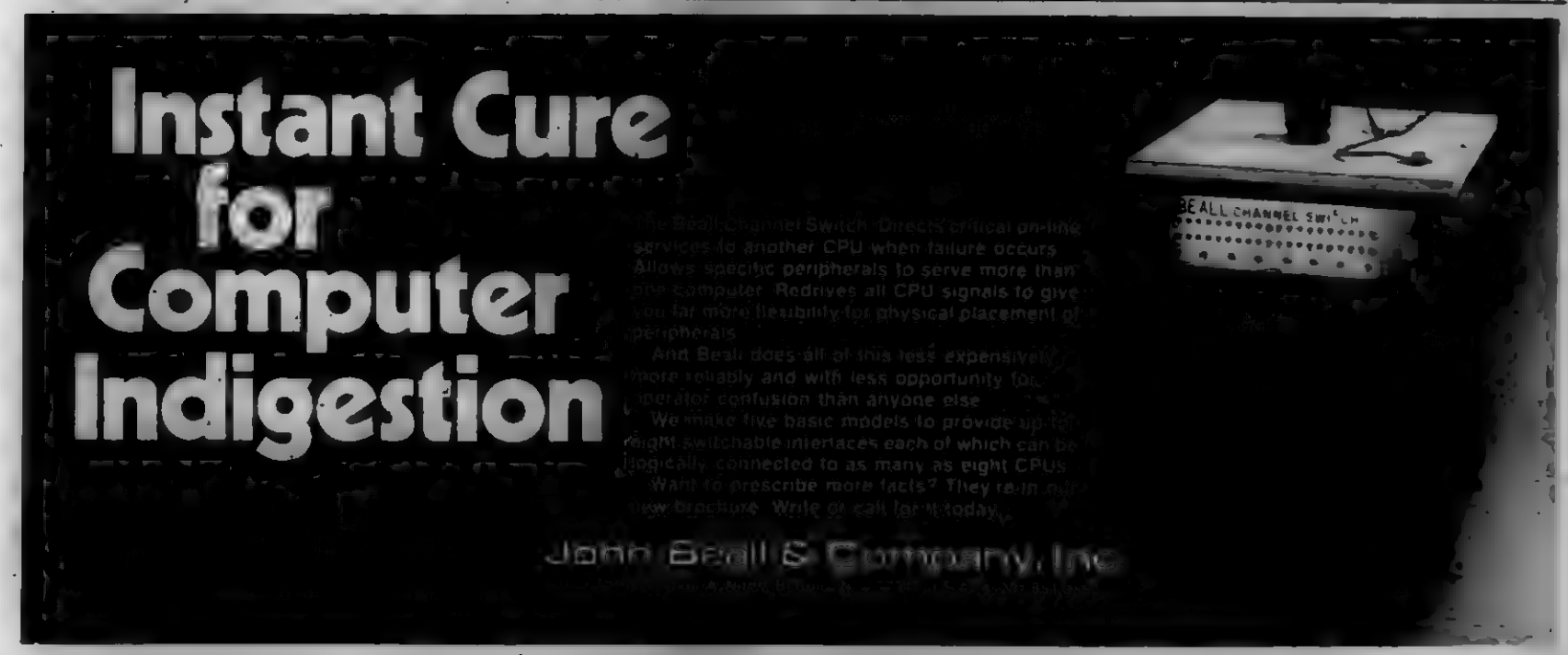
Timing has played a pivotal role in IPL's problems. With the summer typically a slow time for processor purchases, Ippolito said IBM's selection of September to announce the 4361 and 4381 caused what little interest there was in 4300-compatible systems to bottom out.

That slump, Ippolito maintained, has affected not only IPL, but also its competitors.

(Continued on Page 85)

CW File Photo

'Up until now we have been pretty good at making our deadlines. Personally, it bothers me — I don't like to slip a schedule like that,' IPL Systems President Steve Ippolito said recently of the 4480 shipment delay.



NCR Posts Record Earnings in Third Quarter

By David Myers
CW New York Bureau

NEW YORK — NCR Corp. enjoyed record profits in the third quarter as mainframes continued to pace earnings while the firm's fledgling semiconductor works broke even, Charles E. Exley Jr., president and chief executive, told a meeting of security analysts here last week.

The Dayton, Ohio-based computer maker earned $70 million in the third quarter, an amount that included an $8.4 million sale of securities. With that item removed from the total, NCR still earned 23% above its $50.1 million bottom line in the third quarter of 1982.

Asked by an analyst at the meeting if it would be "fair to say that these are the best results since you joined the company" seven years ago, Exley said, "Yes," lit up a cigar and grinned.

"NCR is a financially strong company not dependent on any one product or any one market. We traditionally describe our performance in adjectives — good, very good, substantial, very substantial. We have used our maximum adjectives in describing our third-quarter order gains," Exley said.

NCR sold just under $878 million worth of its 250 different types of products during the third quarter, a 5% jump over its third-quarter sales last year of $840.1 million.

Exley declared that the strength of the U.S. dollar overseas "continued to affect adversely our revenues and income," especially in Europe.

Asked what "adverse developments" might shave the company's profit margins next year, Exley listed growing strength of the dollar, unexpected price erosion and a shortage of semiconductors forcing NCR to go to electronics distributors for parts.

In other replies to analysts' questions, Exley said NCR would not enter the home computer market, has no plans for acquisitions and expects to announce shortly a pilot installation of self-service ticket terminals with "a major airline."

He also said NCR plans to expand its office automation offerings by "focusing on integrating products" and is seeing the first strong returns from the sales team it formed to go after Fortune 500 accounts, where, Exley admitted, the company had "until now been lightly represented.

"We do not have in mind entering the home computer market," the NCR chief declared, describing the firm's recently unveiled personal computer as a business professional's machine. But Exley acknowledged that two dozen entrants in that niche of the market confront NCR with "a challenge to stand out."

'Leg Up With Dealers'

But Exley said that NCR's name would give it a leg up with dealers, and "nobody is worried about our going out of business. That has become a factor of some importance in choosing a personal computer," he noted.

Allowing that his company is cash rich, Exley nevertheless said NCR has no plans "at all for acquisitions. Speaking as an individual, I'm not particularly acquisition-minded."

Even so, he pointed out that under its recent reorganization into three main business units — production, marketing and product integration — NCR is better equipped to handle acquisitions than before.

In the first nine months of the year, NCR's profits climbed by 23% to $173.2 million from $140.4 million in the same term last year. Sales for the period increased by 5% to $2.59 billion from $2.46 billion in 1982.

Analysts at the meeting described Exley's presentation as "generally upbeat.

"The only question is whether he'll be able to ship products," one analyst said, noting that Exley had mentioned a creeping shortage of flexible disks in informal chats before the meeting. "If his orders remain as strong in the fourth quarter as they were in the third, he may exhibit some product shortages."

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Predicts 50% Annual Growth Rate

IDC Sees Swelling Market for WP Applications

By Peter Bartolik
CW Staff

FRAMINGHAM, Mass. — With only one in five white-collar workers today using an electronic keyboard device of any type, the market potential for word processing applications from independent suppliers will result in a 50% annual growth rate compounded over the next five years, according to a study recently released here by International Data Corp. (IDC).

"Packaged Software: Value-Added Opportunities in the Office," a 102-page report by IDC's Continuous Information Services, concluded that as the capabilities of different hardware converge, software is becoming the key to office automation.

However, the market is said to be in a state of transition, with vendors casting about "trying to decide which office tasks are hot items to automate and what should be integrated with what."

At least 70% of all U.S. businesses are presently using typewriters for text handling functions, according to IDC, leading to increased competition in the hardware market.

Wang Laboratories, Inc.'s 50% share of the clustered WP market is being squeezed by minicomputer industry leaders such as Digital Equipment Corp., Prime Computer, Inc. and Hewlett-Packard Co.

More than half of all word processing done today, IDC estimated, is done on systems other than dedicated word processors, and the percentage is expected to rise through the rest of this decade.

"This is because word processing software designed for general-purpose data processing equipment is better than it used to be and because the hardware suitable for small-scale word processing is getting cheaper," according to the report.

Software to Increase

Office software is expected to increase from 7% of the applications solution software market in 1982 to 9% in 1987, IDC said.

While hardware vendors "may be in a better position to offer maximum integration with their operating systems and with the software libraries they presently possess," according to IDC, applications software has traditionally been the domain of independents, "and there is no indication that this will change significantly in the next five years."

In the large system market, the report noted that "in both word and action, the hardware manufacturers have clearly indicated that their future growth rides on the successes they chalk up as major software suppliers."

The impact of personal computers has had a significant impact on the marketplace, IDC said. "[Personal computer] vendors and independent software companies realize that the market for word processing capability far exceeds the market for dedicated word processors, and they are furiously developing word processing packages for the [personal computer]."

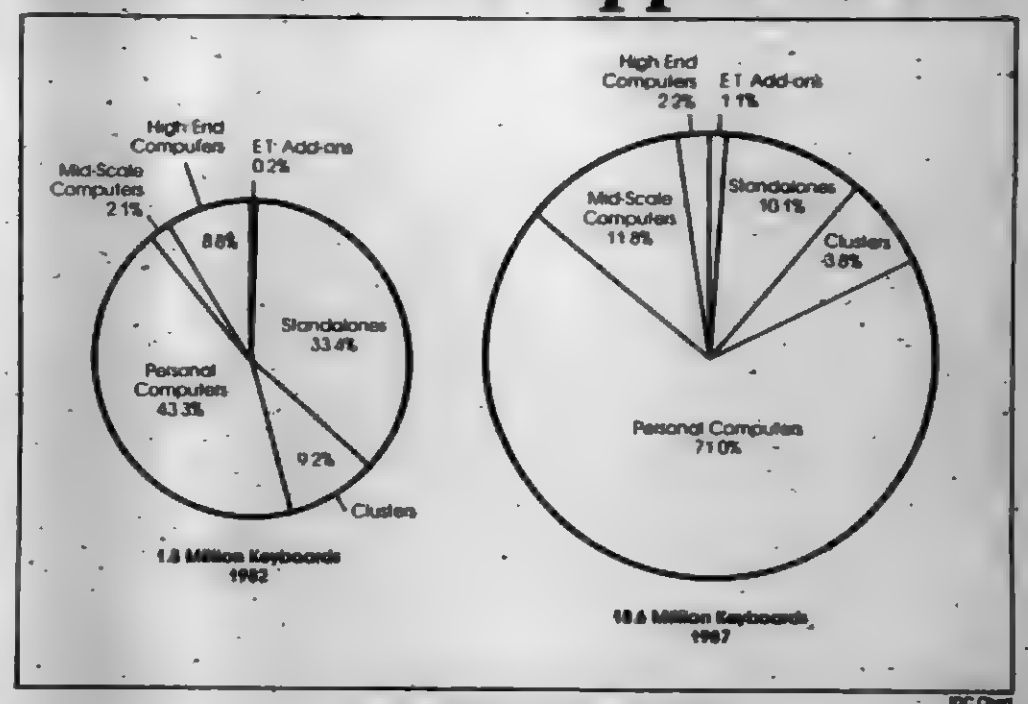
Integration of WP and DP is a central issue in the office automation market, with management workstations "where the action is in the 1980s," according to IDC, and the integration "is particularly a software issue."

It is expected to be a fierce market, IDC said, and while few word processors installed to date are genuinely multifunctional, IDC expects that 80% of the installed base will be capable of performing multifunctional tasks by 1987.

IDC projects graphics software packages and intelligent graphics terminals for use as office-type applications should average 40% to 50% growth rates over the next several years and that the personal computer graphics market should experience revenues in the $50 million range in 1987.

While word processing will continue to be the most popular application in office automation software — presently 95% of total office packages — IDC sees a potential challenger in the development of data base management systems, which "is a market with overwhelming growth potential as the amount of electronically stored information continues to increase."

More information on the study is available from IDC, 5 Speen St., Framingham, Mass. 01701.



The Total Word Processing Market

IPL to Post Loss Again

(Continued from Page 83)

National Advanced Systems, Inc., Cambex Corp. and, to some degree, Magnuson Computer Systems, Inc. (which had filed for protection from creditors under Chapter 11 last spring). In fact, Ippolito said, until the 4361 and 4381 announcements, even IBM was having trouble selling 4300 systems.

As if slow sales were not bad enough, September brought another disappointment for IPL. With early versions of the new 4480 ready for delivery, IPL engineers discovered a problem with the dual processor, which did not allow the two central processing units to communicate properly with each other. The firm was forced to delay the first scheduled delivery of the machine. That delay boosted the firm's expected third quarter net loss by about $500,000.

"This is the 4480 that doesn't work," Ippolito said, pointing to a test system in IPL's Waltham, Mass., manufacturing facility.

IPL expects to resolve the problem with the 4480 before the end of the year; but Ippolito is concerned the delay may already have damaged IPL's reputation.

"Up until now, we have been pretty good at making our deadlines. Personally, it bothers me — I don't like to slip a schedule like that," Ippolito said.

But in spite of problems over the past yeas, Ippolito said IPL and the mid-range IBM-compatible business are poised for another growth period. In Ippolito's estimation, IBM has booked a backlog for 4361 and 4381 systems that it will not be able to fill quickly. If that happens, users will start turning to plug-compatible manufacturers' (PCM) systems to fill their needs.

"The market is enormous," Ippolito said, adding that since most industry watchers believe IBM's 4361 and 4381 processors will be the last additions IBM makes to the now aging 4300 line, more users will turn to plug-compatible versions of the 4300, which offer a better price/performance ratio than IBM. "We keep IBM honest," Ippolito said, noting that until PCMs started making products that competed with the IBM lineup, IBM was free to charge virtually anything for its systems.

This announcement appears as a matter of record only.

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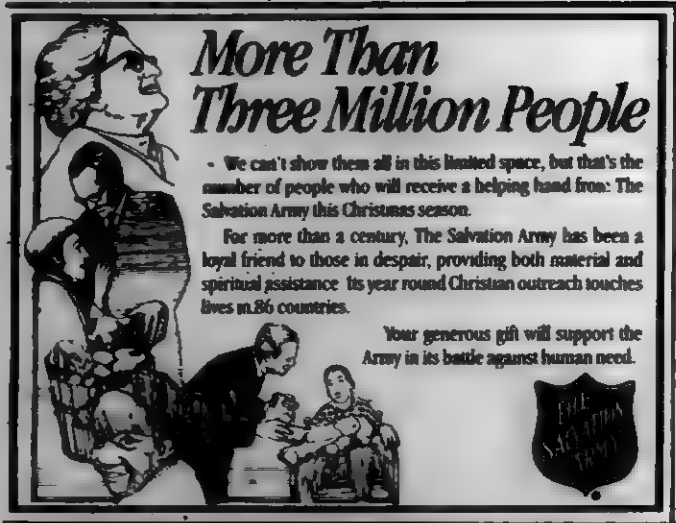


Communications Services Sales Up

MCI Posts 51% Revenue Gain

WASHINGTON, D.C. — MCI Telecommunications Corp. posted a 51% revenue gain for its quarter ending Sept. 30 as sales of its communications services topped $396 million compared with $261 million a year ago.

Profits in the period jumped to $51.5 million or 22 cents per share, up 37% from the same quarter a year ago. Both profits and earnings showed lower per-quarter growth than in the last several quarters.

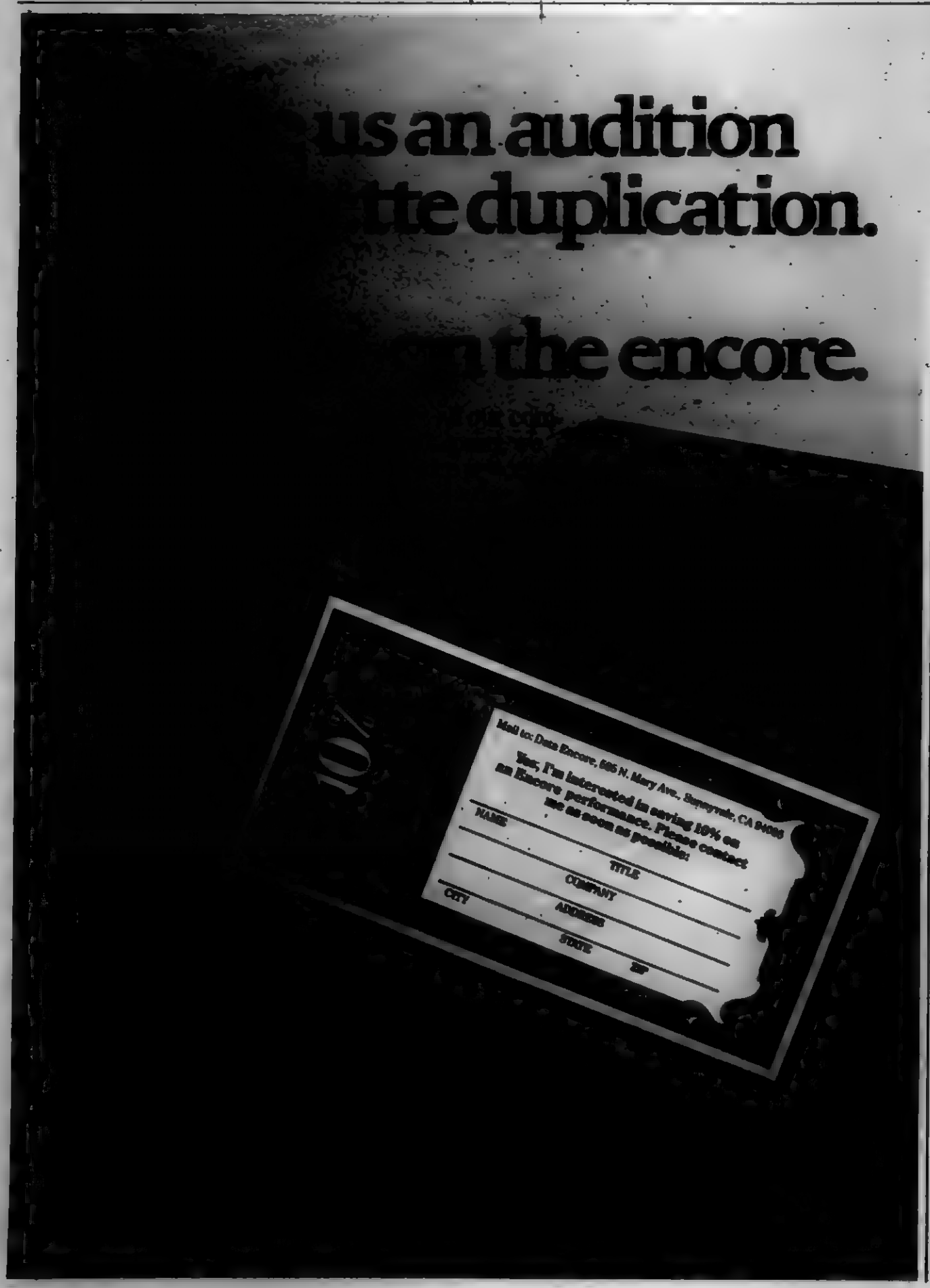
For the year ending Sept. 30, the company posted earnings of $202 million or 92 cents per share, up from $134 million, and sales of $1.4 billion.

Commenting on the results, MCI Chairman William G. McGowan said that an expanded market for MCI will become available as the breakup of the Bell system is implemented over the next three years.

"We are expanding our plant at a record pace and have increased our projected capital spending to $1.1 billion for the current fiscal year," he explained.

McGowan said the results for the recent quarter were negatively impacted by increases in access charges mandated by the Federal Communications Commission as well as by spending on new businesses, including the recently announced MCI Mail.

McGowan added that MCI's fiber-optic system between New York and Washington, D.C., would be operational by early 1984 and that additional communications circuits would become available as a result of the company's purchase of 12 transponders on the recently launched Hughes Aerospace Co. communications satellite.



Chip Race Heating Up

(Continued from Page 83)

Western Electric is the only U.S. company to have claimed to have produced 256K-bit dynamic RAMs in volume quantity, although the actual volumes are a closely guarded secret.

Tad La Fountain, senior analyst at Shearson/American Express, Inc., claimed the lack of commercial marketing experience in this sector will not be a hindrance to the AT&T subsidiary.

"Selling memory is a question of pure price. In the dynamic memory arena marketing is not so important since the product is easy to understand from a user point of view," La Fountain asserted.

Mike Krasko, special limited partner at L.F. Rothschild, Unterberg, Towbin, Inc. agreed.

"The existence of new players such as Western Electric means that, unlike the last memory cycle [64K], the Japanese and traditional U.S. merchant suppliers will have a stiffer run for their money than in previous product evolutions," according to Krasko.

Nevertheless, most analysts do not see the 256K-bit race as a make-or-break issue in the semiconductor market, although those companies whose technologies are memory-oriented, such as Mostek Corp. and Micron Technology, Inc., are thought to have more to lose.

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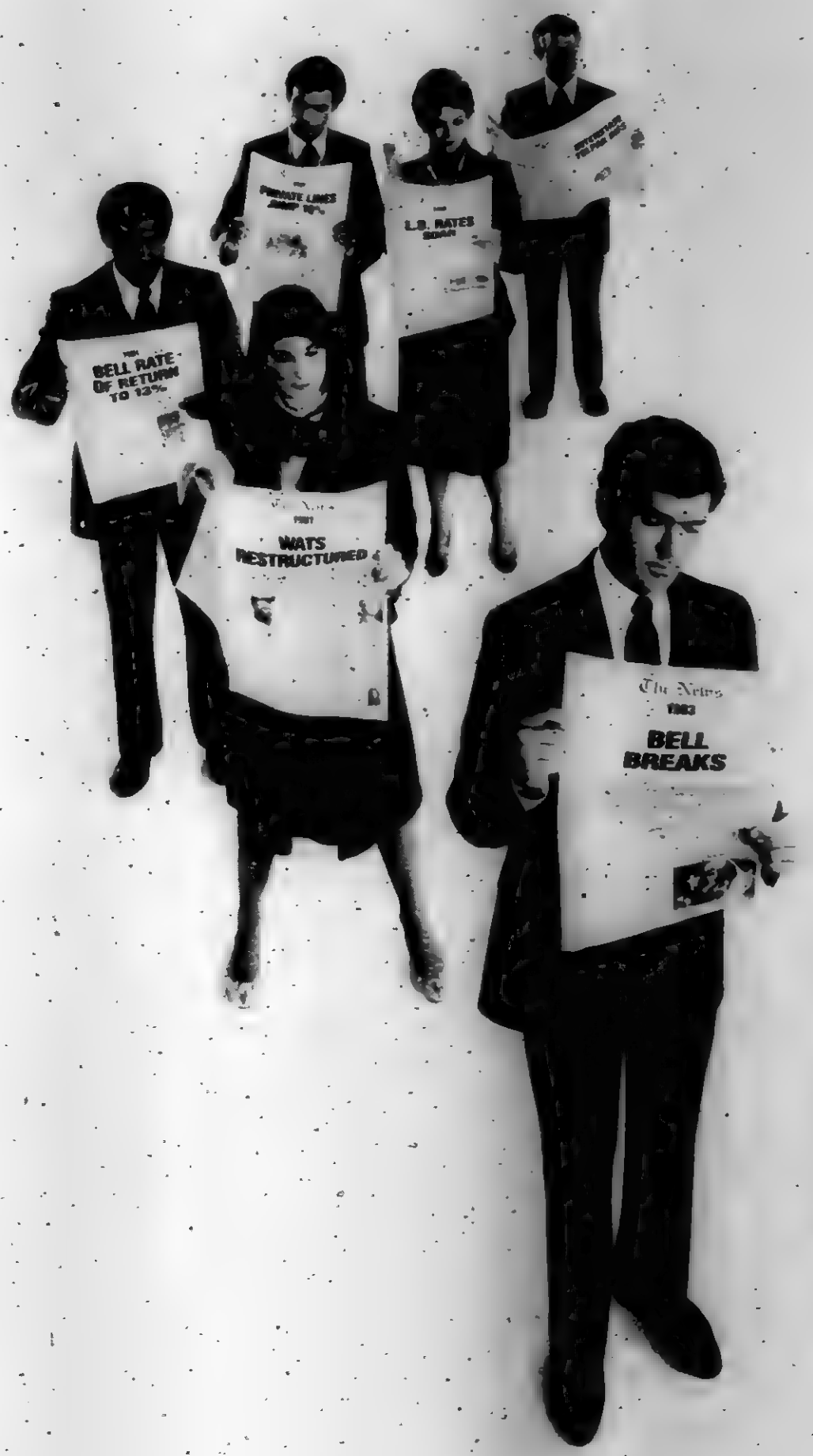

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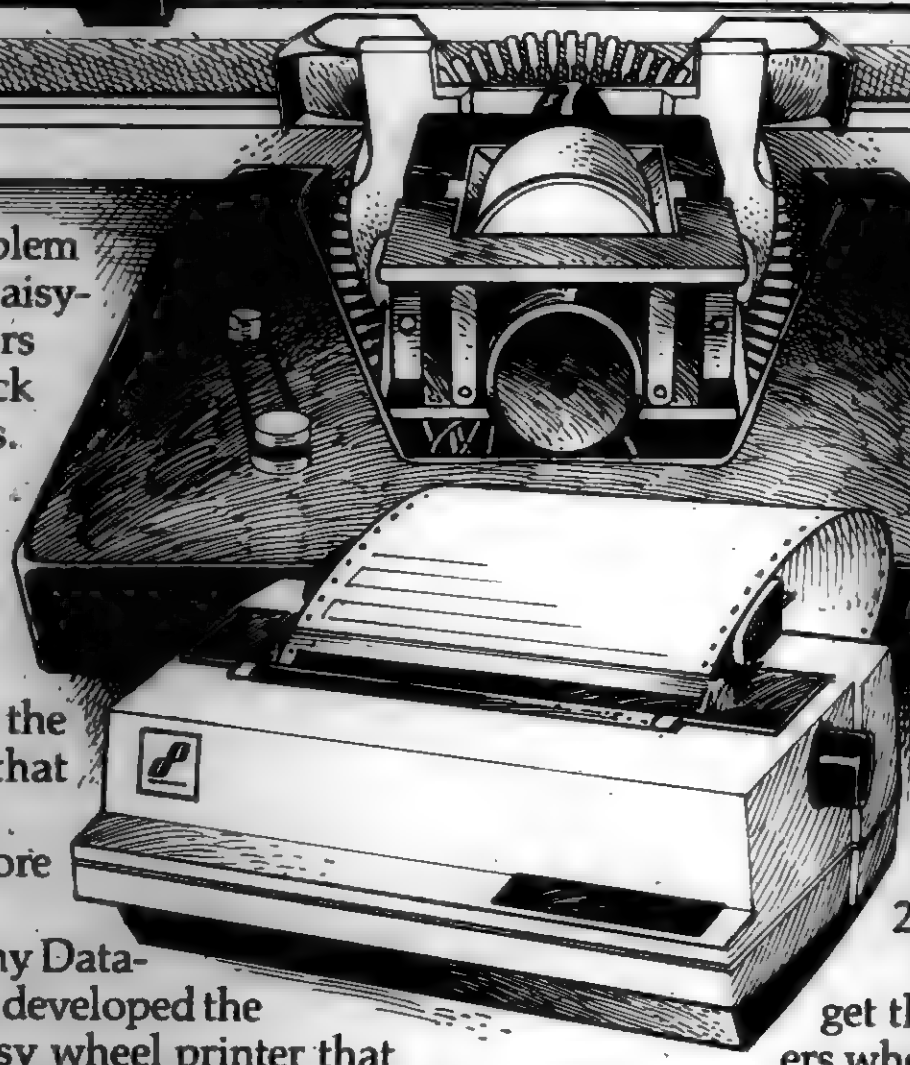

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Intel Earnings Hit $32 Million In Third Quarter

SANTA CLARA, Calif. — Like other of its brethren in the semiconductor business, Intel Corp. has posted significant revenue and earnings gains for the third quarter, reflecting the rising tide of semiconductor demand globally.

Earnings at Intel were $32 million or 29 cents per share, compared with earnings of $8.5 million a year earlier. Revenues for the quarter topped $292 million, a gain of nearly 23% over last year.

Commenting on the results, Gordon Moore, chairman and chief executive officer, said, "This upswing in demand is so great that orders for some products are well above our capacity to deliver, and we are working closely with customers to let them know how much product we can ship. Orders for Intel's microprocessors, microcontrollers and peripherals are especially strong."

Honeywell Plans Personnel Cuts

PHOENIX — As part of an overall restructuring to reduce production costs, Honeywell Information Systems' Large Computer Products Division will reduce its work force by 13%, or 500 employees, by the end of the year, the company announced recently.

Reductions will be achieved through a combination of layoffs, early retirements and transfers to other Honeywell divisions and will impact middle management, engineering and support personnel effective Nov. 3, the company said.

"We need to reduce our operating costs to remain competitive in today's marketplace," said Deward F. Manzer, the division's vice-president and general manager. "Streamlining operations and improving efficiency will position us to maintain our success in the long term."

Meeting to Focus On New Firms

PORTLAND, Ore. — The Second Annual Symposium for Emerging Companies, sponsored by members of the Northwest financial business community, will be held Nov. 1-3 at the Marriott Hotel here.

The symposium will provide companies with the opportunity to meet venture capitalists, investment bankers and professional investors; meet in private with individual venture capital representatives for in-depth discussion of prospects; and make important contacts for future financing needs.

The registration fee is $400 and allows one to three members of a company's management team to attend. The fee includes all registration materials, a cocktail reception, continental breakfast and lunch.

Further information is available by contacting Symposium, 1200 Benjamin Franklin Plaza, Portland, Ore. 97258.

Quarterly Sales Top $9 Billion

Big Blue Reports 25% Earnings Jump

ARMONK, N.Y. — IBM's strong sales growth continued on track in the third quarter as the company reported an earnings increase of nearly 25% to $1.3 billion or $2.14 per share. Sales in the period were up 15% to $9.4 billion compared with $8.2 billion the same period a year earlier.

As further evidence of IBM's emphasizing a sale-over-lease strategy, equipment rentals dropped nearly 20% in the quarter. Analysts were uncertain if the bulk of this decline was being taken up by the company's leasing subsidiary, IBM Credit Corp.

For the nine-month period ending Sept. 30, IBM's worldwide earnings were up 24.5% over the same period in 1982 to $3.6 billon. Sales in the first nine months jumped 17% over the same period last year to $27.2 billion. The only decrease shown on the report was a 15.1% decrease in rentals, again the apparent reflection of the company's efforts to discourage leasing arrangements by making outright purchases more attractive.

Chairman John R. Opel said the growth in earnings was due "both to strength in shipments of IBM products and services and to continuing improvement in the company's operating margins."

Worldwide net earnings for the first nine months of 1983 were reported to be $3.6 billion, up from the $2.9 billion reported for the same period in 1982. Net earnings were $5.98 per share, up 22.3%, based on 605.8 million shares. After-tax margins increased to 13.3% for 1983, up from 12.5% reported in 1982.

Opel said that shipments have been high for the 3380 disk storage device and that display products 3278, 3279 and 3178 continue strong. The 3080 series is being shipped at a high rate, and shipments of the largest in the series, the 3084 processor, began in September, Opel said. The company said it has experienced enthusiastic response to the IBM System/36 and is pleased with the success of the IBM Personal Computer.

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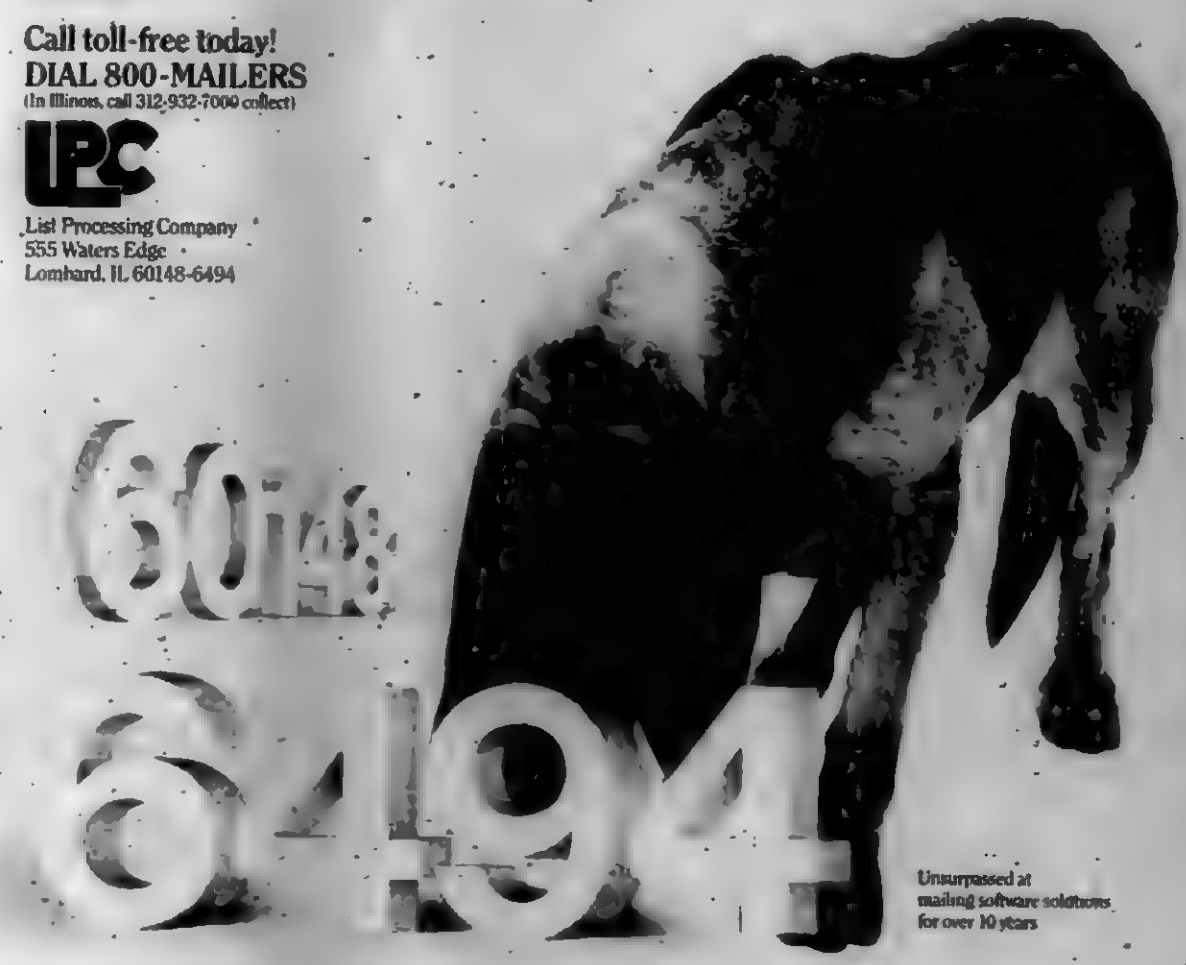

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Company Mines New Distribution Channel By Holding Fairs for Exchange of Micros

By Robert Batt
CW West Coast Bureau

PALO ALTO, Calif. — The burgeoning growth of microcomputer usage in large organizations is leading to an increasing variety of distribution channels for the data processing professional.

One company that has taken advantage of this growth is Computer Swap America, a private company based here which specializes in holding computer fairs where vendors and users can meet to deal in both new and used equipment.

From a modest beginning in 1976, when 30 vendors and a few hundred people attended the first show, Computer Swap America has grown into a healthy $1 million enterprise with four shows a year in California, the last one in Silicon Valley attracting some 200 vendors and 5,000 users. Now the company plans to go nationwide next year with some 48 shows in 12 different cities.

According to John Craig, founder of the company, attendees at the shows are computer and science engineers, programmer/analysts, DP managers, other executives, students and educators. They pay a $5 entrance fee and are then left free to bargain hunt.

"These shows are primarily for the technically capable. Most buyers of personal computers need the full service and support offered by local computer stores. Others, however, are technically oriented in buying and maintaining personal computers and can, therefore, avoid paying the full price," Craig explained.

According to Craig, the shows are eight hours of "high-intensity, no-frills buying and selling."

Vendors who have exhibited their wares at Craig's exhibitions are usually computer manufacturers, software producers, distributors and retailers. They include companies such as Hewlett-Packard Co., Zilog, Inc., Satellite Receiving Systems, Computerland and Atari Corp.

Used Peripherals

Much of the trading, Craig said, is in used peripheral equipment, with disk drives, printers, circuit boards and CPM software in heavy demand.

According to Craig, new IBM and Apple Computer, Inc. personal computers are also sold, with some mail-order companies, he claimed, netting $20,000 in cash during a day-long show.

Although some minicomputer equipment — mostly related to Digital Equipment Corp. PDP-11 machines — has been traded, most of the activity is related to micros, with few buyers spending over $1,000.

"From the vendor point of view these shows offer the chance to sell off surplus stock as well as top-of-the-line merchandise without having to be concerned with follow-up service and support. From the user point of view, he is offered a mix of vendors offering personal computers and peripherals at bargain prices," Craig added.

As the personal computer market heats up and an industry shakeout begins, such shows, Craig said, can be expected to increase in number, appealing in particular to distributors who are left with equipment from a company that is in trouble. At Craig's last show personal computers from Osborne Computer Corp. and Fortune Systems Corp. were much in evidence.

"The growth of these shows has followed the growth of the personal computer industry, and as new products come on-line, so the used equipment market will also grow, particularly in the IBM and Apple computer ranges," Craig asserted.

Many of the buyers, he said, are do-it-yourself people, experimenting in such areas as laser techniques and biofeedback systems.

On the other hand, a DP manager, for example, often uses the show to buy supplies for his company's stock of equipment. "The message is getting out that this is a viable marketplace," Craig concluded.

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New Companies

Ovation Technologies is a new firm that will develop and market business productivity software and integrated hardware for IBM and IBM-compatible personal computers. Ovation Technologies can be reached at 770 Dedham St., Canton, Mass. 02021.

Ultimate Computer Services of Denville, N.J., has opened branch offices at Two Executive Campus, Cherry Hill, N.J., and Two Penn Plaza, New York, N.Y., offering hardware support services in most IBM systems and peripherals.

Bellsouth Services is the holding company that will own and provide centralized support services for Southern Bell and South Central Bell following the breakup of AT&T on Jan 1, 1984.

Microelectric Business International has been formed by a group of former investment bankers, international financiers and Far East industrialists to establish Far East manufacturing operations for American electronics companies. Dr. George Koo, formerly an investment banker with Chase Manhattan Bank, will head up the new organization, which is located at 444 Castro St., Mountain View, Calif. 94041.

Lincoln Property Co. has formed **Lincom Corp.**, a telecommunications subsidiary that will design, install and manage telephone and other telecommunications within Lincoln commercial developments. Lincoln Property is located in Tampa, Fla.

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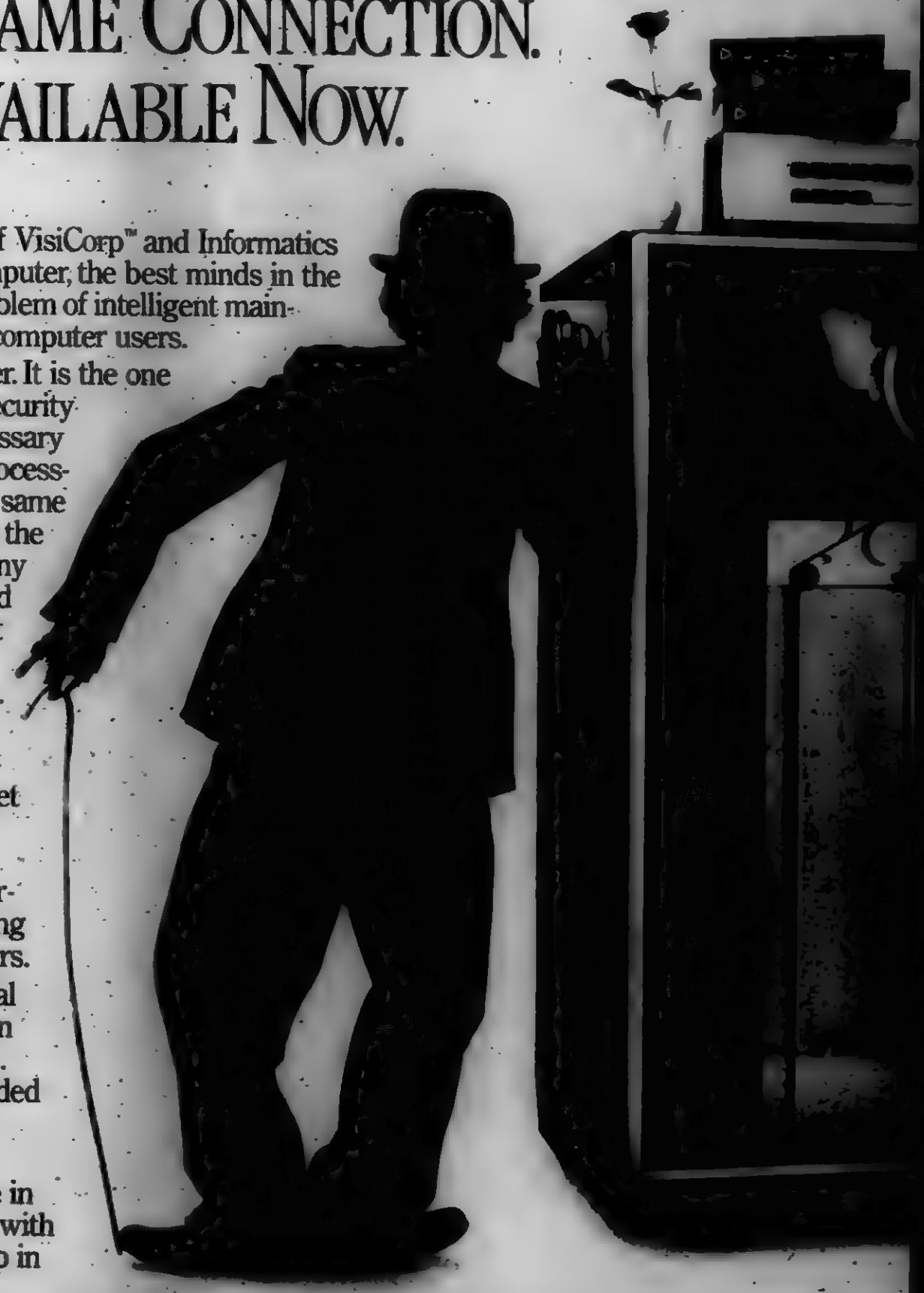

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Two Suppliers Claim Victor Owes $14.7 Million

By Patricia Keefe
CW Staff

Two suppliers to the financially troubled Victor Technologies, Inc. have revealed they hold accounts receivables totaling about $14.7 million from Victor.

The disclosure was forced by "wild" investor speculation about the amount of the receivables, according to a spokeswoman for the Chatsworth, Calif.-based Tandon Corp. The second creditor is said to be Xebec, Inc., located in Sunnyvale, Calif.

Victor owes Tandon about $12 million, primarily for products delivered on an open account basis from May through August, the spokeswoman said. The remaining $2.7 million in accounts receivables reportedly is held by Xebec and covers products shipped during the same time period on the same account basis.

Since Aug. 11, Tandon has been shipping to Victor on a cash basis, while Xebec reportedly has ceased shipments. Tandon is talking with Victor about continuing product shipments and payment of the past-due amount, the spokeswoman said.

Xebec reportedly has not yet determined the ultimate collectibility of the Victor accounts and is conducting similar talks with the troubled micro maker.

The Victor orders reportedly represent a small part of Tandon's business, although Tandon is said to be the sole supplier of 5¼-in. disk drives for the desktop Victor 9000 business computer. Xebec makes disk drive controllers.

Micro maker Victor lost $11 million in the second quarter and anticipated another loss in the third quarter. Victor also has laid off about 1,650 workers since last August, leaving the company with a work force of just over 1,000 employees.

Nickels & Dimes

Information Science, Inc. has filed a registration statement with the Securities and Exchange Commission covering a proposed initial public offering of 1,482,000 shares of common stock. The offer is being underwritten by a group led by F. Eberstadt & Co., New York, and Hambrecht & Quist, San Francisco.

$$$

Software AG Systems Group, Inc. has reported revenues for the first fiscal quarter of 1984 of $8.6 million, compared to $6.4 million for the same period last year, a 36% increase. Net income for the period rose to $1.1 million, or 18 cents per share, from $149,000, or 2 cents per share.

$$$

Anacomp, Inc. has reported fourth-quarter revenues of $31 million and a net loss of $11.5 million, or 95 cents per share, compared to revenues of $29.3 million and a net loss of $1.4 million, or 15 cents per share in last year's fourth quarter. For the year, Anacomp reported revenues of $172.2 million, with a net loss of $3.9 million, or 38 cents per share, compared with revenues of $109 million and earnings of $2.8 million for the prior fiscal year.

$$$

Analogic Corp. has reported sales of $128.8 million for the fiscal year ended July 31, up 22% over last year. Net income for the period rose 28% to $15 million, or 85 cents per share, compared with $11.8 million, or 20 cents per share, for last year.

$$$

Dataproducts Corp. has reported revenues of $91.4 million and net income of $3.4 million, or 17 cents per share, for the quarter ended Sept. 24, a gain of 8% in revenues and 36% in income over the comparable period last year.

$$$

Data Decision Computer Corp. has announced a 38% increase in revenues and a 57% increase in net income for the third quarter ended Aug. 31. Revenues rose to $26.4 million, up from $19.1 million for the same period in 1982, while income rose to $1.5 million, or 19 cents per share, from $957,000, or 14 cents per share.

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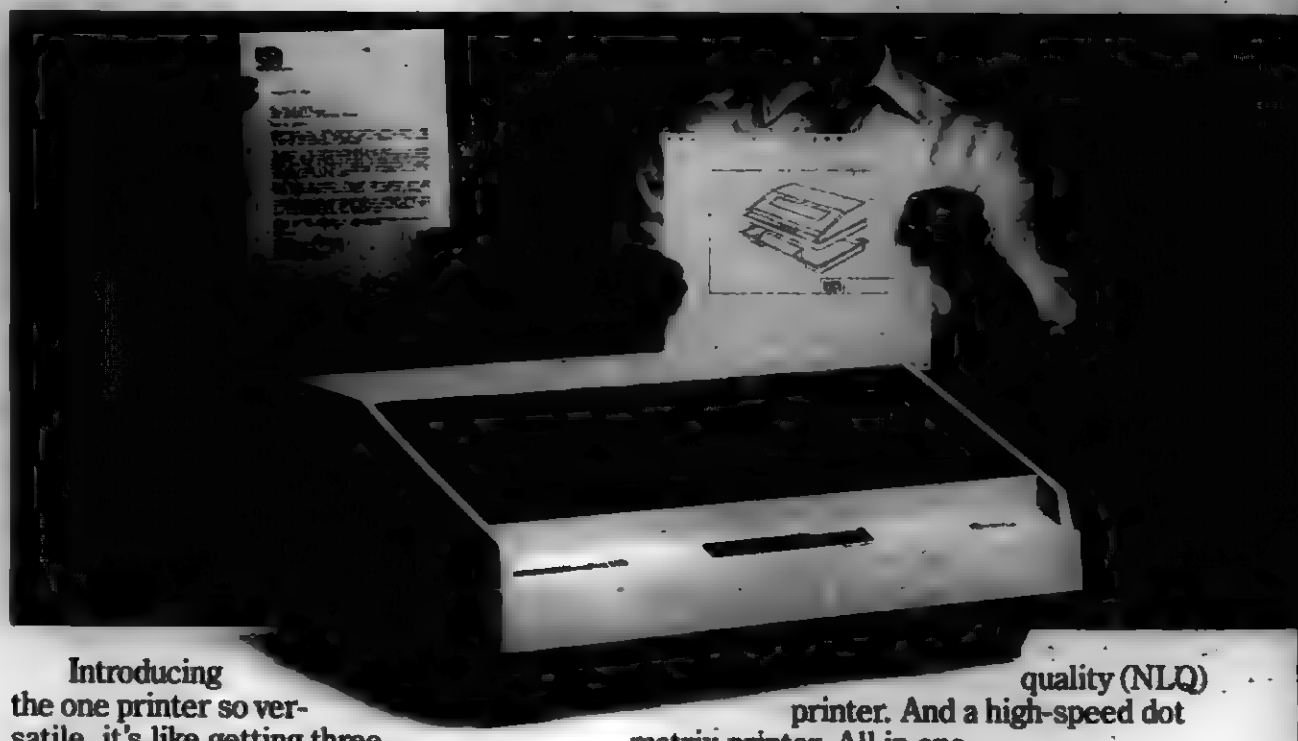

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Aggressive Strategy Planned

GE Sells Printer/Relay Arm to Its Management

By Peter Bartolik
CW Staff

WAYNESBORO, Va. — Boosted by financial commitments from two New York investment firms, the former Data Communications Products Business Department of General Electric Co. "will be aggressive," according to its new president.

In a transaction officially unveiled last week, the department was sold to the operation's management group in a leveraged buyout that reportedly is valued at $50 million.

Curtis Powell, former general manager of the department, was named president of Genicom Corp., which will continue to manufacture data communications printers and relays.

In an interview with *Computerworld*, Powell said the buyout was the only feasible option among several opportunities that had been considered over the last two years since GE refocused its operations under Jack Welch, board chairman.

The operation did not fit in well with GE's alignment since it sold its computer vending operations and for the last two or three years has been shifted around in the corporate organization, Powell said.

Under the GE philosophy, he said, "we had to look at what it would take to get to No. 1 or No. 2 or to get a technical leadership position." When other alternatives were judged not to be attractive, Powell made the purchase offer with the backing of the investment firms of J.H. Whitney & Co. and Welsh, Carson, Anderson & Stowe. Several of the division's managers will receive shares in the new corporation, Powell said.

Powell said the new entity will be aggressive. "The commitment is to make it successful," he said. All relevant patents have been transferred to the new company, Powell said, adding, "Basically, we have the talent, the patents and the technology."

With revenues in the range of $130 million last year, the company is the third largest domestic printer supplier and has experienced solid growth, Powell said. Orders for the company's relay products were up 45% in the first nine months of this year, he said.

The nonimpact printer that GE for so long was supposed to bring out has not been financed by the division since 1979, Powell said. "I wouldn't dust it off," he added quickly, saying the new company is going to have to market a nonimpact printer.

He said the GE prototype, developed in a GE lab and assigned to the division, was funded heavily from 1977 to 1979 and drained resources from the division's core products. "During a 1979 review, we indicated we could not meet our objectives and fund the nonimpact printer," he said.

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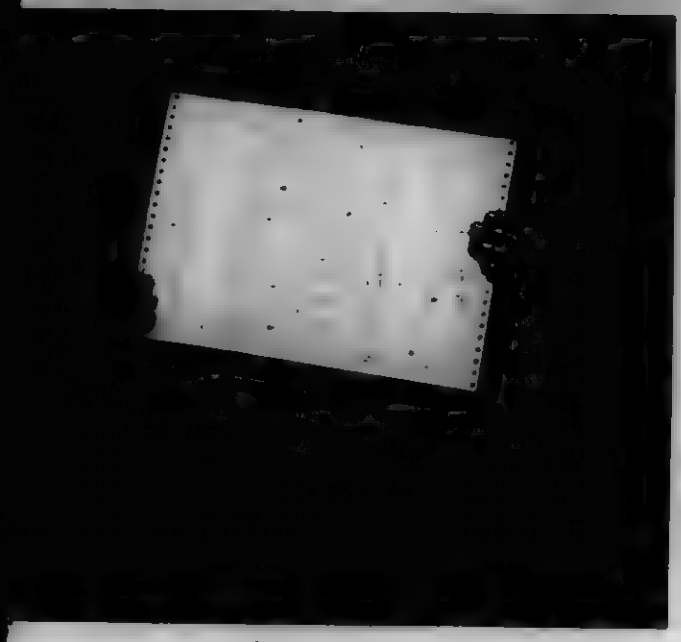

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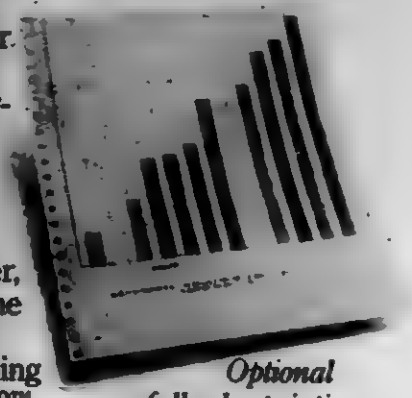

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Mergers & Acquisitions

Automatic Data Processing, Inc. has acquired a portion of **Computer Sciences Corp.'s** business services operations for an undisclosed amount of cash plus contingent payments based on future business results. Included in the acquisition is the processing of payroll and other accounting services for more than 2,000 customers.

Fairchild Industries, Inc., Germantown, Md., has reached an agreement with **Insouth Microsystems, Inc.** of Auburn/Opelika, Ala. to acquire 51% of the privately held firm for approximately $6 million.

Bank of America has completed acquisition of **Managistics, Inc.**, a subsidiary of Chase Manhattan Bank. Details of the acquisition were not disclosed.

Semi Equipment at Issue

Shipper Out on Bail in Export Case

By Peter Bartolik
CW Staff

BOSTON — A New York shipping firm manager named in a federal indictment, along with his company and a Belgian native, was released on $100,000 surety after being arraigned here this month on charges of illegally exporting a semiconductor manufacturing device to a Soviet bloc country.

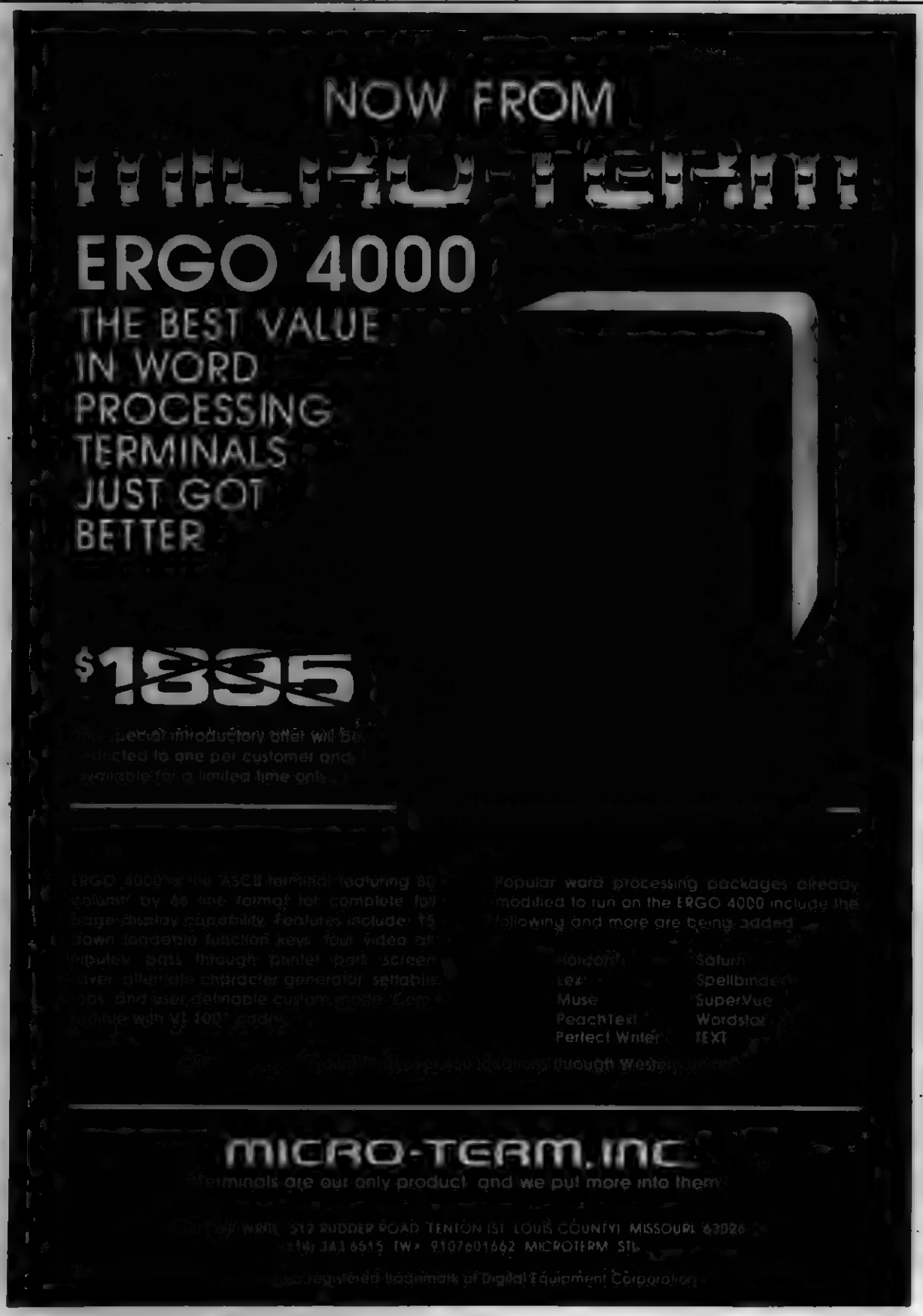
Michael Kolleczek, 24, reportedly a West German native living in Saddle River, N.J., pleaded innocent to six counts of export violations handed down in a grand jury indictment and was released after a $100,000 surety was made against a co-surety's real estate holdings, according to assistant U.S. Attorney Dennis Kelley.

Also charged with six counts was Joseph d'Haens of Antwerp, Belgium, who was arrested last August by Belgian authorities after reportedly falsifying a Belgian import certificate stating the equipment in question was for use in Belgium. Kelley said he did not know if d'Haens is still in custody.

The indictment alleges that, in March of 1982, the men shipped a GCA Corp. Mann 4800 Direct Step-On Wafer System (a photo optical mask-making device) from Boston to Hungary. The equipment allegedly was flown to Zurich on a Swissair flight and then trucked to Budapest.

The indictments charge Kolleczek and d'Haens each with conspiracy to violate the Export Administration Act, two counts of violating the act and three counts of making and filing, or causing to be made and filed, false statements to government agencies. If found guilty, Kolleczek, who is scheduled for trial Dec. 13, could face fines of more than $9 million and imprisonment of up to 25 years.

Kolleczek reportedly is the manager of Airfo International, Inc. of Jamaica, N.Y., which was also charged with three counts of violating the export act.



Book Contends Embargoes Strain Soviet Relations

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — American supporters of East-West trade said in a book released earlier this month that U.S. restrictions on trading with the Soviet Union serve only to aggravate already tense relations between the two countries.

The book, *Common Sense in U.S.-Soviet Trade*, appeared as the U.S. Congress began final debate on renewing the Export Administration Act, the primary instrument of government control over American exports to the Soviet bloc. The book, a collection of essays and reports, argued that properly structured trading relations between the two nations can benefit both societies.

"One reality we all should recognize is that there is no advantage in not doing business," Robert D. Schmidt, Control Data Corp. vice-chairman of the board, said in the book's forward.

'Ineffective' Policies

"The strategic relationship between U.S. and Soviet military power is such that we either must live with the Soviets on this planet or die with them. There is no point in aggravating our relations with the U.S.S.R. by punitive trade policies which are politically ineffective and economically self-destructive," he wrote.

Schmidt is president of the American Committee on East-West Accord, which produced the collection. The committee consists of some 400 members from the fields of industry, labor, science, academia, government and politics and journalism.

Several executives from IBM, Burroughs Corp. and CDC are committee members; CDC Chairman William Norris authored one of the essays in the book, which also includes a piece by former President Nixon and a Central Intelligence Agency report on Soviet economic strengths and weaknesses.

In his forward to the book, Schmidt cited U.S. government trade actions between 1970 and 1982 that, he said, have "seriously" impaired "the reputation of the U.S. as a reliable trading partner."

According to Schmidt: "Our export controls prevent the sale by U.S. companies of products and technologies which are available from other western countries. Our competitors are free to sell what we are not, and these sales are often products and technologies which command high prices because the socialist countries need these imports to supplement their growing industrial base.

"The manner in which we have administered export controls has not only damaged our economic interest, it is also manifestly clear that we have failed, through our embargo on a wide range of exports, to prevent the Soviets from achieving their economic and military goals," he said.

Common Sense in U.S.-Soviet Trade is available for $5 from the American Committee on East-West Accord, 109 11th St. S.E., Washington, D.C. 20003.

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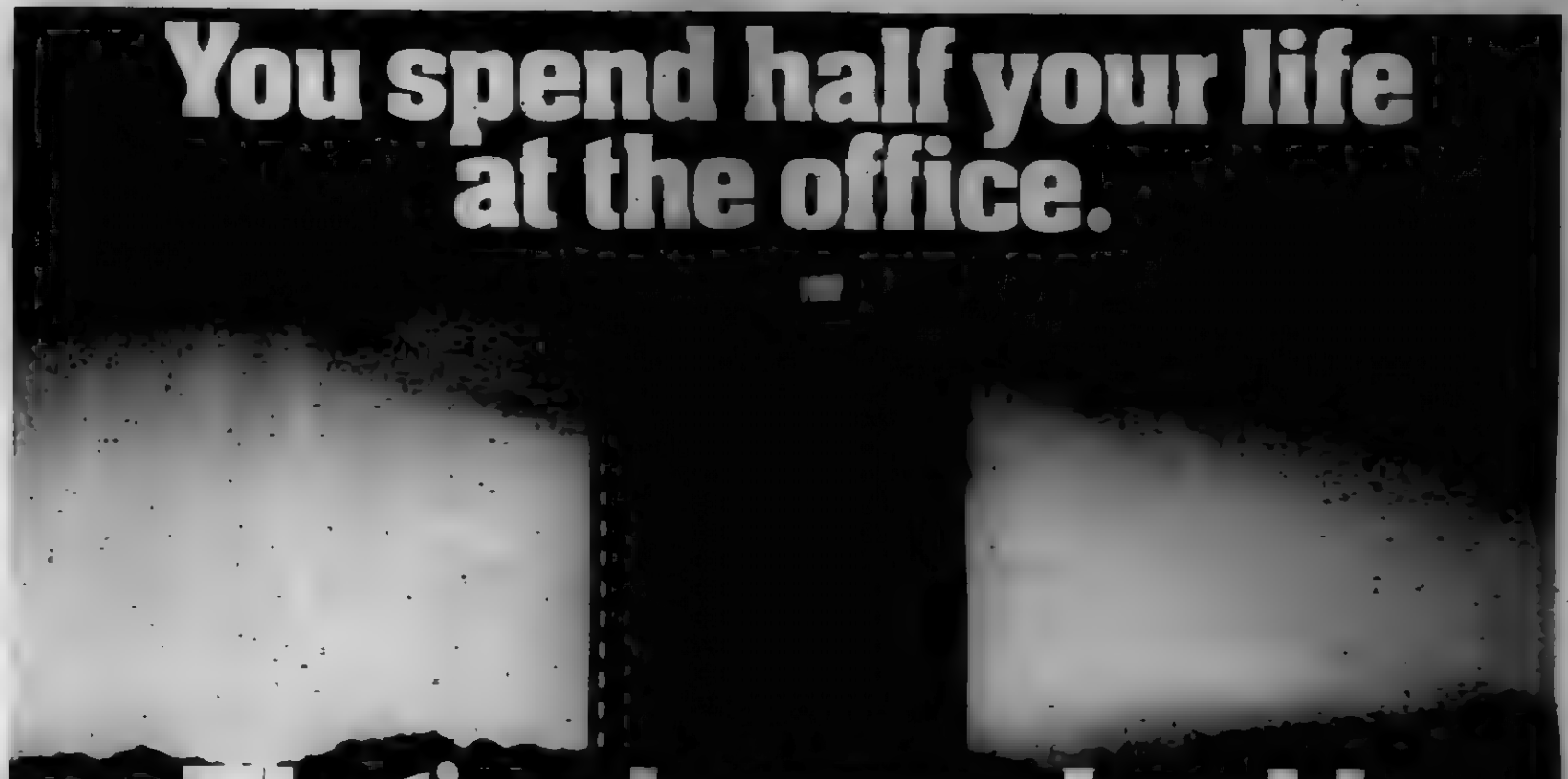

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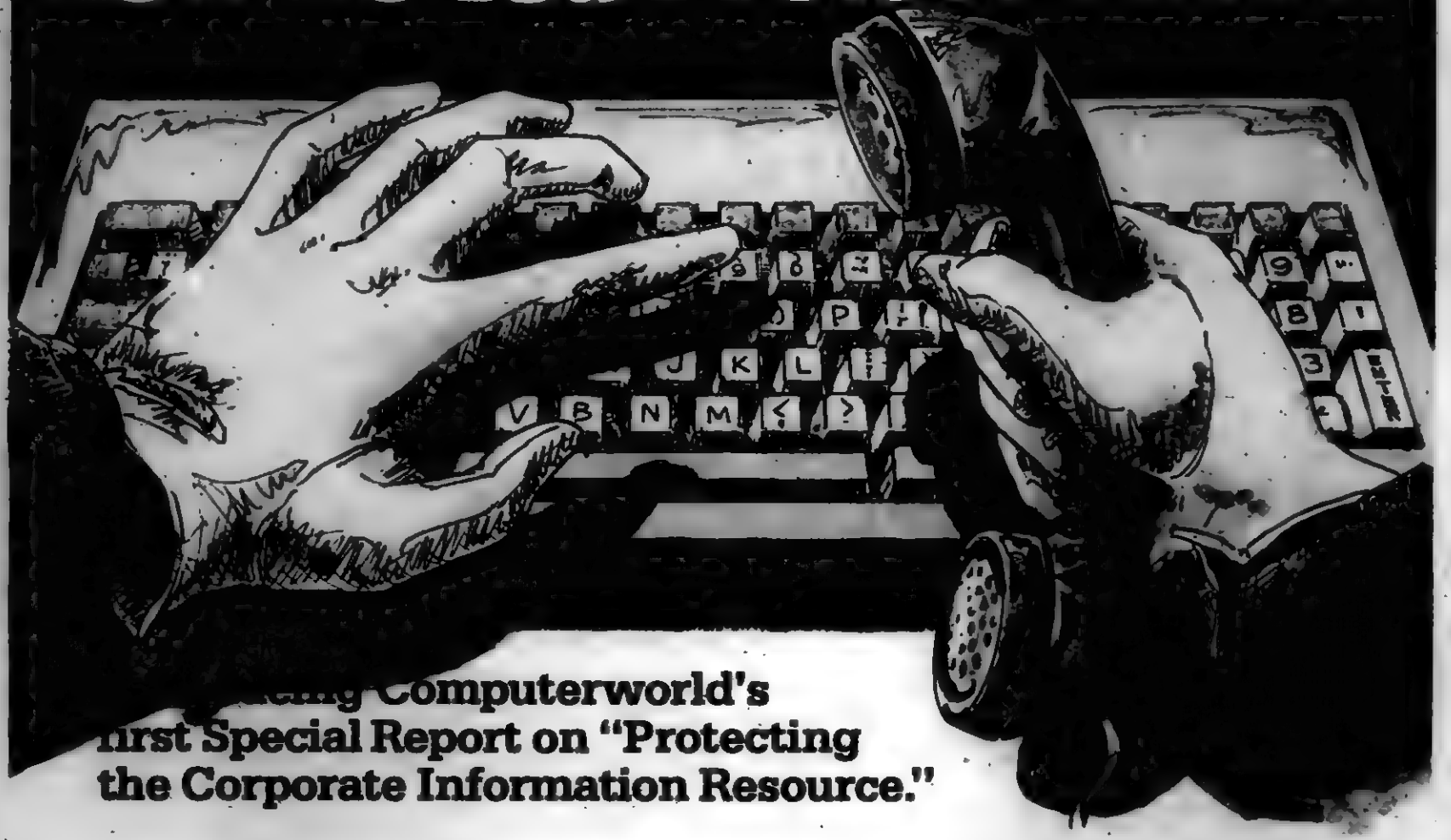

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"Protecting the Corporate Information Resource" will deal with security issues from electronic funds transfers to disaster recovery. You'll read about one company's contingency plan and another's experience with verifying operations problems at remote sites. We'll cover DP personnel security and DP security for micros. You'll get advice on contingency planning, and software protection devices.

If you need to know how to protect your company's MIS/DP assets — then ***Computerworld's*** first-ever Special Report on security issues is what you need.

Ad deadline for "Protecting the Corporate Information Resource" is November 11th. Call Don Fagan, Vice President, Sales/Marketing; Ed Marecki, National Sales Director or Kathy Doyle, Marketing Support Manager at (617) 879-0700. Or call one of the sales offices listed below:

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Seagate/Atasi Deal: A Double-Edged Sword?

By David Myers
CW New York Bureau

NEW YORK — Depending on whom you talk to, Seagate Technology, Inc. either paid too high a price when it agreed to buy Atasi Corp. for about $131.4 million or the acquisition will promote the newly combined company to the head of the disk drive class.

Scotts Valley, Calif.-based Seagate agreed in principle to acquire 7.2 million shares of privately held Atasi at $18.25 a share. Closing the sale still requires the drafting of a definitive agreement and approval of both firms' directors.

But analysts who spoke to *Computerworld* in the wake of the initial agreement were sharply divided on whether Seagate had struck a good bargain.

Raymond J. Bosso, an analyst at L.F. Rothschild, Unterberg, Towbin here, said Seagate's acquisition of Atasi's voice-coil technology makes the newly enlarged company "unstoppable at 5¼ inches." The Atasi technology gives Seagate the opportunity to go to 46M bytes, Bosso said.

Other Wall Street analysts, who asked that they not be named, said $131 million is too high a price to pay for advanced Winchester technology.

"You mean [Seagate] couldn't go out and hire some people? What this deal says to me is that Seagate felt the high end of the market would explode quickly, and it couldn't wait," one analyst said.

Big Losers

Analysts who favored the deal said privately that the big losers are Seagate rivals Micropolis Corp., Priam Corp. and Computer Memories, Inc. and Atasi competitors Maxstore, Vertimag Systems Corp. and Evotek.

Seagate increased its capitalization by 17% to bring off the deal.

Priam and Computer Memories are worth nearly the amount of Seagate's increased capitalization, analysts pointed out.

The acquisition of Atasi, which has said that it expects to be an $80 million company by next year, could make Seagate a $700 million vendor by 1987, according to enthusiastic analysts.

Comdex '83 Will Be Held Oct. 24-27

AMSTERDAM — Comdex/Europe '83, the second annual European conference and exposition for the computer industry's independent sales organizations (ISO), will be held at the RAI Congress and Exhibition Center here Oct. 24-27.

According to the Interface Group, Inc., the conference producer, more than 300 computer and computer-related companies are expected to exhibit, and total show attendance will exceed 10,000. Seven plenary conference sessions will be held to address a range of business, financial and marketing issues of relevance to European ISOs.

Comdex conferences and expositions are presented for independent sellers of small business systems products, including computer retailers, dealers, distributors, systems integrators, commercial OEMs, office machines and office products dealers and manufacturers' representatives.

Admission to the conference is $27. More information is available from the Interface Group, 300 First Ave., Needham, Mass. 02194.

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Getting your system in front of management is finally made simple.

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It is an asynchronous terminal that can also be configured to operate in IBM 3270 and other sophisticated computer environments. This flexibility gives users high speed access to a full range of corporate and public data bases.

The Displayphone terminal is an exciting example of Northern Telecom's commitment to the OPEN World—our approach to information management that combines telecommunications and computer technology in innovative ways to increase productivity, save time ...and money.

To find out how productive the Displayphone terminal can be for your company, call 800/621-6476. (In Illinois: 800/572-6724; in Canada: 800/268-9079), or send in the coupon.

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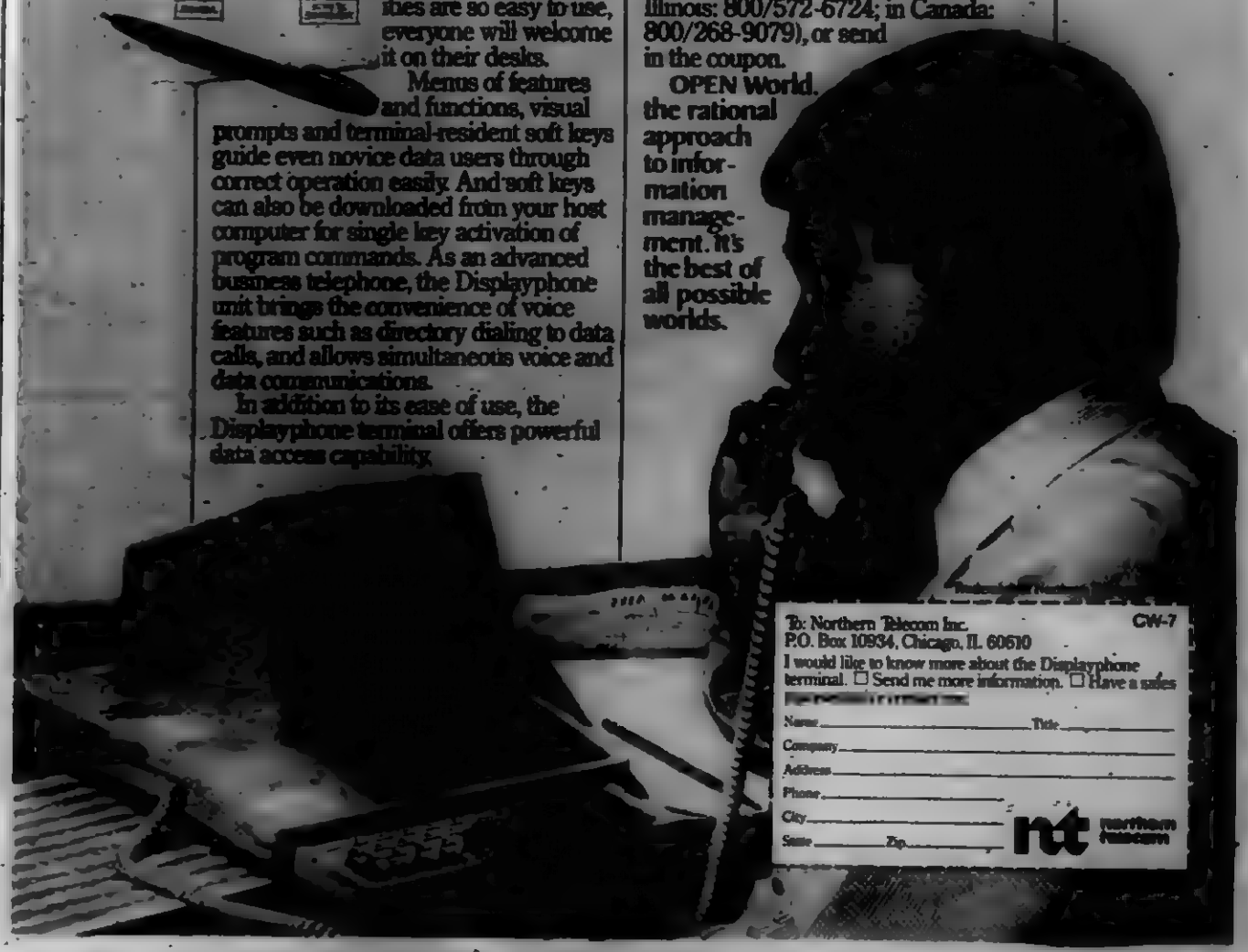

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Supershorts

Infocorp's recently released second quarter survey of retail computer stores revealed that the Apple Computer, Inc. Apple II and IIe were the easiest models to sell to the home and school markets while IBM dominated the business and professional markets. The quarterly survey monitors major product and distribution trends among independent and franchise chain microcomputer retailers and is based upon between 250 and 300 telephone and mail surveys across the country. The most widely distributed models were the Apple II, Apple IIe, Apple III, IBM Personal Computer, IBM Personal Computer XT and the Osborne Computer Corp. Osborne I.

• • •

Honeywell, Inc. will provide third-party maintenance for **Racal-Redac, Inc.** customers under terms of a recent agreement. In addition to the Honeywell service, Redac has field service engineers in Boston; Philadelphia; Dallas; Anaheim, Calif.; and Santa Clara, Calif.

• • •

NCR Corp. has donated hardware and software valued at nearly $1 million to Miami University. The NCR system will be used in the university's School of Business Administration.

• • •

Control Data Corp. plans to open nine stores specializing in microcomputer software in California by the third quarter of 1984. The stores, which will be patterned after Control Data Corp.'s Software Only Store, which opened a year ago in San Diego, will carry microcomputer software for businesses, schools and homes.

• • •

Intel Corp. is halving the die size of its industry-standard 64K byte electronically programmable read-only memory and is using a larger wafer to increase the production rate nearly fivefold in response to rapidly growing market demand and tight supplies.

• • •

Apple Computer, Inc. has begun shipping international versions of its Lisa personal computer in Europe, Australia and New Zealand. Lisa software and users' manuals are available in French, German and British versions now, with Spanish, Italian and Swedish versions scheduled to be released in 1984.

• • •

Nippon Telegraph and Public Telephone Corp. is accepting applications for research and development on four new products: integrated service fiber-optic subscriber system equipment, high-definition TV fiber-optic subscriber system equipment, one-way video communication terminal equipment and two-way video communication terminal equipment.

• • •

Burroughs Corp. has been awarded a $48.6 million contract by the Federal Bureau of Investigation for the installation of terminals and tempest-qualified printers in its Washington, D.C., headquarters and field offices in 61 U.S. cities.

• • •

Pixel Computer, Inc. has established a wholly owned subsidiary in the UK to handle sales, service and support of Pixel's family of 16- and 32-bit Unix-based supermicrocomputers in the U.S. The subsidiary, Pixel Computer UK, Ltd., will also provide technical support to Pixel distributors in Western Europe.

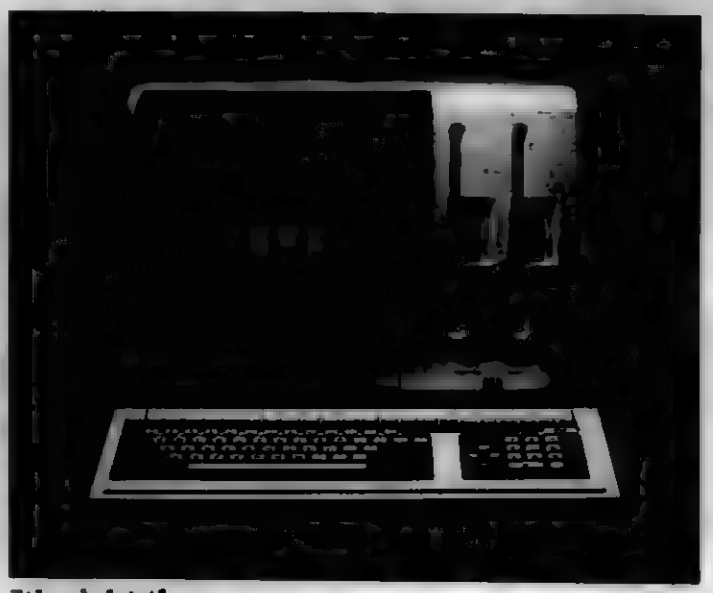
• • •

Harris Corp. has transferred its Information Systems International Division headquarters from Melbourne, Fla., to Geneva, Switzerland. Harris has also signed a merger agreement with **Lanier Business Products, Inc.** and will acquire the firm through the issuance of .525 of a share of Harris stock for each of the approximately 15 million Lanier shares presently outstanding.

• • •

Cray Research, Inc. has extended its design and development agreement with Seymour Cray an additional two years until Dec. 31, 1987. Under the agreement, Cray acts as an independent contractor, furnishing develop-

CAN YOU FIND THE IBM* 3278 HIDDEN IN THIS PICTURE?



It's right there.

Inside the Advanced Personal Computer from NEC Information Systems.

In fact, the Advanced Personal Computer is the best personal computer for direct connect 3278 emulation, with 3274 and 3276 controllers.

Get the advantages of personal computing plus direct connect 3278 emulation.

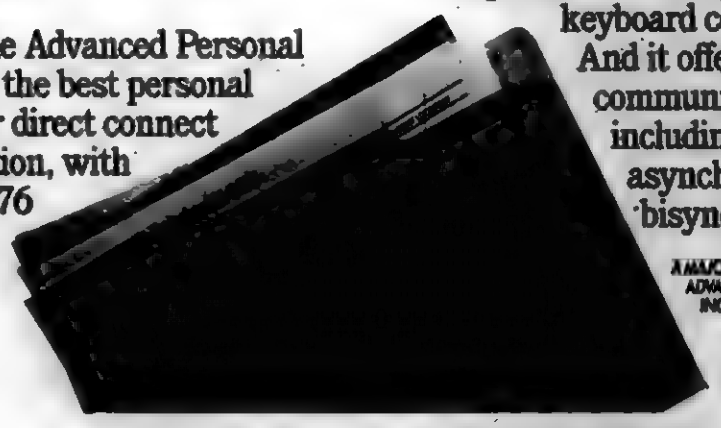
With the APC, your people will be more productive than ever before.

They can easily perform all their existing 3278 applications. Then, with a single keystroke, switch to a full function personal computer, quickly and easily.

WITH A SINGLE KEYSTROKE, YOU CAN SWITCH FROM 3278 EMULATION TO A FULL FUNCTION PERSONAL COMPUTER.

And the APC is fully compatible with all 15 different 3278 keyboard configurations.

And it offers a full range of communications protocols, including SNA/SDLC, asynchronous and bisynchronous.



A MAJOR INSURANCE COMPANY IS USING THE ADVANCED PERSONAL COMPUTER TO GREATLY INCREASE WORKER PRODUCTIVITY.

Supershorts

ment work for the company's advanced computer systems.

• • •

Plexus Computers, Inc. has announced agreements with three software manufacturers, TOM Software, Inc., Science Management Corp. and Bridge Software Concepts, to distribute software that will allow Plexus users to run software written for Digital Equipment Corp., Wang Laboratories, Inc. and Basic Four Corp. minicomputer systems on Plexus computers.

• • •

The Japan External Trade Organization (Jetro) has opened a Center for Industrial and Technological Cooperation (Citec) in New York and in San Francisco to promote a smoother flow of capital and technology between the U.S. and Japan. Citecs are also being established in London, Paris, Brussels, Milan, Italy, and Dusseldorf, West Germany, as part of Jetro's efforts to encourage cooperation among industrialized nations.

• • •

Prime Computer, Inc. has signed a contract with **Cipher Data Products, Inc.** to purchase at least 1,000 Cipher Microstreamer II 1600/3200 bit/in. streaming tape drives per year. Value of the two-year contract was not disclosed.

• • •

NCR Corp. has announced a nationwide scholarship program that will award an NCR personal computer and a $3,000 college scholarship to approximately 100 graduating high school seniors. Offered through the NCR centennial scholars program, established by the company as part of its 100th anniversary celebration for 1984, the program is being administered by the college scholarship service/sponsored scholarship programs, an activity of the Educational Testing Service of Princeton, N.J.

• • •

Vector Graphic, Inc. has added seven Digital Research, Inc. CP/M-compatible software packages to its business software marketing service, Vector Quest. They are Benchmark, a cluster of office automation products from Metasoft Corp.; Planfin, a forecasting and budgeting program, and Profin, a financial analysis program from Business Software Pty., Ltd.; Mag/base, a data base system from Mag Software; Omtool Corp.'s Softbol, a Dibol-compatible language; FMS-80, a menu-driven relational data base management system from DJR Associates; and a package developed by a Vector dealer, Universal Business Automation, for the wholesale distribution market that combines a variety of accounting functions.

• • •

Victor Technologies, Inc. has signed an agreement with **Peachtree Software, Inc.** to distribute Peachtext 5000 with its Victor 9000 microcomputer.

• • •

The EFT Group, Washington, D.C., and the **Mid-Atlantic Exchange, Inc.** of Raleigh, N.C., have reached an agreement in principle to combine under a common holding company, creating what is reputed to be one of the largest electronic banking networks in the U.S. The 86 financial institutions that will make up the new company serve customers in four states and the District of Columbia and have combined assets in excess of $60 million.

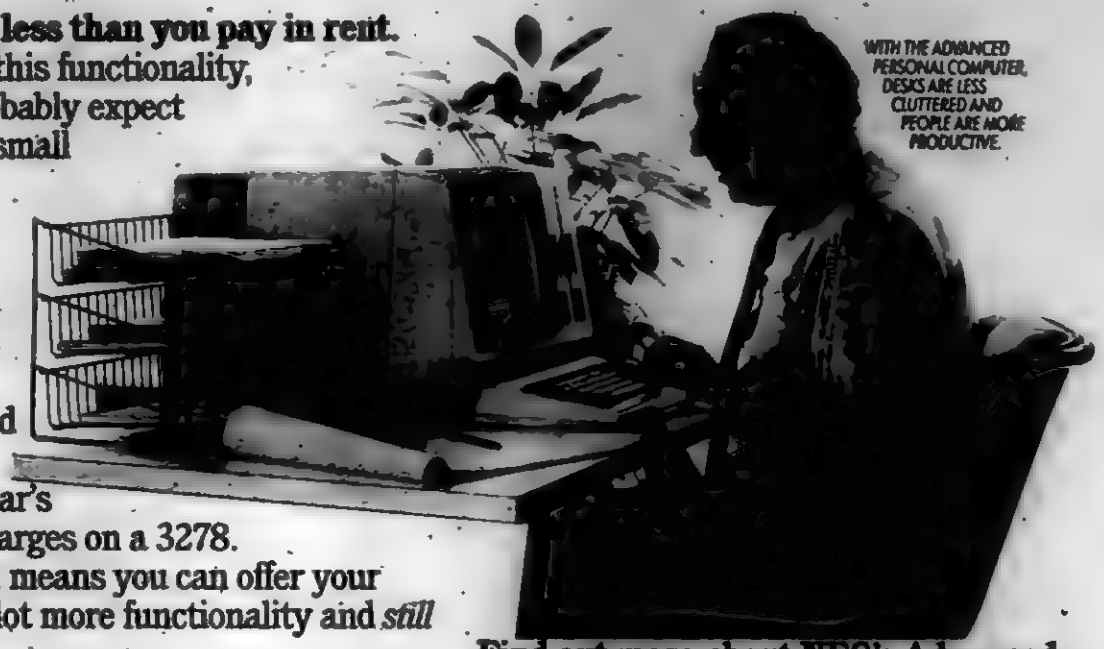
• • •

Digital Equipment Corp. and **Tektronix, Inc.** of Beaverton, Ore., have announced an agreement to cooperatively market Digital's VAX 32-bit superminicomputers and Tektronix's specialized hardware and software development tools.

• • •

SRI International, Inc. has formed a new unit, the Information Systems and Consulting Division. The new division's functions will range from the development of expert systems and other applications of artificial intelligence to the analysis of information processing products and services, operating systems, local-area networks, terminals and personal computers.

Own for less than you pay in rent.
With all this functionality, you'd probably expect to pay a small fortune for the APC. Surprise! The APC can be purchased for less than 1 year's rental charges on a 3278.



Which means you can offer your people a lot more functionality and *still* pay less.

Software, software, and more software.
With the APC, you can choose from hundreds of different software applications programs.

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YOU CAN OWN AN NEC ADVANCED PERSONAL COMPUTER FOR LESS THAN THE COST OF LEASING A 3278 FOR 1 YEAR.

The APC also offers you the best color graphics in the industry, and a wide range of graphics software. The most storage capacity of any computer in its class. And the kind of reliability that NEC is famous for.

All for less than you're paying now.

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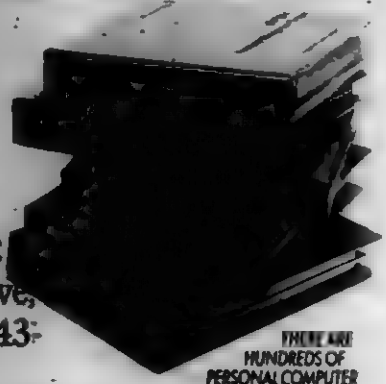
Find out more about NEC's Advanced Personal Computer.
For more information about the APC, or for the location of your nearest NEC representative, call 1-800-343-4419.



And find out why so many 3278 users are saying "NEC and me".

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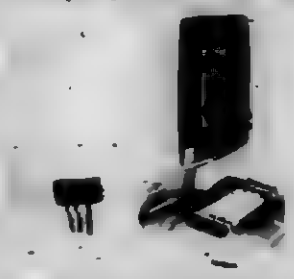
Finally, a 3270 A/B switch designed to meet your needs (at a reasonable price)



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Using the SMS-1 coax A/B switch your 3270 terminal can be used to access two different computers or in critical applications, can access the same computer via two paths.

Terminal Mounted-no need to waste valuable desk space for an oversized switch box.

Connecting Cable Included-no need for an additional patch cable to connect the switch to your terminal, we've built it in.

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Executive Corner

● **Paul E. Huber** has been elected president and chief executive officer of Megatek Corp.

● **Martin D. Winnick** has been named vice-president of software and development at Mag Software, Inc.

● **David I. Caplan** has been appointed senior vice-president, technical operations, for Fortune Systems Corp.

● **Gerald R. Birr** has been named vice-president, chief financial officer and treasurer for Ztel, Inc.

● **Robert A. Fuire** has been promoted to vice-president and general manager of the Taps Division of Informatics General Corp.

● **Robert R.B. Dykes** has been appointed executive vice-president, finance and administration, at Xebec Corp.

● **Cal Shoemaker** has been named vice-president for sales and marketing at Timeplex, Inc.

● **George Wikle** has joined Sorcim Corp. as vice-president, finance operations, and **Ronald E. Grubman** has been named vice-president, general counsel and head of corporate development.

● **Harold E. Patterson** has been appointed president, Sylvania systems group at GTE Communications Products.

● **Michael J. Rowny** has been named vice-president and treasurer of MCI Communications Corp.

● **Donald A. Millers II** has been named vice-president of engineering at Megatek Corp.

● **Scott Gilmour** has been named vice-president, marketing, for Corporate Systems.

● **Samuel H. Fuller** has been appointed vice-president, group manager for research and architecture, and **Jeffrey C. Kalb** has been appointed vice-president, group manager for large-scale integration, at Digital Equipment Corp.

● **John Frank** has been named vice-president, marketing, at Zenith Data Systems.

● **Edward J. Hall** has been appointed president and chief executive officer for I/Net-Pacnet Corp.

● Storage Technology Corp. has announced the following appointments: **Mornay R. Maloney**, corporate vice-president of European operations; **Archie H. Higgins**, corporate vice-president and general manager of the Storage Technology Documentation subsidiary; **Frank M. LaHue**, corporate vice-president in charge of international manufacturing; **Donald A. Oliverio**, corporate vice-president of sales of western operations.

● **Richard E. Johnson**, a founder and former president and chief executive officer of Amlyn Corp., has been elected chairman of the board and executive vice-president. **Tom McCrystal** has been named to succeed him as president and chief executive officer.

● **David Fleming** has been named president of Communications Products-Asia for GTE Communications Products Group and will head GTE's first Tokyo office to market communications systems and services.

● **R.L. Earnest** has been named president of VM Software, Inc.

● **Robert Healy** has been appointed senior vice-president of marketing for Software International Corp.

● **Rodney A. Bayne** has joined Micro Five Corp. as vice-president of finance.

● **Frederick A. Snow** has been named vice-president and general manager of Infodynamics, a wholly owned subsidiary of Management Analysis Co.

● **Leonard J. Koch** has been appointed vice-president of major account marketing at NBI, Inc.

● **Gerald R. Birr** has been named vice-president, chief financial officer and treasurer for Ztel, Inc.

● **Roger Llewellyn** has been appointed managing director of Wicat Systems Ltd., London, a wholly owned subsidiary of Wicat Systems, Inc.

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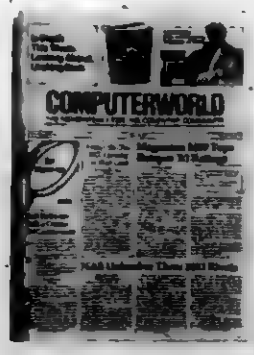

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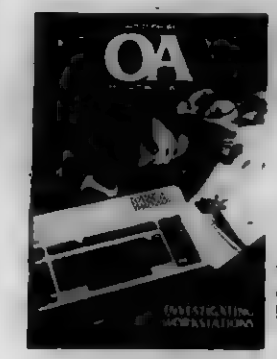
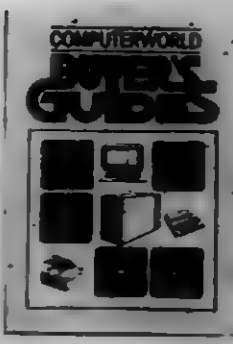


Every two months, *Computerworld OA* gives you a detailed, thoughtful look at all the happenings in Office Automation. Each issue examines a particular area of OA, giving you a complete overview of the state of the art in that area and other aspects of OA: Recent issues have examined overall OA planning Strategies, Workstations, OA Software, Personal Computers, and Management Support Systems.

Our newest publication does for communications what OA does for Office Automation. *Computerworld on Communications* covers the fast-merging worlds of computers and communications with in-depth articles on important trends and current topics. Subjects which have been or are scheduled to be covered in *CW on Communications* in its two 1983 issues include: Voice and Data Communications, Local Area Networks, Communicating Personal Computers, Local Loops, Convergent Technologies, and Telecommunications Management.

Computerworld Buyer's Guides are a new type of reference source for the computer-involved professional. *CW Buyer's Guides* are broken down by topic, for easy reference, and include useful articles on that issue's topic, as well as complete company and product listings. With thousands of companies and tens of thousands of products now in the computer market, and new ones becoming available every day, these guides can be an indispensable reference source. Three *Buyer's Guides* are to be produced in 1983: *Computer Systems* (August); *Terminals and Peripherals* (October); and *Software* (November).



Computerworld Extra! is a special, extra-issue of *Computerworld* which we publish from time to time in order to give extra attention to an important current topic. Every issue of *Extra!* is devoted entirely to a complete look at a single area of topical importance. Next Extra! is on Microcomputers.

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1. **BUSINESS/INDUSTRY** (Circle one)
   End Users
   10 Manufacturer (other than computer)
   20 Finance/Insurance/Real Estate
   30 Medicine/Law/Education
   40 Wholesale/Retail Trade
   50 Business Service (except DP)
   60 Government-State/Federal/Local
   65 Public Utility/Communication Systems/Transportation
   70 Mining/Construction/Petroleum/Refining
   75 Other User _____
   Vendors
   80 Manufacturer of Computers, Computer-related Systems or Peripherals
   85 Computer Service Bureau/Software/Planning/Consulting
   90 Computer/Peripheral Dealer/Distributor/Retailer
   95 Other Vendor _____
2. **OCCUPATION/FUNCTION** (Circle one)
   11 President/Owner/Partner/General Manager
   12 VP/Assistant VP
   13 Treasurer/Controller/Financial Officer
   21 Director/Manager/Supervisor DP/MIS Services
   22 Director/Manager of Operations/Planning/Administrative Service
   23 Systems Manager/Systems Analyst
   31 Manager/Supervisor Programming
   32 Programmer/Methods Analyst
   35 OA/WP Director/Manager/Supervisor
   39 Data Comm Network/Systems Mgmt
   41 Engr/Scientific/R&D/Tech Mgmt
   51 Mfg Sales Repr/Sales/Marketing Mgmt
   60 Consulting Mgmt
   70 Medical/Legal/Accounting Mgmt
   80 Educator/Journalist/Librarian/Student
   90 Other _____
3. **COMPUTER INVOLVEMENT** (Circle all that apply)
   Types of equipment with which you are personally involved either as user, vendor or consultant
   A. Mainframes/Superminis
   B. Minicomputers/Small Business Computers
   C. Microcomputers/Desktops
   D. Communications Systems
   E. Office Automation Systems

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Responsibilities will include the development, design and implementation of firmware for micro-processor-based products, and the optimization of firmware development for real-time run requirements. Assignments will include development of digital signal processing algorithms involving signal filtering, modulation/demodulation and effective implementation of hardware/firmware requirements. BS/MS EE and a minimum of 8 years' experience in real-time software/firmware design and implementation are required. Assembly language programming experience with a variety of microprocessor knowledge is highly desirable.

SOFTWARE DEVELOPMENT PROGRAMMERS/ANALYST

Responsibilities will include the development of high quality programs using PASCAL and other high level languages. Should be experienced with microcomputers including operating systems, local area networks and applications programming. Should be familiar with standard design, test and documentation techniques. BS/MS Computer Science or equivalent and previous microcomputer experience required; training/experience in assembly programming beneficial.

DESIGN ENGINEER (SENIOR)

Your responsibilities will include providing design support for development of microprocessor-based data communication products. Digital signal processing, analog filters, and standard digital design experience required, in addition to adherence to strict quality, reliability and performance requirements. A BS/MS EE with 5 or more years experience in microprocessor-based design and digital signal processing experience are required. Data communications product design and active filter (Analog) design highly desirable.

Hayes offers experienced profesionals a stimulating work environment that encourages personal and professional advancement, and a comprehensive benefits package that includes profit sharing. Qualified candidates should send a confidential resume or apply in person at:

HAYES MICROCOMPUTER PRODUCTS, INC., Department CW-HR14, 5923 Peachtree Industrial Blvd., Peachtree Crossing Office Park, Norcross, Georgia 30092. An Equal Opportunity Employer, M/F. Principals only need apply.

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Senior MUMPS Applications Development Programmer

To participate in the initial design and development of several exciting new products for office automation and database applications. Strong background in design and programming of major MUMPS-based applications required.

Senior Systems Programmer

To support our advanced MUMPS operating system. Minimum of three to five years UNIX or MC68000 programming experience required. Previous MUMPS experience desirable, but not necessary.

Technical Writer

To develop documentation and manuals. Must be able to write understandably to the non-technical user. Three to five years technical writing experience in the software field required.

These positions are in our attractive, waterfront headquarters near Boston's Quincy Market. We provide pleasant working conditions, comprehensive benefits and the opportunity to make significant contributions to one of the most exciting software technologies.

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Telephone 617 227-1555

MANAGER OF SYSTEMS DEVELOPMENT

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- Structured Techniques
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Large South Florida builder seeks aggressive working manager for their computer department.

Requirements
- NCR VRX operating software experience.
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- 3-years on-line communications experience.
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- D.E.C., R.S.X. and VAX
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Data Center Manager will be responsible for operating a six-processor, state-of-the-art computing facility including hardware support, computer operations, software technical support, development support, and performance management. Applicants must have experience in resource and personnel planning, hardware and software procurement, contract negotiations, systems software development, data base administration, IBM OS or VS systems programming, and financial analysis. Knowledge of SAS software and a bachelor's degree, preferably in computer science, or equivalent experience, are required. Qualified candidates should have 15 years' experience in data processing with IBM large-scale mainframe expertise, with at least five years in a supervisory capacity.

Performance Analyst will be responsible for 3083/4341/3158 system performance measurement, tuning, and resource balancing in support of on-line software product development and batch production systems running under MVS/XA, MVS/370, VM/SP, DOS/VSE, and OS/VS1. Candidates must be able to develop a comprehensive performance management and capacity planning program. MVS/SP or VM/SP, and IBM hardware experience are required. Experience with CICS/VS, RMF, IMS/VS, TSO, SAS software, OMEGAMON, ACF/VTAM, ACF/NCP, or VCNA is a plus. Applicants must have a minimum of five years' systems programming experience. Technical proficiency in Assembler language and a bachelor's degree, preferably in computer science, or equivalent experience are required.

Data Base Software Developer will design and develop data management subsystems and user interfaces. Applicants must be familiar with query language design, relational data base theory, SQL, and indexing methods. A master's degree in computer science is preferred. Knowledge of SAS software is a plus.

MVS Systems Programmer will support MVS and MVS/XA systems software and related products on an IBM 3083 processor. Duties include installing, maintaining, enhancing, and modifying IBM and OEM vendor software products; working with operations personnel in problem solving; and providing assistance to internal users. Applicants must have a minimum of five years' systems programming or technical support experience with three years as an MVS systems programmer. Experience with SMP and technical proficiency in Assembler language are required. Experience with JES2, TSO, and ACF/VTAM is highly desirable. Knowledge of PL/I and IMS/VS or CICS/VS is a plus.

OS/VS Systems Software Developer will develop and maintain the SAS system supervisor and related components for the IBM OS/VS and MVS/XA environments. Use of IBM 370 Assembler as a programming language and exposure to OS/VS supervisor and data management services macros are required. Experience with the development and support of large software systems and the use of IBM service aids is desirable. Familiarity with operating system concepts, compiler design and implementation, PL/I, and the SAS system are significant assets. A bachelor's degree, preferably in computer science, or equivalent experience is required.

VM/CMS Systems Programmer will support VM/CMS systems software and related products on an IBM 4341 processor. Duties include installing, maintaining, enhancing, and modifying IBM and OEM vendor software products; developing system utilities; working with operations personnel in problem solving; and providing assistance to internal users. Applicants must have a minimum of two years' systems programming or technical support experience with one year as a VM/CMS systems programmer. Technical proficiency in Assembler language is required. Knowledge of VSE/VTAM and VCNA is a plus.

VM/CMS Systems Software Developer will develop and maintain VM/CMS systems software for internal applications and Institute Program Products. Applicants must have a minimum of one year's experience as an OS/VS1 or OS/MVS systems programmer, and one year's experience as a VM/CMS systems programmer as the most recent job experience, including writing SVC traps, I/O traps, and applications requiring knowledge and use of Assembler as the primary programming language. A working knowledge of PL/I and SAS software is also desirable. A bachelor's degree, preferably in computer science, and excellent communication skills are required.

PL/I Systems Programmer will support compiler and minicomputer interface development for SAS software under several mini and microcomputer operating systems. Applicants must have demonstrated growth potential and three years' experience in systems development. In-depth knowledge of PL/I is required and knowledge of SAS software is highly desirable. A bachelor's degree, preferably in computer science, is required.

Systems Programmer will assist the development of SAS software products on various minicomputer systems. Applicants must have a minimum of two years' PL/I programming experience, working knowledge of SAS software, and experience with one of the following minicomputer systems: Digital VAX under VMS, DG MV under AOS/VS, or Prime under PRIMOS. A BS in computer science is required. Knowledge of SAS/GRAPH and SAS statistical procedures is desirable.

Testing & Documentation Systems Programmer will perform source code management functions, including documentation of procedures and consultation for SAS System developers on Digital under VAX. Applicants must have 1-2 years' data processing experience, with a working knowledge of PL/I and SAS. Candidates must have experience with IBM under TSO or VM/CMS, or one of the following systems: Digital VAX under VMS, DG MV under AOS/VS, or Prime under PRIMOS. One to two years' VMS experience is desirable. A BS degree in computer science or equivalent is required.

Minicomputer Programmer will develop SAS software for various minicomputers. The individual will write and maintain code and documentation, transport code, prepare master tapes, and educate users. A BS degree, preferably in computer science, and PL/I knowledge are required. Minicomputer experience; knowledge of SAS software, and Assembler language experience are preferred.

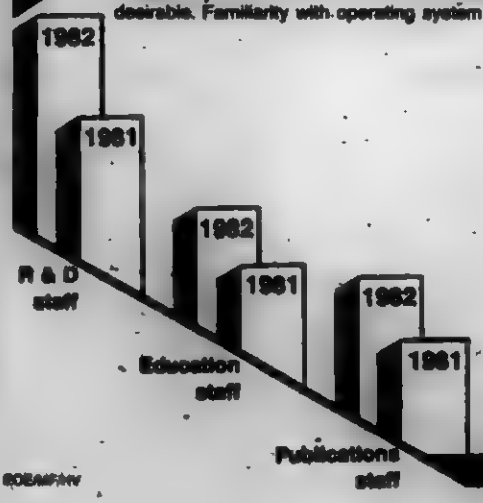
DG Minicomputer Programmer will be responsible for developing SAS software for the Data General minicomputer. Responsibilities include writing and maintaining machine-dependent code, reviewing documentation, transporting code from the VAX minicomputer to the Data General, and assisting in educating users. Applicants must have knowledge of PL/I and a BS degree, preferably in computer science. Experience with Data General minicomputers, knowledge of SAS software, and Assembler language experience are preferred.

Systems Developer will be responsible for the design and implementation of a PL/I- like compiler. Applicants must have a MS in computer science or mathematics and a strong background in block structured languages, preferably in PL/I. Experience in design and construction of state-of-the-art compilers and familiarity with optimization and code generation issues are required.

Communications Systems Programmer will support ACF/VTAM and ACF/NCP/VS systems software and related products under MVS/XA, MVS/370, VM/SP, OS/VS1, and DOS/VSE on IBM 3083, 4341, and 3158 processors, and 3705 and 3725 controllers. Applicants must have a minimum of five years' systems programming or technical support experience. Experience with SMP and a technical proficiency in Assembler language are required. Experience with JES2/NJE, VM RSCS Networking, TSO, and CMS is highly desirable.

Communications Systems Software Developer will develop and maintain the SAS system supervisor components for the IBM MVS, VM/CMS, and VSE environments that interface to communications terminals and access methods, such as the 3279, 3287, 3288, and ACF/VTAM. Use of IBM 370 Assembler as a programming language and knowledge of SNA protocols, 3270 data streams, and MVS or CMS supervisor services macros are required. Experience with the development and support of large software systems and the use of VTAM/NCP service aids is desirable. Familiarity with PL/I and the SAS system are significant assets. A bachelor's degree, preferably in computer science, or equivalent experience is required.

Technical Writer will document SAS installation procedures and advanced programming concepts. Applicants must have a bachelor's degree and PL/I programming experience. Familiarity with an operating system and the ability to communicate technical information to people with various technical backgrounds are required.



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AT&T Information Systems is looking for a few uniquely talented Network Specialists for our Orlando, Florida location.

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We offer nationally competitive salaries, a comprehensive benefits package and a desirable Central Florida location featuring affordable housing and unlimited recreational opportunities.

Qualified candidates please send resume in confidence to: Robert Carey, P.O. Box 13970, Dept. 180, Room WJ100, Orlando, Florida 32809. We are an Equal Opportunity Employer. We regret that we cannot accept phone calls or pay agency fees.

AT&T Information Systems

California Federal, one of the nation's largest financial institutions, has immediate openings for high-caliber technical support personnel. Our systems include multiple Sperry 1100/80 and IBM 3083 computers, installed at our new Service Center in Rosemead, California.

Advanced Software Specialist (OS-1100) Provide operating system support to Sperry 1100/80 computers. Experienced in SYSGEN'S, TCP application, and post-dump analysis.

Advanced Software Specialist (CICS/TELECON) Provide TELCON support to five 90 Sperry DCP/40's, controlling 100+ branch network, and 300+ in-house terminal system. Experienced in TELCON and CMS support.

Transaction Processing Group Leader Minimum of six years' coding or enhancing Sperry 1100 Control Software. Fluent in COBOL and 1100 Assembler. Minimum of two years' technical supervisory experience.

Data Base Group Leader Experience with hierarchical data base management systems in a large business environment. Minimum two years' technical supervisory experience required.

Senior Data Base Specialist (DMS-1100) Minimum of four years' experience using and maintaining DMS-1100. Experience with IDMS data base products desirable.

Senior Systems Programmer (CICS) Three to five years' systems and programming experience in current CICS software products, such as CICPARS, DLI, MRO, ISC, PA II, OmEGAMON CICS. Experience in network products such as ACF/VTAM and ACF/NCP a plus.

Applications Support Analyst Provide technical support to applications programmers/analysts. Heavy COBOL experience in a transaction processing/data base management environment required. Responsible for second-level problem resolution.

Senior Programmer Analyst Responsible for host-to-teller machine interfaces. Minimum four years' COBOL programming experience. Knowledge of a major vendor's Assembler is desired.

Programmer/Analyst Responsible for host-to-teller machine interfaces. Minimum two years' COBOL programming experience.

Senior Hardware Specialist Assist the supervisor of all installation and maintenance activities. Extensive knowledge of Sperry (1100 series) or IBM large-scale, multiprocessor hardware configurations, log-outs, and diagnostic techniques mandatory.

Senior Performance Analyst Experience with System Control Software on Sperry 1100 or IBM 308X systems. Solid performance analysis experience which includes the use of system modeling.

Advanced Software Specialist (MAPPER) Provide MAPPER support, including MAPPER GENs. Plan, test, and implement new releases of MAPPER, and other system processors, as assigned. Knowledge of COBOL, SMS, and ASM required.

Manager, Network Department Responsible for the design and maintenance of a network supporting nearly 1,000 devices. A management track record, with a minimum of 6 years' experience in DP communications is mandatory.

If you are qualified and are interested in working in a dynamic and professional environment, we would like to talk to you.

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Atlanta based regional office of a dynamic growth oriented life insurance company is seeking an experienced Technical Support Analyst. Position is responsible for production error recovery and resolution. Qualified candidate must have experience in the following: Life 70, and/or Life Comm, OS/MVS environment, TSO/SPF, VSAM, OS/JCL and utilities, knowledge of automated scheduling system, knowledge of automated tape library system. We offer an excellent benefit package coupled with career growth opportunities. Send resume with salary history to:

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Join a progressive computing service organization located in the Sunbelt. The Computing Center provides a wide range of services to meet the administrative and academic needs of the University of New Mexico. Computers include IBM 3032/4341/MVS and multiple DEC 11/70/VAX units running UNIX and VMS. Applications are being accepted for:

Associate Director for Development
Responsible to the Director of the Computing Center for development activities, including application and systems programming, networking and contract and grant activities.

For more information please contact:
David Harris, Director
University of New Mexico
Computing Center
2701 Campus Blvd., N.E.
Albuquerque, NM 87131
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UNIVERSITY OF VERMONT DEC SYSTEMS PROGRAMMER

The Academic Computing Center requires a systems programmer to help maintain a DEC 2060 system running under TOPS-20. Responsibilities include maintenance of the operating system, system utilities and languages. Some experience with telecommunications and networking is also needed. Master's Degree in computer science or related field, two years of FORTRAN, and 3 to 4 years of TOPS-10/20 experience are required. Excellent fringe benefits package, friendly academic atmosphere, and an agreeable living environment in the Burlington area. Please submit a resume with cover letter along with the names of 3 professional references. For further information contact Personnel Department, Waterman Building, University of Vermont, Burlington, Vermont 05405.

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COMPUTER SCIENCE FACULTY POSITION

Applications are invited for a faculty position beginning January 1984. Candidates who have completed their doctorate in computer science or who expect to complete one are preferred, but more experienced candidates will also be considered. Candidates with a doctorate in mathematics and interest in retraining in computer science will be considered. Facilities include the College's HP3000 and the Department's TRS-80. Applications should be sent to Sherry Lewis Allen, Head, Department of Mathematics/Computer Science, Longwood College, Farmville, VA 23901. AA/EOE

EXECUTIVE POSITIONS IN COMPUTER AND COMMUNICATIONS TECHNOLOGY

The U.S. General Accounting Office has two executive level openings for professionals who are highly skilled in computers and communications technology. The positions are at GAO's Washington, D.C. Headquarters within its newly formed Information Management and Technology Division, and provide a unique challenge to qualified professionals. The available opportunities are:

CHIEF SCIENTIST FOR COMPUTERS AND COMMUNICATIONS

Provides expert advice and consultation on computers and communications technology issues to the Comptroller General, senior GAO officials, and the Congress. Represents GAO when dealing with congressional, government, and industry officials. Provides assistance and guidance in planning GAO work in technical areas. Individuals should have (1) Ph.D., Doctor of Science, equivalent academic credentials or equivalent experience in the computer and/or communications-related fields, as well as (2) extensive knowledge and recognized accomplishments in computer and/or communications technologies such as computer and network architecture and operating systems design. This is a 3-year noncompetitive appointment.

ASSOCIATE DIRECTOR

Manages a group of professional information systems auditors who plan and conduct evaluations of Federal agency management and use of computers, communications, and other information-related resources. Responsible for preparing written reports and presenting oral testimony to Congress on results of such evaluations. Individual must have extensive knowledge of computer and communications technologies, managerial experience, and excellent oral and written communications skills. This is a competitive Senior Executive Service Career Appointment.

These positions offer full Federal benefits. For information and application procedures call Jane Clark, (202) 275-3463.

Applications must be received by November 25, 1983.

U.S. General Accounting Office
Personnel, Room 4718
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Washington, D.C. 20548

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We require an assertive, goal-oriented generalist to supervise and work with a team of computer professionals, maintaining and installing MVS and VM system software. BS in computer science desirable (MS a plus).

We offer the stability of a private utility, a challenging visible opportunity to achieve with a team of talented, highly-motivated individuals. Our compensation will be highly competitive with an excellent benefit program.

Join us. Send your resume, with cover letter, in confidence to:

Scott Bradshaw
Staffing Coordinator—Management
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Resumes accepted for this position only. Principals only.
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Meeting the challenge of change.

Manager, Research Computing Support

(Position is with College of Liberal Arts which includes large solid state research group.) PhD in science, engineering, or related field and 5 years of appropriate experience, or equivalent. At least 1 year of supervisory experience. Understanding of minicomputer and microcomputer-based architecture and hardware capabilities. Familiarity with single and multi-user systems, including local area networks based on these computers is required. Experience with DEC equipment is preferred. Familiarity with graphics software and Assembly language, BASIC and FORTRAN is essential. Salary commensurate with experience and University research staff policy. Application deadline: December 15, 1983 - please state job title. Send resume and 3 references to: Personnel, Arizona State University, Tempe, Arizona 85287. ASU is an Equal Opportunity Affirmative Action Employer.

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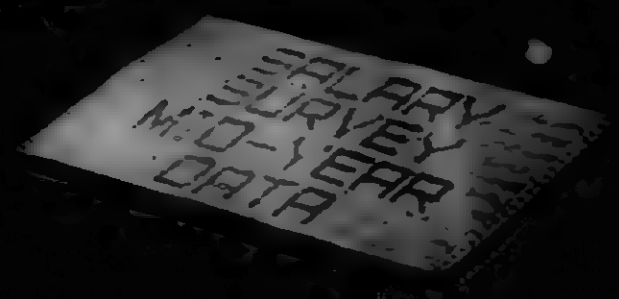

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It covers more positions and places!

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Our new, mid-year *Local Metropolitan Computer Salary Survey* – the most extensive one published to date – details salary differences in major metropolitan areas throughout the United States and Canada. It's chock-full of new statistics; some you'll find have changed substantially from past reports.

2,250 position and compensation categories.

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A useful tool for career advancement.

The Survey is compiled by Source Edp, the world's largest recruiting firm that's devoted exclusively to the computer profession.

If you're wondering where your career and income are heading, the report just might be the most valuable compensation guide you'll read and refer to often. It will not only help you evaluate your current career progress, but show you what skills are in most demand and what you can expect to earn in the future – with and without certain skill sets.

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The new Survey is available at no charge to computer professionals. Call the Source Edp office nearest you to request a copy, without obligation. As you'll discover, there's no better way to pinpoint salary levels with more precision or to gain insight into emerging opportunities. It could be the best reading you'll do all year.

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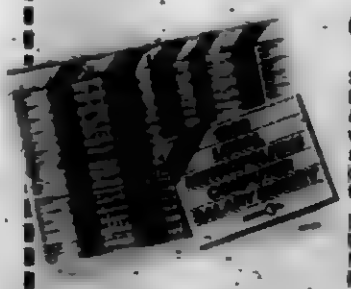

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You will use your technical knowledge and expertise to train personnel for our rapidly expanding computer maintenance organization. Experience instructing PDP-10/11, VAX-11 family, or Perkin-Elmer hardware is required.

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COMPUTERS AND THE LIBERAL ARTS

Reed College seeks an energetic and imaginative person with a strong academic or industrial background who has scholarly interest and practical experience in computing sciences. The College is poised to take a substantial initiative in the establishment of a campus-wide system networking large numbers of personal computers with particular attention to facilitating the broadest possible use of the computing resources in the context of a rigorous Liberal Arts curriculum. Thus, we are seeking a person who will be able to address the computer-related interests of students and faculty in diverse disciplines and provide guidance and leadership toward further development of an open-access computer system in this academic context.

This position was created by a gift to the College from the John D. and Catherine T. MacArthur Foundation. The term of the initial appointment is negotiable but expected to be not less than six months or more than 3 years. The successful applicant will have faculty status and a formal association with an appropriate academic department. It is expected of the occupant of the MacArthur position that he/she will lead an upper division undergraduate seminar in an area of his/her expertise during each academic term in residence. In addition, it is anticipated that he/she will participate actively and as a consultant in the implementation of the program for diffusion of computer-based information handling in the Liberal Arts. The closing date for applications is January 15, 1984. Address enquiries and applications (including resume and three letters of recommendation) to: S. Arch, Ph.D., Chair, MacArthur Search Committee, Reed College, 3203 S.E. Woodstock Blvd., Portland, Oregon, 97202. *Reed College is an AA/EO employer*

DIRECTOR COMPUTER SERVICES
NORTHWESTERN MICHIGAN COLLEGE

The Director of Computer Services provides leadership and direction for the College's computing environment. Primary responsibilities include management of computer operations, planning and review, staff management and development and budgetary planning. Reports to Vice-President for Administrative Services.

Specific responsibilities include 1.) Coordination of services to users in Instructional Services, Administrative Services, Student Services and the Development Office; 2.) Supervising the design, assignment and implementation of new systems; 3.) Establishing priorities for application and system services in coordination and consultation with advisory committees; computing staff and users; 4.) Determining inadequacies in programs and systems - evaluating requirements and priorities for improvement; 5.) Maintaining reports and statistics indicating the amount and types of services performed; 6.) planning and overseeing the proper documentation of computing systems.

Qualifications: 1.) Master of Business Administration Degree; 2.) Three to five years DP experience in a collegiate setting (DEC PDP 11/70); 3.) Working knowledge of accounting; 4.) Technical and Administrative experience related to the management of a computer center (managerial effectiveness will be considered of prime importance in the selection process); 5.) Extensive knowledge of Student Records Information System, Financial Applications, Word Processing and an in-depth knowledge of program languages.

Salary Range: $22,232 - $34,835

Send letter of application and resume by November 15, 1983 to:

Personnel Office
Northwestern Michigan College
1701 East Front Street
Traverse City, MI 49684
(616) 922-1011

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The successful applicant will have a minimum of ten (10) years' data processing experience; five (5) years' of which was in an IBM, IMS data base position.

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Our New England division currently has a need for a Senior Analysts to join our staff in Pittsfield, Mass. Qualified individuals must have 3-5 years' experience with IBM mainframe equipment, as well as proficiency with COBOL, MVS and TSO. Responsibilities will include the implementation of an established purchasing system at two additional G.E. facilities. Financial applications experience in the area of general ledger, accounts payable and purchasing are also required.

This person must have strong user interface skills as well as the ability to participate in long range planning. Responsibilities will also include the supervision of other members of the technical staff. Exposure or work experience with both MIMS and Honeywell equipment is highly desirable.

Competitive salary plan, benefits, relocation expenses and tuition reimbursement.

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Manager of Product Marketing needed to direct and coordinate activities of personnel engaged in the marketing of scientific computer systems. Analyze market, establish targets, suggest new hardware and software products, determine customer influence factors to increase marketability of company product. Identify and develop new markets in the area of third party products. Plan, develop and establish short-term and long-term goals associated with increasing market share. Requires Bachelors degree in Data Processing/Computer Science or its equivalent with at least three years direct scientific computer applications Sales/Marketing Home Office experience and three years directly related systems analysis experience or will consider some higher education and at least ten years experience in Computer Science/Marketing in lieu of degree and experience. However, experience must have included at least three years direct scientific computer applications Home Office Sales/Marketing experience and three years directly related systems analysis experience. Must have experience in the area of third party products including software selection, evaluation, acquisition, conversion and merchandising. Must have strong marketing background in high performance super-mini computers. Must be experienced in developing programs in FORTRAN, ASSEMBLY and PASCAL languages. Must be familiar with hardware architecture design. Requires knowledge of international computer systems market. Must present evidence of direct responsibility in increasing revenue and profit to meet specific Corporate objectives. Must have had direct responsibility for supervisory/management of market force as well as computer systems support personnel. Must be available for extensive overtime. 40 hour work week. $36,000 per year. Apply at Texas Employment Commission, Dallas, Texas. TEC Job Order #2871462. Ad paid by Equal Employment Opportunity Employer

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For sincere personal service, please send a confidential resume to:

Dan Pullman (602) 274-5660
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2033 North Central Ave. Suite 401, Phoenix, Arizona 85012

USER SERVICES CONSULTANT/ANALYST

The University of Notre Dame Computing Center has an opening in User Services.

- Experience in User Services
- Bachelor's, Master's or PhD
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Good communications skills are essential. Job involves consulting, documentation, teaching minicourses, and potentially programming and analysis of user systems.

Kelly Havens, User Services, (219) 239-5660

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We are a progressive manufacturing company located in the New England area and have an immediate need for an experienced Director of Data Processing to take a hands-on role in the planning, management and analysis of our Data Processing Department.

The successful candidate must possess the following qualifications:

- Be degreed
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- Knowledge of on-line and real-time networks utilizing CICS
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Selected candidate will direct a staff of 25 data processing professionals.

Please submit your resume and salary history to: Box BPH 4067, 71 Fifth Avenue, 8th floor, New York, NY 10003. An equal opportunity employer, M/F/H.

MIS Coordinator

We are a fast growing corporation in the electronics industry looking for an ambitious individual seeking a challenging opportunity. This newly created position will be responsible for coordinating the MIS function corporate wide, presently involving eight companies. You will direct the installation of four HP 3000's with applications ranging from accounts payable to manufacturing. You must be able to work with and direct the outside software vendor while meeting the needs and coordinating efforts of all sister companies. Candidates must have a BS in computer science or a related field and a manufacturing background. Please send your resume to:

Kathy Strickland
P.O. Box 110
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SC

PERFORMANCE ANALYST - Software tuning & performance skills required.

SYSTEMS ANALYST - 4 yrs exp. Requires design/implementation of mgt. order servicing & financial applications.

For more information on these and other DP opportunities, contact Larry Ellers at (704) 375-0660 or send resume in confidence to:

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Systems Analysts/Programmers are needed to begin development of a graphics-oriented professional workstation for database administration. The workstation will provide powerful tools for visualizing and manipulating graphical representations of database schemata. An expertise in database management and/or computer graphics is required. Experience in UNIX, C or Multics is helpful. An advanced degree in Computer Science or a related field is preferred.

CAD/CAM DATABASE MANAGEMENT SYSTEM

A Project Manager and several Systems Analysts are needed to design, develop and implement a CAD/CAM database management system. This system will provide a central repository for all CAD/CAM data needed during the project life cycle. It will replace the storage and management functions of individual data repositories. Experience in the design and development of a large scale DBMS in an IBM environment is required. CAD/CAM experience is a definite plus. An advanced degree in Computer Science or a related field is preferred.

DATABASE SUPPORT for LARGE APPLICATIONS SYSTEMS

A variety of challenging positions exist for Database Consultants, Systems Analysts and Programmer/Analysts to support the design, development and implementation of large, complex applications systems utilizing **MODEL 204**. Advise customers on the application of advanced data management techniques including database design, data dictionaries and distributed data management. Experience with a commercial DBMS in a large IBM environment required. These positions will be located in Cambridge, MA and Denver, CO; some travel necessary. U.S. citizenship required.

DISTRIBUTED DATABASE MANAGEMENT SYSTEMS

A Project Manager, Lead Systems Analyst and several Systems Analysts/Programmers are needed to design, develop and implement a production distributed database capability for an interactive IBM environment with **MODEL 204**. Experience in the design and development of large software systems in an IBM environment is required. Training in DBMS technology and experience using a commercial DBMS required. BS/MS in Computer Science is preferred.

DATABASE COMPUTER SCIENTIST

A Computer Scientist with experience in database management systems is needed to be an internal consultant on the application of advanced data management technology for a variety of CCA projects. A Ph.D. or equivalent in Computer Science is preferred. Some travel may be necessary and U.S. citizenship is required.

Send your resume, specifying position of interest, to David Levine, Dept. CW1024-83, Computer Corporation of America, 4 Cambridge Center, Cambridge, MA 02142.

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Seeking an Interactive Systems Coordinator for our HP-3000 installation. Responsibilities include systems hardware and software specification preparation, user interface, program development and implementation of application systems. Bachelor's Degree in Computer Science or related discipline plus 5 years experience required. Experience must include MPE, COBOL, IMAGE, QUERY, V/3000, Programmer Productivity Package and computer security. Must also possess good communication skills. Position part of a six person shop serving administrative computing needs of the Ames Laboratory, U.S. Department of Energy. Located on the campus of Iowa State University. We offer competitive compensation and benefit package. Interested candidates should send resume and salary history to: Sue C. Porter, Assistant Personnel Officer, Ames Laboratory, 127 Spedding, ISU, Ames, Iowa 50011. An Equal Opportunity/Affirmative Action Employer. M/F/V/H

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Responsibilities include participation in the development/implementation of computer hardware and software planning and resource management. You will coordinate the implementation/maintenance of all operating systems and software products. VM/MVS and/or OS/VSI and CICS background required.

Manager / IRM Operations

Primarily, you will assist in the administrative functions of Computer Operations in the areas of hardware, software, service level agreements and Problem/Change Management. You will also evaluate and recommend future computer and communications hardware needs. Interfacing with all KFC users and vendors will be required.

At least 8-10 years' experience with computer mainframes, associated peripherals and data communications equipment is required for both positions. You should be thoroughly familiar with IBM operating systems and software. DOS/VSE to MVS conversion experience is essential. Management and interpersonal skills, as well as a degree (or close to completion) in Business, Computer Science or related field are required.

We offer an excellent salary, comprehensive benefits program and a professional environment. For further information, please send your resume, stating background, salary history and requirements, to: Ms. Kathleen Brittain, Employment Specialist, Kentucky Fried Chicken, P.O. Box 32070, Department 294C, Louisville, KY 40232. We are an equal opportunity employer M/F.

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Call or send resume to **Doug Strelka:**

TRIANGLE SOFTWARE COMPANY
4340 Stevens Creek Blvd.
Suite 108
San Jose, CA 95129
(408) 554-8121

Systems Analysts and Systems Programmers

Handley Walker Data Services, an NYC computer services firm that is moving to Woodbridge, New Jersey, is seeking both Systems Analysts and Systems Programmers to modify and develop software for the cable TV and warehouse distribution industries. Applicants must be competent in Assembler language.

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Applicants should send resume and salary history to:

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3 West 35th Street
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Ms. Kashmira Patel
Systems Specialist Search
DATA RESOURCES, INC.
24 Hartwell Avenue
Lexington, MA 02173

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COMMUNICATIONS SPECIALIST-LOCAL NETWORK

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Send resume to:
Robert A. Leech
University Computer Center
University of Arizona
Tucson, Arizona 85721

Equal Opportunity/
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Florida International University

Associate Director, Southeast Regional Data Center/Director, Academic Computing

Applications and nominations are invited for the position of Associate Director of the Southeast Regional Data Center (SERDAC)/Director of Academic Computing at Florida International University. The University, a member of the State University System of Florida, is composed of 7 colleges and schools and has approximately 15,000 students.

The position reports directly to the Executive Director of SERDAC and has responsibility for the management of the Academic Computing Center which services the instructional and research needs of the faculty and students of the University. The individual selected will have direct supervisory responsibility over a unit which serves as the academic support arm. The individual selected will not have day-to-day responsibility for computer facilities operations, but rather will be expected to provide vision, leadership and the ability to plan for rapid expansion and growth. These activities are carried on in coordination with the Provost of the University.

The University is seeking to attract an individual who has at least a Master's degree in computer science or a related discipline and a minimum of 5 years in academic computing with some administrative/managerial responsibility. A Ph.D. with qualifications for a faculty appointment is desirable. The beginning salary will be in the mid $40's.

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Paul O. Gallagher
Associate Vice President for Academic Affairs
Florida International University
Miami, Florida 33199

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Bryn Mawr, PA 19010
or call us at (215) 525-1038

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Professional requirements for the position include some college (deg. preferred), working knowledge of insurance industry, and 2+ years of hands on interactive experience with the System/38 in RPG III. Knowledge of SDA, DFU and SEU mandatory.

Company offers a competitive benefits package comprised of comprehensive insurance program, job related tuition reimbursement, and potential bonus. Salary negotiable.

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IBM

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Rapid growth of a major ATLANTA financial institution has created openings for a variety of DP positions from $25K to $40K. This is a IBM CICS/MVS environment. Excellent benefits/relocation package. For prompt consideration contact:

Anderson/Watson & Associates
Executive Search Consultants
1627 Powers Ferry Road
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Atlanta, Georgia 30067

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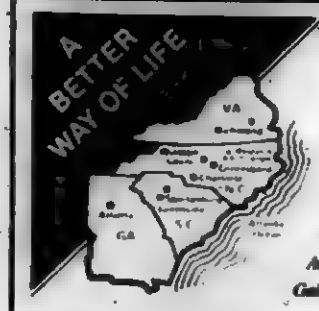

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TOLL FREE 1-800-438-1056

OUR CLIENTS are the leading NATIONAL and INTERNATIONAL corporations with major DATA PROCESSING CENTERS in NC, SC, So VA, No GA. They offer "state of the art" Technology, excellent WORKING CONDITIONS, outstanding FRINGE BENEFITS and nationally COMPETITIVE SALARIES. Many positions are eligible for equity home-purchase and closing cost reimbursement.

THE SOUTHEASTERN METRO AREAS – which we serve – are characterized by: A REASONABLE COST OF LIVING – at or below the national average. AFFORDABLE HOUSING – below the national average. AN ENJOYABLE MODE OF LIFE – population density is sufficient to support excellent shopping facilities, cultural and recreational opportunities and quality educational systems, without the congestion, pollution and crime you may be experiencing. OUTSTANDING CAREER OPPORTUNITIES – recognizing the attractiveness of living in the Southeast, a growing number of Major Corporations relocate their data centers to this area each year. AN AGREEABLE CLIMATE – four very definite seasons each year with long pleasant Springs (March-June) and Falls (Sept.-Dec.) with short summers and winters, although we see snow every winter, it doesn't last long.

WE ARE SEEKING THE BEST QUALIFIED EXPERIENCED PROFESSIONALS AVAILABLE FOR SPECIFIC RECRUITING ASSIGNMENTS WHICH REQUIRE SPECIFIC QUALIFICATIONS.

TECHNICAL

CAPACITY PLANNER to $40K
Min. 2 yrs. Capacity Planning exp. in large mainframe IBM multi CPU's MVS/JES/CICS environment. Applications Representative Planning.

SR. SYSTEMS PROGRAMMER to $40K
Min. 4 yrs. Operating Systems generation, maintenance and tuning with min. 2 yrs. VM.

SR. SYSTEMS PROGRAMMER to $40K
Min. 4 yrs. Systems generation with min. 2 yrs. MVS Performance measuring & tuning.

SR. SYSTEMS PROGRAMMER to $40K
Min. 4 yrs. Software Support with min. 2 yrs. SNA, IBM 3705's, NCP, ACF/VTAM.

SR. SYSTEMS PROGRAMMER to $40K
Min. 2 yrs. Exp. in the generation, maintenance & tuning of RSX 11M+. DECNET a plus.

SR. SYSTEMS PROGRAMMER to $40K
Min. 3 yrs. IBM host based Distributed Systems with Min. 1 yr. in the generation, maintenance & tuning of DPPX Operating System.

APPLICATIONS

SR. SYSTEMS ANALYST to $40K
Min. 2 yrs. exp. in the analysis and design of shared logic OFFICE AUTOMATION SYSTEMS. Exp. with IBM 8100's, DISPLAYWRITER, P.C.'s, Electronic Mail and/or Communications are a plus.

SYSTEMS ANALYST to $30K
Min. 4 yrs. exp. in the analysis & design of data processing systems with project involvement, user interface, analytical ability & verbal & written communications skills. Capability of understanding, evaluating & solving equipment problems in the OFFICE AUTOMATION AREA.

ANALYST/PROGRAMMER to $30K
Min. 3 yrs. Analysis, Design Development & Programming & implementation of business systems in a large mainframe IBM OS/MVS environment. Proficiency in COBOL, OS/MVS JCL & IMS DB/DC required. SAS, TSO/SPF experience and a college degree a plus.

WE ARE PROFESSIONAL RECRUITERS. Our function is to identify, Quantify, Qualify, and Refer candidates for specific positions within our company clients' organizations. We serve as a BROKER in the truest sense of the word (i.e. represent both parties with the objective of reaching an agreement which is satisfactory to both) throughout the Interview, Offer, and Acceptance Process. We only recruit for companies who have agreed in advance to assume the responsibility for our fees and your interview and relocation expenses.

STO FOX personnel consultants

WE PRACTICE AFFIRMATIVE ACTION
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or write giving us your current salary, career, salary & geographic objectives & a complete current chronological resume or work history (education optional) to:
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NBI, Inc., a leading manufacturer of information processing, office automation, and personal computing systems, has the following career opportunity:

PRODUCT MARKETING MANAGER

Individual will have responsibility for current and future systems peripherals especially hard copy output devices. Position will coordinate with all headquarters departments to ensure that peripherals products marketing requirements are met. Individual will assist in developing and administering sales strategies and programs, support Major Account VIP presentations, and assist in developing marketing tools.

Qualified candidates must have thorough knowledge of industry and peripherals product marketing.

We offer a competitive benefits package including life, medical and dental insurance, stock purchase plan and an opportunity to grow with a successful company. Qualified candidates should send resume, with salary history and requirements, to **NBI, Inc., Employee Relations Department, 3450 Mitchell Lane, P.O. Box 9001 -Dept. PMM, Boulder, Colorado 80301.**

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NBI

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OTHERS HAVE VISION.

Harris Government Systems Sector is involved in many of the most stimulating and ultimately rewarding technological challenges available. All of our on-going projects depend on strategic software advances in: Real-Time, Scientific/Analytic Applications, Operating Systems, Simulation and Modeling, Telemetry Processing, Mission Operations, Interactive Graphics, Communications, Large and Secure Data Base, Man-Machine Interface Design and full Systems Architecture capabilities.

The Government Information Systems Division is responsible for pursuing major programs in the software marketplace. Our GISD Software Operation provides Software-intensive programs, services, and systems products to government customers. We are involved in all aspects of the software life cycle from concept definition design & development, all the way through implementation and field support. We use the latest tools and techniques. Qualified candidates will be attracted by the unparalleled growth opportunities in our project-team environment, backed by a dynamic Fortune 200 Parent Company with 1983 sales in excess of $1.4 billion.

DISPLAY/IMAGE PROCESSING ENGINEERS:
Must have 3 years minimum experience in Image Processing and graphics software development using RAMTEK 9460 Image Processor. Experience with VAX 11/780 or 750 with VMS Operating System using FORTRAN 77, especially for satellite image processing application.

SOFTWARE DESIGN ENGINEERS:
You should have a BS in CS, Math, EE or a related Technical discipline as well as experience with DEC VAX, Data General or Tandem Systems and any of these languages: FORTRAN 77, PASCAL, PL/1, ADA, DEC MACRO Assembly. Experience desired in several of the following areas: Real-Time Database Systems, Advanced Software Methodologies, Modeling and Simulation, Image Processing for Displays, Network Protocol Software, Real-Time Scientific Software Development and Software Documentation.

HARDWARE/SOFTWARE SYSTEMS ENGINEERS:
Requires a BS in EE, CS or related field, MS or PhD desired, and at least 5 years experience in any of the following: Image processing; information processing; meterological systems; SIGINT systems; information handling & routing; storage, retrieval and display; high-speed local area network; tactical and strategic systems; artificial intelligence; analysis, simulation and modeling; minicomputer and microprocessor distributed processing systems; computer and software architecture; photogrammetry; cartography.

SOFTWARE SYSTEMS TEST ENGINEERS:
BS degree and 3+ years experience with performance of detailed software module testing; writing software test plans to government format, developing software programs for integration and test activities.

U.S. Citizenship is required for all positions.

Take a panoramic view of Melbourne:

An Atlantic oceanside setting, complete with white sand beaches, waving sea oats, and miles of waterways, inlets and rivers.

A playground for sports enthusiasts with everything from sailing and snorkeling to golf and tennis.

A youthful but sophisticated approach to city living that includes superb dining and entertainment, cultural events, fashionable shopping, affordable housing, along with close proximity to your job as well as major tourist attractions and NO STATE INCOME TAXES.

A hub of activity in the electronics industry that attracts hi-tech experts and their families from around the world to create a city unlike any other.

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We are a part of Harris Corporation, Florida's largest industrial employer. We offer a formal merit review program and outstanding advancement opportunities. We are a close-knit team of professionals sharing our experience and insights, in an open, communicative and unregimented environment. We offer an excellent compensation and benefits package.

We will be conducting interviews this fall in the following cities:

Palo Alto	Denver
Philadelphia	Washington D.C.
St. College, PA	Dallas
Boston	San Antonio

For more information please call our toll-free number 1-800-327-8552 anytime 7 days a week. Or send your resume in confidence to: H.J. Ostle, Personnel Manager, Harris GISD, P.O. Box 98000, Dept. CW1024, Melbourne, Florida 32902. We are an equal opportunity employer, m/f/h/v.

We'd like to share our vision of the future with you.

HARRIS

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SOFTWARE ENGINEERS

Software Development Engineer
Perform engineering analysis of avionic system requirements and complete task specifications and planning as necessary to accomplish mission software design, development and test. Will function as lead engineer to direct a group of software engineers. Requires BS degree in Engineering, Computer Science or related field.

Software Configuration Management Engineer
Prepare software engineering plans for customer and management review. Perform software engineering management, audit, and unit development. Assist in creating and maintaining software design standards and controls. Prefer aircraft industry experience. Requires BS degree in Engineering, Computer Science or Systems Management with relatable skills in hardware/software applications.

Send your resume to: Brenda Hawkins

Software Engineering Specialist
Responsible for computer system integration, real-time systems software design and hardware/software interfaces in laboratory and test environments in the area of Ground Data Systems. Experience required on Gould SEL 32, DEC VAX 11 or HP 9845. Must have a proven track record in computer systems applications in the area of data acquisition and control, firmware development, operating system concepts and direction of software development. Requires BS degree in Computer Science/Mathematics or Electrical Engineering.

Send your resume to: Irene Brandt

We're located near LAX in Hawthorne, CA. Our benefits package is excellent, including company-paid medical and dental insurance, 12 paid vacation days per year, and an outstanding company-contributed savings/investment plan. For immediate consideration, please forward your resume to the representative listed under your discipline:

Northrop Aircraft
Hawthorne Facility
Dept. 1222/80 NA-CW 106303
P.O. Box 2163
Hawthorne, CA 90250

NORTHROP
Making advanced technology work.

Equal Opportunity Employer M/F/H
Proof of U.S. Citizenship Required

Manager, User Services
Computer Center
Rhode Island College

We invite applications for a person to plan and manage technical services for academic computer users. Includes scheduling, assigning duties, and evaluating work of technical personnel involved in providing user services. Requires BS/BA (MS preferred) in computer science or related field, 4 years of experience gained through employment in a computer center as an academic programmer/consultant or equivalent experience. Detailed knowledge of job controlled language, system design and function, several programming languages and technical writing important. Beginning salary $26,674 to $29,836 depending on qualifications. Attractive fringe benefits. APPLICATIONS MUST BE RECEIVED BY 4:00 PM ON NOVEMBER 7, 1983. Submit letter of application with college placement office credentials or resume and 3 current letters of reference to:

Office of Personnel Services
Rhode Island College
600 Mount Pleasant Avenue
Providence, Rhode Island 02908
Attn: Director, Computer Center.

An Affirmative Action
Equal Opportunity Employer

INFORMATION SYSTEMS DIRECTOR

Manage the development, implementation and maintenance of information systems for the Minnesota Department of Revenue.

Responsibilities include providing conceptual leadership in information systems and developing a comprehensive data processing plan.

Candidates must have a minimum of three years management experience in the design, planning, development and implementation of application systems in a large scale computer environment. This experience must include the on-going management of systems analysts, development and programming activities including the supervision of systems analysts and programmers, and, be acquired within the last six years.

Contact the Minnesota Department of Revenue, Personnel Office-Location 122, P.O. Box 43446, St. Paul, MN 55164 (612) 296-3414 for the required application form. Applications will be accepted no later than 4:30 pm on November 14, 1983. An eligible list of qualified candidates will be established.

Equal Opportunity/
Affirmative Action Employer

Field Engineers

Leading national company for third party maintenance is currently recruiting for field engineers. Well rounded experience in maintaining varied computer systems necessary. Top salary and benefits. Call Mr. Lynch:

20th Century Computer Maintenance, Inc.
800-821-8151

Experienced Programmer/Analysts

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We'll Help You Grow

M.I.S. International is one of Southeastern Michigan's largest contract programming corporations supplying data processing professionals to major area companies. In addition, AUTOFLEX, Inc., a subsidiary of M.I.S., is heavily involved in the design and development of Robotics equipment and software systems.

If you have at least one year's experience in any of the following disciplines and desire a high tech, state-of-the-art environment, call **Marie Clark** or **Dennis Jay.**

- **IMS DB/DC with COBOL or PL/1**
- **CICS with COBOL or PL/1, DOS/OS**
- **PL/1, OS/MVS**
- **COBOL using TSO/SPF or VM/CMS**
- **PL/1 with MULTICS**
- **M6800 Electronic Controls, Automotive Related**
- **HOGAN Systems - Project Leader**

MIS
INTERNATIONAL INC. "A Total Systems Company"

24655 Southfield Road
Southfield, Michigan 48075
(313) 552-0550
(800) 521-2144

Equal Opportunity Employer

SYSTEMS ANALYST

We are looking for creative people with 1-2 years experience interfacing with various aspects of systems design and practical Business - Financial applications in a large complex manufacturing environment. Immediate consideration to MBA with 4 year undergrad degree in Computer Science or related field. Good interpersonal-/communication skills.

Excellent compensation and benefits package. Send resume and salary history to: C. Dowell, Dept. 2129

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P.O. Box 338
Bradenton, FL 33506

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REAL-TIME SOFTWARE ENGINEERS

TANO CORPORATION, a leader in the design and manufacture of computer-based automation control systems, seeks career-oriented individuals to fill immediate openings:

SR SYSTEMS/SYSTEMS SPECIALISTS
Responsibilities involve in design, documentation and implementation of distributed microprocessor systems for real-time monitoring and control. Experience with Ada, Motorola 68,000, and distributed processing is a definite plus.

SR PROGRAMMERS
Candidates must possess relevant degree and real-time software; Fortran and/or Assembler experience in an RSX-11M or VAX environment in the area of process or supervisory control, or energy management.

USER SERVICES/SYSTEM SUPPORT PROGRAMMERS/ANALYSTS
Responsibilities include providing a full spectrum of services to corporate users to achieve "user" systems development, data analysis and education involving system/supporting tools (DATATRIEVE). Must possess a degree in Computer Science or equivalent experience. VAX experience a necessity.

TANO CORPORATION offers an excellent compensation and benefit package, including 100% company paid medical insurance, incentive plan and pension trust. Please telephone or submit confidential resume, to:

Professional Recruitment
1-800-824-6966

TANO
CORPORATION
4321 Pontiac Court West, New Orleans, Louisiana 70129
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Below is a partial listing of Fee Paid opportunities. Call, submit resume in confidence

PROGRAMMERS/ANALYSTS ($) TO $25K
High visibility positions working with small teams in software installation analysis. Full project exposure. Must have 2 years IMS DB/DC.

ANALYSTS ($) TO $30K
Multiple openings in major vendors' in-house and client development projects. Must have min. 2.5 years UNIVAC 1100 DMS, TIP req.

SOFTWARE ENGINEERS ($) TO $40K
DEC, POP, RSX 11-M FORTRAN, REAL-TIME PROCESS CONTROL, DATA ACQUISITION. MUST HAVE SOLID EXPERIENCE AND HAVE PROJECT MANAGEMENT, LARGE SYSTEMS DESIGN, R & D EXPERIENCE.

THE DATA GROUP
3400 Peachtree Road
Suite 525
Atlanta, GA 30326
(404) 231-5794

SYSTEMS PROGRAMMER
(Degree Preferred)

Join an IBM Systems programming team supporting an IBM 3033 in a VM/370. Calls, OS/VS1, CICS, and TOTAL environment. Several years experience with VM/370 and/or OS/VS1 and Assembler language as a systems programmer required. Familiarity with VM/370 and/or OS/VS1 performance and tuning, teleprocessing and data base software desirable. Dynamic and challenging issues in a pleasant suburban working environment. Competitive salary and excellent benefits. Please mail resume to:

Dr. C.B. Hazelwitt, Executive Director
Trinity University Computing Center
715 Stadium Drive
San Antonio, Texas 78284
(512) 736-7401
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PROGRAMMER/ANALYST- Temp. proj. invlvg. programming, analysis, coding & testing of prototype on-line trading room facility in money market environment. Knowl. of COBOL, CICS, TSO, IMS/VS, TIO & IBM 3033/83. 2 yrs. exp. or 2 yrs in programming $32,100 p.a. 35 hrs/5 days/wk. **ACSIS, Inc., 90 John St., NY, NY 10038. SEND RESUMES.**

ASST. DBA - IMS

Fortune 500 firm (SUBURBS) seeks tech. astute IMS-DBDC sys. prog. Environ. is multi. CPU OS/MVS & distributed network. Oppty. to move up to mgmt. w/fast growing firm committed to tech. $44,000 (Fee Paid).

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(617) 423-1300
Personnel Consultants

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+ Openings in IMS DB/DC, FOCUS and ADABAS/NATURAL
(714) 891-1344

CPU COMPUTER PROFESSIONALS UNLIMITED, agency
7041 Garden Grove Blvd.
Ste. G, Garden Grove, CA 92641

Data Processing Supervisor
City of Greeley, Colorado

Managerial and technical position supervising the data processing function, including overall systems analysis and hardware/software evaluation. Requires B.S. in computer science, 5 years progressively responsible experience in computer programming and systems analysis and design. Minimum 2 years supervisory experience. Unisys 90/40 computer. Reports to finance director. 1983 salary range $30,756 to $36,384 per year depending on qualifications. Apply by October 28, 1983 to:

Personnel-DPS
City of Greeley
919 Seventh Street
Greeley, Colorado 80631
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BUSINESS SYSTEMS DEVELOPMENT

At General Dynamics Data Systems Division in Fort Worth, Texas, we can offer experienced computer professionals diverse and challenging opportunities in the design and development of sophisticated business systems.

Here at our Central Center, you'll work on a variety of assignments with some of the best people and most advanced equipment in the industry, supporting one of the largest multinational coproduction programs in history... the F-16 Falcon.

If you have a degree, and at least 3 years' experience in one of the following areas, write to us TODAY!

BUSINESS APPLICATIONS PROGRAMMERS

Design, develop, maintain and modify large-scale, on-line and batch, user-oriented systems which require experience in a large-scale IBM environment, and a working knowledge of:

- On-line operating systems
- IMS on-line processing
- TSO with SPF
- HIDAM/HDAM data bases
- Message Format Service (MFS)
- COBOL

Also, requires familiarity with BTS and ability to translate business problems into workable solutions.

DATA BASE SPECIALISTS

Requires knowledge of the Data Dictionary and experience in IMS, including data base administration and design functions. Application development using COBOL or PL 1 is also required.

General Dynamics offers competitive salaries, a comprehensive benefits package, plus exclusive use of our 80-acre recreational area and 18-hole championship golf course.

Send your resume, in confidence, to: D.H. Huckaby, Division V.P./Director, Central Center, Data Systems Division, P.O. Box 748-032, Mail Zone 5300, Fort Worth, TX 76101.

U.S. Citizenship Required

GENERAL DYNAMICS

Data Systems Division

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FINANCIAL INSTITUTION SERVICES

We Make The DIFFERENCE

OPERATIONS SHIFT MANAGER

Requires a minimum 5 years experience including 2 or more years in a supervisory/management/capacity. Familiarity with MVS/JES II, JCL and good understanding of all facets of computer room management, scheduling, and planning is essential.

ON-LINE BAL ANALYST/PROGRAMMERS

Requires a minimum 3 years experience with macro Assembler & CICS. Native 3270 and structured BAL is preferred.

PROGRAMMER/ANALYSTS

Requires a minimum 3 years experience with a through knowledge of COBOL. Exposure to BAL and MVS preferred but not essential. Openings exist in CABLE TV or CREDIT CARD systems.

CREDIT CARD SYSTEMS ANALYSTS

Should understand Bank Credit Card Systems including interchange, authorization processing, ticket entry, storage & retrieval, familiarity with cardholder & merchant processing and PIN# verification and electronic data capture essential.

CABLE SYSTEMS ANALYSTS

MUST have Cable TV background in analysis, marketing & installation of cable services. Minimum 2 years and degree. Will interface directly with CCS customer base and designing systems/new systems recommendations are included in your responsibilities.

FIS offers highly competitive salary's, excellent benefits and exceptional opportunities for advancement in a dynamic and growing industry. For consideration send resume or CALL TOLL FREE to: DAVE VONTZ

1-800-228-9079

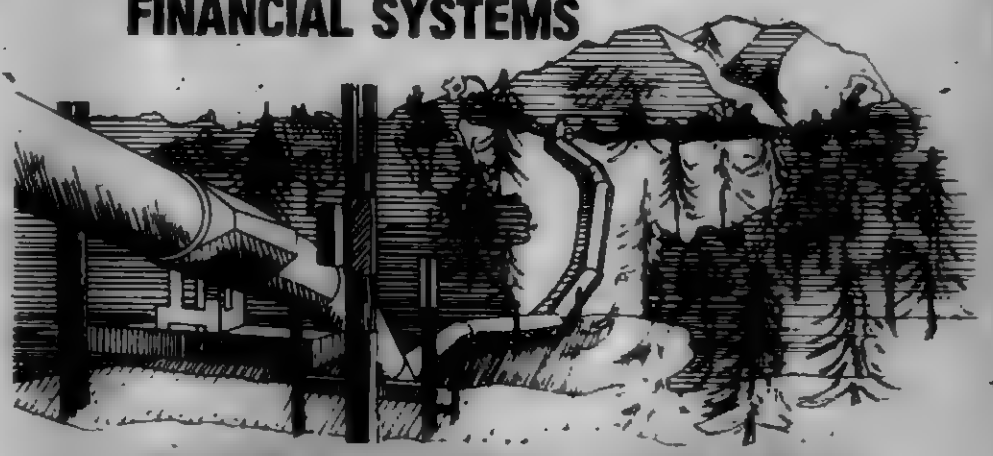
FINANCIAL INSTITUTION SERVICES

7301 Pacific St.

Omaha, Ne. 68114

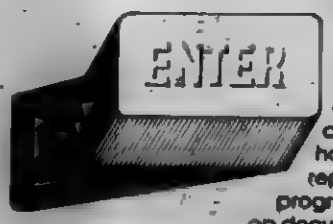
Equal Opportunity Employer M/F

PROGRAMMING/ANALYSIS FOR FINANCIAL SYSTEMS



EXPLORE SOHIO

Grow with Sohio's expanding Data Base Facility and link your programming experience and analysis capabilities with Sohio's career growth environment.



PROGRAMMER/ANALYST

A college degree and a minimum of three years' COBOL experience analyzing and programming financial systems are essential for assuming the responsibility for developing new corporate-level financial systems, as well as enhancing existing applications. Experience with a report writer is a plus. In this position you will develop program specifications, code and test programs, develop documentation, and consult with and train users. Our state-of-the-art environment includes IBM 3033, MVS, IMS/CICS, FOCUS and fourth generation languages.

PROGRAMMER

The requirements for this position include a Computer Science degree with at least one year of COBOL programming experience in an IBM OS environment. Two years' college and three to four years' significant related experience could be acceptable. Your primary responsibilities will include maintaining, enhancing and developing accounting, budget, tax and treasury systems.

These key positions will be compensated with excellent salaries and comprehensive benefits within a stimulating and progressive environment. **Sohio's comprehensive relocation package for new hires includes all normal moving expenses. Homeowners also qualify for mortgage interest differential allowance, third party home purchase and other features typically restricted to internal transfers.** Start by sending your resume stating your current salary history and outlining your education, experience and professional abilities to:

Ms. Sarah Steiner, Senior Executive Recruiter
THE STANDARD OIL COMPANY (Ohio)
1424 Midland Building —577CW• Cleveland, Ohio 44115
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NO THIRD PARTY INQUIRIES, PLEASE
"Help us Help to Assure America's Energy Future"

SOHIO

IDAHO POWER
Systems Programmer

Idaho Power has an opening for a DEC systems programmer to support the load research data aquasition project. Our system includes remote microprocessors and a PDP 11/44 running RSX-11M. Conversion to RSX-11M+ under consideration. The position requires experience in system generation, [illegible] and knowledge of FORTRAN, MACRO-11, FCS, and RMS-11. Broad responsibilities include serving as technical advisor for the project and participating in the design and development of load research software.

Send Resume and Salary Requirements to:

Mr. John C. Dominick
Idaho Power Company
P.O. Box 70
Boise, Idaho 83707

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Are you challenged by your current working environment? If not, there is an abundance of opportunity and challenge in Baltimore, MD; Central PA; Washington, D.C.; Philadelphia, PA; Wilmington, DE; and Seattle, WA.

Comp-u-Staff is seeking to hire experienced analyst/programmers to work in Fortune 1000 client accounts. Comp-u-Staff is a growing, professional services company that offers high salaries, performance bonuses, excellent benefits, expense accounts and training programs.

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[illegible] (DB/DC) CICS (DL1) ADS

Call or send a resume to:

Comp-u-Staff
[illegible] RECRUITMENT DEPARTMENT
[illegible] (301) 828-0788

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Bentley College

CHAIRPERSON, Computer Information Systems

Applications and nominations are invited for the position of Chairperson, Department of Computer Information Systems. The Chairperson must hold a doctorate with a specialization in either Information Systems or Computer Science. In addition, preference will be given to an individual with impressive teaching, research, and/or industrial experience. It is expected that the Chairperson will enhance the reputation and visibility of the Department both regionally and at the national level.

Bentley College is a thriving, independent, accredited coeducational institution with a reputation for quality business education. It is the sixth largest independent institution of higher learning in Massachusetts and enrolls over 6,000 undergraduate and 1,350 graduate students in a variety of business disciplines.

The Computer Information Systems Department presently consists of 23 full-time faculty and 42 adjunct faculty who teach at the undergraduate and graduate levels. There are over 600 undergraduate majors and 250 graduate students in the Master of Science program in Computer Information Systems.

The curriculum orientation is in the areas of applied business information systems and systems programming. A wide range of specialized courses is offered including database, data communications, systems architecture, distributed systems, decision support systems, computer auditing, small business systems, and information systems policy. The faculty is supported by seven administrative staff plus graduate assistants, and the computing facilities include three Prime 850s, a DEC and an IBM system, and over 100 micros supported by a broadband network with planned expansion underway. An Academic User Services Group supports all faculty.

Salary is very competitive. Faculty salaries have perennially been in the top ranges of compensation scales compiled by the AAUP. Rank is expected to be at the associate or full level commensurate with academic background and professional experience. A generous benefit package is included.

Applications, nominations and supporting materials should be sent to:

DR. JOHN H. BURNS, DEAN
BENTLEY COLLEGE
BEAVER & FOREST STREETS
WALTHAM, MASSACHUSETTS 02254

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FACULTY POSITIONS
MARSHALL UNIVERSITY
COLLEGE OF BUSINESS
DEPARTMENT OF COMPUTER AND INFORMATION SCIENCE

The College of Business at Marshall University is accepting applications for faculty positions for the Academic Year 1984-85 at the Assistant Professor or higher level in Computer and Information Science.

Marshall University, located in Huntington, West Virginia, enrolls approximately 11,000 students. The College of Business offers quality programs leading to the BBA, BS in Computer Science, MBA, and MS in Accounting degrees.

Applicants should hold an earned doctorate in the field of Information Systems, Computer Science, or a similar discipline, however those who are ABD will be considered. Business experience is preferred. Salary will be determined by credentials.

APPLICATION DEADLINE: Applications must be received by November 10, 1983 or until the position is filled.

CONTACT: Dr. Robert Babb, Chairman, Department of Computer Science, College of Business, Marshall University, Huntington, WV 25701.

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FLORIDA
SUNSHINE OPPORTUNITIES

Excellent growth company with good rate package, excellent benefits and competitive salaries has needs for:

Programmer Analysts - OS/MVS, COBOL and/or Assembler, IMS DB/DC, variety of applications.

Systems Programmers - OS/MVS, XCF/VTAM, ACF/NCP, TSO

Plus, progressive insurance company needs P/A s with Lifecomm or Life 70 experience.

Plus High Tech Company needs HARDWARE and SOFTWARE ENGINEERS with microprocessor experience and Pascal, Assembler, PL-1 or Unix and "C"

Always have needs for CICS Programmers.

Send confidential resumes to:

MANAGEMENT RECRUITERS of St. Petersburg
10051 5th St. N., Suite 215
St. Petersburg, FL 33702

PROGRAMMER/ANALYST- Temp. proj. invlvg. upgrading of current banking system. Rsp. for impl., debugging, testing & user training. Knowl. of COBOL, CICS, ASSEMBLER, VSAM, VTAM, PRG, DOS/VSE & IBM 4300 Series. 2 yrs exp. or 2 yrs in programming. $30,750 p.a. 35 hrs/5 days/wk. **ACSIS, Inc., 90 John St. NY, NY 10038. SEND RESUMES.**

Beech Aircraft Is Hiring

Electronics Engineers

The stimulating challenge of unlimited frontiers in aviation and aerospace will be advantageous to your career.

If you have experience, we have immediate openings in the following disciplines:

Software Engineer—BSEE or BSCS plus 3-5 years experience in design and development of real time software for a multi-processor system. Experience in executive functions of a micro processor based system.

Electrical Systems Designer Engineer—BSEE or BSCS plus minimum 5 years experience in digital electronic hardware and software design.

Electrical Engineer—BSEE plus experience in FMEA, valuation of program emulation and simulation. Experience in software quality assurance.

Beech is a good place to work, a company of stature and leadership that responds to the contribution of the individual.

For application or additional information call or write.
JEROME WILLIAMS, Dept. CW
9709 E. Central/Wichita, Ks. 67207/(316)681-7700

Beechcraft

DIRECTOR OF DATA PROCESSING

Major midtown publisher has an excellent career opportunity for experienced data processing professional with a proven track record.

Knowledge of prime hardware a must. Degree in computer science required. Minimum of 7 years data processing with at least 3 years direct experience in a large mini computer environment and detailed knowledge of COBOL and FORTRAN required. Responsibilities include systems development, implementation and operations. Previous experience in publishing a plus.

Excellent company benefits.
Salary to $45,000.

Send resume in confidence to:

BOX CW 708
810 Seventh Avenue
New York, NY 10019
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Could you be a consultant? for MARK IV/V

You probably could if:

- You are a good analyst/technician
- You like to meet people
- You like a variety of environments
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NOTE: Additional considerations made to those who are capable of extended or frequent travel.

Experience in other Fourth Generation type languages such as NOMAD 2, RAMIS II or FOCUS would also be of interest for New York/New Jersey.

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Instr or Asst. Prof in Quant. Methods/Comp. Sci. Fall 1984, 2 of 3 tenure track. Areas: telecommunications or comp. sci. plus 1 or 2 of: stats, DBMS, languages, digital electronics, op. systems, compiler/assembler construction, data structures, systems software, MIS, systems design. Qualifications: PhD or Master's with teaching exp. and/or substantial prof. exp. competent to teach undergraduate level courses (stats, D.P., BASIC, FORTRAN, COBOL, PASCAL), adv. courses (DBMS, systems software), courses in the evening MBA program (stats & seminars) and the evening undergrad OM/CS degree and certificate programs. St. Thomas is a Catholic Liberal Arts College with an undergrad. day and evening division, an evening MBA program, and a Grad. Educ. program. Send resume by 2/15/84 to Dr. B. Fotz, Chair, OM/CS Dept., College of St. Thomas, St. Paul, MN 55105.

Satellite Communications

Research and software development company has openings for Senior Systems Analysts and Technical Writers to work in areas of local area networking, realtime programming, packet switched networks and software engineering. Minimum requirements include a B.S. in math/physics/engineering or computer science with at least 3 years experience. Hardware experience must include minicomputers preferably HP-1000. Send resume in confidence or call:

Research & Data Systems, Inc.
10300 Greenbelt Road
Lanham, Maryland 20706
(301) 220-6100

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New York City agency-high $20's-4-years programming experience; 3-years admins-mandatory; RSX 11M-Plus preferred; (benefits plus 4 weeks vacation); Resumes to: New York City Department of Correction, Personnel Division, 377 Broadway, 8th Floor, New York, NY 10013. *EOE/MF.*

DIRECTOR OF MANAGEMENT INFORMATION SYSTEMS

For Nassau Community College (approx 23,000 enrollment). Position, reporting to V.P. of Academic/Student services, requires Master's degree with computer-related field specialization or business/public administration, plus 5 yrs supervisory & management exp in MIS unit including computer operations systems analysis & programming.

Responsibilities include coordination, general supervision, evaluation, systems control & development, college programming & data operation, plus ensuring security of data base & physical security of on-site IBM4341, Group 2 & associated peripherals/equipment.

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Dr. Irving L. Williams, Affirmative Action Officer
Nassau Community College, Garden City, N.Y. 11530

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Director of Data Processing Operations

Oberlin College is looking for an individual capable of filling the position of Director of Data Processing Operations. The position is responsible for the overall management of the Operations, Production Services, and the Maintenance Group within the computing center. Experience in organizational planning and developing operations procedures is essential. A staff of 10 people reports to this position.

Requirements: Three to six years experience in the management of a computer operations department or equivalent organization. Experience in evaluating hardware and software products. The ability to communicate verbally and in writing in a clear, concise manner. Highly developed administrative capabilities. Baccalaureate desirable.

Compensation. The position is to be filled as soon as possible. Salary commensurates with experience and qualifications. Fringe benefits include a generous pension program, fully paid medical and long term disability insurance, one month vacation, life insurance and tuition support for children.

Interested persons should submit resumes by November 6, 1983 to:

George M. Sowis
Director of Computing
Oberlin College
Oberlin, Ohio 44074

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We're looking for an ambitious, talented manager with proven technical skills on DEC 10/20 operating systems. The ideal candidate will know operating systems, I/O drivers, communications, and be adept in the design and implementation of code that enhances systems availability.

To qualify, you must have three to five years programming experience on DEC 10/20 systems and a like number of years managing a technical systems group that has performed systems design, enhancements, crash analysis, and diagnostics.

SOFTWARE SUPPORT SPECIALISTS

Your primary responsibility will be to upgrade our TYMCOM 10/20 operating system by enhancing its performance, availability, and reliability. The task requires individuals experienced in the thorough analysis, design, coding, and debugging of existing and new software.

These positions require three to five years assembly language experience with micro or macro-coding of the DEC 10/20.

For immediate consideration, please send your resume and salary history, in confidence, to **Tymshare, Inc.**-Computer Systems and Support Division, 89100 Liberty Street, Fremont, CA 94538, ATTN: John Swarbrick.

TYMSHARE

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Senior Programmers/ Analysts

Key Openings in our Strategic Accounts Branch Automation Systems Group in Dayton, Ohio

NCR Corporation, a leader in the development of financial terminal systems has attractive opportunities in a task force that is marketing and installing the BAS 5000 teller terminal systems throughout the U.S.

Based in Dayton, this dynamic group consists of highly trained specialists who have the experience and enthusiasm to help NCR reach new plateaus within the commercial bank/thrift terminal marketplace.

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As one of the most respected companies in the field, NCR offers competitive salaries, a comprehensive benefit program and an atmosphere where the challenge, reward and recognition are as great as any opportunity in the business world today.

You should have a technical or business degree with computer science courses. In lieu of a degree, we will consider equivalent experience. If you are successful in your present position and want to expand your potential, forward your resume and salary history to: Mr. Bill Macek, NCR Corporation, 955 Eastwind Drive, Westerville, Ohio 43081.

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Dartmouth College

Senior Technical Consultant - A small computer consulting company dedicated to providing products and services to the users of the VM/370 and CMS systems, has an opening for a Senior Technical Consultant to serve as technical advisor to company clients in all aspects of VM/370 and CMS software including analysis of business requirements and the development of proposals for increased system development and production. Specific responsibilities include: 1) analysis of client requirements, 2) creation, development and implementation of proposals for VM/370 and CMS system enhancements, inclusive of strict discipline requirements 3) on site consultation on system evaluation, performance analysis, software quality, problem determination and system internals, 4) design, development, documentation and support software products to support operations on multiple central processor units (CPUs) and 5) lectures, presentations and written contributions for company newsletter on technical aspects of VM/370. Minimum requirements include a Master's Degree in Math/Computer Science or equivalent experience and/or training and at least six years experience in all aspects of VM/370 and CMS and System/370 Assembly language, including four years of management experience related to VM/370 and CMS operations. Specifically, experience must include the design and development of VM/370, VM/SP and CMS system enhancements particularly related to tightly coupled multiple processor complexes and VM-based teleprocessing systems. Also required is demonstrated knowledge of OS-based systems at the internals level, extensive presentation and lecture experience on VM/370 and related topics and demonstrated expertise in operating systems (i.e. CP CMS), subsystems (i.e. RSCS, PVM), and familiarity with system applications (i.e. VMAP, SMART, DCF). Salary is $62,400 per year for a fifty hour work week and benefits include three weeks vacation, medical, life and disability insurance. Qualified applicants respond with resume to: Box CW-84280, Computerworld, Box 880, Framingham, MA 01701.

Data Processing

SENIOR PROGRAMMER/ ANALYST HP 3000

Mission Viejo Company, a leader in the development of masterplan residential communities, has an immediate opening for a Senior Programmer/Analyst to join our business data processing staff.

Responsibilities will include program design, coding, testing, documentation and implementation of business/financial information systems.

Qualified candidates must have several years experience with Hewlett Packard equipment and software; a strong accounting background; have worked with accounting systems and as a liaison with financial users, and developed or used financial modeling or spreadsheet analysis systems.

Please apply by sending your resume to the Personnel Department.

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24882 Chrisanta Drive
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- **SENIOR ANALYST PROGRAMMER**

These positions (determined by applicant's level of experience) require a minimum of two years commercial experience with ANS COBOL; experience in medium to large scale IBM mainframe; strong ability in OS/JCL, TSO, MVS; teamwork orientation; capable of system analysis and specification. Experience in a discipline systems/projects management environment; IMS DB or DC experience; or management skills are definite pluses.

- **DATA BASE ANALYST**

This position requires proven ability as a Data Base Analyst in an IMS environment. Proven management skills and technical experience a plus.

- **SUPERVISOR, DECISION SUPPORT**

This position will manage the Information Service Center and Micro-computer activities. Position requires a minimum of 8 progressive years data processing experience; knowledge/capability of analyzing, designing and installing Fourth Generation Life Cycle and Micro systems; short and long range planning skills; well-developed written and verbal communication skills; sensitivity to service needs of end-users.

- **SYSTEMS PROGRAMMERS**

This position requires a minimum of three years experience; familiarity with MVS, BAL, JES 2 and TSO. IMS/DC, VSAM, VTAM, NCP, performance tuning and experience in a multi-processor (lossely coupled) environment a plus.

- **TELECOMMUNICATIONS SPECIALIST**

This area requires a technical emphasis and strong background in remote telecommunications disciplines. Expertise should include current communications protocols and equipment (minis, terminals, controllers, etc.), network design and performance analysis.

We offer competitive salaries, an attractive benefits package and opportunities for advancement. For immediate consideration, SUBMIT RESUME and SALARY HISTORY IN COMPLETE CONFIDENCE to:

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EDP EMPLOYMENT COORDINATOR
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Excellent position for experienced Field Engineer to work on IBM 327X equipment. We have several openings in the Dallas, Ft. Worth metro area.

Los Angeles, California — FIELD ENGINEERS
Field Engineers required for the support of IBM 3600 Banking and/or Supermarket Systems.

FIELD ENGINEER — MIDWEST LOCATION
Experienced with IBM 5525 Administrative Systems. We have an excellent opportunity and immediate opening for qualified individual.

Dataserv will soon have additional opportunities for field engineers and technical specialists in several other major cities throughout the United States. If you are considering a change in employment, contact Dataserv for a review of what we have to offer.

For immediate consideration and more information call **Toll Free — 800-328-6729** or send your resume to: **Bev Walters, Dataserv Computer Maintenance, Inc., P.O. Box 3003, Hopkins, MN 55343.** We are an equal opportunity employer and all inquiries are considered confidential.

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If you have 2 or more years mini or microcomputer experience that involves FORTRAN; COBOL, ASSEMBLY LANGUAGE; UNIX; VAX/VMS, operating systems (RDOS), submit your resume along with salary history and requirements for immediate confidential consideration to Mr. Richard Bedell, 1300 N. 17th Street, Suite 950, Arlington, VA 22209. (703) 276-9600.

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Muskegon Community College is seeking qualified candidates for the professional staff of Instructional Specialist for Data Processing. The candidate must have a minimum of a Bachelor's Degree in Computer Science or a closely related area with a Master's Degree preferred. Teaching experience and/or professional data processing experience, specifically software evaluation and training desirable.

Salary will be commensurate with educational preparation and experience.

Application Deadline. A detailed resume and transcripts should be submitted no later than December 15, 1983.

Interested candidates may apply to:

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Personnel Director
Muskegon Community College
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You will be responsible for managing a data base administration department, supporting the IMS development and production environment for on-line and batch application systems. Responsibilities also include implementing and maintaining backup/recovery/reorganization systems, defining standards for the IMS DB/DC system, providing technical advice and training, and DB/DC fine tuning and optimization.

No resume initially required. Call Mr. Crowe (day or evening) or send resume to: Timothy D. Crowe, Jr., Executive Search Consultants, Dept. 1024, Box 6, Chelmsford, MA 01824. You can be assured of the strictest confidence. Client is EOE.

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UNIVAC Software:	EXEC 1100, TIP, CMS, DMS/1100, MAPPER

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Qualifications: Bachelor's degree in Computer Science or in related field and a minimum of 2 yrs. work exp in D P required. Master's degree in Computer Science with business orientation. Knowledge of COBOL, RPG II, VSAM & Data Base preferred.

Duties: Instruct courses such as Intro to C.T., Computer Operations, Automated Accounting, Micro Computers, BASIC, RPG II, FORTRAN, COBOL, etc.

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Information Systems Management Department
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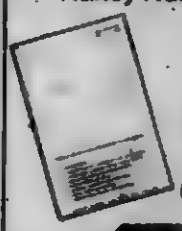

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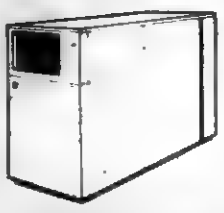

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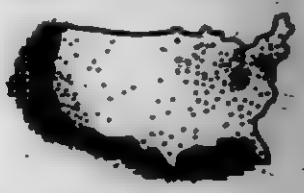

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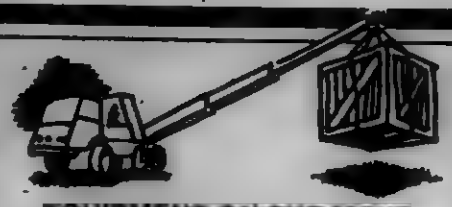

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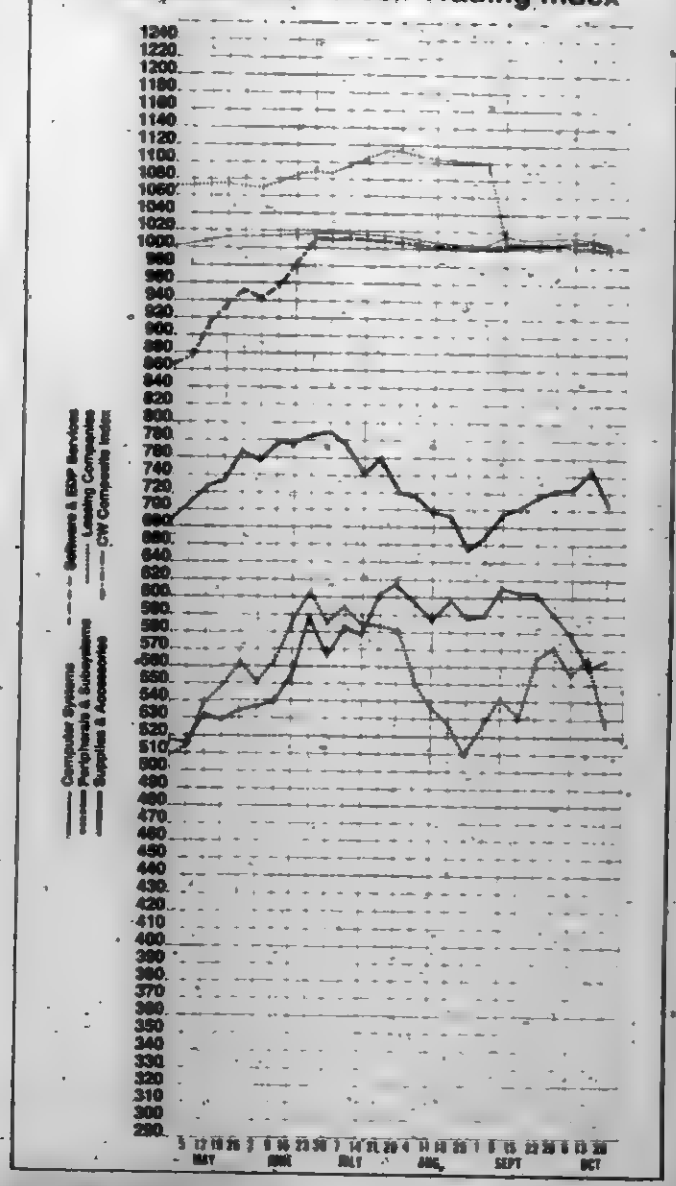

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All quotes last sale reported and firm, filed by TRADE QUOTES, INC. Cambridge, Mass. (617) 491-

	1982-83 RANGE	CLOSE OCT 19 1983	WEEK NET CHANGE	WEEK PCT CHANGE
COMPUTER SYSTEMS				
ALPHA MICROSYSTEMS	12- 424	12 1/4	-1 1/4	-9.2
ALTOS COMPUTER SYST	8- 28	8 1/4	- 1/8	-2.9
ANSAHL CORP	9- 36	18	-1	-5.2
APPLE COMPUTER INC	18- 63	21 1/2	+ 3/8	+1.7
AT&T	60- 70	62 7/8	-1 3/8	-2.1
BURROUGHS CORP	28- 58	50 7/8	-2 3/8	-4.6
COMPUTER AUTOMATION	7- 17	7	- 0/8	-0.1
COMPUTER CONSOLES	8- 22	18 3/8	- 3/8	-2.0
CONTROL DATA CORP	21- 82	65 1/2	-6 0/8	-8.0
CONVERGENT TECHNOL	18- 41	18 3/8	- 3/8	-2.0
CRAY RESEARCH INC	20- 92	47 5/8	-1	-2.0
DATA GENERAL CORP	20- 62	66 1/8	+6 3/8	+9.0
DATAPOINT CORP	11- 36	24 3/8	-1 1/2	-5.7
DIGITAL EQUIPMENT	62-132	72 1/2	-20 1/8	-21.9
EXCO INC	8- 16	14 7/8	- 3/8	-2.4
ELECTRONIC ASSOC.	3- 15	6	-1 3/8	-21.3
FLOATING POINT SYST	18- 44	35	-1 3/8	-3.7
FORDORO	22- 47	38 1/8	-2 3/8	-5.3
GENERAL AUTOMATION	3- 18	11 1/8	- 1/4	-2.1
GOULD INC	31- 44	30 1/2	-2 7/8	-8.6
HARRIS CORP	30- 51	36 3/4	-1 1/8	-2.9
HEWLETT-PACKARD CO	22- 48	38	-2 3/4	-6.5
HONEYWELL INC	66-132	126 3/4	0	0.0
IBM	87-134	130 1/2	-2 1/8	-1.6
IPL SYSTEMS INC	3- 14	6	-1 1/2	-20.0
LANIER BUSINESS PROD	12- 21	19	- 1/2	-2.5
M/A-COM INC	22- 38	22 1/8	-2 7/8	-11.5
MADISON COMP SYSTS	3- 9	3	0	0.0
MANAGEMENT ASSIST	7- 19	13 1/4	+1 1/4	+10.4
MATSUSHITA ELECIA(ADR)	47- 77	69 3/8	-5 1/2	-7.3
MODULAR COMPUTER SYS	6- 16	8 7/8	+ 1/8	+1.4
NORAND DATA SCI	10- 19	13 1/2	- 7/8	-6.0
MOTOROLA INC	82-140	143 1/8	+1 3/4	+1.2
NAT'L SEMICONDUCTOR	22- 66	34	-1 1/2	-2.7
NCR	30-135	128	-8 1/2	-6.0
PERKIN-ELMER	17- 37	24	- 7/8	-2.8
PRIME COMPUTER INC	21- 39	25 5/8	-1 1/8	-4.7
SPERRY CORP	21- 47	44 7/8	- 1/8	-0.2
TANDEM COMPUTERS INC	14- 38	36	-2 1/8	-5.6
TANDY CORP	30- 69	32	-3 1/4	-9.2
TELEVIDEO SYSTEMS	14- 41	14 7/8	+ 3/4	+9.3
TEXAS INSTRUMENTS	71-176	116 3/8	-8 1/2	-9.2
VECTOR GRAPHICS INC	3- 14	8 1/8	- 3/4	-10.9
WANG LABS "B"	13- 42	32 5/8	-6 3/8	-16.1
WANG LABS "C"	11- 42	32 3/4	-4 1/4	-11.4
XEROX CORP	39- 86	47 3/4	- 3/8	-0.7
LEASING COMPANIES				
BOOTHE FINANCIAL CP	11- 35	30 3/4	+1 1/8	+3.8
COMPUTECO INC	7- 43	28 3/8	+1 1/8	+4.1
CONTINENTAL INFO SYS	3- 18	10	- 1/2	-4.7
DPF INC	9- 18	12 7/8	- 7/8	-6.3
U.S. LEASING	18- 67	36 3/8	-3 3/8	-8.4
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ANALOG DEVICES INC	18- 42	38 1/8	-3 1/8	-7.5
ANALOGIC CORP	22- 37	21 1/2	- 1/2	-2.2
APPLIED MAGNETICS CP	18- 57	39 1/8	-1 3/8	-3.4
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SOFTWARE & EDP SERVICES				
ADVANCED COMP-TECH	1- 8	3 1/2	- 1/2	-12.5
ADVANCED SYSTEMS INC	8- 22	19 3/4	0	0.0
ADS COMPUTERS INC	7- 32	23 7/8	- 7/8	-3.5
AMERICAN SOFTWARE	21- 31	24 1/2	- 1/2	-2.0
AMACOMP INC	8- 23	8	- 3/8	-4.1
ANALYSTS INTL CORP	8- 20	13 1/2	+ 1/8	+1.0
APPLIED DATA RES.	8- 37	31 3/4	+1 1/8	+3.4
ASK COMPUTER SYSTEMS	6- 21	16	+3 1/2	+17.9
ASTRODYNE CORP INS	1- 7	7 7/8	-1	-29.0
AUTOMATIC DATA PROC	21- 44	38	-1	-2.5
CDA COMPUTER ASSOC	9- 17	13 3/4	-1 3/4	-11.2
COMPUTER ASSOC INT'L	6- 35	23 3/4	-8	-17.3
COMPUTER HORIZONS	8- 20	11	-2	-15.3
COMPUTER METHODS	6- 10	6 3/8	- 3/8	-5.8
COMPUTER SCIENCES	11- 23	17 3/8	- 1/2	-2.7
COMPUTER TASK GROUP	8- 22	13 3/4	+1 3/8	+11.2
COMPUTER USAGE	2- 22	13 3/4	+ 1/4	+1.8
COMPUTONE SYSTEMS	6- 38	8 3/4	+ 1/4	+3.0
CONSECO CORP	7- 20	8 1/2	-1 1/2	-18.7
CORVUS	7- 13	10 5/8	- 1/8	-1.2
CULLINET SOFTWARE	12- 50	30 1/2	-2 3/8	-8.9
CYCARE SYSTEMS INC	8- 27	20	- 1/2	-2.4
ELECTRONIC DATA SYST	10- 42	30 1/8	-1 1/2	-3.8
HBOMAN SYSTEM INC	27- 53	41 1/8	- 7/8	-2.0
GENERAL ELECTRIC CO	69- 98	53 3/8	+ 1/8	+0.2
GTE CORP	30- 48	45 1/8	+ 3/8	+1.6
INFORMATICS INC	18- 34	23 1/2	-2 3/4	-10.4
INFOTRON SYSTEMS COR	22- 43	30	+3 1/4	-8.5
KEANE ASSOCIATES	4- 15	8	-2	-20.0
LOGICON	8- 30	28 3/8	+ 1/8	+0.4
MCI COMMUNICATIONS	13- 34	16 1/8	+1 3/8	+10.7
MDBT SBI AMER INC	8- 32	27 1/2	-3 3/4	-12.0
MATHEMATICAL APP GRP	12- 22	14 1/2	0	0.0
MICOM SYSTEMS INC	23- 50	43 1/8	-5	-10.3
MINICHIK-MEDER CP	10- 22	8 3/4	0	0.0
NATIONAL DATA CORP	8- 28	18 1/2	- 3/8	-2.2
ON-LINE SOFTWARE INT	17- 27	17 1/2	-2	-10.7
PANSOPHIC SYSTEMS	8- 30	21 1/2	-3	-12.2
PLANNING RESEARCH	8- 31	18	- 3/4	-4.7
POLICY MGMT SYSTS CP	15- 38	30	-3	-10.3
PROGRAMMING & SYS	1- 8	6 1/8	- 1/8	-2.0
REYNOLDS & REYNOLD	17- 33	26 1/4	+ 1/2	+1.9
SEI CORP	11- 34	27	+4 1/2	+16.2
SHARED MEDICAL SYST	19- 48	36 7/8	-8 3/8	-18.5
SCIENTIFIC COMPUTERS	8- 14	11	- 1/8	-2.2
SOFTWARE AG	9- 13	9 3/4	- 1/8	-2.5
TYMSHARE INC	12- 30	21	- 1/8	-1.1
UMS CORP	9- 18	12 1/8	0	0.0
UNLY CORP	7- 17	12 1/8	- 1/8	-1.0
PERIPHERALS & SUBSYSTEMS				
AM INTERNATIONAL	2- 7	4 1/8	0	0.0
ANDERSON JACOBSON	8- 28	10 3/8	- 3/8	-3.5
AUTO-TROL TECHNOLOGY	8- 20	19	-3 1/2	-15.5
DATATEC INC	8- 33	12 1/2	-1 1/2	-8.2
DEDICATED INT'L	8- 18	8 1/2	0	0.0
DELTA-BENCHER & MCH	8- 58	32 1/2	- 3/4	-2.4
DIGITAL CORP	3- 4	3 3/4	- 1/8	-3.2
CENTRONICS DATA CORP	8- 20	10 1/4	-2 7/8	-12.0
CETEC CORP.	8- 12	10 3/8	- 1/2	-4.6
COMMITRONICS	2- 20	8 3/4	- 3/4	-7.8

	1982-83 RANGE	CLOSE OCT 19 1983	WEEK NET CHANGE	WEEK PCT CHANGE
COMPUTER DEVICES INC	3- 21	3	-1 3/8	-31.4
COMPUTER TRANSCEIVER	4- 12	8 1/4	- 7/8	-14.2
COMPUTERVISION CORP	19- 53	38	-3 3/8	-7.8
COMPAC CORP	17- 39	17	-1 3/8	-7.5
DATAPRODUCTS CORP	10- 41	29 1/8	-2 1/8	-6.8
DATARAM CORP	9- 12	10 3/4	0	0.0
DATA SWITCH CORP	13- 41	27	-5	-15.5
DATUM INC	2- 17	11	- 3/4	-6.3
DECISION DATA COMPUT	3- 18	11	- 3/8	-3.3
DOCUTEL-OLIVETTI	13- 38	13 0/8	+ 1/8	+1.0
ELECTRONIC M & M	9- 11	9 1/8	+ 1/8	+1.1
EVANS & SUTHERLAND	18- 50	38 3/4	+2 1/8	+5.8
GANDALF TECHNOLOGIES	9- 22	9 1/8	- 1/8	-1.3
GEN'L DATA COMM INS	6- 29	20 1/4	0	0.0
GREAT SOUTHWEST IND	1- 8	1 1/2	0	0.0
HAZELTINE CORP	7- 31	22 3/4	- 7/8	-3.7
ICOT CORP	3- 16	3 7/8	- 3/8	-8.8
INFORMATION INTL INC	10- 22	13	-2	-13.3
INTEL CORP	11- 45	37 3/4	+8	+9.3
IPL SYSTEMS INC	3- 14	6	-1 1/2	-20.0
LUNDY ELECTRONICS	7- 19	11 7/8	-1 3/4	-12.8
MEGADATA CORP	3- 15	11 1/2	+ 3/4	+6.1
MAI BASIC CORP	10- 37	18 3/4	+ 3/4	+4.1
MAGNUM CORP	8- 28	23 3/8	-2 1/2	-9.8
METHODS SYSTEMS CORP	8- 34	18 1/8	-3 1/2	-15.4
NO AMERICAN PHILIPS	47- 73	71 3/8	- 7/8	-1.2
NORTHERN TELECOM LTD	22- 48	42 3/8	-1	-2.3
ORBIX	3- 8	6	0	0.0
PARADYNE CORP	14- 30	15 1/2	-1 1/2	-8.8
PENRIL CORP	7- 16	8 5/8	- 7/8	-9.3
PHOENIX AMERICAN INC	7- 17	11 1/2	+1 1/4	+8.8
PLESSEY CO LTD(ADR)	28- 41	38	- 1/2	-1.3
PRINTRONIX INC	23- 34	29 1/8	+ 1/8	+0.4
QANTEX CORP	12- 28	13 3/4	-2 1/2	-17.5
RAYTHEON CO	42- 58	43 1/2	-2 3/8	-7.4
RECOGNITION EQUIP	4- 17	13 1/8	- 3/8	-2.8
ROLM CORP	40- 80	35 1/4	-2 3/4	-6.8
SANDERS ASSOCIATES	33-121	34 3/4	-4 1/2	-7.5
SCAN DATA	1- 3	7/8	0	0.0
SCAN-TRON CORP	12- 18	13 1/4	0	0.0
SCIENTIFIC ATLANTA	18- 27	24 5/8	-1 1/8	-7.0
STORAGE TECHNOLOGY	18- 33	27 1/2	-1 3/4	-6.0
SYKES DATATRONICS	5- 27	8 3/8	-1	-17.2
SYSTEMS & COMP TECH	27- 38	27 1/2	-4 3/4	-8.0
T BAR INC	7- 13	9 1/4	-1 1/8	-10.8
TAB PRODUCTS CO	8- 30	21	-2 1/8	-9.0
TANDON CORP	16- 38	21 1/2	-2 3/8	-11.3
TEC INC	6- 12	7 3/8	0	0.0
TEKTRONIX INC	34- 87	76 3/4	+1	+1.3
TELEX	9- 32	27 7/8	-2 3/8	-8.0
TESDATA SYSTEMS CP	3- 17	8	+1 1/2	+18.7
TIMEPLEX INC	7- 20	12 3/8	-1 5/8	-9.3
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SUPPLIES & ACCESSORIES				
AMERICAN BAR PRODS	11- 34	32 3/8	- 3/8	-1.8
BARRY WRIGHT	13- 32	30 7/8	+ 7/8	+2.8
DUPLEX PRODUCTS INC	12- 28	23 1/2	- 1/8	-0.4
DYNIX ELEC. PRODS	8- 28	27	+2 1/4	+8.3
3M COMPANY	49- 80	68 1/8	-1 1/8	-1.6
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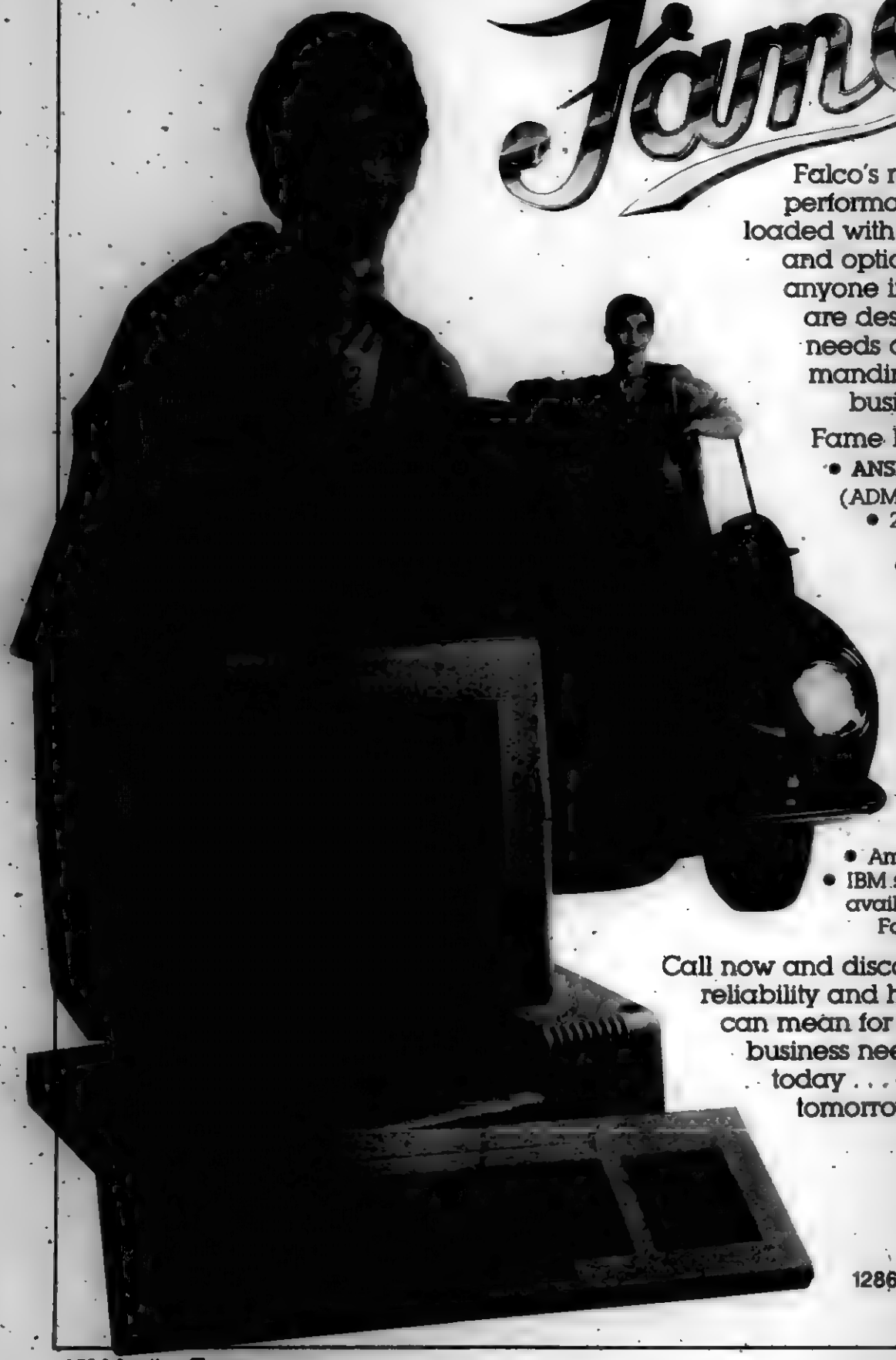

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COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

ekly Newspaper — Second-class postage paid at Framingham, Mass. and additional mailing offices

44/year — October 31, 1983 — Vol. XVII, No. 44

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NEWSPAPER

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SPECIAL REPORT

Inside — DBMS: Weighing The Options

Inside

IBM gave its blessing to the much-touted micro-to-mainframe link with its recent announcement of the 3270-Personal Computer and Personal Computer XT/370. Users will be the big winners. **Page 2.**

• • •

Closing the last chapter in the celebrated high-technology espionage case, Mitsubishi Electric Corp. pleaded no contest to charges it conspired to receive stolen IBM trade secrets. **Page 4.**

• • •

If sales are up 16%, why are Digital Equipment Corp.'s first-quarter earnings the worst the company has posted in seven years? **Page 4.**

• • •

Apollo Computer, Inc. has increased its line of 32-bit scientific workstations with two units that use proprietary Apollo chips. The vendor also linked its users to Ethernet-based networks. **Page 5.**

• • •

Compaq Computer Corp. started playing hardball in the transportable computer market last week by introducing a system that is compatible with IBM's Personal Computer XT and features a built-in 10M-byte Winchester hard disk system. **Page 6.**

• • •

Eagle Computer, Inc. also unwrapped a hard disk-based portable system that is compatible with both IBM personal computers. **Page 75.**

• • •

A voice mail system that can facilitate both internal and external communications and plugs into existing digital switching equipment has been unveiled by Centigram Corp. **Page 71.**

• • •

Short-term needs and the fear of machine obsolescence are forcing more users to take out new leases on the lives of their micros rather than buy systems. Micro rentals are also on the upswing, according to a number of leasing firms. **Page 91.**

Industry Giants Preview Own Local-Area Networks

•AT&T Won't Sell Net Directly to End Users

By Phil Hirsch
CW Washington Bureau

GENEVA, Switzerland — Western Electric will begin marketing next January a local-area network developed by Bell Laboratories, AT&T Chairman Charles L. Brown revealed at a press conference here last week. However, AT&T will not market the network directly to end users.

Instead, Western Electric, AT&T's manufacturing arm, will sell the network to telephone operating companies, which then will market it to end users.

Although he was reluctant to provide detailed specifications for the network, Brown said it would utilize both fiber-optic and coaxial cable. The network does not require a particular transmission protocol, he added, so users will be spared the related code conversion costs.

A version of the local-area network, which reportedly will be called 3Bnet, is currently installed in Florida's Dade County, where it connects a number of Southern Bell Telephone Co. switching centers, Brown said. Its first installation outside the telephone net-

(Continued on Page 10)

•IBM Token Ring Net Not Yet on Market

By Phil Hirsch
CW Washington Bureau

GENEVA, Switzerland — IBM displayed its much-anticipated local-area network at an international telecommunications conference here last week, but company officials refused to say when — or if — it would be offered commercially.

Although the token ring network transmits digital voice signals, "it's not a private automated branch exchange," noted an IBM technician who asked not to be identified. Much more work is needed before real-time voice conversations can be handled as well as the telephone network handles them, he said, but noted that the network accommodates stored voice applications.

Scientists at IBM's Zurich laboratory, where much of the development work was done, are now working on a 16M bit/sec version of the network, he added. The model shown at Telecom '83 has a nominal speed of 4M bit/sec, but the technician acknowledged that the actual throughput is "considerably less."

Even so, IBM's new token ring network

(Continued on Page 10)

Software Lets PE Superminis Run in SNA, X.25 and BSC Nets

OCEANPORT, N.J. — Perkin-Elmer Corp. today unwrapped a set of communications products that make its Series 3200 line of 32-bit superminicomputers compatible with IBM's Systems Network Architecture, Ansi's X.25 and other IBM-supported protocols.

The products, collectively dubbed "Pengates" for networking gateways, reportedly permit 3200 systems and peripherals to access data bases and applications programs stored on IBM processors for either interactive or batch jobs. Today's introductions include:

• Pennet Plus Open Systems Network, a general-purpose, open networking environment that provides both wide-area networking via X.25 and local-area networking via Xerox Corp.'s Ethernet.

• SNA Gateways, which provide connections to SNA networks and emulation of IBM 3270 and 3770 devices and workstations.

• Bisynchronous Communications (BSC) Gateways, to connect with bisynchronous-based and other computer systems, peripherals and communications lines.

Pennet Plus follows the International Standards Organization's Open Systems Interconnection model. It al-

(Continued on Page 6)

Besides the Pengates, Perkin-Elmer Corp. also announced today:

- ***Software that can tie two Series 3200 superminis into a fail-safe system and marks PE's first foray into the fault-tolerant market. Page 7.***
- ***Fortran VII and C compilers that serve as "bridge products" between PE's Unix look-alike operating system and its OS/32 real-time operating system. The compilers represent PE's first step toward language products that can be used in any PE operating environment. Page 7.***
- ***Network Electronic Mail (NEM/32), which works with Pennet Plus and lets users transmit information to multiple computer systems. Page 6.***

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Second-class postage paid at Framingham, Mass. and additional mailing offices. Computerworld (ISSN-0010-4841) is published weekly except February (5 issues), April (5 issues), May (4 issues), August (5 issues), September (5 issues), October (5 issues), November (5 issues), December (5 issues) and a single combined issue for the last week in December and the first week in January by CW Communications, Inc., Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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$1.50 a copy; 52 issues — $80 a year; Canada, Central & So. America — $150 a year; Europe — $180 a year; all other countries — $240 a year (surface); $400 (air). Post office notice is required for change of address. Please allow six weeks for new subscription service to begin.

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Users Seen the Winners as IBM Gives Blessing to Micro-to-Mainframe Link

By Paul Gillin
CW Staff

The only thing that is clear about IBM's announcement on Oct. 18 of two new Personal Computer products is that the users who want to link their microcomputers to their mainframes will be the big winners, according to analysts, vendors and users contacted last week by *Computerworld*.

With its introduction of the 3270-Personal Computer and Personal Computer XT/370, IBM gave its blessing to the microcomputer-to-mainframe link that has been widely advertised but sparsely delivered by vendors since last year. Users are likely to see a variety of benefits from the endorsement, analysts and vendors said.

For one thing, they will be presented with a wider range of options in the micro-mainframe arena. While IBM holds the price umbrella, vendors will compete to offer links that optimize the capabilities of their various products. "Naturally, you have to have IBM's sanction," said Richard Hannes, vice-president of Informatics General Corp.'s New Business Division. "This will create a lot more demand for micro-mainframe links, and we'll look at that a lot more closely."

Users can also expect to see micro software offerings that are closely integrated with packages on the mainframe and mainframe applications that take advantage of the windowing capability offered on the 3270-PC. "IBM has endorsed the windowing concept," said John Landry, senior vice-president at McCormack & Dodge Corp. in Natick, Mass.

Finally, users of IBM's VM/CMS operating system can anticipate a steady shower of new software products that take advantage of the "programmer's workstation" possibilities of the XT/370. "It's a benchmark event to be able to put a mainframe operating system on a micro for $8,600," Landry said. "I think you'll see us and some of our competitors looking a lot harder at CMS."

Landmark Event

Analysts last week proclaimed the IBM announcements a landmark event in the march toward linking micros and mainframes. The new products "will give the sort of functionality the user has been looking for by putting the least user-unfriendly software [PC-DOS] in a mainframe environment," said Thomas O'Flaherty, a principal consultant with Input, Inc., a Mountain View, Calif.-based consulting firm.

The XT/370 announcement has escalated the micro-mainframe war to another level, Vaughan Merlyn, president of Merlyn Consulting, Inc. in Atlanta, noted. "It's suddenly changed from a micro-to-mainframe connection to a mainframe-to-mainframe connection," Merlyn said. "The links I've seen so far have depended on the vendor's application or they're based on queries. Now we have a genuine link."

"The impact on the user can't be anything but positive," said Waverly Graham, executive vice-president of Digital Communications Associates, Inc. in Norcross, Ga. "When IBM provides a capability, it gives a hint to users that it's mainstream."

The XT/370 announcement in particular will probably convince some users who had not expected to tie micros to mainframes that the option is now feasible. The data center at William Filene's & Sons in Boston had not been actively looking for a link before the IBM announcement, but now plans to order two XT/370s. Ed Hester, data center director at Filene's, called the XT/370 "awesome," adding that, "If our mainframe applications running under VM/CMS could be run on the [Personal Computer], we'd probably do it."

Other users who have considered links may now wait until next year to evaluate the Big Blue option. Brunswick Corp. in Skokie, Ill., has been evaluating micro-mainframe link options from independent vendors, but is now reevaluating its search criteria. "They [IBM] have got an edge," Justin Murrish, corporate director of information resource management, said. "We will hold on longer, further and harder to take a look at IBM."

However, Murrish noted that Brunswick may also forestall plans to buy more Personal Computers until then. "It's causing us to put a hold on buying [Personal Computers] as well as 3270s," he said. "We're now trying to assess how effective [the new products] will be because of that added functionality."

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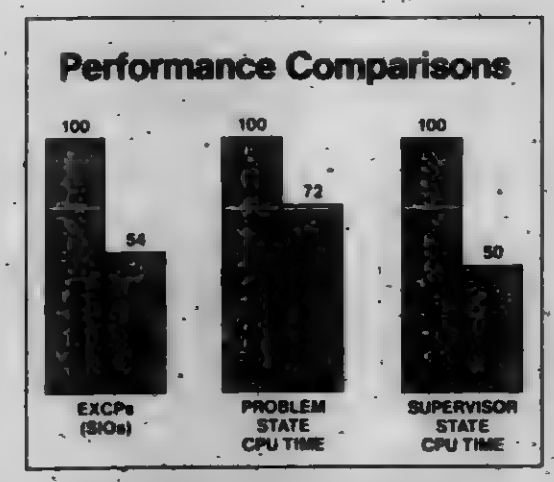

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Mitsubishi Pleads No Contest To Trade Secret Theft Charges

By Jeffry Beeler
CW West Coast Bureau

SAN FRANCISCO — The second of two Japanese electronics vendors charged last year with conspiring to steal IBM trade secrets has pleaded no contest to the criminal charges against it.

In the wake of the plea, which was entered Oct. 20 before U.S. District Court Judge William Ingram, Mitsubishi Electric Corp. received a $10,000 fine, the maximum penalty under federal law.

Also ordered by Ingram to pay $10,000 fines were Mitsubishi employees Kazuma Ban and Takaya Ishida, both of whom pleaded guilty to charges of conspiring to transport stolen IBM technology.

In pleading no contest rather than guilty, Mitsubishi stopped short of admitting any wrongdoing in the trade-secrets theft case, but nonetheless left itself open to criminal penalties.

Mitsubishi's plea effectively closes the last major chapter of a widely publicized espionage case that first grabbed front-page headlines in June 1982, when the Federal Bureau of Investigation accused the company of paying $26,000 to obtain stolen, highly confidential IBM technology. Other defendants charged in connection with the industrial-spying case include a second Japanese electronics manufacturer, Hitachi Ltd., and more than 20 Mitsubishi and Hitachi employees or suspected agents.

Together, the two Tokyo-based vendors reportedly paid federal undercover investigators nearly $650,000 in a clandestine effort to acquire sensitive documents describing IBM's 370 Extended Architecture, 3080 hardware designs and MVS/SP Version 2.0 source code.

Last February, Hitachi pleaded guilty to one criminal count of conspiring to transport stolen property and received the maximum penalty from U.S. District Court Judge Spencer Williams.

On Sept. 16, 1982, IBM filed a civil suit against Hitachi and its two U.S. business partners, National Semiconductor Corp. and National Advanced Systems Corp. The suit's main aim was to prevent the defendants from using the stolen IBM trade secrets in their future products.

Slightly more than a year later, however, IBM and Hitachi settled the civil suit out of court. Under the settlement, IBM has gained the five-year right to scrutinize all its Japanese competitors' new products before they are introduced.

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* IBM PC sales have been estimated at 45,000 shipments per month (2250 sales per business day). Exact figures are not available.

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DEC Earnings Plunge 72%; Analysts Ponder Reasons

By Bill Laberis
CW Staff

MAYNARD, Mass. — Digital Equipment Corp. last week made its poorest financial showing in seven years when it posted first-quarter earnings that plunged 72% below those of the year-ago quarter.

The report came as no surprise. DEC had announced the week before that first-quarter earnings would be lower than projected, and the announcement caused the price of its stock to plummet [CW, Oct. 24].

Earnings for the first quarter were $15.9 million, or 28 cents per share. However, sales rose 16% to $1.07 billion, compared with $927 million a year earlier.

The 16% gain in sales was a bright spot in an otherwise gloomy set of figures. However, this bit of good news served to frustrate and confound further analysts and DEC watchers struggling to understand why the No. 2 computer maker fell so suddenly into a deep fiscal rut.

"That magnitude of revenue gain means there are plenty of machines going out the door and therefore plenty of money coming in. The question is where the hell's the money going if it's not showing up on the bottom line," one analyst said.

DEC stunned Wall Street two weeks ago when it revealed the anticipated quarterly earnings. As early as the week before doing so, the company had indicated to investors that earnings for the quarter would be flat — about $55 million, or $1 per share. DEC's stock dropped precipitously in the days following the earnings estimate, losing one-third of its market value in furious trading.

Since that time, analysts have tried to piece together the reasons for DEC's startling decline; the company has offered little in the way of a plausible explanation. "While revenues grew 16%, this rate of growth was below our expectations due principally to lower than planned personal computer product shipments and the delay in shipment of certain products," said Alfred M. Bertocchi, vice-president of finance and administration.

However, DEC now derives little of its total revenues and earnings from personal computer sales. The firm had planned to ship about 25,000 personal computers per quarter in its fiscal year beginning July 1. However, in the first quarter the firm reportedly sold only 19,000 units, falling nearly 6,000 units short of its intended goal.

"This [personal computer] impact has been overstated by the company," said Frederic G. Withington, industry analyst with Arthur D. Little, Inc. in Cambridge, Mass. "The [personal computer] market is not really all that big for DEC."

DEC's Bertocchi also alluded to problems in implementing the companywide reorganization begun a year ago to make the company a more responsive, market-driven force. The ongoing reorganization will replace DEC's product groups with market groups.

When he commented on the quarter results, Bertocchi said, "There were also temporary problems caused by changes in the company's administrative systems," an admission not made when earnings estimates were made public two weeks ago.

Withington said the earnings plunge more likely indicates "all sorts of confusion on the administrative level." He speculated that DEC may have decided at the last minute to write off certain projects it has canceled, similar to what Burroughs Corp. Chairman W. Michael Blumenthal did when he took control of that company two years ago.

Withington hypothesized that the reorganization could have turned up recurring costs that were never registered under the old product group arrangement. If this is the case, he said, DEC's relatively low earnings reported this quarter may become the rule and not the exception.

"I'm not too surprised at what's happened," Withington said. "We've been saying for some time that DEC has been getting technologically fat and lazy."

Stephen K. Smith, financial analyst at Paine Webber Mitchell Hutchins, Inc. in New York, said the atmosphere on Wall Street could be characterized as one of betrayal the week following DEC's earnings estimate.

Smith attributed the sharp earnings decline to DEC's selling many products with low profit margins, such as its VAX-11/780 superminicomputer.

But, Smith added, there is "great concern" on Wall Street about management's credibility. "One would have to say it is difficult to explain how management could not know just how bad things would be on the earnings side. . . . DEC will travel a very rocky road over the next six months or so."

Year Earnings Dip 6.5% at DG

WESTBORO, Mass. — Citing moderate but steady improvements in orders, Data General Corp. last week reported fourth-quarter earnings of $10.7 million, or 86 cents per share, compared with $600,000, or 5 cents per share, in the same period one year ago. Sales in the quarter rose 8% to $272 million.

For the year ended Sept. 24, however, DG's earnings were down 6.5% to $23 million, or $1.93 per share, compared with $24.7 million, or $2.28 per share, a year earlier.

Commenting on the results, Edson deCastro, company president, said DG's bottom line was bolstered in the fourth quarter by interest in the MV/10000, the superminicomputer introduced last spring. Further, deCastro said that DG has begun shipments of its Desktop Generation microcomputer systems, announced last summer.

The company also announced a two-for-one stock split in the form of a 100% stock dividend on its common stock, payable Nov. 18. This action will effectively double the number of outstanding shares to 22.6 million.

Also Offers Ethernet Access

Apollo Caps 32-Bit Scientific Workstation Line

By Tom Henkel
CW Staff

BOSTON — Apollo Computer, Inc. last week added two high-end systems to its 32-bit line of scientific processor/workstations, both of which operate with the firm's Domain local-area network.

At a press conference here, the firm also announced:

- A networking gateway that reportedly allows Apollo users to connect their systems to Ethernet-based local-area networks, allowing communications outside the firm's proprietary Domain network.
- Domain Professional Support Services and the Domain Software Engineering Environment, which allow scientific and engineering users of Apollo systems to perform administrative functions concurrently with scientific applications (story below).
- A Domain server processor, the DSP160, which offers accelerated calculation and high-speed memory. The unit was designed to improve performance for computation-intensive applications conducted on the Domain network.

Perform Like VAXs

The DN460 and DN660 processors introduced last week as high-end additions to the Apollo workstation family are said to offer roughly the same performance as Digital Equipment Corp.'s VAX-11/780 superminicomputer. The processors are identical, except the DN460 offers a monochrome display and the DN660 features a color display.

Both processors mark a departure in the firm's use of Motorola Inc.'s 68000 microprocessor chip in favor of its own proprietary 32-bit chip. However, the proprietary chip is compatible with 68000-based applications, noted Apollo's vice-president of marketing, Edward J. Zander.

The chip reportedly boosts the systems' internal performance to the equivalent of a VAX-11/780 supermini. The processors perform at approximately 1.2 million instructions per second, about a three-fold increase over Apollo's earlier high-end processors, the DN420 and DN600, the vendor said.

The two processors feature up to 4M bytes of main memory and a virtual address space of up to 256M bytes. Each is housed in a 10-slot chassis. An optional five-slot chassis is available as an add-on for users who want to use Intel Corp. Multibus boards.

The DN460, with 1M byte of main memory, a 19-in. 800- by 1,024-pixel bit-mapped monochromatic graphics display, three asynchronous I/O ports, an integrated hardware floating-point processor, detachable keyboard, local-area network interface and a license to use the firm's networkwide virtual memory operating system, costs $39,500.

(Continued on Page 6)

Programs Ease Paperwork For Tech Staff

BOSTON — With an eye toward helping administratively burdened technical people, Apollo Computer, Inc. last week announced two software programs that allow users to run technical and management applications simultaneously and to catch up on their paperwork.

Announced at a press conference here, the two programs, which operate on Apollo's Domain local-area network, are Domain Software Engineering Environment (DSEE) and Domain Professional Support Services (DPSS).

DSEE is a set of four integrated interactive functions: history management, which allows users to keep and manage a history of past versions of multiple software modules; configuration management, which integrates modules into software systems; advice management, which tracks dependencies and allows new software engineers to build on their co-workers' past experiences; and task management, which relates the work of an individual engineer to a firm's organizational goals, Apollo said.

All four functions operate in conjunction with Domain's Fortran 77, Pascal or C language compilers.

DSEE costs $1,500 per processor node on the Domain network.

DPSS consists of five administrative tools: DPSS/Document, a structured document editor; DPSS/Mail, a Domain-wide electronic mail package; DPSS/File, a document storage and retrieval program; DPSS/Calc, a spreadsheet program; and DPSS/Calendar, a personal calendar and schedule management program. The DPSS package costs $500 per nodal processor.

DSEE will be available in January, and DPSS will be available in February.

Apollo is headquartered at 15 Elizabeth Drive, Chelmsford, Mass. 01824.

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PE 3200s Now Run in SNA, X.25 and BSC Nets

(Continued from Page 1)

lows users to distribute computers and facilities over a wide area at geographically dispersed sites or locally in multiple local-area networks.

The group of products that make up Pennet Plus feature the X.25 packet-switched network protocol; Ansi X.29 remote terminal access to support asynchronous terminals; and Ethernet Version 2, to connect multiple local systems.

User facilities of Pennet Plus include interactive terminal access, network printing, file transfer between systems on the network, a user program interface for network applications and a network management and control facility for control and user access security.

Pricing for Pennet Plus, which is available immediately, is based on the size of the user's processor. For instance, the initial license of Pennet Plus for a low-end PE supermini like the Model 3205 would cost $2,300. To implement the product on a medium-range system such as PE's 3230 or a high-end system such as the Model 3250 would cost $4,700 and $7,000, respectively.

Additional copies of the Pennet Plus software are priced at about 25% of the initial copy.

Electronic Mail

Network Electronic Mail (NEM/32) is an optional facility that operates within the Pennet Plus network. It confirms the receipt of electronic mail transmissions and stores them in a private user area that can be accessed at a time convenient to the user.

NEM/32 allows users to create messages and memos, amend messages, send mail to local or remote users, manage files and transfer mail.

The original license fee for NEM/32, which is scheduled to be available in February, is $1,400 (low-end supermini), $2,600 (mid-range supermini) and $4,000 (high-end supermini). Additional copies are $490, $910 and $1,400, respectively.

SNA Gateways

SNA Gateways, a further set of products in PE's supermini networking philosophy, consists of the SNA/3270 and SNA/RJE emulators.

SNA/3270 allows interactive terminals, printers and application programs on a Series 3200 supermini to emulate IBM 3270 terminals. By providing users with Logical Unit Types 1, 2 and 3 support, the software makes a Series 3200 appear to be a 3270 cluster controller.

In addition, SNA/3270 provides an IBM 3280 printer emulator and interface to accommodate functionally equivalent PE equipment, a PE spokesman noted.

SNA/RJE is said to supply either real or virtual emulation of a remote job entry station, making a PE 3200 supermini appear to an SNA/SDLC network as a Logical Unit Type 1 3776 RJE workstation. In real emulation, the package uses the PE Spooler for buffering. For virtual emulation, SNA/RJE permits applications programs direct access to the data stream.

Pricing for SNA/3270 and SNA/RJE is also geared toward the size of the user's system and the number of copies required. Both require purchasing a software base priced at $2,800 for a low-end PE system, $5,200 for a medium-range system, and $8,000 for a high-end, 32-bit computer. The 3270 and RJE modules must be added to the base structure; the 3270 module costs $1,600, $3,000 and $4,500, respectively, based on the firm's three-tiered pricing schedule, and the RJE module costs $1,000, $1,600 and $3,000, respectively.

Additional copies of these modules are priced at approximately 33% of the original license cost, the spokesman said.

SNA/3270 is available immediately. SNA/RJE will be available in January.

BSC Gateways

PE's BSC Gateways is a set of three products that collectively can be used to connect PE systems to BSC products and systems. Available now, they can also be used to interconnect with 3270 devices, Hasp RJE stations and 2780/3780 RJE stations.

BSC/3270, the first of the three products, is a high-level and interactive product that PE said is operationally identical to SNA/3270 but operates over bisynchronous communications lines. It supports three BSC applications: 2780/3780 and Hasp RJE for batch processing and 3270 for interactive terminal/printer work.

BSC/3270 costs $1,400, $2,600 and $4,000 for the low-, medium- and high-end systems, respectively.

The two additional portions of the firm's communications package are Hasp, which emulates an IBM Hasp RJE station over bisynchronous lines; and 2780/3780 for RJE emulation. These products are priced approximately the same as SNA/3270 and SNA/RJE packages, PE said.

Finally, PE also announced an Ethernet Data Link Controller, which provides processor-to-processor serial communications over a 10M bit/sec Ethernet coaxial cable. It costs $3,780 and will be available in January.

PE is headquartered at 2 Crescent Place, Oceanport, N.J. 07757.

Compatible With IBM Micro

Compaq Adds Portable With Hard Disk

By David Myers
CW New York Bureau

NEW YORK — Compaq Computer Corp. last week brought out a second 16-bit, IBM-compatible portable computer. This one features a 10M-byte hard disk drive and software compatibility with IBM's Personal Computer XT.

The system — the Compaq Plus — is targeted at the XT market, but industry observers see corporate users turning to the machine more as a complement to rather than as a replacement of their IBM microcomputers.

Compaq, based in Houston, unveiled the 31-lb computer at a press conference here. The unit is architecturally similar to Compaq's first machine, but has a built-in 3½-in. Winchester disk unit, mounted in a cage to absorb shock, and a 360K-byte floppy diskette drive for backup.

The hard Winchester disk provides enough storage for 100,000 mailing addresses, a Compaq spokesman noted.

The Compaq Plus is also equipped with 128K bytes of random-access memory (RAM), two IBM Personal Computer-compatible hardware slots and a CRT display measuring 9 in. diagonally.

Like the IBM Personal Computer XT, the Compaq Plus runs under both Microsoft, Inc.'s MS-DOS 2.0 as well as Basic 2.0 operating systems.

The basic Compaq Plus costs $4,995. However, a full-blown system with monochrome card and display, MS-DOS and Basic, a color card and asynchronous communications capability costs $5,110, about $850 less than the list price of the IBM XT.

In addition, Compaq announced a $2,500 kit that allows users of its first portable computer — which costs $2,995 — to upgrade to the Compaq Plus. The kit, which includes the 3½-in. Winchester disk and 128K bytes of RAM, will be available by the first quarter of next year.

Compaq President Rod Canion said the company is shooting for three types of customers with its new system: users of floppy diskette-based IBM Personal Computers who have outgrown their storage capacity; would-be users who have not bought an IBM Personal Computer because of its limited diskette capacity; and current owners of the IBM XT who want a portable version in addition to their desktop models.

In fact, industry analysts at the press gathering told *Computerworld* that corporate users who already work on an IBM XT in the office and need a similar machine for "field work" — at home, for example — would be the most likely buyers of the new portable.

Compaq's Canion said also that his company, which has made its mark by offering one of the first portables that is totally compatible with IBM Personal Computer software, is not interested in duplicating IBM's recently introduced Personal Computer XT/370, which is capable of running IBM 370, 4300 and 30 series programs [CW, Oct. 24].

"The number of people who can run 370 software on the [Personal Computer] has to be very, very small," Canion said. "That's just not a very interesting market for our company."

Compaq is located at 12330 Perry Road, Houston, Texas 77070.

Apollo Beefs Up Its Line Of Scientific Workstations

(Continued from Page 5)

The DN660, with 2M bytes of main memory, a 19-in. 1,024- by 1,024-pixel bit-mapped color graphics display, 1M bytes of dedicated display memory, an integrated floating-point processor, detachable keyboard, local-area network interface and a license to use the firm's operating system, is priced at $59,500.

Both systems will be available in February.

Ethernet Gateway

The Domain Networking Gateway for Ethernet includes a bidirectional file transfer protocol for Ethernet and a unidirectional protocol for Domain node virtual terminal services. Both of these services work in conjunction with Ethernet attached systems. Also included is a User Diagram Protocol, File Transfer Protocol and a communications controller and transceiver, Apollo said.

The Ethernet gateway features error checking, delivery and flow control, sequencing, third-party invoked file transfers, active and passive opens, host name internetwork, address mapping and full-duplex connection.

The gateway, including an intelligent controller, transceiver, cable and Transmission Control Protocol/Internetworking Protocol software access protocol, costs $3,500. It will be available this January, according to Apollo.

The Domain server processor, the DSP160, offers a 32-bit architecture with up to 4M bytes of main memory and a 256M-byte virtual address space. The unit can support a 68M- or 158M-byte Winchester disk drive, plus a 1.2M-byte floppy disk drive.

The server processor was designed to perform computationally intensive applications, Apollo said. It can optionally use a 300M-byte disk drive, a 1,600 bit/sec magnetic tape drive or a Versatec, Inc. V80 plotter.

The DSP160, with 2M bytes of main memory, integrated hardware floating-point unit, three asynchronous I/O ports, license to use the Apollo operating system and a network interface, costs $37,500.

Apollo is home-based at 15 Elizabeth Drive, Chelmsford, Mass. 01824.

Corrections

The Information/Word Processing Association ["Upper Management Lacks OA Training," CW, Oct. 10] changed its name effective June 1 to the Association of Information Systems Professionals (Aisp). It is still located at 1015 N. York Road, Willow Grove, Pa. 19090.

The Computer Museum in Marlboro, Mass., ["Not Your Everyday Bargain," CW, Oct. 10] is no longer part of Digital Equipment Corp. It became a nonprofit independent public institution in June 1982.

PE Unwraps Two Packages That Give 3200s Links to Unix, C

OCEANPORT, N.J. — Perkin-Elmer Corp. last week took a further step toward making its software compatible with other vendors' systems by unveiling one software package that can be used to port Fortran programs to Unix environments and another that is a full implementation of the industry-standard C language.

The company also announced a research and development strategy — Everyware — that would adapt future PE systems and products to recognized industry standards.

PE described its Fortran VII and C compiler packages as "bridging" software that act as links between Edition VII, its Unix look-alike operating system, and OS/32, its real-time operating system. They were developed to let users transport applications up and down PE's 3200 series superminicomputer line, from the smallest to the largest system, according to a PE spokesman.

Fortran VII is said to be a complete implementation of the Ansi-77 Fortran standard language for Unix environments and provides the compilers necessary to port Fortran applications to Unix environments from other operating environments. The software's source code is compatible with all of PE's OS/32 Fortran compilers, a spokesman said.

Fortran VII costs $3,400 for an original license fee.

C Compiler

The C compiler is a full implementation of the industry-standard C language and handles the full set of data objects of the PE Series 3200 architecture. This portion of the bridge can be used to produce transportable code that can be easily moved between "operating system" and processor environments, allowing PE users to take advantage of the rapidly increasing number of C language applications, according to the spokesman.

In addition, the compiler is said to eliminate the need to program in assembly language and can be shared by any number of users.

Like PE's networking products, the price of the C compiler is based on the user's processor. For a low-end system, the initial cost is $3,400; for a medium-range system, the cost is $5,200; and for a high-end system, the price is $7,000. Additional C copies cost about 33% of the original license price.

The Everyware strategy announced by PE is a compatibility plan with the objective of adapting or enhancing PE computer systems to connect or coexist with any systems adhering to recognized industry standards, according to Patrick Zilvitis, group marketing director for the Data Systems Group.

Zilvitis explained that the strategy was formulated to take advantage of industry-accepted trends in hardware and software configurations and to fit into the widest possible user base.

PE is based at 2 Crescent Place, Oceanport, N.J. 07757.

PE Moves Into Fault-Tolerant Arena

OCEANPORT, N.J. — A move into the fault-tolerant systems market was made today by Perkin-Elmer Corp. when it brought out its Resilient system.

Described as more of a high-reliability than a total fail-safe system, the Resilient system consists of two Series 3200 superminicomputers that are linked via the newly introduced Resilient software and back up each other. The software also works with an added disk storage device to back up the user's stored data.

The Resilient system is based on two software packages: a reconfiguration monitor that runs as a continuous task under PE's proprietary OS/32 operating system and tracks the dual operations of both computers; and an optional mirror disk system that provides dual images of all user files and transactions on a separate disk unit.

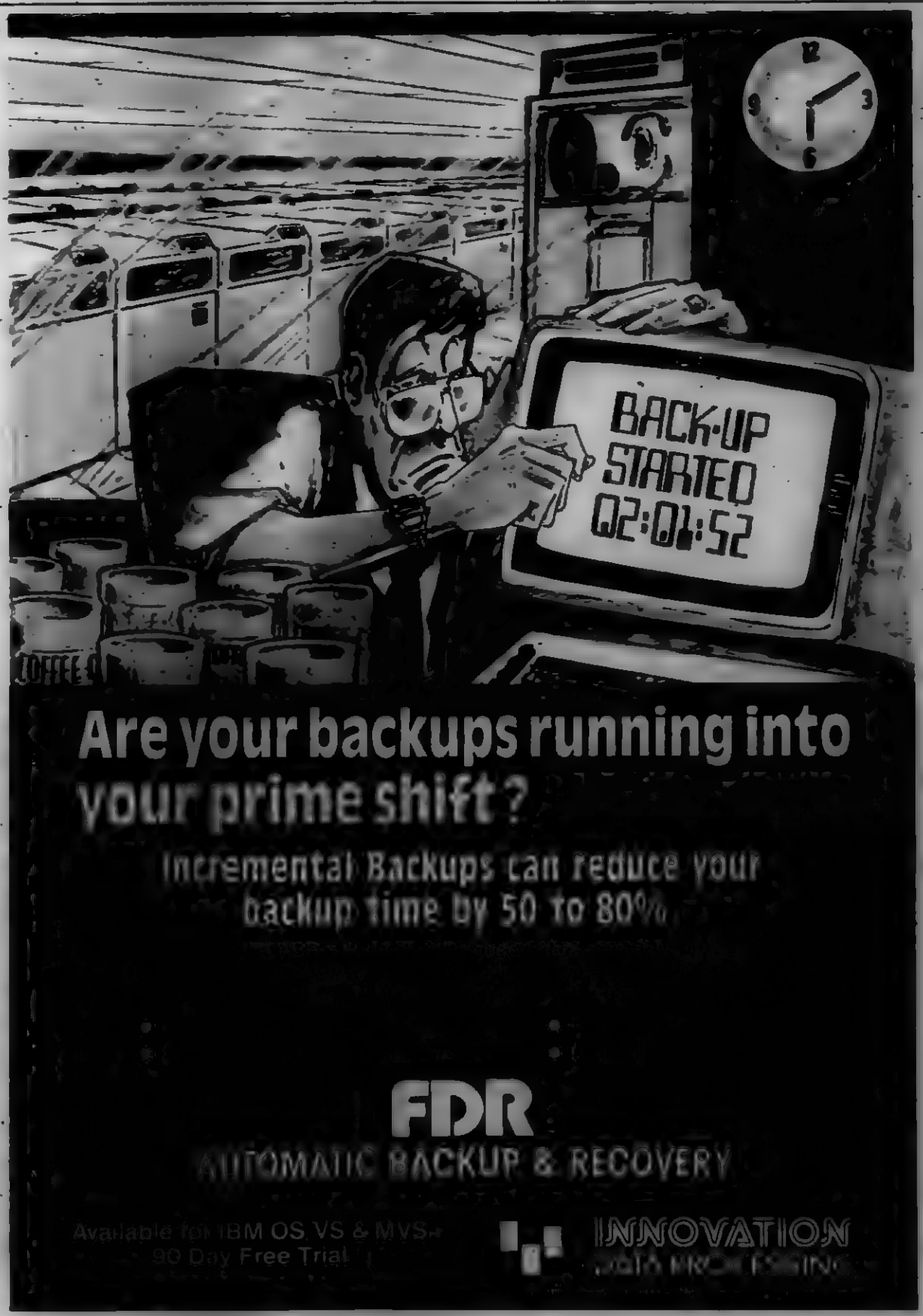
Operation of the Resilient system is virtually invisible to the user, according to PE. Each computer runs independently with separate applications. When a failure occurs, the surviving system takes control of those programs, environments and peripheral devices necessary for total operation.

In the event a single disk fails, the system detects the failure, alerts the system operator and automatically switches operations to the remaining disk.

When the drive that failed is available again, the system supplies the operator with the utilities to guide the rate at which it will catch up to be in full synchronization, a spokesman noted.

The reconfiguration monitor software portion of the Resilient system costs $15,000 for an initial license for each CPU pair. Additional licenses are priced at $6,000 each. The mirror disk costs $4,000 for a first license and $2,000 for subsequent copies, a PE spokesman said.

More information can be obtained from PE, 2 Crescent Place, Oceanport, N.J. 07757.



Analyses Cover Wide Range

Pundits Debate Impact of Disoss, Profs Updates

By Jim Bartimo
CW Staff

The way office automation consultant Amy Wohl sees it, IBM's recent updates to its Distributed Office Support System (Disoss) and Professional Office System (Profs) represent "a giant mopping-up operation" to pull together pieces of previously scattered office technologies.

Other industry pundits contacted by *Computerworld* last week saw the announcements from Big Blue as everything from the creation of "a full-blown electronic mail network" to the slow phasing out of the operating system for smaller IBM processors, DOS/VSE.

At the New York press conference to announce the Disoss and Profs updates [CW, Oct. 24], IBM said it had nearly realized its 1980 statement of intent to link together office systems. By extending the capabilities of Disoss and Profs and enhancing its Systems Network Architecture to allow office machines to communicate with a host processor, IBM now allows users of its 8100 and 5520 distributed processing systems and Displaywriter word processor to exchange letters, memos and other documents.

"We think it means IBM has decided to keep Profs around, so they built a bridge to Disoss," said Wohl, president of Advanced Office Concepts Corp. in Bala-Cynwyd, Pa. "They've done a good job of pulling it all together."

Calling the Disoss/Profs bridge another mainframe-based architecture, Wohl pointed out that such complex computing power is necessary to achieve the type of file transfer most users want and need. "Many customers said, 'Oh no, another layered architecture,' " she noted.

As a result of the complexity of this integration, the DP department will probably be called in to handle the user interface, Wohl said. This will present problems for users without extensive DP resources.

In related office automation developments, IBM released its local-area network in Europe (Page 1) and published what many experts called the American version of the local net in its Research and Development Journal *(Page 11).*

Molly Upton, editor of the *Office Automation Reporting Service* for International Data Corp. in Framingham, Mass., saw the IBM announcements in a positive light. "Disoss is becoming part of a multinode distributed network where it used to be for document distribution only," she said. "It's beginning to look like a full-blown electronic mail network."

Disoss' new ability to run under both the MVS and DOS/VSE operating systems is a sign of change in the IBM operating systems, believes Dale Kutnick, executive director of the Boston-based Yankee Group. "I'm going out on a limb by saying this," Kutnick said, "but we're seeing an effort to phase out DOS/VSE slowly. Users will be pushed toward MVS."

Another result of IBM's new alphabet soup of operating systems and office software will be a more complete integration of the Personal Computer environment and the 370 host environment, which have been very separate, Kutnick said.

"In the corporate environment, the Personal Computer is becoming a more compelling choice because [they] are part of the connection to the host."

ACM Told OA May Squeeze Middle Managers Out of Jobs

By David Myers
CW New York Bureau

NEW YORK — Ballyhooed as a liberating force that would allow managers to work at home, office automation may be forcing middle managers to work longer hours — and may eventually squeeze them out of their jobs altogether.

Those were the conclusions reached by a panel of university scholars at the Association of Computing Machinery conference here last week.

Computer terminals in managers' homes, long portrayed as a way of freeing white-collar workers from the office, have in fact increased productivity — by getting them to work longer hours, said Margaret Olson, associate professor of business administration at New York University.

And Philip Kraft, associate professor of sociology at the State University of New York at Binghamton, used his own survey results as well as figures from the U.S. Bureau of Labor Statistics to show that the ranks of middle management are thinning.

'The Idiot's Revenge'

At computer manufacturers and software houses, the products designed for middle managers are threatening to replace those managers. "In this sense, the appearance of the 'user-friendly professional workstation' represents the idiot's revenge," Kraft said.

The most popular new organizational chart pictures a corporation as an hourglass "or the Mae West structure," Kraft said.

Middle management's ranks are being thinned to a mere communications link between the high-level executive offices and the workers on the bottom, Kraft explained.

Olson, discussing how office automation is changing the definition of the work place, focused on "telecommuting, that is, communicating your work rather than commuting to work." Home terminals were originally celebrated as a way to free managers from the subway, the commuter trains and the clogged expressways. But large corporations with work forces at home have yet to appear, Olson said.

"Portable terminals have essentially become an electronic briefcase. Now we can leave work at five and still work overtime," the business school professor pointed out.

While there is evidence of increased productivity with the extension of the work place into the home, "such work is strictly or for the most part occurring after hours," Olson said.

These developments have social implications, requiring that social decisions be made along with technological decisions, Olson said. "The technology is not value-free," she stressed.

According to Kraft, the language used to describe computer systems has shifted from "idiot-proof" to "user-friendly."

"The idea was to make a system so simple and to allow so few decisions that mistakes could not be made. As near as I can tell, however, 'user-friendly' means exactly the same as 'idiot-proof.' It refers to a system that allows the user very little discretion," Kraft said.

What is more, Kraft continued, the shift in language has been paralleled by a shift in computer marketing. Products like the IBM PC-XT 370, described by the sociologist as "a 370 in a [Personal Computer] box," Lotus Development Corp.'s 1-2-3 software and the Lisa, Apple Computer, Inc.'s highly advanced personal computer, all show that vendors have shifted their sights from clerks and secretaries to middle management.

New 8150 Seen IBM Move Toward Fail-Safe Systems

By Tom Henkel
CW Staff

While IBM's newly announced 8150 distributed processor [CW, Oct. 24] does not directly compete with fail-safe processors such as those manufactured by Tandem Computers, Inc., the system appears to be a first step in that direction — at least as a redundant alternative for IBM's large-systems users.

For example, the 8150 offers users the ability to recover from a hardware failure in about three minutes. Furthermore, the system can be configured to write data to two separate disk drives. In the event of a system failure, the system can protect against data loss by retrieving data from the backup disk.

According to IBM, the almost continuous operation offered by the 8150 is aimed principally at large users of 8100 systems configured in a tightly coupled fashion to multiple host processors. However, users of 8150s that are loosly coupled to host processors, or those that use the system as a stand-alone processor, can also take advantage of the redundant architecture, a spokeswoman at IBM's Information Systems Division in Rye, N.Y., noted.

Like larger IBM systems such as the 3081, the 8150 uses dyadic, or closely coupled, processors. According to IBM product specifications, the 8150 architecture includes two central processors, called Processing and Control Elements (PCE), and two I/O buses. Both PCEs and I/O buses can function simultaneously, thus, according to IBM, increasing internal performance.

However, the 8150 is also equipped for duplex operation of PCEs, memory banks and I/O buses.

With the 8150, IBM has eliminated the integrated disk drives used in other 8100 processors in favor of external 8101 disk drives. This, IBM said, gives 8150 users the ability to switch all disk drives from one PCE to another.

The 8150 was designed to use one to four 8101 disk drives or a combination of 8101s and 8809 tape drives. Furthermore, 8101 disk drives can be connected to both PCEs by using a File/Tape Switch. The switch is available from IBM as a requested pricing quotation item, IBM said.

The newly announced Release 2 of the DPPX/SP operating system includes enhancements that allow the 8150 to redistribute its own work load in the event of a system failure, according to IBM.

For example, users can access I/O devices connected to either PCE on the 8150. In the event of a system failure, Release 2 has been designed to perform automatically an initial program loading of the system to operate on the remaining PCE, with that unit having access to all I/O devices. In additon, devices attached to the 8150 via communications paths can also access either PCE, IBM said.

Lastly, DPPX/SP Release 2 includes an obviously redundant Shadow File Facility that allows users to write data to two disk drives. If one disk fails, transaction processing is automatically switched to the other disk drive. When the broken disk drive is repaired, DPPX/SP Release 2 can automatically synchronize the source and shadow volumes and resume shadow file processing, IBM said.

William Ackerman, president of DPX, Inc., a Cupertino, Calif., consulting firm specializing in 8100 systems, admitted he was surprised by the 8150 introduction. "The 8100 has an excellent reputation for reliability," and redundancy was not a feature 8100 users demanded, he said.

Jack Hart, an IBM watcher with the Framingham, Mass., market research firm International Data Corp., noted that the quasi-redundant architecture of the 8150 may also help users cut down on maintenance costs because "people can defer emergency maintenance until it is convenient for IBM and the customer."

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IBM Shows Token Ring Network in Geneva

(Continued from Page 1)

performs considerably better than other local-area networks, a paper presented at Telecom '83 by engineers at the Zurich lab maintained (story on Page 11).

The IBM network consists of a series of star-shaped subnetworks, each controlled from a "wiring concentrator." A backbone ring connects the concentrators with each other and with a "bridge" through which one backbone can be interfaced to others. The backbone actually consists of two parallel, separate message paths.

The network displayed by IBM at Telecom '83 consisted of only a single ring — a wiring concentrator connected to several terminals located within its exhibit area. Among the interconnected devices were 3270 CRT terminals, a 3725 front-end processor, 8775 display terminal and 8100 distributed processors.

A device gains access to the network by changing the status of a constantly circulating, 1-bit "token" from "free" to "busy." The token is in the header of a message frame; this frame is then filled with all or part of the message itself.

After being delivered to the receiving station, the message frame is returned to the sending station, thus confirming delivery. It is removed from the network at that point.

Digital voice and other kinds of synchronous traffic are transmitted with the help of a Synchronous Bandwidth Manager (SBM), a special station which, upon request, reserves a series of message frames ahead of time. The bits comprising the synchronous message are then sent through the network in bursts at regular intervals. They are buffered at the receiving point and then output.

By keeping the delay between bursts short relative to the speed at which the buffer is emptied, a voice message can be delivered in a way that sounds to the listener as if it is being spoken in real time.

AT&T Won't Market Net to End Users

(Continued from Page 1)

work will be at the 1984 Olympic games in Los Angeles, according to AT&T officials interviewed after the press conference.

Brown, who held the press conference just before giving the leadoff address at Telecom '83, the international telecommunications conference that began last week and ends tomorrow, also reported that Western Electric plans to market a series of 32-bit superminicomputers, the 3B family, on an OEM basis to systems integrators in the U.S. and abroad.

Because the superminis run under the Unix operating system, industry observers see AT&T's plan to sell as an OEM the 3B as part of an ambitious effort that is likely to see AT&T develop Unix-based application software within the next year.

At the press conference, Brown also maintained that AT&T has "no current plans" to market a personal computer.

Two Superminis Planned

According to Brown, AT&T is planning to sell as an OEM two superminis, the 3B20S and the 3B5, which are modified versions of the processor used in AT&T's No. 5 ESS telephone network switch.

The 12M-byte 3B20S offers performance of 1 million instructions per second (Mips). Its peripheral memory can consist of up to 64 Winchester disks, each storing 675M bytes. The 8M-byte 3B5 is a .7 Mips machine with up to 640M bytes of disk storage.

The heart of the 3Bnet local-area network will be the 3B20A, an attached processor version of the 3B20S. The 3Bnet operating at the Olympic games will interconnect the 3B20A to approximately 2,500 electronic message terminals modified to provide split-screen displays.

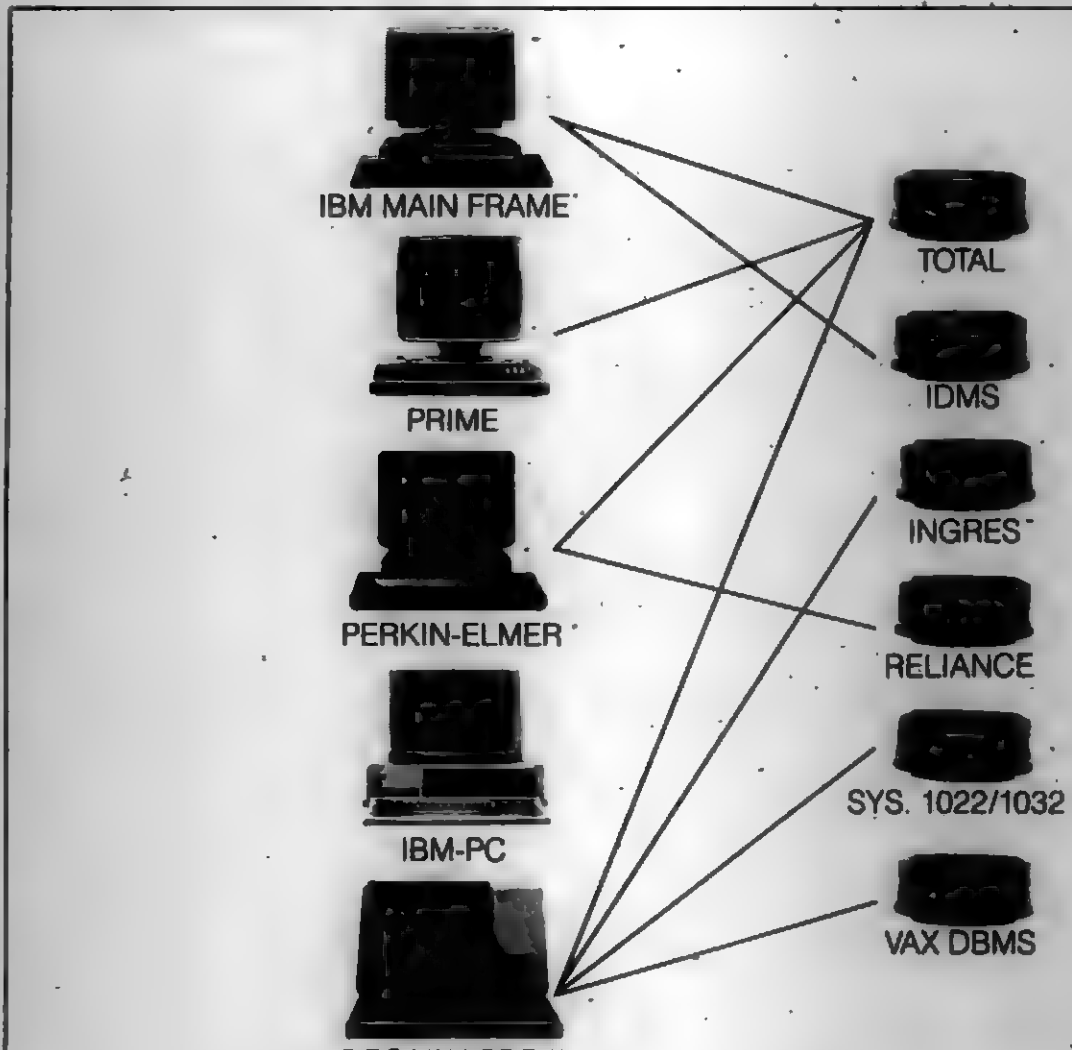
An estimated 50,000 users — administrative staff, security personnel, members of the press and the athletes — reportedly will be able to input and access messages through the system, which also will broadcast results of Olympic events and other information to the attending public.

Entering Software Mart?

Asked whether AT&T plans to get into the software business, a spokesman noted that the company currently is marketing some application software to outside users, but pointed out that the software was originally developed for internal use. "We haven't yet gone into the commercial application software business," the spokesman said, "but I emphasize that word 'yet.'"

Since January, AT&T has been providing documentation to Unix users outside the company and, since May, has been offering training to those using the roughly 100 Unix-based application programs being marketed by others.

Development of Unix-based application software for the commercial market is thus seen as a logical next step.



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Reliability Said Key Advantage Of IBM Net

By Phil Hirsch
CW Washington Bureau

GENEVA, Switzerland — Reliability is the major advantage of the token ring network displayed here last week at Telecom '83, according to both a paper delivered by engineers from IBM's Zurich laboratories and literature handed out by IBM at its booth on the exhibit floor.

Both sources attributed the local-area network's reliability in part to its star-shaped subnetwork architecture. Since each node is connected by separate send/receive links to the wiring concentrator, any malfunctioning node can be bypassed without disconnecting the others.

In addition, the double message path within the backbone ring that interconnects the wiring concentrators allows a faulty concentrator, or a faulty backbone link, to be bypassed without bringing down the entire system.

The constantly circulating token provides a way of monitoring the system continuously, according to IBM. This feature, together with the relays within the wiring concentrators which allow defective components to be bypassed automatically, provides superior fault isolation and recovery, the company claimed.

IBM's local-area network can be deployed on twisted copper pairs, coaxial cable, fiber-optic cable or any combination of these media. The cable used in the local-area network displayed at IBM's Telecom '83 booth, for example, included two shielded twisted pairs which comprised the local-area net plus four wires for telephone communication.

IBM officials said fiber-optic cable could be used in place of or in addition to the twisted pair. Reportedly, this ability to use different transmission media provides increased design flexibility. Optical fiber can be specified, for example, only where its high bit rate is needed and its higher cost can be justified.

Boasts Quick Delivery

Another benefit of the IBM network pointed out in the paper presented at Telecom '83 is its reported ability to deliver messages quickly, even when there are many users on the line.

"If a collision occurs on a [carrier sense multiple access/collision detection (CSMA/CD)] bus, transmission will be aborted [and the message will have to be retransmitted] . . . the high collision frequency at high load levels [creates a] danger of stations becoming locked out for an unpredictable period of time," IBM said.

"A token ring, on the other hand, guarantees fair bandwidth sharing among all active stations, even at high load levels, due to the fact that the token has to be relinquished after the transmission of one frame," according to IBM.

While the network shown at Telecom '83 had a nominal speed of 4M bit/sec and an IBM technician acknowledged that the actual throughput is "considerably less," the Zurich engineers maintained that it performs considerably better than other local-area networks.

According to their paper, as utilization rises above about 30% of capacity, the mean transmission time through a bus-type local network employing CSMA/CD becomes significantly greater than mean transmission time through a comparable token ring network.

U.S. Version of IBM Local Net Described

By Jim Bartimo
CW Staff

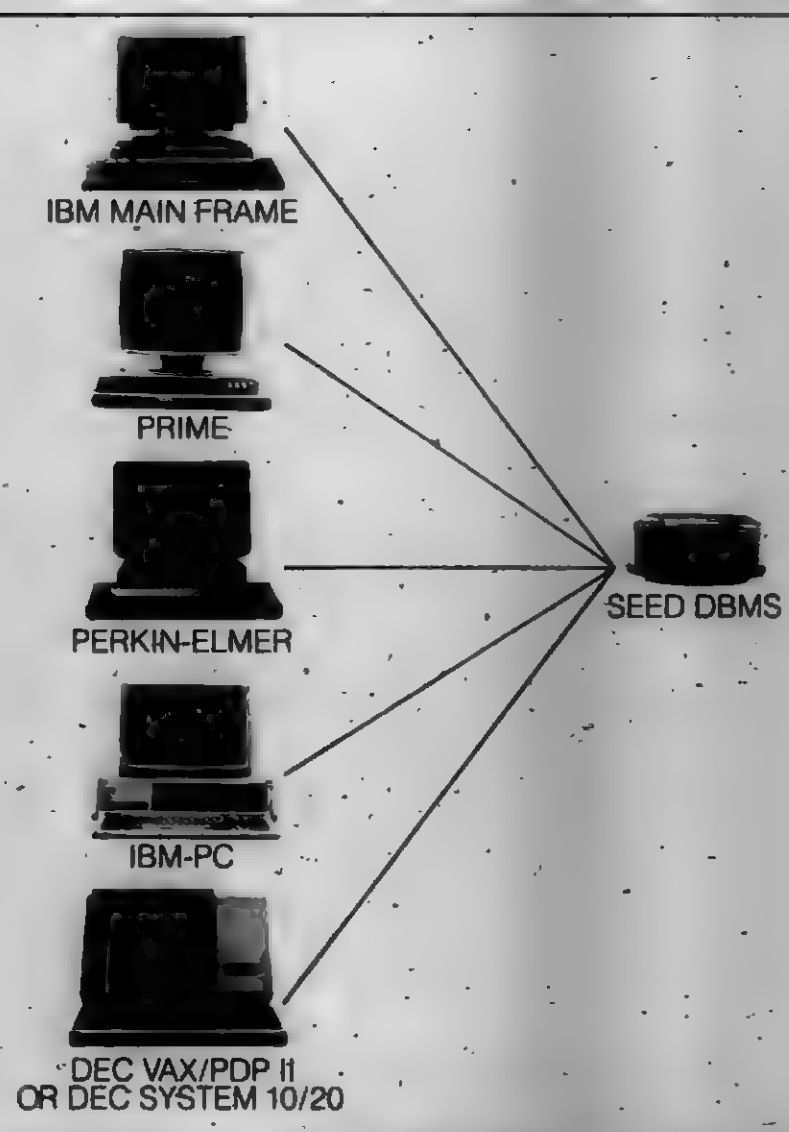
IBM's American version of its local-area network will be a baseband token-passing ring architecture using copper twisted-wire pairs, industry consultants confirmed last week.

What is believed to be a full description of the local-area network appeared in September's issue of the *IBM Journal of Research and Development* in the form of a tutorial titled "A Local Communications Network Based on Interconnected Token-Access Rings." Written by Norman C. Strole, a staff engineer at IBM's Research Triangle Park Laboratory in North Carolina, the tutorial did not predict a release date or price for the local-area network.

The tutorial indicates that IBM's long-awaited local-area network will add another level of connectivity to the recently announced upgrades to its Distributed Office Support System and Professional Office System software. Connection to the IBM Systems Network Architecture (SNA) is one such level mentioned in the tutorial.

"Token passing fits well into the SNA enviroment," noted Dale Kutnick, executive director of the Boston-based Yankee Group. "SNA will provide the higher level architecture and the control function."

The local network will be a variety of rings that — through token passing — will provide the synchronization of devices on the network. Today's most well-known local net, Xerox Corp.'s Ethernet, allows communication on a first-come, first-served basis through carrier-sense multiple access with collision detection.



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Claims Will Cut Long-Distance Rates

FCC Chairman Defends Access Charge Ruling

By Phil Hirsch
CW Washington Bureau

MONTREUX, Switzerland — Insisting that it will reduce long-distance rates 35% to 40%, the chairman of the Federal Communications Commission (FCC) strongly defended the commission's access charge ruling here last week.

Because of the decision to charge users for access to the dial-up network, lower rates already are being "offered by the new long-distance carriers," which "will allow the users of AT&T lines to enjoy reductions as well," Mark Fowler, FCC chairman, said. He mentioned additional benefits, including the likelihood that dramatically cheaper communications rates will make more likely the "marriage of computers with the telephone network."

Fowler was a featured speaker at Televent '83, an international telecommunications conference cosponsored by E.F. Hutton, Inc. and the law firm of Finley, Kumble, Wagner, Heine, Underberg, Manley, and Casey, which includes a number of former congressional communications policymakers.

Later, during a question-and-answer session, Fowler was asked whether the commission has a fallback plan in case legislation is passed that would bar imposition of a flat monthly surcharge on residential customers of local telephone companies. If this happens, nearly $2 billion in costs would have to be collected from other sources, primarily business users.

In reply to the question, Fowler would say only that the FCC is thinking about such a fallback position.

Fowler was also asked whether he speaks for President Reagan. "I speak for his principles," the FCC chairman replied. Much of Fowler's talk, as well as that of another speaker, U.S. Ambassador to Switzerland John D. Lodge, was devoted to promoting free enterprise and the superiority of "free market decisions" over centralized government planning.

Fowler maintained that he was "not here to suggest that private ownership is the only way to develop a technologically advanced communications network; it is not."

But a little later, the FCC chairman began talking about the benefits of the U.S. approach, for example, the vast array of terminal equipment now available as a result of the FCC's equipment-certification/registration program.

But U.S. Court of Appeals Judge Abner J. Mikva, who spoke after Fowler, said the free market, noncentralized policymaking system employed by the U.S. is not without at least a few inconsistencies. He noted that the courts have both increased and decreased government regulation of the communications industry in recent years.

For example, Mikva said, Judge Harold Greene's decision in the U.S. vs. AT&T antitrust case increased regulation by putting the U.S. Department of Justice in charge of monitoring the phone company's compliance with the agreement settling the case. Meanwhile, the FCC's Second Computer Inquiry decision, which allows the phone company to market unregulated products/services through one or more deregulated subsidiaries, decreased government control.

Access Charge Seen Subsidizing The Rich

By Phil Hirsch
CW Washington Bureau

MONTREUX, Switzerland — The Federal Communications Commission (FCC) is forcing "residential users to subsidize the rich," Charles Wohlstetter, chairman of an independent telephone company and a persistent critic of communications policymakers in Washington, D.C., charged here last week at an international conference.

"Twelve years ago," responded William McGowan, chief of MCI Communications Corp., "advanced technology was a Princess telephone." Today, he said, the choices for users are much more significant and numerous.

Wohlstetter's and McGowan's comments were made during a Televent '83 panel discussion on the future of AT&T and the telephone industry after divestiture. Wohlstetter, the chairman of Continental Telecom, Inc., argued that deregulation may lower AT&T's share of the long-distance communications market, but new applications will cause that market to grow tremendously. He believes bypass services will become widespread; that local-area networks will bring about integration of voice, data and image communications; and that "virtually every home" will acquire voice and data communications capability, enabling many people to

(Continued on Page 13)

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User Suit Against Honeywell Awaits Ruling

NEW YORK — The fate of a computer user's $9 million lawsuit against Honeywell, Inc. is in the hands of a federal judge after an eight-day trial that ended earlier this month in U.S. District Court here.

According to papers filed in the case, plaintiff William M. Selden of Rochester, N.Y., claimed that Honeywell defrauded him by selling an untested, unworkable operating system (TL6) and by misrepresenting the capabilities of that software even, Selden charged, after both he and Honeywell realized its inherent design defects.

Selden attributed the demise of his fledgling computer accounting service — Accusystems, Inc. of Rochester — to the failure of the TL6 operating system, which was designed for Honeywell's Level 6 minicomputer.

Selden, a former IBM executive who worked with the research team that developed Cobol, filed the suit three years ago [CW, Oct. 27, 1980]. He is seeking more than $4.6 million, an amount he hopes will be doubled with punitive damages.

Selden's attorney, Thomas K. Christo, said he expects a decision from Judge Dudley Bonsal by December 1983. Honeywell has declined to comment on the suit until a decision has been reached.

Christo said in an interview last week that testimony during the trial indicated that the TL6 software was never fully tested and approved for sale according to Honeywell's own internal guidelines. Selden, who planned to market the Level 6 minis on an OEM basis through Accusystems, was assured that TL6 was a multiuser, multitasking operating system despite Honeywell's knowledge that the software was a "high-risk" product in that environment, Christo said.

According to the attorney, Selden was not informed that TL6 had severe memory restrictions in addition to internal flaws that caused the system to exhibit "fatal embraces," or frequent freeze-ups requiring restarts.

Christo claimed that Honeywell's Minicomputer Marketing Organization (MMO) rushed to provide an operating system for the Level 6 minis, producing TL6 outside the standard software development channels and releasing it despite evidence that it was not a workable system. MMO also promised to offer the system only to OEMs, a practice contrary to Honeywell policy.

Christo said another 40 to 60 users have complained about the TL6 system, and at least one, Sizeler Realty Corp. of Louisiana, has already been awarded an undisclosed settlement from Honeywell.

Selden, now a consultant with New York City-based A.B. Computers, Inc., claimed that Accusystems, which he founded in 1977 to offer accounting services to small and medium-size businesses, would be a $40 million to $50 million enterprise today were it not for the Honeywell TL6 operating system. Selden based that estimate on the success of another New York-based firm, Paychex, Inc., offering a similar service.

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Seed Users Meet Set for Nov. 14

VAIL, Colo. — The Grange, a group for users of the Seed data base management system from United Information Services, will hold its fall conference Nov. 14-16 at the Kiandra Lodge here.

The meet will discuss new Seed features, techniques for enhancing data base performance, journaling concepts and implementation.

Members of the software users group can attend the conference for $185, nonmembers for $235. Information can be obtained from the Director of Seed Software Customer Services, 2300 Walnut St., Philadelphia, Pa. 19103.

FCC Ruling Seen Favoring Rich

(Continued from Page 12)

work at home.

Theodore Brophy, chairman of GTE Corp., argued that any increases in local telephone rates caused by the FCC's access charge plan are likely to be temporary. Echoing Wohlstetter, Brophy said there would be many new applications, allowing the higher revenue requirement assigned by the FCC to the local loop to be spread over a larger amount of communications traffic.

Sam R. Willcoxon, executive vice-president of AT&T Communications (formerly AT&T Long Lines), argued that unless residential users pay a surcharge for access to the long-distance telephone network — which the FCC supports, but key congressmen oppose — business users will bypass the network.

Robert Hall, president of Satellite Business Systems, contended that virtually all of the bypass services to date supplement local exchange service rather than supplant it. Pending legislation, he added, bans the residential surcharge, but it also discourages bypass by requiring bypassers to help support their local telephone companies.

Deadline Pressures At 'New York Daily News' Felt by New MIS Director

By David Myers
CW New York Bureau

NEW YORK — Managing information for a big city newspaper like *The New York Daily News* is as hard a job as being a reporter — there is a daily deadline, and the pressure is enormous.

So says Brian F. Crynes, freshly appointed director of management information systems (MIS) at *The Daily News*. The 36-year-old Crynes joined the country's largest newspaper in mid-September from Price, Waterhouse & Co., one of the Big Eight accounting firms, where he had already worked with *The Daily News* as a data processing consultant.

"In the newspaper business, the timeliness and the accuracy of your information is very key. You've got to get a paper out every day," Crynes said, admitting that deadline pressures percolate throughout the entire news building on E. 42nd St. here.

Because an information supplier like a daily newspaper deals in only the latest facts, everyone at *The Daily News* is affected by the pressure, sometimes mounting to desperation, to get the most current information. Even things like financial data and personnel records, which in another kind of business might not be critically time-dependent, are expected to be up-to-the-minute at *The Daily News*.

That is why Crynes was brought in. The Pennsylvania native, who had no newspaper experience, was hired to modernize the paper's information processing operations.

"We're definitely in a catch-up mode. We're two to three years behind where we should be. Our thrust from here on out is to rebuild the MIS resource base at *The Daily News*," Crynes said.

When he first glimpsed the DP operations at *The Daily News*, Crynes found a "department that lacked overall direction. They didn't have any good plans. They had no focus of where their priorities were."

Morale had hit a low, too, largely as a result of uncertainty over the paper's fate. Two years ago no one knew if the Tribune Co., owners of *The Chicago Tribune* and parent of *The Daily News*, planned to sell America's original tabloid or close it down.

Now, however, the "thing about being sold or going under has gone away," Crynes said.

Tribune is "definitely committed to a revitalization of *The Daily News*," and the MIS department is a focus of the parent company's activities, Crynes said.

Deadline pressures that percolate throughout the entire *New York Daily News* news building on E. 42nd St. in New York reach the DP department, Brian F. Crynes said.

Tribune hired Price, Waterhouse to take on the project of revamping *The Daily News*' computer operations. The accounting firm started work in June, with Crynes as project manager.

Crynes and his team from Price, Waterhouse interviewed 90 executives at *The Daily News* to find out what sort of information they needed and how badly. From the interviews emerged 38 different needs.

The consultants reduced these to eight. That was the first step — to define *The Daily News*' most pressing informational needs.

Needs Analysis

This was followed by a needs analysis "to make sure our analysis of their needs was in fact their true needs," Crynes explained. Once everyone had agreed, the consulting team came up with a strategy for putting together an information processing system.

It was at about this point that *The Daily News* spirited Crynes away from Price, Waterhouse, almost as if *The Daily News*' execs saw Crynes as part of its long-range MIS strategy. "It was as a result of the job I was working on with *The Daily News* that they identified and recruited me," Crynes said.

Crynes saw it as a unique opportunity. "The normal career path would have been to stay with Price and eventually become a partner. This just sort of came up. Here I will have the opportunity to move at some point into the general management ranks," Crynes said, pointing out that "Tribune owns eight properties in print, broadcast and cable."

In the meantime, Crynes' first task is to comb through *The Daily News*' rapidly aging computer systems and weed out antiquated equipment. The current environment includes a Honeywell, Inc. DPS 7/55 mainframe that was brought in as an interim machine to work with equipment that had been around for 12 to 24 years and a Digital Equipment Corp. Decsystem-2060 processor that is now three years old.

Software applications reportedly promised by DEC for the 2060 processor failed to materialize, according to William L. Cole, manager of DP operations and Crynes' right-hand man.

The paper will eventually replace its present data processing setup with entirely new systems. No vendors have yet been chosen.

"We will have a combination of a number of vendors. Who they are will be decided in the next couple of weeks," Crynes said. "I will be making that decision in connection with Price, Waterhouse."

The motto of the news business, Crynes explained, is "I want it yesterday." That is one of the problems facing Crynes: The paper's DP operations are inadequate, and everyone at the paper wants first shot at the newly installed systems.

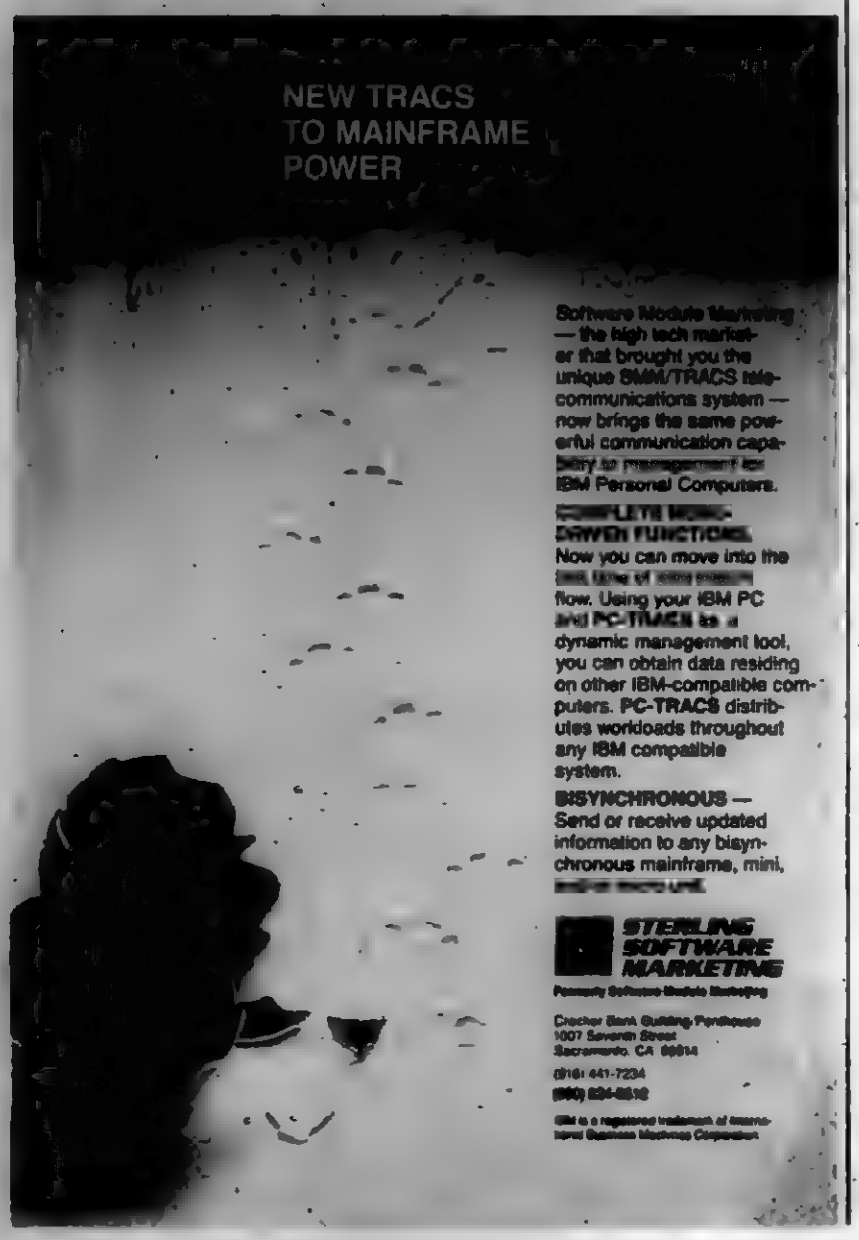
Project Strategy

To prevent a crunch, Crynes has drawn up a "project implementation strategy" to phase in the new systems and "balance out an even flow of work over the next three to five years."

In the newsroom, which has been automated since 1978 on text processing equipment by Allied Corp.'s Mergenthaler, the longtime maker of hot-type linotype machines, a review will be undertaken next year to decide whether to upgrade or replace the system, Crynes said.

So far, *The Daily News* has been happy with its automated newsroom, Cole said. Only once did the system fail badly enough to throw the ultimate scare — a missed edition — into the paper's editors. In the end, the paper was 22 minutes late, but it made the newsstands.

In the future is a single shared online news library — what reporters used to call the morgue, a repository of every story written in the paper — for *The Daily News*, *The Chicago Tribune* and the six other news organizations within Tribune.



House Passes Small Business DP Crime Bill

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Legislation to help small businesses ward off computer crime was passed by the U.S. House of Representatives last week.

The Small Business Computer Crime Prevention Act, approved by the House last Monday and now awaiting Senate action, would set up a public/private sector task force to investigate the problem of computer crime in small business and recommend preventative measures. It would also direct the Small Business Administration (SBA) to establish an information clearinghouse on the subject.

The bill was introduced, according to its sponsor, Rep. Ron Wyden (D-Ore.), because small firms have fewer resources and skills than larger organizations to devote to computer security and are less able to survive computer crime.

Introduced in May, the bill quickly picked up widespread, bipartisan support in the wake of recent reports of unauthorized access of computer systems by so-called computer "hackers." The bill would not set legal penalties for that kind of unauthorized access, but rather is directed at warding off that activity [CW, June 13, Aug. 1].

During Monday's debate on the bill, Wyden said that "small businesses are the most vulnerable [to these kinds of] keyboard criminals. . . . The biggest problem," he said, "is that many within the small business sector do not know where to turn to get factual, detailed information about computers in general and their vulnerabilities in particular."

Security Task Force

The Small Business Computer Crime and Security Task Force called for in the legislation would, over an 18-month life:

- Define the nature and scope of computer crimes committed against small business concerns.
- Ascertain the effectiveness of state legislation and available security equipment in preventing those crimes.
- Develop, with the cooperation of the U.S. National Bureau of Standards (NBS), guidelines to help small firms evaluate the security effectiveness of computer systems.
- Recommend appropriate activities for the SBA information center mandated in the act.

The task force would consist of officials from the SBA, the NBS Institute of Computer Sciences and Technology and the U.S. Departments of Justice and Defense. Private sector members would represent computer vendors, software vendors, the insurance industry, computer security firms and small business associations.

The SBA resource center provided for in the bill would provide information on computer crimes committed against small businesses and on security for computers owned or used by small firms. In addition to this, the resource center would also sponsor periodic regional forums to allow small businesses to exchange data related to computer crime and security.

A companion bill was introduced in the Senate Oct. 4 by Sen. Paul Tsongas (D-Mass.) and has yet to see any action.

U.S. Firms Favor Renewal Of NTT Pact

WASHINGTON, D.C. — Despite disappointing U.S. sales to the Nippon Telegraph and Telephone Public Corp. (NTT), American equipment companies are in favor of renewing the U.S. sales agreement with the Japanese firm when it expires at the end of the year.

A survey of U.S. company officials by Congress' General Accounting Office (GAO) found that most believe the agreement by NTT to open its $3 billion annual equipment procurements to American firms eventually will be successful.

The U.S. government expected the agreement, which went into effect Jan. 1, 1981, to lead to major sales by U.S. firms to NTT, but this has not been the case. During the 12-month period ending in March 1983, for example, U.S. firms sold to NTT only about $38 million worth of equipment, most of it at the low end of the technology scale, GAO said.

Because of the disappointing record of the three-year agreement, U.S. trade officials have indicated they might not seek to renew the agreement, which could lead to increased trade frictions between the two countries. U.S. firms contacted by GAO, however, said a nonrenewal decision would be "premature." The agency's report said, "These officials had seen progress in their efforts to sell to NTT and were generally optimistic that, given enough time and the continuation of Japanese cooperation, they could successfully penetrate the market."

The firms told the GAO that they want to maintain access to NTT procurements because the company is about to begin a $20 billion effort to upgrade its telecommunications system by the end of the century.

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Bankrupt Law Firm Files Suit Against Vendor

By Jeffry Beeler
CW West Coast Bureau

OAKLAND, Calif. — A user that last year declared bankruptcy has sued a local vendor for allegedly reneging on an agreement to supply a system that the user described as "crucial" to its survival.

The multimillion-dollar suit, filed on Oct. 11 in Alameda County Superior Court, accuses Mini Systems, Inc. of failing to provide Yanello & Flippen Law Offices with a desperately needed time-and-billing system. Mini Systems also stands accused of breaching its agreement to deliver a satisfactory word processing package and neglecting to furnish Yanello & Flippen with adequate programming and training services.

Serious shortcomings in the vendor's time-and-billing system purportedly left the law firm unable to bill its clients and collect fees for six months in 1980 and to date have reportedly cost the user $450,000 in lost profits.

Resigned 'in Frustration'

Yanello & Flippen also encountered significant problems with Mini Systems' word processing package, which proved so "inadequate" and "cumbersome" that some of the law firm's staff resigned "in frustration," according to the suit.

By late 1980, less than a year after the systems development effort began, Yanello & Flippen said its dissatisfaction with the project had become nearly complete. But despite its discontent, the law firm found itself unable to replace Mini Systems with an alternative vendor for at least two reasons:

- All the software for the user's word processing and time-and-billing systems is written in a programming language proprietary to Mini Systems.
- Yanello & Flippen was almost entirely dependent on its vendor for hardware maintenance because of the nature of the user's configuration, which combines a Digital Equipment Corp. PDP-11/34 processor with peripherals from other suppliers. Mini Systems is one of only a comparative handful of companies that provide service for mixed-vendor configurations.

Further discouraging the law firm from severing its unwanted Mini Systems ties, the law firm said, was its early decision to discard its existing word processing and time-and-billing facility before the installation of the new system was complete. The complaint indicated that the user organization later came to regret its failure to maintain two parallel configurations.

In May 1982, after struggling for more than two years to salvage its proposed system, the law firm filed for bankruptcy protection.

Yanello & Flippen first burst into local prominence in 1978 when it became one of the U.S.' first law firms to take advantage of a landmark Supreme Court decision allowing attorneys to advertise their services on TV and elsewhere. Within 15 months, the company's innovative marketing approach was attracting more than 500 new clients a month and had swollen the organization's administrative work load to thousands of transactions a month, the complaint said.

So staggering, in fact, did Yanello & Flippen's processing burden become that by 1979 the firm had launched a search for a new system to replace its existing control mechanisms. Of particular concern to the company was its former time-and-billing procedure, which had begun to hinder the organization's ability to collect client fees and was costing it $38,000 in lost revenues each month.

Cooperative Venture

In December 1979, after canceling the lease for its existing word processor and rejecting four alternative vendors, Yanello & Flippen joined Mini Systems and its president, Charles Breckenridge, in a cooperative venture to develop an integrated law office system. Under the agreement, Mini Systems was obligated to supply the user with all the necessary hardware, develop a word processing package patterned after Digital Equipment Corp.'s Decmate product and modify an existing time-and-billing program to do legal applications. The time-and-billing software originally had been written not for lawyers, but for accountants.

The agreement also called for the two companies to market the finished system jointly to other law firms and share the resulting proceeds. Installation of the system began in January 1980 and, because much of its software was reported to be already available, was scheduled to be completed in only five to six months.

But by the end of May 1980, the desired word processing package still "did not function as [Mini Systems] had represented, nor did it even resemble the program after which it was purportedly modeled," the complaint said.

Even after an additional two years of programming effort, the package remained "totally inadequate for use in a law office," the document said. Similar inadequacies also apparently characterized the system's time-and-billing programs and its other DP-oriented software.

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Consultant Points to Development Center As Best Cure for Application Backlog Woes

By Paul Gillin
CW Staff

SCOTTSDALE, Ariz. — If you have built or are planning to build an information center to address the applications backlog problem, you are really addressing only half the issue. Your development staff needs a productivity center of its own, a DP consultant said here last week.

The information center tends to alleviate the hidden applications backlog, or those applications that are never requested because of long DP lead times, said Vaughan Merlyn, president of Merlyn Consulting, Inc. in Atlanta. To produce the complex applications that end-user computing cannot solve, DP departments should look to the relatively obscure Development Center concept coined several years ago by IBM.

The Development Center is an information center that is targeted toward the professional programmer and treats development itself as an important application, Merlyn said in an interview at the Infodata Systems, Inc. National User Meeting held here last week. While most development tools — like applications generators, reusable code and super-efficient teleprocessing monitors — are available today, the concept has received relatively little notice, he said. DP professionals are reluctant to give up traditional programming methods and to take a new approach to development.

The requirements for a Development Center are different from those of its end-user-oriented counterpart, Merlyn noted. They include:

- On-line access to a set of integrated, complementary development tools.
- A development structure that makes those tools available to every programmer when needed.
- Subsecond response time, an environment that dramatically improves productivity, according to Merlyn.
- Batch processing in less than 15 minutes.
- Adequate storage for complex applications.
- A support staff that understands fourth-generation methodologies and prototyping and can optimize the Development Center environment.
- Special training support.
- A data system view that incorporates data base, data communications and data dictionaries.

Merlyn said many DP shops are still not taking full advantage of

(Continued on Page 18)

CW Photo by P. Gillin
Vaughan Merlyn

Three-Part Plan To Structure Future DP Center

SCOTTSDALE, Ariz. — The data processing organization chart of the future may well incorporate a three-part structure that more efficiently provides for the needs of end users and DP professionals, according to a DP consultant.

The future organization will consist of parallel components that include an information center, a development center (see story above) and a production center, according to Vaughan Merlyn, president of Merlyn Consulting, Inc. of Atlanta.

The production center will perform many of the technical functions now handled by programmers, including installation and maintenance, Merlyn said in an interview at the Infodata Systems, Inc. National User Meeting held here last week. The need for a separate staff is justified by the fact that most maintenance needs come up unexpectedly, forcing DP management to pull programmers off development projects in order to fight fires.

The production center will also coordinate quality assurance, ensuring that new applications meet the technical requirements for installation. As such, it will provide a "logical acceptance process" in which developers are reviewed by their unbiased peers, Merlyn said.

The emergence of the production center will change the job of programmer to a more analytical function, Merlyn noted. Development center staff members of the future "will probably be MBAs with a greater degree of business acumen," he said.

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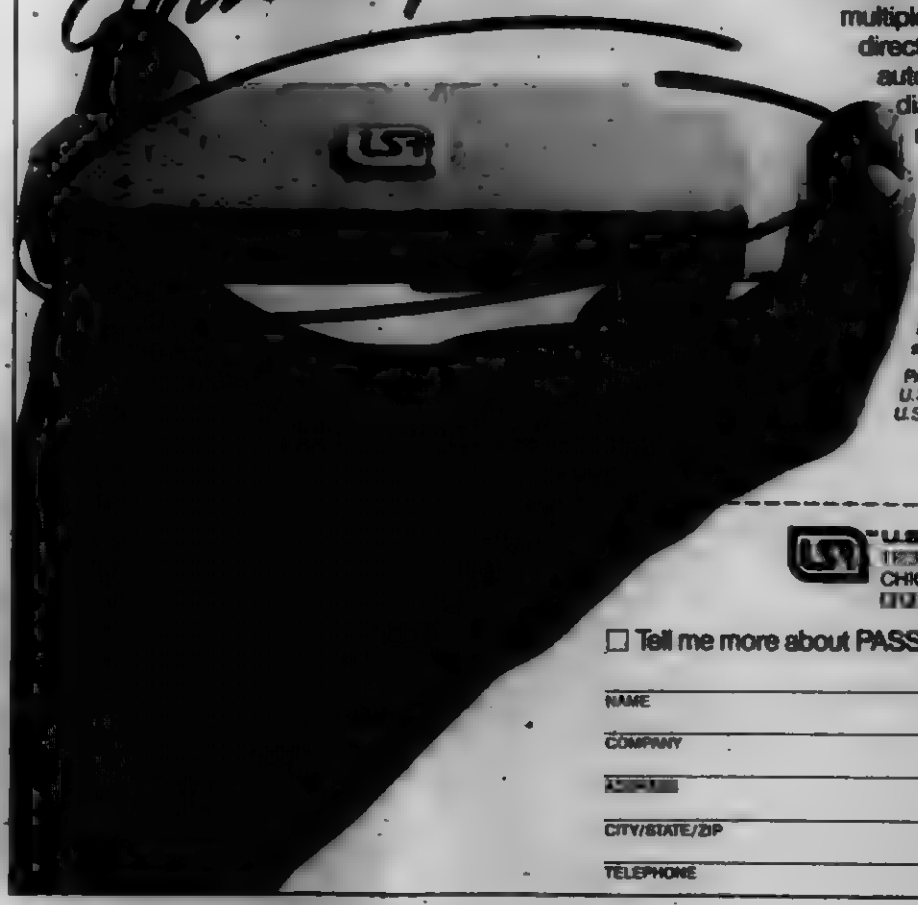

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Packaged Applications: What's Your Experience?

Faced with tight deadlines, large backlogs and slim programming budgets, many DP installations are turning to packaged applications to provide a quick and cost-effective solution.

In the Jan. 30 issue of *Computerworld*, a Special Report on "Applications Software Packages" will look at the issue of choosing and modifying packaged applications to fit particular business needs.

Your input for this special section is welcome. Articles should be in the form of tutorials that offer advice or opinions on specific topics (but are not product-specific), or in the form of application stories that describe your experiences with particular products.

Articles should be four to six pages, typed and double-spaced. Longer articles will be given lower priority and may be heavily edited. Black-and-white photographs as well as camera-ready artwork are welcome.

The deadline for all submissions is Wednesday, Nov. 30.

Further information and a one-page listing of guidelines can be obtained from John Gallant, CW Editorial. Manuscripts should be sent to him at *Computerworld*, P.O. Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

Development Center Seen As Remedy for DP Backlog

(Continued from Page 17)

their data base management systems (DBMS), using them as extensions of Vsam files rather than as a method to manipulate entire applications. When a DBMS is used effectively in tandem with applications generators, reusable code and interactive program development, the foundation exists for a powerful development center.

The consultant called IBM's introduction of the 3270 Personal Computer and Personal Computer XT/370 [CW, Oct. 24] an important step in providing the "programmer's workstation," which is key to the Development Center.

Merlyn cited several factors critical to Development Center success. The DP department must first determine which areas of the development life cycle are causing the applications bottleneck and then look for tools that address those areas. Typically, DP shops "buy coding aids that let them produce the wrong program 10 times faster," he said.

Second, the department must determine the class of the job, whether batch, on-line or a combination of the two. One client, he said, installed IBM's CICS to run some of its major packaged applications, but could not use any of its development tools because they were not designed for CICS.

Another step is to identify the levels of job functions that need to be automated. "If you're recruiting [IBM] IMS programmers, you don't want tools that eliminate the need to know IMS," he said.

Likewise, "if the ultimate goal is to automate programming, why leverage the programmers? You want to leverage the analysts."

Look Down the Road

Departments also need to look down the road at their future environments. It makes little sense to install a CICS productivity tool if the company may later scrap CICS, he noted.

Companies should also prepare for changing job functions that will result from the new productivity, Merlyn said. Programmers will begin to function more as analysts when code writing is reduced. Training becomes essential, both in familiarizing technical personnel with the new tools and in preparing them for changing job duties.

Finally, Merlyn advised that DP specialists begin to become comfortable with the concept of disposable code. Because development tools tend to generate code in different ways, maintenance may become very complex, he said. In the Development Center of the future, it may be easier to maintain software by throwing out the old code and generating new modules incorporating the changes.

DPMA Announces Reps to Afips Board

PARK RIDGE, Ill. — The Data Processing Management Association (DPMA) recently announced that Carroll L. Lewis and Jerry Knierim will represent DPMA on the board of directors of the American Federation of Information Processing Societies, Inc. (Afips).

The appointments were announced along with the naming of Donald E. Price as DPMA representative to the Afips executive committee and the Afips nominations committee.

Lewis, the DPMA's international executive vice-president, is president of Commercial Data Corp. of Memphis, Tenn. Knierim is assistant DP director for Pioneer Corp. of Amarillo, Texas, and Price is senior vice-president of Biz-Tek, Inc. of Cincinnati.

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Suggests Law for Record-Keepers

Ware Pins Hacking Liability on System Operator

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Computer security and privacy expert Dr. Willis H. Ware last week suggested that systems operators should be held legally liable for "contributory negligence" when their systems are victimized by unauthorized access.

That move, he told a U.S. House of Representatives subcommittee investigating computer security, would "give the government a basis in law for acting against the record-keeping installation ... should state-of-the-art security safeguards not be in place."

According to Ware, a computer system is "an intellectually attractive [nuisance] that causes imaginative or criminally minded people to hack at computer systems."

Electronic Mail Problems

Ware, who is on the corporate research staff of Rand Corp., also told the subcommittee last Monday that particular attention should be paid to privacy and security threats and problems associated with electronic mail.

Of the existing body of law related to electronic mail, Ware said, "It's not only underdeveloped, it's absolutely absent."

"A comprehensive business records service is what electronic mail is really all about. ... Can you imagine what a lucrative target it will become?" he added.

Besides the unresolved security issues surrounding electronic mail, a number of other related legal issues should be addressed, he said. For example, according to Ware, "It is not clear who owns the information in an electronic mail system."

Ware added that it is also unclear what the system operator's responsibility is in complying with or resisting search and seizure attempts by government agencies or what the system operator's liability is for lost, disclosed, stolen or abused information.

The privacy concerns are especially troublesome, he added.

Although declining to give further details, Ware told the subcommittee that the internal investigators of a federal agency have recently obtained on three separate occasions the complete electronic mail records of the agency's system. This, he argued, means all the system's users have been subjected to a criminal investigation conducted as a wide "fishing expedition" without legal due process.

The privacy abuses resulting from computer-matching programs the government initiates to gain access to disparate automated records will pale in comparison to the record-screening activities that can be pursued using electronic mail, Ware warned.

Problem 'Understated'

Rep. Dan Glickman (D-Kan.), chairman of the House Science and Technology Subcommittee on Transportation, Aviation and Materials, which has been looking into computer security and privacy — particularly as it relates to the type of computer hacking that has received so much recent publicity — noted reports that hackers in several cities have gained access to government and private-sector electronic mail systems.

Glickman, commenting on Ware's testimony, said, "Many of the things you have said perhaps have been understated. The problems may become even more severe."

Ware suggested the subcommittee can expect to deal with this issue for at least the next five to 10 years.

"The computer security issue must be seen as analogous to the classical offense/defense situation," he said. "As computer security safeguards become stronger, the offenses against them will become more sophisticated.

"Therefore," he continued, "no organization or the Congress can assume that the computer security issue is one that can be looked at and forgotten. ... If Congress has the will to pursue this issue and pay sufficient attention to it, then I suggest ... we should get on with it."

'Major Leverage'

"I would suggest," Ware said, "that the government has a major leverage on this issue. It can make mandatory the inclusion of appropriate technical security features in computer systems that it procures."

That action, plus private-sector efforts to muster "the corporate will to address this problem," will force computer vendors to develop product lines with adequate security, he said.

Ware suggested that the National Bureau of Standards' Institute for Computer Sciences and Technology be directed to develop "a menu of technical features" that would be mandatory for federal acquisitions. He also said the government should develop "a comprehensive handbook of preferred practices and procedures for running a computer center — and securely."

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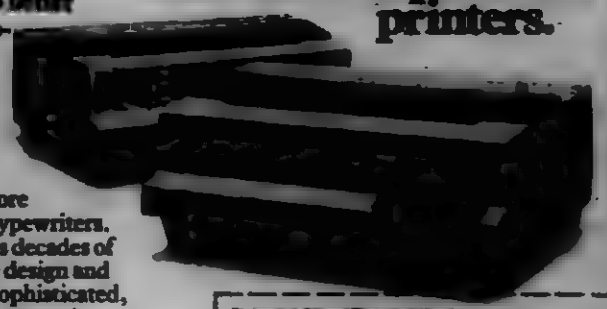

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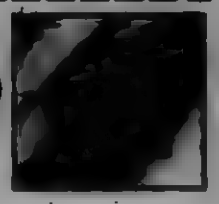

Computer Crime Insurance Available — For a Price

By Patricia Keefe
CW Staff

Publicity about the growth of computer-related crime and the technological advances that aid systems violators have spawned a number of computer fraud insurance policies.

The policies come in many shapes and sizes. Generally providing coverage up to $30 million minus a deductible that can go as high as $1 million, some insurance firms such as Shand, Morahan & Co. of Evanston, Ill., may increase that coverage to $100 million.

Various estimates for annual premiums have ranged from a premium surcharge of 10% to 30% for rider policies to $7,500 to $100,000 for separate policies.

Unlike standard forms of business crime insurance that protect businesses against fraud committed by employees, many of these new policies offer protection against computer fraud committed by nonemployees away from the company premises. Shand, Morahan even covers unauthorized access by so-called thrill-seeking pranksters and hackers.

Among the policies on the market today are:

● Shand, Morahan & Co. — Its "Unauthorized Computer Access Insurance" policy is available both to businesses and financial institutions. For coverage to apply, the policy does not require that the perpetrator be seeking financial or other gain, according to a product brochure.

The policy covers two risks: the client's cost to replace programs, data or materials lost or stolen; and the client's legal liability to others as a result of confidential information, such as customer lists or financial statements, getting out to unauthorized individuals.

Specifically, the policy covers the cost of restoring the computer system to its condition prior to the unauthorized access, including costs to restore data and programs; extra expenses incurred to continue business operations until the system is restored; and other pecuniary loss directly attributable to the destruction, modification and/or use of data obtained via unauthorized use.

The criteria by which Shand, Morahan judges risk include the limit of liability desired, the amount of deductible, the client's security system, the kind of risk involved and the client's disaster plan, if any.

● St. Paul Fire & Marine Insurance Co. and Aetna Life and Casualty Co. — Both offer riders attached to bank blanket bonds, standard policies that insure banks against loss from theft and fraud.

St. Paul's covers fraud or theft committed by nonemployees who "must have materially benefited from the loss," a spokesman said.

● The Travelers Corp. of Hartford, Conn. — Its "Computer Fraud Insurance" specifically covers the use by a nonemployee of any computer to transfer money or other property from company premises, or the premises of its bank, to another place from where it can then be stolen. It was designed to meet the insurance needs of most businesses except banks, brokers and similar financial institutions.

The company is studying the "significant potential" for loss that could be incurred by various financial institutions, a spokesman said, adding that "the losses could be tremendous." However, he predicted coverage for these institutions will be introduced at a later date.

PUG-East Meet Set for Feb. 12

BALTIMORE — The Eastern Region of the Prime Users Group (PUG-East) will hold its annual conference Feb. 12-15 at the Hyatt Regency Hotel on the Inner Harbor here.

The meeting will mark the first time PUG-East has allowed non-Prime vendors to exhibit their wares. Registration for the full conference costs $170. Single-day attendance fees range between $25 and $80, the group said.

More information can be obtained from PUG-East through P.O. Box 138, South Attleboro, Mass. 02703.

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Insurers Say 'Anti-Hacking' Policies Not Selling

By Patricia Keefe
CW Staff

With computer hacking apparently on the rise, or at least more in the public's eye, it would seem that computer fraud insurance would be a hot seller among security-conscious data processing managers. But it is not.

The fact is that although insurance protecting against illegal computer access or destruction of data is a good idea, clients are reluctant to commit themselves to policies that carry heavy premiums and have a hard time putting a price on the corporate data resource, according to representatives of several major insurance firms offering computer fraud policies.

"Out of 2,500 client banks, we've only sold our computer-theft rider to about 5%," said Allen F. Stendahl, fidelity bond underwriting manager at St. Paul Fire & Marine Insurance Co. About 85% of those sales were to larger banks, typically with assets in excess of $500 million, handling tremendous amounts of electronic funds transfers. Community banks with assets under $100 million, however, "don't feel they have the exposure to justify the policy," he added.

His sentiments were shared by representatives from both The Travelers Corp. of Hartford, Conn., and Shand, Morahan & Co., an Evanston, Ill.-based insurance underwriter. However, representatives of both firms claim the recent publicity surrounding the escapades of young computer hackers and their attacks on corporate and government data bases has spurred the number of insurance inquiries by as much as 20% to 30%.

While the cost of fraud insurance can be high, St. Paul's Stendahl did not find the premium to be a consideration. He pointed out that few legitimate inquiries asked the price of the policy. He put the blame for slow sales on corporate executives who place a low priority on system security, misconceptions about the system's security and a belief that "it hasn't happened here, and it never will."

Another problem — both for the insurer and the client — lies in quantifying the value of a corporation's data bank. One way to get some idea of the data's value is to look at the statistics of past computer crimes.

Losses Up to $3 Billion

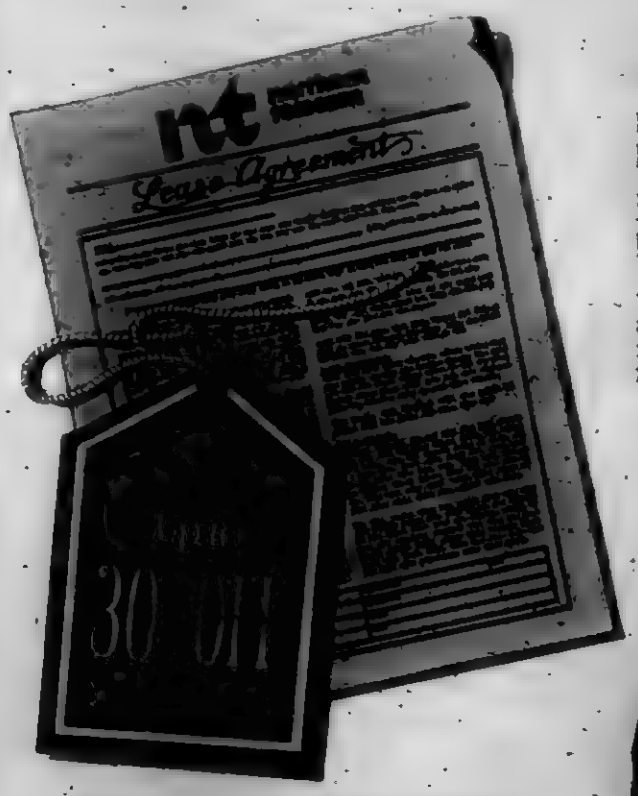
For example, losses stemming from computer-related crime are estimated to range between $100 million and $3 billion a year. According to 1981 Federal Bureau of Investigation statistics, the average take is about $502,000, although losses have ranged as high as $21.3 million and $10 million at two large West Coast banks.

Since computer fraud often goes undetected or unreported, many computer crime experts suggest that actual losses are probably much higher.

In addition to the value of the data itself is the cost to the company in man-hours to locate, compile, interpret and enter all that information into the system. It can be both time consuming and costly to replace data lost as a result of computer criminals or careless hackers. Even more costly can be the loss of business due to damaged data or hardware.

When financial institutions and other business concerns realize the extent of the damages they could incur as a result of unauthorized systems access, sales will increase, believes Don Bray, vice-president of underwriting for Shand, Morahan. He added that another barrier to sales is simply that many potential customers may not be aware that computer crime insurance, which has been around for about two years, is even available.

Among the firms that presently offer computer fraud policies are: Lloyds of London, which offered the first U.S. policy in 1981 for commercial banks; St. Paul Fire and Marine; Shand, Morahan; Aetna Life and Casualty Co.; National Union Fire Insurance Co.; Chubb & Sons, Inc., through its underwriting subsidiary, Federal Insurance Co.; and Risk Advisory Corp.



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International Report

FROM THE CW INTERNATIONAL NEWS NETWORK

AUSTRALIA

SYDNEY — A group of credit unions here has banded together to establish a company that will provide financial institutions and retailers with a network for electronic funds transfers. Large department store chains will be able to access the service of the new company, Electronic Funds Transfer Services Pty. Ltd., by point-of-sale terminals.

BRAZIL

SAO PAULO — Tension and disagreement between American and Brazilian viewpoints were strongly felt at the Seventh U.S.-Brazil Producers Council Meeting here earlier this month. When Brazilian Minister Camilo Penna raised the issue of government market funds during his keynote address, the American contingent, led by Burroughs Corp. President Michael Blumenthal, argued for more liberal government policies that would facilitate technological solutions in Brazil.

CHINA

BEIJING — A delegation of four Chinese scientists and educators will attend the Data Processing Management Association's 1983 International Computer Conference and Business Exposition in Baltimore this week. The rare visit by the Chinese computer scientists and educators is in response to a visit by 14 American and Canadian computer executives to China last summer.

SWEDEN

LINKOPING — A newly formed Swedish company, Context Vision AB, has unveiled a "thinking computer" here called the General Operator Processor (GOP). GOP is capable of associative thinking and, to a large extent, self-programming, a Context spokesman said. Said to represent the culmination of four years of development by a group of researchers at the Linkoping Technical University, the machine's main application is image processing in medicine, remote analysis and industrial processes. GOP consists of two computer systems, is capable of performing billions of instructions per second and will be available next fall.

WEST GERMANY

MUNICH — The Systems '83 Conference held here last week broke another attendance record, racking up 80,000 registrants this year. The show, which attracted 44,000 people last year, hosted about 962 vendors. Microcomputers enjoyed most of the attention at this year's show.

MUNICH — Siemens AG introduced a micro here aimed at the distributed DP market. Called Mikro 9780, the system runs under a Unix-like operating system and can function either as a stand-alone system or as a terminal linked to Siemens mid-range host processors within the vendor's proprietary Transdata communications network.

FRANCE

NICE — One week before Telecom '83, which is being held in Geneva until tomorrow, IBM unveiled here its European telecommunications strategy: Systems Network Architecture (SNA) will be considered the matrix for future development of all IBM telecommunications products. This strategy will not, however, apply to a few special marketplaces, including France. IBM also said it will rely on Rolm Corp.'s CBX as an integral part of its SNA telecommunications strategy.

TOULOUSE — The establishment of a European center dedicated to scientific computation was one of the recommendations made at a recent Technologies of the Future Conference here. The proposal for such a center will be presented to the European Communities Council (ECC) early in 1984. With the entry of nearby Portugal and Spain into the ECC, it was suggested that the center be located here. The center would run with a Cray Research, Inc. mainframe, which would be hooked up with a Honeywell-Bull Multics front-end processor.

MEXICO

MEXICO CITY — Basico is the name of a recently unveiled Spanish computer programming language that is said to run on most major microcomputers and minicomputers. The company that developed the language, Edidatax, said Basico can run on Digital Research, Inc.'s CP/M and MP/M operating systems as well as Cromemco, Inc.'s Cdos and Software 2000, Inc.'s Turbodos.

MEXICO CITY — While the government here is taking steps to encourage the development of domestic hardware and software, the importation of these products is expected to expand over the next several years. The installed computer base in Mexico is estimated at approximately 2,000 mainframes, plus 6,000 minicomputers and microcomputers.

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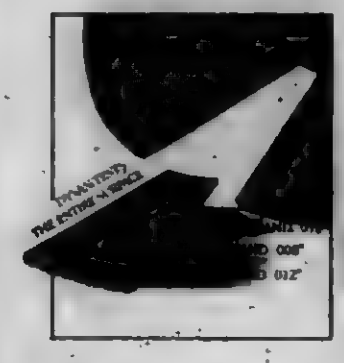

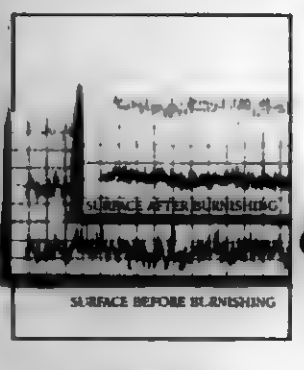

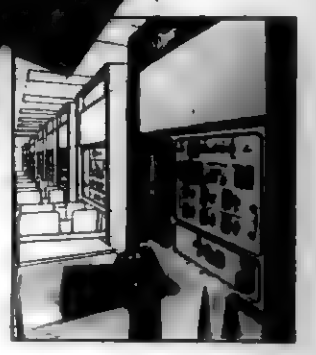

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Work No Longer Abstract

Bio-Chip Researchers Bemoan Lack of Funding

By John Gallant
CW Staff

ROCKVILLE, Md. — Researchers in the field of biotechnology — the union of organic chemistry and electronics — say that progress has been slowed by a lack of funding from both the government and private sector.

"The theoretical basis of our work has been solidified, and the physical reality of these principles has been illustrated in the past two years. This technology has moved out of the abstract and into the laboratory," James H. McAlear, president of EMV Associates, Inc. here, said in a recent interview. EMV Associates, which was recently acquired by Gentronix Laboratories, Inc., is the sole U.S. firm dedicated to applying genetics and biology to the design of molecular-level microcircuits, or "bio-chips" [CW, April 19, 1982].

Some researchers are attempting to use existing biological systems, such as large protein molecules, to produce workable electronic circuits and switches. Others are trying to synthesize an electron-trained molecule from scratch.

Five Hundred Times Smaller

The goal of both camps is to produce functional microcircuits that experts say could be as much as 500 times smaller than current silicon- or germanium-based devices. In the not-too-distant future, perhaps, those molecular microcircuits could be linked to form a pint-size computer with the power of vastly larger supercomputers.

Along with the recent advances in molecular electronics has come increased interest in the technology, though not enough to spur the necessary influx of investment capital. "I would estimate that there are 10 times as many people involved now as there were two years ago," McAlear said. "In addition, many nations have become involved in research, such as England, Israel, Australia and especially Japan, where we've been received very warmly at conferences. We're certain that the Russians have started up with research also. As a result, there has also been a heightened media interest in both the foreign and domestic press."

But, McAlear said, "although we've made some technical progress and gotten some media [coverage], in a corporate sense we've made very little progress. We had hoped to have more venture financing by now, but I fear that this field is regarded by many as very futuristic."

Forrest Carter, director of molecular electronics research at the Naval Research Laboratory in Washington, D.C., also said funding problems are hampering the development of molecular microcircuit prototypes.

"Three years ago I would have thought we'd have a prototype device by now. If we'd had more funding, that would have happened," Carter said. "Conceptually, we've made appreciable advances. But not much real experimental work has been done.

"It's clear that the Japanese have already committed themselves in this field," Carter continued. "I think they have made some important advances in related areas, and it's obvious the field will continue to grow due to the sheer force of the ideas. But, where this goes depends on the funding. In this country, not a lot of money has been devoted to a major experimental program. For example, the research effort here is down to only one person — myself."

Carter's work in molecular electronics is funded through the Office of Naval Research, while McAlear's firm relies on grant money from the National Science Foundation. Both agree that greater government involvement is critical to ensure advances in molecular microcircuit design.

In fact, McAlear said, a recent report published by the Mitre Corp. concluded that the federal government would be the main force driving research in molecular electronics in the years to come.

The House Armed Services Committee has recommended that $10 million in 1984 defense appropriations be earmarked for research like Carter's, but that funding has been threatened by lengthy congressional debate and delays, he said.

Manual Targets Those Selling Own Software

ESTILL SPRINGS, Tenn. — A manual written specifically to guide programmers interested in selling their own software creations was recently announced by ATC Software Co. here.

The manual reportedly provides direction on obtaining national directory listings, pricing new products, locating and qualifying a new advertiser, writing user manuals and operating mail-order fulfillment services from home.

The 78-page manual is available for $20. Additional information is available from ATC Software, Rt. 2, Box 448, Estill Springs, Tenn. 37330.

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Telecommunications Meet Slated for London on Nov. 29

LONDON — The third consecutive conference on World Telecommunications, to be held here at the Royal Lancaster Hotel on Nov. 29-30, will highlight the challenges and commercial opportunities worldwide that the emerging electronic information age offers for telecommunications carriers, their customers as well as their equipment manufacturers.

The conference is expected to be of particular interest to senior executives in the electronics and telecommunications industries and to their bankers and customers.

The Rèt. Hon. Cecil Parkinson, Secretary of State for Trade and Industry, UK, will give the opening address on "United Kingdom Developments in the International Context," according to a spokesman.

Viscount Etienne Davignon, vice-president of the Commission of the European Communities, will be a guest speaker, addressing "European Prospects in Telecommunications," the spokesman said.

The four tracks of the conference will focus on meeting the customer's needs in the information age, supplier strategies, the customer's view and trends for the future.

Registration information is available from the Financial Times Conference Organization, which is located at Minster House, Arthur St., London, England EC4R 9AX.

Forum to Cover Control Of Micro Use in Large Firms

WASHINGTON, D.C. — The National Research Council Commission on Engineering and Technical Systems will sponsor "A National Executive Forum: Managing Microcomputers in Large Organizations" Nov. 7-8 here.

The conference will address the ramifications of decentralized computer use throughout a large organization. It will feature presentations on policy alternatives for guiding the transition into decentralized computer use.

Reports outlining five pilot programs and systems designed to integrate central and desktop computing will be presented, the council said.

The forum, which will be held at the National Academy of Science auditorium at 2101 C St. N.W., is free, but preregistration is required. Information on registration for the conference is available from the National Research Council's Board on Telecommunications and Computer Applications at 2101 Constitution Ave. N.W., Washington, D.C. 20418.

Video Courses Offer Training In Management

ARLINGTON HEIGHTS, Ill. — Advanced Systems, Inc. (ASI) has introduced a series of video-based training courses called "The Information Age Technology Management Curriculum," which offer training in business technologies and information processing systems.

The curriculum focuses on training in the following five areas: information centers, personal computing, emerging technologies, computing literacy and systems development management.

Prices for the curriculum are based on several leasing plans ranging from $50 to $100 per month.

Further information is available from ASI, 2340 S. Arlington Heights Road, Arlington Heights, Ill. 60005.

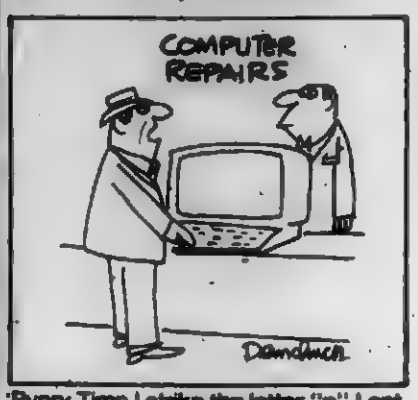
Booklet Recaps Personnel Meet

NEW YORK — The Association of Human Resource Systems Professionals (HRSP), sponsors of the conference on "Technology of Personnel" held here last May, has made available in booklet form the three-day meeting on personnel information systems.

Included in the booklet are presentations by speakers including futurist Isaac Asimov, human factors pioneer Alphonse Chapanis, IBM researcher Lance A. Miller, *The New York Times* Personnel Vice-President Guy T. Garrett Jr., the U.S. Department of Labor's Albert Angrisani and a recap of other sessions and 16 workshops on personnel and information systems issues.

The price for the booklet is $400 for members and $500 for guests.

Further information is available from HRSP, Second Floor, 3051 Adeline St., Berkeley, Calif. 94705.



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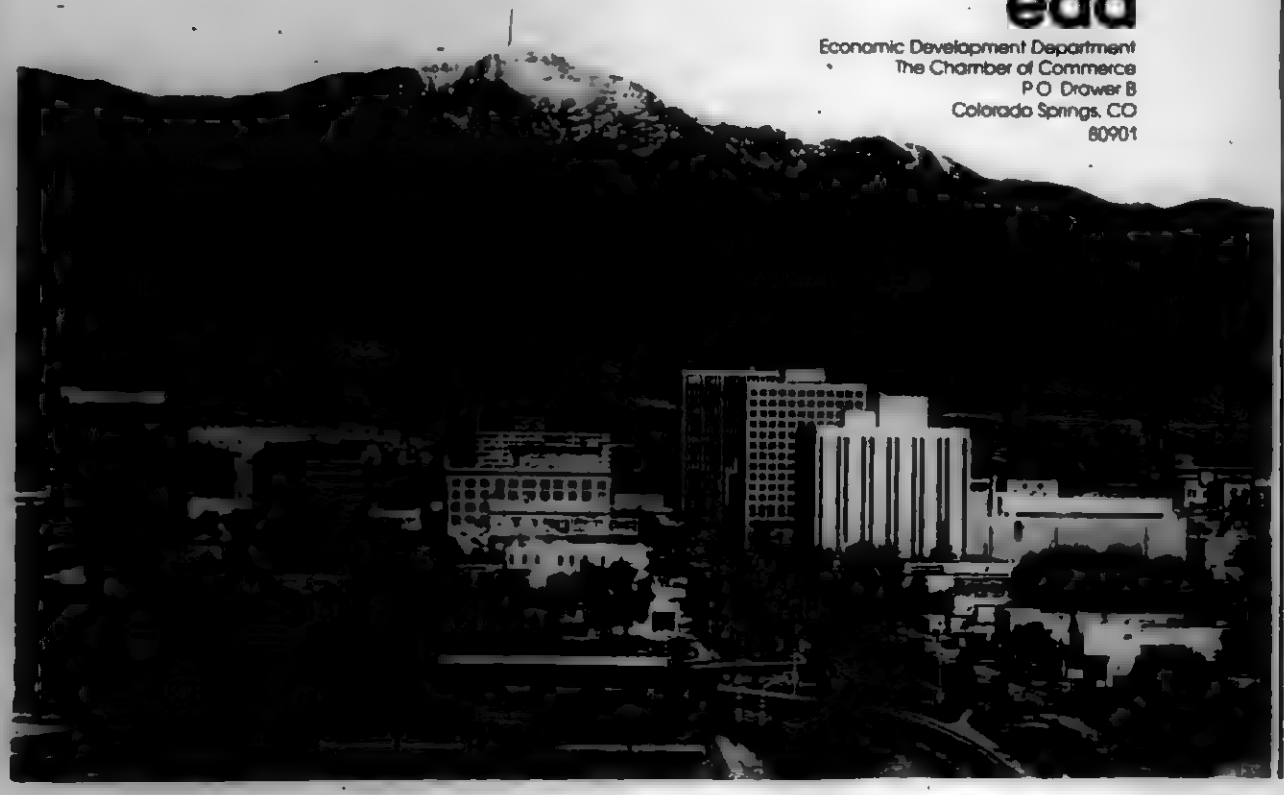


Downtime Linked to Air Conditioning Ills

By John Gallant
CW Staff

CAMBRIDGE, Mass. — A failure of the air conditioning system in your DP shop is good reason to lose your cool, especially in light of a recently completed study that indicates that a loss of air conditioning is one of the most frequent causes of downtime in corporate computer environments.

Consultants from Arthur D. Little, Inc. reviewed the computer centers of eight large telephone and utility companies during the past two years and found that the breakdown of air conditioning system controls was the major culprit responsible for costly and aggravating computer downtime.

Further, the consulting team discovered that while computer hardware failures were usually limited to one of several machines, air conditioning problems often led to the shutdown of the entire computer center.

Failure of Controls

"The failure of air conditioning controls, such as temperature sensors or pneumatic tubes, stands out quite a bit," said Rusi F. Patel, the mechanical and heating, ventilation and air conditioning specialist who directed the consulting team.

"Control failures were more frequent than any other problem we encountered. When system controls fail, the computer must be shut down or it will overheat and possibly be damaged in a matter of minutes," Patel said.

Frequently, Patel said, large air conditioning systems fail because they are not equipped with adequate backup.

"Without built-in redundancy, the failure of a single component can cause a computer to crash. Surprisingly, we found that some large air conditioning systems had only one temperature sensor, for example.

"If that goes, you've got big problems. It doesn't cost much to have two, or even three, such sensors installed, and that backup is a must," he said.

Among the other causes of air conditioning system failure, Patel found, were lack of preventive maintenance, poor support systems design and inadequate alarm systems.

Also, "large computer centers are generally in a state of continuing change, with computers and related equipment constantly being added or relocated," he said.

"In that environment, cooling requirements can suddenly exceed the capacity of the system and the margin of redundancy built into it," he said.

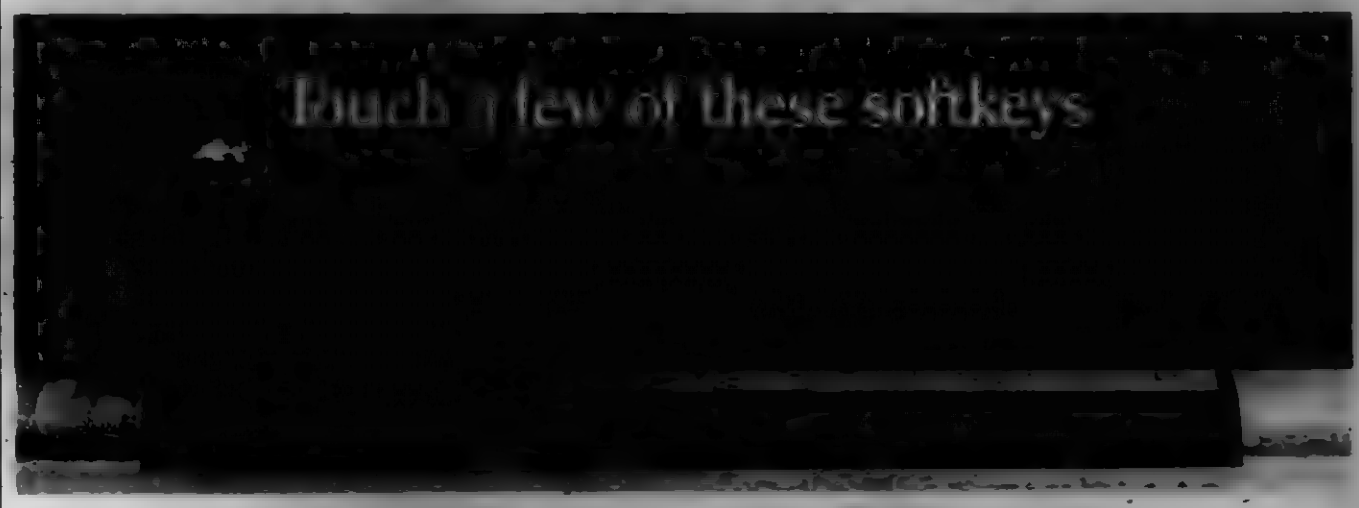
Concern about the reliability of the air conditioning system protecting a major hardware investment is not limited to large companies. "Size is not a critical factor here. Any company that requires constant air conditioning for its computer center should be concerned."

What can be done to guard against air conditioning malfunction?

"With new computer centers," Patel said, "it is important to have the design reviewed from a reliability standpoint before you sink in a lot of money. You can really save yourself a lot of money and hassles."

For existing computer centers, "proper, periodic preventive maintenance, as well as equipment replacement, is important. A lot of people simply perform bandage work on air conditioning equipment that really should be replaced. That can lead to big problems."

The highlights of the consulting team's findings are outlined in "News Notes: August '83" available from Arthur D. Little's Public Relations Department at 25 Acorn Park, Cambridge, Mass. 02140.



and you'll know why HP's new Protocol Analyzer could pay for itself the next time you have a network problem.

Perhaps it's time you took control of your datacomm problems. The minute one of your datacomm interfaces crashes, you're faced with more than inconvenience. A bill for service calls, as you play "vendor roulette" trying to locate the problem, can run into thousands of dollars. If you're faced with a down network, it can cost a hundred times that.

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The HP 4955A supports the major protocols and standard data codes. But what about your own unique protocols and architectures? Our datacomm-enhanced BASIC lets you program sophisticated test routines and perform higher-level protocol analysis. Create statistical displays (tables, graphs, histograms) and perform detailed message manipulation for your own network needs. Add to that the capability of printer output and you have permanent, long-term records of performance. Your efficiency is improved for network planning and expansion.

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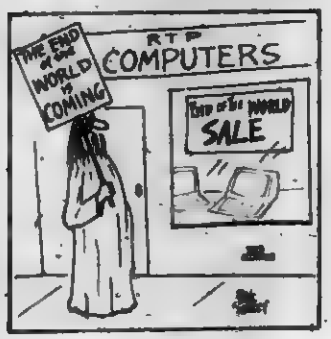
And the softkeys? They're the best feature! From power-on right through complex measurement sequences, they're dedicated to making your job easy! In fact, so easy you're presented only with valid choices every time you select a menu setup or change. You don't have to memorize cryptic syntax.

The HP 4955A Protocol Analyzer. It speaks your language. It speaks your network's language. It's your key to rapidly solving network problems in the datacommunications marketplace.

For a technical data sheet, write to Hewlett-Packard, Literature Distribution, 1820 Embarcadero Rd., Palo Alto, California 94303 or for more information, call your local HP sales office listed in the telephone directory white pages. Ask for an HP Instruments Field Engineer.

HEWLETT PACKARD



Managers on the Move

Peter J. LaSalle

PETER J. LASALLE has been promoted to vice-president and general manager of information services for Market Facts, Inc. in Chicago. Market Facts is a market research firm that conducts studies in the areas of consumer products, industrial strategies, governmental operations and financial services.

In his new position, LaSalle will be responsible for all data entry, data processing and system support activities.

LaSalle joined Market Facts in 1970 and worked on several management assignments within the company's DP component.

•••

WILLIAM F. THOMAS has joined Pertec Peripherals Corp. (PPC) as director of corporate management information systems. In his new position with the firm, located in Chatsworth, Calif., Thomas will be responsible for all data processing activities as well as the company's other areas of electronic communications.

Before joining PPC, Thomas, who has had over 25 years' experience in both DP and materials control, ran his own software development and consulting company.

He has also held positions at Singer Business Machines, Dalmo-Victor, Sylvania and Ampex Corp.

•••

JOHN J. DE MITA has joined the American Business Information Service Corp., subsidiary of American Savings Bank in New York, as senior vice-president responsible for administrative systems and procedures, data processing and the mini systems group.

Before joining American Business, De Mita was vice-president of planning and development for Savings Management Computer Corp., a Boston company servicing 57 savings banks in Massachusetts.

Previously, he was with the New York Bank for Savings for 17 years, the last three as vice-president and director of management information systems.

De Mita attended Brown University Graduate School of Banking in 1979 and 1980. He received his bachelor of science degree from New York University, where he majored in math and science.

•••

MANOLO S. AMICH has been named director of data processing services for Universal Insurance Group (UIG) in Coral Gables, Fla. He will be responsible for the design and implementation of multiple applications for UIG's Wang VS-1000 and Sperry Corp. 80 systems.

Amich joined UIG in February after five years with General Insurance Corp. in Miami Beach, Fla.

His background also includes data processing experience with LaSalle National Bank in Chicago and United Airlines.

He holds a B.S. degree in finance from the University of Illinois (Chicago Circle) and an A.S. degree in DP from Triton College in River Grove, Ill. The latter was acquired while Amich was a DP instructor and serving as manager of the college's DP department.

•••

WINFRED BOWMAN has been appointed regional technical manager of the St. Louis branch office of Computer Associates International. He will manage a department of system engineers and provide ongoing technical support to other departments.

Bowman previously worked for McDonnell Douglas Automation Co., Ralston Purina Co., Southwestern Bell Corp. and Four Phase Systems, Inc.

Bowman holds two B.A. degrees, one in mathematics from Eastern Illinois Univer-

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System W/Micro W – modern analytical tools for the manager, the planner, the analyst.

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True Distributed Decision Support – make real sense of your micros.

System W/Micro W go beyond achieving a mainframe-micro link. Unlike most offerings, Micro W and System W have been designed by the same company. Result: absolute upwards compatibility, eliminating the need to retrain users who switch between mainframe and micro. It also permits mainframe data, applications or whole models to be sent back and forth. In addition, mainframe models and reports can be developed on the micro for eventual running on the large computer. This is true "distributed decision support" for increasing user productivity.

Access to Corporate Data

The top priority problem we hear from end users: How do I get to the data I need? The answer lies not only

Managers on the Move

sity and another in computer science from Southern Illinois University.

•••

THEODORE J. MADICK has been appointed director of management information systems for Omnicor, Inc. in Akron, Ohio. Madick will be responsible for consolidating the computer functions of all the Omnicor companies, including uniformity of hardware and software applications, and for developing corporate statistics that will provide more management-oriented information.

Since 1975, Madick had been with Newell Leasing Systems, Inc., a truck leasing company in Akron that is a wholly owned subsidiary of Omnicor. He began at Newell as data processing manager and advanced to director of management information systems there in 1980.

Previously, Madick had been with Myers Industries in Akron for six years, spending the last two years as the company's systems analyst and programming supervisor.

He attended the University of Akron and completed advanced computer training courses with IBM and technical schools.

•••

NANCIE L. SILL has been named to the newly created position of director of management information systems for Contel Credit Corp. in Atlanta. Sill will direct the corporation's data processing systems and programming activities as well as systems design programming and computer applications.

Sill most recently served as vice-president and manager of the Data Services Division Control for First Atlanta Corp.

She also held the positions of manager of project management and assurance and manager of systems assurance for that corporation. Earlier, Sill served as a systems engineer for Electronic Data Systems of Dallas.

She holds a B.A. from Florida State University and has received advanced data processing training from Honeywell Institute of Information Sciences and Electronic Data Systems.

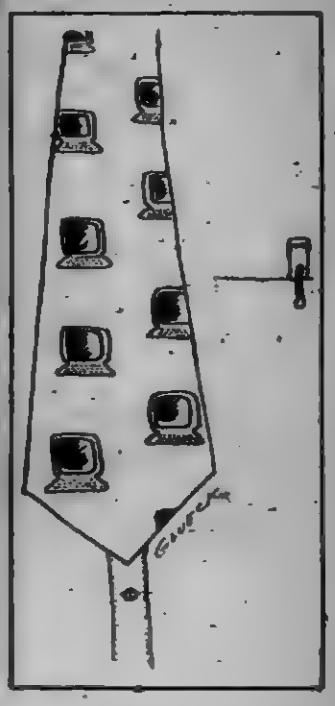
Guide Covers Performance, Price of Micros

ROCKVILLE, Md. — The Management Training Institute, Inc. has announced publication of "The Personal Computer Price-Performance Guide," which it said was published to help guide the user through the maze of microcomputer system features, capabilities and pricing.

A numeric indicator called the Price-Performance Indicator (PPI) has been developed based on over 40 features of nearly 100 personal computers, the institute said. The PPI is based on a theoretical "standard" system with a value of $2,000 and typical specified capacities.

Alternative systems are rated against the standard, gaining points for additional capacity and losing points where deficient from the standard. The result is a single indicator of price performance, where a value less than 1.00 is inferior and a value greater than 1.00 is superior to the standard.

The price of the guide is $19.95. Further information is available from the Management Training Institute, 11317 Old Club Road, Rockville, Md. 20852.



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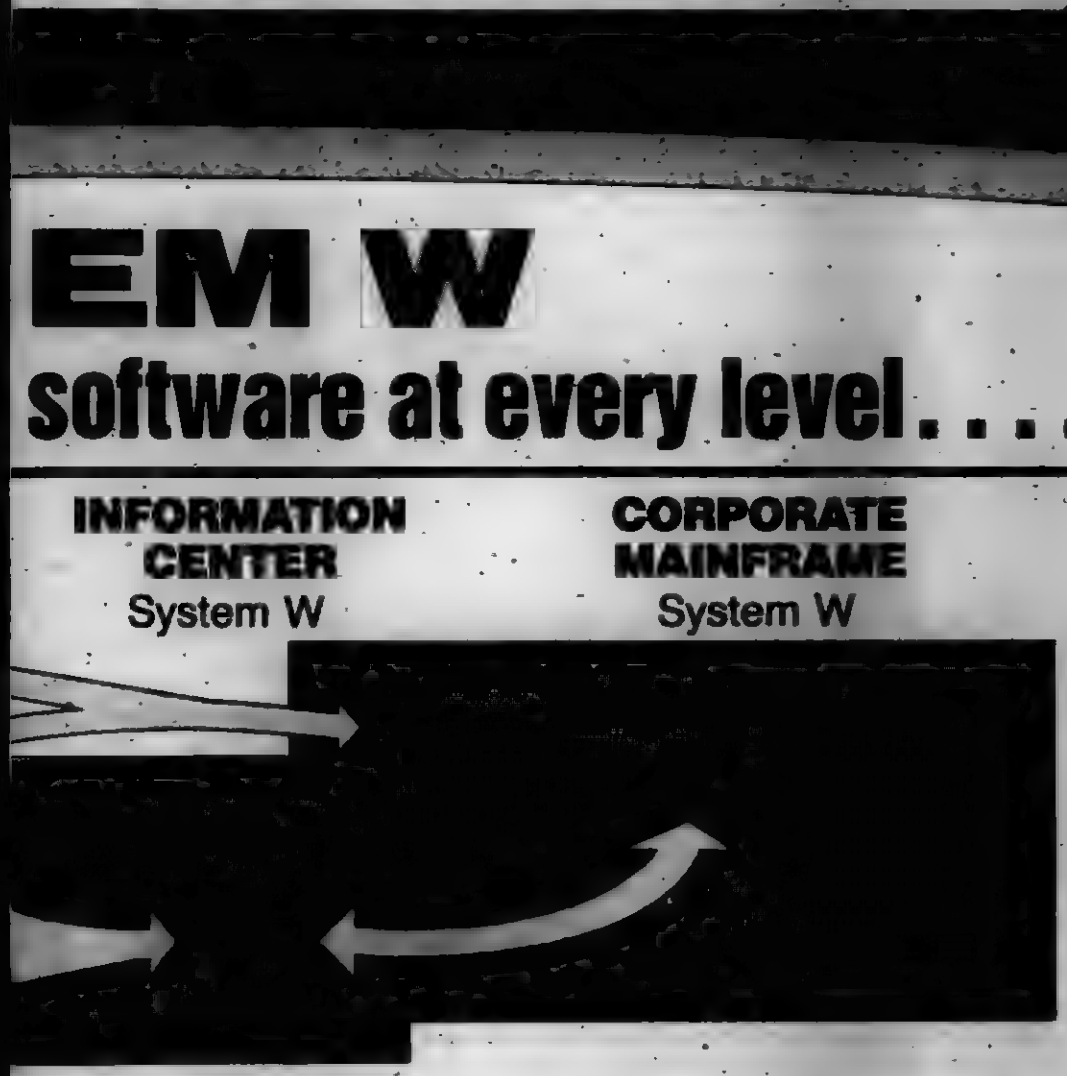

with integrated telecommunications to transport the data, but with mainframe software tools designed to understand data from many sources — general ledger, payroll, and other internal sources as well as external data bases.

With System W Filepower, user access can be permitted (controlled by security provisions) to many data bases, no matter what their formats may be.

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Whether your company is using only mainframes or if the micro explosion has hit, with System W/Micro W your company can proceed at any pace from evolutionary to revolutionary by equipping broad user populations with personal analytical tools. System W simplifies complex planning needs and facilitates coping with changing business factors.

System W is software with proven, outstanding advantages. It is offered by Comshare whose acknowledged expertise is based on 17 years of unmatched experience in developing and implementing thousands of software solutions to business problems.

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Or write Comshare, Decision Support Systems Marketing, P.O. Box 1568, Ann Arbor, MI 48106.

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Communications Net Seen Key 'Corporate Asset'

By Lynn Haber
CW Staff

NEWTON, Mass. — "Your networks are going to become major corporate assets of your companies and, further, if you do it well enough, they may become strategic weapons."

Speaking at a seminar here recently on "The Network as a Corporate Asset," Howard Anderson, president of The Yankee Group, a Boston-based research and consulting firm, told approximately 125 business executives that the key to corporate strategy for now and the future is communications. The seminar was sponsored by the Boston chapter of the Society for Information Management.

Anderson outlined from a management information systems (MIS) point of view how a company can build its network in a way that can give it a major systems and competitive advantage. "In the midst of the beginnings of divestiture by AT&T, you are faced with an unprecedented amount of confusion. There are tons of unknowns out there, yet at the same time a number of major companies are beginning to build their network as a corporate asset," Anderson said. "Not only financial institutions, but every company is attempting to build a link to its customers that will be an on-line interactive link, realizing that its communications and information systems plan is part and parcel to its corporate strategy."

What is imperative, according to Anderson, is that a communications MIS strategy be explicit, in writing, and understandable and that the strategic plan of the business be related well to the MIS department.

Electronically delivered services are one item that allow companies to create a distinctive advantage. "What major financial institutions are doing is migrating customers to higher value services, electronically delivered. Electronics does well what physical distribution and bricks and mortar do poorly," Anderson said. "Their strategy, of course, is to take to high ground, to move as quickly as possible into data base, data processing and communications.

"They're going to try and trade customer loyalty for data processing and communications."

A company attains a vantage point, Anderson said, by operating from the premise that it wants to control costs better than its competitors. Then it must address the following questions: Can it provide more useful functions for the same dollar? Is it able to recognize the potential of high technology earlier than its competitors? Will it be able to integrate this technology into the company and overcome human/organizational barriers?

"The weaknesses of a company's competitor will be that it treats its network as an expense and not a weapon, and it will have failed to enter some of the new markets," Anderson said.

Understanding what users are going to want before they even do is becoming a major factor. A company will also have to understand the strategic plan of its business before its customers can understand what they can do with it, according to Anderson.

Anderson outlined five critical elements necessary to becoming a dominant player in communications: local loop, long haul, communications processing, computer processing and hardware devices.

Why will one company succeed relative to its competitors? "Because that company will build a customer base that is network and computing intensive, because it will be, by integrating toward low cost, a network provider and because that company will recognize the impact of technology earlier than anyone else," Anderson concluded.

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Features and Benefits
—Increased capacity
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—Upgradeability
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—Operates with 1.25 MS-DOS through 2.0 MS-DOS
—Internal upgrade
—1 10mb half-height Winchester=31 floppy's
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Snyder Chosen To Keynote AICPA Meet

ATLANTA — David Pearce Snyder, life-styles editor of *The Futurist* magazine, will deliver the keynote address at the 19th Annual Computer Conference of the American Institute of Certified Public Accountants (AICPA) to be held Nov. 14-16 at the Waverly Hotel here.

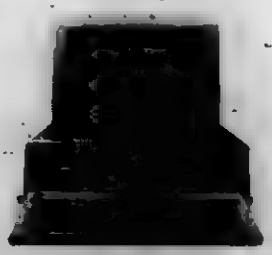
Snyder will examine how computers will impact the accounting profession and the general business environment in the next decade, according to an AICPA spokesman.

The conference will also feature 2½ days of lectures and case studies on computer consulting and auditing skills presented by educators and experts from a number of accounting and consulting companies.

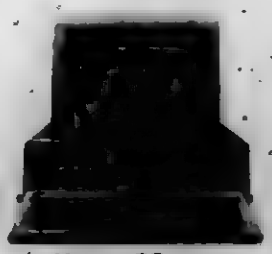
The conference theme of "A Return to the Basics as a Foundation for the Future" was chosen to illustrate that, while computer hardware and software have grown more sophisticated, the basic requirements for using computers in accounting have not changed, according to the AICPA spokesman.

The fee to attend the conference is $425. More information about registration is available from AICPA's Meetings Department, which is located at 1211 Ave. of the Americas, New York, N.Y. 10036.

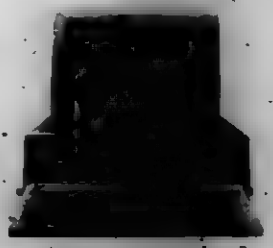
MSA software makes your mainframe computer work 100 times harder than ever before



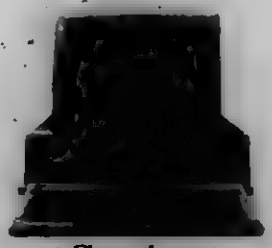
1. Now MSA's Executive Peachpak II™ software links personal computers to the mainframe. So you can...



2. Use your PC to access all your MSA mainframe systems, from General Ledger to Manufacturing.



3. Access entire mainframe files, so you can work with large amounts of information at one time.



4. Choose the exact mainframe information you need, as much as you need, in the form you need.

5. Use it with Peachtree Software, 1-2-3™ from Lotus, DIF,™ VisiCalc™ or other micro software.

6. Replace terminals with PCs at about the same cost—with many more capabilities.

7. Plug PCs directly into your existing online network...

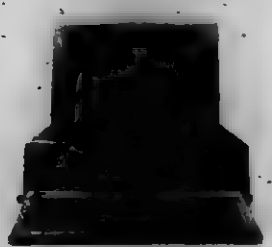
8. Or establish dial-up access with regular telephone lines.

9. Interface mainframe data directly to typewriters, graphics plotters, and printers...

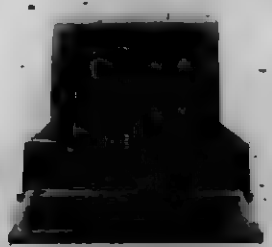
10. And automate your office economically.

11. Get this new technology in any of three specific packages...

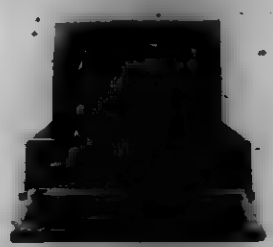
12. Give executives the management tools they need with Executive Peachpak II...



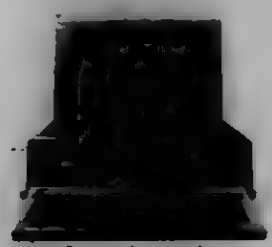
13. Provide word processing and mainframe access to administrative assistants with Administrative Peachpak...



14. Give the graphic arts department direct mainframe access with Graphics Peachpak.



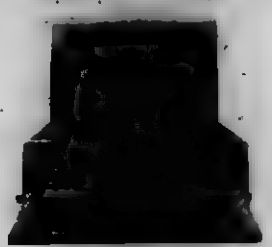
15. Save time because mainframe data is automatically loaded into your PC...



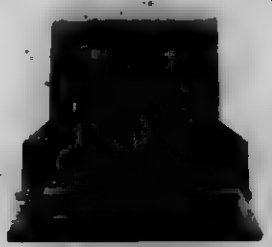
16. So you free up data processing resources...

17. And you don't have to key in data yourself.

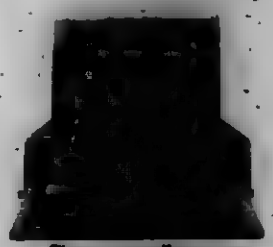
18. Use MSA's Manufacturing System data to produce a cost/margin analysis with PeachCalc...



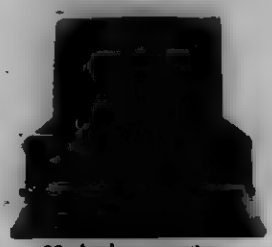
19. Make a capacity analysis using a PC and mainframe manufacturing information...



20. Summarize your findings in a report using PeachText...



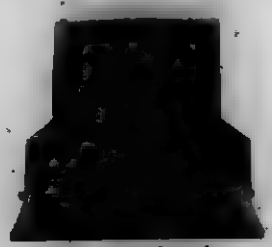
21. Eliminate spelling errors with a built-in Spelling Proofreader.



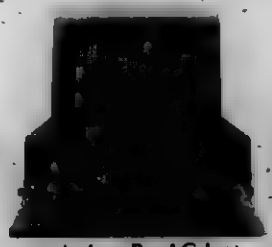
22. Analyze overtime percentage on your PC, using data from MSA's Payroll/Personnel System...

23. Make timely manpower adjustments to maximize productivity...

24. And revise departmental salary projections on your PC.



25. Download vendor history from MSA's Accounts Payable System...



26. And use PeachCalc to do comparative analysis.

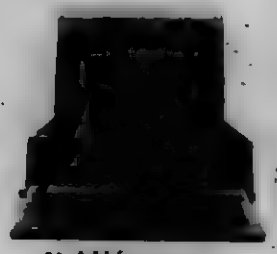
27. Use PeachLink to download information from both MSA and non-MSA online mainframe systems...

28. Create custom online formats with Easy-Screen™.

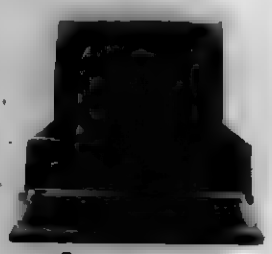
29. Or use standard formats provided by MSA.

30. Download a financial report from the mainframe to your PC...

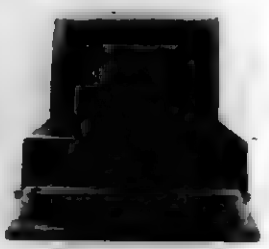
Turn Page ▶



31. Add footnotes to a balance sheet using PeachText...

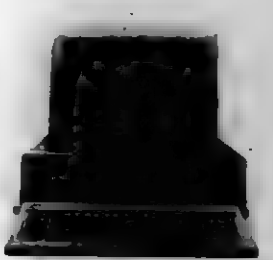


32. Project next month's income with PeachCalc...



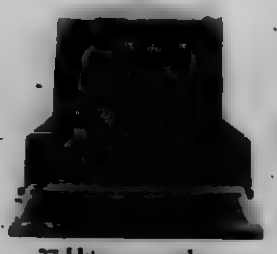
33. Change sales estimates and recalculate income projections instantly.

34. Download names and addresses from your mainframe...



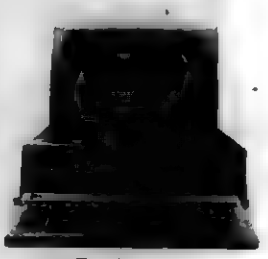
35. Use the List Manager and PeachText to do a mailing informing customers of a special announcement...

36. Or create a mailing to vendors requesting bids.



37. Using personal computer telecommunications, access up-to-the-minute exchange rate information...

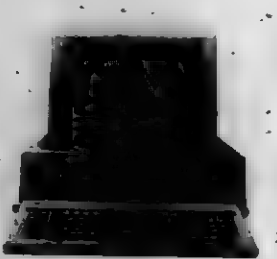
38. Use PeachCalc for float analysis...



39. Display current exposure with a graph...

40. Update MSA's mainframe Foreign Exchange System.

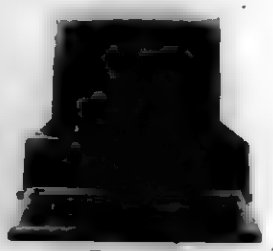
41. Use PeachLink to distribute mainframe data to your other offices across the country...



42. Use a PC at those remote locations to print reports...

43. Graph expenses by location, department or by a single product line...

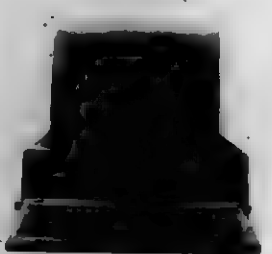
44. Print checks in remote locations from mainframe Accounts Payable data.



45. Create a salary administration worksheet on a PC using MSA's Payroll/ Personnel System...

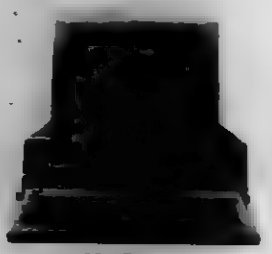
46. Produce a workforce utilization model using PeachCalc...

47. Monitor turnover using Business Graphics...

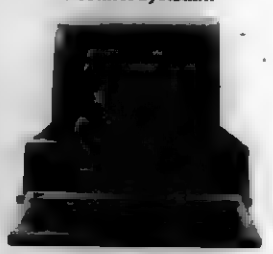


48. And, for a printed copy, route your Business Graphics output to a plotter or printer.

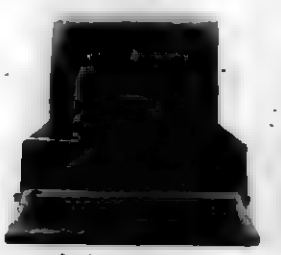
49. Use PeachLink to get economic data from MSA's Forecasting and Modeling System...



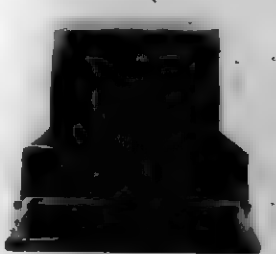
50. Use PeachText to prepare a corporate planning policy document...



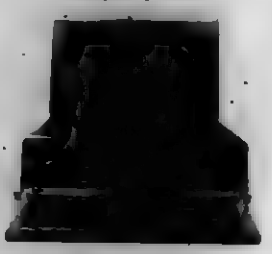
51. Refer to a built-in Random House® Dictionary while writing the report.



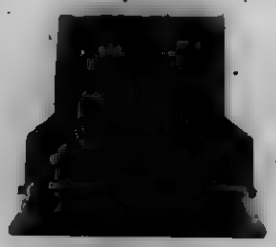
52. Link to mainframes under operating systems OS, DOS, and SSX...



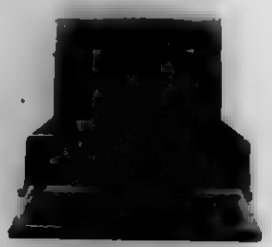
53. Use all standard online monitors, including CICS, IMS-DC, IDMS-DC, TSO, CMS and ICCF.



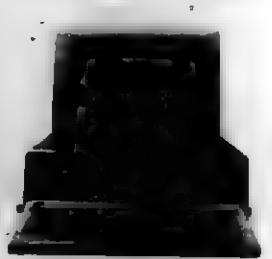
54. Assist your auditors by giving them access to mainframe data...



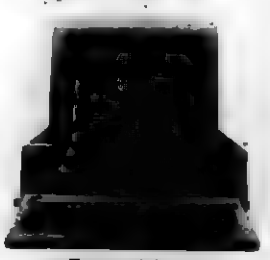
55. And the convenience of PeachText word processing...



56. Give them access to current customer and vendor information for letters of confirmation...

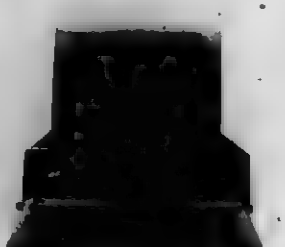


57. And an easy way to prepare notes to consolidated financial statements using PeachText.

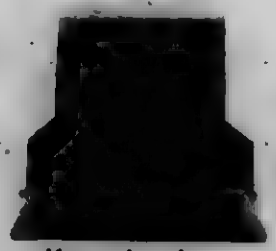


58. Extract delinquent customer invoice information from your Accounts Receivable System...

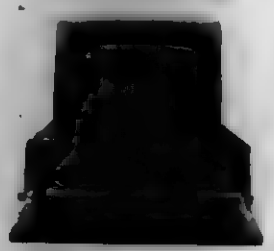
59. Personalize a dunning letter with your micro software...



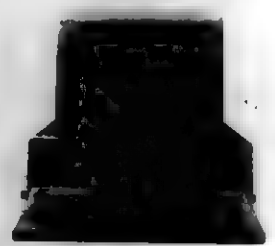
60. For help, call up 30 synonyms instantly using PeachText's Random House® Thesaurus.



61. Use mainframe Inventory and Purchasing data to graph inventory use by department on your PC...

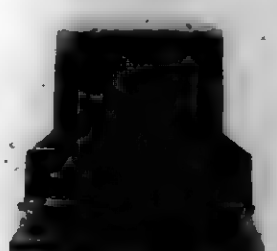


62. Make a purchase order adjustment without leaving your workstation.



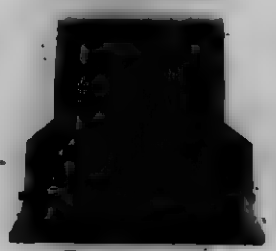
63. Download current balances from General Ledger to graph actual vs. planned...

64. Do a breakeven analysis by department.

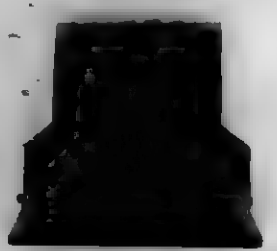


65. Analyze overtime percentage by department on the PC using MSA's Payroll/Personnel System...

66. Use PeachText to prepare a memo summarizing your analysis and attach it to a graph.

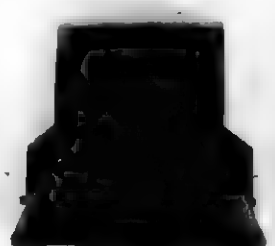


67. Download employee data for an upcoming salary review...

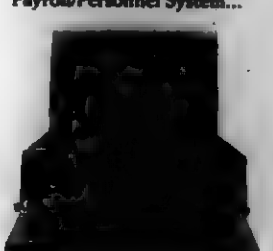


68. Complete the salary review on your PC...

69. Enter the salary adjustment from your PC to the mainframe...



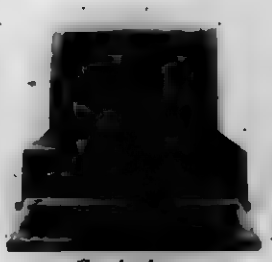
70. Make salary projections on your PC using mainframe payroll data.



71. Capture data from MSA's Fixed Assets System...

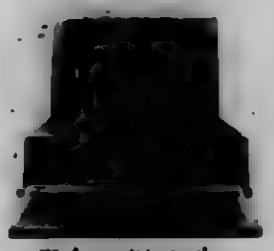
72. Use PeachCalc to create a lease amortization model...

73. Perform a TEFRA depreciation analysis.



74. Get database-to-database transfer with Database Sharing...

75. Download an entire report with the touch of one key...

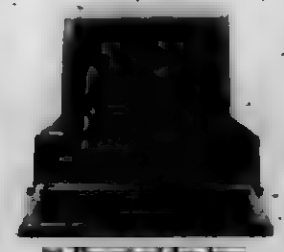


76. Access it instantly, without data processing involvement...

77. Enjoy a realtime environment, no waiting for batch processing.

78. Access available funds data in MSA's Budgetary Control System...

79. Use PeachCalc to project expenditures through year-end.



80. Download data from MSA's Capital Expenditure Tracking System...

81. And analyze cash flows for [illegible] analysis decision.

82. Dial up subscriber databases to access current credit information for customers...

83. Use PeachCalc to analyze information and set credit limits...

84. And update your [illegible]

85. Allow only authorized personnel access to the mainframe, due to built-in security.

86. Instantly express numbers in bar, line and pie charts or other business graphics.

87. Add footnotes to mainframe reports, or customize mainframe documents.

88. Produce up to [illegible] graphs and charts with mainframe information.

89. Get HELP if you need it, with a built-in feature that guides you through the system.

90. Organize your information and mailing lists with your own List Manager.

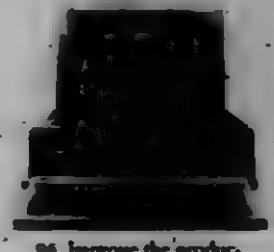
91. Use mainframe information with the Business Graphics System to produce slides and transparencies.

92. Work productively at home, by dialing up the mainframe from your own personal computer.

93. Make late changes to reports generated on the mainframe.

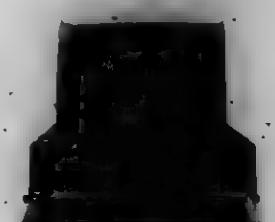
94. Do budget forecasting using PeachCalc and your PC.

95. Review profit and loss [illegible] notice on your PC.

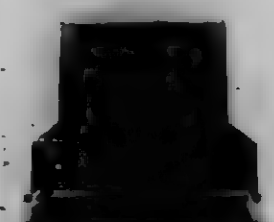


96. Improve the productivity of your staff with simple-to-use software for personal computers...

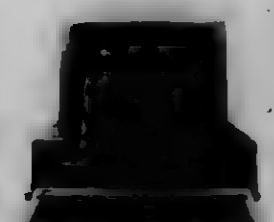
97. Enjoy the convenience of a complete menu-driven system...



98. Use over 20 pre-defined applications from MSA.



99. Put this new technology to work for your company immediately...



100. Install it in less than one hour.

Backlogs? Rush requests? Now they're a thing of the past.

MSA's new Executive Peachpak II™ links your company's personal computers directly to your mainframe. So executives can get to vital information without waiting for print-outs.

Best of all, this hot new technology is available from MSA *right now.* (In fact, it's already installed and working for companies across the country.)

MSA is the mainframe-to-micro leader. While other companies are still trying to work the bugs out of their initial offerings, MSA already has its *second* successful mainframe-to-micro product: Executive Peachpak II.

It offers such advanced features as Database Sharing, MSA's database-to-database transfer technology that lets you get all the mainframe information you need instantly.

And a Universal Interface with most micro software packages including Peachtree Software, 1-2-3™ from Lotus, and VisiCalc.™

Executive Peachpak II also includes PeachCalc,™ an electronic spreadsheet. A Business Graphics System for color charts and other graphics. Telecommunications that let personal computers talk to each other—or link to resources such as Dow Jones News/Retrieval.® PeachText,™ a complete report production system that lets executives edit and footnote reports. A List Manager for organization. And PeachLink,™ the software that links your PCs to the mainframe.

This mainframe-to-micro technology is also available in two other packages: Administrative Peachpak, which includes comprehensive word processing functions. And Graphics Peachpak, for color graphs and charts.

All include PeachLink.™ And all are backed by the service and support MSA is so famous for.

This revolutionary new link means you can now deal with one software company that supplies all the advanced mainframe systems your company needs. All the software for your personal computers through our Peachtree Software Company. And the software that links them together.

Talk to MSA about new Executive Peachpak II. And see how much more you could be getting from your mainframe. Call Robert Carpenter at (404) 239-2000. Or write to Management Science America, Inc.; 3445 Peachtree Road, N.E., Atlanta, Georgia 30326.

MSA
The Software Company

Only MSA makes the mainframe link to personal computers this productive

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Mini Compiles Marathon Results in Record Time

By David Myers
CW New York Bureau

NEW YORK — For Rod Dixon and Grete Weitz, winners of the 14th New York City Marathon last week, the 26.2-mile road race lasted less than two and a half hours.

But for race officials, herding runners through the finish chutes, ripping off their bar-code identification numbers, feeding information to "the Official Computer of the New York City Marathon" and mailing out postcards to the 17,000 runners showing their time and place of finish, the long, rainy race day did not end until after midnight.

By any measure that is a long day. However, in the first 13 New York City marathons, the final tabulation of results and the notifications to participants took anywhere from three days to a week.

Last week, the New York Road Runners Club, sponsor of the marathon, used a minicomputer for the first time to process all the raw data from the race.

The result? Within hours of finishing, the 17,000 runners — 2,850 of them women — all knew exactly where they had finished overall, where they had placed by age and by sex and how fast they had run.

The minicomputer used by the Road Runners Club to track the marathoners was a $300,000 Qantel Corp. System 64 linked to two high-speed printers donated by its maker, MDS Qantel, Inc., a Mohawk Data Sciences Corp. company.

"What did we have to agree to to get it?" asked Fred Lebow, president of the New York Road Runners. "We promised to call it the Official Computer of the New York City Marathon. But look, Qantel is getting

(Continued on Page 34)

Wide World Photo

More than 17,000 runners surge across the Verrazano-Narrows Bridge from Staten Island into Brooklyn at the beginning of the New York City Marathon.

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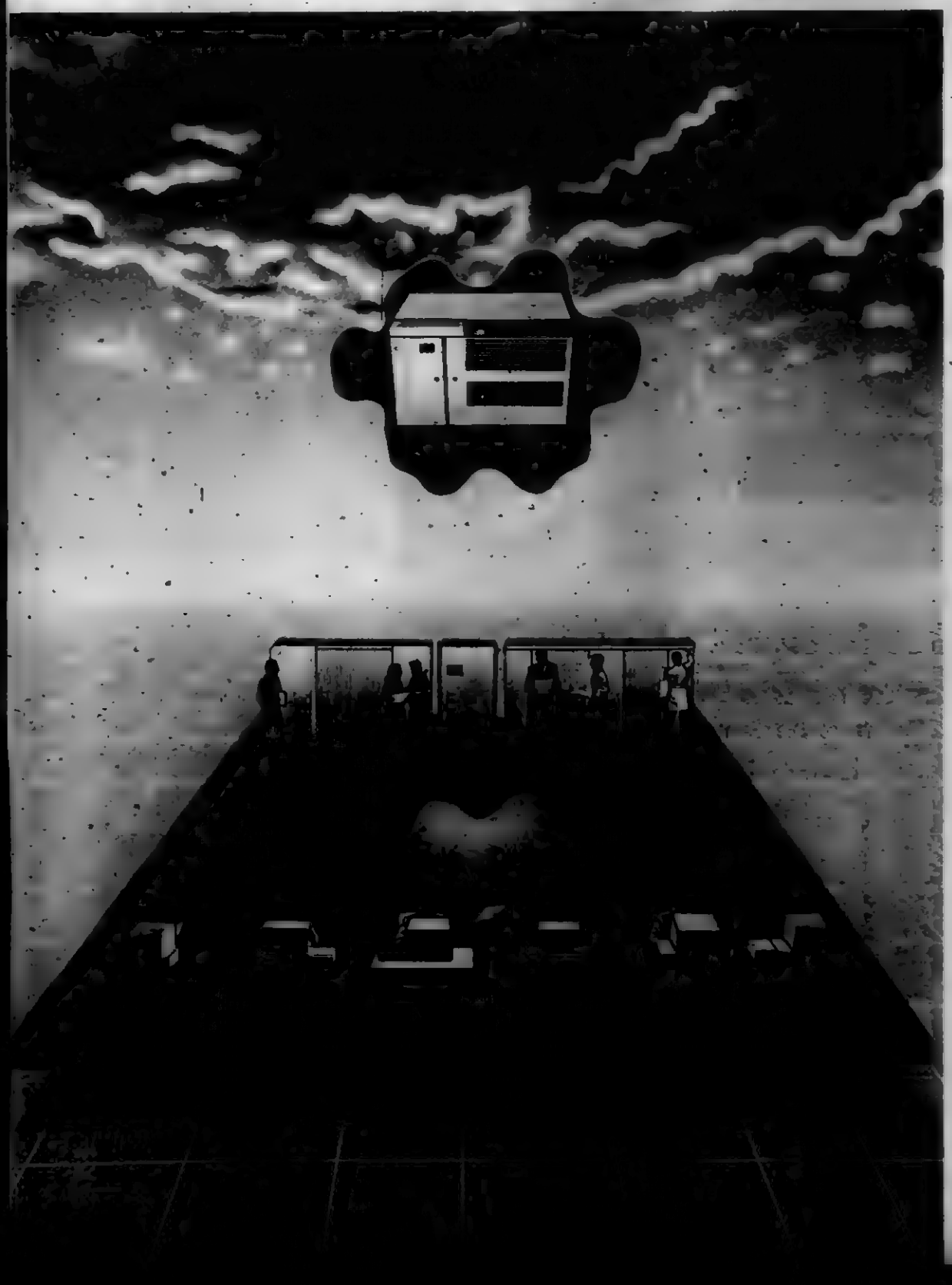
It turns backlog into a quaint, old-fashioned notion.

Now you can demolish that backlog and save a lot on development costs. Just put the DIALOGIC/ONE™ MidFrame System between your mainframe and your interactive development programmers.

The high-performance MidFrame provides a turnkey development solution that's unprecedented. Users get much more done. In less time. Because the MidFrame delivers consistent subsecond response time. What's more, it gives MVS/TSO development programmers advanced interactive processing facilities never before seen in mainframe shops. Things like knowledge-based editors that "know" just what to do. Without being told!



The smart COBOL editor includes automatic syntax checking. Cross-referencing. Formatting. Scanning. Zooming. And more.

There are compound search functions. Undo/redo, too. A powerful, consistent command language that's easily expanded. Plus sophisticated window management—with multiple split screens—for processing and tracking multiple concurrent activities.

Nothing to lose but TSO overhead. The MidFrame employs a unique layered approach that distributes functions while integrating them thoroughly and transparently into the MVS/TSO environment. Thus, data integrity, security and ease of use are assured.

All TSO facilities and MVS data sets/files are accessed via an ISPF-like editor that requires virtually no retraining. All other VTAM applications are available in passthrough mode.

While the highly reliable MidFrame is peerless as a development machine, it's also an uncommonly cost-effective alternative to CPU upgrades. That's because you can offload up to half of your interactive program development workload to the MidFrame.

Designed to keep pace with emerging technologies, the MidFrame lets you grow without penalty. Just add functions, users or more hardware power as needed.

Call or write for complete information: Dialogic Systems Corporation 1335 Bordeaux Drive, Sunnyvale, CA 94089 (408) 745-1300. Continental U.S.: (800) 831-8011. *California: (800) 227-1445.*

Bringing mainframes into the mainstream.

DIALOGIC SYSTEMS

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Bay Area Dama Chapter Moves Toward Nationwide Status

SAN FRANCISCO — A professional association with a special interest in corporate data administration has taken the first step toward accomplishing its long-term goal of evolving from a regional to a nationwide organization.

The Data Administration Management Association (Dama), which in the past has confined its activities exclusively to the Los Angeles area, has now established its first formal presence in northern California.

On Oct. 14, about a dozen local computing professionals gathered here in the Bank of America's world headquarters to attend the premier meeting of Dama's emerging Bay Area chapter.

With the advent of its Bay Area chapter, Dama now boasts two main bases of operation: one centered here and the other in Los Angeles, where the association originated about three years ago.

A third such chapter is expected to come into existence "within the next few months" in Seattle, according to David Schryver, immediate past president and current secretary of Dama's southern California branch.

Schryver also foresees the eventual formation of even more Dama chapters in cities like Phoenix and Sacramento, Calif.

Founded in 1980, Dama aims to advance the emerging field of data administration by providing its members with a forum for exchanging professionally useful information.

More information about Dama's Bay Area chapter can be obtained from Gwenn Davis, Bank of America, Suite 304, 315 Montgomery St., San Francisco, Calif. 94104.

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More and more people are finding it easy to make friends with our TRS-80 Model 100 portable computer. Maybe it's things like a full-size keyboard, a built-in modem and an 8-line by 40-character display. Or is it? *Byte* magazine said, "On top of the impressive collection of hardware that makes up the Model 100 is an equally impressive collection of software." Indeed, the TRS-80 Model 100 is the *only* computer with five built-in programs. Use it as a personal word processor, address book, appointment calendar, telephone auto-dialer and communications terminal.

And *Basic Computing* says Model 100's BASIC language "... gives perhaps the most accurate transcendental mathematical functions in any computer." In its May, 1983 issue, *Money* magazine said "... the Model 100 is so packed with goodies that it could well become the machine of the year. Just the fact that someone who knows absolutely nothing about computers can sit down ... and in less than 10 minutes be writing letters on it puts it in a class all its own." Read enough? Then get your own TRS-80 Model 100 at your nearest Radio Shack Computer Center or participating store or dealer!

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Marathon's Mini Beats the Clock

(Continued from Page 32)

something out of it too. You've got 17,000 runners in the marathon, most of them upper middle class, most of them professionals. They are people who buy computers."

Luckily for them, though, Bruce Heifetz and Pamela and Bert Gold had taken care of things before Mayor Ed Koch had even fired the cannon, starting the runners across the Verrazano-Narrows Bridge. Heifetz and the Golds run HBG Systems, a Valley Stream, N.Y.-based company which developed the software for the marathon under contract to Qantel.

Procedure for System

When a runner crosses the finish line, a race official records his time. The runner is then steered down a chute by a volunteer who keeps him in the order of his finish and then rips off the bar-code identification number.

The bar-code numbers are gathered into batches and sent to the trailer housing the computer to be scanned by hand via a Computer Identics Corp. FCP22A scanner.

Meanwhile, a select timer punches in as many of the runners' shirt numbers as he can enter. The entries are then compared to the bar-code batches to make sure everything is in the right order, and then the computer takes over.

It's still not as fast as Heifetz, operations manager the day of the race, would like. "We're still relying mostly on people," he said. "That's the unfortunate part."

The hang-up is in the scanners, Heifetz explained. "There is no optical scanner we know of that will handle 180 runners a minute. If there were, we could just attach a bar-code tag to their sneakers," he said.

A week before the marathon, a five-mile race was conducted to test the computer. Most of the 1,983 runners had finished in 45 minutes. But less than 400 participants had been scanned by then. "Man the scanners!" came the message from the computer.

The Qantel System 64 can support up to 100 terminals. It runs a proprietary Qantel operating system.

Qantel donated the system as part of its "big push into sports," a Qantel spokesman said. The company's equipment has been bought by the National Basketball Association's administrative offices, as well as by 14 National Football League teams, he said.

For the New York Road Runners, meanwhile, the computer will serve as more than just a race-day tool. Lebow explained that the club is using the System 64 to compile a data base of the world's best runners and their best times.

"Every marathoner who runs under 2 [hours] 20 [minutes], every miler who runs a sub 3:55, every woman who finishes a marathon in under three hours will be kept track of. The times will be completely up-to-date," Lebow said with pride.

As of last week, the names of Rod Dixon (2:08:59) and Grete Weitz (2:27:00) were added near the top of the Road Runners' marathon lists.

TSO Emulation Aids Conversion

User Moves From VSE to OS1 in Four Weeks

RENO, Nev. — For Computing Resources, Inc. (CRI), the time had come to switch operating systems on the company's IBM mainframe.

However, as provider of phone-in payroll services for some of the nation's largest banks, CRI could ill afford a lengthy delay during its recent conversion from the DOS/VSE operating system to OS/VS1 on its IBM 4331 processor. So it set a four-week deadline.

It was not the first conversion for CRI, which supports over 1,200 payrolls for customers such as the Wells Fargo Bank in California, the nation's 11th largest bank. CRI began operating in 1978 when it purchased the assets of Control Data Corp.'s local service bureau branch. CRI got all the branch's DP equipment and applications software and purchased time on a CDC 6400 mainframe.

But the company decided to switch to IBM. "We felt that all our current customers were really IBM-oriented and the same was true for the people we hoped to do business with in the future. It seemed reasonable that offering IBM compatibility would definitely be an advantage," explained Vice-President Harry Hart, who is also in charge of data processing.

After considering everything from an IBM 360/65 to an IPL Systems, Inc. machine, the company settled on the 4331 as "absolutely the best deal we could have gotten," Hart said. CRI decided to run in the DOS/VSE environment because VSE seemed to minimize the difficulties involved in converting from the CDC operating system (Kronos 2.1).

Not All They Expected

However, DOS/VSE was not everything CRI expected. "The CDC system we had when we first bought out the service bureau had a very sophisticated operating system. DOS/VSE was very pale in comparison," Hart said.

The firm then looked to an OS/VS1 conversion as a means of getting the capabilities to which it was accustomed. Before actually committing to the conversion, however, CRI personnel researched software enhancements to VSE that might have helped that operating system meet their needs without a costly change.

"When we added up all the prices for DOS system software, it came to a lot of money," Hart said. "And when it was all done, it would still be DOS/VSE."

CRI decided to switch to OS/VS1, Hart recalled, despite the strong disapproval of local IBM representatives, who thought CRI would not be capable of supporting OS/VS1 on the 4331 and that the firm would be unable to perform the conversion in the time it had set aside for the task.

Hart had his own conversion concerns. "VS1 is oriented to a punched-card reader setup, and we had removed our card readers two years earlier. We needed some way to submit and run jobs in VS1 without a punched-card reader. Also, we weren't able to perform the sysgen for the new operating system on our equipment because we needed a card reader for that also."

VS1 also lacked on-line programming support similar to that provided by IBM's TSO.

After exploring a number of options, CRI turned to Tone Software Corp.'s Tone 3 software which, in combination with VS1, emulates TSO. Thus, Tone 3 offered the necessary programming support and allowed CRI to make use of a variety of other software packages that run with TSO.

Tone 3 also features an "internal reader" capability that enables a user to submit input via terminals rather than through a punched-card reader.

"What's more," Hart said, "the Tone people did the sysgen for us with their hardware in Anaheim [Calif.]. I had been searching around trying to find someplace with the equipment I needed to do the conversion. I was really losing sleep over it. But with their help, we got the system up in just four weeks."

In addition, Tone 3 gives CRI a path to MVS. "We decided against the MVS operating system [during the conversion] because the additional cost of a larger computer, more software and the complexity of maintaining an MVS system just weren't worthwhile. But be-

(Continued on Page 36)

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Mini Roots Agricultural Firm's Distributed Net

MINNEAPOLIS — Succeeding in the commodities business takes more than silos and railroad cars. For one firm based here, computerization is taking an increasingly important role.

Cargill, Inc. buys, stores, transports and sells agricultural and other bulk commodities on a worldwide basis. "The environment in this business, with its sharp swings in supply and demand, rapid price fluctuations and low margins, is dynamic," observed Gene D. Gross, assistant vice-president to the data processing department.

"We rely on computer technology to help us keep up with it. Our computer systems must promote efficiency and productivity in operations to hold costs down and also ensure the ready availability of fresh, accurate information critical to effective decision-making at all levels of management."

IBM's Series/1 minicomputer has become a key element in Cargill's large-scale, data processing capability. More than 100 Series/1s are now deployed in a wide-reaching distributed system serving mainly those company divisions dealing with farm products. The Series/1s handle heavy processing work loads at company offices and facilities around the country and also communicate with Cargill's IBM 3081 host processor located at the firm's headquarters here. "We turned to the IBM Series/1s as anchor units in our distributed system for several reasons," Gross said.

Versatility Cited

"We needed versatile processing and storage capacity because of the large transaction volumes at our remote offices. We had to have communications capability for swift interchange of information between remote locations and headquarters."

Cargill's Commodity Marketing Division is a major user of the Series/1, with 50 included in the network. "We plan to install another 18 Series/1s this year," said Michael K. McNamara, the division's DP manager.

The Commodity Marketing Division buys food and feed grains and oilseeds from producers, local cooperatives and country elevators; assembles bulk quantities in company elevators and port storage facilities; and ships to customers throughout the U.S. and around the world. A typical office handles hundreds of transactions a day, McNamara said.

The local Series/1 functions as a comprehensive back-office support system, similar to that of a commodities broker. Full details of all buy/sell transactions are entered into the processors via on-line terminals. The system sets up its own local data base records, then tracks each transaction from start to finish, according to McNamara.

As buy/sell transaction data is entered into the system at the local office, the Series/1 extracts and transmits data to the host 3081. The 3081 accepts the transmissions continuously from the local processors and initiates cycle processing of related data from all offices on-line to update its own master data base files. Later, the host transmits back invoice data, control and summary report data and management report data from printing by the local Series/1s, McNamara noted.

"The Series/1 network helps Cargill accomplish what must be accomplished to enable the company to buy and sell effectively, and to handle efficiently the many in-between steps that bring the commodity producer and the commodity consumer together in a mutually favorable transaction," Gross said.

Cargill's oilseed and milling operations also benefit from the distributed Series/1 system. Series/1s are in place now at 15 oilseed crushing plants, at 10 flour mills and at three corn milling plants, explained Carol Kowing, DP manager for milling and oilseed operations.

The soybean facilities, which also buy from many producer sources, crush the soybean meal, which is a primary ingredient in animal feeds. The local Series/1 also functions here as a support system, handling all accounts, tracking all buy/sell transactions and communicating with the host 3081.

A Productivity Boost

"Our group's activities also produce heavy clerical work loads which the local computers now quickly handle, boosting productivity and reducing processing costs," Kowing said.

Cargill, its subsidiaries and affiliates have more than 700 plants and offices in 48 countries, employing about 40,000 people.

In addition to more than 100 Series/1s, the firm's configuration includes a 3081, several System 370/168 mainframes, seven IBM mid-range 4300 Series processors, five IBM System/38 processors, 28 System/34 processors, three System/23 processors, five IBM 8100 distributed processing systems and 80 IBM Personal Computers.

Package Speeds Switch to OS/VS1

(Continued from Page 35)

cause Tone 3 is compatible with MVS TSO, many packages designed to run under TSO can now run on our current VS1 system."

Further, the combination of the Tone 3 package and OS/VS1 has resulted in a marked throughput improvement for CRI. "Had we kept DOS/VSE, we would have had to hire another person to fool with the system or we would have fallen behind in meeting customer needs," Hart said. "Because we did not want to hire more programmers, we had to enhance our system and improve our productivity. The most amazing thing is we have actually increased our throughput by approximately 20%."

Also, "we used to have Power/VSE problems about once a week under DOS/VSE, which would hang the system. We'd have to shut the system down and bring it back up," Hart maintained. "We haven't had a system hang of any sort since we began running Tone 3 and OS/VS1."

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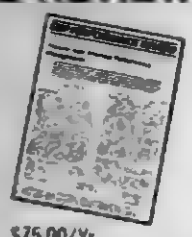

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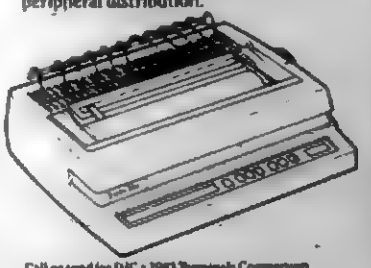

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Firm Levels Multivendor Barrier With WP Tools

INDIANAPOLIS — Incompatibility due to a multivendor environment was a major barrier for a coal producer which wanted to improve communications among nine mines in Indiana, Illinois and Wyoming and its central office here.

"We had several different types of stand-alone equipment for word processing, and it was impossible to transfer information from one type to another," recalled Joseph Rosio, director of information services for Amax Coal, the third largest coal producer in the U.S.

"Our people weren't communicating and we were running out of space to store documents. We also needed to establish some centralized control over costs," Rosio said.

During a five-year period, Amax Coal evaluated numerous hardware solutions and found that programming was required to allow communications between different types of equipment. And there was no guarantee that the resulting word processing environment would be effective.

Word Processing

Two years ago, Amax Coal acquired Applied Data Research Inc.'s ADR/ETC software for interactive word processing on its existing IBM mainframe computer network and later added ADR/Email for electronic mail. Communications improved practically overnight, according to company employees.

"ETC simplified communications so dramatically that it saved us five times what it cost us in its first year of operation," Rosio said. "It allowed us to do more work with fewer people. In areas where we already had IBM terminals, there were no additional start-up costs, other than perhaps a letter-quality printer. Our secretarial and administrative staffs think of it as a stand-alone word processor."

ETC has allowed Amax Coal to standardize manuals and proposals, stabilize reporting procedures and update information throughout the organization.

Among its features are the ability to create standard headings and footings, sorted lists, table of contents, indexes and footnotes, along with its archival, retrieval, and arithmetic calculation capabilities. Tables and charts that had taken several days to compile have been generated in minutes.

According to Vera Hite, supervisor of word processing, "There are several hundred pages in a mine permit. ETC allows us to enter data and update information faster and easier than before."

In 1982, Amax Coal took another step along the road to improved communications. It became the first user of ADR/Email, electronic mail software that tied into Amax's IBM 4341 II computer under OS/MVS without requiring additional storage space.

With its English commands and terminology common to routine office procedures, Email was popular among middle-level managers who otherwise would not have used a computer terminal, a company spokesman said. Messages that often took five days to reach intended recipients now took a matter of seconds.

According to James Kotschwar, warehouse supervisor for the Ayshire Mine in Chandler, Ind., "I can type a message on a terminal and sent it out in as little time as making a phone call and then go about with what I'm doing. You often have to make several calls before reaching the intended party. This cuts down on communications costs and provides me with quick and easy information."

Email has also dramatically reduced the flow of paperwork. "You can get on more distribution lists than you know what to do with," Rosio said. "With Email, you can browse through your inbox electronically and sort out what you want to read first. You can make a hard copy if you want or simply delete the messages after reading it. It's a much faster and efficient way of communicating."

New Western Union Service Helps Corporate Planners Arrange Meetings

DALLAS — Western Union Corp. has created a data base network that it hopes will take the drudgery out of planning for meetings by making it possible to arrange every detail — from air travel to hotel accommodations — with one telephone call.

Under the system, appropriately dubbed One Call, a meeting planner calls Western Union's Travel Industry Services, Inc. based here. Terminal input operators take down the meeting requirements, such as air travel, hotel accommodations and ground transportation, and enter them into a data base that is currently accessed by more than 200 travel industry suppliers.

Those suppliers, who represent many of the nation's largest hotel chains, airlines and car rental agencies, then enter bids for providing the necessary services. The bids are compiled by the Travel Industry staff and sent to the meeting planner via a Western Union Mailgram. The planner can then choose among the bids and finalize the arrangements directly with the suppliers.

Suppliers are charged a monthly fee ranging between $70 and $150; they also pay a fee ranging from $25 to $75 for each successful bid. The meeting planners are required to pay a one-time $75 fee to create a permanent file in the data base and are charged between $10 and $25 for each meeting listed on One Call.

At the core of the One Call system is a fault-tolerant system, a 2M-byte Tandem Computers, Inc. Nonstop II. Some 18 suppliers, spread across the country, are equipped with Tandem terminals for direct telephone access to the data base. The others access One Call via a Telex system or through 3M Corp.'s Whisper Writer desktop printers with 8K-byte memory. Those secondary systems are tied to One Call through Western Union's Easylink network.

One Call became available in early September, and since that time approximately 125 meetings have been arranged through the system, according to Travel Industry Services President John F. Richard.

One Call is already available to meeting planners within the entire U.S. and much of the Caribbean region. "In our original business plan, we were shooting for 30 suppliers by the end of 1983," Richard said. "We're well over 200 already, and we're beginning to offer One Call to independent hotels in addition to the major chains we've already targeted. We could easily end up with 1,000 suppliers by year's end. The response by meeting planners has been equally positive."

Richard said the system cost just under $1 million to implement; marketing costs for One Call have been "considerably in excess of that." The project was conceived in 1982, and marketing to suppliers began last April.

According to Richard, One Call was created to take advantage of the technology Western Union already had in place. "Western Union spent well over $1 billion between 1970 and 1978 developing physical capabilities such as satellites, microwave networks and sophisticated switching equipment. The networks were in place, so we began to focus on product development. There was a definite attitude of 'let's find new products to take advantage of our equipment.' The whole travel industry exploded because of technology, so this technology is a natural fit.

"This is a natural for us," Richard continued. "We already have an extensive communications network in place that we can use at a minimum cost. We also have a very strong marketing system. Also, Western Union is not a travel industry. We are totally disinterested in the outcome of the bidding process. No travel-related industry, such as one of the hotel chains or airlines, could do this. Eastern Airlines, for example, would not feel comfortable bidding within a system operated by American Airlines."

Directory Lists Service Firms

PALMYRA, N.J. — The recently released "Independent Service Directory" provides information on some 262 independent service companies offering computer equipment services.

The directory provides an alphabetical listing by company name of firms providing service of computers; peripheral, communications and office automation equipment; and systems or applications software.

The book also contains a geographic index by state of companies providing on-site services in those states.

Priced at $19.95, the publication is available from the Service Research Group through P.O. Box 335, Palmyra, N.J. 08065.

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N.Y. Transit Authority Dispatches Inventory Headaches With System

NEW YORK — Did you ever wonder what happens to all the buses on a rainy Friday night in New York City?

Thanks to a newly installed computer system, officials at the New York Transit Authority say they can offer an answer with the push of a button. And if you want to know how many spark plugs or windshield wipers the authority has in stock, that can be accomplished too. So can a maintenance history of each bus in the city's fleet.

The Transit Authority installed five IBM System/38 processors, along with 104 remote terminals at depots and maintenance yards throughout the city. The system, which was installed about a year ago, keeps tabs on the inventory and maintenance needs of one of the world's largest public transit systems.

Vincent Pontillo, superintendent of maintenance operations for the city's bus system, is responsible for maintaining over 4,000 buses that transport millions of New Yorkers every day.

"The whole job used to be done manually. I used to call every depot every morning to find out how many buses were down. Now, every foreman in every depot plugs this information into the system. It's on-line; I have it immediately," Pontillo said.

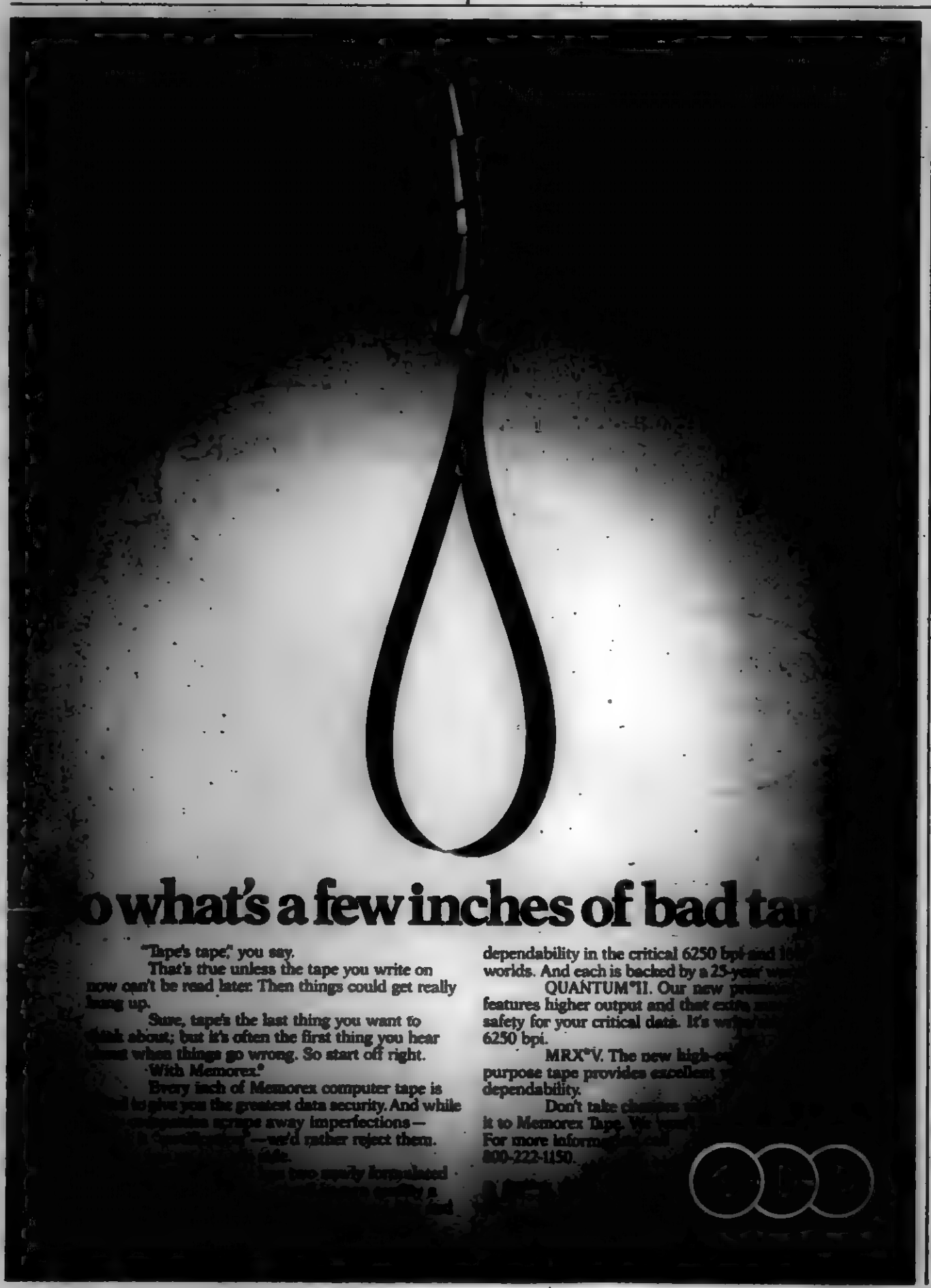
"I used to run surveys," Pontillo added, asking "how many right-side mirrors are missing? How many fare boxes are broken? I'd put three or four guys on these surveys, and it would take them forever. Now, it's all in the system. I have more accurate information, and it takes fewer man-hours to get it."

The Transit Authority is also able to identify fleet defects quickly, he noted, citing the case of the "cyclops bus" — new buses that had only one working headlight. With the computer data at his disposal, Pontillo was able to prove that more than 20% of the buses had defective headlights. "When a defect shows up in more than 20% of a new fleet," Pontillo said, "it's the manufacturer's responsibility, not ours, to repair it at considerable savings to the Transit Authority and its patrons."

Charles Casano, the Transit Authority's assistant supervisor of the East New York Base Shop in Brooklyn, said there may be greater benefits to using the system in the future.

"We already know more about the buses we're servicing now than we used to. But in the future, we'll be able to do things like track the fuel consumption of each bus, improve mileage and fuel efficiency and save our riders money," Casano said.

As more System/38s and more remote terminals come on-line (six more System/38s and 450 terminals are being sought), the opportunities for better fleet management will become even greater. Managers will be able to track major repetitive problems and seek long-term solutions. Scheduling will improve. So will development of man power. Ultimately, the Transit Authority is confident that through automation, it will overcome "problems in image and performance."



Package Enables Insurer to Manage Policy Data

COLUMBIA, S.C. — Storing information for 1½ million policies as efficiently as possible and protecting the data from loss and unauthorized access is a task that the data processing department at a growing insurance company here has accomplished with software.

In pursuit of aggressive growth goals, Colonial Life Insurance Co.'s DP needs burgeoned. "Today our policy master files alone take up three of our 32 [IBM] direct-access storage device [Dasd] drives," noted Randy Barnett, systems programmer and security administrator.

For Dasd space management, Colonial Life's DP department acquired Pac/Master from CGA Software Products Group, Inc. of Holmdel, N.J., in June 1980. The software assists Colonial Life programmers in transferring to tape on a daily basis 30-day-old data and temporary data that are no longer needed.

Weekly, all partitioned data sets are compressed automatically. "Pac/Master has definitely saved space by condensing the data," Barnett said. "That means a cost savings in disk drives."

Protecting the Data

In addition to storing the data, the company also had to address the problem of protecting the stored information. "To lose even some of that information or our ability to process it would cost us quite a bit," Barnett said.

Colonial Life's physical security precautions include surveillance cameras, security personnel, badges and agreements with other data centers to keep information backup.

One concern in selecting a software security product, Barnett said, was that it should be able to handle every aspect of security for all systems, from various on-line systems to different vendors' software packages. "It had to be flexible so that any decision we made one day could be changed at a later time," he added, explaining that Colonial Life is currently converting from an IBM 3033 mainframe to an IBM 3091G. "For example, we recently replaced CICS with IBM's IMS. Because we're installing it in phases, we must be able to build the security on what's already there."

CGA's Top Secret package was selected and was installed in October 1981. Barnett said Colonial Life obtained the package during its early production stage and was able to work with CGA to build in enhancements.

Top Secret uses the security interface built into MVS. No changes to the operating system are made, so compatibility with other MVS-related software is assured, Barnett said.

"We'll use these interfaces to check authorization for a user to update a specific record in a data base," he observed. "For example, a user will be able to read a data base, but only update those parts he's authorized to update."

Colonial Life has 250 IMS terminals spread throughout two buildings. "Initially we used a package which secured only TSO. It was very difficult to modify because it required an initial program load. Top Secret can be used across our entire system. We currently use the product for IMS, TSO and batch security," Barnett explained.

Top Secret's gradual implementation allowed Colonial Life to secure the essential applications while defining the other systems. In dormant mode, Top Secret was installed, but it did not actively control access. The warn mode was set up not to warn the users, but to enable Barnett to test his definitions. By checking his daily reports, he could determine if each violation was a true violation or a definition error; this allowed him to refine his security file without arousing users.

Colonial Life then moved to the fail mode, where access to unauthorized files is denied and the administrator is made aware of the violation.

"Top Secret is efficient," Barnett said. "It's not necessary to write a lot of exits which take up programmers' time and resources, where you end up doing a lot of work to get something out of it."

Meet to Target Sperry 1100 User

WASHINGTON, D.C. — The First Annual 1100 Data Center Management Conference will be held Nov. 2-4 at the Crystal City Hyatt here. The conference will be of special interest to DP directors, managers of computer operations and management personnel of large and small Sperry Corp. Sperry 1100 sites, according to the conference sponsor, Datametrics Systems Corp.

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Package-Micro Duo Speeds Firms' Data Access

Armed with personal computers, two small businesses are taking advantage of an innovative software package to boost productivity and remain profitable in a tight economy.

David Pratt, manager of the Pratt-Younglove Employment Agency in Sioux City, Iowa, said that since purchasing his Apple Computer, Inc. Apple II microcomputer and PFS:File software from Software Publishing Corp. of Mountain View, Calif., last year, the company has been able to match applicants with job openings five times faster than before.

"The economic slowdown has made jobs more scarce, which means our agency needed to increase its efficiency and effectiveness to compensate for the reduced placement opportunities," Pratt said. The company uses the Apple/PFS system to maintain active files on some 15,000 job hunters from six states. Before Pratt purchased the microcomputer and software, he had to search through a mass of applicant files to come up with a match each time a job opening became available. With the PFS system, he can generate a list of qualified applicants in just minutes.

Pratt said the PFS:File package works like an electronic index card filing system and enables the user to custom design file forms. His form employs a coding of each applicant by, among other things, years of experience, current salary, skills, education and the government's Standard Industrial Code (SIC) for the particular profession.

"With this system, our agency can find applicants best suited to a specific job. For example, an employer's job order may call for a project engineer with a master's degree, four years of experience and salary requirements of no more than $35,000 a year. We simply key in the appropriate skill, degree and SIC codes, enter 'greater than three' for experience level and 'less than 36' for asking salary. Then the computer will search through these groups and list the qualified applicants on the screen."

Along with prospective candidates, the company codes all employer job orders by SIC category and stores them on the system. When a new resume is received, Pratt can search PFS for unfilled job orders suited to the applicant's qualifications.

He chose the PFS package because other software systems he reviewed could search only one file at a time. Further, he maintained the Apple/PFS combination has alleviated his fear of computers. "PFS has been easy to learn and use, plus it's foolproof. Working with the software has been therapy for me during these slow business times."

Auto Repair Applications

Pratt is not alone in his approval of the PFS:File package. Craig Sherman, owner of Craig's Car Center in Madison, Wis., started using the Apple/PFS combination last year and has already stored nearly 2,000 files recording such transactions as tire sales and repair work.

"We designed a form that allows us to file by customer name and to cross-reference those names by vehicle type for customers with more than one car. We record each invoice with information about the type of repair work done, the mechanic involved and when the repair was done. If a customer has a question, we can call up the file and provide the answer," Sherman said.

Before installing the software on his Apple II + microcomputer, Sherman had to dig through stacks of old invoices whenever a customer requested information, and even then he was unable to provide the invoice transaction number or the repair date.

"PFS makes it much faster and easier to access a file. When someone telephones and wants to know when we last aligned his car, for example, I can pull that information on the screen immediately. It increases my efficiency and enhances the customer's satisfaction; that can only lead to repeat business," Sherman said.

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Local Net Keeps School Bus Maker on MRP Road

FORT VALLEY, Ga. — In the early part of this century, school buses were constructed almost entirely of wood. But they did not last long on the wet dirt roads that dominated most of the country's rural areas.

A. L. Luce, founder of the Blue Bird Body Co., had an idea for constructing a sturdier and more reliable bus — one that would survive the wear and tear of the rugged Georgia countryside. Originally the owner of a Ford agency in Perry, Ga., Luce was able to fabricate an all-steel bus body and mount it on a Model T chassis in his Ford garage.

As the news of his innovative achievement spread, Luce soon found himself in the business of building buses. Today, Blue Bird Body Co. is the leading manufacturer of school buses in the U.S.

Production activities of Blue Bird over the past decade have grown dramatically — it currently operates several assembly plants, and the company's product line has grown to include small shuttle buses, large transit buses, city passenger buses, luxury motor homes and the familiar yellow school bus. The company credits its continued growth partly to the real-time processing power provided by a Datapoint Corp. Attached Resource Computer (ARC) local-area network, that has been in place since 1976.

According to Blue Bird, the biggest benefit of the ARC local network is reflected in its production ability. The company has been able to increase the number of buses built without a proportional increase in inventory investment.

George Will, DP director for Blue Bird, recalled that the company began using computers in 1970. Later, the need for real-time tracking prompted Blue Bird to look at various computer offerings. Initially, the company wanted to update the mainframe then in use, but decided it would be too expensive.

It settled on an alternative: real-time processing power with a less expensive Datapoint 5500 minicomputer that could share processing with the existing IBM 370/135.

According to Tom Morroill, a programmer at Blue Bird, in 1975 the company decided to implement a materials requirement plan (MRP) — a move that necessitated augmenting its IBM 370. Blue Bird decided to augment the system with Datapoint equipment consisting of two file processors, eight applications processors connected to the network and four 70M-byte hard disk drives. The applications processors have eight to 16 CRT terminals connected to them.

As more and more of the applications originally assigned to the mainframe were put to the test on the Datapoint equipment, the power of the ARC local-area network became evident.

"The move began with our inventory control system," Will noted. "We took the whole inventory, including all materials movement, and switched it from a batch-type operation to real-time processing on Datapoint equipment. This enabled us to track parts from the initial setup to completion of the part and its movement to the warehouse."

By 1978, the company was using the Datapoint ARC local-area network as the primary real-time computer system. "At that time, the ARC local network was far ahead of anyone else in the field," Will said. "Datapoint equipment is also used in our branch plants in Iowa, Virginia and Canada. It enables us to maintain a corporate materials requirement plan — a very effective tool in our industry."

Because the ARC local-area network provides shared resources throughout the company, all offices have access to a total inventory plan, making it possible to know what has been shipped and what is on back order. It plays a key role in keeping branch assembly plants operating with a minimal amount of inventory.

Today the company has installed 10 Datapoint processors: Datapoint 600s, 6600s and 6000s, along with 60 Datapoint CRT terminals consisting of Model 3600s and 8200s.

According to Will, the dependability of the ARC network allows the company to handle numerous tasks involving over 1,000 applications programs, which include inventory control, shop floor control, payroll and data gathering and editing, which is then fed to the mainframe via magnetic tape.

"Our current Datapoint system is a vital part of our data processing needs today," Will noted. "Demands made on our ARC system are much more rigorous than on the mainframe. We can afford to have the mainframe go down for a few hours, but we can't afford that with our ARC local network."

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Handles OA Applications

Supermicro Eases End-User Tasks at PR Agency

SAN JOSE, Calif. — Three years ago Franson & Associates, a public relations firm here in Silicon Valley, had three employees and one small personal computer.

Today, the company has grown some 1,000% to reach its current staff of 30 and has expanded its client roster from three to 25 accounts. Committed to productivity through office automation, the agency recently installed a multiuser, multiprocessor microcomputer.

With the new system, employees can write their own memos, letters and articles, update mailing lists and make final revisions on news releases and articles from their desks.

The agency had been upgrading its office automation system continuously to keep pace with its growing client and employee roster. Before the multiuser system was purchased, the agency used three nonnetworked microcomputer systems, each equipped to communicate with four users. But by early spring of this year, several problems with the configuration of the computer system surfaced.

"The most obvious problem was that we were running out of terminals for employees," said Paul Franson, president of the firm. A more subtle but no less frustrating discovery was that when all four users were on one computer, the entire system would slow down significantly, he added.

Moreover, because the three computers were not networked, diskettes had to be changed physically when data was exchanged between computer systems, adding further delay to everyone's productivity. "It always seemed we were just one system behind what we needed," Franson said.

Last spring, the company's management researched a number of alternative office automation solutions. The agency chose a multiuser, multiprocessor supermicro system that would not degrade in power as more users were added to the system. The system, a Supermicro 32 from Molecular Computer, Inc. of San Jose, Calif., is geared specifically to users in small to medium-size companies as well as departments in large organizations. The multiprocessor configuration reduces performance degradation, a problem associated with shared-logic computer systems such as minicomputers.

After acquiring the Supermicro 32, the agency first networked 16 users. As growth continued, Franson linked all 30 employees to the system. "We chose the Molecular system because it provided our company with an incremental solution," Franson observed.

Since installing the Molecular system, the agency has implemented an electronic mail service, enhanced its word processing and accounting packages and expanded its mailing list programs.

The cost per user of the system, including the computer and application processor boards designed with a dedicated microprocessor for each user, was less than $2,000, Franson said.

Four printers are connected to the system. Two are used for letter-quality printing, with one dot matrix printer for spreadsheets and another for rough-draft printing.

Each office is equipped with RJ-11 modular telephone jacks connected via a patch panel to the computer system. These jacks make it possible to move any terminal to any office. The terminals are Wyse Technology, Inc. Model 100s, sold by Molecular as MT-100s, Franson said.

An OZ 212 modem from Tri-Data Products, Inc. is linked to the system to allow employees to use terminals at home or on business trips, to access external data bases and to communicate to clients and publications.

The employees at Franson & Associates are happy with the new system. According to business manager Chris Soden, who uses a spreadsheet program daily, the difference is enormous. "When three other people were on the old system, I used to wait up to 20 seconds for the computer to recalculate columns," she said. "With our new system, I don't have to wait more than a second."

Stevan Leonard, a Franson computer specialist, noted that a collision detection method is built into the Molecular system to reduce overhead automatically. A Zilog, Inc. Z80-based central file processor that handles all I/O is located within a local-area network in a box.

As more users are added to the system, additional application processor boards are simply inserted into the back of the system cabinet to provide each user with a dedicated microprocessor.

In addition, Molecular's N/Star operating system performs tasks independently on each user's terminal. Because the Supermicro 32 is configured as a local-area network in a box with the high-speed M/Bus interprocessor link rather than as a network linked with coaxial cable, the response time for each terminal is faster, Leonard said.

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Anticipating DP Execs' Concern

IBM Adds Two Classes to Institute

NEW YORK — Apparently anticipating some concern among DP executives about how to manage mainframe and microcomputer resources, IBM has added two courses — "Managing Personal Computing" and "User Computing: Planning for Productivity" — to its Systems Management Institute courses.

"Managing Personal Computing" is a 2½-day course for the information systems executive. Developed to provide a background in nontraditional ways of delivering computer processing capabilities to the end user, it will also deal with implementation and management control issues.

The course, whose code is W9944, will be given Dec. 12 in Chicago, Feb. 28 in Los Angeles and March 13 in New York. The tuition fee is $620.

More information about this course can be obtained from the IBM Systems Management Institute at 19th Floor, One IBM Plaza, Chicago, Ill. 60611.

"User Computing: Planning for Productivity" is aimed at department managers. Its objective is to give managers the information necessary to formulate an information processing plan for their departments.

The course will present the characteristics and management issues associated with various methods of information processing. It lasts 2½ days and costs $640.

IBM said no dates have yet been set for this course, whose code is W9945. More information on "User Computing: Planning for Productivity" can be obtained from the IBM Systems Management Institute at 5th Floor, 355 S. Grand Ave., Los Angeles, Calif. 90071.

Intro Course Targets IBM Micros

NAPERVILLE, Ill.— Deltak, Inc. has introduced a video-based "PC Starter Kit" for the computing novice with an IBM Personal Computer.

"How To Get Started With Your IBM PC" and "How To Use Software On Your IBM PC," two courses produced by Deltak Microsystems, Inc. in conjunction with Kennan Publishing of Mill Valley, Calif., constitute the "PC Starter Kit."

The first course instructs students on computer fundamentals — what a computer is and how it works, system assembly, keyboard use and control, how to "start" IBM's PC-DOS and why it is important. The second course teaches students how to get data from disks and save work, learn what software is available and do rudimentary Basic programming.

Requirements for users of the two-course kit include access to a television monitor and videocassette player, an IBM Personal Computer with a minimum of 64K bytes of memory, at least one diskette drive, an IBM video terminal, a PC-DOS diskette, a diagnostics master diskette and a blank diskette.

The price for the kit is $150; each course sells individually for $75 from Deltak, East/West Technological Center, 1751 W. Diehl Road, Naperville, Ill. 60566.

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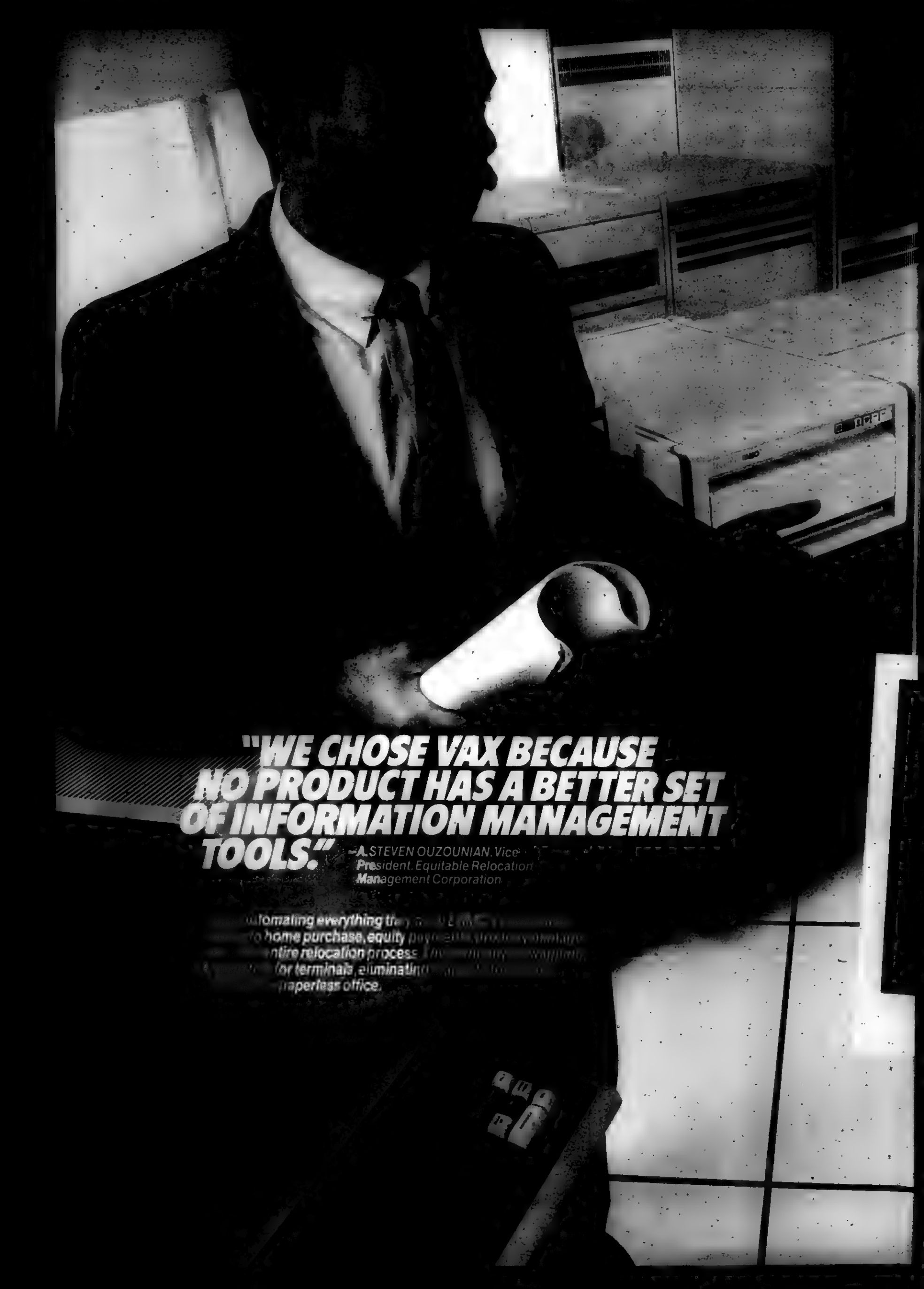
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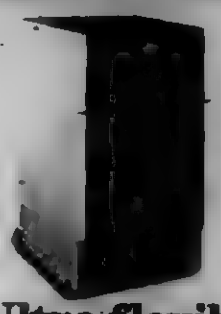

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The UltraMux has centralized point-to-point or network-wide control. So, from anywhere in the system you can monitor and test the entire system or its individual components, perform complete reconfiguration or change any operating parameter.

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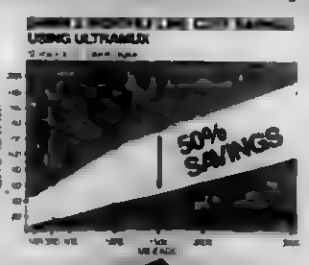

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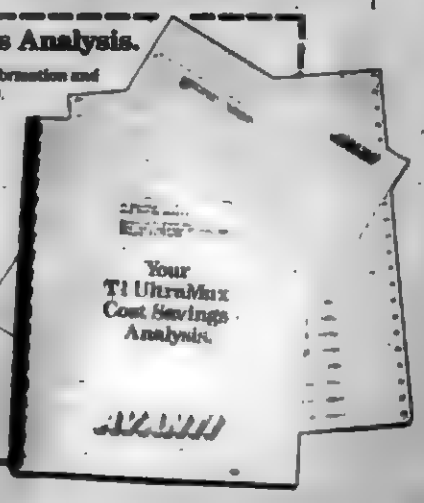


Calendar

Week of Nov. 13

Nov. 14-16, New York — **Structured Programming in Cobol.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 14-16, Baltimore — **Personal Computers and Networking.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Nov. 14-16, San Francisco — **Data Communications II — System Design.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Nov. 14-16, Anaheim, Calif. — **Structured Analysis for Users.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 14-18, Washington, D.C. — **Basic Systems Analysis.** Contact: Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

Nov. 14-18, Chicago — **IDMS Application Programming.** Contact: Kaaren Perez, Comped, 10 E. 21st St., New York, N.Y. 10010. Also being held Nov. 28-Dec. 2 in Philadelphia.

Nov. 14-18, Houston — **Structured Data Base Design Workshop for 1983.** Contact: Learmonth and Burchett Management Systems, Inc., Suite 320, Dresser Tower, 601 Jefferson, Houston, Texas 77002.

Nov. 14-18, Reno, Nev. — **Systems Analysis and Design Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Nov. 14-18 in Phoenix.

Nov. 14-18, New York — **CICS/VS Command Level Programming.** Contact: Teltech, 39 Broadway, New York, N.Y. 10006. Also being held Nov. 28-Dec. 2 in New York.

Nov. 14-18, Portland, Ore. — **Structured Analysis/Design Workshop.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011.

Nov. 14-18, New York — **Vsam File Management.** Contact: Kaaren Perez, Comped, 10 E. 21st St., New York, N.Y. 10010.

Nov. 15, New Haven, Conn. — **The Fourth Meeting of Focus Users of New England.** Contact: Timothy F. Scudder, Chesebrough-Ponds, Inc., 55 Merritt Blvd., Trumbull Industrial Park, Trumbull, Conn. 06611.

Nov. 15-16, San Francisco — **IBM CICS/VS Systems Design Concepts.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 15-16, Cary, N.C. — **SAS Procedure-Writing Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Nov. 15-16, San Francisco — **Introduction to the Tools of Structured Analysis.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 15-17, Columbia, Md. — **Structured Analysis and Design Seminar.** Contact: McCabe and Associates, Inc., Twin Knolls Professional Park, Suite 111, 5501 Twin

Calendar

Knolls Road, Columbia, Md. 21045.

Nov. 15-17, Houston — **SAS Processing Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Nov. 15-17, Columbia, Md. — **Software Quality Assurance Seminar.** Contact: McCabe and Associates, Inc., Twin Knolls Professional Park, Suite 111, 5501 Twin Knolls Road, Columbia, Md. 21045.

Nov. 15-17, New York — **Data Communications: Network, Design and Optimization.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Nov. 15-17, Boston — **SNA Architecture and Implementation.** Contact: George Haskell Communications Solutions, Inc., 992 S. Saratoga-Sunnyvale Road, San Jose, Calif. 95129.

Nov. 15-18, Los Angeles — **Software Project Management.** Contact: Ruth Dordick, Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405. Also being held Nov. 29-Dec. 2 in Boston.

Nov. 16, New York — **Files on the Unix System.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011.

Nov. 16-18, Providence, R.I. — **Data Communications Systems.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705. Also being held Nov. 16-18 in Honolulu.

Nov. 16-18, Washington, D.C. — **Computer Performance Measurements and Capacity Planning: Tools and Techniques.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 16-18, Chicago — **Software Quality Assurance.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

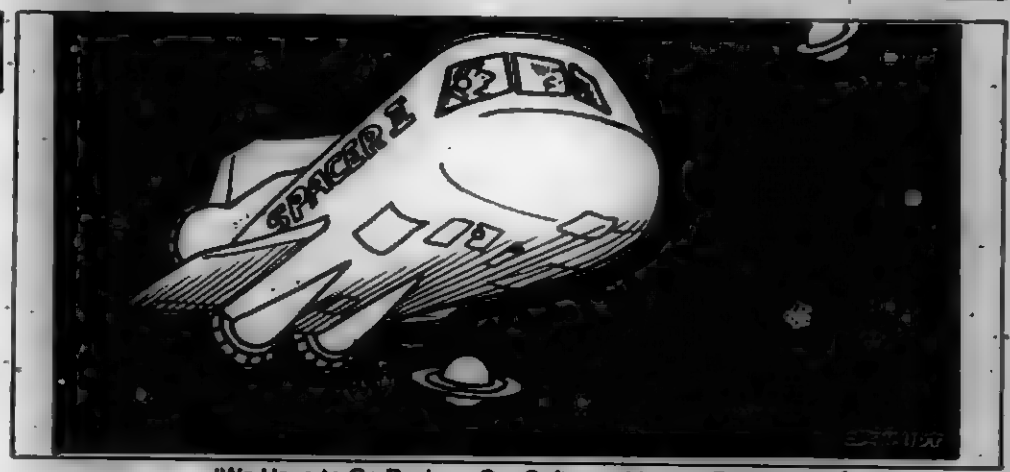
Nov. 16-18, Baltimore — **Data Communications: An Intensive Introduction.** Contact: American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held Nov. 28-30 in Phoenix.

Nov. 16-18, Ottawa — **Local-Area Networks.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Nov. 16-18, San Francisco — **Power of Personal Computers.** Contact: The Institute for Professional Education, Suite 303, 1515 N. Court House Road, Arlington, Va. 22201.

Nov. 16-18, Dallas — **Microcomputer Data Base Management Systems.** Contact: Software Institute of America, 339 Salem St., Wakefield, Mass. 01880. Also being held Nov. 28-30 in Los Angeles.

Nov. 16-18, Chicago — **Information Center Concepts: Organization and Implementation.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.



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EDITORIAL

Unleash a Watchdog Agency

Given that we depend on other agencies, we feel that it is only fair to give them access to our information.

— A spokeswoman for the Selective Service

The government owes us all a better explanation for why it will begin comparing its draft registration records against lists of fathers who owe child support payments [CW, Oct. 24].

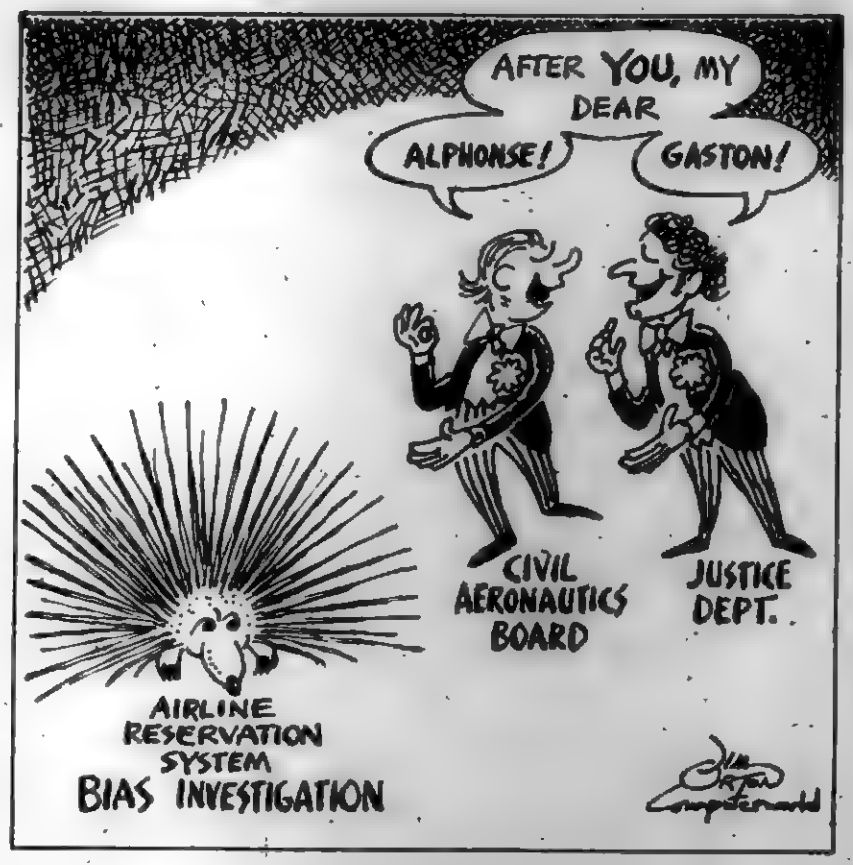
Thus far, the Selective Service claims it is only complying with the law in implementing the computer matching program in conjunction with the U.S. Department of Health and Human Services. Though it admits this use of computer matching is likely to dredge up few absent fathers, the Selective Service sees the program as a wonderful opportunity for one government hand to wash the other. Having used data compiled by other federal agencies to track down draft registration evaders, the Selective Service is now more than happy to open its files in return.

That rationale cleverly ignores a number of important issues: Should information collected for one purpose be used in very different ways? Does the goal of increased government efficiency justify uninvited intrusion into the personal histories of private citizens? What protection or recourse is available to those who will inevitably become the targets of investigations spawned by errors in the matching process?

Doubtless, there are situations in which computer matching is a legitimate, perhaps even necessary, tool of government. But opportunities for abuse and misuse also exist. A set of stringent guidelines and an independent agency to see that those standards are upheld are necessary.

Perhaps the federal government would do well to follow the example of New York. There an independent watchdog agency — the Committee on Open Government — oversees compliance with the state's new Personal Privacy Protection law. Though the committee has no real power, its privacy impact statements regarding the proposed uses of computerized information by state agencies are upheld by the courts.

It is time to implement a similar system of oversight on a national level. Along with the access the government has to detailed information about every facet of our lives must also come accountability.



DATA PAST

Five Years Ago
Oct. 30, 1978

ATLANTA — IBM combined its latest memory technology with enhanced logic circuitry and previously unavailable operating software and created a general-purpose system that provided an upward expansion path for users of the firm's System/3 and System /34 processors. The advances were described as upper end additions to IBM small business systems.

— — —

WASHINGTON, D.C. — Former President Jimmy Carter's proposed 7% lid on salary increases was expected to cut into most DPers' earnings.

Ten Years Ago
Oct. 31, 1973

LOUISVILLE, Colo. — The 8000 series disk storage subsystem from Storage Technology Corp. was unveiled as a replacement for the IBM 3330 disk subsystem in applications where users have high data volumes with medium data accessing activity.

— — —

WASHINGTON, D.C. — The elevation of Robert H. Bork to acting attorney general and the resignation of Elliot L. Richardson and firing of William D. Ruckelhaus brought about psychological changes in the U.S. Justice Department's Antitrust Division.

LETTERS

Raise Bit/Sec Rate

There are several methods to help to eliminate the types of "hackers" described in "Hacking: Mark of Genius or Plain Theft?" [CW, Sept. 12] and related articles.

I would like to suggest one very simple thing that may help: Raise the bit/sec rate.

Replacing existing modems (300 and 1,200 bit/sec) with 2,400 or 4,800 bit/sec modems substantially reduces the number of hackers that have equipment that is capable of breaking into the system.

One may even recover the cost of the new equipment through improved response time and reduced line charges.

Despite popular misconceptions, modems are available for dial-up lines that will operate as high as 9,600 bit/sec.

Mark Higgins
Manager
Computer Systems
Gold Kist, Inc.
Atlanta, Ga.

Hacking Not a Way of Life

Contrary to what is stated in "School Invites Hackers to Break Into Its System" [CW, Oct. 3], students at Western Washington University in Bellingham, Wash., are not invited to break into the school's computer systems.

The Statement of Standards posted conspicuously in terminal rooms states that "Vandalism of either hardware or software; unauthorized use of private, group or system files; or actions that tend to obstruct or harass others in their use of the system are discouraged and will lead, at the very least, to the offender's being denied access to the system. Offenders may also be subject to penalties for violation of the Academic Code under the Student Rights and Responsibilities Act (WAC 516-22-020) and codes as appropriate for other constituencies."

Those of us who help to administer the system feel that the assistance received from students may be a result of the concluding paragraph in the Statement of Standards: "If you know of system bugs or weaknesses which can cause the system to fail, make it difficult to protect the privacy of existing files or allow unauthorized access to system software, please let us know about them to help strengthen the system."

Hacking is not a way of life at Western Washington University. Cooperation is.

Joan Lauer Hayes
Coordinator of Academic Services
Computer Center
Western Washington University
Bellingham, Wash.

Supplement to Studies

As a new subscriber and a student of information systems, I find *Computerworld* indispensible. Each week brings a wide selection of articles on subjects that supplement my studies.

I do agree with many professionals that DP security is of utmost concern. Firms that have been lax in the past will now have full staffs devoting time to keeping an eye on who is using the systems and for what.

I am in favor of not prosecuting hackers who do not criminally use the system. These people should come forward with their knowledge and work with the owners of the penetrated system so that it may be improved for future protection.

New topics such as these are not covered much, if at all, in my classes. Reading *Computerworld* is a challenge that I enjoy each week: It should be required reading for any student bound for the DP profession.

Kristin Steen
San Diego, Calif.

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40 Wholesale/Retail Trade
50 Business Service (except DP)
60 Government—State/Federal/Local
65 Public Utility/Communication Systems/Transportation
70 Mining/Construction/Petroleum/Refining
75 Other User

Vendors
80 Manufacturer of Computers, Computer-related Systems or Peripherals
85 Computer Service Bureau/Software/Planning/Consulting
90 Computer/Peripheral Dealer/Distributor/Retailer
95 Other Vendor

2. OCCUPATION/FUNCTION (Circle One)
11 President/Owner/Partner/General Manager
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13 Treasurer/Controller/Financial Officer
21 Director/Manager/Supervisor DP/MIS Services
22 Director/Manager of Operations/Planning/Administrative Services
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
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35 OA/WP Director/Manager/Supervisor
38 Data Comm Network/Systems Mgmt
41 Engr/Scientific/R&D/Tech Mgmt
51 Mfg Sales Reps/Sales/Marketing Mgmt
60 Consulting Mgmt
70 Medical/Legal/Accounting Mgmt
80 Educator/Journalist/Librarian/Student
90 Other

3. COMPUTER INVOLVEMENT (Circle all that apply)
Types of equipment with which you are personally involved either as user, vendor or consultant
A. Mainframes/Superminis
B. Minicomputers/Small Business Computers
C. Microcomputers/Desktops
D. Communications Systems
E. Office Automation Systems

LECHT ON SCIENCE/Charles P. Lecht

Of Hacks and Hackers

'Articles and correspondence in both the general circulation and trade press focused on the kid who "did it," alternately applauding and condemning him. But what are we to make of the committee that made him into a national hero for having embarked on nothing more or less than a criminal path of electronic intrusion? And how do we explain to our kids that crime doesn't pay when, upon completing his simpleminded, pompous lecture before a group of credulous politicians on national TV, he was actually thanked for having rendered a valuable service to his country?'

Maybe this time the national TV coverage was worth it. We got to see a real, honest-to-goodness, close-up look inside the works of the curious swarming beast, crania politica, live as life itself and lively as only prime-time news revues could make it. Like an armor-piercing missile, the idea that computer-induced mischief could actually be afoot in our newly deregulated communications network environments found its mark deep within the usually impenetrable collective neuronal tangle of a congressional subcommittee, visibly moving its members to uncontrollable synaptic discharge. On color TV sets, the least psychic viewer could see an aura, in the shape and hue of the NBC peacock's tail, arise from the head of each of the worthies as the light of recognition dawned upon him.

The committee was conducting an "investigation" into an August 1983 incident that involved the unauthorized accessing of basically nonsecure files in places like the Los Alamos Nuclear Laboratory, Los Alamos, N.M., by an adolescent hacker. That boy's curiosity (or temerity, depending on your point of view) switched on a veritable Pandora's boob tube upon which materialized the depressing spectacle of political scavengers picking the flesh from the bones of childish pranks. This sight was all the sadder as those pranks had little of the meat of cleverness upon their meager frames to begin with.

Naturally, articles and correspondence in both the general circulation and trade press focused on the kid who "did it," alternately applauding and condemning him. But what are we to make of the committee that made him into a national hero for having embarked on nothing more or less than a criminal path of electronic intrusion? And how do we explain to our kids that crime doesn't pay when, upon completing his simpleminded, pompous lecture before a group of credulous politicians on national TV, he was actually thanked for having rendered a valuable service to his country? This created such an appalling tableau vivant — a modern vision of the hacker leading the hacks — that the criminality of his acts, admittedly amateur, seemed positively benign by comparison.

The seriousness with which those congressmen hung upon the errant youth's words, the gratitude with which they welcomed his inexpert testimony, betrayed the depths of their ignorance about the kinds of problems Americans will have to resolve as society continues to automate. For they clearly could not recognize that what he had to say was every bit as shallow as the hacking itself was inexcusable, and their posturing was sleazy.

Who were these technological illiterates to feel they had the right to hold up to ridicule the achievements of our scientific and business communities in making data communications power accessible to anyone smart enough to flip a terminal's on/off switch? Were they the same legislative and ethical paragons that approved dial-a-sex as a legitimate use of communications networks for anyone capable of dialing a telephone? That hacking is made easier as access is improved should surprise no one — so is robbery as we lay new highways to our doorsteps. Should we feature the latest "successful" crook displaying his booty on prime time before an obsequious congressional committee and tarnish the reputations of our road builders by drawing America's attention to the ways in which their achievements can be put to perverted use by juvenile delinquents and other assorted social misfits?

Anyway, the committee had to be aware that responsible American scientists have been sounding the alarm on computer security for years, that genuine experts in the field have published reams of articles and spoken until blue in the face on the subject and that the attention of our elected officials had, indeed, been solicited many a time, but could not be directed into public discussion of the issue until a spectacular "vehicle" deposited it under their rosy red noses.

Life 'on the Set'

Perhaps the warnings of the real experts were expressed in terms that members of Congress could not understand until an errant child offered them an explanation. Or maybe it's just life "on the set" in D.C. these days. I, for one, would prefer not to believe that the committee could only be roused from its dreamless sleep by the pointless despoliations and puerile rationalizations of an adolescent highwayman on our communications beltway. No, I think we must look elsewhere if we are ever to understand what our esteemed elders were up to; and I propose now to offer my own speculations.

One might at first be tempted to blame our frustrated Federal Bureau of Investigation, although I think they're "clean" on this one. Still, unable to get the Senate to acknowledge the existence of fire without first administering 100 left and 100 right hot feet, and feeling themselves under the increasing pressure of technological change, it's just barely conceivable they decided to avail themselves of this historic moment to do a little hard-sell fund raising.

You would expect the late charges of L. Patrick Gray to recognize the

(Continued on Page 54)

HUMAN CONNECTION/Jack Stonet

Credibility of DP Sales Reexamined

My article "Shabby Sales Tactics Threaten DP Credibility" [CW, Sept. 12] brought forth some strong words from readers.

Joel Robinson of Toronto said, "Usually I find your column right on the mark but your critical opinion of the NEC Information Systems, Inc. Advanced Personal Computer software promotion was way off.

"In today's market, software at the retail level is overpriced. For example, Micropro International Corp.'s Wordstar, with its options sells for over $500. However, if the computer manufacturer buys it in bulk, it will cost him somewhat less than $50. Would you rather the manufacturer keep the profits all to himself or pass the savings on to his customers?

"The concept of bundled software included at nominal cost has sold many machines for Osborne Computer Corp., Kaypro, Inc., Sanyo Business Systems Corp. and others. I would be pleased to see NEC bundle permanently rather than on limited time offers. But anytime is better than no time.

"As a consultant, I have installed a number of NEC Advanced Personal Computers. They have proven to be of superior performance and capacity than others, including the IBM Personal Computer.

"In one case, the 'free' software was the deciding factor for the client; an IBM Personal Computer would have required purchase of the same [software] products at their [list] selling prices.

"I suggest you open your mind to the bundled concept. It can be the best investment you can make in today's computer market."

Top-Notch Marketing Idea

Perhaps my expressions in the article were not explicit enough. I happen to believe that software bundling is a top-notch marketing concept, and the practice will surely be continued and expanded by most vendors as they enter the battle with IBM for a share of the personal computer market.

Where I get off the track is that the advertising distorts the facts when it pushes over $2,600 worth of "free software." Everybody knows the software isn't free and that its cost is obviously buried into the price of the bundled machine.

Who is kidding whom? Why shouldn't the text state accurately that volume purchases of software have reduced the cost to the manufacturer, who is, in turn, passing the savings on to the consumer?

Credibility as DP Professionals

Ernest R. Gillespie of Carlellton, Va., said, "I read your article . . . seeking insights to our credibility as DP professionals. You seem to be saying that the entrepreneur — in your words 'hawkers and discounters' — have somehow distorted what otherwise would be a great idea by overselling their products. These methods of selling have contributed to the 'low-cost computer industry . . . sinking rapidly.' I don't agree.

"It was the computer professional, or at least some of them, who first sold the micro. I remember well the presentations, magazine articles and even some conferences where technical computer professionals were predicting a computer in every home. I also remember several friends getting very anxious about home computers. It would be great if the 'thing would balance their checkbooks,' and 'make menus flash on a television screen.' What a waste of hard-earned money.

"No, the shortfall in sales of micros, home computers, personal computers or whatever you call them has a direct relationship to their utility for the ordinary person. Our high-tech hype has dazzled these folks far too long. Give them tangible benefits, or even just promise them such benefits, and they will beat a path to your door."

I think we're saying the same thing in different ways. There aren't enough benefits in the personals to justify the current prices for home use, and consumers have become very wise to the advertising hype. Most will continue to defer buying decisions until machine prices come into line with their value.

GETTING AHEAD IN DP/Donald J. Berardo

How to Handle DP Team Members in Trouble

A project review date is coming up, and as project leader you find yourself in an uncomfortable position. It is uncomfortable not only because the project is running late, but also because the reason it is running late is that one of the project team members has not been pulling his weight, due to a personal problem. This person has confided in you and has asked that the information not be shared with anyone else.

Meanwhile, the review date approaches, and you seem caught between a pair of equally distasteful alternatives:

- You can protect the team member's confidence in you and absorb the blame yourself.
- You can relate the problem to your boss in an effort to explain the delay.

These are the immediate alternatives, and each has potential results worthy of consideration.

In the first case, you will unnecessarily look bad in your boss' eyes and will probably hurt your position with the boss, at least temporarily. It will certainly cause you anxiety and possibly some animosity toward the team member with the problem, which is probably the last thing that person needs.

The second alternative has double-barreled drawbacks. On one side, the boss could perceive you as a back-stabber or complainer or both.

On the other side, it could get back to the team member that you betrayed his confidence. Then you face the prospect of dealing with an angry person who already is under some emotional stress.

What would you do?

A solution to this problem can be outlined on two levels: There's the general approach, which can be applied to this and many other situations, and the specific approach that applies to this one situation.

Start by asking yourself, "How do I want to look when this is over?" Obviously, you want to look just the opposite of what the events are setting you up for. You want to come out looking dependable, responsible and trustworthy.

How can this be accomplished? Just as problems are separated from symptoms in systems analysis, the problem can be separated from the person in this case. Determine in your mind just how much of a problem you can relate to your boss without identifying which team member is involved. This could vary from a detailed account to just stating that one of the team members has a personal problem.

Next, determine what you and other team members are capable of and willing to do to make up the lost time and how long it will take to get back on schedule, if possible. If this seems impossible, estimate what resources would be necessary to return to schedule.

Review dates are for good news or, at worst, minor problems you have well in hand. In this case, you should go to the boss as soon as the issue is clear in your mind and you have been through the "last things first" thought process.

Now you can go to the boss to outline the situation, explaining why you can provide only so much information, offering to pull some extra weight and assess the alternatives if that isn't sufficient.

How will you look to the boss now? You should look:

- *Responsible.* You came in with some other alternatives before it was too late.
- *Dependable.* You offered to carry some extra weight to get over the hump.
- *Trustworthy.* You didn't betray a confidence (a fact that may bring you into the boss' confidence at some later date).

Those are the specifics of this case, but you can apply the generalities to many situations.

Berardo is a management counselor and career therapist. He is a vice-president with the Meld Group in West Hartford, Conn., publishers of a monthly newsletter on management development.

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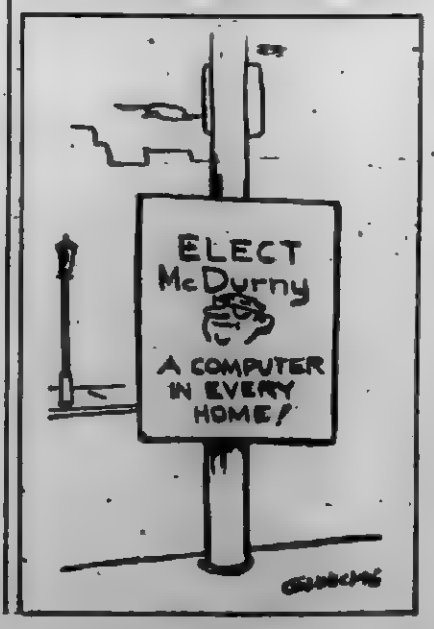

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LETTERS

Understandable Programs

In the article "Defense's Implementation of Ada Evaluated" [CW, Sept. 12], Jerry Sitner admits that Cobol has within it the means to be written understandably and that if a Cobol program is not understandable, it is not the fault of the language.

I, myself, have had the displeasure of trying to make sense of incomprehensible data names and convoluted logic.

Sitner then claims that Ada is inherently unclear.

I have studied Ada and, like any other language, once the concepts behind the language and use are understood, the language itself becomes easy to read.

Ada programs, like Cobol programs, can be written using unclear data names; that's just bad programming and not the fault of the language.

Sitner is blaming Ada for his lack of even basic knowledge of the language and the conventions of its constructs.

I find that use of Ada contributes to understandability, and most of the Ada programs I have seen and written as exercises were highly readable.

Martin M. Waxman
SRS Programming Reserve
New York, N.Y.

Credit Card Chase

Jack Stone's article, "Concern Mounting Over Data Controls for Credit Reporting Agencies" [CW, Aug. 1], on credit bureau abuses really hit home.

I attempted to obtain a credit card from Phillips Petroleum. I was turned down, based on a credit report from a credit bureau in Camden, N.J., about 100 miles from where I live and work. The report was incomplete, full of errors and illegible.

Phillips could not give an acceptable reason for not dealing with a credit agency closer to my home. After many phone calls to the Camden agency, and considerable aggravation, I decided I didn't really want a Phillips credit card after all.

Susan Bunting Bianchi
Manager
Corporate Research
Pennsylvania Blue Shield
Camp Hill, Pa.

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Committee on Hacking: Lights, Cameras . . .

(Continued from Page 51)

makings of a spellbinding soap opera when they saw one. Well, here came *Mary Hartman, Mary Hartman* with a vengeance: a group of slightly overdone apple-pie kids breaching security, then going straight with all the freckles of a space age Mickey Rooney bearing witness to their new sense of religion; a bundle of congressional sticks looking for any reason to display their movieola faces before a TV minicam; a current, mass appeal film (*War Games*) whipping the national interest in hacking into a fine froth; and TV news producers and directors ever awake to anything that can be sensationalized and beneath whose taste for pithy scripts the more primordial taste for silent-screen histrionics lurks on and on and on. Heck, even the antiseptic J. Edgar Hoover might have been tempted — after all, this was the stuff for which the folks in public relations spent thousands sacrificing reputations.

Or could this all have been the work of prime-time news sponsors who knew they had their own congressional pigeons to feed before another flock came home to roost? And what better show than one exposing the possibilities for data base incursions to a nation grown edgy over privacy as electronic networks spread to touch the inmost corners of its manifold lives?

On the whole, I favor the political exploitation scenario over the sinister sponsor stratagem. Apparently wearied by the parade of wizened scientists sounding the trumpet over conceptual developments of no seeming practical importance, our pronouncedly unintellectual Congress hovered like a motionless school of fish in the depths of its own ignorance, allowing all the warnings of responsible security experts to float by, waiting for more attractive publicity bait. When it materialized in the form of a juicy young hacker/worm, they bit and swam with their prize to the nearest make-up studio to prepare for a televised fishbowl epiphany.

Lecht is chairman of Lecht Sciences, Inc., a New York-based think tank specializing in computer and communications technologies.

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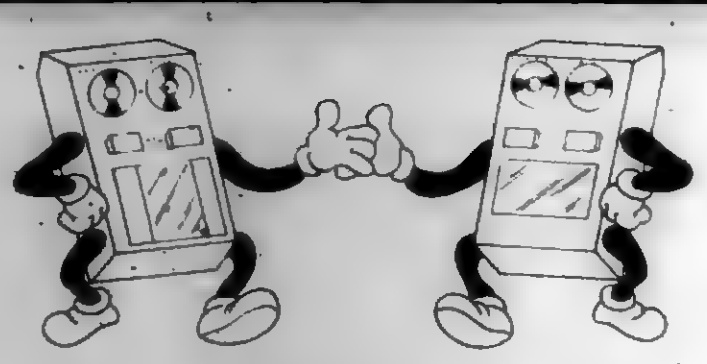

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READER COMMENTARY

MIS: Make Anticipating Corporate Needs

Do you approach corporate management with ideas on how management information systems (MIS) can help them run the business better, or do you wait for them to tell you what they want? The ability of companies to survive and prosper during the 1980s and 1990s will depend greatly on the quality of the information they receive to run their businesses, the information that MIS is best suited to provide. If you are offering high-quality information that anticipates needs on a timely basis — often before corporate managers know they need or want it — your department is doing both itself and the company a great service.

Many managers of companies still do not have a technical grasp, even on a modest level, of the functions of their MIS departments. This, in terms of obtaining better management information and knowledge of what should be done, whether it can be done or when it could be done remains so elusive that the relationship of company management to its MIS function is hampered. This is where you can help. You can guide management in determining what kind of information they need by letting them know what you can provide, in how many different forms and how much it will cost.

It cannot be guaranteed that one particular technique or methodology will work for you in making your MIS department more action-oriented. However, a number of factors can be identified that can foster anticipation of corporate needs, the most obvious being your own style of managing the MIS department. The director or vice-president of MIS usually sets the standard for how the department as a whole acts. The nature of this influence depends on personality, education, experience and industry knowledge.

These variables combined, plus others, have a great bearing not only on how you view problem-solving responsiveness, but also on how the entire department operates. If you tend to wait for direction from corporate management, it's likely that your people tend to wait for direction from you. If, on the other hand, you've set a style of forward-thinking creativity, you've given others in the department the message that this approach is acceptable and desirable for them as well.

Competence in industry applications and knowledge of your company's unique requirements within the industry are areas in which MIS staff education — including your own — should be strengthened. Your staff, like many others, may be composed of people who are technically competent, but who lack the depth of industry expertise and knowledge of the special requirements of your organization that would complement their technical skills.

Responsive MIS

Providing the fertile ground for a responsive MIS function is the job of company senior management. Unless you were hired or promoted from within, you should seek a thorough introduction to the company and its problems, opportunities and special needs. As you hire staff, you should make sure that they receive a similar orientation.

Involvement in the mainstream of your company is critical to being able to act rather than react. It allows you to approach senior management with constructive suggestions, and it affords senior management the opportunity to see you and your department to advantage.

Obtaining the education you need is not always easy,

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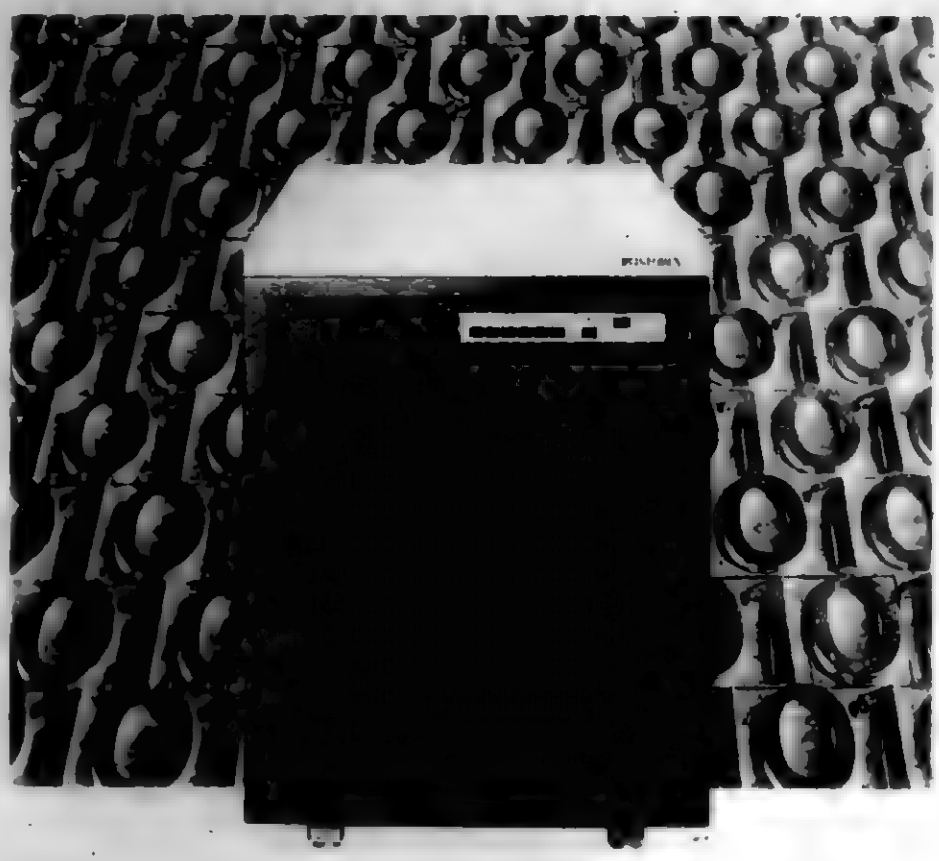

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but it can be done. One successful technique is to become involved in one of the operating committees of the company, if this is compatible with management style and company organization. As a function vital to the future success of the company, your department is likely to be a welcome addition to such a committee. If not, an alternative is to suggest that an MIS or "information needs" steering committee be established to guide and monitor the MIS process. Such a committee should bring together the most senior members of the management team and MIS management for discussion of MIS' relationship to the company as a whole, and it should meet regularly.

Both of these techniques can encourage cross-fertilization of ideas between MIS and corporate management, and they can give you great insight into the workings of your organization. To remain successful, however, either approach must be based on free give-and-take of ideas; the communication must not be one way.

Become Involved

There are other ways to show senior management that your department acts rather than reacts. Becoming involved in industry-oriented DP panels or groups and reporting back to management on what you have learned can be a healthy stimulus. Meeting with your peers within the industry can be informative and rewarding. For example, if you can arrange to visit counterparts in similar but (ideally) noncompetitive companies, you can get valuable exposure to different perspectives on problem-solving techniques. Such experiences can help you to understand better how problems have been solved within your organization vs. how they might have been solved. You can act on this increased understanding by presenting senior management with alternative approaches to solving current problems.

These activities may not result in an immediate change in the way you manage your department or in the way you are regarded by senior management. They can, however, contribute to preparing the fertile ground that will eventually yield greater understanding and allow you to be more responsive to and even anticipate corporate needs.

As you move toward becoming a more action-oriented department, the area to which you should give the most concerted attention is planning. Planning is the glue for your department, allowing it to operate efficiently and effectively. A proper approach to planning will exert a positive influence on every aspect of your performance.

MIS planning is not, however, your responsibility alone. Corporate needs and directions are usually identified by management above the level of MIS. In addition, most organizations follow a strategic plan developed by senior management that delineates objectives and identifies the resources required for its implementation. How well you comprehend and provide support for the overall plan is part of the ultimate measure of your responsiveness to company needs.

Planning requires involvement: You must interact with users. You can do this by explaining how MIS works to solve user problems or to listen to users explain their problems and needs. On the more formal level, you can organize personnel meetings, structured presentations and written reports to bring your message to the rest of the company and to promote effective interaction between MIS and users.

An MIS function that wants active involvement gets the greatest benefit from a visible and lively user education program. Don't offer such a program just for the sake of appearances.

(Continued on Page 58)

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MIS: Anticipate Corporate Management's Needs

(Continued from Page 57)

because this is a waste of everyone's time. Through an in-depth program, you can foster awareness, understanding and appreciation of the range of activities you offer the user community and, ultimately, enable users to take greater advantage of your department's services. The payoff should be a more important and influential role for your department within the company.

Your department should also take a leading role in introducing new MIS technology to your company. The 1980s will be characterized by dynamic growth in the utilization of microcomputers and their integration into the traditional data processing use environment.

Thus, effectively managing this new and powerful tool, integrating it successfully into the user environment and establishing data and management controls over its use will be the benchmark of your active involvement in company growth.

Technological change will require greater user involvement and more extensive user education programs, and the MIS department should lead the way in promoting these developments. How you implement this technology and assist the firm in benefiting from its capabilities will shape your department's future.

In dealing with senior management and end-user alike, avoid technical jargon when at all possible. The extra effort to turn computerese into simple English will be repaid when users and management feel comfortable in discussing possibilities with you.

Increase Productivity

A highly effective method of impressing upon senior management the value of your department is to increase the productivity of the MIS resources to yield better and more timely management information. With the portion of your department budget related to people growing at a faster pace than the budget for hardware, taking full advantage of your people resources will have the greatest positive effect on your department's bottom line. Greater productivity and efficiency will encourage management to accept expanded roles for MIS within the company structure.

One way to work toward productivity improvement is to introduce and make good use of packaged software. Packaged software reduces the lead time for implementing applications and can reduce the requirement for additional staff while improving the productivity of your existing staff.

With the dynamics of technological change, the increased DP savvy of the end user and the need for optimal productivity from your people, you can no longer allow a less-than-satisfactory interrelationship among MIS, senior management and end users to exist. By taking an active approach to improving the relationships, you can head off problems before they occur.

You must seek to solve problems without relying on traditional techniques that may result in delays and in lost opportunities as a result of the delays. Today, you must manage your MIS function with an eye toward results. Work at identifying problems, understanding them and coming to grips with them in a technical sense. But keep the emphasis on timely and efficient implementation.

Tharrington is a senior partner of Case and Co., Inc. in Stamford, Conn.

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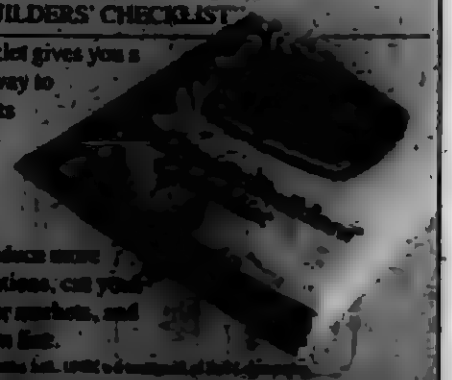

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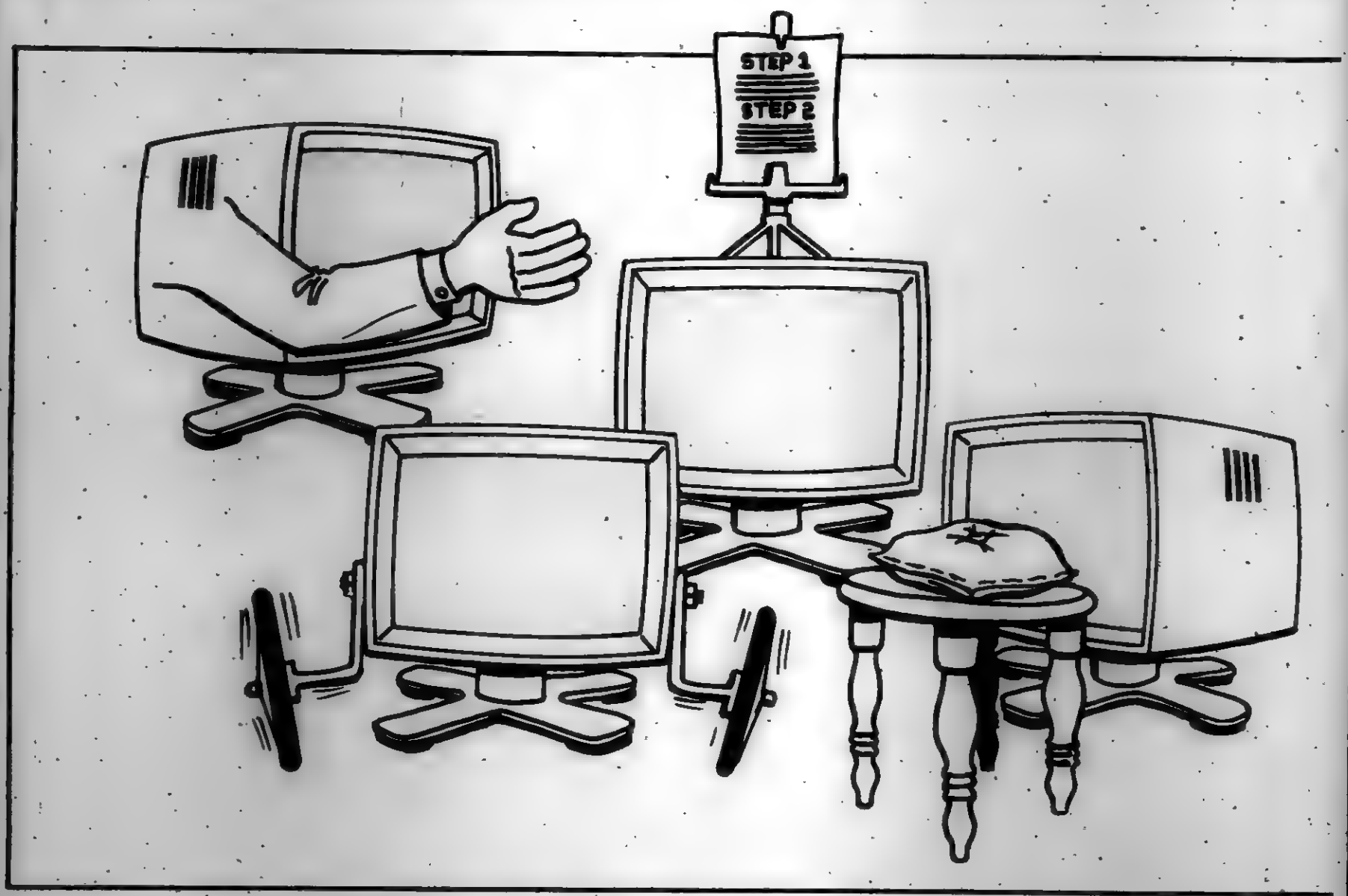


Friendly to all or none?

User friendly, as a general term, is meaningless. If some naive definition was accepted based on what novices would like it to mean, the term would have meaning but be useless as a concept.

Designing for novice & expert

If today's 'user-friendly' systems fail to meet the needs of both novice and experienced user, the fault lies in the method, not objective. The solution is good design technique.

User Friendly

By Paul F. Nesdore

As microcomputers and software application packages grow in complexity, more and more vendors claim their systems are user friendly.

What does "user friendly" mean? Is the concept of any value? Is it desirable? Could it be harmful? How do you tell if one program is more user friendly than the other?

Before the arrival of microcomputers and word processors, users of mainframes and minicomputers were almost exclusively professional programmers or systems analysts. "User friendly," if the term had been defined then, would have been anything easier than IBM JCL.

However, with the use of computers by complete novices, the need for a simple system interface became clear.

When microcomputers and word processors were introduced, the problem was not severe, for functionality was limited and complexity of interaction was at a minimum. As the machines' versatility increased, however, so did the difficulty of inputting and accessing information. This situation caused a mild panic among both the untrained personnel who saw the computers suddenly appearing in their offices and the vendors who realized their products might be perceived as too hostile to use. People who had no concept of an operating system now had to absorb some rudimentary facts about them and learn basic operating system commands in order to execute and manipulate their applications programs.

In order to overcome this creeping cyberphobia, vendors countered with an overwhelming campaign of user friendliness, hurling the phrase recklessly at customers. The marketing departments of these companies had a lot going for them with this attack. The user, after all,

(Continued on In Depth/4)

By William G. Quirk

While today's so-called "user-friendly" systems may rightfully be described as "novice friendly," they frequently fail to be "expert friendly." Yet, contrary to common opinion, there is no inherent conflict between aiding the beginner and pleasing the more experienced user. Poor design techniques only make it appear that way. It is perfectly possible to design interactive application systems that meet and even surpass the quality expectations of novice, intermediate and expert users.

Novice-friendly systems initially present the beginner with a minimal subset of user interface capabilities. These functions typically allow the novice to accomplish the basic work objectives of the application, but rarely in the most efficient possible way. Limited functionality, learner aids and special protective features all negatively affect novice productivity. But this lack is of little concern to the beginner. He is preoccupied with acquiring basic system familiarity.

On the other hand, once he is basically familiar with the system, the user becomes increasingly interested in more efficient ways to accomplish his application-related work. Expert-friendly design supports this shift in the user's priorities by teaching him how to bypass eventually the novice-level support features that now hinder his efficiency. In addition, expert-friendly systems provide the experienced user with a rich assortment of personal productivity enhancement tools. Transparent to the novice, these tools improve user efficiency by exploiting functional and data repetition inherent in the application.

Although menu screens serve as important memory aids for novice users, they often impede the experienced user.

(Continued on In Depth/7)

FRIENDLY TO ALL?

(Continued from In Depth/3)

wanted to believe that the system he was buying was friendly. And the marketers certainly stood on safe ground. Since no good definition of user friendliness existed, who could say whether the system was or wasn't?

User friendly, as a general term, is meaningless. If some naive definition were accepted based on what novices would like it to mean, the term would have meaning but be useless as a concept. More precise definitions could only be restricted to relative definitions: that is, a software package A is more user friendly than software package B running the same application under the same operating system. Further, user friendly, if defined in a more general way, tends to contradict the technology.

Do we have user-friendly computers now? There are menu-driven applications packages for simple programs that allow a beginner to have an application running in 15 minutes. But if a more complicated package is considered (a decision support system, for example, or a computer-aided design and manufacturing application), the training time could be considerably longer. Is it fair, then, to say that the former is user friendly and the latter not? This test is obviously useless and does not help at all in formulating a definition.

If the use of applications packages is more closely scrutinized, two different aspects come to light. One is the initial time it takes to have the package up and running the basic application; the second is the ease of adding options and permissible variations. The more sophisticated programs have a variety of parameter modifications that the user can manipulate in order to apply the package to a particular form of the problem. The ease with which the user can perform these functions is a direct indication of the package's user friendliness.

Vendors or users frequently refer to the user friendliness of a software package without considering the instruction manual or training aids. User friendliness must be viewed from both angles. It would be possible to have a user-friendly operator's manual or program documentation, but a very unfriendly program in terms of using all its features once it is up and running. Similarly, an interactive tutorial program could be very user friendly and, again, the program not so easy to use.

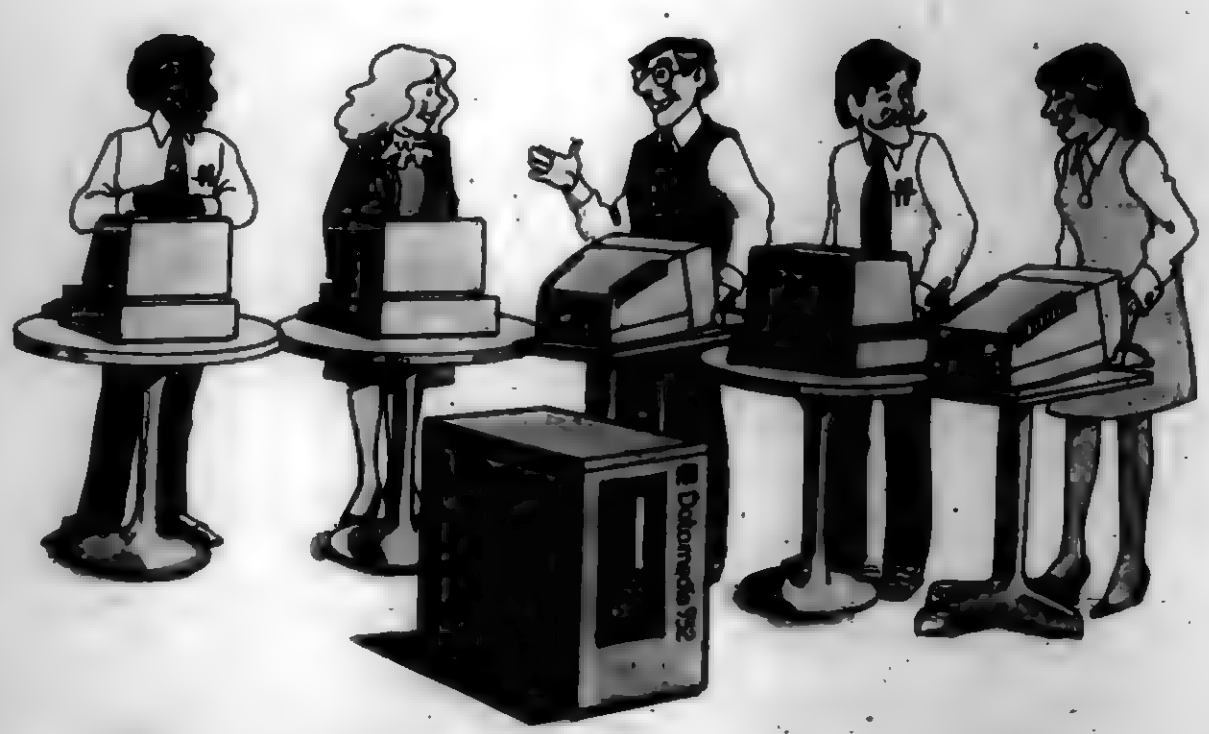
A frequent complaint is that the manuals are incomprehensible, but once the program is understood, it is fairly friendly. No vendor should make this oversight. Investment of time in producing a clear, understandable manual should be an absolute requirement.

Another neglected area regarding user friendliness is the operating system. It is one thing to say that an application program is user friendly and another to say that the program must be run on a particular micro or on a particular operating system with no comment on the friendliness of the operating system. The user must first confront the operating system before he gets to the application. But how much vendor advertising or software development effort has been given to user-friendly operating systems?

It would be possible to have a user-friendly operator's manual or program documentation, but a very unfriendly program in terms of using all its features once it is up and running. Or a tutorial program could be user friendly and the program not so easy to use.

The situation with office automation is no better. There was a great amount of time spent at Syntopican this year on the subject of training. A backlash was feared because training was not being done, and some expressed the fear that thousands of dollars of computer equipment would not be utilized because no one

Personal computing.



Departmental computing.

FRIENDLY TO ALL?

IN DEPTH

had been taught to use it ["Upgrade In-House Training," CW, June 20]. The implication and, indeed, the indictment is against the vendors of the hardware and software.

Even without a definition of user friendliness, it is tempting to ask why user-friendly equipment should have such a formidable training requirement that already-purchased equipment would lie idle because no one knew how to operate it. It is difficult to believe that when this equipment was sold, the vendor clearly expressed the training requirements.

Because of its "rollability," the mouse has the aura of a gimmick, a stigma not attached to the keyboard. Did anyone consult a psychologist before marketing this device?

What if the software or hardware was truly user friendly? What would it mean to you as a user? The popular view is that a user-friendly program would allow complex programs to be run with a minimum of manual reading, training and keystrokes. Now we can get back to a statement made earlier regarding the concept of user friendliness as contradicting the technology.

To declare that a complex program can be run with just a few keystrokes implies that you are truly running a canned program. Any complex function must have numerous parameters specified. If these parameters are not specified, then a default setting must be made for each one. The conclusion is that the more user friendly a complex program is, the less control the user has over its internal specifications — that is, unless the expertise of the user is elevated. But now another dimension has been added to the possible definition of user friendliness, namely, the expertise of the user.

Before attempting to define "user friendly," consider some of the other nonsoftware approaches. The mechanical interface to the computer lends itself to promoting user friendliness as does the design of the software. Innovations in this area include the mouse, the touch screen and voice input.

The mouse is a valiant attempt to eliminate keyboard fright. The mouse has two main advantages: It eliminates keyboard use and provides more cursor control freedom. But the major question remains: Does the mouse make the computer more accessible, more friendly, to certain target audiences such as executives?

The answer is no. An executive who does not type and who regards the keyboard as a secretary's tool will now be rolling around on his desk something akin to a mobile joystick with buttons. If the vendors add more buttons to the mouse, it will become a mobile keyboard without cursor keys.

There is no possibility that this device will feel more comfortable to the executive than the keyboard. Because of its "rollability," the mouse has an aura of a gimmick, a stigma not attached to the keyboard. Did anyone consult a psychologist before marketing this device?

As for the touch screen, the intimidation is even greater. If touching a keyboard is intimidating, the anxiety level must certainly be raised to touch the screen itself, a screen that emits radiation. This feature obviously will not be the sought-after breakthrough in user friendliness.

There have been great hopes for voice input to provide user friendliness through direct interaction between the spoken word and computer. But as a colleague of mine pointed out, dictation equipment — an obvious, low-cost way to increase productivity dramatically — never realized its full potential because people were too intimidated to talk into the device. What makes the voice input advocates believe that talking into an

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even more sophisticated piece of equipment, such as a computer, will be easier?

The mistake is made in assuming that the user would rather act in a more human (social) manner than in a more mechanical way. The state of human communication has always been less than adequate.

Communication must be made as impersonal as possible to relieve cyberphobia, not the opposite.

With all these problems in mind, consider the following definition: A system is user friendly if it permits execution of the function for which it was designed in a minimum of training time by a user who has little knowledge of the process and in a moderate amount of time in its most sophisticated form with options and extensions by a user with a sound knowledge of the intricacies of the system.

The actual useful information from such a definition would be relative — that is, how much more time one program took than another. The difference between a canned program that is user friendly and an "uncanned" program that is easy to use is the difference between the software vendor saying, "This is what we are going to do for you" and, "What would you like this program to do for you (of course, within the area of its application)?"

You cannot have user-friendly input to a complex application and expect that the program will do everything you want.

If, however, you have complete control of all the bells and whistles, the program will no longer be user friendly, unless you are such an expert in the field that it is easy for you to set all parameters and options. Further, gimmicks (such as the mouse) that seem to be designed for user friendliness do not seem promising.

Probably the one single area that can be improved easily is for the vendors of software packages to put much more time in writing clear instruction manuals and documentation, including teaching aids and interactive tutorials. Their failings in this area are the reason for the recent successes of the computer schools teaching Mr. Average how to get past IBM DOS.

Much has been written about fifth-generation computers, knowledge-based systems, inferences per second and the like. The concepts involved in fifth-generation computers are drastically different from the von Neumann-type approach that created the vast array of languages and thinking about computers today. The attempts at user-friendly systems are productive in this regard — not as a bridge to the fifth generation, since the fifth generation cannot be arrived at by this means — but as a stopgap measure to increase productivity as much as possible until the fifth generation gets here.

About the Author

Paul F. Nesdore is group managing editor, international publications, for Datapro Research Corp. in Delran, N.J.

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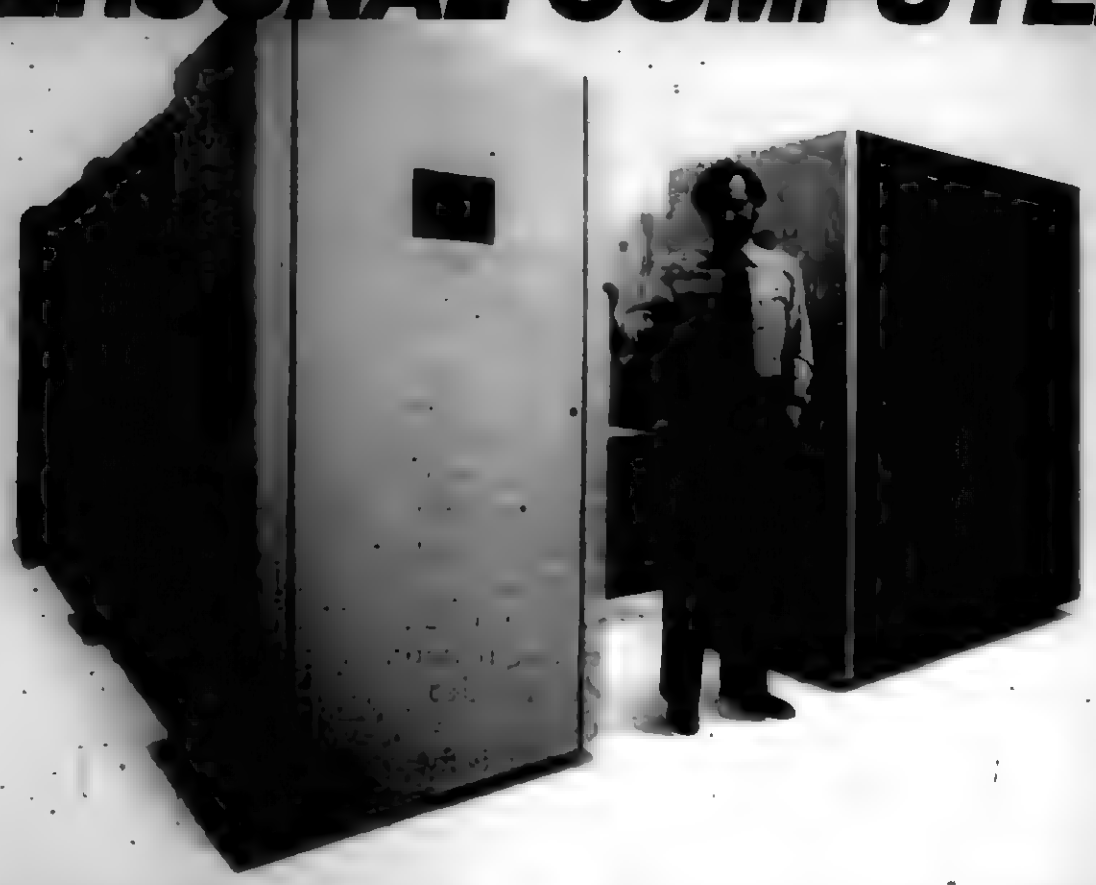

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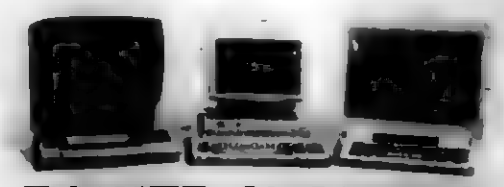

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FOR NOVICE & EXPERT

(Continued from In Depth/3)

Expert-friendly systems allow menu bypass. They also teach bypass methods as a by-product of menu usage.

Menu bypass is taught through information on the menu and subsequent response screen. For example, a menu of major purchasing system functions may identify purchase order entry as POE, vendor file maintenance as VFM and so forth. If the user wishes to select the purchase order entry function, the menu information instructs him to enter the mnemonic POE in the SELECT field and then press ENTER. The response will present the purchase order entry screen, and it will also inform the user that SELECT POE is a valid system command that can be entered without using the intermediate menu screen.

Some will argue that it is more efficient to identify menu functions by function key or numeric identifiers. But these commonly used techniques fail to support menu bypass. Also, the keying efficiency defect of the mnemonic identifier approach is only visible at the novice level, and the novice will not perceive any deficiency.

Prompt screens also serve as memory aids for the novice user. They remind him of information needed by the system in order for it to take some user-desired action.

For example, while viewing the purchase order entry screen, the user may need validation information for the ACCOUNT field. If the system is novice friendly, it will allow him to display a user interface documentation prompt screen (help-prompt). The information on the help-prompt explains how to access the desired documentation.

Expert-friendly systems allow prompt bypass and teach bypass methods as a by-product of prompt usage. Similar to menu bypass, prompt bypass is supported by command language and taught by information on the prompt and subsequent response screen.

For the help-prompt example, the prompt information may instruct the user to entes the values ACCOUNT and EDITS in specified help-prompt screen fields. The response screen will then display the desired validation documentation together with an explanation of documentation direct access. For this example, the user may learn that he could have bypassed the help-prompt if he had originally entered the command HELP ACCOUNT EDITS, rather than calling for the help-prompt.

Logical user files offer another powerful vehicle for implementing novice/expert flexibility. They allow each user to tailor the system to his own experience level. Novice-level support can be gradually turned off and expert-level productivity aids turned on.

Although expert-friendly systems allow experienced users to bypass menus and prompts, they automatically reappear if the user slips back into novice-level behavior. If the user enters a nonspecific selection request, he is presented with a menu. If he fails to supply the system with needed information, he will be prompted for the information.

Unfortunately, it is not always possible to reinvoke novice-level

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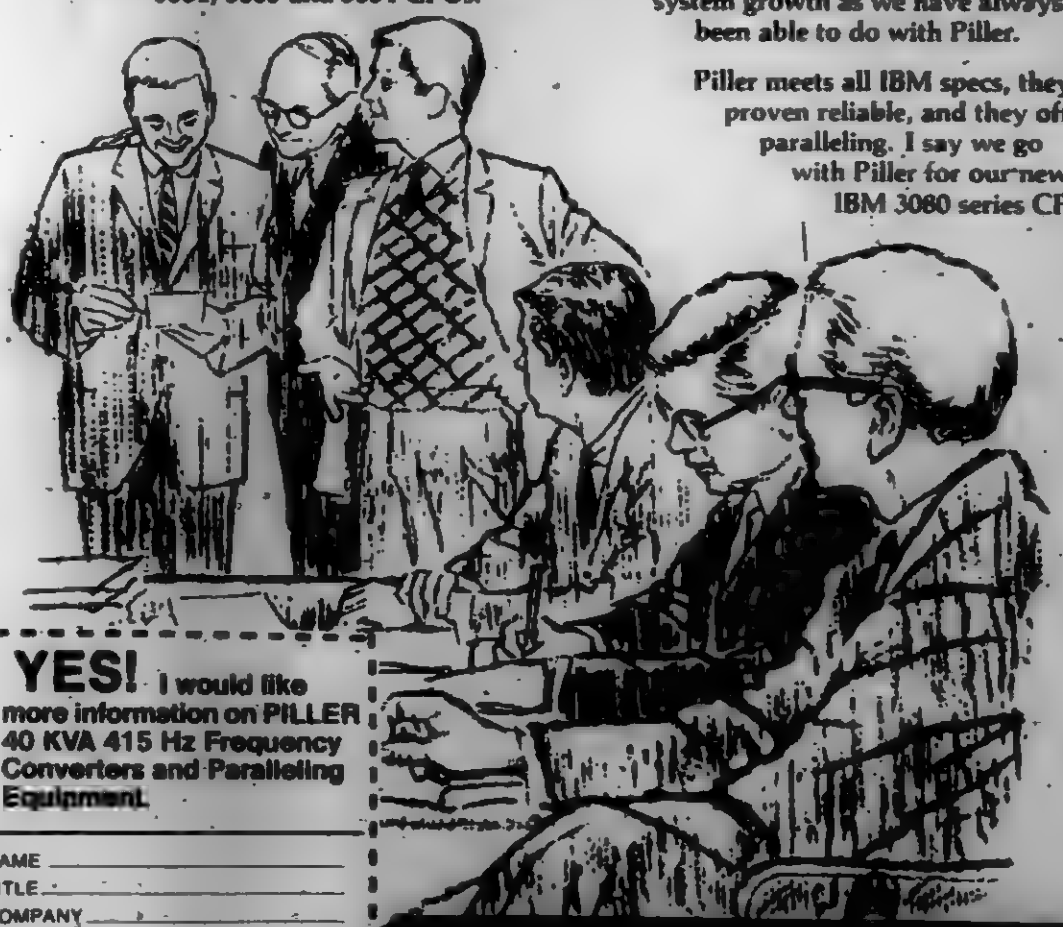

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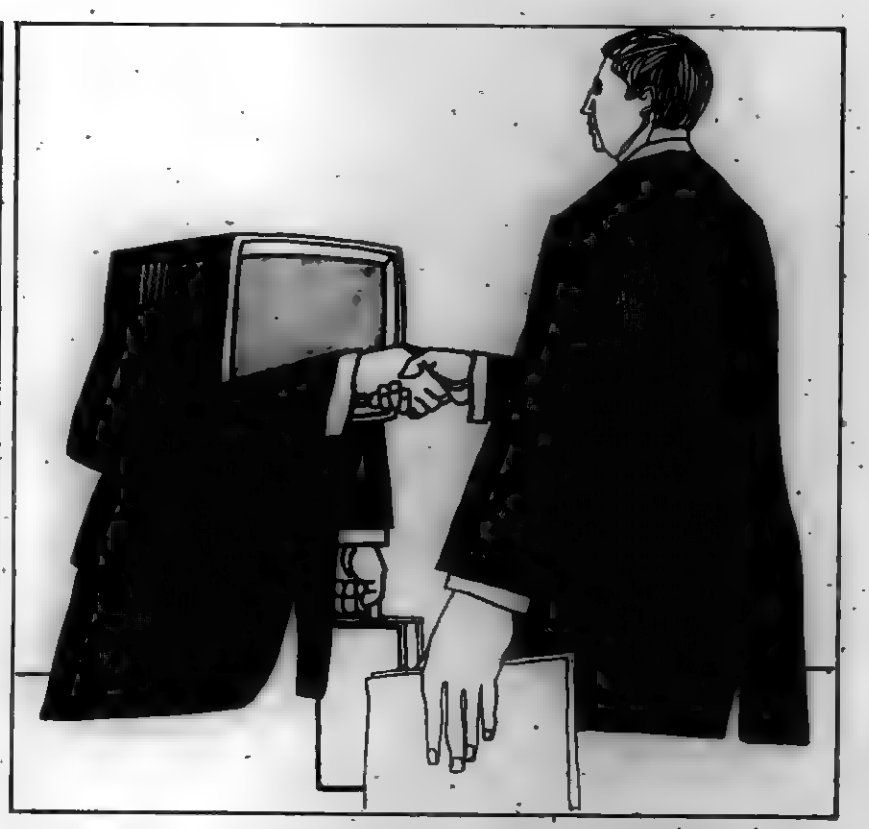

support automatically as a function of the user need. If, for example, an experienced user decides he is tired of a particular system warning, an expert-friendly system will allow him to suppress this irritant, but then he is on his own. The user cannot expect the system to discover the times that he still needs the warning.

Menu, prompt and warning bypass all require command language power. As the user gains system experience, he learns more and more about the user interface flexibility supported by the language.

Logical user files offer another powerful vehicle for implementing novice and expert flexibility. They allow each user to tailor the system to his own experience level. Warnings and other novice-level support can be gradually turned off, and expert-level productivity aids can be gradually turned on.

There are three basic user interface design strategies for maximizing user productivity:

1. Minimize user interface time factors for each request/response dialogue component.
2. Minimize the number of request/response pairs needed to accomplish a given amount of work.
3. Maximize user input data integrity.

The first two strategies improve user productivity by reducing the time required to accomplish a fixed amount of application work. That is, they focus on techniques that get the job done more quickly. The third strategy recognizes that the reliability and quality of information are directly related to the productivity of all those who are affected by system outputs.

The first strategy is implemented by techniques that reduce one or more of the following:

1. Response comprehension time.
2. Input preparation time.
3. Cursor movement time.
4. Information keying time.

Some design features serve this end by recognizing and satisfying basic human needs. Another category of techniques reduces user interface time factors by exploiting functional and data repetition inherent in the application. Generally speaking, techniques in this second category require the expertise of the experienced user, while those in the first do not.

Techniques that help to reduce user interface time for any user include:

1. Screens organized for eye movement and cursor movement efficiency.

2. Utilization of terminal and teleprocessing monitor features that speed cursor movement.

3. Consistent identification and location of information that appears on multiple screens.

4. Needed reference information supplied on the response/input screen.

5. System response messages that are precise and standardized with respect to vocabulary and structure.

Experienced users may take advantage of application repetition to reduce user interface time factors through:

1. Screen initialization techniques that allow reuse of input values from the preceding input screen.

2. Screen initialization techniques that allow the user to save or retrieve frequently used input values on or from supporting logical files.

3. Internal completion techniques that supply missing request information by exploiting a logical key relationship with information entered by the user.

4. Internal completion techniques that allow the entry of abbreviated values with subsequent internal expansion.

5. Internal completion techniques that supply missing request information by duplicating other values entered by the user.

6. Work sequence and selection control features that support maximal back-to-back request repetition.

7. Dialogue-level control techniques that minimize the need for request-level user instructions.

Experienced users may also exploit application repetition to reduce the number of dialogue request/response pairs. Techniques that eliminate unproductive pairs and/or improve the work contribution of productive pairs include:

1. Menu, prompt and warning bypass.

2. Techniques that allow bypass of the "see it one more time" successful response in order to prepare the screen for new work.

3. Methods that combine error correction with new work.

4. Compact entry and/or reference formats based on common/exception analysis.

5. Mass change, copy and other powerful information update commands.

6. Information retrieval and summarization features.

Finally, techniques for maximizing input data integrity include:

1. Screen initialization, internal completion and other methods that reduce direct keying of input.

2. Screen field relationship edits.

3. Personalized file-driven validation.

4. Rollback/undo features.

If minimal functionality is to be preserved for novice users, productivity aids must be available as user interface options. The beginner should not be required to use the aid in order to get his work done. But as the novice

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gains system experience and becomes increasingly interested in work efficiency, he should learn how to activate the productivity enhancement features.

Each of the following examples illustrates an efficiency aid together with an activation method. In each instance, note that the user does not need the aid to accomplish his application-related work. However, if he activates the aid, he can accomplish his work more quickly and/or more accurately.

1. For an order entry application, the entry clerk notices that he has several orders with the same accounting and shipping information. The system allows him to interrupt the order entry dialogue, "check off" the accounting and shipping fields, enter a command to set the redisplay rules and continue with the order entry dialogue, with the system now redisplaying shipping and accounting data from the prior order to initialize the screen for the next order.

2. An employee information maintenance system allows the update of one employee's information to be combined with identification of the next employee whose data requires update. If error correction is not required and the next employee has been identified, the response displays information for that employee.

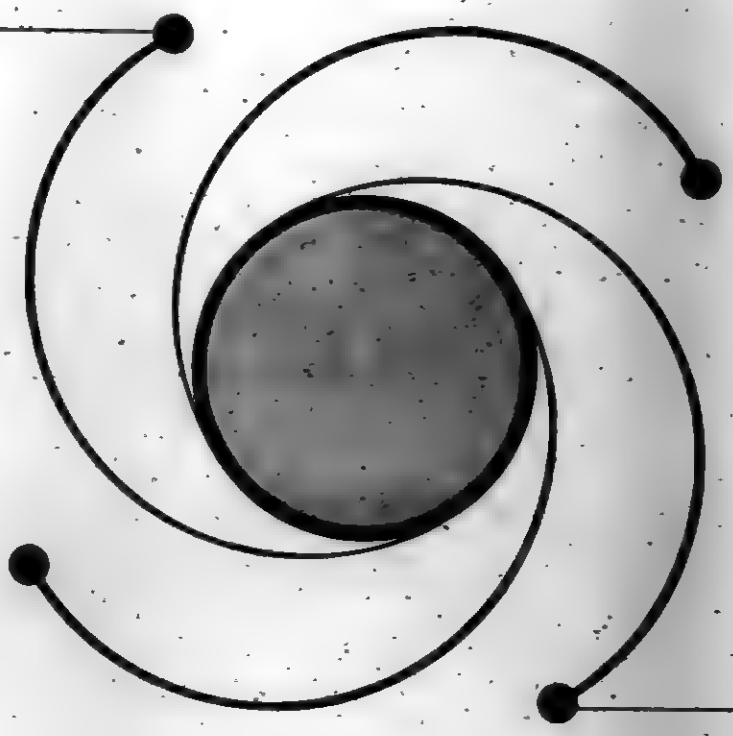
3. Since health care claims often list several services with the same diagnosis and/or service date, the claim data entry screen contains default fields for this information. If the data entry clerk enters default diagnosis and service data values, he may then omit identical values at the individual service level. The system will internally complete the service level information by duplicating the corresponding default field value.

4. A process control information system reports inspection information that is repetitive with respect to product line equipment and equipment operators. Considering this data repetition, the user is allowed to maintain tables of valid equipment IDs by product line and valid operator IDs for each equipment ID. These tables are then used for validation of input inspection information. In addition, if there is only one valid operator for a given equipment ID, the system can internally complete the operator information.

Interactive systems can help the beginner gain basic system familiarity, support and teach novice-feature bypass and satisfy the "power" needs of experienced users without negatively affecting the beginner. If today's so-called user-friendly systems have failed to accomplish this end, the fault lies in method, not objective. The problem is not one of design trade-offs. The solution is good design technique.

About the Author

William Quirk is a systems design consultant who lives in Guilford, Conn. This article is based on information in his interactive systems design seminar, a two-day course available through William G. Quirk Seminars, 1500 One Corporate Center, Hartford, Conn. 06103.



- *Package Software*
- *Data Base Management Systems*
- *Fourth-Generation Languages*
- *Structured Systems Methodologies*

Four Tools to Build Systems Synergy

Four technologies which evolved in the 1970s typically are offered as separate, total solutions to data processing problems. But package software, DBMS, nonprocedural languages and structured methodologies are more effectively used together, combining the strengths of each to minimize their individual weaknesses.

By Mike Ruggera

Companies assign their data processing managers to take charge of two divergent missions: to support high-volume production systems as well as tactical and strategic business planning.

It is not unusual for a production system to spend two to three years in development and then be used by the business for the following 10 to 15 years.

Tactical and strategic systems, on the other hand, are characterized by short lead times and short life spans. A manager may request an analysis in the afternoon and expect the results on his desk the next morning. After reviewing the result, he often tosses it out and requests a totally different analysis. The functional manager can ask for any data from any source at any time. This unpredictability can be particularly unnerving to the DP professional unprepared to cope with it. However, this unpredictability is a critical part of tactical and strategic analysis; the DP professional must learn to handle it.

During the last decade, a number of technologies emerged to help companies develop a "total solution" to their information systems problems, encompassing the production area, as well as strategic and tactical planning.

Package software, data base management systems (DBMS), fourth-generation languages and structured systems design and development are unquestionably major accomplishments in the effort to deliver information systems to modern businesses. However, proponents often mislead users in presenting these aids individually as complete solutions to the information system problem.

The first step in building a truly "synergistic" systems environment is to recognize those four technologies as tools to achieving the business' system objectives. Each tool must be used in a framework that maximizes its advantages while minimizing disadvantages.

The second step toward a synergistic environment requires that the data in the business be viewed relationally. This statement does not mean the data must be contained in a relational data base. Business data has always

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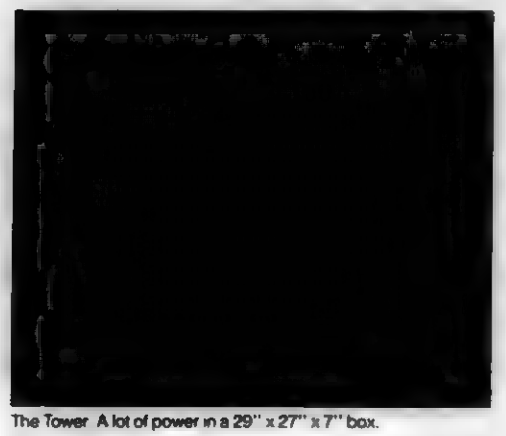

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been inherently relational. People just never looked at their data this way because the effort required to perform the relational operations in procedural languages far exceeds the value of the resulting information. Fourth-generation languages change the situation completely.

Any data file can be viewed as a table of rows and columns. The rows are records of the file, and the columns are the individual data elements. This concept can be applied to any file in a business regardless of whether it is physically organized as a sequential file, an indexed file or in a data base. It also applies equally well to tape files, disk files or any other physical medium.

In practice, the concept is very difficult to apply using third-generation languages like Cobol because one gets so completely immersed in the details of the access method. Using fourth-generation languages, defining a file simply requires writing a set of statements and usually takes an hour or two. In using the file definition, one is oblivious to the file's physical structure.

Columns of the table can be isolated as is done in producing a report. Data elements from the file are selected to appear. This selection can be done easily in procedural languages and in a fourth-generation language.

Rows of the tables can be selected using any criteria. This procedure is also typically done in reporting as records from the file are chosen to be included in a report. It can also be easily done in Cobol and in a fourth-generation language.

These tables can be logically matched with each other by using a column in each table that contains the same data element. In this way, data that is logically related but stored in different physical files can be brought together for reporting and analysis. This kind of file matching is very complicated in procedural languages because of all the details of the matching logic. It is trivial to perform in a fourth-generation language.

For any two tables that do not logically match because related data elements are not the same data element, a third table can be constructed that will define how to relate the other two tables. If one is presented with two files that cannot be matched directly because they do not contain the same data element and if they contain related data elements, a file can be created that specifies how to match records of the two data files.

This type of matching is hardly ever performed in Cobol because it requires writing programs to create and maintain the intermediate file and programs to perform the two matchings. In a fourth-generation language, the intermediate file can be created and the maintenance routines written in about a half day. Then the routines to perform the two matchings can be written in an hour or two.

Figure 1 contains a subset of the data files in a typical company. Note the fragmentation of the data into separate files. Each file was probably created by a separate system built some 10 to 15 years ago. Note that both files (budget and actuals) contain the same data element, account number. Creating a report of budget and factual data in a fourth-genera-

(Continued on In Depth/18)

BUDGET

Acct	Budget
100	3879
200	574
300	1396
306	563
400	1276

ACTUALS

Acct	Y-T-D
100	5000
205	900
300	2500
306	750
400	2000

PROJECT

Prjt	Y-T-D
704	276
709	97
710	143
713	358
724	34

PROJECT <-> ACCOUNT

Prjt	Acct
704	205
710	205
709	400
724	400
710	100

Figure 1. Example of Fragmented Data Files

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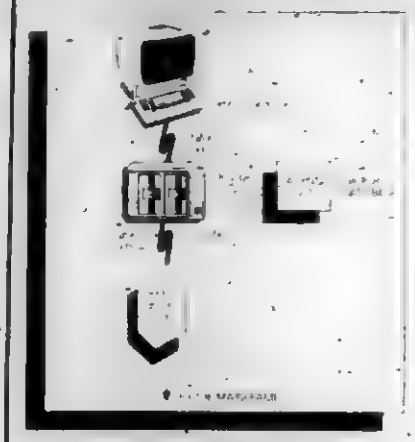

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IN DEPTH

Surveying Four Technologies

Achieving a synergistic system architecture requires an understanding of each technology's pros and cons. Here is a brief rundown:

Package software. The biggest advantage is its low cost. Most packages are available in the range of $60,000 to $100,000. A comparable system developed in-house could cost from $350,000 to $500,000.

Another important advantage of package software is that good documentation and training is professionally provided.

Software vendors are responsive to the impact of regulatory change to system logic. Typically, if a new regulation is enacted, resources have to be removed from a current project to revise old software to comply. With package software, the vendor makes the modification and ships it to current users at little or no charge.

Also, this kind of software is especially advantageous for multidivisional corporations. They set the standard for the particular application, eliminating the expense of multiple development efforts. Also, it may be necessary to have only one support group serving all the divisions. Both these points can result in substantial savings and provide continuity in a field experiencing a great deal of personnel turnover.

The final advantage is that the software will constantly be upgraded by the vendor. As information system technology changes, the vendor will change the software to take advantage of the new capabilities. No longer will the software go out of date.

Probably the biggest disadvantage of package software is that the package will not do everything the way the company would like. In all cases, some changes will have to be made to fit the practices of the business to the package. However, one objective of installing a new system may be the elimination of current inefficient practices, which packages encourage.

Another disadvantage of package software is that the company is beholden to the vendor to upgrade, fix or modify the software. More often than not, the priorities of the vendor are different from your priorities. Similarly, one is forced to upgrade the software when the vendor issues a new release irrespective of whether one wants to use the new features of the new release. In fact, if the software is not kept up to date, the vendor will refuse to support it.

Finally, package software, like traditional systems, is built to stand on its own and therefore does not integrate well with other systems. If one buys multiple systems from the same vendor, there is some assurance that these systems will transfer required data from one system to another. But at no time does the vendor assert that its software will integrate with any of the user's systems.

Data base management systems (DBMS). The major advantage of the data base concept is the physical separation of data from programs. Close behind this advantage is the ability to integrate all the data of all the systems of the business. Of less importance is the ability to manage the company's data as a data resource and the ability of the DBMS to handle high transaction volumes at good speeds.

But there is also a catastrophic disadvantage to using a DBMS. To achieve the full benefits of organizing one's data under such a system, it is necessary to build all the systems of the business using the DBMS. The result is often referred to as a total information system. A large number of companies have tried for this goal and failed miserably.

If you are talking about rebuilding all of your information systems, you are undertaking a project of colossal proportions. To be specific, a total data base project is usually projected to take hundreds of man-years and cost tens of millions of dollars. It may require five to eight years to complete. During the initial two to three years, the subsystems and data requirements are being analyzed. No programming is being performed, and therefore no subsystems are completed. The fortunes of the business can change or there can be a change of management and the data base project is interpreted as producing no results and is summarily terminated.

Even if total data base projects were not terminated for managerial reasons, they contain a philosophical contradiction. A total data base project takes years to complete. Meanwhile, businesses change over time, and with change their information needs change. As a result, the business the subsystems were designed to handle will not be the business at the time the project is completed. In many instances, the divergence will be so great that the completed systems would be useless. The data base project team would have to start designing a new set of subsystems.

Fourth-generation languages. Fourth-generation languages are software that permits the system designer and programmer to concentrate on the business problem rather than the structure of the data or the details of programming logic. In using a fourth-generation language, one thinks in terms of what one wants the program to do instead of how the program is to perform the "what."

The major advantage of fourth-generation languages results from the drastic reductions in program development effort. For example, a sys-

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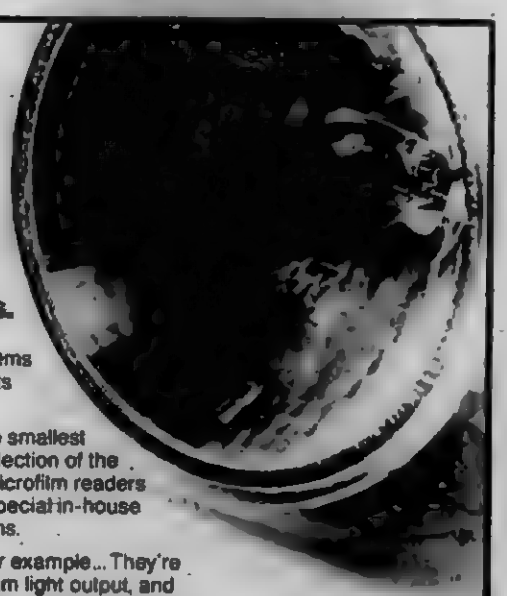

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Where Strengths Counteract Weaknesses

tem that might take eight to 12 months to design and program in Cobol can be expected to take 1½ to two months in a fourth-generation language. This ability to generate systems quickly makes these languages highly attractive for tactical and strategic analysis. By definition, the need for these types of systems arises and dissipates very quickly. If they were to be developed using traditional programming tools, by the time the software was completed, the system would no longer be needed.

Fourth-generation languages are relatively easy to learn and use. The average learning curve of a traditional programming language like Cobol is two years, while the average learning curve of these languages is two months. As a result of this short learning period, it becomes practical to teach user managers and their subordinates to use these languages to solve their own problems.

Similar to DBMS, fourth-generation languages have the advantage of separating the data from the programs. This trait makes it possible to add new data elements or reorganize the data without having to rewrite the programs that use or update it. The ability to access data from any file may be the most powerful of the software's strengths. Most of the project backlog in data processing shops comes from requests to obtain reports from existing files. This work is not done because each report would require three to five days of a Cobol programmer's time and the priorities have been set to work on large projects only. Using a fourth-generation language, this type of report can be completed in half a day.

Along with the ability to access any file in a data processing shop, these languages provide the ability to match data from these files. A typical user request these days is for a report that requires data from two or three different files. Using traditional programming tools, such a report would require two to three weeks to complete. Using the file matching capabilities of this language, such a report can be generated in a day.

The major disadvantage of fourth-generation languages is that with all the available flexibility and all the promotion about how easy they are to use, they can fall victim to very serious abuse. The first area for abuse comes from letting inexperienced users design their own systems. Invariably, they will take a wrong course and find themselves with an unmanageable result or a result that costs much more then it should to run.

The second area of abuse comes from the idea that once users have had basic training in these languages, data processing can forget about supporting them. Nothing could be further from the truth. Data processing and the users must come to some agreement as to what level of complexity the user may undertake before data processing will get involved.

The second disadvantage of fourth-generation languages is that they are poor at processing volumes greater than about 15,000 records. A number of people have seen these languages' all-round utility and fast system development capability as a signal to program every system in the shop in the language. The results are invariably disastrous. These languages are generalized software designed to handle a large number of request variations for a fair-size data base. To handle very large data bases, one has to accept the fact that customized application-oriented software will be required.

Structured systems design and development. The major advantage of this approach to software development is that the user is involved throughout the entire process. His participation ensures that his desires will be met and that there will be an understanding of what the system's capabilities are.

The next advantage is that this methodology affords great control over the software development process. Every step has certain outputs expected and the step is not considered completed unless the outputs have been presented and approved by the user and peers in the systems and programming group. And if someone should leave the staff, the project will not be substantially delayed. The new person can review the documentation of the previous steps and continue the project.

Finally, by following the methodology, one is assured of achieving a high-quality software product. This result will pay repeated benefits as it becomes necessary to maintain and enhance the software over its lifetime.

The major disadvantage of structured system development is that one is still developing systems from scratch. All the high costs associated with this kind of effort will be experienced. Also, there is a heavy time commitment required by the user. In many projects, the user must assign people full time to participate in the development effort.

The methodology has to be performed by trained, experienced people. Valuable staff members may have to be taken away from other projects and a good deal of money spent on training. Even with all the training, there is no assurance that the people will understand and adopt the concepts involved.

Finally, since the system will be built in-house, it will have to be maintained in-house.

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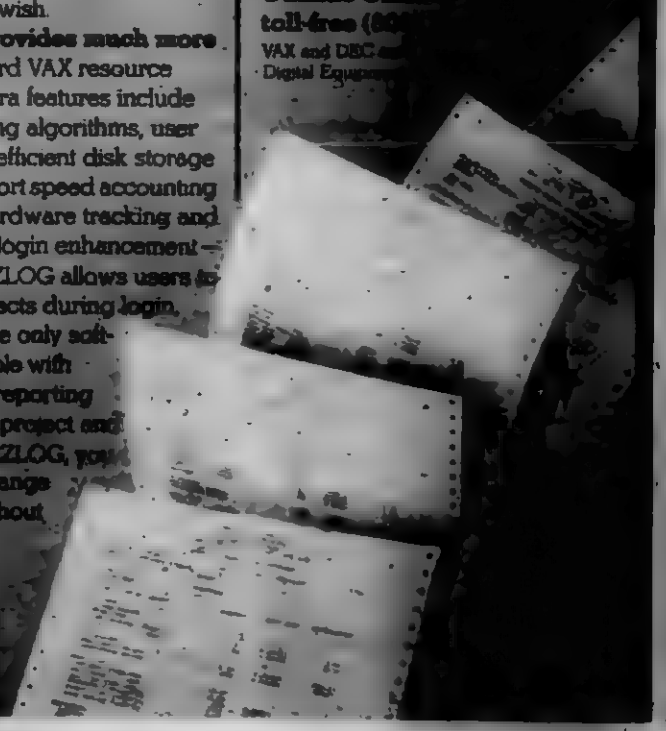

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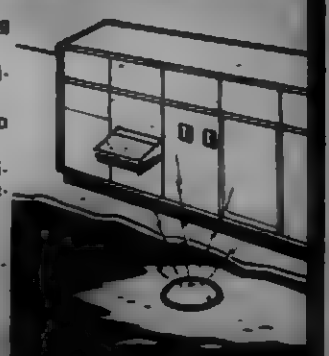

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100	Gamma	792	Jack	1685	2065	3750
100	Gamma	721	Alex	638	754	1392
400	Zulu	792	Fred	2682	2364	5046
400	Zulu	834	John	385	571	745

Figure 2. Traditional Flat File

(Continued from In Depth/15)

tion language would simply require writing the file definitions of the two files and the routines to create the report. This job can probably be accomplished in a day, but certainly would not take more than two days.

Another file in the DP shop contains project data. This file contains the data element, project number, which is related to but not the same as account number. Reports using this file with the budget file and/or the actual file can be created by defining the relationship between project numbers and account numbers in another file. This file can be created in the fourth-generation language data base and maintained using the maintenance language. The resulting files can be matched and the desired reports created. A project like this could take two to four days to accomplish using a fourth-generation language.

Fourth normal form. Using the relational approach to data files and fourth-generation languages to manipulate data provides the ability to access any data in any logically related way. An approach is required to direct the file designer to the files that should be created and maintained. That approach is normalization.

Fourth normal form, which describes the result of this process, is the state of data when the repetitions have been removed in the three steps described below. There is a first normal form, which is trivial and consists of a straight listing of the data elements in the data base.

The first step of refinement checks that all nonkey data elements are dependent on the primary key: Any data elements not properly dependent are moved to new record segments, and the result is second normal form. Any system that has the same header information repeated for every detail record is not in second normal form. As a consequence of this file design, when any header information is changed, it has to be changed in every record. As a result of programming errors or data errors, the change is often not made, and the result appears as annoying reporting anomalies. Many systems have header records and detail records as a step to attacking this problem.

The second step is to ensure that all nonkey data elements are nontransitively dependent on the new primary keys. Any data element that is dependent on a data element that is not the primary key is moved to new record segments, and the result is third normal form. Data elements like account titles, department names and code descriptions should be in separate files. If the title or description is repeated on every record where the code appears and the title is changed, it has to be changed on every record. Also, when a new entry is made, the title must be the same as previous entries. In either case, reporting and selection problems will creep into the files.

The third step is to check that multivalued dependencies are not also functional dependencies. Any data element that satisfies this test should be moved to separate record segments. The result is called fourth normal form. Many files contain records with data elements that are direct functions of other data elements in the record. These can be tabular functions where the price or packaging is put in the record with a product code or values are added and the sum is in the record. In any of these cases, if the function key or argument is changed but the result is not, reporting and selection anomalies will result. The only way to avoid these problems is to keep functional data dependencies in separate tables

PROJECTS

Nbr	Title
100	Gamma
400	Zulu

DEPTS

Nbr	Mgr
609	Henry
792	George
721	Alex
834	John

EXPENDITURES

Prjt	Dept	Q1	Q2
100	609	964	854
100	792	1685	2065
100	721	638	754
400	792	2682	2364
400	834	385	571

Figure 3. Same data as Figure 2 in Fourth Normal Form

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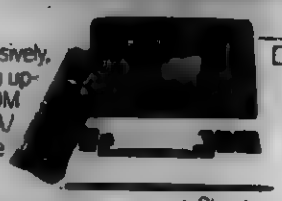

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IN DEPTH

and calculate the function only when it is needed.

Figure 2 (on In Depth/18) shows a traditional flat file. Note that the project number and project name constitute a repeating group, the descriptors for project number and department number are included, and the sum of the first and second quarters' expenditures is included as the year's expenditures. This file also demonstrates all the anomalies mentioned. There are two different titles for Project 100. Department 792 has two different managers. And the yearly expenditures of Project 400, Department 834, is not the correct sum of the two quarters' expenditures.

Figure 3 shows the same file in fourth normal form. The project repeating group has been separated out; the department managers have been moved to a separate file; and the yearly expenditures have been dropped.

The traditional flat file can be logically created at any time by matching the appropriate data elements without concern that data anomalies exist. If a data error exists, it will be blatantly obvious because it occurs in every instance, and correction in one place will correct all the reports.

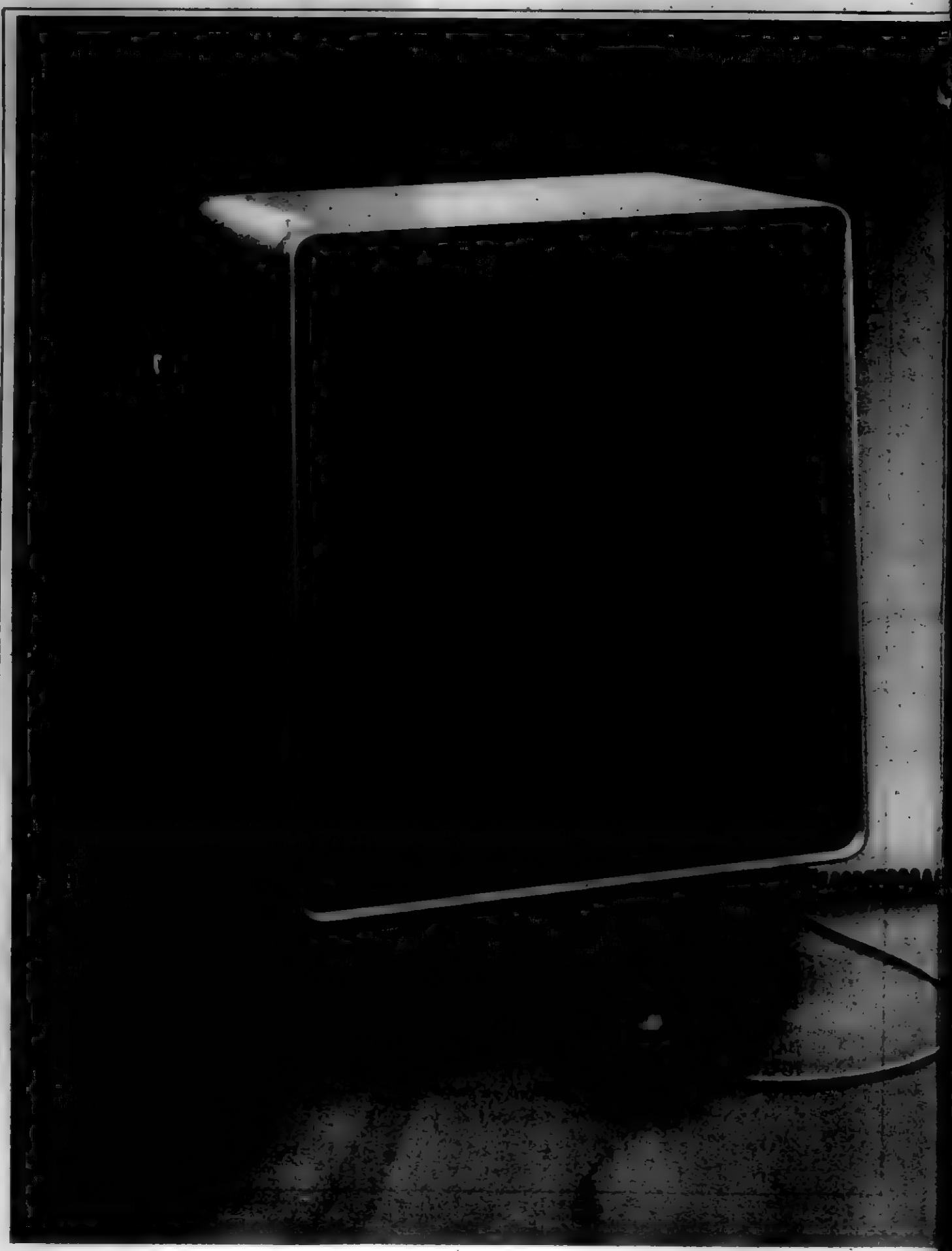
A classic diagram of the position various information systems take in business would show operational systems as the base for the total system environment. The tactical systems build on the operational systems' data, and the strategic systems build on the tactical systems' data.

Each of these layers of systems serves a different level of management. The operational systems serve the operating managers. The tactical systems serve middle management in shaping policies and procedures. The strategic systems serve top management in setting a long-range course for the business.

The bottom layer for any information systems environment is the business. If any system is not supporting the business in some way, it should be eliminated.

The second layer of the environment is the operational systems. These systems exist to support daily business functions. Package software will be a primary component of our operational systems. It is inexpensive, well documented, maintained and enhanced by the vendor and can be installed and put to use quickly with little risk of failure.

For most businesses, the following systems can be purchased in package form:



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In any business, there will always be some systems that are peculiar to that particular business or for which performance is a critical factor. An example of the former would be the "back-room" accounting of a brokerage house or the policy information system in an insurance company. An example of the latter would be a decentralized order entry system for automobile parts or an airline reservation system. For these systems, no package software is available and will probably never be available. In these cases, the business has no choice but to build its own system from scratch and accept the costs of doing so.

There are, however, several choices in building systems from scratch. The first consideration should be the use of a fourth-generation language, which affords drastic reductions in development time and provides inherent flexibility. Regrettably, there will be many systems for which the transaction volume will be too great or the speed too slow to be programmed in a fourth-generation language. For these systems, application generators should be considered for parts of the system if not for the whole. Only as a last resort should procedural languages be used in the system development process.

On the other hand, use of a DBMS should be strongly considered in order to achieve the benefits of separating the programs from the data and to provide for the possibility of future systems using some part of the data base of the current system. Most of the application generators provide convenient interfaces to the popular DBMS.

With a good base of operational systems, the tactical and strategic systems can be tackled. The purpose of these systems is to permit intermediate and long-range planning. The first step is to provide access to every file in the DP shop. If this access is provided with the file definition capabilities of a fourth-generation language, the relational approach can be applied to the data. In this way, reports can be prepared from any file. Data that has been scattered into separate files can be brought together. If two files are logically related but do not contain the same data element, another file can be created to contain records that tell how the other files should be connected.

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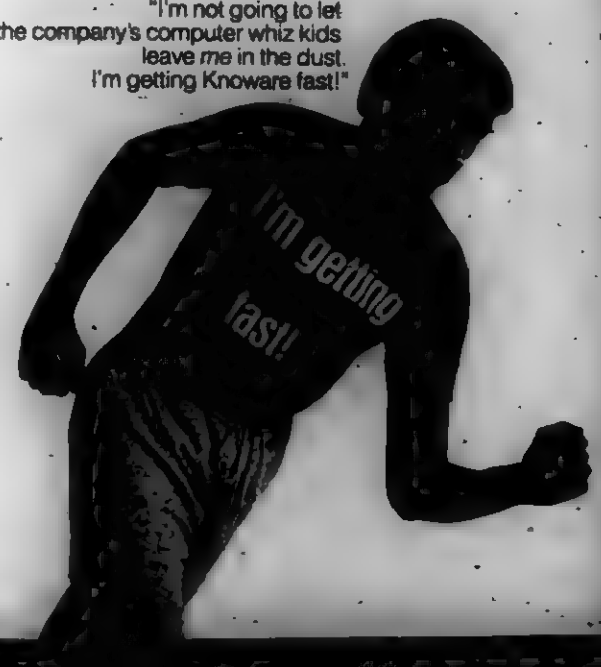


IN DEPTH

Users will invariably want to access files that have not yet been defined or will try to generate a report that is beyond their experience. For these reasons, a support group should be established.

every file in the data processing shop, the final step is to train staff members to use the windows and to support their use of the windows. The first item requires sending user personnel to the basic training sessions provided by the fourth-generation language vendors or providing the same training in-house. After basic training, it is necessary to provide some in-house training about available data and to emphasize the ability to join data in different files. This last point is usually underplayed in most vendor training.

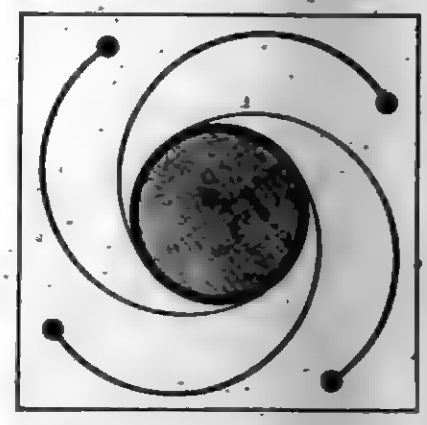
Figure 4 shows a user terminal connected to the files of a sample data processing environment. The business has purchased a general ledger, sales analysis, inventory control and production control system for its operations. It has decided to build four of its information systems from scratch, one by using a fourth-generation language, two with an application generator and the last with a procedural language.

All these systems were analyzed, designed, programmed and implemented using structured system design and development. The structured approach allowed for project control and ensured that the users' needs were being met. As a product of the methodology, the appropriate documentation would be written and serve to support the system throughout its life.

A fourth-generation language file definition was constructed for every file in the business. It made no difference whether the file was from package software or from a home-grown system. After the definitions were created, it was realized that some of the files did not match because of different but related data elements. Table files were then created to match these files.

It has been recognized that users will invariably want to access files that have not yet been defined or will try to generate a report that is beyond their experience. For these reasons, a support group should be established.

When a user wants to access a file that has not been defined, this support group develops the file definition. When users attempt reports beyond their abilities, the support



group provides assistance in developing it.

Implementing the synergistic systems environment. Since most businesses already have systems in place, what they need is some reasonable way to move from their current environment to the environment proposed above.

Any data processing shop can start at the level of defining the currently existing files to a fourth-generation language. This beginning immediately makes it possible to produce many reports that users have been requesting for some time. A program of user training and user support provided on a continuing basis would soon have to follow.

It should be noted that it is not necessary to define all files in the beginning. In fact, one could let the reporting demands direct which files need to be defined. Since file definition takes such a short time, it can be done just when it is required.

With the pressure relieved from the demands for tactical, strategic

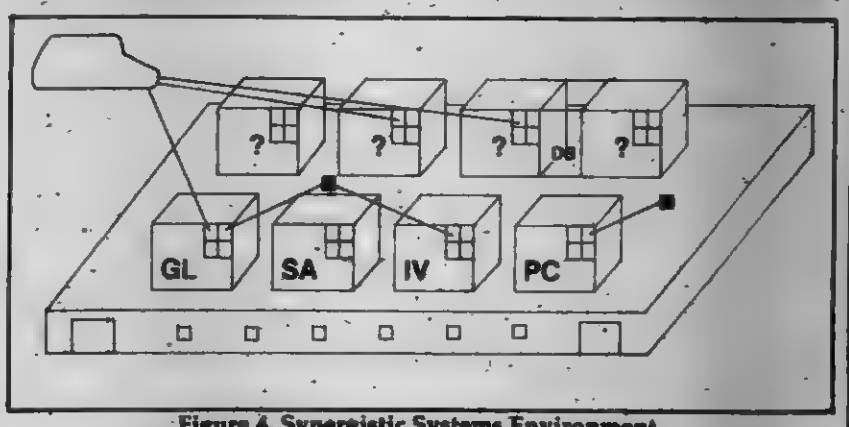


Figure 4. Synergistic Systems Environment

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information, the shop can turn its attention to upgrading the operational systems that can be replaced by package software. No concern should be given to how the package will affect fourth-generation language file definitions of existing files. When the new package is in place, the file definitions will be redone using the same field names to refer to the same data elements as much as possible.

This point is where the independence of fourth-generation languages between the file and the programs becomes invaluable. As a result, 70% to 90% of the fourth-generation language code used to produce reports under the old files should be immediately usable under the new files. Of course, some code will have to be adjusted to the new processing environment, but if this architecture is followed, that work will be kept to a minimum.

Users will invariably want to access files that have not yet been defined or will try to generate a report that is beyond their experience. For these reasons, a support group should be established.

With as many systems as possible converted to package software, attention should be turned to rewriting the remaining systems. Again, in these efforts, every attempt should be made to use fourth-generation languages where performance is not critical or high volumes are not expected.

Where fourth-generation languages are not appropriate, the system should be built with an application generator and data bases for maximum speed and flexibility.

In either case, a structured systems design and development methodology should be used to manage the project and keep the users fully involved. The analysis and design phases must be performed no matter what development tool is used. Structured systems design and development give adequate opportunities for deciding if fourth-generation languages or application generators are more appropriate for the development phase.

The result of this entire effort should be a very strong set of production systems, obtained at a reasonable price and installed over a short period of time. An added benefit is that maintenance and enhancement are largely performed by the software and, therefore, maintenance expenditures can be kept to a minimum. Through the use of fourth-generation languages and the relational approach, users will gain easy access to data for tactical and strategic analyses. This benefit alone may be priceless.

About the Author

Mike Ruggera is a consultant based in Fords, N.J., who helps organizations achieve information systems objectives through the "synergistic systems environment."

He specializes in matching advanced software to an application.

Ruggera has worked in data processing since 1970 for companies such as RCA Corp., Chemical Bank and Engelhard Corp.

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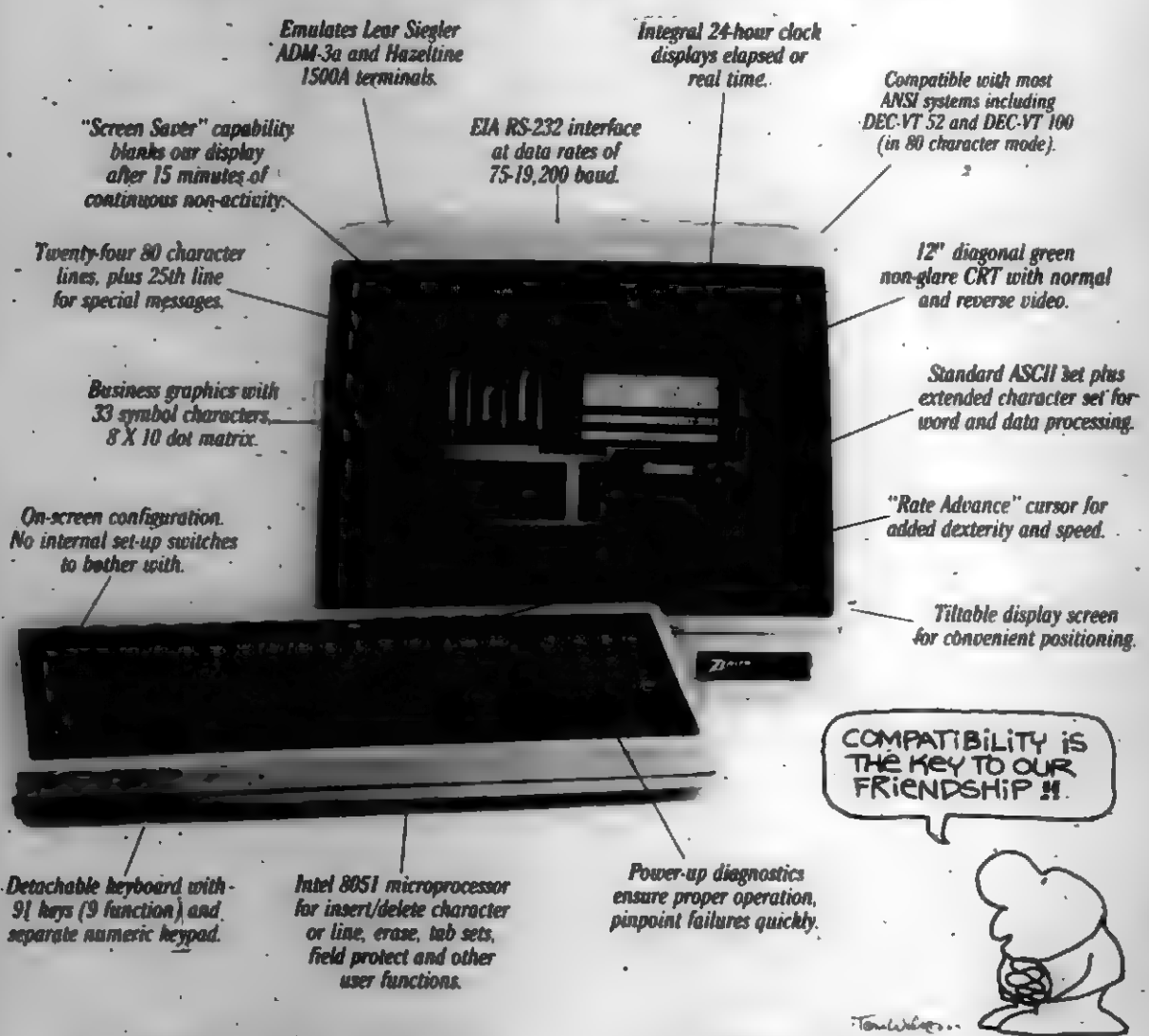

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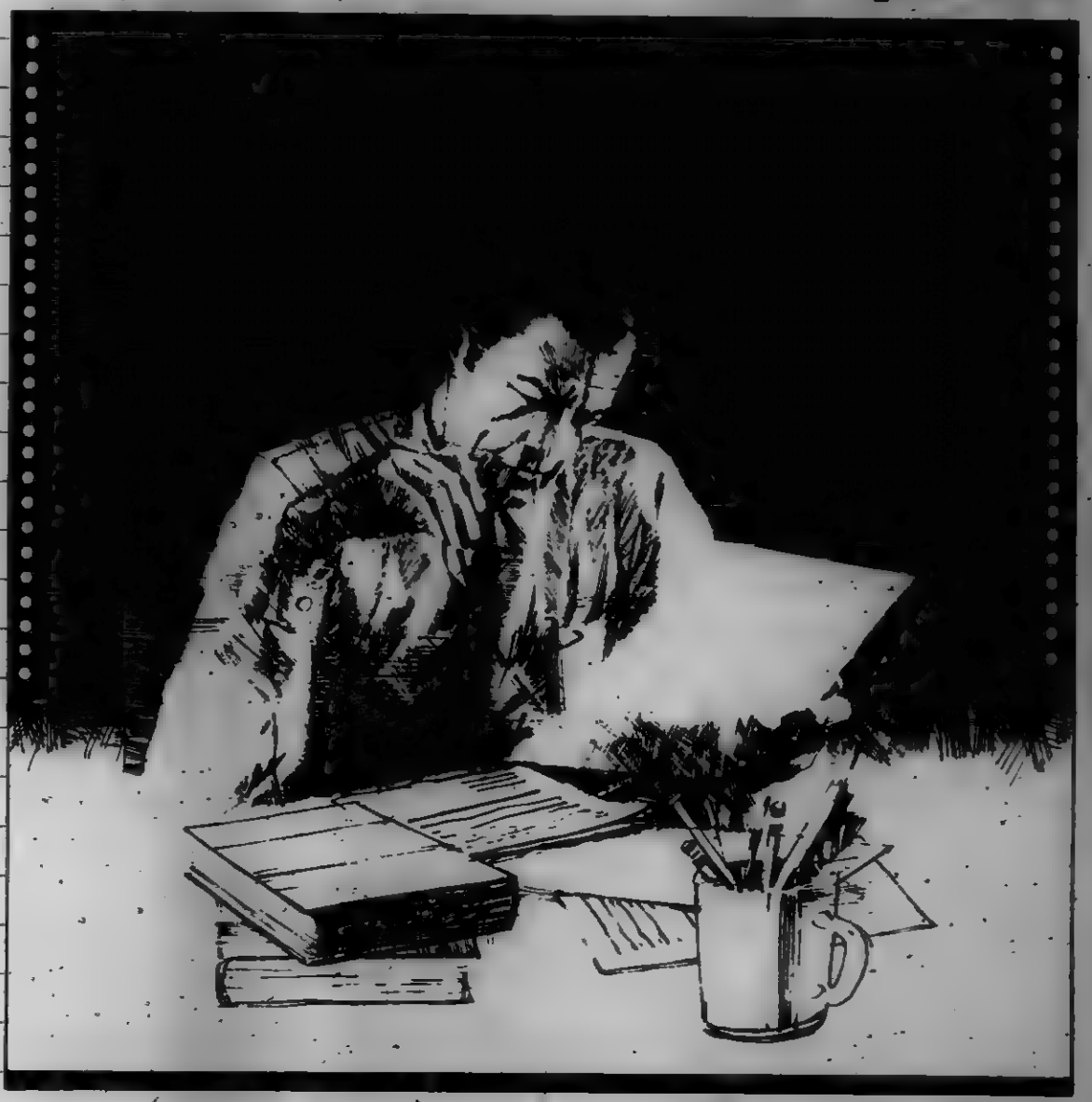

Edited by Paul Gillin

October 31, 1983

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Data Catalog Eliminates Data Base Middleman

By Dale P. Van Aman
And Mark W. Clark
Special to CW‡

'Virtually all of the ingredients necessary to involve the user in the data-to-information conversion and analysis process are a reality today: individual processing capabilities in the form of microcomputers; networks linking widely dispersed access ports to central data bases; and high-level languages to provide the user with human-compatible data analysis tools. Yet a middleman is still necessary to access the data.'

Companies today are rapidly becoming information-starved animals with an insatiable appetite for data. Yet conventional methods of satisfying this appetite, such as on-line, event-driven information systems, simply cannot keep pace with the demand:

Traditional information handling techniques — those of batch and/or on-line computerized systems using structured data bases and developed by computer specialists — can no longer remain as the total solution. Their inherently long development time and relative inflexibility to change are, in fact, contributing to the same information bottleneck that they were originally designed to alleviate.

If the growing demand for information is to be truly satisfied, end users must be involved directly in the data retrieval process, and the process must be dynamic and unstructured.

Generally, users of an information center do not access corporate data files directly, but instead utilize generalized extract routines operated by a member of the information center staff. So while we have moved toward involving the user in the process, we have not done away with the middleman — only changed his title from programmer to information center consultant.

Virtually all of the ingredients necessary to involve the user in the data-to-information conversion and analysis process are a reality today: individual processing capabilities in the form of microcomputers; networks linking widely dispersed access ports to central data bases; and high-level languages to provide the user with human-compatible data analysis tools.

Yet a middleman is still necessary to access the data. Data extraction is not performed in a real-time environment, thereby creating a critical time delay in gaining access to requested data.

In most large businesses, data is generally captured and stored using a variety of discrete methods, all containing a high probability of discrepancy involving the description and definition of data elements. This makes it difficult, if not impossible, for the end user to assemble the correct data elements necessary to analyze a business problem or opportunity.

At the Essex Group of United Technologies Communication Co., these questions have led to a vision of a user-driven data retrieval capability referred to as a data catalog. The catalog is a concept in which the information manager assumes the role of the keeper of business data and acts as a centralized control ove. data element values. Data elements are linked together in a mode appropriate to allow common data values to be maintained and that permits the end user to extract data logically and directly without the need of a technical middleman.

With this concept, the conversion of data to information becomes the end user's responsibility using friendly data manipulation tools. The importance previously placed on which tools to employ ceases to be an issue.

Conceptually, the data catalog should contain the following properties:

- All forms of computerized data

(Continued on SR/4)

Integrating DBMS With DSS Seen Key to Decision Making

By Miles A. Vogel
Special to CW‡

Even though data base management systems (DBMS) have been commercialized and widely used, the effective utilization of DBMS to achieve more effective decision making is questionable until the point that the DBMS is integrated and is the hub of a decision support system (DSS).

Let's first give a definition of these significant management tools as well as an illustration of the traditional approach of file management.

A data base is simply a collection of data logically organized to meet the information needs and time constraints of the entire organization. These data items are processable by application programs or by the data base information-retrieval language.

The data base system's primary function is efficient management of files for information. A total data base system has two main features: one to manage data centrally for many applications and the other to make data available for on-line ac-

In a data base system, the data files are organized in a manner that facilitates their use in a multiapplication environment, enabling company-wide usage without modification of the system. Thus, the emphasis is not on a particular application with spe-

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Depends on Nature of Software

Relational Systems: Key to Curing Backlog?

By William H. Inmon
Special to CW‡

Not since the 1970s and the clamor to go "data base" has there been a concept so touted as relational data bases. The most loudly proclaimed rationale for relational data bases comes in the promise for the reduction of the ever-increasing user backlog of requests for new systems.

The purpose of relational data bases is to put the development of systems in the hands of users by means of software that is extremely user-friendly, even to the point of being user-seductive. By doing so the user can develop his own system, thus bypassing traditional data processing development. But is this strategy really going to work?

The answer lies in the nature of relational software and in the backlog of user requests. The trademark of relational software is that it is very user-friendly and allows the user to change his mind quickly once the results of processing are obtained.

The typical uses of relational software are threefold. In one application, data is passed from the operational environment to the relational environment. Typically, the processing done in this mode is decision-support processing (see Figure 1). A second use of relational software is as an electronic filing cabinet. A third use is by small groups of users for processing a limited amount of data. A typical hardware configuration for relational systems is shown in Figure 2.

'The typical uses of relational software are threefold. In one application, data is passed from the operational environment to the relational environment . . . A second use of relational software is as an electronic filing cabinet. A third use is by small groups of users for processing a limited amount of data. But there are some limitations . . .'

But there are some limitations that are caused by close proximity to data and the concomitant ability to change the usage of the data. These include the amount of data that can be pragmatically handled, the amount of processing that can be concurrently processed and often the concurrency of data.

Practically speaking, relational systems can handle far less data and far less processing than operational systems. Often the data that is handled relationally has been extracted or downloaded from an operational environment, thus being up to date only to a moment in time past.

Another limitation of relational software occurs when the software is run in the micro environment. In that case, the software is limited by the physical capabilities of the microprocessor.

In contrast to the strengths and weaknesses of relational systems are the strengths and weaknesses of the operational environment (which is supported by hierarchical and network data base management systems). The operational environment is capable of handling large amounts of transactions and large amounts of data while maintaining a high degree of system integrity. But the disadvantage of operational systems are that they take a long time to develop and are not easy to change once built.

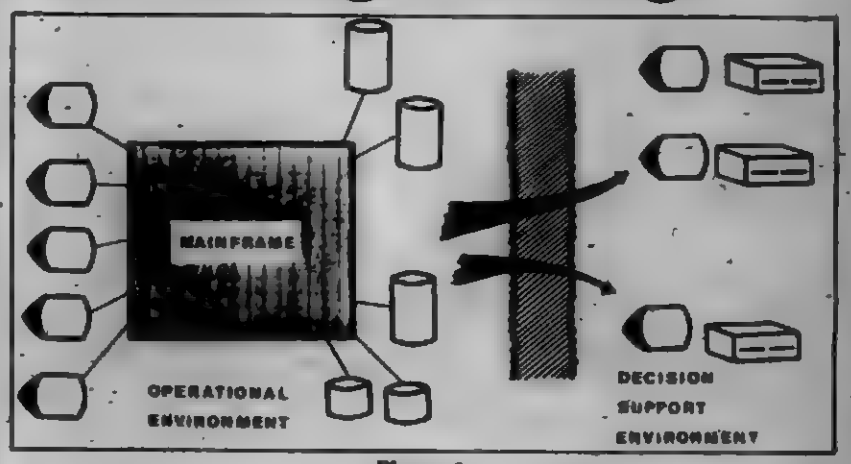

Figure 1

'Practically speaking, relational systems can handle far less data and far less processing than operational systems. Often the data that is handled relationally has been extracted or downloaded from an operational environment, thus being up to date only to a moment in time past.'

From a superficial analysis it appears that relational software will ease the backlog of users' demands for systems. But that entirely depends upon the nature of the requests in the backlog. If the user is asking for a true decision support system or an electronic filing cabinet for very limited purposes, then the backlog will be reduced. But a typical backlog contains only a fraction of these kinds of requests for systems. The user is actually looking for help with operational systems.

What then are the options? The first is to let the request for a new system remain in the backlog queue. In this case relational software has done nothing to reduce the backlog. The second option is to accept the limitations of the relational environment. But this does not really meet the users' needs when operational characteristics are required (fast response time, ability to handle many transactions, ability to manage large

(Continued on SR/4)

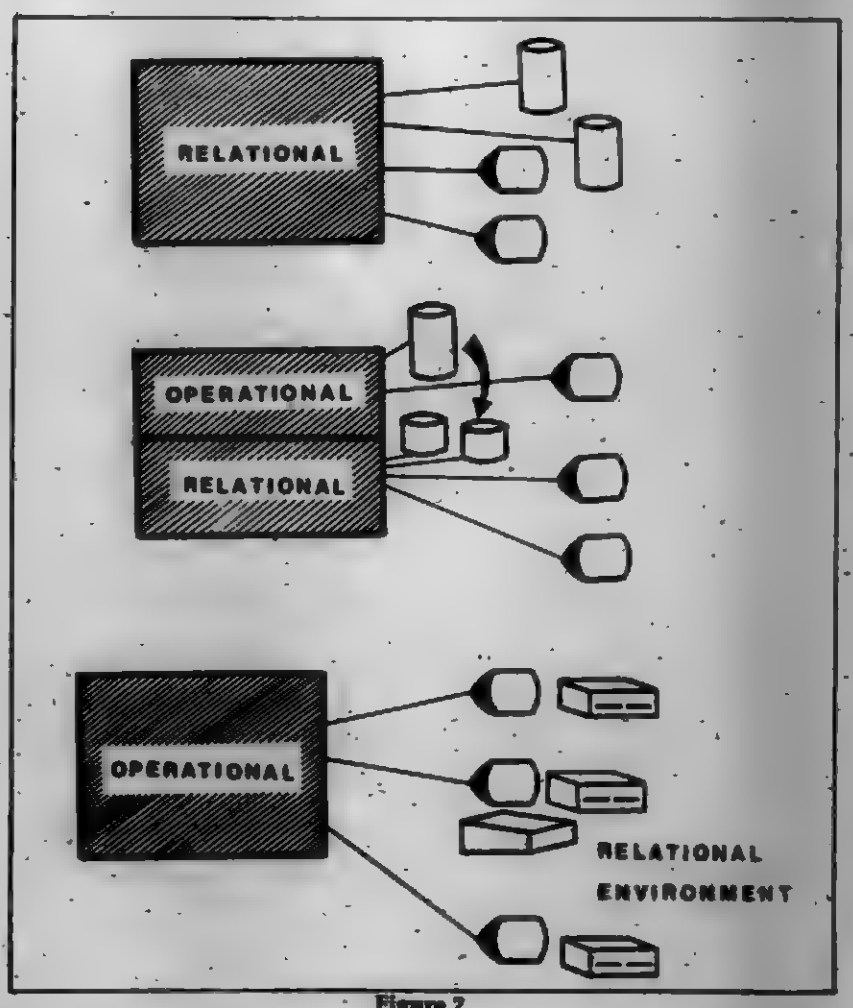

Figure 2

The Gamma Curve: Relational DBMS Phenomena

By Daniel Nolan
Special to CW‡

It happened again: I watched another DP manager draw the Greek capital letter "Gamma" on the blackboard while explaining the growth of data processing in his shop.

"This depicts," he said, "our use of [Software AG of North America, Inc.'s] Adabas and Natural. Notice that it rises sharply, then abruptly levels off, dips and rises more gradually. The peak of the rise is beyond what we had thought our machine could tolerate, but once we adjusted the parameters, it became quite tolerable."

Not so long ago, the threat of reaching capacity was the one thing that would guarantee to blanch the features of even the most stalwart DP manager. You reached the rated capacity of your machine, and you would slow down.

Just as inevitable were the arguments for more machine and a healthy delay waiting for a machine to roll off the assembly line. Once the new box was on the floor, the work was just beginning. There would be the conversion process as the programs had to be individually fit.

Unfortunately, most DP managers view approaching capacity with the same fear instilled by their forebears. The result is an early launch of a campaign for more and faster equipment. However, throwing hardware at a problem to make it go away is like trying to put out a fire with kerosene.

The result is that the firm is stuck with equipment that rapidly fills with activity but has little evidence of improvement to the end user. The end user begins to question the wisdom of the DP manager, and another resume soon hits the streets.

With traditional processing, each request resulted in the addition of a file, and each new file required supporting audit trails, update controls and constant monitoring. When capacity was increased, the incentive for sharing or integrating data was lost.

(Continued on SR/8)

Relational Systems and Development Backlog

(Continued from SR/3)
amounts of data and so on).

The third option is to build the system with relational software as has been tried in several cases. The user uses relational software to build a system that looks as operational as possible.

In the few cases where this has been tried the results have been catastrophic. In one case, hardware was consumed at a tremendous rate, and the user was still dissatisfied with the operational system.

How much is user happiness worth when the cost is measured in a new mainframe every few months?

User-developed systems display characteristics of Richard Nolan's first stage of evolution. In this stage, when areas are penetrated by the computer, there is a "nurturing of innovation" and a loose amount of control. These characteristics are found in end-user-developed systems.

Because of the similarities identified by Nolan, it is worth asking some pointed questions.

Is the user in the infancy of recreating the data processing department? And if so, is relational software appropriate? Will the user have to go through all the mistakes made by DP managers in an industry that is still immature? Is the user any better equipped to run the data processing department than DP management?

It is clear that relational software will address the user backlog of systems development requests for a limited area. But when the request is for an operational system, relational software is inappropriate for systems development.

Inmon is a director at Coopers & Lybrand in Denver; he is an author on the subject of data base design.

Data Catalog Eliminates Middleman

(Continued from SR/2)
(for example, voice, data, text and video).

- Menu-driven and user-prompted.
- A published (on-line or hard-copy) shopping list of available data elements.
- Availability to all authorized end users utilizing any computer terminal.
- Ownership, authorization and security schemas.

Data in any form can be added to the data catalog without affecting data already stored. Data element names and values are centrally managed. The end user can retrieve various data elements with user-friendly tools and join them together with data from personal sources to represent the collective data view necessary to resolve a specific business problem.

Stored in Catalog

The unique views can then be stored in the catalog, if desired, for subsequent future use. The user is free to interact with data dynamically, based on business requirements, and can thereby effectively model his changing business environment.

Authorized access to any data element in the company data bank can be obtained via the data catalog. User views of data contained in the data catalog include descriptive information about data elements, their relationships to other elements and the ownership and security levels required for access.

At no time is the user forced to consider any complex data relationships or interface with a technical middleman in order to access the desired computerized data.

Van Aman is manager of technical support, and Clark is data administrator at United Technologies' Essex Group.

AT LAST, A HIGH PERFORMANCE, RELATIONAL DATA BASE SYSTEM FOR YOUR PRODUCTION-ORIENTED VAX ENVIRONMENT.

DBMS Integration Necessary for Info Center

By Marilyn Bracy
Special to CW‡

Many information centers have achieved success largely because they capitalized on the features of today's friendly data base management system (DBMS) software.

These systems have recognized the management of data as the "hub" function of an information center. The DBMS must not only service the ad hoc query need directly, but also service specialized analytical needs for specific information centers.

The most critical feature of an information center DBMS is an easy-to-learn, concise, ad hoc query command language, which must deliver consistent results regardless of the data base design.

The data base structure must be transparent to the user. The language must be rich with defaults. With few command words, a user must receive clear, well-formatted output. The same command language must enable the nonprogrammer to save the results of the query as a personal data base for further subset problem analysis.

For users of specialized financial or statistical software, the role of the DBMS is different. The DBMS either provides those capabilities through its single command language or, transparent to the user, provides data load and refresh services through the analytical data base of a separate package. At any rate, the end user will only learn one command language well. This capability exists today and works extremely well.

Successful information centers have introduced the information center DBMS into corporations that already have a production DBMS. They recognize that not only the required features, but also the types of data usage of the information center systems are unique.

Opportunity for End Users

Many information center staffs are also utilizing the information center DBMS to allow end users to develop their own small applications. With the DBMS screen-development tools, dialogue languages and a minimum of effort, the information center staff can develop a friendly, user-oriented applications generator similar to those available on the personal computer.

For personal desktop types of applications, these Help facilities prompt the user for a description of the data required, develop the simple data base structure and provide data entry screens and update procedures.

Utilizing a fourth-generation language DBMS, the professional programming organization is becoming responsive to developing small interactive production-type systems or prototyping large-scale systems to verify user requirements.

Information center users today want support for personal computers, responsiveness to data access requests for corporate and external data banks and integration of text management capabilities with the information center data management functions.

There is a demand building for more powerful DBMS software to assist in integrating the information center and its users to provide the total corporate office systems solution.

The information center staff is expecting its DBMS to resolve these problems. To integrate the information center personal computer user to the host, the integrated personal computer DBMS must function identically in stand-alone or host-connected mode to process and provide data to the end user.

Integrated data base

(Continued on SR/10)

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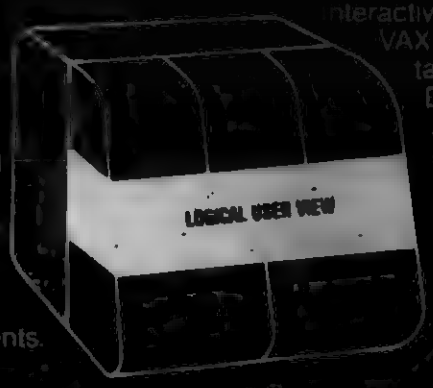

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DBMS: The Hub of Effective Decision Support

(Continued from SR/2)

cific I/O requirements, but on the total needs of the company.

A DSS is a collection of data (organized in a DBMS) that is transformed into information for decision making and actions by utilization of models, statistics, graphics, simulation and optimization routines and various other analytical tools.

The DBMS is conceptually the central focal point of a DSS. In essence, the DSS is extremely vulnerable and dependent upon the efficiency and effectiveness of the DBMS.

The DSS should supply information to the three types of managers: executive, managerial and line.

There is a need to bring in a third viewpoint whereby the individual retains control over the computerized decision-making process and brings his judgment and expertise to bear on the whole process of problem solving. DSS allows the manager to utilize the query capabilities of the computer (DBMS) to obtain requested information and to retain control over the decision-making process as changes occur.

Building on the capabilities of the DBMS, DSS are reoriented to produce information to support specific decision processes.

Fundamentally, the main thrust of the DSS is toward decisions in which there are sufficient structures for computer and mathematical or statistical models to be of value, but where the manager's judgment is essential.

DSS must be designed to allow for combining computerized output with managerial judgment for producing meaningful information to support the final decision. Basically, meaningful information is the rearrangement and classification of computer output that managerial judgment suggests for the decision-making process. This rearrangement is handled specifically by the DBMS.

Synergistic Interaction

DSS/DBMS can synergistically interact. The following illustrates the integration of these tools:

- DSS must be broadened in its approach to decision making — DBMS must support all three levels of management.
- DBMS structure of a DSS needs to be both horizontal and vertical. It has a horizontal axis, which is the moving data base element. Data must be available for marketing, research and development, manufacturing, finance, human resources, sales and so forth. On the vertical axis, data should be available for the three levels of management.
- Analytical tools of DSS must have easy access to DBMS.
- DSS must be capable of solving structured, semi-structured and unstructured problems while the DBMS facilitates this activity by using its easy-to-use query capabilities to obtain information by request.
- The type of data base must complement the types of problems and decisions to be made in the DSS. A hierarchical data base tends to work better with a structured DSS, a network data base with a semistructured DSS and a relational data base with an unstructured DSS.

In summary, the integration of DSS/DBMS satisfies the essential criteria of a support tool for the decision maker because it:

- Supports, but does not replace, decision making.
- Is an easy-to-use interface between man and machine.
- Has interactive and ad hoc capability.

Vogel is director of management information systems at Becton Dickinson Vacutainer Systems in Rutherford, N.J.

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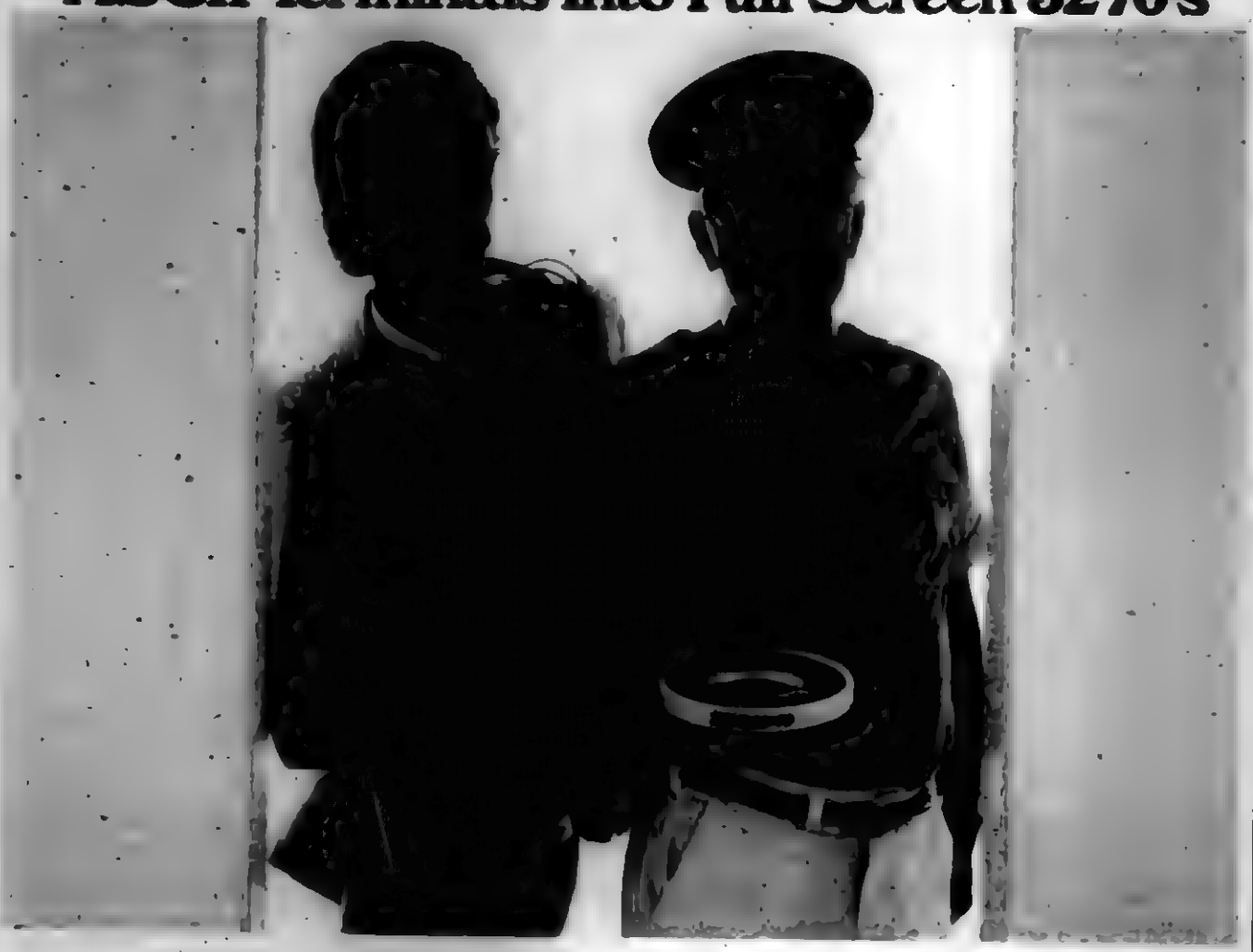

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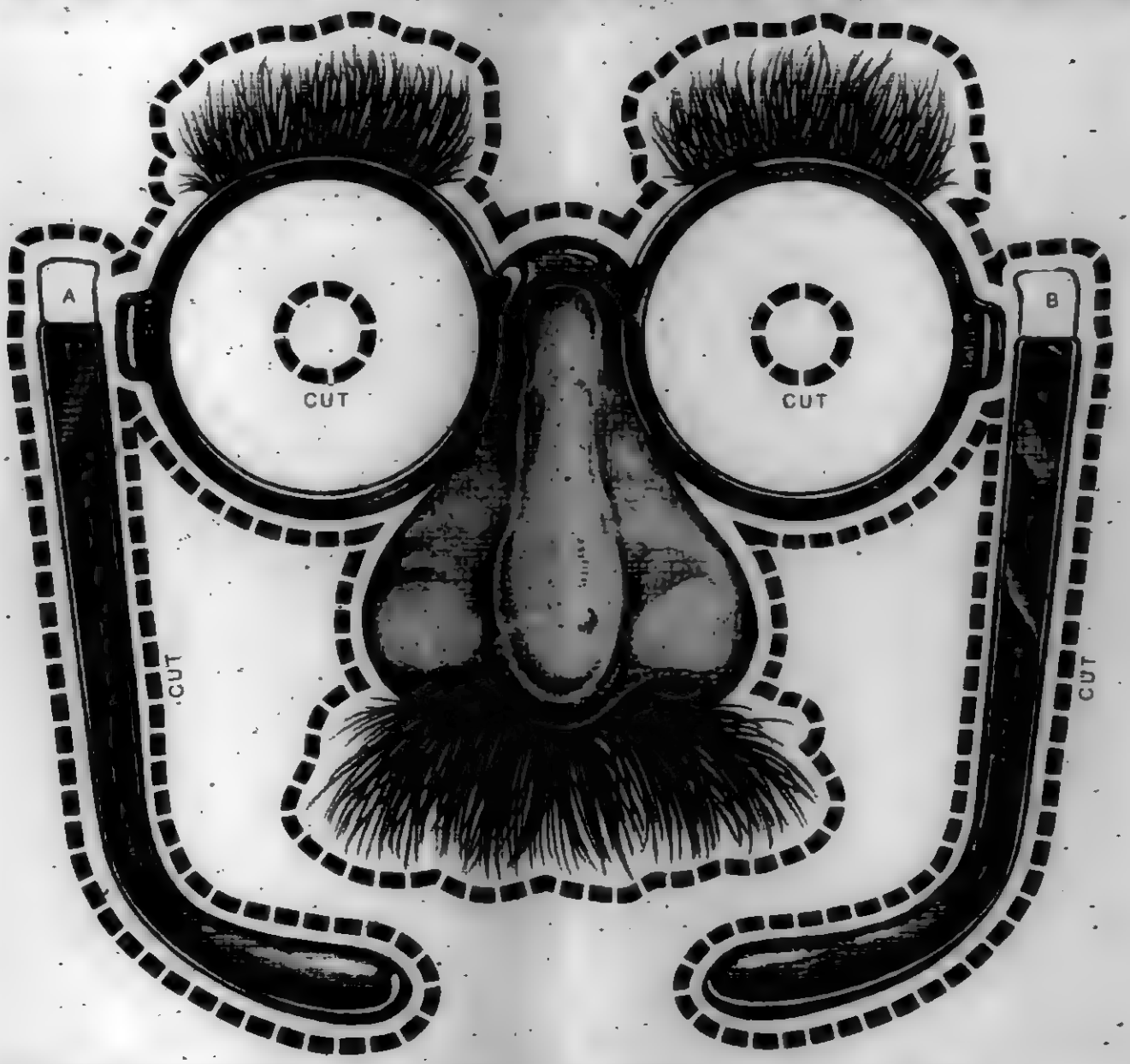

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Finally, two other things that no other DBMS can say. MODEL 204 received the highest overall rating in a recent *Datapro* survey: 3.5.[1] And it's the fastest growing system for IBM mainframes from an independent vendor.[2]

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1. *Datapro*: "User Ratings of Proprietary Software-COMPLETE" November 1982. 2. *Computerworld*: December 20, 1982.

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Customizes Information for Clients

DBMS Gets High Ratings From Nielsen

DUNEDIN, Fla. — The media research division of A.C. Nielsen Co. here, the world's largest market research organization, is helping customers tune in to their target television markets with a newly installed data base management system (DBMS) from Computer Corp. of America (CCA).

"We've traditionally provided ratings to our clients in either paper or computer tape form," said Eric Adler, A.C. Nielsen's director of production research. "But now the broadcast industry is changing. Viewer alternatives are growing fast, and our clients need faster, more specific information."

In January, Nielsen installed CCA's Model 204 DBMS. The system provides clients with more customized ratings services delivered electronically whenever needed.

"We've used computers to store and organize our information for years," Adler said, "but with so much data and so many clients, we weren't able to customize information for each client's needs.

"We would make up huge research books, and we'd tell our clients where to look for the information they wanted. But they'd have to do the looking, then make up their own evaluation spreadsheets based on these figures. Now we'll be able to do that for them."

A.C. Nielsen began evaluating DBMS software two years ago, according to Adler. With more than 600 users and a growing diversification of research areas, including cable, the DBMS would have to be capable of handling very large volumes of information at high speeds.

"We wanted a system that had a central data dictionary, that could hold a large number of records, that had an easy query language, that would support both CMS and MVS operating systems and that had strong monitoring and tuning features," Adler said. Nielsen selected Model 204 because of the high-performance query potential of its "inverted-file" data structures and its powerful monitoring and performance-tuning facilities.

"We're projecting that the CCA system will hold 60G to 100G bytes of data on-line for instantaneous use by our subscribers," Adler said. "This information will include a variety of demographic breakdowns for each network, television station and program covered and will extend back multiple years for national and local surveys."

"There are three basic types of file structures used by DBMS," he said. "The chain-pointer type, with embedded pointers that relate records and files to one another, is efficient for updating information but cumbersome for queries because you have to navigate through the pointers to get your information out. The relational type is strong on query handling, but it's not very efficient in terms of machine resources.

"Model 204 uses a proprietary inverted-file structure, where each data item has one or more — maybe 10 or 20 — indices that relate to other records, files or data items," he said. "It's very quick for queries, which was our primary objective, but updates can slow down an inverted-file system because updates to records also have to update all related indices. The Model 204 solves this problem by allowing users to update records only, deferring updating of indices until a time when query traffic is down."

The system will handle as many as 100 users simultaneously, and many of these people will perform some time-consuming queries to get their custom demographic ratings information, Adler said.

Combining IBM's CMS with Model 204 should give users the easiest means of customizing the information they need, Adler said. An example is in long-term trending, which uses Model 204's file-grouping feature.

"We report our national figures in two-week intervals and our local figures many times a year," he said. "So if a user wants to do trending for, say, two or three local reporting cycles, he can request the May/July/September cycle information, and Model 204 will automatically join these together so they look like one file to the application. The separate files don't have to be rewritten, and the user doesn't have to go through a number of indices to get at this information.

Eric Adler, A.C. Nielsen's Director of Production Research

Viewing the Gamma Curve As DBMS Phenomena

(Continued from SR/3)

Also lost was the ability to control data as a resource by having a single point of control for each field. A time card, for instance, became many records concerning labor, employment, benefits and expenses.

The Relational Alternative

The relational data base management (DBMS) shop is able to supply user views of a single data base. Employing the data dictionary, the file is identified once for each end user. This user view is given a unique name, and every interrogation made by the user with the programming language refers to that name.

As time passes, the user may need to add information. This is no problem; the field is added to the file and to whichever views need it. Other views not needing the data are unaware of its existence.

In addition to keeping the auditing and support confined to a single file, security becomes quite simple. Each field has only one "owner" or person entitled to update the field, and that person can grant access to another "user."

Are you serious about end-user satisfaction? The only way to do this, short of changing careers, is to look at the newer relational DBMS packages. If you listen to the salesmen, however, you may get the impression that all you have to do is buy it and sit back.

What you have to do is view your machine as just that — a simple machine. Your team will have to be divided into a data base administration — instead of a single administrator — devoting attention to each of three areas:

- Operations and systems, which control the equipment and work flow.
- DBMS internals, which keep watch over the visceral parts of the DBMS package and make certain that all parts are in synchronization.
- DBMS applications, which assist the developers who are responsible for setting up the machine to do work for the end users and who are themselves responsible for making enough money to pay for the machine. This job includes so many activities that it justifiably employs more than one person.

In essence, a data base administration is responsible for delivering guarantees. The major part of the administrator's day will be spent in identifying which duties he is competent to perform and which rightly belong to other staff members.

The tail end of the gamma curve lifts upward. This indicates a renewed expansion, which is more realistically paced to the expectations and expenses of the end users.

Auditing and support functions have been reduced. Integration has reduced maintenance to virtual nonexistence. Since tables handle most adjustments, even the most rapidly developed systems remain effective to the point where they are made obsolete, not by technology, but by the environment changing so radically that a new project is begun.

Nolan is director of business data processing at Computer Sciences Corp.

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Green Bay, WI	Nov. 22
Greensboro, NC	Nov. 17
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Knoxville, TN	Nov. 2
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Madison, WI	Nov. 1
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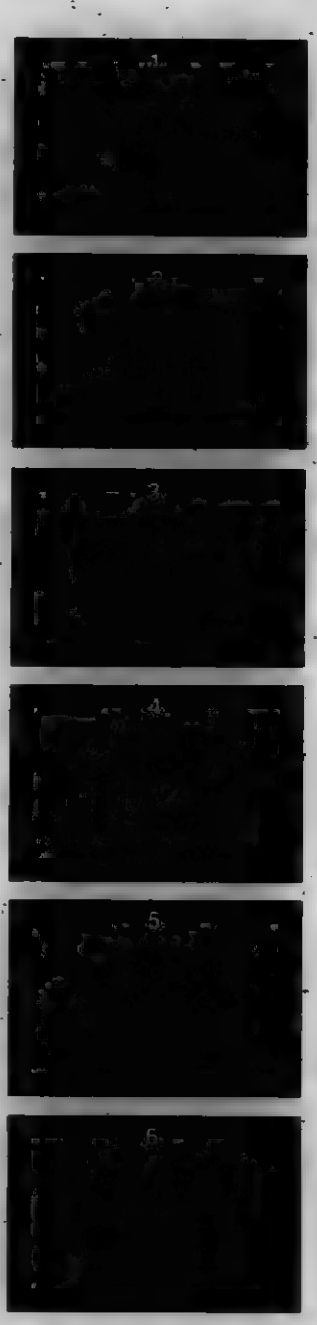

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One database management system provides an Automatic System Facility for system development: IDMS/R.

Fourth generation languages, though excellent productivity tools, only address part of the system development task – namely, steps three and four as shown above. IDMS/R with Automatic System Facility, however, automates all of the steps necessary to develop systems. All you do is specify the data.

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For more information on this unique facility, to attend a seminar or for a demonstration see the adjacent page.

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Software Tools Ease Firm's System Conversion

ST. LOUIS — Navco Corp., a diversified direct-writing insurance company, has a history of providing new customer services with a minimum of staff resources.

Recently, Navco used the same approach in redesigning its in-house software using Software AG of North America, Inc.'s Adabas and Com-Plete.

The new implementation strategy has resulted in systems that are easier to create, modify, maintain and extend — while delivering faster response and greater accuracy, company officials said.

Navco is made up of subsidiaries offering personal property and casualty insurance. In 1981, Navco handled over 65,000 policies in its personal lines, with total annual premiums in excess of $50 million.

As a direct writer, Navco handles almost all its policy activity itself rather than through independent agents. This approach places high demands on the company's customer service representatives and requires sophisticated on-line computer systems.

"The company's growth has been achieved through the concept of computer-based data access to support our telephone operations," said Ron Egger, Navco's data administrator. "Our reps need to be able to locate policies in seconds, even if the customer doesn't have the policy number available. They need to be able to calculate policy quotes quickly. And we need to be able to keep our data files current, so that anything that comes in the morning's mail is in the files by afternoon."

Navco's computer operations run on an IBM 158 Model 3 and a National Semiconductor Corp. AS5 with nearly 9G bytes of on-line mass storage.

Jose Mora, Navco's vice-president of data processing, said Navco had begun looking into alternatives to using Isam files about 1½ years ago. "A data base management system was clearly called for," Mora said. "And Navco's analysis determined that Adabas was the most user-friendly of the packages available which also met our other requirements such as operating environment and file sizes." Egger was brought in as Navco's data administrator to implement the system changeover.

"Navco had already decided to convert to [IBM's] OS and had chosen Com-Plete as the teleprocessing monitor," Mora said. "Com-Plete has both TSO and CICS functions and can handle all the terminal I/O involved in transaction processing."

The original plan was to convert the existing personal lines' Isam files to Adabas file structures and convert the existing programs to run in the Com-Plete environment and access the new data structures, Egger said. "But when we looked at the existing system carefully it became clear that it wasn't going to be a simple conversion. The old system was completely inflexible. What we had on our hands was a total system redesign, rewrite and rebuild."

An analysis of programs showed

(Continued on SR/12)

Role of DBMS in Info Center

(Continued from SR/5)

definitions and data transfer utilities are also necessary.

The DBMS must be closely linked with the corporate data directory for locating any required data as well as to process information center data base load and refresh routines. These information center requirements highlight the need for establishing a corporate data administration service.

Through such a service, data analysts would initiate user definition of long-term data needs and develop multiorganizational data services.

The integrated data and text management system is as elusive as the distributed data base software, the active dictionary and the data administration function. Limited capabilities exist today for automating the communications results of an information center analysis by integrating the data with text.

It is not clear today if the information center DBMS will fulfill the needs for finally integrating these information centers with development centers to achieve integrated business systems.

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2. Immediate Testing and Check-out — Testing and checkout are accomplished

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5. Simplified Maintenance — Data definitions can be added, changed, or deleted on-line with little effort or expense. The analyst can also add new fields to segments, attach additional segments to records, and create new files and applications in his data base without affecting the existing application system.
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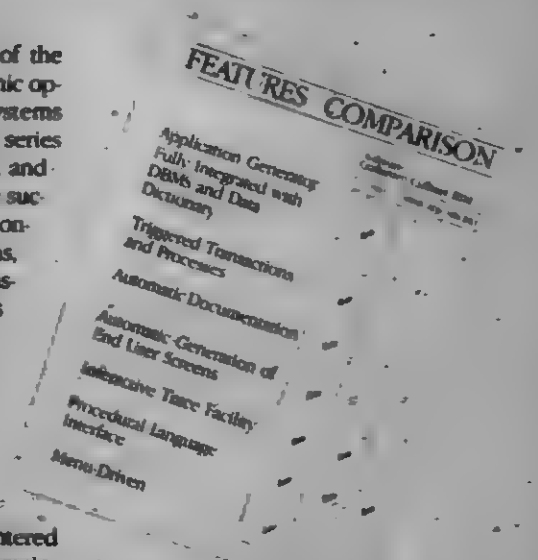

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Reaching Out via Telephone

And Monitors Growing Needs

DBMS Tracks Telephone Activity

NEW YORK — At the New York headquarters of American Express Co., reaching out to touch someone via telephone will result in an estimated $9 million telephone bill in 1984, a jump of almost $2 million over the previous year.

American Express averages over 100,000 long-distance calls and more than 300,000 local calls each month from its headquarters.

The size and growth pattern of this expense taxed the monitoring, analysis and reporting system on telephone billing that was developed by the company in 1975.

Although the original assembler code was modified with numerous Cobol modules over a six-year period, the organization still suffered from application change request backlogs and an overburdened traditional systems development staff.

The American Express General Services Office, which was responsible for administering telephone usage expenditures, called for a data base management system (DBMS) flexible enough to allow the development of an application tracking the company's telephone usage patterns that could be easily altered to reflect expanding needs.

It chose Ramis II, the fourth-generation language and DBMS from Mathematica Products Group, Inc.

Alan S. Zaben, manager of the

(Continued on SR/14)

Insurance Firm Uses DBMS, Cuts Response Time

(Continued from SR/10)

that most performed one of two types of activity: either on-line transaction processing involving a single formatted screen, minimal data base I/O and interactive screen writing or batch reporting, presenting sorted line lists or summaries.

"We discovered that the bulk of the actual code involved could be expressed in a small number of nearly identical portions," Egger explained. "The programs used map definitions, map request control blocks, definitions of field-control tables and so on, and every program needed data base calls. We precoded these generally used paragraphs up front in Cobol, tested and debugged them and made up a library of these pieces in the form of program stubs."

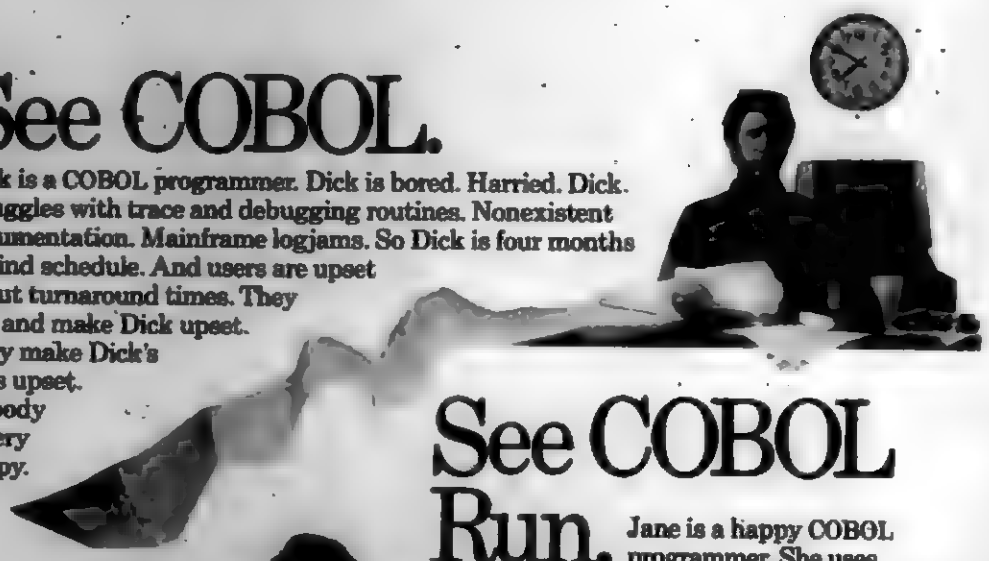
Once the department had these building blocks accumulated, it used them to put together the actual new programs. Using a Com-Plete utility that performs program concatenation, it assembled a program. Then other Com-Plete utilities let the programmer code in specific values, field names and editing requirements, compile, test, reedit the new program and retest without getting up from the terminal.

Egger said Adabas allowed the department to get data into a form that could be worked with more easily. "We already had the stub-and-assembly concept; Com-Plete let us implement it easily," he said.

Egger said Adabas and Com-Plete were valuable throughout the process. "First, both systems operate at the call level, which makes coding programs much easier. Secondly, running under Com-Plete lets us work on-line and interactively, so program turnaround is rapid," he said. "Like any DP department, we used to be swamped with ad hoc requests," Mora added. "By installing Adacom, Software AG's report writing package, we've been able to let managers handle these for themselves."

He added that a number of chores that used to be done by hand have been automated. "Instead of having the staff sort through thousands of 3-in. by 5-in. cards to check dates and numbers, all this is now done automatically," he said. "We're now getting faster response time at the terminals, because Adabas only retrieves the part of a record actually needed instead of all of the record like Isam did."

See COBOL.



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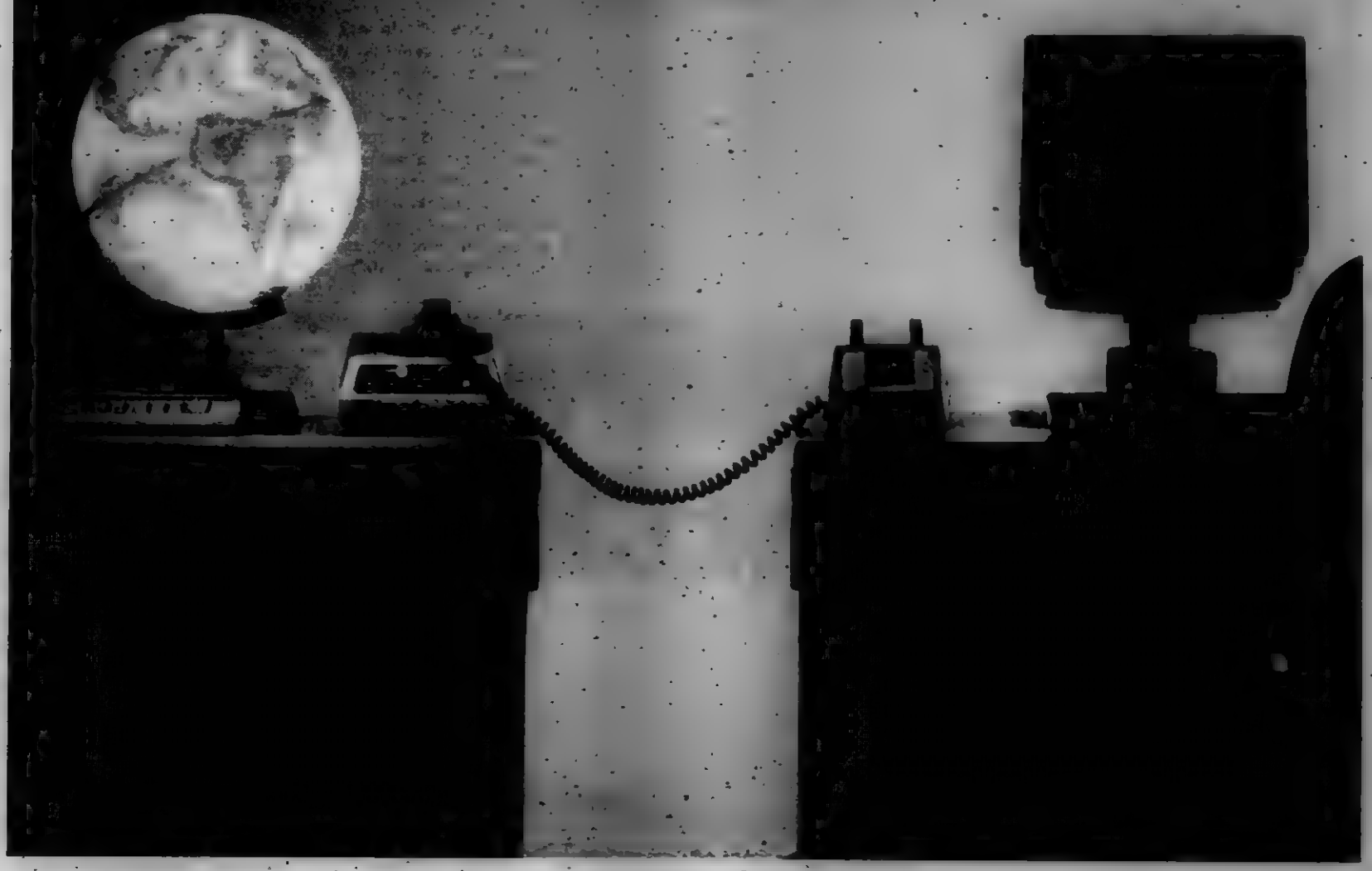

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Planning Ahead Can Cause Data Base Disaster

By Frank Sweet
Special to CW‡

If you look ahead and try to design files to be shared by future systems, you'll probably fail. So don't try to do it right; just do it.

The concept of an integrated data base is straightforward: Redundant (duplicated) data tends to become inconsistent rather quickly. It is easier to use one shared pool of master files for all applications in the firm. It sounds reasonably simple.

Why then are there horror stories of data base projects taking years to implement? Why do some data base applications become so unending and so time-consuming that management finally despairs of pouring money down the hold and slays the monsters? The answer is that file designers are sometimes lured into the fatal trap of trying to foresee the data needs of future applications.

Imagine a systems analyst faced with designing a billing system under the data base approach. Among other tasks, he must design a record layout for the customer master record.

He interviews users, finds out what they want and eventually comes up with a layout that includes every field needed by the system on which he is working. If he was not using a data base, he would be done.

But the customer record will be shared by many future systems other than billing. Shouldn't the systems analyst find out what they need and include that also? If he does not, he will just have to redesign the customer record every time he does a new system.

However, in order to find out what other systems need, the analyst would have to identify every field, every data element and every attribute of "customer" that any user could ever want for any possible application that might ever arise. The more he learns, the more future potential applications would come to mind. This would bring up more data needs that must be investigated. He would be trapped in a closed loop of user-application data user.

What about the problem of retro-

(Continued on SR/20)

Firm's DBMS Monitors Use Of Telephone

(Continued from SR/12)

General Services Office at the headquarters facility, wrote the entire series of programs required for the new expense and monitoring application. The application, which had been requested for development using traditional means for over 2½ years, was completed in one month by Zaben with the guidance of American Express' information center.

Zaben designed the original application to look at expenses by telephone number and to report on traffic patterns. The application also is used to determine the impact of rate increases on the total telephone expense and to advise management of actual and potential expenses.

Since its original design, the application has changed to include new reports and changing formats as often as every month, Zaben said. One of the changes added a cover sheet to monthly reports that features a six-month breakdown of average expenditures by month. The changes in data base design were completed by General Services Office personnel within a day.

According to Zaben, the New York telephone company provides five tapes each month that list telephone charges and the types of telephone equipment and services used by American Express. This data is then read into four disk files accessible by Ramis II. The data in each file results in more than 20 monthly reports.

Malfunction Identified

The ability to track calls has saved the company money. A previously undetected technical malfunction in the Wats system was identified in the data gathered for a Ramis II report from the application. The malfunction had been costing the company an additional 17 cents per call.

"The system also is designed to pick up any changes in use or overabundant calls to an area code or exchange that is not extensively serviced by our company," Zaben added.

Cost savings of up to $600 per month in one department alone were realized by this application.

The company's information center personnel assisted in setting up file descriptions for the application. Zaben now uses the information center personnel as a 'sounding board for ideas on enhancements to the application as it evolves toward more extensive and sophisticated analyses.

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Used in Japan's Fifth-Generation Project

Prolog Language Includes Relational Data Base

By Kamran Parsaye
And David Warren
Special to CW‡

Prolog is a simple yet extremely powerful language invented at the University of Marseilles, France, in the early 1970s. It is a declarative language whose design includes a relational data base. It has been chosen by the Japanese as the language on which their fifth-generation computer systems project is based.

Prolog is based on pattern matching and "if . . . then" rules. A Prolog program is simply a collection of these rules. Prolog, in effect, uses an internal relational data base to store these rules and then applies them by pattern matching.

Prolog is a declarative, or relational, language. It computes relations, just as functional languages like Lisp compute functions. Programming and relational queries are combined very naturally and effectively in Prolog. Due to its deductive capabilities, Prolog can be viewed as an advanced and powerful relational query language that may also be used for general programming.

Prolog is suitable for rapid application development in conjunction with relational data bases. It has been used in applications from data base integrity control to natural-language comprehension.

Early structure-oriented data base systems such as IBM's IMS or Codasyl relied on structures, such as trees and networks, that depended on navigational searches. For example, users of IMS store their data in trees and retrieve them by explicit search operations. They need to be aware of the underlying structures used by the system.

Relational data bases rely on a more abstract method of data management by computing relations. Users no longer need be aware of lower level implementation details and simply view results in an abstract form.

Similarly, programming languages such as Fortran, Lisp or Pascal are structure-oriented since the programmer needs to create structures such as arrays, lists or stacks to store and retrieve information. For this reason, relational query languages need to be explicitly embedded within structure-oriented languages such as Cobol. For example, a Cobol programmer needs to leave Cobol to write an IBM SQL query.

Data Base-Oriented

Prolog is not a structure-oriented language. It is a data base-oriented language since it uses an internal relational data base rather than more common structures such as arrays or pointers. Programming in Prolog can be viewed as programming by assertion and query.

The Prolog programmer is not aware of the distinction between programming and query; he simply stores information in the internal relational data base of Prolog and retrieves it by powerful relational queries.

Relational data bases are based on relations. Prolog is based on logical predicates. There are essential mathematical reasons connecting the mathematics of relations with logical predicates. The semantics of both Prolog and relational data bases form a subset of first-order logic known as Horn Clauses.

The close relationship between Prolog and relational data bases can also be seen with simple examples. A relation can be viewed as a predicate that asserts the truth of facts.

Relational data bases view the world in terms of relations and tuples. For example, the relation "father" may include the two tuples "John, Mary" and "David, Sara." Data is retrieved from relations by using a query language such as SQL.

Prolog views the world in terms of simple logical predicates whose truth is asserted. Thus, one can assert the truth of two instances of the "father" predicate. For example, the Prolog equivalents of the two tuples from the "father" relation above are father "John, Mary" and father "David, Sara."

Essentially, each relation name in a relation data base is treated as a predicate in Prolog. Prolog is more powerful than just a relational query language. It includes recursion, pattern matching and deductive capabilities.

Relational data bases and Prolog are moving fast toward a common destination. This holds true both in terms of functionality and performance.

Processing deductive natural-language queries in Prolog is now a

(Continued on SR/20)

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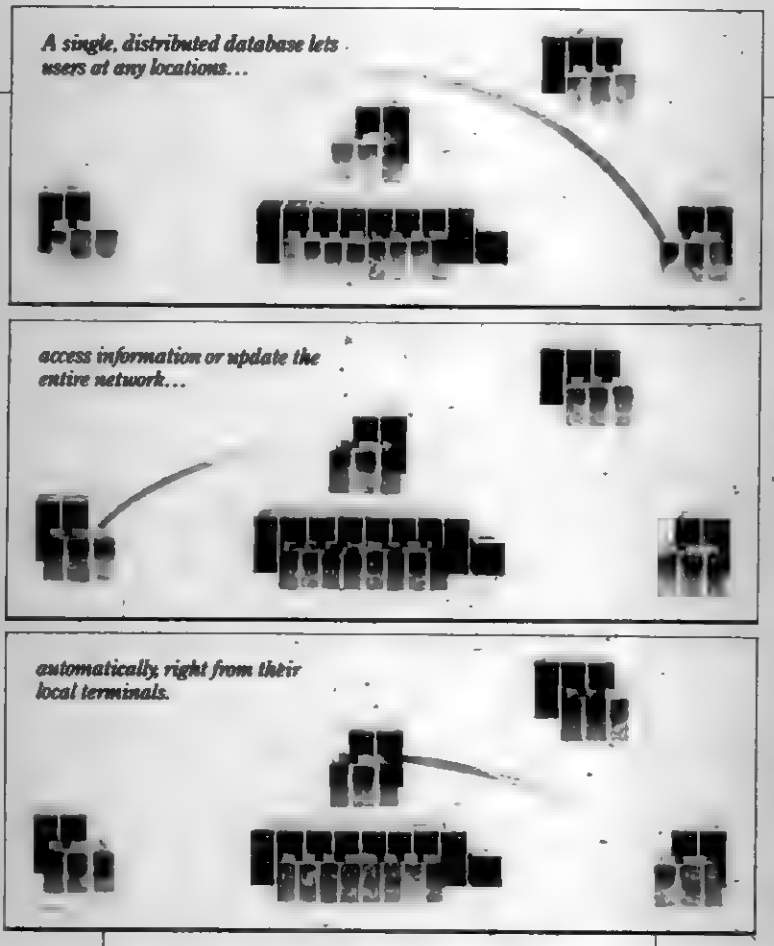

Information float. It's when your sales manager in Phoenix needs accurate inventory information from the warehouse in Atlanta—and at the exact same time a salesman at the Seattle office is asking for the product. Or when your plant foreman in Boise needs clarification on product specs from the engineering manager at the lab in Boston. When *any* of your people, in short, has an immediate need for timely, up-to-the-second information from people at other locations—and can't get it. That's information float.

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Phoenix/ Sales

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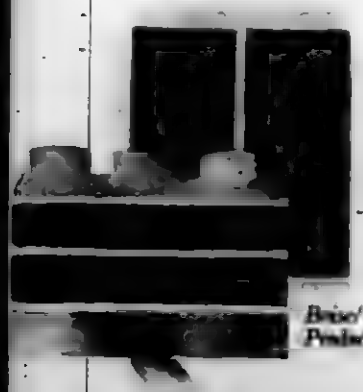

Boise/ Production

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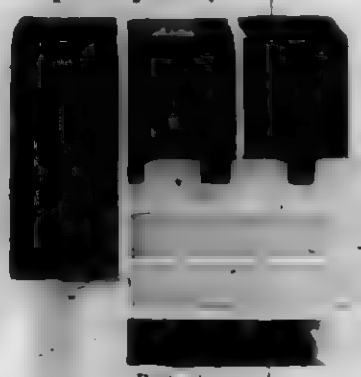

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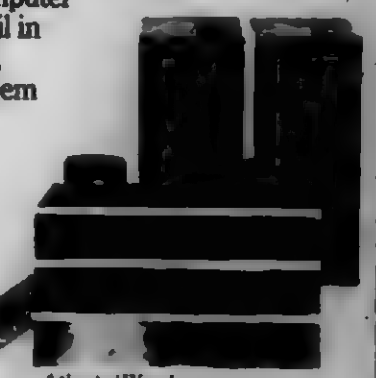

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The Use of Relational DBMS for Prototyping

By Gabrielle Wiorkowski
Special to CW‡

Prototyping requires tools that have a high level of ease of use and data independence. Data independence is necessary if components of the prototype are to be used in the ultimate production system.

It is necessary to address all aspects of a system in order to impact significantly the total time and cost. Life-cycle methodologies recommend a detailed analysis of requirements and specifications of precisely what functions are to be performed perhaps over the life of the application system. A study typically requires months of concentrated effort and results in a document of several hundred pages.

Proponents of prototyping advocate developing a skeleton system that can be exercised by the user very early in the project. As users begin to use the prototype, they will learn more of just what is required of the system. The project team will be able to accommodate changes if a high level of data independence is available.

A request for a function or format that cannot be accommodated immediately can be responded to with an accurate estimate of the time and cost involved to satisfy the request.

Two primary attributes of the relational model that make it good for prototyping are its ease of use and data independence. Ease of use begins with its simple table structure in contrast to complex network or hierarchical structures.

With a network structure, it is necessary to know in which set one is working, who the owner and members of the set are and how the sets relate to each other. A hierarchy is simpler, but it is still necessary to navigate down and across the hierarchy as well as between hierarchies when two or more hierarchies are connected logically.

A relational data base management system (DBMS) derives its ease of use from its simple table data structure and its language.

The relational languages are easy to use. The same statements that were designed for end users are used in developing prototypes and can be embedded in a host language. Statements can be stored as commands or used in combination with other statements in a routine to create prototype transactions.

Updates can be entered directly at the terminal, placed in routines or embedded in a host language in exactly the same format as they are entered directly on-line. The constants can be replaced with host language, working storage variable names. The majority of a prototype would be developed by storing the statements in commands or routines.

Programs that require editing of data, procedural code, access to nonrelational data and noncolumnar formatting of output would be developed using the relational statements embedded in a host language.

Relational DBMS have no separate data dictionaries to become out of sync with application systems. Meta-

'Two primary attributes of the relational model that make it good for prototyping are its ease of use and data independence . . . A relational data base management system [DBMS] derives its ease of use from its simple table data structure and its language.'

data is automatically recorded in catalog tables when tables, views, indexes and programs are created or dropped. The metadata in this integrated dictionary/directory cannot be changed directly, but is accessible by any authorized user. A considerable amount of application and DBMS documentation can be generated from the catalogs using select read statements.

A high degree of data independence is needed for prototyping. In a relational DBMS, changes to the logical design are remarkably simple. Logical design is implemented through views that do not physically exist; rather, it draws columns from physical tables and other views. Views are created and dropped directly on-line with concurrent on-line and batch users handling the great majority of the system control functions. The physical design can be changed in a number of ways without affecting existing programs.

A change from a character to a numeric data type would require program change. Deletion of a column from a table is accomplished by dropping the table and recreating the table without the column. Only programs using the deleted column will need to be changed. If the column is deleted from one table and added to another table, program changes can be minimized by creating a view that looks like the old table and using the view name in place of the old table name.

Adding a table has no effect on existing programs. The impact of deleting tables can be minimized in a similar fashion as deleting columns. Views can be created to look like the previously used real tables. Program changes can be eliminated where the view name can be made the same as a dropped real table. All machine-level access modules that use a table are marked invalid when a table is dropped.

Relationships between tables are expressed through common values so that if a need had not been anticipated in the early stages of the prototype, it can be satisfied by simply adding a column to the table.

The importance of data independence extends through the life of the project. A significant reduction in maintenance costs and time needed to respond to user-requested enhancements may have a greater impact on DP budgets and user satisfaction than the benefits of data independence for prototyping. Users can also handle many of their unanticipated needs through the query language.

This can begin once the prototype is beyond the embryonic stage. In addition, components of the prototype can be used while the full production system is being developed. Usage of the stored commands and routines will test the applicability of components of the prototype to the business functions they support.

System professionals can take the tested statements in the stored commands and routines and embed them in a host language as needed. Host language programs will be needed for extensive editing of data in update programs and processing files from other applications.

Relational DBMS are particularly well suited to prototyping. The simplicity of creating tables, views and indexes lends itself to experimentation and testing of various approaches. Update and retrieval programs can be developed in stored commands and routine tables. Users can be given an opportunity to determine if the update and retrieval programs meet their needs.

After the prototype is beyond the embryonic stages, the tested statements can be transferred from routine tables and embedded in a host language, which, in the case of updating programs, will perform extensive editing.

Wiorkowski is a software engineer in the Process Automation Center at Texas Instruments, Inc.

What's Behind The Language Called Prolog?

(Continued from SR/15)

well-tested practicality. Similarly, many relational data bases are now adapting natural-language query systems.

Part of most current Prolog development efforts is the extension of in-core compilers to include large data base facilities. Similarly, relational data bases are moving toward more intelligent interfaces and better integrity control.

Today, Prolog compilers are achieving impressive execution speeds even on medium-size and small-size machines, just as relational data bases are beginning to perform well on minis and micros.

Combining the deductive powers and the ease of use of Prolog with the data management experience obtained from large relational data bases results in a powerful computing environment. Such an environment can reduce the expense of application development effort.

Pursaye is president of Silogic, Inc. in Los Angeles, where he is concentrating on the development of Prolog compilers and industrial applications of Prolog. Warren conducts Prolog-related research at SRI International Corp., Menlo Park, Calif.

Keep the Design of the Data Base Current

(Continued from SR/14)

fit? If he refrains from pursuing the lure of the complete record layout, how does he avoid redesigning the shared customer record with each new application? The answer is to go ahead and redesign it each time. Add fields as they are needed by each new application. It costs nothing.

The reason this suggestion sounds reckless is that most of us are used to non-data base management system (DBMS) files. Without a DBMS, records cannot be redesigned with impunity. If a 10-byte telephone number is added, for example, and an in-use record is lengthened, every program that reads that record must first be identified, recoded and recompiled.

Recompiling could take a day, but recoding first to add a 10-byte filler to the customer record could take a week; and before that, finding out which 50 programs (out of the 1,500 that are in production) read the customer record, could take a year.

With a DBMS package, current programs need not be retrofitted just because a record layout changes. The DBMS, at execution, will feed each application with the layout that was in effect when that application was written — even though the real layout on disk has grown much longer over the years. All top-selling DBMS packages today provide this "field sensitivity."

Data Base Approach

I once worked for a manufacturing firm that decided to use the data base approach. Realizing that we could never retrofit our systems, we set out to "do it right." We were designing an item master and were determined to include every field that could ever be needed by any future materials requirements planning application.

We fell into a never-ending loop of learning user application data. The more we spent, the more compelled we felt to continue. After investing $1,000 we felt we could not give up. We felt the same after $10,000, after $100,000 and after our first million. Five years and many millions of dollars later, higher management finally came to its senses and cut us off.

In conclusion, when designing a file to be shared by future applications and that insidious voice whispers, "Do you want it right, or do you want it Friday?" answer firmly, "I want it Friday; we'll always have plenty of time to make it right."

Does this mean that long-range planning is useless? Not at all. It is vital, but not at the level of individual record layouts. That is the subject of another article.

Sweet is corporate manager of data administration for The Charter Co. in Jacksonville, Fla. He was formerly president of the national (Cullinet Software, Inc.) IDMS User Association.

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With Prototyping

DBMS Cuts Firm's Software Development Time

MCLEAN, Va. — Maximizing resources for its management information systems (MIS) staff was the goal BDM Corp. had in mind when it went shopping for a data base management system (DBMS).

BDM, a professional services firm located here, performs system design, engineering and testing for clients in the defense, communications, energy and banking industries. With 300 to 400 contracts active at any given time, both MIS and non-MIS personnel are involved in developing applications for company clients.

A $7 million overhaul of its batch-oriented corporate MIS system resulted in a three-level MIS system using an IBM mainframe, Digital Equipment Corp. minicomputers and various microcomputers.

Two DEC VAX-11/780s networked with Decnet are located at BDM headquarters. A third, which will also be networked, is being installed at BDM's Technology Applications Center in Albuquerque, N.M.

An IBM 3033 running MVS uses modified Management Science America, Inc. financial software to handle BDM's accounting. The MSA software produces transaction files that are then downloaded to the VAX machines via IBM 2780/3780 protocol emulators.

Approximately 20 microcomputers of various kinds are used in corporate MIS applications by BDM's field offices and executives on the road. The micros perform analysis only.

"We wanted an interactive system for our project design," stressed Mark Filteau, director of Systems Design and Integration. "Detailed financial accounting would remain on a mainframe, but our management decision support information had to be interactive," he said.

A deciding factor for BDM was that most of its applications are relational in nature, and most have very complicated data structures, he pointed out. BDM selected the Oracle relational DBMS from Oracle Corp. in February 1981 after looking at about 50 DEC-oriented data base systems.

Oracle was up and running in April — one month after its delivery, Filteau said.

"Most of the packages we examined were just file managers under the skin," Filteau recalled. "None were as powerful as Oracle. But the driving factor to use it as the primary data integration tool was its ability to support data access through traditional host language applications, ad hoc queries and its own applications generator."

One facility BDM found attractive was SQL Plus, Oracle's extension of the SQL data language developed by IBM. "You can define data in Oracle with common, everyday names that are meaningful to non-DP people," Filteau said. "Whereas other data base systems required their users to know physical link paths, all we had to do with SQL Plus was post pictures of the data tables on our walls. Its simplicity enabled our 26 programmers who work with the DBMS to get up to speed quickly."

The biggest payback to BDM came in prototyping applications using Oracle's Interactive Application Gen-

(Continued on SR/24)

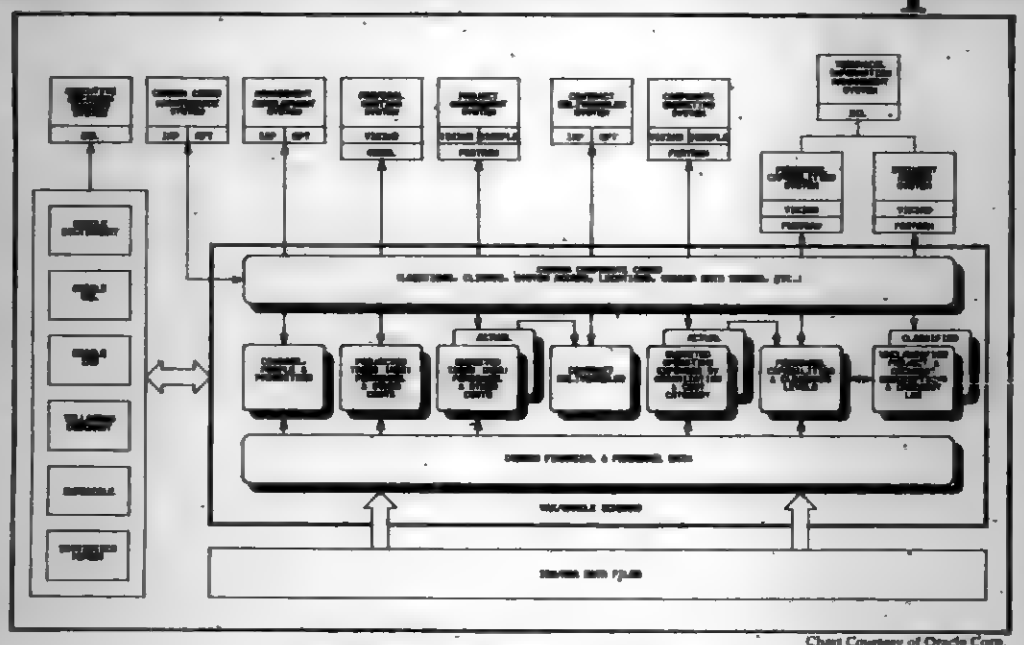


Chart Courtesy of Oracle Corp.

MIS Conceptual Software Architecture

Time-Relational Model Integrates Time Processing Into DBMS

By Jacov Ben-Zvi
Special to CW‡

The time-relational model is a new architecture that integrates comprehensive and complete time-processing capabilities into the relational model of existing data base management systems (DBMS). It allows users to operate only upon the latest data base state.

An important limitation of current DBMS is that information becomes effective at the same moment it is recorded in the data base. There are no provisions for the distinction between the physical time a data item is entered and the time period to which it pertains.

Many data base updates in real applications are either retroactive, meaning that their effectiveness takes place sometime in the past, or proactive, meaning that their effectiveness will take place sometime in the future.

Another limitation is that current systems maintain no history of changes. A previously recorded data item might be changed because of human error, program error or simply because we have learned more about a given data value.

However, many problems require the history of altered values. For example, inserting a retroactive change to be effective at a point between two previous changes may not be possible without the transaction program history.

Rules and logic that manipulate data are also dynamic. Any attempt to provide retroactive and/or proactive processing capabilities must include the provision for the transaction program's history as well as data history.

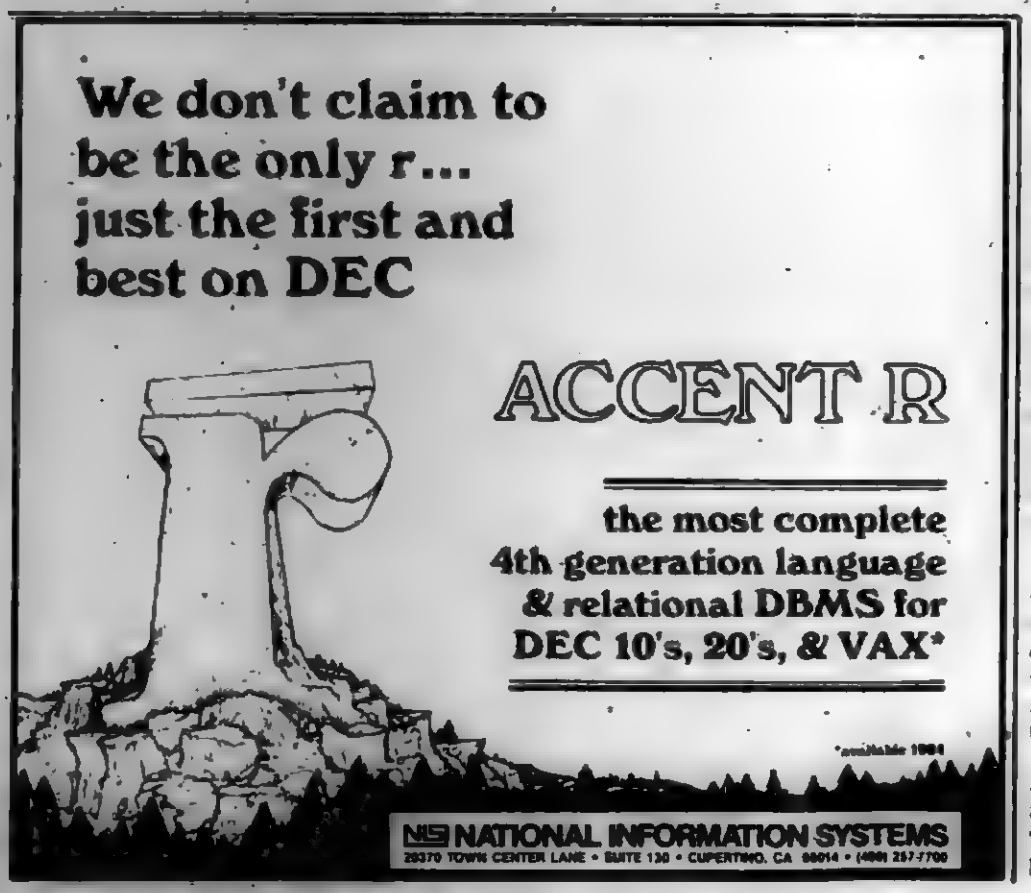
Lastly, the issue of data base structural changes over time is important. The objective to shield a data base user from such changes is part of the data independence characteristic. Unfortunately, there are cases where even a very high degree of data independence cannot mask some data base structural changes. For example, a deleted column or table forces some changes at the application level.

The ability to manage and perform all these functions is called time-processing capability. It is the fundamental ability a data base user is given to access the time dimension of data.

A conceptual data model that contains the notion of time is more realistic to the end user. Indeed, many of today's applications have been implemented on an ad hoc basis to meet their particular requirements for accessing historical data.

Interestingly enough, the notion of time is somehow embedded in most of the issues concerning centralized and distributed data bases, such as synchronization, consistency, checkpoint/re-

(Continued on SR/24)



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Time-Relational Model Integrates Processing

(Continued from SR/22)

start and recovery. For example, recovery is equivalent to taking the data base back in time to the last consistent state.

A fundamental concept in time-relational research is the time view of data and transaction programs. Its major objective is to provide automatically and dynamically multiple and complete data base views reflecting different points in time.

A complete data base view is composed of the data, its structure and the rules and logic that manipulate it, all representing a data base "snapshot." Multiple data base views taken from different points in time, for a fixed point in time, will not necessarily yield the same results.

For example, a request to view an employee's salary effective Jan. 1, 1982, executed Feb. 1, 1982 and March 1, 1982 may result in different salary values if a retroactive salary change that pertains to Jan. 1, 1982 has been applied between these two execution times.

The time-relational model is based on a centralized relational data base manager coupled with a built-in time mechanism. It increases available functionality for data base users and provides better solutions to such internal DBMS operations as recovery, concurrency control, synchronization and so forth.

There were three main objectives laid out for this research:

- *Exploring the viability and feasibility of the time-relational model.* The extended user functions, as well as new solutions for several DBMS internal operations, are developed, and some implementation and design approaches are analyzed. The central idea is to gain more functions and solutions based on the presence of time-related information within the data base domain and thus spread the overall operational and implementation costs of such a model across multiple sources.
- *Providing a high level of time independence.* The addition of this new time-dimension facility to an existing relational model should not degrade its data independence quality. The term "time independence" captures all issues of time-access path details, changes of data structure over time, changes of data manipulation rules over time and so forth.
- *Ensuring that those who are not concerned about time in their applications should perceive this model as a regular relational model.* The ability to make the time capabilities transparent for those who operate only upon the current data base is very important. It provides the means for migrating from a relational DBMS to a time-relational DBMS. The time facilities are used only when a given application requires them. Otherwise, they are bypassed.

Ben-Zvi is vice-president of Implementation Systems Development for the Software Products Group of Informatics General Corp. and a visiting professor of computer science at the University of California at Los Angeles.

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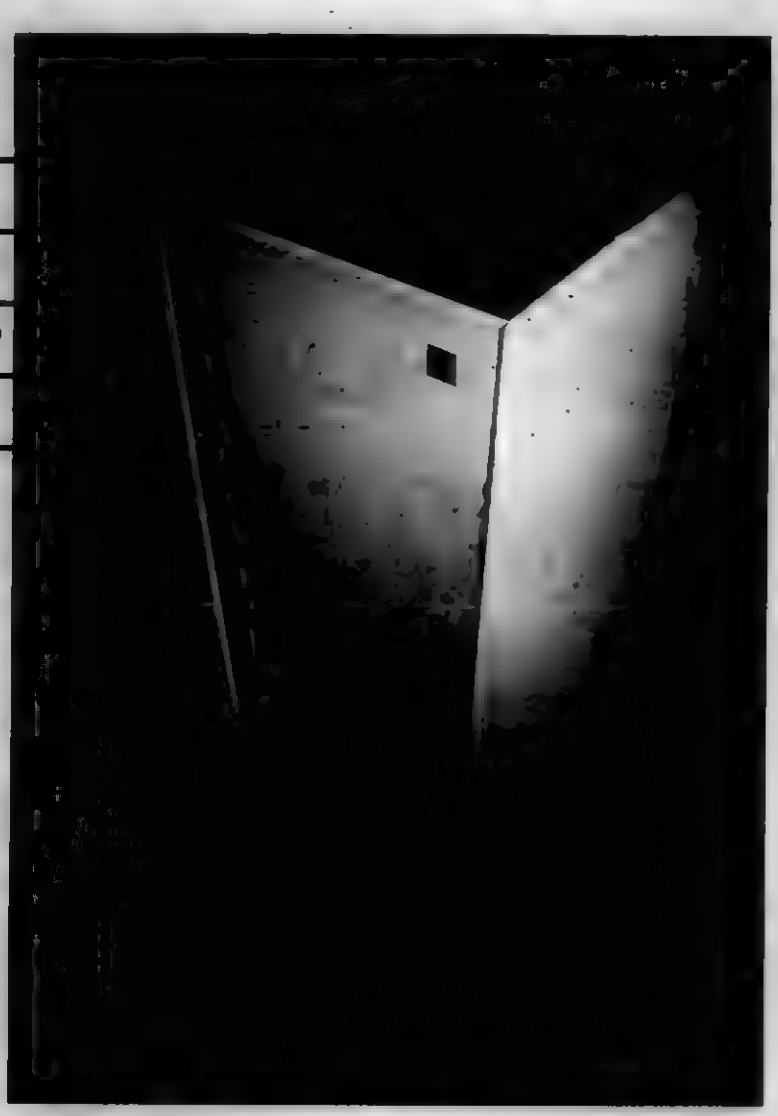

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DBMS Speeds Development For Tech Firm

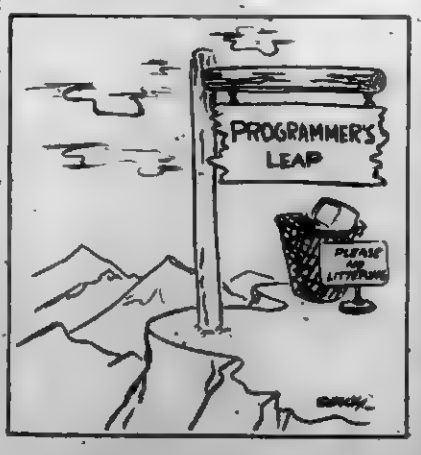
(Continued from SR/22)

erator (IAG), Filteau said. IAG lets users define applications by engaging the user in a question-and-answer dialogue, allowing him to tailor screens for on-line data entry, query and update applications without the need for programming.

"Sometimes the model is so good it becomes the system," Filteau maintained.

"Other times it goes through several iterations. We keep changing it until we get it the way we want it; development with IAG is so fast that we can afford to build prototypes and throw them away," he said.

Once a satisfactory prototype is established, Filteau's staff prepares a software design document covering all data elements with attributes and meanings, relationships among other data elements and logical groupings, the type of access required for each element, the typical retrieval or update path for single or multiple data elements and the anticipated size of the full-scale data base.



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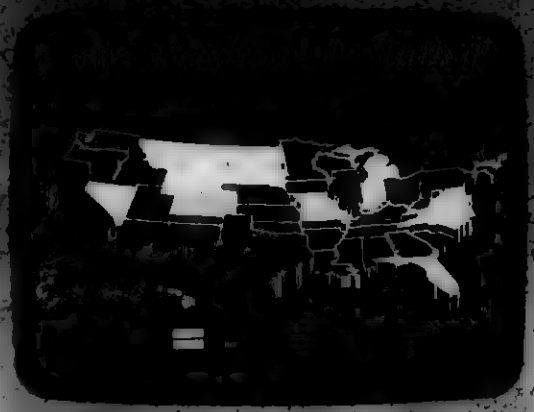

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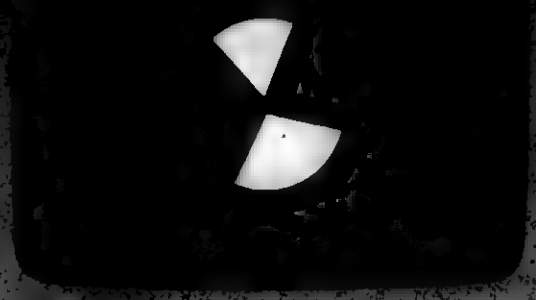

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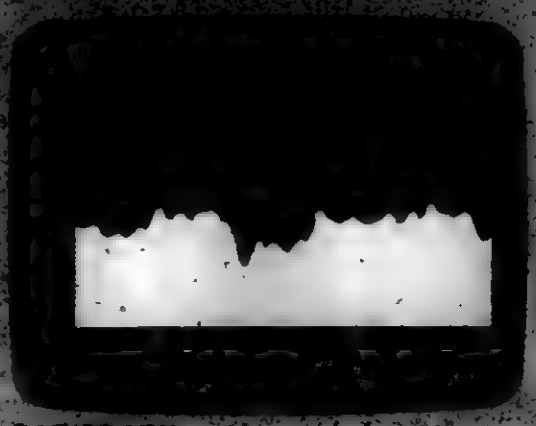

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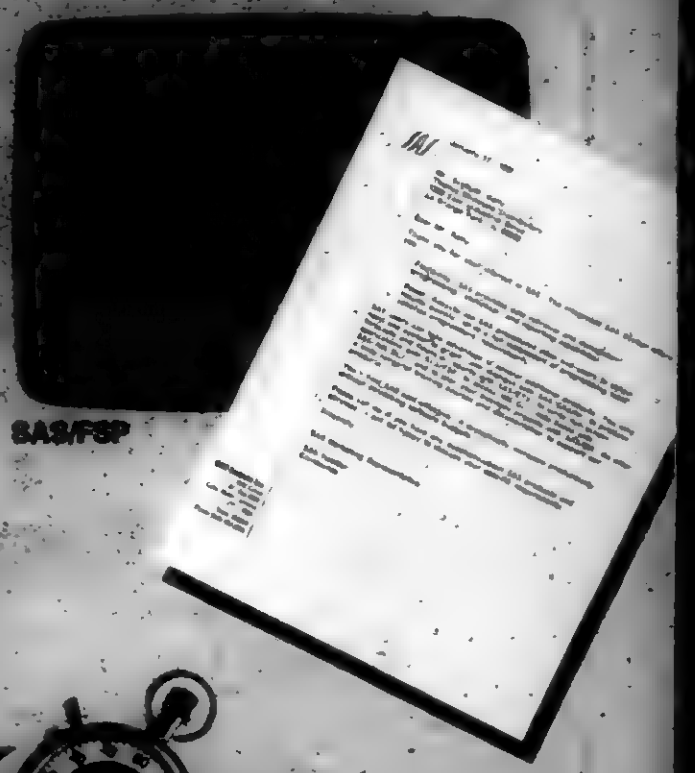

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Trading System Developed With Aid of DBMS

CHICAGO — Sharpe Trading Systems, Inc. (STS), a software vendor based here, wanted to develop an application system for the securities and commodities industry, but faced the problem of selecting a data base management system (DBMS) that could support the application system's needs.

STS' system, The Trading Instrument Accounting System, requires a sophisticated DBMS that allows on-line inquiry to all members of an investment or brokerage firm.

STS proposed to develop a flexible application system that would provide immediate in-house processing of a firm's trading activities or other firms' trades across all types of trading instruments. Taking current price quotes from a wire service, the system can continually update the data to provide on-line information.

However, STS quickly discovered that designing an on-line system that constantly updates the data base required some special functions not found on all DBMS. The system had to have easy-to-use data description specifications, efficient data storage and retrieval, flexibility to permit change and the ability to expand without requiring the rewriting of programs.

STS discovered that the IBM System/38 architecture integrates certain key elements into the DBMS that not only make it more powerful, but also make it possible to use new, flexible programming methods.

Organized Mayhem on the Trading Floor

According to Rich Sharpe, president of STS, "The System/38's DBMS allows us to view data in any sequence we want to see it and to access the data with remarkable swiftness."

Sharpe admits, however, that the System/38's DBMS is not a true relational data base. Specific operations such as union, minus, intersect, times, project and join are not found on the System/38. Without these operations, STS had to compensate through programming.

The System/38 integrates the data description specifications into the DBMS, allowing programmers to describe data fields outside the programs. Because of this, STS programmers were able to eliminate repetitious redefining of input specifications in programs, which cut programming costs, Sharpe said.

Indexing methods are also integrated into the DBMS and the hardware, providing rapid data access. Its binary radix tree indexing method takes only five I/Os to find any direct access record on the system, no matter how large the file, Sharpe said.

Data base security is integrated into the design of the hardware and the DBMS. Unlike many security systems, the System/38 requires authority to be granted before anyone may access any data. STS further reinforced security with an additional level for the individual customer or trader.

Categorizes Records

The system's object orientation feature categorizes all records, programs, files and allows the DBMS to store and manipulate the data base more effectively. Not only does it relieve the programmer of having to know where the data is, it also provides easier testing, Sharpe said.

Programming languages are integrated into the DBMS, so the data no longer has to be described in the programming language or redefined in the program, Sharpe said. Many data base changes on STS' trading system only require a recompile of the program without any changes in the code.

The System/38's high-level machine interface permits the data base to be compatible with different models of the hardware and new versions of the operating system, Sharpe noted.

The user can upgrade or change hardware models without making software conversions.

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A Misguided Data Base Administrator

Learning a Lesson From the Saga of Hyram Tech

By Robert E. Lutz
Special to CW‡

Some data base administrators are practical, efficiency-minded team players who are a joy to work with. Others are not. I have seen well-meaning data base administrators waste hundreds of thousands of dollars by insisting on overly complex designs and originating needless project delays. If my observations are typical, misguided data base administrators waste millions of America's corporate dollars every year.

There seem to be two primary reasons for overly complex designs and needless project delays:

- Some data base administrators lack application design experience.
- Most data base administrators are given absolute authority.

Because data base administration is a highly technical area, many administrators are chosen from among the ranks of systems programmers. This has proven to be unwise.

Hyram Tech (name changed to protect all concerned) was promoted from operating system bit manipulator to data base administrator. Hy attended vendor classes, where he was taught the five commandments of data base theory. They are:

1. All company data, no matter how insignificant, must be entered in My Data Dictionary.

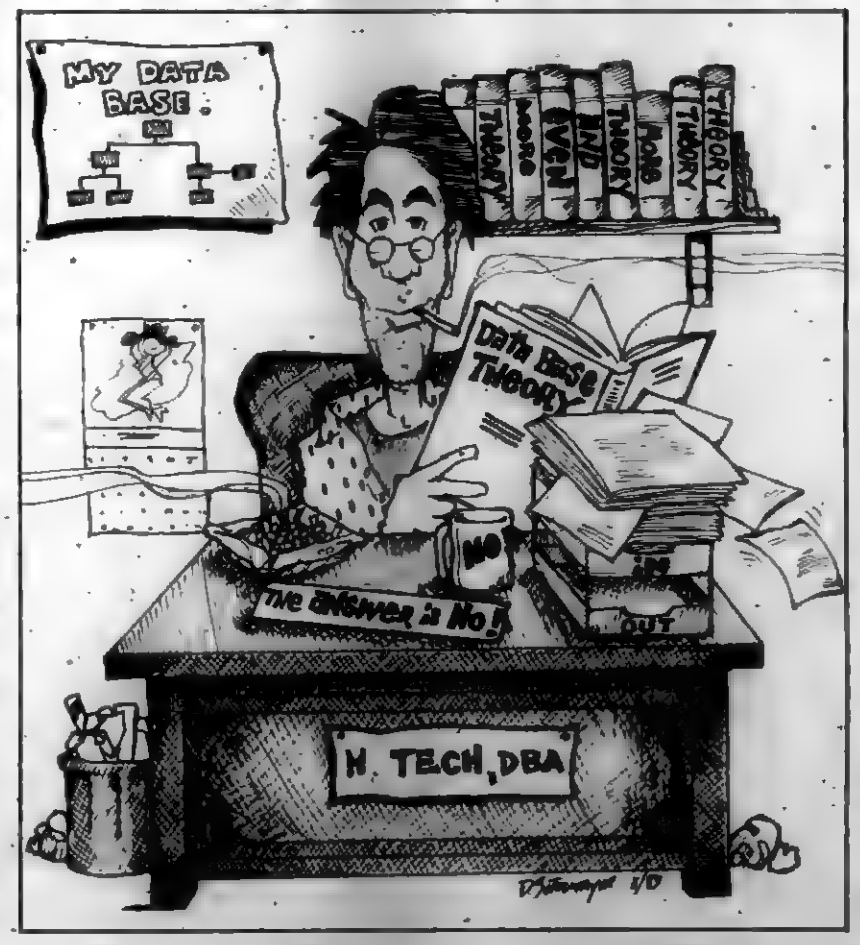
2. All company data, no matter how simple or static, must reside in My Data Base.

3. There shall be no redundant, derived or control information stored in My Data Base.

4. No change to the data dictionary or data base may take place without My Lengthy Delay.

5. None of the above commandments may be violated regardless of the potential costs or savings involved.

Data base administrators with experience in application design recognize the complexity and added expense introduced into a system by rigid adherence to the above rules. Unfortunately, Hy had no such experience. He adhered blindly to the theories he had learned and was eventually fired for incompetence.



The final decision over the shape of a company's data is too important to be made by one person. Hy would probably have been a great data base administrator had his work been subject to the same quality control sessions as the rest of the development team.

In determining the architecture of the data, applications designers as well as the data base administrator should have input. If a conflict develops that cannot be resolved, the final decision should be made by the head of systems, who will have to live with the consequences.

Misguided data base administrators too often:

- Are idealistic, impractical and theory-oriented.
- Insist on making every file and table a data base.
- Are obsessed with security.
- Make a project of data definition and file design.
- Avoid important design decisions.
- Will not allow storage of any switches, flags or accumulators.
- Are unwilling to compromise, even on small issues.

An efficiency-minded data base administrator with a strong background in application systems design can save you a lot of money in hardware as well as development and maintenance dollars. By all means, subject his work to quality control. It will save you money, and it may save him his job.

Lutz is president of Predictable Systems, Inc. in Chicago.

A Quick 'Walk-Through' Data Base Basics

By Michael Barnosky
Special to CW‡

The evolution of the storage of data from files to data base management systems (DBMS) is representative of the dynamic aspects of data processing. But working with a DBMS is not always a simple task.

However, a DBMS can be understood through its unique syntax. The variety of words used can be readily seen by looking through the table of contents or index of a DBMS manual.

To approach this large number of new words, have a person who is familiar with the DBMS mark those most commonly used. Normally, they constitute a small percentage of the reserved words. Look up the meaning and use of these and try to understand what they do. The remainder of the reserved words will become familiar as DBMS experience is gained.

Once reasonably comfortable with the syntax, put this new knowledge to work. Ask for a program listing that is fairly easy and uses the DBMS. Usually a print program that accesses multiple record types will do nicely. Acquire any documentation and output reports for the program. These will help provide a basic working knowledge of the program.

'A data base organization eliminates the redundant and inconsistent qualities through data structures that form dependencies of one type of data on another . . . data dependencies and data structures are maintained in a data base through one physical representation of data.'

After reviewing the documentation, work on the program. First, simply look for the data base verbs used and determine if they are familiar. Look up any new data base verbs in the manual to gain an understanding of what they do. Follow the logic of the program, and study how the DBMS words fit and what they cause the data to do.

Normally there will be I/O access words and other words to qualify further the data being accessed. Once the program's function is reasonably understood, the DBMS will be better understood. Other basic aspects to know are the data structure, data dependencies, flat file vs. DBMS and basic storage and access methods of the DBMS.

The flat file concept, in which data is represented schematically as one data record following another in a long sequence of data records, is replaced by a data structure. This structure can be represented as a hierarchic structure in which dependent or child data records are shown below a master or father record, as a relational structure in which data records are shown as a circle of records with an owner and its members or as a network in which each data record of a kind can be shown connected to every other of its kind in a ring format. These different data structures give some meaningful advantages to a DBMS over a flat-file concept. One is the elimination of the redundant and inconsistent arrangement of data in flat-file concepts. Redundant data occurs when the same data values of a particular kind appear in more than one place. Inconsistent data occurs when a data value is changed in one place, but not in other places where that value is stored.

A data base organization eliminates the redundant and inconsistent qualities through data structures that form dependencies of one type of data on another. For instance, a customer name and address relate a customer's order to his name and address values and through data structures that connect these differing values through pointers. In this method, when a customer address is updated, all orders for that customer will then reflect the change because all the orders point to the same address information.

The data dependencies and data structures are maintained in a data base through one physical representation of data. Various programs can view the data in different ways through a logical view. This logical view allows a program to recognize only those data-values with which it needs to be concerned.

You only need to be concerned with your shop's particular organization of the data base.

Barnosky is a data base consultant in the Cleveland area.

From Stalled Development

Fourth-Generation Languages Rescue DBMS

By Thomas O'Flaherty
Special to CW‡

The accepted data base management system (DBMS)-driven system development process is in deep trouble, and fourth-generation languages may represent the only remedy.

The major symptoms of the problem include multiyear visible backlogs, lengthy development cycles that often produce obsolete systems and nonrobust systems that cannot be easily modified.

The very power and complexity of the DBMS has greatly increased the rigidity of the classic system life-cycle process.

Most information systems professionals still view fourth-generation language applications and conventional DBMS applications as inhabiting quite different worlds. Fourth-generation languages are seen as quite useful for small, analytic projects, but they are typically viewed as unsuitable for large, transaction-oriented systems.

However, leading fourth-generation languages can already support sizable production-type systems, such as data files running into millions of records, millions of calls a day against a large data base and dozens of simultaneous users.

In many cases, a significant amount of additional processing resources will be required to perform a task using a fourth-generation language (often 75% more resources may be needed). The trade-off is that programming speed can be increased by five times or more.

'Most information systems professionals still view fourth-generation language applications and conventional DBMS applications as inhabiting quite different worlds. Fourth-generation languages are seen as quite useful for small, analytic projects, but they are typically viewed as unsuitable for large, transaction-oriented systems.'

The real issue is not so much the technical capabilities of fourth-generation languages vs. conventional DBMS-based developments, but the kind of development process that each can support. While in principle a conventional DBMS is flexible and can be changed, in reality this is very difficult to accomplish.

The process is essentially sequential. Analysis, at best, correctly analyzes the situation at a single point in time. And the resulting system reacts very poorly to subsequent changes in requirements, especially where previous data relationships are turned topsy-turvy. Unfortunately, the reordering of data and logical relations are quite common in a dynamic business environment.

For large, complex systems, the elapsed time during the life-cycle development has become a significant percentage of the system's useful life. The process is horribly complicated. At the same time, there are no effective analytic methodologies that have succeeded in converting a process that is half inspiration and half trial and error into an engineering discipline. However, the life-cycle approach expects a usable design to come out of the analysis phase.

What is needed is a prototype, something at which fourth-generation languages are extremely good at for the following reasons:

A fourth-generation language, up to a certain point, can be quickly mastered by a user, giving users and information systems staff a common language.

Systems can be roughed out, often in a matter of days. This is a critical advantage for letting users see the effects of their desires.

Feedback between users and information systems staff can move forward throughout the entire development process.

Obviously, a fourth-generation language prototype can have very significant benefits for the feasibility, analysis and design steps by combining them and, even more important, permitting multiple iterations of assumptions and system features to be tested.

The impact of the fourth-generation language can be even larger, although less immediately obvious, in the debugging and maintenance stages. Since the code really is self-documenting, it is easier to identify and correct errors.

Considerable controversy surrounds the wisdom of moving a fourth-generation-language-based prototype into production, as opposed to rewriting it as a conventional application. The rewrite's increased operating efficiency (if any) must be weighed against the benefits that will be lost.

Using a fourth-generation language in a production setting does not necessarily mean that it replaces a conventional DBMS. The issue is not so much the extent to which fourth-generation languages are competing with established DBMS as it is selecting the best strategy for ensuring that the particular fourth-generation language selected complements a conventional DBMS.

Information systems departments that see fourth-generation languages as allies stand a good chance of retaining control over systems and the systems development process. Otherwise, users will wield fourth-generation languages themselves, with unforeseeable consequences.

O'Flaherty is principal consultant in the Saddle Brook, N.J., office of Input, Inc., an international research and consulting firm. This article is based on research conducted for Input's recent study "The Opportunity of Fourth-Generation Languages."

Project Control for Development Of Data Base Systems

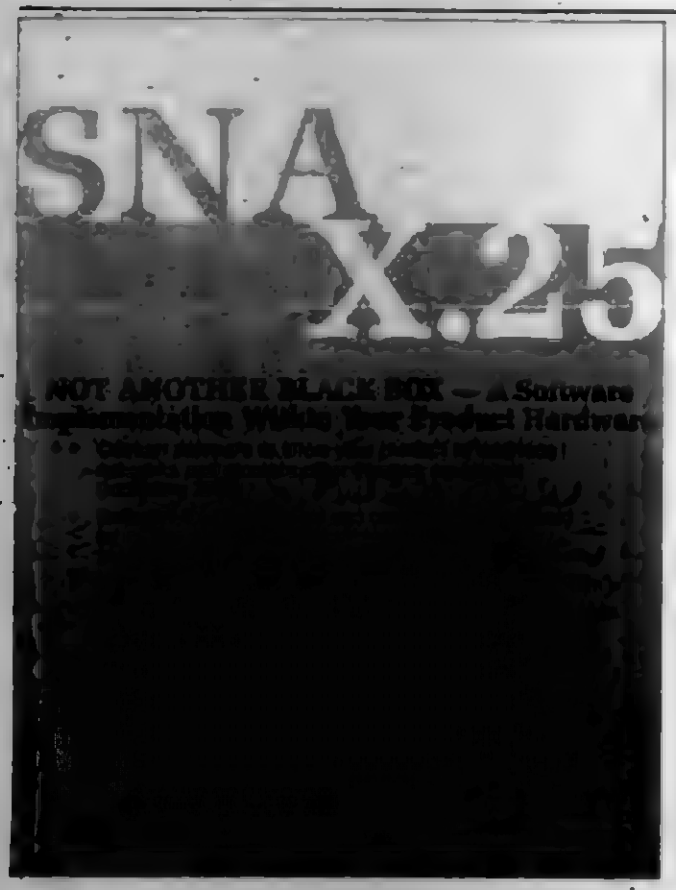
By J. Colbert Jr.
Special to CW‡

The data base management system (DBMS) is a welcome addition to the functional tools available for use in most management environments. However, bringing it up with cumbersome system development methods and traditional project controlling restraints is not always pleasant.

While DPers are abreast of current developments in the field, non-DP management personnel are not. The impact of on-line DBMS project development and use points out a need for educating "just plain folks" and moving them forward with the DP environment.

Those procedural steps once mandatory in development of data processing systems have been reduced to prerogatives for management to explore and use as necessary or to ignore in favor of economy and the

(Continued on SR/32)



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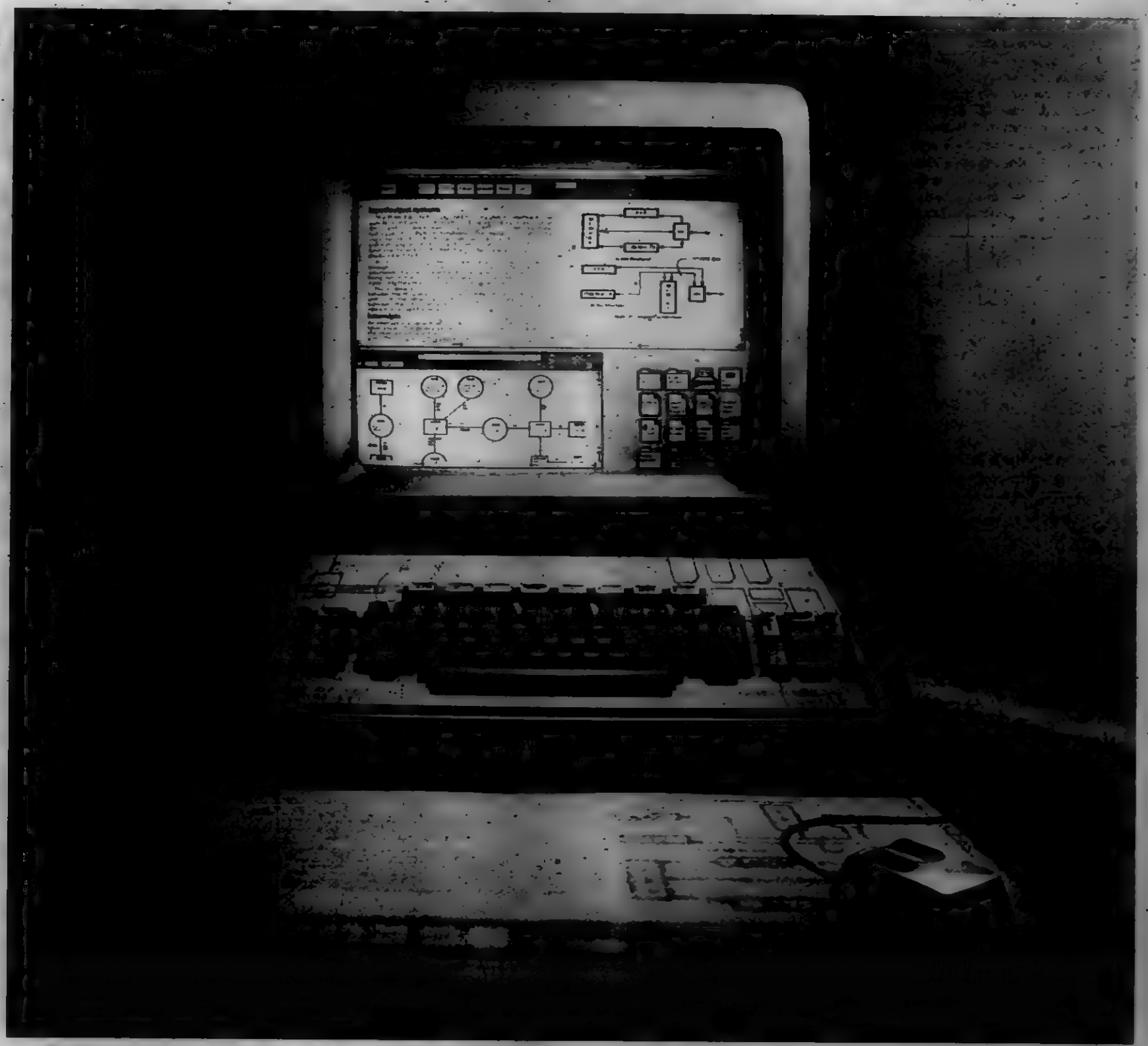

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Project Control Tips for DBMS Development

(Continued from SR/30)

weight of our own needs. Failing to take the most direct route from conception to completion of systems is like ignoring electric starting motors on our automobiles and sticking with the hand crank.

On-line and batch DBMS are dramatically different. Developers of communication systems have long recognized that application of the end item or system influences the development methodology and configuration of the system being designed.

Strategic communication systems must provide precise administrative and security controls, since material processed by the system is usually sensitive and highly classified. Operations of strategic systems are well defined, scheduled and administered, since the product of those operations is to be used at the highest level of command. Batch data processing is conducted in a fixed, stable and often rigidly scheduled environment using the most sophisticated control techniques available with products designed for use at the highest level of management.

Operational or tactical communication systems design is dedicated toward providing flexibility, mobility and rapid response, unencumbered by burdens of administration and overly restrictive procedures. The product of operational communication systems is "right now" information. The on-line DBMS is operational in that users are communicating with and through their data base unencumbered by the need for lengthy data entry, fixed schedules or data processing intervention.

Moving from one system and capability to a new or different type of operation in data processing is often met with frustrating resistance to change. The more established and bureaucratic a management group becomes, the less it is prepared to accept change. Moving from one scheme of system development to a new or different development methodology often meets with equally frustrating resistance.

Large volumes of procedures have been assembled assigning great credibility to tried and true system development methods and project control techniques considered set in concrete for development of systems. The usefulness of sophisticated project management and development control techniques would be hardly debatable as long as DP capability and requirements remain fairly static.

However, conditions in the DP community have not remained as the chart and graph keepers would like. In spite of constraints imposed by management's inflexibility, DP has evolved to a different level of operation — the on-line DBMS.

State-of-the-Art Tools

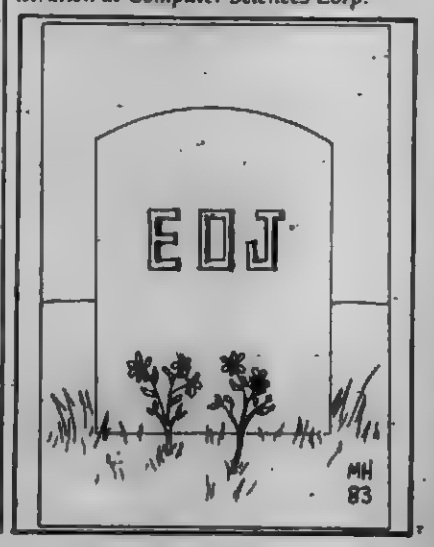
Fourth-generation programming languages, heuristic compilers and DBMS software are state-of-the-art tools available for DP systems development. The need for agonizingly slow development procedures, elaborate development schedules and stringent project controls is challenged by current DBMS development methodology.

Comparisons between communication systems and data processing systems exemplify the impact of end-use application on design and development of the systems. Design, development, installation and use of either communication systems or data processing systems must be given the same considerations by development engineers.

The intended application of systems being designed should influence non-DP management thinking to evaluate the usefulness of controlling DBMS project development with the same measuring stick as that used for batch processing systems.

Data processing professionals are armed with knowledge of DBMS development using fourth-generation technology. Non-DP managers and engineers must be moved forward to embrace that technology if the industry is to take full advantage of evolutionary system development.

Colbert is involved in security/administration at Computer Sciences Corp.



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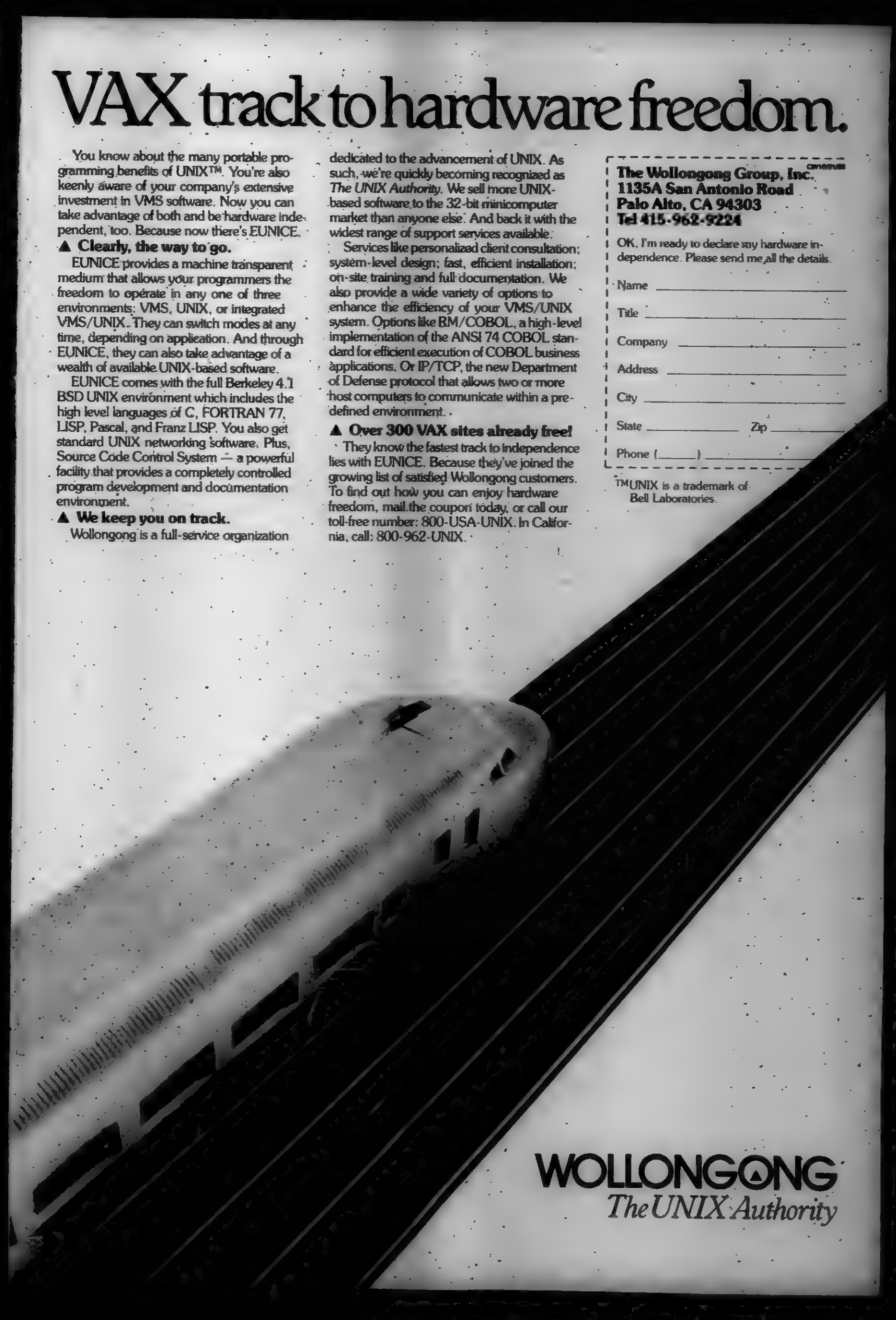

WOLLONGONG
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Making Data Bases More Usable

Extended Query Systems Allow Rapid Updating

By Michael R. Stadelmann
Special to CW‡

Data bases are being updated faster and more accurately than ever before as extended query languages nearly eliminate the need for programming languages during the development of data base applications.

These systems — often referred to as fourth-generation languages and application generators — are an important contribution toward making data bases more usable. A query system allows users to specify results desired rather than the specific method for achieving those results.

It reduces the amount of instruction needed to request services from a data base management system. The desired results are stated as the selection of data items to be displayed, the order in which these items are to be displayed, functions to be performed for the data and so on.

Updating causes changes in a central repository of data. For example, records can be added, deleted and modified. Extended query languages use keywords, modes or other techniques to indicate the particular operation to be used.

Updating a data base requires more extensive data input than retrieval. When a record is created, values for several or all fields of the record are supplied. When a record is modified, values for those fields being changed are specified. Record deletion tends to resemble retrieval in the nature and quantity of input data required. Usually, only key values are specified for those records to be deleted.

A query system performing retrieval handles formatting of output data. Users need not be concerned with this relatively mechanical chore. Likewise, an extended query system performing updates formats input screens as well.

Field labels and input data areas are distinguished. Fields are separated properly, and they are spread out rather than compressed into a small section of the screen. Default screens should not appear cluttered.

Certain input values for a transaction may be destined for storage into several data base fields. The system should not force the terminal operator to enter this single value more than once. Allowing assignment of one data base field to another is useful.

Boolean Expressions

Most query systems allow the user to specify record occurrence selection through the use of Boolean expressions. Boolean expressions also have an application when updating is performed. They can be used to indicate constraints on acceptable input data.

An update request should be capable of indicating data validation criteria, whether failure of the criteria should result in an error or a warning condition and a message to be displayed to the terminal operator.

Extended query systems should be capable of generating audit trails and should be able to save both accepted and rejected transactions. The user should be able to query these audit trails and input them to other transactions.

An extended query system handles manipulation of data base records, fields within the records and relationships among the records. Particular fields for a record occurrence can have new values assigned to them; alternatively, numeric fields can be incremented or decremented by an input value.

The system performs conversions of input data to several formats. For example, numeric data is usually stored internally in packed or binary format. The system must handle conversion errors properly and must notify the terminal user when an error occurs. It should generally be impossible to write a request that can place extensive amounts of "garbage" into a data base.

Retrieval is frequently an ad hoc activity. On the other hand, updating is usually an activity that is performed on a production basis.

With extended query systems, data bases can be created and modified rapidly, programmers can be more productive, data base designs can be realized almost immediately because the entire application does not need to be designed ahead of time and the application requirements can be tested on the computer without extensive programming. Entire application systems can be generated by the use of extended query languages.

Stadelmann is manager of language development at Mims Systems, General Electric Information Services Co.

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Integrated Information Management Systems

By Martin D. McKendrick
Special to CW‡

Most organizations use information in three distinct ways. First, the traditional data processing center captures and produces operational information that is vital to the operation of the organization. Second, strategic information is necessary to manage the course of the enterprise. This must be concise in content and subject to impromptu demands. Third, personal data such as electronic mail, appointments and memos may be the highest level of information immediately available.

DP typically dictates to the user how and what the computer will provide, a procedure that has proven time-consuming, costly and ineffective. With the proliferation of personal computers, users who were once dependent on the DP department are acquiring computers independently. The need to integrate these powerful personal computers into corporate information systems will place demands on the DP organization that are far more challenging and complex than ever before.

Within most organizations, there exist mainframes, minis and micros from various manufacturers seeking to access common data bases. Personal computers must be able to access responsively and efficiently corporate data bases. Mainframes and their accompanying DP staffs must also retain control to monitor and ensure the integrity of these data bases.

A comprehensive system must have the ability to manage and disseminate responsively information from a common data base to various computers, regardless of manufacturer or operating system. Not only should the system support dissimilar computers, but it must ensure the integrity of the data base. Access must be controlled, and data traffic must be audited to ascertain the quality and flow of the data.

Sophisticated DBMS software is currently available for general-purpose computers. However, there are drawbacks to software-only implementations. Software-based DBMS often suffers from significant system overload and response degradation. In fact, if the DBMS is being run on a large mainframe, then the cost of the activities not being performed by the computer, in lieu of the DBMS program, can outweigh the value of the DBMS function.

A uniquely designed computer dedicated to performing DBMS can offer optimum performance while providing a cost-effective solution. Such a dedicated hardware and software solution is called a data base machine. This contains most of the DBMS software functionality on-board the dedicated hardware. A small amount of programmed intelligence is required by the computers to coordinate command and query processing and to communicate with the data base machine. A data base machine allows any combination of host computers to access a common data base.

While speed of response is important, the response format is equally important. The advent of relational data base systems allows all users to access, update and review information in familiar formats of rows and columns. This format is fundamental to the way information is presented in the business environment.

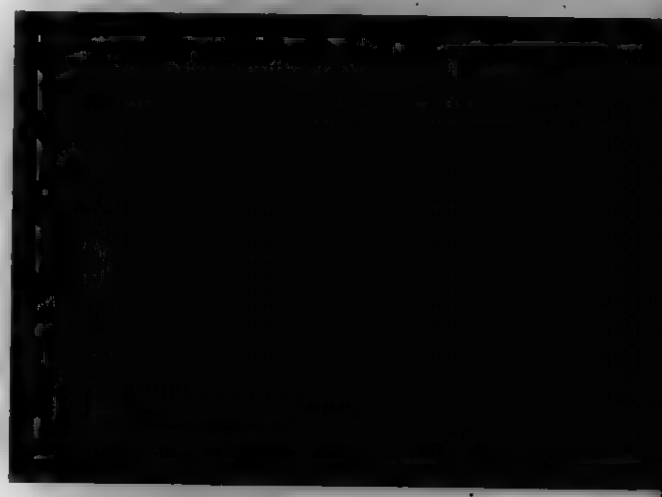
Once a system is developed and put into use, it is very difficult to incorporate major innovations. The tendency is to massage existing technologies. A comprehensive integrated information management solution must be thought through and designed to allow for next-generation technologies.

A well-designed integrated information management system allows the DP organization to continue performing the functions required by the mainframe, while the manipulation and transportation of data to the user is virtually transparent. Properly designed and integrated, such a system minimizes the necessity of programmer involvement and allows the user to perform work virtually independent of the DP organization. New solutions must easily coexist with existing DP system architectures.

The problem of managing the burgeoning level of corporate information in today's multiple computer environment is just beginning to dawn on management. Integrated information management teams must be developed internally.

McKendrick is product marketing manager at Britton-Lee, Inc.

IF YOU'RE CONSIDERING CONSIDER



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Allows for More Work in Less Time

Employee Benefits System Aids Administrators

STAMFORD, Conn. — Employees aren't the only ones benefiting from an employee benefits system developed at Combustion Engineering, Inc. (CE) here with the help of a data base management system (DBMS).

In the seven years since the system was created, the Fortune 500 company's corporate technical and nontechnical benefits administrators have been doing more work in less time, with a smaller staff and less assistance from the DP department.

CE administers its own domestic pension, group insurance and employee investment plans for 34,000 active employees and over 6,400 retired salaried and hourly employees. The corporate employee benefits department handles all domestic benefits for the company, which supplies systems, equipment and services to oil and gas, petrochemical, utility and industrial markets worldwide.

Despite the complexity of such operations, nearly all benefits were maintained manually prior to 1975. It was the Employment Retirement Income Security Act — the government law mandating companies to maintain accurate retirement and benefit plan records for employees, among other requirements — that led CE to automate fully its employee benefits records.

After some lengthy research, management realized in 1976 that few organizations had the capabilities to meet the needs of all CE benefits plans. CE began searching for a DBMS that was compatible with its IBM environment.

The software had to have the capabilities to handle corporate systems programs in order to meet all legal reporting requirements, maintain records of employee retirement contributions, offer repeating fields for the 52 pay periods and allow the 100 domestic facilities to batch input and access their own data on-line in the decentralized environment, according to Robert Rupar, supervisor of benefits information systems.

Inquire from Infodata Systems, Inc. was installed early in 1977. "Prior to installing the employee benefits system, we were sending all benefits data to the remote locations, whose staffs would manually delete the names of terminated employees and fill in the names of new plan participants. After that information was collected, it was sent to the actuary for processing," Rupar said.

"Once a year the actuary sent us a booklet containing the retirement benefits information for each plan participant. The corporate employee benefits staff then manually calculated the retirement benefits for any individual retiring that year," he said.

Frees Personnel for Other Duties

Today, all of CE's remote locations update the centralized benefits system in batch with basic employee data. CE's internal programs then calculate the yearly retirement benefits accruing for each employee. The corporate employee benefits department has been allowed to free three of its six benefits professionals for other duties.

The Inquire command-retrieval language also allows the staff to obtain statistical data to make decisions about designing future enhancements to its benefits plans, Rupar said.

CE also utilizes Inquire and its own internal program to do a monthly audit of retirement checks actually sent to pensioners from the trustee bank. The bank sends a tape of the checks issued to CE, which compares this against its benefits data base to reject any ineligible or unpaid payments. Soon after this monthly audit program was developed, an increase to the salaried pensioners was granted by management.

Even though this pension increase would be calculated for 2,700 people, Rupar saved intercompany billing and actuarial fees. Approximately 35 groups of set functions were entered through the on-line update as part of the Inquire replace-command query. The information was unloaded by Inquire to a tape and sent to the bank that makes the benefit payments for CE.

After the bank paid the checks, it sent its tape back to CE, where the monthly audit program was run. Rupar noticed fewer errors than those incurred when the company's actuary calculated the benefits.

Because CE does its own internal thrift-investment plan record keeping, remote personnel offices can retrieve a current statement of an employee's account. These locations also utilize Inquire's command language to format management reports to meet their own internal needs.

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The optional extended ReportWriter™ provides enhanced reporting and calculating capabilities (MS-DOS version is list $150). Program Interface™ is a set of subroutines which allows direct database access from PASCAL or FORTRAN programs (MS-DOS Version is list $395).

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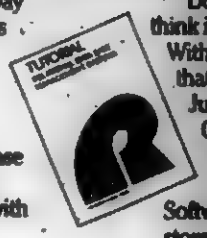

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System Generator Produces Documentation

By Kim O. Jones
Special to CW‡

Successfully integrating a data base management system (DBMS) poses many problems:

- How to afford the time and expense of training current development personnel and hiring DBMS-experienced analysts and programmers.
- How to enforce effectively standards with respect to accessing information stored on the data base.
- How to ensure adequate and accurate documentation for data base programs.

A system generator — a software tool that automates tasks of designing and programming business applications — is one solution. It differs from application generators, fourth-generation languages and application development systems in that it is neither a pure code generator nor an interpretive development language. Major functions include the production of design and system documentation, in addition to the generation of a source language such as Cobol from the same input.

Describing System Requirements

Initially, a system generator provides one with a nonprocedural language with which to describe system requirements and detail specifications. The design documentation produced from one's input includes samples for reports and screens, file and data base layouts and data and processing flows and rules. In addition, the system generator produces data and component cross references, specification auditing diagnostics and project management status summaries.

The programmer, using the system generator's procedural commands, adds minor processing subroutines to the specification input created by the analyst. All of the source code is then generated by the system generator.

Very high-level nonprocedural and procedural commands are inherent in system generators. Control and search work area definitions are always created in the proper format, DBMS access calls are handled entirely by automatically generated routines, and DBMS return codes are translated into more meaningful and logical statuses.

Creating User-Defined Commands

In addition to using the built-in DBMS commands, user-defined commands can be created by the data base administrator to simplify processing multiple-segment logical record sets. Using the command-definition features available with some system generators, a complex series of data base accesses (including work areas and procedural coding) can be invoked with a single command.

These capabilities allow the analyst and the programmer to approach the problem functionally, leaving almost all of the DBMS technical details to the system generator, which is acting literally as a catalog of DBMS experience.

A company using a system generator creates source code in which installation standards are the rule rather than the exception. This is accomplished through the use of high-level and user-defined commands, as well as user-modified system generator options.

Since 100% of the source code is generated from the system generator input, the resultant code is significantly dictated by the data base administrator and the department standards group, not by the analyst or programmer who created it. It becomes easier to create standard code than nonstandard code. The standards that are enforced are controlled by the data base administrator, independent of application development.

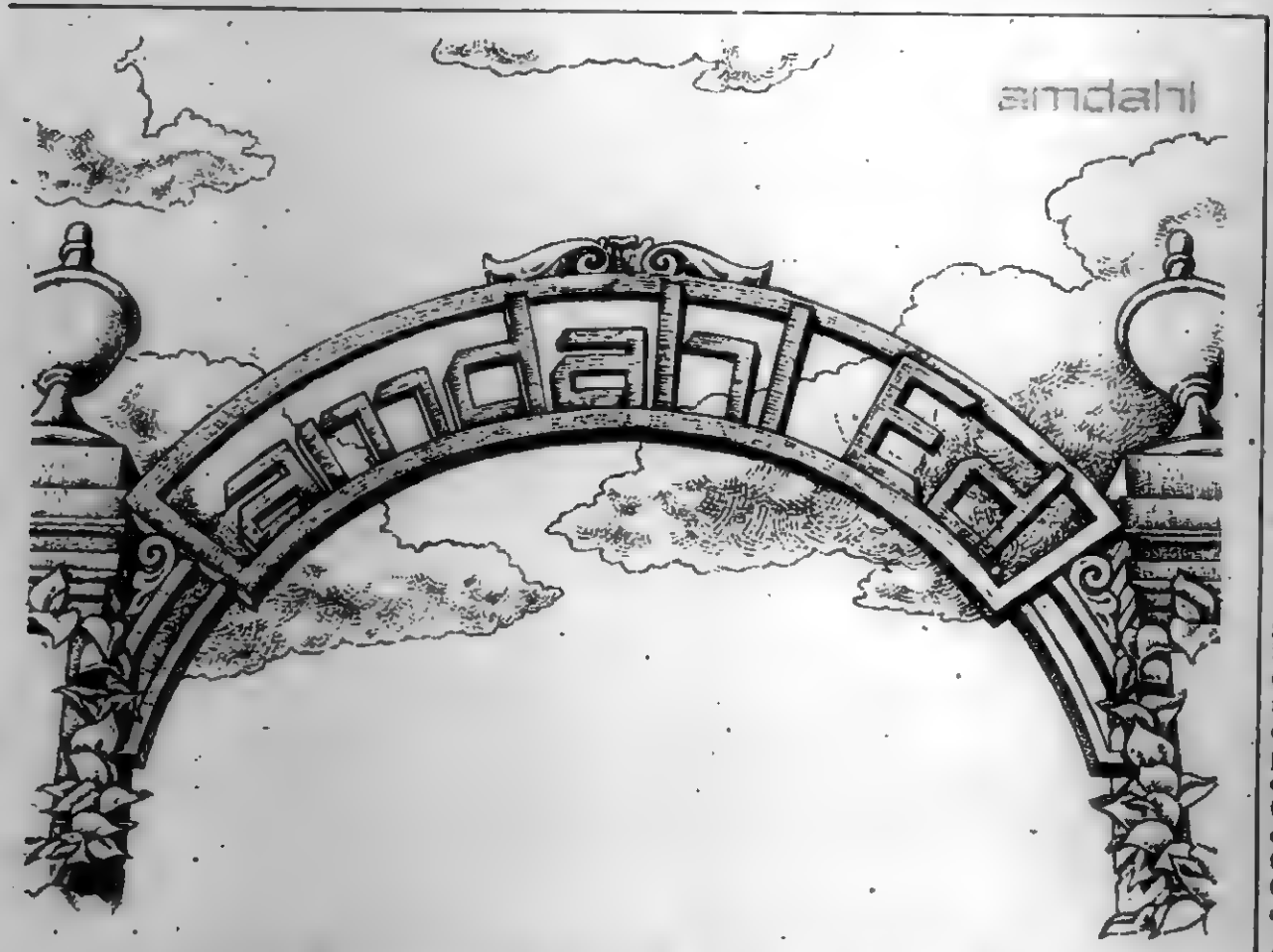
Control of the DBMS Environment

Control of the DBMS environment is enhanced by the automated documentation produced by a system generator. Because the documentation is produced from the same input as the source programs, it always reflects the current status of all components in the data base application system.

Cross references are produced that identify segment and element use and access by program. Data base access volumes are extrapolated from transaction to system levels and are easily kept current.

During the production of each iteration of the system documentation, the system generator also performs extensive auditing of the input specifications, including checking for valid DBMS segment and element naming and ensuring that each program includes only allowable data base accesses. Any errors discovered are displayed in the specification diagnostics section of the design and system documentation.

Jones is president of Genasys Technologies, Inc. in San Francisco.



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Utility Aid Gives Fuel Firm Breathing Space

SALT LAKE CITY — As a government-regulated utility, Mountain Fuel Supply Co., a major utility serving most of Utah, faces the problem of constantly having to change its reporting requirements. The data base group is continually inundated with requests from the data processing department to make changes to the data bases.

So last summer the group began searching for an IBM IMS data base utility aid to solve its data base space usage problems. They found Databasic from Consumer Systems in Downers Grove, Ill.

Databasic is an IMS productivity aid that automatically provides test data bases without coding. Built-in capabilities allow multiple users to create subsets of production data bases without affecting other users' test data and eliminate the need for multiple copies of data bases, according to the vendor. No system generations are required or existing environment changes needed, a spokesman said.

"We found ourselves always in a reactive, emergency situation," said Craig Dee, Mountain Fuel's supervisor of data administration. "Many times these requests had to be implemented immediately or Mountain Fuel would face penalties. It was just not feasible for our data base group to handle and turn them around on a timely basis."

Mountain Fuel is also heavily involved in a large system development effort called the Well Information System. The system contains 10 data bases that are intricately involved in many logical relationships, Dee said. The project is developed piece by piece by prototyping data bases and assigning teams of programmers to each prototype.

"As we bring a prototype data base up and integrate it with the other data bases, we assign resources to work on that new prototype. If that prototype does not function properly, we cannot put it into the system and affect the logical relationships in all of the other data bases. Those other programmers have got to be able to continue testing."

Mountain Fuel had another problem in the use of its data bases. "Two of our company divisions, Transmission and Distribution, wanted to keep all of their segments and keys within the data bases separate from the other divisions so that there would be no mishaps or confusion between the two divisions' data," said Judy Kilby, systems programmer in charge of installation and maintenance of IMS and IMS software. "In essence, they each wanted their own separate data base. However, it was decided that all data bases should be kept at the corporate level."

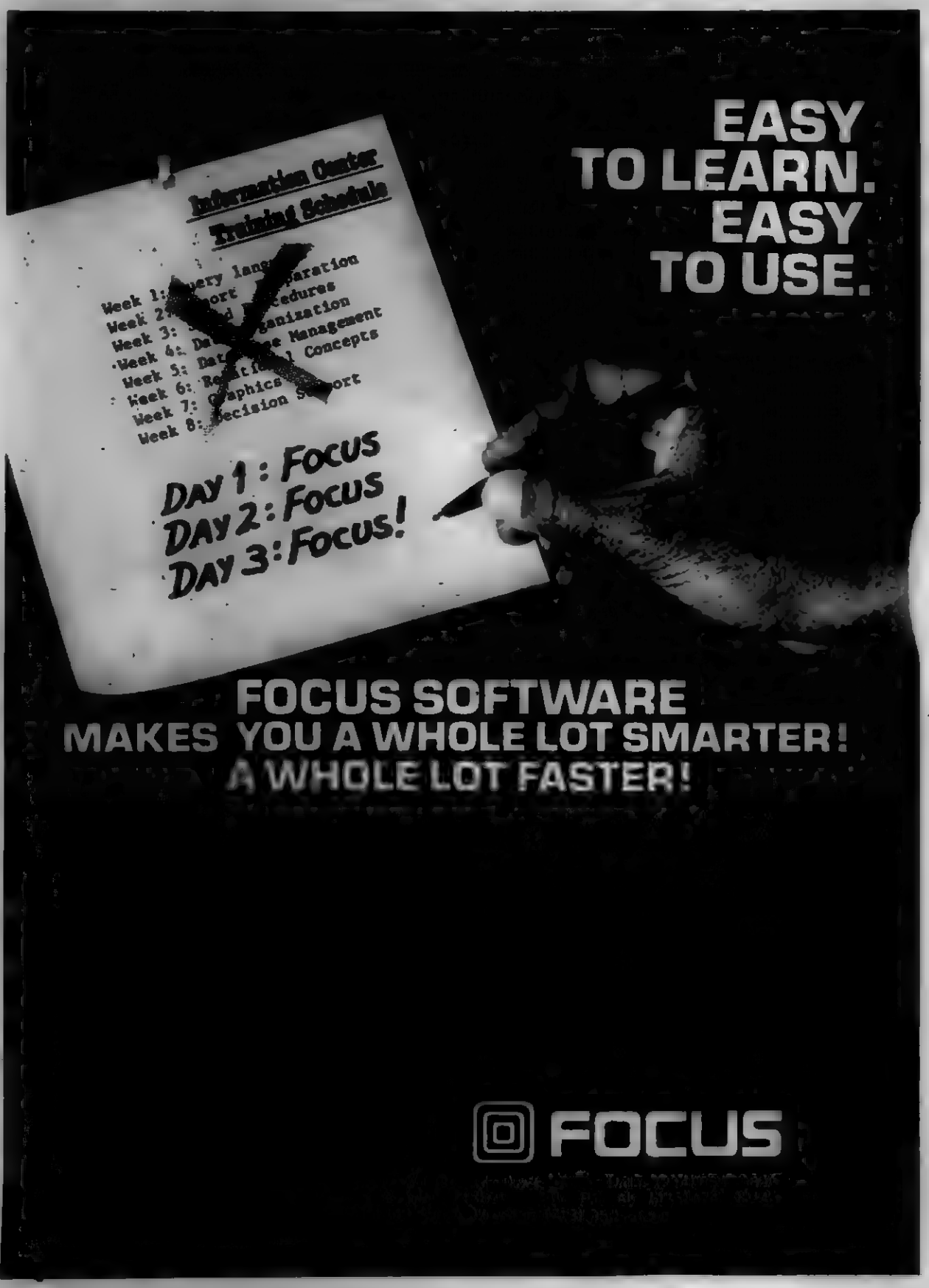
Databasic allows Mountain Fuel to keep a corporate-level data base and yet makes it possible for each division to pull off particular segment types of data without affecting the integrity of each department's keys and segments in the corporate data bases, Kilby said.

Dee explained the effect Databasic has had on compliance with government regulations. "Programmers were constantly at my door for new changes and requirements. Databasic has allowed us to stay ahead of user requirements," he said. "We can now present the solution to their problems faster than they can rewrite the programs. We can change a data base faster than application programmers can fix the code. We find ourselves in the position of waiting for the application people now."

For Mountain Fuel's Well Information System, Databasic allows each programmer to have his own personal subset of the prototypes he is working on with the necessary logical relationships intact. If a new prototype is brought up for integration into the system and malfunctions, it will not affect any of the other programmers, their prototypes or logical relationships, Dee said.

"Databasic allows us to work on each new piece, and as each new piece is being developed, you get a test data base for it without influencing the work others are doing," he said. "We can work in an integrated mode in one area and a nonintegrated mode in another."

In the area of disk storage, the company went from four IBM 3350s to one 3380. The jobs take little time to set up, and system development projects proceed without any slowdown at the data base level, Kilby said.



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Management System Helps College Track Student Info, Stay in Touch With Alumni

NORFOLK, Va. — Chartered in 1961 and opened in 1966, Virginia-Wesleyan College (VWC) here relies on innovation rather than ivy-covered tradition to solve typical administrative problems. Tracking, classifying and scheduling students manually became unwieldy tasks as the school grew. Since these functions were handled by different administrative offices that required the same basic information, it was determined that a computer-aided management system was needed.

Recently, the administration installed Henco Software, Inc.'s Info data management system to handle applications in a number of administrative offices. The offices draw and update information from on-line data files to keep track of student records, maintain the college catalog, produce class lists and grade reports, maintain alumni files and produce mailings in addition to other uses.

"Info and [Marc Software International, Inc.'s] Muse word processing software were chosen because we don't have a large programming staff here at VWC. These packages are easy to implement, and laymen can be taught to use the system in a short time period," Dennis Govoni, director of computer services, said.

"The admission office is the starting place for information on prospective students," Govoni said. "Currently, this office maintains four basic data bases — the basic data, freshman, transfer and readmit files.

"The basic data file contains names and addresses of all individuals inquiring about admission to VWC. Each person applying for admission is classified, and that record is related to additional information contained in one of the other files."

Main Biography File

The files set up by the admission office are used by other departments and offices throughout the campus. The registrar's office uses the basic file to obtain basic biographical information on an admitted student and to transfer it to his main biography file. This main biography file also contains the student's academic record.

Info's relational capabilities allow matching and sorting of student and course listings stored in Info data files, Govoni said. The system then generates a personalized course schedule for each student, giving the course name and number, instructor's name, meeting place and time. Consistency with chosen programs of study is ensured by a check against a master curriculum file containing prerequisite courses. Other files used in the registrar's office contain college directory information, academic probation status and student standing with reference to proficiency examinations.

The registrar's office maintains a separate student biography file for each semester. A separate semester course offering file is related to the student biography file. "By keeping less frequently accessed information in separate files, processing times are kept to a minimum," Govoni said.

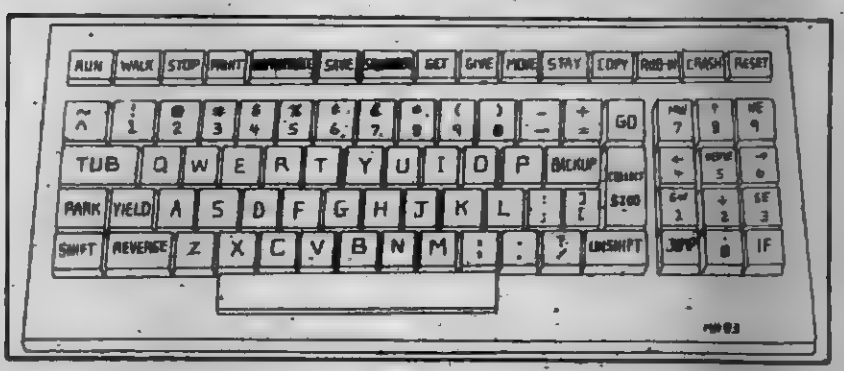
Tracking Alumni

Info also helps the college keep in touch with alumni, according to Roy K. Patteson, vice-president for special resources. "We had a manual gift accounting system originally. We needed to have a highly efficient means of processing, coding and receipting gifts as the school grew," Patteson said. VWC purchased a Prime Computer, Inc. 550 superminicomputer and Info data management software for administrative improvement and strategic planning and management.

"The system is used to track about 15,000 constituents," Patteson said. Each group is assigned to a biographical file containing name, address and other data. These files also include pertinent data regarding gifts. "When a gift is sent to us, it is recorded in a gift file and assigned a unique transaction number and a pledge number for tracking by other programs," Patteson said. "If the gift is further specified as an installment pledge, future payments are recorded in a pledge/payment file. All pledges are summarized automatically in the gift file."

Once the biographical and financial data are recorded in the appropriate file, the college generates reports, including an alumni register, donor lists, special project reports, daily journals and transmittal forms for the business office.

The system is also used to produce the direct-mail solicitation letters using Muse word processing. Using Info, they are personalized automatically by accessing data in the biographical and gift files.



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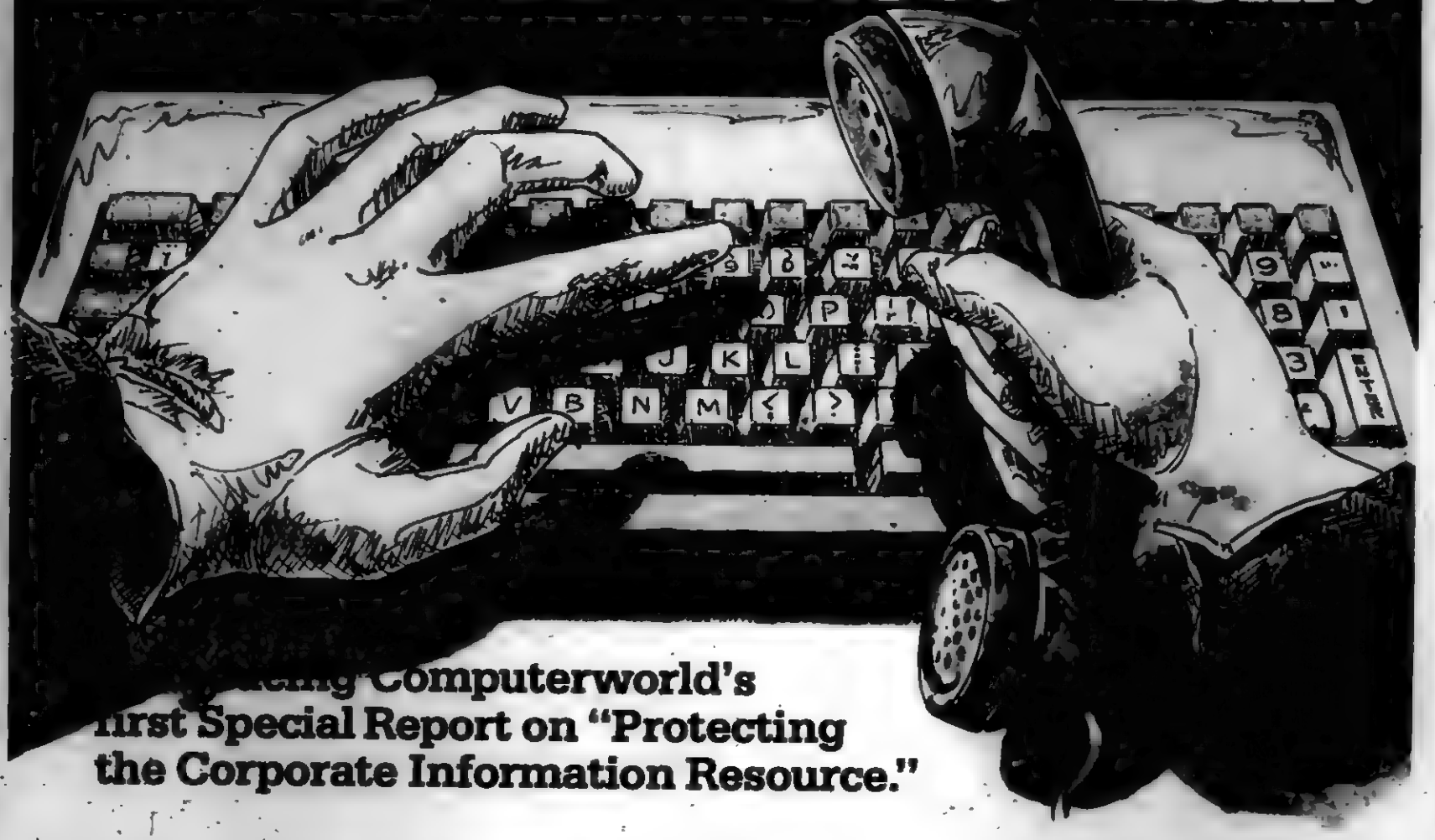

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DBMS Restores Data Integrity

Dairy Producer Avoids DP Disaster

SALT LAKE CITY — Sixteen months ago, Meadow Fresh Farms, Inc. was flirting with disaster. The multimillion dollar producer of dairy and dietary beverages was months behind in payments to its distributors, had no data integrity and could not make business forecasts. Data was stored separately in three minicomputers, and processing by clerks was well behind schedule.

Today, data is accurate, business forecasts are reliable, payments are current and Meadow Fresh Farms' relationships with its 100,000 distributors throughout the U.S. and Canada have improved greatly, according to Ron Zyzelewski, director of information systems. The company's corporate staff has been reduced from 130 to 39. Its data entry staff has been cut by 80%, its research and customer service staff by 96%.

The turning point occurred in June 1982 when the then one-year-old company formed a data processing department. In four months it designed and built a computer room, hired a DP staff and acquired hardware and software.

"We had been far behind in our payments and couldn't handle the data," Zyzelewski said. "It was taking almost a week just to print checks. For all practical purposes, our system was based on paper."

After selecting an IBM 4341-11 and an OS/MVS operating system, Meadow Fresh Farms began to evaluate data base management systems. Zyzelewski leaned heavily toward IBM's IMS DL/1, with which he had 11 years of experience.

A consultant hired by Meadow Fresh Farms said it would take a year to implement the IMS applications needed by the company. Applied Data Research, Inc. (ADR) assured Meadow Fresh Farms that its Datacom/DB software would accomplish the job in one-tenth the time required by IMS. The decision was made to go with ADR. In addition to Datacom/DB, Meadow Fresh Farms acquired ADR/Datadictionary, ADR/Dataquery, ADR/Datareporter, ADR/Librarian and ADR/Roscoe.

Meadow Fresh Farms dramatically cut corners on training. ADR established an ad hoc training schedule, with instruction limited to several hours per product, "just enough for us to get by," Zyzelewski said. Documentation manuals were used for follow-up instruction, he said.

Meadow Fresh Farms began to bring up its data base a few days after the initial training, but again had to cut corners. There wasn't time to test the system properly, conduct structured walk-throughs or use recommended methods to improve design. To compound its problems, Meadow Fresh Farms had to install ADR software, MVS and related applications and systems software all at the same time. The job was completed in a matter of days.

Meadow Fresh Farms immediately began to update its data and write its major applications. In one month, the company wrote 120 application programs, both on-line and batch. Two months later, data that had been stored on the minicomputers was converted and current.

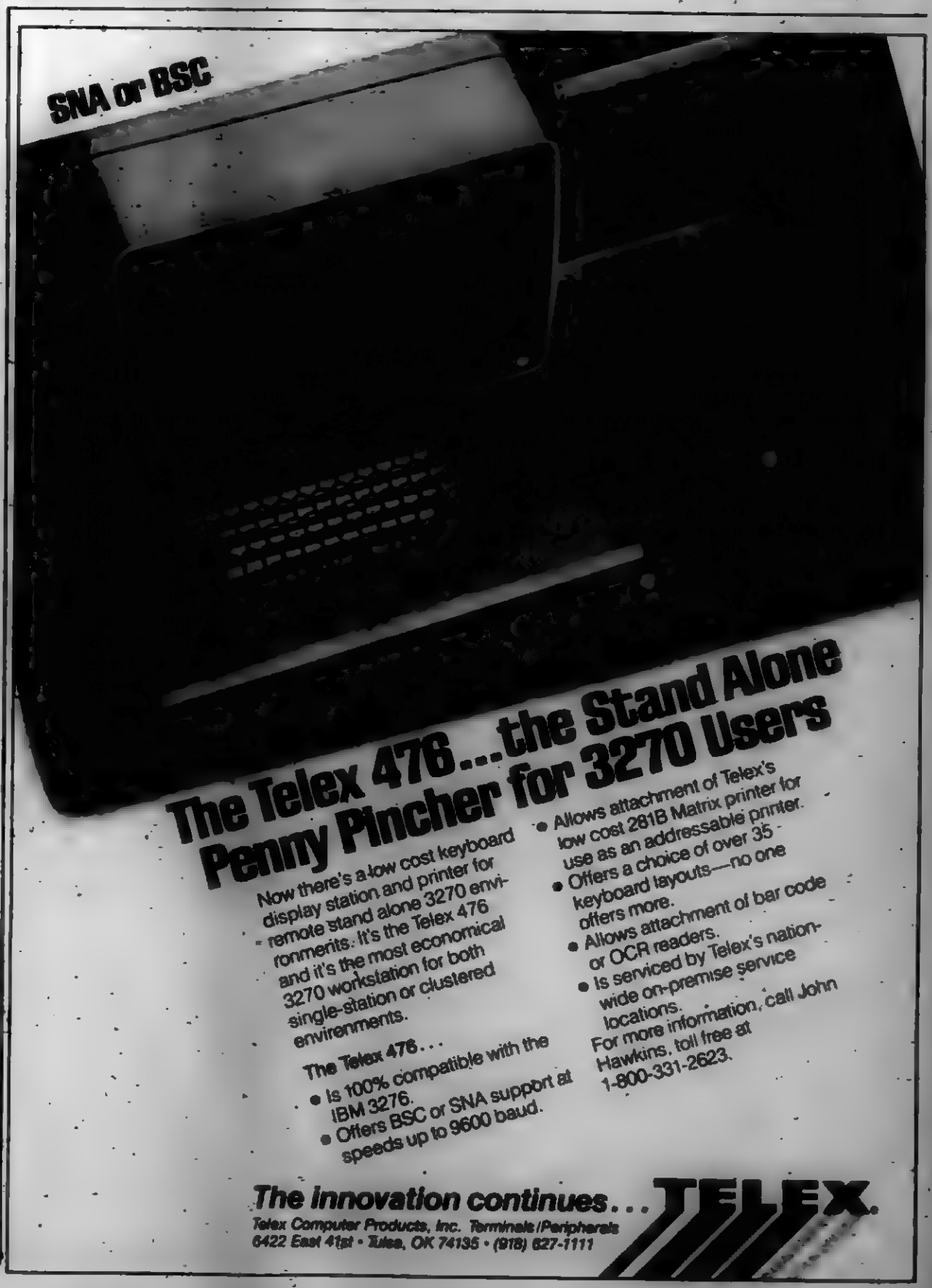
Today, Meadow Fresh Farms averages 250,000 transactions daily, processing purchase orders and distributor applications and performing accounting functions. Information is now immediately available on product mix, trends in purchasing and distributors' profiles.

The company views the results of Datacom/DB job executions through Roscoe and corrects and resubmits large accounting reports before printing the output.

Dataquery has satisfied many ad hoc information requests from management. Inexperienced users have queried the data base after learning Dataquery by reading a manual, Zyzelewski noted.

Datareporter has enabled Meadow Fresh Farms' legal department to receive hard-copy reports on a one-time basis. Subsequent reports can be produced quickly with many changes in information content or format.

Ron Zyzelewski



Query Facility Eases Access to DBMS for Center

TULSA, Okla. — Standard Oil Co. of Indiana's Tulsa Data Center here needed an on-line query package that would allow users to satisfy their requests for information from data bases that did not have logical ties through the data center's existing data base management system (DBMS).

Though Tulsa Data Center's DBMS — IBM's IMS — may be many things, it is not normally considered user-friendly. However, using ASI/Inquiry from Applications Software, Inc. (ASI) of Torrance, Calif., the data center successfully provided users with an on-line query facility capable of accessing IMS data bases.

The Tulsa Data Center provides computing services for Amoco Production Co. Amoco Production's Exploration Department originally expressed a need for an on-line query facility capable of accessing IMS data bases in 1975. At that time, Standard Oil's Information Services Department was converting existing Isam applications to IMS. A study team was assigned the task of finding an on-line query package to meet the requirements as set forth by the Exploration Department. They included:

- A retrieval package oriented to non-DP personnel.
- Only incidental knowledge of data base structures required for use.
- Support for predefined commands or elements of complex queries.
- Security features.
- On-line documentation.
- Multiple path support within a data base in a single inquiry.
- Output that could be routed to a device other than the requesting terminal.
- Own-code exits for support of specialized inquiries.
- Interface with batch processing.
- Retrieval from multiple data bases in one inquiry.

True Query Language

Of the four products studied in the evaluation, ASI/Inquiry from Applications Software, Inc. (ASI) of Torrance, Calif., was the only one that could be defined as a true query language, and it met 70% of the Exploration Department's requirements, according to Leslie Gayle, senior computer facilities analyst.

The product includes Sort/Defer logic; multiple data base and secondary index support; If logic; and arithmetic expressions to provide computed values and user-defined screen formats. "The results of the pilot were that the software was fast and provided accurate answers," Gayle said. According to Gayle, the projected use was:

- To provide data base administration with an immediate solution for providing access to IMS data.
- To provide all Amoco Production departments with interactive access to all corporate IMS data as it became available.
- To provide the system development area with access to test IMS data during program checkout and testing.

The product contained enough functions and flexibility that each new IMS data base coming on-line was defined to ASI/Inquiry as a matter of course, and users were provided with immediate access to their data without having to wait for completion of a retrieval application, Gayle said.

"ASI/Inquiry became the primary access method of IMS data bases. Message processing programs were written for only the most complex retrieval applications," she said. "Through ASI/Inquiry's multiple data base access facility, users were able to satisfy their requests for information from data bases which did not have logical ties through IMS."

TIS WINS INDUSTRY'S HIGHEST TECHNOLOGY AWARD.

Helps Keep Tabs On 8,000 Students

College Masters Student-Body Data With CIS

ONTARIO — Although its products cannot be measured by the pound, boxed for shipment or displayed on shelves, Niagara College of Applied Arts and Technology's information needs are much like those of a commercial business.

Niagara College is one of the 22 community colleges in the Ontario Community College System. Since 1967, Niagara has offered a variety of programs to the local community of 350,000 residents, including full- and part-time career education, adult training and skill development programs.

Niagara's administrators need to know as much as possible about the hundreds of courses offered in a variety of disciplines. They also need to know about finances, course availability and classroom occupancy.

But most importantly, the administrators need to know about the more than 8,000 full- and part-time students who enroll annually.

Niagara College's information manager is the College Information System (CIS). Currently, the CIS comprises nearly 300 separate programs that manage registration information, student records, timetables, admissions documentation, staff-related data and course descriptions.

Designed by Niagara's in-house data processing staff, the CIS is based on the Seed data base management system (DBMS) offered by the Seed Software Operation of United Information Services, Inc.

Dictionary-Run DBMS

Seed is a dictionary-run DBMS that includes data description and data manipulation languages, a query language, a report writer, a decision graphics option, a screen formatter and editor, an interactive data manipulation language and an intelligent file converter.

Louis Le Roux and Beth Weldon, manager and assistant manager, respectively, of Niagara's data processing department, said they faced a monumental challenge when they were asked to create the college's first totally integrated data base system.

"On a very slow day we process 500 transactions," Weldon explained. "Each transaction is defined as one change to a single record in the data base, and during the registration period we've processed as many as 18,000 transactions in one day."

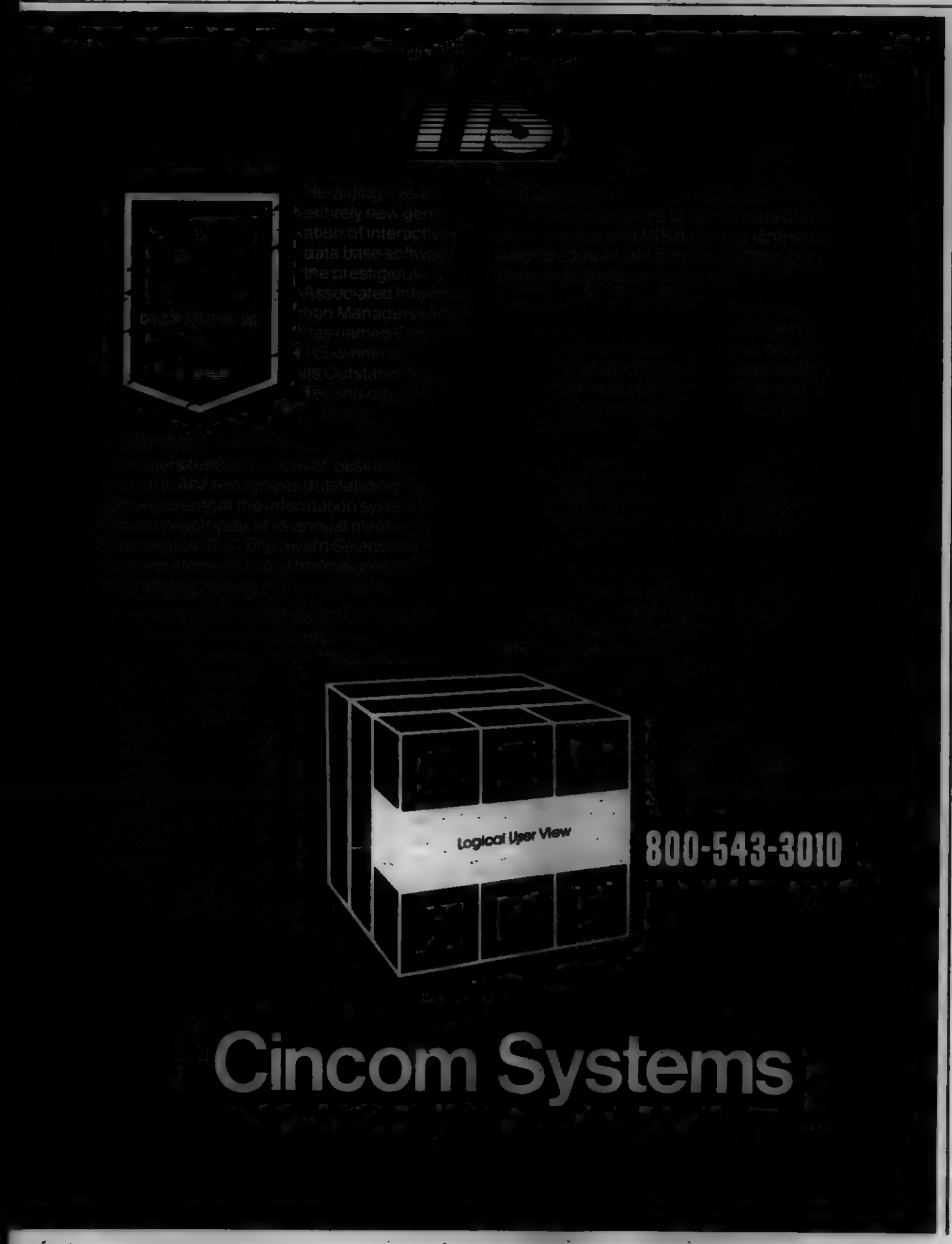
Before CIS, the college had been using an antiquated batch processing system with less than desirable results. "The old registration system was constantly failing," Le Roux recalled. "Often, data changes would be delayed, information would be misplaced or a student's entire set of records might be lost.

"In February of 1982, an academic decision had already been made to change from a standard grade-point system to a percentage system. To do that on the old system would have required a major revision."

With their September deadline less than seven months away, Le Roux and Weldon began the design task. "In March, we spent long hours documenting enrollment procedures at the college," Weldon explained. "We wanted to find out as much as possible about the step-by-step procedures of the process."

From their research, Le Roux and Weldon wrote a three-volume recommenda-

(Continued on SR/48)



Some Tips for Purchasing a Relational DBMS

By Lee Elbinger
Special to CW‡

Conventional wisdom among management information systems (MIS) professionals has it that data base management systems (DBMS) are "going relational." What are the implications of this transition, and what are the steps necessary to achieve it?

The primary advantage of any DBMS is that it provides data independence. The hierarchical and network models do provide some data independence, but by their nature they freeze the data into relations that limit its usefulness.

In contrast, the relational model provides a greater degree of data independence because no dependencies are defined at all; they are created by the user at execution time. All data is presented to the user in a tabular "user view" that is totally unrelated to the physical storage of the data; the relational software buffers the user from access considerations.

In addition to greater data independence, the relational data base concept provides set processing capabilities that allow the user to process whole tables of data at one time rather than one record at a time, as is done conventionally. The set processing capability is the consequence of a nonprocedural language, in which the user specifies the desired result and leaves it to the relational system to achieve that result.

However, one major obstacle to acceptance of the relational model is the unfamiliar terminology in which relational concepts are expressed. Another obstacle is that the performance of the DBMS, based on the relational model, is not yet comparable to the standards set by more familiar models. Third, there is the justifiable suspicion that the relational model is just a fad designed to complicate simple concepts and sell untested software.

The truth lies somewhere in between. Proponents of the relational DBMS model are correct in asserting that their approach would provide a high degree of data independence, set processing capability and user freedom and provide ease of access. Opponents are equally correct when they charge that the relational concept is unnecessarily complex, untried and of dubious benefit. MIS managers are advised, therefore, to move cautiously into this area, and that is precisely what they are doing.

More progressive MIS managers, however, are not content to adopt a "wait-and-see" attitude. If DBMS is truly going relational, such managers want to keep abreast of developments. Terence O'Neill, a consultant with Applied Information Development, Inc. of Oak Brook, Ill., recommends seven steps for a user's first implementation of a relational DBMS [CW, Nov. 30, 1981]:

- A thorough requirements study should be done to determine the business need.
- The first application should be small and relatively self-contained.
- Data base design should be as complete as possible and include all of the systems that interface with the target applications.
- A modeling effort should be undertaken to determine the expected performance of the system.
- The vendor's software should be tested early in the project.
- Do not overstate the benefits of the implementation.
- Plan the project thoroughly and realistically.

Before applying these recommendations, one should read about the subject. In addition to published articles, the vendor's literature provides information about relational data base implementation. In most cases, vendors will provide reports, articles, brochures and user testimonials.

Elbinger is a systems analyst/programmer at the King Fahad Hospital in Riyadh, Saudi Arabia.

College Masters Student Data With CIS Tool

(Continued from SR/47)

tion proposal to the college. The recommendations included changes in policy and procedures that would be necessary to ensure that the new CIS would function smoothly. Because nearly every user's data processing knowledge was negligible, the data base system had to be user-friendly and easy to learn.

"None of our users had any experience with a terminal or an on-line system," Le Roux said. "But they understood the new system very quickly, partially, I think, because we stressed ease of use when we designed it."

The users adapted to the new system so readily that they never referred to the explanatory documentation written by Le Roux and Weldon.

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Micro DBMS Keeps Trucking Firm Rolling

KAUFMAN, Texas — Barry Trucking Co. here no longer has to depend on time-sharing services for biweekly reports and invoices. The short-haul sand and gravel company has moved computer operations in-house.

Barry Trucking made the in-house move with a customized microcomputer data base application system, the Short-Haul Trucking System (STS), which was built by C&L Systems, a computer consulting/software application development firm located in Ennis, Texas.

STS is an information management system that performs accounting, billing and payroll functions. To deliver a fast, affordable system to Barry Trucking, the team at C&L Systems used as its development tool the Micro Data Base System (MDBS) from Micro Data Base Systems, Inc.

"One reason we first gave some thought to an in-house system was the slow computer service we were getting for our money," Sharon Carrier, office manager at Barry Trucking, explained. The trucking company must account for 70 trucks, 900 delivery locations and a variety of products.

Increased Productivity

Using MDBS, the developers at C&L Systems produced an on-line system that increased productivity dramatically, according to Barry Trucking officials. "We used to wait a week to get our invoices back from the computer service," Carrier said. "Now we process and mail them within two days."

Payroll is prepared in less than two hours instead of the eight hours formerly needed to write and post paychecks and to balance payroll accounts manually, she said. Quarterly, semiannual and annual reports required by the Internal Revenue Service, which took two weeks when done by hand, are generated by the STS in 10 minutes.

C&L Systems surveyed several software development products, including Ashton-Tate, Inc.'s Dbase II. After C&L Systems Vice-President Richard Cook worked with it, however, he decided that a more flexible tool was needed. "With Dbase II, I had to learn a whole new language. With MDBS, I was able to choose the language I felt most comfortable with," Cook said.

The STS consists of 16 major program modules, using PL/I/80 as the host language.

The system's MDBS schema consists of 14 record types involving 98 fields. They are related by means of 23 semantically distinct relationships integrated into a single data base without data redundancy. The STS runs under Digital Research, Inc.'s CP/M operating system.

The STS prepares sales analyses and invoices. It also manages payroll data, prints paychecks and generates 25 reports, according to Cook. The reports detail drivers' statistics, customer deliveries, mileage charges, product code assignments and other information.

All data is kept in a single data base rather than a collection of files. For example, the STS retrieves from the sales analysis report the biweekly revenues of each truck and then deducts charges that have been entered for items such as fuel purchases and repairs to arrive at a net income figure for each trucker. Checks, along with itemized check stubs, are printed, Carrier said.

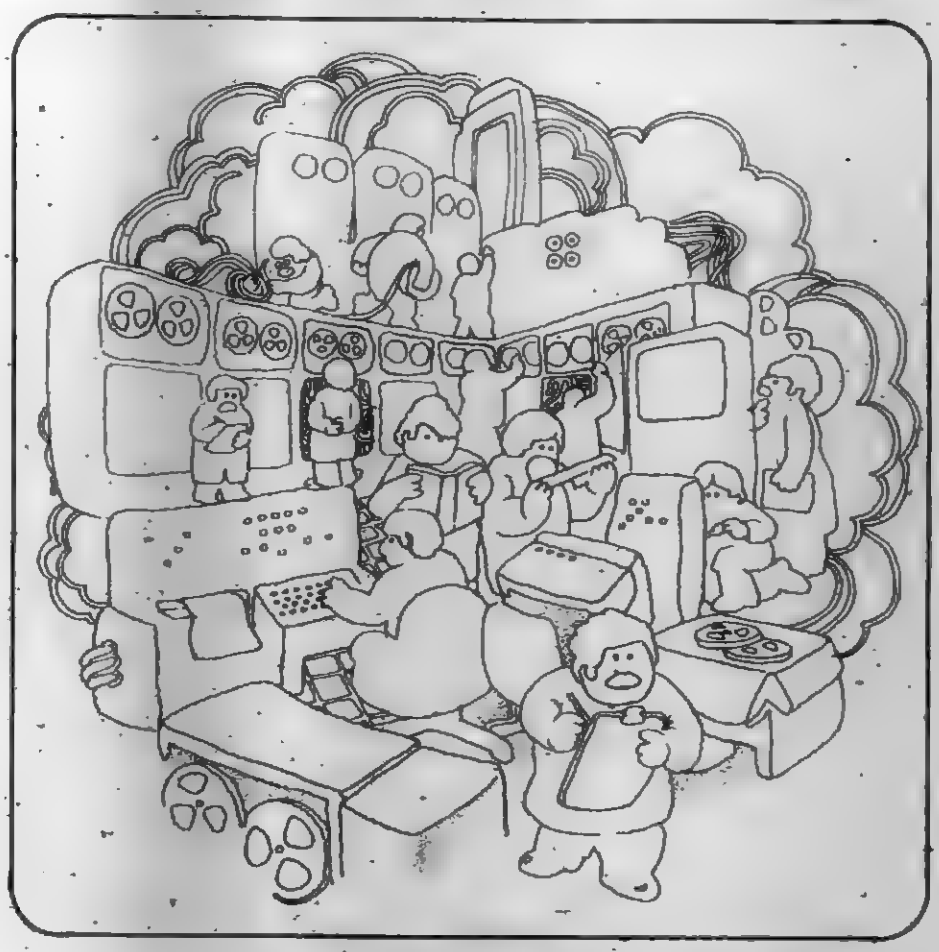
Data entry and creation are interactive, with set updating done overnight by the STS after business hours. The system enables Carrier, the sole operator of the STS, to enter transactions twice a month in a rapid input session. The STS uses the data checking and editing capabilities of MDBS to ensure correct input of data automatically. Carrier estimated that she is able to enter 900 transaction tickets in five hours at an average of three per minute using a 10-key numeric key pad.

"At first, we only replaced the sales analysis and invoice preparation done by the time-sharing service with our own," Carrier said. "After seeing how well the system worked, though, we asked for more." Additional functions, including payroll, were added to the STS after installation. "With MDBS, customization or modification of a system is done quickly, without a major reprogramming effort," Cook said.

The initial time and effort spent determining end-user needs and completing system design paid off, Cook said. The extended network data structure of MDBS enabled him to model the flow of operations at Barry Trucking and to develop a logical micro system for the company.

"MDBS allows a number of data relationships that we hadn't imagined were possible," Cook said. "Once system requirements are set, you just draw a picture. MDBS takes care of all sorting and maintains data relationships automatically."

when programming is not enough . . .



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Relationships Among Elements

Managing Data for Electronic Systems Design

By Ashok Shenolikar
Special to CW‡

The electronic systems design process has been likened to structured software design. Because of the definite, inherent hierarchy, the process starts with initial high-level concepts. These concepts form the basis of a more detailed design that defines the primitive elements.

Comparing this to a tree, the nodes of the branches represent how the primitive components are distributed and interconnected. The leaves on the branches specify the primitive cells of the design.

This design hierarchy may be depicted via alternative representations. For example, functional specifications, logic diagrams, block diagrams, interconnection diagrams, placement diagrams and behavioral specifications could represent different levels of the same design.

The principal reason for using a data base management system (DBMS) is to separate the activities of data organization and management from the activities of generating applications using this data. Thus, the data is maintained independent of the application programs. The DBMS accomplishes this via an integrated set of general-purpose software programs.

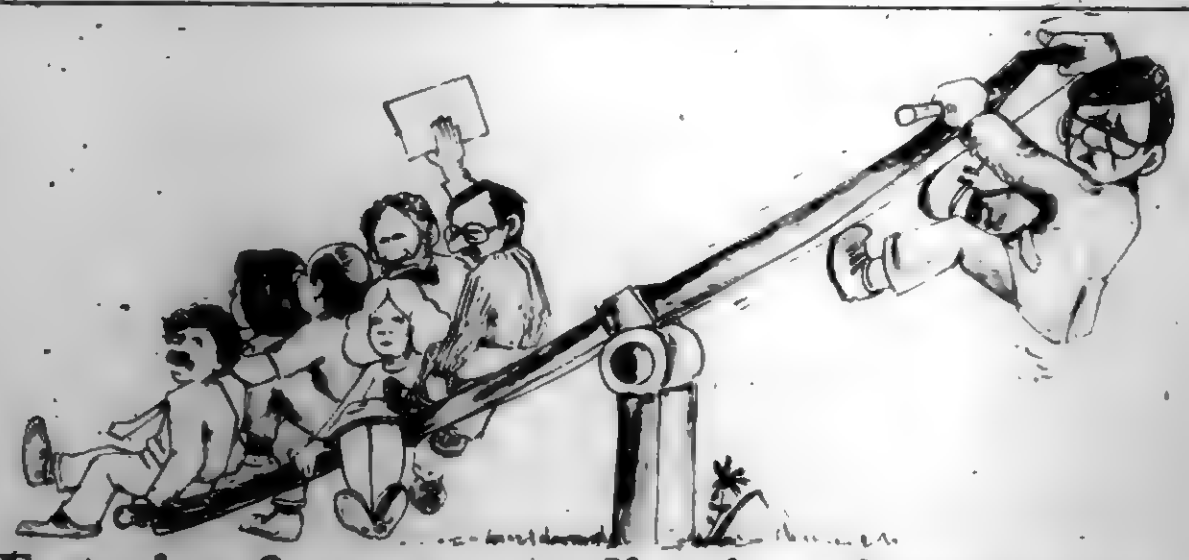
However, the role of a data base manager is different for a computer-aided engineering (CAE) application than it is for a commercial business application. For business applications, users are in greater proximity to the DBMS environment than to CAE applications. Data base administrators and systems analysts spend a considerable amount of time in logical definition of the data and defining transactions and other application interfaces. For the CAE applications, most of the transactions and data access paths are already known. The data base merely works in the background accepting commands from the turnkey engineering applications software.

There is also a significant difference in the nature of transactions. For business applications, the queries are truly ad hoc, more frequent and require retrievals of small amounts of data from a data base. For engineering applications, the transactions are generated at longer intervals and usually retrieve large amounts of data.

In a complete turnkey application, where an engineer is not required to perform traditional data administration functions, the use of a data base manager by a CAE vendor should not make a difference. But where interfaces to other systems, such as document processing, project management and manufacturing systems, are contemplated, the data base will offer invaluable flexibility. For complex, large-scale applications of these types, close attention should be paid to the data base architecture to ensure compatibility among the various applications.

Which data base architecture is better has no black-and-white answer. Much depends on the system configurations. The network and hierarchical data bases are finely tuned and have an established track record. But the processing overhead required to maintain these architectures generally requires a mainframe host.

Shenolikar is with the Government Support Systems Division of Harris Corp.



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At Hartford Insurance

Programmers Tie Agencies to Mainframe

By John Gallant
CW Staff

HARTFORD, Conn. — Drawing on an in-house project team of 45 programmers, the Hartford Insurance Group here has developed the Agency/Company Communications and Electronic Service System (Access), an interactive communications network that has given remote agencies access to the company's mainframe system.

According to William L. Harrison, vice-president of information management systems, Access enables independent agents in remote offices to access the Hartford's IBM 3081 mainframe through a dial-up telephone link from their own minicomputer systems or via a leased line network and a special terminal — called an "Exclusive" terminal — provided by the company.

Agents may choose between an on-line, batch or combination batch/on-line interface to the mainframe. This allows representatives to make inquiries and process policy changes immediately for those with on-line capabilities and within 24 hours for batch subscribers.

Hartford, one of the nation's largest insurance companies, has already linked 250 independent agents to the corporate data base via Access, and the company plans to have an additional 250 interfaced by the end of 1984. Harrison predicts that task will occupy the project team for at least another two years.

"The idea of linking remote agencies to the mainframe sprang up in 1980," Harrison said. "We envisioned Access as a sort of front end to take agency data in one format and convert it into a format for the mainframe system. Access is a series of programs designed to link company-developed computer systems with those systems in the different agencies.

"The Access software was developed entirely in-house," Harrison continued. "We first put up our commercial and personal insurance lines, and then widened it to put all company functions, such as accounting/billing, claims handling and life insurance, on-line."

According to Harrison, the Access system is designed to recognize input from the remote minicomputers as agency data.

(Continued on Page 62)

Pro-Source Unveils CICS Query And Report Writer

HOUSTON — Productive Resource Co. and Sonetics Corp. (Pro-Source) has announced Access+, an end-user-oriented IBM CICS query and report writer.

Information requests are entered free-form from any authorized CICS terminal, a Pro-Source spokesman said. Requests can be executed and displayed on-line under CICS in a pseudoconversational mode or submitted in batch. Files are defined in the Access+ dictionary by means of the on-line menu-driven maintenance system.

Existing Vsam, Isam and sequential access method files are read directly by Access+. An unlimited number of files can be read. Multiple users of the same file can be restricted to specific key ranges within a file, the spokesman noted.

Features include extended selection criteria, arithmetic capabilities, control breaks, totaling and selective display of named dictionary items. Screens or output reports can be formatted under Access+ control or be created free-form. The on-line maintenance system is used to designate security levels for Access+ users. Security can restrict user access to data by terminal, user identification, file and dictionary item.

Access+ is available for IBM DOS/VSE, OS/MVS and DS/VS1 operating systems with CICS/VS. A perpetual license costs $16,000 for OS and $14,000 for DOS until January 1. However, a significant price increase will be imposed effective January 1, the spokesman said from Suite 704, 1235 N. Loop West, Houston, Texas 77008.

IBM Takes Wraps Off Three Products For Its CPU Users

WHITE PLAINS, N.Y. — IBM recently released three new products for its mainframe users. They include:

- A Customer Order Servicing (COS) Shipping Management module for its Communications-Oriented Production Information and Control System (Copics) series of applications software.
- Release 4 of VS APL for VM/CMS, TSO or CICS users.
- The Language and Host Services (LHS) product to support the IBM 3650 and 3680 Programmable Store Systems (PSS).

Copics COS functions include assistance for end users in the tasks of order entry, servicing customer requests for delivery information, changing existing orders and maintaining order status, the company said. COS-Shipping Management extends the sequence of capabilities provided by IBM's COS-Data Management and COS-Order Management.

(Continued on Page 62)

Data Base Service Targets Executives

COLUMBUS, Ohio — Compuserve, Inc. has announced an on-line data base and communications service for microcomputer users. Called Executive Information Service (EIS), it offers access from a variety of micros to a range of financial, news and research data bases and includes electronic conferencing and electronic mail, the company said.

Services include:

- Updates and selected price quotations on a continuous 20-minute delayed basis for over 9,000 security issues on the New York and American Stock Exchanges and the over the counter market.
- Standard & Poor's descriptive and financial information on more than 3,000 companies.
- Arnold Bernhard & Co.'s Value Line Data Base-II for performance analysis of more than 1,700 corporations.
- Caci, Inc. Federal's Site II/Site-Potential demographic data base.
- Electronic communications using Compuserve's Infoplex Electronic Mail

(Continued on Page 60)

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'Intellect' Available for DOS/VSE, MVS, VM

WHITE PLAINS, N.Y. — IBM last week formally announced the availability of Artificial Intelligence Corp.'s (AIC) Intellect natural language query system for IBM's DOS/VSE, MVS and VM operating systems. The release comes four months after the computer giant announced a marketing agreement with AIC to make Intellect a major new offering in its line of Information Center products [CW, June 20].

Intellect allows users to query files in ordinary English using a flexible lexicon that can be updated and customized to unique environments, a spokesman said. The DOS/VSE version of Intellect includes an interface to IBM's Structured Query Language/Data System (SQL/DS) using Interactive Computing and Control Facility (ICCF).

Under MVS/SP, Intellect queries Vsam files using TSO. The VM version queries Vsam files in the VM/SP environment using CMS. Both the MVS and VM versions can be expanded to provide an interface to IBM's Graphical Data Display Manager and Presentation Graphics Facility to produce a variety of charts and graphs.

Intellect's lexicon is comprised of a list of over 400 common English words and phrases applying to all data bases defined by the users. The lexicon can be further enhanced by defining synonyms, commonly occurring values in the data base, local jargon and groupings of data items.

Intellect on an IBM 30 series mainframe costs $56,000 for DOS/VSE users and $76,000 for MVS and VM users. The graphics interface for VM or MVS costs $16,500.

IBM's National Accounts Division is located at 1133 Westchester Ave., White Plains, N.Y. 10604.

CRI Releases Version 1.10 Of 'Projectalert' for HP 3000

SANTA CLARA, Calif. — Computer Resources, Inc. (CRI) has announced the release of Version 1.10 of Projectalert, which the company described as an advanced project management system for Hewlett-Packard Co.'s HP 3000 computers utilizing the MPE operating system.

New capabilities include time-scaled networks, which provide color precedence diagrams showing the critical path and work accomplished against a user-selected time base. The menu-driven software is said to provide a system for planning, scheduling and monitoring all types of projects.

Projectalert Version 1.10 is also said to support a variety of HP plotters, including the HP 7580 and HP 7585 drafting plotters. The package can operate in conjunction with Version 4.30 of CRI's Relate/3000 integrated relational data base management system, providing the capability to integrate project planning and scheduling data with other data base information to create a decision support system, according to a vendor spokesman.

The basic system, including planning, scheduling and resource allocation, is priced at $9,950 from CRI, 5333 Betsy Ross Drive, Santa Clara, Calif. 95054.

'EIS' Provides Data Base Service To Micro Users

(Continued from Page 59)

Service and the U.S. Postal Service's E-Com system.

- The Associated Press's Executive News Service.
- Electronic conferencing and professional forums.
- Updated schedule and fare information for commercial airline flights on the Official Airlines Guide Electronic Edition.

Compuserve's Professional Connection software for the IBM Personal Computer provides automatic dialing and sign-on, instant access to any area of the service, uploading and downloading of data, programmed function keys for menu selection and printer support, a spokesman said. However, EIS can be accessed by most computer terminals and communicating word processors.

Price is based on connect time and services used from Compuserve, Corporate Headquarters, 5000 Arlington Centre Blvd., P.O. Box 20212, Columbus, Ohio 43220.

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Aid Converts 'Mapics' Site To Multiuser Environment

NEEDHAM, Mass. — Marcam Data Systems Corp. has announced the Multiple Mapics Environment System (Mumes), which the firm described as a utility software package designed to convert an IBM System/38 single-user Manufacturing, Accounting and Production Information Control System (Mapics) environment to a multiuser environment.

Mumes allows Mapics users to utilize multiple data bases on one CPU and maintain and utilize as many as 35 unique and independent data base entities from one CPU, a spokesman said. The package is said to create a multiple-thread Mapics environment that allows data base entities with differing modifications or specifications to be maintained and run concurrently on a single CPU.

The company said Mumes allows a single-thread Mapics environment to keep System/38 workstation users on-line while running test, education or demonstration systems. Installation of entities or applications and security maintenance is menu-driven. The system also creates independent job queues for each entity installed in Mumes. It allows Mapics users to work in an interactive mode with any installed Mapics application and Marcam products.

Mumes is priced at $1,900 from Marcam Data Systems, 123 Highland Ave., Needham, Mass. 02194.

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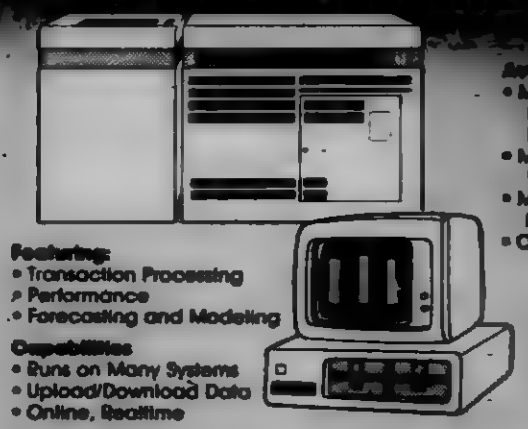

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Release 3.4 Of 'Screenform' Announced

SUNNYVALE, Calif. — Boole & Babbage, Inc. has announced Release 3.4 of Screenform, said to be an on-line tool for the interactive creation and maintenance of IBM TSO, CICS and IMS screen formats.

The Screenform package, which operates in the IBM OS/MVS environment using 3270-type visual display terminals, now includes support for up to six terminals and three printers per screen format, and it can be used with either 80- or 132-col. terminals, according to a spokesman for the vendor.

An 80-col. terminal can be used to design formats for 132-col. devices. Because the new release requires users to specify an author name for each format, data base administrators can track and control screens, according to the spokesman.

Pricing for Release 3.4 of Screenform starts at $12,500 from Boole & Babbage, World Headquarters, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Accounting Tool Targets HP Users

CHICAGO — An on-line, menu-driven accounts receivable system for Hewlett-Packard Co. HP 3000 series computers has been announced by Abacus Data Systems.

Ezcash is written in Cobol II and utilizes HP's Image data base management system and View to maximize its transaction processing capability. Batch jobs are said to be initiated interactively to validate input parameters, but are detached from the session to free the display terminal.

The package was designed for multiple company/location applications and provides an on-line inquiry subsystem to retrieve customer account information simultaneously, a spokesman said. Inquiry can be made by account number, name or Zip Code.

Purchase price is $4,500 from Abacus Data Systems, 5000 W. Bloomingdale, Chicago, Ill. 60639.

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Three IBM Products Debut for Mainframe Users

(Continued from Page 59)

COS-Shipping Management uses the order data generated in those application areas to control the processes of selecting customer orders for shipment; planning deliveries; picking materials from stock; packing orders; planning loads; and processing shipping results. The package is useful in manufacturing, process and distribution companies and can be extended to cover intercompany orders, a spokesman said.

The product runs on an IBM System/370, 30 series or 4300 series processor supporting IBM's DL/1-DOS/VS or IMS/VS data base management systems in a CICS/VS environment. It requires 512K bytes of memory. The initial license charge is $1,600, with a monthly charge of $310.

The new release of VS APL allows users to access through the VS APL Graphical Data Display Manager (GDDM) processor the new functions that were provided with GDDM Releases 2 and 3, the spokesman said. The user can access the Interactive Chart Utility of GDDM and a variety of other features. In addition, IBM said any new functions of future GDDM releases will automatically be available to users of the VS APL GDDM auxiliary processor. The basic license costs $329, with a distributed support licensing option priced at $246.

LHS is a replacement product for IBM's Subsystem Program Prep Support II (SPPS II) and PSS Host Support products that provides support previously available on both products, the spokesman said. It is said to improve the usability of 3650/3680 PSS by reducing the number of tapes that must be installed and maintained.

LHS requires an IBM System/370, 4300 series or 30 series mainframe under the DOS/VSE, VSE/SP, OS/VS1 or OS/VS2 (MVS/370 and MVS/XA) operating systems and Vsam files. The initial license fee is $4,000, with a monthly charge of $415, the spokesman said.

IBM's National Accounts Division is located at 1133 Westchester Ave., White Plains, N.Y. 10604.

TTI Enhances Sort Package For VAX-11s

ESCONDIDO, Calif. — Touch Technologies, Inc. (TTI) has introduced a major enhancement to TTI Sort, a high-performance sort package for Digital Equipment Corp. VAX-11 superminicomputers under the VMS operating system.

The package is implemented using a transparent interface between user applications and the VAX-11 Sort. This eliminates the need for any code changes, a spokesman said.

The package reportedly runs faster than the VAX-11 Sort while also reducing disk space, direct and buffered I/O and page faults.

A perpetual license for the TTI Sort sells for $1,295 for the first CPU and $300 for each additional CPU from TTI at Suite 101, 609 S. Escondido Blvd., Escondido, Calif. 92025.

Hartford Develops 'Access' Interactive Net

(Continued from Page 59)

not in-house data, and the system processes that data only for the agency's use. No other agent has access to data from another remote office. In the interactive mode, he said, the agent's computer system acts like a terminal on the mainframe. The company supplies each agent with a modem, a telecommunications board to accommodate the linkup, and the Hartford-developed software package that renders the language of the agency's minicomputer compatible with the mainframe.

Harrison said Hartford faced two major problems in developing the Access system. First, in order for the system to function properly, the company had to negotiate with a variety of vendors to arrange for necessary modifications of the agents' hardware.

"For example, we felt it would be better — and faster — if the agents had most of the editing capabilities at their end," Harrison said. "So, we had to negotiate with each of the vendors to get them to provide that capability."

The independent representatives operate a variety of minicomputer systems which the agents purchased to automate office functions. They include insurance industry-specific configurations based on hardware from Wang Laboratories, Inc., Digital Equipment Corp. and Honeywell, Inc.

Secondly, the existing in-house system had to be modified for use by outside personnel. "We have had an interactive on-line system in use for quite some time," Harrison said. "But we had to make modifications to that system in order to provide the remote agents the same capabilities. In addition, the software had to be adapted to allow for batch processing, which is an option for the agents."

The Hartford programming staff employs IMS as its prime teleprocessing system, according to Harrison. In addition to the development aids the staff normally relies upon, programmers used Christensen Systems, Inc.'s Telon code generator to aid in screen development for the Access system.

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Electrohome EDP 57 has achieved worldwide success in monochrome computer projection for training sessions, sales meetings, boardroom decisions and other group presentations.

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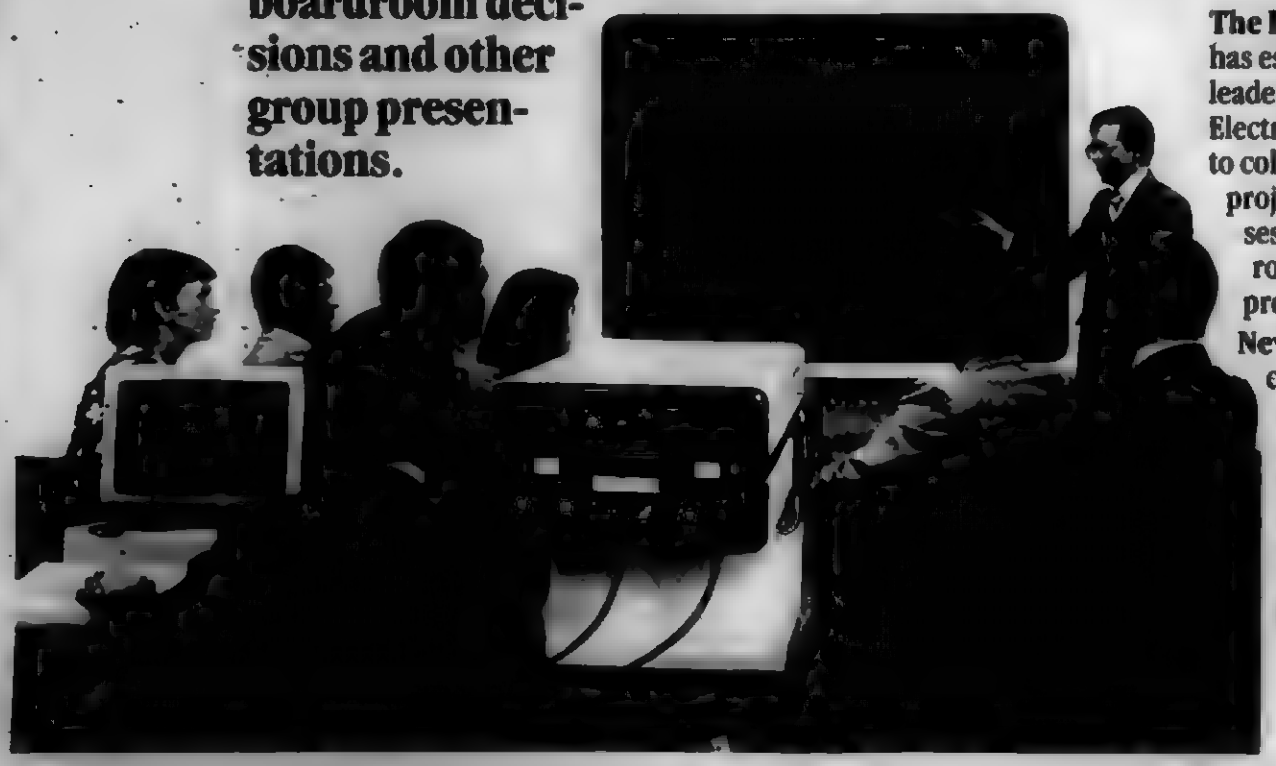

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D&B Releases MVS/TSO Version Of Nomad2 Info Service

GOLETA, Calif. — Softool Corp. has announced that Softool, which the company described as a set of software tools for the management, development, maintenance and conversion of software, now runs on the Hewlett-Packard Co. HP 9000 desktop computers running HP-UX.

The vendor said the combination of Softool and HP-UX, the HP-supported version of Unix, will provide a complete, interactive software development and control facility. The Change and Configuration Control portion of Softool is said to allow software managers and programmers to keep track of software and documentation changes and versions. It also supports automatic reconstruction of previous versions, problem tracking, difference reports, management reports, access control and other functions.

Softool's Programming Environment portion is a collection of tools allowing a user to compose an application program from prefabricated code. The tools include shorthand language, source code auditor, interface documenter, code generator, testing aids and dynamic memory manager. Programming Environment is said to support Fortran, and an optional transportation package automates the conversion of Fortran programs from Digital Equipment Corp. and IBM to the HP 9000.

Softool is available with interactive tutorials for $40,360 for a single CPU from Softool, 340 S. Kellogg Ave., Goleta, Calif. 93117.

D&B Releases MVS/TSO Version Of Nomad2 Info Service

WILTON, Conn. — D&B Computing Services, the computer services company of Dun & Bradstreet Corp., has introduced an IBM MVS/TSO version of its Nomad2 information center service.

The new MVS/TSO version is offered as part of the package, including a series of support staff and end-user training courses, supporting documentation and training aids.

The new information center contains the same product features as the current VM/CMS version, including a data definition language, nonprocedural report writer, a statistical package and a complete financial modeling package, a spokesman said.

Available the first quarter of 1984, the product will be priced at $135,000, including a financial modeling language and support staff training programs.

D&B Computing is located at 187 Danbury Road, Wilton, Conn. 06897.

'Business Modeler' Updated

OAK BROOK, Ill. — Business Model Systems, Inc. has announced a new version of its Business Modeler software system for use with IBM's System/34 and System/38 and NCR Corp. computers operating with CICS/VS under DOS/VSE.

Business Modeler is described as a business management and decision support system, which is menu-driven and offers multiuser capabilities similar to those offered by systems with complex modeling languages.

Business Modeler is priced at $18,500, and discounts are available for multiple-site licenses from Business Model Systems, 2625 W. Butterfield Road, Oak Brook, Ill. 60521.

Package Ties Micro Software To Burroughs Mainframes

TALLAHASSEE, Fla. — ESI, Inc. has announced a package to link microcomputer software with data bases on Burroughs Corp. mainframes without disturbing the integrity of production data bases.

Called Micropulse, the product was designed to use the Burroughs ET 2000 workstation in conjunction with any Burroughs B-1000 medium-size or large system. Micropulse allows users to extract selected data from the host data base and store it in their own personal data bases, the vendor said. The downloaded data is summarized and formatted for use by the software packages supported by ET 2000's Microsoft, Inc. MS-DOS 2.0 operating system. Control of data and host machine facilities is provided through sign-on data access security and resource utilization features.

Micropulse is composed of a component that resides on the Burroughs host and works with a component executing in the ET 2000, the spokesman said. A menu-driven, nonprocedural interface is provided to build what the company called an "information data base" that is accessed by the end user. The user can extract information by data field and sort and aggregate the retrieved information for downloading. Data can be automatically formatted for certain microcomputer application programs.

The cost ranges from $6,000 to $25,000. Availability is scheduled for the first quarter of 1984 from ESI, 1801 S. Gadsden St., Tallahassee, Fla. 32301.

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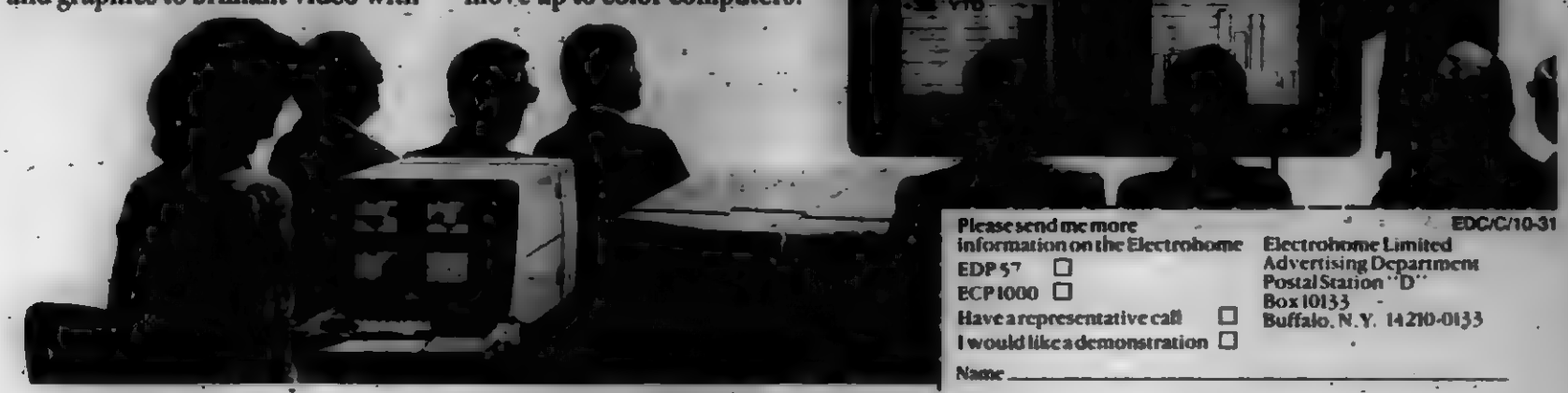

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'Docuvise' Manages Insurance Rule, Rate Changes

DALLAS — Image Sciences, Inc. has announced Docuvise, a new independent component for the firm's Docuflex software package.

Docuvise is said to manage automatically the updating of rules and rate manuals for the insurance industry, and it can print a transmittal letter and revised pages of rules and rate manuals for distribution to manual holders. The Docuflex system is an automated document production and management package for use with IBM Models 4341 and up.

When rules or rates change, the user applies the changes to an electronic version of the manual residing in the Docuvise electronic library, and an approval request letter and revised pages are automatically printed, a spokesman said. A status report is also printed indicating current status of the filing: approved, disapproved or pending. Docuvise is also said to print a report stating the quantity, titles and destinations of all requests for replacement copies of entire manuals, sections or transmittals.

The base price for the Docuvise component is $80,000 from Image Sciences, 8350 N. Central Expwy., Dallas, Texas 75206.

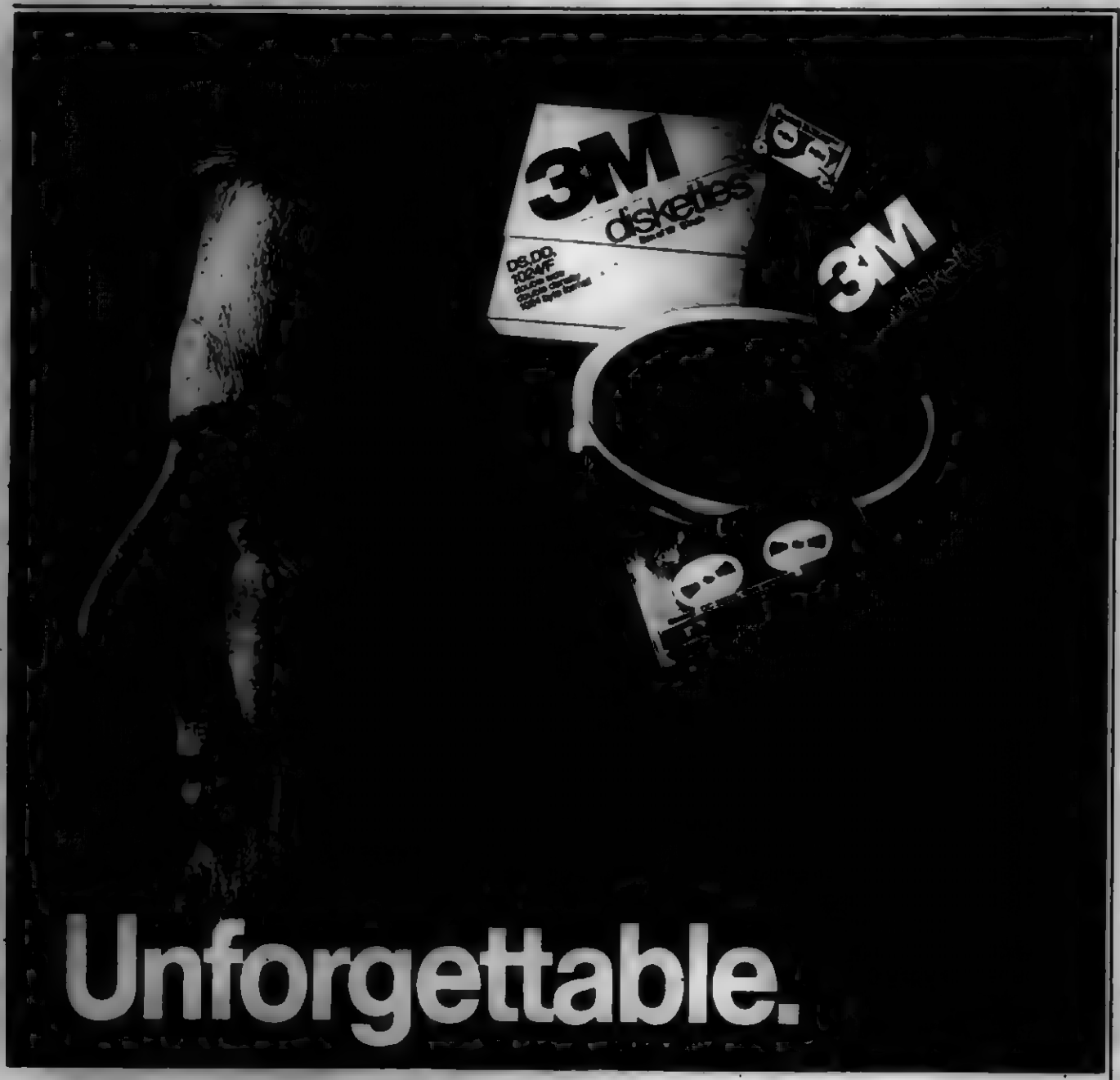
Assembler Out for Intel Chips

COSTA MESA, Calif. — Systems and Software, Inc. has announced REX-SMA/86, a structured macro assembler for the Intel Corp. 80186/80187/80188 microprocessors, which is said to provide compatibility with Intel's ASM-86 relocatable macro cross-assembler and offer program development hosted on the Digital Equipment Corp. VAX-11 series superminicomputers.

REX-SMA/86 is said to include a structured macro assembler that supports Intel's macro processing language and code macro facility; a locator that formats the object code modules into Intel MCS-86-compatible absolute code with optional debug information; and an object code librarian that provides library management for the object code modules. The package will run on any VAX in native mode under VMS.

Two optional absolute code converters are also included in the REX-SMA/86 that allow the absolute code to be converted into either Intel hexadecimal format or Tektronix, Inc. hexadecimal format. A user interface provides on-line help, and menu-driven input for constructing a command file is included to automate the linking and locating process.

REX-SMA/86 is priced starting at $3,100 from Systems and Software, 3303 Harbor Blvd., C-11, Costa Mesa, Calif. 92626.



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'Fast/Post' Unveiled By Walker

SAN FRANCISCO — Walker Interactive Products, Inc. has announced a financial subsystem for real-time journal entry and posting procedures with its Integrated, Interactive/General Ledger (II/GL) System.

Fast/Post reportedly permits multiple transaction posting entries from a single screen and can be user-tailored without programming to accommodate customized journal requirements.

It is available for 12-, 13- and 52-period accounting systems and handles both financial data and statistical data, a spokesman said.

Fast/Post will be distributed at no cost to all users of II/GL, which runs on IBM and plug-compatible mainframe computers for prices ranging from $80,000. II/GL is part of Walker's Integrated, Interactive/Financial Systems, which range in price from $67,500. Walker is located at 100 Mission St., San Francisco, Calif. 94105.

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Program Generator Runs On Burroughs Machines

MINNEAPOLIS — Technalysis Corp. has introduced Generation II, an on-line program generator for Burroughs Corp. B-1700, B-1800 and B-1900 computers that allows programmers to create executable Cobol programs faster than hand coding.

Generation II is a new version of a program generator introduced two years ago by the vendor. Generation II can produce any type of on-line program, according to the vendor. It will access existing Burroughs DMS II data sets of conventional files, provide a choice of Cobol 68 or 74 and offer a variety of user options.

The program generator requires no special coding skills or extensive training, a spokesman said. The programmer uses Generation II and designs all screen formats on the CRT screen, then specifies field edits and program parameters.

The one-time charge for the Generation II is $10,000, which includes documentation and training material. The vendor is located at 6700 France Ave. S., Minneapolis, Minn. 55435.

Security Tool Targets Users Of VAX-11

PROVO, Utah — Clyde Digital Systems, Inc. has introduced Contrl, an interactive security tool for Digital Equipment Corp.'s VAX-11 computers.

The software package was designed to monitor users without their knowledge, and it can also be used for user training and remote user support and instruction, according to the vendor.

Contrl allows a system manager or trainer to watch a new user run programs, correct mistakes and demonstrate procedures, the vendor said. In a time-sharing environment with remote users, the software allows on-site support, where a system manager can offer direct assistance to remote users.

The product is also available for DEC's RSTS/E operating system and is priced at $900.

Further information is available from Clyde Digital Systems, Suite 3-E, 3707 N. Canyon Road, Provo, Utah 84604.

Screen Manager Out for HP 3000

PHOENIX — EDP Construction Systems has announced the SCRN/3000 software package for users of the Hewlett-Packard Co. line of HP 3000 processors.

The company said SCRN/3000 is an on-line, interactive, character mode screen designing and management system. The package features build, modify, list, copy, test and delete capabilities in addition to an on-line directory of available screens. Upon completion of a screen design, the system utilizes a screen management subsystem to provide a simplified approach to program interface.

SCRN/3000 is said to utilize HP's Image data base management system and may be used with non-HP character mode terminals. It is available for $995 from EDP Construction Systems, Suite 200, 2910 E. Camelback Road, Phoenix, Ariz. 85016.

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'Data Expediter' Backs IBM OS

LOS ANGELES — The Pacific International Marketing Group has announced the Data Expediter for IBM mainframes running under OS.

The package is described as a software tool that ensures the consistency of Cobol program data elements. It features the ability to find data names containing specified elements, check for users' standard naming conventions, and create a graphics display of a Cobol data definition. Data Expediter can be used to audit compliance with naming conventions and document Cobol source programs. It is also said to eliminate redundant data names.

The software tool is said to work with all data dictionaries, and it can detect and report variations from user-identified naming standards. The Data Expediter produces comprehensive statistics at the end of each pass, recapping the report findings. It is priced at $11,500 from Pacific International, Suite 400, 6033 W. Century Blvd., Los Angeles, Calif. 90045.

'Ezpers' for Wang VS Offers Human Resource Management

SEATTLE — Synergy Software, Inc. has announced Ezpers, a human resources management system for Wang Laboratories, Inc.'s VS computer.

The system provides a variety of reports, including standard reports required by various federal government agencies. Ezpers is written in Cobol with on-line documentation available from any point in the system, the vendor said.

Ezpers is available as a stand-alone application or can be integrated with Synergy's Ezpay payroll system.

The price ranges from $5,000 to $25,000, with actual pricing dependent upon system configuration from Synergy Software, Suite 102, 1836 Westlake Ave. N., Seattle, Wash. 98109.

'Caps-Invest' Manages Portfolios

ROSEMONT, Ill. — Capsco Software, Inc. has introduced Caps-Invest, a Cobol-based product for use in managing a mixed investment portfolio.

Caps-Invest is geared toward the institutional investor. It features on-line processing of bonds, stocks, certificates of deposit and convertible investment information.

The major divisions of data include acquisition, interest/dividend/principal/escrow, disposal, accumulation, amortization, market and book values.

The system can be run on Prime Computer, Inc., Burroughs Corp. or IBM computers.

Caps-Invest is available immediately at a price of $25,000, which includes installation, user documentation and system documentation. Capsco Software is located at 6300 N. River Road, Rosemont, Ill. 60018.

Emulator Enhances IBM Micro

IRVINE, Calif. — Users of the IBM Personal Computer can communicate directly with IBM mainframes through an IBM 3270 terminal emulator add-on from AST Research, Inc.

The AST-Pcox terminal emulator allows IBM Personal Computer and Personal Computer XT systems to access IBM host systems as an IBM 3274/76 or 3278/79 terminal. An optional software package provides for menu-selected, bidirectional file transfers between the Personal Computer and the host system. In addition, the AST-Pcox emulator provides direct communications for 3270 series users with coaxial connections.

The AST-Pcox package is priced at $1,195 and includes the Personal Computer board, user manual, emulation template and utility software diskette. An optional file transfer program, Pcox-ETU, costs $200. More information is available from AST Research, which is located at 2121 Alton Ave., Irvine, Calif. 92714.

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Maintenance Parts Manager Upgraded for Scheduling

ELMHURST, Ill. — Probe-III, a maintenance parts management system from Efax Corp., reportedly has been upgraded to include work-order scheduling in addition to its existing modules of stockroom, tradesman, purchasing and inventory control.

The work-order scheduling module provides management reports, checks stock status when scheduling work orders and records equipment history and tradesman-time utilization, according to a vendor spokesman.

Supplementing the main module, which is inventory control, are sections dealing with stockroom, purchasing and tradesmen, the vendor said.

The stockroom section automatically issues pick tickets for back orders when new stock is received and produces a back-order alert if still more stock is needed, according to a vendor spokesman.

The purchasing section analyzes and recalculates each inventory item's reorder point daily and issues suggested order reports, the vendor said.

The module for tradesmen is designed to help the user identify parts more easily, Efax said.

Probe-III typically operates through a stand-alone minicomputer, with CRTs and printers located in the stockroom and shop areas, the vendor said.

It can be used by any type of business with an inventory of 5,000 to 100,000 parts per location, the vendor said.

The existing Probe-III package costs $30,000 with the new work-order module priced at $20,000, according to the vendor.

The package is currently available to run on the Datapoint Corp. 6600 and larger systems, according to Efax.

However, Efax said it can custom convert the programs to run on any minicomputer system.

Efax can be reached at 444 N. York Road, Elmhurst, Ill. 60126.

Survey Tool Aids Engineers Using Wang VS

GLASTONBURY, Conn. — Modern Data Management, Inc. has announced Survey, an on-line data entry civil engineering system for users of Wang Laboratories, Inc.'s VS computers.

Survey is a problem-oriented programming system that enables civil engineers to solve coordinate geometry problems, the vendor said.

The prime feature of the system allows the engineer to state problems in a familiar terminology, such as azimuth, deflection and traverse adjustment, the vendor said.

The product can be applied to computation problems involved in control surveys, highway design, right-of-way surveys, interchange design, bridge geometry, subdivision work, land surveying and construction layout.

Survey is priced at $3,000, according to the vendor.

Survey is available from Modern Data Management, located at 70 Oakwood Drive, Glastonbury, Conn. 06033.

Hygiene, Safety Tool Debuts

ELK RIVER, Minn. — The Industrial Health and Hygiene Group, Inc. has introduced a medical, industrial, hygiene and safety system for the IBM System/38.

Called Biotrak, the product reportedly is an on-line, interactive system written in RPG III, which utilizes the System/38 data base capabilities and functions.

The Biotrak Medical Module was designed to enable close monitoring of individuals for physiological abnormalities in their early detection stages, according to a vendor spokesman.

The system compares the health of similar industry groups, points out trends and shifts in employee health and allows numerous ways to analyze the health and hygiene data available in the system, a spokesman said.

The Industrial Hygiene Module tracks employees who have been exposed to specific substances and their corresponding exposure levels, the vendor said.

The Safety Module evaluates patterns of high-accident rates, analyzes work relationships and tracks lost workdays and workers' compensation claims, according to a vendor spokesman.

The system sells for $150,000, the vendor said.

The Industrial Health and Hygiene Group can be reached at 633 Upland Ave., P.O. Box 350, Elk River, Minn. 55330.

Protocol Links Micros, CPUs

OAKLAND, Calif. — Wordcraft has announced the Christensen File Transfer Protocol for transferring files between mainframe and micro computers.

The protocol contains a block-structured algorithm and implementation notes to aid mainframe programming in Cobol, Fortran and other languages, a vendor spokesman said.

Some of the product's features include transfer of text, data, spreadsheets, object code and any files defined as a sequence of bytes. Used with data exchange formats like SDF or DIF, the protocol can, according to the vendor, download subsets of corporate data into personal computer spreadsheets and data bases.

The product is priced at $395 and is available from Wordcraft at 3827 Penniman Ave., Oakland, Calif. 94619.

OEM's get the most out of the UNIX operating system with Zilog's System 8000.*

Zilog

Pioneering the Microworld

EXXON

Release 2.0 Available Of VAX Chargeback System

BRAINTREE, Mass. — Computer Information Systems of Massachusetts, Inc. has introduced several enhancements to VMSactsys, the company's resource accounting and chargeback system for Digital Equipment Corp. VAX-11 processors running the VMS operating system.

VMSactsys is a menu-driven, project-level accounting system that enables users to monitor usage of VAX systems and gather information about resource utilization, such as connect time, amount of disk use, amount of I/O activity, CPU time and related items, a vendor spokesman said.

Release 2.0 of VMSactsys (formerly called React) permits installations to bill users by billing account, user name, user identification code, image use or any other installation-defined criteria.

New enhancements allow managers to track accounting information at the image level and to summarize information by project, by billing account and by any user-defined criteria, according to the spokesman for the vendor.

The price of the system is $2,995. More information is available from Computer Information Systems of Massachussetts, which is located at 165 Bay State Drive, Braintree, Mass. 02184.

For Displaywriter

Program Checks Spelling

PORT CHESTER, N.Y. — IBM has introduced a Displaywriter licensed program that helps verify the spelling of 16,000 legal terms and an extended general usage dictionary that doubles the number of words that can be checked for spelling on the Displaywriter.

The Extended Spelling Dictionary-Legal is tailored to the needs of law firms and legal departments. The primary sources for the spelling and hyphenation of the terms in the program are Black's Law Dictionary, Fifth Edition, and Webster's Legal Speller, 1978.

The new program diskette, which is available for a one-time charge of $195, is used in conjunction with Textpack 6.

New Textpack 6 program diskettes with the spelling enhancement will be shipped automatically to licensed users.

Prices for the Textpack 6 licensed program with the extended dictionary remain the same. The one-time charge is $1,150; the annual charge is $520. The vendor is located at 900 King St., Port Chester, N.Y. 10573.

'Tegas-5' Simulates Nets For Engineers

SANTA CLARA, Calif. — Calma Co. has introduced Tegas-5, a time-based logic/fault simulation and test generation software package for printed-circuit board and integrated circuit-level design work.

The Tegas-5 simulator can run on a Data General Corp. MV/10000 and Digital Equipment Corp. VAX-11 series processor, as well as other superminicomputers, according to Calma. It enables an engineer to describe a network for simulation, verify that the logical implementation of a network is functionally correct and identify timing problems with the design. Other features of the system include worst-case analysis simulation, testability anaylsis, automatic test generation and fault simulation.

The Tegas-5 simulator costs $135,000 including a DEC VAX 11/780 processor and is available from Calma at 2901 Tasman Drive, Santa Clara, Calif. 95050.

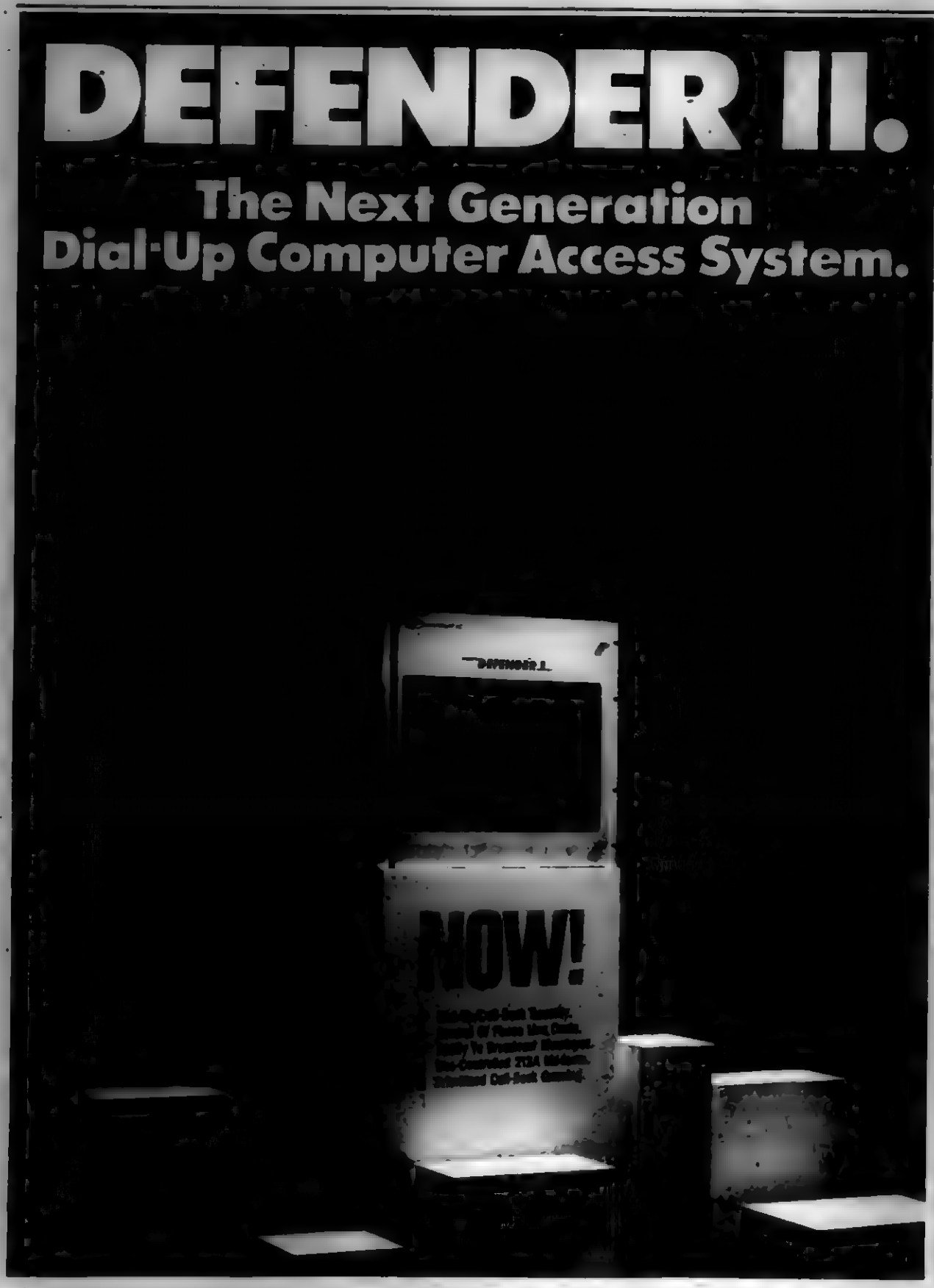
Package Creates Form Files For HP's Vplus

AUSTIN, Texas — Cole & Van Sickle Co. has introduced Autoview, a package to create form files for Hewlett-Packard Co.'s Vplus forms handler from HP Image data bases.

Autoview is designed for use with the HP 3000 computer. It reads an Image data base and creates a Vplus form for each data set in the data base. The programmer needs to specify only the name of an Image data base.

The programmer can control the appearance of the forms by specifying field enhancements, field delimiters and other characteristics of the form, a spokesman said.

Autoview can be run interactively or in batch. The price is $1,500 from Cole & Van Sickle, Suite 406, United Bank Tower, 400 W. 15th St., Austin, Texas 78701.



Compatible With Multiple PBXs

Voicememo Mail System Introduced

SUNNYVALE, Calif. — Centigram Corp. has introduced a voice mail system design to facilitate internal and external communications.

Voicememo is a real-time electronic substitute for written memos or messages that would otherwise have to be dictated, typed or copied and physically distributed. It provides 24-hour-a-day, seven-day-a-week telephone access and allows for efficient communication across time zones.

Compatible with multiple private branch exchanges in the attached configuration, the system can plug into a company's existing digital switching equipment to answer telephones electronically and store and forward voice messages. Each user of Voicememo is given an electronic "mailbox" where messages are stored, according to a vendor spokesman.

The vendor's proprietary waveform coding technique, Centimode, is said to combine a form of unique adaptive differential pulse code modulation algorithms for a method of encoding voice. Resulting digitization is at a data rate of 15K bit/sec, as compared with common rates of 24K bit/sec or higher. Because of the compression rate, less storage is required.

Voicememo's system allows users to send or receive voiced messages using the telephone. The system is based on mnemonic commands that are keyed to function letters: "M" to make a message; "P" to play a message; "K" to keep a message; "D" to discard a message and "X" to exit the system, the spokesman said.

Five seconds of silence after a prompt will initiate another prompt, providing the user with a menu of options from which to choose.

Because it is an open system, outside callers, even those with rotary dialing, can access the system and leave messages in a specific mailbox. The company user can operate the system from any dual-tone, multifrequency telephone touch pad at home or while traveling.

The system reportedly features unlimited message length. Recording continues until three seconds of silence is detected or until another command is entered. Pauses are automatically compressed out of the message to allow for more storage. Each message is time-stamped for reference. Messages are retrieved on a last-in, first-out basis, a vendor spokesman said.

Voicememo is available in three configurations. The VM 150, priced at $28,000, supports up to 200 users with 6.2 hours of message storage. Providing 9.8 hours of message storage capabilities, the VM 250 supports up to 300 users at a cost of $37,000. The VM 400, supporting up to 500 users, provides 13.6 hours of storage at a price of $49,500.

More information is available from Centigram at 1362 Borregas Ave., Sunnyvale, Calif. 94089.

NBI Announces Options For Its Oasys 64 Series

BOULDER, Colo. — NBI, Inc., a manufacturer of high-performance office automation systems, has introduced two new communications products for its Oasys 64 series: Binary Synchronous Communications (BSC) 3270 capability and Digital Equipment Corp. VT100/VT52 emulation.

The Oasys 64, available in four different models, is a central controller that drives NBI's Oasys 3000 and Oasys 4000 series word processing workstations and Oasys 2000 personal computing workstations, as well as IBM Personal Computers.

The clustered products were designed to communicate interactively with IBM mainframe computers via BSC 3270 and emulate DEC's VT100 or VT52 product series.

With the 3270 emulation, NBI customers can have a multifunctional workstation that may be used as a word processor or as a terminal to a mainframe computer, the vendor said. Some applications include data base inquiry, update, retrieval, document transmission and on-line program development.

The 3270 option is priced at $3,000. The VT100/VT52 emulation option, priced at $2,500, will be added to the vendor's asynchronous/BSC package. Both options will be available the first quarter of 1984. More information is available from NBI through P.O. Box 9001, Boulder, Colo. 80301.

Communications System Touts Multifunctionality

RESEARCH TRIANGLE PARK, N.C. — Network Products, Inc. has introduced a modular data communications system said to provide multifunctionality within a single unit.

Commponents reportedly reduces the communications systems to three basic building blocks — chassis, hardware modules and software modules — that can be used to implement switches, asynchronous and synchronous multiplexers, pads and entire networks communicating over ground lines, fiber optics, microwave and satellite.

Commponents hardware modules reportedly include a universal line card with four RS-232 ports, an asynchronous line card, a V.35 line card, a T1 line card, a chassis interface card, switching/configuration, point-to-point multiplexing, multitrunk multiplexing and multidrop multiplexing.

Ranging in price from $2,200 to $500,000, depending on the configuration, the system is available from Network Products at Research Triangle Park, N.C. 27709.

Mux Combines 48 Voice, Data Lines

CHERRY HILL, N.J. — Datatel, Inc., has introduced the DCP9100, a multiplexer said to reduce communication costs by combining up to 48 voice and data lines over a single T1 carrier facility.

T1 facilities offer 1.544M bit/sec of bandwidth. According to the vendor, the service is becoming more attractive in availability and price as microwave, satellite, infrared, fiber-optic and other private facilities have been added to telephone company offerings.

The DCP9100 accommodates up to 48 inputs, both voice and data. Data channels may be synchronous or asynchronous, at speeds up to 896K bit/sec, a vendor spokesman said.

The DCP9100 includes test and monitoring capabilities as standard equipment. Built-in test pattern generators and detectors facilitate trouble-shooting without the need for external test equipment. System and individual channel testing may be performed from either end of an installation.

Prices for the DCP9100 T1 multiplexer start at $3,200 for the base unit. Each input channel costs $325 per end. Delivery is 30 to 45 days.

Additional information is available from Datatel, which is located at Pin Oak and Springdale Roads, Cherry Hill Industrial Center, Cherry Hill, N.J. 08003.

IBM Micro Enhancement Out

LOS ANGELES — C. Itoh Electronics, Inc. and Alternate Channel Marketing, Inc. have introduced the CIE-7850 IBM Personal Computer enhancement for use with existing IBM 3178 or 3278 terminals, as well as with the CIE-7800 multipersonality 3178/3278 plug-compatible terminal.

The CIE-7850 is said to be functionally compatible with IBM Personal Computer versions, whether stand-alone or 3270-adapted, and will reportedly accept both Digital Research, Inc.'s CP/M and Microsoft Inc.'s MS-DOS operating systems.

Priced at $2,495, the CIE-7850 will be available in late November from C. Itoh at 5301 Beethoven St., Los Angeles, Calif. 90066.

Networking Facility Provides Communications to Prime Users

LA JOLLA, Calif. — A networking facility that provides asynchronous communications between a Prime Computer, Inc. system and any other remote interactive system is being offered by Pacer Software, Inc.

The package, called Gnet-II, enables a Prime user, either directly connected or dialed up, to communicate with any vendor's system that supports asynchronous terminals, according to Pacer. The communication speed is limited only by the maximum rate of the line from the local to the remote system, the company added.

Gnet-II includes autodial support, auto-sign-on and auto-porting.

The package, including documentation, installation guide and a 60-day warranty, is $1,500. Sources are available for an additional $1,000. Optional maintenance is $150/year. Pacer Software is located at 1227 Pearl St., La Jolla, Calif. 92037.

IBM 3270 Emulation Subsystems Fit Micros

LAGUNA HILLS, Calif. — ABM Computer Systems has announced the availability of an expandable family of intelligent IBM 3270 emulation subsystems that plug into the IBM Personal Computer, XT and other compatible computers.

Dubbed the PS-3270/BSC, the system, which uses ABM's PS-ICP Intelligent Communications Processor board and ABM-developed 3270 emulation software, relieves the communications load from the personal computer.

Depending on the hardware and software selected, the PS-3270 Intelligent Communications Subsystems emulate the following IBM 3270 systems:

- Level one: Single station IBM 3276-2 control unit display station with attached 3287 printer.
- Level two: Small cluster system IBM 3276 control unit display station with 3287 printer and three down-line display stations for a cluster of four personal computers.
- Level three: Large cluster system IBM 3274-51C cluster controller with 3287 printer and 13 IBM Personal Computers emulating 3278-2 display stations.

The Level one subsystem is priced at $1,295, with quantity discounts available. The Level two and Level three options are each priced at $1,990.

More information is available from ABM at 23362 Peralta Drive, Laguna Hills, Calif. 92653.

Two Terminals Out For Executive Series

MELVILLE, N.Y. — Esprit Systems, Inc. has introduced two terminal products for its Executive terminal series.

The Executive 10/102 is a plug-for-plug replacement for the Digital Equipment Corp. VT102 and VT131 terminals. It offers a 14-in. tilt-and-swivel display with a 132 char./col. in a 5 by 9 dot-matrix format. It features a low-profile sculptured keyboard, meeting European DIN standards, and the same key layout found on DEC products, a vendor spokesman said.

The vendor also announced the Executive 10/25 terminal, with the same ergonomically designed package as the Executive 10/102. It features a 16-bit terminal processor, smooth scroll, 132 char./col. format and editing features.

Prices for the Executive 10/102 and the Executive 10/25 are $995 and $1,045, respectively. Delivery is 60 days. More information is available from Esprit at 100 Marcus Drive, Melville, N.Y. 11747.

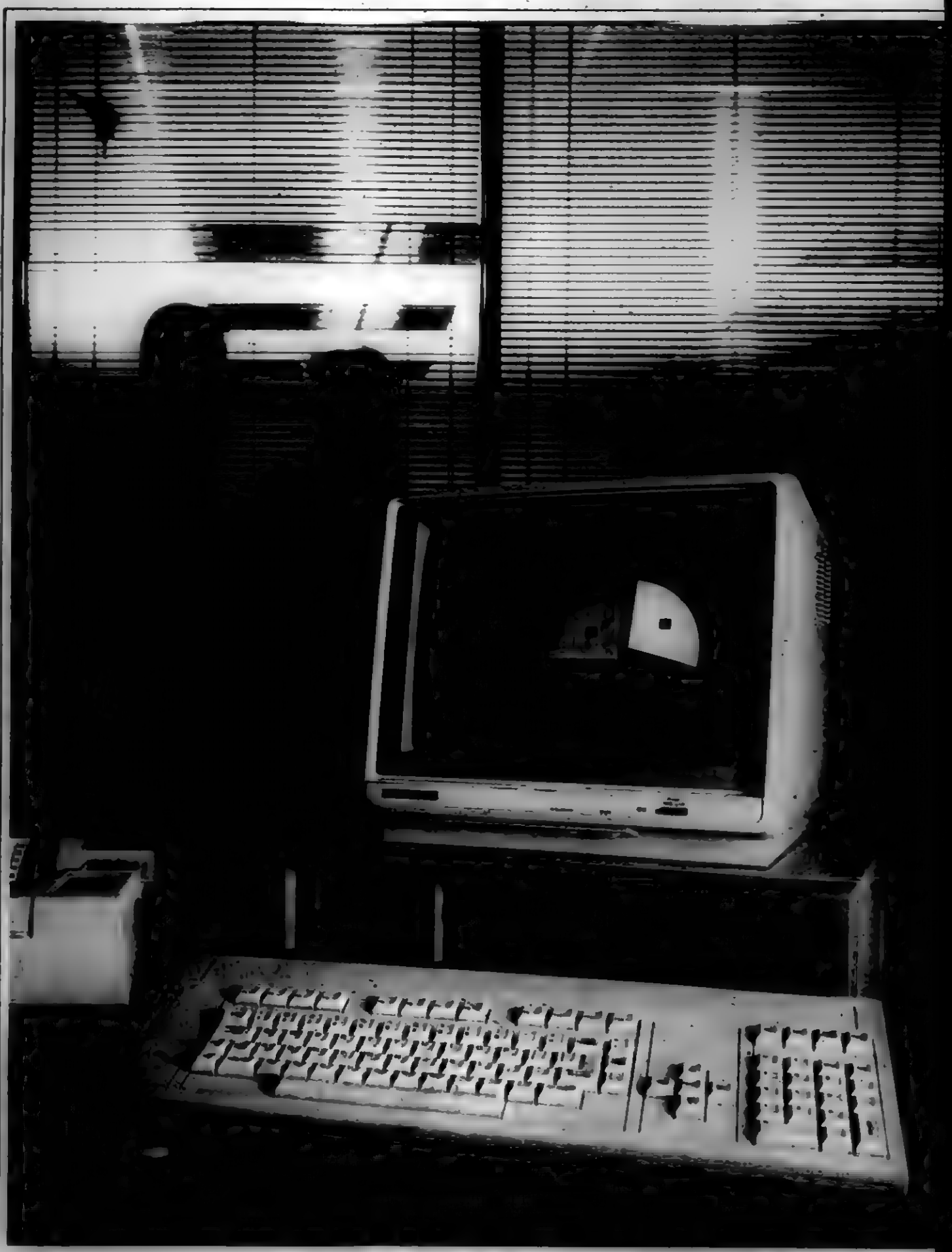
Davox Adds Series Option To Controller

MERRIMACK, N.H. — Davox Communications Corp., a manufacturer of desktop workstations, has announced a high-speed communications option to the Davox Series 1000 cluster controller.

The enhanced controller results in transmission speeds of up to 56K bit/sec in IBM's Systems Network Architecture/Synchronous Data Link Control (SNA/SDLC) mode.

The Series 1000 controller is a microprocessor-controlled eight-port device. It is modularly expandable so that a fully configured Davox cluster can contain up to 56 devices, 32 terminals and/or printers, plus 24 IBM Personal Computers, the vendor said.

The 56K bit/sec communications option is priced at $700. The base price for the Series 1000 controller, including both binary synchronous communications and SNA/SDLC emulators, is $3,880. More information is available from Davox at 6 Continental Blvd., Merrimack, N.H. 03054.



For High-Resolution Graphics

Terminal Handles CAD/CAM

SANTA CLARA, Calif. — Ramtek Corp. has announced the 6411, a color graphics terminal for high-resolution applications, such as computer-aided design/computer-aided manufacturing.

The 6411 offers all the capabilities of the firm's top-of-the-line 6412 terminal, the vendor said.

In its basic configuration, the 6411, with four refresh memory planes, allows simultaneous display (static or blinking) of 16 colors chosen from a palette of 4,096. Color selection is made from a programmable video lookup table, the vendor said.

With the addition of four optional planes of memory refresh, the 6411 can simultaneously display 256 colors from a palette of 16 million.

The 6411 has a display resolution of 1,280 by 1,024 pixels and a zoom ratio ranging from 1:1 to 16:1. The 6411 is based on a Zilog, Inc. Z80A microprocessor and comes with 12K bytes of random-access memory for user subroutines.

The 6411 costs $14,995, Ramtek said from 2211 Lawson Lane, Santa Clara, Calif. 95050.

Three Modems, Stat Mux Unveiled by Comdesign

GOLETA, Calif. — Three modems ranging in speed from 300 to 9,600 bit/sec and a statistical multiplexer that operates with both synchronous and asynchronous terminals have been introduced by Comdesign, Inc.

The Comdesign TM-1200 is a Bell 212A-compatible modem which operates full-duplex asynchronous at 300 bit/sec, or full-duplex synchronous/asynchronous at 1,200 bit/sec over a two-wire dial-up circuit. The TM-1200 can be connected directly to the direct distance dialing network, the company noted. Automatic answer capability is also incorporated into the unit.

The Comdesign TM-2400 data modem is Bell 201B-compatible and operates full-duplex synchronous at 2,400 bit/sec. The unit reportedly provides antistreaming protection to eliminate costly network jams. The digital interface complies with RS-232C and CCITT V.24 under CCITT Alternative B.

Comdesign's TM-9600 data modem is CCITT V.29-compatible and designed primarily for four-wire operation in point-to-point configurations. It operates at a speed of 9,600 bit/sec.

All three modems include testing features such as analog, digital, remote digital loopback and self-test, the vendor spokesman said.

The TC-500 statistical multiplexer concentrates both synchronous and asynchronous terminals and features programmable options. Using multiprocessor architecture, the TC-500 provides monitoring, statistics reporting and system diagnostics. Automatic error correction and optional dual data links are also provided.

The TC-500 also handles satellite communications by utilizing a programmable composite link delay. It is compatible with most host computers, Comdesign said, and is available in four- to 32-channel configurations. Prices range from $1,700 for the four-channel version to $7,800 for the 32-channel configuration.

Prices of the modems range from $750 for the TM-1200 and TM-2400 to $2,750 for the TM-9600. Additional information is available from Comdesign, which is located at 751 S. Kellogg Ave., Goleta, Calif. 93117.

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'I Think You Might Have Come Back to Work Too Soon.'

Multiport Mode Capability

Kinex Modem Runs at 9,600 Bit/Sec

LARGO, Fla. — Kinex Corp. has developed a 9,600 bit/sec modem designed for network applications on domestic and international leased lines.

Designated the 9600/M, the modem, reportedly can also operate in a multiport mode in which up to four 2,400 bit/sec data channels can use the same high-speed transmission path. Ten multiport configurations utilizing varying port bit rates are selectable from the front panel.

Independently simulated controlled carrier operation, with different RTS-CTS delays, is provided for each port in the 9600/M. This enables connection of remote 2,400 and 4,800 bit/sec multiport links to a central site through a multiplexed 9,600 bit/sec link, the company said.

The 9600/M data modem and the transmission link may be tested through internal test circuitry, and loopbacks may be initiated from the front panel.

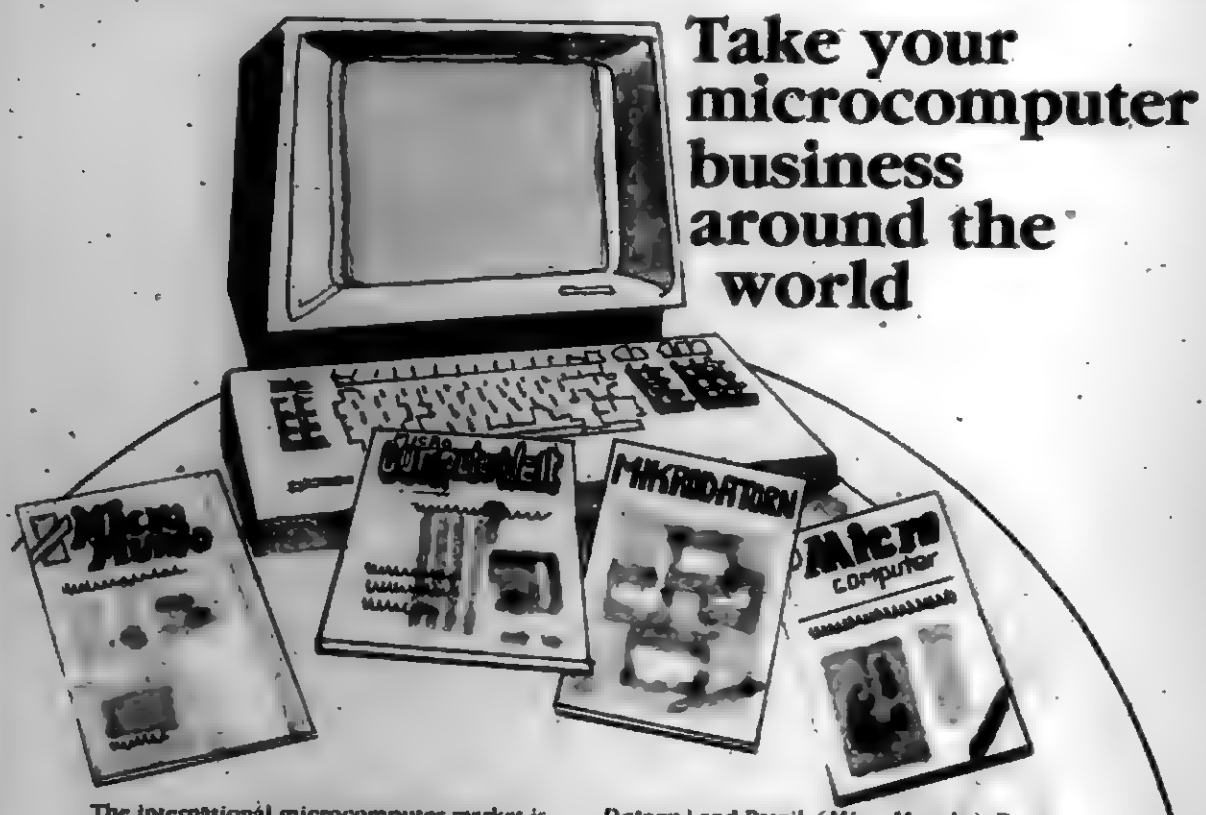
The price of the modem is $3,650 with quantity discounts available from Kinex at 6950 Bryan Dairy Road, Largo, Fla. 33543.

Videoconferencing System Debuts

SAN JOSE, Calif. — Compression Labs, Inc. has announced an international videoconferencing system said to enable global transmission of two-way, full-motion color video graphics and data.

Based on the vendor's Differential Transform Coding technology, the VTS 512 reportedly permits two-way videoconferencing between sites throughout the world at speeds ranging from 512K bit/sec to 2.048M bit/sec.

Priced at $145,000, the system will be available in the third quarter of 1984 from Compression Labs at 1800 Embarcadero Road, Palo Alto, Calif. 94303.



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'I/O Express' Links Micros, Mainframes

FALLS CHURCH, Va. — Tau Systems Corp. has introduced its I/O Express software for microcomputers to provide user-interface and protocol conversion to remote stations and to allow global networking of various types of personal computers and mainframes.

Targeted for the office automation market, I/O Express is intended to simplify the installation of distributed workstation networks by using the telephone system or the office private branch exchange as the basic network architecture. The network may include up to 149 remote computer stations, according to a vendor spokesman.

The product was designed to allow an Open System Interconnection network by offering software protocol conversion for different protocols in common use. Micro-to-mainframe links are established using an adaptable line-at-a-time protocol, compatible with most mainframe time-sharing systems, the Tau spokesman reported.

Priced at $395 per workstation, I/O Express is currently available under Digital Research, Inc.'s CP/M operating system. Additional information is available from Tau Systems, which is located at Suite 327, 7115 Leesburg Pike, Falls Church, Va. 22043.

EIA Develops Data Standard For Serial Links

WASHINGTON, D.C. — The Engineering Department of the Electronic Industries Association (EIA) has developed a data communications standard for serial links between numerical control systems and equipment.

Called the RS-484, the standard was designed for moderate-speed communications between machine programs and data with numerical machine controls on a factory floor. The standard also has general-purpose capabilities that may be applied to data communications links that use asynchronous character transfer. For example, RS-484 can be used as an alternative to several proprietary protocols supported by computer vendors, according to a spokesman for the EIA.

The principal features of the RS-484 standard include two-way simultaneous message transfer, error detection and automatic retransmission, rejection of errors caused by noise, data transparency for character and binary data, a transparent link to application protocols, point-to-point applications, switched or nonswitched links, direct transmission or modem transmission and support for transmission speeds of up to 19.2K bit/sec, the spokesman said.

Copies of RS-484 are available for $17 from the EIA's Standards Sales Department, which is located at 2001 Eye St. N.W., Washington, D.C. 20006.

Compatible With IBM Micros

Eagle Spirit XL Portable Unwrapped

LOS GATOS, Calif. — Eagle Computer, Inc. has unwrapped a hard disk-based transportable computer that is compatible with IBM's Personal Computer and Personal Computer XT.

Labeled the Eagle Spirit XL, the 16-bit system is compatible with both Microsoft, Inc.'s MS-DOS and Digital Research, Inc.'s CP/M 86 operating systems as well as with Microsoft's GW Basica programming language.

The system's basic configuration consists of the Intel Corp. 8088 microprocessor, 9-in. monochrome screen, 128K bytes of random-access memory expandable to 640K bytes on the motherboard, an integrated 10M-byte Winchester hard disk and a 5¼-in. floppy disk drive with 360K bytes of storage. Optionally available is the Intel 8087 support chip for mathematical applications.

A standard feature of the Personal Computer-compatible system is its color graphics capabilities, allowing users to add an optional color monitor. A combined monochrome and color graphics display card with composite and red-green-blue output capable of simultaneous operation is also standard.

The Spirit XL weighs 33 lb and is carried using a built-in handle. An optional carrying case is offered with shoulder strap, a spokesman said.

Expected to be available at the end of October, the Eagle Spirit XL is priced at $4,795, from 983 University Ave., Los Gatos, Calif. 95030.

TI Micro Gets Speech Package

DALLAS — Texas Instruments, Inc. has announced a speech recognition and synthesis turnkey application package for its Professional Computer.

The Speech Command application package reportedly can be integrated with any Microsoft, Inc. MS-DOS software program. It includes a plug-in hardware package said to accept voice commands and to allow the Professional Computer to deliver vocal feedback, the vendor said.

The transparent keyboard feature of the software is said to allow verbal communication with the computer in addition to regular keyboard input. The system recognizes vocabularies of up to 50 words each. The number of vocabularies on the disk is only limited by the amount of mass storage on the system, a spokesman said.

Other features include connected word recognition capability and telephone management capabilities that reportedly allow the system to record incoming

(Continued on Page 76)

Micros Bridge Gap to Firm's Supermini

CHICAGO — Harza Engineering Co. here is using microcomputers to link field engineers to the firm's superminicomputer.

Chicago's Tunnel and Reservoir Plan (below) and the Strontia Springs arch dam (above) are projects Harza Engineering Co. designed using a Harris Corp. 800 superminicomputer to alleviate the Chicago River and Lake Michigan overflow.

Harza is a consulting engineering firm operating in the development of water, land and energy resources. Its major emphasis is on water-related projects, from dam design to environmental studies.

Established in 1920, Harza is privately owned by about 20% of its approximately 800 employees. Harza currently has 160 projects under way in 20 countries; 125 projects are in the U.S.

"Our engineers need access to a powerful computer system. What good is it to give an engineer in the field one or two programs that'll work on a microcomputer when he needs to do an entire study and have access to our whole program library?" stated Kenneth J. Reca, head of computer services at Harza.

Too Large for Micros

That is why Harza is going with terminals at engineering sites that can communicate directly with its superminicomputer. Most of Harza's programs are too large for micros, although the firm may try using them for off-line storage, connecting up on the phone line and dumping data to save communications costs. But for true access, especially if the project requires a lot of different programs, having phone lines with direct connect is the only way, Reca said.

Harza took its first major step in implementing terminals at remote job sites when it installed CRTs at a hydroelectric project on Alaska's Susitna River. "We're thinking of at least one dedicated line up there, one dedicated 9,600-baud line multiplexed with a minimum of four terminals, another dedicated line from Bellevue, Wash., [a project office] to Chicago and possibly to New York and Washington, D.C.," Reca explained.

Harza has been utilizing computers for approximately 25 years. Prior to installing its superminicomputer nearly three years ago, Harza had been working with service bureaus at a cost averaging about $40,000 a month.

"We evaluated a number of superminis, and it came down to [Harris Corp.] and Digital Equipment Corp. In our benchmark, the Harris 500 came out equivalent to the DEC VAX-11/780, and the Harris 800 was 50% faster. Compared to the [Sperry Corp.] 1108s we were used to running on at the service bureau, the Harris 800 was 33% faster. The dollar figures were factors, too. It turned out we would be getting more value for the money with the 800," Reca said.

Interactive Operating System

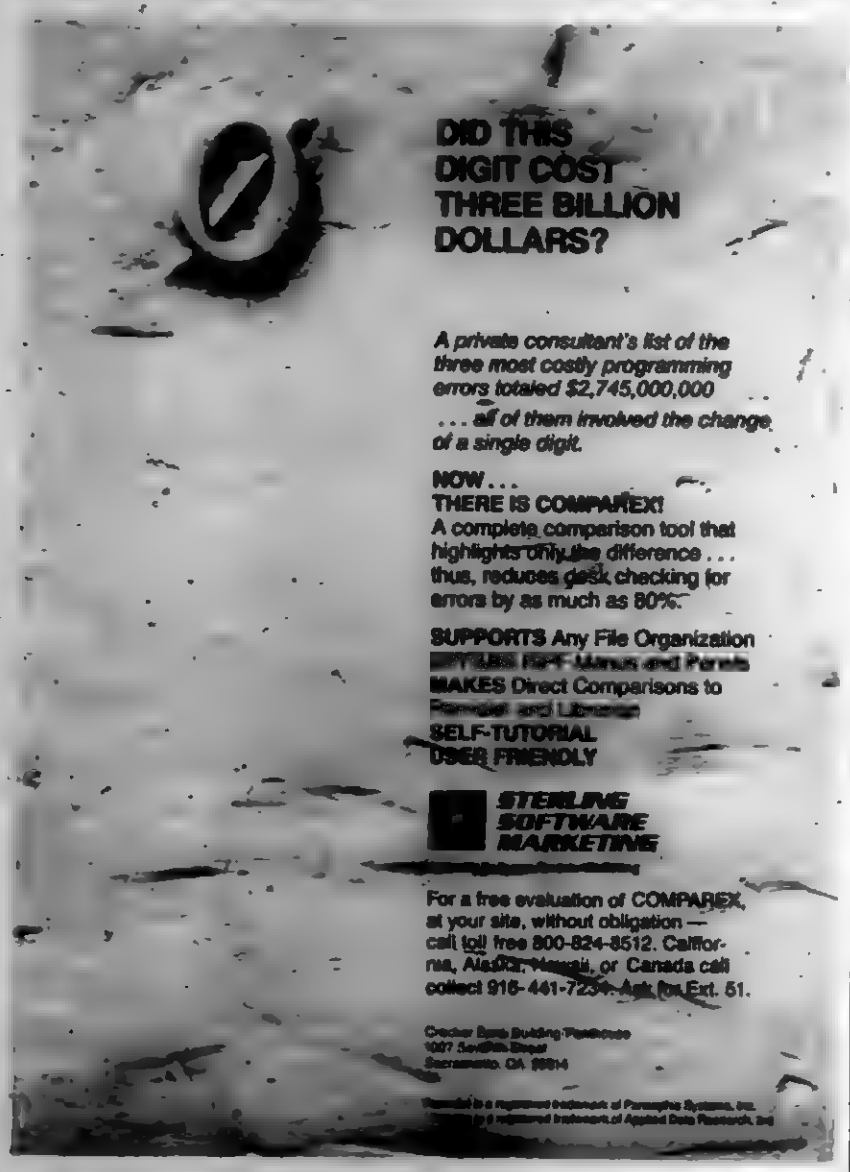
Another big selling point for the Harris machine was its interactive operating system, which was extremely user-friendly. In addition, the disk storage was considerable compared to the Sperry, which could only access two million words of disk storage, Reca added.

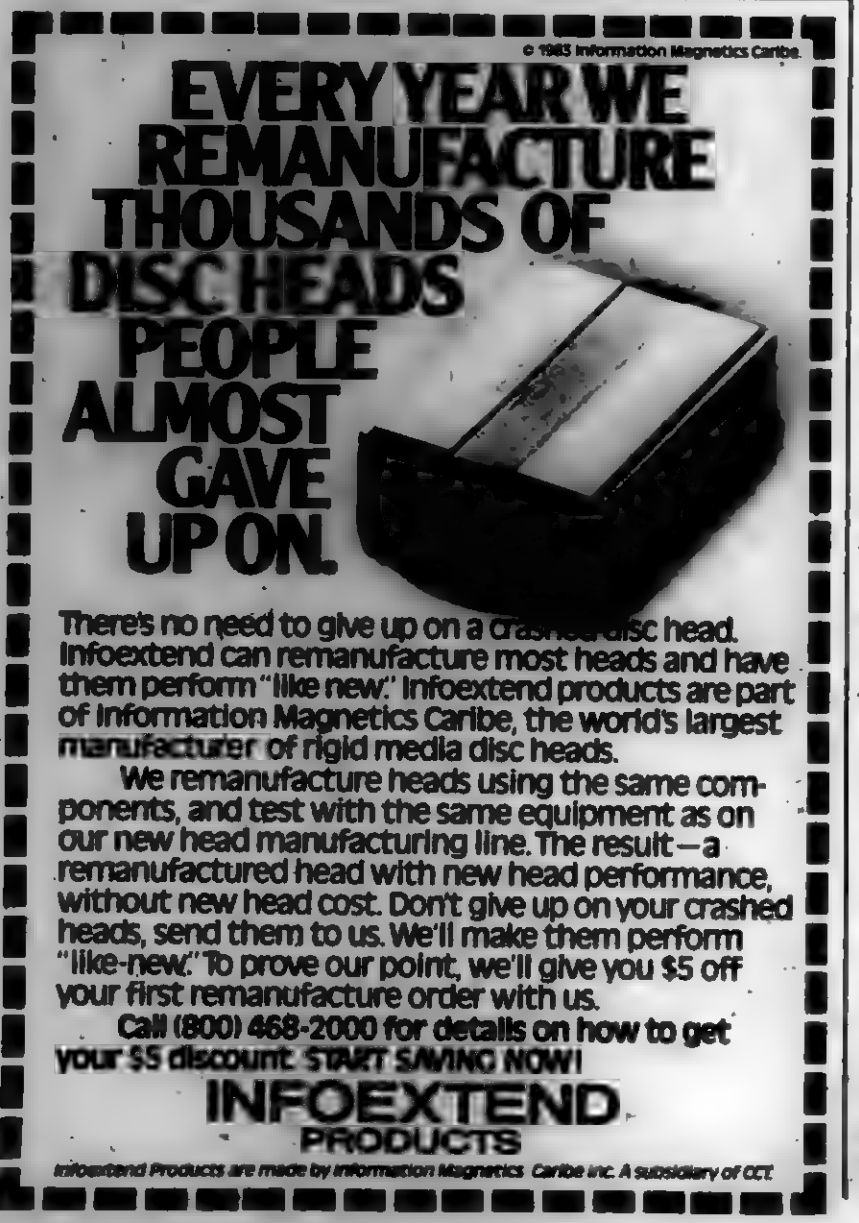
"The full Harris 800 configuration, including overhead, runs at about half the $40,000-per-month cost of the service bureaus," Reca said.

Harza's computer usage since installing the H800 has increased almost fivefold both from applications and users' standpoints. "Coming from service bureaus, we had some knowledge of communications. When the Harris came in, we put about 30 terminals all over the building, using differential and interbuilding phone lines. We were able to communicate up to 19.2 baud," Reca said.

Harza's H800 has 2.5M bytes of real memory and up to 10M bytes of virtual memory. Peripheral devices include a 675M-byte and two 80M-byte disk drives; an 800/1,600 byte/in. magnetic tape drive;

(Continued on Page 78)





Wordplex Corp. Portable PC

Wordplex Desktop, Portable Run Software for IBM Micro

WESTLAKE VILLAGE, Calif. — Wordplex Corp. has unveiled desktop and portable computers that run most software packages designed for IBM's Personal Computer.

The Wordplex Desktop PC and Portable PC both use Intel Corp.'s 8088 microprocessor and are compatible with Microsoft, Inc.'s MS-DOS operating system. Both systems also accept four IBM Personal Computer-compatible board upgrades, according to the company.

The main board in both systems contains 128K bytes of random-access memory and can be expanded to 512K bytes. A 320K-byte double-sided floppy and 10M-byte Winchester drive are available as options. The main board also includes communication and printer ports.

The units' video monitors display high-resolution characters and graphics, high-contrast image and nonglare, nonreflective, 9-in. screens. Text and graphics can be displayed at the same time, the company said.

To be marketed as an executive workstation, both systems are compatible with application software such as Visicorp's Visiseries line and Ashton-Tate's Dbase II.

Price of the monitorless Desktop PC with a single floppy disk is $2,696. A monitor can be added for an additional $287. The single-floppy version of the Portable PC costs $2,926, the vendor said from 141 Triunfo Canyon Road, Westlake Village, Calif. 91361.

Gould Unveils Enhancements For Superminis

FORT LAUDERDALE, Fla. — Gould, Inc.'s Computer Systems Division has announced two modular performance enhancements for the firm's Concept/32 line of 32-bit superminicomputers. The enhancements are an updated release of the firm's Fortran 77+ compiler and a new Multiply Accelerator for the Concept 32/8780.

Using a Whetstone I benchmark, Gould said the combined use of the Fortran 77+ compiler and Multiply Accelerator can potentially boost program execution by 55%.

The Fortran 77+ compiler has been optimized to improve program execution speed. Gould said the enhanced compiler offers a 27% improvement in performance on the Concept/8780, the vendor said.

The Fortran 77+ compiler and associated Scientific Run-Time Library comply with most popular standards. The compiler costs $4,500, the vendor said.

The Multiply Accelerator consists of two printed-circuit modules that plug into the firm's Selbus in the Concept 32/87 chassis. Since it is a modular enhancement, the Multiply Accelerator can be field-installed on an existing system or it can be included in a new system.

The Multiply Accelerator computes products for nine fixed- and floating-point instructions in the Concept 32/8780. Except for an improvement in execution speed, the device is transparent to systems software, the vendor said.

The Multiply Accelerator costs $25,000 from Gould through 6901 W. Sunrise Blvd., P.O. Box 9148, Fort Lauderdale, Fla. 33310.

Speech Package Out for TI Micro

(Continued from Page 75)

phone messages, dial telephone numbers, deliver outgoing phone messages and provide playback of recorded messages that can be activated from a remote telephone.

The Speech Command package includes two piggyback circuit boards, a headset, user's manual and two software diskettes, an installation/diagnostics guide, diagnostics diskette and a telephone cable.

The complete kit is priced at $2,600 and is scheduled for shipment in November, the spokesman said. More information is available from TI through P.O. Box 402430, H-678, Dallas, Texas 75240.

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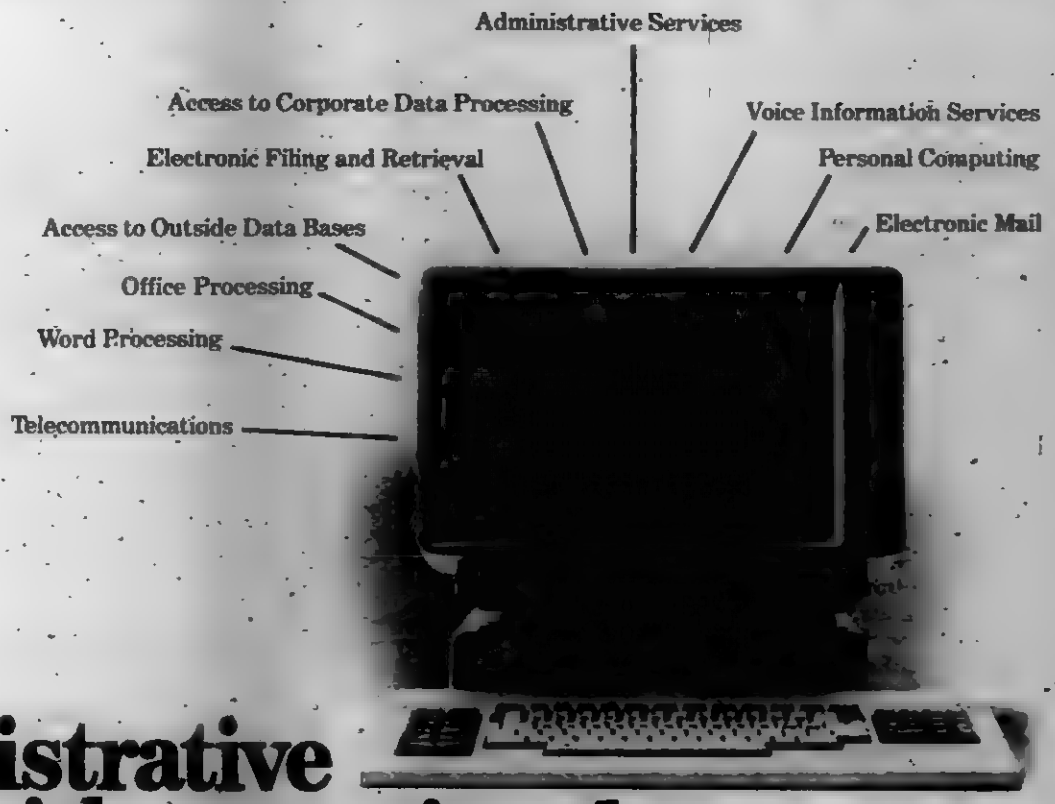

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Field Engineers Tied to Supermini via Micros

(Continued from Page 75)

a California Computer Products, Inc. 1051 drum plotter; one 600 card/min card reader; two 600 line/min printers; a Versatec, Inc. line/min printer/plotter; a Tektronix, Inc. 4014 terminal; hard-copy unit and 11-in. digitizer; a 36-in. Calcomp digitizer; seven Anderson Jacobson, Inc. 520 CRTs with Anderson Jacobson 833 printers for word processing; 17 Harris 8680 interactive CRTs; and five 30/1,200-baud autoanswer Bell Laboratories modems and Hasp host with one 4,800-baud dial-I/O Bell modem.

Graphics has been one of the major growth areas at Harza since it installed the Harris 800. Harza has been training personnel in computer-aided design (CAD) using a three-dimensional package. Harza is also converting the Relational Information Manager, a data base management system developed by the National Aeronautics and Space Administration, for Harris computers. "We've been deluged with requests for it from other Harris users," Reca commented. "Along with the data base, word processing via Harris Muse is starting to go over big with our secretarial staff."

The lion's share of computer usage at Harza involves programs for analysis, simulation and design — approximately 80%. About 10% is for data base management, 7% for word processing and 3% for CAD drafting. It is expected that the latter will show dramatic growth in usage very soon.

"Obviously, we use the computer for the design and drafting stages — everything from finite element analysis studies on different structures to computing concrete quantities and reinforcement bars needed computer-aided drafting for the actual drawings and modifications," Reca said.

Analysis Program

One program Harza uses extensively is the Structural Analysis Program (SAP). This is a general-purpose, finite element program that can model any complex structure mathematically. It analyzes structures for static and dynamic loads. SAP also can be used to generate the predicted deflections of an arch dam under earthquake effects on the dam.

"We also use the computer for project management. We use an in-house developed, extensively modified and improved version of Digital Research, Inc.'s CP/M Pert-type analysis. CP/M includes all the nodes and elements of a project, isolates the critical ones and computes the effect on the entire project if they were stopped, slowed down or extended. Pert does the algorithms, the statistical probabilities," Reca added.

Most of Harza's programs are in Fortran. However, the administrative tasks that are handled by the service bureau are in Cobol. Harza decided to keep some of its administrative work at the service bureau for the time being to avoid burdening the Harris 800 with the I/O requirements of the smaller administrative programs.

Engineers are given as much computer access as they want for their engineering work. Priorities are changed for them, and they cater to projects with tight deadlines. In the future, Harza is considering installation of a second Harris 800 and bringing its accounting work in-house.

"The Harris 800 is used almost entirely for interactive work by the engineers and designers. There are batch runs," Reca explained, "getting the data to a control point once the data preparation is done. But that's really a form of interactivity, too. While that job is running, an engineer can be reviewing his data for modifications, corrections or deciding his next step.

"There aren't too many problems in the world where he just enters the data and the computer shoots out the entire answer. If that was the case, we wouldn't need engineers or designers," he added.

Besides the Harris 800 superminicomputer system, Harza also has two other Harris systems, a Harris remote job entry terminal and a Harris 9200 with three CRTs and a 600 line/min printer.

The Harris 1620 telecommunications workstation has a 64K-byte CPU, two 600 line/min printers, a 100 card/min punch and dual emulation. Its primary function is to communicate with the service bureau where administrative work is performed. All three systems are equipped with bisynchronous communications adapters that allow access to service bureaus, clients and government agencies.

Harza has compiled an extensive program library that comprises approximately 400 major technical programs and about 150 administrative programs. Although some of these programs have been acquired from outside sources, 80% of them have been developed by Harza.

These computer programs can be classified into three basic categories: analytical, simulation and optimization. Analytical programs are used for problems in engineering design and analysis. This could include structural design, soil mechanics and hydraulics.

Simulation programs are used for studying and evaluating the operation of a project. This type of program could be used in areas such as reservoir operation for flood control, hydro power production, low flow augmentation or electric power systems operation.

The optimization programs are mathematical programming algorithms, such as linear programming, to determine the best solution to a problem. An example is the minimum cost design or operation of a project to meet a specified level of output. Often, optimization of a complex system is achieved through successive simulations.

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Firm Unveils Enhanced Controller, CPU Board

COSTA MESA, Calif. — Star Technologies, Inc. has introduced two products it claims will increase the performance of its entire line of combined data and word processing minicomputers and microcomputers. The company designs, manufactures, markets and services data and word processing mini and microcomputers for the office automation market, according to a spokesman.

The first product is an improved version of the company's proprietary multifunction Dart controller. Super Dart increases disk transfers by over 35% and multiuser station capacity from five to nine. It also allows for the use of all sizes of Winchester drives.

The second product is a CPU/memory board that increases available memory from 128K bytes to 512K bytes. Using mapped memory techniques, the CPU allows faster response to a larger number of simultaneous users, the vendor spokesman said.

The price of the Super-Dart is $1,280; the 512K-byte memory board is $3,840. Both enhancements were designed for the Micro Star, the Mini Star 200 and the Mini Star 400, priced from $11,000.

More information is available from Star Technologies at 3180 Pullman, Costa Mesa, Calif. 92626.

Burroughs Offers On-Line Service

DETROIT — Burroughs Corp. has introduced a computerized marketing service that allows customers to make telephone orders and, in many cases, get delivery within 24 hours.

The Burroughs On-Line Supplies Service (Boss) is available by calling a toll-free 800 number. Products available include an array of computer products and office supplies, such as ribbons, print wheels, computer disks and paper.

The Boss toll-free number is (800) 448-1424.

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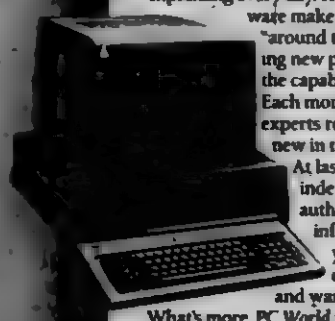

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Teleram Takes Wraps Off Portable Office System

WHITE PLAINS, N.Y. — Teleram Communications Corp. has introduced a combined portable desktop office system comprised of the Model 3000-1 portable computer and the Model 3500 desktop office station. The system is priced at $3,495.

The package includes the office interface console, plus a floppy disk interface card and a CRT monitor interface card, as well as one half-high floppy disk drive and all the necessary cabling. A CRT monitor may be purchased separately for an additional $195.

The portable 3000-1 weighs less than 9 lb and fits into a briefcase, the company said. It is a full-function computer with a full-size keyboard and up to 256K bytes of nonvolatile bubble memory.

The 3500 office station reportedly can serve as a home base for several Teleram portable computers. Programs can be loaded and unloaded, and copy can be transferred from a portable's bubble memory for more permanent storage while the 3500 charges the portable's internal battery.

More information is available from Teleram at Two Corporate Drive, White Plains, N.Y. 10604.

From Monolithic Systems

Micro Boasts Multitasking

ENGLEWOOD, Colo. — Monolithic Systems Corp. has announced a portable computer designed for multitasking applications.

The Indy Industrial Portable Computer, first in a planned family of system and support products, offers two operating systems, four high-level languages and a variety of utility programs.

Based on the Intel Corp. Multibus architecture, the Indy Portable Computer integrates a 16-bit 80186 CPU, up to 512K bytes of parity random-access memory (RAM), 9-in. CRT screen, dual 3½-in. floppy disk drives, parallel and serial ports and SCSI interface. The total package weighs approximately 35 lb and includes a 100W power supply, cooling fans and a built-in carrying handle.

According to a vendor spokesman, the customer may choose between Intel's IRMX-86 operating system and Digital Research, Inc.'s Concurrent CP/M 86. Monolithic Systems has implemented the two software systems so that applications and utilities supplied by the vendor operate identically from the user's point of view.

IRMX-86 is a multiuser, multitasking real-time operating system which provides such advanced features as hierarchical file structures with variable file granularity. It schedules tasks with true real-time preemptive priorities. It enables dynamic memory allocation among concurrent applications with device-independent I/O.

Concurrent CP/M 86 is a single-user, multitasking system that executes up to four tasks concurrently. Its virtual console approach allows the CRT terminal to act as a window into any one of the tasks. Its file structure is compatible with that of the familiar CP/M 80 system.

Four language compilers are available: Fortran, Pascal, Basic and C (Version 7). Basic is also available in interpretive form. Other software modules in the comprehensive package include a full-screen CRT editor, assembler/linker, formatter for both Winchester and floppy disk drives, hardware diagnostics and a programmable read-only memory.

The Indy Portable Computer is available in a variety of configurations, starting as a portable terminal containing only the CRT controller board at a single-unit price of $1,975.

A packaged system with the CP/M 86 operating system and 128K bytes of RAM is priced at $4,875, while the same configuration with the IRMX-86 operating system has a price of $5,475.

All models will be available in production quantities the first quarter of 1984. The vendor will have a limited number of evaluation units available with 512K bytes of on-board RAM, based on 256K-byte RAM chips at $6,775.

More information is available from Monolithic Systems at 84 Inverness Circle E., Englewood, Colo. 80112.

CDC Expands Maintenance

MINNEAPOLIS — Control Data Corp. has announced the expansion of its Comma maintenance services to include the IBM 4331 and 4341 processors.

The expansion reportedly enables the vendor to provide maintenance services as well as installation and relocation services for the entire 4300 product line.

The price of Comma maintenance services, which varies according to the type of equipment and frequency of service, ranges from $330 to $1,075.

More information is available from CDC through P.O. Box 0, Minneapolis, Minn. 55440.

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Braegen's Way Puts IBM-Compatible Personal Computing Inside A Low-Cost, 3274-Compatible Cluster Controller.

Several companies now offer personal computing capability as part of their 3270 terminal package. Their approach, however, has built-in problems—primarily because the personal computing *isn't* built in, but just bolted on.

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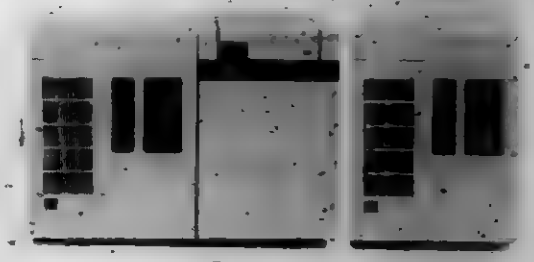

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For IBM Personal Computer

Firm Unleashes Peripherals

BEDFORD, Mass. — Ideassociates, Inc., a manufacturer of peripherals for the IBM Personal Computer, has unveiled a raft of products, including a monochrome/color display graphics card.

Ideagraph, a graphics card for general-purpose applications, reportedly features high- and medium-resolution graphics in combination with a monochrome/color display. A display memory of 128K to 256K bytes, programmable to eight planes and up to 256 colors selectable from a palette of 4,096, will be available soon, the vendor said. Ideagraph ranges in price from $895 to $1,895.

The IDE line of disk products has been expanded to include 10M-, 20M- and 40M bytes of 3.9-in. Winchester disk storage, available in fixed or removable, internal or external mount versions. Prices range from $1,495 to $5,295, depending upon configuration, a spokeswoman said.

Further integration of the disk line will be achieved through the introduction of two resource-sharing products: Ideashare and Ideanet. Ideashare, a software product designed for small business applications, allows asynchronous communications for disk sharing by up to four users. It costs $595. Ideanet, designed for larger scale networking, is said to be a turnkey product that provides high-speed coaxial communications within a range of 2,000 feet. It is 100% compatible with Orchid Technology, Inc.'s PC Net and costs $595 for the board and $795 for the software, a spokeswoman said.

Also introduced was Ideacomm 3278, a high-speed mainframe communications card. It allows IBM Personal Computers to interface with the IBM 3274 and/or IBM 3276, whether local or remote, using IBM's Binary Synchronous Communications or Synchronous Data Link Control. Ideacomm 3278 costs $1,195.

Ideassociates is located at 7 Oak Park Drive, Bedford, Mass. 01730.

Apple Unveils Business System, Serial Card III

CUPERTINO, Calif. — Apple Computer, Inc. has introduced the Apple III Business System, which is said to provide both hardware and system software components for small- to medium-size businesses.

Also introduced was the Apple Serial Card III for Apple III users requiring more than one serial communications device. With appropriate software, the card reportedly enables users to perform multiple communications tasks. Suggested retail price is $225.

The Apple III Business System includes:

- The Apple III personal computer with 256K bytes of memory and a built-in floppy disk drive.
- Profile — Apple's 5M-byte hard disk.
- Monitor III — a 12-in. monitor.
- Catalyst 2.0 Program Selection software from Quark, Inc., which enables users to select and switch programs resident in the hard disk without resetting the system.
- System Utilities Product Training Pak, which includes instructions, reference cards and a self-help tutorial training disk that introduces users to the most commonly used features of the Apple III's SOS operating system.

The Apple III Business System is priced at $5,330. A 12-mo, carry-in service plan is available for the Apple III, Profile and Monitor III at a retail price of $288.

Apple Computer is located at 10260 Bandley Drive, Cupertino, Calif. 95014.

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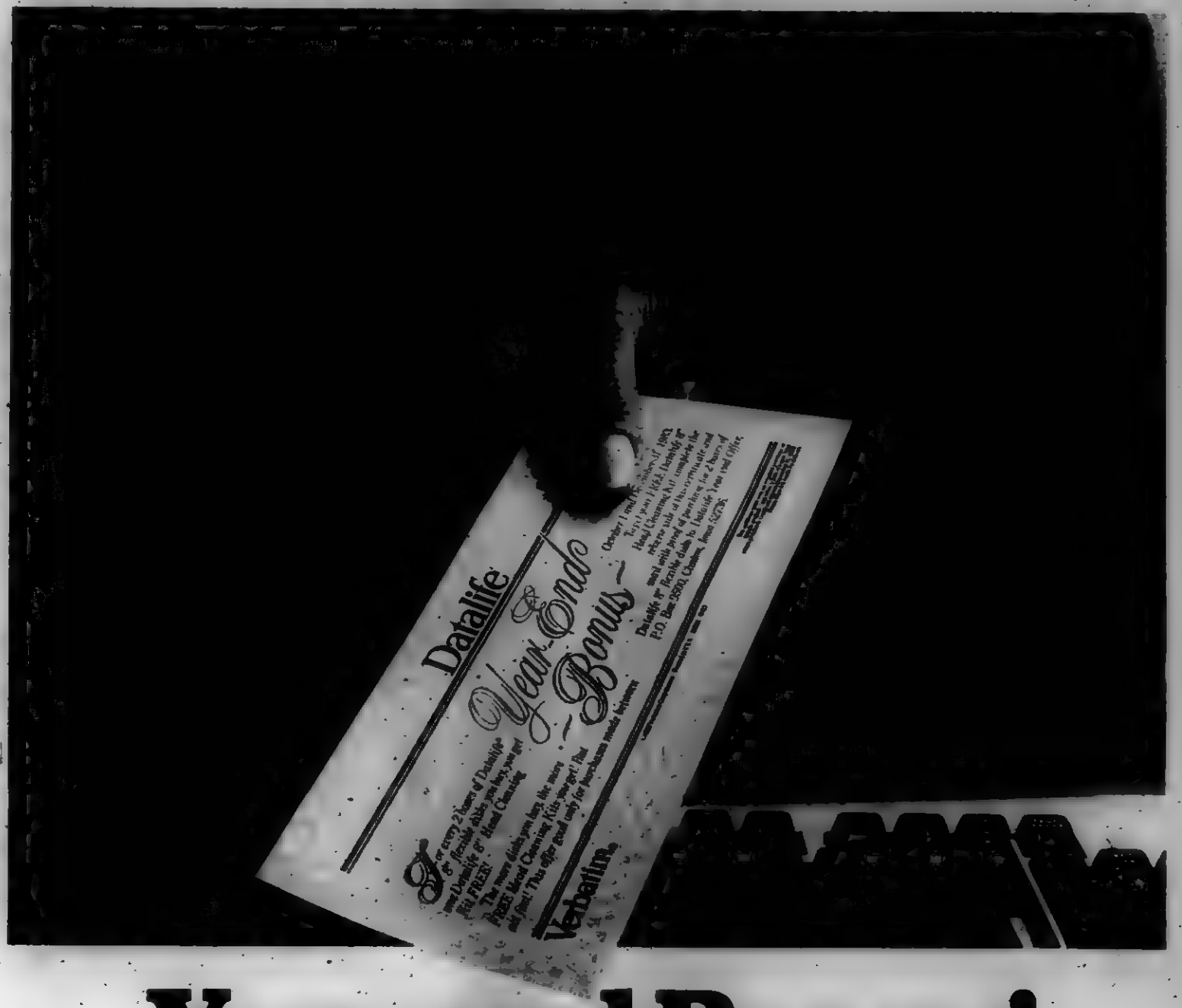

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Alloy Line Runs With IBM, Compaq, TI Micros

FRAMINGHAM, Mass. — Alloy Computer Products, Inc. recently introduced four personal computer products including an integrated Winchester disk and backup unit, a credit card reader for personal computer keyboards, a 9-track tape controller for data interchange with mainframes and a cartridge tape drive for disk backup and archiving.

PC-Stor, the Winchester disk and backup package, combines a 5¼-in., 38 msec Winchester hard disk for data storage with a 6,400 bit/in. file-oriented cartridge tape backup unit. Available capacity is 33M or 43M bytes formatted, which can be increased to 86M bytes with the incorporation of a second disk.

Each cartridge in PC-Stor has a capacity of 16.5M bytes, and data transfer rates of up to 1M byte/min can be achieved with Alloy's Tape Interchange Package (TIP), the company said.

In addition to the IBM Personal Computer, PC-Stor will operate with personal computers made by Compaq Computer Corp., Columbia Data Products, Inc., Eagle Computer, Inc. and Texas Instruments, Inc. as well as other brands, Alloy noted.

The price of the PC-Stor is $4,995 for the 33M-byte unit and $5,995 for the 43M-byte model.

The PC-Card is a magnetic-stripe card reader that attaches to a personal computer's keyboard. The reader can be used for such applications as security access control, password input validation, credit card transactions and data logging. The price of the PC-Card, which includes a sample Basic program, is $279.

The ITS-PC is an intelligent 9-track tape controller, supplied with or without the tape drive, that allows users to transfer data between personal computers and 9-track tapes for data exchange to mainframes. It also provides users with high-capacity, high-speed, file-oriented backup for Winchester disks, according to Alloy.

ITS-PC offers 42M bytes of working or backup storage and a disk-to-tape transfer rate of 1M byte/min. It supports 1,600 bit/in. tapes with user-specified formats from 128 byte/block to 9K byte/block and is priced at $6,595.

Alloy's PC-Backup cartridge drive is a 4-track, 6,400 bit/in. unit that can accommodate 16.5M bytes on a single 555-ft cartridge. Both the 9-track and cartridge units are available with PC-TIP software under IBM's PC-DOS or Digital Research, Inc.'s CP/M 86. The TIP Package controls reading, writing and dumping operations and also provides utilities that allow the user to customize drive operations, Alloy noted. The price of the PC-Backup unit is $2,195.

All four products are ready for immediate delivery, with dealer discounts available from the company at 100 Pennsylvania Ave., Framingham, Mass. 01701.

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Memory Board Gives Rainbow 256K Bytes

IRVINE, Calif. — Persyst, Inc., a microcomputer enhancement company, has introduced the Rainbow Memory Expansion Board that offers Digital Equipment Corp. Rainbow 100 users a single flexible board for expanding system memory up to 256K bytes.

The Memory Expansion Board allows users to add memory in 64K-byte increments utilizing a single board. Factory-configured versions of the board with 128K or 192K bytes of memory are also available.

User documentation is supplied with each Rainbow Memory Expansion Board and the Field Memory Expansion Kit at no extra charge.

Available now, volume shipments of the Rainbow Memory Expansion Board are priced at $335 for the 64K-byte board, $440 for the 128K-byte board and $525 for the 192K-byte board. The Field Memory Expansion Kit is priced at $95.

Persyst is located at Suite A, 15801 Rockfield Blvd., Irvine, Calif. 92714.

Card Provides Parallel Interface For STD Bus

OTTAWA — Dy-4 Systems, Inc. has introduced a high-speed parallel interface card for the STD bus.

The DSTD-408 card has been configured to be compatible with the QIC-2 ¼-in. tape interface protocol.

A Zilog, Inc. Z80 data memory access (DMA) controller chip is used to gain the transfer speeds of up to 88K byte/sec required for the 90 in./sec streaming tape drives, according to a spokesman for the vendor.

Seven control signals plus two handshake signals are reportedly supported by the DSTD-408. When used with other Dy-4 STD modules, the DMA on the DSTD-408 can co-reside with up to three other DMA devices on the same bus, the spokesman said.

Prices range from $225 to $275, depending on quantity, the vendor said. More information is available from Dy-4 Systems, which is located at Len Place, Ottawa, Ont., Canada K1Z 5M1.

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- Teach Yourself VisiWord on the IBM PC
- Teach Yourself PC-DOS

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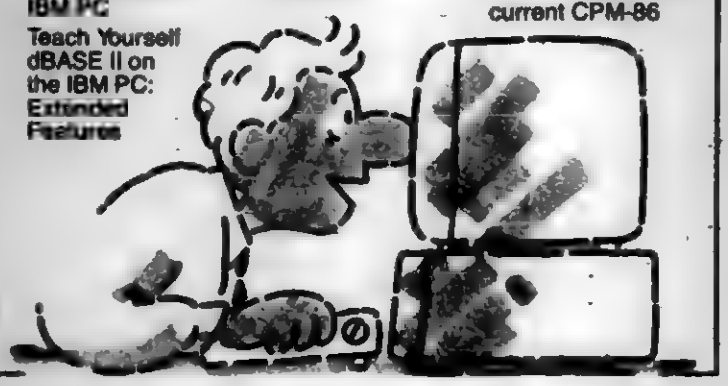
- Managing Your Business with Multiplan
- Training for EasyWriter II
- Training for the Apple IIe
- How to Use Your IBM PC with CPM-86 and Concurrent CPM-86



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Immediate, Future Cost Savings

Microimaging Seen Key to Future Office

By John A. Lacy
Special to CW‡

The advanced technology incorporated into some of today's most sophisticated microimaging equipment promises to be the cornerstone on which tomorrow's office image processing systems will be built.

Therefore, by carefully investing advanced micrographics technology today, offices can realize immediate cost efficiencies and gains in productivity as well as begin building a foundation of hardware and software that can help meet future image processing needs.

Specifically, concepts and products are being developed today that will permit the creation of a centralized document image storage file (similar to a centralized computer base), provide a way to transmit and receive document images at electronic speed from several locations and deliver extremely high-quality CRT displays of document images.

It is anticipated that tomorrow's image-processing systems will incorporate technology from several areas, including traditional micrographics, optical disk, computer electronics and even robotics. In some instances, the technology applications and results will startle the imagination.

Major Image Processing Steps

The major steps in the image processing network of tomorrow include image capture, coding, indexing, storage, transmission, enhancement and editing as well as image retrieval and presentation. Much of the technology required for the successful accomplishment of these steps is already in place.

For example, the first step in the imaging process requires capturing, coding and indexing document images. By using high-speed, intelligent rotary microfilers, document images can be captured easily and coded automatically.

The conversion of microimages to electronic signals offers several advantages:

- Images can be enhanced for readability. Irrelevant and unnecessary information such as graphics design on personal checks can be removed to make it easier to locate and verify pertinent information.
- Operators can selectively enlarge portions of document images.
- Annotation of alphanumerics over the image will be possible. In fact, the operator can create new images electronically.
- Several documents can be accessed from the file, electronically grouped and sent to the CRT terminal(s). These documents then can be called out for display on an individual basis; and hard-copy prints can be made.

An experimental optical disk system at Eastman Kodak Co. can store about 100,000 pages of text.

'It is anticipated that tomorrow's image-processing systems will incorporate technology from several areas, including traditional micrographics, optical disk, computer electronics and even robotics. In some instances, the technology applications and results will startle the imagination.'

Another path for mass storage of images in the future might be optical disk technology, especially for the receipt and transmission of document images. Specifically, optical disk has great packing density, and its laser record/read methods provide a precise, high-quality way of capturing electronic signals such as those produced by scanning microimages.

Moreover, it allows information to be verified at the same time it is recorded either from paper originals or from microfilmed documents.

When using optical disk technology, information is captured by scanning and transforming that information into digital signals. The signals are transmitted to an optical disk recorder. Sophisticated laser technology codes information on the spinning disk and at the same time reads the information to verify its accuracy and quality.

Automated retrieval of optical disks might involve a principle similar to a juke box. Any one of many disks could be addressed from a remote location, moved to the drive mechanism automatically and played back on a CRT.

Similar to Microimage Transmission

Capabilities to modify and manipulate images would be similar to the microimage transmission system. If the disk playback unit held 100 disks — at 100,000 documents per disk — 10 million document images could be stored in a single device.

Along with microimage scanning of optical disk equipment, a device to produce hard-copy output from the electronic signals will be required, as will a computer link to provide an interaction between magnetics, film, optical disk and hard copy.

Therefore, the microimaging system of tomorrow is likely to consist of a centralized microfilm storage facility, a method of transmitting and receiving document images and an effective computer link that will enable the interchange of information from the wide variety of media in use today.

The main benefits of tomorrow's technology will include quick, economical access to information, reduction of paper work, reduced document-handling costs, increased productivity and a practical way to integrate document-related information from several media.

Lacy is the national sales manager for the Business Imaging Systems Business Systems Markets Division of the Eastman Kodak Co., Rochester, N.Y.

'Wordperfect' WP Enhanced To Support Variable Printers

OREM, Utah — Satellite Software International has announced the release of Version 3.0 of its Wordperfect word processing package.

Running on IBM Personal Computers and other Microsoft, Inc. MS-DOS-based microcomputers, Revision 3.0 will reportedly enable the package to support the following printers in addition to NEC, Qume Corp. and Epson American, Inc.: the Diablo Systems, Inc. ECS 630; Okidata Corp.; Centronics Data Computer Corp. 351; MPI Print Mate 150; Toshiba Corp. P1350; Digital Equipment Corp. LA-50; and Olympia U.S.A., Inc.

Version 3.0 includes a table-driven printer support and a setup menu, enabling users to map up to 52 keys from 126 Ascii symbols, according to a vendor spokesman.

Additional features include true proportional spacing, hyphenation cancel and document security.

Wordperfect is priced at $495, which includes a spelling dictionary, math, automatic footnotes, text columns and a built-in spooler. The cost of the update for documentation, template and diskette is [illegible].

More information is available from the vendor at 288 W. Center St., Orem, Utah [illegible].

'Pecowriter/7000' Word Processor Out for PE Series 7000 Computer

NORWALK, Conn. — Perkin-Elmer Corp. has announced the Pecowriter/7000, described as a screen-oriented, word processing software package for use with the company's Series 7000 Professional Computers.

The package is said to feature automatic centering of titles, printing enhancements such as underlining and bold face, on-screen formatting and editing functions. The company said automatic reformatting allows text to be inserted anywhere within a document, and text can be moved, copied, saved or deleted with the package, a vendor spokesman said.

Pecowriter/7000 may be used with any Series 7000 Professional Computer, and all files stored with the package are compatible with the company's optional Series 7000 Fortran-77 compiler and Basic interpreter, according to the spokesman for the vendor.

Priced at $350, the package will be available in November from PE, which is located at Main Ave., Mail Station 12, Norwalk, Conn. 06856.

Desktop Faxes, Autodialer Join Burroughs Line

DANBURY, Conn. — Burroughs Corp. has added three products to its facsimile line: two desktop digital machines and an autodialer that interfaces with both units.

The Dex 3200 is a CCITT Group 3, 2 and 1 facsimile that features a message verification capability called the Dex validator. When transmission is completed, the receiving Dex 3200 faxes a hard-copy reception confirmation to the sending Dex 3200, including date, time, number of pages received and the identification of the receiving terminal.

The Dex 3606 includes all three CCITT groups and also interfaces with the autodialer. Operating at 9,600 bit/sec, the Dex 3606 transmits a page in 20 seconds. Other features include autoreduction of oversize originals, 30-page automatic feeder, activity reporting system, convenience copying and polling.

The Dex controller is an autodialer designed to perform a number of polling and sending transactions at preprogrammed times throughout the day. It has a memory bank of 50 telephone numbers for automatic sending and polling. It can also be used as a standard telephone with two-digit speed dialing of all phone numbers stored in its memory, a vendor spokesman said.

The price of the Dex 3200 is $3,995, while the Dex 3606 costs $5,495. The Dex controller is priced at $825. More information is available from Burroughs, Image Systems Division, Danbury, Conn. 06810.

'Pen-Pal' for Apple II Creates Text, Graphs

INDIANAPOLIS — Howard W. Sams & Co., Inc., a subsidiary of ITT, has announced a word processing package running on Apple Computer, Inc. Apple II and compatible systems.

Designed for writing simple letters, complex documents, tables and forms, Pen-Pal features five Help menus and editing features such as global search-and-replace, global search-and-delete, block manipulation and formatting features.

Pen-Pal reportedly operates in two modes: the "thinks" mode, where text is entered without format considerations; and the "looks" mode, which allows text to be viewed as it will appear in printed form.

Priced at $59.95, the package is available from the vendor at 4300 W. 62nd St., Indianapolis, Ind. 46268.

Daisywheel Said to Fit Most Micros

SADDLE BROOK, N.J. — Juki Industries of America, Inc. has introduced its Model 6100 daisywheel printer, an 18 char./sec unit compatible with most personal computers.

The Model 6100, which prints bidirectionally at 18 char./sec and utilizes 100-char. daisywheels, supports WP functions including superscript, subscript, bold/shadow printing, double strike and underlining, the company said. It also features graphics capabilities.

The standard buffer memory for the daisywheel printer is 2K bytes, expandable to 8K bytes. Centronics' parallel interface is provided as the standard, with the RS-232C serial interface available as an option.

Optional paper-handling accessories include bidirectional tractor and a cut-sheet feeder.

The Model 6100 is priced at $699 from Juki Industries, 299 Market St., Saddle Brook, N.J. 07662.

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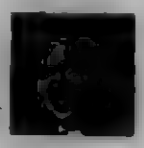

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User Needs Drive Micro Leasing Mart

By Patricia Keefe
CW Staff

Short-term user needs and a fear of amassing obsolescent machines are driving the growing microcomputer leasing and rental market.

In response to customer demand, over the past year and a half a number of computer equipment leasing companies have expanded their offerings to include many of the top personal computers and small-business micros. The response, they say, has been tremendous.

In great demand at four such leasing firms are IBM's Personal Computer and Personal Computer XT. Typically, there was little demand for Apple Computer, Inc.'s Lisa, which was surpassed in popularity slightly by its older sibling, the Apple IIe.

Although one firm, Selecterm, Inc. of Danvers, Mass., caters almost exclusively to Fortune 500 corporations, the other three firms interviewed said their clients range from individual users to Fortune 500 members. The three firms include General Electric Co.'s Quick-Rental Instruments in Schenectady, N.Y.; U.S. Data Systems in San Mateo, Calif.; and Leasametric in Foster City, Calif.

Standard leases generally run from one to five years, with discounts for volume orders. Rentals, which can be had for as little as two weeks at GE's Quick-Rent, are sensitive to both the size of the order and the length of rental. The majority of demand comes from people with specific applications in mind, according to David Sobo, Leasametric's vice-president of marketing and sales. However, "People call us up and ask if we rent for this type of job, and [they] end up doing more with it, and the micro stays there," he added.

Big companies, in particular, base their rental and lease plans on an applications analysis basis, added Phillip Ciolfi, president of Selecterm.

'By leasing, users can swap their machines or get the latest upgrade without losing their investment. These changes usually occur within a year and a half after the product is introduced. . . . As a result, it is less expensive to lease if the life of the application is 40 months or less.

According to Ralph Marchetti, national sales manager for U.S. Data Systems, users cite many reasons for choosing to lease micros, including: to conserve cash or lines of credit and get the job done with a minimum of cash expenditure; to try before buying; to handle short-term projects up to a year; to meet a need until the next budget cycle, when funds can be appropriated for purchases; and to take advantage of tax deductions.

However, an unwillingness to assume the technology risk inherent in a rapidly changing market was considered a key factor in the leasing and rental market. "Despite the fact that the major companies have standardized on the IBM [Personal Computer], there is a fair amount of obsolescence within the associated peripherals and the [Personal Computer] itself," Selecterm's Ciolfi said. "The [Personal Computer] grows, gets upgraded, changes operating systems, and [these changes] are not 100% compatible." By leasing, users can swap their machines or get the latest upgrade without losing their investment. These changes usually occur within a year and a half after the product is introduced, he estimated. As a result, it is less expensive to lease if the life of the application is 40 months or less, Ciolfi asserted.

(Continued on Page 92)

Flexibility Of Leasing Makes Good Cents

By Patricia Keefe
CW Staff

With microcomputers starting at under $2,000, it doesn't seem likely that users would want to lease them. But for two Fortune 500 companies that have stepped up their micro leasing efforts over the past year, leasing makes good sense — financially and technologically.

"The primary reason we lease is flexibility, given the variety of technical leapfrogging that's been going on the past couple of years," said Steven Kelsky, vice-president of interactive computing services at the investment firm of Paine Webber-Mitchell Hutch-

(Continued on Page 92)

Federal Demand to Automate Seen Draining People Resource

By Bill Laberis
CW Staff

PALM SPRINGS, Calif. — The drive to modernize and automate the sprawling federal bureaucracy will drain valuable DPers from the private sector, pushing more organizations to seek the aid of professional services firms over the next few years.

But while this personnel drain will boost demand for professional service firms — the external programmer and system design specialists — it will also act as an impediment to their growth, as the public versus private competition for skilled DPers comes to a boil.

These were some of the observations gleaned from a comprehensive survey of the $30-billion-plus software and services industry, observations presented at the recent 59th Management Conference of the Association of Data Processing Service Organizations, Inc. (Adapso) here.

The findings were reported by Peter Cunningham, president of Input, Inc., which conducted the industry survey by polling some 436 software and service companies. Most of the companies polled had sales in 1982 in excess of $10 million.

Cunningham predicted that the 1984-85 time frame will bear witness to a "very dramatic increase" in demand by the federal government for DP services. This growth in demand will parallel the government's efforts to streamline its heretofore cumbersome operations, Cunningham said, adding that federal DP outlays will exceed $50 billion by 1990 — more than $35 billion of which will pay for soft-

(Continued on Page 94)

CW at Adapso

Input President Peter Cunningham

Honeywell, NEC Agree in Principle To Business Deal

MINNEAPOLIS — Former transpacific partners Honeywell, Inc. and Nippon Electric Co. (NEC), estranged since late 1982, are in the process of reconciling.

Honeywell announced recently an agreement in principle for a new business arrangement covering patents, copyrights and technical cooperation and granting Honeywell distribution and related manufacturing rights for NEC's large-scale computer products.

NEC grew up under Honeywell's wing and was granted Japanese rights to Honeywell technology in 1962. The relationship began to erode in 1980, however, and earlier this year [CW, Feb. 14] it appeared the two would butt heads when General Electric Information Services Co. announced that its network of Honeywell DPS 8 computers would be upgraded with NEC's S-1000 mainframe under NEC's Acos operating system, rather than Honeywell's announced DPS 88/81 under its Gcos operating system.

According to Honeywell, the pending agreement will see the U.S. company integrating the NEC machine with Gcos and granting Honeywell exclusive U.S. marketing rights.

During the previous 20-year relationship, according to Honeywell spokeswoman Kathy Tunheim, the two companies had distributed each other's products and participated in joint developments, but had also "chosen different options" in some areas. "By the end of 1982, what we had were two companies with similar technologies, but not with identical architectures or identical operating systems," Tunheim said.

The planned agreement will take the form of a 10-year contract, Tunheim said. She said the S-1000 has a processor speed about 40% faster than the DPS 88/81.

"This does not mean Honeywell will not continue to develop very large-scale computers on its own," she added. Rather, it gives the company an opportunity to "focus our investment" on competitive areas that the company might otherwise not be able to afford. Those areas include "primarily software areas, operating software beyond Gcos 8 and so on," Tunheim said.

Anticipates $6 Million Loss

STC Enters Pact With Leasing Firm

LOUISVILLE, Colo. — Storage Technology Corp. (STC), losing money in a transition year, has entered into a limited partnership and purchase agreement with Phoenix Leasing, Inc.

STC recently announced that preliminary figures indicate it will post a third-quarter loss of approximately $6 million, or 17 cents per share. For the third quarter in 1982, the company posted earnings of $17.6 million, or 51 cents per share.

STC blamed the expected loss on the discontinuance of several products and the relatively low-level shipments of new products. Heavy start-up costs have also been incurred for the development of several new products including an optical/laser disk storage system and mainframe computers, the company said.

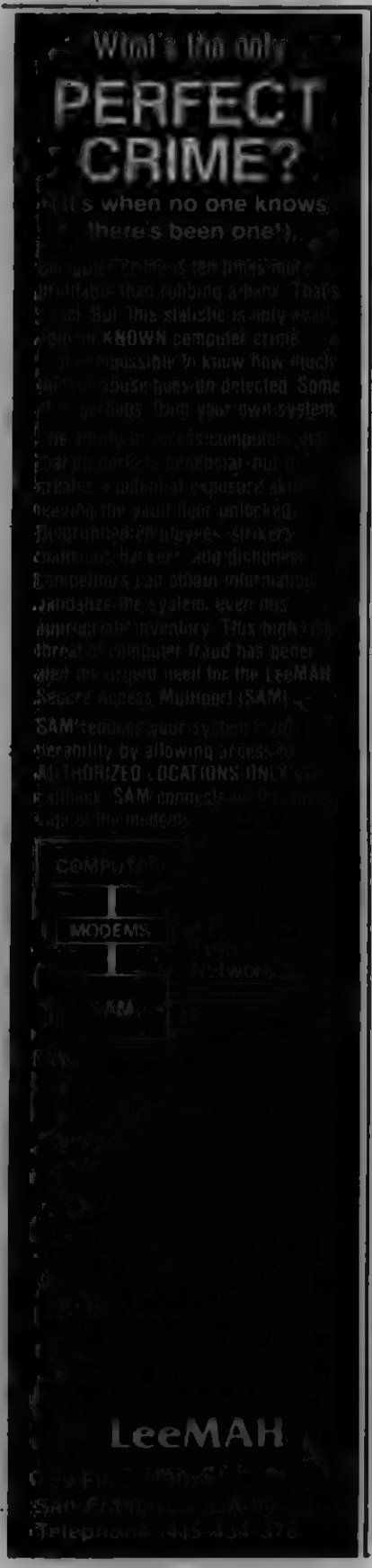
Third-quarter costs associated with the optical system and the mainframe totaled about $10 million, according to STC.

Later the same day, Phoenix Leasing announced the sole limited partnership for the purchase of $50 million of STC equipment subject to lease and entered into an agreement for the purchase of an additional $115 million of STC equipment also subject to lease.

The deal with Phoenix Leasing is actually two separate agreements, according to Phoenix spokeswoman Linda-Marie Loeb. She said that under both the limited partnership and the $115 million purchase agreement, STC must first lease equipment to a user before in turn selling the lease and equipment to either the partnership or directly to Phoenix Leasing.

STC spokesman Ronald D. Weinel said the arrangement will bring the company at least $50 million and potentially more.

Founded in 1972, the Mill Valley, Calif.-based Phoenix Leasing organizes and manages computer and communications equipment-leasing partnerships and has acquired over $500 million of leased equipment for investor portfolios, according to a spokesman.



Leasing Making Sense — Financially, Technically

(Continued from Page 91)

ins, Inc. in New York.

Kelsky pointed out that had he purchased the former micro "standard" products from vendors like Apple Computer, Inc. (Apple I and II) and Radio Shack (TRS-80), he would now be tied to obsolete equipment.

Even the two-year-old IBM Personal Computers are no longer as popular as the IBM Personal Computer XTs in the corporate environment, he said, estimating the technical life of a microcomputer to be two years or less. As a result, a leasing arrangement tailored to that time frame is more advantageous from a financial point of view, he said. "Given the changeovers of last year, it was advantageous to us not to purchase [the IBM Personal Computer]," Kelsky added.

Another problem with obsolete units is that, once they are purchased, people tend to keep them despite an inability to run the latest software packages, he observed.

Flexibility is also a key factor behind the San Francisco-based Crocker National Bank's leasing efforts. However, Kurt Schweer, vice-president and manager of advanced office systems, pointed out that the bank buys more micros than it leases. Some of those purchases are stimulated by the bank's leasing program. "In some cases, people who lease later come to me with a proposal to purchase; it's cheaper to them," he said.

Describing the bank's current corporate micro policy as "reactive to user needs," Schweer said he is working toward completing a more "proactive" strategy by the end of the year. Under this strategy, the bank will be considering concepts such as a company store for dispensing micros, loaner programs and equipment exchanges.

Both Kelsky and Schweer primarily lease IBM Personal Computers and Personal Computer XTs, although Crocker also uses Digital Equipment Corp. machines. While Schweer has tested three Apple Lisas and retained two, neither executive expressed any interest in using the top-of-the-line Apple device for traditional office functions.

Although both work in IBM shops, Kelsky insisted the computing environment had nothing to do with his choice of a Personal Computer or Personal Computer XT model. It was a case of other users and software houses embracing the IBM standard.

Users Create Leasing Mart For Micros

(Continued from Page 91)

In addition, the four firms interviewed offered a slew of maintenance and support packages. Those packages currently on the "softwafe hit parade" include Lotus Corp. 1-2-3 and Visicorp's Visicalc.

Software availability was cited by most of those interviewed as the primary reason behind the demand for the IBM Personal Computer and Personal Computer XT. Ciolfi carries the Digital Equipment Corp. Rainbow, but its relative lack of software was the main reason why his clients are not too pumped up about it, Ciolfi said.

Ciolfi urged users to consider what they are getting for their money. "Is it just a strict financial transaction, or does the company provide on-site maintenance, software and consultative support? Don't overemphasize the financial side, because the other side [maintenance] can cause you more problems."

While the Personal Computer and Personal Computer XT were the most popular at the four firms, Leasametric and Quick-Rent reported strong interest in the Lisa and Apple IIe. However, at Leasametric the popularity of the Apple products is tied to IBM's inability to meet orders. "If it could fill our needs, IBM would outrace Apple," a Leasametric exec said.

Ed DeMarco, marketing manager of instrumentation rental at GE, predicted an increase in IBM rentals coupled with slowing demand for Apple units.

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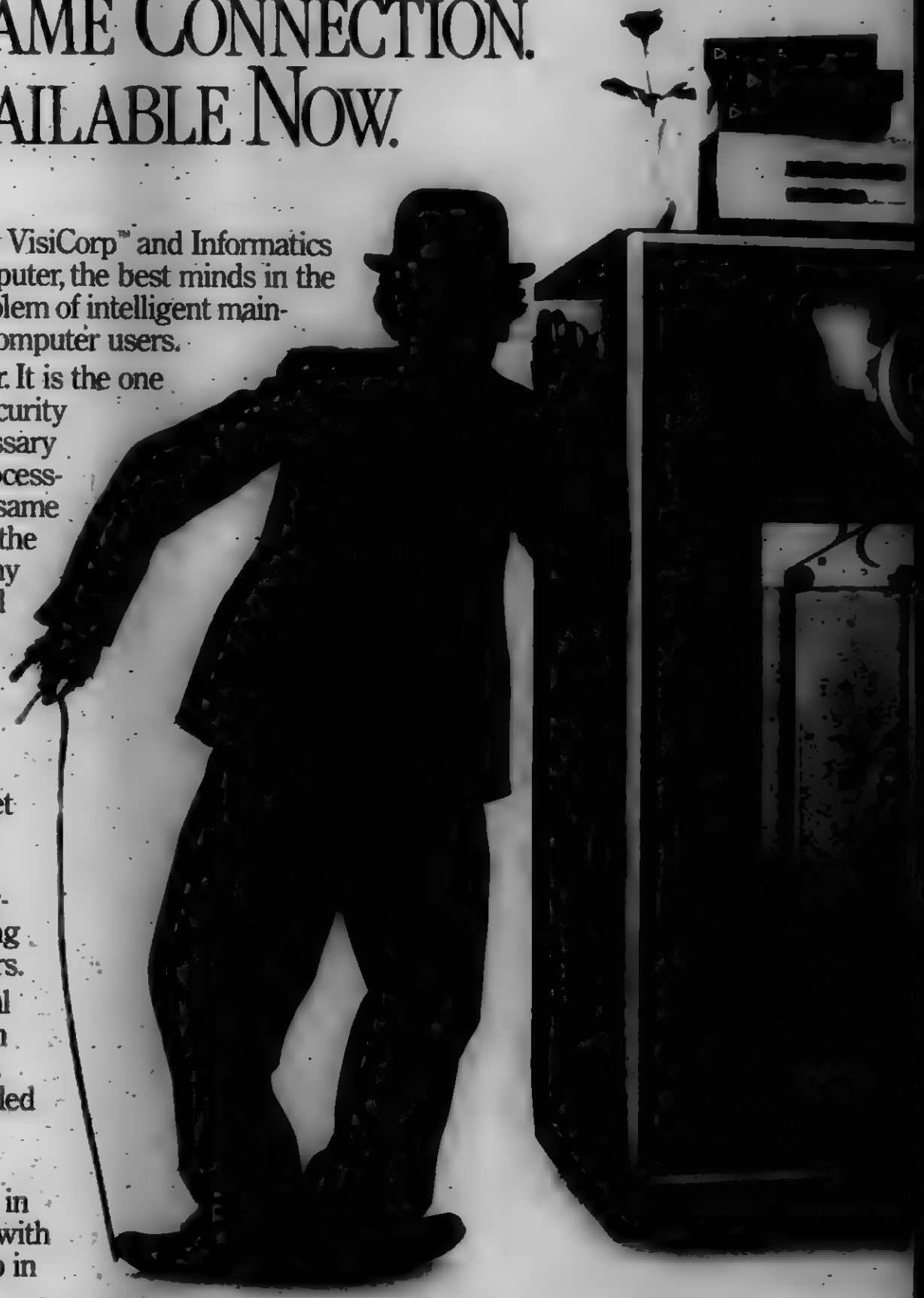

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Federal Drain on DPers Forecast

(Continued from Page 91)

ware and maintenance.

The government will attempt to satisfy this huge DP hunger by hiring more DPers.

This situation will create a people drain throughout the private sector, which will also turn to the professional services companies for help, Cunningham said. "I think clearly we will see that the availability of people becomes the biggest impediment to growth within the services industry, due in great part to what goes on at the federal government level."

But, curiously enough, when Input asked service industry executives what their biggest problems might be in the near future, few of them placed personnel shortages at the top of their list. Cunningham attributed this to short-sightedness on the part of service industry firms, reiterating that "the problem is off in the '84-'85 time frame . . . but is very real, nonetheless."

What did the service firms view as the key issue for the rest of the decade?

"Micros," said Edward Metz, Input vice-president.

Indeed, microcomputer-related issues have become the hottest topic within the Adapso membership, with more than one-third of the 36 work sessions at the conference dedicated to microcomputing in one way or another. In contrast, there were but two mainframe software sessions for the Adapso members, which still garner the vast majority of their sales writing, selling or servicing mainframe software.

Metz said the Input survey indicated that most large software and service companies either now offer microcomputer packages or systems or are planning on doing so soon. More than two-thirds of the software companies polled had micro product offerings, usually as part of a larger system offering.

This trend, he said, contrasts sharply with the companies' attitudes toward micros in years past, when micros were generally shunned by the Adapso membership.

Corroborating speculation of some industry observers, microcomputers are providing an increasingly low-cost solution for end users, a solution which allows some users to bypass more costly processing services companies. It is no coincidence, Metz said, that the processing services companies are rapidly expanding into other areas, such as professional services and systems integration.

However, Cunningham warned that users may be overemphasizing the applicability of micros in a professional DP setting.

"You shouldn't send a boy to do a man's job," Cunningham said.

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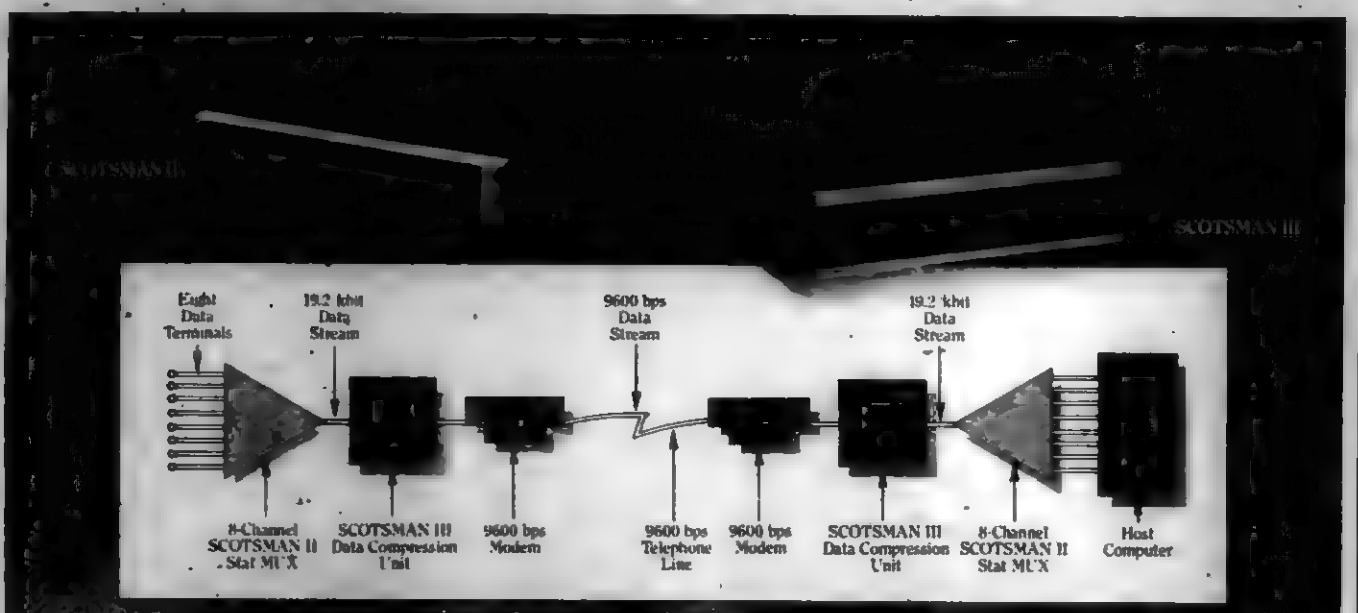

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Compaq, TI End Litigation

HOUSTON — Compaq Computer Corp. announced recently it has negotiated a patent license agreement with Texas Instruments, Inc., and both firms have settled all pending litigation against each other.

TI had charged in a federal suit filed last January that Compaq, among other things, had infringed upon several TI patents. Compaq filed a counterclaim alleging TI was engaged in unfair competition.

Remote Computing Seen Threatened

PALM SPRINGS, Calif. — "Incredible" advances in inexpensive hardware coupled with a broadening array of high-level software are creating a new breed of user. He is largely DP illiterate and, as he becomes comfortable with his machine, demands increasingly stronger dosages of support.

The same forces of change also pose a formidible threat to vendors of remote computing services, companies whose growth was spurred in the 1960s and 1970s by the relatively high cost of computing.

And unless remote computing services vendors react to the new challenges posed by the changing environment, they "will not be around in the future."

So said an individual whose job depends on meeting such challenges, Robert L. Dryden, president of Boeing Computer Services Co. and former strategic planner at IBM, who spoke at the recent 59th Management Conference of the Association of Data Processing Service Organizations, Inc. (Adapso) here.

Micros a Threat

Dryden's warning to fellow remote computing services providers echoed the growing concerns of some industry observers and market analysts who claim that low-cost, increasingly powerful microcomputing will be the demise of large chunks of remote computing services business. They argue further that remote computing services vendors cannot accommodate the growing cadre of non-DP end users.

Dryden, whose company sold more than $600 million worth of remote computing services, software and professional services last year, advised his Adapso brethren to stop thinking of themselves as remote computing services vendors.

"We are now in the information services business. We must address a broader range of customers and computing problems. The trends of the '80s are forcing users toward in-house, integrated information solutions, support previously supplied remotely on an individual system basis," Dryden said.

A Change in Course

Dryden set forth a number of suggested course changes for other remote computing services vendors to follow in navigating a shifting market, changes he said Boeing has made or will undertake. Included in his laundry list were:

- Develelopment of architectural standards to assist in a "phased organizational approach to implementing integrated systems."
- The establishment of information and utility and labor services to support information centers and advance programmer productivity and network administration.
- Increased on-site support for system installation, networking solutions and user consultation.

CW at Adapso

Dryden also seized the opportunity to take a swipe at governmental regulations, which he said are more costly to society than they are cost-effective. In particular, Dryden lashed out at proposed congressional legislation that would modify the access charges the Federal Communications Commission has previously outlined.

Referring to the similar House and Senate bills now pending (CW, Oct. 24), Dryden said, "Both bills are anti-business and anti-technology ... The legislation could, according to analysts at Adapso, increase telecommunication costs by 50% next year alone."

CW Photo by B. Lubow

Robert L. Dryden

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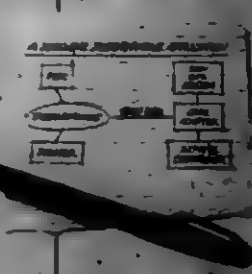

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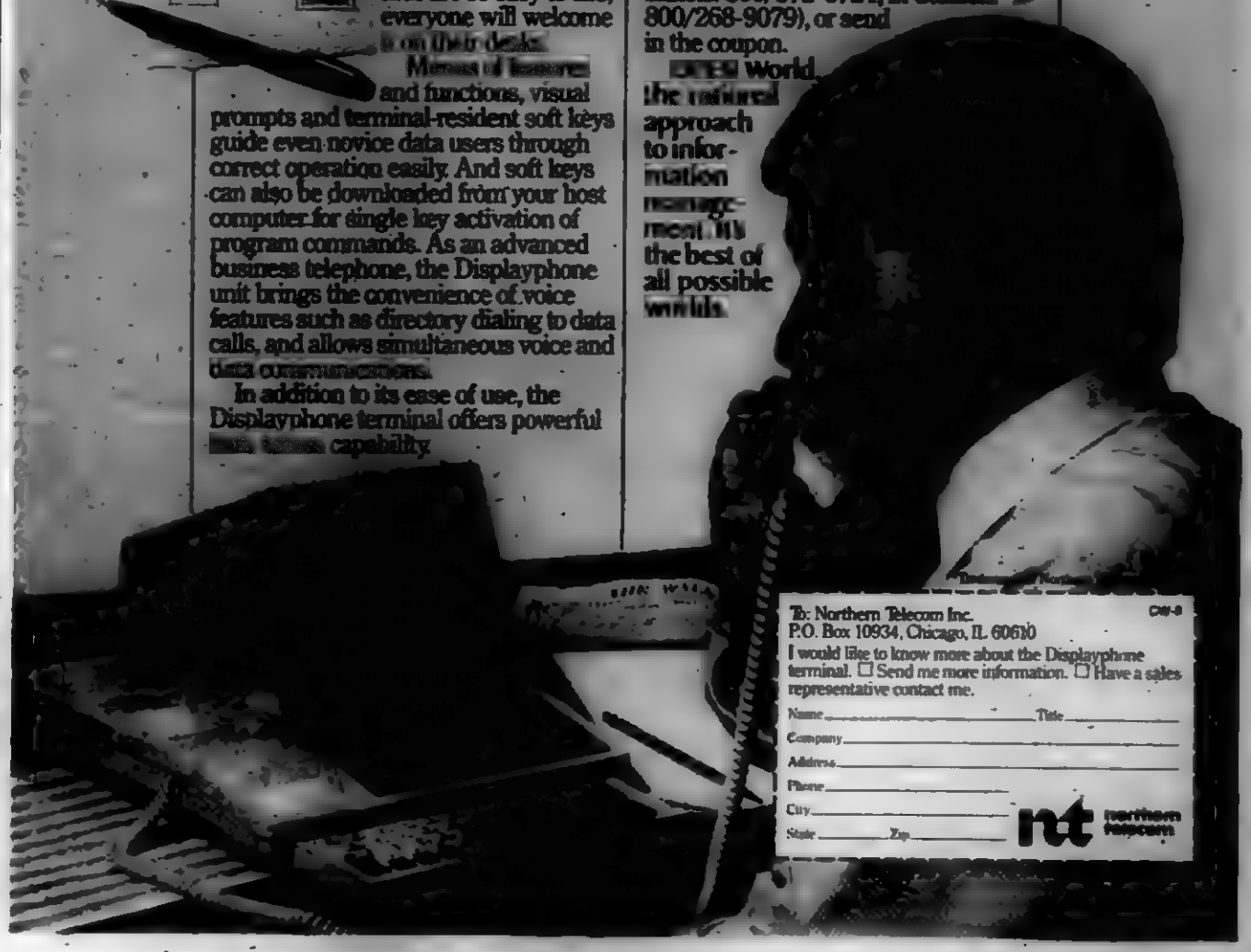

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IBM, AT&T, Japan Forecast to Lead Micro Mart

By Jeffry Beeler
CW West Coast Bureau

SAN FRANCISCO — IBM, AT&T and the Japanese will collectively dominate the personal computer business by the 1990s and will end Apple Computer, Inc.'s long reign as the leader in its field, according to Perfect Software, Inc.'s president, Robert Glidden.

Speaking at the first National Software Show held here recently, Glidden depicted a future in which a triumvirate of "megagiants" will struggle mightily for personal computer dominance, with Apple continuing to grow, but stripped of its former preeminence.

Glidden likened the impending microcomputer conflict to an all-out war, whose first big "battlefield" is likely to be the software industry, which each of the Big Three combatants has "targeted for conquest," he said.

Rely on Software

As Apple has already done with its much celebrated Lisa system, the Big Three micro suppliers will rely heavily on their own proprietary software to leverage future hardware sales, Glidden predicted.

Portents of the coming battle for personal computer supremacy will probably begin to appear sometime next year when AT&T is expected to enter the micro fray with the introduction of a small system based on Unix, he added.

AT&T's manufacturing and technological prowess, as embodied in its Western Electric and Bell Laboratories subsidiaries, gives the company's predicted assault on the personal computer field a high probability of success.

In fact, by the end of the century, AT&T will be practically indistinguishable from IBM, each company having successfully invaded the other's traditional turf, Glidden predicted.

What will propel the Big Three into the front ranks of the personal computer field, more than any other factor, is their ability to "marshal their resources" and "systematize" the mass manufacturing of new products, Glidden said.

AT&T Third-Quarter Profits Slide, Revenues Up 5%

NEW YORK — AT&T announced lower than expected earnings for its third quarter, reporting profits of $1.46 billion, or $1.51 per share, compared with $2 billion the same period a year ago. Revenues in the quarter rose 5% to $17.5 billion from $16.6 billion.

Earnings for the nine-month period ending in September were pegged at $5.1 billion, down from $5.8 billion in 1982. Sales in the period were up 7% to $52 billion.

Charles Brown, AT&T chairman, said the results do not indicate a trend of declining profit, but "rather are the products of crosscurrents in the economy, in our operations and in our efforts to ready the Bell system for divestiture."

Noting the relatively slack economy, Brown said, "The lingering effects of the recession are still with us. Long-distance revenues are up only 3% over a year ago. Western Electric sales to the Bell companies are substantially below forecast, reflecting tight control of capital budgets and vigorous expense control measures."

The third-quarter results were accompanied by the announcement that AT&T will take a $5.2 billion charge against 1983 earnings in anticipation of the company's divestiture taking place next year [CW, Oct. 24].

Hogan Systems Acquires Henco

DALLAS — Hogan Systems, Inc. recently announced the acquisition for an undisclosed price of Henco Research, Inc., a New York-based company specializing in software systems for banking operations.

Henco, founded in 1978, specializes in computing software for international banks and the international departments of large domestic banks. Its major product is the International Banking Management Systems, a group of nine systems that can be used independently or in an integrated fashion, according to a Hogan spokesman.

Hogan President Richard Streller said the acquisition should contribute significantly to the company's efforts in the international marketplace. Hogan currently provides on-line applications software to banking customers in Australia and New Zealand and is marketing in Great Britain.

Henco's software products reportedly are designed to improve profitability of international banking operations through better control and coordination of all internal banking functions.

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Nickels & Dimes

Automatic Data Processing, Inc. has recorded revenues of $202 million and net earnings of $13.6 million for the first quarter of fiscal 1984, ended Sept. 30, both up 17% from the same period last year.

$$$

Rolm Corp. has announced orders for the first quarter of 1984 ended Sept. 30 of $146 million, up from $100 million for the first quarter last year, and an order backlog of $237 million for the period, compared with a $149 million backlog in the first quarter of 1983.

$$$

Integrated Software Systems Corp. has reported revenues for the third quarter ended Sept. 30 of $6.3 million, compared to $4.4 million for the third quarter of 1982.

$$$

Computer Task Group, Inc.'s revenues for the third quarter ended Sept. 30 were $13.5 million, a 38% increase over the same period last year. Revenues for the first nine months of 1983 totaled $37.9 million, a 27% increase over 1982.

$$$

Ask Computer Systems, Inc. has reported revenues of $12.4 million and net income of $991,000 for the first quarter of fiscal 1984, increases of 76% and 21%, respectively, over the first quarter of 1983.

$$$

Computer Consoles, Inc.'s net income for the third quarter ended Sept. 30 was up 228% over last year's third quarter. Revenue for the quarter totaled $23.6 million, up 55% over last year, while net income was $4.1 million, or 32 cents per share, compared to $1.2 million, or 11 cents per share, for the third quarter of 1982.

$$$

Cray Research, Inc. has reported revenue for the first nine months of 1983 of $86.9 million, compared to $78.5 million for the same period last year. Earnings for the period were flat at $6.7 million, compared to $6.8 million for last year.

$$$

Tandy Corp. has announced consolidated sales for the first quarter of fiscal 1984 of $583.4 million, an increase of 13% over the first quarter of 1983. Net income rose 11% for the quarter to $59.6 million.

$$$

Informatics General Corp. has announced increases in net income of 72% and 71%, respectively, for the third quarter and the first nine months ended Sept. 30. Income for the quarter rose to $2.3 million, while income for the first nine months was $4.2 million.

$$$

Computer Sciences Corp.'s revenues for the quarter ended Sept. 30 increased 11% to $184.4 million from $166.1 million a year ago. Net earnings for the quarter of $4.4 million, or 32 cents per share, were flat compared to last year's $4.1 million, or 31 cents per share.

$$$

Ungermann-Bass, Inc. has reported a 122% increase in net revenues for the third quarter and a 127% increase for the nine months ended Sept. 30. Net income for the quarter was $891,000, or five cents per share, compared to $91,000, or one cent per share, for the comparable period last year.

$$$

NBI, Inc. has reported that revenues for the first fiscal quarter ended Sept. 30 increased 41% to $38.4 million, up from the $27.2 million reported for the comparable period last year. Net income for the first quarter was $2.5 million, a decrease of 19% from the first quarter of last year and an increase of 115% compared with the fourth quarter of fiscal 1983.

$$$

Hogan Systems, Inc. has reported net earnings of $1.8 million, or 29 cents per share, for the second quarter ended Sept. 30, compared to net earnings of $364,000, or 7 cents per share, for the same period last year.

$$$

Apollo Computer, Inc. has recorded 1983 third-quarter net income of $3 million, or 15 cents per share, compared to $203,000, or one cent per share, for the third quarter of last year. Net sales for the period were $21.1 million, compared to $4.8 million for 1982.

$$$

Altos Computer Systems, Inc. has reported net sales for the first quarter of fiscal 1984 of $18.4 million, a 4% increase over the comparable period in fiscal 1983. Net income for the period dropped to $1.1 million, compared to the $1.8 million posted for last year.

$$$

Corvus Systems, Inc. has reported an 82.6% increase in net income and a 47.8% rise in sales for the first quarter of fiscal 1984, ended Aug. 31. Sales totaled $14.9 million, and net income was $1.4 million, or 14 cents per share, compared to sales of $10 million and net earnings of $772,000, or 9 cents per share, for the same period last year.

$$$

Burroughs Corp. has filed a registration statement with the Securities and Exchange Commission covering three million newly issued shares of common stock. The offering will be underwritten by a group managed by Lehman Brothers Kuhn Loeb, Inc.; Goldman, Sachs & Co.; and Lazard Freres & Co.

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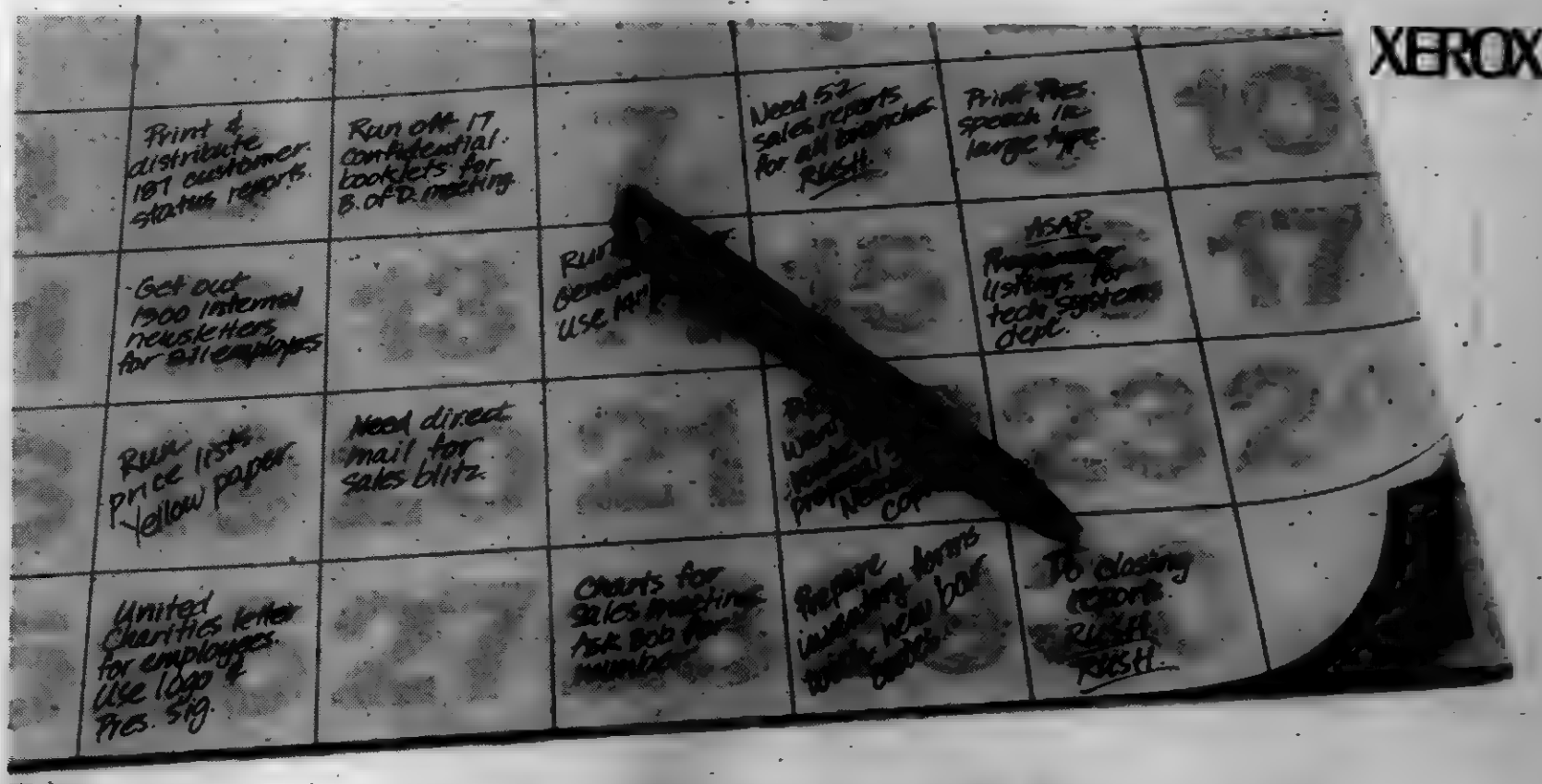

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CDC Reports Earnings Jump Of Almost $2 Million

MINNEAPOLIS — Control Data Corp. recently reported that earnings for the third quarter ended Sept. 30 were $40.7 million, or $1.05 per share, up from $39 million, or $1.03 per share, reported for the same period last year.

The company reported revenues of $1.2 billion for the period, up from $1.1 billion last year, and revenues for the first nine months of this year of $3.333 billion, up from $3.175 billion last year.

As in the preceding quarter, CDC reported, increased earnings in the area of information services and products, along with a lower provision for taxes, offset lower pretax earnings from its financial services. Consolidated pretax earnings amounted to $49 million for the quarter and $143 million for the nine months, as compared to last year's $57.9 million for the quarter and $173.8 million for the comparable nine-month period.

The company said continued strengthening of computer-related businesses, along with some improvement in financial services, are expected to result in higher earnings for the total year. After nine months, earnings were $113 million, or $2.94 per share, compared to last year's figure of $111.3 million, or $2.95 per share.

Sprint Buy Boosts Profits

GTE Announces 19% Gain

STAMFORD, Conn. — GTE Corp. recently reported a 19% increase in third-quarter earnings compared to the same period last year, with a 14% increase in revenues that reflects the recent acquisition of the Sprint long-distance telephone company.

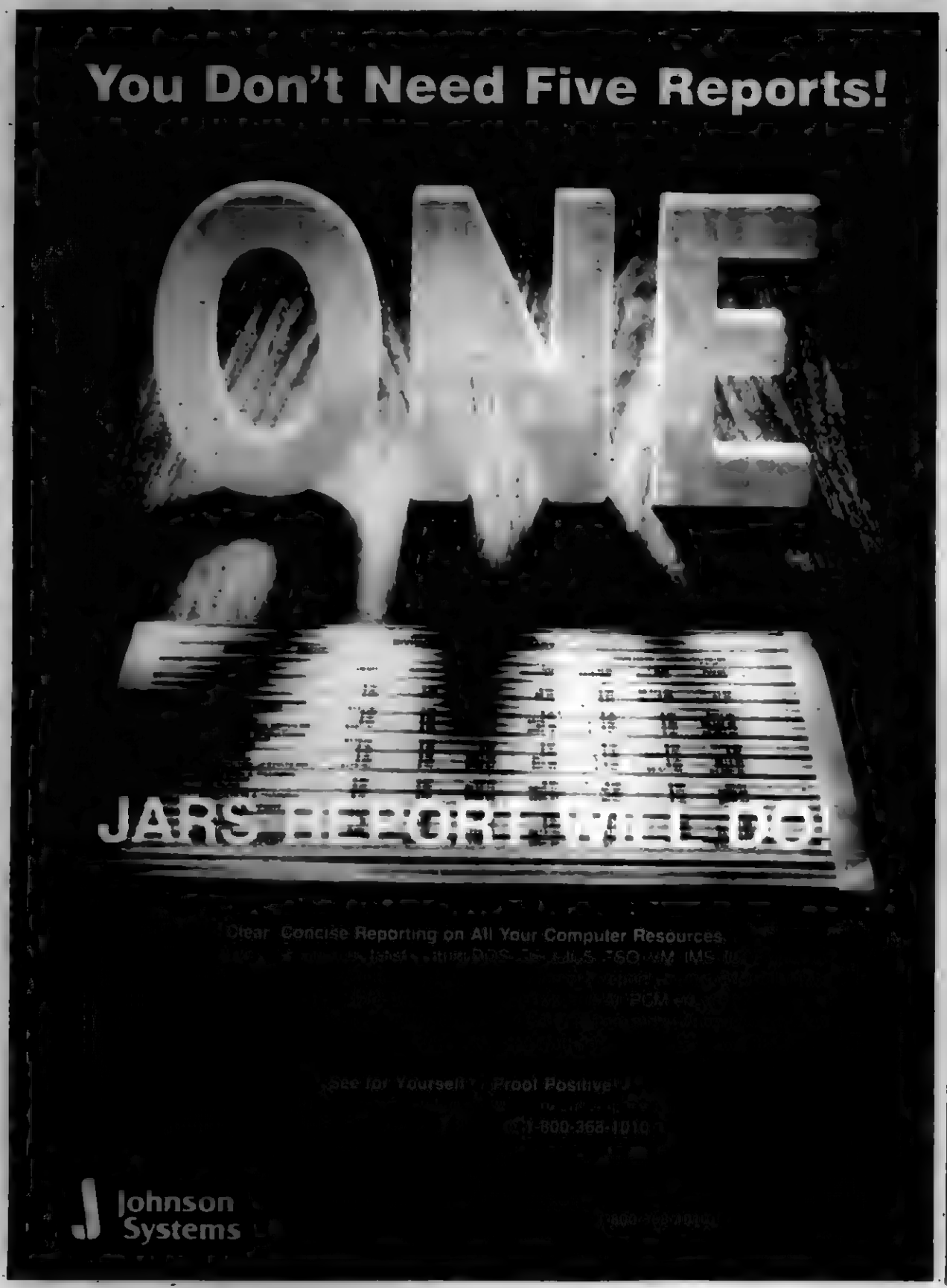
GTE reported that consolidated net income for the third quarter was $236 million, up from $200 million a year earlier; per-share earnings rose 10% to $1.22 from the $1.11 reported last year.

Revenues and sales were reported at $3.3 billion for the third quarter, compared to $2.9 billion a year ago, and a large portion of that increase was a result of the Sprint acquisition.

A new business grouping including Sprint, satellite and GTE Telenet operations showed revenues of $231.3 million, compared to $26.7 million reflected in the corresponding quarter last year.

Earnings for the new grouping were reported to be $12.8 million for the quarter, compared to a loss of $2.1 million a year earlier. GTE said it was a result of the Sprint acquisition and increased demand for specialized communications services offered by GTE Telenet.

Theodore F. Brophy, chairman and chief executive officer of GTE, cautioned that a recent Federal Communications Commission (FCC) order "would effectively stifle competition in the long-distance telephone market" by more than doubling access charges paid by GTE Sprint and other intercity carriers. "We are vigorously opposing this action and hope the FCC will modify the order accordingly," he said.



CCIA Offers Exec Seminars On Law, Exports

WASHINGTON, D.C. — The Computer & Communications Industry Association (CCIA) has announced two additions to its ongoing program of executive seminars: "Exports — The Key to Increased Profits" and "Current Issues in Computer and Communications Law."

The seminar on exports will be held Nov. 1 at the L'Enfant Plaza Hotel here. The one-day conference will focus on strategic, tactical, and legal perspectives to provide novice and veteran international marketers with the practical, comprehensive information needed to increase profits.

Topics will include an overview of Commerce Department programs for exporters, the Export Trading Company Act and how to use it and the Export Administration Act of 1983. Keynote speaker Donald V. Earnshaw, deputy assistant secretary for export development of the Department of Commerce, will discuss "The President's Plan to Create a Department of International Trade and Industry."

The second seminar is slated for Nov. 10, also at the L'Enfant Plaza Hotel. The areas to be covered include legal implications of advances in technology, current developments in securities law, trends in litigation, software protection and antitrust policy. The keynote address, "Future Computer and Communications Technology: Implications for Your Practice," will be delivered by Richard E. Wiley, founder and senior partner in the Washington, D.C.-based law firm of Wiley, Johnson & Rein.

Registration at these two conferences is limited. Costs for each seminar are, respectively: $245 for the first CCIA member; $195 for each additional registrant; $345 for each nonmember; $295 for each additional non-CCIA member from the same company. More information is available from CCIA, 1500 Wilson Blvd., Arlington, Va. 22209.

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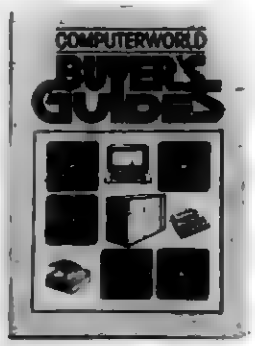

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   A. Mainframes/Superminis
   B. Minicomputers/Small Business Computers
   C. Microcomputers/Desktops
   D. Communications Systems
   E. Office Automation Systems

Burroughs Reports Earnings For Third Quarter Up 16%

DETROIT — Burroughs Corp. recently reported earnings for the third quarter were up 16% to $42.5 million compared to the third quarter of 1982, as revenues increased 2% to just over $1 billion. Earnings for the first nine months of this year were up 10% over the corresponding period last year, but revenues remained relatively flat.

Chairman and Chief Executive Officer W. Michael Blumenthal said that the strong U.S. dollar "continues to impact negatively our results" in international operations, but that U.S. activity is gaining momentum.

For the first nine months, revenue was essentially the same as the period a year earlier, $3.1 billion, as sales revenue was flat and rental revenue decreased, according to Burroughs.

The third-quarter earnings of $42.5 million, or $1.01 per share, compared to $36.8 million, or 87 cents per share, in the corresponding period last year. Blumenthal said he was encouraged by a 35% increase in earnings before taxes.

New products announced over the past year were strong contributors to the gains in orders, the company said.

Worldwide orders during the quarter were reported to be "good," while domestic order activity was said to be strong.

During October, a company spokesman reported, Burroughs raised $150 million by issuing three million new shares of common stock.

Honeywell Airs 33% Rise In Earnings for Third Quarter

MINNEAPOLIS — Honeywell, Inc. recently reported earnings of $58.4 million in the third quarter ended Oct. 2, up 33% from the $44 million in earnings reported in the corresponding quarter one year ago. Earnings for the nine months ended Oct. 2 were substantially lagging for the corresponding period last year, however.

Earnings per share were up 30.1% to $2.55, compared to the $1.96 reported a year ago. Revenues for the quarter were up 5.3% to $1.406 billion.

Edson Spenser, chairman and chief executive officer, said, "Domestic computer orders continue to make significant gains over the reduced levels of last year." International computer orders for the quarter were about even with 1982, he added.

Cost savings in the information systems business produced substantial benefits, and operating profit was up sharply over the previous year, Honeywell said.

For the first nine months, however, Honeywell reported earnings were down 24.7% to $139.3 million, from last year's pace of $184.9 million; earnings per share for the nine months were off $2.17 from the previous year, when Honeywell recorded a $90.8 million gain on sales of interests in other companies.

Raytheon Posts Drop in Earnings For Quarter

LEXINGTON, Mass. — Raytheon Co. recently reported third-quarter earnings were $6.9 million less than during the same period last year, with defense electronics sales said to be showing strong growth in volume and diversity.

Earnings for the period ended Oct. 2 were $76 million, or 90 cents per share, compared to the $82.9 million, or 98 cents per share, reported for the same period in 1982.

During the first nine months of this year, sales have grown to $4.397 billion from the $4.148 billion reported in the same nine-month period last year, but net income has declined this year to $227 million, or $2.68 per share, from last year's $248 million, or $2.94 per share.

Raytheon's backlog of total orders stands at $5.686 billion, with $3.349 billion funded by the U.S. government, compared to last year's $6.073 billion, with $2.640 billion funded by the U.S. government.

Prime Reports 32% Profit Dip

NATICK, Mass. — Profits at Prime Computer, Inc. slid 32% in the third quarter to $7.6 million, or 16 cents per share, down from $11.1 million during the same period a year ago. The minicomputer maker's revenues for the quarter were up 20% to $131 million.

Commenting on the results, Joe M. Henson, president and chief executive officer, said, "Prime's revenue gain reflects the increase in incoming orders experienced during the quarter. However, earnings were below the comparable quarter last year as a result of gross margin pressure and continuation of Prime's long-term investments in [research and development], customer service amd marketing programs."

Henson said shipments of the company's 9950 superminicomputer are strong.

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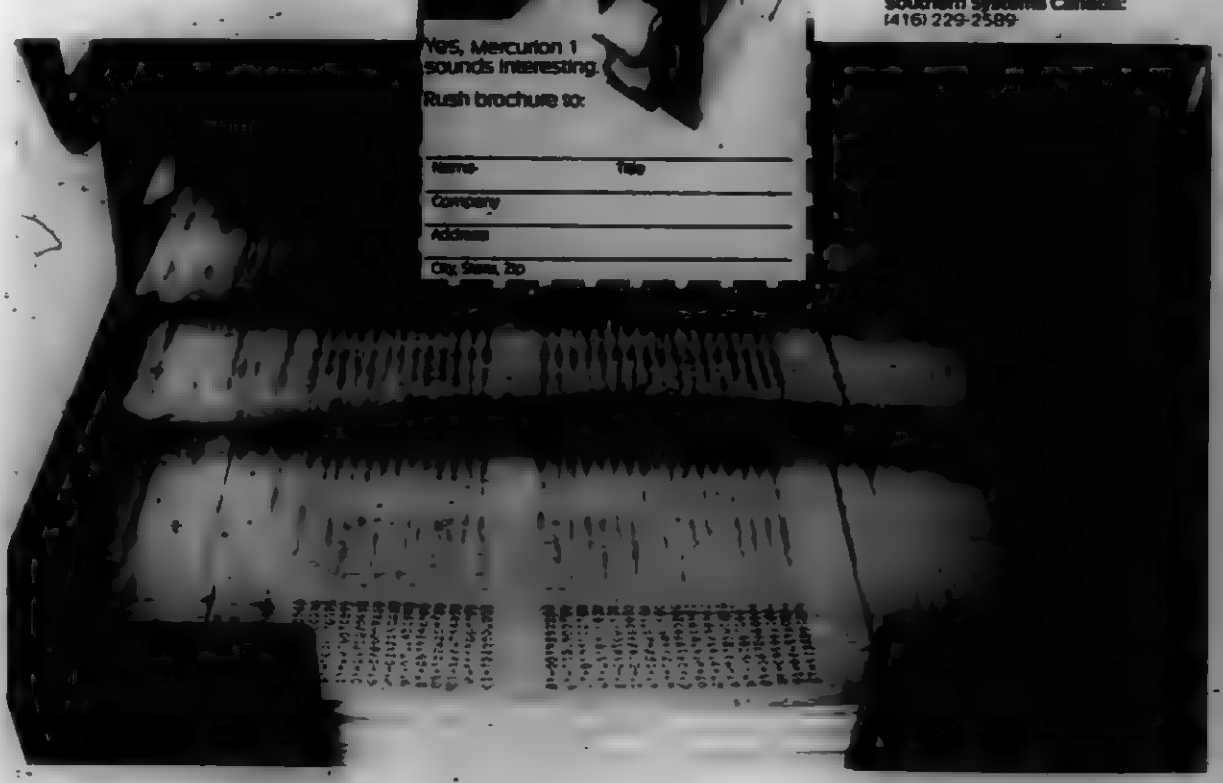

Supershorts

Dallas-based Genra Group, Inc., formed by a group of investors, has agreed to acquire most of the 54 retail stores of **Xerox Corp.** and become an authorized Xerox dealer. A spokesman for Genra said the group will specialize in selling computers and business equipment and, with the Xerox locations as a foundation, open a "significant" number of additional outlets nationwide. A Xerox spokesman said the sale of its retail stores represents a step in changing the company's retailing strategy to the use of authorized retailers. Xerox plans to assume an equity position in the group through its venture capital operation, while supplying management talent. The plan calls further for Xerox store personnel and store management to remain in place.

Ultimacc Components, Inc., a subsidiary of Storage Technology Corp., has acquired **Global Software, Inc.**, marketer and developer of IBM-compatible computers and a line of turnkey systems, for an undisclosed sum. Global will continue to operate with its existing management. Global's systems compete with IBM 4300-class machines.

* * *

Automatic Data Processing, Inc. has transferred its Automail computer-based message system to ADP Autonet, the company's public data network division. The Automail product has previously been supported by ADP Network Services, the company's remote computer services division, which will also continue to sell and support the service.

Digital Research, Inc., Pacific Grove, Calif., and **Televideo Systems, Inc.**, Sunnyvale, Calif., have entered into a technology exchange agreement under which Televideo Systems has provided Digital Research with the rights to market and further develop Teledraw, a graphics software package that creates diagrams and other pictures on personal computers.

* * *

Titsch Communications' research division **International Communications Research** (ICR) has formed a new unit, the ICR Information Division, and named William R. Polchiluk Jr. executive vice-president and general manager. The unit will refine and market the Cable Information Service, ICR's CATV data base, and will develop additional data bases and marketing information systems for the telecommunications industry as well as for the automotive industry.

* * *

Computer Consoles, Inc. (CCI) of Rochester, N.Y., and **Standard Telephone & Cables Ltd.** (STC), London, have signed a $34 million contract to provide CCI's computerized telephone Directory Assistance System to the UK. STC will supply the equipment to British Telecom, manager of the telephone system.

* * *

Paradyne Corp. has filed its answer to the suit filed in March 1983 by the Securities and Exchange Commission (SEC), denying the SEC's allegations concerning Paradyne's contract to supply PDN 8400 intelligent terminal systems to the Social Security Administration. Company President Robert S. Wiggins stated that his firm had acted properly in winning the contract and had performed satisfactorily under the contract.

* * *

Northern Telecom, Inc. has made the message system interface specifications for its SL-1 digital business communications systems available to other manufacturers of communications, data processing and office equipment. The specification is available for a one-time licensing fee of $500.

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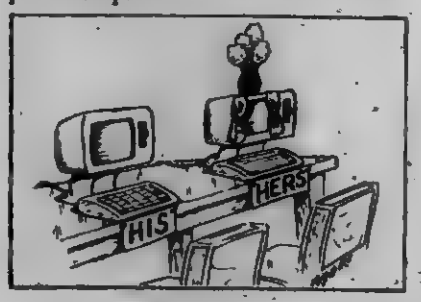
Executive Corner

- **Richard G. Taylor** has joined ITT Dialcom, Inc. as senior vice-president of marketing.
- **Stephen J. Durham** has been named to the position of vice-president of marketing at Cermatek Microelectronics, Inc.
- **Robert J. Hingre** has been appointed president of Mohawk Data Sciences Corp.'s (MDS) Herkimer Division and has subsequently been elected a senior vice-president of MDS.
- **Gerald F. Clancy** has been promoted to the position of vice-president of software development at Synapse Computer Corp. In addition, **Brad P. Hebert** has been named to the position of vice-president of customer services at Synapse Computer.
- **Dr. John D. Foulkes** and **Gen. Walter S. Lotz** (U.S. Army, Ret.) have both been named to the board of directors of Basic Telecommunications Corp.
- **David M. Weishaar** has been named vice-president of manufacturing at Ztel, Inc.
- **Jan F. Ahart** has been elected vice-president and treasurer of Datapoint Corp.



POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENT
COLLEGE OF
VETERINARY MEDICINE
MISSISSIPPI STATE UNIVERSITY

COMPUTER SYSTEMS ANALYST

The Computer Systems Analyst will be responsible for coordinating the development and operation of the College of Veterinary Medicine Computer System to include:

1. Maintain all operating systems software for the College's computer and its interface with other systems.
2. Maintain all applications software.
3. Design, implement, and supervise the development of applications software for the College of Veterinary Medicine.
4. Coordinate, instruct and liase with Medical Records, Animal Health Center, Research and other College of Veterinary Medicine functions.
5. Supervise personnel, as appropriate.

Applicants must have experience related to systems management of a minicomputer. Experience with MUMPS programming language and COSTAR medical management systems (or similar systems) is highly desirable. A B.S. degree in computer science or related area is required. Advanced degree preferred. (Extensive experience may substitute for degree.) Applicant must have system programming skills.

Salary--commensurate with experience.

Send letters of application, including current resume and names of three references by December 9, 1983, to:

Ms. Barbara Rhoades, Assistant Coordinator
Support Staff and Budget
College of Veterinary Medicine
Drawer V
Mississippi State, MS 39762

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Associate Editor
Personnel Manager
Box 783
Sidney, OH 45367

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Defense Personnel Support Center is seeking applicants for the position of Security Specialist. Position involves development and implementation of ADP security programs, requiring experience in such areas as: ADP fraud investigations, systems security and a background in hardware and software. Position may be filled at GS-11 trainee level. Three years general and three years specialized experience required. Entry salary ranges from $24,508 to $29,574 per annum depending upon qualifications. (Excellent benefits plus non-paid holidays.) To obtain required application forms contact the Examining Unit at (215) 952-2366. Closing date 11/18/83. U.S. citizenship required.

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Strong management skills with 8+ years in data processing including minimum 3 years project management. Experience desired: IMA/36, time sharing and development of user based systems. Northern Nevada location.

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Requires design, development and implementation of business systems for financial, administration and accounting systems. Large scale IBM. Kansas location.

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Requires design, development and implementation of business systems for inventory and purchasing systems plus logic modeling. Large scale IBM. Kansas location.

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(702) 736-0977

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Design and implement computer system. Analyze test run and direct any necessary corrections. Review programs and application system to increase efficiency and conserve storage area. Must have experience on S/36, 3-5 years RPG programming. Must have RPGIII and communication knowledge.

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CITY POLYTECHNIC OF HONG KONG

The City Polytechnic of Hong Kong is a new institution which will be offering tertiary level courses up to degree level. The institution will have an initial target of the equivalent of 8,000 full-time students by the early 1990's and a planned capacity for an ultimate population of 13,500. The Polytechnic expects to be able to enroll its first students in early 1984. It is intended that the study programmes should be developed on a modular structure with a strong vocational flavour. Applications are invited for the following posts:

AT HEADS OF DEPARTMENTS LEVEL:

Head (Computer Centre, Ref. No.: CP/CC/001/83)
To be responsible for the development and operation of the Computer Centre.

Management Information Officer (Ref. No.: CP/MIU/001/83)
To be responsible for the development and operation of a management information unit. The function of the unit will be to collect information from a variety of sources on all aspects of polytechnic activity, to rationalise methods of data-presentation and, as an end-product to supply such data as may be required for planning purposes.

The appointee will be expected to work in conjunction with three associate directors (academic planning, resources planning and administration) and to ensure that the administrative systems provide a proper framework for planned academic and administrative developments.

AT PRINCIPAL LECTURER/SENIOR LECTURER/LECTURER LEVEL:

Department of Computing Studies (Ref. No.: CP/COMP/002/83)
One of the principal objectives of the department will be to ensure that its students are able to take initiative and be creative in exploiting this rapidly changing technology and to develop in them a practical approach to computer applications. In addition to running its own courses the department will provide service-teaching modules to all other areas of study within polytechnic. Initially, this will be predominantly in the business/management and accountancy areas. Potential candidates for the job will therefore need to have expertise in both technical and application areas. Applicants must demonstrate that they have kept abreast of the latest developments in the field through applied research and/or consultancy. Applicants must specify their specialism in technical areas (COBOL, PASCAL, ADA, 4th Generation languages, Data Base, Systems Analysis and design, Graphics, Networking, etc.) and in application areas (Finance, Accounting, Banking, Marketing, Manufacturing, Process Control, Education, Engineering, Management, etc).

The appointee will be expected to assist the Head of the Department to plan, develop and administer such new programmes and course modules up to degree level, and to teach in their specialist areas. Personal research will be encouraged. Preference will be given to candidates with a successful research/consultancy record.

SALARIES AND QUALIFICATIONS FOR APPOINTMENT:

Head of Department: Within a range but not less than HK$277,200 P.A.
Candidates should have (a) a relevant academic/professional qualification of at least first degree level, and (b) substantial professional and administrative experience at a senior level.

Principal Lecturer: HK$208,860 - HK$259,320 P.A.
Candidates should have (a) a good honours degree or professional qualification and an advanced specialist qualification or extensive experience in a specialized field, and (b) substantial professional experience, and (c) proven administrative ability.

Senior Lecturer: HK$175,920 - HK$228,360 P.A.
Candidates should have (a) a good honours degree or professional qualification and preferably an advanced specialist qualification, and (b) substantial professional experience, and (c) proven administrative ability.

Lecturer: HK$84,440 - HK$166,129 P.A.
Candidates should have (a) a good honours degree or equivalent professional qualification but in certain disciplines, candidates with lower qualifications, such as at higher technician level, may be considered, and (b) at least three years' professional experience.

NOTE: 1 US Dollar: HK$7.80 (US Dollar equivalent as at 17-10-83)

TERMS AND CONDITIONS OF SERVICES:

For Headship posts: The initial appointment will be made on fixed-term contract of four years, at the end of which a gratuity equal to 25 per cent of salary earned over the whole contract period will be payable. Benefits include long leave, heavily subsidized housing, medical and dental benefits and where appropriate: children's education allowances and leave passages.

For Principal Lecturer/Senior Lecturer/Lecturer Posts: Appointment will be made initially on two-year gratuity-bearing contract terms with a terminal gratuity equal to 25 per cent of basic salary received over entire contract period. Benefits include long leave, subsidized accomodation for overseas appointees and local appointees on a salary of HK$12,060 or above, medical and dental benefits and where appropriate: Children's education allowances and leave passages.

Applicants should send detailed resume to the Secretary, Planning Committee, City Polytechnic of Hong Kong, P.O. Box 98441, TSIM SHA TSUI Post Office, Hong Kong by 12 November 1983 or as soon as possible thereafter.

For the above posts, interviews in United States candidates on the shortlist are planned to take place in the United States in the second and third weeks of December 1983. The recommended candidates for Head of Department posts will be invited to attend final interviews in Hong Kong around the third week of January 1984.

FACULTY POSITION

Allbright College is continuing to invite applications for a new faculty position in Computer Science. Candidates must be qualified in two or more of the following areas: assembly and machine language, operating systems, data base theory, computer organization, theory of programming languages. Doctorate in Computer Science or a closely related area preferred, but a master's degree will be considered; relevant professional or industrial experience desirable. Strong commitment to undergraduate teaching in a liberal arts college and excellent communications skills are mandatory.
Computer Science at Albright is an established major field of study based on ACM Curriculum '78 recommendations. The college curriculum includes a broad general studies program and emphasizes critical thinking and communicative skills.
February or September 1984 appointment possible. Send resume by November 30 to:

Mrs. Donna McClelland
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Albright College
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Reading, PA 19603
EO/AAE

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A leading computer firm has an opening for a Sr. Engineer with experience in designing and evaluating CMOS MACRO functions. Applicants must possess a bachelor of science in computer science or electrical engineering and 3 years of experience in designing of testability features into large gate array logic function using VLSI-5000 gate array technology. Good verbal and written communication skills required. Applicants must also possess a knowledge of CDC AIDS (automated integrated design systems) simulation program. Salary level is $36K per year. Applicants should respond to:

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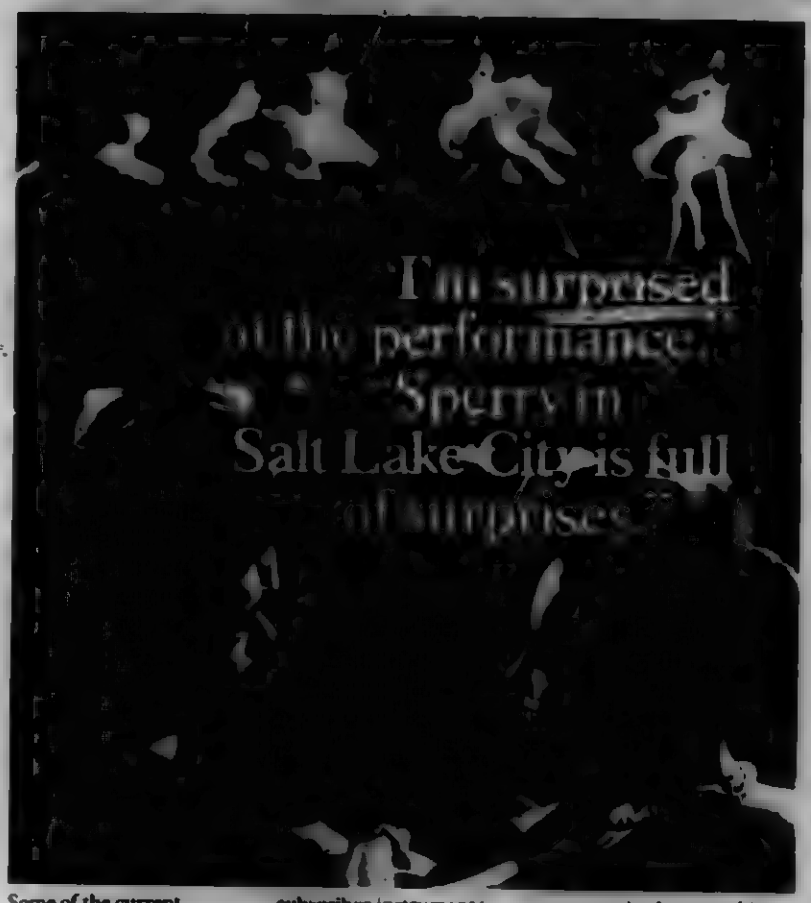

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Salt Lake City is a center for culture in the west. There's the Utah Symphony, the famed Ballet West, The Mormon Tabernacle Choir, theatres, an art complex, and a strong educational life built around the University of Utah, Westminster College, Brigham Young University, as well as other major universities and junior colleges in the immediate area. Coupled with the grandeur and lifestyle of the Great Salt Lake Valley, a career at Sperry can be one of the most pleasant surprises one could uncover for a rewarding future.

Some of the current opportunities available are in positions such as:

MICROWAVE DATA TRANSMISSION SYSTEMS

Communications Systems Engineer
Experience in RF communication system technology with experience in data link systems, radar tracking systems and/or command and control systems, threat evaluation, multi-plexing and encoding techniques.

Digital Systems Engineer
Experience in digital communication system technology with real-time data link systems, multiplexing and encoding techniques, analog, digital interface, micro-processor design/application system integration and test.

Telecommunications Systems Engineer
Prefer exposure to digital subscriber instruments and transmission components.

Scientific Programmers
Experience in real-time process control, PDP-11, HP-98+5, UYK-20, UYK-44 type hardware; FORTRAN IV, BASIC, CMS-2 languages, RSX-11M and/or SDEX 20 operating systems.

Sr. RF Design Engineers
Test & Reliability Engineers

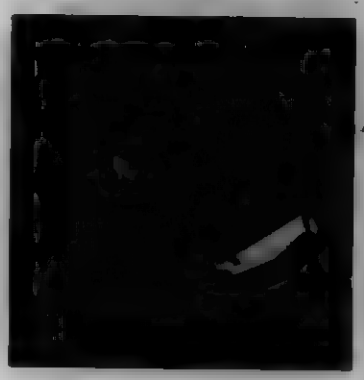
COMMUNICATIONS AND TERMINAL PRODUCTS

Terminal Design Engineers
Will be involved in the development of the new terminal products. Should have a BSEE plus minimum of two years logic design experience working with microprocessors and digital circuitry. Assignments include peripheral interface design, telephonics communications, graphics and color terminal design.

Programmers
Positions require BSCS/BSEE and minimum one year experience in assembly level Z80 and/or M68000 programming. Assignments in computer terminal and small system development involving personal computing and CP/M operating system, graphics and CRT control, communications, I/O control, LAN and PDN development plus other challenges at the forefront of microprocessor system application.

Address all employment inquiries to:

Sperry Computer Systems
[illegible]
322 North 2200 West
Salt Lake City, Utah 84116



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KING SAUD UNIVERSITY
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The Data Processing Department of King Saud University invites applications from:

MVS SYSTEMS PROGRAMMERS
A college degree and 3 years experience in MVS JES 2 TSO installation and maintenance are required

TELECOMMUNICATIONS SYSTEMS PROGRAMMER
A college degree and a minimum of 3 years experience in I B M. Telecommunication Software Products (ACF, NCP, VTAM) are essential.

Applicants should send complete resume including address and telephone number, photocopies of credentials, and names and addresses of three references to:

King Saud University Office
2425 West Loop South, Suite 450
Houston, TX 77027
Attn: Mrs. Norma Carbonari

COMPUTING MANAGER

University of Arizona

The data processing department of the University of Arizona welcomes applicants for a Computing Manager, available immediately.

The individual will be responsible for developing long range strategies, supervising professional programming and analyst staff, and the implementation of new applications systems on super mini computers.

The position reports to the Director for Data Processing in the division of Administrative Services at the University of Arizona, a major research university located in the sunbelt.

A bachelor's degree in computer science or a related field is required. A master's degree preferred.

The successful candidate must possess 4 years of demonstrated technical and management experience, preferably in a large scale computer installation, as well as excellent written and oral communication skills. The position is Academic Computer Manager III (grade 24); the starting salary $33,282 - $38,610, dependent upon experience and qualifications.

Resumes and letter of application should be mailed to: Staff Employment Office, University of Arizona, 1717 E. Speedway, Tucson, AZ 85721. Closing date for applications is November 16, 1983.

equal opportunity/affirmative action employer

DATA PROCESSING MANAGER IN BEND, OREGON

If you are searching for a career position in a growing county located at the base of the Cascade Mountains in beautiful Central Oregon, then read on:

*** PICK ***

Deschutes County is accepting applications for Data Processing Manager. The position requires knowledge of the principles and practices of systems analysis and computer programming associated with a multi-job computer. It requires the ability to plan, supervise, and coordinate the work and staff of the data processing unit, ability to remain current of technical developments in the data processing field, to establish and maintain working relations with representatives of user departments, County management, and subordinates. Applicants with Microdata and/or PICK experience are encouraged to apply.

The Area. Located in the heart of the State, Deschutes County encompasses the snow-capped Cascades and the fertile valley, range and forest lands of the "high country" in the Central Oregon plateau. It has experienced the most rapid growth of any county in the State during the past 10 years. Principal products are lumber, plywood, cattle and potatoes. A number of luxury resorts, an ideal climate. Fishing, hunting, golfing and skiing are popular attractions. The County comprises 3,055 square miles with a population of 67,000.

If you are interested in applying for this position, please send a resume and salary requirements to:

Deschutes County Personnel Office
Courthouse Annex
Bend, Oregon 97701

Deadline for applications is November 24, 1983. Any additional information may be obtained by writing the above address or calling (503) 388-6570, Attention Mike Maier, Administrative Director. EOE/AA

Graphics Display

"With the introduction of its model 4115 computer display terminal . . . Tektronix set new performance levels of raster-scan graphics displays and bit image manipulation."
April 11, 1983 EE Times

"Tektronix is plowing new ground with its model 4115 color raster system."
April 1983 The Anderson Report

The introduction of the 4115 set new standards for High Resolution Computer Display Terminals. Its development includes many state-of-the-art techniques to produce high-performance graphics with unmatched display quality. The continued development of this product as well as development of future products requires that we add engineering staff. If you are interested in working on an industry leader and with a firm recognized for technological innovation, you may want to consider one of the following positions:

Sr. Software Engineers
Design major firmware enhancements & firmware modifications to the 4115

Software Engineers
Participate in the design of 3D graphics transformations

Software Engineers
Design/implement/test firmware for new products based on 4115 technology

Hardware/Software Engineers
Design and write microcode for a bit-slice picture processor used in new graphics terminals

Electronics Engineers
Contribute to the development of new products in the 4100 series of Graphic Display Terminals

Microelectronics Component Engineers
Expand the utilization and application of VLSI technology in graphics systems and participate in the development of the next generation of graphics display products

To Learn More . . .
. . . about the exceptional scenic, cultural and recreational resources of Oregon, plus our complete benefits package, including education and relocation, send your resume to P.H. Gribbin, Tektronix, Inc., PO Box 1000, MS-63-658, Wilsonville, OR., 97070.

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- **INFORMATION CENTER** ADR's Easytrieve, ICT (Telegal) and Display + plus)

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Cedars Medical Center, a modern 525-bed major health care facility, is seeking a creative, experienced Director of Information Service to direct the implementation of an advanced IBM Computer Center utilizing the Technicon Medical Information System. This administrator-level position reports directly to the Executive Director.

The qualified applicant must have extensive experience in the implementation and management of computer-based patient care systems. Experience with large IBM Mainframes and related operating software is mandatory.

Proven expertise in the management of Technicon Medical Information System and a computer science degree (or equivalent) are preferred.

Cedars-Medical Center offers excellent salary and comprehensive benefits including free medical, life insurance and relocation assistance. For immediate consideration, forward a resume and salary requirements in strict confidence to Elly Howard, Associate Director, Human Resources, 1400 N.W. 12th Avenue, Miami, FL 33136.

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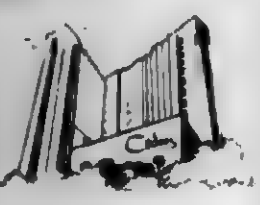

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(704) 542-0312

TEACHING POSITION

A tenure track position in Computer Science in September, 1984. Minimum MS in CS. Rank and salary open depending on experience and credentials. Send resume, copies of all transcripts, and three recent letters of recommendation to: Dr. David L. Albig, Chairman; Department of Math/Stats/CPSC; Radford University; Radford, VA 24142 by January 1, 1984. Radford University is an equal opportunity employer.

INFORMATION SYSTEMS PROGRAMMER

The candidate should have degree in Computer Science. (M.S. Preferred). Experience in IBM OS/VS, OS/MVS or other mainframe environment required. Must have knowledge in the areas of data base design, schema development and language interface processors, micro computers and networking. Salary: open.

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We can offer you competitive salaries and comprehensive benefits programs including bonuses and profit sharing. If you've been searching for a growth opportunity with a dynamic and progressive company with a Management team that puts people first, then DRC is your answer.

For immediate consideration, please call BECKY FINLEY or CHARLIE WEXLER at 1-800-241-8002 or send your resume to:

DRC
DATA RESOURCE CORPORATION
3301 Buckeye Rd
Suite 103
Atlanta, GA 30341
(404) 455-7260
An EOE M/F

TECHNICAL SUPPORT ANALYST

Atlanta based regional office of a dynamic growth oriented life insurance company is seeking an experienced Technical Support Analyst. Position is responsible for production error recovery and resolution. Qualified candidate must have experience in the following: Life 70, and/or Life Comm, OS/MVS environment, TSO/SPF, VSAM, OS/JCL and utilities, knowledge of automated scheduling system, knowledge of automated tape library system. We offer an excellent benefit package coupled with career growth opportunities. Send resume with salary history to:

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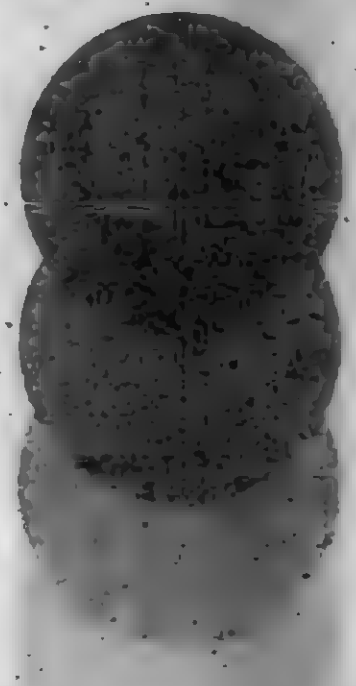

The ECI Division in St. Petersburg has a place in the sun for talented Data Communications Professionals.

The ECI Division develops and produces military communications systems, electronic data-handling systems and microwave phased array antennas.

Senior Technical Staff — Software — To serve as Technical Consultant for the Division's Software products. Minimum of 10 years real-time systems design and implementation experience required as well as strong background in Mathematics, Digital Intefaces, Digital Communications, and DOD Software Development Methodologies.

Software Designers — BSCS/BSEE and five years experience in real-time embedded computer systems utilizing assembly and higher order languages. Significant hardware software interfacing experience, and the ability to perform analysis, design, and implementation of sophisticated weapon system software.

For immediate consideration please forward your resume to: **Mr. Tim Harris, Director of Employee Relations, E-Systems, Inc., P.O. Box 12248, St. Petersburg, FL 33733.**

The Garland Division in Dallas has "heart-of-the-sunbelt" opportunities for talented Software Professionals.

The Garland Division is involved in high tech communications, command and control systems, electronic warfare, computer-based intelligence and reconnaissance systems, and digital image processing.

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Experienced Software Engineering Professionals in all areas including

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- Data Base Administrator — VAX system using VMS
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Prefer 6 years experience for all positions

SOFTWARE ENGINEERS

Requires a BS in EE or Computer Science with experience in Pascal. Prefer a strong math and science background with experience in Data Base Administration and VAX Systems Programming. VAX 11/780 experience highly desirable.

For immediate consideration please forward your resume to: Professional Placement, **Ann Olson, E-Systems, Inc., Garland Division, P.O. Box 226118, Dept. 41, Dallas, Texas 75266.**

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The Joint Center for Graduate Study in Richland, Washington wishes to fill a tenure track faculty position of Program Coordinator in Computer Science. The level of this appointment will be at either the Associate or Full Professor rank. The Center is administered jointly by the University of Washington and Washington State University. Programs offered at the Center are mainly in science and engineering and are oriented to serve local working professionals. The graduate and undergraduate programs in Computer Science are sponsored by the Computer Science Department of Washington State University.

Responsibilities attendant upon the position include three major areas as follows: (1) interfacing with the Computer Science Department at Washington State University in curriculum development, graduate student projects, faculty appointments and program review; (2) teaching courses in the Computer Science curriculum and supervising and advising graduate and undergraduate students; (3) research. The Center has a PRIME 750 computer at the Richland campus and access to an AMDAHL 470/V8 computer, as well as a Vax 11/750 and an HP 3000/64 located at Washington State University in Pullman, Washington.

Candidates must hold a Ph.D. in Computer Science or a related field and should have knowledge and experience in a core area. Application, including three (3) letters of recommendation and a current curriculum vitae, should be addressed to Chairman, Computer Science Screening Committee, Joint Center for Graduate Study, 100 Sprout Road, Richland, WA 99352. Evaluation of applications will begin on November 30, 1983. The Joint Center for Graduate Study/Washington State University is an Equal Opportunity/Affirmative Action employer.

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As the worldwide leader in packet switched data communications systems and devices, GTE Telenet has expanded our packet switching network to include dial-in access to 325 cities in the U.S. and 50 foreign countries. To meet the challenges this expansion presents while maintaining our standard of quality, we are seeking the following individuals to join us:

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You will manage data as a resource, assuming overall responsibility for the integrity and validity of data base contents. Additionally, you will serve as a consultant to IPs and developmental staff, serve as data librarian, and interact with individuals within and outside of Telenet. You must have a BS/BA degree in Computer Science (or commensurate experience in a related area) and excellent interpersonal, verbal, written, and management skills. You also would have 3-5 years experience as a Systems Analyst or Programmer/Analyst in the medical/biological field and knowledge of commercially available data base management systems. Knowledge of DEC VAX, VMS, or TANDEM operating systems a plus. Knowledge of RMS file management and Datatrieve Development Tool directly applicable.

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TANDEM COMPUTER SYSTEMS MANAGER

You will manage either multiple VAX or TANDEM Nonstop II hardware systems, coordinate vendor maintenance, maintain operating system, and perform system engineering functions, such as performance monitoring and measurements. Both of these positions require a BS degree in Computer Science and 7-9 years hardware/software experience. Additionally, 4-5 years experience with related equipment and operating systems, and 3-4 years data communications experience are required, as are strong interpersonal, management, and communication skills. Experience with X.25 network desired.

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You'll also find a salary/benefits package that's fully commensurate with your experience...and opportunity for continued career growth. Qualified individuals are invited to forward resume, with salary history and requirements in professional confidence to: Mr. John S. Termini, Allied Corporation, Fibers & Plastics Company, P.O. Box 631, Hopewell, Virginia 23860.

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LEE COUNTY ELECTRIC COOPERATIVE INC.

SYSTEMS PROGRAMMER DATA BASE MANAGER

St. Lukes Regional Medical Center is installing a state of the art patient care system on a new IBM 4341 DOS/VSE. An experienced Systems Programmer is needed to install and maintain operating systems, related utilities, communication network and data base, as well as performing hardware planning and analysis, systems problem solving, and performance surveillance. Requires effective communication skills, ability to function as a team member, and 3-5 years IBM systems programming experience. Data base management experience helpful, excellent benefit package and salary commensurate with experience. Send resume and salary history in confidence to:

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A Programmer/Analyst is needed to provide design, programming, and documentation skills for simulation language system development and compiler design. Responsibilities include support in publication development and interaction with users for purposes of system design, with growing interest in expert systems for microcomputers.

Position requires a BS and/or MS(preferably) in Computer Science or equivalent. Background should include compiler design, programming languages, data base management, and artificial intelligence. Programming environment in UNIX using C and FORTRAN. Background in simulation and statistics helpful.

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Personnel Manager
Rogers Group, Inc.
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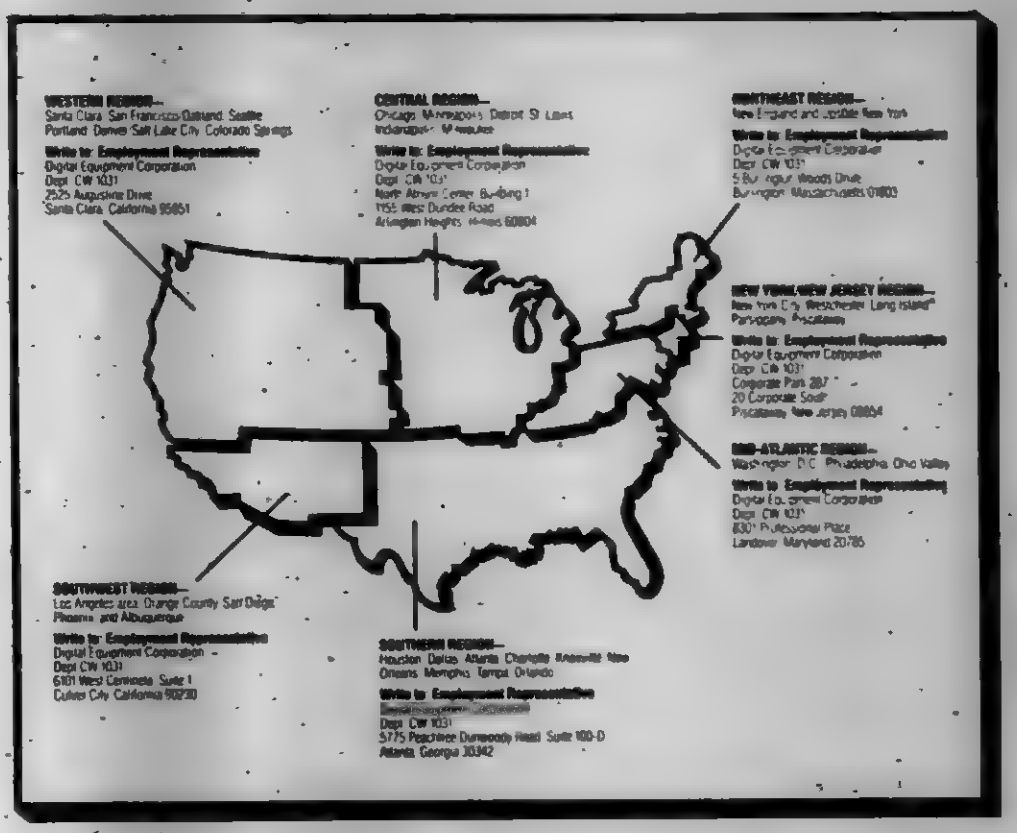

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Statewide Office of Human Resource Development
Room 1
Sunnell Building
University of Alaska
303 Tanana Drive
Fairbanks, AK 99701

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The successful applicant will have 1-3 years experience managing technical development, experience integrating operating systems and applications software into cohesive facilities, extensive familiarity with the facilities, and limitations of VM/CMS, familiarity with non-SNA networking, a broad grounding in the current uses of computing, and excellent interpersonal and communications skills.

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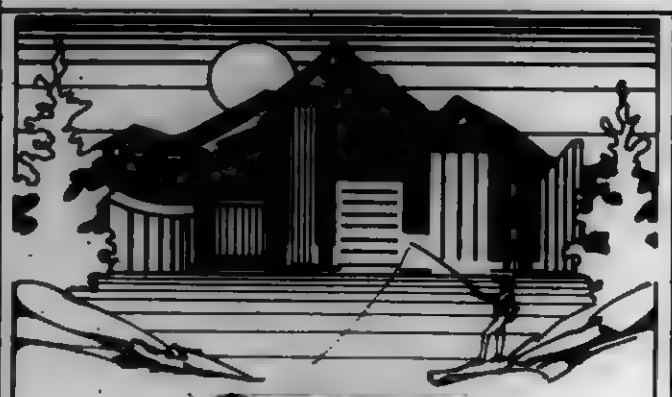
Will participate in system maintenance and the design and development of changes to the VM/CMS operating system and various system software and applications packages, and in the efforts to improve the interconnections between 3081, the LAN, and the workstations.

Applicants should have 3 years experience maintaining and modifying the CP portion of VM/CMS, experience with non-SNA communications protocols in a heterogeneous environment (preferably IP/TCP and XNS), familiarity with 68000 based workstations (such as the Apple LISA), and excellent interpersonal and communications skills.

Please submit resumes by November 11, 1983 to: Michael Brennan, Manager, Staffing & Employee Relations, Brown University, Box 1879, Providence, R.I. 02912



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Syracuse, New York 13206 (315) 463-5225

NORTH CAROLINA: DataMasters
Div. of TasaForce, Inc. PO Box 6888
Greensboro, North Carolina 27405
(919) 373-1461

PHILADELPHIA: Systems Personnel, Inc.
[illegible]
[illegible]

PHOENIX: Professional Career Consultants
4628 North 17th Street, Suite 1101
Phoenix, Arizona 85016 (602) 274-6866

SAN FRANCISCO: The Computer Resources Group, Inc. Agency, 303 Sacramento Street
San Francisco, California 94111 (415) 398-3535

SEATTLE: Hooper, Marsh, Mawre & Associates
[illegible]
Bellevue, Washington 98004 (206) 453-2700

WASHINGTON D.C.: ESP Systems Corporation
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Please send resume for immediate, confidential consideration to E.W. Boone, Director of Personnel, HARRIS COMPUTER SYSTEMS DIVISION, 2101 W. Cypress Creek Road, Ft. Lauderdale, FL 33309-1892.

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(804) 490-3666 or
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Min. 3 yrs. Exp. in the generation, maintenance & tuning of RSX 11M+, DECNET a plus.			
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- 3-5 years' applications programming experience, including the use of data base management software.
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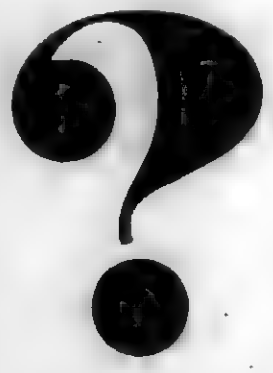

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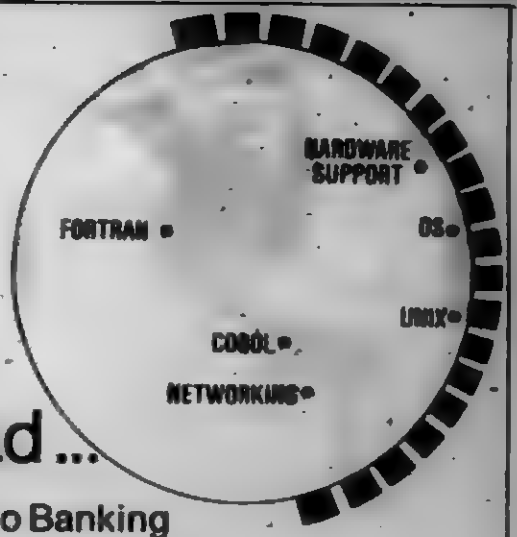

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Applications must include resume, three references, and salary history. Send in confidence to:

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Computerworld
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R.A. Pogal
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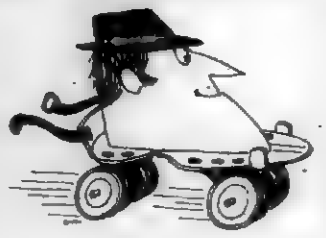
New York, NY 10016



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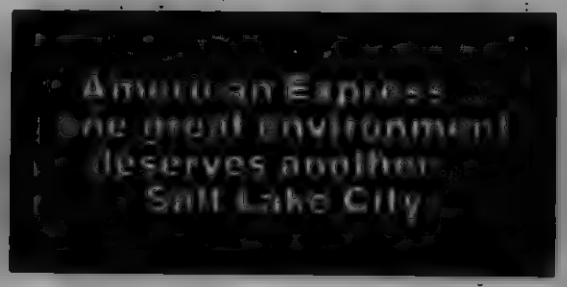

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General Request for Proposal No. 871 due 3:30 p.m., Wednesday, December 14, 1983, for the general acquisition of consulting services to address upcoming project needs in the areas of feasibility study, systems analysis and design, and systems development and implementation. This is a general RFP to be used to select consulting services for the State of Mississippi during 1984.

General Request for Proposal No. 872 due 3:30 p.m., Wednesday, December 14, 1983, for the acquisition of IBM 8100 compatible terminals and printers. This is a general RFP to be used to select terminals and printers for the State of Mississippi during 1984.

General Request for Proposal No. 873 due 3:30 p.m., Wednesday, December 14, 1983, for the acquisition of keypunch services for State Agencies and Institutions. This is a general RFP to be used to select keypunch services for the State of Mississippi during 1984.

General Request for Proposal No. 874 due 3:30 p.m., Wednesday, December 14, 1983, for the acquisition of IBM 3270 compatible CRT's, printers, and controllers. This is a general RFP to be used to select terminals for the State of Mississippi through 1984.

General Request for Proposal No. 875 due 3:30 p.m., Wednesday, December 14, 1983 for the acquisition of microcomputers, peripherals and software. This is a general RFP to be used for acquiring micros for teaching, data acquisition and a variety of other purposes for the State of Mississippi during 1984.

General Request for Proposal No. 876 due 3:30 p.m., Wednesday, December 14, 1983, for the acquisition of graphics terminals, plotters and related peripherals. This is a general RFP to be used to select graphics equipment for the State of Mississippi through 1984.

General Request for Proposal No. 877 due 3:30 p.m., Wednesday, December 14, 1983, for the acquisition of ASR and KSR hardcopy terminals. This is a general RFP to be used to select terminals for the State of Mississippi during 1984.

General Request for Proposal No. 878 due 3:30 p.m., Wednesday, December 14, 1983, for the acquisition of receive-only printers to attach to TTY compatible CRT's. This is a general RFP to be used to select printers for the State of Mississippi during 1984.

General Request for Proposal No. 879 due 3:30 p.m., Wednesday, December 14, 1983, for the acquisition of TTY compatible CRT's. This is a general RFP to be used to select CRT's for the State of Mississippi during 1984.

General Request for Proposal No. 880 due 3:30 p.m., Wednesday, December 14, 1983, for the acquisition of acoustic couplers. This is a general RFP to be used to select couplers for the State of Mississippi during 1984.

General Request for Proposal No. 881 due 3:30 p.m., Wednesday, December 14, 1983, for the acquisition of low to medium speed synchronous and asynchronous modems ranging in speed up to 3600 baud. This is a general RFP to be used to select modems for the State of Mississippi through 1984.

General Request for Proposal No. 882 due 3:30 p.m., Wednesday, December 14, 1983, for the acquisition of medium, high, and wideband modems ranging in speed from 4800 through 56K baud. This is a general RFP to be used to select modems for the State of Mississippi during 1984.

General Request for Proposal No. 883 due 3:30 p.m., Wednesday, December 14, 1983, for the acquisition of short haul modems, line drivers and modem eliminators. This is a general RFP to be used to select special purpose modems for the State of Mississippi during 1984.

Request for Proposal No. 891 due 3:30 p.m., Thursday, November 10, 1983, for the acquisition of a 20MB disk storage upgrade to an existing Datapoint Intermitch System running ARC DOS 2.0 for Mississippi State University.

Request for Proposal No. 892 due 3:30 p.m., Thursday, November 17, 1983, for the acquisition of an upgrade to an existing Wang computer system for Disability Determination Services.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

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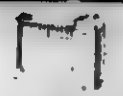

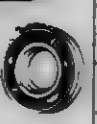

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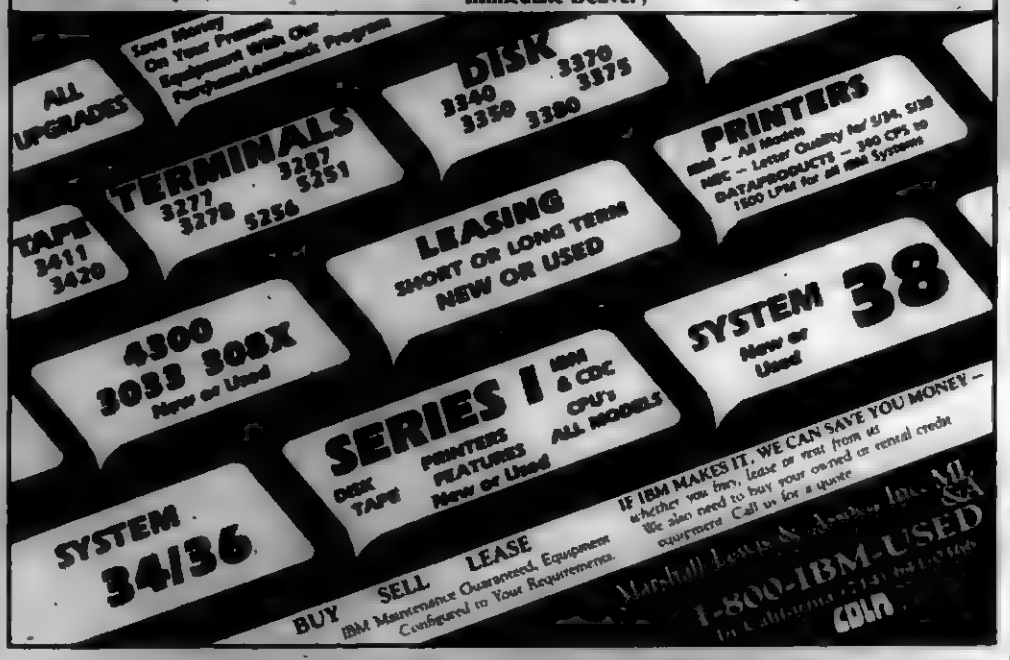

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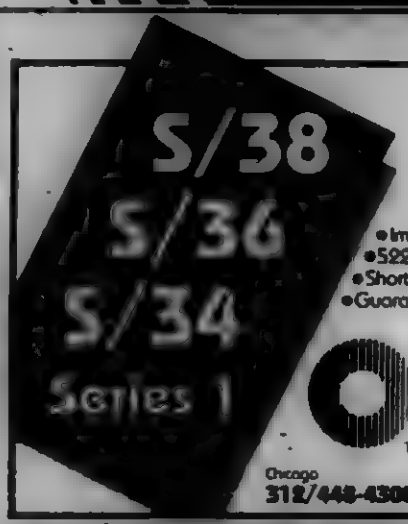

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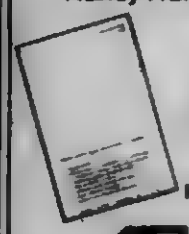

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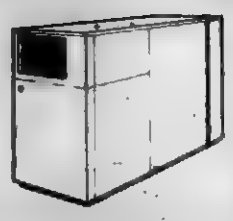

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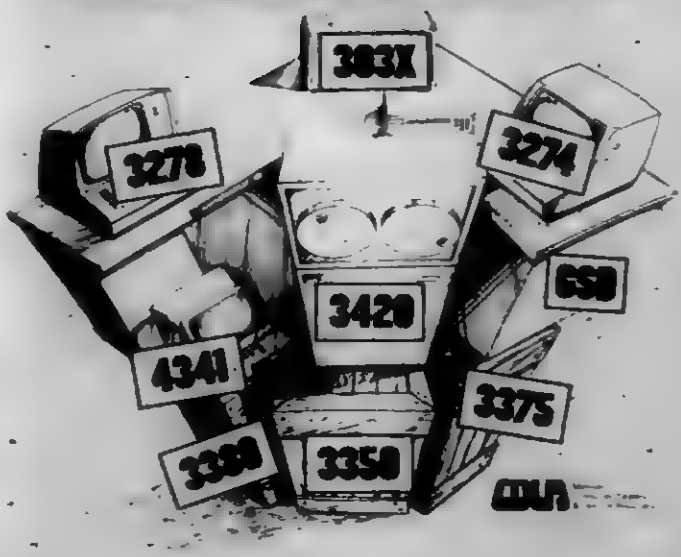

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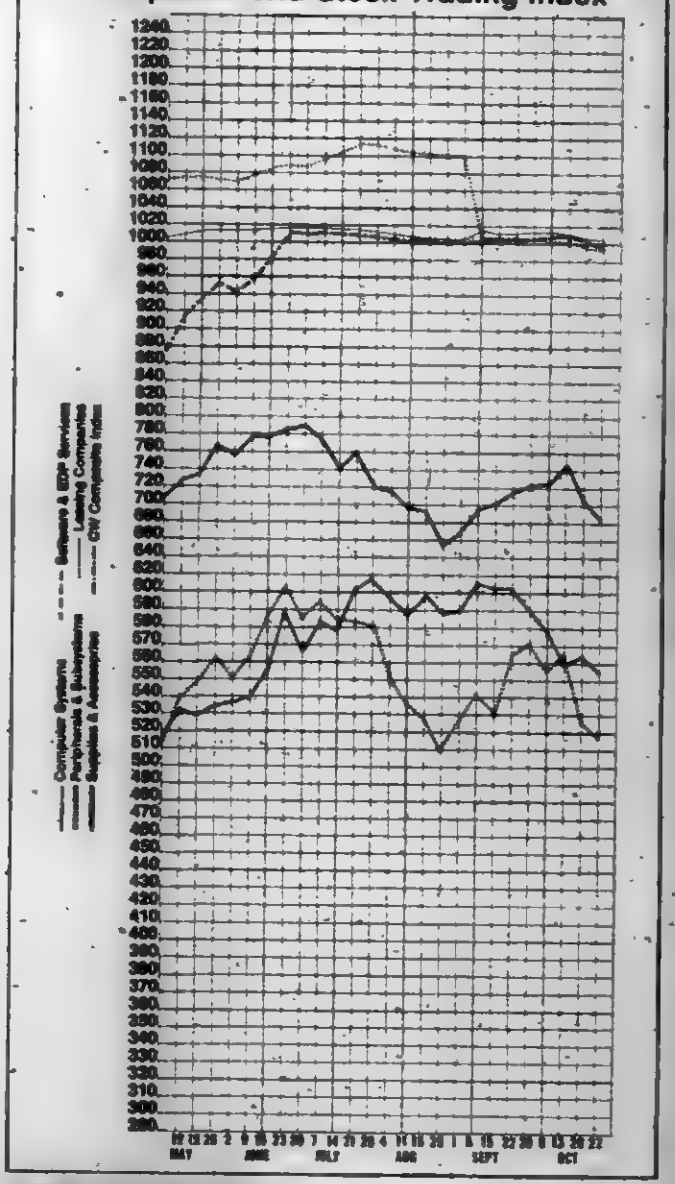

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CLOSING PRICES WEDNESDAY, OCTOBER 26, 1983

All statistics compiled, computed and formatted by TRADE QUOTES INC. Cambridge, Mass. 02139

	1982-83 RANGE	CLOSE OCT 26 1983	WEEK NET CHANGE	WEEK PCT CHANGE
COMPUTER SYSTEMS				
ALPHA MICROSYSTEMS	11- 24	11 3/4	- 1/2	-4.0
ALTOS COMPUTER SYST	8- 28	8 3/4	+ 1/2	+6.0
AMBAM, CORP	2- 30	17 1/8	- 1/8	-0.6
APPLE COMPUTER INC	18- 83	20 1/2	-1 3/8	-6.3
AT&T	60- 70	60 3/8	-2 1/2	-3.9
BURROUGHS CORP	28- 58	50 1/4	- 5/8	-1.2
COMPUTER AUTOMATION	7- 17	6 3/4	- 1/4	-3.9
COMPUTER CONSOLES	8- 26	18 1/8	- 1/8	-1.3
CONTROL DATA CORP	21- 62	45 1/8	-1 3/8	-2.8
CONVERGENT TECHNOL	18- 41	20 1/4	+1 7/8	+10.2
CRAY RESEARCH INC	20- 52	50 7/8	+3 1/8	+6.8
DATA GENERAL CORP	20- 62	71 1/2	+3 3/8	+4.8
DATAPOINT CORP	11- 38	23 1/4	- 1/8	-0.6
DIGITAL EQUIPMENT	82-132	87	-5 1/2	-7.9
EXCO INC	8- 18	15 3/8	+ 1/2	+3.3
ELECTRONIC ASSOC.	3- 15	6 5/8	+ 5/8	+10.4
FLOATING POINT SYST	16- 48	35 7/8	-1 1/8	-3.2
FOXBORO	22- 47	32 3/4	-2 5/8	-8.7
GENERAL AUTOMATION	3- 16	8 7/8	-1 3/4	-11.2
DOUBLE INC	20- 44	28	-1 1/2	-4.9
HARRIS CORP	20- 51	36 1/8	- 5/8	-1.7
HEWLETT-PACKARD CO	22- 48	35 5/8	-3 1/4	-8.3
HONEYWELL INC	80-132	127	+ 1/4	+0.1
IBM	97-134	128	-2 1/2	-1.9
IPL SYSTEMS INC	3- 14	6 1/8	- 2/4	-12.5
LANIER BUSINESS PROD	12- 21	18 5/8	- 3/8	-1.9
M/A-COM INC	21- 35	20 7/8	-1 1/4	-2.6
MADNISON COMP SYSTS	2- 5	5 1/8	- 1/4	-20.6
MANAGEMENT ASSIST	7- 18	13 1/2	+ 1/4	+1.8
MATSUSHITA ELEC(ADR)	47- 77	71 3/4	+2 3/8	+3.4
MODULAR COMPUTER SYS	6- 18	8 1/2	- 3/8	-4.2
MOHAWK DATA SCI	10- 18	13 5/8	+ 1/8	+0.9
MOTOROLA INC	82-148	143	- 1/8	-0.0
NAT'L SEMICONDUCTOR	22- 66	53 1/8	- 7/8	-1.6
NCR	38-135	123 7/8	-2 1/8	-1.6
PERKIN-ELMER	17- 37	32 7/8	-1 1/8	-3.3
PRIME COMPUTER INC	11- 36	13 3/4	-1 7/8	-12.0
SPERRY CORP	21- 47	42 1/2	-2 3/8	-5.2
TANDEM COMPUTERS INC	14- 38	24 1/2	+ 1/2	+1.0
TANDY CORP	35- 65	38 5/8	- 3/8	-1.0
TELEVIDEO SYSTEMS	14- 41	18 1/8	+1 1/4	+7.4
TEXAS INSTRUMENTS	71-178	108 1/2	-7 7/8	-6.7
VECTOR GRAPHICS INC	3- 14	3 5/8	- 1/2	+10.0
WANG LABS "B"	13- 42	31 1/8	-1 1/2	-4.6
WANG LABS "C"	11- 42	30 1/2	-2 1/4	-6.8
XEROX CORP	35- 50	45 7/8	-1 7/8	-3.9
LEASING COMPANIES				
BOOTHE FINANCIAL CP	11- 35	31 1/4	-1 1/2	-4.6
CONDISCO INC	7- 42	24	-1 3/8	-5.4
CONTINENTAL INFO SYS	3- 18	10	0	0.0
DPF INC	3- 15	13	+ 1/8	+0.8
U.S. LEASING	18- 47	35 3/8	+ 3/4	+2.1
COMPONENTS				
ADVANCED MICRO DEV	13- 38	30 1/2	+ 3/8	+1.2
ADV'D SEMICONDUCTOR	12- 34	26 1/8	- 3/4	-2.8
ANALOG DEVICES INC	18- 42	38 5/8	-2 1/2	-6.5
ANALOGIC CORP	20- 27	22	+ 1/2	+2.3
APPLIED MAGNETICS CP	19- 37	27 3/4	-1 3/8	-4.7
TERADYNE	14- 38	28 1/2	-2 1/4	-7.0

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SOFTWARE & EDP SERVICES				
ADVANCED COMP TECH	1- 8	3	- 1/2	-14.2
ADVANCED SYSTEMS INC	8- 22	17 3/4	0	0.0
ADS COMPUTERS INC	3- 32	25 1/4	+3 1/2	+16.3
AMERICAN SOFTWARE	21- 31	24 1/2	0	0.0
BANCOMP INC	8- 23	8	- 3/8	-7.2
BROWNS INTL CORP	5- 20	16 3/4	+1 1/4	+8.2
APPLIED DATA RES.	18- 37	32	+ 3/8	+1.1
ASK COMPUTER SYSTEMS	8- 21	18	+3	+18.7
AEROSPACE COMP INC	1- 7	3	+ 1/8	+6.3
AUTOMATIC DATA PROC	31- 44	37 1/8	+ 7/8	+2.3
CSA COMPUTER ASSOC	3- 17	13 3/8	- 3/8	-2.7
COMPUTER ASSOC INT'L	8- 33	29 1/4	+1 1/2	+5.3
COMPUTER HORIZONS	8- 26	20 1/2	- 1/2	+6.9
COMPUTER NETWORK	4- 19	6 1/8	- 1/8	-3.8
COMPUTER SCIENCES	11- 23	17 3/8	- 1/4	-1.4
COMPUTER TIME GROUP	8- 22	13 3/4	0	0.0
COMPUTER USAGE	2- 22	14 3/8	+1	+9.2
COMPUTRE SYSTEMS	6- 38	6 3/4	0	0.0
CONSERV CORP	6- 20	8 7/8	+ 3/8	+5.7
CPSNAME	7- 13	9 3/8	-1	-9.4
CULLINET SOFTWARE	12- 50	40 1/4	+ 3/4	+1.8
CYCARE SYSTEMS INC	8- 27	18	-2	+10.0
ELECTRONIC DATA SYST	18- 42	37	+2 1/2	+6.3
HOGAN SYSTEM INC	27- 53	42	+ 7/8	+2.1
GENERAL ELECTRIC CO	62- 96	92	+1 3/8	+3.5
GTE CORP	38- 58	55 7/8	+ 3/4	+1.6
INFORMATICS INC	10- 34	22 1/2	-1	-4.2
INFOTRON SYSTEMS COR	29- 43	32 3/4	- 1/4	-0.7
ISAME ASSOCIATES	4- 15	7 1/2	- 1/2	-6.2
LOGICON	8- 30	20 3/8	+1 1/4	+6.2
MCI COMMUNICATIONS	13- 34	13 3/8	- 1/2	-3.5
MGT SCI AMER INC	8- 33	28	-1 1/2	-5.4
MATHEMATICAL APP GRP	12- 22	14	- 1/2	-3.4
MICOM SYSTEMS INC	25- 56	40 1/8	-2	-4.7
MONCHIK-WEBER CP	10- 22	10 3/4	+1	+10.2
NATIONAL DATA CORP	5- 20	19 1/4	+2 3/8	+16.6
ON-LINE SOFTWARE INT	17- 27	17	- 1/2	-2.8
PANSOPHIC SYSTEMS	8- 30	21 4/8	- 3/8	-1.7
PLANNING RESEARCH	6- 21	17 1/4	+2 1/4	+15.0
POLICY MGMT SYSTS CP	18- 38	27 1/4	+1 1/4	+4.8
PROGRAMMING & SYS	1- 8	3 1/2	- 5/8	+10.2
REYNOLDS & REYNOLDS	17- 53	44 1/2	-1 3/4	-3.7
SCI CORP	11- 34	25	+1	-3.7
SHARED MEDICAL SYST	13- 43	31 3/8	-5 1/4	-14.2
SCIENTIFIC COMPUTERS	6- 14	10 3/4	- 1/8	-2.2
SOFTWARE AG	8- 17	8 3/8	- 1/8	-1.2
TYMSHARE INC	12- 30	21 1/4	+ 1/4	+1.1
URS CORP	5- 18	12 3/8	+ 1/2	+3.8
UVLX CORP	7- 17	10 7/8	-1 1/4	-10.3
PERIPHERALS & SUBSYSTEMS				
AM INTERNATIONAL	3- 7	4 1/8	- 1/8	-2.9
ANDERSON JACOBSON	8- 26	8 3/8	- 3/4	-7.2
AUTO-TROL TECHNOLOGY	8- 30	17	-2	-10.5
BARCTEC INC	3- 30	15 3/4	+ 1/4	+1.6
BEEHIVE INT'L	4- 15	8	- 1/2	-3.8
BOLT,BERANEK & NEW	9- 60	46 1/4	-6 1/4	-11.9
CAMPEX CORP	3- 8	7 1/8	- 1/8	-3.5
CENTRONICS DATA CORP	8- 28	18 3/4	+2 1/2	+12.0
CETEC CORP	4- 12	10 1/8	- 1/4	-2.4
COMMITRONICS	2- 24	9 1/2	-1 1/4	-14.2

	1982-83 RANGE	CLOSE OCT 26 1983	WEEK NET CHANGE	WEEK PCT CHANGE
COMPUTER DEVICES INC	3- 21	4	+1	+33.3
COMPUTER TRANSCEIVER	6- 12	9	- 1/4	-2.7
COMPUTERVISION CORP	19- 53	38 1/8	+ 1/8	+0.3
CONRAC CORP	17- 38	16 3/4	+ 1/8	-1.4
DATAPRODUCTS CORP	16- 41	28 3/4	+ 1/8	+0.4
DATARAM CORP	9- 12	10 1/8	+ 1/8	+1.2
DATA SWITCH CORP	13- 41	28	+1	+3.7
DATUM INC	3- 17	8 3/4	+1 3/8	-11.3
DECISION DATA COMPUT	3- 16	10 3/8	- 5/8	-5.6
DOCUTEL-OLIVETTI	33- 38	13 3/8	+1	0.0
ELECTRONIC M & M	9- 11	7 5/8	- 1/2	-6.1
EVANS & SUTHERLAND	19- 30	30 1/8	- 1/2	-1.6
GANDALF TECHNOLOGIES	8- 22	8	- 1/4	-3.7
GEN'L DATA COMM IND	6- 28	27 1/4	-1	-3.9
GREAT SOUTHWEST IND	2- 6	1 1/2	0	0.0
HAZELTINE CORP	7- 31	21 1/2	-1 1/4	-5.5
ICOT CORP	3- 10	4 3/8	+ 1/4	+6.0
INFORMATION INTL INC	10- 22	13 1/2	+ 1/2	+3.8
INTEL CORP	13- 49	38 1/2	+ 3/4	+1.8
IPL SYSTEMS INC	3- 14	6 1/4	- 3/4	-10.9
LUNDY ELECTRONICS	3- 18	11 5/8	- 1/4	-2.1
MEGADATA CORP	8- 13	11 1/8	- 3/8	-3.2
MSI DATA CORP	18- 37	18 7/8	+ 1/8	+0.6
NANMUS CORP	3- 28	24 3/8	-1	-3.9
NETWORK SYSTEMS CORP	8- 34	21 1/8	+2	+10.6
NO AMERICAN PHILIPS	47- 74	73	+1 3/8	+1.9
NORTHERN TELECOM LTD	22- 48	40 1/8	-2 1/4	-5.3
ONES	3- 6	6	0	0.0
PARADYNE CORP	14- 34	14 1/4	-1 1/8	-8.0
PENRIL CORP	7- 18	10 1/8	+ 1/2	+5.1
PHOENIX AMERICAN INC	7- 17	10 3/4	- 3/8	-3.5
PLESSEY CO (ADR)	26- 67	28 1/2	- 1/2	-1.8
PRINTRONIX INC	23- 34	25 1/2	+ 1/8	+0.5
RANTEC CORP	12- 26	12	+ 1/8	+1.1
RAYTHEON CO	45- 98	84 3/8	+ 1/8	+0.1
RECOGNITION EQUIP	6- 17	15 1/8	0	0.0
ROLM CORP	44- 89	52 1/2	-1 3/4	-3.1
SANDERS ASSOCIATES	33-150	52 3/4	-2	-3.6
SCAN DATA	1- 3	3/4	- 1/8	-14.2
SCAN-TRON CORP	12- 16	13 1/2	+ 1/4	+1.8
SCIENTIFIC ATLANTA	19- 33	15 3/8	+ 3/4	+5.1
STORAGE TECHNOLOGY	19- 30	25 1/8	-2 3/8	-13.5
SYKES DATATRONICS	5- 27	8 1/2	- 1/4	-2.8
SYSTEMS & COMP TECH	27- 38	28 1/2	-2	+7.7
T BAR INC	7- 17	8 1/8	0	0.0
TAB PRODUCTS CO	8- 20	20 7/8	- 1/8	-0.5
TANDON CORP	18- 38	22 1/2	+1	+4.6
TEC INC	8- 12	7 5/8	0	0.0
TERTRONIX INC	38- 87	78 1/4	+ 1/2	+0.6
TELEX	9- 32	24 1/8	-3 3/4	-13.4
TESDATA SYSTEMS CP	8- 17	8 1/2	+ 1/2	+5.5
TIMEPLEX INC	7- 28	21 3/8	+1	+4.8
VISUAL TECHNOLOGY	9- 28	18 1/2	+3 3/4	+29.4
SUPPLIES & ACCESSORIES				
AMERICAN BUS FORMS	11- 36	31	-1 5/8	-4.8
BARRY WRIGHT	13- 36	32 1/8	+1 3/8	+4.4
DUPLEX PRODUCTS INC	12- 26	22 1/8	- 1/4	-0.5
ENNIE BUS. FORMS	8- 28	26 4/8	- 7/8	-3.2
3M COMPANY	48- 90	85 1/8	+ 1/8	+0.1
MOORE CORP LTD	20- 91	42 3/4	-1 1/4	-2.8
STANDARD REGISTER	14- 38	31	-1 1/4	-3.8
WALLACE BUS FORMS	17- 31	30	0	0.0

15 pointed questions to ask MSA or any software supplier

These questions will help you when you sit down with individual software companies.

They're tough questions. Relevant ones. And any supplier who is worth his salt should be able to answer them without backpedaling.

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We'll answer all these questions to your satisfaction—plus any others you may have.

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So you avoid the headache of trying to tie together individual systems. (And the even bigger headache of adding to them.)

With MSA's integrated systems, there's no unnecessary duplication of data or effort. Reporting is faster. All your company's information is more timely and accurate—and in the right form.

Our technical edge comes from experience

Staying ahead is easier for a company that's steeped in software technology. MSA has spent years developing, refining, testing and enhancing our systems.

This year alone, we'll invest $25 million to make sure all our systems are technologically razor sharp. That gives us a decided advantage over flash-in-the-pan technology that may not have the bug-free logic of a more experienced system.

It also gives you a decided advantage over "custom" systems you have to update yourself.

MSA relieves you of that time-consuming burden. We update and enhance your software for a full year. Then we continue this service for a surprisingly low annual fee.

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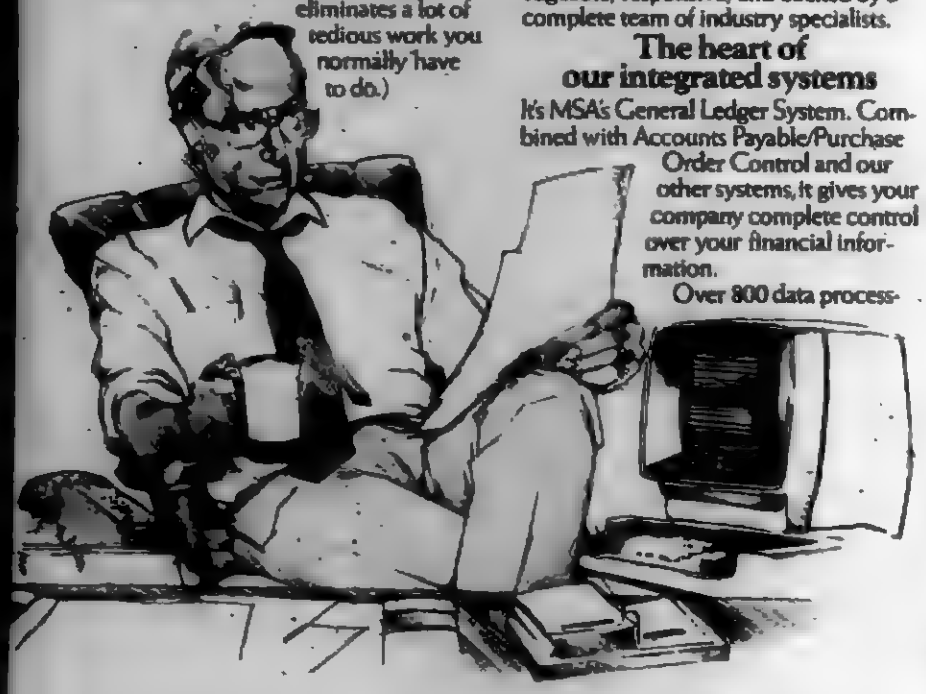
And making sure it reflects changes in accounting procedures and government regulations, including 401(k), TEFRA, and FAS52. (That eliminates a lot of tedious work you normally have to do.)



Save this box. It can help you make an intelligent software decision.

1. Can you offer us a complete range of software systems designed to work together?
Or will we have to piece together a patchwork of systems?

2. Are your systems just record keepers, or can they really help us make decisions?
Can we pull together information from any of our integrated systems? In exactly the form we want it?

3. Can you provide business software for both mainframe and microcomputers?
Do you develop this software yourself or do you simply market it for another company?

4. Are your systems truly online so all of our information is current?
How many of your systems are online? How secure are they?

5. Will my company have to be the one that discovers the bugs in your brand new system?
Just how long have your systems actually been used, and how have they been tested?

6. Will you update your systems as technology advances and regulations change?
What are some of your most recent updates? Will you keep us current on regulatory changes?

7. Do your systems really do everything you say they will?
Or will we have to change them or add to them to get the features we want?

8. How long have you been in business?
What are your revenues? What is your growth record? Where will your company be five years from now?

9. How many systems has your company installed?
How many of these were installed in the past six months? How many of your earlier customers are still using —and liking—your systems?

10. Do your financial systems handle unlimited foreign currencies?
Do your financial systems use a common set of currency exchange rates?

11. Can you link our executives' computers directly to the mainframe—so they can get their own information?
Is that software available right now?

12. How will you make sure our own people thoroughly understand your system?
Do you have educational centers near us, or will we have to travel all the way across the country to find one? Will you be there to help during installation and after?

13. How many of your people specialize in software for my industry?
How many accountants work for you? Human resource specialists? Manufacturing experts?

14. Do your systems have built-in features that make them easier to use?
What happens if someone needs help figuring out a feature? Do you have online documentation that's easy to understand?

15. As my business changes will your system be flexible enough to change with it?
Or will we have to pay a lot to revamp it? Or even regenerate it?

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And MSA systems are just as friendly as our people. Our online HELP feature actually guides users through our systems, and EASY-SCREEN™ lets them design their own screens without creating data processing nightmares.

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It's MSA's General Ledger System. Combined with Accounts Payable/Purchase Order Control and our other systems, it gives your company complete control over your financial information.

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We'll provide business software for your microcomputers, through our Peachtree Software Company.

We'll even link your microcomputers to your company's mainframe—with MSA's Executive Peachpak™ application software. A revolutionary concept that lets executives get the mainframe information they need through their personal computers.

MSA ready-to-install application software
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8. Order Processing
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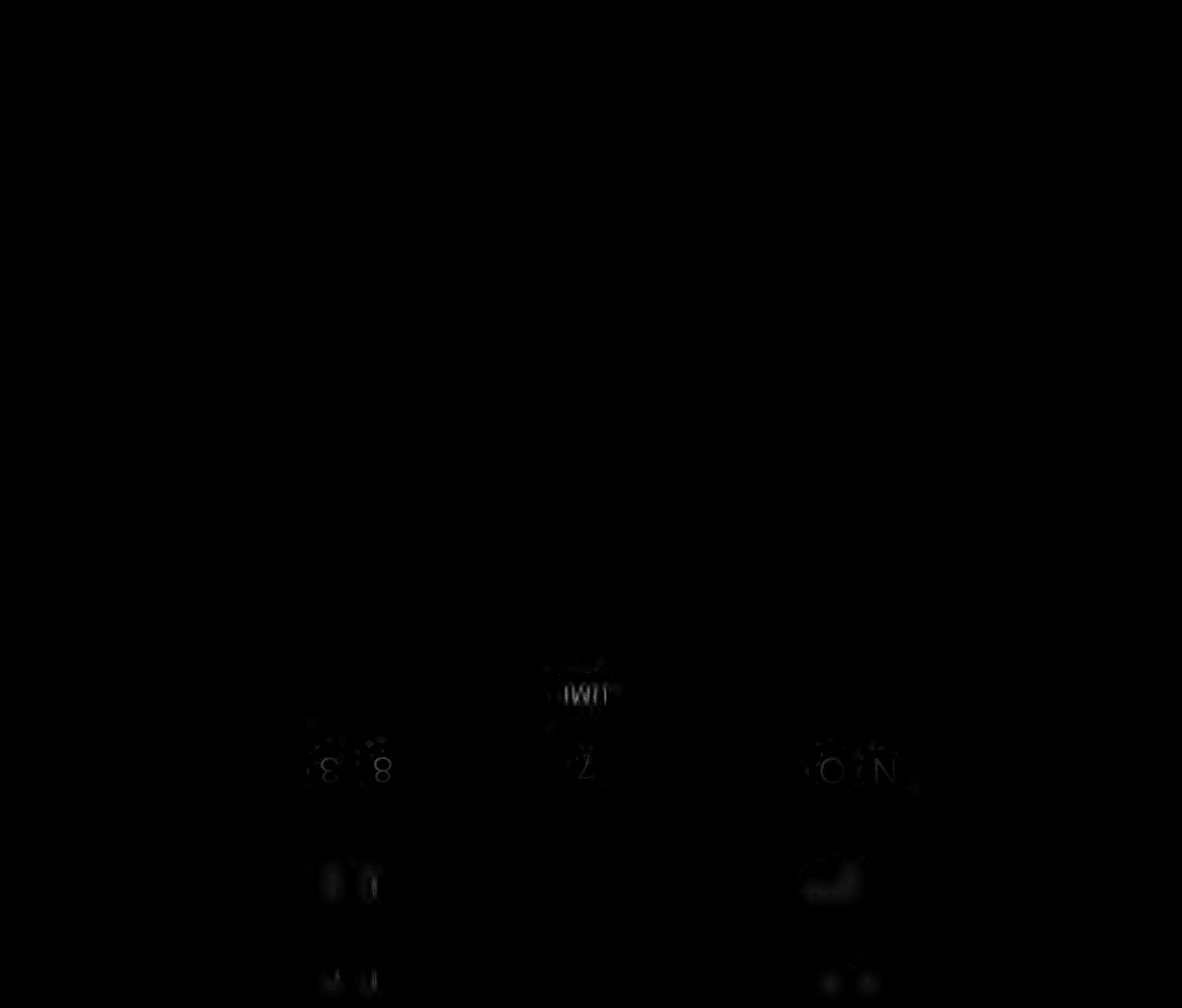

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Just Two Packages Get Top Billing In Datapro Poll Of Software Users

Complete Charts of User Ratings On Pages 45 and 46

By Paul Gillin
CW Staff

DELRAN, N.J. — Are software packages getting worse or are users just getting pickier? While Datapro Research Corp.'s 1983 "User Ratings of Proprietary Software" does not address that question, the survey does indicate that the period of unqualified user satisfaction that many packages have enjoyed in previous years may be at an end.

Continuing a trend begun in the 1982 survey, only two packages — IBM's Mapics manufacturing software and 1040 Software, Inc.'s Software 1040 tax administration package — made Datapro's top-rated group. Just two years ago, 19 packages received that honor.

The survey results also showed that overall expenditures on software packages have fallen dramatically in 1983. Of the more than 1,400 respondents who estimated their software expenditures, the average user spent $56,808 on packaged software in 1983 compared to $71,241 in 1982. However, users expect the average nearly to double in 1984 to more than $110,000.

(Continued on Page 44)

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper

Second-class postage paid at Framingham, Mass. and additional mailing offices

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NEWSPAPER

$1.50 a copy; $44/year

November 7, 1983

Vol. XVII, No. 45

PCjr Debuts; Analysts Left Unimpressed

By David Myers
CW New York Bureau

NEW YORK — IBM's long-awaited home computer, code-named Peanut but actually dubbed PCjr, may well leave corporate users wondering what all the hubbub was about.

IBM unveiled the small computer, made for it by Los Angeles-based Teledyne, Inc., at a press conference here last week. A 64K-byte version of the machine operating from a magnetic tape cassette sells for $669, while a 128K-byte floppy diskette-based model sells for $1,269.

"We expect it will find wide application as a desktop computer. That's why we're offering it through our national accounts and national marketing divisions," an IBM spokesman said. "Our feeling is that [management information systems] managers will demand it. They'll want to see if it works."

The PCjr, which will not be available until the first quarter of next

(Continued on Page 6)

Inside

Continuing to push its DOS users into VM and MVS, IBM last week announced it will sell University Computing Co.'s UCC-2. Page 2.

• • •

Pacific Telephone and Telegraph Co. added more fiber to its diet of transmission networks. Page 4.

• • •

A University of California student was arrested last week for allegedly breaking into some 200 computer accounts at computer sites around the world. Page 9.

• • •

A decision support system that lets executives and middle managers bypass the DP department and develop their own applications has been announced by Sperry Corp. Page 9.

• • •

There's some good news and some bad news for technical specialists in a recent survey of the DP job market. Page 10.

Microcomputers and technological change may be in the minds of most DP managers, but it's the erosion of their power base that is keeping them awake nights, attendees at last week's Data Processing Management Association conference said. Page 18.

• • •

Automatic teller machines may be hitting the streets with a passion, but next-day electronic funds transfer systems are what will capture the hearts of most businesses and banks, a former Chase Manhattan Bank executive suggested. Page 69.

• • •

Shuttle diplomacy is not reserved for politicians and world leaders. IBM recently transported a number of high-level retail executives into and out of a popular island resort to smooth relations between itself and the powerful Computer Dealers and Lessors Association. Page 95.

• • •

Stratus Ties Its Systems To Machines From IBM

By Jim Bartimo
And Katherine Hafner
CW Staff

CHICAGO — Software linking Stratus Computer, Inc.'s fault-tolerant systems to IBM systems and a desktop microcomputer from Data General Corp. were announced here last week at the Integrated Office Technology Conference and Exposition (Intech '83).

Stratus introduced an integrated set of software products that links its Stratus/32 Continuous Processing Systems to IBM Personal Computers and also provides a bridge to IBM mainframes running under the MVS operating system.

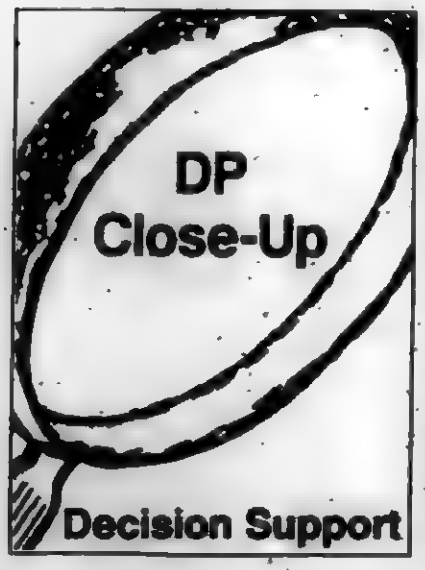
Called the Stratus Office Solution, the packages also provide some office management capabilities, such as electronic mail and calendar management, and can convert Stratus/32 data and files to or from microcomputer-based spreadsheet formats, a Stratus spokesman said. SOS is also compatible with IBM 3270 and Ascii-based terminals.

Six of the software packages composing SOS run on the 32-bit Stratus/32 processor, which acts as a host. The seventh package, SOS Ascii, operates on IBM's Personal Computer. The seven packages are:

- SOS/Exec for electronic mail and calendar management, resource scheduling and office-oriented electronic filing.
- SOS/Main, consisting of Cobol programs and job control statements running under MVS. SOS/Main is also said to provide controlled access to MVS data by allowing the transfer of data files between processors running under MVS and the Stratus/32.
- SOS/Spread, which reportedly converts data files on a Stratus/32 to

(Continued on Page 15)

DSS Departments Becoming an MIS Reality



By Paul Gillin
CW Staff

They have grown from finance, marketing or management information systems departments. Some incorporate an information center while others are planning to evolve in that direction. The software tools they use are as diverse as the forms they take.

Whatever their structure, formal decision support system departments are becoming a highly visible adjunct to traditional MIS. Interviews with DSS managers conducted recently by *Computerworld* indicate that in many companies, the departments are now reporting on a level equal to the MIS function.

At Mead Corp. in Dayton, Ohio, for example, the manager of decision support applications supervises a staff of five managers and reports on the same level as the MIS director. The functions reporting to Clay Sundermeyer include the information center, office systems, financial modeling and decision analysis within operations research. A personal computer information center will be established soon.

The decision support function grew out of operations research after "a general ground swell of interest" became apparent three years ago, Sundermeyer said. A staff of 10 now supports 850 users, "covering just about every function in the company." Users include most of the company's top executives, who have programmed function-key access to a

(Continued on Page 8)

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Second-class postage paid at Framingham, Mass. and additional mailing offices. Computerworld (USPS 694-010) (ISSN 0010-4841) is published weekly, except February 17 (year), April 7 (year), May 26 (year), July 4 (year), September 5 (year), and a single combined issue for the last week in December and the first week in January by CW Communications, Inc. One MB 375 Cochituate Road, Framingham, Mass. 01701.

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To Move Users to VM, MVS

IBM to Sell UCC Conversion Tool

By Paul Gillin
CW Staff

WHITE PLAINS, N.Y. — In an action that continues IBM's push to move users of its DOS operating system into either a VM or an MVS environment, the computer giant last week announced that it will sell University Computing Co.'s UCC-2, a DOS-to-MVS conversion facility.

UCC-2 allows DOS programs to be moved into an MVS environment without source code conversion, a spokesman said. The product thus reduces conversion time by up to 60%.

DOS facilities not available under MVS are supported by UCC-2, and MVS facilities are immediately available on DOS programs.

'Nothing Comparable'

The product is the most complete DOS-to-MVS conversion tool IBM has ever offered, a spokeswoman said. "We have had JCL conversion and conversion to VM, but nothing comparable to UCC-2," the IBM representative said.

The UCC-2 linkage editor produces executable, partition-independent MVS modules from DOS object or Core Image Library modules. The existing DOS linkage editor control statements control the UCC-2 link edit process. When a DOS program is executed under MVS, the UCC-2 interface captures DOS service requests, interprets them and automatically invokes the appropriate MVS or UCC-2 service routine.

Analysts contacted by *Computerworld* last week said the announcement reflects IBM's commitment to make MVS and VM its premier operating systems. "It's becoming clear that DOS is the odd man out," said Frank Gens, director of information systems research at The Yankee Group, a Boston consulting firm.

A Wider User Range

Gens noted that the agreement is consistent with IBM's release of MVS on the recently announced 4361 processor [CW, Sept. 19]. IBM has thus indicated that it will extend the operating system to a wider range of users.

"We may later see DOS pushed in under VM as a batch initiator," Gens said.

But IBM's spokeswoman said the push is from the other direction. "It's not that we're trying to force this trend. We saw many of our customers moving from DOS to MVS, and this is our response," she said.

Concerning the 4361 and 4381 processors, she said, "These machines should be using MVS. When running multipartitions, sharing Dasd [direct-access storage devices] and moving on-line, MVS will better accommodate this growth."

"It's a good move," said Bob Cook, president of VM Software, Inc. in Falls Church, Va. "IBM has been pushing users for a while [to migrate away from DOS]. The problem has been a transition."

However, Cook noted that MVS is not an ideal alternative for many current DOS users and that the company has failed to provide adequate tools to execute in batch under VM. "VM's batch capabilities are not very good," he said. For IBM to expect DOS users to migrate, "They're going to have to give them some better production tools under VM. I don't think we'll see DOS being pushed aside until that happens," he said.

IBM will make UCC-2 available in the first quarter of 1984 for a one-time charge of $45,000. Its National Accounts Division is located at 1133 Westchester Ave., White Plains, N.Y. 10604.

Corrections

Because of an error during the production of the Oct. 31 issue of *Computerworld*, the announcement of the TRS-80 Model 168 desktop computer from Radio Shack did not appear on Page 85 as scheduled. That story appears in today's issue on Page 16.

The average response time of Primdata's 3033 mainframe ["Calif. Users Offered Access to Swedish CPUs," CW, Sept. 26] is .7 sec, not seven seconds.

A chart accompanying "Micro Explosion Forces T/S Vendors to Refocus" [CW, Sept. 12] contained erroneous information about the remote computing services offered by Comshare, Inc. The correct information about the Comshare services follows: Business Information Systems (IBM-based); VM/CMS, MVS/TSO; Commander II (Honeywell, Inc.-based).

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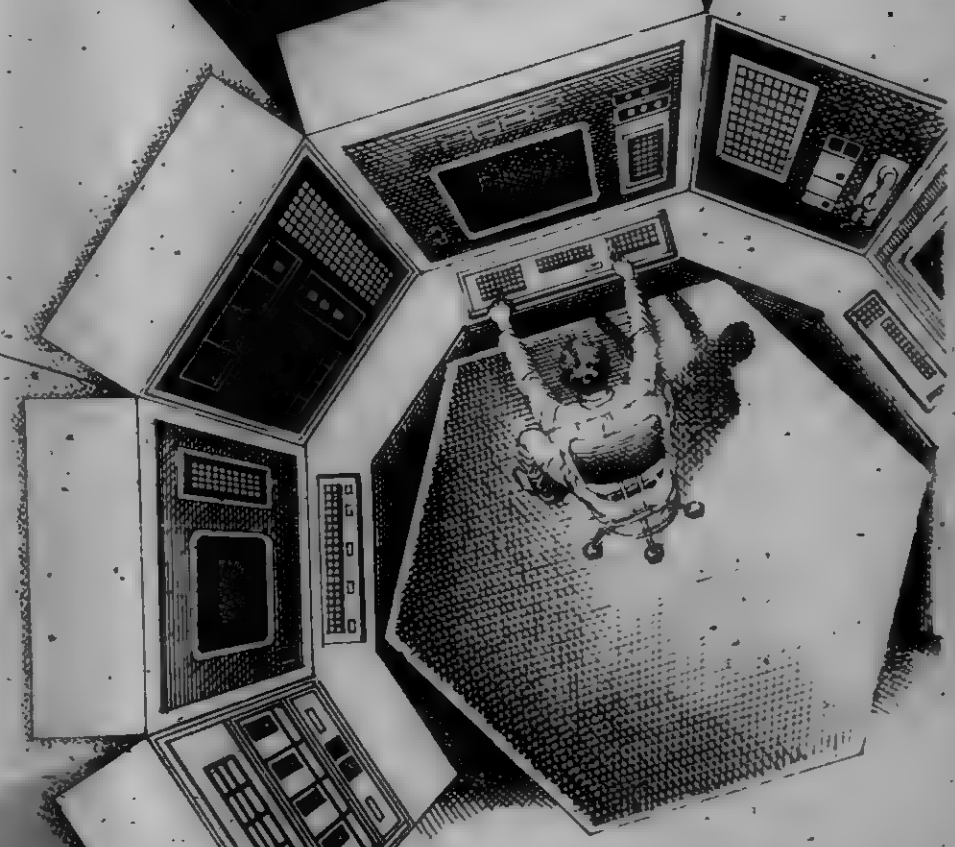

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Pacific Tel Installs Fiber-Optic Local Loops

By Phil Hirsch
CW Washington Bureau

SAN FRANCISCO — Pacific Telephone and Telegraph Co. installed three fiber-optic local loops in downtown San Francisco last week — the first such facilities to be added to its transmission network.

The new facilities will be able to put at least 90M bit/sec of digital transmission capacity on the doorsteps of some 200 downtown business locations. However, each location can be provided with up to 270M bit/sec of full-duplex digital transmission capacity.

Similar local loops were installed earlier in Miami by Southern Bell Telephone Co. However, those in San Francisco are connected to a much more extensive intercity fiber-optic communications network. As a result, they may be a better harbinger of what telecommunications users throughout the country can look forward to, as Bell operating companies, encouraged by divestiture and spurred by competition from vendors of bypass services, add wideband facilities to their facilities.

Pacific Tel's fiber-optic channels will connect all of California's major cities by 1986, according to spokesman Craig McDonald. "At that time, our network will be the most extensive in the nation, and it should be capable of providing the bulk of our business customers with high bit-rate, integrated digital voice, data, video and image services end to end," McDonald said.

At last month's Telecom '83 conference in Geneva, Switzerland, Charles L. Brown, AT&T's board chairman, said his company plans to market a broadband local-area network, developed by Bell Labs, to telephone operating companies [CW, Oct. 31]. Brown indicated that one of the first users would be Pacific Tel.

Brown was referring to fiber-optic local loops of the type Pacific Tel is installing in San Francisco. Each loop contains 72 paired fibers; 68 of the pairs carry customer traffic, explained Aaron Baker, one of the project's managers. Since each fiber-optic pair physically connects a different terminal location with a local telephone switching center, the cable is logically a broadband local-area network composed of 68 separate channels, each carried on a separate fiber pair but within a common cable.

Pacific Tel has begun marketing the three loops installed last week, and Baker confirmed a report that Bank of America is one of the prospective users.

Loops to Support '84 Olympic Games

LOS ANGELES — Besides San Francisco, Pacific Telephone and Telegraph Co. is also installing fiber-optic local loops in the Los Angeles area, where they will be used initially to support next year's Olympic Games.

The events comprising the Games will take place at 19 locations scattered throughout the Greater Los Angeles area. The most remote sites are 90 miles north, 33 miles east and 110 miles south of the city. The new local loops will connect these locations (officially referred to as "venues") via a fiber-optic network that is slated to be completed this month to interconnect all of Pacific Tel's switching centers in the area.

The major Olympic Games application will be electronic mail. Through approximately 2,000 terminals distributed among the venues, the press, athletes and Games administrative staff will be able to access electronic mailboxes housed in a computer complex located in downtown Los Angeles.

The complex consists of 12 Model 3B20S minicomputers, general-purpose machines developed by Western Electric about two years ago. AT&T plans to begin marketing the 3B20S, a modification of the computer used in some of AT&T's electronic switching systems, on an OEM basis outside the Bell system, AT&T Chairman Charles L. Brown announced at Telecom '83 last month in Geneva, Switzerland [CW, Oct. 31].

The electronic mail terminal to be used at the '84 Olympic Games is a new keyboard/CRT, the Model 5410, manufactured by Teletype Corp. Capable of operating in both directions at 1,200 bit/sec, the 5410 is said to be more user-friendly than Teletype's older electronic mail terminals.

Could a scaled-down version of this hardware and software be fashioned into a local-area network? Ira Jacobs of Bell Laboratories indicated at Telecom '83 that AT&T has such a product in mind. "Planned Bell system fiber-optic applications," he reported, "range from short links within a building to transcontinental terrestrial and intercontinental undersea links."

Reagan Backs Carriers in Access Fee Battle

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — The Reagan administration last week lined up alongside the nation's other common carriers in a dispute with the Federal Communications Commission (FCC) over charges to access the nation's long-distance telephone network that are slated to become effective April 3.

The dispute involves the differential between what the other common carriers pay for local exchange connections — which are generally agreed to be inferior — compared with what AT&T Communications, formerly the Long Lines Division, pays for local exchange connections. Under present tariffs, the other common carriers pay 65% to 75% less than what AT&T Communications pays for local exchange connection; during the first year the access charge is in effect, the differential will drop to 25%, according to the other common carriers.

Over a three-year period, the other common carriers will gradually be offered interconnection equivalent to what AT&T Communications receives, and the differential will disappear.

The other common carriers' complaint is that the improvement will be only slight next year, but their access charges will be more than twice as high. The result, according to a request for reconsideration sent to the FCC by the other common carriers last month, is that they will be precluded from becoming "meaningful competitors."

Secretary of Commerce Malcolm Baldridge agreed. In a letter sent to FCC Chairman Mark Fowler last week, Baldridge said the proposed cut in the differential is "a matter of serious concern. . . . We have carefully reviewed [the other common carriers' request for review and] believe they advance a sound case."

Accompanying Baldridge's letter was a proposal drafted by the National Telecommunications and Information Administration (NTIA), which is part of the Commerce Department, proposing an alternative access charge plan. According to the NTIA, its plan would relate the other common carriers' access charges more closely to the quality of the interconnection they receive.

Jack Smith, chief of the FCC's Common Carrier Bureau, said he expects the commission to rule before Christmas on the requests for reconsideration of the decision.

AT&T, however, called the administration's action "disappointing" because it would "continue to subsidize a discount of more than 50% for our competitors."

January Vote Eyed for S. 1660

WASHINGTON, D.C. — In additional developments related to the Federal Communications Commission's (FCC) access charge decision:

- Senate Majority Leader Howard Baker (R-Tenn.) said last week he plans to bring S. 1660 to the floor of the U.S. Senate for a final vote early next January. The legislation would drastically alter the FCC's access charge plan and make a number of other structural changes in the U.S. telecommunications industry.
- The U.S. Court of Appeals has delayed further consideration of several appeals asking review of the FCC access charge decision. The court pointed out that pending legislation, if enacted, would make major changes in the plan. It also said that the FCC, in the process of reviewing the voluminous tariffs filed recently by AT&T and the Bell operating companies to implement the plan, will reconsider many of its key provisions.

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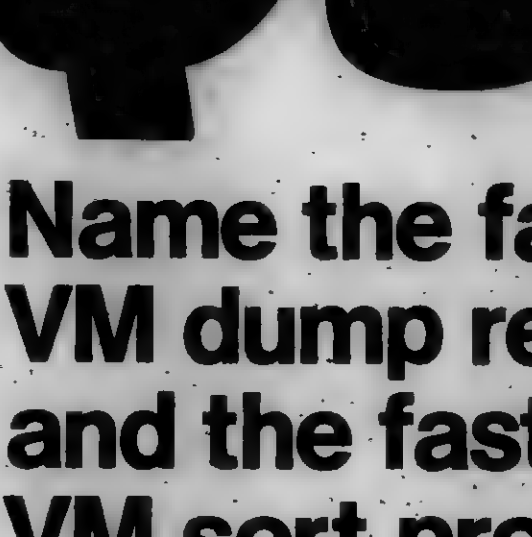

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Shelling of 'Peanut' Leaves Corporate Users Hungry

(Continued from Page 1)

year, will be sold through retail outlets as well as by IBM's national accounts and national marketing crews. IBM spokesmen at the press gathering here last week admitted the company had missed the Christmas season with the computer.

IBM said in a prepared statement that the new machine is aimed at the home, classroom and office markets. But industry analysts questioned after the press conference whether the machine is right for corporate users of the IBM Personal Computer who might want a compatible micro to use at home.

"My feeling is that this marks IBM's entry into the home market and nothing more," one analyst said privately. "This is the kind of machine a guy buys his kid to learn about computers."

Many analysts at the PCjr's debut complained about the computer's keyboard, which several observers described as "toy-like." The keyboard has 62 keys, is detachable and can be powered by small batteries for cordless, infrared operation.

Most criticisms of the device centered on its lack of function keys. "Unless you build in a high degree of functionality, you're stripping it down to the level of the lowest common denominator," one analyst said.

An IBM product manager said the keyboard is "mapped" for the same functions performed by the Personal Computer, but admitted that the missing function keys would mean that multiple keystrokes would be required to perform those functions. IBM would not say who built the keyboard for the company, nor would it reveal the keyboard's life expectancy.

The PCjr is equipped with an Intel Corp. 16-bit 8088 microprocessor. The $1,269 version of the machine, fitted with a 360K-byte 5¼-in. double-sided disk drive, runs Release 2.1 of PC-DOS. IBM said this operating system makes the PCjr compatible with a selection but not all of the diskette programs written for the Personal Computer. The Personal Computer runs under PC DOS 2.0 and Microsoft, Inc.'s MS-DOS, as well as Digital Research, Inc.'s CP/M 86 and MP/M 86.

Along with the PCjr, IBM is offering an internal $199 asynchronous modem, which a spokesman said would equip the small computer for office use.

In related announcements, IBM took the wraps off two new printers. One, a $175 thermal printer, was designed for the PCjr but can be adapted via a connector to operate off the company's Personal Computer and Personal Computer XT. The second peripheral, priced at $1,995, is an eight-color printer for the Personal Computer and XT microcomputers.

The PCjr can be used at home, in the classroom or at the office, IBM said, but admitted it can not run all of the Personal Computer software.

PCjr Memory, Operating System Spark Analysts' Concern

By Tom Henkel
CW Staff

Is it a toy or the answer to an executive's prayer?

IBM seems to think the PCjr, its latest and smallest microcomputer, is both. Industry watchers and corporate users of IBM's larger Personal Computer and Personal Computer XT had mixed opinions when they were interviewed last week after the newest micro's formal introduction.

IBM is promoting the PCjr's ability to run computer games, home finance and educational applications. An IBM spokesman, however, was quick to point out that the PCjr can also run almost any application designed for the Personal Computer and Personal Computer XT — provided those applications take up less than 128K bytes of memory and are compatible with the PCjr's operating system — PC-DOS Release 2.1.

The memory and the operating system of the PCjr seem to be the two major concerns of consultants and corporate users of IBM micros. Everyone seems to agree that the low-end $669 PCjr configuration is virtually worthless for any kind of serious business application. But the larger $1,269 model, which offers 128K bytes of main memory and a floppy disk drive, can be enhanced with a printer, modem and monitor to be adequately used as a home supplement to an office-based Personal Computer or Personal Computer XT. Several industry watchers, however, suggested that most business users of the PCjr will spend at least $1,500 on a complete system.

The PCjr uses a new release of IBM's PC-DOS operating system, which was designed to accommodate the slower "slim-line" disk drive used on PCjr. For most applications, an IBM spokesman said, Release 2.0 and 2.1 applications should run interchangeably. But the spokesman could not promise all applications would run without a hitch. IBM plans to review all the applications available for the Personal Computer or the PCjr "on a case-by-case basis" to identify problem applications.

Another question surrounding the PCjr is whether the unit will offer enough main memory to accommodate business applications. The currently available 128K bytes is not enough to run commonly used business applications, such as Lotus Development Corp.'s 1-2-3, noted Ted Kaplan, president of the Boston Center for Computer Applications.

The trend toward user-friendly microcomputer applications has created a subtrend toward larger, more sophisticated software programs, Kaplan said. He noted that 1-2-3 requires a minimum of 192K bytes.

But in addition to 128K bytes of main memory, the PCjr has two slots to accommodate read-only memory (ROM) cartridges. Skip Bushee, executive vice-president at Infocorp, a Cupertino, Calif.-based microcomputer market research firm, contended that software companies offering floppy disk versions of programs for the Personal Computer and Personal Computer XT will soon start marketing those programs on ROM cartridges for the PCjr.

One user interviewed last week, Joseph Brophy, senior vice-president of management information systems at Travelers Insurance Co. in Hartford, Conn., thought the PCjr "looked pretty good." Travelers, which has approximately 4,000 corporate Personal Computer and Personal Computer XT micros, is considering buying large quantities of the PCjr and offering them to employees, possibly on a payroll deduction scheme or at a discount.

Infocorp's Bushee emphasized that while IBM is currently offering a bevy of games and home-computing software for the PCjr, its real target market is the executive. Games and other software that might appeal to the rest of the family serve as an added benefit in helping the business user justify buying the home unit, he said.

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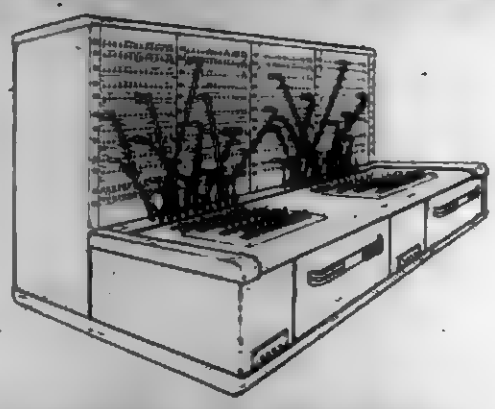

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Formal DSS Departments Becoming Reality

(Continued from Page 1)

customized set of decision support tools created within the company (see story below). More than 30 Mead locations can access the central DSS through leased line or asynchronous communications.

A distributed DSS at Harris Corp. in Melbourne, Fla., supports 1,200 active users "addressing everything from financial analysis to corporate management and manpower planning" in the areas of marketing, finance and accounting, production and program management.

According to Richard Wood, manager of decision support services at Harris, the department is "literally a worldwide time-sharing network with DSS networked into the corporate mainframes." Using Harris satellites, common carrier telephone lines or Tymshare, Inc.'s Tymnet, "you can be anyplace in Europe, Asia or North America and dial up a local phone number to connect into the DSS center."

DSS billed $1.1 million for services last year, the equivalent of $10 million to $12 million worth of commercial computing, Wood said.

Harris' four-person DSS consulting and education staff is largely from a business background. "We have found it's easier to train them in the required amount of MIS activity they need to know than in the business acumen," Wood said.

Although the staff is small, the work load has been manageable. "We find users have to be very quickly self-sufficient," Wood said. "Often they use local MIS people to help them in systemization, and they do their own applications."

Resentment and Tension

Some managers interviewed by *Computerworld* reported that they have had to cope with some resentment from MIS employees toward the high-visibility DSS function. "At first there was a sort of antagonism among MIS that I had this high-visibility position," said Nancy Stager, manager of DSS at Unitrode Corp. in Lexington, Mass. "We dealt with that by giving credit where credit was due on all projects. And the MIS manager and I have a lot of respect for each other."

There was also some initial tension between DSS and MIS at Cal Gas Corp. in Sacramento, Calif., according to John Skelly, manager of business systems support. "DP is a thankless task," he said. "When these guys saw us working with top management and getting all the kudos, there was some resentment. We dealt with it by interviewing in-house to see if DP people had career goals in this area. But we emphasize that they have to learn the concepts of the business first."

Skelly was one of the original members of the DSS group chartered in 1978 at Dillingham Corp., Cal Gas' parent company. The group was created out of MIS after "we found we worked a lot with management doing financial modeling and data access. It struck us that what we were doing was more in line with DSS," he said.

Skelly now supervises one programmer/analyst in a department that serves about 20 users, most of whom are upper level executives. The department works closely with MIS on many projects, and DSS has even been incorporated into some production applications.

Maintaining close ties with MIS was also cited as a critical factor by Unitrode's Stager. DSS evolved there about four years ago when the company installed a Hewlett-Packard Co. HP 3000 minicomputer.

"The execs were frustrated because they had spent all this money developing these on-line systems, and the lower level people were getting all the benefits while they weren't getting any pay back," Stager recalled. "It got to be that more than 50% of my job was doing ad hoc requests."

Supported in large part by the vice-president of corporate planning, Stager developed the DSS job and has written most of the applications to support the 10 regular users. She also maintains the extracted data base that users access with microcomputer-based tools. DSS at Unitrode is heavily dependent on microcomputers, she said. Some programmers are working on micros now, and a link to the HP 3000 is planned for 1984.

Managers List Most Popular DSS Tools

By Paul Gillin
CW Staff

To succeed in business, a decision support system (DSS) function must be small and use a lot of customized software. That was the consensus from DSS managers interviewed recently by *Computerworld*.

Among the most popular DSS tools listed by users are financial modeling and analysis packages, data base management systems (DBMS), graphics and high-level languages. Most DSS departments surveyed also provide customized query and retrieval systems that offer "one-button" answers to nontechnical users.

The heart of the decision support applications department at Mead Corp. in Dayton, Ohio, is a reporting and graphics tool developed in-house and called the Executive Information System (EIS), according to Clay Sundermeyer, manager of the department. Written with extensive input from executives, the system allows the user to perform programmed function key graphics and exception reporting with a full set of query capabilities customized for Mead executives.

Other Tools

Other tools include SAS Institute, Inc.'s SAS; Execucom Systems Corp's Interactive Financial Planning System (IFPS); IBM's Professional Office System (Profs); Information Builders, Inc.'s Focus; and a mainframe spreadsheet called Electronic Spread Sheet from Trax Softworks, Inc. of Los Angeles. The department has a dedicated IBM 3032 mainframe with the VM/CMS operating system and Information Builders' Focus fourth-generation language and DBMS.

Users can access EIS directly from IBM's Profs by pushing a programmed function (PF) key. The goal in designing such ease-of-use features was "to create an integrated environment in which users don't have to feel like they have to learn a whole bunch of programs," Sundermeyer said. "The same PF keys are largely transportable across Profs and EIS."

Similarly, the business systems support group at Unitrode Corp. in Lexington, Mass., relies upon an internally developed system called the Decision Support Data Base, an ad hoc query and reporting package based on Hewlett-Packard Co.'s Image DBMS and a report writer from Quasar Systems, Ltd. of Canada. Data is loaded from the production data base into the DSS data base each week.

A key element of a successful DSS department is "good relations with MIS [management information systems]," said Nancy Stager, manager of DSS. "I haven't had to hire any people because I can always go to MIS for help," she said. Expenses for computing are shared between the two departments; between 10 and 20 IBM Personal Computers are being brought in next year under the DSS budget.

A successful DSS function must be small, responsive and tightly tied in with MIS, according to John Skelly, manager of business systems support at Cal Gas Corp. in Sacramento, Calif. "The DSS service can't be effective if it's large," he noted.

DSS at Cal Gas initially reported to the vice-president of finance, which "at the time was appropriate because it caused people to recognize that the service was more like a planning department."

However, business systems support is now tied more closely to MIS. The departments will soon share a Digital Equipment Corp. VAX-11 superminicomputer running Oracle Corp.'s Oracle relational DBMS and IFPS for DSS functions.

"You should try not to distinguish for users between DSS and MIS," Skelly said. "Ultimately, if you have MIS as a separate service then DSS belongs there."

The key to managing a successful center with a large number of users "is to pick the right software and integrate it," according to Richard Wood, manager of decision support services at Harris Corp. in Melbourne, Fla. Harris' four-person DSS department serves 1,200 users with a style that emphasizes up-front training and handing over control to users as quickly as possible.

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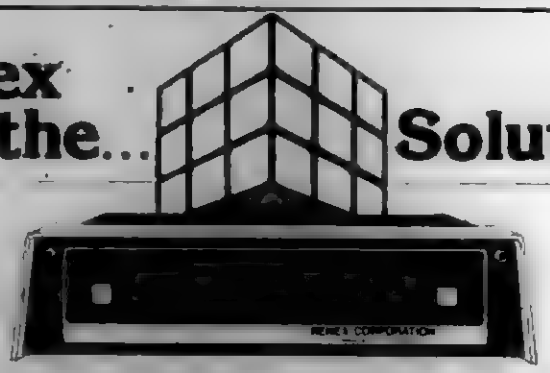

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Sperry Combines Mapper, 1100 To Form DSS

By Tom Henkel
CW Staff

BLUE BELL, Pa. — Sperry Corp. today announced that it has combined its fourth-generation language, Mapper, and a 36-bit, very large-scale integration version of its 1100 series mainframe to form a new stand-alone system, the Mapper 10.

Designed for executives, middle managers and administrative personnel, Mapper 10 is a decision support system which Sperry said allows users to bypass the DP department and develop their own applications. It is software-compatible with other Sperry mainframes.

Capabilities that allow the Mapper 10 to access information stored in IBM mainframes will be available in November 1984, Sperry said.

Available in three basic configurations, Mapper 10 allows users to organize, manipulate and extract needed information. The software has been available for Sperry 1100 and System/80 Series processors for about two years.

The Mapper 10 system features color graphics, word processing, electronic mail and similar office functions. In addition, it permits relatively unsophisticated users to initiate data searches, sorts, merges and computations necessary to carry out "what if" analysis, Sperry said.

Most users can learn the basics of the system folowing a two-day training course, a spokesman said.

In addition to the Mapper software, the Mapper 10 can be equipped with Sperry's Sufics, a nonprocedural financial modeling and business planning package. The Sufics software costs $26,950.

Color Graphics Option

Also available for the Mapper 10 is a color graphics option which allows connection of color terminals and a color plotter. The $5,400 option allows users to display numerical information graphically.

The hardware component of the Mapper 10 system consists of a 36-bit central processor which can be equipped with 2M to 8M bytes of main memory. The system supports up to 32 users. The Mapper 10 processor is roughly equivalent in power to the 1100/60 and can accommodate up to six fixed disk drives for a maximum disk capacity of 1.2G bytes. Its basic configurations are:

- The entry-level offering, which features 2M bytes of main memory, console, two fixed disk drives (406M bytes), one streaming tape drive and one printer. It costs $200,000.
- The mid-range configuration, which offers 4M bytes of main memory, console, four fixed disk drives (816M bytes), one streaming tape drive, two Sperry Uniservo 22 tape drives and one printer for approximately $350,000.
- The top-of-the-line configuration, which offers 8M bytes of main memory, up to six fixed disk drives (1.2G bytes), two streaming tape drives, four Uniservo 24 tape drives and printer for about $550,000.

Sperry can be reached through P.O. Box 500, Blue Bell, Pa. 19424.

Student Charged With Tapping Into Arpanet Sites

By Katherine Hafner
CW Staff

LOS ANGELES — A University of California student here was arrested last week and charged with 14 counts of felony after he allegedly broke into some 200 computer accounts at computer sites around the world linked to the U.S. Department of Defense's Advanced Research Projects Agency Network (Arpanet).

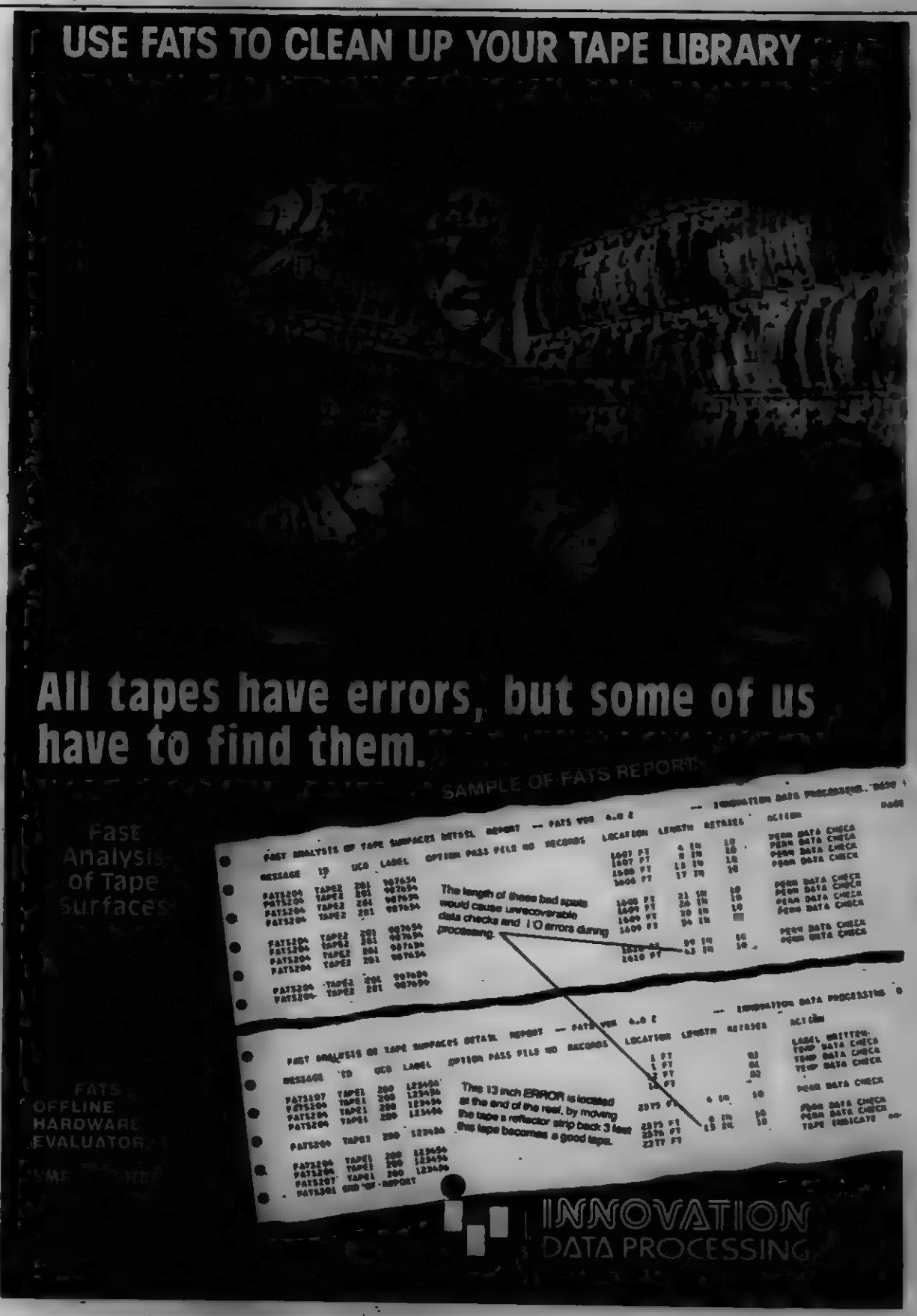
Ronald Mark Austin, 19, was arrested last Wednesday at his home in Santa Mortica, Calif., held on $10,000 bail and arraigned the following day. The arrest was made by the Los Angeles District Attorney's office.

Austin reportedly used his home computer to gain access to 14 sites participating in Arpanet. He allegedly tampered with several hundred computer accounts and in some cases destroyed information files.

If found guilty, Austin faces penalties ranging from 16 months to three years in prison and a $5,000 fine on each count, with a maximum sentence of six years.

"This is more than a prank pulled by a young kid playing games on his computer," said Al Albergate, press secretary in the district attorney's office. "We estimate it will cost all these different agencies and institutions hundreds of thousands of dollars to reprogram their systems."

The sites Austin allegedly tapped include The Mitre Corp. in Bedford, Mass.; the Naval Ocean Systems Center in San Diego; the Naval Research Laboratory in Washington, D.C.; the Rand Corp. in Santa Monica; the Telecommunication Administration in Norway; Purdue University in West Lafayette, Ind.; BBN-Communications Corp. in Cambridge, Mass.; the University of California at Berkeley and Los Angeles; the University of Wisconsin; SRI International of Menlo Park, Calif.; Computer Science Network of Madison, Wis.; Cornell University in Ithaca, N.Y.; and Information Science Institute of Marina Del Rey, Calif.



Survey Finds 'Plain-Vanilla Programmer' Less

By Lynn Haber
CW Staff

NEW YORK — There is some good news and some bad news for technical specialists in a recent survey of the DP job market that was compiled by Dunhill Personnel Systems, Inc. here.

The good news is that, relatively speaking, the number of jobs for systems programmers and programmer/analysts increased dramatically during the first half of 1983 compared with the first half of 1982. Systems programmers increased their piece of the DP salary pie by 7.7%, and programmer/analysts took a 48.4% slice of the same pie, a 3.3% increase from the previous year (Figure 1).

The bad news: programmers' hiring share was cut by almost 5%, reinforcing the trend in which hiring officials are finding the "plain-vanilla programmer," once the industry's mainstay, a less attractive commodity.

The new figures, compiled by Dunhill computer and DP specialist Rick Kean, indicate that the shift in DP job roles and functions precipitated by the economic hard times in 1982 are continuing into 1983. "Since 1982, there have been very extensive changes in the marketplace, which created some hiring rules, and as we went into 1983, it was anticipated at least by some that these rules would change back to the old way. But that's not what's happening," Kean said. "The relationship between services and manufacturing firms, in terms of who's hiring, remained almost the same since 1982.

'Since 1982, there have been very extensive changes in the marketplace, which created some hiring rules, and as we went into 1983, it was anticipated at least by some that these rules would change back to the old way. But that's not what's happening.'

"And," he added, "the trend that had already started toward hiring programmer/analysts and system programmers over programmers and systems analysts continued to grow." As firms implement more applications packages, the programmer increasingly needs to become a generalist. "You've got to be a little bit of a systems analyst, a little bit of a programmer — and a lot of a politician," Kean noted.

Another indication of the lack of demand and interest shown by hiring officials toward programmers is a decline in the average salary that programmers are being offered. According to the study, salary levels for all other groups increased, though the composite growth rate in the first half of 1983 was lower (4.6%) than it was in the first half of 1982 (5.3%). When programmers were excluded from the equation, the composites for the remaining three titles showed an 8.1% increase for the first half of 1983 compared with 6% in the first half of 1982.

Salaries for programmer/analysts did not climb significantly since 1982, and the percentage of increase was not as great in 1983 as it was in 1982, but the trend toward increased salaries for programmer/analysts is starting to accelerate.

According to the survey analysis, programmer/analyst salaries increased faster than any other group in 1982 and slacked off in early 1983 as demand caught up with a slightly overabundant supply.

"The feeling is that around January, even though the economy was beginning to recover, the signs weren't clear enough for companies to have the confidence to go out and make a lot of decisions, so I think there was just a bit of a breathing period there for a while," Kean said.

System programmers' salaries rose

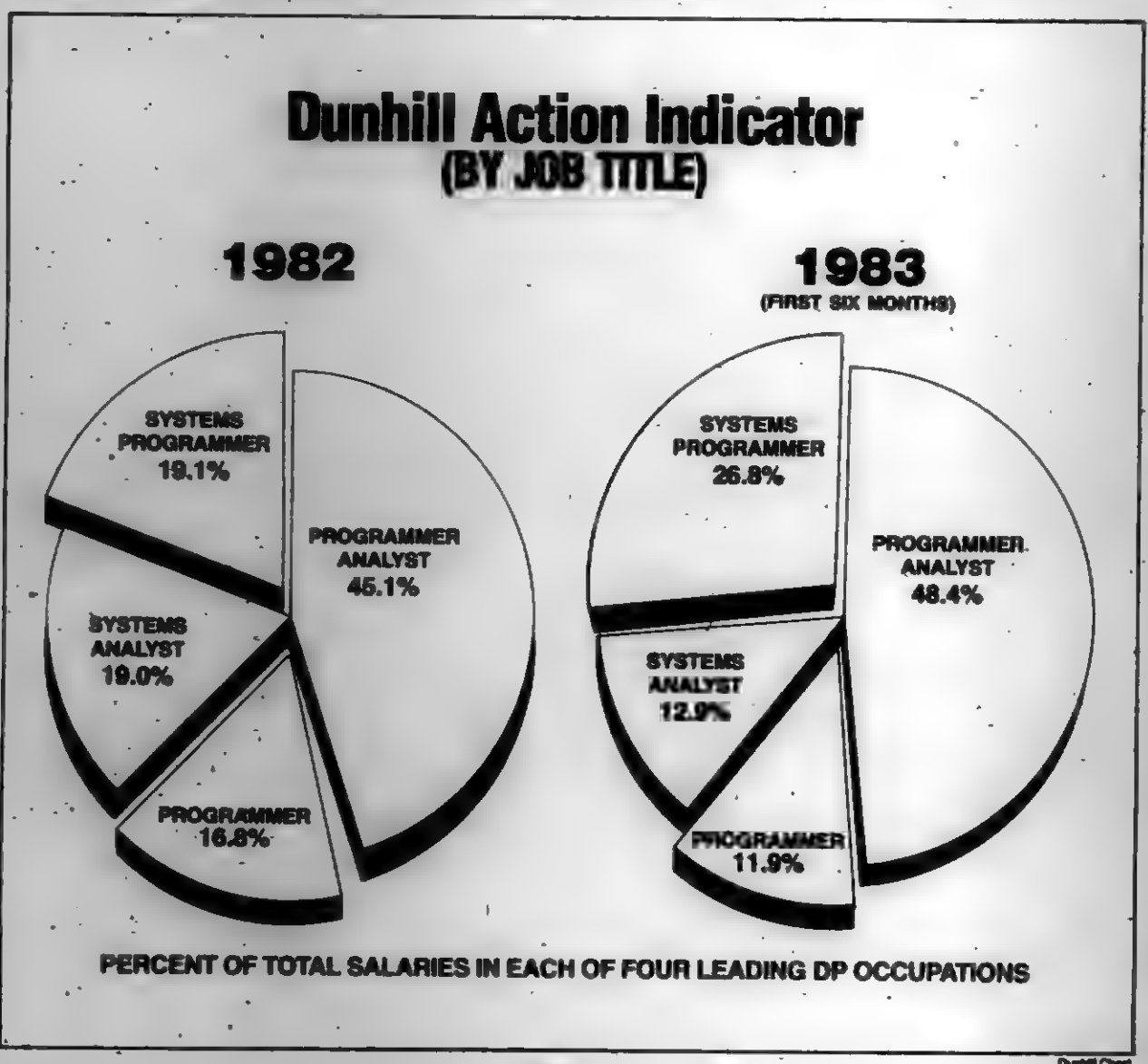


Figure 1

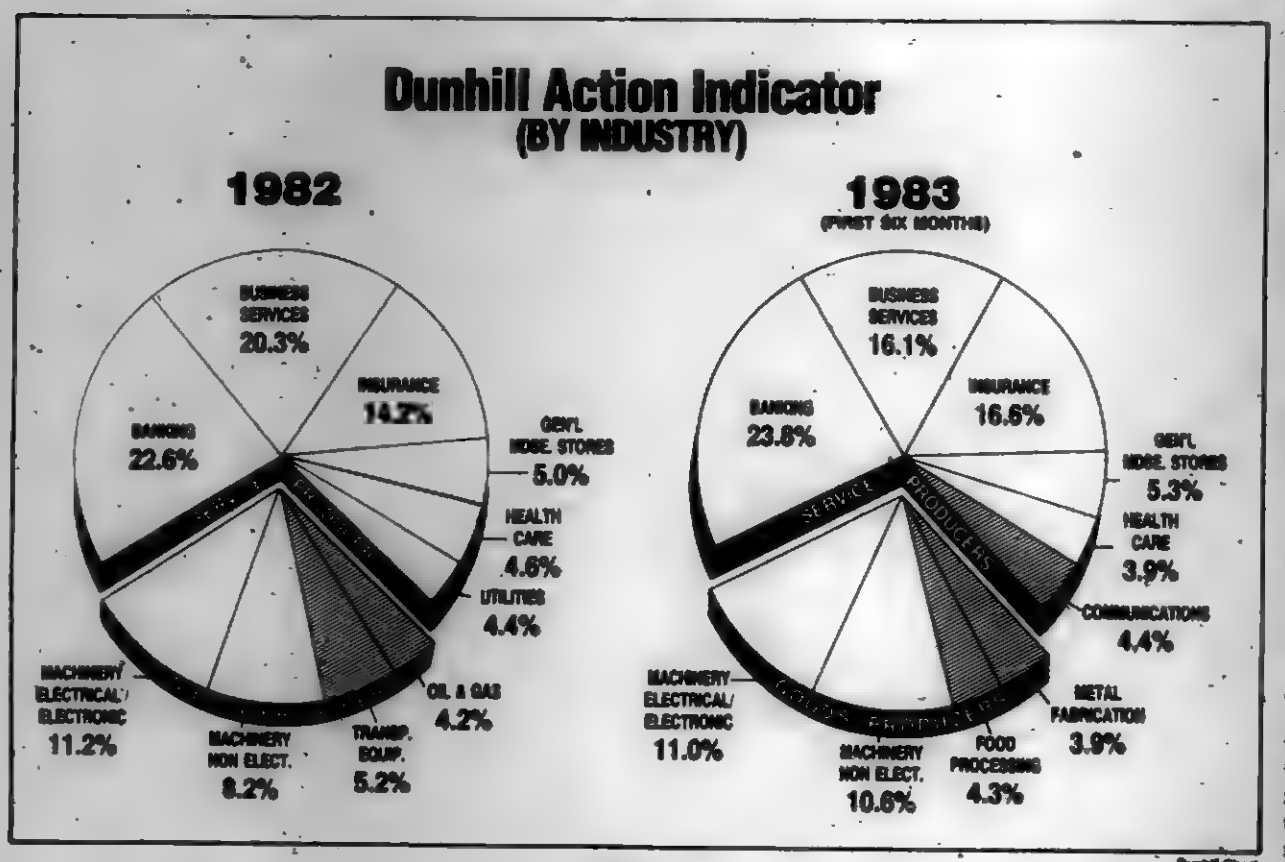


Figure 2

Attractive Commodity

because the programmers were in increasing demand — a demand supported by the growth of packaged software, the need to interface mainframes with small computers and the growth of data communications and data base applications, according to the study.

"The more software packages there are, the more you need a doctor if something goes wrong," Kean observed.

System analyst salaries have gone up even though the amount of hiring activity for them has gone down. "A lot of companies using the system analyst title are really hiring a person who is a functional manager. What they're hiring functional managers for is not so much for analyst skills, which they get from the programmer/analyst, but more for the supervisory skills — the system analyst person will be tying together a series of modules developed by different projects. The whole function is really changing," Kean said.

'The more software packages there are, the more you need a doctor if something goes wrong.'

The result of this changing definition of the system analyst's job, he said, is that those who hold this title occupy a more senior position and, therefore, command more money.

Survey data also shows that overall hiring demand is increasing and that with a gradually accelerated growth in demand, a candidate-scarce situation by the end of the first quarter of 1984 can be expected.

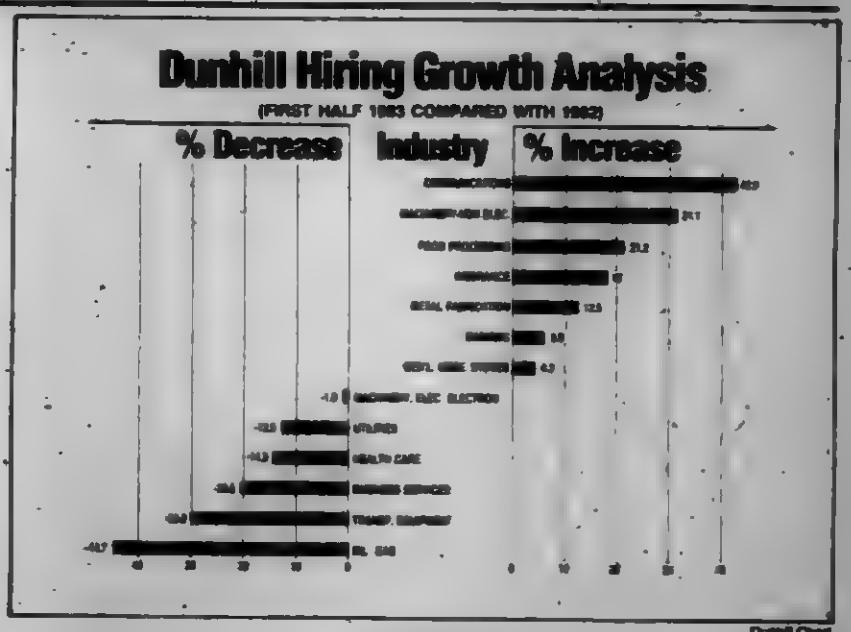


Figure 3

Survey Reveals Stability In DP Job Mart

NEW YORK — The profile of the DP professional currently in high demand may be changing, but there has been almost no change in where he is most likely to find a job.

A recent survey of the DP job market by Dunhill Personnel Systems, Inc. found that information-intensive service producers like banks and insurance companies moved down only 1% (from 71.1 to 70.1%) in terms of hiring action during the first half of 1983. As in 1982, manufacturers provided approximately 30% of DP-related jobs so far this year (see Figure 2 on Page 10).

This stability indicates that the changes evident during 1982, when service producers began to provide the majority of jobs in the DP area, are structural rather than temporary aberrations, Dunhill analyst Rick Kean maintained.

However, data showing relative growth in specific industries (Figure 3) illustrates very rapid growth for communications (42.9%), nonelectric machinery (31.1%) and metal fabrication (12.5%). Slow but steady advances came in banking (5.9%) and general merchandise stores (4.3%).

According to Kean, it is reasonable to expect that an industry segment with a small market share, such as communications, would post a large growth percentage. But what is surprising and very significant, he said, is that an industry segment with a large market share — machinery, nonelectric or business services, for example — would post a large change.

These changes indicate that although the impact of the manufacturing rebound has not yet arrived, it is on the way, Kean said.

"I don't think the 70:30 services-to-manufacturing relationship will become a 50:50 relationship in the forseeable future," he added. "But the relationship might change to, say, a 60:40 figure with services still dominating the hiring segment."

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At 'Express' Users Group Forum

MIS Advised to Help End Users Define Goals

By John Gallant
CW Staff

BOSTON — Management information systems (MIS) professionals must help corporate managers clearly define their goals in order to design the tools they need to achieve them, the director of MIT's Center for Information Systems Research said here last week.

Speaking at the MDS, Inc. Express Software Users Group's Second International Conference, Dr. John Rockart urged MIS designers to utilize what he called Critical Success Factors (CSF) analysis to get managers to think about the information they need to fulfill their most important tasks. After management's information needs are clearly defined, he said, data bases and reports can be designed to meet those needs.

According to Rockart, who is also senior lecturer of management science at MIT's Sloan School of Management, CSFs are a set of tasks that must be achieved to meet corporate goals. Citing the U.S. auto industry as an example, he said that improved quality, sound pricing strategy and cost control are the CSFs behind the goal of survival in the face of increasing foreign competition.

Rockart said CSFs arise from the particular industry in which a company exists and from a firm's competitive position and strategy within that industry. He also said CSFs could be affected by temporal factors, such as a threatened strike or increasing government regulation.

MIS-Management Cooperation

Once CSFs have been defined, MIS designers must work with management to determine methods to measure progress toward their achievement. "This analysis is a bridge from the manager's world to the MIS world," Rockart said. "You must take the manager from a general view of his world — the corporate goals — to a more specific view of what the CSFs are. Once you determine the information you need to measure these CSFs, your information system needs are spelled out clearly."

According to Rockart, CSF analysis is useful in a number of different ways. It can be used to develop specific reports and data bases for use by an individual manager or a top-level management team. In addition, the analysis can be used to define information system planning priorities, pointing out where time and money should be spent in developing MIS tools.

Finally, CSF analysis can be used for management resource allocation to indicate where efforts must be focused to achieve the now clearly defined corporate goals.

Too often the process works in reverse, with DP personnel telling management, "This is the data base we have. Tell us what you need to know." But, he said, "it's difficult for managers to think of their information needs from the MIS end up. You have to take them from their end, the management end, to the MIS end in order to provide the necessary information systems."

CSF analysis is a "management focusing device" that MIS designers can employ with individual managers or with management teams in a "focusing workshop," Rockart said. "This is an excellent method to engage senior management, to draw their attention and make them understand the information they need."

Because the environment in which a corporation exists is constantly changing, he explained, management must be aware that corporate goals evolve as a result. As means to those ends, the CSFs also change, requiring a constant assessment of management information needs.

"If an analyst can understand the forces from which the CSFs arise, he can build a template of what management needs information wise," Rockart said. "But, that person must be able to interact with management to discover exactly what is needed. And, above all, the analyst must learn to listen."

European Users Establish Group

ROCKVILLE, Md. — Performance Systems, Inc. recently announced the formation of a European Scert Users Association.

The initial meeting of the association was held in London, Sept. 29. Elected as officers of the users association were Anne Marie Amos and Carol Piper of England's Customs and Excise Department, cochairwomen, and Richard Scotney of England's Inland Revenue Department, secretary.

A fourth officer and the board of directors will be elected at the next meeting on Nov. 17.

More information on the users group can be obtained from Performance Systems, 30 Courthouse Sq., Rockville, Md. 20850.

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Reagan, Deputy Commit Administration to OA

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — President Reagan and a White House official told a conference here last week that the administration is committed to improving government efficiency through office automation.

In a videotaped address to the Federal Office Automation Conference, Reagan spoke of his administration's efforts to control waste in federal programs and cut paperwork. "Despite these efforts," he added, "our government needs something more — good management."

Beyond efficiencies gained through automation of government clerical and support functions, Reagan said, "we need to get our managers and professionals into the act."

Saying "we owe it to the American people to give them a government that operates in a business-like manner," Reagan said the administration "will continue to develop our [OA] program to include managers and senior executives."

Craig L. Fuller, assistant to the president for Cabinet Affairs, said in his conference keynote address that because the product of government is information, "it is important that we have the best tools available to manage information." Fuller's office, which coordinates communications between the White House and the executive department and agencies, relies heavily on word processing, electronic mail and other OA technologies.

Of reliance on these technologies, Fuller said, "the president's come to accept it, the Cabinet members have come to accept it and the senior staff members have come to accept it."

Noting the explosive increase in office automation and microcomputer use in particular, Fuller told the conference that "we all better dedicate ourselves to learning how to use this resource wisely."

Washington Update

Supreme Court Upholds Win For IBM Over Transamerica

WASHINGTON, D.C. — The U.S. Supreme Court last week upheld IBM's victory in a lower court that ruled the firm had not violated antitrust laws as charged by Transamerica Corp.

Without comment, the high court refused to consider a Transamerica appeal of the adverse decision reached earlier this year by a San Francisco federal appeals court [CW, Feb. 28]. That decision confirmed a 1979 ruling against Transamerica in its suit involving IBM's pricing practices for peripherals.

Transamerica had charged IBM with driving it from the IBM-compatible peripheral market by predatory pricing. After a four-month trial and a hung jury, the judge in the original action ruled that IBM's pricing actions could not be found to have unreasonably or unfairly restricted competition in the peripheral market.

United Airlines Asks Court To Quash CAB Request

WASHINGTON, D.C. — United Airlines has asked a federal court here for relief from a Civil Aeronautics Board (CAB) investigation of the airline's computerized reservation system.

United said the CAB disregarded its own procedures and regulations in requesting airline documents in the ongoing CAB proceeding to develop regulations for computerized reservation system operations. The board's action is in response to complaints that United and other airlines offering computerized reservation services are unfairly hindering competition [CW, Aug. 15].

United asked the District Court here to quash the CAB request for documents relating to the rule making procedure. The airline said the document request is "at least in part an investigative subpoena designed to determine whether [United] and other [computerized reservation system] operators are engaged in unfair and deceptive practices."

The motion, filed Oct. 28, said the CAB should have appointed an administrative law judge in the proceeding and requested a subpoena for the documents.

Reagan Asked to Negotiate U.S. Access to NTT Bidding

WASHINGTON, D.C. — On the eve of President Reagan's trip to Japan, 15 U.S. senators have asked him to take steps to ensure American firms greater access to the Japanese telecommunications equipment market.

In an Oct. 31 letter to Reagan, the senators conveyed their "disappointment" that the soon-to-expire agreement by Nippon Telephone and Telegraph Public Corp. (NTT) to open its $3 billion annual equipment procurements to U.S. bidding has resulted in less than 1% of NTT contracts being awarded to American firms.

The senators said the breakup of the Bell system here will most likely result in Japanese firms obtaining

(Continued on Page 14)

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Speaker Sees New Frontiers for Microprocessor

By Jim Bartimo
CW Staff

CHICAGO — The advent of the integrated circuit and the subsequent development of the microprocessor has brought about changes comparable in significance to the invention of the alphabet, according to William Zachmann, vice-president of corporate research for International Data Corp. (IDC) and a speaker at the Integrated Office Technology Conference and Exposition (Intech '83) here last week.

"You have to go back a millennium to see this type of impact and change," Zachmann said. "For the first time, we're looking at desktop systems that exceed the capabilities of the mainframe," he added, referring to Apple Computer, Inc.'s Lisa and Visicorp's Vision software as examples of this technology.

One reason these capabilities are possible is because "the bandwidth of the connection from the memory to the screen is very much higher than you can get with a mainframe."

CW at Intech '83

Another developing aspect of the microprocessor frontier is the slow phasing out of eight-bit technology, which characterized the first microcomputers.

"The eight-bit computers are already becoming fading photos in the album," Zachmann said. They are being replaced by 16-bit machines not because the size of the address bus is important, but because there is more space available in memory that can be addressed.

Microprocessors will come to the aid of desktops in the form of peripherals and networking chips, he continued. "The new networks will bring a distributed resource system to replace the old distributed data processing," Zachmann said. These networks will bring full connectivity and transmission speeds measured in megabits.

Taking some time out from a session that focused on the impact of the microprocessor, Zachmann gave his personal impression of the IBM PCjr microcomputer which had been officially introduced the previous day.

'Relatively Unexciting'

The prediction that IBM would dominate the home computer market was drastically premature, Zachmann contended. "The PCjr turns out to be a relatively unexciting product — a real ho-hummer," Zachmann said. "It's like an IBM Personal Computer with one arm tied behind its back. That's not much for the money."

In conclusion, Zachmann said the the challenge for the remaining part of the '80s is to close the gap between user and machine. Information systems must be so user-friendly that they are invisible to the user. In turn, users must become familiar with the existing technology.

"The ability to use microcomputer functions will be a requirement in the next decade," according to the IDC vice-president.

DCA Banquet Set for Feb. 23

EL SEGUNDO, Calif. — The Digital Computer Association's (DCA) 32nd annual symposium and banquet will be held here Feb. 23 at the Air Force Systems Command, Los Angeles Air Force Station.

British futurist and author Eric Blair is scheduled to present the keynote speech on "Men, Machines and Media."

He will examine the interrelationships between technology, governments and media and their impact upon civil liberties and individual freedom, according to a DCA spokesman.

R.D. Stone of Symbolics, Inc. will present recollections and collected folk history of the Computer Age, the spokesman said.

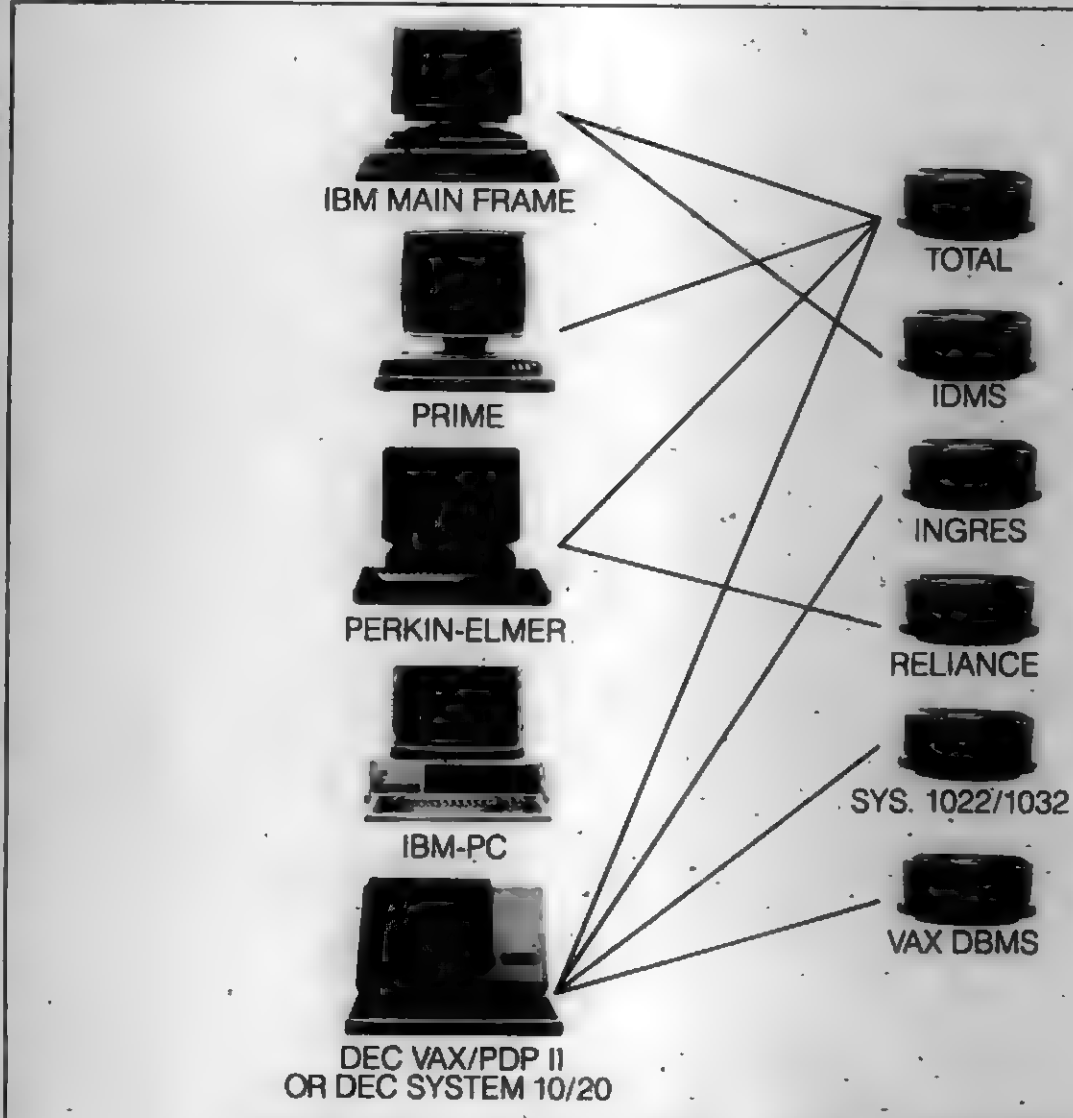
Additional information concerning the symposium is available from DCA, The Rand Corp., located at 1700 Main St., Santa Monica, Calif. 90406.

Washington Update

(Continued from Page 13)

more orders from AT&T and the Bell operating companies than before. Japan, the letter said, exported more than $1.5 billion in equipment last year while importing only $141 million worth.

"While the Japanese have taken some steps to enhance this record," the letter said, "there remains considerable room for improvement." Failure "to secure an effective and fair agreement on telecommunications equipment would have grave consequences for our industry," according to the 15 senators, who added that "failure would likely increase the call for protectionism here at home."



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Keynoter Issues OA Challenge to DP Industry

By Jim Bartimo
CW Staff

CHICAGO — The major challenge facing the computer industry today is to create an integrated office that will answer the needs of end users but not confuse them with new technology.

That challenge was issued here last week by Edmund B. Fitzgerald, president of Northern Telecom, Inc. Delivering the keynote address at the Intech '83 Integrated Office Technology Conference and Exposition, Fitzgerald said, "This is a young industry, in its adolescence. Like any adolescent, we had our first crush — on technology. Now it's time for an adult love affair with the end user."

The computer industry has failed the end user, Fitzgerald contended, because computer technology has often made his job more difficult. "Users are applications-oriented, so the providers of technology must also be applications-oriented," he reminded his audience. "It's time to stop looking at the world through technological glasses."

Fitzgerald said products aimed at end users should meet the specifications of what he called the five C's:

- ***Continuity,*** which gives products an upgrade path and prevents them from becoming obsolete.
- ***Compatibility,*** which allows products to talk to each other.
- ***Congeniality,*** which allows them to be used easily.
- ***Control,*** which allows users to regulate the technology's use.
- ***Cost-effectiveness,*** which allows the business to benefit from the installation of the technology.

CW at Intech '83

Stratus Link, DG Micro Unveiled at Show

(Continued from Page 1)

or from microcomputer spreadsheets.

- SOS/Host, which provides data exchange between IBM Personal Computers attached to a Stratus/32 and converts the output of popular Personal Computer word processing packages.
- SOS/Edit, said to provide Stratus word processing to Ascii terminals attached to a Stratus/32.
- SOS/Xedit, which reportedly allows users of IBM's Xedit text editing package to edit text on IBM 3270s attached to a Stratus/32.
- SOS/Ascii, which allows IBM Personal Computers to emulate Ascii terminals.

A software license for SOS/Exec costs $20,000. SOS/Main costs $5,000, and SOS/Spread is priced at $2,000. SOS/Host is $8,000 for the Stratus/32 and $150 for each Personal Computer, with a minimum order of 10 required.

SOS/Edit costs $3,600. SOS/Ascii is $150 for each Personal Computer, also with a minimum order of 10. SOS/Xedit costs $3,000.

A complete license for the first six software packages is $33,000. Stratus is located at 17 Strathmore Road, Natick, Mass. 01760.

Desktop Eclipse Micro

DG went to Intech '83 to unveil the Eclipse C/30 desktop microcomputer, which it said is compatible with the DG Eclipse family of minicomputers.

Supporting up to 2M bytes of main memory and 150M bytes of disk space, the C/30 includes a hardware floating-point accelerator and fits into DG's Comprehensive Electronic Office system, the company said.

With 512K bytes of memory in an eight-slot chassis, the C/30 is priced at $10,000. Other configurations can cost as much as $33,770 for more features, such as a hard disk and an additional workstation.

More information on the C/30 is available from DG at 4400 Computer Drive, Westboro, Mass. 01581.

Electronic Mail From ADR

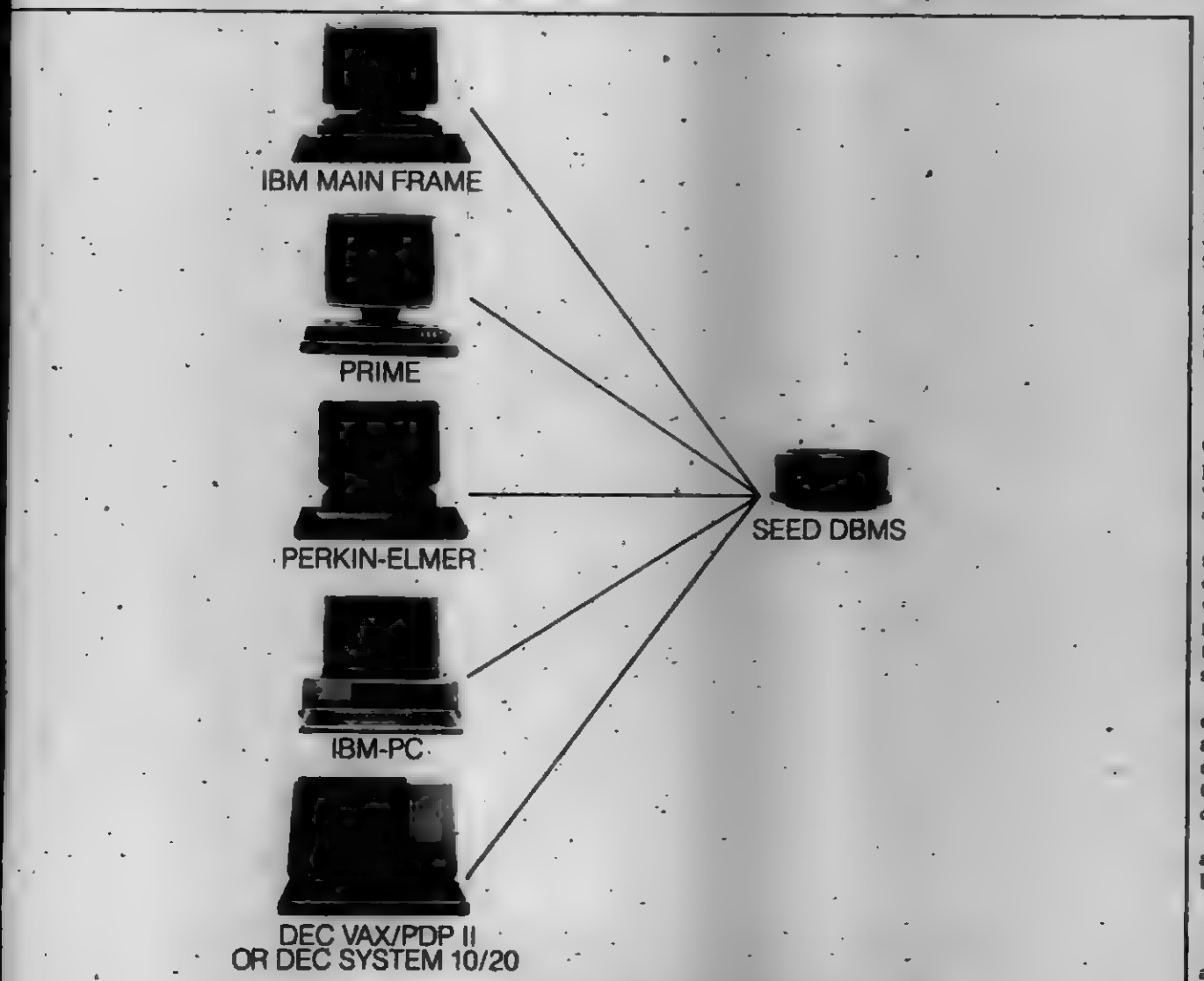
Applied Data Research, Inc. (ADR) announced at Intech '83 that it has enhanced its ADR/E-Mail electronic mail software by adding calendar and scheduling options.

ADR/E-Date is said to provide E-Mail users with an automatic meeting schedule facility, an executive-style daily calendar and the ability to inquire about other users' schedules within specified limits.

Release 1.1 of E-Mail for the IBM 370, 4300 and 30 series of mainframes was also released to allow the integration of the electronic mail package with other mainframe applications such as word processing, ADR said.

The upgraded version of E-Mail starts at $37,500 for OS operating systems and at $18,500 for DOS. The E-Date software will be available in the second quarter of 1984 for $10,000.

ADR's home base is at CN-8, Route 206 & Orchard Road, Princeton, N.J.



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DP Managers Seen Going Astray With DSS Plans

By Bill Laberis
CW Staff

BALTIMORE — The DP department's position with respect to the evolution of decision support systems (DSS) is analogous to the pilot of a wayward jet over the Atlantic — lost but making great time.

That is how Richard P. Bonzagni characterized DP departments' progress to date in meeting the critical challenge of implementing viable DSS. Bonzagni, director of marketing management at Decision Systems, Inc. of Waltham, Mass., analyzed the DSS phenomenon at last week's 32nd Conference of the Data Processing Management Association.

Bonzagni defined DSS as a tool kit that allows end-user professionals to analyze business information directly to make better decisions. Citing data from various studies, Bonzagni said that U.S. expenditures on end-user DP will grow from 1980's $30 billion level to $360 billion by 1990. Much of this growth will be fueled by the microcomputer revolution and proliferation of micro DBMS offerings, as well as by the growing recognition of information as a corporate weapon, he said.

CW At DPMA

Studies have further borne out that DPers and end users subscribe to similar goals regarding the implementation of DSS, Bonzagni said. However, end users also believe that DP has not done a good job in providing DSS to date.

Bonzagni outlined a plan for acquiring and implementing well-reasoned DSS, a plan mandating the earnest cooperation, guidance and technical assistance of the DP department.

The first step in the process requires making a valid determination of DSS application levels. DP departments should ask for whom the DSS will be implemented and toward what ends, as well as whether the implementation plan is harmonious with overall corporate goals.

Once a preliminary plan has been drafted, with maximum input from both the end user and DP communities, hardware and software must be selected. Both the hardware and software will be different at the various levels of implementation, namely the individual, departmental and corporatewide levels.

On the individual level, Bonzagni said, hardware is optimized for one person's needs, such as a personal computer or terminal tied to an information center. The software library, Bonzagni said, should include general tools, such as Lotus Corp.'s 1-2-3 integrated software or Visicorp's Visicalc financial package.

At the departmental level, hardware and software are optimized for several users doing essentially similar tasks, such as accounting or forecasting, he said. There is an acute need at this level for centralized control of the DSS functions, as there is a need for users to share information on a continuous basis.

There is a corresponding requirement for more computer horsepower to accomplish the data- and logic-sharing applications. Thus, the growing importance of DP's involvement is evident as DSS moves up the corporate hierarchy.

And at the corporate level, hardware and software are optimized for many users doing different functions. Such DSS are generally superminicomputer- or mainframe-based.

The next step in the process, Bonzagni said, is choosing a vendor. In this regard, he suggested, the guide words are experience, support and reputation. Bonzagni said it is wise to choose a vendor with products for which there is plenty of support in the form of a selection of consultants.

"Make sure you take advantage of opportunities to educate potential users," Bonzagni concluded.

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TRS-80 Desktop Features Hard, Floppy Drives

FORT WORTH, Texas — Radio Shack recently announced the TRS-80 Model 16B, a desktop computer that includes integrated floppy and hard disk drives.

The Model 16B comes with a 1.25M-byte, 8-in. floppy disk drive and a 15M-byte hard disk drive. An external 12M-byte hard disk drive can be added to the system.

The Model 16B package includes the vendor's TRS-Xenix multiuser operating system, which allows up to three people, simultaneously to use the Model 16B without loss of performance, Radio Shack said. In addition, files can be shared by all users on the system or restricted to certain users.

Design features of the Model 16B include Zilog, Inc. Z80A and Motorola, Inc. 68000 microprocessors. In addition, the Model 16B features a built-in, user-accessible card cage with four plug-in expansion slots.

The Model 16B with 256K bytes of main memory and 15M bytes of hard disk storage costs $6,999.

Radio Shack is based at 1800 One Tandy Center, Fort Worth, Texas 76102.

But No Application Backlog Cut Seen

Managers See Micros Whetting Users' Appetites

By Bill Laberis
CW Staff

BALTIMORE — Although currently at the bottom of the growth curve, the implementation of microcomputers has whetted end-user appetites for computing power and has stimulated a potentially explosive market.

However, the proliferation of microcomputers throughout the end-user community may not put a dent in the applications backlog, as some DP specialists had hoped. Instead, this proliferation may break the dam of computer phobia for thousands of new users, who will devise new applications.

These were some of the observations gleaned from random interviews with DP managers at last week's 32nd Conference of the Data Processing Management Association (DPMA) here. In all, 10 managers were interviewed, eight of whom worked in organizations where micro proliferation is under way. Of the two remaining organizations, one is working on a policy statement for micro acquisition and the other, a health insurance company, is awaiting the go-ahead from its front office to begin acquiring micros.

Larry Needham, operations manager at Woodwards Stores Ltd. in Vancouver, B.C., said his shop tightly controls and monitors micro acquisition. Woodwards established an information center nine months ago to aid end users, screening requests for micro acquisition and, most importantly, providing much-needed technical support to the growing legions of first-time users.

Everyone Wants Them

Asked who in the Woodwards organization wants a micro, Needham replied, "Just about everybody."

Woodwards' information center recently opened on a walk-in basis, with the result that "it's hard keeping them [end users] away," Needham remarked. The information center, at the behest of DP, limits micro vendors, including IBM, on its list of purchase recommendations. Needham said Woodwards requested 30 IBM PCjrs over two months ago, even though the product was announced only last Tuesday.

"People are gobbling up microcomputing and they are happy," Needham said. "We're watching the process very carefully. But some things are inevitable. They are so darned cheap, and there's so much the users are doing with them."

No Backlog Reduction Seen

But will they reduce the applications backlog? "I don't think so. . . . They just seem to create that many more wish lists."

Linda Jennings, computer services manager at WETA, Washington, D.C.'s, public broadcasting station, concurred. "Once users get comfortable on their micros," she said, "they dream up one application and use after another."

End users at WETA are particularly attracted to word processing and spreadsheet applications. "Other applications possibilities "are just beginning to unfold," Jennings said.

As an example of microcomputing's popularity at WETA, Jennings said that a six-user distributed micro system with 10M bytes of disk storage, bought just six months ago, is already at the limit of its storage capabilities.

But Jennings noted that the end users require a great deal of support and assistance initially, support that can come only from the DP department. "Otherwise, they get so intimidated or frustrated that the machine just sits on their desk. . . . They need a certain amount of hand holding, and we are willing to give it to them."

CW At DPMA

Kenneth H. Johnson, manager of Enterprise Information Systems (EIS) at Sentry Insurances Corp. in Stevens, Wis., said his shop first studied the need for micros, then set down the ground rules for their acquisition. Like most other managers interviewed, Johnson works at an IBM mainframe shop and therefore placed the IBM line of micros on his recommended-to-purchase list.

"It is important that the micros can interface with our main system, whether or not that ever becomes desirable," Johnson said.

Sentry, too, established an information center to interface with the new cadre of end users. The DP shop has maintained a high level of visibility in the implementation process, ensuring first that those who want micros can demonstrate a need, then shepherding users through the orientation process, according to Johnson.

The information center also conducts periodic "computer concepts classes" to educate those who are largely computer-illiterate to the potential of end-user computing.

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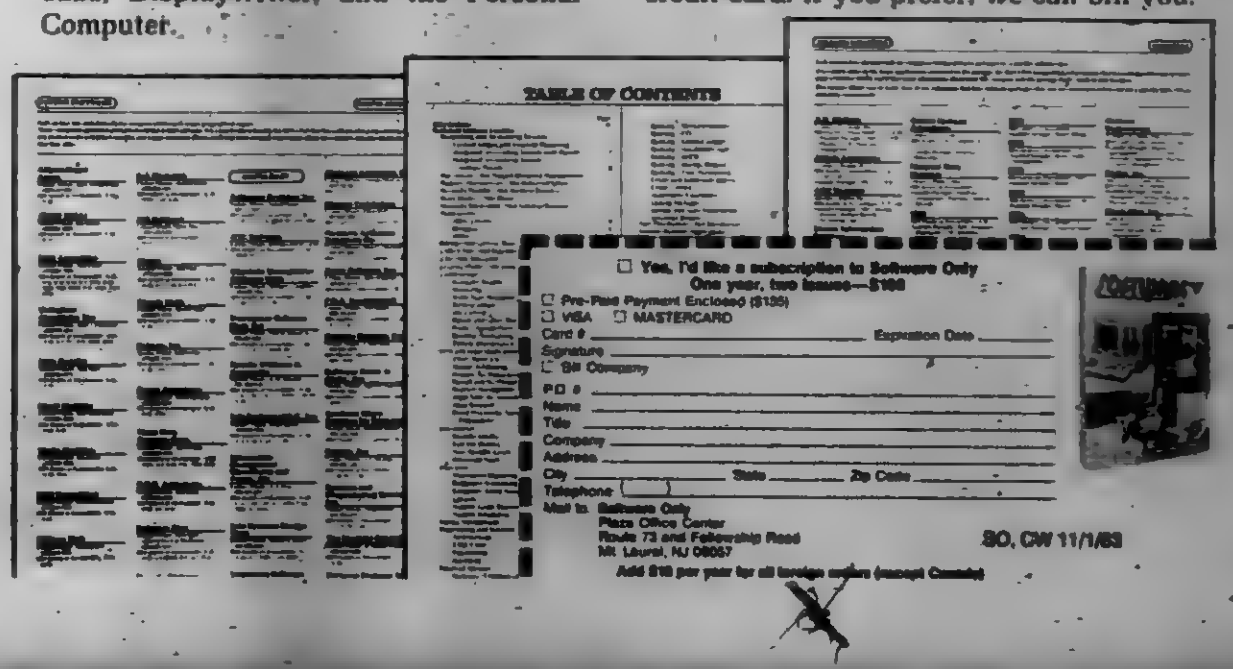

Managers Grappling With Power Base Erosion

By Bill Laberis
CW Staff

BALTIMORE — What is of concern to the DP manager — employee turnover? The implementation of microcomputers? Staying on top of technological change?

While all of the above are keeping managers on their toes, it was clear at last week's 32nd Conference of the Data Processing Management Association that one concern looms as particularly worrisome to many in the DP community: the erosion of the DP power base.

As highlighted at several seminars at the conference and in one-on-one discussions, the growing sophistication of end users, coupled with a headlong rush into office automation, has fostered a sort of class struggle in some organizations. Computer-savvy end users are tiring of hearing about applications backlogs of 18 months and more. Taking the word processing bull by the horns, they are increasingly implementing and controlling their own systems.

The feeling among end users seems to be that if the DP department won't assist in the process, the DP department be damned.

"Control of the design and implementation phases of application systems is rapidly going from [management information systems (MIS)] to end users, whether or not MIS supports this," said Allan F. Ayers, a management consultant with K.W. Tunnell Co. in Chicago. Ayers led a seminar titled "User Systems: Is MIS Losing Control?"

Ayers outlined a list of issues with which all companies will struggle during the transition to more end-user-based computing, including the maintenance of data integrity and security, the development of effective hardware acquisition strategies and the ongoing provision of technical resources for the new breed of user.

CW At DPMA

However, the problems encountered during this transition may be grossly exaggerated by personal rather than functional reasons. Simply put, some DP managers view the evolution of end-user computing as a de facto drain on their traditional power base, some end users at the show remarked.

'Heads in the Sand'

Lorne McLachlan, a DPer from the end-user community at Canadian Forest Products in New Westminster, B.C., said that certain divisions within his company developed, hatched and implemented their own office automation systems while DPers "stuck their heads in the sand."

End users at Canadian Forest a few years ago helped sell corporate management on a reorganization of the DP department into the present information services department, dedicated to more end-user computing. The old guard of the DP shop is still running payroll and accounting, but the leading-edge applications have been relegated to the new department, McLachlan explained.

For technical assistance, end users can now go to the manager of user services instead of "beating our heads against the wall with DP," he said.

Further, McLachlan said he was forced to design and implement his own office automation system for his company's building materials division because DP was willing to provide little help. McLachlan settled on a Data General Corp. Comprehensive Electronic Office System, which interfaces with DP's IBM-based system "wherever it's necessary."

"DP could be much more effective if they would just reach out and extend a hand to end users," McLachlan said. "DP managers see it as a threat, but it's really a great opportunity for the technical guys to move up to management. . . . I see a tremendous potential route to the top [for DP] if they just get the users on their side."

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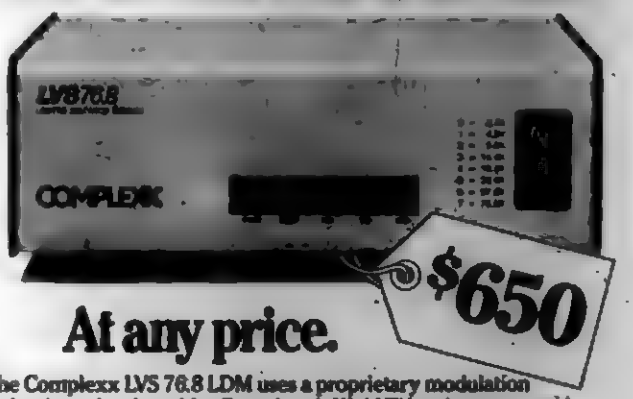

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COMPLEXX

DP Managers Urged Not to Deify Machines

By Bill Laberis
CW Staff

BALTIMORE — A few words to DP managers on the dawning of the Era of Artificial Intelligence (AI): However "intelligent," a computer is not human, and however efficient, a human is not a machine.

Thus, as AI enables computer systems to function as more autonomous information gatherers and processors, managers must fight the human tendency to deify their machines, while respecting the fallibility of their staff.

That was the crux of the message delivered by author Joseph Deken, who keynoted the 32nd Conference of the Data Processing Management Association here last week.

Deken — Ph.D. holder, university professor, former Green Beret and author of the best seller *The Electronic Cottage* — cautioned further that the AI era will provoke major changes in the fundamental duties of DP managers.

No longer will DP managers hold the system keys exclusively while directing the efforts of their programmers. Rather, great advances in distributed processing will give individual programmers their own set of system keys, making the primary duty of the DP chief "manager of managers."

No longer will programmers be writing only human-to-machine interfaces, Deken added. "Artificial intelligence will increasingly make computers [the] vehicles for people to communicate with people. . . . The programmer will simply write documentation, and the computer will write the programs for the end users," he said.

CW at DPMA

Therefore, the focus of the "new" DP manager will be one entirely based on facilitating communications between programmers and the systems with which they work, Deken asserted.

This situation is viewed as both a challenge and a threat, he noted. Some managers will become infected by what Deken termed "rash anthropomorphism," attaching superhuman attributes to a machine because of startling developments in microcircuitry and natural language programming.

Deken referred to a program dubbed "Eliza" that uses key-word techniques in the computerized application of Rogerian psychotherapy. Calling these applications "trick programs," Deken said they are designed primarily to show us that we had better not accept AI unseen and assume that because computers suddenly start taking on characteristics of human intelligence that we ought to start thinking of them as human beings.

DPMA Cites Educator

BALTIMORE — The founder of one of the nation's first proprietary schools specializing in computer automation was the recipient of the Distinguished Information Sciences Award in ceremonies at last week's 32nd Conference of the Data Processing Management Association (DPMA) here.

Paul M. Pair, 69, was cited for his pioneering role in offering quality DP education in a way that served as a model for other DP educators.

From an early career in public school education in Kansas, Pair moved to the private business school arena, serving as director of Gregg College in Chicago and later founding the Pair School of Business. Hearing about automation for the first time in the early '50s, Pair said he "spent one year studying this trend and decided I'd bet my future on it."

In 1957, Pair founded the Automation Institute of Chicago, later allying himself with Control Data Corp. Institutes of Control Data Corp.

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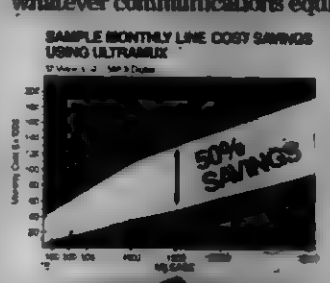

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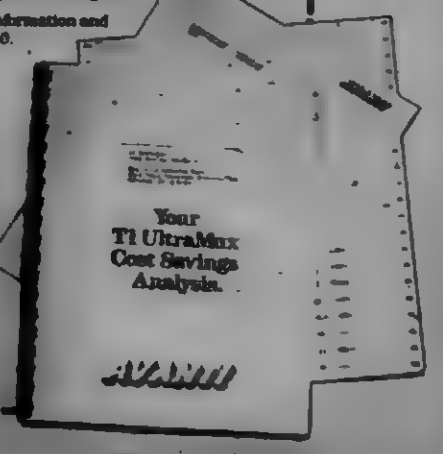

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AT&T's Brown Looks to 'Intercommunication'

By Phil Hirsch
CW Washington Bureau

GENEVA — "Intercommunication among an increasingly diverse array of products, services and systems" is one of the major challenges confronting telecommunications vendors and policymakers, AT&T Board Chairman Charles L. Brown said here recently.

Speaking at Telecom '83, an international telecommunications conference and exhibit, Brown also called for closing the "communications gap" between such countries as the U.S., where "more than eight million people use video display terminals daily," and those countries where people lack access to basic voice telecommunications services.

Underlying Brown's address was the idea that the opportunities created by advances in communications technology will not be realized in most countries until "intercommunication standards" are developed. The telephone has become an information terminal, the TV set an interactive communications device and the private automatic branch exchange an office management system, he pointed out.

But standardization does not require total uniformity, Brown said. "What we do need is agreement on fundamental standards that will maximize the ability of users to communicate effectively and efficiently."

Brown pointed to current international efforts to develop standards for integrated services digital networks (ISDN) as "one of the most crucial and promising" steps toward achieving intercommunication. The ISDN standards development shows how fundamental concepts, once agreed upon, can be implemented in a variety of ways by different countries, Brown said.

The conference, which began Oct. 26 and ended last week, is held every four years by the International Telecommunications Union. Telecom '83 officials expected an attendance of 50,000 by the end of the seven-day event.

Some attendees commuted from cities in France and West Germany that are more than 100 miles from Geneva.

The exhibit of telecommunications products that runs with the show filled a cavernous two-level convention center. Approximately 160 countries, ranging from the U.S. and France to China and Saudi Arabia, were represented at the exhibit.

Bill Revising FCC Surcharge Goes to House

WASHINGTON, D.C. — Legislation that could significantly raise large companies' communications costs awaited final action in the U.S. House of Representatives last week after being passed by the House Commerce Committee. Floor action on the House bill, H.R. 4102, is believed likely within the next two weeks.

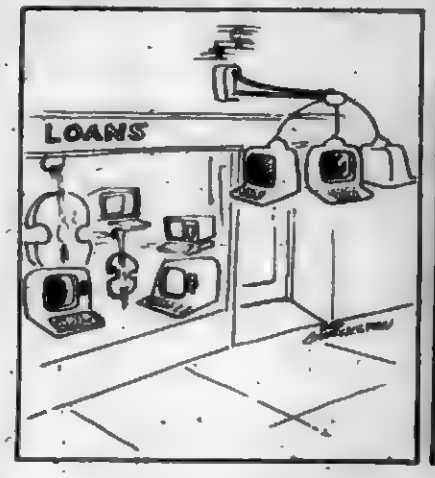
The Senate may act soon afterward on a similar measure, S. 1660.

Both the House and Senate bills would drastically revise the surcharge that the Federal Communications Commission (FCC) wants to impose beginning Jan. 1 on business and residential users of the long-distance telephone network. These surcharges, plus usage charges imposed directly on interstate carriers but paid by their customers, were designed to reimburse local telephone companies for the costs of providing access to the long-distance network.

The new charges would replace the "separations/settlements process," which historically has reimbursed local telephone companies for long-distance access and supplied about 25% of their revenues. Fees received by local telephone companies under this arrangement have been paid solely by long-distance users through charges levied by intercity communications carriers.

The FCC's new access charge plan, as originally proposed, imposed a flat charge of $2/mo per line on residential subscribers and up to $6/mo per line on business users. The former charge would total about $1.9 billion next year and the latter about $1.5 billion, according to a House Commerce Committee estimate.

If the pending legislation is enacted, all of this "revenue requirement" would have to come from other sources — for example, from higher monthly surcharges on larger business users and/or higher rates for long-distance services used by business and residential customers.



The Suit and The Chip write a Eulogy to the Mainframe.

"You've got to find new ways to use your VM/CMS mainframe, or you might as well bury it."

Why would you bury it, we asked?

"The IBM mainframes used in most large institutions and corporations today are based on the System 370 design of the 1970's," the Suit said. "These magnificent old machines are just not capable of providing their users with the

The Suit, Bob Bernard (right) and The Chip, Nick Pisarro (second from right) co-founded Canaan Computer Corporation in 1981.

To Meet Challenge of Automation

Union Changes Urged to Attract Service Sector

By Patricia Keefe
CW Staff

GAINESVILLE, Fla. — The spiraling growth of automation requires a new form of unionism that can organize and effectively represent service-sector workers, according to an assistant professor of business at the University of Florida here.

To win over service-sector workers, including clerical, white-collar and high-tech employees, the professor, Luis Gomez-Mejia, and other labor experts suggest that unions:

- Grant management more freedom in decisions concerning promotions, work assignments and pay.
- Stress other benefits besides security and seniority rights, such as professionalism, product quality, education and advancement opportunities.

Most professionals value autonomy and the concept of achievement, Gomez-Mejia said in a recent interview. High-tech employees, whether categorized as professionals or as assembly-line workers, reportedly tend not to be pro-union, fearing a decline in quality when unions come in.

The biggest obstacle facing unions in their bid to organize the service sector is an attitude among this pool of potential recruits that they can do better without a union, Gomez-Mejia said. High-tech workers, who have a reputation for job hopping every two to three years, provide prime examples of personnel with this attitude.

'Although the AT&T strike this summer "proved that computers make pretty effective scabs," it also proved that unions are moving in the right direction by actively recruiting from the service sector. . . . Most businesses can stand it if support personnel go on strike, but not if their top-level people go out, too.'

Gomez-Mejia expects this situation to continue for another 10 years until the high-tech industry stabilizes and attains maturity. When this happens, work will not be so plentiful, and workers will no longer be able to jump from job to job in search of the perfect blend of job opportunities and liberal benefits.

Faced with the possibility of investing a significant portion of their career in one company, high-tech workers will become more open to what unions have to offer, Gomez-Mejia said.

"As long as it's easy to find a job elsewhere, people feel unions will hurt them," he said.

Although it will be another 20 to 50 years before computers make the strike worthless, computers are moving in — restructuring the work place and replacing workers in their wake, the professor said. As a result, "the nature of unions is changing in response to automation."

Although the AT&T strike this summer "proved that computers make pretty effective scabs," it also proved that unions are moving in the right direction by actively recruiting from the service sector, Gomez-Mejia said. Most businesses can stand it if support personnel go on strike, but not if their top-level people go out, too, he explained.

Traditionally, unions have gained power from large memberships, which give them more leverage in contract negotiations. But union membership today represents less than 19% of the work force compared with 25% in 1955, according to Gomez-Mejia.

"Unions have been hurt by the fact that employment has been growing faster in the less unionized service sector than in the heavily unionized sectors," he observed.

Possible Recruits

To counter this trend and beef up their ranks, some unions have been looking toward the service sector for possible recruits. For example, the Teamsters union is attempting to organize clerical workers.

In another move to modernize for the computer age and to expand their power bases, several unions have merged, Gomez-Mejia said. The American Federation of Teachers recently joined the American Federation of Labor/Congress of Industrial Organizations.

However, unions will not find change easy, Gomez-Mejia warned. In addition to the computerization of job functions, many of the basic union functions are being supplanted by federal statutes and by companies that are offering benefits and safeguards traditionally provided by unions, he said.

As a result, some labor experts relate the diminishing power of unions to their own success in improving the work place.

"There's no question about it. Over the last 30 years, American business has invested a significant amount of money in human resources. Companies are getting smart," Gomez-Mejia added.

productivity-boosting functions that are offered by the new high performance workstations."

"For certain segments of a corporation," continued the Suit, "those who do only simple editing and inquiry, or those who do non-interactive batch processing, the present equipment is perfectly fine. Call them mainframe-satisfied! But for a large group, some 35 percent of the users, the multi-user mainframe just can't provide the kind of one-on-one, productivity-building capabilities that are proving so fruitful today."

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"The advantages are obvious," continued the Chip. "While adding more users to a multi-user mainframe degrades the computing power available to the single user, adding more Canaan computers to a networked system actually increases the power available to each user."

"As we see it," the Chip said, "your large, centralized mainframe—which has served as the hub, the Master, the source—will be more and more utilized as an adjunct to workstation units like ours which have similar power, but are dedicated to single users."

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"Plus, it provides multi-window very high-resolution graphics, concurrent processing, the Ethernet networking—and," the Chip paused for a breath, "the company using VM/CMS applications doesn't have to do a thing to its present body of data."

"Except call us for some of ours," added the Suit. Call [redacted] Or write Canaan Computer Corporation, 39 Linderman Drive, Trumbull, Connecticut 06611.

CANAAN

CAT Scanning Unwraps Mysteries of Mummies

By John Gallant
CW Staff

ST. PAUL, Minn. — With an eye toward making computerized axial tomography (CAT) scanning as much a tool of the archaeologist as the pith helmet and the shovel, two doctors here are using that powerful technology to unravel mysteries hidden for centuries in ancient mummies.

According to Dr. Derek Notman, resident in radiology at the University of Minnesota Hospitals and chief of the research project, CAT scanning, which links X-ray imaging with minicomputer technology to provide two-dimensional, cross-section views of the body, may soon become standard equipment for Egyptologists. Notman has already used the technique, which he said is more commonly known as computed tomography (CT) scanning, on two mummies and plans to apply the technology to several more in the near future.

CT scanning "is particularly useful for viewing Egyptian remains encased within linen or coffins," Notman said, whose undergraduate background in physical anthropology and archaeology led to his interest in mummies. "Regular X-rays give overlaying shadows that obstruct detail, but CT scanning paints a clear anatomical picture for you."

Some Insights

In May the first mummy viewed under the CT equipment offered some new insights to researchers. "We found with the first mummy a number of abnormalities. There was, for example, extensive evidence of bone disease that had not appeared on the regular X-rays," Notman said. "This showed us the advantages of using the CT scan to capture information that escapes standard X-rays."

The most recent focus of Notman's research was what was thought to be the remains of a 35-year-old male priest known as the Nameless Mummy, who died approximately 3,500 years ago during Egypt's 18th dynasty. While the results of the CT scanning produced no real surprises, the 200 images taken at one-centimeter intervals along the length of the mummy offered new evidence to support existing theories.

"We were able to see very clearly the internal details of the mummification process," said Dr. Orrin Shane, curator of archaeology at the Science Museum of Minnesota, where the Nameless Mummy is housed. "For example, the images clearly showed a fracture of the septum caused by the insertion of a long tube. That tube, with a hook-like appendage, was used to scoop the brain out. We were familiar with that process, but the scan showed it very clearly."

Method of Wrapping

The scan also showed "in great detail the method of wrapping. You could see the many levels of linen used," Shane said. "By taking the computer-integrated slices, you are able to clarify the internal view," he said.

"We're very pleased with the results," he added. "The detail is far greater than that obtained with flat X-rays."

The equipment used most recently by Notman is a third-generation General Electric Co. Model 8800 CT scanner valued at about $1.2 million. According to Notman, the GE equipment issues an arc of X-ray beams, which passes through the body to an array of collectors beneath, scanning a full 360° at increments chosen by the research team. The X-ray data is then automatically digitized and relayed to the minicomputer, which processes the information and outputs the results as hard copy or on a CRT.

Notman, whose research was funded by a grant from the hospital's radiology department, plans to publish the results of his work to encourage more widespread use of CT scanning in studying ancient remains. "Eventually, I hope to have the chance to use the CT technology on other mummies housed overseas," he said in a recent interview. "This work is important from both an archaeological and a pathological viewpoint."

Shane is currently developing an exhibit at the museum based on the CT scan images.

Compec '83 to Feature 500 Exhibitors

LONDON — The Computer Peripherals, Small Computers and Systems Exhibition (Compec '83) will feature 500 exhibitors and 12,000 square meters of exhibit space when it opens here Nov. 15.

Organized by Reed Exhibitions and sponsored by several English computer magazines, the event will be held at the Olympia exhibition halls and will feature vendors from countries that include the UK, U.S., Japan, Norway, Sweden, Netherlands, Poland, West Germany, Canada and Italy.

Among vendors exhibiting new equipment will be Acorn Computers Ltd., Research Machine Ltd., Sinclair Research Ltd., GEC Computers Ltd. and Ferranti Computer Systems Ltd.

More information on the exhibition can be obtained from the British Information Services, 845 Third Ave., New York, N.Y. 10022.

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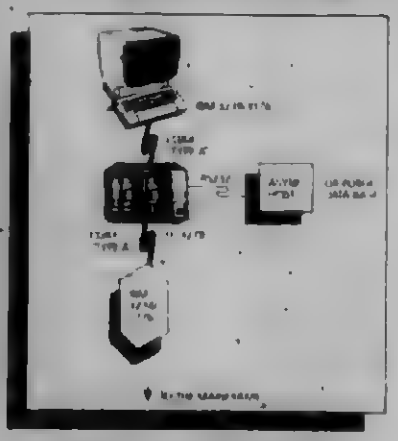

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- 30 Medicine/Law/Education
- 40 Wholesale/Retail Trade
- 50 Business Service (except DP)
- 60 Government—State/Federal/Local
- 65 Public Utility/Communication Systems/Transportation
- 70 Mining/Construction/Petroleum/Refining
- 75 Other User

Vendors
- 80 Manufacturer of Computers, Computer-related Systems or Peripherals
- 85 Computer Service Bureau/Software/Planning/Consulting
- 90 Computer/Peripheral Dealer/Distributor/Retailer
- 95 Other Vendor

2. OCCUPATION/FUNCTION (Circle One)
- 11 President/Owner/Partner/General Manager
- 12 VP/Assistant VP
- 13 Treasurer/Controller/Financial Officer
- 21 Director/Manager/Supervisor DP/MIS Services
- 22 Director/Manager of Operations/Planning/Administrative Services
- 23 Systems Manager/Systems Analyst
- 31 Manager/Supervisor Programming
- 32 Programmer/Methods Analyst
- 35 OA/WP Director/Manager/Supervisor
- 38 Data Comm Network/Systems Mgmt
- 41 Engr/Scientific/R&D/Tech Mgmt
- 51 Mfg Sales Reps/Sales/Marketing Mgmt
- 60 Consulting Mgmt
- 70 Medical/Legal/Accounting Mgmt
- 80 Educator/Journalist/Librarian/Student
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3. COMPUTER INVOLVEMENT (Circle all that apply)
Types of equipment with which you are personally involved either as user, vendor or consultant
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- B. Minicomputers/Small Business Computers
- C. Microcomputers/Desktops
- D. Communications Systems
- E. Office Automation Systems

Provides a Better Fit for Prostheses

CAD/CAM System Giving Bioengineers a Hand

By John Gallant
CW Staff

NEW YORK — Biomechanical engineers at the Hospital for Special Surgery here are using an innovative computer-aided design and manufacturing (CAD/CAM) system to give surgeons a hand . . . or a foot . . . or a leg . . .

With the help of the $3.4 million CAD/CAM system, researchers have adapted industry techniques to model, and produce artificial human joints such as hips, legs and arms. The use of CAD/CAM has led to improved quality of customized implants, increased comfort for prosthesis patients and a reduced need for surgeons to modify a patient's bone structure during the implant operation, according to biomechanical engineer Robert Paxson.

Paxson said engineers at the hospital's Biomechanics Department use patient X-rays to obtain limb measurement data that is entered into a McDonnell-Douglas Automation Co. (McAuto) Model D/100M graphics terminal driven by a Digital Equipment Corp. VAX-11/750 supermini. The CAD/CAM system, which was funded by Johnson and Johnson Products, Inc., utilizes McAuto's Unigraphics interactive graphics system software.

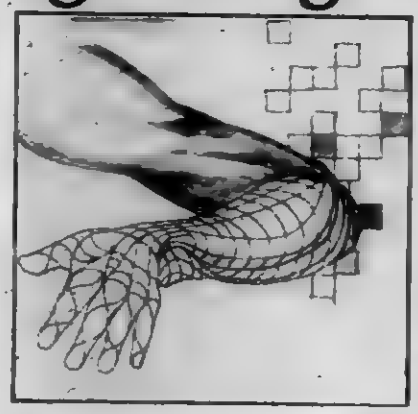
Using the X-ray data, a biomedical engineer can produce on the graphics terminal a rough sketch of the particular prosthesis needed. That sketch is then modified to design an exact-fitting implant on screen.

With support from a special machining module of the Unigraphics package, the design data is then transferred to paper tape, which drives the numerically controlled manufacturing machines that actually sculpt the joint from polyethylene.

In the past, each artificial implant had to be measured and manufactured by hand, a process that was not only a time-consuming process but also forced surgeons to do much of the actual prosthesis fitting while the patient was on the operating table. Because the CAD/CAM-designed joints are more accurately fitted, they require less surgical time to implant and wear out less quickly, Paxson said.

"Essentially, surgeons used to just choose from a variety of catalog items," he noted. "The goal of this program is to reduce the cost of providing prostheses and to reduce the waiting period from the time a surgeon determines a prosthesis is needed to the surgery date. We have also been able to improve the fit and comfort for each patient."

In conjunction with researchers at Cornell University in Ithaca, N.Y., the Special Surgery staff is also working to develop what Paxson called the Computer-Assisted Prosthesis Selection (Caps) system. The Caps system, which Paxson said could be in place by early 1984, will provide surgeons with a data base of standard implant designs that can be quickly modified for a particular patient.



"Caps will be designed as a computer program using dynamic graphical images that will allow surgeons to enter X-ray data and patient parameters, such as height, weight and age, and the system will select the best fitting prosthesis. Then the surgeon can test-fit that prosthesis on screen," Paxson said. "It will relieve biomechanical engineers of the necessity of custom designing each implant."

As surgeons become familiar with the hospital's CAD/CAM project, Paxson said, the techniques will become more widely used. "This technique allows quick and easy modifications to produce a better fitting prosthesis. I think hospitals will come to rely on this more and more in the future."

Directory Details Programmer's Mart

CINCINNATI — Writer's Digest Books has made available a new directory called the "1984 Programmer's Market" that lists over 500 software publishers, arcade game publishers and magazines.

The directory also gives information on submission requirements, royalty/payment terms, available contract work, tips from buyers on selling software and tips on how to prepare a query letter.

The directory will be updated and issued annually. Priced at $16.95, it is available from Writer's Digest Books, 9933 Alliance Road, Cincinnati, Ohio 45242.

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International Report

FROM THE CW INTERNATIONAL NEWS NETWORK

AUSTRALIA

MELBOURNE — In a series of moves said to be worth about $91 million to the Australian economy over the next five years, IBM Australia Ltd. has laid plans to develop both hardware and software in Australia, winning federal offset credits and government kudos. IBM will reportedly convert its Selectric typewriter plant in Victoria to assemble and test its Personal Computer product line.

MELBOURNE — Australia will host the inaugural Pan-Pacific Computer Conference in August 1985. The conference will be a biennial event coordinated by Australia and the U.S. and will rotate between Southeast Asian cities.

CHINA

BEIJING — A relational data base management system for the IBM Personal Computer has been unveiled here by Hefei Polytechnical University. The relational DBMS runs under Digital Research, Inc.'s CP/M 86 operating system and adopts a hierarchical architecture, a spokesman said. A data dictionary is reportedly built into the data base management system to guarantee data independence; a self-reliant query language is incorporated for nontechnical users.

BEIJING — The Chinese Institute of Scientific and Technical Information has established an agency to retrieve on-line information from the European Space Agency's Information Retrieval System (ESA-IRS). Known as the International On-line Information Retrieval Services Office, the agency will tap the ESA-IRS via the Itali public data communications network. In addition to this, plans are under way to extend the service to handle on-line information retrieval from the U.S.-based Lockheed Corp. Dialog system via European and American data communications networks at the end of this year.

ITALY

MILAN — In celebration of its 75th anniversary, Carlo Olivetti, Inc., Italy's premiere computer maker and second in the European marketplace only to IBM, has organized, sponsored and partially restored a 20-work collection of Leonardo da Vinci. The collection of masterpieces will leave here on Nov. 27 and tour museums in Washington, D.C., Sidney, Australia, Toronto and Amsterdam.

JAPAN

TOKYO — IBM Japan Ltd. announced that its Multistation 5550 — the Japanese version of the IBM Personal Computer — has the added capability of functioning as an IBM 3270 Personal Computer. Users can reportedly choose to use the 5550 as both a 3270-PC or as a dumb terminal just by pressing a button called the "hot key." A spokesman said users can exchange files between the 5550 and host system and can communicate either by cluster or single-station method. Present IBM 5550 users can obtain the function of the 3270-PC as of September 1984 at a cost of $745 for the hardware and $319 for the software.

TOKYO — Over 134,000 attendees and 29 vendors were at Data Show '83, Japan's largest annual computer show, which was held here Oct. 18-21. The big attractions at the show were workstations equipped with mouse interfaces, graphics, Japanese word processors and local-area networks. Data Show '84 is set for Sept. 26-29.

TOKYO — Six major Japanese computer vendors reported very healthy sales figures for the first half of fiscal 1983 (April 1 to Sept. 30). Fujitsu Ltd. topped the list with computer equipment sales garnering $12 million, up 22.4% from the same period last year. Nippon Electric Co. Ltd.'s sales were valued at $8.9 million, up 29% from last year; Hitachi Ltd. had sales of $8.3 million, up 26%; and Toshiba Corp. had sales of $3.3 million, an increase of 47.4% from the same six-month period last year. OKI Electric Industry Co. Ltd.'s sales reached $2.9 million, a 21% hike from last year, and Mitsubishi Electric Corp. sold $2.08 million worth of computers, showing an increase of 20%.

YOKOHAMA — Seiyu Stores, the third-largest supermarket chain in Japan, opened an experimental grocery store based on computer-aided sales and service technology. The store is electronically automated in nearly all respects. The loading, unloading and storage of products are fully automated and handled by robots and conveyers. The lights, air refrigeration, security, germ-free kitchen, robots and conveyers are all remotely controlled at the company's Total Control Center facility, which is located at another store. The communications between the two are handled via fiber-optic communications. In addition to these features, the store features an "Information Salon," where shoppers can tap into an electronic recipe and visual cooking information data file with the help of a Nippon Electric Co. Ltd. personal computer system and a video disk system produced by Fujitsu Ltd.

SWEDEN

STOCKHOLM — While the advent of optical computers is not expected to occur until the 1990s, a researcher at the Swedish Institute for Microwave Technology named Bjorn Broberg believes the individual components exist now for optical computers. Observing that every telephone company in the world is buying fiber-optic systems, Broberg recently contended that these wires will reach inside the computer before long. According to Broberg, the logic will remain electronic, but communications inside the computer will proceed along fiber-optic cables, achieving higher speed and reliability while lowering the power consumption. The principle Broberg promotes is to use different wavelengths for different communications channels inside the same optical cable. The new patented devices will eventually be manufactured by the Swedish electronics firm Rifa, which is already making galium arsenide devices for fiber-optic cable networks.

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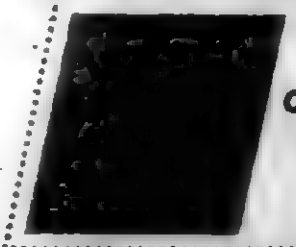

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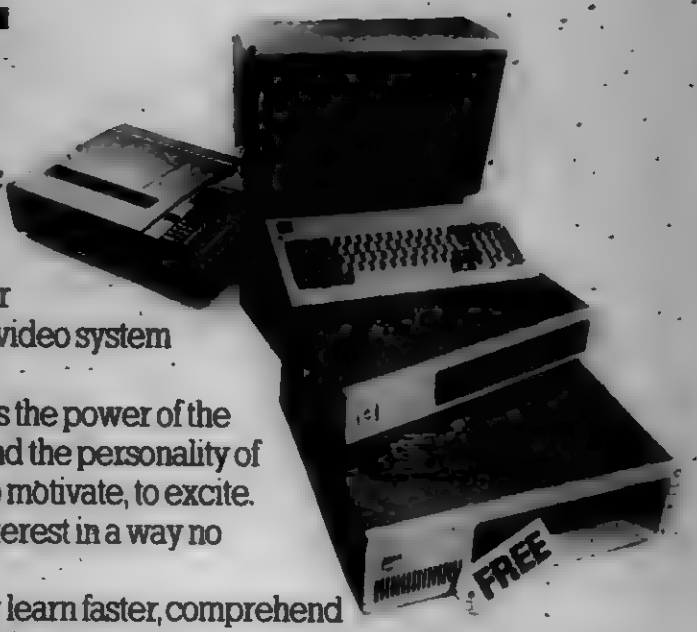

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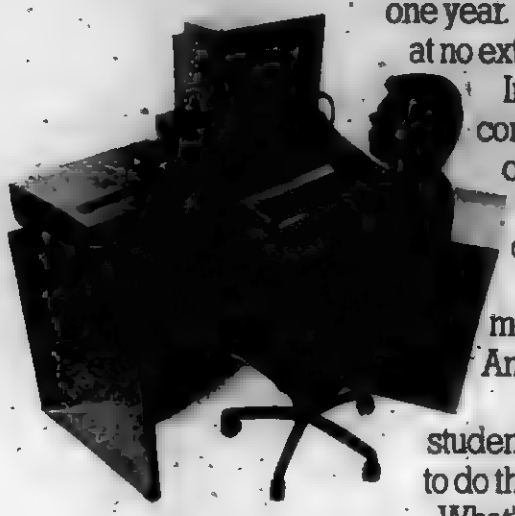

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Sessions to Target Management

Micro Forum Slated for Nov. 30

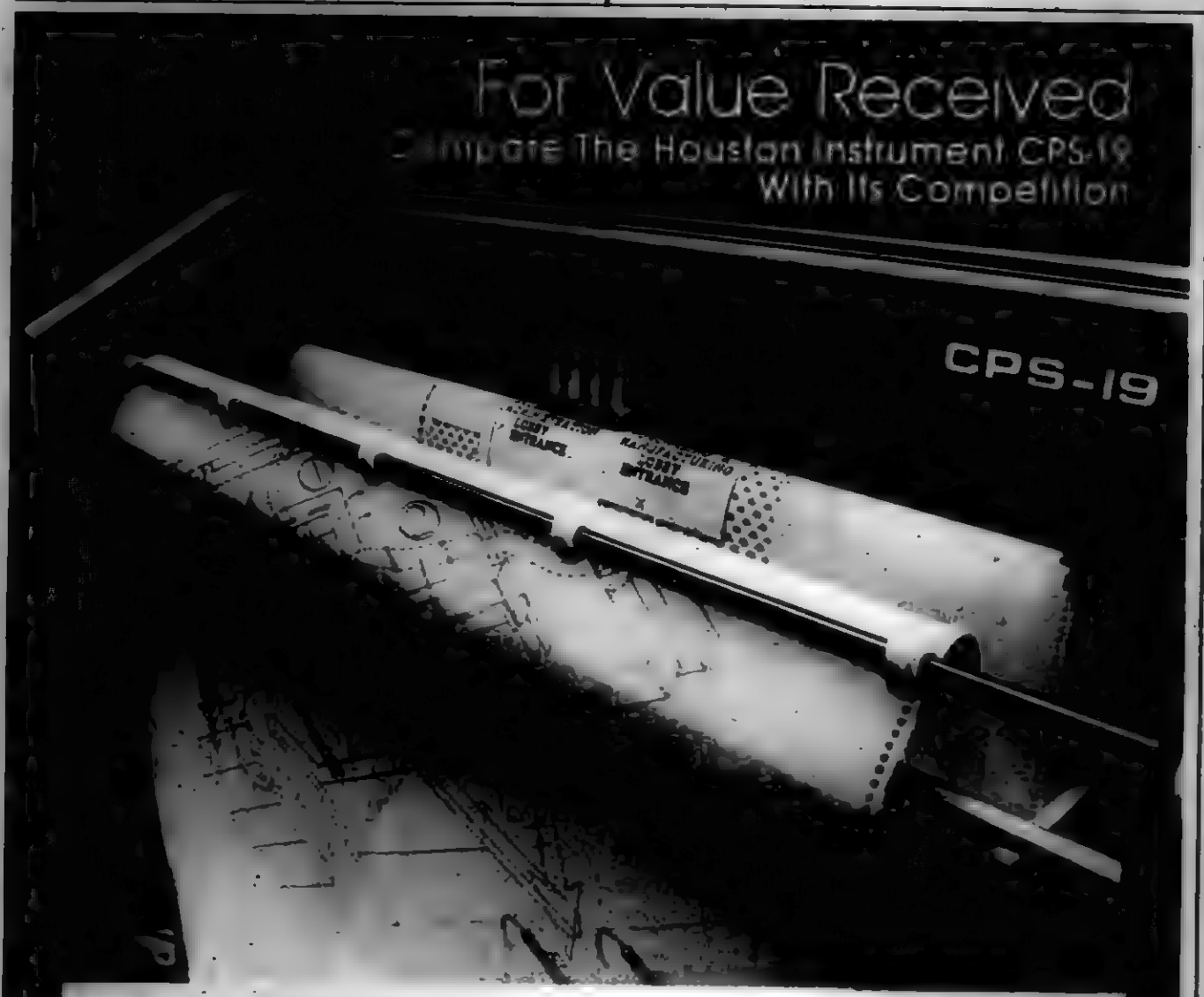
WASHINGTON, D.C. — "Managing Microcomputer Systems: Integrating Personal Computers into the Organization's Operating Environment" will be the topic of a Systems Executive Forum sponsored by the George Washington University School of Government and Business Administration here Nov. 30-Dec. 2.

The three-day forum will feature sessions on top management perspectives on microcomputer usage, decision support system applications, policy approaches to micro acquisition and information center implementation.

The forums will also include two full-day briefings on leading systems and strategic planning for mainframes and micros.

Speakers will include Dr. Norma Maine Loeser of George Washington University; Raymond S. Jozwik of Peat, Marwick, Mitchell & Co.; Al Iagnemmo of Federal ADP Users Group; and Alan Paller of AUI Data Graphics.

Registration for the conference is $535 for the executive forum only and $295 for the executive briefing only. The cost of attending both is $745. More information is available from Managing Microcomputers, Department K, 1805 Powder Mill Road, Silver Spring, Md. 20903.



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Office Efficiency Analyzed in Book Produced by IMC

WASHINGTON, D.C. — The International Information Management Congress (IMC) has made available a new book titled *Office Automation*. The publication reportedly depicts how mechanization, automation and people can fit together to achieve greater efficiency in performing office work.

The book covers the "principles involved in analyzing and designing office information systems," IMC said, and combines basic computer concepts with an examination of the "people factors" involved in introducing mechanization and automation into offices.

Published by John Wiley & Sons, the 336-page book is priced at $36 from IMC, Publications Sales, Box 34404, Bethesda, Md. 20817.

Guide on Robots, CAD/CAM Out

ROCKAWAY, N.J. — Technical Data Publishing Corp. has published the "Robotics-CAD/CAM [computer-aided design and manufacturing] Directory," the first in a series of technical- and specification-oriented directories.

The first edition includes sections titled "Robots," "CAD/CAM," "Sensors," "Vision and Automated Inspection Systems," "Products and Services Index," "Consultants, Distributors and Representatives" and a glossary of terms associated with these industries.

Each section gives photographs and specifications on the complete system and/or products in that particular category, according to the publisher.

The price of the directory is $30 (U.S.), $40 (Canada) or $50 (foreign). Further information is available from Technical Data Publishing, located at 53 Lake Shore Drive, Rockaway, N.J. 07866.

Managers on the Move

ROBERT V. RICHARDS, formerly director of information systems, has been promoted to the newly created position of vice-president of information systems for The Nestle Co., Inc. in White Plains, N.Y.

Richards, who joined Nestle in September 1982, is responsible for information systems, telecommunications and office automation.

He previously worked for Philip Morris, Inc., where he was director of management information systems. He relocated to New York from Richmond, Va., where he had been director of systems development for Philip Morris USA since 1975.

Prior to his seven-year post with Philip Morris, Richards was director of corporations systems at Lowenstein, Inc. in Rock Hill, S.C., between 1965 and 1975.

He received his degree in industrial engineering from Purdue University, West Lafayette, Ind., in 1962.

• • •

RICHARD D. REINBEAU has been promoted to director of information systems for Associates Bancorp, Inc. in South Bend, Ind., a subsidiary of the Associates Corp. of North America (The Associates). He will direct the efforts of personnel in developing and maintaining computer systems for The Associates' Commercial and Diversified Services subsidiaries.

Reinbeau joined The Associates in July 1978 as a senior systems analyst and subsequently served as a team leader and manager of information systems. His prior professional experience includes 11 years as senior processing analyst with Xerox Corp. in Rochester, N.Y., and four years as a control supervisor with Ralston Purina Co. in Pittsburgh, Pa.

He has a bachelor's degree in accounting from Duquesne University, Pittsburgh.

Robert V. Richards

Vsam Course Updated

BELLEVUE, Wash. — Software Information Services, Inc. has announced that its "MVS Vsam for Systems Programmers" course has been updated to include coverage of the Data Facility/Extended Function program that replaces Vsam catalogs with Interactive Communication Feature (ICF) catalogs.

Developed for anyone who maintains a Vsam environment, the four-day course is said to feature lectures and exercises covering all aspects of ICF catalogs, Vsam file performance tuning and the new Vsam functions available with the Data Facility/Data Set Services program.

The course can be presented on-site for $3,800 plus expenses. The cost to attend a public presentation is $400 per person. A course outline is available through Software Information Services, P.O. Box 4132, Bellevue, Wash. 98009.

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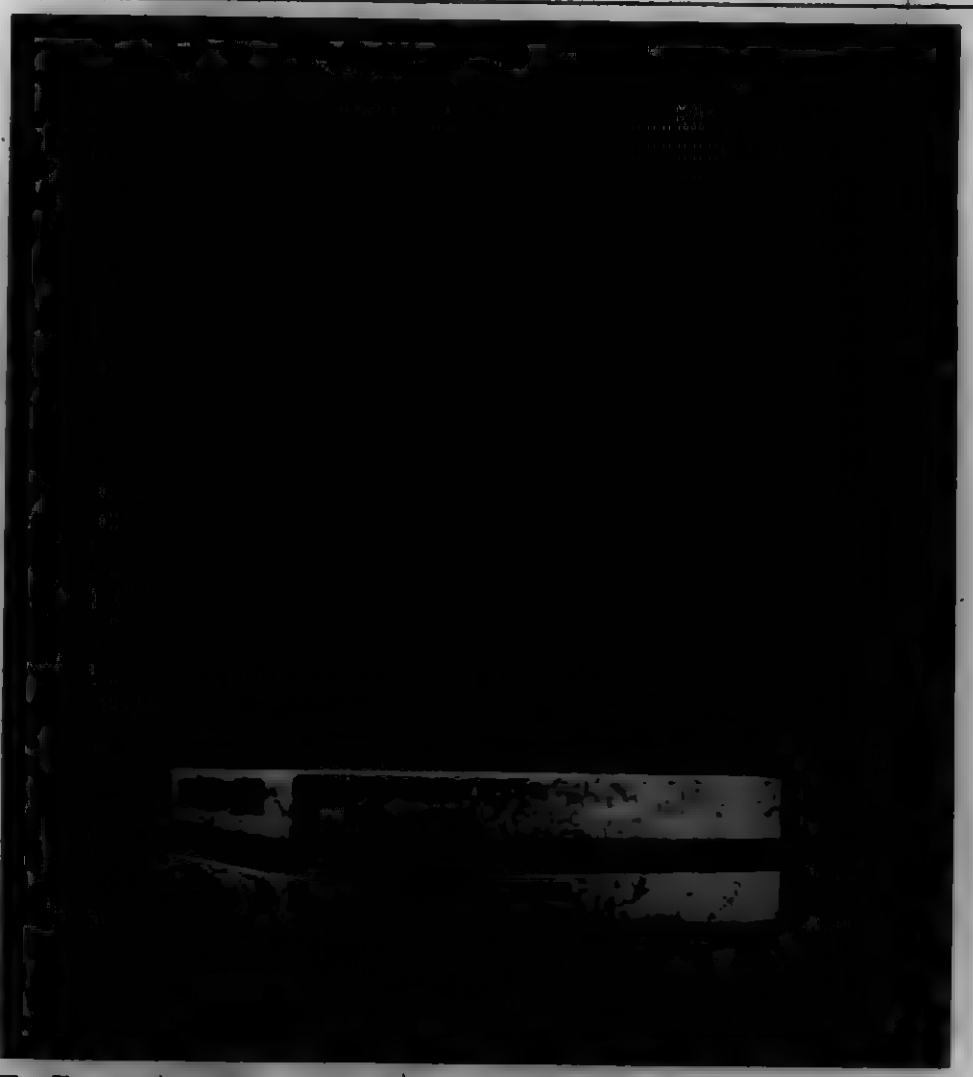

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To Offer Remote Clients Better Access

Data Provider Links Micros to Mainframe Site

PRINCETON, N.J. — When Sage Data Corp. began looking for a way to offer its remote computing clients better access to its data bases and software, the company saw the linking of microcomputers to the mainframe environment as an opportunity rather than a threat.

Sage provides economists, researchers and corporate planners with proprietary historical and forecast data bases, analytical and presentation software and economic and DP consulting. The core of the firm's services is the Sage System, a query-driven support package designed to provide an environment for econometric modeling and analysis.

Sage already offered the system through time-sharing and in-house VM/CMS installation. The firm, however, was looking for a way to advance its distributed processing strategy by offering a micro communications and data transfer link.

"The microcomputer is playing an increasingly important role in the executive work place," Sage President John Torkelsen said. "But for the type of advanced processing, data base management, analytical and graphics capabilities our clients need, you have to have a mainframe. It's critical for our clients to have this information at their fingertips for inclusion in micro-generated reports, and we needed a way to provide that."

The problem Torkelsen discovered was that most software packages that promised to provide the capability to upload and download data files between mainframe and micro were good only for specific applications. After a lengthy review, he could find only one package that offered the capabilities Sage needed.

Torkelsen chose a combination of the Please and Relay communications software packages developed by VM Personal Computing, Inc. of New York. Please software, designed for the VM/CMS environment and used in conjunction with the Relay package for the IBM Personal Computer, provided for the uploading and downloading of data between the Personal Computer and the mainframe.

As a tool to transform the microcomputer into an executive workstation for Sage clients, Torkelsen said the package is "very successful. So far it's done just what they said it would."

Please/Relay Package

Torkelsen said that, in addition to allowing users to download data for inclusion in micro-based reports or spreadsheets, the Please/Relay package has enabled clients to download files and use them off-line, a capability that has resulted in a significant reduction in on-line charges in many cases. The ability to upload files to the mainframe has helped maintain data integrity, allowing users to store files locally and submit them only for analysis or interpretation.

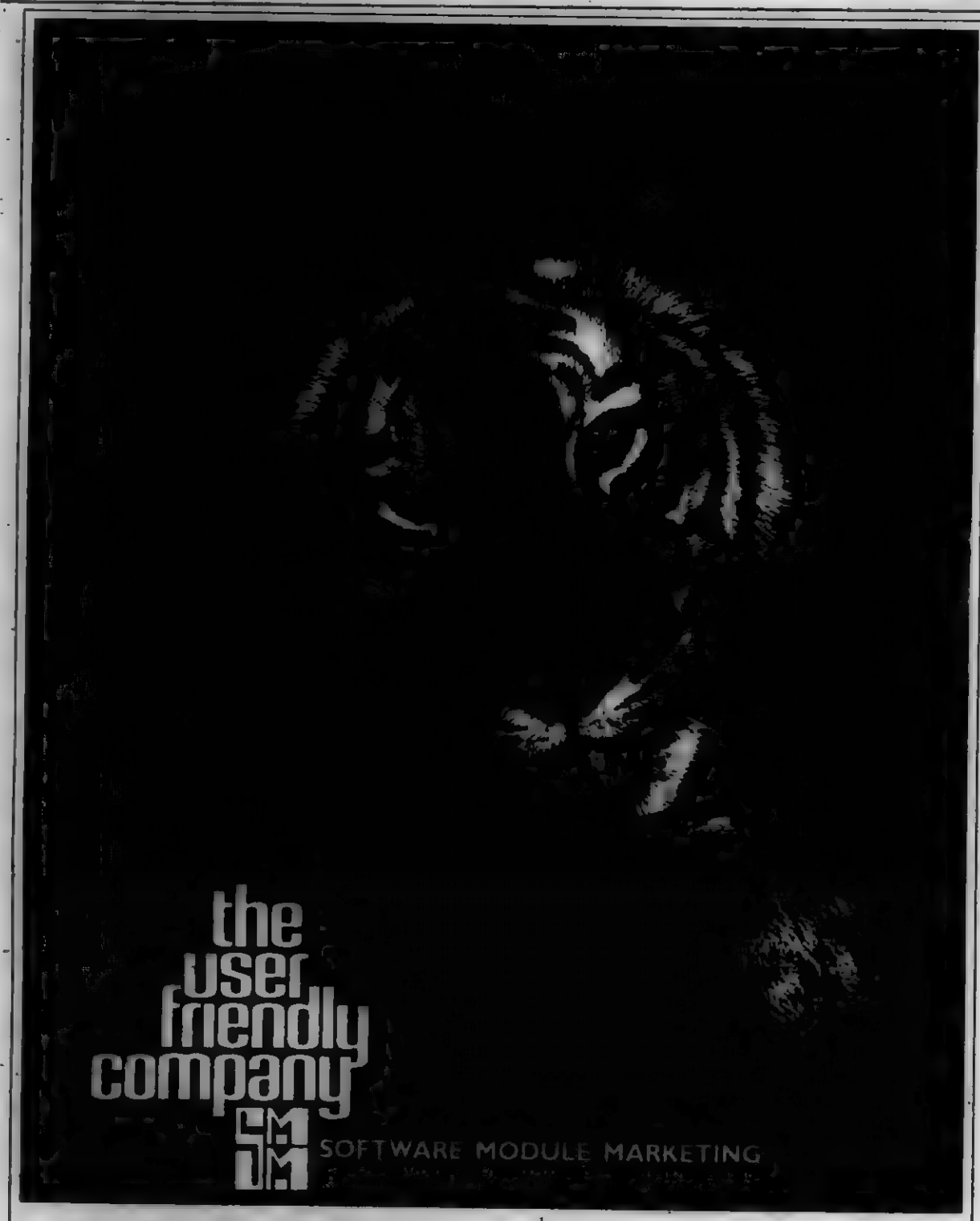
The Please/Relay combination, according to Torkelsen, has also given clients the ability to create their own commands for applications performed repetitively on the Sage System. Additionally, users can incorporate data from other data bases into the system through the Personal Computer

But, Torkelsen said, the most important aspect of the newly developed micro-mainframe link is the capability for users to download Sage's graphics generation files, including command and control characters, to perform graphics generation off-line.

"Before, if there was a line-hit or other noise in the middle of a graphics transmission, it would cause havoc," Torkelsen said. "Now, rather than put the graphics on-line, we send the commands to the Personal Computer disk-file so it can be plotted off-line.

"Also, having the graphics file on the micro allows integration into other application packages and the generation of multiple copies," he said.

The Please/Relay combination has also allowed the Sage System to accommodate either text or data files of any length or format. The files can be micro-based, such as spreadsheets, or mainframe-based, such as systems files or modules. Files can be transfered with or without conversion between the Ascii format used by the Personal Computer and the Ebcdic format utilized by CMS.



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Package Greases MRP for Oil Tools Company

HOUSTON — The in-house project team at Baker Packers knew exactly what it was looking for to improve the firm's existing manufacturing resource planning system: the ability to integrate multiplant planning and improved computer processing time.

Unfortunately, the team discovered that Baker Packers, a division of Baker Oil Tools, Inc., would have to spend about $1 million if the existing library of 800 application programs that accessed the manufacturing data base had to be converted to a new data base format.

The company, which manufactures tools used in petroleum production, had based those programs on what Donald Floehr, management information systems director, described as a "vintage 1960s material requirements planning [MRP] package that was part of the old DOS operating system on our IBM 3033 processor."

"We needed a new manufacturing resource planning package," Floehr said, "because we had embarked on a plan to become a Class A [advanced MRP] company. We were attempting to improve our inventory accuracy and implement a new master scheduling and forecasting system.

"But, most of the vendors we looked at required that we change our data set format to use their programs," Floehr continued.

No Format Conversion

The project team requested responses from a number of software suppliers, specifying that the vendor's software had to use the existing data base without a costly format conversion.

Also, because Baker Packers' existing system required that MRP reports be processed individually for each of the firm's four plants in three states — a procedure that took up to 36 hours of computer time — the team wanted a package with the ability to integrate multiplant planning.

Only two vendors responded to Baker Packers' queries.

One vendor offered to reformat its own internal data base at a cost of $1 million, exactly what the project team had predicted it would cost Baker Packers to convert its programs.

The second vendor, Applied Information Development, Inc. (AID) of Oak Brook, Ill., offered what it called its "data base independent" software, AID-MCS, which was priced at less than $200,000.

Test Package

To test the capabilities of the AID-MCS package, the Baker Packers project team put together an acceptance test package comprised of engineered test data, test data base files and engineered results that defined the existing format and what results the company expected from the AID package. AID personnel then developed an extract routine, which was designed to draw data from the existing data base and reformat it to the AID-MCS package's internal routine.

The extracted data could then be processed by AID-MCS, converted into the old format and reloaded to the data base.

The project team set up more than 400 test cases, which were executed and evaluated before the software was accepted for installation.

In the first year of use, Baker Packers encountered only a small number of minor problems, all of which were corrected either by warranty work or with minor enhancements to the AID-MCS package.

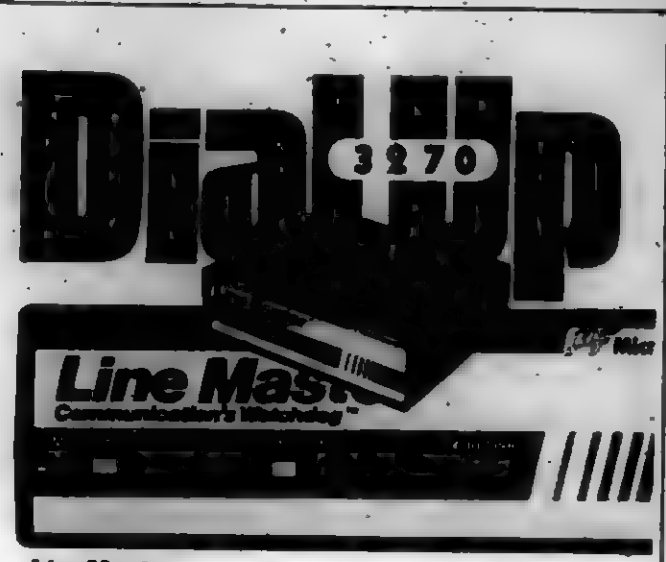
With the AID package, Baker Packers now processes MRP reports for all four plants simultaneously — a procedure that involves more than 45,000 inventory items — in only 10 hours.

Each week when the firm processes its MRP reports, the AID-developed extract routine draws data from Baker Packers' manufacturing data base, reformats and processes the data with the AID-MCS package and reloads that information into the manufacturing data base once again.

That data can then be utilized with the firm's existing applications programs.

Baker Packers initially installed the MRP module of AID-MCS and later the Master Production Scheduling subsystem.

The company also plans to add the Distribution Requirements Planning module of AID-MCS.



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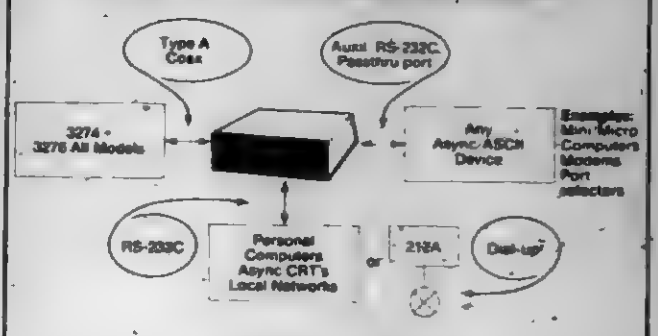

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Mini Processes, Tracks Ticket Sales, Trims Lines for Basketball Fans

COLUMBIA, S.C. — When varsity basketball tickets went on sale this fall at the University of South Carolina (USC), fans of the "Fighting Gamecocks" did not have to wait in long lines, for a change.

That's because ticket office clerks here are using a newly installed IBM minicomputer and workstation this season to keep track of ticket sales, instead of having to rely on dozens of elaborate and confusing seating charts.

The system, based on an IBM System/36 processor, provides accurate information on ticket availability and helps locate seats for season ticket holders should they arrive at the game without their tickets.

Combines Functions

The computer combines data processing, word processing, business color graphics and office management functions. Its 516K-byte memory has the capacity to store over a half million characters.

The university has an IBM 3081 mainframe, but that is used almost entirely for administrative purposes.

The athletic department began using an IBM System/36 last July to process, print and record this summer's sales of season and over-the-counter tickets to Gamecock basketball games.

It has resulted in faster and more cost-efficient ticket processing, reordering, assigning and accounts receivables.

Jim Petrus, assistant business manager for athletics, said, "The implementation of the System/36 has reduced the need and the use of the current manual seating charts, while at the same time increasing overall efficiency within the department."

For Basketball Season

Petrus said the college decided to start out by implementing the computerized ticketing during the basketball season rather than during the more popular and crowded football season in case anything went wrong. "We could always back it up manually — which was how we did it before," he said.

Petrus said everything is going smoothly, and the university will have a similar ticket application in operation next year for the 72,400-seat Williams-Brice football stadium.

The seating charts for basketball games, 2-ft by 3-ft sheets of cardboard that provide a detailed view of the seating arrangement of the 12,139-seat USC coliseum, were used sparingly during the conversion. Each seat in the chart has the name of a ticket holder on it. In the past, salesmen had to flip through several charts to find the right seat, should problems arise.

In addition to using the computer to store seating charts and recall them with a few strokes on the keyboard of an easy-to-use workstation, the athletic department has converted the university's current mailing list computer program for the Gamecock Club — the booster organization of the USC athletic department.

The old program for the booster organization was written in Cobol for the university's IBM 3081 and was rewritten in RPG-II for the System/36, according to Petrus.

The new version will also be used for all future administrative, budgeting, planning and sports information retrieval required by the department, Petrus added.

Gary Goodman, athletic ticket manager for the University of South Carolina (USC), and Jim Petrus, USC assistant business manager, pose with the IBM workstation that will help fill 72,400 seats at Williams-Brice Stadium next fall. The USC athletic department used a System/36 to process and sell season tickets.

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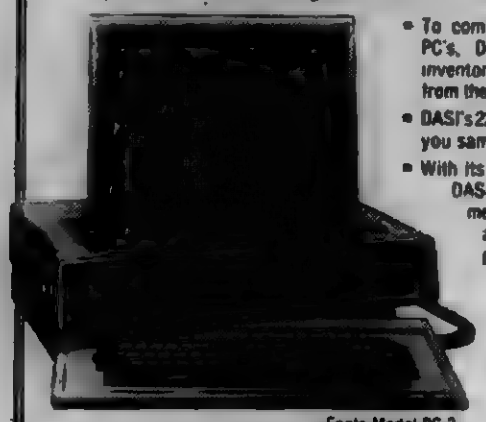

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What three letters represent the most powerful on-line computer in business today?

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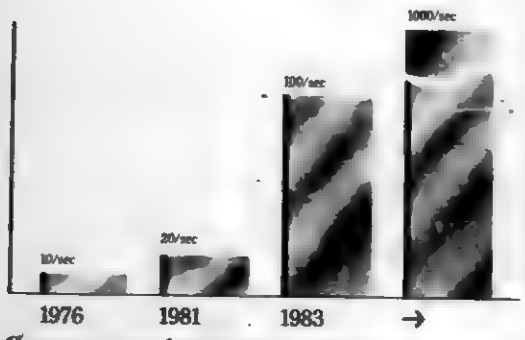
It's built around multiple parallel 32-bit processors. Each addressing 16 MB of physical memory and over a gigabyte of virtual memory.

To help memory keep pace with that kind of processing, TXP pulls 64 bits on each memory access.



Our success can be summed up in a second.
Transactions per second. Numbers unsurpassed in the industry. On-line systems that fit your needs today. And tomorrow. With more processing power on the way.

The TXP system also features parallel data paths. Manipulating 32 bits of information in a single cycle. Or two 16-bit operations in the same cycle.

And TXP incorporates extensive pipelining, to process multiple instructions simultaneously. Each processor overlaps instructions in three levels: Fetching one, while preprocessing a second, while executing a third.

While helping TXP deliver full 32-bit power, for less.

Cache memory pays off in faster response times.

Cache memory is a high-speed data storage area between the processor and main memory. It lets the processor store more frequently used information closer. So it can get to it faster.

And our tests have shown that the TXP cache memory has a 98% "hit rate." Which means the requested data is virtually always nearby for fast access.

The result? Larger volumes of work can be processed in shorter amounts of time. Helping TXP to be even more productive.

Making cache memory pay big dividends.

A system you'll expand, not disband.

Most computer systems have very limited expandability. So if a company outgrows its computer's capacity, it usually means starting again from scratch.

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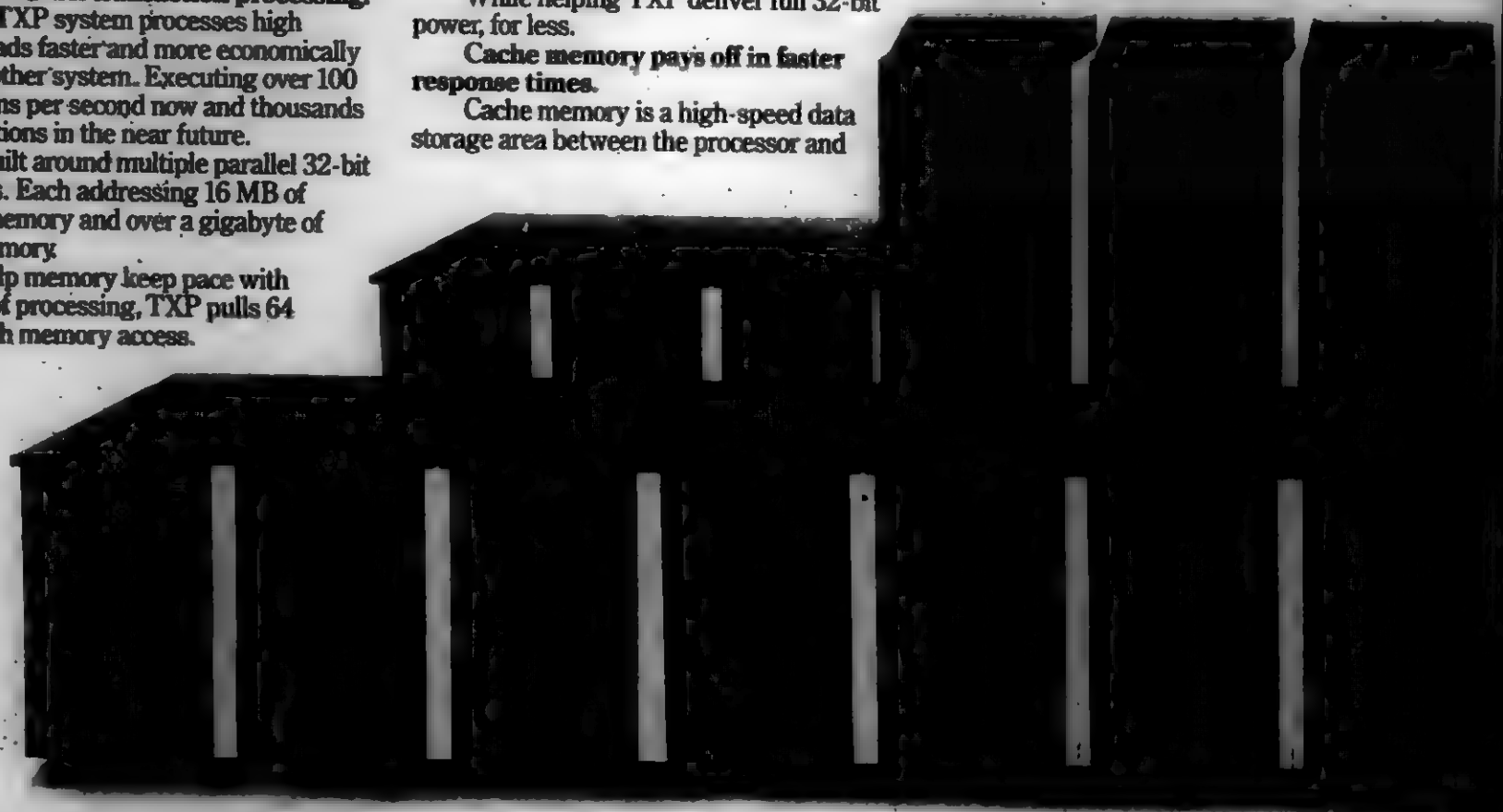

XP

computer in business today.

massive loss of revenue that's unavoidable during the switch-over.

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It can expand from two to 16 processors. Increasing its power by a factor of eight.

That's more power than any of the largest mainframes.

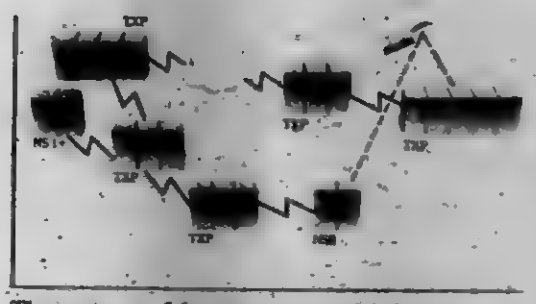
And the additional processors can be installed while TXP is running at full speed. No downtime. No reprogramming.

Still not enough power? Up to 14 TXP systems can be joined together by high-speed fiber optics. Linking the systems together as one computer with 224 processors.

But that still isn't the full potential of the TXP.

TXP systems at up to 255 sites can be joined in a worldwide network. Generating the power of over 4,000 processors.

And that gives TXP the most powerful on-line computer capacity in business.



The most powerful computer network in business today. *Users access a single unified global data base from any of thousands of terminals anywhere in the system.*

Expandability our competition wishes they could disband.

NonStop™ system compatibility from the people who started it all.

TXP can process more information and support more programs, users and devices than any other computer designed for on-line transaction processing.

Devices you most likely already have. Even devices made by IBM.

But what if your company isn't quite ready for TXP system's awesome power?

We suggest the Tandem NonStop II™ system. The second most powerful on-line computer in business today. The cost effective solution for medium to large corporations.

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And for over eight straight years, despite attempts by others, we've continued to lead the industry.

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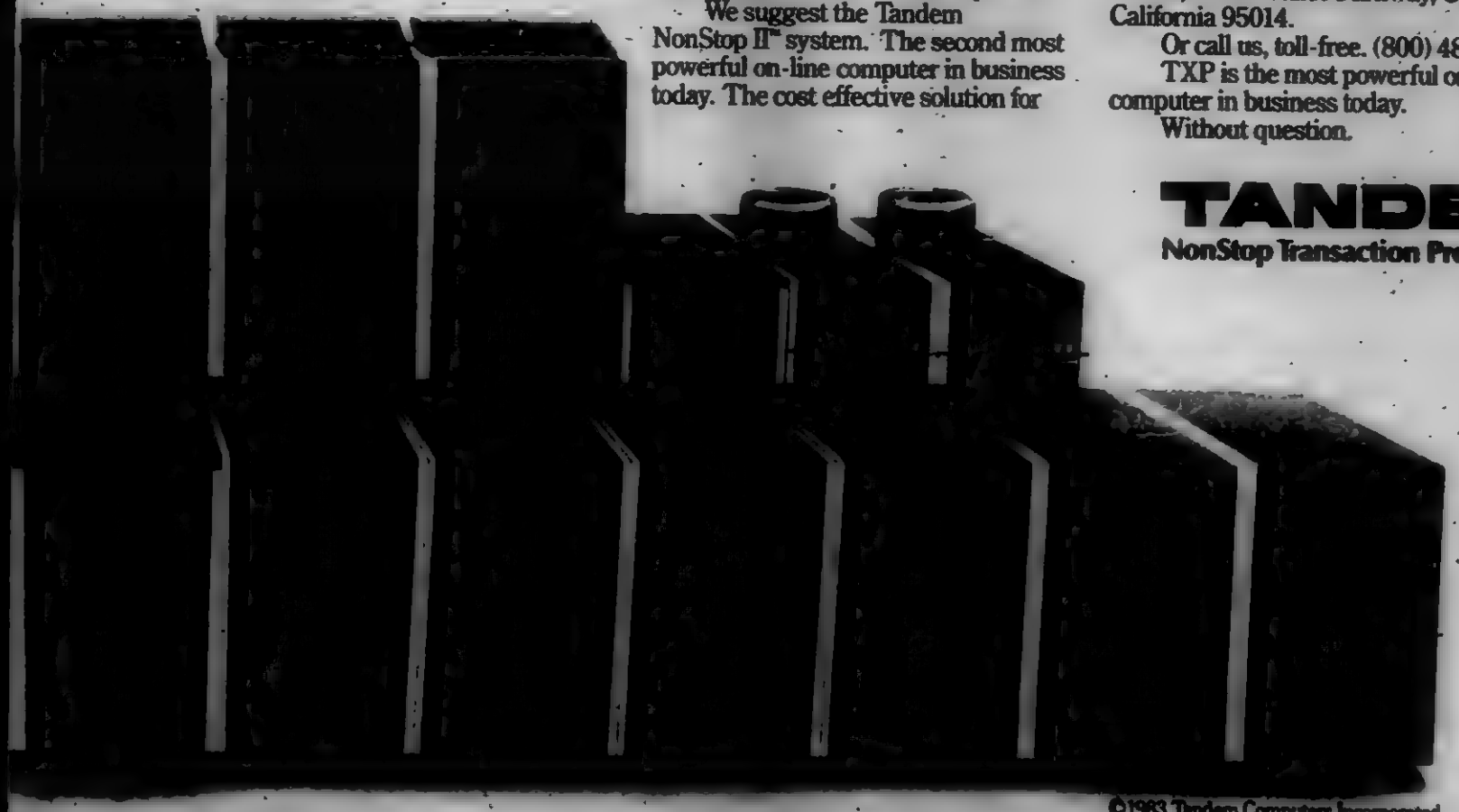

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Personal Computers as Permanent Guests

Hotel Chain Using Micros in Reservations Net

PHOENIX — Personal computers are becoming permanent guests at hotels belonging to the world's third largest hotel firm.

With the installation of 635 IBM Personal Computers in hotels throughout the U.S. and Canada, Ramada Inns, Inc. has become the first hotel chain to use the micros as reservations terminals.

The Personal Computers have been linked to the company's main reservations computers in Phoenix and to other hotels in the chain which has 97,000 rooms in more than 600 inns and hotels.

"We had a homegrown system which we developed over 10 years ago that ran on Digital Equipment Corp. processors," said Nicolas Bredimus, vice-president of the Information Services Division for Ramada here, "but it wasn't appropriate for the '80s.

"We changed our main reservation system and cut over in December 1982 to an IBM-based system which uses the Airline Control Program operating system used by most major airlines and travel companies," said Bredimus.

Right Time

"Then we followed up with a replacement of all the terminals. It just happened that at the time we were looking for a replacement terminal, IBM announced the Personal Computer," he added.

The Personal Computers were installed at the rate of about 60 per week over a 90-day period which ended this past September.

"The reason we chose IBM wasn't necessarily for performance but because that's where the availability of the best programs was. So it was a software decision," he added.

Reservations can be sent via the Personal Computer to individual Ramada Inns or to one of four reservations centers in Omaha, Neb., Toronto, London and Frankfurt, West Germany. Presently, the Personal Computers have been installed only in the company's North American hotels.

Ramada personnel are able to make, change and confirm reservations as well as supply guests with detailed information about any Ramada Inn worldwide.

Future Uses

According to Bredimus, future uses for the Personal Computers include electronic mail, hotel inventory, labor forecasting and financial planning and reporting.

"The use of the terminals for reservations is their primary function. But the main reason we went with the [Personal Computer] was because it's a dumb terminal and because of all the things that we could do locally at the hotel," Bredimus said.

The Personal Computer has been programmed with information on travel agencies and holders of Ramada Pacesetter cards.

When a travel agent or Pacesetter card holder calls for a reservation, all a clerk needs is the agent's code or the card holder's number, Bredimus said.

The computer then prints all of the pertinent reservation information, including home address and credit card number.

The computer also stores addresses and phone numbers for Ramada executive offices, reservations centers and sales offices worldwide.

"Up to this point the performance of the units has been excellent," according to Bredimus.

"We put a tutorial system right into the software because it was designed for people who have no prior experience with computers, and it actually shows them what every key on the keyboard does."

Besides saving time and adding to guest convenience, the Personal Computers are expected to reduce Ramada's communications costs, which will supposedly allow the hotel chain to keep its prices down.

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Wehr Corp.'s John Gevaert (left) and Brian Manley both use TIS Intelligent Query and Comprehensive Retrieval to facilitate their jobs, including computing of scrap percentages and monitoring customer credit.

Integrated Data Base Fulfills DP and User Requirements

MILWAUKEE — "Give the managers timely and accurate information so they can make good decisions."

That was the directive to data processing from Brian Nahey, president and chief executive officer of Wehr Corp., a "minicongiomerate" based here that manages a number of manufacturing firms located throughout the U.S.

Using the Total Information System (TIS), the integrated data base system from Cincom Systems, Inc., Wehr was able to satisfy the requirements of data processing as well as end users.

"TIS has allowed us not only to build a corporate data base, but also to give our users a logical view access to the data," Nahey said. "Whether the data is stored in a data base or another file structure is of no concern — the user can still access his data without going through data processing."

TIS is installed on an IBM 4341 Model Group 2 with OS/VS1 operating system and Vtam at Wehr headquarters. Eight company data bases and manufacturing systems are controlled by the TIS In-Line Directory in the computer center.

The key components of TIS are Logical User View, TIS In-Line Directory, TIS Data Base Management System (DBMS), TIS Data Manipulation Language, TIS Intelligent Query (IQ), decision support system capabilities, fourth-generation procedural language and TIS Communications Support System.

The first steps to allow managers to access information included implementation of computerized manufacturing and financial systems and Cincom's Series 80 Total DBMS.

"When TIS became commercially available in the spring of 1982 we had already built the integrated data base system and developed the on-line applications running under the Series 80 data base/data communications environment," stated DP manager Peter Puestow.

"With the implementation of the TIS data base system, the In-Line Directory became the central brain of the system controlling access, security, integrity and application development," he said.

The directory controls the interrelationships of the data during all phases of development, execution and maintenance; Puestow said.

The physical structure requirements are fulfilled, as well as the logical requirements of end users and programmers requesting data. Users can access information without knowing how it is physically stored, he said.

With the new TIS integrated data base system, the major concern for data processing at Wehr is educating the users. TIS IQ provides end users with relational query facilities. It is even possible to define the request on-line, save it in the In-Line Directory and execute the query in batch, Puestow said.

TIS Comprehensive Retrieval handles more complex decision support types of reporting, he said.

If TIS IQ cannot satisfy users' needs because they require more complex reporting or data manipulation, they can write a Comprehensive Retrieval program. Anything that cannot be done using Comprehensive Retrieval is programmed by data processing, Puestow said.

"I use Query to look for the exceptions that indicate trouble, such as inventory running out of control," said Bruce Kessler, manager of operational planning. "Then I use Query to design a solution, test it and monitor the results once the solution is in place."

Many general managers at the division levels of Wehr do not write their own queries but have access to someone in their own division who can write a Query or Comprehensive Retrieval program.

"I believe that as this proficiency increases among all our users, the data processing department will become the keepers of the data and educators of the end users to an even greater extent," Puestow said.

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Package to Monitor Transaction Status

Banks Poised to Use Securities Processing Tool

NEW YORK — Five banks in New York are apparently leading the way toward a goal long awaited by financial institutions and brokerage firms: fully automated securities processing.

The Bank of New York, Barclay's Bank International, Chemical Bank, Citibank and French American Banking Corp., a subsidiary of Banque Nationale de Paris, will be using a software package that monitors the physical location and transaction status of customers' securities for which the banks are custodians.

On a real-time basis, Vista Concepts, Inc.'s Security Processing System (VSPS) software makes information available on securities movement that historically has had to be gathered from separate sources, either manually or through less sophisticated data processing systems. VSPS runs on IBM mainframes and plug-compatibles in CICS environments.

When securities are traded, the system tracks them through every stage of the transaction sequence, using information on the securities' current status to determine the next trading step and to assure that it takes place on time.

As part of this tracking function, the system monitors receipt and delivery of payments for securities, dividends, interest payments and commissions.

Upon demand, securities processing personnel can determine whether securities are in certificate or book entry form, stored in the banks' vaults or in a depository, such as the Depository Trust Company (DTC), or en route between seller and buyer. VSPS automatically settles trades through the Institutional Delivery System via the DTC's Computer-to-Computer Facility. It also generates reports on their movements to bank customers and debits and credits their cash accounts, according to the vendor.

At the end of each day, it provides printed summaries of all transactions that took place that day as well as the current status of all transactions in process.

The software package updates customers' accounts by processing information on corporate actions, such as dividend declarations and stock splits and handles reregistration of securities into approved registrations.

For the five banks using VSPS, the software package will mean the elimination of costly and time-consuming manual methods that are still used in most back-office operations of many banks and brokerage firms.

Errors and delays in manual or partially automated operations — including the inability to locate stock certificates for timely delivery, the need to reclaim improperly paid dividends — are said to be eliminated by this system.

At Chemical Bank, which handles between 3,500 and 4,000 securities transactions per day, Vice-President Mike Romano claimed, "VSPS' functionality is what we needed. In terms of its capabilities, all the tests show that it will support us in the business."

According to Vista's Chairman of the Board, Steve Gardos, Vista is in the process of developing enhancements for the VSPS package that adapt it to the needs of medium-size and small banks (1,200 transactions per day and up) as well as brokerage firms' back offices.

Previously, their only practical means of access to automated securities processing had been through correspondent banks or specialized service bureaus whose monthly fees break down to a very high cost per securities transaction, Gardos maintained.

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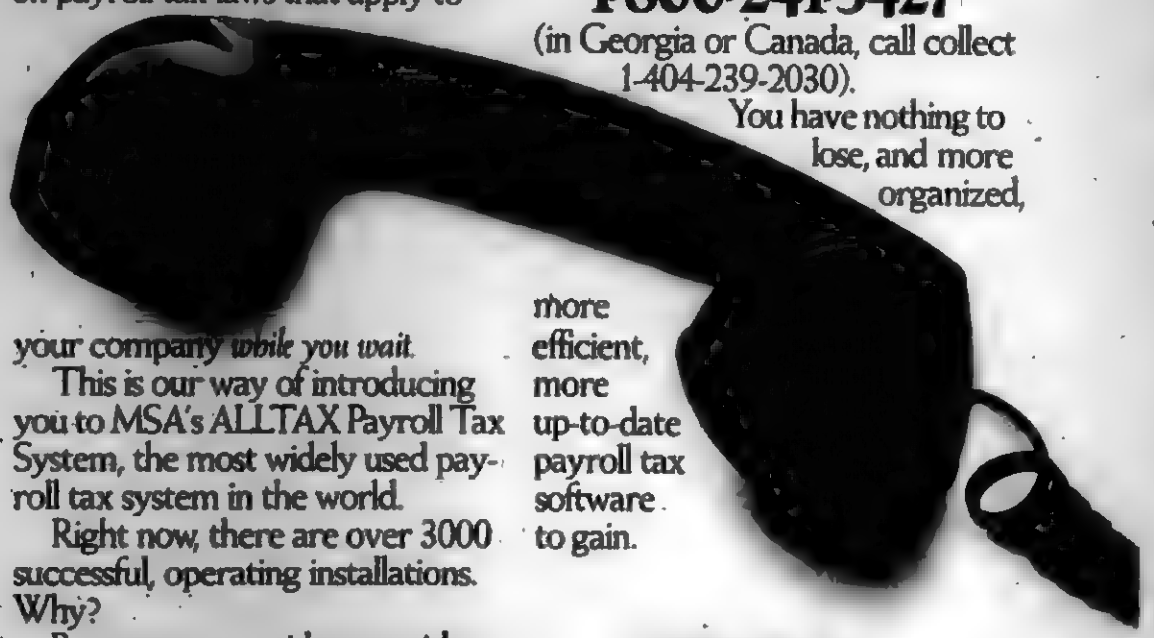

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Quarterly To Address MIS Concerns

PENNSAUKEN, N.J. — Auerbach Publishers, Inc. has announced a new quarterly publication titled "The Journal of Information Systems Management." The quarterly was "created to help DP people become better and more efficient managers by offering in-depth; practical advice on management issues and providing workable solutions for those special problems the MIS [management information systems] manager encounters daily," according to J. Kevin Reger, Auerbach president.

Articles and columns will be from the MIS professional's perspective. The periodical will cover issues affecting middle- and upper-level managers, such as how to reduce operating costs and provide practical advice on staff training, resource allocation and organizational structure.

The periodical is being introduced at a special charter price of $48. Regular subscription price is $60. Further information is available from Auerbach Publishers, 6560 N. Park Drive, Pennsauken, N.J. 08109.

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Electric Firm Sparks Cost Savings With DBMS

BATON ROUGE, La. — A data base management system (DBMS) has generated real-cost savings at a major southern electrical power generation utility.

When Cajun Electric Power Cooperative, a nonprofit cooperative supplying electrical power to 13 member cooperatives throughout Louisiana, went looking for a DBMS, it first conducted an extensive market survey.

"We have a massive amount of data that is all interrelated. We were looking for a DBMS that would allow us to get a system up and running quickly, yet was readily modifiable at low cost. It also had to be a high-performance record access and transaction processing system," Dave Courtney, DP manager, explained.

Key Criteria

Rexcom, an integrated application development and management system from Rexcom Corp. of Houston, was chosen to operate on Cajun's networked Prime Computer, Inc. Prime 750 and 850 systems. "Key criteria were programmer productivity features, enough flexibility to handle all our needs in both engineering and business data processing and the capability to integrate existing software with our future plans, some of which we had not yet defined," said Don Babcock, supervisor of engineering systems.

"That last criterion was the critical issue," added Courtney. "Today you can't predict what your data structure will look like even two years from now. You are left with basically two choices: Find an easily modifiable system, or spend six months to a year designing your data definitions and schemata and be prepared to throw it away in a couple of years."

Rexcom, which incorporates an automatically and transparently generated relational DBMS, answered needs for an interactive screen and menu-oriented system emphasizing query, reporting and transaction processing, Babcock said. "Rexcom's one-step screen generation was a real benefit to our staff. Being able to use the screen immediately for loading, querying and reporting right after it has been painted saves incredible amounts of time," he said.

Complicated schema design and data dictionary setup and intermediate compiling steps are automatically handled by Rexcom, Babcock said. "The system lets us concentrate on the design of our applications and not on how the computer is going to handle it. Additionally, the random record access speeds for both query and processing are phenomenal for any DBMS, much less relational system," he said.

"In a traditional DBMS, a tremendous amount of time is spent defining and building your relationships and creating convoluted schemata beforehand," Courtney added. "If six or seven months later you realize you have incorrectly defined a relationship or need to create a new one, you have to throw out most of the system and virtually start over.

"Rexcom allows you to make those design mistakes without penalty," Courtney said. "The relational capability is so easy to use that a complex data base can be integrated to secondary data bases or files in no time. New relationships and modifications to old ones can be made without ever having to deal with schemata or data dictionaries."

Courtney also pointed to the DBMS' ability to access other programs. In one case, a large Cobol batch system was already in place for payroll/personnel processing. The batch system is now tied into Rexcom via its load utility, and a mirror data base is created and updated by Rexcom after each batch run, he said. Administrative personnel are now able to do on-line querying, reporting and updating with Rexcom, while the Cobol data base is protected from modification or damage. The updates are then run back into the Cobol data base from Rexcom through an audit and edit program.

References Cover Programming

ESTILL SPRINGS, Tenn. — Associated Technology, Inc. has introduced a four-volume reference set designed to serve as a tool for establishing internal programming and software documentation practices.

The first three volumes of the set highlight standard methods for programming in the Cobol, Fortran and Basic languages, and the fourth covers software documentation practices.

The set is available for $45 from ATC Books, Rt. 2, Box 448, Estill Springs, Tenn. 37330.

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With Interactive Dictionary

Theatrical Index Organizes Galaxies of Stars

BEVERLY HILLS, Calif. — In an industry where fantasy often prevails over reality and happy endings abound, the legal administration department of 20th Century-Fox Film Corp. has developed its own happy ending to a real-life tale.

"Our traditional system for indexing contracts was becoming burdensome and inadequate," explained Les Gerber, 20th Century-Fox's manager of legal administration department. "We would index a contract by picture, artist and any other pertinent terms, which means we were averaging six index cards for every new contract. About four years ago we faced the reality that our central file room contained more than 50,000 index cards dating back to the time the studio was originally founded."

Gerber and his legal group, along with management information systems (MIS), installed a stand-alone data dictionary designed principally for IBM OS and DOS environments. Then with the technical and training support of MIS and legal central files personnel, they developed a program to automate their central file indexing system and ultimately to implement a central calendaring system.

"By computerizing the index," Gerber explained, "we could not only deal with a single entry, but also do all the cross-indexing necessary to make a great deal more information directly available."

Since Manager Software Products, Inc.'s Data Manager was implemented in June 1980, Gerber's Central Files staff has added over 7,000 entries utilizing more than 300 different catalog classifications in less time, in a smaller space, at lower cost and with less effort than ever before, he said.

"Data Manager provided us with a predesigned system that included a free-standing data base, maintenance, report and query programs and built-in security features," he said. "We were able to implement the system with limited MIS support."

Structured on a hierarchical basis, the system always locates the theatrical or television motion picture title as the highest level of entry, from which all other information entries flow.

Entries are then cataloged to show under which major classification — master index, cross-reference or people — the entry belongs. Then the whole system is broken down into various sections.

As an interactive dictionary that handles data relationships in a flexible manner, Gerber said, "Data Manager not only allows us to list files alphabetically and numerically, but also to add information to the index and update and retrieve it when needed."

Because the system classifies picture entries into types, Gerber's staff can easily zero in on what the entry actually represents, he said. Also, by listing motion picture titles as they change during development or production, the system leads the user back from the early working title into the final release title, he said. When a picture is created from a sequel or other existing work, the system informs the user, especially during a write/read search, to reference the original file.

From the second level in the system hierarchy, the legal staff can cross-index people and pictures, permitting search capabilities. By establishing a string of cross-entries and dummy entries all the way down the hierarchy the staff can cause all the data to relate back simply by querying the system with the right questions.

The success of the central files indexing system enabled the legal department to implement a calendaring feature.

"With more than 200 entries already in the system, Data Manager allows us to handle the calendaring system on a project and date basis — ranging from two months hence to 30 years or more into the future," Gerber said.

Health Care Users Set Spring Meeting

MONTEREY, Calif. — The spring meeting of Electronic Computing Health Oriented (Echo), an organization of IBM equipment users in the health care field, will be held at the Hyatt Delmonte here April 8-11.

The group's meetings are designed to bring together various computer-oriented personnel in the health care field, including systems executives, hospital administrators, physicians, hospital consultants and government officials. The group is comprised of more than 900 hospitals and health care related institutions and has a membership of more than 1,900 people.

Registration fees for the meeting are $150 for members and $165 for nonmembers. Additional information is available from Lee R. Cort, Stanford University Hospital, S310, 701 Welsh Road, Stanford, Calif. 94305.

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Evolves From Outside Service Bureau

School Graduates to Distributed DP System

ELKHART, Ind. — Intelligent workstations that "talk" with mainframe computers are nothing new. However, it can be interesting when the workstations are distributed microcomputers and the system evolved from an outside service bureau operation.

The distributed system is implemented at the Elkhart Community Schools here and is used for such financial applications as payroll, accounts payable and general ledger, as well as for such administrative chores as word processing. However, that is an extensive job. The school district operates two high schools, four junior high schools and 14 elementary schools for about 11,400 students. More than 1,100 people are employed in the district that has an annual budget in excess of $32 million.

Based on an evaluation conducted with the assistance of the outside management consulting firm of Crowe Chizek and Co. of South Bend, Ind., the school district selected a distributed data processing system proposed by Low Associates and NCR Corp.

"This proposal was the only one that recommended a distributed data processing system as a solution to our needs," said Eugene Hungate, director of DP, federal programs and research. "The other proposals were for conventional, on-line systems."

Distributed DP System

Installed in mid-1983, the new distributed DP system was built around NCR's V-8545-II central processor with a VRX multiprocessing operating system, 1M byte of main memory, 540M bytes of disk storage and a 600 line/min printer. The 8545 mainframe system was installed in place of the previously used NCR Century 200 computer and its B-1 batch operating system.

The distributed DP system operates with 12 NCR Adds Multivision small business computer systems. Communications with the mainframe system is via two common-line controller/multiline adapters tied into eight dial-up and two hardwired lines. These multiuser micros provide 256K bytes of main memory and 15M bytes of disk storage and support the operation of one to four workstations.

Previously, the Elkhart Community School district handled DP operations through multiple outside service bureaus. In 1978, the district consolidated these operations in a single service bureau that processed all applications in a batch mode.

Then in early 1980, consideration was given to the possibility of improving operations through increased DP automation, according to Hungate. He discussed the subject with Joseph F. Scher, assistant superintendent for business affairs, who identified many areas in which productivity improvements could be made. Based on the positive support of Richard D. Miller, the superintendent of Elkhart Community Schools, an automation project was launched in August 1980.

Low Associates, a DP services organization specializing in the educational field, had served as the district's service bureau processing applications on NCR's Century 200 system.

Since the system was designed to be distributed, it was possible to implement one application at a time on a phased basis, Donald H. Kramer, assistant superintendent for business services, said. The first application brought up was payroll. This was followed by accounts payable and financial, including the general ledger. Other applications that are now operating on the system, or will be implemented in the future, include student attendance and enrollment, personnel, insurance, students records, grade reporting, scheduling, inventory control, fixed assets accounting and book rentals.

For each application, microcomputers are used for all day-to-day data entry, editing, balancing, processing and maintenance on an on-line, interactive basis. Data is also downloaded from the mainframe system via phone lines to microcomputers. In addition, the microcomputers are used to make data inquiries to the mainframe and communicate with each other. Then at the end of predetermined processing cycles, data is transmitted back to the mainframe for batch processing operations.

The system can be expanded without causing degradation in response times. Income can also be generated by providing DP services to other school systems without the need to upgrade mainframe system capabilities.

Elkhart Community Schools has also used the distributed network to provide DP services on a remote basis to the Penn-Harris-Madison School Corp., a neighboring school system based in Osceola, Ind. Serving 6,700 students in one high school, two middle schools and nine elementary schools, Penn-Harris-Madison is using the network to achieve increased efficiency and accuracy, faster turnaround and better control, according to Kramer.

"We're working with the distributing data processing network instead of installing our own mainframe system," Kramer said. "We're better off doing this than taking on the problems of personnel and training involved in operating a mainframe.

"In addition, the distributed network is easier to work with than previous service bureau operations," he said. "We're able to solve balancing and other problems before transmitting data to the mainframe, minimizing the need for later corrections by phone," Kramer said.

"We're excited about the capabilities of the system in terms of its management information, word processing and other capabilities," Richard Miller, Elkhart superintendent, said. "We see definite improvements in information processing and other areas of school system operations. In the future, we would like to put system terminals in the homes of all of our board members so that school information would be immediately available to them at all times."

Feigenbaum, Martin to Talk On Fifth-Generation Future

ARLINGTON, Va. — Edward A. Feigenbaum, professor of computer science at Stanford University and the author of *The Fifth Generation*, and consultant James Martin are among 14 guest speakers featured at a lecture series entitled "Knowledge Base and the Fifth Generation" that gets under way today at the Sheraton Crystal City Hotel here. The four-day event, which will conclude this Thursday, is being sponsored by the Technology Transfer Institute of Santa Monica, Calif.

A group of American and Japanese computer experts will discuss the implications of Japan's national goal to develop intelligent, fifth-generation computers to establish a "knowledge industry", in which knowledge itself will be available for sale.

Besides Feigenbaum and Martin, speakers will include Koichi Furukawa, chief of the Second Research Laboratory of the Institute for New Generation Computer Technology, a Tokyo-based research and development group; Ralph E. Gomory, vice-president and director of research for IBM's Research Division; Samuel Fuller, technical director for engineering, Digital Equipment Corp.; Michael L. Dertouzos, MIT professor of electrical engineering and computer science; and Takeo Kanade, associate professor at Carnegie-Mellon University's Computer Science Department and Robotics Institute.

Registration fee for the series is $995. Further information is available from the Technology Transfer Institute, which can be reached at 741 10th St., Santa Monica, Calif. 90402.

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System Bails Out Troopers From Paperwork

RALEIGH, N.C. — Time-consuming paperwork threatened to keep North Carolina state troopers from their patrols, but now a computer system is helping to put troopers back on the highway.

Daily activity reports — among the paperwork that consumes 30% of an officer's work day — are now being compiled by computer, allowing troopers to stay on patrol longer, North Carolina Highway Patrol officials said.

Once applications work is completed, the IBM 4341-based system is expected to give patrol officials the capability to deploy troopers more effectively and so help curb serious traffic accidents by 25%. Although all computer equipment has been installed and is up and running, Patrol Lt. Richard Suddarth estimates it will be another two years before all programming and applications work, "still in the developmental stage," is completed.

Necessary Support

The IBM system itself was installed over the summer, according to Suddarth, who noted the Highway Patrol depended on manual processing of data prior to the system's installation. "We looked at everything that was available, but chose IBM because it gave us the support we needed at a price we could afford," he said. The system includes 89 terminals, including IBM Models 8775, 3276 and 3279. In addition, there are 59 printers, including IBM Models 3230 and 3287.

The IBM system also helps patrol officials know when a trooper is in potential danger. North Carolina's Highway Patrol is the first such decentralized organization in the nation to automate its radio dispatch system, linking its various troop branches to centralized information services through the system.

The dispatch system, called computer-assisted dispatch, is modeled after a system used by several centralized city police departments, Suddarth said. Robert Melott, deputy secretary of the state's Crime Control and Public Safety Department, credits close cooperation between agencies for the system's effectiveness.

The IBM computer is a component of the Highway Patrol's communications network, which enables the Patrol to share information and data with several state agencies and departments, including the Division of Motor Vehicles and the Administration Office of the Courts.

As a trooper reports daily activity to the communications center, a radio dispatcher will log that data into the computer, which will produce a work record that an officer would otherwise have to write by hand at the end of the day. "Our projections indicate that if it can save one hour per man per day it can put the equivalent of 108 [additional] troopers on preventive patrol," according to Suddarth.

The Patrol will automate as many of its manual record-keeping functions as possible, Melott said. Computerization of vital records, particularly those relating to arrest and traffic accidents, will greatly benefit troop supervisors who are responsible for direct management of patrol operations.

Data about the frequency and location of arrests and traffic accidents — which took at least three months to compile by hand — will be available much more quickly through the computer. A Patrol supervisor, for instance, would be able to examine computer-prepared analyses of accident data on a daily basis.

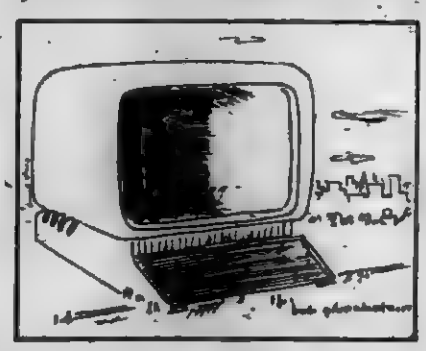
That speedy analysis will enable the supervisor to pinpoint accident trouble spots quickly and assign officers to patrol those areas to prevent further accidents.

With relevant data and effective trooper deployment, Highway Patrol officials believe they can reduce death and injury accidents on North Carolina highways by 25%. "If we can find out on a timely basis where accidents are happening, instead of [waiting] three or six months, we can respond faster," Melott said.

Patrol officials will also use the IBM system and the state network to keep in constant touch with troopers when they respond to potentially dangerous calls. If the trooper fails to contact headquarters at frequent, prescribed intervals, the computer alerts the radio dispatcher through a changing color screen on video display terminals at communications centers.

The dispatcher can summon backup help for the trooper after determining if the officer needs help. Also, the computer can locate nearby officers that could respond to the emergency.

"As we've told the people we've trained, the actual applications you can do are limited only by your imagination," Patrol Sgt. Julian Hendricks said.



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Only Two Packages Make Datapro's Top Group

(Continued from Page 1)

A total of 46 individual packages from 31 vendors were rated by 10 or more respondents to the Datapro survey. Respondents were asked to rate no more than two packages. Packages were rated on a scale of one to four, with one equaling "poor" and four equaling "excellent."

To win top-rated honors, a package must be rated "excellent" in overall satisfaction and either "excellent" or "good" in each of eight other categories by survey respondents who use those packages.

Users' Stats

The survey of 2,269 users also revealed the following statistics:

- Most respondents (88.3%) use separately priced software (software not bundled in with the hardware when a system is bought) that is acquired from their hardware vendor or an independent vendor.
- Over 90% of the users said the primary benefits of the package they rated were savings in human resources. Other significant advantages included flexibility (75.5%), simplicity (61%) and compatibility (58.4%).
- The primary disadvantages of the packages evaluated by respondents included complexity (28.8%), slowness (24.5%) and an excessive use of resources (24.5%).
- Packages performed immediately for 85.1% of the users, while 7.8% reported that the package they rated never performed as promised.
- The vast majority of packages can be run with little or no modification. Of the 33.3% of the respondents who reported that modifications were necessary, nearly two-thirds said that all modifications were paid for by the vendor.
- Users unanimously said they saved money on at least one of the software packages they evaluated. Only 3.4% said they lost money on a software package.
- One hundred percent of the users acquired at least one package by permanent license.
- Asked whether previously published user ratings influenced their decision whether to acquire a particular package, 37% said yes, while 60.2% said no. Of the 850 respondents to the question, 65% said their subsequent experience confirmed the survey information, while 3% said their experience contradicted the survey results.

The packages surveyed in the Datapro study were rated in each of the following nine

- Reliability.
- Efficiency.
- Ease of installation.
- Ease of use.

Vendor technical support:

- Troubleshooting.
- Documentation.
- User education.
- Vendor maintenance.
- Overall satisfaction.

Ups and Downs

DELRAN, N.J. — Twenty-four of the packages rated in Datapro Research Corp.'s 1983 "User Ratings of Proprietary Software" were also included in the previous year's scoring. Three packages experienced improvements in overall satisfaction of .3 or better: Burroughs Corp.'s DMS, from 3.0 in 1982 to 3.3 in 1983; Computer Associates International, Inc.'s CA-Sort, from 3.4 to 3.7; and Henco Software, Inc.'s Info, from 2.9 to 3.3.

Four packages saw decreases of .3 or more in overall satisfaction between the last two surveys: Information Builders, Inc.'s Focus, from 3.2 to 2.9; Management Science America, Inc.'s Payroll package, from 2.9 to 2.5; SAS Institute, Inc.'s SAS, from 3.7 to 3.4; and Visicorp's Visicalc, from 3.5 to 3.1.

Compared with data from the 1981 survey, two packages saw overall satisfaction increase by .6 points: IBM's Cmas, from 2.4 to 3.0, and McCormack & Dodge Corp.'s Accounts Payable package, from 2.3 to 2.9. The overall satisfaction rating for Para Research, Inc.'s Paratext package fell from 3.1 to 2.5 in the same period.

Survey Ratings Came From 2,269 Users

DELRAN, N.J. — The road to the results of Datapro Research Corp.'s 1983 "User Ratings of Proprietary Software" began some 7,000 names ago with a list of known computer sites obtained by Datapro from International Data Corp., the Framingham, Mass.-based market research firm.

The sites that received survey questionnaires were selected on an nth-name basis after excluding computer manufacturers, software suppliers and service bureaus.

A four-page, 27-question survey sent to the users included three general questions addressing their use of separately priced software, budgetary issues and the effect of published ratings on the selection of software.

Two sections of 12 questions each asked the users to rate specific software packages.

Datapro requires a 50% or better survey response to achieve reliable statistics. A total of 1,846 telephone surveys were conducted to supplement the mailed responses, resulting in a response rate of 59.9%.

Ratings for 3,265 Packages

There were 2,269 respondents to the survey who together rated 3,265 packages. The results listed in the charts on the next two pages reflect all packages rated by 10 or more respondents.

The charts cover most categories of applications software. Prices range from the cost of the recording media up to hundreds of thousands of dollars.

Datapro makes available a complete listing of ratings of all packages that were rated by three or more users.

The report is available for $25 from Datapro Research, located at 1805 Underwood Blvd., Delran, N.J. 08075.

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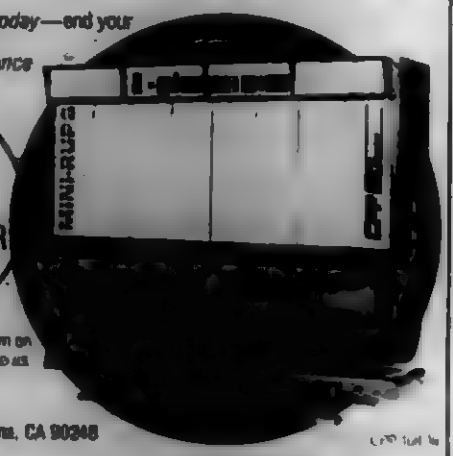

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Cluster Analysis Groups Software

The right-hand chart on each of the next two pages rates the packages included in Datapro Research Corp.'s 1982 "User Ratings of Proprietary Software" based upon a cluster analysis. The analysis is employed to provide an objective procedure for grouping similar packages on the basis of the proximity of their mean averages within a single attribute, according to Datapro.

Cluster analysis separates the packages into four distinct groups so that the mean ratings for packages within a given group are made more homogenous. Datapro took the mean average response for each of nine categories provided (see charts) and determined the average user rating in those categories for all the packages surveyed. One represents the highest rating, while four is the lowest rating. User responses were merged into clusters by a computer program so that, in the end, responses were narrowed down to four categories.

Cluster analysis provides a more definitive line of demarcation than that provided by mean average ratings, Datapro explained. Packages forming a particular cluster within an attribute are more alike, based upon their mean response, as compared to the packages found in other clusters.

Reliability

Cluster 1 : 3.57-4.0
Cluster 2 : 3.17-3.56
Cluster 3 : 2.8 -3.14
Cluster 4 : Below 2.8

Efficiency

Cluster 1 : 3.47-4.0
Cluster 2 : 2.90-3.46
Cluster 3 : 2.33-2.89
Cluster 4 : Below 2.33

Ease of Installation

Cluster 1 : 3.50-4.0
Cluster 2 : 3.06-3.49
Cluster 3 : 2.53-3.05
Cluster 4 : Below 2.53

Ease of Use

Cluster 1 : 3.43-4.0
Cluster 2 : 2.88-3.42
Cluster 3 : 2.32-2.87
Cluster 4 : Below 2.32

Trouble Shooting

Cluster 1 : 3.14-4.0
Cluster 2 : 2.63-3.13
Cluster 3 : 2.0 -2.62
Cluster 4 : Below 2.00

Documentation

Cluster 1 : 3.13-4.0
Cluster 2 : 2.57-3.12
Cluster 3 : 2.0 -2.56
Cluster 4 : Below 2.0

User Education

Cluster 1 : 3.19-4.0
Cluster 2 : 2.57-3.18
Cluster 3 : 2.00-2.56
Cluster 4 : Below 2.0

Vendor Maintenance

Cluster 1 : 3.43-4.0
Cluster 2 : 3.06-3.42
Cluster 3 : 1.33-3.04
Cluster 4 : Below 1.33

Overall Satisfaction

Cluster 1 : 3.4 -4.0
Cluster 2 : 2.88-3.39
Cluster 3 : 2.33-2.87
Cluster 4 : [illegible]

Datapro Research Corp. Chart

Mean Average Ratings Distributed in Each Cluster

User Ratings of Software Packages

Vendor and Package Name	Pkg. Class.	No. of User Ratings Received	Mean Average User Ratings								
							Vendor's Technical Support				
			Reliability	Efficiency	Ease of Installation	Ease of Use	Troubleshooting	Documentation	User Education	Vendor's Maintenance	Overall Satisfaction
Applied Data Research											
Vollie	5	16	39	37	34	37	34	33	31	33	34
Ask Computer Systems											
Manman	7	12	35	30	36	36	31	25	29	34	32
Burroughs											
DMS II	1	10	38	31	28	30	25	25	27	29	30
Business Comp. Design											
Docu·mint	2	10	33	29	34	34	25	27	26	26	29
Candle Corp.											
Omegamon	3	16	39	35	37	32	34	31	30	32	36
Century Analysis											
Boss/3	1	13	36	32	28	34	32	27	28	31	30
Cincom Systems											
Total	1	11	35	27	30	27	27	26	27	28	28
Computer Associates											
CA-Dynam/D	3	12	36	33	32	33	30	34	29	33	33
CA-Dynam/T	3	21	35	31	28	34	27	29	26	29	30
CA-Sort	5	11	39	37	36	38	33	34	28	32	37
Cullinet Software, Inc.											
IDMS	1	19	35	31	29	31	31	28	29	31	33
Henco Software, Inc.											
Info	1	10	34	28	37	35	28	29	30	32	33
IBM											
Accounts Payable	7	13	32	28	29	30	30	32	27	29	28
CICS	4	15	35	29	21	25	28	27	26	30	29
CMAS	7	10	37	33	30	31	31	31	28	29	30
Copics	7	12	33	26	24	24	29	24	23	27	28
General Ledger	7	17	34	31	31	30	32	33	32	31	31
Inventory System	7	12	32	28	28	28	29	28	25	28	28
Mapics	7	102	33	27	30	29	29	32	28	31	30
Payroll	7	17	34	28	28	28	23	26	24	27	28
Information Builders											
Focus	1	11	33	25	35	33	24	25	29	28	29
Innovation Data Processing											
FDR	5	12	40	38	38	37	34	34	29	38	38
Johnson Systems											
JARS	3	10	34	29	31	28	28	33	30	30	30

LEGEND Mean average user ratings for each package, as tabulated above, were calculated on a scale of 4 for each user rating of Excellent, 3 for Good, 2 for Fair, and 1 for Poor

Separate cluster analyses were then made of the mean average user ratings for all packages rated by three or more respondents These cluster analyses were used to determine the ranges of mean average user ratings which can be interpreted as being in the highest cluster, the second, the third, and the fourth or lowest cluster for each characteristic. The mean averages which fall into each cluster group for each characteristic are listed at the bottom of the facing page The resulting hierarchical cluster groupings for each package are tabulated on the facing page

Datapro Research Corp. Chart

Vendor and Package Name	No of User Ratings Received	Hierarchical Cluster Groupings								
						Vendor's Technical Support				
		Reliability	Efficiency	Ease of Installation	Ease of Use	Troubleshooting	Documentation	User Education	Vendor's Maintenance	Overall Satisfaction
Applied Data Research										
Vollie	16	1	1	2	1	1	1	2	2	1
Ask Computer Systems										
Manman	12	2	2	1	1	2	3	2	2	2
Burroughs										
DMSII	10	1	2	3	2	3	3	2	3	2
Business Comp. Design										
Docu·mint	10	2	2	2	2	3	2	2	3	2
Candle Corp.										
Omegamon	16	1	1	1	2	1	2	2	2	1
Century Analysis										
Boss/3	13	1	2	3	2	1	2	2	2	2
Cincom Systems										
Total	11	2	3	3	3	2	2	2	3	3
Computer Associates										
CA-Dynam/D	12	1	2	2	2	2	1	2	2	2
CA-Dynam/T	21	2	2	3	2	2	2	2	3	2
CA-Sort	11	1	1	1	1	1	1	2	2	1
Cullinet Software, Inc.										
IDMS	19	2	2	3	2	2	2	2	2	2
Henco Software, Inc.										
Info	10	2	3	1	1	2	2	2	2	2
IBM										
Accounts Payable	13	2	3	3	2	2	1	2	3	3
CICS	15	2	2	4	3	2	2	2	3	2
CMAS	10	1	2	3	2	2	2	2	3	2
Copics	12	2	3	4	3	2	3	3	3	3
General Ledger	17	2	2	2	2	1	1	1	2	2
Inventory System	12	2	3	3	3	2	2	3	3	3
Mapics	102	2	3	3	2	2	1	2	2	2
Payroll	17	2	3	3	3	3	2	3	3	3
Information Builders										
Focus	11	2	3	1	2	3	3	2	3	2
Innovation Data Processing										
FDR	12	1	1	1	1	1	1	2	1	1
Johnson Systems										
JARS	10	2	2	2	3	2	1	2	3	2
NOTE The range of average user ratings attributed to each cluster for each characteristic is as follows:										
Cluster 1		3 57 to 4 0	3.47 to 4 0	3 5 to 4 0	3 43 to 4 0	3.14 to 4 0	3 13 to 4.0	3.19 to 4.0	3.43 to 4.0	3.4 to 4.0
Cluster 2		2 17 to 3.56	2 9 to 3 46	3 06 to 3 49	2.88 to 3 42	2.63 to 3.13	2 57 to 3.12	2.57 to 3.18	3.06 to 3.42	2.88 to 3.39
Cluster 3		2 8 to 3 16	2 33 to 2 89	2 53 to 3 05	2 32 to 2 87	2.0 to 2 62	2.0.to 2 56	2 0 to 2 56	1.33 to 3.04	2.33 to 2.87
Cluster 4		Below 2 8	Below 2.33	Below 2.53	Below 2.32	Below 2 0	Below 2:0	Below 2 0	Below 1 33	Below 2.33

Datapro Research Corp. Chart

User Ratings of Software Packages

Vendor and Package Name	Pkg. Class.	No. of User Ratings Received	Mean Average User Ratings								
							Vendor's Technical Support				
			Reliability	Efficiency	Ease of Installation	Ease of Use	Troubleshooting	Documentation	User Education	Vendor's Maintenance	Overall Satisfaction
Management Science America (MSA)											
General Ledger	7	19	3.1	2.6	2.3	2.5	2.6	2.6	2.9	2.5	2.9
Payroll	7	19	2.9	2.1	2.1	2.3	2.4	2.4	2.6	2.5	2.5
McCormack & Dodge											
Accounts Payable	7	14	3.0	2.6	2.7	2.9	3.0	2.8	3.2	2.8	2.9
General Ledger	7	19	3.3	2.7	2.5	2.9	2.5	2.8	3.1	2.7	2.9
Micropro											
Wordstar	7	20	3.5	3.2	3.1	3.1	2.4	2.6	2.5	2.5	3.1
Microsoft											
Multiplan	7	14	3.8	3.2	3.5	3.4	2.9	2.9	2.9	3.0	3.4
Oxford Software											
UFO	1	16	3.2	3.0	2.9	2.9	2.8	2.8	2.6	2.9	2.9
Pansophic Systems											
Easytrieve	1	17	3.7	3.5	3.5	3.4	3.3	3.2	3.1	3.3	3.4
OWL	2	10	3.7	3.4	3.2	3.6	3.1	2.8	2.5	2.9	3.3
Panvalet	5	15	3.6	3.6	3.6	3.5	3.4	3.1	2.9	3.2	3.3
Para Research											
Paracalc	7	23	3.5	2.7	3.6	2.8	2.8	2.5	2.3	2.8	2.8
Paratext	7	21	3.2	2.6	3.2	2.2	2.4	2.5	2.2	2.3	2.5
The Poise Company											
Poise	7	10	3.3	2.4	2.9	3.1	2.4	2.6	2.6	2.6	2.9
Quasar											
Powerhouse	2	10	3.8	3.6	3.9	3.9	2.9	2.8	3.3	3.4	3.9
Quick	2	10	3.3	3.0	3.2	3.2	2.8	2.9	2.8	3.1	3.0
SAS Institute											
SAS	7	11	3.6	3.4	3.5	3.5	3.2	3.1	3.0	3.2	3.4
Software International											
General Ledger	7	35	3.3	2.6	2.6	2.6	2.5	2.3	2.5	2.4	2.6
Sorcim											
Supercalc	7	10	3.7	3.1	3.6	3.4	2.6	2.6	2.5	2.7	3.3
SPSS, Inc.											
SPSS	7	24	3.4	2.8	3.2	3.0	2.9	3.2	2.9	3.2	3.2
Syncsort, Inc.											
Syncsort	5	22	3.9	3.9	3.6	3.6	3.6	3.2	2.9	3.5	3.6
1040 Software Inc.											
Software 1040	7	15	3.7	3.7	3.4	3.5	3.5	3.5	3.5	3.9	3.8
University Computing Co.											
UCC 1 Tape M.S	3	10	3.9	4.0	3.3	3.4	3.3	3.3	2.9	3.4	3.5
VisiCorp											
Visicalc	7	25	3.6	3.3	3.5	3.0	2.8	3.0	2.7	2.9	3.1

Datapro Research Corp. Chart

Vendor and Package Name	No of User Ratings Received	Hierarchical Cluster Groupings								
						Vendor's Technical Support				
		Reliability	Efficiency	Ease of Installation	Ease of Use	Troubleshooting	Documentation	User Education	Vendor's Maintenance	Overall Satisfaction
Management Science America (MSA)										
General Ledger	19	3	3	4	3	3	2	2	3	2
Payroll	19	3	4	4	4	3	3	2	3	3
McCormack & Dodge										
Accounts Payable	14	3	3	3	2	2	2	1	3	2
General Ledger	19	2	3	4	2	3	2	2	3	2
Micropro										
Wordstar	20	2	2	2	2	3	2	3	3	2
Microsoft										
Multiplan	14	1	2	1	2	2	2	2	3	1
Oxford Software										
UFO	16	2	2	3	2	2	2	2	3	2
Pansophic Systems										
Easytrieve	17	1	1	1	2	1	1	2	2	1
OWL	10	1	2	2	1	2	2	3	3	2
Panvalet	15	1	1	1	1	1	2	2	2	2
Para Research										
Paracalc	23	2	3	1	3	2	3	3	3	3
Paratext	21	2	3	2	4	3	3	3	3	3
The Poise Company										
Poise	10	2	3	3	2	3	2	2	3	2
Quasar										
Powerhouse	10	1	1	1	1	2	2	1	2	1
Quick	10	2	2	2	2	2	2	2	2	2
SAS Institute										
SAS	11	1	2	1	1	1	2	2	2	1
Software International										
General Ledger	35	2	3	3	3	3	3	3	3	3
Sorcim										
Supercalc	10	1	2	1	2	3	2	3	3	2
SPSS, Inc.										
SPSS	24	2	3	2	2	2	1	2	2	2
Syncsort, Inc.										
Syncsort	22	1	1	1	1	1	1	2	1	1
1040 Software Inc.										
Software 1040	15	1	1	2	1	1	1	1	1	1
University Computing Co.										
UCC 1 Tape M.S	10	1	1	2	2	1	1	2	2	1
VisiCorp										
Visicalc	25	1	2	1	2	2	2	2	3	2

Datapro Research Corp. Chart

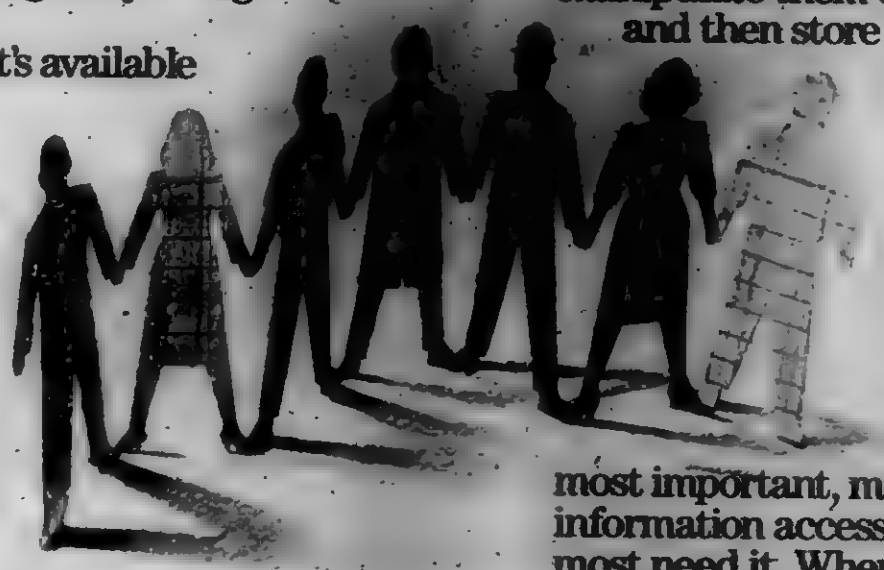
Once, and for all.

Cullinet's General Ledger and Financial Software System.

Enter an item in one component of Cullinet's Financial System, general ledger for example, and it's entered in all of Cullinet's Financial System components.

Enter it once and you can access financial data through any of eight components.

Entered once, it's available for all.



This is only possible because all of Cullinet's Financial components share a common database. This integration is so thorough that data can be called up from separate components joined and viewed together at the same time. This integration also extends to the full line of Cullinet applications software (our manufacturing system, for instance).

Personal computer applications are also integrated in this unique enter-it-once-enter-it-for-all system. A person can access financials directly from the database, manipulate them on a personal computer and then store the results in Cullinet's Database Management System. Features such as these suggest that Cullinet's Financial System may be the most effective way to eliminate data redundancy, facilitate monthly closings and, most important, make accurate financial information accessible to the people who most need it. When they most need it.

Once, and for all.

For more information on Cullinet's Financial System or a seminar schedule call (617) 329-7700.

Cullinet

Seminars on Cullinet's Financial Software System will be held in the following cities during the coming weeks: Harrisburg, PA Nov. 22; Meadowlands, NJ Nov. 30; Minneapolis, MN Nov. 29; Regina, SASK Nov. 15; Tampa, FL Nov. 29; Valley Forge, PA Dec. 1; Vancouver, BC Nov. 30 and Washington, DC Nov. 22.
To reserve a place call Harry Merkin at (617) 329-7700.

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Calendar

Week of Nov. 13

Nov. 16-17, Washington, D.C. — **Relational Data Base Systems.** Contact: Friedman and Fuller Training Center, Suite 350, 11140 Rockville Pike, Rockville, Md. 20852.

Nov. 16-17, Los Angeles — **Data Modeling and Conceptual Data Base Design.** Contact: Dr. Jack Hokikian, Skyline Information Systems, Suite 900, 3250 Wilshire Blvd., Los Angeles, Calif. 90010.

Nov. 16-18, Phoenix — **Micro and Personal Computers: Technical and Applications.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Nov. 16-18, Seattle — **Local-Area Networks.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

Nov. 16-18, Orlando, Fla. — **Data Communications: A Complete Overview and Update.** Contact: Data-Tech Institute, 100 Myrtle Ave., Nutley, N.J. 07110. Also being held Nov. 28-30 in Cincinnati.

Nov. 16-18, San Francisco — **SAS Basics Course (Portable).** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Nov. 16-18, Seattle — **Unix.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Nov. 16-18, Houston — **Data Communications Concepts and Facilities.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 16-18, Anaheim, Calif. — **Robotics and Artificial Intelligence.** Contact: The Technology Transfer Society, P.O. Box 3608, Department RAI, Torrance, Calif. 90510.

Nov. 16-18, Orlando, Fla. — **Network Communications Protocols.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Nov. 17-18, New York — **Local-Area Networks: Selection Guidelines.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held Nov. 17-18 in Chicago.

Nov. 17-18, New York — **Shell Programming on the Unix.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011.

Nov. 17-18, Chicago — **Beyond System/34.** Contact: Techtran, 72 Cummings Point Road, Stamford, Conn. 06904.

Nov. 17-18, San Francisco — **Financial Analysis for Telecommunications Professionals.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Nov. 17-18, San Francisco — **Fourth-Generation Systems and Language.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 17-18, Atlanta — **IMS/VS Dump Reading.** Contact: Data Base Management, Inc., 1075 Tolland Tnpk., Manchester, Conn. 06040.

Nov. 17-18, Washington, D.C. — **How to Build and Use a Data and Information Resource Directory.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

Nov. 17-18, Chicago — **DP for Key Users.** Contact: Ed Green, Peat, Marwick, Mitchell and Co., 810 Seventh Ave., New York, N.Y. 10019.

Nov. 17-18, San Francisco — **Developing Business DP Systems.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 17-18, Washington, D.C. — **Voice-Data Integration and the Digital PBX.** Contact: Phillips Publishing, Inc., Suite 1200N, 7315 Wisconsin Ave., Bethesda, Md. 20814.

Nov. 17-18, Cary, N.C. — **SAS Color Graphics Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Nov. 17-18, San Diego — **Imple-**

Optical Memory Focus of Meeting

SAN FRANCISCO — A technical conference on the future of optical memories scheduled here Dec. 5-7 will feature speakers from IBM, Eastman Kodak Co. and 3M Corp.

Sponsored by Rothchild Consultants, publisher of *Optical Memory Newsletter*, the First International Technology Opportunity Conference will focus on "The Future of Optical Memories, Video Disks and Compact Disks to the Year 2000." It will feature interactive meetings at which vendors and end users will discuss the workings and uses of optical storage technology and analyze its business potential.

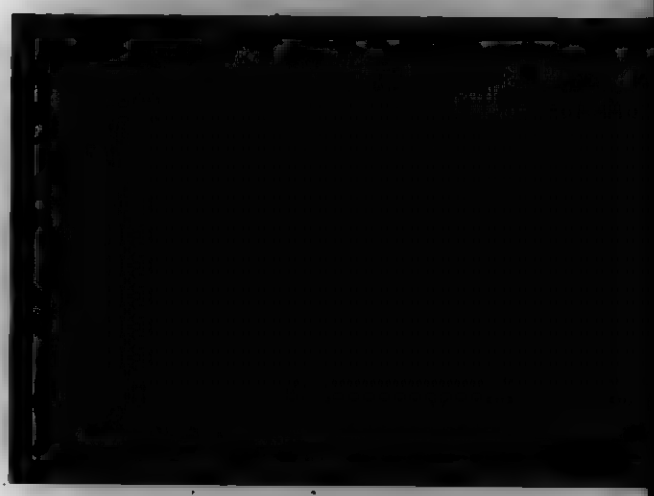
Dr. David H. Davies, project manager for 3M's optical recording project, will deliver the keynote address on "Laser Optical Information Storage: Wave of the Future."

Other speakers will include Dr. James U. Lemke and Stuart Lambers of Eastman Kodak; Dr. Barry H. Schectman, manager of applied science at IBM; Andrew Lippman of MIT; and senior executives of Sony Corp., Canon, Inc., Drexler Technology Corp. and others.

The conference, which will be limited to approximately 100 people, will be held at the Sir Francis Drake Hotel. The registration fee is $695.

More information is available through Technology Opportunity Conference, P.O. Box 14817, San Francisco, Calif. 94114.

IF YOU'RE CONSIDERING CONSIDER



As a knowledgeable personal computer user, you know that there's a world of difference between first generation software products and second. (Think of VisiCalc™ and Lotus 1-2-3,™ for example.)

It's the difference between setting standards. And then raising them.

INTRODUCING R:BASE,™ FROM MICRORIM™

Rbase is the new generation of relational database software. With a combination of capacity, speed and transportability that today's more powerful PC applications need. (Check out the comparisons.)

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MANAGING A DATABASE. CONVENIENTLY.

With Rbase, it's simple. A series of prompts guides you every step of the way. Which means you don't have to be a programmer to create data entry or report forms just like the ones you're used to using.

As you become more proficient, you'll create shortcuts by customizing menus of stored commands. And print reports as simple or complex as you like at the touch of a key. With Rbase, prompted, ad-hoc queries and customized report formatting become the reality that first generation products could only promise!

Rbase is also very forgiving. It's very hard to make a mistake. That's because commands are simple English expressions—like SELECT, PROJECT, WITH, WHERE, FROM, etc. Dates and dollar amounts are written normally: 11/16/83;

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Calendar

menting Personal Computers in the Corporate Environment. Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held Nov. 21-22 in Boston and Nov. 28-29 in San Jose, Calif.

Nov. 17-18, San Diego — **Interconnect Japan.** Contact: Technology Analysis Group, Suite 102, 1424 16th St. N.W., Washington, D.C. 20036.

Nov. 17-19, Boston — **The Fifth Annual Northeast Business Computer Show and Software Exposition.** Contact: Northeast Expositions, Inc., 822 Boylston St., Chestnut Hill, Mass. 02167.

Nov. 17-20, Washington, D.C. — **The Semiannual Washington, D.C. Computer Showcase Expo.** Contact: The Interface Group, 300 First Ave., Needham, Mass. 02194.

Nov. 17-20, Chicago — **The Semiannual Chicago Computer Showcase Expo.** Contact: The Interface Group, 300 First Ave., Needham, Mass. 02194.

Nov. 18, Washington, D.C. — **Relational Data Base Design Techniques.** Contact: Friedman and Fuller Training Center, Suite 350, 11140 Rockville Pike, Rockville, Md. 20852.

Nov. 19, New York — **Working With IBM Computers.** Contact: Women in Data Processing, Inc., Suite 2008, 310 Madison Ave., New York, N.Y. 10017.

Nov. 19, New York — **Basic Programming For Programmers.** Contact: Women in Data Processing, Inc., Suite 2008, 310 Madison Ave., New York, N.Y. 10017.

Week of Nov. 20

Nov. 20-24, Dubai, Abu Dhabi — **The Third Gulf Computer Exhibition and the Gulf Office Exhibition.** Contact: Mabco, Inc., Mid-Asia/Africa Business Co., 739 Boylston St., Boston, Mass. 02116.

Nov. 21, Washington, D.C. — **State-of-the-Art Telecommunications.** Contact: Sheila Brayman, Associated Information Managers, Suite 4708, 1776 E. Jefferson St., Rockville, Md. 20852.

Nov. 21, New York — **CICS/VS DL/1 Interface Architecture.** Contact: Teltech, 39 Broadway, New York, N.Y. 10006.

Nov. 21-22, San Francisco — **Datapro Update: "Data Communications Today."** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 21-22, Englewood Cliffs, N.J. — **Security Management.** Contact: Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Nov. 21-22, Minneapolis — **Personal Computer Local Networks.** Contact: Architecture Technology Corp., P.O. Box 24344, Minneapolis, Minn. 55424. Also being held Nov. 29-30 in Phoenix.

Nov. 21-22, New York — **Rational Data Bases: Fact or Fancy?** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 21-22, San Francisco — **Focus for the End User: Basic Report Preparation.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 21-Dec. 12, New York — **Interpersonal Skills Workshop.** Contact: Women in Data Processing, Inc., Suite 2008, 310 Madison Ave., New York, N.Y. 10017.

Nov. 21-23, Amsterdam — **Videotex Europe.** Contact: Online Conferences, Suite 3314, 133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 21-23, San Francisco — **Data Communications for Microcomputers: Acquisition, Application and Implementation.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 21-23, Washington, D.C. — **Fundamentals of Data Communications.** Contact: Continuing Engineering Education, George Washington University, Washington, D.C. 20052.

Nov. 21-24, Atlanta — **System Administration and Performance.** Contact: Technology Information Systems, 2305 E. Lincoln Drive, Phoenix, Ariz. 85016.

Nov. 22-23, New York — **CICS/VS Command Level Debugging.** Contact: Teltech, 39 Broadway, New York, N.Y. 10006.

Nov. 22-29, New York — **Data Communications Protocols.** Contact: Women in Data Processing, Inc., Suite 2008, 310 Madison Ave., New York, N.Y. 10017.

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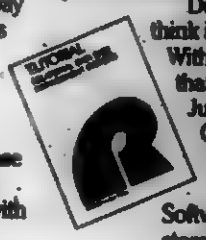

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EDITORIAL

The New Buzzword

Getting information from here to there has never been an easy task for users, especially those who are locked into a single vendor that aggressively protects its technological turf at the expense of a user's systems growth.

Computer vendors — like automobile manufacturers — have always thought that the best way to guarantee a dedicated user base is to build machines whose parts are only interchangeable with similar machines. If you want to add to your information fleet, you have to deal with the same firm or risk having a shop filled with systems that work separately, but are not on speaking terms with the rest of the family.

Fortunately, the situation is changing. Spurred by the standardizing motions of major computer vendors and the ominous shadow of "The Shakeout," a number of companies are building gateways from their computers to the computers of competing firms. In fact, "gatewaying" might very well be the buzzword of the mid-'80s as more firms learn that you cannot please all of the users all of the time without making a few technological concessions.

Two recent converts to gateways are Wang Laboratories, Inc. and Perkin-Elmer Corp. Wang, which has traditionally kept all of its equipment under the same technological umbrella, recently opened its communications door to office automation rival IBM by unveiling software that provides a gateway between its VS systems and IBM or IBM-compatible host systems [CW, Oct. 10]. The Massachusetts-based firm did this both to expand its customer options and base and, apparently, to fight IBM's systems juggernaut through an if-you-can't-beat-them-join-them compromise rather than an outright us-or-them battle.

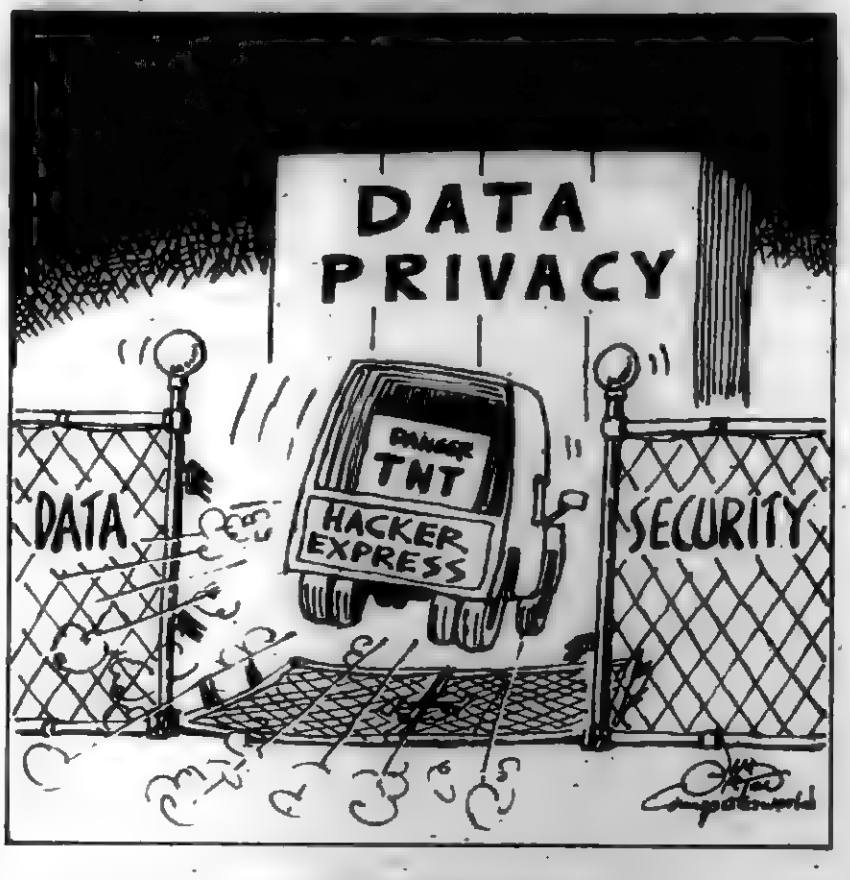
PE, a maker of 32-bit superminicomputers that has carved a respectable position for itself in the scientific computing arena, recently expanded options for its users by unwrapping products it collectively calls "Pengates." Simply, the software makes the firm's Series 3200 superminis compatible with IBM's Systems Network Architecture, Ansi X.25 and other IBM-supported protocols.

PE went one step further by announcing a plan to adapt its systems and peripherals to any present and future industry-accepted standards that might influence the buying decisions of users. Called Everywhere — a term that might prompt critics to charge PE with impossibly trying to be all things to all people — the plan would allow PE to piggyback accepted industry trends without appearing to be strategically fickle.

Cincom Systems, Inc. made its pitch for gatewaying recently by announcing an IBM-Digital Equipment Corp. connection that would allow users with both systems in-house to bridge the communications gap between software programs. Cincom is reportedly the first software house to market such a product, which is called the Ultra Interactive Data Base System.

Finally, Stratus Computer Corp., a young but recognizable force in 32-bit fault-tolerant computing, this week announced software that ties its computers into IBM mainframe and Personal Computer systems. Termed the Stratus Office Solution, the software also places the firm's foot into the office automation market, as well as high-speed transaction processing. The strategy there, obviously, is to link the two, much like what vendors are also trying to do in the manufacturing and office markets.

The handwriting on the wall, or in this case the gate, is clear. Vendors and users have woken up to the fact that infrasystem compatibility is no longer enough to survive in the highly volatile computer industry. Gateways are being opened, and this time it is the user who is invited to make an entrance.



LETTERS

Public-Key Cryptosystems

Istvan Sebestyen's and Matthew Nimetz's In-Depth article "A Democratic Use of New Technology" [CW, Oct. 17] indicated a number of methods of using the public-key cryptosystems. However, it glossed over a fundamental problem: authentication during initial key distribution.

In the article, it is indicated that each user would "pick up the private key in person from the key administrator." In addition to the logistical problems of a million or more videotex users being required to pick up an initial public key personally, a more fundamental question arises.

Why not distribute private (data encryption standard [DES]) keys by the means indicated and have the key administrator also function as an on-line key distribution center, about which a great deal has been published? The question becomes even more cogent because of the time required to generate a public-key pair.

The article also indicates that key generation of a secure public-key pair ranges from 15 minutes to four hours. This seems extreme when a DES key can be generated in a few msecs, at most. Miles Smid, ICST, NBS, has described a secure method of generating DES keys. I have also developed a method. Smid has also described methods of using the DES to obtain public signatures.

The public key system as originally proposed seemed to solve the encryption key distribution problem. However, Needham and Schroeder ("Using Encryption for Authentication in Large Networks of Computers," Comm. Association for Computing Machinery, Vol. 21, No. 12, pp. 993-999) have shown that the logistics of key distribution is substantially the same for public and private-key cryptosystems.

If the initial public key distribution method does not provide some means of authentication, such as the proposed local key generation, which does not, the network is vulnerable to a pernicious attack. A penetrator can sequentially masquerade as "n" authentic users and request a change in public key from the key administrator for each of the users. At the least, this attack would create a chaotic situation and may result in subversion and compromise of confidential information on a vast scale.

There is a secure method of initial key distribution, registered mail or courier. The article indicates that this method is not required with public-key cryptosystems, but the article does not support the contention. If mail or couriers are required, the question arises: Why not distribute DES keys and avoid a number of the problems described in the article?

Marvin Sendrow
Advanced Computer
Security Concepts
Annandale, Va.

Data Gathering a Fact

James E. Gorman, in his letter to the editor [CW, Oct. 24], bluntly affirms: "Under no circumstances can any agency ... obtain access about [individuals] ... from Census records."

I must ask if he also believes in the tooth fairy.

U.S. intelligence and law enforcement agencies in covert operations use any means they must to get the data they need. These means have included theft, bribery, coercion, infiltration and the like.

I don't object to covert data gathering: Where our nation's security is at stake, the niceties of court orders must sometimes be evaded. National survival, in my opinion, takes precedence over technicalities.

Frank Sweet
Jacksonville, Fla.

HUMAN CONNECTION/Jack Stone

Getting DP Managers for Remote Mini Sites

For years, data processing centers have been struggling with the problems of supplying skilled managers for their branch office DP sites. These days the difficulties are compounded by several orders of magnitude as the needs have extended into the international arena. Here's how one major organization classifies the salient issues, preparatory to designing a comprehensive in-house recruitment and training program.

Applications systems are developed by the headquarters' systems and programming group and distributed as complete packages to field locations.

The field is, of course, responsible for installation, user training, operation and follow-on applications support. Assistance is provided in this regard from headquarters in principle, but in practice the field must operate more or less autonomously, since the line for such aid can be interminably long.

As is so typical these days, tight budgets have restricted the sites' DP head count to no more than a handful and often just one or two, plus the manager. Of course, overseas sites do receive local or area support from the equipment vendor for hardware repair and systems programming maintenance, which eases the manpower burden somewhat.

Since the program calls for minicomputer installations for several hundred sites over the years, the notion of recruiting skilled DP managers from the outside is completely out of the question. Instead, the firm is forced to select those with a propensity for the DP profession from within the organization, but without any prior experience in DP operations, and to train them appropriately, starting from the sock-bottom basics.

Selection Process

But how is the selection made? More specifically, in view of the miniscule staffing levels, is the position of DP manager for the remote mini site one that is primarily administrative, that is, applications installation, machine operations, user training and so on.

And what is "appropriate" training for such managers, anyway? Even more elusive is the subject of career ladders: Do the managers climb the rungs of administrative generalists or those of technical specialists?

Key field personnel within the organization have strong feelings that the managers should possess particular technical strengths to solve the day-to-day technical problems. In contrast, key personnel on the headquarters staff believe that the managers should possess more of a generalist's background to make them more suitable for rotational assignments in areas other than DP.

These opinions also are reflected in the various thoughts about a training program: Field personnel would like to see a substantial amount of time devoted to applications and hardware-specific subjects, whereas the headquarters staff would like to see a greater emphasis on administrative topics.

Training Needed

But there was fairly general agreement that candidates should receive training in such areas as general principles of business systems and computer technology; technological developments, particularly the rapidly converging thrusts of DP, word processing and telecommunications; and current systems and hardware operations procedures, at least sufficient to handle emergency situations.

The current approach to the training includes these general areas, among others: strong technical grounding in major applications areas, with emphasis on hands-on exercises using operational hardware and systems; presentation of the major functions of the DP manager and how the role may evolve over time; elementary programming; and basic systems analysis to gain an appreciation of the needs for user responsiveness.

The information presented above was derived from a preliminary study. If you are interested in a contact to receive additional information, please forward a self-addressed, stamped envelope to Jack Stone, P.O. Box 33699, Washington, D.C. 20033.

READER COMMENTARY/Milt Bryce

Information System Design Methodologies

The organizations that will excel in the 1980s will be those that manage information as a resource. Information resource management is the latest rallying cry for corporate America, one that has a noble, if familiar, ring to it. Unfortunately, if information resource management is the only criterion for success, very few organizations will excel in this decade.

Managing the information resource means, essentially, gathering, storing and processing data so efficiently and effectively that organizations produce the best information with which to make decisions and take actions, both on operational and corporate levels.

Millions of man-years have already been spent on this goal, as the computing community will attest, but we are pessimistic that it is anywhere near realization. Why?

To put it bluntly, most corporate executives and managers do not really understand information and information systems or how to build them — and, frankly, neither do most people in computing. If companies built bridges the way they've built information systems for the past two decades, this would be a nation dependent on ferryboats.

There are exceptions: Good systems have been built, and enlightened management can be found. In general, however, organizations continue to be plagued with complaints of information systems that do not meet the needs of users and are not easily adaptable to ever-changing requirements. As if that weren't enough, add severe cost overruns (100% is not uncommon), incessant delays, lack of standards, terrible or nonexistent documentation and modifications and maintenance that consume 85% of staff time. In the midst of all this, applications backlogs are mounting, and users are screaming and scheming to buy their own computers.

Attempting a Cure

We have been popping aspirins to cure these headaches. For instance, during most of the 1970s, the emphasis was on new programming techniques to improve productivity. The efforts were laudable, but misdirected. In fact, only 15% of good system development has to do with programming at all; the right program specifications will do more than all the techniques combined.

To solve these cost overruns and delays, management bought project management systems, which compounded the problem by adding a nightmare of controls and paperwork; the blame and effort were not where they belonged — on design.

Data base management systems were installed with the promise that they would help to realize the dream of the integrated corporate data base. But most of them have been little more than complex memory-gobbling access methods; they have neither addressed the task of managing data nor the issue of handling organizational data that is not stored on a disk. Documentation aids and guidelines have proliferated. But isolated from, rather than integrated with, the process of system development, the documentation aids and guidelines have not solved the problem of people who will not document.

Some are beginning to see that these headaches are mere symptoms of a systemic disease: the total lack of the organization, structure and discipline to design and build good information systems with consistency. Without a sound, standard system design methodology, these headaches will never be cured, and the idea of managing information as a major resource will be a corporate pipe dream.

Black Art

Until very recently, system design methodology had been viewed as a black art, with each DP witch doctor serving up his own unique incantations and secret brew. Organized and structured ways to design systems do exist, but the black art misconception has persisted in part because most people do not really understand what information and information systems are.

System design methodology cannot be discussed without establishing a definition for what is being designed. That entails clearing up two basic misconceptions: Information is equated with data, and information systems are equated with computer systems.

Information is not data. Information is the result of processing data to gain insights from which to make decisions and take actions. Simple enough, but management has confused the two in communicating its information requirements to system developers. Far too many executives and managers are still asking for data and accepting reams of printouts from which they must distill the information they need to make decisions.

Why? There are two reasons. Analysts and programmers don't know how to ask the right questions, or they think they have the computer solution without asking. Managers, on the other hand, often will not (or cannot consciously) express what they need, for what purpose and when. The end user is seldom involved in or made responsible for the design of his information system. If he were, he would, no doubt, be more responsive and accurate. In fact, the user and the developer have somehow escaped true accountability to top management for their lack of communication and the often costly and inadequate results.

Equating information systems with computer systems is a misconception born of decades of preoccupation with technology. When management took information systems out of the hands of the systems and procedures people and gave them to the DP technical staff, the emphasis shifted from business processes to computer processes. What had top management done? Mostly out of fear of a technology it did not understand, it had abrogated its responsibility for the information it used to run its business. It then compounded the felony by isolating systems managers and developers from the mainstream, abandoning them to their disks and downtime. The wall of jargon grew and grew.

The crime is not that this occurred, but that it has persisted. Despite exhortations from the computer industry itself, most DP or information system managers have not been elevated into top corporate echelons or involved in business planning. So the emphasis has stayed on computer processes, and that must be reversed.

(Continued on Page 52)

Implementing System Design Methodologies

(Continued from Page 51)

The correct definition of "information system" is "a logically interrelated set of business processes that accomplish organizational goals." There is no "computer" in that definition.

The methods or tools of implementing a system are not (or should not be) even considered until after a logical definition and design are done. Information requirements drive design, and they dictate also what tools will be used to meet them.

Now that the computer has been driven out of the information systems equation, let's go back to the correct definition. It is a set of business processes. The meaning of "business processes" has also caused confusion. All too often, the DP department responds to requests to automate a department or a function, proceeding with a system designed in isolation from the rest of the company. Business processes are not departments or functions. They cut across such lines.

The foundation for building information systems consists of these basics:

- Properly defined information (not data) requirements are mandatory to the development of a sound information system.
- End users and developers must be held accountable for defining these requirements and developing systems to meet them.
- Information systems must be defined and designed from the standpoint of related business processes that cut across functional and departmental lines.
- DP or information systems management must be involved in top corporate business planning to manage the shift in emphasis from computer processes to business processes.

"System design methodology" can be defined as a complete logical method for developing effective systems to meet the information requirements of an organization. Without this broader perspective of logical — not physical — design, there is a tendency to develop systems that solve the wrong problems, produce voluminous and inappropriate data and concentrate on the implementation of DP technologies. Information systems are not DP systems; design methodologies that do not consider, equally, both manual and automated procedures are doing only part of the job.

Such a comprehensive methodology does not stop with analysis and design. It also encompasses these interdependent disciplines: data management, project management and documentation and communications.

What can an organization expect to accomplish with such a design methodology? From a business standpoint, it will be the development of a set of information systems that are models of how the entire business operates. Ultimately, all of an organization's data will be indexed and organized to meet user information requirements.

Systems Development Standpoint

From a systems development standpoint, such a methodology should:

- Significantly increase the productivity of analysts and programmers and, thus, the number of applications that can be developed in a given period.
- Cut down drastically on cost overruns and delays.
- Create data definition standards.
- Diminish system maintenance and modification time.
- Ensure thorough, accurate documentation.
- Improve the quality and effectiveness of systems.
- Dramatically increase the business knowledge of the developers in the management information systems (MIS) department.

This kind of integrated approach is an enormous undertaking, which is not to be underestimated. It must be adopted almost as a religion, as it will change corporate business systems and the DP professional's work life. It requries strong conviction because it takes time, hard work and patience to implement. During that time, belief can be weakened.

During this time, policy must mandate that all new systems development will be done using this methodology. Top management must support and continuously reaffirm this policy to keep both user management and DP management in line and to keep new managers from unilaterally deciding they are going to change things.

User management and end users of the system must be involved — by corporate fiat, if necessary — in almost every phase of system design and development, accepting the responsibilities of participation and approval assigned to them.

A good methodology will create systems prepared for change. So it must have rigid adherence to concepts and procedures, in every phase from design to implementation, test and audit.

Corporate and MIS management have a great deal to think about before implementing an information system design methodology.

Bryce is president of M. Bryce & Associates, Inc. in Cincinnati, developers of Pride-Automated System Design Methodology.

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By John M. Carney
Special to CW‡

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What happens when you take the perspective from the other end? You start with the application generators. As the application is being defined by the analyst, definitions and interrelationships are built in the data dictionary. You begin with an overall view of the data structures needed by the appplication. A simple hierarchy or network structure is drawn up.

Menu-Driven Screens

Once the analyst has defined the basic data structure, he begins creating the application by defining data elements, combining related elements into segments that go to make up a record. All this is done through a series of menu-driven screens. Meanwhile, a complete data dictionary of the data structure is being built.

Having completed the data definition phase, the analyst then creates transactions against that data structure using the same type of menu-driven screens. A transaction is defined to input, change, delete or view the data structure. Once a transaction is defined, the analyst can begin working with the application by inputting test data through automatically generated screens still using the same program that is being used to define the system. At this point the analyst can quickly put together a menu of screens to show his end user what the application is going to look like.

The analyst is now ready to process this data. Traditionally, this is where the programmer comes into the picture with Cobol coding sheets aplenty and only second-hand knowledge of the application's processes from the analyst. Using a DBMS, the programmer may have a precompiler to help him access his way around the data base. The effort to implement the application goes into the programs-and-procedure code. The

(Continued on Page 62)

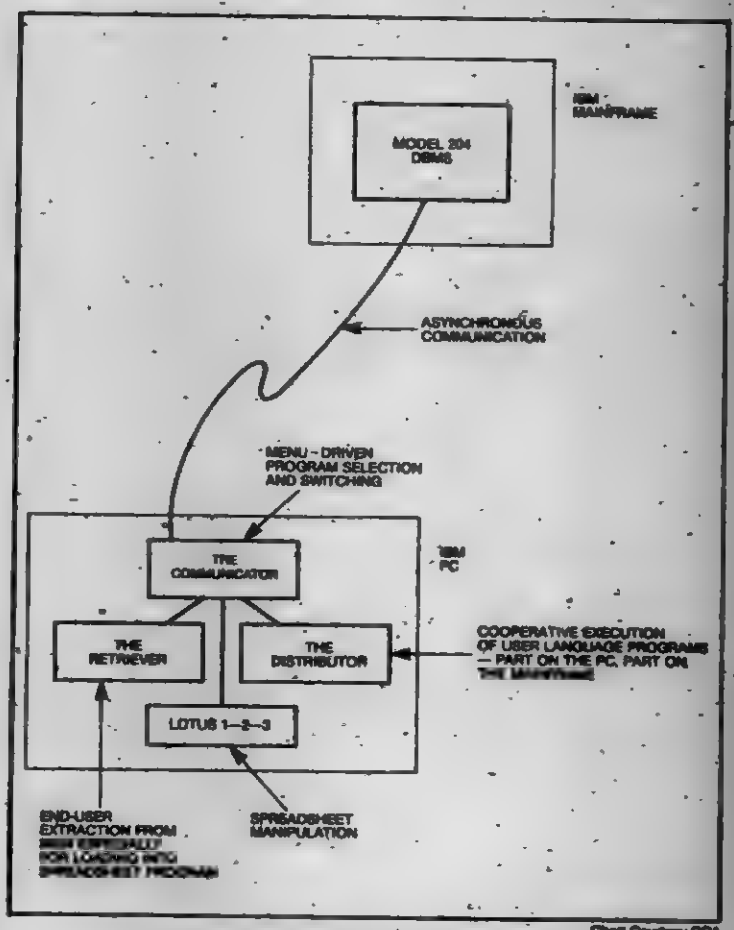

Chart Courtesy CCA

Architecture of the PC/204 Family C

CCA's 'PC/204' Links Its DBMS to IBM Micro

CAMBRIDGE, Mass. — Computer Corp. of America (CCA) has announced a link between IBM Personal Computers and CCA's Model 204 data base management system running on IBM mainframes. Called PC/204, the product is designed to optimize the use of mainframe data in microcomputer spreadsheets and includes a conversion routine to reformat data for use on Lotus Development Corp.'s Lotus 1-2-3 spreadsheet, graphics and data base management package for the Personal Computer.

PC/204 allows transparent access to the mainframe data base without connecting through a network or logging onto the operating system, a spokesman said. The user can extract data from the mainframe and convert it directly to spreadsheet format without rekeying.

PC/204 consists of four prod-

- The Communicator provides the basic communications link between Personal Computer and mainframe and makes

(Continued on Page 62)

ADR Unwraps Release 1.1 Of 'D-Net'

PRINCETON, N.J. — Applied Data Research, Inc. has announced Release 1.1 of ADR/D-Net, a distributed data base system that makes data location independent of the program, operating system and teleprocessing monitor.

D-Net now provides distributed data base support for both batch and on-line ADR/Datacom/DB programs, a spokesman said. Batch and on-line applications can read and update Datacom/DB data bases while remaining insensitive to the physical location of the data.

(Continued on Page 58)

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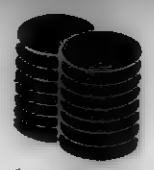
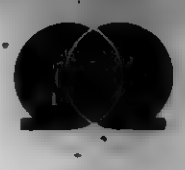


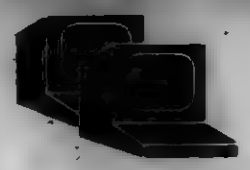
SDSI

Shared Dataset Integrity, SDSI, solves the inherent data integrity problems caused by the simultaneous access of the same data by more than one system without the use of device 'reserves'. SDSI greatly improves system performance by allowing the user to eliminate device 'reserves' from existing programs without any system or program modifications.



STAM

Shared Tape Allocation Manager STAM, automatically manages mountable devices, (tape and disk), in multi-CPU installations. Allocation decisions for shared device pools are made automatically, thus eliminating the potential for disastrous operator errors and more effectively using these valuable resources than is possible with manual control.



SCON

Superconsole is designed to provide a single console image for a multi system environment where console messages can be merged together to create a single stream on one or more designated consoles. The result is a more streamline and productive operating environment. Operators will have to monitor only one console instead of many eliminating the need for redundant hardware and personnel.

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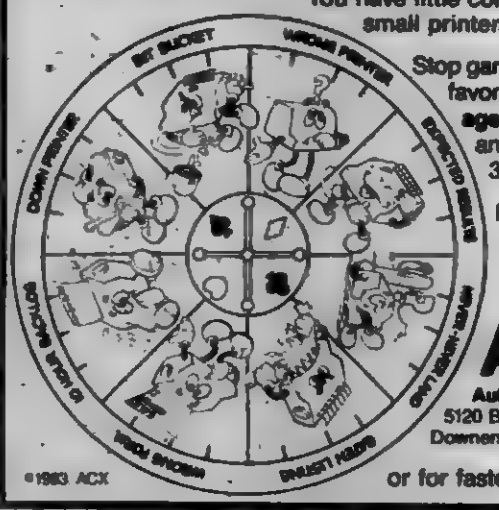

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Said to Optimize Response Time

Planning Tool Fits VM/370

WALTHAM, Mass. — BGS Systems, Inc. has announced Capture/VM, a capacity planning package for the IBM VM/370 operating system.

The company said Capture/VM will optimize both interactive response time and job processing volume. Reports generated by the package allow capacity planners to determine and correct imbalances in work load among system components, to identify the types and specific elements of use that cause system response degradation and to evaluate the results of corrective action.

The package is said to summarize performance data from the VM monitor and compile reports in user-determined categories. Standard reports include systemwide CPU utilization, I/O device usage, channel usage and response time by individual and group user identification. Capture/VM interfaces with BGS Systems' Info/Base and Best/1-VM capacity management software.

Capture/VM is priced at $9,000 from BGS Systems, One University Office Park, Waltham, Mass. 02254.

'Arsap' Release Runs on RSTS For PDP-11s

RIVERDALE, Md. — Gejac, Inc. has announced that Arsap, the firm's resource management and charge-back package for processors manufactured by Digital Equipment Corp., has been updated to run under DEC's RSTS Version 8.0 operating system. The product is aimed at users of DEC's PDP-11 line of minicomputers.

Features of Arsap include: project accounting, terminal accounting, the ability to generate system utilization reports and invoice generation, the vendor said.

The package can be used to control day-to-day operations, to monitor system utilization growth and to plan the resources needed for the future.

The RSTS version of the package costs $3,495. Gejac can be reached through P.O. Box 188, Riverdale, Md. 20737.

System/38 Users Get Utility For RPG-III Files

OAK BROOK, Ill. — Michaels, Ross & Cole Ltd. has announced Mrc-Maintainer, an IBM System/38 utility designed to allow nontechnical users to create and utilize RPG-III file maintenance programs. It is the fifth module of the company's Mrc-Query series.

Mrc-Maintainer is said to write all code necessary to create applications including data description specifications (DDS) physical files, DDS logical files, DDS display files and RPG-III file maintenance programs. It also adds files automatically to Mrc-Dictionary so that reports, retrievals and graphs can be created.

Other features of Mrc-Maintainer maintenance programs include Help key support, file edit checking, message file use, file look-up functions through "search" mode, full function maintenance (add, update, delete, inquire) and automatic audit trail. All programs generated by Mrc-Maintainer are fully documented.

Other modules in the Mrc-Query series include Mrc-Reporter, Mrc-Grapher, Mrc-Dictionary and Mrc-Retriever. They are designed for use with the IBM System/38 Release 5.0, and each module costs $1,140. Michaels, Ross & Cole is located at Suite 501, 1301 W. 22nd St., Oak Brook, Ill. 60521.

On March 31st, 1983, IBM announced that its new operating system, MVS/XA, was available for general release.

On March 31st, 1983, CGA Software Products Group announced that its Super-MSI™ and MSM® software were already enhanced to support MVS/XA.

Our clients wouldn't expect any less.

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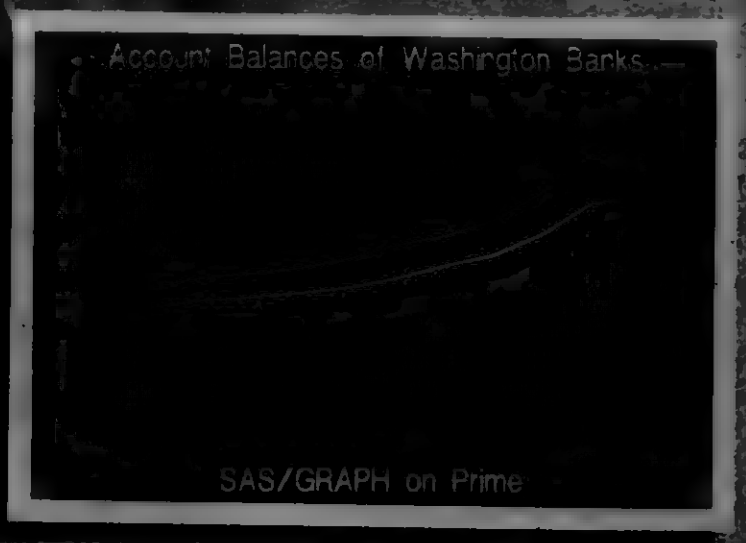
SAS. Not Just for IBM ...Anymore

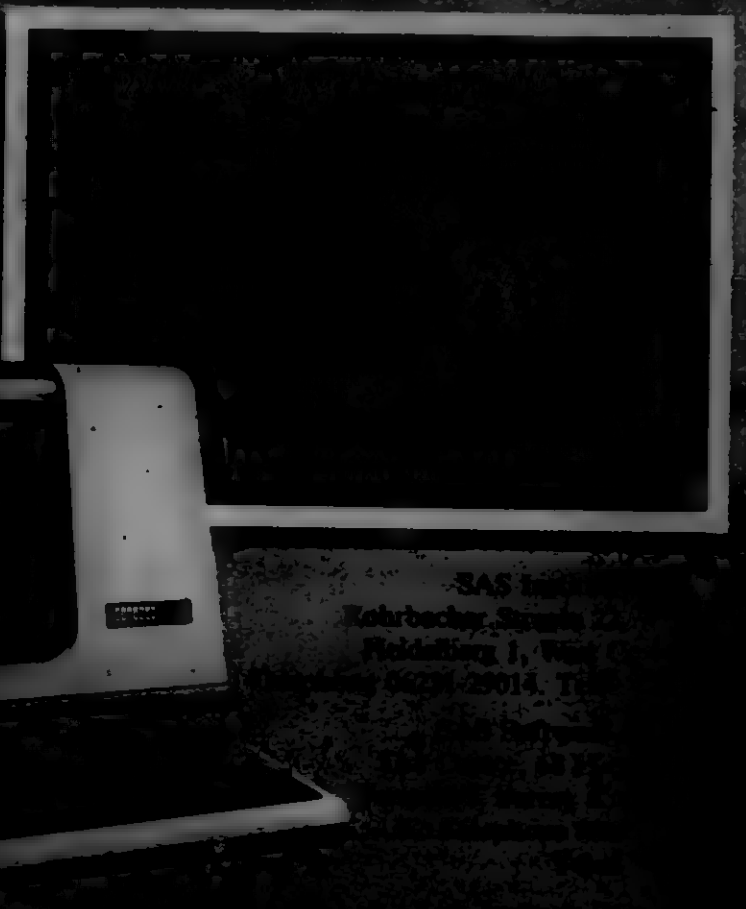
Since its beginnings, SAS® has provided a powerful and flexible software system to IBM users. Now SAS for VAX,® ECLIPSE® and PRIME® users has the power and flexibility.

You get a twofold advantage with SAS. A comprehensive library of ready-to-use procedures gives you the power to analyze data without formal training. And every product provides an on-line help facility. With a few simple SAS commands, you can use SAS for data entry, market research, capacity planning, financial forecasting, summary statistics, charts, plots, personnel analysis and many other jobs.

In addition to these routine reports, SAS also provides extensive data management capabilities that can be combined with a macro facility, to handle all your complicated programming needs.

In short the SAS System gives you the analytical tools for a complete Decision Support System. Integrating SAS for data management, statistical analysis and report writing; SAS/GRAPH™ for graphics; SAS/ETS® for econometric and financial modeling and forecasting; and SAS/PSP® for data entry, text editing and financial applications.





The Interac

Our word processor makes text composition and editing fast and simple. And with its link to the computer, it can also access data.

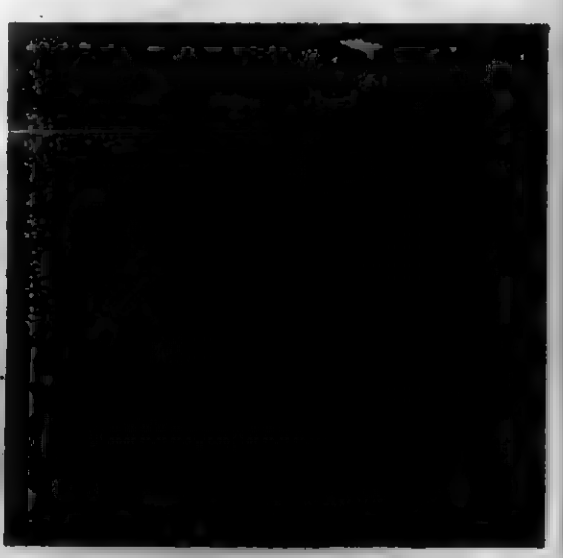
Electronic mail and filing make people and information far more accessible, whether they're across the hall or around the world.

Our Series 100 personal office computers handle a manager's individual needs, such as word processing, graphics and data analysis. They talk to big computers, too.

Economical computing with up to 56 terminals. That's what the HP 3000 Series 39 delivers. You can use it as a central processor in a small office or as part of a network.

This manager's workstation functions both as a stand-alone computer and a terminal. That makes it easy for business professionals to access the data they need for decision-making.

High-volume printing on this laser printing system virtually eliminates preprinted forms, letterhead stationery and long lines at the copier.

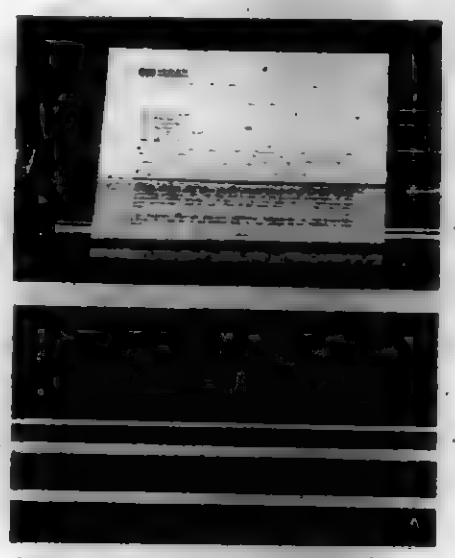


Data communications can expand The Interactive Office throughout the building or across the country.

tive Office.

Our high-performance HP 3000 Series 68 can handle over 200 interactive users while processing big batch jobs like the company payroll.

Graphics created on this color terminal can be plotted on paper or transparencies.



High-quality printing for business correspondence and reports can be generated on this letter-quality printer.

Report generation is simplified by special software tools which help business professionals create reports and summaries in a matter of minutes—without any programming.

Hewlett-Packard has made a major contribution to productivity in the office. Our interactive approach to office automation allows you to integrate the four major resources your staff needs to do their jobs faster and more effectively—document management, personal computing, support for decision making, and communications.

Based on an expanded, fully compatible family of HP 3000 computers, The Interactive Office brings powerful word processing, data processing and business graphics capabilities to a wide range of users, including secretaries, managers and other business professionals. So vital information and much needed computing power can be placed in the hands of everyone that needs them—within the same office or on the other side of the world.

If you'd like to see HP's Interactive Office at work, call your local Hewlett-Packard sales office, and we'll arrange a demonstration. You'll see what a difference it can make to your business today. And how it can grow to assure even greater productivity tomorrow.

For more information, send for our brochure, "The Interactive Office." Write to Bruce Woolpert at Hewlett-Packard, Dept. 03178, 19447 Pruneridge Avenue, Cupertino, CA 95014. In Europe, write to Henk van Lammeren, Hewlett-Packard Nederland B.V., Dept. 03178, P.O. Box 529, 1180 AM Amstelveen, The Netherlands.

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ADR 'D-Net' Release 1.1 Features Distributed Support

(Continued from Page 53)

Data and programs can be moved within the distributed network without program modification, the company claimed. Datacom/DB support of D-Net also enables up to 999 data bases across a network to be concurrently accessible with full read, add, delete and update capability.

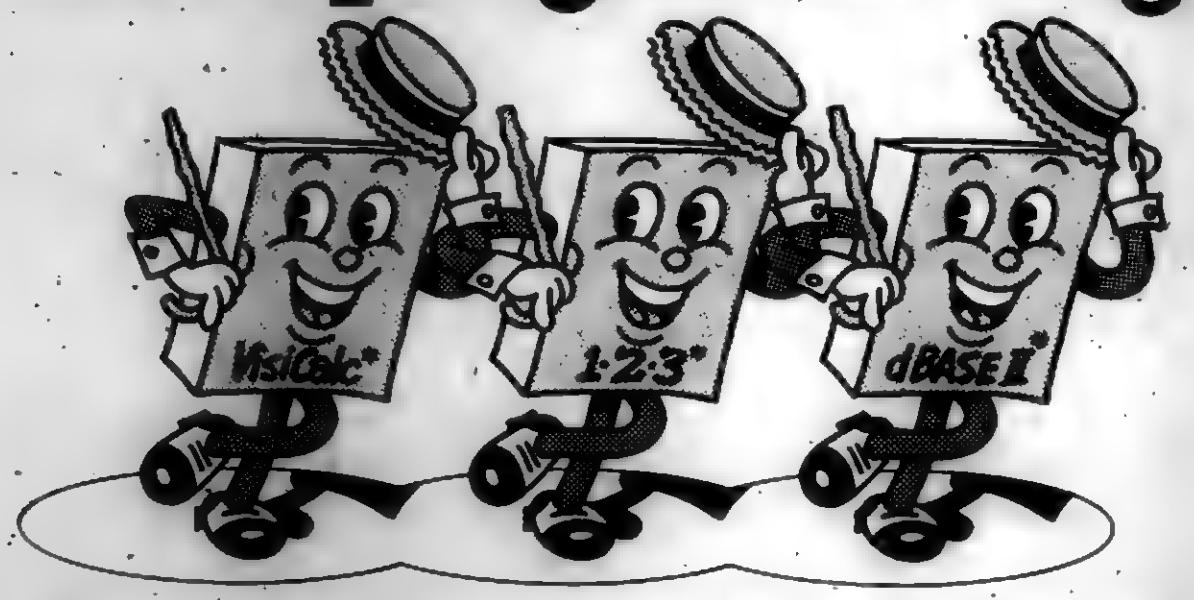
The new release protects data integrity across processor boundaries, the spokesman said. D-Net provides protection against loss of data integrity due to concurrent updates. It also provides synchronization of data across processor boundaries by building a level of integrity control greater than that provided by Datacom/DB in a single-processor environment.

The new release also features enhanced security measures, which allow administrators to restrict access at the file level. Through controlling information in ADR/Datadictionary, inquiry or update access from remote data centers can be disallowed.

D-Net operates in IBM 370, 4300 series, 30 series and plug-compatible environments and is available immediately. D-Net requires Datadictionary, which costs $34,200 under IBM's OS operating system; $28,100 under IBM DOS; and $21,100 under IBM 4321, 4331, 370/115, 370/125, 370/135, 370/138 or plug-compatible processors.

The permanent license price for the first CPU using D-Net is $37,500 for OS, $29,100 for DOS and $21,800 for smaller mainframes and plug-compatibles. ADR is located at CN-8, Rt. 206 and Orchard Road, Princeton, N.J. 08540.

How to make these programs sing.



Most programs written for the IBM® PC or XT enable you to do amazing things with numbers. Trouble is, numbers don't exactly jump off the page.

Enter BPS Business Graphics.™ The graphics program from Business & Professional Software.

With BPS Business Graphics, you can take numbers from virtually any program you're now using—spreadsheet, data base, accounting, you name it—and turn them into bar graphs, line graphs and pie charts. *Without retyping a single digit.* You can even access text files created by a word processing program or down-loaded from your mainframe, and graphically manipulate them. So those numbers actually begin to mean something.

If you've already been introduced to graphics through 1-2-3,™ you'll be interested to know that BPS Business Graphics not only works with that and other integrated programs, but offers you additional power and flexibility. Functions like curve fitting and moving averages give you unmatched analytical capabilities.

And since BPS Business Graphics supports more than 80 popular printers and plotters, you can produce high-quality reproductions—even overhead transparencies—for your important presentations.

For more information, visit your computer dealer. Or call us, toll-free, at 1-800-DIAL-BPS for the name of the dealer nearest you. (In Mass., phone 617-491-3377.)

Soon, your numbers will be singing a whole new tune.

When BPS Business Graphics, you can see relationships more clearly.

BPS BUSINESS GRAPHICS
BUSINESS & PROFESSIONAL SOFTWARE

BPS Business Graphics is also available for Apple® computers and the Wang PC. © 1983 Business & Professional Software, Inc.
Business Graphics is a trademark and BPS is a registered trademark of Business & Professional Software, Inc. IBM and VisiCalc are registered trademarks of International Business Machines Corporation and VisiCorp, respectively. 1-2-3 and dBASE II are trademarks of Lotus Development Corporation and Ashton-Tate, respectively.

MVT/VSE Touts Full Support For IBM 4381

SAN FRANCISCO — Software Pursuits, Inc. has announced MVT/VSE, a DOS/VSE-compatible operating system the company said supports the full 16M bytes of memory available on IBM's recently introduced Model 4381 mainframe.

According to the vendor, when MVT executes on a processor with 16M bytes of memory, it sets the dynamic address translation controls to indicate 4,000 pages, allowing it to use the full high-speed buffer instead of only half. The company said IBM currently provides support for only half of the 16M bytes of storage available on the 4381 with DOS/VSE.

MVT/VSE is available for a monthly rental charge between $600 and $900 from Suite 800, 444 Market St., San Francisco, Calif. 94111.

Contel Offers 'Virtual RT-11' For VAX-11 User

BETHESDA, Md. — The Small Computer Systems Group of Contel Information Systems, Inc. has announced the Virtual RT-11 (VRT) package for users of Digital Equipment Corp. VAX-11 processors.

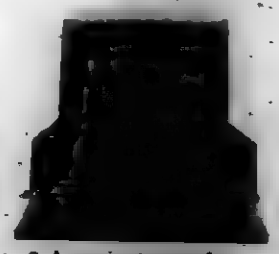
The package is said to be a high-efficiency emulation of DEC's RT-11 operating system, providing an environment that supports both runtime applications and program development. All RT-11 single-job applications and utilities will run under the Virtual RT-11 system, a spokesman said. An RT-11 license is not required unless DEC RT-11 utility programs are used.

The VRT package is available for $1,750 from Contel Information Systems, Small Computer Systems Group, No. 200, 4330 East-West Highway, Bethesda, Md. 20814.

MSA software makes your mainframe computer work 100 times harder than ever before

1. Now MSA's Executive Peachpak II™ software links personal computers to the mainframe. So you can...

2. Use your PC to access all your MSA mainframe systems, from General Ledger to Manufacturing.



3. Access entire mainframe files, so you can work with large amounts of information at one time.

4. Choose the exact mainframe information you need, as much as you need, in the form you need.

5. Use it with Peachtree Software, 1-2-3™ from Lotus, DIF,™ VisiCalc™ or other micro software.

6. Replace terminals with PCs at about the same cost—with many more capabilities.

7. Plug PCs directly into your existing online network...

8. Or establish dial-up access with regular telephone lines.

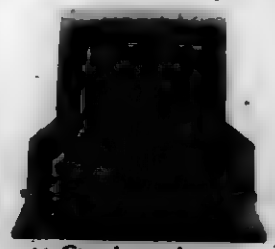
9. Interface mainframe data directly to typewriters, graphics plotters, and printers...

10. And automate your office economically.

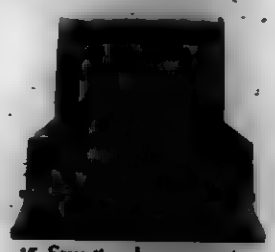
11. Get this new technology in any of three specific packages...

12. Give executives the management tools they need with Executive Peachpak II...

13. Provide word processing and mainframe access to administrative assistants with Administrative Peachpak...



14. Give the graphic arts department direct mainframe access with Graphics Peachpak.



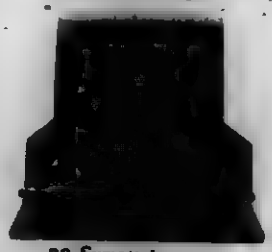
15. Save time because mainframe data is automatically loaded into your PC...

16. So you free up data processing resources...

17. And you don't have to key in data yourself.

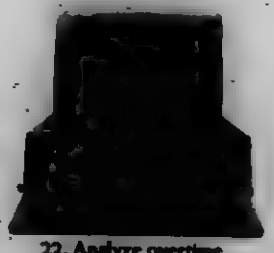
18. Use MSA's Manufacturing System data to produce a cost/margin analysis with PeachCalc...

19. Make a capacity analysis using a PC and mainframe manufacturing information...



20. Summarize your findings in a report using PeachText...

21. Eliminate spelling errors with a built-in Spelling Proofreader.



22. Analyze overtime percentage on your PC, using data from MSA's Payroll/Personnel System...

23. Make timely manpower adjustments to maximize productivity...

24. And revise departmental salary projections on your PC.

25. Download vendor history from MSA's Accounts Payable System...

26. And use PeachCalc to do comparative analysis.

27. Use PeachLink to download information from both MSA and non-MSA online mainframe systems...

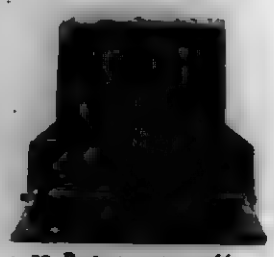
28. Create custom online formats with Easy-Screen™.

29. Or use standard formats provided by MSA.

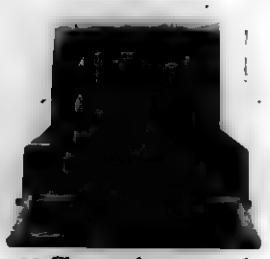
30. Download a financial report from the mainframe to your PC...

Turn Page ▷

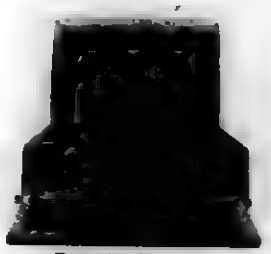
31. Add footnotes to a balance sheet using PeachText...



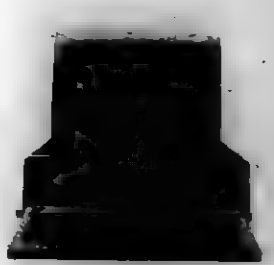
32. Project next month's income with PeachCalc...



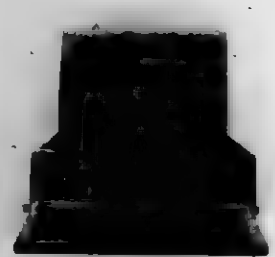
33. Change sales estimates and recalculate income projections instantly.



34. Download names and addresses from your mainframe...



35. Use the List Manager and PeachText to do a mailing informing customers of a special announcement...



36. Or create a mailing to vendors requesting bids.

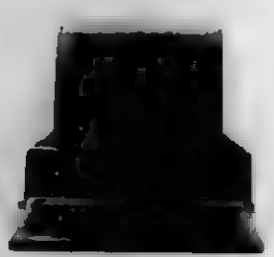
37. Using personal computer telecommunications, access up-to-the-minute exchange rate information...

38. Use PeachCalc for float analysis...

39. Display current exposure with a graph...

40. Update MSA's mainframe Foreign Exchange System.

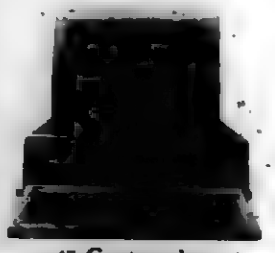
41. Use PeachLink to distribute mainframe data to your other offices across the country...



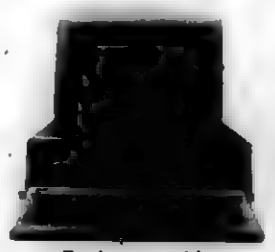
42. Use a PC at those remote locations to print reports...

43. Graph expenses by location, department or by a single product line...

44. Print checks in remote locations from mainframe Accounts Payable data.

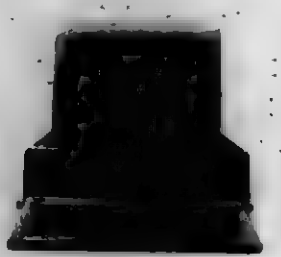


45. Create a salary administration worksheet on a PC using MSA's Payroll/ Personnel System...



46. Produce a workforce utilization model using PeachCalc...

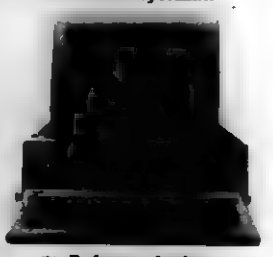
47. Monitor turnover using Business Graphics...



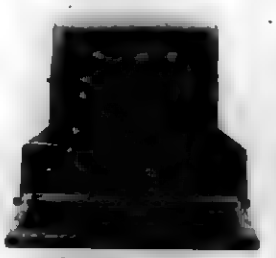
48. And, for a printed copy, route your Business Graphics output to a plotter or printer.

49. Use PeachLink to get economic data from MSA's Forecasting and Modeling System...

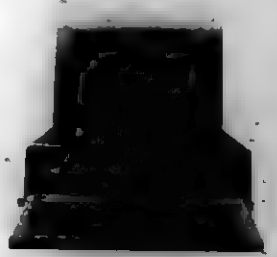
50. Use PeachText to prepare a corporate planning policy document...



51. Refer to a built-in Random House® Dictionary while writing the report.

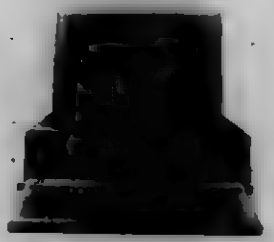


52. Link to mainframes under operating systems OS, DOS, and SSX...

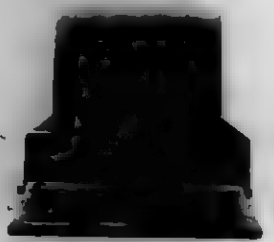


53. Use all standard online monitors, including CICS, IMS-DC, IDMS-DC, TSO, CMS and ICCF.

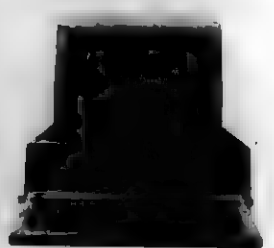
54. Assist your auditors by giving them access to mainframe data...



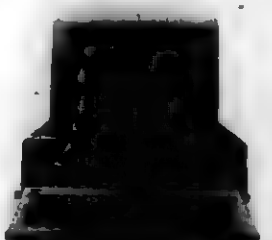
55. And the convenience of PeachText word processing...



56. Give them access to current customer and vendor information for letters of confirmation...

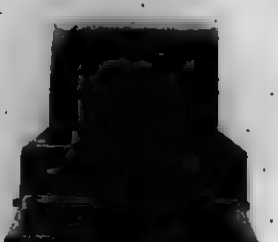


57. And an easy way to prepare notes to consolidated financial statements using PeachText.

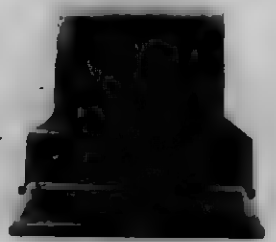


58. Extract delinquent customer invoice information from your Accounts Receivable System...

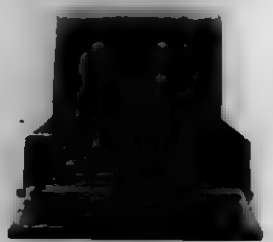
59. Personalize a dunning letter with your micro software...



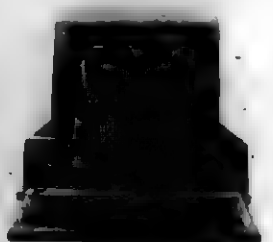
60. For help, call up 30 synonyms instantly using PeachText's Random House® Thesaurus.



61. Use mainframe Inventory and Purchasing data to graph inventory use by department on your PC...

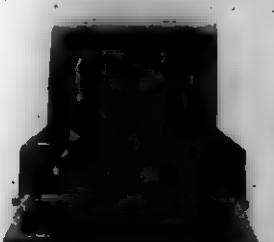


62. Make a purchase order adjustment without leaving your workstation.



63. Download current balances from General Ledger to graph actual vs. planned...

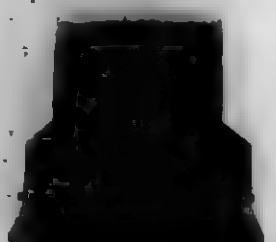
64. Do a breakeven analysis by department.



65. Analyze overtime percentage by department on the PC using MSA's Payroll/Personnel System...

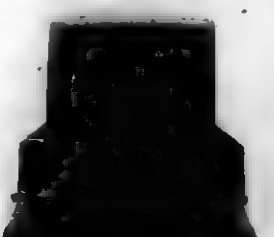
66. Use PeachText to prepare a memo summarizing your analysis and attach it to a graph.

67. Download employee data for an upcoming salary review...



68. Complete the salary review on your PC...

69. Enter the salary adjustment from your PC to the mainframe...



70. Make salary projections on your PC using mainframe payroll data.

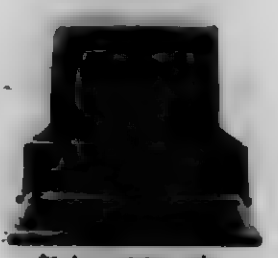
71. Capture data from MSA's Fixed Assets System...

72. Use PeachCalc to create a lease amortization model...

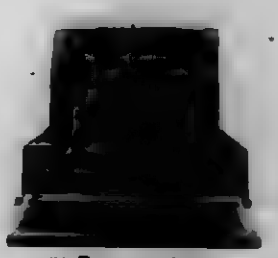
73. Perform a TEFRA depreciation analysis.

74. Get database-to-database transfer with Database Sharing...

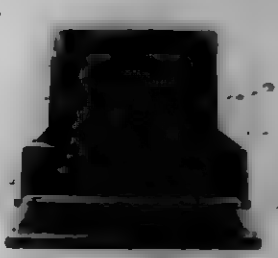
75. Download an entire report with the touch of one key...



76. Access it instantly, without data processing involvement...



77. Enjoy a realtime environment, no waiting for batch processing.



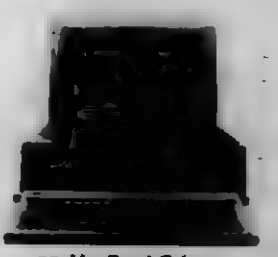
78. Access available funds data in MSA's Budgetary Control System...

79. Use PeachCalc to project expenditures through year-end.

80. Download data from MSA's Capital Expenditure - Tracking System...

81. And analyze cash flows for an investment analysis decision.

82. Dial up subscriber databases to access current credit information for customers...



83. Use PeachCalc to analyze information and set credit limits...

84. And update your mainframe Accounts Receivable data.

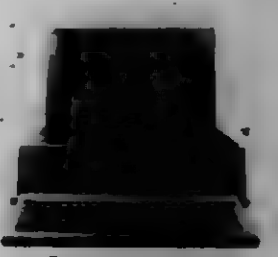
85. Allow only authorized personnel access to the mainframe, due to built-in security.

86. Instantly express numbers in bar, line and pie charts or other business graphics.

87. Add footnotes to mainframe reports, or customize mainframe documents.

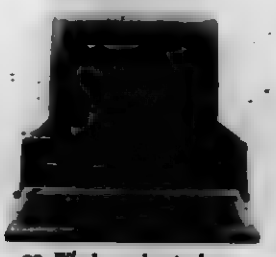
88. Produce up to nine different kinds of graphs and charts with mainframe information.

89. Get HELP if you need it, with a built-in feature that guides you through the system.

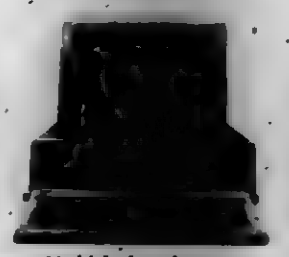


90. Organize your information and mailing lists with your own List Manager.

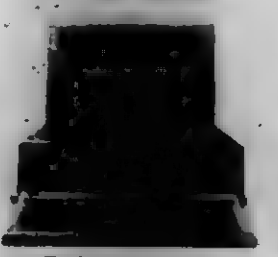
91. Use mainframe information with the [redacted] Graphics System to produce slides and transparencies.



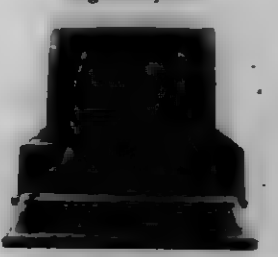
92. Work productively at home, by dialing up the mainframe from your own personal computer.



93. Make late changes to reports generated on the mainframe.



94. Do budget forecasting using PeachCalc and your PC.

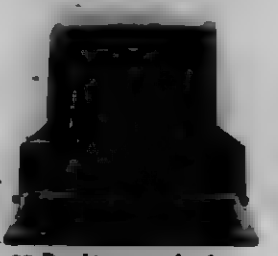


95. Review profit and loss statements at a moment's notice on your PC.

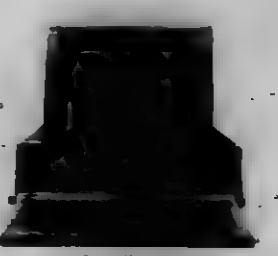
96. Improve the productivity of your staff with simple-to-use software for personal computers...

97. Enjoy the convenience of a complete menu-driven system...

98. Use over 20 pre-defined applications from MSA.



99. Put this new technology to work for your company immediately...



100. Install it in less than one hour.

Backlogs? Rush requests? Now they're a thing of the past.

MSA's new Executive Peachpak II™ links your company's personal computers directly to your mainframe. So executives can get to vital information without waiting for print-outs.

Best of all, this hot new technology is available from MSA *right now.* (In fact, it's already working for companies across the country.)

Ideal for use with the newly announced IBM® 3270-PC

While other companies are still trying to work the bugs out of their initial offerings, MSA already has its *second* successful mainframe-to-micro product: Executive Peachpak II.

It offers such advanced features as Database Sharing, MSA's database-to-database transfer technology that lets you get all the mainframe information you need instantly.

And a Universal Interface with most micro software packages including Peachtree Software, 1-2-3™ from Lotus, and VisiCalc.™

Executive Peachpak II also includes PeachCalc,™ an electronic spreadsheet. A Business Graphics System for color charts and other graphics. Telecommunications that let personal computers talk to each other—or link to resources such as Dow Jones News/Retrieval.® PeachText,™ a complete report production system that lets executives edit and footnote reports. A List Manager for organization. And PeachLink,™ the software that links your PCs to the mainframe.

This mainframe-to-micro technology is also available in two other packages: Administrative Peachpak, which includes comprehensive word processing functions. And Graphics Peachpak, for color graphs and charts.

MSA's revolutionary new link means you can now deal with one software company that supplies all the advanced mainframe and micro systems your company needs. And the software that links them together.

Free personal computer...

...with your qualifying purchase of MSA mainframe software and Executive Peachpak II.

For details on how to get your free personal computer contact Robert Carpenter at (404) 239-2000. Or write "Free Computer Offer," Management Science America, Inc., 3445 Peachtree Road, N.E., Atlanta, Georgia 30326. This offer expires December 31, 1983, so act today.

MSA
The Software Company

Only MSA makes the mainframe link to personal computers this productive

Executive Peachpak II and PeachLink are trademarks of Management Science America, Inc. PeachCalc and PeachText are trademarks of Peachtree Software, Inc., an MSA company. DIF is a trademark of Software Arts, Inc. 1-2-3 is a trademark of Lotus Development Corp. VisiCalc is a trademark of VisiCorp, Inc. Random House is a registered trademark of Random House, Inc. Dow Jones News/Retrieval is a registered trademark of Dow Jones & Company, Inc.

CCA Announces Data Base Link for IBM Micro

(Continued from Page 53)
applications resident in both systems available by menu selection. It employs block-mode communications using the CRC-16 protocol, which performs automatic error detection and retransmission of damaged data blocks.

● The Retriever enables end users to scan mainframe data stored in Model 204 and extract information for manipulation on the Personal Computer. It is designed especially for extracting data for spreadsheet applications, the spokesman said.

● The Distributor permits applications written in Model 204 User Language to be executed partly on the mainframe and partly on the Personal Computer.

● Lotus 1-2-3 is provided as an optional PC/204 product. Users may also use spreadsheet programs other than Lotus 1-2-3, the spokesman noted.

Shipments are scheduled for the first quarter of 1984. The CPU price for PC/204 is $10,000. The package consisting of the Communicator, the Retriever and the Distributor costs $750 per Personal Computer. Lotus 1-2-3 is available for $500 per Personal Computer. Model 204 costs $235,000 under IBM's MVS operating system, $195,000 under IBM's CMS and $150,000 under IBM's DOS. CCA is located at Four Cambridge Center, Cambridge, Mass. 02142.

Application Generators Filling a Dream

(Continued from Page 53)
data processing part of the application gets separated from the data.

To carry on with the application generator concept, why not let the analyst define the processes right with the data, where the definition belongs? Using the same tools that were used to define the data structure and transactions, the analyst can use a series of menu-driven screens to define the processes that will be used to manipulate the data when a transaction is entered by an end user.

The kind of processing that is available includes:

● Derived update to establish connections between segments or records and to automatically build inverted files.

● Local check to ensure that a field value falls in a given range.

● Local computation to calculate or update fields.

● External check to compare a field against a field in another file; for example, a table of state codes against a product file.

● Fetch operations to obtain fields from other segments or records.

● If-then-else processing to allow an operation to be performed based upon a certain condition.

As this process is being defined through the application generator, the system is documenting itself. A process is attached to or triggered by a segment, which is viewed by the user through a transaction. The analyst finds that by defining the processes that make up the application with the data, there is no need for writing procedure code.

What we have described so far is done through a universal transaction processor. The analyst uses the same vehicle throughout to define the data structure, transactions, processes and on-line forms. The end user uses this same vehicle to run his application — data entry, customer query or the like — on-line or in batch. The end user can request reports using English-language statements through this same universal transaction processor. If the report request is frequently used, the user can store the request in the same dictionary with the data definitions and applications.

Lastly, let's discuss maintenance. The user finds that a 25-char. field doesn't have enough room to hold the customer name and asks to extend the field to 30 characters. No problem. Just change the field length in the field definition, and let the application generator remind the analyst to change the field length in related segments and transactions. There is no need to reload the data base. The analyst can make additions without having to reload existing data.

The system uses Vsam, installs in one hour under VM/CMS or in less than a day under OS or DOS/VSE. After three days or so of training, a programmer/analyst can begin using the system productively.

This must be a dream. My alarm clock will go off any minute and I'll get up and resume my schema definition, mapping programs as I rush off to a special class for advanced Cobol programming methods.

This is not a dream. This is the way the industry is going with fourth-generation software.

Carney is technical director at Software Craftsmen, Inc. in Boston.

VS Series Gets System Package

OAK BROOK, Ill. — Business Model Systems, Inc. has announced Version 2.0 of the Business Modeler package for use with the Wang Laboratories, Inc. VS series.

A vendor spokesman described the package as a menu-driven, business management and decision support system that offers multiuser and multimodel capabilities.

The package is priced at $14,000 from Business Model Systems, 2625 W. Butterfield Road, Oak Brook, Ill. 60521.

WHAT TO LOOK FOR WHE
TRIES TO GET ITS F

For VAX-11s Running Unix

Relational Technology Offers Updated DBMS

BERKELEY, Calif. — Relational Technology, Inc. (RTI) has announced the Ingres VAX/Unix Version 2.0, an update of its relational data base management system for Digital Equipment Corp. VAX-11 processors running under Unix. The new release includes performance enhancements and three new application development tools.

Improved performance of Version 2.0 results from enhancements to the I/O subsystem, lock management and internal sort routines. According to the vendor, new query-update optimization strategies are provided for Quel, the Ingres data manipulation language.

Row size has been increased from 1K byte to 2K bytes; the maximum number of columns in a row has been increased from 49 to 127; and the data page size has been doubled from 1K byte to 2K bytes. Version 2.0 also supports multiple data bases on different disk volumes.

The three new application development tools available for VAX/Unix are Ingres/Reports, Ingres/Graphics and Ingres/Applications-by-Forms. All three use form-based visual programming interfaces, so that nonprogrammers can create reports, graphs and new applications without the problems generally associated with syntax-bound languages and applications generators.

The price for 750 or 780 system users is $40,000; for 730 users it is $20,000. The new applications are free to Ingres VAX/Unix users, with the exception of Ingres/Graphics, which is $500.

More information is available from RTI at 2855 Telegraph Ave., Berkeley, Calif. 94705.

Accounts Receivable Release Out for HP 3000, DEC VAX

TAMPA, Fla. — Collier-Jackson, Inc. has announced Release 1.05.A of the CJ/Accounts Receivable package for use with the Hewlett-Packard Co. HP 3000 and the Digital Equipment Corp. VAX-11 series of computers.

The package is said to be a data base-oriented, on-line, menu-driven accounts receivable system controlling customer account status for sales and collection analysis. According to the vendor, the new release incorporates multiple user-defined fields and a free-form comment field for customized reporting.

The package enables automatic tracking of customers through multi-divisional levels under a common customer number. It also includes a division/branch code through which reports can be requested without specifying a particular division or branch.

Release 1.05.A of the CJ/Accounts Receivable costs $12,000 for the HP 3000 and $14,000 for the DEC VAX-11 series from Collier-Jackson, 5406 Hoover Blvd., Tampa, Fla. 33614.

Resource Planning Package Targets 4300s, 30 Series

LEXINGTON, Mass. — Distribution Management Systems, Inc. (DMS) has introduced DMS-1800, described as a distribution resource planning package written in Ansi Cobol for use on the IBM 4300 series and 30 series mainframe computers.

The package is multilevel software designed for the forecasting, purchasing, production planning, finished goods inventory management and transportation scheduling operations of manufacturing and distribution companies.

DMS-1800 consists of four modules: forecasting, strategy, planning and execution. The forecasting module is said to establish estimates of product demand at each level of a distribution structure based on historical order data. The strategy module utilizes product information and historical demand data to compute and control safety stock and economic replenishment quantities.

The planning module can generate overall production and distribution plans based on data generated by the forecasting and strategy modules. The execution module provides information on the effectiveness of the production and distribution activities.

The complete system, with on-line capability, is priced at $182,000. The forecasting module can be purchased separately at $67,000 for batch or $75,000 for batch and on-line capability. The strategy, planning and execution modules can be purchased as a combination package for $115,000 from DMS at 81 Hartwell Ave., Lexington, Mass. 02173.

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In a word, experience.

Ryan-McFarland compilers have been around almost as long as there have been computers that needed them. And that makes us stand out from those newer compiler companies in a lot of different ways.

Ryan-McFarland compilers set the standard in transportability. In fact, programs written with our compilers are so transportable that they can move from one brand of computer to another, from one operating system to another, and all the way from micros to mainframes without changing a single line of code.

Instead of constantly introducing state-of-the-art "breakthroughs," we constantly build upon what's worked for years. And instead of abandoning you after the sale, we respond to 98% of all requests for technical assistance within 24 hours.

RM/COBOL,™ for example, has been used to write more than 700 applications available from independent distributors and developers. And it's already working in thousands of installations. Our unmatched experience also went into the development of RM/COS,™ our multi-user operating system that makes business applications run more efficiently than any other operating system. And we're committed to building that experience into all our future products, too.

The way we see it, you've got a very clear choice: Go with one of those newer compiler companies. And enjoy the experiment.

Or go with Ryan-McFarland. And enjoy the experience.

RM/RYAN-McFARLAND
OUR EXPERIENCE SHOWS.

609 Deep Valley Drive, Rolling Hills Estates, CA 90274, (213) 541-4828.

Enhancement of 'Adders' Announced by Rendeck

BOSTON — Rendeck Corp. has announced Release 3.0 of its Adders Data Entry on-line system for IBM CICS-based data entry systems.

New facilities include the ability to contain up to 30 screen formats in a batch, with each screen holding up to 20 records; control total capabilities allowing establishment of up to 20 hash counters and up to 10 document counters, each permitting totals of up to 15 digits; and cross-presence checking that provides some logic to checking for presence of a given field in an input record.

The package is available for DOS versions from $18,500 and for OS versions from $22,500. Rendeck is located at 5 Faneuil Hall Marketplace, Boston, Mass. 02109.

'Easyvsam' Fits IBM Mainframes In DOS/VSE Environment

LOS ANGELES — Easy-Soft, Inc. has announced the Easyvsam software package for IBM mainframe installations in the DOS/VSE environment.

Easyvsam can be accessed through any programming language, allowing programmers to use Vsam features not normally available with the higher languages, such as mass sequential insertion and backward processing, a spokesman said.

The system automatically handles all Vsam errors and prints the Vsam return code and error code upon program termination, permitting a programmer to pinpoint errors during program development.

A permanent license for Easyvsam is priced at $3,600 per installation, and a monthly license costs $180 from Easy-Soft, located at Suite 650, 601 W. 5th St., Los Angeles, Calif. 90017.

WP Package Targets System/34

WINSTON-SALEM, N.C. — Word Management, Inc. has announced Softword/34, a word processing package for the IBM System/34.

The Softword/34 text editor automatically breaks text into correct-length lines and permits insertion, deletion and copy commands. Text formatting features include centering, indentation and tabulation. Text can also be copied from any document stored on the system to the current working document.

Softword/34 can insert data from existing System/34 files into a master letter or document, allowing large amounts of customized letters to be produced. The user can select records from a file for letters and then sort the selections. Print options include printing multiple copies, line number and selected pages of a document.

The product costs $500 from the vendor at 535 E. Clemmonsville Road, P.O. Box 12068, Winston-Salem, N.C. 27117.

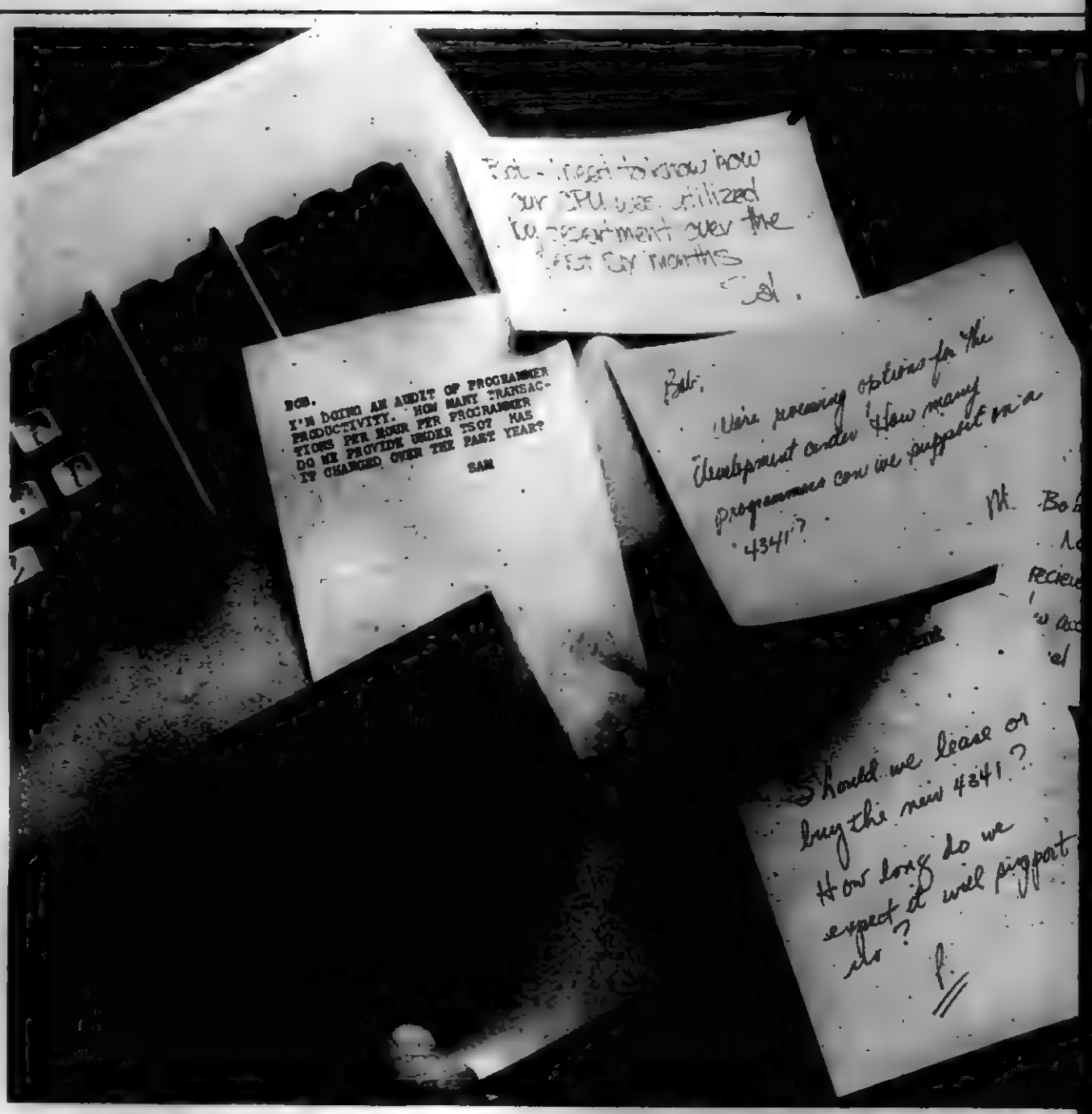
Version 2.0 Of 'Fetch' Unveiled

CENTEREACH, N.Y. — Axios Products, Inc. has announced Version 2.0 of Fetch, an asynchronous program loader for IBM CICS.

The major enhancement of Version 2.0 is the speed at which CICS tasks are loaded; it reportedly cuts the disk reads required to load programs by 60% to 70%.

Fetch can be started and stopped automatically during CICS start-up and shutdown. Each time Fetch is started, it optimizes the programs that are not permanently resident and that have been used at least once.

The price is $9,000 from Axios Products, 2364 Middle Country Road, Centereach, N.Y. 11720.



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Your company's multi-million dollar investment in data processing and data communications depends on how you answer questions. And you know that intuition, rules of thumb and seat-of-the-pants judgments are not the way. Intuition can no longer penetrate the increasing complexity of today's systems and networks. It can't provide the answers needed to guarantee agreed-upon service levels to your end-users. And it certainly can't produce cost-effective alternatives for future hardware needs.

BGS can. Only BGS has developed a *completely integrated system to manage computer capacity.* It enables you to analyze, forecast and model the performance of your host and data communications systems to get the answers needed for long-range planning and cost-effective control of your installation.

With the BGS family of software you can answer questions about how each workload uses the CPU and complex I/O configurations, allowing accurate system tuning. And for increased management control, BGS software provides trending, historical summary and exception reporting.

Further, BGS' systems include the most widely used modeling tool, BEST/1,™ to accurately forecast your system's performance. You'll know how your host and network will be affected by new applications, before installation. You'll be able to predict when response times will degrade. You can forecast precisely when and how you'll need to upgrade and expand, allowing you to evaluate hardware alternatives so that you can get the most out of your DP dollars..

And, to know how your host and network interact, BGS products serve as a complete, end-to-end host/network modeling

BGS...SYSTEMS FOR DP MANAGEMENT

CICS Transaction Dump Support Offered for MVS, OS/VS1 Users

MOUNT FREEDOM, N.J. — Macro 4, Inc. has announced CICS transaction dump support for IBM MVS and OS/VS1 users.

The Dumpmaster support traps CICS transaction dumps and writes them into its own self-maintaining disk file, from where they are available for examination and debugging as soon as the dump occurs.

Other features include a formatted display of the CICS trace table at the time of the dump; more than 30 CICS-specific diagnostic notes, autogenerated and displayed on-line with the dump; and a special CICS core display facility.

The cost for a one-month lease is $300. Leasing is available on a one- or two-year basis.

Macro 4 can be reached at 1 W. Hanover Ave., Mount Freedom, N.J. 07970.

Application Processor Out For DEC's VAX-11 Series

LITTLETON, Mass. — Pro-IV, Inc. has announced the Pro-IV fourth-generation application processor package for use with Digital Equipment Corp.'s VAX-11 line of computers.

The package is described as a multiterminal, multidata file development/runtime system that processes data files created by Cobol, Basic and Fortran, among other languages. The Pro-IV features report, screen, menu and update function-definition menus, on-line Help facilities and screen windowing. Applications on the package can be transported without modification across systems running Pro-IV.

Pro-IV offers a menu-driven application development process, a data dictionary, interactive screen and report definition, a self-contained application security system and automatically generated application documentation. The package can be purchased for $20,000 from Pro-IV through P.O. Box 595, 119 Russell St., Littleton, Mass. 01460.

'Esri' Package Incorporates Info DBMS

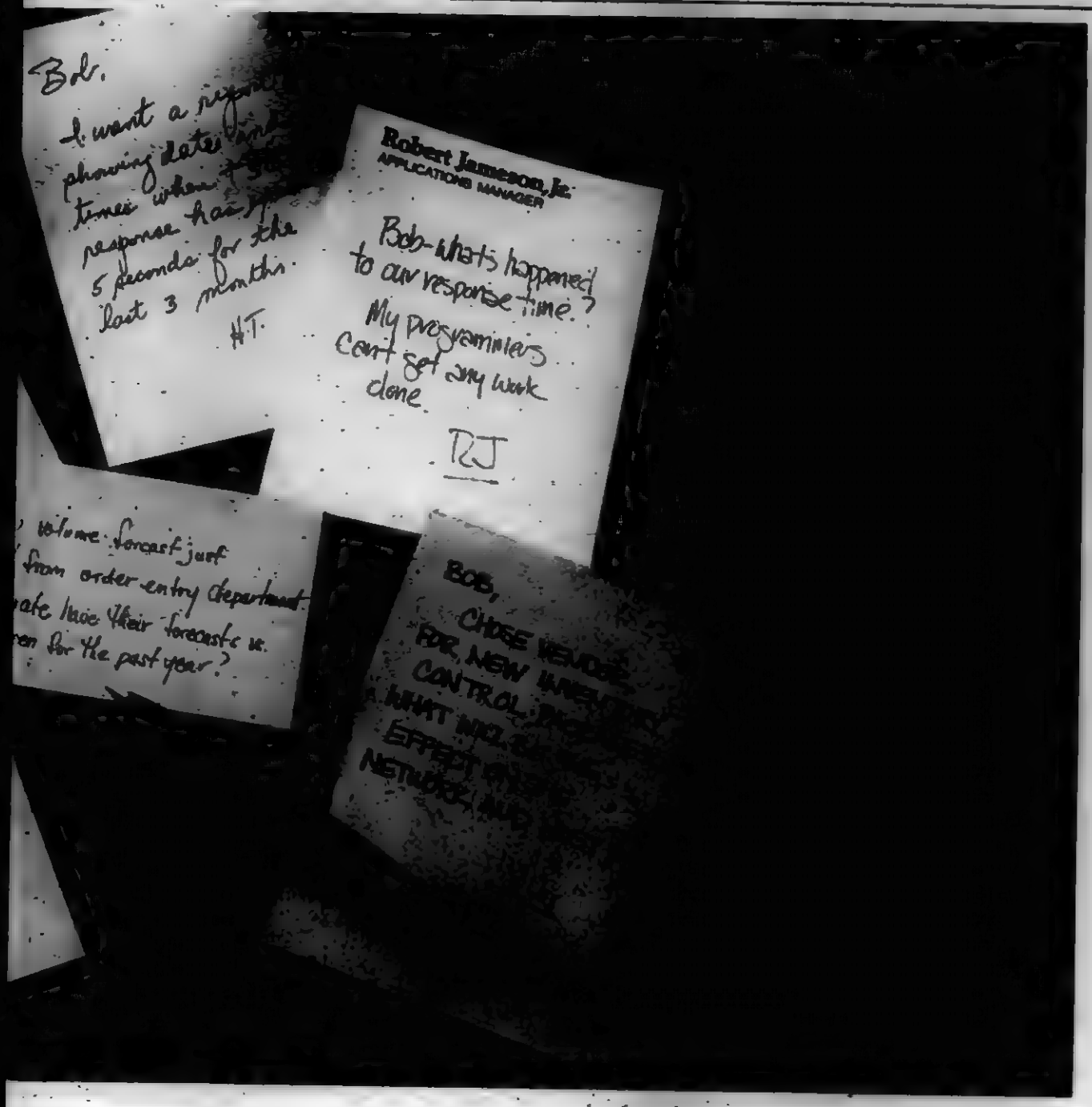
REDLANDS, Calif. — Environmental Systems Research Institute (Esri) has announced a geographic information system package incorporating Henco, Inc.'s Info data base management system.

Arc/Info reportedly combines geographic analysis and modeling capabilities with an interactive system for entry, management and display of spatial data. An Esri spokesman said the package features easy-to-use command language, digitizing and attribute entry. Spatial analysis tools reportedly include polygon overlay, point-in-polygon calculation and buffering.

The package runs on Prime Computer, Inc. and Digital Equipment Corp. VAX-11 series computers, the Esri spokesman said.

The product is available for $75,000, or $60,000 for users already equipped with Info.

More information is available from Esri at 380 New York St., Redlands, Calif. 92373.



system. From initial design to scheduling timely network growth, BGS SNA network products give answers that keep you continually responsive to service and cost agreements with end-users.

And there's no question about BGS' claim. Over 500 large IBM installations answer their questions with BGS' computer capacity management systems. BGS has an integrated family of products for VM, MVS and SNA – specialized systems for managing your complex DP environment. With a BGS system, you have the methodology to control your installation and plan for its future – keys to successful management.

Your questions need answers. Why risk performance: the host's, the system's, the network's, the end-user's, the company's and yours?

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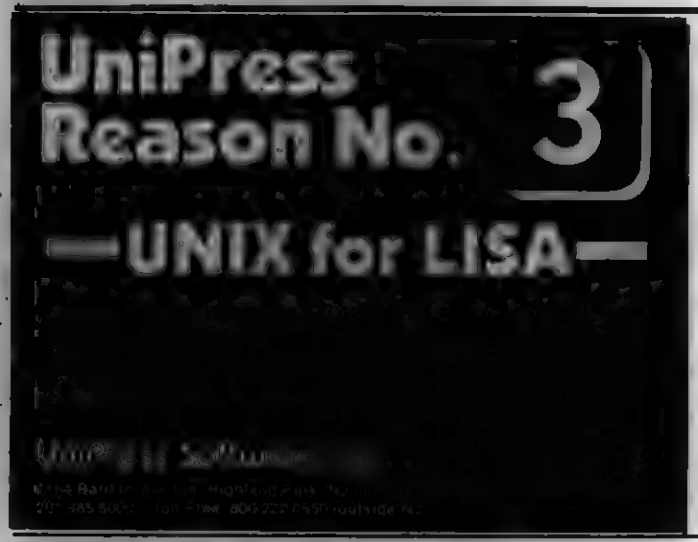

Allows Resource Sharing of Host

Virtual Disk Software Offered

RIDGEFIELD, Conn. — The Computrol Division of Kidde Automated Systems, Inc. has introduced virtual disk software that allows Digital Equipment Corp. RT-11 and RSX-11M/S-based real-time applications programs running in standalone processors to share the disk resources of a host computer that is running other applications.

According to Computrol, a full disk-based operating system like RSX-11M can run at the remote site without disks. The power bootstrap is performed automatically across the network, elminating the need for read-only memory-based satellite software. The satellite stations are linked with the host computer through a 1M bit/sec local network implemented with Computrol's Megalink processor-to-processor hardware.

Individual floppy disks at the satellite processors are replaced by files on the host computer disk. Network operations are transparent to the satellite applications programs, which continue to make standard I/O file requests. Up to 32 satellites can be accommodated, Computrol said.

Prices of the virtual disk software start at $1,000 from Computrol at 15 Ethan Allen Highway, Ridgefield Conn. 06877.

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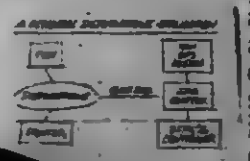

Menus of features and functions, visual prompts and terminal-resident soft keys guide even novice data users through correct operation easily. And soft keys can also be downloaded from your host computer for single key activation of program commands. As an advanced business telephone, the Displayphone unit brings the convenience of voice features such as directory dialing to data calls, and allows simultaneous voice and data communication.

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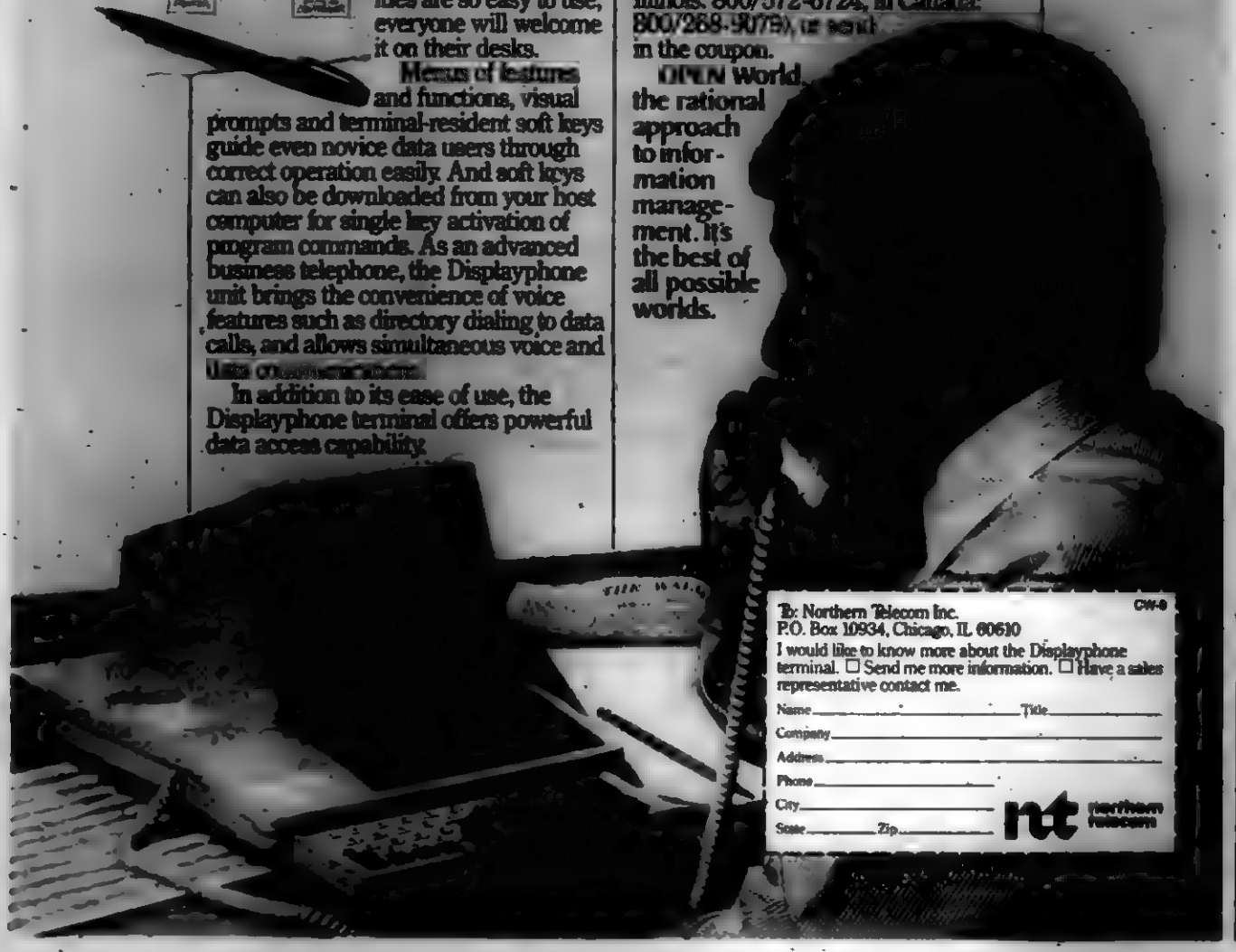

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Data Forms Created By 'Sofforms'

RIDGEWOOD, N.J. — Softest, Inc. has introduced Sofforms, a software product that allows a designer to create and display data collection forms. Softest has also announced The Menu System, a user interface to Unix.

Using Sofforms, the designer is able to tailor the user interface to suit the individual application, a spokesman said. Sofforms is written in C and will work on all Unix systems and systems that support C.

The first part of the package is the Forms Painter, a stand-alone program that enables the designer to paint the screen, creating forms with labels and input fields. The Forms Runtime System displays forms and fields, validates user inputs and responds to help requests.

The Forms Painter provides the designer creating or modifying a form with the ability to validate input to the form on a per-field basis. The designer has the option of specifying the order in which he would like the end user to step through the form.

Available immediately, the price for Sofforms on a single-user system is $500; on a multiuser system the price is $1,000.

The Menu System is an interface to the operating system's command language that is used to build and display menus in front of any program on the Unix or Unix look-alike system on any terminal, the spokesman said.

It allows the user to create and modify menus using English-like commands.

The Menu System is sold at $500 per CPU on single-user systems and $1,000 for multiuser systems from Softest, located at 555 Goffle Road, Ridgewood, N.J. 07450.

Wicat to Unwrap Irak Tool For Use on Its Equipment

OREM, Utah — Wicat Systems, Inc. has announced a version of the retirement accounts processing system, called Irak, available for users on the company's equipment.

Created by Employee Communications Services, Inc. of New York, Irak was designed to interface with a company's current account-based financial system, providing software for processing and controlling Individual Retirement Account, Simplified Employee Pension and Keogh retirement plans.

Implemented on Wicat equipment, some system features include audit trails and control totals, categorization of all types of credit and debit transactions, processing of various rate savings instruments, management-level evaluations of the expanded retirement account segment of consumer's savings and compliance with government regulations pertaining to retirement accounts, the vendor said.

The price begins at $10,000 from Wicat through P.O. Box 539, 1875 S. State, Orem, Utah 84057.

Camax Systems Unveils Tool As Data Link

MINNEAPOLIS — Camax Systems, Inc. has announced the Camlink package, said to provide a means of transferring design data from computer-aided design (CAD) systems to the company's Camax Graphics Design System hardware and software.

According to the company, Camlink is a one-way communications link from other CAD systems into the Camax system, allowing the transfer of design geometry from standard initial graphics exchange specification formats, as well as special formats generated by Ford Motor Co.'s and General Motors Co.'s CAD systems.

The package is said to allow for the correction of data errors that are present on the transfer tape, and it can accept data files of any size.

Camlink offers a Fordlink module that provides one-way communication from Ford's CAD system into Camax, and a GMlink designed to translate data output in General Motors format into geometry files in the Camax design systems.

The package is available for $7,500 from Camax Systems, 7225 Ohms Lane, Minneapolis, Minn. 55435.

Geisco Offers Turnkey Using IBM's Micro

ROCKVILLE, Md. — General Electric Information Services Co. (Geisco) has announced Easy*Claim, a turnkey system utilizing the IBM Personal Computer for insurance claim filing procedures for health care providers and insurance companies.

The system is a patient billing and receivables package, according to the company; and it will be marketed jointly by Geisco and Blue Shield Plans. Easy*Claim is said to provide physicians with control for accounts receivable.

Features of the system's Threshold software include aged receivables balance reporting, open item accounting, clinical analyses of patient diagnoses and procedures, referring physician analyses and appointment registration.

Easy*Claim has an initial one-time price of $20,000 including hardware, training, support and maintenance. Geisco is at 401 N. Washington St., Rockville, Md. 20850.

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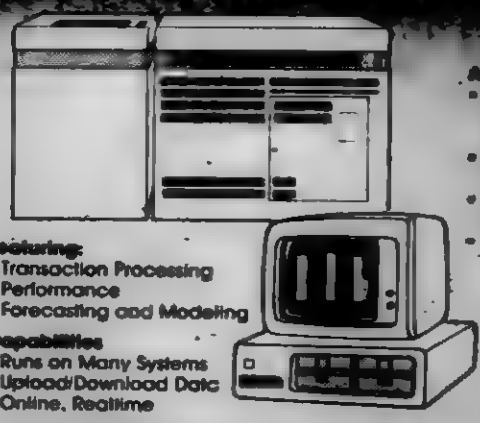

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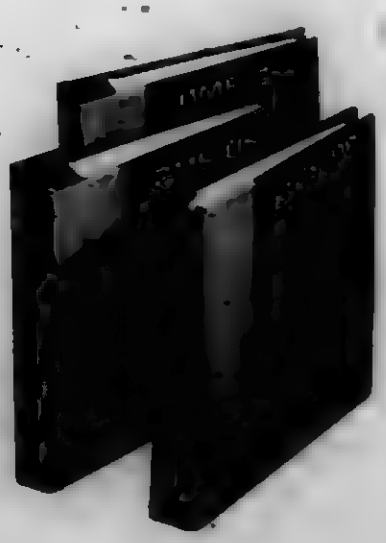

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CICS Solutions

Modal Analysis Program Gets Split-Screen Animation

CINCINNATI — Entek Scientific Corp. has introduced Emodal Version 2.0, a modal analysis program.

The new features of the program include split-screen animation of two modes, multiple orthogonal plus isometric views of the test structure, complex mode extraction and animation, increased animation speed, several levels of automated test setup, extensive Help features and increased speed of overall program execution. Emodal 2.0 calculates modal coefficients, modal parameters (mass, stiffness and damping) and animates the mode shapes on the CRT screen.

Nine methods of curve fitting are now standard in the program. All Emodal 1.0 users can upgrade to Emodal 2.0 with no changes to existing project files.

Emodal 2.0 can be used on the Hewlett-Packard Co. HP 200 series desktop computers interfaced to most popular spectrum analyzers for data acquisition.

The product is priced at $3,900 from Entek at Suite 316, 4480 Lake Forest Drive, Cincinnati, Ohio 45242.

Cobol File Editor Fits Sperry 1100

LITTLETON, Colo. — Electron Information Systems has introduced the Cobol File Editor (CED) for users of Sperry Corp.'s 1100 computer systems.

CED can handle field data and Ascii Cobol or binary data files. Some software features include search, display, examine, copy and edit Cobol data. Files can be copied or merged, in whole or part, depending on user input, the vendor said. CED also features autorecovery and a Help function.

The price is $4,650 from Electron Information Systems, 5554 S. Prince St., Littleton, Colo. 80120.

Medical Tool Utilizes Lanier 5000

ATLANTA — Lanier Business Products, Inc. has introduced the Lanier Medical Team, a new software package designed for medical records departments using the Lanier Business System Series 5000 computer.

The package is reportedly a chart management and transcription system that simplifies chart location. By typing in a medical record number or name, the location of a patient chart appears on the screen. The package also tracks incomplete or delinquent charts awaiting completion.

The system reportedly allows personnel to print reports identifying charts that are incomplete or delinquent. The package batch prints reports, such as histories and physicals, and it allows automatic line counting.

The Lanier Medical Team software also reportedly handles patient discharge lists, physician master lists, statistical productivity reports of transcriptions and selected lists of patients.

The package is priced at $4,995 from Lanier Business Products, 1700 Chantilly Drive N.E., Atlanta, Ga. 30324.

Mumps Users Group Plans College Donations Program

COLLEGE PARK, Md. — The Mumps Users Group recently announced a program to donate licenses to colleges and universities for use of the Mumps computer language.

The licenses, which will be provided by six vendors of the Mumps-based system, will be awarded on the basis of proposals to use the system for educational and research purposes, as well as on the qualifications of the applying institutes, according to Dr. Ruth E. Dayhoff, chairwoman of the Mumps Users Group.

A grant panel created by the organization's executive committee will review the proposals, and each institution awarded a license will be expected to produce reports suitable for publication describing the projects.

Mumps is a programming language and a data management system with powerful string-handling and file manipulation capabilities.

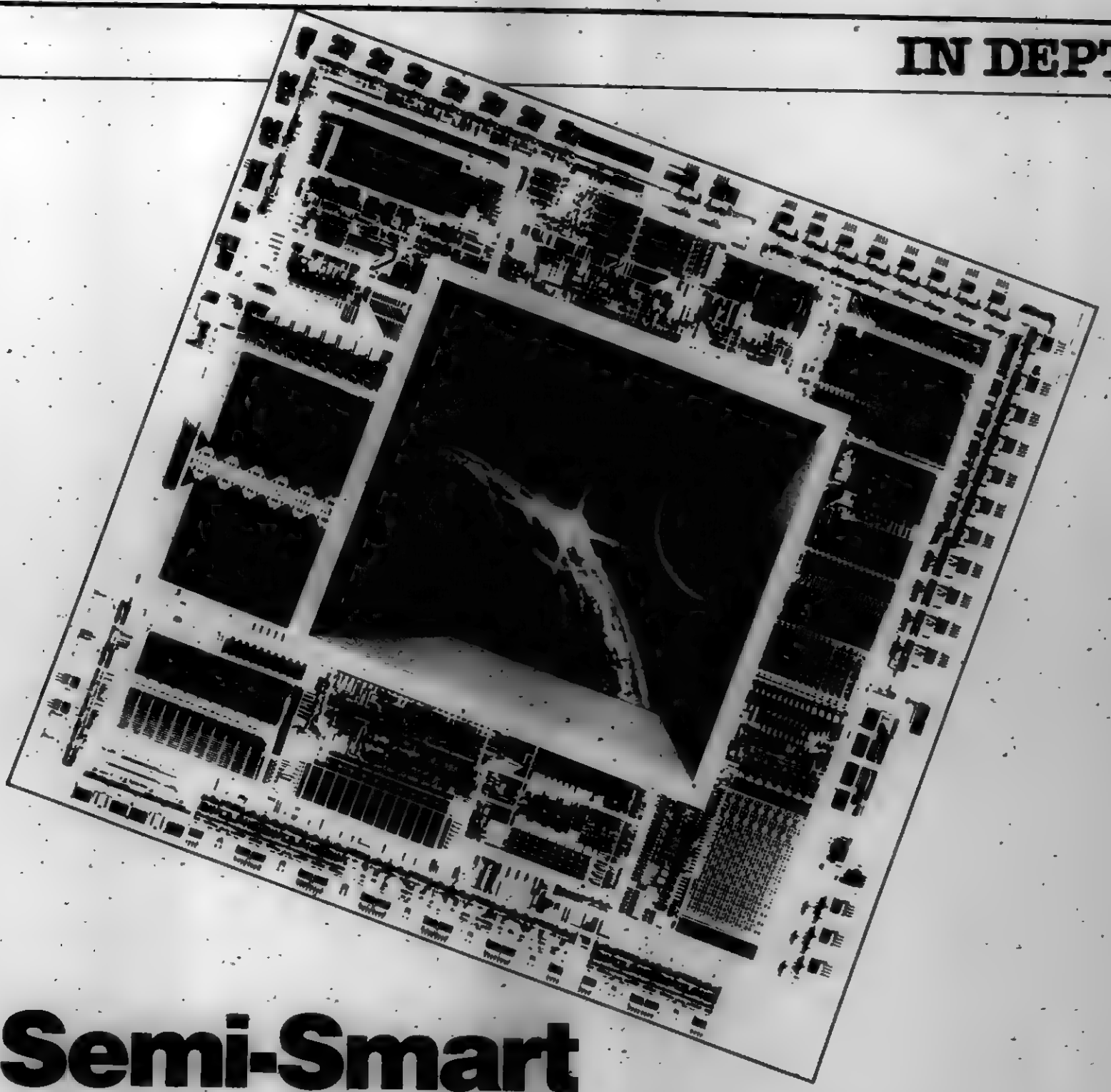
The vendors participating in the license grant program are Data Tree, Inc.; Digital Equipment Corp.; Harris Corp.; Intersystems, Inc.; Micronetics, Inc.; and Vista Computer, Inc. Institutions interested in participating should send proposals to Chairperson, Mumps Users Group, Suite 308, 4321 Hartwick Road, College Park, Md. 20740.

'Quickscreen' Bypasses Cobol

PORTLAND, Ore. — Rasmussen and Associates recently announced a productivity tool that reportedly provides users of NCR Corp.'s NCR I series minicomputers with a method of establishing file maintenance procedures without writing Cobol code.

A spokesman said the product, Quickscreen, operates in NCR's Imos III, Imos V, IRX and ITX operating environments. The product is an interactive maintenance program that reportedly allows maintenance to several interrelated files without exiting the program. It works with any indexed file and provides options for cross-file validations.

The product is sold on a one-time license for $2,500 from Rasmussen at 4838 S.W. Hamilton Court, Portland, Ore. 97221.



Semi-Smart

The Faster, Cheaper, Smaller World of Semiconductors

By Howard K. Dicken

Speed, cost and flexibility are the three primary driving forces in the computer industry. In less than 35 years, processing speed has increased by a factor of 100 million. This speed is typically measured in terms of operations or calculations per second. Cost, or more accurately the cost vs. performance factor, is as important as performance.

For all systems from micros to supercomputers, users want and sometimes need more performance. This demand translates to development of new semiconductor technologies.

Market forces and some of the semiconductor technologies developed in response have pushed performance to the point where new problems are now the limiting factor. The performance of the new circuits has created system packaging problems, including heat removal, a high package pin requirement and parasitic effects. Even at the speed of light, the signal delay between sections of the computer becomes critical.

These problems have set directions in new semiconductor technology for large computers:

- Higher speed devices with propagation delays of 10 picoseconds (trillionths of a second).
- More efficient gate design (power-delay products of less than 100 femtojules). Note: The efficiency of the human brain is 200 fJ. We are now designing and using circuits that are more efficient.
- The ability to perform more calculations on

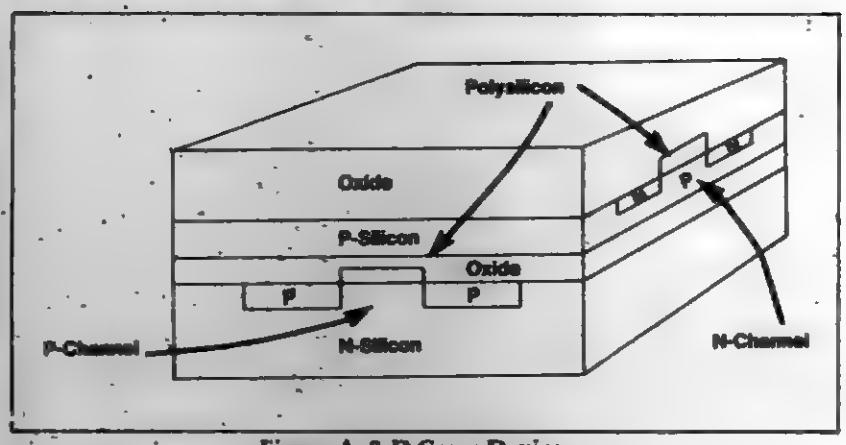


Figure A. 3-D Cmos Device

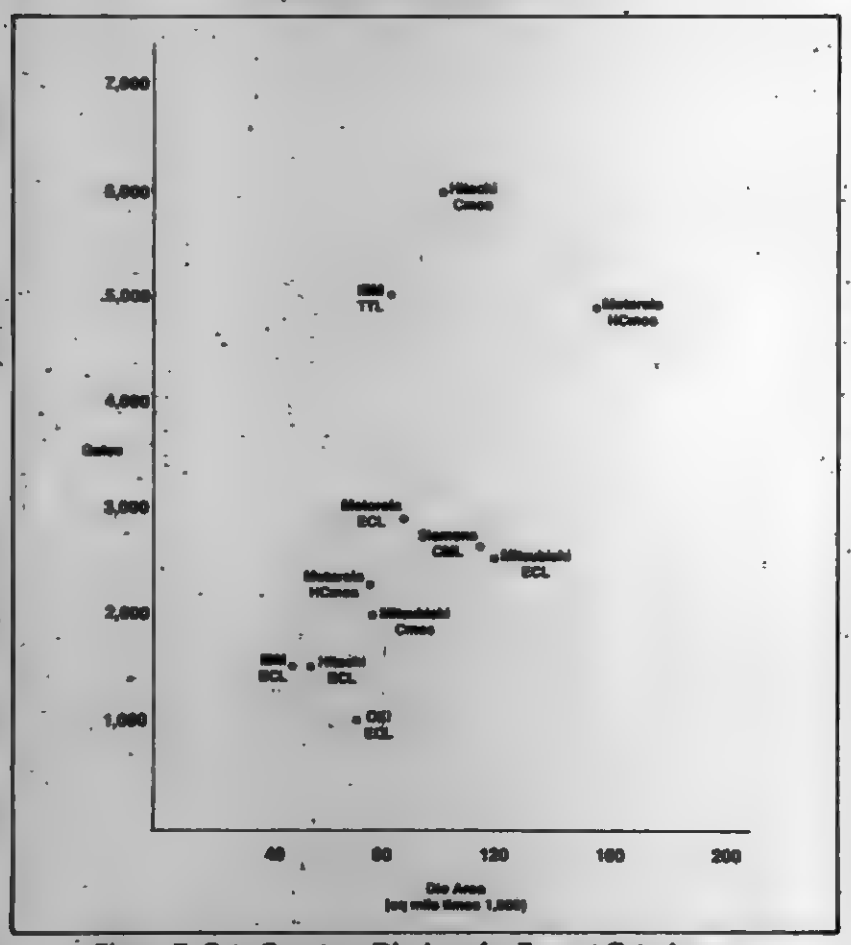


Figure B. Gate Count vs. Die Area for Present Gate Arrays

a single chip (VLSI circuits with die sizes of more than 150,000 sq mils [97 mm sq] will both reduce the signal path length and eventually reduce the pin count [Rents rule]).

Available Technologies

The available technologies include transistor-transistor logic (TTL), emitter-coupled logic (ECL), complementary metal oxide semiconductor (Cmos), gallium arsenide, Josephson junction and 3-D.

ECL and TTL are slowly being replaced by high-speed Cmos devices because of equivalent efficiencies and lower power requirements. Development work is continuing in both gallium arsenide and the high electron mobility transistor. Many in the industry, however, believe that because of various technical problems, the same development effort in Cmos or ECL would provide better performance.

The Josephson junction remains an unknown. Operational circuits have been made and the potential efficiencies are a factor of 1,000 better than present technologies allow, but because of technical requirements (cooling to the temperature of liquid helium), this approach is not in the immediate future. The most promising near-term winner is some advanced form of Cmos. One technology approach that might be applied to improve Cmos performance is 3-D.

Potentials of 3-D LSI

Although no standard form has been developed, the basic structure is shown in Figure 1. The key to developing this technology lies in the ability to create a thin layer of single-crystal silicon on top of the oxide that covers the lower device. The upper devices are then formed in this layer. The result, after the appropriate interconnections are completed, is two layers of circuits and more than twice the functional density on one silicon chip.

As with most other processing approaches, the basic driving force is the demand for lower system cost plus better performance, both of which result from higher component density.

In the case of 3-D, however, the initial interest lies in the potential of higher system speeds. The oxide layer can provide better isolation between components and thus increase the circuit speed by reducing the interacting parasitic capacitance.

An even more critical factor in this case, however, is the possibility of reducing both the length and number of interconnecting metallization

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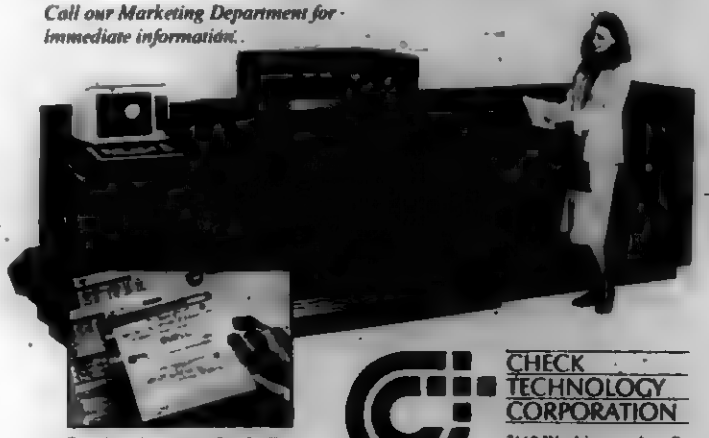

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IN DEPTH

paths between components and, thus, the major sources of capacitance. In some custom circuits, there is more than six meters of metallization per chip, which must be formed in three levels to allow for all of the necessary connections and crossovers.

The CPU system designers themselves need new technology to achieve better and more competitive computer performance.

At present, the major limitation is the quality of the second layer of silicon. Typically, polycrystal silicon is grown on the oxide (the same as for an MOS gate), and then it is melted to recrystallize into a single-crystal structure. Without the orientation of a silicon substrate, however, the grain size is not large enough for good device characteristics, such as high switching speeds.

Three-D circuits can rapidly become a major factor whenever this process is developed. Currently, several methods of recrystallization (remelting) are being investigated, including the use of laser beams, graphite strips and mercury arc lamps.

To meet flexibility requirements, the industry is turning to "semicustom" approaches, such as gate arrays. A gate array is one approach to obtaining a custom LSI circuit. This approach is simpler and lower cost than other techniques because it only requires changing the final interconnection patterns. This semicustom method, which can be applied to most technologies, allows prototype quantities in 12 weeks or less. In many cases, because of the high tooling cost for a full-custom design, gate arrays are used for the life of the product.

To meet flexibility requirements, the industry is turning to "semicustom" approaches, such as gate arrays.

Companies such as IBM have invested hundreds of millions of dollars in systems and manufacturing lines to customize computers to optimize performance for specific applications.

One example of the trend toward gate arrays is a new Motorola, Inc. circuit that uses a high-speed Cmos (HCmos) technology with 4,800 possible gates per chip. Hitachi Ltd., Siemens Corp. and Mitsubishi Electric Corp. have announced similar products. The result will be larger chips and more efficient and lower cost devices, which will allow continuing performance improvements in mainframes.

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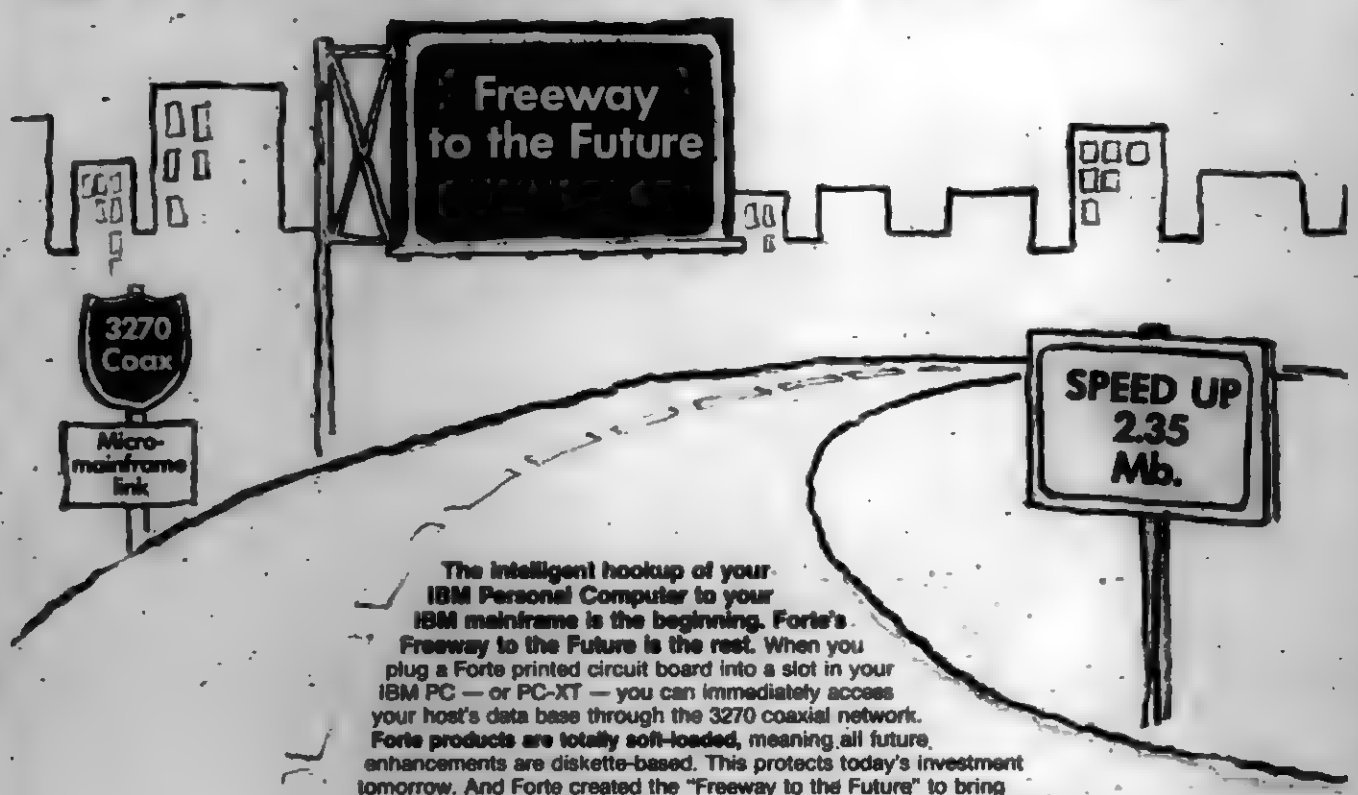

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A Look at the Semiconductor Cost Picture

For the last 12 years, the semiconductor industry has followed a pattern of 68%/year cost improvement for the price of a bit of semiconductor memory. For a 16K or 64K dynamic RAM package, the typical market price is now six millicents per bit. This cost trend will result in a price of less than one millicent per bit by 1989. The device will be packaged as a 1M-bit single-chip Cmos RAM.

During this period, designers have developed methods to perform the same circuit functions with fewer transistors. The function of storing one bit of memory is now performed with only one transistor, whereas four were required 10 years ago. The result is a reduction in cost by a factor of more than four, because of area and the improved yield from the simpler circuit.

During this same period, the diameter of the silicon wafer used in the processing has increased from 3 in. to 5 in. (Table 1). Because the labor and some of the other costs are the same regardless of wafer size, the cost per bit of memory in theory is reduced by the same factor as the increase in the square of the diameter. In this case, it is almost a factor of three (25 divided by nine).

The industry has been continually increasing the level of equipment investment to process the curcuits. The cost of new production modules has increased from the $10 million-to-$20 million range to between $70 million and $100 million (Figure 1). Much of this increase in equipment costs is for yield improvement. For a given circuit complexity, the yield can be increased by using better clean rooms as well as processing equipment that provides tighter control over device parameters. Also, more expensive equipment, such as projection mask aligners, is used to avoid yield-reducing damage by avoiding contact with the silicon

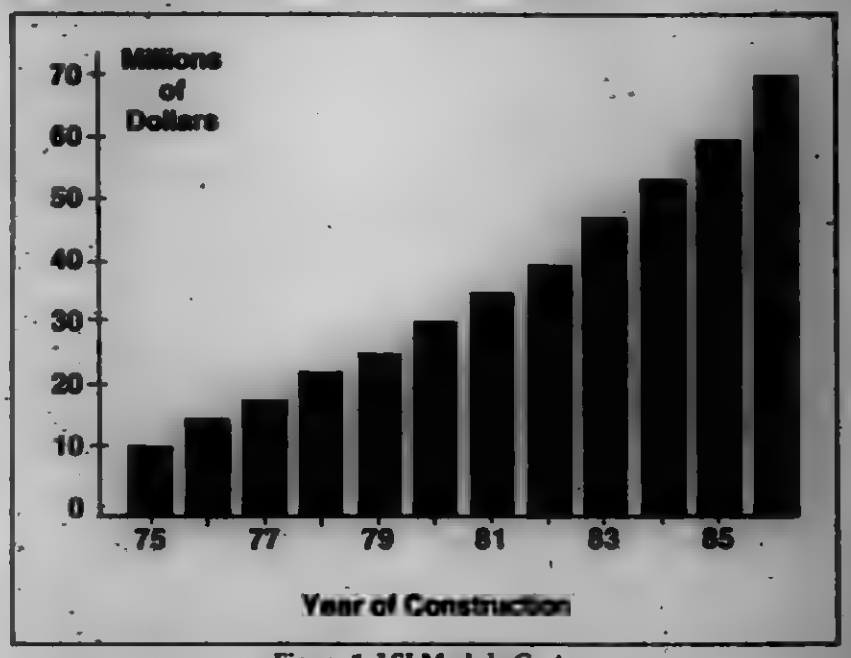

Figure 1. LSI Module Costs

Silicon Wafer Usage (Percent)

Diameter (mm)	1983	1985
50	3	—
75	25	2
100	50	25
125	20	47
150	2	25
200	—	1

Table 1

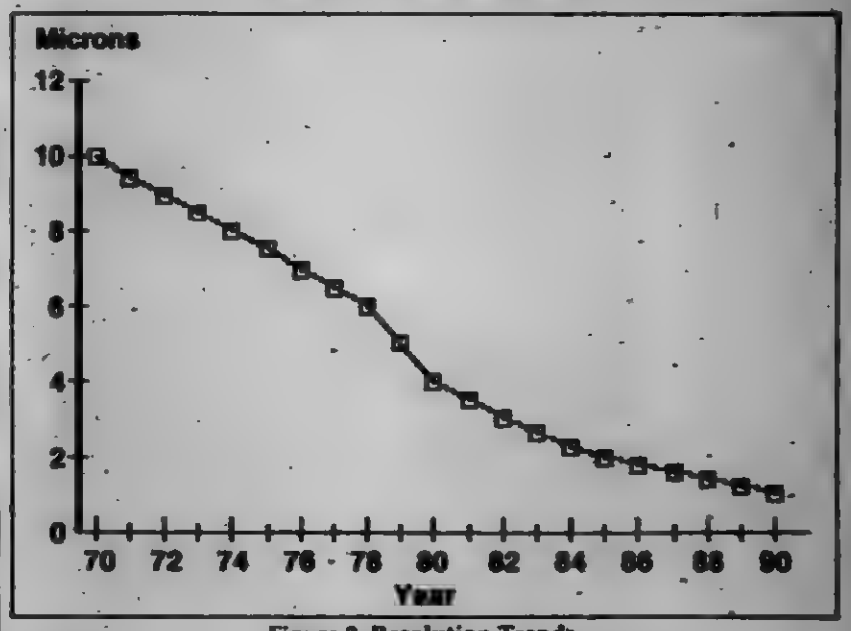

Figure 2. Resolution Trends

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IN DEPTH

wafers. The result is a yield increase (cost reduction) of a factor of three or more during this period.

The most important change has been a major improvement in resolution (spacing between lines). Again, as with the wafer diameter, because the cost of any device has a direct relation to the area occupied, any improvement in resolution will reduce the circuit cost by the square of the change. During this period, the typical process resolution has dropped from 10 microns to three (Figure 2), reducing the cost by more than a factor of 10 (100 divided by nine).

When combined, the four areas have provided the major mechanisms for reducing both circuit and memory costs. More important, it is expected that these trends can be extrapolated for the rest of this decade.

Actual Factory Costs

The critical cost factors and cost trends involved in the manufacturing of an integrated circuit are demonstrated by Table 2, which lists the average industry supplier's cost for a 64K dynamic RAM. The key to lower future costs is that after several years of experience, these same basic manufacturing cost values, with only small increases, will apply to the manufacturing of a 256K RAM. The result is almost a factor of four in cost reduction. Typically, these factory costs must be multiplied by factors of 1.5 or two to arrive at a typical market price. For example, today the average volume market price of a 64K RAM is $3.75.

The normal sequence for a new semiconductor memory design is to increase the complexity (bits) by a factor of four every three years. The last was the 256K design in 1982 and the next design expected is the 1M-bit dynamic RAM in 1985.

Actual Factory Costs (64K Dynamic RAM)

Processed Wafer	
Silicon wafer	$14
Depreciation	25
Labor	28
Supplies	34
Total	$101
Yield	78%
Yielded cost	$130
Total die on wafer	304
Electrical probe yield	37%
Probe cost	$8
Good die cost	$1.22
Package	$0.09
Assembly costs	$0.16
Assembly yield	92%
Assembled cost	$1.58
Final test costs	$0.08
Final test yield	88%
Factory cost	$1.92

Table 2

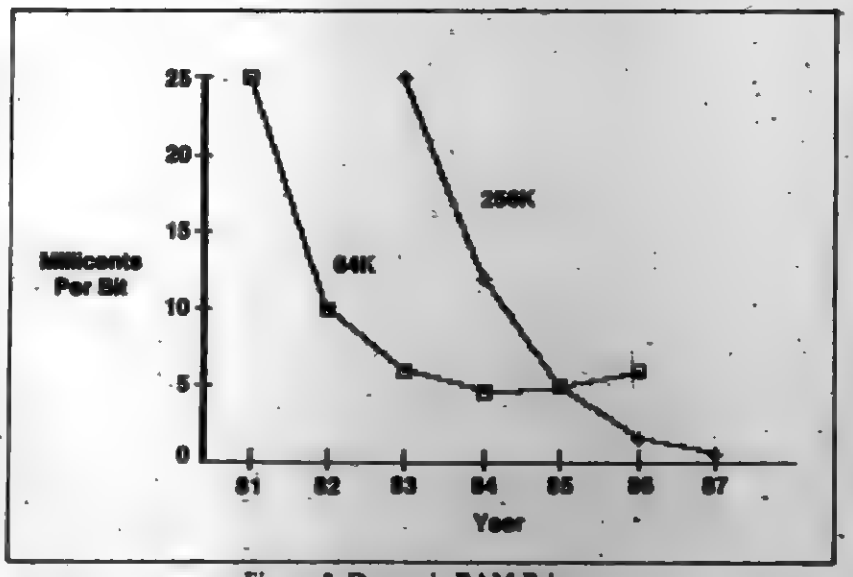

Figure 3. Dynamic RAM Prices

IBM, however, has just announced an experimental .5M-bit dynamic RAM, which is interpreted as an attempt to obtain an optimized design during the intermediate period. This device uses a double-poly, single-metal, n-channel MOS (Nmos) process with an average resolution of two microns. The speed is enhanced by using an extremely thin (25-nanometer) gate oxide.

No special effort was made to reduce the die size. The die area (160,000 sq mils) is still twice the size of the average 256K circuit. As a result, this circuit will have a useful economic life of only one to two years before the 1M-bit designs become cost competitive.

Th expected pricing trends, assuming a competitive market, will result in a crossover to the 256K devices sometime during 1985 (see Figure 3). For the 64K device, this crossover will occur when the market price is $2 to $2.50. The industry has been introducing new dynamic RAM designs approximately every three years (see Table 3). Improvements in cost have caused a market shift to the next design every two to four years. The shift to a 1M-bit RAM is projected for 1988 at a price of one millicent per bit.

Dynamic RAM Market Windows

	1K	4K	16K	64K	256K	1M
Initial prototypes	1970	1973	1976	1979	1983	1986
Price crossover to next circuit	1975	1979	1983	1985	1988	—
Cost per bit at crossover (millicents)	200	30	7	3.5	1	—

Table 3

About the Author

Howard Dicken is president of DM Data in Scottsdale, Ariz. The company specializes in high-technology consulting and interpreting technology trends for business management. Special areas of interest include semiconductors, computers and artificial intelligence.

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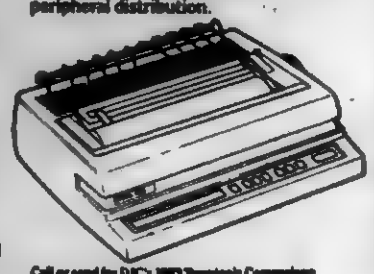

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Computer Crime in Japan

Compared with the U.S., computer crime in Japan is embryonic. Such crimes as illegal program modifications and destruction or alteration of magnetically recorded data have not yet occurred. But the recent "Police Department White Paper" says that computer crime has the potential to significantly affect the nation's social order. The time for preventive mea-

Japan's National Police Department is beginning to note a new form of crime — computer and credit card fraud. Law enforcement agencies believe computer crime has the potential to affect significantly the nation's ability to maintain social order.

With the liberalization of data communications lines, computer usage will become increasingly sophisticated. According to a recently published "Police Department White Paper," this development could lead to an increase in unlawful activities involving computers and to the disruption of people's living styles or business activities through sabotage of vital computer functions.

The police department is investigating and attempting to prevent computer-related offenses. What follows is a summary of items relating to computer crime from the "1983 Police Department White Paper."

There are six types of computer crime (exclusive of automated teller machine [ATM] crime):

- Input of unlawful data.
- Acquisition of data and programs by unlawful means.
- Destruction of a computer.
- Unlawful use of a computer.
- Unlawful program modification.
- Destruction or alteration of magnetically recorded information, such as magnetic tapes.

The number of computer crimes has risen over the past few years (see Table 1 on In Depth/8). Of the 30 cases reported between 1971 and 1982, "unlawful input of data" tops the list with 22 cases. As for the type of person who commits the crimes, employees of financial institutions make up the majority.

Compared with the situation in the

This article originally was published in *Computerworld Japan* and appears here as part of the CW International News Network.

Type	Total	Year 71	72	73	74	75	76	77	78	79	80	81	82
Total (cases)	80	1		1	1	3	1		4	3		10	6
Illegal data input	22			1	1	2	1		3	3		6	5
Illegal acquisition of data/programs	4	1							1			1	1
Destruction of computer	1					1							
Illegal use of computer	3											3	

Table 1. Known Incidence of Computer Crime (1971-1982)

Control Method	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Offices (companies)	172	92	79	48	26	26	167	31
Percent implemented	38.8	20.8	17.8	10.8	5.9	5.9	37.7	7.0

(a) Entrance by outsiders permitted only in the presence of company staff.
(b) No one other than computer staff allowed to enter.
(c) Institution of a procedure to permit clear identification of those other than computer staff in the computer room.
(d) Establishment of required qualifications to enter computer room; requirement to wear badge or carry ID.
(e) Checking qualifications to enter at receptionist desk.
(f) Requiring signature in check-in/check-out log.
(g) No controls on entrance/exit.
(h) Other.

Table 2: Controls on Computer Room Entrance/Exit (1982)

U.S. and other countries considered more "advanced" in computer-related offenses, the level of crime in Japan appears to be relatively embryonic. In Japan, "illegal program modifications" and "destruction or alteration of magnetically recorded data" have not yet occurred, but a good possibility exists that sooner or later they may.

The methods employed in "unlawful input of data" range from a relatively simple one of drawing cash by entering illegal data on a computer terminal to complex operations of an entire computer system. In other countries, crimes affecting human life or diplomatic relations have been taking place.

Software piracy is a potentially fertile area for breeding computer crime activities. There have been four reported cases of "unlawful acquisition of data/programs" with the intent of selling the items acquired. There have been cases in which the perpetrators of the crime intended to sell the items to overseas outlets and other cases where ransom was demanded for return of the stolen items.

"Unlawful use of a computer" means for an employee to make illegal use of the computer or the organization he works for or for an outsider to use the computer through data communications lines. With advancement of data communications, an increase in the latter type of crime is anticipated.

Control Method	Totals	(a)	(b)	(c)	(d)	(e)
Offices (companies)	443	163	27	158	88	7
Percent implemented	100.0	36.8	6.1	35.7	19.8	1.6

(a) Done regularly
(b) Done occasionally
(c) Done when problems or questions arise
(d) No records kept
(e) No response

Table 3: Logging of Computer Operation (1982)

"Program modification" — to change the content of a processing program or a system operating procedure to make profits unlawfully or to damage the functioning of a system — has not yet been detected in Japan. In other countries, numerous crimes have been committed by those who have access to computer programs. There have also been instances where software has been modified by an outsider who illegally gained access to the computer program.

"Damaging or destroying magnetically recorded data, such as magnetic tapes" also has not been reported in Japan.

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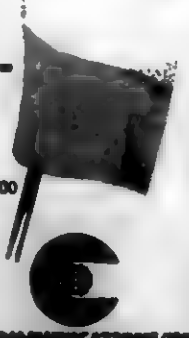

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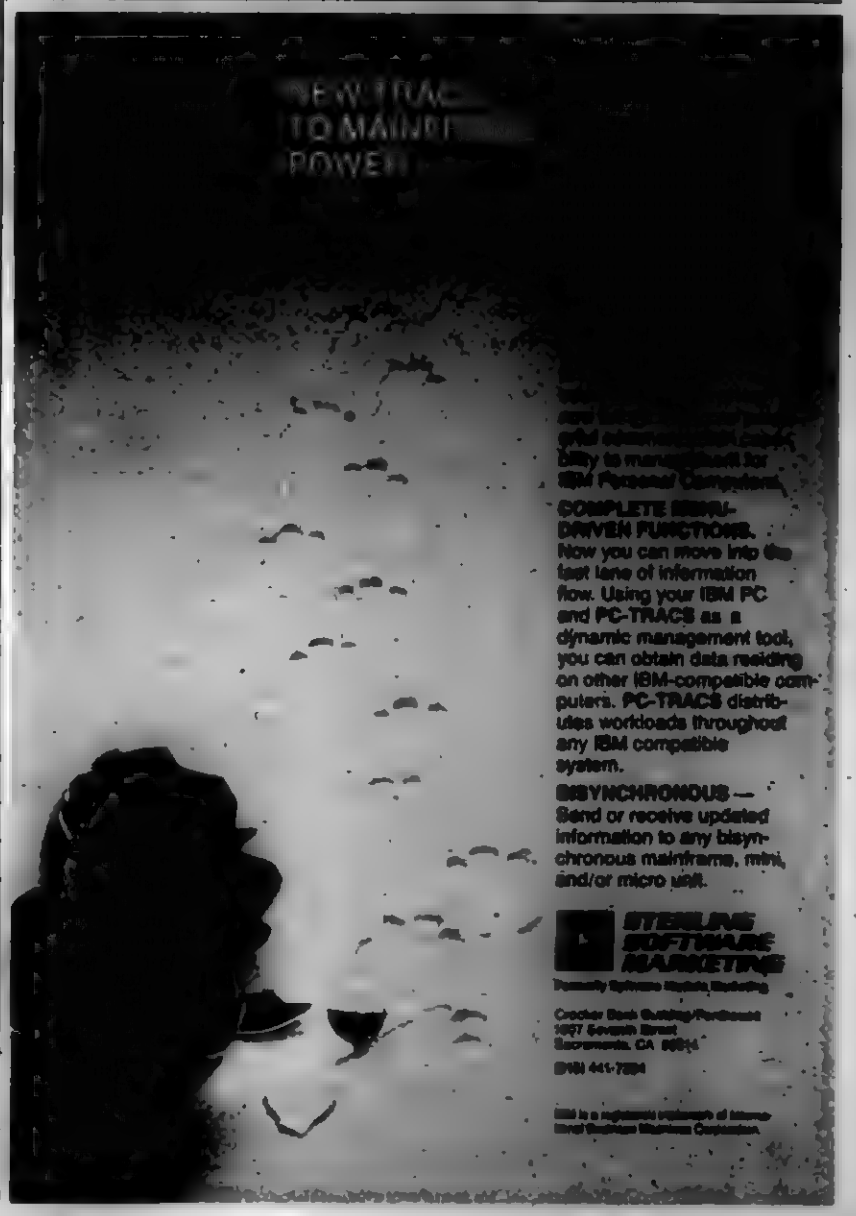

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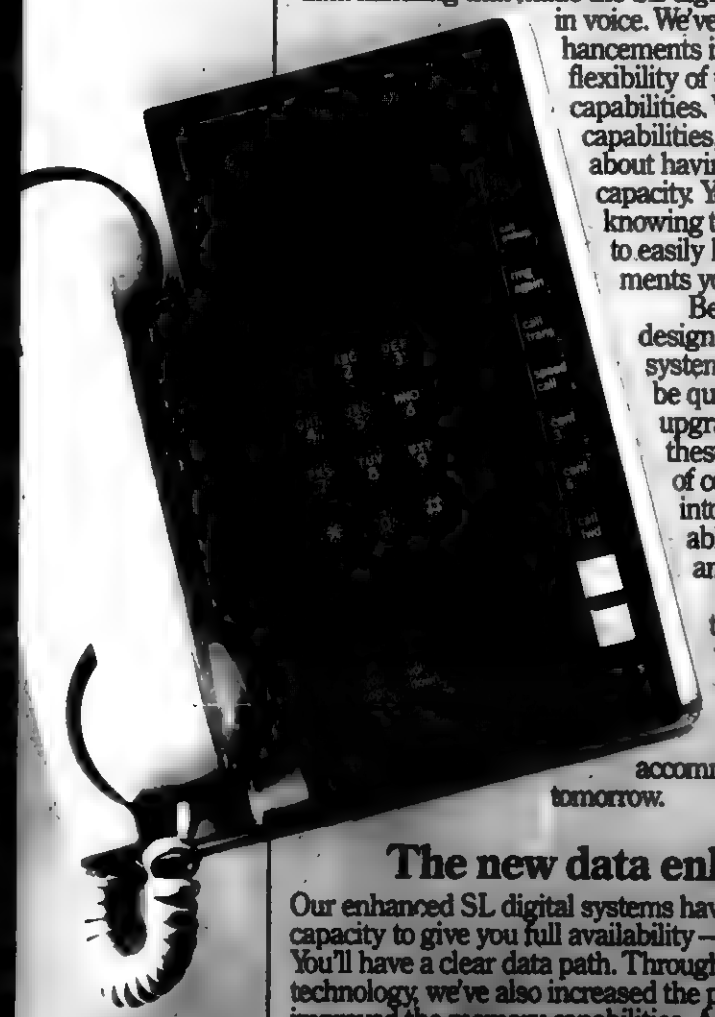

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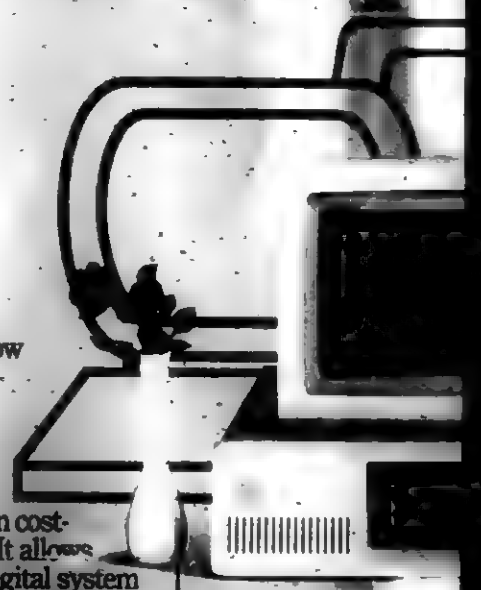

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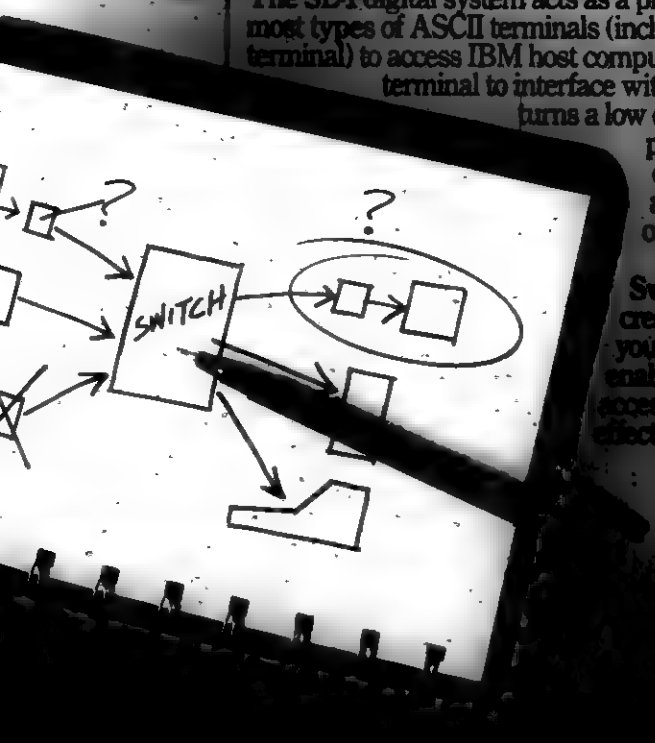

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IN DEPTH

In December last year the police department conducted a survey of crime deterrence measures being taken by businesses that use computers. According to that survey, a very high percentage of businesses, 69.1%, do not even control access to or exit from buildings or offices.

The percentage of businesses that have instituted control of entrance to computer rooms is illustrated in Table 2. A startling 37.7% of those surveyed indicated that their companies had no controls. At the same time, 20.8% reported that they admit no one to their computer rooms except staff members.

As for the use of security guards to check entrances and exits, 58.7% said they had a security guard; however, only a small percentage of businesses have placed a guard near their computer room entrance or have had that area patrolled.

When asked about computer operations and crime prevention through use of control programs, 56.4% of the offices surveyed claimed to have two or more full-time operators to run their computers. In 13.1% of the offices, however, computer operation is performed by individual part-time operators. Furthermore, only 17.2% of the offices have implemented a computer crime prevention program through use of control programs. Crimes that take advantage of these holes in computer operation management have become noticeable.

In terms of safeguarding peripheral devices, only 6.3% of the offices surveyed require use of a key and an identification code (operator number) for access to their computers.

In terms of safeguarding peripheral devices, only 6.3% of the offices require use of a key and an identification code (operator number) for access to their computers; the survey revealed that the majority of the offices have no controls of this type. Table 3 shows the status of data/program security management.

Although many offices place restrictions on who is allowed to handle computer access keys, less than half use a locked room or safe to keep the keys. Even fewer offices keep check-out records for the keys. Only 8.1% record the disposition of keys no longer in use.

Dealing With Offenses

In July 1982, the national police convened a "National Conference of Computer Crime Abatement Specialists" to provide guidance and to promote exchange of information on computer crime investigation. The national police is considering the development of personnel specially trained in this area.

More than half of the offices indicated that they feel a need for tightening up their security programs; however, more than 30% of the respondents said that making improvements is difficult because there are no adequate standards as to what measures are necessary.

Crime prevention is essential. However, according to the survey data, most business offices have inadequate procedures for deterring crime. Only 31.6% of the offices surveyed had any kind of crime prevention measures. More than half of the offices indicated that they feel a need for tightening up their security programs; however, more than 30% of the respondents said that making improvements in this area is difficult because there are no adequate standards as to what measures are necessary.

To promote crime abatement capabilities in view of these facts, it is necessary to ensure that each business has its own system of defense against crime. At the same time, the establishment of comprehensive standards for crime abatement relating to computer usage and operation

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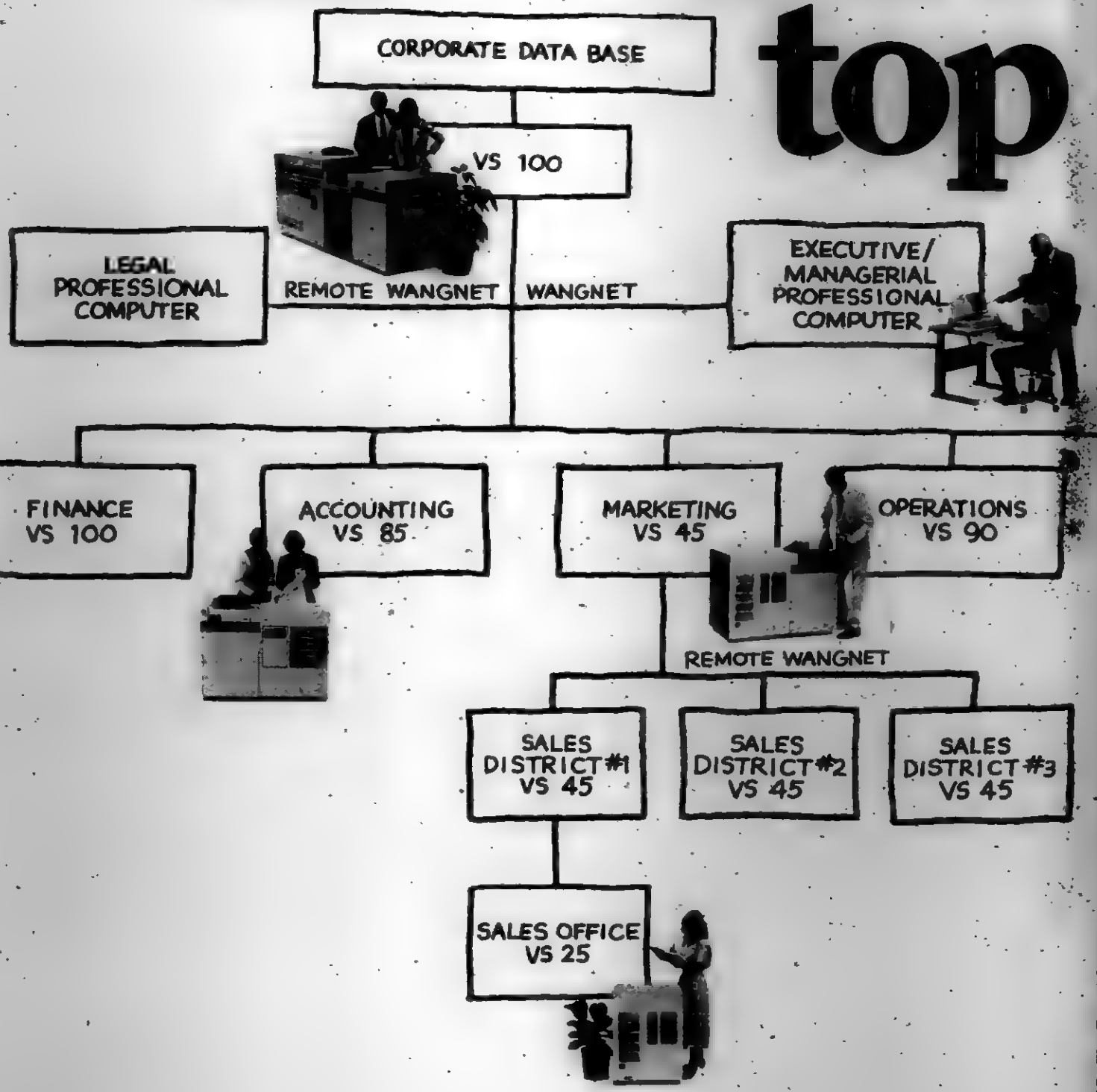

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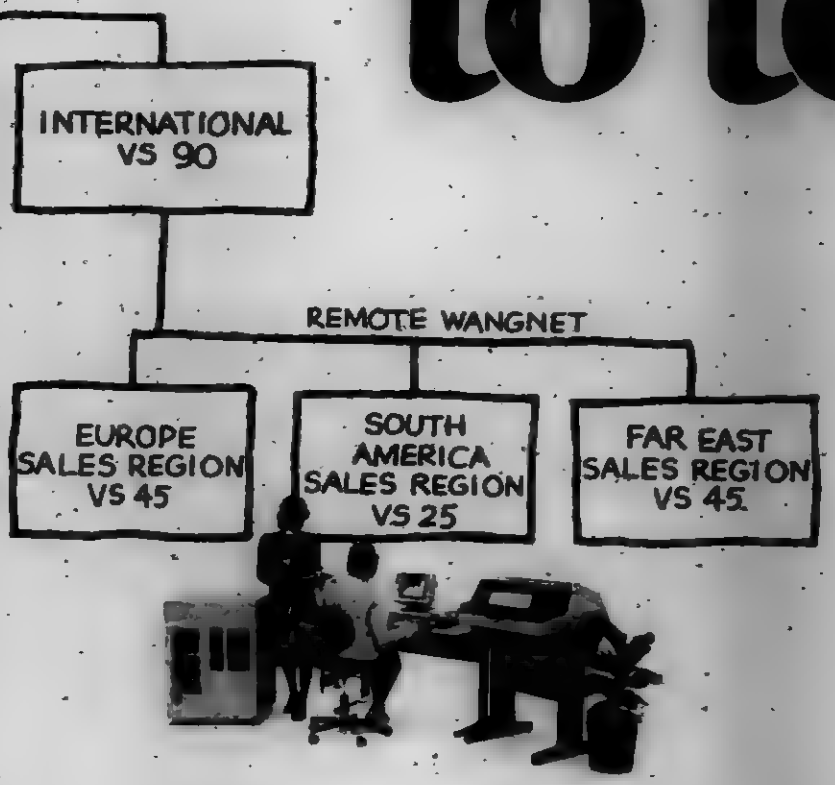

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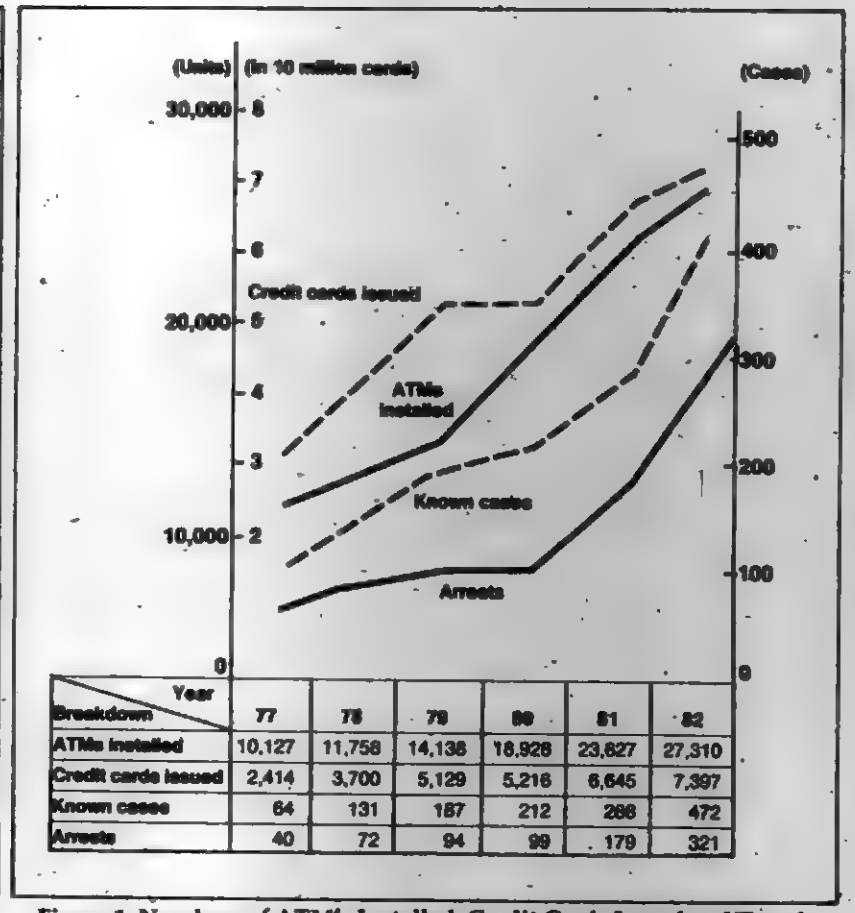

Breakdown \ Year	77	78	79	80	81	82
ATMs installed	10,127	11,758	14,138	18,928	23,627	27,310
Credit cards issued	2,414	3,700	5,129	5,216	6,645	7,397
Known cases	64	131	187	212	286	472
Arrests	40	72	94	99	179	321

Figure 1. Numbers of ATM's Installed, Credit Cards Issued and Trend in ATM-Related Crime (1977-1982).

A system has been installed so that information is retrieved instantly whenever a query comes in from police officers in the field. The number of referrals made during 1982 was 4,060,000, an increase of 900,000 from the previous year.

is urgently needed. Such standards should address needs for security personnel and physical facilities to ensure computer security. Beyond that, a Study Group on Computer System Security Regulations (established in November 1982) is conducting research on problems in criminal law dealing with computer crime and is studying the establishment of regulations aimed at protecting computer systems from abuse.

ATM-Related Offenses

Offenses connected with use of ATMs is rapidly increasing. The number of known cases has jumped from 64 in 1977 to 472 in 1982. The spread of ATM use, combined with inadequate safeguards for credit and identification cards, is leading to many incidents of ATM crime. Figure 1 shows trends in the numbers of ATMs installed, credit cards issued and incidence of ATM crime.

A rather unusual reported case involved gaining access to a data communications line to steal data for the purpose of forging credit cards. This incident shows that crime involving use of expert computer knowledge is also occurring.

Referral Operations

According to the "white paper," the police department is using computers for such purposes as checking a suspect against the list of wanted persons, administering drivers' licenses, comparing fingerprints and keeping statistics.

Lists of runaways, stolen vehicles and stolen goods are stored in a data base. A system has been installed so that information is retrieved instantly whenever a query comes in from police officers in the field. The number of referrals made during 1982 was 4,060,000, an increase of 900,000 from the previous year. The police department is considering including other types of information, such as drug cases, in the system as well.

In 1981, the department developed an automated fingerprint identification system. The effort to input fingerprint records in police files was started in October 1982. In October of this year, the department will begin to compare fingerprints taken at the site of a crime against this information base.

In addition, on-line referral and registration of drivers' licenses was initiated in January 1982. This has enabled the local community police departments to issue drivers' licenses the day applications are received and to speed up the process of license renewals. In April of that year, the computer was put into uninterrupted operation to permit drivers' license renewals on Saturday afternoons and Sundays.

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Automatic Organization Chart Capability	YES	NO
Word Charts	YES	NO
Gantt Charts	YES	NO
Multiple Bar Chart Formats	YES	NO
Multiple Line Chart Formats	YES	NO
Graphic Chart Library	YES	NO
Business Graphs Per 1 Megabyte Of Storage	300 to 400	10
Executive Color Graphics Presentation Features	YES	NO
Offers Extensive Geographic And Demographic Mapping & Statistical Analysis Capabilities For Marketing, Real Estate Location, Finance, Etc.	YES	NO

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COBOL

Input Validation

Will the fourth generation reach Cobol?

By Ken Meyer
John Piggott
Rod Grealish

A group of programmers and lecturers in England proposed a Cobol validation facility which was adopted in July 1982 by the Codasyl Cobol Committee into its Journal of Development. Yet the validation facility will not be part of the next Cobol standard. Supporters ask: "Why was this productivity tool ignored?"

Data validation can be a complex task in many applications. A program to validate data is usually the first one expected from a new recruit on a programming team or a trainee who has joined the firm fresh from school. It is difficult enough for him to understand the poor documentation he is given. But after eight compilations, the new programmer is told to change a field to admit a new condition or told that two fields have been combined into one.

Data must be checked to ensure its integrity in format and content and its relation to other data items. When a check fails, the application will require details of the failure. The format in which the data is received may not be suitable for further programs in the system, so the data may need conversion. Default values may need to be supplied in place of blank or invalid fields.

The validation facility, adopted July 1982 into the *Codasyl Cobol Committee Journal of Development*, provides all these functions within the Cobol language. Nevertheless, the American National Standards Institute (Ansi) X3J4 Committee, after reviewing proposed features for the Cobol-8X second draft standard, failed to adopt this tool into the standard at its London meeting last summer.

The committee gave several reasons for rejecting this

IN DEPTH

proposal. One was that the feature had not received enough publicity, so commenters on the second draft standard might not understand the power of the feature and it might not be acceptable.

The validation facility provides automatically for checking data format and content and relations with other data items. It indicates errors and distributes the data to other fields (converting format, if necessary). All validation specifications and error responses are incorporated in the data division. Validation is invoked by a single procedure division statement:

VALIDATE {identifier-1} ...

The VALIDATE statement may reference any group or elementary item, including a record-name (except those items defined in the report section).

The validation facility provides automatically for checking data format and content and relations with other data items. It indicates errors and distributes the data to other fields (converting format, if necessary).

The validation facility works in two cycles. Upon execution of a VALIDATE statement, the data is tested for format, and distribution to destination fields takes place. New values, including defaults, are placed in all destination fields, if indicated.

In the second cycle, content and relation validation takes place. The values placed in the destination fields in the first cycle may be used in relation checks in the second cycle.

When these first two cycles are complete, error indicators are set.

Format Validation and Data Distribution — Cycle 1. The contents of each elementary data item referred to in (or subordinate to) the identifier used with the VALIDATE verb are compared with the template provided in the corresponding PICTURE clause. Note that more than one identifier may be used in the same VALIDATE statement.

Each PICTURE character symbol has its own significance, interpreted with its USAGE clause.

For example, consider:

```
01 IN-RECORD
   03 ELEM-ITEM-1 PIC AAA999.
   03 ELEM-ITEM-2 PIC 999.
   03 ELEM-ITEM-3 PIC Z(4)9.99-.
   03 ELEM-ITEM-4 PIC S99
      USAGE COMP.
```

Executing VALIDATE IN-RECORD on the record in the example above, ELEM-ITEM-1 should consist of three alphabetic characters (or spaces) followed by two numerics and then one character of any kind. ELEM-ITEM-2 should consist of three numerics.

ELEM-ITEM-3 starts with four numerics (which could, alternatively, have one or more leading blanks), followed by a numeric, a decimal point, two numerics and a blank or a minus sign.

"De-editing," a new feature of the Cobol-8X standard, would allow the validated value in this field to be moved to a numeric data item for further processing. ELEM-ITEM-4 has two numerics which have a sign indication according to the rules of the machine on which it is being compiled (and run).

Any mismatch between the input and the template in PICTURE results in rejection of the corresponding item on format. An elementary item that has failed format validation cannot be further rejected for content or relation, but a default value may be used, if required, in subsequent validation.

Data descriptions may be made to apply only under a specified condition by means of a PRESENT WHEN clause. Used with a REDEFINES clause, it enables the same area to be given more than one description. The several alternative data descriptions could follow the layout for different transaction codes, so familiar in commercial data processing. For example:

```
01 IN-RECORD.
   03 RECORD-TYPE PIC 9.
   03 FORMAT-1 PRESENT WHEN
      RECORD-TYPE-1 = 1.
      05 PIC X(27).
   03 FORMAT-2 REDEFINES FORMAT-1
      PRESENT WHEN RECORD-TYPE = 2
```

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```
    OR 2.
    05 NAME-1 PIC A (20).
    05 VALUE-1 PIC 9(6).
    05 PIC X.
```

In the example, if RECORD-TYPE is 1, then 27 characters from the computer's set follow. If RECORD-TYPE is 2 or 3, 20 alphabetic characters (including spaces) are followed by six numerics and a final arbitrary alphanumeric character.

If the REDEFINES clause is used without a PRESENT WHEN clause, the same area is validated according to only the first data description. Codasyl altered this point from the proposal.

Data Distribution in Cycle 1. As the data item is being validated for correct format, its contents may be optionally stored away in one or more locations (without a MOVE statement). This option is specified by writing a DESTINATION clause in the data description entry for the data item being validated. Any data transformation (or conversions) take place using the same rules as the MOVE statement:

A default value is stored in the destination item if the subject item is blank or if it is an elementary item that has failed the format test. Group items may also carry a DESTINATION clause, which is not affected by format errors. The default value may be specified through use of the DEFAULT clause, in the absence of which values of spaces or zeros are assumed as appropriate. For example:

```
[illegible] PIC 99
    DESTINATION IS STORE-AGE DEFAULT
    IS 18.

...
05 STORE-AGE PIC 99.
```

In this example, IN-AGE is a two-digit number or a single-digit number with a leading space. If it validates successfully, the "de-edited" version is stored in STORE-AGE, where the value can be used in computations.

A default of 18 is stored in STORE-AGE if IN-AGE is blank or contains an invalid value.

If necessary, the default value is used if the data item is referenced elsewhere; that is, in content or relation validation.

It does not replace the contents of the input data item. The contents of data items being validated are never overwritten.

The example in Figure 1 shows how the DESTINATION clause would act on two numeric and two alphanumeric elementary fields.

In the example, IN-RECORD contains !!23ABS!T (where ! stands for a space).

The validate facility distributes IN-RECORD as follows: IN-VAL-GRP, containing !!23, is moved to OUT-VAL-GRP. IN-VAL, containing OUT-VAL, has a PICTURE of $(4)9 and yields !!$23. IN-CODE-GRP, containing ABS!T, is moved to OUT-CODE-GRP.

IN-CODE-1, containing AB, is moved to OUT-CODE subscripted by 1, and IN-CODE-2, containing S!T, is moved to OUT-CODE subscripted by 2.

OUT-RECORD will contain !!23!!$23AB$!TABST upon completion.

In a second example, IN-RECORD contains !!!!!!!! and, after distribution, appears as !!!!$9999!!!!!!ZZ in OUT-RECORD. The 9999 and ZZ are inserted as a result of the operation, with the DEFAULT clause.

Savings in Cycle 1. The savings in Cobol coding in the first two stages, format validation and distribution of data to outputs and work areas, are

```
01 IN-RECORD.
   03 IN-VAL-GRP DESTINATION OUT-VAL-GRP.
      05 IN-VAL PIC ZZZ9 DESTINATION OUT-VAL DEFAULT 9999.
   03 IN-CODE-GRP DESTINATION OUT-CODE-GRP.
      05 IN-CODE-1 PIC AA DESTINATION OUT-CODE (1).
      05 IN-CODE-2 PIC XBX DESTINATION OUT-CODE (2) DEFAULT "ZZ."

01 OUT-RECORD.
   03 OUT-VAL-GRP PIC X(4).
   03 OUT-VAL     PIC $(4)9.
   03 OUT-CODE-GRP PIC X(5).
   03 OUT-CODE PIC XX OCCURS 2.
```

Figure 1. DESTINATION and DEFAULT clauses aid distribution.

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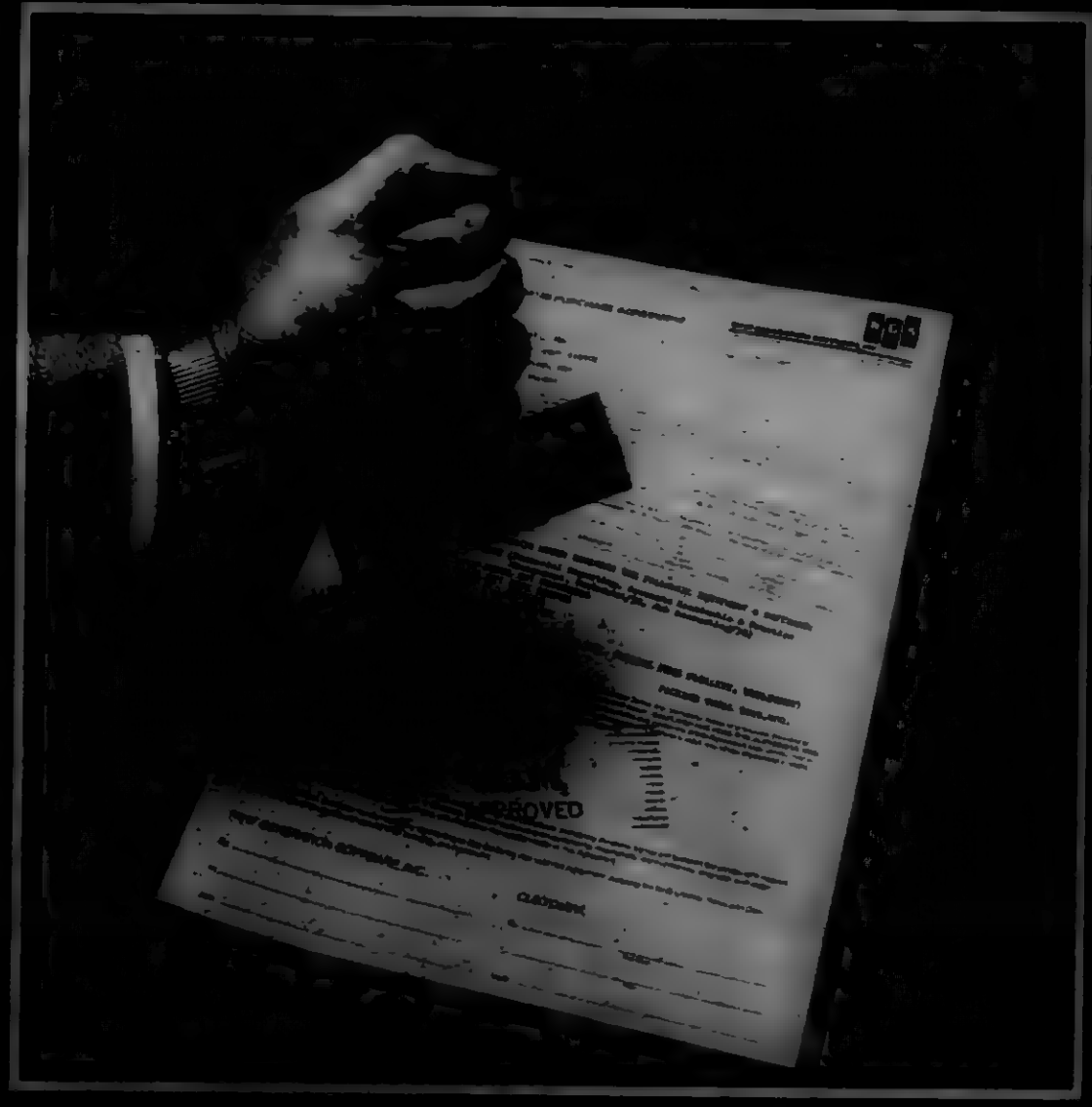

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alone worth the addition of the .VALIDATE verb to the language. The tests that are accomplished would require many IF statements over an input area handled with a subscript on each field.

X3J4 has helped to structure the IF statement with the END-IF, but has not reduced the problems of confusing interpretation of complex IF statements. The solution, we think, is to reduce the number of IF statements in a program.

The number of MOVE statements required to store the information being validated also is dramatically reduced. Every MOVE statement eliminated results in fewer statements in a program. The concept is not new in Cobol, as the report writer feature has had (for some 20-odd years) a SOURCE clause to reduce MOVE statements.

If the SOURCE clause is a miniature movie frozen into the data division, the DESTINATION clause is really just the same movie run in reverse direction — in other words, the other side of the coin.

Indicated overall savings. Recent questions asked of one large user of the S + PC Systems Ltd. preprocessor for combined validation and report writer facilities indicated that 500 to 600 programs had been written, about half with the validate feature alone. The user, North Thames Gas of London, claimed 20% savings in manpower.

The most significant fact was that a substantial reduction in compilations took place. Programmers were using three to four compilations for very large programs, rather than six or seven. Several regional computing centers of British Gas are well committed to using these features.

Content and Relation Validation -- Cycle 2. In the second cycle, content and relation validation take place. The values placed in destination files may be used in relation checking in the second cycle. After cycles one and two are complete, error indication takes place.

Content validation. Each group or elementary data item may have any number of content-validation, level 99, entries associated with each item. During the execution of Cycle 2 of the VALIDATE statement, the contents of the associated data item are compared with the value, values or range of values in each content-validation entry.

```
{VALID  }                 {VALUE IS  }
{INVALID} [CHARACTER]     {VALUES ARE}

{FROM {identifier-1} ...                }
{     {literal-5}                       }
{                 {THRU    }            }
{                 {THROUGH }            }
{                          literal-7} ...}

[WHEN condition-1]
```

The simplest test is for mandatory values in a data item:

```
03 PIC X(20).
   88 VALID VALUE SPACES.
```

Any character that is not blank within this data item will cause an error, but the field is checked as a whole to determine this error. (Later, we will discuss treatment of blanks.)

An easy test with four values in a data item is as follows:

```
03 MARITAL-STATUS PIC A(8).
   88 VALID VALUES "SINGLE"
      "WIDOWED" "MARRIED"
      "DIVORCED".
```

WIDOWER causes the item to be rejected.

When the CHARACTER phrase is used, the comparison is made with each character of the associated data item.

To validate a field HEXA-

NUMBER as being a hexadecimal number, character by character, use:

```
03 HEXA-NUMBER PIC XXXX.
   88 VALID CHARACTER VALUES ARE
      "0" THRU "9" "A" THRU "F".
```

Values may be specified by a literal or by an identifier which may reference a single data item or a table.

```
03 ANIMAL PIC X(20).
   88 VALID VALUES ARE FROM
      LIST-OF-ANIMALS.
...
03 LIST-OF-ANIMALS PIC X(20)
   OCCURS 100 TIMES.
```

Here is a table showing the day of the week which contains an OCCURS clause.

```
01 DAY-TABLE VALUE
   "MONTUEWEDTHUFRISATSUN".
   03 DAY-MNEMONICS PIC XXX OCCURS 7.
```

This permits you to write:

```
03 W-DAY PIC AAA.
   88 VALID VALUE FROM DAY-MNEMONICS.
```

The content-validation entry may also be qualified by a conditional expression through which the check may be activated or deactivated.

```
   03 MARITAL-STATUS PIC A.
      88 MARRIED VALUE "M".
      88 SINGLE VALUE "S".
01 IN-RECORD.
   03 IN-CODE PIC A.
   88 VALID VALUES "A" THRU
      "H" WHEN MARRIED.
   88 VALID VALUES "J" THRU
      "S" WHEN SINGLE.
```

The invalid condition may be specified to eliminate one or more values or a table of values.

```
03 WORKER-AGE PIC 99.
   88 INVALID VALUES
      00 THRU 15  65 THRU 99.
```

Figure 2 illustrates how content validation can be applied to check the time of day, a date, a personal name and a security code whose value must match an entry in an internal table.

Failure of content validation results in rejection of the item "on content."

An elementary item that has failed content validation cannot be further rejected on relation.

Relation Validation. Each group or elementary item may be subjected to any number of additional tests that specify its interrelationships with any other data items.

The VALID clause specifies the condition under which the data item is rendered valid or not valid, regardless of other validation checks made during the execution of a VALIDATE statement.

```
[ALL] [NOT] VALID [WHEN condition-1]
```

If a data item is in the middle of a record being validated, for example, the data item may be removed from the checks performed on other items subordinate in the record.

```
01 IN-RECORD.
   03 TIME-STAMP.
      05 HOURS PIC 99.
         99 VALID VALUES ZERO THRU 23.
      05 MINUTES PIC 99.
         99 INVALID VALUES 60 THRU 99.
   03 MONTH-DAY.
      05 MONTH-NO PIC 99.
         99 VALID VALUES 1 THRU 12.
         88 SHORT-MONTH VALUES 2 4 6 9 11.
      05 DAY-NO PIC 99.
         99 VALID VALUE 1 THRU 31.
         99 INVALID VALUE 31 WHEN SHORT-MONTH.
         99 INVALID VALUE 30 WHEN MONTH-NO = 2.
         99 INVALID VALUE 29 WHEN MONTH-NO = 2 AND LEAP = "NO".
   03 SURNAME PIC A(31).
         99 VALID CHARACTER VALUES
            "A" THRU "Z" "-" "'" ".".
   03 SECURITY-CODE PIC A(5)9.
         99 VALID VALUE FROM CODE-TABLE.
```

Figure 2. Content Validation Entries

```
05 ANYTHING-GOES PIC 999 VALID.
```

If a data item is contrary to the format shown within the same data item, that data item may be released from checks when true.

```
05 MONEY.
   07 PIC 9(4) VALID
      WHEN MONEY = "******".
```

On the other hand, if the data item is wrong when certain conditions occur and ordinarily correct:

```
05 WORK-DATE PIC 9(4) NOT VALID
   WHEN WORK-DATE = 0101 OR 1225.
```

The validity of a payment might be questioned if the payment did not measure up to a minimum payment amount:

```
03 MIN-PAYMENT PIC 9(4)V99.
03 PAYMENT PIC 9(4)V99 NOT VALID
   WHEN PAYMENT IS LESS THAN
   MIN-PAYMENT.
```

The BLANK clause specifies the condition under which the data item must be blank or not blank during

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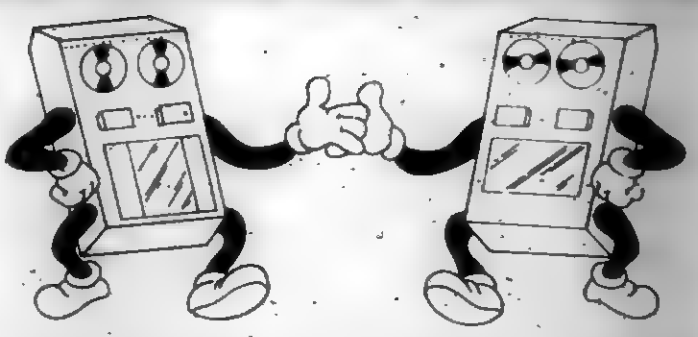

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```
01 IN-RECORD.
   03 SEX PIC X.
   03 AGE PIC 99 BLANK OPTIONAL DEFAULT 21.
   ...
   03 M-STATUS PIC X NOT BLANK.
   03 MAIDEN-NAME PIC X(32) BLANK WHEN SEX = "M" OR M-STATUS = "S."
   03 PARENTS-NAME PIC X(32) NOT BLANK WHEN AGE < 18.
   03 INITIAL-PAYMENT PIC 9(6)V99 BLANK OPTIONAL WHEN AGE < 66.
   03 PRESENT-BALANCE PIC 9(6)V99 NOT VALID WHEN PRESENT-BALANCE
      < INITIAL PAYMENT.
   03 CATEG-CODE BLANK OPTIONAL.
      05 PIC X(4) VALID WHEN CATEG-CODE = "NONE".
```

Figure 3. Relation Validation Entries

The savings in Cobol coding in the third and fourth stages, content validation and relation validation, add to the savings in the first two stages. These savings lie in reducing hundreds of lines of Cobol code to a single line.

the execution a VALIDATE statement.

```
[ALL] [NOT] BLANK [OPTIONAL] [WHEN condition-1]
```

If an AGE is blank, it can become valid even if previously rejected.

```
03 AGE PIC 99 BLANK OPTIONAL.
```

Or if the data item is blank when it should not be, the data item can be rejected.

```
03 FORENAME PIC X(20) NOT BLANK.
```

The data item can be tied to other entries as a condition.

```
03 MAIDENNAME PIC X(20) BLANK WHEN
   SINGLE OR MALE.
```

MAIDENNAME must be blank when a single female is placed on the personnel file.

If the item fails the VALID or BLANK test, it is rejected "on relation." An elementary item that has failed format or content validation cannot be further rejected on relation.

Each clause may contain a conditional expression that specifies when the check is to be applied and when it is to be ignored. Figure 3 contains several examples.

Since DESTINATION clauses are processed during the first cycle, the target fields may be referenced instead of the input item in the formulation of a conditional expression:

```
01 IN-RECORD.
   05 PIC 99 DESTINATION FIRST-WEEK
      NOT VALID WHEN FIRST-WEEK =
          LAST-WEEK.
   03 PIC 99 DESTINATION LAST-WEEK.
```

Checks at the group level that apply to the group as a whole are independent of checks on subordinate items, enabling constructions such as the following:

```
02 PAYMENTS NOT BLANK.
   05 AMT-COINS PIC 9(6)V99 BLANK
      OPTIONAL.
   05 AMT-BILLS PIC 9(6) BLANK
      OPTIONAL.
   05 AMT-CHECKS PIC 9(6)V99 BLANK
      OPTIONAL.
```

In the example above, the group item is valid if at least one of the elementary items is not blank. At least one of the 05-level fields must be present, although individual 05-level fields may be blank. In the example below, each elementary item must pass the specified validation criteria to be valid, but if the group item is completely blank, the group item is valid.

```
03 DELIVERY-ADDRESS BLANK OPTIONAL.
   05 DELV-CODE PIC 9(5).
   05 DELV-NAME PIC X(32) NOT BLANK.
   05 DELV-LINE-1 PIC X(32) NOT
      BLANK.
   05 DELV-LINE PIC X(32) OCCURS 6.
```

More examples will not serve to explain the fundamentals. The adventurous will find that the conditions of the WHEN clause include arithmetic expressions. Maybe you would like to make up the entries for a mandatory retirement at age 60 or after 40 years of service, given date of employment and birth date?

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DETAILS.
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Cobol coding in the third and fourth stages, content validation and relation validation, add to the savings in the first two stages. The tests that are accomplished dramatically reduce the number of IF-statements applied to an input area. Many of the comparisons required would have used subscripts for each data item in examination of each character. The savings lie in reducing hundreds of lines of Cobol code to a single line.

A secondary benefit, gaining more importance in an organization, is that the validation entries are part of a data description. The preparation of these entries is, in many firms, the function of a data administrator, one who conducts a meaningful and comprehensive company survey of data and records his findings in a data dictionary.

Data should be the same everywhere in an organization, with the same data name. The validation entries do not interfere with the use of the data description for file updating, report preparation, sort, merge or any other use in Cobol.

The VALIDATE verb is more powerful than the GENERATE verb is in report writer.

One programmer, writing a report on VALIDATE for his management, stated, "Having worked (and played) with VALIDATE for some weeks now, I have found that the immensely varied combination of clauses that can be constructed provide a powerful programming tool."

He continued, "It seems natural to write validation programs in this way, and this helps [a programmer] to become competent in its use very quickly."

Error Indication in the Validation Facility.

After cycle one and cycle two are complete, error indication takes place.

During cycles 1 and 2, whenever an error is detected, a type of error condition is noted. If a data item fails in cycle 1 "on format," further validation on the item is stopped. Failure of an elementary item or content validation results in rejection of the item "on content" and rejection for other reasons is halted. Failure of relation validation in a VALID or BLANK test results in rejection of the item "on relation" and, if in error, cannot be further rejected on relation.

When all the specified checks have been completed for all the elementary and group items within the scope of the VALIDATE statement, the outcome of the validation may be reported. This is accomplished by means of the ERROR STATUS clause.

The general format for the clause is as follows:

```
ERROR STATUS IS { literal-1 | identifier-1 }

[NO ERROR STATUS IS { literal-2 | identifier-2 }]

[ON { CONTENT | FORMAT | RELATION } FOR { identifier-3 }...]
```

The clause enables a specified value to be placed in locations elsewhere in the data division if a certain item, or a set of items, fails a particular check.

In its simplest form, the ERROR STATUS may be used to produce an error message for one particular field.

```
01 IN-RECORD
   03 IN-DATE PIC 9(6).
...
01 ERR-IN-DATE PIC X(12)
   ERROR "INVALID DATE" FOR
   IN-DATE.
```

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History of the Validation Facility

The validation facility originated as a proposal for format validation written by Ken Meyer in November 1974 and presented to a working committee of the British Computer Society Cobol Specialist Group set up by Tony Sale. Meyer developed it into a proposal to the Programming Language Committee in mid-1975 with John Triance, John Piggott and others. Piggott continued to enhance the syntax, semantics and operation. In 1978, arrangements were made with North Thames Gas for ICL 1900 development, with West Midlands Gas for ICL 2900 development and with Southeastern Gas for large IBM mainframe development.

Proposals were made in 1980 from a group led by Phil Brown, Burroughs Corp. and now National Computing Centre representative to the Codasyl Cobol Committee. Rod Grealish has served on the committee, which worked on the proposals that resulted in acceptance of the validation facility into the Codasyl Cobol Committee *Journal of Development* in July 1982.

John Piggott formed S + PC Systems Ltd., 69 Merton Hall Road, Wimbledon, London, England SW19 3PX to develop and market preprocessors that have enhanced Ansi Cobol compilers for ICL, IBM and Sperry Corp. mainframes.

```
Record Under Validation;
 01 IN-RECORD.
    03 CODE-1 PIC AAA99X.
    03 VALUE-GRP.
       05 VALUE-1 PIC 9(6).
       05 VALUE-2 PIC 9(6) NOT VALID WHEN VALUE-1 = < VALUE-2.
          99 INVALID VALUES 0 THRU 100000.
    03 CODE-2 PIC 999B999B999 OCCURS 2.
Error Status Reports;
 01 GLOBAL-MESSAGE PIC X(15)
    ERROR STATUS "INVALID RECORD"
    NO ERROR STATUS "RECORD ACCEPTED" FOR IN-RECORD.
 01 DETAILED-MESSAGES.
    03 MSG-1 PIC X(12)
       ERROR "INVALID CODE" FOR CODE-1 CODE-2(1) CODE-2(2).
    03 MSG-2 PIC X(17) ERROR "VALUE NOT NUMERIC" ON FORMAT FOR
       VALUE-GRP.
    03 MSG-3 PIC X(30) ERROR "VALUE-2 OUT OF RANGE" ON CONTENT
       FOR VALUE-2 ERROR "VALUE-1 SHOULD EXCEED VALUE-2" ON
       RELATION FOR VALUE-2.
    03 FLAG-1 PIC 9 ERROR 9 FOR IN-RECORD.
    03 FLAG-2 PIC 99 OCCURS 2 ERROR 23 FOR CODE-2.
```

Figure 4. Example of ERROR STATUS reporting.

The ERROR STATUS is as flexible in its messages as could be required, as show here:

```
03 ERROR "NOT 'M' OR 'F' " FOR SEX.
03 ERROR "NOT NUMERIC" ON FORMAT
   FOR AGE.
23 ERROR "DATA NOT ACCEPTED"
         NO ERROR "DATA ACCEPTED"
         FOR NEW-CUSTOMER.
```

The status of a group item may be indicated as well as that of elementary items. Unless overridden by clauses associated with a group item, it is invalid if any immediately subordinate item is invalid.

```
01 IN-RECORD.
   03 IP-DATE BLANK OPTIONAL.
      05 IP-MO PIC 99.
      05 IP-DAY PIC 99.
...
      05 IP-YR PIC 99.
01 DATE-ERR PIC X(12)
   ERROR "MONTH ERROR" FOR IP-MO
   ERROR "DAY ERROR" FOR IP-DAY
   ERROR "YEAR ERROR" FOR IP-YR.
```

Several messages can be written in the same area for elementary items in the same group, in which case the priority is from the order in which they are written in the data description. A good systems designer would allow one message per line (but space may be limited). On a terminal, for example, space may be limited, so only one response may be shown at a time.

Dispersal. Error messages can be dispatched to any data division section at any level and combined with other clauses. For batch programs, it may be convenient to place the messages in the WORKING-STORAGE SECTION or REPORT SECTION. A WRITE or GENERATE would be required.

For on-line use, it may be more convenient to use the WORKING-STORAGE SECTION or LINKAGE SECTION. This requires a DISPLAY or SEND statement or an exit to the teleprocessing monitor.

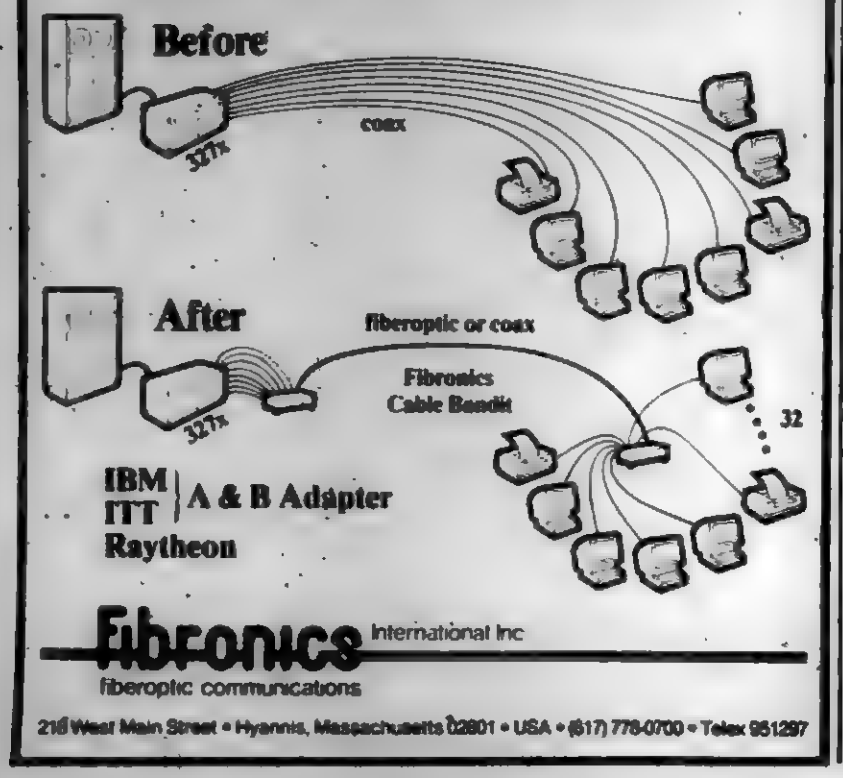
Format. The ERROR STATUS is not limited to messages and can use numeric or alphabetic literals of any type. Error numbers for some systems have become ingrained in the error-handling procedures. One way of handling the IP-DATE example is shown:

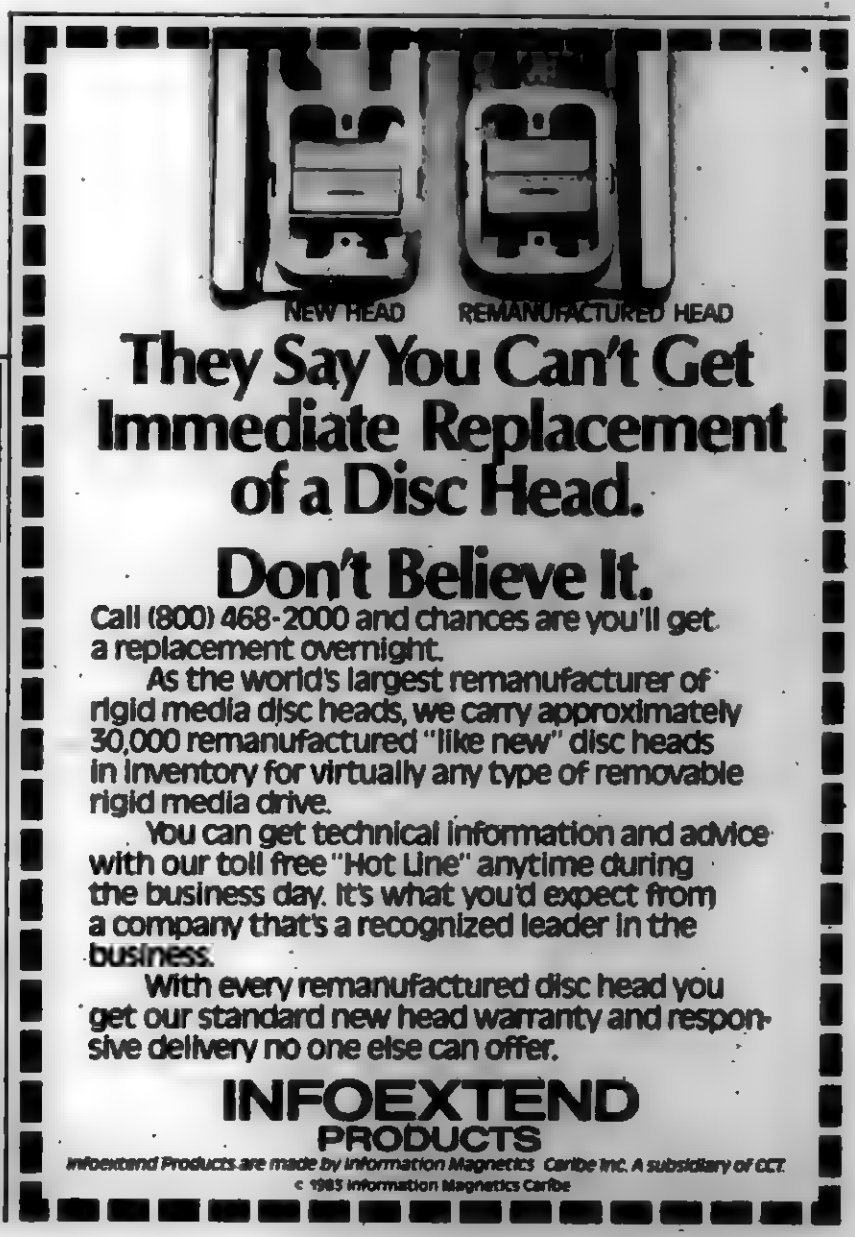
```
01 ERROR-AREA.
02 ERR-1 PIC 29 ERROR 1 FOR
   IP-DATE.
03 ERR-2 PIC 29 ERROR 2 FOR
   IP-MO.
03 ERR-3 PIC 29 ERROR 3 FOR
   IP-DAY.
03 ERR-4 PIC 29 ERROR 4 FOR
   IP-YR.
```

This would give an erroneous date of 999999 an error message: 1234.

The combinations are not limited in their scope.

Valid Status. Valid status is





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indicated by a default value, which is zero or spaces unless specified. This is overridden with any message specified with the value shown with the NO ERROR phrase.

Three stages of validation, format, content and relation may also be distinguished by means of the ON phrase in the ERROR STATUS clause. Figure 4 (on In Depth/30) shows most of the variations possible with the ERROR STATUS clause.

The ERROR STATUS clause has no effect on the program or the contents of the working-storage, linkage or report sections, as indicated, until a VALIDATE statement has been executed. A few of the methods in common use for error reporting have been shown. As discussed, the preparation of error messages can be done automatically through use of this clause and in conjunction with VALIDATE.

Overall savings. One installation showed that with the validate feature replacing a major 6,000-line validation program, by comparison, structure took 20%, coding took 57% and testing took 42% of the time. The compilation time was similar, but 350 statements generated 1,750 statements, replacing 3,400 hand-coded statements in the program.

P.A. Graham points out that "The objective of the Cobol validate feature is to provide automatic validation and error-reporting procedures driven by the data description of the item to be validated."

"Validation programs tend to be tedious, repetitive and boring — to the extent that very often they are merely a sequence of simple tests. This tends to mask the basic logic of the program, and the nature of the input data becomes lost in a mass of conditional statements.

"Relative to other programming areas, costs for both development and maintenance of validation programs should see a reduction as programmer time becomes more expensive and computer equipment becomes cheaper."

Since the Ansi X3J4 Committee rejected this validation facility in the 198X standard, it looks like Cobol users will have to wait until the turn of the decade to share these gains on each and every Cobol machine. Jerry Garfunkel of Jerome Garfunkel Associates in Litchfield, Conn., has come up with a proposal for Cobol enhancement at mid-stream. X3J4 has already accepted this method for network data bases, pending the completion of the Codasyl X3H2 Committee report.

One installation showed that with the validate feature replacing a major 6,000-line validation program, by comparison, structure took 20%, coding took 57% and testing took 42% of the time.

It is fine to represent Cobol as a consistent language with compatibility and continuity between versions, but this principle should not cut off development of new features that will improve the language for users and management. This validation facility should mean cash savings and orderly, progressive development of Cobol.

Comments on the validation facility can be addressed to Linda Willis, chairwoman, X3J4 Cobol Technical Committee, Cbema, Suite 500, 311 First St. N.W., Washington, D.C. 20001.

About the Authors

Ken Meyer has been active in data processing since 1955 with Pure Oil (now Union Oil), Creole Petroleum (Esso) in Venezuela, Control Data Corp. and British Gas. He now consults, writes and lectures in the UK. He also serves on the ISO Cobol Experts' Group and belongs to the Association for Computing Machinery and British Computer Society (BCS).

Rod Grealish worked with ICL from 1971 through 1974 and, since then, has been lecturing at Coventry (Lanchester) Polytechnic in programming languages and data bases. He is a member of the British Standards Institute Cobol Group, the National Computing Centre Cobol Group and the BCS.

John Piggott has spent his entire computing career as a consultant. His interest lies in merging the linguistic and logical aspects of programming. He is currently managing director of S + PC Systems Ltd. in London and is working in the area of data languages derived from Cobol.

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Interface to Allow Bank With IBM 370 Link ATMs, Nets

FUQUAY VARINA, N.C. — Software Development and Maintenance, Inc. recently announced an interface said to enable banks with the IBM 370 to connect their automated teller machine (ATM) systems directly to national and regional ATM networks.

The ATM Shared Network Facility (SNF) is an interface that resides in the host between the authorization system and the switch, according to a company spokesman. It reportedly can be simply modified for integration to various authorization systems, a vendor spokesman said.

SNF runs under IBM's OS or DOS operating systems using CICS and supports a full transaction set along with administrative and communication messages, according to the spokesman.

The product is priced at $35,000 from the vendor through P.O. Box 668, Fuquay Varina, N.C. 27526.

Electronic Funds Transfer, Not ATMs, Seen Bank Rage

By David Myers
CW New York Bureau

NEW YORK — The real breakthrough in electronic banking is not — as many believe — the automated teller machine; it is next-day electronic funds transferal, George C. White Jr. told an audience at the Association of Computing Machinery Conference here recently.

White, a former executive with Chase Manhattan Bank and now president of his own consulting firm, told listeners about a pilot installation at Exxon Corp. gas stations in Southern California, where customers authorize an electronic withdrawal on their checking accounts to pay for their fill up.

Funds are transferred the next business day, saving Exxon money on the transaction, a portion of which the oil company passes on as a 4 cent bonus to customers using the plan.

"You keep reading articles that say the consumer must be educated. That's a bunch of nonsense. The consumer is already educated," White said.

'You keep reading articles that say the consumer must be educated. That's a bunch of nonsense. The consumer is already educated. . . . Those who must be educated are the banks' corporate customers.' — George C. White Jr., former Chase Manhattan Bank executive.

Those who must be educated are the banks' corporate customers, White declared. Less than 20 large U.S. corporations are receiving payments electronically, he said.

While banks may protest that they are already selling electronic funds transfer (EFT) to their corporate customers, only 8% of American banks are using EFT for their own payments.

Instead, banks are busy setting up electronic bank-at-home systems that permit customers to authorize a withdrawal of funds via their home computers. "In plain fact, that's even slower than the old method because the bank still has to make out a paper check to send to the payee. Consumers are too well educated to accept something as dumb as this," White said.

At this point, only 1% of the checks drawn on U.S. banks are paid out through EFT, according to White.

What may be slowing the acceptance of EFT is the proliferation of automated teller machines, White suggested. Automated same-day transactions are properly used when there is a pressing need for immediate payment, since they are vastly more expensive than a next-day electronic transfer of funds, White pointed out.

But same-day transactions are all the rage. "We assume it should be done because we have the capability to do it," he said.

EFT will win acceptance from corporate customers only when they understand that the leading argument for EFT is not its immediacy. "All the electronic transfers in the world don't get you your funds any faster," White said.

But a setup that permits transactions to occur electronically "from initiation to completion — that's when you have a real electronic transfer that is worth using," White said.

'Intext II Emulator' Boasts IBM Micro Emulation With Unix

SANTA MONICA, Calif. — Interactive Systems Corp. has announced the Intext II Emulator, a software package said to allow the IBM Personal Computer to act as an intelligent terminal compatible with the company's versions of Bell Laboratories' Unix operating system.

The product runs under IBM's PC-DOS operating system on any IBM Personal Computer or Personal Computer XT with at least 64K bytes of memory, one diskette drive, a color and/or black-and-white monitor and an asynchronous communications card.

The emulator allows the IBM Personal Computer to function as Digital Equipment Corp.'s VT100 or VT52 terminals and also as a standard dumb terminal to access asynchronous communications ports on the majority of machines and most public communications networks, the vendor said.

The unit is priced at $475.

Further information on the emulator is available from Interactive Systems, 1212 Seventh St., Santa Monica, Calif. 90401.

Protocol Controller Features Ascii Link

TORRANCE, Calif. — Local Data Co. has announced the Interlynx/3278 protocol controller that enables asynchronous Ascii devices to be linked to IBM control units via coaxial cable.

The protocol converter performs the multiple interface and protocol conversion functions necessary for plugging asynchronous mini and microcomputers, CRT word processors, port selectors, modems and terminals into the IBM Type A coaxial port. The price is $1,395.

Local Data is located at Suite 706, 2701 Toledo St., Torrance, Calif. 90503.

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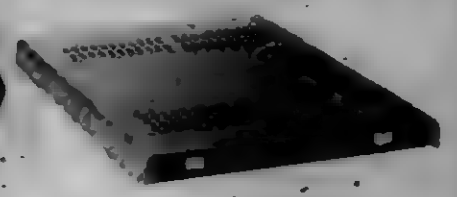

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Fame Series of Terminal Products Announced

SUNNYVALE, Calif. — Falco Data Products, Inc. has announced the Fame series of terminal products including Fame II, Fame III and Fame 100.

The Fame II features 22 user-programmable function keys with room in nonvolatile memory for up to 900 characters. An optional keyboard provides 48 functions. The additional preprogrammed function keys offer editing capabilities, screen-display control and data transmissions from either of two independently configurable ports, a vendor spokesman said.

The display screen features 24-line by 80-col. screen size with a 25th line for status information, the vendor said.

The Fame III is a general-purpose Ascii terminal with a 24-line by 80-col. display. The unit has a microprocessor-controlled logic board and a CRT control circuit for a separate sync/video CRT monitor. This model offers a standard Falco keyboard with 101 keys and features a 128-char. generator, with 96 Ascii displayable characters and 32 special symbols, the vendor said.

The Fame 100 features 18 user-programmable, nonvolatile function keys, advanced video option (132 col. by 24 lines, graphics character), conversation and block modes with VT-131 edit commands, local printer port, display of control characters and a pass-through print capability. Pricing for the series ranges between $595 and $1,195.

Further information is available from Falco Data Products, 1286 Lawrence Station Road, Sunnyvale, Calif. 94089.

Racal-Milgo Unveils Central-Site Modem

MIAMI — Racal-Milgo, Inc. has introduced the Omnimode central-site modem, said to permit users to operate up to 64 central-site modems having data rates of 4,800 and/or 9,600 bit/sec from a single master front panel.

The central-site modem is available as a primary or secondary shelf. The primary shelf provides a master front panel for controlling the central-site modems. Each shelf has a dedicated power transformer, a vendor spokesman said.

The product allows the operator to monitor, test and control all modem operating parameters for the entire modem rack. Shelf/unit indicators and controls enable location of individual modems for immediate operator action and response, the vendor said.

Pricing begins at $2,600 for the primary shelf and $1,600 for the secondary shelf, from Racal-Milgo, 8600 N.W. 41st St., Miami, Fla. 33166.

Access 1-2-3 Unwrapped For IBM Micro

CHATSWORTH, Calif. — Novation, Inc. and Microstuf, Inc. have announced the Access 1-2-3, an IBM Personal Computer communications system, which combines Novation's PC1200B modem and Microstuf's Crosstalk XVI software.

The modem features a set of commands and responses that provides telephone-line status. It has a built-in dialer with dial tone and busy-detect, which allows the modem to be programmed to redial. Autoanswer is also included, and the product can provide audio monitoring through the computer's internal speaker, the vendor said.

The PC1200B is capable of operating at either 300 or 1,200 bit/sec full duplex, and can perform an automatic self-test and receiver alignment at power-on and can be put into analog or digital loop-back test modes.

Crosstalk XVI is an intelligent terminal and file transfer program that allows for disk-to-disk transfer and provides control of stop bits, parity, bit/sec rate and duplex while online. The package is available for $595.

Further information is available from Novation, 20409 Prairie St., Chatsworth, Calif. 91311.

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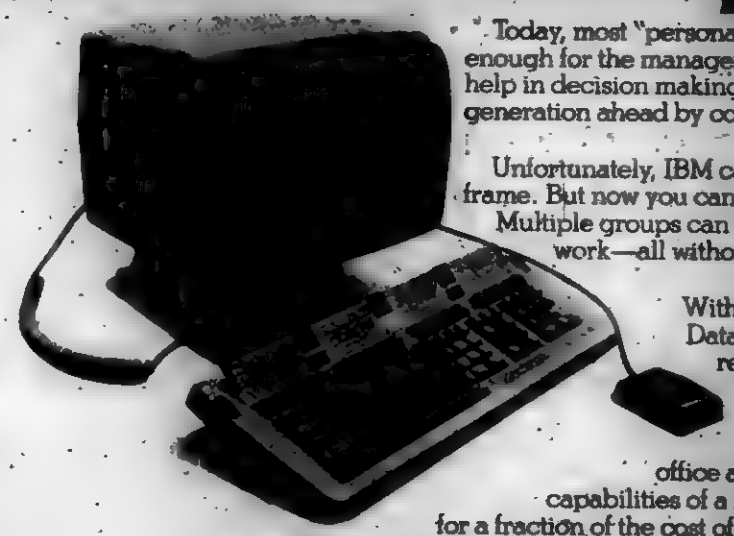

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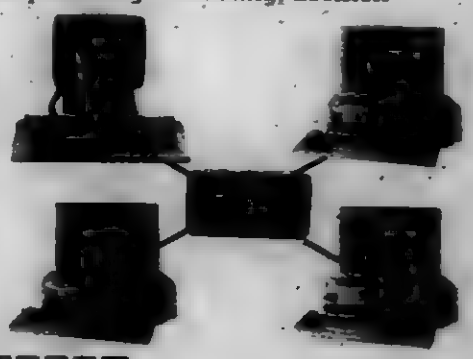

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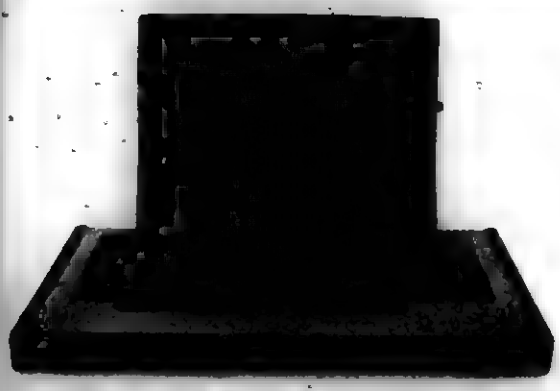

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The result? Vastly improved call coverage, better information flow, no unanswered phone calls, no missed messages, *no more pink slips.*

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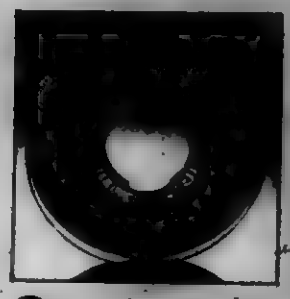

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GX-100 Graphics Terminal Announced by Modgraph

WALTHAM, Mass. — Modgraph, Inc. has introduced the GX-100 graphics terminal and workstation.

The workstation includes dual 5¼-in. floppy disk drives and a digitizing tablet.

Some features include 768 by 585 pixel resolution on a 15-in. CRT, dual graphics and text screens and emulations of Digital Equipment Corp.'s VT100/VT52, Lear Siegler, Inc.'s ADM-3A and Tektronix, Inc.'s 4010/4014 terminals.

In the workstation mode, the floppy drives allow the user to run under Digital Research, Inc.'s CP/M 2.2 operating system.

The graphics terminal is priced at $2,550.

Further information is available from Modgraph, 1393 Main St., Waltham, Mass. 02154.

RJE Protocol Introduced For 68000 Line

IRVINE, Calif. — Alpha Micro, Inc. has announced the availability of its RJE communications protocol for its line of Motorola, Inc. 68000-based systems.

The product will allow users with properly configured systems to communicate with most other manufacturers' computers that use IBM's Binary Synchronous Communications protocols 780 and 3780, as well as with other Alpha Micro systems.

By enabling a user's Alpha Micro system to communicate with other Alpha Micro systems, the RJE protocol allows data to be transmitted over dedicated or leased telephone lines instead of requiring the user to transport manually floppy diskettes or other media, the vendor said. The price ranges from $300 to $450.

Further information is available from Alpha Micro, 17332 Von Karman Ave., Irvine, Calif. 92714.

TRS-80 Model 4 Gets Adapter For Mainframe

NEW BRUNSWICK, N.J. — Microframe; Inc. has introduced a mainframe communications adapter for the Radio Shack TRS-80 Model 4.

The Bisync 4 allows the microcomputer to emulate a cluster controller with a single terminal attached. It also provides IBM 3287 printer emulation on the Model 4's printer.

According to the vendor, any number of Model 4s can share a single line without a cluster controller. A simplified line-sharing system, integrated into every Bisync 4 unit, reportedly ensures fair access to the line by each unit.

The Bisync 4 software provides features such as full screen editing, screen printing and screen-to-disk copying. Also available is 2780/3780 protocol support. Priced at $700, Bisync 4 comes with a 30-day, money-back guarantee.

More information is available from Microframe at 205 Livingston Ave., New Brunswick, N.J. 08901.

Emulator Allows IBM Micros To Access Hosts

IRVINE, Calif. — AST Research, Inc. has announced the Pcox terminal emulator, which allows IBM Personal Computer and Personal Computer XT systems to access IBM host systems as an IBM 3274, 3276, 3278 or 3279 terminal.

Among the terminals the Pcox emulator replaces are the IBM 3278 Model 2, 3 or 4; the IBM 3279 Model 2A or 3A; and the IBM 3274 and 3276. The emulator also provides direct communications for 3270 series users with coaxial connections, the vendor said.

To access the IBM mainframe in a real-time mode, the user activates the communication link and keys in mainframe commands on the micro, a vendor spokesman said.

The package costs $1,195. An optional file transfer program Pcox-ETU, which provides menu-driven file transfer from the Personal Computer XT to the host and from the host to the Personal Computer XT, costs $200.

Further information is available from AST Research, which is located at 2372 Morse Ave., Irvine, Calif. 92714.

Firm Unveils Portable Tester

WESTBORO, Mass. — Muir Test Systems, Inc. has introduced a portable interactive terminal tester.

The Model CT-300 permits full, off-line testing and exercise of intelligent and dumb terminals; serial, line and page printers; graphics printers and plotters; graphics displays and models, all without need for an external CPU.

The CT-300 weighs 8 lb and is suited for field service, depot or factory use. It operates on RS-232C, RS-422, RS-423, current loop, MIL-188C and parallel ports, a vendor spokesman said.

User-generated tests are programmed through the front panel keypad and can be stored within a battery-backed random-access memory cartridge that is provided within the CT-300 operating system, permitting development of a very wide range of test programs by the user.

Test control can be via the CT-300 keypad itself (controller-made) or can be transferred to the keyboard of the device under test (interactive mode).

In many interactive operations, bit/sec rate, parity, error bits and data bits are automatically set and can be read.

A single unit is priced at $2,795.

Muir Test Systems is located at 129 Flanders Road, Westboro, Mass. 01581.

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SCANPRT provides the general user with the capability of viewing any VM spool file owned by that user. Full screen displays of VM queues may be sorted in a variety of ways. For the spooling operator, SCANPRT provides inspection and transfer options for all queues. Direct viewing of DOS/VSE POWER queues is also provided.

PACKMAN is a disk management tool that deals with two areas normally addressed separately: space utilization and usage contention under VM. A map of free and used space combines the CMS users mini-disk utilization and guest SCP data set usage. The online display of head contention also shows position by data set name.

IGCFCNVT converts DOS/VSE ICCF library members to VM/CMS format files. It converts all, or selected members from ICCF libraries. An equivalent of the ICCF /INCLUDE function is provided. A cross reference of all member inclusions is optional.

MAPMAN utilizes DMS for CMS to expedite CICS screen design by allowing the programmer to define and format screens interactively. It then creates both the BMS macros and symbolic description maps for inclusion in the CICS source transaction. MAPMAN will also convert previously defined BMS macros to DMS/CMS format for future simplified maintenance.

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Uses IBM's BSC Protocol

Firm Unveils Conversion Device

MIAMI, Fla. — Innovative Electronics, Inc. has announced the MC-80/602 communications processor, a device that converts a general keyboard send/receive device or an asynchronous Ascii host into a full-function IBM 3277 Model 1, 2 or 3278 Model 2 terminal communicating with the IBM host using IBM's Binary Synchronous Communications protocol.

Full screen mapping is performed by the MC-80/602. Data displayed on the terminal will be the same as an IBM 3277/3278 display station, with virtual screen sizes of 480, 960 and 1,920 characters, the vendor said.

This stand-alone, self-powered communications processor provides up to 16K bytes of read-only memory, 16K bytes of random-access memory and one serial communications port. The price is $1,650.

Further information is available from Innovative Electronics, 4717 N.W. 165th St., Miami, Fla. 33014.

Micros Get Full-Page Terminals

HASTINGS, Minn. — Micro Display Systems, Inc. has announced two full-page display terminals for use with microcomputer systems.

Both terminals feature 57 lines by 80 char., high resolution, reverse video, flashing attributes, phosphor choices of black and white, green or amber, multiple protocol and a low profile keyboard, a vendor spokesman said.

The Model 202 is a full-page Ascii terminal with a personal computer-style keyboard that has 20 user-definable keys, while the Model 212 provides Digital Equipment Corp. VT100 terminal emulation.

Priced at $1,995, the terminals are available for immediate delivery from Micro Display Systems, 1310 Vermillion St., P.O. Box 455, Hastings, Minn. 55033.

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Emulator Targets Zenith Z100 At VT52, VT100

VANCOUVER, B.C. — KEA Systems Ltd. has released Zstem, a smart-terminal emulator for the Zenith Data Systems Corp. Z100 microcomputer system.

Zstem emulates a VT52 or VT100 terminal and provides parallel and serial printer support, as well as bi-directional file transfer capability. Zstem can be configured by the user to operate from 38.4K to 45.5K bit/sec, half or full duplex.

The user can also control the number of data/parity/stop bits, flow-control protocols and programmable soft keys (any key can represent any string of characters). Configurations may be saved temporarily or permanently, KEA Systems said.

The emulator is priced at $98.95 for VT52 emulation and $148.95 for VT100 emulation, according to the vendor.

More information is available from KEA Systems, Department ZCW-1, 311-811 Beach Ave., Vancouver, B.C., Canada, V6Z-2B5.

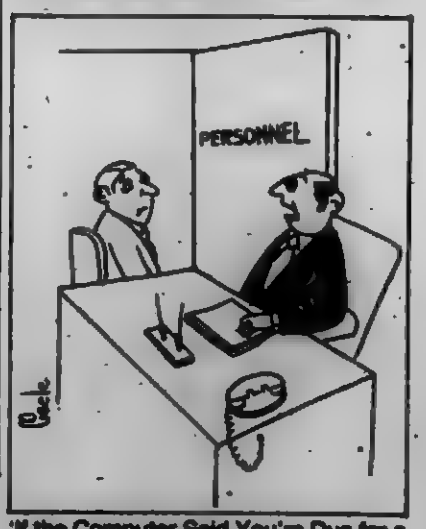
'Passport' Gets Enhancements From Datalex

SAN FRANCISCO — The Datalex Co. has announced an enhanced version of Passport, a remote communications program said to provide full-protocol file and program transfer from microcomputer to microcomputer and between micros and remote computers.

Some product features include full file transfer capability with error checking, utilization of a protocol data transfer link to the remote computer to ensure accuracy of file transfers, data transfer protection with check-sum/retransmit and by a sequence check on each packet and the transfer of both Ascii and binary files, the vendor said.

Passport operates on IBM and IBM compatibles under Microsoft Corp. MS-DOS, PC-DOS and the UCSD P-system. An asynchronous modem is required to transfer data over regular phone lines. The price is $260 each.

Further information is available from Datalex located at Suite 406, 650 Fifth St., San Francisco, Calif. 94107.



'If the Computer Said You're Due for a Raise, Let It Give It to You.'

STC Laser Printer Targets IBM Users

LOUISVILLE, Colo. — Storage Technology Corp. (STC) has unveiled the 6100 printing subsystem, a nonimpact laser printer aimed principally at users of IBM and compatible mainframes.

The 6100 uses laser technology and electrophotography. The unit is capable of printing forms, data and text at up to 103 page/min using an 8½-in. page format. The printer attaches to IBM processors via the interface used by IBM's laser printer, the 3800, STC said.

The 6100 employs a constant paper-feed rate and is not affected by line length, the number of lines or the density of lines or characters. In addition, STC contends the 6100 offers a higher print quality than high-speed impact printers.

An integrated controller allows internal modules of the 6100 to intercommunicate. In addition, a page buffer is included to hold one or more pages of information. This, STC said, allows incoming data to be printed continuously.

The 6100 printer is capable of handling single-part forms from 6½- to 16 in. wide and from 8- to 14 in. long.

The 6100 costs $195,000. The unit can be leased for $5,659/mo on a three-year plan, which includes maintenance, STC said from 2270 S. 88th St., Louisville, Colo. 80028.

Sperry's 1900/20 Out, 1900/10 Systems Get Multiprocessor Versions

BLUE BELL, Pa. — Sperry Corp. has announced a distributed processing-and-capture system, the 1900/20. At the same time, the firm announced multiprocessor configurations of its existing 1900/10 processor.

The 1900/20 offers basically the same specifications as the firm's earlier 1900/10 processor; however, it incorporates an enhanced CPU board, which includes features aimed at accessing mainframe data easier, the vendor said.

The 1900/20 reportedly features 512K bytes of main memory, 4M to 120M bytes of Winchester storage and a maximum disk capacity of 480M bytes.

Added features include an Ansi 74 Cobol compiler and a multiport communications capability. The 1900/20 can use the same 17.6M-byte fixed disk drives, 30M-byte Winchester disk drives, key stations and card readers as the earlier 1900/10. In addition, the 1900/20 operating system, 80 R1, is functionally similar to the operating environment used in the 1900/10, a Sperry spokesman said.

Ansi Cobol, based on the Ansi X3.23 1974 Cobol standard, can be implemented in less time than the earlier checkbox Cobol complier. In addition, Sperry said that 1900/20 users can take advantage of many third-party software programs by using the Ansi Cobol compiler.

Cobol jobs now running on users' mainframes can be offloaded to the 1900/20 without modification.

Existing 1900/10 systems can be converted in the field to 1900/20 systems. A typical 1900/20 system, which consists of a processor with 128K bytes of main memory, five CRT terminals, a 10½-in., 600 bit/in. tape drive and 30M-byte disk drive, costs $80,060 and is available on a five-year lease program for $2,261/mo, Sperry said.

In addition to the 1900/20, Sperry announced multiprocessor versions of its 1900/10 system. Called the 1900/32 and 1900/33, the units offer two- and three-processor configurations of the 1900/10, respectively. The 1900/32 costs $47,004, or $869/mo, on a five-year plan. To field-upgrade a 1900/10 system to the 1900/32 costs $15,600. The 1900/33 costs $58,204, or $1,082/mo, on a five-year plan. To upgrade to the 1900/33 from the 1900/32 costs $11,200, according to the vendor, which can be reached through P.O. Box 500, Blue Bell, Pa. 19424.

Sun Unveils 32-Bit Workstation

MOUNTAIN VIEW, Calif. — Sun Microsystems, Inc. has announced two 32-bit, engineering-oriented workstation/processors based on the Motorola Corp. 68000 microprocessor. The units operate under the firm's version of the Unix operating system.

Called the Sun-2 family, the units consist of deskside and rack-mountable workstations that offer dedicated computing power plus the ability to use the units in a local-area network, such as Xerox Corp.'s Ethernet.

Aimed at software development, document preparation and computer-aided design and manufacturing applications, the workstations, called Sunstations, feature local-area network communications as a standard capability.

Local-network hardware and software permit several types of resource sharing among clusters of Sunstations, such as common printer service and common modems for remote telecommunications.

The Sun-2/120 can be configured either as a network node or a self-contained, standalone system. The Sun-2/170 is a rack-mountable system intended to act as a file server equipped with a disk drive, tape drive or other peripherals, according to the vendor.

Both models use an Intel Corp. Multibus backplane, with nine slots in the Sun-2/120 and 15 slots in the Sun-2/170. A standard Sun-2/120 workstation, including a processor, 1M byte of main memory, a bit-mapped graphics display, keyboard, mouse, Ethernet interface and all software, costs $16,900. A stand-alone configuration substituting a 42M-byte formatted disk drive and a ½-in. tape unit for the Ethernet interface costs $16,300, the vendor said.

A standard Sun-2/170 workstation, including the processor, 2M bytes of main memory, Ethernet interface and software, costs $20,900, Sun Microsystems said from 2550 Garcia Ave., Mountain View, Calif. 94043.

IVY Portable Micros IBM Micro-Compatible

WILMINGTON, Mass. — IVY Microcomputer Corp. has announced the IVY 3000 series, two portable microcomputers that are reportedly fully compatible with IBM Personal Computer software. Both systems are based on the Intel Corp. 81086 microprocessor.

The IVY 3001 offers two half-height 5¼-in. diskette drives and 256K bytes of random-access memory (RAM). The IVY 3002 offers one half-height 5¼-in. diskette drive, one 10M-byte, half-height, 5¼-in. Winchester disk drive and 256K bytes of RAM. Memory is expandable to 512K bytes on both units, the vendor said.

The IVY 3001 costs $2,995, and the IVY 3002 costs $3,995, IVY Microcomputer said from 220 Ballardvale St., Wilmington, Mass. 01887.

The IVY 3001

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Inforex Data Entry System Supports Up to 24 Terminals

BURLINGTON, Mass. — Inforex, Inc. has announced Gen-V, a 32-bit data entry system that supports up to 24 terminals.

The unit is equipped with 512K bytes of standard memory, which is expandable to 2M bytes. The Gen-V can support from 10M to 120M bytes of Winchester disk storage, the vendor said.

Besides supporting up to 24 terminals, Gen-V can perform concurrent foreground and background tasks. Multifunctional terminals can be used for data entry, data management, report generation or application programming. A remote terminal capability allows remote terminals to share the same data base and programs as local terminals. Remote terminals can be operated on-line at up to 19.2K bit/sec through standard RS-232C protocols, the vendor said.

Software for the Gen-V was designed to provide integrated data entry, file management, report writing and multiple communications protocols. The software is menu driven and provides extensive on-screen Help messages. For the experienced user, menus can be bypassed with direct-access commands. The Gen-V supports both Ansi 74 Cobol and Basic. An English-like data entry language is also provided, the vendor said.

Data can be entered in either a batch or interactive mode using a check-box selection format, according to Inforex.

A typical Gen-V configuration consisting of the processor, 512K bytes of memory, a 10M-byte hard disk drive, a 1M-byte floppy disk drive and 10 terminals costs $35,000.

Inforex, a subsidiary of Datapoint Corp., is located at 186 Middlesex Tnpk., Burlington, Mass. 01803.

Mid-Size System Gets Backup From HP Drive

PALO ALTO, Calif. — A dual-density, start/stop and streaming-mode tape drive from Hewlett-Packard Co. is designed for the backup of mid-range systems with 100M to 500M bytes of on-line disk storage.

The HP 7974A is a ½-in. phase-encoded tape drive formatted with 1,600 char./in. An 800 char./in. non-return to zero inverted (NRZI) dual-density option is also available.

Using tension-arm buffering, the drive offers start/stop tape motion operating at 50 in./sec and rewinds at 200 in./sec. In streaming mode, it operates at 100 in./sec.

Other features of the HP 7974A include burst transfer rate of 160K byte/sec, start/stop time of 7.6 msec and access time of 59 msec.

The tape system costs $12,500, and the 800 NRZI format option is priced at $2,500. Further information is available from HP at 1820 Embarcadero Road, Palo Alto, Calif. 94303.

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Page Readers Announced By Compuscan

FAIRFIELD, N.J. — Compuscan, Inc. has announced the Alphaword Series 80, three modular optical character recognition page readers.

The readers were designed for desktop or pedestal use and contain a numeric keypad and a 16-character liquid crystal display. Features include friction-feed document handling and double-document detection, according to a company spokesman.

The readers reportedly can recognize the following popular typestyles: Courier 10, Courier 12, Prestige Elite, Prestige Pica, Letter Gothic and OCR-B. Each scanner supports one RS-232C-compatible, asynchronous or synchronous interface, and the scanning rates vary from 145 to 250 pages per hour.

Prices for the Series 80 begin at $12,990. More information is available from Compuscan at 81 Two Bridges Road, Fairfield, N.J. 07006.

Plessy Offers Two Systems Capable of DEC Emulation

IRVINE, Calif. — Plessey Peripheral Systems has introduced two Digital Equipment Corp. 11/23-based computer systems which feature a controller that addresses large-capacity disk drives and allows for the addition of a wide variety of storage module type devices, according to a spokesman for Plessey.

The new Models 6603 and 6703 include a Plessey-designed controller board that provides emulation of DEC's RMO2/RMO5 disk drives, the spokesman said.

Both systems are said to feature an 8-in., 67.3M-byte formatted capacity disk drive with 28.3 msec data access time.

Six communication ports are also standard, according to the spokesman.

The Model 6603 reportedly has 256K bytes of on-board memory; the Model 6703 has 512K bytes expandable to 4M bytes.

Applications for the system include those in memory-intensive markets such as data base management applications.

The Model 6603 is reportedly priced at $17,750, and the Model 6703 is priced at $19,750, in single quantities.

OEM discounts are available, and delivery is in 30 days, according to the Plessey spokesman.

More information on Model 6603 and Model 6703 is available from Plessey Peripherals, which is located at 17466 Daimler, Irvine, Calif. 92714.

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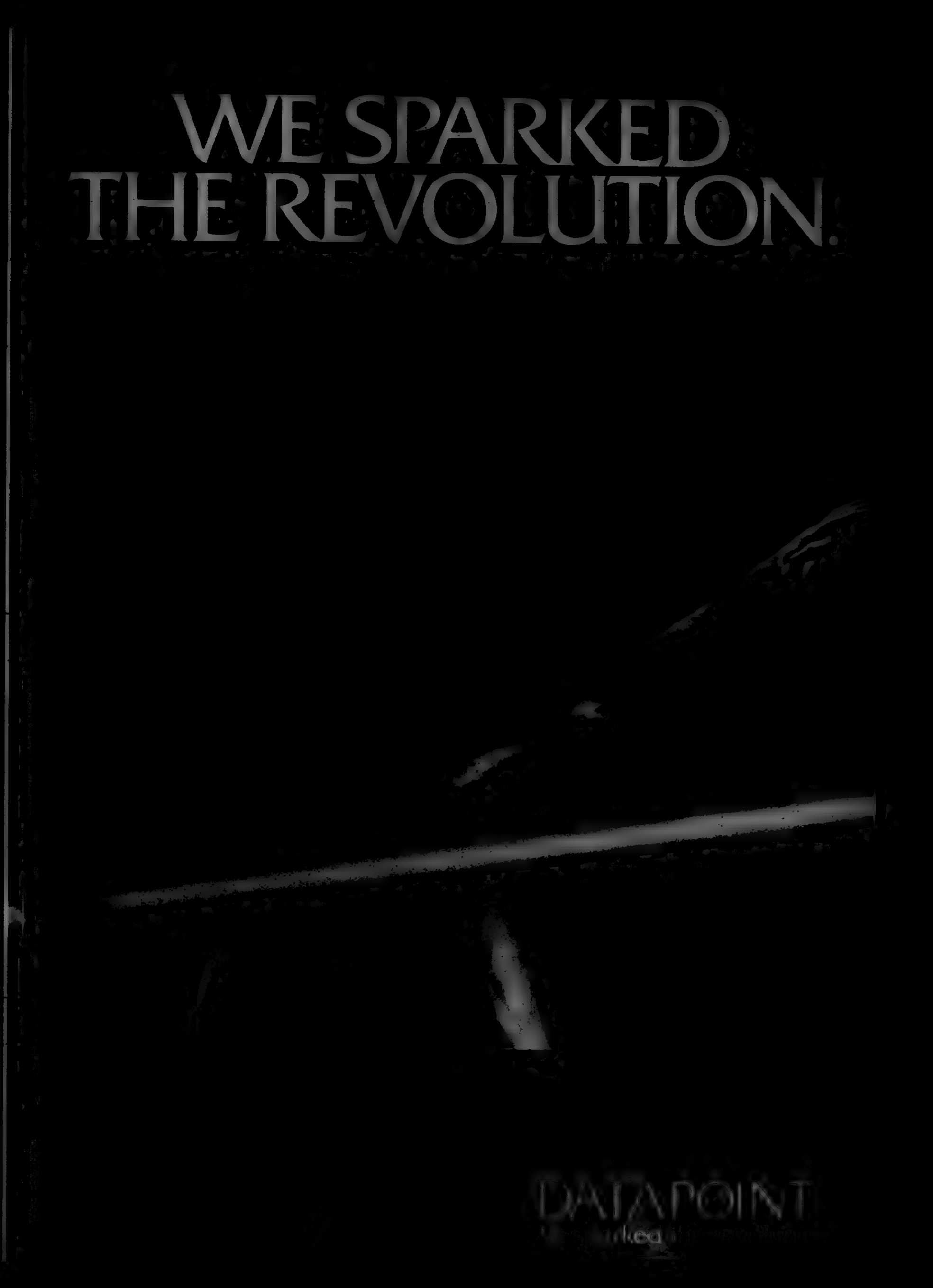

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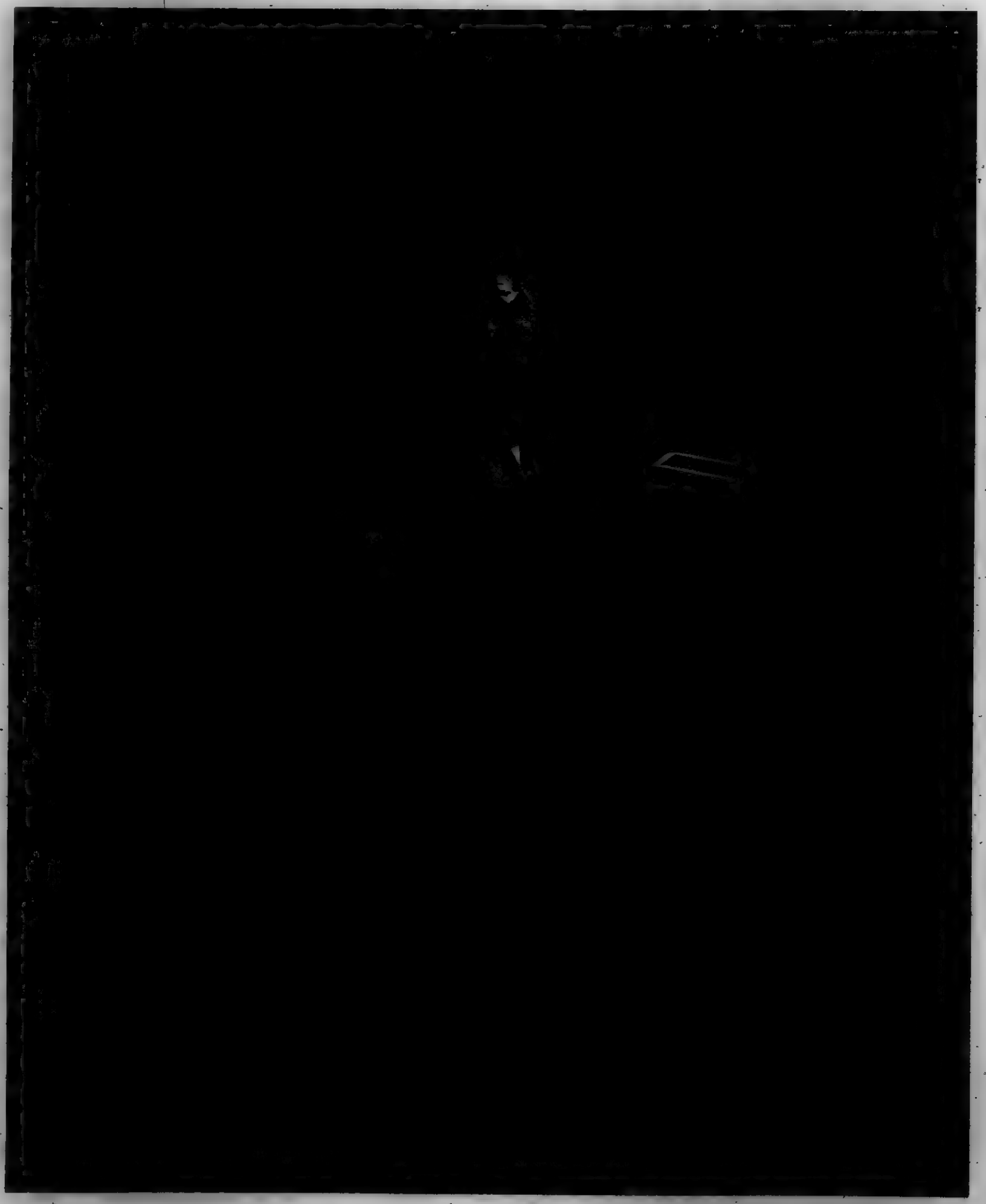

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Kaypro Beefs Up Micro Line With Two Models

SOLANA BEACH, Calif. — Kaypro Corp. has added two models, the Kaypro II Plus 88 and the Kaypro 4 Plus 88, to its line of microcomputers.

Both systems allow users to choose between 8- or 16-bit microprocessors using either Digital Research, Inc.'s CP/M or Microsoft, Inc.'s MS-DOS operating systems. The two microcomputers are equipped with Zilog, Inc. Z80 8-bit and Intel Corp. 8088 16-bit microprocessors, the vendor said.

In the 8-bit mode, the user can operate CP/M 80 programs. In addition, 8-bit users have access to a maximum of 247K bytes of random-access memory, the vendor said.

In the 16-bit mode, users can run MS-DOS programs. In addition, main memory is expanded to 247K bytes, the vendor said.

Both the Kaypro II Plus 88 and the Kaypro 4 Plus 88 are shipped with a standard package of bundled CP/M and MS-DOS operating systems. The Kaypro II Plus 88 operates with single-sided, double-density diskettes and costs about $2,000. The Kaypro 4 Plus 88 operates with double-sided, double-density diskettes and costs $2,200, from 533 Stevens Ave., Solana Beach, Calif. 92075.

Harris Disk Drive, Controller Bow

FORT LAUDERDALE, Fla. — The Computer Systems Division of Harris Corp. has announced the Harris 5360, a 406M-byte disk drive for the firm's 700, 800 and 1000 series superminicomputers. The firm also announced the 5360 Integrated Disk Controller to support the unit.

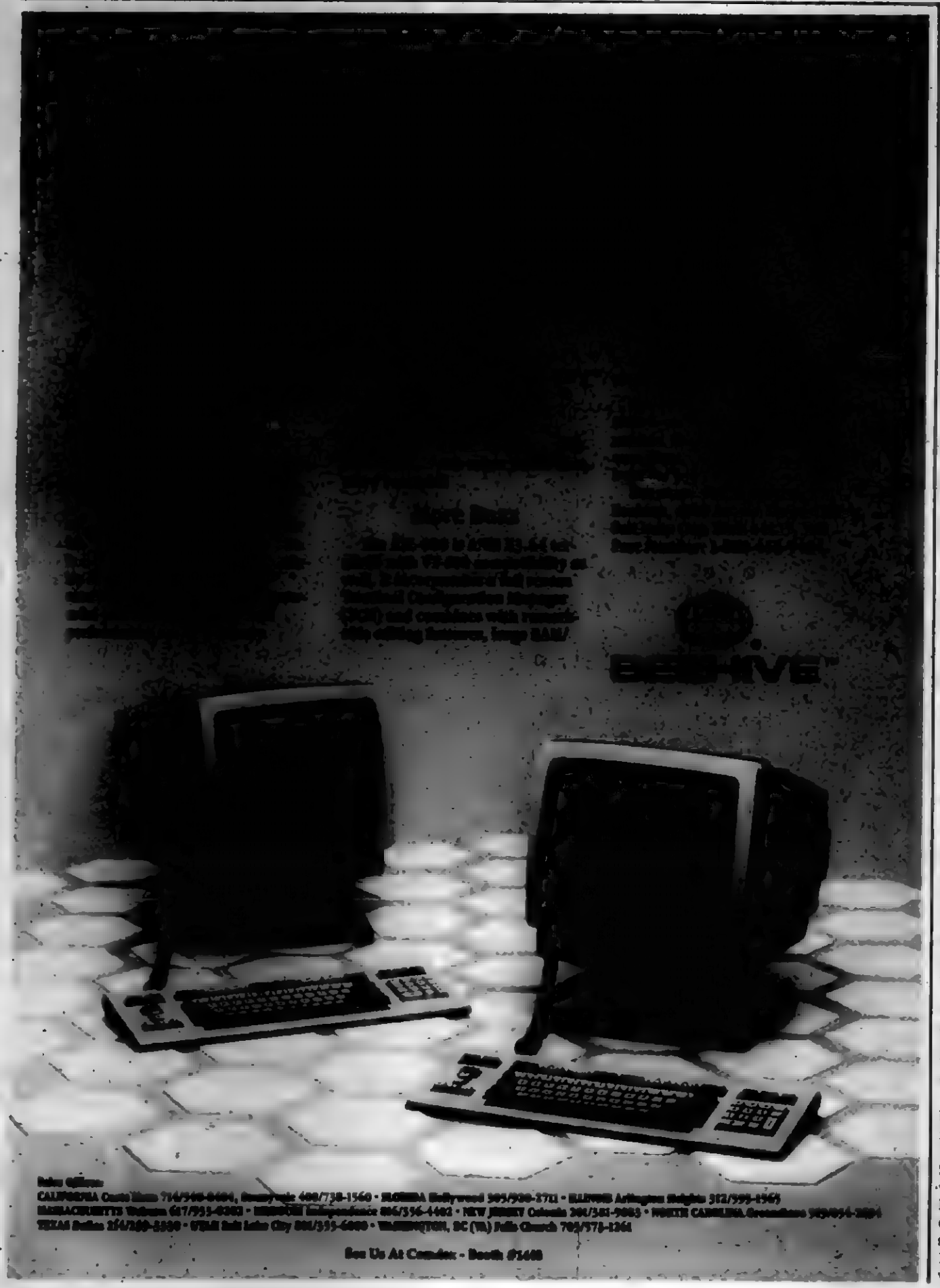
The 5360 features a 1.9M byte/sec data transfer rate and an average seek time of 18 msec. The unit reportedly offers users a 54% faster I/O speed and up to 33% faster access time over earlier Harris disk drives.

The 5360 is rack mountable in a Harris peripheral cabinet. The drives consist of a single spindle drive motor, power supply, a sealed media module, a rotary actuator and read/write heads. Each drive contains six fixed, sealed 10.5-in. platters and 10 data recording surfaces, Harris said.

The 5360 costs $19,000, according to the vendor.

The 5360 Integrated Disk Controller provides the functions required to operate the 5360 drives with Harris superminicomputers. The unit is compatible with all other Harris disk drives and can connect up to three slave disk drives. The controller also features self diagnostics. A 5360 disk unit with the Integrated Disk Controller costs $26,000, Harris said.

A cluster of four 5360 drives plus the Integrated Disk Controller costs $80,000, Harris said from 2101 W. Cypress Creek Road, Fort Lauderdale, Fla. 33309.



Firm Adds Two Micros To Series

IRVINE, Calif. — Micro Five Corp. has added two models to its Series 1000 line of 16-bit microcomputers.

The Model 1640 features 40M bytes of disk storage, a 1M-byte diskette drive, 256K bytes of main memory, six I/O ports and a 20M-byte streaming tape drive for backup. The Model 1640 costs $16,495, the vendor said.

The Model 1740 configuration is identical to the 1640 except that it offers 80M bytes of hard disk storage. The unit costs $19,995, the vendor said.

Both models are compatible with the Micro Five Series 1000 family. The Series 1000 supports Micro Five's Stardos operating system, as well as Digital Research, Inc.'s CP/M and MP/M operating systems, the vendor said. Micro Five is located at 17791 Spy Park Circle, Irvine, Calif. 92714.

Disk Cache System Available for IBM Micro

SAN JOSE, Calif. — Santa Clara Systems, Inc. has introduced a disk cache system and a line of internal hard disk drives for IBM Personal Computer users. The products can also be used as upgrades to the firm's external 5¼-in. hard disk drives.

The disk cache system, called Quick Disk, is an external add-on memory device that contains random-access memory (RAM) ranging from 128K bytes to 1M byte. When attached to an IBM Personal Computer, Quick Disk increases the speed and performance of Santa Clara Systems' personal computer network, called PCnet, and speeds up hard disk drives, the vendor said.

Quick Disk reportedly operates 120 times faster than a Winchester disk drive and 190 times faster than a floppy disk drive when performing common data transfers. The unit also features dynamic-error correction, the vendor said.

Quick Disk can be used independently as an additional data storage unit (such as for RAM disk or as a print buffer), or in combination with a floppy or Winchester as a disk cache.

Five models of Quick Disk are available. They range in price from $2,795 (128K-byte version) to $8,595 (1M-byte version), the vendor said.

The family of internal disk drives is designed for use with the IBM Personal Computer or Personal Computer XT. Offered in three configuration kits, the 3.9-in. drives fit into one of the IBM Personal Computer's floppy disk enclosures.

The three configurations available are: 6M bytes of removable media ($2,095); 6M bytes of removable storage with a 5¼-in., half-height floppy drive ($2,795); and 6M bytes each of removable and fixed storage ($2,995), the vendor said.

Upgrade kits that allow an internal single-drive unit to be converted into a dual-drive system are also available. An additional drive, new cabling and brackets are supplied. A half-height floppy upgrade is $905, and a 6M-byte fixed upgrade is $1,295, the vendor said.

The 6M-byte, removable cartridges are not interchangeable with the lower-capacity units. Users can upgrade existing units to the new storage capacities by purchasing a new disk controller for $475, the vendor said.

The higher capacity, 5¼-in. drives cost from $2,295 to $5,056, the vendor said.

More information is available from Santa Clara Systems at 1860 Hartog Drive, San Jose, Calif. 95131.

Printer Said To Utilize Four Links

SCOTTSDALE, Ariz. — Blue Chip Electronics, Inc. has announced the Model BCD-4015, which the company described as a 40-char./sec 132-col., high-resolution impact printer.

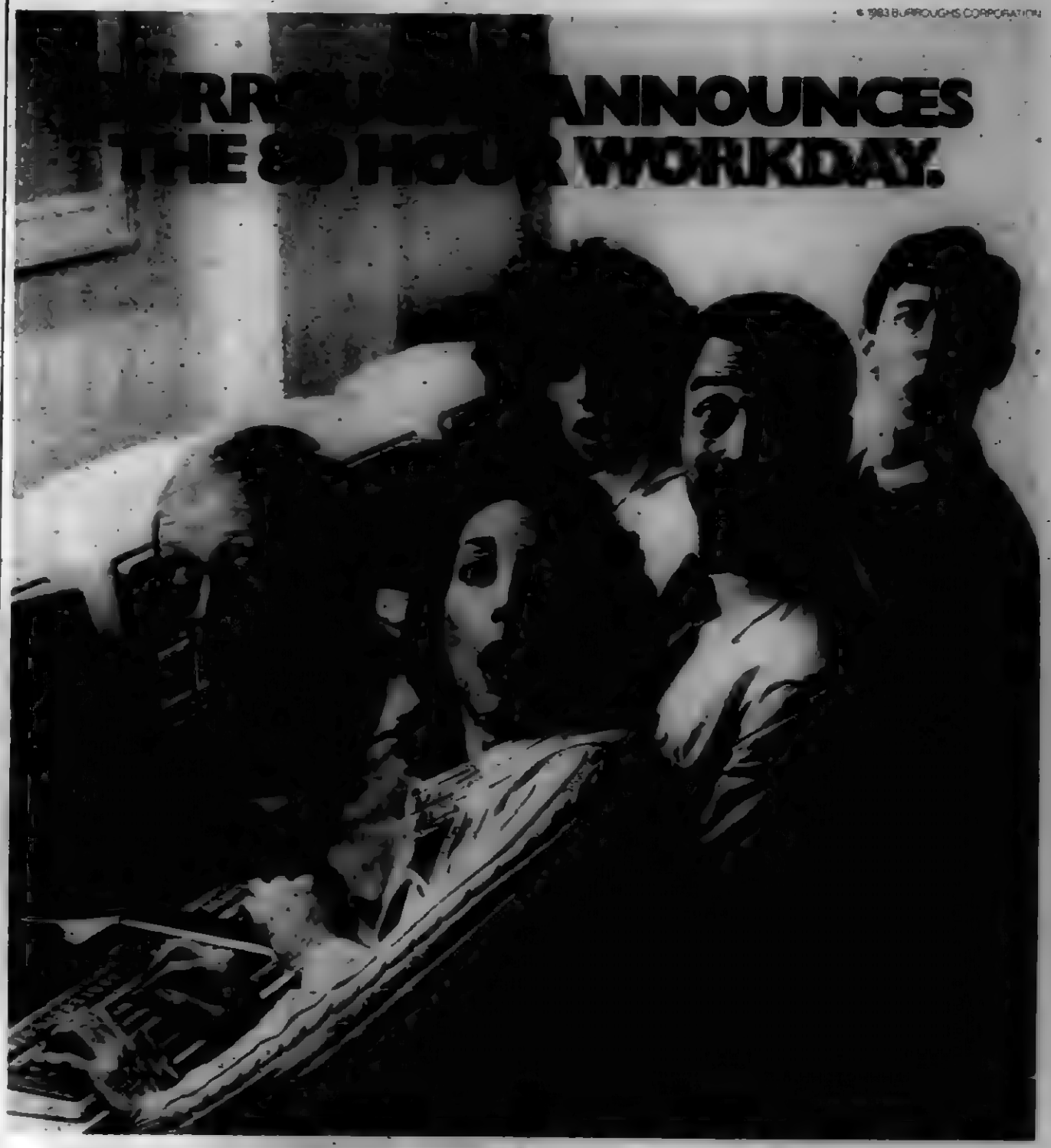
According to a vendor spokesman, the printer is compatible with all currently available microcomputers using interfaces offered with the BCD-4015. It is said to print 10 or 12 char./in. and is software controlled for standard word processing commands.

A daisywheel mechanism operates in a logic-seeking, bidirectional mode, printing on standard office stationery or fanfold paper, the vendor said.

The Model BCD-4015 operates on full-duplex asynchronous communications lines and includes a universal power supply. A tractor feed is included with the printer, which accommodates paper from 80 col. to 132 col. (5 to 15 in.) wide.

Four interfaces are available for use with the printer, including the Centronics Data Computer Corp. 8-bit parallel interface (supplied as standard equipment), a serial RS-232C interface, an IBM Personal Computer interface and an IEEE-488 interface, the vendor said.

The printer is available for $1,895 from Blue Chip Electronics, 7406 E. Butherus Drive, Scottsdale, Ariz. 85260.



Thanks to an ingenious productivity tool from Burroughs called the Logic and Information Network Compiler, or LINC, computer programmers can now increase their productivity as much as 10 times! (In some cases, even more.)

It's like getting an extra 72 hours of work in a day.

How is this possible?

The LINC software system automatically writes virtually all the coding programmers would have to do manually so it drastically reduces the time it takes to develop and implement even complex application systems. (It also simplifies program maintenance.)

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Falcon Offers Hard Disk Systems for IBM Micro

KENT, Wash. — Falcon Technology, Inc. has introduced a series of hard disk systems for the IBM Personal Computer.

In addition to providing either 10M or 15M bytes of mass storage, the series includes a serial port, a clock/calendar, sockets for as much as 192K bytes of additional system random-access memory and software backup utilities.

The hard disk controller, together with the added functions, occupies one system expansion slot.

The vendor has developed a proprietary circuit design that can continuously transfer data between the computer and the disk at the maximum speed of the drive. The systems can read 1M bytes from the disk in three seconds.

The Falcon Personal Computer Extender systems allow users to load programs and data 10 times faster than floppy disk-based systems, the company said. A 15M-byte extender drive provides about the same online storage as 45 floppy disks.

To resist damage from contaminants and head crashes, the systems have a thin-film plated medium, which is harder than conventional oxide coatings.

The RS-232 serial port is compatible with IBM's Asynchronous Communications Adapter. A single switch configures the port as either COM1 or COM2. Pin configuration selections can be made for direct connection to a modem, as is the case with the IBM card, or for direct connection to a printer.

For users who require additional system memory, sockets are provided for as much as 192K bytes of random-access memory. Cards accept standard 64K-byte random-access memory chips.

The Falcon Personal Computer Extender 10M-byte drive, designed to be mounted in an IBM chassis, is $2,295. The 15M-byte version is $2,595.

When mounted in a Falcon case, the 10M-byte drive is $2,495, and the 15M-byte drive is $2,795. A second 10M-byte drive in a Falcon case can be added for $1,595; the 15M-byte drive is $1895.

More information is available from the vendor at Suite T-101, 6644 S. 196th St., Kent, Wash. 98032.

SMD-Compatible Drive Out From Century Data Systems

ANAHEIM, Calif. — Century Data Systems, a subsidiary of Xerox Corp., has introduced a storage module drive (SMD)-compatible, 571M-byte, 14-in. Winchester disk drive.

According to the vendor, the AMS 571 was designed for high-performance and high-capacity storage. It combines 32K byte/track with a five-disk platter configuration. It utilizes 19 thin-film data heads capable of reading 10K bit/in.

Other features of the AMS 571 are a contamination-controlled disk compartment, a ventilated spindle for rapid temperature balancing of the disks and a dedicated landing zone.

Optional cabinets to stack two AMS 571s in a 25½-in. cabinet, or three AMS 571s in a 36-in. cabinet, allow up to 1.7G bytes of storage capacity, the company said.

In quantities of 200, the unit is priced at $8,400, which includes a basic drive, power supply, desktop enclosure and SMD interface.

More information is available from the vendor at 1270 N. Kraemer Blvd., Anaheim, Calif. 92806.

Tape Subsystems Enhanced For CDC CPUs

DENVER — Delta Systems, Inc. has announced that it is incorporating Storage Technology Corp.'s (STC) tape controllers and drives into its tape subsystems. The subsystems were designed for use with most Control Data Corp. mainframes.

The vendor's HP/T tape subsystem attaches directly to CDC channel interfaces and uses standard CDC software. The unit can also be simultaneously shared among CDC mainframes and other vendors. The vendor claims to be the first to offer STC peripherals to users of CDC mainframes.

Features of the tape subsystems include tri-density operation in a single drive, multimainframe operation, on-line diagnostics and standard 60Hz power. File transfer between CDC and IBM processors is also available, as are tape speeds from 75 to 200 in./sec. Various maintenance plans are offered either through on-site personnel or a remote diagnostic center, the vendor said.

A minimum subsystem consisting of an adapter, controller and two 125 in./sec drives costs about $90,000. More information is available from Delta Systems at 6060 W. 91st Ave., Westminster, Colo. 80030.

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Single-Bin Sheet Feeder Fits Printers, Typewriters

MERIDEN, Conn. — LQ Corp. has announced a single-bin sheet feeder designed to fit daisywheel printers, dot matrix printers and electronic typewriters used as output devices on business/personal microcomputers and other information processing systems.

The A100 automatically feeds, stacks and collates letterhead and other cut sheet paper during the printing process. A gear mounted on the printer platen shaft synchronizes the feeder to insert a fresh sheet for every 15 in. of platen motion.

Priced at $595, the A100 is available immediately for use with the following printers: NEC's 3500 and 2050 series, Computers International's Daisywriter 2000 and C. Itoh Electronics, Inc.'s F-10. The company expects the A100 to be available for other models, including the Digital Equipment Corp. LA-100, Qume Corp. Sprint 11, Diablo Systems, Inc. 620, 630 and Ricoh, Inc. 1300, by the end of the year. The company also said it can adapt the sheet feeder to other printers as well.

Further information is available from LQ at 180 Research Pkwy., Meriden, Conn. 06450.

Firm Adds to Cadmax Line

BALTIMORE — Vector Automation, Inc. has announced an entry-level two-dimensional computer-aided design and manufacturing system.

Cadmax-M is the newest member of the Cadmax family line and is said to use the same basic software as the more powerful Cadmax-II product and support most of the same options. Cadmax-M is priced at $39,500.

Cadmax-M is less expensive than Cadmax-II because it includes only a single minicomputer, a smaller workstation with separate display, keyboard and tablet assemblies, a 10M-byte disk and a floppy disk for archival storage, the vendor said. The Cadmax-M includes the same high-resolution Vector refresh display as the Cadmax-II.

Both Cadmax-M and Cadmax-II workstations reportedly can be mixed in a network that allows each operator to share data and output devices in the network. Vector Automation is located at Village of Cross Keys, Baltimore, Md. 21210.

Company Aims Tape Product At IBM Series/1

DENVILLE, N.J. — Ultimate Computer Services, Inc. (UCS) has introduced Tapesaver (USC 969 Cartridge Tape System), a method for IBM Series/1 users to store and retrieve data on ¼-in. magnetic tape cartridges.

Available in two models, Tapesaver/1 operates at speeds up to 30 in./sec (17,500 byte/sec) enabling the user to copy 67M bytes of data (capacity of one 600-ft cartridge) in one hour, while Tapesaver/2 operates at 60 in./sec (35,000 byte/sec) for copying the same amount of data in half the time, the vendor said.

For data retrieval, Tapesaver/1 can operate fast-forward or reverse at 60 in./sec and Tapesaver/2 at 90 in./sec.

Other features include high data integrity, single-bit correction, automatic error retry, automatic self-diagnostics with each tape load, write data verification and extensive log-out capabilities.

The system consists of a cartridge tape drive, controller, power supply and a single board attachment card that fits into one I/O slot on any IBM Series/1. The Tapesaver unit mounts into the IBM 4997 rack enclosure.

Tapesaver/1 costs $6,600; Tapesaver/2 lists for $6,800.

Further information is available from UCS, 30 Broad St., Denville, N.J. 07834.

MPI Introduces Portable Printer For Micro Users

SALT LAKE CITY, Utah — Micro Peripherals, Inc. (MPI) has introduced Sprinter, a portable printer designed to meet the needs of the portable computer user.

A 180-col., 160 char./sec dot matrix printer, Sprinter's standard features include an IBM Personal Computer-compatible parallel port, high-speed space skip-over, five character sets including correspondence quality, built-in friction and tractor feed mechanisms, user-programmable character design, 4K-bit buffer and full graphics capability.

Options include data buffers up to 68K bits equaling 34 pages, IEEE 488 interface, RS-232 interface and MPI's Softswitch keypad with battery backed-up random-access memory.

The data buffers for print spooling incorporate data compression buffer management, which is dynamically allocated for down-line character set loading. The standard buffer memory size is 4K bits, with options available for 20K-, 36K- and 68K bits.

Sprinter costs $795 from MPI at 4426 S. Century Drive, Salt Lake City, Utah 84107.

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Winchester Disk Drive Fits Micros

SCOTTS VALLEY, Calif. — Seagate Technology, Inc. has announced the ST212, a single-platter, 12M-byte, 5¼-in. Winchester disk drive for portable computers and desktop systems.

The company said the half-height drive incorporates ferrite read/write heads. The unit is configured with one oxide-coated disk and four read/write heads, each of which addresses 306 cylinders. The drive is said to be hardware and software compatible with Seagate's ST412 rigid disk drive.

The ST212 is said to operate at an average access time of 64 msec using a conventional stepper-motor-driven actuator. The drive has a total of 612 tracks per surface divided into two 306-cylinder bands. It will be available in early 1984 for $1,265 from Seagate Technology, 920 Disc Drive, Scotts Valley, Calif. 95066.

Mark Series Processors Out as Complete System

IRVINE, Calif. — Point 4 Data Corp. has announced its Mark Series multiuser, small business computers are now available in complete system packages.

The Mark Series processors packaged as complete systems include the Mark 2T, Mark 3, Mark 5, Mark 8 and Mark 9. The company describes Model Mark 2T as Point 4's entry-level tabletop model. The Mark 3 is a system for up to seven users, and the Mark 5 supports more than 32 users. The Mark 8 can support more than 64 users, and the Mark 9 is the firm's top-of-the-line model. The Mark 3, 5, 8 and 9 can be packaged in either a 30-in.-high or a 42-in.-high cabinet, the vendor said.

The packaged systems are priced between $16,400 and $30,000 from Point 4 Data, which is located at 2569 McCabe Way, Irvine, Calif. 92714.

Microform Primer Offered

BETHESDA, Md. — The International Information Management Congress (IMC) is offering a booklet entitled "How to Choose and Use a Microform Reader."

Available in English and French, the publication is a primer on the fundamentals of micrographics, including microfilm formats, roll microfilm and unitized microforms.

Publication IMC-137E (English) or IMC-137F (French) costs $6 from IMC, Publications Sales, P.O. Box 34404, Bethesda, Md. 20817.

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Handles every facet of accounts payable—from invoicing through issuance of checks. Various management reports provide up-to-date information on all payables plus complete audit trails. Cash requirement reports help you set payment priorities and take advantage of cash discounts. New features allow you to: take a discount amount after discount date; select a single batch of vouchers for updating to open payables file; and report status of every vendor on a vendor analysis report. Multiple line distribution for up to 19 accounts. Processing of multiple accounting periods. Automatic discount option. System flags vouchers for payment.

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TI Expands Memory of 600A, 300 Series Systems

AUSTIN, Texas — Texas Instruments, Inc. has announced versions of its 600A and 300 series small business systems that feature expanded memory systems. In addition, the 300 series has been equipped with an Electronics Industries Association (EIA)-to-fiber-optic converter.

Designed for small businesses or branch offices of large corporations that require local processing and communications with a corporate data base, the Business System 352 features a single workstation with integral processor, disk controller and 256K bytes of error-correcting memory.

Also included is the WD500A mass storage subsystem. The WD500A consists of a 5¼-in. Winchester disk with 17M bytes of formatted storage and an 8-in. floppy disk drive with 1.2M bytes of formatted storage, the vendor said.

The operating system for the 352 is TI's DX10 3.6. The languages supported include Cobol, Fortran, Pascal and Basic. Utilities include a sort/merge feature, a data base management package and a data dictionary. The unit supports IBM 2780/3780 communications terminals. The IBM 3270 CRT terminal communications package is also supported on the 352, the vendor said.

Main memory on the 352 can be expanded to 512K bytes. Host communications and/or workstation expansion can be accomplished through the two-channel synchronous/asynchronous interface. Additional workstation interface ports can be provided with a four-channel asynchronous interface. A variety of printer products can also be supported by the 352, TI said.

The Business System 352 costs $9,995, the vendor said.

The mass storage capacity of packaged systems in the Business System 600A series ranges from 18M bytes to 126M bytes. Each 1M-byte 600A includes a Model 931 video display terminal with EIA or fiber-optic transmission capabilities.

All languages, communications packages and utilities supported under TI's DX10 and Dnos operating systems on the current 600A series will be supported on the 1M-byte version, the vendor said.

Prices for the 1M-byte version of the Business System 600A, which will be available in January, range from $28,400 to $47,100.

The EIA-to-fiber-optic converter allows fiber optics to be used with EIA versions of TI's video display terminals, as well as with communications boards that do not have fiber-optic interfaces. The converter can either accept standard RS-232C signals and convert them to optical outputs or accept optical signals and convert them to RS-232C outputs.

The converter supports asynchronous full-duplex communications at standard rates of up to 38.4K bit/sec and operates at distances of up to 1,000 meters from the host computer, the vendor said.

The EIA-to-fiber-optic converter kit, consisting of the converter and a power transformer, is available for $350. More information is available from TI through P.O. Box 402430, Dallas, Texas 75240.

Memorex Offers Disk Subsystem For IBM Users

SANTA CLARA, Calif. — Memorex Corp. has announced the 3695 disk subsystem. The unit is compatible with IBM's 3375 disk drives.

The unit includes the 3695 disk storage module, the 3697 disk storage and primary controller module and the 3698 disk storage and alternate controller module.

The vendor's 3695 disk storage module contains one head disk assembly with a horizontal-axis spindle. The head disk assembly provides 819.7M bytes of data storage and is accessed by two independent actuators. Each actuator can access half, or 409.9M bytes, of the data storage space, the vendor said.

The horizontal axis of the head disk assembly allows a single motor to drive both the spindle and the air flow system. This, the vendor said, generates less heat and consumes less power than the IBM equivalent. In addition, the 3695 subsystem employs integrated large-scale integration circuitry, the vendor said.

The 3697 primary control unit contains all the interface, power sequencing and control circuits necessary to attach the subsystem to a Memorex 3888 storage control unit or an IBM 3880 control unit. The 3697 also contains a head disk assembly that provides data storage space equal to that of the 3695, the vendor said. The units offer a data transfer rate of 1.86M bytes per second and an average access time of 19 msec.

The 3695 disk storage module costs $28,770 and leases for $808 per month. The 3697 disk storage and primary controller module cost $38,040 and lease for $1,003. The 3698 disk storage and alternate controller module costs $36,290 and leases for $958/mo. All prices exclude maintenance, and lease prices are for 36-month leases.

More information is available from Memorex at San Tomas at Central Expwy., Santa Clara, Calif. 95052.

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Epson Offers QX-10 Promo

TORRANCE, Calif. — Epson America, Inc. has announced a packaged system configuration of its QX-10 personal computer with Valdocs (1.18) CP/M, the newly released RX-80 F/T dot matrix printer and a printer cable for the price of the QX-10 alone, $2,995.

The QX-10 was designed for users with no previous computer experience. It includes word processing, graphics, calculations, scheduling and electronic mail. The newest version of Valdocs has new features including variable line spacing, underlining, terminal emulation to run CP/M software and more help from the Help button.

The RX-80 F/T, the vendor's newest printer, features friction and tractor feed and 100 char./sec printing, in addition to the other capabilities of the RX-80 model.

Customers may substitute Epson's MX-80 F/T printer for the RX-80 F/T for an additional $100, according to the vendor.

More information is available from the vendor at 3415 Kashiwa St., Torrance, Calif. 90505.

Ufonic Voice Synthesizer Designed for Apple Micros

ARLINGTON HEIGHTS, Ill. — Borg-Warner Educational Systems has announced the Ufonic voice system, said to be a human-sounding voice synthesizer designed for use with Apple Computer, Inc.'s Apple II and IIe microcomputers.

The system reportedly consists of a single interface card, which will fit into any available slot in the Apple, and a small amplifier/speaker unit, which fits on top of the Apple disk drive. No additional hardware is required, and the system reportedly operates on a single disk drive.

Initial software for the Ufonic voice system offers a program that allows users to include voice in programs they write themselves.

The Ufonic voice system is priced at $495, according to the vendor. Borg-Warner Educational Systems is located at 600 W. University Drive, Arlington Heights, Ill. 60004.

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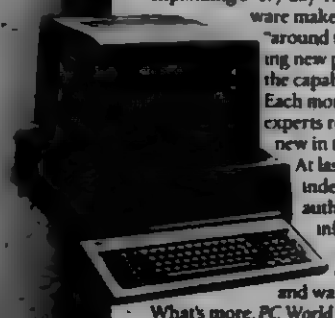

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Security System Unveiled

CHATSWORTH, Calif. — Cardkey Systems, Inc. has announced a programmable access security system designed to control and record all entry and exit privileges within any facility as well as monitor for any alarm or environmental conditions.

The Pass-3000 is able to monitor up to 10,000 card holders within its network of up to 64 reader/terminals. It consists of an operator control console housing the central processor, a Winchester drive, floppy disk drive, a video display terminal and a report/alarm printer.

The Pass-3000 system is programmed to read two personalized five-digit codes that are contained within each of its security cards. The system then records the time, card number and reader/terminal number on the card and compares it with data stored in the memory.

If the information is authorized, access is permitted; if it is not, entry is denied, and an alert appears on the dialogue printer. Pass-3000 also allows the user to limit access to various parts of a facility, as well as monitor various alarms.

The Cardkey Pass-3000 is priced in the $30,000 range. More information is available from the vendor at 20660 Bahama St., Chatsworth, Calif. 91311.

Diebold Releases MPS-1030

CANTON, Ohio — Diebold, Inc. has introduced the MPS-1030 modular proprietary security system with integrated security and data management facilities.

Basic components of the MPS-1030 include a central console, intelligent remote units and alarm sensing and activating devices. Two-way communication between the system's remote units and the central console is said to provide dedicated monitoring and control of security-sensitive points in a single building or in a network of facilities. The system is designed to alert console operators continuously of faults, operational mode changes, requests for data alarm conditions and detailed information on the status of operations at every point in the network, the company added.

The MPS-1030's data management module provides storage, control and display of security system reporting, operational procedures and management control information; it also offers a management report generating capability.

MPS-1030 messages are monitored and recorded for later retrieval. They can be searched, sorted and reviewed over the system's dedicated CRT and selectively printed for management reports. Any selected floor plans or alarm areas monitored by the MPS-1030 can also be displayed.

The MPS-1030 security and data management system can be operated over a variety of communications lines, the company said.

Diebold is located at 818 Mulberry Road S.E., Canton, Ohio 44707.

Printer Buffer Offered

NEW YORK — The Alien Group has announced the availability of a printer buffer that allows its contents to be viewed on a standard monitor.

Text throughout the Sprinter's 62K-byte memory reportedly can be rapidly accessed, allowing users to see any portion of a printout on the monitor instead of waiting for hard copy. A 12-button keypad features bidirectional scrolling, as well as the ability to jump between numerous tab points set by the user.

The Sprinter is made of heavy-gauge steel on which a monitor can be placed. It comes in both serial and parallel versions and reportedly works with any computer that drives a standard printer. The Sprinter requires no modification to the host's program and costs $550, a spokesman said. The Alien Group is located at 27 W. 23rd St., New York, N.Y. 10010.

Theft Protection System Out

LOWELL, Mass. — Stajer Corp. has developed and patented a computer protection security system said to protect microcomputers and computer peripherals from theft.

Equipment Guard CP looks like a standard multiple outlet electrical strip, but actually contains a dual theft detection security system, the vendor said. The first level of protection is located in the ac receptacles, activating an alarm if the computer's power cord is removed from the receptacle. The second level of detection reportedly is provided by special cables that attach to the peripherals and/or the microcomputer. Another alarm will sound if the cable is cut or removed. However, authorized individuals are permitted to move equipment freely.

For remote annunciation and 24-hour protection, the Equipment Guard CP is said to interface with existing central alarm systems. All units are engineered with voltage surge suppression to protect the computer against damaging ac line surges and spikes, the vendor said.

Depending upon volume purchased, Equipment Guard CP ranges in price from $126.50 to $165.50, a spokesman said. Stajer can be reached through P.O. Box 1171, Foot of John St., Lowell, Mass. 01853.

Tape Transport Ties Minis

MONROVIA, Calif. — The Kennedy Co. has announced the Model 9400 nine-track, group-code-recording tape transport that is said to provide connection to host minicomputers with Storage Technology Corp., Telex Corp. and Pertec Computer Corp. interfaces.

According to the company, the tri-density Model 9400 has a 6,250 bit/in. data density, with an unformatted capacity of 180M bytes on a 10.5-in. reel of tape. It operates at 1,600 bit/in. using phase encoding and at 800 bit/in. using nonreturn-to-zero encoding, the vendor said.

The Model 9400 is said to incorporate microprocessor-controlled diagnostics.

The transport also incorporates an RS-232 port, which allows remote diagnostics via telephone lines, the vendor said.

It is said to offer multiple processors that separate data handling and control functions.

Its analog-read chain features automatic gain-control and threshold circuits to establish the data envelope and compensate for read-amplitude variations caused by head and tape wear or differing media characteristics, the vendor said.

The Model 9400 is priced at $12,000 from Kennedy, located at 1600 Shamrock Ave., Monrovia, Calif. 91016.

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Boasts Adaptive Access Method

Local-Area Net Combines Coaxial, Fiber

WAKEFIELD, Mass. — Applitek Corp. has introduced a local-area network said to feature a 10M bit/sec data transmission speed over either broadband or baseband coaxial or fiber-optic cable connections.

The foundation of the local net is the company's Unilink network access protocol that is said to allow an "adaptive message division multiple access" method, the vendor said. This access method operates in both contention and dedicated modes with variable and fixed message lengths.

Unilink is also said to provide the quick access of carrier-sense multiple access with collision detect (CSMA/CD) systems when the network is lightly loaded with terminal-type traffic, as well as the guaranteed access of token-passing systems when traffic load increases or intelligent synchronous devices are added.

By sensing traffic and the data transmission characteristics (asynchronous, synchronous) of devices on the network, Unilink is said to provide the minimum response time for each user. It allows fixed-length packets so the network can perform like the variations of slotted time division multiple access.

Unilan from Applitek

Unilan's network interface unit, called the NI10/T, links to network devices, such as terminals, workstations, computers and printers. The design of the network interface follows the seven layers of the International Standards Organization's Open Systems Interconnect reference model.

The interface unit can operate on baseband or broadband coaxial cable or optical fiber cable, according to a vendor spokesman.

The media access unit module of the NI10/T connects the interface unit to the cable. With the appropriate media access unit, either a baseband transceiver or an optical fiber tap can connect user devices to commonly used networking cables.

Any IEEE 802-compatible baseband transceiver can be used to connect to baseband coaxial cable, the vendor claimed. It operates at a data rate of 10M bit/sec.

Deliveries of the Unilan are expected in the fall. A system supporting 200 terminals, 25 network interfaces and software will cost approximately $150,000. More information is available from Applitek at 107 Audubon Road, Wakefield, Mass. 01880.

Role of Politics Cited in WP Intro to MIS

By David Myers
CW New York Bureau

NEW YORK — The introduction of word processing in a management information systems (MIS) department demands policies and politics, not just choosing the right equipment, Association of Computing Machinery conference attendees here learned last week.

Jean A. Green-Dorsey, deputy MIS director for the New York City government, urged her fellow MIS directors to take control of all their organization's computer buying decisions and to learn negotiating skills.

"Negotiations between different departments [within the organization] must occur if you are to have a truly integrated system," Green-Dorsey said.

In another talk at the same meeting, consultant Joe Ramellini of Office Sciences Corp. agreed it was no longer enough for MIS directors to have a deep knowledge of systems.

They must also know their company's business and how to get things done within their organizations, he said.

Ramellini said the extension of an MIS director's responsibilities to include word processing forced additional responsibility upon the director for indexing all of the information within the system, for networking, for system standards and for the training of system users.

'Increasing responsibility will transform the MIS director into a politician ... if MIS directors fail to take on the new tasks, someone else will — and will advance as a result.'

Ramellini insisted that these new problems will be "driven by business issues, not systems issues, not technological issues." The limitation of vendors' ability to produce goods limits standardization at present, he said.

This means that someone within the user organization must assume the burden of setting standards for the system, Ramellini pointed out.

Increasing responsibility will transform the MIS director into a politician. Ramellini suggested MIS directors become adept at office politics.

"Any time you get three people involved in something, you've got politics. They're inescapable," he said.

Shouldering these new responsibilities is "a pretty tall order," Ramellini granted, but he went on to say that if MIS directors fail to take on the new tasks, someone else will — and will advance as a result.

"You must adapt and change, or be swept away," Ramellini advised the listening MIS directors.

Green-Dorsey told the tangled story of setting up New York's first MIS center less than three years ago.

"We committed all the errors of office automation. The users were not involved in the choice of equipment. There was no training plan.

"They were going to put the CPU in the engineering building and have an engineer just turn it on in the morning," Green-Dorsey laughed.

But the experience taught her some valuable lessons that other MIS directors could benefit from, she said.

As a newly hired manager who sometimes had to instruct her superiors, Green-Dorsey said she had to tell herself "every morning, 'I must appear credible, I must appear credible.'"

She insisted that all purchasing decisions on computer equipment be coordinated by the city's MIS department, she said.

"We've made it a requirement that all equipment be compatible. But we are not inflexible as an MIS group," Green-Dorsey declared, saying the city owns two Apple Computer, Inc. machines for engineers who work separately and whose information is not needed by the rest of the system.

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IBM Shuttles Execs to Make Peace With CDLA

By Jake Kirchner
CW Washington Bureau

HILTON HEAD, S.C. — IBM shuttled several high-level executives into and out of this island resort late last month to try to smooth the relationship between the computer giant and its largest customer, the combined companies of the Computer Dealers and Lessors Association (CDLA).

While IBM has always had the power to make or break many CDLA members through the firm's lease and sale policies, the uneasy relationship between the two has grown more nettlesome since early 1981, when IBM set up — in partnership with Merrill, Lynch, Pierce, Fenner & Smith, Inc. and Metropolitan Life Insurance Co. — its own leasing subsidiary, IBM Credit Corp. (ICC) in direct competition with CDLA firms.

'IBM Credit Corp. . . . has no hidden agendas . . . no Machiavellian design. . . . We expect to be competitive; we expect to be fair and ethical. . . . Sometimes we will win; sometimes you will win.' — David A. Finley, president IBM Credit Corp.

Addressing the CDLA fall meeting here late last month, ICC President David A. Finley sought, through a combination of candor concerning the firm's competitive drive in general and good-humored reticence about ICC plans in detail, to assure CDLA members they have nothing more to fear from ICC than from any other powerful, well-heeled competitor.

ICC, Finley claimed, has "no hidden agendas . . . no Machiavellian design. . . . We expect to be competitive; we expect to be fair and ethical." In sum, he said, "Sometimes we will win; sometimes you will win." In the end, however, IBM's actions spoke louder than ICC's words in demonstrating IBM's desire to compete peaceably with the CDLA.

Several hours after Finley's appearance, IBM flew in a high-ranking executive from company headquarters to resolve with CDLA a months-long dispute between the two over IBM's decision to insist on payment for its equipment upon installation. Prior to June, payment was due 30 days after installation.

Besides the difficulties that new policy could have caused dealers trying to wrap up paperwork from clients, vendors and financial backers in multi-million dollar deals, association members conceded that

(Continued on Page 100)

TI Home Computer Cast Off in Light Of Financial Loss

DALLAS — Moving to limit the financial drain on its overall operations, Texas Instruments, Inc. cast off its sagging home computer operations recently, following continued losses in its consumer group.

The company announced a continuation of a nine-month slide with third-quarter losses of $110.8 million, compared with earnings of $36.9 million for the same quarter one year ago. However, the losses for the third quarter reflect a one-time charge of $330 million for getting out of the home computer business, partially offset by tax credits of $227 million. The company said it would continue to manufacture its Professional Computer, a microcomputer at the higher end of the market.

Third-quarter results brought the company's losses for the nine months ended Sept. 30 to $222.9 million and the potential for a fiscal year loss of up to $5 per share, according to one analyst. Despite large price cuts and rebates, sale of the TI 99/4A continued, according to the company.

The company's total sales were down

(Continued on Page 102)

CDC Inks Pacts With Retailers To Sell Drives for IBM Micros

MINNEAPOLIS — Control Data Corp. recently announced its entry into the retail market by signing nonexclusive agreements with Sears, Roebuck and Co. and Computerland Corp. to sell CDC disk drives for IBM and compatible microcomputers.

The two retail organizations will stock and sell CDC's Storagemaster disk drives to users of IBM Personal Computers and compatible microcomputers. The first product of the Storagemaster line is the model 409, a full-height, 5¼-in. flexible disk drive, a CDC spokesman said.

The unit reportedly stores up to 320K bytes, or up to 360K bytes with IBM's DOS 2.0 operating software, on a double-sided floppy diskette. The units will be available at Sears Business System Centers and Computerland stores beginning in November, the spokesman said.

(Continued on Page 102)

Vector Graphic Posts Third Loss

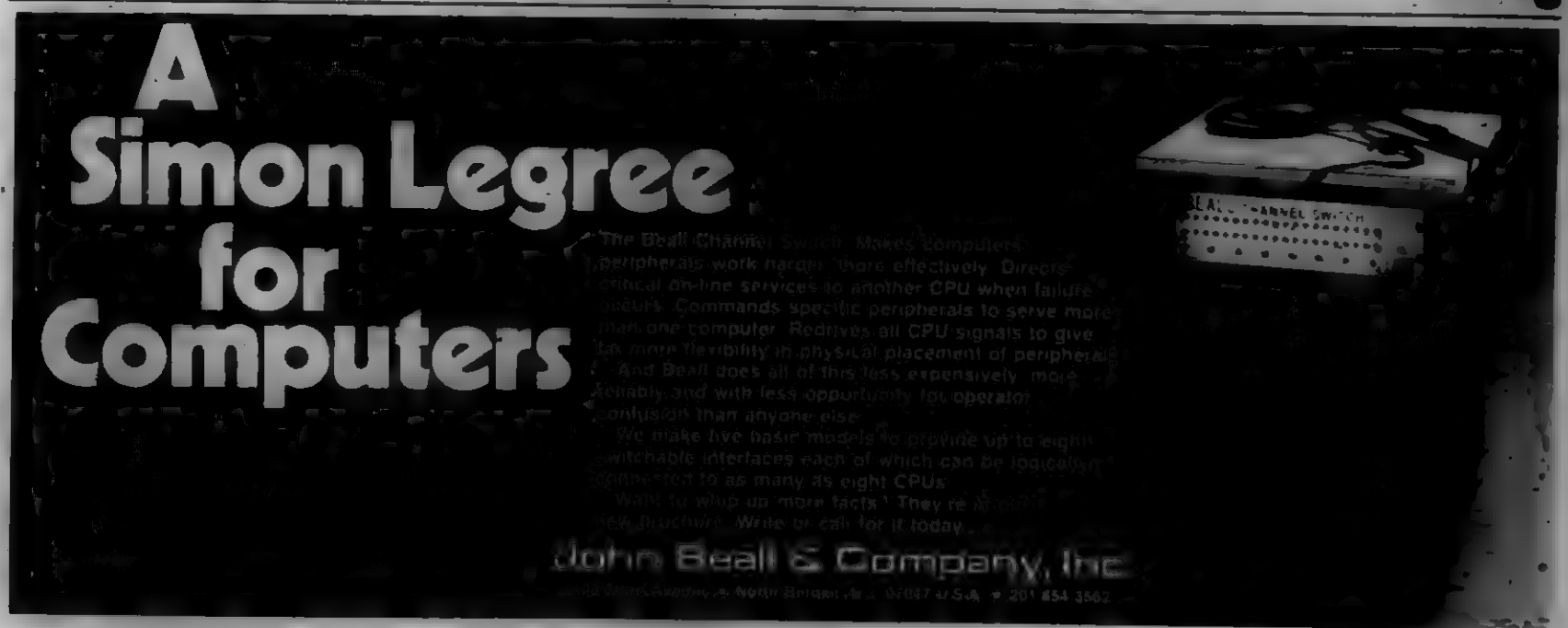
THOUSAND OAKS, Calif. — The flow of red ink and other bad news continued at Vector Graphic, Inc. as the company announced its third consecutive quarterly loss recently, losing $701,000, or 12 cents per share. Sales in the period declined nearly 10% to just over $6 million, compared with $6.7 million the same period a year ago.

In response to the continuing losses, Lore Harp, company president, announced a shortened work week for "many of its employees."

The company is continuing to evaluate "potential consolidations of departments and functions and possible reductions in personnel and other cost-reduction programs," it was announced. Earlier this year, the company let go 25% of its workers to counter losses.

The business systems maker also announced the resignation of two board members, Daniel R. Carter and Carole B. Ely for "business and personal reasons." Further, Vector Graphic announced that a class action suit against the company has been filed stemming from the sale of one

(Continued on Page 104)



Wang Reports Earnings Rise 56% In First Quarter, Revenues Up 35%

LOWELL, Mass. — Wang Laboratories, Inc. recently reported that earnings for the first quarter ended Sept. 30 were up 56% from the corresponding period last year, with revenues increasing 35%.

Dr. An Wang, chairman and chief executive officer, announced that revenues for the quarter were $412 million, up from the $305 million reported one year ago. Net earnings, including an after-tax gain of $1.8 million resulting from the sale of marketable securities, were $39 million, or 29 cents per share, up from $25 million, or 20 cents per share, reported for the corresponding period in 1982.

For the year ended Sept. 30, Wang reported revenue of $1.64 billion, up from the $1.23 billion reported for 1982.

Despite increased competitive pricing practices within the industry and continued strengthening abroad of the U.S. dollar, the company noted, pretax and after-tax margins improved in comparison to last year's first quarter.

Second-Quarter Earnings Up $22 Million for Sperry

NEW YORK — Sperry Corp. announced recently that earnings for the second quarter ended Sept. 30 were $31.1 million, up from the $9 million recorded for the corresponding period one year ago. Revenues rose 5% to $1.24 billion, compared with $1.18 billion a year ago.

Gerald G. Prost, chairman and chief executive officer of Sperry, attributed the sharp increase in earnings to "stringent cost-cutting measures instituted over the past 18 months and better economic conditions in several of our markets."

For the six months ended Sept. 30, the company reported a 2% increase in revenue and an earnings increase of $55.7 million, up 121% for the same period in 1982. Earnings per share were 60 cents for the second quarter and $1.12 for the six-month period, compared with 20 cents and 57 cents, respectively, for the corresponding periods last year.

During the second quarter, computer systems revenue increased only 1% and electronic systems revenue increased 21%, while flight systems revenue decreased 3%. The company said backlogs of orders show significant improvement with increases of 9% in computer systems, 21% in electronic systems and 26% in flight systems.

Firm Posts 77% Rise In Earnings

TORONTO — Northern Telecom Ltd. recently reported a 77% rise in earnings for the third quarter ended Sept. 30, compared to the third quarter in 1982, even though revenues for the two periods were even.

The company reported earnings, before an extraordinary gain, of $49.5 million, or 44 cents per share, compared to $28 million, or 26 cents per share, recorded in the corresponding quarter of 1982.

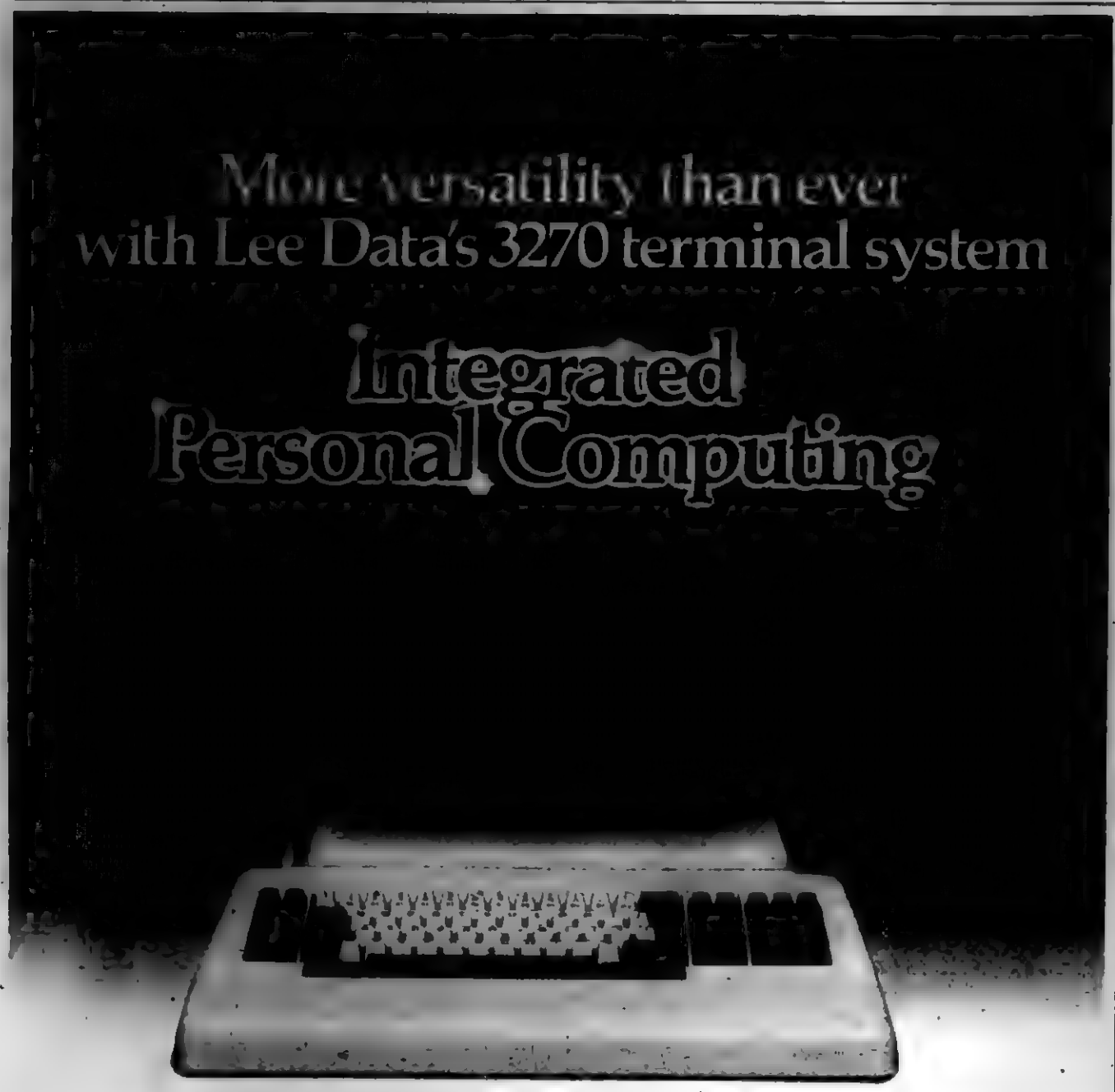
The extraordinary gain resulted from a reduction of income taxes arising from the use of prior years' tax losses of a U.S. subsidiary and boosted earnings to $57.9 million, or 29 cents per share.

For the nine-month period that ended Sept. 30, earnings before extraordinary gains amounted to $183.9 million, compared to $91.1 million for the first nine months of 1982.

U.S. revenues were up 18.2% for the third quarter and 24.1% for the first nine months, compared to 1982, but Canadian revenues declined 18% for the quarter and 20.7% for the first nine months.

U.S. revenues accounted for 57.9% of the company's third-quarter consolidated revenues.

Company officials reported that they anticipate a strong fourth quarter.



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More Flexible Hiring Policies Sought

High-Tech Firms Seen Facing Manpower Crisis

By Robert Batt
CW West Coast Bureau

LOS ANGELES — High-technology companies will need to adopt far more flexible hiring policies than hitherto if they are to recruit the skilled technicians and executives they require, a management consultant here has claimed.

William Mangum, president of Thomas-Mangum Co., a firm specializing in executive search and organizational development for high-technology industries, said there is the potential for a crisis in today's manpower glut which could lead to faltering growth for many companies.

"A lot of high-technology firms have been lulled into a false sense of security by the recession, which resulted in a large pool of labor being available for hire. However, when it comes to filling critical positions in areas such as the computer, telecommunications and semiconductor markets, the market has if anything become more restrictive," he said in a recent telephone interview.

According to Mangum, the traditional shortage of skilled programmers, analysts and data processing executives has been aggravated during the recent recession by the continued high cost of housing and made even more acute by the fact that high-technology centers are located, for the most part, in cities with the highest costs of living — Los Angeles, San Diego, San Francisco, Boston, New York and Washington, D.C.

"In the past," he added, "professionals thrived on moving from one opportunity to another. Now there is little motivation to make a move and take on the responsibilities of selling one home and buying another in today's real estate market."

To entice DP professionals to make a move, Mangum asserted, companies will need to develop highly flexible hiring policies including offering creative and often expensive relocation packages to selected individuals.

For example, he said, a San Diego firm offers bridge loans to potential employees with critically needed skills. The loan, against the sale of an existing home, in effect draws out the capital in advance of the sale. Other incentives include rental-lease assistance, more lucrative per diem payments, larger salary increases, generous up-front bonuses and payment of brokers' fees.

However, Mangum noted, there is a great deal of resistance among high-technology firms to adopting such practices. A recent nationwide poll of 750 companies carried out by the consulting firm showed that many companies are offering less in the way of assistance than before the recession.

"Companies will need to offer much more than they offered last year. Our research shows that unless a company is offering a salary increase of between 15% and 30%, executives are not interested in moving. However, most companies are currently offering between 7% and 15%, and as a result they are not getting the people they need," Mangum asserted.

One possible solution to the skills shortage problem, the consultant declared, is the "growing your own" approach successfully adopted by firms such as Hewlett-Packard Co., IBM and Tektronix, Inc. These companies, Mangum said, are hiring college graduates and training them in critical skills — a slow and expensive way to solve the problem.

"If the economic recovery turns out to be sluggish, this solution may be the one that works. But if there is a strong recovery, this approach will not be the answer," he concluded.

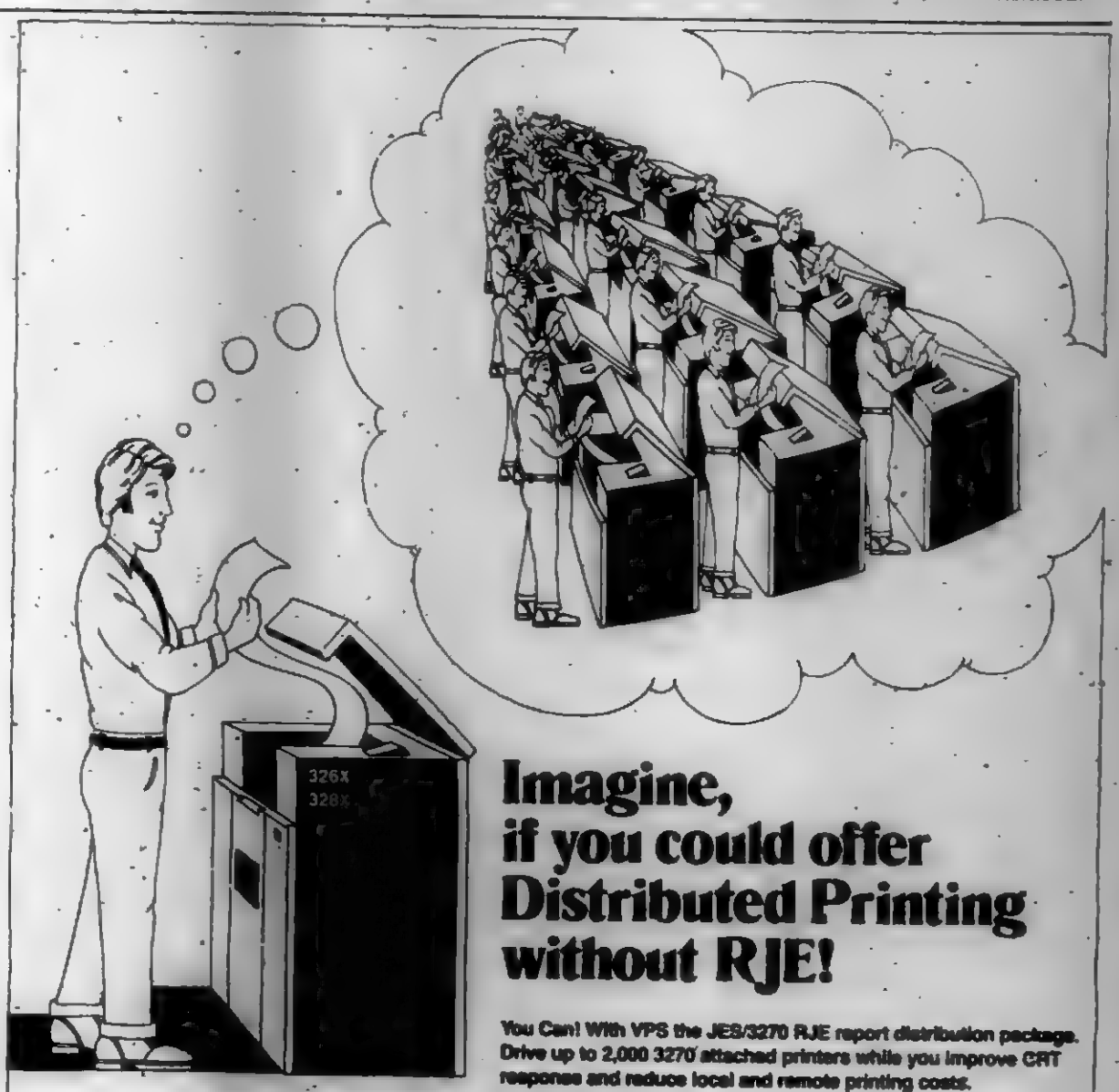
Western Union Reports Dip In Earnings

UPPER SADDLE RIVER, N.J. — Western Union Corp. recently reported earnings for the third quarter ended Sept. 30 of $16.6 million, or 60 cents per share, compared with $31.2 million, or $1.24 per share, reported for the same period one year ago.

Operating revenues also dipped, going to $261 million for the third quarter this year, compared with $280 million in the same period last year.

Income for the third quarter included $8.5 million from reversal of a reserve for amounts paid to Western Union under protest by international record carriers and $2.7 million from the sales of two transponders on Western Union's Westar VI satellite. During the third quarter of last year, the company recorded an extraordinary item in its earnings of $7.69 million and earnings from transponder sales of $27.7 million.

The company reported that earnings for the nine-month period were $66.7 million compared with $71.5 million in the corresponding period last year. Revenues for the nine-month period declined $1 million to $775 million.



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IBM Shuttles Execs to Smooth CDLA Relations

(Continued from Page 95)

the ability to retain several million dollars for 30 days before passing it on to IBM provided considerable interest income for the middlemen.

CDLA members accounted for 40% of IBM's 1982 worldwide purchase volume, according to the association. Thirty-day interest on even a small portion of that sales volume is not a small amount of money. If held by dealers, that extra income could be passed on to customers, giving them a break and the individual dealer a competitive boost, CDLA members noted. But it was the prospect of uneven enforcement — possibly causing a competitive imbalance among dealers — that most worried the CDLA, several of its members said.

'Tough' IBM Enforcement

The resulting agreement between CDLA and IBM, according to the association, is that IBM will not rescind its pay-on-installation policy, but will not enforce it until 30 days are up. In the words of one association executive, IBM committed itself to "tough," even enforcement: It will not "pull the trigger" for the first 30 days after installation, but on the 31st day, "it will pull the trigger and pull it hard."

Discussing ICC's success to date, Finley said the subsidiary has earned $22 million on income of $82 million in the first six months of 1983, compared to $31 million earned on $126 million in income last year. Since its inception in early 1981, ICC has risen to number six in the leasing industry, according to one estimate, still far behind such industry giants as Comdisco, Inc. and General Electric Credit Corp.

While some here suggested the IBM unit may have failed to meet company expectations, the concern among CDLA members clearly is for the future. With its top credit rating, and relying on IBM's huge sales force, ICC could move very aggressively and quickly to capture a larger share of the computer equipment leasing market.

Finley told the association meeting, "We are not going to drive prices [down]" to capture market share. "We do have partners; we do have investors; we do have fiscal responsibilities to them," he said.

But, he also said, "Our strategy is to sell financing through the IBM sales force." To that end, Finley said, IBM offers what he termed "a rather modest" bonus to salesmen who deliver leasing deals to ICC. He also indicated the bonus system implies salesmen eventually will have a quota for delivering these deals.

He added, however, "We do not plan to remarket ICC-leased equipment through the IBM sales force." Used equipment is a lucrative CDLA business, and ICC competition could have considerable impact.

But according to Finley, dealers, such as those in the CDLA, will be used. "We will remarket it through the used equipment market as just another player in that market — pure and simple," he said.

According to Finley, ICC is important to IBM's long-term plans. "Customer financing is an integral part of and support to our . . . business objectives," he said. CDLA can expect ICC to be competitive, but for now he said, "we're still learning."

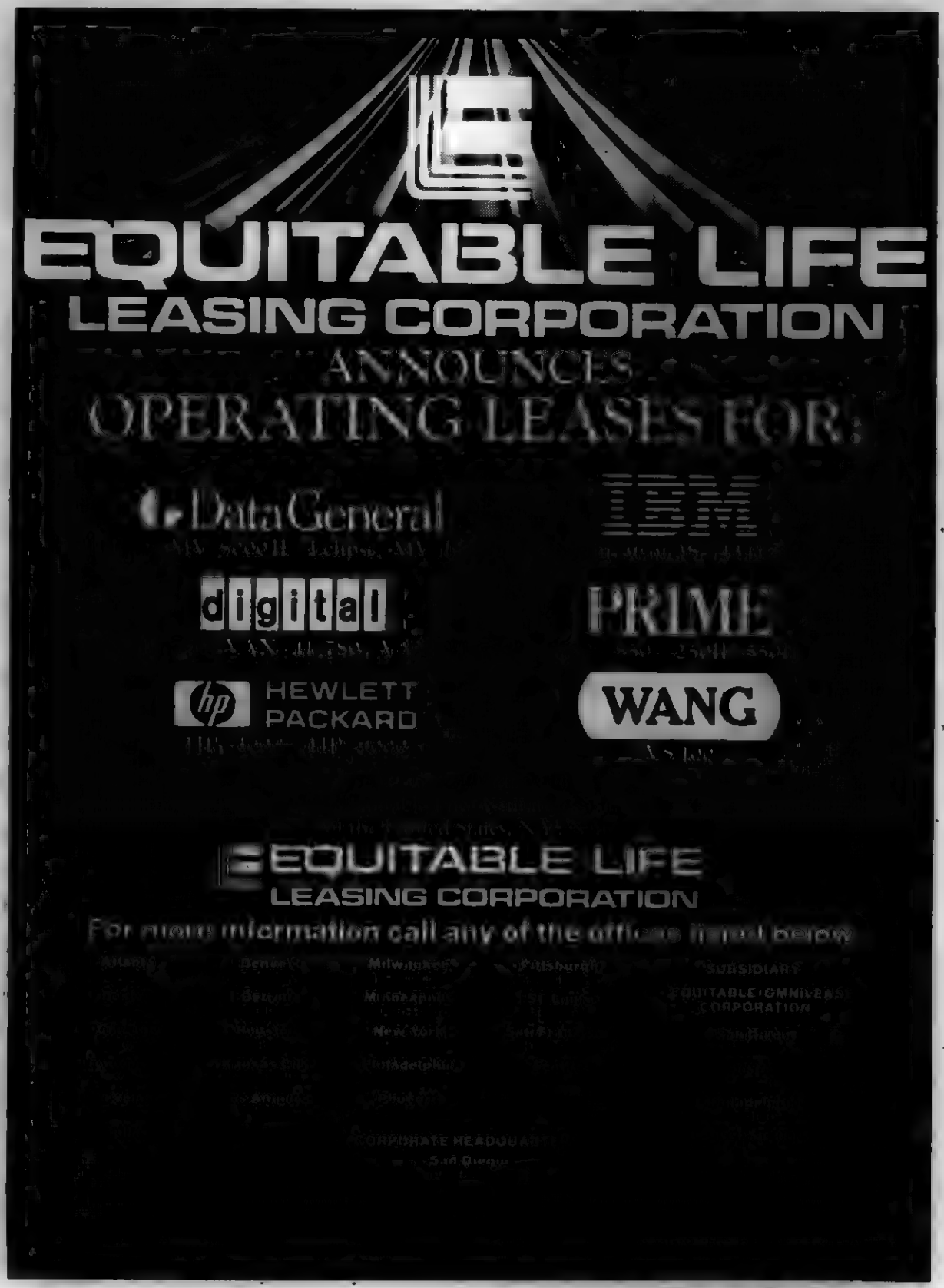
CDLA President Richard Forsythe remarked later that "IBM is willing to spend money to get an education." Although there is an uneasy truce between ICC and its CDLA competitors at this time — while business is booming — the association obviously is still worried about what the IBM subsidiary might do after it completes its education.

CDLA Elects Three Members To Its Board

HILTON HEAD, S.C. — The Computer Dealers and Lessors Association (CDLA) elected three new members to its board of directors at its annual fall meeting here.

Elected were Lawrence G. Lyon of DSI, Inc., Denver; Gordon D. Tracy of Continental Computer Leasing Corp., Newtown, Pa.; and Tom C. Martin of Computer Financial, Inc., Hackensack, N.J., according to a spokesman for the CDLA.

George H. Heilborn of IPS Computer Marketing Corp., Paramus, N.J., will reportedly serve one more year as CDLA chairman, and Richard A. Forsythe of Forsythe/McArthur Associates, Inc. in Chicago will continue as association president, the spokesman said.



CDLA Cites Available Investment Capital

Users Seen Cashing in on Leasing Competition

By Jake Kirchner
CW Washington Bureau

HILTON HEAD, S.C. — Widespread availability of investment capital and the increasingly competitive presence of the IBM Credit Corp. in the computer leasing industry are adding up to a very favorable situation for the DP community, according to members of the Computer Dealers and Lessors Association (CDLA).

With many sources of capital for middlemen to turn to and with dealers looking over their shoulders as IBM Credit grabs for greater market share of IBM and, in the future, non-IBM equipment leasing deals, the users are enjoying "the best of all worlds," said Richard A. Forsythe, chairman of Forsythe/McArthur Associates, Inc. of Chicago and CDLA president.

With increasing competition from IBM Credit, founded in March 1981, "everybody's beating their brains out to get [users'] business," Forsythe said, adding, "if there's anyone [who] wins, it's the user."

Despite the greater competition in the leasing market, the mood of the association membership as it met here late last month for the CDLA's annual fall meeting was one of strong optimism. CDLA members' business is up 28% this year over 1982 and running at about $4 billion in annual equipment rentals.

Unlike a year ago when recession-scarce capital made computer deals harder to swing as the year ended, the market is now flush with money for CDLA business. Kenneth B. Steinback of Computer Sales International, Inc., a CDLA director, commented, "The lenders today love our business." Forsythe agreed, saying, "Money is all over the place looking for a home right now." He added that the computer leasing business is seeing more and more "big money" — large investors looking for large computer deals to finance.

The association, coming off of a successful year and looking ahead eagerly to an even better year expected with the continuing economic recovery, seems to have arrived at a fairly comfortable if not totally secure modus vivendi with IBM Credit [see story on Page 95]. Forsythe, noting the competitiveness of IBM Credit, said profit margins for CDLA firms are getting narrower and narrower but added that there are a lot more deals being made, which adds up to increased revenues for the association's members.

Discussing how the IBM Credit-CDLA competition is shaping up, Forsythe and Steinback said association members seem to be getting the bulk of the deals on peripherals, which the firms find more lucrative than CPU deals because peripherals retain more residual value at the end of the lease term than CPUs. IBM Credit, on the other hand, is going after and getting "those four- and five-year CPU deals," Forsythe said, suggesting it is doing so because it is easier to remarket a few expensive CPUs than thousands of disk drives.

The result, Forsythe said of the CDLA membership, is that "we seem to be losing [to IBM Credit] the deals we don't mind losing, and we're winning the deals we really want."

Brightening the Outlook

Further brightening the outlook of the association in terms of IBM Credit competition is the possibility the IBM subsidiary will become a source of capital that CDLA firms can tap to finance deals on non-IBM equipment.

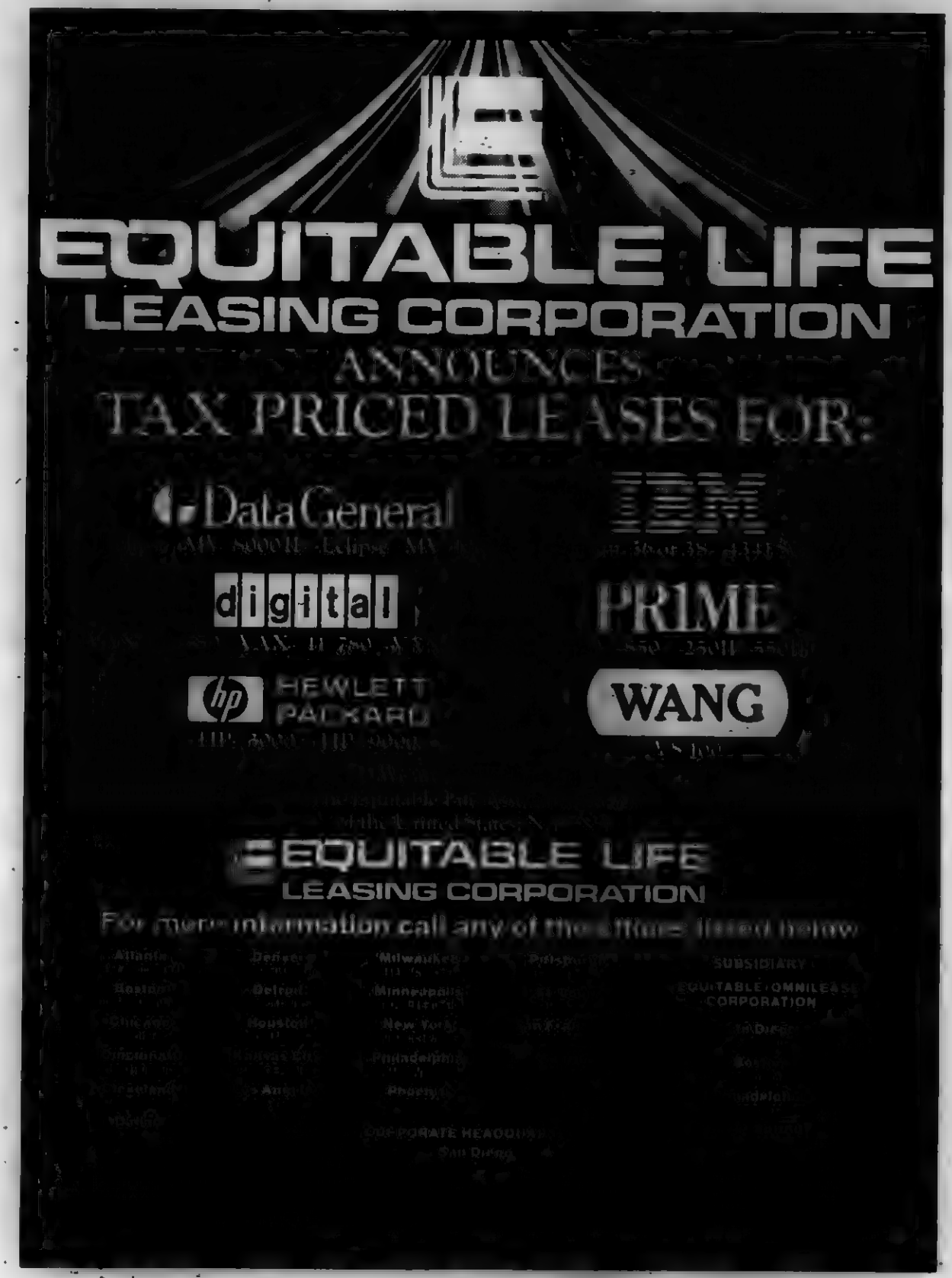
While IBM Credit President David A. Finely was fairly circumspect in his comments to the meeting here about his company's intentions in this regard, he did confirm that IBM Credit's recently announced deal with Bankamerilease is leading IBM Credit in the direction of financing non-IBM equipment acquisitions.

Finley said IBM Credit at this time does not have the staff to deal with non-IBM proposals brought to the company by outside brokers. But, he said, "it's not unreasonable to think that sometime in the future we will be much more interested than we are now."

Certainly CDLA members are aware that IBM Credit, backed by the financial resources of IBM's partners, Merrill Lynch and Metropolitan Life, and armed with the marketing power of the IBM sales force, could greatly increase its market share and make life very difficult for its independent competitors. But for the time being, at least, the game seems large enough for all players.

If anything clouded the CDLA horizon it was the recent furor touched off in the computer-leasing industry by an article in *Barrons* last month questioning the accounting practices of industry leader Comdisco, Inc. [CW, Oct. 17].

The most troublesome aspect of the *Barrons* article, Steinback said, is the fact that Comdisco is not accused of perpetrating any fraud. The questions raised, he said, deal only with interpretation of federal accounting practices and standards.



Cincom Touts Software to Bridge IBM-DEC Gap

CINCINNATI — The reality in the business world is that corporate headquarters tend to use IBM mainframes, but subsidiaries and divisions in the field like the performance and interactive aspects of Digital Equipment Corp.'s VAX series superminicomputers.

At least that's the thinking behind Cincom Systems, Inc.'s recent [CW, Sept. 26] announcement of an "IBM-DEC connection" that reportedly will be able to "bridge the gap between DEC and IBM hardware environments for corporations using both types of equipment."

Cincom's DEC end of the connection is the recently announced Ultra Interactive Data Base System. The company said that applications written for Ultra can "with little or no change" be run on its Total Information System (TIS) package for IBM mainframes.

Cincom has traditionally produced software for the IBM user market, and the move into the DEC environment signals a major change. According to Dennis Yablonsky, director of marketing and sales at Cincom, the company "sees a major market for DEC equipment." He noted that DEC estimates the sale of 19,000 VAX units in 1983.

While IBM mainframes dominate the headquarters of the $100 million-and-up companies to which Cincom targets its products, Yablonsky said the company has found that many subsidiaries and divisions of those companies have selected DEC units because of their "interactive computing ability."

Ultra reportedly provides relational technology to VAX data base applications and a set of user tools in common with the TIS package. "There is a logical user view implemented on both TIS and Ultra," Yablonsky said.

Cincom writes its programs in Cobol, and Yablonsky said transferring programs between DEC and IBM units involves "nothing other than having to recompile." The process could take a few hours to a day, he said, "but it's not a three-month process."

Apparently Cincom is the first software house to make this "connection," and Yablonsky said he was unsure why others have not stepped in.

"There is a demand out there for programs that are compatible on IBM and DEC equipment," Yablonsky maintained.

Facing Losses, TI Backs Out Of Micro Mart

(Continued from Page 95)

4% for the third quarter and 2% for the nine-month period, while sales in divisions other than the consumer group rose 11%. The company's breadwinners, semiconductor circuits and defense electronics, continued their strong growth with an increase in back orders of $66 million, the company reported.

Mark Shepherd Jr., chairman, and J. Fred Bucy, president, said in a joint statement, "The first nine months of 1983 have been the most difficult period in the history of TI."

Some 4,000 employees may be affected by the decision, and there has been some speculation that the company's semiconductor sales may feel some impact from the loss of one of its best customers, the TI consumer group.

Michael A. Gumport, an analyst of semiconductor stocks for Paine Webber Mitchell Hutchins, Inc., said he expects the company to post strong earnings in the 1985 fiscal year in the range of $10.50. "The impact is as expected," he said. "The only surprise was how large the write-off was." Asked if this signals TI's exit from the home electronics market, Gumport replied, "You'd hope so."

CDC Signs Pacts With Retailers To Sell Drives

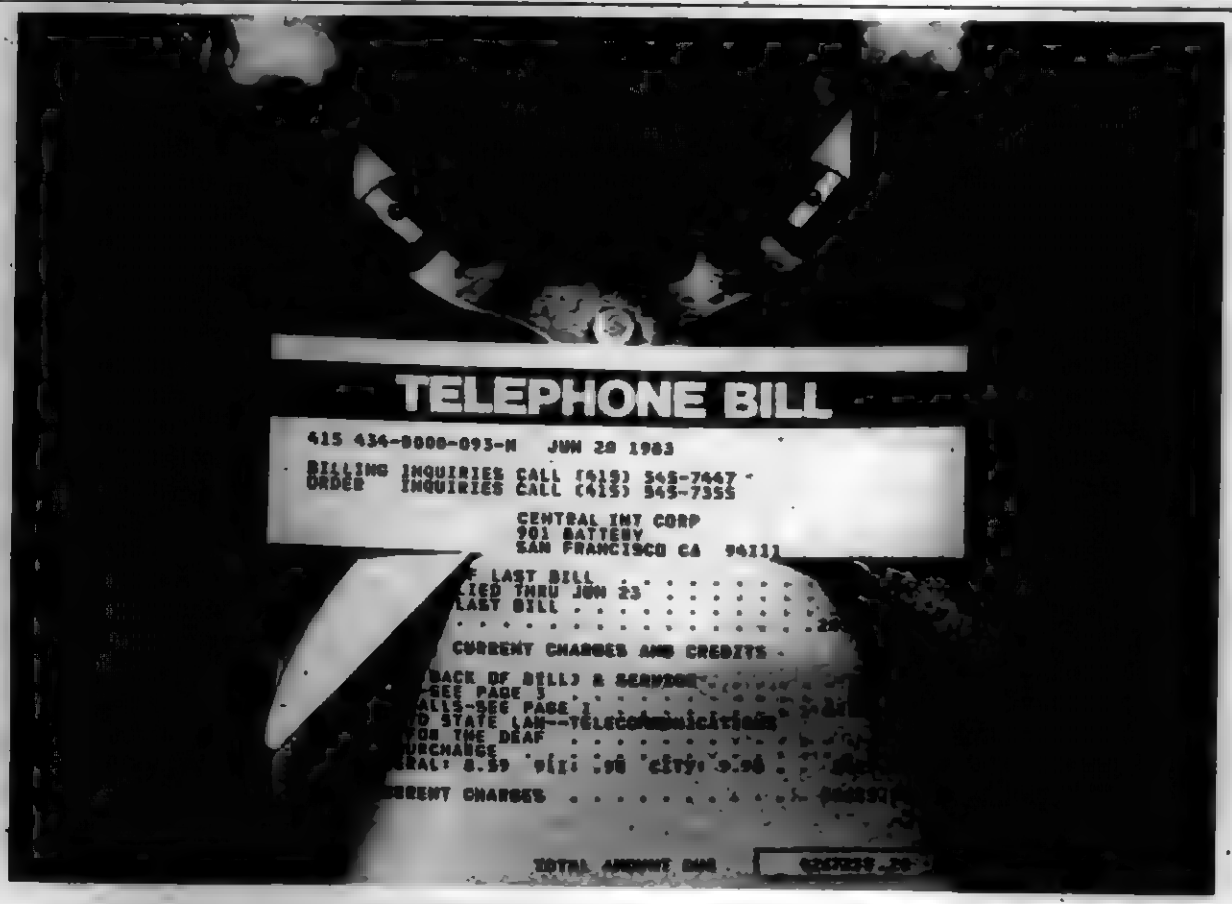
(Continued from Page 95)

CDC is looking at the potential for marketing other peripherals, "but has no specific products identified yet or any timetable established," the spokesman said.

The company has established a Microperipheral Systems organization with responsibility for the new retail marketing program. The group will also be in charge of direct sales of Storagemaster peripherals to high-volume end users of the IBM Personal Computer and compatible systems and will establish a commercial distributor program for the products, the spokesman said.

Donald R. Anders, director of Microperipheral Systems, said, "We want to establish [CDC] as the alternative peripheral supplier to this segment of the microcomputer market that today is demanding greater capacity and efficiency in data storage."

David L. Point, general sales manager of the division, said, "We have been and are continuing to make substantial investments in disk technology that will ensure very competitive products for the personal computer market."



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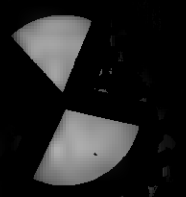

House Approves Relaxed Export Controls

WASHINGTON, D.C. — In the midst of a continued standoff on renewal of the expired Export Administration Act, the U.S. House of Representatives recently approved what is considered a liberalized version relaxing controls on the shipment of goods to non-Eastern bloc countries.

Under one key provision of the House-approved bill, U.S. firms would be able to ship controlled high-technology items to countries with membership in the Free World Coordinating Committee without having to obtain individually approved export licenses. The 223 to 188 vote in the House reversed a stricter bill that had been approved earlier in the month that would have granted the Secretary of Commerce discretion to require individual licenses in such cases.

The bill would, however, require exporters to report each shipment to the Commerce Department along with details on destination and the designated customer. An amendment approved by the House would also prohibit further investments in South Africa by U.S. companies until that country relaxes its apartheid laws and regulations.

The Senate, which allowed the act to expire Oct. 14 when it failed to pass an extension, has yet to act on a version of the bill that would place stricter export restrictions than previously existed. Provisions of the act are being enforced under a presidential executive order.

Pact Would Enhance SL-10, VAX-11 Link

NASHVILLE, Tenn. — An agreement to provide enhanced communication between Northern Telecom, Inc.'s SL-10 packet switch and Digital Equipment Corp.'s VAX-11 series of superminicomputers was recently announced.

The agreement is designed to deliver an integrated systems approach through which value-added office services can be handled with optimum efficiency across a wide geographic area, a Northern Telecom spokesman said. Services to be supported over the SL-10 equipment reportedly will include DEC's Decmail electronic mail application and All-In-1 office automation package.

The spokesman said the companies are presently defining, testing and enhancing the network connection between their respective equipment. Earlier this year, the two companies announced a computer-to-private branch exchange interface specification.

Vector Airs Third Loss In Revenues

(Continued from Page 95)

million shares of common stock two years ago. The plaintiff in the suit filed a similar pleading against Vector Graphic earlier this year.

Company founder Harp, who reassumed control of daily operations last April, blamed buyer confusion caused by "adverse publicity" for part of the company's misfortunes.

"We believe widespread speculation by the media concerning the future of companies such as Vector had a detrimental effect on sales during September," she said.

Vector Graphic and other makers of small business systems have suffered severe setbacks both in the value of their outstanding shares and in system sales in the past three quarters.

After achieving startling market successes through 1982, Vector Graphic lost $1.67 million last quarter and $1.1 million the previous quarter, losing nearly $3 million for the year ended June 30, a spokesman for the company reported.

Cmos Key to Billion Dollar Mark, AMD Says

By Robert Batt
CW West Coast Bureau

SANTA CLARA, Calif.—Advanced Micro Devices, Inc. (AMD) will become a $1 billion company in less than two years, with complementary metallic oxide semiconductor products (Cmos) accounting for 20% of sales, company president Jerry Sanders predicted here recently.

Speaking at a security analyst meeting, Sanders, who is also AMD chairman and chief executive, said the company expects sales in excess of $300 million in the second half of its current fiscal year (1984) to add to the $230.5 million it recorded in the first two quarters ending Sept. 30. In fiscal 1983, AMD had net sales of $358.3 million.

Sanders claimed the key to AMD's rapid growth was its willingness to invest in research and development activities during the recent prolonged recession. "Boom times are here again," he told his audience.

AMD was recently ranked fifth among manufacturers of integrated circuits by Integrated Circuit Engineering Corp., a Scottsdale, Ariz.-based market research firm. Last year AMD was ranked seventh in this sector.

Sanders said the company spent 19.4% of its revenues on R&D in 1983, with this figure rising to 21%, or nearly $22 million, in the first quarter of the current fiscal year. By the end of fiscal 1984, AMD will have spent $125 million on capital expenditure, he predicted.

This activity, Sanders added, has resulted in AMD proprietary products accounting for 38% of sales in the quarter just ended. "We have gained acceptance as an innovator, and this allows us to attract new customers and grow. For example, 72% of AMD products sold in Japan have been invented within the company. The equivalent figure for Europe is 42%. It is very important for our protection in world markets that we continue to produce our own products," he explained.

AMD, the chief executive continued, is committed to being the major large-scale and very large-scale integration (VLSI) manufacturer within the current decade. In this connection, he said, Cmos is the tool of the future, with the Cmos market expected to reach $2.3 billion in 1986.

"AMD has a major development under way in Cmos that is expected to bear fruit in 1984," he asserted, referring to the construction of a 200,000-sq ft Cmos facility in Austin, Texas.

Cmos Dominant

Expanding on this theme, James Downey, senior vice-president of operations, told the analysts that Cmos will be the dominant technology in the company's drive to become the leader in VLSI technology over the next few years.

At its recent annual meeting, the company announced its intention to introduce later this year its first Cmos products including a 16K byte Cmos static random-access memory (RAM), the first in a family of Cmos static RAMs to complement its existing N-channel metallic oxide semiconductor (Nmos) family.

Explaining the company's decision to focus on Cmos, Downey proclaimed: "Cmos is a performance and cost extension of mainstream MOS technology in the VLSI domain.

More gates can be put on a chip with Cmos than with Nmos, leading to lower power dissipation, lower packaging costs and higher device reliability." The company's current technology mix is about 55% bipolar products and 45% MOS.

The company said it also believes the future in dynamic RAMs is Cmos and, as a result, AMD has announced plans to enter the 256K dynamic RAM market with a second-generation product to be sampled in January 1985.

In addition, Downey revealed that a computer-aided design (CAD) supported Cmos macrocell family is being developed to form the design technologies for future logic products.

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Legal Expenses Blamed For Paradyne Decline

LARGO, Fla. — Paradyne Corp. blamed the mounting legal expense incurred in defending federal government charges against it for its third-quarter 89% earnings slide.

Earnings fell to $804,000, or four cents per share, compared with $7 million, or 32 cents per share, the same period a year earlier. Revenues also declined slightly, dropping to $50 million from $52 million.

The decline in earnings reflects some $700,000 in legal expenses relating to Paradyne's defense of charges against it brought by the federal Securities and Exchange Commission (SEC) last March.

The SEC charged, among other things, that Paradyne mislabeled its equipment in a demonstration of its system capabilities prior to being awarded a contract by the Social Security Administration (SSA). Defense of the charges cost Paradyne nearly $1 million in its second quarter, when the company posted a $929,000 loss.

Paradyne recently filed a countercomplaint in federal district court, charging members of the SEC with "fraud, deceit and trickery" in the course of the investigation leading to the filing of the original complaint.

Paradyne's counterclaim asserted that SEC officials falsified evidence in preparing the SEC's case. The counterclaim charges further that the SEC attempted to coerce members of the SSA to make false statements against Paradyne.

Shortly after the SEC's suit was filed, a spokesman for the SSA made public statements that, in part, refuted what the SEC had charged, particularly as the suit related to the performance of some of Paradyne's systems that were already installed.

The counterclaim also stated that the SEC allowed Paradyne's competitors to view company secrets, while urging the SSA to cancel a software contract with Paradyne.

MCI's Fiscal Program To Cover Microwave

WASHINGTON, D.C. — MCI Communications Corp. recently announced a $1.1 billion capital spending program for the current fiscal year, including an upgrade and expansion of its microwave communications network.

The company said it will install a single-sideband radio system, add digital radios to existing analog routes and upgrade approximately 2,000 of its existing microwave antennae.

"The additional capacity and versatility that we will obtain from these upgrades will provide required capacity for growth," according to V. Orville Wright, MCI president.

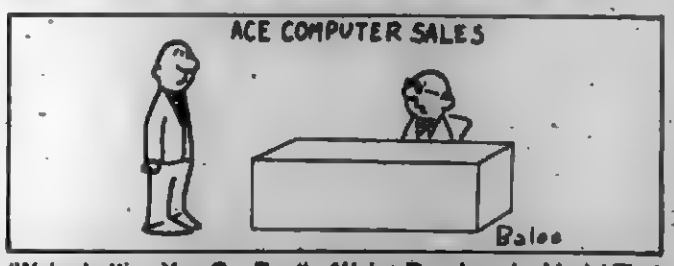
"They are part of our overall design to enable MCI to handle the increased demand for services we expect to occur with the breakup of the Bell system," he said.

The company said the single-sideband radio system will more than double the voice channels used in present FM systems. Scheduled for completion in 1984 and initially slated for Irving, Texas, to Los Angeles, the single-sideband technology will reportedly increase MCI's voice-circuit capability from 14,700 per radio route to 37,800.

The company will add 4 GHz digital radios to existing 6 GHz routes and will reportedly operate at the rate of 90 million bit/sec. The radios were developed by Northern Telecom, Inc. and Rockwell International Corp. and will have twice the bandwidth efficiency of other radios operating in that band, according to MCI.

Existing microwave antennae will be upgraded to a dual-band system to transmit and receive signals in the 6 GHz and 4 GHz common-carrier frequency bands, the company said.

The antennae are being developed by Thomson-CSF and the Andrew Corp.



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Memorex Acquires Rights To Make, Sell DMA Drive

SANTA CLARA, Calif. — Memorex Corp. recently acquired manufacturing rights for DMA Systems Corp.'s Micro-Magnum 5¼-in. fixed/removable Winchester disk drive family and a half-height 3½-in. Winchester cartridge disk drive.

The companies jointly announced the signing of a licensing agreement under which DMA granted the rights to Memorex, a subsidiary of Burroughs Corp.

Under the terms of the agreement, Memorex will manufacture and market the half-height drive as the Memorex 450, while DMA will manufacture and market it as the DMA 360.

According to Dr. James C. Castle, executive vice-president of Memorex, the agreement resulted when Memorex decided to exercise options contained in an agreement signed last January. "At that time, Memorex and DMA Systems agreed to fund jointly the product development that led to the new half-height drive," he said, adding that the design was developed to jointly agreed upon specifications by the DMA engineering staff headed by DMA Engineering Vice-President Dave Sutton.

CSC to Manage AT&T's Tirks For Five Years

EL SEGUNDO, Calif. — Computer Sciences Corp. (CSC) recently announced it has been contracted to manage for five years a computer applications system for AT&T Communications, a deal CSC said is potentially worth more than $30 million.

The company will maintain and further enhance the Trunks Integrated Records Keeping System (Tirks) at AT&T Communications' data center in Cincinnati.

Developed by Bell Laboratories with CSC's assistance over the past 15 years for use by Bell operating companies, Tirks is said to be the largest application system in commercial use, containing more than 350 data bases, 18,610 software modules and five million lines of code.

The system manages the provisioning and planning of telephone circuits, facilities and equipment.

After divestiture of the Bell system, Tirks will come under the supervision of the Central Services Organization, formed by the Bell operating companies, and will be supported by CSC.

A CSC spokesman said the contract calls for the company to take full responsibility for the continued development of the system, including any customization required by the post-divestiture environment.

IBM Unifies Info Services

RYE BROOK, N.Y. — IBM announced recently it has combined the activities of three of its independent business units to form a new unit, the IBM Information Services.

The three units combined were: IBM Information Network, which offers remote computing services and networking; Information Programming Services, which develops, acquires and supports computer programs and services; and Information Systems Services, which customizes programs for IBM systems' users and provides consulting services.

According to a vendor spokesman, combining the activities of the three units under single management will enable the company to achieve new efficiencies and provide a full, coordinated line of information services to customers.

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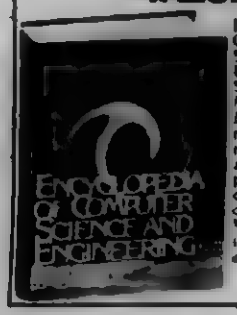

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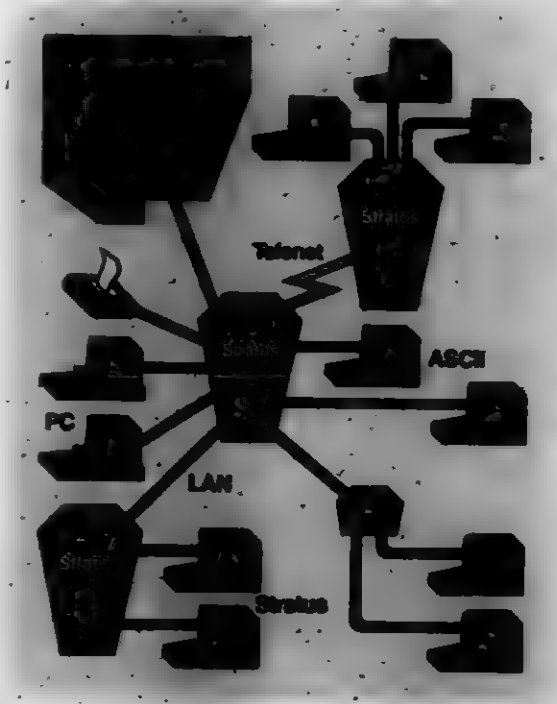

- ❑ Word processing on IBM PCs using WordStar, or MultiMate (a Wang-like word processing package)
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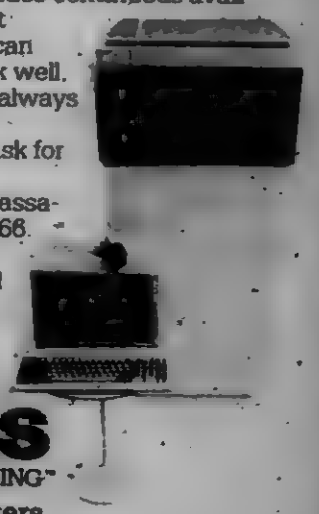

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Forecasts & Findings

Simplify Price Setting

Lack of quality data, misunderstood user requirements and major shifts in delivery modes are complicating price setting for processing services and integrated systems, according to the first volume of a two-volume report on "Information Services Pricing."

According to the report, remote computing services vendors have little room to maneuver in the face of declining profitability and prospects of losing users, but the vendors should simplify their price schedules and determine the requirements of [illegible].

Batch and facilities management vendors are too cautious in setting prices, but do not place enough importance on knowledge about users' applications, according to the report.

In the area of integrated systems, available software and after-sales support are two of the most important purchasing criteria, and users will pay for critical applications.

The report contains data on which applications are valued by users, preferred pricing methods and other concerns.

Priced at $2,000, the report is available from Input, Inc., 1943 Landings Drive, Mountain View, Calif. 94043.

Open Nets Preferred

Open, or multivendor, networks are preferred to proprietary networks by 62% of network buyers, and 88% of the users prefer to use a third-party maintenance group for service when the principal network contractor is unwilling to maintain the entire network, according to a report from International Data Corp. (IDC).

"Network Support" concludes that network users are becoming more aware of the need for a comprehensive approach to maintenance and that service providers are in many instances overlooking potential profit areas where users are willing to pay for service; with many vendors refusing to support foreign equipment, a potential windfall exists for third-party groups willing to commit to support such systems.

According to the report, most users surveyed would not hesitate to seek third-party groups capable and willing to support an open network.

Priced at $3,000, the report is available from IDC at Five Speen St., Framingham, Mass. 01701.

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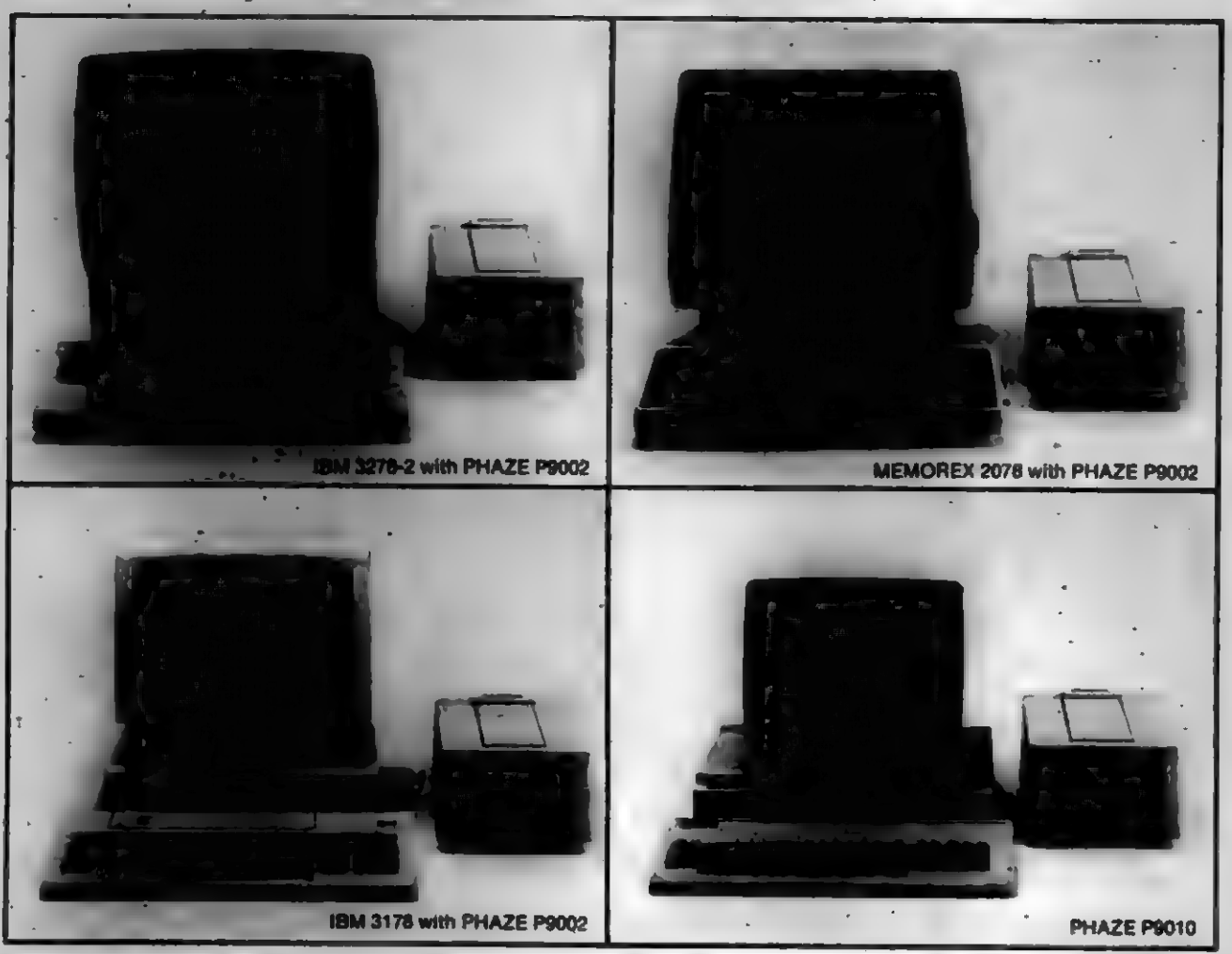

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The P9002 features a computer and diskette module with two 320Kb disk drives. It connects directly to the terminal and the controller via standard coax cable and the entire installation can be done in less than 60 seconds. Without tools. And since the P9002 utilizes an IBM 3278 or equivalent for its keyboard and display, the operating configuration remains unchanged, so there is no operator retraining.

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No one else offers the versatility and compatibility that you can get from PHAZE. Because we offer 3278 compatible terminals as well as computer upgrades, we cover the breadth of the 3278 spectrum. We understand user needs, and we make it easy for you to upgrade your current system with our P3270, P9002 and P9010 products. That's because at PHAZE, we're expansive...not expensive. *For more information, call S.T. Lifeson at 1-800-423-2994.*

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Big Three Profits Up

IBM, Apple Computer, Inc. and Radio Shack Corp. will each draw revenues in excess of $1 billion for personal computer hardware and software sales with IBM topping the list at $1.5 billion, according to the "Personal Computer Industry Report."

While only 7% of U.S. office workers will have personal computers by the end of the year and less than 10% of U.S. households will have home computers, the report projects that by 1990, 40% of office workers will have at least one personal computer, and many will be using portable, battery-powered units in addition to desktops. According to the report, two-thirds of all households will use home computers by then. Eventually, the report states, 75% of office workers will use a personal computer.

The report provides historical data and forecasts for each category of personal and home computer. It is priced at $2,000 for the first copy and $300 for each additional copy by Future Computing, Inc., 900 Canyon Creek Center, Richardson, Texas 75080.

UK Telemart to Grow

The next 10 years will provide big opportunities for equipment suppliers as the UK telecommunications environment is liberalized and new technologies emerge to more than quadruple the present market, according to a report by International Resource Development, Inc. (IRD).

Where now half of the UK market is comprised of cable and public exchanges, by 1993 the two will account for less than 10%, as cable television, business peripherals

Forecasts & Findings

and satellite communications emerge. The report notes that British Telecom is moving away from traditional suppliers and that the government's majority stockholding in the company will be sold to private stockholders.

The report notes similarities and differences between the telecommunications market in the U.S. and UK.

The report sees almost a doubling in sales by 1985 and reviews market segments and 14 traditional and emerging suppliers. "UK Telecommunications Market Opportunities" is available for $1,650 from IRD at 30 High St., Norwalk, Conn. 06851.

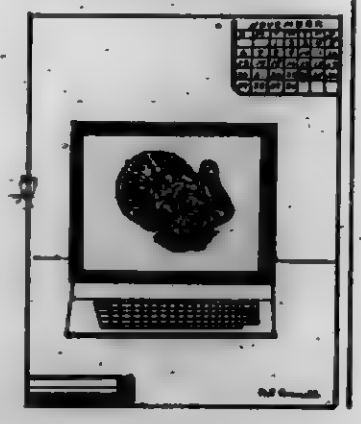
Japan's Micros Gaining

Although Japanese firms have been largely unsuccessful in penetrating the burgeoning microcomputer market because of poor planning and lack of adequate software and hardware, the installed base of Japanese systems will total 1.5 million units in 1983, up 123% from a year ago, and systems produced for export will increase by 227% to account for 16% of all production, according to a report by Competitive Strategies International (CSI).

Many export units produced by Japanese firms cannot be identified in European and U.S. shipment calculations because they are sold under other names through OEMs, according to the report.

While U.S. companies do not fear the Japanese micro manufacturers as much as they did three years ago, the report said government research and development subsidization, product imitation and production cost advantages have increased the threat.

The report notes that software has become a targeted industry in Japan, with an all-out effort under way to create new programming technology and language application programs. "The Japanese Microcomputer Industry" is priced at $1,450 by CSI, located at Suite 275, 4340 Stevens Creek Blvd., San Jose, Calif. 95129.



New Features Added

New features are being added to established fourth-generation languages, including mainframe languages with versions that run on personal computers, inefficiencies that hampered earlier efforts are being refined out and some vendors are developing entirely new languages aimed at personal computers.

What that means, according to "Opportunities in Fourth-Generation Languages," is that fourth-generation languages are moving toward a prominent role in mainline information systems tasks and might turn out to be the means of reducing the enormous backlog of application development in corporate information systems departments.

The report from Input, Inc. describes nine fourth-generation languages and examines the impact they can have on management information systems operations, including costs and benefits.

The report also looks at the future effects of higher language use, such as the number of programmers using the languages climbing 680% by 1985 and nonprogrammers using the languages climbing 990% over the same period.

Other areas examined are the possible demise of experienced Cobol programmers and the transfer of technically adept personnel into the informations systems department.

The report is priced at $2,000 by Input, 1943 Landings Drive, Mountain View, Calif. 94043.

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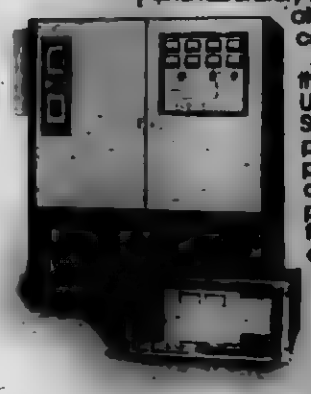

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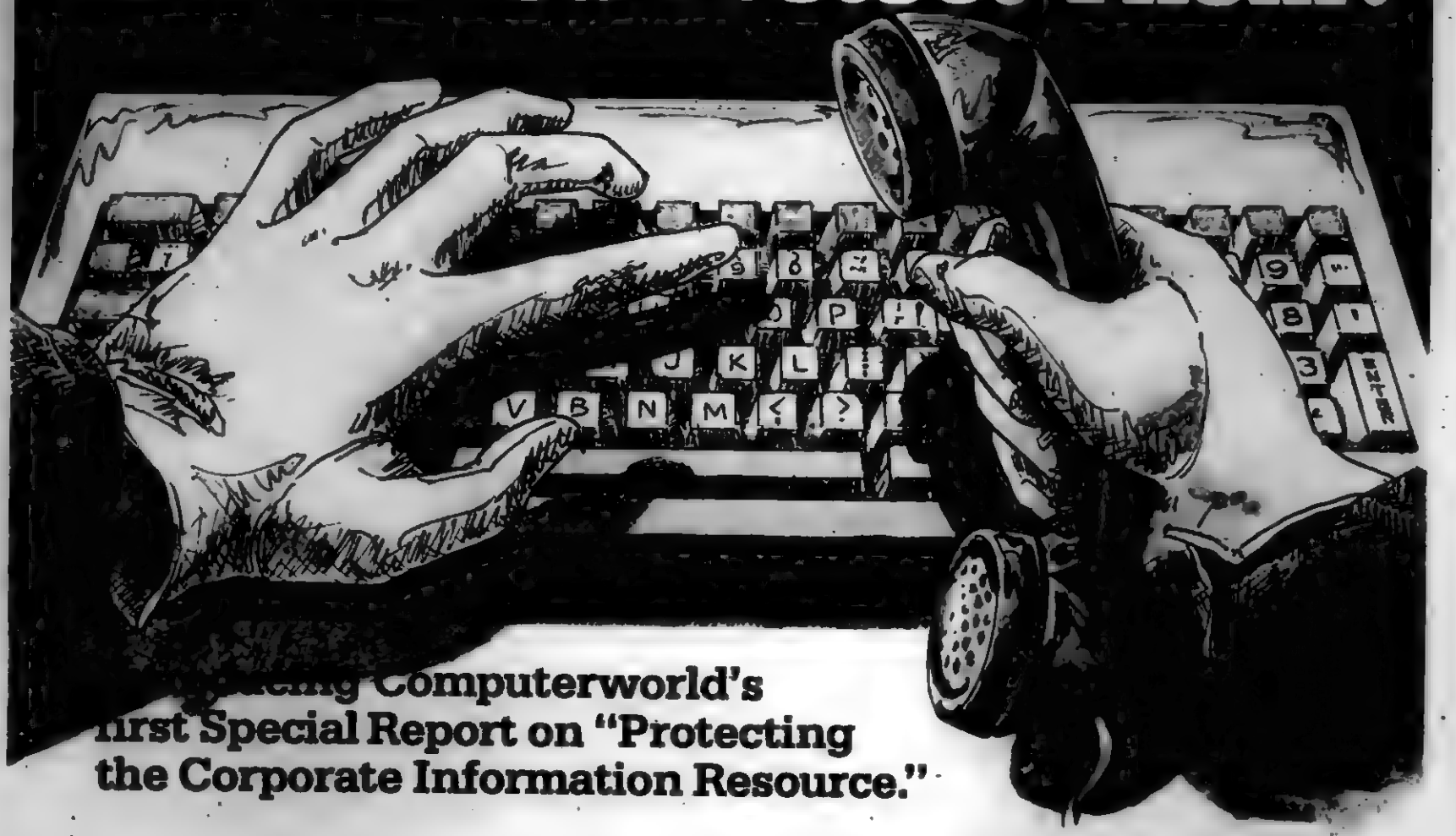

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Ad deadline for "Protecting the Corporate Information Resource" is November 11th. Call Don Fagan, Vice President, Sales/Marketing; Ed Marecki, National Sales Director or Kathy Doyle, Marketing Support Manager at (617) 879-0700. Or call one of the sales offices listed below:

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The following positions are at Nixdorf offices located in the Boston area on the Route 128 high technology belt.

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Several challenging opportunities exist to provide technical software and communications support to our field organization. Working closely with several departments, you will also be involved with service planning for our 8860 distributed processor. Your background should reflect an in-depth knowledge of communication protocols including Bisync, SNA, SDLC, etc. A working knowledge of assembler language, prior software development or support experience in the communications environment is desirable. Some domestic or international travel may be required. **Ref. #8058**

National Product Specialists

A number of exciting opportunities are available in our Product Line Management organization to assume responsibility for technical software marketing/sales support to various functions. Qualifications require prior networking and communication protocol experience (Bisync, X.25, SNA, etc.), knowledge of PDP-11, VAX, SERIES 1, NOVA or equivalent minicomputer exposure; POS/Banking background very desirable. Marketing background a plus, however, positions warrant heavy technical expertise **Ref. #8300**

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A variety of marketing/technical positions are available in the POS marketplace. Some positions require a hardware engineering background and will be responsible for product planning and functional specifications for product development and enhancements. Other positions require a software/marketing orientation to focus on market data evaluation and competitive analysis.

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Opportunities exist for high level professionals to manage operations associated with installing large computer systems in varied special business applications. Successful candidates will direct activities both at customer sites and for Nixdorf in-house efforts with total profit and loss responsibility. A minimum of 3-5 years' experience in program management with large computer systems utilizing large amounts of special application software and a BS or MS in electronics or computer science desired **Ref. #8151F**

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If you would like to make a contribution to our organization, please forward your resume, including salary history, and indicating reference number, to Elizabeth Lightbourn, Nixdorf Computer Corporation, 168 Middlesex Turnpike, Burlington, MA 01803. An equal opportunity employer m/f.

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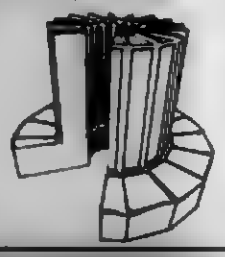

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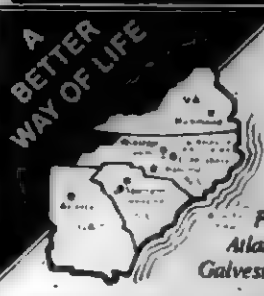

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Statewide Office of Human
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Room 1
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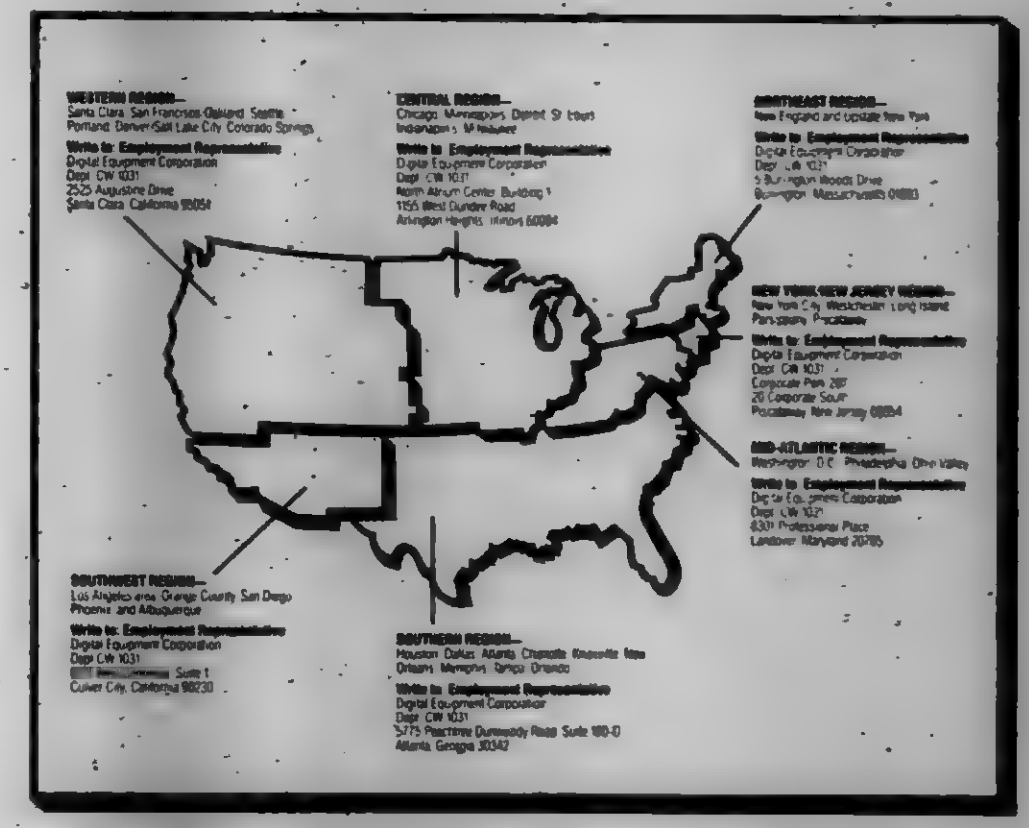

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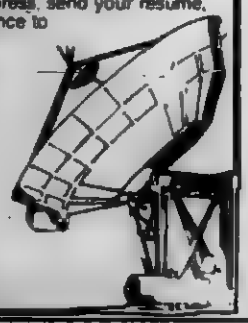

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Computer Scientist/Computer Documentation Specialist

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The Pennsylvania State University in Erie. Continuing position starting Fall, 1984. Tenure track if appointment is made at Assistant Professor level or higher. Duties include teaching and participation in research. Prefer Ph.D. in Computer Science or Ph.D. in related area with Masters degree in Computer Science. Will consider candidates with Masters degree and industrial or teaching experience. Rank dependent on qualifications. Salary and benefits competitive.

A detailed resume, three letters of reference and official transcripts should be sent to Dr. R.E. Larson, Acting Head, Division of Science, Engineering and Technology, The Pennsylvania State University, Erie, PA 16563. Application deadline is January 31, 1984 or until a suitable applicant is identified. An equal opportunity/affirmative action employer.

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Candidates must hold a Ph.D. in Computer Science or a related field and should have knowledge and experience in a core area. Application, including three (3) letters of recommendation and a current curriculum vitae, should be addressed to Chairman, Computer Science Screening Committee, Joint Center for Graduate Study, 100 Sprout Road, Richland, WA 99352. Evaluation of applications will begin on November 30, 1983. The Joint Center for Graduate Study/Washington State University is an Equal Opportunity/Affirmative Action employer.

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An Intergovernmental Electronic Mail Network. Proposals Due: Monday, December 12,1983 at 2:00 P.M. Proposal No. B48-400-8736. Sealed proposals will be received at the office of the Director of Purchasing, 2505 S.E. 11th Avenue, Portland, Oregon for Multnomah County, representing itself, several other local public agencies, and the State of Oregon is requesting proposal for hardware and/or software for the pilot phase of an intergovernmental electronic mail system. The product(s) offered will include or imply a network architecture which should be explained in detail. It is assumed that any centralized operation and support would be located at the Multnomah County Data Processing Authority facility as per specifications on file with the Purchasing Director. No proposal will be received or considered unless the proposal contains a statement by the bidder as part of his bid that the requirements of ORS 279.350 shall be included. Multnomah County reserves the right to reject any or all proposals.

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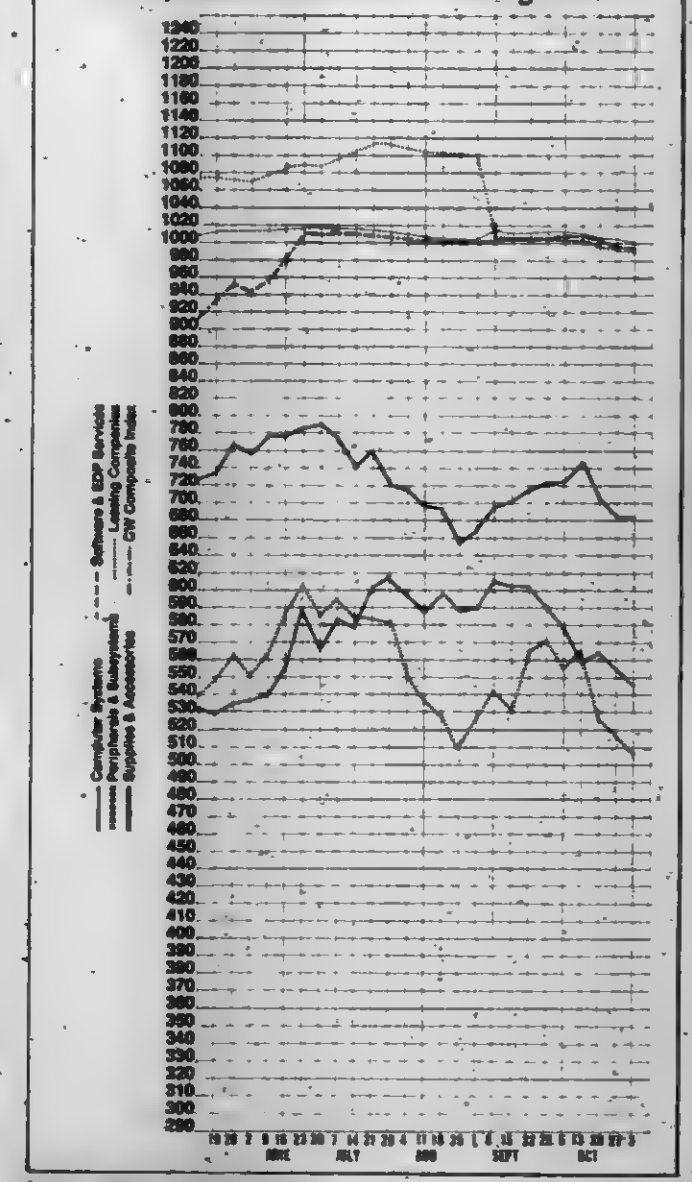

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O	APPLE COMPUTER INC	19- 63	23	+2 7/8	+14.2
N	AT&T	60- 76	61 7/8	+1 1/2	+2.6
N	BURROUGHS CORP	28- 58	46 5/8	+1 5/8	+3.2
O	COMPUTER AUTOMATION	6- 17	6	- 3/4	-11.1
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B	CONVERGENT TECHNOL	10- 41	20 1/4	0	0.0
N	CRAY RESEARCH INC	20- 94	53 7/8	+3	+5.9
N	DATA GENERAL CORP	20- 82	72 5/8	+1 1/8	+1.5
N	DATAPOINT CORP	11- 38	23 5/8	+ 5/8	+1.8
N	DIGITAL EQUIPMENT	82-252	88	+1	+1.4
A	EECO INC	8- 18	14 5/8	- 3/4	-4.9
N	ELECTRONIC ASSOC.	3- 15	3 7/8	- 3/4	-11.3
N	FLOATING POINT SYST	18- 44	32 7/8	-1	-2.9
N	FOXBORO	22- 47	28 7/8	-2 7/8	-8.7
O	GENERAL AUTOMATION	3- 16	6 3/8	- 1/2	-5.6
N	GOULD INC	28- 64	28 1/4	- 3/4	-2.5
N	HARRIS CORP	20- 51	34 3/4	-1 3/8	-3.8
N	HEWLETT-PACKARD CO	22- 48	37	+1 1/4	+3.5
N	HONEYWELL INC	90-132	128 3/8	- 3/8	-0.2
N	IBM	97-134	126 1/2	-1 1/2	-1.1
O	IPL SYSTEMS INC	8- 14	9 3/4	+ 1/8	+8.3
B	MAI-CDM INC	21- 35	23 3/8	+2 3/4	+13.1
O	MAGNUSON COMP SYSTS	2- 9	3/8	- 1/4	-60.0
N	MANAGEMENT ASSIST	7- 18	15 7/8	+2 3/8	+17.5
N	MATSUSHITA ELEC(ADR)	47- 77	73 1/8	+1 1/2	+2.0
N	MODULAR COMPUTER SYS	6- 16	7 3/4	- 3/4	-8.8
N	MOHAWK DATA SCI	10- 18	13 1/8	- 1/2	-3.5
N	MOTOROLA INC	82-140	122 3/4	-10 1/4	-7.7
N	NAT'L SEMICONDUCTOR	22- 80	53 1/4	+ 1/8	+0.2
N	NCR	38-125	128 3/4	+5 7/8	+4.7
N	PERKIN-ELMER	17- 37	27 3/4	-5 1/8	-15.5
O	PRIME COMPUTER INC	11- 36	14 5/8	+ 7/8	+6.3
N	SPERRY CORP	21- 47	45 3/4	+1 1/4	+2.8
O	TANDEM COMPUTERS INC	14- 38	32	-1 1/2	-4.5
N	TANDY CORP	28- 69	38 3/8	+3 3/4	+10.8
O	TELEVIDEO SYSTEMS	14- 41	18 1/4	+ 1/8	+0.7
N	TEXAS INSTRUMENTS	71-170	138 1/2	+20	+16.4
O	VECTOR GRAPHICS INC	2- 14	2	- 3/8	-23.6
A	WANG LABS "B"	13- 42	33 3/4	+2 3/8	+8.4
A	WANG LABS "C"	13- 42	33 5/8	+3 1/8	+10.2
N	XEROX CORP	38- 90	46 3/8	+ 1/2	+1.0
	LEASING COMPANIES				
O	BOOTHE FINANCIAL CP	11- 35	28 3/4	-1 1/2	-4.9
N	COMDISCO INC	7- 42	19 5/8	-4 3/8	-18.2
O	CONTINENTAL INFO SYS	3- 18	8	-1	-10.0
N	DPF INC	9- 19	13 7/8	+ 7/8	+6.7
O	U.S. LEASING	18- 47	28 1/4	- 1/8	-0.3
	COMPONENTS				
N	ADVANCED MICRO DEV	13- 36	26 1/4	- 1/8	-0.5
O	ADV'D SEMICONDUCTOR	13- 34	28 1/4	-1	-3.4
N	ANALOG DEVICES INC	18- 62	36	+ 3/8	+1.0
O	ANALOGIC CORP	20- 27	22	0	0.0
N	APPLIED MAGNETICS CP	18- 37	25 3/8	-1 3/8	-5.2
N	TERADYNE	14- 38	32 1/4	+2 3/8	+8.2

EXCH: N=NEW YORK A=AMERICAN P=PACIFIC B=BOSTON I=NATIONAL M=MIDWEST O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. EST LAST BID
(1) TO NEAREST DOLLAR

E x c h		1982-83 RANGE ($)	CLOSE NOV 2 1983	NET CHANGE	NET PCT CHANGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 8	5 1/8	- 1/8	-2.3
B	ADVANCED SYSTEMS INC	8- 22	17 3/4	0	0.0
O	AGS COMPUTERS INC	7- 32	24	-1 1/8	-4.8
O	AMERICAN SOFTWARE	31- 39	21 1/2	-3	-12.2
B	ANACOMP INC	7-[illegible]23	8 7/8	-1 1/8	-14.6
O	ANALYSTS INTL CORP	5- 28	18	+ 1/4	+1.4
A	APPLIED DATA RES.	8- 27	20 1/2	-1 1/2	-6.8
O	ASK COMPUTER SYSTEMS	6- 21	17 3/4	-1 1/4	-6.6
B	ASTRADYNE COMP INC	1- 7	3	0	0.0
N	AUTOMATIC DATA PROC	21- 64	25 1/8	-3	-9.9
O	CDA COMPUTER ASSOC	9- 17	13 5/8	+ 1/4	+1.8
O	COMPUTER ASSOC INT'L	8- 35	28	+ 3/4	+2.9
O	COMPUTER HORIZONS	6- 20	10 1/4	- 1/4	-2.3
O	COMPUTER NETWORK	4- 10	6 1/8	0	0.0
N	COMPUTER SCIENCES	11- 23	18 1/2	- 7/8	-4.5
O	COMPUTER TASK GROUP	6- 22	13 3/4	0	0.0
O	COMPUTER USAGE	2- 22	14 1/4	- 1/2	-3.3
O	COMPUTONE SYSTEMS	6- 38	8 1/4	- 1/2	-7.4
O	CONSERV CORP	6- 20	6	- 7/8	-12.7
O	CONSHARE	7- 13	8 1/2	- 1/8	-1.2
N	CULLINET SOFTWARE	12- 38	26 5/8	-3 3/8	-9.9
O	CYDANE SYSTEMS INC	9- 27	19	+1	+5.9
N	ELECTRONIC DATA SYST	10- 42	30 3/4	-2 1/4	-6.8
O	HOGAN SYSTEM INC	37- 93	61	-5	-2.3
N	GENERAL ELECTRIC CO	49- 58	52 3/8	+ 3/8	+0.7
N	GTE CORP	38- 48	46 7/8	+1	+2.1
N	INFORMATICS INC	10- 34	22 7/8	- 3/8	-1.6
O	INFOTRON SYSTEMS COR	25- 43	31 1/2	-1 1/4	-3.8
O	KEANE ASSOCIATES	4- 15	7 1/4	+ 1/4	+3.3
A	LOGICON	9- 39	28 1/4	+ 7/8	+3.0
B	MCI COMMUNICATIONS	13- 34	10 3/8	+ 3/4	+9.9
O	MDT SCI AMER INC	10- 41	25 1/4	+ 1/4	+0.9
B	MATHEMATICAL APP GRP	13- 22	12	-1	-7.1
O	MICOM SYSTEMS INC	23- 50	41 1/4	+1	+2.4
O	MONCHIK-MEBEN CP	6- 22	8 1/4	-1 1/2	-13.9
O	NATIONAL DATA CORP	5- 25	18 7/8	- 3/8	-1.9
B	ON-LINE SOFTWARE INT	12- 27	12	0	0.0
O	PANSOPHIC SYSTEMS	8- 30	20	-1 1/8	-5.3
B	PLANNING RESEARCH	4- 31	18 7/8	- 3/8	-2.1
D-	POLICY MGMT SYSTS CP	19- 38	27	- 1/8	-0.5
O	PROGRAMMING & SYS	1- 10	5 1/4	- 1/8	-2.3
B	REYNOLDS & REYNOLD	17- 32	31	- 1/2	-1.1
O	SEI CORP	11- 34	25 3/4	+ 3/8	+1.4
O	SHARED MEDICAL SYST	13- 43	36 1/2	-1 1/8	-3.0
O	SCIENTIFIC COMPUTERS	8- 14	10 1/8	- 1/8	-1.2
O	SOFTWARE AG	9- 17	8 5/8	0	0.0
N	TYMSHARE INC	12- 30	22 3/8	-1 1/8	-4.8
A	URS CORP	8- 16	12 7/8	+ 1/8	+1.0
N	WYLY CORP	7- 17	9 7/8	+1	+11.1
	PERIPHERALS & SUBSYSTEMS				
P	AM INTERNATIONAL	2- 7	6 3/8	+ 1/8	+2.0
A	ANDERSON JACOBSON	9- 28	8 1/2	- 1/8	-1.4
O	AUTO-TROL TECHNOLOGY	9- 28	17 3/4	+ 3/8	+2.1
B	DATACTEC INC	7- 32	14 3/8	-1	-6.5
A	DIEBOLD INT'L	4- 15	9 3/8	- 1/8	-1.3
A	DOLT-BEHANER & MEN	9- 88	42 1/2	-2 3/4	-6.1
O	DYMEC CORP	2- 6	2	- 1/8	-5.8
N	CENTRONICS DATA CORP	6- 20	17 1/8	+ 3/8	+2.2
A	OTTEC CORP	4- 12	8 3/4	-1 1/8	-13.5
B	CONRITRONICS	2- 20	8 1/2	+1	+13.3

E x c h		1982-83 RANGE ($)	CLOSE NOV 2 1983	NET CHANGE	NET PCT CHANGE
O	COMPUTER DEVICES INC	1- 21	1	-3	-75.0
O	COMPUTER TRANSCEIVER	4- 12	8 3/4	- 1/4	-2.8
A	COMPUTERVISION CORP	18- 53	41 5/8	+2 1/2	+6.3
A	COMRAC CORP	17- 38	17 1/2	+ 3/4	+4.4
A	DATAPRODUCTS CORP	10- 41	20 3/4	0	0.0
B	DATAWAM CORP	9- 12	11 1/8	- 1/8	-1.2
O	DATA SWITCH CORP	13- 41	28	0	0.0
O	DATUM INC	7- 17	8 5/8	- 1/8	-1.4
B	DECISION DATA COMPUT	3- 18	10 3/4	+ 3/8	+3.6
O	DOCUTEL-OLIVETTI	13- 38	13 1/4	- 1/8	-0.9
O	ELECTRONIC M & M	5- 11	7 1/8	- 1/8	-0.9
O	EVANS & SUTHERLAND	10- 50	34 3/4	-3 1/2	-9.1
B	GRANDALL TECHNOLOGIES	8- 22	8	0	0.0
N	GEN L DATA COMP INC	6- 28	23 3/8	-1 7/8	-6.8
O	GREAT SOUTHWEST IND	2- 8	1 1/2	0	0.0
N	HAZELTINE CORP	7- 31	20 3/4	- 3/4	-3.4
O	ICOT CORP	3- 18	3 3/8	3/4	-18.1
O	INFORMATION INTL INC	10- 22	13 1/2	0	0.0
O	INTEL CORP	11- 45	37	-1 1/2	-3.9
O	IPL SYSTEMS INC	9- 14	9 3/4	+ 1/2	+8.3
A	LUNDY ELECTRONICS	7- 18	11 1/4	- 3/8	-3.7
O	MEGADATA CORP	6- 15	11 1/8	+ 1/8	+1.1
A	MSI DATA CORP	18- 37	18 7/8	+1	+5.2
N	MASSCOMP CORP	9- 28	22 3/8	-2	-8.2
O	NETWORK SYSTEMS CORP	8- 34	21 1/4	+ 1/8	+0.5
N	NO AMERICAN PHILIPS	47- 74	72 3/4	+ 3/4	+1.0
O	NORTHERN TELECOM LTD	22- 48	41 1/2	+1 3/8	+3.4
O	OMEX	3- 6	6	0	0.0
A	PARADYNE CORP	14- 38	19 1/2	+1 1/4	+6.7
O	PERKIN CORP	7- 14	10 7/8	+ 3/8	+3.6
O	PHOENIX AMERICAN INC	7- 17	12 1/8	- 3/8	-3.0%
O	PLESSEY CO (ADR)	23- 41	38	+ 1/2	+1.3
B	PRINTRONIX INC	23- 34	24 1/2	-1	-3.9
O	RANTEC CORP	9- 25	8	-3	-23.0
N	RAYTHEON CO	42- 58	48 1/2	+1 1/8	+2.3
A	RECOGNITION EQUIP	6- 17	14 3/4	- 1/2	-3.2
O	RELA CORP	20- 66	35 7/8	+2 3/8	+4.4
B	SANDERS ASSOCIATES	32-126	37 1/4	+4 1/2	+8.5
B	SCAN DATA	1- 3	3/4	0	0.0
O	SCAN-TRON CORP	12- 18	15 1/2	0	0.0
O	SCIENTIFIC ATLANTA	19- 33	19 3/4	- 3/8	-1.8
O	STORAGE TECHNOLOGY	19- 33	18 1/2	+1 3/8	+8.0
B	SYKES DATATRONICS	3- 27	9 3/8	+ 7/8	+10.4
O	SYSTEMS & COMP TECH	27- 38	28 1/4	+1 1/4	+4.2
A	T DAU INC	7- 17	8 5/8	3/8	-6.7
A	TAB PRODUCTS CO	8- 31	26 1/8	0	0.0
O	TANDON CORP	18- 39	24 3/4	1 3/4	-3.7
A	TEC INC	8- 12	8 5/8	-1	-13.1
N	TEKTRONIX INC	34- 67	48 3/4	-2 1/2	-3.1
N	TELEX	8- 32	23 5/8	- 1/2	-2.0
O	TERADATA SYSTEMS CP	3- 17	8 1/8	- 1/8	-2.0
O	TIMEPLEX INC	7- 28	22 1/4	+ 3/8	+4.0
O-	VISUAL TECHNOLOGY	9- 26	10 1/2	0	0.0
	SUPPLIES & ACCESSORIES				
A	AMERICAN BUS FORMS	10- 30	28 5/8	-1 3/8	-4.6
O	BARRY WRIGHT	13- 32	31 3/4	- 1/2	-1.5
O	BURLER PRODUCTS INC	12- 38	28 1/2	- 3/8	-1.3
A	ENNIS BUS. FORMS	6- 28	25 3/8	- 3/4	-2.8
A	3M COMPANY	68- 86	84 3/4	- 1/2	-0.5
O	MOORE CORP LTD	74- 91	83 1/8	+ 3/8	+0.5
O	STANDARD REGISTER	11- 34	30 1/2	- 1/2	-1.6
B	WALLACE BUS FORMS	11- 31	30	0	0.0

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NEWSPAPER

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper — Second-class postage paid at Framingham, Mass. and additional mailing offices ©1983 by CW Communications/Inc.

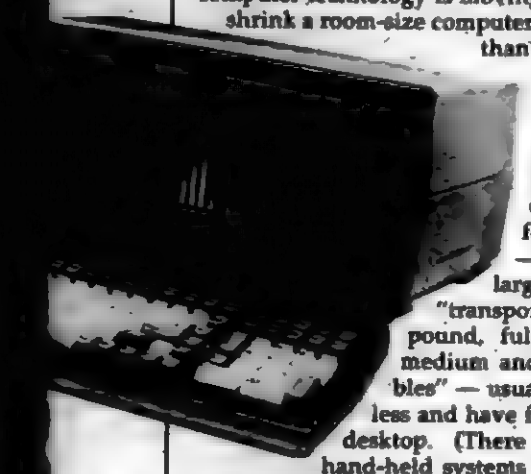
44/year — November 14, 1983 — Vol. XVII, No. 46

oduct Spotlight

The Portables: Traveling Quickly

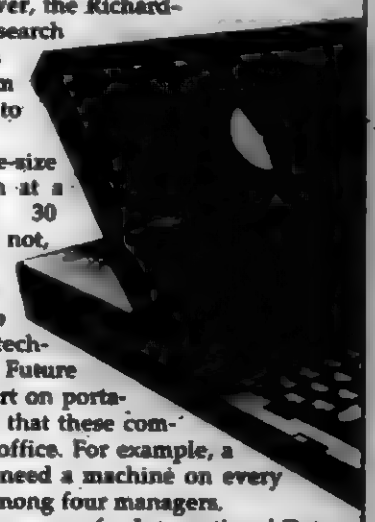
By Jim Bartimo
CW Staff

It is a testament to the exponential speed with which computer technology is moving that it took 30 years to shrink a room-size computer to desktop size, but less than five years to shrink a desktop computer to the size of a briefcase.



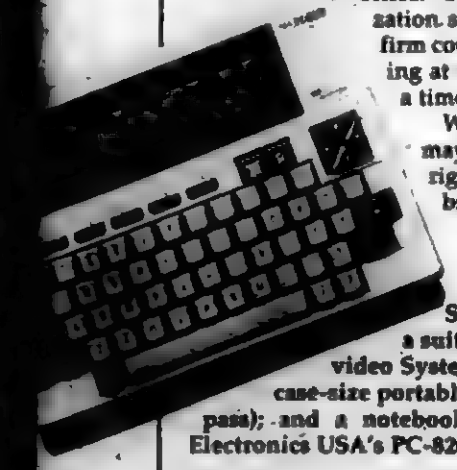
The move to miniaturization is continuing with portable computers, which today are offered in a variety of sizes — small, medium and large. The large ones — "transportables" — are 20- to 30-pound, full-function micros. The medium and small ones — "portables" — usually weigh 12 pounds or less and have fewer capabilities than a desktop. (There are also extra-small, hand-held systems with one-line displays, but their applications are limited.)

Just how seriously should the transportable market be taken? At the end of this year, some 410,000 transportables will have been sold, according to Future Computing, Inc. Moreover, the Richardson, Texas, market research firm estimates that this market will grow from $1.23 billion in 1984 to $2.76 billion in 1987.



Because the suitcase-size transportables weigh in at a back-breaking 20 to 30 pounds, many users are not, in fact, buying them with long-distance travel in mind. According to John Hemphill, senior technology consultant for Future Computing and an expert on portables, much of the travel that these computers do is within the office. For example, a company that does not need a machine on every desk can "divide" one among four managers.

Ellen Levin, product manager for International Data Corp. in Framingham, Mass., agreed that transportables are "too heavy to take back and forth to the home and office." But, she noted, a service organization such as a Big Eight accounting firm could hand them out for computing at the client's office for weeks at a time.



While transportables' weight may be too much, their size is just right. "The small footprint is a big factor," explained Kenneth

(Continued on Page 10)

Shown from top to bottom are a suitcase-size transportable (Televideo Systems, Inc.'s Teletote I); a briefcase-size portable (Grid Systems Corp.'s Compass); and a notebook-size portable (NEC Home Electronics USA's PC-8201).

One-Vendor Users Groups Denied Tax-Exempt Status

By Tom Henkel
CW Staff

WASHINGTON, D.C. — The Internal Revenue Service has pulled the rug out from under computer users groups with a ruling that denies tax-exempt status to user organizations dedicated to one vendor's products.

The Oct. 31 ruling applies to organizations seeking tax exemption as a "business league" or a group of people with a common business interest. In most cases, users groups are primarily comprised of users of a specific vendor's hardware. But even if the organization allows nonusers to join its ranks, the users group cannot qualify for the exempt status unless the forum is open to competing vendors, an IRS spokesman said.

The IRS made its decision, a tightening of a similar 1974 ruling, on the reasoning that a vendor's product line is only a segment of the total computer marketplace. A group of users devoted to solving problems and improving that product line, therefore, provides a service for the vendor and puts other vendors at a competitive disadvantage, the IRS spokesman explained.

The ruling caught administrators of most users groups by surprise. Several expressed concern that the ruling could cause financial problems for their organizations, but most were confused over exactly how the IRS plans to enforce the ruling. Several users group spokesmen said they wanted to see the actual IRS ruling before commenting on its impact.

The issue raised by the IRS centers on whether users groups can exclude makers of different or competing products from their meetings. The national Prime (Computer, Inc.) User Group, for example, does not allow vendors marketing Prime-compatible hardware and software to display products or make presentations at its meetings, according to the organization's president, Bill Lenharth. IBM users groups, such as Guide and Common, have similar policies.

But other users groups, such as the Eastern Region Prime User's Group (a regional subsidiary of PUG), open their meetings to vendors of competing products. According to PUG-East Presi-

(Continued on Page 8)

Communications Processor Announced by Tandem

By Jeffry Beeler
CW West Coast Bureau

CUPERTINO, Calif. — Tandem Computers, Inc. today expanded the communications capabilities of its product line with an enhanced front-end processor that reportedly outperforms its Tandem predecessors by 20% to 40% and gives users increased flexibility in configuring their networks.

The Model 6100 integrates into a single package all of the communications features found in the firm's previous systems, a Tandem spokesman said. However, the early models — the 6303, 6202 and 6204 — will continue to be sold and supported.

A beta test site for Tandem's first 32-bit processor, the newly introduced TXP, confirmed the vendor's performance claims. *Story on Page 9.*

Like the rest of Tandem's fault-tolerant Non-Stop product line, the 6100 is aimed primarily at on-line transaction processing environments, requiring large numbers of terminals for applications such as automated banking, point-of-sale and shop-floor control.

The Model 6100 front-end controller is said to accommodate simultaneously up to.

(Continued on Page 8)

Inside

First users of Viewtron, America's first commercial videotex service, are happy with what they see. But the technology's true screen test lies in the future. **Page 2.**

• • •

Apple Computer, Inc. will introduce "major new products" early next year, its president said last week as he warned Wall Street analysts that earnings will remain down through next spring. **Page 4.**

• • •

The research relationship between IBM and Josephson junction technology has cooled, raising to three the number of major firms that have put supercooling on the back burner. **Page 5.**

• • •

IMS or IDMS? When the John Hancock Mutual Life Insurance Co. had to choose between those data base management systems, it used a performance management utility to build performance models of the two. **Page 13.**

• • •

Mobil Oil Corp. has given a little gas to the movement toward a national electronic payment system. It has become the first to announce plans for a network that would allow consumers around the nation to use bank debit cards for retail purchases. **Page 103.**

• • •

Yet another IBM-compatible communications gateway has been announced. A back-end processor from Plexus Computers, Inc. lets users of IBM microcomputers access data in Plexus superminicomputers. **Page 117.**

• • •

An export administration bill has been approved by the House of Representatives. **Page 151.**

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Second-class postage paid at Framingham, Mass., and additional mailing offices. Computerworld (ISSN-0010-4841) is published weekly except February (4 issues), April (5 issues), May (4 issues), June (5 issues), August (4 issues), September (4 issues), October (5 issues), November (4 issues), December (3 issues) and a single combined issue for the last week in December and the first week in January by CW Communications/Inc., Box 880, 375 Cochituate Road, Framingham, Mass. 01701.
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Users Generally Pleased

First U.S. Videotex Service Up

By Phil Hirsch
CW Washington Bureau

MIAMI — First users of Viewtron, the nation's first commercial videotex service, which went into operation here Oct. 30, are generally pleased. But whether the videotex service will be a long-term success depends on future subscribers and their acceptance of the technology, according to an executive of the firm that implemented the system.

"It has met our expectations," reported Norman Morrison, executive vice-president of Viewdata Corp. of America. And if subscriptions to Viewtron continue at the present rate, "we'll be in good shape," he said.

The Viewtron venture is the result of seven years of market research and a $20 million investment. Subscribers access data base information using a $600 Sceptre terminal supplied by Western Electric.

AT&T was deeply involved with Viewdata in the preliminary planning of the system. However, Viewdata — a wholly owned subsidiary of Knight-Ridder Newspapers, Inc., publishers of the *Miami Herald* and a number of other papers — is the system operator.

If Viewtron succeeds in Miami, similar services will be launched in a number of other cities. Knight-Ridder has negotiated joint venture agreements with publishers in 17 cities and plans to offer Viewtron alone in five others where it publishes newspapers.

To Set the Standard?

Prospective videotex developers across the country are closely watching Viewtron not only because it is the first commercial service to become operational in the U.S., but also because the Sceptre terminal is the first one to implement the North American Presentation Level Protocol Syntax (NAPLPS), a graphics display format adopted earlier this month as a U.S. standard by the American National Standards Institute.

Although NAPLPS produces better graphics than its chief rival — Britain's Prestel system — the Viewtron terminal, at $600, is considerably more expensive than Prestel terminals. One big question is whether NAPLPS graphics will attract a sufficient number of subscribers willing to pay $600 for the hardware and a sufficient number of advertisers. These are a videotex system operator's main revenue sources.

It may be significant that the *Los Angeles Times*, which plans to begin offering a videotex service next summer to 880,000 households in Southern California, also has chosen the Sceptre terminal, but will rent rather than sell the device, at least initially.

Viewtron charges approximately $12/mo for data base service and $1/hour for communications; in addition, the subscriber has to pay $600 up front for his terminal.

By comparison, the charge for the *Los Angeles Times'* Gateway service will be about $35/mo, a spokesman said. That cost will cover the terminal rental fee plus the service charge. Subscribers will access the data base through a local dial-up, or 800-service, telephone call, so there will be no charge for communications.

Correction

An article announcing Paradyne Corp.'s PDN5200 packet-switching system [CW, Oct. 24] should have specified that the product implements the packet switch recommendation of the Consultative Committee on International Telegraph and Telephone (CCITT), not ITT.

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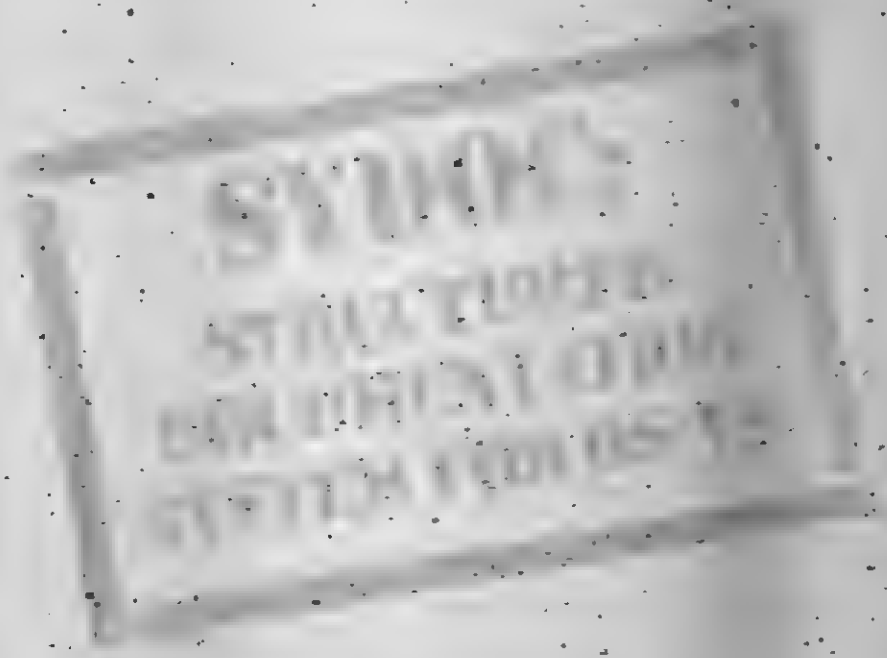

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Apple Says Earnings Will Remain Depressed

By Peter Bartolik
CW Staff

NEW YORK — Apple Computer, Inc.'s chief executive last week warned Wall Street analysts that increased expenditures on new products will keep the company's earnings through next spring at the depressed levels reported Sept. 30.

"Major new products" will be announced early next year, including a 32-bit microprocessor, John Sculley, Apple's president and chief executive officer, told a gathering of analysts here. That microprocessor is universally believed to be the rumored Macintosh.

Two analysts with differing views of Apple's strategy agreed after the meeting that the company is betting much on the hope of carving out a market niche with the Macintosh.

Apple's earnings for each of the next two quarters ending Dec. 31 and April 1 "should not be expected to exceed the eight cents [per share] reported for 1983's fourth quarter, which ended on Sept. 30, 1983," Sculley said. Earnings in the $5.1 million range reported in September would be significantly below the $23.5 million reported last December and $23.9 million reported last April.

It will take a year for Apple's earnings to return to the traditional return-on-equity level of about 25%, Sculley reported. "It is not in the best interests of our long-term business or our shareholders to compromise new product development, marketing support of new products or development of enhancements to increase the competitiveness of existing products in order to show favorable short-term quarterly earnings results," he said.

Analysts' Reaction

While Sculley encompassed the Lisa and the Apple II microcomputers in his remarks, analysts told *Computerworld* after the meeting that the company is counting on a big splash with the Macintosh to spur consumer demand.

"They are betting the company on the Macintosh" is the way that Michele Preston, an analyst with L. F. Rothschild, Unterberg, Towbin, put it. Preston said Apple claims to have 100 companies developing software for the expected micro.

Preston concluded that Apple hopes to establish the Macintosh as a standard apart from the IBM Personal Computer and will need a "spectacular" splash to do so. "Everybody is going to be dazzled by it; the question will be, 'Do the users buy it?' "she said.

Donald Brown, analyst with Shearson/American Express, Inc., is not dazzled by the new micro and said the Macintosh strategy "has high potential, but high risks." He said Apple will start manufacturing "revenue-producing" Macintoshes within two weeks and will begin selling them in January for about $2,500. For a "downgraded Lisa," he said, that price is too high in comparison to IBM's recently announced PCjr models.

According to Brown's projections, the company will only post an earnings ratio of 60 cents per share when fiscal year 1984 closes out next September, with Apple II sales remaining flat and Lisa inventories staying high. In the fiscal year just ended, the company reported earnings of $1.28 per share despite the poor fourth quarter.

Apple also announced and endorsed last week a Rana Systems, Inc. add-on product that reportedly will contain a processor and dual disk drive enabling the Apple II series of microcomputers to run programs written for Microsoft, Inc.'s MS-DOS operating system.

With that unit priced at about $1,500 on top of the base price of the Apple II units, Brown said, "It's unacceptable. . . . Why not go out and buy an IBM?"

IBM PCjr 'a Puny System,' Not Inexpensive, Says User

By David Myers
CW New York Bureau

IBM's newly introduced PCjr is "a puny system," one of the microcomputer's first users said last week.

"People are going to buy it thinking it's an inexpensive system and find they need a lot more expensive equipment to really run it," said William R. Parks, a professor of microcomputing at Maricopa Technical Community College in Phoenix.

A number of sources, including developers and builders in the personal computing aftermarket, told *Computerworld* last week that IBM deliberately designed the PCjr so it would not compete against the two-year-old Personal Computer.

"When [IBM] decided to go into this market, it essentially decided to make a machine that competes with the [Personal Computer]. So they built roadblocks into it to keep people from turning it [PCjr] into a cheap [Personal Computer]," said an executive with an electronics component manufacturer who asked that his name not be used.

It is those "roadblocks" that have made the PCjr a target of attack by users who had hoped the new micro [CW, Nov. 7] would run the same programs at home that the Personal Computer runs at the office.

People who want to expand the PCjr to its full capabilities, or even far enough to make it useful as an at-home extension of the Personal Computer, may have to invest more money than they had originally planned. For example, the basic $669 PCjr must be fitted with a disk drive; modem and display monitor to make it usable by corporate managers, bringing its price to $1,813. A similarly configured Personal Computer, with 128K bytes of random-access memory and one dual-sided floppy disk drive, costs $3,169.

The biggest difference between the two machines is the keyboard. The PCjr's keyboard — an under-$50 component manufactured by Advanced Input Devices, an Idaho company — has no function keys and has been described by some first users as "toylike."

The PCjr keyboard "makes [the computer] feel like a different machine [from the Personal Computer]. That's going to be the biggest stumbling block to use of the system by corporate managers," one industry consultant said.

A rival keyboard maker, who spoke to *Computerworld* on the condition that his name not be used, said the problem with the keyboard is its "nonstandard size." PCjr's keyboard has 62 keys — 21 fewer than its older brother — and the rectangular keys are widely spaced, more like a calculator's keypad than a typewriter's.

Because of the missing function keys, "there's no way this machine can be used at home by corporate managers. Someone who wants to run an accounting program, for instance, has to buy the other machine [the Personal Computer]," the keyboard manufacturer executive said.

Because of the keyboard's design, there is also some question of its durability. However, Peter Wezeman, vice-president of sales for Advanced Input Devices, who declined to say whether the company had produced the keyboard for IBM, said comparable products were rated for about 30 million operations.

Despite criticisms, however, few people believe IBM's smallest personal computer — built for the firm by Teledyne, Inc. — will fail to hit its target market.

"It's a dud, but so was the [Personal Computer] when it first came out," said Nick Cosentino, operations manager for Pure Data Ltd., a maker of multifunction boards for the Personal Computer and Personal Computer XT. Cosentino said the aftermarket helped win acceptance for the Personal Computer, and it will help win acceptance for the PCjr.

"[IBM's] master plan is to take all the business back themselves. They let suckers like us establish the market for them, then they come in and take it over," Cosentino said.

An IBM spokesman, however, disputed Cosentino's view, saying the technical reference manual on the PCjr would be available in IBM product centers in December.

IBM detractors disagree, pointing to the company's switch from Version 1.0 to Version 2.0 of the PC-DOS operating system at the introduction of the Personal Computer XT, believing it to be a tactic to discourage the aftermarket from cashing in on sales of the computer. PCjr runs under PC-DOS 2.1, raising fears that the company plans another operating system switchover.

Meanwhile, makers of expansion boards are rushing to get PCjr add-ons ready for market. Software writers are lagging behind, but said they should be ready with competing programs by the time PCjr shows up in the stores next February.

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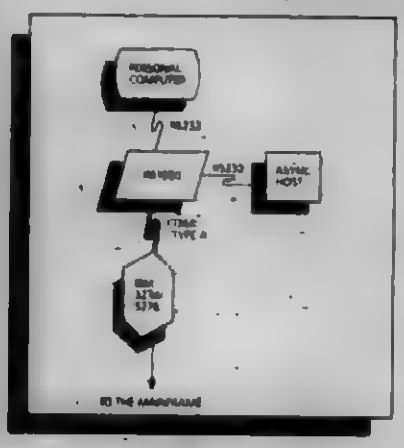

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Refocus on Silicon, Gallium Arsenide

IBM, Bell and Sperry Scrap Josephson Research

By Tom Henkel
CW Staff

Josephson junctions, the supercooled, superfast circuits that many researchers thought held the key to the next generation of computer systems, appear to have lost their glimmer.

IBM, Bell Laboratories and Sperry Corp., the three top firms experimenting with Josephson junctions, have scrapped their research in favor of silicon- and gallium arsenide-based research projects. Sperry cut back its Josephson project significantly in June, citing basic problems with the technology. IBM and Bell Labs officially halted Josephson research in the past two months, citing technical problems with building Josephson circuits that have severely impaired the possibility of manufacturing cost-effective, reliable Josephson-based processors.

The technology is based on a theory developed in 1962 by British physicist Brian Josephson which states that circuits become superconductive, or lose almost all resistance, when cooled to near absolute zero (about minus 400 F). To get down to that temperature, the circuits must be immersed in a very cold substance such as liquid helium.

While the severe cutbacks by Sperry, IBM and Bell Labs do not signal that research into Josephson junctions is dead — all three organizations, as well as academic and military researchers, are still investigating the Josephson effect. They indicate there are apparently too many problems with Josephson technology for it to be released as an economical, reliable commercial product.

Computer manufacturers are driven to adopt the most economical means to an end to attract customers, and Josephson technology currently cannot provide that means. The government and military may now lead Josephson research since the government's budget, fed by tax dollars, is not specifically geared toward the production of an economical end product.

Researchers Reassigned

IBM, which reportedly has spent more than $100 million on Josephson research since 1976, has reassigned most of the 115 Josephson researchers at the Thomas J. Watson Research Center in Yorktown Heights, N.Y. The company also shut down an experimental Josephson manufacturing project at its East Fishkill, N.Y., plant that was part of the research and development effort.

About one sixth of IBM's Josephson research team will continue to work on cryogenic devices, an IBM spokesman said. They will work on gallium arsenide- and bipolar silicon-based devices.

Bell Labs, which one industry watcher estimated has spent about $50 million to $75 million on Josephson, has reassigned all but one or two of its Josephson researchers and has stopped all development of Josephson devices. Thomas Fulton, a member of the technical staff at Bell Labs, said in a telephone interview last week that the Josephson project started to wind down about a year ago, when lead researchers on the project decided to refocus their efforts on gallium arsenide and optics research.

However, the researchers' refocusing was not done in an effort to find a replacement for the Josephson technique, Fulton noted.

"We could show no immediate application [for Josephson junctions] in telecommunications," a Bell spokesman said, adding that technical problems with the Josephson technique made its use appear unrealistic when compared to recent advances in gallium arsenide and silicon devices.

Sperry, which has been researching the Josephson effect for about as long as IBM, virtually killed its Josephson project because of problems in maintaining the low temperature conditions required to promote the Josephson effect, a spokesman told *Computerworld* last week. The spokesman added that Sperry could not give an accurate estimate of how much it has spent on Josephson research because the research is bundled into other projects, such as silicon and gallium arsenide research.

Sperry has refocused most of its research on gallium arsenide, the spokesman said, adding that gallium arsenide appears to offer the potential of surpassing the performance expected from Josephson junctions.

Some scientists thought Josephson junction devices held the potential of offering circuits with sub-nsec switching speeds. A Bell Labs experiment developed a series of 548 Josephson circuits with internal switching speeds of about 1 nsec. However, the actual switching speed of the Josephson device was 75 nsec, about three times that of currently available mainframe processors. Bell attributed this to the long distances the information had to travel from the liquid helium bath to the parts of the equipment at room temperature [CW, July 5, 1982].

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Feb 27-02 San Francisco
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Circuitous Route Leads Exec to Telecom Post

By Katherine Hafner
CW Staff

MEMPHIS, Tenn. — Patrick Greenish's career path has been a circuitous route to the top. Recently appointed vice-president of international telecommunications for Federal Express Corp., he is an attorney whose involvement in data communications came by way of his legal practice.

The 35-year-old Greenish was born in Morocco and raised in Western Europe. He received his bachelor's degree in secondary education from St. Francis College in Loretto, Pa., and later graduated from Western New England College in Springfield, Mass., with a law degree.

Greenish had a private law practice from 1976 to 1978, then went to Western Union International, Inc. in New York City as a corporate attorney.

It was at Western Union International that he gained the technical knowledge of telecommunications that would catch the eye of Federal Express.

"At [Western Union] I received an overview of the working of international telecommunications operations ... the various circuitry and services offered between the U.S. and international points, including a basic understanding of the European packet-switched networks and interface requirements between Europe and the U.S.," Greenish recalled.

In 1982, Greenish was made director of European international relations at Western Union. He was in Europe when he crossed paths with some Federal Express executives. "Federal was looking for someone with a telecommunications background. Throw that in with a little bit of legal background, and mine was exactly the type of experience they were looking for."

Legal Background

"My legal background will help me out a great deal in this job," Greenish added. "We're in the process of setting up an international telecommunications department that will require some sort of entity overseas."

In his new position, Greenish is in charge of the international portion of Federal Express' planned electronic delivery service as well as setting up the international network for data processing.

The new electronic delivery service, expected to go into operation between April and July of next year, involves sophisticated facsimile transmission of documents with guaranteed two-hour delivery.

"One of the requirements of my job is to have an understanding of overseas international telecommunications and monopolies," Greenish said.

"My tenure at Western Union prepared me for that. I also have good experience with the line requirements and procurement requirements to set up the network. I think I have an added advantage in that I'm in a better position to figure out where we can establish subsidiaries."

Greenish is the first to admit that his strength does not lie in technical matters.

"I think I know enough to get me by, but I wouldn't want to hold myself up as having any expertise in the telecommunications area," he said. "I've always relied on others for that."

Greenish's job was created when the international network grew to the point where a separate director was needed to handle the project.

"It's a little overwhelming right now because I have to develop a staff," Greenish said. "But Federal Express is a great place to work. It's a very people-oriented company."

'I think I know enough to get me by, but I wouldn't want to hold myself up as having any expertise in the telecommunications area,' says Patrick Greenish, Federal Express' newly appointed vice-president of international telecommunications, who started his career as a lawyer. 'I've always relied on others for that.'

How Charles E. Ames "dumped the dumb"

You'd be hard pressed to find someone who keeps up with IBM's smaller systems better than Charles E. Ames does. He's president and editor of **Basic Society News**, an independent journal devoted to the subject.

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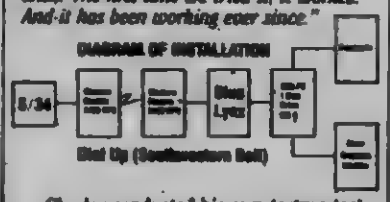

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House Poised for Final Vote on Bill Prohibiting Phone Net Access Charges

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Legislation that would wipe out the rate cuts recently proposed by AT&T for many business communications services was up for a final vote in the House of Representatives last week as *Computerworld* went to press.

The bill, H.R. 4102, would prohibit the Federal Communications Commission (FCC) from imposing surcharges next April on residential and single-line business customers for accessing the long-distance telephone network.

It would also require users of bypass facilities to help pay for the upkeep of local exchange networks.

The surcharges are a key part of an FCC plan to change the way local telephone companies are reimbursed for providing access to the long-distance network.

A $6.5 Billion Tab

Today, long-distance carriers pay for this service and pass on the charges to their customers; the tab comes to about $6.5 billion annually.

Under the FCC's access charge plan, a major portion of this $6.5 billion would be paid directly by all users of local telephone service. Residential and single-line business users would contribute roughly a third of the total amount next year and approximately two-thirds beginning in 1989.

Part of the rest of the $6.5 billion would come from multiline business subscribers in the form of a monthly surcharge on each local loop. The balance would be paid by long-distance carriers, which would pass on the charges to their customers.

If H.R. 4102 is enacted, much of the residential/single-line business users' share of the $6.5 billion will have to be assumed by multiline business subscribers.

AT&T, which recently proposed a new tariff based on the FCC plan — one offering substantial rate cuts to users of longer distance and/or higher bit-rate services — has said it will cancel the reductions if the legislation is enacted.

Before that can happen, the full Senate must vote on a companion bill (S. 1660), and any differences between the House and Senate measures will have to be worked out by a conference committee.

Senate action on the above is scheduled next month.

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Tandem Adds Communications Front End

(Continued from Page 1)

360 lines. In addition, each line can be individually microprogrammed by transmission and line type, electrical interface, protocol and communications speed, allowing a broad assortment of line configurations to coexist in the same network, the spokesman said.

Communications attributes of the processor include:

- Three transmission types — asynchronous, byte synchronous and bit synchronous.
- Two line disciplines — point-to-point and multipoint.
- Two electrical interfaces — RS-232 and V.24/V.28.
- Multiple protocols capable of supporting the IBM 3270 terminal, 2780/3780-class equipment, X.25 packet switching and Tandem's own video display units and point-of-sale terminals.
- Transmission rates ranging from 50 bit/sec to 56K bit/sec.

An important difference between Tandem's latest front-end processor and its three predecessors is that the enhanced product assimilates many of the communications functions previously assigned to facilities like interrupt handlers, controllers and system processes. The 6100 cuts a central mainframe's communications overhead by 20% to 40% and in so doing frees the machine to devote its resources to practical applications, the spokesman said.

The most recent addition to Tandem's front-end processor family consists of two main parts: communications interface units and line interface units. The communications interface units support either Tandem's Non-Stop II or TXP mainframes and are always connected to two such CPUs at the same time.

To ensure the continuous processor availability that has become the hallmark of Tandem's Non-Stop architecture, the communications interface units are installed in pairs, with up to three pairs able to operate with each dual-CPU complex. If one of the communications interface units in a pair breaks down, its twin will automatically fill the breach and allow its two associated mainframes to continue operating without interruption or performance degradation, the spokesman said.

Every communications interface unit pair controls as many as 15 line interface units, each of which corresponds to a different communications line, the spokesman said. The line interface units consist of two printed circuit boards, a line interface module and a communications line interface processor. Housed in their own separate enclosure, the line interface units can be situated up to 200 feet from their cooperating communications interface units.

As their name suggests, the line interface units provide the 6100's transmission lines with their necessary electrical and mechanical interfaces. The communications line interface processors are the modules that allow each of the lines to be individually programmed with its own mix of communications attributes.

To define or revise a given line's protocol, users need only to download the microcode from their Tandem mainframes to the appropriate communications line interface processor, which holds its own dedicated microprocessor and 64K bytes of random-access memory (RAM).

In addition to permitting lines to be configured independently, a communications line interface processor's on-board microprocessor and RAM enable the 6100 to be easily upgraded to support future communications capabilities as they become available, the spokesman said.

Tandem has already announced its intention to make the 6100 compatible with IBM's Systems Network Architecture by the end of next year.

A basic 6100 subsystem configured with two communications interface units costs $23,900, with each line interface unit selling for an additional $1,940. Tandem is located at 19333 Vallco Pkwy., Cupertino, Calif. 95014.

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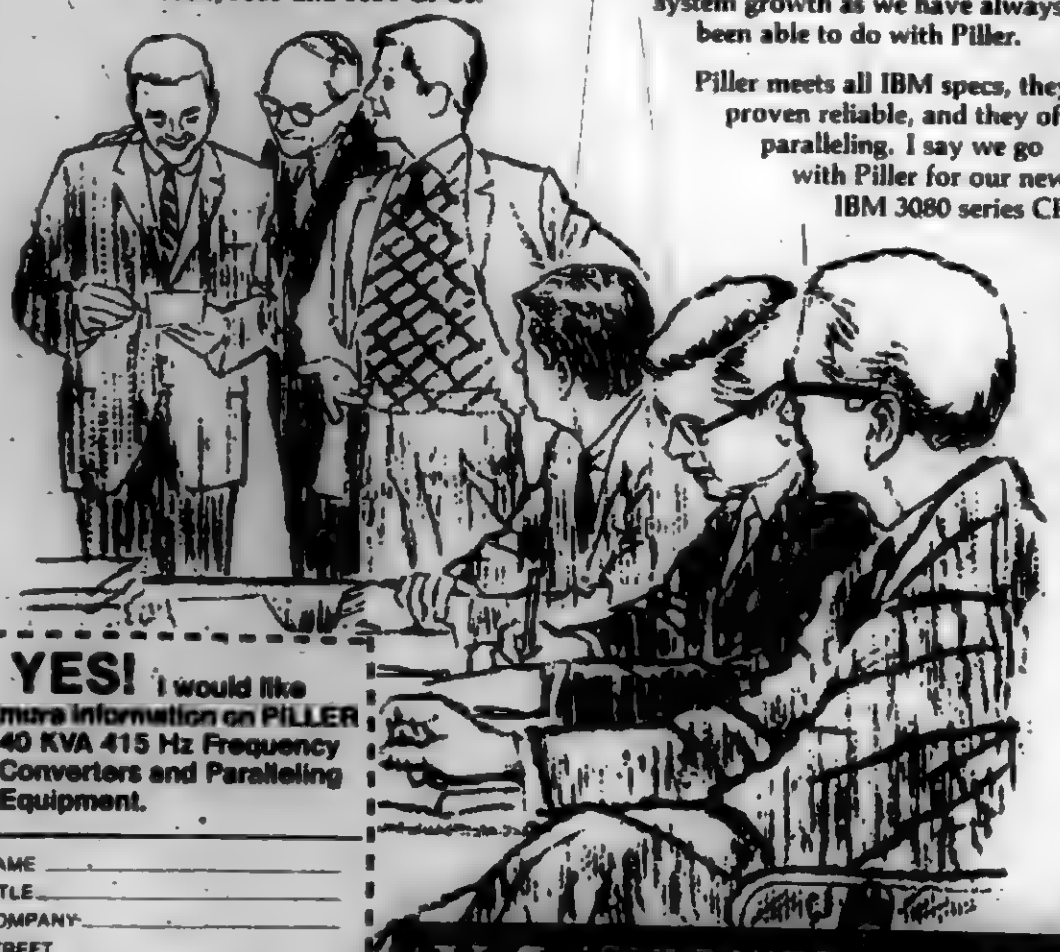

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Groups Denied Tax Exemption

(Continued From Page 1)

dent Raymond J. Grande, the open-door policy has created problems. Prime has refused to send representatives to PUG-East this February in Baltimore because non-Prime vendors will be present.

Lenharth said the IRS appears to be putting users groups in a no-win situation. If the groups deny other vendors the opportunity to participate in and display products at meetings, tax-exempt status will be denied because the users group has too narrow a focus. However, if all vendors are allowed to participate and display products, the IRS will consider the meetings trade shows and also deny tax exemption.

Tom Clark, who publishes an independent newsletter for users of Burroughs Corp. hardware, said the IRS ruling may have an adverse impact only on organizations like the Cooperative Users of Burroughs Equipment if the organizations turn a profit. As long as the users groups spend all the money they take in over the course of a year, tax-exempt status should not be an issue, he said.

Vendor's 32-Bit Non-Stop CPU

User's Tests Jibe With Tandem Claims for TXP

By Jeffry Beeler
CW West Coast Bureau

SACRAMENTO, Calif. — One of the beta test sites for Tandem Computers, Inc.'s first 32-bit processor has confirmed the vendor's claim that the recently introduced machine [CW, Oct. 24] has two to three times the performance of its most powerful sister system.

During a recent benchmark test at System Integrators, Inc., a configuration built around three Tandem TXP processors reportedly delivered 2½ to three times more computing power than a similarly configured cluster of Tandem's older Non-Stop IIs.

The test results jibe almost exactly with the performance claims that Tandem made for the TXP when the transaction processing machine was formally introduced during an Oct. 18 press conference held in New York.

Founded about 10 years ago, System Integrators ranks among Tandem's largest OEMs, according to Jack Pritchard, who is the users organization's general director of marketing.

For years, the company has bought large quantities of Non-Stop mainframes and then resold them as modules in an electronic publishing system that allows newspapers and magazines to automate their editorial, production and advertising functions.

At some unspecified time in the future, System Integrators will probably begin to upgrade its current product line by expanding its selection of Tandem processors to include the month-old TXP, Pritchard maintained.

Under Own Roof

But before it begins selling the TXP to its customers, the OEM insists on experimenting extensively with the mainframe under its own roof. System Integrators' effort to familiarize itself with the 32-bit machine began around Sept. 1, when the company installed its first TXP in its in-house research and development department.

The installation project calls for System Integrators to replace eventually its existing R&D system, built around four 16-bit Non-Stop IIs, with three 4M-byte TXPs. Among its main benefits, the conversion effort is expected to boost substantially the power of the company's new product development system, Pritchard predicted.

"Of course, we could achieve the same performance increase just as easily by simply installing some additional Non-Stop IIs alongside the ones we already have," he said, "but we decided instead to acquire some of the new TXPs in the hope of gaining some valuable hands-on experience with the machines."

Software Prep Tasks

For nearly two months after they first arrived at System Integrators' doorstep, the three TXPs occupied a section of the firm's manufacturing floor. There, for the better part of a week, company employees devoted themselves to a variety of software preparation tasks that included loading the freshly uncrated processors with their necessary test information and data bases.

Then, in late October, the vendor began dismantling and transporting the CPUs from their original installation site to a permanent location in the organization's development area, where the products were slated to be reassembled and reactivated early this month.

For about two weeks beginning in late September, System Integrators conducted an assortment of performance comparison tests involving a three-processor Non-Stop II configuration and a similarly configured TXP system.

In one of the tests, which lasted an hour and entailed the processing of almost 16,000 transactions, the vendor loaded the Non-Stop IIs to 50% of their capacity and then steadily increased the computing burden to 80% and 90%.

Responding to Applications

After observing how system performance changed in response to growing applications work load, the firm duplicated the procedure with a TXP-based configuration.

In the end, according to Pritchard, the 32-bit machines were found to process on-line transactions as much as three times faster than their 16-bit predecessors — a finding that corroborates Tandem's own performance ratings.

The results of the independent benchmark tests also affirmed Tandem's earlier claim that the TXP is fully software-compatible with the Non-Stop II, Pritchard added, although "the system generation processes for the two machines are quite different."

That discrepancy between the transaction processing engines forced System Integrators to "regen" its TXPs before it could finally press them into service, according to Pritchard.

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Users Flock to Portable, Transportables

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[illegible]	[illegible]	16	MS-DOS	[illegible]	1 Floppy Drive	[illegible]	[illegible]
Computer Devices, Inc. Dot 3000 A	64K	16	MS-DOS	—	1 Floppy Drive	10 in.	$3,220
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] Floppy Drives	[illegible]	[illegible]
[illegible]	[illegible]	16	MS-DOS	[illegible]	2 Floppy Drives	7 in.	[illegible]
[illegible]	[illegible]	16	MS-DOS CP/M 86[4]	—	[illegible] Hard Disk	9 in.	[illegible]
Non Linear Systems, Inc. Kaypro 10	64K	8	CP/M	6	1 Floppy Drive 1 Hard Disk	9 in.	$2,795
Kaypro II	64K	8	CP/M	6	2 Floppy Drives	9 in.	$1,795
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Radio Shack/Tandy Corp.[2] TRS-80 Model 4P	64K	8	TRS-DOS[5]	—	2 Floppy Drives	9 in.	$1,799
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Televideo Systems, Inc.[3] Teletote I	64K	8	CP/M	3	2 Floppy Drives	9 in.	$1,499

Shaded Machines Indicate IBM Personal Computer Compatibility
[1]Source: International Data Corp.
[2]Data Provided by Vendor.
[3]MS-DOS from Microsoft, Inc.
[4]CP/M, CP/M 86 from Digital Research, Inc.
[5]TRS-DOS from Radio Shack.

(Continued from Page 1)

Bosomworth, president of International Resource Development, Inc. of Norwalk, Conn. "If your desk looks anything like mine, a small footprint is important."

The Specter of Instability

Transportables made their appearance on the computer scene two years ago, when Adam Osborne introduced the Osborne I, an 8-bit suitcase with bundled software and a peephole screen. The Osborne I "was a good deal for a two-disk system," Bosomworth said. "The portability was an extra."

Oscilliscope maker Non-Linear Systems, Inc. then jumped into the transportable fray with a somewhat larger screen and a plan to take much of Osborne's business away.

At last count, 27 companies were offering a transportable of some type. Even the staid Tandy Corp. recently repackaged its Model 4 into a handy transportable machine and will this week begin offering it through its Radio Shack outlets, just in time for Christmas.

Roller-Coaster Times

Despite all this activity in the transportable market, the man who started the trend toward transportability in micros may have also started the trend that all the micro world had been fearing — the shakeout.

Osborne's filing for protection under Chapter 11 this past September reminded many users that the micro business is still in the roller-coaster times of introduction and bankruptcy.

However, in spite of Osborne's misfortune, industry experts believe the transportable market is probably the most insulated from a shakeout. "Osborne had a management problem and a distribution problem," Levin explained. Osborne "got their dealers mad by announcing the Executive system [a more powerful version of the Osborne 1, with extended features] without letting their dealers know."

The uncertainty generated by what appears to be the beginning of a shakeout has been one factor contributing to many users' hesitancy about buying a transportable. Perhaps to prove that they will remain a powerful force in the desktop market, transportables have added hard disks (Non Linear Systems, Inc.'s Kaypro 10) or IBM compatibility (Corona Data Systems, Inc.'s Portable PC 2) or both (Eagle Computer, Inc.'s Spirit XL).

The reliability of hard disk portables has been questioned by some, but almost everyone agrees that IBM compatiblity is a good idea (see story at left).

The Briefcase Computers

The portables — those that are the size of a briefcase rather than a suitcase, such as the Sharp Electronics Corp. PC-5000 — are currently as small as computers can get without significantly losing the functions of a desktop computer.

With features such as a flip-up LCD (or, in the case of Grid Systems Corp.'s Compass, an electroluminescent display), portables are designed for easy travel. But most portables fall short of being categorized as full systems because it is difficult to carry

Product Spotlight

Hopping on Two Bandwagons at Once

Buying an IBM-compatible transportable computer is like hopping on two bandwagons at the same time, but there are a number of good reasons for doing so.

The most obvious reason is to be compatible with IBM's desktop Personal Computer.

The next reason is that there are barely enough IBM Personal Computers to go around; the average wait for delivery is six weeks. Even when a user can get one, he pays extra for almost everything, such as disk drives and extended memory.

Compaq Computer Corp.'s 16-bit transportable (and most other compatibles), on the other hand, are sold complete with three software packages and one printer port bundled in for about the same price as a basic IBM Personal Computer.

While IBM is not expected to release a transportable or portable computer anytime soon, at least six healthy companies offer transportables that are compatible with the Personal Computer (see chart). Although true compatibility is hard to measure, the clear leader in this market is Compaq, whose machine is so IBM-compatible that "even if IBM changes its operating system, Compaq will be in a good position to survive," Ellen Levin, an analyst with International Data Corp., said.

Osborne Computer Corp.'s shaky existence today, combined with uncertain futures for transportable makers like Computer Devices, Inc. — which, like Osborne, has filed for protection under Chapter 11 of the bankruptcy code — is yet another reason why users are looking for the security of an IBM environment.

Why isn't Big Blue planning to come out with a transportable? "IBM has a policy never to enter a market where other companies are making their living solely on the one product in that market," explained one industry watcher, who chose to remain anonymous. In other words, IBM will not attempt to put the transportable/compatibles out of business. Nor will it play "me too" to Compaq and others.

Compaq Computer Corp.'s IBM-Compatible Transportable

With Sales Seen Skyrocketing Through the '80s

PORTABLES

Microcomputer	Dimensions	Bits	Built-in Modem	Storage	RAM	Display	Comments	Price
Convergent Technologies, Inc. Workslate	Notebook Size[1]	8	Yes	Microcassette Drive	16K	16 Lines x 40 Char. LCD	Microcassette Software Available	$995
Commodore Business Machines Executive 64	5-in. x 14½-in. x 14½-in.	8	Yes	2 Floppy Drives	64K	6-in. Color Monitor	PET-Compatibility Optional	$995
Epson America, Inc. HX-20	Notebook Size	8	No	Microcassette Drive	16K	3½-in. x 4 Lines x 20 Char.	Built-in Microprinter	$795
Gavilan Computer Corp. Gavilan	9 lb. Briefcase Size	16	Yes	3½-in. Floppy Disk	80K	8 Lines x 80 Char. LCD	Touch-Panel Pointer Control	$3,995[2]
Grid Systems Corp. Compass	9 lb. Briefcase Size	16	Yes	Bubble Memory + Cmos	256K	Flat Panel 24 Lines x 80 Char.	Runs MS-DOS Operating System	$8,150[2]
NEC Home Electronics USA PC-8201	Notebook Size	8	No	Cmos	16K	8 Lines x 40 Char. LCD	17 Applications Packages Included	$799
Radio Shack/Tandy Corp. TRS-80 Model 100	Notebook Size	8	Yes	Cmos	8K	8 Lines x 40 Char. LCD	Address Book and Schedule Data Basis Included	$799
Sharp Electronics Corp. PC-5000	11 lb. Briefcase Size	16	No	Bubble Memory	128K	8 Lines x 80 Char. LCD	Attachable Thermal Printer Optional	$2,500[2]

[1]Notebook Size — Approximately 8½-in. x 11-in. x 1-3 in.
[2]As of June 1983

CW Chart

printers and disk drives in a briefcase. As Levin pointed out, portables are "usually supplements to other systems."

The briefcase portables vary widely in price and functions, with the Grid at the high end ($8,150) and the Sharp at the low end ($2,500). In the middle range, there is even what some industry watchers have called "the first designer computer" — Gavilan Computer Corp.'s Gavilan, which features a touch-panel cursor control.

Product Spotlight

Notebook-Size Computers 'Wholly Remarkable'?

By Jim Bartimo
CW Staff

In a current science fiction best-seller called *The Hitchhiker's Guide to the Galaxy*, the guide itself — repeatedly described as "a wholly remarkable book" — is not a book at all. Instead, it is a book-size computer containing most of the knowledge of the galaxy.

While today's notebook-size computers aren't quite as remarkable as the *Hitchhiker's Guide*, they provide users with a handy computer away from home, especially when traveling (or hitchhiking, as the case may be).

So handy are these computers that there will be some 140,000 of them at large in 1984 and 540,000 in 1987, according to Future Computing, Inc. They will account for $154 million in retail sales in 1984 and $486 million in 1987.

Although notebook-size computers are limited in application, what they can do is wholly remarkable. The three major notebook-size computers available today contain both a word processing package and a Basic compiler burned into the read-only memory (ROM); they need no ac outlet to operate (although a cord is provided for ac use and recharging).

Communications Software

Because they are designed mainly to supplement home or business computer systems, most of these "kneetops" come with communications software and can work with a built-in or external modem.

The two notable points about these systems is that most of them feature a full-stroke keyboard and a price tag of $1,000 or less.

With Cmos storage, the only thing these systems really lack is a better display. LCD is the preferred display today, but Kenneth Bosomworth of International Resource Development, Inc. pointed out that "flat panels are coming down in price," as are other display technologies.

At Best for Memos

The kneetops are perhaps at their best when they are used for writing short memos or programs, since even 32K bytes of random-access memory can be limiting. However, programs can be downloaded or uploaded with tape cassettes, and there seems to be plans to provide the lap-size machines with monitors and disk drives as well.

Third-party vendors are already bringing out additional tape cassette software and peripherals, such as the thermal microprinter about to be released by Teletex Communications Corp., but too many peripherals may detract from the unique portability these machines offer.

A relatively new entry into the notebook-size arena is Convergent Technologies, Inc.'s Workslate. Expected by some to open up yet another floodgate in the portable marketplace, the Workslate — with its "Chiclet" keyboard — is designed

(Continued on Page 12)

Future Computing expects the market for briefcase-size machines to grow from 100,000 in 1984 to 550,000 in 1987. This will account for $330 million of the desktop market in 1984 and $1.4 billion in 1987.

Some Limitations

While Hemphill believes these machines have a lot of power, "my guess is that they're not going to take over the desktop machine because they'll always have some limitations. But they will have an impact."

Bosomworth credited the advent of the briefcase computer to three recent technological advancements — the modem on a chip; Cmos nonvolatile memory; and the reduction of memory in both size and cost. "A 256K-byte memory chip will cost $10 next year," he said. "You can do a lot with 256K [bytes] of memory and an 8-bit computer."

Cmos allows stored files to remain intact with a very small power source such as a common household battery and a backup nickel cadmium battery. While some portables like Compass use bubble memory — once the rage — Cmos is currently the preferred form of storage.

"The Compass is real expensive, but once bubble memory technology improves, the cost will come down," Levin predicted.

Major Airlines and Their Policies On Portable Computers

American Airlines — Allows hand-held computers only, those that typically have a one-line display and very-limited capabilities.

Delta Airlines — Allows the use of portable computers

Eastern Airlines — Prohibits the use of all portable computers.

Republic Airlines — Claims to allow portable computers despite warnings in its in-flight magazine against their use.

TWA — Allows the use of portable computers.

United Airlines — Allows hand-held calculators only.

CW Chart

Convergent Technologies, Inc.'s Workslate

A Hands-On Review of Three Notable Notebooks

By Jim Bartimo
CW Staff

Testing the notion that portable computers can be used by anyone, this writer tried, in the course of writing this Spotlight, the three that are considered the most popular. In fact, this story was written on the Radio Shack TRS-80 Model 100, then transmitted to *Computerworld*'s complex of Digital Equipment Corp. PDP-11/70 minicomputers for typesetting.

What follow are personal evaluations of the three portables:

Product Spotlight

Radio Shack's TRS-80 Model 100

Clearly the hands-down winner with its built-in modem and communications software, the Model 100 transmits at 300 bit/sec with ease and reliability. Software extras include a rudimentary pair of data base management systems for calendar scheduling and note taking.

The word processing program is easy to use, especially since text can be manipulated via a number of clearly labeled function keys.

The major drawback of the Model 100 is its limited memory. By the time you upgrade to 32K bytes of random-access memory (RAM), you will have crossed the $1,000 dollar purchase mark. However, if you remain with the standard 8K bytes of memory and don't upgrade to at least 24K bytes of RAM, there will only be enough room to store a few pages of text.

NEC PC-8201

This machine could have walked off with first prize if only it had a built-in modem. While the company claims it doesn't want to force you to buy a modem in case you already have one, carrying a full-size modem and/or acoustic coupler defeats the purpose of portability.

This machine is otherwise identical to the Model 100, but comes with a bevy of programs on tape and burned into read-only memory, the required cables to hook up to a tape cassette and superior cursor-control keys.

Another feature of the PC-8201 is removable, nonvolatile Cmos RAM packs that give added memory — 32K bytes a crack — to virtually eliminate any memory-shortage problems.

Epson America, Inc. HX-20

It's hard to know what Epson was thinking when it brought out this machine, but perhaps the HX-20's drawbacks can be attributed to its early entry into the market.

The HX-20 has no built-in modem or any communications software as yet, so transmitting to another machine is virtually impossible at this point.

The machine does have a built-in printer and an optional micro cassette drive — perhaps Epson was hoping the HX-20 could be more of a stand-alone device — but alas, with a 3½-in.-wide, 4-line by 20-char. screen, it's too easy to go blurry eyed while writing a program or memos. The HX-20's virtual screen extends somewhat beyond these dimensions, but to little avail.

Epson added Skisoft, Inc.'s Skiwriter word processing after the introduction of the machine; this word processing software is perhaps a bit better than its competitors' WP software. Moreover, the Epson keyboard is of higher quality. However, none of this is enough to make up for the HX-20's other deficiencies.

The Epson HX-20 uses Cmos for storage, but, unlike its competition, relies totally on a rechargeable battery for power instead of four AA batteries.

NOTE: Microsoft, Inc.'s version of Basic appears in some form in all three of these notebook computers.

'Kneetops' Seen Supplements To Host System

(Continued from Page 11)

mainly for calculations, such as in portfolio analysis.

"The Workslate is aimed at a number of vertical markets," according to Boeomworth. "You can get Convergent to put programs in ROM for you depending on what you want to do with it."

Amidst all that is remarkable about the notebook-size computers is one irony. Although they are the perfect dimensions for the back seat of a jet, at least three major airlines have prohibited their use on-board their flights (see box).

"We had an incident where a portable computer caused interference with the flight controls of the aircraft," a United Airlines spokesman said. "We'll have the results of that incident in 45 days."

Other airlines, such as Eastern Airlines, are waiting for a ruling from the Federal Communications Commission before allowing these lap-size computers near the 32 computers already on-board a 757 jet.

STOP YOUR STRINGING YOU

Lease a Codex Cable Multiplexer
for your IBM 3274 system.
It can link up to 32 terminals
with a single cable.

In High-Volume Environment

Tool Helps Firm Compare DBMS Performance

By Paul Gillin
CW Staff

BOSTON — It is a refrain that is sung all too often: The project looks good on paper, meets all the specifications and is completed on deadline. But once the system starts to handle some volume, response time goes out the window.

The DP department at John Hancock Mutual Life Insurance Co. is determined not to let such chords mar its installation of IBM's IMS data base management system (DBMS). The evaluation and installation of IMS is proceeding with the help of Visicorp's Visicalc and Crystal, a performance management utility from BGS Systems, Inc. of Waltham, Mass.

Hancock, which employs multiple IBM 30 series mainframes at its corporate headquarters here, began reevaluating its DBMS environment early last year. After sifting out proposals from a number of vendors, the choice came down to Cullinet Software, Inc.'s IDMS and IBM's IMS. Crystal was then used to build performance models for the two finalists.

The head-to-head evaluation was targeted at comparing the performance of the products in acquiring data and examining their relative resource consumption in high-volume environments, according to Tom Moran, a Hancock consultant. Using information supplied by both vendors, project members input the path links used by both DBMS and created a transaction-heavy model to run through Crystal.

'The head-to-head evaluation was targeted at comparing the performance of [Cullinet's IDMS and IBM's IMS] in acquiring data and examining their relative resource consumption in high-volume environments. ... Project members input the path links used by both DBMS and created a transaction-heavy model to run through Crystal.'

"We got rid of the on-line and application environment and focused on data base access, specifically over a wide number of paths," Moran said. "We used a data base that required 100 [IBM] 3350 spindles. We're talking about an application with 500,000 to 750,000 transactions going against it every day."

The performance model "pointed up some other things that did not appear in the initial study," Moran said. "Using Crystal, we narrowed down [the technical differences] and did a further technical examination."

Although the products performed similarly, IMS proved more efficient at random data acquisition under heavy volume, Moran said. This fact, brought out by the performance model, "made the choice apparent. A lot of issues were raised in the modeling process."

The installation of IMS will continue into 1985, with the design aided by a three-tiered structure using Crystal, Visicalc and IMS "snapshots," which are standard path links used by IMS for various processes. A novel use of the popular Visicalc package allows designers to create module or data path design on the spreadsheet and, thus, bypass the intensive calculations that the process requires.

Gives Design More Depth

"First, the designer can use Visicalc to get a relative idea of the impact of a particular design and then move it to Crystal to give general analytical models compared against other possible designs," Moran said. "Crystal allows you to build a model of your application, which normally would be a tremendous manual effort. It gives your design a little more depth."

The best designs are then compared against IBM snapshots to determine resource requirements.

Crystal also creates a model that can be fed into a model of the DP installation's internal environment created on Best/1, a capacity planning package also from BGS. By running the Crystal model in conjunction with the Best/1 model, the impact of the data base on CPU time can be estimated.

"The productivity benefits are that the designer, in the early days of his design, puts some of his assumptions into the model to see what the benefits are," Moran said. "He does not have to wait until the design is developed and programmed. So it helps a little bit in the quality side.

"It also helps that you don't have to prototype, which on a large project can be quite a savings," he added. "It also can provide a check mechanism of the model against the final result. It gives you some sort of baseline of expectation."

Because installation is still continuing, it is impossible to compare the accuracy of the Crystal model against actual performance, Moran said. However, "we feel rather good about it."

3274 SYSTEM FROM ALONG.

IBM 3274 system users no longer have to pull individual cables each time they add or relocate terminals.

The Codex Cable Mux provides transparent, high speed communications for up to 32 terminals through one single cable. It saves you money and offers unlimited flexibility in setting up terminal clusters throughout your entire organization.

The Codex Cable Mux also offers a variety of purchase and service options no other vendor can match.

Like the opportunity to lease a unit for as little as $26 a month.

And a choice of on-site or back-to-the-factory maintenance.

For more information about Codex's Cable Mux, call 1-800-821-7700 ext 888. Or write: Codex Corporation, Dept. 707-88, 20 Cabot Blvd. Mansfield, MA 02048.

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SEC Plans Electronic Filing of Disclosure Forms

By Peter Bartolik
CW Staff

WASHINGTON, D.C. — Those who like to play the stock market may be able in the not-so-distant future to analyze opportunities and immediately execute confirmed buy and sell orders from their homes.

The Securities and Exchange Commission (SEC) announced recently that it has contracted for a study to establish a pilot project for the electronic filing of disclosure forms by reporting companies, as well as for instant dial-up access to the accumulated data by the investing public.

Some 9,500 publicly held companies file more than 175 types of forms with SEC, ranging from stock prospectuses to annual reports and tender offers. SEC would like to reduce this mound of paperwork.

According to an SEC spokesman, reporting companies generally have their disclosure reports printed and delivered to SEC headquarters here. The reports are then distributed to staff offices responsible for review, copied onto microfiche and then made available to the public through SEC's public reference rooms. "Summaries of some of the information in these reports are eventually distributed by private firms through computerized data banks, but the lag time can be three months or more," the spokesman said.

Commission Chairman John S. R. Shad wants to establish a means for reporting companies to file their reports electronically. He sees that development speeding up the public's access to the data provided by companies.

Mitre Corp. has been contracted by SEC to examine the information to be processed, evaluate available technology — including security — and costs and advantages and disadvantages of various system approaches. A pilot program involving an as yet undetermined number of companies will begin some time next year and will be tested and debugged for at least one year, the spokesman said.

Whereas typical investors now must wait while financial analysts digest and regurgitate the many filings, SEC foresees home computers and data bases in the future providing instant analysis in the home and the office. By the time the system is completed, the spokesman said, "it is expected that investors will be able to enter their market orders directly and receive instant execution confirmations on their own computer terminals. They will also be able to retain their complete portfolios in their data banks and instantly price them to the market."

Through links to software systems, analysts and investors should be able to display all listed stocks that closed the previous day, with crucial factors and ratios such as stock prices above or below six times earnings, four times cash flow, 75% of book values per share and so forth.

Northwest Bell Cited by FCC For Violation

WASHINGTON, D.C. — Northwestern Bell Telephone Co. was fined $80,000 last week by the Federal Communications Commission (FCC) for violating the commission's Second Computer Inquiry decision, which says that AT&T and its operating companies must market terminal equipment through separate subsidiaries.

Northwestern Bell transferred ownership of its installed terminal base last June to AT&T Information Systems, the separate subsidiary established by AT&T, to comply with the FCC order. However, it continued to provide maintenance and other support to the users, which the FCC said violated Computer Decision II.

Virtually all of Northwestern Bell's terminal support activities have now been transferred to AT&T Information Systems, and the remainder soon will be, according to an FCC spokesman. He added that he expects Northwestern Bell to appeal the fine.

WHY YOU SHOULD RECOMMEND A KAYPRO EVEN IF YOU DIDN'T BUY ONE YOURSELF.

If you're happy with the computer you now own, we're happy for you. Because we both know what you went through to buy it.

More than likely, it was a long year's education that sent you into a complex maze of trial and error. You spent a lot of time asking questions in computer stores. More time hunting for answers in computer books. Even more time investigating all the hardware, let alone software options you had to consider.

It was a hard way to get what you needed. A year that earned you an honorary degree in computer engineering and the status of a computer buff.

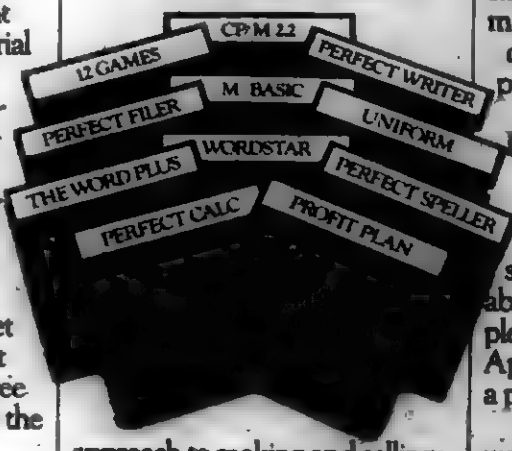
But just between us buffs, would you recommend a year like that to a friend?

FOR THE FIRST-TIME BUYER, KAYPRO IS A GODSEND.

We think the 'hard way' is the wrong way to have to buy a computer. After all, a business person shouldn't be required to make decisions better left to an engineer.

Trying to find compatible interfaces and software packages alone would drive most people up the wall (remember?).

So, we've taken a different approach to making and selling our Kaypro II. Rather than a starter system, with options you buy piece for piece, it's designed with all the integrated hardware and software it needs to be fully functional.



Off the shelf, Kaypro II is completely ready for business. We think that's what the first-time buyer really needs.

IT'S A COMPLETELY INTEGRATED SYSTEM.

Since we don't consider a monitor, disk drives, interfaces or other hardware as optional extras, all Kaypro's hardware comes complete in an integrated system. Except, of course, for a printer. As you know, some people don't need one. And those who do must decide whether they need dot matrix or letter quality printing.

What's complete on a Kaypro II?

64K RAM, Z-80 microprocessor. A 9" green screen monitor. Dual disk drives, the same used by IBM. A detachable keyboard that's more complete than you'll find on the latest Apple. Built-in interfaces for both a printer and communications.

In other words, all the hardware you'd recommend to a first-time buyer. In one complete package.

IT COMES COMPLETE WITH SOFTWARE.

While businesses can be very different, the fact is that 95% of all business needs can be fulfilled by a series of three business applications programs. Word Processing/Spelling, Data Base Management and Financial Spreadsheeting.

It's the software that's optional with other computers.

Registered Trademarks: Apple – Apple Computer Inc., IBM – IBM Corp., CP/M – Digital Research Inc., Z-80 – Zilog, M-Basic – Microsoft, Inc., Trade TRS-80 – Tandy Corporation, Osborne – Osborne Computer Corporation, Xerox – Xerox Corporation. Prices based on published information as of July 15, 1983. © 1983 Kaypro Corporation.

Felony Charges Filed Against Alleged Hacker

By Katherine Hafner
CW Staff

LOS ANGELES — Ronald Mark Austin, arrested earlier this month, has been charged with a series of penetrations at computer sites around the world that left a path of altered records, stolen CPU cycles and general resolve among victims of the break-ins to revamp their password systems.

The 19-year-old University of California at Los Angeles (UCLA) sophomore allegedly used the U.S. Department of Defense's Advanced Research Projects Agency Network (Arpanet) to gain access to 200 accounts at 14 separate sites, including Rand Corp. in Santa Monica, Calif., and Cornell University in Ithaca, N.Y.

A concurrent investigation by the Federal Bureau of Investigation has also linked Austin to a string of break-ins at Stanford University in Palo Alto, Calif.

"It's our belief it will cost all these different agencies and institutions hundreds of thousands of dollars to reprogram their systems in order to prevent this from recurring," commented Al Albergate, press secretary in the Los Angeles County district attorney's office, which arrested Austin.

All of the companies and schools allegedly tapped by Austin participate in Arpanet, Defense's packet-switched network for the research community. Although classified data has been transmitted over Arpanet, "the data is encrypted and cannot be accessed by anyone but the intended receiver," a Defense spokeswoman maintained.

"We can say that the authorized accesses were known to the department at the time they were occurring and were recognized as unauthorized attempts to obtain data, but no information damaging to the national security was obtained," the Defense spokeswoman said.

Relay Point

Paul Weeks, a public information officer at Rand, said, "On Aug. 29, an unauthorized user got into a Rand computer, then used the Rand system as a relay point to hop to another system on Arpanet. But no information was destroyed."

"I can't say Austin is the one who broke in here," Dean Krafft of Cornell's computer science department said.

"But it appears someone did log on to at least five of our accounts. As far as we can tell, no damage was done to our system. No records were altered. Maybe CPU cycles were stolen, but that's all we know," according to Krafft.

Krafft said that Cornell is taking measures to improve the university's password system.

Inactive Account

According to Tom Tugend of UCLA's engineering and physical sciences department, Austin was pinned down when another UCLA student was working late one night and noticed that someone was logged on to a University of California at Berkeley account that he knew had been inactive for a long time.

"His suspicion was aroused. He told people in the computer lab, and the [district attorney's] office was notified," Tugend said. The district attorney's office began monitoring late-night activities on the UCLA computer system.

According to Albergate, Austin habitually gained access to UCLA accounts and "chatted" with two others: Kevin Poulsen of North Hollywood, Calif., and another person, who is identified only as Kareem.

Poulsen is under investigation, and Kareem has yet to be tracked down, Albergate said.

Authorities confiscated Austin's personal computer at his Santa Monica home on Sept. 22, along with a black-and-white television set he used for a screen. Austin was arrested Nov. 2 and awaits a Dec. 2 preliminary hearing. He is charged by the district attorney's office with 14 counts of maliciously accessing a computer system, which carries a maximum sentence of six years.

But it too comes complete with a Kaypro.

And with its CP/M operating system, Kaypro II is capable of running thousands of other business programs, to fill more specialized needs.

IT SELLS FOR $1595, COMPLETE.

People are bound to ask you how much they should spend on a computer. There is, of course, an obvious answer: as little as possible and still get a serious business system, complete with all the functions they need.

At $1595, Kaypro II is the least expensive serious business system we know of on the market today.

There are basic starter systems advertised for less. But their optional hardware and software can double or triple their basic price. So they can end up costing $2000-$3000 more than a Kaypro.

A good example is an Apple IIe. With a hardware configuration comparable to Kaypro II's, complete with comparable software, it lists for an average price of $4400. $2805 more than a Kaypro.

IT OFFERS MORE MEMORY FOR THE MONEY.

Since disk drive memory capacity is always a concern, once again the idea is to get the most for the money. With two disk drives, Kaypro II gives you 400K for $1595. With equivalent hardware, an IBM gives you 320K for about $2800. And Apple IIe gives you 286K for about $2400.

So once again, Kaypro II delivers.

IT HAS POWER TO SPARE FOR WHAT MOST BUSINESSES NEED.

The more you love computers, the more tempting it is to recommend a 16-bit vs. 8-bit machine. You know that 16-bit systems are a little faster and have more power to run longer programs.

However, 16-bitters are far more expensive than the 8-bit variety. And, unfortunately, have only a handful of business applications software packages that really take advantage of them.

SPECIFICATIONS

Microprocessor Z-80	Perfect Filer Perfect Calc spreadsheet
Operating System CP/M 2.2	Wordstar word processing The Word Plus
User Memory 64K	Profit Plan spreadsheet
Disk Drives 2 drives, 400K, unformatted	M-Basic 12 Games
Interfaces 1 Serial 1 Parallel	Uniform—allows computer to 'read' and 'write' TRS-80, Osborne, Xerox disks
Keyboard Detached, 63-key with numeric keypad	Dimensions Height: 8 inches Width: 18 inches Depth: 15½ inches Weight: 26 lbs. (portable)
Software included: Perfect Writer word processing Perfect Speller	

Considering the real needs and budget limitations of most small businesses, why suggest a company limo when a good company car will do?

Since 75% of all micros sold today are 8-bit systems, it's indicative of their capacity to take care of business. We'd stick with a Kaypro II.

IT CAN PAY FOR ITSELF FASTER THAN MORE EXPENSIVE COMPUTERS.

Every business person wants a computer to pay for itself in increased productivity. And the faster the better. Perhaps on this count alone, Kaypro II is worth recommending.

As a fully functional business system for $1595, Kaypro can win the payout race hands down.

IT'S BECOME A LEADING SELLER THANKS TO COMPUTER BUFFS, LIKE YOU.

In fact, Kaypro II is one of the best sellers in the $1000-$5000 price range. And it got there largely because of the enthusiastic word of mouth, and word of press, of computer enthusiasts. Many of whom, after building their own systems, bought a Kaypro II as their second computer.

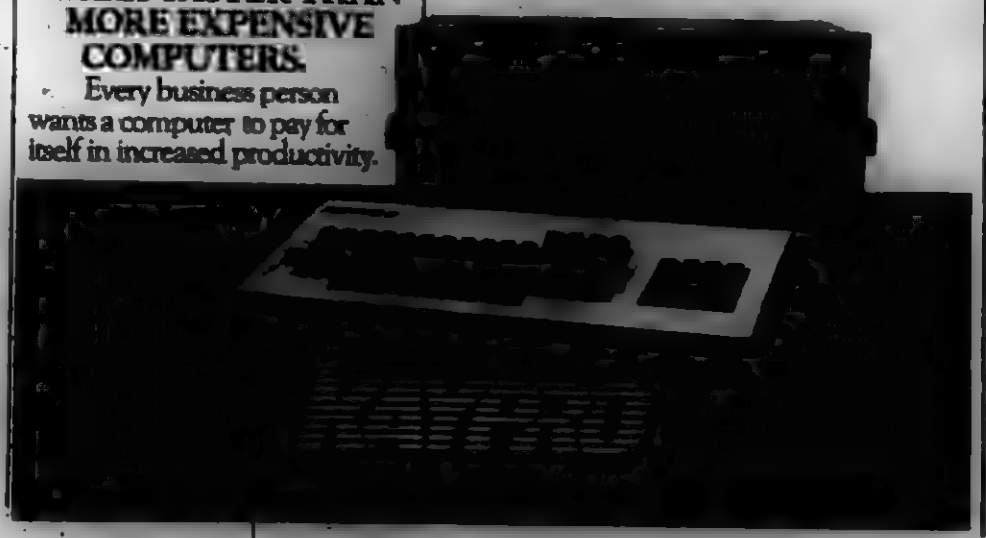
So you certainly won't be alone if you recommend Kaypro II to anyone shopping for a first computer.

Or look at it this way. Once you tell people about the complete business computer for $1595, they'll probably stop bugging you with a lot of questions.

They may even forget to ask why you didn't buy a Kaypro II for yourself.

Just between us buffs, we can't recommend a good answer for that.

CALL 800-447-4700 FOR THE DEALER NEAREST YOU.



Japan Readies Backbone Cable for ISDN

By Phil Hirsch
CW Washington Bureau

GENEVA, Switzerland — The first section of a 400M bit/sec fiber-optic transmission cable that runs down the center of the Japanese archipelago is scheduled to go into service next month. The cable will be the backbone of a new integrated services digital network (ISDN) that is intended to support the "advanced information society" being created by Japan's increasing use of computers and computerized information.

The quote comes from a paper presented here recently at Telecom '83, a worldwide telecommunications conference. The author is Yasusada Kitihara, executive vice-president of Nippon Telephone and Telegraph Co. (NTT), Japan's domestic telecommunications carrier.

Kitihara's paper, along with those of the other NTT officials who spoke at Telecom '83, provided a detailed picture of how Japan is preparing for the "advanced information society."

Although integration of presently separate data, voice, image and record services is one way of lowering the cost of those services and thus extending their reach, it is not enough, according to Kitihara. Since 1977, he has been advocating a new scheme of charging for communications services based on the number of information bits transmitted rather than on the time of day or distance traversed.

At Telecom '83, Kitihara said that the new charging scheme will be a key element of Japan's new ISDN, which is known officially as the Information Network System (INS). Another key element will be "a new-generation computer" — one having "pattern recognition, voice synthesis, natural language processing and intelligent processing capabilities. Through the development of such computers we will . . . be able to provide automatic translation service, making it possible for future generations to communicate worldwide in their mother tongues."

However, it will take more than 10 years to develop the new computer, Kitihara said.

In 1985, he added, Japan expects to begin providing voice/data services through common, computer-controlled switching equipment. These facilities, along with digital local loops and digital intercity transmission links, will provide the hardware needed to build the commercial INS network.

"In September of last year, we started building a model INS system in the Musashino and Mitaka area, a Tokyo suburb," he reported. This system, which will serve some 10,000 subscribers, is to be tested for about five years; during that time, it will offer a variety of interactive services including Captain, Japan's advanced videotex system.

Commercial INS service is scheduled to begin in 1985, said Kitihara, and be available a year later in 10 major cities. By 1987, the company intends to have Japan's 60 largest cities interconnected.

Wideband Loops Called Significant

GENEVA, Switzerland — Wideband local loops will be the most significant part of Japan's Information Network System (INS), according to one of several papers presented by representatives of Nippon Telephone and Telegraph Co. (NTT) at the recent Telecom '83 here.

Only by putting high-bit rate transmission capacity on the user's doorstep can the full potential of the new network be realized, explained NTT engineers Nobuo Inoue and Kimio Tazake in a paper titled "Steps to Enhance Telecommunications Networks Toward [an] Advanced Information Society."

Initially, subscribers will access INS through existing local loops, which, modified by black boxes at either end of the circuit, will be able to transmit digital information either simultaneously or alternately with analog voice signals. In the latter mode, two digital channels will be provided — one operating at 64K bit/sec, the other at 16K bit/sec — along with two 4K bit/sec channels for customer-network control signals.

In the "simultaneous" mode, digital data will be transmitted in a frequency band above the one used for analog voice, thus permitting both to operate at the same time.

The use of this "hybrid access" system reportedly will allow digital data to be transmitted at up to 16K bit/sec and possibly as high as 24K bit/sec.

Most of Japan's in-place local loops use paper insulation and will permit a digital signal to be transmitted only about three kilometers. In 1981, however, NTT began installing plastic-insulated loops, which reportedly extend the transmission distance to seven kilometers and enable the company to reach "virtually all" of its subscribers, the authors said.

"Optical-fiber systems will be the main vehicle for modernizing the local network," they added. The system Japan is planning will be able to carry analog and digital video, analog and digital voice and high- and low-speed data.

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Lonely Misfits or Budding Criminals?

Hacker Debate Continues at Security Conference

By David Myers
CW New York Bureau

NEW YORK — Conservative and liberal squared off in a dispute over hackers at the 10th Computer Security Conference here last week.

Seymour Papert, professor of mathematics and education at MIT and the inventor of the educational software language called Logo, defined hackers as social misfits who need to be given an opportunity to communicate their computer skills.

Donn B. Parker, senior management systems consultant at SRI International, countered that hackers are criminals — shoplifters, spies, even terrorists — who should be punished.

"I'm afraid some of them don't really understand that they are in violation of the law. When they see their fellow hackers are in fact going to juvenile hall for six months, maybe they'll wise up," Parker said.

Parker said hackers may start off as pranksters. He compared them to himself as a boy and to his young friends.

"We would tear down an abandoned barn for the sheer joy of being destructive. But we knew we were breaking the law. I'm not sure hackers understand that," he said.

Prof. Papert, however, characterized hackers as skilled computer users who "manipulate the machine the way they are unable to manipulate people."

Hackers tend to be isolated and to work alone, Papert said. Hacking is often their only means of interacting with others, he pointed out.

The irony is that computers are designed to be linked together and the computer not part of a larger enterprise is "the extreme case," not the norm, Papert said. In their hacking, young computer whizzes betray their desire to belong, he noted.

Parker inadvertently supported Papert in this when he quoted a message left on an electronic bulletin board for computer pirates: "The few people we can communicate with are our fellow hackers," someone had written.

But in general Parker took a harder view of the menace from hackers, saying that "when unauthorized people gain access" to a computer system, "the losses can be serious and they can be large."

The losses include destroyed software programs, tied-up access services, disclosure or theft of data,

(Continued on Page 18)

IBM's Security Outlined at Meet

NEW YORK — Computer users and security specialists who attended the 10th Computer Security Conference here last week were treated to an inside view of IBM's security arrangements.

Dominic Stavola, senior security administrator at IBM, told an audience at the New York Penta Hotel that "setting up data security requirements must start at the very top of an organization and come down from there. It helps to get the chairman of the board involved if you can."

Stavola also warned against the "arbitrary split" between physical-plant security and information protection and said a firm's computer center is "the wrong place" to locate responsibility for systems security.

"Typically, the computation center is not high enough up in an organization to provide executive-level protection," Stavola said.

What is more, since data processed in the DP department is available "outside the confines of the computer room," data protection ought to be centered somewhere outside the room, too, according to the IBM security chief.

Stavola urged appointment of a "staff catalyst" to put security plans into motion. Though the "staff catalyst" should not double as director of management information services for the firm, he should still "be intimately aware" of computer technology so he can recommend enhancements to the system where necessary, Stavola said.

Other suggestions Stavola made included assigning ownership of every bit of information to someone within the organization and giving every bit of information a dollar-and-cents value.

"It's a mistake to treat all information as if it had the same value, rather than selectively applying protection to data based on its worth to the organization," Stavola said.

Asked how to go about convincing management of the need for data security measures, Stavola replied, "The only way I know for sure is to have a major incident. They don't appreciate the value of the information they have until someone misuses it."

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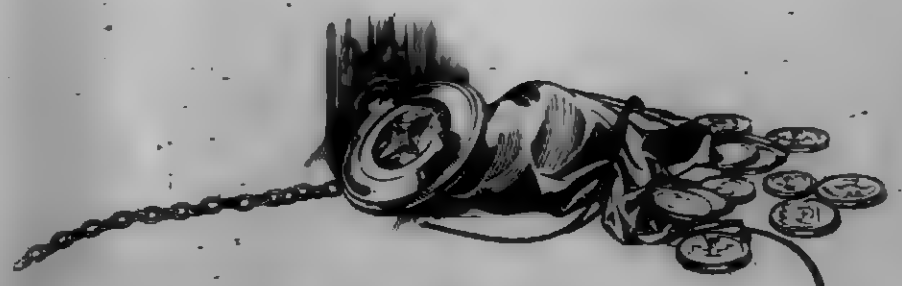

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Computer Law Forum Addresses Software Piracy

By David Myers
CW New York Bureau

NEW YORK — Although legal experts are unanimous in agreeing that the U.S. Congress intended software to be protected by its Copyright Act of 1974, the problems of protecting software from pirates did not end with that act, lawyers attending the Computer Law Institute here recently were told.

Copyright lawyers and computer law experts addressing the three-day conference all said that U.S. law protects software programs from unauthorized copying and use. But they did not agree on the ramifications.

"All right, software is copyrightable. But how valuable is the copyright for protecting it?" asked Jon A. Baumgarten, an attorney with the firm of Paskus, Gordon and Hyman in Washington, D.C. Baumgarten suggested that copyrights held by large vendors may raise antitrust questions.

For users, even the lowliest diskette is covered by a copyright, even if it carries no encircled C symbol, and companies that copy the diskette's programs without permission are breaking the law, noted Daniel T. Brooks, staff attorney with Computer Law Advisers in Springfield, Va. But memory chips and operating systems do not seem to be protected by copyright, Brooks told the conference attendees, of whom about 80% were lawyers representing vendors and around 20% were lawyers representing users.

Software is eligible for copyright protection in the first place because it is intended to communicate something. "Other programmers can, in fact, read what you have done," Brooks explained.

Michael S. Keplinger, a division chief in the U.S. Copyright Office, explained that a piece of work is thought to communicate something when it is "fixed in a form in which another human being can perceive it."

Under this definition, the fact that software programs can be reproduced is what brings them under the scope of the copyright laws, according to Keplinger. But he went on to warn that requirements for copyright protection differ depending on whether the software is licensed, distributed or sold over the counter.

An operating system, however, has been interpreted by the U.S. District Court as "enabling machines to work in tandem" and not communicating anything, Brooks pointed out. Therefore, it is not currently shielded by copyright law.

While the Copyright Office has taken the position that memory chips are "useful objects" and not eligible for copyright, it has also gone on record as saying that the drawings of the circuits burnt onto the chip, and even the chip masks, are indeed "original works" and can be copyrighted. But Baumgarten warned that recent court decisions suggested that copyright protection of a circuit layout "does not necessarily provide you with protection of the circuit's function."

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Hacker Debate Still Brewing

(Continued from Page 17)

wholesale changes in stored information and time spent chasing down the intruders and locking them out, Parker said.

As for a cure to hacking, Professor Papert urged adoption of the goal of a computer for every child.

In a classroom full of computers, the hacker — a young expert — is solicited by the other children for help with their problems, Papert pointed out. Getting computers into the hands of his contemporaries will make the hacker feel wanted, he suggested.

"We now have in this country one computer for every 150 children. That's not enough to make a difference in anyone's life. To be competitive in the 21st century, we can't afford not to do this. But that's only the economic side. We can't afford it morally either," Papert said, warning that an uneven distribution of computers could divide the U.S. into classes of haves and have-nots.

'Change Their Values'

Parker agreed that "somehow we have to change the values of these kids" and "turn valuable kids around." But for the most part his solutions to the hacking problem were more straightforward.

Cut down the number of prompts that a caller into a dial-up access system receives on his screen, he urged. Investigate automatic dial-back devices for use with preauthorized telephone numbers, he added.

"You may want to design a trap in your system to lure [the hacker] into an attactive but limited area and keep him on-line long enough for the authorities to find out who he is," Parker said. He also recommended that DP managers know the names of their police department and FBI contacts in the event of a system break-in.

One solution Parker said he does not favor is hiring the successful hackers. "We have to let them know they are not heroes. Anyone who hires a malicious hacker deserves anything that happens to him."

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Managers on the Move

ALAN G. MERRITT has joined National Gypsum Co. in Dallas to fill the newly created position of general director of information systems. He will be responsible for the development and implementation of the long-range architecture for information systems facilities as well as the management of specific related functions.

Merritt was employed by IBM for the last 15 years, progressing through sales, staff and management positions. Prior to joining IBM, Merritt was with Pacific Telephone Co.

Merritt is a graduate of the University of California at Berkeley, where he received a bachelor's degree in economics in 1964.

• • •

JOHN W. DOWNING has been named vice-president of management information services for Southern Pacific Co. in San Francisco.

Prior to his promotion, Downing served as senior assistant general manager of management services for Southern Pacific Transportation Co. He joined the company in 1951 and during the next nine years held various positions in the general auditor's office.

In 1961, Downing was named a systems associate in the systems research office and later was a supervisor and assistant manager. Five years later, he was made assistant manager of the Total Operations Processing System, Southern Pacific's computer system, which became operational in 1968.

Downing was named manager of systems research in 1967 and was appointed senior assistant general manager of management services in 1982.

He attended City College of San Francisco and the University of San Francisco.

• • •

ELLEN L. BURNETT has been promoted to corporate data base coordinator for McCormick & Co., Inc. in Hunt Valley, Md., where she will be responsible for data base administration involving the audit, review, analysis and coordination of data on the corporate product and component data base.

Burnett previously held positions in production control, the spice mills and the payroll department for the former McCormick division (now know as the Grocery Product Division). She joined the Corporate Specifications Department in September 1980.

Burnett attended both Essex Community College and Dundalk Community College in Baltimore County.

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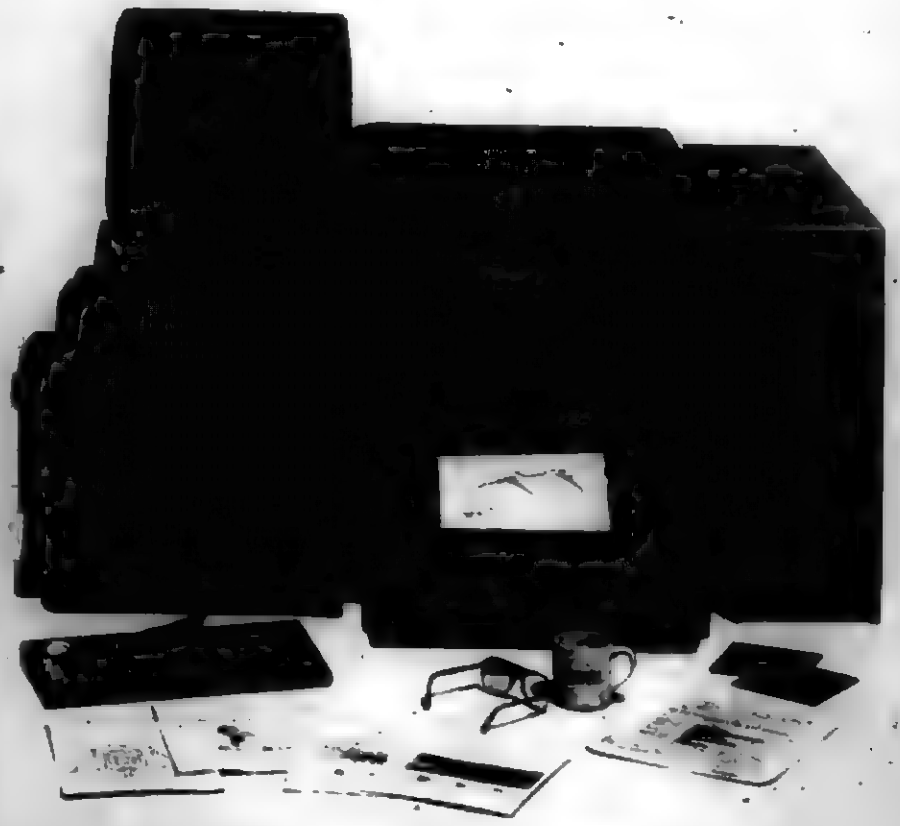

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Seminar Series Treats Software

COLUMBIA, Md. — McCabe & Associates has announced a schedule of its remaining software engineering methodology seminars for 1984.

"Structured Analysis and Design" will be offered Dec. 13-15 in Washington, D.C. "Structured Testing" will take place Dec. 5-7 in New York. "Software Quality Assurance" will be offered Jan. 10-12 in Washington, D.C., and "Project Management" will take place Dec. 6-8 in San Francisco and Jan. 18-20 in Washington, D.C.

Registration prices are $650 prepaid or $725 if billed after the conference.

More information is available from McCabe & Associates, Suite 111, Twin Knolls Professional Park, 5501 Twin Knolls Road, Columbia, Md. 21045.

NCR Users Meet Set for Sept. 12

ATLANTIC CITY, N.J. — The second annual conference of the NCR Corp. East Central Users Organization (ECUO) will be held at Bally's Park Place here Sept. 12-14, 1984.

Atlantic City was also the site for the first conference held by the fledgling group this past October.

Literature on the conference will be mailed out prior to next April, according to a users group spokesman.

Information on attending the conference and vendor exhibition provisions are available from NCR ECUO, which can be reached through P.O. Box 7, Dresher, Pa. 19025.

Consider Maintenance, Tests, Timetables

More Seen to Contracts Than Price, Delivery

By David Myers
CW New York Bureau

NEW YORK — In negotiating contracts with vendors for large-scale purchases of computer systems, users should pay as much attention to maintenance clauses, acceptance tests and project timetables as they do to price and delivery.

That is what computer law experts told staff attorneys from both vendor and user companies who attended the Computer Law Institute here recently, a continuing education seminar offered by the Practicing Law Institute.

"Organizations focus too exclusively on delivery, on that point in time at which the machinery is delivered. There are other considerations that are just as important," said Richard L. Bernacchi, a lawyer with the Los Angeles firm of Irell and Manella.

Focusing on the equipment's price to the exclusion of its maintenance costs is dangerously shortsighted especially when upkeep averages between 10% and 15% of a system's bill each year, according to Charles E. Harris, a Florida attorney and editor of the computer law newsletter "CNReport."

Consider Maintenance Early

Maintenance needs in particular must be considered from the very beginning of contract negotiations, Harris said.

"If you wait, you will run into the vendor's 'Oh, by the way' attitude. 'Oh, by the way, now that we have a contract, we need a maintenance agreement — here it is.' At that point, you face, to put it mildly, very reduced negotiating leverage. The salesman has his commission, the vendor has the contract, and if you don't like the maintenance that is proposed, fine, you provide it," Harris said.

Users shopping for a new system must pay as much attention to maintenance provisions as to performance characteristics in judging a vendor's goods, Harris added.

Bernacchi urged users to negotiate long-term maintenance agreements. "More and more vendors are terminating maintenance, especially on operating software, if there's a clause permitting them to do so," he pointed out.

If a vendor is unwilling to commit himself to long-term maintenance on his product, "you'll find out why," Bernacchi warned. Usually it means the vendor is on the edge of developing something newer and more competitive but doesn't want to tip off the unwary user, he said.

In judging the results of a system's acceptance tests, pay as close attention to reliability as to sheer performance, Harris cautioned.

"Focus on both the frequency of down-time problems and their duration. They may last just a few minutes but occur quite often," he pointed out.

Both Harris and Bernacchi warned against leaning too heavily on the results of benchmark tests.

"Benchmark tests can be remarkably good marketing ploys and remarkably poor performance gauges if compatibility is not taken into account," Harris said.

Other things to think about in a major systems purchase, Bernacchi said, are:

- Whether the system is being chosen because it is cheap or because it consists of what the corporate organization needs.
- Whether it can provide the business results desired, not in terms of "bits and bytes and the other gobbledygook you see floating around the industry," but in terms the executives "who are going to have to live with it" can understand.
- Whether the system can be up and running and starting to accomplish those results when management needs them.
- And whether the system, from acceptance testing to annual maintenance, fits into the corporation's DP budget.

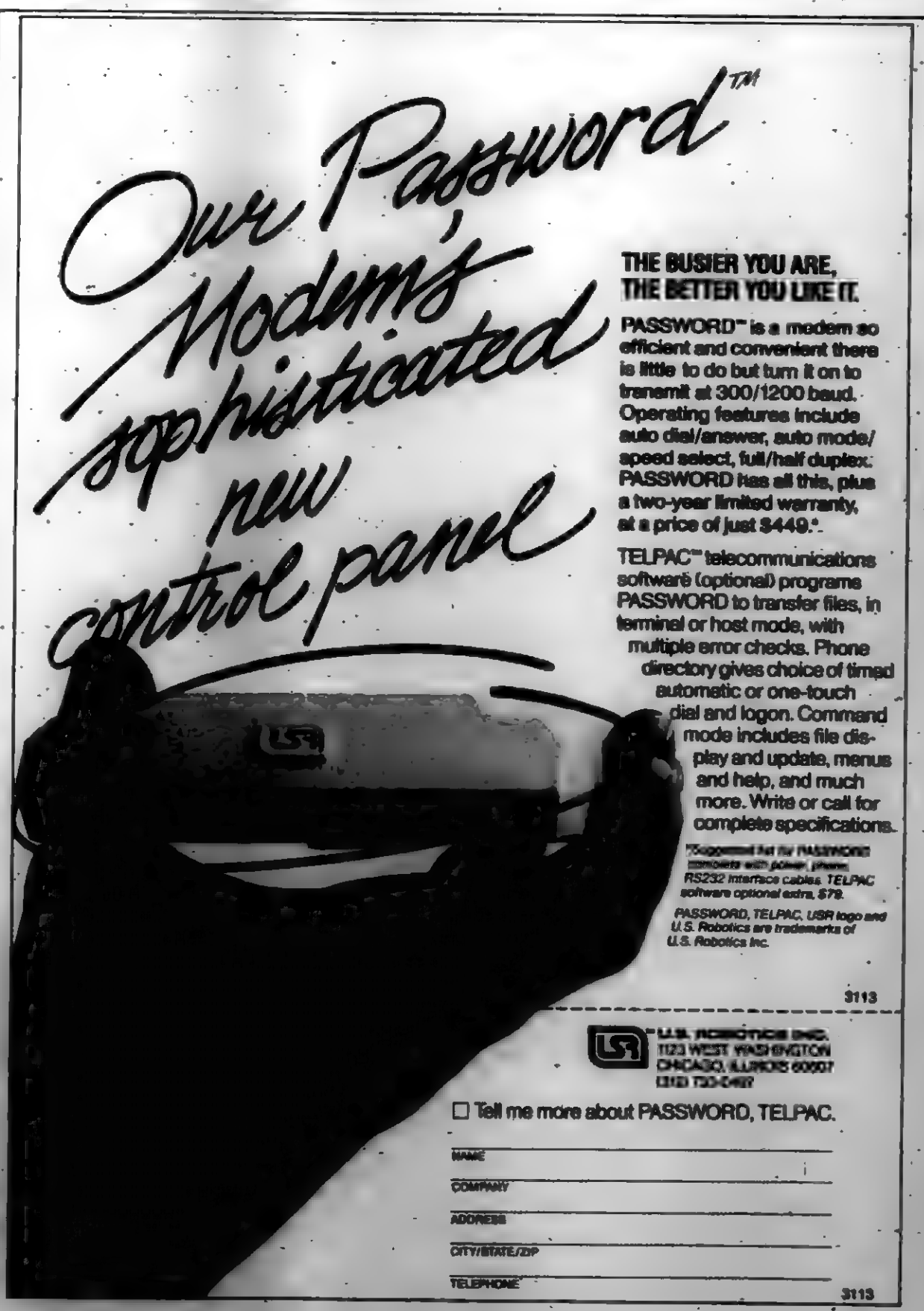
Harris added that a vendor's maintenance personnel and consulting services ought to be judged along with its equipment.

Timetable Enforces Deadlines

To make sure that the system meets its deadline, Bernacchi proposed drawing up a project timetable as part of the contract between user and vendor.

The advantage of an agreed-upon timetable, he said, is that it clearly defines the responsibilities on both sides of the negotiating table, prevents later finger pointing in the event of a disaster and promotes frank relations between user and vendor.

Perhaps the most important thing for the user is the correct negotiating attitude, according to Bernacchi. And he caught that attitude in a negotiating table statement: " 'There are certain basic things we want from you, or we simply won't do business with you.' That's a very effective argument in contract talks," he concluded.



What to Look for in a DP Manager

Q During the last three years we have had two directors of the DP department. As director of personnel, I am responsible for recruiting for all department head positions.

I hired both DP directors and relied heavily on input from people in the DP department in my final evaluation of candidates. As a result, the overriding criteria became technical capability. Neither of the people hired has lived up to our expectations; and we are currently searching for a replacement.

We have learned our lesson, and this time we hope to look past technical capabilities and hire someone with the potential to move our department forward in computer applications. Could you give us a personality profile of a successful DP manager?

A The successful director of an information services function commands the technical respect of his peers in management information systems, sets a good example in attitude and work, is committed to excellence (within the constraints of reality), is committed to the corporate good, downplays the "mystique" of computers, has a commanding presence and is comfortable in a peer relationship with top management, is innovative and generates a continuous string of ideas, is not afraid to make and stand behind a decision, is willing to get involved in risky projects and is genuinely concerned about the welfare of workers within his realm of responsibility.

Q After receiving my Ph.D. in economics, I took a faculty position at a major university's school of business. I spent seven years in the economics department. Five years ago I took an interest in computers, transferred to the management department and began teaching courses in information systems.

We now have three professors with computer or information systems specialties and authorization to hire three more. We are having trouble attracting qualified people because the dean and the department chairs are reluctant to recognize information systems as other than a support function.

On numerous occasions we have approached the administration about consolidating information systems education into a separate department. They say that their primary concern is to strengthen the traditional areas. Do you have any wisdom that I can use to counter this position?

A I question their wisdom. To maintain the attitude that information systems is a support function in a school of business is a step backward. Smart business school administrators are paying a great deal of attention to the ordered growth of an information systems program. They recognize that a progressive information systems program is the best way to strengthen traditional curricula.

You may be aboard a sinking ship. If you do not detect a radical change in attitude by the end of the semester, I would suggest that you take a position elsewhere. There are plenty of openings.

Q I am a senior systems analyst with over 16 years in data processing. Over the years I have designed and implemented several systems for the IBM System/3 and IBM System/34. Can you tell me the best method to market these systems?

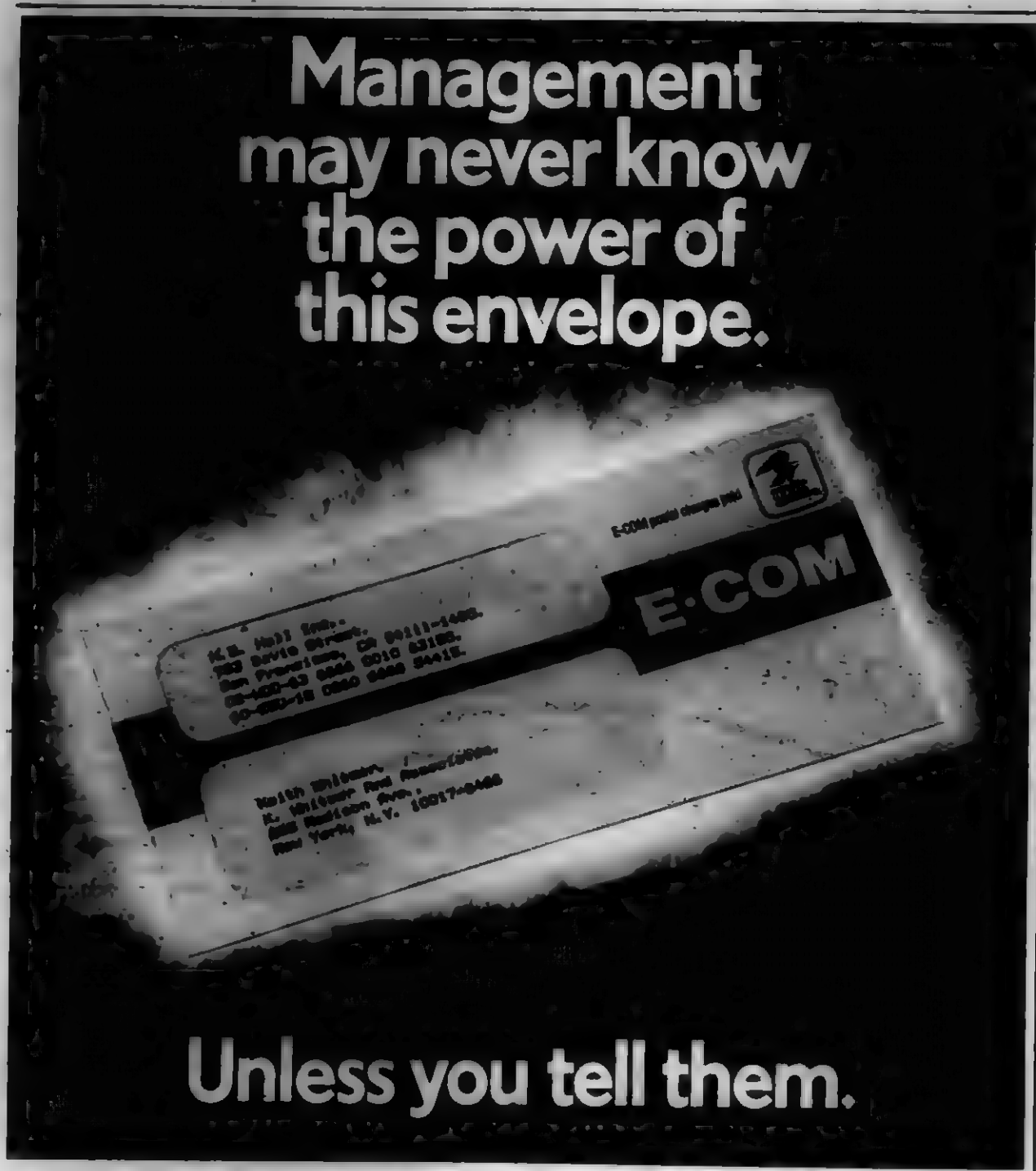
A I can't conceive of a more risky entrepreneurial venture than an individual entering the market for proprietary software aimed at well-established hardware. If your planned product orientation is along the lines of standard systems, I am reluctant to offer much encouragement.

However, if you have a unique product that is state-of-the-art and noticeably superior to the existing alternatives, then opportunity does exist.

Unless you have plenty of seed money and finely tuned marketing skills, I would recommend that you first try to sell your products to an established hardware or software vendor. Such an establishment will have the distribution network and sales force needed to market your product successfully.

You will increase the probability of success if you design a product that uses the full potential of recently introduced hardware.

Long is a professor at Lehigh University, a DP consultant and author. If you have a question you'd like him to address, send it to Larry Long, Editorial Department, Computerworld, P.O. Box 880, Framingham, Mass. 01701.



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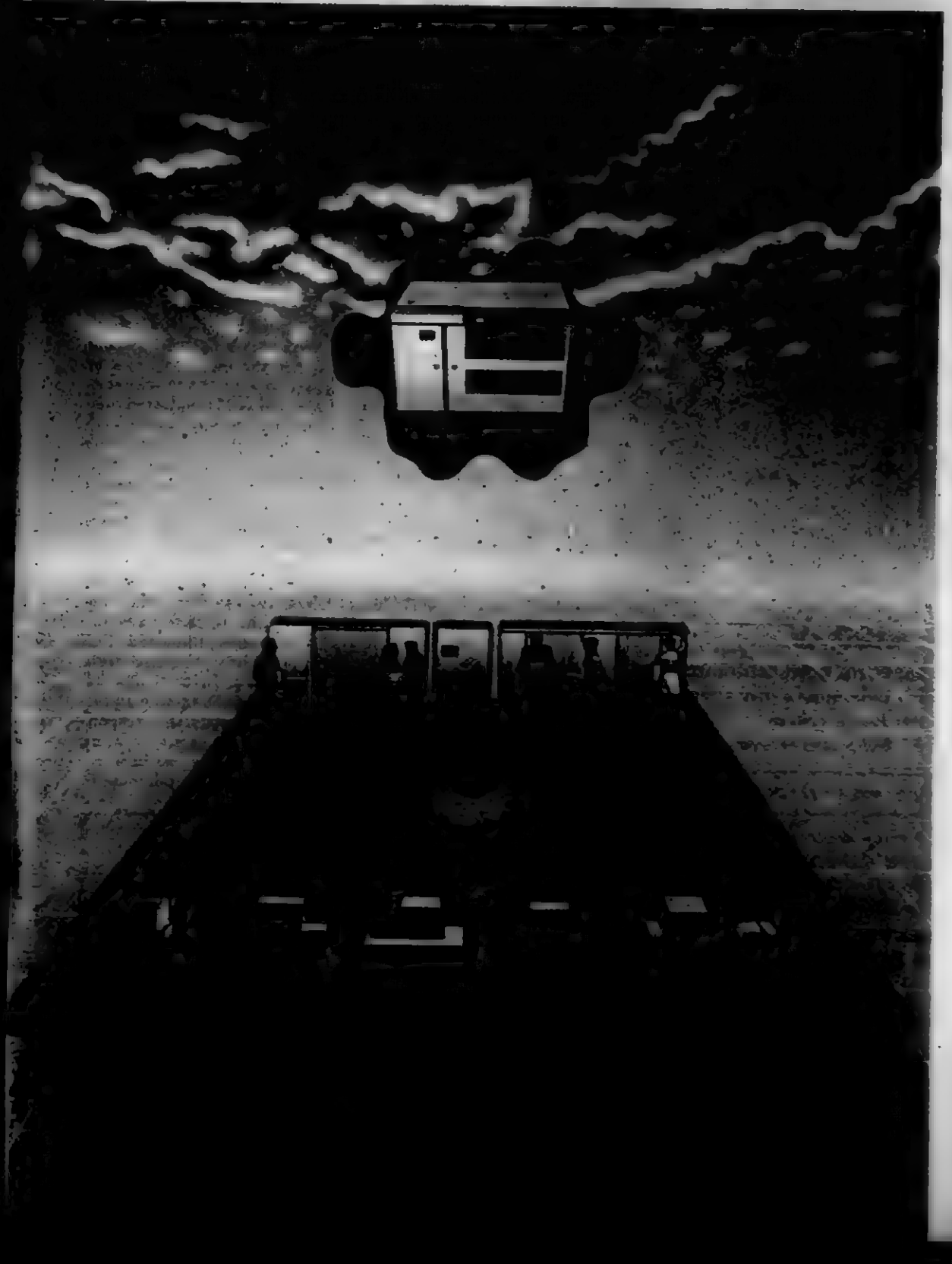

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Generally Satisfied With Performance

Most Senior Accountants Found Using Micros

By Peter Bartolik
CW Staff

NEW YORK — The majority of senior management accountants use microcomputers in their daily business activities and are generally satisfied with equipment performance, a survey recently conducted by the National Association of Accountants (NAA) found.

According to NAA research associate Suzanne Connors, "Senior managers now indicate they have hands-on experience, [and] they're becoming dependent on the microcomputers in much the same way as [they are on] calculators."

The NAA mailed questionnaires to a sample of its 95,000 members and processed 700 responses from senior management personnel, a majority of whom are controllers and treasurers. Those responding were employed in nonmanufacturing firms, service industries and the financial industries; respondents also included consultants employed in a wide range of industries.

Almost 60% of the respondents, 414 out of 700, said they or their staffs use microcomputers to perform daily activities. And nearly half of the respondents (321) said they personally use microcomputers in their daily activities.

Microcomputer use was indicated by more than 50% of respondents from companies with annual earnings in the $10 million and under and $30 million and over ranges, while usage was less than 50% in the $10 million to $29.9 million range.

Of the five respondents with more than 500 people in their departments, only one said microcomputers were used by that respondent's staff. But use increased to almost 60% in departments employing less than 25 people; 580 of the 700 total respondents work in departments of that size.

General Satisfaction

General satisfaction with systems was reported by 368 of the 414 respondents with micros in the office, but 170 also said they had been dissatisfied with particular aspects, ranging from memory limitations to slow speed.

In the offices in which there presently are no microcomputers, 33.7% of the respondents (or 13% of the total survey) indicated one or more units will be purchased in the next 12 months.

IBM's was the most frequently used computer, indicated by 32% of the respondents with micros in their offices. Apple Computer, Inc. units came in second with almost 23%. Epson America, Inc. apparently was most favored as supplier of printers, with 106 respondents indicating the use of Epson units. Only 49 respondents indicated the use of hard disk or Winchester storage, while 217 indicated they relied on floppy disks.

Spreadsheets were the most popular applications software package, being used in 82.4% of the departments with microcomputers. Word processing was the second most popular package, with 66.9% of the departments with micros using such applications. In most areas, the respondents indicated that applications programs were purchased. In particular areas, such as budgeting and financial analysis, respondents reported more packages were written in-house than were purchased.

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Securities Center: A Case Study in DP Conversion

NEW YORK — When Denmark's bond trading industry made the switch over a single weekend from a paper-based system to one that is completely electronic, there was no opportunity to look back.

Since then, VP-Centralen, the Danish securities center that was established to handle the conversion, has become a case study, its vice-president, Henrik Dines Hansen, said in a recent interview here.

"We abolished everything about the old system virtually overnight. We were conducting business the Monday after the Easter holiday, and we have increased our transaction productivity by 20%," Hansen said.

The center could not perform a parallel conversion test because the information all had to be converted at the same time. "There was no turning back. We had to go with it and not look back."

Fortunately for Hansen and VP-Centralen, there was no need to "turn back," and he subsequently decided to publish a chronicle of the successful conversion in a book called *Up and Running*, which will soon be released by Yourdon Press here. "[Yourdon, Inc.] had helped in the consulting stage of the project, and they thought it would make a good story," Hansen said. "I actually had the manuscript ready before the conversion went off — I knew I was going to be successful — and I just had to add a few pages."

Asked if he thought it was ironic for Denmark — whose money supply is tight and, on a global scale, small — to be taking this leap into the future with a totally electronic bond trading system, Hansen replied, "The less money you have, the more you need to move it fast. This is the challenge for countries like Denmark and Sweden. You have to be very efficient with whatever you have."

Hansen maintained that the world is closer than it realizes to becoming a paperless society and predicted that Denmark will soon electronically automate its system of stock trading. He also thinks Norway and Sweden will be interested in what Denmark has achieved at VP-Centralen.

"Sweden had to shut down their trading during the market boom last spring. They couldn't cope with the paperwork. They couldn't settle, so they had to stop doing business for a week."

Hansen anticipated that in automating finance around the world, more software products are coming along like Intel Corp.'s Intel Data Base Information System (Idis), a multiuser mainframe-to-micro link that acts as a buffer in the Danish system. "You need products like Idis to help solve the data anarchy problem: global processing and maintenance vs. individual information processing needs. That's the only way to deal with application backlogs."

VP-Centralen, the Danish Securities Center

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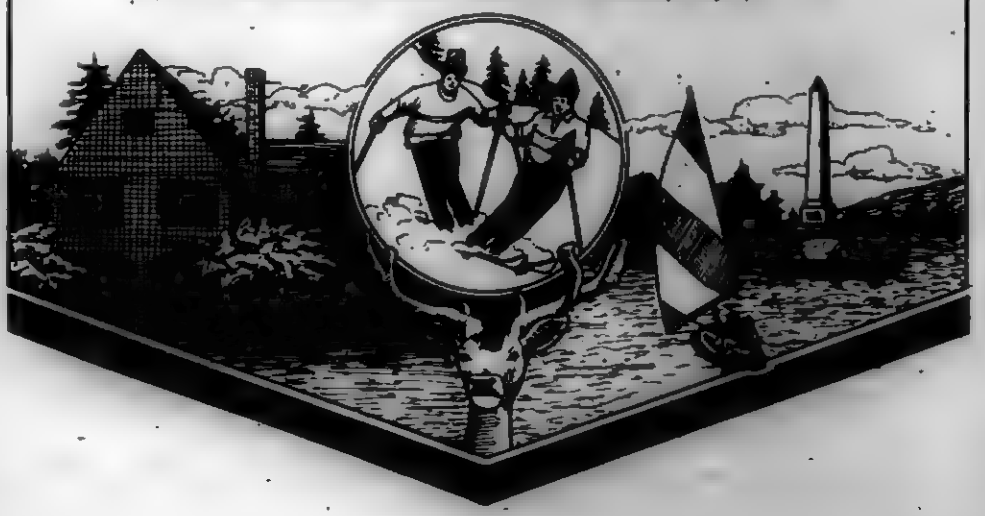

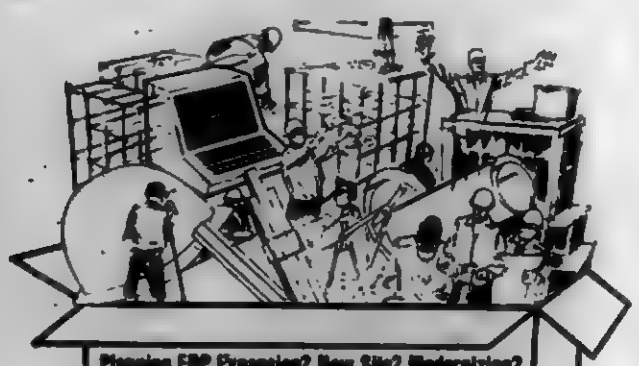

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Denmark First to Shred Paper Securities for EFT

By Susan Blakeney
CW Staff

NEW YORK — Paper securities are a thing of the past in Denmark, which has become the first country in the world to replace them with electronic funds transfer (EFT).

During a recent visit to the U.S., where he hopes to convince American banks to follow suit, the man behind the new system outlined how an entire country moved from shuffling manual securities to EFT. Henrik Dines Hansen, vice-president of VP-Centralen, the Danish securities center, provided the details of a system that was converted to EFT on April 1 and has been operating successfully since then.

Denmark converted its paper securities to an electronic system in order to stop the flood of paperwork associated with issuing and trading bonds. "Because of Denmark's highly complex mortgage credit system, which finances private homes, bond trade exceeds $60 billion dollars, or 1.5 times the country's [gross national product] . . . the amount of paper transactions that was involved was staggering," Hansen said.

Recognizing this problem in 1975, Denmark's Ministry of Housing appointed a commission to propose alternatives to the paper securities system. Hansen, who had previously worked in a data center owned by some Danish banks, became project adviser for the commission.

The group recommended the creation of a national DP securities center, which would eventually become VP-Centralen, and Hansen was chosen to direct the standards and methodologies for system development of the center. Hansen's strategy comprised a three-pronged, 10-month analysis leading to his decision to pick software first and then determine the most appropriate hardware configuration.

Hansen first conducted a technical comparison of five data base management systems (DBMS), including Sperry Corp.'s DBMS 1100, Software AG's Adabas, IBM's IMS, Cincom Systems, Inc.'s Total and Intel Corp.'s System 2000. During the second phase, he evaluated the level of support offered by the software vendors.

"There were three finalists that we thought could do the job, but we thought Intel's potential was the strongest. We wanted a vendor that could accommodate us and provide service five years down the road," Hansen said.

The final planning phase involved testing the DBMS using a full-scale model of the future application. IBM had just released its 4300 mainframe, which worked well with VP-Centralen's mock-up of the system, according to Hansen. During this phase, the decision to go with System 2000 was confirmed.

It was not until May 1980 that the Danish Parliament formally authorized the creation of VP-Centralen — some five years after its foundation had been laid — and Hansen was appointed vice-president. The data center was to serve only as a repository of information, Hansen explained, funded by Denmark's commercial banks, savings institutes, brokerage firms, mortgage credit institutions and the Federal Reserve Bank.

The decision to burn all Danish paper securities in favor of the new system was announced by VP-Centralen two years ago at a conference held by the Association of System 2000 Users for Technical Exchange [CW, March 30, 1981]. The projected conversion was to be completed this year; after "intensive and meticulous planning, the conversion occurred precisely on schedule and without a single software bug," Hansen claimed.

According to Hansen, the System 2000 DBMS, which runs on the center's three IBM 4341 Group 2 mainframes, has made for a smooth transition.

"Investors can obtain their securities in the same way they always did — from their banks or credit unions — but instead of receiving paper bonds, they simply receive statements from the banks of all their transactions. These cannot be used as legal tender," he added.

All transactions are registered on an account in VP-Centralen's data files, and the transfer of securities becomes valid only by registering the transaction in the computer.

Because 95% of the paper bonds were already on a DP system in either a Danish bank or credit house, the 1,500 end users of the new system only had to extend their existing communications networks within the financial sector to include VP-Centralen's data center.

CW Photo by S. Blakeney

H.D. Hansen

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Chinese Engineer Outlines China's DP Strategy

BALTIMORE — While the Chinese computer industry is producing a wide range of fourth-generation computer products, there is still a vast development potential in the People's Republic.

So said Yang Tian-xing, the deputy chief engineer of the North China Computer Technology Institute, during a presentation on "Computing in China" that he delivered at the recent Data Processing Management Association Conference here.

The computer industry in China is largely directed by two government bodies, the Electronics Industry Ministry and the Machinery Industry Ministry. A number of specialized research institutes, such as the Beijing Computer Technology Institute, and academic research centers also contribute to the advancement of computer science. "They are all devoted to the development, production and application of computers," Yang explained.

Yang admitted that the utilization of computer equipment in China is still sparse. He compared China's installed base to that of Spain, which ranks 12th in the world.

China imports most of its computer technology from the U.S. (37%), Japan (30%), France (9%), West Germany (8%), the Soviet Union and East European countries (6%) and the UK (3%). The remainder of equipment comes from a smattering of other European countries.

Unlike the West — where transaction processing often accounts for 75% to 80% of computer activity — China uses computers primarily for scientific applications (29%), Yang reported. Transaction processing accounts for only 2% of their use.

Main Obstacle

One of China's main obstacles in catching up with Japan and the West is the development of efficient Chinese-character information processing systems. Yang noted that China uses as many as 50,000 complex Chinese characters and another 20,000 simplified ones; this presents unique problems in terms of encoding, data compression and lengthy I/O efforts. Advances are being made, nonetheless, to overcome these obstacles, Yang maintained.

"Computing in China has undergone 30 years of development and achieved very great progress. The production system of the industry has been initially formed; the scientific research centers have been established and are being continually strengthened; and we now have a number of computer specialists of high academic level.

"If there had not been that decade-long setback, our achievements would have been greater. ... Due to the unnecessary setbacks lasting from the mid-60s to the mid-70s, the number of professional personnel graduating from computer departments only amounted to about 30,000.

"Today the developing situation after China's economic transformation and the effective measure taken by the government to maintain further an open-door policy, have promoted the academic exchange between Chinese computer specialists and their foreign counterparts."

Specifically, Yang outlined the following future for China's computer industry:

- The state will greatly increase its investment in computer industry and enterprises.
- In three to five years, Chinese medium- and small-scale integrated circuits will greatly boost their output capacity while their costs go down.
- A viable Chinese software industry will evolve soon.
- Production will be stepped up in the areas of minicomputers and microcomputers.
- The open-door policy will facilitate the introduction into China of advanced technology from foreign countries.
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70 Mining/Construction/Petroleum/Refining
75 Other User

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85 Computer Service Bureau/Software/Planning/ Consulting
90 Computer/Peripheral Dealer/Distributor/Retailer
95 Other Vendor

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13 Treasurer/Controller/Financial Officer
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22 Director/Manager of Operations/Planning/ Administrative Services
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
35 OA/WP Director/Manager/Supervisor
36 Data Comm Network/Systems Mgmt
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C. Microcomputers/Desktops
D. Communications Systems
E. Office Automation Systems

International Report

FROM THE CW INTERNATIONAL NEWS NETWORK

BRAZIL

SAO PAULO — An agreement to develop jointly a superminicomputer has been reached here between IBM and Itautec, an equipment manufacturer belonging to Brazil's Itau Bank. Another agreement is said to be in the works that calls for the implementation of a network linking IBM mainframes to Brazilian banking terminals.

FRANCE

PARIS — A joint marketing agreement was reached here last week by two of Europe's office machine superpowers, Carlo Olivetti, Inc. and CII-Alcatel. CII-Alcatel will sell Olivetti electronic typewriters, and the two companies will collaborate on a new company to develop a new generation of electronic typewriters featuring Zilog, Inc. Z80 microprocessors, micro floppy disks and electronic spreadsheets. In addition, Olivetti will market the CII-Alcatel videotex terminal.

TOULOUSE — A terrorist anti-computer group that calls itself the Committee for the Struggle Against Computers claimed credit for a fire that was set in Sperry Corp.'s office here the night of Oct. 25. No one was in the systems office at the time of the fire, which the group said it set to protest the U.S. invasion of Grenada. In the last two years, the group has bombed offices of CII-Honeywell Bull, Philips Data Systems, Inc. and software vendor CAP Gemini.

JAPAN

TOKYO — Hitachi Ltd. has installed its supercomputer, the high-speed array processor S-810 Model 20, at the University of Tokyo's Computer Center, which is used by all computer students at the university. The supercomputer features a main memory of 64M bytes and operates at speeds of 630M floating-point operations per second.

TOKYO — Toshiba Corp. has released an optical character recognition (OCR) system that is reportedly able to read 500 kinds of handwritten Kanji and Kana characters in addition to printed Japanese words. The OCR-V595 system, according to Toshiba, will enable users to input data 60 times faster than with traditional keyboard input methods. Furthermore, the vendor predicted that the market for such devices is growing at an annual rate of 30%, and some 3,600 systems will be sold in 1983. The standard OCR-V595 system is priced at $107,660 and will be available in December.

SWITZERLAND

GENEVA — The French Postal Telephone & Telegraph Administration (PTT) took the wraps off Telecom 1 at the recent Telecom '83 Conference here. The satellite-based digital network service is expected to be operational sometime in 1984. Also on view was AT&T's videotex terminal called Sceptre, which will reportedly come in a microcomputer version with videotex capability and support European standards in the near future.

UNITED STATES

BOSTON — During a recent "trade mission" to the U.S., the Northern Ireland Partnership stopped here in an attempt to dispel its country's reputation for being a war zone and to promote high-technology business ventures there. The Belfast-based group, composed of business executives, bankers, trade unionists, academics, technologists and industrial development specialists, hailed its country as the "gateway to the European Common Market" and introduced a package of incentives for potential investors.

WEST GERMANY

MUNICH — German participants at this year's IBM Users Group conference, held in Oxford, England, reportedly were unhappy with IBM's plans to "stabilize" Virtual Storage Personal Computing (VSPC), the concept that allows Personal Computer users to store information on IBM mainframes and do away with floppy disks. The IBM policy will, at the same time, force DP service centers to switch to alternative time-sharing environments such as IBM's TSO and VM/CMS, which calls for massive conversions of application software, critics said. In big installations, labor costs could run up to 45,000 man-hours because IBM has not come up with "usable conversion tools yet," according to one user. The user group's executive board plans to bring this problem before IBM Europe.

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Message From EPS Keynoter:

MIS Manager 'Must Become Agent of Change'

By John Gallant
CW Staff

BOSTON — In a corporate environment marked by well-educated, highly aware end users, the information systems manager must become "an agent of change, an information czar" in order to survive.

That was the message delivered by Leslie Ball, professor of information systems at Babson College in Wellesley, Mass., in his keynote address to EPS, Inc.'s 1983 User Group Conference here last week. A frequent lecturer on information systems management, Ball said that management information systems (MIS) managers will have to focus on strategic planning rather than technical expertise to satisfy the demands of an increasingly sophisticated community of end users.

According to Ball, the MIS manager faces users who are highly educated and more familiar with the information resources that are, or should be, available to them. With the advent of micros, Ball said, those users are now spread through every level of the corporation, even to the carpeted confines of the chief executive officer.

Employees have become "knowledge workers" and demand more and better information to perform effectively. "The end users are now better aware of trends and capabilities. The users want new tools, and they want them fast," Ball said. "They have an increased perception of the information systems services that they're getting, and they know when the MIS department is not doing its job."

But the MIS manager, faced with such economic constraints as high interest rates and the shortage of capital, must learn to "do more with less."

No longer, Ball said, can the DP staff easily justify programming cost overruns or the addition of more and more equipment. The MIS manager will have to learn to compete with other executives for corporate funds.

All of this points to the importance of long-range, strategic planning by the MIS manager, Ball emphasized. "The MIS manager is faced with a moving target. He needs to be a strategic planner to keep ahead of needs, because those needs change so fast. He will have to manage strategy rather than hardware, and if he can't do that he won't survive. It's no longer so important to be technically knowledgeable — the most important skill today is management."

The implication, according to Ball, is that the MIS manager must "become political." The successful DP professional will combine the skill of managing a technical staff with the ability to understand the needs and responsibilities of end users to become a "manager of managers." And, to balance the need for service with the shortage of resources, the MIS manager must make users aware of the true cost of information services.

"He must achieve a high profile within the organization. He must be viewed as a leader and not simply as a technical person," Ball said. "It's imperative that he learn who's important within the company and how to get things done. To be successful, he must be seen as an agent of change, the gatekeeper and the information czar."

New Responsibilities

Ball said the introduction of microcomputers clearly illustrated the new responsibilities MIS professionals must undertake. "When the personal computer was introduced, most MIS managers blew it badly. They were certain that these things were a fad, that they'd just go away. In the future, MIS managers have to take the lead in planning, not just react to change."

That strategic planning, Ball explained, will be necessary to coordinate the use of an increasingly wide variety of hardware and software products available to end users. More importantly, the MIS professional will need a sound strategy to manage what Ball labeled the "total-access world."

"We're moving to an environment where users demand access to all the information they want. That's a great opportunity to open the MIS world to them. But it also implies ethical and security problems. That area is one of both opportunities and problems that the MIS manager will have to address," Ball said.

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Outdated System Costs Montana $2.5 Million In Lost Taxes

JEFFERSON CITY, Mont. — An outdated computer system has cost the state of Montana between $350,000 and $2.5 million in uncollected state income taxes, the state auditor's office here has reported.

The amount is based on a discrepancy in taxes owed by individuals but not billed because the computer system is incapable of detecting those people, according to Ken MacNevin, public affairs officer for the state auditor's office.

"The system wasn't picking them up," MacNevin said, explaining, "When a taxpayer pays 80% of his tax liability throughout the year in withholding and installment payments, unless the tax payment meets one or more of the exceptions in the tax form, he gets an addition to his tax that's owed, a penalty for not paying enough of it on time. The individual income tax section has not established an alternative procedure for identifying these nonpayers."

According to MacNevin, the problem could be rectified by updating the Department of Revenue's technology, and the collection of tax dollars by the state could proceed more efficiently.

The problem reportedly lies in the computer program, which was developed in the mid-1970s and has only been revised to keep up with legislative changes in the tax laws. "We have not revised the system to keep up with modern technology," said Hal Hebert, manager of Tax Production Systems for the Division of Revenue Information Services Division. "We're working on that."

None of the systems in place for corporate income tax, individual income tax and employer withholding tax are less than five years old, MacNevin added.

"The corporate income tax system went in in 1967, the individual in 1973 and the employee withholding system in 1977. Of course if you're talking about a 1967 computer system, it's like talking about a 1934 Model A."

French Group to Issue Smart Cards in 1984

PARIS — Intelmatique, the international marketing bureau of the French telecommunications industry, announced recently that 1½ million "smart" cards will be issued in 1984 by the Ministry of Post and Telecommunications.

The multiservice Smart Card is a plastic, credit card-size credit device containing one or more embedded programmable microcircuit chips with memory storage capabilities. Intelmatique said the cards will initially be used for public pay telephone service, payment for videotex services, decoders for pay television and payment for conferences and special events at permanent exhibition and conference sites.

The card will also reportedly be used by some savings account customers of two postal bank institutes.

IAT to Beam Data Communications Forum

ROCKVILLE, Md. — The Control Data Institute for Advanced Technology (IAT) has announced the third edition of its Data Communications Update seminar, to be beamed by satellite to 10 cities on Dec. 5.

IAT data communications instructor Gary Zielke will conduct the seminar. The program will focus on current developments and standards and explore future trends in this rapidly changing field.

Topics will include local-area networks, the emerging technology of integrated voice and data, the impact of office automation on data communications and packet switching services from Bell Laboratories as well as from competitors.

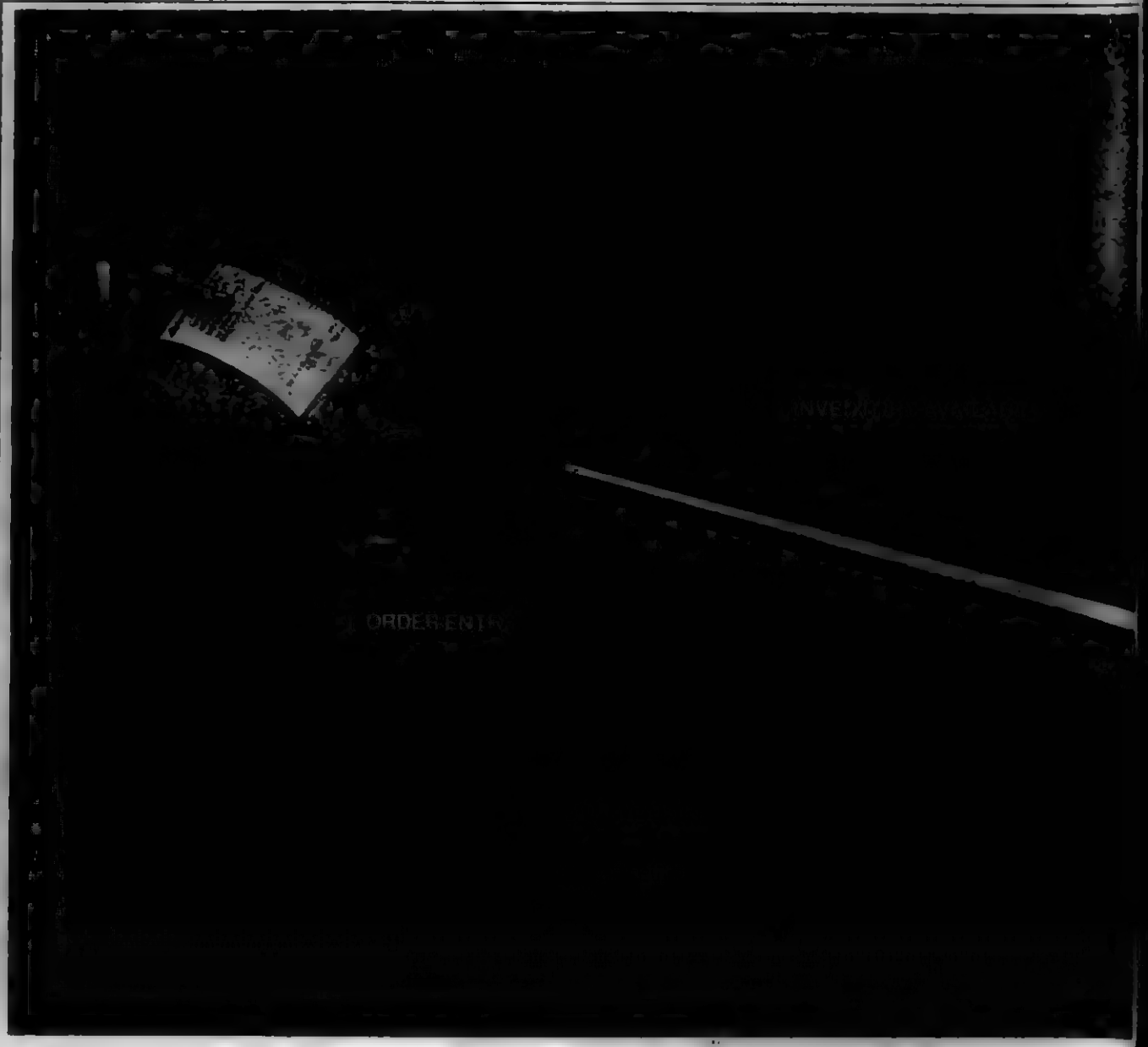
The seminar will be beamed to the following locations:

- From noon to 4 p.m. — Atlanta: Atlanta Marriott Northwest; Boston: Sheraton Mansfield Inn; New York: Sheraton LaGuardia; and Washington, D.C.: Twin Bridges Marriott.
- From 11 a.m. to 3 p.m. — Chicago: Sheraton International O'Hare; Houston: Houston Astrodome Marriott; and Minneapolis: Bloomington Marriott.
- From 10 a.m. to 2 p.m. — Denver: Denver Marriott Southeast.
- From 9 a.m. to 1 p.m. — Los Angeles: Los Angeles Marriott; and San Francisco: Sheraton at Fisherman's Wharf.

Registration is $195 per person, if payment is received prior to the seminar. For every three participants from the same organization registering together, a fourth participant may register without charge.

If the institute has to bill registrants after the seminar, the fee is $245 per person.

Additional information on the Data Communications Update seminar is available from IAT, located at 6003 Executive Blvd., Rockville, Md. 20852.



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Manager's Role to Reflect Shift

Computers Seen Moving to Industry Front Lines

By Jim Bartimo
CW Staff

CHICAGO — Computers have moved from a support role to the front lines in areas including the banking and airline industries. This shift in the computer's role will change the way we look at data processing and the way we do business.

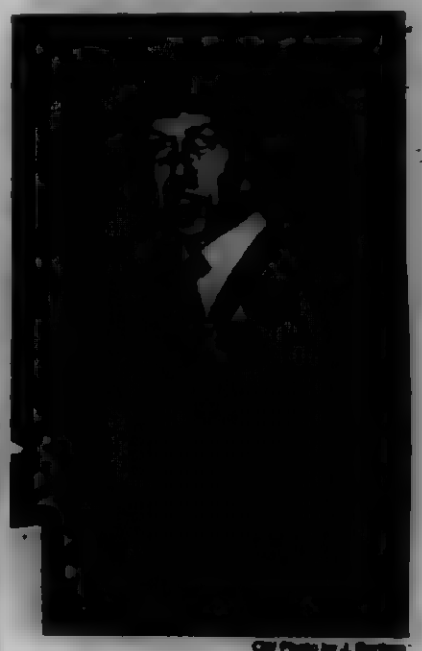
That was the message John Diebold delivered at the Integrated Office Technology Conference and Exposition held here recently. The chairman of the New York-based Diebold Group, Inc. gave a featured presentation on the corporate effort toward office systems integration. "You must ask yourself what is the role of automation in your business," he said. "Information technology is becoming a determinant of competitiveness."

Communications Department

Among the changes brought about by the proliferation of computers is the increased role of the technical communications department. Diebold suggested that one scenario would be to combine data processing and communications into a single department. This would be helpful to the communications department because network design now requires a large staff, he said.

The role of the data processing manager will also change. Once head of the "information factory," he will soon become a policymaker as more end users acquire desktop machines. "It's changing from a wholesale activity to a retail activity," he said. Pointing to what he called "an analytical void when it comes to system integration," Diebold said the corporation must change its method of evaluating the computer. "We measure people and machines that are displaced rather than the time/value of the information," he noted.

Most of the changes coming into data processing and the business world start with the advent of the personal computer and microprocessor. Although the large computer has been in existence for about 30 years, it is only now that "we have a number of computer-literate people," Diebold said.



CW Photo by J. Bartimo

"Information technology is becoming a determinant of competitiveness," John Diebold recently told a conference in Chicago.

As consumers become more computer-literate and microprocessors creep into everything from home appliances to automobiles, some unexpected changes may take place. For instance, a home appliance with a resident microchip will be able to dial a service center when it breaks down, determine its own problem and the best method of repairing itself "without reference to the home owner," Diebold predicted.

Info/Software Set for June 12 In Chicago

NEW YORK — Info/Software, a new, exclusively software exposition, will be held at Chicago's McCormick Place next June 12-14.

Exhibits at the show will cover applications and systems software for mainframes, minicomputers and microcomputers, with an emphasis on products for business, industry or institutions.

Software for games, homes and entertainment will not be permitted, according to a spokesman for the show's organizer, Clapp & Poliak, which also sponsors the annual Information Management Exposition & Conference (Info).

The creation of the show was spurred by the interest in the Software Center at Info, which was 60% larger in 1983 than the previous year, the spokesman said.

Prices for admission to the exhibition floor are $5 in advance and $10 at the door. Pricing on conference registration will be available in December.

More information is available from Clapp & Poliak at 708 Third Ave., New York, N.Y. 10017.

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Report Writer 'Travels' With User's Auditors

HOUSTON — Report writing against a data base is often complicated by the technical considerations involved in reading the data base as well as the scarcity of generalized report writing packages capable of interfacing with multiple data bases. But a Fortune 500 manufacturing company here is using a generalized data base interface to do the job.

Cooper Industries employs approximately 30,000 people, has annual sales of approximately $2.3 billion and is made up of more than 15 independent divisions that manufacture a variety of products ranging from scissors to portable drilling rigs, from fiber-optic wire to jumper cables and from drapery rods and miniblinds to gas compression equipment.

The company's data processing functions are decentralized. Each division works with the hardware, software and application systems that are best suited for its particular product line and customer base.

Any report writer selected to be used throughout the 15 divisions had to run on any IBM mainframe operating system and interface with both Cullinet Software, Inc.'s IDMS and Cincom Systems, Inc.'s Total data base management system. Partly because Carleton Corp.'s report writer Auditec met these criteria, it was selected in 1981 for use by Cooper's internal auditors.

"We were looking for a report writer that was easy to use and easy for a nonprogrammer to learn," said Robert Hevle, director of internal auditing, "and it was essential that the report writer be portable from division to division, from system to system."

Before Cooper purchased the package, auditors relied on whatever report writers — if any — were installed within the individual divisions. As part of a plan to create an integrated auditing function, Cooper searched for a single report writer that could be used not only throughout the corporation, but also by all auditors, rather than just by DP auditors, a Cooper spokesman said.

Cooper spokesman Paul Cowley is particularly pleased with the package's portability. On field audits, the system is typically installed, and productive work is being accomplished on the morning the auditor arrives at the field location. Once the audit is complete, the system is "deinstalled," with the contents of the dictionary saved for possible use in future audits, Cowley said.

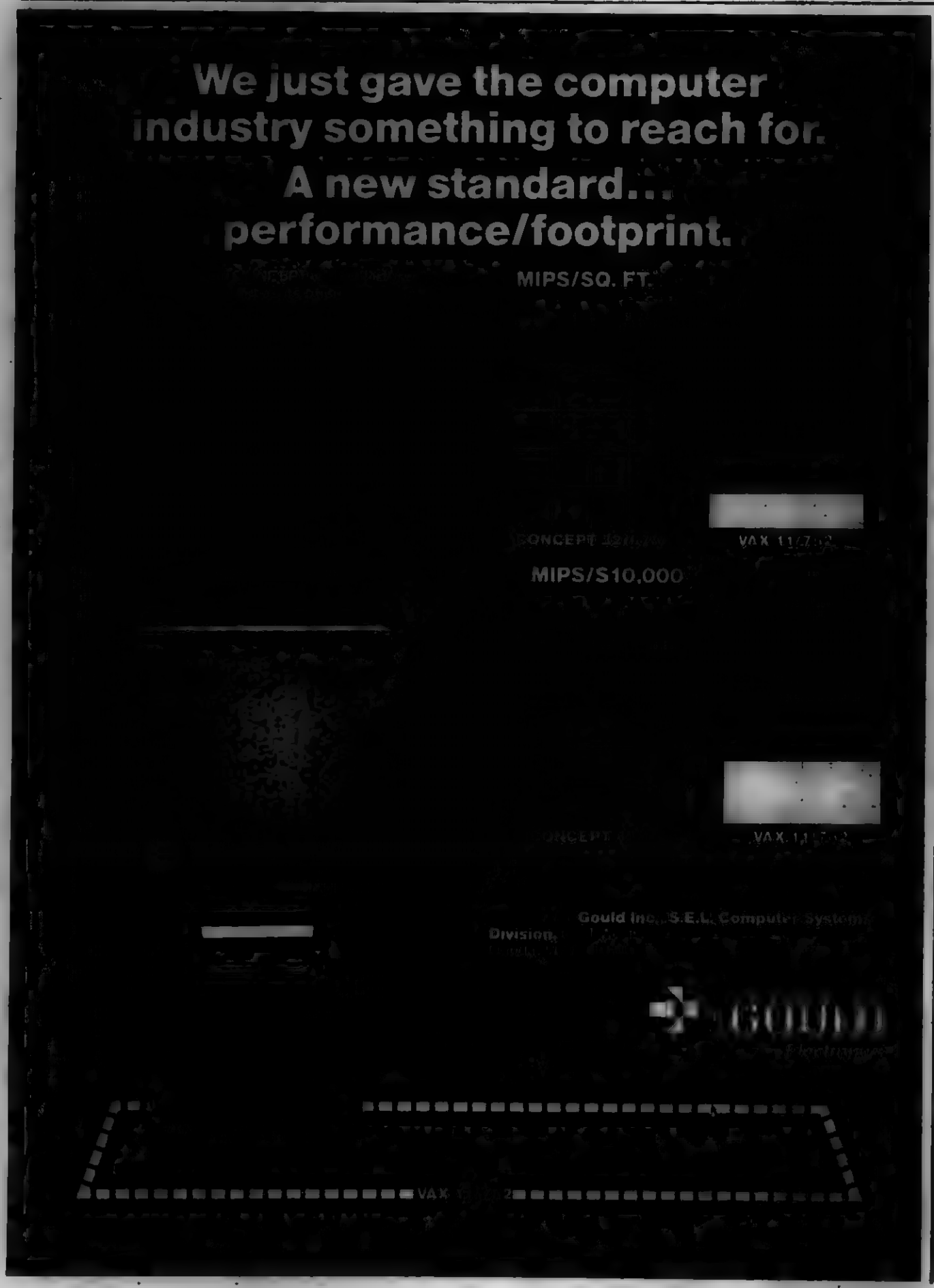
Hidden From Users

Data base jargon is said to be hidden from end users because data bases are defined to the dictionary in much the same fashion as non-data-base files (both data base and non-data-base files consist of records and fields). To support the generalized data base interface, two additional entities are defined to the dictionary: record indexes (relating all records of the same type in a particular sequence) and record links (relating two or more different record types). All supported data base files are defined in this manner.

Cowley said that when he began to work with the IDMS data base, "the dictionary was set up by someone with very little knowledge of any data base, and it worked. I never thought it would be that easy." Shortly, Cowley will be working at a Cooper division using the Total data base management system, and he expects that the process will be equally simple.

Once a data base file has been defined to the dictionary, end users can code report requests using the same programming rules that are used for non-data-base files. There is never a need for the end user to be familiar with the calling protocols usually needed to access data base files; the system constructs these bases on the dictionary definition of the file and the system's knowledge of the supported data base management systems.

With the variety of report formats that can be produced and the flexibility of the programming language itself, the package has many features of a report writer, Cowley said.



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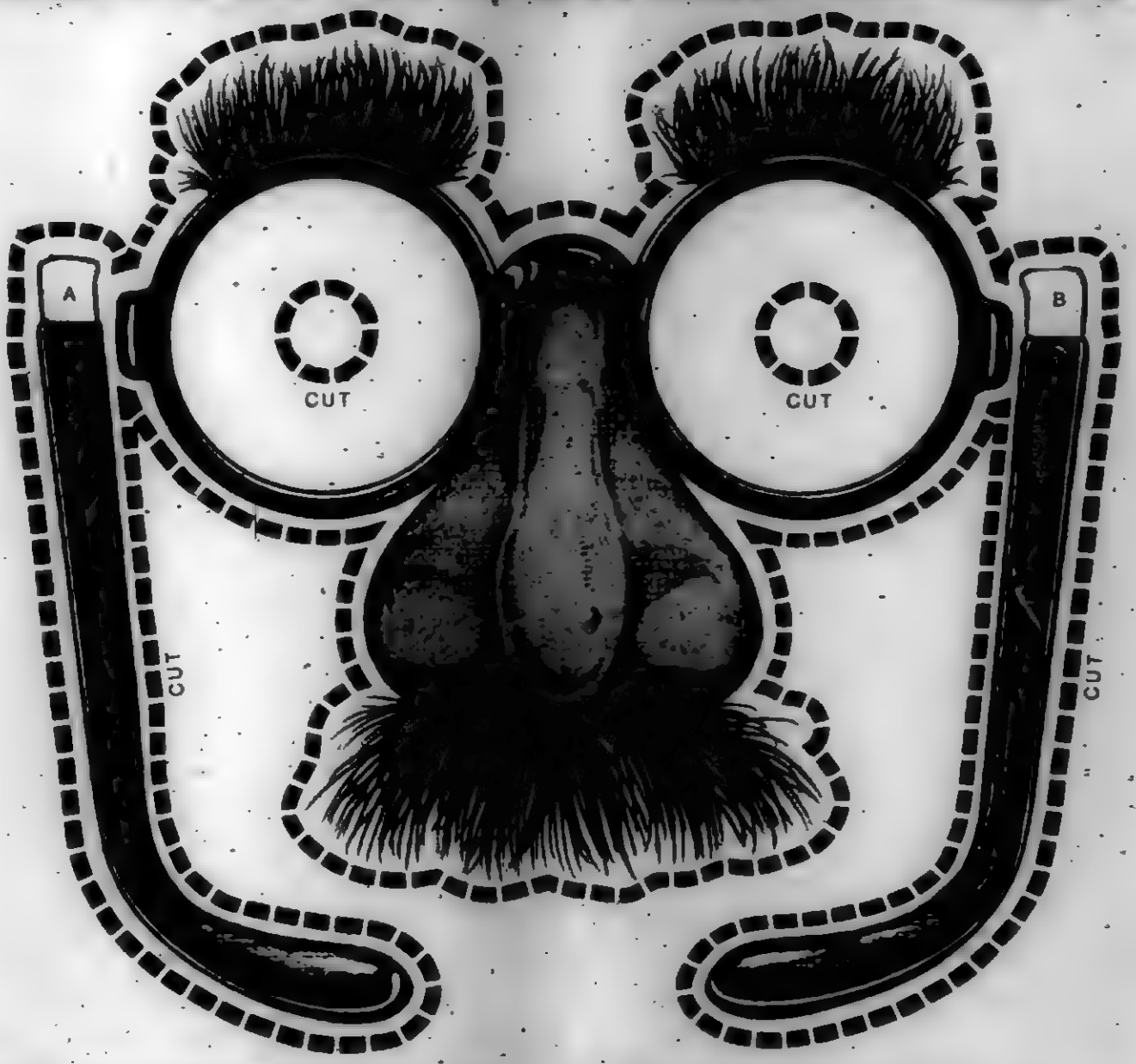

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1. *Datapro*: "User Ratings of Proprietary Software-COMPLETE" November 1982. 2. *Computerworld* December 20, 1982.

Other Offices: New York, Houston, Dallas, Los Angeles, San Francisco, Chicago, Philadelphia, Washington, D.C., Morristown, NJ, Stamford, CT/Representatives: Canada, U.K., Europe, Australia, Japan, Saudi Arabia.

Printers Handle Output From Different CPUs

CALGARY, Alberta — A Canadian company with diversified interests in insurance, property management and resort operations solved a hardware problem from a hard-copy angle by installing a switching system that allows two printers to handle output from both an IBM and a Digital Equipment Corp. processor.

"Our IBM 4341 was using two high-speed printers [IBM 3203 Model 5] — a very costly operation, especially since the output need was really equivalent only to about 1½ printers," explained Vi Sadler, director of computer services for the Cascade Group here. "At the same time, our two DEC PDP-11/70s, one of which we knew would be phased out within 12 months and the other somewhat later, were functioning with two old 300 line/min printers, which were not operating at an efficient level."

Besides the IBM 4341 — soon to be upgraded to an IBM 3033 — Cascade's Computer Services Division uses an IBM 4331. The two PDP-11/70s will be eliminated in favor of a distributed data processing system using PDP-11/44s this year.

Confronting its output problem, Cascade's DP operations staff consulted with Southern Systems-Canada in Willowdale, Ont., which provides users with printer systems compatible with most computer processors. Cascade decided to use two 1,100 line/min Southern Systems QT 1100 printers together with Southern Systems' PS-10 switcher.

"The two Southern Systems printers take up far less space than the IBM 3203 printer," Sadler said. "The two actually fit into space that would be required for one IBM printer."

"The difficulty in achieving this versatility previously was that the electronic interfacing needs of the DEC and the IBM are so different that only very, very costly switching systems could have accomplished what the PS-10 does today, very inexpensively," added Steve Miller, vice-president of information systems for Cascade. "Having the two printers — switchable either to the DECs or the IBMs — also gives us a backup output system should one have any downtime."

The Cascade Group companies include Family Life Insurance Co., Soverign Life Insurance; Soverign-General; Merrett Management Ltd., a property management firm; and the Panorama Ski Resort. "Our DP operations serve all those companies," Miller said.

"The biggest applications are the administration of the insurance policies in the life and casualty business. These are large systems running on IBM," he said.

"The DEC equipment has been used for most of our noninsurance needs — the reservation system for Panorama Ski Resort, as well as property management functions for Merrett, plus general ledger and accounts payable for all those companies."

Because Cascade has to support such a diversity of applications, "we require a diverse set of tools — the necessity for having both DEC and IBM. It's been very cost-effective for us to use the two Southern Systems printers on the three computers. The alternative would have been two printers for the IBM and two for the DEC — a costly solution."

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'Top Secret' Meet Set for Dec. 7-9

ORLANDO, Fla. — The first annual conference for users of CGA Computer Associates, Inc.'s Top Secret security package will be held at the Marriott Inn here Dec. 7-9 by the Top Secret International Committee.

Security consultant Jack Bologna will deliver the keynote address on how to sell access-control security to upper management. Workshop sessions will cover auditing facilities, password management, application protection, auditing MVS, technical support personnel and CICS considerations.

The registration fee for the conference is $250 per person. Registration forms are available from CGA Computer Associates, 960 Holmdel Road, Holmdel, N.J. 07733.

Users Guides List Service Organizations

PALMYRA, N.J. — The Service Research Group here has made available three users guides listing independent service companies, particularly those servicing personal computers.

The "Independent Service Directory" is said to cover 262 companies, with company name, address, telephone number and corporate officer.

The "Independent Service of the IBM Personal Computer" provides profiles of 25 independent servicers of IBM micros, including information on service features, service contract, average response time and geographic areas serviced.

The "Independent Service of Applications and Systems Software" includes profiles of 105 companies, including company data and annual and service revenues.

Priced at $19.95 each, the reports are available from the Service Research Group through Box 335, Palmyra, N.J. 08065.

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Paint Maker Finds Right Order, Invoicing Mix

PITTSBURGH — The problem was clear. PPG Industries Chemical Group needed to improve its order processing and invoicing (OPI) system, which linked its network of sales offices, distribution centers and manufacturing facilities across the country.

However, the original system, operating on the management information systems (MIS) department's twin IBM 3033 processors, was complicated. The system consisted of 825 programs and took more than 25 man-years to develop.

The OPI system did the job, but was becoming increasingly inefficient in light of PPG's growing requirements. In addition, applications development was slowed because the system required constant maintenance by the programming staff at PPG, one of the country's largest manufacturers of flat glass, industrial coatings, paint and strand fiberglass.

The solution involved rewriting the entire OPI system, using Cincom Systems, Inc.'s Mantis package. The package not only allowed the firm to rewrite the entire system in less than one year, but to do it with less than half the 150,000 lines of code in the original program. It also took only 5½ man-years to complete.

According to MIS manager Michael Crowley, the firm began its search for a solution to its software problem by forming a study team. The team began to explore applications development software to use in updating the OPI system — including the addition of on-line order entry capabilities. The team also wanted a package that would increase programmer productivity and reduce applications development time.

After reviewing 10 leading development tools, the team eventually whittled the pool to three: Cincom Systems, Inc.'s Mantis package; Cullinet Software, Inc.'s Adds-On-Line; and IBM's Development Management System.

System Brought Up in One Day

"We were able to bring the system up in one day, despite the size of the OPI system," explained Tony Liberoni, manager of the firm's operations and systems. "We had contingency plans in case the system came down, but we didn't have to implement them because Mantis gave us the ability to correct bugs almost immediately after we discovered them."

When a customer order is entered into the renovated OPI structure, the system determines the manufacturing facility closest to the order destination, assigns a shipping date and selects appropriate routings and transportation. The system also generates the necessary paperwork, including invoices and bills of lading. Because shipping notices can be printed at any manufacturing facility within minutes of order entry, rush orders can be handled easily.

According to Crowley, the Mantis package has also increased programmer productivity by as much as 35%. The new OPI system has also reduced the drain on Crowley's programming staff, allowing programmers to devote an average of 80% of their time to application development and the rest of the time to program maintenance.

The OPI project is only the first step in a major overhaul that the PPG Chemical Group's MIS department has planned. Crowley said that some manufacturing sites are operating antiquated batch systems which often require the full-time attention of an analyst just to keep them functioning.

The programming staff, as a result, has begun updating the company's base of manufacturing support applications, such as storeroom inventory control, wage and payroll, purchasing, accounts payable and maintenance management.

"Using Mantis, we will update each system as an integrated, data base-oriented system," Crowley said.

Guide Helps Banks Develop Micro Programs

ATLANTA — Computer Based Solutions, Inc. (CBSI) has announced the publication of *Micros in Banking*, said to be a complete guide for banks, savings and loans and thrift institutions to use in the development or improvement of microcomputer programs.

In addition to 22 case studies, an overview of trends and a listing of 20 software firms, the book includes chapters on the following topics:

- Sorting out the facts and myths about micros.
- To write or buy software.
- How to buy the right brand of hardware.
- The micro's proper place in banking.
- Micros as transactional processors.
- Micros as analytical instruments.
- The people-micro relationship.
- Budgets and costs.
- Data security.
- How to buy asset and liability management software.

The book can be purchased for $75. CBSI is located at Suite 1148, 3390 Peachtree Road N.E., Atlanta, Ga. 30326.

Apollo recognizes the fact that there are two sides to every professional.

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Data Ten, Inc. President Ed Allen (standing) discusses a system inventory update with Bill Palmer, the service bureau's telecommunications analyst.

Bureau Clients Get Features Of Personal Computers With Terminal-CPU Link

IRVINE, Calif. — Top management at Data Ten, Inc. has found a way to provide the computer service bureau's customers with the operating features of a desktop personal computer — but without the personal computer.

Instead, Data Ten customers can link a remote terminal to the service bureau's central IBM computer and use it as if it were a personal computer. The equipment cost is a few hundred dollars for a terminal and modem, and the "personal computer" customers have greater storage capacity available and a wider variety of peripheral devices to call upon.

"The key is that we've used existing software to provide a relational data base that lets the mainframe computer look exactly like a user-friendly personal computer," explained Edward D. Allen, president of Data Ten, which serves Orange County, Calif. "Users log on their terminals, build their screens, allocate their disk file space, do their data entry and then generate whatever reports they need from that data."

The primary CPU is a 6M-byte IBM 370/158-3, whose peripheral equipment includes three high-speed line printers and a laser printer; 40 IBM 3330 disk drives; eight tape drives; 32 IBM 3278-compatible terminals for in-house use; and a card reader/punch. Teleprocessing capabilities include an IBM 3705 equivalent front-end processor with low-speed asynchronous dial-up support, bisynchronous high-speed line support for both remote job entry and time-sharing operation and Systems Network Architecture capabilities for other devices.

The mainframe operates under the OS/VS2 MVS/SP operating system with a variety of user features for multiple console support, teleprocessing, time-sharing, remote job entry and multiple file-access methods, Allen said.

Internal Applications

Data Ten added the PNMS-II network management software package from Peregrine Systems, Inc. of Irvine, Calif., in early 1983 to maintain its own equipment inventory and manage problems relative to the network. As Data Ten's staff became more familiar with PNMS-II, it began to use the package to develop internal applications including computer housekeeping tasks, related accounting subroutines and electronic mail.

PNMS-II is also used in Data Ten's personal computer user approach. It was originally intended to maintain the network inventory and present management information in reports. It provided files, screen formats and relationships between files that are all user-defined without programmer assistance, Allen said.

PNMS-II includes a relational data base system, a problem management facility and a report writer facility. The problem management facility is used by Data Ten customers for data entry and specification of information relationships. The data base is the collection point for all user files. The report writer permits extraction of data from any files.

The problem management facility allows users to define any number of categories and lay out screen formats for them, Allen noted. The screen format utility defines screens exactly as they will appear. Horizontal and columnar data fields can be used in the same format.

All popular data types are sup-

(Continued on Page 42)

According to recent reports, people who work with computers spend some 30% of their day working in their chosen profession. And 70% of their day just getting things done.

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apollo

*VAX is a trademark of Digital Equipment Corporation.

Remote Terminal-CPU Link Simulates Micro

(Continued from Page 41)

ported, and field attributes may even be color coded on color terminals. Format changes do not invalidate existing data. A "fill" function fills records with the required information from the data base, as defined by the user in the link file. A "find" function displays information directly from a record, again according to user definition in the link file.

The data base contains the information necessary for management of a network. Users may define any number of files to access information by keyword. The data base structure, relationships and screen formats are all defined by the user.

Query-by-example access to records and files is provided by comparison operators. The Fill and Find functions provide interfile reference capabilities. Any number of key fields may be supported in each record.

A variety of common data base maintenance functions is also provided, Allen noted. System flow and relationships are also defined without programmer assistance, using the link and menu files.

The report writer lets users define and run reports on any aspect of the data base, Allen said. Reports can be created using data from any number of files, with the system prompting the user through the definition of the report. The report writer may also be used to perform mass updates of the data base.

Other utilities handle system security, message communications between users, a conversion facility that converts files from other systems to the PNMS-II format, a status function that displays all current users and a journal that records all system activity with data, time and operator identification.

"The data base is structured in such a way that the casual user can set up his system, without any programming restrictions or being an experienced programmer," Allen said. "The user can sit down at his terminal or personal computer and develop his own program in a matter of 15 to 30 minutes."

In addition, he noted, the user can go back in and make changes in his program without losing all the data he has already keyed in. "The integrity of the information remains, even though new records or fields may be developed. It can be reformatted to the new screen layout without redoing data entry or using a conversion program."

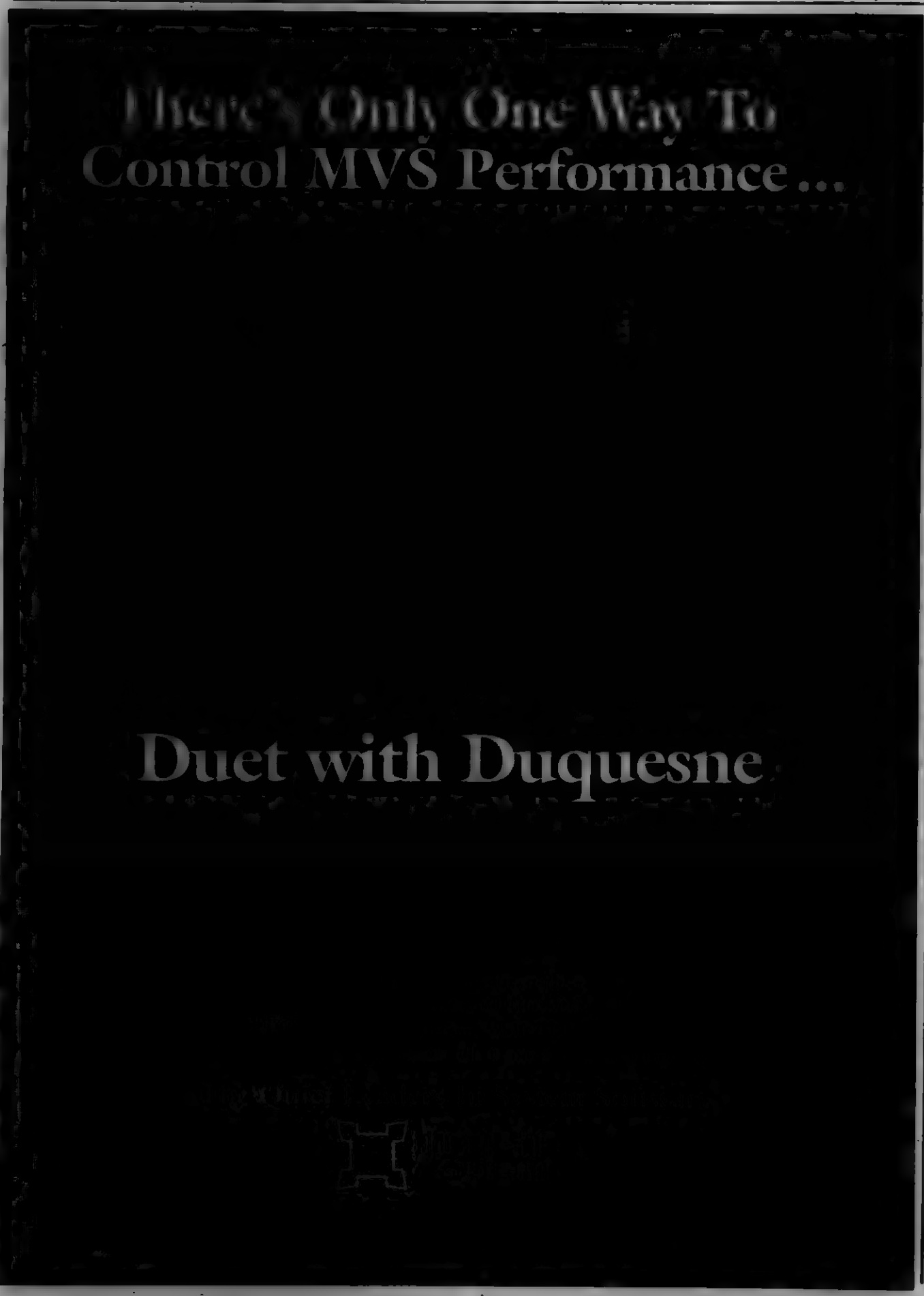
PNMS-II users may employ existing personal computers as remote terminals in a 3270 emulation mode to communicate with the mainframe. "In fact, the data base and our Megacalc spreadsheet program [from The Mega Group, Inc.] let personal computer users load their own programs into our mainframe and continue to use them," Allen said.

Data Sharing Easier

Communications and data sharing are easier because the mainframe "personal computer" can support up to 32 users per site. To maintain communications between remote personal computers or terminals and the central computer, Data Ten has installed protocol converters to take the Ascii asynchronous data coming in from the personal computer and convert it to the 3270 mode.

Mainframe computers were structured as transaction-driven data base with a batch orientation. These traditional designs have been modified in recent years to be interactive, but the resulting data bases have not been relational.

"The personal computer has changed all of that," Allen said. "The personal computer creates keys and pointers at the time the data is entered, so whenever data is to be retrieved, the personal computer simply goes through the same calculation to come up with the data address. Personal computers are fast in cycle time so they execute well. But they don't support large data bases because their off-line storage is limited. So this new partnership of personal computers and large CPUs gives users the best of both."



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UW Library Testing On-Line Card Catalog

MADISON — Few students at the University of Wisconsin's Madison campus relish the thought of a close encounter with the card catalog at the university's Memorial Library.

Confronted by drawer upon drawer of file cards containing listings for the library's 4.5 million books, students often complain that finding resource materials is by far the toughest assignment of any research project.

But the university has taken the first step toward a computerized cataloging system that will someday make today's cards and drawers obsolete.

Currently in the testing stage at UW-Madison's smaller College Library in Helen C. White Hall, the new system promises to make searches for materials easier and quicker.

Students with just a vague idea of a subject heading or only part of a book title will be able to conduct a fast search using the computer, predicts Donna Senzig, acting director of College Library, which serves mainly undergraduate students.

According to Senzig, the computer will even tell the student whether the book is on the shelves or out on loan.

Installed in late June, the College Library system contains listings for the 40,000 titles available at that library. Seven IBM 3101 terminals access information on a data base residing on the university's IBM Series/1 minicomputer.

Expansion of the system to handle 400,000 of the volumes at the larger Memorial Library is expected next spring, but is dependent upon approval of funds by the state legislature, Senzig said.

She hopes that 50 computer terminals will be available at Memorial Library next year.

Terminals at Branches

Eventually, terminals will be available at all 22 major campus libraries, departmental offices and dormitories, making trips to the main libraries unnecessary.

"In a time of budgetary constraints, the system will provide a better way of providing service without increasing staff," Senzig said.

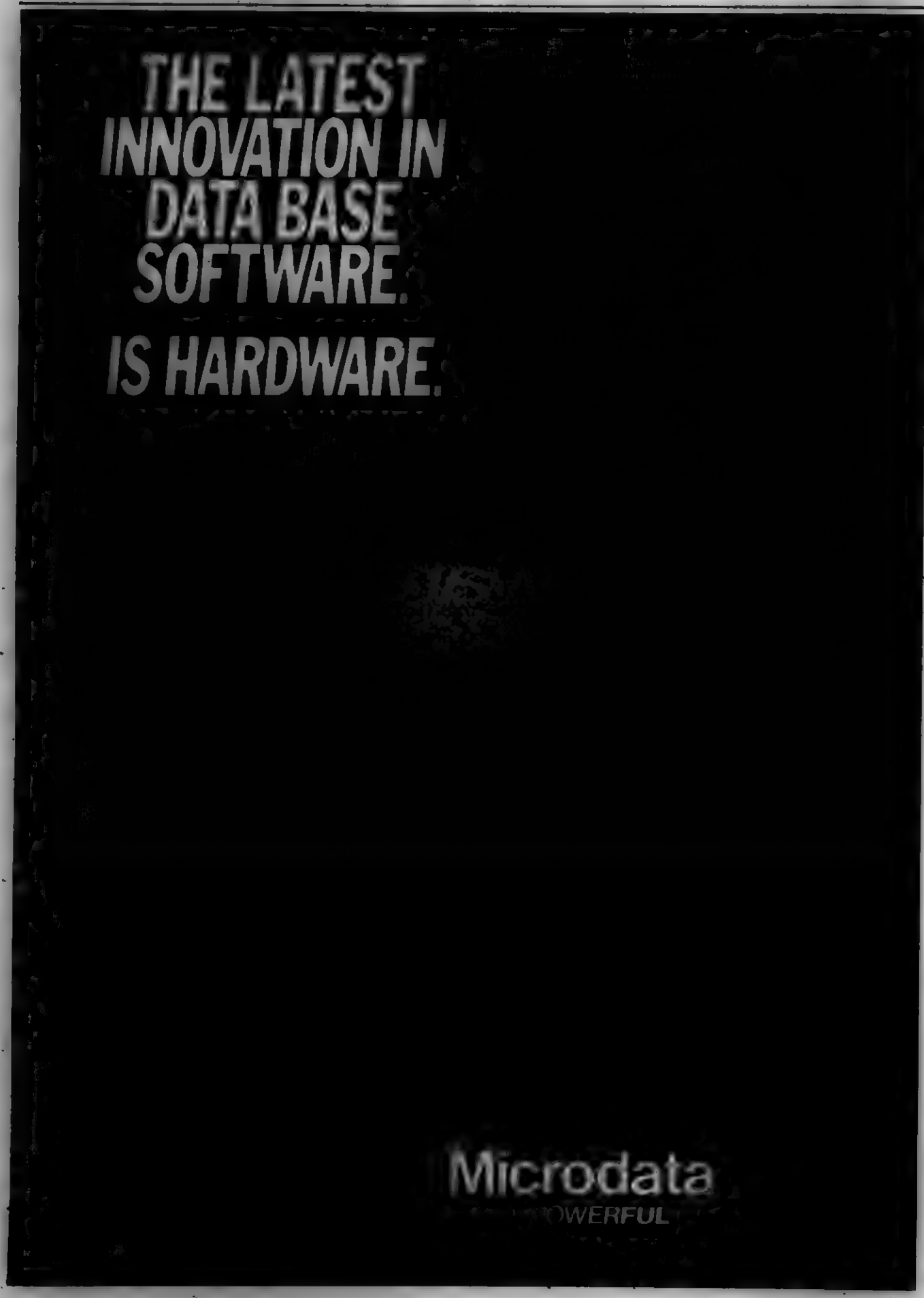
The "Online Catalog," as it is called, will bring important changes for both researchers and librarians, said Frank Bright, director of technical services at Memorial Library.

According to Bright, efficiency will be improved for librarians as well. He estimates that as many as 200,000 cards may be misfiled in the Memorial Library card catalog, making these books inaccessible both to librarians and researchers. "This is one of the most important things libraries must do over the next decade to meet the needs of scholars," Bright said.

Card Catalogs Out

"Card catalogs are on the way out. They've grown too large, complex and costly, and there are too many inconsistencies in them," he said.

Bright predicted that electronic cataloging will eventually eliminate most of those problems. But two familiar problems — time and money — will make the switch-over to computer cataloging a years-long process. Aside from the obvious cost of providing mainframe computers and access terminals, the university must also deal with the problem of cataloging millions of volumes that were filed on cards under outdated systems, Bright noted.



Handles Variety of Applications

Petroleum Firm Strikes Oil With Local Net

DALLAS — The nation may depend on oil, but the people who search for oil depend on information.

"The lifeblood of an oil exploration firm is land to drill on," explained Joe Lanier, data processing manager for Lear Petroleum Corp. based here. "You have to keep track of the leases under your company's control."

When Lear Petroleum's accounting work load began to skyrocket, its DP department had to keep up, even though the work load increased by a factor of 20 between 1977 and 1983. The firm's business grew from $17 million to $200 million.

Lear Petroleum is an oil and gas exploration and gas transporting firm. Prior to 1977, the firm — which employs 350 people in Oklahoma, Texas, Louisiana and Montana — subscribed to a computer service bureau.

"We wanted applications developed specifically for Lear, but the service bureau couldn't provide that," recalled John Winslow, Lear Petroleum's vice-president for management information systems. "In shopping for our own computer, we were looking for systems that were user-friendly — we didn't want a data processing staff that would get between the system and the users."

Lear Petroleum bought in 1977 a Datapoint Corp. 6600 processor configured as a Datashare system with three attached terminals and 20M bytes of disk storage. The 6600 is a minicomputer that fits easily on a desktop, according to Datapoint. Lear Petroleum ordered one with the maximum internal memory possible — 256K bytes.

Datashare is the multiuser version of Databus, the Datapoint programming language. Up to 24 terminals running different Databus programs simultaneously can be attached to a 6600 processor.

"Not only did we grow transactionally — by the amount of accounting work we had to do — but we also grew by the number of applications we had running on the computers," Winslow said. "We needed to add about one terminal every month or so."

Initially, Lear Petroleum began running four applications — lease records, general ledger, revenue distribution and joint-interest billing. Progress, however, didn't stop there, and soon the company reached a point at which more processors were necessary.

Lear Petroleum expanded to a Datapoint Attached Resource Computer (ARC) local-area network in 1979 with the addition of two 6600s. One 6600 acted as a "file processor," handling the network's disk storage, and the other two acted as Datashare processors.

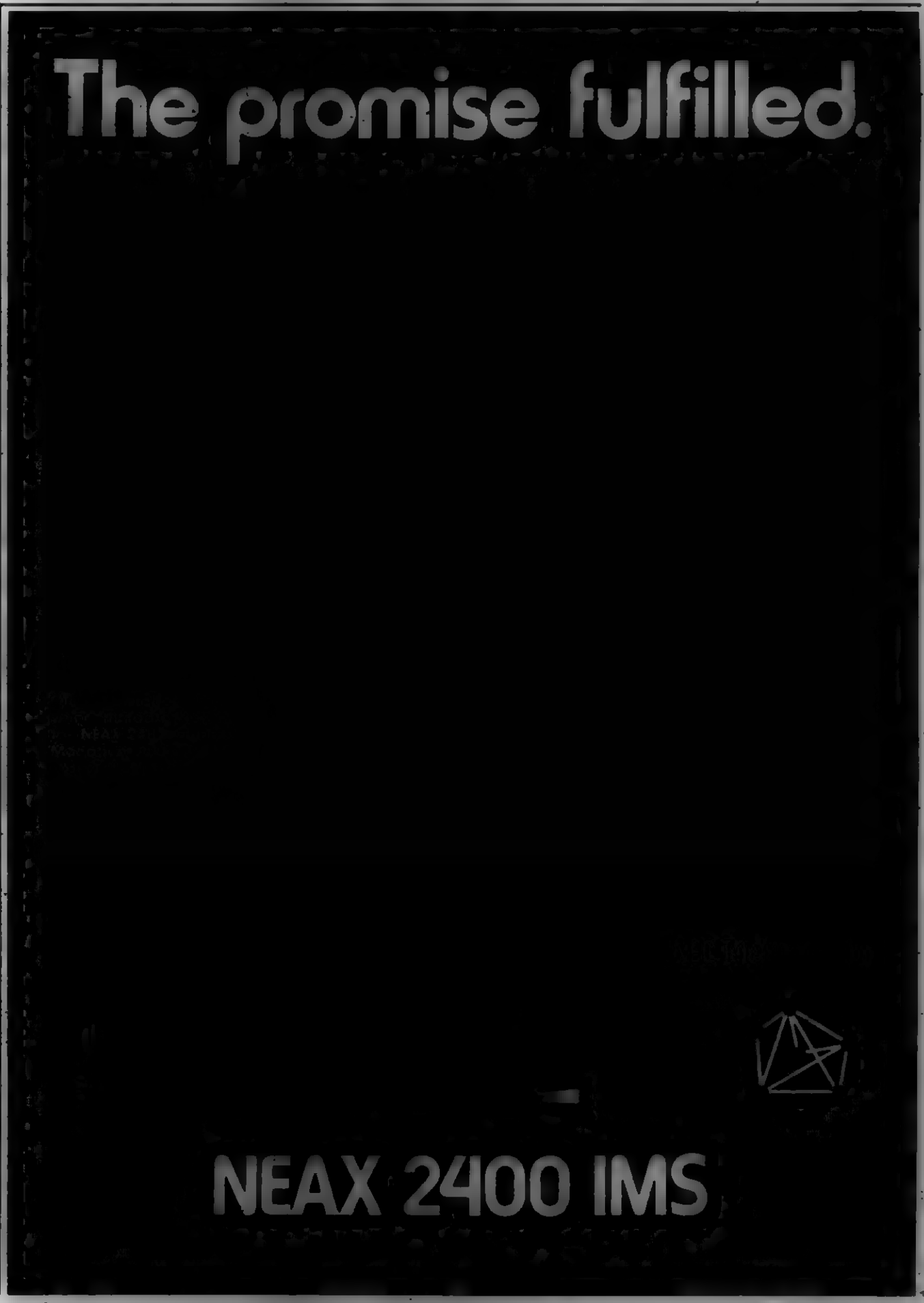
Network of Processors

Lear Petroleum now has a network of Datapoint processors at its headquarters, and smaller networks have been installed at three divisional offices. Seventeen of the processors are 6600s; another 17 are 3800s; and seven are 8600s. The 3800s and the 8600s are large-screen processors suitable for word processing.

Five of the 6600s are file processors, supporting a total of 740M bytes of storage. Another five are used for Datashare, supporting a total of 38 terminals. Other network resources include four letter-quality printers, three high-speed belt printers and two 160 char./sec dot matrix printers.

Lear Petroleum now runs more than 60 application software systems on the ARC network, ranging from payroll accounting to natural-gas purchasing. The programs are written by a software consulting firm that Lear Petroleum owns. When the programmers aren't working for Lear Petroleum, they're available to work for some other company. On the average, about 15 people

(Continued on Page 46)



Conference to Highlight Micros

PALM SPRINGS, Calif. — Enterprise Information System, Inc.'s fall conference focusing on the use of personal computers and developments in microcomputer software will be held Nov. 21-22 at the Americana Canyon Hotel here.

Among the featured speakers at the conference will be Esther Dyson, president of Rosen Research, Inc., whose keynote address will highlight "Critical Factors for Success in the Personal Computer Arena."

IBM Director Robert Berland will present an overview of application software developments and end-user trends, and Ralph Ungermann, president of Ungermann-Bass, Inc., will discuss local-area networking for large organizations.

According to the sponsor, the conference will highlight the growing use of microcomputers and the implications of that trend for users, vendors, OEMs and retailers.

The cost to attend the fall conference is $850.

Enterprise Information System can be reached through P.O. Box 1154, Greenwich, Conn. 06836.

Local-Area Net Keeps Track Of Oil Firm's Land Leases

(Continued from Page 45)

work on software for Lear Petroleum at any one time. However, Lear has only one full-time DP staff member.

"With every application we do, the first thing we think about is how the user can do this for himself. All data entry, all file updating and 60% of the processing is done by the users," Winslow said. The DP staff performs overnight batch jobs, plus file backups and other "housekeeping" chores.

Divisional offices in Denver, Oklahoma City, Okla., and Houston have been equipped with ARC networks. "The systems at the divisional offices are used for regular accounting and for tracking the number of undeveloped leases under Lear's control," Lanier explained.

The divisional ARC networks are on-line with headquarters via phone lines using a Datapoint software package called Arclink. This gives all users transparent access to the files stored in the headquarter's ARC network — except, of course, that the data is transferred at 9,600 bit/sec instead of 2.5M bit/sec. A processor at each end of the communications link must be dedicated as a "communications processor."

Word processing is done through Datapoint's Integrated Electronic Office Station software, which turns the 8600 or 3800 into a WP station. Mathematical modeling is done with Microsoft, Inc.'s Multiplan, a spreadsheet simulator.

"Multiplan has proven very valuable," Winslow said. "It's used a great deal by top management.

"The direction I want to go in is toward tying a number cruncher or mainframe to the ARC network — to be a slave of the network, not the other way around," Winslow said.

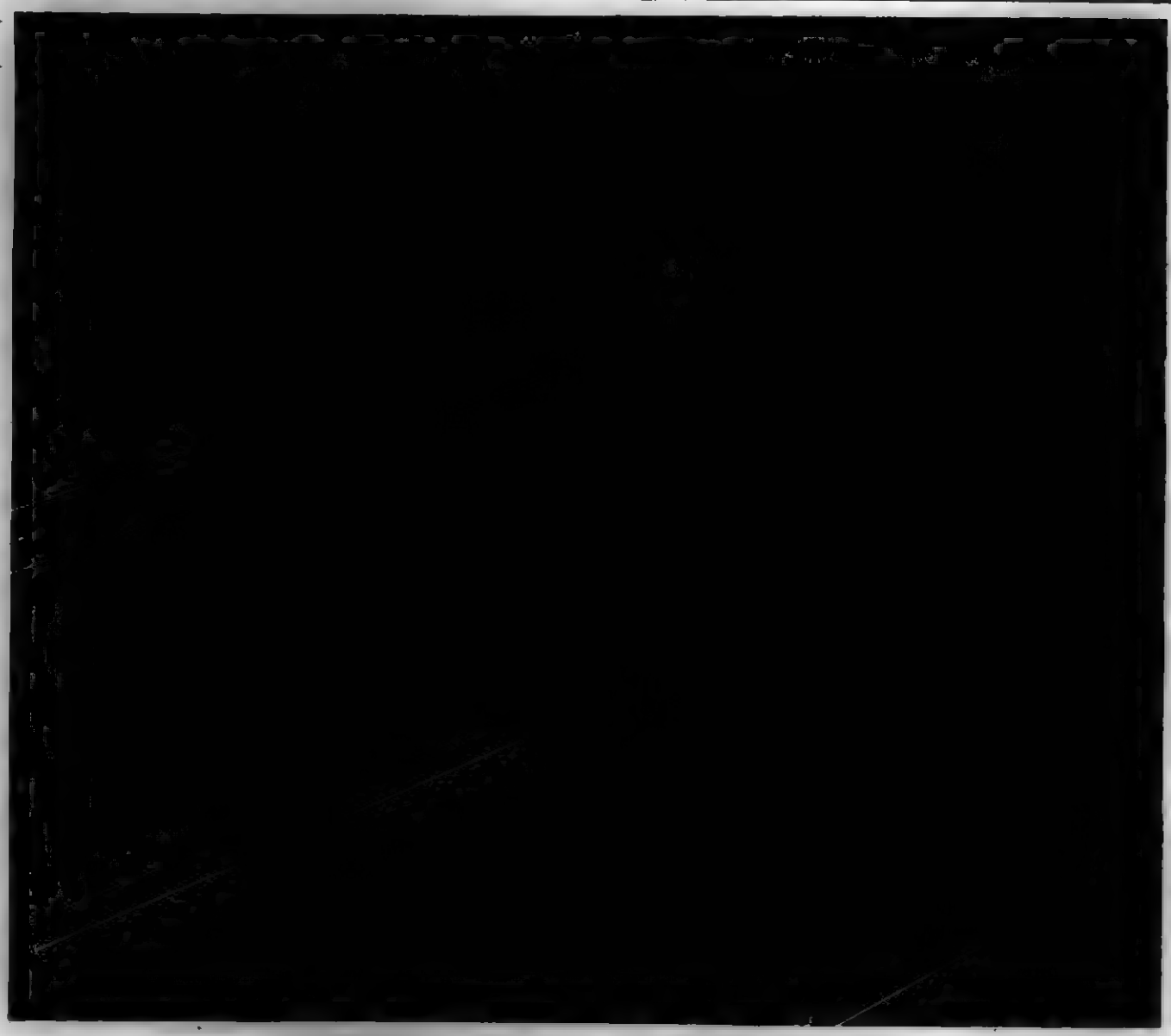
Group Formed For CLS Users

JACKSONVILLE, Fla. — TCS Software, Inc. has announced the formation of the first TCS Client Ledger System (CLS) Users Group. The organization was established to provide CLS users with details on the features and benefits of the package, to answer questions and to establish a source of information on CLS capabilities.

The chairman of the group, Robert T. Hood, is an accountant who has used the package for two years. Hood is interested in talking about problems, solutions and desires for the future with other CLS users.

The group's first meeting was held in late October. Participants included Fred Martin, author of CLS, and Tom Lytle, a CLS specialist.

More information on the organization is available from the CLS Users Group, which is located at 10695 Beach Blvd., Jacksonville, Fla. 32216.



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Answers Users' Application Demands

Supermini Software Cleans Up Sassoon DP Shop

LOS ANGELES — Rapid growth in sales of its beauty products throughout the 70s placed ever-growing strains on DP resources at Vidal Sassoon, Inc., a subsidiary of Richardson-Vicks, Inc., an international hair care and beauty products organization based here.

Users came to demand increasingly more from the shop's patchwork series of homegrown applications, which were written largely in Fortran and were difficult to modify. In time, the shop fell into the rut of doing more maintenance than new development.

Sassoon's data processing specialists realized in 1981 that a clean break was needed from their existing systems, and a search for new software began. Consultants were hired to examine user requirements and audit the DP department.

With the need for new applications verified, the selection cycle began with the premise that the software should drive the hardware choice. A checklist of features and functions was drawn up for the soft-

"We looked at a number of software suppliers, including large mainframe companies," said John Seddon, Sassoon's manager of systems and programming. Ultimately, Sassoon settled on Los Angeles-based Computer Data Corp.'s financial applications running on two Hewlett-Packard Co. HP 3000 Series 44 superminicomputers. Seddon said the selection was based on the system's on-line capabilities.

On-Line Transaction Editing

Of particular appeal was Computer Data's standard transaction file structure, Sila, which allows data entry to a standard format and provides the capability to edit transactions on-line then update immediately or off-line overnight. This contrasted with Sassoon's in-house system, which required batch data entry to disk and an overnight update remote from where the documents originated.

Why wasn't a mainframe chosen? The software on a superminicomputer turned out to be sufficient functionally, and the two HP 3000 Series 44s were capable of handling Sassoon's volume requirements, Seddon said.

"I find it hard now to distinguish between minis and mainframes," he added. "I used to work for IBM, and in retrospect I can't understand why I got so involved in all that complexity. Those IBM customers that I have visited are doing the same kind of things we are, but they have a huge overhead in terms of specialized data processing experts."

Installation of the applications began in March 1982. In preparation for the conversion from Sassoon's older hardware, a Data General Corp. Eclipse C/350, the DP staff wrote data conversion programs that included the capability of entering data only once while running in parallel. The staff produced a tape on its DG equipment, loaded that into a Sila batch and ran the data through the normal transaction processing to ensure that it was clean.

The general ledger and accounts receivable systems were brought up first and ran in parallel for three months. When manual balancing was performed to verify processing, the two balanced to within a penny.

After Sassoon was confident of the results from the general ledger and accounts receivable applications, the accounts payable was implemented.

Today, 40 terminals are connected to one of the HP 3000s and 20 terminals to the other machine. Approximately 3,000 vendors are maintained in accounts payable, with over 6,000 customers in the accounts receivable system. Sassoon's order entry system still runs on the Eclipse.

"I find it hard now to distinguish between minis and mainframes. I used to work for IBM, and in retrospect I can't understand why I got so involved in all that complexity. Those IBM customers that I have visited are doing the same kind of things we are, but they have a huge overhead in terms of specialized data processing experts."

Sassoon uses an open-item approach to accounts receivable processing. Disputed items and unsettled claims, for instance, can be excluded from processing so that their aging is truly representative. Cash is applied to individual items, while the items placed into disputed and unsettled claims do not age.

"It's much more evident what's going on — where the data's going," Seddon observed. Batch files can be examined on-line, and source entries exist that tell users exactly where the transactions originated. Since batch records are entered and can be corrected on-line, "users really feel that they own the data and are maintaining it. They have more control today than in the past."

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Hardware Firm Stays Current With T/S Service

ATCHISON, Kan. — When you mention hardware to John Mize, more than likely he'll start talking about nuts, bolts and doorknobs. But as president of Blish-Mize Co., a large hardware distribution firm based here, Mize does have more than a passing knowledge of computer hardware and its operation within a business environment.

Blish-Mize has grown steadily since its founding in 1871. A member of the PRO Hardware merchandising group, the company operates two warehouses with a total of 235,000 sq ft and does all its own deliveries with a fleet of tractors and trailers. John Mize is a fourth-generation descendant of one of the firm's founders.

Mize fills orders and maintains his business with the help of a time-sharing service, Distribution IV, provided by Informatics General Corp.'s Management Systems Division in Columbus, Ohio. Distribution IV offers integrated information management systems for inventory, merchandising, retail customer services and financial applications, with minicomputer-based distributed data processing capabilities designed especially for distribution businesses such as Blish-Mize.

The time-sharing service's off-site processors interact with Blish-Mize's in-house Harris Corp. 1625 minicomputer. "With 35,000 inventory items, approximately 1,800 customer accounts, 200 employees — including a network of 50 dealer service representatives in the field — and a lot of nickel-and-dime transactions flowing through, it's hard to imagine what we'd do today without this computerized support service," Mize said.

Mize claims the system has helped the firm boost its annual sales from $12.5 million in 1972 to more than $30 million in 1983.

Blish-Mize was one of the first firms to sign up for Distribution IV back in 1969. The 112-year-old distributor is presently turning its inventory about four times a year; the company's objective is five.

"Our company serves seven states fully," explained Mize. "Because of this diverse geography, we must carry a wide range of inventory. For example, in Colorado there is the tourist industry; in Oklahoma, the oil fields; in Arkansas, there is some mining; through Kansas, Nebraska and Oklahoma, we're into agriculture heavily. We are known for our breadth of inventory, and we rely heavily on Distribution IV to help us manage this wide product mix."

User Input Substantial

One of the services of Distribution IV, the Automatic Back-Order System, was designed with substantial input from Blish-Mize and is still used extensively by the company. "It has been a real labor saver," Mize stated. "We also use the Direct Order Entry System to collect all orders and have saved much time and money by reducing the amount of mailing expenses and keypunch input."

The Order Scheduling System, also provided by Informatics, is particularly vital to day-to-day operations at Blish-Mize. As with the Direct Order Entry System, order scheduling is handled in Atchison with the Harris minicomputer connected to the Informatics Data Center in Columbus. Because of the large geographic area served by Blish-Mize, the firm places high priority on handling orders quickly. The Order Scheduling System allows the firm to program its work load through the warehouse, Mize said.

"Our data processing people arrive at 4 a.m.," Mize explained, "and by 6 a.m., we have 95% to 96% of the orders ready to be processed that day. Using the Order Scheduling System, we then batch those orders and process them through the warehouse in accordance with delivery schedules. The first orders processed go into trailer one; then we start on the second trailer with the next orders in line.

"One of the greatest benefits of this system," Mize said, "is that warehouse personnel can program their work load for the day and shift resources to heavy-demand stations as necessary."

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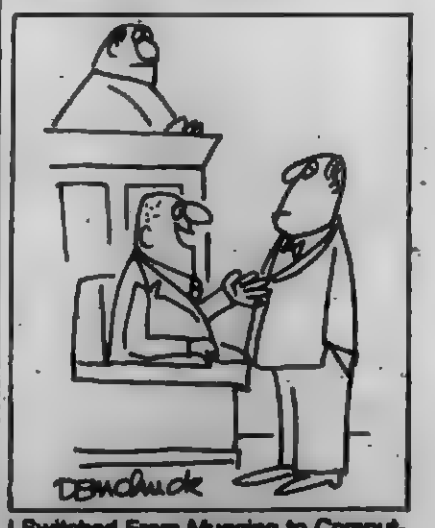

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Workstation Rules Out Paperwork for Court

FAIRFAX, Va. — It hasn't replaced the gavel as a judicial symbol, but a computer workstation has become a fixture in one courtroom. It operates as part of a system that has reduced paperwork and improved accuracy and efficiency in the Circuit Court operation here.

Prior to automation in the late 1970s, the court clerk's office was overburdened with paperwork. Frequent interruptions prevented clerks from recording and filing important documents in a timely fashion, according to Circuit Court Clerk James Hoofnagle. "Employees were constantly thumbing through files to answer questions from the public, which meant they didn't have time to do their filing job," he recalled.

In September 1976, the Fairfax County computer staff and the 19th Judicial Circuit Court began general design work on a series of six applications packages. Those applications were to be run from the county mainframe, an IBM 3031. The first of those packages went on-line in October 1978, the last in January 1981. The six packages include jury management, civil case management, criminal case management, records indexing, automated land records and civil and criminal service.

Terminals Purchased

Twenty-five IBM 3278 terminals were purchased to communicate with the county mainframe, running under CICS. Also purchased were two IBM 3278 printers, according to Circuit Court Management Analyst Shirley Buckley.

Prior to the automation project, Buckley was deputy clerk of the court. Selected to work on the application design project, she eventually became a liaison between the county programming staff and the clerical end users. Over the past six years, Buckley has moved from a primarily end-user orientation to one acutely aware of DP needs.

With automation, court employees have succeeded in erasing the backlog of work and have stayed on top of it ever since, Hoofnagle said. "We do today's work today." Even Chief Circuit Judge Barnard Jennings uses a display terminal — to check quickly judicial orders and other crucial details that can have a bearing on cases before his court, according to a county spokesman.

The system is the reason that clerks have been able to handle a 46% work load increase during this period, even though the staff has only grown 22%, Hoofnagle said.

Training Not a Problem

Supervised in-house, training was not a problem. Buckley, who was in charge of the training effort, estimated it took about two weeks of training before the staff was able to take over. "The system was really very easy to utilize. As a result, most work was reduced by a minimum of 50%," according to Buckley.

Workers are now able to research questions from their desks, using display terminals to find answers quickly, which in turn gives them more time for other tasks. Also, they are able to process documents faster, indexing 830 land records one day recently. Court personnel agree that the IBM system has saved them an astronomical amount of time, according to Hoofnagle.

Accuracy — a critical element in the court's record-keeping operation — also has been enhanced, Hoofnagle said. The system prevents errors by alerting clerks to mistakes through a flashing workstation screen. Further, "The computer is a great security tool for us. We have thousands of files, and if one of those is ever misplaced, we wouldn't lose it because it's on the computer," Hoofnagle said. The court also maintains hard-copy backup, he added.

"Another fascinating feature of the system is that it allows several other agencies in the county to access our records via their terminals, rather than have to make a special trip or pick up the phone," Buckley said.

TIS WINS INDUSTRY'S HIGHEST TECHNOLOGY AWARD.

Off-Loads 95% of Data Entry

Mini Helps Manufacturer Integrate Operations

BRAINTREE, Mass. — A user-oriented, on-line minicomputer system has helped a component manufacturer here integrate manufacturing and financial operations and off-load 95% of its data entry to end users.

Sigma Instruments, a division of the Wheelabrator-Frye Corp., is a manufacturer of electrical and mechanical components that employs 1,200 workers. Its diversified product line of more than 7,000 items ranges from relays to stepping motors. Its operating facilities include the main plant here and several warehouses and assembly plants located in Connecticut, Mexico, Puerto Rico and Canada.

Based on his experience in developing the turnkey system, Sigma DP Manager Paul Meallo had some advice for companies about to embark on a computer project. "The first step should be to define clearly the goals and philosophies behind the implementation of the system. The second step is to find a software company who will work with you to achieve those goals," he said.

Change Philosophy

For 15 years, Sigma's financial and manufacturing information was processed on an IBM 360. In 1978, management decided it was ready to change both the system and Sigma's DP philosophy. It wanted to move from IBM batch mode to a more efficient, on-line, interactive minicomputer system. The goal was to separate the various data bases to create maximum opportunity for growth while running on a turnkey system. Also, the decision was made to break the company into divisions by product line. Each area was to have DP capabilities in addition to its own engineering and administrative capabilities.

The criteria for the new system included a user-oriented approach and the ability to integrate manufacturing and financial operations. Aware that the system transition would be lengthy, Sigma also wanted a software company that would provide the necessary commitment during the process of accurately implementing and customizing a system.

After talking with a number of vendors, including IBM, Sperry Corp. and Burroughs Corp., the firm decided that Digital Equipment Corp.'s Datasystem 11/70 minicomputer and TEC Computer Systems, Inc.'s Manufacturing System Software could provide the right solution for Sigma.

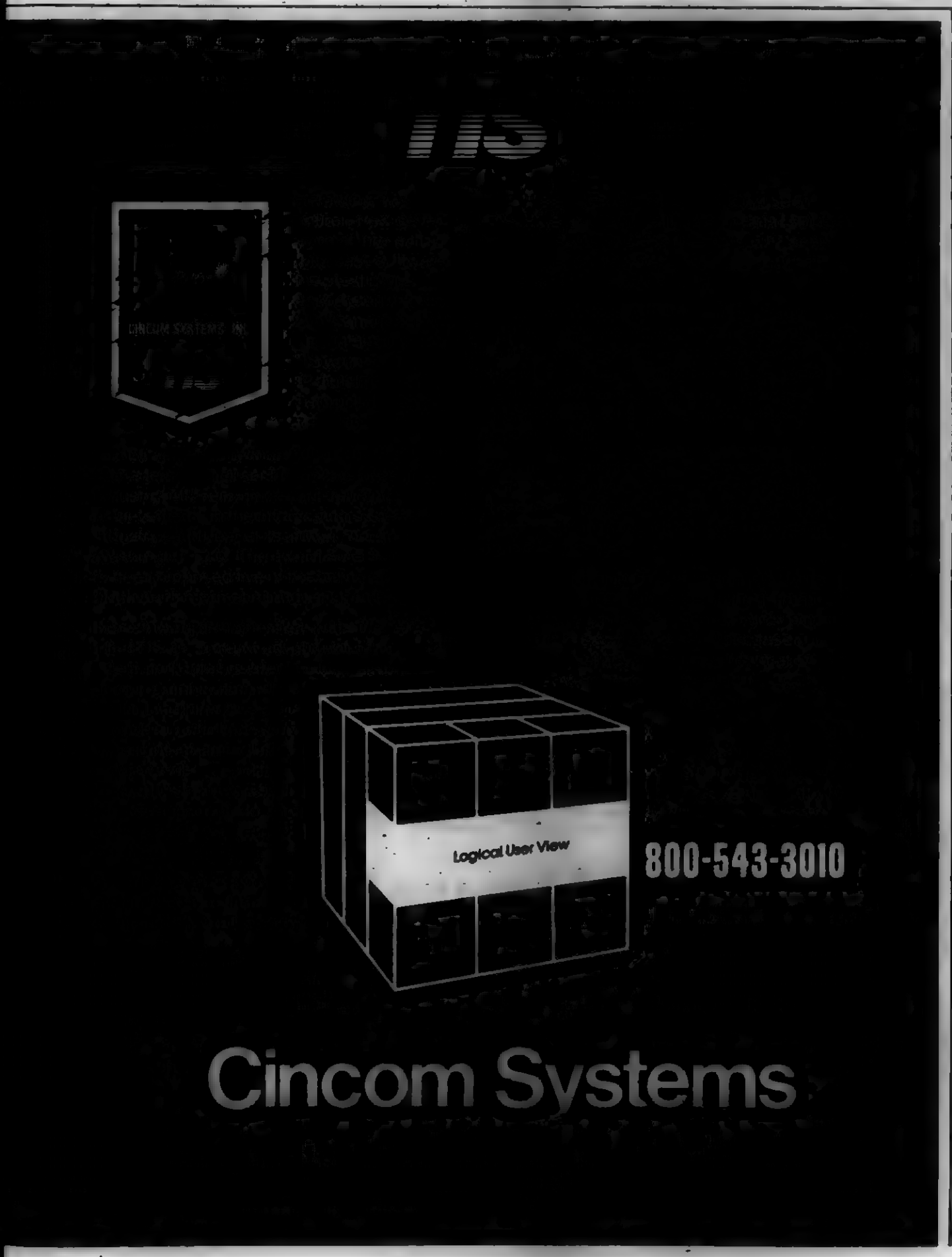
"We chose TEC because we knew they were specialists with manufacturing systems, and we felt very comfortable with the company," Meallo said. "With larger companies, you can spend half your time caught up with a lot of red tape. We knew we would be more in touch with TEC's upper management if we had needs," he added.

In addition, Sigma opted for "plain-vanilla" software. "With this package, you define your requirements and build the applications to suit your needs," Meallo said.

User Involvement

Begun in March 1981, Sigma's approach to system implementation stressed the importance of involving the users as much as possible in the process of defining the company's requirements. A project coordinator was selected from each division and for each application area

(Continued on Page 52)



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Firm Integrates Operations With Aid of Mini

(Continued from Page 51)

in the firm to work with the project leader from TEC.

Together they reviewed TEC's package and determined the specific enhancements that would be needed. TEC then implemented and tested the enhancements in-house before installing them at Sigma.

The manufacturing applications installed at Sigma are: inventory control, bill of materials, material requirements planning, production control (job costing and scheduling) and purchasing.

Financial Applications

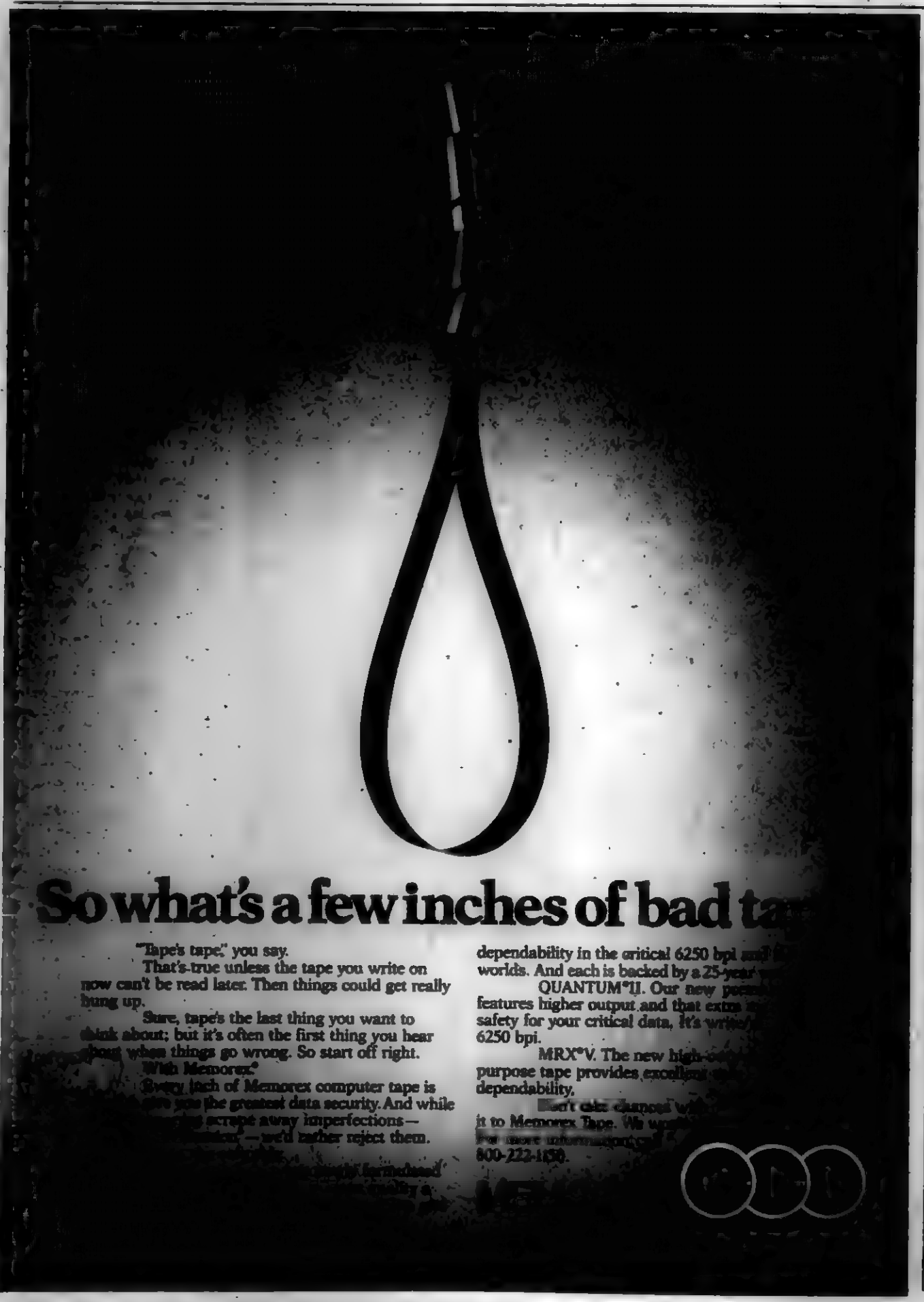
Financial applications include order entry and invoicing, accounts receivable and accounts payable. TEC's Password Security Systems and English (a nontechnical data retrieval language) were installed.

Updated system documentation was also provided for approval. The next step was to demonstrate the capabilities of the modified system and get user acceptance at Sigma. The training phase took place prior to the software implementation to enable personnel to make immediate efficient use of the system.

The transition to the development environment was easily made by Sigma's DP staff. Soon after the installation of the 11/70 system in January 1981, which included 42 DEC VT100 terminals and four LP11 printers, the staff was able to transfer a selected subset of its existing IBM programs to the DEC Datasystem, Meallo said.

This was accomplished with the RPG conversion utility provided with the system. The on-line program development capability and complete documentation has allowed for an increase in programming productivity, and the DP staff now has the ability to respond quickly to users' needs.

Correctability and compatibility are two features that have aided both management and users more than they had anticipated. The TEC System automatically checks the validity of data as it is entered. Because all transactions are verified immediately, the system saves time, effort and money.



RTC Seminars For Programmers Using System/38

NORTH ATTLEBORO, Mass. — RTC Systems, Inc. recently announced two seminars for professional programmers using the IBM System/38.

A five-day Intensive Applications Seminar is reportedly designed to promote immediate productivity on the System/38 and includes instruction on creation of a data base, creating display device files and subfiles, RPG-III and control language programming and interactive data base utilities. Scheduled for Dec. 12-16 here, the seminar is limited to an enrollment of 12 and is priced at $695.

A three-day RPG-III Structured Programming Course is reportedly designed to develop and expand the technical skills of the RPG programmer. It assumes prior knowledge of RPG-II and will be addressed only to the enhancements of RPG-III programming.

Scheduled for Dec. 6-8 here, the class is limited to 12 students and is priced at $495.

Further information is available from RTC Systems Educational Center, 49 Plain St., North Attleboro, Mass. 02760.

With CICS Program Development Tool

Chemical Firm Discovers Productivity Formula

IRVING, Texas — An on-line interactive CICS program development and query system has reportedly delivered the right formula — a 500% productivity boost compared to writing programs in Cobol — to NCH Corp., a large chemical sales and manufacturing company here.

NCH found the successful formula in March. Before that, explained Bill Stivers, manager of systems development at NCH, "A major problem we faced was the need for the productivity of our on-line transactions. We had a partially interactive CICS development system in-house for a year and a half [Informatics, Inc.'s Trans IV], and during that time we became convinced that the additional capabilities available in an interactive development language would be one way of reducing our development time and costs."

After looking at the range of products available on the market, NCH chose a package called Gener/OL from Pansophic Systems, Inc. of Oak Brook, Ill. "We felt that Gener/OL was superior," said Charlie McCarthy, NCH's vice-president of data processing. "It could handle approximately 95% of the CICS transactions that we had to write, while the other system was only handling 60% to 70% of those transactions."

Moreover, McCarthy said, the Pansophic product was much more resource-efficient than Cobol. "I think Gener/OL only uses 40% of the CPU cycles that the other product was using and only 60% of [I/O] calls," he said. "We found the transactions that the average CICS programmer can write using Gener/OL are as efficient as those that a CICS command-level Cobol programmer was writing.

"From inception to delivery, the average command-level Cobol program takes about three to four weeks. Under Gener/OL, the same program takes about three to five days," McCarthy noted.

'Completely Interactive'

Stivers believes the most beneficial aspect of the Gener/OL system is that "it's completely interactive in the coding phase. It checks syntax as you enter statements; in debugging, it tells you at which statement your transaction blew up; and it does not require a core dump. This saves a lot of time and does not interrupt the mental process of coding."

About eight people on Stivers' staff are now using Gener/OL exclusively. "We have observed across-the-board results," he said.

"We came up with a ratio of 5:1 in writing Cobol programs vs. the time that is required for writing the Gener/OL programs. This ratio assumes a fairly complex program that can be written in both languages," Stivers maintained.

Both McCarthy and Stivers said that Gener/OL was easy to learn. "We have recent college graduates using Gener/OL," McCarthy said. "They have data processing backgrounds and are finding Gener/OL very easy to use and similar to languages that they learned on micros at college."

Stivers continued, "The average person on our staff took a half day to a whole day to learn Gener/OL to the point where he could write a simple transaction. The staff's acceptance of Gener/OL was very good."

So far, Stivers' staff has completed a legal contract system, an electronic mail system and a job for the order department that enables them to review orders more easily.

"We have also done a mailing program, which is basically an inquiry system that can select and produce mailing labels for a region. We are also going to do an employee accounts payable system with Gener/OL," Stivers noted.

DPMAEF Board Elects Deken

PARK RIDGE, Ill. — Joseph G. Deken, author of *The Electronic Cottage* and *Computer Images: State of the Art*, has been elected to a three-year term as a member of the board of regents of the Data Processing Management Association Education Foundation (DPMAEF).

Deken is assistant professor in the Department of General Business and the Department of Computer Science at the University of Texas at Austin. He earned an B.A. in physics in 1970 from Washington University, St. Louis, and a Ph.D. in statistics in 1976 from Stanford University. From 1979 to 1981, Deken was a National Science Foundation mathematical sciences postdoctoral research fellow at Stanford.

The DPMAEF is dedicated to enhancing educational opportunities for information systems professionals. The nonprofit organization was established to meet the changing educational requirements of the information processing profession and industry. The DPMAEF is located at 505 Busse Highway, Park Ridge, Ill. 60068.

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DA DATA DESIGN ASSOCIATES

Mini Helps Children's Home Handle Reporting

BETHLEHEM, Pa. — Installing customized software and a new minicomputer system has enabled the staff at The Wiley House, Inc. here to concentrate on helping children instead of shuffling papers.

Wiley House is licensed to perform 16 types of programs for disturbed and distraught children at its main campus. In 1980, the institute's staff found itself increasingly buried under reports and evaluations required to maintain funding for the various programs.

John P. Peter, executive director at Wiley House, recalled the situation he faced in 1979 when the requirements to obtain funding became increasingly complex. "The increase in regulations came at a time when we were considering an expansion to handle more children at our six locations throughout Pennsylvania's Lehigh Valley. We had to decide whether to add more professional staff, with a consequent higher salary burden, or to cut back on child enrollment so the current staff could properly handle the increasing administrative work load. The last thing we wanted to do was turn children away."

Over 7,000 Children Served

The institute takes its name from James Wiley, a retired sea captain who first purchased the site in the 1880s to establish a children's home. Since that time, the house has served more than 7,000 children. The pace has picked up in the last nine years, according to Educational Services Director Richard Babyak, who pointed out that 1,000 children will probably be served this year alone.

According to Peter, "We knew we would have to get into data processing. There really was no choice. If we didn't automate, we would probably go under. At the very least, we could forget about increasing our enrollments."

The institute's staff began looking for a system to suit its needs. After attending a computer fair in Philadelphia, staff came away impressed with with the equipment and the services from Wang Laboratories, Inc., Peter said. Wang visited the Wiley House to evaluate the needs of the institute and later returned with a proposal built around a Wang 2200 MVP minicomputer with 256K bytes of memory, six terminals and five printers.

Applications software was obtained from The Office Manager, Inc. of Seattle and customized to the institute's specifications by the Technic Corp. out of Scranton, Pa. According to Babyak, the institute knew exactly what it wanted and chose the more expensive alternative of having software customized rather than buying it "canned." The principal data processing operations are known as "Individual and Group Therapy with Full Automation" and "The Wiley House Data Communications Program of Psychiatric Treatment and Special Education."

The Wang 2200 MVP came on-line at Wiley House in early 1980. It ran in tandem with the manual way of doing things for the first six months. The results since the conversion have been impressive.

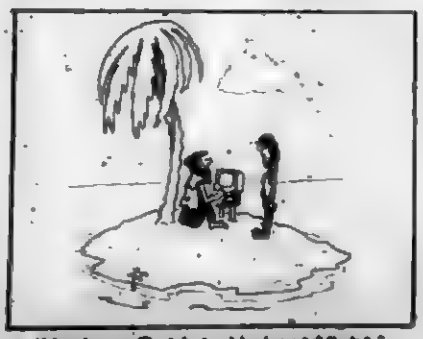
The system was designed for the central office staff. "We had one person who had some experience with computers, but not much, and none with Wang," Babyak recalled. "All the people in the office picked up the system within one month."

Kathleen Korutz, the office manager, learned to operate the system from the Wang training manual; today, she trains the new word processing operators. "The technology of the MVP is not hard to grasp," she said. "Compiling data using the old manual methods could take as long as a full day; now, it is a matter of minutes," she said.

The Wang 2200 MVP allows Wiley House to standardize information covering virtually every conceivable aspect of a child's behavior, providing a measure of an individual's growth in the treatment program, according to Tom Mentis, director of clinical services.

"Behavior is measured in 40 major classifications with three subclassifications to each major category. Using the Wang system, we are able to match a child's behavior against statistical norms to determine his or her relation to peers. This technique helps us to structure programs according to the specific needs of a child," he said.

A file of some 20,000 names of actual and potential supporters has been developed. "Shortly after we put in the MVP," Peter said, "we used it to handle a $30,000 solicitation drive. It's also being used for a $2.5 million capital campaign, the fruits of which will be a new child development and therapeutic recreation center. Using the MVP, we've been able to raise about $90,000 a year."



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Runs on IBM Machines

Operating System Saves Cost of Programmer

SAN FRANCISCO — When Walker Interactive Products, Inc. here began to offer computer services to outside customers, it could not afford to hire a systems programmer to support the operation.

The DP staff at Walker was already accustomed to working with a variety of IBM operating systems on its 3083 mainframe. Because Walker's primary business is supplying interactive financial software for mainframes, the staff was required to emulate its customers' operating system environments by running VM, VS and VS1.

But when Walker needed an operating system to support its outside service bureau customers, Data Center manager Thomas Dowling estimated he would need at least one full-time systems programmer if the firm installed an IBM system. Dowling knew that the fledgling company would have difficulty absorbing the cost of a programmer, so he decided to look beyond the range of IBM operating systems.

Walker installed an IBM-compatible operating system — DOS/MVT — offered by San Francisco-based Software Pursuits, Inc. "DOS/MVT let us get by for two years without a full-time systems programmer. That saved us at least $100,000 a year, or about the price of a 4331. It kept overhead to a minimum, which is critical when you're selling excess machine capacity," said Walker President Richard Currier.

Dowling performed the conversion last year in a single weekend when Walker installed Software Pursuits' enhanced version of DOS/MVT, the MVT/VSE.

Dowling said he alone maintains MVT/VSE and that Walker never expended any programming effort on either of the IBM-compatible operating systems.

"Even though systems programmers have been on staff for the last year," Dowling said, "we have never spent any programming time on DOS/MVT or MVT/VSE. We did not hire a systems programmer until we began running [IBM's] VM concurrently with MVT/VSE and began operating OS machines."

Better Features

According to Dowling, the MVT/VSE operating system offered features that outweighed comparable IBM capabilities.

Its Sage spooler was easier to use and more flexible than IBM's Power spooler, he said. Before Walker took delivery of its 3083, it ran Sage in a double-machine environment utilizing a 4341 on loan from IBM and a Magnuson Computer Systems, Inc. Model M80/42 processor.

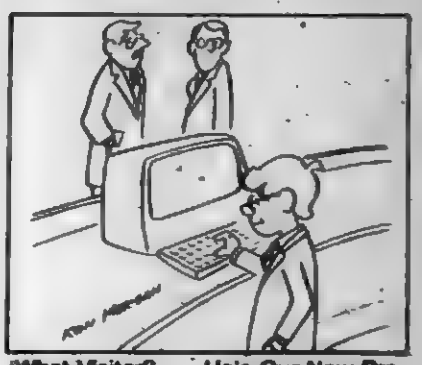
The 4341 handled both on-line and batch jobs, and the Magnuson processed only batch.

From their terminals, Walker's programmers submitted all jobs to the 4341 and, based on machine capacity, Sage ran their batch work on either machine. All jobs were placed in a common queue and then executed in whatever machine the DP staff chose.

That capability, Currier said, gave Walker the processing capabilities it needed until the 3083 was installed.

MVT/VSE's Proc library support feature also provided more flexibility than IBM's MVS operating system's capabilities, Dowling added. For example, "the system's conditional statements multiply the Job Control Language flexibility by permitting a procedure to invoke another procedure, depending on the outcome of a prior step.

They also let the operator restart a job at a specified step by entering a single Proc statement, and variable symbol substitution lets us establish values at runtime."



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For Work in Info Engineering

UK Professor Wins Warnier Prize

TOPEKA, Kan. — Enid Mumford, a professor at the UK's Manchester Business School, was recently named the first recipient of the J.D. Warnier Prize for major contributions to the theory and practical application of information engineering. The award was made at the Data Structured Systems Development Users Conference, which was sponsored by Ken Orr and Associates, Inc.

Mumford has done research in the design and human consequences of computer-based work systems for 15 years. The author of several books on systems design and the involvement of end users, she has developed a systems design methodology called Effective Technical and Human Design of Computer-Based Systems.

The prize received by Mumford was named in honor of Jean-Dominique Warnier, a recently retired member of a research group at CII-Honeywell Bull in France, who is considered one of Europe's leaders in the information science field and has published several books on logical approaches to solving problems with data processing systems.

Enid Mumford

SCIENCE/SCOPE

A high-speed integrated optic modulator for fiber optic applications promises to significantly affect the future of microwave transmissions. The device, developed by Hughes Aircraft Company research scientists, is a guided-wave Mach-Zehnder interferometer. Light entering the interferometer is split into two arms and then recombined. By applying an electric field to one arm, a relative phase shift is induced so that the light, upon recombining, interferes to produce an intensity variation proportional to the applied electric field. The field is applied by a microminiature traveling-wave electrode design with a 3 dB rf bandwidth of 17 GHz. Only 6 volts of drive are required. This modulator will let a fiber optic link transmit simultaneously all common microwave and radar bands.

An advanced infrared seeker now being developed would improve the operating range and accuracy of future air-to-ground missiles and guided bombs. Hughes is producing a scanning focal plane array (FPA) seeker to demonstrate advanced infrared imagery. The sensor is the size of a collar button and consists of tiny infrared detectors on one side and a corresponding number of signal-processing elements on the other. Because the sensor would be more sensitive than existing devices, it can stay locked on small targets more easily, distinguish between targets and background clutter more easily, and detect targets from farther away. The seeker also promises benefits in weight and cost. Hughes also will conduct a study to determine whether the seeker would be feasible for a variety of weapons planned by the U.S. Air Force and Army for between 1990 and 2000.

A new computer system promises to reduce scrap and rework, thereby helping one Hughes group slash costs by an estimated $1.5 million annually. The Quality Information System (QIS), now under development, will compile and analyze data on how defects happen and how they are corrected. Information will be made available to manufacturing employees for immediate feedback and for use during production. Data will also be kept in a central historical file for future reference. QIS is expected to improve quality by spotting problems that stem from faulty design, poor supplier quality, and improper manufacturing methods.

An infrared sensor made of standard components turns night into day for tanks and other combat vehicles. The compact device, called Hughes Infrared Equipment (HIRE), was designed to be low in cost yet high performing. It can be adapted to periscopes to let gunners of such tanks as the M48 see through darkness, haze, or battlefield smoke. HIRE can be mounted in laser tank fire control systems, light armored vehicles, or used as a target acquisition/fire control sight for anti-aircraft, ship, and helicopter applications. The design uses U.S. Army common modules, the standard building blocks for thermal imaging systems.

Hughes Research Laboratories needs scientists for a spectrum of long-term sophisticated programs. Major areas of investigation include: masked ion beam lithography, liquid-crystal materials and applications, submicron microelectronics, ion propulsion, and new electronic materials. For immediate consideration, please send your resume to Professional Staffing, Hughes Research Laboratories, Dept. SE, 3011 Malibu Canyon Road, Malibu, CA 90265. Equal opportunity employer.

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Denver Meet To Address Managing DP Conflicts

DENVER — A seminar on "Conflict Management in the DP Environment" will be held Dec. 5-7 in Denver. It will be taught by Leo Johnson, principal consultant to QED Information Sciences, Inc. of Wellesley, Mass.

The course will help DP managers understand sources of conflict in the DP environment and teach them how to manage that conflict more effectively, according to its sponsors, QED and the Seminar Broker of Broomfield, Colo. Topics will include definition of conflict, exploring the basic elements of conflict, examining conflict resolution styles, interpersonal conflict, intergroup conflict and differences, tools for effective conflict resolution and developing an action plan.

The three-day seminar costs $500. More information is available from Mary Willard, Seminar Broker, 3212 W. 133 Ave., Broomfield, Colo. 80020.

Syntopican XII To Take Place In Chicago

CHICAGO — Syntopican XII, the annual conference of the Association of Information Systems Professionals (Aisp), will be held here July 17-27.

Syntopican XII's theme is "Communicating Information: People, Systems, Networks." Professional papers pertaining to the theme in either a technical or managerial sense are currently being requested.

The deadline for receipt of completed papers is Nov. 30, 1983. All submissions will be reviewed and considered by the Syntopican Advisory Committee for possible presentation at the conference or for publication in the annual Papers and Proceedings book.

Registration for the conference is tentatively set at $300 for members and $400 for nonmembers. More information is available from Aisp at 1015 N. York Road, Willow Grove, Pa. 19090.

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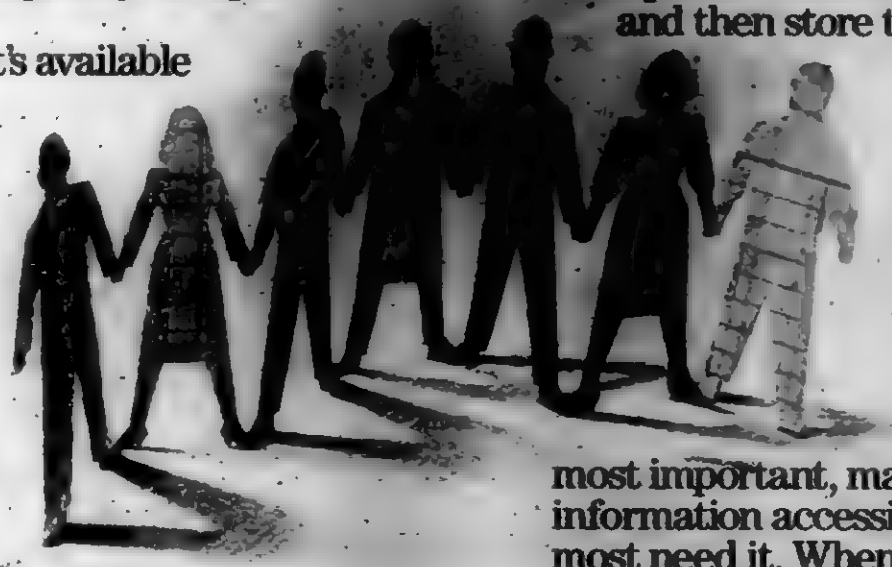

This is only possible because all of Cullinet's Financial components share a common database. This integration is so thorough that data can be called up from separate components joined and viewed together at the same time. This integration also extends to the full line of Cullinet applications software (our manufacturing system, for instance).

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Seminars on Cullinet's Financial System will be held in the following cities during the coming weeks: Harrisburg, PA Nov. 22; Meadowlands, NJ Nov. 30; Minneapolis, MN Nov. 29; Regina, SASK Nov. 15; Tampa, FL Nov. 29; Valley Forge, PA Dec. 1; Vancouver, BC Nov. 30 and Washington, DC Nov. 22.
To reserve a place call Harry Merkin at (617) 329-7700.

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Graphics Tool Helps Bechtel Rewrite Application Library

WALNUT CREEK, Calif. — When Bechtel Power Corp. here decided to rewrite its entire library of accounting and financial applications, the DP department was faced with a costly and time-consuming documentation effort.

In May 1979, the controller's organization within the company began a development effort called the Controller Financial Information Systems (CFIS) project to replace Bechtel's existing applications programs, such as payroll, billing and accounts payable. Scheduled for completion in 1986, CFIS will support all of Bechtel's permanent offices and the many remote offices it maintains at its electric power, petroleum and mining projects around the world.

The development method Bechtel planned to use on the CFIS project incorporated structured analysis techniques, such as data flow diagramming, to describe user requirements. While this technique was a proven and effective approach to software system development, it would require a great deal of time to draw and redesign diagrams.

Documentation for the project would include several hundred data flow diagrams alone. The project team needed an automated tool to relieve it of the task of drawing and proofreading these documents.

After reviewing a variety of programmer productivity packages, the project team chose the Stradis/Draw interactive graphics system from McDonnell Douglas Automation Co. of St. Louis, Mo. The package facilitated the drawing and revision of the CFIS project data flow diagrams and systems structure charts on Bechtel's two Tektronix, Inc. Model 4113A color graphics terminals, which access an IBM 3033 mainframe.

Stradis/Draw allowed the design team to construct diagrams on-screen through a menu-driven process. All the graphics symbols used to design the structured diagrams were defined within the system; they could be identified using a function key and positioned on the display screen by the terminal cursor.

After the project team created a diagram, the diagram could be maintained in an interactively accessible file for on-line editing, and hard-copy plots of the diagrams could be produced for presentations.

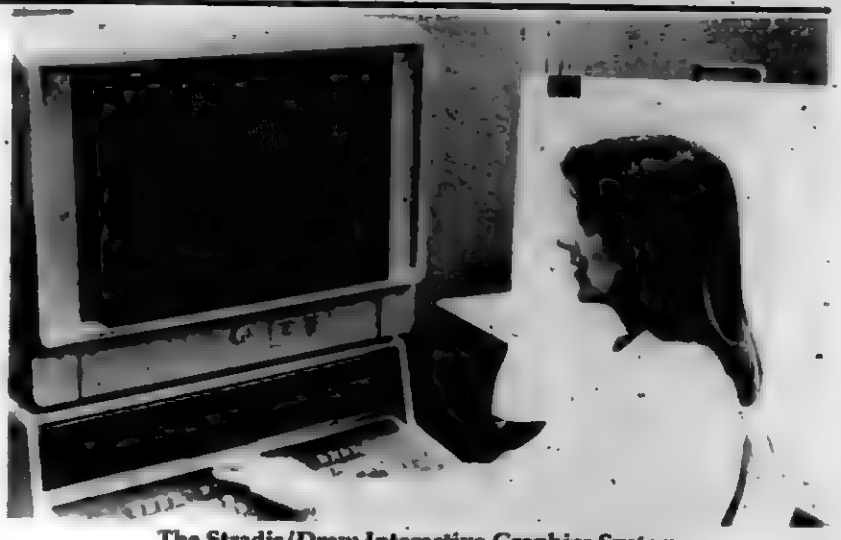
Bechtel has used Stradis/Draw to support documentation of the entire CFIS project thus far, reportedly saving considerable time and money. With the McDonnell Douglas package, project members gave rough diagram copies to a data entry operator who entered the diagram. By allowing someone else to generate and maintain diagrams, the package permitted the project analysts to concentrate on important design activities.

Because the data entry operator was not required to redraw an entire diagram to make revisions, the amount of proofreading involved was reduced.

In addition, Bechtel has saved money in producing permanent hard-copy diagrams for the CFIS project. Printed diagram copies from Stradis/Draw were found to be cheaper to produce than those done manually by a graphics department. Also, while the diagrams were of equal quality, the time required to produce copies with the package was substantially less.

Project analysts also used a "free-form" diagram function of Stradis/Draw to develop a variety of other charts and graphs for management presentations.

Bechtel has also reaped some other benefits. Since the CFIS analysis team began to use the Stradis/Draw package, it said it has achieved greater consistency within the library of diagrams. The system has helped maintain a standard presentation format, which is used by the many application groups generating diagrams for review by the end-user community. The end users have said the Stradis/Draw documents are easy to review and understand.



The Stradis/Draw Interactive Graphics System

And Reduces Telecommunications Costs

Engineers' WP System Cuts Prep Time by 85%

CHERRY HILL, N.J. — An engineering firm here has cut preparation time for specifications and energy audits by up to 85% after switching from typewriters to a word processing system. Telecommunications costs are down as well, and automated recordkeeping has become a source of management information.

Colm Engineering has handled planning and design for more than 170 projects since it was founded 11 years ago. The firm has a long-standing involvement in energy conservation and management, as well as alternative energy systems.

In the past, getting project specifications typed often turned into a headache, according to Howard Colm, company founder and president. Depending on the type of project, a specification can have as many as 200 pages. In the early years, Colm had his typing jobs done by a service bureau. Turnaround time was slow, however, and corrections added more costs and delays. Eventually, the company began handling part of the typing load in-house on an electronic typewriter, but putting together a specification was still "cut-and-paste." To grow and serve its clients better, Colm concluded, his company needed word processing support.

A survey of some 40 systems in 1979 by Colm's son Stephen, also an engineer, ended in 1980 with the choice of a Wang Laboratories, Inc. Word Processor System 5/III. "We were looking for superior equipment, and we felt we'd give better service with Wang systems," Colm recalled.

The system, purchased in 1980, consisted of a dual-diskette drive, a workstation and a daisywheel printer. A second System 5 was added within a year. In late 1982, Colm replaced both stand-alone System 5s with a Wang Office Information System (OIS) 105. Equipped with telecommunications capabilities and built around a master processor with a single-diskette drive and a 4.2M-byte system disk, it includes two workstations and a printer.

Since the first system went on-line in the fall of 1980, Colm and his staff have worked out a highly efficient procedure for producing specifications. Time savings begin at the drafting stage. Parts of earlier specifications often serve as starting points for writing up a new project. Rather than piece a draft together himself, an engineer now asks a secretary for sections or selected pages of appropriate specs. The secretary then electronically retrieves and merges them into a new draft.

Little New Typing Required

Because a draft already exists in electronic form, very little new typing is required. Editing functions such as delete, insert, move and copy make it easy to enter revisions, executive secretary Ursula Bielecki reported. Paragraph files allow quick retrieval of often-used blocks of text. To insert entire pages into specifications, she prefers to create glossaries, which allow her to call up text with two keystrokes. She has also written glossaries to speed up entries on standard forms.

"The most important thing for us is to give our customers service, and the best way to do that is to respond quickly," Colm commented. "We can put together a specification in two days instead of a week and a half, and we get to do a much more professional job."

The ability to rearrange charts or tables quickly led to a successful experiment: Equipment schedules for the drawings that accompany specifications are no longer written by hand or typed, but produced on the OIS. Printouts of the schedules are copied onto adhesive-backed mylar, which is then attached to the drawings. Schedules are stored on diskette, so the formats can be reused.

Technical assistance reports are another service the company has successfully automated. Colm has also built a file of some 150 energy-saving maintenance and operating procedures. "That way we can do the reports competitively," Colm maintained. "In fact, we paid for the first System 5 on one of these projects."

Telecommunications costs have been down since staffers began transmitting data through one of the System 5s and later through the OIS. "With the data terminal we had been using, we were putting the data in at a much slower rate, and we didn't have that much storage capacity," Colm explained. "Now, we load the data on the disk and then put it all out at one shot. And we can receive the analyses on the disk and print them at our leisure."

For Colm, office automation has become an indispensable competitive tool. "We were probably one of the first companies in this area to install a word processing system," he said. "The next step we're going to take is to automate drafting. You have to move in this direction. It's the only way you can increase productivity and serve your clients."

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DBMS Spurs Parisian Horse Racing to the Wire

PARIS — In France, data processing is as integral a part of horse racing as horse racing is to the French.

The DP department of the Societes des Courses Parisiennes is made up of five different departments that deal with a variety of management applications, including licenses for over 250,000 horsemen, insurance and diplomas for the French Equestrian Federation.

The bulk of data processing, however, relates to horse-racing information processing. At the beginning of each year, all data regarding the races for that year are entered into the data base system. After each race, a series of updates and printouts is required. More than 300 data entries are gathered for each horse, over 70 of which deal with blood types.

After each race — over 15,000 are held every year — 250 operations have to be performed for each of the first five winners, according to DP manager Jean-Louis Maldant. These operations require the transfer of data to third-person accounts — owners, jockeys, trainers, stable boys — all according to a system of various bonuses and compensations that are subject to a very complex horse-racing code.

The very severe constraints and controls of the Societes, as well as the quantity and importance of the information to be processed, caused Maldant's department in 1975 to consider the purchase of a data base management system (DBMS). Until then, the department had been working with sequential and indexed files.

Maldant's investigation of various systems took two months. Each system was evaluated for its ability to respond to the severe specifications needed to manage the accounts of show-horse owners. Finally, Cullinet Software, Inc.'s IDMS was chosen.

"IDMS brings much better efficiency and is easier to use and develop applications with than IBM's DL/1," Maldant explained. "Certain aspects of modeling and processing using other DBMS were more difficult to implement."

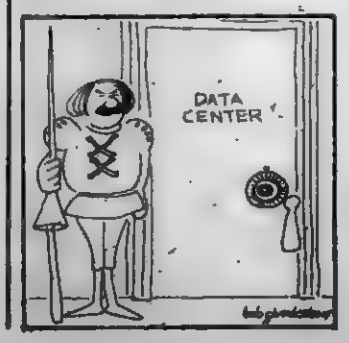
According to Maldant, IDMS was chosen as "the system which could best meet the particularly severe requirements of the Societes: very large amounts of elementary data, numerous and complex overlappings of technical and management data, the need for fast updating and distribution of information and the generation of a great number of financial operations made from technical data."

Another consideration that tipped the scale in favor of IDMS was the system's ability to modify the structure of data, which is critical for an organization such as the Societes des Courses Parisiennes, whose rules evolve continuously.

IDMS was installed in 1975, and today, using Cobol as the main programming language, IDMS runs on two IBM 4341 systems with over 120 terminals throughout the organization.

Until 1978, five different services had to be processed separately: "people," "horses," "races," "results" and "accounting." With IDMS up and running, one information structure is enough to feed the whole organization, and 80% of all account operations are automatically generated, including those concerning compensatory operations with foreign countries.

"One of the main strong points of IDMS in comparison to its competitors is the great ease and rapidity of development with Cullinet's Application Development System/Online," Maldant said. "This allows considerable savings of time and money, given the large quantity of data to be processed."



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Retrieves Data, Generates Reports

Package Eases Processing for Rainware Maker

ELDERSBURG, Md. — Think of fog and you invariably think of London. It should follow, then, that if you think of London Fog raincoats, you think of London. Right? Wrong.

Londontown, the company that stole trench coat fame away from Humphrey Bogart, is alive and well and producing London Fog rainwear in Maryland.

To make life sunnier for those involved in data processing, Londontown recently installed a data base query software package.

Ralph A. Hoffmeister, data base administrator for Londontown, implemented Scientific and Business Systems, Inc.'s Easywork package in order to define the data structure, retrieve data and generate a report in one step. Londontown installed Easywork in 1980 when the company's computer system consisted of a Honeywell, Inc. 66/60 mainframe running under Honeywell's Gcos 3 operating system. Shortly thereafter, the company upgraded its hardware to a Honeywell, Inc. DPS 8/52 mainframe also running under Gcos 3.

Upgrade to 'Umbrella' Package

Londontown is currently upgrading its software from Honeywell's IDS I DBMS to Honeywell's DM4, an umbrella software package that includes IDS 2, an upgraded version of IDS 1, and a Cobol 74 compiler with transaction processing software. The system also includes five Honeywell MSU 500 disk drives and four MSU 450 disk drives.

According to Hoffmeister, Londontown is constantly trying to develop more on-line systems. His staff of five is responsible for all data base design, implementation, restart/recovery and security, as well as for defining the system parameters for their on-line systems.

In addition, the group develops interface modules for the integration of data with different systems. (Other functions are handled by three additional groups in the DP department, which numbers some 65 people in all. Half of these form the Operations Group; the rest, the Technical Support and Analysis/Programming Groups.)

Rewriting Programs Eliminated

"By using Easywork for the generation of data base content reports under the IDS 2 environment, the necessity of having to rewrite all 'chain walk' programs is eliminated since Easywork will generate that capability," Hoffmeister said.

When Easywork was installed, its chief uses were in the order processing and engineering departments as well as in the Data Base Group for producing sophisticated reports from their data bases. The DP department is the biggest user of the package, with the majority of applications going to the departments that have the fewest management decision-making systems available to them — the sales and marketing departments.

The marketing department, like marketing departments elsewhere, however, is acknowledging the potential of DP. One of the most recent Easywork applications is a three-pronged marketing report which contains a comparison of bookings with both the forecast and the inventory position.

"This is the first time we've been able to produce a single report that combines the results of these three different applications," Hoffmeister said.

Priority Basis

All requests for Easywork-generated reports are handled by Hoffmeister's department, which enables him to control the system and allocate resources on a priority basis.

Opening up the system for anyone to submit reports at will would necessarily exclude other, perhaps more important, jobs; so, at least for the present, the Data Base Group is serving as a clearinghouse for all such requests.

"However," Hoffmeister added, "we've just implemented Easywork's interactive feature, and our planning for end users includes allowing Easywork usage by non-DP personnel." The group is presently evaluating use of Easywork as a Cobol generator for the development of production systems for reports that are run frequently.

Free Brochures

• "V/Update," a free monthly newsletter, is available to all VM installations from VM Systems Group, Inc., developers of VM software products. The newsletter contains hints and information for VM installations.

To receive "V/Update" or information about products, contact VM Systems Group, Inc., 3123 N. Military Road, Arlington, Va. 22207.

• "The Tape Management and Evaluation Technical Manual" is a 48-page manual from Data Devices International, Inc. that describes tape fundamentals and provides a completed description of data transfer losses. It outlines a systems approach to media maintenance.

The manual discusses the three phases of media maintenance and provides detailed instructions for each phase. A technical reference and glossary of terms is included, together with a reference list.

The manual is from Data Devices International, 20235 Bahama St., Chartsworth, Calif. 91311.

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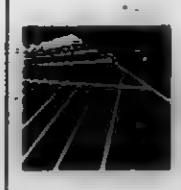

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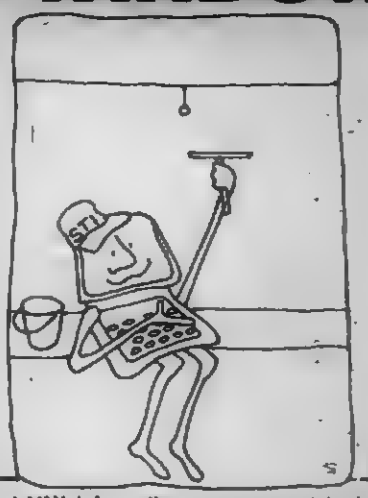

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Desktop Speeds Freight Rates to Firm's Clients

UNION, N.J. — Before installing a computer to handle its freight consulting business, F.H. Traper, Inc. had to rely on an all-manual system, which was complicated, time-consuming and prone to human error.

Now, however, a desktop microcomputer takes care of all that and reportedly provides accurate freight rates for its clients in less than 30 seconds.

The ability to produce extremely fast, accurate freight and invoice documentation can substantially impact profitability in many corporate areas — from finance to marketing — according to Glenn A. Fishman, president of the two-year-old firm.

Up until a few years ago, managing transportation cost data — the number-one activity of traffic/distribution departments — had to be done manually, using paper ponies (tariff guides) and a space-consuming reference library of regulatory and rate tomes. Unless shippers and carriers employed some type of automated freight rate updating service, the rates for most shipments were incorrectly derived and posted, according to Fishman.

Also, with the advent of deregulation of freight rates (Motor Carrier Act, 1980 and Staggers Act-Rail, 1978) the increase in paper/tariff data was complicated further. The proliferation of tariffs and tariff changes produced more chaos in the management of the freight tariff functions, Fishman said. "We needed even further refinement of our approach to rate maintenance and tariff data control. Computerization was the only answer to increased productivity and accuracy at lower costs," he added.

Confronted with the overwhelming impact of deregulation, Traper started investigating alternatives to existing automated systems in the spring of 1982. Among the software companies examined were Numerax, Inc., ESI, Inc. and Rand/TDM, according to Marc Cooper, Traper executive vice-president.

"We were aware that Lester A. Probst, president of Transportation Concepts and Services, Inc. (TCS) had covered this information in presentations given at various transportation seminars and conferences," Fishman noted. The Probst demonstrations convinced Cooper to purchase two Trans-Port systems from Bell & Howell.

Each Trans-Port system consists of an Apple Computer, Inc. Apple IIe system and software designed by TCS, Cooper said.

Traper claims the desktop Trans-Port system has proven to be three or four times faster than on-line computer systems and at least 500 times faster than manual freight rate retrieval. It is also less costly than using typical manual techniques, a service bureau or a time-share facility.

The system also allows the firm to handle clients that have great work loads. For example, for a major manufacturer of beauty products, Traper now processes over 40,000 bills monthly.

Monitors Electrical Consumption

System Helps Hotel Casino Cut Power Bill

LAS VEGAS — Over the past four years, a hotel and casino here has cut its power bill by more than $248,000 by installing a computer to help control electrical consumption. The system monitors the power meter and automatically shuts off unused equipment.

From March 1979 to March 1983, despite rate increases, the Frontier Hotel and Casino's power bill went down by more than $248,000, according to Curt Thompson, Frontier's vice-president in charge of hotel operations. Nearly two million fewer kWH of electricity were used in 1982 than in 1978.

In addition to saving money, the Frontier received a governor's award in 1982 for energy conservation.

The IBM Series/1 controls 52 electric devices, ranging from air conditioning and ventilation equipment in the casino and conference rooms to the bulbs on the marquee.

The hotel's engineering crew can override the computer at any time and program it to switch on specific circuits at certain times of the day.

Richard Lang, manager of facilities projects for Frontier's parent company, Summa Corp., said the hotel approached energy conservation cautiously.

"We're running a resort," Lang said. "People come here to be comfortable."

The computer does not interfere with the cooling system in the casinos or showrooms during the peak business hours between 3 p.m. and 2 a.m. After 2 a.m., the Series/1 shuts off the air conditioning for at least a few minutes of every hour.

The hotel tries to maintain a conducive temperature level. "We think because of the tension and excitement, people may become a little bit warmer and, consequently, they'd like it to be a little cooler than a typical office," Lang said.

According to Richard Whelan, Frontier's chief engineer, lighting, ventilation and air conditioning in the gaming, show and conference rooms account for 60% of the hotel's electric bill. There are 20,000 lights in the signs alone.

Air conditioning and lighting in the guest rooms consume 25% to 30% of the hotel's power, with the balance consumed by a variety of appliances. Slot machines require very little electricity, according to Whelan.

Phil Arce, president of the Frontier, said management is committed to the energy conservation program and additional steps will be taken to reduce further the hotel's power bill.

The hotel plans to install banks of low-voltage, 50W lights over the gaming tables, replacing the high-voltage, 500W quartz lights now in use. The new lights will reportedly provide better lighting and use less electricity.

The Frontier also plans to install movement sensors in its guest rooms. When the rooms are empty, the air conditioning will be switched to a more energy-efficient setting. When a guest returns to his room, he'll be able to readjust the temperature to his liking.

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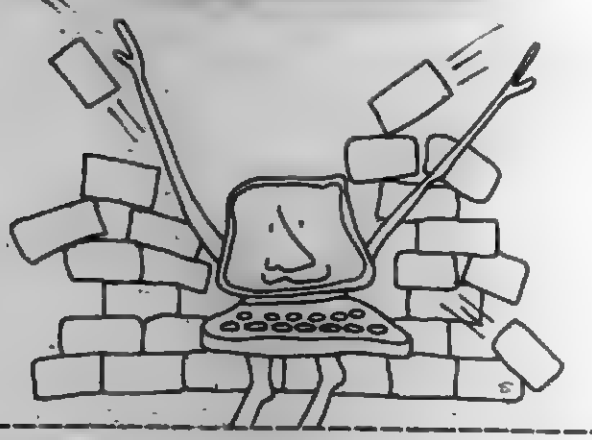

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Effects Changes in System Requirements

Rolm's Growth Produces Special DP Hurdles

SANTA CLARA, Calif. — A dramatic growth rate over the last five years at Rolm Corp. here has brought with it special kinds of data processing problems. The manufacturer and distributor of computer-controlled voice and data private branch exchanges, electronic office products and Data General Corp.-compatible computers has seen annual sales rise to nearly $500 million while the number of employees has increased to more than 6,500.

Five years ago, Rolm contracted with Ross Systems, Inc., a Palo Alto, Calif.-based time-sharing company, to provide a proprietary financial consolidation and reporting system. However, Rolm's sales growth soon led to changes in system requirements.

First, Rolm decentralized, creating several new divisions. Then each new division hired its own financial executive who had unique information requirements. Procedural delays and costs associated with relying on an outside vendor for program changes increased to an uncomfortable level, according to Mark Bronder, corporate division controller.

In addition, Ross Systems' Maps, a proprietary decision support system (DSS) language, was a precompiler with embedded Basic instructions. While it was capable of meeting system specifications, major changes required too much time. With limited time and a tight budget, Rolm was forced to take shortcuts in some crucial areas, according to Stephen Locke, financial systems analyst.

"The decision support system developed by and for Rolm's corporate staff "has cut the time required to consolidate monthly actuals and forecasts at least in half, thus freeing several highly paid financial professionals for analytical rather than 'rack 'em and stack 'em' duties."

The company decided to bring the development and maintenance functions in-house and seek a more flexible DSS language to run on its IBM 4341 Model Group II processor. Twenty-two DSS tools for mainframes were examined.

Ultimately, both a DSS language and Information Builders, Inc.'s Focus, a stand-alone data base management system/report writer, were acquired. Focus has been successfully used on several applications, but has proven to be inadequate for financial matrix applications, Locke said. Much of the functionality is mutually exclusive.

Number of Report Formats	200+
Number of Line Items	300+
Number of Months	48
Number of Reporting Entities	37
Number of Consolidation Levels	5
Types of Data	Actuals, Forecast, Target
Virtual Memory	3 MB
Disk Storage	190 CYL (IBM 3375 Disk Drive)
[illegible]	5-6
Number of Users	30+
Number of CMS ID's	17
Language	EMS
Vendor	Economic Sciences Corp.
Operating System	VM/CMS

Rolm Chart

Figure 1: Facts About Facts, the Rolm DSS

EMS from Economic Sciences, Inc. of Berkeley, Calif., was selected because it provided fourth-generation capabilities, efficient computer resource utilization, was available on IBM mainframes under VM/CMS and could be brought in-house on a monthly leased basis, Bronder said.

Using EMS first on National CSS, Inc.'s time-sharing service and later in-house, a DSS called Facts was developed by and for the Rolm corporate staff to consolidate actual, forecast and targeted financial data from the various divisions (see Figure 1). One systems analyst developed and implemented the first release of Facts, including comprehensive documentation, within five months.

"The system has cut the time required to consolidate monthly actuals and forecasts at least in half, thus freeing several highly paid financial professionals for analytical rather than 'rack 'em and stack 'em' duties," Bronder said.

The system has now been extend-

(Continued on Page 64)

China Computerworld 电脑世界

The only specialized computer publication written exclusively for the People's Republic of China (PRC).

The PRC is a huge country which now has a rapidly growing installed base of computers. And the future looks very bright for the Chinese EDP market.

Government plans call for extensive use of computers in the PRC's technological modernization, and annual EDP expenditures are expected to grow into the billions of dollars in the 80's.

A good deal of this money will be spent on foreign computer equipment and the purchase decision-makers for this equipment will be using *China Computerworld* to help them choose the products and the companies they need.

China Computerworld is a joint venture of the Fourth Ministry of Machine Building and CW Communications/Inc. Its 50,000 subscribers include the key government officials and computer managers who have EDP purchase decision authority.

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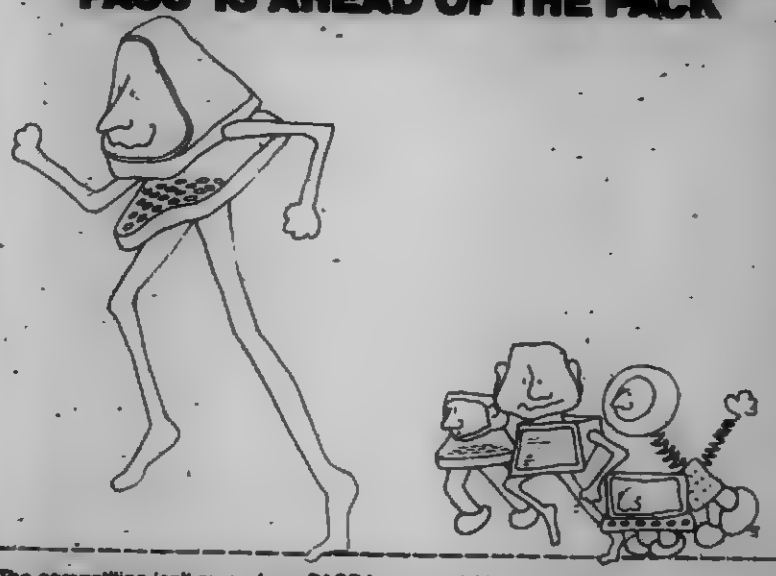

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Rolm's Growth Brings With It Special Hurdles

(Continued from Page 63)

ed to the largest division at Rolm, which sells and services Rolm products, he said.

One systems analyst "cloned" and modified the corporate version of Facts in weeks.

Users Across the Country

Users from 14 sales and service subsidiaries located across the country enter data into this system. These users access the system via Tymshare, Inc.'s Tymnet into a Tymnet engine that is located at Rolm in Santa Clara and from there into a Rolm digital computerized branch exchange (CBX) that is equipped to handle both voice and data communications.

The Rolm CBX acts as a local-area network allowing users access to their choice of processors, including 14 Hewlett-Packard Co. HP 3000s, 23 DG Eclipse MV/8000 superminicomputers and the IBM 4341.

Users of Facts select the IBM 4341 and then access the system (see Figure 2).

"Ease of system development and the ability to respond quickly to system maintenance and enhancement requirements is a major advantage of EMS," Locke explained.

"A total investment of less than 1½ man-years over a two-year period has been made in Facts, including development, constant changes and expansion and major reorganizations of the company," according to analyst Locke.

Though he conceded that the learning curve on EMS is fairly high, financial analysts previously untrained in computers have successfully used the computer to meet their needs, sometimes preferring to use EMS for "quick-and-dirty" analysis over Visicorp's Visicalc on a personal computer.

Now EMS does the heavy-duty computing while personal computers handle ad hoc analysis where access to the large Facts data base is not mandatory.

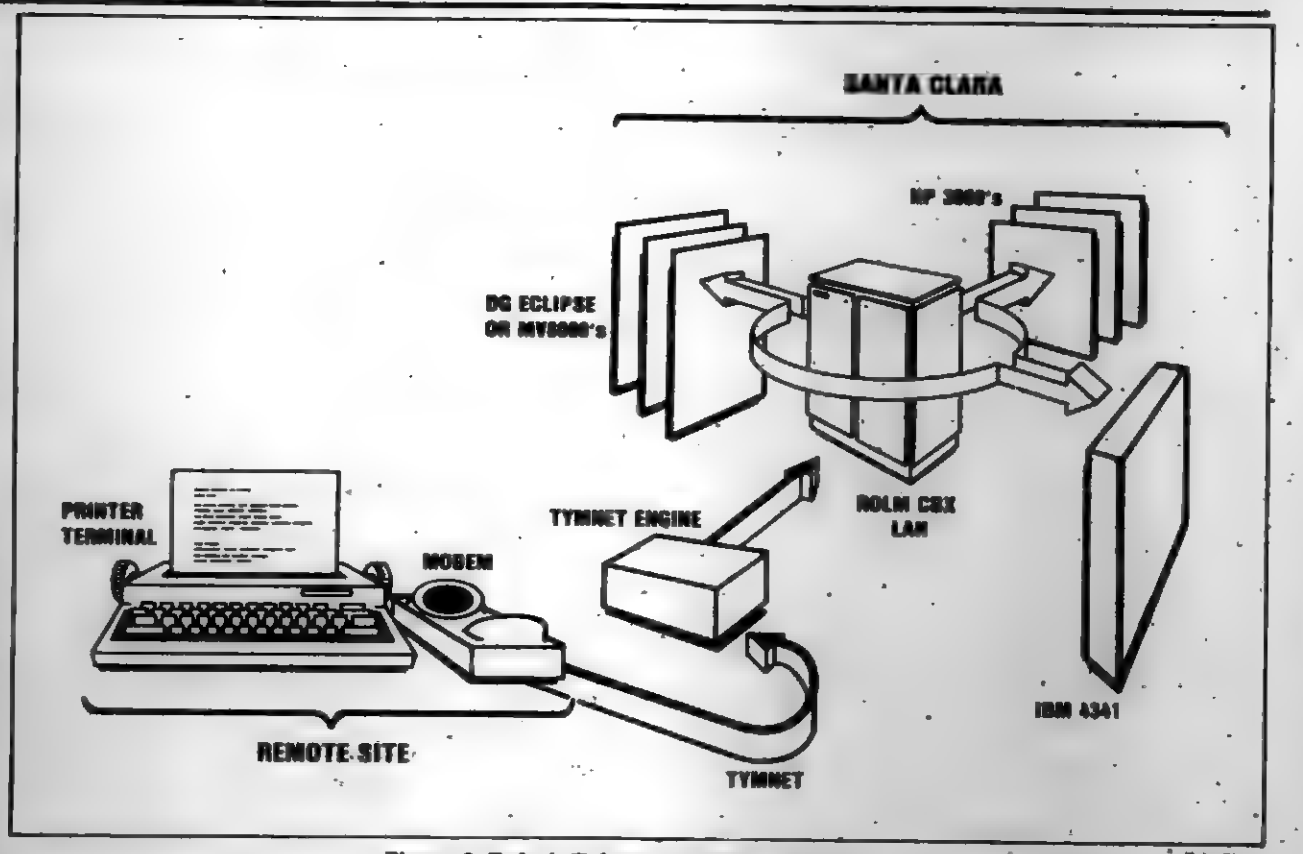

Figure 2: Rolm's Telecommunications Link

Rolm Chart

Tristar Data Systems to Hold Meet on Corporate Use of Micros

CHERRY HILL, N.J. — Tristar Data Systems, Inc. will hold a free one-day seminar Nov. 15 at the Sheraton-Poste Inn here on the use of microcomputers by corporate executives and DP managers.

The seminar will focus on integrating microcomputers into large corporations and will feature addresses by representatives of a variety of microcomputer manufacturers, Tristar said.

The featured speaker will be author Victor Vurpillat, who recently completed a public television series titled *Conversation With the Future*.

More information is available from Tristar Data Systems, Cherry Hill Industrial Center, 2 Keystone Ave., Cherry Hill, N.J. 08003.

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Datapro Service Looks at Micros

DELRAN, N.J. — Datapro Research Corp. has launched a new reporting service aimed at the microcomputer market.

Called "Datapro Reports on Microcomputers," the service consists of two looseleaf volumes totaling approximately 2,000 pages that are updated on a monthly basis. Updates include changes in original material, as well as additional information on hardware and software products, a spokesman said.

The service also includes access to the firm's consulting group, via a hotline telephone number, for late-breaking information on new equipment and software.

The publication compares equipment from more than 1,000 vendors and features comparisons of 30 of the most prominent microcomputer systems and 40 of the most popular peripherals, the spokesman noted.

In addition to the report, subscribers will also receive a copy of a survey conducted by Datapro of nearly 6,000 users of microcomputers across the country. The survey presents user ratings of 126 computers from 57 manufacturers; 19 operating systems; 13 popular software packages; and 90 peripherals.

"Datapro Reports on Microcomputers" costs $600 per year. Both the service and the included survey will be available in December, Datapro said from 1805 Underwood Blvd., Delran, N.J. 08075.

Rome to Host World Forum On Data Policies

ROME — The Second World Conference on Transborder Data Flow Policies will be held here June 26-29. The conference is being organized by the Intergovernmental Bureau for Informatics (IBI).

The first conference, organized by the IBI in 1980, presented the international community with an opportunity to identify the main economic, legal and sociocultural aspects inherent to transborder data flows, according to an IBI spokesman.

The second conference will attempt to examine fundamental aspects of transborder data flows that are of interest to developing countries; a further objective is to encourage the establishment and adoption of universal principles or to set up mechanisms for the future formulation of principles.

Any individuals or organizations seeking further information on participation or presentation of papers may contact the IBI through the Department of Policies, P. O. Box 10253, 00144 Rome, Italy.

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RUST	RUST	3 x 6	53.50
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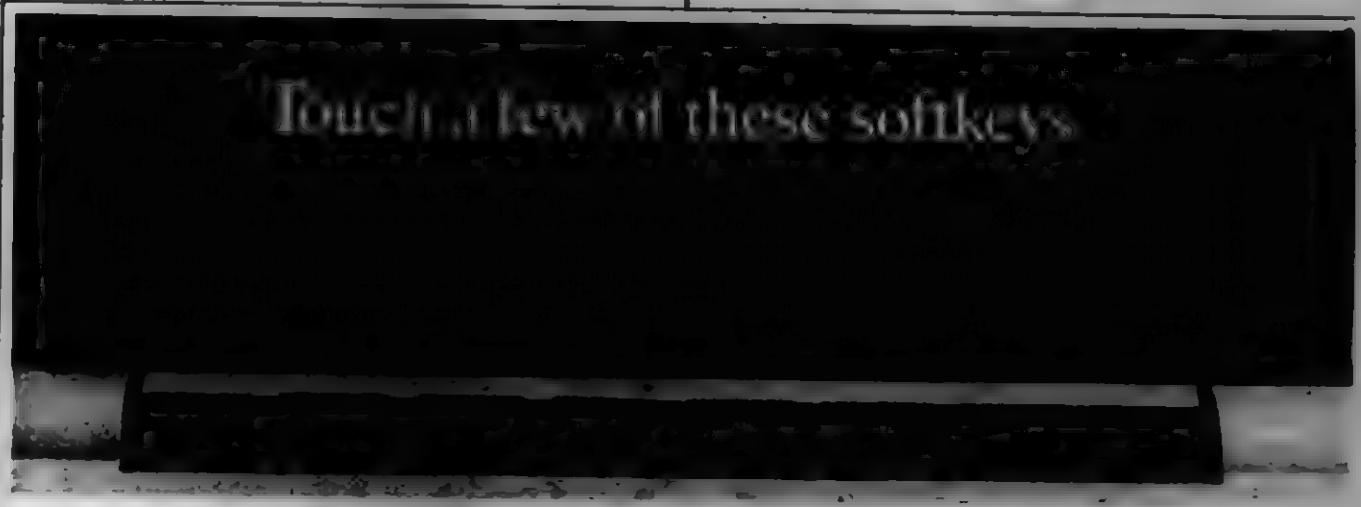

and you'll know why HP's new Protocol Analyzer could pay for itself the next time you have a network problem.

Perhaps it's time you took control of your datacomm problems. The minute one of your datacomm interfaces crashes, you're faced with more than inconvenience. A bill for service calls, as you play "vendor roulette" trying to locate the problem, can run into thousands of dollars. If you're faced with a down network, it can cost a hundred times that.

Take control with HP's new 4955A Protocol Analyzer. Its softkey-guided interface lets you troubleshoot your datacomm problems *before* you call in repair personnel. And you can monitor, simulate and trigger from 50 bps to 72 kbps. Avoid vendor fingerpointing by quickly diagnosing DCE/DTE malfunctions and isolating the fault yourself. Nonintrusively monitor network traffic to catch protocol glitches before they turn into full scale problems. Save time bringing new datacomm equipment on-line simulating modems, line, CPU, and/or terminals.

Multiple display formats are dedicated to identifying protocol problems easily at the physical interface, frame, and packet levels. In one format, the 4955A will give you *data transitions with lead transitions* so you can see handshaking faults at once.

The HP 4955A supports the major protocols and standard data codes. But what about your own unique protocols and architectures? Our datacomm-enhanced BASIC lets you program sophisticated test routines and perform higher-level protocol analysis. Create statistical displays (tables, graphs, histograms) and perform detailed message manipulation for your own network needs. Add to that the capability of printer output and you have permanent, long-term records of performance. Your efficiency is improved for network planning and expansion.

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Officers Elected for 1983-1984 At AIM's Annual Conference

HILTON HEAD, S.C. — Covel Allen, vice-president of the Western Savings and Loan Association of Phoenix, was elected president when the Association of Information Managers for Financial Institutions (AIM) elected its 1983-84 officers during its annual conference held here.

A. Paul Cox Jr., president of Data Systems Corp. of Richmond, Va., was chosen to serve as vice-president of AIM. Both Allen and Cox will serve one-year terms.

AIM members also elected six new representatives to three-year terms on the organization's 16-member governing board. They are Marc DeFano, senior vice-president of the American Savings and Loan Association of Whittier, Calif.; Howard Hanson, president of On-Line Computer Services of Seattle, Wash.; Dan Lanphear, president of First Chicago Data Corp. of Chicago; Linda M. Martin, senior vice-president of the Valley Federal Savings and Loan Association of Van Nuys, Calif.; Larry Morse, president of Northeast Datacom, Wallingford, Conn.; and Paul Williams, vice-president of Union National Bank in Little Rock, Ark.

An affiliate of the Financial Managers Society, Inc., AIM is a national organization for individuals who develop and operate automated support systems in financial institutions.

'Diversifying Technology' Theme Of Comtec Convention

SAN FRANCISCO — "Diversifying Technology" is the theme of the 14th Annual Convention of Comtec, an association of professional users and vendors in the computer micrographic industry, which will be held at the Westin Miyako Hotel here Feb. 20-23.

The conference will reportedly feature lectures on the various data processing methods and techniques interfacing with computer micrographics.

Technical presentations on micropublishing, business graphics, alphanumeric and computer micrographics and scientific graphics will also be offered.

High-technology subjects covered at the meeting will include imaging art management for electronic publications, turnkey microcomputer-based graphic systems, hardware and software considerations for computer micrographics, computer micrographics and video systems, computer-aided design and computer micrographics and trends in the computer micrographics marketplace.

Registration for the conference is $295 until Dec. 31 and $320 after the above date, a conference spokesman said.

Further information is available from Comtec, which can be reached at Suite 200, 100 N. Winchester Blvd., San Jose, Calif. 95128.

Babbage Trustees Name Bauer Foundation Head

MINNEAPOLIS — The trustees of the Charles Babbage Foundation (CBF) here have elected Dr. Walter Bauer as foundation chairman. He is currently chairman of Informatics General Corp., a software and professional services firm he founded in 1962.

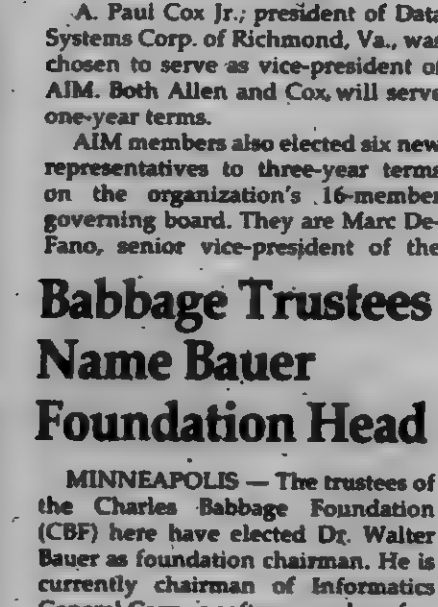
The trustees also recognized Erwin Tomash, the founder of Dataproducts, Corp. and other high-technology firms, for his role in the creation of the Babbage Institute and five years of service as the CBF's chairman. Tomash was elected as Chairman Emeritus.

Elected as foundation president for 1984 was James Birkenstock. Now retired, he was a long-time employee of IBM where he was a senior officer responsible for all phases of management of industrial and intellectual property rights.

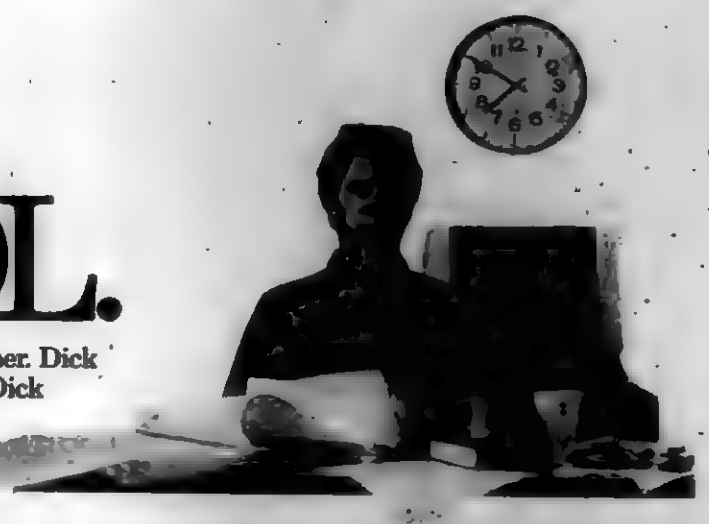
Formed in 1978, the CBF supports the activities of the Charles Babbage Institute, an information processing, industry-sponsored center located on the University of Minnesota campus.

The institute encourages the study of technical and socioeconomical aspects of the industry's development.

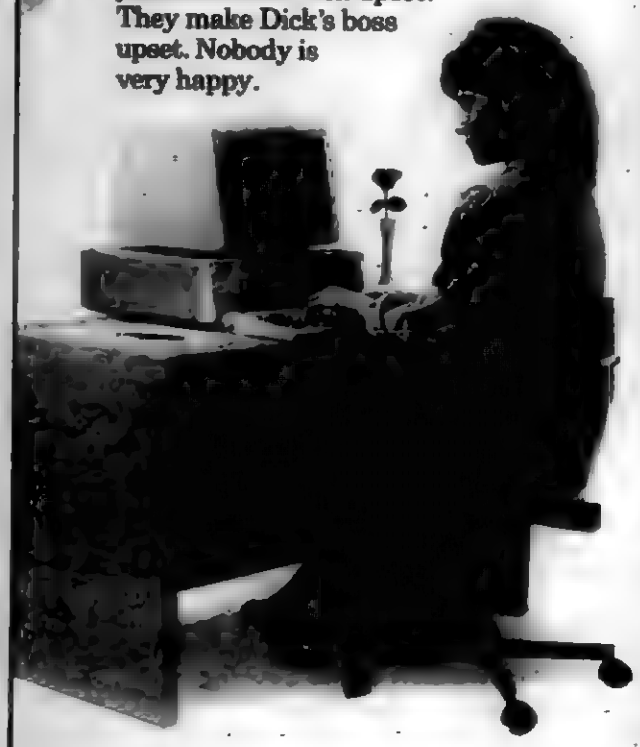
Both the Charles Babbage Institute and Foundation are located at 104 Walter Library, 117 Pleasant St. S.E., University of Minnesota, Minneapolis, Minn. 55455.



See COBOL.



Dick is a COBOL programmer. Dick is bored. Harried. Overworked. Dick struggles with tedious trace and debugging routines. Nonexistent documentation. Mainframe logjams. Dick is four months behind schedule as a result. And users are angry about long turnaround times. They yell and make Dick upset. They make Dick's boss upset. Nobody is very happy.



Dick sees COBOL as a drag. He dreams of a different sort of life. Where he's a programmer hero. Entertained by his work. Admired for his skill. Rewarded for his performance. Now his dreams can come true.

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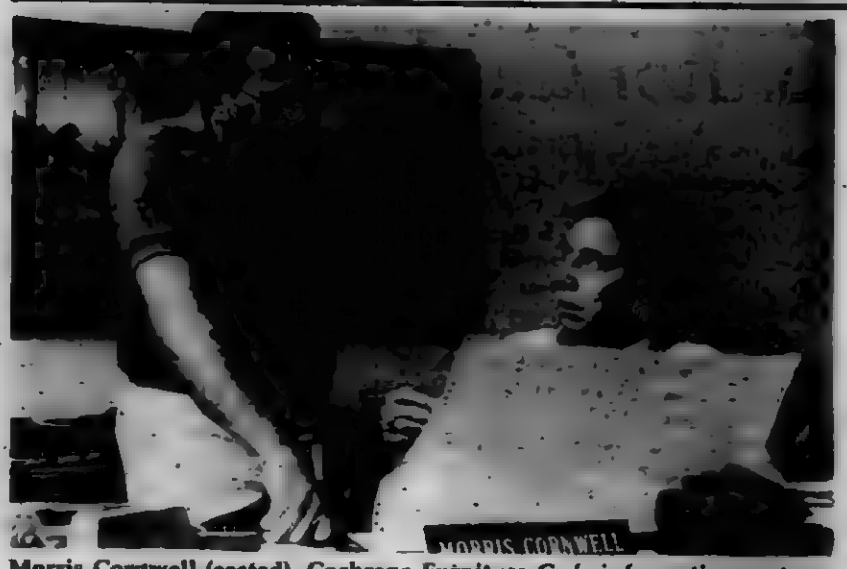

Morris Cornwell (seated), Cochrane Furniture Co.'s information systems manager, reviews health insurance reports with Neal H. Rhyne, vice-president of finance. The reports help Cochrane evaluate employee needs for new health plan coverage.

Furniture Firm Carves Out In-House Insurance Plan With Turnkey Installation

LINCOLNTON, N.C. — A furniture company here has recently made a name for itself among its employees and health care providers as a top-notch health insurance plan administrator.

At its headquarters here, Cochrane Furniture Co. now processes a monthly average of about 400 health insurance claims for its 700 to 750 full-time employees and their families.

Morris Cornwell, manager of Information Systems, said the company's 1982 decision to self-administer its employee health insurance plan has dramatically cut benefit costs and simultaneously improved plan efficiency and employee morale.

"We took our first actions to reduce health insurance plan costs in 1977 when we opted for self-insurance and self-funding," Cornwell said.

"Management was very concerned that health insurance premiums, which impact balance sheets as operating expenses, were escalating year after year.

"So to contain costs, we first embraced the idea of a self-funded insurance plan as a proven way to reduce expenses," Cornewll said.

"However, we continued to have a major insurance company administer our plan, which meant we were still paying $40,000 a year in administrative service charges alone. Yet we were dissatisfied with the service. Finally, we decided that self-administration could improve the plan and reduce costs."

In June 1982, Cochrane installed an Applied Digital Data Systems, Inc. Mentor 4000 minicomputer and CG Data Corp.'s fully automated claims terminal system software to bring administration in-house. CG Sales, out of St. Petersburg, Fla., provided the equipment and software as a turnkey system.

Project Benefits

The projected benefits quickly materialized. Processing is faster — the average claim is now paid within three days of its receipt.

Cochrane's total health insurance plan costs have stabilized. It no longer pays any out-of-pocket administrative costs, which, given inflation, would now exceed its previous $40,000 annual total.

Though Cochrane has expanded its plan's coverage, administrative efficiencies have enabled the company to hold the line on premium costs.

"The result is that we can offer employees a really good health care plan while containing premium costs shared by employees and the company," Cornwell said.

"With our automated claims-processing system, we feel like we're doing justice to everybody concerned — employees and their families, health care providers and the company.

"Initially, we projected savings would pay for the minicomputer system and software we purchased within one to two years," he added. "But it now appears that the payback period will be even shorter."

The furniture manufacturer has a Sperry Corp. computer that runs a comprehensive on-line manufacturing control system for all plants, but it ruled out using this mainframe for insurance claims processing.

The nine-person MIS department had neither the time nor expertise to write the software, according to Cornwell.

Claims for employees at all Cochrane facilities are processed by the

(Continued on Page 68)

branches. The view is precise. Compact. Unambiguous. And there's no waiting for computer time.

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System Helps Feedlot Monitor Cattle's Weight

CALEXICO, Calif. — A computer system is helping a California feedlot operator decide when cattle are putting on too much weight.

Cutting back on feed at that point means more appetizing cuts of meat for the consumer and more cost-efficient operation for Hartman & Williams here, one of the oldest feedlot operators in the Imperial Valley.

According to Hartman & Williams manager Tom Remington, a certain amount of fat is desirable because it helps produce tender, flavorful cuts of beef. However, because fat contains more than twice the stored energy of an equal weight of muscle tissue, it takes more feed to produce a pound of fat than it does a pound of lean beef.

Hartman & Williams installed an IBM System/34 in 1980 to keep track of weight gain in proportion to feed. When the rate of gain falls off, the feed is being turned into excess fat instead of lean meat.

"The computer monitors how much the cattle are eating," Remington said.

"It estimates what their gain should be from that consumption. It allows us to determine the point at which, on a cost basis, the animal has reached a point of diminishing returns — the point at which the gain costs more than what it's going to sell for on the market."

Nearly all of the approximately 30,000 head of cattle that pass through the Hartman & Williams feedlot in a year are part Brahman, selected because they tend to be leaner than other breeds. The cattle weigh about 300 pounds when they arrive. In about nine months, they gain 600 to 700 pounds before being sold to meat packers.

In addition to monitoring weight gain, the computer double checks the records maintained for each lot of cattle in the yard.

As many as 22,000 head of cattle, divided into more than 100 lots, may be in the yard at any one time, Remington said. Feedlot workers record the amount and type of feed delivered to each lot. By comparing records, the computer can point out apparent discrepancies in the feeding schedule, such as when the wrong formula or amount is delivered to a particular lot.

Remington said he was amazed at the number of errors that showed up in the feeding records once he started to cross-check them with the computer. Cattle feeders operate on a narrow margin, and feeding errors can quickly add up to lost profits.

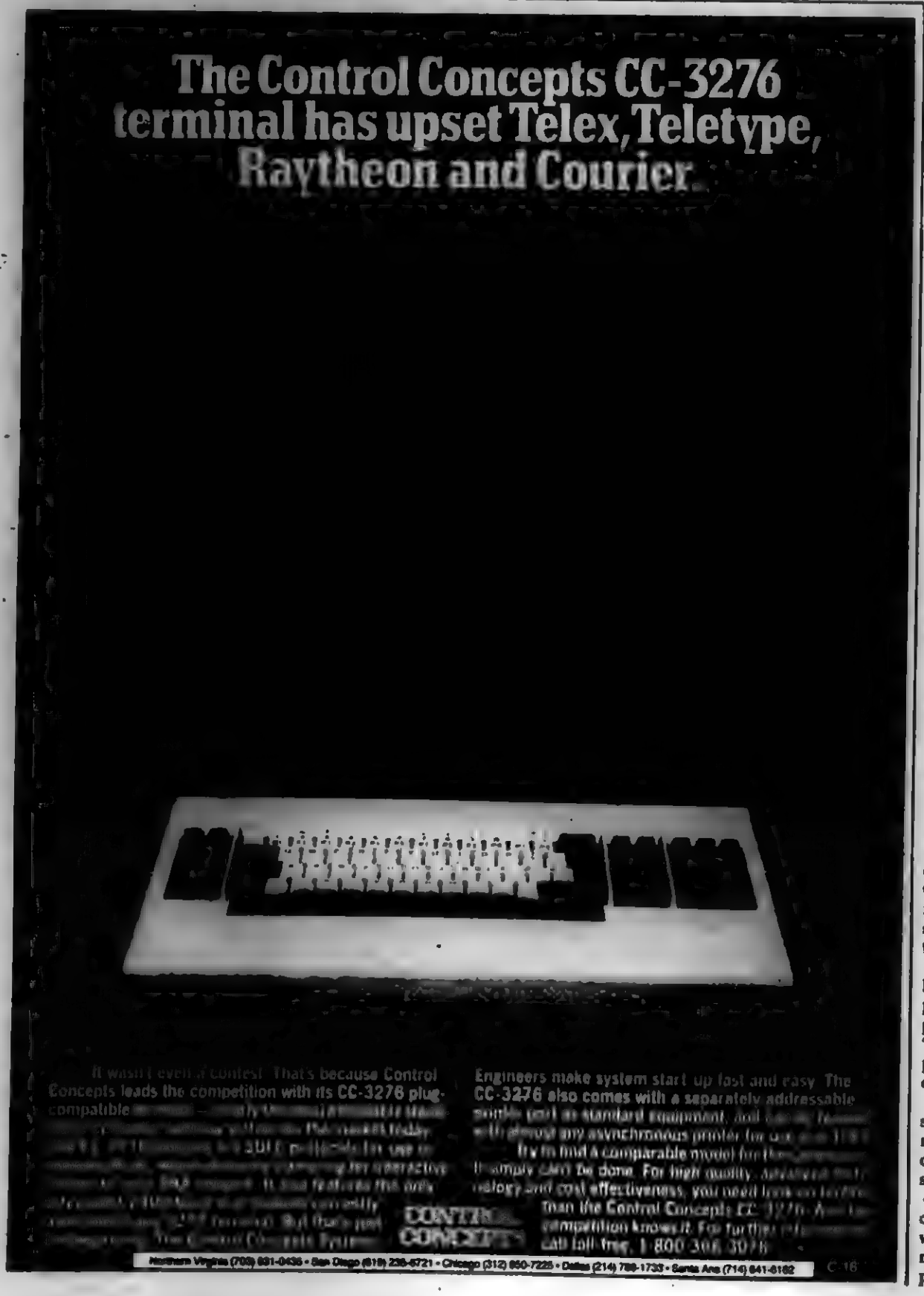
The IBM system provides a weekly report that lists the average daily consumption of feed, the number of days the cattle have been in the yard, the formula they take, total weight gain and total cost.

Although Hartman & Williams own some of the cattle in the feedlot, most are owned by investors. The computer prepares itemized bills as well as profit and loss statements for each investor. It generates a report listing each individual partner's gain or loss for groups of up to 10 investors.

Hartman & Williams also mixes its own feed. Remington said the computer helps him analyze commodity prices so he can decide which grains or agricultural by-products are the best buys at any given time in a rapidly changing market.

The feedlot uses three different feed formulas, and because some of the ingredients are interchangeable, analyses are very complicated.

"The IBM system can complete an analysis within five minutes, making it feasible to do more analyses more often and have better information to help make major purchasing decisions," Remington said.



Firm Improves Insurance Plan

(Continued from Page 67)

equivalent of one full-time staffer here, where the majority of Cochrane's work force is based.

"We're not using data processing staff to run our system," Cornwell said. "Instead we've trained employees who previously interfaced with the insurance company so no additional staff was required to bring claims processing in-house."

Cornwell said he believes internal administration of health insurance plans is fast becoming an industry trend.

"At a summer 1983 industry meeting, perhaps 75% of the 24 companies were self-insured," he noted. "But only one other company besides Cochrane was handling its own administration. Since then, though, several companies have called to say they're taking this route."

"Another self-insured company, located about 25 miles from us, is purchasing time on our system as a pilot project," Cornwell explained. "A modem links a CRT and a small printer to our system so it can process claims for one of its divisions.

"I don't see us outgrowing this system, though we'll probably add memory, another disk drive and another port for more CRTs," Cornwell said.

"We looked at expansion options closely because we realized we would probably want to build on this new distributive data processing capability," he said.

Dairy Uses Micro, Tradition to Manage Herds

LANESBORO, Minn. — On a 750-acre dairy farm in Minnesota, traditional herd management has been combined with modern microcomputer technology to help increase milk production and decrease costs.

"Feed represents as much as 50% of a dairy farm's overhead, and the use of the computer to monitor and regulate the herd's intake compared to its milk production means a significant savings," explained Gary Eide, who, along with his father Glen, owns the Eide farm. "We're achieving a better balance between feed and production, and we're wasting less feed concentrate."

The Eides use an Altos Computer Systems, Inc. 8000-10 microcomputer, combined with Northhouse Industries, Inc.'s (NII) Herdstar, a dairy management software package. The system tracks breeding and calving as well as the amount of feed each cow gets to achieve its milking peak.

The computer is kept in the main house, with additional terminals in the milk house, where the cows are fed, and the milking parlor, where they are milked. Using Digital Research, Inc.'s MP/M multiuser operating system, the main house computer terminal can be in operation checking on weekly production while a dairyman in the milk house is determining the status of an individual cow's daily feed allotment.

Protection From the Cold

Because of the especially harsh environment in the milking parlor, a membrane keyboard terminal with an LCD display is used there. This adds protection from water and dust to the unit. Underground cables connect terminals to the main house computer, providing insurance against damage during the severe cold and ice storms of Minnesota winters.

A traditional milk herd management method segregates cows by various groupings — one such grouping is production (measured in pounds of milk) — so that high producers (75 to 100 or more pounds of milk per day) can be fed appropriate amounts of grain, while lower producers receive less.

A large farm may have three or four such groupings, requiring more barns, sleeping and feeding facilities than the Eides can provide. So, instead of depending on physical segregation of the milk animals, the Eides monitor the herd with Herdstar software and the Altos computer.

NII developed the Herdstar software over a period of three to four years. Dr. Richard Northhouse, founder of NII and Compco Farm Computer Systems, had made several visits over the course of a year to the Eide farm to study the specifics of its operation before recommending the present system.

The main use of the system, with Herdstar's Herd Manager program, is to track the breeding, calving and dry periods of each milk cow. However, the software also handles feed rationing and requirements.

Each cow in the herd is assigned a number and wears an electronic transponder around its neck. Sensors in each of the six feeding stalls react to the transponder, sending a coded signal to the computer. This identification is critical to the success of the system because it allows the computer to recognize each animal when it appears in a feeding stall.

A feeding record is kept in the computer's 10M-byte hard disk memory for each animal. The amount and type of feed is determined based on National Research Council nutritional guidelines and the cow's milk production. For body maintenance and quality milk production, each cow's protein intake must be watched closely.

"Even though the automatic herd feeders are over 600 feet from our Altos computer, we can actually sit at the terminal display and check which cow is in which feeder at any moment," Eide said. "The animal is identified by number on the screen, and the brightness level of that number indicates whether the cow will be fed this time or not.

"The amount of feed is controlled by the Herdstar computer program, and the system operates 24 hours a day, seven days a week," he added. "We think of it as our 24-hour hired hand."

The microcomputer maintains feed records on each cow in the Eides' herd for about 3½ years. This aids the family in cost analysis, profit and loss determination and maintenance of a healthy, productive herd.

Since cows must be bred periodically to maintain their milk producing capabilities, the program also reports on the animal's ovulation cycle, determines proper breeding and expected calving dates, predicts when the cows should dry up and performs other aspects of animal maintenance.

A software program known as Reproduction Manager, also from NII, provides details on which cows were "mated" to which bulls. The animals are bred through artificial insemination, and the bull sires are chosen from a catalog listing.

One other NII software program Eide uses, the Heifer Manager, also helps him track individual calves from birth through first breeding (usually at 12 to 14 months of age).

"We use the computer twice a day," Eide said. "It's as important to our operations as tractors and silos."

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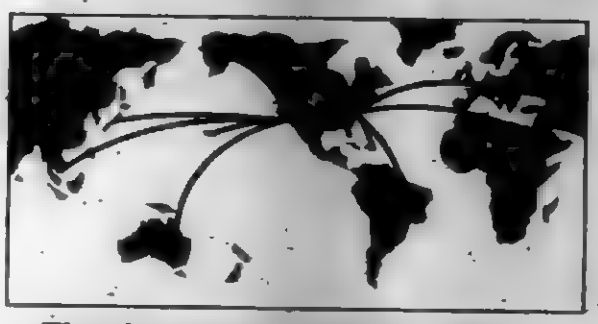

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Seminar on Preventing DP Crime Set This Week in Paris

PARIS — The Institut de Formation Interbancaire is sponsoring an international seminar on "Security for Computer Crime Prevention," which is taking place Nov. 17-18 in the George V Hotel here. DP crime specialist Donn B. Parker from SRI International, Inc., Menlo Park, Calif., will conduct the seminar.

The seminar objective is to provide the latest safeguarding methods and controls in an information age context based on actual losses from computer crime. The program will be divided into three sections:

- Identified crime — funds transfer, program falsification, automated teller machine attacks and credit card fraud.
- Prevention and control methods — physical, technical and human controls; security procedures; investigation methods; and staff training.
- Evolution — increase in crime and risk-reduction efforts.

The seminar costs $445. This includes conference papers and refreshments during breaks and lunches. More information is available from the Office de Recherche d'Organisation et de Securite, 42 Blvd. Pasteur, 75015 Paris, France.

TI to Sponsor and Supply Products to U.S. Ski Team

AUSTIN, Texas — Texas Instruments, Inc. has announced its official sponsorship of the U.S. Ski Team. TI will supply the team with an array of computing products, including a multiuser minicomputer system, personal computers, printers, portable terminals and home computers.

"We're excited about incorporating computing power into our growing and active organization," said Inez Aimee, the U.S. Ski Team's executive director. "The computers will help us receive critical information faster and give us access to new data that will help our athletes keep that competitive edge.

"One of the applications we're planning includes communicating with the U.S. Olympic Committee's computer in Colorado Springs, Colo., for various functions ranging from accounting to athlete information," Aimee said. "In addition, we're considering the possibility of interfacing with equipment at the Olympic Training Center in Colorado Springs. We will look at using the TI computers for psychological testing, sports medicine information and computerized testing of both skiing techniques and equipment."

The minicomputer system will be used by the Ski Team administration at its headquarters in Park City, Utah, to handle the day-to-day operations of the team. These include such tasks as accounting, donation management, tracking the activities of athletes, tabulation of race results, operation of the Ski Team press information office and the storing and transmitting of race results.

The team coaches and office staff will use the TI Professional Computer for managing individual data bases, mailing lists and word processing.

Portable terminals will be taken on the road to help the team keep up with its education while training and while on location at World Cup and Olympic events.

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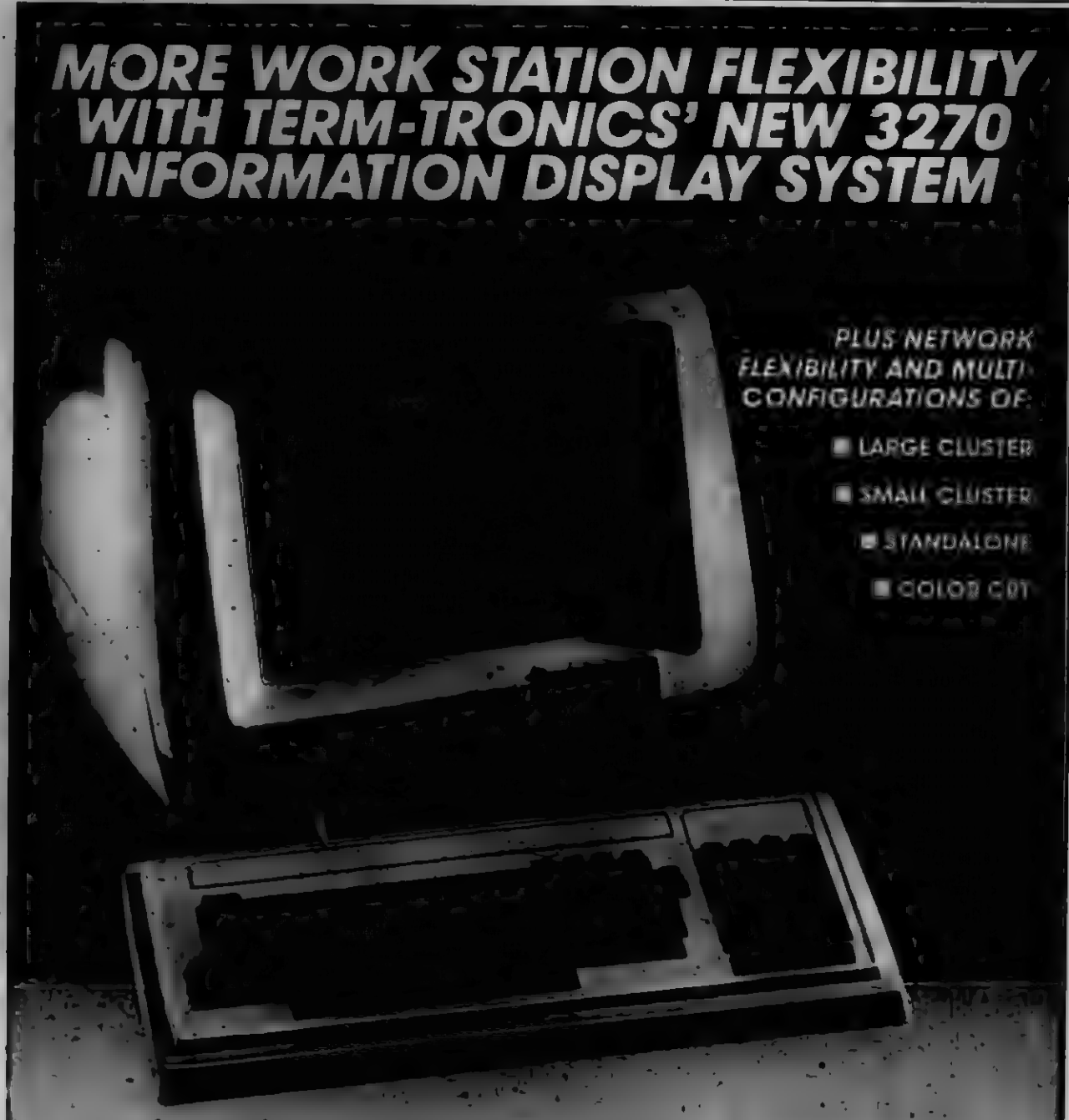

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Each 3270 display communicates with the IBM communications processor at speeds of up to 9600 bps via the standard binary synchronous (BSC) line protocol.

The 3270 comes standard with the P31 green phosphor display. Color and amber monitors are available as options. The monitor is adjustable and the keyboard is detachable for operator comfort, and the system can be arranged to compensate for ambient lighting conditions.

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Advisory Group Seeking Names For OA Awards

WASHINGTON, D.C. — Nominations for the 1984 Federal Office Systems Expo (Fose) Office Automation Achievement Award for the commercial sector are being sought by Fose's Commercial Program Advisory Committee.

Eligible individuals must have implemented office automation systems within their organizations that have increased professional productivity, achieved cost savings, provided a useful product that could be adapted by others or lead to new business opportunities, the Fose committee representative said.

The committee is particularly interested in achievements in the areas of decision support systems, professional and executive training, information centers, integrated communications strategies, wide and local-area networking and the integration of microcomputers with mainframes and minicomputers.

Nominations for the Office Automation Achievement Award, which will be presented at the 1984 Federal Office Systems Expo to be held here March 19-22 at the Washington, D.C. Convention Center, must include the name, address and telephone number of the nominee. Submissions must also include a description of the project and a summary of the results, the committee spokesman said.

Nominations must be in by Jan. 31, and more information is available from the conference sponsor, National Trade Productions, Inc., at 9418 Annapolis Road, Lanham, Md., 20706.

For Upper Management

Deltak Announces Video Courses

NAPERVILLE, Ill. — Deltak, Inc. has announced four video courses:

● "Increasing DP Productivity," a video journal composed of three courses offering a view of current DP productivity problems and potential solutions.

This series was designed for upper management inside and outside of the DP department, development support teams, systems analysts and project managers, Deltak said.

The courses are available for an average rental fee of $50 to $125/mo per course, depending on volume. Purchase price is $1,750 per course.

● "The Micro/Mainframe Link," a video magazine that provides a look at the problems and opportunities associated with linking standalone microcomputers with corporate mainframes.

This is one tape in a series of half-hour videotapes focusing on the latest developments in information technology, Deltak said.

Program rentals average $50 to $125/mo per program, depending on volume. Purchase price is $450 each.

● "VSE, DOS/VSE and DOS/VS for Application Programmers" is a series presented through videotapes, audiotapes and text.

The five training courses that complete this series include "The VSE Linkage Editor," "Using VSE Libraries and Cataloged Procedures," "VSE Utility Programs," "VSE Sort/Merge Utility" and "VSE Debugging."

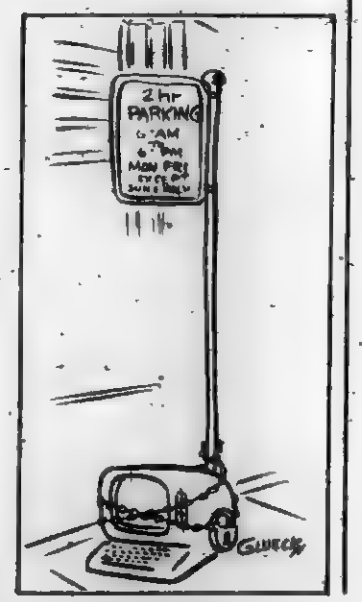
Students must have access to Apple Computer, Inc.'s 48K-byte Apple II+ with two disk drives and an Apple language system to complete the training. It was designed for self-instruction, and the microcomputer encourages this method by diagnosing and prescribing the training needed, according to the vendor.

Average rental for courses is $50 to $125/mo per course, depending on volume. Purchase price is $1,750 each.

● "IMS/VS Data Communications Programming," a four-course series that analyzes three types of on-line application programs: batch message processing, message processing conversational and message processing nonconversational.

A working knowledge of Cobol, PL/1 or assembler and DL/1 application programming is required for this series. The average rental fee for this course is $50 to $125/mo. Purchase price is $1,750.

Further information on the above products is available from Deltak, East/West Technological Center, 1751 W. Diehl Road, Naperville, Ill. 60566.



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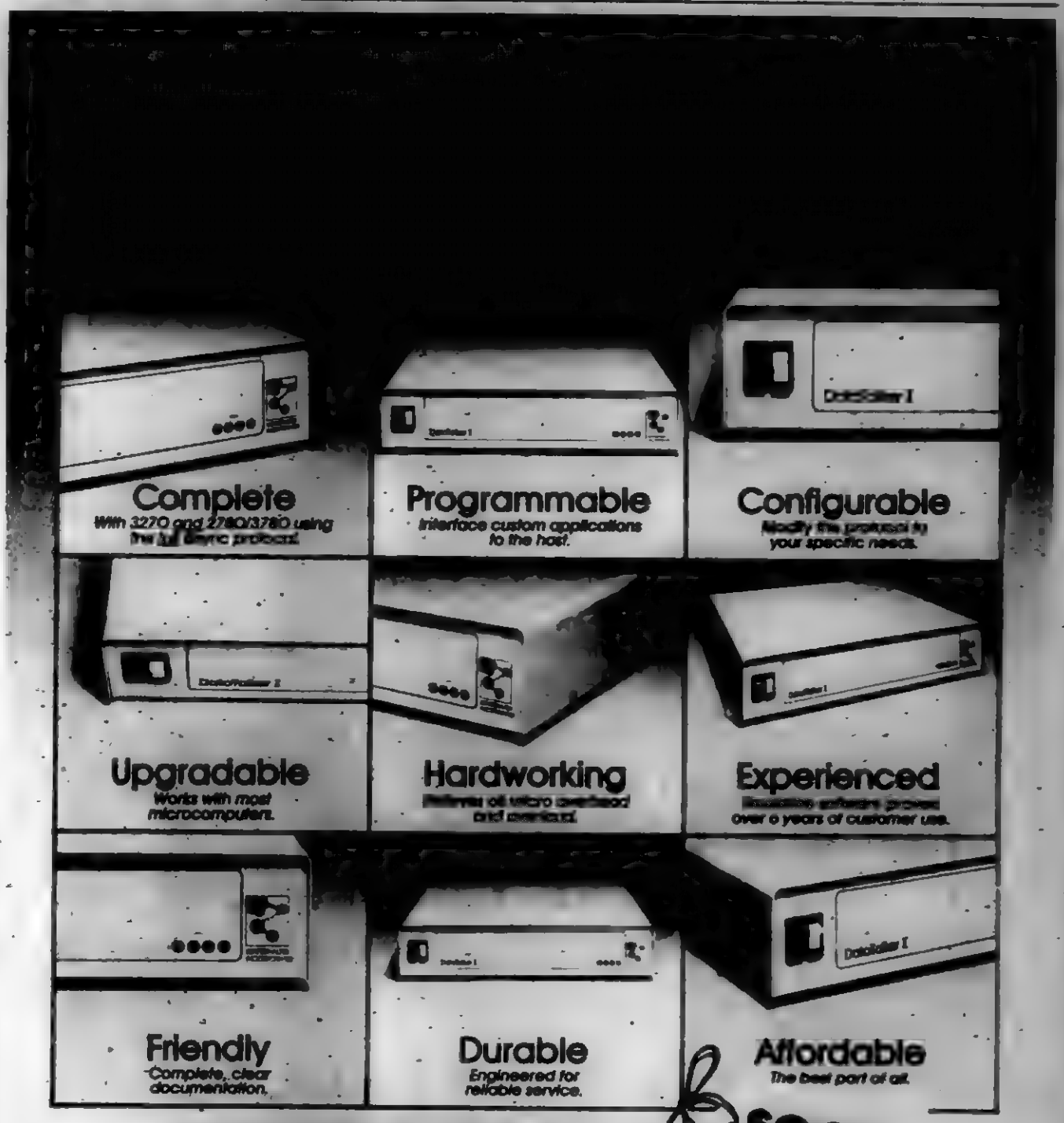

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Calendar

Week of Nov. 20

Nov. 24, Washington, D.C. — **Telephone Bypass Technologies and Economics.** Contact: Telestrategies, Inc., 6842 Elm St., Box 874, McLean, Va. 22101.

Week of Nov. 27

Nov. 28, Denver — **Structured Systems Development.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 28, New York — **Computer Acquisition and Disposition.** Contact: 20th Century Systems, 647 E. Carpenter Drive, Palatine, Ill. 60067.

Nov. 28, San Francisco — **Artificial Intelligence.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Nov. 29-Dec. 1 in San Francisco.

Nov. 28-29, Chicago — **Data Communication: Advanced Concepts, Products and Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 28-29, San Francisco — **Introduction to the Tools of Structured Design.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 28-29, Orlando, Fla. — **How to Manage Data and Information as a Resource.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

Nov. 28-29, Salt Lake City, Utah — **Systematic Software Testing.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 28-29, Atlantic City, N.J. — **Software Quality Assurance and Verification and Validation.** Contact: Education Foundation of the Data Processing Management Association, P.O. Box 3608, Department SQA, Torrance, Calif. 90510.

Nov. 28-29, New York — **Management Implications of Structured Techniques for Microprocessors.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 28-29, Denver — **Introduction to TSO/ISPE/SDSF.** Contact: Steve Comstock, 256A S. Monaco Pkwy., Denver, Colo. 80224.

Nov. 28-30, Houston — **Data Base Management Systems: Concepts and Guidelines.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 28-30, Parsippany, N.J. — **Data Processing for the Non-DP Executive.** Contact: Chubb Institute, 8 Sylvan Way, Parsippany, N.J. 07054.

Nov. 28-30, Los Angeles — **Data Communication: Effective Network Design.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 28-30, Denver — **Data Communications Systems.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Nov. 28-30, Atlanta — **Data Base Management Systems: A Comparative Analysis of General-Purpose Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 28-30, Minneapolis — **Micro and Home Computers: Technology and Applications.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Nov. 28-30, Philadelphia — **Personal Computers: Strategies for Managing.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 28-30, Chicago — **Structured Analysis for Users.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 28-30, Washington, D.C. — **Computer-Generated Business Graphics for Today's Manager.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 28-30, Arlington, Va. — **Network Communications Protocols.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Nov. 28-30, Chicago — **Microcomputers: A Guide to Selection and Application.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 28-30, Chicago — **DOS/VSE Job Control Language.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 28-30, Washington, D.C. — **Distributed Systems Designs: Micros to Mainframes.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 28-30, Phoenix — **Personal Computers and Networking.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Nov. 28-30, San Francisco — **Data Base Management Systems for Micros and Minis.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 28-30, Denver — **Dbase II for the PC User.** Contact: The Institute for Professional Education, Suite 303, 1515 N. Court House Road, Arlington, Va. 22201.

Nov. 28-30, Chicago — **Information Systems Modeling, Analysis and Planning.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 28-30, Hartford, Conn. — **Unix.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif.

(Continued on Page 74)

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Recommends Digital Terminals

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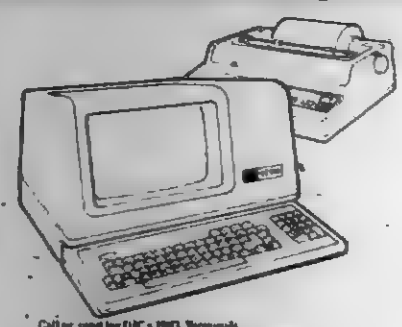

Call or send for DJC's DEC Terminals Comparison Chart as seen in Computer Decisions.

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All MAPS products are available for license or via ROSS/NET remote computing and are backed with 11 years experience in customer and product support.

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You can tailor MAPS/GL to your individual needs, controlling accounting structures, organizational roll-ups and reporting specifications. As your company grows and your needs change, you can change your system to adapt.

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MAPS/GL was developed by Price Waterhouse under the name "PW480" and adapted for the VAX by Ross Systems, Inc., with the support of many MAPS/GL current with new PW480 releases. Price Waterhouse markets PW480 on other computers.

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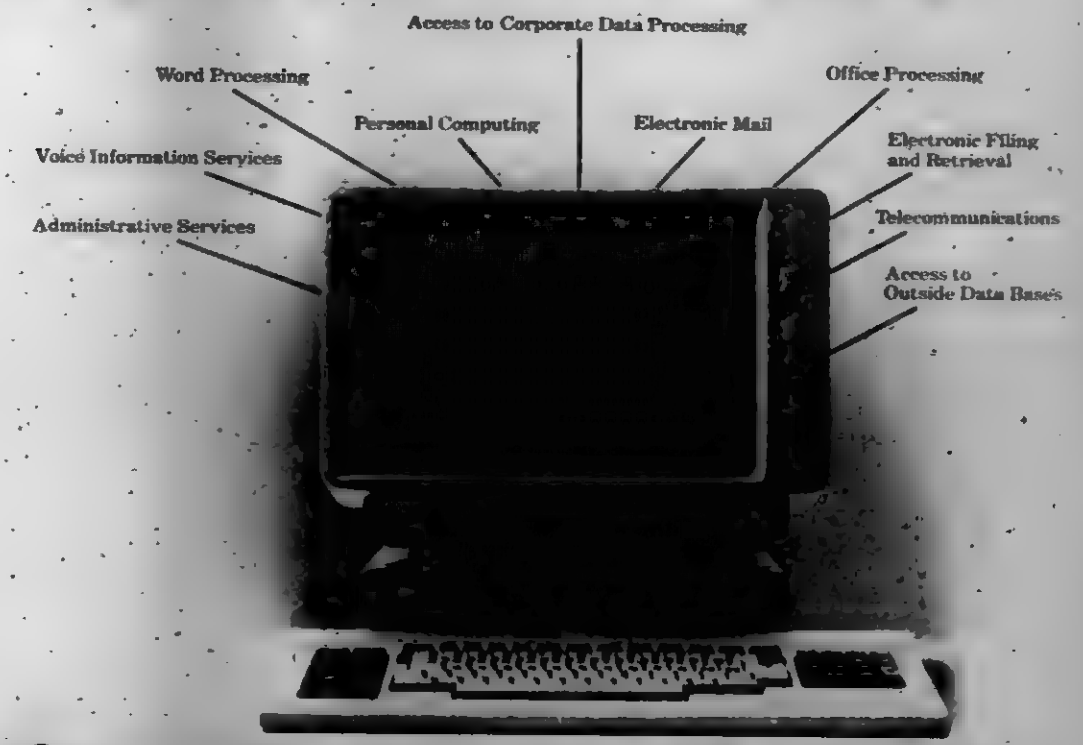

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Calendar

(Continued from Page 72)

92705.

Nov. 28-30, San Francisco — **Advanced DP Management: Methods and Techniques in the '80s.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 28-Dec. 2, Detroit — **Structured Analysis and Design Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Nov. 28-Dec. 2 in Indianapolis.

Nov. 28-Dec. 2, Las Vegas — **Comdex/Fall.** Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

Nov. 28-Dec. 2, Fort Lauderdale, Fla. — **How to Increase the Productivity of Computer People, Including Implications of Office Automation for the User as a Programmer and Systems Developer.** Contact: Keston Associates, 11317 Old Club Road, Rockville, Md. 20852.

Nov. 28-Dec. 2, Anaheim, Calif. — **Structured Analysis and System Specification Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Nov. 28-Dec. 2 in Atlanta and in Washington, D.C.

Nov. 28-Dec. 2, Atlanta — **Structured Systems Design/Structured Program Design Combined Course.** Contact: Georganna Carson, Ken Orr and Associates, Inc., 1725 Gage Blvd., Topeka, Kan. 66604.

Nov. 28-Dec. 2, Chicago — **Information Modeling Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 28-Dec. 2, Seattle — **Auditing in the Contemporary Computer Environment.** Contact: Marge Umlor, EDP Auditors Foundation, 373 S. Schmale Road, Carol Stream, Ill. 60187.

Nov. 28-Dec. 2, San Francisco — **Structured Design Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 28-Dec. 2, Englewood Cliffs, N.J. — **Effective Data Base Design.** Contact: Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Nov. 28-Dec. 2, Denver — **Structured Analysis for Real-Time Systems.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 28-Dec. 2, Rochester, N.Y. — **Structured Analysis Workshop.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y 10011.

Nov. 28-Dec. 2, Chicago — **Information Modeling Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Nov. 28-Dec. 2 in Houston.

Nov. 28-Dec. 2, New Orleans — **System Resource Planning and Selection.** Contact: Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Nov. 28-Dec. 2, Houston — **CICS/VS Macro-Level Coding.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 28-Dec. 2, San Francisco — **Project Planning and Control Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Nov. 28-Dec. 2 in Chicago.

Nov. 28-Dec. 2, Boston — **Auditing Structured Analysis and Design Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 28-Dec. 2, San Francisco — **Computer Performance Measurement Capacity Planning.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Nov. 28-Dec. 2, Phoenix — **IMS Application Programming Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 28-29, San Francisco — **Stress Management.** Contact: Registrar, Control Data Management Institute, 6003 Executive Blvd., Rockville, Md. 20852.

Nov. 28-Dec. 2, Boston — **CICS/VS Command-Level**

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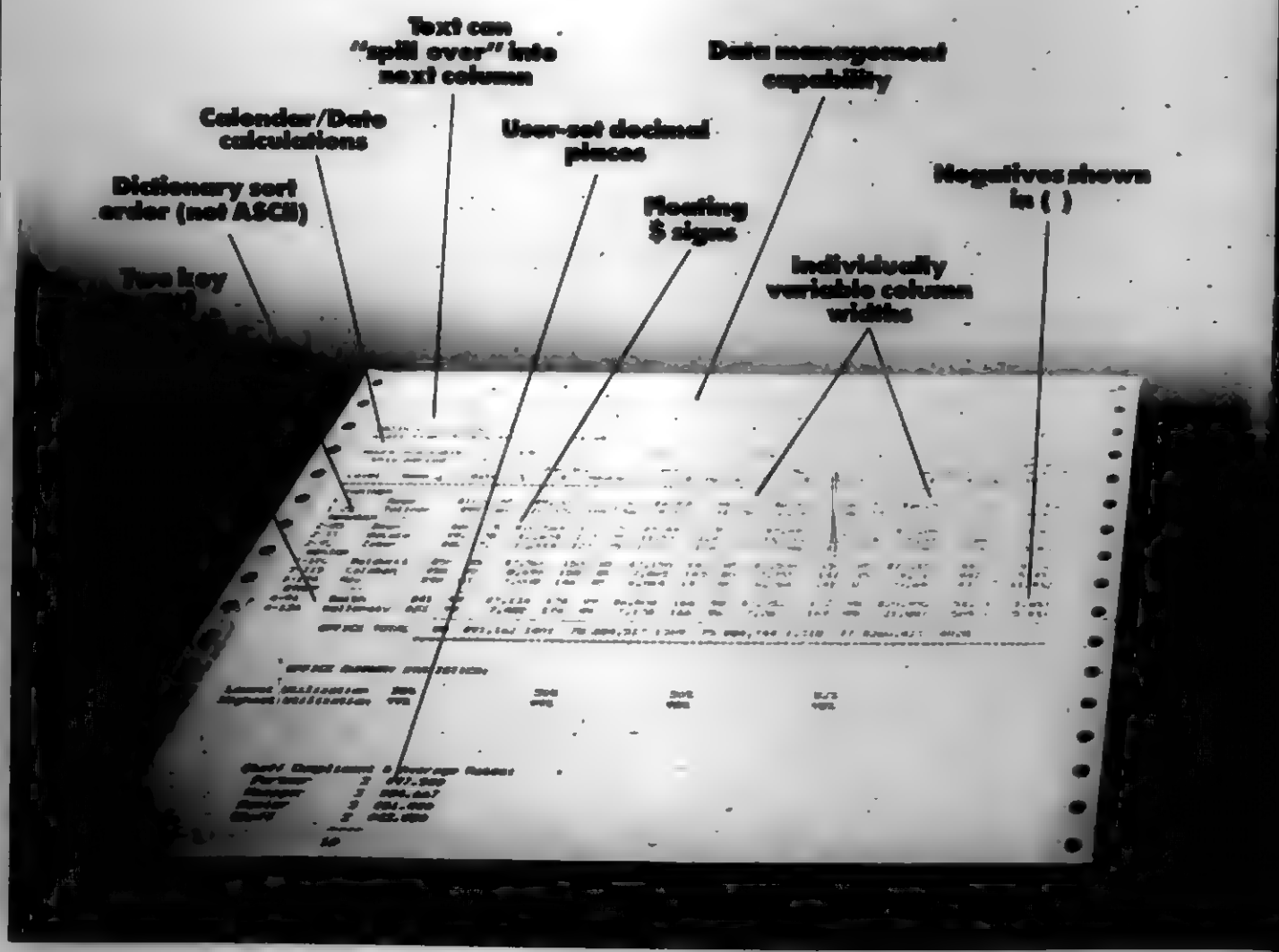

Calendar

Coding. Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 28-Dec. 2, Chicago — **IMS Logical Data Base Design and Implementation.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Nov. 29, New York — **Technology Briefing.** Contact: 20th Century Systems, 647 E. Carpenter Drive, Palatine, Ill. 60067.

Nov. 29-30, San Francisco — **Effective Communication Skills for DP Professionals.** Contact: Registrar, Control Data Management Institute, 6003 Executive Blvd., Rockville, Md. 20852.

Nov. 29-30, New York — **Strategic Redistribution of Services and Work by Computer.** Contact: The Conference Board, 845 Third Ave., New York, N.Y. 10022.

Nov. 29-Dec. 1, Arlington, Va. — **SAS Macro Language Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Nov. 29-Dec. 1, Minneapolis — **Data Communications: Network, Design and Optimization.** Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Nov. 29-Dec. 1, San Francisco — **Computer Networks.** Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.

Nov. 29-Dec. 2, Washington, D.C. — **Data Base Management Systems: Mini, Micro and Distributed Applications.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045.

Nov. 29-Dec. 2, Washington, D.C. — **Data Communications: Components, Systems and Networks.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

Nov. 29-Dec. 2, Atlanta — **System Administration and Performance Monitoring for Honeywell Large System Users.** Contact: Technology Information Systems, Inc., 2305 E. Lincoln Drive, Phoenix, Ariz. 85016.

Nov. 30, New York — **Contract Negotiations.** Contact: 20th Century Systems, 647 E. Carpenter Drive, Palatine, Ill. 60067.

Nov. 30-Dec. 2, Washington, D.C. — **Software Quality Assurance.** Contact: Registrar, Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md, 20852.

Nov. 30-Dec. 2, Washington, D.C. — **Robotics and Artificial Intelligence.** Contact: Manufacturing Productivity Center, U.S. Professional Development Institute, Robotics/Artificial Intelligence, Department AB, 1805 Powder Mill Road, Silver Spring, Md, 20903.

Nov. 30-Dec. 2, Arlington, Va. — **SAS Basic Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Nov. 30-Dec. 2, Washington, D.C. — **Managing Microcomputer Systems.** Contact: U.S. Professional Development Institute, Managing Microcomputers, Department A, 1805 Powder Mill Road, Silver Spring, Md. 20903.

Nov. 30-Dec. 2, Orlando, Fla. — **How to Build and Use a Data and Information Resource Directory.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

Nov. 30-Dec. 2, Philadelphia — **Systems Analysis and Design: Concepts and Effective Practice.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

(Continued on Page 76)

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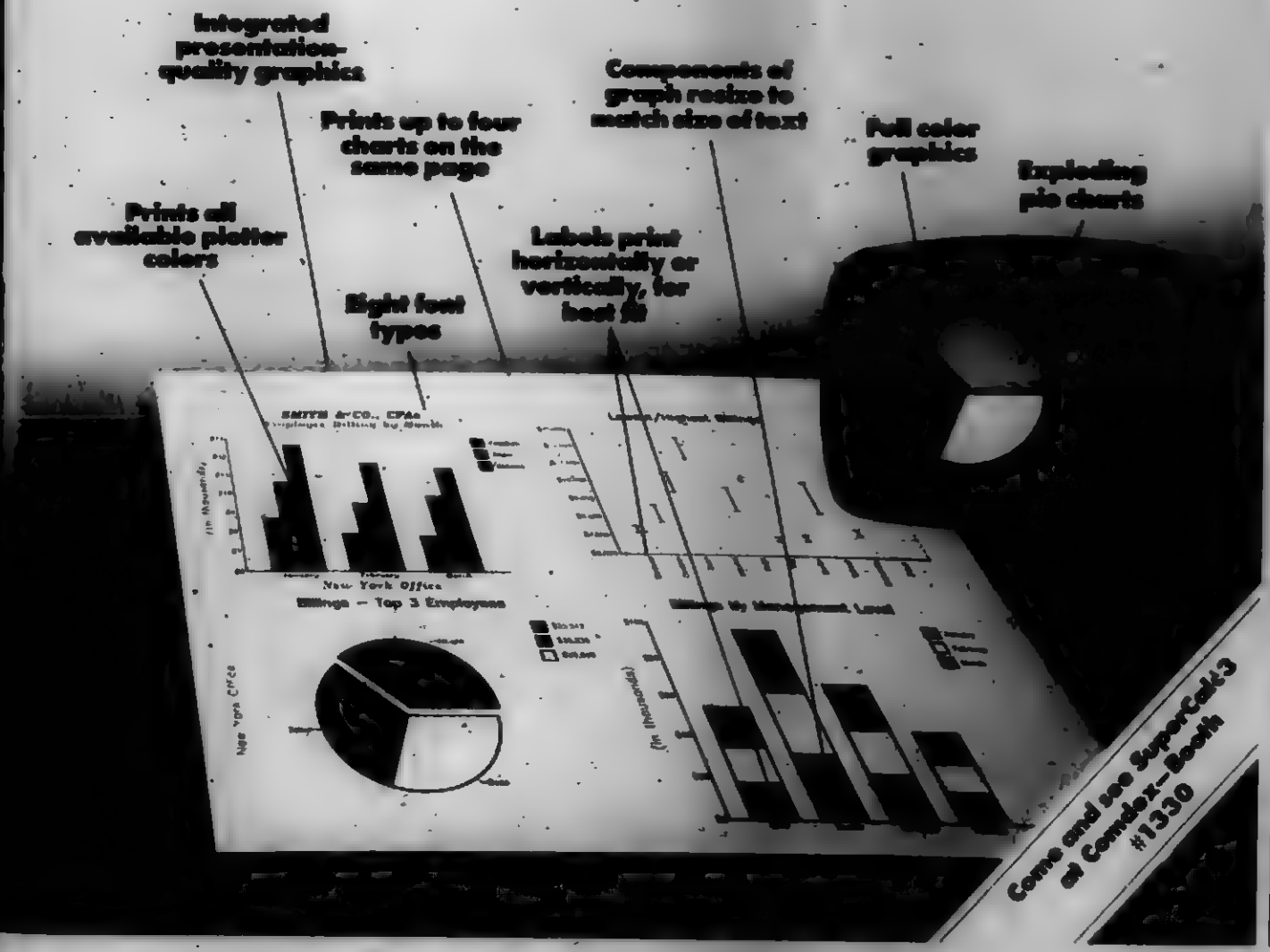


'Relief? I Spell It . . . C-O-M-P-U-T-E-R.'

Calendar

(Continued from Page 75)

Nov. 30-Dec. 2, Washington, D.C. — **Capacity Management Forum.** Contact: Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Nov. 30-Dec. 2, Seattle — **Local-Area Networks.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Nov. 30-Dec. 2, Chicago — **Computer Performance Measurements and Capacity Planning: Tools and Techniques.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Nov. 30-Dec. 2, San Francisco — **Office Automation: Concepts, Systems and Implementation.** Contact: Registrar, Control Data Management Institute, 6003 Executive Blvd., Rockville, Md. 20852.

Nov. 30-Dec. 2, Denver — **MVS, JCL and Utilities.** Contact: Steve Comstock, 256A S. Monaco Pkwy., Denver, Colo. 80224.

Nov. 30-Dec. 2, San Francisco — **Managing Proliferation of Small Computers.** Contact: The Institute for Professional Education, Suite 303, 1515 N. Court House Road, Arlington, Va. 22201.

Nov. 30-Dec. 2, Chicago — **Basic Systems Analysis.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y 10036.

Nov. 30-Dec. 2, Washington, D.C. — **Simulation Modeling for Decision Making.** Contact: The Institute for Professional Education, Suite 303, 1515 N. Court House Road, Arlington, Va. 22201.

Nov. 30-Dec. 2, New York — **DL/1 Application Programming.** Contact: Kaaren Perez, Comped, 10 E. 21st St., New York, N.Y. 10010.

Report Outlines Ways to Guard Against DP Theft

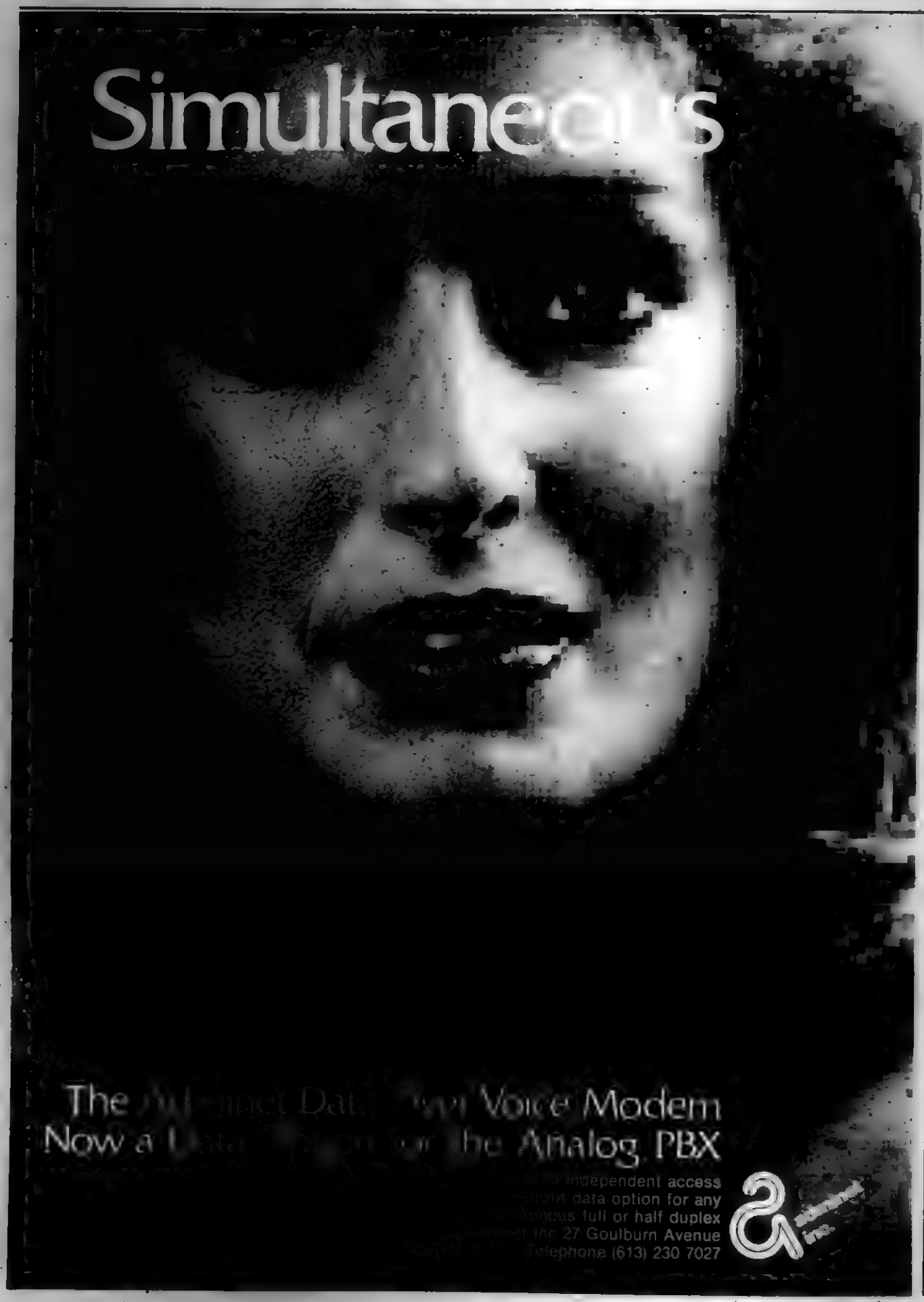
NEW YORK — In a special report called "Safeguarding Your Business Against Theft and Vandalism," the Research Institute of America (RIA) estimates that $70 billion is lost annually to white-collar computer-related crimes, fraud and embezzlement, and another $30 billion each year disappears to theft, inventory shrinkage and unidentified pilferage.

Many companies refuse to believe that they could have a serious security problem, the report says. The common reaction to such crime reports, according to consultants surveyed in the report, is always "but our employees wouldn't steal."

While this is sometimes true, security expert Norman Jaspan maintains that when his team of consultants visit a new corporate client, they know they have a better than 50% chance of uncovering a major case of theft or financial manipulation and a 75% chance of finding "costly malpractices."

The RIA report offers an overview of the various steps that go into a loss prevention program and provides guidelines for reviewing present practices and procedures to determine where the weak links might be, a spokesman said.

The report is available for $25 from RIA's Membership Service Group, Mount Kisco, N.Y. 10549.



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EDITORIAL

New Kids on the Block

The emergence of a new decision support system department in a number of large corporations has meant a new title for the person managing the department. It has also added one more element to the corporate political structure with which today's management information systems director must cope — whether he wants to or not.

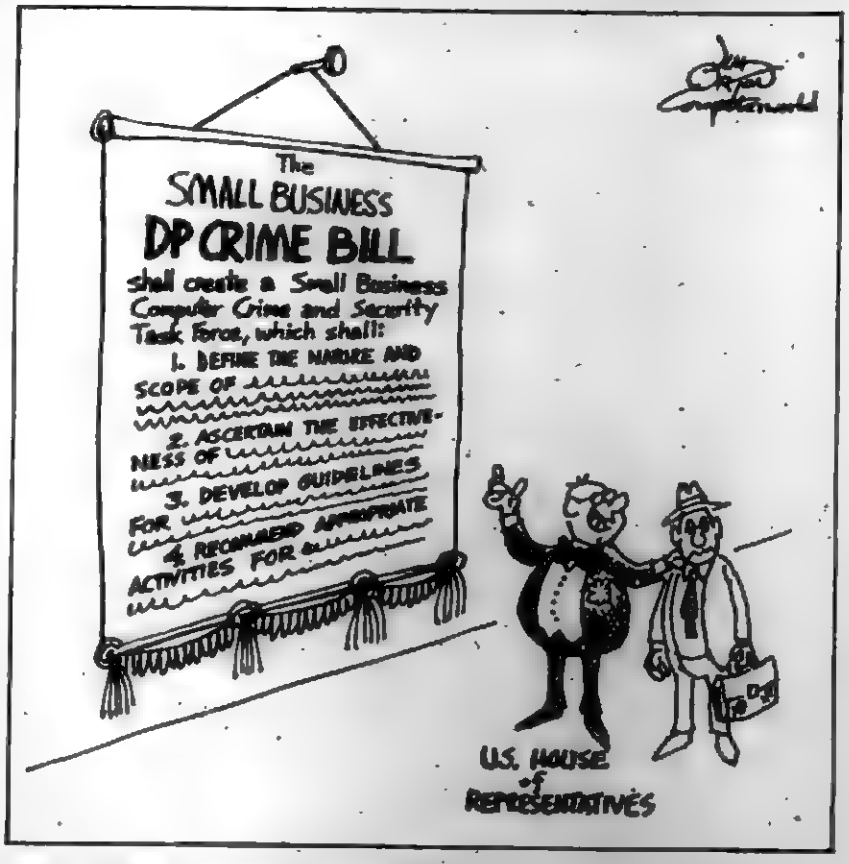
Formal DSS departments did not suddenly spring full-blown because overambitious administrators wanted to increase their visibility by adding more reporting lines on corporate organization charts. But the fact is that the decision support function is a highly visible one, and the MIS executive who only reluctantly agrees to cooperate with the newly powerful manager of decision support applications may find himself in an untenable position.

Areas falling within the DSS manager's purview tend to incorporate end-user-oriented entities such as the information center, office systems, financial modeling and manpower planning. These functions, and the people working with them, have needs that have apparently not been successfully addressed by the traditional MIS department. Yet, decision support managers recently interviewed by *Computerworld* maintained that the very act of filling these needs generates some antagonism from MIS employees [CW, Nov. 7].

It is, perhaps, natural to feel some resentment for coworkers who have the advantage of interacting with top management without having had to pay dues in the less glamorous and less visible systems department. However, the wise MIS executive will realize that the new kids on the block in the DSS department can make his job much easier by taking away the increasing pressure from end users who want their information problems solved now and simply don't want to hear about things like a two-year applications backlog.

Offloading functions, like financial modeling, that depend on immediate turnaround to the DSS area can free MIS personnel to cut that backlog down and respond to complex and sophisticated user requests that require the expertise of the professional information systems specialist. And the DSS department can offer another choice of career path for programmers and analysts who wish to develop business expertise to complement their technical knowledge.

Thus, cooperation between MIS and DSS managers can work to everyone's advantage. The end user gets his solutions more quickly, the MIS executive can utilize his resources more effectively, and the technical specialist has the opportunity to round out his professional background. An obstructionist attitude toward DSS from the person at the top of the information systems organization can only work to his disadvantage and, with increasingly computer-literate top management, eventually lead to political disaster in the corporate arena.



'Why Hit the Computer Criminal With Legal Penalties When We Can Drown Him in a Sea of Paper?'

LETTERS

Major Mistake

Deregulating the channel service unit (CSU) in Dataphone Digital Service (DDS) circuits is a major mistake, in the words of a DDS user.

DDS has been a premium service, which offers high reliability to its limited number of electronic components.

Responses to problems on a DDS were quick, due to a single party being involved and the party's ability to test all components on that system.

With the CSU installed at either end, AT&T is able to ensure that the line is operational end to end. Without the AT&T CSU in place, it is impossible to differentiate between line problems and customer premise equipment problems through a central site test.

The portion of the network whose integrity is in question, if the deregulation of the CSU goes through, is the portion of the communications line that goes from the DDS hub to the user site.

Should a failure occur in this stretch of communications line or equipment, the procedure for testing and identifying the problem should continue to be to loop back the client site by means of the CSU.

The primary function of the CSU should continue to be a testing device, in addition to being a termination device.

Deregulation of the CSU probably means that AT&T no longer can control-site test the local loop.

But even if a non-AT&T CSU were to be used for testing and a failure condition were to be detected, I'm afraid that a line service call would not be placed.

Rather, the client would be asked to have the CSU checked by the servicing company. This would probably require a minimum of six hours to 24 hours to have a third party or vendor dispatched for the purpose of checking the CSU.

Once the CSU was found to be functioning properly by a field engineer or technician at the site, then AT&T would be contacted and asked to dispatch someone to identify or repair the problem on the line, thereby creating an additional delay in repairing the DDS network.

The deregulation of this device ensures the degradation of service in the way of mean time to repair, isolate and locate problems and dispatch service. Quick repair and high uptime have made DDS a premium service.

The parties that have lobbied for this deregulation do not have the best interests of the user in mind, but are more interested in the revenue of CSU sales to the consumer.

As a user, I would gladly pay the few extra dollars that would be saved to maintain this section of the DDS line under the umbrella and responsibility of AT&T.

I strongly urge that this deregulation be defeated so that the CSU can be maintained and used as a termination and testing facility for the DDS service.

Howard Fingerhut
Network Manager
Shaw Data Services, Inc.
Wayne, N.J.

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. Letters may be edited for purposes of brevity and clarity. Letters should be addressed to Editor, *Computerworld*, 375 Cochituate Road, P.O. Box 880, Framingham, Mass. 01701.

DATA PAST

Five Years Ago
Nov. 13, 1978

LOS ANGELES — The Federal Bureau of Investigation arrested a computer consultant, Stanley Mark Rifkin, on charges of using Fedwire, the Federal Reserve's electronic Funds transfer system, to steal $10.2 million from the Security Pacific Bank here. The heist was considered to be one of the largest thefts in U.S. banking history.

Ten Years Ago
Nov. 14, 1973

LOS ANGELES — A computerized car-pool system established here successfully matched 1,700 persons in the first week of operation. But the system was also criticized for creating a confidentiality problem for police officers, whose home addresses were listed on the computer printouts and then posted in some city buildings.

LECHT ON SCIENCE/Charles P. Lecht

PCjr's First Halloween

'In the midst of the restless spirit horde lurked the weirdest and most thoroughly terrifying creature of them all: a big, blue meat-eating peanut. It stood out among the ghosts of what had been and what might have been by virtue of its yet-to-be quality. And what could be more frightening then that, for this was the wraith by which both the quick and the dead were haunted.'

In the somber streets of a quaking computer community, Halloween was dolefully celebrated this year by a heartrending lot of ghoulies and ghosties. Still connected to the living by their own memories of life, a spectral pack of microcomputer companies past rattled their chips and chains upon the doorsteps of their colleagues not yet dead, showing the gaping mouths of their empty trick-or-treat bags with uncomprehending misery to all who would look. What a wailing was there!

Mattel, Inc. moaned; Atari Corp. shrieked and tore its hair, Osborne Computer Corp. squinted blindly through its tiny screen while Computer Devices, Inc. scrolled the black-bordered pages of a book composed solely of Chapter 11s. Texas Instruments, Inc., in the lead, pointed the way along DP's Via Dolorosa with the index finger of its severed microcomputer arm.

Behind doors barred to that cold night, the remaining manufacturers stood rooted in indecision, not knowing whether to stop up their ears or heed the baleful plaints of their deceased brethren in hopes of learning how best not to join them prematurely. Taking its feeble pulse, Coleco Industries, Inc. wondered whether it would be here at all if God had taken as long to create Adam as it had. Digital Equipment Corp. had nightmare visions of a rainbow limned in lugubrious shades of gray. Wang Laboratories, Inc. was driven nearly to distraction by the cries of the watchamacallit it kept bricked up in its dark cellar. Tremulous Tandy Corp. adopted a pose of irritation, silently praying that affected scorn could banish doubt from the troubled minds of its management. Apple Computer, Inc. secreted razor blades in the Macintoshes it had specially prepared to induce terminal indigestion in its competition and then, as the first, ghostly footfall was heard on its stair, disconsolately ate a few itself.

Abroad, the Japanese, long accustomed to spirits and especially familiar with the inscrutable American version of the spirit of competition, prepared to find themselves in the shadow of a new trade barrier or two; they realized that, whatever sweets they might dispense to these foreign devils, they'd be in for a trick or two just the same. The French wondered whether ghosts could be kept at bay with goose liver. The Germans, misreading the situation, invoked inappropriate spells for the warding off of vampires. An uneasy peace prevailed among the English and the commonwealth, as they prayed through the night in Anglican innocence.

Meat-Eating Peanut

In the midst of the restless spirit horde lurked the weirdest and most thoroughly terrifying creature of them all: a big, blue meat-eating peanut. It stood out among the ghosts of what had been and what might have been by virtue of its yet-to-be quality. And what could be more frightening then that, for this was the wraith by which both the quick and the dead were haunted.

As to its cry, above the bloodless boos of the others, it emitted the sustained and sanguinary howl of a thing that must be fed. This was such a sound as to freeze the blood of the entire global microcomputer community. This was the fearful herald of something whose prototype would materialize only a few hours later, on All Souls Day: the Peanut that would swallow the world, that had already swallowed a fair chunk of it at the moment of its concept — in fact, the unpunctuated IBM PCjr.

Yet in the light of dawn, these graveyard apparitions vanished, as they always do, and there was little but smiles to be seen at the All Soul's Day christening of PCjr. The bells of the Great Cathedral of Mammon reverberated with the news. At the baptismal font, Wall Street analysts, consultants, members of the press, official and avocational soothsayers and dignitaries in pin-striped morning coats oohed and ahhed over PCjr's gummy-fingers and large, tooth-filled jack-o'-lantern mouth. Officiating bluecoated clerics gave absolution to the doubters in the crowd, who thereupon professed themselves reborn in the hard, cerulean light pouring through the windows.

Other micro makers prayed fervently ("O Lord, ASAP!") for a similarly blessed junior of their own. A chorus of software monks raised its voice in thanks ("Unto us a standard is giv'n, the wherewithal to make a liv'n, the Big Blue Standard is the Big Gold Standard to us!") and dreamt of illuminating the characters of its program manuscripts in those two jubilant shades.

Then came the moment of truth for all assembled, well-wishers and otherwise. The sternest judges stepped forward to administer PCjr's final, public test of legitimacy. A PCsr floppy wafer was placed on the newborn's tongue; at once, PCjr's caterwauling gave way to the flawless performance that only the child of so illustrious a parent could carry off. Hosanna! This was truly the progeny of the formidable PCsr. Financial analysts prepared early Christmas cards for mailing to investors, manufacturers and consumers everywhere, showing smiling children disgorging PCjrs from their blue Christmas stockings.

And then PCjr vanished. In the still-warm swaddling clothes and packing materials, there remained nothing but a junior-size note, which read: "Happy Halloween! Buy long! See ya next year." (A documentalist's

(Continued on Page 83)

READER COMMENTARY/John Dillavou

Programmers Can Write Good Documentation

Many data processing professionals erroneously assume that programmers are unable to write concise, intelligible and grammatically correct documentation. These same professionals also accept as fact the premise that documentation analysts are inherently poor programmers. Although there are abundant examples supporting both arguments, I have found many inconsistencies in this reasoning.

My thinking on this subject was reinforced recently when I reread *Elements of Style* by Strunk and White (third edition; New York: Macmillan Publishing Co., 1979). This book lists rules and principles to follow for effective written communication. Many of these rules are equally applicable to computer programs.

While reading this book, I asked myself the following questions: If programmers can learn to write clear, concise and structured code, why shouldn't they be equally adept at writing clear, concise and intelligible documentation? And conversely, shouldn't good writers make good programmers?

Before answering these questions, it would be instructive to compare good writing and good programmers.

Good writing and good programming have four common characteristics:

- *Organization.* A programmer who writes hodgepodge code is like a writer who rambles. In recent years, much emphasis has been placed on the use of structure charts and other devices for organizing a program. The structure chart is really no different from the outline used by writers. Both devices are techniques used to structure hierarchically one's thoughts before beginning the process at hand.
- *Conciseness.* Good writing demands a parsity of words. Readers tire quickly of writers who are verbose or who use ornate or unneeded language. Unfortunately, programming verbosity is often overlooked. How often have you seen programs in which a simple "PERFORM VARYING" could have replaced six or seven lines of Cobol code?
- *Clarity.* The saying "Programs are written to be read" has become a cliche. Yet it wasn't until the mid-1970s that the technological advances in hardware finally enabled management to favor comprehensible code when they were faced with a trade-off between efficiency and understandability.

Although the writer of technical documentation does not face a similar type of dilemma, he is often faced with a decision of sacrificing readability because of time constraints or budget pressures.

- *Egoless Style.* The reader of a computer program or a technical document is not concerned with the writer's state of mind. Instead, his attention is focused on understanding a particular function or process.

As with writing, there are no hard-and-fast rules governing one's style of programming. Programming styles often vary. Yet in all cases, a style that promotes clarity is preferred.

Management's Role

Can programmers write quality documentation? Of course they can. It is a disservice to the career development of DP professionals to assume that their written communication skills are beyond redemption. Just as important, management is wasting hard-fought budgetary dollars if they hire technical documentation specialists for jobs that can be adequately performed by programmers.

Conversely, management should consider for a career in DP individuals who have displayed a flair for writing. Although they may lack the prerequisite technical skills, it has been my experience that they eventually become every bit as productive as career programmers.

Why are there so many examples of poor writing if good programmers are by nature good writers? I believe this phenomenon is due to a lack of foresight on the part of management. When management regards technical and user documentation as integral parts of the deliverable product, the quality of documentation will rise. If, on the other hand, documentation is treated as just another "box to check," the status quo can be expected to continue.

Dillavou is a manager within the management advisory services practice of a national accounting firm in Los Angeles.

READER COMMENTARY

How Microcomputers Can Aid in Applications

To get the most out of each personnel dollar and hour, today's management information systems (MIS) director wants to improve applications reliability and achieve cost-effective development. Since the costs associated with maintaining a staff have become the largest element in most MIS budgets, any tool that can help to achieve these twin goals should be sought out and thoroughly evaluated. Some firms, through creative and sometimes aggressive utilization of microcomputers, have taken steps toward achieving these much sought-after goals of improved productivity and cost-effective development.

A management consulting firm, for example, utilized microcomputers to develop software for its clients in the distribution and retailing industry even though the applications it was developing were intended for mainframe computers.

The consulting firm chose to use a micro for a number of reasons:

- Since it did not have any DP production requirements, it did not need a large CPU to process the large numbers of transactions typically associated with a production environment.
- Its applications software was written in Ansi Cobol, which made it highly transportable and adaptable to a large number of mainframes from different vendors.
- Using a multiuser station micro, it was able to increase throughput while enhancing the productivity from its four-member programming staff.
- Its micro had both an 8-in. diskette and a Winchester disk. The Winchester disk allowed the firm to handle sizable volumes for a meaningful test of their applications, while the 8-in. diskette allowed the transportation of data and programs to and from clients. Further, when a client did not have diskette capability, information on the diskettes could be transferred easily to 800 or 1,600 bit/in. tapes. This flexibility broadened the base of mainframe vendors' installations they were capable of supporting.

Thus, the consulting firm chose micros as a cost-effective ($18,000 to $25,000 less expensive when compared with comparable mini/mainframe hardware) alternative in an environment that was primarily devoted to developing application software. The application products it developed could be run, tested and prepared for installation in any client's environment.

With the micro, the firm could achieve higher productivity (estimated at a 12% improvement) with minimal technological complexity for its staff and, because of the controlled environment, develop highly reliable software while supporting client installations efficiently and cost-effectively.

Second Example

As a second example, the MIS department of a large food retailer utilized micros to test and train new programmers. It also used program-generator software on the micro to develop data entry systems with user-oriented capabilities for heavy editing. These systems enabled the company to provide quick responses for important projects and to fulfill requirements on an interim basis until its traditional IBM CICS-based user data entry systems could be established. As an aside, all requirements for 3741s (key to diskette data entry machines) were eliminated.

The retailer conducted an extensive evaluation before deciding to give micros a role within the organization as an adjunct to, and in some cases a replacement for, its main DP resource. Ironically, the DP function, which initially had resisted the introduction of micros, evolved into its strongest supporter and user. Initially, it found a use for micros in the training and qualification of new programmers.

Because of their simple operation, micros proved extremely successful in overcoming the problems posed by the disparate backgrounds of new employees trained on different hardware. Since the programming skills (especially Cobol) of new employees could be confirmed rather quickly, the emphasis during training could then be on Job Control Language and other procedures for the specific hardware and software environment. This company believes that besides reducing staff training expenses by approximately $12,000 per year, better screening and training has brought about an intangible savings because of reduced turnover.

However, the true value of the micros became evident as a result of the pressures resulting from staff turnover and the need to respond quickly to important and high-return projects. Because of substantial staff turnover, the MIS department had found it increasingly difficult to fulfill user requirements responsively through

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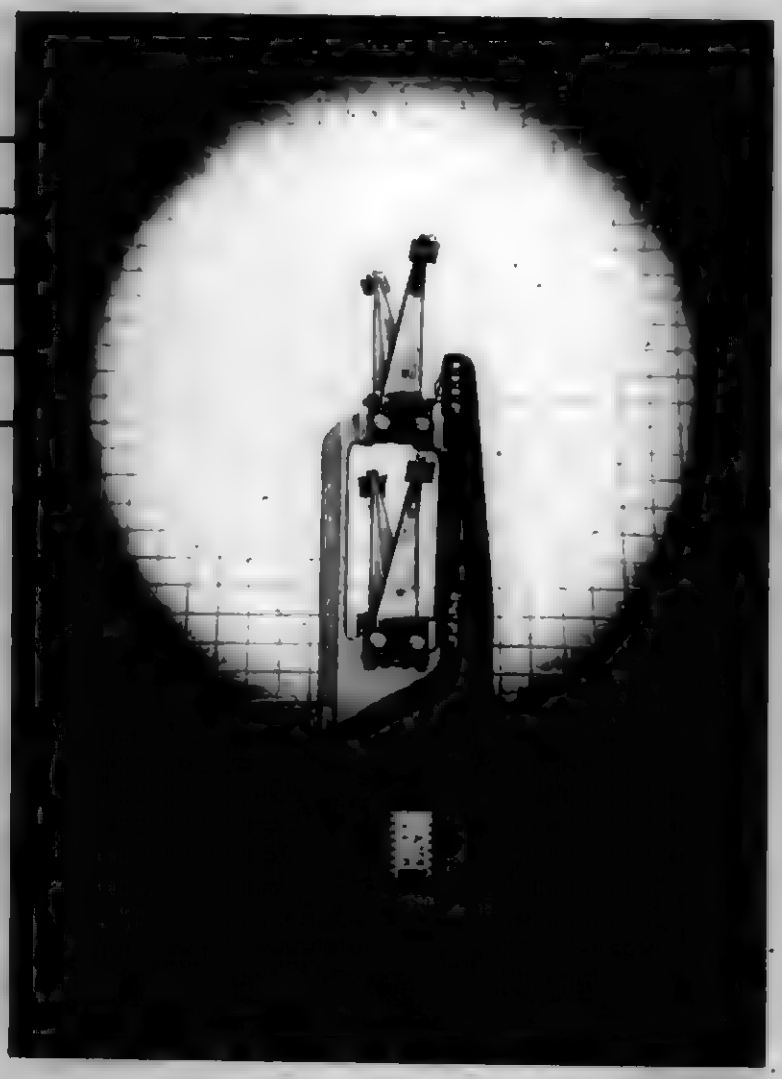

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CONTROL DATA

James M. Tharrington

Reliability, Development: Three Examples

the combination of data base and CICS in a mainframe environment.

Out of desperation, one of the systems supervisors, who acted as the microcomputer coordinator during the evaluation project, struck upon the idea of utilizing the micros and a program generator to develop data entry programs that could be implemented more rapidly than those normally developed. Much to his surprise, initial efforts proved so successful that this "interim" measure allowed a return to the 3741s, and users entered data on micros for their own tasks.

Shifting the responsibility by putting user-oriented data entry systems with heavy editing capabilities in the end-user environment produced greater responsiveness and, therefore, increased accuracy in the data entry function. The transmission of the edited information to the mainframe was initially performed via simple diskette reformatting and transfer via diskette reader, but ultimately was done through communications.

Thus, through innovative — and somewhat fortuitous — use of micros, the firm was able to improve its users' responsiveness while increasing the cost-effectiveness of its operation (it estimated that over a three-year period, it saved $75,000 above its investment in the micros by displacing the 3741s).

Final Example

A company that develops applications software provides a final example of the practical approach toward the use of micros. This company understood the creative nature of its business and its employees and recognized that the process of writing software need not be constrained by time or location. Therefore, it provided each employee with a microcomputer for use at home. The firm believed its home micros would result in increased productivity.

First, since the micros were provided with a communications interface, the employees had access to the firm's mainframe from their homes. Thus, they could be engaged in the creative process at any time.

Second, not only would the employees have access to the program code that they had already created, but they would be able to test these programs. Even without the communications interface, they would be able to create new programs or program segments and compile these programs or segments, check for program grammar errors or even perform limited tests based upon the files available for testing.

Although the firm never attempted to quantify dollar improvements resulting from the micro availability, it did note improved flexibility in staff utilization and better deadline management.

In each of these three scenarios, the approach to using micros was either innovative or nontraditional. These two concepts warrant emphasis because in the dynamics of the DP environment, the willingness to seek nontraditional answers to traditional problems may not be just an innovative approach — it may be the only practical approach.

With the tremendous growth in the use of micros and the never-ending stream of new and better products on the markets, it is less effective than ever to approach a DP problem wearing blinders. Today's MIS management must learn to look laterally at problems and seek solutions outside the framework of the traditional — because in many cases, traditional solutions will no longer work.

Tharrington is a senior partner at Case and Co., Inc., in Stamford, Conn.

NETWORKING VS. NOTWORKING:

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READER COMMENTARY

The Ever-Changing World of DP Auditing:

Data processing auditing, as we know it today, is dying. The profession is going to evolve and grow, just as companies do. It cannot be held static. We must look at how it is changing, where it is changing, why it is changing and accept the fact that all institutions grow, develop, begin to wither and, finally, contribute to something new and different.

How has DP auditing changed over the years since it has been accepted as a separate area? It certainly has gotten more recognition and has moved up within the corporate hierarchy.

The DP auditor today is very likely to be a fairly senior individual in his company. But consider the individual who has risen to the top in DP auditing.

Median Age

It is a safe assumption that the median age of DP auditors does not exceed 40. The 40-year-old DP auditor today is going to retire in the year 2008. Will he be doing what he is doing now for the next 25 years? If the answer is "no," then the skills, talents and access to information that DP auditing has provided him should serve as the basis for the rest of his career. The professional career of the 40-year-old DP auditor is not yet at the halfway point: He has a long way to go and is still setting the foundation for something else. The future, whatever it will be, will be different. The DP auditor had better be prepared to adapt his skills, technology and talent to new fields.

He will need credentials to establish his position as a corporate manager in the future. Today, the DP Auditors Foundation has established the Certified Information Systems Auditor (Cisa) program. The Cisa designation is a mark of professionalism, and the Cisa examination is proof of the fact that DP auditors are learned, well read, experienced and determined to do business in an ethical fashion. That sense of professionalism has served not only to build a base under the DP auditing profession, but to be a launchpad for greater remuneration.

The salary base for DP auditors is outstripping inflation. This indicates that the basic market value of the skills that DP auditors have is growing in real dollars. There is a sense that anyone with a B.A. in accounting can get a job in auditing. The disparity in salaries is creating internal divisiveness within many auditing departments. The fact that financial auditors and DP auditors have to be paid on different scales under the same management indicates that DP auditing is experiencing its own independent pattern of development and growth.

That growth is reflected in the number of people who consider themselves to be DP auditors. For all those at the bottom and at the middle levels of DP auditing, there are questions: Where do they go from there? How high up the ladder can they climb?

The 40-year-old DP auditor has seen many changes in the field, and yet he has seen a lot of things stay the same. He has been out of college for 18 years. Perhaps he got his first job as an auditor and was sent to a DP course. A year later he found himself to be the first DP auditor in his company. For all his professional advancement, he is still the DP auditor — he just has more people working for him, auditing and controlling computer systems.

Where does he go now? And what of the people behind him — those people who came into the profession 10 years ago and who have experienced a steady pattern of career advancement? Today the manager of DP auditing is standing in the way of not only the two people behind him, but of the four behind those two and eight behind those four and so on. How much growth can the field absorb? We are seeing maturity; the function of DP auditing cannot rise much higher than it has today in the auditing profession as currently understood.

A by-product of maturity has been the integration of DP auditing with financial auditing. There are many functions that the financial auditor was held back from doing, but is now being given a chance to do. The salary differential is, however, still there. Take a financial auditor, teach him how to program a retrieval package, teach the auditor how to recognize systems controls and teach him how to review the development of a system to see if it is being done properly.

What has he become? A DP auditor.

He can move on and get a job as a DP auditor in a company in which the functions haven't been integrated yet. With more people coming into DP auditing pressing entry salaries from below, and the top position in DP auditing reaching maturity at the other end, where are salaries to

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Steven J. Rossi

How to Adjust to It, Prepare for the Future

go in the future?

I fear and foresee a leveling of the DP auditor's salary progression. Remuneration will not continue to exceed inflation. Already, the best and the brightest (and the youngest) in DP auditing are moving up and moving out into other control-oriented functions, such as data security or data base administration. If the boundaries traditionally drawn around DP auditing are accepted as the only definition there is, then the best and the brightest may be outside that boundary. On the other hand, rather than exclude the ones that have gone on in their careers, it is better to extend the boundary.

The DP auditor must sacrifice a certain degree of audit independence in order to be part of the process of control. Already, many DP auditors help to design controls, auditability and security in information systems. When the auditor signs off on each stage of development, the loss of some of that independence accomplishes effectiveness. It is cheaper to put the controls into the system in the beginning than later.

Skills Need Recognition

It is time to start recognizing valuable skills, skills that the community needs, the company needs, the application needs and that have to be integrated into the development and operational processes. Whether those skills are called auditing, control or management is less important than the fact that the systems are auditable and controlled and managed.

There is not much about the future that is definitive, but one thing is definite about the past: It is over. To quote the immortal Satchel Paige, "Don't look back, something may be gaining on you."

Something is gaining on DP auditing — kids who are learning programming in grade school. It is the financial auditor who is integrating DP auditing into the overall audit program. It is the data processor who does not want the auditor to tell him how to control a system and is developing a control specialty in DP. Each DP auditor should be prepared for change, because the future he predicts is not necessarily the one that is going to come. There are so many variables in this integrated world that no one can know exactly what is going to happen. It is so different today than we thought it would be. Be prepared for at least as much change in the future.

Ross is a principal of The Plagman Group, Inc. in New York.

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InSci

First Halloween For IBM's PCjr

(Continued from Page 79)

officious footnote pointed out that next year was only two months away.)

Sigh of Relief

The imagined Christmas stockings collapsed, now stuffed with nothing more substantial than a gift certificate redeemable in 1984. Certain micro manufacturers released a deeply ambivalent sigh of relief; a stay of execution is not quite the same thing as a reprieve, after all. And would anyone remember their names between this day and the new year? The Big Event was over — for the moment.

Meanwhile, back in Basking Ridge, Judge Green's incredible Shrinking Giant yawned and sank into untroubled sleep. Metamorphosing easily from one to 23 entities and back again with the rhythm of each nocturnal breath, it dreamt a dream of PCs, junior to senior, madly proliferating like the buckets and mops of the sorcerer's apprentice and all of them seeking to connect and talk to each other and to yet bigger systems on the giant's tolled networks.

As it dreamed on, a vision of the ultimate Halloween joke formed in its brain: The progeny of PCjr would be as minuscule and featureless as the single plug needed to connect consumers with the giant's own massively integrated systems digital networks, and the Big Blue Terror would distribute itself to death. Twenty-three sets of lips parted to form a smile shaped by years of experience at gobbling down such small fry as this.

Lecht is chairman of Lecht Sciences, Inc., a New York-based think tank specializing in computer and communications technologies.

READER COMMENTARY/Ted Singer

DP Hackers Not Our Greatest Threat

In August, we were somewhat stunned by the Federal Bureau of Investigation apprehending a group of computer hackers. We heard that the data processing vandalism perpetrated by youthful members of the group reached into the depths of computer systems across the expanse of our nation. Wiping out student records, penetrating medical records of cancer victims, entering one of the systems at an atomic research installation is all somewhat terrifying to those of us who depend upon the integrity of data within our systems. Suddenly, computer security became a topic of national interest. Every type of new media milked the story for everything it had. We are still being assaulted with articles, letters to the editor, accounts of hearings and possible prosecution involving the vandals.

It would seem that the serious threat we have from these "electronic vandals" (a term coined by Donn Parker, a DP crime expert) is the greatest threat we have to face in protecting our systems and the information they contain. Not so. Electronic snooping and manipulation has been a real threat for years, and it will continue to be a threat in years to come.

We have more serious threats from within and without. If we concentrate on denying access by hackers, we are only fooling ourselves. With sums in the hundreds of billions of dollars floating around from system to system every day, we are primary targets of professional thieves. Measures that prevent hackers from entering our systems, no matter how successful, will not necessarily keep professional criminals out. Organized crime must certainly have some of the best technical experts on its staff. With millions and millions of dollars at stake, perhaps even more, the professional criminal can pump sufficient funds into technical research involving our security systems to cause crime to become such a threat that hacking becomes almost insignificant.

Worst of all, professional DP crime can be covered up in such a way that our auditors may not be able to detect it. We may find that our receipts and profits are much less than we expected; however, even with thorough investigation, we may not be able to find out why. Security systems dedicated to keep professional criminals out of our systems should certainly prevent vandalism by youthful hackers.

Penetration or message interception and manipulation by outside forces may not be our greatest threat either. It is our own people, our officers, managers and employees (even consultants) who are best equipped to commit computer-related crimes within our organizations. They are, first of all, most trusted by the rest of us. They have direct knowledge of our systems and how they operate. Many of these people are authorized users and have the capability to enter a system and create sufficient activity within the system to commit crimes. Even if duties and access limitations are segregated to the extent that a conspiracy involving several employees would be necessary to commit a crime, they have or can easily develop the close relationships necessary for such a venture.

Personnel Relations

Crime by our own personnel is the most difficult to safeguard against. Mistrust has never been the basis for good employee relations that are so necessary to efficiency and productivity. Except for the partitioning of duties, personnel screening and monitoring are our main weapons. Good morale, pay and benefits and all the things that go with personnel relations can be a great assistance. However, all these things are delicate matters and must be achieved through diplomacy.

Realistic audit trails reporting all activity within the DP system are a must. To be effective, the audit trails should be examined by individuals other than the ones who would be in the best position to commit fraud. Actions taken to prevent and detect crime from within can also lead to minimizing negligence and abuse, which are probably the greatest threats of all to our DP operations.

It seems that the stress today is upon DP-oriented crime and vandalism; therefore, the other things are somehow put on the back burner while we attend to matters that are highlighted in the news. With the utter dependency we have on our DP operations for production, our jobs and the solvency of our corporations, we should never place anything pertaining to the protection of our computer system, its data and its uninterrupted operation on the back burner. Computer security, whether we like it or not, is essential to our very existence in the DP field.

Singer is a computer security consultant in San Antonio, Texas.

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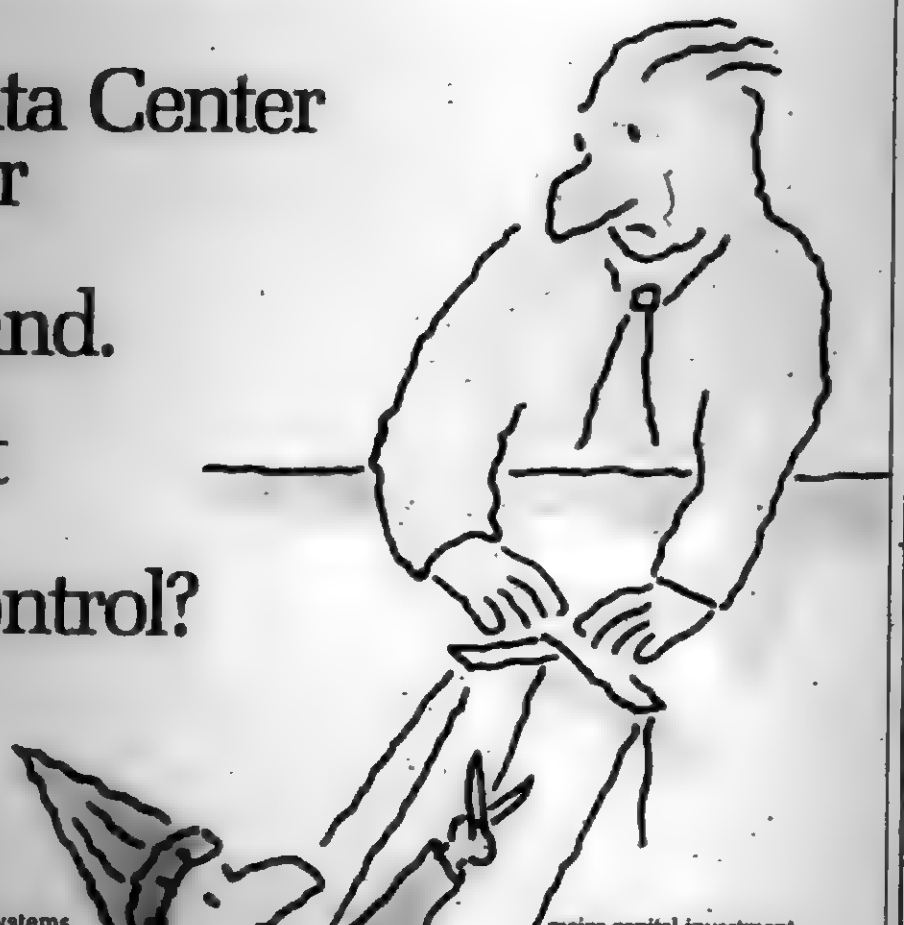

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To Avoid Problems Later

Consider Performance in Choosing DBMS

By Peter Breeze
Special to CW‡

Too often companies overlook data base management system (DBMS) performance when choosing a DBMS. What they discover is that in the early implementation stages, when the data base is relatively small and there are few applications, performance is acceptable. But as the size and complexity of the data base increase and an on-line environment is added, DBMS performance is taxed.

'Since there are no great breakthroughs in direct-access device speed expected during the 1980s, execute channel program measurements are perhaps the most important of all [data base management system] considerations.'

The common solutions are to upgrade the hardware, which is expensive and not always successful; convert to a new DBMS, which is costly and time consuming; or abandon the idea of an integrated information system. If companies consider performance when selecting a DBMS, many problems can be avoided.

Two factors are important to understand:

- The on-line environment is infinitely more complex and consumes more resources than batch.
- An on-line system accessing a data base environment adds an even higher level of complexity.

The performance "trap" is subtle at first but worsens exponentially as data base/data communications (DB/DC) implementation progresses. Two key performance factors are priority job scheduling and inefficiency of direct-access devices.

Most computers use a priority job scheduling system to accommodate multiple users and processes. Typically, the operating system has the highest priority, followed by the on-line system, the DBMS and various application processes. It is important to study the stages of competition for CPU cycles when the processing load is increased.

During stage one, only a few applications are processed on-line. The data base is neither complex nor large. The high-priority data communications software consumes perhaps 15% of the available CPU cycles, and the DBMS consumes approximately 20%. With another 10% allocated to the operating system, this leaves about 55% for application processing. Performance in this environment is excellent.

In stage two, new DB/DC applications slightly increase the impact on the DB/DC software processing environment. Data communications increases only 5% and

(Continued on Page 88)

IBM Spreadsheet Targets End Users On MVS, VM

WHITE PLAINS, N.Y. — IBM has announced a mainframe spreadsheet for its MVS/TSO and VM/CMS operating environments. Oxycalc reportedly allows end users to create, manipulate and save spreadsheets. The report required is entered directly on the display screen in the format desired, a spokesman said.

Features include an on-line tutorial, a Help-programmed function key with Help panels to explain errors, extensive use of menus, full screen editing and the use of tab and program function keys to select spreadsheet areas.

The program is invoked by a single keyword on an IBM 3270 terminal, the spokesman said. The user can then select a tutorial on the use of Oxycalc; review program function key assignments; change any spreadsheet, chart or report file definition; operate utility functions such as selecting spreadsheet display colors, browsing or printing a previously created report file; or begin viewing a previously saved spreadsheet.

Spreadsheets can be as large as 132 columns by 32,000 rows. A set of arithmetic and logical operators and a set of mathematical, econometric, trigonometric and logical functions are provided to define value relationships.

Oxycalc was designed to utilize fully the color highlighting and graphics features of the IBM 3279 color display and 3287 color printer, the spokesman said.

The product is available for a one-time charge of $8,000 from IBM's National Accounts Division at 1133 Westchester Ave., White Plains, N.Y. 10604.

SAS Operations Research Package Unveiled for Large IBM Systems

CARY, N.C. — SAS Institute, Inc. has announced an operations research software package for large IBM systems.

Called SAS/OR, the product includes procedures for scheduling projects and solving linear optimization models. It features tools for planning distribution strategies, solving transportation and assignment problems, evaluating investment profitability and determining product mix, a spokesman said.

Procedures are based upon linear programming and other operations research techniques. The two principal procedures are Proc CPM (critical path method) for analyzing activity relationships and establishing effective schedules and Proc LP (linear programming) for solving linear programming models and reporting on solution sensitivity.

SAS/OR also features Timeplot, a plotting procedure for displaying schedules. A macro to convert IBM Mathematical Linear Programming Extended data sets to SAS data sets is included.

SAS/OR is fully integrated with other SAS products and requires the base SAS product, the spokesman noted. The software runs on IBM 370, 30 series, 4300 series and compatible machines under IBM's OS, VM/CMS, DOS/VSE and SSX operating systems.

The first-year license fees are $7,500 for SAS and $3,000 for SAS/OR from SAS Institute through SAS Circle, Box 8000, Cary, N.C. 27511.

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For Cobol Program Testing

File Manipulation Tool Launched

SANTA CLARA, Calif. — XA Systems Corp. has announced Data-Xpert, an interactive file manipulation tool that is said to reduce the time and difficulty of creating and manipulating files for Cobol program testing, maintenance and support.

The product dynamically interprets the existing Cobol layouts, without modification, to define and manipulate files, a spokesman said. This eliminates the need to redefine files in another language when creating, viewing, updating, extracting, reformatting and printing files.

Data-Xpert is menu-driven with full screen displays, user-defined programmed function keys and on-line help facilities.

The product supports sequential, partitioned data sets, Isam and Vsam files; allows editing or browsing using a formatted screen consisting of the Cobol layout and data fields; provides automated interfaces to Pansophic Systems, Inc.'s Panvalet and Librarian products; prints the file contents in Cobol formatted model, three-line hexadecimal mode or single-line character mode; allows reformatting of file contents by providing specification of fields to be mapped from one Cobol layout to another; and allows selection criteria to be specified by entering the condition next to the Cobol names to select records.

Running under IBM's TSO/ISPF (Interactive System Productivity Facility), the product costs $30,000 from XA Systems at No. 216, 3000 Scott Blvd., Santa Clara, Calif. 95050.

Screen Generator Updated For CICS Users

ATLANTA — GT Software, Inc. has announced Release 4 of the company's Basic Mapping Support (BMS)/GT screen generator on IBM 3270-like terminals for IBM CICS us-

The company said that users of the package can design screens by keying in the data as they wish it to appear. BMS/GT supports line replication, full naming conventions, page building, header/trailers and the ability to retrieve any BMS-compatible map.

The new release is said to offer prototyping of screens, JCL management for on-line submission, production status maps and the capability to archive and restore maps selectively from a history tape. By invoking the prototyping facility, the company said, an end user can view the flow of a system before the programmer has written any code, allowing the end user to make any necessary changes. Through the production status capability, maps can be frozen in a read-only status to protect them from change or deletion.

A permanent license for the BMS/GT package, which is compatible with CICS 1.4 and higher releases, is available for $5,500 for VSE and $6,900 for VSI and MVS operating systems. GT Software is located at 1965 North Park Place, Atlanta, Ga. 30339.

'Secure/CICS' Extended To Support DL/1 Data Bases

SUNNYVALE, Calif. — Boole & Babbage, Inc. has announced an extension of its Secure/CICS data security feature to include support of IBM DL/1 data bases to the field level. Secure/CICS is an on-line security software package that monitors and controls information across IBM's CICS environment.

Secure/CICS Release 5.0.0 provides DL/1-CICS with security support for both IBM OS and DOS users and was designed to protect operators, terminals and transactions as well as to specify access authorization.

The update protects system data bases and segments by name. In addition, the new release reportedly enhances the application interface facility.

Secure/CICS is priced at $18,000 for systems running under the OS/MVS operating systems, $13,500 for VS1 and $11,500 for DOS. Maintenance is provided free of charge for the first year and at 20% of the prevailing license fee thereafter. Boole & Babbage is located at 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Service Targets Mapics Users

NEEDHAM, Mass. — Marcam Data Systems Corp. has announced an on-line support service for IBM Mapics users that connects the user's IBM System/34, System/36 or System/38 directly to Marcam Data System's facilities via data communications.

The Solution On-Line Value Extension program permits the firm's technicians to use in-house display terminals as though they were local terminals on the user's host computer, a spokesman said.

Installation fees range from $2,000 to $3,000 plus actual travel expenses. Semiannual charges range from $3,000 to $3,600 and include the first 50 hours of service. Marcam Data Systems is located at 123 Highland Ave., Needham, Mass. 02194.

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TSX-Plus Update Boasts RT-11 Compatibility

NASHVILLE, Tenn. — Version 4.0 of the TSX-Plus operating system, featuring increased virtual address space, enhanced user security and compatibility with the latest version of the Digital Equipment Corp. RT-11 operating system, has been announced by S&H Computer Systems, Inc.

The operating system, which is said to allow RT-11 users to work in a multiuser, multitasking environment, addresses up to 4M bytes of main memory on DEC PDP-11 systems that have either the extended Unibus or the 22-bit Q-bus together with the PDP-11/23 CPU.

In addition, TSX-Plus 4.0 provides the RT-11XM environment, which supports program logical address space. This allows programs as large as 3.5M bytes to run on the PDP-11 series if virtual overlays of arrays are used, a spokesman said.

The amount of memory available for a single program not using the virtual features has been increased from 56K bytes to 64K bytes.

TSX-Plus 4.0 supports up to eight logical disks per user, and access can be restricted to specified logical disks at the time a user logs on. The files can be arranged either hierarchically or in parallel, with related files occupying neighboring physical disk space.

Compatible with Version 5.0 of RT-11, TSX-Plus 4.0 supports such DEC peripherals as the RA80 and RD51 fixed disk drives and the RX50 5¼-in. floppy disk drive. It also supports DEC's IND indirect command file processor, as well as RT-11's backup utility.

TSX-Plus 4.0 is priced at $2,000 with an annual $500 fee for support and the option to order upgrades. S&H Computer Systems is located at 1027 17th Ave. S., Nashville, Tenn. 37212.

Inquire/Disclosure Link Accesses Financial Data Base

FALLS CHURCH, Va. — Infodata Systems, Inc. has announced the Inquire/Disclosure System, a link between its Inquire fourth-generation language and the Disclosure II data base from Disclosure Partners of Bethesda, Md.

Disclosure II provides Securities and Exchange Commission information on over 11,000 public companies, a spokeswoman said. Inquire/Disclosure is menu-driven, with menus for selection, reporting and utility functions. The data base contains historical financial information as well as searchable textual data such as descriptions of business, officers and directors, subsidiaries and management.

In addition to 20 standard reports, information can be accessed by a variety of search criteria, the spokeswoman said.

The system will be available in January. The full system, including the Disclosure II data base and the full Inquire language, is licensed on an annual basis for $32,000. Current Inquire users can purchase the front-end menu system for a one-time fee of $5,000 and the Disclosure II data base for an annual fee of $20,000.

Infodata is located at 5205 Leesburg Pike, Falls Church, Va. 22041.

Cobol Debugger From UCSC Out For Burroughs

NEWARK, Del. — University Computing Services Corp. (UCSC) has announced the Interactive Cobol Debugger (ICD) for users of Burroughs Corp. large systems.

The company described ICD as an on-line, interactive facility that enables Cobol programmers to suspend program execution dynamically when a fault occurs. The package allows data structures to be inspected or modified using source-level Cobol names, and it permits repeated testing and debugging without recompilation.

ICD is said to feature Help functions that permit the programmer to inquire about structure names or source statements. It is activated through a one-time compiler option, and the compiler is identical to the standard Burroughs compiler.

ICD is priced between $5,000 and $10,000, depending on options, from UCSC, 254 E. Main Street, Newark, Del. 19711.

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*Rainbow 100 is a trademark of Digital Equipment Corporation. LOTUS is a trademark of Lotus Development Corporation

Security Package Available for IBM's CICS

PLANTSVILLE, Conn. — TK Data Solutions has announced the Security and Terminal Operator Performance (Stop) software package, which the company said was designed as a security, performance and menu system for use with IBM's CICS Level 1.4 and higher.

All security entries are made online with the Stop system, thereby eliminating the need to modify and recompile tables or fixed code in programs, the vendor said. CICS remains active during Stop maintenance functions.

The package was designed to accommodate a unique password and identification for each terminal operator and reportedly allows personnel access only to the functions assigned to them, a spokesman for the firm said.

The Stop system can be used to assign highly sensitive functions to a specific terminal or group of terminals.

An optional method of coding can be implemented to reduce operator entries, and the system also features encrypted security data, security sign-on field with darkened password field and a complete log of terminal sign-ons and security violations.

The DOS version of Stop costs between $3,000 and $5,000 from TK Data Solutions, through P.O. Box 392, Plantsville, Conn. 06479.

Don't Overlook Performance of DBMS

(Continued from Page 85)

data base increases only 10%, so that 40% of the CPU is available for application processing. Response time is still good.

In stage three, more and more applications have been added to satisfy growing end-user demand. But the results are devastating to the system. As the combined DB/DC usage has increased by about 60% (80% vs. 50%), applications processing is reduced to one-fourth its previous level (10% vs. 40%).

At this point, any slight increase in existing DB/DC applications would degrade performance seriously. For example, a 10% increase to 33% and 55%, respectively, would reduce application processing availability to 2%.

It is important to recognize that this is merely an example. In reality, the vast majority of DB/DC users cannot accurately predict the impact of new applications on performance and CPU utilization until the applications are brought up in a production mode.

It is also important to consider the detrimental impact of nonprocedural software such as query system and application development products. They consume considerably more re-

There is a need at this point to increase CPU power. But since the leverage is so stacked against application processing, any power upgrade is just a temporary solution. As development resumes, upgrades must be made faster and in bigger leaps.

A better approach is to correct the cause of the problem. For example, had it been possible to reduce the DBMS usage from 50% to 25%, the additional availability could go directly to more application processing.

This 25% increase in availability could produce a performance increase similar to a substantial increase in computer power. Even a small performance advantage in DB/DC software can produce a substantial increase in overall performance.

Since there are no great breakthroughs in direct-access device speed expected during the 1980s, execute channel program measurements are perhaps the most important of all DBMS considerations.

'Hybrid Relational' Tech

With the new technology known as "hybrid relational," values inherent within the data itself enable retrieval of associated records without using pointers or indexes. Reduced pointer and index maintenance overhead dramatically improves performance.

Main memory processing speeds, already much faster than direct access, are expected to continue to increase dramatically. Therefore, the best way to achieve a balance between DBMS performance potential and the current capabilities of data communications software is to move more of the data base accessing into main memory. This is not the logic needed to retrieve the data, but larger percentages of actual data of interest.

Further, if it were possible to reduce the number of pointers, indexes and tables stored and maintained on direct-access devices, overall throughput and performance would increase substantially. Thus, the two most critical factors in high performance systems are a large percentage of "in-memory buffer hits" and a substantial cut in pointer logic.

Breeze is a product manager at Cincom Systems, Inc. in Cincinnati, Ohio.

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Datamate Offers Report Writer for VAX-11s

TULSA, Okla. — Datamate Co. has announced the Enquery report writer for the Digital Equipment Corp. VAX-11 series of superminicomputers operating in the VMS environment.

The vendor said that Enquery uses an English-style language to access user files through a data dictionary, and the package allows users to define their own English names for the data names in their files. The package features standard mathematical functions, and it allows for complex conditional statements from which the user may count, total and subtotal fields, a spokesman said.

The package's output can be printed or displayed and is said to be formatted automatically in the program. A bi-level security system reportedly gives administrators the ability to choose the interactive capacity of each user on a report-by-report basis.

Enquery is priced at $4,000 plus installation, the vendor spokesman said, from Datamate at Department CWA3, 4135 S. 100th East Ave., Tulsa, Okla. 74146.

'Zword/36' Bows for System/36

SAN RAFAEL, Calif. — Accusoft, Inc. has announced the Zword/36 software package, which the company said offers standard word processing functions to users of the IBM System/36 small business computer.

Zword/36 is said to allow users to insert information from the System/36 data base into documents and allows data from any file to be merged without reformatting. The system offers standard word processing functions such as user-definable tabs, global search and replace and automatic text wrapping and page numbering.

The vendor said the package allows users to merge data by selecting from a menu of instructions. Zword/36 utilizes the full screen and can support line lengths of up to 132 characters. Users can access any section of the document by line number or through a scrolling function.

The package is available for $3,000, which includes a one-day training session, from Accusoft, 126 Alto St., San Rafael, Calif. 94901.

Planning Aid Announced For Wang VS

RICHMOND, Calif. — Soft Pro Systems, Inc. has announced the Project Management System for use with the Wang Laboratories, Inc. VS computer series.

According to the company, the package is a project planning and management system that is designed to help project managers plan resources and measure actual resource status against planned schedules. The Project Management System is based on the critical path method analytic technique and is written in Cobol.

The package is said to feature on-line task maintenance, project schedule reports by work day or date, actual man-hour reports, calendar maintenance and resource planning maintenance. Reports include manpower planning reports and task source analysis, individual resource analysis and project task resource analysis reports.

The system is priced at $5,000 per CPU copy from Soft Pro Systems, 4121 MacDonald Ave., Richmond, Calif. 94805.

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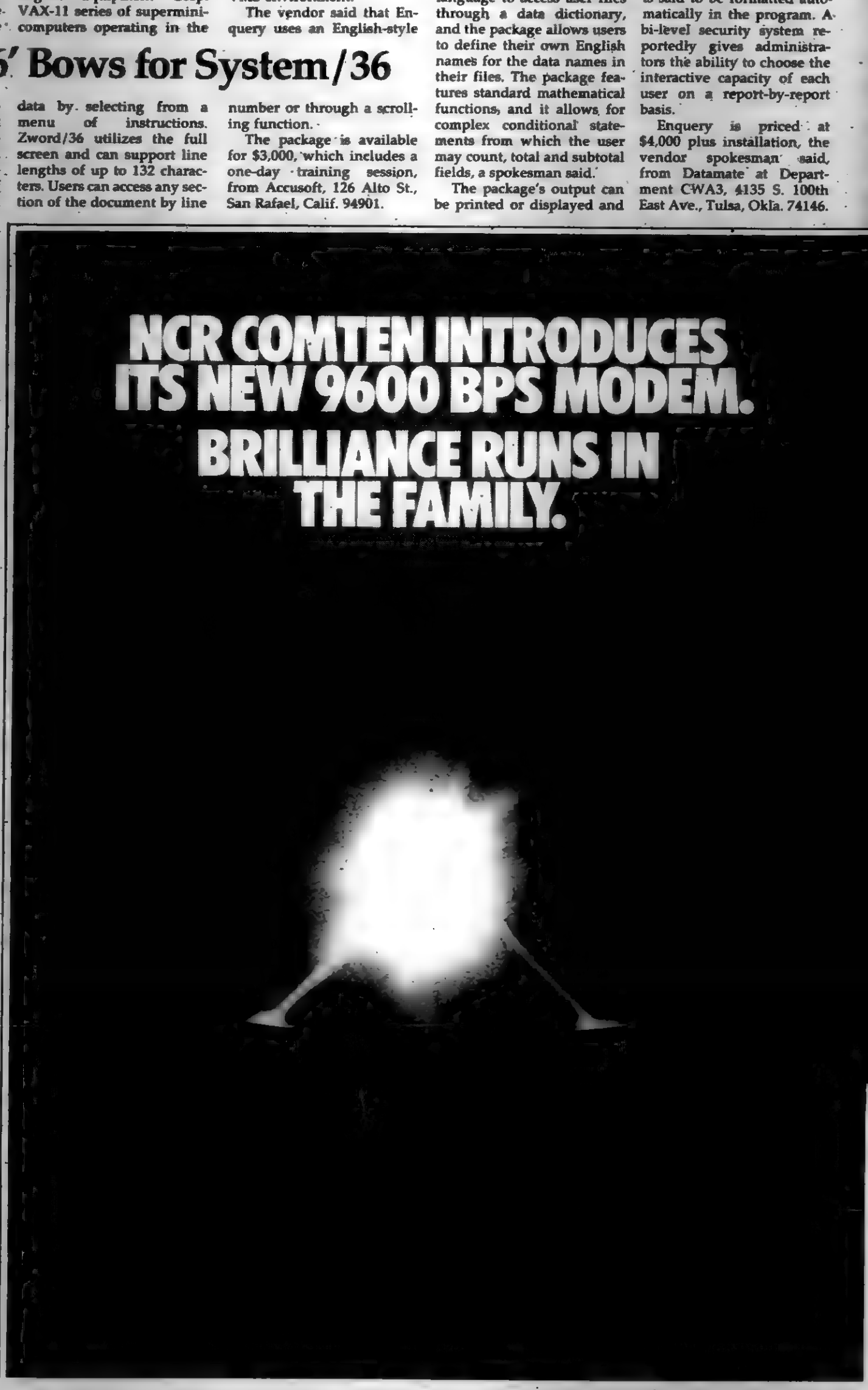

Program Processes Employee Medical Claims

NORTH HOLLYWOOD, Calif. — A system for the automated processing and administration of employee medical expense claims has been announced by California Interactive Computing, Inc. Called Dimed, the program allows partially self-funded, self-insured or self-administered employers to handle medical, dental, vision care and prescription claims.

Dimed includes a mix of on-line and scheduled processing program modules. The scheduled portion carries out a series of scheduled processing tasks and generates appropriate reports. On-line modules provide real-time inquiry and the development of special forms. In addition, optional modules can be provided for special functions such as the generation of personalized form letters.

Information is entered via a video display terminal, using masks or menus on the screen. A data base management system and data dictionary facilitate the functions required for the administration, updating, storage and retrieval of claims and related data, the company said.

Processing functions of Dimed include on-line verification of eligibility coverage and claim status and computation of claim payment based on interpretation of plan coverage.

The Dimed system can generate personalized claimant correspondence, as well as print checks, drafts or vouchers, the company noted. In addition, it can provide management reports. A plan-modeling module allows a user to change figures, such as deductibles, to make "what if" comparisons.

Available for use on a range of micro, mini and mainframe systems, the basic Dimed package is priced from $18,000 depending on modules selected.

More information is available from California Interactive Computing, 12517 Chandler Blvd., North Hollywood, Calif. 91607.

Solids Model Available For HP 9000

ATLANTA — Catsoft, a three-dimensional solids modeling program from Catronix Corp., is now available for use on the Hewlett-Packard Co. HP 9000.

Designed for implementation at the level of engineering design and development, the solids model may then pass automatically to analysis, computer-aided design and manufacturing and publications systems.

Originally developed on a Digital Equipment Corp. PDP-11/23, Catsoft makes solids modeling possible on a number of 16- and 32-bit systems, the company said.

Purchase price for Catsoft is $30,000 for a perpetual license; lease terms with the option to purchase are available. from Catronix, Suite 800, 120 Ralph McGill Boulevard N.E., Atlanta, Ga. 30308.

File Tool Out For PDP-11

DUBLIN, Ohio — System Performance House, Inc. has announced the user file directory (UFD) optimizer, a record-like utility for Digital Equipment Corp. PDP-11 minicomputers under the RSTS/E operating system.

In addition to sorting on access or creation date in forward or reverse order, UFD sorts the most important files in the directory to the front of the directory.

The product costs $250 for a one-time license from System Performance House, 5522 Loch More Court, Dublin, Ohio 43017.

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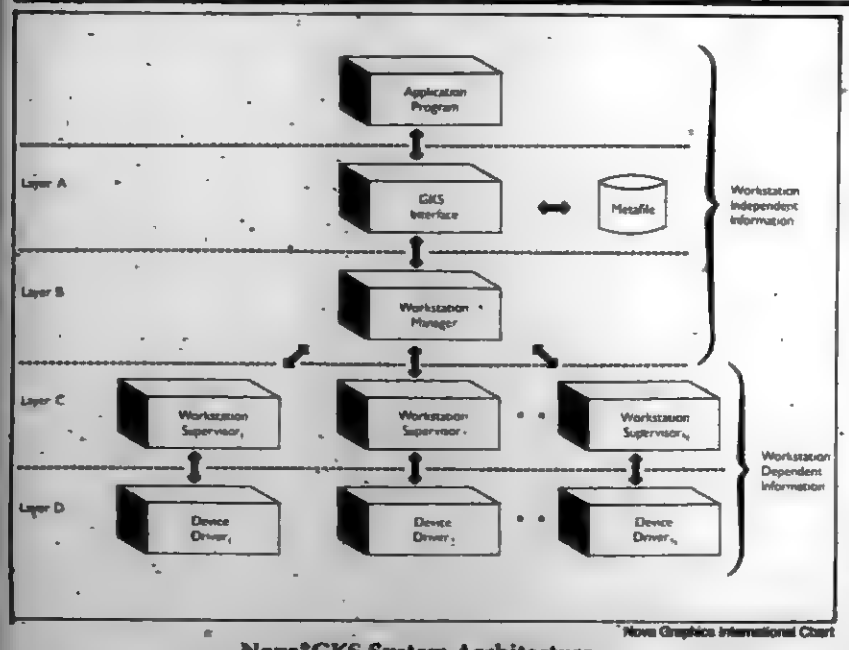

Nova*GKS System Architecture

Nova*GKS Graphics Tool Incorporates GKS Standard

AUSTIN, Texas — Nova Graphics International Corp. has announced Nova*GKS, a graphics application development tool that incorporates the International Standards Organization's GKS graphics software standard.

Applications developed under Nova*GKS are device-independent and are transportable among several types of hardware, a spokesman said. GKS specifies a library of standard software programs that provides an interface between an application program and any number of graphics I/O hardware devices. It provides a consistent interface to application programs, giving the applications programmer a common graphics model and standard syntax.

The product uses a mutlilayer architecture that consists of the GKS interface, a workstation manager with picture storage independent of the graphics device and one or more workstation supervisors, each handling a specific graphics device.

The system can be distributed between a host computer and a microprocessor-based graphics workstation in eight possible configurations. All portions of the system can operate on either the host or the workstation. Nova*GKS can be tuned to implement specific features of the hardware devices of various manufacturers, the spokesman said.

The Fortran implementation of Nova will be available in January 1984 at a cost of $7,500. Nova Graphics is located at 1015 Bee Cave Woods, Austin, Texas 78746.

Fusion/1 Update, Fusion/2 Debut For System/34

LARKSPUR, Calif. — Fusion Products International, Inc. has announced the availability of Version 5.0 of the Fusion/1 information retrieval system and the Fusion/2 file management system for the IBM System/34.

The enhanced version of the two productivity tools now provides an IBM Personal Computer a retrieval interface that links System/34 files to personal computer programs such as Lotus Development Corp.'s Lotus 1-2-3, Visicorp's Visicalc and Ashton-Tate's Dbase II. It also allows user-defined output files in Ascii, Ebcdic or DIF formats including the virtual diskette facility from IBM.

Other enhancements to the Fusion systems include color attribute support, retrieval formatting that permits full user print position control, support of nonstandard paper form sizes, concurrent sort/select on any field in a retrieval over primary and nonprimary files and total and subtotal break calculations.

Provides Improved Support

In addition, the latest version provides multiple data dictionary support, improved file maintenance editing, improved file maintenance capacity and improved documentation and on-line help, according to the company.

Fusion/1 and 2 can also be integrated with Fusion/3, a financial modeling and electronic spreadsheet system, the company noted.

Licensed users of Fusion/1 with an active maintenance contract may upgrade to Version 5.0 at no charge. Single-copy licenses for Fusion/1 are $3,500 with multiple-copy discounts available. Fusion/2 single-copy licenses are $2,000 if bought individually and $1,000 if purchased with Fusion/1. Fusion/3 is $2,500 for a single copy. Fusion Products International is located at 900 Larkspur Landing Circle, Larkspur, Calif., 94939.

Tems Automates Recordkeeping

Communications Equipment Manager Debuts

NEW YORK — Commercial Software has announced the Telecommunications Equipment Management System (Tems), a product said to automate the recordkeeping activities of a large telecommunications system.

The product runs on Digital Equipment Corp.'s VAX-11 superminicomputers.

Created to supplant much of the recordkeeping previously assumed by the Bell operating companies, the product provides detailed information about installed telecommunications equipment and services, provides information by which to evaluate rate increases, analyzes competitive proposals and reviews deployment of new equipment.

An order writer sees a "picture" of the phone, which includes organizational data as well as equipment information, a spokesman said. The system alerts operators of potential errors through the work-order creation process. For example, if an order attempted to disconnect a line attached to other instruments, a warning would flash, the spokesman said. When necessary, Tems automatically translates the equipment information into Universal Service Order Codes.

The system maintains pricing information for both installation and ongoing charges, the company claimed. It also maintains a series of reports indicating pending orders, orders on hold and orders that should have been completed. An inventory is automatically updated as orders are completed.

Tems provides two mechanisms for the reconciliation of vendor bills. It supports the cost allocation of telephone and telecommunications equipment to user departments and provides detailed inventory reports.

Tems costs $55,000 from Commercial Software at 420 Lexington Ave., New York, N.Y. 10170.

DOS Version of 'JCLflow' Receives Enhancements

DOWNERS GROVE, Ill. — Consumers Systems Services Group, Inc. has announced a series of enhancements to the DOS Version of the company's JCLflow application documentation software package.

They include simplified execution Job Control Language to reduce system implementation modifications, expansion of the program file to include the identification of Copy books, Sort and Idcams (IBM's Vsam file utility program), control card review logic to correct documentation of those utility programs, a report function that produces a cross-referenced list of program Call and Copy books and automatic replacement of program information on the program master file.

The company said the JCLflow system provides an automated tool with which users can develop a standardized library of systems documentation. A DOS version of JCLflow is also available, and both the OS and DOS versions are priced at $7,500 from Consumer Systems, 1100 31st St., Downers Grove, Ill. 60515.

Mailer's Choice Splits Files Into Groupings

LOMBARD, Ill. — List Processing Co. has released Mailer's Choice, a sorting, addressing and printing system that can split an address file into 99 major groupings, each including any or all records from the user's file.

Mailer's Choice can print mailing labels, bag tags and sack, tray and pallet summaries and reports in U.S. Postal Service-approved formats. Printed one split at a time, mailing labels can be separated for various publications and multiple versions of the same publication, the company explained.

Users of Mailer's Choice can obtain presort discounts on a variety of Zip Codes and carrier route codes, as well as "firm package" multiple second-class pieces for the same address as one piece.

Other features of the system include the ability to generate a file of label images ready for ink-jet printing, adjust sack weights, alter the contents of fixed fields within records, duplicate mailing records and generate match codes.

Mailer's Choice operates under DOS or OS on an IBM 4300, 370 or equivalent system and is available for $17,500 under a perpetual license agreement. List Processing can be reached at 555 Waters Edge, Lombard, Ill. 60148.

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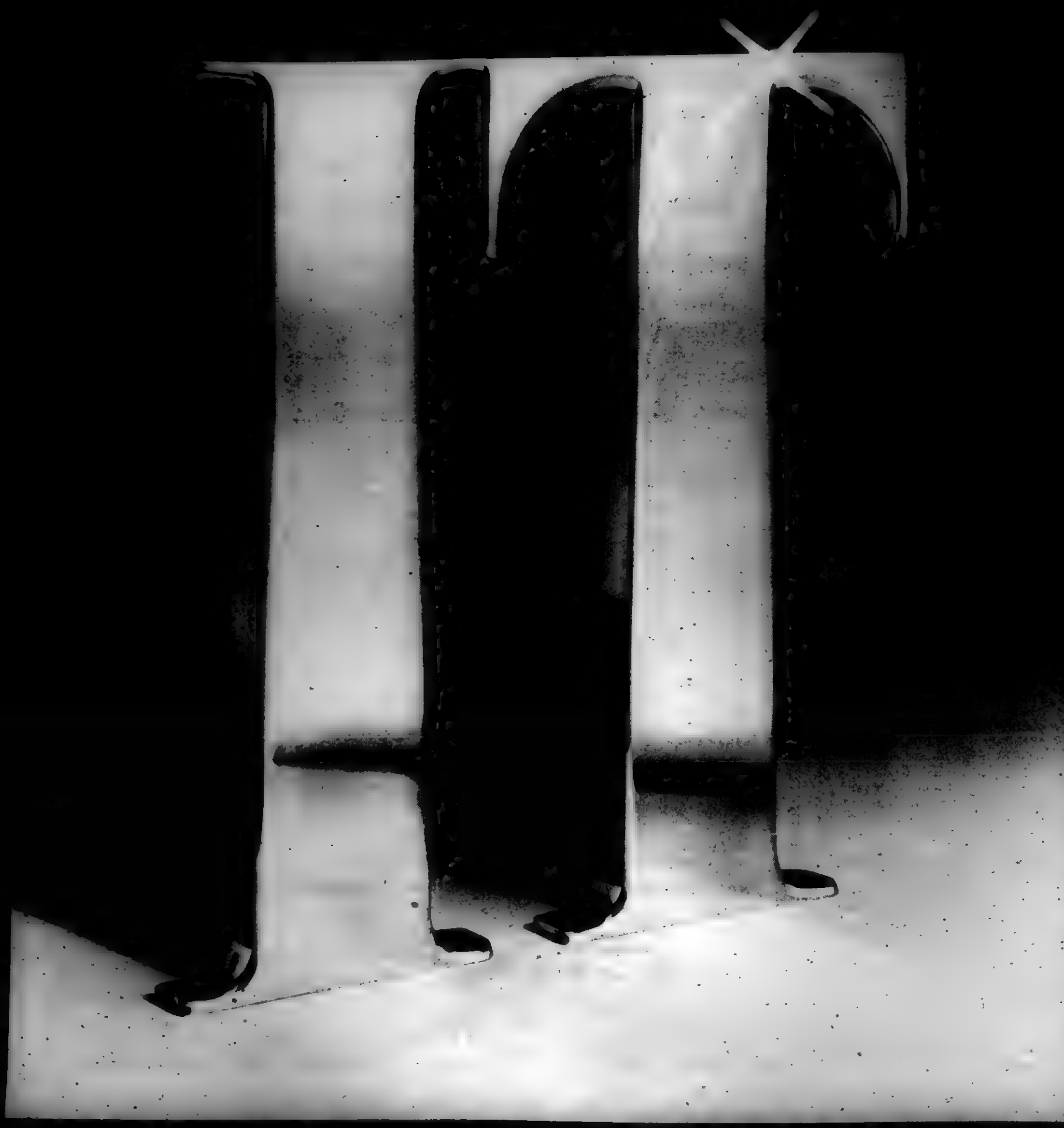

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'Design Graphix' Fits RSX-11M

BATON ROUGE, La. — Engineering Systems Corp. recently announced a computer-aided design and drafting software product for Digital Equipment Corp.'s RSX-11M operating system.

The product, Design Graphix, reportedly includes a three-dimensional data base, multiple pens and multiple layer drawing construction, geometrics, user-definable symbols and figures, and graphics and text editing.

Other features include user-definable menus, command file processing, a macro programming facility and various utilities, according to a spokesman. The product reportedly links with Fortran programs and offers Teach, an on-line programmed instruction course, and a Help facility to speed learning by in-house personnel.

Software options range from single workstation versions to multitasking versions supporting multiple workstations. The system reportedly supports a variety of peripherals such as graphics displays, digitizers, plotters and magnetic tape.

The product is available for under $20,000 from Engineering Systems, P.O. Box 80318, Baton Rouge, La. 70898.

'Maps/AP' Designed For VAX-11

PALO ALTO, Calif. — An interactive accounts payable package with cash management features, designed for use on the Digital Equipment Corp. VAX-11 superminicomputers, has been announced by Ross Systems, Inc.

Maps/AP handles such tasks as payables processing, check writing, vendor information, cash management, inquiries and reports. Designed to be integrated with other Ross software, Maps/AP can be used with the general ledger/financial management package, Maps/GL, to update payables automatically to the general ledger and provide a general ledger distribution by multiple account structures.

Other features of Maps/AP include user-defined reports, automatic allocations by vendor and a vendor directory, as well as a distribution preview, which allows the user to look at any detail combinations in any order of the five possible elements that make up the general ledger account code.

Maps/AP will be available in January at a cost of $15,000 to $20,000 depending on the VAX model.

Ross Systems is located at 1860 Embarcadero Road, Palo Alto, Calif. 94303.

'Word-11' WP Enhanced For VAX-11 Under VMS

ANAHEIM, Calif. — Data Processing Design, Inc. (DPD) has announced an upgrade of its Word-11 word processing package for Digital Equipment Corp.'s VAX-11 superminicomputers under the VMS operating system.

In Version 3.0, Word-11 is converted from Macro-11 mode to Macro-32 mode, which reportedly eliminates the need for it to run in a compatibility mode and provides for faster operation. The package also provides expanded management and support for additional output devices, including laser printers, according to a spokesman.

Features include an advanced system management utility, scientific character set support for DEC's VT100 terminals and Diablo Systems, Inc.'s 630-ECS printer.

Version 3.0 supports DEC's VMS Version 3.4 and will be available in late 1983. It is priced at $9,500 for large VAX systems and $8,500 for small VAX systems. DPD is located at 1400 N. Brasher, Anaheim, Calif. 92807.

Course Supported By Video

WESTWOOD, Mass. — Cullinet Software, Inc. has announced a video-based training series to complement the course offered at its National Education Center.

Cullinet users can acquire video-based training courses on the basic components of IDMS; Integrated Data Dictionary; Application Development System/Online; and IDMS-Data Communications/Universal Communications Facility.

Course prices range from $4,000 to $8,500, and all five are available for $30,500; annual renewals are available for 10% of the purchase price. Cullinet is located at 400 Blue Hill Drive, Westwood, Mass. 02090.

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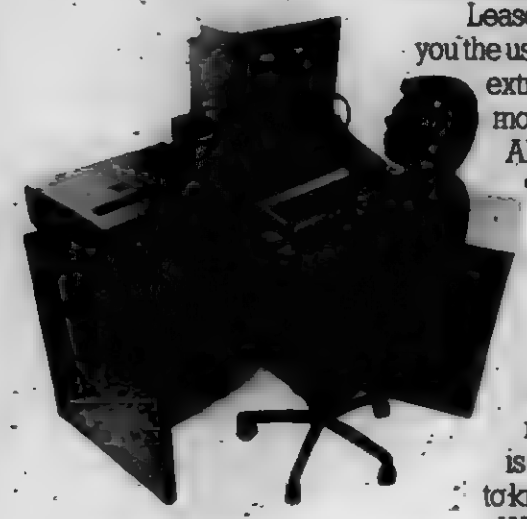

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Relational DBMS Available For DEC Professional Models

BETHESDA, Md. — Contel Information Systems, Inc. has announced that its RT-File relational data base management system (DBMS) is available for the Digital Equipment Corp. Professional Computer 325 and Professional Computer 350 systems.

At the same time, the company introduced an RT-11 emulation system, called Virtual RT-11 (VRT), for users of VAX-11 computers.

RT-File now provides Professional Computer 300 series users with menu-driven, forms-oriented utilities that are said to enable nontechnical personnel to perform tasks such as sorting files, performing calculations and selecting records.

The RT-11 version of RT-File has been bundled with the PRO/RT-11 operating system, which supports both runtime applications and program development. Virtually all RT-11 single-job applications and utilities will run under PRO/RT-11, according to Contel. The PRO/RT-11 and RT-File package, including an RT-11 license, costs $1,500.

VRT includes a Virtual Exchange Program, which allows users to move files between RT-11 and Files-11 formats. VRT programs may access files in both formats, Contel noted.

VRT is priced at $1,750. Contel is located at 4330 East-West Highway, Bethesda, Md. 20814.

IBM Micro Nets Get DBMS

SANTA CLARA, Calif. — A relational data base management system (DBMS) designed for local-area networks of IBM Personal Computers has been announced by Software Connections, Inc.

The product, LAN/Datastore, supports a variety of local-area networks and offers end-user security and record-level locking, a spokesman said. Security is defined at the field and record levels, and users can be limited in ability to read, update, delete and add records. Audit trails are provided.

Help messages and menus are provided for novice users, but can be bypassed by function-key and mnemonic-driven commands, according to the vendor spokesman.

A full screen editor is provided for screen printing.

The data base handles up to 16M bytes of storage and does not limit the user to a fixed number of records. Each record can be as large as 16K bytes and can contain more than 500 fields. A report writer is included.

The single-user version costs $495, and the network version costs $1,945 per Personal Computer, according to the vendor. More information can be obtained from Software Connections, at Suite 17, 1800 Wyatt Drive, Santa Clara, Calif. 95054.

Trademark File Now Available On Dialog

PALO ALTO, Calif. — Dialog Information Services, Inc. has announced that the Trademarkscan data base of more than 600,000 registered U.S. trademarks is now available through the company's Dialog Information Service.

According to the company, the Dialog service is available through word processors and microcomputers with communications capabilities and offers more than 180 data bases containing 80 million items of information.

The Trademarkscan data base, compiled by Thomson and Thomson, Inc. of Boston, Mass., reportedly tracks active trademark registrations of the U.S. Patent and Trademark Office.

Through Dialog, a user can access Trademarkscan and perform a trademark search immediately, according to a spokesman for the firm. The data base is designed to allow researchers to scan by the trademark, owner, a description of the product or service or through a prefix, suffix and letter string searching feature.

The company said there is no subscription fee or minimum usage charge to access Trademarkscan, and charges will be based on the $85 per connect hour fee.

Additional information is available from Dialog Marketing, located at 3460 Hillview Ave., Palo Alto, Calif. 94304.

Adage 3000 Gets Program Tool

BILLERICA, Mass. — Adage, Inc. and Intermetrics, Inc. have announced a high-level programming system for use with the Adage 3000 Color Raster systems on Digital Equipment Corp. minicomputers.

Icross 3000, developed by Intermetrics, is reportedly styled after the C programming language and supports compilations of microcode modules for the Adage 3000 bipolar BPS32 microprocessor.

Spokesmen for both the companies said the package allows subsequent link-editing to produce load modules for microprocessors that can be downloaded directly after compilation.

The package is available for $7,500, the vendor said. Adage is located at One Fortune Drive, Billerica, Mass. 01821.

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Tool for Oil, Gas Industry Runs on Datapoint Processor

DALLAS — Hal Systems and Services, Inc. unveiled a software package for the oil and gas industry that runs on Datapoint Corp. processors.

The Lease Management System includes a separate contract section that can be linked to leases or individual owners, a spokesman said. Users can also specify multiple owner sections per lease, unlimited special obligations and a shut-in royalty cycle to pay owners automatically. Leases can be designed from up to 17 separate information sections. Ten different budget reports, three separate formats and up to 99 different reports can be defined, the spokesman noted.

The Lease Management System costs $12,500 from Hal Systems and Services at 14840 Landmark Blvd., Dallas, Texas 75240.

Tool Out for System/38 Users

SANTA SUSANA, Calif. — Ventura Computer Systems, a division of Tri-Delta Corp., has announced Superzap/38, which is described as a productivity aid that enables direct access of records in any data base file on the IBM System/38.

Once the system has verified that System/38 security has been cleared, records can be requested for display, and records in logical and keyed physical files can be located by key. Once a record is displayed, a user may scroll forward or backward through the file, modify the displayed record in character or hexadecimal mode and rewrite it to the disk or delete it, a spokesman said.

Superzap/38 allows programmers to modify test file data and provides direct access to disk information. The package is available for $750 from 1411 Kuehner Drive, Santa Susana, Calif. 93063.

'Catsoft' Available on HP 9000

ATLANTA — Catronix Corp. has announced that its Catsoft three-dimensional solids modeling program is available on the Hewlett-Packard Co. HP 9000 desktop computer.

Implemented at the level of engineering design and development, the solids model reportedly may pass electronically to analysis, computer-assisted design and manufacturing, publication and manufacturing systems.

The purchase price is $30,000, with lease terms available from Catronix at Suite 800, 120 Ralph McGill Blvd. N.E., Atlanta, Ga. 30308.

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Financial Aid Introduced For DG Products

SEATTLE — Minicomputer Modeling, Inc. has announced a financial modeling system for Data General Corp. Eclipse, MV, Micro Eclipse and Desktop Generation computers running DG's AOS and AOS/VS and Microsoft, Inc.'s MS-DOS operating system.

Data Model is a menu-driven system for financial modeling and spreadsheet management. Using a virtual spreadsheet design, Data Model reportedly allows an unlimited number of individual spreadsheets to contain 500 columns and 30,000 rows. Multidirectional consolidation capability permits any number of consolidations to be performed in any direction, the company said.

Data Model includes data projection and built-in financial routines. A time-slice reporting feature allows users to summarize and print spreadsheet rows or columns in any order, perform mathematics at report time and duplicate any current report forms, the company noted.

Permanent license fees for Data Model start at $1,295 from Minicomputer Modeling, Suite B, 1507 Queen Anne Ave. N., Seattle, Wash. 98109.

Report on MRP Gets Updated

ESSEX JUNCTION, Vt. — Manufacturing Software Systems, Inc. has published an updated version of the company's research report on guidelines for a closed-loop Material Requirements Planning (MRP) II software system.

Titled "MRP II Standard System," the publication also includes evaluations of 25 of the most popular of these packages. The guide is said to offer information on developing or modifying MRP II software in-house. The vendor said the findings contained in the publication were based on the experiences of successful MRP II user companies.

The "MRP II Standard System" is available to owners of the older version for $125 and to new customers for $800 from Manufacturing Software Systems, Publications Department, which is located at 85 Allen Martin Drive, Essex Junction, Vt. 05452.

Business Articles Summarized In Data Base

LOUISVILLE, Ky. — Data Courier, Inc. has announced ABI/Inform, a business data base available to the financial community through Inner-line, an electronic management support service which is a co-venture of the American Banker and the Bank Administration Institute.

The data base contains 200-word summaries of articles appearing in more than 590 business and management publications worldwide. Users can do banking-related searches, scan several months of the file on additional topics, such as data processing, marketing, human resources and industries; and order full-text articles of the summaries.

The service price for the data base is $1.00 per minute connect charge and $6.50 for each full-text article ordered off-line.

Further information is available from Data Courier, 620 S. Fifth St., Louisville, Ky. 40202.

Inquiry System For Banks Runs On System/34, 36

FRAMINGHAM, Mass. — An on-line inquiry system for consumer bank accounts maintained on IBM's System/34 and System/36 was recently announced by W. A. Wills Associates, Inc.

The Willinq system is presently operational on the System/34 and can be readily converted to the System/36, according to a spokesman. It is written in RPG-II.

The system reportedly provides current transaction history since the last statement cycle for loans, savings and various checking and savings accounts such as Now and Super Now accounts, along with automated teller machine transactions.

In addition to daily posting of debit memos and informational messages, the system reportedly calculates daily collected balances, displays daily cumulative interest on Now accounts, reflects payoff amounts on loans and clubs and maintains delinquent history information.

The system is priced at $20,000 from Wills Associates, which can be reached through P.O. Box 449, Framingham, Mass. 01701.

'Consider it Character Assessment, Higgins — the Computer is Toying With You.'

'FM/3000' Upgraded for HP Micro Access

BURLINGTON, Mass. — Computer Solutions, Inc. has announced that its FM/3000 line of productivity software has been upgraded to allow access by the Hewlett-Packard Co. Model 150 personal computer acting as a terminal on the HP 3000 series minicomputers.

According to the company, users of the FM/3000 and FM/3000 Plus software can download data from the mini to the micro for manipulation or for use in conjunction with application programs currently available for the HP Model 150 personal computer. The FM/3000 and FM/3000 Plus packages include accounts payable and receivable, general ledger and sales order processing.

The package's manufacturing module includes inventory control, purchase order control, materials requirements planning, capacity planning and shop floor control functions. FM/3000 Plus' marketing module — Salespower — is said to provide a data management structure for customer information, sales campaigns and lead and quote activity.

FM/3000 costs $40,000, and FM/3000 Plus costs $55,000 from Computer Solutions, One Burlington Woods, Burlington, Mass. 01803.

Connect Charges for 'Delphi' Cut

CAMBRIDGE, Mass. — General Videotex Corp. has implemented a 37% reduction in its daytime connect charges for individual users of the company's Delphi information and communications utility. It has also eliminated the 50% surcharge formerly levied on users communicating at the 1,200 bit/sec rate.

The hourly charge for basic service to individual users not under volume contract has fallen from a maximum of $25.50 to $16. Also, the hourly rate for organizations that have contracted for $200,000 or more of connect time has been lowered from $19.50 to $12.

Delphi is said to enable subscribers to send electronic mail messages and to exchange information via bulletin boards or conferences. It is available for a one-time fee of $49.95 from General Videotex, 3 Blackstone St., Cambridge, Mass. 02139.

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For more information, call Amdahl Education at 800-538-8460 ext. 6393. Within California call (408) 746-6393.

[redacted] the amdahl phenomenon

In October, 1970, a company was formed expressly to build one product. A mainframe computer that would outperform the mainframe that owned the market at that time. Today, that company is an international success story, a phenomenon.

Engineering Data Base Out, Provides Microfiche Files

DENVER — An engineering data base providing regularly updated microfiche files has been announced by Inacom International.

Tech-Doc reportedly contains information on more than 400,000 industrial products and is updated every 60 days. Also announced was Micro-Index, a microcomputer-based indexing program providing access to the location of data stored on the data base.

Information contained in Tech-Doc files and Micro-Index is divided into 18 categories: electronic components; electrical components; computers; communications equipment; instruments/controls; motors/engines/turbines; compressors/blowers/fans; mechanical components; fasteners; fluid system components; metallic materials; nonmetallic materials; plastics/resins/elastomers/rubbers; adhesives/sealants; lubricants; surface treatments; chemicals; and services.

Subscribers can order all 18 files for $4,500 a year or tailor the subscription to meet their needs. Micro-Index is provided on hard disks or floppy disks at 57% of the Tech-Doc subscription price for use with microcomputers using Microsoft, Inc.'s MS-DOS operating system. Inacom is located at 4380 S. Syracuse St., Denver, Colo. 80237.

Mumps Users Publish Primer

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The primer covers concepts relating to operations on numeric values and operations on strings and commands before advancing to specific Mumps capabilities, such as the ability to create global variables and the use of string subscripts.

The primer is available for $12, plus $1.50 for shipping from the Mumps Users Group, Suite 308, 4321 Hartwick Road, College Park, Md. 20740.

Design Package Debuts for Use With DEC RSTS

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The SD Design package reportedly also features an option to cross-reference and classify usage of all data names. Screen and report layouts, along with the master and transaction program narratives, can be used to produce a static prototype of the proposed system. It is said to be a subset of the company's Solutions Deck series of productivity tools.

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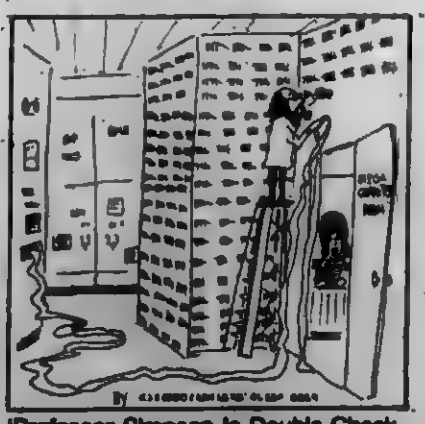
A typical license costs $32,500 for the Decsystem-2060. Software House is located at 1105 Massachusetts Ave., Cambridge, Mass. 02138.



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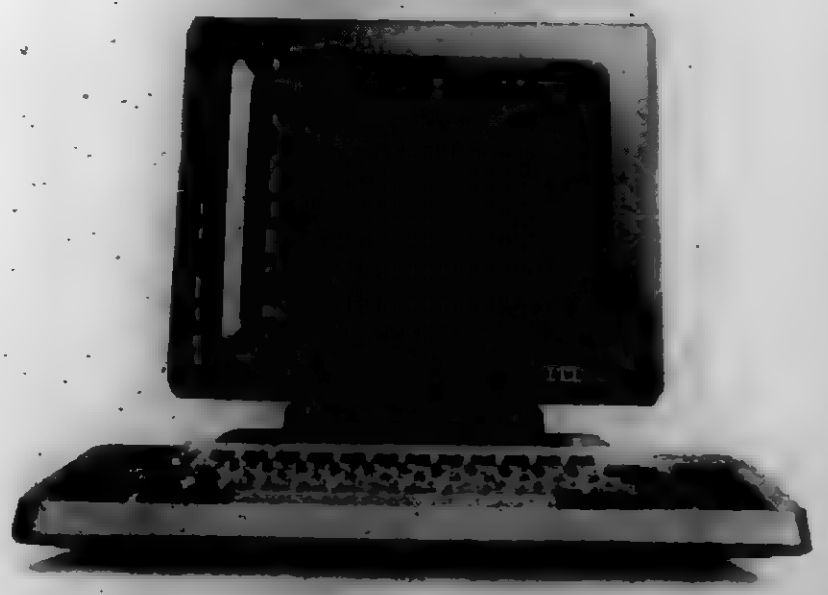

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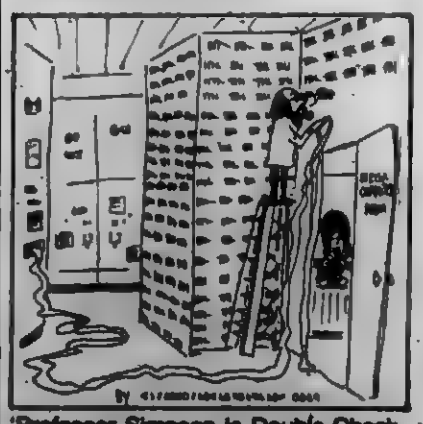

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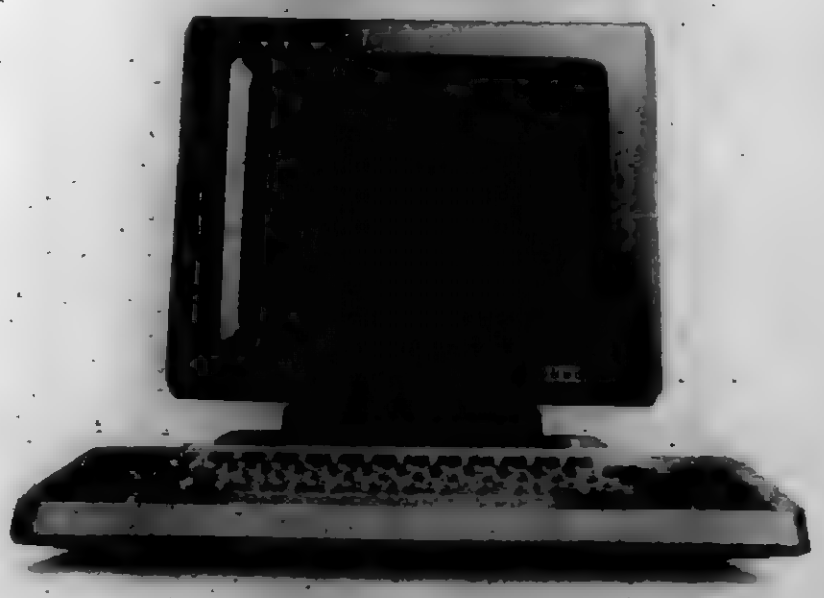
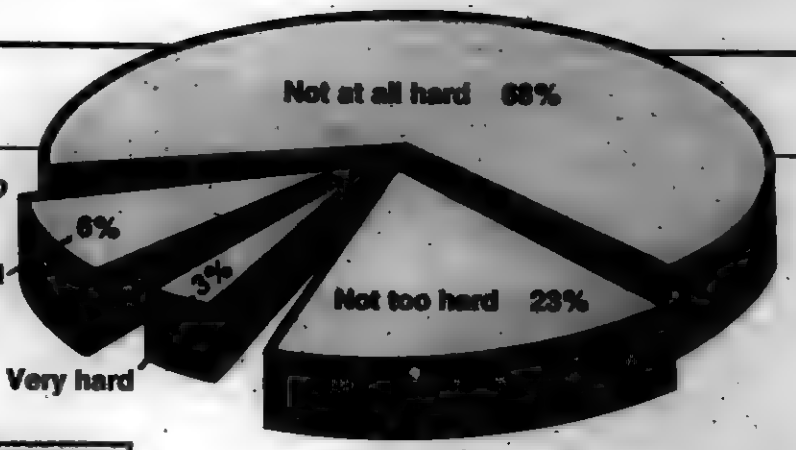
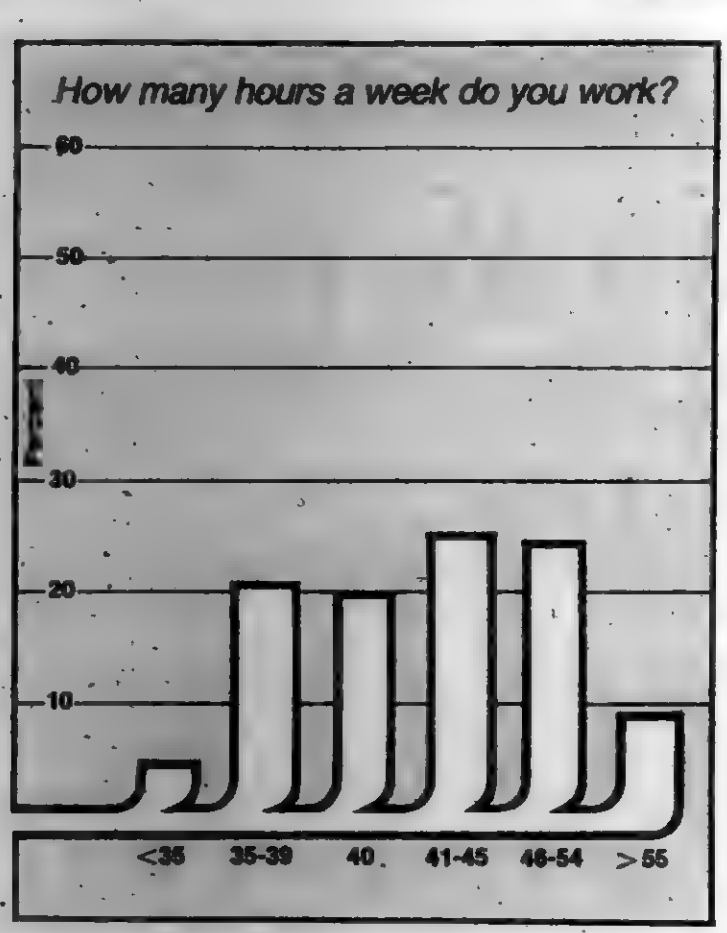


ITT Courier 1700.

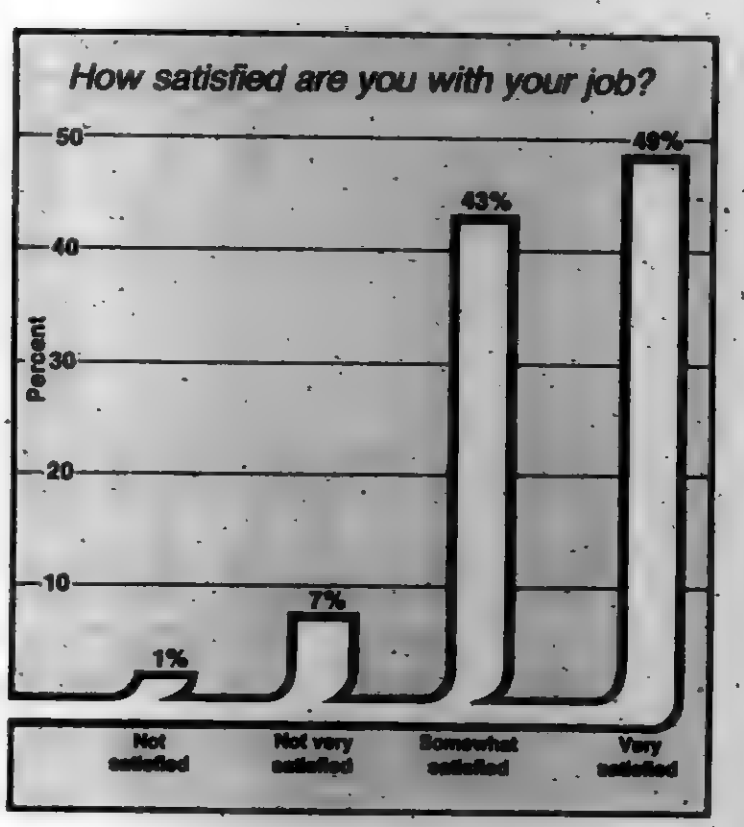
How hard is it to take time off?



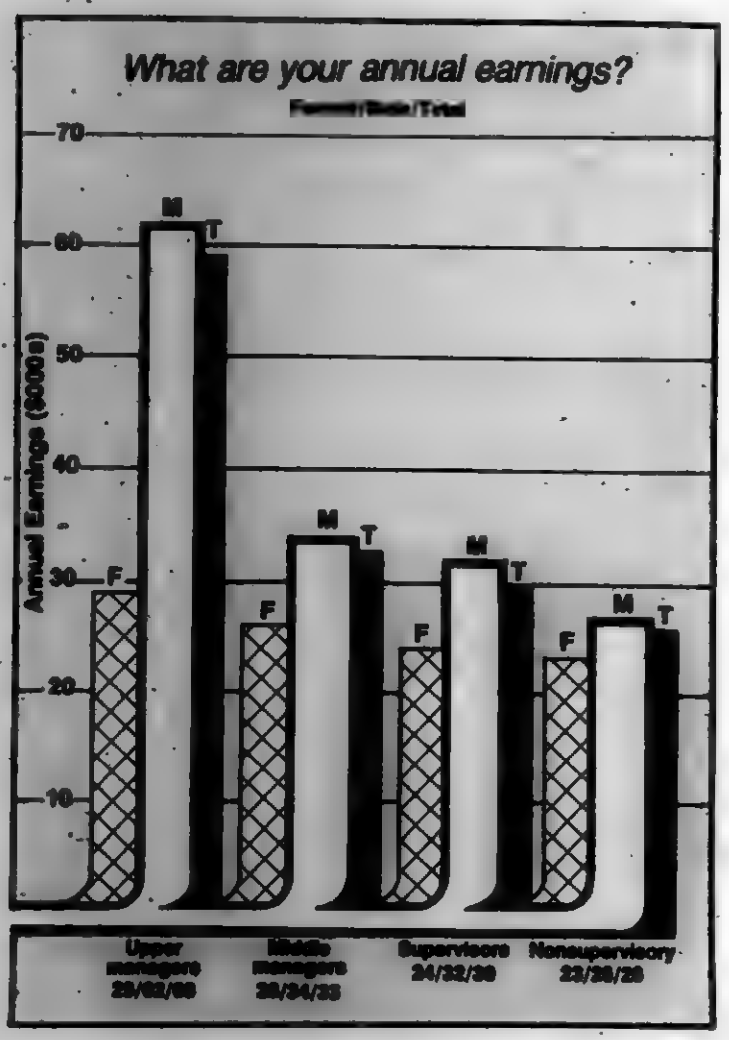
How many hours a week do you work?



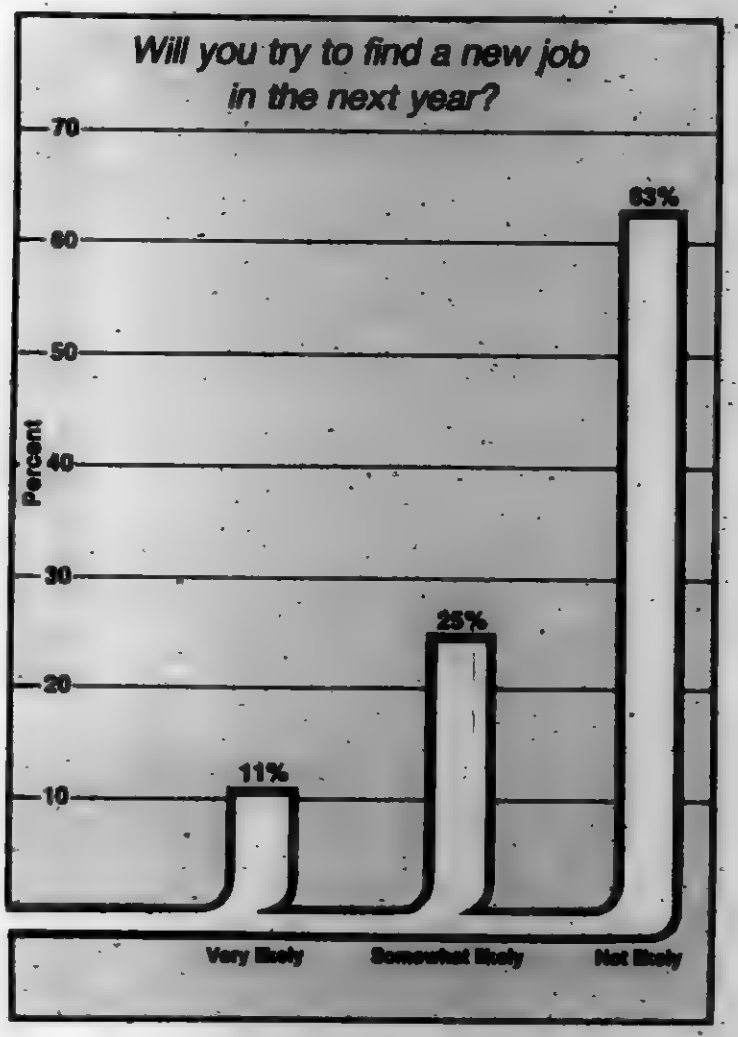
How satisfied are you with your job?



What are your annual earnings?



Will you try to find a new job in the next year?



Software Workers Survey

Ninety percent of U.S. software specialists express a high level of job satisfaction, yet more than a third of them intend to look for another job within a year.

Of the high-tech fields, software work is the most open to women, yet their status in this area is that of second-class citizens. Furthermore, their situation may get worse before — and if — it gets better.

By Philip Kraft and Steven Dubnoff

There is a frustrating lack of information about the software work force. In an attempt to build a worker profile, we recently conducted a two-year survey of 677 software specialists. We believe this study is the first of its kind based on a comprehensive probability sample. Completed in 1982, it confirmed some widely held beliefs about software work and raised doubts about others.

One of our intentions was to collect the standard demographic and attitudinal data that is available for most other occupations. Data collected by the Bureau of Labor Statistics and the Census Bureau offers a skeletal picture, at best, of the software field. Industry and academic studies of software specialists have been based on convenience samples that are not representative of the general software work force. For example, membership in professional societies is confined almost exclusively to academics and managers. Most software specialists would therefore not appear in a sample drawn from membership lists of those organizations.

By contrast, our study was based on a sample of software specialists of all kinds, drawn from the general population and stratified by age and gender (see box on In Depth/4). It is thus much more representative of the software work force as a whole.

The typical software specialist is male, age 32 (=median, mean=34, mode=29), white and employed by someone else. The average programmer has completed 16 years of school. Five percent have only a high-school degree or less, 80% college degrees, 24% master's degrees and 4% Ph.D.s or the equivalent.

Software workers are almost exclusively white. Only 5% are not, and of this group, a majority are Orientals. Women make up 24% of the work force. By contrast, in 1980 the employed U.S. work force as a whole was 11.2% black and 42.4% female.

A majority of respondents said they routinely worked more than 42 hours a week. Although a substantial majority began work at the same time every day, nearly one-fifth said they varied their starting times and 44% said they did not work the same number of hours every day.

Whoever said "IBM isn't the competition, it's the environment" knew what he was talking about. Thirty-five percent of our sample used IBM operating systems — although not all used them on IBM machines. Cobol, assembler and Fortran were the three most widely used languages, in that order, accounting for 53% of the primary languages used. Interestingly, 6.5% of our respondents reported they did no programming at all.

In terms of hardware, it might be said that IBM came in a strong first and Digital Equipment Corp. a weak second,

(Continued on In Depth/5)

IN DEPTH

Drawing a Representative Sample

Our sample was drawn from the "street lists" of the cities and towns of the Boston Standard Metropolitan Statistical Area. These lists are a unique resource in that they contain the names, ages, addresses and occupations of all inhabitants over the age of 17. They therefore allow us to construct probability samples of rare occupational groups such as software specialists.

Software specialists were sampled from the lists at varying rates based on age, sex and occupational title.

The goal was to produce a sample with approximately equal numbers of men and women, equally distributed by age.

Women represent about a quarter of the software work force. We oversampled women in order to obtain a statistically valid population of female specialists. The numbers of male and female specialists are proportionately weighted in arriving at the accompanying analysis.

Because each of our respondents was sampled with a known probability, we have been able to weight our sample to represent accurately the population from which it was drawn. At the same time, we have been able to analyze the characteristics of such rare populations as older female programmers.

Our sampling was inclusive in that we wanted to give every member of our target population a chance to be in the sample. Respondents determined their eligibility based on a series of screening questions which, at their base, sought to determine whether the potential respondent was employed in a job that "involved the design, production or maintenance of computer software."

We are confident that our sample adequately represents the population of software specialists in the Boston area. We believe it is also broadly representative of the working conditions, if not the industrial distributions, of software specialists elsewhere in the U.S.

The study was supported by the National Institute of Mental Health.

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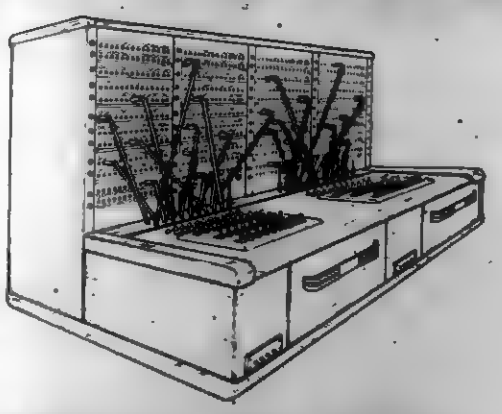

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SOFTWARE WORKERS SURVEY

(Continued from In Depth/3)

while everyone else competed for last place. In fact, our miscellaneous catch-all category of "other hardware" came in third, beating all other manufacturers.

In 1981, the mean annual earnings of software specialists exceeded $31,000. The figure is a bit misleading, however, because managers as a group earn considerably more than nonmanagers. When managers and supervisors are excluded, the average annual earnings figure is a more modest $26,300.

Upper-level managers do very well indeed. The mean annual job earnings of upper-level managers are $62,000. For middle managers, the figure is $34,000 and for low-level supervisors, $32,000.

Job Satisfaction

On the surface, job satisfaction is high. Ninety-two percent of our respondents said they were either somewhat or very satisfied with their jobs. There was no overall difference in job satisfaction between men and women.

Among men, but not women, there is a small and statistically weak association between job satisfaction and satisfaction with pay. In fact, what is significant is the lack of a strong association between pay and job satisfaction. This finding is consistent with studies of other occupations, which show that the nature of the job and on-the-job personal relations are more important than pay in predicting overall job satisfaction.

Although the 92% satisfaction level appears high, American workers in virtually all occupations consistently report high levels of job satisfaction. An earlier study conducted by the University of Michigan showed that job satisfaction for the U.S. work force as a whole was about the same as that of the programmers in our sample.

A better indicator of job satisfaction is whether employees intend to change jobs in the near future. Thirty-six percent of the software specialists in our sample said they were somewhat or very likely to look for another job in the next year. Most of those who said they were expecting to look for another job indicated they would look for a different job in the same field, indicating dissatisfaction more with their current job than with the software field in general.

Another and related indicator of job satisfaction is whether someone is willing to recommend the same kind of job to a close friend. Overall, 79% of our sample said they would recommend their job to a friend, while 21%

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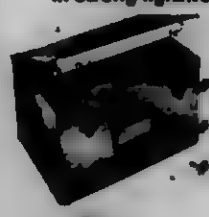

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said they would advise against it or had doubts about doing so. Although somewhat less positive than the response to the question "How satisfied are you with your job?," these figures still indicate a relatively high level of job satisfaction.

The responses changed significantly when we asked our respondents whether they found their managers technically capable and helpful with respect to personal problems that affected the respondents' work. Of those who said their managers were technically capable, 90% said they would advise a friend to take a similar job. Seventy-four percent of those who felt their managers were not technically capable would recommend their job to a good friend.

Similarly, 91% of those specialists who felt their managers were helpful with personal problems that affected their work would recommend their job to a good friend. For specialists whose managers were not helpful with personal problems, 68% would recommend their job.

In short, pay seems relatively unimportant in predicting job satisfaction, at least when we ask the straightforward question, "How satisfied are you with your job?" However, if we use the job-recommendation question as an indicator of job satisfaction, competent and supportive managers emerge as statistically reliable predictors of job satisfaction. In other words, managers who have the respect and trust of their staff are more important than money to programmer job satisfaction.

Equal Opportunity

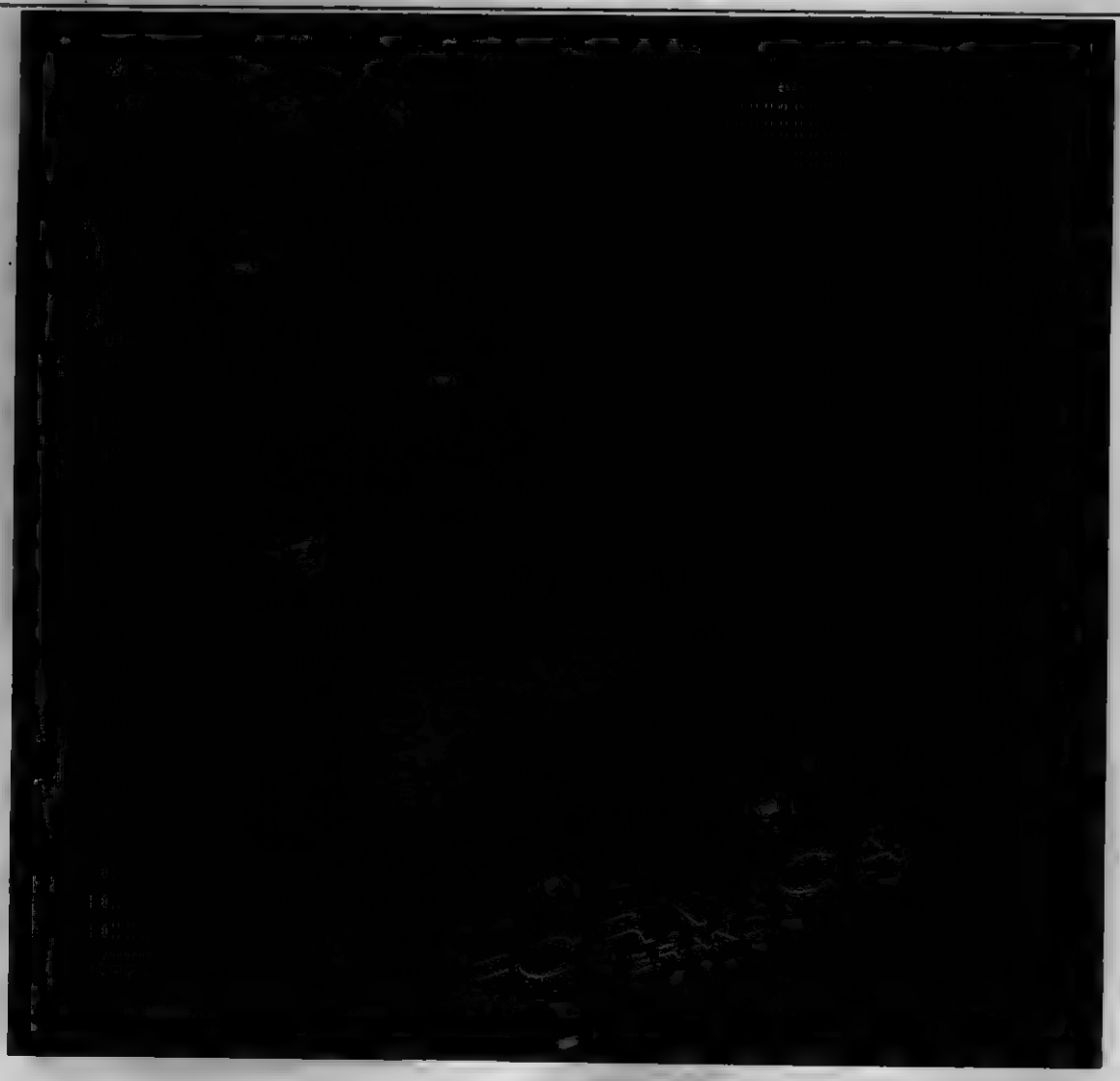
The extremely low number of American blacks in software jobs is astounding. We have no systematic explanation for this situation and intend to explore the matter in future studies. For whatever reason, the employment opportunities offered by this prototypical high-tech industry seem to have completely bypassed black Americans.

The situation of women is more complex. Our study confirms a widely held perception that women have established a significant presence in software work: 24% of the software work force is female. To put this figure in perspective, consider that the percentage of women in electrical engineering has recently doubled — to 2%. In addition, women software specialists are represented among managerial ranks in proportion to their overall numbers: 22% of the women in our sample were managers of one kind or another.

Software jobs promise to remain open to women. About equal numbers of women and men entered the field in the two years immediately preceding our study, 1980-1981. Furthermore, in terms of people currently in the occupation, a higher proportion of women than men entered the occupation during the previous *five* years.

In fact, software work is the most open to women of the technical-scientific fields. One has to look to the traditional so-called female professions — teaching, library work, counseling, nursing and so on — before finding any professional occupation with as high a percentage of women.

In 1981, the mean earnings of women software specialists were 70% of men's. Even when we control for background characteristics other than gender (years in



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SOFTWARE WORKERS SURVEY

In terms of earnings, women are better off in large organizations. Pay discrepancies are greatest in small organizations (less than 100 employees), where women earn barely half of what men earn.

software work, weeks and hours worked and years of education), the figure rises only to 85%.

In terms of earnings, women are better off in large organizations. Pay discrepancies are greatest in small organizations (less than 100 employees), where women earn barely half of what men earn. Pay discrepancies are smallest in large organizations (more than 499 employees), where women earn 79% of male wages (percentages not controlled for background characteristics here).

There are several possible explanations for the variation. The most likely is that federal and state equal opportunity and antidiscrimination regulations apply primarily to large organizations.

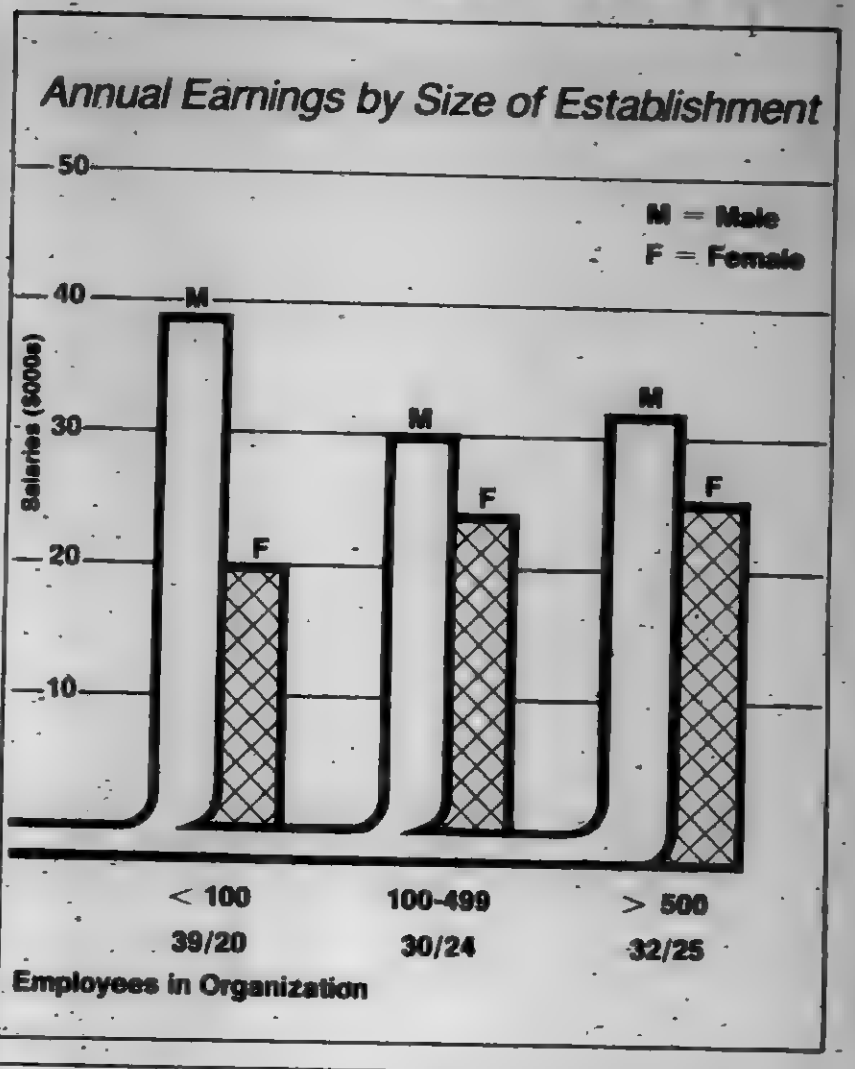
These discrepancies are smaller than the male/female wage difference in the U.S. work force as a whole, in which women earn 59 cents for every dollar earned by men.

But the earnings gap between men and women software specialists hardly suggests a field free of pay discrimination. To put a dollar value on pay discrimination, on average it is a $5,000 per year liability to be a woman in software.

In a similar vein, men are three times more likely to be upper-level managers than women (10% vs. 3%). And probably just as significant, women who supervise software specialists are likely to supervise other women, while men are likely to supervise other men. Men managing men and women managing women is a familiar scene in the business world.

The status of managers reflects the status of the people they manage. Our society defines women as low status workers. We would, therefore, expect that women would be managed by other women.

Finally, although few women in



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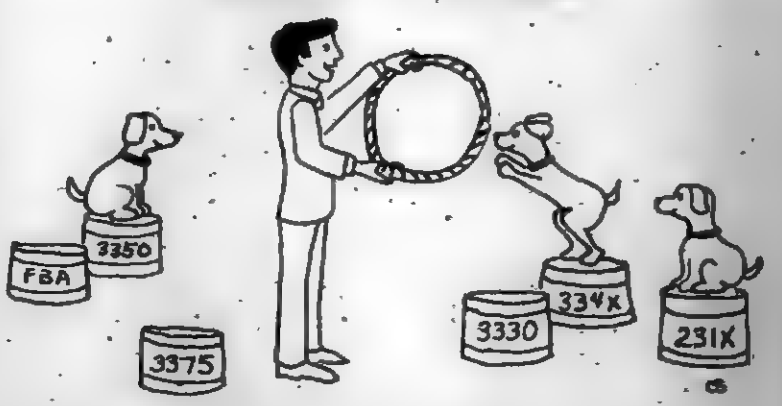

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our sample reported that they had experienced job or pay discrimination on the basis of sex. 35% of the women (vs. 19% of the men) said they expected to encounter sex discrimination in the future. Discrimination on the basis of age was also a concern to a minority of both men and women.

We take these anxieties to be an indicator of the type of experiences women software workers have had after working at least a year in the field.

The extent and depth of the pay differences — particularly at the management level — are much greater than indicated here. They will be examined in more detail later.

Ironically, in a field that symbolizes the glamour and earnings potential of specialized high-tech skills, the key to financial success in software is not to specialize and not to get too technical. People with the highest paying software jobs spent only modest amounts of their time on technical matters.

We were especially interested in the relationship between time spent on particular job tasks and total job earnings. Here, too, there were some contradictory findings. Ironically, in a field that symbolizes the glamour and earnings potential of specialized high-tech skills, the key to financial success in software is not to specialize and not to get too technical. People with the highest paying software jobs spent only modest amounts of their time on technical matters, such as designing specifications for software systems. Similarly, they spent some but not a lot of their time supervising others.

The best paid people spent most of their time making general decisions involving software and hardware purchases, planning the direction of their department or organization and carrying out other — and largely traditional — managerial roles.

In short, in spite of the talk about the financial rewards available to scarce technical specialists, in software work, as in the rest of the corporate world, the rewards go to managers, not to technicians, engineers or scientists. With respect to gender, if generalists are rewarded with higher pay than technical specialists, then the generalists tend to be men while the specialists tend to be women. In programming, we have not found any evidence of a strong relationship between technical skill and high pay.

Women, Pay and Middle Managers

In terms of demographic characteristics, education and pay, software workers resemble specialists in other technical and engineering fields.

Yet our study also reveals important changes in the organization of software work. These changes promise to have a great affect on entry into the field, the role of women and long-term career prospects, particularly for middle managers.

Polarization. The first of these changes is the clear-cut polarization of software work into distinct specializations. By this term we mean more than the traditional divisions by industry or field, that is, business programming or systems analysis. We also find emerging divisions between analytic work and routine work, between work that involves decision-making responsibility and work in which most decisions are made by someone else.

We asked our 677 respondents to tell us how much time they spent on a variety of job tasks typically performed by software specialists. The tasks ranged from documenting one's own code to specifying the requirements of a software system to planning the direction of the respondent's department or organization.

When we clustered the tasks performed by the respondents, we discovered divisions that are essentially between managers and managed. Software is now characterized by a thoroughly conventional organizational structure in which some people do the thinking and other people do the work.

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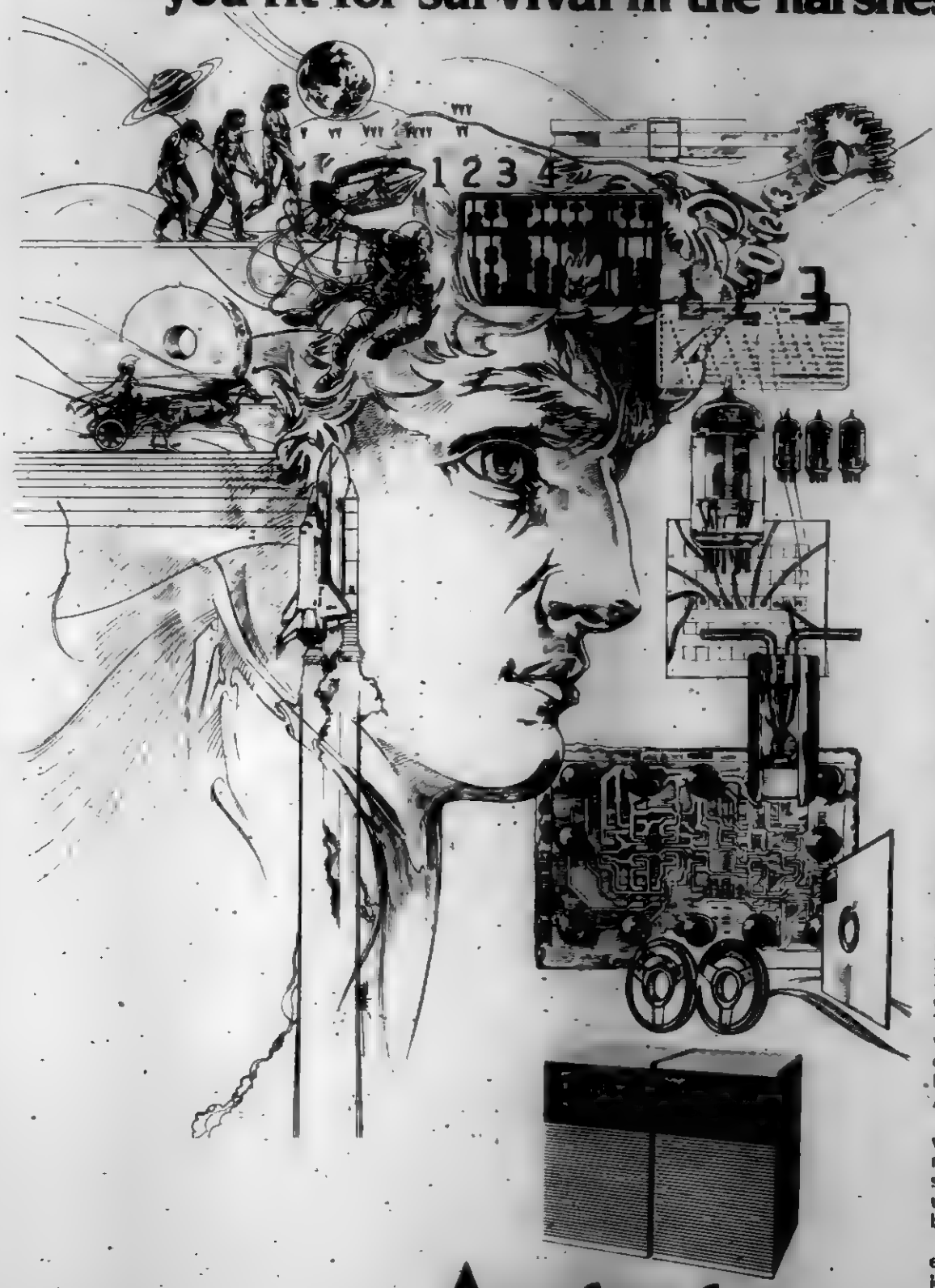

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software product were all undertaken by the same small, closely integrated group of specialists — is rapidly disappearing. In its place is emerging a system organized much like a traditional assembly line: Individual workers are assigned small pieces of a larger task, which in turn is part of still larger tasks. Even the name of the occupation has been changed to reflect this transformation: We talk less of "programming" and more of "software production."

Our findings confirm what industry observers have long noted: Documentation, report writing, coding (particularly in Cobol) and maintenance are now distinct jobs, not merely specializations. Comparatively speaking, they are not particularly well-paid. Similarly, systems design, departmental planning and so on are also now distinct jobs. In contrast to the first group, they are paid relatively well.

The elaborate division of labor emerging in software work is sometimes — and mistakenly — called specialization. It is more accurately called fragmentation. Increasingly, software work is characterized by a stratification of responsibility and pay, not just a division of labor. What is unclear is whether there is a direct career path between low-paying and high-paying positions.

The software field is still too new to have developed rigid or even clear-cut career paths. Some clues to possible paths can be found, however, in the history of older engineering and technical fields. Early engineering resembled programming to the extent that it began as a master-apprentice occupation. Training was informal and acquired on the job. Eventually, the engineering fraternity, under pressure from industry, adopted elaborate formal training requirements. It also developed into an increasingly fragmented occupation that replaced the plain "engineer" with "technicians," "designers," "managers" and "entrepreneurs."

The elaborate division of labor emerging in software work is sometimes — and mistakenly — called specialization. It is more accurately called fragmentation.

Most studies of modern engineering agree that these specializations are distinct careers that do not overlap. To put it in management terms, there is no single engineering career ladder but several. They are not "parallel" and, by and large, they do not overlap.

Is the software field following the example of engineering? It is probably too early to say for sure, but many of the signs indicate that it is. Although we have not yet completed analysis of our data on training and education, we have done a quick, preliminary examination. The data shows a three-tiered software training establishment that roughly corresponds to the technical school/college/university division characteristic of engineering training. Although we believe that, at present, career opportunities in software are not rigidly associated with formal credentials, we do think a trend in that direction is likely.

Women. A major development in software is the changing role of women. As we described earlier, software work is relatively open to women, particularly in comparison to other technical and engineering fields. On the other hand, our data shows conclusively that women are concentrated in the lowest paid jobs: business programming, documentation and maintenance. They are also concentrated in the worst-paying industries: financial/real estate and communications.

Furthermore, women are paid less in *every* specialization, in *every* industry and at *every* organizational level.

In fact, there is not a single industry in which women achieve pay parity with men. Ironically, the only industry in which women come close to pay parity is financial/real estate, the second-worst paying industry. Only at the bottom of the pay ladder, it seems, are women equal.

At the management level, the pay disparity is even more dramatic. Women supervisory workers earn less than their male counterparts at *all* levels of management. In fact, the higher a woman goes through the management ranks, the greater the discrepancy between her pay and the pay of her male colleagues: The higher up she goes, the lower her relative income. To state the situation in the baldest terms, on average, *the lowest-paid male manager makes more than the highest-paid female manager.*

Software has enjoyed a reputation as a field relatively free of discrimination and in particular as a field open to women. Yet the systematic pay discrepancies make a strong case that the field is not characterized by just random pay discrepancies but by systematic pay discrimination against women.

In light of the remarkable pay differences, the entry of large numbers of women into the software field takes on another and perhaps sinister meaning. If the field has indeed polarized into relatively creative, relatively well-paid jobs on the one hand and relatively routine, relatively poorly paid jobs on the other, then women seem to have been recruited to fill the openings at the bottom. Even when they achieve top management positions (or even more rarely, when they enter esoteric scientific and technical specialties), their pay is considerably lower than men's.

The only industry in which women come close to pay parity with men is financial/real estate, the second-worst paying industry. Only at the bottom of the pay ladder, it seems, are women equal.

It is useful at this point to compare male/female pay discrepancies in the rest of the work force, particularly at the management level. What we find in the U.S. work force as a whole are roughly the same male/female pay discrepancies that we have found in software work. Similarly, women managers in the U.S. work force experience the same degree of pay discrimination characteristic of software. In effect, software work isn't

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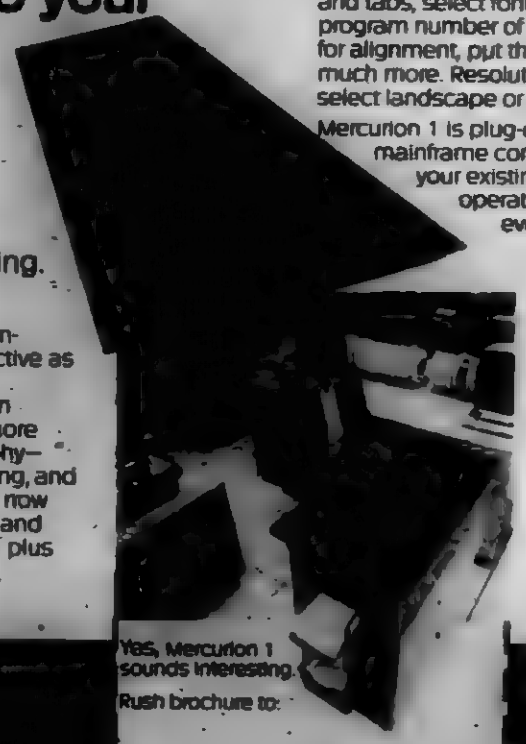

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There are at least two ways to view male/female pay discrepancies in software. Women in software work are, on the whole, no more discriminated against than in other occupations. Indeed, they do somewhat better. Even if women are paid less than men on the average, there are considerably more women in software than in most other engineering occupations: 24% vs. perhaps 2%. Furthermore, their pay, relative to other women, is high.

This figure may actually explain why there are no major statistical differences in male and female job satisfaction. Men compare their pay with that of other software specialists. Women, on the other hand, probably compare their (relatively high) pay with that of other women.

At least in software work, high tech has not yet fulfilled its potential to be not only new but "different" with respect to equal opportunities for women and minorities.

The second view is less optimistic. Software work is barely 40 years old. It does not carry the burden of a tradition of discrimination against women. Indeed, modern computer programming began as an all-female occupation. In 1943 through 1944, responsibility for programming the Eniac belonged to a group of young women just out of college. Similar, if less dramatic, roles were played by women on the Mark projects at Harvard University and in the development of some of the first high-level languages, such as Cobol. Yet women in software today still face about the same kinds of structural discrimination as they do in the rest of the work force.

Recall, too, that black Americans have been all but excluded from the job opportunities promised by software work. Women, although relatively better off, are still confined to the least responsible, most routine, worst-paying (and probably dead-end) jobs. For whatever reason, software work has replicated the sexual (and racial) divisions that characterize older occupations. At least in software work, high tech has not yet fulfilled its potential to be not only new but "different" with respect to equal opportunities for women and minorities.

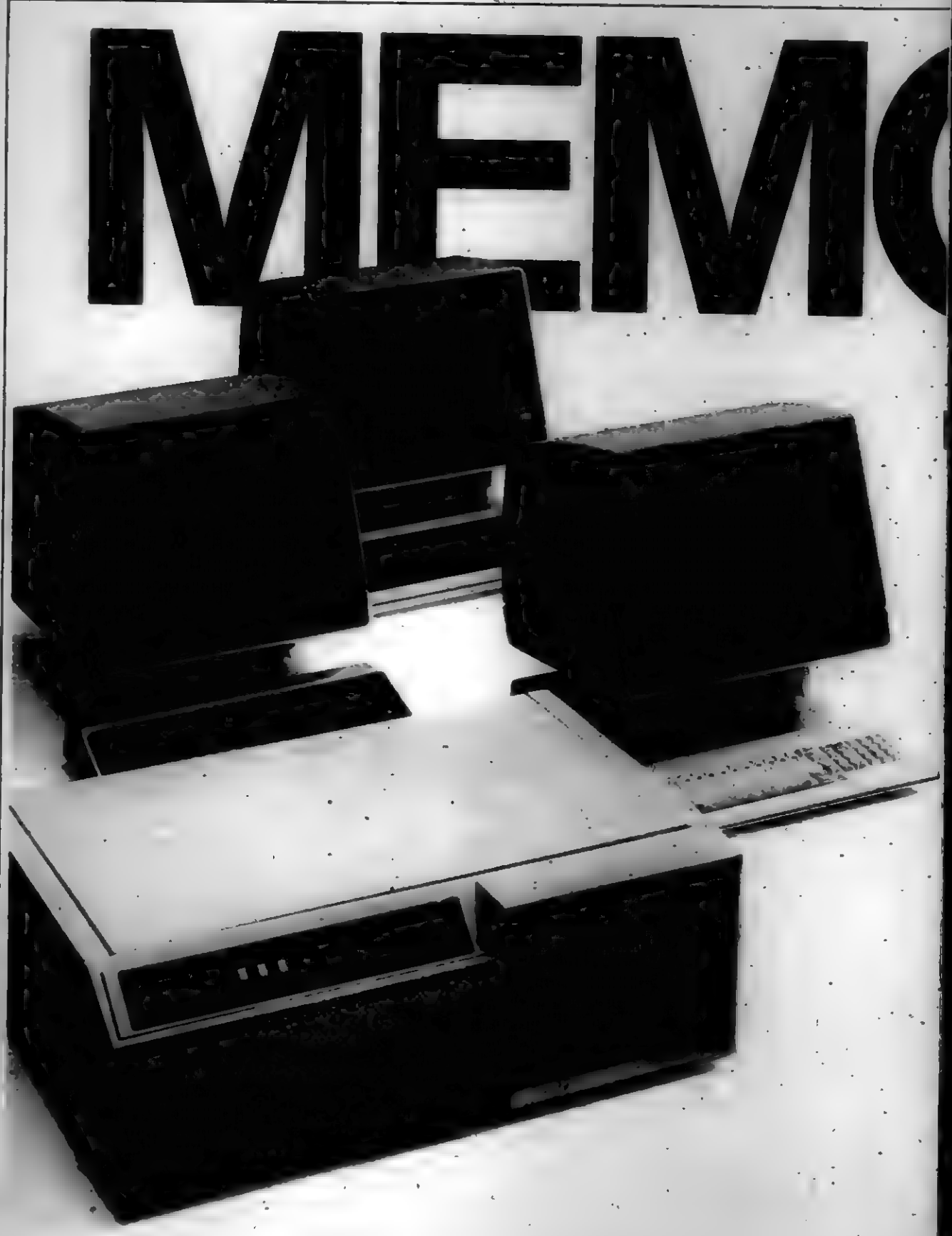
The Future of Middle Managers. The third and perhaps most significant change in software work is the position of middle managers. As sharp as the male/female pay differences are, the differences in management pay are even more striking. For example, overall, managers make about 20% more than nonsupervisory personnel. Low-level supervisors make 18% more than nonsupervisory workers.

Low-level supervisors make 18% more than nonsupervisory workers. Upper-level managers make a whopping 82% more than middle managers. Middle managers, on the other hand, make only 8% more than low-level supervisors.

Upper-level managers make a whopping 82% more than middle managers. Middle managers, on the other hand, make only 8% more than low-level supervisors.

Why are middle managers paid so little? In this case, the simplest explanation is that the market pays middle managers what it thinks they are worth. Many business analysts have noted that American industry as a whole has been moving away from the traditional pyramid structure of organization — with its many levels of management between top and bottom — toward a form sometimes described as an hourglass.

In other words, organizations are now moving toward a structure with the majority of its employees on the bottom, a very small group of top-level managers and specialists on top and a communications channel connecting the two. The communications channel, of course, performs



IN DEPTH

the functions that were previously the responsibility of middle managers. Because there are relatively fewer positions in the middle but more people than ever competing for them, employers today do not have to pay a very high premium for middle managers.

We suggested earlier that software is probably more like than unlike traditional industries. If this is the case, then the relatively low value the market places on the services of middle-level software managers is entirely consistent with the broader trends in U.S. industry as a whole. Middle-level software managers are caught in a squeeze. Like middle managers elsewhere, they are on the verge of being replaced by a machine. The irony is that the machine that threatens to replace them is one many of them have helped build.

The relatively low value the market places on the services of middle-level software managers is entirely consistent with the broader trends in U.S. industry as a whole. Middle-level managers are caught in a squeeze. Like their counterparts in other fields, they are on the verge of being replaced by a machine.

In Conclusion

It is assumed that software workers are well-paid and generally satisfied with their jobs. By and large, both of these perceptions are correct. Similarly, it is widely believed that the field is much more open to women than other technical occupations. This belief, too, seems based in fact.

On the other hand, our data suggests a different and less encouraging aspect of software work. If women are welcomed in the industry, they are paid considerably less than men. Although male and female entrants are initially paid about the same, the earnings of women flatten out quickly. The earnings of men, on the other hand, seem to increase in a regular way. The pay differences between male and female managers, in particular, are dramatic. An equally large gap in earnings characterized employees of small organizations.

The pay situation of women is reflected in perceptions of discrimination. Women are more likely than men to say they have been discriminated against. Interestingly, a significant minority of both men and women complained about age discrimination.

If the situation of women is not as rosy as the popular image suggests, the situation for black Americans is probably worse. We say "probably" because there are so few blacks in our (or anyone else's) sample. For whatever reason, software work is not the place for black Americans to find jobs.

Another popular conception is that software work is a wide open field. It rewards people on the basis of what they can do rather than who they are. Here, too, preliminary analysis of our respondents' training suggests a different picture. By a large majority, software specialists are college graduates. Most have some formal technical training. Moreover, the younger specialists are, depending on one's perspective, either better educated or more narrowly trained than their elders. Whatever the consequences for the quality and quantity of software, the emergence of de facto credentials in the form of college degrees suggests that the software field has begun to mature. In plain language, "maturity" means that the most important thing about software is not how different it is from other kinds of work, but how similar.

About the Authors

Philip Kraft, principal investigator, is associate professor of sociology at the State University of New York at Binghamton. He is the author of Programmers and Managers: The Routinization of Computer Programming *(Springer Verlag, New York) and numerous articles on the computer industry.*

Steven J. Dubnoff, co-principal investigator, is a study director at the Center for Survey Research, University of Massachusetts, Boston. He is an economic sociologist.

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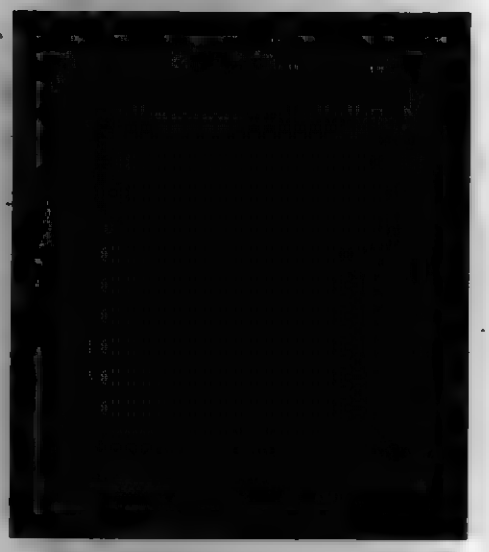

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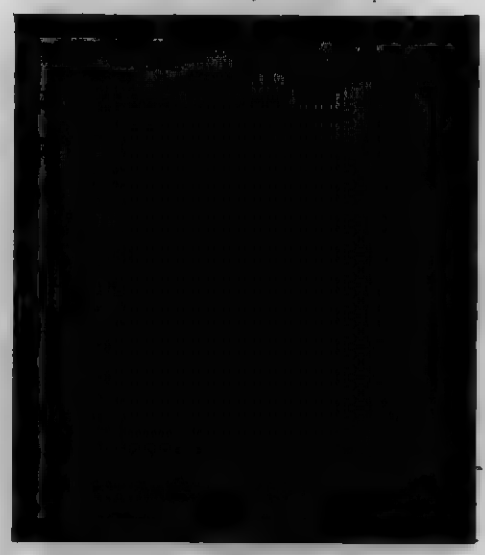

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Can the People's Republic Catch Up?

An American finds the Chinese decades behind and asking the wrong questions.

By Vaughn J. Mantor

Dai ye in Mandarin means "waiting for work." The Chinese use the phrase to describe 17-year-old graduates who have not yet been assigned jobs. Chinese programmers also wait. They wait for the rest of the Chinese computer industry to tell them what to do. They will continue to wait.

Early last August, 27 software specialists from the U.S. embarked for the People's Republic of China. We stayed one month and visited six cities along the eastern coast. All of us were, in one way or another, anxious to speak with the Chinese about computer software.

We found an underdeveloped software industry which we would estimate at from 10 to 20 years behind the U.S. We also found a naivete about software that reminded us of our own misunderstanding of the nature of software 10 or 20 years ago. For example, in Beijing on the first day of our tour, one man asked, "We have the IMS data base at the Census Bureau, but we have heard of System R, a relational data base. Which one is better? Which one should we use?"

Even if we could have spoken without an interpreter, it would have been difficult to explain how dozens of factors

CAN CHINA CATCH UP?

affect the choice of a data base management system (DBMS) and how it would be unprofessional to recommend one over another categorically.

I don't mean to malign the Chinese. They are intelligent, hardworking and genuinely interested in the computer field. They have read much of the academic and theoretical literature. But they are unaware of the vast and difficult engineering that is necessary to build modern software. Their naivete stems from the country's self-imposed isolation of 30 years. Unfortunately, their simplistic notions are not limited to the computer field. While we were there, a petroleum engineer asked a Texas oil man, "What is the best way to drill for oil?"

Some time before our group arrived, the Chinese made a list of topics in which they were especially interested: data bases, microcomputers, local-area networks and on-line transaction processing and data base applications.

. Some time before our group arrived, the Chinese made a list of topics in which they were especially interested: data bases, microcomputers, local-area networks and on-line transaction processing and data base applications. Most of our delegates prepared presentations on these subjects. In each of these areas we found the Chinese knowledgeable about theory but ignorant of how to apply it. It is fair to say that even their theory is not quite current.

The data base is probably the most popular topic in China. But as in other areas, the Chinese ideas of data bases are similar to our ideas a few years ago. The story about Zhangzhi is one example. There are others. At a university near Guangzhou, a master's degree student is doing his thesis work building a data base manager that has the functions and organization of Cincom Systems, Inc.'s Total. Although this student is familiar with the work of Edgar F. Codd and others on relational data bases, his knowledge (and the knowledge of most graduate students) about engineering a data base management system is lacking.

The largest project ever done by the Shanghai Technical Services Corp. — the only one I know of in the province — contains 25,000 lines of Fortran.

It's not as if the Chinese have no experience with data bases. The Census Bureau uses IMS, another agency uses Digital Equipment Corp.'s DBMS 10/20 data base, and there are a few installed applications which, at the least, demand some on-line file manipulation and searching. For example, in Shanghai, there is a semi-automated telephone directory assistance system. With it, an inquiry for a number can be answered in three to five seconds.

The problem is the limit of the data base technology that supports the system and the limited incursion of the technology into the society. As far as I know, Shanghai boasts the most sophisticated directory assistance system in China. But the city has fewer than 60,000 telephones to serve its 11 million residents. And the data base is extremely stable because virtually all of the telephones are in business, state organizations and hotels for foreigners. Moreover, the directory assistance system is regularly shut down for reorganization and backup, which forces users to call back later.

The Chinese showed their need for data base engineering expertise in other ways as well. In Shanghai, one of the presentations that was particularly well received addressed the performance evaluation of data bases. By the audience's questions, we concluded:

1. The Chinese are just beginning to consider the question of data base performance.

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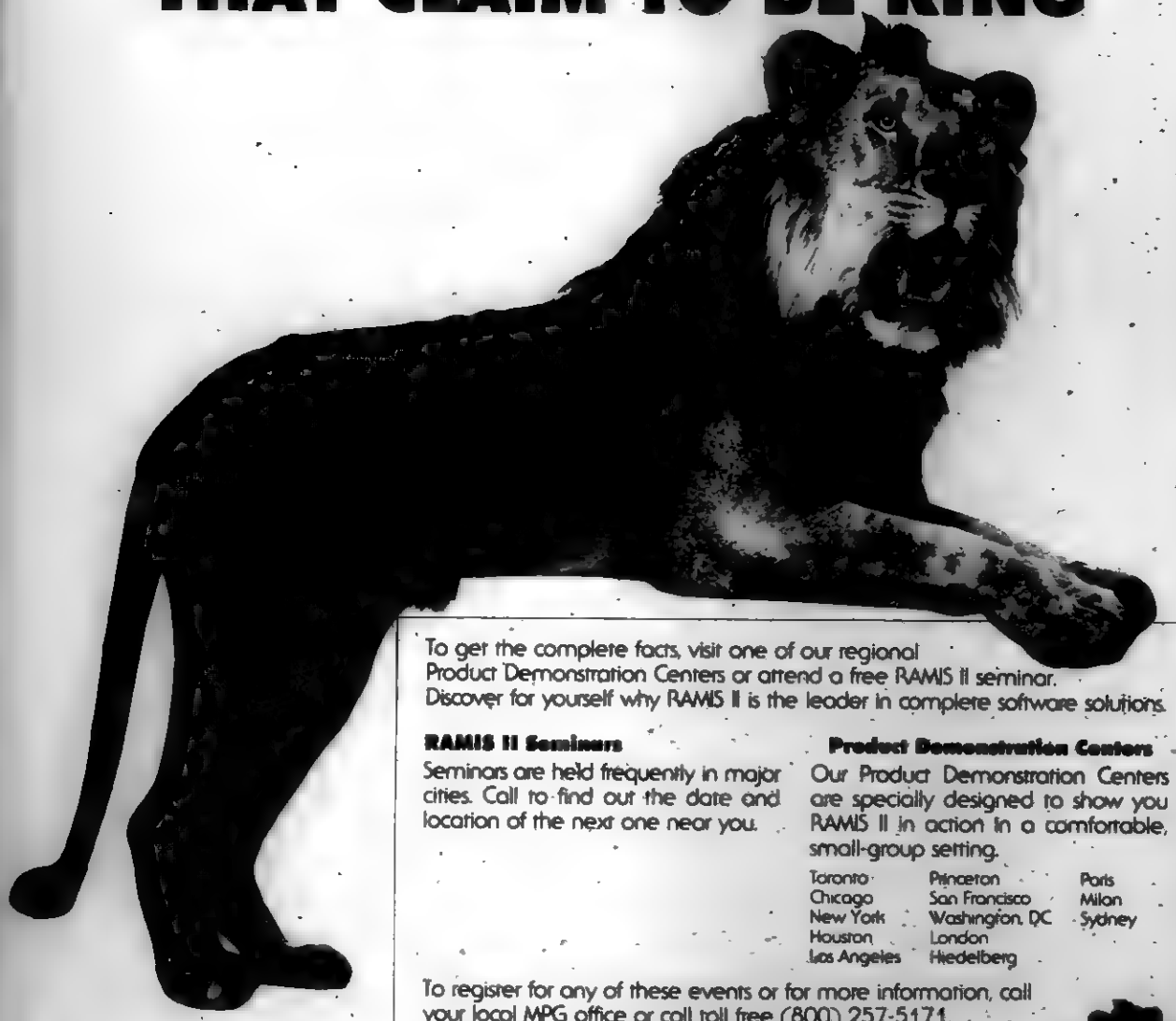

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2. They did not realize how difficult it is to measure performance.

3. They had not yet considered the difficulty of separating the measure of the data base's performance from the measure of its performance in a particular environment.

4. They were not familiar with the standard benchmarks of the commercial data bases.

Although the Chinese are enthralled with data bases, they realize that well-designed data base management systems are only academic exercises unless applied to problems. Understandably, they were not as enthusiastic about this more mundane topic. For the Chinese, building applications with data bases is quite possibly a bigger problem than building the DBMS.

There are several reasons for this apparent contradiction. First, using a data base to support management information systems is not usually economically feasible unless there is a relatively large body of data to manage. That requires substantial disk storage, and disk storage is prohibitively expensive and very difficult to come by in China. Data bases in management information systems usually mean large numbers of transactions, and to process them takes computing power — power the Chinese rarely have.

Most data bases are supported by ancillary and complementary systems such as a teleprocessing monitor for inquiry and update. Much of this support is unavailable to all but a few installations in the country.

Besides the difficulty of obtaining support, the Chinese have little experience in developing systems large enough to warrant data bases. The largest project ever done by the Shanghai Technical Services Corp. — the only one I know of in the province — contains 25,000 lines of Fortran. The only commercial transaction processing system built in Tianjian, the third largest city, is a limited batch banking system.

In the building of applications systems, the Chinese appear to be farther behind than in most other areas. While we are looking at prototyping and generation as ways to automate the development of transaction processing systems, the Chinese are struggling to handcraft them.

Large-scale systems also demand more attention to the management and control of the development project and the accuracy, succinctness and organization of system specifications. During our entire trip from Beijing to Guangzhou, I found no evidence the Chinese are aware of the methods currently in use in the U.S. such as Warnier-Orr or Yourdon for management or specification.

Microcomputers are also of great interest to the Chinese. Just after we returned, the Committee for Science & Technology decided that the hardware industry would concentrate on the development of micros as opposed to minis or large computers. Because the economy is centrally planned and administered, this pronouncement means the micro segment of the industry will be given the resources to expand and develop new products at the expense of the other two segments. The Chinese will diminish or discontinue research and development on large machines and their ancillary hardware and software systems.

The Committee for Science & Technology has decided that the hardware industry will concentrate on the development of micros as opposed to minis or large computers. The micro segment of the industry will be given the resources to expand and develop new products at the expense of the other two sectors.

Although I disagree with the principles of a centrally planned economy, I do not know if it is a mistake for the Chinese to concentrate on microcomputers. I do know that if China tries to catch the micro technology of the West, the effort will be like trying to hit a rapidly accelerating target. In Shanghai, we were told the Chinese are able to build only 4K chips, and the yield from the manufacturing process was only 30%. But they said they were researching 16K

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chips and 16-bit architecture. Compare these ventures with IBM's announcement of the 512K chip or Hewlett-Packard Co.'s 32-bit micro.

Moreover, the price of Chinese microcomputers is very high, beginning at about $14,000. Even though the labor is inexpensive — 10 cents to 17 cents an hour — the cost of parts is exorbitant, availability is low and service is intermittent at best.

Chinese-made micros are based on the Intel Corp. 8080 but do not contain an 8080. They have a wired-board equivalent. The error rate in wiring the board contributes to the high cost and low reliability. Even if the Chinese add huge import duties to the cost of foreign-made microcomputers, they will probably be able to import them more cheaply than build them for the next 20 years or more.

The fourth area in which the Chinese are most interested is local-area networks. Here, too, the West's lead is large. I do not believe there are any local networks in regular use in China outside research installations. The gap between the Chinese ability and the West's is so big, they are incredulous at some of our advances. During a presentation about Omninet, one of our delegates from Corvus Systems, Inc. was interrupted by one of the Chinese who said, "That's not possible." The speaker was describing an installed feature of Omninet.

The Country's Needs

Before one can grasp the predicament of the Chinese computer industry, one must try to understand the relationship between the computer and Chinese society. In China, labor is inexpensive; materials and machinery are expensive. Information and knowledge are dear and to be hoarded, but time (in a society with a recorded history longer than 5,000 years) is less important than it is to Westerners.

In the West, where labor is expensive, we have used the computer as a labor-saving device. But in China, using a $5,000 computer instead of 10-cent-an-hour labor means the computer cannot possibly pay for itself in less than 15 or 20 years. Moreover, Chinese managers rarely have the authority to fire employees, so the computer may not save any labor costs at all. Many of the possible users in China are not interested in computers for this reason that labor is cheap and computers are expensive.

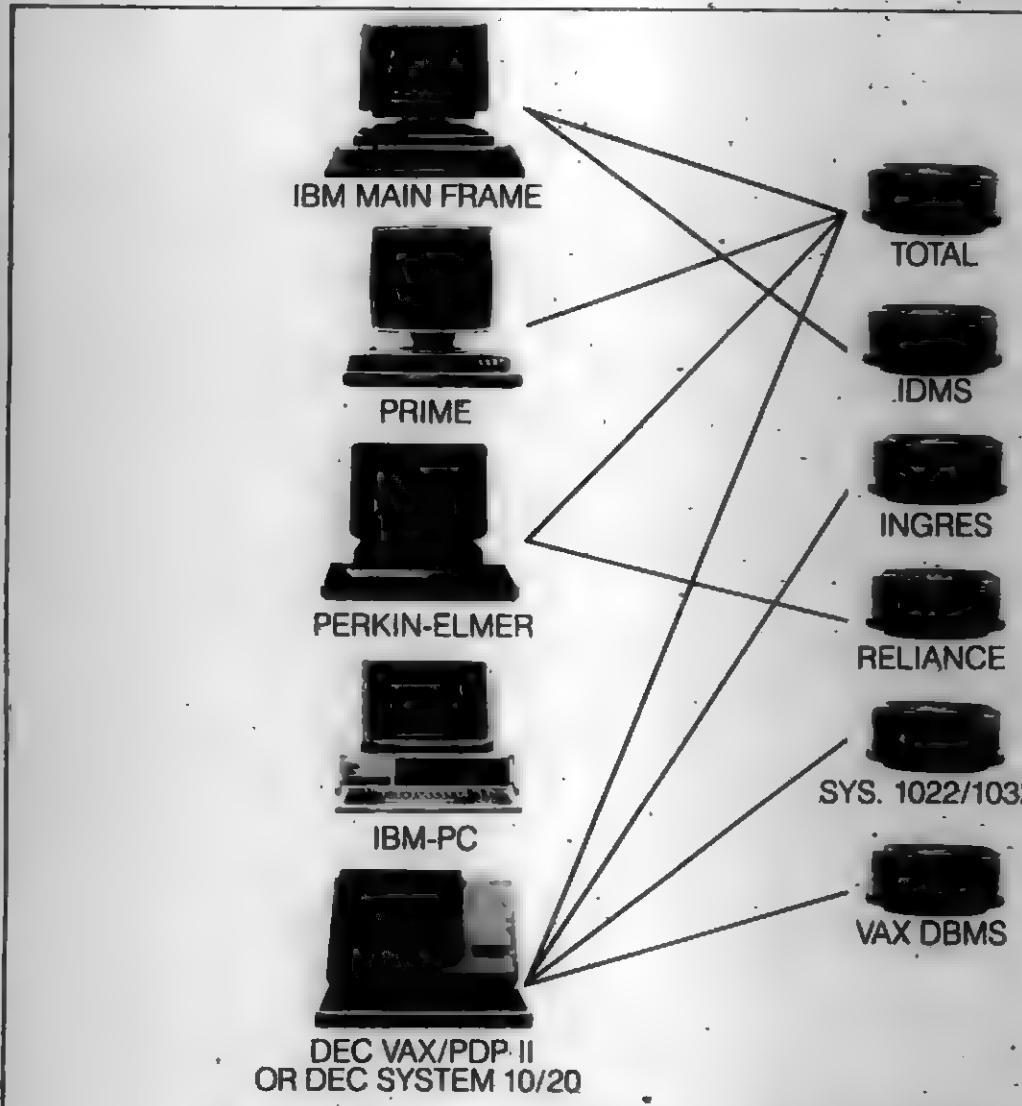
Cheap labor is not the only barrier to greater use of computers in China. We take for granted the phone system, the ready availability of replacement parts, supplies and service and at least some standardization among the models built by any particular computer manufacturer. The buyer of a Chinese computer cannot, as a matter of course, find these supports. Although many Chinese don't see the need for computers — and in spite of the great obstacles to installing them — China's leaders eagerly want them. They understand the

Even if the Chinese add huge import duties to the cost of foreign-made microcomputers, they will probably be able to import them more cheaply than build them for the next 20 years or more.

country's computer needs, and the needs are urgent. China has more than one billion people, mostly farmers, and grows by 17 million more every year. It may be possible (although unlikely) to run an agrarian, regulated, controlled, centrally planned society of a billion souls without computers; but a modern society based on industry, information and services is impossible without them.

And China's leaders are anxious for their country to become a modern society.

In its anxiousness to be modern, China has begun a program called the Four Modernizations. This scheme is supposed to transform China into a "powerful socialist economy" by the year 2000. The four sectors of the society selected for rapid modernization are agriculture, industry, defense and science and technology. Many of China's computer



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CAN CHINA CATCH UP?

specialists claim the government ranks computing among the most important technologies. However, the plans seem too ambitious to be finished by the turn of the century, and the computer sector appears to be a little behind schedule.

China may even be too far behind to soon build its own international computer industry; they will probably import computer technology for many years. The supporting goods and services that are needed for a computer industry do not exist or are difficult and expensive to get. By the time the Chinese build them, computer technology will have moved ahead again.

Besides lacking management information to run the country, the Chinese lack technical information. The government prohibits or discourages importing much of the West's literature. The U.S. and other countries will not allow export of certain technology and information to China. And much of the literature is just too expensive for the individual Chinese.

With wages of $60 per month, a university professor could hardly afford a $50 subscription to the *Communications of the Association for Computing Machinery*. Even a $24 subscription to *Time* or *Newsweek* represents two weeks' wages or more for most Chinese. China's economy, politics and technology argue against any significant computer industry in the foreseeable future. And as long as the West prohibits export of advanced computer technology, China will stay in the rear.

Unfortunately, one of the big problems facing the Chinese computer field is the language. As yet, the Chinese cannot process their own language.

There are probably more than 50,000 characters, or pictographs, in Chinese. However, there are only 400 syllables, so a single sound can represent more than 100 different pictographs. If that were not enough of a difficulty, the tone or pitch of the syllable changes its meaning. There are four tones in Mandarin — level, up, down and up, and down — but nine in Cantonese. Both spoken and written Chinese are so different from languages using alphabets that they inhibit China's computer technology.

A number of researchers in China are searching for ways to manipulate Chinese characters in computers. To date, they have solved only the I/O problem. They have a keying method for input, an arbitrary encoding or numbering scheme and special output software that drives special dot matrix printers and CRTs.

The Chinese lack technical information. The government prohibits or discourages importing much of the West's literature.

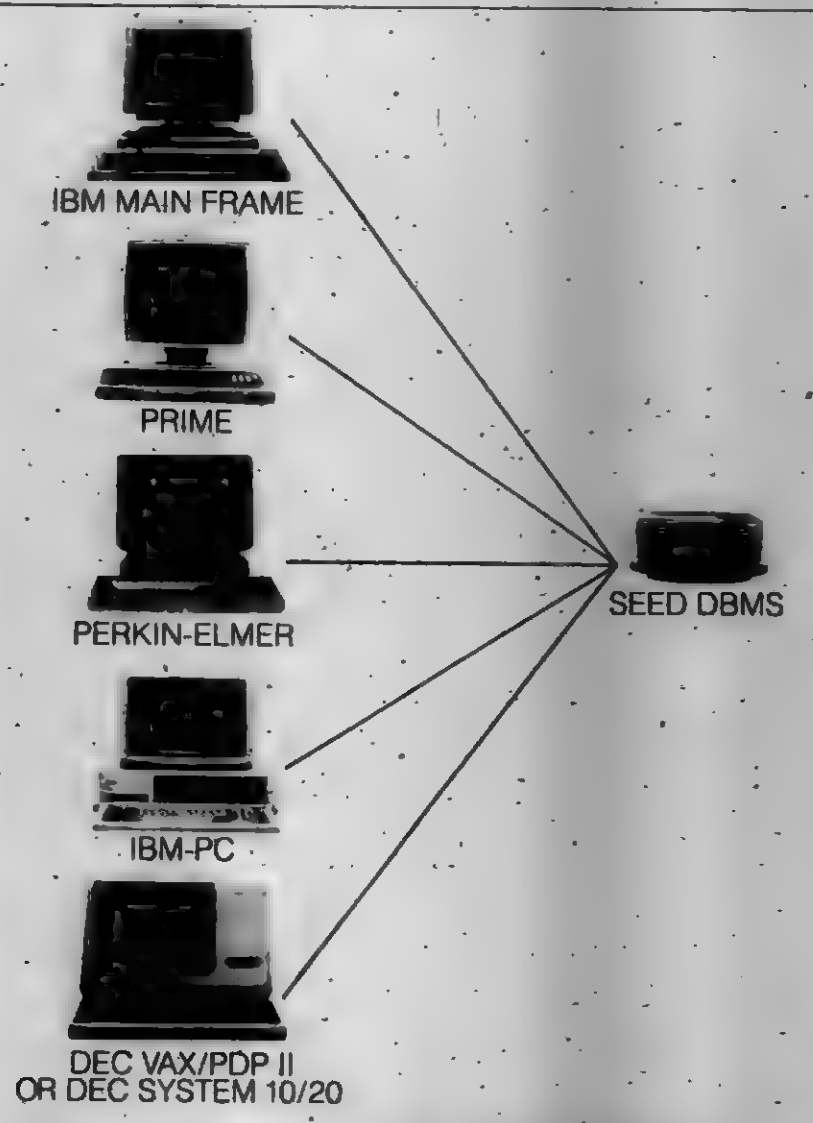
Because so many people are working on the problems, there are several different solutions to I/O.

None are particularly elegant or efficient. The first solution was no more than a typewriter-style keyboard with hundreds or thousands of keys. Another solution is a touch-sensitive, flat, plastic board about 18 in. by 30 in. Various sections of the board are marked in different colors. There is a row and column array within each colored area. Each cell of the array contains one, or occasionally two or three, Chinese characters. The operator enters a character by touching the character on the board with the wand.

A third solution uses a standard typewriter-like keyboard with an alternate function key. Holding the alternate function key, the operator can draw the "strokes" of a character by pressing various English letter keys. It can take up to eight strokes to define a Chinese character, and even then there may be some ambiguity. None of these methods are very efficient, and they do not allow a programmer to do anything other than read, store and display Chinese characters.

In the simplest storage schemes, each character is stored as an arbitrary, 16-bit number. However, there does not seem to be any available method for processing with the stored characters — no sorts, no merges, no comparisons — because the code does not conveniently correspond with meaning.

The display of Chinese characters



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is also a small problem. Although impact printers are impractical, dot matrix and laser-electrostatic printers are very useful. However, dot matrix printers must use a large matrix — about 21 by 27 points — and are not as fast as most other printing methods. Laser-electrostatic printers seem to be the most promising type for the Chinese language. Besides speed and flexibility to print any Chinese character, the laser-electrostatic printer is the only type that can mix Chinese and English characters at higher printing speeds.

The Chinese language can be displayed on a CRT, but there are problems. If the tube is one that accepts and displays data in fields, such as an IBM 3270, there are not enough points in a cell's matrix for printing Chinese characters.

Chinese can also be displayed on a CRT, but again, there are problems. If the tube is one that accepts and displays data in fields, such as an IBM 3270, there are not enough points in a cell's matrix for printing Chinese characters. So the choices are to expand the size of every cell or to use more than one cell to display a character. No matter what the choice, the result appears to be the same: A lot less information will fit on a screen.

Best Solution

Raster graphics terminals would seem to offer the best solution to the problems of display, but this type of terminal does not fit well into day-to-day operations' information systems. These systems have substantial numbers of data transactions. Raster graphics terminals are not designed for that use. Besides, Chinese graphics equipment and software are far behind the West's. The only Chinese-made graphics terminal I saw was an experimental vector machine of limited ability; all the other graphics equipment was Japanese and American.

Beyond all these problems looms the English language. Virtually every manual, technical report and significant paper on computing is printed in English. Even if the original was not, the second printing probably will be. There is a shortage of technicians in China because they must speak two or more languages. To alleviate the problem, China has assigned a large number of translators, who are ignorant in computer technology, to translate technical papers into Chinese. The problems with this approach are obvious.

The greatest setback for China's computer industry, indeed for all of China, was the Cultural Revolution. Between 1966 and 1976, while the West built a computer industry, the Chinese dismantled their high-tech industries.

While the U.S. reaped a crop of the best scientifically educated people in history, the Chinese closed many of their universities, eliminated graduate schools and persecuted professors and other intellectuals, sending them to the farmlands to be reeducated.

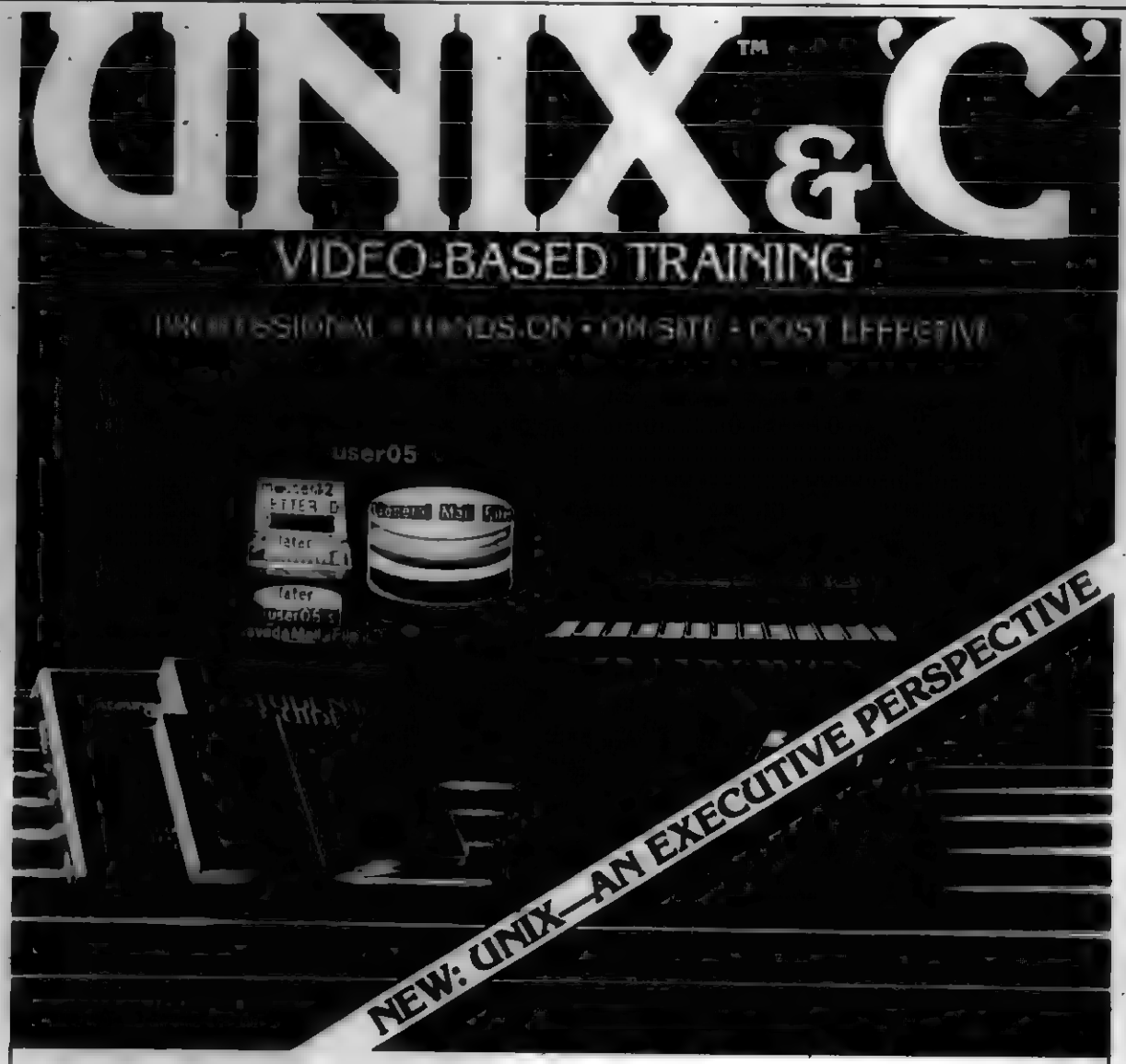
It was not until 1978 or 1979 that China reopened a graduate school. While the countries of the West enjoyed a relative internal peace, demonstrations notwithstanding, 20 million youths in the Red Guard ran rampant throughout China. Provided with free food, clothing and transportation by the government, they destroyed much of China's science, technology, literature, art and artifacts.

Today there is a lack of hardware and software experts that makes our shortage look like a surplus. It is another reason the Chinese are unlikely to have a substantial computer industry any time soon.

About the Author

Vaughn Jeffrey Mantor is a consultant and researcher with Computer Task Group (CTG), a nationwide software services company headquartered in Buffalo, N.Y.

Currently he is developing a large transportation application system, designing a graphics productivity aid for system development and teaching at CTG's Institute for Technical and Management Training.



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China's Goal to Build Own Computer Industry

By Chen Liwei

This article was originally prepared by China Computerworld *and appears here courtesy of the CW International News Network. The author is chief engineer at the Administration of Computer Industry under the Ministry of Electronics Industry.*

At the first national meeting called by the Computer and LSI Leading Group in May, Group Leader and Vice-Premier Wan Li pointed out, "If we are to quadruple the gross output value and realize the four modernizations, we must first of all build up our own computer and LSI industry." As a professional in the computer field, I feel it is our responsibility to realize this goal. But how?

The computer industry has developed at an astonishing speed in advanced countries. In the U.S., the gross national product (GNP) quadrupled between 1958 and 1978, but the value of computer hardware output rose by 40 times (50 times, if software and services are included). In 1958, the computer hardware output value in the U.S. was only .1% of the GNP, equivalent to the present situation in China. But 20 years later, its output value represented 1% of the GNP, a growth rate 10 times higher than the GNP. If compared with the U.S. electronics industry, the computer hardware annual output value jumped from 7% to 50% of the total output value in the same two decades, a growth rate seven times faster than that of the electronics industry.

In the other economically developed countries, the annual growth rate in computer industry output value averages more than 20%. Then what about China's?

At present, China has more than 300,000 industrial enterprises, a vast potential market. As the reform of management systems develops in depth, the demand for computers will inevitably become greater and greater. By 1990, several thousand backbone industrial enterprises will have installed mainframes and minicomputers. By the end of the century, this figure will rise to several dozen thousand.

If one considers the need for computers in finance, trade, commerce and administration, the number of installed mainframes and minicomputers may reach several hundred thousand. And applications of various types of microcomputers will involve huge quantities of those devices, too.

Therefore, as in other developed countries, China's computer industry will grow dozens of times in 20 years, at a speed much higher than

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that of the gross output value of industry and agriculture.

To satisfy users' needs, the computer industry must provide not only mainframes and related peripheral equipment but also system software, application software, system design and consulting, maintenance and training services. All these elements come together to form a complex product — a computer system. To the end user, each element is indispensable.

When an experienced user purchases a computer, he will pick the best one after comparing price, functions and quality with other models. Therefore, China's computer industry must balance product development to meet the users' needs. At present, computer product development in China is seriously out of proportion. For instance, disk drives are a weak link in peripheral equipment, and maintenance services are almost nonexistent.

With a balanced product base, the industry must also adjust its organizations and personnel structure. In this system, attention should be paid to consulting, systems analysis, maintenance, personnel training, marketing and other service departments. The industry should have a massive contingent working in all walks of life. Feedback information from the field will be an important basis for decision making at the top level.

In the U.S., IBM and Digital Equipment Corp. have one-third of their workers and staff members working at these service departments. IBM has 100,000 people, DEC 16,000. In China, we have very few people doing the same kind of jobs. This wide gap is one reason for the slow development of our computer industry.

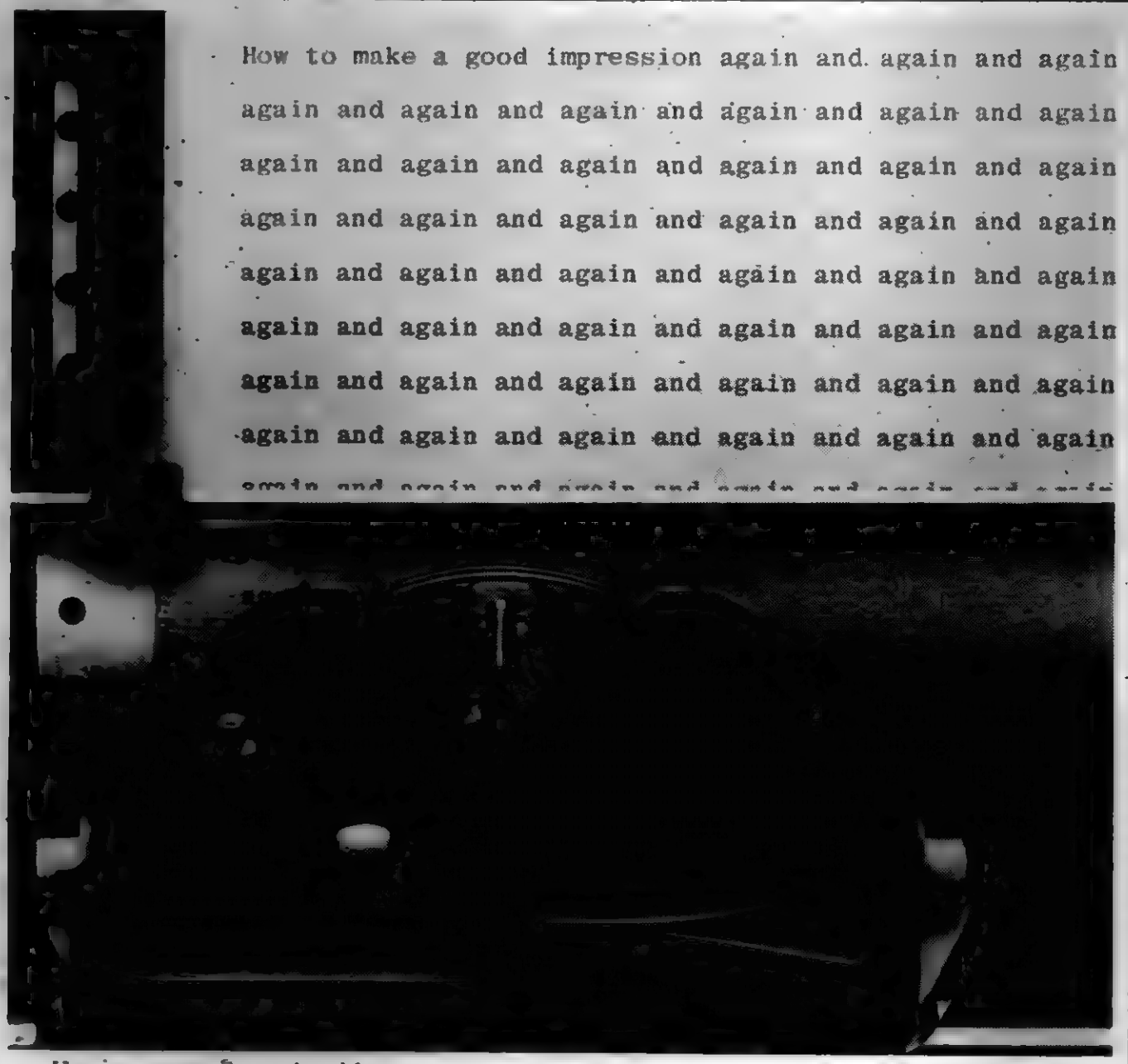
At present, computer product development in China is seriously out of proportion. Disk drives are a weak link in peripheral equipment, and maintenance services are almost nonexistent.

Another weak spot in the industry is the poor management system. Most computer factories in the country are isolated and small enterprises. Each does what it thinks is right. How can such a situation suit the needs of a rapidly developing industry? It is high time that big corporations be organized to improve the management system and to speed up computer production.

Developing Software

Application software is the key to computer industry development. Without that software, the computer is useless. Generally, computer manufacturers can supply application software, but only for general purposes. Some large-scale application software still has to be written by software personnel on the user's side.

The expenses of what is called the "user's second development" usually exceed hardware expenditures, and the process takes a long time. Software personnel on the user's side are important members of the computer industry. Without their hard



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CAN CHINA CATCH UP?

IN DEPTH

working, computers could not have played miracles.

There are about half a million software workers in the U.S. About 80% of them work in user companies. This figure is much greater than the total staff and workers of IBM. In the Soviet Union, there are about 200,000 application software people working at the All-Soviet Automatic Management System (ACY). But there are only 40,000 technicians for software and hardware development of the EC series computers that serve the ACY.

These figures show that application software people are much more than product development technicians (software and hardware people together). If these people are not trained on a regular, timely basis, computer applications become merely empty talk.

To explain how many application software people China needs, I give the following example. If 5,000 information systems were to be put into use by the end of the century and each system had 40 software people, the whole country would need 200,000.

Though China has a very limited number of application software personnel for the time being, it has very rich human resources.

Model	Word Size (In Bits)	Memory Size	Speed (Operations per Second)	Factory
DJS-101	16	8K to 32K bytes	400,000	Huadong Teachers' University Scientific Instrument Factory
DJS-110	16	4K to 12K bytes	80,000	Changzhou Radio Factory No. 2
DJS-112	16	4K to 32K MOS	150,000	Changzhou Radio Factory No. 2 Shaoguan Radio Factory
DJS-130	16	32K bytes	500,000	Suzhou Computer Factory Weifang Computer Factory Beijing Computer Factory No. 3 And two others in Tianjin
DJS-131	16	32K bytes	500,000	Shanghai Computer Factory
DJS-132	(Upgraded DJS-131)			Tianjin Radio Technology Institute Tianjin Electric Instrument Factory Suzhou Computer Factory
DJS-135	(Same as DJS-130, temperature resistant -15°C to 45°C)			Tianjin Radio Factory No. 2 Yunnan Electric Equipment Factory
DJS-140	16	64K to 128K	800,000	Beijing Computer Factory No. 3 Jinzhou Computer Factory
DJS-142	16	.5M bytes		Jinzhou Computer Factory
DJS-153	16	32K to 128K MOS	1-1.4 million	Tianjin Radio Technology Institute No. 785 Factory Suzhou and Weifang Computer Factories
DJS-154	16	32K bytes	200,000	No. 738 Factory, Dalian Radio Factory
DJS-183	16	28K bytes	500,000	No. 830 Factory, Hubei Radio Factory
DJS-184	16	32K to 128K	400,000-500,000	No. 1915 Institute
DJS-185	16	16K to 124K	500,000	Shanghai Computer Factory
DJS-186	16	16K to 128K MOS	1 million	No. 1915 Institute

Minicomputer Models Manufactured by Chinese Factories

The shortage of application software people could be solved by teaching computer applications in colleges and training staff technicians in a planned way.

From a long-term point of view, the computer industry will take over more and more of the development of large-scale application software now done mostly by the users themselves. As a result, the software industry will gradually take shape; and the users' second development will gradually decrease.

The computer will eventually appear to users as an almost wholly "complex" product.

In China, some end users have worked to develop application software. They should be encouraged. However, as there is not yet a way to evaluate software and no copyright law to protect it, their work has not been rewarded properly and their initiative is dampened. The state must work out a law to protect software products and find a way for software evaluation. Otherwise, the software industry can never be developed.

Putting Reputation First

When a user buys a computer, he means to use it to solve problems in his work and achieve economical results. If the computer breaks down

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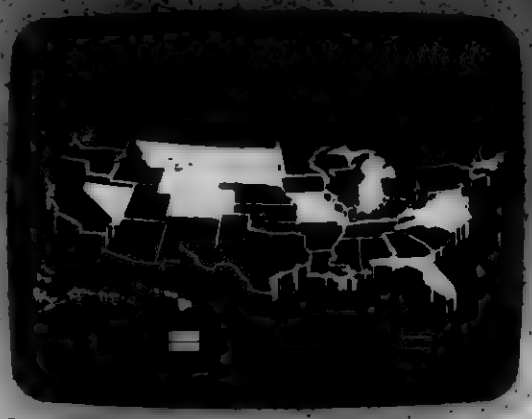

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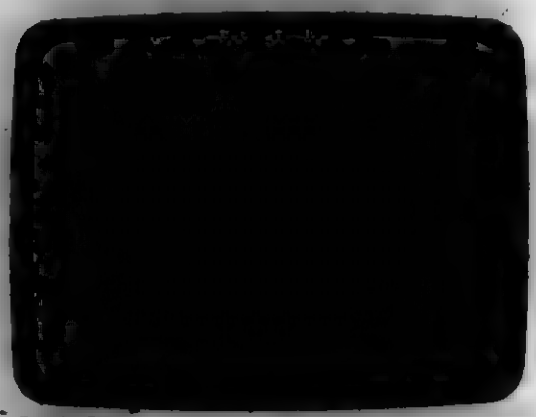

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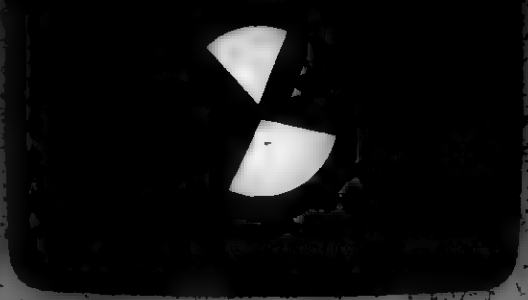

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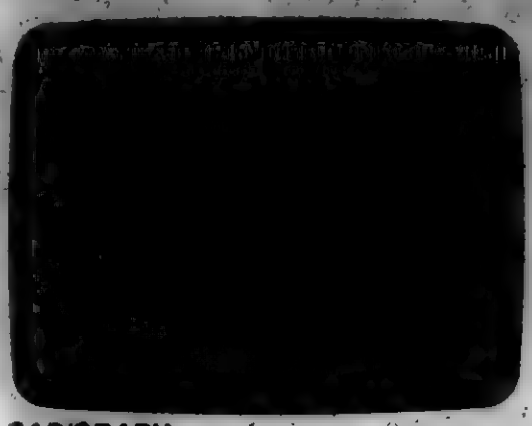

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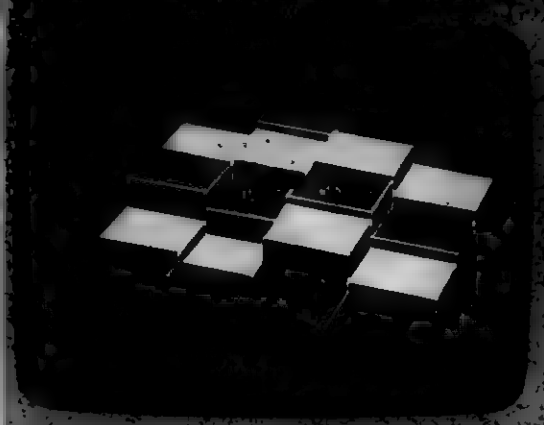

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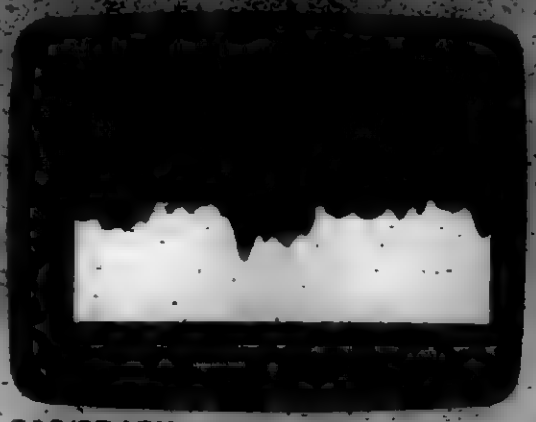

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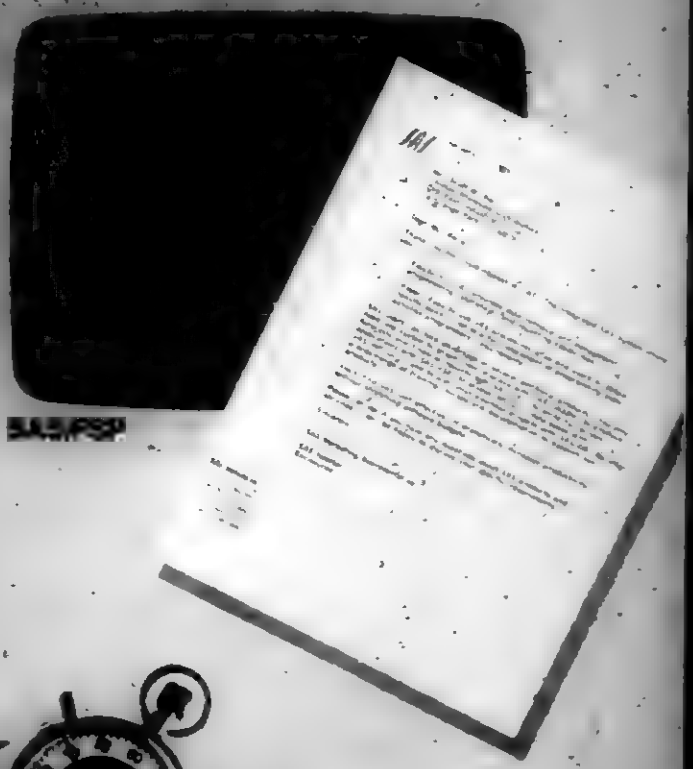

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IN DEPTH

and cannot be repaired within minutes, routine work has to stop and the user suffers heavy losses. Every one of us in the computer field must have a clear understanding of such consequences. Our products should have good quality, reasonable price and backup services. "Reputation" means making users completely satisfied.

Building up reputation is easier said than done. Though some computer factories in China have begun to do so, homemade [domestic] computers in general are not of high reputation. At present, especially when some computer products have lost their reputation in one way or another, doing one or two good things can by no means redeem one's reputation. Only by doing thousands of good things in a period of several years can a factory redeem and build up its own reputation.

The state has worked out some policies to restrict importation and protect domestic industries. But these policies need improvement. The state should also formulate a plan concerning the development of technologies so that the computer industry can grow according to social needs.

Therefore, the computer industry should put a high priority on building up its reputation and should treat that reputation as a lifeline. Without it, there will be no computer industry for China.

As an integral part of the national economy, China's computer industry must develop proportionately, in a planned way. But what is meant by "in a planned way"?

Usually it takes three to four years to develop a medium-size system or minicomputer. While the product is being prepared, production lines must be set up and industrial production capacities determined. Personnel must be trained to work at maintenance service centers to be built throughout the country. This process requires a huge investment. The cost to put a new model into production might reach tens of millions of dollars, or five to seven times more than the development expenses.

After a new model is put into production, it should be manufactured for a certain period (say five years) and sold in certain numbers (say 1,000 sets). Otherwise, the investment will not be able to return profits. After that certain period, the system should be replaced by another more advanced model. This is what "in a planned way" means.

Such ideas actually are quite common knowledge. But in reality, they are not so easy to be carried out. For instance, we are developing and trial-producing a new computer model equivalent to the international level of the late 1970s and early 1980s. In three or four years, it will be put into production. But computer technology advances very rapidly in the world. By the time the new model is ready for volume production, some more advanced foreign-made models with better cost/performance will have already entered the Chinese market. They will inevitably have a strong impact on the domestic model. The very existence of the computer factory will be threatened and the production plan seriously affected.

This situation is not a hypothesis. As a matter of fact, some Chinese factories that have undertaken to develop new models are sitting under the sword of Damocles. How can they have the resolve and courage to put in more financial and human resources for mass production and backup services? Such a new model might well come to a premature end. Even if it did go into operation, it may not be manufactured on a mass scale. The price might be too high, quality too low and maintenance services unprepared. What a worrying picture this is!

However, we should not be that pessimistic. True, China's computer industry is still young and lacks competitive ability. The state has worked out some policies to restrict importation and protect domestic industries. But these policies need further improvement.

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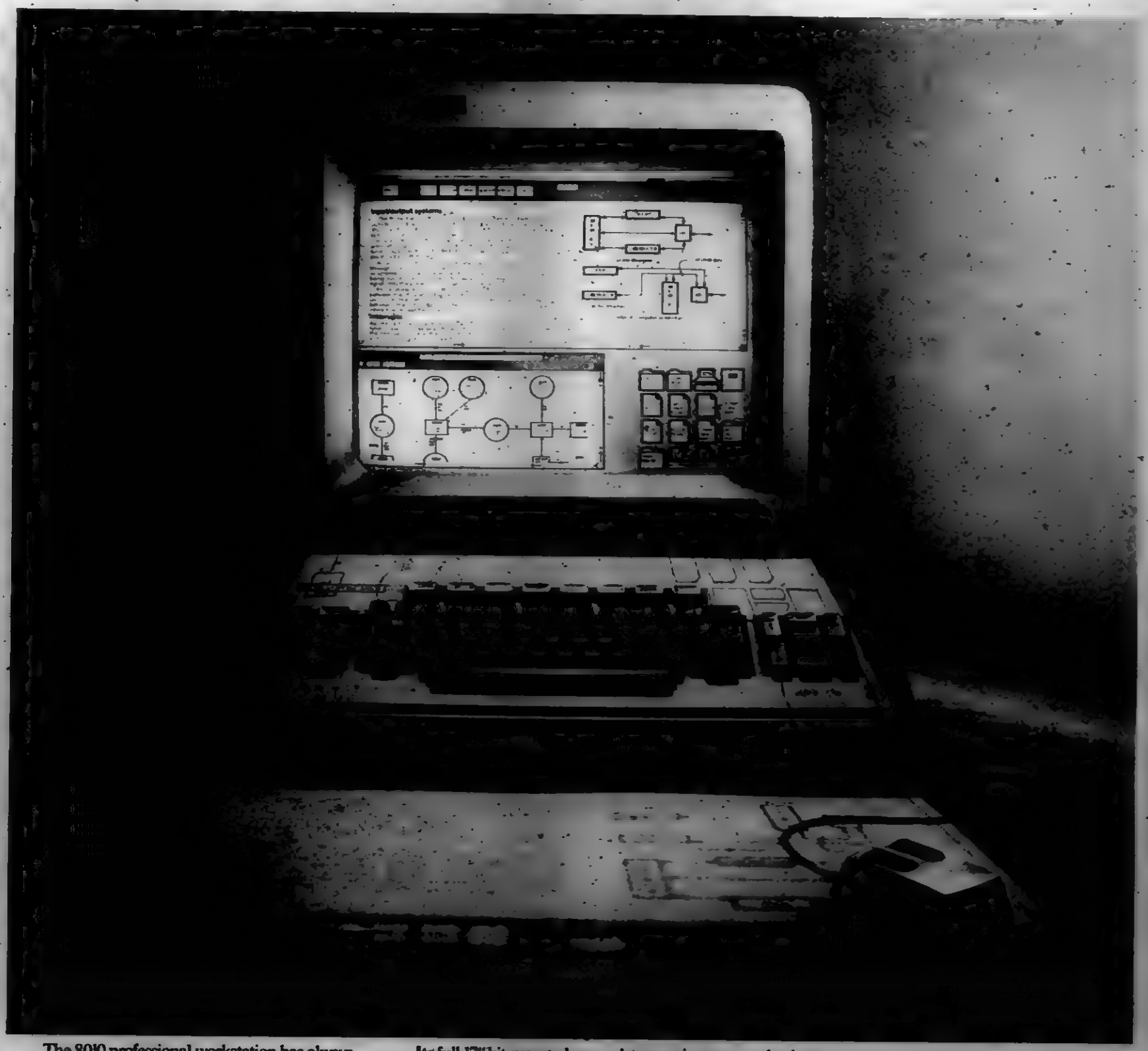

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The state should also formulate a series of policies concerning the development of technologies so that the computer industry can grow according to social needs and based on a state plan. Such policies would greatly encourage factories to manufacture new models on a trial basis and would protect them from outside disturbance. They could become fully confident so that they could invest more financial and human resources in developing new computer models.

With such a program, there should be no problem of guaranteeing the quality, forming capabilities for mass production, training a maintenance force and setting up service centers. Consequently, users would be satisfied, product reputation built (though gradually), the national computer healthily developed and the four modernizations in China sped up. What a bright future that will be!

Over the past few years, China's minicomputer output has dropped markedly because of the powerful impact of imported minicomputers. Some computer manufacturing factories suddenly found themselves in a tight corner — though temporarily, in most cases. Nevertheless, the total number of Chinese-made minicomputers installed over the same period has been increasing.

This fact shows China still has a potential market for minicomputers. There is a bright future for domestic manufacturers if they can turn out minicomputers with reliable quality and good cost/performance.

At present, Chinese minicomputers (especially the DJS-100 series) have an average mean time between failures (MTBF) of more than 1,000 hours. This is a big stride forward in stability and reliability. When DJS-130 came into being in 1974, its MTBF was only 50 hours. That figure jumped to 500 hours in 1980. Now some DJS-130s have an improved MTBF of 2,000 hours.

Meanwhile, the minicomputers China has imported from abroad are not without problems. There are 22 DEC PDP-11/34s being used in east China. A total of 128 malfunctions were recorded in two years. Some machines had several malfunctions in a row.

Spare parts are also a serious problem in maintaining the imported minicomputers. One PDP-11/34 had to stop working just because of the damage to a safety device — no spare parts were available. This problem does not exist with homemade computers.

Among the minicomputer models manufactured in China, DJS-153, 142, 185 and 186 have reached the middle and high-end levels of similar models made abroad. Their hardware and software functions are not second to that of the PDP-11/34. S-16, a new model soon to be put on the market, has further raised the quality and reliability of Chinese-manufactured minicomputers to a new high.

There is the possibility that China's minicomputer manufacturers could catch up with advanced world levels if they fully utilize their own strong points and learn advanced computer technology from abroad. Supported by correct policies from the state, they might recapture the minicomputer market in China in the long run.

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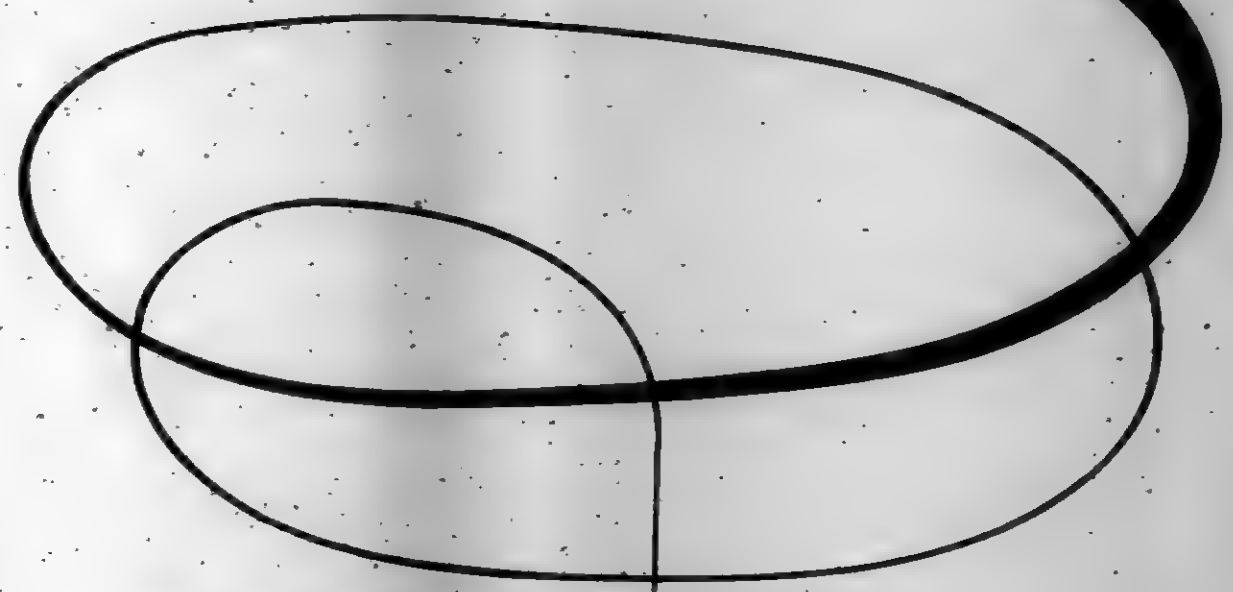
AN SNA PRIMER FOR PROGRAMMERS Part 1

By David M. Baer and Jim Sturch



The programmer/analyst and the communications specialist often speak different languages. After all, to the typical programmer, "able baker" could easily designate an individual capable of producing a credible croissant, while asking a person involved with communications to "scratch a data set" might be interpreted as a request to vandalize telephone company property.

It is not surprising, therefore, that a programmer frequently meets with failure when he attempts to improve his knowledge of the IBM environment by learning something about Systems Network Architecture (SNA). Most written material on the subject originates with people whose primary expertise is communications.

With this basic problem in mind, we offer a "grass-roots" overview of SNA as an introduction for those who do not speak the language of communications specialists.

This discussion is intended for the programmer who would like a general explanation of how information flows between points in an SNA network, for the potentially serious student who needs a starting point for a more extensive education and for the project manager who would like to be able to look systems programmers straight in the eye, even as they speak of NCPs, NCCFs and NPDAs.

SNA did not burst upon the scene fully developed; the technology's power and flexibility have expanded continually since its introduction in 1974. It is educational to follow that evolution to understand not only what the various SNA hardware and program products

IN DEPTH

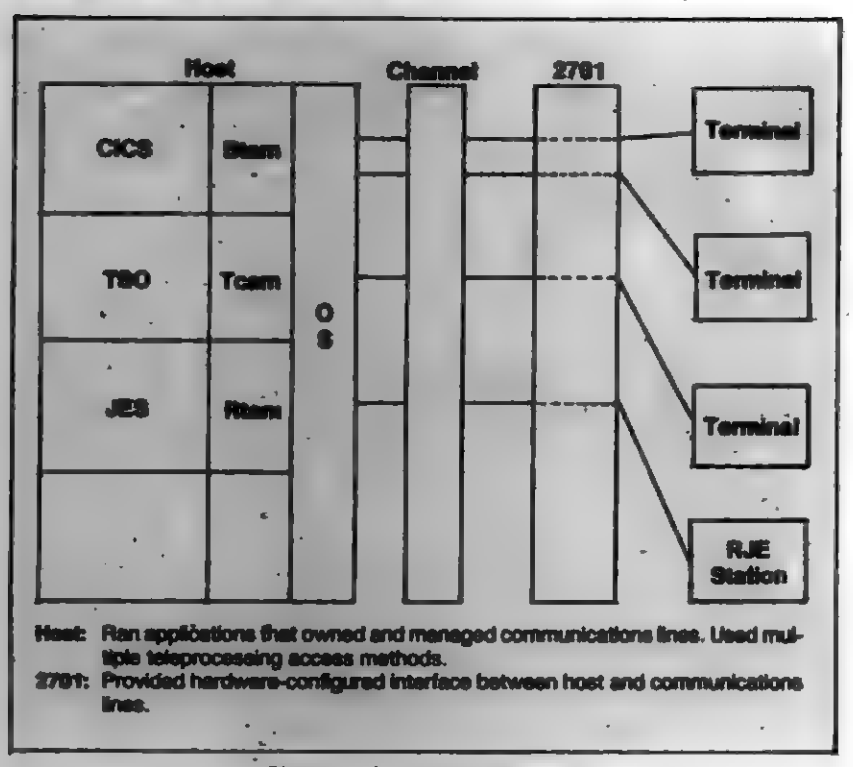


Figure 1. Pre-3705 Networks

are, but also their reasons for being.

In the early '60s to early '70s, before the first release of SNA products, a typical environment would have been similar to the one shown in Figure 1. The host computer, a 360 or later a 370, ran applications that owned communications lines, which were assigned a unique and fixed subchannel. A terminal connected to TSO, for instance, was owned by TSO and could not access any other application. The lines also used a predetermined protocol that dictated the type of terminal required.

This inflexibility resulted in wasted potential network resources and unnecessarily high communications costs. Finally, no capability existed for host-to-host communications; the structure was strictly limited to a master/slaves relationship.

Within the hosts, applications would accomplish network communications using one of several telecommunications access methods. As Figure 1 illustrates, TSO used Tcam, CICS and IMS generally called upon the services of Btam and JES used a less familiar access method, Rtam. None of these access methods were compatible, however. For instance, TSO could not communicate via Btam. Clearly, a universal telecommunications access method was needed to permit flexible network utilization, as well as to provide a standardized foundation upon which to base future telecommunications program products.

Devices in communication with the host could be connected directly to the channel or could interface to a front-end communications controller, the 2701. The 2701 was a nonprogrammable, hardware-configured device; hardware modifications were required to change the interface.

Enter the 3705

A new communications controller, the 3705, was introduced in 1972. While it was later to become one of the cornerstones in the SNA hardware product line, its initial function was to replace the 2701. Though it performed the same network role, it offered more attractive price/performance characteristics and, more significant, it was programmable. This feature allowed it to function as a 2701 look-alike by employing an emulation program; it also allowed network modifications to be introduced far more easily. However, a more important aspect of the 3705 was that it set the stage for the introduction of the first true SNA networks.

In 1975, IBM introduced two major program products and compatible hardware in the 3270 product line that supported an approach to network management dramatically different from the one preceding it. An example of an initial SNA configuration is illustrated in Figure 2.

In the host, a universal telecommunications access method was provided which ran in its own partition. The Virtual Telecommunications Ac-

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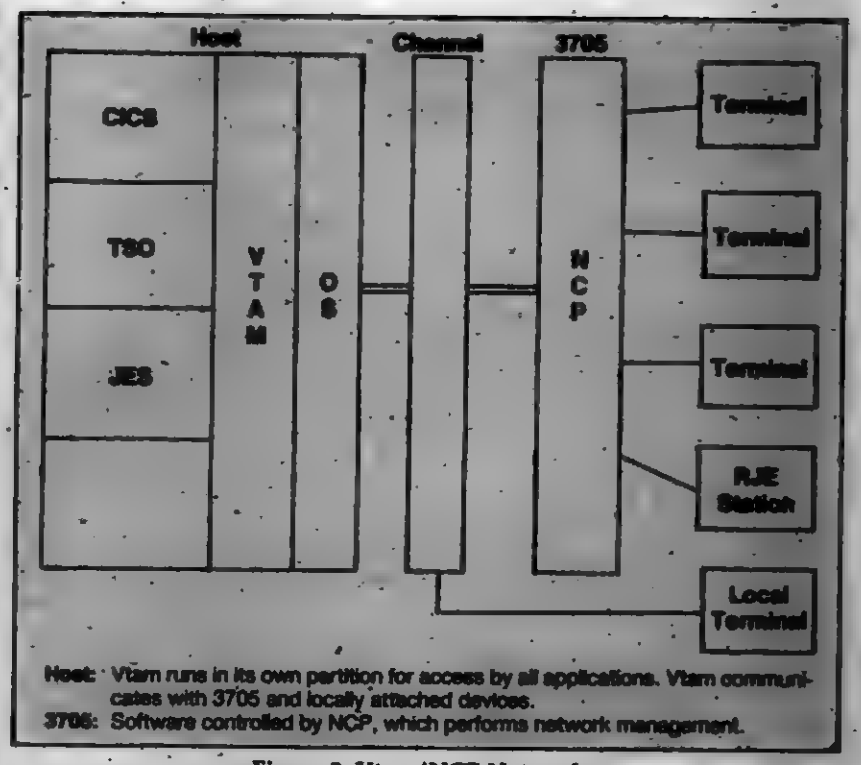

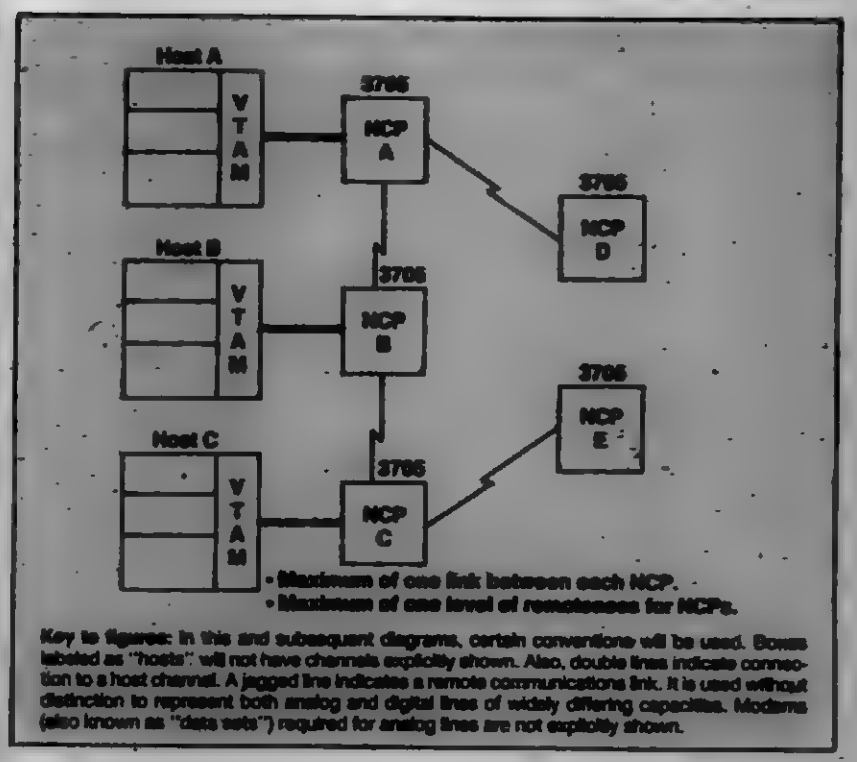

Figure 2. Vtam/NCP Networks

cess Method (Vtam) was available to all application subsystems such as TSO, IMS and CICS to receive and direct network messages to locally attached terminals, 3705s and other applications within the same host. Vtam provided the additional benefit of being able to supply a level of communications error recovery above that of the application.

Also significant was the fact that Vtam owned all the resources of the network, which permitted a degree of network flexibility previously unachievable; the applications no longer owned the communications lines they used. This meant that a single terminal on a fixed line could now be used to communicate with a variety of applications.

A Vtam-compatible software package was introduced at the same time to run in the 3705. The Network Control Program (NCP) provided additional support for the networking environment. It allowed communications with Vtam using only a single subchannel between the 3705 and the host. It assumed additional network management responsibilities such as polling, which previously had been accomplished by the host. It also supplied another level of error recovery between the application and the devices in communication with it.

There were problems of stability in the early SNA networks, as might be expected of any new, highly complex technology. There were also limitations: The network was essentially still limited to a master/slaves configuration, and multiple hosts could be integrated into a single network only with great difficulty.

These problems and others were

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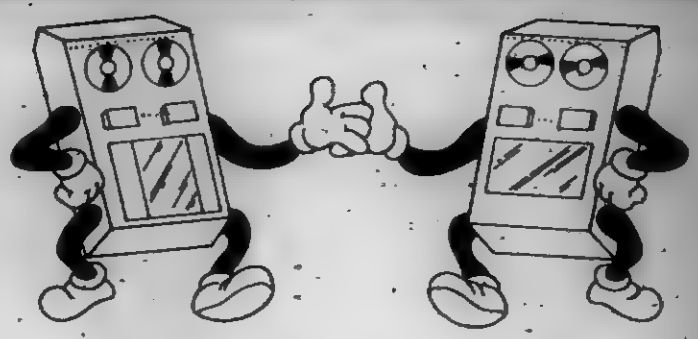

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alleviated in 1978 with the release of a new set of Vtam/NCP packages extended with the Advanced Communications Function (ACF). These new releases provided improved stability and application interfaces, as well as better operator facilities. ACF/NCP offered the ability to alter device configurations dynamically on the network; it also provided improved testing and error diagnosing/reporting capabilities. ACF/Vtam supplied corresponding support for these features. Furthermore, ACF/Vtam and ACF/NCP supported and were compatible with several new program products that dramatically improved network flexibility and network management capabilities.

A major evolutionary event in the history of SNA occurred in 1981 with Release 3 of ACF, a new level of SNA software intended to support expanded network capabilities.

The ability to integrate multiple hosts in a single network was provided with a new feature of Vtam, the Multiple System Network Facility (MSNF). An example of a multihost system is shown in Figure 3. MSNF supplied the capability for any terminal in the network to be in session with an application in any host. It also supported application-to-application sessions between two separate systems. A related product, Network Job Entry (NJE), provided further capabilities for processing in multihost systems. With it, batch jobs could be transferred from one host to another for execution, and job output could be transferred among hosts for printing or browsing.

A powerful tool to assist operators in network definition and monitoring became available with the Network Communications Control Facility (NCCF). Running as a Vtam application, it provided a program operator interface to Vtam, accepting commands from the NCCF operator and passing them along to Vtam. It permitted the creation of a network master terminal to which Vtam messages from all hosts could be channeled, while collecting those messages in a single log. NCCF also supplied a capability for defining and executing command lists similar to Clists in TSO.

NPDA Services

With large networks of complicated configurations now possible, a tool to assist in troubleshooting network problems was needed. This capability was made available with the Network Problem Determination Aid (NPDA). It is a Vtam application program that runs as a task of NCCF. NPDA performs a wide range of problem-determination services:

- Recording error statistics on network resources.
- Providing interactive and dynamic display of current networking conditions.
- Maintaining history data bases on network resources.
- Generating alarms as resources approach on overload state based on predefined threshold values.
- Permitting concurrent testing and production usage.
- Determining and reporting on probable cause of failures.

Performance monitoring in general also needed automation, and this ability was provided with the Network Performance Analyzer (NPA). Resources that it could monitor included utilization of lines and 3705 processors and buffers; message rates of lines and logical units; and error rates for lines, physical units and logical units. It further provided threshold reporting on error rates, data rates, queue lengths, 3705 utilization and polling rates.

All of this collected information was maintained in a data base for subsequent reporting and interactive retrieval. Performance analysis functions did not extend to the NCP; however, this feature would come in a later release.

ACF/Release 3

The next major evolutionary event in the history of SNA occurred in 1981 with Release 3 of ACF, a new level of SNA software to support expanded network capabilities. Extensions to Vtam included the ability to

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specify classes of service and network priorities for network traffic. This was particularly useful in networks incorporating satellite communications channels, with their high capacity but relatively long transmit/receive delays. It was also beneficial where network traffic consisted of both batch and interactive transmissions. NCP extensions further expanded network possibilities.

Transmission groups, which are multiple parallel links between 3705s, replaced single links, and multiple transmission groups were permitted between pairs of 3705s. Remote-to-remote links were allowed; previously only one level of remoteness had been possible. Multiple session routing was supported where a session would select one of several predefined routes based on priority and availability. All of these capabilities contributed to improving throughput and ensuring reliability. Figure 4 illustrates the possibilities of networks at this time; compare it with Figure 3 to get an appreciation for the added capabilities.

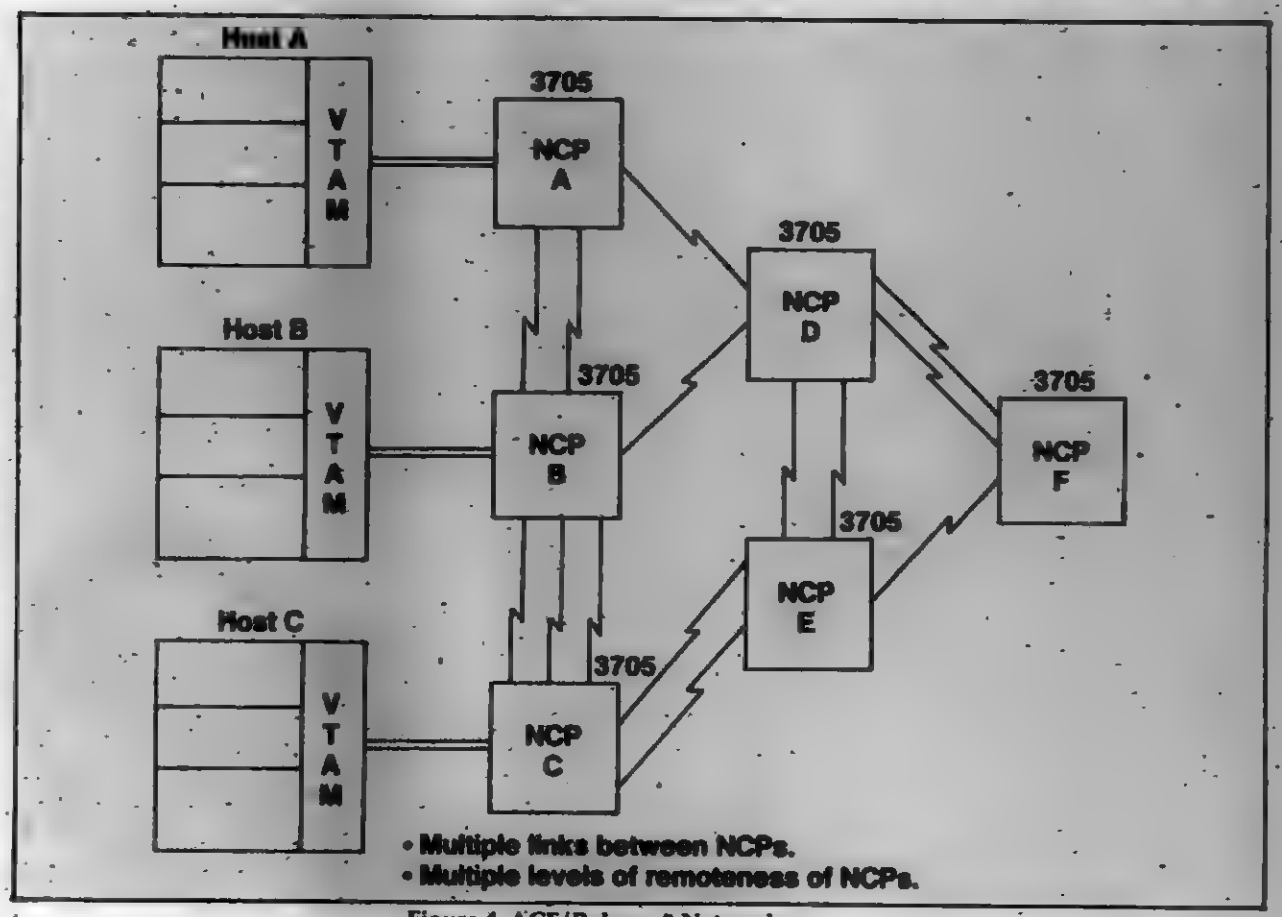

Figure 4. ACF/Release 3 Networks

SNA — Version 2

IBM is known for its ability to do a great many things well, but consistent naming of its products is not necessarily one of them. Version 2 of SNA, released in 1982, does contain several significant enhancements, but it is hardly the revolutionary advance one might expect of it, given its weighty designation. This latest release provides productivity aids for network systems programmers, and Network Performance Analyzer functions are now integrated into the NCP. Multiple system coupling, formerly a separately available option, is now a standard feature.

The most dramatic enhancement is the ability to link mainframes with direct channel connections without a communications controller in between. That suggests a number of interesting possibilities such as channel-connected dedicated data base machines.

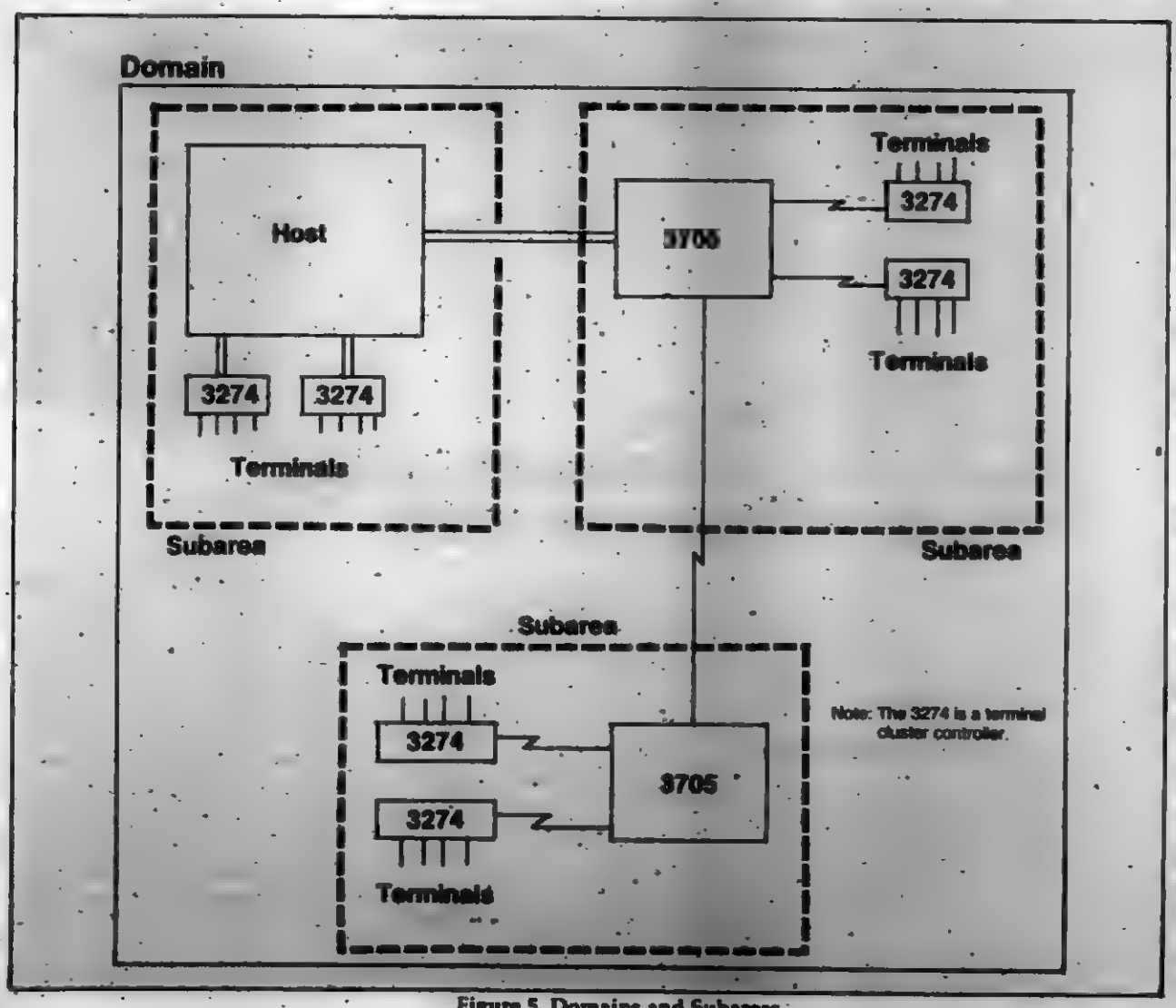

Figure 5. Domains and Subareas

Communications Architecture

Preceding each of the hardware and software products described in the previous section was a substantial body of concepts and specifications directing the design of those products, and that is what SNA really is. It is a set of definitions of protocols and formats under which to implement compatible communications products. SNA is not something tangible like a piece of hardware or a listing of software. The NCP, for instance, is not a part of SNA; it is a software product implemented to standards defined within the architecture.

Furthermore, it is unlikely that any SNA communications component will ever contain all the functions allowed in the architecture. Instead, each product implements only that portion of the architecture it requires to perform its function.

Another important aspect of SNA's scope is that it does not govern the method of implementation of any function; that is, it does not require that a given function be implemented in hardware or software or some predefined combination of the two. It does dictate the structures that a function must use and the protocols it must observe.

IN DEPTH

Finally, it needs to be understood that SNA is not a monolithic entity of implemented components which provide services that must be used to accomplish data communications. For example, while CICS uses Vtam as a telecommunications access method, within CICS are some functions duplicating services provided by Vtam. This was done because it was easier to directly implement those functions within CICS, and this in no way violates rules of the architecture.

Elements of the Architecture

Any data communications network consists of communications lines and all the nodes at which one or more of those communications lines terminate. In SNA networks, those communications lines are of two basic types: local lines connecting a device directly to a host processor's channel and remote lines interconnecting devices with serial data links, which range from slow analog telephone circuits to high-capacity digital satellite links. The nodes that the lines interconnect include such familiar objects as host processors, communications controllers, terminals and RJE devices.

A 48-bit address space permits a network of awesome proportions. No network with that many NAUs is likely to be created in the near future.

In every SNA network resides at least one central control and coordination facility. This is called the system services control point (SSCP); it resides in a host processor and may be thought of as the "brains" of Vtam. The SSCP is responsible for managing and allocating all network resources under its control. Those resources include not only the hardware components and communications lines, but also application programs known to the SSCP.

Any individual resource is known to the SSCP as having a unique network address, and thus this wide variety of network entities is referred to as network addressable units (NAUs). All NAUs under the control of an SSCP constitute a domain. For the moment, the discussion will be restricted to single-domain (single-host) networks, but the topic of multidomain networks will be explored later.

Within each domain are one or more subareas. A subarea is comprised of a host/SSCP and its locally attached NAUs or a 3705/NCP and its locally attached NAUs. A domain and its subareas are illustrated in Figure 5 (on In Depth/37).

There are basically two types of network addressing used in SNA: networkwide addresses and local addresses, known only within a subarea. Early SNA networks utilized a 16-bit network address, but it was foreseen that this would eventually be too restrictive. In the current definition of SNA, network addresses have two components: a 32-bit subarea address and a 16-bit element address within the subarea.

Now, a 48-bit address space permits a network size of awesome proportions, and no network with that many NAUs is likely to be created in the foreseeable future. However, it should be remembered that at one time, a 24-bit memory address space in the early 360 processors was thought to be more than sufficient. The new 3084 processors with their 31-bit addressability to real memory are presenting IBM with a major task in modifying its system software to accommodate the new memory capacity.

A shorter 8-bit address is used for localized data flow within a subarea. For example, a 3274 cluster controller can have a maximum of 32 terminals attached and clearly has no need to support full network addressing. The process of conversion between network and local addresses will be described shortly.

In addition to the SSCP, there are two other major types of NAU: physical units (PUs) and logical units (LUs). A PU may be though of as the manager of the physical resources of a node, and each node will usually contain exactly one PU. Most nodes will also contain one or more LUs; these are, effectively, interfaces between the end users and the network. An end user is an application program, a terminal operator or any other user of the network's communications services.

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IN DEPTH

It should not be inferred, as the names might suggest, that PUs are hardware implementations and LUs are software implementations. It is also untrue that LUs do not concern themselves with interacting with the physical processes of data transmission. PUs and LUs were defined as a mechanism for the distribution of functions and responsibilities within a node.

Four PU types currently exist in SNA:

PU Type 5 (PU.T5) is the physical unit of a host processor and is implemented within Vtam.

PU.T4 is the physical unit residing in 3705 and is implemented within the NCP. Currently, communications controllers are the only nodes that have only a PU and no LU.

PU.T2 is a cluster controller like the 3274.

PU.T1 is defined for pre-SNA 3270 terminals and is provided so that a large base of existing equipment could be incorporated into new SNA networks. While they may play a dominant role in many existing networks, their future architectural significance is limited and they will be disregarded here.

PUs of one type may communicate with PUs of any other type. Nodes containing a PU.T5 or PU.T4 are designated as major nodes, and PU.T2 nodes are designated as minor nodes. Thus, another way of defining a subarea could be to say it is a major node with all locally connected minor nodes.

There are six currently defined types of LUs which effectively define the mode of communications between two nodes. In most LU-to-LU communications, one of the LUs will have access to more powerful resources and will thus assume greater responsibilities in the management of the communications. The more powerful LU is designated the primary LU (PLU) and the other the secondary LU (SLU). Unlike PUs, LUs may only communicate with other LUs of the same type.

The types of LUs are:

LU Type 1 (LU.T1) is used for communications between an application program and a remote SNA printer or workstation using what is known as SNA character strings (SCS), which contain data and formatting commands. SCS have more flexible and appropriate commands for printer control than a 3270 data stream (LU.T3). Printers compatible with SCSs include 3287 and 3289 printers and 3777-type RJE workstations.

LU.T2 is used for communications between a 3270 display device and an application program. The data stream transmitted includes formatting commands embedded with the display data. The commands provide field attributes such as highlighting, color and modifiability and display formatting control information.

LU.T3 is similar to the LU.T2 except that the display device in this case is a 3270 printer running in 3270 data stream mode (as opposed to SCS mode). Originally, all 3270-type printers supported only 3270 data streams; SCS capabilities were added later to support LU.T1 communications. The data stream is very like that of a 3270 display station data stream, except that not all attributes are relevant or supported (for example, cursor positioning commands are irrelevant to a printer).

LU.T4 is used primarily to support much of IBM's office products equipment for both host-to-terminal and terminal-to-terminal communciations. The terminal-to-terminal type of communications is somewhat unique among currently defined LU types in that both LUs have the same capabilities and share the same responsibilities. This is known as a peer relationship.

LU.T6 supports communications between two application programs, whether they both reside within a single host processor or in separate hosts. It supports communications between two CICS regions, two IMS regions or even between a CICS and an IMS region.

It also allows user-written programs to communicate with CICS or IMS using a clean and documented interface. LU.T6 is a more intelligent protocol than those mentioned so far in that it has more sophisticated error-detection and recovery procedures and has access to more powerful data flow commands. LU.T6 pairs additionally have the capability to support parallel sessions (that is, multiple sessions between two single LUs).

LU.T0 is at once very like LU.T6 and very different from it. Like LU.T6, it is a very intelligent proto-

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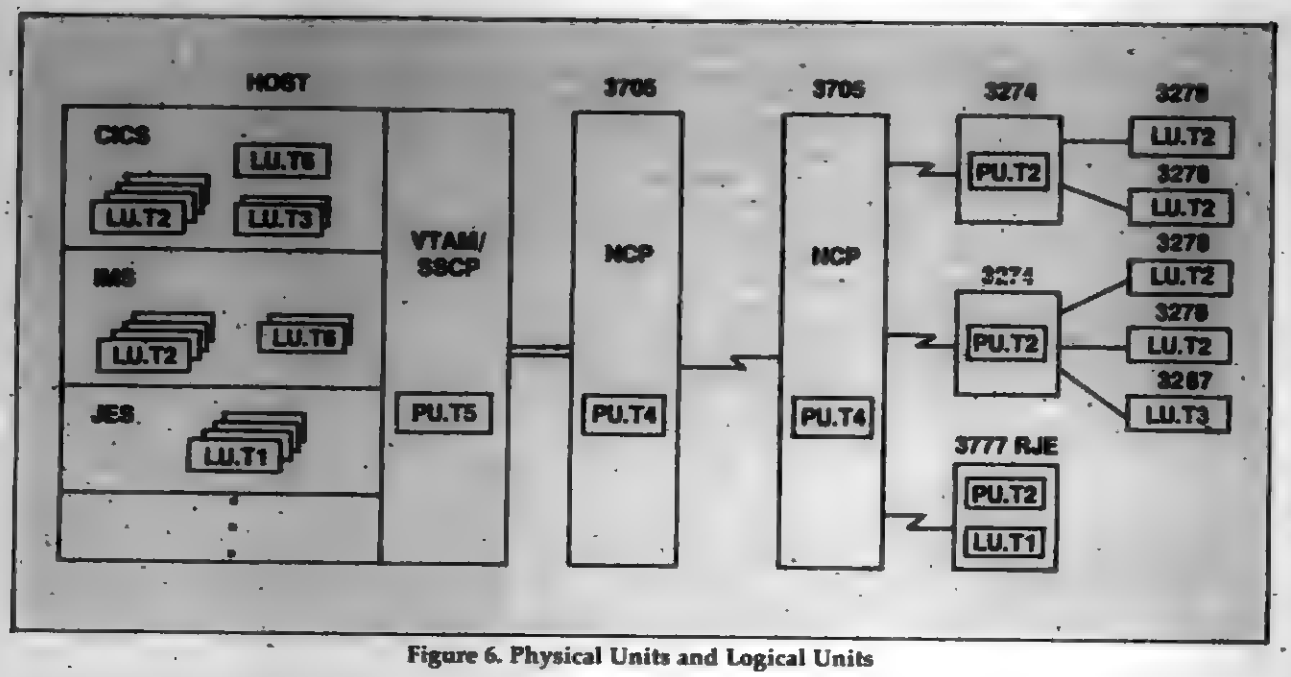

Figure 6. Physical Units and Logical Units

col and is suitable for application-to-application communications. But unlike LU.T6, which is very tightly designed, LU.T0 is open-ended. That is to say, it uses application-dependent message flows, and these may be tailored to meet the specific needs of the application. Also unlike LU.T6, it is not constrained to host-to-host communications. LU.T0 provides "roll-your-own" capabilities. It offers great flexibility, but the price paid is the added responsibilities that the application must assume in defining and regulating its communications.

We are almost at a point where a significant group of concepts can be tied into a comprehensible package. One more major SNA concept needs to be presented first: that of the session. First refer to Figure 6 in which various PUs and LUs are distributed in a single-domain network. Now, the whole purpose of the network is to enable communications between end users, and we know that the LUs are the interfaces between the end users and the networks.

The session is the basic mechanism that ultimately allows those LUs to communicate in coordination with their attached PUs and the SSCP. A session is the establishment of communications between two nodes. In a single-domain network, there are three types of sessions:

SSCP-PU sessions are established by the SSCP. They define the ownership of a PU by the SSCP and allow the SSCP to confirm a PU's active status.

SSCP-LU sessions are also established by the SSCP. They permit the SSCP to determine if the LU is available and willing to engage in a session with another LU.

LU-LU sessions may be established by either LU in cooperation with the SSCP. They are required before application data may be exchanged between the end users. The initiation of an LU-LU session involves establishing an agreement for conversion rules between the LU partners.

Using the simple network shown in Figure 6, we can follow the process of a user at a terminal logging onto an application like CICS as a basis for illustrating the types and sequence of session establishment.

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- First, the SSCP must establish a session with each physical unit (the host itself is a PU.T5 and the SSCP is effectively in session with itself when Vtam is brought up). The SSCP-PU sessions will be established either at the direction of control tables loaded into the SSCP during Vtam start-up or at the direction of the network operator at a later time. At this point, the only data that can flow is maintenance statistics.
- Next, SSCP-LU sessions are established with all LUs defined to the SSCP (or like SSCP-PU sessions, these may be explicitly initiated by a command from the network operator). It is at this time that the LOGON menus will appear on a terminal.
- The terminal may now be used to log on to an application in the host. The terminal operator enters the LOGON request, which is passed on to Vtam.
- Vtam then contacts the requested application, informing it of the terminal's desire to establish a session. If the application finds the terminal acceptable, it returns a request to BIND the LU-LU session.
- When the terminal sends back a positive response, the LU-LU session is activated, and the operator is now in a position to utilize the facilities of the application.

At the conversational level of a session between two end users, such as an operator in session with TSO, there is a dialogue that is much like two people conversing.

Thus, four sessions are involved in this process: an SSCP-PU, two SSCP-LUs and an LU-LU. The SSCP-PU and SSCP-LU sessions remain active after the LU-LU session is started and are available to initiate and service other LU-LU sessions.

Route Selection

In the preceding example of session establishment, there was no problem in deciding which data links to use in the exchange of information for any of the sessions, since there was only one route between the terminal and the host, and indeed this was always the case prior to Release 3 of Vtam.

But recall from the earlier discussion that with Release 3, several significant SNA enhancements made possible a selection of end-to-end transmission paths by providing multiple levels of remoteness for 3705s, transmission groups and parallel transmission groups between adjacent 3705s (as was illustrated in Figure 4). These new capabilities necessitated a mechanism by which the SSCP could select the most suitable route for establishing sessions, and thus were born explicit and virtual routes.

An explicit route (ER) defines an end-to-end path between two major subarea nodes (PU.T5 or PU.T4), one end of which must be a PU.T5. Major nodes between the end nodes must be PU.T4s. An ER definition specifies exactly one transmission group between each pair of major nodes along the route (a channel connection from a host processor to its local 3705 is considered a transmission group). ERs must be reversible (that is, the physical path information uses flowing in one direction must be the same physical path on which it flows in the opposite direction).

ERs define only a data path; they cannot be assigned with attributes such as priority. However, ERs are used as the basis for the definition of virtual routes, which do have those attributes.

A virtual route (VR) is used to define the path between two LUs in the network. A VR must be mapped onto an ER from one end of PU.T5 to another major node along the route. But because a VR is between two LUs and an ER is only between major nodes, a route extension (REX) is used to complete the definition of a VR. Figure 7 (on In Depth/42) illustrates a network upon which is defined several ERs and VRs.

In choosing a VR for an LU-LU session, the SSCP will consult a table containing one or more virtual routes available for the session. It will assign a VR to a session based on a priority scheme assigned at network generation time. If this route is, for some reason, unavailable, it will attempt to assign the next highest priority route that is available.

Neither VRs nor ERs are physical circuits running from the originating node to the terminating node. Instead, information is packaged into transmittable units, sometimes called frames, which proceed one link at a time from node to node along the route. Upon receipt of a frame in an

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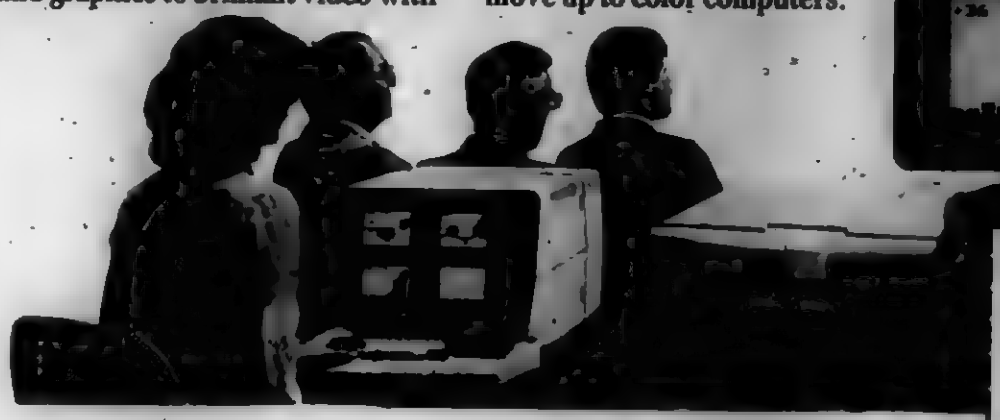

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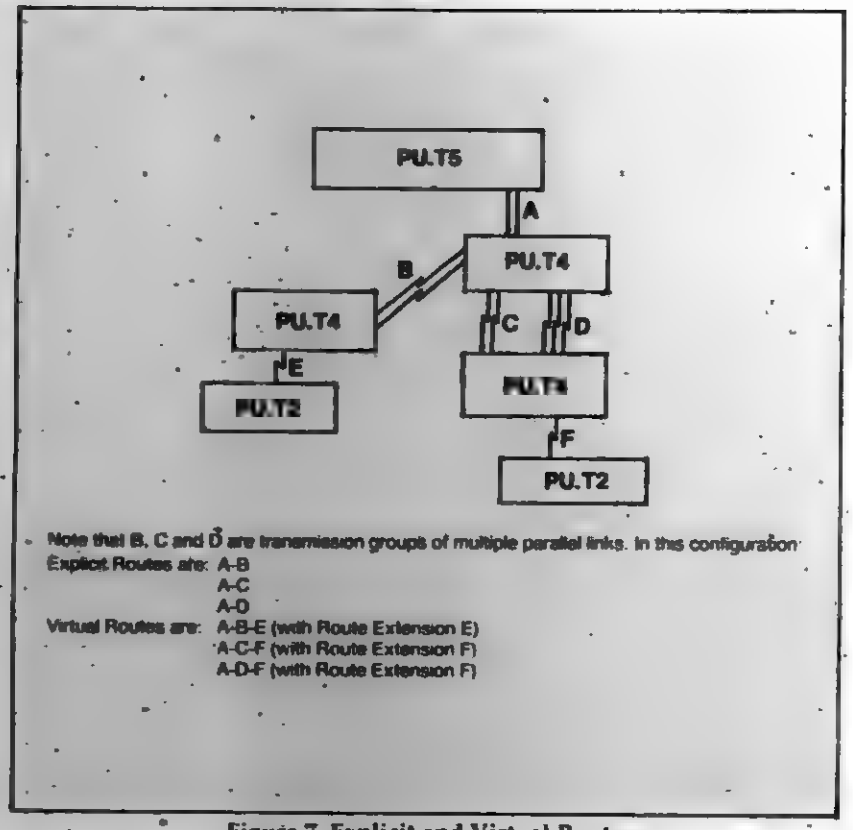


Figure 7. Explicit and Virtual Routes

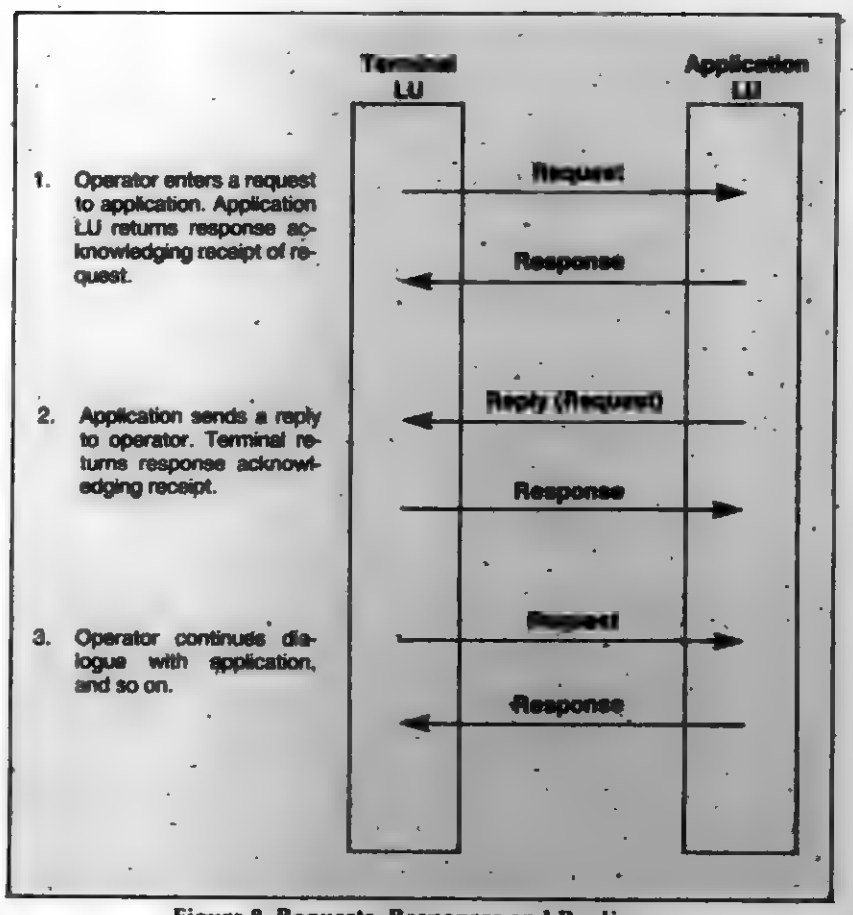


Figure 8. Requests, Responses and Replies

intermediate node's buffer, that node must determine the next node to which it must be passed, and it may have to retain the frame a short time until facilities for this forwarding process are available.

Those familiar with the concept of packet switching will recognize this method to be in that category.

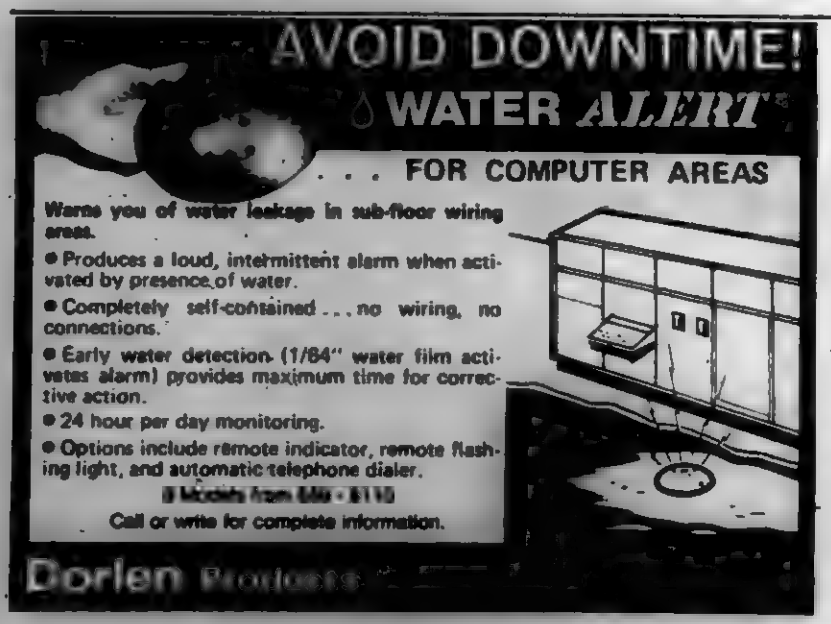
Transmissions, Acknowledgments

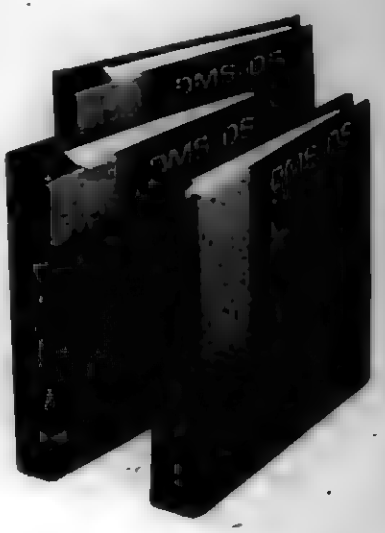
At the conversational level of a session between two end users, such as an operator in session with TSO, there is a dialogue that is much like two people conversing. The operator keys in a request for certain services, there follows a reply to the request which may in itself be another request, and the dialogue continues in this fashion.

At the network level, the terminology is different: Every transmission, whether that of a network command or user data, or a combination of those, is called a request unit (RU). This choice of terms may seem unusual; after all, why call a command or even a block of data a request? The reason is that the extreme level of cooperation needed among network components and the intricate protocols defined to ensure that cooperation require that most transmissions be, effectively, requests.

Thus, a command of "Do ABC" is usually implicitly "Can you do ABC? Answer yes or no." Likewise, a transmission of end-user data is usually implicitly "Will you accept this data? Answer yes if so." In SNA, the answers to requests are called request responses (RR); they are acknowledgments to the originator of a request that the request has been accepted or that a problem has been detected. There are several possible protocols for responses to requests:

Definite Response: A response is required whether processing is suc-





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cessful or not. The response will contain that positive or negative status.

Exception Response: A response is required only when processing detects a problem; otherwise, no response is required. In this case, a lack of exception response is implicitly a positive response.

No Response: No response is required, even when processing a request is unsuccessful.

The extreme level of cooperation needed among network components and the intricate protocols defined to ensure that cooperation require that most transmissions be, effectively, requests.

The response should not be confused with a "reply" at the conversational level of two end users. At that level, the dialogue is always exchanged in the form of RUs. The RRs are not visible to the terminal operator. Refer to Figure 8 for a simple diagram of this process.

Transmission Status

An RU flowing on the network may be sent as a normal transmission or designated as an expedited one. Normal flows account for the majority of RUs and usually include all end-user data. In normal transmission, RUs are queued and processed on a first-in, first-out basis.

However, if all RUs including network regulating commands were queued, situations could arise where a command issued to resolve a deadlock could not be passed through and acted upon because it would be awaiting resolution of the deadlock itself. Therefore, the expedited transmission is used to send many high-priority network commands. An expedited RU will always move to the head of a queue of RUs awaiting transmission.

Next week, in the concluding half of this primer, the authors will approach the "nuts-and-bolts" level of SNA more closely by examining the communications layers defined in the architecture, the physical contents of transmissions and some of the more important protocols supported.

About the Authors

David Baer has been active in DP for 15 years, specializing the last few years in architectural design of large-scale, on-line applications. He is now technical director of IBM mainframe application development for Tera Corp., a Berkeley, Calif., firm that provides proprietary software and hardware to utilities and general industrial clients.

Jim Sturch is an independent consultant and instructor in various areas of data processing. He currently specializes in the areas of MVS and SNA and teaches an SNA course under the auspices of the Mariposa Corp. of Larkspur, Calif.

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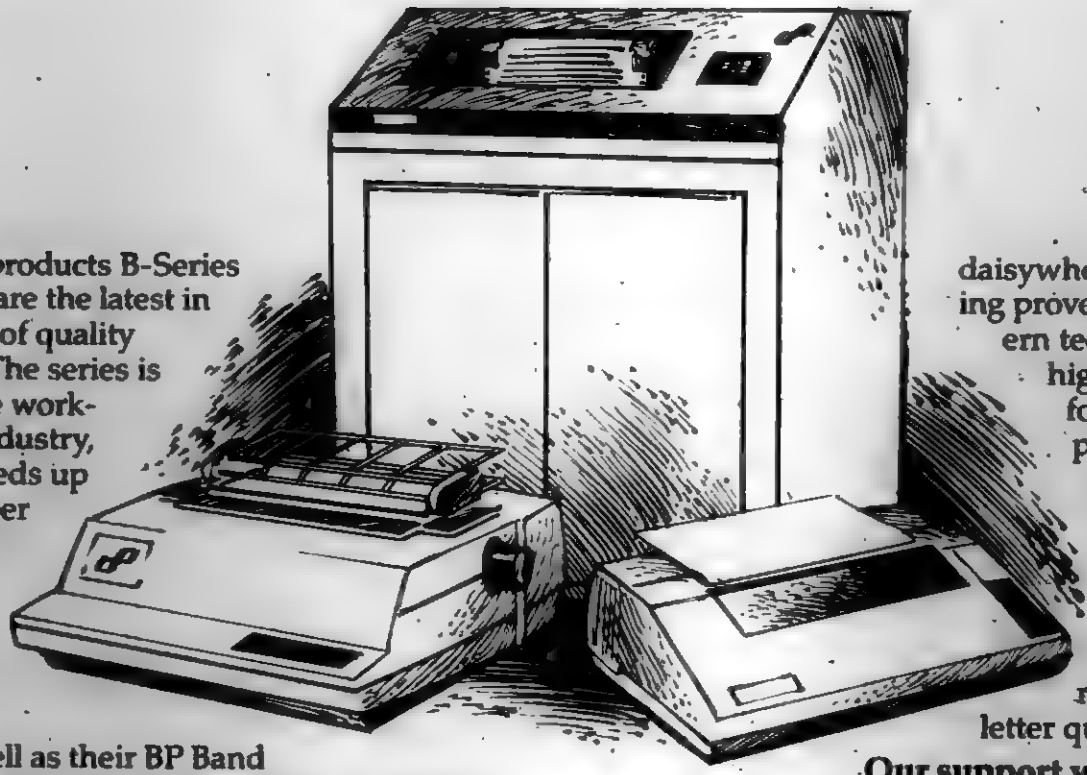

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On-Line Insurance

By 1990, insurance companies will keep information in true data bases, not copied from file to file. Underwriters and adjusters will have on-line access. Customers may even deal directly with the company's mainframe to apply for a policy or settle problems.

By Kenneth E. Lantz

Computer systems have greatly changed the operation of today's organizations, but . . .

• Input is still often batch, or if there is on-line input, it is input to a file for overnight update in batch mode. The input comes primarily from company employees, with a few exceptions, such as via automatic teller machines (ATM).

• Output usually takes batch form — reports delivered to company employees. Some limited inquiry is being used, but it is usually preprogrammed. A management information systems (MIS) analyst has anticipated exactly what a user might want to know, and a programmer has set up specific inquiry transactions to help him.

• Data is usually kept in what are really files, although we started calling them data bases more than 10 years ago. True data bases are single files updated and used by more than one system.

The average insurance company's systems typify today's systems. Data is still passed from system to system. For instance, the insurance policy system may pass information to the claims system with a substantial time lag. Often, the claims system has no direct way to access policy data. When a claim is entered, the adjuster quite often must input policy information manually at the same time.

The underwriting and policy issue processes are still a mixture of manual and computerized processes for most insurance companies.

When an agent or broker receives a request for coverage, he completes an application with information he receives from and about the prospective insured. The completed application goes to an underwriter, who uses rate tables, experience reports and actuarial studies to determine whether to propose coverage and what premium to charge. The underwriter prepares a quotation for the agent or broker to take back to the applicant.

The underwriter may have used the computer system to review rates. The experience reports he consulted may have been prepared on the computer. If he decides to cover the risk, the system may actually prepare the quotation. Then, if the applicant accepts, the

computer system may issue the binder and policy.

When there is a claim today, the insured may first call an adjuster to alert him to the possible loss. The adjuster gathers preliminary information from the insured and then calls the insurance company's claims department.

Claims department personnel establish a paper file and enter some data into a computer system. Part of that data may be information about coverage that is not available from the policy management system.

Claims department management assigns supervisors, attorneys and adjusters. Reserves are established, reinsurers notified, payments made, reports produced and someday, with luck, the claim will be closed.

In current insurance systems, employees usually work with batch input and output that is processed by computer systems whose primary function is to perform relatively simple, repetitive, voluminous tasks. The evolution of today's systems has been limited by how much hardware and software has developed and by how much the systems designers have understood the organization's operations.

Future Systems

Computerized systems will have changed more by 1990 than we think possible. They will truly become what we now claim they are.

Input that doesn't come from other computerized systems generally will be entered through an on-line update process and may be entered by nonemployees. Responses to inquiries, which are a form of output, will be made on-line if they are not voluminous. Some reports will still be generated, but many transactions may be produced on-line, possibly with later paper confirmation. Also, some output may go directly to nonemployees.

Information will be kept in true data bases, not copied from file to file either by computer or, as in the earlier claims example, manually. We should no longer need to ask questions about the data, such as, "What date was it entered? Was it copied after yesterday's or today's file update?"

An important feature of the coming operational systems is that they will allow whoever needs to work with the data — an actuary, accountant or a product development manager — to examine, manipulate and analyze it while sitting at a workstation.

The production, communication, storage and use of information through computerized systems will occupy much of the business day for most people in such segments of American industry as insurance and banking. In 1990, a prospective insured may learn about a new type of policy through a videotex "commercial" from the insurance company. If he wants to apply, the videotex system will connect the insured's home terminal to one of the insurance company's mainframes.

The mainframe will collect and evaluate background information on the customer, determine whether to provide coverage, rate him and give a quotation — all while he waits.

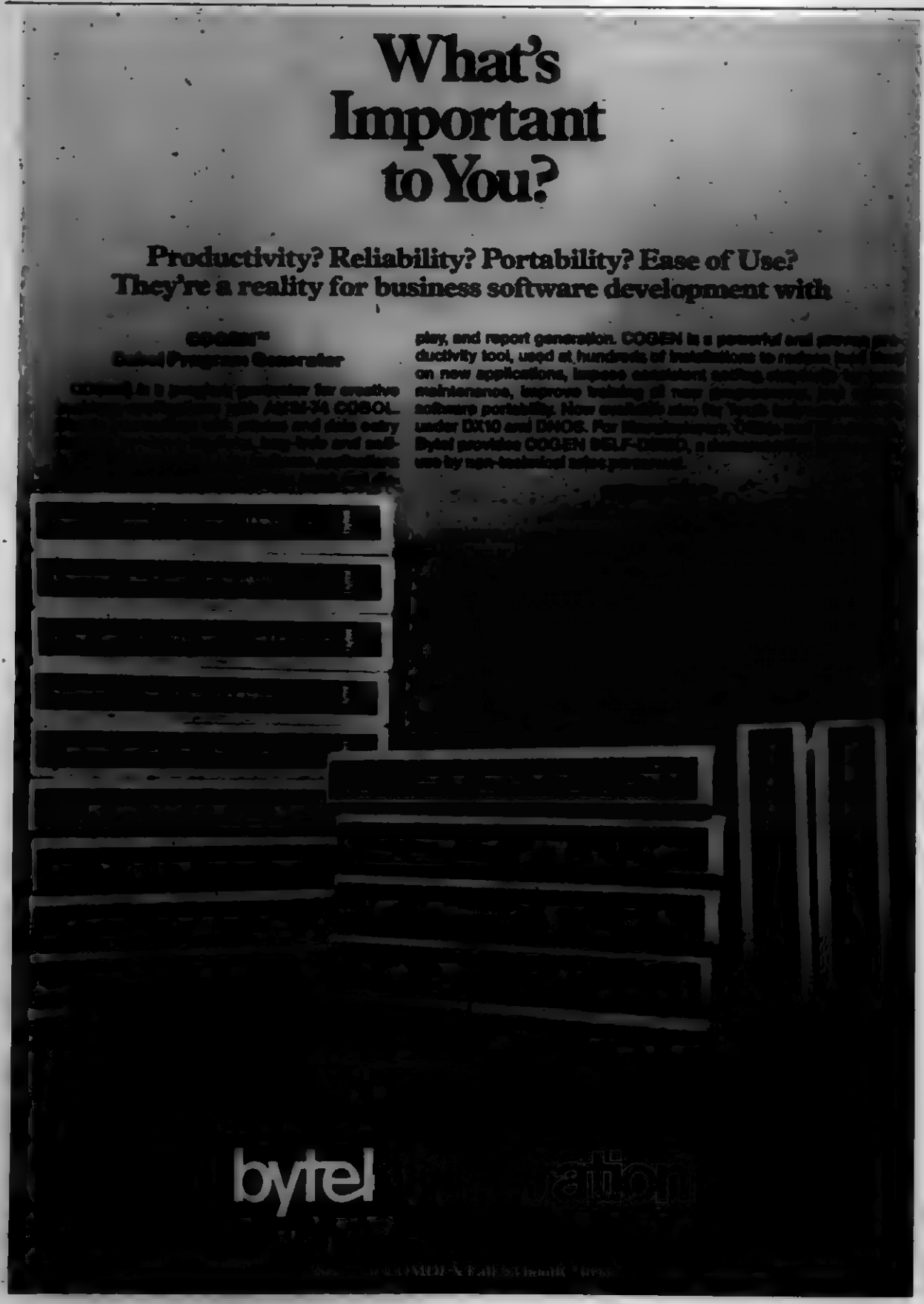
If he accepts, the mainframe will debit his bank account for the initial premium and transmit a binder screen, which the potential insured may print on his printer. The mainframe will later print a policy in batch mode to be mailed to the insured.

In 1990, an insured may still call an independent claims adjuster to notify him about a loss. While the customer is on the phone, the adjuster may load a claims report screen on his workstation. (The insurance company's mainframe downloads the latest version of the screen whenever it changes.)

The adjuster will use the screen as a guide for taking information from the insured. The program downloaded with the screen won't verify coverage, but it will do such things as check the characteristics of the policy number and catch an alpha character entered as part of the Zip Code. After he has completed working on the screen, the adjuster may transmit the claims report to the mainframe.

The mainframe will probably verify the information in the claim report as soon as it is received. If a problem is found — such as an incorrect policy number — the mainframe itself may call the insured, use a voice synthesizer to ask for the correct policy number and recognize and record what the insured says in response.

What will companies use in the



future to develop operational systems? Three factors will be important:

- System development methodologies.
- User-friendly languages.
- Artificial intelligence (AI) systems.

System development methodologies, most likely involving prototyping, will be used for those systems that are jointly developed by users and MIS people. These jointly developed systems, though operational, will be focused primarily on establishing and maintaining data bases. That will be the principal reason for MIS participation, since data bases will be of major concern to MIS.

Users will be responsible for stating the operational requirements of the system. They will also contribute knowledge of their data and its uses to such a joint development effort. MIS people will contribute their knowledge of the company's data and the plans for its use.

In the world of the 1990s, users may be primarily responsible for developing non-data base systems. Consider the case of a user who wants to develop a new weekly report of all insurance claims requiring reserves in excess of $5,000. With a user-friendly language, he would only need to mention the name of the data base that contains the information he wants — in this case, the data base with claims information. Using a workstation, he would describe what he wants the report to look like and where he wants each field to be placed. He might also need to list the information element names that he will be using.

If a standard layout is acceptable for the report, he will only need to list the element names. If he mentions a name that is not in the data dictionary, the dictionary system will question him and help him to select a name it recognizes.

The user will need to specify when the report should be produced, what kind of paper stock it should be printed on and to whom it should be delivered. He will also need to specify that a line should be produced on the report to indicate a claims reserve or reserve change exceeding $5,000.

The line between user-friendly languages and AI systems may become greatly blurred by the end of the decade. How will AI systems work? Let's say a user wants to develop a new underwriting system, but he isn't sure how to begin. He might initiate a conversation with the AI processor and state just that.

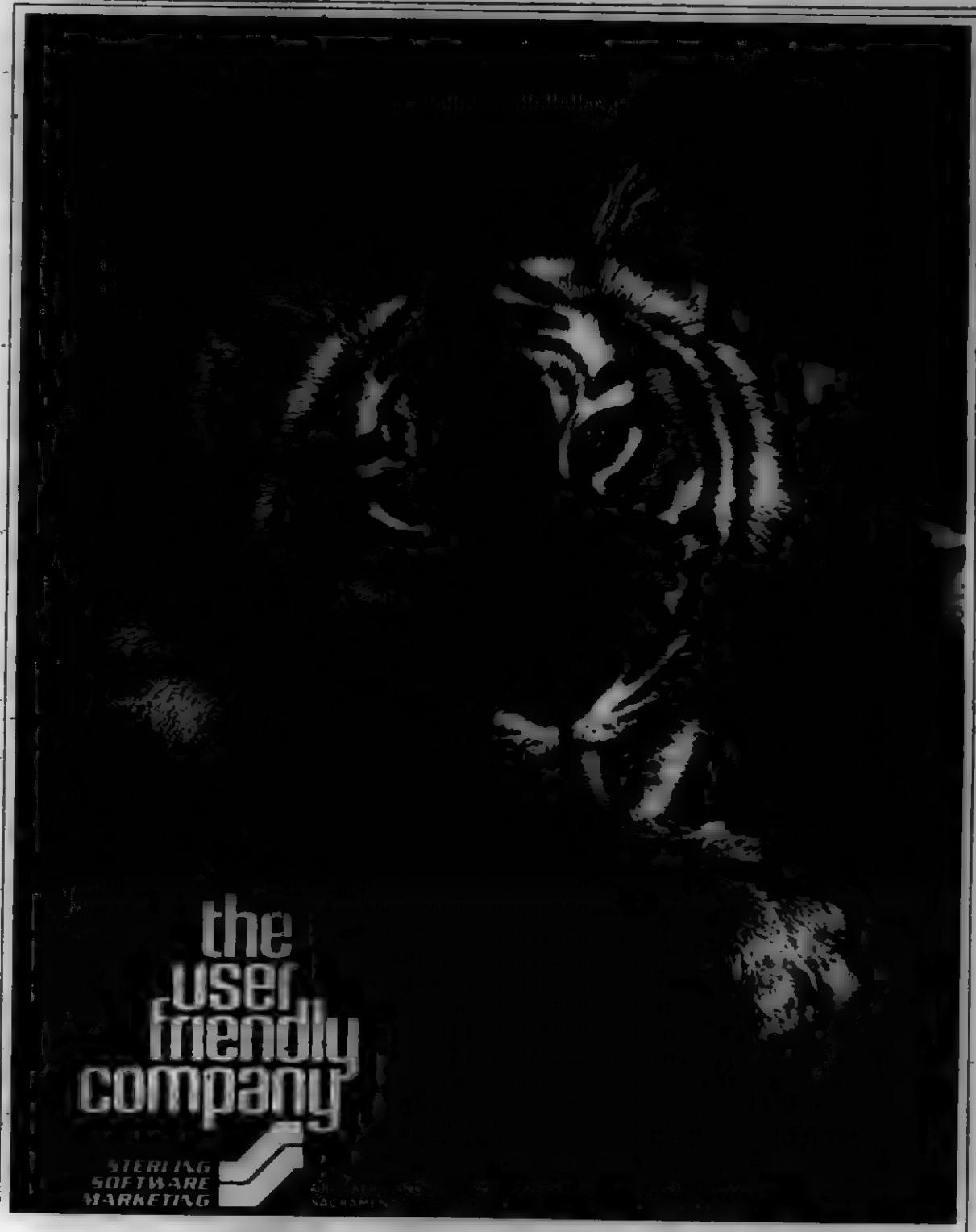
The AI processor may begin by asking what data base should be used to determine coverage. The user would answer with the name of the data base that contains the experience, claims, reinsurance, rate and policy data. The processor would find this information in the data dictionary and set itself up to browse through the actual data base.

Next, it might ask what starts the underwriting process. Eventually, the processor would have a description of all principal input and output of the underwriting process.

By 1990, if a user wants to develop a new underwriting system, but isn't sure how to begin, he might start a conversation with an AI processor and state just that. When he has gone as far as he can in working with the processor, it may have built a system that can handle 70% of the underwriting process.

The AI processor may then engage the user in a conversation about the underwriting process. What does an underwriter look at when he receives an application? What does he look at first? If the application is for property insurance, some of the first things looked at might be location, class, amount of coverage desired and deductible amount. One by one, the AI system would ask what part of the data base the user would look at for each of the underwriting elements, what kind of information he would be looking for and what kinds of decisions he would make based on what he found.

Maybe the user will not have any idea what is done with certain infor-



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IN DEPTH

mation. Then the AI processor may scan the data base with him, offering hypotheses for his consideration. It will try to produce a list of possible decisions.

When the user has gone as far as he can in working with the AI processor (which could take weeks), it may have built a system that can handle 70% of the underwriting process. The user may decide to have the underwriters, who will handle the remaining 30%, plug into the AI processor as they work.

The system developed by the processor will take care of what it can and then hand the application to the underwriter. As the underwriter does his part, the AI processor will ask him what he did and why he did it. As time passes, the system will be able to take over more and more of the process, although it may never handle 100%.

User Workstations

By 1990, the workstation should include a keyboard with at least as many keys as a terminal has now; a large, but quite thin, full-color TV-compatible screen; a handset (think telephone); a light-pen; and a communications line and memory, too, but they will be small.

Will a user have a personal computer at his desk by 1990? The workstation will provide access to personal computing, and it will evolve from the personal computer of today. At a workstation, the user will be able to produce, store, retrieve, manipulate and analyze information located in personal, corporate and external data bases.

When asking for data from a data base, the user need not give the names of the elements he wishes to use, only the name of the data base itself. The processor — a spreadsheet processor in this example — and the data dictionary will determine the specific information needed and provide it.

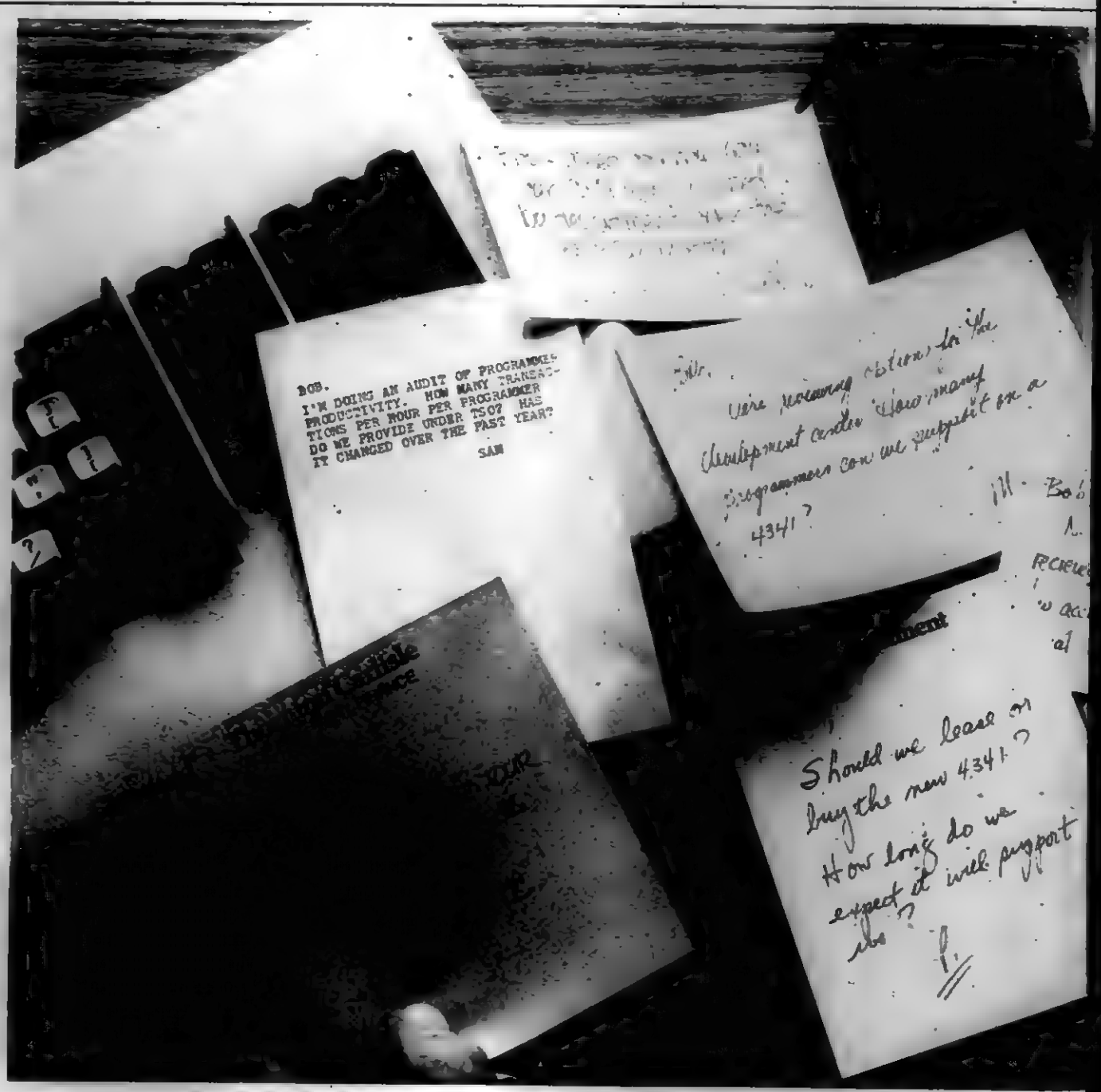
Let's assume that while the user is working, he receives a message across the bottom of the screen, accompanied by an audible tone, that he is to attend a video conference from his office. He might save what he is working on in order to call up review notes for the conference that he had made a few days before. As he looks them over on the screen, he will change phrases he doesn't like. To get a hard copy of the notes, which may fill about two screens, he can request they be printed, perhaps in full color.

When the conference begins, the user may split his screen. Most of the attendees may be together in a conference room in London. They will appear in the left two-thirds of the screen. Two people attending together from Boston will appear in the upper right one-sixth of the screen. The other attendee from Omaha will appear in the lower right one-sixth.

The full screen may be devoted to any one person at any time. Not only can the user see and hear *them*, but they can see and hear *him* because the workstation will also contain a concealed microphone and camera.

The user might also split his screen to call up any mail he might have. He might make another temporary split in the screen to page through his calendar.

If a user takes a public speaking course, it will be transmitted to his workstation. If he wants some information from a videotex ser-



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vice, he will view it there. If he wants to use the service to transfer funds from his savings account, he can also do it at his workstation.

When a user is working with the AI processor to develop an underwriting system, he will do it at his workstation. When he is composing a report, he will do it at his workstation. The user may also wish some deluxe features on the workstation, such as the capability to make audio or video recordings of his workstation's activity.

At this point, some analysis of the workaday world of 1990 computer systems should be attempted. What will all this hardware and software be working on, sending, changing, producing, creating, deleting? They will be operating on information in two forms: messages and data bases.

Messages may be thought of as information in motion and data bases as information at rest.

The functions to be performed on the information are transmission, storage, processing and reception.

Hardware will be used to perform the functions. We used to think of the basic hardware components as input, output, storage, processing and control. The components we will be focusing on in the 1990s will consist of terminals, storage, communications networks and processors.

The use of the word "terminal" doesn't feel right at first, but it's the best word for what needs to be described. Workstations will be terminals, and they will fit most people's idea of what a terminal is. The printer that receives a report will also be a terminal. So will be a cash register in a point-of-sale system, a video camera, an optical character reader and a voice synthesizer.

A terminal as described here is something that is hung on a network to send or receive messages — as well as 5,000-page reports. Storage will be a place where processors put information for later retrieval and reintroduction to a processor. The latter point is important to the concept: If a processor puts information on microfiche, from which it can later be retrieved by a processor and sent back over a network as a message, then the microfiche is storage.

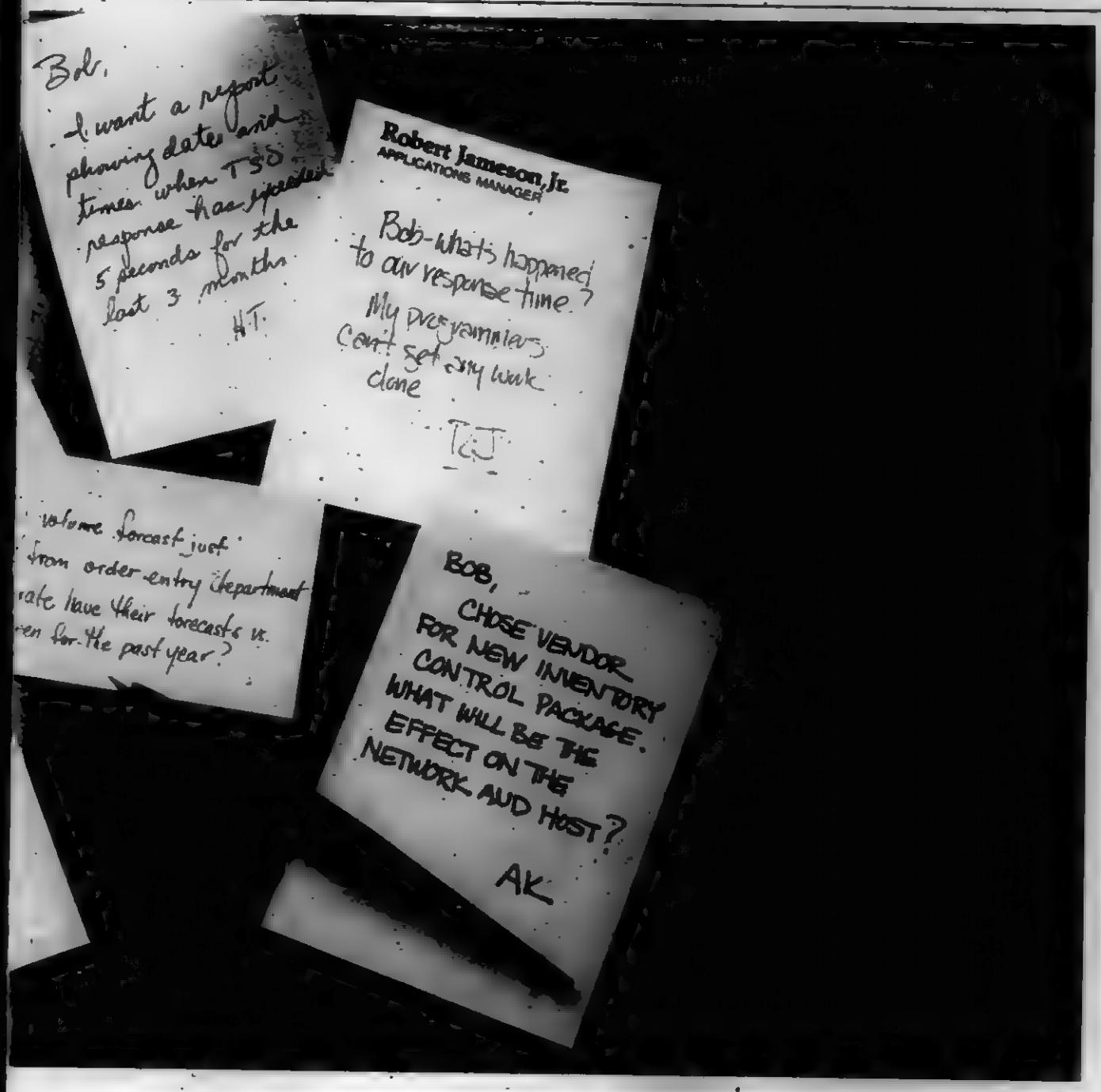
If, once the data is on microfiche, people can look at it with viewers and make copies — but a processor can't use it — then whatever put the data on microfiche will be a terminal, not a storage device.

Processors will be computers.

Communications networks will consist of lines, whether voice-grade, private, optical fiber, cable, satellite transmission — whatever the future holds — and the processors that control them.

In a sense, hardware will all be part of a network that the user will join when he sits at a workstation. Such an environment recalls Teilhard de Chardin's "Noosphere" — everything in the network will have an address. Minds and data bases will be connected through networks in which processors will expand the capabilities of the human. Yet the whole may become much more than the sum of its parts.

Hardware performs functions on messages and data bases, but not on its own initiative. Software uses hardware to operate on messages and data bases.



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The major software components will be:

- Information managers.
- Network managers.
- Processor managers.
- Development processors producing operational systems.
- Information processors enabling "symbiotic systems."

Information managers will include data base management systems (DBMS) and data dictionaries.

Network manager software, residing in processors, will control all facets of communications within a network, as well as to and from external networks. It will include transmission, message switching, error detection and correction, encryption and decryption, access authorization and maintenance of usage statistics.

Processor managers will be operating systems.

Development processors will include user-friendly language processors, AI processors, report writers and whatever form language processors, such as Cobol, will take.

They will produce the operational systems that will maintain data bases and perform the information-based processes essential to organizations.

Information processors will include inquiry and report language processors; analysis systems, such as spreadsheet processors; simulation language processors and text editors. They will be used for symbiotic systems.

Symbiotic systems are systems in which the person who initiates the conversation also controls its form and direction, while using one or more person-extending systems.

In contrast, operational systems are ones in which, even though a person may initiate the conversation, the system itself controls the conversation's form and direction. An insurance claims system would be an example of the latter.

Whatever became of stand-alone word processors, office automation, information centers and personal computers in a business environment?

They served their purpose as intermediate steps along the way.

Word processors taught users the indispensability of computerized text editing.

Office automation showed users some of the things that could be done with internal information networks.

Information centers taught users how to draw directly on computerized data and showed MIS people that their primary concern must be information, not programs.

Personal computers were the first workstation, but more important, they were the catalyst that sped up everything that happened in the '80s.

Survival Guidelines

Nothing an organization does will be irrevocably bad, but some methods will certainly turn out better than others. DBMS will change; terminals will change; operational systems will change; communications lines will change. As time passes, these changes will become easier to make because more and more software and hardware aids will be available for changing and converting.

Nonetheless, as Rule 1 for the '80s, I would propose the following: The more distinctly a thing is what it is, the less it will hamper development.

The more a DBMS is a distinct DBMS, rather than being embedded within something else, such as an application package, the easier it may be replaced with another DBMS. If it is contained within an application package, the application package may have to be modified or replaced before an improved DBMS may be used.

The more a data dictionary is a separate entity, rather than being part of a DBMS, the easier it may be replaced with an improved data dictionary.

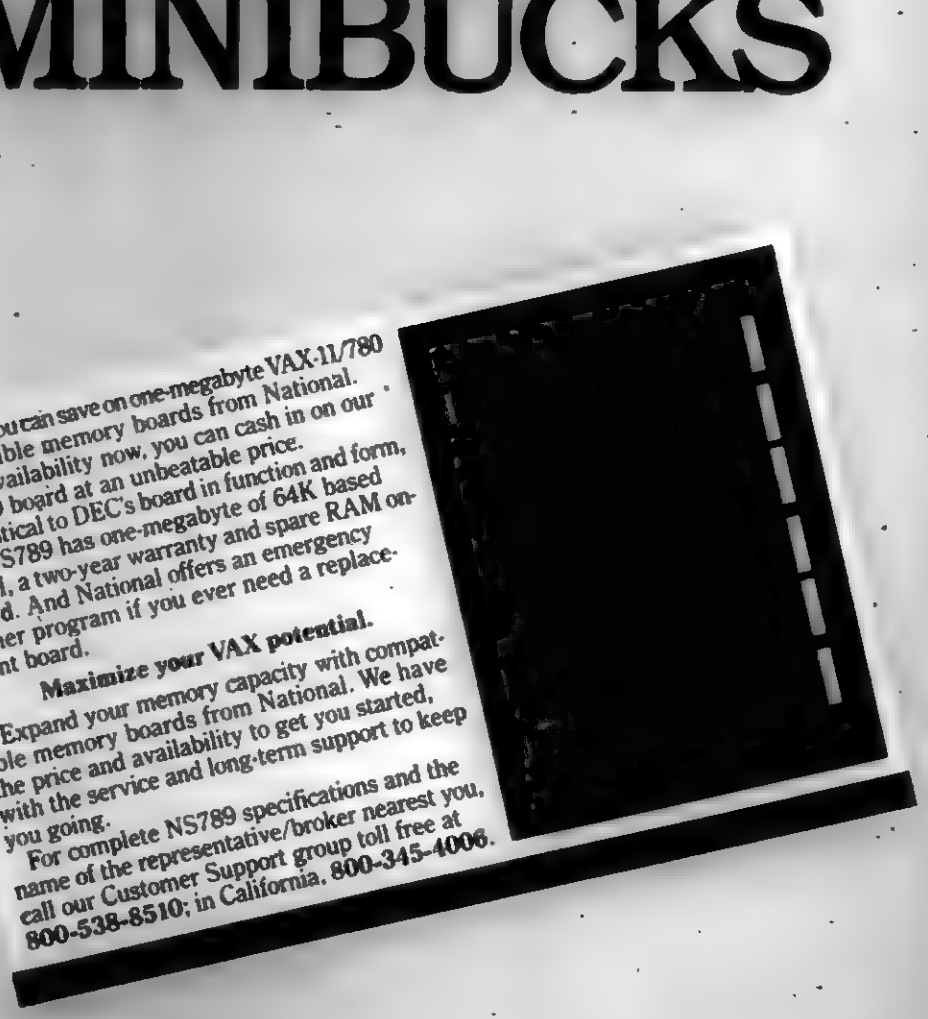
The less an inquiry language is part of a DBMS or a data dictionary system, the more easily it may work with most DBMS and data dictionaries and the less it will be affected by a change in either.

So beware of black-box solutions to systems problems. The more facets of software or hardware that a vendor's product bundles together, away from the user's control, the more it locks in the user and the less freedom his systems will have to evolve and progress without it.

Portrait of Application Software

Application software packages available in 1990 will probably be of two main types. The first will be generators that will allow the user to use

MEGABYTES FOR MINIBUCKS



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IN DEPTH

his own data dictionary and DBMS. They will contain the main thrust of the operational processing that the organization needs, but they may be tailored to fit the user's needs and tastes.

The second type of package will bundle the operational processing with the DBMS, possibly the data dictionary function and even the report-writing function. If an organization needs such packages, it will probably also need people from the outside to design and maintain its hardware configuration and communications network.

Nothing is more central to an organizations' uniqueness than how it uses information. Consequently, how the user would define and structure information in a data dictionary is also unique. The user should not abdicate definition of his data to the vendors of application packages.

Somehow MIS must look beyond the distractions of an ever-increasing backlog of requests, frustrated end users and an explosion of hardware and software products to begin managing information. MIS must accept responsibility for the organization's information.

MIS people must become experts in the organization's data. If a formalized data dictionary effort has not been started, MIS managers should push to have one started. They should encourage the creation of true data bases whose contents are defined in a data dictionary.

Ideas need time to gain acceptance. Many installations are just now recognizing the value of following a standard life-cycle approach for systems development. But the development and freezing of detailed requirements as the basis for systems design will not produce systems that please users.

What is needed for the '80s is a methodology for change. Prototyping is such a methodology. End users need to be more closely involved with the design and modification of systems. Prototyping keeps them involved on a day-to-day basis.

Users need experience in user-friendly languages to help them learn how to produce their own operational systems. If you have already set up an information center, make sure you have staffed it well and are properly selling its use.

While an information center is important to users for learning user-friendly languages, it is even more important to MIS. The job of supporting an information center begins to tilt MIS toward providing information and away from processing it. It's a healthy tilt.

Nothing short of a cataclysm will stop end users from acquiring personal computers in vast numbers. And, despite what many senior managers in MIS think, the users will not produce mammoth problems with personal computers, nor get frustrated with them, nor tire of them enough to stem their spread. Granted that the software available for personal computers last year was not easy to use; it is quite a bit better this year.

MIS managers would be wise to proceed as follows: First, develop a plan for integrating personal computers into the network, including providing for downloading and uploading information. Second, determine the characteristics of personal computers that will fit the plan. Third, secure the services of people to help the users pick names, find software for them, install them, hang them on the network and use them. Then send those people out to join the users, not to fight them.

Last to be mentioned, but almost first in importance, is the communications network. Strive to have the organization combine the responsibility for voice and data communications and, more important, for message communications and information storage. Expand the organization's expertise in the design and management of communications systems.

About the Author

Kenneth Lantz is a principal with Atwater, Lantz, Hunter and Co., management consultants in Woodland Hills, Calif. He has worked for 27 years with more than 200 organizations as an information systems consultant, data center director, president of a software house, analyst and programmer.

Lantz headed IBM's application development project for computer-aided manufacturing and has developed decision table languages, data dictionary systems and systems methodologies.

He is currently writing a book on prototyping.

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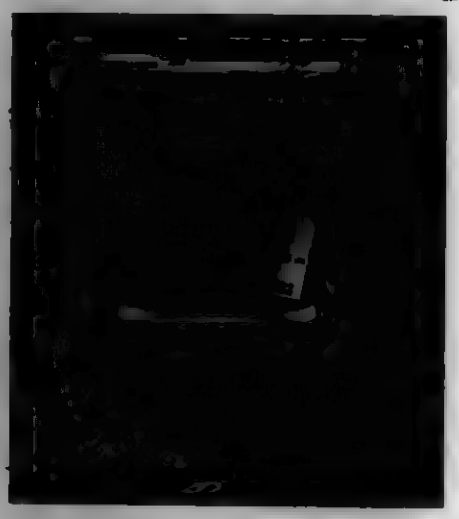

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WHERE IMAGINATION LEADS

To Access Bank Accounts

Mobil Unveils On-Line Payment Project

By Peter Bartolik
CW Staff

WASHINGTON, D.C. — The first on-line transaction system that would allow consumers around the nation to use bank debit cards for retail purchases was announced here recently by Mobil Oil Corp.

The system, which will be initiated in this area, will enable Mobil to receive immediate payments electronically from consumer bank accounts for purchases around the country at 2,400 gas stations that account for more than 50% of its gasoline pumping operations.

It is likely Mobil will activate the first nationwide retail-level electronic payments system, known under a variety of names such as direct debit point-of-sale, retail-level electronic funds transfer and others. Several major gasoline companies have announced experimental systems in particular areas of the country, and various bank-sponsored regional systems have also been announced; Mobil, however, is the first organization to announce definite plans for a nationwide system.

'We had two objectives, operational feasibility and customer acceptance. We were less concerned with the technical aspect, [and] we're very pleased in both areas.' — Thomas Lewis, vice-president at Virginia National Bank and manager for Mobil Oil Co.'s debit card test project.

Within two or three months, holders of bank debit cards in the Washington, D.C., and northern Virginia areas will be able to present their cards as payment for gasoline at 70 Mobil stations in the area, the company announced. Two shared automated teller machine (ATM) networks, Most and Cash Flow, representing more than 50 area banks, have signed agreements with Mobil to transfer funds from customers' accounts.

Most is the shared network operated by the EFT Group, Inc., a system serving 52 banks in the Washington-Maryland-Virginia area, including American Security Bank and Bank of Virginia. Cash Flow is a network comprised of Virginia National Bank, Riggs National Bank, Mercantile Safe Deposit and Trust Co. and Citizens Trust Bank.

According to Walter D. Manz, Mobil's general manager of marketing systems and control, the stations will be equipped with terminals that will transfer debit card identification to Mobil's credit center in Kansas City, Mo. From there, the information will be switched back to the ATM network for an automatic transfer from the customer's checking or savings account

(Continued on Page 104)

Micro-Based Operating System Out

SAN DIEGO — Softech Microsystems, Inc., a firm that got its start marketing UCSD Pascal, has brought out an operating system for microcomputer networks.

The operating system — called Liaison — provides a way of linking together micros that were previously unable to communicate with each other, according to John J. Splavec, president of the wholly owned subsidiary of Softech, Inc. In a demonstration held recently, equipment from IBM; Apple Computer, Inc.; Texas Instruments, Inc.; and Corvus Systems, Inc. was shown operating on the same network.

Liaison is actually a superset of the company's "P-system," its UCSD Pascal operating code. The software is intended for multitasking and multiple users and can support a number of users constrained only by the hardware wired to the network, a company spokesman said.

The operating system also includes a

(Continued on Page 108)

Lee Data Adds Dual Controller To 300 Series of Control Units

MINNEAPOLIS — Lee Data Corp. recently announced the addition of a dual host controller to its 300 series of standard IBM 3274-compatible control units.

The Model 311 dual host controller reportedly offers dual remote host access capability and contains two remote communication interfaces that operate concurrently to enable display stations to switch freely between two selected IBM or compatible mainframes through keyboard commands.

The 311 operates in any Binary Synchronous Communications or Systems Network Architecture/Synchronous Data Link Control combination and supports up to 32 display stations and printers. It can be configured to provide application redundancy or host backup for uninterrupted processing in the case of host failure or communication interruptions.

The unit is available for a purchase price of $14,215, or a lease price of $591 per month on a three-year lease from Lee Data, 7075 Flying Cloud Drive, Minneapolis, Minn. 55344.

Multiplexer Supports Controller In Providing Greater Port Count

ANAHEIM, Calif. — California Computer Products, Inc. (Calcomp) has unveiled a communications multiplexer that works in conjunction with the firm's Model 951/953 plotter controller to increase its maximum number of allowable data ports from one to four outputs.

All of the ports on the device, called the 4 to 1 Input Multiplexer, can be independently configured to accept serial data in Calcomp's 960 or 907 plotting formats.

Basically, the unit's priority scheme allows the user to select ports for preferential access, a spokesman pointed out.

The device will screen for any active ports to allow plotting to proceed or put other ports in a wait-state until a job is completed, according to the firm.

The multiplexer also reportedly allows users to recover from host errors. Using a "dead host timeout," a port is automatically released if data is not received within a user-specified interval, the spokesman noted.

In addition, time intervals on the device are user-selectable, so the unit can be altered to accommodate various connecting devices and lines.

The 4 to 1 Multiplexer operates at communications rates of from 300 to 19.2K bit/sec. Since it is contained on a single board, the device can be installed in the field, a spokesman explained.

The multiplexer costs $1,995 and can be delivered in 60 to 90 days from Calcomp, headquartered at 2411 W. La Palma Ave., Anaheim, Calif. 92801.

Decnet Users Get Controller to Access MVS-Based Files

FREMONT, Calif. — Interlink Computer Sciences, Inc. has announced an integrated hardware and software controller system that is said to allow users of Digital Equipment Corp.'s Decnet network to access MVS-based mainframe files.

Called System 3711, the device allows users on Decnet to retrieve information from IBM data bases down to the record level, without physically keying in IBM protocols and communications procedures, a spokesman said.

The system combines hardware — a network controller — and Decnet software with Interlink-designed host-resident software that functions in International Standards Organization Level 7, said to be the highest level of communications in a layered network architecture. The network controller actually functions as an intelligent front-end processor linked to the IBM system via a high-speed data communications channel.

The host-resident software — Master Control and Translator modules — reportedly allows DEC users to share information to and from IBM data bases.

Software features of the package include; dynamic file access at the record level, without entering batch mode and without need for JCL; data security via Cambridge Systems Group and IBM protocols; error messaging; and transparent data translation as well as support of multiple data records.

The System 3711, including the network controller hardware and IBM host-resident software, is priced from $98,500. Shipments are scheduled to begin in January from Interlink at Suite 203, 39055 Hastings St., Fremont, Calif. 94538.

First Package in NDS-Series

'Multipoint Network Design' Fits IBM Micros

WEST BRIDGEWATER, Mass. — Connections, Inc. has announced Multipoint Network Design software, the first package in its NDS-Series for use on IBM Personal Computers and other microcomputers.

Designed to analyze performance characteristics such as response time, system utilization, topological configurations and cost variables of any size network, the software features English-language prompting with a hierarchy of commands and file structure.

The network data base is stored on diskettes, the vendor said.

Modeling and topological optimization are achieved by using queueing models and linking algorithms, the company explained.

The software allows the user to define all network parameters, and a menu-driven screen lets the user build libraries of all variable protocols and tariffs for modeling run comparisons, a spokesman said. The results of any network design can be compared graphically against other alternatives, and gross statistics on network traffic or application volumes may be input.

Multipoint Network Design software costs $3,500, the vendor said. Connections is located at 322 E. Center St., West Bridgewater, Mass. 02379.

Mobil Oil Inaugurates Instant Payment Plan

(Continued from Page 103)

into Mobil's account.

Mobil tested the system in the Tidewater region of Virginia in cooperation with Virginia National Bank, which operates the Cash Flow network switch, built around an IBM 370/158. The software to allow communications between Mobil's terminal-to-Tandem system and the bank ATM networks was developed by Mobil.

Thomas Lewis, vice-president at Virginia National Bank, was manager for the Mobil test project and he told *Computerworld*, "We had two objectives, operational feasibility and customer acceptance. We were less concerned with the technical aspect. We're very pleased in both areas."

Manz said Mobil is already installing terminals in California and plans to move "as rapidly as we can" to complete installations at the 2,400 stations nationwide. The terminals are custom-made for Mobil by Datatrol, Inc. of Hudson, Mass., and will communicate over leased telephone lines to the switch, a Tandem Computers, Inc. Non-Stop II computer system.

The terminals will also process Mobil credit cards along with Visa and Mastercard credit cards.

While Mobil has 15,000 to 16,000 stations around the country, the terminals are being placed "in the 2,400 that are the high-volume stations that do a lot of credit card transactions and cover well over 50% of our gas operations," Manz said. Following California, installations will be extended next year to the Northeast, Florida and Texas.

Manz said it will take 60 to 90 days to "get the software in place and operating" at the Washington networks, at which point customers of member banks will be able to use their debit cards at any terminal-equipped gas station. He said the company will negotiate with other ATM networks in the areas.

Donald O'Connor, president of the EFT Group that operates Most through a switch maintained by NCR Corp., said the Mobil transactions will have little impact on the performance of the network. "It's certainly going to increase volume at the switch level, but it does not require any modifications. It doesn't look any different than an ATM transaction."

Virginia National's Lewis agreed. "There's some effort involved, but once it's up and running it's a typical day-to-day operation really," he said. Preparing for the actual machine-to-machine communication, he said, "is an interface project" establishing protocol flows and message flows.

Mobil's system took 2½ years to develop and was extensively field-tested, Manz said. Although automated fuel dispensers that accept debit and credit cards are presently being manufactured and installed around the country by several gas companies and computer equipment vendors, Mobil decided not to select that path for now.

"We had no problem with consumers using the card-activated pump, but we really couldn't justify the cost or see any economic benefit," Manz said. While conversion units to enable pumps to dispense automatically gas cost in excess of $10,000, typical card terminals are selling for several hundred dollars.

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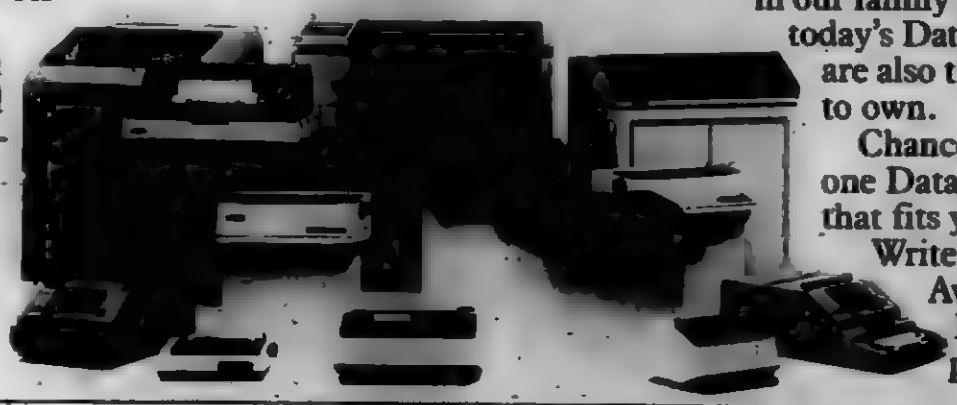

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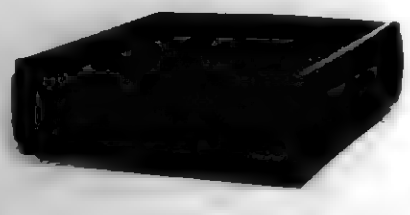
Limited-Distance Modem Unveiled

CHERRY HILL, N.J. — Datatel, Inc. has unveiled a limited-distance modem that is geared for use in close communications applications where transmission distances are short.

The DCP3055 features an autospeed capability, reportedly giving it some advantages in statistical multiplexing and tail-circuit applications. The limited-distance modem, working at a remote multiplexer, is designed to sense any operator changes on communications lines and adjust the line speed accordingly.

A similar unit at the end of the tail circuit also senses any line-speed changes and will alter its operating speed, a spokesman claimed.



Datatel's DCP3055

Used With DCP3050

The DCP3055 can be used in conjunction with the firm's DCP3050, which is similar to the first unit but does not have the autospeed capability. Instead, this unit provides for speed selection via a front-panel rotary switch.

A typical application would have the 3050 at a central computer site transmitting to an autospeed 3055 at an unattended remote site. The remote unit would change line speeds automatically in response to changes made on the local unit, the spokesman claimed.

The DCP3055 operates at speeds from 1,200 to 19.2K bit/sec, in both synchronous and asynchronous applications. Asynchronously, it will reportedly operate at speeds up to 64K bit/sec.

It also provides full-duplex transmission over four wires, at ranges depending on the data rate and wire size, the spokesman added.

The unit appears as an RS-232C interface to the user's computer or peripheral and conforms to Bell Publication 43401 requirements.

Other features include built-in diagnostics and front-panel indicators. The unit is available in a module version for installation in a Datatel equipment nest, the spokesman explained.

Prices for the DCP3055 range from $440 to $550, depending on quantity. Additional details on the device can be obtained from Datatel.

Datatel is located at Pin Oak & Springdale Roads, Cherry Hill Industrial Center, Cherry Hill, N.J. 08003.

Bell-Compatible Modem Introduced by Gandalf Data

WHEELING, Ill. — Gandalf Data, Inc. has introduced the second modem in its synchronous/asynchronous Bell-compatible modem line.

The SAM 201 is a 2,400 bit/sec modem designed for switched network, unconditioned, 3002-type lines or two- or four-wire voiceband private lines.

Unlike other Bell-compatible 201C modems, the SAM 201C operates in synchronous and asynchronous modes. In the synchronous mode, the SAM 201 is compatible with other 201C and CCITT V.26 Option A and B modems. In the asynchronous mode, the SAM 201 communicates with another SAM 201 modem.

SAM 201 features a built-in, autoanswer for use on the switched network. It can also be used with an 801-type auto-dialer. Both rack-mount and stand-alone units are available.

Stand-alone units are priced at $725. More information is available from Gandalf Data at 1019 S. Noel, Wheeling, Ill. 60090.

Net System Gives Users Access to Files

CONCORD, Mass. — Xyplex, Inc. has introduced a terminal switch and front-end networking system said to provide users with access to computer files while reducing direct wiring requirements.

The system includes an XP-UN64-A Unibus host interface unit for Digital Equipment Corp.'s VAX-11 and PDP-11 minicomputers running DEC's VMS or RSX operating systems and the XP-CC8-A terminal-cluster controller, providing connections for up to eight terminals.

Within a local environment, a single cable can reportedly be used to connect terminals and computers, allowing a user to access the computers or other terminals.

System management functions are said to be integrated into the computers with host interface units, including system performance information, configuration data bases and diagnostic tools.

The host interface unit is priced at $9,500, and the cluster controller costs $5,600 from Xyplex at 100 Domino Drive, Concord, Mass. 01742.

HP Interface Kit Connects to Net

PALO ALTO, Calif. — Hewlett-Packard Co. has announced an interface kit that allows the HP 4955A protocol analyzer to connect physically to an Ansi X.21 public network.

The interface kit, HP 18138A, provides a cable with X.21 15-pin connectors for use with the vendor's RS-449 interface pod, the HP 18136A, for the physical connection.

Included in the kit is display software allowing simultaneous viewing of both character- and bit-oriented protocols, which is said to expand the problem-solving capability of an HP 4955A user.

The HP 18138A interface kit is priced at $250 and must be used with the HP 18136A interface pod, priced at $950.

More information is available from HP at 3000 Hanover St., Palo Alto, Calif. 94304.

Send more information on:

- ☐ **PCI 1076:** ASCII to SNA/SDLC 3270 emulation.
- ☐ **PCI 1051:** ASCII to Sys 34/36/38 5251 emulation.
- ☐ **PCI 1067:** SNA/SDLC to ASCII 3767 emulation. The NTO alternative.
- ☐ **PCI 71B/SNA:** BSC 3271 to SNA/SDLC 3274 emulation.
- ☐ **PCI 75B/SNA:** BSC 3275 to SNA/SDLC 3276 emulation.
- ☐ **PCI 1071:** ASCII to BSC 3270 emulation.
- ☐ **PCI 3780/SNA:** SNA/SDLC to BSC 3780 emulation.
- ☐ **Videotex 67:** SNA/SDLC to Videotex protocol conversion.
- ☐ **PCI's X.25 Series:** PCI 73SX and PCI R73SX,SNA/SDLC to X.25 protocol converters for host and terminal connections respectively; PCI 1076X, ASCII to 3270 SNA/SDLC through X.25 networks, PAD included.
- ☐ **PCI's Networkers:** Keystroke for keystroke 5251/11 and 3278 keyboard compatible ASCII CRTs.
- ☐ **PCI's IBM-PC software packages:** For 3270 and System 34/36/38 emulation.
- ☐ **PCI's Personal Computer Support book.**

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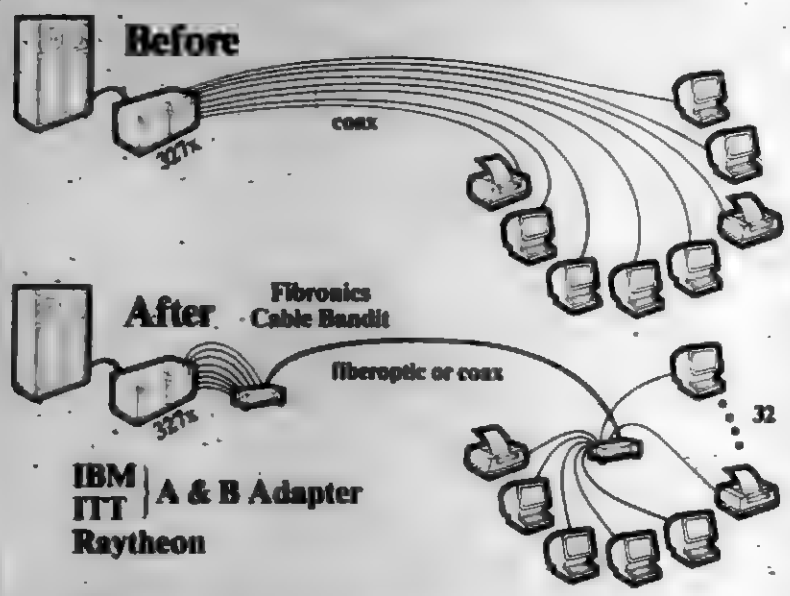

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And PCI converters will operate with SAS/GRAPH, PLOT-10, DISSPLA, TELL-A-GRAF, DI 3000, and many other graphics software packages – through the same protocol converter that supports your non-graphics terminals. So they're very fluent, graphically speaking.

PCI's 1076 and 1071 protocol converters move your graphics devices into the fast lane; they'll run at up to 9600 bps. PCI allows ASCII graphics equipment to attach to your IBM system as 3278s or 3287 terminals and printers – instead of much slower TTYs. So your IBM host can communicate with the protocol controller using more efficient, high speed, asynchronous SDLC or BSC line disciplines.

In addition, PCI protocol converters allow your ASCII terminals to emulate 3270 full screen operation. So you can access SPF, full screen editors and any utilities available to a 3270. Which means more productive use from your graphics hardware, even when it's not doing graphics.

There are a lot more graphic examples of what PCI protocol converters can do for your graphic devices. So if you've been having communications problems with computer graphics on your IBM system, let PCI speak your language. Call for a demonstration today.

For more information call today, **(800) 423-5904, (213) 716-5500** in California, TWX 9104945941 PCI WHQ. Or write PCI, 6150 Canoga Avenue, Woodland Hills, California 91367-3773.

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Videtoex News Service Out

OLATHE, Kan. — Harris Electronic News has announced a Kansas City, Kan.-based videotex service that will offer more than 1,000 items of information including business news, local Kansas City news, weather, sports and entertainment.

The News will also feature hourly updates on Wall Street activity, including Dow Jones averages, Standard & Poor's Register of Corporations and other market indexes. It will update more than 250 stocks four times a day. Other information will include Treasury bill rates, exchange rates, certificate of deposit rates, metals cash-and-futures prices and columns on investments and technology in business.

A home or business computer will allow subscribers to gain access to the computer-based information system.

The price for the service ranges from $5 to $15, depending on which information a user accesses from the data base. More information is available from Harris Electronic News, 514 S. Kansas, P.O. Box 124, Olathe, Kan. 66061.

Operating System Unveiled For Microcomputer Nets

(Continued from Page 103)

monitoring device meant to restrict simultaneous use of network applications programs.

At a press conference held recently, Joseph Hughes, marketing vice-president at San Jose, Calif.-based Corvus Systems, announced that his company had signed a letter of intent with Softech to distribute the network software as an option on its Omni-Net hardware. In addition, future versions of the network code will be made available for networks by Nestar Systems, Inc. and Xerox Corp., Softech said. The operating system costs $700 for an an eight-user installation and $2,000 for a 24-user site. Deliveries are slated to commence in late February of next year.

Softech Microsystems is based at 16885 W. Bernardo Drive, San Diego, Calif. 92127.

To all reps: Price changes on following items effective immediately. No. 10-11A, 10-114A, 10-AL.

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Smartcom II communications software, currently available for IBM PC, DEC Rainbow 100, Xerox 820-II and Kaypro II.

Smartmodem 1200 for all computers with an RS-232C interface; Smartmodem 1200B plug-in board for the IBM PC.

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The lower-priced Smartmodem 300 is ideal for local data swaps and communicates at 300 bps. A built-in speed selector on Smartmodem 1200 automatically detects transmission speeds (110, 300 or 1200 bps).

Smartmodem 1200B™ is also available as a plug-in board for IBM® Personal Computers. And Hayes manufactures the Micromodem IIe® for Apple® II, III, IIe and Apple Plus computers, as well. It comes packaged with Smartcom I™ communications software.

Speaking of software, more programs are written for Hayes modems than for any other. And that impressive list includes our own incomparable communications software. **Smartcom II.™ Complete, menu-driven software for the IBM PC, DEC Rainbow 100,™ Xerox 820-II™ and Kaypro II.™** Even first-time communicators will find success with Smartcom II. Screen prompts guide users in the simple steps it takes to create, send, receive, list, edit, name and re-name files.

Tasks like simultaneously receiving, printing and storing data—completely unattended—are easily managed with Smartcom II, because it takes full advantage of Smartmodem's capabilities.

The program reduces lengthy dial-up and log-on sequences to a single keystroke. It stores communications parameters for 25 remote systems.

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Smartmodem Specifications:
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High Speed Data Format: (Smartmodem 1200) Serial, binary, asynchronous. 7 data bits, 1 or 2 stop bits, odd, even, or fixed parity or 8 data bits, 1 or 2 stop bits; no parity (1200 bps)
Dialing Capability: Touch-Tone® and rotary-dial pulse dialing.
Command Buffer: 40 characters.
Commands: (unnecessary with Smartcom II software) A: Immediate answer. A/: Repeat last command. C: Transmitter Carrier. D: Dial command, including simple dialing, waiting for second dial tone, auto-dialing and other features. E: Local echo. F: Full/half duplex. H: Switch hook. M: Audio monitor. O: On-Line. P: Pulse dialing. Q: Quiet mode. R: Reverse originate/answer mode. S: 17 "Set" commands speed, escape code character, number of rings to answer on etc. S?: Checks operational parameters above. T: Touch-Tone dialing. V: Verbal result codes.
Result Codes: (can be numerical/verbal): 0/OK: Command line ok. 1/Connect: Carrier detected. 2/Ring: Phone is ringing. 3/No Carrier: Carrier lost or never heard. 4/Error: Error in command line. 5/Connect 1200: Carrier detected at 1200 bps. (Smartmodem 1200 only)
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Operation: Full or half duplex.
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Interface: RS-232C.
Intelligence: Z8™ microprocessor with 4K byte control program for Smartmodem 1200; Z8 microprocessor with 2K byte control program for Smartmodem 300.
Modem Capability: Bell System 103 or 212A compatible originate or answer mode for Smartmodem 1200; Bell System 103 compatible originate or answer mode for Smartmodem 300.
Receive Sensitivity: -28dBm for Smartmodem 1200, -45dBm for Smartmodem 300.
Transmit Level: -10dBm.
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Response Time Analyzer Out for IBM Net Users

EAST NORWALK, Conn. — A data collection instrument that measures performance levels and the efficiency of IBM data communications networks has been announced by Datacomm Management Sciences, Inc.

The RTA-3271I response time analyzer was designed to be used with IBM Binary Synchronous Communications or Synchronous Data Link Control/Systems Network Architecture protocols and can operate with IBM 3271, 3274, 3276 or equivalent terminals.

The unit permits simultaneous measurements of user-perceived response time; host and polling delays; traffic loading; and other significant parameters that impact overall system performance, a spokesman said. The device can measure the performance of an entire circuit, or it can be selective to a specific controller, terminal or software application package via a trapping capability, the spokesman said.

By using the device, a network manager can see system responses and delays as a user would and take the appropriate actions to keep network performance up and costs to a minimum, the spokesman claimed.

All network measurements are made at the CPU site or optionally at a remote location.

Performance data is measured and analyzed simultaneously, with each measurement report time stamped and routed to the test output.

The analyzer costs $4,875 from Datacomm at 25 Van Zant St., East Norwalk, Conn. 06855.

Datacomm Management's RTA-3271I

Service Links 3270 Users To Telenet

VIENNA, Va. — GTE Telenet Communications Corp. recently announced a service enabling IBM 3270 terminal users to access asynchronous host computers connected to the Telenet data network.

GTE Telenet Interface Program (Gtip) reportedly combines an IBM-based application program with a Telenet network interface, enabling local and remote 3270 terminals to establish switched connections through their host computers to any other asynchronous host application on the network. The service is available for any IBM 370, 4300 series, 3030 series or 3080 series mainframe system with an MVS operating system.

Gtip functions with both Binary Synchronous Communications and Synchronous Data Link Control 3270 terminals and is fully compatible with IBM's Systems Network Architecture (SNA) and non-SNA systems, a spokesman said.

The service is available for a $300/mo incremental charge above the normal Telenet service rate for a leased line connection between the customer host computer and Telenet. More information is available from GTE Telenet, 8229 Boone Blvd., Vienna, Va. 22180.

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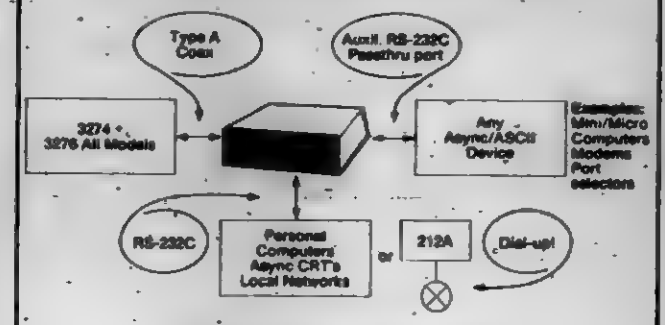

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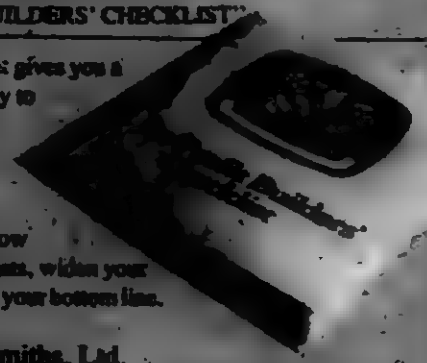

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1. The Millennium environment is borderless.

Unlike any other company's software packages, Millennium packages aren't walled off from each other by separate programs and commands. So you can cross instantly from one system to the next. You can ask a question in general ledger, immediately seek an answer on-line in accounts payable, and follow the track wherever it leads. Into fixed assets, purchase order management, anywhere. While traditional packages force you to work within the narrow confines of a given application, Millennium creates a limitless environment that enables you to access applications at will. With a single key, you're free to explore the vast entirety of your information universe. No other system works like Millennium, except your own mind.

2. Millennium has common functions across all applications.

Let's say you have a half dozen different packages. General ledger, accounts payable, and so on. In the past, that meant doing everything a half dozen times. Learning the different programs and commands for each application. Training users in data entry procedures for each one. From a training and service standpoint, Millennium is infinitely less complicated because the same set of functions governs all applications. You use, for example, the same real-time update procedures for accounts payable as fixed assets. Functions never change, only the data that defines the particular application. Once you learn one set of functions, you've learned them all. And you quickly find you're faced with a much lighter load of training, documentation and support requirements.

3. All Millennium systems are real-time, on-line.

Working in the borderless environment, you perform routine file maintenance on the spot as you cross from system to system. You can update fields, records or any other information in your files instantly. There's no waiting for batch processing. You get accurate, up-to-

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the-second information the moment you need it. Today, not tomorrow when it's too late.

4. All Millennium systems are secure and friendly.

Although Millennium is borderless, the security is tighter than any border patrol. Totally comprehensive and user defined. You can set up any restrictions you want, right down to the field level.

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5. Millennium offers an interactive PC link.

This gives you an enormously powerful and effective managerial tool. Without leaving your desk, you can open up your mainframe to the analytical powers of your personal computer. You can selectively download specific data from the mainframe and study it, manipulate it and graph your results. When you've finished you can upload the data back to the mainframe in minutes.

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Communications Processor Emulates IBM Controllers

MIAMI — Innovative Electronics, Inc. has announced a communications processor said to emulate an IBM 3271, Models 1 and 2, IBM 3274-51C and IBM 3276, Models 1 and 2, communications controllers.

The MC-80/602 processor reportedly converts a keyboard send/receive device or an asynchronous Ascii host into a full-function IBM 3277-1, 3277-2, 3278-1, 3278-2 terminal communicating with the IBM host using the IBM Binary Synchronous Communications protocol.

A switch selection is said to allow the MC-80/602 to communicate with an asynchronous Ascii host for file transfer, with a blocking feature built into the MC-80.

Priced at $1,650, the processor is available from the vendor at 4714 N.W. 165th St., Miami, Fla. 33014.

Net Said to Handle 10 Workstations

WINTER PARK, Fla. — Control Electronics, Inc. has announced a networking system said to handle up to 10 workstations, each with its own Zilog, Inc. Z80A or Z80B processor and 64K bytes of internal memory.

Control/Net is said to operate under the Turbodos operating system, which is compatible with Digital Research, Inc.'s CP/M operating system. Control/Net reportedly includes one 8-in. double-sided floppy disk and a choice of 12.7M, 20M, 40M or 80M-bytes of 5¼-in. Winchester hard disk storage.

The system is reportedly based on the IEEE S-100 bus, with up to 20 slots for user expansion. Priced at $6,250 for a 10M-byte system, the Control/Net is available from the vendor at 707 Nicolet Ave., Winter Park, Fla. 32789.

Mark XII Modem Unveiled

VAN NUYS, Calif. — Anchor Automation, Inc. recently announced a modem that emulates the command structure of the Hayes Microcomputer Products, Inc. Smartmodem.

The Mark XII modem reportedly can be operated manually through a keyboard without computer coding or automatically to answer and originate calls at 1,200 bit/sec for Bell 212A compatibility and up to 300 bit/sec for Bell 103, according to a company spokesman.

The unit detects dial tone and busy signals, automatically displaying dialing status on the CRT. The spokesman said an on-board complementary metallic oxide semiconductor microcomputer results in low power consumption and a high degree of reliability.

The device uses a standard RS-232 serial interface with built-in cable, comes equipped with two telephone jacks and cord and is directly connected to a wall telephone outlet.

The Mark XII is available for $399 from Anchor Automation, which is located at 6913 Valjean Ave., Van Nuys, Calif. 91406.

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Ascii Terminal Features 12-In. Display

SAN FRANCISCO — Liberty Electronics has announced a visual display terminal said to include a high-resolution, nonglare, 12-in. diagonal screen display, user-programmable features and nonvolatile memory.

The Freedom 200 Ascii terminal is said to offer eight foreign character sets, a standard low-profile keyboard, nonembedded character attributes for both visual display and data entry, double-high and double-wide characters and 86 extended graphics characters.

Priced at $745, the terminal is available from Liberty Electronics at 625 Third St., San Francisco, Calif. 94107.

DMS-816 Touts Compatibility With IBM Micro

OAKLAND, Calif. — Digital Microsystems, Inc. has announced the availability of a workstation said to be compatible with the IBM Personal Computer.

The DMS-816 workstation allows users to run either IBM's MS-DOS or Digital Research, Inc.'s CP/M operating system on the vendor's Hinet local-area network, a spokesman for Digital Microsystems said.

The DMS-816 reportedly duplicates the functions of IBM's read-only memory for I/O, an IBM-compatible monochrome video display and a keyboard with all the functions of the Personal Computer.

The DMS-816 features an integrated 12-in. video monitor and detachable keyboard, as well as dual microprocessors, 256K bytes of random-access memory, a 19.2K bit/sec RS-232 printer port and a parallel port, according to the spokesman for the firm.

Priced at $1,695, the DMS-816 is currently available from Digital Microsystems, which is headquartered at 1755 Embarcadero, Oakland, Calif. 94606.

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Powerful because multiple processors share the UNIX load. So processing power is distributed to where it does the most good.

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Plus our own software and maintenance support. And even a software referral service for your OEM programs.

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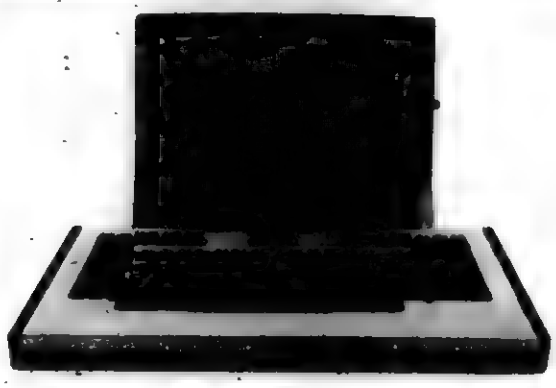

Message Center/Directory from AT&T Information Systems displays visible proof that you can be out of town, out of the office, but never out of touch.

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It's a personalized call coverage and information system. With it, one trained attendant can act as a backup personal secretary to you and 149 other busy managers.

Calls to unanswered or busy phones are automatically routed to the Message Center attendant. The display lets the attendant know where you are, why you're there, for how long, how you can be reached—or anything else you want to leave as a message.

You can retrieve your messages three ways: from a display unit, on electronically-printed hard copy, or with a call to the attendant.

The Directory function adds to Message Center. It's an on-line database that gives you continuously updated information about fellow employees. Information such as name, extension number, location, title, department, and up to ten other fields of information.

The result? Vastly improved call coverage, better information flow, no unanswered phone calls, no missed messages, ***no more pink slips.***

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Message Center/Directory is just one of several office management applications available on DIMENSION® 600 and 2000 systems and the new System 85. You can hook up a few individuals or your entire company. It's your choice.

System components and features are customized to fit your needs.

The *Information Controller* is the switching hub of the system. It is connected to the *Applications Processor,* a fast, powerful minicomputer with software that supports several new user-controlled applications. Its UNIX™ operating system creates a fully interactive multi-user environment.

You can attach any combination of peripheral devices: voice-only terminals, voice terminals with 40-character displays, data terminals with full CRT screens like the 500 BCT pictured above, or new intelligent terminals that combine voice and data functions in an integrated workstation. And there's a full line of printers.

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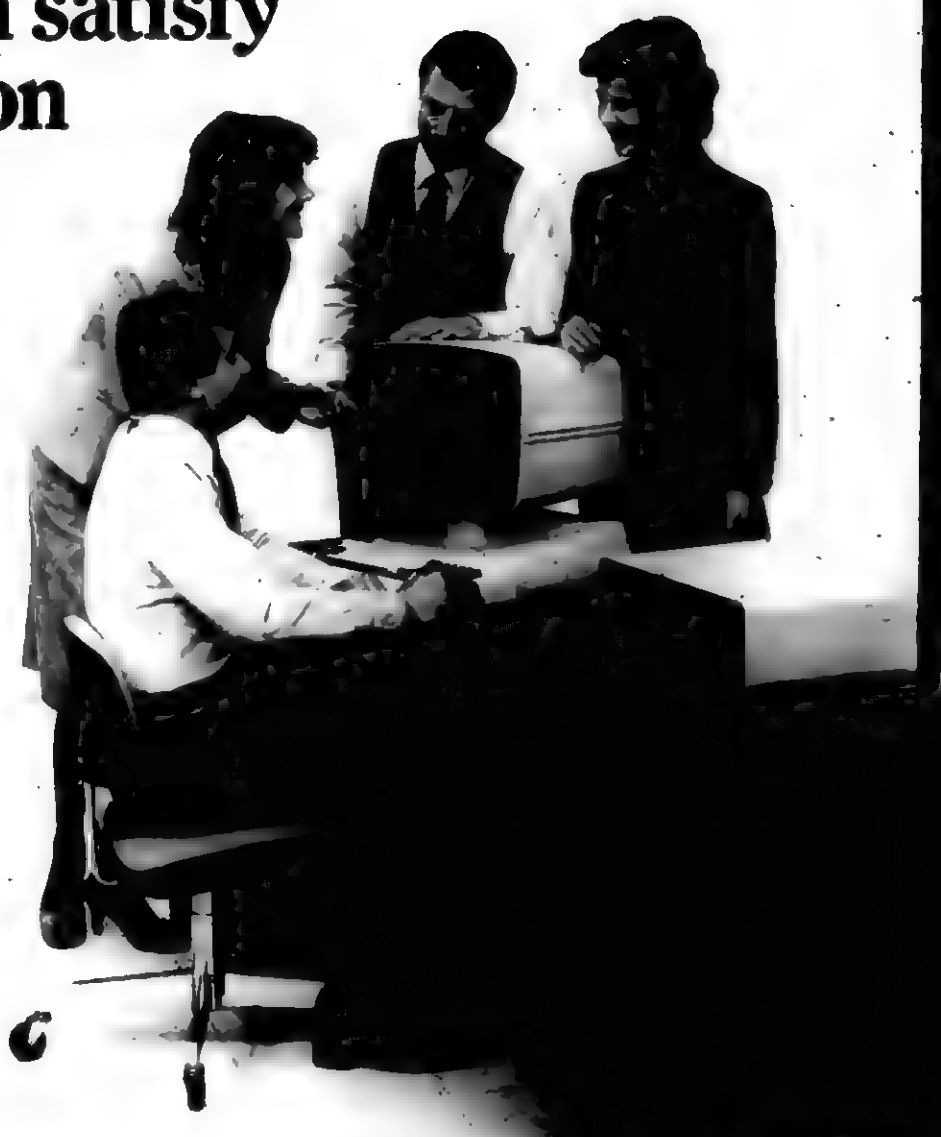

Finally, there's a single, universal way to satisfy the individual information processing needs of all your people. From sales manager to accountant. From research to production. The Lee Data Universal Terminal System can do it all.

And our system is modular by design to provide you any or all of these cost-effective, problem-solving advantages:

3270-compatibility plus more

Combine complete 3270 system-compatibility with an innovative Lee Data design and you have a System that delivers greater convenience and flexibility.

Our System not only offers standard 3274-compatible local and remote control units, but now also provides combination local/remote controllers with a unique dual-host access capability.

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3270-plus-Async: another cost-effective advantage

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As part of our System, you can enjoy the further advantage of a 3270/Async capability that allows dynamic selection of 3270 and VT100 operating modes from a single Lee Data display. A simple command entered at the keyboard provides you access to applications running on an IBM CPU, non-IBM systems (such as DEC, H-P or Prime), as well as timesharing services. Another Lee Data solution to simplifying your company's terminal network.

And now integrated personal computing too

That's right! Now our System also includes a sophisticated personal computing package that can easily be integrated into an existing Lee Data 3270 system.

With our approach, you get continued interactive access to host-based files, plus all the advantages of professional business computing from the same Lee Data workstation.

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All these additional capabilities plus the same user-friendly Lee Data displays.

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Plexus Unleashes Back-End Processor

SANTA CLARA, Calif. — Plexus Computers, Inc. has announced a back-end processor, the P/65, which allows users of Plexus and IBM microcomputers to access data stored in Plexus superminicomputers.

In addition, Plexus announced support for a relational data base management system (DBMS), Unify, developed by Unify Corp. The DBMS reportedly gives users access to data bases in multiple Plexus systems using the Unix operating system.

The P/65 acts as a network file server providing up to 1.1G bytes of storage, data base management and multiuser access to shared data. The unit was designed with disk caching hardware and software to store and retrieve shared data on a Xerox Corp. Ethernet local-area network. This, the vendor said, frees individual multiuser systems to perform terminal-oriented and DP functions.

Three Micros Share Memory

The P/65 consists of three microcomputers, which share from 1M to 4M bytes of memory. The Ethernet interface is accomplished via an intelligent network processor based on an Intel Corp. 8086 16-bit microprocessor with 128K bytes of main memory. This processor manages the network I/O transactions and handles low-level network protocol processing, the vendor said.

Disk caching software is executed by a mass storage processor, a 16-bit Zilog, Inc. Z8000 microprocessor with 128K bytes of memory. The mass storage processor reportedly anticipates those sections of the disk that are likely to be accessed and stores that data in a buffer memory for retrieval, the vendor said.

All file-service functions are performed by a 32-bit Motorola, Inc. 68000-based file-service processor, which can be equipped with 1M to 4M bytes of main memory. This processor manages the Unix file system and directs the operations of the entire system.

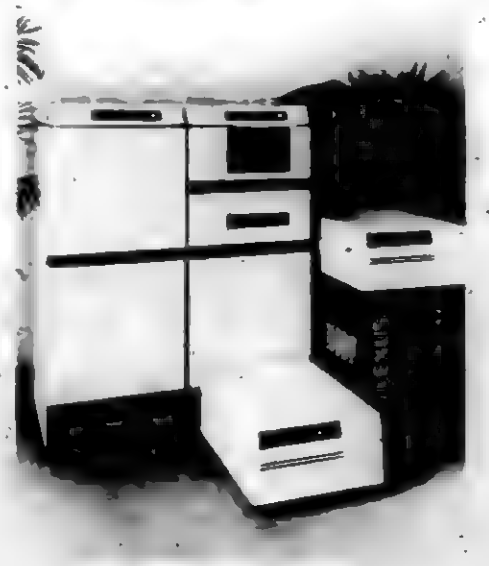
The file-service processor also runs the Unify DBMS and other software packages, according to the vendor.

The P/65 supports up to four 285M-byte, 14-in. rigid Winchester disk drives with streaming 9-track tape backup. Smaller disk drives are also available, the vendor said.

The P/65 costs $49,950 and operates with Unix System III and the firm's Network Operating System.

In addition to the P/65, Plexus unveiled a Unix network workstation capability, which permits stand-alone IBM Personal Computers to act as single-user, Unix-based microcomputers. The IBM Personal Computers can also serve as nodes on a Unix-based network with access to shared peripherals, data bases and larger Unix-based Plexus processors. The networking capability consists of a software package called Unetix. The package costs $250, the vendor said.

The Unify DBMS permits multiple users in a Plexus network to gain access to data bases in various systems in the network. Unify is geared to larger data bases and transaction processing applications. Other features include a query function, report writer, host language interface and transaction logging. Unify costs $3,000, the vendor said.



The Plexus P/65, P/35 and P/25

Plexus is located at 2230 Martin Ave., Santa Clara, Calif. 95050.

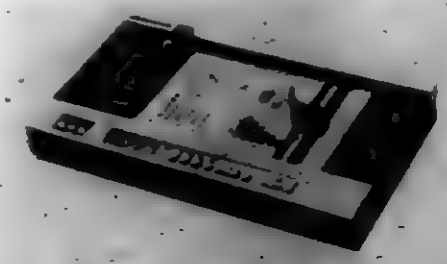
Western Graphtec Announces Line of X-Y Flatbed Plotters

IRVINE, Calif. — Western Graphtec, Inc., formerly Watanabe Instruments, has announced the WX 4630 series, a line of X-Y flatbed intelligent plotters.

Using one, two or 10 pens, the plotters are said to be directly compatible with digital control equipment through the use of standard interfaces, such as RS-232C, GPIB/IEEE-488 or 8-bit parallel.

The series features modular mechanical and electrical design, incorporating microprocessors and fully digitized inner controls. Other features include a pulse pen drive, 42 single-key programmable function commands, an operating speed of 16 in./sec., a 15-in. by 10-in. plotting area, a flatbed and a roll feed with or without a built-in paper cutter. Also, the plotters can draw circles, curves and arcs, the vendor said.

The WX 4630 series ranges in price from $3,990 to $6,990. Western Graphtec is located at 12 Chrysler St., Irvine, Calif. 92714.



WX 4630 Intelligent Plotter

North Star Offers Multiuser System, Fits IBM Micros

SAN LEANDRO, Calif. — North Star Computers, Inc. has announced the Dimension system, a multiuser microcomputer system that is compatible with IBM's Personal Computer and Personal Computer XT.

The Dimension system can support up to 12 users simultaneously with each user having the capability of running a different Personal Computer or Personal Computer XT application, the vendor said.

The heart of the system is an Intel Corp. 8086 microprocessor and a 13-slot IBM bus. Each user has a dedicated workstation board, which connects to the IBM bus. The Dimension system uses an operating system compatible with IBM's PC-DOS Release 2.0, the vendor said.

The microprocessor used in the workstation is an Intel 8088-2, which reportedly provides each user with the equivalent of a Personal Computer XT microcomputer.

In addition, the Dimension system offers each user access to common peripherals such as fixed disk drives, printers and communications devices, the vendor said.

Standard features of the Dimension sys-

(Continued on Page 137)

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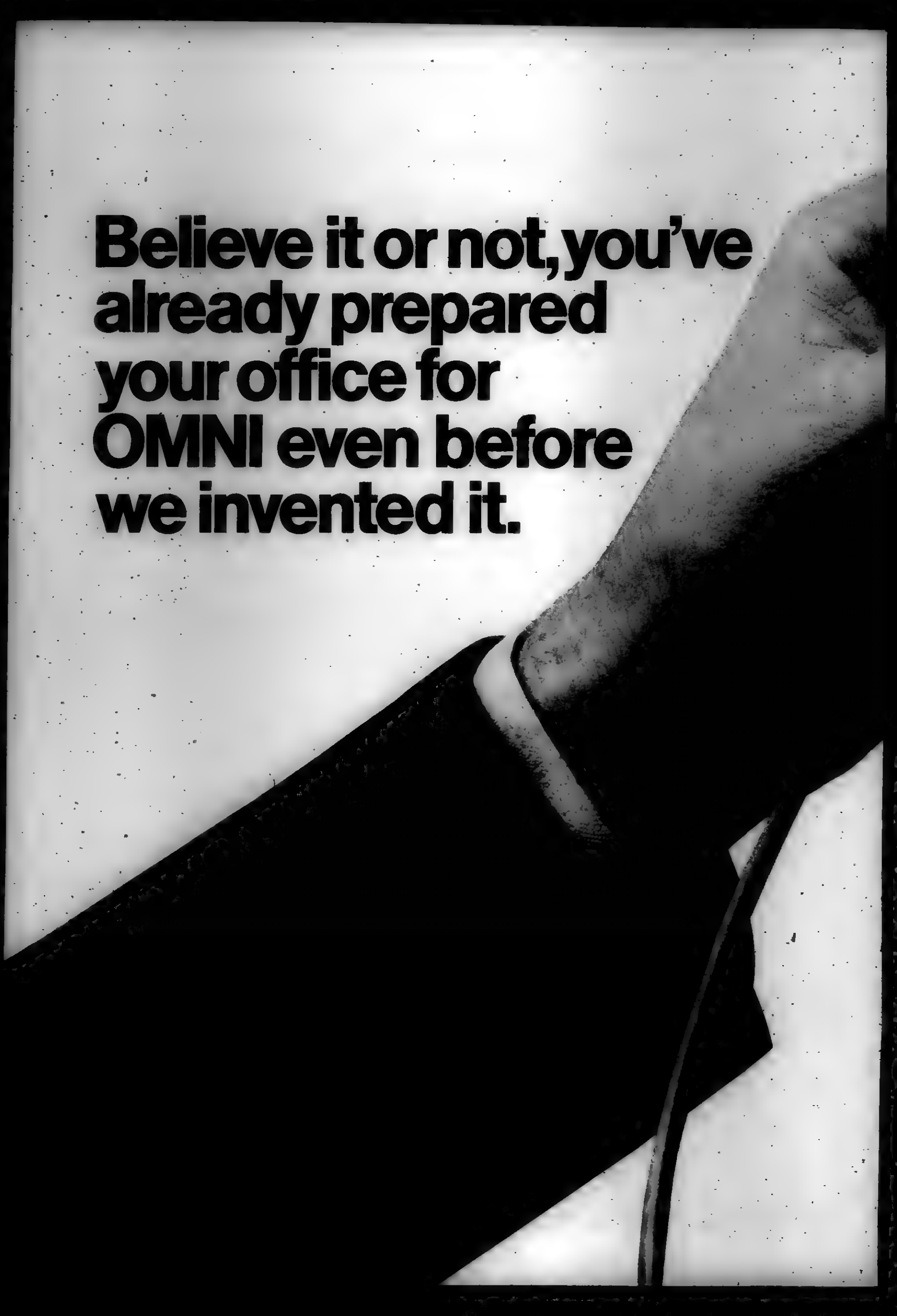

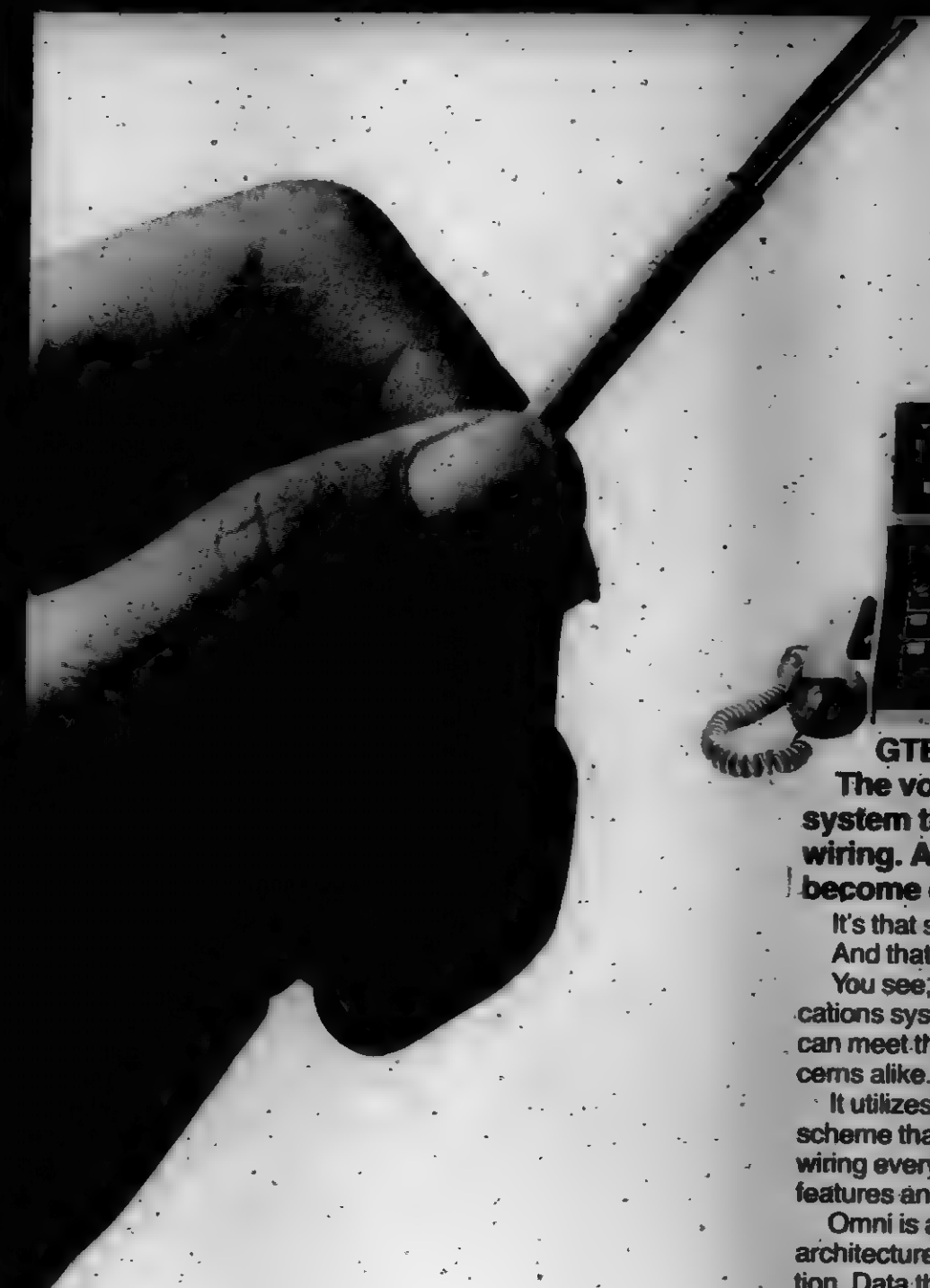

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Micro-Based Controller Supports DEC Systems

ANAHEIM, Calif. — Computer Storage Technology, Inc. (CST) has announced a microprocessor-based magnetic tape peripheral processor that supports Digital Equipment Corp. Unibus-based computers and can control up to four 9-track tape drives.

The firm also unveiled a streaming tape subsystem for DEC LSI-11 computers that provides up to 55M bytes of backup storage for Winchester disk systems.

The Model TC-200 controller is a single-board processor that can control tape drives operating at speeds ranging from 25 to 125 in./sec. It takes up one slot in the computer's backplane and can be used with 800 bit/in., 1,600 bit/in. and dual-density tape systems, a spokesman claimed.

The unit features automatic self-test verification and read-after-write error-checking logic to prevent data loss. It supports all DEC operating systems that include drivers for RSTS/E, RSX-11M and RT-11 operating systems. The unit can reportedly be installed without adding software drivers or implementing any diagnostic changes, the spokesman added.

The TC-200 costs $3,000.

The CS-300 tape subsystem incorporates the firm's CC-300 single-board peripheral processor and a ¼-in. streaming tape drive. The unit also includes a ¼-in. tape cartridge as the high-capacity storage medium.

The device can be configured with two capacities: the 20M-byte CS-320 and the 45M-byte CS-345, which can be extended to 55M bytes by using an optional cartridge. Data transfer in both configurations can reportedly be sustained at 90K byte/sec with a 97% tape utilization.

The peripheral processor takes up one slot in the LSI-11 backplane, while the tape drive and associated power supply are contained in a single chassis that can be mounted in a standard 19-in. equipment rack.

The device costs $4,970 from the firm at 1369 S. State College Blvd., Anaheim, Calif. 92806.

HP Announces ½-In. Tape Drive

PALO ALTO, Calif. — Hewlett-Packard Co. has announced the HP 7974A, a ½-in. tape drive designed for data backup on mid-range systems with between 100M and 500M bytes of on-line disk storage.

The HP 7974A can operate in either start/stop or streaming modes with a capacity of 1,600 phase-encoded char./in. The drive operates at 50 in./sec with a 200 in./sec backup speed when used in a start/stop mode. Support for nonreturn to zero inverted (NRZI) 800 char./in. double-density tape formats is also available, the vendor said.

In a streaming mode, the tape drive can operate at 100 in./sec.

The HP 7974A is supported on the HP 3000, HP 1000 and HP 9000 series processors. The disk drive costs $12,500. The NRZI format option costs $2,500 from HP, 1820 Embarcadero Road, Palo Alto, Calif. 94303.

ISI Model 487

ISI Model 487 Added to Line Of Printers

ANN ARBOR, Mich. — Interface Systems, Inc. has announced the ISI Model 487, the latest addition to its family of IBM 3270 plug-compatible printers.

The printer is said to incorporate a variety of features into a tabletop design. The Model 487 reportedly delivers near-letter quality or 7- by 9-in. dot matrix printing. It accepts continuous forms and offers a demand document feature. Single-cut letterhead sheets can be fed manually or automatically with the optional sheet and envelope feeder. A control panel provides access to the ISI 487's programmable memory, the vendor said.

The ISI Model 487 comes ready to be plugged into any IBM 3274/3276 system and offers standard coaxial support of IBM's Synchronous Data Link Control Character Strength.

The Model 487 costs $3,950, according to the vendor. ISI is located at 5855 Interface Drive, Ann Arbor, Mich. 48103.

COMMUNICATION NETWORKS '84 offers you 100 solutions to your post-divestiture telecommunication problems.

Charles Wohlstetter, Chairman, CEO, Comsat General Telesystems, Inc. Keynote

F.S. Vigilante, AT&T Information Systems, Viewpoint

Mimi Dawson, FCC, Policy

Howard Anderson, The Yankee Group, Futures

Amy D. Wohl, Advanced Office Concepts, Micro Networks

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COMMUNICATION NETWORKS gives you twelve sessions focusing on "Network Technologies." Thursday, February 2, is "Microcomputer Networking Day," a full day devoted to teaching you how to get more from your PC than just stand-alone applications.

You may even choose to develop specific skills in one of the nine full-day "In-Depth" seminars. "In-Depth" seminars will be held on January 30, one day prior to the official opening of COMMUNICATION NETWORKS.

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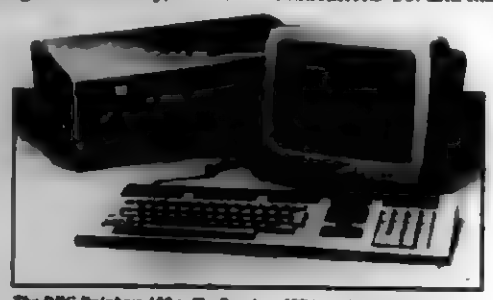

The DEC Rainbow 100+. The Rainbow 100+ system unit features 8MA and 8088 microprocessors, a 10 MB Winchester hard disk, a dual floppy diskette with 800 KB capacity and synchronous communications, built-in terminal emulator, printer port and 128 KB of system memory.

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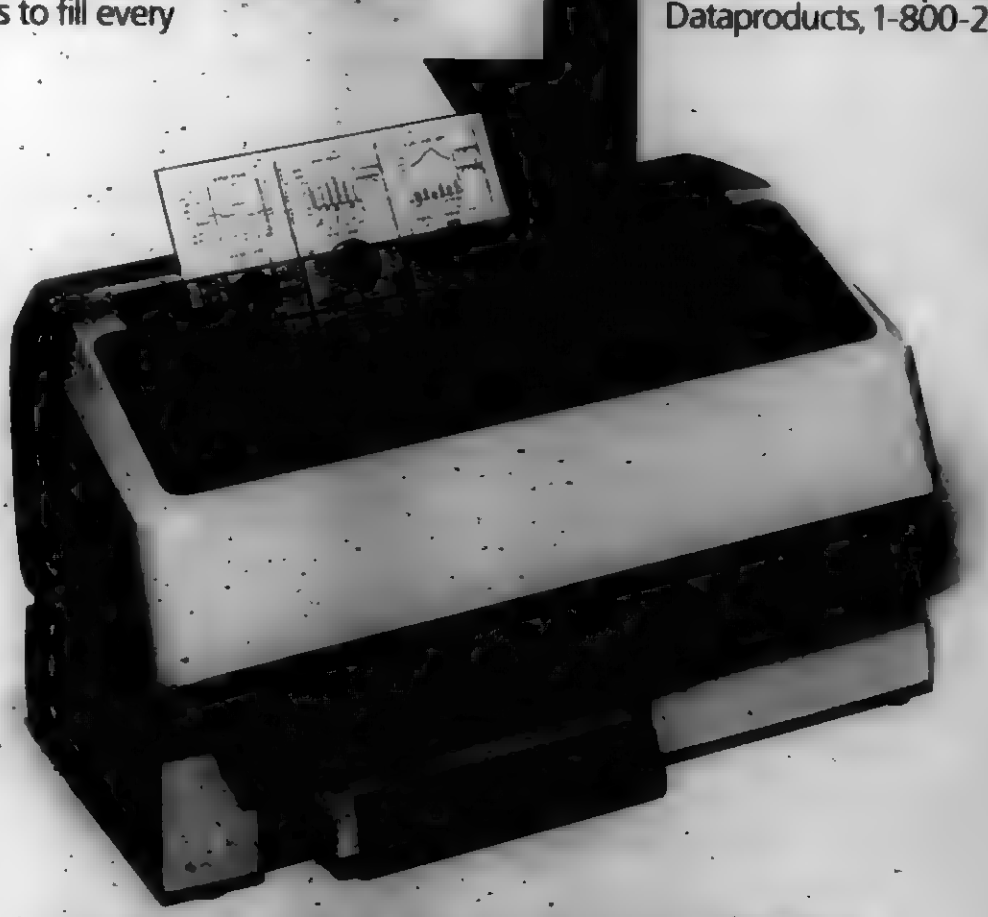

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SMS Micro/TSX-Plus Software-Compatible With DEC PDP-11

NASHVILLE, Tenn. — A multiuser microcomputer system that is software-compatible with Digital Equipment Corp.'s PDP-11 minicomputer has been announced by Scientific Micro Systems, Inc. (SMS).

Called the SMS Micro/TSX-Plus (the computer runs under the firm's TSX-Plus operating system), the machine is built around DEC's LSI-11/23 CPU and can accommodate from three to 16 users. The system includes 15.9M bytes of hard disk storage and can be placed on a desktop, a spokesman said.

The unit includes a memory management facility that is said to speed throughput by allowing many processes to reside simultaneously in up to 4M bytes of main memory. It also has a transparent spooling system that allows users to print files without degrading terminal and program performance.

Other features of the TSX-Plus operating system include system administrative control, shared-file record locking, data and directory caching, program debugging facilities, performance analysis and a system optimization utility.

The system is preconfigured to support three user-supplied DEC VT100 terminals and one serial port operating at 9,600 bit/sec. It can be expanded by upgrading to the firm's full implementation of the operating system, adding four serial ports and 256K-byte memory modules.

The largest TSX-Plus system will support up to 30 concurrent tasks as well as real-time jobs, the firm said.

The SMS Micro/TSX-Plus costs $11,000 from Scientific Micro Systems at 1027 17th Ave. S., Nashville, Tenn. 37212.

Hard Disk Subsystem Fits IBM Micro

SANTA ANA, Calif. — A 5¼-in. hard disk subsystem for the IBM Personal Computer has been announced by Zetec Corp. The unit integrates a number of popular business and word processing software packages along with a data storage area.

Called the Business Manager subsystem, the hardware/software device boasts from 10M to 15M bytes of storage and integrates such software as Micropro International Corp.'s Wordstar, Spellstar and Mailmerge and Datamension Corp.'s Report Manager spreadsheet program and Exec program generator. A relational data base manager and six accounting programs are also included, the vendor said.

All of the software programs are integrated into a single shell section on the hard disk and can interact with data stored on the main portion of the disk as well as with each other, a spokesman said.

The system costs $4,500 for the 10M-byte version and $5,200 for the 15M-byte disk unit.

Zetec is located at Suite 115, 1420 E. Edinger Ave., Santa Ana, Calif. 92705.

Repair Aid Designed For Unibus

HOUSTON — Information Products Systems, Inc. has announced its Digital Equipment Corp., VAX-11 Unibus maintenance aid said to allow troubleshooting and repair of all Unibus peripherals without interrupting VMS operation.

The Model 700 is plugged into the Unibus path and reportedly allows the user to switch the Unibus string on the output on and off. The switching operation does not generate unsolicited interrupts to the VMS operating system causing errors.

A 14-day free evaluation is offered to credit-approved customers. The Model 700 costs $995 from Information Products Systems, 6567 Rookin, Houston, Texas 77074.

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Northern Telecom batch processing systems have proven themselves, in more than a decade of use in a variety of applications, to be among the most reliable, practical, cost-effective systems ever developed. They deliver more throughput per dollar than any competitive system.

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We're back

UCS' Tapesaver 969 Cartridge Tape System

Cartridge Tape System Targets Users of IBM Series/1 Minis

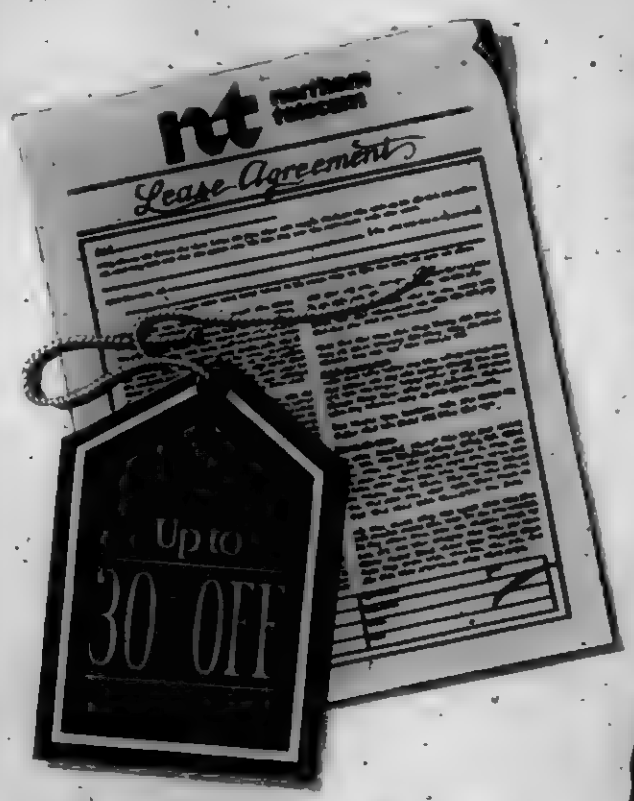
DENVILLE, N.J. — A cartridge tape system that allows users of IBM Series/1 minicomputers to store and retrieve data on ¼-in. magnetic tape cartridges was recently announced by Ultimate Computer Services, Inc. (UCS).

The UCS 969 cartridge tape system, named Tapesaver, is available in two models operating at storage rates of 30 in./sec or 17,500 byte/sec for the Tapesaver/1, and 60 in./sec or 35,000 byte/sec for the Tapesaver/2. Retrieval rates are 60 in./sec and 90 in./sec, according to a company spokesman.

The Tapesaver/1 will copy 67M bytes of data on one 600-ft cartridge in one hour, and the Tapesaver/2 will copy the same amount of data in half the time, the company said.

Each system consists of a cartridge tape drive, controller, power supply and a single-board attachment card that fits into one I/O slot on any Series/1. The units mount into the IBM 4997 rack enclosure.

Each model costs about $7,000 from UCS, 30 Broad St., Denville, N.J. 07834.



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Andromeda Introduces Micro

CANOGA PARK, Calif. — Andromeda Systems, Inc. has announced a transportable computer system based on Digital Equipment Corp.'s LSI-11 processor and Q-bus.

Called the 11/M12, the unit features an LSI-11/23 processor, 256K bytes of random-access memory, 10M bytes of fixed Winchester disk storage, 512K bytes of floppy disk storage and four serial ports.

The unit runs standard DEC software including the RT-11, TSX-Plus and RSX-11M operating systems, the vendor said.

When used with a standard CRT terminal, the unit can be used as an intelligent workstation.

The 11/M12 costs $8,400 from Andromeda Systems, 9000 Eton Ave., Canoga Park, Calif. 91304.

ADC Unit Translates Disk Media

TUSTIN, Calif. — Applied Data Communications, Inc. (ADC) has announced a universal diskette reader/writer. The unit is said to be a media translation system that accepts source computer data from a floppy disk of any size, density and format.

The Model TM-500 reportedly resolves physical and logical incompatibilities among floppy disk formats enabling computers to interchange Digital Research, Inc. CP/M files, text and data bases.

A standard X-on/X-off feature reportedly allows the TM-500 to accept real-time data communications input.

IBM's Binary Synchronous Communications protocol is optional at $1,600. In its basic configuration, the TM-500 system is priced at $15,800 from ADC, 14272 Chambers Road, Tustin, Calif. 92680.

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The Prime 9950. It's our latest and greatest technological achievement. And there's nothing else like it. Anywhere.

For more on the Prime 9950, or on the entire Prime family of compatible computers, call **1-800-343-2540** (Mass., 1-800-322-2450), or write Prime Computer, Prime Park, MS 15-60, Natick, MA 01760. In Canada call 416-678-7331. In Europe write, One Lampton Road, Hounslow Center, Hounslow, Middlesex, TW3 1JB, England. In the Far East, write Unit 1005, Tannery Block, 35 Tannery Road, Singapore 1334.

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System Provides Services To Micros Under CP/M

FAIRFIELD, N.J. — Personal Computer Gateway, Inc. recently announced a hardware and software system that provides communications capability, file handling and storage service to microcomputers operating under Digital Research, Inc.'s CP/M operating system.

Called the Data Pouch, the unit includes an 80M-byte hard disk drive, eight I/O ports and software.

The product connects to several popular microcomputers through RS-232 ports. The Data Pouch provides file storage and file transfer among connected microcomputers as well as electonic mail, a bulletin board and private and shared user files. Other features include security sign-on and menu commands.

The product reportedly provides facilities for registering up to 31 users. It will support a mix of eight to 16 simultaneous users depending on the transmission rate. The product supports transmission speeds up to 9,600 bit/sec over dedicated lines and up to 1,200 bit/sec over direct-dial lines. It is available for IBM Personal Computers and compatible products; Apple Computer, Inc.'s Apple II and III; and other micros operating under CP/M.

The package costs about $19,000 from Personal Computer Gateway, 22 Daniel Road, Fairfield, N.J. 07006.

Sony Bundles SMC-70 Models

PARK RIDGE, N.J. — Sony Corp.'s Information Products Division has announced the availability of four bundled versions of its SMC-70 microcomputer system. Each one includes Digital Research, Inc.'s CP/M operating system and a variety of vertically targeted software programs.

At the same time, Sony announced price reductions in the components that make up the SMC-70 microcomputer.

The bundled systems, each equipped with dual 280K-byte, 3½-in. floppy disk drives, include:

- The Generalist, consisting of a 12-in. Sony monitor, dot matrix printer, word processing and spreadsheet software and all cables and wiring. It costs $3,451.
- The Artist's Easel, including a 12-in. color monitor, Sony Disk Basic and Graphics Editor software, costs $2,691.
- The Manager includes a color monitor, spreadsheet software and Sony's Record Management package for small businesses or department-level managers. This is an expandable system for business modeling applications and costs $3,036.
- The Bookkeeper consists of the color monitor; dot matrix printer; 6M-byte Corvus Systems, Inc. hard disk system with interface; and accounts payable, receivable and general ledger software. This system, priced at $6,700, was designed to handle large amounts of data.

Peripherals for each of the systems include a 5¼-in. hard disk system and 256K bytes of cache memory. Each system includes 13 resident I/O interfaces as standard equipment, including a Centronics Data Computer Corp.-type parallel port, an RS-232C serial interface and a red-green-blue video port. The basic units also have a battery backup clock calendar, system test diagnostics and a time generator, a spokesman said.

Price reductions on SMC-70 components include markdowns on some peripherals, including the 64K-byte keyboard/CPU console, which will be discounted by $480, Sony announced.

Sony is headquartered at Sony Drive, Park Ridge, N.J. 07656.

CAD System Out, Based On DG Series

FAIRFIELD, Conn. — Summagraphics Corp. has introduced Icon, a computer-aided design (CAD) system based on Data General Corp.'s new Desktop Generation series computer.

The CAD system was designed for applications in the architectural, engineering, construction and printed-circuit board marketplaces.

Icon features full performance capabilities and all software necessary to create, preview, edit, store and recall graphics in a professional workstation.

It offers a self-contained, ergonomically designed workstation available in single- and dual-user configurations. Each workstation has an integral digitizer with an easy-to-use menu and two tilt and swivel monitors, a spokesman said.

The new system features a 19-in. raster graphics display with instructions and built-in Help tables detailing the steps required for any operation.

Complete application packages for AEC and PCB professionals are available. The packages include programs for architecture, civil engineering, surveying, cost estimating, printed-circuit design, mechanical and electrical design and word processing.

A per-workstation price of $37,250 is based on a four-workstation configuration.

More information is available from Summagraphics through 35 Brentwood Ave., P.O. Box 781, Fairfield, Conn. 06430.

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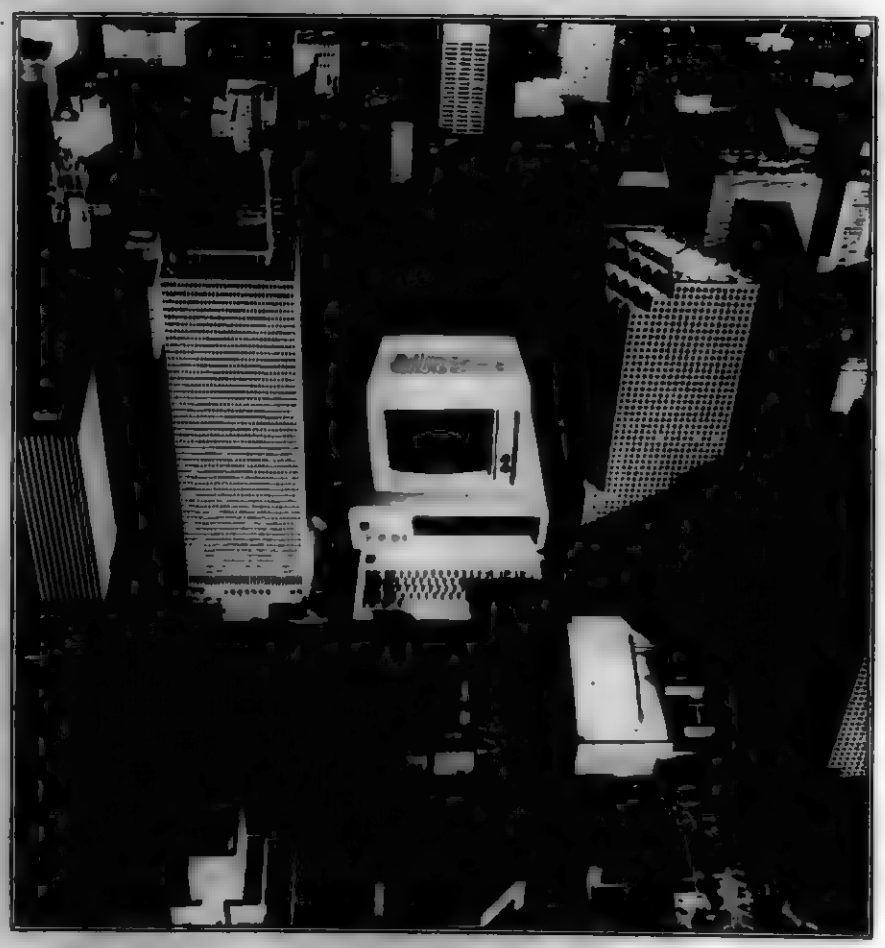

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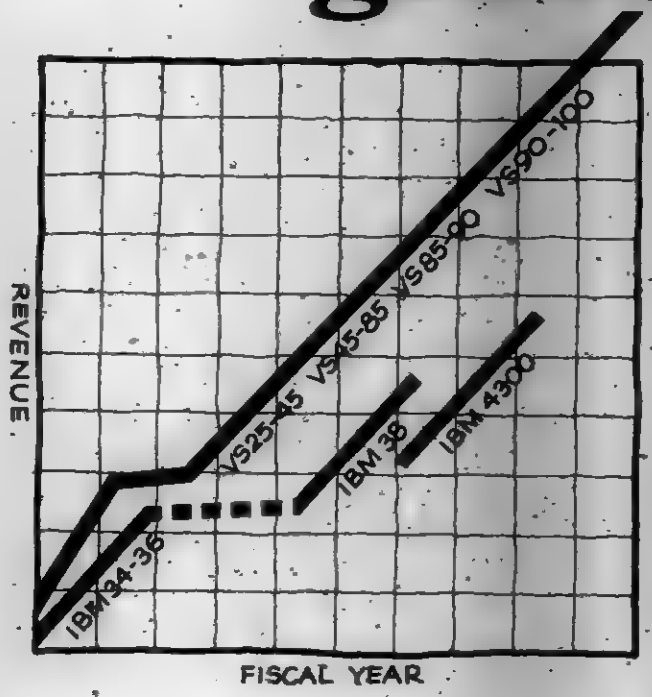

The best reason for choosing a Wang VS computer today may be tomorrow. Because unlike comparable IBM systems, the Wang VS line is a computer family with a smooth, proven and continuous growth path.

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On the other hand, the IBM 34/36, 38 and 4300 all use different operating systems, different source codes and even different software. Upgrading from one to another is almost like starting over again with a whole new system.

A typical conversion from the IBM 34/36 to a Wang VS computer takes about two months. From then on, no other conversions are necessary.

Converting from the IBM 34/36 to the IBM 38 is a long and tedious process. And you face an even more difficult task going to an IBM 4300. That's time and money that a growing company just can't afford.

If you want to spend more time doing business, and less time getting ready to do business, choose the Wang VS computer line. It won't stunt your company's growth no matter how fast you grow.

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Hard Disk Drive Line Also Announced

Disk Cache System Targets IBM Micro Users

SAN JOSE, Calif. — Santa Clara Systems, Inc. (SCS) has introduced a disk cache system and a line of internal hard disk drives for IBM Personal Computer users. In addition, SCS is offering upgrades of its high-capacity, external 5¼-in. hard disk drives.

Quick Disk, the disk cache system, is said to be an external add-on memory device that contains random-access memory ranging from 128K bytes to 1M byte and dynamic error correction.

Attached to an IBM Personal Computer, the product is said to increase the speed and performance of SCS' PCnet network and to speed up hard disk drives. The five models of Quick Disk range in price from $2,795 for 128K bytes to $8,595 for 1M byte, the vendor said.

The newly announced family of internal disk drives was designed for use with the IBM Personal Computer or Personal Computer XT. Offered in three configurations and in kit form, the 3.9-in. drives fit into one of the Personal Computer's floppy disk enclosures. The line of products ranges in price from $2,095 to $2,995, the vendor said.

The upgraded 5¼-in. hard disk drives reportedly give users 20% more storage capacity and about a 25% increase in I/O throughput for the same price. The upgraded versions feature 6M, 12M or 18M bytes of fixed disk storage, with 6M bytes of storage on a removable 3.9-in. cartridge.

The prices range from $2,295 to $5,056 from SCS, 1860 Hartog Drive, San Jose, Calif. 95131.

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The speed of your data processing is limited by the speed of your data collection and input. Unfortunately, for a lot of people, data collection technology stopped with the development of the clipboard.

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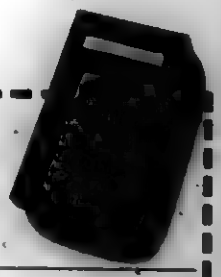

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Sanyo Micro Competes With IBM

MOONACHIE, N.J. — Sanyo Business Systems Corp. has unveiled the MBC 550 series, a 16-bit microcomputer that reportedly will run about 80% of the off-the-shelf programs for the IBM Personal Computer. The system differs from the Personal Computer in that it does not address memory in the same location and offers eight colors to IBM's four, a spokesman said.

The MBC 550 series includes a detachable keyboard and 128K bytes of random-access memory that is expandable to 256K bytes. In addition, the unit features a standard parallel printer port, optional serial port, dual disk drive, speaker and joystick ports, the spokesman said.

The MBC 550 comes with Information Unlimited Software, Inc.'s Easywriter I, Micropro International Corp.'s Wordstar and Calcstar, Sanyo's Basic and Microsoft, Inc.'s MS-DOS.

It costs $999. Sanyo is located at 51 Joseph St., Moonachie, N.J. 07074.

Omni Line Beefed Up

SAN DIEGO — Digital Computer Corp. has added two models to its Omni line of multiuser microcomputers.

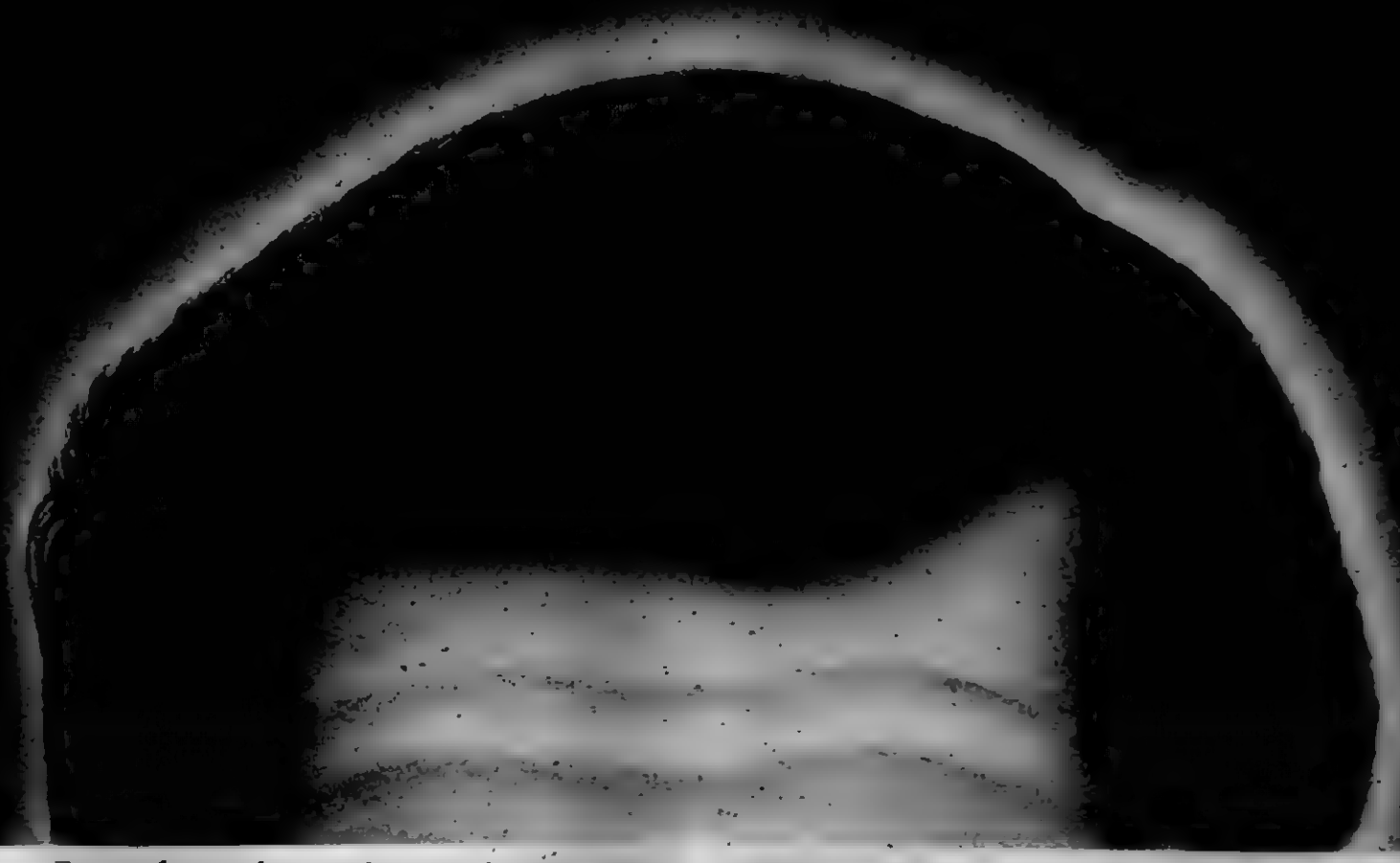
Called the Series 2000 and 4000, the models use Digital Research, Inc.'s CP/M or Software 2000, Inc.'s Turbo DOS operating systems. The Series 2000 has single or dual hard disk configurations and offers up to 106M bytes of disk storage.

Up to 10 users can operate the Series 2000, according to the vendor.

The Series 4000 can operate with two or four hard disk drives, offering up to 212M bytes of storage. The Series 4000 supports up to 32 [illegible].

The Series 2000 costs from $6,595. The Series 4000 costs from $17,995.

Digital Computer is located at 7430 Trade St., San Diego, Calif. 92121.



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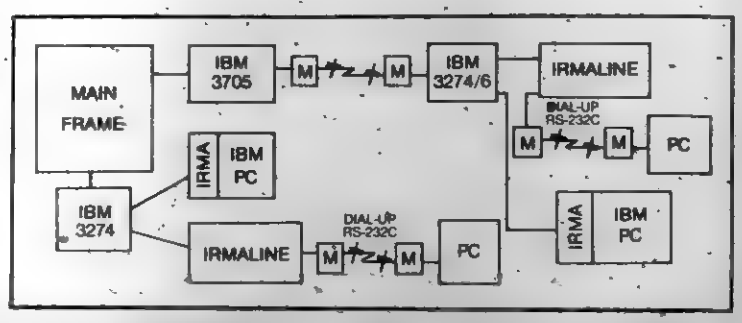

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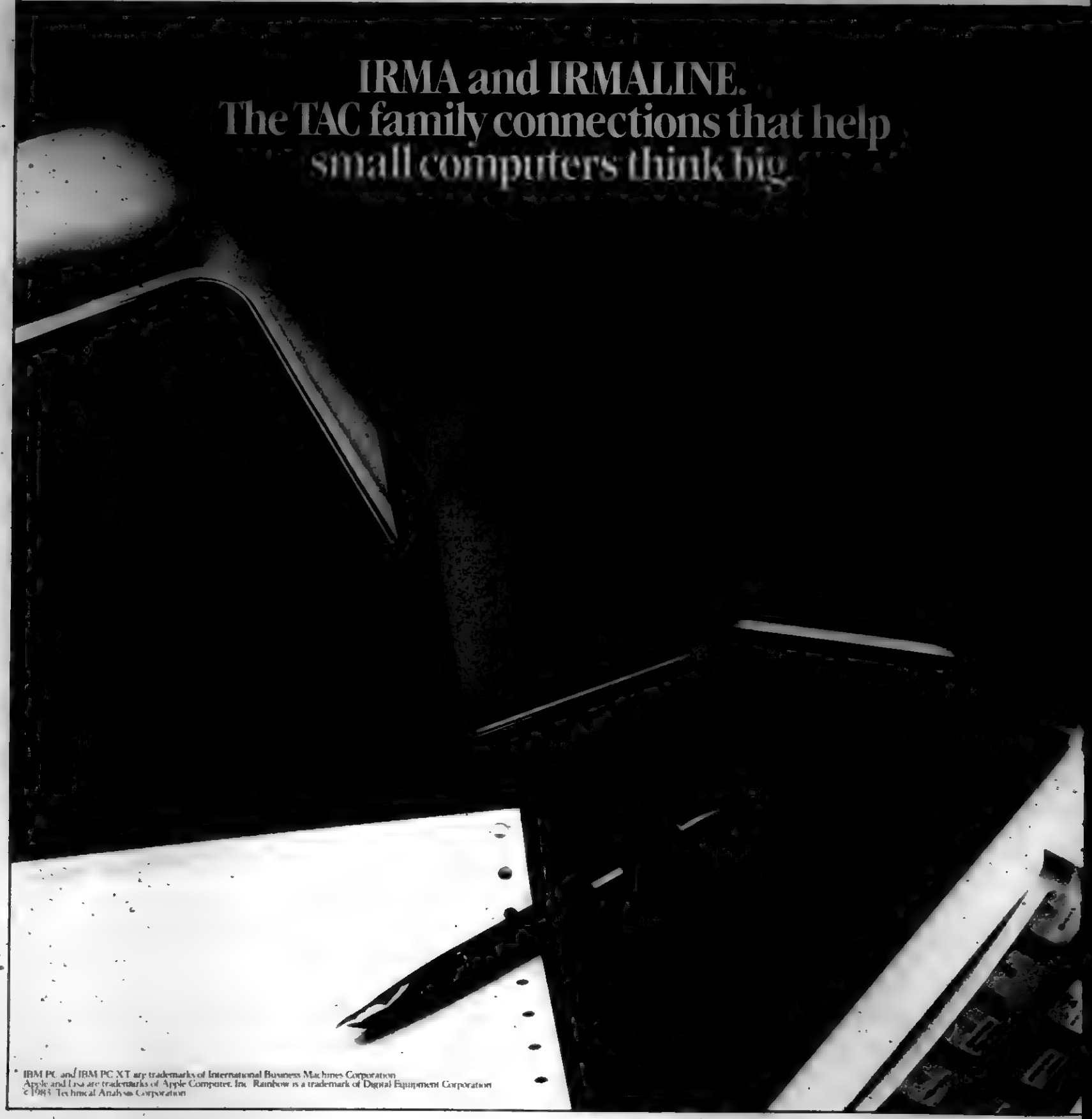

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With the p-System, a program you buy or develop for one brand of micro can also run on an IBM, Apple, TI, Corvus, Epson, Tandy, HP, Wang, Digital, NCR, NEC and over 100 other micros.

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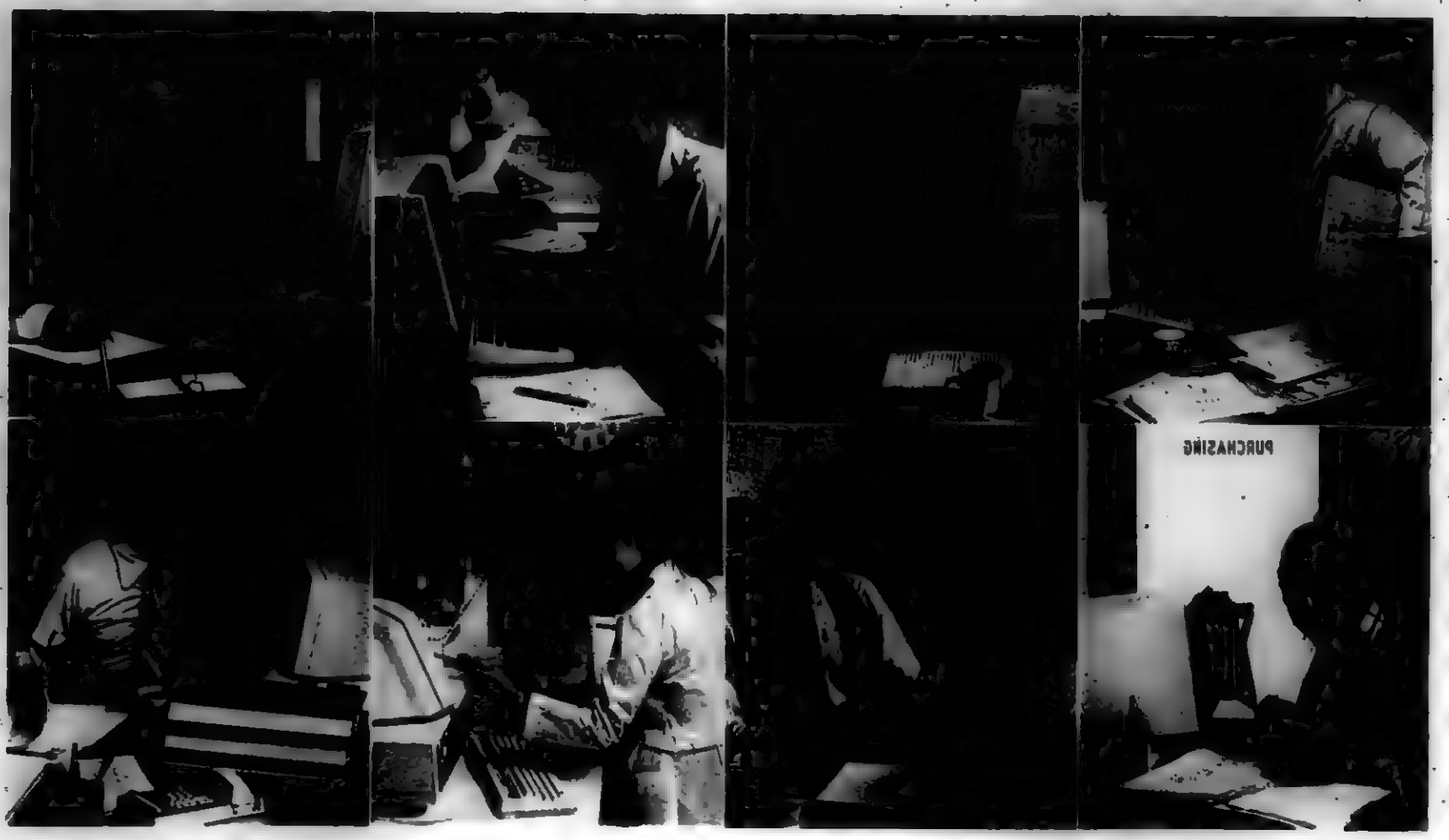

Sunol's Mass Storage System Boosted With 5¼-In. Disk

PLEASANTON, Calif. — Sunol System Co. has upgraded its microcomputer Mass Storage System with a 5¼-in., 51M-byte Winchester disk drive system.

Host adapters are available for IBM; Texas Instruments, Inc.; Apple Computer, Inc.; Radio Shack; and other microcomputers.

The half-size Winchester features built-in error-correction code, run length limited magnetic tape-coding format and a proprietary controller design. Those features reportedly enable Sunol Systems to provide up to 60% more usable storage and allow information transfer rates to climb from 5M bit/sec to 7.5M bit/sec. Users reportedly can double their storage by using two of these half-size drives in place of a 5¼-in. drive.

Up to 64 users and up to seven different operating systems can share a single Mass Storage Unit.

The Mass Storage Disk costs $4,595 and will be available in December. On-line backup storage (32M-byte capacity) is available via a ¼-in. tape cartridge that lists for $1,295 from Sunol Systems through P.O. Box 1777, 1072 Serpentine Lane, Pleasanton, Calif. 94566.

Disk Controller Designed To Optimize Unix Systems

DALLAS — A hard disk controller said to be designed to optimize the Unix operating system and Unix-based systems was recently announced by Interphase Corp.

The company's SMD 2190 features cache memory and an intelligent caching system whereby the controller predicts what data will be accessed next and caches it in the controller memory for immediate availability to the operating system, a spokesman said. A selected override capability allows reading on a non-cached basis.

The unit reportedly formats disks in programmable groups of contiguous sectors. It also features a direct mode that bypasses the controller's on-board buffering and provides direct connection between the bus and the disk, the spokesman said.

The SMD 2190 supports many popular microcomputers and disk drives, the company said. Single-unit purchase price is $2,250. Additional information is available from Interphase, 2925 Merrell Road, Dallas, Texas 75229.

Comrex Christens Multicolor Plotter

TORRANCE, Calif. — Comrex International, Inc. has introduced a plotter for users of the IBM Personal Computer, Epson America, Inc. QX-10, Apple Computer, Inc. computers and other microcomputers.

The Model CR-1810 Comscriber I plotter can produce charts, graphs and illustrations in several colors. The plotter uses paper 8½-in. wide by 1-in. to 10-ft long. The basic plotting area of 8½-in. by 11-in. can be extended up to 120 in. in length. Characters ranging in height from an ⅛-in. to 20-in. high can be drawn. The plotter measures 2.9-in. by 14.3-in. by 8.8-in., the vendor said.

Using a pen, the plotter reportedly can operate at up to 6 in./sec, and line segments are accurate to one four-thousandth of an inch.

The Model CR-1810 costs $695. A support rack of pens, paper, interface cable and tutorial software is also available from Comrex, 3701 Skypark Drive, Torrance, Calif. 90505.

Drives Target Honeywell DPS 6

CHICAGO — Knaus Systems, Inc. has announced its Parrot Winchester disk drives that operate on Honeywell, Inc.'s DPS 6 processors.

The drives offer a maximum storage capacity of 315M bytes and are compatible with Honeywell's MSU 9604 256M-byte drives. The drives are rack-mountable with interchangeable parts. An automatic lock protects read/write heads by locking the heads and disk platters when power is switched off.

The Parrot drives cost $15,990, Knaus Systems said from 9950 W. Lawrence Ave., Chicago, Ill. 60176.

Kaypro Micros Receive Adapter, Cable

ORANGE, Calif. — Advent Products, Inc. has announced an External Monitor Adapter (EMA) and a 12-ft keyboard cable for Kaypro, Inc.'s Kaypro II and 4 microcomputers.

The EMA reportedly provides the ability for the Kaypro II or 4 to drive an external video monitor. Installation does not alter or damage the motherboard, and no soldering, desoldering or wiring is required. It costs $59.95, the vendor said.

Using the same type and quality of cable, the 12-ft keyboard cable is said to be a direct replacement for the original 6-ft cable and works with the Kaypro II, 4 or 10. It costs $12.95. Advent Products is located at 965 N. Main St., Orange, Calif. 92667.

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Nuvec Laboratories Unveils Decentralized Micro Systems

LEXINGTON, Mass. — A family of supermicro and personal computer systems with decentralized hardware and software has been introduced by Nuvec Laboratories, Inc.

Nuvec Multex I and Multex II supermicros feature dedicated processor buses and decentralized multiported processors that share a common system bus to provide 6.3M bytes of random-access memory (RAM) for up to 32 users. Running on decentralized software, the micros include standard Unix programmer interfaces and built-in data base management systems.

The Multex I system includes a 157M-byte Winchester disk, while the Multex II combines a 315M-byte disk with a 16-channel, 1,200 bit/sec full-duplex modem for a total network capacity of-1,024 users. Multex II is expandable to 17,000M bytes.

Running under IBM Personal Computer software or Digital Research, Inc.'s CP/M 86, the Nuvec personal computer features up to four quad-density, double-sided 5¼-in. diskettes or hard disks and up to 983K bytes of RAM.

The Nuvec Multex systems start at $25,000 and the personal computer at $18,000, with the price depending on configuration and options. Nuvec Laboratories is located at 429 Marrett Road, Lexington, Mass. 02173.

Power System To Distribute AC Power

SAN DIEGO — Topaz, Inc. recently announced a power distribution system series for distributing noise-free ac power to computers and peripherals.

The Topaz Maximum Value Powercenter (MVP) distributes ac power throughout a computer room via flexible, watertight-shielded cables that allow users to rearrange equipment without the inconvenience associated with fixed-wire installations, a spokesman said.

The MVP reportedly provides up to 126 pole positions and will accommodate up to 75 cables. Each system is equipped with an internal isolation transformer and includes a digital power management panel for system status monitoring, computer-grade grounding, a building interface package for creating centralized air-conditioning/fire alarm control and main circuit breakers for each output load center.

The system is said to be 97% power efficient and is available in power ratings of 100 kVA, 125 kVA and 150 kVA, starting at $12,000. Topaz can be reached at 9192 Topaz Way, San Diego, Calif. 92123.

Disk Extends Micro's Storage

PRINCETON, N.J. — Floppy Disk Services, Inc. has announced the FD-PC8, which the company said is an 8-in., double-sided disk drive that adds 2.5M bytes of on-line storage capability to the IBM Personal Computer.

The FD-PC8 is said to be one-half the height of standard disk drives and offers IBM mainframe interface capabilities, the vendor said.

The unit is available in both single and dual system configurations for $1,095 and $1,495 respectively from Floppy Disk Services, 741 Alexander Road, Princeton, N.J. 08540.

Workstation With Logic Unit Completes Idea 1000 System

PORTLAND, Ore. — Mentor Graphics Corp. recently announced a workstation that incorporates a logic analysis system into its Idea 1000 computer-aided engineering system.

The company said the Midas 7000 completes the automation of digital hardware design by bringing hardware verification and test to the existing capabilities of schematic entry/capture, design simulation and physical layout.

The logic analysis system is controlled through the Idea 1000 workstation's graphics-oriented user interface that controls other system tools, and the unit features an expandable architecture that will accommodate other digital test instrumentation, a company spokesman said.

The Midas 7000 takes real-time "snapshots" of the digital activity taking place inside a computer-based product as it executes software, providing two types of information: a record of the logic states produced by the software/hardware interaction, and a record of the timing relationships between the various digital control lines.

The logic analysis system is priced at $14,900 and will be available for shipment in the first quarter of 1984, according to Mentor Graphics. Additional information is available from Mentor Graphics, located at 10200 S.W. Nimbus Ave., G7, Portland, Ore. 97223.

Timex Offers Color Micro

WATERBURY, Conn. — Timex Computer Corp. has announced the 2068 color microcomputer.

The unit features 72K bytes of internal storage divided into 48K bytes of random-access memory and 24K bytes of read-only memory. The unit can be used for word processing, entertainment and educational applications, the vendor said.

The 2068 costs $199.95, Timex Computer said through P.O. Box 2126, Waterbury, Conn. 06720.

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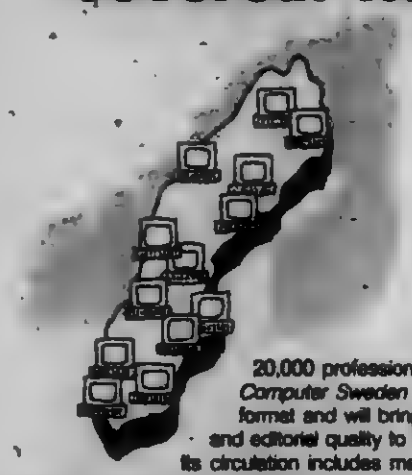

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TUTORIALS

TUESDAY, JAN. 17

ALL-DAY SESSIONS – 8:30 a.m. to 5 p.m.

1. Software Contracts & Licenses
   Speaker: Susan H. Nycum, of Gaston, Snow, Ely Bartlett; Palo Alto, CA
2. C Style and Portability
   Speaker: Eric Allman, of Britton-Lee; Los Gatos, CA
3. UNIX Systems Administration
   Speakers: Ed Gould and Bob Kridle, of Mt. Xinu; Berkeley, CA
4. Advanced Shell Programming
   Speaker; Steve Bourne, of Silicon Graphics Inc.; Mountain View, CA
5. VI Editor
6. UNIX Systems on Local Area Networks

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UniForum will present the largest showing of UNIX-related hardware, software and services . . . ever.

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Displays fill the Washington Hilton's big exhibit hall and overflow to adjoining areas.

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/usr/group SESSIONS

USENIX SESSIONS

WEDNESDAY, JAN. 18

7. Keynote Address – 9 a.m.-10 a.m.
8. Joint Session – 10:30 a.m. to Noon
9. Fifth Generation Computer – 1:30-3 p.m.
10. Networking – 1:30-3 p.m.
11. UNIX Market Research – 3:30-5 p.m.
12. Distributed Processing Under UNIX 3:30-5 p.m.

THURSDAY, JAN. 19

13. UNIX Micro to Mainframe Communications – 8:30-10 a.m.
14. Compilers and Languages – 8:30-10 a.m.
15. UNIX Graphic Work Stations and Applications – 10:30-Noon
16. Programming Tools – 10:30-Noon
17. Standards for UNIX & C – 1:30-3 p.m.
18. Novel Applications – 1:30-3 p.m.
19. UNIX and Entertainment – 3:30-5 p.m.
20. Implementations – 3:30-5 p.m.

FRIDAY, JAN. 20

21. Office Automation Case Studies And New Products Using UNIX – 8:30-10 a.m.
22. Database Systems – 8:30-10 a.m.
23. UNIX Microports and Western Electric – 10:30-Noon
24. Graphics – 10:30-Noon
25. Ada and UNIX – 1:30-3 p.m.
26. Open Session – 1:30-3 p.m.
27. Joint Session – 3:30-5 p.m.

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TUESDAY	HOURS	WEDNESDAY		THURSDAY		FRIDAY	
(Select One:)	8:30 - 10 a.m.	7†		13	14	21	22
1 2 3	10:30 Noon	8		15	16	23	24
4 5 6	1:30 - 3 p.m.	9	10	17	18	25	26
	3:30 - 5 p.m.	11	12	19	20	27	

†Keynote; session begins at 9 a.m.

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To register after December 30, 1983, register at UniForum at the Washington Hilton. On-site fees are $50 higher. On-site registration fee to attend exhibits only, $10.

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North Star's Dimension Works With IBM Micros

(Continued from Page 117)

tem include one 360K-byte floppy disk drive and one 15M- or 30M-byte fixed disk drive. Add-in spaces for a second fixed disk drive and an integrated tape backup subsystem are also included, the vendor said.

The main processor board is equipped with 256K bytes of random-access memory (RAM), which is expandable to 512K bytes. This memory is used primarily as cache memory to speed up the interaction between the user and the hard disk drive. In addition, each workstation board includes 128K bytes of RAM, which is also expandable to 512K bytes. The workstations also come with a local RS-232 interface to connect a local printer or mouse device, according to the vendor.

A two-workstation system, including the CPU, 256K bytes of RAM, a 360K-byte floppy disk drive and a 15M-byte hard disk, costs $7,000. The same configuration with a 30M-byte hard disk costs $8,000. Each workstation module costs $1,500. A 15M-byte add-in hard disk drive costs $2,000, and a 30M-byte hard disk costs $3,000. The tape backup add-in module costs $3,000. Expansion memory boards for the workstation and central module range from $300 for a 128K-byte board to $700 for a 384K-byte expansion, the vendor said.

The Dimension system will be available in the first quarter of 1984. More information is available from the vendor at 14440 Catalina St., San Leandro, Calif. 94577.

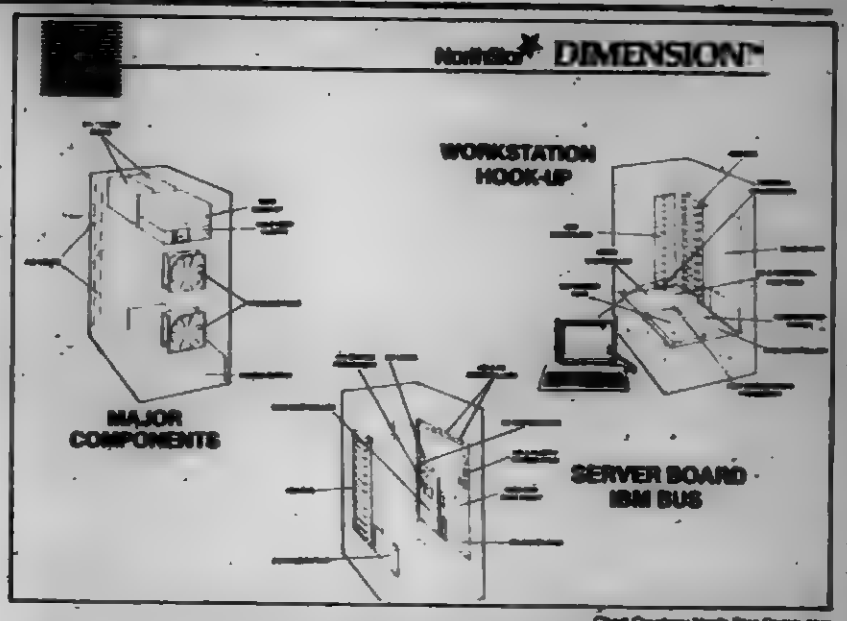

Chart Courtesy North Star Computers

North Star Computers, Inc. Dimension

DEC Falcon Gets Cmos Expander From Infosphere

PORTLAND, Ore. — Infosphere, Inc. has announced the FMX-11 complementary metallic oxide semiconductor (Cmos) memory expander for the Digital Equipment Corp. Falcon single-board computer.

The company said the FMX-11 will extend the Falcon's on-board memory capacity to 60K bytes, add battery support for Cmos static random-access memory and provide a Cmos calendar clock and power failure detection logic with battery-back-up. The product will allow users to develop and execute real-time applications in process control, data acquisition and energy management.

According to a vendor spokesman, the FMX-11 supplies address, data and control signals at on-board, memory-cycle speeds, and it retains data during a power failure. The unit's programmable read-only memory address decoder allows the system integrator to link any combination of 2K-, 4K- and 8K-byte memory chips for a total of 60K bytes. It is a dual-width, Q-bus board in two versions, one that supports the company's Sphere application development software and another that supports DEC development software.

The single-unit price is $700 from Infosphere, 4730 S.W. Macadam Ave., Portland, Ore. 97201.

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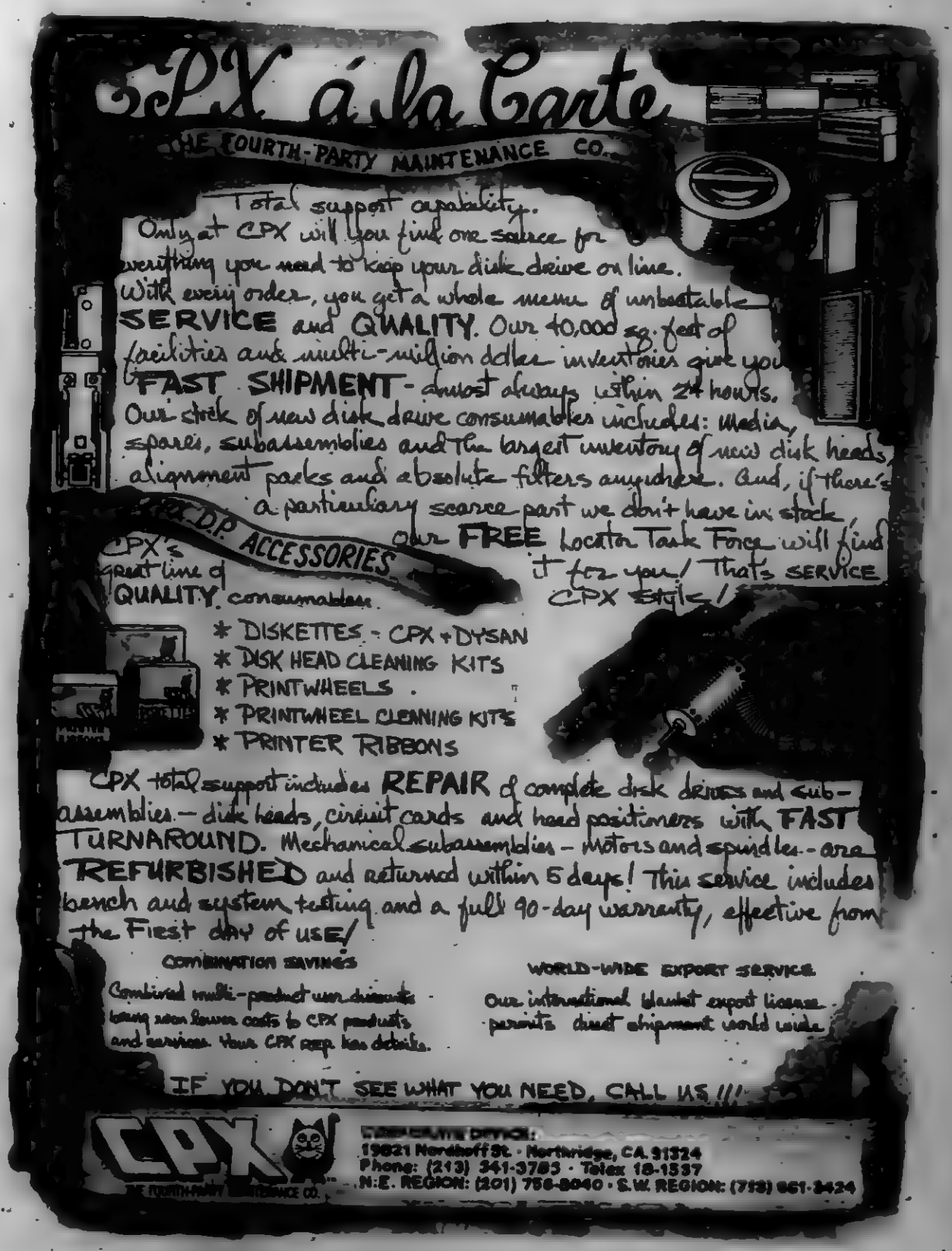

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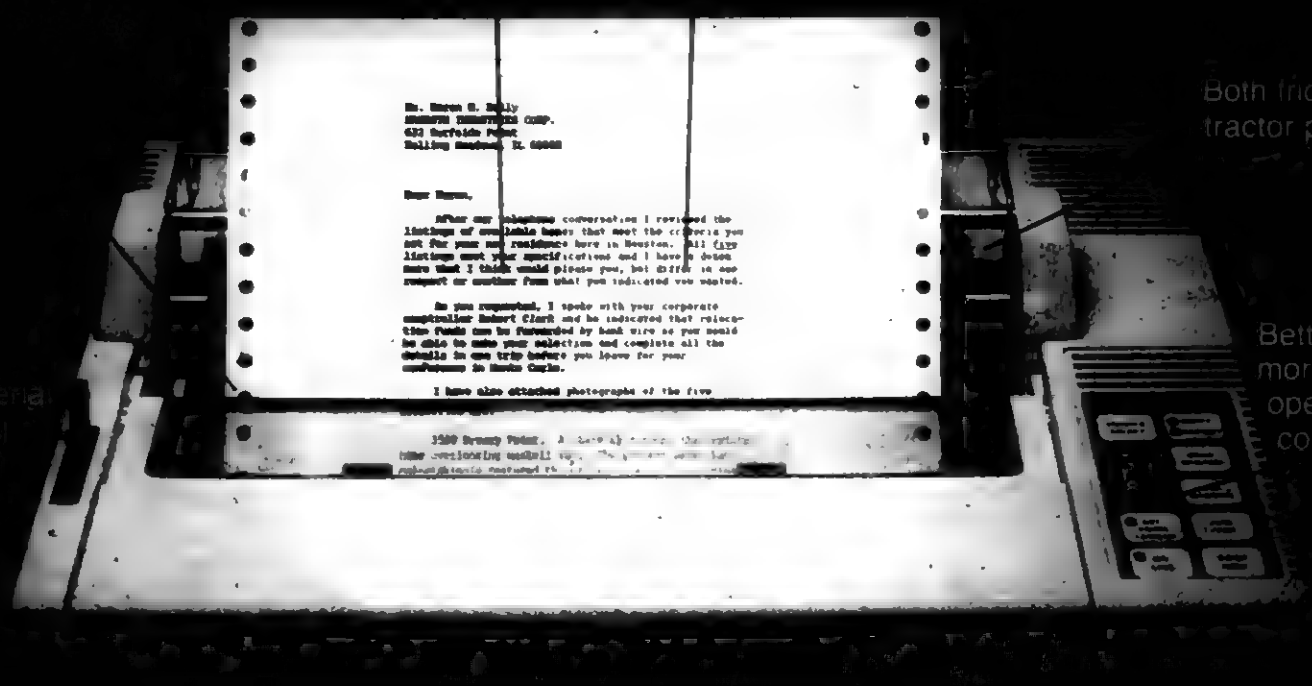

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Get the printer that makes for better information systems. For more information visit your nearest TI authorized dealer or write Texas Instruments Incorporated, P.O. Box 402430, Dept. DPF-00000, Dallas, TX 75240. Or call toll-free: 1-800-527-3500.

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291380-R1

Computer-Aided Design System Supports Apple

NEWTOWN, Pa. — Chessell-Robocom Corp. has introduced the Robographics CAD-1, a computer-aided design system.

The new package connects to the Apple Computer, Inc. Apple II or Apple IIe micro and produces scaled, technical drawings and custom graphics. Designers, illustrators, educators and other business professionals can use the system to create building plans, mechanical drawings, schematics, flowcharts and business graphics.

The CAD-1 system works with standard, off-the-shelf Apple computers. A complete hardware/software configuration, including plotter, is available at a starting price of $4,920.

The system uses a handheld controller to draw lines, circles, arcs and tangents to exact dimensions. Once completed, commonly used symbols and finished drawings are stored on library diskettes and are displayed in miniature for easy recognition and reuse through a graphics index system, the vendor said.

Two Robographics drafting plotters are available to produce drawings up to 22 by 34 in.

The price of the CAD-1 software, controller and user manual is $1,095. The product line is currently available through Apple Computer dealers or directly through the vendor, located at Suite 2B, 125 Pheasant Run, Newtown, Pa. 18940.

Price Cut on Tape Backup System

SUNNYVALE, Calif. — Davong Systems, Inc.'s tape backup subsystem, which safeguards data from any Winchester or floppy disk drive used with IBM Personal Computer or Personal Computer XT microcomputers, has been reduced to $1,775, including interface.

The stand-alone streaming tape drive uses a ¼-in. tape cartridge with a formatted capacity of approximately 18M bytes. An adapter for the backup plugs directly into an IBM Personal Computer or Personal Computer XT expansion slot.

Software capabilities include initial checkout, copying from floppy or hard disk to tape and restoring files from tape to hard or floppy disk. It also can compare file dates so that the most current file with the same title is restored, the company said. Files may be restored to a different volume, and an index lists names and dates of all backup files.

Using the Davong Multi-OS control system, backup can be done by volume or by individual file. A 15M-byte disk can be copied in about four minutes, the company said, and there are four error-checking methods.

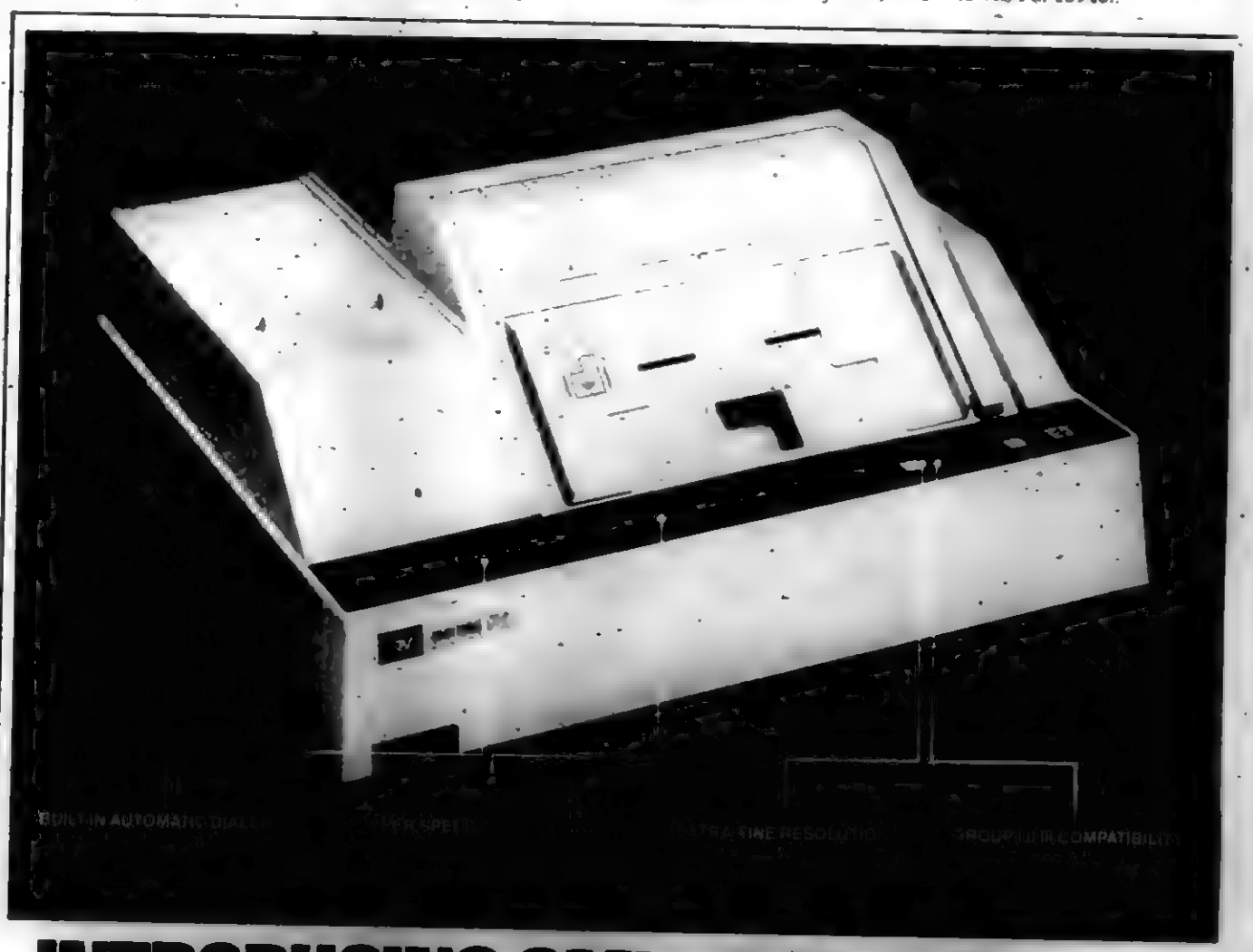
More information about the tape backup system can be obtained from Davong at 217 Humboldt Court, Sunnyvale, Calif. 94086.

SBE, Inc. Upgrades Disk Drive

EMERYVILLE, Calif. — SBE, Inc. has announced a Motorola Corp. 68000-based hard disk drive, the SBE 200, which includes a 5¼-in. Quantum 40M-byte Winchester disk drive. The new system is an upgrade from the standard SBE 200, which includes a 10M-byte Winchester disk drive and a 5¼-in. floppy disk.

The Quantum hard disk drive has a capacity of 42.6M bytes of unformatted data or 36.8M bytes of formatted data. Its average access time is 45 msec. Other features of the Quantum drive include a proprietary embedded wedge servo, a rotary voice coil, industry standard interface and a standard mini-floppy form factor.

The price of the SBE 200 with the 40M-byte Quantum drive is $6,000 from SBE at 4700 San Pablo Ave., Emeryville, Calif. 94608.



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The EMT 9165's dual polling mode is a good example. It lets you do either of two things: (1) poll other Group III machines in the usual way, or (2) send traffic to and obtain documents from other EMT 9165s with a single call to each machine, so that you eliminate the added expense of double phone calls.

3M's EMT 9165 also helps to lower communication costs by providing a detailed audit trail through two types of status reports, including one that supplies a department or personal ID number for each call.

Other major features include: Automatic time and date stamping of incoming and outgoing traffic. Alphanumeric display for prompting casual operators and to help in programming the machine for "one-button" operation. Two-digit ID numbers as passwords, if required.

Special Applications: Modular design. 3M-I computer store-and-forward system that interfaces with data networks and supporting protocols such as SNA, HDLC and X.25

For details on the new EMT-9165 and the full line of 3M electronic message terminals, call 1-800-328-1684 toll-free. (In Minnesota, 1-800-792-1072.) In Canada, call 1-800-268-9055. Operator 11. Or mail the coupon to: 3M Business Communication Products Division, 3M Center, Building 216-2N, P.O. Box 33600, St. Paul, MN 55144. Attn: G. Collins.

I want information on 3M's state-of-the-art EMT 9165 and the growing 3M EMT 9165 network.

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Holmes' Portable Drive Fits TRS-80 Model 100

SALT LAKE CITY, Utah — Holmes Engineering, Inc. has introduced the PMD-100 portable micro drive for the Radio Shack TRS-80 Model 100 portable computer.

The PMD-100 allows the Model 100 to save and load programs and files at high speeds using miniature continuous-loop tape cartridges.

The portable micro drive is a battery-operated system which is reportedly a natural companion to the Model 100 computer. Rechargeable batteries allow several hours of portable operation. The PMD-100 fits with the Model 100 into a standard briefcase.

The drive is attached to the Model 100 RS-232C connector via a coiled telephone cord. The operating system is then downloaded to the Model 100, using the built-in Telcom software in the Model 100. The operating system then resides in the Model 100's nonvolatile memory.

The operating system provides a menu for the operator's convenience. A program or file may be saved to the tape or loaded from the tape into the Model 100 by single key commands executed from the menu.

Operation of the drive is similar to operation of a floppy disk. The operator first inserts a tape cartridge into the micro drive. Files may then be saved or loaded, a spokesman explained.

A directory of all files on a cartridge may be displayed on the Model 100's screen. A file may be deleted from anywhere on a tape, and another file may be put in its place.

The PMD-100 operates at 9,600 bit/sec, and a 16K-byte random-access memory buffer in the PMD-100 makes file transfers fast and efficient, the company claimed.

The portable micro drive retails for $349.95. Included with the package are five wafer tapes, a battery charger, a cable to connect the drive to the Model 100 and operating instructions. A cable to allow the Model 100 to operate from the battery in the PMD-100 is also included.

More information is available from Holmes at 5175 Green Pine Drive, Salf Lake City, Utah 84107.

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Imaging System Aids Designers, Engineers

MOUNTAIN VIEW, Calif. — Silicon Graphics, Inc. has introduced the Integrated Raster Imaging System (Iris) workstation, which allows designers and engineers to manipulate two- and three-dimensional designs. The unit can be used in a stand-alone environment or in multiterminal networks.

The workstation was designed for advanced design and engineering applications among the mechanical sector, including: automobile, aircraft, machine tool, mining and farm equipment industries, electronic systems and components, architecture, engineering and construction, scientific, animation, film and graphics, a spokesman said.

Some product applications include complex three-dimensional wire-frame and shaded-solids modeling, engineering analysis and simulation, geophysical modeling, printed and integrated circuit layout, schematic capture, animation and document preparation and medical imaging applications.

The price for a stand-alone workstation is $59,500, and the price of a terminal is $37,500, the spokesman for the vendor said.

Further information is available from Silicon Graphics, which is located at 630 Clyde St., Mountain View, Calif. 94043.

Gould's UPS Touts 2.5 kVa

SAN DIEGO — Gould, Inc. has unveiled a 2.5-kVA uninterruptible power supply (UPS), the Model 7026.

The Model 7026 is available in either a 14-in., rack-mountable package or in a 40-in.-high cabinet including 15 or 45 minutes of battery reserve.

Gould's 7000 series utilizes bipolar transistors switching at 25 kHz. The 2.5-kVA model, which includes a built-in static transfer switch, is available in either 120V, 220V or 240V versions at 50Hz or 60Hz.

Prices of the 7000 series UPS start at $5,995 from Gould, Power Conversion Division, 2727 Kurtz St., San Diego, Calif. 92110.

Card for Apple III Allows Extra Devices

CUPERTINO, Calif. — Apple Computer, Inc. has announced the Apple Serial Card III.

According to the vendor, the Serial Card III is for Apple III users who require more than one serial communications device.

By inserting the card into one of the Apple III internal slots, a user can communicate with a variety of modems, plotters, printers and other serial RS-232C communications devices without disconnecting or reattaching any of the system's cables.

Depending on the user's communications requirements, up to four cards can be used at once. The card enables users to perform multiple communications tasks, such as printing documents, while simultaneously communicating with another computer via modem.

If a user requires only one serial communications device, it can be connected directly to the built-in serial port on the Apple III's back panel.

The Apple Serial Card III is available now at a price of $225. More information is available from the vendor at 10260 Bandley Drive, Cupertino, Calif. 95014.

What happens in the computer industry in 1984 will profoundly affect the way you do business.

This January 2nd Computerworld is going to give you a very educated guess on how it will all fall out.

Computerworld's annual review and forecast issue will examine some of the major events of 1983 and put them in perspective. But this year the stronger emphasis is on what's *going* to happen in 1984:

- The January 1 divestiture of AT&T. What will the impact *really* be?
- When is the shakeout going to come in the Micro market? Who will the big players be and who'll be dropping out?
- The results of the *Computerworld* DP Budget Survey: Where is the DP/MIS exec's money going to go? Why?
- Technology. Just what are the R&D people *actually* working on?

Last year's software announcements and/or agreements will be looked at in light of which will come to reality in 1984. You'll get a close look at control, security and training issues and how they'll impact DP/MIS managers who spent 1983 off-loading applications to end-users and providing them with computing power.

The entire editorial staff of *Computerworld* is working full time to review the key events of 1983 and how they'll affect your business in 1984. So you'll get all the insight you need to do your strategic planning for the year ahead.

If you've got product or service ads that will help our readers make informed choices for 1984 — then you need to get color ads to us by December 9th and black and white ads to us by December 15th.

To reserve space in the combined December 26th/January 2nd special issue, call one of the sales offices listed below, or call Don Fagan, Vice President Sales/Marketing; Ed Marecki, National Sales Director or Kathy Doyle, Marketing Support Manager.

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Targets Micros

Multimode Matrix Printer Unveiled

CHARLOTTE, N.C. — Datasouth Computer Corp. has unveiled the DS220, a multimode matrix printer for most popular microcomputers.

The unit provides correspondence-quality, as well as word processing and draft-quality printing, the vendor said.

In a correspondence mode, the DS220 generates an 18- by 48-dot matrix and can print at up to 40 char./sec. For print-intensive applications, the DS220 can operate at up to 220 char./sec, with a maximum throughput of 450 line/sec. In this mode, the unit prints on a 9- by 7-dot matrix and offers a selection of pitches, ranging from 10 to 16 char./in. The unit can also operate in an expanded print mode, producing between 5 and 8 char./in., the vendor said.

The DS220 features 50 programmable features including forms control, print mode and communications.

The printer costs $1,995, Datasouth said from 4216 Stuart Andrew Blvd., Charlotte, N.C. 28210.

Touch-Sensitive Screen Fits IBM

ALBUQUERQUE, N.M. — Computer Technology Associates (CTA) recently announced a touch-sensitive screen and interface for IBM Personal Computer monitors.

The IBM-compatible Soft-Touch utilizes infrared emitter-sensor array technology and is accessed directly through the IBM Personal Computer Basic compiler without extra assembly language routines, according to a CTA spokesman, with the Basic program reading the X and Y coordinates of the moving command.

The screen provides a resolution of 96 horizontal by 64 vertical pixel points, the spokesman said.

Available in January, Soft-Touch costs $695 from CTA, 1704 Moon N.E., Albuquerque, N.M. 87112.

Keyboards Out For Radio Shack, IBM Micros

SPOKANE, Wash. — Key Tronic Corp. has announced a version of its enhanced plug-compatible IBM Personal Computer keyboard that offers the Dvorak keytop layout. Also announced was a replacement full-travel keyboard for Radio Shack's TRS-80 Color Computer.

The Model KB-5150D reportedly is directly plug-compatible with either the IBM Personal Computer or Personal Computer XT and offers additional features such as familiar placement of the Shift and Return keys, an Enter key next to the numeric pad and indicators on the locking mode keys. The KB-5150D has a suggested price of $269.

The model's Dvorak layout, named after its inventor, August Dvorak, was recently endorsed by the American National Standards Institute. The home row of the Dvorak keyboard reportedly can configure 3,000 word combinations as compared to the standard Qwerty keyboard's 100.

The Model KB-500 keyboard for the TRS-80 was designed to upgrade the functional efficiency and capabilities of the microcomputer. It is said to provide a 15% to 20% higher data input rate. Other features include a user-programmable function key, complete legend description, familiar typewriter layout and full sculptured keytop array with low profile keys. Suggested retail price for the Model KB-500 is $89.95.

Key Tronic can be reached through P.O. Box 14687, Spokane, Wash. 99214.

PC11 Boasts Compatibility With PDP-11

HOUSTON — Abacus Technology Systems, Inc. has announced a Digital Equipment Corp. PDP-11-compatible peripheral computer for S-100 bus-based computer systems.

The PC11 reportedly allows users to run PDP-11 software on Digital Research, Inc.'s CP/M-based microcomputers. It includes the DEC RT-11 operating system and CP/M interface software. It also offers the PDP-11 user a method of adding additional systems based on some of the inexpensive S-100 systems currently available.

The PC11 is a T11 microprocessor-based unit with 64K bytes of onboard memory. The unit plugs into existing S-100-based computers and utilizes the existing processors and peripherals for I/O. The use of 8-in. soft-sectored disks will allow media compatibility with DEC PDP-11 series minis for program interchange, the vendor said.

The package includes the RT-11 operating system, CP/M-based I/O interface program source supplied on 8-in. floppy disk media and supports console, printer and dual disk drives, the vendor said. The PC11 introductory price is $795.

Abacus is located at 8343 Carvel, Houston, Texas 77036.

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Available From Computer Ideas

HP 3000 On-Site Courses Launched

CHICAGO — Computer Ideas Ltd. has announced a series of on-site operational training courses for Hewlett-Packard Co.'s HP 3000 superminicomputer.

Courses available include "The HP Environment," "System Management," "Introduction to HP's Image Data Base," "Image Optimization," "Cobol Optimization" and a variety of others, a spokesman said.

The courses run from two to five days and cost from $560 to $1,400 per person.

The firm also offers a series of advisory services that help users evaluate different computer systems. These services are tailored for each user and are priced according to the time involved. For example, a five-day evaluation program costs about $1,600, the spokesman noted.

Additional information on these and other services can be obtained from the firm at 4559 W. 64th St., Chicago, Ill. 60629.

Source 2 UPS Introduced By Topaz

SAN DIEGO — Topaz, Inc. has introduced the Source 2 uninterruptible power supply (UPS). The unit was designed for protecting word processors, point-of-sale terminals and other small computer-based equipment against power outages.

The Source 2 provides up to 60 minutes of steady ac power to enable critical equipment to continue operating, even during blackouts. Source 2 output is a sine wave that exactly matches the wave shape of commercial power. This makes the units suitable for use with virtually any type of system, the vendor said.

Each Source 2 UPS consists of a battery, a battery charger, a sine wave inverter, a power monitor and a high-speed transfer switch. When commercial power is present, the Source 2 system filters the power, providing protection against electrical noise and voltage spikes, according to the vendor.

If primary power is lost or if voltage drops more than 15% below nominal, the Source 2 automatically begins supplying ac power from energy stored in its battery, according to the vendor.

The transfer from primary power to battery power occurs in approximately four msec, so the protected equipment experiences no discontinuity of power. When commercial power is restored, the protected equipment is automatically switched back to the power line, and the UPS begins recharging its battery, according to the vendor.

Source 2 is available in power ratings of 200VA and 400VA in 50Hz and 60Hz models. Prices start at $800, the vendor said.

More information is available from Topaz at 9192 Topaz Way, San Diego, Calif. 92123.

Lifeline Power Supply Bows

ADDISON, Ill. — Instrumentation and Control Systems, Inc. has introduced the Lifeline uninterruptible ac power supply.

Lifeline was designed to provide continuous power for microcomputer system users, according to the vendor.

The "no-break" power feature provides voltage regulation and line filtering plus an inverter that supplies power only during power outages, with no interruption to the critical load, the company said.

An internal battery handles the full power of the system for five to 10 minutes, while an external battery may be used to extend operation for one hour or longer if required.

A 200-VA system is priced at $1,042 from Instrumentation and Control Systems, 520 Interstate Road, Addison, Ill. 60101.

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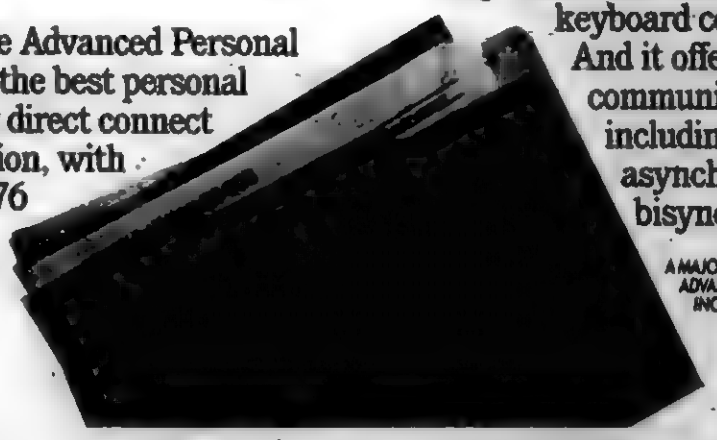


A MAJOR INSURANCE COMPANY IS USING THE ADVANCED PERSONAL COMPUTER TO GREATLY INCREASE WORKER PRODUCTIVITY.

Controller, Slave Board Designed for S-100

SACRAMENTO, Calif. — Teletek Enterprises, Inc. has announced the release of two S-100 board products — a hard disk/cartridge tape controller and a slave board.

The Hard Disk/Cartridge Tape Controller (HD/CTC) reportedly can interface two Shugart Technologies, Inc. ST-506-compatible, 5¼-in. hard disk drives and a Qic-02 cartridge tape drive to an S-100 system. An intelligent controller, it has a Zilog, Inc. Z80A CPU, 8 bytes of random-access memory (RAM) and 16K bytes of read-only memory (ROM). Hard disk drives of 5¼-in., 8-in. or 14-in. can be interfaced to a number of tape backup devices. The HD/CTC costs $795 each, a spokesman said.

The SBC-11 slave board utilizes Software 2000's Turbodos software and is said to support two users. Each user is provided with a Z80A (optional Z80B) CPU, 64K bytes of RAM and 2K bytes of erasable programmable ROM (expandable to 32K bytes). Each CPU has one associated Z80A serial I/O providing two RS-232C-compatible serial ports, the vendor said. Each CPU has one 8-bit interrupt vector/status register and one 6-bit command register. Independent addressing of the S-100 I/O space is accomplished via user-selectable jumpers. The SBC-11 slave board costs approximately $1,395, a company spokesman said.

Teletek is located at 4600 Pell Drive, Sacramento, Calif. 95838.

Adapter Fits IBM Micros, Provides Graphics Aid

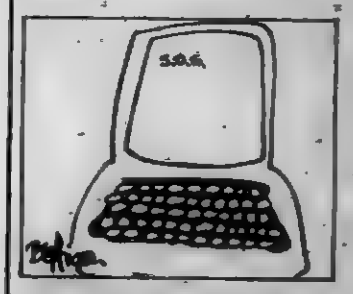
MILPITAS, Calif. — Micrographics Technology, Inc. has announced an adapter for the IBM Personal Computer or XT said to replace three IBM adapters with a single module and to provide graphics functions currently unavailable by any other means to IBM computers.

The Mastergraphics 1 adapter reportedly provides Personal Computer and XT users with extra slot space while extending the graphics power of their machines. It is part of the modular Mastergraphics System, which is fully compatible with all personal computer hardware and software from IBM.

The device is said to increase active colors from four to 16, quadruple the display storage provided by the IBM adapters from 16K bytes to 64K bytes and allows higher resolution in color and monochrome — 640 pixels by 200 pixels (16-color) and 768 pixels by 340 pixels (monochrome).

Functions include Masterpalette, an adapter that increases available colors to 4,096, Masterset Programmer hardware and software to allow any user to generate custom character sets quickly and a Dual Display kit for simultaneously attaching a color and a black-and-white monitor to the IBM micro.

The Mastergraphics 1 adapter costs $579, from Micrographics at 1820 McCarthy Blvd., Milpitas, Calif. 95035.



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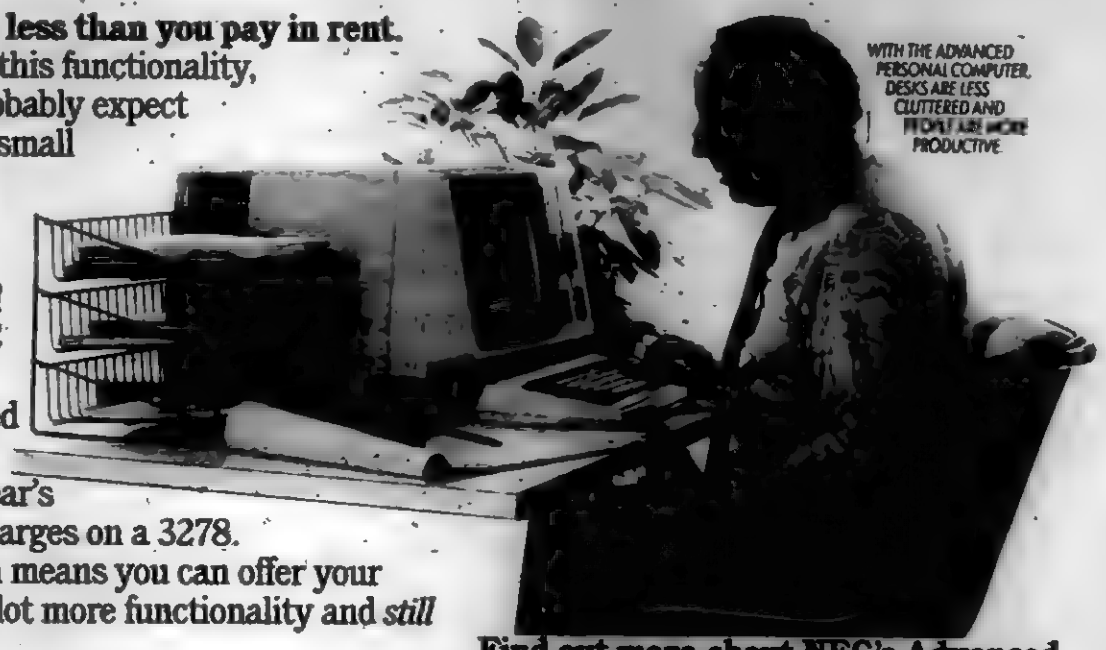

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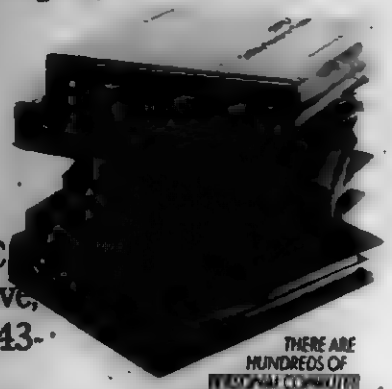

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Reach Out to End Users, DP Managers Told

'Make certain you have your people available to the OA people on a friendly basis. Don't try to bulldoze your way in.'

— Mary M. Greenwood, consultant.

By Bill Laberis
CW Staff

BALTIMORE — To borrow a phrase from a popular commercial, DP shops should reach out and touch someone — and that someone is the end user, who is more and more often threatening to design and implement his own office system if the DP department won't make an overture to help.

That was the message at the recent conference of the Data Processing Management Association, where DPers got an earful of strategic ideas for gaining more control over the implementation of office automation, even when this implementation is largely out of their purview.

"Make certain you have your people available to the OA people on a friendly basis. Don't try to bulldoze your way in," advised Mary M. Greenwood, consultant with Greenwood and Associates of Baltimore and a speaker at one of the conference seminars.

Mary Greenwood and Frank Greenwood outlined a shopping-list approach to effective DP interaction with the user community in implementing office systems. Their approach was designed to combat the implementation of patchwork systems that can result when design is carried out without some centralized planning.

Their approach was also intended to confront what some end users see as DP's refusal to share computing power with non-DPers. Said one end user at the seminar, "People are going out and buying micros, getting answers on their own, while the DP department is still spinning its wheels. End-user computing is a fait accompli, so DP had better get used to it."

According to the Greenwoods, DPers are often perceived as oriented more to their technology than to the organization that employs them and its goals. Thus, when management looks for someone to implement the concept of information as a corporate resource — one that is to be managed accordingly — there are often reservations about involving DP managers in the process, the existing systems investment notwithstanding.

The Greenwoods' recommendations for effective DP strategy in office systems implementation included:

- Help end users develop a long-range plan. DPers are accustomed to doing this with their systems strategies.
- Let end users know what is feasible. Frank Greenwood said that users "see a television ad and think they can do just about anything with computers."
- Help end users prepare a commercial solicitation to gauge what the vendor community has to offer.
- Help implement the solution chosen, standing by with technical assistance.

Of Total Office Integration

WP, E-Mail Seen Only the Beginning

By Jim Bartimo
CW Staff

CHICAGO — Word processing and electronic mail are the baby steps toward total office integration, according to consultant Susen S. Kay.

Kay, who is senior consultant for Hannagan & Associates, Inc. of Schaumburg, Ill., addressed a session on office integration at the Integrated Office Technology Conference and Exposition held here recently. She also reviewed some current integration technologies and predicted what the future may bring.

Among various electronic mail systems on the market today are facsimile, communicating word processors, telex and TWX, store-and-forward systems, voice messaging and computer-based message systems (CBMS), such as IBM's Professional Office System.

"You will see CBMS take over for many of these technologies," Kay said. "One of the ways CBMS will become the prevalent electronic mail system is when it is used to connect the user to an information inquiry data base. This connection gives users access to both word processing and a selected category of corporate data.

One major step to office integration will be connecting electronic mail to the data base and tying the data base to the word processing system to complete the circle, Kay said.

Kay also noted that the data processing department must become involved in order for office automation to become truly integrated with the corporate data base. For example, "99% of the data base used here is from the data processing department," she said.

Referring to some other emerging office technologies, Kay predicted that Wang Laboratories, Inc.'s Professional Image Computer and other image processors will have little immediate impact on office integration, but called combination terminal/telephones "one of the slickest things to hit the hardware market."

Although combination terminal/telephones represent mainly a hardware integration and not necessarily a functional integration, Kay suggested that "just because we're not integrated to the point we want to be doesn't mean you can't get some benefits out of what is there."

Matrix Printer Operates In Three Modes

CHARLOTTE, N.C. — Datasouth Computer Corp. recently announced a matrix printer that operates in three modes with micro- and mini-based systems.

The DS220 multimode matrix printer provides multiple type fonts that may be selected using the operator panel or the program control. Included as standard are two correspondence-quality fonts, two memo fonts, variable-pitch draft fonts and micro character set as well as seven international character sets, a vendor spokesman said.

In correspondence mode, the device generates "near letter-quality" 18- by 48-dot matrix at 40 char./sec; in high-speed print mode, the device operates at 220 char./sec with a nine- by seven-dot matrix; a graphics feature reportedly is able to print up to 217 columns for spreadsheets.

The printer is priced at $1,995, and more information is available from Datasouth, 4216 Stuart Andrew Blvd., Charlotte, N.C. 28210.

Enhanced Version of Decmail Gives Word-11 Users E-Mail

ANAHEIM, Calif. — Data Processing Design, Inc. has announced an enhanced version of Digital Equipment Corp.'s Decmail designed to provide users of the vendor's Word-11 word processing software with electronic mail capability.

Decmail Plus, a menu-oriented package, is said to run on DEC's RSTS/E operating systems equipped with Word-11, allowing users to create and store documents or messages or send them to other terminals or users within their computer system.

Decmail Plus reportedly allows users to send messages either to specified terminals, specified users or to all users within either a single computer system or a network of computers.

The introductory price for Decmail Plus for users operating under RSTS/E is $3,500 for the first license and $1,750 for secondary licenses. More information is available from Data Processing Design, 1400 N. Brasher, Anaheim, Calif. 92807.

Wizard Mail Operates With CICS

GREENVILLE, S.C. — Steel Heddle Products, Inc. has introduced an electronic mail system for office automation applications.

Wizard Mail is said to operate with any IBM CICS or Vsam host computer. Uses of the system include the ability to broadcast messages to all computer users, optional automatic hard-copy printout of each message, confidential message recognition, message priority assignments, status of mail sent, tracking recipients wherever they are signed on and monitoring the status of messages.

Wizard Mail is menu-driven and can reportedly be used on all terminals with access to host computer systems.

It is priced at $495 from Steel Heddle Products through P.O. Box 1867, Greenville, S.C. 29602.

Package Lets VAX-11 Users Exchange Information

NEWPORT, R.I., — Aquidneck Data Corp. recently announced an office automation package said to allow Digital Equipment Corp. VAX-11 series users to exchange information between five different office application programs.

The VAX Office Exchange provides full transfer of information from one program to another and transfer of entire files and documents from one user to another.

All applications, including data base management system, word processing, spreadsheet, electronic mail and graphics are reportedly integrated into one menu that prompts the operator for successive commands.

The seven-module system can be purchased unbundled with individual prices ranging from $2,000 to $3,000. Aquidneck Data can be reached through P.O. Box 639, Newport, R.I. 02840.

WP Package Runs on Wang 220

RICHTON PARK, Ill. — Basic Computer Services, Inc. has announced a word processing package for use with spreadsheets, electronic mail and client data base files.

Perfect Composer operates on Wang Laboratories, Inc. 220 computers and includes global editing, margin, tab and pagination controls.

Perfect Composer is also said to contain mail merging features that allow the generation of letters with specific material such as name, address, account number and amount due. Priced at $495, the package is available from Basic Computer Services at 3699 Sauk Trail, Richton Park, Ill. 60471.

Integration Package Out

PROVO, Utah — Lytron Systems, Inc. has announced a microcomputer office integration package said to allow users to combine all data and applications software into one integrated, menu-driven system.

The Lytronet Office Integration Software (Lois) package reportedly allows a user to bring together and integrate software from almost any source. The company said a user can move data among different software applications and move from one application to another without returning to the operating system.

The product also reportedly includes a variety of tools such as a calendar, calculator, scratch pad, phone manager and a talk facility. It can be configured for a stand-alone microcomputer or local-area network.

The package operates with Microsoft, Inc.'s MS-DOS operating system. It is available in a stand-alone version for $1,495.

More information is available from Lytron Systems, 1675 N. 200 West, No. 2, Provo, Utah 84604.

Course Diskettes Cover Visiword

NAPERVILLE, Ill. — Deltak, Inc. has announced the availability of self-paced course diskettes to help IBM Personal Computer users teach themselves the key word processing functions of Visicorp's Visiword WP system.

"Teach Yourself Visiword on the IBM Personal Computer" reportedly helps users learn how to interpret and access menus, how to access functions and options, how to create a document on disk and how to edit documents; using menus and function keys.

Users of the course must have access to an IBM Personal Computer with a minimum of 64K bytes of memory running under DOS, at least a single diskette drive and an IBM video terminal.

Priced at $70, the course is available from Deltak, East/West Technological Center, 1751 W. Diehl Road, Naperville, Ill. 60566.

Series Targets Real Estate Execs

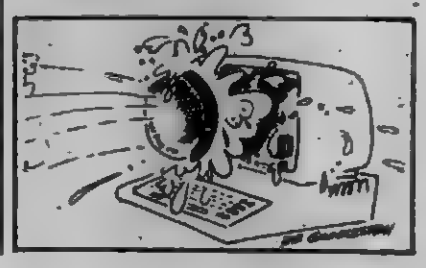
MCLEAN, Va. — PRC Realty Systems, a division of Planning Research Corp., recently announced a software package bundled with the IBM Personal Computer in a system designed for real estate executives.

The PRC Execupro Series includes four software application packages for residential financial analysis, sales management, accounting and word processing, a vendor spokesman said.

The IBM Personal Computer includes the UCSD P-system and 256K bytes of memory.

The complete package is available for $6,300, and the software alone is priced at $1,800.

More information may be obtained from PRC Realty Systems, 1500 Planning Research Drive, McLean, Va. 22102.



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Industry Groups Pleased

House OKs Export Administration Bill

By Jake Kitchner
CW Washington Bureau

WASHINGTON, D.C. — The U.S. House of Representatives has approved an export administration bill that embodies many of the features sought by the electronics and other high-technology industries.

The bill, in the form of amendments to the 1979 Export Administration Act, which expired a month ago but remains in force through emergency-powers authority invoked by President Reagan, calls for the government to rely much more on consultations with Congress and U.S. allies in setting and implementing export controls. It is also expected to ease restrictions on American exports to friendly countries, making U.S. firms more reliable suppliers in the eyes of overseas customers.

The Senate has yet to act on its version of the export act amendments, and with congressional adjournment scheduled for the end of next week, it is unlikely the legislation can be completed this year unless, as is now expected, the House and Senate return for a final session in December.

"The House has passed something we're really happy with," commented Lloyd Kaufman, director of trade programs for the Computer Business and Equipment Manufacturers Association. In particular, he said, "industry was surprised" the House turned back a Defense Department bid to grab greater

(Continued on Page 158)

'We Goofed,' Olsen Says Of DEC Loss

By Bill Laberis
CW Staff

BOSTON — "I never thought I'd have to come here and explain why we goofed up. . . . It is hard to explain how a computer company can get into administration problems. Our sales pitch is that we will usually save you from these."

In this way, Kenneth Olsen, president of Digital Equipment Corp., kicked off the company's recent annual meeting as he

(Continued on Page 152)

CW Photo by B. Laberis

Facing the music, Kenneth Olsen, DEC president, makes a point at the company's recent annual meeting.

Boom in Small Computers Fueling Development of 3½-In. Microfloppy

By Robert Batt
CW West Coast Bureau

MENLO PARK, Calif. — The rapid growth of the small business computer market with its attendant shift to smaller desktop units and portable designs is accelerating the development of new data storage configurations.

One of the configurations that is receiving a lot of attention from industry analysts and manufacturers is the 3½-in. microfloppy disk, which some pundits predict will replace the traditional 5¼-in. minifloppy disk at the lower end of the computer range.

The 3½-in. microfloppy, pioneered by Sony Corp. and now manufactured by Hewlett-Packard Co., Shugart Associates, Tandon Corp. and Mitsubishi Corp., among others, recently received a major boost to its fortunes when IBM withdrew from the market its potential rival, the 3.9-inch disk.

The 3½-in. disk, which has the support of manufacturers comprising the Microfloppy Industry Committee, has a single-sided capacity of 500K bytes. It is said to provide the same storage capacities as the 5¼-in. systems but with a faster data transfer rate. Sony has also recently announced plans to produce a double-sided 1M byte microfloppy available in the second quarter of 1984.

According to HP, which has shipped over 25,000 3½-in. devices, reliability is four times better than the standard 5¼-in. minifloppy, due to its rigid case and automatic shutter protection system.

HP claimed that by going to the 3½-in. system, it has been able to reduce prices by 30% in each of the last two years. As a result, the company said it has

(Continued on Page 154)

Sony Production Figures Illustrate Disk's Popularity

The rising popularity of the 3½-in. microfloppy disk is well illustrated by the production figures of its pioneer, Sony Corp.

In 1982, the first year of production, volumes at the Japanese manufacturer were a little over 5,000, according to Myles Tintle, general manager of Sony's Data Products Division. By the end of this year, the company expects to have shipped 140,000 of the 3½-in. units.

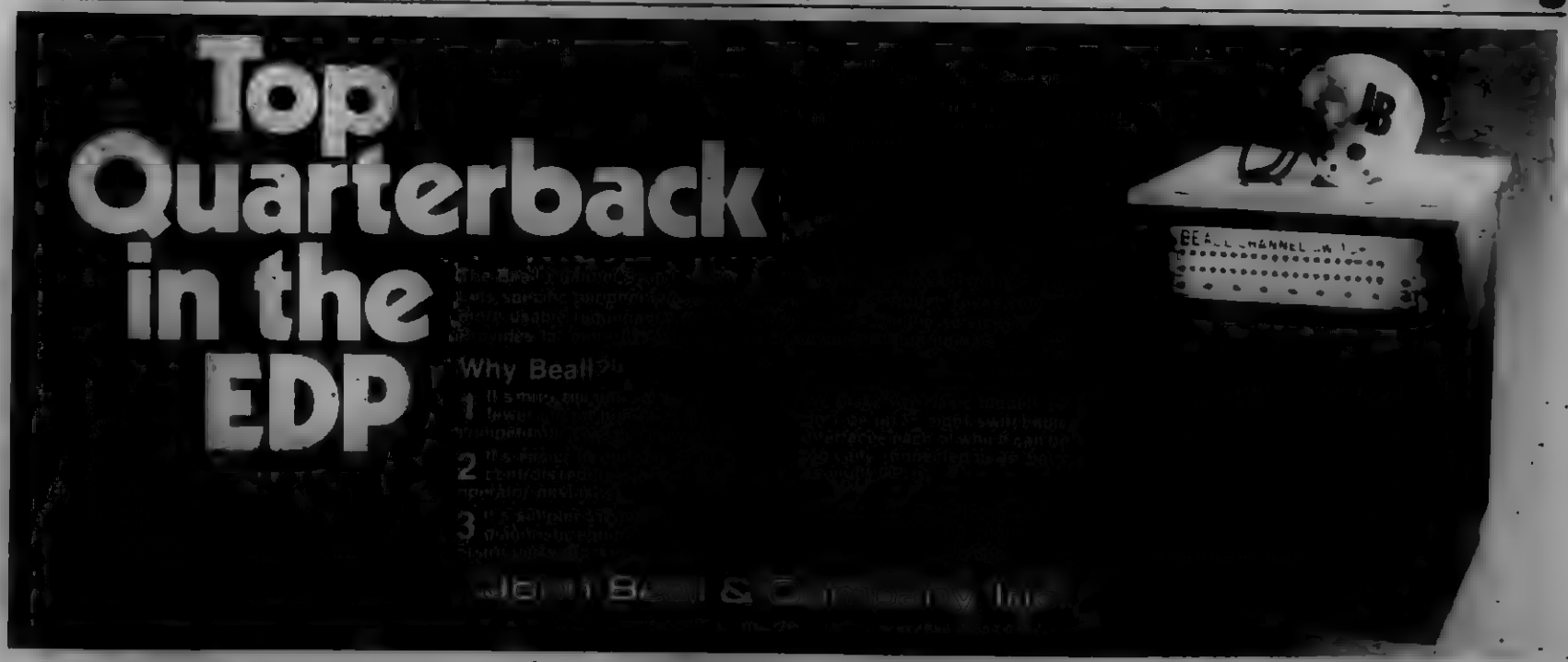
Furthermore, 1984 is anticipated as a take-off year for the company with volume shipments reaching over 600,000, the bulk of them to be used in personal and portable computers.

However, the trend toward more end-user computing does not mean that in the mass storage market the 3½-in. disk will have the field all to itself. Several alternative technologies are also emerging, the most promising of which appears to be optical data storage.

According to its proponents, the cost of optical data storage per 1M byte should be considerably less than that of magnetic disk storage due to its potential for storing substantially greater amounts of data on a single optical disk than on a magnetic disk of the same size.

According to a report issued by Drexler Technology Corp., a Palo Alto, Calif.-

(Continued on Page 154)



SEC Inquiring Into DEC Officials' Stock Sale

MAYNARD, Mass. — Three Digital Equipment Corp. officials, including the company's head of the personal computer group and its vice-president of finance, sold company stock the month before DEC announced its worst quarterly profits in seven years.

A DEC official confirmed last week that the Securities and Exchange Commission (SEC) has made inquiries into the stock sales, adding that such inquiries "are a matter of routine ... whenever a company's stock value rises or falls sharply."

DEC's stock plummeted 30% on Oct. 18, the day the company announced its quarterly profits would fall 65% to 75% below the first quarter a year ago. The results were followed by the filing of several shareholder lawsuits, which are presently in litigation.

The company verified the trading of three top officials, including:

- Joel Schwartz, chief of DEC's personal computer operations, who sold 1,000 shares — more than half his DEC portfolio — at the end of September. DEC's original earnings estimate blamed poor personal computer sales for part of the dismal financial results.
- Edward A. Schwartz, vice-president and general counsel, who sold 2,400 of his 2,750 shares on Sept. 6.
- Alfred M. Bertocchi, vice-president for finance and administration, who sold 702 shares in mid-September, retaining 10,400 shares.

The DEC spokesman said company President Kenneth Olsen, who owns more than 2.4 million shares of DEC stock, "did not sell any recently, nor has he done so in years, as far as I know."

Administrative Problems to Blame: Olsen

(Continued from Page 151)

steeled for the inevitable questions that would follow concerning DEC's sudden and dramatic fall from grace on Wall Street.

Speaking to nearly 400 shareholders, analysts and members of the press, Olsen cautiously told his audience that any failure by DEC to return to "normal" levels of profitability can be blamed on "poor management." Five shareholder lawsuits lodged against DEC in recent weeks prompted Olsen's caution in discussing details of the firm's future financial performance, he said.

The suits followed the revelation that quarterly earnings for the minicomputer maker would fall 73% below earnings the same quarter a year earlier, which was also a relatively poor quarter. DEC's stock lost one-third its value the days following its earnings estimate, as investors and shareholders sought answers to the unexpected decline.

At the meeting, Olsen told them little they hadn't already heard and declined to elaborate much on what he termed the administrative problems that led to DEC's current problems.

The administrative problems, which resulted in inaccurate sales projections being transmitted to corporate management, were the product of "simply changing too many things at one time," Olsen offered. Order processing, in particular, suffered, such that some orders were counted twice and others were not recorded at the shipping point at all.

Asked by one analyst why administrative procedures decayed so rapidly, Olsen replied, "I can't explain why so many administrative groups [within DEC] should have changed at the same time."

Steering clear of explaining further details of DEC's administrative woes — which he said will be rectified within months — Olsen instead directed his prepared remarks largely at the company's product offerings, reiterating time and time again that DEC's commitment to technological excellence will restore the company to financial health. He shared the stage with a variety of DEC's newest products, including the yet-to-be-announced Microvax workstation.

But even when speaking of DEC's product lineup, Olsen was on the defensive, frequently rebutting criticism that the company has often been late in bringing certain products to market.

Olsen admitted that slack sales of the company's personal computers were caused in part by a lack of third-party software, admitting further that many independent suppliers will write for IBM's micros first and DEC later.

He also admitted that DEC's research and development team "made some false starts" in failing to apply a systematic approach in the developmental phase of a high-end VAX superminicomputer — to be announced next year.

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Microfloppy Gaining in Popularity

(Continued from Page 151)
shipped more 3½-in. units than its 5¼-in. and 8-in. disk drives combined.

"The new benefits of reliability, cost of ownership, size modularity and integrated appearance have given us an overwhelming customer acceptance, and for this reason we have committed that all floppy-based systems will use the 3½-in. microfloppy as their standard I/O device," a recent HP internal paper revealed.

The question of standards is a critical one for the future of the 3½-in. disk. Currently, there are four different standards being proposed for the microfloppy by the American National Standards Institute X3B8 technical subcommittee. However, it is believed that many more 3½-in. units have been shipped to customers than the other sub-4-in. formats. Approximately 23 computer, peripheral and media manufacturers have endorsed the 3½-in. configuration.

"With the present trends and support of a large number of companies, the 3½-in. disk will probably become a de facto standard before official acceptance is granted," said Howard Dicken, president of DM Data, Inc.

The rapid growth of the 3½-in. unit is closely tied to the continuing expansion of the microcomputer market. According to one estimate, in 1982, 2 million personal computers were installed. By 1986, this figure is expected to climb to 12 million. Sony, for example, has just incorporated the 3½-in. disk in its first microcomputer, the SMC-70.

Success of Disk Backed By Production Figures

(Continued from Page 151)
based company specializing in optical storage techniques, optical storage media is believed to have much longer data retention periods compared with disk storage.

"Optical data storage systems could have advantages over presently available media where a combination of data compactness, relatively fast access, long storage life and relatively low cost per megabyte is desirable," according to the Drexler report.

Potential applications are believed to include auxiliary computer memory, archival storage of document images and data and information storage on credit and identification cards.

Apple Posts 69% Increase In Net Sales

CUPERTINO, Calif. — Apple Computer, Inc. reported a 69% increase in net sales to almost $1 billion for the fiscal year ended Sept. 30. Earnings were up 25% as the company increased its spending by 77%.

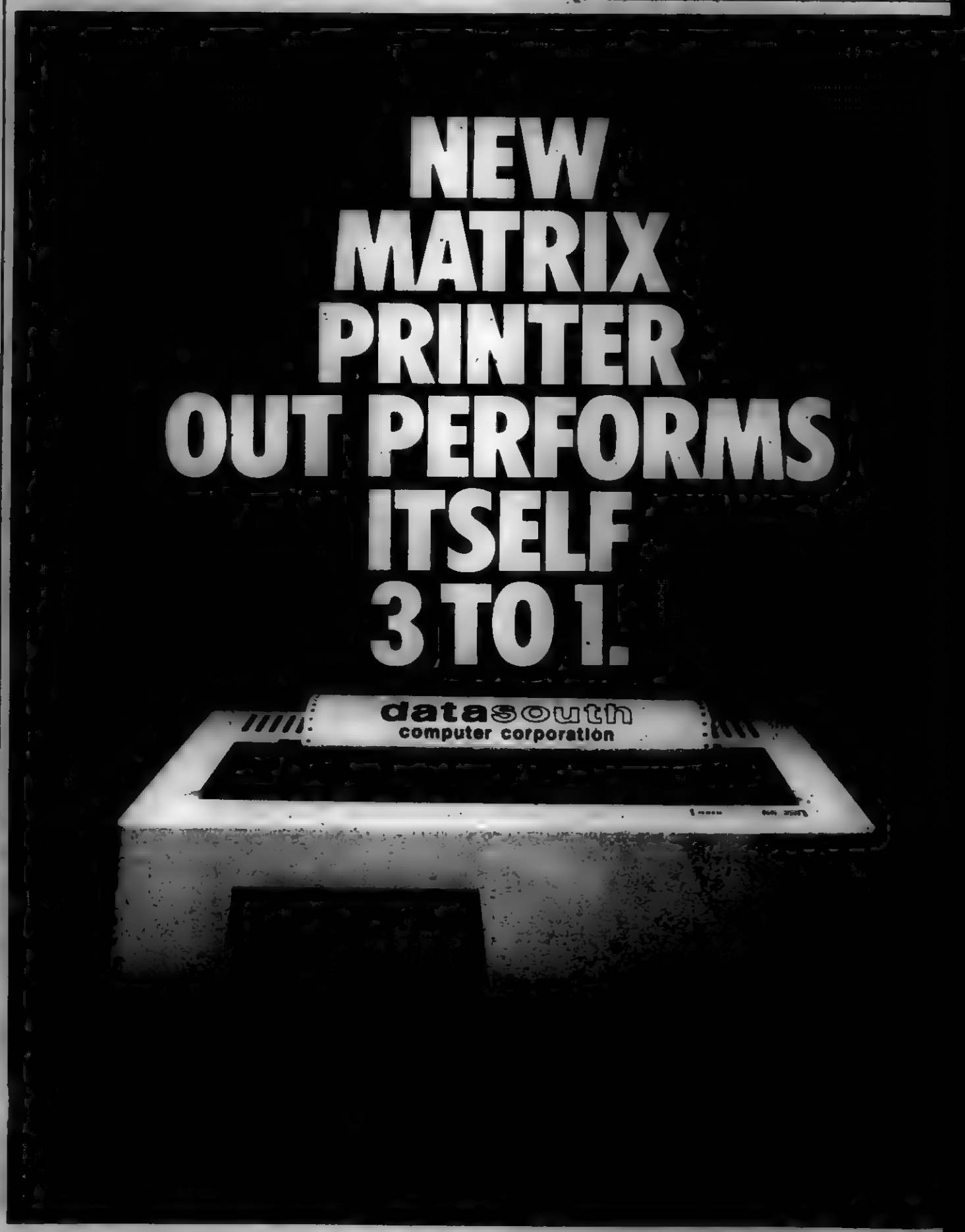
Earnings increased to $77 million, or $1.28 per share, up from the $61.3 million, or $1.06 per share, reported in fiscal 1982. Net sales jumped to $982.7 million for the year, which is in contrast to sales of $583 million reported last year.

The company's increased spending was dramatically evident during the last quarter as sales grew 55% over the same period last year, but earnings were only $5.1 million, or eight cents per share, compared to last year's corresponding fourth-quarter earnings of $18.7 million, or 32 cents per share.

John Sculley, president and chief executive officer, reported that "market conditions and several strategic decisions which were made to strengthen the company" cut into the earnings increase.

During fiscal 1983, the company saw an increase in costs and expenses from last year's $480 million to $853 million. Spending for research and development rose to $60 million from $38 million; marketing and distribution rose to $230 million from $120 million; and cost of sales rose to $508 million from $288 million.

Sculley said the company ended the year "in a strong financial position" with $143 million in cash, working capital of $340 million, shareholders' equity of $378 million and total assets of $557 million.



Buyout Seen CDI's Main Hope

By Patricia Keefe
CW Staff

A buyout by a larger company hoping to gain a foothold in the micro marketplace is Computer Devices, Inc.'s main hope for survival following its Oct. 31 filing for bankruptcy, according to Alex Stein, senior analyst for Dataquest, Inc., a San Francisco-based research house.

A "modestly successful" manufacturer of teletypewriters for 10 years, Computer Devices has made several attempts to enter the microcomputer market, according to Kenneth Bosomworth, president of International Resource Development, Inc. Seaforth M. Lyle, who recently resigned as company president, was encouraged by the board of directors to take a new run at the market, Bosomworth added.

The "new run" resulted in the development of the DOT portable microcomputer, which has floundered because it does not meet the requirements of any specific user, according to Stein. In addition, he said the DOT offers users a 3½-in. disk as opposed to the standard 5¼-

(Continued on Page 156)

Computer Devices Files for Chapter 11, But Shop Still Open

By Patricia Keefe
CW Staff

BURLINGTON, Mass. — Computer Devices, Inc. became the second portable microcomputer vendor in less than two months to file for protection from its creditors under Chapter 11 of the U.S. Bankruptcy Code. Court papers were filed Oct. 31 in U.S. Bankruptcy Court in Boston.

However, the vendor has not shut down operations. Rather, it plans to unveil an IBM-compatible version of its DOT portable microcomputer at the fall Comdex show later this month. A January delivery date is slated for the new micro, said to offer a 9-in. screen, 128K bytes of memory, double disk drives, an integrated printer and color port monitor.

Corporate counsel Mark Manski blamed the company's problems on a combination of some "internal marketing decisions" concerning the DOT, a lack of funds and a highly competitive marketplace.

"We were either ahead of our time by 12 months [by using a 3½-in. disk on the DOT] or we misread the public need for IBM compatibility. Actually, it's probably a combination of both," Manski said, referring to the inability of the DOT to run most IBM Personal Computer programs. "We really underestimated the dominant role of IBM, and it hurt us."

Employees Laid Off

As a result of the bankruptcy petition filed two weeks ago, 81 employees were laid off, leaving a work force of 129, according to Manski. In addition, Seaforth M. Lyle, company president and chief executive officer, resigned and was replaced by Executive Vice-President Robert J. Moore, who joined the firm in August.

Computer Devices has been in financial trouble for the last 12 months, laying off nearly 40% of its staff by August, Manski said. Bankruptcy papers were filed after "the company reached a level of cash insufficient to meet the payroll," he added. Efforts launched two months ago to find a merger partner to provide much-needed financial support had failed, although Manski claimed talks are currently under way with at least two potential suitors.

Also, although a public offering of shares in July netted the firm $10.4 million, Manski said that $6 million was paid immediately to the Bank of New England which, he added, has refused to advance the firm any more money.

Court documents filed by Computer Devices in U.S.

(Continued on Page 156)

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For correspondence, the DS220 uses its 40 CPS bi-directional NLQ mode to form characters with the precision and clarity you would expect from a word processing printer.

And for graphics, the DS220 adds high performance artistry to popular microcomputer applications programs through high-resolution, dot-addressable output. Sharp new details emerge from business charts and graphs, and from engineering drawings.

The sum is even more than three printers in one. The DS220 offers a total of eleven different pitches and fonts along with seven international character sets. Plus non-volatile space for up to 64 do-it-yourself characters for downloading from the host computer.

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Best of all, the DS220 advances all the engineering, design and mechanical virtues established by its forerunner, the DS180. In the Datasouth tradition, the DS220 is made to run virtually nonstop in a wide variety of applications.

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Plans for Updated DOT Continue Despite Filing for Chapter 11

(Continued from Page 155)

Bankruptcy Court in Boston list total assets at $18.6 million and liabilities of $7.6 million. From a list of about 640 creditors, the vendor owes more than $250,000 ($346,196) to only one creditor, Sony Corp., according to Manski. Other creditors included Keytronic Corp., Future Electronics, Marshall Industries and Digital Equipment Corp. Before the bankruptcy filing, some of the suppliers had halted equipment deliveries, Manski said.

The firm soon will file a business plan with the court, Manski said. Like portable micro vendor Osborne Computer Corp., which two months ago filed under Chapter 11, Computer Devices is hoping to gain enough financial support to complete production of an upgraded, IBM-compatible version of its troubled portable, which it believes will solve most of its problems.

Unlike Osborne, Computer Devices does have another product line to fall back on, its Series 2000 line of thermal printers, which it concentrated on selling for about 10 years before testing the micro market waters.

Buyout Seen CDI Hope For Survival

(Continued from Page 155)

in. disk and, so, lacks compatibility with most of the available software.

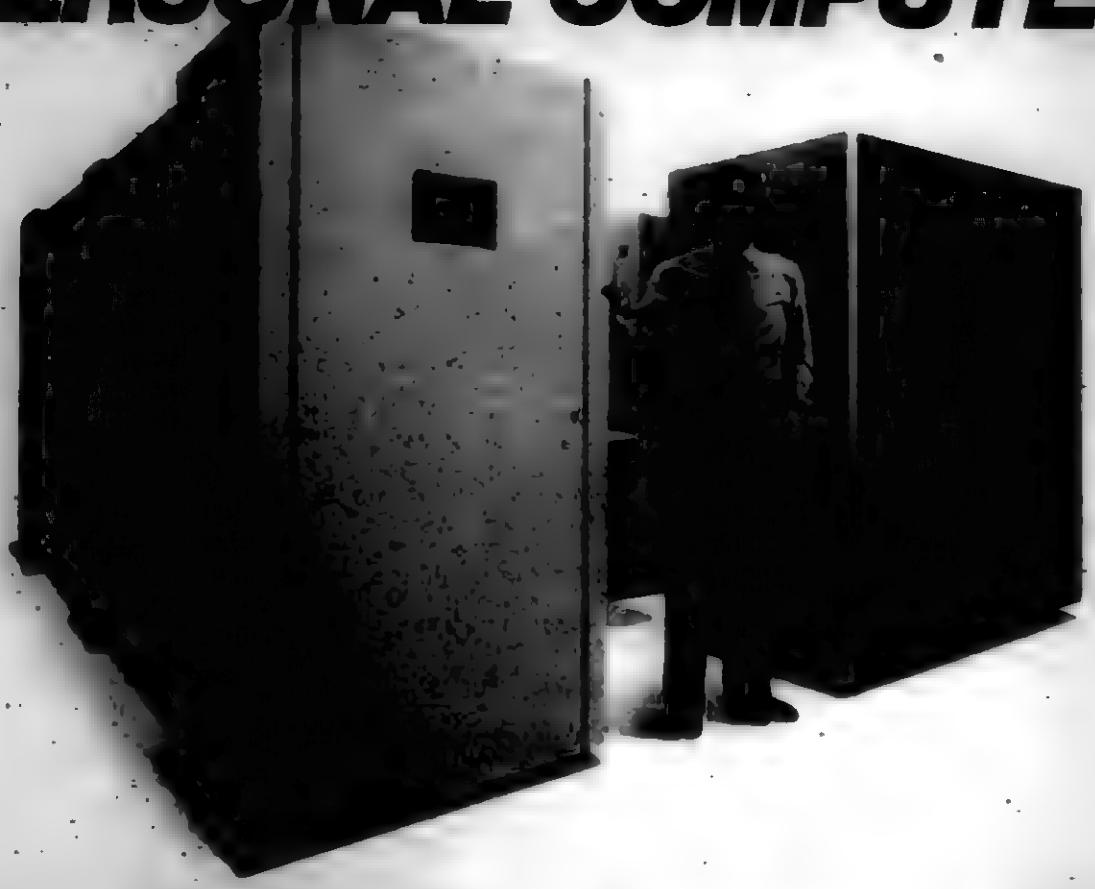
As a result, the DOT was never able to attain a sufficient level of distribution and couldn't compete against any of the major IBM-compatible companies, such as Compaq Computer Corp., Bosomworth said. Agreeing that the small disks had caused problems, he noted they also add to a product's portability.

"Computer Devices has had a viable product line all along," Bosomworth said, adding that "a lack of customer enthusiasm and satisfactory distribution with the DOT" was the problem. Computer Devices' woes "demonstrate that it is very difficult to get a product positioned and distributed."

Stein maintained there is "no way" Computer Devices could compete in the battle for the corporate micro environment without the compatibility or standard the industry requires, particularly as more of the big-name vendors, such as IBM, Digital Equipment Corp. and Wang Laboratories, Inc., enter the business micro market.

While it is true that some of the smaller micro firms could turn a profit after only a few large-volume sales, Stein pointed out that they do not seem to realize how difficult it can be to land those sales.

INTRODUCING IBM'S NEW PERSONAL COMPUTER.



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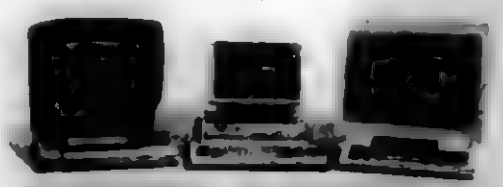
*VisiCalc is a registered trademark of VisiCorp.



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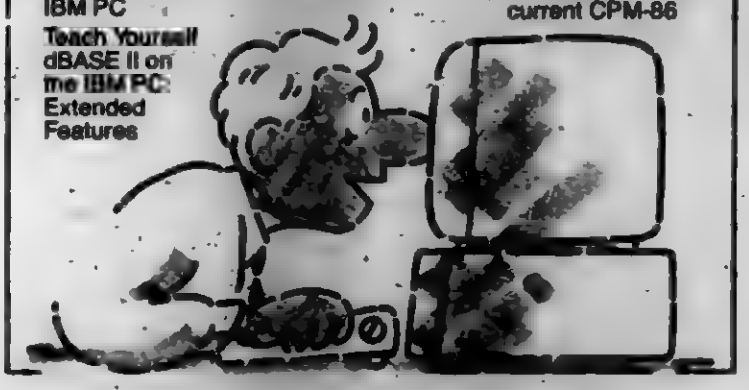

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On Minimum Wage Requirements

Federal DP Service Contract Exemption Issued

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The U.S. Department of Labor has issued its long-awaited exemption of federal DP service and maintenance contracts from government-imposed minimum wage requirements.

First proposed more than two years ago, the regulation exempts maintenance and repair of DP equipment, office systems and high-technology scientific and medical equipment from the provisions of the 1965 Service Contract Act.

That law was passed to protect primarily low-paid service workers from wage busting by employers trying to win federal contracts. In 1977, Labor proposed to extend the act's coverage to other industries, including federal data processing maintenance.

A number of computer firms and the Computer and Business Equipment Manufacturers Association (Cbema) have been fighting the proposal ever since.

Those firms argued that their service workers are relatively highly paid and are in such demand that they do not have to worry about their wages being held down by firms seeking government work which, they said, is only a minimal part of their business anyway. They also said the regulation would ruin their merit pay systems and force them to refuse government contracts.

The government's procurement agency, the General Services Administration, agreed with that assessment and backed the exemption, claiming the law would hurt agencies' ability to procure equipment maintenance and repair. The U.S. General Accounting Office of Congress also said the exemption, opposed by organized labor groups, should be granted for this category of service work.

In its final rule, published late last month, Labor said it had determined that "wage competition in the [DP service] industry is not a significant factor in obtaining federal contracts."

It said it was granting the exemption because "the affected employees are relatively highly paid pursuant to complex merit pay systems and because the nature of the industry . . . is such that price competition based on labor costs and concomitant wage abuses are unlikely to occur."

Labor also concluded that the exemption is needed "to avoid the serious impairment of government business."

The department ruled that federal contract officers must police compliance with the exemption's conditions and, when approving service agreements, certify that the firms will use the same compensation plan for employees on government and commercial contracts.

Following publication of the exemption, Cbema President Vico Henriques issued a statement hailing Labor's decision. Henriques called the decision "the sensible, cost-saving approach," which has kept the government from "squandering taxpayer dollars through unnecessary regulation."

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House OKs Bill; Industry Groups Like Changes

(Continued from Page 151)

export licensing authority from the Commerce Department, which currently has primary authority to license high-technology exports.

Kaufman also said the computer industry was pleased the bill contained a provision for a "comprehensive operating license," authorizing a one-time license for exports of goods and technology between U.S. firms and their foreign subsidiaries, affiliates and licensees. This and other types of multiple export licenses approved in the bill would eliminate burdensome requirements to obtain licenses for individual exports to approved organizations, industry spokesmen said.

The bill also seeks to force the government to reduce or eliminate export controls on items available from foreign sources and to remove controls on items that are routinely approved for export. In addition, licenses for goods containing microprocessors could not be denied solely because of the microprocessor component, but would require a determination that the chip could make "a significant contribution to the military potential" of another country.

The House bill would provide expanded penalties for anyone attempting to export controlled items illegally. Whereas the House amendments would be in force until Sept. 30, 1985, the Senate version calls for a six-year span. Observers here expect a compromise somewhere between the two versions' time frames to be reached before the final bill is ready for the president's signature.

Forecasts & Findings

Eight-In. Disk Dead?

The 8-in. floppy disk will ultimately be eliminated from the microcomputer data storage market by the 5¼-in. rigid and floppy disk systems; but the 5¼-in. category, which accounted for 97% of the microcomputer magnetic media market last year, will find its market share declining dramatically as the sub-5-in. Winchester and microfloppy disk systems erode its dominance, according to a study by Creative Strategies International, Inc.

"Mass Storage Media Technology, Evolution and Opportunities" predicts that the 3½-in. hard-jacket disk will take the lead in the microfloppy industry, accounting for as much as 50% to 60% of the U.S. market. Magnetic tape, bubble memory and optical disk markets will grow, but will only play minor roles in the microcomputer storage market through the 1980s, the report declared, predicting that emerging magnetic media technologies will stave off challengers at least until the beginning of the 1990s.

The report is priced at $1,450 and is available from Creative Strategies International, Suite 275, 4340 Stevens Creek Blvd., San Jose, Calif. 95129.

Mainframe, Micro Blitz

Users will show a nearly insatiable demand for processing power over the next five years, and the value of worldwide computer shipments from U.S. suppliers will grow at a compound rate of 17.3% during that time, according to a report released here by International Data Corp. (IDC).

According to "Computer Industry Review and Forecast — 1977-87," personal computers have blitzkrieged the user market and are destined to become the largest computer market of all. The report declares, "In 1981, the value of personal computer shipments to the U.S. market passed those [sic] of terminals; in 1982, small business computers fell; 1983 will leave the minicomputer market behind; and by 1984, the once almighty general-purpose market will succumb."

However, IDC claims that somewhat unnoticed has been a renewed sense of enthusiasm for the mainframe market, especially at the high end, albeit dominated by IBM at the expense of the five noncompatible companies. The minicomputer market will continue to grow at an 18.8% rate over the next five years, as vendors emphasize a single architecture from the desktop computers to the powerful superminis that have increased performance into what was once the mainframe realm.

The 80-page report is available for $325 from Department M, IDC, 5 Speen St., Framingham, Mass. 01701.

Year of the Desktop

This is the year of the desktop computer, according to "The Professional Computer," a 200-page report in The Technical Office series from The Yankee Group, which reports that worldwide microcomputer sales have increased this year from 1.5 million units to 3.3 million units and from a value of $5.4 billion to $10.5 billion.

Of the micros classified by The Yankee Group as desktops, 35% are going into the offices of Fortune 1,000 companies; 37% are purchased by small businesses and independent professionals; 10% are acquired for scientific and engineering use; 5% are bought for educational institutions; 10% are purchased for a mix of applications by elite consumers in the home market; and the remaining 3% are acquired for industrial applications.

The study projects that shipments of desktops will expand at almost a 60% cumulative annual growth rate through 1987, but in North America at only a 40% annual growth rate. Portable computers, however, will experience growth rates in excess of 100% over the next two or three years, according to the report.

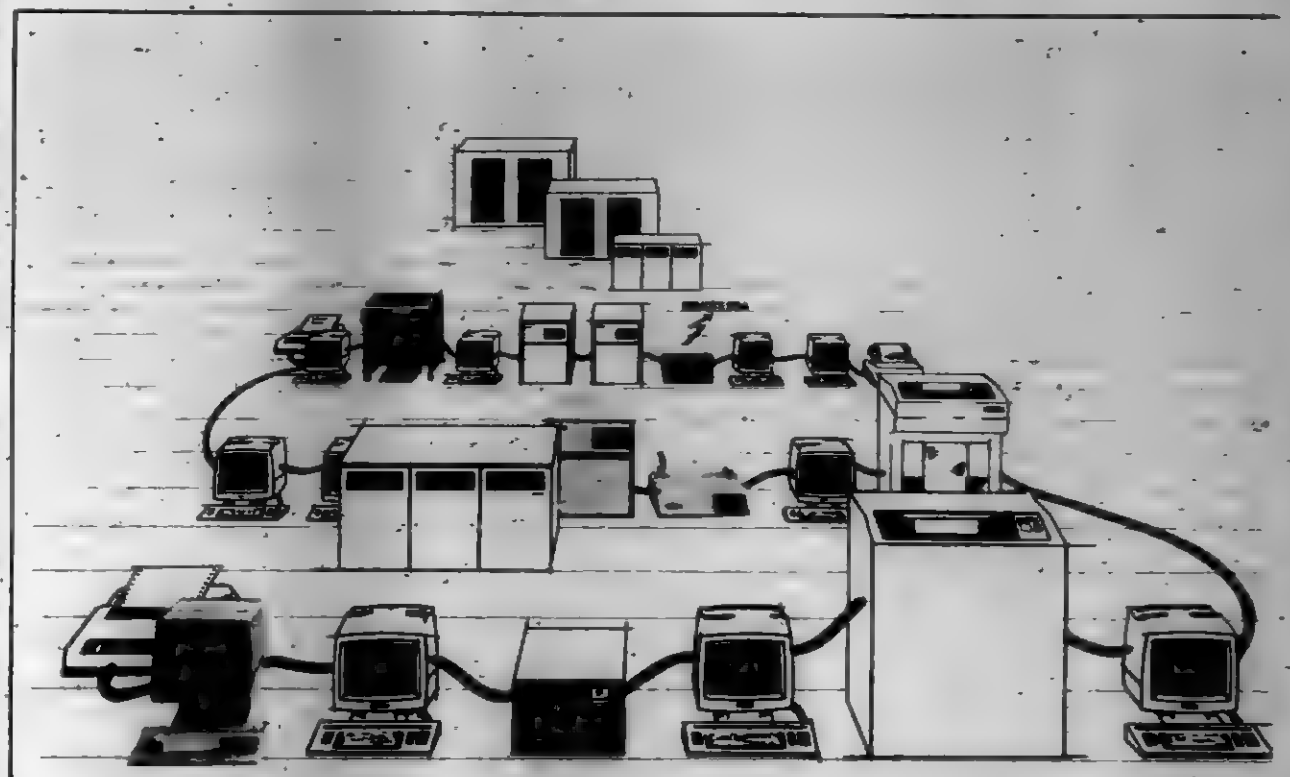
The study is priced at $950 from The Yankee Group, 89 Broad St., Boston, Mass. 02110.

Floppy Price Dilemma

The single most crucial issue facing floppy disk drive manufacturers today is in offering the most cost-effective product with maximum data capacity in the smallest space; but while higher performance can be achieved, total price becomes a barrier to user acceptance, according to "The Floppy Disk Drive Industry: A Strategic Analysis 1983-1987," recently published by Venture Development Corp.

Prices over $1,000 have discouraged interest in high-performance disk drives, perhaps because of competition from low-priced hard disks, and the average number of drives per small business computer system will decline from 2.4 units in 1982 to 2.0 units in 1986, according to the report.

The study provides installed base estimates and manufacturer market shares and forecasts shipments in units and current dollars for several product categories in addition to profiling manufacturers and recommending competitive strategies. Priced at $2,790, the 175-page report is available from Venture Development at 1 Washington St., Wellesley, Mass. 01181.



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Of course, such a system would have SNA compatibility. But it would also have a set of capabilities to dramatically increase throughput, while reducing hardware and support costs in *any* environment. Capabilities like multi-host and multi-personality support, application and address switching, and system printing.

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Mostek: U.S. Needs to Open Semi Trade With Japan

By Robert Batt
CW West Coast Bureau

SAN JOSE, Calif. — While the semiconductor industry does not employ as many people as some of the older U.S. smokestack businesses, its importance for the entire economy is vital. Semiconductor imports should become more of a priority in Washington, D.C., following last week's visit to Japan by President Reagan, according to a senior industry executive.

The president's trip should underscore needed changes in semiconductor trade between the two nations, according to James Byrne, senior vice-president for business development at Mostek Corp. "If we lose our leadership in this arena, it will have dire consequences for our country," he said in a recent interview. The strategic importance of the semiconductor industry is still not sufficiently understood in Washington, D.C., he added.

That Japan, the world's second strongest economy, is essentially closed to U.S. chip manufacturers should be a cause for concern, he said. "It is important that the problems be discussed at the very highest levels of government," Byrne said. The Mostek executive and seven other top industry officials made a visit to Japan last month in an effort to increase U.S. semiconductor shipments to Japan through the setting up of new, long-term relationships with Japanese equipment manufacturers.

Met With Officials

Those executives, including Robert Noyce, vice-chairman of Intel Corp., and Joseph Boyd, chief executive of Harris Corp., met with representatives from 22 Japanese vendors and suppliers, as well as senior government officials.

"It now appears that a political framework is emerging that allows for the possibility of increasing the U.S. semiconductor presence in Japan," claimed Warren Davis, director of government affairs for the Semiconductor Industry Association (SIA), who also went to Japan.

Davis said sufficient progress has been made by the 18-month-old U.S.-Japan High-Technology Working Group to warrant delaying the threat of U.S. retaliation for what domestic suppliers see as unfair Japanese practices, including government-subsidized cartel policies. The group was born of a joint effort by both countries.

Nevertheless, Davis warned, the patience of U.S. manufacturers is limited. "We would expect to see a significant improvement in the U.S. semiconductor trade with Japan over the next six to 12 months. Currently our market share is 10%, and we will expect to see that climb to 20% to 30% in a fairly short time span," the SIA executive said.

Earlier this year, the SIA prepared a draft petition under Section 301 of the U.S. Trade Act of 1974, alleging that target industry practices in Japan unfairly deny access to U.S. firms and called on the Department of Commerce to exert pressure on the Japanese to open up its markets. The SIA decided to postpone submission of the petition to the government because of the apparent progress being made by the High-Technology Working Group.

> *'It now appears that a political framework is emerging that allows for the possibility of increasing the U.S. semiconductor presence in Japan.'* — Warren Davis, director of government affairs for the Semiconductor Industry Association.

AT&T Information Systems Inks Pacts With HP, Wang

MORRISTOWN, N.J. — AT&T Information Systems here announced agreements recently with both Hewlett-Packard Co. and Wang Laboratories, Inc. to develop interfaces between the companies' products.

In a prepared statement, AT&T said the agreement covers plans to forge a digital, multiplexed interface linking AT&T's Dimension System 85 voice and data private branch exchange to HP and Wang equipment.

The interface will be made public early next year, AT&T said. As part of the joint agreements, Wang will license AT&T on its recently announced document communications specifications.

The interface will permit texts written on Wang machinery to be transferred to the AT&T System 85, where it will be converted to electronic document communications format, AT&T said.

Development of the interface between HP and AT&T equipment will involve certification of HP hardware with the System 85. The interface was described in AT&T's statement as a 1.544M bit/sec digital switch, opening up 23 data channels.

Announcing the State of the Smart.

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Shareholders Approve Harris-Lanier Merger

MELBOURNE, Fla. — Shareholders of Harris Corp. at their annual meeting here recently approved the merger of Lanier Business Products, Inc. into Harris, as did shareholders of Lanier. Also, Harris announced a 16% increase in earnings for the first quarter ended Sept. 30.

The Lanier acquisition, labeled a merger by Harris [CW, Aug. 1], will result in Lanier operating as a subsidiary of Harris. Lanier's chairman, Gene H. Milner, was elected to the Harris board following the annual meeting and will continue to head Lanier.

The arrangement is reportedly valued at about $275 million, with .525 shares of Harris traded for each of the 15 million shares of Lanier.

Joseph A. Boyd, chairman and chief executive officer of Harris, described the new relationship as "very synergistic."

Harris reportedly intends to use its communications expertise in attempting to link its large systems with Lanier's stand-alone terminals and other office automation products.

Deal Combines Strengths

The deal, Boyd said, "brings together Harris' state-of-the-art technology in information processing, communications and semiconductors and Lanier's outstanding sales, service and distribution capabilities in the office products area. With these combined strengths, Harris now has a very powerful presence across the total spectrum of the rapidly growing office automation market."

During a New York meeting with security analysts following the announcement of the impending acquisition [CW, Aug. 15], Boyd said Lanier will operate as a relatively autonomous sector of the Harris organization for a year or two.

The quarterly report issued a few days prior to the shareholders' meeting indicated net income for the first quarter of $14.3 million, or 45 cents per share, in comparison to $12.3 million, or 39 cents per share reported in the first quarter in 1982, from operations that are presently continuing. It was a drop from total income in the first quarter of 1982 of $14.7 million, which reflected $2.4 million in operations since discontinued.

Sales revenue increase, reflecting the discontinued operations, was $350 million for the first quarter of this year in comparison to the $342 million reported one year ago. Boyd said that total orders booked in the first quarter of 1983 increased 26% over a year earlier and exceeded shipments.

STC Ultimacc Acquires Global Software

WALDWICK, N.J. — STC Ultimacc Components, Inc., a division of STC Systems, Inc., recently announced the acquisition of the Raleigh, N.C.-based Global Software, Inc. According to a spokeswoman for STC Ultimacc, the acquisition is valued at $2 million in cash and $10 million in notes.

The spokeswoman said the acquisition will enable the STC division to add health care turnkey systems to its line of turnkey systems already serving industries such as lumber, apparel, publications, warehousing and others. Software developed by Global will also enable the STC division to offer plug-compatibility with IBM's Series/36, Series/38 and 4300, according to the spokeswoman.

Global will continue operations as an autonomous business unit with a continuation of its present management team of Ronald Kupferman, president, and Frederick Filger, who will report directly to George J. Pilmanis, president of STC Systems.

The spokeswoman said the acquisition will also enable STC Ultimacc to offer software with its systems at a much lower cost than was previously possible. Previously, the company had paid for third-party software.

The arrangement will provide STC Systems — which had 12 regional offices — with Global offices in Raleigh, Richmond, Va., and Los Angeles, in addition to a 12-member team of international agents.

STC Systems, a wholly owned subsidiary of Storage Technology Corp., is projecting combined revenues of $25 million.

Adapso Releases Financial Survey

ARLINGTON, Va. — A financial survey of 150 U.S. companies providing various types of computer services was recently released by the Association of Data Processing Service Organizations, Inc. (Adapso).

Adapso's Operating Ratios Survey provides a variety of measures indicating how various entities "stack up against the competition," according to Jerome L. Dreyer, president of the association.

Survey participants are entitled to a report comparing their results to the survey data base. Information is available from Adapso, Suite 300, 1300 N. 17th St., Arlington, Va. 22209.

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The information windows can be moved, just as a person moves papers on a desk. They can be made bigger or smaller, put on top for immediate attention or temporarily hidden when not in use. Information on the screen can be processed, printed or exchanged between windows. And the IBM 3270-PC can be programmed by the data processing professional to meet the needs of each end user or department.

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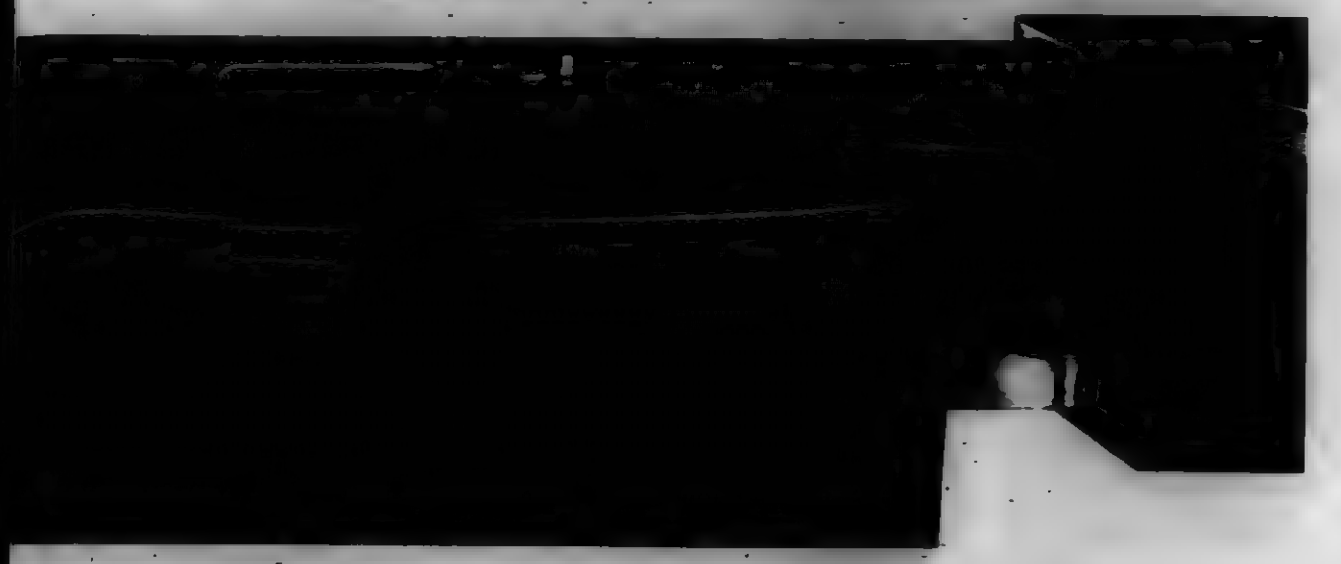


IBM Seen Poised for Communications Assault

FRAMINGHAM, Mass. — IBM has emerged as a much more potent competitor than the antitrust-bound giant of the late 1970s and is in the process of becoming a very aggressive communications company, according to "IBM, The Giant Awakens," a report published by International Data Corp. (IDC).

With record sales of 3081 computers and 3380 disks, IBM's share of the 1982 mainframe market reached 71%, its highest since the early 1970s, according to IDC. With results expected to be similar in 1983, IDC concludes that IBM appears to be establishing a new level of high-end dominance.

'IBM would much rather see its users buy products from others that can fit into an IBM network than have its customers build non-SNA networks to which IBM would provide products as just another vendor.'

— International Data Corp.

Big Blue has adopted major philosophical and strategic shifts, the report claims. Historically, IBM has defended its mainframe turf by keeping its 370 architecture proprietary, but has abandoned that approach with the Personal Computer, thus attracting the type of third-party software and peripheral support needed to meet the diverse needs of that market.

From the experience of the Personal Computer, IDC said, IBM has changed its thinking and become more open to competitors wishing to support its System Network Architecture (SNA) and has published its Document Content and Document Interchange Architecture (DCA/DIA) specifications well in advance of their availability on many products.

"The strategy is clear," according to IDC. "IBM hopes that a combination of its 3270 protocol, SNA and its DCA/DIA formats will allow it to establish the de facto communications standards for the next decade. And as the plug-compatible market continues to grow, the 370 architecture also looms as a strong industry standard."

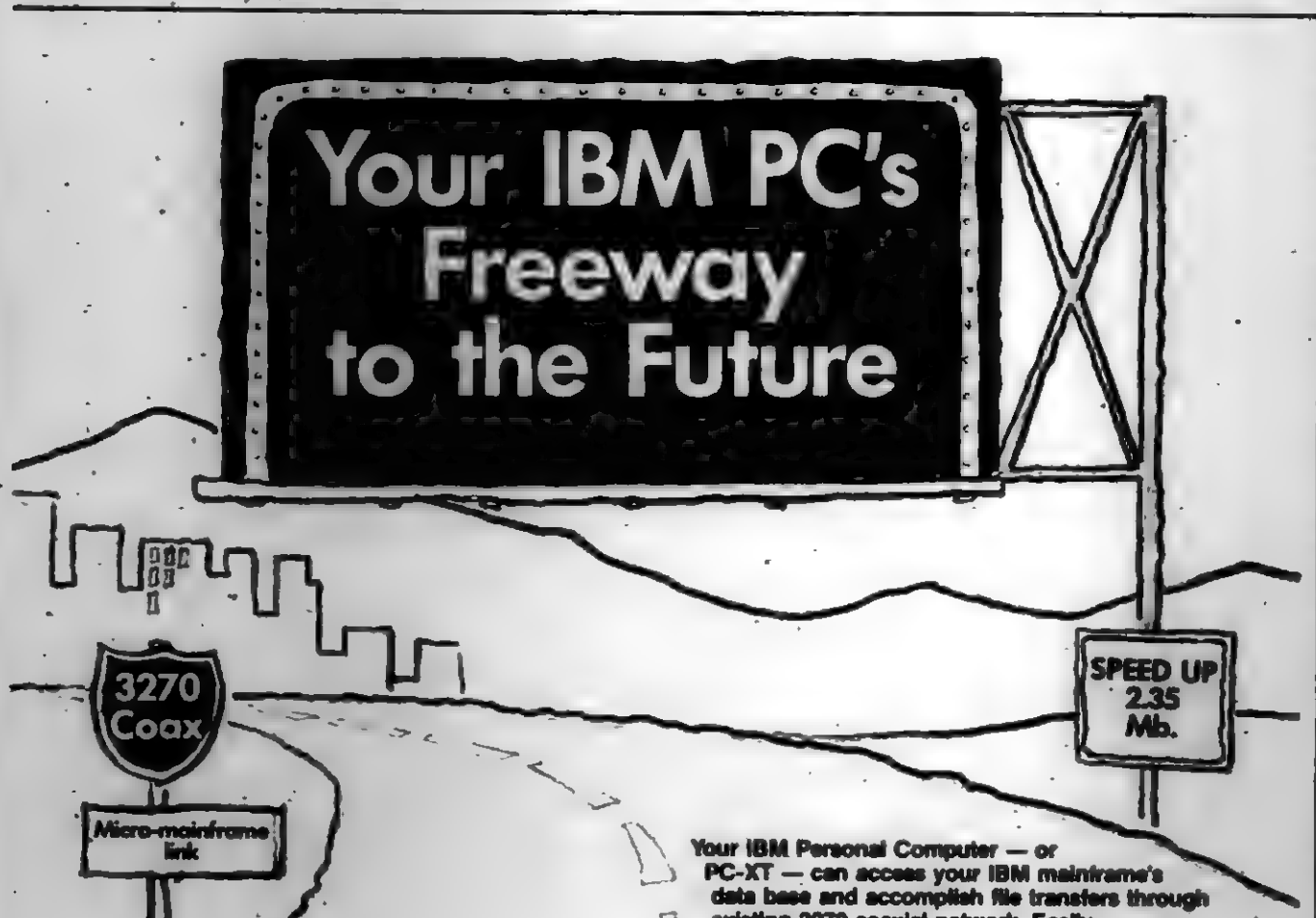
Control of communications standards is one way of bracing for the upcoming battle with AT&T and others for control of the giant integrated digital networks that will evolve over the next few years and become more important than hardware and peripherals, the report says. "Recognizing that it cannot meet all of its customers' needs, IBM would much rather see its users buy products from others that can fit into an IBM network than have its customers build non-SNA networks to which IBM would provide products as just another vendor," IDC concluded.

More Aggressive Stand

IDC said IBM will become aggressive in the fast-growing, $100 billion communications market that it previously has not tapped. And the computer giant has shifted from the goal of dominating a few markets to one of participating in the growth of many markets, as evidenced by the establishment of independent business units to enter fast-moving areas such as personal computers and robotics, according to the report.

IDC expects that IBM will now start to concentrate more heavily on mid-range systems to meet the competition from Digital Equipment Corp., Wang Laboratories, Inc. and others, the report said. "DCA/DIA appears to be the giant's way of tying [its variety of products] all together to meet its customers' office automation needs."

The 71-page report contains detailed analysis of IBM's hardware, software and financial strategies, as well as overviews of joint-venture efforts and office and communications positioning, with an emphasis on the implications for competitors. Priced at $295, it is available from Department MT, International Data Corp., 5 Speen St., Box 955, Framingham, Mass. 01701.



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Forte products for the micro-mainframe link are totally soft-loaded, and enhancements will be diskette-based. Such Forte upgrades as new terminal emulations and custom file transfers will be on diskette, so your investment today is protected. Right now, Forte products provide such delights as switch-selectable address selection, field-configurability of PC elements such as keyboard changes, program symbols, full-color graphics, menu-selected file transfers, and access of full-screen host applications. There's lots more, too, including parity and remote dial-up of the host via coax. All the reasons for a micro-mainframe connection for your business are compelling today. They'll be essential tomorrow. We can help you put your IBM Personal Computers on the Freeway to the Future now. Ask about it. That's our Forte.

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DEC Announces VAX Software Marketing Pacts

MAYNARD, Mass. — Digital Equipment Corp. recently announced three cooperative marketing agreements for manufacturing- and process-related software that will be marketed with the VAX series of superminicomputers.

Agreements for DEC to promote and market software products were reached with Consilium Associates of Palo Alto, Calif.; NCA Corp. of Sunnyvale, Calif.; and Rath & Strong System Products, Inc. (RSSP) of Dallas.

Consilium's Comprehensive On-Line Manufacturing and Engineering Tracking System is an 11-module computer-aided manufacturing software package that reportedly is used primarily in semiconductor manufacturing. Written in Ansi Cobol and utilizing standard VAX architecture and layered software, the modules range in price from $25,000 to $150,000 and are available 30 days after receipt of order.

NCA Corp.'s Maxcim product is a 14-module package with an integrated common data base designed as a manufacturing and financial planning and control system to provide information required for planning, reporting and control of manufacturing resources; the system integrates information from manufacturing, marketing, finance and engineering functions. Originally developed for the PDP-11 series, the VAX version can be configured on VAX-11/750, 11/780 and 11/782 systems. Prices range from $60,000 up to the complete package cost of $113,000, and delivery is 30 days after receipt of order.

The Production and Inventory Optimization System from RSSP is an eight-module closed-loop package reportedly providing master production scheduling, purchasing management, shop-floor control, inventory control, customer order entry, materials requirement planning, bill of materials and cost management. Written in Ansi Cobol, modules are priced from $10,000 to $25,000 individually, with versions for single-plant and multiple-plant operations available for $100,000 and $250,000 respectively.

More information is available from DEC, Maynard, Mass. 01754.

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The big screen terminal that's sooooo easy on the eyes

If your operators are getting eyestrain and headaches from staring at small, fuzzy screens all day long, chances are, you haven't yet heard of the Tandberg Data TDV 2200.

The TDV 2200 features a 15-inch screen with big, flicker-free, green-on-green characters; a patented Equalite™ Video system that displays both vertical and horizontal lines with equal intensity; and true character definition across the entire 15-inch screen. The TDV 2200 also tilts, swivels, raises and lowers for easy readability in any room light, at any angle.

But there's a lot more to the TDV 2200 than meets the eye. There are sixteen soft switches called PUSH keys that recall previously stored words, phrases, or code sequences. A single keystroke can recall up to 48 characters. This not only saves time, but also eliminates the possibility of error when entering this data. Up to 416 characters can be stored and recalled from the terminal or host computer.

There's also a simplified menu protocol that cuts set-up time in half; full editing capability; up to eight screens of memory; semi-graphic display; character, page, block or line/field transmission and a host of other features.

The Tandberg Data TDV 2200 family is available in a number of models that will emulate virtually any popular terminal including the DEC VT100 and VT52, Datapoint 3600 and 8200, IBM 3101, Data General 6053 and D200, H-P 2622, Basic Four and others. An advanced performance model is also available for the development of application-tailored OEM terminals.

To truly appreciate this outstanding combination of graceful ergonomic design, functional capabilities and performance features, you should really try one for yourself. Just call or write for a demonstration. You'll see that there's a lot more to the TDV 2200 than meets the eye. Tandberg Data, Inc., P.O. Box 99, Labriola Court, Armonk, N.Y. 10504. Phone: (914) 273-6400. Telex: 137357 Tanberg Amk.

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Fujitsu Nets 21% Increase In Income

TOKYO — Fujitsu Ltd. recently reported net income of $81.5 million for the six-month fiscal period ending Sept. 30, nearly a 21% increase over the corresponding period in 1982, when earnings were $67.5 million.

Net sales for the six-month period rose 20% to $1.9 billion, compared with $1.56 billion in the same period the previous year.

Fujitsu reported a decline of 1.4% in sales of communications systems, but healthy increases of 20.5% for computers and DP equipment and 42.4% for electronic components. Export revenues increased 18.3%.

The Japanese company predicted that net sales for the fiscal year ending next March 31 will reach $4 billion, and earnings will be $186 million, compared with earnings reported for the fiscal year ended this past March of $159 million on sales of $3.42 billion.

Comdex Set For Japan

NEEDHAM, Mass. — The Interface Group, Inc. has announced that its series of Computer Dealer Exposition (Comdex) conferences for the computer industry will extend to Asia with the premiere of "Comdex in Japan" in spring 1985.

The conference will be sponsored by the Interface Group and the Comdex in Japan Executive Committee, a joint venture partnership comprising two Asian firms — International Congress Service, Inc. and Information International, Inc.

More information is available from the Interface Group, 300 First Ave., Needham, Mass. 02194.

A unique company dedicated to the development and enhancement of UNIX* software and support regardless of host hardware! This was the concept pioneered by The Wollongong Group in 1980. The year it introduced the 32-bit UNIX-based operating system for the Perkin-Elmer 3200 Series.

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System-level packages

These run under VMS or EUNICE for VAX users, or UNIX for PE 3200 users.

IP/TCP Internet Protocol Transmission Control Protocol is the newly adopted Department of Defense standard which provides a set of cooperative processes allowing two or more host computers to communicate.

R/M COBOL is a high-level implementation of the ANSI 74 COBOL standard, designed for efficient development and execution of COBOL business applications. Features include GSA certified COBOL, Level-2 relative and indexed file access methods, plus full arithmetic capability.

Full Screen Editor supports advanced programming and [illegible] requirements, concurrent file editing, and

Micros Seen Redefining Value-Added Mart

By Peter Bartolik
CW Staff

FRAMINGHAM, Mass. — The rush of microprocessor-based hardware and software in commercial markets is redefining the boundaries of virtually all traditional computing markets and has critical implications for value-added suppliers, according to a report by International Data Corp (IDC).

"Hardware Strategies of Value-Added Vendors," a 53-page report by IDC's Continuous Information Services, concludes that the rationale for larger system computing's monopoly in commercial markets is fading rapidly as computer processing and storage prices radically decline. The result, according to the study, is that value-added suppliers — providers of processing and professional services, independent software firms and OEM/system houses — face rapid changes in the traditional markets.

"New hardware technology and architecture are critically important in the breakthrough to significant new end-user markets, but just as important is the software that makes the machines work the way users need them to," the report said.

Prior to the micro breakthrough, IDC said, "the software industry was a veritable Tower of Babel [with] many languages and syntaxes used by enclaves that could not communicate with each other — all to protect the hardware manufacturers' installed base from incursions by competitors."

Micro manufacturers, however, have relied on a handful of operating systems that have become de facto standards, resulting in a large number of applications packages "allowing users instant access to large libraries of software for their newly purchased micros," IDC said.

Processing services, both data base providers and time-sharing companies, increasingly see microcomputer offerings as important to their survival and "to prevent further erosion of their traditional business."

(Continued on Page 168)

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Executive Corner

● **Richard P. Abraham** has been appointed president of Synertek, Inc., a Honeywell, Inc. subsidiary.

● **Jerry Thorp** has been named president and chief operating officer of Solutions Group, Inc.

● **Paula J. Brooks** has joined Infodata Systems, Inc. as vice-president, marketing.

● **Andrew C. Knowles** has been named president and chief executive officer at Lexidata Corp., replacing **Ralph T. Linsalata**, who will remain a member of the board of directors.

● **Donald L. Waite** has been appointed vice-president of finance and chief financial officer at Seagate Technology, Inc.

● **Anthony L. Craig** has been appointed vice-president, international sales integration, at General Electric Information Services Co.

● **Mornay R. Mahoney** has been appointed vice-president in charge of European operations for Storage Technology Corp.

● **Cal Shoemaker** has been named vice-president for sales and marketing at Timeplex, Inc.

● **Raman M. Patel** has been promoted to vice-president, channel products and special engineering, in Harris Corp.'s Interactive Products Division.

● **Charles M. Brennan III**, senior vice-president and chief financial officer at Gould, Inc., has been named a director of the company. **Dr. Joseph E. Rowe** has been elected vice-chairman and chief financial officer and **Henry J. Peppers** has been elected executive vice-president of defense systems, business section.

● **Richard E. Pigman** has joined Associates Bancorp, Inc. as senior vice-president of information technical services.

● **Charles P. Reilly** has been appointed senior vice-president of marketing, sales and service at Centronics Data Computer Corp.

● **Dean Witter III** has been appointed corporate treasurer at Amdahl Corp.

● **William J. Razzouk** has been named vice-president, sales, and **James R. Vaughan** has been named vice-president, service, for Federal Express Corp.'s Electronic Products Division.

● **Ron G. Stegall** has been promoted to senior vice-president, computer marketing, at Tandy Corp.

● **Bert J. Novak** has been elected an officer of Tymshare, Inc. and named group vice-president of computer management services.

● **Jim Ortman** has been promoted to senior vice-president of sales at Phillips Information Systems, Inc.

● **David K. Anderson** has been promoted to vice-president and legal counsel for the computer systems operations of Sperry Corp.

● **Wallace A. Cataldo** has been promoted to chief financial officer for Keane, Inc.

● **George W. Sullivan** has been appointed president and **Charles M.H. Shiu** has been appointed vice-president, business development, at Northern Telecom International, Inc.

● **Charles Babbitt** has been appointed executive vice-president and chief operating officer at Ashton-Tate.

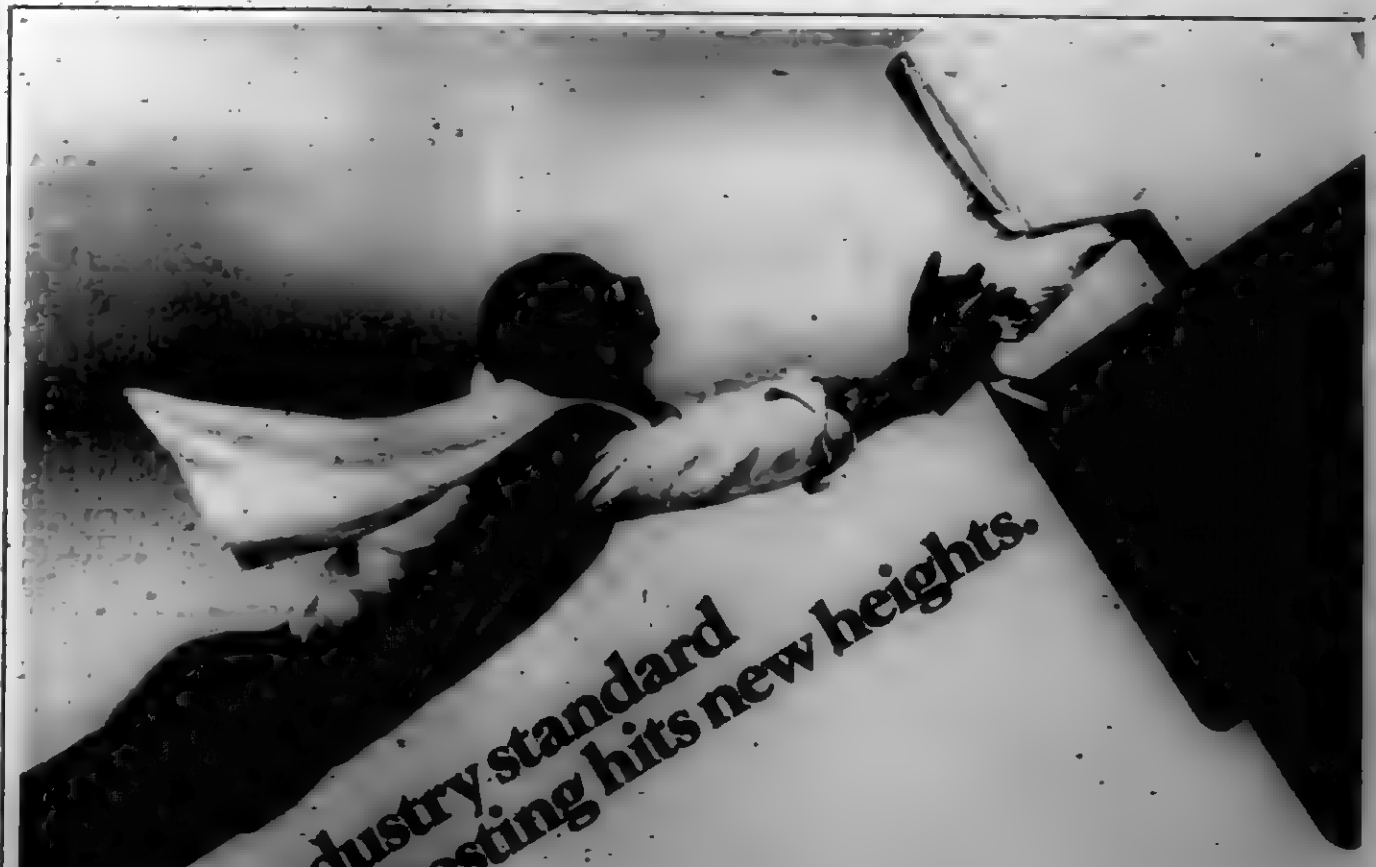
● **Robert L. Dahlberg** has been named by Otrona Computer Corp. of Boulder, Colo., as director of manufacturing. He was formerly director of material for Harris Corp. in Dallas.

● **David J. Packwood** has been named president of Altergo Products, Inc. Packwood was previously sales director for Software Sciences, which purchased Altergo in April.

● **John J. Theiss** has been named president and general manager of Cardkey Systems, Inc., a Fairchild Industries, Inc. company.

● **David R. Earl** has joined Pixel Computer, Inc. as vice-president of manufacturing, the same position he held for four years at Data Terminal Systems, Inc.

● **Walter J. Eissmann** has been appointed vice-president of Tymshare, Inc.'s national accounts division. A Tymshare vice-president for four years, he most recently served as general manager of the office automation division.



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CW8/83

Motorola Exec Sees Semi Industry Boom in '84

By Robert Batt
CW West Coast Bureau

PHOENIX — A booming semiconductor industry for the rest of this year and a record-breaking 1984 were the prospects held out to industry observers here at a recent technical briefing by Motorola, Inc.

In an upbeat assessment of his company's prospects, Chuck Thompson, vice-president and director of marketing at Motorola Semiconductor Products Sector, said Motorola, the No. 2 chip manufacturer, will experience a compound growth rate in chip sales exceeding 20% this year.

Thompson noted that third-quarter results just released show revenues up by 30% compared with the equivalent period last year. Year-to-date billings (September 1982-September 1983), he said, showed major increases in all of Motorola's product areas, with metallic oxide semiconductor (MOS) products growing by nearly 39%, discrete devices up by 28% and bipolar products increasing by 17%.

The automotive industry, he added, has been the most hungry consumer sector for the company's products, with demand in that sector up 45%, followed by communications equipment, up 38%, and computers, up 17%.

Thompson claimed total integrated circuit industry sales will double over the next five years from the current $17.4 billion to $37.7 billion in 1988.

"The business outlook is positive, demand for semiconductor products is strong and the key to future growth lies in developing new products," added Jim Fiebiger, assistant general manager of the semiconductor products sector.

Fiebiger claimed the company will see a 22% compound growth rate in its bipolar products sector over the next five years, compared with an industry growth average of 15%.

The introduction of the Motorola 68000 chip into the IBM Personal Computer XT/370 model will give sales a boost, he predicted, with 1983 shipments of the 68000 expected to be five times as large as 1982 levels. Fault-tolerant computing, word processing systems, executive workstations and other office automation equipment are responsible for the increase in demand, he explained.

In the memory area, the company predicted that MOS memory products will be the fastest growing segment ever in the history of the semiconductor industry, with industry levels climbing from a 1980 level of $2.2 billion to $32 billion by the end of the decade.

According to Peter Bagnall, Motorola's director of memory operations, 1984 will also see a continuing acceleration of dynamic random-access memory (RAM) shipments, with volumes reaching 750 million units compared with 350 million this year. Bagnall estimated Motorola's share of the market at 10%, and he also confirmed that Motorola expects to unveil a 256K-byte dynamic RAM in the spring of 1984. The product has been under development for the last three years, he added.

Despite the rosy picture painted by Motorola officials, some gaps in the company's performance were noted. For example, while the company has achieved the status of No. 1 semiconductor supplier in the U.S., it continues to trail Texas Instruments, Inc. worldwide.

The Japanese market in particular, the world's second-largest chip market, is grossly underdeveloped, accounting for only 3% of the company's business, compared with 68% for the U.S., 19% for Europe and 10% throughout the rest of the world.

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They approached programmability with the same high standards. Other emulators offer you 6 or 7 programmable function keys, the Visual 383 has 16. In fact the ENTIRE keyboard can be reconfigured to meet your exact needs with all soft keys and configured screens password protected. Plus you can store up to 350+ bytes in non-volatile memory.

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The Visual 383 line monitor mode enables you to quickly identify communications and system problems. You can assign one of the 6 standard pages of user memory to the 'line monitor page' for greater analysis capability.

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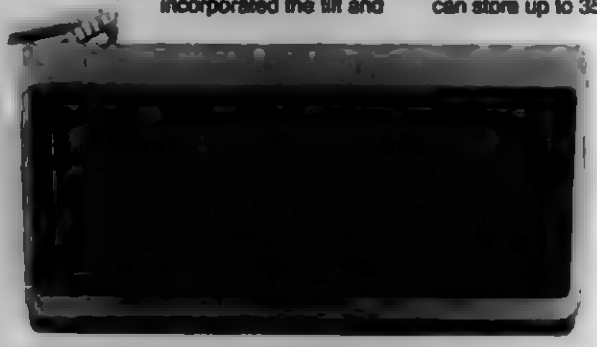

Screen Type	14" Green P-31	12" Green P-31	12" Green P-31	12" White P-4	12" Green P-42
No. of Pages Standard	6*	2	2	6*	4*
Password Protected Set-Up Functions	6	3	None	None	1
TD830 XON/XOFF Printer Support	STD	STD	STD	STD	STD
Host Accessible Local Forms Storage Buffer	STD	STD	STD	STD	STD
Function Key Storage	Non-Volatile RAM with Battery Back-up	Non-Volatile RAM with Battery Back-up	—	Non-Volatile RAM	Non-Volatile RAM
Detachable Programmable Keyboard	STD	STD	STD	STD	STD
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Study Details Micro Impact On Remarketers

(Continued from Page 166)

Hardware strategies of processing service providers "add up most often to micro software strategies" as micros bring information processing capabilities to "vast new realms of heretofore unreachable users" and change the habits of experienced users, IDC concluded.

Similarly, the success of the personal computer is reshaping the packaged software marketplace and opening up a mass market to software firms. "The hardware strategies of the packaged software suppliers revolve around capturing as much share of this new market as possible with new software products, or newly refurbished software products, that successfully piggyback on those microcomputers which are bought in large numbers by first-time and old-time computer users alike."

IDC predicts that retail software sales will become increasingly important with more large users turning to retail outlets for both hardware and software. IDC also said the line between types of software products is blurring as suppliers cross over into previously distinct areas. Very much in question is whether micro proliferation will spur infinite growth for independent software operations, or if a few large organizations — hardware firms, traditional print publishing companies, data communications networkers and processing services — will dominate.

Micro Software Mart Competition Seen Intense

By Bohdan O. Szuprowicz
Special to CW

Early last month, Lotus Development Corp. became the first of the new breed of micro software companies to go public. Its immediate performance in the aftermarket augurs well for a group of leading microcomputer software firms that are expected to go public in the months ahead. Lotus came to market with 2.6 million shares at $18 each, which rose to over $27 per share in recent trading.

The overall market for micro software is estimated at $2.1 billion and expected to increase rapidly to almost $12 billion by 1988. There appears to be much room for growth and profits for entrepreneurs and investors alike.

But these statistics may be deceptive because, unlike hardware manufacturing, just about anyone with a microcomputer can get into the micro software business; the competition in this game is probably more intense than in any other high-technology sector.

In mid-1983 there were at least 5,000 micro software products on the market, supplied by about 200 manufacturers. That, however, accounts for only the most visible and best financed suppliers. An executive at a recent meeting of the Association of Data Processing Service Organizations, Inc. (Adapso) said his company started a count of micro software firms in North America, giving up after reaching 11,000, with no end in sight.

Few and Far Between

This means the average revenues of a micro software firm are but a few hundred thousand dollars per year; while the industry is booming, individual firms with prospects of rapid and profitable growth to become micro software giants are few and far between.

A recent Adapso study also revealed that average revenues per employee in a micro software firm are just over $53,000, about half that of employees at mainframe and minicomputer software companies. At the same time, micro software firms spent almost 50% of their revenue on salaries and are constantly scrambling to find new talent as their employees move to better paying jobs with competitors or start their own micro software businesses.

A recent survey identified 25 software companies whose revenues grew by over 50% during 1982. Among those firms, there were eight companies growing at over 100%, and five of those were new micro software firms such as Softsel Computer Products, Inc.; Micropro International Corp.; Ashton-Tate; Digital Research, Inc.; and Microsoft, Inc.

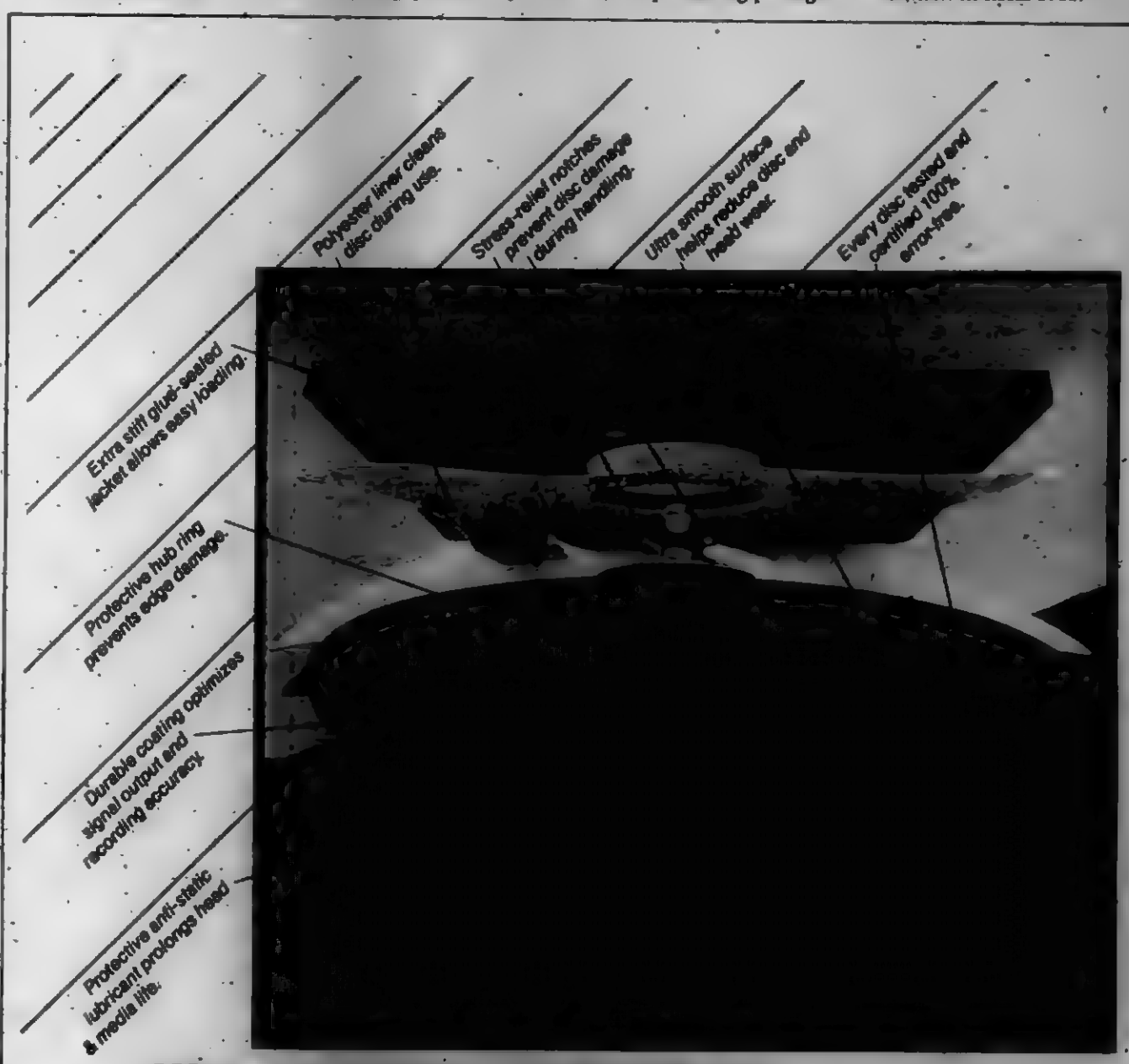
Ashton-Tate specializes in cross-industry micro software, and its relational data base management system is the third-best selling package after Visicorp's Visicalc and Lotus 1-2-3, which gave Lotus its leading edge in this market.

But the leader of the pack with an impressive growth in revenues of 353% during 1981-82 is Softsel, the largest independent distributor of micro software packages, which expects to double its revenues to about $70 million in 1983. The company also received at least $11 million in venture capital and looks like a prime prospect for going public very soon. Only extensive teledelivery of software directly from producer to end user threatens its future.

Micropro turned up as the second-fastest growing micro software company, whose revenues rose by 336% from $9 million in 1981 to over $39 million in 1982 and are expected to reach $50 million in fiscal 1983. Micropro produces the Wordstar word processing package.

Digital Research, owner of CP/M, posted revenue growth of almost 160%, to $22 million in 1982, and the company expects to reach between $30 million and $40 million in fiscal 1983.

Microsoft, also competing in the operating micro software business, has been growing at about 120% per year recently and expects to double again to about $50 million in fiscal 1983.



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We're looking for Systems Engineers with 5-8 years' experience in Telecommunications, ADPE, Simulation and Modeling, and/or Test and Integration. 2-3 years in logistics-oriented systems, distributed systems, engineering practices in accordance with Mil. Spec. highly desirable. You must have a BA/BS degree, preferably in Math, EE or Computer Science.

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Participate in the design and project management of on-line data processing systems including DBMS, telecommunications and logistics systems. We require 15 years' experience in the above, with 10 years in project management of defense programs specifically, and 5 years' management of programs in excess of $5M.

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Participate in the design and development of software for the AEGIS Weapons System. Intermediate and senior level positions exist for individuals with experience in real-time programming in a military/scientific environment. A BS in Computer Science is preferred.

Systems Programmers

These positions involve determining program requirements as well as the design, test and integration of systems programs. Candidates should have 3-10 years' experience working in operating systems using Fortran and Assembly language. Additional experience in executive programming is a plus; A BS in Computer Science or related discipline is necessary.

In addition to competitive salaries and excellent benefits program, CSC offers challenge to match your abilities, high visibility and unequalled potential for career advancement.

For immediate consideration, please forward your resume with salary history/requirements, indicating position and location of preference, to A. Gaynor:

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Send 2 copies of resume, referencing Job No. A310 to: Ms. Sally Hansen, MIT Personnel Office, E19-239, 77 Massachusetts Avenue, Cambridge, MA 02139. MIT is an equal opportunity/ affirmative action employer.

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The University of Wisconsin-Madison General Library System (GLS) is searching for an Automation Manager. This is a 12-mon. academic staff appointment that reports to the Director of the GLS. Benefits include vacation, sick leave, insurance, retirement. Salary minimum $30,000. Qualifications: Advanced degree in information science, computer science or library science. Education in systems analysis, principles of programming and system design, and information technology. Demonstrated ability to analyze complex systems. Proven experience in library automation with mainframe/mini computer applications. Demonstrated communication skills. Ability to teach and promote the use of information technology in libraries to library staff and campus community. Ability to develop cost analyses and budgets for automation activities. Responsibilities: Administer activities of the GLS in relation to the Network Library System (NLS) - an automated circulation system and online catalog - being developed by the UW-Madison, the University of Chicago and IBM, currently in the test phase, including responsibility for fiscal control, design and development, acceptance testing, implementation, staff training and patron relations. Provide program direction for other in-house, contracted or purchased automated systems. Advise on the use of microcomputers and bibliographic data base retrieval systems. Applications including resume, and the names, addresses and telephone numbers of 3 references who can speak to your qualifications for the position should be sent to Sandra Pfahler, Assistant Director, Memorial Library, 728 State St., Madison, WI 53706. Application deadline: Dec. 31, 1983. EEO/AA Employer.

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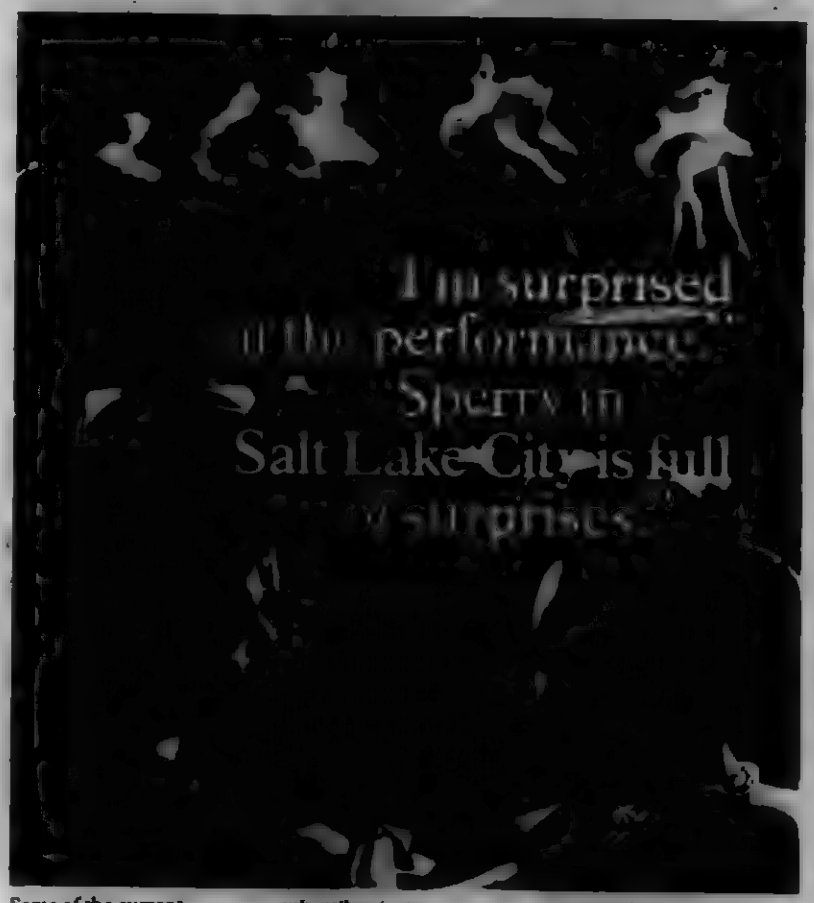

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Experience in digital communication system technology with real-time data link systems, multiplexing and encoding techniques, analog/digital interface, micro-processor design/application system integration and test.

Telecommunications Systems Engineer
Prefer exposure to digital subscriber instruments and transmission components.

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Experience in real-time process control, PDP-11, HP-9845, UYK/20, UYK/44 type hardware, FORTRAN IV, BASIC, CMS-2 languages, RSX-11M and/or SDEX 20 operating systems.

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Will be involved in the development of the new terminal products. Should have a BSEE plus minimum of two years logic design experience working with microprocessors and digital circuitry. Assignments include peripheral interface design, telephonics communications, graphics and color terminal design.

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Positions require BSCS/BSEE and minimum one year experience in assembly level Z80 and/or M68000 programming. Assignments in computer terminal and small system development involving personal computing and CP/M operating system, graphics and CRT control, communications, I/O control, LAN and PDN development plus other challenges at the forefront of microprocessor system application.

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The Corvallis, Oregon office of CH2M HILL, an employee-owned, multi-discipline consulting engineering firm with offices throughout North America and overseas, has career opportunities for Systems Programmers/Analysts.

Positions require BS in computer science. Experience in VAX, DEC-10 or DEC-20 operating systems preferred.

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Naval Postgraduate School salaries are nationally competitive. Minimum qualification is either a Ph.D or D.B.A. in a major in Information Systems or a closely related doctoral degree (e.g. accounting computer science) with some industrial or governmental experience in Information Systems. ABDs will be considered if all requirements for the doctorate will be completed by September 1984. Please send resume to Professor Norman F. Schneidewind, Code 54Ss, Naval Postgraduate School, Monterey, CA 93943 or call (408) 646-2719 or (408) 646-2211. Equal Opportunity Employer.

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Duties include systems software installation problem determination and resolution, application programmer support and system environment documentation.

Candidates must have extensive experience in ASSEMBLER and COBOL, thorough knowledge of DOS operating systems, a general knowledge of data base management concepts and an ability to communicate well with all levels of City Management. Ref. DP-3-04. Applications must be received by Nov. 30, 1983.

For further information and to request an application, please call:

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Banking Analysts—Management Potential. Large Florida statewide bank seeks Banking Analysts for its latest IBM state-of-the-art data center. Continuing formal training programs provide excellent management promotion opportunities. Bankers with programming, analysis, project leadership, systems programming, or data communications experience preferred. To $34,000

Manager of Systems and Programming—On-line Environment. Growing Florida company with over $300 million in sales seeks an aggressive Manager to take over 12-person department. CICS, VTAM experience preferred. To $38,000.

Programmer Analyst—Learn CICS. Miami based firm seeks a professional to work in its state-of-the-art IBM 4341 DOS/VSE environment. Two years of COBOL programming experience preferred. CICS training provided. To To $25,000.

Programmer Analysts—Project Leader Potential. Large Florida financial institution seeks Analysts for both its Miami and Tampa data centers. IBM DOS/VS, COBOL, BAL environment offers career path leading to Project Leader. To $25,000.

Consultants—Programmer Analysts. A major division of a communications utility has moved to Orlando and requires multiple Programmers with heavy experience in IMS DB/DC and PL/1. To $40,000.

Programmer Analysts—Banking. Leading Florida financial institution seeks professionals to work in its state-of-the-art IBM environment. Excellent internal training program provided. To $30,000.

Consultant—Big 8. Prestigious Big 8 CPA firm seeks experienced computer professionals for its Southern Florida Management Advisory Services Group. Broad business experience a plus. Excellent growth opportunity. To $34,000.

Programmer/Analysts. Major Florida financial services organization has an excellent opportunity for experienced IMS DB/DC Applications Programmers. Excellent internal training program. Suburban location. To $32,000.

System Programmer. South Florida-based corporation with newly installed IBM 4341 seeks a DOS/VSE Systems Programmer to become its resident expert. To $32,000.

Series 1—RPS Analyst. Atlanta-based company seeks an experienced Series 1 RPS professional to develop a new point of sale network. Company has purchased 1000 Series 1 units to implement this dynamic project. Position requires two years programming experience in an RPS environment. To $28,000.

Data Base Sales Representative—Move up to Branch Manager. Rapidly growing manufacturer of intelligent data base machines seeks a proven sales professional to start and manage an Atlanta branch. Excellent growth opportunity. Estimated first-year earnings $60,000 with a $40,000 base salary.

Software Sales Representatives. International manufacturer of CPA industry software with 2000 installations in all 50 states is expanding its Atlanta sales force. Position requires two years of quota measured sales experience with small business computers and a general knowledge of fundamental business financial applications. First year compensation to $65,000

IMS Applications Analysts—Will Relocate. Prestigious Atlanta software development organization needs IMS DB/DC Analysts for a major national project. Join a very professional peer group and enjoy a complete relocation package to metro Atlanta. Two years of specific DB/DC expertise sought. To $37,500.

Banking Programmers and Analysts. One of Atlanta's largest financial institutions seeks professionals to design and implement a major ATM project in an OS/MVS, TSO environment. Team members will work directly with top management to define, plan, schedule, and implement this dynamic system. One year of banking data processing experience needed. To $34,700

Communications Specialist—Super Benefits. Atlanta division of a world renowned manufacturer of aircraft is increasing its technical support staff in communications. Three years of installation and maintenance of ACF/VTAM, ACF/NCP and BYSYNC SDLC helpful. Network planning and debugging is preferred. Benefits include a complete relocation package and comprehensive fringe benefits. To $40,000

Consultant—Partner Potential in National CPA Firm. Firm with heavy concentration in medium-sized client firms seeks a DP Consultant to expand its Atlanta practice. Bachelor's degree, excellent communications skills, and a broad industry reference base support. Will gain a broad exposure to a variety of computer hardware applications. Career path to partner. To $37,500.

CICS Analysts—Move into Development. Well-known Atlanta-based service organization is increasing its Analyst staff to implement a major on-line development. Career growth opportunity provides "blue chip" benefits, top salaries, internal education and a recession-proof industry. Two years CICS applications work in a medium to large scale IBM environment sought. To $32,000

IBM Applications—Train for DBA. Major southeastern service firm is offering the right professional a career path to Data Base Administrator. Will join two current DBAs in a major relational data base endeavor. Two years of heavy IMS applications experience and good communications skills sought. Beautiful surroundings in South Carolina and a complete relocation package are included. To $32,400.

Manufacturing Systems Analyst. South Carolina manufacturer of heavy equipment seeks an Analyst who understands and relates to manufacturing users. Three years of manufacturing background in an IBM OS environment needed. IMS DB/DC knowledge, MRP and Process Control are definite pluses. Nice rural location close to a major suburban vicinity. To $34,000

Louisiana, Mississippi

Senior Manufacturing Systems Analyst—High Visibility. Fortune 200 corporation requires degree plus 5 years experience with a background in directing the analysis and design of large-scale manufacturing applications. Data base environment, excellent corporate exposure, very prestigious firm in New Orleans. To $37,000.

IDMS System Analyst. Join the processing shop of one of the leading international engineering companies based in New Orleans. Position offers IDMS on-line development of financial and engineering applications. Current technical expertise in OS/MVS, IDMS and COBOL skills sought. To $36,000

UNIVAC 1100 Programmer Analyst—Excellent Relocation Package. Major manufacturing company, based in New Orleans, seeks Programmer Analyst for their UNIVAC 1100/83. DMS and COBOL environment. To $30,000.

Senior Real-Time Systems Analyst—New Orleans. Major NYSE corporation requires person with six or more years in the design and documentation of real-time operating software, with knowledge of data base management software and techniques. Large-scale R/T installation experience a plus. To $42,000

IMS Systems Programmer. Multi-state organization based in New Orleans requires two years experience in the installation, maintenance and tuning of, IMS DB/DC software. Multi-processor state-of-the-art environment moving to, OS/XA. To $38,000

Senior systems Analyst—New Orleans. Major IMS shop seeks a Senior System Analyst with five years experience in data base, financial systems and PL/1. Good problem solving ability and affords excellent career opportunities. Outstanding relocation package. To $36,000.

Scientific/Engineering Analyst. Fortune 100 New Orleans company seeks HP1000 real-time experience, using FORTRAN in a process control environment. Excellent fringe benefits and relocation package to New Orleans. To $32,000

IMS Systems Analyst—Oil and Gas. Prestigious southeastern headquarters of oil and gas corporation seeks Systems Analyst to participate in the development of on-line IMS-DB/DC oil and gas production reporting system. New Orleans. To $36,000

Texas, Oklahoma

Programmer Analysts—New DB/DC Projects. Corporate staff of a rapidly expanding Dallas Fortune 500 organization seeks experienced professionals with strong OS COBOL background. All applications projects are new and involve IMS DB/DC. To $29,000.

Systems Analyst—Exposure to Senior Corporate Management. Large financial services organization seeks Internal Systems Consultant. Banking systems background preferred. To $30,000.

Director Systems Development Firm. $2 billion firm seeks an accomplished Manager to direct development efforts of three Managers and 50 professionals. IBM experience preferred. Good communications and people skills required. Dallas location. To $55,000.

Microcomputer Development—Unique Projects. Worldwide company based in Dallas seeks several Microcomputer Systems Software Programmers to participate in leading edge commercial systems. Will use Intel 8086 with Assembler Language. To $36,000.

CICS Systems Programming Manager—Worldwide System. International organization in Texas with worldwide network seeks individual to supervise IBM technical support people. Data center composed of IBM 3033, Amdahl 470, MVS, JES 3, CICS, ACF/NCP/VTAM. To $30,000

Regional Sales Manager—Turnkey Financial Systems. National computer products firm seeks a current Sales Manager based in Dallas to direct sales efforts for multistate area. Minicomputer background preferred. Base salary to $40,000

ACP Programmer. Successful, Dallas-based airline seeks experienced ACP/PARS Programmers to participate in new development. Group will expand 100% over next 12 months. To $38,000

Systems Software Development—Operating Systems. Acknowledged leader in software packages seeks a professional to develop software for use by Systems Programmers. IBM ALC or systems software experience required. Dallas location. To $36,000.

IMS Programmer Analysts—Rapid Growth. An expanding Houston financial institution is adding to staff due to increased market activity. They seek several individuals with banking application development experience with IMS DB/DC exposure. To $35,000.

Lead Development Analyst—Relocation Package. Outstanding opportunities are available to participate in a major software development effort with this Houston-based firm. Three-plus years of COBOL or FORTRAN experience using PRIMOS sought. Will provide relocation assistance. Rural location. To $42,000.

Software Designers. State-of-the-art developer of mini/micro software products is rapidly expanding and is in need of experienced design specialists with experience in UNIX & C. Houston location. To $50,000.

Senior Database Analyst—High Visibility. Progressive Houston-based firm seeks senior with IDMS skills. Opportunity for great management visibility. Will be groomed to direct the activities of the DBA team. Heavy IDMS DB/DC skills required. To $41,000

Project Leader—Gain New Exposure. A rare opportunity to join a company at the ground floor is available in the North Houston area. Will be a member of a team developing new software for the hospital industry using a new relational database product. Recent industry experience using PCS, SHAS, etc. is required. To $43,000.

Senior Programmer Analysts. Major energy corporation in Houston is expanding its database development staff. Solid COBOL and IDMS or IMS skills combined with analysis and design experience sought for these very visible opportunities. To $36,000

Sales Representative—Growth Company. Developer of a mini/micro based database management system is seeking a career-minded individual to expand its Houston staff. Experience selling relational or hierarchical database products and a desire to be the best are required. $60,000 package.

Supervisor—Consulting Services. Expanding practice of a management consulting company is seeking a proven performer. Beautiful Austin-based location. To $40,000.

Data Base Analyst—IMS Design. Will provide technical support both internally and to clients of the leading financial software firm. Currently developing entirely new version of industry leading packages. Beautiful Texas hill country location. To $42,000

Programmer/Analyst—Four-Day Week. State-of-the-art IBM environment, including IMS DB/DC. This is a new systems development. A four-day work week permits you to enjoy the South Texas sunshine. To $34,000

System Programmers. Two new IBM OS environments are seeking Systems Programmers with MVS internals experience. VM or CICS experience a plus. San Antonio Area. To $40,000

Programmer/Analyst. Two or more years insurance systems experience. IBM environment in a fast-growing, Austin-based company. To $30,000.

Communications Specialist. IBM specialist needed with skills in SDLC/SNA. Challenging growth area of the company. San Antonio location. To $40,000.

Scientific Systems Developers. CAD/CAM vendor in beautiful area of South Texas needs several good FORTRAN Systems Developers. Experience in placement or routing of circuit boards helpful. To $40,000

Programmer Analyst—Energy. Large petroleum corporation with headquarters in Tulsa seeks a professional with two years of OS COBOL and accounting applications experience. CICS and IDMS experience preferred. To $30,000

Systems Programmers—Learn MVS. Oklahoma corporation seeks qualified Systems Programmers with a minimum of three years experience as a Systems Programmer. State-of-the-art environment. To $45,000

Programmer Analysts—Data Center Expansion. Manufacturing corporation with headquarters located in a Tulsa suburb seeks Programmers for its small but growing data processing center environment. Three years experience with CICS and DOS/VSE background required. To $32,000

Programmer Analyst—New Development. Industry leader located in rural Oklahoma seeks a professional for its DOS/VS and CICS environment. One year of DOS COBOL experience and financial applications experience required. To $34,000

Programmer Analyst—Unique Benefits. Major transportation corporation seeks professionals with PL/1 coding experience and IMS applications. Tulsa location. To $35,000.

EDP Auditor—New Position. Rapidly expanding Tulsa corporation seeks a professional with a minimum of one year EDP auditing experience. To $30,000

Marketing Representative—Management Potential. Major national corporation located in Tulsa seeks an experienced data processing Marketing Representative to cover a large, lucrative territory. Career path leads to sales management. Estimated first-year earnings $45,000.

DBA—Ground Floor. Oklahoma based corporation seeks a professional for its state-of-the-art IBM data center. A minimum of three years IDMS design experience required. To $45,000.

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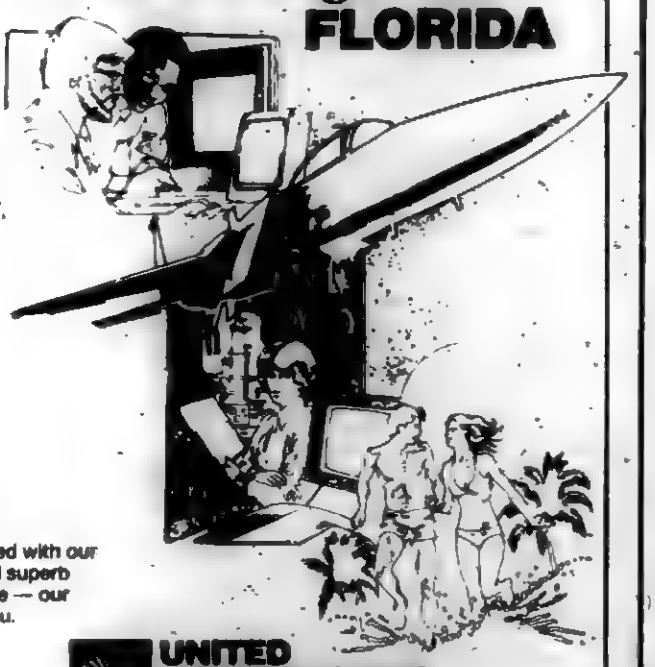

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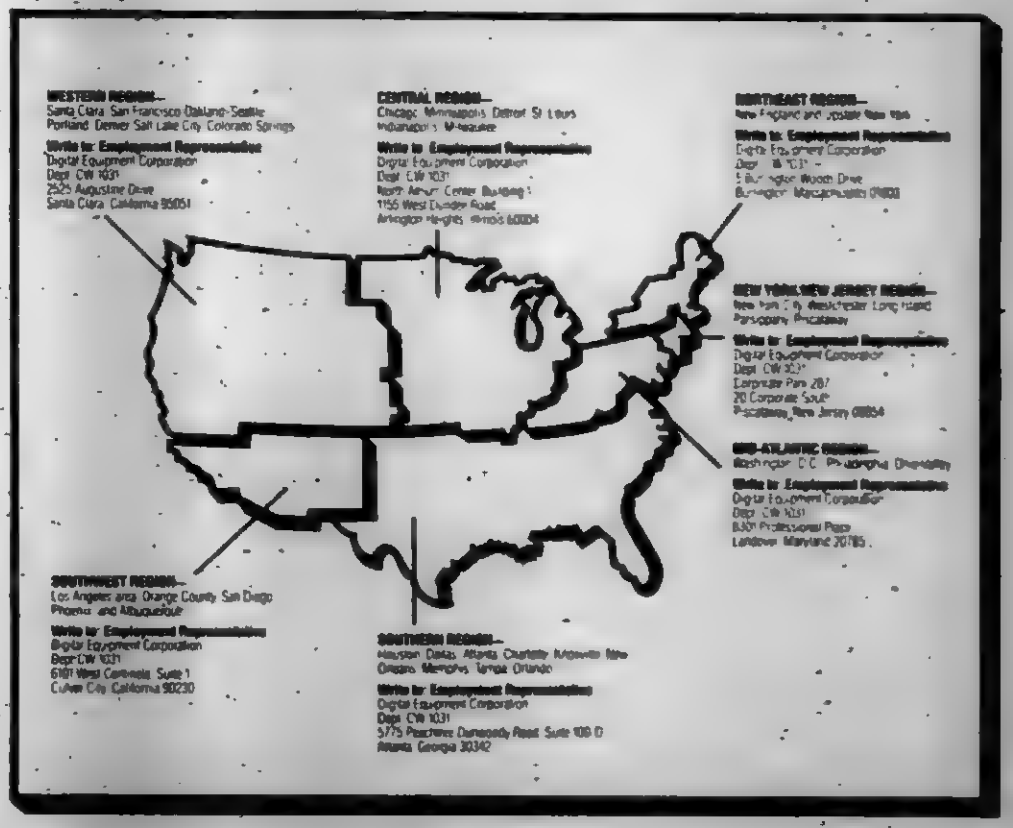

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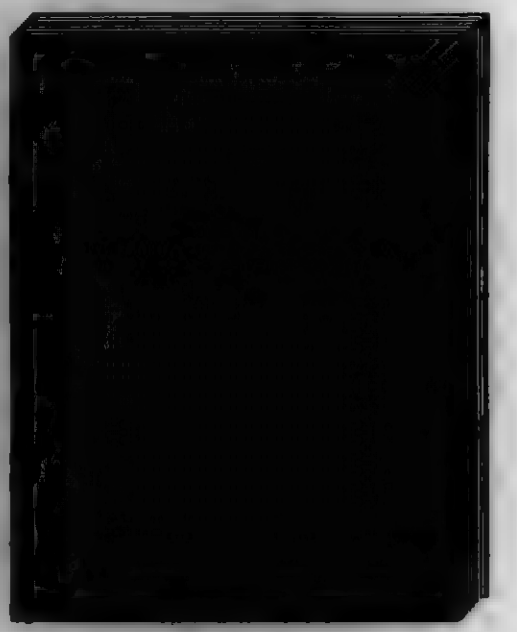

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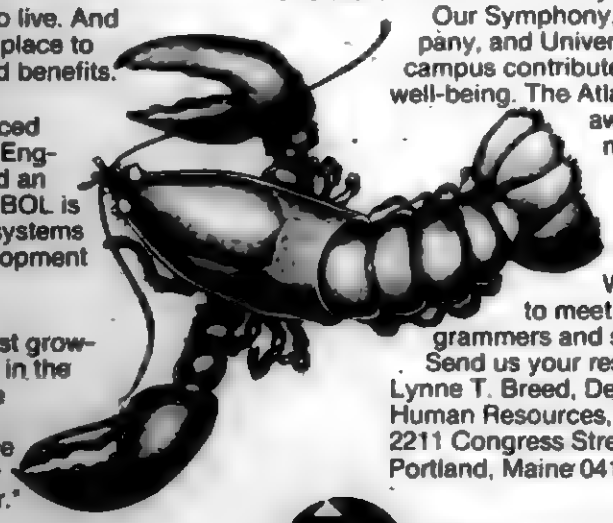

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To explore one of these opportunities, call Bob Tyler at (408) 746-6190, or send your resume to his attention at Amdahl Corporation, MS-300, Dept. 11-218, P.O. Box 470, Sunnyvale, California 94086. We are an equal opportunity employer through affirmative action.

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GTE, as a world renowned leader in the development of C^3 and C^3I systems technology, has been charged with the mission of developing a system that will stand up to the toughest challenges ever conceived for an information system. A system that will lead the way for technology well into the next century.

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Qualifications: 3-5 years' experience selling computer software systems; solid understanding of IBM environment and marketplace; DBMS experience desired.

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Responsibilities: Pre- and post-sale support for **Model 204** DBMS within our Federal Systems Group; pre-sales presentations; analysis of user requirements, benchmarks, customer training and installation.

Qualifications: Solid experience in IBM systems/applications software with emphasis on operating systems, database and teleprocessing.

Positions available in New England; Connecticut; New York City; New Jersey; Washington, DC; Rochester; Pittsburgh; Chicago; Dallas; Los Angeles; San Francisco.

INTERNATIONAL SALES

Responsibilities: Sales and marketing support for **Model 204** international affiliates. Prepare and implement sales and marketing strategies; monitor and report sales progress; coordinate technical consultant support efforts and develop new affiliate relationships.

Qualifications: Minimum 3 years' experience selling systems software in an IBM environment, preferably in the international marketplace.

INTERNATIONAL TECHNICAL CONSULTANT

Responsibilities: Pre- and post-sale support for **Model 204** DBMS; pre-sales presentations; analysis of user requirements, benchmarks, customer training and installation.

Qualifications: Solid experience in IBM systems/applications software with emphasis in operating systems, database and teleprocessing.

Positions involve international travel including Japan, Australia and Europe.

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Responsibilities: Complete responsibility for all aspects of customer education including budgetary and personnel concerns; plan, coordinate and control coursework development; materials preparation and distribution and class offerings in CCA Education Centers and at customer sites.

Qualifications: Management, course development and teaching experience; knowledge of instructional techniques and presentation skills, knowledge of IBM mainframe systems and DBMS experience preferred

Positions available in Cambridge, MA and Denver.

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Responsibilities: Conduct **Model 204** education classes in CCA Education Center or on-site customer locations; assist in development of course material; provide hot line and on-site technical support to customers, assist in contract consulting/programming

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Responsibilities: Plan, design, produce and maintain customer classes covering all aspects of **Model 204** DBMS and related CCA products including class handouts, video presentation materials and teachers' notes

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SENIOR PROGRAMMER ANALYST—Minimum of 5 years experience including systems analysis, system design, COBOL, CICS and Data Base applications; and project leadership.

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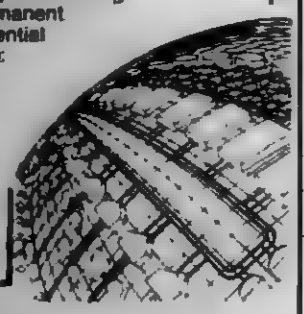

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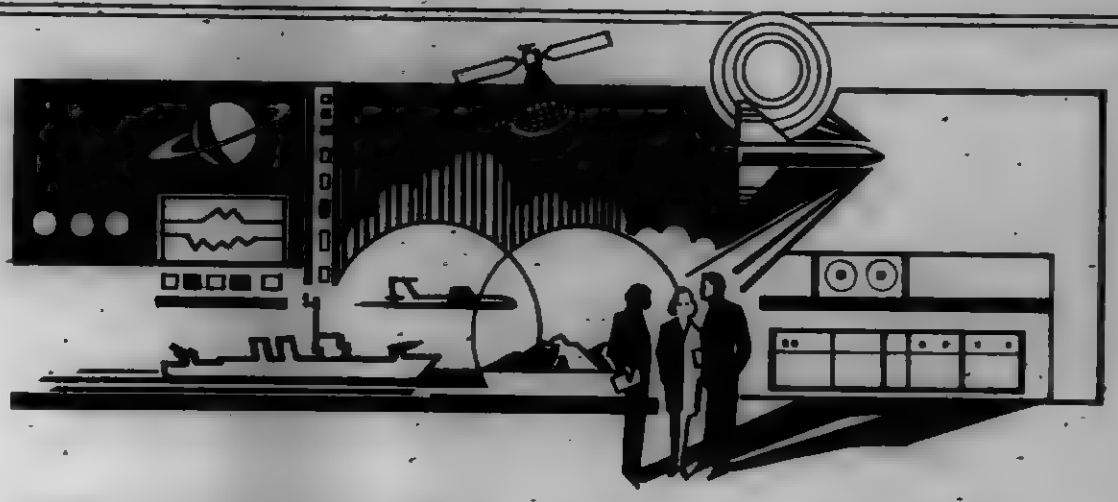

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OFFICE AUTOMATION/ INFORMATION PLANNING EXPERT

The National Cancer Institute (NCI), National Institutes of Health, Public Health Service, is seeking a professional to establish an organizational unit to provide planning, developmental, and management support to the Office of the Director and the five operating divisions in the area of office automation and information planning (OA/IP). The Institute is the lead Federal agency in cancer research and is responsible for coordinating the National Cancer Program. Its mandate includes both basic and applied research programs related to the understanding of the causes of cancer, and improvements in detection, diagnosis, treatment, and rehabilitation.

The objective of this effort is to improve the efficiency and the effectiveness of Institute operating systems. With a budget of approximately 1 billion dollars, the Institute reflects a complex management system with the possibility of major gains in efficiency by appropriately incorporating current and projected advances in office automation. The incumbent will be responsible for the initial staffing of the unit with Federal employees.

Applicants should have formal training in information management, computer science, engineering, management, or operations research as well as experience in OA systems design and selection, experience and training in data communications technology and application of OA technology (hardware and software). Experience in local area networks, federal procurement regulations and project management is desirable.

Qualifications:

Requirements: Formal training should include a BA in one of the following areas and at least 1 year of training in a second area listed: information management, computer science, engineering, management science, and operations research.

At least five years total recent "hands on" experience in the following two areas is required:

- systems analysis, design, and selection for information or OA systems
- OA technology applications including hardware, software, and data communications aspects

Experience in local area networks, federal procurement regulations and project management is desirable.

The position of Expert has a duration of 2 years. The salary range will be $48,553–$63,115 depending on the expertise and experience of the individual selected for the position. The applicant selected will be covered by Civil Service Retirement and will be eligible for life insurance and health benefits.

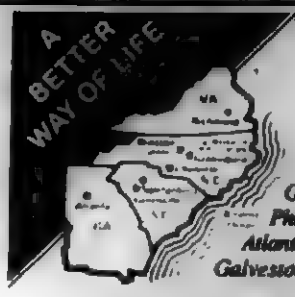
The position is located at the NIH Campus in Bethesda, Maryland.

NIH is an equal opportunity employer.

Interested persons should submit a SF-171 (Personal Qualifications Statement) by January 3 to:

Ms. Valerie Berlew
Personnel Management Branch
National Cancer Institute
Building 31, Room 3A23, 9000 Rockville Pike
Bethesda, Maryland 20205

If additional information is needed, please call Ms. Berlew at 301/496-6864.



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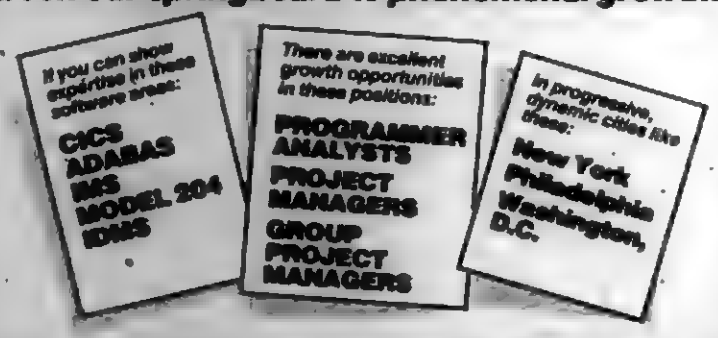

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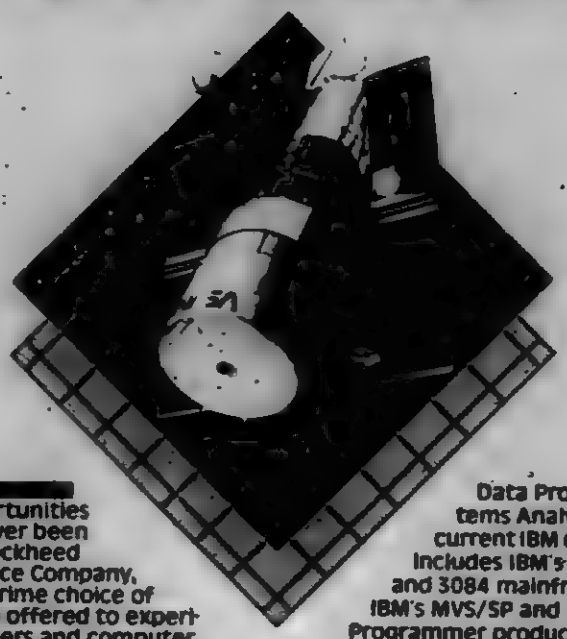

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DEC Systems Engineer

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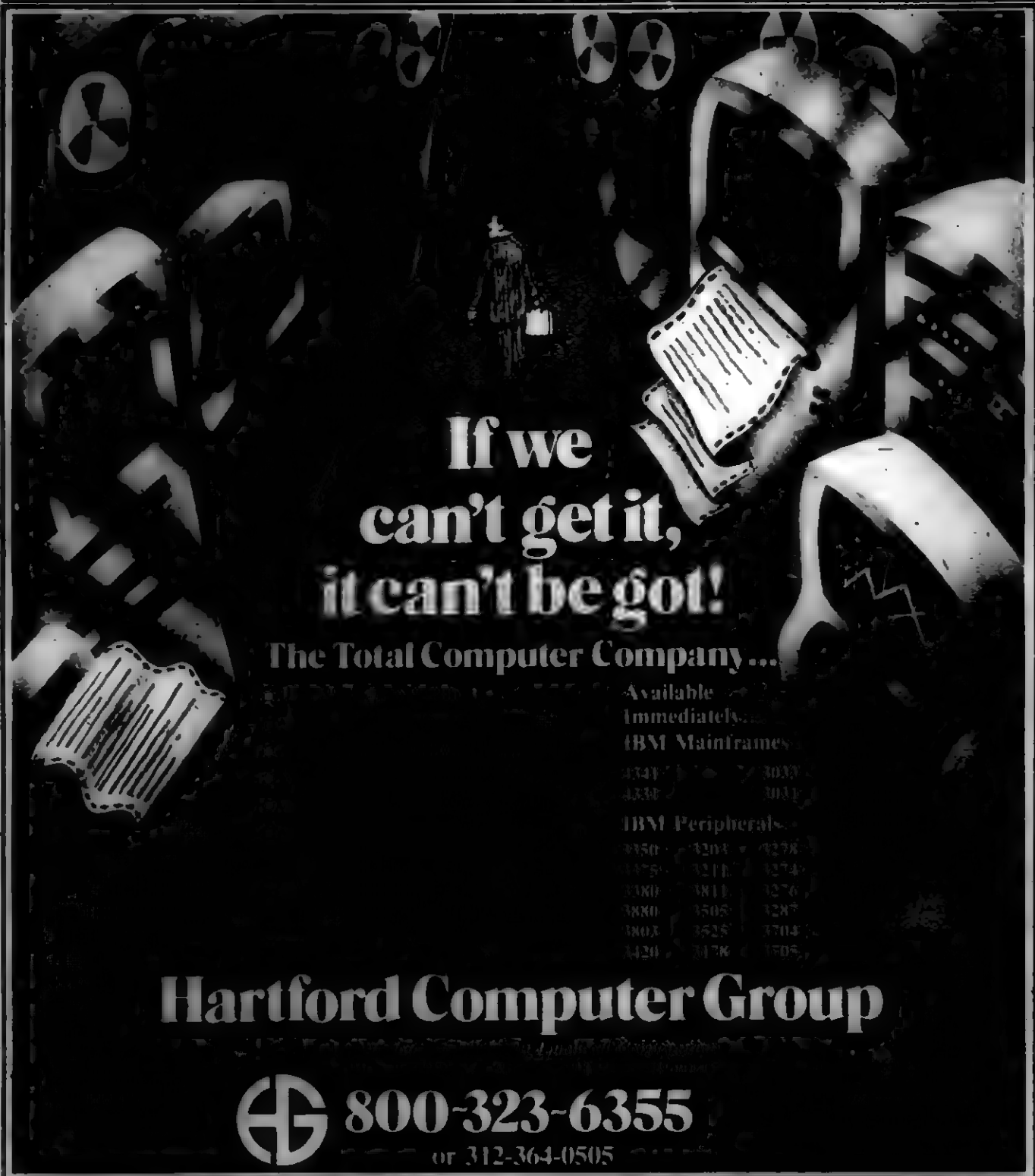

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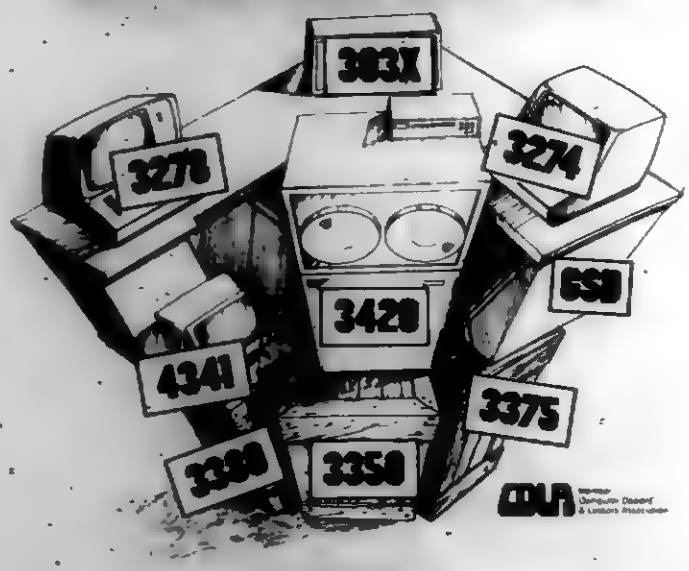

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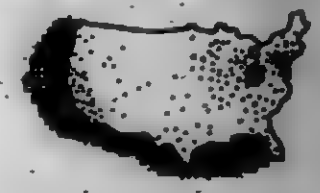

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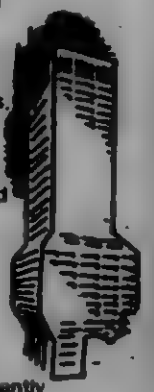

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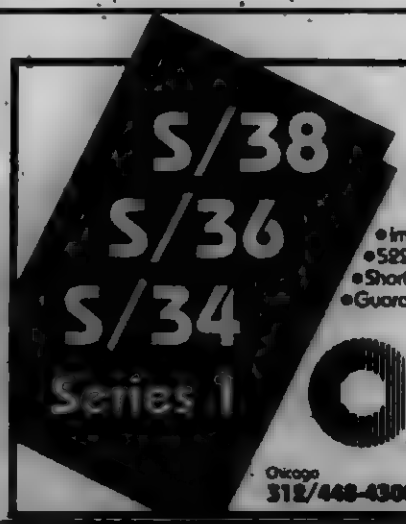

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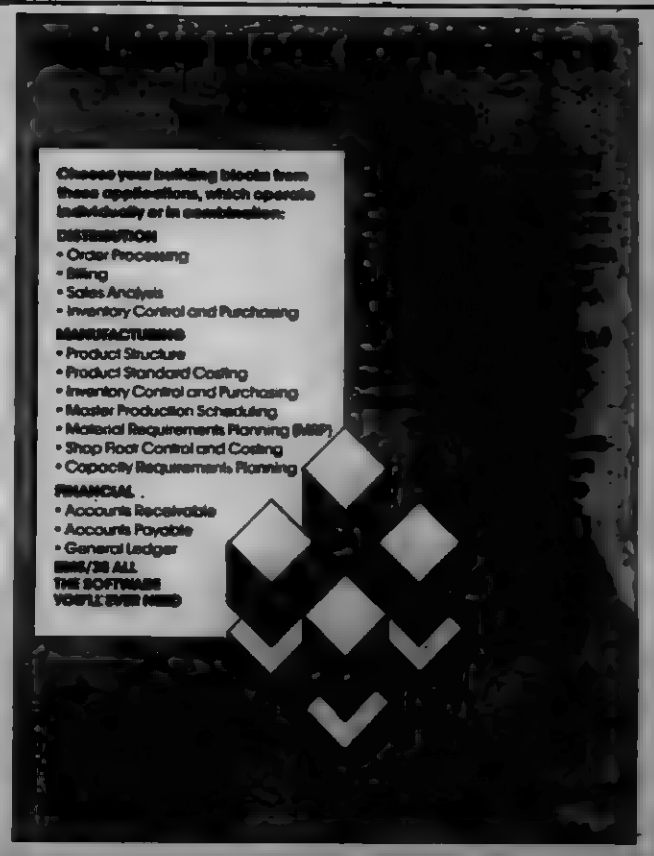

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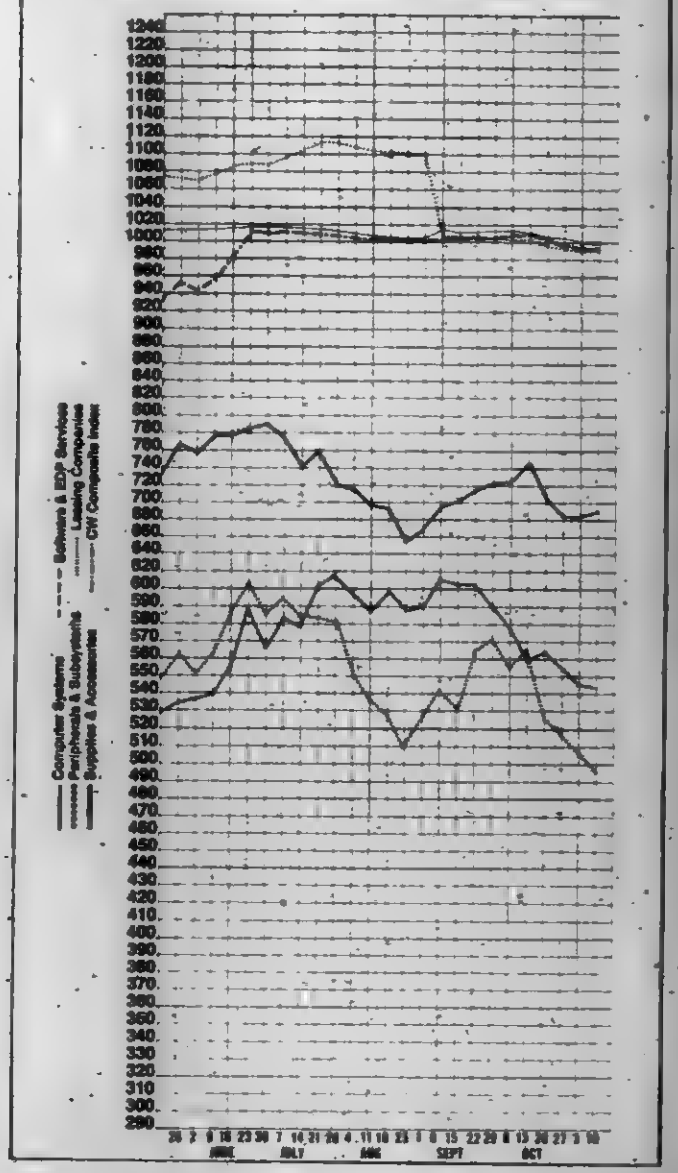

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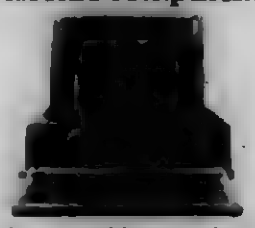

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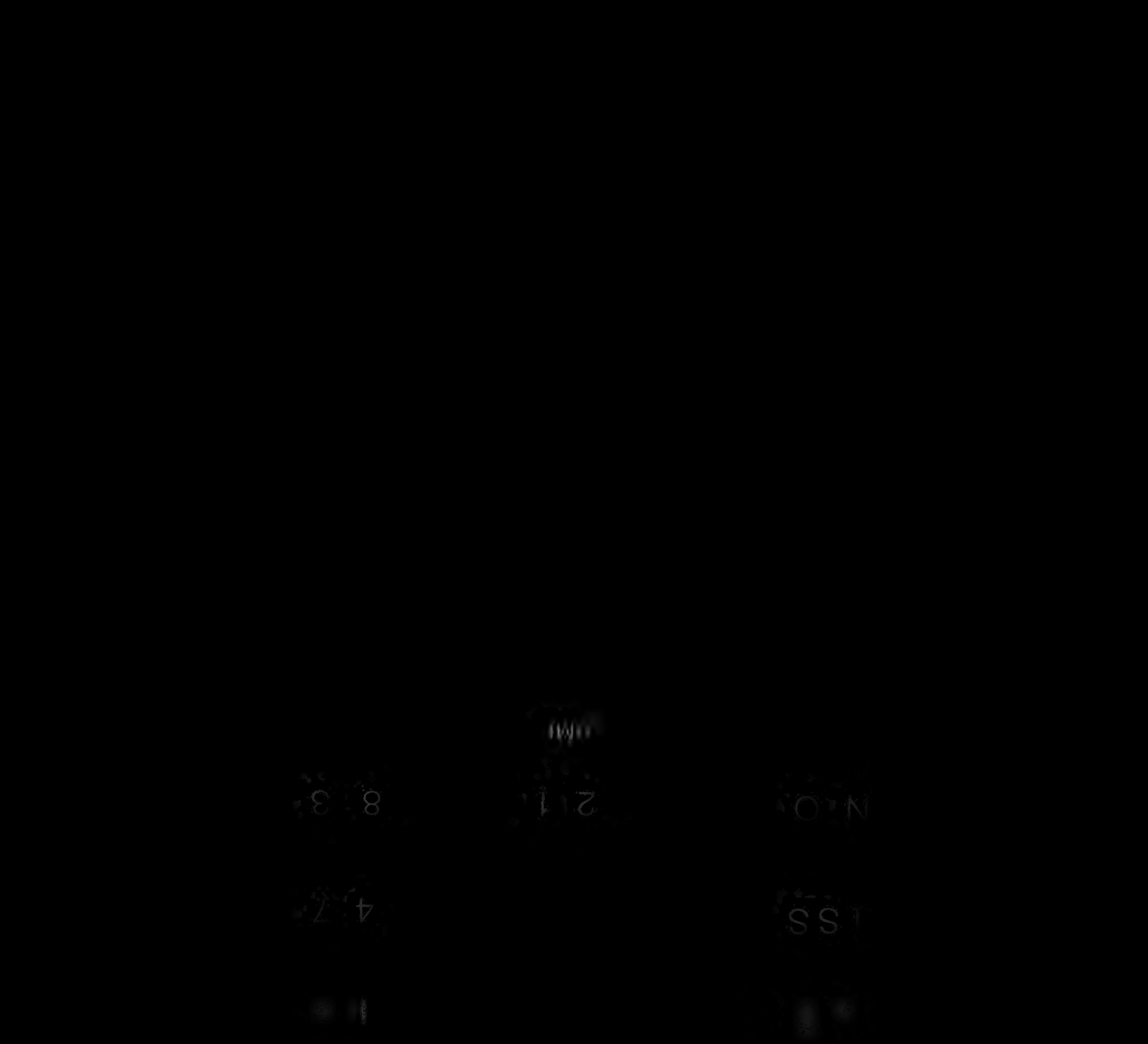

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West Germany Seizes VAX Believed En Route to USSR

By Peter Bartolik
CW Staff

A top-of-the-line Digital Equipment Corp. superminicomputer allegedly en route to the Soviet Union was seized by West German authorities just minutes before it was scheduled to leave their jurisdiction, U.S. authorities reported last week.

The seizure comes during bitter debate in the U.S. over renewing export regulations.

According to officials of the U.S. Treasury Department and the U.S. Customs Service, West German authorities waiting at dockside in Hamburg received court authorization to seize the VAX-11/782 from a Swedish cargo ship just seven minutes before it left for Sweden on Friday, Nov. 11. The ship was slated to travel on to the Soviet Union, where the computer allegedly would have been delivered.

Customs agents stationed overseas reportedly learned the equipment was destined for the Soviet Union and initiated the seizure procedures. One West German court refused to issue the seizure order but was overturned by a higher court, the U.S. officials said.

The DEC superminicomputer, which is embargoed by the U.S. government from shipment to communist countries, was reportedly purchased by an unidentified firm in New York for shipment to an affiliate company in South Africa; at some point it was diverted to Hamburg, West Germany. Officials could not say whether the computer was ever delivered in South Africa or whether it was diverted during shipment from the U.S.

According to a U.S. Customs spokeswoman, the VAX-11/782, composed of dual VAX-11/780s, was equipped with 4M bytes of memory and was valued at $1.5 million to $2 million.

John M. Walker Jr., assistant secretary of the treasury for enforcement and operations, said the unit can be used for military applications. He also said it was unclear whether the

(Continued on Page 9)

NEWSPAPER

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper

Second-class postage paid at Framingham, Mass. and additional mailing offices ©1983 by CW Communications/Inc.

$1.50 a copy; $44/year

November 21, 1983

Vol. XVII, No. 47

Inside

IBM wants up to $2.5 billion in damages from National Semiconductor Corp. and National Advanced Systems, Inc. for allegedly helping Hitachi Ltd. to steal IBM trade secrets. **Page 2.**

• • •

Rolm Corp. unveiled a successor to its CBX telephone and data switching line — a high-speed digital communications system that can support up to 10,000 voice and data users. **Mohawk Data Sciences Corp. was also active last week;** it introduced workstations and communications processors for IBM 3270 sites. **Page 4.**

Data General Corp. positioned itself several bytes above the rest of the crowd by becoming the first vendor to use the 256K-byte memory chip in a commercially available processor. **Page 5.**

• • •

Charges have been dropped against Magnuson Computer Systems, Inc. co-founder Paul Magnuson and two associates, accused of computer crime and trade-secrets theft. **Page 8.**

• • •

The Reagan administration has failed to enforce privacy laws, the House Government Operations Committee charges in a recently issued report. **Page 15.**

• • •

DP professionals are not necessarily for sale to the highest bidder. Many will take a cut in pay in return for a position promising professional growth, according to two surveys. **Page 18.**

• • •

Users of small computer systems are less than pleased with the support they receive from computer vendors, especially in the area of software, according to a study just released by Input, Inc. **Page 83.**

• • •

Doling out dollars for employee ideas is not a new practice among computer firms, but it can be quite lucrative for both the employer and for the worker who trades his brainstorms for bucks. **Page 101.**

Bell DP Shop Takes Controversial Route In Rush to Meet Divestiture Deadline

By Paul Gillin
CW Staff

PISCATAWAY, N.J. — What do you do when you have a billion-dollar contract and billing system to implement, no previous experience in the area and a nearly impossible deadline that is set in stone by judicial mandate?

Faced with just such a problem last February, AT&T elected to use a fourth-generation language and data base management system rather than build the system in a traditional programming language. The decision was controversial, but AT&T's experience has indicated that high-level languages can be useful in a high-volume production environment where meeting deadlines is a top priority, according to Warren Sobelsohn, a manager in the Information Systems Organization at AT&T.

Called Mica, for the Mechanized Inter-Company Contracts Administration, the massive program now under development will track the more than 20,000 contract schedules that must be created to meet the requirements of the divestiture of AT&T, scheduled for Jan. 1.

The AT&T breakup requires that many facilities once owned by AT&T — such as land, buildings and equipment — be divvied up among the communications giant and its divested units.

"In the good old days, one switch could be used to call Alaska or to call your next-door neighbor," Sobelsohn said. "Since we can't throw all those switches away, we designate them to one company or the other. But somebody's got to pay somebody else for the use of those switches."

Mica will not only contain the expense and investment accounts for

(Continued on Page 6)

'Every time we'd start to get moving on something, the specs would change.'
— Warren Sobelsohn

DEC Unveils New Design In Successor To VT100

By Jim Bartimo
CW Staff

BOSTON — Digital Equipment Corp. last week introduced a new line of CRT terminals that it said costs less than its long-successful VT100 series, offers more features than its predecessor and sports a completely revamped design — including a detached keyboard.

Although the VT100s will remain in production for at least the next two years, the new terminals — the VT200s — are expected to replace them eventually. The VT200s are compatible with their VT100 predecessors which, with an installed base of about 500,000, have become an unofficial standard in communications.

DEC President Kenneth Olsen, who addressed the press conference here last week at which the VT200 line was announced, said his company has taken the same design approach it took with the VT100 series. "People wondered why we sold a terminal for more money than [our competition]," Olsen said. "But people appreciated the VT100, and [the extra functions] paid off in the long run."

The VT200 family includes three members: the VT220, the basic model; the VT240, which supports bit-mapped business graphics; and the VT241, which supports color graphics and text. All three emulate the VT100, but add reverse video, character highlighting and special function keys.

The keys on the 103-key keyboard are programmable. A total of 256

(Continued on Page 6)

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General-class postage paid at Framingham, Mass., and additional mailing offices. Computerworld (ISSN 0010-4841) is published weekly except February (5 issues), April (5 issues), May (5 issues), June (5 issues), August (5 issues), September (5 issues), October (5 issues), November (5 issues), December (4 issues) and a single combined issue for the last week in December and the first week in January by CW Communications/Inc. for IDG, 375 Cochituate Road, Framingham, Mass. 01701.

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Special requests should be addressed to Nancy M. Sherman, CW Communications/Inc. Box 880, 375 Cochituate Rd., Framingham, MA 01701. 0010-4841/82 $3.00 + $.50.

$1.00 a copy. U.S. — $60 a year. Canada, Central & So. America — $150 a year (surface). — $160 a year all other countries — $265 a year (airmail service). Four weeks notice is required for change of address. Please allow six weeks for new subscription service to begin.

POSTMASTER: Send Form 3579 (Change of Address) to Computerworld, Circulation Dept., Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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IBM Seeking $750 Million to $2.5 Billion In Damages From National Semi, NAS

By Jeffry Beeler
CW West Coast Bureau

SAN FRANCISCO — IBM will ask National Semiconductor Corp. and its National Advanced Systems, Inc. (NAS) subsidiary to pay up to $2.5 billion in damages for allegedly aiding Hitachi Ltd. in stealing the industry giant's trade secrets.

National Semi and NAS "got their hands on about a year's worth of IBM's research and development" while acting as Hitachi's "principal collectors" of stolen U.S. technology, according to IBM attorney Thomas Barr. As compensation for the disclosure of its purported trade secrets, IBM will seek damages ranging from $750 million to $2.5 billion, Barr said during a Nov. 15 hearing before U.S. District Court Judge Spencer Williams.

Announcement of the damage estimate brought a sharp reply from National Semi and NAS lawyer Fred Furth, who accused Barr of "using this courtroom to conduct a press conference" and of focusing on "irrelevancies." Furth disputed the opposition's repeated contention that National Semi and NAS received stolen IBM technology and reminded the court that neither defendant has ever been charged with any criminal wrongdoing in the case.

Barr's disclosure marked the first time IBM has publicly specified the damages it will request in its year-old civil lawsuit against National Semi, NAS and several other co-defendants. Filed in September 1982 in U.S. District Court, the suit was triggered by the discovery of a Japanese conspiracy to swipe documents containing some of IBM's most sensitive trade secrets.

In addition to National Semi and NAS, defendants in the suit included Tokyo-based Hitachi and 16 of its employees or alleged agents. Hitachi's involvement in the legal action ended last month when the Japanese vendor and IBM resolved their wrangle out of court. Provisions of the settlement purportedly include $300 million in secret payments to IBM and give the U.S. firm the right to scrutinize its Japanese competitor's new systems products for the next five years.

The civil suit took yet another turn last week when Barr appeared in Williams' courtroom and announced his intention to redraft IBM's original complaint to include specific damage figures and clarify some previously unspecified allegations. Barr expressed confidence that an amended suit could be filed "within 10 days."

Motion to Dismiss Denied

In other developments during last week's hearing, Williams denied a defense motion to dismiss the suit's charge that National Semi and NAS violated a federal racketeering act by receiving and transporting stolen IBM property.

The motion for dismissal originated with Furth, who also asked the court to drop the suit's third count, which accuses the defendants of engaging in commercial bribery, unfair competition and other offenses in violation of California law. Furth later withdrew the motion, however, after learning of Barr's plans to rewrite the original complaint.

"We don't want to argue [for dismissal of the third count] until we know what's going to be contained in the new suit," Furth told Williams.

Furth's comments came only about an hour after IBM itself moved to dismiss the complaint's second count, in which National Semi and NAS stood accused of violating a federal copyright-infringement statute.

The impetus for IBM's dismissal motion comes from the company's recent out-of-court settlement with Hitachi. "IBM has already been fully compensated by its agreement with Hitachi," Barr explained, and thus has no further need to pursue copyright-infringement litigation against National Semi and NAS.

During the hearing, Barr also informed Williams of a recent settlement of IBM's civil suit against NCL Data, Inc. and its president, Tom Yoshida, both indicted alongside Hitachi in the trade-secrets theft case. The out-of-court agreement was "modeled after the Hitachi settlement," the IBM attorney said, and contains basically the "same injunctive provisions."

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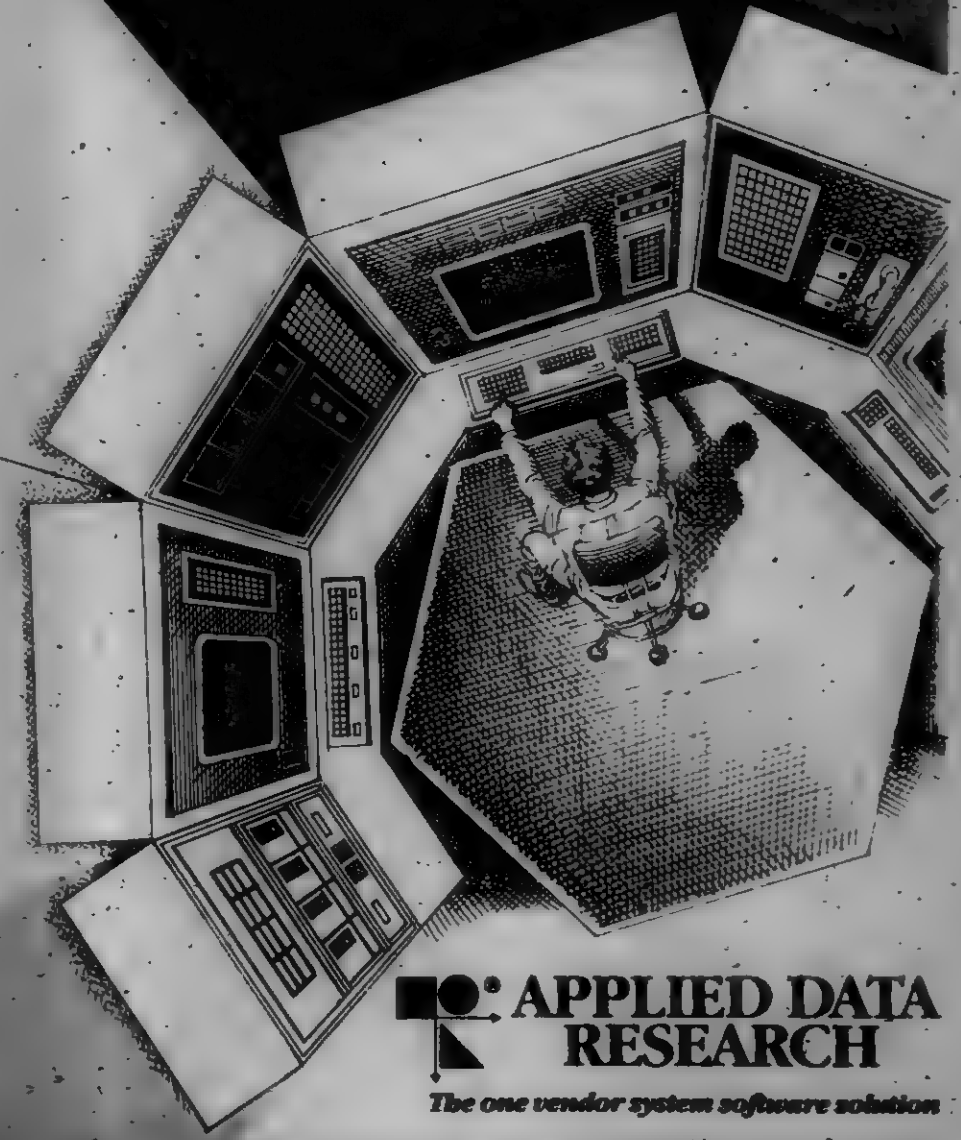

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Supports Up to 10,000 Users

Rolm Releases Business Voice/Data System

By Robert Batt
CW West Coast Bureau

SANTA CLARA, Calif. — Rolm Corp. last week unveiled an end-to-end, high-speed digital business communications system that can reportedly support up to 10,000 voice and data users at distances of eight miles or more.

The CBX II system can support individual user speeds of up to 64K bit/sec and is said to have a total communications-handling capacity in excess of 4G byte/sec. It is the successor to Rolm's current CBX telephone and data switching product line and is directly compatible with previous CBX hardware and software systems, a spokesman said, noting that current CBX users can upgrade to the new system.

CBX II operates with either a 16-bit Rolm 8000 or 32-bit Rolm 9000 processor. In a CBX II/9000 processor environment with several nodes, each CPU offers a packet network interface called the Control Packet Network for communicating with its peer processors in other nodes and for talking to specialized applications processors.

The CBX II, Rolm explained, is intended to be both a product and an architecture. When fully configured, it has enough bandwidth to switch 23,000 data channels of 192K bit/sec each or 3,000 nodes, depending on user needs. The nodes operate independent of each other and can connect users locally or at distances of more than eight miles using land-based and microwave communications links.

Rolmphones combine voice and data capability simultaneously over standard twisted-pair wiring.

Key Element

The key architectural element of the CBX II is a high-speed, parallel time-division-multiplexed bus called Rolmbus, which appears in two configurations: Rolmbus 74, in use with the present CBX system for the past few weeks, but officially announced last Thursday; and Rolmbus 295, the spokesman said.

Rolmbus 74, which provides 74M bit/sec of data capacity, is intended to fit into standard communications configurations and provides enough capacity to drive currently available voice and data devices. It offers 192 communications channels, each capable of supporting two-way communications at 192K bit/sec, according to the vendor.

Rolmbus 295, on the other hand, has a bandwidth of 295M bit/sec and is designed as a "travelling wave bus," meaning it can be configured to handle future communications requirements, the vendor claimed. The device can handle several successive signals at the same time, with the signal pulses sent through the bus in such a way that they do not interfere with one another. This portion of the Rolmbus can handle up to 17 directly connected devices.

Other elements in the total system architecture include:

- Inter-Node Link (INL), a non-blocking internode connection that is designed to permit extremely high bandwidth connection between nodes and is available only on systems equipped with Rolmbus 295. Up to 12 fully redundant INL links can be installed on any CBX II node, and they are most likely to be used to perform data swapping operations.
- Rolmlink, used to connect terminal devices to the CBX by providing a basic communications channel of 256K bit/sec bidirectionally from the CBX to the terminal equipment.
- Dynamically Allocatable Bandwidth, to handle devices that communicate at data rates faster than 192K bit/sec.

The CBX II with Rolmbus 74 is available immediately, the vendor said, and will be priced similarly to the old CBX line, with an average price per line of $800.

The Rolmbus 295 option will be available at the end of 1984 and will cost 10% to 15% more than the original CBX system.

In addition, Rolm said, current CBX users can upgrade to the full capacity of the CBX II at an approximate cost of between 15% and 20% of the original system price.

More information is available from Rolm at 4900 Old Ironsides Drive, Santa Clara, Calif. 95050.

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MDS Unwraps Personal Workstations, Communications Processors for IBM Sites

By Jim Bartimo
CW Staff

PARSIPPANY, N.J. — Mohawk Data Sciences Corp. (MDS) has introduced networked personal computer workstations and communications processors for IBM 3270 environments. When configured with the communications processor, the workstations can communicate with IBM mainframes and over public packet-switching networks.

The Super 21 communications processor and the Hero workstation allow the use of shared equipment and information in an IBM mainframe environment.

The Super 21 software supports all major data communications protocols and connects directly to an interactive IBM 3270 Systems Network Architecture (SNA) or 3776 remote job-entry network, an MDS spokesman said. It also supports Binary Synchronous Communications, Synchronous Data Link Control, X.25 and other protocols.

In addition, the Super 21 processor runs the existing MDS Intelligent 3270 software, which provides a link between locally active Super 21 programs and the central site, according to the vendor.

Users can write programs that permit remote workstations to access mainframe data, process and update it locally and return it to the mainframe.

The Hero workstation consists of a CRT display, keyboard and a modular processor that incorporates a 16-bit chip architecture and at least 256K bytes of random-access memory (RAM). The workstation's storage units are textbook-size and snap together for system expansion.

The workstation also incorporates two RS-232 ports with a modem controller that can be operated in both synchronous and asynchronous modes at speeds up to 19.2K bit/sec. It features an RS-422 port for cluster operations at speeds up to 1.8M bit/sec and a parallel printer interface, the spokesman noted.

The Hero's keyboard includes a 98-key standard typewriter layout and five key pads: one each for cursor control, status control, numeric input, page control and user-definable functions.

Support H/OS, MS-DOS

Finally, the workstations support MDS' H/OS operating system for multitasking capabilities and Microsoft, Inc.'s MS-DOS operating system Version 2. The screen can be split into multiple windows within an application — each with its own cursor — and scrolling can be performed in each window independently, the spokesman said.

The Hero is available in five models, while the Super 21 communications processor comes in four models. A typical entry-level system consisting of four workstations, each with 256K bytes of RAM, and one Super 21 processor with 5M bytes of disk storage, two communications ports and Intelligent 3270 SNA software costs about $22,550.

An expanded system, including 16 workstations and one communications processor with 60M bytes of disk storage, 512K bytes of RAM, two ports and SNA software will cost about $70,100.

The products will be available in the first quarter of 1984, MDS said from 7 Century Drive, Parsippany, N.J. 07054.

An MDS financial manager uses the Hero workstation to conduct a spreadsheet analysis.

DG Supermini Boasts 256K-Byte Chip

By Tom Henkel
CW Staff

WESTBORO, Mass. — Data General Corp. last week announced a 32-bit supermiticomputer that is reportedly the first domestic processor to use 256K-byte dynamic random-access memory chips and 2,000-gate logic gate arrays.

The Eclipse MV/8000 C, an OEM version of the 32-bit Eclipse MV/8000 supermini, is the result of a cooperative agreement between DG and its Japanese subsidiary, Nippon Data General.

DG last week also announced an array processing unit for the MV/8000 line, the Arrayplus 2000, and an OEM migration aid, which allows users of 16-bit architectures to move to the 32-bit MV/8000 C.

Not Complete System

The MV/8000 C offers roughly the same performance as DG's commercially available MV/8000 II. The MV/8000 C, which is only a central processor and not a complete system, is available in a 10½-in. rack-mountable unit.

The MV/8000 C, which has a maximum disk storage capacity of 5.6G bytes, offers 1M or 4M bytes of main memory. Only the 4M-byte version, however, uses the 256K-byte memory chips; the 1M-byte configuration uses 64K-byte memory chips.

DG developed the designs for the MV/8000 C domestically, but will manufacture the processor in Japan through Nippon Data General. Nippon Data General developed the processor boards for the system; the 2,000-gate logic gate arrays and 256K-byte memories, which are integrated into the system in the U.S., come from several unspecified Japanese suppliers.

A 1M-byte MV/8000 C costs $55,500 with DG's AOS/RT32 operating system. The 4M-byte version costs $85,500, including the operating system. Both systems are available in 120 days, DG said.

Array Processor

The Arrayplus 2000 floating-point array processor announced for DG's MV series processors was designed for imaging, modeling, simulation, signal processing and other scientific applications that require rapid computations of large blocks of data. Priced at $18,000, it will be available in 120 days, DG said.

The migration aid announced by DG last week is an OEM software product called Rdos Agent. It allows users of 16-bit DG Nova and Eclipse systems to write programs under DG's Rdos operating system, which is used on the MV series.

Rdos Agent was developed as a migration path from 16- to 32-bit architectures. Available now, it costs $3,000 for an initial license fee and $1,000 for subsequent licenses.

DG is located at 4400 Computer Drive, Westboro, Mass. 01580.

New Technology Offers Edge For Users

What does the new technology in Data General Corp.'s MV/8000 C processor mean to users?

For one thing, the use of 256K-byte dynamic random-access memory chips means the MV/8000 C takes up less space than its commercially available counterpart, the MV/8000 II, according to technology expert Howard Dicken, president of Scottsdale, Ariz.-based DM Data, Inc., a high-tech consulting firm.

DG said it was able to design the MV/8000 C to fit into a 10½-in. rack-mountable unit by eliminating four circuit boards from the system. This was done by reducing the system cache memory from four circuit boards to one, a DG spokeswoman explained.

Aside from taking up less space, the 256K-byte chips are expected to be more reliable because they employ newer packaging technologies.

Using 256K-byte chips is expected to be the most cost-effective way for vendors to build computer systems in the next one or two years, Dicken said. In fact, several vendors are currently working on final processor designs which incorporate 256K-byte memory chips.

Dicken was skeptical, however, that DG would be able to acquire the memory chips in sufficient quantities and cheaply enough to throw the MV/8000 C into full production. It will probably be at least a year before DG will benefit from a dramatic reduction in production costs resulting from using the 256K-byte memories, he said.

The use of 2,000-gate logic gate arrays in the MV/8000 C also appears to be an industry first, Dicken noted. Many firms have been using gate arrays, standardized chips which can be custom-configured to a vendor's specifications, but this appears to be the first time a vendor has used 2,000 gate chips.

IBM has been using 700 to 1,500 gate arrays for some time, Dicken pointed out.

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AT&T Rushing to Meet Divestiture Deadline

(Continued from Page 1)

each contract, but will generate bills based on usage. Sobelsohn estimated that first-year billings will exceed $1 billion.

When the Mica project began to take shape in February, the company considered hiring a contractor who proposed to develop it on microcomputers. The subsequent growth of the project would have made that decision "disastrous," Sobelsohn said.

The Information Systems Organization proposed developing Mica in-house using Ramis II, the fourth-generation language and DBMS from Mathematica Products Group, Inc. of Princeton, N.J. Within two days, two Ramis programmers put together a mainframe prototype and demonstrated it to the contract specifiers. "I have never seen a prototype work so easily," Sobelsohn commented.

The project was begun using Ramis in February. Working initially without specifications, a team of 12 programmers assembled the first release, incorporating an estimating module by April. The module contains costing algorithms that allow owners of the contracted equipment to input usage and expense figures. The program helps build the contract schedule data base from there.

As users began inputting test models, unanticipated needs arose almost immediately. "Every time we'd start to get moving on something, the specs would change," Sobelsohn said. "People who were coming on this from other areas had never seen it so busy."

A capability to handle revenues lost from early contract termination had to be incorporated. Other users discovered they needed a facility to handle accounting periods other than a year. The volume of changes required has warranted the division to issue "releases" rather than enhancements of the program, with four versions issued to date.

Acid Test

The acid test of Mica will come in early February, when the Information Systems Organization will dispatch the bills for usage in January, the first month of divestiture. With the deadline near, the developers are allowing owners of the contracts to build the data base as the project proceeds. Editing procedures are built in, and a number of reports are generated as the data base is being built to ensure accuracy, according to Sobelsohn.

Testing and revisions are also being made interactively. Updates are performed by a data base administrator using what Sobelsohn called "a nifty little batch facility for VM," developed internally at AT&T.

When completed, Mica will reside on a VM-based system at Information Systems Organization headquarters in Fairhaven, N.J. IBM MVS-based systems at user sites will run expense information and transmit it to Mica via Ttran, an AT&T proprietary data communications facility. The data will be used to update the Mica files, and a general billing file will be sent back to the user MVS sites via Ttran for local bill generation.

The capabilities inherent in fourth-generation languages have enabled the project to stick to its deadlines so far. "If we had had to use PL/1 with IMS, based on my experience, we would not have met the development schedule," Sobelsohn said.

In particular, he praised the ad hoc reporting capabilities of Ramis II, its ability to access various data bases and its flexibility for making changes on the fly. He also noted that various programmers have been transferred to and from the project and have been productive almost immediately.

However, "you pay some kind of price" for those capabilities. For all its flexibility, Ramis offers limited facilities for customizing procedures, Sobelsohn said.

For example, a table request against a whole file is performed by a Ramis macro. "It would be nice if we could get in it with our own hands," he remarked.

Inexperienced Users Building Bell's Data Base of Contracts

PISCATAWAY, N.J. — The data base of contract schedules that will make up AT&T's Mechanized Inter-Company Contracts Administration (Mica) is being built interactively by users, many of whom "have never seen a terminal before," according to Bob Sauer, a manager in AT&T's Information Systems Organization.

In response, AT&T system designers have built in extensive editing and prompting features to allow the data base to be created with little or no help from data base administration.

Mica relies heavily on menus, prompts and execs written in Ramis II, a fourth-generation language and data base management system from Mathematica Products Group, Inc. of Princeton, N.J., to guide users through data base creation and shield them from the underlying functions.

Users on remote terminals log on with an identification under IBM's VM operating system and are logged immediately into Ramis II, Sauer explained. Once in Ramis, all operating system commands are disabled and the user is presented with a menu of the functions which are available under his ID.

Ramis II execs are used to bring the user into data base creation or other menus. Users need not know Ramis II to add to or update the data base; a series of prompts leads the user through the process of entering chains of data.

Entries are edited in a Ramis II exec for range, value and lengths and table lookups and error messages are included. At any time the user can drop into an uncontrolled Ramis II environment to produce an ad hoc report. However, he cannot access CMS from that environment.

At the end of a record entry, a record management routine is automatically invoked to update the data base while the user proceeds onto the next record.

Response Time Problem

With more than 250 users authorized to create Mica data bases, response times have been a problem, Sauer admitted. Developers have cut down response times by using several Ramis minidisks on the mainframe. The concept is similar to a syslib, with each user having a unique ID for access to Ramis.

Although the size of the data base has created time problems, Ramis II has performed well, Sauer said.

"It's never been down because of bad data bases and we haven't lost any data bases," he noted. "It seems to handle most everything we want it to do."

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Successor to DEC's VT100 Offers Detached Keyboard

(Continued from Page 1)

characters can be stored in the terminal so that commonly used commands can be invoked with one keystroke, a DEC spokesman said.

The VT200s, which have more of the characteristics of DEC's personal computer monitors than the VT100s, look completely different from the VT100s. For example, the VT200s have a wedge-shaped monitor, like the monitor used with DEC's Rainbow personal computer. A nonglare screen is included, as well as a 60 image/sec screen refresh rate to limit the on-screen flicker that was common with the VT100.

The new hardware design also includes the detached keyboard, which features sculptured, matte-finished keys and an acoustic key click.

The VT200 uses a cursor-driven, menu mode selection process rather than the previous setup modes offered with the VT100. The menus are in English but can be purchased in German or French, DEC noted.

Other features of the VT200 include:

- CRT Save, a function that blanks out the screen image after 30 seconds to prevent images from burning out the terminal's phosphor. Data can reportedly be redisplayed by touching any key on the terminal's keyboard.
- A serial printer port and down-line-loadable character set, which is said to allow as many as 94 characters to be loaded into the terminal from the host processor.

DEC's next step will be to link the VT200 terminals with Xerox Corp.'s Ethernet local-area network, Olsen said.

Descriptions, Prices

The VT220 is a two-piece unit consisting of a monitor, detachable keyboard and 12-in. monochromatic screen. The screen can be purchased in standard black-and-white, green or amber, the DEC spokesman said, and will display 80- or 132-col. by 24-line display. It costs $1,295.

The VT240 is a three-piece unit consisting of the monitor, detached keyboard and system box. The 12-in. diplay features a screen resolution of 800 by 240 pixels that will display 80 or 132 col. by 24 lines. Two graphics planes allow for four levels of gray. The terminal will support DEC's Regis and Tektronix, Inc.'s 4010 and 4014 graphics protocols. It is priced at $2,195.

The VT241 also consists of three pieces — the monitor, system box and keyboard. It features a 13-in. color display with 800- by 240-pixel resolution and a display of 80 or 132 col. by 24 lines. Two graphics planes allow use of four colors out of a palette of 64. It is priced at $3,195 and supports DEC and Tektronix protocols.

All three VT200 terminals are available immediately. More information is available from DEC, 200 Baker Ave., West Concord, Mass. 01742.

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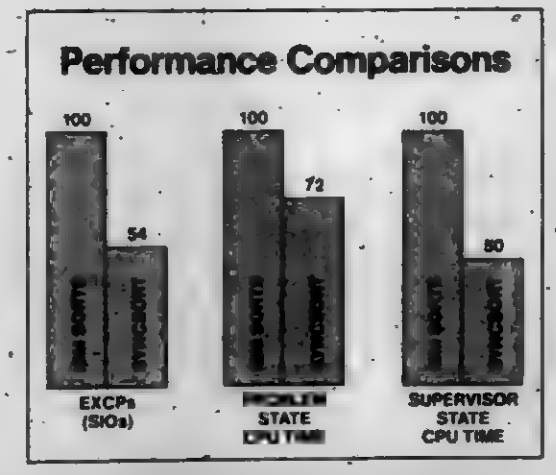

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Customs Agent Praises Vendors for Cooperation

By Peter Bartolik
CW Staff

While lobbying groups that represent high-technology vendors oppose more restrictive versions of the export act, vendors do cooperate with enforcement officials to detect sales to agents of Soviet bloc countries.

Groups such as the Computer Dealers and Lessors Association have lobbied hard against more restrictive regulations, claiming communist countries can obtain much the same equipment from vendors in friendly countries. One vendor believes cooperation results in "mutually acceptable" regulations.

In a recent interview with *Computerworld*, William Simmons, the U.S. Customs Service's special agent-in-charge of the Northeast District, said information is a key to interceptions. Since the beginning of Customs' Operation Exodus program in December 1981, "most of the good information has come from private industry. We have gotten tremendous cooperation."

Simmons' district, which encompasses New England and parts of the Canadian border, has made about 130 seizures valued at about $5 million since Exodus began. "We have agents who have met with most of the high-tech industry in the area, and we're doing that on a continuing basis," he noted.

The FBI's Program

The Federal Bureau of Investigation has a similar, less publicized program designed to blunt the more traditional type of foreign technical espionage. Begun in the late 1970s, the Development of Counter Intelligence Awareness (Deca) program is composed of agents in each of the FBI's 59 field offices who visit companies awarded classified government contracts "to raise their level of awareness," according to William Carter, an FBI spokesman in Washington, D.C.

The day before the recent seizure of the Digital Equipment Corp. VAX-11/782 superminicomputer in West Germany (story on Page 1), the assistant director of the FBI's Intelligence Division, Edward J. O'Malley, met with 30 executives from the greater Boston area in a closed-door "foreign counterintelligence awareness briefing." The discussion reportedly focused on the more traditional technology espionage, where spies attempt to obtain classified information from companies that have contracts with the U.S. government.

The meeting was arranged by and held at Prime Computer, Inc. in Natick, Mass. Prime would not name the companies who attended, but did say most attendees were either chief executive officers or top research and development executives, along with a few security executives.

The meeting was initiated by Prime as a result of its work with federal law enforcement agencies, according to company spokesman Joseph Gavaghan.

Prime has not taken a public position on renewal of the export act, but, according to Gavaghan, "believes the most effective way to protect from the loss of technology is to work closely with government agencies to develop mutually acceptable regulations."

Gavaghan said the company involves all phases of its operations in the issues of export compliance and works closely with law enforcement officials.

Number of Spies in U.S. on Rise, FBI Says

The number of officials assigned to the U.S. from communist countries has more than doubled over the past decade, and counterintelligence services here and abroad believe that roughly one out of three such officials is an intelligence officer — a spy, a pamphlet recently published by the Federal Bureau of Investigation contends.

A large number of business representatives, scholars and others visiting the U.S. from foreign countries are also working for or on behalf of their respective intelligence services, according to "The Unseen Conflict — Foreign Espionage Operations Against The United States." The pamphlet was published by the FBI's Intelligence Division "to heighten Americans' awareness of the presence and dangers of foreign intelligence efforts to obtain sensitive information," wrote FBI Director William H. Webster.

The pamphlet alleges "the central mission of hostile intelligence service officers" is to assess and recruit Americans as agents and "as middlemen to acquire technology that has been embargoed from export." Even if the recruit has no direct access to targeted material, he can be used as a "spotter" to provide personal data on Americans who do have access.

The pamphlet details several techniques, along with actual examples, for recruitment:

Financial: Tactics geared to exploit material needs are perhaps the most common and most effective means of recruitment, according to the FBI. "An intelligence officer will initially solicit innocuous material, responding with gifts or small sums of money, and then gradually attempt to acquire more sensitive information."

Blackmail: Seldom, if ever, employed within the U.S., according to the FBI, blackmail attempts are not uncommon when Americans tour the Soviet Union and other East European countries where "hostile intelligence services can play rough." Another tactic is the exploitation of situations where a targeted person has relatives in communist countries who can be pressured.

"False Flags": Intelligence operatives misrepresent themselves as citizens of countries friendly to U.S. interests or countries or entities to which a target is particularly sympathetic. In a case in the mid-1970s, an American of Armenian extraction was approached by an Armenian claiming to be a distant relative working with the Soviet Union to reclaim lost Armenian lands from Turkey; the target was reportedly duped into turning over classified material.

Ideology: Not used as frequently as in earlier decades, this tactic plays on the ideological beliefs of a target, such as one's desire to work for world peace, according to the FBI. One such target, studying in Europe in the mid-1970s, was talked into returning to the U.S. and seeking employment in a sensitive position; he was reportedly discovered.

Naivete: "An intelligence officer or agent in the role of a 'student' may urge an American 'colleague' that knowledge has no political boundaries or that the field of science is beyond politics," according to the FBI's scenario. "In the interests of scholarship and science, the American is encouraged to exchange the results of his research with a fellow member of the international community of scientists."

Magnuson Co-Founder, Associates Cleared of Trade Secrets Theft

By Jeffry Beeler
CW West Coast Bureau

SAN JOSE, Calif. — Magnuson Computer Systems, Inc. co-founder Paul Magnuson and two of his business associates have been absolved of any wrongdoing in a computer crime and trade secrets theft case dating back to late 1982.

Citing lack of evidence, a Santa Clara County Municipal Court judge dismissed all charges in the case against Magnuson and his codefendants, Samuel Dottle and Kevin Anderson. The dismissal, announced during a recent courtroom hearing, followed an admission by local prosecutors that the case's technical intricacies had led them to misconstrue the evidence against the defendants and charge the trio unfairly.

The roots of the case go back to a Dec. 2 criminal complaint that accused Magnuson of stealing technology from the firm that bears his name and transferring the information to Prodigy Systems, Inc., his latest start-up [CW, Dec. 13, 1982].

At the time, authorities suspected Magnuson of having gained unauthorized access to a Magnuson Computer Systems mainframe several months after he quit the supplier of IBM-compatible processors to devote his full energies to Prodigy. The break-in was believed to have netted the entrepreneur an estimated $100,000 worth of Magnuson Computer Systems trade secrets, including printed-circuit board layout data, an engineering change-order facility and a printed-circuit board design automation system.

Subsequent Investigation

During a subsequent investigation by the county sheriff's department, the proprietary Magnuson Computer Systems technical information was found to have been entered into Prodigy's central computing system, according to the complaint.

Since then, however, local law enforcement officials have reexamined the evidence in the case and have abandoned their belief that Magnuson and his codefendants acted criminally, according to the county's assistant district attorney, Douglas Southard.

The Magnuson Computer Systems technology in Prodigy's central system held little value for a competitor and found its way into Paul Magnuson's hands largely by accident, Southard said

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Embargoed VAX Believed on Way to Soviets

(Continued from Page 1)

equipment actually was unloaded in South Africa earlier in the year or remained on the ship, which had recently sailed from the U.S.

Published accounts from West Germany said the equipment was seized on a ship that called in South Africa and then continued on to West Germany.

The equipment may have been the most sophisticated unit ever seized during shipment, according to both Walker and Customs spokeswoman Chris Fraze. "It was certainly the largest and most expensive and highest in terms of state of the art," Fraze said.

The seizure of the sophisticated superminicomputer comes at a time when law enforcement officials are urging passage of a stricter version of the expired Export Administration Act and criticizing a House of Representatives-approved bill that they claim will weaken their means of preventing shipments such as the DEC unit. The House bill would provide for one-time licensing for multiple exports, as opposed to the current system of individual export licenses [CW, Nov. 14]; other versions of the bill would provide government agencies with greater authority to restrict imports.

Walker said the House version of the act would cut the export administration budget by one-third and would probably reduce the number of agents stationed abroad, who presently acquire valuable intelligence information. It would also allow inspections of outbound shipments only when there was prior information that a shipment could be illegal and would prevent Customs from following up investigations after seizures, he added. His department urges retaining the status quo of the previous version of the act.

In a recent speech, Commissioner of Customs William von Raab declared opposition for the House-approved version of the new export act. He pointed out that Operation Exodus, a two-year-old special interception program, has referred to the U.S. Justice Department 350 cases of illegal exports of high-tech equipment and actual weapons of war and has uncovered "wide gaps" in U.S. ability to safeguard strategic technology. "The Customs Service is involved in a number of lengthy and complicated investigations into conspiracies which, when they become public knowledge, will shake the high-technology industry to its roots," Raab said.

Operation Exodus has placed specially trained teams of agents at Customs ports of exit around the country and resulted in 276 arrests, 21 convictions and interception of almost 2,000 shipments of improperly licensed or otherwise illegal export materials valued at almost $100 million [CW, Aug. 15].

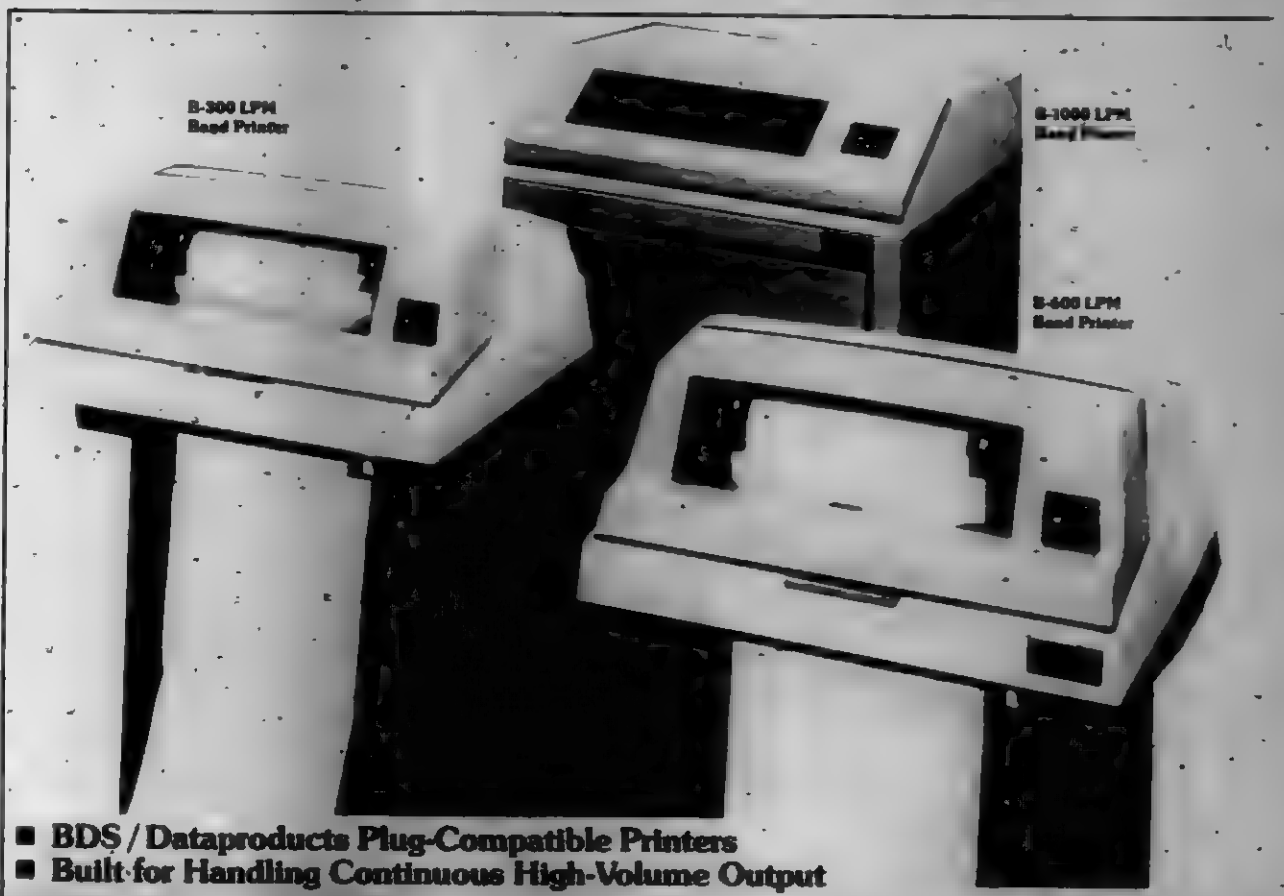
Customs Offers Detection Tips

Vendors may be able to detect the purchase of high-technology items made on behalf of Soviet bloc countries if they look for warning signs compiled by the U.S. Customs Service for its Operation Exodus program, which attempts to prevent the shipment of embargoed high-technology and military equipment.

The Customs Service offers the following tips to detect agents for foreign purchasers even if an order is purportedly for domestic use:

- The specification of 230V/50 Hz, 115V/50 Hz or unusual power cords, plugs, fuses or power lines.
- Requests for illogical options.
- Instructions for special salt spray or humidity packing.
- Instructions to make direct shipments to trading companies, freight forwarders or export companies.
- Circuitous or economically illogical routing, particularly through Canada to a non-Canadian end user.
- Instructions to deliver to companies with no apparent connections to the purchasers.
- Requests for cubic volumes and/or packaged weights, particularly in metric tons.
- Certification as to country of origin or conformity to international standards.
- Payments involving drafts drawn on foreign banks or other special banking requirements.
- Requests for exemption from state tax but an unwillingness to provide resale identification numbers.
- Orders placed by firms or individuals from foreign countries other than the country of the end users.
- Unusual behavior by customers and unusual or extremely lucrative financial compensation for products.

The Customs Service, in advisories it sends out regularly, stresses the need for corporate personnel to know current regulations and to follow appropriate screening and licensing procedures. A number of publications are available from the Department of Commerce, including a summary of export regulations.



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Tax-Exempt Status at Stake

Users Groups Still Confused About IRS Ruling

By Tom Henkel
CW Staff

What did the Internal Revenue Service (IRS) really mean when it ruled that computer users groups devoted to a single vendor's product line do not qualify for tax-exempt status?

Most users groups were still confused about the IRS decision nearly three weeks after the agency issued Revenue Ruling 83-164 [CW, Nov 14]. Although several users group administrators told *Computerworld* they are confident the ruling does not apply to their groups, all of the administrators contacted by *Computerworld* last week offered different reasons why they should qualify for tax exemption.

A spokeswoman for Guide, the group for users of small to medium-scale IBM systems, said that the organization believes it qualifies for tax-exempt status because its membership includes users of several types of IBM systems. And Interact, a Management Science America, Inc. (MSA) users group, believes it will not have a problem with the IRS because the group is set up as a nonprofit organization. Still another users group, /USR/Group, Inc., a federation of users of the Unix operating system, does not expect to be affected because its membership includes users of many different hardware systems.

"The Oct. 31 revenue ruling . . . states that "any organization whose members represent diversified businesses that rent or lease computer products from a single computer manufacturer does not qualify for exemption from federal income tax as a business league."'

An IRS spokesman said he could not comment on whether individual organizations would qualify for tax-exempt status. He referred to the wording of the Oct. 31 revenue ruling, which states that "any organization whose members represent diversified businesses that rent or lease computer products from a single computer manufacturer does not qualify for exemption from federal income tax as a business league."

To get a decision on the exemption issue, the IRS spokesman said, users groups should contact the agency and identify their inquiries as being related to Revenue Ruling 83-134. The inquiries should be sent to the Office of the Assistant Commissioner (Employee Plans and Exempt Organizations), Internal Revenue Service, 1111 Constitution Ave. N.W., Washington, D.C. 20224.

Home Free?

Ron Beck, chairman of MSA's Interact, thinks that newly formed organizations should be home free. He explained that users of MSA software products, which are targeted mainly at large IBM mainframe environments, formerly belonged to several different profit-making users groups organized around various MSA products. (Beck himself was chairman of Future, a users group for MSA's general ledger software).

However, before the IRS issued its new ruling, the separate MSA users groups merged into one large users group. Unlike the now-defunct smaller groups, Interact has been organized not to turn a profit. The group plans to determine each year how much it will cost to cover operating expenses and hold user conferences; it will then set a budget and charge users an annual membership fee. If Interact goes over that budget, MSA will pick up the bill, Beck said.

/USR/Group has already been granted tax-exempt status under California law, but the organization has waited about 18 months to receive word from the IRS on whether it will be exempt from federal income taxes. Saying that a long delay from the IRS is often a good sign, the group's president, Mike Florio, is confident /USR/Group will be granted a federal tax exemption.

Florio's confidence stems from the fact that /USR/Group is comprised of many different types of Unix users. For example, there are different versions of Unix compilers offered by different vendors.

In addition, some Unix implementations are based in hardware, others in software. Florio, therefore, contends that /USR/Group is an organization based around a whole industry.

While some users groups are hoping their organizations will be spared a negative IRS decision, the Prime User Group (PUG) plans on taking action. According to the organization's accountant, Harold Williams, the users group is preparing to file a formal appeal with the IRS contesting the ruling on the grounds that PUG provides an educational service to users of Prime Computer, Inc. hardware. Williams said PUG's attorneys are currently reviewing the appeal.

Correction

CII-Alcatel of France, which is engaged in a joint research and development project with Carlo Olivetti, Inc., was incorrectly identified in the Nov. 14 "International Report" as CII-Alcatel. Olivetti and CII-Alcatel are collaborating on microprocessor-based electronic typewriters with microcomputer capability.

WHAT TO LOOK FOR WHE
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Wells Fargo Tying Micros Into Overseas EFT Net

By Katherine Hafner
CW Staff

BOSTON — Wells Fargo Bank in San Francisco, the world's 11th largest bank, is integrating microcomputers into its overseas electronic funds transfer (EFT) operation.

Addressing a conference on EFT held here last week by the Bank Administration Institute, John W. O'Connell, vice-president for Global Payment Services at Wells Fargo, described the applications that have been devised for handling overseas transfer inquiries, a sensitive process fraught with potential for mistakes.

For the past 15 months, the bank has been steadily installing IBM Personal Computers in its wire room to help control and manage the heavy volume of transfer inquiries received each day, according to O'Connell. With a base of approximately 100 microcomputers, systems consultants devised custom software applications and set up a communications network for the machines.

Working independently of the bank's mainframe, the microcomputers contain applications that feature a simulation program for potential mishaps. According to O'Connell, the independent micros were chosen in lieu of tying an inquiry system to the bank's mainframe because "waiting for systems to come up with applications for us would have taken too long. So the idea for using personal computers came out of the exposure we've all had to micros."

Although the IBM Personal Computers are "not the best or the fastest," O'Connell said, "they are pervasive and easy to justify to the senior level." Citing access as a consistent problem, O'Connell said the bank has experimented with multiple keyboards on an Eagle Computer Corp. microcomputer.

"Once we saw how quickly we could develop applications, the use of the micros mushroomed," O'Connell added.

Most of the inquiries that come in from other banks usually result from a mistake that has occurred somewhere in the transaction. "Six percent of all wires sent result in some sort of inquiry," O'Connell reported. "There's all kinds of potential for doing it improperly."

Although the Personal Computers do not ordinarily speed up the inquiry, having certain files tracked automatically "gives you better control on the inquiry in-house," O'Connell said. "Most importantly, we can keep much better track of where we make most of our errors."

Most helpful of all the applications, O'Connell said, is a simulation program that presents the user with potential disaster scenarios. The program simulates unusually heavy days with unanticipated downtime.

"Running a wire room is a lot like being a pilot in a 747 ... The day starts at zero [transactions] and then gets fast and furious. The simulation program helps people make decisions faster under duress and time pressure."

Another application devised by the bank's systems consultants is called Micro Express, which provides a customer with a terminal to do "cash-management-related things." Approximately 10 Wells Fargo customers currently use Micro Express.

The computers are also being used for the bank's own electronic mail system and for Lotus Development Corp.'s 1-2-3 for graphics and data base management."

Increased Access to Supercomputers Urged

WASHINGTON, D.C. — Representatives of the scientific and academic communities last week urged Congress to support efforts aimed at providing greater researcher access to supercomputer facilities.

Purdue University President Dr. Steven C. Beering told the House Science and Technology Committee Tuesday that research at universities and other institutions is severely restricted by a lack of computer capabilities. Testifying on behalf of the Association of American Universities, Beering blamed this restricted access on three factors: lack of researcher training or experience with supercomputers; lack of funds to support supercomputer acquisitions and use; and lack of physical access because of a scarcity of university supercomputer sites and a lack of adequate telecommunications facilities to access machines at other locations.

Beering said the National Science Foundation (NSF) has not sufficiently promoted access to supercomputers in its grant awards. He strongly recommended that NSF provide more support for supercomputing in academic computing centers.

In testimony before the committee the next day, NSF Director Dr. Edward Knapp said the foundation's newly formed Advanced Scientific Computing Resources Task Force is developing plans for providing researcher access to supercomputers.

In addition, Knapp said, the foundation is trying to improve access on a long-term basis. Discussing this effort's objectives, the NSF director said the foundation wants to provide access in order to develop "the new generation of computational scientists and engineers."

In addition, he said, NSF will seek ways to improve remote access to supercomputers, develop supercomputer facilities at universities and support academic research in the areas of supercomputer architecture, computational mathematics, software and algorithms.

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GTE Telenet Exec Calls for Anti-Hacker Law

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Warning that telecommunications networks are becoming "an electronic playpen" for computer hackers, an executive of GTE Telenet Communications Corp. recently urged Congress to pass a federal law against "computer trespass."

Appearing before a House of Representatives judiciary subcommittee considering computer-related fraud legislation, Peter C. Waal of GTE Telenet, whose network has been used by a number of hackers seeking unauthorized access to computer systems, said, "It is our feeling that this trespass problem is of equal or perhaps even greater national importance than that of the use of computers in fraudulent transactions."

Noting estimates that there will be more than seven million personal computers in use within three years, nearly two million of which will have communications capabilities, Waal, vice-president of marketing and plans for GTE Telenet's Network Services Group in Vienna, Va., said there will be 10 times the number of potential hackers there are today.

These numbers and the interstate nature of computer networks and illegal hacking activities make a federal law mandatory, according to Waal. Because there is a widespread perception that computer trespass is not wrong, "so long as there are no directly applicable federal laws on electronic trespass, the problems will continue and will stand as a barrier against solving other problems."

In particular, Waal told the Judiciary Subcommittee on Crime during his Nov. 10 appearance, computer-related fraud problems cannot begin to be successfully addressed until there is legislation addressing computer trespass. He said GTE Telenet advocates that "an appropriate law would vary its penalty with the nature of the harm, with fraud being severely punished and trespass less so."

Looking at the potential long-term harm from illegal hacking activities, Waal told the subcommittee that "the hacker's hobby will inevitably induce cost growth in our economic system due to the necessary overdesign of systems to handle intended work in addition to the load imposed by hackers." This, he concluded, would "force our whole economic system to bear the costs of an electronic playpen for the hackers."

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Datacomm Briefs

Alteration of Dial Tones Approved by FCC

WASHINGTON, D.C. — Subscriber-generated dial tones can be altered as part of a "basic" service, the Federal Communications Commission (FCC) decided early this month in a clarification of its Second Computer Inquiry decision.

The FCC also indicated that it will not allow the decision to hamstring the addition of new technology to dial-up telephone service and other basic offerings. There is some chance of that because a key provision of Computer Decision II bars AT&T and its operating companies from offering end-to-end protocol conversion as part of a basic offering. What constitutes end-to-end protocol conversion, however, has never been totally defined.

In its latest pronouncement on the subject, the FCC attempted to reduce this ambiguity by citing conversion of voice signals from analog to digital and vice-versa as one example of end-to-end protocol conversion that basic carriers would be allowed to perform if they requested a waiver of Computer Decision II's restraints.

In general, the FCC added, where there is no change in an existing service but only a change in electrical interface characteristics to facilitate introduction of new technology, "petitions for waiver will be acted on expeditiously to ensure that new technology . . . will be employed."

AT&T Asks Quick OK Of New Service

WASHINGTON, D.C. — AT&T has asked the Federal Communications Commission (FCC) for permission to offer a new international-wideband service one day after filing the tariff instead of waiting the usual 90 days.

Known as the International Accunet Reserved 1.5 Service, the offering consists of a full-duplex, digital 1.5M bit/sec transmission channel. Its primary application would be videoconferencing.

The first two locations served would be New York and London over circuits furnished jointly by AT&T and the British Telecommunications Authority. AT&T plans to charge $625 for 30 minutes of use. The British have said they will charge about $900 for each hour; they are reportedly willing to provide service in half-hour increments, but the cost has not been disclosed.

AT&T said the new service can support computer-to-computer data transfer, high-speed facsimile and digital voice communications.

Simple Measures Not Enough

Encryption Endorsed as Way to End Hacking Plan

By Jake Kirchner
CW Washington Bureau

GAITHERSBURG, Md. — In the wake of recent revelations that youthful hackers have been regularly accessing computer networks around the country, security experts have proclaimed that a few relatively simple and inexpensive measures, such as better passwords, would deter much of the unauthorized access.

But according to several such experts who spoke at a conference here last week, those low-cost but effective measures may escalate the nature of computer vulnerability and eventually force system managers to implement much more expensive data encryption devices.

"The way to stop the hackers is to use a good password management system," said Melville Klein, director of the Defense Department's Computer Security Center (CSC). If a hacker "can't guess the passwords," he added, "you're going to force him to commit a crime" by making him tap a system's communications links if he wants access.

"How do you keep people from exploiting your communications?" Klein continued. "You encrypt them."

Klein's remarks came at a press conference held during last week's sixth annual computer security conference at the National Bureau of Standards (NBS) headquarters here, sponsored by CSC and the NBS Institute for Computer Sciences and Technology.

Delivering the conference keynote address, Dr. Richard D. Delauer, under secretary of Defense for research and engineering, said that given current technology, encryption "can be a way of life" for computer systems management. The task, he added, is to make encryption affordable.

Elaborating on that point later, Klein noted the Data Encryption Standard (DES) was adopted by the federal government six years ago, but still is not widely used. "It is not a question of availability of good communications security," he said, but rather one of promoting its use within the DP community.

Dr. Dennis Branstad, manager of the NBS Computer Integrity and Security Technology Group, told reporters DES functions could be built into computer terminals for very little money, but DES devices added to existing machines are considerably more expensive. He estimated that the devices available today cost between $2,000 and $3,500 per terminal; if that capability were built in, however, it would cost less than $100 per terminal.

Branstad and Robert Courtney, a security consultant and former IBM executive, remarked that several firms, including IBM and Motorola, Inc., have taken DES devices off the market for lack of demand. Branstad said, however, that several vendors are now considering adding encryption protection to their equipment.

The security experts also said that except for data communications involving sensitive or valuable data or money transfers, encryption is not the first step. Although encryption should be more widely used, the immediate threat, they said, is not from wire tappers or even from slightly sociopathic hackers. The biggest threat to computer security is from inside the organization, particularly from clerks and other administrative personnel, they said.

According to Klein, "in the private sector . . . it's primarily a problem of [employee] security. . . . If they abuse their [computer access] privileges, there is not much you can do with technical measures."

Courtney agreed, saying systems "do not seem to be under attack by technical giants." He said that of 1,293 computer-related fraud cases identified in the three years ending in mid-1983, only eight were perpetrated by programmers.

Courtney added that many inside computer crimes result from administrative personnel noticing that their mistakes are not caught. "The clerk who steals is often wholly controllable by making him see you are aware of what he does," he said.

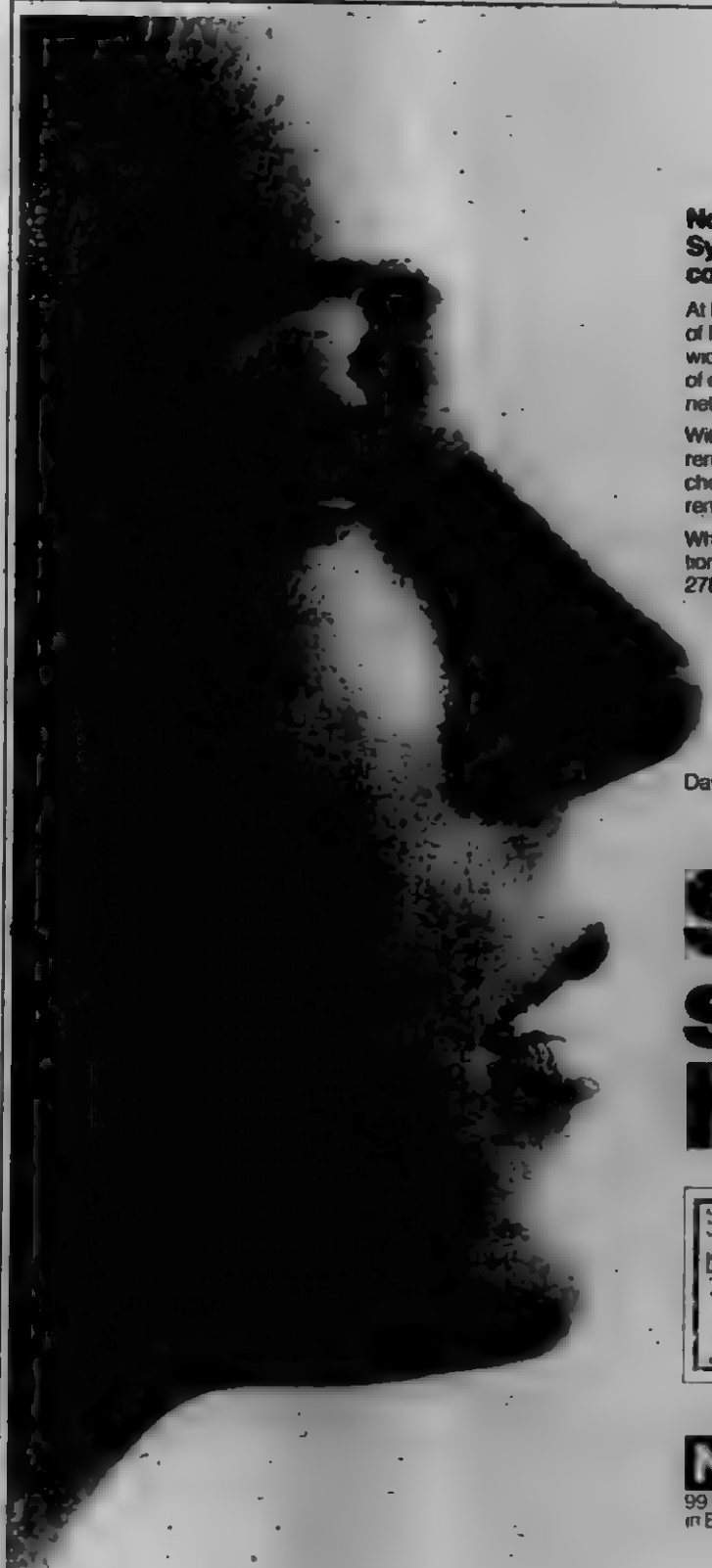
FCC May Reduce Orbital Spacing

WASHINGTON, D.C. — There may not be enough orbital slots to accommodate all of the 22 companies that have requested Federal Communications Commission (FCC) permission to launch and operate domestic communications satellites, an FCC spokesman said earlier this month.

If that happens, the FCC is likely to reduce the present two-degree orbital spacing to one degree.

Western Union proposed three C-band (4-6GHz) satellites to supplement the four satellites already authorized, plus three Ku-band (12-14GHz) satellites.

Satellite Business Systems, American Satellite Co. and RCA America Communications, Inc. were among the other applicants.



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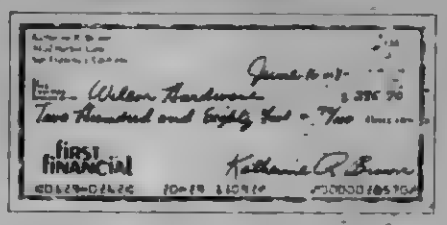

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Sale of Drivers Lists Nets Michigan $12.7 Million

By John Gallant
CW Staff

LANSING, Mich. — Whether or not they use their cars, the 6.5 million licensed drivers in this state get around quite a bit — at least in name.

The secretary of state's office here collected more than $12.7 million last year by selling computerized lists with data about residents who hold licenses or who have motor vehicles registered with the state, according to Edward Boucher, a spokesman for the secretary of state. There are no restrictions on who can obtain those state lists, and the buyer is free to resell the information to others.

Almost 95% of the $12.7 million, which is channeled to the Michigan Department of Transportation, was obtained through the sale of driving records to insurance companies. However, Boucher estimated that "at least a couple of hundred other companies" also purchased lists containing information maintained by the Motor Vehicle Division of the secretary of state's office.

"A person could be on any number of the lists we've sold," Boucher explained. "It just depends on how the buyer asked for the information, by what category it was sorted. Our records are quite sought-after because they're very up-to-date. The addresses and ages in the records are accurate because an individual has to update his automobile registration each year and his driver's license every four years."

According to Boucher, Secretary of State Richard H. Austin is opposed to the sale of information to organizations other than government agencies, but he is required by a 1932 state law to make the data available upon request. Currently, the department charges $6 per driving record and $16 per 1,000 names for other information, such as a list of new car registrations or persons of a certain age.

In order to obtain information, the buyer must post a $10,000 bond that can be withheld if the list is used for an illegal or deceptive purpose, Boucher said.

State legislators are entitled to lists of up to 3,000 names if they agree not to use the information "politically"; lists are offered to federal and state agencies for only $500. The Selective Service System, for example, obtained for $500 the names and addresses of more than 475,000 draft-age males last year.

In addition, Boucher said, many cities purchase lists to track down residents with outstanding parking violations. The city of Detroit purchased a list of 275,000 drivers last year at a reduced rate of 57 cents per name.

Not Everyone Happy About Practice

LANSING, Mich. — While there has been no great public outcry against the practice of selling computerized lists here, a spokesman for Michigan's secretary of state said problems arise when residents receive unsolicited mail they find offensive.

"About a year ago," according to Edward Boucher, "an insurance company in Texas bought a list of our registered drivers from another firm and mailed letters to everyone over age 55. That letter was very insulting, and it brought a flood of complaints to our office.

"Generally, though, this issue only comes up before an election, when the secretary of state's opponent tries to beat him over the head with it," he said.

Election time or not, Rep. David Evans (D-Mt. Clemens) is unhappy with the practice. "It's basically a privacy issue," he said. "When a person gives his name and address to register a car or to get a driver's license, the secretary of state has no business selling that information to someone else."

Bill to Restrict Defeated

In a previous legislative session, Evans sponsored a bill that would have restricted the commercial use of the Department of State information. The bill failed to win approval; however, there is a possibility it will be reintroduced by another sponsor in the current session.

"We ran up against a lot of pressure from auto dealers who testified that these lists are their only source of information for automobile recalls," Evans said. "We held a number of hearings on the issue, but the bill simply never made it out of committee. It died there."

According to Boucher, Secretary of State Richard H. Austin supported Evans' effort. "We're opposed to that type of commercial sale ... there's just no control," Boucher said. "I don't think it's a matter of secrecy, but people shouldn't be subjected to solicitation just because they have registered with us.

"One of the ironies," Boucher continued, "is that when a controversy arises about this, we get more calls from businesses looking for information. Some people get all worked up about it, but they never organize to change things. I guess people get so much junk mail already that they don't care."

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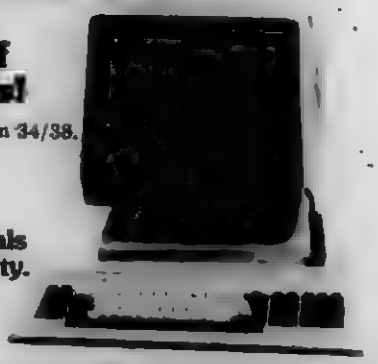

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OMB's Lack of Enforcement Cited

Report Slams Administration's Privacy Record

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — A recently issued congressional report sharply criticized the Reagan administration's record on privacy protection, calling it the worst since passage of the 1974 Privacy Act.

The report, released by the House Government Operations Committee early this month, declares that the Office of Management and Budget (OMB) under the Reagan presidency has failed to enforce the privacy law entrusted to it and has weakened government agency privacy guidelines.

"The Reagan administration has the worst record on privacy issues of any administration since passage of the Privacy Act," said Rep. Glenn English (D-Okla.), commenting on the inquiry into the administration's enforcement of the law. English's Subcommittee on Government Information, Justice and Agriculture performed the study.

"Presidents Nixon, Ford and Carter showed at least some concern on privacy issues," said English, who added, "Now on the eve of 1984, there is no one in the Reagan administration with any interest in privacy. President Reagan talks about getting the government off the backs of the people, but I guess he just doesn't care if government snoops around in people's private lives."

OMB Singled Out

The study is particularly critical of the Privacy Act activities by OMB, which in a June hearing on this subject admitted it does not monitor agency compliance with privacy guidelines [CW, June 13]. OMB also was accused of weakening its computer matching privacy guidelines under pressure from federal inspectors general without asking for public comments.

In addition, the House committee said, OMB failed to submit a required report on inconsistencies in privacy, confidentiality and disclosure laws due last April. And the Privacy Act annual reports submitted in 1981 and 1982 were incomplete, according to the study.

In general, the document stated, "Interest in the Privacy Act at the Office of Management and Budget has diminished steadily since 1974." Saying that "privacy interests frequently conflict with other important government interests, such as economy and efficiency," the report maintained that "there is a constant risk that privacy concerns will not be fully or fairly considered by federal agencies."

The committee recommended that OMB give privacy concerns higher priority and be more aggressive in monitoring agency compliance with the Privacy Act. "Congress should consider strengthening the role of the Office of Management and Budget and should also consider alternatives to OMB as a privacy oversight agency," the report added.

The report also discusses international privacy issues and legislative proposals on privacy laws and practices and looks at 21 selected agency records on Privacy Act matters. Titled "Who Cares About Privacy? Oversight of the Privacy Act of 1974 by the Office of Management and Budget and by the Congress," the study is available from the Government Printing Office.

Developers of Unix System Receive ACM's Top Honors

NEW YORK — Dr. Dennis M. Ritchie and Ken Thompson, members of Bell Laboratories' technical staff in Murray Hill, N.J., have received the Association for Computing Machinery's (ACM) 1983 Turing Award and the ACM Software System Award.

The awards were presented during the opening session of the ACM's annual conference here last month.

The Turing Award, which is the ACM's highest honor for technical achievement in computer science, was given to Ritchie and Thompson for "their development of generic operating systems theory and specifically for the implementation of the Unix operating system." The award includes a certificate and a cash prize of $2,000.

The ACM Software System Award, which was established in 1983 to recognize systems that have had a lasting influence in concept or commercial practice, was also presented jointly to Ritchie and Thompson for their "creation and promulgation of the Unix system and the software components comprising a complete system."

The Unix operating timesharing system was conceived by Thompson and developed jointly with Ritchie in the late 1960s.

According to the Turing Award selection committee, "The success of Unix stems from its tasteful selection of a few key ideas and their elegant implementation. The model of the Unix system has led a generation of software designers to new ways of thinking about programming. The genius of the Unix system is its framework, which enables programmers to stand on the work of others."

Ritchie received a Ph.D. in applied mathematics from Harvard University and joined Bell Labs in 1968. Thompson received an M.S. degree in electrical engineering from the University of California at Berkeley.

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For User of Adabas, Natural

Conversion of Interface Solves Access Hangup

By Paul Gillin
CW Staff

PORTLAND, Ore. — The DP department at Evans Products Co., a manufacturing and retail firm based here, has found that Software AG of North America, Inc.'s Natural high-level programming language is ideal for most of its programming work. But until recently, the department was hamstrung by the fact that Natural could only access files on Software AG's Adabas data base management system or sequential files.

Many of the DP department's existing programs were designed to access Vsam or Isam files. With only about 10% of the programming time devoted to new development, a lot of work focused on "spiffing up, adding extras or making [existing programs] more user-friendly," according to Dian Odell, Evans' supervisor of technical services.

Natural was ideal for those quick jobs, Odell said. However, because of its limited file access capabilities, some programmers were shying away from taking advantage of it.

"There's a myth that if you use Adabas, you have to be big and smart," she remarked. "So some programmers were using Vsam files [and Cobol programs] because it's an easy transition from Isam." Switching Isam files to Adabas would be "a major development effort," but the switch to Vsam "was not a big deal."

Odell knew that Software AG was planning to unveil its Natural/Vsam access utility in the summer, but she decided to look elsewhere as well for solutions because, she said, Evans has often felt "abandoned" by Software AG when service or maintenance was needed. "We have found that if you run into a problem with Com-Plete or Adabas, you wait for a very long time for it to be solved and you don't get a lot of attention from the company," she said. "So that made us look twice at something coming from them."

A Software AG spokeswoman said service calls on severe problems are answered promptly, but that lesser problems are given lower priority. She said 60% of Evans' service calls since July 1 have been answered within two days.

Odell heard about Vsam Natural (Vnat), a product from MB & Associates of Aurora, Colo. Vnat is accessed through a standard CALL and associated parameter values that allows users to retrieve, add, replace, modify or delete Vsam records. In addition, Vnat was much cheaper than the comparable Software AG product — about $1,500 compared with more than $30,000 for Natural/Vsam, Odell said.

The problem was that Vnat was designed to work only under CICS, while Evans relied on Software AG's Com-Plete teleprocessing monitor for most of its work. However, the department determined that it was worth the cost to bring in Vnat and modify it to run under Com-Plete.

"It turned out that in converting Vnat to run on Com-Plete, we also made it a more general product," Odell said.

The conversion involved rewriting the I/Os to make the product more general. "Once it was not CICS-specific, it became something that would work with Com-Plete or batch or TSO." MB & Associates performed some of its own modifications and later released the product as Vnatb, a general-purpose Natural/Vsam interface.

A major factor in the decision was Vnat's flexibility, Odell said. "Vnat can select records by specific key or generic key, can read files sequentially, can position you within a file via a LOCATE command and then read forward or backward from that point. Natural/Vsam didn't have that."

The enhanced Vnatb utility allows files to be opened automatically with no extra user CALL. Files can be read while they are under update control by another job, and a command is available to release the held record area left from an update so other users can get to it in inquiry mode, she said.

Since Vnat was installed, Natural's use has almost doubled, Odell said. Vnat "opened up the option of using Natural and bringing all that power and productivity into the Vsam world. It started making Vsam a full partner to Adabas so that one access method could be chosen based specifically on what that could do for you rather than because it's the only one that lets you use Natural."

The installation came at an opportune time because "the new Natural release has a lot of power," Odell said. "This is enticing people to use Natural because they find they can get a system four to five times faster than in Cobol." She added that the DP department has only a handful of Isam data bases still in operation.

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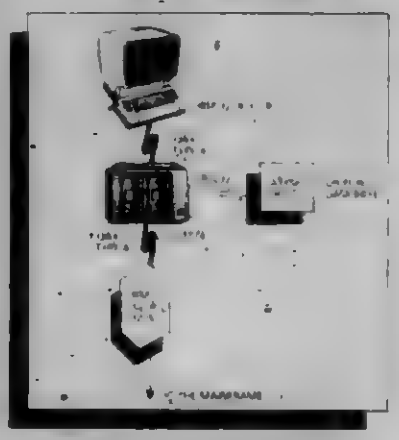

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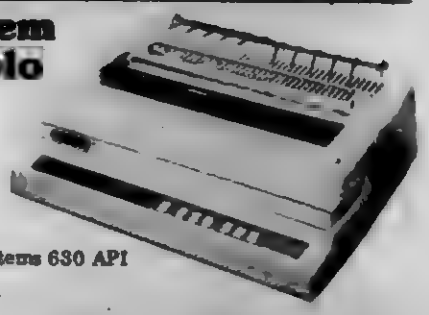

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House Approves Companion Bill

Senate Passage of Communications Bill Seen

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — There is an "excellent chance" the Senate will pass its pending telecommunications bill late in January, one knowledgeable observer said last week shortly after the House approved a companion bill.

Herbert N. Jasper, executive vice-president of the American Council for Competitive Telecommunications, a trade association of other common carriers, added that Senate passage of its bill would lead quickly to conference committee consideration of both measures and resolution of differences between them.

The differences are significant but "not insuperable," Jasper pointed out. He believes Sen. Robert Packwood (R-Ore.), who will head the Senate conferees, is sympathetic to the House bill because it embodies a number of ideas in legislation that Packwood introduced last summer; that measure, after being modified to gain majority support within the Senate Commerce Committee, became the pending Senate bill, S. 1660.

Brian Moir, Washington counsel for the International Communications Association (ICA), a users group composed of the country's largest companies, agreed with Jasper's estimate. ICA has opposed both the House and Senate bills. "Given the present environment," he said, "it's unlikely S. 1660 won't pass the Senate. However, there may be some changes made on the floor." Regarding the overall outlook, Moir agreed that opponents of the two measures are on the defensive for the moment, although he regards a recent comment by the Reagan administration as a hopeful sign.

Shortly before the House voted on H.R. 4295 Nov. 10th, the Office of Management and Budget, in a letter to Congress, said the administration "strongly opposes" enactment of the bill because it "would encourage retention of inefficient cross-subsidies, would delay introduction of new equipment and services and would inhibit competition in the telecommunications marketplace."

The provision of H.R. 4295 that has aroused the greatest public controversy would bar the FCC from imposing a surcharge on residential and single-line business users of local telephone networks. These surcharges are part of a plan, unveiled by the commission last December, for changing the way local telephone companies are reimbursed for providing access to the interstate telephone network. The plan also underlies an AT&T tariff, which proposes big rate reductions for users of

(Continued on Page 18)

Life After 'Settlements' System

WASHINGTON, D.C. — While the battle over national telecommunications policy simmers in the U.S. Congress, a closely related scuffle is under way at the Federal Communications Commission (FCC).

The key issue is what happens next Jan. 1 when, as a consequence of AT&T's divestiture, the "settlements" system ends. Settlements (see related story) presently pay local telephone companies some $6.5 billion per year.

This money reimburses them for the interstate access facilities they provide. It also includes a hefty subsidy that reduces what users must pay for local and intrastate telephone network services.

Although the FCC's access charge plan would replace settlements with a system of flat monthly surcharges imposed directly on all local telephone subscribers and usage-based fees imposed on long-distance users through their interstate carriers, this plan has been deferred from the original start-up date of Jan. 1 to April 3. Thus, an interim reimbursement scheme is needed.

AT&T has proposed one that the Bell operating companies are willing to accept. Essentially, AT&T is offering to pay the operating companies the usage-based access charges specified in the FCC's plan, plus part of what the operating companies will lose through deferral of the end-user access surcharges.

While the FCC seems likely to go along with this plan, it is not clear that U.S. Federal Court Judge Harold Greene, who is presiding over AT&T's divestiture, will also agree.

In previous rulings, he has expressed strong opposition to the FCC's access charge ruling and might balk at endorsing the usage-based access charges the phone company has proposed.

But if Greene rejects AT&T's interim proposal, the FCC is likely to reconsider its three-month deferral of the access charge.

Analysis

In the last two weeks, the commission has received several petitions requesting reconsideration. One, from the Department of Justice, said "the timely implementation of access charges is key . . . to the efficient and effective implementation of [AT&T's divestiture]." The commission's three-month suspension "unnecessarily and inordinately complicates that process." Similar sentiments were expressed by AT&T and the Bell regional companies.

These arguments have been undercut by the Bell operating companies' acceptance of AT&T's recent proposal.

If that offer is implemented, it would provide a way for AT&T to pay the operating companies for use of their local network facilities while enabling the FCC to defer start-up of its access charge plan until April. But if Greene shoots down the AT&T plan, a replacement will be needed very quickly.

One option would be for the FCC to cancel its three-month suspension of the access charge plan and put it into effect Jan. 1.

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Many Would Take Pay Cut for Growth

Career Growth Tops DPers' Desires: Survey

By Patricia Keefe
CW Staff

CHICAGO — Contrary to popular belief, data processing professionals are not necessarily for sale to the highest bidder.

In fact, many computer specialists will take a cut in pay in return for a position promising professional growth, according to two recent surveys of 6,720 job seekers conducted by General Employment Enterprises, Inc. (GEE).

GEE is a national employment recruiting firm with 44 offices across the country. It initiated the surveys to discover why people sought new jobs and to find out what was important in their job hunts.

Professional Growth Key

In the first survey, which focused on pay hikes vs. professional growth, GEE found that 41% of 317 currently employed DP professionals would be willing to accept a position providing an excellent career opportunity at the same pay level as their current salary. Another 21% went a step further and said they would be willing to accept the position at a lower salary than they now receive.

About 21% of the computer specialists responding had more than 10 years of experience, the rest had accrued from one to 10 years of experience.

Of those with 10 years of experience or less, 68.8% were found willing to take a position offering professional growth at the same salary or less. Similarly, 67% of those with more than 10 years of experience in their field put professional growth and career opportunity ahead of increased salary. The survey involved 3,270 people overall.

GEE's second survey — which involved 3,500 people, including 415 employed computer professionals — centered on job dissatisfaction. According to the survey, 43% of the computer specialists were looking for new positions because they perceived limited opportunities for promotion in their present jobs. Many also felt their current employers underutilized their abilities.

Surprisingly, dissatisfaction with pay ranked only third among employed applicants, cited by 15% of those polled, according to GEE President Herbert F. Imhoff.

Imhoff advised employers to be sensitive to the way employees view their work and the advancement opportunities available to them, particularly in the case of engineering, technical and data processing employees.

While "very few of these professionals said their companies lagged from a technology standpoint, they failed to see corresponding professional opportunities open to them," he said.

"This is an area in which an employer's human resources development efforts can have a dramatic impact on reducing turnover," Imhoff added.

GEE is headquartered at 150 S. Wacker Drive, Chicago, Ill. 60606.

Senate Approval of S. 1660 Bill Foreseen

(Continued from Page 17)

longer-distance, higher bit-rate services beginning early next year.

Currently, users of interstate services alone foot the bill for interstate access. A portion of what carriers collect for those services reimburses local telephone companies for providing the related facilities. These payments, technically known as "settlements," currently amount to about $6.5 billion per year, they include a hefty subsidy that reduces the charges for local/intrastate services.

Under the FCC's new plan, beginning early next year, about one-third of that $6.5 billion will be collected directly from all local telephone company subscribers in the form of a monthly surcharge on each local loop. The charge will be $2/month for residential subscribers and up to $6/month for business subscribers. By 1989, approximately two-thirds of the costs assigned to local carriers' interstate access facilities will be collected through surcharges. (The remainder will be paid by interstate service users, indirectly, through their carriers).

Supporters of H.R. 4295 oppose the FCC plan partly because it would force local telephone company customers who do not make interstate calls to help finance interstate access facilities; another objection is that the surcharges will destroy universal service.

Opponents of H.R. 4295, however, say that if long-distance rates do not come down, business communications users will migrate to bypass facilities, rates for the others will go up and universal service will be compromised. (To discourage bypass, the House bill requires users of alternate facilities to pay a monthly access charge of $25/line termination. If the user certifies the circuit will not be used to bypass the local-exchange network the surcharge will be waived).

The other common carriers support the House bill mainly because it retains the existing differential between what they pay for access to the local networks and what AT&T pays.

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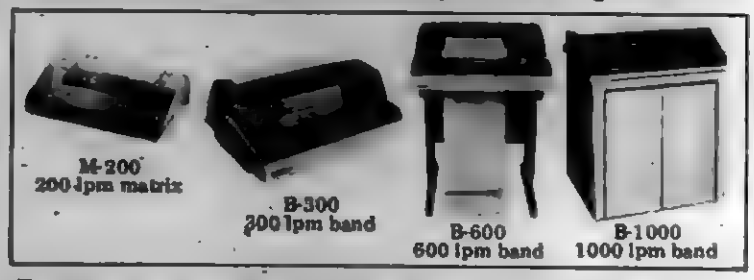

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Many Students Start at 'Ground Zero'

Firm's Personal Computing Classes Entice Users

By Patricia Keefe
CW Staff

LONG BEACH, Calif. — Training and outreach for end-user computing is not necessarily the responsibility of corporate DP departments. Nor are information centers the only viable solution.

The growth of end-user computing has spawned a diverse set of programs created to meet the needs of corporate micro users. The most innovative and encompassing programs are designed both to aid the second wave of micro users — those who are likely to resist automation — and to grow with the increasingly computer-literate and enthused first wave. Moreover, many of these programs are led by non-DPers who share the same work experience as their end-user peers.

One such model is about to enter its third year at the Arco Transportation Co. (ATC), where it is primarily directed at 450 home office employees in Long Beach, Calif. Ron Ellis, ATC's manager of systems development for the Information Services and Technology Department, estimates that 41% of those employees have gone through a voluntary introductory training program and have taken at least two of the 10 courses now offered. The introductory class is intended to make the staff aware of the possible applications for using microcomputers, Ellis said.

Many of these employees were at "ground zero" in terms of their exposure to computers, according to Ellis. "I think they see [the courses] as a good chance to get in touch with technology — a gentle way to get introduced to what's going on."

Interest in the program began in the clerical department and has moved part way up the corporate ladder. There is a need to aim training specifically at executives and middle managers who are primarily interested in the strategic applications of microcomputers, Ellis said.

The department is currently shaping two more courses: "Introduction to IBM" and an "Introduction to Microcomputers." "The focus is on the computer and how to make worthwhile use of it. We provide some word processing or editing capabilities to get them going," Ellis added.

Current course offerings include Visicorp's Visicalc software, spreadsheets and an introduction to Hewlett-Packard Co. — ATC has an HP 3000, a number of HP 125s and is experimenting with some HP 150s. There is also a growing number of Apple Computer, Inc. Lisas and IBM Personal Computers. All micro use is exclusively stand-alone, although Ellis admits to having "networking ambitions." There are 15 to 20 micros in use at ATC, a figure that Ellis predicted will grow substantially in 1984.

Some 40 employees have progressed to the point of being able to develop their own applications. This in turn has helped to alleviate ATC's programming backlog and has increased the user's own productivity. Combined with the ability and willingness of some employees to teach eight of the 10 courses, it has had the added benefit of considerably easing the pressure on ATC's DP staff of 15 and cutting training costs.

However, end-user computing also develops a need for applications and a support mechanism for those users who have progressed to developing their own applications, Ellis said. ATC handles this in several ways. One method is the development of microcomputer work groups to serve as consultants on various topics and to present a variety of applications.

A second method involves a formalized effort to appoint an "account manager" to serve as the "first line of terminal support" in various

(Continued on Page 20)

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End-User Departments Told to Do Their Own Training

SEATTLE — Both vendors and data processing departments in user organizations have sorely underestimated the need for end-user training. Therefore, much of the responsibility for training must lie with end-user departments, according to Bill Fly, a consultant with Microcomputer Support Group (MSG) here, specializing in education, training and support for small computers.

"It is important to push this responsibility on the end-user departments, particularly in larger organizations," Fly noted. However, he also stressed the importance of management information systems involvement in this area. In Fly's experience, training efforts are typically hampered by:

- Buyers who expected equipment to be user-friendly — something Fly asserted is rarely the case. As a result, the equipment is not used. In this case, Fly provides what he calls starter classes — providing product-specific training.
- Buyers who have no realization of how much training will be necessary.
- DP departments that lack the willingness, staff or resources to provide end-user outreach for microcomputer applications. "They are often struggling to keep up with the needs of the big systems," he said.
- Manufacturers who do not have the facilities in which to provide training.

One solution to end-user training is developing what Fly calls the "computerist" — an employee who will serve as a computing resource and provide training for others. "Many companies haven't thought through the problem of who is going to help others," he said, adding, "You have to have a micro support person — particularly in large companies."

The consultant also advocated forming microcomputer support groups. In addition to providing applications support, the groups can deal with sellers to develop and negotiate contracts, Fly suggested.

"In this way, you can spread [microcomputer-related] experience slowly throughout the company," Fly said. This is important because there are not enough DP resources in most firms to allow one-to-one counseling for frustrated users, he added. An important goal, therefore, is to prevent end users from depending too much on the DP department.

The consultant also lamented the unwillingness of many corporate training departments to get involved with end-user training. "Many avoid training on computers because they think it's too technical or too difficult for them," Fly said. He urged a merger of the "people who train and set up classes and the people who put together micro groups."

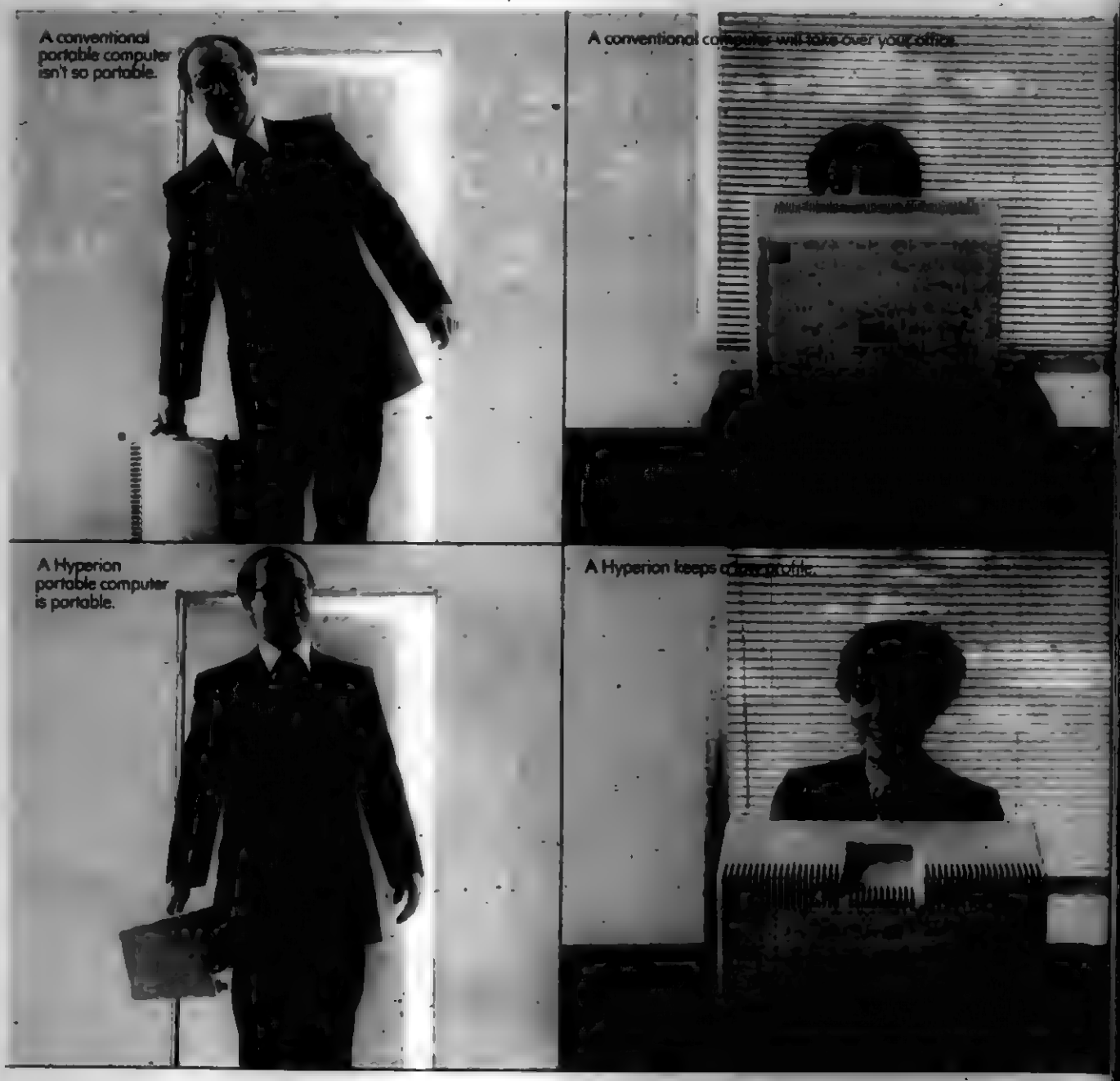
Micro Classes Stimulate End Users

(Continued from Page 19)

end-user departments. "The account manager accepts the responsibility to help manage the problem of providing DP services to the user by providing logons, controlling the proliferation of files, conducting file purges and keeping track of what is going on," Ellis explained.

However, he emphasized that these managers are not experts. Users developing applications are likely to turn to their last instructor or their micro work group for support. The evolution of the work groups and account managers reflects users' acceptance that they need a level of service that the systems staff is not able to provide, Ellis said.

ATC is somewhat unusual in that it does not offer an information center, a popular route to end-user training in recent years. The problem is staffing, according to Ellis, who hopes to develop an "information center-like function" supported with dedicated staffing. Also in the works is development of a corporate microcomputer purchasing policy designed to limit microcomputer purchases to those that the DP department can support.



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Human Aspects of Managing Change Urged

By Robert Batt
CW West Coast Bureau

SAN FRANCISCO — The traditional role of the data processing manager needs to be expanded beyond its technical limitations to encompass the human aspects of managing change, according to an industry consultant specializing in organizational development.

In a paper presented at a seminar on "Managing the Human Aspects of Technological Change" sponsored by his firm here last week, Daryl Conner, president of O.D. Resources, Inc., an Atlanta-based company, said the role for today's management information systems (MIS) department is not only to tend to the technical issues of automated systems but also to help integrate these technologies into the complexities of the work environment.

One of the more important issues that must be dealt with in managing human reactions to technological change, Conner said, is to build enough commitment to the new technology to ensure that support will be sustained throughout the implementation period and into full utilization of the system.

Connor identified three parties to technological change:

- The change sponsor — the individual or group that legitimizes the introduction of technology.
- The change agent — the individual or group that is responsible for implementing the technology.
- The change target — the individual or group that must use the new technology.

"The most prevalent factor contributing to failed change projects is a lack of commitment by the people in these central roles. If an organization is involved in major technological change that significantly disrupts the standard operating patterns, high levels of commitment from all three roles are essential," he asserted.

Speaking at the same seminar, Wayne DeBow, senior staff consultant at O.D. Resources, said that people will not adapt to technological change unless they perceive the need to change personally.

"It is not enough for DP managers simply to appeal to the need for the organization to change or assume a new level of technological competence. Being creatures of habit, employees fear and resist change that disrupts the way things have always been done. It is not really the technology they oppose as much as the way the technology changes their lives," he contended.

For a DP manager to manage technological change successfully, DeBow claimed, requires a clear vision of where the organization is now and where it is going; knowledge of the existing dangers and opportunities; and a strategy that will reduce dangers and increase opportunities.

On this last point, DeBow urged DP and human resource managers to include all levels of the organization in planning tech change.

It does not pay, he suggested, to attempt to hide the amount of disruption that will occur. "As long as disruption doesn't cause total mayhem, beginning it early, although painful in the short run, can accelerate a person's ability to adapt to that change," he added.

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Understand What Is in Writing

Negotiations Can Spell Out Successful Systems

By Lynn Haber
CW Staff

FRAMINGHAM, Mass. — The purchase of a computer system involves more than just a sale. It also represents the art of negotiation between buyer and vendor to come up with a contract that spells out a successful system.

"The art of negotiation is to determine what's important, what's possible and then get it. There are cost considerations and risk considerations reflected in the standard form contract from the vendor. So you negotiate what's possible for you, the buyer, and to the extent that you may want more, you may have to give to get," attorney James Marcellino from the Boston-based law firm of Gaston Snow & Ely Bartlett said during a recent telephone interview.

Multiple contracts may be involved in buying a complete system, he noted. The overall purchase could include a software contract, a hardware contract, a software maintenance contract, a hardware maintenance contract and possibly a fifth contract for programming services. To make matters even more difficult, there are different considerations for each type of contract depending on the particular situation, he pointed out.

In essence, you will be handed a standard contract by the vendor, which it has drafted and which certainly puts the vendor in the strongest position. But, "almost every contract is negotiable," David A. Anderson, senior consultant for Verbit & Co. of Bala-Cynwyd, Pa., told *Computerworld*.

A basic premise that buyers must understand is that what is in writing becomes important. "Invariably, almost without exception, the writing will govern the legal relationship between the parties," Marcellino said.

The degree to which a contract can be negotiated involves many elements, including vendor and buyer flexibility, the status of a particular business within the business community, competition in the market and the willingness of the buyer or vendor to assume monetary risk.

"To the extent that you negotiate a good contract, I think it's reasonable to expect that the vendor may ask for more money because he takes more risk."

(Continued on Page 23)

Four Pitfalls Await Firms Planning Micros

By Tom Henkel
CW Staff

BOSTON — Four major pitfalls await corporations planning to install microcomputers.

Speaking before users of small to medium-size IBM systems at the New England Systems users group here recently, Ted Kaplan, president of The Boston Center for Computer Applications, a consulting firm that deals in corporate microcomputer use, said the most common problems in installing micros include:

- Defining a need for micros. Kaplan said many companies decide to install microcomputers without really identifying a need for them. When this happens, micros tend to be used as executive toys or as "a solution looking for a problem," Kaplan noted.
- Audit control is another headache. In their haste to give employees microcomputers, many firms fail to evaluate who will be using the processors for how long and for what purposes. The result is a segment of a company's work force performing work that cannot be traced. That work can also be easily lost through theft or a natural disaster, Kaplan said.
- A lack of consistency in corporatewide microcomputer use is a companion problem with the lack of audit control. Often, principally in large corporations, several departments wind up duplicating efforts in developing microcomputer software or micro-to-mainframe links. The result is usually several microcomputer systems that cannot communicate with each other, according to Kaplan.
- Unrestrained growth of corporate microcomputers presents its own problems. Often, various departments "sneak [micros] through on their budgets," Kaplan said. As with the lack of consistency, the unrestrained growth of microcomputers breeds incompatibility.

The solution to these problems, Kaplan said, is to develop a strong central authority that governs corporatewide micro purchases. Whether the authority is one person or a committee, it should force various departments to cost-justify each microcomputer purchase.

In addition, the authority must also govern training and support for microcomputers, as well as standardize operation procedures and report formats, Kaplan said.

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Computer Contracts: Getting the Right Perspectives

FRAMINGHAM, Mass. — A contract can be approached from more than one perspective.

David A. Anderson, senior consultant with Verbit & Co. of Bala-Cynwyd, Pa., and attorney James J. Marcellino from the Boston-based law firm of Gaston Snow & Ely Bartlett suggested that a potential buyer should understand the following aspects of a computer contract.

● **Technical** — "You should address the details of the products and services that are being supplied," Anderson said. The buyer should obtain a list of all equipment, including serial numbers, model numbers and descriptions and manufacturer's specifications. "In fact, whenever there's a request for proposal [RFP] or any type of literature involved, that too should be incorporated into the contract," Anderson said. "You really want to be able to get down to detail."

Detail on the operating system and the utilities present should accompany information on software involved. A buyer should also look for documentation on both the program and system, screen layouts, report formats, program listings and user's instructions.

● **Financial** — "What we're talking about here is what kind of money is involved and how payments will be made," Anderson said. While there is no fixed formula, a vendor commonly expects a certain percentage as a down payment, a certain amount upon specification approval and a payment upon delivery and acceptance of the entire system.

Anderson recommended holding back the amount of the payment that represents the vendor's profit until the purchaser is certain that all the loose ends are tied up.

Another aspect of negotiating financial matters pertains to cancellations. "You really don't want a nonrefundable down payment because that means that if you cancel tomorrow, you're out some big bucks," Anderson said. The purchaser wants an agreement that allows the vendor to be paid for the costs he incurred until the time of the cancellation. "Nobody should ever profit from a cancellation," he said.

● **Administrative** — This area includes items such as an implementation schedule, training and information about warranties. All organizations involved, including installation and maintenance, should be identified. The buyer should also know how to go about invoking penalty clauses and how to cancel the contract.

● **Legal** — This area covers the purely legal aspects of the contract including what kind of courts have jurisdiction, how disputes are settled and the types of protection afforded by patents, copyrights and trade secrets.

Some additional, simple techniques Marcellino suggested the user follow include negotiating a set period of time in which the buyer can operate the machine while maintaining the option of rejecting the product if it does not perform up to a standard.

"I think the nature of negotiation is changing because of increased competition, and I think you can negotiate performance standards that include a window, where in effect you can reject [the product]," Marcellino said.

"The contract should solidify that the system being purchased works in the way the parties had in mind, and what they had in mind should be in writing," Anderson concluded.

What Is Involved In a System Contract

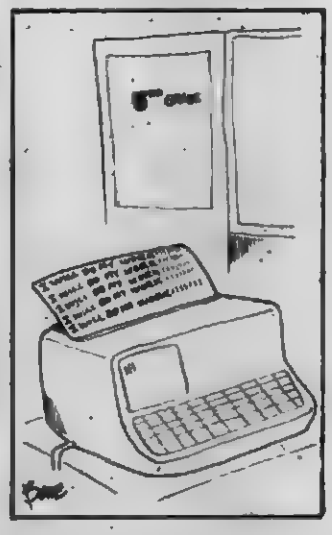
(Continued from Page 22)

So a fundamental question to be considered is — Does the buyer want a good contract or does the buyer want the machine at the price at which it is being offered? "The price at which a system is being offered generally reflects the allocation of risk that's reflected in the contract," Marcellino said.

In addition to seeking legal advice in negotiating the contract, the potential purchaser should also obtain the expertise of a technical professional.

"Depending on economics, it is always advisable to have a technical expert advising the user," Marcellino said. "In the long run both the user and vendor profit from that," he maintained. The user's expectations often exceed the ability of the vendor to deliver. And there is always the risk that something will be oversold by the vendor, he continued.

"To the extent you get an expert in there to counsel the user realistically, you get a more realistic assessment of the capabilities of the machine and someone on the user's side who can assess what the vendor can deliver. You avoid the risk that the vendor will try to oversell, and you avoid the risk that you're going to have an unhappy user. That same expert can assist a lawyer in assessing whether the contract itself reflects the understandings that are finally arrived at."



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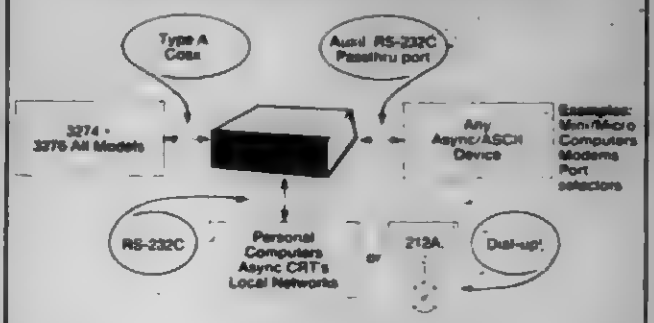

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As Computer Literacy Increases

Danger of Electronic Theft Seen Escalating

By Paul Gillin
CW Staff

RESTON, Va. — Stephen Leibholz likes to recall the time a New York bank challenged him to break the security features on one of its automatic teller machines (ATM).

Working with a special ATM filled with fake money, Leibholz and a partner tapped into the telephone line between the ATM at the bank's mainframe, recorded the code being exchanged between the two, deciphered the protocol and emptied the machine of $80,000 within a half hour.

The experiment is only one example of the poor computer security measures many institutions employ, Leibholz said in a recent interview. "Every working day, electronic funds transfers [EFT] around the world total $600 billion, $400 billion in the U.S. alone," he said. "But probably less than two percent of the users who are vulnerable to penetration have anything beyond password security."

Not surprisingly, Leibholz has an interest in pointing out the shortcomings of conventional computer security measures. His company, Analytics Communications Systems, markets a data encryption and authentication device that is claimed to eliminate the possibility of computer crime in dial-up, dedicated and multidrop systems. Called Sherlock, the device incorporates a solid-state "key" with control and memory chips and a random key generator that produces encrypted code that can only be unscrambled by a Sherlock using similar keys. New codes are used for every communications session and are validated twice, he said.

'Estimates of how much money is pirated from corporate data bases every year varies between $1.5 billion and $3 billion [and] ... as people in general become more computer literate and microcomputers continue to proliferate, the danger of electronic theft has become even more pronounced.'

A Growing Problem

Estimates of how much money is pirated from corporate data bases every year varies between $1.5 and $3 billion, but it is clear that the problem is growing, Leibholz said. As people in general become more computer literate and microcomputers continue to proliferate, the danger of electronic theft has become even more pronounced, he said.

Currently, three primary barriers exist to the use of more sophisticated security facilities in most businesses, he said. The first is the "It can't happen to me" syndrome. The second is the attitude put forth by many vendors that the problem can be avoided by carefully screening employees.

A third and dangerous problem is the perception that computer thieves are not really stealing, he said. "People equate hacking to stealing bananas from a push-cart," he said. "After all, you're just putting wires together, you're not really stealing anything."

However, experience indicates that even companies with "reliable" employees and extensive password security are victimized by computer thieves. Furthermore, figures reveal that the average computer crime nets about $650,000, while bank robbers get away with an average of $9,000. And hacking incidents that have come to light in recent months have pointed out that computer crime is still treated lightly by the courts. Only 21 states have specific laws dealing with the issue, he said.

An archaic reliance on password security is at the heart of the problem in most companies, Leibholz indicated. "The majority of computer crimes since 1972 have involved penetrating passwords. That's how weak they are," he said. Passwords can be dug out of wastebaskets and desk drawers or even deciphered from recordings of communications between computers, he said. In addition, hackers have compiled lists of some of the most common verbal keys ("Snoopy" is a popular one).

The ultimate effect of passwords is to keep honest people out, he said. "They have a role in providing management discipline and protecting the system from mistakes, but they don't provide security protection."

Encryption devices, such as those being offered by Analytics, Motorola, Inc. and Racal-Milgo, Inc., are becoming an increasingly popular alternative, Leibholz stated. The National Bureau of Standards has issued a Data Encryption Standard and the American National Standards Institution has authorized a data encryption algorithm to compute a Message Authenication Code (MAC). Between parties that share a secret key, the MAC identifies the sender to the recipient and assures that the received data is unaltered. MAC also makes it possible to establish an audit trail back to the originator of a transaction.

With bank-at-home and shop-at-home technology emerging and ATM and EFT use expanding in the future, protection devices "will be as important as terminals themselves," Leibholz predicted. He noted that national and international funds transfer capabilities have magnified the potential for abuse. "You can now transfer money to a bank in Brazil and be gone from the face of the earth before the auditors even know about it," he said.

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Merchandise Planning Consultation

Retailer Keeps Data Finger on Fashion Pulse

By Peter Bartolik
CW Staff

RIVERSIDE, Calif. — A firm specializing in merchandise planning from its headquarters here has an electronic finger on the pulse of the nation's fashion industry.

Retail Merchandising Service Automation, Inc. (RMSA) serves some 4,500 retail clients and locations in each of the 50 states. Vernon J. Rossi, president, chairman and founder of the company, recalled recently that the company became involved with computers in the mid-1960s because its customers were dealing with computers.

The company got its start here 27 years ago, providing merchandise planning consultation to apparel stores. In the mid-60s, according to Rossi, computer printouts started to show up in the material received from clients. "We decided that if computers were a way of life with retailers, we'd better find out what they were all about," he said.

Rossi said he hired top-notch programmers from IBM and "lived with them for three years" to teach them all about the retailing business. The programmers, in turn, automated RMSA's operations, which had been completely manual.

"Most of our operation is batch," according to Gordon Schoof, vice-president of the company. But communications capabilities have brought changes to the company and will continue to do so, he added.

RMSA tracks every piece of merchandise that goes through its customers' hands by coded tags attached to the item that identify it to RMSA's IPL Systems, Inc. 4436, equipped with a 4M-byte memory. While most tags are still shipped to the company's headquarters, more and more stores are now equipped with Telxon Corp. optical readers that read the identifying code and transmit the data over dial-up telephone lines.

According to Schoof, the stores communicate the data directly into the mainframe, and in some cases the mainframe communicates with minicomputers in the field. "We're in the process of developing a program for communicating with microcomputers," Schoof said, adding that he believes micros will be an increasingly important factor in retail operations.

A recent survey of 922 clients, according to Rossi, showed 21.8% of the respondents were interested in obtaining computers, 70.1% were not interested and 8.1% already owned computers. "The bulk of stores below $10 million in annual volume fit this pattern, over that, the results would be completely reversed," Rossi said.

While many stores produce inventory control numbers from the flow of goods, they are not so well equipped in developing strategies from those numbers, according to RMSA's executives. "There is no magic in processing data; it's just that we have succeeded in making applications for handling a lot of data to produce results with people on the other end who are not necessarily [technically] sophisticated," Schoof said.

Rossi said the company prepares weekly unit management reports — analyzing every item every week — and monthly planning reports that are used by RMSA's 112 analysts in 26 field offices to advise buyers and planners on items that should be purchased; when they should be purchased and in what quantities; and even when particular goods should be marked down. According to Schoof, "The magic of the fashion business is to have the right thing at the right time."

The company, which is presently converting from tape to disk, "has more classification information than the Department of Commerce," Rossi boasted.

RMSA not only can answer a client's inquiry, but can provide manufacturers with trending patterns on how well their items are selling.

In the DP operation, the company has two directors, one for transmission and one for day-to-day operations; seven senior programmers; 11 computer operators; and 22 checkers in the control department.

Second Edition Of Directory Out for Pick

SAN DIEGO — International Database Management Association, Inc. (IDBMA) has released the second edition of *Directory of Application Software* for users of Pick and Associates, Inc.'s Pick operating system-based computers.

The IDBMA is the sponsor of the annual "Pick Spectrum" conference and trade show. The text they produced is said to list 211 individual application packages offered by some 70 companies in 48 classifications.

The directory is available for $30 from IDBMA, which can be reached at Suite 210, 9740 Appaloosa Road, San Diego, Calif. 92131.

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Forum Established to Discuss Transborder Ties

By Peter Bartolik
CW Staff

ATLANTA — Taking a portable microcomputer overseas may present some problems, and using that device to access U.S. data bases may be all but impossible for a traveler.

In an effort to solve these problems or at least provide a forum for their discussion, an electronic file is being established for businessmen to share successful and unsuccessful transborder access attempts.

Called Project Easylog, the file is designed to be used by executives who use portable micros on foreign travel to report and share their experiences logging on to any data bases in the U.S. The file was recently announced by Conway Data, Inc. and Conway Publications, Inc. and is available free on the firm's Sitenet data base, established earlier this year [CW, July 18]. Sitenet, also a no-charge information service, focuses on industrial and economic development opportunities.

Basically, the information collected via Project Easylog will be used to persuade officials of various nations to improve or introduce procedures for easy link-ups between microcomputer users with overseas data bases, according to McKinley Conway, head of Conway Data and director of the Industrial Development Research Council in Atlanta.

"In general, those who have attempted to carry a portable computer to other countries and use it via modems and telephones to contact their offices or read on-line data bases in the U.S. have found nothing but disappointment and frustration," Conway said.

Often, portable microcomputer users are required to obtain special permits to carry their machines abroad or face delays by sending micros ahead, Conway stated. As an example, he noted a three-month delay he experienced when sending a micro to a staffer in New Zealand.

"Once you get your machine to another country, you probably won't be able to use it to link with the U.S. without getting specific approval from the government telecommunications office," he added. "That may take some time and involve substantial fees."

Conway's organization has mailed questionnaires to overseas postal telephone and telegraph agencies, which regulate communications in their respective countries, in an attempt to determine established transborder micro communications procedures and to spur the establishment of ease of access.

"Ease of accessing data bases in the U.S. is becoming a consideration in the location of new investment in less developed nations," Conway said at the launching of the project. Information on accessing Sitenet and the Easylog file can be obtained from Conway Data, 1954 Airport Road, N.E., Atlanta, Ga. 30341.

Communications Main Topic At Pacific Meet

HONOLULU — PTC '83, the sixth annual conference of the Pacific Telecommunications Council, will convene here Jan. 8-11.

The principal topic for discussion at this year's event will be basic telecommunications needs in the Pacific hemisphere, according to sponsors at the PTC. The conference will be structured to identify basic telecommunications needs, discuss technical and institutional responses to those needs and examine relevant issues and policy considerations to resolve those needs.

On the platform to address this subject will be Armando Vargas, Minister of Information and Communication for the Republic of Costa Rica; Lionel Olmer, undersecretary for international trade with the U.S. Department of Commerce; Tetsuro Tomita, deputy director-general of the Telecommunications Policy Bureau in the Ministry of Posts and Telecommunications, Japan; Basil Beneteau, vice-chairman of Northern Telecom, Ltd.; and J.H. Stevens, chairman of Canada Wire & Cable Co. Ltd. and international president of the Pacific Basin Economic Council.

The conference will also feature informal study groups, round tables and workshops.

The registration fee is $375. Further details may be obtained from PTC headquarters at Suite 303, 1110 University Ave., Honolulu, Hawaii 96826.

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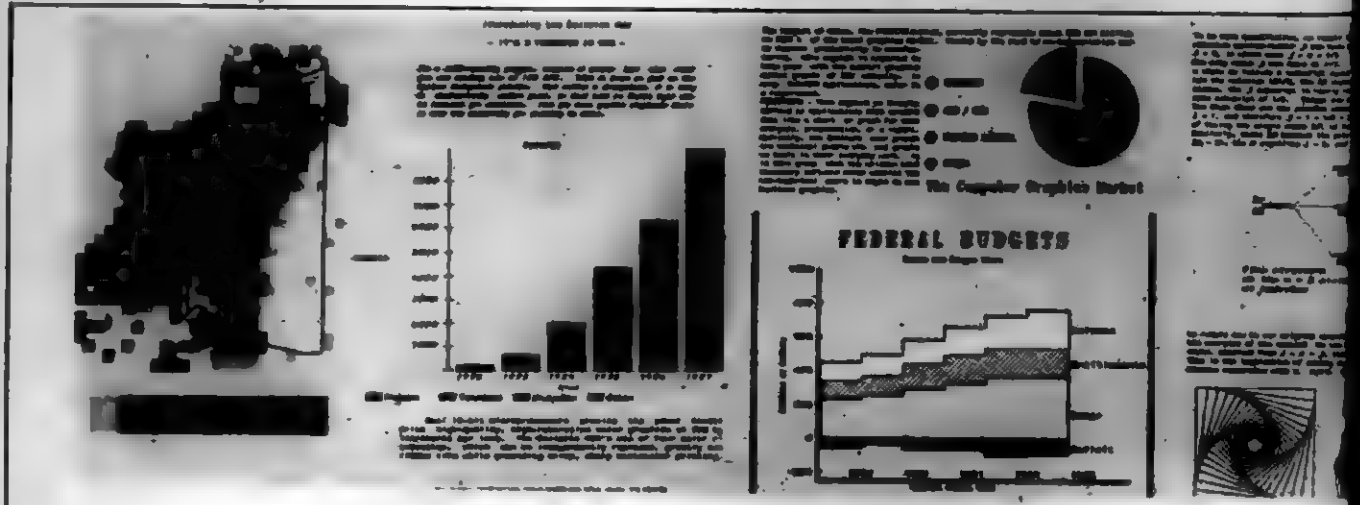

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International Report

FROM THE CW INTERNATIONAL NEWS NETWORK

AUSTRALIA

MELBOURNE — In a deal worth approximately $12 million, Rupert Murdoch's multinational newspaper conglomerate called News Ltd. has acquired a one-third interest in Computer Power Group. The agreement calls for News Ltd. to underwrite Computer Power's operations and finance a five-year master plan to build Computer Power into a $100 million company, sources said. News Ltd.'s list of companies includes a score of newspapers — including the *Chicago Sun Times*, the *Boston Herald*, the *New York Post*, the *Star*, and the London *Times* — but this marks the company's first interest in a computer vendor.

RYDE — Following a significant drop-off in the personal computer market over the past few months, Apple Computer Australia Pty. Ltd. is terminating agreements with its 100 dealers here. Sources claimed Apple's distribution network has been fighting a losing battle for its market share, which dropped from about 27% in May to about 12% in October.

SYDNEY — Attache Software Pty. Ltd. is said to be posed for an attack on the North American microcomputer accounting software market. The company has raised a total of $2.2 million in venture capital and has established an office in Michigan. It launched its sales campaign during the National Software Show in San Francisco last month and has since nailed down deals with Toshiba Ltd., Otrona Corp. and Wang Laboratories, Inc. Negotiations are now in the works to secure deals with other micro makers, one of which is rumored to be IBM.

MELBOURNE — The Australian Bank Employees Union has made a number of demands on Australian banks concerning the impact of technological change. The union wants to negotiate proposed technological implementations before they are introduced, a spokesman said. Specifically, the union wants to discuss health and safety issues with respect to CRT display units and related equipment.

BRAZIL

BRASILIA — IBM was again deflected in a second attempt to break into the Brazilian marketplace. Brazil's Special Department of Informatics rejected IBM's proposal to set up a showroom in São Paulo composed of bank terminals from a number of vendors. Earlier, IBM had been excluded from a Brazilian project calling for a distributed processing system, sources said.

RIO DE JANEIRO — Firmino Rocha De Freitas, the president of the Brazilian Association of the Electrical and Electronics Industry, claimed that private enterprise in Brazil is being ruined by lack of components, due to rigid import restrictions. Because companies are getting no imports, they are forced to halt production and shut down. According to De Freitas, the government has refused to give financially troubled companies enough money to continue production. In the meantime, the president of Brazil's Central Bank has reportedly assured De Freitas that by the end of November, Brazil's financial problems will begin to work themselves out.

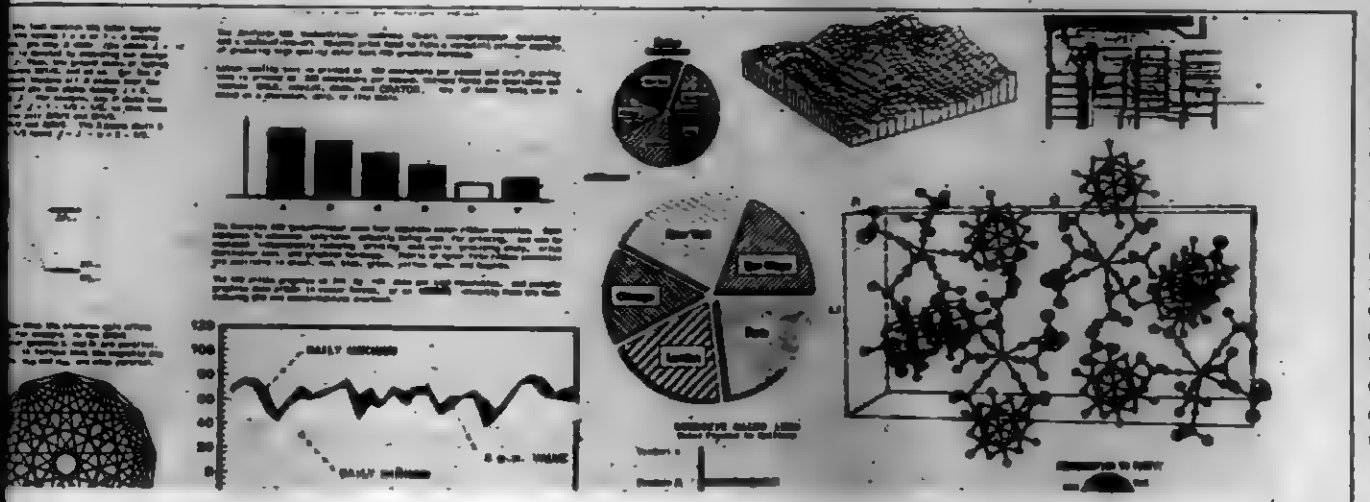
FRANCE

MONTE CARLO — At its recent European Users Group meeting, Culinet Software, Inc. demonstrated its relational data base management system IDMS/R and its line of personal computer software. The vendor demonstrated relational access capability to a central data base via a personal computer and a tool kit that integrates word processing, an electronic spreadsheet, graphics and communications capabilities.

PARIS — Bull-Sems, the minicomputer subsidiary of the French computer group Bull, is expected to announce three new models of its Mitra and Solar product lines: the Mitra 725, the Solar 16/35 and the Solar 16/90. The Mitra 725 is a high-end, 16-bit system dedicated to transactional applications and features cache memory and cache disk. The two Solar CPUs will be aimed at industrial environments. The Solar 16/35 is a 16-bit machine with 256K bytes of memory and a high-end biprocessor called the Solar/90.

JAPAN

TOKYO — Sony Corp. has unveiled a Cable Digital Audio/Data Electrical Transmission System (Cada). The product reportedly uses Japan's free channel on existing CATV and enables users to transmit and receive high-quality digital music, facsimile, software and various other data. Cada is an application of pulse code modulation technology, the vendor explained. The standard system for sending signals is priced at $29,787, and the terminal costs $213. The Cada system is scheduled to be available during the summer of 1984, a spokesman said.



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Computer Attendants Cut Parking Lot's Losses

NEWARK, N.J. — A computerized parking lot? That idea is not out of the question for a firm here that claims computerization can help parking companies cut down on losses and better manage facilities.

Maintaining that parking lot owners lose up to 20% of their revenue to employee theft and customer abuse of privileges, Steve Nislick, comptroller of Edison Parking, Inc. here said his firm spent four years working with Secom International, Inc. of Los Angeles to develop a system to control that revenue loss.

The firm recently completed development of what it claims is the first computerized control system for monthly parking suppliers that integrates access control with the debit and audit accounting functions of a standard business computer.

Dubbed the Computing-Recording-Auditing (CAR) System 1000, it was developed by Secom to Edison's specifications. The system reportedly includes entrance and exit monitors, which are controlled by Intel Corp. 8080 microprocessors. The units are connected to a specialized central processor, which is also based on an Intel 8080.

The central processor handles accounting functions, Nislick said. The system uses the same optical scan technology Citibank of New York developed for its "Citicard" banking system — a technology licensed by Secom for nonbanking purposes, according to Nislick.

CAR System 1000 is currently used in five parking facilities in the U.S. These include the Hippodrome Building garage in Manhattan (with 250 monthly customers) and the Tower Place garage in Atlanta (with 1,993 monthly customers). The modular CAR System 1000 can accept additional memory to process up to 18,000 accounts, Nislick said. The system was originally developed for use within Edison, but the user firm is now willing to sell the system to other parking companies, Nislick noted.

Each monthly customer receives a plastic card for entering and exiting the facility. Through an administrative terminal in the garage, the manager commands a central processing unit to link an optically coded 20-digit cipher number in the card to a specific, recognizable account number, according to Nislick.

To use the facility, the monthly customer must insert his card into an optical card reader. Before the system accepts the card and raises a gate arm, it first confirms the card's status (whether its account is paid) and mode (whether a vehicle is already using the facility through that card), Nislick said.

After a predetermined time period (typically the end of 30 days plus a grace period), the central processor unit cancels the authorization of an account for the upcoming month. The customer must at that time pay the amount due and have his card reauthorized for daily use, Nislick noted.

Another feature of the system is that it can selectively reject a card reported lost or stolen while maintaining the same customer account number. A substitute card with a different 20-digit cipher number is used at the facility. Once the new card is issued, the original lost or stolen card becomes inoperable, Nislick explained.

"When the loss of a card is legitimate, we can replace it immediately, without the inconvenience of going back to the manufacturer," Nislick said. "However, every card must be authorized before it can operate the system, so no employee has access to floating inventory cards that can be abused."

CAR System 1000 was designed with intelligence at each optical card reader. Together with the central processing unit, the intelligent reader performs a five-step check calculation on the customer account number for each card inserted.

The system also makes it possible to hold the garage manager accountable for his activity.

DSS Software Meet To Feature MIS Topics

BOSTON — "Software Tools for Distributed Support Systems" is the title of a conference to be held here Feb. 27-28 at the Westin Hotel. The keynote speakers will be Peter G. W. Keen, chairman of Micro Mainframe, Inc., and Gary K. Gulden, vice-president of Index Systems, Inc., according to a spokesman for Suffolk University's School of Management, which is sponsoring the conference.

The conference will focus on the management issues of integrating microcomputers, telecommunications and decision support functions into the corporate mainframe environment.

A panel discussion on each day will include four users and consultants and the keynote speakers, according to the Suffolk University spokesman. Twelve software vendors will provide demonstrations and discussions of their products.

Registration costs $495 for both days. More information is available from Dr. Warren Briggs, The Software Tools Conference, Suffolk University, Boston, Mass. 02114.

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Consolidation Cuts Costs, Raises Efficiency

BU Ties Itself Together With Standardized WP

BOSTON — Standardizing its word processing systems has helped decentralized Boston University (BU) tie itself together by cutting purchasing costs, increasing efficiency and ensuring equipment compatibility.

The school's 500 departments are spread throughout the city, rather than operating from a self-contained campus. Even the main nucleus of buildings is dissected by two major thoroughfares.

Because of its geographical characteristics, BU could easily have fallen into the decentralization trap — an abyss into which hundreds of thousands of dollars are poured to acquire various pieces of expensive, noncompatible equipment.

"That's exactly what was beginning to happen here three years ago," said Michael King, director of office technologies for BU. "All our departments had a need for word processing, but at that time, the good systems were extremely expensive." This turned out to be a cloud with a silver lining, according to King.

Although various vendors were approaching different departments individually, the high cost of word processors effectively limited the number and variety of systems purchased.

Problem Studied

However, there were fears that unless something was done, dozens of noncompatible systems would proliferate throughout the university. King was asked to study the problem. The more he investigated, the more convinced he became that standardization was not only desirable, but necessary.

"The advantages were obvious," King said. "Having one brand of word processor throughout the campus would not only facilitate communications between the word processors and our main computers, it would also reduce retraining efforts for transferred employees." Also, purchasing $500,000 worth of equipment from one vendor, instead of $50,000 worth from 10 different vendors, would give the school more financial clout, King added.

It was decided to go with one vendor, but which one? A wrong decision would prove very expensive. Wang Laboratories, Inc. was the recommendation after an extensive six-month study of available systems, including those from Digital Equipment Corp.; IBM; NBI, Inc.; and Micom Systems, Inc.

Now, more than two years after the initial purchase, BU has 20 Wang systems, ranging from a small stand-alone System 5 to several Wang OIS 140s, some of which are supporting a combination of 32 terminals and printers.

King believes that for a school the size of BU, automation is a necessity. "Take the admitting process alone," he said.

"Our Admissions Office generates over 60,000 letters annually to prospective students. Before automation, these had to be impersonal form letters. A personalized letter makes a much friendlier impression," he said. Word processing has allowed the School of Management to offer a resume cover letter service for its job-hunting graduates. And, word processors "have really taken the drudgery out of grant proposal writing," King added.

"We're finding new applications all the time," King said. These include using Wang's List Processing software in conjunction with the OIS system and automating the controller's refund logs.

In addition to freeing the main administrative computer from routine operations, some Wang systems have been adapted to communicate directly with the mainframe computer, greatly extending its usefulness. Wang 3271 Emulators have been added to some of the Wang systems on the campus, so operators of these systems can access (with authorization) all the data resident on the administration's IBM 3081 mainframe. They can call up this information on their screens and print it on their printers — performing the same functions as would separate IBM workstations.

"Another thing we've generally found," King continued, "is that many administrators throughout the university are saving a tremendous amount of time by typing their own text. Since mistakes are corrected easily, we don't have to be great typists. It's just as fast — sometimes faster — to do it ourselves on the word processor rather than write it out longhand for a secretary to type, or wait until a secretary is available to take dictation."

The amount of training necessary is minimal, according to King. "The documentation is excellent. It really leads you through the entire process. One can pick up the finer points from co-workers who may be more familiar with the systems." Another plus is the service Wang provides. Initially the school had problems with service not keeping pace with the advancing technology, but now BU essentially has its own Wang technician resident on campus.

All in all, King said the university is very satisfied with Wang. "As new technologies are developed," King said, "we will go through the same investigative process to decide which vendors can best meet our particular needs. Wang is certainly one of the manufacturers whose new products we're watching closely."

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Computer Simulation System Lifts Boeing's Airliner Designs to Skies

RENTON, Wash. — Boeing Corp. engineers have taken their designs for new commercial airliners to the skies on scores of occasions without ever leaving the ground, thanks to a computer-based simulation system that has substantially reduced the need for costly flight testing.

Boeing's $20 million Flight Simulation Center here is the most sophisticated engineering and flight simulation laboratory in the country, according to its manager, Calvin Phillips. Assisted by a bank of Harris Corp. superminicomputers and simulation software developed by Phillips' staff of 150 software and hardware engineers, the center has for three years played a major role in the design and testing of Boeing's new 757 and 767 airliners.

Emphasis at the facility here is on engineering flight simulation rather than on training flight simulation. Designers are allowed to experiment with a number of flight variables that generally remain constant during training flight simulation.

A simulator pilot approaches a runway in a C cab.

Beyond Normal Testing

"With tools like simulation," Phillips said, "we are able to go considerably beyond the normal flight test during the design stage. We can carry the testing further than might be safe in a real airplane — at higher speeds or closer to the ground or in unusual flight altitudes or abnormal weather conditions."

Moreover, Phillips said, "We have estimated that simulation has offered us substantial cost savings over flight test, somewhere in the neighborhood of 100 to one. Capital costs for a simulator are less than for an airplane — you use no fuel, and fewer people are needed for 'flight' and maintenance. Where simulators cost hundreds of dollars an hour to operate, flight test in an airplane costs many thousands of dollars."

In addition, simulation enables Boeing designers to study only that part of flight affected by the performance of a given prototype. To test the autolanding system, for example, engineers can simulate landings without first having to take off and land.

During an actual flight test, the design team might undertake only four or five landings an hour. But using simulation, the team can perform the exercise once every two to three minutes because the plane can be positioned for "landing" again at the touch of a button.

The staff here developed the 757 and 767 simulation software and built the interfaces between the Harris computers and the flight deck systems. In addition, standard simulation models have been developed for all Boeing aircraft, including the 707, 727, 737 and 747.

The center has five simulation cabs and a computer-generated imagery (CGI) visual display system that can provide independent and simultaneous displays to any two of the cabs. The CGI system, which provides an out-the-window perspective, was jointly developed by Rediffusion Simulation, Inc. and Evans and Sutherland, Inc.

The majority of the simulation studies done in the laboratory are run on its 24 Harris superminis. Real-time tasks utilize five Harris Model H-800s, two Model H-100s and one Model S-200. Two additional Model H-800s are used for program development and interactive use. A Model H-100 supermini is used as a test system for hardware and software checkout, and 12 Model Slash 6-2 front-end processors are used for simulation tasks. A Harris S-200 and two Model H-100 systems are used in support of avionics hardware and integration checkout for the 757 and 767 programs.

Utilization of the simulation center here has grown by more than 1,000% since 1976, from approximately 3,600 hours of use per year to more than 42,000 now. The development of the 757 and 767 aircraft required significantly more simulation and more computing capacity than previous airplanes.

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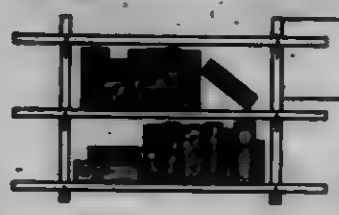

Off the Press

TELEPHONY: TODAY AND TOMORROW
By Dimitris N. Chorafas

For a book covering so much, this 292-page paperback provides surprising technical detail, capability appraisal and market assessment of communications technologies. The subject is electronic switching systems, the great determiner of office efficiency, speed and reliability.

Telecommunications, that "necessary evil" in the eyes of corporate management a few years ago, now is viewed as a strategic tool. A typical manager spends 40% of his time involved with mail, the telephone and business travel. Writing and reading claim another 12% to 35% of the workweek. Obviously, any "compunications" (computers and communications) advance that offers a faster, better and/or cheaper means of communications requires careful consideration.

This book clearly and interestingly presents the facts needed to understand and compare telecommunications options. Part 1 recounts the familiar technologies, such as message services, facsimile, private branch exchanges and the telephone. As the title implies, the ubiquitous telephone is emerging as the center of telecommunications today and tomorrow. Currently, 75% of calls made do not reach the desired person, and 50% are one-way — requests, orders, notifications.

Part 2 considers newer technologies, such as microwave, optical fiber and satellite systems. The major emphasis here goes to optical fibers, as significant in potential impact, the author believes, as the effect of large-scale integration on electronics.

Part 3 looks at how the old and new technologies will be connected through local-area and value-added networks. Privacy issues close this book — an afterthought, perhaps, adding a little social perspective to an otherwise valuable nuts and bolts rendering of telecommunications.

Telephony: Today and Tomorrow carries a 1984 publication date, though at least one reference bears a 1983 stamp: AT&T Information Systems, Inc. appears in several places as its short-lived predecessor, American Bell.

Cloth, 292 pages, $19.95, ISBN 0-13-902700-9. Prentice-Hall, Inc., Englewood Cliffs, N.J. 07632.

MANAGEMENT SUPPORT SYSTEMS: A PRAGMATIC APPROACH
By Harry Katzan Jr.

Cast aside the familiar DP buzz phrase "decision support systems" (DSS). In its place, Katzan outlines management support systems, a network that includes DSS, office information, modeling/simulation/optimization and data base systems, all of which enhance executive and administrative decision making.

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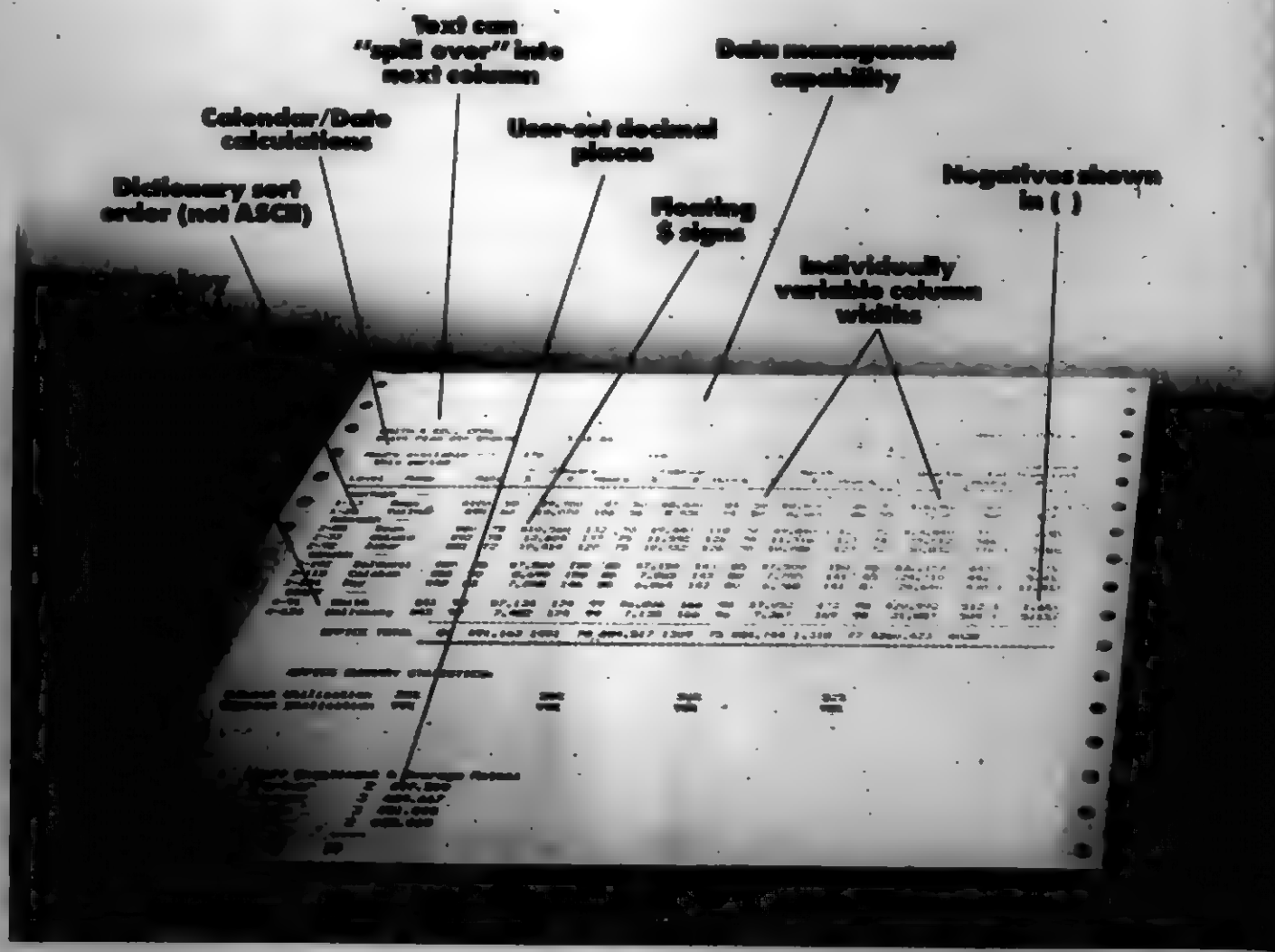

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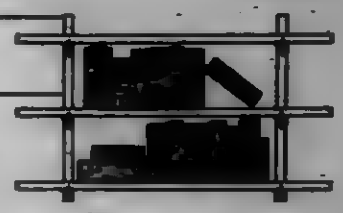

take advantage of information services; and providing the right computer facilities to further decision making. This kind of support can reveal where the company stands now, where it is heading and what the best way is to get there.

One management support system envisioned employs artificial intelligence in a sophisticated question-and-answer process between two people.

Hardcover, 128 pages, $21.95, ISBN 0-442-24753-2. Van Nostrand Reinhold Co., 135 W. 50th St., New York, N.Y. 10020.

MANAGING HIGH-TECHNOLOGY COMPANIES
By Henry E. Riggs

In high-tech companies, technology is the key to business strategy. Engineers seem to predominate, product life cycles are short, the risk is high and change rapid. Directing a company in such an environment demands a special sort of manager, or at least an average manager who understands the special environment in which he operates.

Henry Riggs is currently vice-president for development at Stanford University and director of several Silicon Valley companies. From experience and study, he creates a broad picture of the high-tech company, covering market choices, debt financing, capacity planning, product forecasting, quality circles, vertical integration, corporate culture and much more. For anyone working in high-tech as an engineer or production manager or marketer, this book allows him to place himself in the wider context of the company.

The emphasis is on the differences compared with other industries. High-tech plants tend to be smaller because the economies of scale occur sooner in a plant's growth and because smaller means better in terms of communications. Exploitation of the technology is just as likely to come as the brainstorm of a marketer as an engineer, and customers may be the single best source of ideas.

Riggs intends the book to be a pragmatic look at high-tech companies showing the relationships between engineering, production and marketing. The more each department knows of the others' functions and purpose within the organization, the better they all work together toward the corporate goals.

Hardcover, 340 pages, $35, ISBN 0-534-02720-2. Lifetime Learning Publications, 10 Davis Drive, Belmont, Calif. 94002.

THE PRACTICE OF STRUCTURED ANALYSIS: EXPLODING MYTHS
By Robert Keller

The latest from the Yourdon House of Structured Analysis is purposely short on theory and long on practical advice. This publication posits a world of systems development too unpredictable to be fully governed by any theory. Keller does not offer anecdotes of real DP life, expecting the reader to ferret out the lessons and put them to use in their own companies. He prefers to describe the ideal, structured manner of operating, with accompanying comments of what to do when — as so often happens — the real diverges from the ideal. Sometimes problems even demand non-structured solutions, and the author presents those instances as well.

(Continued on Page 38)

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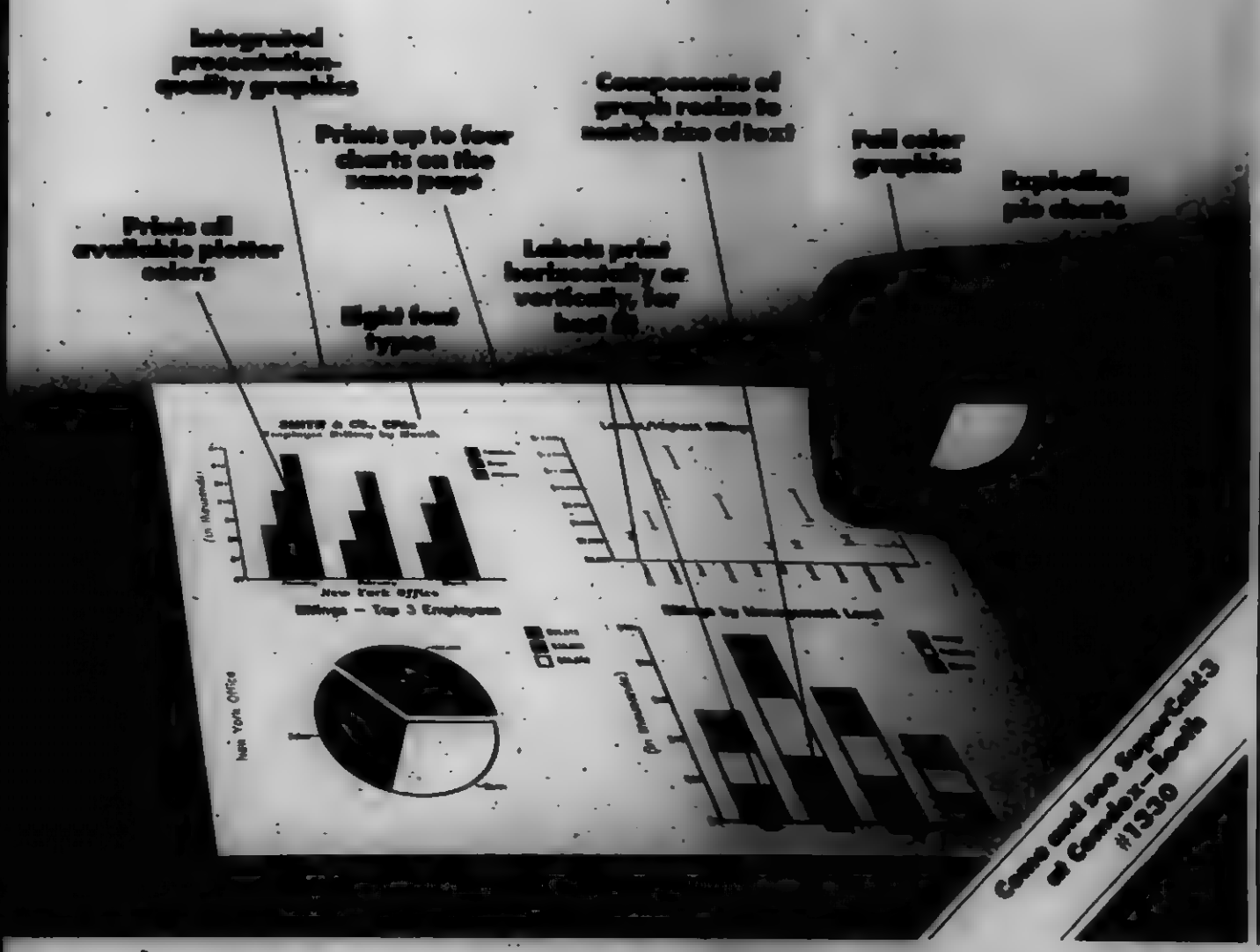

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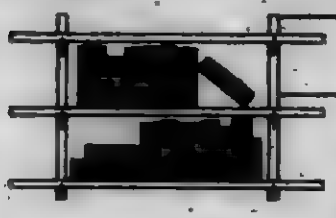

Off the Press

(Continued from Page 37)

The book opens with an overly dramatic portrayal of the analyst as hero and systems development as "a hero journey." This chapter does no more than justify the subtitle — "Exploding Myths" — and the cover art — a dragon, of course. Skip to Chapter 2.

Now we get into definitions as found in the structured analysis lexicon. "Physical," in reference to data, means implementation dependent, and "logical" means implementation independent. Definitions lead to notation and storage of data, to data flow diagrams (DFD) and finally to DFD process descriptions. That said, the author moves to the second half of the book to fulfill in 50 pages the promise of examining structured analysis as a matter to practice rather than preach. More time could have been spent here, more examples offered, more advice from the structured analysis perspective rather than so much explanation of the methodology itself. In this form, the book serves novices far better than those already familiar with the structured way.

Cloth, 136 pages, $18.50, ISBN 0-917072-31-6. Yourdon Press, 1133 Ave. of the Americas, New York, N.Y. 10036.

HIGH-TECH CONSULTING: A GUIDE TO MAKING MONEY AS A COMPUTER CONSULTANT.
By John Zarrella

A consultant answers to no man; decisions are his. He is untethered from a rigid salary structure, free to earn according to his talents and efforts. He escapes office politics and the often grating behavior of upper management.

Such a rosy picture lures many each year to take off the corporate blue suit and try on a different life-style. Consulting *can* bring freedom, wealth and inner peace to those good enough to declare themselves experts and convince others of it. But consulting also brings binding contracts, with the client as boss. Consulting requires earning about 170% of your employed salary to make up for losing paid insurance, vacation, pension and office overhead. Consulting typically means one man working by day, marketing himself by night, with no co-worker to substitute in case of sickness or fatigue.

For those of risky nature ready to take a calculated jump into self-employment, the author covers all the details, some of which would no doubt go forgotten until they grew into business-threatening problems. Filing for a business license, incorporating or not incorporating, choosing office furnishings and billing forms are discussed here among the larger issues of finding clients, restricting liability and getting paid (by negotiating your way onto the client's "quick pay" list).

Advice specific to the high-tech industry appears sparingly — for instance, in the section on what not to forget in estimating a hardware project. Otherwise, the author could change titles and market the book to any other industry.

Cloth, 167 pages, $18.95, ISBN 0-935230-08-4. Microcomputer Applications, 827 Missouri St., Fairfield, Calif. 94533.

Books of Note

THE NEW ALCHEMISTS, by Dirk Hanson: softcover, 364 pages, $4.50, ISBN 0-380-65854-2. Avon Books, The Hearst Corp., 1790 Broadway, New York, N.Y. 10019.

REFERENCE ENCYCLOPEDIA FOR THE IBM PERSONAL COMPUTER, edited by Gary & Karen Phillips: loose-leaf binder, 1,000 pages in two volumes, $69.95. Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, Calif. 90230.

MANAGEMENT INFORMATION SYSTEMS, by Jerome Kanter: hardcover, third edition, 446 pages, $27.95, ISBN 0-13-549543-1. Prentice-Hall, Inc., Englewood Cliffs, N.J. 07632.

NETWORKING VS. NOTWORKING:

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Call for Papers

THE NATIONAL EDUCATIONAL COMPUTING CONFERENCE (NECC), Dayton, Ohio, June 13-15, 1984.

Authors are invited to submit papers describing actual experiences with computer use in the classroom or the consequences of such use on education in general. Papers should report concrete results or be survey or, tutorial in nature and include a synthesis and thorough evaluation. Generally, papers that describe projects presented at previous conferences will not be considered unless substantial new information can be reported. Authors should provide a brief synopsis of the earlier paper, clearly indicating the new information. It is expected that most papers will report on specific materials, problems, programs and measures of success or accomplishment. Papers reporting negative results are also encouraged, especially when the results could have a profound effect on the way educational computing is viewed.

Each paper will be evaluated by at least two referees knowledgeable in the area of the paper and familiar with the type of institution from which it is submitted. Referees recommended by particular cooperating organizations will be directly involved in assessing papers which represent the interest of that group. Papers will be rated on originality, clarity, relevance to the goals of Necc '84, information in the paper and usefulness to the attendees. (Usefulness here refers to transportability of programs and materials or to the potential use of the information and ideas in papers where programs and/or materials are not presented.) Because the proceedings will be distributed at the conference, papers will not be conditionally accepted subject to rewriting.

Authors are to submit an original manuscript and four copies. Papers should be typed, double-spaced and not exceeding 15 pages. Pictorial material should be no larger than 8- by 10-in. glossy black-and-white photographs or other illustrations suitable for photoreduction. The title page of each manuscript must contain the author's name, complete mailing address and telephone number. Each page should have the principal author's name in the upper left-hand corner. If there are multiple authors, the title page should indicate which author will handle correspondence and deliver the talk.

The release of copyright to the conference is a necessary condition for acceptance of a paper. Accepted papers must be retyped by the author in a form suitable for reproduction. Authors will be sent appropriate copyright release forms and forms for retyping the accepted papers.

Paper deadline is Dec. 15, 1983. Papers should be sent to: A.J. Turner, Department of Computer Science, College of Nursing Building, Clemson University, Clemson, S.C. 29031.

THE SOCIETY FOR INFORMATION MANAGEMENT 1984 SOCIETY AWARDS COMPETITION.

The Society for Information Management has issued a Call for Papers for its 1984 Awards Competition. First place award will be $5,000, and the paper will be published in the "MIS Quarterly." Awards up to $3,000 are made to runners-up, and all finalists in the competition will be reviewed for publication in the "MIS Quarterly."

To be eligible for the competition, a paper must describe a management information system (MIS), an approach to developing information systems, a technique for improving MIS activity or the management of the MIS activity. The work described must be in-place and implemented and must have been evaluated and judged to have had a significant impact on the organization involved, as in contributing to improved profits, services or communications. Telecommunications and word processing are also acceptable topics.

Since the focus of the society is on top management, the work described must address top management issues — the impact of systems support on top management decision making, the timely and/or effective presentation of information to top management. Papers must clearly define a conceptual and managerial context in which to view the work. Impact of the work must be validated by the senior user management of the organization where the work was implemented. The work described should relate to the management of the information systems resource within a complex organization, rather than to the technology of information handling.

Applicants for the competition must submit an abstract of their work by Dec. 15, 1983. The abstract must be no longer than 1,000 words and must include a brief statement of the work, its impact, the extent of its implementation and statements of senior managers validating the impact.

Papers should be sumitted to E. Nancy Markle, vice-president for Information Services, Federal National Mortgage Association, 3900 Wisconsin Ave. N.W., Washington, D.C. 20016.

THE TRENDS AND APPLICATIONS CONFERENCE, Silver Spring, Md., May 23-24.

The conference will be cosponsored by the National Bureau of Standards and the IEEE Computer Society. The subject selected for 1984 is "Making Data Base Work."

Papers are being solicited in the following areas of data base: user interface, new technology, overcoming barriers, management, con- [illegible] and applications.

Notification to authors of acceptance will be made by Feb. 1, 1984, and camera-ready manuscripts for the proceedings will be due by March 15, 1984. Further information and a copy of the call for papers are available through Trends and Applications '84, P.O. Box 639, Silver Springs, [illegible].

Authors are requested to submit three copies of completed papers by Jan. 15, 1984 to: Dr. David Jefferson, Trends and Applications '84, P.O. Box 639, Silver Spring, Md. 20901.

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Survey Needs Participants

SANTA MONICA, Calif. — CRWTH Computer Coursewares is seeking 2,000 participants for a survey on the current status of the information center.

A questionnaire has been developed to identify the stages of implementation, user population, staffing requirements and responsibilities of the information center, CRWTH said. Another goal is to determine the software and hardware supported by the information center and to ascertain the role of the microcomputer vs. the mainframe, so that appropriate training materials can be developed for the end users of the information center.

The results of the survey will be published in the upcoming CRWTH newsletter, a publication for information center managers and computer-based training specialists. Questionnaire respondents will receive copies of the survey findings.

Interested parties may obtain copies of the questionnaire by sending their business cards to Bibi Garcia at CRWTH, Suite 200, 613 Wilshire Blvd., Santa Monica, Calif. 90401.

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TXP: 32-bit transaction processing.

The TXP system processes high volume loads faster and more economically than any other system. Executing over 100 transactions per second now and thousands of transactions in the near future.

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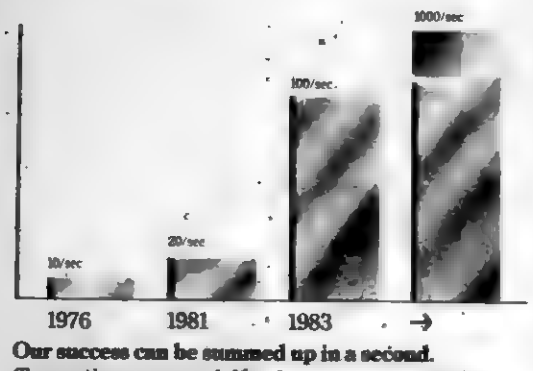

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The TXP system also features parallel data paths. Manipulating 32 bits of information in a single cycle. Or two 16-bit operations in the same cycle.

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Cache memory is a high-speed data storage area between the processor and main memory. It lets the processor store more frequently used information closer. So it can get to it faster.

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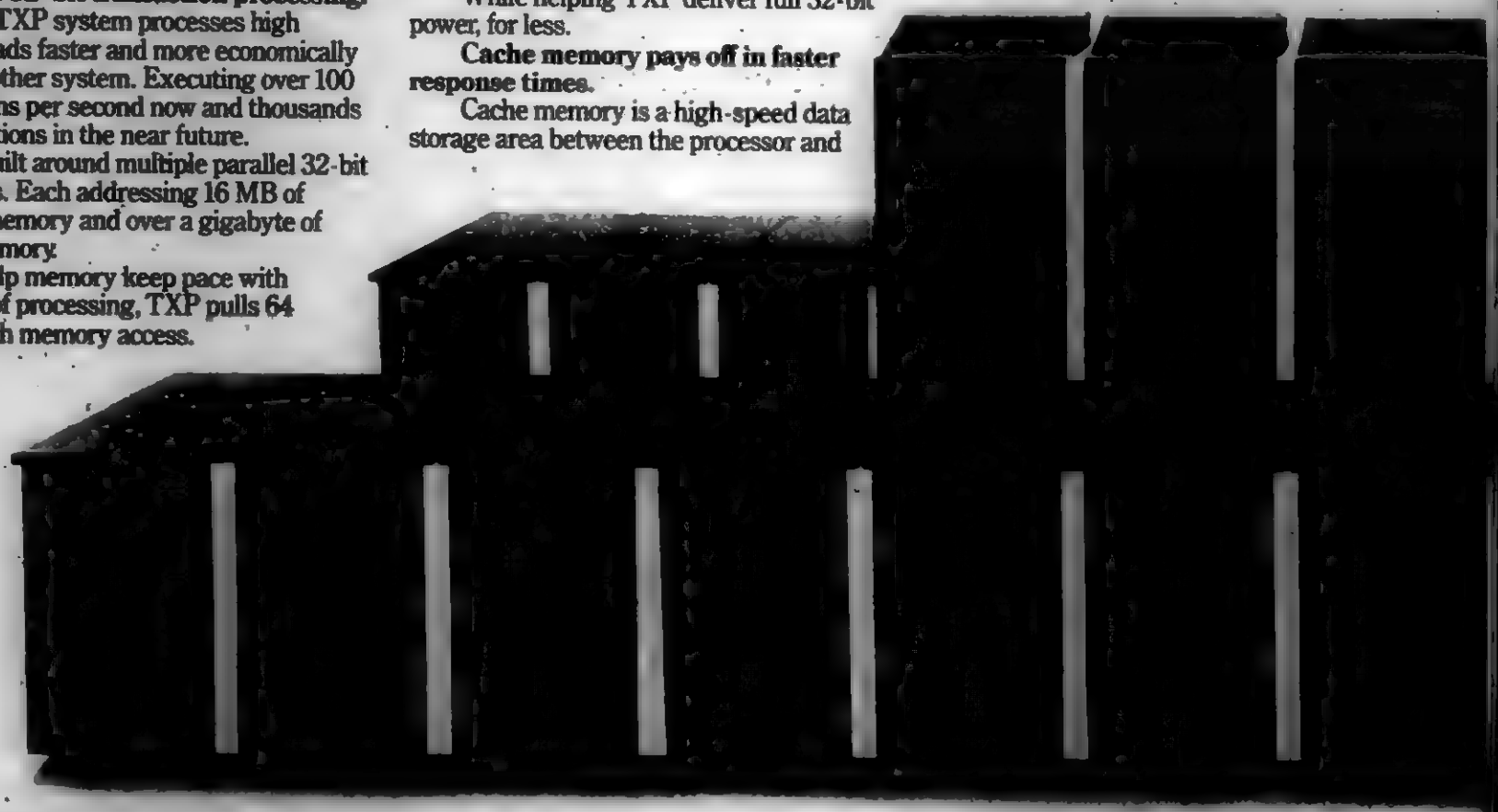

XP

computer in business today.

massive loss of revenue that's unavoidable during the switch-over.

Not so with the TXP system.

It can expand from two to 16 processors. Increasing its power by a factor of eight.

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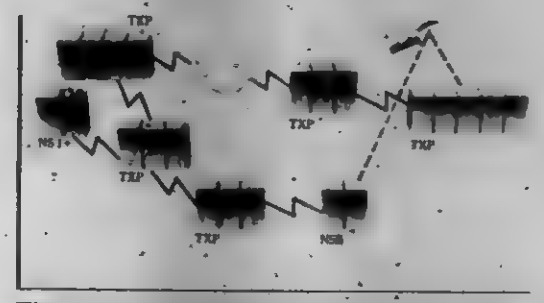
And that gives TXP the most powerful on-line computer capacity in business.



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TXP can process more information and support more programs, users and devices than any other computer designed for on-line transaction processing.

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Over eight years ago.

And for over eight straight years, despite attempts by others, we've continued to lead the industry.

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Or write Tandem Computers Incorporated, 19333 Vallco Parkway, Cupertino, California 95014.

Or call us, toll-free. (800) 482-6336.

TXP is the most powerful on-line computer in business today.

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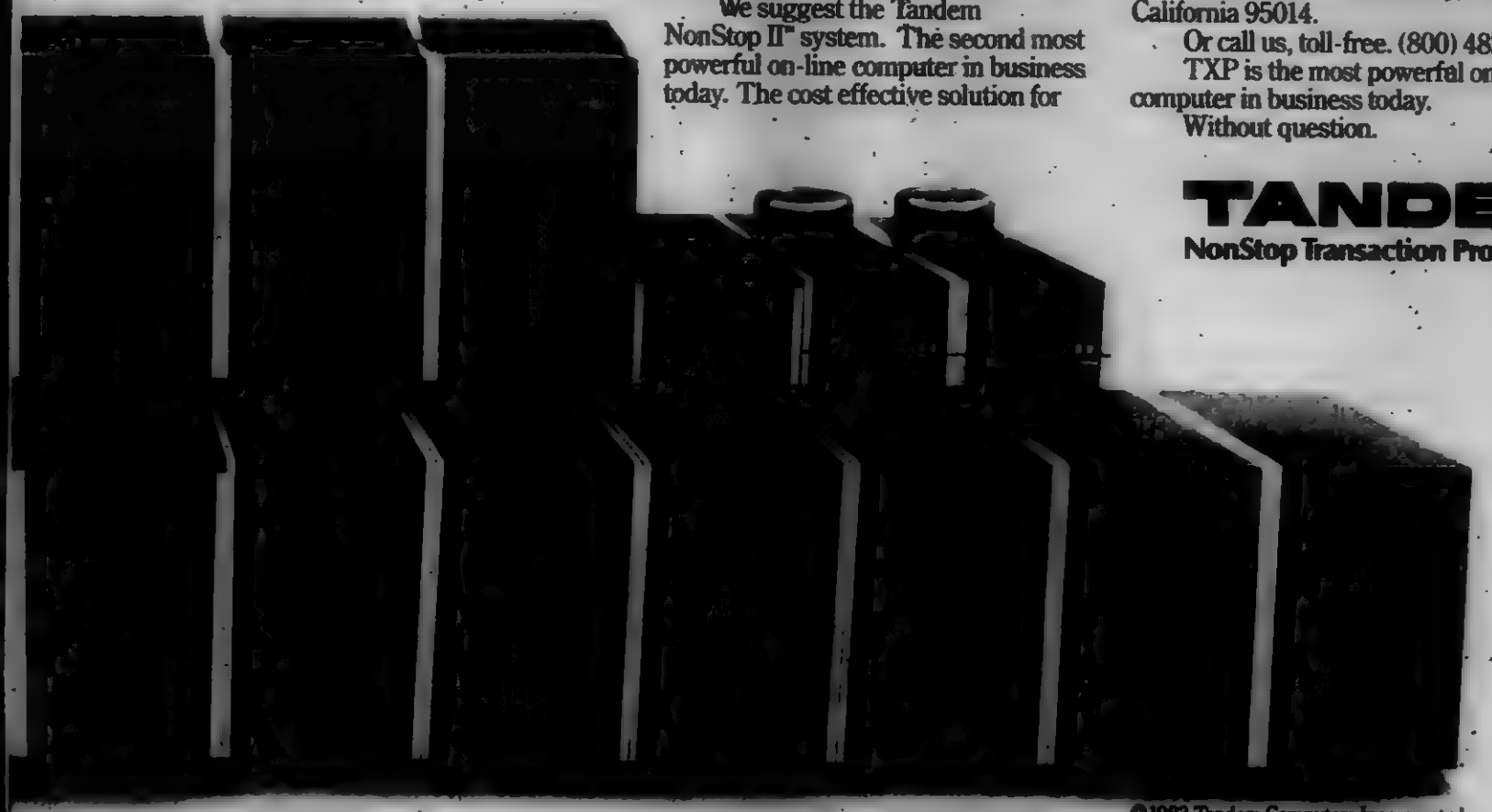
NonStop Transaction Processing



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Calendar

Week of Nov. 27

Dec. 1-2, New York — **How to Analyze and Evaluate the Cost and Service Impacts of the New Tariffs, Access Charges and Divestiture on Your Telecommunications Networks.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Dec. 1-2, Los Angeles — **Computer Networks: Protocols, Standards and Compatibility.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 1-2, Palo Alto, Calif. — **Fifth-Generation Languages.** Contact: Data Processing Management Association Education Foundation, Department FGL, Suite 2000, P.O. Box 3608, 3420 Kashiwa St., Torrance, Calif. 90510. Also being held Dec. 5-6 in Los Angeles.

Dec. 1-2, Washington, D.C. — **Cost-Effective Software Design.** Contact: Data Processing Management Association Education Foundation, Department CESD, Suite 2000, P.O. Box 3608, 3420 Kashiwa St., Torrance, Calif. 90510.

Dec. 1-2, Atlanta — **Micros in the Corporate Environment.** Contact: Techtran, 72 Cummings Point Road, P.O. Box 10212, Stamford, Conn. 06904.

Dec. 1-2, New York — **Telecommunications Strategic Planning Methodologies.** Contact: Marilyn Chasteen, The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

Dec. 1-2, Minneapolis — **Software Engineering.** Contact: Battelle, 4000 N.E. 41st St., P.O. Box C-5395, Seattle, Wash. 98105. Also being held Dec. 8-9 in Detroit.

Dec. 4-6, Andover, Mass. — **Electronic Document Distribution.** Contact: Institute for Graphic Communication, 375 Commonwealth Ave., Boston, Mass. 02115.

Dec. 4-7, Atlanta — **The Fifth International Conference on Automation in Warehousing.** Contact: Institute of Industrial Engineers, IIE Conference Department, 25 Technology Park/Atlanta, Norcross, Ga. 30092.

Week of Dec. 4

Dec. 5, New York — **Introduction to the IBM Personal Computer.** Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 7th Ave., New York, N.Y. 10123.

Dec. 5, New York — **Structured Systems Development.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 5, New York — **CICS/VS Concepts and Facilities.** Contact: Teltech, 39 Broadway, New York, N.Y. 10006.

Dec. 5-6, Los Angeles — **Local- Area Networks: Selection and Guidelines.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 5-6, Dallas — **Voice Mail and Messaging Systems: How to Select, Implement and Manage.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Dec. 5-6, San Francisco — **Quality Assessment of Analysis and Design.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 5-6, Dallas — **Office Automation.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

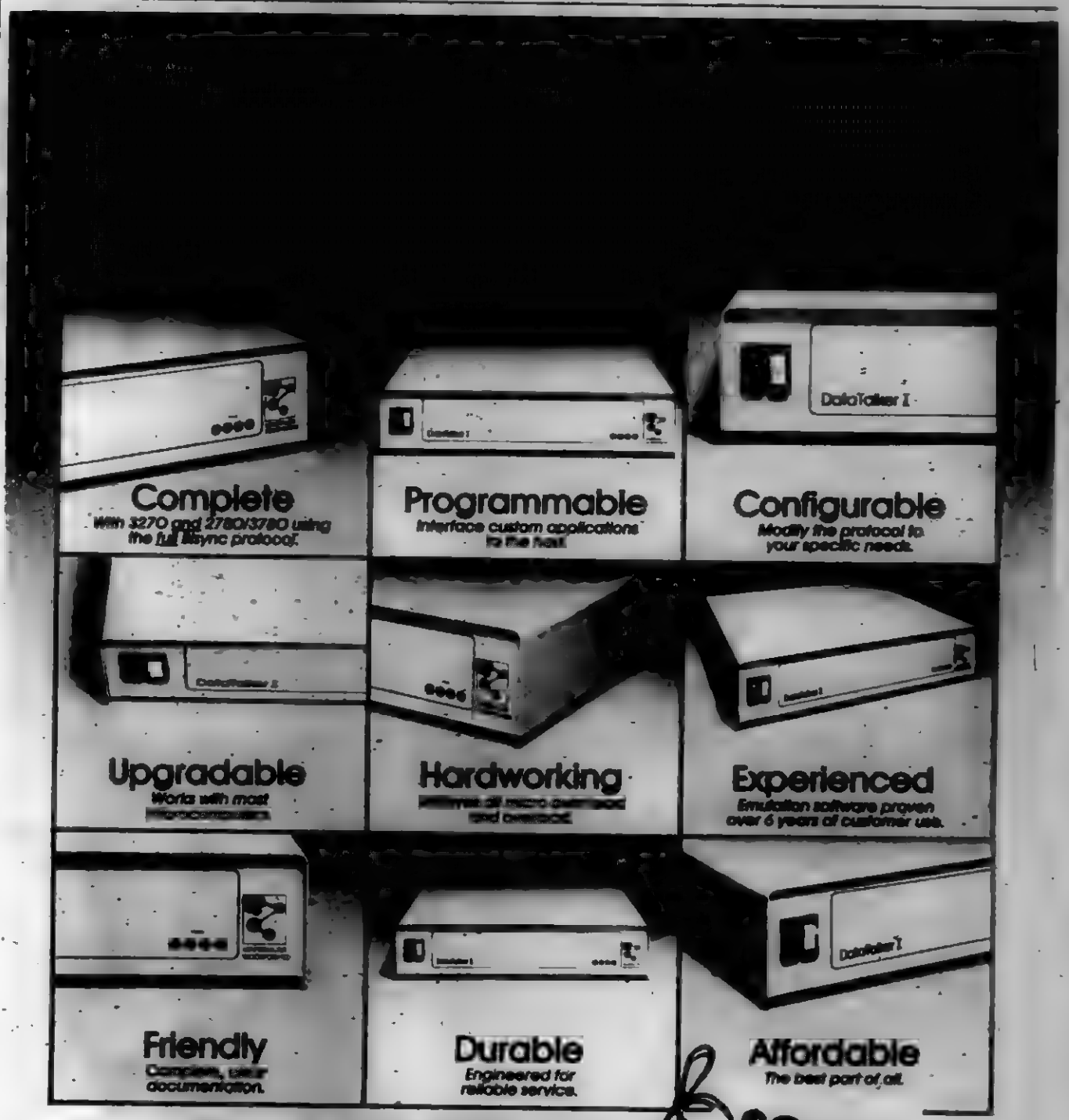
Dec. 5-6, New York — **Computers and Management.** Contact: Grumman Data Systems Institute, Center for Professional Development, 280 Crossways Park Drive, Woodbury, N.Y. 11797.

Dec. 5-6, Washington, D.C. — **Quality Assurance and Verification and Validation.** Contact: Data Processing Management Association Education Foundation, Department SQA, Suite 2000, P.O. Box 3608, 3420 Kashiwa St., Torrance, Calif. 90510. Also being held Dec. 12-13 in Boston.

Dec. 5-6, San Francisco — **Systematic Software Testing.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 5-6, Detroit — **Implementing Personal Computers in the Corporate Environment.** Contact: The

(Continued on Page 47)



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American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held Dec. 6-8 in Minneapolis, Dec. 12-13 in Philadelphia, Dec. 15-16 in New York and Dec. 19-20 in Chicago.

Dec. 5-6, San Francisco — **Team Management Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 5-6, Natick, Mass. — **Programmable Controllers: Basis of the Control Revolution.** Contact: Kathy Shaw, Office of Continuing Education, Higgins House, Worcester Polytechnic Institute, Worcester, Mass. 01609.

Dec. 5-6, Chicago — **Rational Data Bases: Fact or Fancy?** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 5-6, Chicago — **Managing Projects in the Structured Environment.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036

Dec. 5-6, Dallas — **Enhancing SAS Technical Support Skills.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Dec. 5-6, Nashua, N.H. — **Corporate Problem Solving with Microcomputers.** Contact: New Hampshire College, Resource Center, 2500 N. River Road, Manchester, N.H. 03104.

Dec. 5-6, Chicago — **Micro/Mini Financial Applications Conference.** Contact: Financial Managers Society, Inc., 111 E. Wacker Drive, Chicago, Ill. 60601.

Dec. 5-7, Dallas — **Structured Analysis for Users.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Dec. 5-7 in San Francisco.

Dec. 5-7, Chicago — **Data Administration: Successful Techniques.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 5-7, San Juan, Puerto Rico — **Data Communications Systems.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705. Also being held Dec. 7-9 in Woodbury, N.Y.; Dec. 14-16 in Los Angeles; and Dec. 19-21 in Dearborn, Mich.

Dec. 5-7, New York — **Internal Controls and Data Security Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 5-7, New York — **Data Communications: An Introduction to Concepts and Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held Dec. 5-7 in Atlanta.

Dec. 5-7, Atlanta — **Minis/Micros With IBM Mainframes.** Contact: Techtran, 72 Cummings Point Road, P.O. Box 10212, Stamford, Conn. 06904.

Dec. 5-7, Chicago — **Introduction to Computer Concepts.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 5-7, Denver — **DP Project Management: A Practical Approach.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 5-7, Washington, D.C. — **Personal Computers: Strategies for Managing.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 5-7, San Francisco — **The First International Conference on The Future of Optical Memories, Videodisk and Compact Disks to the Year 2000.** Contact: Technology Opportunity Conference, P.O. Box 14817, San Francisco, Calif. 94114.

Dec. 5-7, New York — **Structured Testing.** Contact: McCabe and Associates, Inc., Suite 111, Twin Knolls Professional Park, 5501 Twin Knolls Road, Columbia, Md. 21045.

Dec. 5-7, Phoenix — **Network Communications Protocols.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705. Also being held Dec. 12-14 in Washington, D.C.; Dec. 14-16 in Philadelphia; and Dec. 19-21 in Irvine, Calif.

Dec. 5-7, San Francisco —

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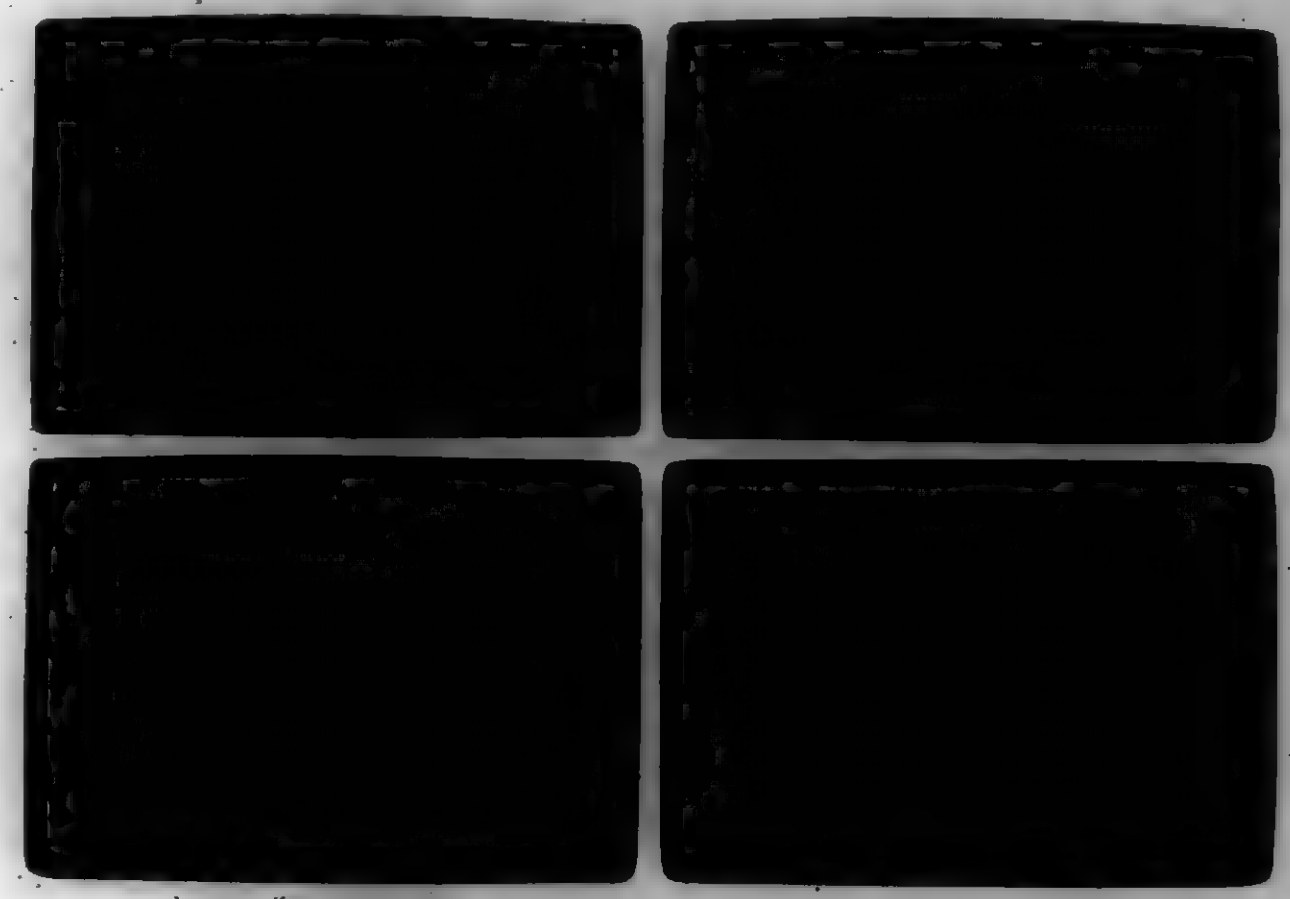

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Basic Systems Analysis. Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 5-7, Dallas — **Microcomputer Systems: A Guide to Selection and Application.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 5-7, Dallas — **CICS/VS Internals for Systems Programmers.** Contact: Goal Systems International, Inc., 5455 N. High St., Columbus, Ohio 43214.

Dec. 5-7, Orlando, Fla. — **Data Dictionaries: Concepts, Contents and Uses.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

Dec. 5-7, Anaheim, Calif. — **Data Communications Concepts and Facilities.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 5-7, Washington, D.C. — **Data Communications for Microcomputers: Acquisition, Applications and Implementation.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 5-7, Los Angeles — **CICS/VS On-Line Design.** Contact: Southern Training Corp., Suite 1030, SCN Center, P.O. Box 11692, Columbia, S.C. 29201.

Dec. 5-7, Chicago — **Data Base Management Systems for Micros and Minis.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 5-7, Chicago — **Project Leadership Laboratory.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Dec. 5-7 in San Francisco.

Dec. 5-7, Washington, D.C. — **Project Management for Telecommunication Systems.** Contact: Architecture Technology Corp., P.O. Box 24344, Minneapolis, Minn. 55424.

Dec. 5-7, New York — **Office Automation: Strategic Planning, Design and Implementation.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 5-7, Boulder, Colo. — **International Tele/Conferencing Symposium.** Contact: Cross Information Co., Suite B, 934 Pearl Mall, Boulder, Colo. 80302.

Dec. 5-8, Washington, D.C. — **ADP and Telecommunications Acquisition Management.** Contact: George Washington University School of Government and Business Administration, ADP and Telecommunication Acquisition Management Department K, 1805 Powder Mill Road, Silver Spring, Md. 20903.

Dec. 5-8, Boston — **National Data Base and Fourth-Generation Language Symposium.** Contact: Software Institute of America, 339 Salem St., Wakefield, Mass. 01880.

Dec. 5-8, San Diego — **Structured Analysis and Systems Architecture Seminar.** Contact: Janis Halsted, Oberland Associates, 4036 N.E. Sandy Blvd., Portland, Ore. 97212.

Dec. 5-8, Atlanta — **CICS On-Line Application Design.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 5-8, Fort Lee, N.J. — **IMS/DB (DL/1) Application.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Dec. 5-9, New York — **Hands-On C Language Programming Workshop.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011.

Dec. 5-9, New Orleans — **Establishing Computer Configuration Capacity.** Contact: Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Dec. 5-9, Atlanta — **Advanced Structured Analysis.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Dec. 5-9 in San Francisco.

Dec. 5-9, Atlanta — **CICS/VS Command-Level Programming.** Contact: Data Base Management, Inc., 1075 Tolland Tnpk., Manchester, Conn. 06040.

Dec. 5-9, New York — **Project Management.** Con-

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tact: Brandon Systems Institute, 4720 Montgomery Lane, Bethesda, Md. 20814.

Dec. 5-9, Anaheim, Calif. — **Structured Analysis and Design Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Dec. 5-9 in Chicago and San Francisco.

Dec. 5-9, Atlanta — **IMS Systems Management.** Contact: Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Dec. 5-9, San Francisco — **CICS/VS Internals.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Dec. 5-9, Boston — **Structured Analysis and System Specification Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Dec. 5-9 in Houston and in Portland, Ore.

Dec. 5-9, Toronto — **Basic Systems Analysis.** Contact: Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

Dec. 5-9, Atlanta — **Structured Design Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Dec. 5-9 in Phoenix and in Anaheim, Calif.

Dec. 5-9, Dallas — **IMS/VS Data Base Design.** Contact: Data Base Management, Inc., 1075 Tolland Tnpk., Manchester, Conn. 06040.

Dec. 5-9, Chicago — **Structured Design for Real-Time Systems.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Dec. 5-9 in Dallas, Phoenix and Washington, D.C.

Dec. 6-7, Washington, D.C. — **Personal Computer Local Networks.** Contact: Architecture Technology Corp., P.O. Box 24344, Minneapolis, Minn. 55424.

Dec. 6-7, New York — **Personal Computers: A Hands-On Experience.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

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EDITORIAL

Taking It Out on the Users

The Internal Revenue Service has dealt computer systems users an injustice by denying tax-exempt status to users groups devoted to a single vendor's product line.

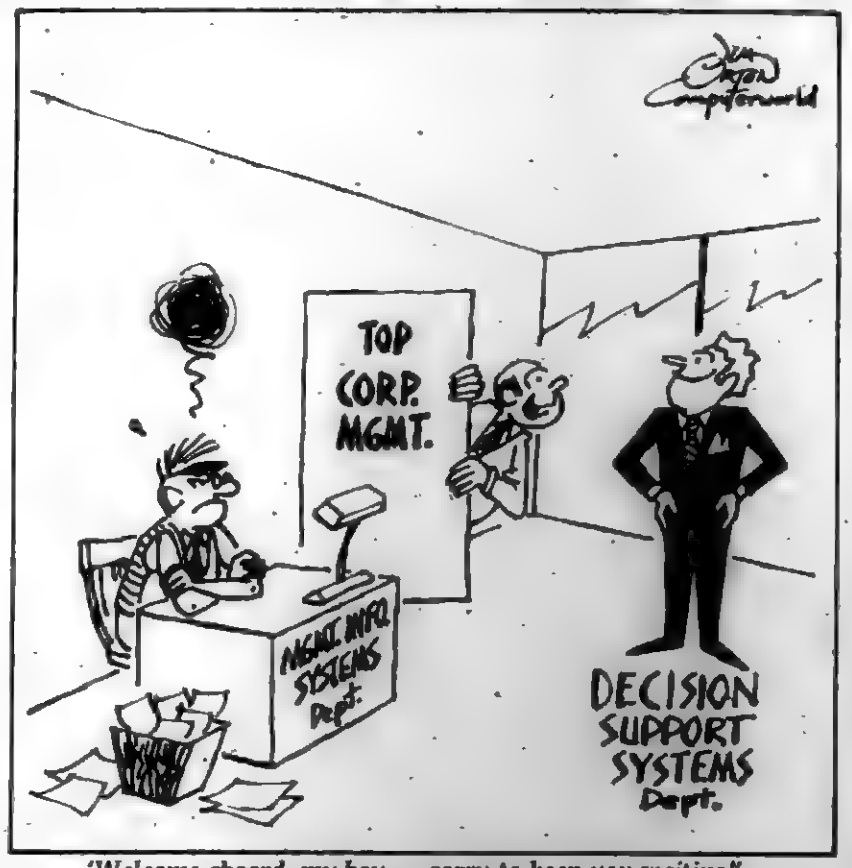
The IRS ruled that such organizations can no longer qualify as tax-exempt business leagues [CW, Nov. 14] because they might give large computer vendors an unfair advantage over smaller firms. Now, to qualify for the tax-exempt status, users groups must allow manufacturers of competing systems to attend and participate in regular meetings.

To some degree, the IRS decision has merit. Big vendors such as IBM, which has three users groups, reap the benefits of well-attended meetings peppered with technical experts and consultants. The experts often make complaints and suggestions, which can be parlayed into highly successful products. Users groups devoted to smaller vendors' products lack the sheer numbers that large users groups like IBM's Guide, Share and Common draw. They often fail to draw the same level of technical experts, which puts the smaller vendors at a competitive disadvantage.

But why take it out on the users? The original idea behind users groups was to provide an open forum for users to discuss their problems, compare notes and ask questions. Users groups were never intended to provide brainstorming sessions for the vendors' benefit.

The vendors are not blameless either. Prime Computer, Inc., for example, refused to attend the February meeting of the Eastern Region Prime User's Group meeting because other vendors will be allowed to show their wares.

Without tax-exempt status, users groups will have to either rely more heavily on vendor funding or raise their membership fees and conference charges. Either option poses problems. If the users groups become more closely tied to the vendors, they can be bullied. If they retain their independence and raise their fees, some users will have to drop out or attend fewer meetings because the cost has become too high.



'Welcome aboard, my boy — sorry to keep you waiting!'

DATA PAST

Five Years Ago
Nov. 27, 1978

DAYTON, Ohio — NCR Corp. announced its largest systems ever with the introduction of two mainframes featuring emitter-coupled logic, 64K-bit memory chip technology and gate speeds of 750 picosec. The NCR production was apparently aimed at competing with IBM's 3032 and 3033 processors.

— — —

RICHMOND, Va. — The State Board of Elections here completed its official statewide canvass of the U.S. Senate election votes to settle a contest that had been troubled by computer foulups and human inaccuracies. Unofficially, Republican John W. Warner defeated Democrat Andrew P. Miller earlier this month in what was described as the closest general election in recent Virginia history. However, the accuracy of the 1.2 million vote count and the News Election Services computer were questioned because of numerous delays and discrepancies.

Ten Years Ago
Nov. 28, 1973

OTTAWA — The Canadian government issued a patent on a software system the inventor described as a "revolutionary" approach to management reporting, analysis, financial and accounting operations that are so "fundamental" to business, the patent "will affect the entire accounting and computer industry." The patent was issued to David M. Homa, president of Xoma Ltd., a Montreal-based consulting firm, who warned that he intended to have his invention recognized and royalities paid to his company.

— — —

LOS ANGELES — IBM countersued California Computer Products, Inc., charging that the firm had monopolized the market for digital plotters and, therefore, kept IBM from entering that market. The move came from the IBM legal team, which dealt with all of the members of the plug-compatible peripherals market presently suing IBM.

LETTERS

'Qualified' DP Applicants

In recent issues of DP trade publications and *The Wall Street Journal*, articles have again appeared complaining of the difficulty in finding "qualified" DP applicants.

All of these articles discussed those in the top 10% to 20% (preferably the 10%) who are happy at their present jobs, highly productive and are the most desired applicants because they are considered to be the "best qualified."

It is these applicants DP managers seek to induce to leave their current jobs in DP for new ones. The implied assumption is that those not in the upper 10% to 20% range that are currently employed are, for various reasons, unqualified or unattractive as applicants.

This assumption that only those who are currently employed are qualified, because those who are not employed are obviously deficient, is one of the popular hiring myths that is widespread throughout the U.S. and creates a roadblock against the unemployed.

This assumption is bias-laden, opinionated, myopic and unjust. It can be proven simply by thinking for a few minutes of the hundreds of different reasons people are fired or laid off, reasons that have nothing to do with performance, abilities or skills.

Any number of books dealing with industrial psychology, personnel or job tenure can detail lists of reasons for firings.

These articles reveal some very interesting facts when viewed beyond the surface-level opinions. According to the cries of the many DP managers who supposedly represent widespread managerial thinking in DP as reported in these articles, only 10% to 20% of employees are happy and productive.

It has been asserted that people who love their jobs will always be happier, more productive and more successful compared with those who are not. Only those who are strongly motivated by their job tasks will fit into the employee class indicated above.

If one applies these valid and firm observations, which result from sound motivation principles, to the 10% to 20% figures sought by DP managers, one must conclude that only 10% to 20% of DP employees are strongly motivated.

This means that only 80% to 90% of DP employees are not strongly motivated.

What a sorry condition in data processing that the very managers who condemn the unemployed DP workers as unqualified and therefore not worthy of serious consideration for new DP jobs have themselves been able to build a motivational work atmosphere of only 10% to 20% of their DP employees.

In other words, out of a 100-person DP department, only 10 to 20 employees are strongly motivated by their DP job tasks and environment.

John Callahan
Arlington, Texas

A Thief Just the Same

Max Schindler's letter to the editor [CW, Oct. 24] asserts that if Bennet N. Babcock leaves the doors to his house open when he goes on vacation the silver thieves can't be convicted.

This is nonsense. It may be silly not to have security, but trespassing or theft is trespassing or theft even if the door is open.

I agree it would be silly for the bank to leave the vault unlocked at the end of the day, but if Schindler goes in and takes the money, he's a thief just the same.

Ben Cohen
Chicago, Ill.

HUMAN CONNECTION/Jack Stone‡

There's More Than One Way to Hunt a Duck

My friend, Capt. J. Donald Griffin, one of the world's all-time great professional hobbyists, called me recently to talk about the need for bringing small microprocessors into the hunting of ducks, one of his favorite pastimes.

Because of the unusual significance of this topic, the fact that little attention has been given to it in the trade press and the recent trend toward environmentalism, I felt that the topic was timely for this column. Here's what Griff had to say:

"The sport of duck hunting, unbeknownst to those who don't participate, is governed by laws that were largely created centuries ago and, in a number of respects, force many hunters to run somewhat afoul of the law. Here's the way it works:

"Most states assign values to ducks based on a 'point' system and allocate a hunter so many points a day, typically 100. This is perfectly acceptable when you stalk a flock of teal or goldeneyes, usually rated at 10 points a head. But wood ducks and redheads go for 70 or more, so one good shot would spoil the rest of the day's outing.

'One notion I have is to connect a little passive radar scanner to an input channel of the computer and do a little in-flight tracking. Then, too, a computer-driven voice synthesizer and loudspeaker system would be useful to generate appropriate duck calls.'

"Some outdoorsmen have thought about a computerized system in which every bird is marked with a class identifier code, and the hunter is supplied with a palm-size computer for fowl data processing. After spotting a bird's code through a telescopic sight, the hunter need only punch in the code along with a state ID symbol and the computer would respond with 'snow goose, Maryland, 60 points, maximum daily allowance 120 points.

Chip-Based 'Bird Tag'

"Others have even suggested that a chip-based 'bird-tag' be used, one with a little radio frequency transmitter, so that when the bird comes into range, a signal would be sent to the computer, displaying the class of bird, point count, aggregate points at that time and a recommendation on whether or not to shoot.

"These people haven't gone far enough, apparently not appreciating that state-of-the-art techniques permit us to move much further ahead. One notion I have is to connect a little passive radar scanner to an input channel of the computer and do a little in-flight tracking. Then, too, a computer-driven voice synthesizer and loudspeaker system would be useful to generate appropriate duck calls.

"In addition, there is the need for a militarized version of the machine to maintain system reliability in the frigid, moisture-filled, mud-laden, Eastern Shore marshland that we typically encounter during hunting season. There aren't many customer engineers who are willing to get outfitted in hip boots to fix hardware bugs at four in the morning.

Automatic Unloading

"Still others have suggested that the hunting gun be under the control of the computer facility so that, for example, when the hunter had achieved his daily limit, the gun would automatically unload itself and replace itself in its case.

"So far, so good. But we desperately need a highly mobile robot that would replace a dog and tear across swamps at high speeds to retrieve our bags.

"I can hardly elaborate on the idea of the government prepackaging nuclear-powered ducks and giving each hunter a federal water fowl stamp and a personal display unit that he can use only during official hunting hours. The computer would identify the ducks from their radiation signals, figure the proper combination of targets to meet the daily limits and blank out the screen when the limit is reached. Now that's real computerization!"

Letters to Stone should be addressed to Box 33699, Washington, D.C. 20033.

GETTING AHEAD IN DP /Donald J. Berardo‡

The Work-Obsessed DPer: A High Price to Pay for Success

Many professions, including DP, say that it is absolutely necessary to "get the job done" or to "meet our corporate demands." In fact, studies have shown that most of us continue to think about our work throughout the day and night whether we're actually working or not.

The total time we spend thinking about and doing our DP tasks can be as high as 15 hours or more per day — for six days each week — or up to 4,500 hours per year. Now try to calculate your hourly rate using your own figures or the think-time and work-time figures above.

These facts are only the beginning of a gruesome picture of how many of us strive to succeed. The actual toll on our health, our family life and our longevity because we don't leave our work at work can be psychologically and physically devastating. However, most DPers would agree that the results justify the means — that success and money may buy all of the pleasure and happiness that we need. But this is wrong.

Most national studies on health in the work place indicate a strong connection between work stress and a host of illnesses. DPers, in particular, suffer from a special kind of "workamania" that can cause them to be victimized by the insatiable matrix/DP monster.

High divorce rates, widespread depression, high blood pressure, poor vision, chronic headaches, peptic ulcers, alcoholism and other drug-related addictions are only a few of the problems related to the DPer's dilemma.

The DPer seems to express an inability to restructure his life so that it becomes more balanced and pleasurable. As a group, DPers simply automate themselves into an early grave because their work stress is always with them. Like a continuous loop subset, it invades every cell of their existence. It causes DPers to carry their work home too often and to confuse the healthy boundaries they need to separate work, family and play.

Ironic Failure

An inescapable result of such striving is to risk illness, divorce and, ironically, failure at home and at work. DPers, accountants, lawyers and others don't have to live this way; some basic changes in their priorities and expectations can bring enormous personal rewards.

First, as much as you can, examine every detail of your present work and personal life. This is initially cumbersome and aggravating, but it gradually shows you where you are spending your time and with whom, what your priorities are and the way you work — smart and easy, or long and tough.

Now look at your data and your plan and ask yourself these questions: Can all of this be done in a normal workday of seven to eight hours? Do I have to do it all, or can I delegate? Are my priorities correct?

Gradually begin to simplify the process by using less detail. Use just

(Continued on Page 52)

THE DATA CENTER /John P. Murray‡

Separating Maintenance From Development Function

Larry Long, in his article "Should DP Functions Be Separated?" [CW, Aug. 30, 1982], responded to a question from a reader who was concerned about a proposed organizational change that would separate the function of systems maintenance from development. The reader's concern was with the validity of such a structure.

Long favored the more traditional approach, which is to keep maintenance and development in the same section. I would like to suggest the alternative approach of separating the two functions. This is not necessarily a better approach, but it does have certain advantages. In many installations, the traditional approach has not proved to be terribly effective, so consideration of something else is worth a try.

There is a basic problem with the maintenance aspect of work or, as Long calls it, the "enhancement" effort. "Maintenance" is a word we should drop from our management information systems (MIS) vocabulary; its negative connotations do nothing to enrich the very necessary and important work that must be done to improve operational systems.

As long as the general perception is that all the glamour, excitement and reward are to be found in the design and development of new systems, the effort to encourage people to develop a strong interest in systems support work will be difficult. It is clear that there is an urgent and growing need for improvement in the management of system enhancement functions.

How will the separation of the functions (development and systems support) improve the enhancement effort? Because of the different demands of each function, the emphasis of the work in one function causes distraction in the other.

Second-Class Status

Usually, unless the operational system is really "broken," the emphasis under the traditional approach is to place primary attention on the development of new systems. This means that enhancements become second-class items and, therefore, carry the connotation that the work is also second class.

As long as people feel that judgment of their performance and, consequently, their salary and promotion progress are tied to project results, as opposed to enhancement efforts, it will be difficult to build much enthusiasm for a consuming interest in systems support work.

Dividing the function into two separate but equal sections within the department, each with its own manager, can produce more effective results in both areas. The separation not only relieves some of the distraction of attempting to concentrate on two dissimilar entities, but also provides increased opportunity to focus on the specific area of concern. This makes it clear to each employee that

(Continued on Page 52)

Upgrading the Definition of Maintenance

(Continued from Page 51)

responsibility and performance measurement are linked to a specific [illegible].

Under the proper management, the separate enhancement section will reduce the overall work load in the enhancement section and, at the same time, improve the image of the MIS department within the client [illegible].

If the systems support group has the authority to negotiate with the development group for the quality of the system to be turned over to it for operational support; and if both managers work to see that appropriate standards are developed and adhered to; the general level of the initial systems will improve, and the scope of the enhancements will be less.

There is a benefit to the development group, even though it may have to deliver better systems than in the past.

'One of the drawbacks to the separation of the functions is that it produces increased tension between the managers of the respective areas. They are certain not to agree all the time on the conditions of acceptance, and discussions are bound to come up that will require some form of arbitration.'

Once it has been able to get the systems support group to accept the system as operational, it no longer has to worry about it. How many people in MIS have developed a system and then found that they "owned" that system whenever anything went wrong with it?

One of the drawbacks to the separation of the functions is that it produces increased tension between the managers of the respective areas. They are certain not to agree all the time on the conditions of acceptance, and discussions are bound to come up that will require some form of arbitration.

These situations, in turn, create some additional concerns for the MIS manager, but the net result, improved MIS performance, is worth the effort.

There may be an even more important issue here: the unwillingness of many MIS departments to change for the sake of developing something new.

However, such a change in the department's structure may help provide a fresh perspective for other concerns as well. In any case, it doesn't hurt to try.

Murray is director of MIS for Ray-O-Vac Corp., Madison, Wis. He is responsible for worldwide MIS activities. Murray has 21 years of DP experience, 10 of which have been devoted to the management of data centers.

'Workamania' Seen High Price For Success

(Continued from Page 51)

an outline. But most importantly, change your plan. A new plan must always include:

- Consistent playtime.
- Healthful sleep time.
- Pleasurable family time.
- Restful alone time.

Next, log all of the times and work-related topics that occur after a normal workday in order to decontaminate your other roles of any overtime, work-related thoughts or activities. Now come the most difficult steps: Give yourself permission to restructure your activities permanently in a more balanced, pleasurable way and concurrently solicit the cooperation of other key figures in your life so that you can follow through on your healthy changes.

Berardo is a management counselor and career therapist. He is a vice-president with the Meld Group in West Hartford, Conn., publishers of a monthly newsletter on management development.

LETTERS

Hypocrisy on TV

Reading the recent comments about hackers has caused me to be concerned about the security of my system, and I have taken the most simple of all security steps: I changed all the passwords.

What really has me concerned, though, is the glorification of the abuse of computer access on TV.

I wonder how long the networks could show children joyriding in cars, smoking a few joints and "borrowing" items from the neighbors before America's parents would be up in arms.

Amy E. Parker
Data Processing Manager
Arthritis Foundation
Atlanta, Ga.

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LETTERS

Government DPers

Having subscribed to *Computerworld* for almost a year, I'm disappointed to find that there are not many articles on the data processing professional working for the government.

Do people in the DP industry feel that government DPers aren't paid enough? That they don't receive enough education? Why not examine government DPers?

At this time, the only category that recognizes my B.S. in computer science or requires a degree for qualification is for a mathematician. The highest I will be paid after 10 years of service is $27,000 (this, of course, is based on the whims of the U.S. Congress).

What about those of us who do not work in DP? The engineering profession ignores us and the trade newspaper industry ignores us. Where are we to turn?

I know that there are more of us out there.

Why not recognize us? How about more articles on our applications and equipment?

Elizabeth B. Lamberton
Bloomfield, Ind.

Formatting a Printout

In the article "This Country Needs a Good Portable Micro" [CW, Oct. 3], Jack Stone complains, quite rightly, that neither Radio Shack's operating manual nor its sales force can tell you readily how to format a printout on the TRS-80 Model 100, which is otherwise a lovely little machine.

I discovered quite by accident in a footnote on Page 60 of a Radio Shack manual that, in addition to the limited means explained under the "printing" headings in the manual, there is another way to print out. This other method offers underlining, subscripts and so on. Unfortunately, to understand it properly, you have to consult two formidable tables in two different manuals.

Furthermore, Appendix Four discloses that you can write a little program in Basic to control printout. You have to read it carefully to understand this, however, and the appendix is not referenced by the manual's sections on printing.

I still was stumped by the problem of stopping the printer to insert new sheets of paper when outputting a long document to cut sheets. Finally, I discovered by accident that the INPUT command in Basic has this effect.

Thus, Radio Shack not only failed to provide formatted printout as a standard text-editing feature, but also failed to explain the printout features the machine does have.

Lee Levitt
Executive Vice-President
PR Aids
New York, N.Y.

Theory, Experience Needed

Robert J. Bauhs' letter to the editor [CW, Oct. 24] states that universities teach too much theory. He obviously does not realize that the theoretical atmosphere in a university contributes to the advancement of the computer science field. Students learn how to make use of new methods, not just to stick with old methods that were around when they went to school.

Maybe Bauhs believes that the software he has been maintaining for the last 10 years is high-quality software.

If DP managers really want to lower their high maintenance costs, they are going to have to hire people with the theory to help them write high-quality code.

I am currently a senior, and have worked summers as a programmer. Because of this, I understand that experience is useful, but by no means a substitute for a good theoretical background.

If a manager does not believe that universities are providing people with proper skills, then he should set up an internship program with a nearby university or universities. Students need both theory and experience in order to write high-quality code.

Universities should supply theory, and business should supply experience.

Steven J. Hanley
University of Wisconsin-River Falls
River Falls, Wis.

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. Letters may be edited for purposes of brevity and clarity. Letters should be addressed to Editor, *Computerworld*, 375 Cochituate Road, P.O. Box 880, Framingham, Mass. 01701.

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'ODE' Package Offers Data Entry, On-Line Help For IBM Users

MONROE, Wis. — International Software Technology, Inc. has announced the On-Line Data Entry (ODE) package for users of IBM's DOS/VSE, MVS and OS/VS1 operating systems.

The ODE package, operating under CICS, reportedly offers on-line Help capabilities for all system screens, commands and functions, in addition to screen formatting and customizing capabilities. The system offers high-level screen painting technology with automatic generation of input field edits, attributes and field definitions. Attributes and field definitions can be modified or expanded using a check box technique.

The ODE package is said to feature on-line specification of table validation, range checking and check digit validation or generation. Record and batch exits are provided for validation against data files

(Continued on Page 56)

IBM Micro-Based Workstation Tied To Boeing Executive Service Via T/S

VIENNA, Va. — Boeing Computer Services Co. has announced a bundled hardware/software package based on the IBM Personal Computer and Personal Computer XT that includes upload and download capabilities to Boeing's Executive Information Service on its Mainstream-CTS time-sharing service.

EIS Microworkstation includes a full implementation of the Personal Computer and $6,000 worth of time on Mainstream-CTS. Boeing also announced that it will make its EIS modeling language available on the recently announced IBM Personal Computer XT/370.

Users of EIS can download data for manipulation on an integrated set of Boeing software on the Personal Computer. Local facilities include data collection, editing and revision, growth projections and analysis and graphics by row and column on a color monitor. IBM 3270 emulation is also provided.

Data may be uploaded and the EIS data base updated with facilities and security provided on the mainframe. Boeing will also offer an enhancement that enables data to be loaded from EIS into a variety of popular Personal Computer software packages via the Boeing software on the micro.

A configuration that includes a Personal Computer with 128K bytes of memory, two double-density floppy disk drives, a color monitor, graphics printer, Boeing software and $500/mo worth of EIS processing for the first year costs $6,600. The XT configuration includes the same peripherals, software and processing time but substitutes a 10M-byte hard disk drive and 360K-byte floppy disk drive for the two floppy drives. It costs $8,700.

Boeing Computer Services is located at 7980-90 Gallows Court, Vienna, Va. 22180.

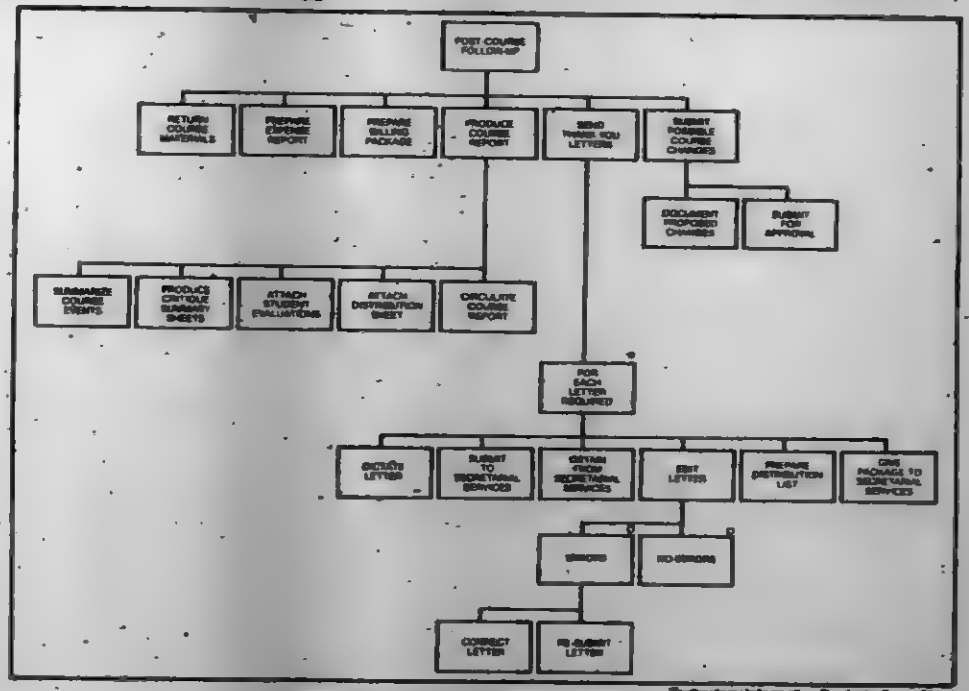
Business Analysis, Graphics Tools Debut

BURLINGTON, Mass. — Technology Information Products Corp. (T&IP) has announced a business analysis technology and graphics software tool for system development. The products help users accurately define business requirements, identify bottlenecks and functional overlaps and recommend areas of possible computer solutions, a spokesman said.

The emphasis of the modeling process is to identify business needs and then to investigate appropriate applications of computer technology. The product family also includes a program design technique and an application program generation software tool, the spokesman said. The business analysis products are requirements analysis methods that operate in conjunction with application generation tools to cover the entire information systems development cycle from requirements analysis through application program development.

The analysis technique emphasizes consistent terminology and notation. Each step of the analysis process is verified

(Continued on Page 58)



Typical Business Analysis Model

Technology Information Products Corp. Chart

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STAR

'Megacalc' Spreadsheet Enhanced to Increase Speed

IRVINE, Calif. — The Mega Group, Inc. recently announced an enhanced version of its Megacalc electronic spreadsheet for IBM mainframe users that reportedly provides an increase of up to 200% in data input and execution speed.

The enhanced version reportedly adds 10 functions, including macrocommands, to conserve input time and stacking commands to allow preprogramming of multiple commands. The package provides user-defined single- or double-precision calculations, binary or Ebcdic file storage and sequential or partitioned data sets. It is displayable on IBM 3278 terminals I through V and all 3279 terminals, a spokesman said.

Designed for IBM mainframe users in IBM's TSO, Applied Data Research, Inc.'s Roscoe and Tone Software Co.'s Tone operating environments, Megacalc can be used on IBM 370, 4300 series, 30 series and plug-compatible systems.

A conversion utility feature allows virtually all spreadsheet models running on personal computers to be run on the mainframe and allows for uploading and downloading.

The package is priced from $15,000, and lease prices start at $400 a month. The Mega Group is located at Suite 100, 2091 Business Center Drive, Irvine, Calif. 92715.

'Vista' Targets Harris VOS

FORT LAUDERDALE, Fla. — The Computer Systems Division of Harris Corp. has announced Vista (VOS Integral Source Tracking and Analysis), a product for Harris' VOS that incorporates operating system technology to solve source code configuration problems.

Vista places configuration control in the operating system to improve flexibility, security and performance, a spokesman said. The software automatically establishes audit trails and historical records for software development projects running on VOS. It permits control of all software source modules during development.

Transparent support is also provided for edit sessions, multiple-level releases, concurrent development operations, project merge operations, change control tracking, module abstracts, overviews or engineering logs. It automatically tracks information — such as the nature and content of changes, the changer's name and the date and time of the change — and includes a tracking identifier. A "historical" file automatically keeps a complete history, with all versions of the source code available. No preprocessors are needed.

For computers currently running on VOS, Vista costs $15,000 with a $100 monthly maintenance fee from Harris, 2101 W. Cypress Creek Road, Fort Lauderdale, Fla. 33309.

Procedure Aids Unix Installation On DEC VAX-11

FREMONT, Calif. — Voelker-Lehman Systems, Inc. has announced U/Install, an automatic procedure for installing the Unix operating system on Digital Equipment Corp.'s VAX-11 series of superminicomputers.

Loading the operating system requires inserting the operating system cassette, loading a magnetic tape and pushing a button, a spokesman said. The procedure takes about 30 minutes, during which the operator does not need to be present. The VAX prints its progress on the console.

With U/Install, the system disk is built, files are created and all pertinent information for the system is installed automatically, the spokesman said. When the procedure is finished, the system is functional and will boot from the disk.

The minimum hardware configuration on a VAX-11/750 computer is 1M byte of memory and DEC TS/TM-11-compatible magnetic tape. U/Install is included in all installations of U/OS, which is Voelker-Lehman's version of Unix. The price for a 16-user unit is $7,500; for a 32-user unit, $9,950; and for a 64-user unit, $14,750. The company is located at 44160 Old Warm Springs Blvd., Fremont, Calif. 94538.

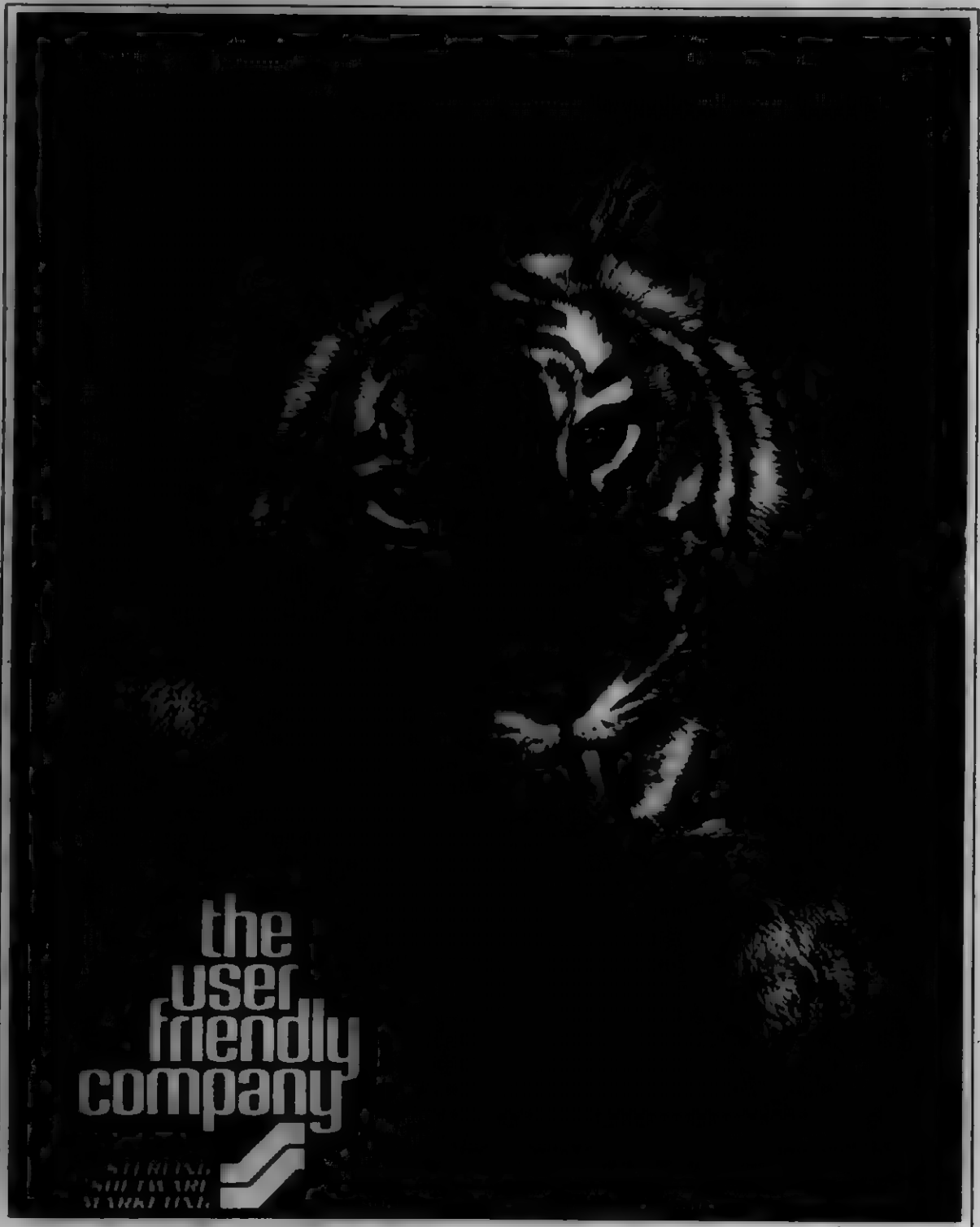
ODE Package Announced For IBM Users

(Continued from Page 55)

or to handle application requirements. ODE reportedly also features full or selective verification, visual, key or conditional verification and error correction capabilities.

According to a spokesman, when a mismatch error occurs during verification, the ODE system displays the entry and verified data, allowing the verifier to accept the entered data, accept the verified data or rekey the field. The package requires 40K bytes of resident storage, and 300K bytes of virtual memory can support up to 80 data entry terminals.

The ODE package is priced at $12,500 and $16,500 for DOS/VSE environments, $18,500 for OS/VS1 environments and $22,000 for MVS users from International Software Technology, 1112 7th Ave., Monroe, Wis. 53566.



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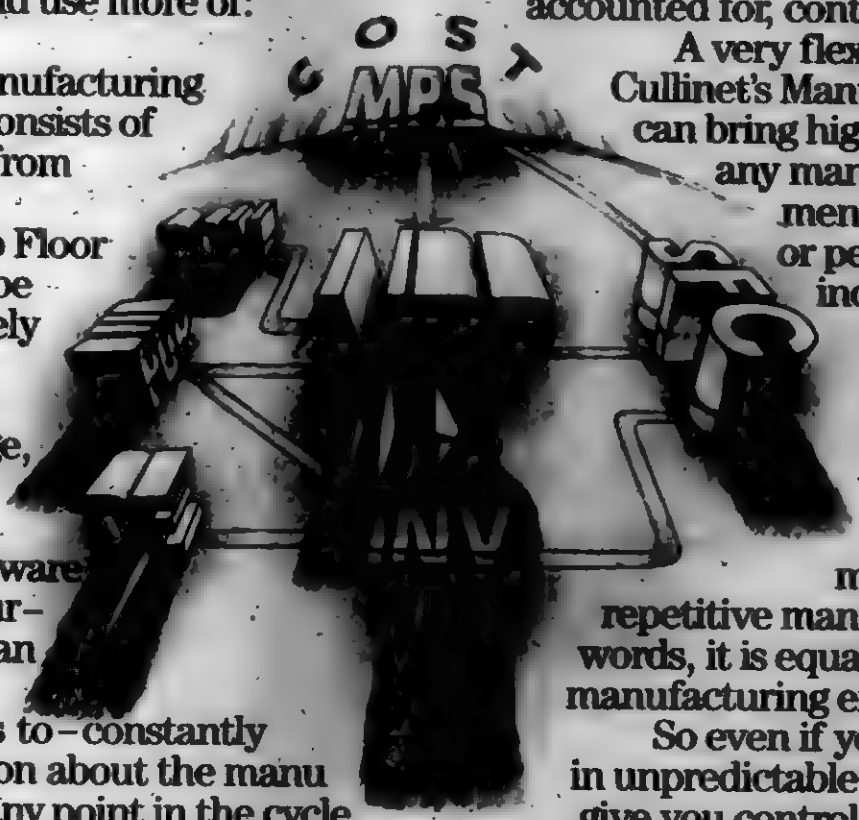

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Liaison Series Introduced By Softech Microsystems

SAN DIEGO — Softech Microsystems, Inc. has introduced the Liaison product family, a network enhanced version of its P-system operating system, which is said to allow programs and data to be shared among different kinds of computers in a local-area network.

Disks and printers may be shared among all network users, and distributed, networking applications and special device servers may be used. Programs written for Liaison can run without change on any microcomputer in a network, a spokesman said.

The products introduced include Liaison, the P-system microcomputer operating system with network capabilities; Liaison Disk server, a program that manages and shares disk storage; Liaison Printer Server, a program that shares one or more printers; and Liaison Tool Kit, a collection of software that can be used to develop special device servers and networking applications.

The Liaison P-system costs $750 for up to eight users, $2,000 for up to 24 users and $4,000 for up to 64 users. The Disk Server and Printer Server cost $150 for up to eight users, and the Tool Kit costs $200 for up to 64 users. Softech Microsystems is located at 16885 W. Bernardo Drive, San Diego, Calif. 92127.

ADR/E-Mail Users Get Electronic Calendar Option

PRINCETON, N.J. — Applied Data Research, Inc. (ADR) has announced an electronic calendar and scheduling option that features time and resource management facilities for users of the firm's ADR/E-Mail. ADR/E-Mail operates on IBM and IBM-compatible mainframes under OS and DOS.

Called ADR/E-Date, the option provides users with an automatic scheduling facility, an executive-style daily calendar and the ability to inquire about other users' schedules.

According to the vendor, a user can schedule a meeting by filling out a prompt screen, which automatically generates an electronic mail message to all attendees. By confirming attendance, each attendee's calendar is updated to reflect the meeting.

A facilities management feature ensures that the appropriate meeting facilities are available. The executive calendar feature allows each user to define his schedule in desired time blocks. A user's normal working hours can be preestablished, designating that the time available for meetings falls only within certain periods.

ADR/E-Date is priced at $10,000 and will be available the second quarter of 1984. ADR is located at Rt. 206 and Orchard Road, Princeton, N.J. 08540.

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UCC Adds CTP Processing To System

DALLAS — University Computing Co. (UCC) has announced Corporate Trade Payment (CTP) processing, an addition to the Paperless Item Processing System, UCC's distribution, accounting and proof system, which provides financial institutions with an interface to automated clearing houses for electronic funds transfers.

The CTP module provides a fee-generating service to financial institutions and can process as an originating or receiving institution on the corporation's behalf, the vendor said. The module also provides an exclusive control file for CTP processing and service charge options on a corporate-to-corporate basis.

A license is $15,000 from UCC, UCC Tower, Exchange Park, Dallas, Texas 75235.

Analysis, Graphics Tools Announced

(Continued from Page 55)

through walk-through checkpoints. The technology uses models, including hierarchies, flow diagrams and matrices to define, document and analyze an organization's data and functional requirements and to form an information base for both business and computer application solutions. It also instructs the analyst how to interview personnel and organize information in diagrams.

The analysis software tools help the analyst develop diagrams and models through a menu-driven system that provides diagrammatic structures for the data as well as keyboard functions for manipulating and editing the diagrams.

T&IP's business requirements analysis technology and its accompanying software are available for medium- to large-scale IBM and compatible systems. The technology and software can be purchased for $120,000. The entire T&IP product family is available for $150,000. T&IP is located at 12 New England Executive Park, Burlington, Mass. 01803.

MSA software makes your mainframe computer work 100 times harder than ever before

1. Now MSA's Executive Peachpak II™ software links personal computers to the mainframe. So you can...

2. Use your PC to access all your MSA mainframe systems, from General Ledger to Manufacturing.

3. Access entire mainframe files, so you can work with large amounts of information at one time.

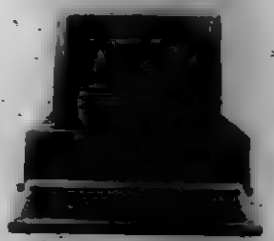
4. Choose the exact mainframe information you need, as much as you need, in the form you need.

5. Use it with Peachtree Software, 1-2-3™ from Lotus, DIF,™ VisiCalc™ or other micro software.

6. Replace terminals with PCs at about the same cost—with many more capabilities.

7. Plug PCs directly into your existing online network...

8. Or establish dial-up access with regular telephone lines.



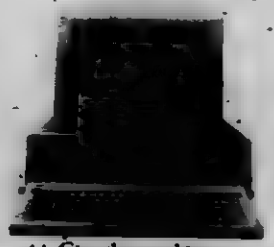
9. Interface mainframe data directly to typewriters, graphics plotters, and printers...

10. And automate your office economically.

11. Get this new technology in any of three specific packages...

12. Give executives the management tools they need with Executive Peachpak II...

13. Provide word processing and mainframe access to administrative assistants with Administrative Peachpak...



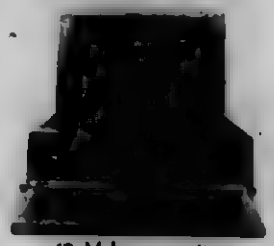
14. Give the graphic arts department direct mainframe access with Graphics Peachpak.

15. Save time because mainframe data is automatically loaded into your PC...

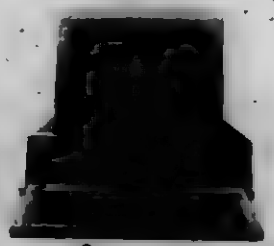
16. So you free up data processing resources...

17. And you don't have to key in data yourself.

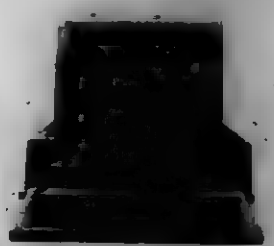
18. Use MSA's Manufacturing System data to produce a cost/margin analysis with PeachCalc...



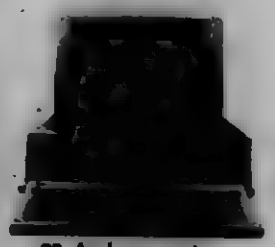
19. Make a capacity analysis using a PC and mainframe manufacturing information...



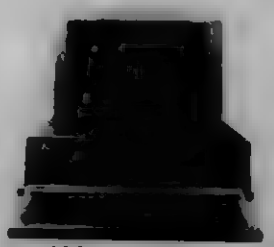
20. Summarize your findings in a report using PeachText...



21. Eliminate spelling errors with a built-in Spelling Proofreader.



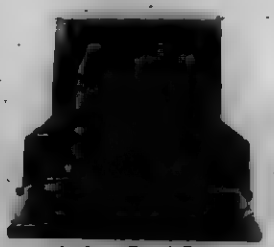
22. Analyze overtime percentage on your PC, using data from MSA's Payroll/Personnel System...



23. Make timely manpower adjustments to maximize productivity...

24. And revise departmental salary projections on your PC.

25. Download vendor history from MSA's Accounts Payable System...

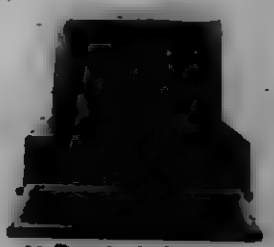


26. And use PeachCalc to do comparative analysis.

27. Use PeachLink to download information from both MSA and non-MSA online mainframe systems....

28. Create custom online formats with Easy-Screen™

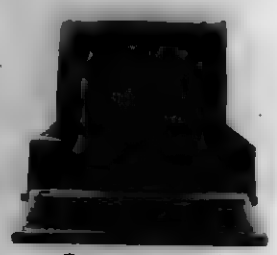
29. Or use standard formats provided by MSA.



30. Download a financial report from the mainframe to your PC...

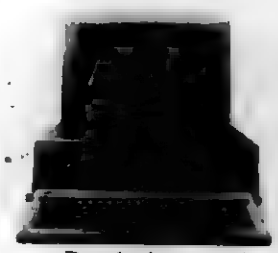
Turn Page ▶

31. Add footnotes to a balance sheet using PeachText...

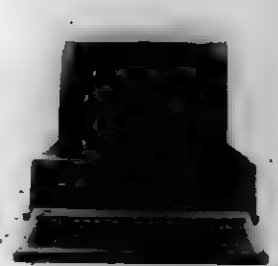


32. Project next month's income with PeachCalc...

33. Change sales estimates and recalculate income projections instantly.



34. Download names and addresses from your mainframe...



35. Use the List Manager and PeachText to do a mailing informing customers of a special announcement...

36. Or create a mailing to vendors requesting bids.

37. Using personal computer telecommunications, access up-to-the-minute exchange rate information...

38. Use PeachCalc for float analysis...

39. Display current exposure with a graph...

40. Update MSA's mainframe Foreign Exchange System.

41. Use PeachLink to distribute mainframe data to your other offices across the country...

42. Use a PC at those remote locations to print reports...

43. Graph expenses by location, department or by a single product line...

44. Print checks in remote locations from mainframe Accounts Payable data.

45. Create a salary administration worksheet on a PC using MSA's Payroll/ Personnel System...

46. Produce a workforce utilization model using PeachCalc...

47. Monitor turnover using Business Graphics...

48. And, for a printed copy, route your Business Graphics output to a plotter or printer.

49. Use PeachLink to get economic data from MSA's Forecasting and Modeling System...

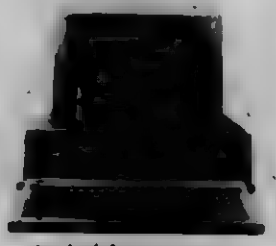
50. Use PeachText to prepare a corporate planning policy document...

51. Refer to a built-in Random House® Dictionary while writing the report.

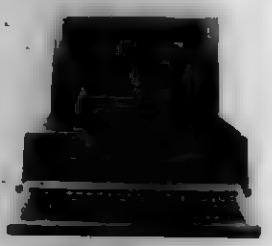
52. Link to mainframes under operating systems OS, DOS, and SSX...

53. Use all standard online monitors, including CICS, IMS-DC, IDMS-DC, TSO, CMS and ICCF.

54. Assist your auditors by giving them access to mainframe data...



55. And the convenience of PeachText word processing...



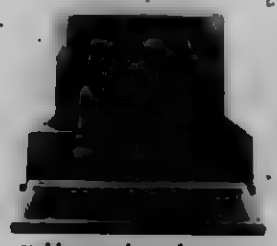
56. Give them access to current customer and vendor information for letters of confirmation...

57. And an easy way to prepare notes to consolidated financial statements using PeachText.

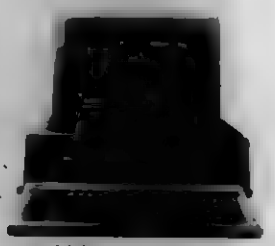
58. Extract delinquent customer invoice information from your Accounts Receivable System...

59. Personalize a dunning letter with your micro software...

60. For help, call up 30 synonyms instantly using PeachText's Random House® Thesaurus.

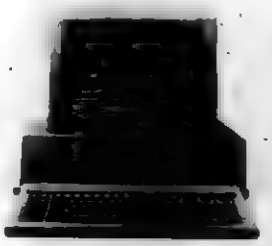


61. Use mainframe Inventory and Purchasing data to graph inventory use by department on your PC...



62. Make a purchase order adjustment without leaving your workstation.

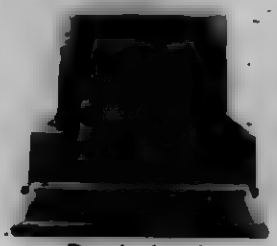
63. Download current balances from General Ledger to graph actual vs. planned...



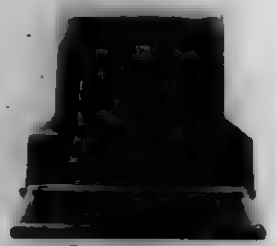
64. Do a breakeven analysis by department.

65. Analyze overtime percentage by department on the PC using MSA's Payroll/Personnel System...

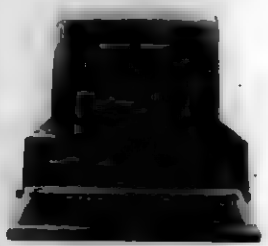
66. Use PeachText to prepare a memo summarizing your analysis and attach it to a graph.



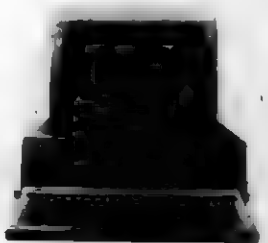
67. Download employee data for an upcoming salary review...



68. Complete the salary review on your PC...



69. Enter the salary adjustment from your PC to the mainframe...



70. Make salary projections on your PC using mainframe payroll data.

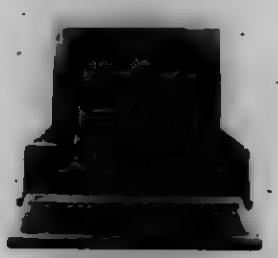
71. Capture data from MSA's Fixed Assets System...

72. Use PeachCalc to create a lease amortization model...

73. Perform a TEFRA depreciation analysis.

74. Get database-to-database transfer with Database Sharing...

75. Download an entire report with the touch of one key...



76. Access it instantly, without data processing involvement...

77. Enjoy a realtime environment, no waiting for batch processing.

78. Access available funds data in MSA's Budgetary Control System...

79. Use PeachCalc to project expenditures through year-end.

80. Download data from MSA's Capital Expenditure Tracking System...

81. And analyze cash flows for an investment analysis decision.

82. Dial up subscriber databases to access current credit information for customers...

83. Use PeachCalc to analyze information and set credit limits...

84. And update your mainframe Accounts Receivable data.

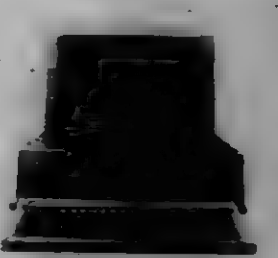
85. Allow only authorized personnel access to the mainframe, due to built-in security.

86. Instantly express numbers in bar, line and pie charts or other business graphics.

87. Add footnotes to mainframe reports, or customize mainframe documents.

88. Produce up to nine different kinds of graphs and charts with mainframe information.

89. Get HELP if you need it, with a built-in feature that guides you through the system.



90. Organize your information and mailing lists with your own List Manager.

91. Use mainframe information with the Business Graphics System to produce slides and transparencies.

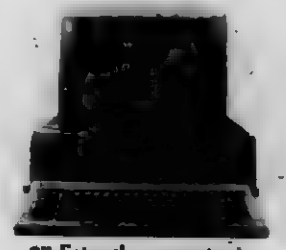
92. Work productively at home, by dialing up the mainframe from your own personal computer.

93. Make late changes to reports generated on the mainframe.

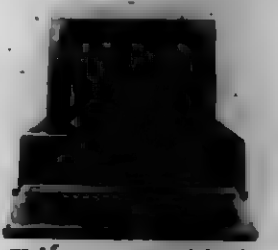
94. Do budget forecasting using PeachCalc and your PC.

95. Review profit and loss [redacted] notice on your PC.

96. Improve the productivity of your staff with simple-to-use software for personal computers...



97. Enjoy the convenience of a complete menu-driven system...



98. Use over 20 pre-defined applications from MSA.

99. Put this new technology to work for your company immediately...

100. Install it in less than one hour.

Backlogs? Rush requests? Now they're a thing of the past.

MSA's new Executive Peachpak II™ links your company's personal computers directly to your mainframe. So executives can get to vital information without waiting for print-outs.

Best of all, this hot new technology is available from MSA *right now.* (In fact, it's already working for companies across the country.)

Ideal for use with the newly announced IBM® 3270-PC

While other companies are still trying to work the bugs out of their initial offerings, MSA already has its *second* successful mainframe-to-micro product: Executive Peachpak II.

It offers such advanced features as Database Sharing, MSA's database-to-database transfer technology that lets you get all the mainframe information you need instantly.

And a Universal Interface with most micro software packages including Peachtree Software, 1-2-3™ from Lotus, and VisiCalc.™

Executive Peachpak II also includes PeachCalc,™ an electronic spreadsheet. A Business Graphics System for color charts and other graphics. Telecommunications that let personal computers talk to each other—or link to resources such as Dow Jones News/Retrieval.® PeachText,™ a complete report production system that lets executives edit and footnote reports. A List Manager for organization. And PeachLink,™ the software that links your PCs to the mainframe.

This mainframe-to-micro technology is also available in two other packages: Administrative Peachpak, which includes comprehensive word processing functions. And Graphics Peachpak, for color graphs and charts.

MSA's revolutionary new link means you can now deal with one software company that supplies all the advanced mainframe and micro systems your company needs. And the software that links them together.

Free personal computer...

...with your qualifying purchase of MSA mainframe software and Executive Peachpak II.

For details on how to get your free personal computer contact Robert Carpenter at (404) 239-2000. Or write "Free Computer Offer," Management Science America, Inc., 3445 Peachtree Road, N.E., Atlanta, Georgia 30326. This offer expires December 31, 1983, so act today.

MSA
The Software Company

Only MSA makes the mainframe link to personal computers this productive

Executive Peachpak II and PeachLink are trademarks of Management Science America, Inc. PeachCalc and PeachText are trademarks of Peachtree Software, Inc., an MSA company. Diff is a trademark of Software Arts, Inc. 1-2-3 is a trademark of Lotus Development Corp. VisiCalc is a trademark of VisiCorp, Inc. Peachtree Software is a registered trademark of Peachtree Software, Inc. Dow Jones News/Retrieval is a registered trademark of Dow Jones & Company, Inc.

Distributed Resource Planning Tool Offered

LEXINGTON, Mass. — A multilevel package for large manufacturing and distribution companies has been announced by Distribution Management Systems, Inc. (DMS). Called the DMS-1800, the distribution resource planning package is said to improve demand forecasting, purchasing, production planning, finished goods inventory management and transportation scheduling operations.

The package is written in Ansi Cobol and is designed to run on IBM 4300 series and 30 series mainframes utilizing data on customer orders and warehouse inventory levels provided by the DMS-1000 distribution system or the DMS-1500 warehouse management system or both. The system can be purchased to operate entirely in batch mode or in batch with on-line inquiry and transaction entry functions.

The DMS-1800 system consists of four modules: forecasting, strategy, planning and execution. The forecasting module establishes estimates of product demand at each level of a distribution structure, based on historical order data. It then periodically monitors actual demand vs. forecasted demand.

The strategy module utilizes product information and historical demand data to compute and control safety stock and economic replenishment quantities at all locations in the distribution chain.

The planning module can generate overall production and distribution plans based on the data developed by the forecasting and strategy modules.

The primary function of the execution module is to provide a flow of information back to management on the effectiveness of the production and distribution activities.

The complete system, with on-line capability, is priced at $182,000. The forecasting module can be purchased separately for $67,000 for batch or $75,000 for batch and on-line. The strategy, planning and execution modules can be purchased as a combination package for $115,000. DMS is located at 81 Hartwell Ave., Lexington, Mass. 02173.

Subcheck Release 1.0 Supports 'JCL-Check'

SAN JOSE, Calif. — Triangle Software Co. has introduced Subchek Release 1.0, an optional feature for the vendor's JCL-Check systems utility package.

JCL-Check is a systems utility that detects and diagnoses all job stream Job Control Language (JCL) errors and many run-time abend situations before the job is submitted for test or production runs.

With Subchek, JCL-Check is automatically invoked when the user enters a Submit command. JCL-Check validates the file being submitted and reports all errors back to the operator at the terminal.

Errors that are found are identified clearly and must be corrected before the job can be submitted. If the file is clear of JCL errors, it is automatically submitted.

With Subchek, the user cannot bypass JCL-Check, thereby enforcing standards in the data processing operation, the vendor said.

JCL-Check runs on any IBM or IBM-compatible mainframe under OS/VS or VM/CMS operating systems and licenses for $15,500. Subchek is an optional feature licensing for $1,500.

More information is available from Triangle Software at Suite 108, 4340 Stevens Creek Blvd., San Jose, Calif. 95129.

VM Information Center Developmental Center

VM Software Shopping Center? [Great Idea!]

If you've considered implementing an Information Center or Development Center under VM, you've discovered two things

1 VM can't be matched, for fast interactive response time, flexibility and user friendliness. It's a *great* product from IBM.

2 System software products to help you manage your VM Center just aren't available from your traditional DOS/MVS software vendors, nor from IBM.

Welcome To The VM Shopping Center

VM Software, Inc. has exactly the software products you need, to be effective with VM from the start. As much or as little as you need. From the undisputed leader in VM products.

VMBACKUP
- Saves up to 90% of time by dumping only changed data
- Dumps all data—both CMS and non CMS
- Protects tapes and saves space with multifile multivolume SL tapes
- File, minidisk, and full pack restores done easily
- Full screen restore -standalone restore, and more

VMACCOUNT
- Complete collection, costing and reporting online
- Flexible algorithms, account structure and displays
- Project accounting, Product accounting, budget cutoff and more
- Capacity planning

VMARCHIVE
- Saves space by moving utilization data to tape or disk in compressed format
- Complete audit trail of activity

VMTAPE
- Provides flexible control by managing any number of tape volume series and tape drives
- Supports SL tape usage
- Eliminates operator tasks
- Full DOS/VSE guest support

VMLIB
- Shared file facility for CMS
- Saves space (usually 50%), provides auditability and version tracking
- Allows synchronization of source and object code
- Interface to DOS and OS systems

VMSECURE
- Comprehensive security for VM
- Comprehensive directory management allowing user group space and resource administration
- Permits encryption of data with no source code changes
- Simple end user command language

VMSCHEDULE
- Permits users to schedule their virtual machine on any basis
- Allows load balancing of CPU by permitting events to be run in off prime
- Serves as substitute for CMS BATCH
- English language commands

If your needs change later, or if you don't like the way we implement something (it happens), turn in one product for a different one at no extra charge. (Even one of the new ones we're planning). Now, what could be fairer than that? We're good, we know we're good, so we take a little risk.

More than 600 of the largest companies in the world are already using our VM products including 35 of the Fortune 50. (We won't tell whether number 38 is on the list). That's because we offer the best VM products available—anywhere. Call us, write us, but if you're looking at VM, you can't afford to ignore us.

Call Us 703/821-6666 or Write

VM Software, Inc.
2070 Chain Bridge Road,
Suite 355
Vienna, VA 22180

Name
Title
Company
Address
City State ZIP
Phone ( )
CPU

VM Software Inc.

1-CW-11-83

Cobol Analysis Included In 'Abstract/38'

WHEELING, Ill. — Advanced Systems Concepts, Inc. (ASC) has enhanced its Abstract/38 documentation system for the IBM System/38 to include Cobol source-code analysis. A previous version of the product provided source-level analysis of RPG and Control Language programs.

Abstract/38 records all program-described data base usage by Cobol programs, including file record layouts and field usage information, a spokesman said.

Program-level documentation includes program flowcharts, procedure explosion reports and inquiries, "where-used" listings, sample report outputs and source-code listings.

Data base information is reported for both external file descriptions and internally described program descriptions. Data base structures are referenced in file dependency reports and usage reports. Abstract/38 provides information on data base command usage, file overrides, usage of the reformat command and file and member management.

Abstract/38 is available for a one-time license fee of $1,000 from ASC, 1084 Cornell, Wheeling, Ill. 60090.

Said to Reduce Installation Risks

IBM Announces Access to 'Copics' Products

TAMPA, Fla. — IBM's Information Network has announced TRY-Copics, a service that provides access to any of IBM's Communication-Oriented Production Information and Control System (Copics) family of products.

The service reduces the risk of new installations, simplifies the Copics test environment, reduces new hardware requirements before product use and shortens the implementation cycle, a spokesman said.

Users can interactively access Copics data, execute batch jobs, tailor the provided Copics function and test those modifications. Offered under the VM Productivity System (VMPS), TRY-Copics provides the user with a "fill-in-the-blanks" set of dialog panels that assist in program execution and testing.

Copics on-line transactions may be executed using the Copics sample data bases. The initial selection of products may be changed. Dialogs are provided to allow the user to refresh the data bases with the initial sample data bases.

Each TRY-Copics account is provided with a set of DOS program libraries and data bases. The supplied Copics programs may be copied into the user's library and modified. The user may also add personally developed programs.

Batch jobs may be submitted to build tapes containing copies of the data bases and any programs or modifications that have been made. The data bases can be dumped in IBM DL/1 Unload format, Vsam Export format or Vsam Repro format.

TRY-Copics charges are the same as standard VMPS charges, which are based on usage. In addition, there is a monthly charge of $2,000. The charge is waived when consecutive payments equal $10,000. The IBM Information Network can be reached through P.O. Box 30104, Tampa, Fla. 33630.

Electronic Spreadsheet Runs on Prime Series 50s

SCHAUMBURG, Ill. — Advent Online Knowledge, Inc. has introduced an electronic spreadsheet program that will run on any Prime Computer, Inc. Series 50 computer.

AOK-Calc tasks involve jotting down numbers in rows and columns, making changes in assumptions or data, doing further computations and charting figures into bar graphs. The program will run without the support of any separately priced Prime software, a spokesman said.

Using Prime's Primos operating system, a single copy of AOK-Calc can be used by all users simultaneously without degrading operating system performance, the company claimed.

Features of the program include a built-in help menu with a help message for each command; maximum column width of 30 char./col.; independent adjustment of column width; an extensive array of display attributes; and the ability to consolidate numbers from an unlimited number of files.

A one-time licensing fee for an "execute-only" version of AOK-Calc is available at $1,495. As of Jan. 1, the price will be $1,995. Advent Online Knowledge is located at Suite 133, 1305 Wiley Road, Schaumburg, Ill. 60195.

'Scribe 11' Out For Applications On DEC PDP-11s

BELLEVUE, Wash. — Westec Associates, Inc. has announced the Scribe 11, which the company described as an application development system for use with Digital Equipment Corp.'s PDP-11 processors in the RSX-11M or RSTS/E operating system environment.

The Scribe 11 reportedly utilizes the full set of graphics capabilities offered by DEC's VT 100 terminals, including the Advanced Video Option. The system is said to allow for the generation of application screens, and specialized coding is eliminated through single-instruction cells.

Scribe 11 offers more than 40 macro routines, including cursor control, line and screen erasing, tab setting, keypad selection, histograms, bar charts, special graphics characters, screen modes and scrolling.

The vendor said the package can be used to write form management, word processing, spreadsheet and graphics software programs. It is available for $995 from Westec Associates, Suite 108, 1607 116th Ave. N.E., Bellevue, Wash. 98004.

Stand-Alone Provides Protection Of CICS Storage

NEW YORK — Information Technology Corp. has introduced Trak, a stand-alone CICS storage protection system.

According to the vendor, Trak operates independently of CICS program testing systems. It increases the uptime of any CICS production or test system by preventing programs from overlaying storage areas critical to the integrity of CICS, a spokesman said.

Trak was designed to be totally compatible with IBM's Extended Diagnostic Facility (EDF). The system monitors programs for storage violations while allowing the same programs access to shared storage areas. This mode of operation can be invoked without specifying the range of storage addresses to the Trak system.

Trak storage protection may be invoked for a single terminal, all terminals including nonterminal-oriented tasks and systemwide for only those terminals running EDF.

Trak intercepts software storage violations before they occur, prevents programs from executing invalid branches, traps invalid instructions and automatically protects programs running under EDF.

It is available for $4,000 from Information Technology at 322 W. 57th St., New York, N.Y. 10019.

ACT Arm Aims Mumps System At DEC Micros

NEW YORK — Advanced Computer Techniques Corp. (ACT) has introduced a Mumps multitasked operating system for Digital Equipment Corp.'s Professional series of microcomputers. The system is available from Creative Socio-Medics Corp. (CSM), the medical division of ACT.

Dubbed SMM300, the basic system supports up to three users. With the inclusion of a real-time interface board, a total of five simultaneous users can be supported..

SMM300 was developed to run on DEC's Professional 325 or 350 personal computer as a dedicated software system. It was designed for those who wish to run a multiuser-based management system, a spokesman said.

The SMM300 provides a compatible environment for CSM's standard Mumps financial management, medical practice and other standard Mumps application programs. Software for word processing, spreadsheets and graphics running under SMM300 is also available through CSM.

A single license for SMM300 is priced at $1,400. The product is available through an exclusive U.S. distributor agreement with Structured Data Systems, the developer of the system. CSM is located at 16 E. 32nd St., New York, N.Y. 10016.

Moves Files Automatically

File Allocation Utility Out for CICS

PARSIPPANY, N.J. — The Matlen Silver Group, Inc. has introduced Dale, a dynamic file allocation utility for CICS that automatically allocates and deallocates on-line application files.

The 3270 menu-driven display screens facilitate the control and management of all user data sets, including Vsam and IBM's DL/1. Data sets are managed on an ongoing basis when accessed by the application programs, the vendor said. Dale is said to increase CICS uptime, minimize on-line/off-line data base conflicts and provide more flexibility for applications development groups.

The product is available for IBM operating system environments with CICS/VS 1.5 and Basic Mapping Support. It is priced at $3,500 per site, with a $525 per site annual maintenance fee.

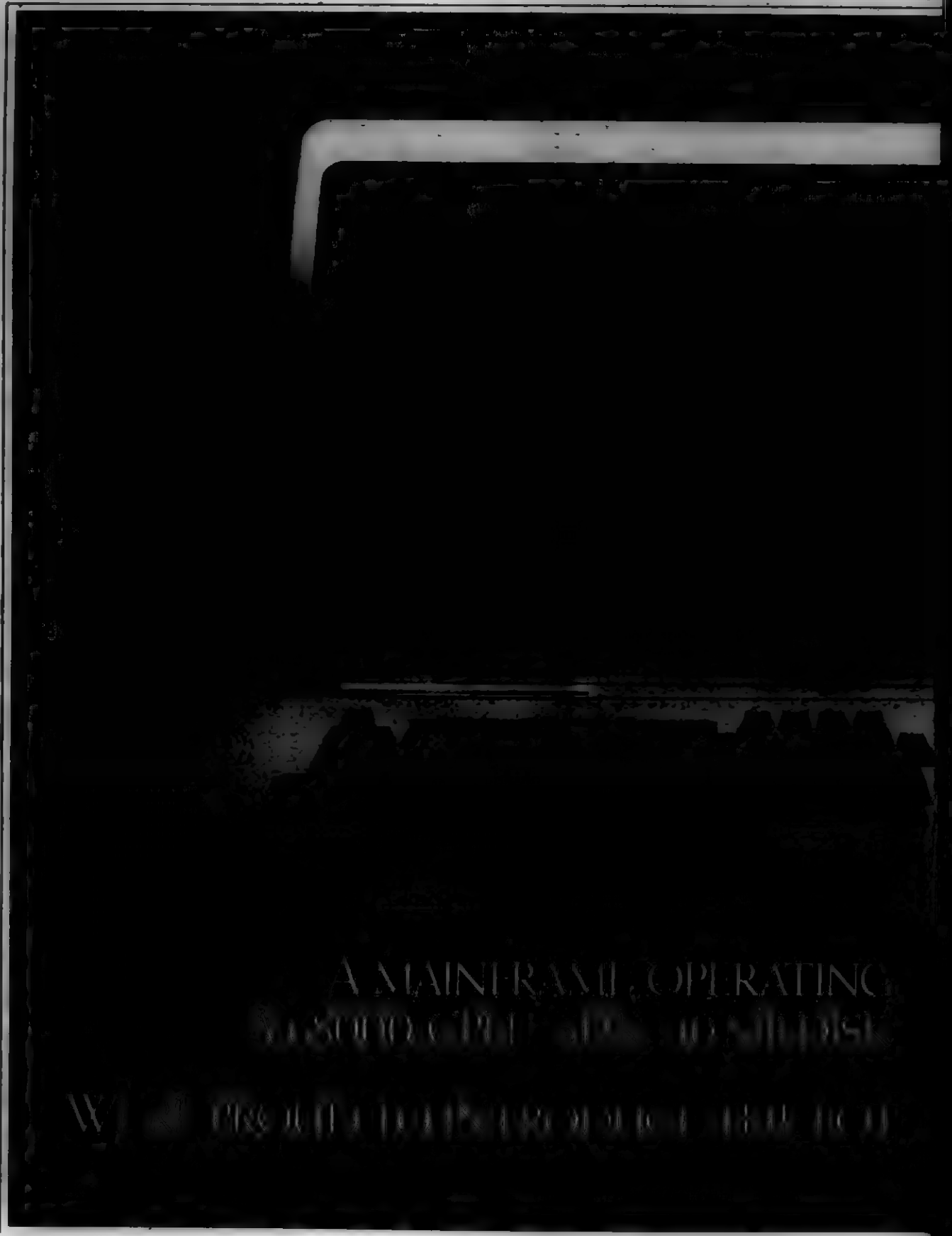
Matlen is located at Suite 306, Littleton Plaza II, 119 Littleton Road, Parsippany, N.J. 07054.

VM Software Introduces Release 3.0 Of Memory Backup-Restore System

VIENNA, Va. — VM Software, Inc. has introduced VM Backup Release 3.0, a virtual memory backup-and-restore system.

A spokesman said the new release includes 60% faster physical dumps, tape pool management, validation of CMS files, catalog management and stand-alone restore utility to provide emergency restore capability.

The system is priced at $9,000 for a permanent license from VM Software through P.O. Box 985, Vienna, Va. 22180.



'Epic/VSE' Manager Backs DOS/VSE, VM/CMS

IRVINE, Calif. — Tower Systems International has introduced Epic/VSE, a data set management package designed for users of DOS/VSE and VM/CMS operating environments.

According to the vendor, Epic/VSE eliminates manual data base management procedures, replacing them with a unified, interactive approach to managing, securing and reporting on all tape and disk data set resources.

The system concentrates on the management of data sets, regardless of their storage media. Most Epic/VSE capabilities are available to the user on-line from the terminal.

The system provides a method for on-line display and maintenance of Vsam catalogs. The Vsam on-line feature reduces programmer time and specification errors, facilitates maintenance functions and improves control over the content and format of Vsam reports when compared to its batch counterpart, the company claimed.

VM/CMS support provides the ability to automatically share tape drives across any mix of DOS/VSE and VM/CMS machines without operator intervention, as well as full reporting on CMS tape processing.

Epic/VSE automatically allocates disk space, provides disk and tape work data sets for intermediate data storage and frees installation from making program and job control language changes to access different device types.

Lease prices start at $550/mo; rental and perpetual license agreements are available. The vendor is located at Suite 365, 19782 MacArthur Blvd., Irvine, Calif. 92715.

Mathematica Targets IBM XT/370

PRINCETON, N.J. — Mathematica Products Group, Inc. has announced several products for use with the IBM Personal Computer XT/370.

The Ramis II 4GL reportedly offers the same capabilities that the Ramis II DBMS provides to mainframes and enables the microcomputer to run mainframe programs without modification. It is priced at $1,395, the vendor said.

The company also announced additional components, including Ramlink, which provides bidirectional data transfer for $185; a formatted screen manager for $285; Relate, meant for extended relational capabilities, also $285.

Mathematica Products Group can be reached through P.O. Box 2392, Princeton, N.J. 08540.

IBM Extends Applications For CS 9000

RYE BROOK, N.Y. — IBM has announced new programs for its desktop Instruments Computer System 9000 (CS 9000) which extend its range of mathematical and statistical applications and increase its diskette storage capacity.

The announcements include an emulation program that enables the CS 9000 to access application programs in a host computer by emulating a 3101 Model 20 display terminal.

The new mathematical and statistical program library features 66 individual subroutines. Release 1.1 of the Computer System Operating System (Csos) provides support for double-density 5¼-in. diskettes and extends the system's multitasking capability to support up to 13 user tasks. Support for Fortran, Basic and Pascal has also been expanded, and an optional Csos Extensions program has been enhanced to provide a full-screen editor.

The enhanced operating system supports IBM Instruments' 10M-byte hard disk with the ability to attach up to four hard disks to the system. Diskette capacity is increased to 640K bytes per diskette. A new bit-mapped disk format is used for diskettes and disks; file access methods are provided; and critical file directory information is stored redundantly.

The Scientific Subroutine Library (SSL) provides 66 individual subroutines for mathematical support of statistical, linear, matrix and quadrature functions.

Prices for new, licensed program orders are: Csos Extensions 1.1, $155; Basic 1.1, $195; Fortran 1.1, $595; Pascal 1.1, $595; IBM 3101 Emulation, $160; and SSL, $325.

Further Information is available from IBM's Information Systems Group at 900 King St., Rye Brook, N.Y. 10573.

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Human Resource Package Designed for OS, DOS

ANDOVER, Mass. — Software International Corp. has reached an agreement in principle with Integral Systems, Inc. (ISI) of Walnut Creek, Calif., to market ISI's line of payroll and human resources packages for IBM OS and DOS operating systems. Software International will license, install and support clients directly.

The payroll and personnel system is said to provide interactive capabilities in a variety of data base management system environments, including IBM's IMS/DB and DL/1, Cullinet Software, Inc.'s IDMS, Software AG of North America, Inc.'s Adabas and Vsam files. The products also work in communications environments including IBM CICS, IMS/DC and CMS as well as Cullinet's IDMS/DS and IDMS ADS/OL.

Technical features include expandable data bases, on-line direct update processing, on-line system security and recovery, general ledger interface and structured design. A system costs from $80,000 to $300,000 depending upon modules ordered and processing environment from Software International at One Tech Drive, Andover, Mass. 01810.

'CJ/Fixed Assets' System Provides HP 3000 Support

TAMPA, Fla. — Collier-Jackson, Inc. has announced CJ/Fixed Assets, an on-line, data base-oriented fixed assets accounting system for the Hewlett-Packard Co. HP 3000 computer. The product provides property depreciation facilities and is geared toward medium-size to large corporations, a spokesman said.

CJ/Fixed Assets tracks property at company, division and department levels and can create separate or consolidated reports. Users can define parameters to determine specific types of assets and sorting sequences. It also maintains data for historical reporting.

An unlimited number of books can be kept, the spokesman said. Eight common depreciation methods are supported. CJ/Fixed Assets includes an automatic interface to the company's CJ/Advanced General Ledger and can be adapted to other general ledger systems.

The $18,000 license fee includes object code, source code, training, installation, documentation, an implementation plan and 90-day start-up support. Collier-Jackson is located at 5406 Hoover Blvd., Tampa, Fla. 33614.

'APX II' Handles Deposits/Costs

HILLSIDE, Ill. — The Weiland Software Group, Inc. has announced APX II, which is said to increase fee income for commercial deposit account relationships by weighing deposit-earning power against cost services. The software is delivered with a new cost/price subsystem, the vendor said.

The subsystem expands the service categories to 99,999 differentiated sources, the vendor said. The system can perform "pro forma" analyses at three levels: single accounts, families of related accounts and groups of accounts.

The system was designed to run on the IBM 4300 series or larger systems in either DOS or OS operating systems. The price of the subsystem is $45,000. Weiland Software is located at Suite 100, 240 Fencl Lane, Hillside, Ill. 60162.

Cullinet Opens Training Centers

WESTWOOD, Mass. — Cullinet Software, Inc. has announced the opening of district and regional education centers in 13 cities in the U.S. and Canada. The new education centers expand training opportunities available to Cullinet customers.

Courses offered at the education centers emphasize a "how-to-use" approach and role training for applications programmers, systems analysts, systems programmers and other data processing professionals, the vendor said.

District education centers in Atlanta, Chicago, Philadelphia and Los Angeles offer an expanded curriculum, integrating classroom instruction with hands-on computer workshops. Each district education center has on-line access through a computer laboratory to interactive training exercises developed at the National Education Center in Framingham, Mass., which opened last January.

Regional education centers in Cleveland, Dallas, Denver, Houston, Montreal, New York, San Francisco, Toronto and Washington, D.C., offer a newly expanded curriculum.

Tuition prices range from $220 to $750, depending on the length and subject matter of the class, from Cullinet at 400 Blue Hill Drive, Westwood, Mass. 02090.

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Package Offered for 'Mapics'

DOYLESTOWN, Ohio — Siam International, Inc. has announced the Siamgl Procedure for users of IBM's System/34 Manufacturing, Accounting and Production Information Control System (Mapics) general ledger package.

The vendor said the software provides a method of maintaining the general ledger detail lost during each end-of-month closing. The menu-driven Siamgl Procedure reportedly does not modify any Mapics codes and will save each month's detail transactions in an off-line file. The file can then be used to run a listing of the general ledger with all detail transactions listed in chronological order within account code, according to the vendor.

All detail transactions for a year can be held on a series of diskettes, which can be stored for security and audit purposes. The Siamgl Procedure is available for $100 from Siam, 12321 Hollow Ridge Drive, Doylestown, Ohio 44230.

Prime 50 Series Users Get Programming Aid

RANCHO PALOS VERDES, Calif. — Armstrong Systems House, Inc. has introduced a new multifeature programming aid for users of Prime Computer, Inc. 50 series computers.

According to the vendor, the Keypr system is a software development tool and text archive system. Keypr maintains a master file containing user-named blocks of code or text. Each line within a block is given its own unique identifier, providing the user with a direct method of performing random modifications. The program documents all changes automatically, providing the user with an audit trail.

Keypr may be used for most languages including Cobol, Fortran, Pascal, PMA and PL/I. The program is available now for a license fee of $1.25 per day from Armstrong Systems House, 28635 Hazelridge Drive, Rancho Palos Verdes, Calif. 90274.

Book Details Mini, Micro Services

GLENVIEW, Ill. — Information Sources, Inc. has announced the *Small Systems Software and Services Sourcebook and Supplement*, a two-volume library of over 3,000 listings of minicomputer and microcomputer software and services.

Listings for each package cover such areas as which users the software is designed to serve, equipment and operating systems, languages, availability, number of installations and cost comparisons.

A one-year subscription rate is $125 if paid in advance and $135 if billed later from Information Sources, 1807 Glenview Road, Glenview, Ill. 60025.

System 1032 Enhanced For VAX-11/780

CAMBRIDGE, Mass. — Software House, Inc. has announced a series of enhancements to its System 1032 data base management system (DBMS) for use with Digital Equipment Corp. VAX-11/780 computers.

Version 1.5 of the System 1032 DBMS is said to offer programming features such as the handling of Ebcdic data and an enhanced Pascal interface. The system, written in Macro, includes mid-command choice lists, help messages and instant abbreviation completion. A FOR command is said to make the System 1032's internal programming language a Pascal-like, block-structured language, and a host-language interface supports Pascal data types.

The vendor said Version 1.5 also includes on-screen reporting, wider access to VMS system data and on-line instructional demonstration. A typical System 1032 license costs $40,000 for the VAX-11/780 from Software House, 1105 Massachusetts Ave., Cambridge, Mass. 02138.

'Emacs' Editor Expanded For Domain

HIGHLAND PARK, N.J. — Unipress Software, Inc. has announced that its Emacs screen editor software has been expanded for use with Apollo Computer, Inc.'s Domain system under both the Aegis and Aux operating systems.

The Emacs system reportedly features multiple windows that allow several files to be edited simultaneously, search and replace commands and programming aids such as automatic indenting. The system is said to communicate directly with both the Aegis and Aux systems, allowing users to execute system commands and programs from within Emacs windows and capture the output in an Emacs buffer.

The vendor said the Aux "make" function can be run from one window to compile a program, and erroneous statements will automatically be placed in another Emacs window. Emacs costs $995 per workstation from Unipress Software, 1164 Raritan Ave., Highland Park, N.J. 08904.

New for VAX

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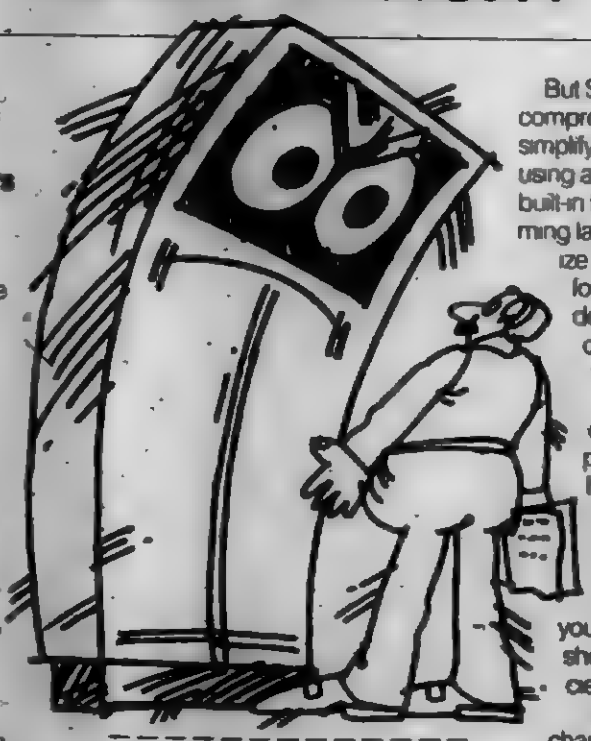

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Micro Notes

Onyx Systems, Inc. recently announced a set of 11 utilities to be bundled free with purchase of its **Oasis Version 5.6** operating system, which is priced at $850, and available by upgrading for $95 to users of Version 5.5C and for $150 for users of 5.5B1 and earlier versions. The company is located at 25 E. Trimble Road, San Jose, Calif. 95131.

Ashton-Tate has announced that its existing **Dbase II** package is totally compatible with the recently introduced IBM 3270 Personal Computer. A company spokesman said Ashton-Tate software specialists worked under agreement with IBM to assure compatibility of the software with the new microcomputer. Ashton-Tate is located at 10150 W. Jefferson Blvd., Culver City, Calif. 90230.

Logical Systems, Inc. (LSI) recently announced the four-package LSI Help system series, **Help, Technical Help, Help Generator** and **Help Text Source**, to provide syntax information to the user from the disk operating system level or from within most application packages. The series is available in two versions: one for its Ldos Version 5.1 used on the Radio Shack TRS-80 Models I and III and Lobo Systems International's Max-80; and another version for the Ldos/TRSDOS 6.X used on TRS-80 Models 4, II and 12. Packages are priced from $19 by Logical Systems through 8970 N. 55th St., P.O. Box 23956, Milwaukee, Wis. 53223.

Micro Architect, Inc. announced the **Word-X** word processor package for the IBM Personal Computer XT and compatible microcomputers. The package supports color or monochrome monitors and consists of full screen editor and text processor modules. It is priced at $58 by the vendor, located at 6 Great Pines Ave., Burlington, Mass. 01830.

Advanced Software Products, Inc. announced Version 1.5 of its 3101 emulator package for the IBM Personal Computer and IBM Displaywriter, providing the ability to transfer data files during block mode emulation. Perpetual licenses are available for $300 per system from the vendor through P.O. Box 790, Delray Beach, Fla. 33447.

Applefile III is a data management program from Apple Computer, Inc. for organization, management and maintenance of large files on its Apple III microcomputer. It enables users to store, arrange, review and print records in files that have up to 16M bytes of mass storage. It requires 256K bytes of internal memory and an Apple Profile hard disk or comparable unit. The suggested retail price is $325 from dealers of Apple, which is located at 10260 Bandley Drive, Cupertino, Calif. 95014.

Rosen Grandon Associates has announced **A-Stat 83**, a statistical analysis and data base reporting system compatible with Apple Computer, Inc.'s DOS 3.3 and Digital Research, Inc.'s CP/M operating systems.

The software was designed for survey market research and applications. The price for the Apple II, II+ and IIe software is $200. For the CP/M and Microsoft, Inc. MS-DOS versions, the price is $300 from Rosen Grandon Associates, 7807 Whittier St., Tampa, Fla. 33617.

Alpine Datasystems, Inc. has announced a new version of its **Fixed Asset System** software for use with microcomputers operating under Digital Research, Inc.'s CP/M operating system.

The new version has been updated with current government depreciation regulations, and it provides traditional calculation methods along with the Accelerated Cost Recovery System. It costs $495 from the vendor at 8043 S.W. Cirrus Drive, Beaverton, Ore. 97005.

Omtool Corp. has developed a version of its Digital Research, Inc. CP/M 80 and CP/M 86 **Softbol** language system for Digital Equipment Corp.'s Rainbow 100 and Decmate II microcomputers. Softbol is compatible with DEC's CTS-300 Dibol-11 language and permits business applications, including Mini-Computer Business Applications, Inc.'s software packages written in Dibol, to run on both microcomputer systems. It is available for $1,000 from the vendor at 212 Bacon St., Waltham, Mass. 02154

Relational Solutions, Inc. has released **Superstar**, which allows users to select the foreground and background colors for Micropro International Corp.'s Wordstar, eliminating the hard-to-read white on black that Wordstar defaults to when used on a color monitor. Reverse video is supported for monochrome monitors. Superstar also allows the user to select default Wordstar parameters once, from a menu, eliminating the need to reset the default parameters each time. Superstar runs on any IBM Personal Computer or Personal Computer XT that uses Wordstar 3.2 or a later release and is available for $29.95 from 8723 Woodleigh Drive, Houston, Texas 77083.

Advanced Computer Techniques Corp. (ACT) has announced **SMM300**, a Mumps multitasked operating system for Digital Equipment Corp.'s Professional series of microcomputers. The basic system supports up to three users, and with the installation of a real-time interface board, five users can be supported. The system is available from Creative Socio-Medics Corp., the medical divison of ACT, through an exclusive U.S. distributorship agreement with the developer, Structured Data Systems. A single license for SMM costs $1,400 and quantity discounts are available from Creative Socio-Medics, 16 E. 32nd St., New York, N.Y. 10016.

Turbo-Pascal for IBM's PC-DOS, Microsoft, Inc.'s MS-DOS and Digital Research, Inc.'s CP/M 86 and CP/M 80 operating systems has been announced by Borland International. Named Turbo Pascal because of its speed, it is reportedly 10 to 70 times faster than Digital Research's MT and JRT Pascal. It takes 27K bytes of disk space and includes a built-in, interactive, full screen editor, which is compatible with Micropro International Corp.'s Wordstar. Turbo Pascal will sell at an introductory price of $49.95. Marketing will be through key distributors, and Borland is accepting distributor applications at 4807 Scotts Valley Drive, Scotts Valley, Calif. 95066.

Avant Garde Creations has introduced **Amperfinesse**, an enhancement to Apple Computer, Inc.'s Applesoft Basic designed to run on the Apple II and IIe. Amperfinesse allows the user to call subroutines with arguments and by name, format numeric output, redimension arrays, chain Applesoft programs or move a program in memory while it is running. Amperfinesse can be fragmented and placed anywhere in memory, and machine language command routines can be appended to the Applesoft program, creating a package that will run on machines that don't have Amperfinesse available. It costs $79 from P.O. Box 30180, Eugene, Ore. 97403.

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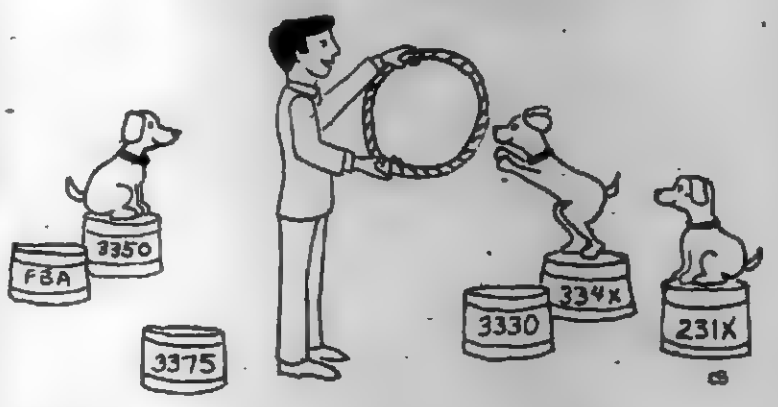

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COMPUTERWORLD
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40 Wholesale/Retail Trade
50 Business Service (except DP)
60 Government--State/Federal/Local
65 Public Utility/Communication Systems/Transportation
70 Mining/Construction/Petroleum/Refining
75 Other User
Vendors
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85 Computer Service Bureau/Software/Planning/Consulting
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95 Other Vendor

2. OCCUPATION/FUNCTION (Circle One)
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12 VP/Assistant VP
13 Treasurer/Controller/Financial Officer
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22 Director/Manager of Operations/Planning/Administrative Services
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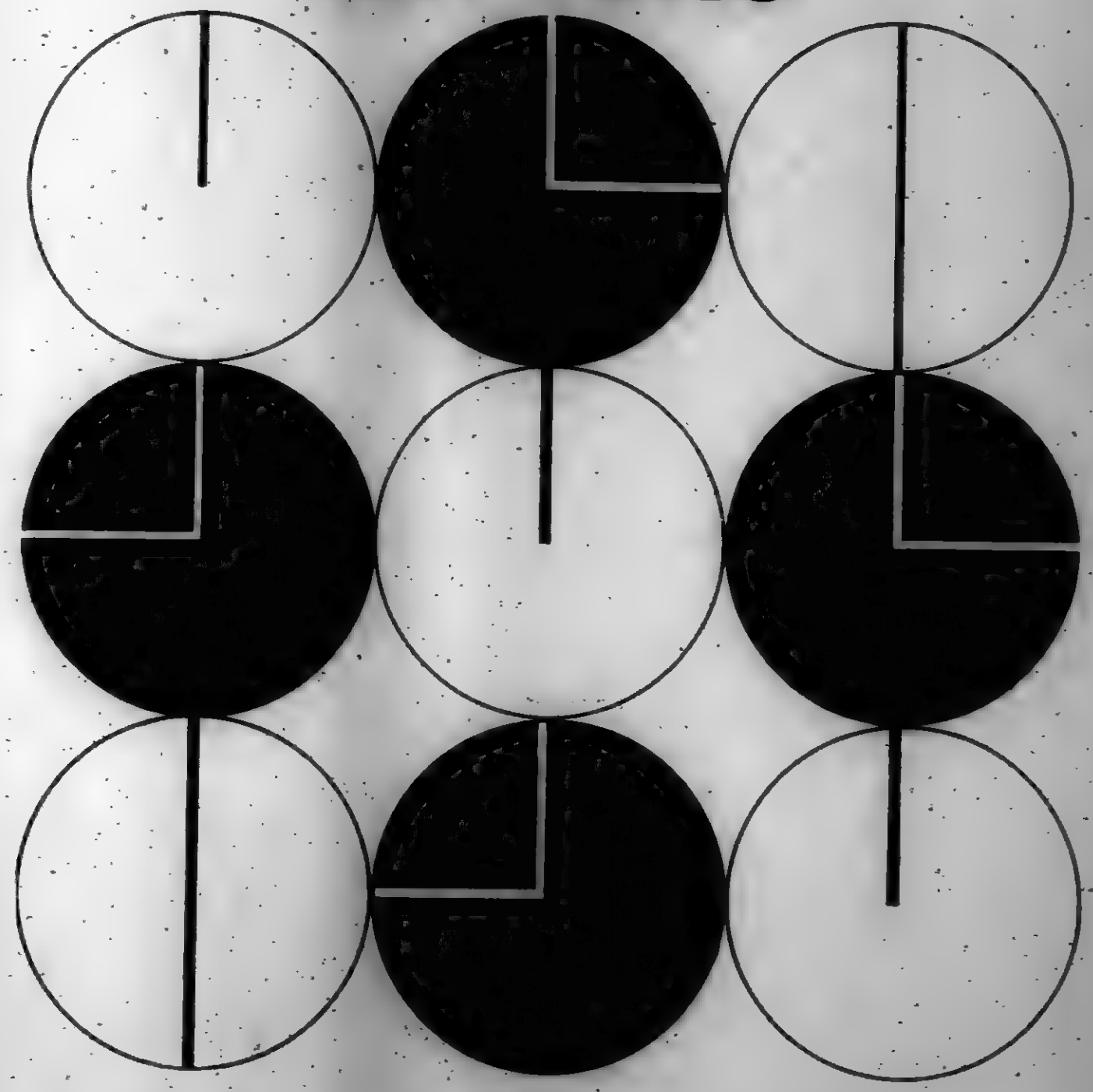
Getting the Right Things Done On Time



"Time consciousness pervades data processing," explained an MIS executive, "but time management isn't so prevalent."

"It's worse than that," a colleague responded. "We're acutely aware of time and its pressures: elapsed time during development steps, project milestones and deadlines, the effect of user impatience and lack of understanding. It's the stress that results from all these that's cutting into my effectiveness."

"What bothers me," a third manager replied, "is the trouble my newer, less experienced project leaders and managers are having managing their time. They're uncomfortable with the need to pay attention to people and really to communicate with them. It was easier when all they had to worry about were themselves and their own piece of the project. Managing others requires a different kind of time consciousness."

By Stewart L. Stokes Jr.

Organizations have personalities or "cultures" that help to influence behaviors on the job (and sometimes off the job, as well). They are often described as "the way we do things around here" and are communicated through

(Excerpted from Time Is of the Essence, *by Stewart L. Stokes Jr. © 1983 by QED Information Sciences, Inc., 170 Linden St., Wellesley, Mass. 02181.)*

IN DEPTH

action and behavior as well as words.

Organizational personalities evolve, subtly shaping the ways work gets done. The task and process dimensions of activities and objectives are molded by the strength of personality present in the particular unit or department.

The organizational personality affects the way time is used and managed in two major ways.

First, it directly affects how expectations are managed, as well as how mutual understanding of objectives, tasks and responsibilities is achieved.

An organization's personality dictates directly how time is consumed hour by hour, day by day. How is information communicated? What information is communicated? How frequent are meetings, and who schedules them?

In some organizations, the personality dictates that considerable time and attention be paid to developing a clear understanding of where the organization is going, how it plans to get there and what everyone's contribution is expected to be. The spirit of open, up-front communication pervades the atmosphere, and people tend to have a clear conception of their roles. There are few secrets, with politics kept to a minimum. As a matter of fact, office politics is frowned upon in such organizations, because politicking is regarded as a waste of time and energy.

Second, the organizational personality dictates directly how time is consumed hour by hour, day by day. For instance, how is information communicated? What information is communicated? How frequent are meetings? Who schedules them? Where are they held? Who is invited? Who is expected to participate and how? How long do meetings last? What is discussed? How are decisions reached? Who is involved in making decisions? What is the correlation between length of meeting and results?

In some organizations, no one would think of holding a meeting without:

- Inviting everyone who is even remotely affected by the matter at hand.
- Clearing the date and time on everyone's calendar well in advance.
- Reserving a conference room.
- Confirming the data and time in writing.

This style reflects the way things are done in a formal, structured environment and culture. In keeping with this personality, it is safe to assume that:

- There are frequent meetings.
- They tend to be long.
- A "meeting code of conduct" pervades the atmosphere, and participants are expected to follow it.
- Discussions are relatively formal and structured.
- Written agendas are circulated in advance to all attendees.
- Written agendas are followed rigorously.
- Minutes are kept, circulated and used as the basis for future action.

On the other hand, in other organizations, no one would think of setting up meetings so formally. Meetings are considered necessary evils, to be kept as brief as possible. In such organizations:

- Meetings are few and tend to be attended by only those involved in the decision.
- Meetings are organized on the spur of the moment.
- Agendas are also drawn up hastily and tend not to be circulated.
- Agendas are loosely followed and discussion is free-flowing.
- A meeting code of conduct exists, but the atmosphere tends to be more informal.
- Discussions are less formal and structured.
- Minutes are kept by those who care to keep them, but are seldom circulated, and decisions are subject to change "on the fly" as new information is received into the system.

Which style is better? It's not an either-or choice. Organizations grow their own style, and what works well for some will not work at all for others. What's important to understand is that an organizational culture is present and working and that

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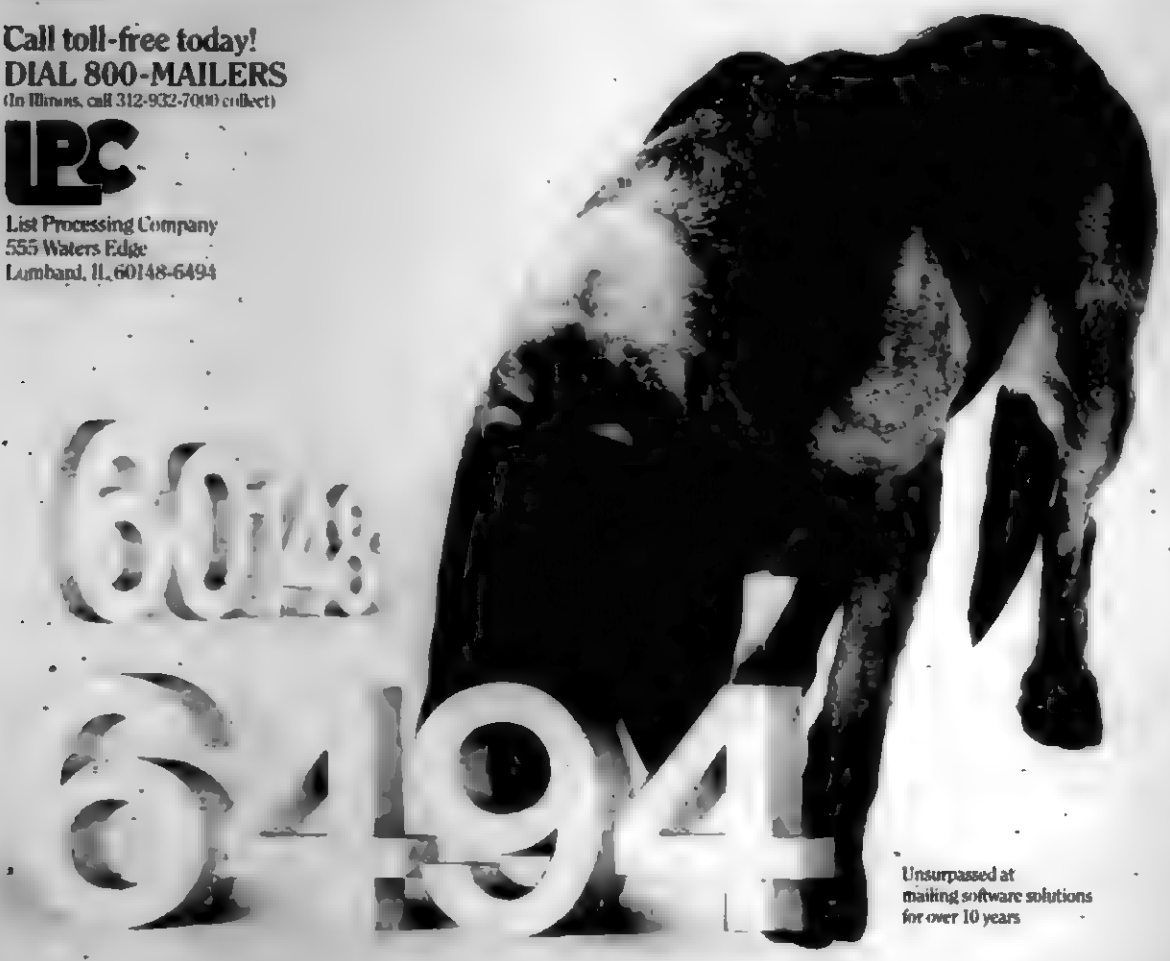

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managers need to understand the culture and its impact on how the time resource is handled.

Quick-and-dirty time-management tips often fail because the person trying them doesn't understand the organizational culture and its influence.

Five Time-Control Problems

Five major, universal time-control problems underlie many of the "time thieves." They are:

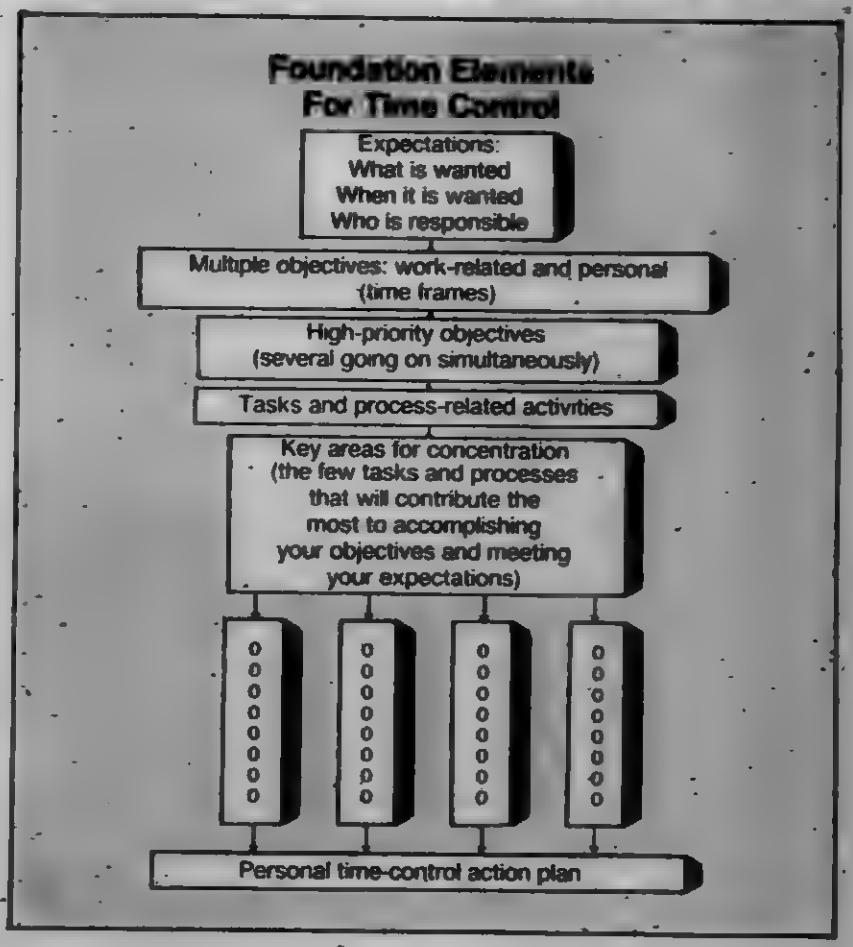
1. Differences in expectations; gaps in understanding; lack of mutually understood expectations.
2. Lack of information about organizational and unit objectives that affect performance.
3. Difficulty in transmitting understanding through oral and written communication.
4. Difficulty in delegating.
5. Crisis management resulting from a lack of interest in planning.

As you read about these universal time-control problems, think about how they affect you and what you can do about them. You will be able to build a more efffective personal action plan for time control if you take time now to understand the problems that affect your attitudes and behavior.

A major time-control problem in organizations today is a lack of understanding about what is wanted, needed and expected. It is often assumed that everyone perceives the organization, department and unit in the same way and that everyone is traveling down the same road, toward the same objectives and with the same time-management concerns and constraints in mind. But such is seldom the case, especially in data processing, where it is well understood that the loyalties of DP professionals are often stronger to the field or profession itself than to the employer.

If you make the necessary effort to learn more about where your organization is going, you will have taken a giant step toward more effective time management — both for yourself and your unit.

A second and related universal time-control problem is a lack of understanding of organizational and unit objectives that affect individual performance. No one can manage any resource effectively (hardware, software, people, dollars, time) unless he has a clear understanding of what is expected of him, what his objectives are (task and process, quantity and quality) and what his key areas for concentration need to be.



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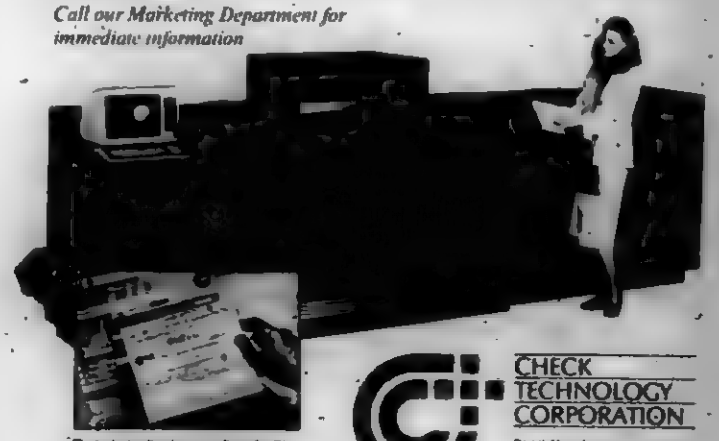

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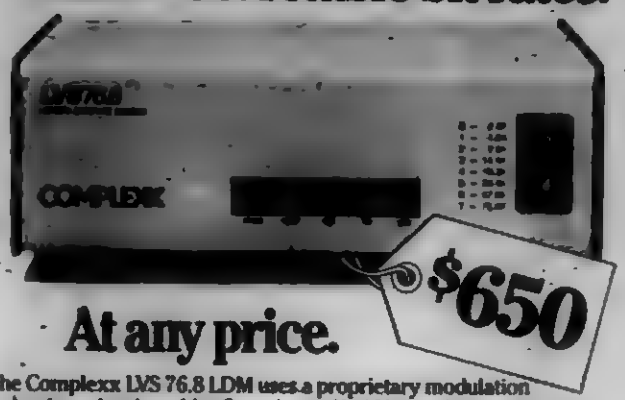

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Most people must continually seek out this information, process it, establish an organizational network and channels of communication (formal and informal) to stay up to date and make it their business to keep their personal network open and two-way communication flowing.

If you continually monitor your on- and off-the-job objectives, focus on key areas for concentration and maintain an ongoing action plan, you have all the raw material necessary to manage your time and energy more effectively. A flowchart of these foundation elements appears in the box on In Depth/3.

Poor Communication

A third problem involving time control is difficulty in gaining the understanding of others through oral and written communication. Poor communication skills account for significant time loss in just about every DP organization. This loss is visible in abnormally high costs for systems development, maintenance and operations.

You may document this time loss for yourself, with data obtained from a time log. When thinking, writing and speaking skills are faulty and mutual understanding is not checked out every step of the way, time will be misused and mismanaged.

Experience has convinced me that there are five key difficulties encountered in the communication process:

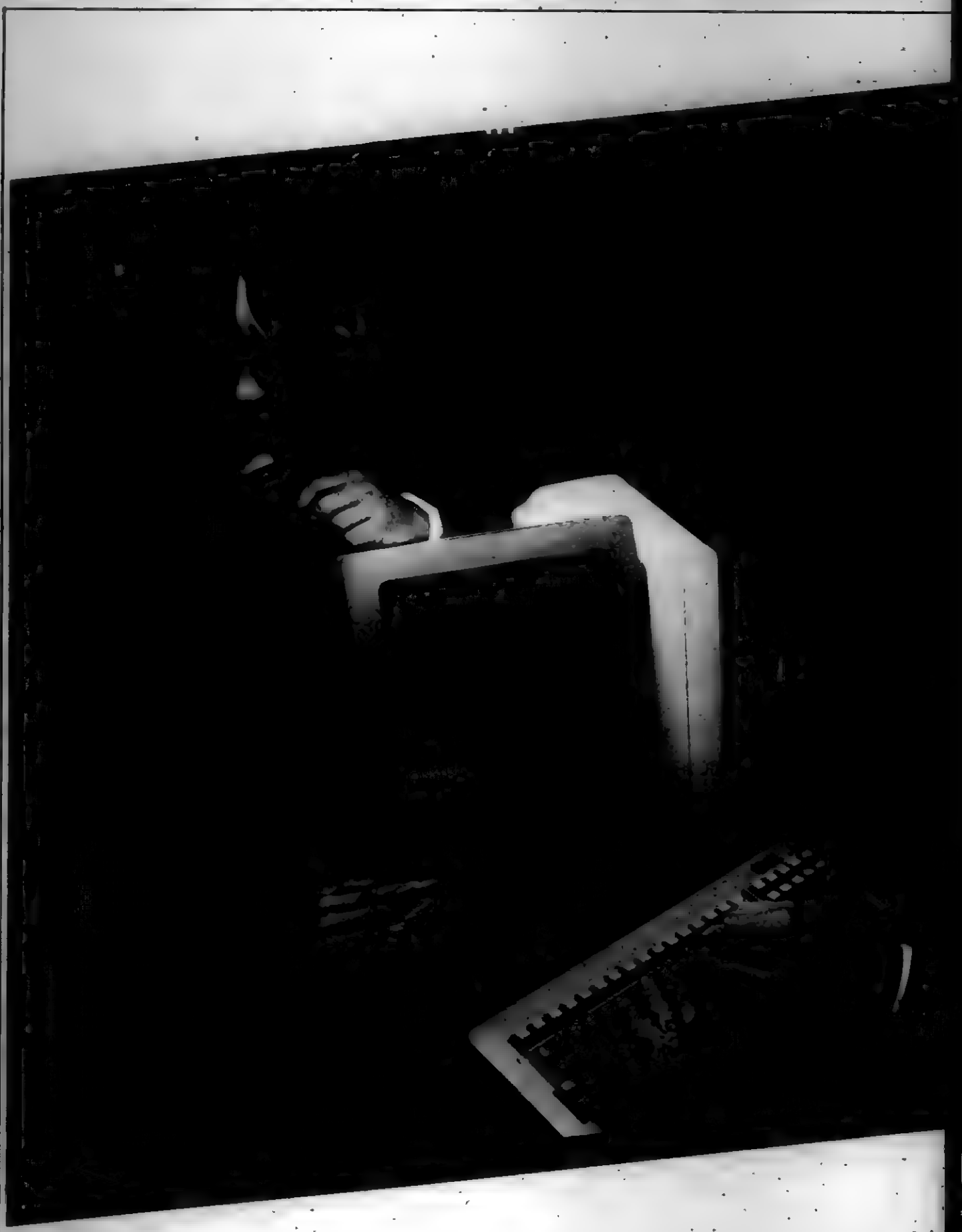
1. Failure to recognize and deal with the natural barriers to understanding that exist between all people.
2. Poor listening habits.
3. Lack of feedback when communicating orally and in writing.
4. Poorly organized oral communications.
5. Awkward written communications.

One of the most important elements in gaining understanding through communication (a "key area for concentration") is to anticipate and recognize the natural barriers between people and between groups. These barriers are a complex of cultural factors, assumptions, prior experiences, attitudes and prejudices that get in the way of understanding. Recognize them for what they are, understand that they exist, and work with them, trying to minimize their effects by knowing how subtle but far-reaching their effects are.

These barriers often result in poor listening habits. The feelings we have about the people with whom we are communicating and the assumptions we make about them often get in the way of gaining understanding. As we strive to use time effectively during the communication process, we need to recognize the impact (positive and negative) that our feelings and assumptions will have on the understanding we create.

It is during this process that we need to check frequently for understanding with the others involved in the discussion. We need to check what is understood and be sure that everyone involved understands the situation in as much the same way as possible. Very often, managers and supervisors (like parents) check for this understanding by asking the wrong question: "Do you understand?" This puts the person in a bind. If he really doesn't, he is often reluctant to admit it.

Adults don't like to admit to uncertainty about something they feel someone else thinks they should know, so



they fib a little and try to cover up this twinge of insecurity by replying, "Sure, I understand." They often get into trouble with predictable results:

"But I thought you understood."

"I did, but I didn't really think that was what you wanted."

"Of course it's what I wanted. That's what I told you."

"That's not the way I heard it."

This typical, fractured communication often leads to fractured human relations, too. Both communications and human relations will take a lot of time to repair.

A far better approach is to take a little extra time to check for understanding by asking, "What is it that we're going to do?" or "What is our understanding of the next step?" or "Let's share our understanding of how we're going to proceed."

These are much more "adult" questions, and they will help the person or people involved not to be on the defensive. By checking for understanding in this forthright, nonthreatening way, clear channels of communication will be kept open. People will understand that open communication is expected, wanted and valued in the organization, and significant amounts of time and energy will be saved.

Another aspect of effective listening relates to the clutter and competition for attention in our everyday environments. We sometimes miss the most important dimensions of an oral communication: the tone of voice, inflection and nonverbal clues that impart meaning. There are excellent training materials, books and films available on the subject of nonverbal communication. Again, the objective in mentioning it here is to point out the amount of time that is consumed by misunderstandings. "Reading" other people is not that difficult, and the time-conscious person soon learns that the skill pays dividends.

As far as written communications are concerned, the following guidelines should result in more effective use of time:

1. Know as much as possible about your audience. (Of course, this applies to oral communication as well.) Who are they? What are their backgrounds? How much do they already know about the subject, and what do they want to know? What do they expect?

2. What are your objectives? What do you wish to accomplish with your written communication? What do you want your audience to do?

3. Keep the communication simple. Avoid flowery language.

4. Put yourself in your audience's shoes. What's in it for them? What benefits? What results? Why should they read your communication, anyway?

5. Decide which form of communication is most appropriate for your objectives: a memo, letter, report. If you want a reply, ask for it. Don't leave the reader guessing.

6. Just as you check for understanding in an oral communication, do so with a written one. Ask someone else to read it and tell you what they think you mean. Don't get hung up on your own matchless prose. You're not writing for a Pulitzer Prize. You're only trying to convey understanding to someone else, and this can be a very difficult job — so "market test" your writing.

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7. Don't be lazy. If obstacles are in the way of understanding, rewrite. I was in a manager's office not long ago, and his secretary brought him a freshly typed letter he had dictated. "What do you think of it?" he asked. "It's okay, I guess," she replied, "but you could be clearer here, here and here." After quickly scanning the letter, he grabbed for his pen. "I'll sign it and you send it. I can understand it."

One result is certain: A lot of precious time will be lost when someone tries to figure out what that manager was trying to say.

One of the most important strategies for more effective use of time is to fine-tune the art of delegation, one of the most difficult managerial skills to execute well. Sloppy delegation leads to much lost time every day.

Delegation disturbs many managers because it requires them to relinquish control. Most successful managers have a high sense of personal responsibility, and this is often nurtured through close control over that sphere of responsibility.

Effective time management through delegation requires that you loosen control over your operation and encourage other people to grow through job assignments. Delegation is unsettling, because part of a manager's reputation goes with the assignment.

Of course, subordinates have not had the benefit of the same experiences, insight and knowledge. Yet, if managers are to survive as managers, they must delegate. And if subordinates are going to grow in their ability to handle managerial situations, they must be tested in real situations. There is no alternative.

It takes time to delegate, for there is often a lot of communicating, explaining and checking for understanding. Delegation always consumes time at the outset, but effective delegation saves time in the end. It frees the manager for the tasks he should be accomplishing and gives subordinates the opportunity to develop. Delegation, in addition to being a prime training strategy, is also one of the best motivators around. Most people want to be all they are capable of becoming, and delegation is one of the best ways of "turning people on" to accomplishment.

Inadequate Planning

The fifth major time-management problem is plain lack of interest in planning — not only in sophisticated, long-range strategic planning and short-range operational planning, but also in day-by-day, week-by-week and month-by-month planning.

Lack of planning results in management by crisis. Every day is a struggle. You fall behind and never catch up. You overload your schedules and don't leave time to accomplish the truly important tasks that always come in at the last minute and are a part of managerial life in every organization.

When you don't think through and write down what you want to talk to key people about on the phone, you end up phoning the same person several times a day when a couple of calls would do.

You might drop by colleagues' offices early and often — without checking to see whether they have time at that moment to give you. You assume they have time because you do. When they "return the favor," you resent it.

A few minutes of thought, a list of key items you wish to discuss and a polite call ahead of time to arrange a meeting will earn you a friend and his attention. That touch of professionalism is sorely needed in many organizations.

Planning is a must before you use any resource. You would think long and hard about spending money without a business plan.

You should think long and hard about spending personal energy — and a part of your life — without a time plan.

About the Author

Stewart Stokes is vice-president and manager of education programs for QED Information Sciences, Inc. in Wellesley, Mass. Prior to his association with QED, he served as associate dean, School of Continuing Education, at Babson College in Wellesley.

Stokes has conducted management training and education programs for a variety of organizations including the American Association of Industrial Management, Digital Equipment Corp., Polaroid Corp. and Harvard University.

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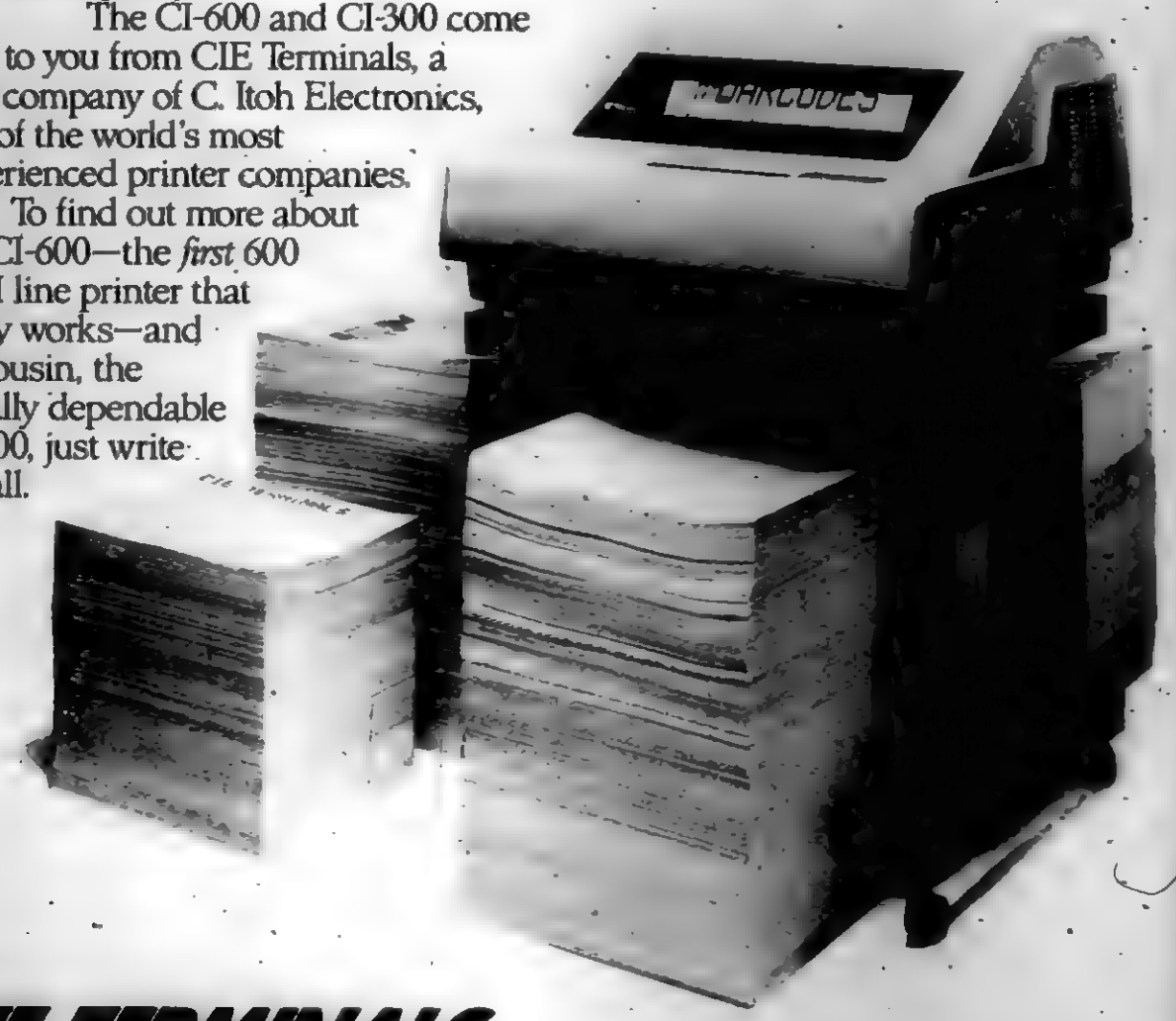

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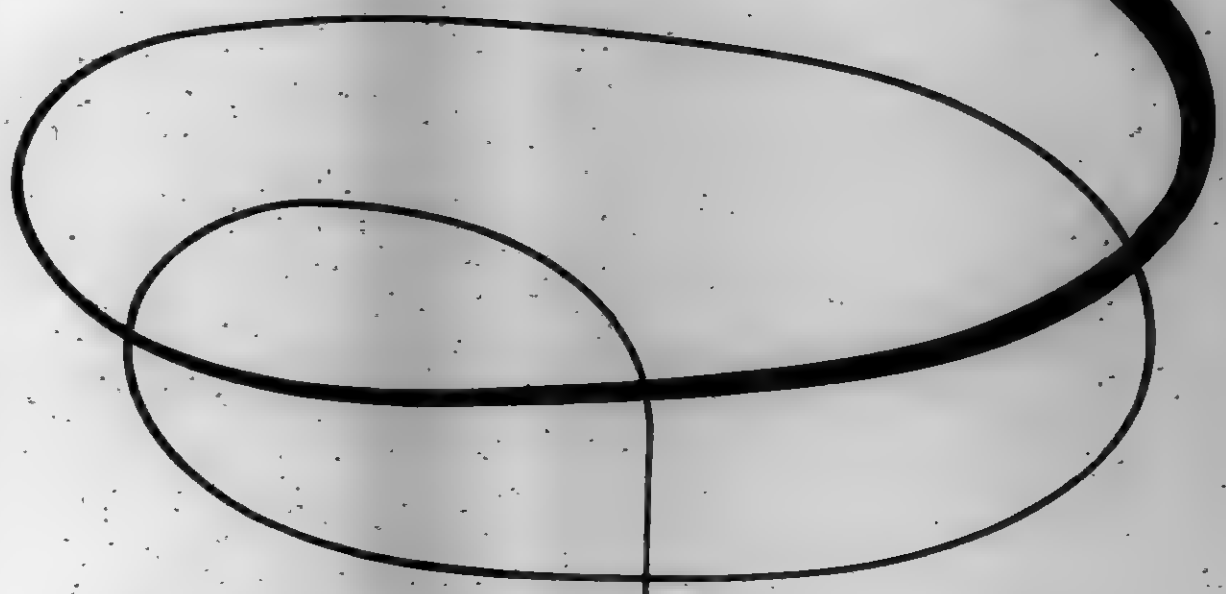
AN SNA PRIMER FOR PROGRAMMERS Part 2

By David M. Baer and Jim Sturch



In the first half of this primer, we initiated the reader into the world of IBM's communications technology by discussing the evolution of Systems Network Architecture (SNA) in relation to the products that support it. Then followed an examination of some fundamental concepts and components of the architecture. In this concluding half, we delve into the details of SNA and look at how it all fits together.

For some time now, it has been clear that a preferred methodology for network communications design must incorporate the division of functions and responsibilities into layers, with the lower layer always removing some detailed responsibility from the layer above it. This philosophy is not unlike that of top-down modular structured programming, and the derived benefits are much the same as well.

In communications between two end users, the layer approach involves the existence of two mirror images residing between them, where one of the mirror images supports each end user. Each layer in one mirror image deals only with its counterpart in the other.

There are five layers defined for SNA. The top three may be considered one "super layer" that concerns itself with management functions for the end user and the bottom two another "super layer" called the transmission subsystem. This arrangement is illustrated in Figure 2-1 (on In Depth/12). The transmission subsystem layer is responsible for physical routing of transmissions through the network, including all intermediate nodes along the route. The upper "super layer" is only required at the nodes to

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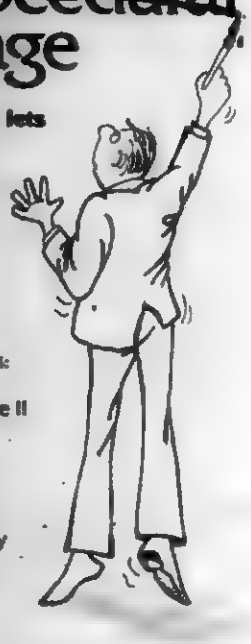

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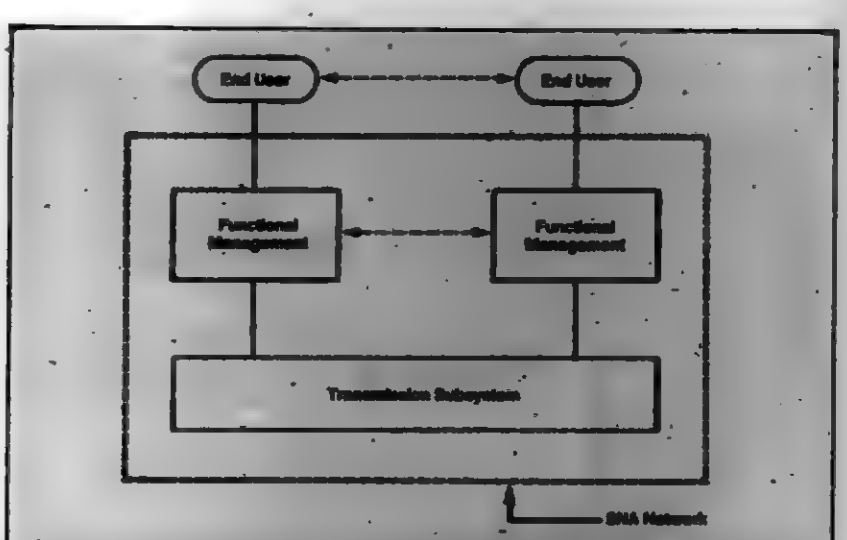

Note that the transmission subsystem components could physically consist of many links and intermediate nodes between the end users, but the functional management components above it may behave as if their counterparts were immediately adjacent, regardless of the true configuration.

Figure 2-1. Simplified View of Layered Approach to Communications

which the end users are directly attached.

For a session between two end users, two compatible groups of processes are established in the upper "super layer"; these are known as half-sessions. A number of elements active within the half-session manage various aspects of communication; these may include Session Control, Network Control, Data Flow Control, Function Management Services (for device selection, data management, data compaction/compression and so forth) and Presentation Services (for mapping data to and from a formatted display space.)

Figure 2-2 is a more complete diagram of the layers in an SNA session. Briefly, the layers have the following functions:

- Data Link Control is responsible only for data transmission from one node to the adjacent node and for ensuring that the data was received intact at that node.
- Path Control concerns itself with routing the data from the originating node to the terminating node, selecting the appropriate intermediate nodes along the way.
- Transmission Control acts as the interface between the upper layers of a session and the common transmission subsystem. It controls rates of data flow and manages correct sequencing of those flows.
- Data Flow Control is responsible for controlling the direction of data flow and managing various mechanisms for the logical groupings of a series of transmissions.
- High-Level Services incorporates a wide variety of functions, only a subset of which will be present for any given session. Since it is

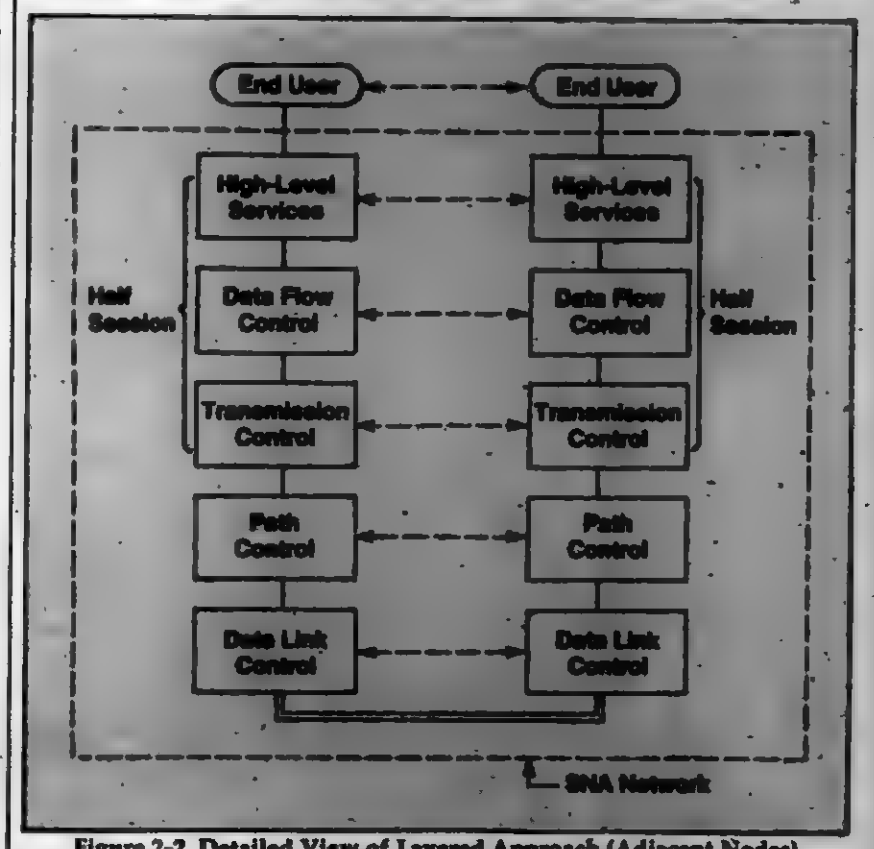

Figure 2-2. Detailed View of Layered Approach (Adjacent Nodes)

this level that directly interfaces to the end users, the specific services provided here are dependent on the nature of the session and the requirements of the end user.

Format of Transmissions

Request units (RU), whether they contain user data or network or session control commands, originate in the upper layers and are passed down through the lower layers for transmission. The three lowest layers perform a "packaging" function in which headers are added to the RU before being shipped down another layer for eventual transmission. At the receiving end, these headers are stripped as the RU is passed up through the layers.

- Upon receipt by Transmission Control of an RU or request response (RR) from Data Flow Control, a request/response header (RH) is prefixed to the RU/RR, and the result is known as a basic information unit (BIU).
- The BIU is passed down to Path Control, which attaches another header called a transmission header (TH); the result is a path information unit (PIU).
- Finally, Data Link Control receives the PIU and attaches both a link header (LH) to the front and a link trailer (LT) to the end of the BIU. The resulting basic link unit (BLU) is now ready for transmission.

Figure 2-3 diagrams the result of this process and illustrates several variations that will be introduced later. There is one subtle but important point in all this: While the three lowest levels are responsible for the construction and attachment of their respective headers, not all information used in the construction of a header resides within the layer itself; some is passed as parameters from higher levels.

This distinction deals with a level of detail somewhat beyond the scope of this article; it is made only to avoid an erroneous oversimplification. Next will be a more detailed explanation of each of the SNA layers; the various headers will be examined more closely in conjunction with the layers that build them.

SDLC is used to effect the serial transmission of data between adjacent nodes regardless of the transmission medium employed (analog telephone circuit, microwave and so on).

Data Link Control (DLC)

The basic job of DLC is to transmit data from one node to an adjacent node and to ensure that the transmission preserves the data's integrity. There are two types of link protocol used in SNA, depending upon whether the data link is a connection to the channel of a mainframe. A channel connection to a device like a communications controller or a local terminal cluster controller uses a channel protocol similar to that used for I/O to other data devices peripheral to a mainframe. Since there is nothing about it unique to network communications, it is rarely mentioned in discussions of SNA, but plays an important role nevertheless.

The protocol used in SNA for non-channel connections is called Synchronous Data Link Control (SDLC). SDLC is used to effect the serial transmission of data between adjacent nodes regardless of the transmission medium (analog telephone circuit, microwave and so on) employed. Binary Synchronous Communication (BSC) was the line protocol used in pre-SNA networks, but BSC could not be carried forward into the newer architecture for several reasons:

- BSC incorporated higher session-level functions that did not really lend themselves to the SNA layered concept.
- The protocol observed by BSC utilized frequent acknowledgment transmissions, which were inappropriate for efficient satellite transmission.
- BSC protocol was dependent on the type of terminal supported.

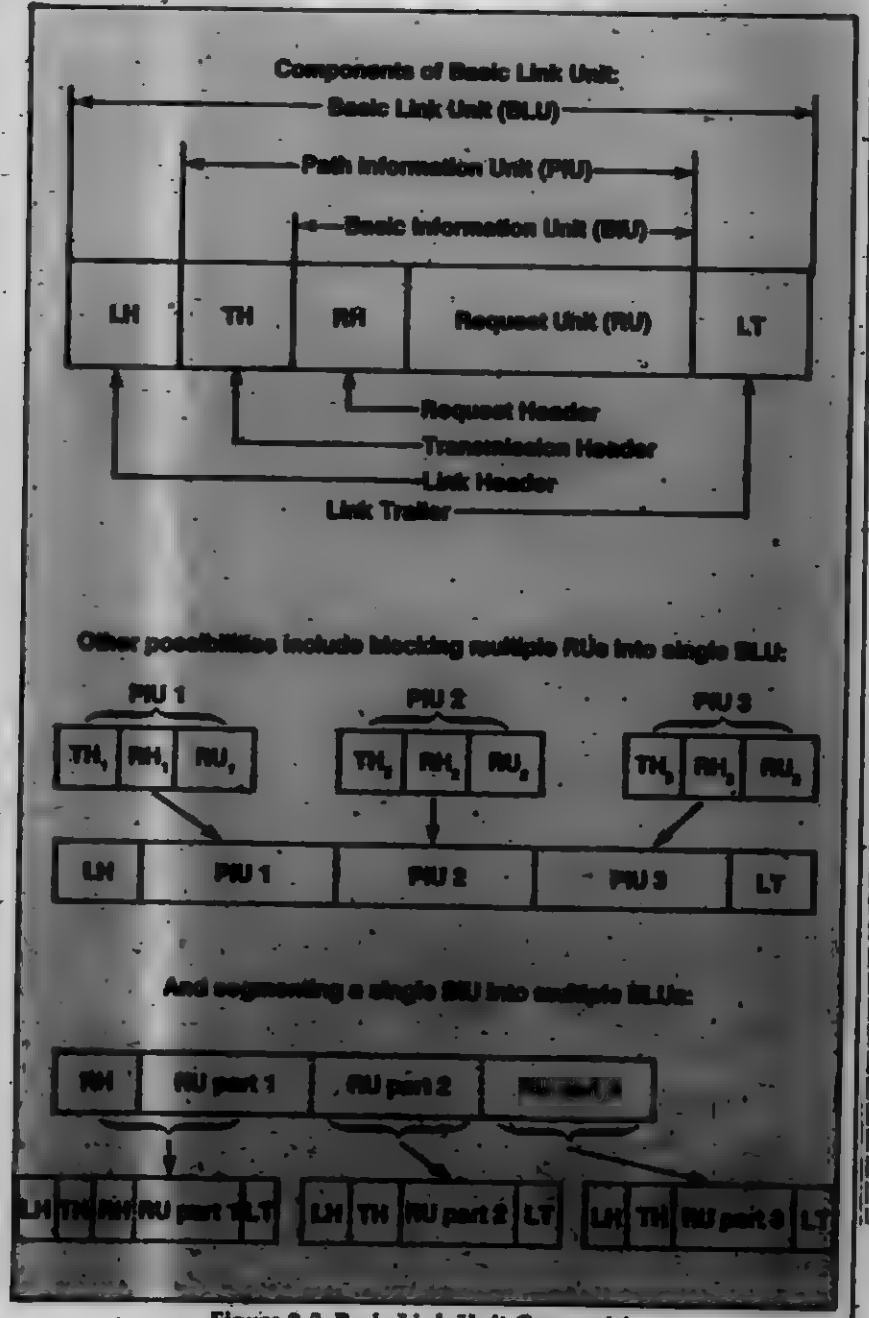

Figure 2-3. Basic Link Unit Composition

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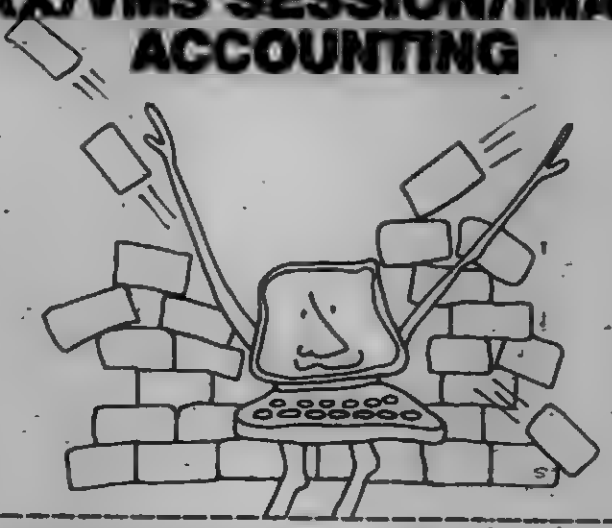

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• In general, BSC did not lend itself to networking.

SDLC was selected because it had none of BSC's shortcomings; it was a much simpler and more uniform protocol; it was suitable for satellite communications; it was a reliable mechanism for transmission; and it permitted bit-level transparency (no special bit patterns are prohibited within the data).

A single SDLC transmission is a basic link unit, which is also often called an SDLC frame. Frames may be quite large, but in practice are usually not longer than 256 bytes. Bit-level transparency is accomplished by beginning and terminating each frame with a flag of seven consecutive one bits. Upon transmission, any time six consecutive one bits are encountered in the data (except within the flags), SDLC automatically will insert a zero bit. At the receiving end, any zero bit that follows six one bits is discarded. This process is known as bit stuffing. Thus, any number of adjacent one bits in the data will never appear to the receiving station as a flag terminating the transmission.

Another clever technique is used to synchronize the clocks in the sending and receiving stations. The technique, called nonreturn to zero (NRZ), alleviates the need for a separate synchronization signal between them. Every time a zero bit is sent, the polarity of the zero setting is switched. At the destination, a reverse in polarity is decoded as a zero bit, and failure to reverse polarity after a cycle is decoded as a one bit. Thus, long strings of zero bits are eliminated, and bit stuffing eliminates the possibility of long strings of one bits, so reliable synchronization is effectively built into the signal.

The link header built by DLC consists of three bytes. The first is the X'7E' flag denoting start-of-frame, mentioned earlier. A second byte is used to specify the SDLC address; it is valid only at the DLC level and should not be confused with the SNA network address. Its purpose is to identify one particular node on a multidrop line.

The third byte of the LH has three possible formats, one used for information transfer and two for SDLC control purposes. In the former, two three-bit sequence fields are maintained to record a send-count and a receive-count. The purpose of these is to ensure that the complete loss of one or more frames will always be detected. Up to seven frames can be sent before a DLC-level response specifying the last receive-count must be returned to the sending station; it can then verify that all frames have arrived at the destination.

This acknowledgment would also inform the sending station in the case one or more frames were received but found to contain transmission errors (such as might be introduced by a noisy line). The result is that the SDLC protocol can recover from most transmission-error situations without involving the higher layers at all.

The other two control byte formats are used by SDLC for acknowledgments and for link-level control commands. Regardless of control byte format, one bit is used for polling purposes; it indicates a readiness to accept data or a lack of further data to be sent.

The link trailer is also a three-byte field, the third of which is another X'7E' flag

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signifying end-of-frame. The first two bytes of the trailer are known as a frame check sequence, which is a kind of elaborate hash total of data in the frame. This total is calculated in such a way that the probability of an undetected error in a transmission is on the order of one in 10^{21}, so DLC is able to offer the upper layers a very reliable transport mechanism indeed.

Path Control

The responsibility of Path Control is routing data from its source to its destination along the appropriate path. At the originating node, Path Control accepts a request unit from the half-session above it, builds a transmission header for it, determines on which route it should go out and passes it to Data Flow Control for transmission.

At an intermediate node, the receiving Data Link Control element will strip the link header and trailer from the frame and pass the resultant path information unit up to Path Control. At that point, Path Control processes the message in the same way its counterpart in the originating node did. Finally, at the terminating node, Path Control must route the data to the half-session that is the intended destination.

Figure 2-4 shows an example of an end-to-end itinerary of a message from a host, through one 3705 to a cluster controller. The most significant difference between Figure 2-4 and Figure 2-2 is the presence of the intermediate node, which only processes the message at the two lowest layers. Upon receipt of a message at the intermediate node, Path Control will strip the existing transmission header and build a new one appropriate to the next leg of the journey.

Two other functions performed by Path Control are segmenting and blocking, which were previously illustrated in Figure 2-2. Blocking is a process of grouping multiple transmissions to be sent in a a single SDLC frame; it is quite similar to the familiar method of grouping multiple records into a block for data set I/O. Segmenting, on the other hand, is similar to the spanned record recording format.

In current practice, segmentation is used far more frequently than blocking. It is an extremely necessary technique when minor nodes with limited buffer capacities are involved. It also increases efficiency of transmission when a long RU must travel across many slow-speed links along the route, since successive segments may be traveling along different links at the same moment. Blocking, however, is an optimizing technique of somewhat limited value and is currently implemented only for transmissions between major nodes.

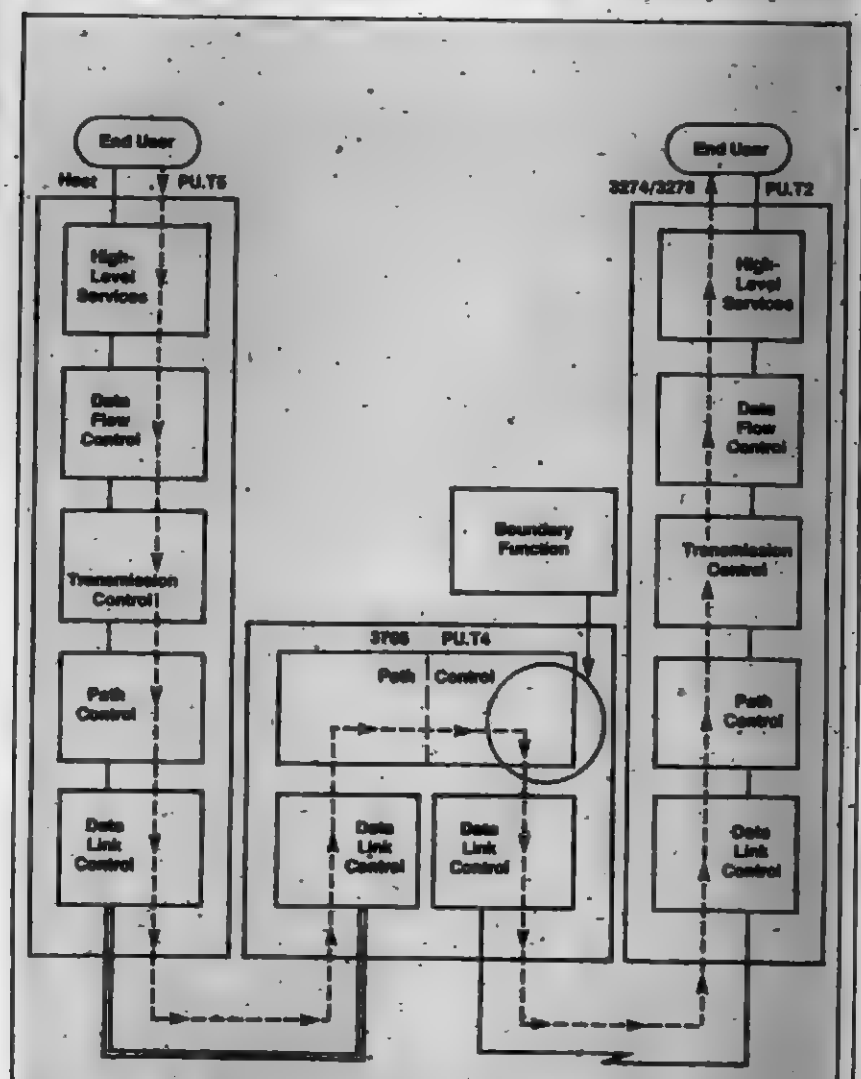
There are four transmission-header formats which differ primarily in the type of addressing they support. You might assume that these would be designated as TH Type 1, TH Type 2 and so on. But no, they are called format identifiers (FID) Type 1 through 4. While FID is the more commonly used term, it is synonymous to transmission header. FID types 1 and 3 are essentially older forms of network-address and local-address transmission headers and will not be discussed here.

FID 4s are used for messages between two major nodes. They contain two network addresses called the origin address field (OAF) and the destination address field (DAF); the OAF/DAF pair uniquely identifies a session. There are also a number of shorter fields used for diverse purposes:

- Control of segmenting and blocking.
- Expedited flow control.
- Message priority.
- Pacing control.
- Message sequencing used by the higher levels for bookkeeping purposes (this is a separate sequence control from the more primitive sequencing used in SDLC).

FID Type 2s are used for the message flows between major and minor nodes. They are considerably simpler than FID 4s in deference to the limited processing capabilities of the minor nodes. They, too, contain an OAF/DAF pair, but these are local eight-bit addresses. The only other control fields are a segmenting indicator, an expedited flow indicator and a sequence number like that contained in a FID 4.

A conversion between FID types 2 and 4 takes place in the major node immediately adjacent to a minor



This figure illustrates the itinerary of a message originating in an application program en route to a 3270 display device via a 3705 communications controller. Between the host and 3705, a FID 4 TH is used. The 3705-to-3274 link is a major-to-minor node boundary, so the boundary function of converting to FID 2 is required before the message is sent by the 3705.

Figure 2-4. Transmission With Intermediate Node

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node. Conversion of FID types and pacing alterations to suit the capabilities of minor nodes are known as boundary functions (again, refer to Figure 2-4). Boundary functions are essentially a process in which the major node provides a simplified interface point into the network for the minor node.

Transmission Control

Transmission Control is the lowest layer of each half-session. For outgoing messages, it constructs the request header that is prefixed to the request unit. For incoming transmissions, it acts as a "mailman" whose purpose is to deliver the message to the appropriate processing component of the half-session. TC has two other important functions: to keep track of sequence numbers of requests and to synchronize and pace session data.

Half-sessions use sequence numbers to ensure that messages are not lost during transmission. This function is supported using the sequence number field in the transmission header. When a logical unit sends a message to another LU, a sequence number is inserted in the request header. The sequence is incremented on successive transmissions. The receiving LU checks each incoming message to verify that the sequence number is one greater than the preceding number. The same process occurs for data sent the other way.

Therefore, two sets of sequence numbers are kept by each LU, one for "send" sequencing and the other for "receive" sequencing. When a missing message condition is detected by a secondary LU, it may issue a request to the primary LU to initiate recovery for the session.

Pacing is a technique used to ensure that RUs are not sent at a rate greater than the receiving node's capacity to handle them. An agreement is made at the time a session is established as to the number of RUs that may be sent before requiring a go-ahead signal for more.

Pacing may be used in one or both directions, although it frequently is only required in the direction of host to minor node. There may be (and typically are) different pacing parameters employed along a single route, with high-capacity pacing employed between major nodes and a more restricted pacing used at boundary nodes.

In addition to a pacing indicator, the three-byte request header built by Transmission Control contains a number of fields used by various elements in the half-session. These include:

- Request/response indicator.
- Bracket and chaining indicators (these topics will be introduced in the next section).
- Information specifying the type of request unit (Data Flow Control, Session Control, Network Control or application data).
- A response indicator specifying whether a definite response, exception response or no response is desired.

Data Flow Control

Data Flow Control concerns itself with protocols relatively close to the conversational level of the end users. Most important, it is responsible for establishing logical groupings of consecutive RUs of a session with two techniques called chaining and bracketing. In addition, Data Flow Control governs the control of send/receive modes, establishes and monitors response protocol and assists in error management.

Chaining is a mechanism defined in SNA to delineate recoverable transmission sequences. The easiest way to explain chaining is with an example of a common usage: SDLC frames are usually about 256 bytes long, while a 3270 display screen typically accommodates 1,920 characters. Consecutive RUs may have to be transmitted to a 3278 before a complete screen is ready for presentation.

Once the sender knows the full screen has arrived safely, it may then release its own copy of the data, but does not want to do that until it has confirmation that all the RUs for that screen have been received.

A response to the sender indicating that the last RU of a chain has been received thus acts as a syncpoint/commit indicator (in other words, "Message received and sender no longer responsible for it").

Two bits in the transmission header are used to denote that an RU is the first in a chain, in the middle of a chain, last in a chain or the only RU of a chain. In general, exception responses are required for all but the

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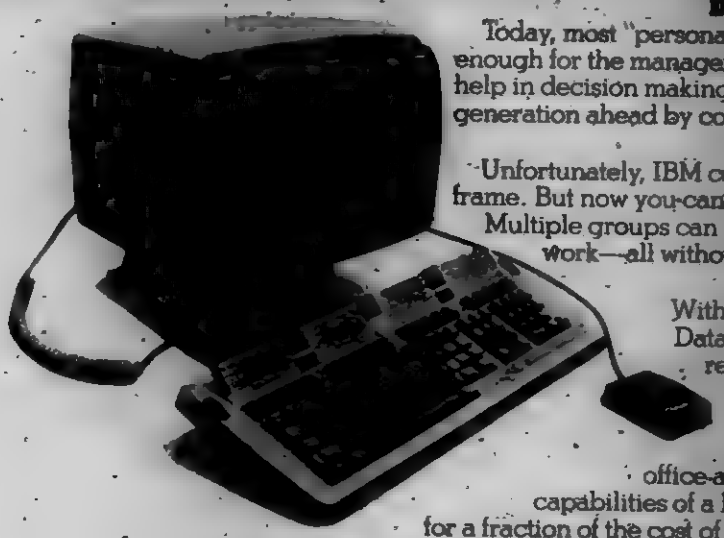

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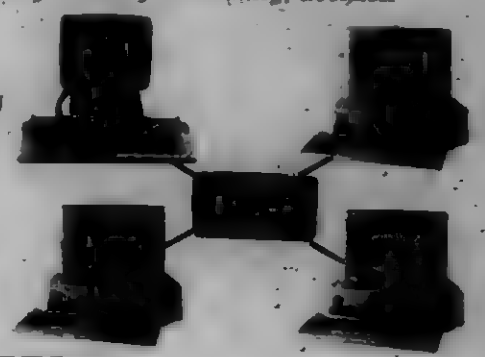

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last RU in a chain, which requires a definite response.

Finally, chaining can be easily confused with the segmenting function of Path Control, and a single segmented RU might also constitute a chain. But segmenting implies nothing regarding the recoverability of a sequence of RUs; it is a separate and lower level function.

A second technique called bracketing is employed by Data Flow Control to promote integrity at the conversational level. A bidirectional series of RUs flowing between LUs and dedicated to a specific activity may be bracketed to prevent intrusion of other RUs unrelated to that activity. Again, an example of a common usage: A TSO session involves providing TSO processing services to a terminal operator and also allows message routing between operators logged on concurrently. But a message sent to a terminal from another TSO user will not appear on the screen at any random time. It will only appear after the operator responds to TSO with a transmit key (Enter, a PF key or the like). The reason for this is that brackets are established at the start of a transmission from TSO to the operator and are terminated when his response is received.

The highest level of SNA activity is often called the Function Management Layer and incorporates two distinct areas of processing depending upon the type of request unit involved.

Once the brackets are ended, Data Flow Control permits other RUs to be received at the terminal. Brackets protocol is only observed by normal-flow RUs, not by expedited flow. For example, the Enter key or a PF key cannot be used to interrupt a program executing in the TSO foreground, since bracketing is used during this activity. IBM 3270 PA keys result in a signal sent in expedited mode, and consequently they can be used to override the lockout that brackets would normally impose.

Brackets are a rather complicated protocol, the rules for which are agreed upon at session initiation. The agreement may dictate that only one of the LUs may establish brackets or that either LU may. In the latter case, the LU wishing to start brackets must offer a bid to the other LU, requesting permission to do so. If that bid is accepted, the bracketing will commence.

High-Level Services

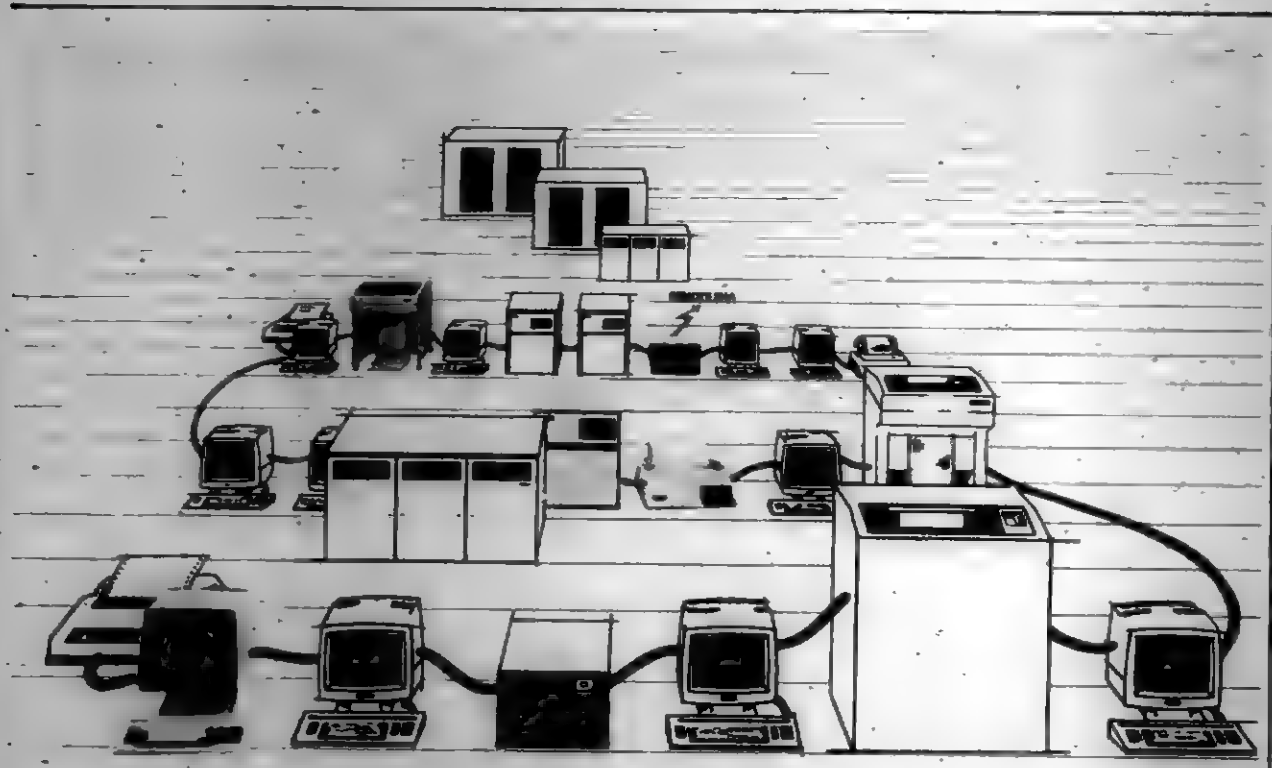
The highest level of SNA activity is often called the Function Management Layer and incorporates two distinct areas of processing depending upon the type of RU involved:

- One category is Network Services, which may be thought of as providing high-level support for an LU-LU session.
- The other category is the general application data transmitted between two LUs in session.

Network Services is comprised of six sets of high-level services, which are responsible for a variety of network management activities:

- Configuration Services communicates network commands to activate links and to load and initialize Network Control Programs (NCPs).
- Maintenance Services performs network maintenance functions, such as activating line traces and uploading NCP storage to a mainframe.
- Management Services basically acts as a long-distance carrier for other classes of network services.
- Session Services is generally involved in cross-domain session requests and control activities.
- Measurement Services participates in information gathering for network analysis purposes.
- Network Operator Services is the portal through which information flows to and from the network operator.

The second broad category of high-level processing is that involved with the actual application data flowing between two LUs, and within this category are two classes of RUs: those containing only data and those containing a prefix in the



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RU called a function management header (FMH).

RUs with no FMH consist either of display data and information for display formatting or simply contiguous bytes of data meaningful to the receiving LU. A high-level function called Presentation Services deals with the specifications for formatting, mapping the data between transmission format and the indicated physical layout. The most familiar example of Presentation Services is that which converts the 3270 data stream to the external representation viewed on the screen. Basic Mapping Support (BMS) of CICS is another implementation of Presentation Services.

Request units with function management headers are a rather more complicated topic, but they can briefly be explained with several examples of common usage.

- Model 3777 RJE stations exist as single LUs, but they contain multiple physical devices (such as printers or card readers). In sessions involving 3777s, FMHs are used for device selection and management.
- Data streams likely to contain frequent occurrences of repeating characters (such as spaces in printer output) may be compressed to reduce transmission time; FMHs provide this compression information.
- Distributed presentation management is a technique whereby display formats and all literal data are downloaded to an intelligent receiving (displaying) station. FMHs are used in this case to identify to that station the particular transform to be used.
- Any application-to-application communication may use "home-grown" FMHs for whatever purposes are appropriate. Use of FMHs implies some computational abilities in both partners of a session; they are specifically not permitted in 3270-type transmissions.

Sessions Revisited

At this point, it should be apparent that there is a substantial variety of options at the disposal of SNA product designers and that the number of permutations on all possible combinations of those options can be intimidating. In reality, however, there are certain practical combinations of particular allowable options that can be reused in many different situations by an LU type. These combinations, known as session profiles, are of two types:

- Transmission Services (TS) profiles deal primarily with options available at the Transmission Control level. They dictate such things as the use of pacing and sequence numbers, the maximum RU size allowed and what TC-level SNA commands are permitted.
- Function Management (FM) profiles dictate options available to the two upper SNA layers. They control the use of FM headers, bracketing, multiple-RU chaining and data compression. They also define such things as response types required (definite or exception), which half-session is responsible for recovery and which DFC-level SNA commands may be issued.

There are currently some seven TS profiles and nine FM profiles built into SNA, and each is appropriate to only certain LU types. In general, the difference between the various profiles of either type is in the level of sophistication of SNA support they offer.

Multiple-Processor Networks

The early SNA networks were restricted to a single host processor and thus a single system services control point (SSCP). Today, of course, there are vast possibilities for configuring multiple processors in a network, including processors offered by non-IBM vendors, most of whom provide at least some level of SNA support. A processor can exist in an SNA network in one of two forms:

- As a fully independent host running Vtam. In this case, the host is an SSCP and can be said to be a major node of PU.TS.
- As a processor executing some type of emulation program that allows it to appear as a minor node to the network.

In the latter option, the CPU is often referred to as a subhost. Many minicomputers are incorporated into SNA networks this way. In a typical configuration of this type, the subhost will have locally attached terminals that can converse with applications running in the subhost. One of those applications will provide an interface or gateway into the network by allowing the local devices of the subhost to appear as standard SNA

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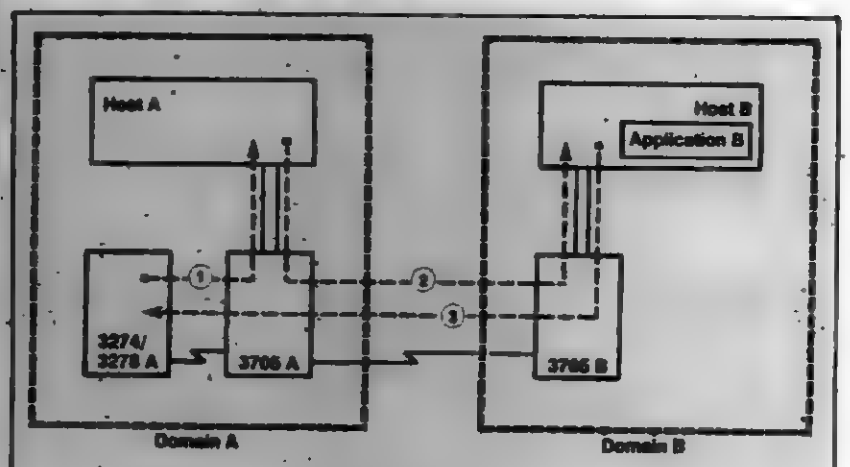

Before Terminal A accesses Application B, the following sessions must be active:

SSCP-SSCP:	Host A & Host B
SSCP-PU:	Host A & 3705 A
	Host A & 3274 A
	Host B & 3705 B
SSCP-LU:	Host A & 3278 A
	Host B & Application B

The process of Terminal A logging on to Application B proceeds as follows:

1. Terminal A sends the application's identifier to its own SSCP, which determines that the requested resource is in another domain.
2. SSCP in Host A contacts SSCP in Host B, informing it of the request for Application B. If Application B finds Terminal A acceptable, then:
3. A direct LU-LU session is established. Session data flow is directed along the indicated path for the duration of the session. Thus, Terminal A is temporarily owned by Host B for the session's duration.

Figure 2-5. Establishing a Cross-Domain LU-LU Session

devices to the network.

These gateway interfaces are frequently referred to as pass-through programs. Their most common uses are as cluster controller emulators and as remote JES workstation emulators. This is the way the majority of non-IBM minicomputer manufacturers provide SNA compatibility with their systems. IBM minicomputers like the System/34s, 38s, 8100s and 4300s running under VM are also often tied into the network in this manner.

Multiple full hosts present a more complicated situation, because multiple independent system services control points exist.

Host-to-host communications is accomplished under control of the Multiple System Network Facility (MSNF) by a type of session not previously mentioned: the SSCP-SSCP session. Like SSCP-PU and SSCP-LU sessions, they are automatically established at network start-up or may be explicitly established by command of the network operator.

SSCP-SSCP sessions provide the foundation upon which cross-domain LU-LU sessions can be established; these LU-LU sessions may be of any type allowed in a single-domain network, including application-application communications.

The process of establishing a cross-domain LU-LU session is illustrated in Figure 2-5, in which a terminal logs on to an application in a remote domain. To begin with, all nodes in a network are owned by a single SSCP. Any LU attempting to communicate with a remote LU first contacts its own SSCP. That SSCP will then determine that the resource requested (in the illustrated example, an application) resides on a remote system.

The SSCP-SSCP session is then used as the vehicle to initiate the cross-domain LU-LU session. The SSCP that owns the terminal may effectively withdraw from the proceedings once the LU-LU session is active, and the terminal becomes temporarily owned by the remote SSCP for the duration of the session. This situation is possible because path control can direct transmissions along a virtual route, which does not have to include the terminal's owner SSCP.

An anticipated facility of Vtam/MSNF is one that will assist in the process of merging existing, previously independent networks (as might be required when corporations merge). Rather than renaming all network addressable units (NAUs) to have unique network

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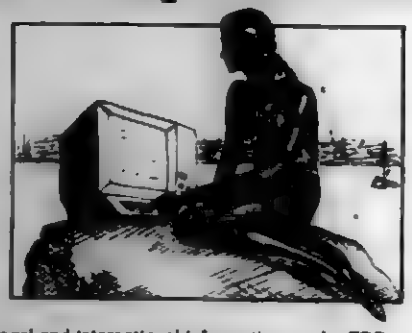

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SNA PRIMER — PART 2

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addresses across all domains, MSNF can be instructed to apply an address translation function of domain-to-domain boundaries. In this way, disruption within any of the domains subject to integration is minimized.

Finally in this discussion of multiple-host networks, there is one particular configuration of hosts that is important but potentially confusing. The low-end 4300 series processors are available with SDLC ports which permit them to establish direct communications with remote communications controllers without the expensive requirement for a local channel-connected communications controller. These processors may be fully independent SSCPs (PU.T5s), but also must support certain communications controller (PU.T4) activities.

This requirement is met with an extended version of Vtam called Vtam/E, which runs under DOS/VSE and performs some NCP types of processing. So, in a sense, Vtam/E turns its host 4300 into a hybrid PU.T5 and PU.T4. As small 370-compatible processors like the 4300 series grow less expensive, this configuration is likely to become increasingly commonplace.

A Look Forward

While it is usually not wise to try predicting future evolution of IBM's products, several areas related to SNA particularly invite speculation.

The first is the future role of the VM operating system within SNA networks. Currently VM's only compatibility with SNA is the provision of 3270 pass-through software of the type mentioned earlier. The alleged history of VM, sometimes referred to as the "black sheep" of the IBM operating system family, is that it was initially intended for internal use by IBM only and that its emergence as a software product was somewhat accidental.

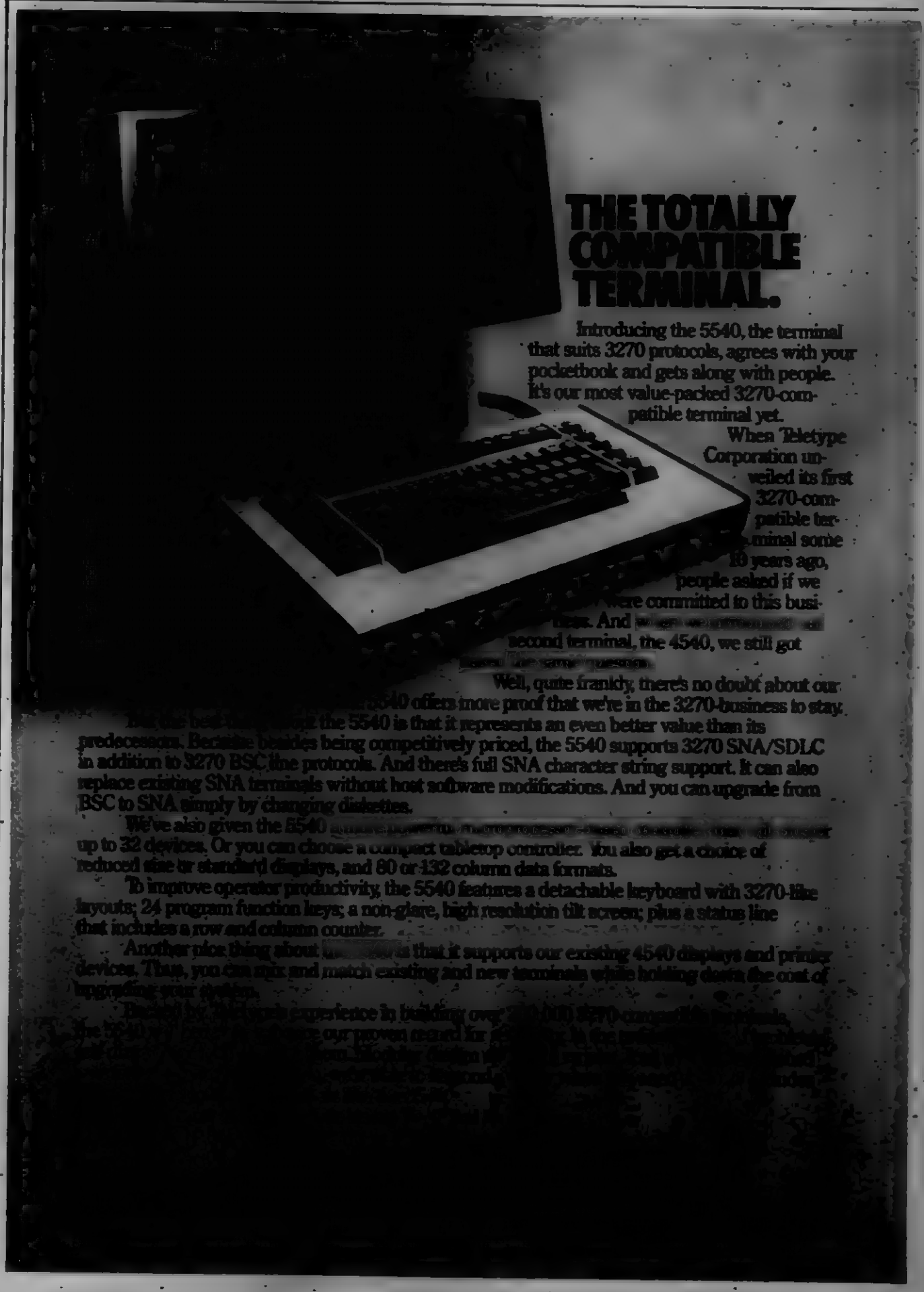
Yet the growing popularity of VM is at odds with its incompatibility with SNA. Because of this situation, IBM has indicated that we will eventually see an SNA-compatible VM, that IBM will release a Vtam (or equivalent) that runs directly under VM.

A second area of future SNA development is much broader in its implications; that is, the role of personal computers in networks. At this point, hardware and software vendors alike are scrambling to provide the suddenly desirable micro-to-mainframe connection.

Yet the very flexibility of these devices produces an immediate enigma when one attempts to define their proper place within the possibilities offered by SNA. At times, personal computers need to behave as 3270 terminals (LU.T2), at other times as data transferral units (LU.T1) and at still other times as applications communicating with a mainframe (LU.T6 or LU.T0).

This dilemma would be solved by the availability of a universal LU type upon which all LU-LU sessions would be based, regardless of the nature of the end users of those sessions. With microcircuitry continuing to become less expensive, more sophisticated protocol processing in all devices is now an economical option, and a single standard LU on which to base all future products could be advantageous in any case.

The widespread use of personal computers within



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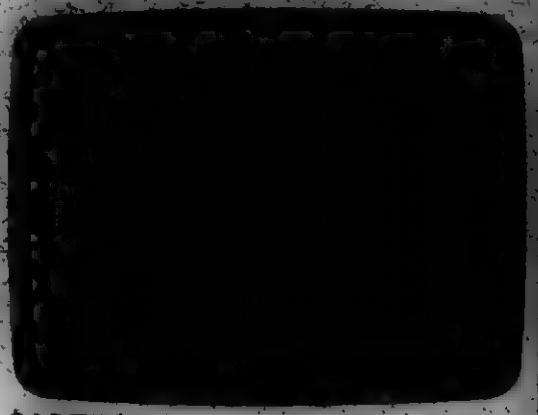

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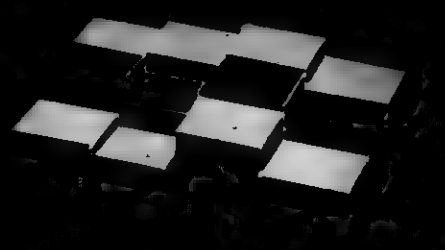

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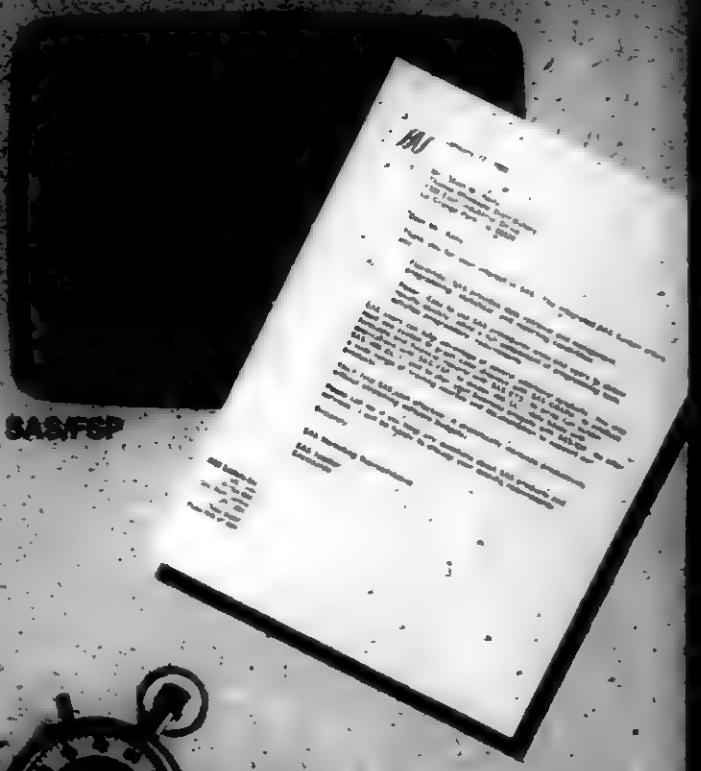

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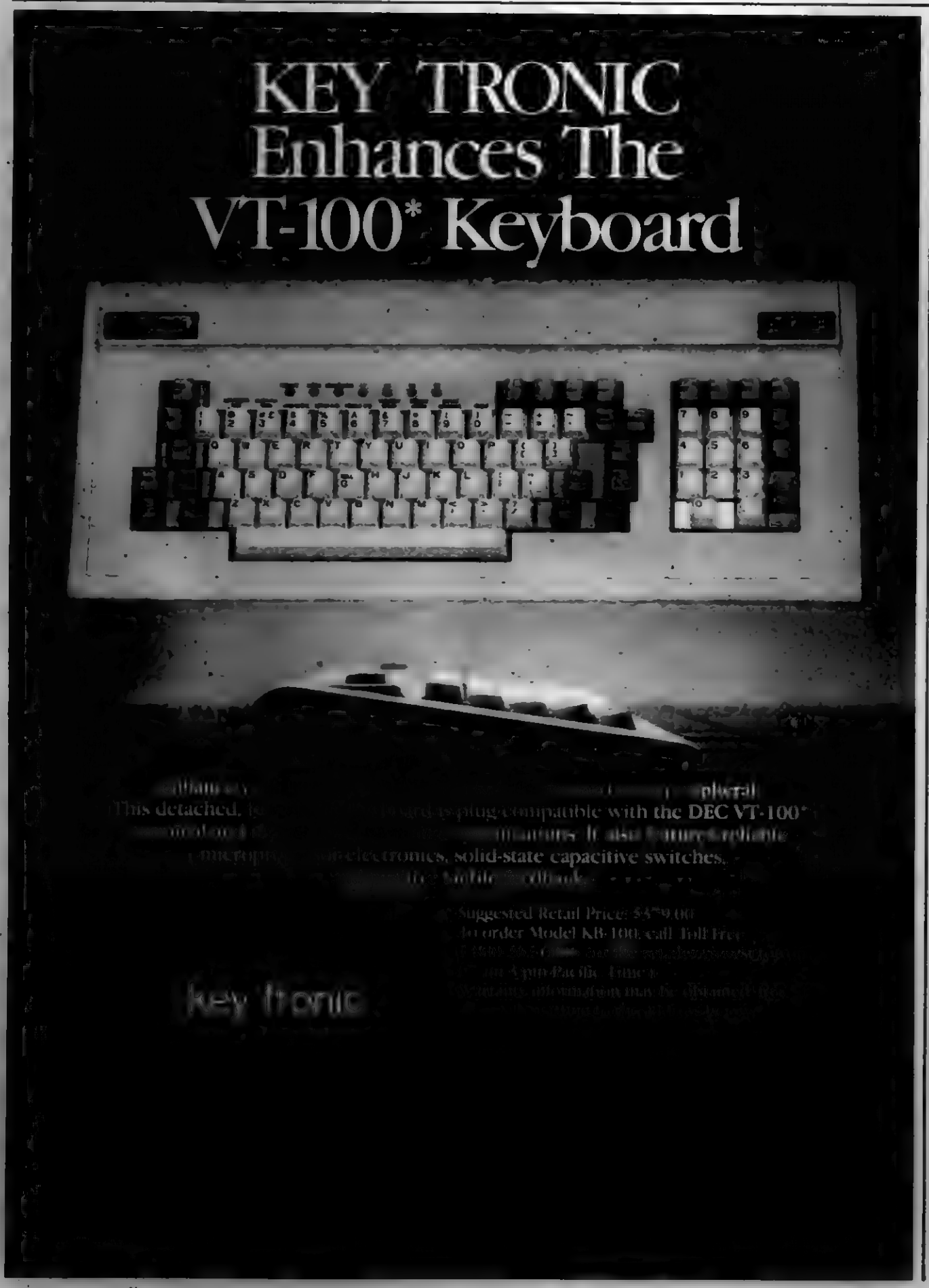
IN DEPTH

corporate networks is a situation most experts believe is inevitable, and IBM has traditionally regarded great flexibility in its products as a necessary quality.

Perhaps the combination of these two factors will hasten the birth of the universal LU type.

With IBM's acquisition of significant portions of Satellite Business Systems and, more recently, of the Rolm Corp., there is no doubt of its commitment to become a major contender in the communications technologies arena. In the next several years, we may likely witness the greatest corporate showdown of all times, the "King Kong vs. Godzilla" of high tech.

Data processing and data communications have become inextricable, and as the communications giant AT&T gains the freedom to pursue business in data processing, we can probably expect to see counter-strategies from IBM that will necessitate increased capabilities for SNA. Just what these increased capabilities will be is anybody's guess, so stay tuned for the latest developments.



A Look Back

In the early years of SNA, there was a great deal of confusion throughout the data processing community as to not only what it was, but why it was. IBM's detractors criticized it as an act of arrogance that ignored efforts in progress to define a truly standard communications architecture. Critics contended that SNA was blatantly intended to stifle legitimate competition. IBM supporters countered that SNA was not a product of arrogance at all, but one of necessity; an architecture was needed quickly, not at some unspecified future time.

There are, no doubt, some elements of truth in both views. SNA has certainly become one of the major standards of communications architectures, and only a company with IBM's predominance in the marketplace could have achieved such a feat.

For several years, SNA did effectively lock out competition from other vendors of communications equipment as they strove to understand the new architectural requirements imposed, but that was a temporary situation. The fact that all the other major computer manufacturers have yet to settle on a universal standard architecture is certainly justification that IBM could not wait for an industrywide consensus to emerge on which to base its own future technologies.

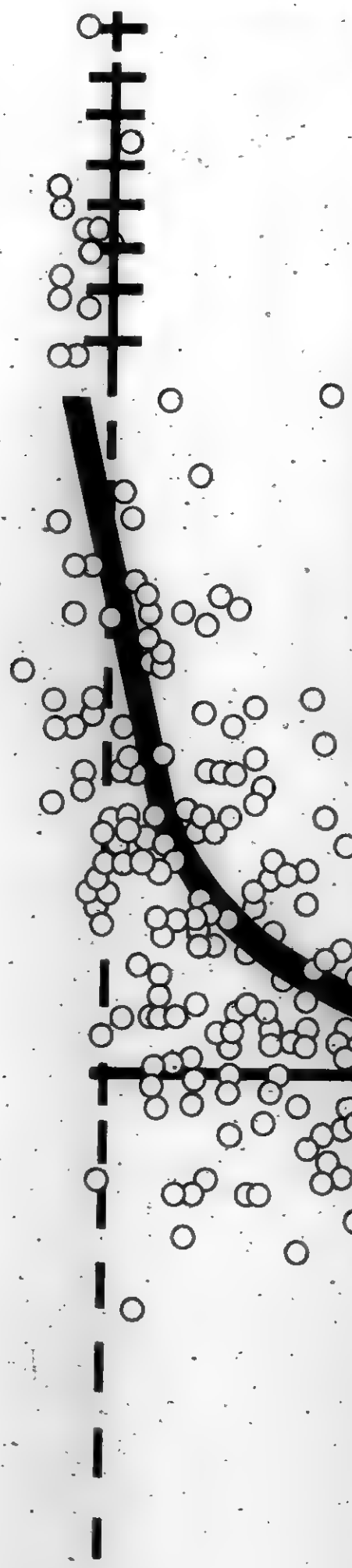
There is one other simple and potent fact, however, that justifies the existence of SNA, if such justification is really needed. It is efficient, flexible and reliable. In short, SNA works.

About the Authors

David Baer has been active in DP for 15 years, specializing the last few years in architectural design of large-scale, on-line applications. He is now technical director of IBM mainframe application development for Tera Corp., a Berkeley, Calif., firm that provides proprietary software and hardware to utilities and general industrial clients.

Jim Sturch is an independent consultant and instructor in various areas of data processing. He has 10 years' experience in operating systems and telecommunications. He currently specializes in the areas of MVS and SNA and teaches an SNA course under the auspices of the Mariposa Corp. of Larkspur, Calif.

Justifying Subsecond Response Time



By Harold Lundy

During the past several months, much has been written about the effects of subsecond response time on TSO transaction rates and application development productivity. Studies conducted by A.J. Thadhani and Geoffrey Lambert of IBM provided sound evidence that productivity on interactive tasks increases as response time is reduced. Further, the leverage on productivity increases significantly in the subsecond response-time range.

Their data is very interesting, but how do you relate these specific studies to a large TSO environment with hundreds of users performing a wide variety of tasks? The studies certainly set you on the right path, but any proposal for better on-line service for your developers will need to be supported by projections based upon your specific situation.

This article explains how the Thadhani curve was verified at Hallmark Cards, Inc. in our existing TSO environment. As you will see, verification of the curve involves three basic steps: 1) establishing service-level objectives, 2) monitoring service reporting tools and 3) analyzing and comparing results.

Our TSO network supports an

IN DEPTH

Performance Objectives (reported)

Service Area	Service Objective	Measurement Method
TSO		
Average — Response Time —		
Trivial	.5 seconds	TSOMON
Nontrivial	5 seconds	TSOMON
Long	30 seconds	TSOMON
90%		
Trivial	2 seconds	TSOMON
Nontrivial	60 seconds	TSOMON
Long	60 seconds	TSOMON
Availability	97%	TSOMON
Batch		
90% — Input Queue Time —		
Class G and L (high priority)	20 minutes	SMF
Class A (medium priority)	[illegible]	SMF
Class 9 (normal priority)	[illegible]	SMF

Figure 1

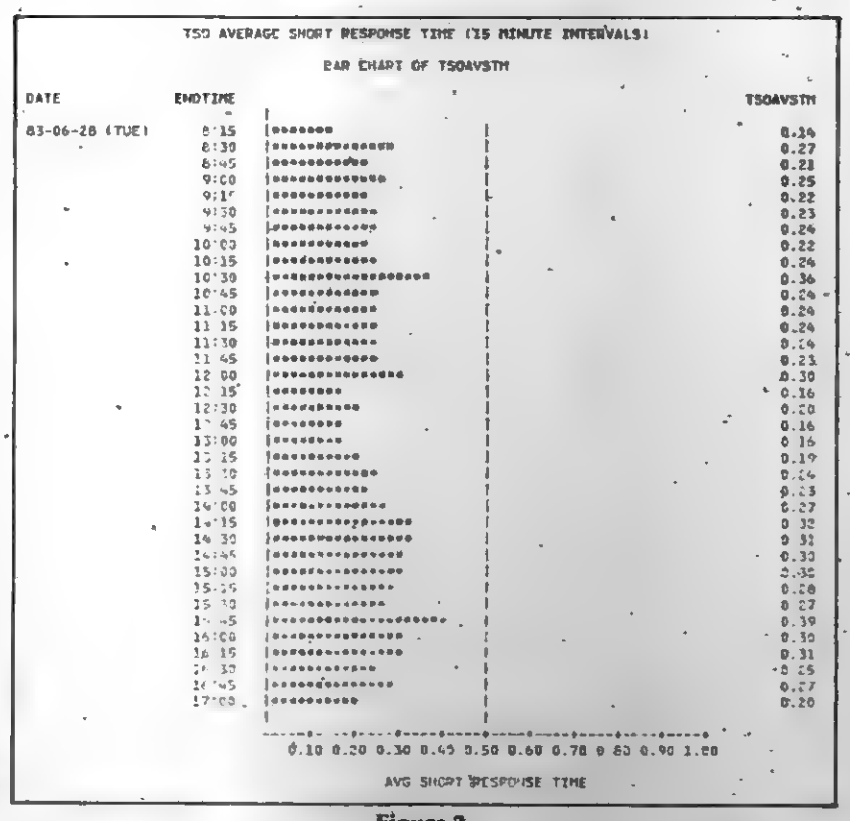


Figure 2

average of 450 active users, of which 200 are systems development staff using locally attached terminals. The network runs on an IBM 3081K, which is shared with batch testing during prime shift hours. The system is equipped with an Intel Corp. 3805 high-speed paging device used for TSO paging. Maximum sign-ons for TSO is currently set at 145 simultaneous users. An IBM 3033 AP handles both production and batch processing.

The systems development staff function includes work in all phases of project development, support of more than five million production lines of code and information center programming support.

Daily TSO activity includes writing memos and documents (word processing), editing and browsing of data, library scans, on-line program compile and debug, submission of batch jobs and use of various TSO-developed project management tools.

Volume on the network averages 200,000 to 225,000 transactions per day, with an average of 6½ to seven transactions processed per second.

Service-Level Objectives

Service-level objectives for the systems development staff had been discussed for some time. During late 1982, the objectives being used today were established and agreed to by data processing management. The objectives that resulted were influenced by three factors:

1. Service that was currently being provided.
2. A realistic view of what the computer resource could provide.
3. An optimistic view of the productivity gains that could be realized with better on-line service.

In other words, current service was reviewed and service-level objectives were set at a level that appeared realistic for the hardware resource available.

The objectives were set individually for each of three transaction priority categories: trivial, nontrivial and long. The definition of these categories can be set arbitrarily by each installation. Ours are defined as follows:

- Trivial — 500 or less service units (high priority).
- Nontrivial — 501 to 2,000 service units (medium priority).
- Long — 2,001 or more service units (low priority).

The appropriate setting of the service unit threshold values that distinguish these three priority categories can be important to optimum service, as you will see later.

Average response time objectives were established as .5 seconds for trivial, five seconds for nontrivial and 30 seconds for long transactions.

Ninety percent of all transactions in each category need to be completed in two, 20 and 60 seconds, respectively. Service objectives were also set for the various job classes of batch testing. Since TSO and batch share the same system, an appropriate balance of service for each must be maintained. (See Figure 1 for a complete list of service objectives.)

Service Reporting

Only weekly and monthly reporting were available, but it quickly

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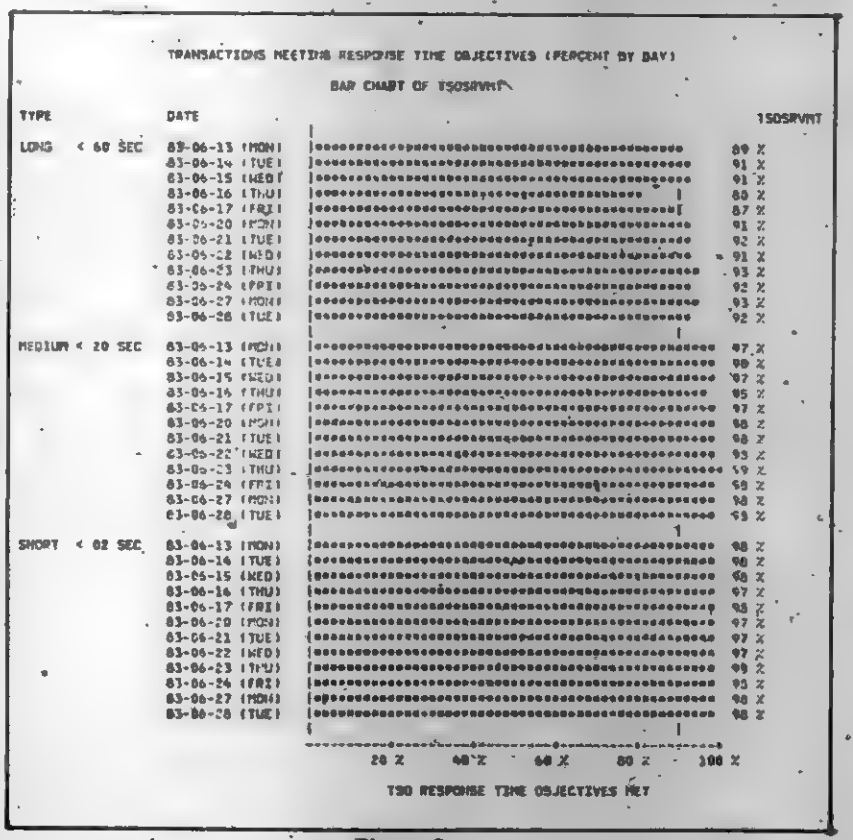

Figure 3

became apparent that daily service reporting was essential for identifying and reacting to problems on a timely basis. This need resulted in the development and installation of several daily reports that are used to monitor response time, transaction load and resource consumption on the TSO network. Figure 2 shows a report used to monitor short transaction average response time for each 15-minute interval during the prime shift hours. Figure 3 is a report that measures the percent of transactions meeting the response time objectives each day.

Other reports show the average system users, transaction load, service unit consumption and system uptime by five-minute time period, with appropriate summaries for the day. These reports identify problem areas immediately and are used by our technical staff to maintain optimum service and the desired balance between TSO and batch work.

Our experiences during the first week of May demonstrate how the reports can be used. As mentioned earlier, the service-unit thresholds for transaction-priority categories can be set arbitrarily; ours was 500 for trivial (highest priority). This category encompassed 85% of our total transaction activity, while in Thadhani's study, 95% of the transactions were in the highest priority category.

On May 2, we decided to move the threshold to 600 service units to encompass more activity and move toward the 95% figure. The ensuing week showed a significant drop in batch test service; thus, it became apparent that the 95% level for the trivial category in our environment would cause excessive batch turnaround time. The threshold was returned to 500 on May 9. Figure 4 shows batch service results before, during and after this experiment.

Data for the reports is provided by the software package TSOMON, marketed by Morino Associates, which samples and records the TSO

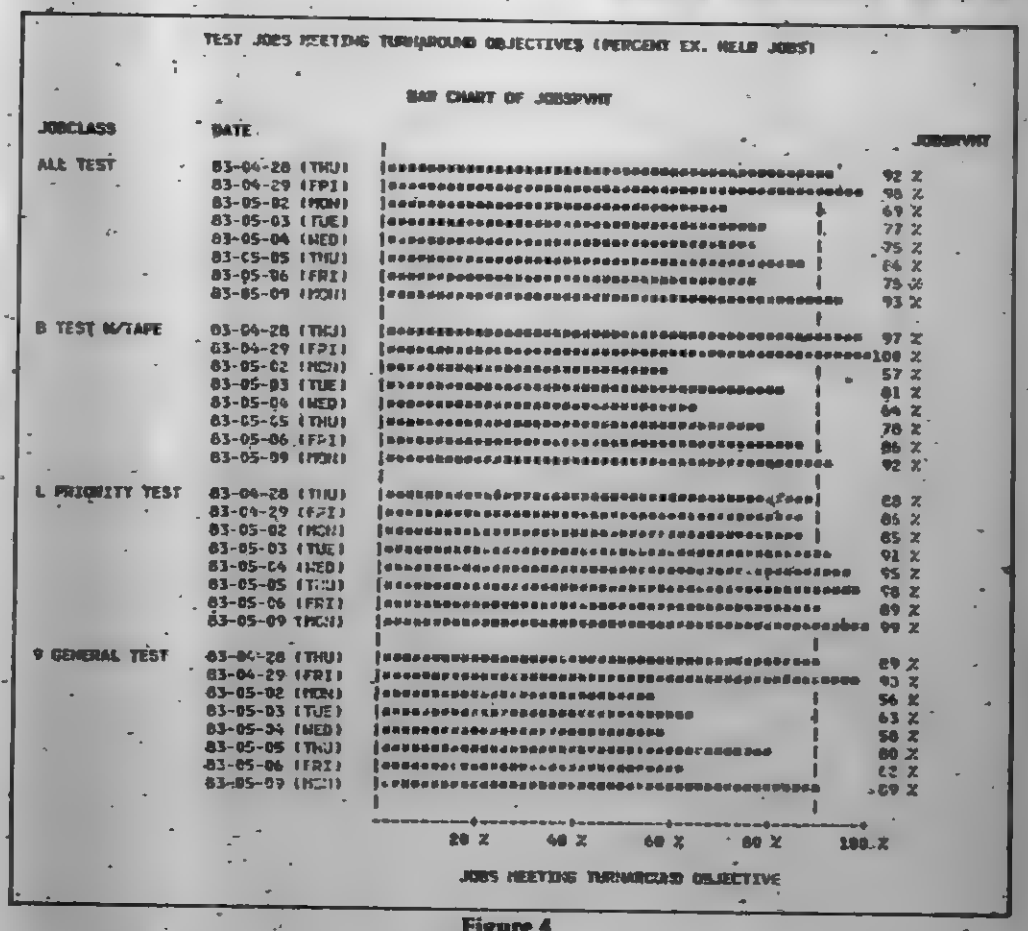

Figure 4

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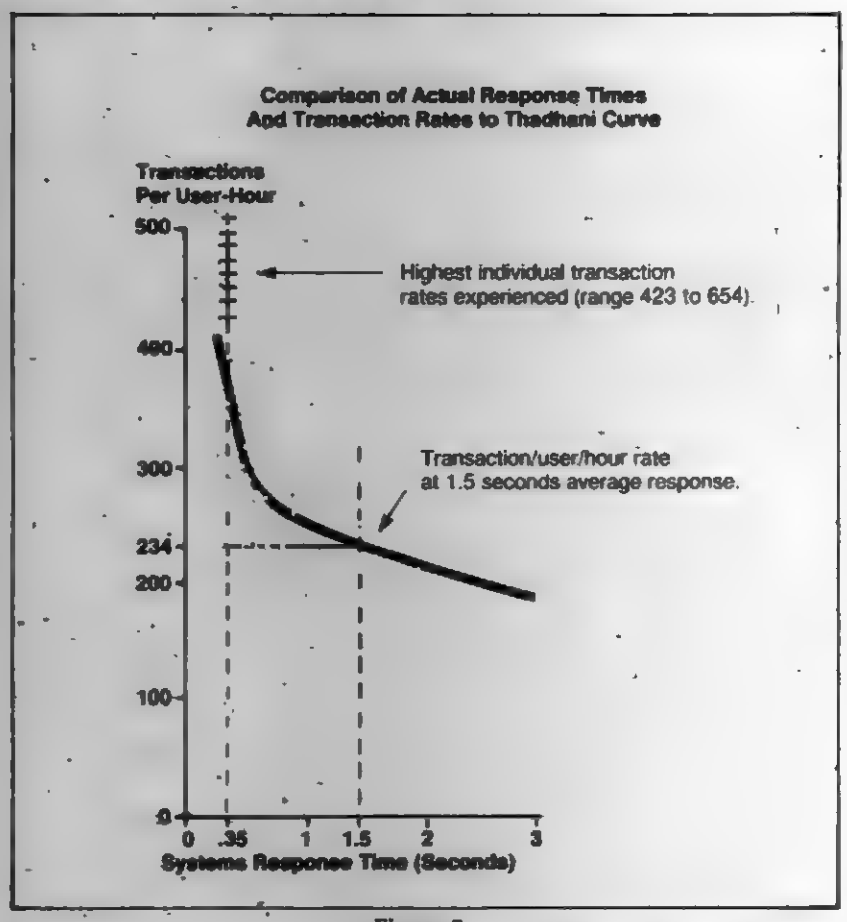

Figure 5

performance data. While it would not provide accurate data for a remote environment since it does not measure network delay time, it works well for us because all TSO users are on locally attached terminals. To confirm its accuracy for us, a terminal response time monitor was attached to individual CRTs for several weeks.

The indication was that network delay was negligible.

During the first six months of 1983, the reports have shown an average of 1.5 seconds response time for all TSO transactions and .35 seconds for trivial transactions (85% of total TSO activity). The 90th-percentile objective (two seconds) has been consistently met with few exceptions. Although not as consistent, nontrivial has averaged in the four- to five-second range, with long transactions averaging about 25 seconds.

With the IBM studies fresh in mind and subsecond response time being achieved on a significant percentage of the TSO activity, the next step was to calculate transaction rates and see if the Thadhani curve could be verified in our environment. The necessary data was available and only needed to be analyzed.

Comparison Results

The analysis was performed using individual transaction rates for calendar-month periods using the same calculation recommended in the studies: TRANSACTIONS ÷ USER HOURS = TRANSACTIONS/USER/HOUR.

The results were very surprising.

The diverse TSO usage in a large-shop environment makes it unrealistic to expect subsecond response time for all transactions, but when provided for 85% or more of TSO activity (trivial transactions), productivity will increase dramatically.

Many analysts were achieving transaction rates over the length of a month of 400 to 650 per signed-on hour, well toward the top of the Thadhani curve. For the month of March, the average TSO transaction response time for all transactions (trivial, nontrivial and long) was 1½ seconds, with a calculated average of 234 transactions per user per hour, precisely the yield that the Thadhani curve indicates.

While the TSO activities of all TSO users are too diverse to expect the overall transaction rate to be at the top of the curve, the people performing a very high percentage of trivial transactions are definitely achieving the transaction rates indicated by Thadhani and Lambert's studies at the high end of the curve. Figure 5 illustrates the close correlation, with our points plotted at .35 and 1.5 seconds for trivial and total transactions.

Obvious questions arise at this point. Will transaction rates continue to climb at this rate as response time approaches zero? Are we, at .35 seconds response, approaching a human threshold for system development activity? Faster equipment and further research should provide the answers to these questions.

Conclusions

At the risk of sounding like a hardware vendor, the conclusions we draw from our analysis are:

- The Thadhani curve is realistic; transaction rates do increase dramatically in the subsecond response-time range. Furthermore, the curve can be verified in any TSO environment.
- The diverse TSO usage in a large-shop environment makes it unrealistic to expect subsecond response time for all transactions, but when provided for 85% or more of TSO activity (trivial transactions), productivity will increase dramatically.
- Service-level objectives and daily monitoring tools are essential in justifying and maintaining subsecond on-line development service on a day-to-day basis.
- Projections of productivity potential using the Thadhani curve are valid and should be used in justifying the cost of better service for a development staff.
- TSO should be given higher priority than batch work to maintain consistent service. However, if staff productivity is dependent on both, the correct balance must be found and maintained.

So, set the objectives, dig out the numbers, project with the curve and you are on the way to better on-line service and increased productivity.

About the Author

Harold Lundy is applications manager, systems development, at Hallmark Cards, Inc. in Kansas City, Mo. He has worked for Hallmark for 22 years in the system operations and systems development areas.

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Software Copyright Litigation:

After Apple vs. Franklin

By Neil Boorstyn

The recent decision of the Third Circuit Court of Appeals in the case of Apple Computer, Inc. vs. Franklin Computer Corp. should bring to an end what may be called the first generation of copyright litigation involving computer software. The main focus of the first wave of cases concerned the copyrightability of computer programs — that is, whether the programs constituted fixed original works of authorship and were eligible for protection under copyright law.

Now that the arguments against copyright protection have been rejected by virtually every court that has dealt with the question, it is anticipated that the next wave or second generation of software copyright litigation will deal with fundamental and real copyright issues relating to scope of protection, copyright infringement and idea/expression dichotomy, the question of substantial similarity, the defense of fair use and other traditional issues.

The courts thus far have had little opportunity to deal at length and in depth with these issues. To date, the reported cases have arisen in connection with motions for preliminary injunctions, for summary judgment or to dismiss. Rejecting the arguments urged in the reported cases has been comparatively easy for the courts because the arguments have been so lacking in merit, so contrary to the language of the Copyright Act and without support in the statutory scheme, the congressional intent or case law.

This article summarizes the early decisions and the near-total rejection of the array of defenses that have been interposed and will look at the more substantive issues and defenses that must now be litigated. Some of the decisions discussed relate to audiovisual works in the form of video games. However, the law relating to the protectability of such works is, in most instances, the same as the law relating to computer programs.

In one of the earlier cases involving electronic video games, Stern Electronics, Inc. vs. Kaufman, 523 F Supp 635 (1981, ED NY), aff'd F2d 852 (1982, CA 2), defendant contended that the audiovisual display

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was not an original work of authorship because the unregistered underlying computer program dictated and controlled the sights and sounds of the audiovisual display. The audiovisual material, according to defendant, was not original because it was totally dependent upon the memory device and the unregistered program.

Although the audiovisual display emanated from the program, the district court ruled that it was "senseless" to say that therefore the display was not original. "An author's work does not become any less original after he has found a means to replicate it."

The court stated that both the underlying computer program and the audiovisual display are copyrightable. The Second Circuit affirmed and termed "without merit" defense contentions that the audiovisual work was neither "fixed" nor "original." The audiovisual work was permanently embodied in a material object (the memory devices) from which it could be perceived with the aid of the other components of the game. All portions of the program, once stored in memory devices anywhere in the game, are "fixed" in the tangible medium within the meaning of the Copyright Act. The displayed sights and sounds resulting from the program embodied in memory devices satisfy the requirements of originality.

In Tandy Corp. vs. Personal Micro Computers, Inc., 524 F Supp 171 (1981, ND Cal), the court held that there "can be little doubt" computer programs are copyrightable works of authorship that may be "fixed" in "any tangible medium of expression, now known or later developed," from which the work can be "perceived, reproduced or otherwise communicated, either directly or with the aid of a machine or device." Moreover, it "makes no difference what the form, manner or medium of expression may be" — whether it is in words, numbers, sounds, pictures or any other symbolic indicia, whether embodied in a physical object in written, photographic, magnetic or other stable form, and whether it is capable of perception directly or by means of any machine or device "now known or later developed."

Thus, the imprinting of a computer program on a silicon chip, which then allows the computer to read the program and act upon its instructions, clearly gives rise to copyright protection. The court rejected defendant's argument that the read-only memory (ROM) chips are not "copies" of the original computer program — and that, therefore, copying the chip does not infringe the copyright in the program.

The Third Circuit Court of Appeals in the case of Williams Electronics, Inc. vs. Artic International, Inc., 685 F2d 870 (1982, CA 3) rejected arguments that the images in audiovisual games are transient and cannot be "fixed" and that the player's participation withdraws the game's audiovisual work from copyright eligibility because there is no set or fixed performance and the player becomes a coauthor of what appears on the screen. It also rejected the contention that there can be no copyright protection for ROM chips (in which the program is fixed) because they are utilitarian objects or machine parts. (The opinion in the Williams

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case was written by Judge Sloviter, who also wrote the opinion in Apple vs. Franklin.)

The court held that the fixation requirement is met whenever the work is sufficiently permanent or stable to permit it to be reproduced or otherwise communicated for more than a transitory period, that the repetitive sequence of a substantial part of the sights and sounds of the game are copyrightable and that the utilitarian object machine part argument is "misdirected."

The issue is not whether plaintiff could protect the ROM itself, but rather whether plaintiff could protect "its artistic expression in original works which have met the statutory fixation requirement through their embodiment in the ROM devices." Also rejected was the contention that a ROM is not a "copy" of the program and a copyrighted program is not infringed when the program is loaded into electronic memory devices (ROMs) and used to control the activity of machines. The argument that a "copy" must be intelligible to human beings and must be intended as a medium of communication to humans was rejected.

Finally, the court refused to accept the argument that infringement of a computer program is limited to copying of the program text but not to copying the program fixed in a ROM chip.

In other cases, defense contentions relating to alleged technical irregularities or failures to comply with statutory deposit requirements have been unavailing. (See, for example, Williams Electronics, Inc. vs. Artic International, Inc. supra.)

Attempts by defendants to invalidate copyrights due to omission of copyright notice have also been unsuccessful. For example, in Midway Manufacturing Co. vs. Dirkschneider, 214 USPQ 417 (1981; D Neb), defendant contended that the failure to place copyright notices on the video games' printed circuit boards invalidated plaintiff's copyright. The court explained that under the Copyright Act, notice may be placed on copies in such place and manner as to give reasonable notice of the claim of copyright. Therefore, plaintiff satisfied the notice requirements by affixing copyright notice to the video game cabinets near the viewing screen.

Perhaps the most bizarre and unrealistic defense to date appears in the case of Midway Manufacturing Co. vs. Bandai-America, Inc.; 546 F Supp 125 (1982, DC NJ). Defendant produced evidence in the form of deposition testimony of the Copyright Office examiner who processed plaintiff's copyright registration applications to the effect that the applications were "not substantively examined to verify the originality" of plaintiff's works. In light of such "failure," the defense contended that the registration certificates could not form the basis of a *prima facie* showing of originality and that such "failure" should invalidate the copyrights. The court wasted no time with that argument and stated that it "skirts the borders of bad faith." So much for nonsense defenses.

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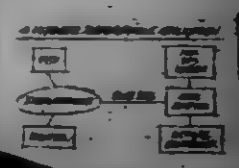

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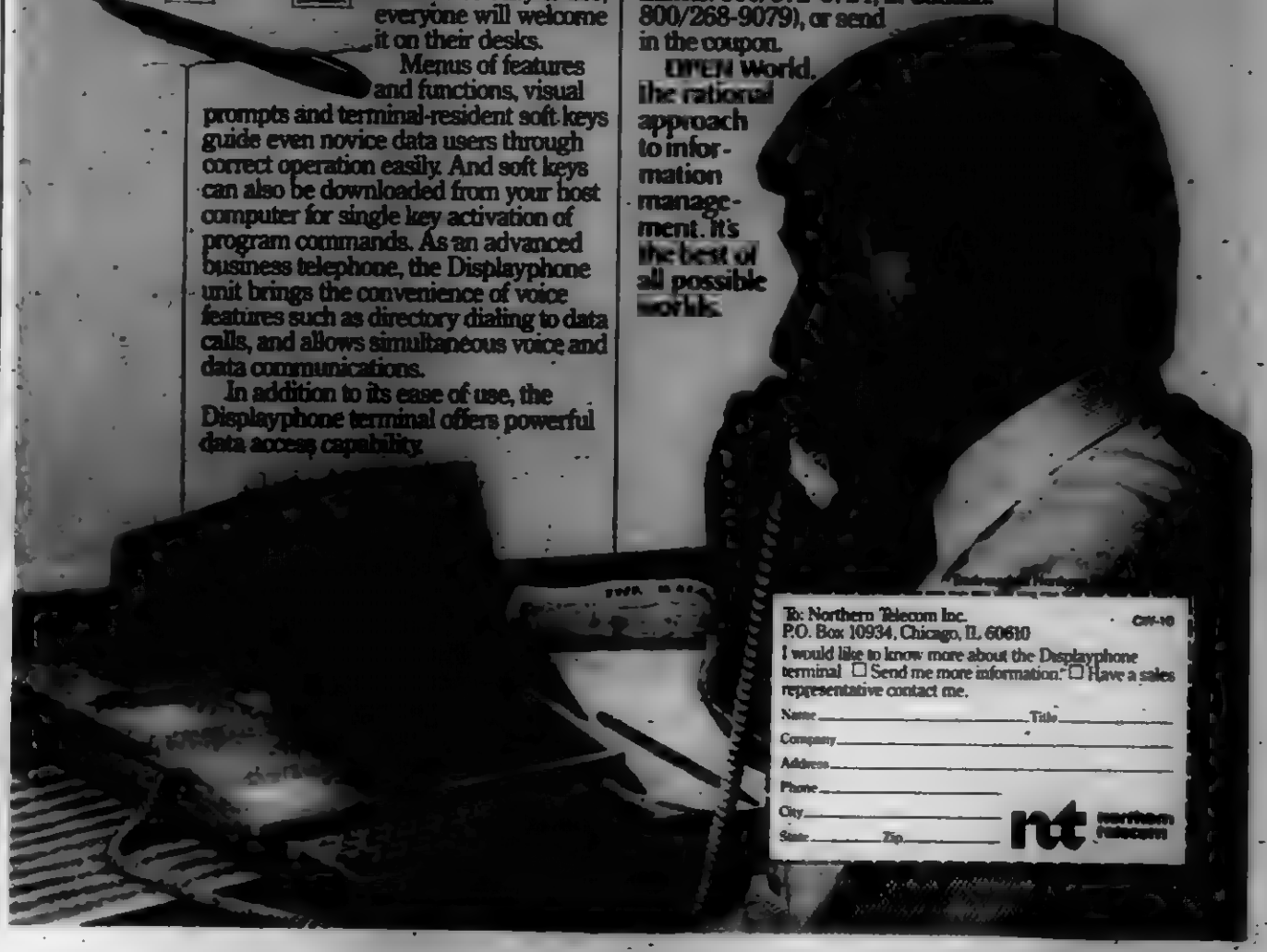

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IN DEPTH

copyright purposes, neither the Copyright Act nor case law makes any such distinction. Although it is not entirely clear what the confusion is all about, it may arise, at least in part, from the baffling opinion of the district court in Apple Computer, Inc. vs. Franklin Computer Corp., 545 F Supp 812 (1982, ED Pa), reversed 714 F2d 1240 (1983, CA 3).

The Third Circuit, in reversing the lower court, made it absolutely clear that "a computer program, whether in object code or source code, is a 'literary work' protected from unauthorized copying, whether from its object- or source-code version."

Other courts have agreed. "Because the object code is the encryption of the copyrighted source code, the two are to be treated as one work; therefore, copyright of the source code protects the object code as well" [GCA Corp. vs. Chance, 217 USPQ 718 (1982, ND Cal)]. The Third Circuit in the Williams Electronics case, supra, expressly rejected a defense contention that a distinction should be drawn between the different code versions of a computer program. See also Midway Manufacturing Co. vs. Strohon, 564 F Supp 741 (1983, ND Ill) and Apple Computer, Inc. vs. Formula International, Inc., 562 F Supp 775 (1983, CD Cal). These rulings should dispel completely any lingering doubts or confusion concerning this issue.

The courts have also rejected the argument that there should be a distinction for purposes of copyright protection between operating system programs and application programs. The Third Circuit in the Franklin case rejected the argument that an operating system program is uncopyrightable because it is a process, system or method of operation. That argument is misdirected because the copyright does not protect "the method which instructs the computer to perform its operating functions but only the instructions themselves."

It makes no difference whether the instructions relate to the tasks of an application program or to the tasks of an operating system program. The argument that an operating system program is an uncopyrightable machine part "mistakenly" focuses on the physical characteristics of the instruction. "But the medium is not the message."

An operating system program is not a "purely utilitarian" work and the fact that the words or instructions of a program are used in the implementation of a process does not affect copyrightability. The copyright status of written rules or instructions for a "system for the operation of a machine" is unaffected by the fact that those rules or instructions "carry out the process."

All Programs Eligible

It is now "crystal-clear" from the opinion in the Apple vs. Formula International case that "all computer programs," fixed in any form by any method, performing any function for any purpose, are entitled to copyright protection. The virtual unanimity of the courts in rejecting the defense arguments relied on thus far makes it unlikely that defendants will continue to urge these contentions in future cases. The total lack of merit or persuasiveness of these misdirected arguments should discourage such use.

As copyright infringement litigation in the software field becomes more sophisticated, it is anticipated that basic copyright principles and issues will become increasingly more important. The courts have in the past been very receptive to fundamental copyright arguments and should continue to be so in the future.

Chief among these basic issues is the requirements of showing a substantial similarity between the works in question. This requirement is the *sine qua non* of copyright infringement. In the absence of substantial similarity, there can be no copying or infringement. In determining this key issue, the court must also apply and rely on other principles of copyright law. One of the most basic of these principles is the concept that copyright protection extends only to the expression of an idea but not to the idea itself.

When the idea and its expression are indistinguishable, protection may be limited to identical copying. Some courts have refused to protect an expression that is inseparable from the underlying idea, since to do so would confer a monopoly of the idea, which is impermissible under copyright law. It has been held that

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the scope of copyright protection "increases with the extent expression differs from the idea." And, conversely, the idea and its expression "will coincide when the expression provides nothing new or additional over the idea." The very complexity of the expression of an idea "will separate it from even the most banal idea" [Atari, Inc. vs. North American Phillips, etc., 672 F2d 607 (1982, CA 7)].

As a corollary, when the use of an idea necessarily requires certain forms of expression, protection may not be afforded if doing so would in effect protect the idea. Where an idea is only capable of expression in more or less stereotyped form, protection against copying that expression will ordinarily not be available. Forms of expression that are inextricably linked with an idea may not be protected. Infringement liability may be avoided where the defendant copies only the idea and uses his own form of expression, or where, because the idea and its expression are inextricably tied, minor variations or differences in expression may be sufficient to negate copying.

An example of the idea/expression dichotomy sufficient to protect against copying is Atari vs. North American Phillips in which the Seventh Circuit reversed the lower court and found substantial similarity between plaintiff's and defendant's works because the latter captured the total concept and feel of the former. Compare Atari, Inc. vs. Amusement World, Inc., 547 F Supp 222 (1981, DC Md), which refused to grant injunctive relief because the similarities of expression were found to be "inevitable, given the idea and the medium." In such cases, the number of dissimilarities becomes particularly significant.

Although drawing the line between an idea and its expression is difficult, it must be done and is generally done on an ad hoc basis. It has been suggested that the focus should be on whether the idea is capable of different forms of expression. Thus, if other programs can be written to express the same idea, the program is an expression and suitable for copyright protection. Where, however, there are no or few other ways of expressing a particular idea, copyright protection will be withheld. Protection may not be available to forms of expression that are necessarily dictated by the underlying idea.

A further corollary to this issue is the question whether in any given case the expression may contain "so little in the way of particularized form . . . as to be only an abstract idea portrayed in noncopyrightable form" [Stern Electronics, Inc. vs. Kaufman, 669 F2d 852 (1982, CA 2). See also Midway Manufacturing vs. Bandai-America].

The idea/expression dichotomy has been codified in Section 102(b) of the Copyright Act, which precludes copyright protection for an idea, system or concept. The expression adopted by the programmer is the copyrightable element and not the process or methods embodied in the program. In determining whether there is a dichotomy or unity between the idea and its expression, the focus should be on the idea that is the subject of the expression. It is only that idea that may merge with the expression so as to render copyright protection unavailable. If other methods of expressing the idea of an operating system are available and have not been foreclosed by the particular expression used, then the idea and its expression have not merged, and the expression is protectable.

Test of Similarity

The test of substantial similarity in infringement cases is whether the works at issue are so similar that an ordinary, reasonable person would conclude that defendant appropriated plaintiff's protectable expression by taking material of substance and value. The test does not involve analytical dissection and expert testimony, but rather depends on whether defendant captured the total concept and feel of plaintiff's work.

The court in Midway Manufacturing vs. Strohon had little difficulty in finding substantial similarity when, after comparing printouts of the information stored on the ROMs at issue, it found that 89% of the 16,000 bytes in the plaintiff's ROMs were "identically reproduced" in defendant's ROMs. This "degree of similarity, while not absolute, is substantial."

The traditional defense of "fair use," which has now been codified by statute, has particular relevance to computer litigation, especially with

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respect to data bases or other compilations of information. It has been held that compilation works "should be most conducive to fair use" because authors of such works "must be held to grant broader licenses for subsequent use than persons whose work is truly creative" [Dow Jones & Co. vs. Board of Trade, City of Chicago, 546 F Supp 113 (1982, SD NY)]. See also National Business Lists, Inc. vs. Dun & Bradstreet, Inc. 552 F Supp 89 (1982, ND Ill).

Issues relating to works made for hire, specially ordered or commissioned works, joint works and derivative works will also have an impact on software litigation, as will questions of exclusive rights of copyrights and the limitations thereof, elements and burdens of proof in infringement cases, damages and remedies. These and other complex issues will require careful analysis and accurate assessment.

There can no longer be any doubt that all computer programs are copyrightable works of authorship, that chips or ROMs are tangible means of expression, that programs imprinted on ROMs are fixed in a tangible medium, that the expression of a program is fully protectable whether written in source or object code and that therefore these issues should not be belabored. Copyright litigation involving computer programs will now center on the real issue of whether defendant copied the protectable expression embodied in plaintiff's program — that is, whether the two programs are substantially similar.

The resolution of this issue will depend upon the application of traditional principles of copyright law.

Copyright law protects computer programs against copying or other unauthorized uses and reflects the congressional intent to encourage continued imagination and creativity in computer programming. As a general rule, anyone is free to create programs that enable a computer to perform the same or similar functions as do other programs. As stated by the National Commission on New Technological Uses of Copyrighted Works (Contu), "One is always free to make the machine do the same things as it would if it had the copyrighted [program] placed in it, but only by one's own creative effort rather than by piracy." That is and will remain one of the central issues in copyright infringement actions involving computer programs.

The main task of counsel in the next generation of computer litigation will be to analyze and evaluate traditional copyright principles as they pertain to software and computer technology. Misdirected arguments that ignore basic copyright law will continue to prove unsuccessful, and litigants who fail to distinguish properly the real issues from the unreal will do so at their peril.

A good example of what may happen when a litigant fails to assess accurately the scope of copyright protection occurred recently in the case of Williams Electronics, Inc. vs. Bally Manufacturing Corp. 568 F Supp 1274 (1983, ND Ill). Plaintiff sued for copyright infringement and other violations of its arcade-type pinball game, which included features of a video game.

The defendant conceded validity of copyright but challenged and sought to limit its scope of protection. The court, applying fundamental principles of copyright law, compared "only the protected elements" of plaintiff's game with the comparable elements in defendant's game and found an "almost complete absence of substantial similarities." The unprotected parts include elements "common to virtually all pinball and video games," the functional elements, and those design features that are neither physically nor conceptually separable from the utilitarian aspects. Accordingly, the court granted summary judgment in favor of defendant and, in a separate order, awarded defendant attorney's fees of more than $90,000. The court noted expressly that it hoped that "responsible counsel in the field of intellectual property would save [the courts] from frivolity in their field of expertise."

About the Author

Neil Boorstyn is an attorney with the San Francisco law firm Phillips Moore Lempio & Finley. A specialist in copyright and computer law and litigation, he wrote the book Copyright Law, *published in 1981 by Lawyers Cooperative Publishing Co./Bancroft-Whitney.*

Boorstyn chairs the Copyright Committee of the California State Bar Patent, Trademark and Copyright Section.

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Terminal Offers Voice/Data Melange

HOUSTON — Zaisan, Inc. has introduced a data terminal integrated with an executive telephone, a 9-in. CRT, an internal 300 bit/sec modem, a detached keyboard and support software.

The ES.1 workstation is said to be capable of simultaneous voice/data communication using two telephone lines. This allows the user access to the data base while speaking on the telephone, a spokesman said.

The workstation also features a telephone directory with single keystroke-dialing services including individual authorization codes and data base logon procedures. Autoredial of the previous 15 numbers called is also included.

Users can maintain a personal calendar/reminder file as well as generate and send electronic messages and memos.

Zaisan, Inc.'s ES.1 voice/data workstation

The data terminal displays 25 rows of 80 characters, a vendor spokesman said.

The typewriter-style, full-travel, step-sculptured keyboard includes 10 function keys and the control panel has a standard Touch-Tone telephone keypad with 13 programmable telephone functions. The ES.1 comes standard with two modular telephone plugs (RJ11C).

The ES.1 is installed by plugging two telephone lines into the RJ11C plugs and functions with most telecommunications systems, such as a private branch exchange. Upgrades to the workstation itself are accomplished with plug-in modules without opening the casing of the ES.1.

Also included in the workstation is a parallel printer port and a 300 bit/sec, full-duplex modem. Optional features include an internal 1,200 bit/sec, full-duplex modem and an RS-232C serial interface. Included software supports a real-time clock, eight communications profiles, eight automatic logon profiles and a line status/timer.

Memory for the workstation includes 8K bytes of battery backup Cmos random-access memory (RAM), optional 8K bytes of Cmos RAM in plug-in modules and 323K bytes of system read-only memory, the vendor said.

The workstation will be available in 1984 for $850 from Zaisan, 13920 Champion Forest Drive, Houston, Texas 77069.

Spads Aids Voice Data Entry Design

BEDFORD, Mass. — Verbex, a division of Exxon Enterprises, Inc. has announced the Model 3000 Spads terminal, said to allow users to develop and implement customized, continuous voice data entry applications.

Using the company's speech applications development software, Spads terminal users can design application-specific vocabularies containing 120 words (with options to 360 words), the vendor said.

The terminal allows users to test their applications at successive levels of development and provides evaluation reports of each vocabulary as well as enrollment and training scripts.

Additional features allow users to implement Verbex's digitized voice response, which verifies data entry by repeating the operator's input in a natural sounding voice, according to the vendor.

The price is $52,000, including Spads software. Further information is available from Verbex, 2 Oak Park, Bedford, Mass. 01730.

Communications Card Links Apple III to BSC Mainframes

CORONA, Calif. — Elcom Systems Peripherals, Inc. has introduced a communications card said to allow an Apple Computer, Inc. Apple III microcomputer to gain access to any mainframe using the IBM 2780, 3780 or 3270 Binary Synchronous Communications Protocol (BSC).

The Commcard II operates independently of the Apple III, using its own Zilog, Inc. Z80 microprocessor, I/O control and memory.

It provides asynchronous RS-232 terminal emulation and costs $1,195 from Elcom Systems, 439 Harrison St., Corona, Calif. 91720.

Tektronix Announces 4970 Cluster Controller

BEAVERTON, Ore. — Tektronix, Inc. has announced the 4970 Cluster Controller, which allows the company's 4010 series terminals and 4100 line of Ascii graphics terminals to operate efficiently in IBM communications environments.

The product and its companion software package connect the terminals to a Systems Network Architecture environment as if they were IBM 3270-type terminals. Communicating with the host like an IBM 3274 or 3276 Terminal Controller, the 4970 supports up to four asynchronous terminals on a single-polled synchronous line.

The price for the 4970 and software package is $6,200 from Tektronix, Mailing Station 63-635, P.O. Box 1700, Beaverton, Ore. 97077.

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ACE makes Cobol applications completely machine independent. ACE can be run under nearly all operating systems, but is specially suited to UNIX.

ACEGEN, a fourth generation programming language, is an invaluable component of ACE. It reduces development time for applications software by allowing systems or business analysts to create error-free Cobol applications by simple responses to non-procedural screen prompts.

Using ACEGEN, a systems designer can quickly "prototype" an application so that users may see an operational model without exposure to heavy "cost to create" penalties normally attached to such software development.

ACEGEN allows development investment to be placed into that most important area of design.

Being machine independent, ACE provides a user environment which facilitates the operation of application software across a range of different brand equipment which can include a variety of functional and performance levels spanning super mini, macro mini, micro and PC. Upwards and downwards compatibility is always available such that when business requirements grow or change, the provision of additional computer hardware, at whatever level, need not incur conversion time or costs.

ACE is part of the AUSTEC Commercial UNIX Environment, CUE. CUE provides totally compatible business applications environment operating under UNIX and includes a number of powerful software components.

ACE – ANSI 74 Cobol compiler featuring a multi-user screen driven implementation with all Level 1 and significant Level 2 specifications included.

ACEGEN – a fourth generation language which provides an ability to develop applications in response to a non-procedural series of screen prompts which interact with the designer to facilitate the building of complete business applications.

ACEGEN features:
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- File Processing/Up-date Generator

ACETEL – a high level query language enabling inquiries to be directed either to screen or printer.

ACELOG – a simple, multi-user menu and security system.

ACECON – a powerful, combined menu, logging and security system, providing security controls at menu, program, file and user level together with priority allocation.

UNISAM – a multi-user file management system designed as an upwardly compatible extension of UNIX. UNISAM offers superior performance which is demonstrated by guaranteed disk access, dependent only on record count (e.g. five accesses for five million records). UNISAM supports indexed, sequential and relative files with fixed length records, and text stream or device files with variable length records. UNISAM conforms with ANSI, Cobol I/O specifications and is multi-user. It allows exclusive access to devices overcoming this common UNIX problem. As UNISAM satisfies all the requirements of an Applications Developer, it provides absolute data compatibility across all developed applications.

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Of course. A design feature of ACE Cobol is its ability to compile and run applications developed under DGC's Interactive Cobol, ACE being a super set of DG's implementation.

For further information contact your UNIX supporting manufacturer or:

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DS 019

Tool Out for Upgrading VDTs to IBM Micros

SANTA CLARA, Calif. — Solaris Computer Corp. has introduced its Personal Computer Emulator (PCE), said to upgrade widely used asynchronous video display terminals (VDT) to IBM Personal Computers without disrupting any element of the existing data processing network. The initial product offering is for Digital Equipment Corp.'s VT100 and VT100-emulating terminals.

While the PCE is emulating the IBM Personal Computer, it permits concurrent transparency to the host and ensures that interaction with the corporate network is undisturbed.

A user can switch at any time from a data entry session on the mainframe to an IBM Personal Computer word processing program and back again without any disruption or loss of data on either side of the system.

One feature of the system is that the screen can be split to show simultaneously information from both the mainframe and the personal computer.

The PCE is now being tested at beta sites and will begin shipping sometime this month at a price of $2,795. More information is available from the vendor at 2797 Park Ave., Santa Clara, Calif. 95050.

Racal-Milgo Unveils LSI Modems With Omnimux Compatibility

MIAMI — Racal-Milgo, Inc. has introduced a series of modems with large-scale integration (LSI) circuit design, compatibility with the vendor's line of Omnimux multiplexers and backward compatibility with other Racal-Milgo modems.

The Omnimux Integrated Modems come in 2,400-, 4,800- and 9,600 bit/sec models. When used with the Omnimux 30 or 40 modems, switches mounted on the front of the modem card are used to change operating parameters.

The 2,400 bit/sec integrated modem is reportedly compatible with the Racal-Milgo 24 LSI Mark I modem; the 9,600 bit/sec modem is said to be compatible with the vendor's MPS 9601 model.

Pricing for the modems begins at $700. More information is available from the vendor through P.O. Box 520399, Miami, Fla. 33152.

Video Units Beef Up MCS Line

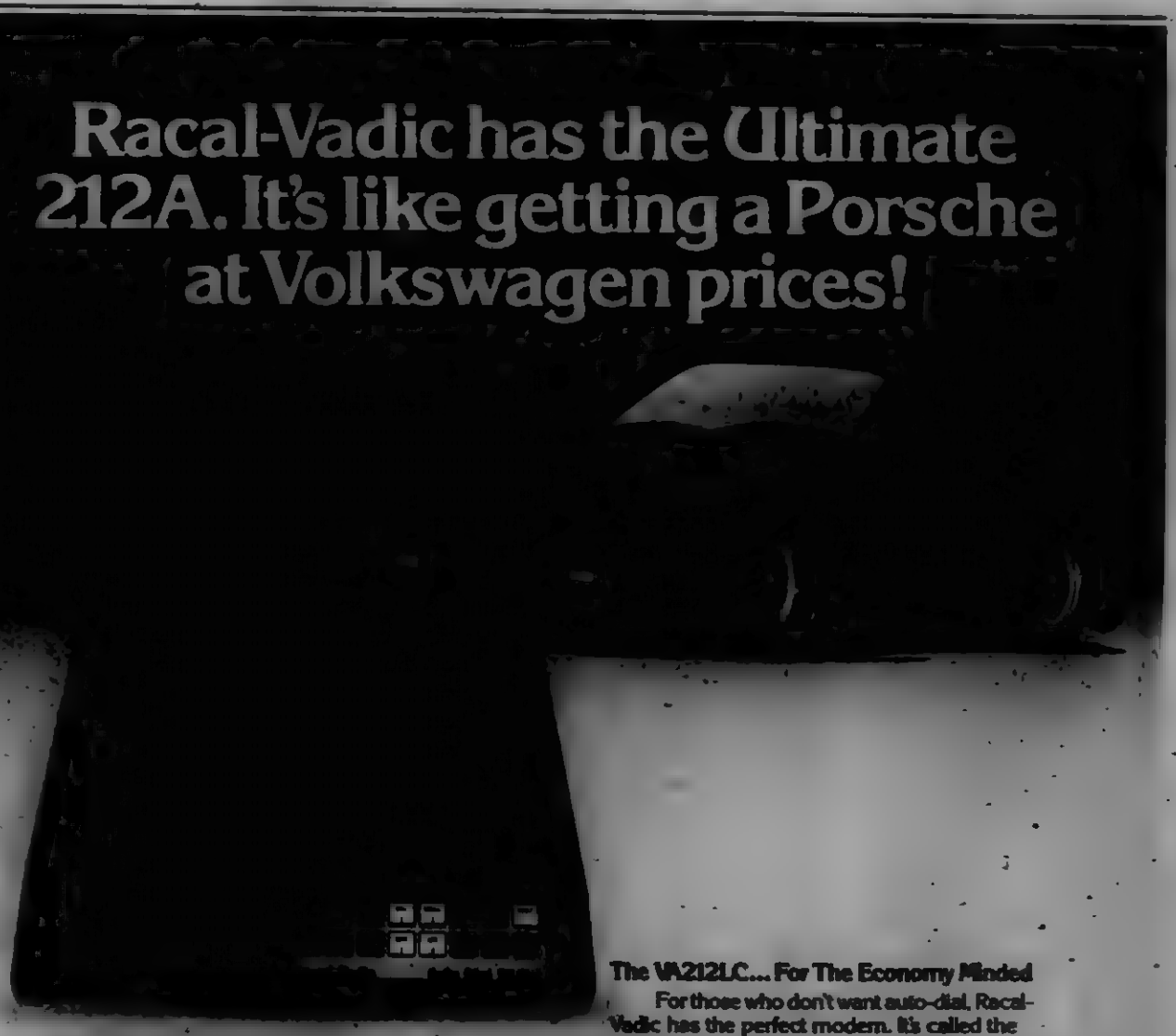
SAN JOSE, Calif. — Compression Labs, Inc. (CLI) has announced two additions to its Mini Conferencing System (MCS) family of compact videoconferencing stations.

The Personal Conference Station, PCS 12, and the Mini Conference Station, MCS 19, are self-contained, portable units that offer complete videoconferencing capabilities, including audio, full-motion video, graphics and control, according to a CLI spokesman.

Each of the stations consists of a central unit housing a color monitor, camera with zoom lens, directional microphone and speaker, the spokesman said. Also provided are a movable stand and a hand-held remote control unit. The PCS has a 12-in. monitor, and the MCS has a 19-in. monitor. Both can support an optional graphics unit for sending and displaying graphics, slides and other printed material.

Both units will be available in the second quarter of 1984 with the PCS 12 priced at $14,000 and the MCS 19 priced at $16,000. The graphics unit is available for $5,500. More information can be obtained from CLI at 2305 Bering Drive, San Jose, Calif. 95131.

Racal-Vadic has the Ultimate 212A. It's like getting a Porsche at Volkswagen prices!



The Auto-Dial VA212... For Those Who Want Everything

Racal-Vadic has the ultimate 212A-compatible modem. It operates at 1200 and 0 to 300 bps and has a built-in automatic dialer with a non-volatile memory that can store as many as 15 phone numbers, up to 31 digits each. Non-volatile means the memory is retained even if you lose power.

This manual-to-modem "talker" is the ultimate operator using English words and phrases to indicate call progress, option status, and telephone numbers in memory. Calls can be originated or answered from the terminal keyboard or the modem front panel.

The front panel is really something. It has a 16-key tactile-touch keyboard and an eight character liquid crystal display. Twenty-six user programmable options are stored in the modem's memory, and can be keyed in from the front panel... eliminating the need to open the modem to change options.

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For those who don't want auto-dial, Racal-Vadic has the perfect modem. It's called the VA212LC. LC means low cost... just $495 in single quantity.

This is not a stripped down model. The VA212LC is a full-featured 212A-compatible modem with manual originate and [illegible] It operates at 1200 and 0 to 300 bps full-duplex.

The VA212LC's extensive diagnostics include remote digital loopback and self test. Remote loopback allows end-to-end testing over the phone from any of Racal-Vadic's regional diagnostic centers. The carrier indicator shows when you've established connection.

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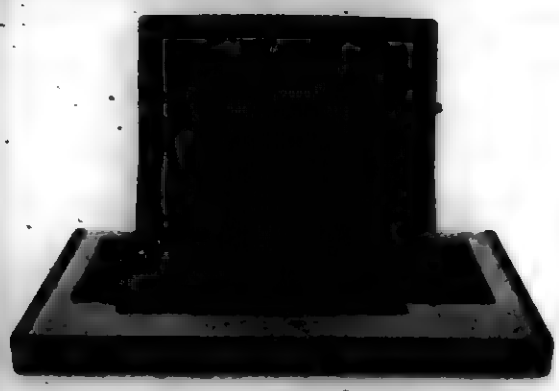

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You can retrieve your messages three ways: from a display unit, on electronically-printed hard copy, or with a call to the attendant.

The Directory function adds to Message Center. It's an on-line database that gives you continuously updated information about fellow employees. Information such as name, extension number, location, title, department, and up to ten other fields of information.

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Omnet Introduces E-Mail Service

BOSTON — Omnet, Inc. has introduced an electronic mail service called Businessnet, which is tailored to each individual company's needs.

Features of Businessnet include public and private bulletin boards, mailing lists and specifically designed forms for order entry, sales force itineraries and other purposes.

Customers are able to access the service via the GTE Telenet public data network using any manufacturer's type of equipment, a vendor spokesman said.

An average active user, composing on-line and sending three or four short messages per day, would spend about $50 per month, according to the vendor. There is also a connect-time charge of $15.40 per hour during business hours. If more than one copy of a message is sent, there is a charge of six cents per additional copy; there is also a charge of six cents for each additional 1,000 characters transmitted out of the system.

Omnet can be contacted at 70 Tonawanda St., Boston, Mass. 02124.

Remote Communicator Out for DEC

NORCROSS, Ga. — Reynolds, Taylor and Lovell, P.C., has introduced a communications package said to run on Digital Equipment Corp.'s PDP-11 minicomputer under the RT-11 operating system.

CTScom enables the user to communicate, via telephone/modem hook-up, with any remote computer, allowing the transfer of data files to or from the remote system. CTScom also reportedly permits the printing of data transmitted from the remote computer, as well as the creating, editing and listing of local data files.

A single-copy license fee for CTScom is $750. The package is available from Reynolds, Taylor & Lovell at 3800-C Holcombe Bridge Road, Norcross, Ga. 30092.

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Complexx Modem Offers Choice Of Eight Speeds

HUNTSVILLE, Ala. — Complexx Systems, Inc. has introduced a limited-distance modem said to allow the user to select from eight synchronous speeds (2,400 bit/sec to 76.8K bit/sec).

The LVS 76.8 modem reportedly allows the user to choose any speed by using a thumb-wheel switch on the unit's front cover. At its 76.8K bit/sec maximum speed, the modem can reportedly send data 16,250 feet on typical 22-gauge wire.

The user has the choice of an EIA RS-232C digital interface or a V.35 interface.

Priced at $650 for the RS-232C interface version, the modem is available from Complexx Systems at 4930 Research Drive, Huntsville, Ala. 35805.

Intertel Units Add Diagnostics To Transmission

ANDOVER, Mass. — Intertel has announced a new family of data service units said to permit data communication users to receive direct digital service supported with diagnostic and control features similar to the vendor's analog modems and network control systems.

The DSU500 units reportedly operate at speeds up to 9,600 bit/sec, and the DSU556 operates at 56K bit/sec.

Central site control of diagnostic testing can reportedly be achieved by equipping remote DSUs with optional diagnostic cards and installing one or more optional central site controllers, each capable of supporting 16 DSUs.

The units are priced at $785 for the DSU500 and $895 for the DSU556. Additional information is available from Intertel, which can be reached at 6 Shattuck Road, Andover, Mass. 01810.

Fiberlink Fields Data Systems

WESTBURY, N.Y. — Fiberlink, a division of Math Associates, Inc., has announced a family of RS-232-compatible data transmission systems.

The products consist of half- and full-duplex data modems, data taps, repeaters and the model XR-1150 direct plug-in, fiber-optic interface module.

The components feature low cost, high security, immunity to electromagnetic interference and radio frequency interference and transmission distances in excess of 2 kilometers at data rates of 19.2K bit/sec, the vendor said.

Prices for the system components range from $349 per pair for the XR-1150 fiber-optic interface to $950 per pair for the RS-232 modem.

Further information is available from Math Associates, which is located at 2200 Shames Drive, Westbury, N.Y. 11590.

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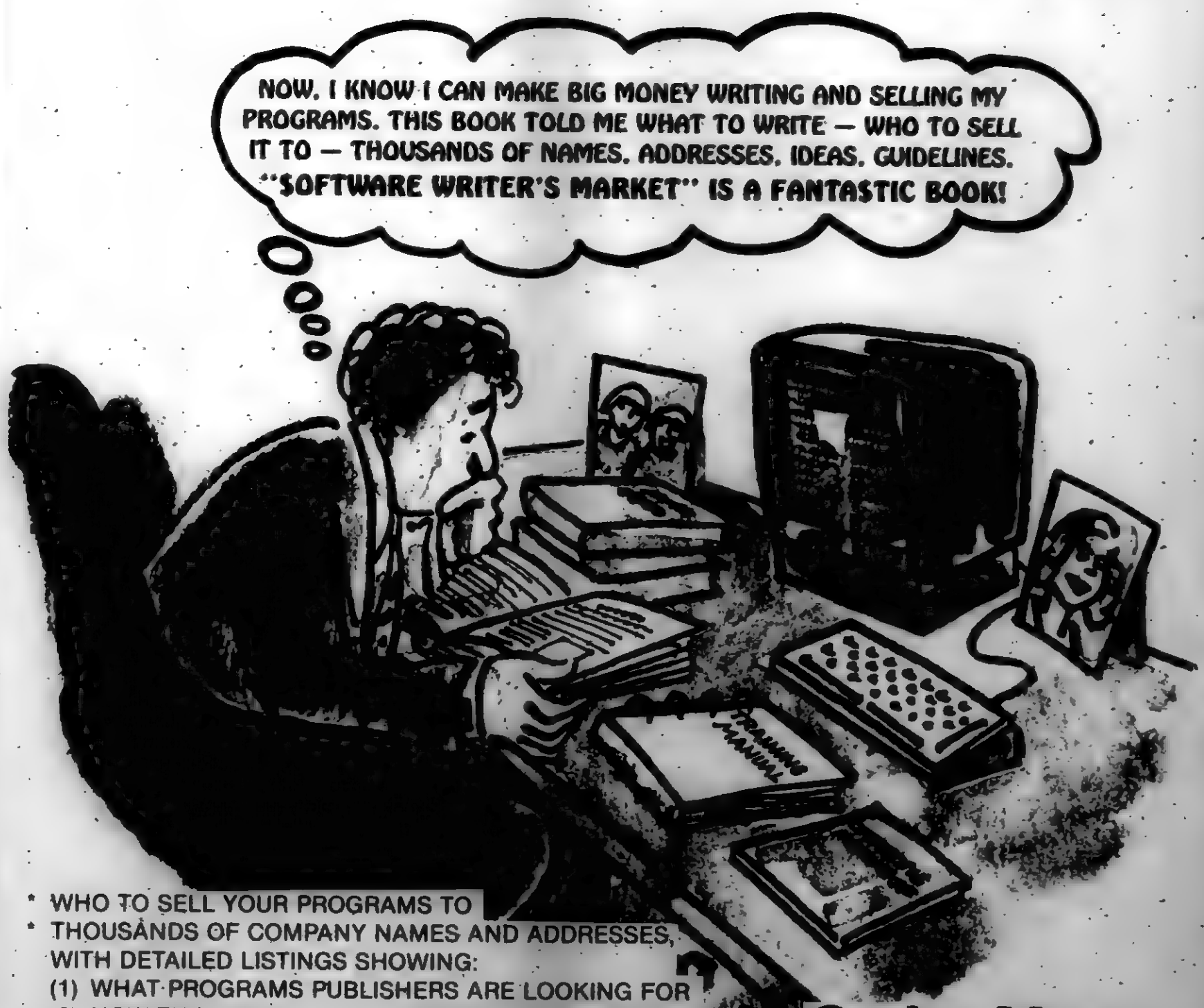

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Tele-Tech Data Base Adds Post-Divestiture Info

FRANKLIN, N.J. — Tele-Tech Service, Inc. has introduced an expansion program for its tariff data base. The vendor is now distributing data base information on the eight AT&T Communications interstate tariffs. The data base details the rates and services that will be offered by the company after divestiture. Originally filed to become effective Jan. 1, the tariffs have been postponed and are now due to become effective April 1.

Also being acquired by Tele-Tech and distributed to the general public are details of AT&T Communications' intrastate tariffs, which will define rates for the intrastate, interlocal-access and transport area services and the local operating company interstate tariffs.

In addition, Tele-Tech will be distributing information on access-charge tariffs and tariffs of other common carriers such as MCI Communications Corp., GTE Telenet Communications Corp., Sprint System, Western Union Corp. and Satellite Business Systems.

Clients may order information on an entire tariff or on any section on a one-time basis with Tele-Tech's automatic revision service. The initial cost of the intrastate tariff data base is approximately $290 for any one state (the cost varies slightly depending on the state); the price of the interstate tariff information ranges from $50 to $125; and the revision service is 25 cents per page.

For telecommunications users who do not wish to purchase the tariff data base, the vendor is offering "Tele-Facts," a newsletter that presents a digest of news related to rate and tariff activity, for $35 per year.

More information is available from the vendor through P.O. Box 366, Franklin, N.J. 07416.

Honeywell Data Link Out For Fiber-Optic Evaluation

MINNEAPOLIS — Honeywell, Inc. has introduced a data link said to allow users to evaluate a set of 1-bit to 5M-bit digital fiber-optic components.

The kit consists of an HFI 6000 digital, 8-pin integrated circuit driver, an HFD 4000 receiver chip, a standard Sweet Spot light-emitting diode, a printed-circuit board and five meters of terminated glass cable, the vendor said.

The kit allows users to construct a completely transistor-to-transistor-logic-compatible serial, digital data link that will operate with the glass cable furnished with the kit, according to the vendor.

The price is $89. Further information is available from Honeywell, Honeywell Plaza, Minneapolis, Minn. 55408.

Converter Boasts Coaxial Link To IBM Ports

TORRANCE, Calif. — Local Data Co. has introduced a protocol converter said to enable asynchronous Ascii devices to be linked to IBM control units via coaxial cable.

The Interlynx/3278 protocol converter performs multiple interface and protocol conversion functions necessary for plugging asynchronous minis and microcomputers, CRT word processors, port selectors, modems and hard-copy terminals into the IBM Type A coaxial cable port. No hardware or software changes are necessary, according to the vendor.

The asynchronous devices are made to emulate the IBM 3278-2 display terminal. When supporting asynchronous terminals, the Interlynx/3278 provides the same full screen formatting and keyboard functions as the 3278-2.

An optional IBM Personal Computer transfer package and support for all IBM Personal Computer compatibles, the Xerox Corp. 860 and the IBM Displaywriter are available.

Price of the Interlynx/3278 is $1,395, with delivery from stock. Information is available from Local Data, which is located at Suite 706, 2701 Toledo St., Torrance, Calif. 90503.

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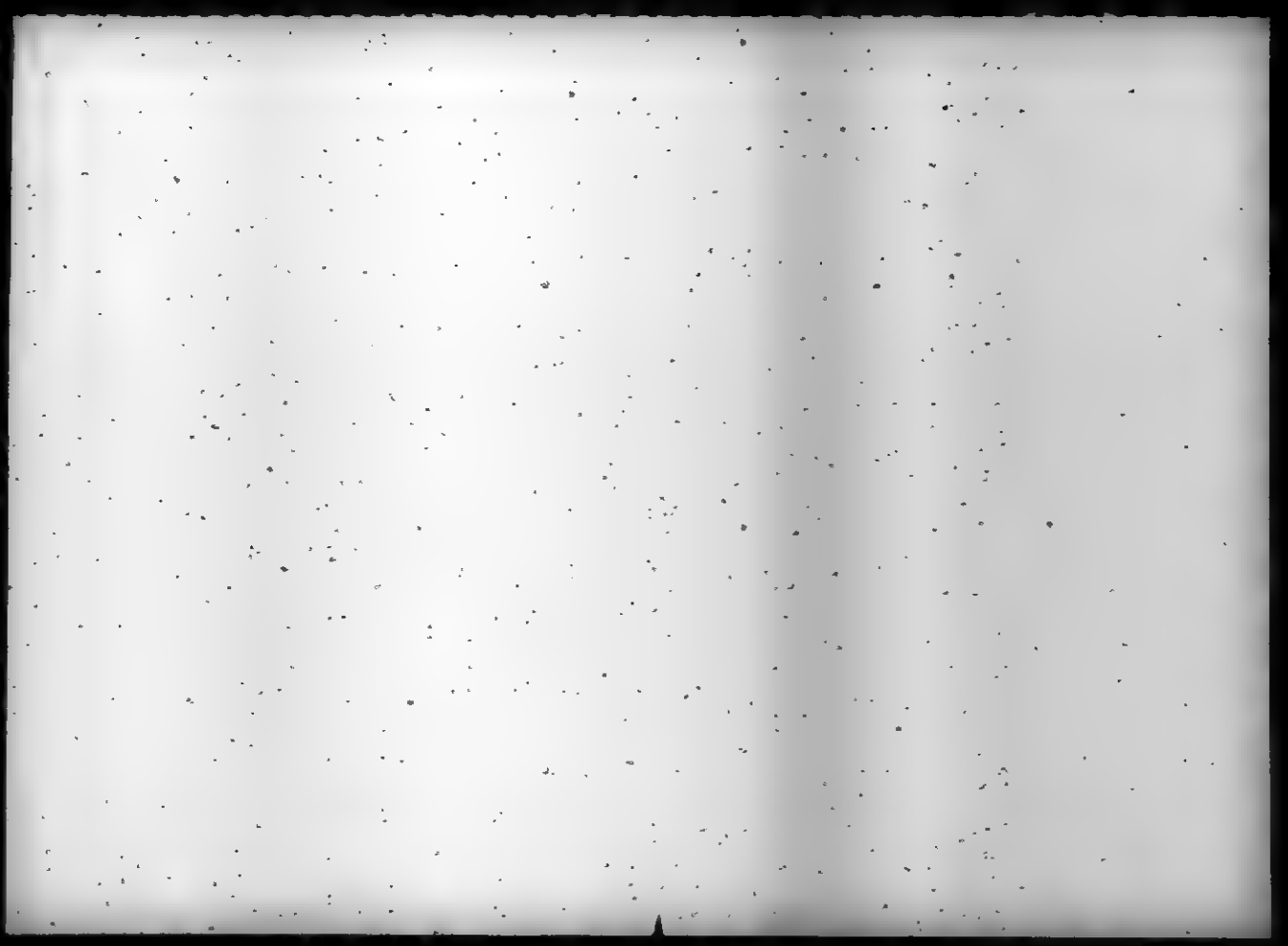

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Three Software Packages Out for Chameleon

SANTA MONICA, Calif. — Tekelec, Inc. has introduced three software packages for its Chameleon simulator/analyzer.

The first, TestSNA, which is developed by System Strategies, Inc. for Tekelec, is a series of 115 scenarios to test all functions of an IBM Systems Network Architecture (SNA) and IBM 3274- or 3276-compatible products. The package provides a completely documented system for quality assurance or product verification, the vendor said.

The second, Chameleon, runs TestSNA connected directly to the cluster controller-type product. No host or front-end processor is reportedly required.

According to the vendor, rigid scenario testing of SNA is the most effective means of evaluating and troubleshooting a controller or emulator. Each layer of SNA, including Synchronous Data Link Control (SDLC) is tested individually from the bottom up so that higher layers are tested with the assurance of a secure foundation.

The other new software package, Replay, provides the user with a method of simulating a particular problem or event without having to write any software. It takes a prerecorded analyzer file and replays either the data terminal equipment or data circuit equipment side while comparing the responses to those on the disk.

The Chameleon simulator/analyzer, TestSNA and Replay sell together for $27,000. Separately, TestSNA sells for $10,000. Replay, included with all new Chameleon systems, can be purchased by current Chameleon users for $50.

Tekelec is based at 2932 Wilshire Blvd., Santa Monica, Calif. 90403.

Belden Announces Cable For Local-Area Networks

GENEVA, Ill. — Belden Corp.'s Electronic Wire and Cable Division has introduced a transceiver cable for use in such local- area networks as Xerox Corp.'s Ethernet.

The Belden 9898 reportedly has three individually shielded twisted pairs and one shielded twisted triplet. The cable's aluminum and polyester foil tape shields make electrical contact with one another.

Standard setups are at 100, 500 and 1,000 feet, with trade prices of $50.25, $180 and $360. Further information is available from the vendor at 2000 S. Batavia Ave., Geneva, Ill. 60134.

Gandalf Unveils PIN Enhancer With Autobaud

WHEELING, Ill. — Gandalf Technologies, Inc. has announced an enhancement package for the PIN 9103 statistical multiplexer said to include autobaud, enabling the PIN to adjust its channel operating speed automatically to that of the terminal.

Available as a standard feature of PIN multiplexers, the enhancement also includes selectable autobaud passthrough, a choice of connect protocols and a Help command for console users.

Available in four- to 32-channel rack-mount or stand-alone units, the PIN 9103 ranges in price from $1,650 to $7,250. More information is available from Gandalf Data, 1019 S. Noel, Wheeling, Ill. 60090.

CGX System 2001 Gets Connection To Bell Facilities

ACTON, Mass. — CGX Corp. has announced that Bell T1 and fiber-optic cable connections are available for its Graphics Display System 2001, an IBM-compatible system of mainframe-based, interactive, computer-aided design and manufacturing workstations.

CGX supplies a T1 adapter connected to the host-based channel unit or to any point along the single coaxial cable. The adapter connects to a Bell-supplied channel service unit modem, which passes data to the local Bell digital transmission facility. Bell transmits information at 1.544M bit/sec over its T1 service.

Using either of these long-distance connections, remote CGX display networks can operate from a central IBM 30 or 4300 series or IBM plug-compatible mainframe host.

Cost of the T1 and fiber optics options is $3,500. CGX is located at 42 Nagog Park, Acton, Mass. 01720.

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Family of Gateway Devices Provides X.25 Connections

ALEXANDRIA, Va. — Dynatech Packet Technology, Inc. has introduced a family of gateway devices said to connect different types of Ansi X.25 networks and also interconnect different services within an X.25 network.

The Multicom 25 has two models. Model 2 translates numbers called between a public or private X.25 network or between two different public X.25 networks. It contains a programmable "table" with up to 200 numbers and their corresponding matching numbers, all protected by their battery-packed random-access memory.

The Model 4 can interconnect permanent virtual circuits (PVC) switched virtual circuits within a network. With the Model 4, host computers that only support one type of dateline can be interfaced to devices and networks which support the other dateline type.

Future models will interconnect X.21 circuit-switching networks to X.25 packet-switching networks.

The Multicom 25 Model 2 is priced just under $6,900 and the Model 4 just under $7,200, with delivery in 60 days.

More information is available from Dynatech Packet Technology at 6464 General Green Way, Alexandria, Va. 22312.

Calcomp Offers Multiplexer

ANAHEIM, Calif. — California Computer Products, Inc. (Calcomp) recently announced an input multiplexer that connects up to four data sources to its Model 951/953 controller.

The 4 to 1 Input Multiplexer contains four input ports which reportedly may be independently configured to accept serial data in Calcomp's 960 or 907 format. Each port may be independently configured by switches or jumpers according to transmission rate, half/full duplex and character framing.

A company spokesman said a priority scheme allows users to select ports for preferential plotter access. A dead host timeout feature reportedly allows users to recover from host errors by automatically releasing a port if data is not received within a user-specified interval.

The unit is available for $1,995 from Calcomp at 2411 W. La Palma Ave., Anaheim, Calif. 92801.

Info-Mate 212PC Offers Direct Tie To IBM Micros

SUNNYVALE, Calif. — Cermetek Microelectronics, Inc. has introduced Info-Mate 212PC, a Bell 212A-type modem that plugs directly into the IBM Personal Computer, Personal Computer XT or compatible computers.

The product is supplied with the company's data communications software package called Modem-Mate, which allows personal computer users to transmit and receive files, autodial data or voice calls, receive or transmit information at full or half-duplex, log modem data on a printer and maintain a 60-entry "phone book," the vendor said.

Additional personal computer requirements needed to operate this product are 64K bytes of random-access memory, one disk drive and an 80-col. display. The price is $495.

Cermetek Microelectronics is at 1308 Borregas Ave., Sunnyvale, Calif. 94089.

Converter Joins CRT, Printer Over One Line

TORRANCE, Calif. — Local Data Co.has announced the Datalynx 3274 protocol converter, which allows support of a CRT and an auxiliary printer over one asynchronous telephone line.

The product supports the serial and parallel auxiliary printer ports on terminals and personal computers as separately addressable 3287-2 printers, the vendor said.

The terminal display and printer appear as separate logical units to the IBM host computer.

This allows up to 18 devices to be addressed simultaneously by the host through the nine asynchronous ports on the protocol converter, according to the vendor.

Prices for the converters are: 3274-9, $6,000; 3274-7, $5,000; 3274-5, $4,000; and the 3274-3, $3,250.

Further information is available from Local Data, Suite 706, 2701 Toledo St., Torrance, Calif. 90503.

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Tempo Response Time Monitor Upgraded

CHERRY HILL, N.J. — Avant-Garde Computing, Inc. has introduced Tempo II, an updated version of its original Tempo response time monitor for individual terminals.

Installed directly at the terminal, this microprocessor-based "electronic stopwatch" gives response time measurements as actually observed by the terminal operator.

Tempo II identifies each transaction by transaction type and transfers the gathered statistical information to the host for further analysis.

The product gives actual, minimum, maximum and average response times, the standard deviation variance, response time distribution and a breakdown of distribution by percentage, the company said.

Available immediately, Tempo II units are compatible with a variety of terminals, including the IBM 3178, 3276, 3278, 3279, 8775, Teletype Corp. 4540 and Memorex Corp. 2078. A single Tempo response time monitor costs about $3,700. Avant-Garde is located at 2091 Springdale Road, Cherry Hill, N.J. 08003.

Communications Tools Fit AD/380

DENVER — Auto-Trol Technology Corp. has announced two software communications packages for use with its AD/380 product line.

These packages — the V/77 communications package and the IBM communications package — enable Auto-Trol systems to transfer data files between one another or between themselves and IBM-like host computers.

The V/77 package enables users to transfer data files, using cable or modem hookups, between Sperry Corp. V/77 computers, or between a V/77 and Digital Equipment Corp. VAX computers.

The package provides a communications path between Auto-Trol V/77-based systems and IBM or IBM-like host computers. With this package, Auto-Trol users can transfer files using any of three IBM standard communications protocols.

The V/77 package costs $2,000 for each link, while the IBM package is priced at $8,000 from Auto-Trol, 12500 N. Washington St., Denver, Colo. 80233.

EDU-Link Designed For Teaching

TEMPE, Ariz. — Advanced Fiberoptics Corp. has announced the EDU-Link, a Transistor-to-Transistor Logic data transmission system designed as an educational tool.

The product package includes a transmitter, receiver and a one-meter length of preterminated fiber-optic cable.

The kit is sold in unassembled format, demonstrating the principles of fiber-optic transmitter and receiver design, the vendor said.

The price is $19.95 and includes instructions, theory of operation and tutorial information, according to the vendor.

Advanced Fiberoptics can be reached at 637 S. Hayden Road, Tempe, Ariz. 85281.

Controller Touts High-Speed Use

SAN DIEGO — Systech Corp. has announced a serial communications controller said to support high-speed asynchronous and synchronous data communications.

The MTI-800/1600 DMA controller reportedly supports eight or 16 serial ports and time-divison multiplexing firmware.

Priced at $1,895, the MTI-800/1600 controller is available from Systech Corp., located at 7630 Miramar Road, San Diego, Calif. 92126.

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Dataroute International Gets Third Border-Crossing Point

MONTREAL — Telecom Canada has announced the availability of a third border-crossing point for its Dataroute International service.

The new connection is between Montreal and Albany, N.Y. The digital network, used by businesses for point-to-point data transmission, currently links 82 Dataroute serving areas across Canada to 93 digital serving areas in the U.S., according to a Telecom spokesman.

A typical connection between Canada and the East Coast costs approximately $1,000 per month, and a connection between Montreal and the West Coast is priced at approximately $3,500 per month.

More information can be obtained from Telecom Canada at 160 Elgin St., Room 1150, Ottawa, Canada, K12 3J4.

IBM Connected Via 'Tele3270'

SUNNYVALE, Calif. — Televideo Systems, Inc. has introduced a software package said to allow Televideo personal computer networks to connect with IBM 3270 terminals.

Tele3270 reportedly emulates 3270 terminals, enabling users of Televideo's personal computer network to access 3270 applications and data bases on IBM mainframes.

Tele3270 is said to feature Digital Research, Inc.'s CP/M-based personal computing.

Tele3270 runs on any Televideo personal computer network that can support the vendor's TS 806/20 or TS 816/40 file servers, according to the vendor. Carrying a license fee of $795 per personal computer network, Tele3270 is available from Televideo Systems at 1170 Morse Ave., Sunnyvale, Calif. 94086.

Facility Allows Interchange

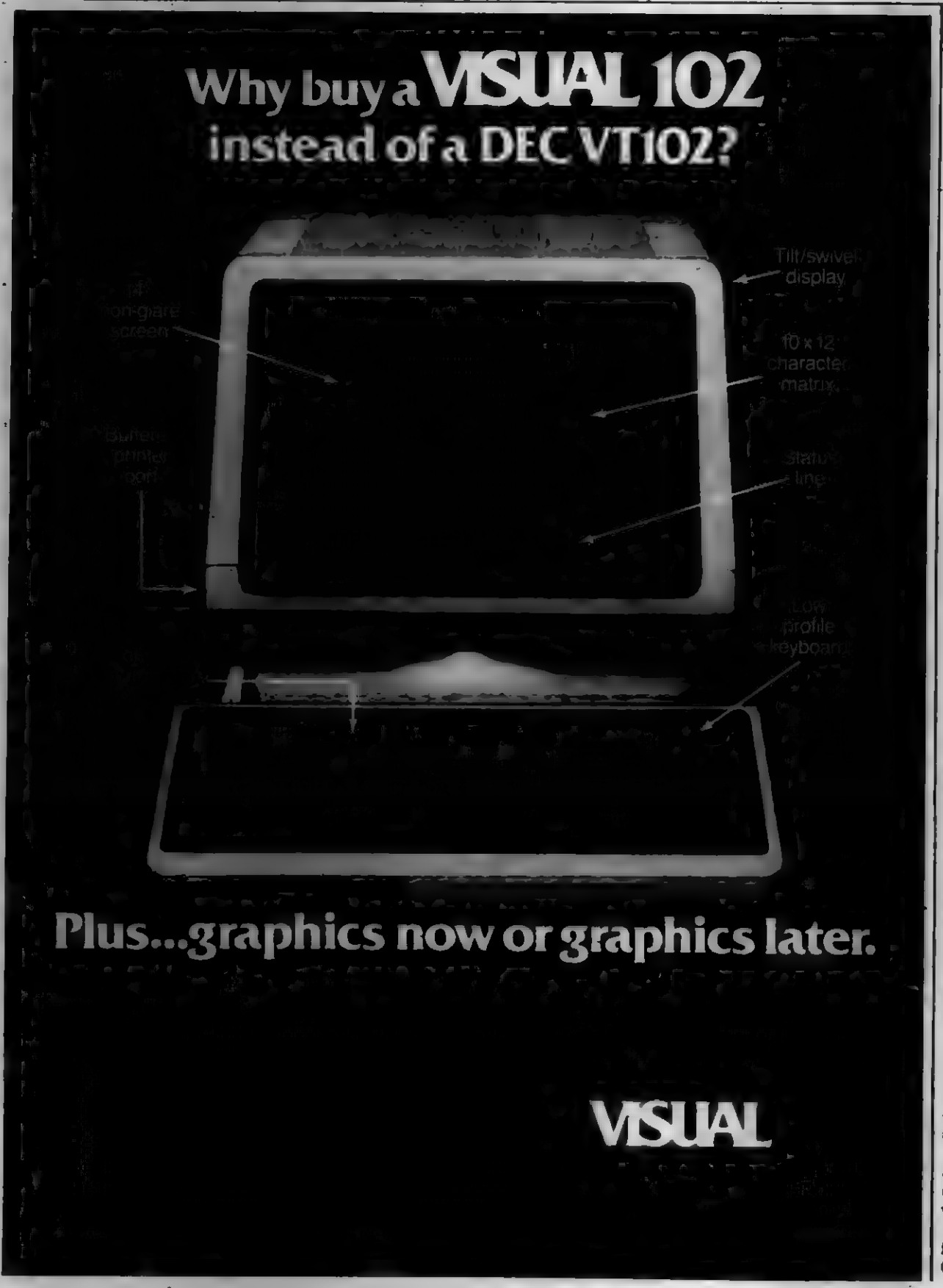
VAN NUYS, Calif. — Cisinetwork Corp. (CNC) has introduced Soft-Switch, a networking facility that allows users with different brands of word processing equipment and personal computers to interchange documents via CNC's host computers without regard for dissimilar formatting codes and communications protocols.

Using Soft-Switch, developed by Integrated Technologies, Inc. of King of Prussia, Pa., CNC can also temporarily store and permanently archive documents.

CNC supports Soft-Switch under IBM's MVS and VM/CMS operating systems at its computing centers in Philadelphia and Los Angeles.

The usage fee is 25 cents per resource unit plus a software surcharge for the use of Soft-Switch.

Further information is available from CNC, at 16625 Saticoy St., Van Nuys, Calif. 91406.



Mux System Fits Users Of PTS-2000

HYANNIS, Mass. — Fibronics International, Inc. has announced its Cable Bandit multiplexer system for Raytheon Data Systems Co. PTS-2000 [illegible]

The system allows up to 32 dedicated coaxial cables connected to Raytheon R2078 and R2079 display terminals and R2187 printers to be replaced by a single fiber-optic or coaxial cable, with terminals located up to 10,000 feet away from the R2074 or R2076 controller.

The system is available in two configurations: the FM-1632 is expandable in eight-port increments up to a maximum of 32 ports; and the FM-1608 is a fixed, eight-port system for multidrop networks.

Priced at $4,200 for a basic system, the Cable Bandit is available from the Fibronics International at 218 W. Main St., Hyannis, Mass. 02601.

Telemac Offers Data Logger

SUNNYVALE, Calif. — Telmac, Inc. has introduced a 4-channel remote data logger.

Called the TM 4041, the data logger reportedly includes an analog-to-digital converter and interfaces with micro, mini and mainframe computers through an RS-232 serial interface.

Designed to monitor analog variables, the Data Logger is oriented for transducer applications and can monitor variables such as temperature, infrared emissions, vibration and power-consumption data on-site or via 300 to 1,200 bit/sec modems, the vendor said.

Control of the Data Logger is through Basic commands, the vendor said.

The memory retains information in an Ascii string format, which can be easily converted to a real-number format via Basic language output commands, according to a vendor spokesman.

The TM 4041 Data Logger is available for immediate delivery at a cost of $500 per unit, according to the vendor.

More information is available from Telmac, located at 770 Privet Court, Sunnyvale, Calif. 94086.

Users Rate Level of Services

Study Discusses After-Sales Support Blues

By Patricia Keefe
CW Staff

MOUNTAIN VIEW, Calif. — Users of small computer systems rate the level of after-sales support services they receive as being below what is needed in almost every area, particularly software, according to a report recently released by Input, Inc., a computer market research firm here.

The report, "An Analysis of User Requirements for Small-Scale Systems," recommends vendors embrace a total service concept that "extends far beyond reacting to reported machine failures and recognizes the dynamics of [changing] user requirements." The "perfect candidate" to provide total after-sales support is said to be the field engineer, and the more successful vendor organizations have already incorporated this concept, Input added.

The study examines what 342 small systems users, primarily managers, want in field-service support and provides their ratings of how well 14 vendors perform in each of 13 specific service areas.

Small-scale systems were defined as stand-alone computers such as traditional minicomputers and business microcomputers. The service areas include physical-site planning, hardware maintenance, software maintenance, supplies sales, add-on sales, site audits, environmental planning, consulting, training, documentation, installation planning, deinstallation and relocation.

The survey respondents indicated that all vendors performed poorly on documentation, supplies sales, relocation and deinstallation. The users also indicated that vendors need to pay more attention to taking the initiative to improve user operations. Input warned service vendors that they are not adequately protecting their installed bases.

In addition, users rated effective communication with software engineers, ability to maintain software and response time to solve software-related problems lower than that for hardware. Also, according to Input, there is a shortage of qualified people in software support. Yet, "with an aggressive training

(Continued on Page 86)

VENDORS	RATINGS (1-10) MEAN	STANDARD DEVIATION	MEDIAN	MODE	NUMBER OF RESPONSES
All Vendors	6.79	2.07	7.0	8.0	251
Autotrol	5.00	1.84	5.0	5.0	21
Burroughs	6.55	2.21	7.0	7.0	20
Computervision	6.21	2.04	6.0	5.0	19
DEC	7.30	2.22	8.0	8.0	20
Data General	8.56	0.88	9.0	9.0	9
Datapoint	7.27	1.96	8.0	8.0	15
Four Phase	6.65	2.40	7.0	9.0	17
Hewlett-Packard	7.05	1.75	7.0	6.0	19
Honeywell	6.50	2.04	7.0	7.0	14
IBM	7.79	1.50	8.0	7.0	29
Intergraph	6.22	1.99	6.5	8.0	18
NCR	6.27	2.46	7.0	7.0	15
Prime	7.27	1.58	7.0	7.0	15
Texas Instruments	7.40	1.78	8.0	8.0	10

Chart Courtesy of Input, Inc.

User Ratings of the Ability to Maintain Software

Are Micros Really Better Than CRTs?

By John Butler
Special to CW‡

CRT terminals may be good, but micros are better.

In order to defend this statement, it is necessary not only to define the terminology but to define more specifically the environment for which the claim is made. The environment addressed is the small to medium-size business environment.

Microcomputers can run many applications, including financial modeling and planning, data base management and telecommunications. Word processing has not been mentioned. Few companies use microcomputers for word processing, even though it is an important business activity.

At the same time, few firms use CRT terminals connected to a mainframe computer for word processing purposes. Normally, word processing is handled by several stand-alone word processors used in conjunction with electric typewriters.

A very recent trend is to use a newer generation of more powerful microcomputers capable of supporting most of the normal business activities in addition to word processing. The operative buzzword is integration — the development of the integrated multifunction workstation.

This is the first in a three-part series focusing on the link between microcomputers and mainframes. This week and next, the author explores the struggle between micros and CRT terminals as doorways to a corporation's mainframe-based information.

Advertisements for new computer systems often give the impression they can do anything. Businessmen are more willing to learn to use a computer when it is a single unit that can help perform many normal business functions.

After analyzing our firm's use of microcomputers, we discovered four categories of use, not including word processing. By far, the largest category of use (about 80%) was for a combination of financial modeling (spreadsheet analysis) and financial planning. The second category was the use of data base management systems (about 7%); the third category was telecommunications (about 6%); and the last category was a conglomeration of everything else, from graphics to actual higher level language programming.

While these numbers are not typical of all businesses, they are probably most reflective of the recent developmental history regarding business software for microcomputers.

Historical Perspective

It is valuable to review the relatively short history of the microcomputer. While many articles have described the sudden emergence of micros into common business-oriented practice, it is necessary to remember that the first practical micro for business use — Apple Computer, Inc.'s Apple II — was released to a business community ill-prepared for it. That was only about six years ago. Prior to 1977, the use of micros in business was a well-kept secret.

(Continued on Page 88)

Point 4 Tops Line, Offers Entry-Level Mini

IRVINE, Calif. — Point 4 Data Corp. has announced two computer systems: the Mark 2T, an entry-level multiuser minicomputer; and the Mark 9, a top-of-the-line system that can support more than 64 users.

The Mark 2T employs bit-alice technology with a microsequencer to effect a 600-nsec instruction execution cycle. The unit also features a 200-nsec random-access memory access time. The system's multiuser architecture, in combination with a direct memory access (DMA) multiplexer, enables the Mark 2T to handle up to seven users within a typical business application, the vendor said.

The Mark 2T incorporates a 5¼-in. Winchester disk drive with a Storage Technology Corp. ST506 interface and memory capacities from 19M bytes to 46M bytes. Back up and program load capabilities are provided by a "floppy tape" streamer cartridge subsystem with 20M-byte capacity, the vendor said.

The Mark 2T, in a basic four-port configuration, costs about $10,000.

The high-end addition to the product line is the Mark 9. Representing a 25% increase in power over the earlier Mark 8, the unit is a 16-bit, general-purpose minicomputer.

The Mark 9 system offers selectable operational modes, including a Control Data Corp. Nova 3-compatible mode and an extended instruction set, which increases throughput by reducing software overhead.

The unit is available with Winchester disk and streamer mass storage subsystem in 35M to 84M byte/spindle capacities and high-speed DMA multiplexers to support more than 64 users.

The Mark 9 computer is priced at $7,500 for a 256K-byte CPU board and $30,000 for an entry-level configuration with 256K-byte CPU, eight ports, 35M-byte Winchester disk and controller and 20M-byte tape streamer and controller, which will be available in 30 days.

Point 4 is located at 2569 McCabe Way, Irvine, Calif. 92714.

Mux Channel Interface Links Plotters to IBM CPU

ANAHEIM, Calif. — California Computer Products, Inc. (Calcomp) has introduced a byte or block multiplexer channel interface that gives IBM mainframe users the ability to utilize the firm's electrostatic or pen plotters on-line.

Designed for use with Calcomp's Model 951 and 953 controllers, the IBM channel interface is a single printed-circuit board that mounts in either the 951 or 953 vector to raster controller, according to the vendor.

With the channel interface installed, the 951 or 953 controller emulates an IBM 3811/3211 controller/printer.

Ebcdic print or plot data may be sent to the controller, the vendor said.

In plot mode, the interface gives IBM 360/370, 30 Series and 430 Series users access to Calcomp's line of electrostatic plotter/printers and pen plotters.

The channel interface costs $5,995 and includes a set of 20-ft bus and tag cables, a 30-ft cable and software. Delivery is in 60 days.

Calcomp is located at 2411 W. La Palma Ave., Anaheim, Calif. 92801.

Turnkey System Out for CAD, Board Designers

PLEASANT HILL, Calif. — Paragon Technology Corp. has introduced the Model 200 turnkey, color computer-aided design (CAD) system for printed circuit board designers.

The system was built around a 20 MHz Digital Equipment Corp. LSI-11/23 CPU, with an independent 16-bit proprietary graphics processor.

It has 256K bytes of memory, enabling the user to design boards that measure 32 sq in. and contain up to 500 equivalent integrated circuits and 64 layers, according to the vendor.

A separate video display console reportedly permits data entry and system control.

A desktop line printer is used to produce a wiring list, bill of materials and other documents required for manufacturing, according to the vendor.

A keyboard, combined with a mouse or tablet, is used to interact with on-screen menus to move, delete or manipulate the graphics, according to the vendor.

The price for the Model 200, which includes printed circuit design software, a line printer and a factory training course is $59,950, the vendor said.

Further information is available from Paragon Technology, located at 2199 Norse Drive, Pleasant Hill, Calif. 94523.

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- The January 1 divestiture of AT&T. What will the impact *really* be?
- When is the shakeout going to come in the Micro market? Who will the big players be and who'll be dropping out?
- The results of the *Computerworld* DP Budget Survey: Where is the DP/MIS exec's money going to go? Why?
- Technology. Just what are the R&D people *actually* working on?

Last year's software announcements and/or agreements will be looked at in light of which will come to reality in 1984. You'll get a close look at control, security and training issues and how they'll impact DP/MIS managers who spent 1983 off-loading applications to end-users and providing them with computing power.

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If you've got product or service ads that will help our readers make informed choices for 1984 — then you need to get color ads to us by December 9th and black and white ads to us by December 15th.

To reserve space in the combined December 26th/January 2nd special issue, call one of the sales offices listed below, or call Don Fagan, Vice President Sales/Marketing; Ed Marecki, National Sales Director or Kathy Doyle, Marketing Support Manager.

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DG Brings Out Eclipse C/30, Based on Microeclipse CPU

WESTBORO, Mass. — Data General Corp. has announced the Eclipse C/30, a multiworkstation microcomputer based on the firm's Microeclipse central processor.

The system was designed to operate with between four and 10 users and fits into DG's product lineup between its Desktop Generation micro and the Eclipse MV/4000 supermini.

The C/30 is supported by DG's AOS operating system, Rdos or MP/AOS and uses a commercial instruction set, which reportedly allows users to run Ansi Cobol and RPG-II programming languages.

The Eclipse C/30 supports up to 2M bytes of main memory and up to 150M bytes of disk storage. The unit includes a floating-point accelerator. An optional-burst multiplexer channel reportedly extends the I/O bandwidth to 4M byte/sec for enhanced I/O performance.

An Eclipse C/30 with 512K bytes of memory in an 8-slot chassis costs $10,300. A C/30 AOS-based system with 512K bytes of main memory, the burst-multiplexer channel option, a 50M-byte Winchester disk drive, a 15M-byte tape cartridge, a workstation, cabinet and license for the AOS operating system and nine software entitlements costs $33,770.

DG is located at 4400 Computer Drive, Westboro, Mass. 01581.

McAuto Offers DDP System

ST. LOUIS — McDonnell Douglas Automation Co. (McAuto) has announced McAuto System 1, a minicomputer-based distributed data processing (DDP) system for the engineering community.

The product also offers the company's engineering and project management software applications on Digital Equipment Corp.'s VAX-11 series computers.

The product tracks computer usage, personnel assigned and job status associated with each task within a project and/or subproject environment. It also provides a hierarchical security system that enables the firm's management to control access to project files, use of specific software applications and data processing transactions, the vendor said.

Prices for the McAuto System 1 software plus VAX-11 series minicomputers range from $100,000 to $400,000. The software alone is available on a monthly license basis that ranges from $1,000 to $2,000.

Further information is available from McAuto, St. Louis, Mo. 63166.

Service Levels After Sales Seen Disappointing

(Continued from Page 83)

program in software support for field engineers, hardware and software maintenance could be combined," the report said, "allowing software analysts to concentrate their efforts on sales teams and in closing new accounts."

And, as hardware becomes easier to maintain, the field-service expertise can be used to concentrate more heavily on software support and on various sales roles. "In this increased role, field service should improve sales of upgrades and add-ons," the report said. Moreover, Input suggested that increased productivity and improved user relations could result from combining several after-sales support services.

Traditional on-site maintenance is favored by all users, pointing out the value of personal contact, the study said. On the other hand, remote support, mail-in repair and support centers leave the user responsible for final problem determination, the study added.

"This affects the users' productivity and requires them to build a high level of [maintenance] expertise within their own organizations," the research firm said. As a result, Input speculated that future sales of new equipment and upgrades could be "significantly" affected by these losses in communication between the vendor and user.

One suggested solution is to follow the example of the large systems sector, where field engineers carry out account management functions. This provides the user with a vendor representative with whom to discuss ideas and problems and has had a positive affect on sales opportunities, the report said.

Input recommends that small systems vendors use their field-service organizations to provide satisfactory after-sales support. Users were found to be generally favorable to dealing with field engineering, although the report noted there was "significant" user resistance to field engineers who sell both supplies and software packages.

Another criticism was directed at documentation efforts, which the report said ordinarily receive the lowest priority and are often started late in product development. The result was found to be low-quality documents, usually delivered late.

The report concluded that as the industry grows and new technologies evolve, system maintenance and account responsibilities will become even more important.

The report costs $2,000 from Input, 1943 Landings Drive, Mountain View, Calif. 94043.

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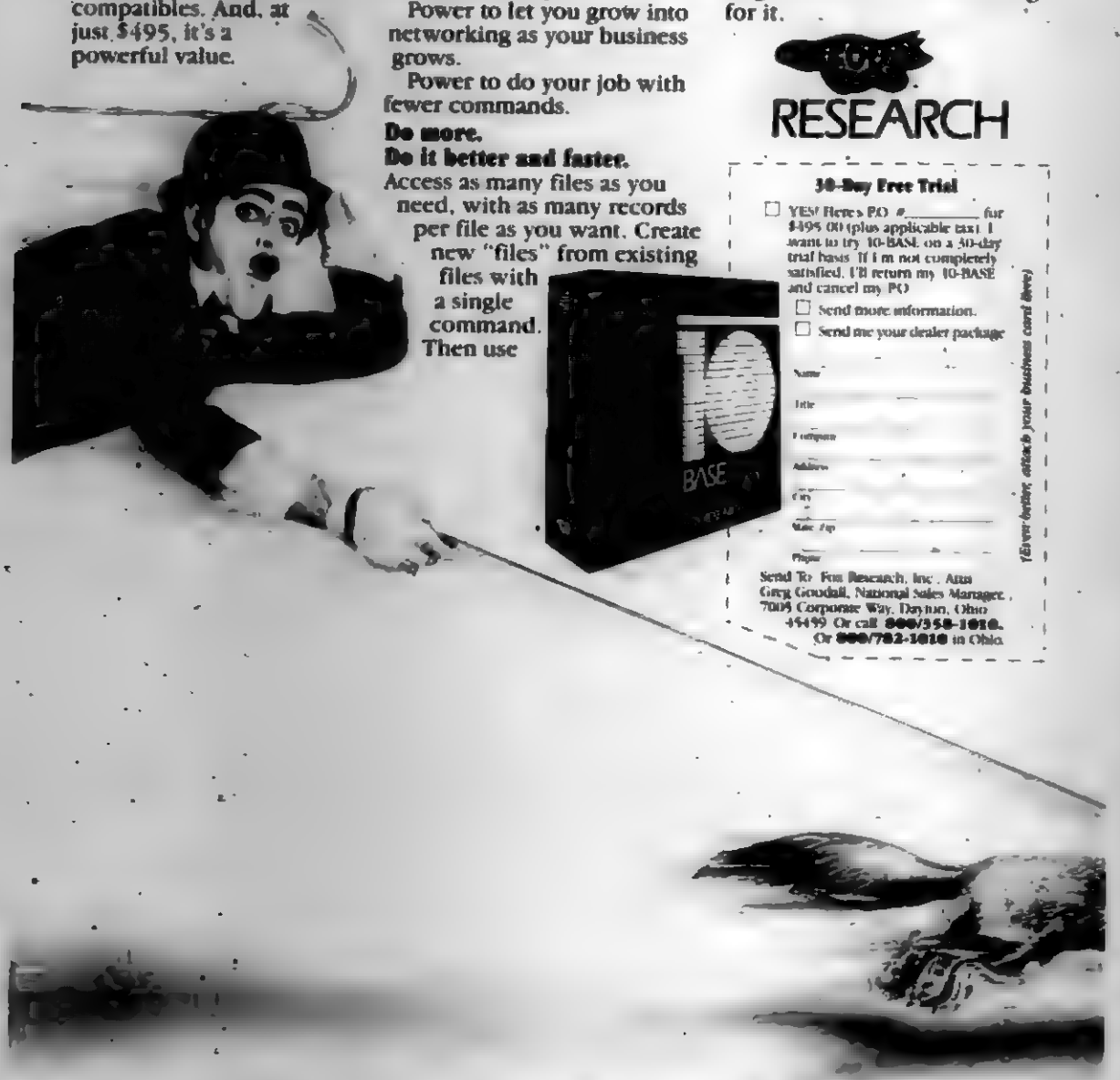

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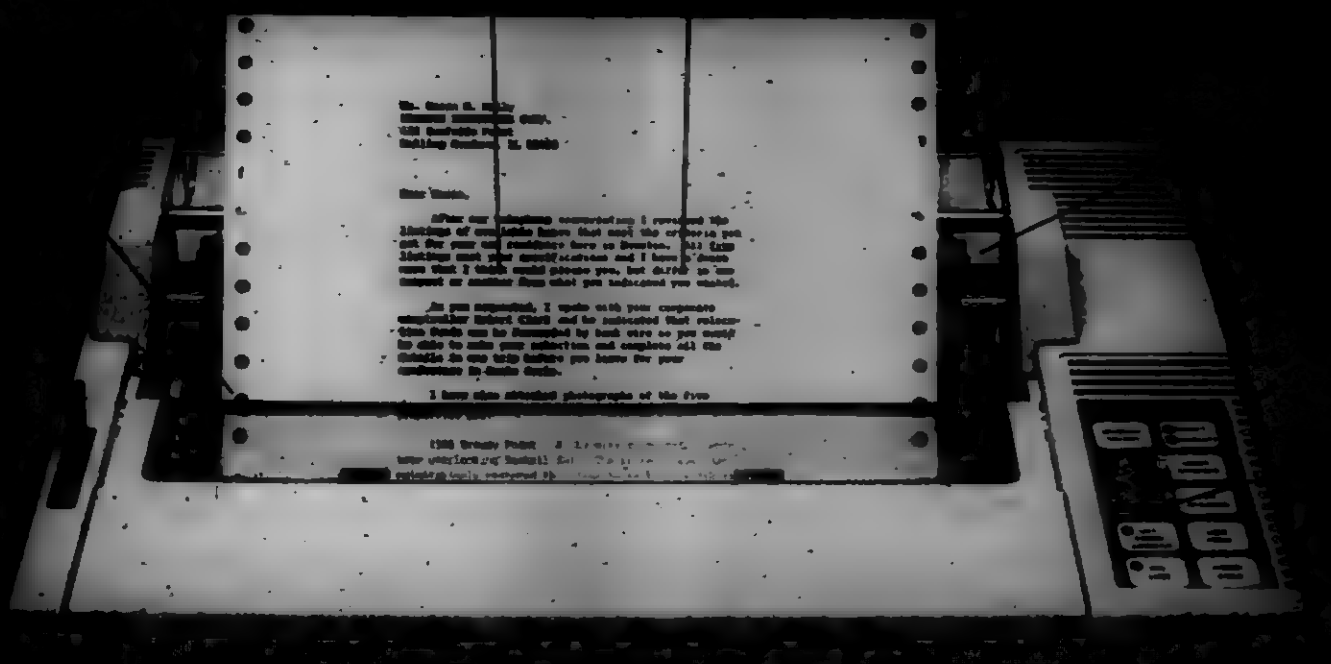

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From Value-Added Remarketer

Dun & Bradstreet Micro Based on IBM XT

WILTON, Conn. — Dun & Bradstreet Corp. has announced the Dunsplus, an IBM Personal Computer XT-based microcomputer, which is equipped with a variety of software products.

Operating as a value-added remarketer of IBM hardware, Dun & Bradstreet is offering Dunsplus with 256K bytes of random-access memory, expandable to 640K bytes. In addition, 40K bytes of permanent read-only memory (ROM) are included. The ROM contains the Basic language, the vendor said.

The system includes one 5¼-in. 10M-byte fixed disk drive; an Intel Corp. 16-bit 8088 microprocessor; three expansion slots; a built-in asynchronous adapter; and a 300- to 1,200 bit/sec modem. The system is also reportedly equipped with an 83-key keyboard and a 6-ft extension cable.

Dunsplus comes equipped with several commercially available programs, including Lotus Development Corp.'s 1-2-3 spreadsheet package and Softword Systems, Inc.'s Multimate word processing software. The system also contains proprietary software that provides a series of menus and preformatted screens which reportedly make the system easier to use.

In addition, Dun & Bradstreet has included a proprietary electronic mail package, a file maintenance package and the capability for users to customize their own systems by adding either purchased or specially developed software. Users of the system can integrate data obtained from other software packages or from a variety of subscription-based network services, the vendor said.

The Dunsplus system can communicate with IBM mainframes in one of three emulation modes. The unit can emulate an IBM 3270 terminal, an IBM 3101 terminal or a Binary Synchronous Communications terminal under IBM's Systems Network Architecture/Synchronous Data Link Control. In addition, the Dunsplus can act as a remote job entry terminal for an IBM mainframe, a spokesman said.

Like the Personal Computer XT, the Dunsplus system uses IBM's PC-DOS Release 2.0 operating system. Furthermore, all programs written for the XT will run on the Dunsplus system, the vendor said.

Included in the $10,200 purchase price of the Dunsplus is a two-day training course. The course was developed for Dun & Bradstreet by National Trading Systems of Los Angeles.

The Dunsplus system will be available in the first quarter of 1984, Dun & Bradstreet said from 187 Danbury Road, Wilton, Conn. 06897.

Micros or CRTs: Which Is Best For Business?

(Continued from Page 83)

Certainly, there were the "beard and sneakers boys," as the programming staff has been referred to by more than one user, but the majority of businessmen were not even aware of the existence of micros. Businessmen who were using data processing equipment were invariably using CRT terminals tied to large, expensive, difficult-to-use mainframe computers.

It is possible to claim that micros did not become popular until the introduction of Visicorp's Visicalc. This spreadsheet application made micros appealing to businessmen who formerly had to act out "what if" scenarios with paper, pencil, eraser, typewriter and copying machine.

The practical necessity before Visicalc was to try to get a projection right the first time, whether you were doing a financial forecast, a budget, a salary projection and so on. In the past, it was a terrible inconvenience to redo any analysis that required a spreadsheet. The post-Visicalc spreadsheet software has removed that inconvenience. Businessmen can afford to be creative, to plan and to schedule resources because of the development and effectiveness of these new tools.

Good software tools for spreadsheets and word processing are also comparatively new. Some of the micro hardware and software products are just entering the second generation. In contrast, mainframe hardware is already in the fourth generation.

The desirable trend is definitely toward integrated software to complement the integrated hardware mentioned previously. Integration of software means that users are able to perform a business function and convert the data resulting from that function to be the input for yet another function. All this can be done in a relatively easy manner. An example is the conversion of a sales forecast into a bar chart or the insertion of an income statement from a spreadsheet into a business proposal.

Butler is an account manager at Duquesne Systems, Inc. in Pittsburgh, Pa.

Apollo recognizes the fact that there are two sides to every professional.

There's a part of a professional that involves their profession.

Then there's the part that goes to meetings, makes presentations, does budget, prepares

Tempest Version of Wang Micro Introduced

LOWELL, Mass. — Wang Laboratories, Inc. has introduced Tempest, a version of the Wang Professional Computer.

The 75PC-T Professional Computer can be used both as a stand-alone microcomputer and as a workstation on Wang's Tempest-accredited 7500T series of multiuser Office Information Systems and Alliance Systems.

According to the vendor, the Tempest expands the scope of protected information processing by providing integrated office automation functions with system security. The unit was designed to meet computing requirements while ensuring system security, the vendor said.

Based on the 16-bit Intel Corp. 8086 microprocessor, the Tempest includes a low-profile, detachable keyboard; a monochrome display monitor; and an electronics unit.

Primary features include Microsoft, Inc.'s MS-DOS operating system; a CPU with eight expansion slots for option cards; a 5¼-in. dual-sided, double-density diskette drive capable of storing 360K bytes of data; RS-232/MIL-STD-188C and MIL-188-114-compatible asynchronous serial interface ports; a character-resolution card; direct memory access; a programmable system clock; a detachable, 101-key keyboard with 16 programmable function keys, numeric keypad, cursor control keys and a Help key; Interpretive Basic; and two self-diagnostic testing systems, according to the vendor.

Options include memory expansion cards; dual 360K-byte diskette drives; a graphics-display card; a local communications option; a monitor arm; Basic, Cobol, Fortran and Pascal compilers; and UCSD P-system, VT-100 and CP/M 80 emulation capabilities.

The emulation options also allow the system to collect and transfer data through an asynchronous communications option that provides the teletypewriter protocol. The 75PC-T can emulate a standard teletypewriter or other teletype asynchronous devices to communicate interactively with a variety of systems and to retrieve data from host systems and information systems.

The Tempest supports the same software packages available with the Wang Professional Computer, including Wang Professional Computer Word Processing, Professional Computer Multiplan, Level II Cobol, Professional Computer Graphics, Notebook and Data Base and a variety of personal computer software.

The diskette drives can also read single-sided, double-density diskettes formatted using MS-DOS and 5¼-in. diskettes formatted using IBM's PC-DOS.

The Tempest supports non-Wang printers through the use of generic printer device drivers. To preserve system integrity, Wang is recommending the use of Tempest-accredited output devices listed on the federal government's preferred products list.

The Tempest is offered in two configurations to meet specific user requirements. The 75PC-01T model includes a single 5¼-in., double-sided, dual density diskette drive capable of storing 360K bytes of data, while the 75PC-02T is equipped with dual 360K-byte diskette drives.

Both models will be available in April. The Wang 75PC-01T Professional Computer is priced at $4,900; the 75PC-02T is $5,585. Wang is located at One Industrial Ave., Lowell, Mass. 01851.

According to recent reports, people who work with computers spend some 30% of their day working in their chosen profession. And 70% of their day just getting things done.

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All of which should come as a very welcome development to every professional. Because we at Apollo are not simply making computers. We're making workstations that work for professionals.

For more information call or write Marketing Services Director, Dept. J1, Apollo Computer, 15 Elizabeth Drive, Chelmsford, Massachusetts 01824 (617) 256-6600, ext. 6608.

apollo

*VAX is a trademark of Digital Equipment Corporation.

SD Processor Announced For IEEE Bus

DALLAS — SD Systems, Inc. has introduced the SBC-300 single-board processor for the IEEE 696 (S-100) bus.

The SBC-300 is a self-contained microcomputer system designed around the Zilog, Inc. Z80 family of microprocessors. Control, CPU, memory and I/O facilities are contained on a single circuit board complying with the IEEE 696 standard.

According to the vendor, the SBC-300 is able to perform as either the IEEE 696 permanent bus master or as one of the slave processors on the bus to support multiuser, multiprocessor applications.

The SBC-300 is available in two versions, a 4 MHz version utilizing the Zilog Z80A CPU and a 6 MHz version employing Zilog's Z80B CPU. The system supplies 64K bytes of on-board, dual-ported, parity-checked memory, the vendor said.

I/O functions include two full-duplex serial ports and a port with an 8-bit bidirectional data bus that may be user-configured to drive printers, Winchester drives or streaming tape drives. All I/O drivers are on board, eliminating the need to purchase additional I/O personality boards, the vendor said.

Additional features include three 16-bit counter/timers, 2K- to 16K-byte-wide programmable read-only memory chips and software-programmable communications options, according to the vendor.

The SBC-300 is offered at a retail price of $741 for the 4 MHz version and $825 for the 6 MHz version. SD Systems can be reached through P.O. Box 28810, Dallas, Texas 75228.

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Micro Users Get Pen Plotter

SAN DIEGO — Enter Computer, Inc. has announced the Sweet-P Model 600, a six-pen plotter for users of Apple Computer, Inc., IBM and other microcomputers capable of running Digital Research, Inc.'s CP/M operating system.

Standard features of the Sweet-P Model 600 include a plotting speed of 14 in./sec, both RS-232 and parallel interfaces, 19 English and foreign language character sets and 2K bytes of buffer memory, the vendor said.

The unit was designed to operate with the firm's Sweet-P graphics language of Hewlett-Packard Co.'s Graphics Language, according to the vendor.

Users have a choice of 12 different pen colors, which can write on paper or acetate. The plotter can also use rapidograph-type drafting pens used in computer-aided design applications, the vendor said.

The plotter costs $1,095, Enter Computer said from 6867 Nancy Ridge Drive, San Diego, Calif. 92121.

Streaming Tape Drive Fits CDC's FSD Disk Drive

DUARTE, Calif. — Megatape Corp. has announced the MT-1220, a half-wide 330M-byte streaming tape drive with an 8.5 in. by 10.2-in. panel footprint compatible with Control Data Corp.'s 9715 FSD disk drive.

The MT-1220 has a book-size data cartridge and operates in a 50 or 200 in./sec. streaming mode or a 50 in./sec. start-stop mode. Operating at 200 in./sec., the unit is capable of backing up a 300M-byte disk in 24 minutes, according to the vendor.

A 24-track, bit-serial, serpentine format is employed in the drive along with a packing density of 9,600 bit/in.

The unit costs $4,950 for the drive and $100 per cartridge.

Further information is available from Megatape through P.O. Box 317, 1041 Hamilton Road, Duarte, Calif. 91010.

Storage Unit Out for IBM Micro

MOUNTAIN VIEW, Calif. — Storex Corp. has announced the SX410, a 5¼-in. mass storage subsystem for the IBM Personal Computer.

Incorporating Memorex Corp.'s Minimark rigid disk cartridge, the unit features a formatted storage capacity with 5M bytes of removable and 5M bytes of fixed media storage, the vendor said.

The SX410 uses cartridge diskettes, which are sealed against contamination until locked into the disk drive. The mass storage subsystem features a 40-msec average access time, the vendor said.

The SX410 costs $3,995, the vendor said from Building E, 999 Independence Ave., Mountain View, Calif. 94043.

Dylon Unveils Tape Drive Line For HP Users

SAN DIEGO — Dylon, Inc. has introduced the Series Seven line of tape drives for data collection, storage, archiving, information interchange and laser disk back-up applications.

The units use group-code-recording method to provide up to 180M bytes of data on a single 2,400-ft reel of standard ½-in. tape.

The 6250 char./in. data density also improves data transfer rates to and from the tape-system, according to the vendor.

Series Seven systems are intended for use with Hewlett-Packard Co. processors and are compatible with most HP 1000, HP 3000 and HP 9000 systems.

Operation through a standard HPIB interface allows compatibility with existing system hardware and software.

According to the vendor, the Series Seven costs approximately $28,000.

Distributor and volume discounts are available.

Dylon is located at 29561 Ridgehaven Court, San Diego, Calif. 92123.

Conditioner Provides Power During Outage

SAN DIEGO — Exlin Power Conditioning Co. has developed a line conditioner said to provide protection from power line disturbances.

The Model EX 500P uses a ferroresonant regulator design to provide line isolation, regulation and noise suppression in a portable enclosure suitable for the office environment. It maintains essentially constant output voltage when input line voltage varies, the vendor said.

Operable output levels are provided even when power line voltage falls to brownout levels. Also, short circuit fault currents are limited to 200% of rated output with no damage. Recovery is immediate upon removal of the short, the vendor said.

The EX 500P costs $375. Exlin can be reached at 4888 Ronson Court, P.O. Box 17841, San Diego, Calif. 92117.

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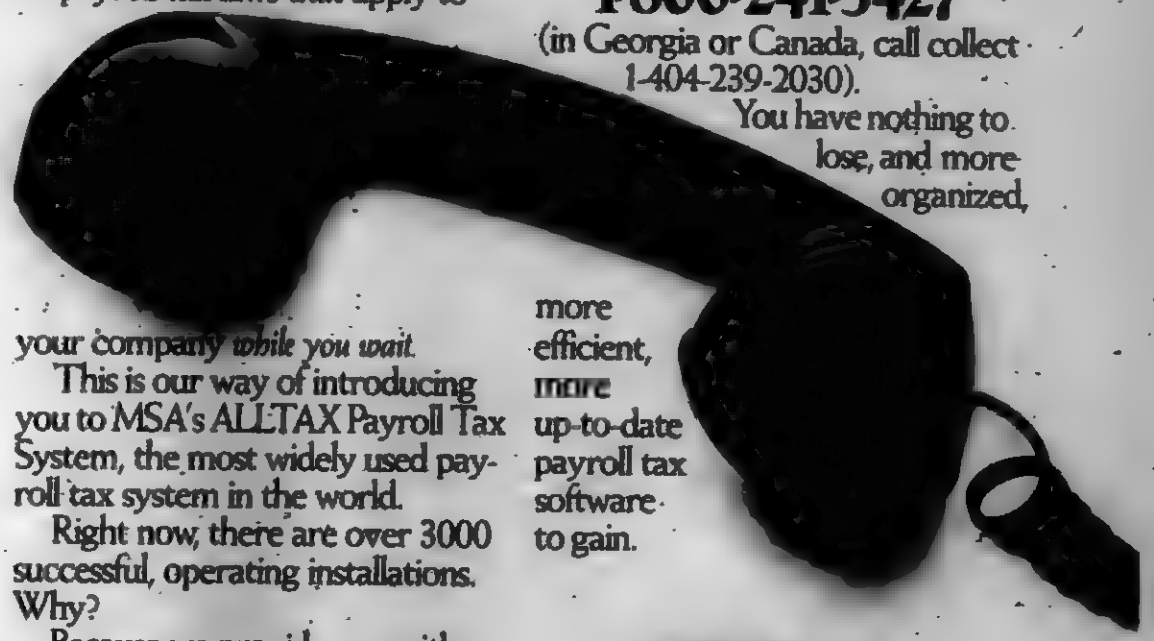

MSA
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UCP Extends Line Modules With USM-1 Synthesizer

IRVINE, Calif. — Universal Computer Products (UCP) has added a speech and sound synthesizer to its line modules compatible with the IBM Personal Computer and Personal Computer XT expansion boards.

The USM-1 Universal Speech and Sound Synthesizer is said to provide the IBM microcomputers with speech, music and I/O capability. The system includes two parallel ports, an IBM-compatible game port and a clock calendar.

The software package provided is a menu-driven interactive program controlling speech and music synthesis.

The synthesizer is list-priced at $445 from Universal Computer Products, located at 17482 Jordan St., Irvine, Calif. 92715.

UPS Unveiled for Small Systems

SAN DIEGO — Topaz, Inc. has announced the availability of the Source 2 Uninterruptible Power Supply (UPS) for protecting word processors, point-of-sale terminals and other small, computer-based equipment against power outages.

The systems are said to provide up to 60 minutes of steady ac power to enable critical equipment to continue to operate even during blackouts. Output is a sine wave that matches the waveshape of commercial power. Each Source 2 UPS consists of a battery, battery charger, sine wave inverter, power monitor and high-speed transfer switch.

Source 2 UPSs are available in power ratings of 200 Vac and 400 Vac and in 50Hz and 60Hz models. All models are portable and fit standard 120V outlets. Prices start at $800.

Topaz is located at 9192 Topaz Way, San Diego, Calif. 92123.

Streaming Tape Drive Offers Varied Tape Reel Capabilities

CERRITOS, Calif. — Rosscomp Corp. has announced the D5160, a ¼-in. streaming-tape drive that offers 40M-, 80M- or 160M-byte tape reels operating in a 5.25-in. package.

Designed to provide backup for Winchester disk drives, file restructuring, on-line memory expansion, data exchange, data security and archival storage, the D5160 supports the basic ¼-in. tape drive and QIC-02 and Sasi interface standards. A 9-track interface board is also available, making the product plug-compatible with Pertec Computer Corp.'s 9-track devices, the vendor said.

The D5160 supports either 90- or 130-in./sec tape speeds, allowing transfer rates of 90- or 130K byte/sec, respectively.

In addition, the tape drive can be configured with one of three single board subsystem controllers which facilitate communications between a host processor with a Sasi interface and disk drives with either the Q2000, SA1000 or SMD interfaces, Rosscomp said.

Other standard features include self-threading, environmentally self-protecting 4-in. reels; a two-channel read/write head; 24-track, serpentine track format; 8,000 bit/in. recording density; and streaming, NRZI or group-code recording-method support, the vendor said.

Single-quantity price for the D5160 tape drive is $995 with OEM discounts available. Rosscomp is located at 16643 Valley View Ave., Cerritos, Calif. 90701.

Firm Targets Disk Drive At IBM Micros

PRINCETON, N.J. — Floppy Disk Services, Inc. recently announced an 8-in., double-sided disk drive that reportedly provides 2.5M bytes of on-line memory to users of IBM's Personal Computers.

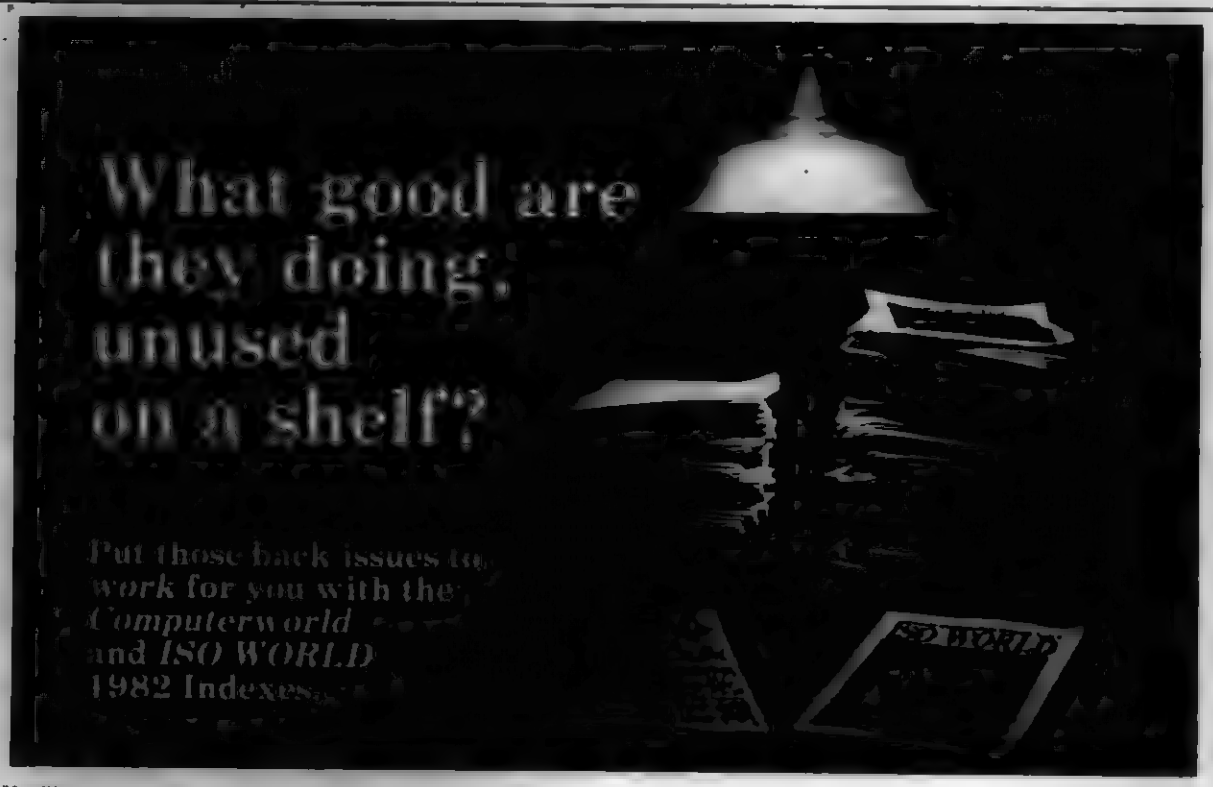
The FD-PC8 is available in single- and dual-disk configurations and is designed to be visually compatible with IBM's Personal Computers.

The drives are half-height and use a motor that runs only when selected, according to a company spokesman.

The drives cost $1,495 for dual-disk configuration and $1,095 for a single configuration. Both units require a controller card.

Floppy Disk Services is located at 741 Alexander Road, Princeton, N.J. 08540.

'Sure It's Smart, But Is It Happy?'



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Index	Heading	# Entries
CW	Local Area Nets	70
CW	Microcomputers	81
CW	Graphics Systems	138
CW	Accounting Systems	101
CW	Disk Equipment	126
ISO	Dealers/Distributors	64
ISO	IBM-PC	84
ISO	Floppy Disks	51
ISO	Modems	45
ISO	Retail Stores	53

And that's a sample of just this year. We also have Indexes for *Computerworld* that go all the way back to 1976 and Indexes for CBN back to the first — (Nov. 1978-Dec. 1979)

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Single-Board Processor Out From SDSystems for S-100

DALLAS — SDSystems, Inc. has announced the SBC-300 single-board processor for the IEEE-696 (S-100) bus.

It is said to be a high-performance, self-contained microcomputer system designed around the Zilog, Inc. Z80 family of microcomputers. Control, CPU, memory and extensive I/O facilities are all contained on a single circuit board that fully complies with the IEEE-696 standard, the vendor said. The SBC-300 is able to perform as either the IEEE-696 permanent bus master or as one of the slave processors on the bus to support multiuser, multiprocessor applications.

It is available in two versions: a 4-MHz version utilizing the Z80A CPU and a 6-MHz model employing the Z80B CPU. Also, 64K bytes of on-board, dual-ported, parity-checked memory is supplied, the vendor added. I/O functions include two full-duplex serial ports and a Shugart Associates, Inc. Standard Interface port with an 8-bit bidirectional data bus that may be user-configured to drive printers, Winchester drives or streaming tape drives.

It is offered at a suggested retail price of $741 for the 4-MHz version and $825 for the 6-MHz model. More information is available from SDSystems through P.O. Box 28810, Dallas, Texas 75228.

Smart Digital Plotter Offered

EVERETT, Wash. — The John Fluke Manufacturing Co. has introduced the 1771A Intelligent Digital Plotter designed for use with the Fluke 1720A and 1722A Instrument Controllers. The unit includes an applications software package programmed in Basic.

The product allows the user to plot interactive line graphs, bar graphs, histograms, pie charts and labels. The applications software contains an Automatic Plotter Driver that can be called by the user's program to plot and format data collected by the user's specific applications software, the vendor said.

The product also plots text via the Controller System Text Editor. Line patterns and point symbols can be varied, and pen color may be changed by the operator, according to the vendor.

The unit costs $1,995, John Fluke Manufacturing said, through P.O. Box C9090, Everett, Wash. 98206.

Disk Controller Said to Handle Four Drives

SAN DIEGO — Axis, Inc. recently announced a single-board floppy disk controller capable of simultaneously controlling up to four drives in various size and format combinations.

The LSB-7810 reportedly features programmable drive formats and motor control; single-sector, multiple-sector and multiple-track transfers; optional on-board direct-memory access controller; and jumper-selectable interrupts.

A company spokesman said the device simultaneously controls four disk drives in any size combination of 8-in., 5¼-in. and 3½-in. drives and any format combination of size, density and track. The optional DMA Controller reportedly will free up the host processor during disk transfers and provide full-vectored interrupt capability.

The controller costs $280 in single quantities, and the DMA option is priced at $35, according to the vendor. Axis is located at Suite 208, 7825 Engineer Road, San Diego, Calif. 92111.

Printer Interface From Microbits Out for Atari

ALBANY, Ore. — Microbits Peripheral Products (MPP) has announced a peripheral attachment for Atari Corp. computers.

The MPP-1150 Printer Interface reportedly works on all Atari computers and replaces the Atari 850 Interface Module. It connects to the serial bus on the computer and daisy chains with other Atari peripherals. The interface includes a 3-ft cable with Centronics, Inc.'s plug and carries a two-year warranty, the vendor said.

The MPP-1150 Printer Interface costs $99.95. Microbits Peripherals Products is located at 225 W. Third St., Albany, Ore. 97321.

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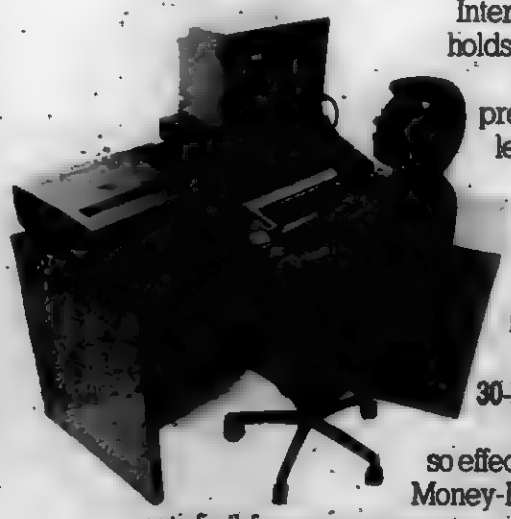

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Tape Drive Formatter Offers IBM Compatibility

HALESITE, N.Y. — The TDX Peripherals Division of Telebyte Technology, Inc. has announced a formatter for IBM-compatible, ½-in. magnetic tape drives.

Using a Signetics Corp. microprocessor and associated integrated circuits, the formatter provides Ansi-compatible operation for generation or reproduction of magnetic tapes.

The formatter has the capability of controlling up to eight tape drives in a daisy chain configuration, the vendor said.

The formatter is packaged on a single, 10½- by 15½-in. printed-circuit board, the vendor said.

The formatters cost $1,600 each. When coupled with the company's 75 in./sec tape drive, TDX 75 and RS-232 interface, the system sells for $8,400, according to the vendor.

Further information is available from TDX Peripherals Division, Telebyte Technology, 148 New York Ave., Halesite, N.Y. 11743.

National Semi Rolls Out 32-Bit Chip

SANTA CLARA, Calif. — National Semiconductor Corp. has announced the NS32032, a 32-bit monolithic microprocessor.

The NS32032 was designed for various applications including computer-aided design and manufacturing, graphics and industrial process control, the vendor said.

Currently, the NS32032 is available for $200 apiece in sample quantities of 100 or more, according to the vendor.

By 1986, the firm said, the units will cost beteen $20 and $60 each.

National Semiconductor is located at 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

Timex Micros Get Devices For Home Use

BOSTON — Intercomputer, Inc. recently announced two devices designed to provide home-use applications for Timex Computer Corp.'s Timex/Sinclair microcomputers.

According to the company, Intercontroller is programmed with Basic commands to control four standard socket outlets into which home electrical devices may be plugged.

Softbox is a multiuse expansion port providing four software-selectable slots to be used with program cartridges and Intercontrollers.

The Intercontroller is priced at $99.95, and Softbox is priced at $59.95. Intercomputer is located at 358 Chestnut Hill Ave., Boston, Mass. 02146.

Adds Winchester Backup Storage

Subsystem Unveiled for LSI-11

ANAHEIM, Calif. — Computer Storage Technology, Inc. recently announced a streaming-tape subsystem that provides users of Digital Equipment Corp.'s LSI-11 processors with up to 55M bytes of backup storage for large capacity Winchester disk drives.

The CS-300 is comprised of a single-board peripheral processor occupying one slot in the LSI-11 chassis or I/O expansion cabinet and a ¼-in. cartridge tape streamer, along with a ¼-in. tape cartridge.

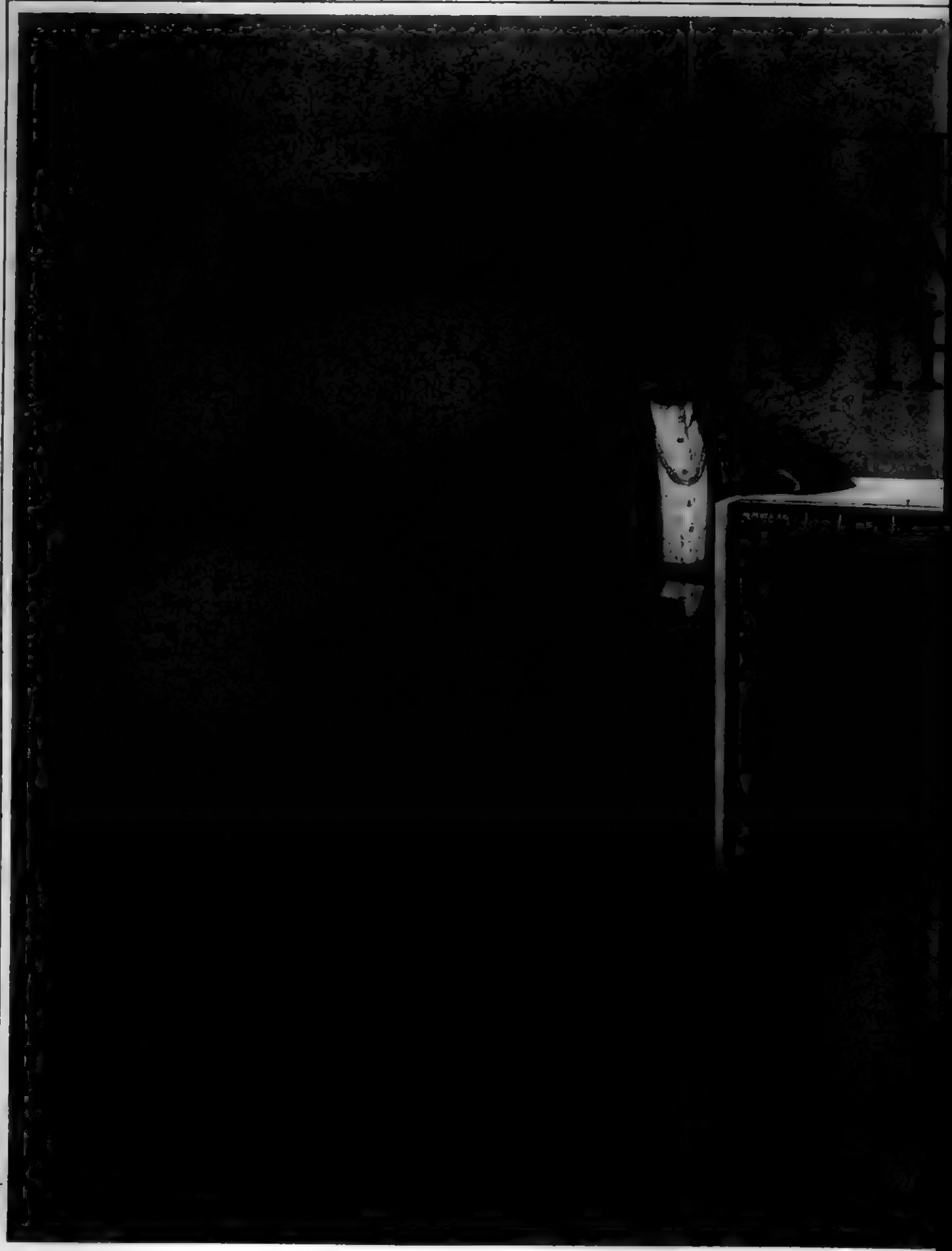
The unit can be configured in two models, the 20M-byte CS-320 and the 45M-byte CS-345, the vendor said.

The latter unit can be expanded to 55M bytes.

Data transfer rates in both configurations may be sustained at 90K byte/sec, with tape utilization of approximately 97%, according to a company spokesman.

Price for a single subsystem is $4,970, and delivery is 60 days after receipt of order, the vendor said.

Computer Storage Technology is located at 1369 S. State College Blvd., Anaheim, Calif. 92806.



Board Ties Drives to Apple Micros

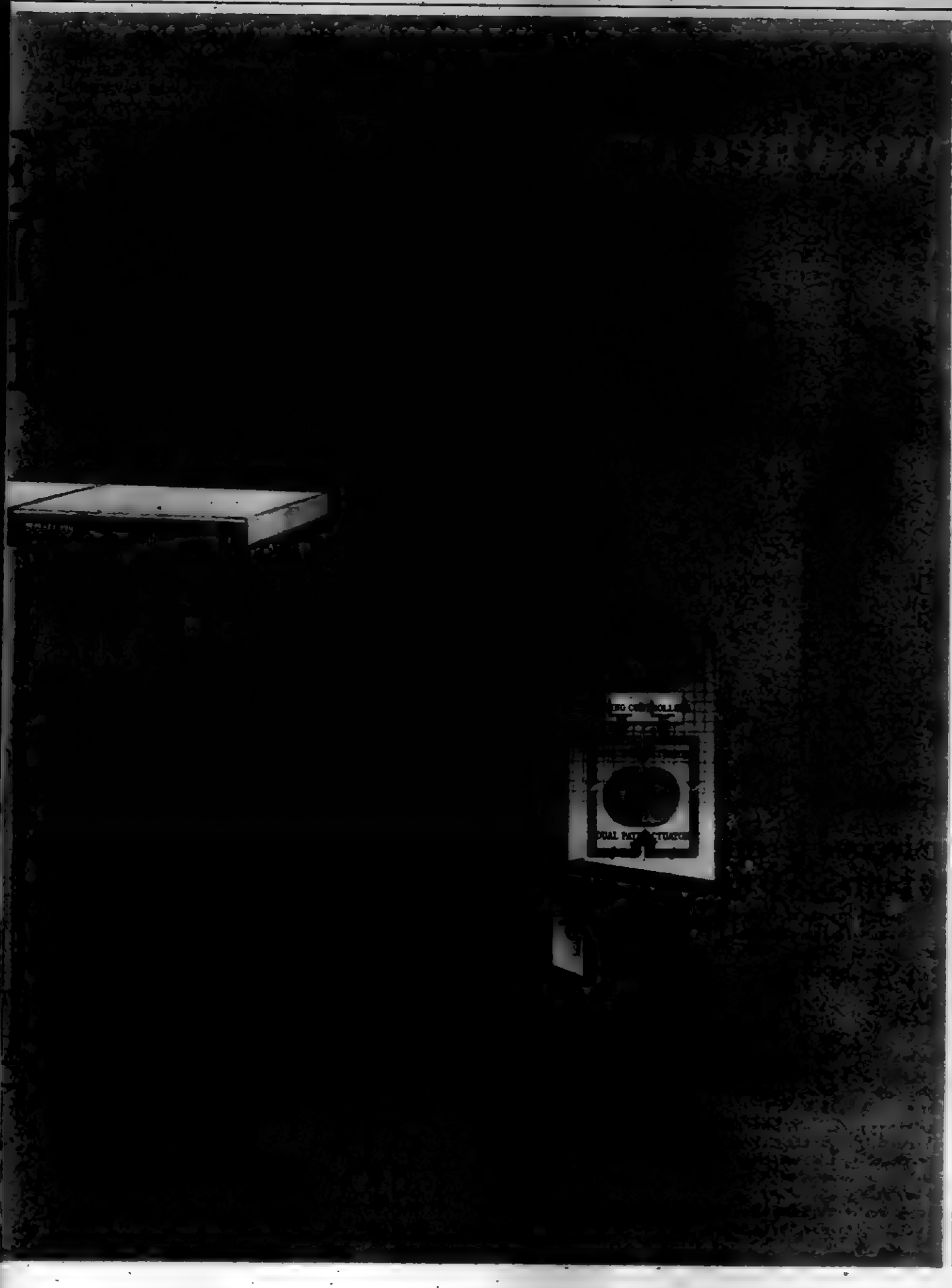
BROWNSBORO, Ala. — Data-Cue, Inc. has unveiled a disk controller board said to allow users to connect two 8-in. or two 3½-in. double-density disk drives to the Apple Computer, Inc. Apple II and compatible microcomputers.

Using Diskmaster II, the Apple II reportedly will support single- and double-sided 8-in. drives such as the Shugart Associates, Inc. 801/851 series. It also supports Shugart-compatible drives.

The board contains integrated read-only and random-access memory and standard utilities. Among these utilities is a Filer, which can be used to transfer files from drive to drive, the vendor said.

The unit includes software drivers to run under DOS 3.3, Pascal 1.1 and Microsoft, Inc.'s Microsoft CP/M. The Diskmaster II will also read and write standard Digital Research, Inc. CP/M and 3740-compatible disks.

Also included in the package are installation and integration instructions. The unit costs $265 from Data-Cue, 5696 Highway, 431 South, Brownsboro, Ala. 35741.



Starflow Announces Drafting System Based on PDP-11

CINCINNATI — Starflow Engineering, Inc. has announced the System Type 2, a computer-aided drafting system.

Based on Digital Equipment Corp.'s PDP-11 minicomputer, the System Type 2 offers 256K bytes of main memory and dual floppy double-density disk drives. A 10M-byte hard disk drive is also included. The system uses the firm's real-time operating system, according to the vendor.

The System Type 2 offers four I/O ports and four user terminals. The applications software is included, and the unit can be programmed in Basic, Fortran, Pascal or assembler languages, the vendor said.

Each intelligent color terminal has a 13-in. screen and offers eight colors from a palette of 64. The workstations have detached keyboards with numeric pads, the vendor said.

Included with the system is a six-pen plotter that offers multiple line widths and col-

The System Type 2 costs $40,000. Additional information is available from Starflow Engineering at 4740A Interstate Drive, Cincinnati, Ohio 45246.

System/38 Gets Service From MAI

FRAZER, Pa. — The Sorbus Service Division of Management Assistance, Inc. (MAI) has introduced remedial and preventive maintenance service for the IBM System/38 and compatible peripherals.

The service offers System/38 users 24-hour, seven-day-a-week servicing and mixed-vendor problem determination, Sorbus said.

Service fees range from approximately $300 to $700 per month.

Further information is available from Sorbus Service Division/MAI, 50 E. Swedesford Road, Frazer, Pa. 19355.

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SMD Disk Controllers Unveiled for DEC Minis

ORANGE, Calif. — MDB Systems, Inc. has introduced two quad-size, storage modular device (SMD) disk controllers for Digital Equipment Corp. PDP-11 Unibus and VAX-11 computers.

Each disk controller is said to be a quad-size board that interfaces two physical disk drives (up to four logical units) to the PDP-11 Unibus. One controller, designated MDB-RM11-Q (quad-size), reportedly emulates DEC's RM02, RM03 and RM05, and the second controller, designated MDB-RK11-Q, emulates RK06 and RK07 disk drives. Either controller can simultaneously mix emulation modes within the same family, the vendor said.

Completely software-transparent to all DEC operating systems, plus Unix and TSX (no patches required), the controllers reportedly offer capability up to 56M bytes (RK11) or 512M bytes (RM11) per formatted device. Also, the controllers have a true SMD interface using standard SMD drivers and receivers, thereby allowing placement of disk drives up to 50 feet from the computer.

In addition, the controllers incorporate true DEC 32-bit Error Correction Codes, Header Error Control and media-defect flagging to allow interchangeability of disk packs between DEC RM drives and add-on drives. A multiple-sector, bipolar, random-access memory buffer reportedly eliminates "date late" errors. A direct-memory-access automatic throttle permits user selection of data transfer bursts from one to 16 words, the vendor said.

The 2091 bit-slice, microprocessor-controlled module is said to support dual disk access capability and overlapped searches.

The controllers are priced at $3,200 for the MDB-RM11 and $2,800 for the MDB-RK11. MDB Systems is located at 1995 N. Batavia St., Orange, Calif. 92665.

Micro Fits Peripherals From Others

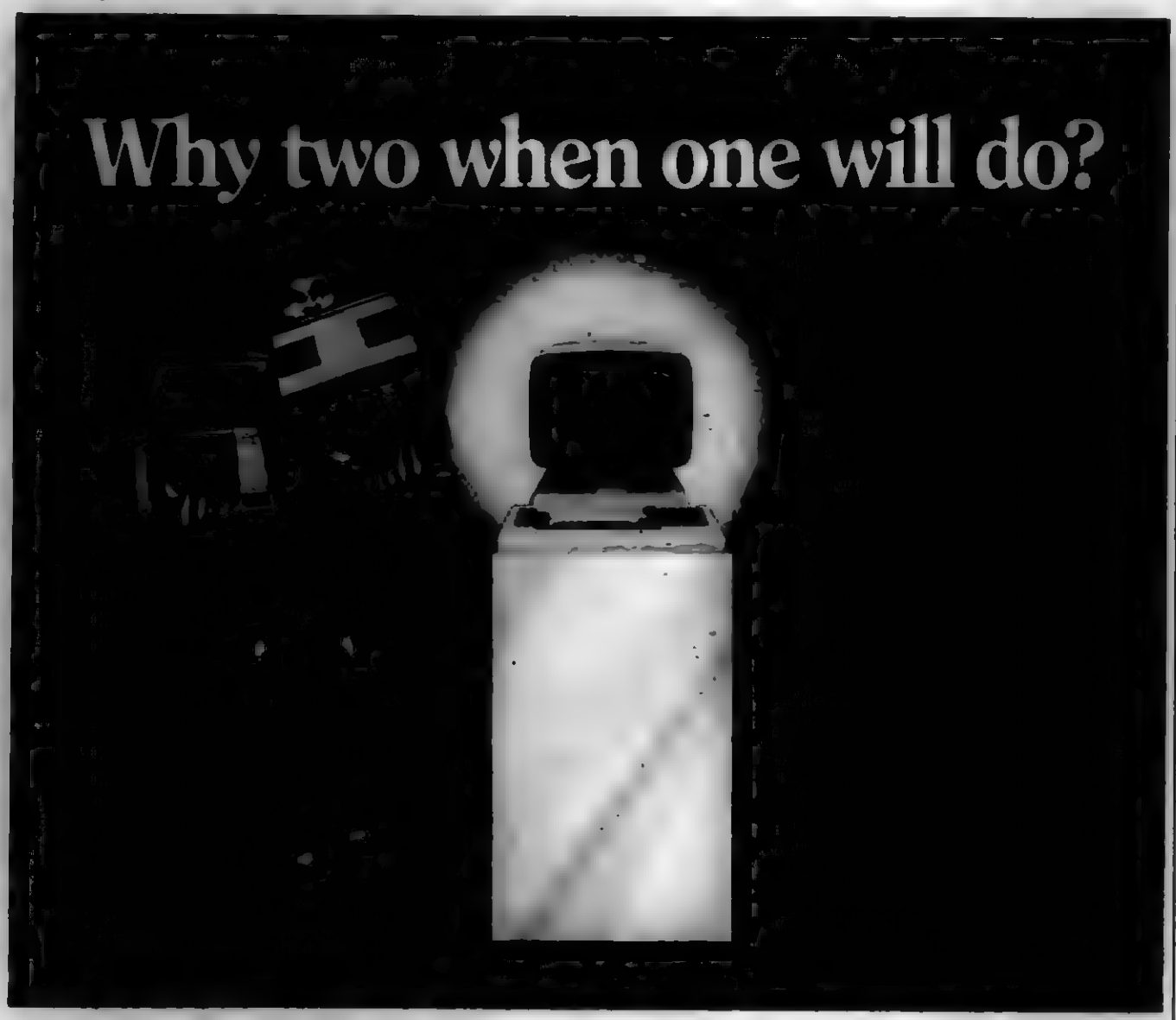
SAN JOSE, Calif. — Onyx Systems, Inc. has announced an Intel Corp. 80186-based, multiuser, 16-bit microcomputer said to support peripherals from other manufacturers.

The Onyx 186 series initially will be available with Digital Research, Inc.'s Concurrent CP/M 86; Phase One Systems, Inc.'s Oasis-16; or Science Management Corp.'s Thoroughbred/OS for multiple users, and Microsoft, Inc.'s MS-DOS for a single user. It reportedly has six serial ports for any combination of terminals, printers or modems; one parallel printer port; and two ports for disk and tape expansion.

A basic configuration includes an ergonomically designed desktop unit with a display terminal, a 256K-byte random-access memory (RAM) and a 1M-byte, 5¼-in. floppy disk drive. The system can be expanded to include up to 512K bytes of RAM, the vendor said. Also, an expansion cabinet can be fully integrated into the system to house an add-on Winchester and ¼-in. tape cartridge for backup.

The video display terminal included with the system is also a new product developed by Onyx. The Onyx terminal features a 14-in., nonglare blue or green phosphor screen; tilt-and-swivel monitor; a detachable keyboard with 104 sculptured keys, numeric keypad and cursor-control keypad; 28 function keys; and a 256 Ascii character set with business graphics, the vendor said.

It is available for delivery in March and has a suggested retail price beginning at $4,495 for a complete desktop workstation. Onyx Systems is located at 25 E. Trimble Road, San Jose, Calif. 95131.



Lee Data's universal terminal system design provides access to both 3270 and VT100 applications.

Now with Lee Data's new 3270/Async Communication System (Series 400) you can eliminate the cost and inconvenience of needing separate displays for access to 3270 and VT100 applications.

The Lee Data universal terminal system approach is another innovative Lee Data design that allows a single Lee Data display to access applications and data from an IBM CPU, a non-IBM system such as DEC, H-P or Prime, and timesharing services. And a simple command entered from the display keyboard is all that is required to switch from 3270 to VT100 operating mode and back again. What could be easier?

The Series 400 System incorporates a new hybrid approach to system operation that is simpler and more efficient than protocol conversion. This approach allows a Lee Data controller to provide dedicated 3270 and VT100 processors for concurrent, but independent application access.

In addition, a single Lee Data controller provides you 3270 compatibility via either a remote BSC or SNA/SDLC or a local SNA or non-SNA interface, as well as 1 to 16 RS232C ports for your asynchronous application needs. Line speeds available are from 300 to 19,200 BPS.

The Series 400 System also provides you support for up to 32 devices, including Lee Data's unique All-In-One display that offers dynamic selection of 4 screen sizes—three 80-column and one 132-column. Lee Data's 3279-compatible color displays and a full line of printers are also available as part of the 32-device complement.

3270 and VT100 capabilities combined in a single terminal system—a reality with the new 3270-plus-Async system from Lee Data.

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OA Package Out For 16-Bit Micros Running Unix

SAN JOSE, Calif. — Onyx Systems, Inc. recently announced an office automation integrated software package for 16-bit microcomputers running under the Unix operating system.

The package, Onyx Office, combines word processing, electronic spreadsheet and relational data base management. Available as options are a development system and an electronic mail package. All applications are reportedly tied together under a runtime menu system.

The package will be available in December and will be bundled free with all Onyx Systems' Unix-based microcomputers. Current users of Onyx systems will be able to purchase the package for a suggested retail price of $4,995. Onyx Systems is located at 25 E. Trimble Road, San Jose, Calif. 95131.

AV Instruction Set Bows for WP Users

ATLANTA — R. Lawrence Ltd. has announced audiovisual instructional modules for IBM's Displaywriter, Wang Laboratories, Inc.'s OIS/WPS/VS and Xerox Corp.'s 860 word processing systems.

The modules consist of an audiovisual presentation (slides and cassette tapes compatible with widely available projector/player units) and learner's manual. Each presentation requires 10 to 15 minutes of training time, according to the vendor.

Weekly rental fees are $300, and the purchase price is $1,800. Further information is available from R. Lawrence, 6065 Roswell Road N.E., Atlanta, Ga. 30328.

Growing Relevance Found For Office Systems in MIS

FRAMINGHAM, Mass. — As management information systems (MIS) managers continue to distribute processing power to the end user, the issue of office automation becomes more relevant.

This according to a study conducted here recently by the International Data Corp. (IDC). Titled "Office Automation Software in Large Systems Environments," it evaluated the "size, growth and opportunities available to vendors serving markets that have opened up due to challenges posed to the industry by end-user computing."

By the end of 1987, the study estimates, there will be 26,000 multifunction systems (which provide more than just word processing) installed across the U.S., representing an increase of 106% compounded annually over the next five years.

According to the study, there were more than 200,000 users of computer-based message systems (CBMS) in 1982, and by 1987, that number should reach over three million.

"Office automation continues to develop away from the enhancement of discrete tasks like text preparation and toward providing integrated information processing systems for the full range of office activities," the study noted.

Multifunction Systems

"The term multifunction is being used to describe more and more office systems. User demand for easy-to-use systems that offer word and data processing and are linked together in an integrated communications network have galvanized a number of vendors who seek a foothold in the unfolding market for office automation," it said.

'Office automation continues to develop away from the enhancement of discrete tasks like text preparation and toward providing integrated information processing systems for the full range of office activities.' — International Data Corp. study.

According to the study, few of the word processors installed to date support features that are "genuinely multifunctional," although the study expects that by 1987, some 80% of the installed base will be capable of performing tasks such as electronic mail, records management, spreadsheet analysis and graphics, all of which are generally held to be multifunctional.

According to the study, the integration of word and data processing is being driven by the following major forces and potential benefits:

- A dramatic price decline in equipment and technology.
- The proliferation of intelligent microcomputers throughout the business organization.
- The availability and integration of new software programs that make it easier to attract and train end users while reducing maintenance and upgrading costs.
- The increased importance of data base access.

As for the integration of CBMS capabilities into multifunction systems, the IDC study suggests that these systems are "just one of the many technologies that fall into a broad-based category that we call electronic mail."

Messaging Services Growing

According to the study, a growing numer of vendors are providing large-scale messaging services to large companies. These include time-sharing companies, service bureaus and specialized common carriers that offer CBMS services as a part of a large product mix: MCI Communications Corp., Satellite Business Systems, value-added networks such as Tymnet and Telenet and telephone companies.

Of 197 users surveyed in the IDC study, 40% of the respondents indicated that they used CBMS. Of paramount concern to CBMS users was the price of a messaging package, followed closely by training requirements.

The study costs $3,000 from IDC at 5 Speen St., Framingham, Mass. 01701.

AMT Desktop Dot Matrix Printer Boasts Daisywheel Print Quality

NEWBURY PARK, Calif. — Advanced Matrix Technology, Inc. (AMT) has introduced a desktop dot matrix printer designed to eliminate the need for hard-copy output devices for the word processing, spreadsheet, graphics, general accounting and overhead transparency generated in the automated office.

The AMT Office Printer offers business users the print quality and flexible paper-handling capabilities of a daisywheel printer, with the speed, multiple-font support and reliable performance characteristics of a dot matrix device, a vendor spokesman said.

The printer can also support multiple fonts," which can instantly be changed from one to another or from alphanumerics to graphics. Using the optional multicolor ribbon cartridge, business documents such as spreadsheets can be illustrated with high-resolution color graphics images. The printer also produces overhead transparencies.

Priced at $3,195, the printer is available immediately. Advanced Matrix Technology is located at 1157 Tourmaline Drive, Newbury Park, Calif. 91320.

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3. Low-profile sculptured keyboard – meets European standards.

4. Editing capabilities not available with DEC VT 102.

5. Legible 132 column format.

PRODUCT SPECIFICATION

Terminal Type

Will replace DEC VT 100, VT 101, VT 102 & VT 131

Ergonomic Characteristics

Tilt, Swivel
Detached low-profile (DIN) keyboard
High contrast green phosphor
Non-reflective surfaces
Non-volatile set-up

Display

High resolution 14" CRT standard
24 x 80 or 132 column/format
Viewing area - (14 inch monitor) 9.09" (23.0 cm) wide by 6.8" (16.3 cm) high
Character size - 80 column - .086" (2.24mm) by .204" (5.18mm) wide by .204" (5.18mm) high
128 unique symbols - 94 alpha-numerics, 32 graphics symbols
7 x 10 matrix with 2 lower case descenders in 9 x 12 window
Selectable 132 column x 24 line display mode with 5 x 9 character dot matrix
Attributes - high/low intensity, blink, reverse and underline
Programmable, double width character line or double width/height character line
Smooth scroll
Line drawing graphics
Cursor, selectable as box or blinking underline

Monitor Performance

Green phosphor - 14 inch (35.6 cm) diagonal±1% geometry
Dot frequency, 22MHz
19.5 KHz horizontal frequency
50/60 Hz non-interlaced refresh

Keyboard

Low profile to European standards
83 Key detached keyboard incorporating sculptured typewriter style alphanumeric pad including period, comma, minus and enter
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Four function keys
Audible keyclick (operator selectable)
Seven visual indicators
Editing function - Tab, insert line, delete line, insert character, delete character, clear, home and back tab
Upper/lower case with all caps light
Local print

Communication Interface

RS232C/current loop
X on, X off protocol (operator selectable)
Full duplex compatible with WE modem #103A, 212A
Baud rate - selectable 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, 19,200
Parity - selectable odd, even, 1 or 0
Word length-7 or 8 bits

Auxiliary Interface

RS232C compatible
Full duplex
Remote control - on line without display, auto print, line print, page print
Baud rate - selectable 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, 19,200

System Oriented Features

ANSI Standard Mode
Multimode - local, interactive, edit page, line and partial page
Self diagnostics
Terminal status inquiry
Numeric pad alternates as function pad
Scrolling by column and by fields
Horizontal "split screen"
Data compression/expansion
X on/X off protocol
Block mode
National character sets (option)
Full editing command set with protected fields

Physical Characteristics

Dimensions
Height - 15 inches (38.1 cm)
Width - 18¾ inches (47.3 cm)
Console depth - 15¾ in. (40.3 cm)
Keyboard depth - 8½ in. (21.8 cm)
Weight - 35 lbs. (15.9 kg)

Electrical

Power consumption - 48 watts
Power input selectable - 115 ±10% and 230±10% (50 - 60 Hz±1%)

Environmental

Temperature - 10° C to 40° C
Humidity - up to 90% relative non-condensing
Shock - 50g in 3 axis (in container)
Vibration - 10 to 30 Hz (in container)

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Employee Ingenuity Rewarded With High-Paying Programs

By John Gallant
CW Staff

John H. Patterson probably never imagined that the $30 he set aside in 1894 to reward employee ingenuity would grow into a multimillion-dollar practice rivaling *The Price is Right* in the amount of cash and prizes awarded each year.

Half a century later in the midst of World War II, Patterson's NCR Corp. — then known as the National Cash Register Co. — celebrated the 50th anniversary of its employee suggestion award program by handing out thousands of dollars in war bonds. The top idea netted the winning mechanical assembler a $1,500 war bond for his innovative method of cleaning ball bearings.

Today, that $1,500 prize pales in comparison to some of the awards handed out to employees whose suggestions — ranging from the painfully obvious to the technically complex (see related story) — boost productivity and profits for the largest computer manufacturers. IBM has awarded five $100,000 prizes this year alone, and a fledgling suggestion program at Burroughs Corp. handed out awards for $100,000 and $50,000 to winning employees in its first two years.

Overall, IBM's employee suggestion award program, implemented in 1928, gave out more than $12 million last year to some 30,000 of the company's 365,000 eligible employees, according to an IBM spokesman. But generosity was not the driving force behind the prizes. IBM figures those suggestions saved the company nearly $65 million. IBM awards 25% of the amount an employee's suggestion saves the firm during the first year it is implemented, up to $100,000.

Burroughs began its employee suggestion award program only two years ago, but the company claims it already rivals IBM's. "It took IBM 40 years to award a $100,000 prize. We did it in our very first year. This is a damn good program," spokesman James Fitzgerald said. Since the program was implemented in October 1981, Burroughs has traded more than $430,000 for ideas the company said have netted almost $3 million in savings.

At Honeywell, Inc.'s manufacturing facilities in Minneapolis, Minn., employees participating in the Error Cause Re-

(Continued on Page 105)

AT&T Official Rails Against Government-Imposed Rules

By Bill Laberis
CW Staff

NEW YORK — With a captive audience of heavy communications users, a ranking AT&T official seized the opportunity to rail against government-imposed regulations, claiming the realities of today's marketplace render the regulatory process "an anachronism."

"The tariff process reveals our market research to our competitors ... and informs them of our plans before we implement them," said Morris Tanenbaum, chairman of AT&T Communications, the long-distance branch of the divested AT&T. "With price effectively constrained by the marketplace, with the ease of entry that exists, with the financing ability of our competitors, there simply is no justification for unequal regulation of AT&T," he said.

Tanenbaum delivered his remarks at the 15th annual convention and exhibition of the Information Industry Association held here earlier this month. His audience consisted largely of representatives of firms that spend heavily on telecommunications services, such as data base companies, econometric data sellers and investment houses.

Sharing the stage with Robert Casale, marketing head of AT&T's Information Systems, Inc., Tanenbaum called for a phased "elimination of all the direct costs associated with regulation." These regulations, which apply in many cases to AT&T in the provision of communications services but not to its competitors, "significantly reduce the benefits that competition can bring to the marketplace," Tanenbaum said.

CW Photo by B. Laberis

Morris Tanenbaum

The Communications chief said that the regulatory process has forced AT&T to charge rates so high that its competitors "can gain market share at will."

In particular, Tanenbaum referred to the Federal Communications Commission (FCC) regulations requiring AT&T to wade through a lengthy tariff filing procedure when it wishes to adjust its communications charges.

The FCC recently ruled that AT&T's communications competitors, chiefly MCI Communications Corp. and GTE Corp.'s Sprint long-distance service, are not bound to the same rules and procedures when instituting a rate change.

On the other hand, the procedures AT&T must follow can delay a rate hike (or decrease it) by a minimum of 90

Micro Makers Seen Close to Shakeout, But Optimism Grows

By Patricia Keefe
CW Staff

Troubled micro makers such as Fortune Systems Corp., Vector Graphics, Inc. and Victor Technologies, Inc. have been considered shakeout candidates by a number of analysts, and recent announcements have done little to erode that belief. However, all three appear to be taking steps to turn around, and there are signs of growing optimism among analysts about the respective futures of these firms.

Victor recently announced that it will lay off 300 employees and expects to lose "substantially" more money in the third quarter than the $11.1 million it lost in the second. More losses are forecast for the fourth quarter. This year, Victor's labor force has yo-yoed from 900 to a reported 3,000 and is projected to dip to about 1,000 by December. To date, the firm has idled some 1,650 employees, reducing the work force to 1,300, with cuts spreading to the managerial sector. Victor is $90 million in debt, $30 million of which is spread over 1,500 creditors. It has said it is not looking to merge.

Victor is, however, viable in Europe, which accounts for 65% of its sales and where it has been successful at competing against the IBM Personal Computer in several markets, according to Kenneth Bosomworth, president of International Resource Development, Inc. The company has a "decent flow of sales" and "potential" to be a survivor, he added. However, analyst Mike Killen of Strategic, Inc. believes that the European market began to

(Continued on Page 106)

Crowntek to Acquire CCA for $40 Million

CAMBRIDGE, Mass. — Computer Corp. of America (CCA) last week announced an agreement whereby Crowntek, Inc. of Canada will acquire all outstanding stock of CCA in a deal valued at about $40 million.

CCA, a data base management software vendor, will retain its present management and head-office staff, according to the preliminary plan for acquisition. The deal is subject to the approval of Crowntek's board and of the holders of at least 52% of CCA's stock.

CCA is a developer and marketer of IBM mainframe products, the principal of which is the Model 204. The company serves approximately 400 customers. Crowntek is owned by Extendicare Ltd. of Toronto.

Motorola Seeks Court Action Against CDI, Former Employees

By Peter Bartolik
CW Staff

CHICAGO — Motorola, Inc. is again seeking legal action against a display terminal company founded by three of its former employees, an action characterized by one of those defendants as an attempt to injure the young company.

'Motorola's litigation was an attempt to harass CDI (Computer Displays International, Inc.) and . . . use . . . unwarranted court proceedings as a basis for (prompting) adverse publicity to injure CDI.' — Robert G. Gatza, former Motorola employee and president of CDI.

Motorola announced recently that it has asked the U.S. District Court here to hold Computer Displays International, Inc. (CDI) and three of its executives in contempt of court for allegedly violating an earlier injunction against the use of Motorola information.

A Motorola spokesman said that under the terms of a settlement agreement, which ended a lawsuit originally filed in March 1982 [CW, April 5, 1982], CDI and former Motorola employees Robert G. Gatza, Chris A. Petri and Thomas S. Fair were permanently enjoined from using Motorola proprietary information that the company claimed CDI was using in its MPG display monitors.

Earlier this year [CW, July 25], U.S. District Judge Susan Getzendanner ruled CDI was violating the earlier injunction in the production and marketing of a monitor that Motorola claimed was "essentially equivalent" to the MPG series. CDI is appealing that finding.

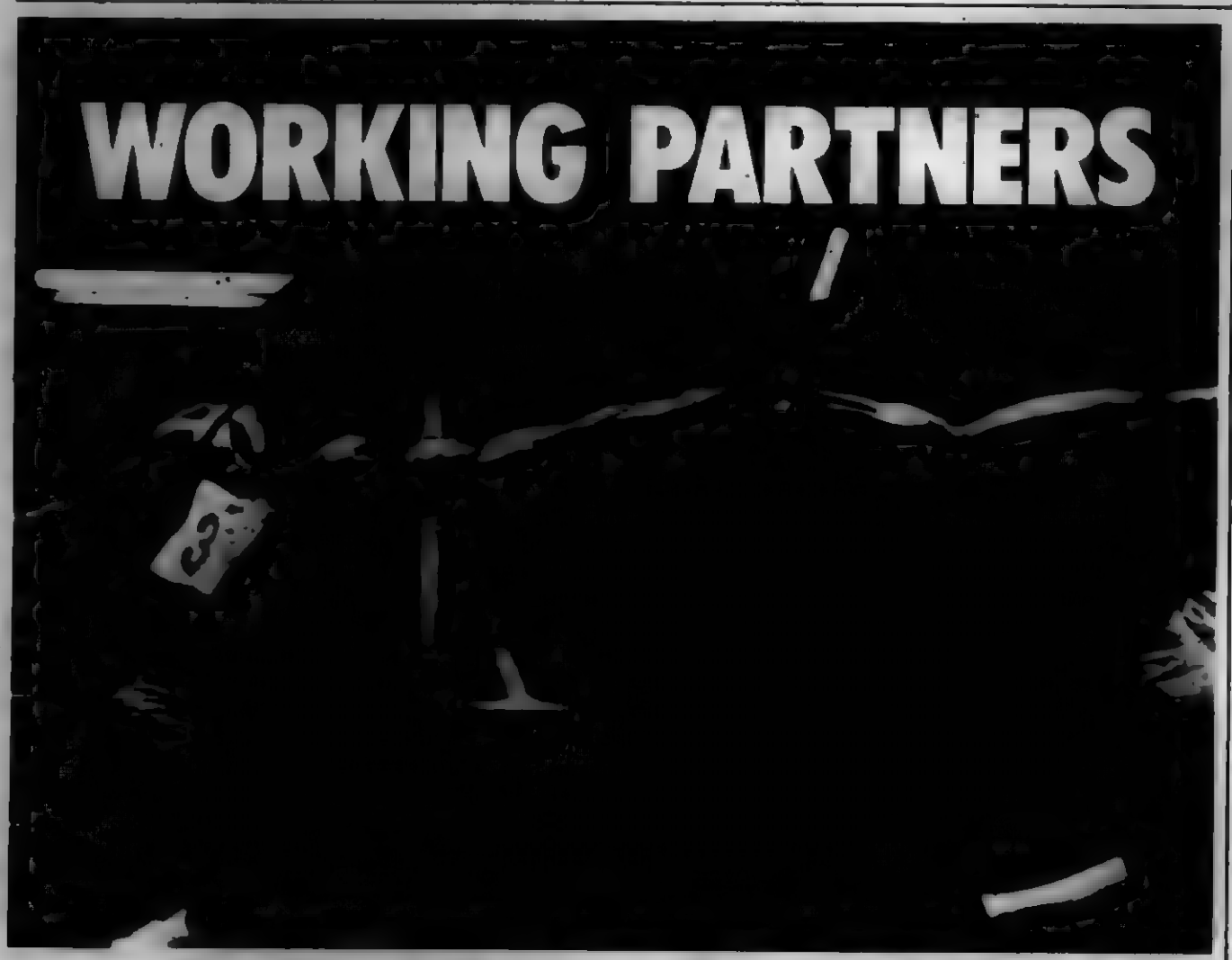
Motorola said it has now asked Judge Getzendanner to order CDI to halt the sale of its recently introduced AD monitor. Motorola's claim in all the court action has been that CDI has used misappropriated confidential information and technology relating to Motorola's DS3000 and DS4000 monitors.

Gatza, president of CDI, left Motorola in February 1981, along with Petri, who is vice-president of CDI. Fair, CDI's director of manufacturing operations, left Motorola in July 1981.

In an interview with *Computerworld*, Gatza said no proprietary or trade-secret information was ever involved in CDI's products, which began shipments in June 1981. Gatza said Motorola admitted "in open court" that its DS series had been shipped "a full year before they allegedly publicly announced that product" in 1981, and that the products had been displayed at the National Computer Conference in 1980.

More significant, according to Gatza, is that "the AD series which we are currently shipping is entirely different [from the DS and MPG products] and warrants no litigation whatsoever."

Gatza said he believed Motorola's litigation was an attempt to harass CDI and said the company is reviewing legal options.



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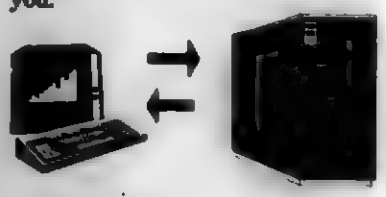

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To Fifth-Generation Orient

Martin: U.S. May Play Second Fiddle

By Bill Laberis
CW Staff

NEW YORK — A quantum leap by the Japanese into the so-called fifth generation of computing could leave the West playing second fiddle to the Orient, industry guru James Martin warned.

Delivering his admonition to a packed house at the 15th annual convention and exhibition of the Information Industry Association earlier this month, Martin argued that "many of us are not looking at the whole spectrum of what's going on. We're not using enough imagination. We're not looking at what the Japanese are doing. We're not synthesizing the latest technological trends.

"We don't want Japan to take our highest revenue industry away from us. Because if we're not careful, the dominant country in the world's largest industry in the 1990s will be Japan."

In a dynamic 90-minute presentation, Martin employed his whirlwind style and wit to guide his audience through the technological past while offering a glimpse of his vision of the future.

The technology that will pave the way into the future is fairly predictable, Martin suggested. The question remains whether the West — largely in the presence of IBM or Japan, as a unified entity — will lead the way.

The "gall" and strategy of the Japanese dictates that its industry-government "partnership takes away as much business from IBM as they possibly can," Martin said.

However, the means for doing so has changed in the last decade. In the 1970s, the Japanese tried to battle IBM on its own turf, building IBM-compatible mainframes. That strategy succeeded "only up to a point," Martin said.

"So now they're saying, 'Let's invest in a different game which IBM is not playing and make sure that we have absolutely *the* world's dominant position in that new game,'" Martin maintained.

That new game involves the development of specialized hardware that is a hybrid of today's scientific and commercial processors, machines Martin labeled "inference processors." Development of such machines, capable of both processing information at almost unfathomable speeds and of executing highly sophisticated programming, will be spearheaded by advances in semiconductor technology.

The Japanese, Martin noted, have already grabbed the market lead in production of high-reliability memory chips.

Martin offered no quick fix to the Japanese threat, suggesting instead that the West's underlying strength resides with the entrepreneurs who run relatively small businesses, not with the industry giants. The entrepreneurs, he said, "will lead the way," with the larger companies buying the entrepreneurs' innovative technology and using it on the production line.

CW Photo by B. Laberis

James Martin

AT&T Official Rails Against U.S. Regulations

(Continued from Page 101)

after the request for a rate change is filed, Tanenbaum said.

"AT&T must submit massive amounts of data, while its competitors can change a price with no documentation or notice," he said. "Similar requirements apply when we wish to introduce, change or discontinue any service."

Tanenbaum also railed against the constraints of the Second Computer Inquiry — the binding, federal government document that set forth guidelines for AT&T to operate in unregulated markets, such as computers. These constraints prevent AT&T's unregulated subsidiaries, such as Western Electric, Bell Laboratories and the Information Systems division, from granting AT&T Communications preferential treatment not accorded the company's competitors.

To press his point in Washington, D.C., Tanenbaum assured his audience that AT&T is lobbying heavily to remove the remaining regulations that apply to AT&T but not to its competitors.

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For more information about remote retrieval of text data in voice with CallText products, contact Speech Plus, Inc., 461 North Bernardo Avenue, Mountain View, California 94043. Telephone (415) 964-7023.

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Hitachi Defense Mum on IBM Payment Report

Calling the amount of any payment by Hitachi Ltd. to IBM "confidential," a lawyer in the firm that spearheaded the defense of Hitachi in a conspiracy suit brought by IBM would not comment on a recent report in *The Wall Street Journal* that said a $300 million payment had been made.

The report stated that the secret payment was made in the settlement of the lawsuit in which IBM charged Hitachi with the theft of trade secrets.

"The story and particularly the amount are highly speculative," a spokesman for IBM added. "We have no further comment."

It was partly in exchange for the payment that IBM dropped the suit, which was described as "painfully embarrassing" to Hitachi.

William Jentes, a partner at Kirkland & Ellis, a Chicago law firm hired by Hitachi, was cited by the paper as confirming that a secret payment had been made under an agreement that also allowed Hitachi to continue using IBM software it had allegedly stolen.

But when Jentes' office was reached by telephone, his secretary would only read a prepared statement to reporters.

Altos Shareholder Files Suit

SAN JOSE, Calif. — A shareholder in Altos Computer Systems, Inc. has filed a class action suit in U.S. District Court charging the company and certain officers and directors with violations of security laws.

The complaint alleges there were misstatements or omissions in connections with the company's recent public offering. It also says Altos was experiencing production problems with its Series 586 and ACS 68000.

The suit seeks action on behalf of all persons who purchased Altos common stock during Nov. 4, 1982 and Jan. 20, 1983.

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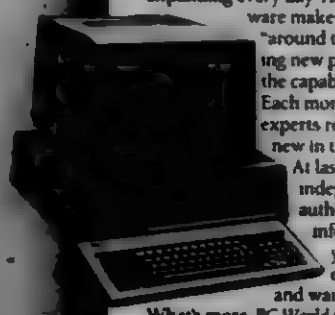

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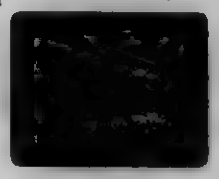

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Simple Innovation Seen Winning Employees Awards

For Francis Hornby, earning $5,000 was as easy as removing eight screws and a wall plate.

Hornby, a group leader at Honeywell, Inc.'s Residential Division in Minneapolis, Minn., thought the company might save some money by eliminating the extra hardware — eight screws and a wall plate — that was shipped with each Econostat thermostat. He was right. Honeywell saved more than $58,000 the first year Hornby's suggestion was implemented and, in return, Hornby was rewarded with $5,000, the maximum award in Honeywell's Error Cause Removal (ECR) program.

Sound simple? It was. But Milton Pfarr's innovative method of changing print wheels in terminal teller machines was not much more complex, and he earned $100,000 for the suggestion. According to a Burroughs Corp. spokesman, Pfarr, a senior field service engineer in Clarksburg, Va., saved Burroughs more than $800,000 in rework costs alone with a solution that embarrassed his superiors by its simplicity. Pfarr's idea was so simple, in fact, that he almost did not submit it.

Pfarr's ingenuity was matched, though, by the resourcefulness of an IBM employee who worked at his kitchen table to fashion a crude ribbon shield that alleviated a printer jamming problem. Formerly a customer service engineer at IBM's Customer Service Division in Chicago, Michael Brown worked with his own tools to design the shield that was later incorporated throughout the entire product line. For his efforts, which saved IBM at least $400,000, Brown was awarded $100,000.

Maria DeFazio, a technician at IBM's East Fishkill, N.Y., General Technology Division facility, also took home the company's maximum $100,000 prize. According to a spokesman, DeFazio's suggestion that photo masks, which are used as stencils to transfer circuit patterns onto silicon semiconductor wafers, be preloaded into a special cartridge to reduce damage from loading and unloading saved IBM at least a quarter of a million dollars in repair and replacement costs.

One of the more complex employee suggestions involved a designer at NCR Corp.'s Columbia, S.C., engineering and manufacturing facility. Working on NCR's Tower 1632 minicomputer line, the designer earned a $2,000 bonus for her ideas that, according to the company, "made a significant innovative addition to the simplicity of the Unix-based user interface for the Tower 1632."

And at Control Data Corp.'s printed circuit operation in Minneapolis, Minn., inner-layer line operator Elizabeth Campbell was a winner in CDC's Bright Ideas program, which awards an additional week of vacation for cost-saving ideas.

Employees Seen Reaping Awards For Ingenuity

(Continued from Page 101)

moval program earned more than $402,000 for their 11,000 winning ideas last year. The program works so well, according to coordinator Gerry Axmark, that Honeywell got an average of two suggestions from each of the 9,400 eligible employees. The maximum prize for the suggestions that saved Honeywell almost $2 million last year was increased in 1981 from $2,500 to $5,000.

According to a company spokesman, NCR expects to pay out more than $500,000 in 1983 through its Engineering/Developer Bonus Award program, which awards employees up to 10% of their salaries for winning suggestions. Like most of the other corporate award programs, NCR's system extends to workers on the production floor, making all 63,000 NCR employees eligible to participate.

In 1982, President Robert Price began Control Data Corp.'s Bright Ideas suggestion program with a bang, holding a teleconference with 40,000 employees at 108 facilities to announce the 25th anniversary scheme that awards an additional week of vacation to winning thinkers. CDC's spokesman Griff Kennedy said that for the winning ideas chosen from the 13,650 suggestions submitted, CDC awarded the equivalent of 25 years vacation. Kennedy said CDC intends to hold the Bright Ideas program for a three-month period each year.

Among the major computer manufacturers, only Digital Equipment Corp. is without a formal employee suggestion award program. In addition to the corporatewide plans described, most of the firms also had decentralized award programs at individual manufacturing facilities.

Not all the programs involve cash. Wang Laboratories, Inc.'s Product Idea Program, which started only last month, will give winning employees an opportunity to head the project team that will develop their ideas. And, at Hewlett-Packard Co.'s Boise, Idaho, manufacturing facility, suggestions chosen through the Boise Improvement Program were awarded with light-bulb pins and preferred parking for a month.

Rolm, Plessey Settle Lawsuit

SANTA CLARA, Calif. — Rolm Corp. and Plessey Co. of the UK have settled a trade secret and copyright lawsuit initiated by Rolm.

The suit alleged that Plessey had misused Rolm's technology to develop the Plessey IDX private branch exchange, which Plessey has sold in volume in England.

Under the agreement, the two companies will modify and extend licensing agreements dating back to 1976.

Plessey will continue to distribute Rolm's Automatic Call Distribution system in the UK and will also continue to promote and support the Rolm computerized branch exchange in Australia.

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Micro Shakeouts Forecast, But Optimism Grows

(Continued from Page 101)

sour for Victor six months ago, after IBM introduced its Personal Computer overseas.

"Whether Victor can turn itself around depends on two things," Killen said, "whether Walter Kidde [parent company that owns roughly 60% of Victor] can come up with assurances for the banks and more cash to tide Victor over; and whether the new management can continue to cut costs, get sales up and find other investors." He added that non-IBM-compatible Victor "never got its feet on the ground in the U.S., and this has come back to haunt it. The window of opportunity for Victor to sell in the U.S. closed six months ago, and it will be hard to reopen. [It] has a rough road ahead."

Despite Victor's troubles, it recently signed a large contract with Ford Motor Co. This, according to Esther Dyson, president of Rosen Research, Inc., is a "very important reaffirmation of support for Victor."

Vector Graphics recently announced its third consecutive quarterly loss, the resignation of two directors and a shortened work week for "many" employees. To date this year, the company has laid off about 25% of its work force. Vector "could be strong in the [computer-aided design] market," Stein maintained. If Vector were to target a niche market and avoid head-on competition with the IBM Personal Computer, "it could very well succeed," Bosomworth said. Dyson agrees that Vector has taken the "right step."

In response to Fortune Systems, Bosomworth said that Osborne Computer Corp. was "done in by its own stupidity" in that it alienated retail outlets. On the other hand, Fortune is in danger of alienating its customer base, he added. "Customers are unhappy with the machine and the software." He suggested that while Fortune may have finally resolved technical problems, it remains to be seen whether customers will believe it — or care.

Earlier this month, Fortune reported a $9.1 million loss on $9 million in sales. The company attributed the loss to shipment delays and increased development expenses.

Fortune, which recently reorganized its management, is a "big question mark," Killen said. Despite the fact that its Unix-based computer system is not IBM-compatible, Killen said it has an advantage in that it is a multiuser, multiprocessor system. A single Fortune system is cheaper than buying the same capacity in several IBM Personal Computers, he added. Dyson predicted the growing Unix market would mean "good news" for Fortune. However, she noted that Fortune has a "great idea" that has not been "successfully implemented."

Losses Continue for Micro Makers

By Patricia Keefe
CW Staff

The bankruptcy filings of two portable microcomputer vendors in less than two months has served to highlight recent announcements concerning quarterly losses and continued layoffs by a number of other financially troubled micro makers.

However, several industry analysts have denied that they see a pattern linking those struggling micro firms now treading the financial waters to those that have either pulled themselves out of the market or have gone under in a sea of creditors and mounting losses.

Following on the heels of Osborne Computer Corp.'s disclosure of losses and its subsequent September filing for protection under Chapter 11 of the U.S. Bankruptcy Code, Computer Devices, Inc. of Burlington, Mass., filed a petition for Chapter 11 protection on Oct. 31 [CW, Nov. 7].

Some industry observers who spoke previously about a significant shakeout in the microcomputer market prior to and following the failure of Osborne, are now talking of a smaller "falling out" of about a quarter of the field in the wake of Computer Devices' action. Conversely, Michael Killen of Strategic, Inc., believes a major shakeout is in progress.

While companies with poor financing and matching marketing plans will continue to wither, the micro industry itself is healthy, according to Killen and Alex Stein, a senior analyst for Dataquest, Inc., a San Francisco-based research firm. "With personal computers growing at 70% and desktops at 60%, the market [demand] can't possibly be in real trouble," Stein said.

And a number of business micro makers, such as Fortune Systems Corp., Vector Graphics, Inc. and Victor Technologies, Inc., long expected by some to constitute part of the market fallout, are getting cautiously optimistic appraisals by several industry observers (see related story).

Nevertheless, in the months ahead recovery for the weak and survival for the strong will not be easy for several reasons, according to analysts.

For one, there has been a markedly smaller infusion of funds into business micro concerns. Venture capitalists have become much more discerning, learning that it is better to give $6 million each to five companies than to give $3 million each to 10 companies, Stein said. Ventures hoping to receive second- and third-round financing "had better get it right the first time," he added.

Also, what has happened to the firms mentioned above reflects symptoms of a

(Continued on Page 108)

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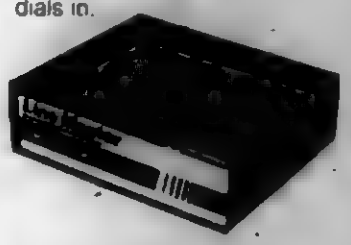

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Twentyfold Increase Posted In Net Earnings by Amdahl

SUNNYVALE, Calif. — Amdahl Corp. reported a greater than twentyfold increase in net earnings for the third quarter ended Sept. 30 as compared to the same period last year.

While revenues doubled to $200 million from the $100 million reported for the previous third quarter, net earnings rocketed to $13.7 million, or 30 cents per share, compared with $630,000, or two cents per share, in the slack period the prior year.

According to John C. Lewis, Amdahl president, "The company's record revenues and improved earnings reflect the growing volume of shipments."

Amdahl's pretax income for the third quarter was $23 million, up from the $1 million reported in the three-month period in 1982. For the nine months ended Sept. 30, Amdahl reported total earnings of $30.7 million, or 69 cents a share, which includes $3.2 million, or seven cents per share, in extraordinary credits from utilizing a subsidiary's prior year accounting losses and tax credits; for the same period last year, Amdahl reported earnings of $4.09 million.

Shakeout May Only Be 'Falling Out'

(Continued from Page 106)

larger problem, Stein believed. "As large vendors enter the market with personal computers, they are closing out corporate sales opportunities for the smaller vendors. The latter have two options — either sell through retail or direct sales or develop products for niche [vertical] markets," he said.

While Stein noted that niche market shares have not turned out to be large value-added markets and that prices are continuing to erode, Harold Kinney of Future Computing, Inc. does not see a market for hardware tailored to these markets. But Barbara S. Isgur of Paine Webber Mitchell Hutchins, Inc., believed that by coupling different software with its hardware, a vendor can market in 10 different niches and attain profitability.

Also, as more small businesses gain familiarity with computers or make automation a priority, niche markets will grow.

Both Isgur and Kinney said that IBM has set the micro standard. Kinney pointed to a recent Future Computing survey of 2,000 of the largest micro users that "revealed the absolute dominance of IBM and compatibles in the market." Although Esther Dyson, president of Rosen Research, agreed that vendors must be IBM-compatible, she predicted there will be many exceptions and stressed that it will take more than IBM-compatibility to succeed in the market.

M/A-Com's Earnings Drop 25%

BURLINGTON, Mass. — M/A-Com, Inc. recently reported fiscal year 1983 earnings from continued operations dropped almost 25% from the previous year, despite a more than 8% increase in sales.

The company reported net sales of $637 million for the fiscal year just ended, compared with $702 million a year earlier; income from continuing operations, however, dropped to $31 million for fiscal year 1983, compared with $42 million the previous year. Earnings per share were 76 cents for the year just ended compared with $1.08 the previous year.

For the fourth quarter just ended, the company reported record sales of $174 million, compared with $160 million one year earlier; but earnings for the quarter were $8.9 million down from $9.3 million last year.

Projecting improved performance in 1984, Richard T. DiBona, company chairman, president and chief executive officer, said, "Although the company's growth in fiscal 1983 was slowed by economic factors, heavy research and development, softness in the cable television market and new markets that have developed more slowly than anticipated, we did achieve, as predicted, sequential improvement in our earnings."

Supershorts

Standard mainframe-level business application development software for **Wang Laboratories, Inc.**'s Professional Computer will be available in December as a result of a recent marketing agreement between Wang and **Micro Focus, Inc.** Micro Focus will deliver Level II Cobol, Anamator, Forms-Z and native code generator software beginning the fourth quarter of 1983. The products will be available from Wang in December. The native code generator will convert the Level II Cobol intermediate code to the Professional Computer's 8086 native machine code under the Microsoft, Inc. MS-DOS operating system, reportedly allowing it to compile and run faster than any comparable software. The agreement is valued at more than $500,000.

Stratus Computer, Inc. of Natick, Mass., and **HMC Computer Corp.** of Toronto, Ont., have announced an agreement granting HMC the exclusive right to market Stratus 32-bit, fault-tolerant computer systems to the Canadian banking, brokerage and insurance industries. The two-year agreement, which includes foreign banks doing business in Canada, is valued in excess of $2 million. In addition, HMC has nonexclusive rights to sell the Stratus/32 continuous processing system to the general Canadian market.

• • •

Calma Co. has formed a government and custom systems organization to market its computer-aided design and manufacturing (CAD/CAM) systems exclusively to the U.S. government and its departments. In addition, the new sales operation will provide custom system software and interface services, including equipment exchange and data conversion that will allow a buyer to convert existing CAD/CAM equipment and/or data base to Calma products.

• • •

A commercial single-mode, fiber-optic transmission system was inaugurated on Sept. 14 by **ITT Telecom Network Systems Division** and **Continental Telephone Co.** of New York. It is reported to be the first system capable of carrying enormous amounts of telephone traffic for long distances without intermediate amplifiers or repeaters. The 90M-byte FTS-3C system, manufactured by ITT Telecom, links two of Continental's digital central offices over a span of 23 miles and is capable of 1,344 two-way telephone channels.

• • •

Mini-Computer Business Applications, Inc, (MCBA) has filed a lawsuit against Donald Lamka and several corporations of which he was an officer, seeking $5 million in compensatory and punitive damages for breach of contract, unfair competition, fraud, conspiracy and conversion, as well as declaratory and inductive relief stemming from the alleged unauthorized distribution of MCBA products in violation of written license agreements between the parties. Implicated in the suit are the Ohio Corp.; Point of Sale Business Systems, Inc.; Universal Sales Companies, Inc.; Universal Gymnasts, Inc.; and Digital Software Consultants, Inc.

• • •

Western Electric has been awarded a $30 million contract by the U.S. State Department for a new integrated voice/data telephone system to serve 16 separate locations in the Washington, D.C., metropolitan area. Western Electric will engineer, furnish, install and maintain the system, which is scheduled to be operational by March 1985.

• • •

Gensoft Corp. and **Tartan Laboratories, Inc.** have announced plans to develop jointly and market Ada compilers.

• • •

A local-area network containing a multiuser turnkey computer system worth $12,500 will be given away by **Alspa Computer, Inc.** at the fall Comdex show in Las Vegas next week. Alspa Computer will be located in East Hall, Booth 2272, and the drawing will be on the final day of the show.

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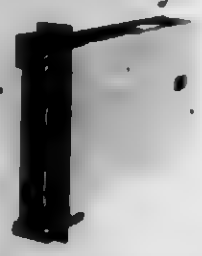

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DP Expo Set for Colorado

AURORA, Colo. — The sponsors of the 7th Annual Rocky Mountain Data Processing Expo and Conference, scheduled for April 18-20 in Denver, are seeking exhibits for the show.

The sponsors include the Mile High Chapter of the Data Processing Management Association (DPMA) and Industrial Presentations West, Inc. The 1984 show will be run in conjunction with the DPMA Region 4 conference.

Members of 22 separate chapters from a nine-state region will be invited to attend, a spokesman said. This year's show reportedly will include a technical track and an increased number of conference sessions, the spokesman said.

The price of booth space includes draped space, company name sign, complimentary entrance tickets for clients and prospects, identification badges for all personnel staffing the booth, general security, conference registration package and a sales seminar, "How to Sell in a Trade Show Environment."

A 10- by 10-ft draped booth costs $900, with a 10% discount for multiple booths. Booth space is said to be 35% sold out. Exhibitors can reserve space by contacting Industrial Presentations West at Suite 304, 3090 S. Jamaica Court, Aurora, Colo. 80014.

ITT Reports Earnings Drop For First Nine Months of '83

NEW YORK — ITT recently reported reduced revenues and earnings for the first nine months of its fiscal year, but expressed optimism that the fourth quarter will bring improvement.

Third-quarter earnings from operations rose 23.5% compared to the corresponding period one year ago, but total earnings for the quarter were off almost $13 million from the earlier period.

The earnings decrease was attributed to a third-quarter 1982 one-time $33 million benefit from a favorable settlement of an antitrust suit against AT&T. That boosted earnings in the 1982 period to $118.5 million, or 80 cents per share, 11% higher than the $107 million, or 70 cents per share, for the quarter just ended.

For the nine-month period, earnings were 9% lower than for the same period last year, while sales and revenues this year are $1.3 billion less than the $16.3 bilion reported for the corresponding period last year.

ITT Telecommunications contributed a $15 million increase in earnings for the nine-month period this year; a strong performance from the Defense-Space Group, substantial improvement at Telecom North America and generally stronger operations in Europe all impacted the improvement, the company said.

Ameritech, Aetna Announce Local Net Plans

WESTBOROUGH, Mass. — Plans to co-develop a new fiber-optic, local-area network business communications system were recently announced here by American Information Technologies Corp. (Ameritech) and Aetna Telecommunications Laboratories.

The software-based local-area network would provide simultaneous high-speed transmission of voice, video and data on single or multiple fiber-optic cables, according to spokesmen for both companies.

Funding for research and development will reportedly be provided by an Ameritech subsidiary, Ameritech Development Corp., but neither the new company nor the parents will be involved in actual manufacture of the product.

Ameritech is also the parent company of five Midwestern telephone companies: Illinois Bell, Indiana Bell, Michigan Bell, Ohio Bell and Wisconsin Telephone.

Aetna Telecommunications Laboratories is a partnership composed of GRE Technology, Inc. and Aetna Diversified Technologies, which is a wholly owned subsidiary of Aetna Life and Casualty Co.

Nynex to Market GTE Products

RESTON, Va. — GTE Business Communication Systems, Inc. recently announced an agreement in principle for distribution of its products and systems by Nynex Corp., the parent organization of the New York and New England Telephone Companies.

The agreement is for a three-year period and calls for Nynex to purchase the GTE Omni series and GTD-5 private automatic branch exchange (PABX) systems, a spokesman said.

The Omni series, announced this fall, is an integrated voice/data communications system serving up to 2,084 ports with a dual-bus architecture. The GTD-5 is a digital PABX that can handle up to 50,000 ports.

The agreement goes into effect Jan. 1, when the seven regional Bell operating companies are scheduled to begin operation.

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To reserve ad space in the January 18th issue of *Computerworld On Communications*, call one of the local sales offices listed below, or call Don Fagan, Vice President Sales/Marketing; Ed Marecki, National Sales Director or Kathy Doyle, Marketing Support Manager.

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Inmos T-424 Chip Boasts Major Tech Advance

By Robert Batt
CW West Coast Bureau

SAN FRANCISCO — Calling it "a major advance in microprocessor design," Inmos Ltd. of Britain has announced the development of a 32-bit chip with an instruction rate in excess of 10 million instructions per second (Mips).

Not slated for volume production until 1985, the T-424 chip is the first of a family of high-performance microcomputers and device controllers, the company said. Other products slated to be introduced include a 16-bit chip, a disk controller and a graphics controller.

Introducing the T-424 at the recent Western Semiconductor (Wescon) show, Ian Barron, managing director of the government-backed enterprise, claimed the chip provides all the resources of a computer, including processing, memory and concurrent communications on a single chip.

"The initial chip products ... integrate 250,000 components on a single chip using two-micron Cmos technology. They provide standard inter-chip communications links and support a programming model which incorporates multiprocessing," Barron claimed.

According to the company, which has research and development facilities in Colorado Springs, Colo., the product contains a processor with access to 4K bytes of on-chip static random-access memory (RAM) to achieve a cycle time of 50 nsec. The memory, Barron said, can be extended off the chip through a specialized memory interface enabling direct connection to both static and dynamic RAMs and providing data rates of up to 26M byte/sec.

In addition, he said, there is a specialized peripheral interface enabling industry-standard products such as device controllers and read-only memory products to be interconnected.

The chip is also said to have four high-speed serial communications links enabling interconnection with other chip products. These links, Inmos said, support message transfers and can operate concurrently with the processor and the peripheral interface.

While applauding the technological achievement that the chip apparently represents, several industry observers are adopting a wait-and-see attitude.

A typical comment came from Seth Goldwin, senior analyst at Paine Webber, Mitchell, Hutchins in New York. "On several occasions, Inmos has come out with real technological achievements, but their problem has been turning them into solid commercial successes. The task facing the company now is how to turn a fantastic engineering accomplishment into a commercially viable product."

Inmos' Transputer: A System on a Chip

By Rex Malik
Special to CW

Reading the specification sheet, what first hits you is that the Transputer, the T-424 chip announced recently by Inmos Ltd. (see related story), combines processor, memory (4K bytes) and communications on a single chip. Next, you find that by going down this route, this gives the processor a memory throughput of up to 10 million instructions per second (Mips).

Then you find that the chip contains 250,000 devices, and that it is still no more than 45 millimeters square. This is more than double the density that is currently the industry norm, and that is usually found in single-function devices, not mixed.

It is the first attempt by a high-grade silicon manufacturer to develop as a standard product what has been obviously feasible since reasonable amounts of integration became possible: the building of a system on a chip. And a system is what Inmos called it.

Competitors Growing

It is a 32-bit system, and it competes initially with, among others, chips from National Semiconductor, Inc. and Hewlett-Packard Co., Intel Corp. and Motorola, Inc. are expected to join them in the next year or so.

When quantity deliveries, slated for 1985, begin, Inmos could well have some competition, though based on present indications, that competition will not offer a processor, memory and communications on one chip.

The Transputer is essentially a long-term project, one primarily aimed at large-systems manufacturers. Though Inmos claims it works well in existing architectures and with existing software approaches, it is primarily aimed at systems of the power that everyone agrees will be in fifth generation, those parallel processors now under development in the U.S., the UK and Japan.

Parallel Systems Use

Though the Transputer may well end up powering simple electronic devices on the basis of one device, one Transputer, it really has been devised to interconnect with other Transputers in the creation of large parallel systems.

The first of the parallel systems to use the Transputer is currently being devised by a team at Imperial College in London, the UK's nearest equivalent to MIT. This is a 32-parallel-processor system, each processor in turn being based on a number of Transputers.

Until now, Inmos has been best known for its 16K-bit random-access memory chips. Inmos has been funded by more than $150 million of British taxpayers' money, though the expectations are that there will be substantial injections of private capital over the next year as the British government seeks to privatize it.

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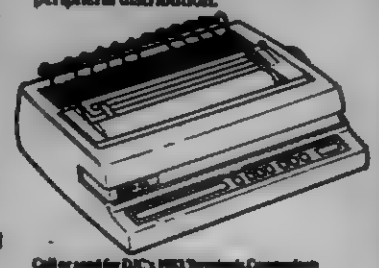

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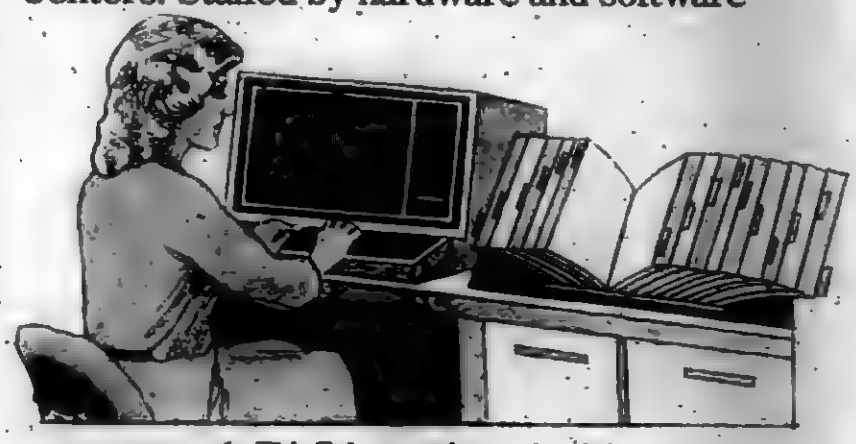

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Indigenous Product Lines Favored

Hard Times Seen for IBM in Japan's Micro Mart

TOKYO — While over a million micros are expected to be sold in Japan this year, even optimistic sources here don't give IBM's Personal Computer more than a 15% share of the Japanese market, as Japanese consumers continue to favor indigenous microcomputer product lines.

This was the opinion of Luc Sala, editor of *Computerworld's* Dutch affiliate, *Micro/Info*, a monthly microcomputer magazine. Sala reached this conclusion during a recent visit to Japan, where he attended "Datashow Tokyo," one of the country's major trade events that hosted some 25,000 guests this year.

Sala said Japan has, to a large extent, adopted Microsoft, Inc.'s MSX (Extended Basic) as an operating system standard, a system not now offered on IBM's machines. This de facto standard will expand the home market in Japan "enormously," Sala said.

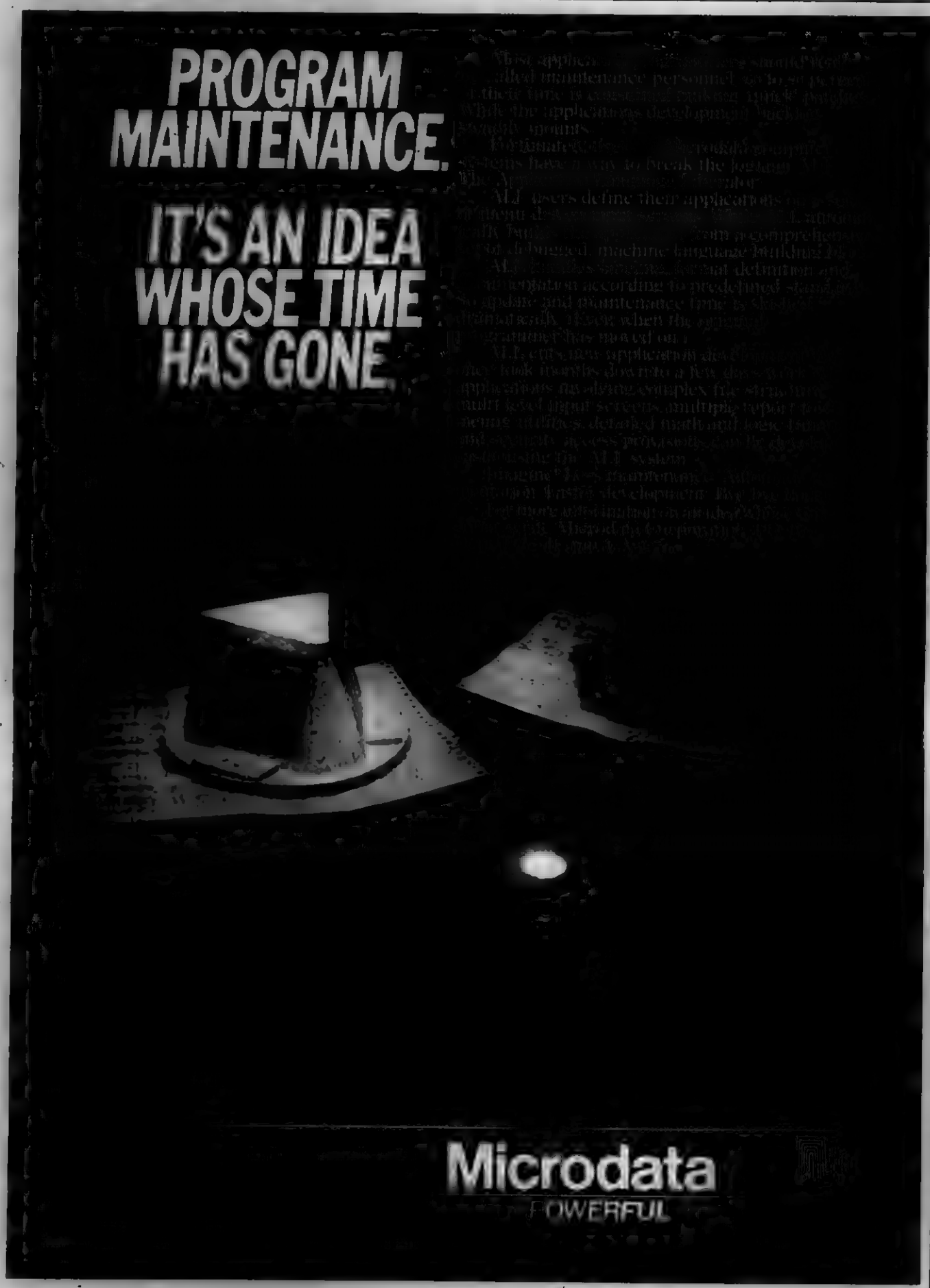
"In the under-$200 [system] class, MSX provides a uniform standard and will lead to more sales of Japanese hardware and software. However, the capabilities of MSX are so limited that the only practical applications are in the recreational and maybe the home-educational market," Sala noted.

"For more business-oriented applications, MSX is not really appropriate. And even for the home, where we expect further integration of video and computers — the X1 TV Computer combination from Sharp Associates is a successful consumer product here — the MSX standard is too limited," he added.

Sala said software for the MSX-based machines is readily available from a number of sources and Microsoft, Inc. channels. He also maintained that although the life span of the MSX products is probably a short one, it is a good way to make Japanese society computer-literate. "What Sinclair did for the UK, MSX is likely to achieve for Japan," Sala remarked.

Portable computers represent another burgeoning market area in the Far East, Sala noted. Popularly known as lap computers or "toteables," portables are especially popular in Japan because the Japanese language allows much more to be related with fewer characters, relative to other languages. Thus, the Japanese are not as limited by a small screen or printer.

The next generation of portables is looming on the horizon, Sala said, and will consist of 16-in. by 20-in. screens, 16-bit processors, integrated software and greater performance capabilities than the present portables, all at a lower price..



McAuto Inks AIS-II Pact With Gould

FORT LAUDERDALE, Fla. — Gould, Inc.'s Computer Systems Division recently obtained exclusive marketing rights to McDonnell Douglas Automation Co.'s Advanced Instructional System-Second Generation (AIS-II) training software for use on Gould Concept/32 computers.

Vel Casler, a Gould vice-president, said the agreement is in line with the company's strategy of placing more third-party application software on its machines.

AIS-II is a computer-aided and managed instruction (CAI/CMI) package that has functional capabilities and modular architecture.

Casler said the pact marks Gould's entry into the computer-based training market; the company believes the industrial and government sectors present a high-growth market for CAI/CMI.

The software will run under UTX, Gould's version of Unix, on the company's 32-bit minicomputers.

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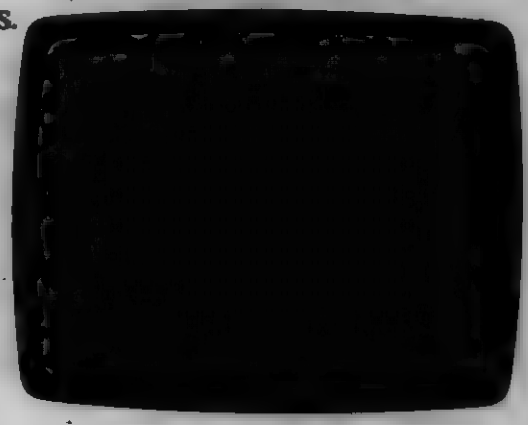

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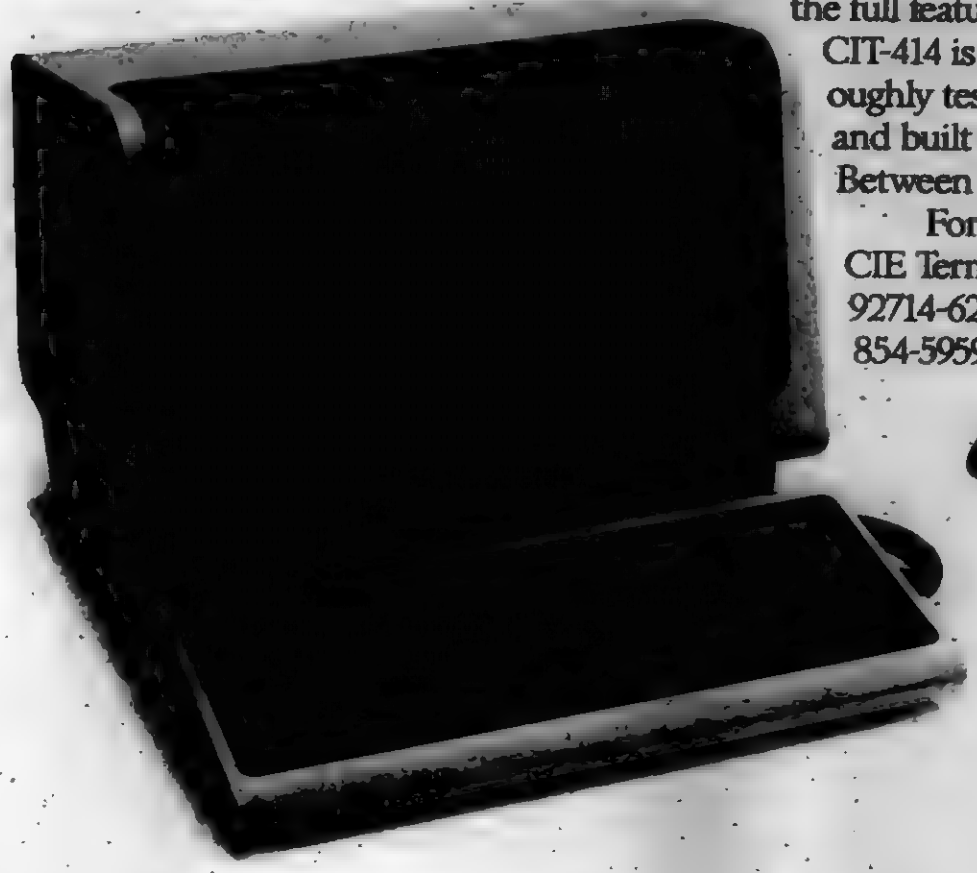

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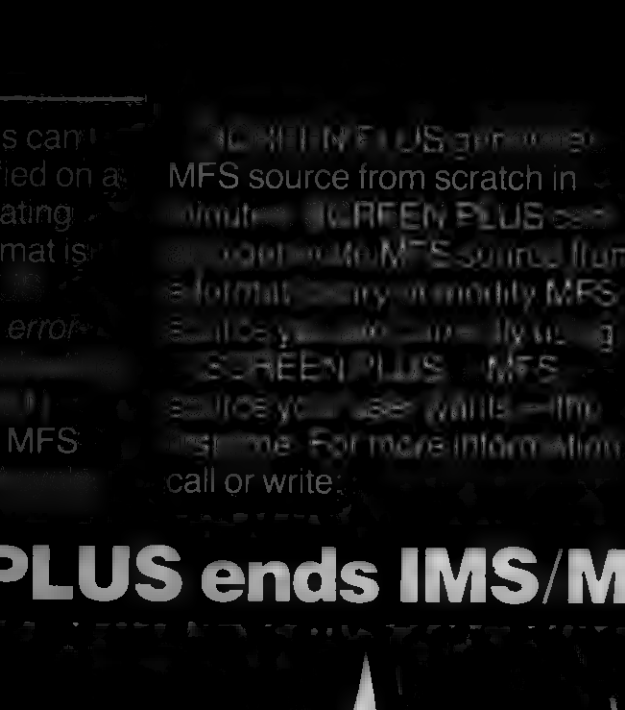

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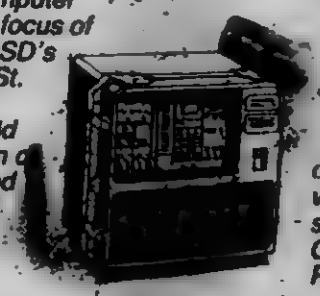

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Ball State University has an opening for an Operations Analyst to perform problem analysis on production jobends; to control and coordinate JCL activities; and to analyze computer usage for efficiency and enforcement of standards. BS Degree in Computer Science or related field or equivalent plus 2-3 years experience in applications program development, operations analysis and problem resolution, and job set-up or equivalent required. Starting salary to $17,856. Good benefits package. Application deadline 12/2/83. Send resume to: Personnel Services Office, Ball State University, Muncie, IN 47306.

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PROGRAMMER

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Successful upward mob undergoing rapid expansion seeks top flight DP Mgr. Strong managerial & technical skills, utilizing Sys 34/36/38 is essential. In depth knowledge of general industry. Systems 36 currently in-house. Small comp...

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Coordinator of Academic Computing

Montgomery College, a comprehensive multi-campus Community College in suburban Maryland is seeking applicants for the position of Coordinator of Academic Computing. The individual in this position reports to the Director of Computing Services and is responsible for the development, design, evaluation and recommendation of college-wide computer-based resources for instructional use. This position works closely with the Director of Computing Services in the overall operational management of the Department. A Master's degree in either Business Administration, Computer Science, Management Information Systems, or any other appropriate area, and work experience in a data processing environment are required. Candidate must be familiar with micro, mini, word processing and mainframe computer system components, devices, software and overall integrated systems development, applications, and utilization strategies. Candidates must possess excellent written, oral, organizational and interpersonal communications skills and general management skills. This salary range for this position is from $39,701 to $57,488. Starting salary range will be based on the candidates qualifications and is expected to be in mid-range. Excellent fringe benefits. Send resume with cover position title noted to: Personnel Office, Montgomery College, 51 Mannakee Street, Rockville, MD 20850 by December 16, 1983. An EO/AA/Title IX Employer

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We also own the largest privately owned telecommunications network in the nation, so for sheer size, you're not likely to find a larger setting to exercise your skills and polish your professionalism.

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Send your resume in confidence to:
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Join a well-funded, rapidly growing product development effort in Portland, Oregon. Participate in the development of a database computer that advances the state of the art. All positions require a bachelor's degree in computer science or a related area, and structured design experience. VAX/VMS experience a definite plus.

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- 5 years experience designing and implementing user-friendly, interactive interfaces for bit-mapped or cursor-addressable displays.
- 3 years interactive graphics experience.
- 3 years Fortran experience.
- Database experience.

Man/Machine Interface Design

- 3 years experience designing and implementing user-friendly, interactive interfaces for bit-mapped or cursor-addressable displays.
- 2 years interactive graphics experience.
- 2 years Fortran experience.
- Database experience a plus.

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- 5 years experience evaluating software written in a high level languages.
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- Must have evaluated a large software product such as a compiler, interpreter or data base system.
- PASCAL and Fortran experience.
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Excellent facilities located in the heart of Portland, yet minutes from uncrowded suburban living. Highly competitive salaries, excellent fringe benefits, equity in the product, plus relocation. Because we are a small company, the work of each individual is important. Design teams are small and the atmosphere is informal. Close to skiing, boating, mountain climbing and ocean beaches.

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As Arizona's resource leader, we are seeking additional energetic professionals to bring their talents and expertise to our organization.

PROGRAMMER ANALYST III/IV

We have an opening in our Corporate Models Development Department. The department provides design and support of computer applications for engineering and planning functions. This position requires experience with PLI, IMS and TSO/SPF. Familiarity with MARK IV or FORTRAN. 3 to 5 years as a Programmer Analyst is required.

PROGRAMMER ANALYST II

We also have an opening in our Power Plant Systems Development Department. The department assists in the enhancement and support of the Materials Management System. This position requires experience with COBOL. Familiarity with MARK IV, SAS and JCL helpful. 2 years as a Programmer Analyst is required. On-line experience helpful.

Applicants for both positions should have a degree in Computer Science, Math, or Engineering. The equivalent experience is acceptable.

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A Company of The Dun & Bradstreet Corporation

We have the following openings at our Wilton, CT headquarters:

NETWORK CONSULTANT: Coordinate conversion of companies from current data communications network, work up plans describing changes, perform as a Project Manager. BS or equivalent with 4 years experience with data communications. Should have exposure to packet switching technology and IBM communications hardware/software.

SENIOR SYSTEMS PROGRAMMER: Development, maintenance, testing of SNA and other network projects. 3-4 years in systems programming. BS in Computer Science. Knowledge of SNA protocol and packet switching networks.

PROGRAMMER: Develop and implement data bases for accounting, network traffic, statistics and billing systems. 2 plus years programming experience with knowledge of NOMAD and FORTRAN.

We offer the opportunity for client contact, problem solving, personal growth, travel, and the expansion of your technical capabilities.

For the ambitious person, these positions offer maximum opportunity for growth as well as excellent benefits. Salary commensurate with experience.

For immediate consideration, please send your resume along with salary requirement to:

Tricia Vengesarejana
Dunsnet, Inc.
Personnel Administrator
Box B
187 Danbury Road
Wilton, CT 06897

We are an Equal Opportunity Employer

Data Base Administrator

The Pan American Health Organization is seeking qualified candidates to serve as its Data Base Administrator. Requirements include university degree in mathematics, information science, computer science or another appropriate specialty as well as experience within a major data processing installation using COBOL or PL/1 and ADABAS. Data base experience should include the following skills:

- Data Base Design and Implementation
- Data Base Tuning and Monitoring
- Data Base Integrity and Security Planning and Implementation
- Data Base Dictionary Operation and Control
- Definition of Access Strategies, Standards, and Control
- Data Base Systems Evaluation, Installation and Control

Interested individuals should forward their resumes to:

Pan American Health Organization
Department of Personnel
525 23rd Street, N.W.
Washington, D.C. 20037

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PROGRAMMER ANALYSTS—At least 3 years in systems design and programming.

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With a prestigious roster of clients throughout the USA, Canada and South America, we're able to offer excellent salaries and benefits. Plus the opportunity to support advanced R&D efforts at our plush, new West Palm Beach headquarters.

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If interested, send your resume or a letter outlining your qualifications to the employment representative at the location that interests you.

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digital™

OFFICE AUTOMATION/ INFORMATION PLANNING EXPERT

The National Cancer Institute (NCI), National Institutes of Health, Public Health Service, is seeking a professional to establish an organizational unit to provide planning, developmental and management support to the Office of the Director and the five operating divisions in the area of office automation and information planning (OA/IP). The Institute is the lead Federal agency in cancer research and is responsible for coordinating the National Cancer Program. Its mandate includes both basic and applied research programs related to the understanding of the causes of cancer, and improvements in detection, diagnosis, treatment, and rehabilitation.

The objective of this effort is to improve the efficiency and the effectiveness of Institute operating systems. With a budget of approximately 1 billion dollars, the Institute reflects a complex management system with the possibility of major gains in efficiency by appropriately incorporating current and projected advances in office automation. The incumbent will be responsible for the initial staffing of the unit with Federal employees.

Applicants should have formal training in information management, computer science, engineering, management, or operations research as well as experience in OA systems design and selection, experience and training in data communications technology and application of OA technology (hardware and software). Experience in local area networks, federal procurement regulations and project management is desirable.

Qualifications:

Requirements. Formal training should include a BA in one of the following areas and at least 1 year of training in a second area listed: information management, computer science, engineering, management science, and operations research.

At least five years total recent "hands on" experience in the following two areas is required:

- systems analysis, design, and selection for information or OA systems
- OA technology applications including hardware, software, and data communications aspects

Experience in local area networks, federal procurement regulations and project management is desirable.

The position of Expert has a duration of 2 years. The salary range will be $48,553—$63,115 depending on the expertise and experience of the individual selected for the position. The applicant selected will be covered by Civil Service Retirement and will be eligible for life insurance and health benefits.

The position is located at the NIH Campus in Bethesda, Maryland.

NIH is an equal opportunity employer.

Interested persons should submit a SF-171 (Personal Qualifications Statement) by January 3 to:

Ms. Valerie Berlew
Personnel Management Branch
National Cancer Institute
Building 31, Room 3A23, 9000 Rockville Pike
Bethesda, Maryland 20205

If additional information is needed, please call Ms. Berlew at 301/496-6864.

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Dataserv Computer Maintenance is expanding nationwide. We now have immediate openings in major cities and will be adding more in the near future.

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Immediate opening for engineer with experience on IBM tapes, printers, disks, display equipment.

Dataserv will soon have additional opportunities for field engineers and technical specialists in several other major cities throughout the United States. If you are considering a change in employment, contact Dataserv for a review of what we have to offer.

For immediate consideration and more information call **Toll Free — 800-328-6729** or send your resume to: **Bev Walters, Dataserv Computer Maintenance, Inc., P.O. Box 3003, Hopkins, MN 55343.** We are an equal opportunity employer and all inquiries are considered confidential.

dataserv

TENNECO

SENIOR DATABASE ANALYST

Tenneco West, a major producer and marketer of agricultural food products, has an excellent career opportunity available for an experienced database analyst. The successful candidate will join the Database Administration Group and will be responsible for database analysis and planning and for both Logical and physical database design. This position requires a minimum of 2-4 years of database analysis experience. Experience with IDMS database software is highly desirable.

The systems environment includes an IBM 4341 running DOS/VSE under VM/CMS with CICS. IDMS is installed along with OLQ, ADS/ON-LINE, IDD, and IDMS DC/UCF. Major database applications include CFS-general ledger and CIMS-inventory control, MRP and BOM.

We offer a new and growing database environment providing challenges and opportunities for individual growth. This opening is in our Bakersfield, California office. We offer excellent benefits and working conditions. Salary commensurate with experience and background.

Send resume and salary history in confidence to:

EMPLOYMENT MANAGER
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P.O. Box 5380
Bakersfield, CA 93388

E.O.E. M/F/H

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ENGINEER, INC.
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Suite 1540
Houston, Texas 77027
(713) 960-9604

SYSTEMS SOFTWARE SPECIALIST

A large Midwestern manufacturing firm seeks an experienced Software Specialist (systems programmer) to plan, install, enhance, tune, and maintain operating system software in IBM OS/MVS, DOS/VSE, and VM/SP environments.

Required qualifications include proficiency in IBM System/370 assembler language, OS/MVS JCL, working knowledge of OS/MVS internals, and 2 to 4 years experience in installation/maintenance of OS/MVS.

Preference will be given to candidates with Bachelor's Degree in Computer Science, Engineering, or other sciences; experience with CICS/VS, DL1 or IMS/VS, IDMS, VM/SP/CMS internals and maintenance, and DOS/VSE maintenance; experience in converting from a DOS/VSE production environment to OS/MVS.

This position offers the opportunity for career development and excellent salary and company-paid benefits. Please forward resume and salary requirements to:

CW-84314
Computerworld
Box 880
Framingham, MA 01701

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MFH

INFORMATION SYSTEMS DIRECTOR

The leading multi-hospital system in Western New York will be expanding Information Systems to extend its aggressive growth plans. An opportunity exists for a data processing executive to manage our total information system and be a key member of our management team. The successful candidate will possess a track record that demonstrates a unique blend of technical, business and people skills. A record of accomplishments in a technically sophisticated environment is required along with an appropriate degree and related managerial experiences.

The compensation and relocation package for this position is designed to attract the highest caliber individual. Please send your resume and salary history to: **Personnel Office, Millard Fillmore Hospitals, 3 Gates Circle, Buffalo, NY 14209. EOE/M/F**

SYSTEM ANALYST, SENIOR-Designs systems, & develops application programming specification (of moderate difficulty) upon approval of systems requirements specs. Conducts technical reviews of application programming specs with technical support & data base administration. Teaches & assists less exp analyst/programmers in system development, programming & testing activities. Must be familiar with assembler, RPG II and RPG III, Fortran, Cobol, PL-1 & basic computer language. 40 Hrs/wk. $34,000/yr. B.S. Degree computer science. 5 yrs. exp. Send resume to: Kelsey National Corporation, 1901 Century Park East, Suite 1200, Los Angeles, CA 90067.

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Outstanding opportunities exist in New England for Program Managers, Project Leaders, Systems Programmers, Systems Analysts, Programmer Analysts, Software Engineers, with two plus years experience. Experience "quality of life" while achieving your career goals. Call or write today in total confidence.

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VOICE NETWORK PLANNING

Candidates should have at least five years' experience in cost analysis, planning and/or design of public or large private voice networks. Familiarity with new technologies, tariffs, services and equipment is essential.

DATA NETWORK PLANNING

Candidates should possess a minimum of five years' experience in cost analysis, planning and/or design of public or private data networks. Experience in both packet-switching and local area networks is highly desirable.

If you are interested in challenging technical work coupled with an excellent salary and benefit package, please send resume, including salary history, to:

Carla Rodstrom, Personnel Administrator
Logica Inc., 666 Third Ave., New York, NY 10017

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As an integral part of our timesharing organization, you will be responsible for systems software maintenance, systems gens and performance. You will also be involved with programming and some assembler utility routines. You will qualify if you have 2-3 years' VM/CMS systems programming experience. A BS or Computer Science degree would make you especially competitive as would strong oral/analytical communication skills. This job may require some overtime and travel. One major highlight of this position is that you will have the professional freedom to work in an unsupervised, unstructured environment. Salaries for this position can range from high 20's to high 30's (depending on qualifications) and our benefits are outstanding.

Turn your future into an exciting place to be by sending your resume to ***PACIFIC TELEPHONE, Management Employment, 1001 Wilshire Blvd., Suite 300, Dept. 83-752, Los Angeles, CA 90017.*** *Relocation not provided. No agencies, please. We are an equal opportunity employer.*

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SYSTEM SENIOR ANALYST

A leading manufacturer located east of Pittsburgh, PA, at its corporate headquarters is seeking an individual with strong systems management skills to direct a staff of Systems Analysts and Programmers in the design, development, [illegible] of business and manufacturing systems within our MIS department.

The successful applicant will plan, organize and formulate systems development strategies, maintain an effective project support system and provide staff counseling.

The ideal candidate will also possess effective systems and managerial ability with a minimum of 7 years MIS experience in applications and development with at least 3 years in a supervisory capacity. A BS degree preferred in Computer Science is required. We offer a competitive salary, full range of benefits and an opportunity to develop your professional skills.

Please forward resume including salary history in confidence to:

Box CW-B4318
Computerworld
Box 880
Framingham, MA 01701

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PROGRAMMER ANALYST TO: $30,000 2-5 yrs banking exp., prefer CO, sys. experience and knowledge of Florida software packages.

PROGRAMMER ANALYST TO: $30,000 2-5 yrs exp. Prefer fixed assets/accounts payable knowledge. Will involve heavy user interface.

PROGRAMMER ANALYST TO: $30,000 CPCS - COBOL/ASSEMBLER. Requires good communication skills plus ability to work with user groups.

PROGRAMMER ANALYST TO: $30,000 3033 experience. CICS, MACRO. Will also require extensive user interface.

SYSTEMS PROGRAMMER TO: $35,000 Minimum 2 yrs exp. Coordination of capacity planning/performance tuning. Requires UVS/SP, XPC/VTAM, SMS, CMF, SMST/1 or Crystal. Must possess good written and oral comm. skills.

All positions offer excellent career option, plus exceptional benefits and competitive salaries. For information of the above and other DP positions contact Larry Sterns, at 704-375-0909 or send resume in confidence to:

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Charlotte, NC 28281

HOW TO MAKE OVER $30,000.00 A YEAR ON THE COMMAND LEVEL PROGRAMMING

Acquire one of the most demanded & rewarding programming skills in months instead of 2 years. A complete self-study book based on CICS latest version 1.5, written in COBOL and with special emphasis on VSAM. It covers virtually every CICS technique you will ever need. Fifteen sample programs address all CICS major applications. Over 150 ready-to-use examples. Sample programs include: Menu, Add, Update, Delete, Browse, Print 24x80, Print 66x132, Print Any Size Report, Message Routing, Screen Refreshing, VSAM Alternate Index Setup and Manipulation, Constant Table Setup and [illegible] and more.

It is hard to believe the learning can be so easy until you try it. In hours, you can start to create your own BMS maps; in days, you can start to write your own pseudo conversational CICS programs. Some CICS techniques are especially hard. When you are stuck for the technical problems, you'll be thankful you have this book.

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But act now. Send $34.95 (plus $2.00 for shp. & hndl.) or $32. ea. for 2, $30 ea. for 3, $28. ea. for 4 and over. (shp. & handl. incl.) in Check or money order to: CCD [illegible] INC., P.O. BOX 795759, DALLAS, TX 75379. Allow 1 to 2 weeks for delivery. Full refund within 10 days if not satisfied.

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In fifteen years Boole & Babbage has become a world leader in the development of both software products and educational and consulting services designed to facilitate, plan for, and optimize the management of large IBM and compatible computer systems.

Corporate growth worldwide has been impressive. And we are now searching for experienced people committed to excellence in this field who would like to join Boole & Babbage's sales organization in the Chicago, Atlanta and St. Louis areas.

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Boole & Babbage

Information Resource Management
Tools : Education : Experience

SYSTEMS/ PROGRAMMER

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Salary is competitive and commensurate with your academic training, work experience, and ability to contribute. For confidential consideration, send your resume TODAY to:

Daniel L. Scheaffer
Manager-Employee Selection & Development
Rocky Mountain Energy
10 Longs Peak Drive
Box 2000
Broomfield, Colorado 80020

Rocky Mountain Energy

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COMMUNICATIONS SOFTWARE SPECIALIST

A large Midwestern manufacturing firm seeks an experienced Communications Software Specialist to plan, configure and administer a company-wide telecommunications network. Responsibilities will include network topology design and network control software maintenance. The network serves a multi-mainframe, multi-vendor, multi-protocol environment. Future plans include the incorporation of Personal Computers and local area networks into the company data processing system.

Required qualifications include proficiency in IBM System/370 assembler language, 2 to 3 years experience in CICS/VS maintenance and CICS/VS internals, 2 to 3 years experience in software maintenance of a telecommunications control unit (IBM 3705, Comten, CC-80, etc.)

Preference will be given to candidates with Bachelor's Degree in Computer Science, Engineering, or other hard science; experience with VM/CMS, DOS/VSE, and OS/MVS systems; written communication skills, including the ability to prepare publication quality technical documentation.

This position offers the opportunity for career development and excellent salary and company-paid benefits. Please forward resume and salary requirements to:

CW-B4312
Computerworld
Box 880
Framingham, MA 01701

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SCIENTIFIC PROGRAMMER

Midwest company has a position available for an individual to define and develop functional specifications for electric utility energy management systems. The person selected will be responsible for the design, implementation, and test of the systems, as well as, the co-ordination of integration and factory acceptance tests, field installation and availability tests. Position requires a degree in one of the physical sciences and 6 years of experience in Real Time Network Communications Systems and Real Time Electric Utility Energy Management Systems. Experience on CYBER 170 and CYBER 18-60 processors with a good systems knowledge of NOS/BE and MBOS is necessary with a strong background in ASSEMBLY and FORTRAN languages. Salary to $3150/month. Hours are 8 am to 5 pm with a 40 hour week. Interested applicants should send resume to:

Randy Thompson
S.E.D.E.S
324 Second Ave., South
Minneapolis, MN 55401

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Four year liberal arts campus located 150 mi. west of Mpls-St. Paul at edge of MN famous lake region seeks Ph.D. or ABD in Computer Science or closely related area to teach upper/lower division C.Sci courses. Requires strong teaching research interest. Person expected to develop and teach upper div Opr. Syst., Compiler, Automata, Architecture. UMM is recipient of Title III grant from U.S. Dept. of Ed. to develop these courses. DEC VAX-11/780 (VMS), PDP-11/44 (UNIX). Access to CDC CYBER's 170, CRAY 1 and IBM 4341. Assistant Prof for Ph.D tenure-track. Salary negotiable. Excellent fringe. Start Jan 2 or Sept 16, 1984. Send resume, transcripts, and 3 letters of reference by Nov 28 for Jan 2 start date to Dr. James Olson, Chairman, Division of Science and Math, Rm 217E, University of Minnesota, Morris, Morris, MN 56267. The University of Minnesota, Morris is an equal opportunity educator and employer and specifically invites and encourages applications from women and minorities.

NATIONAL BUREAU OF STANDARDS
INSTITUTE FOR COMPUTER SCIENCES AND TECHNOLOGY

OPPORTUNITIES FOR CHALLENGING POSITIONS IN COMPUTER SCIENCE AND TECHNOLOGY

Computer Scientists/Electrical Engineers

The System Components Division of the Institute for Computer Sciences and Technology at the National Bureau of Standards is seeking GS-12,13,14, and 15 Computer Scientists and Electrical Engineers to perform research and advanced development on multiprocessing computer systems, speech recognition, data encryption for computer security, and optical digital data disk/high density magnetic recording. Successful applicants must possess an in-depth knowledge and familiarity with one or more of the following technological areas:

MULTIPROCESSING COMPUTER SYSTEMS

Theoretical and applied computer science and technology with emphasis on computer architecture, multiprocessing systems, or parallel processing.

SPEECH RECOGNITION

Theoretical and applied pattern recognition technology with emphasis on acoustics, phonetics, and artificial intelligence algorithms and languages.

DATA ENCRYPTION FOR COMPUTER SECURITY

Theoretical and applied computer science, data communications, mathematics, cryptographic algorithms, and computer security analysis problem definition.

OPTICAL DIGITAL DATA DISK/HIGH DENSITY MAGNETIC RECORDING

Theoretical and applied optical and magnetic tekehnology with emphasis on computer mass storage, system architecture, or dynamic test and measurement techniques.

These position range from the GS-12 to GS-15 grade levels depending upon qualifications and experience and offer competitive salary, excellent career benefits and professional growth opportunities. Please send your Personal Qualifications Statement (SF-171) to:

U.S. Department of Commerce
National Bureau of Standards
Administration Building, Room A-123
Washington, D.C. 20234
ATTN: Josephine White (CW)

The National Bureau of Standards is located in modern facilities in Gaithersburg, Maryland and is an EQUAL EMPLOYMENT AFFIRMATIVE ACTION Employer. U.S. Citizenship is required.

SYSTEMS PROGRAMMERS/ ANALYSTS

PACIFIC NORTHWEST

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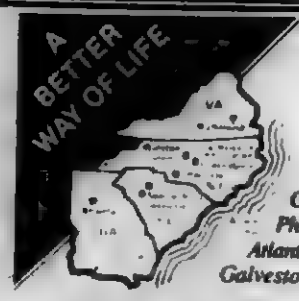

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BS in Computer Science or equivalent curriculum required. At least 3 years experience programming in a OS/CICS/COBOL environment plus 4 years experience designing administrative systems such as finance, accts, payroll or personnel. This experience should be on one of the major database systems such as ADABAS, IMS, or IDMS

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EE degree preferred or equivalent in college, military or vocational training. Minimum of 5 years experience in minicomputer systems and peripherals. Experience on Cambex, Magnuson or Formation desired. Will handle preventive maintenance, repairs, modifications and installation of computer systems and peripherals, modems, multiplexors, facsimiles, switch gears and UPS systems.

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BS/BA required. 6 years experience in production of 35mm aperture cards to mil specs. Must be qualified in Engineering reprographic process to "Blow-Back" aperture cards onto polyester base materials. Will instruct in-house personnel in micrographics techniques.

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BA required. Minimum of 3 years experience in MIS in one or more of the following areas: programming, systems analysis or computer operations. Some teaching experience in school or industry desirable. Must be fluent in Arabic (written and spoken)

Training Specialist

BS/BA required. Minimum of 5 years experience in software engineering or systems programming. A significant amount of experience should be in DP curriculum development and training. In addition, experience in resource planning and development of marketing aid desirable. Knowledge of Arabic a plus.

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Degree required. DP professional with 3 to 5 years programming experience on payroll/personnel systems. Experience should include 1 to 2 years supervision of data entry clerks. Bi-lingual English/Arabic required. This is a SINGLE STATUS POSITION

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HARRIS

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St. Louis, Missouri 63146
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Brown-Forman, a consumer products company and one of the world's largest producers and marketers of distilled spirits and wines, is currently seeking a highly motivated Management Information Systems (MIS) Professional. This important position is responsible for the hands-on design, development, implementation, and maintenance of comprehensive (EDP) Management Information Systems for the International Division of the company.

The qualified candidate will possess a BS in Computer Sciences, Business Math or Engineering, and at least 5 years of business systems analysis experience. Experience in automated financial applications, preferably with micro computers, is essential. We prefer demonstrated skills in initiating and executing projects, and the ability to implement tasks independently. An MBA in Finance or Accounting is highly desirable.

We offer an excellent salary and benefits package and opportunities for the future. For prompt consideration, please send your resume with salary history to:

Linda LeBlanc
Manager of Staffing

BROWN-FORMAN CORPORATION
P.O. Box 1080
Louisville, KY 40201-1080

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(617) 423-1200
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Sutter Community Hospitals
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EOE M/F/H

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Kaiser Electroprecision
Attn: Mike Hollo
Data Processing Manager
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Irvine, CA 92714
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COMPUTER OPERATIONS TECHNICIAN-Monitor computer systems to locate & investigate user problems in hardware, software & telecom. areas. Identify & isolate problem & route those connected w/hardware & telecom. to approp. technician. Using basic command codes, troubleshoot & correct all software problems. Maint/enhance software systems. 1 yr or 1 yr programming/operations exp. A.A.S. in Data Processing. Must have knowl. COBOL & ASSEMBLER. $450 per wk. 40 hrs/5 days/wk. Resumes to:

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Positions are immediately available in many locations in Florida, Michigan, Ohio, Virginia, Tennessee, Louisiana, & Oklahoma.

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SR. SOFTWARE PROGRAMMERS
SR. DATA BASE ADMINISTRATOR - IMS, DB/DC
SR. PROGRAMMER/ANALYST - IMS, DB/DC
SR. PROGRAMMER/ANALYST - CICS, COBOL
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Eastern is a leader in airline computer technology having 3 IBM 9083's and 5 IBM 3033's. Our real time network serves approximately 20,000 online terminals. We offer excellent short term career growth opportunity, company paid dental, medical, life and retirement insurance, relocation reimbursement and outstanding worldwide travel discounts. Living in Florida offers a sun filled casual outdoor lifestyle with no state income tax.

If interested, please call Marilyn Brooks at (305) 873-3680 for more information or send a detailed resume to:

Eastern Airlines
Management Recruiting
Department MB
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NATIONAL BUREAU OF STANDARDS
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Desirable experiences includes systems programming with current VAX/VMS and UNIX operating systems. An undergraduate degree which consisted of 30 semester hours in mathematics, statistics and computer science and included differential and integral calculus courses is required in addition to at least 3 years of experience in the computer science field.

This position is either GS-12 or GS-13 grade level, depending upon qualifications and experience. It offers competitive salary, excellent career benefits and professional growth opportunities. Please send your Personal Qualifications Statement (SF-171) to:

U.S. Department of Commerce
National Bureau of Standards
Administration Building, Room A-123
Washington, D.C. 20234
Attn: Ms. Josephine White (CW)

The National Bureau of Standards is located in modern facilities in Gaithersburg, Maryland and is an Equal Employment Affirmative Action Employer. U.S. Citizenship is required.

Systems Engineer to design and develop software to guild laser trimming equipment for the manufacture of hybrid circuits; will utilize software development languages such as Motorola 68000 Assembly language and "C" programming language; will utilize knowledge of Analog and Digital electronics as well as electronic measurements to design software to control electronic measurements related to laser trimming; software will be designed for multitasking operating systems as well as compiler construction. PDP-11/23 computer will be used for software development. Bachelor of Technology or equivalent in Electrical Engineering required as well as 1 1/2 years experience as Systems Engineer or 1 1/2 years experience as a Field Service Engineer for microprocessor development systems and electronic measurement systems. 40 hours, 9 to 5, $30,000. per year. Resumes required. Please contact Mr. Joseph Milani, President, Chicago Laser Systems, Inc., 4034 North Nashville, Chicago, IL 60634.

Data Processing Instructor

Academic year position starting Spring 1984. Salary based on education and experience; excellent fringe benefits.

Qualifications: Desired: Bachelor's degree with course work in data processing/computer science. Previous teaching experience plus practical work experience in a data processing/computer science environment.

Responsibilities: Teach data processing from the introductory course through some of the higher level languages. Instructing on micro computers and mainframe. Work with data processing advisory committee, develop and evaluate curricula.

Application Requirements: Completed application form, copies of transcripts, resume and three letters of recommendation or placement file.

Closing Date: November 28, 1983.

Arizona Western College
Personnel Office
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DARYL SEARCY, Manager of MIS Recruitment
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Equal Opportunity Employer M/F/H/V

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We are a north suburban marketing firm, leader in our industry and a profitable division of a Fortune 100 company. We are searching for a Project Manager to lead the development of new Marketing and Operating systems. Creativity and strong management and technical expertise [illegible]

The ideal candidate will have 7-10 years experience in systems development including several years management responsibilities with strong familiarity with TSO, CICS and DL1. BA/BS required; advance degree a plus. Our state-of-the-art environment includes IBM 3081 and 3033 hardware with OS/MVS, JES 3 operating systems.

We can offer upward mobility, visibility and challenge to the individual who has the capability of building and directing a staff of 8-15 analysts and programmers in structuring and implementing the MIS systems we will need to keep pace with our growth. We offer compensation to mid 40's plus bonus participation and an outstanding synergistic work environment. All inquiries will be treated with the utmost confidentiality. Please send your resume detailing your background, salary history, and major accomplishments to:

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Box 880, Framingham, MA 01701

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Experience with MSC and/or DBRC a plus.

CICS SYSTEMS PROGRAMMERS - Experience required in ALC, CICS Problem Determination and CICS Multiple Region Operation. Experience in CICS Internals, CICS ISC OR CICS RACF Security a plus.

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AT&T Information Systems

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IDMS VM CMS Cobol Fortran	$45M
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SJA Mktg dev	$43M
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SYSTEMS PROGRAMMER

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BSCS (or equivalent) necessary coupled with minimum 1 year experience in support of Minicomputer systems plus at least 3 years experience as an MVS Systems Programmer. Flexibility to comprehend systems of a variety of vendors as necessary.

Pacific Telecom provides an unusually attractive environment conducive to professional enhancement and personal satisfaction. Our brand new Corporate headquarters offers an outstanding workplace and our Data Processing environment includes MVS, TSO/SPF, IDMS, VAX and DPS6.

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DEC-10
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Apply in person or send resume with salary requirements to:

Gallaudet College
Personnel Office
800 Florida Ave. NE
Washington, DC 20002

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PROGRAMMER ANALYSTS

As the information processing subsidiary of the $18 billion Norwest Corporation, Norwest Information Services is responsible for providing high-quality financial data processing services to the corporation, its 87 affiliates and a number of independent banks. A results-oriented organization, we are proud of our ability to consistently deliver 100% of our defined objectives — more than 99% of the time.

If you are a Programmer/Analyst with Hogan Umbrella experience, our dynamic career environment can deliver for you as well. We are seeking a number of experienced Programmer/Analysts to join our development teams as they embark on an aggressive propagation schedule. Duties are the reading of PEM dumps, working with PEM utilities, trace problems, and installation of new releases.

In addition, we also need experienced persons to work on the analysis, coding, and testing of bank applications. You will be responsible for screen development and report writing under Hogan.

To find out more about our organization, these opportunities and our friendly environment where the president meets all new employees, simply fill out and return the instant application form below. We will get back shortly to tell you about our current projects and excellent benefits including HMO, dental, retirement, free checking, loan and brokerage discounts, and a vacation program that is commensurate with experience.

EOE/Affirmative Action/M/F

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Attach a current resume (if available) and mail in complete confidence to. LeEtta Flicker

Norwest Information Services, Inc.
[redacted]
Minneapolis, MN 55479.

NORWEST INFORMATION SERVICES

EXPANSION OPENINGS
Salary ..... $15 to $70,000

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HDLC Wide Data Communications
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Computer Career Resources
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SCIENTIFIC PROGRAMMER

Midwest company has a position available for an individual to define and develop functional specifications for electric utility energy management systems. The person selected will be responsible for the design, implementation, and test of the systems, as well as, the co-ordination of integration and factory acceptance tests, field installation and availability tests. Position requires a degree in one of the physical sciences and 6 years of experience in Real Time Network Communications Systems and Real Time Electric Utility Energy Management Systems. Experience on CYBER 170 and CYBER 18-50 processors with a good systems knowledge of NOS/BE and MSOS is necessary with a strong background in ASSEMBLY and FORTRAN languages. Salary to $2840/month. Hours are 8 am to 5 pm with a 40 hour week. Interested applicants should send resume to:

Nancy Thompson
M.D.E.S.
[redacted]
Minneapolis, MN 55401
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Diversified national retail corporation based in the Washington, DC suburbs needs a seasoned DP Manager with 7-10 years actual management experience for our expanding DP department. Position responsibilities include new systems development, programming and operations.

The qualified candidate will have a good technical background with on-line and telecommunication experience as well as extensive financial application and distributive processing exposure.

We offer an excellent compensation package and the opportunity to work within a successful and still growing organization. Send resume and salary history to:

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Computerworld
Box 880
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EOE

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Confidential Search
Dr. James A. McCain
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Please forward resume immediately to:

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Carol Stuart, DP Specialist
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Binghamton, NY 13905
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DIRECTOR OF MANAGEMENT INFORMATION SYSTEMS

Oakwood Hospital, a progressive, 615-bed teaching hospital located in suburban Detroit, has an exciting opportunity for a key management individual to participate in the selection, and direct the implementation, of our information systems.

The successful candidate will have a Master's degree in Computer Science or a related discipline, 5-10 years of management experience in a computer service department, preferably in a health care environment, demonstrated strong communication and interpersonal skills, and a thorough knowledge of the state-of-the-art in health care systems.

We'll provide an excellent salary and benefits package. Please forward a resume and salary history in confidence to:

Personnel Department, OAKWOOD HOSPITAL, 18101 Oakwood Blvd., Dearborn, MI 48124

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Oakwood Hospital

SYSTEMS ANALYST

Los Angeles based high-technology firm is seeking an experienced Systems Analyst with solid background in stock market applications, including options and commodities.

Minimum qualifications include good applications programming skills and in-depth experience with developing real-time brokerage systems.

Excellent opportunity to be an individual contributor in a high-growth company. Benefits include company paid medical/dental/life/vision insurance for employees and dependents, and educational assistance.

CW-84317
Computerworld
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In credit card transaction processing, there is only one leader...Financial Institution Services. To maintain that position, we are now expanding to meet the demands of nearly 3,000,000 on-line transactions daily. This growth has created immediate career opportunities for experienced Credit Card Systems Analysts.

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INFORMATION TECTONICS
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MARLTON, NJ 08053
800-696-2244

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Our clients' needs are:

32 Programmer/Analysts COBOL
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11100 E. Bethany, Suite 1420
Aurora, CO 80222

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We are seeking a self motivated programmer to join our progressive organization, located in downtown Washington, D.C. We offer a wide range of challenging assignments, comfortable work environment, competitive fringe benefits, and realistic possibilities for future advancement.

Position requires several years programming experience, including ALC and COBOL, preferably with exposure to financial applications and systems development and modification. Some knowledge of VSAM and CICS/VS is desirable.

Qualified candidates (principals only) are encouraged to send complete resume or letter outlining qualifications, including indication of current salary to address below:

Madison National Bank
Personnel Department
1730 M Street N.W.
Washington, D.C. 20036
EOE/M/F

SCIENTIFIC PROGRAMMER

Midwest company has a position available for an individual to define and develop functional specifications for electric utility energy management systems. The person selected will be responsible for the design, implementation, and test of the systems, as well as, the co-ordination of integration and factory acceptance tests, field installation and availability tests. Position requires a degree in one of the physical sciences and 6 years of experience in Real Time Network Communications Systems and Real Time Electric Utility Energy Management Systems. Experience on CYBER 170 and CYBER 18-50 processors with a good systems knowledge of NOS/BE and MSOS is necessary with a strong background in ASSEMBLY and FORTRAN languages. Salary to $3288/month. Hours are 8 am to 5 pm with a 40 hour week. Interested applicants should send resume to:

Nancy Thompson
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Minneapolis, MN 55401
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Director of Computer Center

Colver College is seeking applicants for the position of Director of the Computer Center to teach computer courses, work with the administration in developing applications for IBM System/34, and direct the operations of the College's Computer Center. This position requires considerable experience in computer operations and at least a Master's degree. Candidates must be familiar with COBOL and Database Management. Salary commensurate with education and experience. Colver College is a small, four year college located two blocks from the headquarters of a Fortune 500 company and within 90 minutes of both the beach and the mountains. Send resume by December 15 to: Dr. Malcolm C. Beddoe, Dean of the College, Hartsville, South Carolina 29550. EOE.

Sacramento & San Joaquin Valley

Systems Development Mgr	$36K
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Executive Recruiting Agency
[redacted]
Sacramento, CA 95825
(916) 481-6141 (916) 923-9074

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ENVIRONMENT: • 3033 & 3091, MVS/JES 3, DL1, CICS, TSO SPF, Panvalet

POSITIONS:
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- SYSTEMS ANALYST – 3 yrs. experience
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- SR. SYSTEMS ANALYST – 4 yrs. experience
- ASSOCIATE TECHNICAL SPECIALISTS – 5 yrs. experience
- TECHNICAL SPECIALIST – 7 yrs. experience

If you are ready to join a company with a strong history of innovation where individual ideas are encouraged and rewarded, consider one of Signature. Also. Our progressive management philosophy includes such payroll benefits as a complete fitness center within our facility, excellent salaries and comprehensive benefits.

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SIGNATURE
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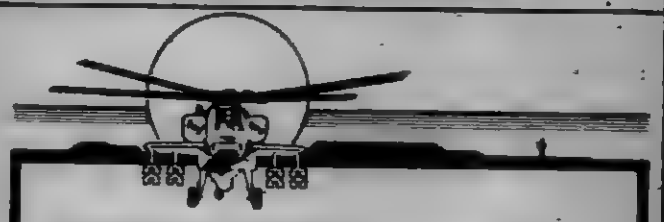

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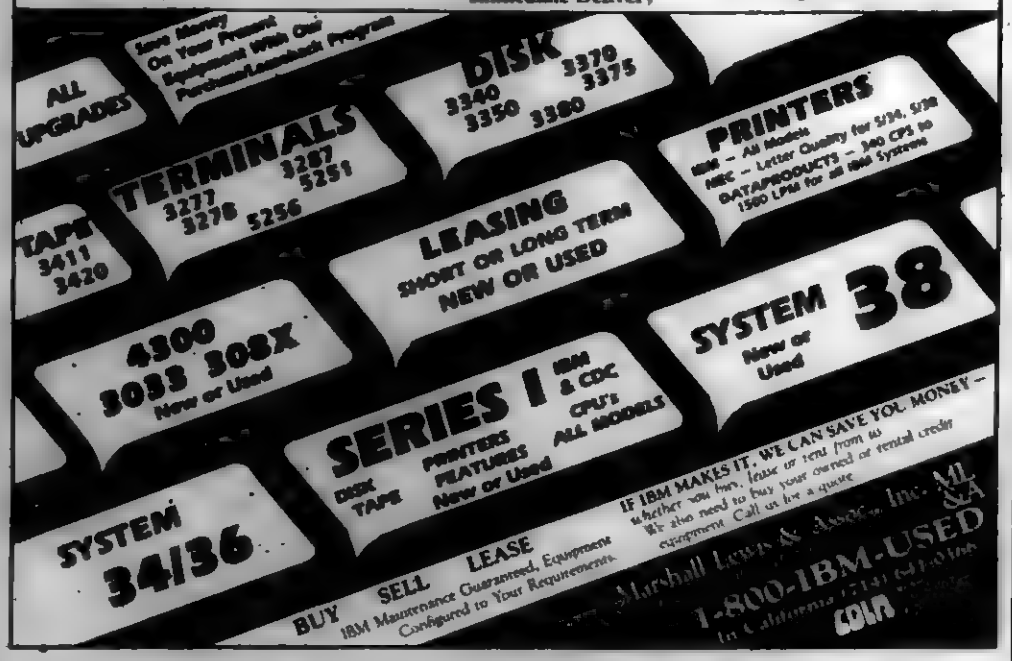

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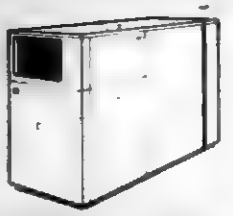

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Request for Proposal No. 884, due 3:30 p.m., Tuesday, November 29, 1983, for the acquisition of two (2) SAS packages for the University of Mississippi.

Request for Proposal No. 885, due 3:30 p.m., Thursday, December 1, 1983, for the purchase of the upgrade components necessary to facilitate a 3780 communications link between a Hewlett Packard 3000/44 and Datapoint 5500 minicomputer for the State Dept. of Administration.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

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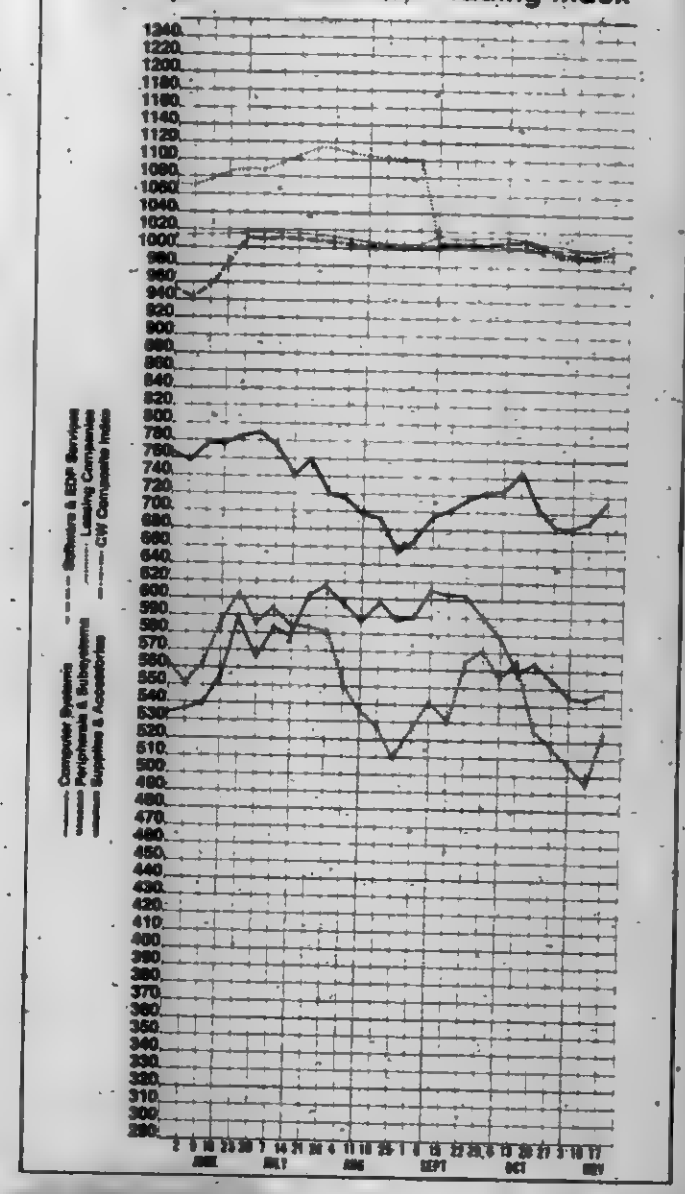

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CLOSING PRICES WEDNESDAY, NOVEMBER 16, 1983

All figures compiled and tabulated by TRADE QUOTES INC Cambridge Mass. (617)

COMPUTER SYSTEMS

		1982-83 RANGE (1)	CLOSE NOV 16 1983	NEWS NET CHANGE	NEWS PCT CHANGE
O	ALPHA MICROSYSTEMS	11- 24	16 3/4	0	0.0
O	ALTOS COMPUTER SYST	9- 28	9 3/4	+1 1/4	+15.0
A	ANSAHL CORP	9- 20	10 3/4	+2 1/4	+12.0
O	APPLE COMPUTER INC	10- 63	24	+ 3/4	+3.0
N	AT&T	80- 70	53 1/8	- 7/8	-1.3
O	BURROUGHS CORP	39- 58	49 1/8	+ 1/8	+0.2
O	COMPUTER AUTOMATION	8- 17	8 3/4	+ 3/8	+5.0
A	COMPUTER CONSOLES	9- 28	18 5/8	+1 1/2	+8.2
O	CONTROL DATA CORP	21- 62	45 7/8	-1	-2.1
O	CONVERGENT TECHNOL	10- 41	23 3/8	+1 3/8	+6.2
O	CRAY RESEARCH INC	30- 84	52 5/8	+1 3/4	+3.4
N	DATA GENERAL CORP	20- 82	72 3/4	-1 1/4	-1.8
N	DATAPOINT CORP	11- 38	38	+3	+12.0
N	DIGITAL EQUIPMENT	102-132	120 1/8	0	0.0
A	EECO INC	6- 18	14 1/8	0	0.0
N	ELECTRONIC ASSOC.	9- 19	8 3/4	+ 3/8	+10.2
N	FLOATING POINT SYST	18- 44	32 3/4	+1	+3.1
N	FOXBORO	22- 47	33 3/4	+1 3/8	+4.2
O	GENERAL AUTOMATION	3- 18	11 1/2	+2 1/4	+24.3
N	GOULD INC	28- 64	30 1/2	+1 3/8	+4.7
N	HARRIS CORP	29- 51	36	+1 1/4	+3.4
N	HEWLETT-PACKARD CO	22- 98	38 3/8	+2 7/8	+7.8
N	HONEYWELL INC	86-132	120 1/8	+4 1/8	+3.2
N	IBM	97-134	124 3/4	+1 1/8	+0.9
O	IPL SYSTEMS INC	9- 14	9 3/4	+ 1/4	+4.8
N	M/A-COM INC	21- 38	26 7/8	+1 1/8	+4.3
O	MAGNUSON COMP SYSTS	2- 9	3 3/8	+2 3/8	+10.9
N	MANAGEMENT ASSIST	7- 18	17 3/8	- 3/8	-2.1
A	MATSUSHITA ELEC(ADR)	42- 77	34 3/8	+2 3/8	+3.8
N	MODULAR COMPUTER SYS	9- 18	8	- 1/8	-1.5
N	MOHAWK DATA SCI	10- 18	13 3/4	+ 3/8	+2.8
N	MOTOROLA INC	82-148	140 7/8	+6	+4.4
N	NAT'L SEMICONDUCTOR	22- 60	31 3/4	+ 3/8	+1.4
N	NCR	38-138	132 3/4	+4 1/4	+3.3
N	PERKIN-ELMER	17- 37	27 7/8	- 3/8	-2.8
N	PRIME COMPUTER INC	11- 30	16 3/8	- 3/4	-4.8
N	SPERRY CORP	31- 47	44 1/2	+1 1/4	+2.8
O	TANDEM COMPUTERS INC	14- 38	30 1/8	+1 3/8	+5.0
N	TANDY CORP	34- 88	38 1/4	+2 1/4	+6.2
O	TELEVIDEO SYSTEMS	10- 41	17 3/8	+1 3/4	+11.1
N	TEXAS INSTRUMENTS	71-148	137	+10 3/8	+8.4
O	VECTOR GRAPHICS INC	2- 14	2 3/8	- 1/2	-17.3
A	WANG LABS "B"	13- 42	34	- 1/4	-0.7
A	WANG LABS "C"	11- 42	34 1/2	- 1/8	-0.3
N	XEROX CORP	38- 58	46 1/2	0	0.0

LEASING COMPANIES

O	BOOTHE FINANCIAL CP	11- 30	28 1/2	0	0.0
N	COMDISCO INC	7- 42	18 1/8	+0 3/4	+17.1
O	CONTINENTAL INFO SYS	3- 16	8 3/4	+1	+13.4
N	DPF INC	8- 15	13 3/4	- 1/8	-0.8
N	U.S. LEASING	18- 47	38 1/8	+1 3/8	+3.8

COMPONENTS

N	ADVANCED MICRO DEV	12- 38	31 3/4	+2 1/4	+7.6
N	ADV'D MICROMICRO	12- 34	24	+2 3/4	+12.3
N	ANALOG DEVICES INC	18- 42	28 3/8	+1	+3.7
O	ANALOGIC CORP	20- 27	23 1/4	+1 1/2	+6.8
N	APPLIED MAGNETICS CP	19- 37	31 7/8	+0 5/8	+1.4
N	TERADYNE	16- 38	37	+2	+5.8

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		1982-83 RANGE (1)	CLOSE NOV 16 1983	NEWS NET CHANGE	NEWS PCT CHANGE
O	ADVANCED COMP TECH	1- 8	3	0	0.0
O	ADVANCED SYSTEMS INC	9- 22	17	0	0.0
O	ADR COMPUTERS INC	7- 32	23 3/4	+1 1/4	+8.3
O	AMERICAN SOFTWARE	21- 31	22 1/2	+ 3/4	+3.4
N	ANACOMP INC	6- 23	8 7/8	+1	+17.0
N	ANALYSTS INTL CORP	5- 20	15 3/4	+ 3/4	+5.0
A	APPLIED DATA RES.	8- 37	30 3/4	+1 3/4	+6.0
O	ASK COMPUTER SYSTEMS	6- 21	17 1/2	.9	0.0
N	AUTOMATRIX CORP IND	1- 7	2 3/4	+ 1/8	+4.7
N	AUTOMATIC DATA PROC	31- 66	54 5/8	- 5/8	-2.1
O	CDA COMPUTER ASSOC	9- 17	12 1/4	- 1/2	-3.9
O	COMPUTER ASSOC INT'L	20- 39	29 1/2	- 1/8	-0.8
O	COMPUTER HORIZONS	9- 20	12	+1 3/4	+17.0
O	COMPUTER NETWORK	4- 16	8	- 1/8	-2.0
N	COMPUTER SCIENCES	11- 33	17 1/4	+ 7/8	+5.3
O	COMPUTER TASK GROUP	8- 22	14 1/2	+ 3/4	+5.4
O	COMPUTER USAGE	2- 22	13 1/2	- 3/4	-5.2
O	COMPUTONE SYSTEMS	5- 38	8 1/2	+1 1/4	+22.0
O	CONSERV CORP	9- 23	5 1/8	- 1/2	-8.8
O	CONSHARE	7- 13	10 7/8	+ 1/8	+1.1
N	CULLINET SOFTWARE	12- 50	41 1/2	+5 1/4	+14.4
O	CYCARE SYSTEMS INC	9- 27	17 1/2	+ 1/4	+1.4
N	ELECTRONIC DATA SYST	10- 42	40 1/8	+3 1/2	+9.5
N	HOGAN SYSTEM INC	27- 53	36 1/8	+1 1/2	+4.3
N	GENERAL ELECTRIC CO	60- 80	69 1/8	+ 7/8	+1.6
N	GTE CORP	39- 68	62 3/4	- 7/8	-1.6
N	INFORMATICS INC	16- 34	22 1/4	+7	+9.4
N	INFOTRON SYSTEMS COR	25- 43	38 1/2	+6 1/2	+7.9
O	KEANE ASSOCIATES	4- 15	7 1/4	- 1/2	-6.4
A	LOGICON	8- 31	28	+2	+7.4
N	MCI COMMUNICATIONS	12- 34	14 3/8	+ 1/8	+0.8
O	MMT SCI ANTE INC	8- 33	31 3/4	+3 3/4	+13.3
O	MATHEMATICAL APP GRP	10- 22	10	-2 1/2	-20.0
O	MICOR SYSTEMS INC	20- 38	34 1/4	+3 1/4	+7.9
O	MINICOM-MEDER CP	8- 22	10 1/2	+2	+23.5
O	NATIONAL DATA CORP	9- 28	20 1/8	+1 3/8	+7.2
O	ON-LINE SOFTWARE INT	17- 27	20	+3	+17.6
O	PANSOPHIC SYSTEMS	9- 20	21	+1 3/4	+9.0
N	PLANNING RESEARCH	6- 21	18 3/8	+ 3/8	+2.3
O	POLICY MGMT SYSTS CP	19- 38	30 1/2	+3 1/4	+11.8
O	PROGRAMMING & SYS	1- 8	3 1/8	+ 3/4	+19.7
O	REYNOLDS & REYNOLD	17- 33	25 1/2	+1	+4.2
O	SCI CORP	11- 34	28 3/8	+1 1/2	+6.1
O	SHARED MEDICAL SYST	13- 43	38 1/8	+3 7/8	+11.1
O	SCIENTIFIC COMPUTERS	8- 14	10 1/4	- 1/4	-2.3
O	SOFTWARE AG	3- 17	10 1/8	+ 3/8	+3.8
N	TYMSHARE INC	12- 36	22 1/8	+2	+9.4
A	UAS CORP	9- 18	13 1/2	+ 5/8	+4.8
N	UTLY CORP	7- 17	16	+ 1/4	+2.9

PERIPHERALS & SUBSYSTEMS

P	AM INTERNATIONAL	7- 7	6 1/4	+	+1.4
A	AMERICAN JACOBSON	9- 28	8 1/8	-1 1/4	-13.3
O	AUTO-TROL TECHNOLOGY	6- 28	20 3/4	+1 7/8	+10.0
O	BANCTEC INC	7- 23	16 1/2	+ 1/4	+1.5
A	BECKMAN INT'L	6- 12	7 3/8	+ 1/4	+3.5
A	BOLT, BERANEK & NEW	8- 50	47 3/4	+1 1/4	+2.6
O	CIPHER D CORP	2- 4	3 7/8	+ 3/8	+23.4
N	CENTRONICS DATA CORP	6- 20	18 1/8	+3 3/8	+22.8
A	CETEC CORP	6- 12	10 1/8	+1	+10.0
O	COGNITRONICS	2- 20	8 1/8	- 3/4	-7.5

		1982-83 RANGE (1)	CLOSE NOV 16 1983	NEWS NET CHANGE	NEWS PCT CHANGE
O	COMPUTER DEVICES INC	1- 21	1 1/8	- 3/8	-25.0
O	COMPUTER TRANSCEIVER	4- 13	4 7/8	0	0.0
O	COMPUTERVISION CORP	18- 33	42 7/8	+ 5/8	+1.4
A	COMTAC CORP	17- 38	18 3/4	- 1/2	-2.6
A	DATAPRODUCTS CORP	18- 41	28 7/8	+1 1/2	+5.4
A	DATARAM CORP	5- 12	11 1/8	+1 1/8	+11.2
O	DATA SWITCH CORP	13- 41	29 1/2	+4	+15.6
O	DATUM INC	7- 17	10	+ 3/8	+3.9
O	DECISION DATA COMPUT	7- 18	11 3/4	+ 7/8	+8.0
O	DOCUTEL-OLIVETTI	11- 38	12 1/2	+1 1/2	+13.6
N	ELECTRONIC M & M	3- 11	7 1/8	+ 1/8	+1.7
O	EVANS & SUTHERLAND	10- 30	15 3/8	+2 1/8	+10.0
O	GANDALF TECHNOLOGIES	9- 22	8 1/8	+ 1/8	+1.7
N	GERBER DATA COMP IND	6- 28	27 1/2	+3	+12.3
O	GREAT EQUIPMENT IND	1- 6	1	- 1/8	-20.0
N	HAZELTINE CORP	7- 31	23 7/8	+3 1/2	+17.1
O	ICOT CORP	3- 16	4	+ 3/8	+10.3
O	INFORMATION INTL INC	10- 32	14 1/2	+1 1/8	+8.4
O	INTEL CORP	11- 48	41 3/4	+4 1/8	+11.3
O	IPL SYSTEMS INC	9- 16	9 3/4	+ 1/8	+4.8
A	LUNDY ELECTRONICS	7- 18	12 1/8	+1 1/8	+13.4
O	MEGADATA CORP	8- 13	11 1/2	+ 3/8	+3.9
A	MEI DATA CORP	18- 37	21 3/8	+1 1/8	+5.5
A	MINIMA CORP	6- 28	26 1/2	+1 1/8	+4.3
O	NETWORK SYSTEMS CORP	9- 34	23 1/2	+2 5/8	+10.2
N	NV AMERICAN PHILIPS	67- 98	90 7/8	+1 5/8	+1.8
O	NORTHERN TELECOM LTD	33- 48	42 1/8	+2	+4.9
O	OMEX	2- 8	3 3/4	- 1/8	-3.2
O	PARADYNE CORP	14- 30	18 3/8	+1	+5.3
O	PERKIN ELMER	7- 14	10	0	0.0
O	PHOENIX AMERICAN INC	7- 17	13 3/4	+1 1/8	+11.0
O	PLESSEY CO (ADR)	26- 61	32 1/2	+ 1/2	+1.5
O	PRINTRONIX INC	23- 34	28 1/4	+4 1/8	+17.1
O	QANTEX CORP	9- 28	12	+2 3/4	+22.7
N	RAYTHEON CO	42- 58	44 7/8	+1	+2.2
A	RECOGNITION EQUIP	4- 17	15 1/8	+ 3/8	+2.5
O	ROLM CORP	48- 80	38 3/4	+6 1/8	+7.8
N	SANDERS ASSOCIATES	32-170	38 1/8	+1 1/2	+4.7
O	SCAN DATA	1- 3	3 1/8	0	0.0
O	SCAN-TRON CORP	12- 16	13 3/4	0	0.0
N	SCIENTIFIC ATLANTA	19- 33	29 1/8	0	0.0
O	STORAGE TECHNOLOGY	19- 33	14 3/8	+1 3/8	+8.3
O	SYKES DATATRONICS	3- 27	4 7/8	- 1/8	-2.5
O	SYSTEMS & COMP TECH	29- 38	28 1/4	+1 1/4	+4.6
A	T BAR INC	7- 17	8 1/8	+ 1/8	+1.5
A	TAB PRODUCTS CO	9- 30	21	0	0.0
O	TANDON CORP	19- 38	23	+3	+15.0
A	TEC INC	6- 12	8 3/8	- 1/8	-3.7
O	TELTRONICS INC	36- 87	80 1/2	+2 3/4	+3.5
N	TELEX	9- 38	34 7/8	+1 1/8	+3.3
O	TESDATA SYSTEMS CP	3- 17	10 7/8	+1	+10.1
N	TIMEPLEX INC	7- 28	24	+1 3/4	+7.8
N	VISUAL TECHNOLOGY	9- 28	17 3/4	+ 1/4	+1.4
N	AMERICAN BUS PHONE	11- 34	28	- 3/4	-2.6
N	BARRY WRIGHT	13- 32	33	+ 7/8	+2.7
A	DATAPLEX PRODUCTS INC	12- 28	26 1/8	+ 1/8	+0.5
O	DAVIS BUS. FORMS	8- 28	26 5/8	- 3/8	-1.3
O	3M COMPANY	69- 89	88 3/8	+ 1/4	+0.2
O	MOORE CORP LTD	28- 51	44 1/2	+ 3/8	+0.7
O	STANDARD REGISTER	11- 34	34 3/4	+1 1/8	+3.3
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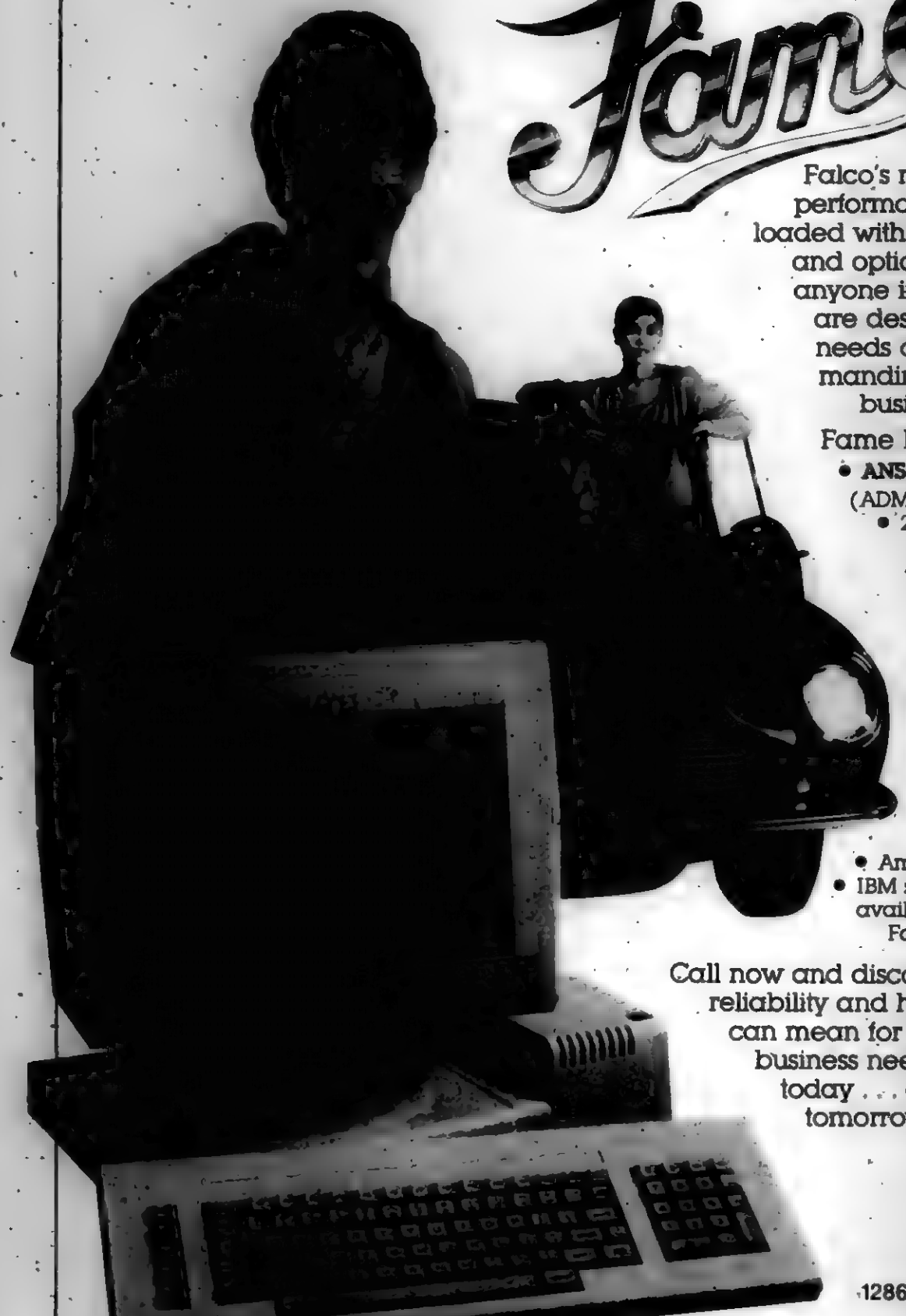

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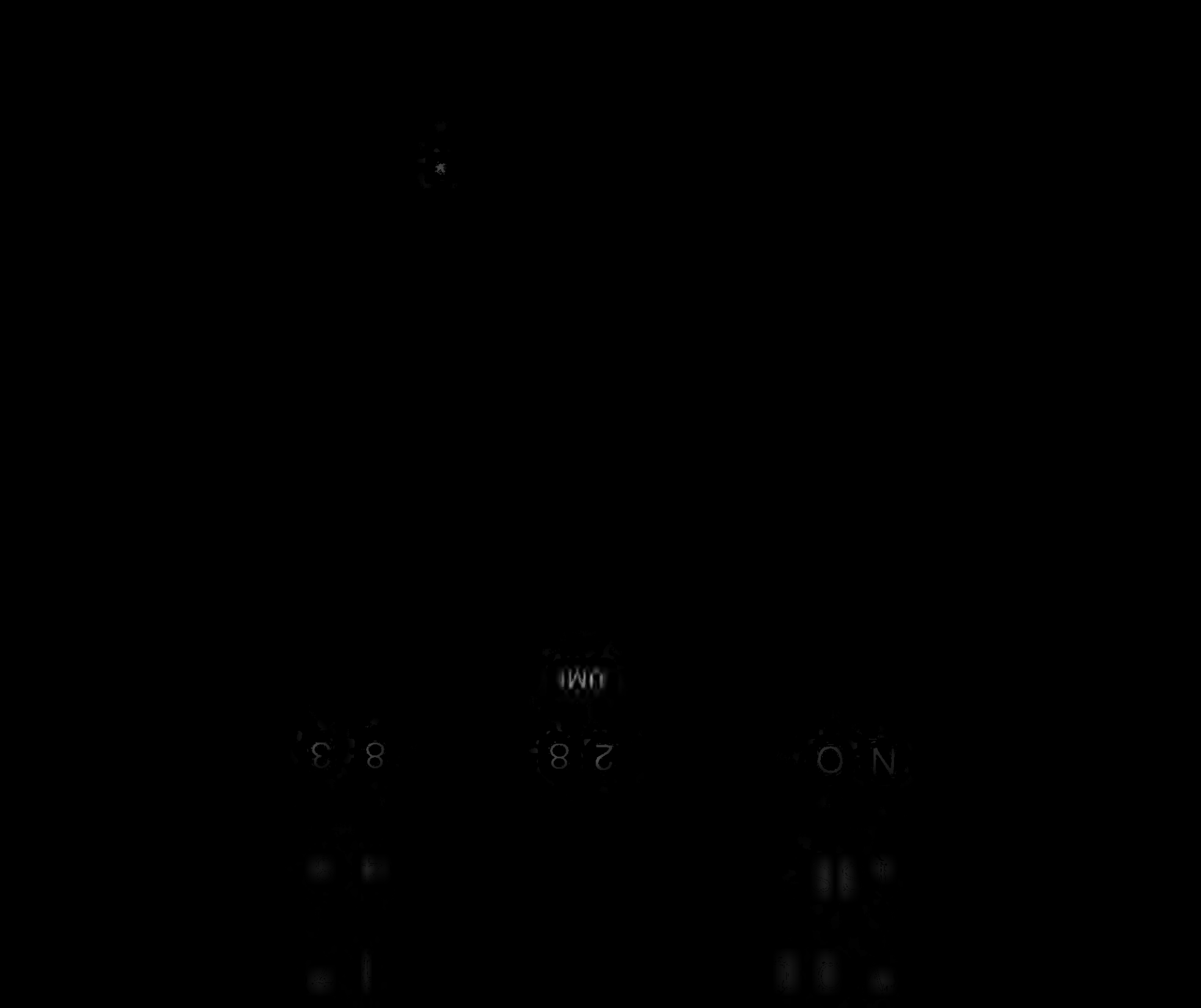
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NEWSPAPER

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper

Second-class postage paid at Framingham, Mass. and additional mailing offices ©1983 by CW Communications/Inc.

y; $44/year

November 28, 1983

Vol. XVII, No. 48

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A robot that replaced four workers is the focus of a possibly precedent-setting complaint filed by a Pittsburgh union. **Page 4.**

• • •

Just weeks after it ducked out of the home computer market, Texas Instruments, Inc. leaped into another hot market area by introducing a suitcase-size computer for business professionals. **Page 7.**

• • •

Information systems managers will face increasing pressures as micro-to-mainframe links allow more people to compete for host system time, a senior IBM manager warned at last week's Enterprise Information Systems Forum. **Page 10.**

• • •

"When in doubt, buy it out" seems to be the battle cry of software and services firms this year. **Page 135.**

Congressional Action Desultory

No DP Crime Law Again This Year

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Supporters of federal computer crime legislation have seen yet another year pass without congressional action on bills to make misuse and abuse of computers a federal crime.

When Congress adjourned for the year Nov. 18, the growing number of federal bills on this subject had received no more than initial consideration. A last-day hearing on the bills in a House of Representatives judiciary subcommittee was held as little more than a favor to the bills' sponsors, who pressed the subcommittee for action, but they were not given much reason to hope that the legislation would move any faster next year.

Rep. Don Edwards (D-Calif.), chairman of the Judiciary Subcommittee on Civil and Constitutional Rights, which has jurisdiction over the bills, told the hearing that "the subcommittee will move ahead promptly" to determine if there is a need for a federal law on computer crime.

Rep. Bill Nelson (D-Fla.), sponsor of the Federal Computer Systems Protection Act, reminded Edwards that he, Nelson, has been prodding the subcommittee for four years. Nelson said that even if every state passes its own computer crime law, there will still be a need for a law covering abuse of federal computers and computer systems in interstate commerce.

"You are quite legitimately concerned if there is a national mandate for this legislation," Nelson told Edwards. But pointing to a growing concern in Congress about computer security and crime — a concern prompted in no small part by the recent spate of arrests of youthful computer hackers caught illegally accessing computer systems — Nelson also said "that mandate is quite clearly now being spoken."

Although the current bills have moved no further than did the first computer crime bill, introduced more than six years ago, there is much more support for such legislation now on Capitol Hill. That support is shown in the number of different but related bills

(Continued on Page 8)

Part of VAX Shipment Surfaces in Sweden

By Peter Bartolik
And John Gallant
CW Staff

Part of an illegally shipped dual-processor Digital Equipment Corp. superminicomputer that had been reported seized in West Germany on Nov. 11 showed up a week ago in Sweden, just one stop away from its alleged destination in the Soviet Union.

The U.S. Customs Service revealed on Nov. 20 that part of the VAX-11/782 consignment reported seized in Hamburg, West Germany [CW, Nov. 21], had been shipped to Sweden aboard the Swedish vessel *Elgaren*, the same freighter that had carried it to Hamburg.

It was not known at press time how the second part of the consignment slipped by the West Germans or what exactly is in four closed containers currently under armed guard in the Swedish free port of Helsingborg.

Christine Frazer, a spokeswoman for U.S. Customs, said the three containers seized earlier this month in West Germany contained the VAX-11/782 along with generators, air conditioning units and other related equipment. But spokesmen for the U.S. State Department said the four containers in Sweden are "thought to be the VAX-11/782 Model I . . . [and] it is believed that the equipment is part of a shipment that passed through South Africa, part of which was confiscated in West Germany."

Customs' Frazer said the West Germans are conducting a complete inventory and investigation.

DEC spokesman Joseph Nahill said it was his understanding that only one dual-processor VAX-11/782 system was involved in the case. The company is cooperating with the Customs investigation and would not provide details on the New York company that allegedly shipped the equipment through an affiliated company in South Africa.

The South African company, according to press reports there and in the UK, is controlled by Richard Mueller, reported by British and South African press to be an agent of the Soviet KGB. Mueller has been named in two illegal export cases that occurred in the U.S. in the late 1970s. The first involved exporting equipment to establish a microcomputer assembly line [CW, Feb. 9, 1981]; the second concerned an attempt to ship a computerized drafting system to the Soviet Union [CW, Sept. 14, 1981].

Because of his alleged involvement in those cases, Mueller — a fugitive from a U.S. indictment — has been barred from U.S. trade for 20 years.

According to South African reports, Mueller relocated there in 1980 and purchased a vineyard for a

(Continued on Page 4)

Wide World Photo

Roadblock

Striking workers scuffled with police last week in front of Boston's Greyhound terminal in an effort to keep the buses from rolling. Programmers and data entry staff in Greyhound's DP shop either walked off the job or were drafted into non-computer-related services. Story on Page 5.

SPECIAL**REPORT**

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Protecting the Corporate Data Resource

COMPUTERWORLD

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Second-class postage paid at Framingham, Mass., and additional mailing offices. Computerworld (ISSN-0010-4841) is published weekly, except [illegible] (5 issues), April (5 issues), May (4 issues), June (5 issues), August (4 issues), September (5 issues), October (5 issues), November (4 issues), December (5 issues), and a single combined issue for the last week of December and the first week in January by CW Communications/Inc. Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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Consultants Commend Rolm for CBX II Despite Questions About Its Capabilities

By Jim Bartimo
CW Staff

With the introduction of its new switching system, Rolm Corp. has well served its installed base of customers and staved off competition from newer manufacturers of private branch exchanges (PBX), consultants told *Computerworld* last week. But some unanswered questions have arisen about the true technical capabilities of the system and IBM's purported role in the development of the product.

The CBX II is Rolm's first major product introduction since IBM purchased 17.7% of Rolm stock earlier this year. The announcement of the end-to-end, high-speed digital business communications system that can handle up to 10,000 voice and data users simultaneously came about two weeks ago [CW, Nov. 21]. Current users of Rolm CBX systems can upgrade to the CBX II to transfer data between telephones, terminals and computers.

The capability to transfer voice and data over the switch is of special interest to existing Rolm users who have been barraged by upstart companies like Mitel Corp. and Intecom, Inc. These companies have introduced the so-called "third-generation" PBXs that allow voice and data switching through a nonblocking architecture.

Analysis

Nonblocking is claimed to be superior for data switching because this architecture does not interrupt (block) data lines. Rolm's answer to the nonblocking invasion takes a different approach; according to Edward Horrell, president of the Memphis, Tenn., consulting firm of Mitchell & Horrell, Inc., "Rolm has always had a fairly wide bandwidth, but they've added some more and are distributing it on an as-needed basis."

Wider, switchable bandwidth also translates into faster transmission rates for data. "Local-area network people have been offering 10M bit/sec transmission rates, and PBX people have been offering 56K bit/sec," Horrell said. "So here comes Rolm with gigabits per second transmission."

While Horrell commended Rolm for giving its users an upgrade path to combined voice and data switching, he also questioned Rolm's ability to transmit billions of bits of data per second over twisted-pair wiring. Twisted copper-pair wiring — the standard telephone cable — has always stood in the way of high transmission rates for PBXs. "Nobody has shown me you can put that bandwidth on twisted pair," Horrell said.

IBM's Role Questioned

Another Tennessee consultant — James Gordon, president of TCS Communications Consultants in Nashville — raised questions about IBM's involvement in the project. Agreeing with other consultants that CBX II was probably developed before IBM purchased the Rolm stock, Gordon said, "I don't know if Rolm will connect to IBM better than anyone else."

Industry experts agreed that the IBM gateway on Rolm's CBX played a large role in IBM's decision to buy the Rolm stock.

Calling Rolm a "marketing company," PBX expert Charles R. Robbins of International Data Corp. in Framingham, Mass., suggested that the IBM gateway is more of a selling point than a technological achievement. "Rolm is very strong because of the IBM connection; but others are doing it too," he observed.

As a result of Rolm's concentration on IBM shops and other large installations, Robbins predicted the PBX maker will serve a smaller group of large companies — "mostly in the Fortune 100." With this development, smaller PBX makers with nonblocking architectures may still capture a large portion of the remaining market.

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IN-LAWS

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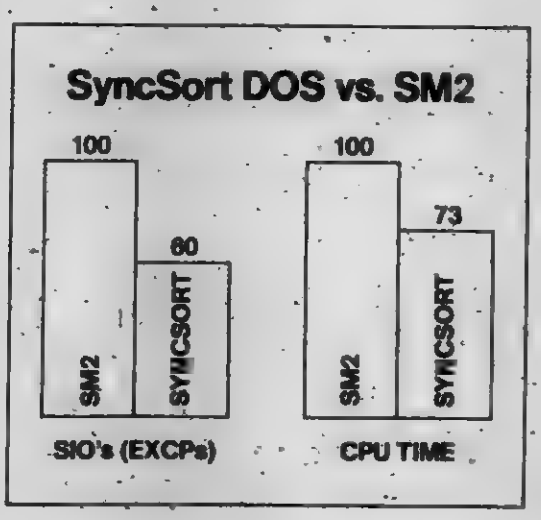

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Union Files Complaint Objecting to Robot

By Patricia Keefe
CW Staff

PITTSBURGH, Pa. — A potentially precedent-setting case concerning the rights of workers replaced by robots has been filed with the Federal Labor Relations Authority (FLRA) in New York.

The complaint, filed by Richard Clougherty, president of Local 644 of the American Federation of Government employees here, charges the U.S. Labor Department with failing to inform the union that a robot would be installed. It seeks to secure the employment rights of four workers who lost their jobs to the robot.

If a ruling is handed down in favor of the government employees involved, it could have a far-reaching impact on federal and private-sector organizations seeking to take advantage of robotics, according to Clougherty. He said organizations that install robotics will have to address rather than just consider the human side of automation.

Clougherty filed the complaint of unfair labor practices with the FLRA on Nov. 1, after learning a robot had been used at the Labor Department's Mine Safety and Health Administration (MSHA) since July to test dust samples from mines, replacing four nonunion MSHA laboratory employees. A union official discovered its presence accidentally while investigating another grievance.

Although the four workers do not belong to the union, federal law requires the union to represent all workers at the facility, Clougherty explained. The four workers have been assigned to other jobs, but Clougherty is concerned about their future employment. "Basically, they're doing busywork, and every day they get closer to running out of busywork to do and closer to the street."

Clougherty conceded the robot "is probably here to stay" and described the job it does as "dirty and terrible." However, the union is "fussed up" about what will happen to the four unskilled workers, not whether the robot can do the job better, he said.

Because of the publicity surrounding the case, Clougherty expects there will be pressure on the FLRA to resolve the dispute quickly. An investigator will start the process Dec. 5, when he visits here to interview the parties involved.

Clougherty claimed the case is an embarrassment to the Labor Department and said he expects it will deny the charge and force the case to go to a hearing. The union local president is convinced the case is a "sure winner." He said the union will ask that the robot be "retired" and the workers given back their jobs until MSHA and union officials can reach an agreement concerning the workers' future. Options include job retraining and transferring the workers to another government facility.

If the union does win, it could set a precedent for future robot/worker cases, Clougherty predicted. As for the FLRA, although it has settled cases on automation via the bargaining process, it has never before dealt with a case involving a robot.

Firm Indirectly Owned by China

Chipex Fined for Illegal Wafer Exports

By Peter Bartolik
CW Staff

SAN JOSE, Calif. — An electronics company based here and partially owned indirectly by the Peoples Republic of China recently pleaded guilty to exporting silicon wafers illegally and received the maximum $50,000 fine.

Chipex, Inc. pleaded guilty on Nov. 17 to shipping without export license the silicon materials that are generally used to manufacture integrated circuits. The shipments were made in May 1981.

The guilty plea came in response to a "criminal information" filing made by the U.S. Attorney's office. According to Assistant U.S. Attorney Eric Fisher, that kind of filing is a procedure that can be used in all cases involving misdemeanors and in felony cases where the accused waives the indictment procedure.

The U.S. government charged in the filing that Chipex was "just a front . . . to train Chinese engineers in the actual process" of manufacturing semiconductors, Fisher said. However, he indicated there was no sign that the company was acting as an intelligence agent for the communist Chinese goverment.

Chipex, according to Fisher, is owned by the Hong Kong firm of Hua Ko Electronic Co. Hua Ko is a joint venture of Teleart Ltd. of Hong Kong and Hua Yuan Import Export Co., the Hong Kong trading arm of Peking's China National Light Industries Corp.

Chipex had been under investigation by the U.S. Department of Commerce for two years prior to the filing in San Francisco U.S. District Court, Fisher said. On May 1 of last year, U.S. Customs agents seized a Chipex shipment of 75 silicon wafers that were about to be shipped from San Francisco's airport without an export license. The Justice Department also executed a search warrant against Chipex in July of last year.

"What [Chipex] actually set up was a wafer fabrication plant [in San Jose] and they purchased enough semiconductor manufacturing equipment to actually manufacture semiconductors," Fisher said, adding, "They obtained designs from various U.S. companies. What we alleged is that that was just a front; what they really were there to do was to train Chinese engineers in the actual process."

In a related case, two California firms hired as consultants by Chipex both pleaded guilty in September to the illegal export of technical data. United Pacific Enterprise, Inc. of Cupertino and HSCMOS, Inc. of Freemont were each fined $5,000 after criminal informations were filed in both cases.

As a result of the plea agreement, only the company was charged, and none of its executives face charges, according to Fisher. He said the company also faces civil and administrative penalties to be administered by the Commerce Department.

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More VAX Parts Surface

(Continued from Page 1)

reported sum of $2 million. South Africa's commissioner of police, Gen. Johann Coetzee, reportedly has said that Mueller is hiding in Austria and that South Africa is cooperating with two U.S. agents in a "top-level probe."

Mueller's wife, according to the reports, remains in Capetown, South Africa.

The U.S. Commerce Department, which reportedly issued an export license for the VAX system, would not comment on the New York firm that purchased and shipped the equipment or its alleged connection with Mueller. "Information on the name of the company granted the export license is not available for two quite compelling reasons," a Customs spokesman said. "One, the regulations . . . under which we grant these licenses require that we keep all information in them confidential. Second, we cannot comment on that because this particular case is under investigation."

A spokesman for the State Department, which is negotiating with Swedish officials over the fate of the VAX equipment seized in Sweden, could not identify the owner of the equipment, nor could he confirm or deny Mueller's alleged status as a spy.

A spokesman for the Swedish Embassy in Washington, D.C., said, "The authorities in Sweden have said they will do all they can to keep the equipment in Sweden; the coast guard and the police are guarding it at present. We are currently working on a solution with the buyer and the U.S. The status of the equipment is being investigated currently, and the contents of the shipment will be determined through that investigation."

Last Tuesday, the Swedish government announced it had invoked a regulation prohibiting the import of war material from South Africa, and the embassy spokesman added that no one had as yet claimed the shipment sitting in Helsingborg.

At Both Greyhound and Its Rival

DP Departments Feeling Impact of Bus Strike

By Jim Bartimo
CW Staff

PHOENIX — The three-week-old strike by union workers against Greyhound Lines, Inc., based here, is having an impact on the data processing departments of both Greyhound and its major competitor, Trailways, Inc. of Dallas.

The strike affects Greyhound's DP shop directly because about 70 data entry and keypunch personnel are union members and walked off their jobs along with the bus drivers. In addition, Greyhound programmers have been called upon to help out in understaffed sections of the company, performing duties that range from answering phones to washing buses in the company's garages.

To solve the data entry problem, work has been contracted out to temporary and personnel agencies. But "the worst thing is that programmers have been taken away from program development," according to Bob Wood, Greyhound's senior director of information systems. "A large number of programmers are working in the field."

Mainframes Tied to Six Cities

Greyhound's DP network is based here, where an IBM 4341 Model Group 1 processor is installed, and in Cleveland, which has an IBM 3033. A Systems Network Architecture (SNA) network ties the mainframes to six cities using Datapoint Corp. 6600 small business computers and Attached Resource Computer local-area networks and, in San Francisco, a remote job entry system. The company's remaining 200 locations use terminals to access the mainframes via dial-up lines and about 130 IBM 3680 point-of-sale (POS) terminals that access the SNA network.

The overall strike experience is not a totally negative one, Wood said. With programmers scattered around the country using the remote terminals for scheduling and accounting, the programmers are getting to know the end users' problems firsthand. In addition, "It's great [public relations] for the data processing department to help run the company."

Field offices are not the only areas depending on the DP department. "When you're in a strike situation, your management wants to know how the business is doing," Wood said. "We've set up a command center to give management frequent updates" on ticketing and revenues.

Beefed-Up Security

Security has been beefed up to ensure that none of the POS or data entry personnel attempt to sabotage the systems using their passwords. "You've got to take the same precautions you take when an employee leaves, but it's like you've got a 90% turnover," Wood pointed out.

Although Greyhound's buses are running at only 15% of capacity, Wood doesn't foresee any downtime for DP — but he does expect a backlog of at least two months because so many programmers have been called into the field. "Headquarters has been stripped bare," he said.

Another DP shop expecting a backlog as a result of the strike is at Trailways. With Greyhound working under capacity, Trailways is working over capacity to handle the overflow of bus riders.

"Our tickets are selling more and our payroll department needs more support because we're calling back furloughed employees," said Robert Zayas, Trailways' vice-president for management information systems. "We were still cleaning up some summer business when this happened. We'll still be busy two months after the strike."

General ledger and other revenue information is sent to Dallas by Trailways agents who put their paper records on a bus each day, but most of the scheduling information is online via GTE Telenet, Inc.'s packet-switched network.

'Security has been beefed up to ensure that none of the POS or data entry personnel attempt to sabotage the systems using their passwords. "You've got to take the same precautions you take when an employee leaves, but it's like you've got a 90% turnover," Wood pointed out.'

The Trailways schedule reporting system is based on a Honeywell, Inc. Level 6 processor with remote asynchronous Teletype Corp. Model 43 terminals. The field offices route the scheduling information through Dallas for distribution to other field offices.

With more than 80 Trailways-owned stations and 2,000 commissioned agents, the average number of messages received on the scheduling network is 50,000. Zayas expects the number of messages to remain constant as their length increases with the rise in passengers and the need for more scheduling information.

"You can't control what you can't measure." —Tom DeMarco

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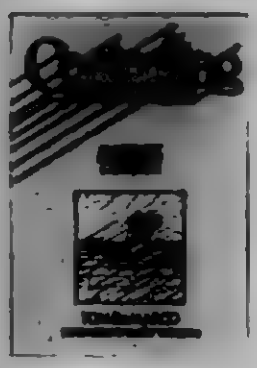

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Justice Slams CRS Abuses, Calls for Regulation

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The Justice Department said recently that airlines providing computerized reservations systems (CRS) have used their services in anticompetitive ways, requiring federal regulation to prevent further abuses and to make air travel reservation practices more equitable.

In a detailed, 200-page filing with the Civil Aeronautics Board (CAB), which is trying to develop CRS rules, Justice said its investigation of the reservation systems — in particular American Airlines' Sabre and United Airlines' Apollo, the two major CRS offerings — found widespread attempts to use those systems to harm competing airlines.

According to the filing, more than 50% of all airline ticket sales are made by travel agencies using CRS. Sabre and Apollo account for 70% of the industry, the department added. Other CRS mentioned in the study were Trans World Airlines' Pars system, Eastern Airline's System One and Delta Air Line's Datas II. Each of those five has dominant market shares in at least one urban area, Justice said.

Claims of Biased CRS Displays

Airlines that do not have their own CRS can, for a price, make their reservation information available over the existing ones. Following claims that host airlines are biasing their CRS displays for their own benefit and denying competitors access to their systems — claims strongly denied by the CRS hosts — the Justice Department began an inquiry into the CRS industry in early 1982.

"The important conclusions," Justice said of its investigation, "are that CRS confers upon an airline host both market power and the technological ability to target rival carriers and that the incentive to use that power is always present." Specific abuses of CRS detailed by Justice included:

- From November 1981 to February 1982, American suppressed from its CRS display Continental Airlines' "Supersaver" fares in 65 individual markets. "American decided not to match Continental's fares, but rather to remove them from Sabre's price-comparison display," Justice claimed.
- In 1981, New York Air entered the LaGuardia (New York City)-to-Detroit market in competition with American. "American altered Sabre's display logic so that New York Air flights would be buried far down in the display sequence." New York Air subsequently left the market after experiencing a drop in passenger volume, according to the filing.

"There is evidence that American's purpose was to punish New York Air for its entry and to intimidate New York Air so that it would not enter the LaGuardia-Chicago market in competition with American," the Justice Department added.

- There is also evidence that United "suppressed information on its Apollo system on specific Frontier, U.S. Air and, perhaps, Continental flights." Justice said evidence suggests United refused for 12 months to co-host Frontier, which competes directly in some markets, and did the same for shorter periods with respect to other airlines.

Justice added that American and United priced access to their systems using a strategy that considered the extent to which other airlines seeking co-hosting competed with the CRS provider.

The "most effective and most insidious" way of using CRS against competitors, Justice said, is by biasing the display against competitors, which the filing said is now "pervasive." United and American can adjust bias on a market-by-market basis, Jusice said.

"Not surprisingly," the filing said, "some rivals have shown trepidation about entering markets to compete with a dominant carrier that also hosts a CRS. A few carriers, such as Air Florida, Pan Am and Jet America, have even sought to gain favorable treatment on Apollo by suggesting that they would not compete intensely with United.

"It is unlikely, under current market conditions," the filing said, "that a new or expanding CRS can successfully challenge an incumbent carrier-owned CRS in the cities and regions where the incumbent has both a significant airline presence and a major share of the CRS market."

Justice noted that "the CRS industry is a young, technologically dynamic industry." Even though some regulation is necessary, "sound public policy" dictates that the government not "rush to impose public utility-type controls on the industry's prices or return on investment."

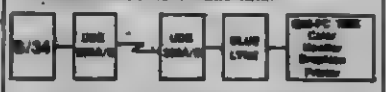
How Art Blumenthal "dumped the dumb"

Art Blumenthal knows his stuff. An 11-year IBMer, he now heads the firm that is the largest third-party programmer for System/34 and System/36 in the Baltimore area.

Art and his staff used to use IBM 5251 Model 12 dumb terminals to communicate with clients. Now they use BLUE LYNX-equipped IBM Personal Computer, and get all the benefits of the PC's offline power.

"I'm tickled pink with the thing," says Art. "We've had great success with it. Now, instead of being limited to the text processing program on the S/34, we have great word processing capabilities on the PC."

A typical configuration at Arthur Blumenthal Co. looks like this:



Besides the productivity enhancement, Art likes the BLUE LYNX bottom line: "At $4,000 for the PC system with BLUE LYNX and a graphics printer, it is a far sight less than the hardware it is replacing. The cost of a 5251 Model 12 with printer is about $8,000."

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Portable Micro Flies With Shuttle Today

By Jake Kirchner
CW Washington Bureau

CAPE CANAVERAL, Fla. — When the space shuttle *Columbia* leaps into orbit today, it will carry a crew of six, a $1 billion space lab for scientific experiments and a $6,200 off-the-shelf personal computer to help the crew track its position and time its experiments.

Following lift-off, the 10-lb, 12½-oz. Grid Systems Corp. Compass computer, measuring only 15 in. by 11½ in. by 2 in., will be removed from a cabinet on-board the *Columbia* and placed on the instrument console between mission commander John W. Young and pilot Brewster Shaw.

On the machine's 6-in. diagonal screen will be displayed a replica of the giant mission control map in Houston, showing shuttle orbits, mission elapsed time, day/night bands, indicators for the next Earth observation sight and time to arrival at the sight, location of the next ground communications site and satellite communications range and time to pick up and lose signals.

A real-time clock in the Compass will be set by the astronauts. The clock and map will allow the shuttle crew to know its exact location at all times, which will be particularly helpful during the times — 30% to 50% of each orbit — when the shuttle cannot communicate with mission control.

Before this flight, during the silent periods, the shuttle crew had to determine exact position using calculators and charts and maps, according to Grid Systems Vice-President Bruce Walter. For general orientation, he said, "What they did prior to this was to look out the window."

Mission control maps will be displayed on the Compass micro aboard the space shuttle *Columbia*. Shown here are orbit and night/day divisions.

The shuttle has, of course, other computers on board, including five general-purpose IBM processors and a small computer inside the space lab for scientific use. The space lab, developed over a 10-year period, rests inside *Columbia*'s hold and will be the center for more than 70 experiments conducted by two astronaut/scientists, plus a scientist from Germany and one from MIT.

The Compass, however, is the first portable personal computer taken into orbit in the nine shuttle flights. According to Willard F. Lochridge IV, director of Grid Systems' federal systems marketing, the only modifications made to the machine for this ride were to replace the internal modem with an interior fan for heat dissipation in the zero-gravity environment, to add a new, shuttle-compatible power cord and to wrap the unit with several strips of Velcro to keep it from floating about *Columbia*'s cabin.

The software for this application was developed by the National Aeronautics and Space Administration and is known as Spoc, or Shuttle Portable Onboard Computer. It is run under Grid Systems' Unix-like COS operating system.

According to Lochridge, this use of the Compass is experimental and was voted on board by the astronauts themselves after training with it in the shuttle simulator. In future flights, it could be used for additional purposes, such as figuring emergency landing procedures and sites, entering scientific data and keeping a mission log.

A Month After Nixing Home Computers

TI Takes Wraps Off 16-Bit Business Portable

By David Myers
CW New York Bureau

NEW YORK — Texas Instruments, Inc. has announced a 27-lb transportable computer that is compatible with TI's desktop Professional Computer and features a 16-bit chip architecture.

TI's Data Systems Group took the wraps off the Portable Professional Computer at a press conference here last week. The micro, which sells for $2,395 with a one-color display screen and $2,965 with a color screen, features a basic 64K bytes of random-access memory expandable to 768K bytes, offers up to 360K bytes of floppy disk storage and runs under Microsoft, Inc.'s MS-DOS 1.1 or 2.1 operating system.

While the machine puts TI into a highly active and potentially lucrative sector of the computer market, TI watchers are divided over the wisdom of the move in the wake of the Dallas company's $600 million ditching of its home computer business last month. "Did they trade one bad situation for another? That's the question people will be asking," said Michael Van Deelen, analyst with Rauscher Pierce Refsnes in Dallas.

And James L. Barlage of Smith Barney, Harris Upham here in New York pointed to the intense competition in the market for portables and remarked, "They're getting right back into the same ball game. They're losing money in their [personal computer] business right now. This will just add to [the loss]."

On the other hand, some observers see the debut of the 5¼-in. floppy-based portable as a reaffirmation of TI's commitment to the office rather than to the home. They note that TI's home and portable computers are produced by two separate divisions.

"The marketplace should not confuse this with the fiasco over the home computer. It's a sensible move in a market in which TI feels it has a role to play," said Gregory P. Richards, a stock analyst with Morgan Stanley & Co. here. "It shows TI is serious about staying in the business."

However, TI watchers seemed in general agreement that the new portable will not immediately help earnings recover from the financial bath TI took when it stopped manufacturing its 99/4A home computer.

The machine will be sold by TI dealers beginning next month. More information can be obtained from the firm through P.O. Box 225012, Mail Station 57, Dallas, Texas 75265.

Surcharge Delay Still in Effect

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — It looked last week as though the Federal Communications Commission (FCC) would stick with its earlier decision and delay for three months surcharges for access to the long-distance telephone network.

Last month, immediately after the commission deferred these charges from Jan. 1 to April 3 [CW, Oct. 24], AT&T, and then the soon-to-be-divested Bell operating companies, asked for reconsideration. The telephone companies charged that establishing interim arrangements for AT&T to reimburse the local carriers during the three-month hiatus would be very costly, tie up personnel needed for divestiture-related activities, reduce Bell operating company revenues and add to the investor confusion created by divestiture.

The U.S. Department of Justice initially agreed with the telephone companies, maintaining that the three-month suspension would "unnecessarily and inordinately complicate" divestiture [CW, Nov. 21]. But soon afterward, AT&T and Bell Atlantic, one of the seven new regional holding companies created by the breakup of the Bell system, agreed on a plan under which the former will pay the latter for access during the three-month interim period. All the other Bell regional companies subsequently agreed to this plan.

The carriers continue to insist that the FCC's three-month delay in imposing access surcharges on residential and business users will be onerous, despite the interim agreement. As AT&T pointed out in a comment to the commission Nov. 16, calculating the payments due the Bell operating companies will be "difficult and time-consuming." AT&T also said the Bell operating companies will not earn as much under the interim scheme as they would during the same period under the FCC's plan.

Justice, however, said that if the FCC decides to stick with the April 3 date, "the approach now agreed to by AT&T and the [operating companies] minimizes, to the extent possible, potential conflicts between the FCC suspension order and the Modified Final Judgment," the agreement settling the government's antitrust case against AT&T, and the department will support it.

Another Year; No Crime Bill

(Continued from Page 1)

on computer crime. They include:

- The Nelson bill, H.R. 1092, the direct descendant of the original 1977 bill, which would set penalties for misuse of computers in federal and interstate use.
- A get-tough bill, recently introduced by Rep. Lawrence Coughlin (R-Pa.) and numbered H.R. 4301, that is only three paragraphs long — just long enough to mandate penalties of up to 10 years in jail and/or $100,000 in fines for anyone using a computer in federal and interstate commerce without authorization.
- Two new bills from Rep. Daniel A. Mica (D-Fla.) — H.R. 4259 and an updated version, H.R. 4348, titled the Computer Fraud Prevention Act, which would not only set penalties for unauthorized computer use but also establish a government Computer Security Research Program and an Interagency Committee on Computer Crime and Abuse.
- Besides the Senate counterparts to most of these bills, there are also several bills that concern computer crime, including bills directed at credit card fraud and a bill already passed by the House to establish a Small Business Administration task force to educate and assist small businesses in their efforts to protect themselves from computer crime.

Nelson, Coughlin and Mica all appeared before the Edwards panel Nov. 18. They all said basically the same thing: It is time to pass some form of federal legislation on computer crime.

Rep. Dan Glickman (D-Kan.), whose Transportation Aviation and Materials Subcommittee recently held several days of hearings on computer security and crime, also suggested that the issue is so important that it may require that a separate congressional subcommittee be established.

Barriers to Legislation

At this point, three major barriers to passage of such legislation remain: the belief, particularly by Edwards, that the computer crime problem might be more effectively and more properly tackled at the state level; lack of strong support from the private sector, especially the DP community, which seems to prefer additional study before legislation; and the lack of a firm Reagan administration position on the federal legislation.

John C. Keeney, deputy assistant attorney general and head of the Justice Department's Criminal Division, told the Edwards subcommittee that "the administration is actively reviewing various legislative proposals in this area, but at this juncture we have not yet reached a final decision on what type of new legislation we believe is needed."

Keeney said the Nelson bill is preferable to the short but tough approach of the Coughlin bill and told the subcommittee that an administration recommendation on legislation will be made to Congress soon.

Speaking for the Federal Bureau of Investigation, Floyd I. Clarke, head of the bureau's Criminal Investigative Division, would only say that although prosecution of these crimes might in the future be aided by a federal law, "we in the FBI have not had, to date, any significant problems in prosecuting ... under existing statutes over which we have jurisdiction, such as the fraud by wire statute."

Although Congress adjourned without acting on any of these bills, the legislation will still be up for consideration when Congress returns in January. The sponsors of the legislation are already promising renewed efforts to move some form of federal computer crime bill through Congress at that time.

Lawyer Advocates Federal Crime Law

WASHINGTON, D.C. — Although Congress has been reluctant to pass federal computer crime legislation, among those who have backed the idea for the six years it has been before Congress there is little doubt that a federal law is needed to curb growing misuse of computer systems.

One such supporter is August Bequai, a Washington attorney who has written a half-dozen books on computer and white-collar crime and who helped draft the original federal bill, introduced in 1977 by then-Sen. Abraham Ribicoff (D-Conn.).

"Present criminal laws at the federal level really are not adequate to address computer-related crime. They really have not been adequate in general to address white-collar crime," Bequai told *Computerworld* in an interview last week.

States cannot effectively fight computer crime, he said, because many of the crimes are interstate or international in nature and because, except for a few large states such as California and New York, states do not have the resources to counter these crime problems.

Noting that there are dozens of laws that might be brought to bear against computer criminals, he said, "You want to have something that addresses a specific problem." Today that body of law "is like a junkyard where you have lots of cars because 98% of them you can't drive; they're outdated."

In addition, he said, there are economic reasons to have a specific federal statute against computer crime. Because a defendant knows it is difficult to bring him to trial under this amalgam of laws, "he might not be that hesitant to go to trial and to appeal" rather than plead guilty or seek a bargain with prosecutors.

Further, he said, a new law would force investigators, prosecutors and judges to learn about computer crime, how to detect it and how to handle it in a courtroom.

But, he cautioned, "a federal computer crime law is not going to answer all questions. It won't be a quick fix — there is no quick fix." Besides the law, there will have to be better education of law enforcement about white-collar crime in general and higher ethics in the computing community.

Senate Report on Federal DP Security Cites Poor Management in Oversight Agencies

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — A U.S. Senate report on federal computer security suggested that few agencies adequately manage DP security programs and said that all government oversight agencies share the blame for this situation.

"A lack of understanding of the problem, coupled with a reluctance to commit resources for the computer security effort, are major barriers to instituting good security practices," said the report, which was released by the Government Affairs Permanent Subcommittee on Investigations. Titled "Federal Computer Security: An Analysis of Congressional Initiatives and Executive Branch Responsibilities," the report was prepared by Louise G. Becker of the Congressional Research Service, a branch of the Library of Congress.

In the report, Becker pointed to a failure of the central agencies to provide adequate security measures and direction for agencies. Particularly singled out for criticism was the U.S. Office of Management and Budget, which, according to the report, has failed to live up to its responsibilities under federal information management laws.

In addition, the General Services Administration, which is responsible for federal procurement practices, has failed to insist on adequate protection measures for federal computer acquisitions, according to the report. Moreover, the National Bureau of Standards' Institute for Computer Sciences and Technology was said to be unclear about its mission in this area and lacked adequate funding to carry it out, anyway.

Spreading the blame even further, the report suggested that too many resources for DP security research and development have been given over to the U.S. Department of Defense. Noting that Defense was concentrating on development of "trusted" computers, the report suggested that the results of that technical approach may not be transferable to civilian agencies and the private sector.

The report also pointed to criticisms of Defense with respect to concentration of computer security R&D within its supersecret National Security Agency.

'Not Vital' to Postal Service

Report Calls Ecom a Taxpayers' Boondoggle

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Electronic Computer-Originated Mail (Ecom), the controversial service offered by the U.S. Postal Service (USPS), is a waste of the taxpayers' money, a U.S. House of Representatives government operations subcommittee angrily concluded in a report released last week.

The Postal Service "deliberately manipulates the release of information about Ecom to make [it] appear to be more successful than it really is," the report contends.

The subcommittee also accused Ecom's managers of violating postal rules and of refusing to make some information about a pending rate increase available to the public. The proposed rate — 31 cents for a one-page Ecom message and 40 cents for two pages (the present charges are 26 cents and 31 cents, respectively) — is based on a projection that the number of messages the service carries in 1987 will be sufficient to make revenue balance costs. According to the subcommittee, using a "test year" this far in the future explicitly violates the Postal Service's Rule of Practice 54.

According to the subcommittee, this and all other Postal Service market projections are suspect. One reason is that the Postal Service "does not measure costs and revenues in constant dollars and does not consider the time value of money." Also, "the data upon which the Postal Service bases its request for [higher] Ecom rates are subjective and unreliable."

In the past, the commission observed, "actual volume has always been below the Postal Service's estimates."

Possibly the most significant conclusion of the report is that "Ecom, as currently configured, is not vital to the long-term viability of the Postal Service."

Even if Ecom generates the message traffic projected by USPS for 1987, it will represent "less than one-third of 1% of total Postal Service mail volume," according to the subcommittee. Quoting an August 1982 study by the Office of Technology Assessment, a congressional research agency, the report said that "under any plausible scenario, USPS is still likely to be handling 70 billion to 110 billion pieces of mail in 2000," and by that year, the mail volume transmitted and delivered by electronic message systems like Ecom is expected to start declining.

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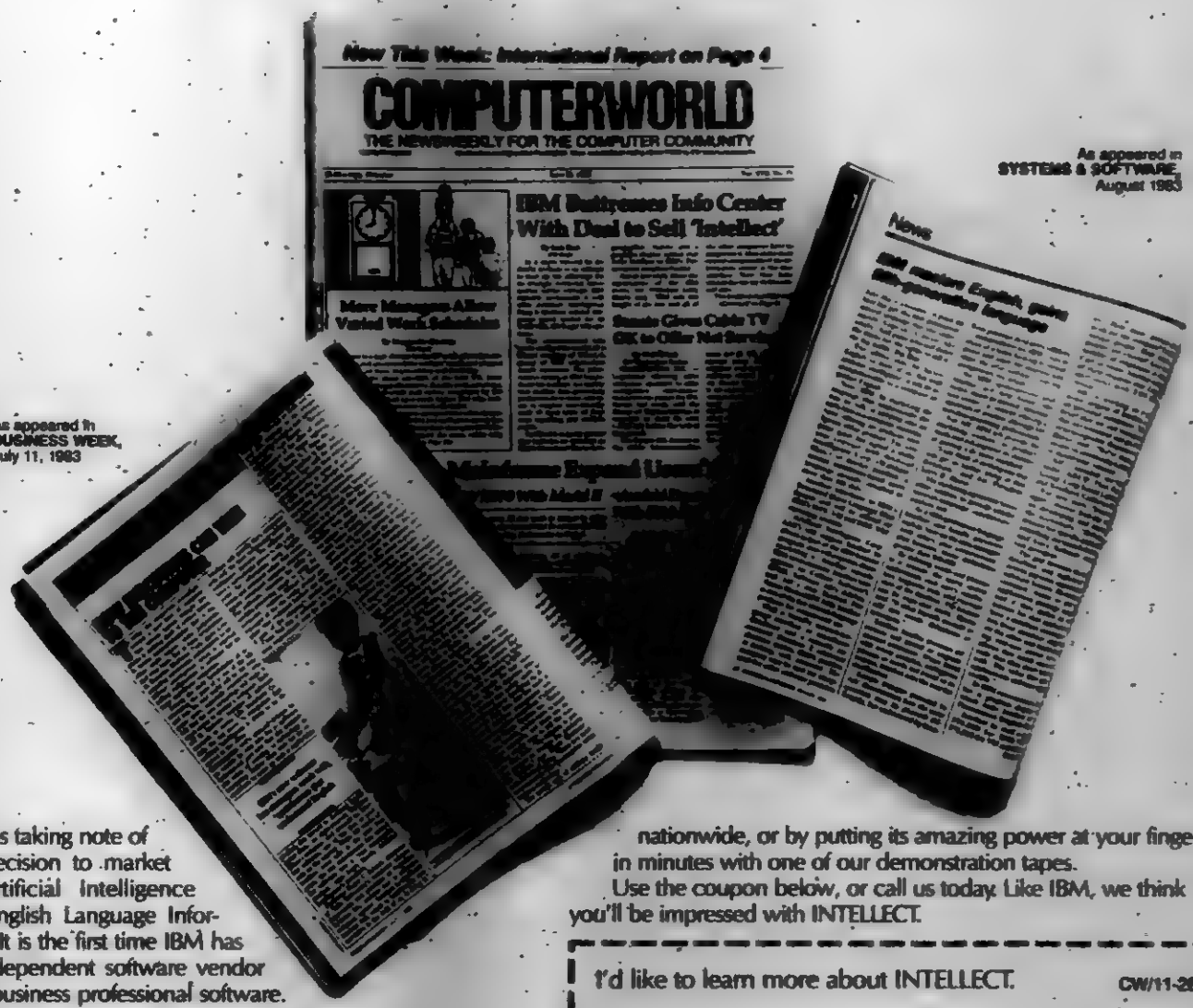

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Micro-Mainframe Links Called Problematic

By Robert Batt
CW West Coast Bureau

PALM SPRINGS, Calif. — Managers of information systems will come under increasing pressure as more sophisticated micro-to-mainframe links are developed, a senior IBM manager warned here last week.

Robert Berland, director of IBM's Information Programming Services, said at the Enterprise Information Systems Forum that the data processing community has not even scratched the surface of the problems and opportunities that the microcomputer calls forth.

"We haven't even begun to witness the pressure that will be placed on the mainframe once host computer software and personal computer software truly work together. When that happens, there will be an absolute explosion of [millions of instructions per second] and [direct-access storage device], which will result in computing power going to people who never use the host," he asserted.

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Berland told the forum, sponsored by Enterprise Information Systems, Inc., a Greenwich, Conn., market research firm, that with the proliferation of personal computers in large organizations, definitions of size are changing very rapidly. "Software relationships between hosts and personal computers are going to drive us to new notions of size as dynamic business needs continue to expand, thereby dictating rapid growth of online usage and more responsive DP solutions," he continued.

The relationship between personal computers and the management information systems (MIS) department must be part of a "synergistic whole," Beriand contended. This will put more emphasis on the place of information processing within an organization.

Already, he said, some DP managers are acting as consultants to senior managers not only on MIS concerns, but on how best to run the overall corporation. They have attained this position of influence because of the unique view that MIS directors have on the flow of information in an organization.

"While only a small number of MIS managers currently play this role, as time goes on, more and more corporations will use their DP people in this fashion," Berland predicted.

The No. 1 requirement for DP personnel, particularly those working in the information and application development centers, is to be tremendous communicators and superb company politicians because of the increasing need to interface with many other areas of the organization. This will change the nature of the DP department's job, Berland remarked.

The trend toward greater end-user involvement in computing means that DP specialists will increasingly be required to perform prototyping in concert with the end user. "One of the mistakes DP personnel make is that they want to do prototyping in a way that it becomes the production system," Berland remarked.

Turning to the efficient use of DP resources, Berland claimed that a whole area of applications exists that should never become the domain of the DP department. For example, Berland contended, the vast majority of company reports should be generated by end users rather than by the DP department.

"We need to give end users the appropriate tools, such as report writer capabilities on personal computers, so that they can get the data they want and send information to the people who need it, instead of getting the DP function bogged down in generating the report," Berland told his audience.

'We haven't even begun to witness the pressure that will be placed on the mainframe once host computer software and personal computer software truly work together,' Robert Berland, director of IBM's Information Programming Services, said last week.

Exec Details Key Design Elements Of a Successful Relational DBMS

PALM SPRINGS, Calif. — The key elements of data base management system (DBMS) design involve a number of trade-offs that cannot be ignored, a senior industry executive said here last week.

Umang Gupta, vice-president of Oracle Corp.'s Microcomputer Products Division, said concurrence vs. data integrity, CPU capacity vs. I/O intensity, query vs. update performance and transaction recovery vs. performance are the key issues to be considered in any relational data base design.

Higher performance data base systems will be more memory-intensive than disk-intensive, Gupta said at the Enterprise Information Systems Forum.

"A well-designed relational [DBMS] in its most elemental form can be defined as a series of algorithms that ensure data searches take place in memory, where possible; and avoid the use of expensive disk resources. This is especially important in systems that have a large amount of users and deal with vast quantities of data," Gupta noted.

Turning to other trade-offs, Gupta said that in a multiuser, transaction-oriented environment, the need both to improve concurrence while not sacrificing data integrity and to optimize queries without sacrificing update and in-search schemes are vital to the success of a relational DBMS.

Regarding the trade-off between transaction recovery and performance, Gupta said multiple data base operations often comprise one logical operation. Automatic transaction-level rollback and recovery are useful for maintaining data integrity; the key is to provide a high level of recovery without seriously downgrading performance.

Users, he told his audience of DP professionals, want fast, easy-to-use and portable data base systems. At the same time, the management information systems (MIS) manager cannot allow the propagation of multiple systems because of the expense of training employees and the cost of developing and maintaining such an arrangement.

Therefore, the former IBM marketing manager added, the primary issue confronting DP specialists is how to obtain a standard that can operate in a number of different environments. "While the MIS manager cannot dictate the use of hardware very often, he can manipulate the software environment," he said.

Another issue, he said, is that data base systems must be at least equal to, and for the most part better than, the information center products currently using mainframes, including fourth-generation languages such as Ramis, Focus and Nomad.

Another forum speaker, Robert Berland, director of information programming services at IBM, also addressed the issue of data base design. Berland stressed the need to simplify data base design and to ease the change to a data base structure.

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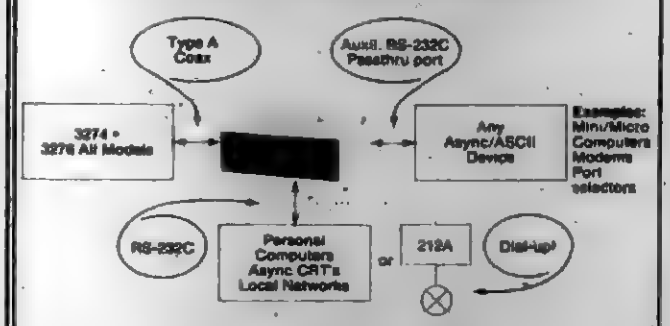

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Clamor for Micro Standards Heard at Forum

By Robert Batt
CW West Coast Bureau

PALM SPRINGS, Calif. — The increasing clamor for standards to deal with the impact of personal computers in large organizations was much in evidence at last week's Enterprise Information Systems Forum.

At a session here on "Local-Area Networking Requirements for Large Organizations," Ralph Ungermann, president of Ungermann-Bass, Inc., the California manufacturer of general-purpose local-area network systems, said the merger of data, voice and video will dictate an increasing need for standardization.

"While these three markets are currently distinct, as new local-area networks develop they will begin to merge," Ungermann said. "The ability to connect different media is essential to the long-term viability of the industry and critical to the success of this is the adoption of and adherence to industrywide standards."

The availability of local-area networks will lead to an explosion of application software development, Ungermann predicted, suggesting that the key to the successful management of this new technology is a system approach that builds on products recognized as standards, with a strong emphasis on network management facilities.

"Managers need to configure complex networks and change them dynamically to meet business needs. This is a serious problem, given the wide range of differences between different vendor products," he explained. For example, he said, just maintaining a multivendor local-area network is difficult because fault detection and isolation is a complex process.

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The growth of personal computers and powerful workstations is creating a demand for local-area networks, Ungermann said. As these units grow in numbers, users will constantly require more bandwidth, so the development of a system to account for who has what is essential, as is support for the development of new or enhanced software.

Success in this area, he stressed, will be greatly aided by the rapid adoption of standards.

The issue of standards was also addressed by Esther Dyson, president and owner of Rosen Research. In a keynote address to the forum, Dyson claimed the increasing trend toward more horizontal data architectures is spurring a greater need for standardization in microcomputer software.

"The world needs many more standards in application development tools. What makes a product good is whether it becomes a standard. . . . For personal computer vendors, the trick is to build up a cadre of application software," she said.

In this development, the role of IBM will be crucial, Dyson maintained. For example, in the rapidly growing area of products with window facilities, an endorsement of one particular product by Big Blue would determine the winner, she said.

Currently leading the contenders with window products — which allow several applications to be viewed simultaneously and permit the interchange of data — is Visicorp, with its Vision product. However, Microsoft, Inc. of Bellevue, Wash., recently came out with its own product, called Windows. Announcements of window products are expected from Digital Research, Inc. and Softech Microsystems, Inc. at this week's Comdex/Fall '83 show in Las Vegas.

House Panel OKs CATV Nonregulation

WASHINGTON, D.C. — A U.S. House of Representatives telecommunications committee earlier this month approved legislation barring the regulation of nonvoice communications services offered by CATV companies. Although a similar bill (S. 66) has been approved by the U.S. Senate, proponents of nonregulation face an uphill fight.

Rep. John Dingell (D-Mich.), chairman of the House Commerce Committee, believes CATV networks that provide common carrier-type transmission should be regulated as common carriers, and a substantial number of his colleagues on the 42-member committee reportedly agree.

Since the recently approved House bill (H.R. 4103) must be considered by Dingell's committee before it can go to the floor for a final House vote, this opposition is significant.

A committee source said last week there is "no rush" to bring the legislation before the committee. Asked about the likelihood of action next March or April, he said the chances are "50/50."

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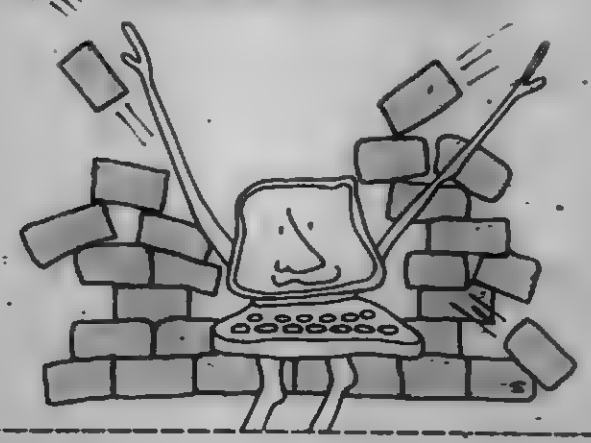

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Within Multiple-Computer Environments

Flexible Info Management Structure Sought

By Robert Batt
CW West Coast Bureau

PALM SPRINGS, Calif. — A comprehensive and flexible integrated information management structure is necessary for the successful development of a multiple-computer environment.

That was the main theme of a paper presented to the Enterprise Information Systems Forum here last week by David Britton, founder and president of Britton-Lee, Inc., a firm specializing in data base machines. In the paper titled "Personal Computers, Mainframes and Data Base Servers," Britton said the problem of managing burgeoning corporate information is just beginning to occur to managers of information systems.

CW at EIS

"With the rapid proliferation of desktop personal computers throughout the business environment and the enthusiasm of their users, the traditional structure has changed," said Britton, who was formerly vice-president of marketing at Zilog, Inc. The advent of easily accessible and affordable micros has caused users to bypass the traditional DP structure and acquire computers independently.

"This has, in effect, allowed other departments to develop their own DP capabilities without the expertise and overview of the main-line DP specialists. The important task is to integrate these powerful personal computers into the corporate information system. This, in turn, will place demands on the DP organization far more challenging and complex than ever before," Britton added.

Integrated information management teams must be developed internally, drawing on personnel from all levels of the company, Britton said. "Through the process of thorough review and planning, a comprehensive and flexible integrated information management system can be developed and implemented. The immediate priority is to plan and implement such a concept before a catastrophe occurs."

Britton argued that a new and serious problem has arisen with the unbridled growth of personal computers in large organizations and increased user sophistication — the need to integrate corporate information in a way that satisfies today's corporate demands. To achieve this goal, he continued, two key factors are essential.

First, the personal computers involved must responsively and efficiently access the corporate data bases. Secondly, mainframes and their accompanying DP staff must retain control to monitor and ensure data base integrity.

Incorporating Innovations

"Once a system is developed and put into use, it is very difficult to incorporate major innovations," Britton noted. "The tendency is to massage existing technologies rather than to seek alternatives that attack the root of the problem.

"Therefore, a comprehensive integrated information management solution must be thoughtfully planned and designed to allow for next-generation technologies and, ideally, the technologies anticipated after that."

A well-designed integrated information management system, Britton said, will allow the DP organization to continue performing the functions required by the mainframe, while the manipulation and transportation of data to the user is virtually transparent. It would have the ability to manage and responsibly disseminate information from a common data base to various computers, regardless of manufacturer or operating system, Britton said.

"Properly designed and integrated, such a system will minimize the necessity of programmer involvement and allow the user to perform work virtually independent of the DP organization," according to Britton.

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UNIX Internals	Feb 6-10	Oct 24-28 Dec 5-9 Apr 2-6	Oct 31- Nov 4 Dec 12-16 Feb 6-10 Apr 2-6	Nov 7-11 Apr 30- May 4	Oct 3-7 Nov 14-18	Jan 30- Feb 3 Feb 21-25 Mar 19-23	Jan 30- Feb 3	$1375	
UNIX Performance	Feb 14-16	Apr 10-12	Feb 14-16 Apr 10-12	May 8-10		Feb 7-9 Mar 27-29	Feb 7-9	$ 735	
Advanced "C" Programming Workshop*	Feb 27-29	Apr 30- May 2	Feb 27-29 Apr 30- May 2	May 14-16		Feb 13-15 Apr 2-4	Feb 13-15	$ 735	$1125
Advanced "C" Programming Under UNIX*	Mar 1-2	May 3-4	Mar 1-2 May 3-4	May 17-18		Feb 16-17 Apr 5-6	Feb 16-17	$ 490	
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Brown, IBM Sign $15 Million Pact

PROVIDENCE, R.I. — Brown University recently signed a three-year, $15 million agreement with IBM for computer equipment and research of educational uses of computers.

By 1990, the school plans to have a network of 10,000 workstations, making one available to each student, faculty and staff member, according to a Brown spokesman.

In the first year of the agreement, Brown will receive a $450,000 cash grant for research and a $750,000 grant in the form of 100 personal computers. The computers will be used for software development in subjects such as sociology, anthropology, physics and biology.

Brown has also received donations from Apple Computer, Inc. and Apollo Computer, Inc.

CW at Comdex/Fall '83

Micro Alive, Well at Comdex Despite Rumors

By Jeffry Beeler
CW West Coast Bureau

LAS VEGAS — Prophets of an impending shakeout in the personal computer industry will find precious little evidence to support their gloomy forecasts at Comdex/Fall '83, which begins a five-day run here today.

Among the microcomputer-oriented conference's expected 1,400 exhibitors will be more than 300 vendors who will be participating at Comdex for the very first time. "Most of those 300 companies are start-ups," noted Peter Young, public relations director for the Needham, Mass.-based Interface Group, the show's organizer.

The presence of such a large contingent of start-up exhibitors flatly contradicts a recent spate of dire predictions that the ranks of the personal computer industry are about to be drastically thinned, Young said. "We don't foresee any shakeout coming to the personal computer industry. On the contrary, the industry will continue to grow. Its lifeblood is still pumping away vigorously."

Underscoring the industry's continuing prosperity has been the steady, year-to-year increase in Comdex attendance. Last fall, the show attracted some 50,000 attendees. This year, the head count at the event is expected to total 80,000.

Largest Show Here This Year

As the largest trade show of any sort to hit the Las Vegas Convention Center this year, Comdex will "put tremendous pressure on [that city's] infrastructure," Young said. "Hotel rooms are already as scarce as proverbial hens' teeth."

In the past, Comdex has been geared primarily to a national audience of independent sales organizations and other intermediate resellers, and this month's show is expected to be no exception. "We don't foresee any major departure this year from our traditional content or emphasis," Young said.

Like most of its predecessors in the Comdex series, the fall '83 conference will undoubtedly serve as a major launching pad for scores, if not hundreds, of product introductions. Although the expected announcements will be spread over a multitude of generic product classes, some of the categories will inevitably generate more unveilings and visitor interest than others.

Photo Courtesy Microsystems World

Attendees crowd last year's exhibit floor at Comdex, also held in Las Vegas. More than 80,000 people are expected to attend this year's show.

The volume of introductions is expected to be especially heavy in product classifications, such as micro-to-mainframe links and local peripherals, particularly disk systems and printers, Young said. Product announcements will also be unusually plentiful among suppliers of portable and transportable personal computers.

In addition, Young said, many of the product introductions at Comdex/Fall '83 will come from Japan — a continuing sign of "Japan's careful, methodical expansion into the U.S. marketplace."

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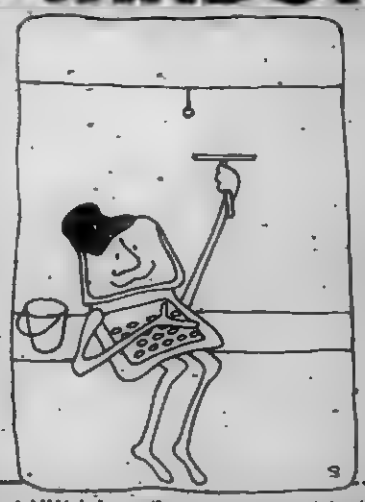

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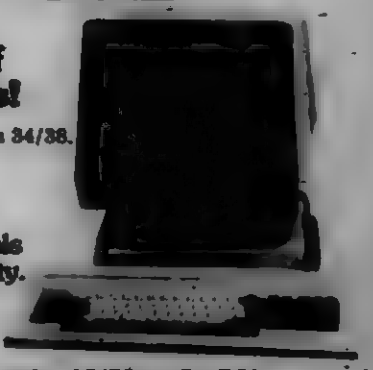

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CW at Comdex/Fall '83

Insiders Discuss IBM Micro-Compatible Mart

By Paul Freiberger
Special to CW

How many companies will be able to elbow their way into the IBM Personal Computer-compatible market? At least three more companies — Vector Graphic, Inc., Panasonic Co. and Visual Technology, Inc. — have recently announced machines designed to run software developed initially for the IBM Personal Computer. All of them will be exhibited this week at the Comdex/Fall '83 show.

"I think the market will support fewer compatibles than it has," said Esther Dyson, president of Rosen Research, a high-technology market research company.

But in order to make a new machine appealing to the microcomputer consumer, each vendor must persuade software firms to modify their programs for its machine. Thus the micro vendors often develop machines that can tap a wide existing array of packaged software.

"We like true IBM [Personal Computer]-compatible machines," said Mitch Kapor, president of Lotus Development Corp. of Cambridge, Mass., developer of the Lotus 1-2-3 software program.

Software companies will, on the other hand, modify machine-specific programs for an incompatible machine if it appears to have a good chance at commercial success and if the new machine promises to exploit the capabilities — such as graphics — of a program.

"We'll change our products to support a market," Terry Opdendyk, Visicorp president, said. Visicorp is creating a more graphics-oriented version of its new Vision operating environment for the Wang Laboratories, Inc. Professional Computer, which offers higher resolution graphics than the IBM Personal Computer, Opdendyk said.

Hardware firms that depend on major software firms like Visicorp and Lotus to support their machines face the problem of being lumped together. In an effort to stand out from the pack, the latest IBM Personal Computer-compatibles thus offer different features, at varying prices.

"It's not designed to be a [Personal Computer]-compatible," said Ron Tharpe, director of marketing at Vector Graphic, referring to Vector's newly released 4-S system. Rather, it is "a step toward compatibility."

There are already several machines that run most IBM Personal Computer programs without modification. Vector Graphic's answer to the challenge is to sell a machine with features not available on the IBM Personal Computer or its clones. Such an approach could appeal to software companies like Software Arts of Cambridge, Mass., developer of TKSolver. Dan Bricklin, company chairman, reiterated that he likes machines that can help differentiate his software from its competitors.

In addition to running 16-bit software with an Intel Corp. 8088 microprocessor, the new 4-S (like the Vector 4) comes with a Zilog, Inc. Z80 microprocessor, which can run older 8-bit Digital Research, Inc. CP/M software.

The new Vector Graphic quad-density drives can store more information than an IBM Personal Computer disk drive. A system with a single floppy disk drive and a 5M-byte hard disk drive is priced at $4,995. Several other configurations are available, the vendor added.

Panasonic has opted for a lower cost, 28-lb portable machine called the Sr. Partner. This machine comes with a built-in printer and several application programs and is compatible with the IBM Personal Computer. It will sell for $2,495.

Visual Technology, Inc. in Tewksbury, Mass., is also emphasizing compatibility and portability in its new 16-lb machine. The Commuter is designed to fit in an attache case. It is priced at $1,995.

Freiberger is a senior editor at Infoworld, a newsweekly for microcomputer users based in Menlo Park, Calif.

'Baby/34' Software System to Bow

LAS VEGAS — Comdex/Fall '83 held here will offer the first opportunity for California Software Products, Inc. to present its software system that allows programs written in RPG-II for the IBM System/34 to be moved to and executed on the IBM Personal Computer.

The system, Baby/34, reportedly allows entire business applications systems that have been used for years on the System/34 to be used on the Personal Computer.

The system includes a data exchange utility, operations control language, RPG-II compiler, workstation I/O, screen format generator, source entry utility, data file utility and sort.

The system is available immediately for $2,500 in the U.S. from Software Products, located at 525 N. Cabrillo Park Drive, Santa Ana, Calif. 92701.

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CW at Comdex/Fall '83

Visual Computer to Introduce 16-Lb Portable

LAS VEGAS — Visual Computer, Inc. will introduce at Comdex/Fall '83 here a 16-lb, 16-bit portable computer said to be compatible with the IBM Personal Computer. Packaged in a 15- by 18- by 3-in. case, it is also said to fit in a briefcase.

Standard features on the Commuter include 128K bytes of random-access memory, expandable to 512K bytes; Microsoft, Inc.'s MS-DOS operating system; an 83-key, full-stroke keyboard with functions and layout identical to IBM's; and a 5¼-in., double-sided, double-density disk drive, according to a spokesman for the vendor.

Also standard on the machine are bit-map color graphics support, a parallel port, an RS-232C serial port, composite video output and a connector for integral IBM expansion-chassis support for additional IBM memory cards and hard disks, the vendor spokesman claimed.

An 80- by 16-char. LCD is optional; support logic for the same display and a 40- by 25-char. display is standard. This is said to provide the logic for high-resolution monochrome and color displays, black-and-white display or color television.

The Commuter includes communications options such as an RS-232C port that will provide asynchronous communications as well as IBM's Binary Synchronous Communications and Synchronous Data Link Control.

The microcomputer is available for $1,995 from Visual Computer, which is located at 135 Maple St., Marlboro, Mass. 01752.

Visual Computer, Inc.'s Commuter

Micro-Based Modem to Bow From Anderson Jacobson

LAS VEGAS — Anderson Jacobson, Inc. will introduce this week at Comdex/Fall '83 a microprocessor-based modem said to incorporate touch-controlled front-panel switches and indicator lights, multispeed operation and integral power supply on a single board.

The AJ 1212-ST low-profile 300-1,200 bit/sec modem is an originate, manual or autoanswer modem for switched telephone network operation in both Bell 212A and Bell 103/113 protocols. It automatically identifies incoming calls and sets itself according to the appropriate data rate, according to a vendor spokesman.

It will be available for $495 in January from Anderson Jacobson, 521 Charcot Ave., San Jose, Calif. 95131.

Comdex Menu: Room-Service News Available to Conventioneers via TV

LAS VEGAS — Attendees of Comdex/Fall '83 will be able to view a daily show update, interviews and other show news in their hotel rooms via special closed-circuit television broadcasts from the Las Vegas Convention Center.

Comdex Today, a production of the Las Vegas-based Convention Television Network (CTN), will provide 24-hour-a-day programming throughout the show into more than 22,000 hotel rooms in the Las Vegas area. A different two-hour segment will be prepared each day and shown 12 times during the day.

Each day's *Comdex Today* segment will include interviews with industry leaders, new product information and on-the-spot coverage of Comdex events, according to CTN President Barry Lenett. Additionally, 16 major companies will be featured in sponsored segments, which provide the funding for the broadcasts.

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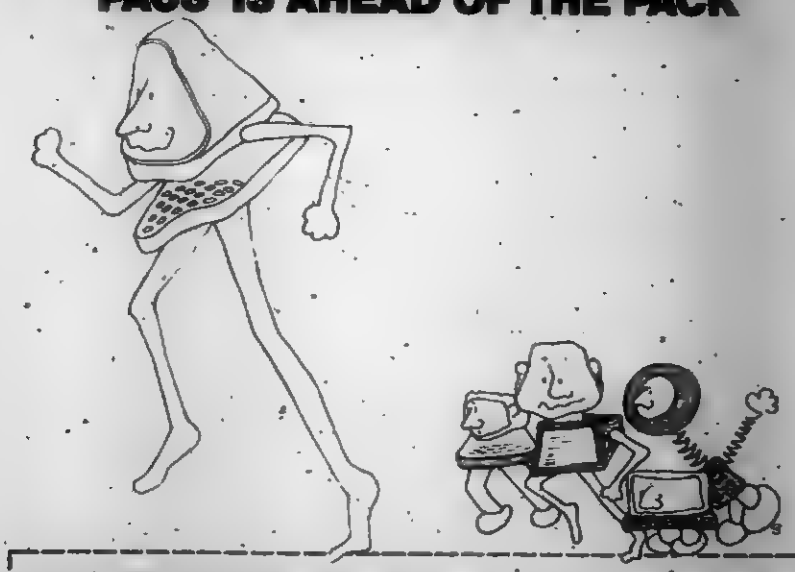

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This Week at Comdex/Fall '83

North Star Enters IBM Micro-Compatible Arena

By Michael Swaine
Special to CW

SAN LEANDRO, Calif. — One of the latest entries into the IBM Personal Computer-compatible arena is a multiuser system from North Star Computers, Inc.

The vendor is now looking for a hospitable habitat in the IBM market environment, and North Star President Chuck Grant is hoping that he has found it with Dimension, his company's recently announced Intel Corp. 80186-based multiuser system.

Grant insisted that Dimension "is not just another IBM clone," pointing out that the multiuser system is more cost-effective than single-user systems.

Furthermore, North Star is banking on more than a price advantage to set its product apart from the herd. Dharam Ahuja, North Star vice-president of sales and marketing, believes the Dimension system will appeal to management information systems (MIS) managers in Fortune 1,500 companies who are disturbed by the onslaught of personal computers in corporations.

To back up such claims, North Star is also planning to release communications links for the Dimension that will allow it to communicate with IBM mainframe computers.

"Our challenge was to identify a market need that no other company had addressed," Grant said. The Intel 80186 microprocessor in Dimension's central module represents the next step up in the family of chips that includes Intel's 8088. Monroe Systems for Business, Inc. recently announced plans to bring out a single-user system based on the Intel 80186 chip, but North Star appears to be the first to incorporate it into a multiuser system.

The North Star machine is based on a central processor box or module that can control two to 12 Personal Computer-compatible workstations. The central module is reportedly the key to Grant's strategy to stake out new territory.

Each workstation linked to the central module has the chief features of an IBM Personal Computer, including an Intel 8088 microprocessor (running at a faster clock speed than the Personal Computer's — 7 MHz vs. under 5 MHz), 128K bytes of random-access memory (RAM), a Personal Computer-compatible keyboard and a monochrome monitor with the same resolution as the Personal Computer.

Each workstation can be running a different IBM PC-DOS program simultaneously while sharing central disk storage, according to the vendor. The individual workstations have no local disk storage, since the main unit includes one or more 15M-byte or 30M-byte hard disk drives and a 360K-byte floppy disk drive, the vendor said.

The central module also includes 256K bytes of RAM, used chiefly to speed data transfer between the workstations and the hard disk; the vendor explained.

A system with two workstations, an operating system compatible with IBM's PC-DOS Version 2.0 and a 15M-byte disk drive will be priced at $7,000 when North Star starts shipping the Dimension in the first quarter of 1984.

Additional workstations will cost $1,500 each from North Star Computers, 14440 Catalina St., San Leandro, Calif. 94577.

Swaine is a senior editor at Infoworld, *a newsweekly for microcomputer users based in Menlo Park, Calif.*

Arktronics to Unwrap Integrated Package

LAS VEGAS — Arktronics Corp., this week here at the Comdex/Fall '83 show, will introduce Jane, an integrated software package that combines several popular business applications in one system.

According to the vendor, the software includes a word processing program, spreadsheet and file/list management programs. Applications including a graphics program and a communications program compatible with MCI Communications Corp.'s electronic mail and the U.S. Postal Service's Electronic Computer-Originated Mail systems will be available in the near future.

The software is designed to operate on Apple Computer, Inc.'s Apple II, Apple II+ (64K), the Apple IIe (including Apple's new double-resolution graphics) and a tape cartridge version for Commodore, Inc.'s Commodore 64 computer. The software requires systems containing at least 64K bytes of random-access memory.

The software package is priced at $295. Further information can be obtained from Arktronics Corp. at 113 S. 4th Ave., Ann Arbor, Mich. 48104.

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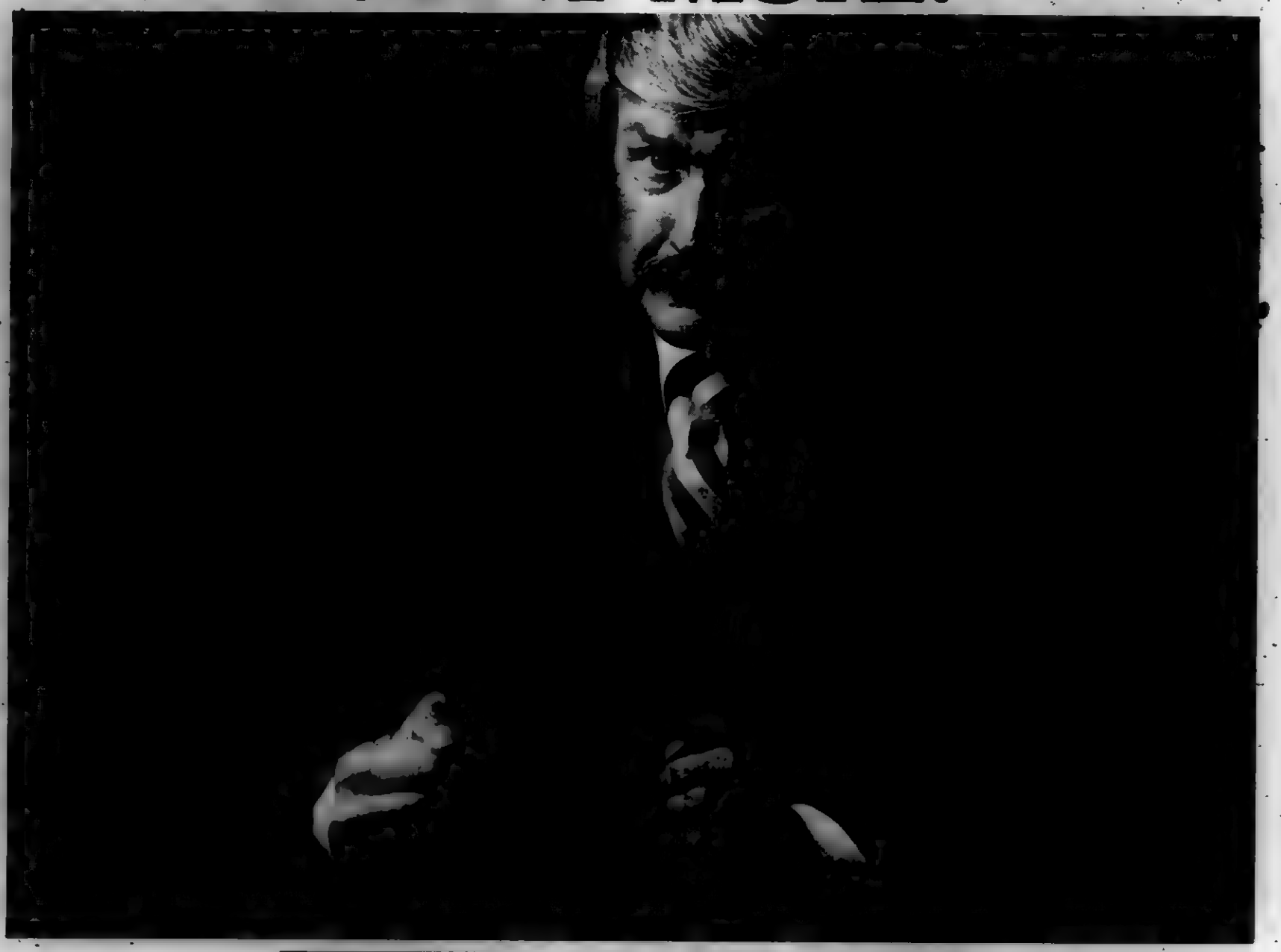

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PLESSEY

This Week at Comdex/Fall '83

MDBS Utilities for 'Knowledge Manager' to Bow

LAS VEGAS — Micro Data Base Systems, Inc. (MDBS) will be introducing three facilities for its Knowledge Manager information management software package at Booths 390-495 here this week during Comdex/Fall '83.

Knowledge Manager reportedly integrates a relational data manager with an ad hoc query language, a third-generation spreadsheet, statistical analysis, a screen I/O manager, a printed forms manager and a full-scale programming language. The package is available under IBM's PC-DOS; Microsoft, Inc.'s MS-DOS; and Digital Research, Inc.'s CP/M 86 and MP/M 86.

MDBS will introduce a forms painter, full-screen text processor and a graphics facility.

Kpaint reportedly allows Knowledge Manager users to design I/O forms interactively, using up to 64 foreground/background color combinations. A company spokesman said the utility enables users to receive visual feedback immediately as each charactistic of the form is electronically painted onto the console screen as it is designed. The utility can be used to design forms from scratch or to modify previously designed forms, and the forms can be used for screen I/O or printer output.

The second utility, Ktext, enables a user to enter, maintain and display any type of text within a Knowledge Manager session, the spokesman said. The text may be various kinds of documents such as reports, letters and memos, or it could be free-form text such as package procedures, macro declarations and form declarations. Integration of the utility with the data manager and spreadsheet permits merging of text with data on a record-by-record basis.

Kgraph, the third utility, reportedly enables users to plot information held in Knowledge Manager tables, spreadsheets, arrays and variables. Plots supported include clusters, stacked and three-dimensional bar graphs, scatter diagrams, line graphs, cumulative and percentage area plots, pie charts and free-form drawing. Up to four plots may be displayed on one screen, according to the spokesman. Plot commands reportedly can be invoked interactively or embedded in Knowledge Manager procedures.

Kpaint will be available for shipment during the present quarter for $100. Ktext, at $100, and Kgraph, at $225, will be available during the first quarter of 1984. Demonstrations will be conducted by MDBS, which can be reached through P.O. Box 248, Lafayette, Ind. 47902.

Omnidata To Show System

LAS VEGAS — Omnidata will introduce a multiple microprocessor system called the Omni Convertible in Booth H-7760 here at Comdex/Fall '83. The Omni Convertible is said to feature a Variable Processor Architecture (VPA), which allows conversion from one multiple microprocessor configuration to another by means of plug-in microprocessor boards.

VPA reportedly permits the Omni Convertible to operate concurrently with up to three different microprocessors, employing such operating systems as Digital Research, Inc.'s CP/M and Microsoft, Inc.'s MS-DOS and Xenix.

Equipped with a Zilog, Inc. Z80H and a Texas Instruments, Inc. 9995 microprocessor, the Omni Convertible can be expanded to include the Intel Corp. 80186 and 80286, as well as Motorola, Inc.'s 68000, according to a spokesman.

Pricing for the Omni Convertible is scheduled to be announced at the show, the spokesman said.

Omnidata is located at 5717 Corsa Ave., Westlake Village, Calif. 91362.

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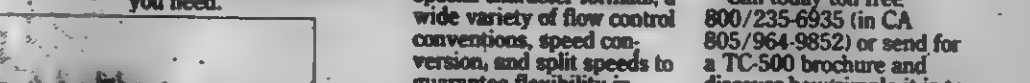

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This Week at Comdex/Fall '83

CYB Systems to Release Micros, Net Products

LAS VEGAS — CYB Systems, Inc. has announced plans to introduce six new microcomputer and networking products at the Comdex/Fall '83 exhibition here.

According to CYB Systems, the high-speed personal computer networking tools to be unveiled this week will provide a multiuser, multitasking, virtual terminal environment that operates under the firm's Uniplus Unix System V operating system.

The products include: the CYB/Workmate Computer professional workstation; the CYB/Unite-4I and CYB/Unite-16I personal computer network server systems; the CYB/Workmaster software development system; the CYB-Sky floating-point processor; and the RM/COS Commercial Operating System software.

The CYB/Workmate Computer professional workstation is a desktop computer that can be used as a stand-alone micro or as a networked software development station. With networking, the system can share centrally located disks and peripherals, and in such a configuration, the system loads the operating system and executing programs directly from the network server system.

The CYB/Workmate reportedly processes locally and offers transparent access to files, programs, electronic mail and other features residing in the network server. The system uses a 16-bit processor chip and features up to 512K bytes of high-speed memory and two serial communications ports.

It also has up to 10M bytes of hard disk storage and can function with Xerox Corp.'s Ethernet local-area network, a company spokesman explained.

The vendor said that the CYB/Unite-4I microcomputer network system allows up to four IBM personal computer users to share Unix and Microsoft, Inc.'s MS-DOS operating system files, utilize electronic mail and share printers and large disks. The system reportedly can operate either as a local network server or be interconnected with other 4I units and CYB/Unite-16I units to form larger networks.

Stand-Alone Micro

It reportedly can be used as a stand-alone IBM Personal Computer-compatible micro or as the central node in a network of up to three other IBM Personal Computers.

The CYB/Unite-16I micro networking system is said to enable users of the IBM Personal Computer and Personal Computer XT to utilize the multiuser, multitasking capabilities of the Unix operating system, including centralized data files, hard disk storage, printer spooling, peripheral sharing and electronic mail.

According to the vendor, the system can be used as the central node in a network of up to 16 IBM Personal Computers, Personal Computer XTs and existing CRT terminals.

The CYB/Workmaster software development system reportedly features the Motorola, Inc. Model 68010 microprocessor, enhanced with optimized instruction execution, loop mode and page faulting with instruction continuation.

Total memory is said to be increased from 1.5M to 8.5M bytes to reduce disk access requirements. Communications capabilities include two high-speed serial ports that operate at a 38.4K bit/sec transmission rate and intelligent, buffered serial controllers that function at rates from 50 to 19.2K bit/sec rates.

The CYB-Sky system, also to be introduced at Comdex, is a single floating-point processor that is designed to work with CYB computers. The processor basically delivers additional processing power for applications written in Fortran or C, a spokesman for the firm said.

Most programs reportedly will require only relinking or recompiling to work with the CYB-Sky floating-point processor.

Cobol Applications

Finally, the RM/COS commercial operating system is said to be a multiuser, multitasking package for the development and execution of Cobol applications.

A third-generation system designed by the Ryan-McFarland Corp., RM/COS is engineered to support a specific compiler and to perform vertical applications such as general ledger and accounts payable. It reportedly features automatic file compression, record-level locking, data protection and interactive and batch command capability.

CYB Systems will announce both price and availability at the Comdex conference.

The firm's headquarters are located at Suite D-106, 6448 Highway 290E, Austin, Texas 78723.

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This Week at Comdex/Fall '83

Monroe to Show 80186 Chip in Its Model 2000

LAS VEGAS — Monroe Business Systems has made a change to the standard IBM Personal Computer-compatible recipe, joining several other manufacturers.

The new ingredient in its Monroe Model 2000, which will be shown at this week's Comdex/Fall '83, is an Intel Corp. 80186 chip. By abandoning the Intel 8086 and Intel 8088, the company has come up with a "pure 16-bit system," Robert Kane, president of the firm, claimed.

Kane said the Intel 80186 chip gives the Model 2000 an edge over other IBM Personal Computer-compatibles: "Our computer runs at 8 MHz; the actual IBM Personal Computer runs at 4.7 MHz."

Targeted at the business professional, the Monroe Model 2000 can operate most IBM Personal Computer software, Kane said.

With the addition of a $475 Zilog, Inc. Z80 card, which Monroe plans to sell, the system will also run 8-bit Digital Research, Inc. CP/M-based software, according to the vendor.

The firm has created both a floppy disk and hard disk version of the Monroe Model 2000.

The system has half-height, 640K-byte disk drives, internal 128K-byte memory expandable to 896K bytes and three RS-232 serial ports, Kane noted. Both Microsoft, Inc.'s MS-DOS and Digital Research, Inc.'s CP/M 86 operating systems, along with GW Basic, come bundled with the $4,295 base model. Equipped with 10M bytes of hard disk, the system costs $5,600.

The Monroe 2000 will be shipped in January. At the same time, the firm will reportedly introduce a synchronous 300 to 1,200 bit/sec modem, a letter-quality printer and a dot matrix printer for the system.

Monroe is located at The American Road, Morris Plains, N.J. 07950.

ADC to Introduce S-100 Single-Board Micro

LAS VEGAS — Advanced Digital Corp. (ADC) will introduce its Super 186, an S-100 single-board computer built around Intel Corp.'s new 16-bit 80186 semiconductor chip, at the Comdex/Fall '83 show.

The 8 MHz Super 186 reportedly can be configured as a stand-alone bus master or bus slave to serve both single or multiple users. It can be used to enhance the performance of ADC's Super Slave processor boards or as an 8-bit slave card to process exceptionally large work loads at increased speed, according to the vendor.

Super 186 is said to feature 256K bytes of memory, expandable to 1M byte; a floppy disk drive controller that can simultaneously support both 5¼-in and 8-in. disk drives; four serial RS-232 and two parallel I/O ports; a direct-memory access controller; and parity and monitor erasable programmable read-only memory.

The board is said to be compatible with Digital Research, Inc.'s CP/M 86 and MP/M 86; Software 2000, Inc.'s Turbodos; and Microsoft, Inc.'s MS-DOS operating systems.

Super 186 has a suggested retail price of $1,650. ADC is located at 5432 Production Drive, Huntington Beach, Calif. 92649.

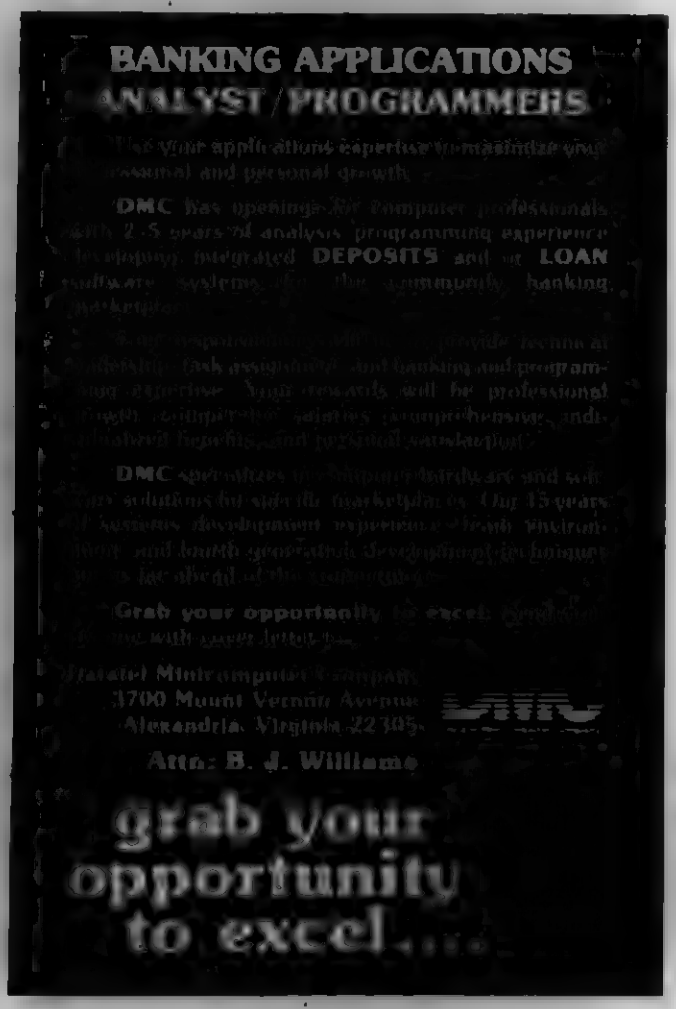
Ovation to Feature Software

LAS VEGAS — Ovation Technologies will introduce its Ovation Software and its Common Command Environment at Booth 117 here at the Comdex/Fall '83 conference.

During the show, the company will also host the Association of Better Computer Dealers' annual Comdex business meeting on Monday, Nov. 28 at Caesar's Palace here. At that meeting, Ovation President Thomas Gregory will give the keynote speech on "Management in a High-Growth Industry."

Ovation software, formerly introduced in mid-October, reportedly allows businessmen to use personal computers to analyze data, create reports, file information, construct graphs and communicate with other computers. The program can reportedly be operated with less than 30 commands. Features include virtual memory, context-sensitive Help, user prompts, micro capabilities and automatic backup.

Priced at $795, it will be available during the first quarter of 1984. Ovation Technologies is located at 770 Dedham St., Canton, Mass. 02021.



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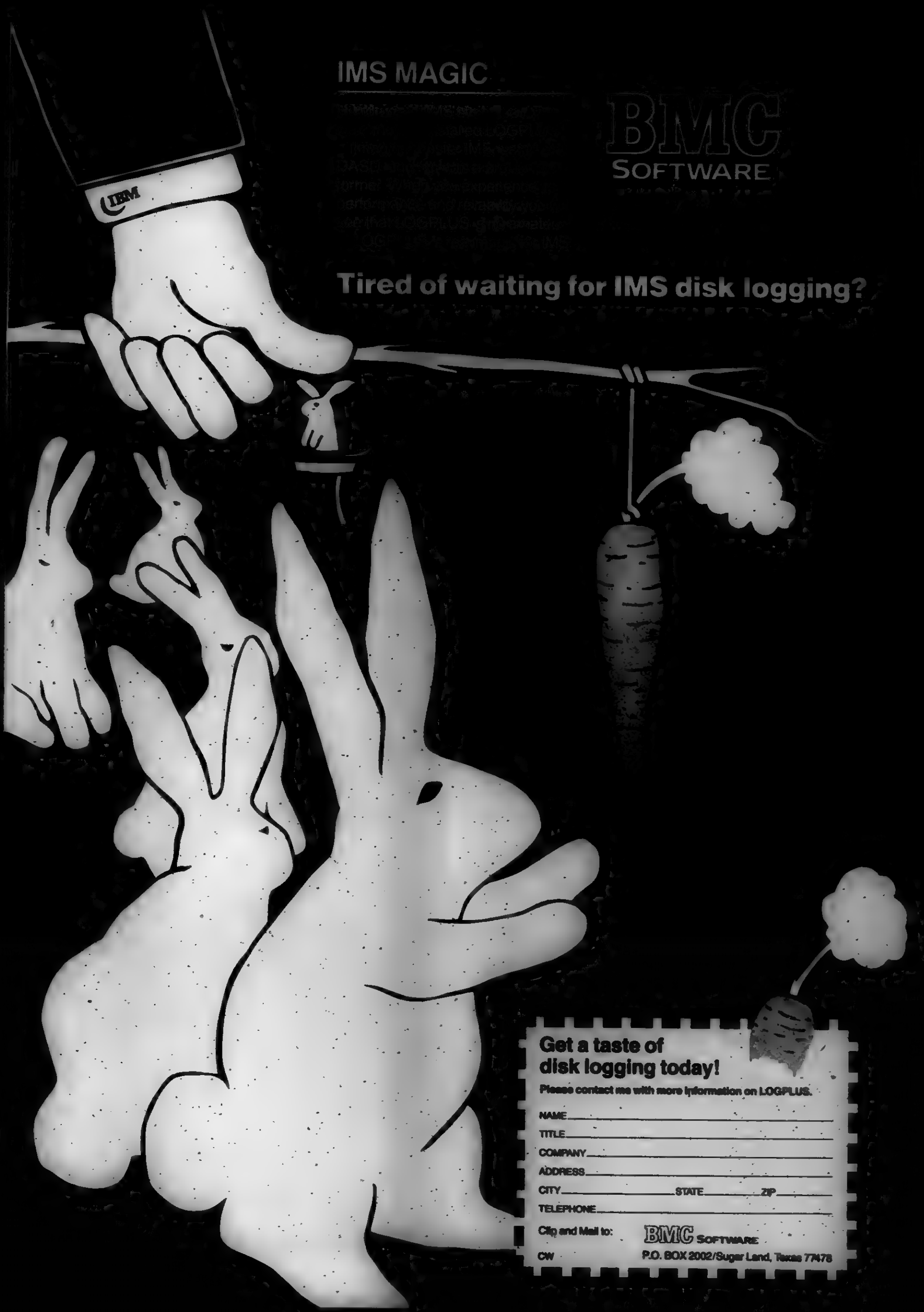

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This Week at Comdex/Fall '83

Dynasty Local Net to Bow From Dy-4 Systems

LAS VEGAS — Dy-4 Systems, Inc. will be demonstrating components of its Dynasty local-area network software at the Comdex/Fall '83 show this week, said to allow workstations with different operating systems to be configured into the same network.

The Dynasty 3.0 local-area network reportedly can accommodate workstations with 8-, 16- and 32-bit boards and allow communication and storage among Digital Research, Inc.'s CP/M 2.2; Microsoft, Inc.'s MS-DOS 8088; and the Unix operating systems.

The Dynasty local-area network will support up to 64 microcomputers and printers incorporated with a central file server capable of storing up to 40M characters, a spokesman said.

A variety of disk technologies can also be incorporated into the network, including the company's Ramdisk module, a dense memory card that reportedly provides semiconductor random-access memory emulation of a floppy disk system.

Dy-4 Systems is a four-year-old Canadian company that plans to double sales next year, partly through expansion into the U.S. and Europe. It plans a major push abroad with its Dynasty integrated computer system and a product line that eventually will encompass 32 products based on its VME bus boards.

The company is located at 888 Lady Ellen Place, Ottawa, Ont. Canada K1Z 5M1.

Firm to Offer Office Tool Under CP/M

LAS VEGAS — Molecular Computer, Inc., in Booths 316 and 417, will demonstrate its Application Tool for Office Management (Atom) integrated office management software package here at the Comdex/Fall '83 exhibition. The package is compatible with multiuser computers running under Digital Research, Inc.'s CP/M operating system.

Atom consists of an electronic spreadsheet, electronic mail package and a word processing package. All of the packages are said to function together as a unit and share a comprehensive set of menus, Help facilities and system manager functions.

Atom is designed to allow other standard packages supplied by outside vendors to be easily integrated into the system by its automatic installation function, according to a vendor spokesman.

Atom is list priced at $1,400. Molecular Computer is located at 251 River Oaks Pkwy., San Jose, Calif. 95134.

Micro Prize Offered

LAS VEGAS — The Naked Mini Division of Computer Automation, Inc. is planning to give away a microcomputer system based on the Unix operating system to the person who can correctly identify the name of Computer Automation's version of Unix.

The winner will receive the firm's Datacase/5 microcomputer with 512K bytes of random-access memory and one parallel and seven serial ports. Also included with the system is a 1.6M-byte, unformatted low-profile floppy disk drive and a 12.7M-byte Winchester disk drive. The unit costs $13,000, the vendor said.

Computer Automation is based at 18651 Von Karman, Irvine, Calif. 92713.

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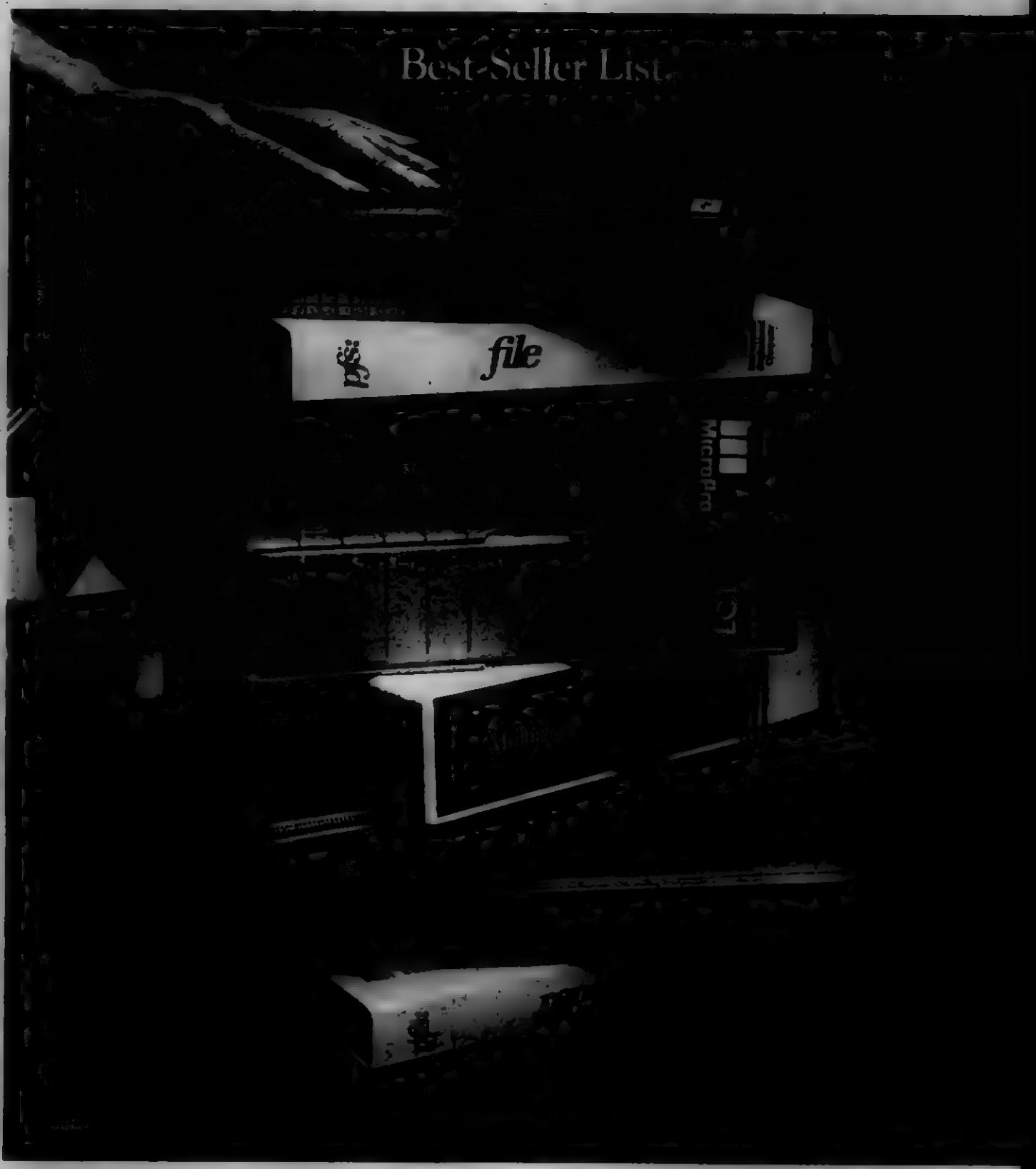

This Week at Comdex/Fall '83

Pyramid to Show Unix-Based, 32-Bit Supermini

LAS VEGAS — Pyramid Technology Corp. will demonstrate at Comdex/Fall '83 here this week its 32-bit, virtual memory superminicomputer that is based on the Unix operating system and reportedly can host from 16 to 128 Unix-based microcomputers operating in business environments.

The recently announced Pyramid 90X features a proprietary 32-bit CPU that reportedly has a 125-nsec cycle time and 4K-byte, high-speed instruction cache. Physical memory space in the unit can range from 1M to 8M bytes. In addition, the memory hierarchy is said to provide each Unix process with 4G bytes of virtual address space, utilizing a 2K-byte page size for demand paging.

The system features a synchronous Xtend bus, which has a 32M byte/sec transmission rate and reportedly a flexible, open-ended design that will allow future multiprocessor configurations and integration of new technology. The bus can support the CPU, one to four memory modules, the system support processor, multiple I/O processors and adapters leading to other buses, according to a company spokesman.

Enhancements to the Unix System V include streamlined system calls and trap recovery, a 2K-byte block size for the file system and I/O logic offloading. Pascal, C, and Fortran 77 compilers reportedly generate code optimized for a register-intensive architecture.

System prices range from $100,000 to more than $300,000. The company is located at 1295 Charleston Road, Mountain View, Calif. 94043.

CIE to Offer Medical Tool

LAS VEGAS — CIE Systems, Inc. will introduce the MED/680 medical practice management package this week at Comdex/Fall '83.

The MED/680 package is said to be a totally integrated system that allows for immediate patient information update and reporting and for the linking of treatment and procedural information to an accounts receivable and third-party billing system. It is reportedly compatible with all the company's Model 680 desktop computers.

The MED/680 has a text-processing feature that allows for the generation of insurance claims, patient recall notices, appointment reminders, account dunning notices and billing statements, a spokesman said.

Further, the package features accounting tools such as daily activity reports (by physician or for the entire practice), insurance carrier accounts receivable, responsible party accounts receivable and cash flow analysis, according to the spokesman.

The MED/680 package is priced at $2,800 through CIE Systems, 2515 McCabe Way, P.O. Box 16579, Irvine, Calif. 92713.

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Popular Computing
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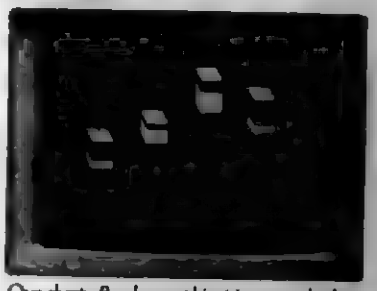

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This Week at Comdex

Seagate to Unwrap Disk Products

LAS VEGAS — Seagate Technology, Inc. will be in Booth 4324 at Comdex/Fall '83 demonstrating its 12M-byte, half-height ST212 and 25M-byte, full-height ST425 disk drives as well as its ST9000 controller and the ST400 family of 6M-, 12M- and 19M-byte standard-height drives.

The ST212 is a 5¼-in. Winchester disk drive that has a single platter and four mini-slider read/write heads. It costs $1,265. The ST425 is a 5¼-in. drive that has a two-disk, eight-head design. It sells for $1,645. Both products have an average access time of 65 msec.

The ST400 family of 5¼-in. Winchester disk drives includes the 6M-byte, single-platter, two-head ST406, priced at $965; the 12M-byte, dual-platter, four-head ST412, priced at $1,215; and the six-platter, three-head ST419, priced at $1,465. The drives have average access times of 85 msec and operate at 345 track/in.

The ST9000 is an intelligent controller designed to provide an interface for up to two 5¼-in. Winchester disk drives to a host processor. It costs $255.

Seagate is located at 920 Disc Drive, Scotts Valley, Calif. 95066.

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IBM is a registered trademark of International Business Machines Corporation. PCnet is a registered trademark of Orchid Technology. The AST-3780 is a product developed by AST Research, Inc., and Alliant Systems, Inc. AST-SNA is a product developed by AST Research, Inc. and Software Systems, Inc., of Jefferson City, MO. PCOX is a product developed by CXI Inc.

Tool to Aid Windowing

LAS VEGAS — Structured Systems Group, Inc. will introduce its Windowmaster software this week at Booth 2124 here at the Comdex/Fall '83 show.

The product is a windowing package that allows users of IBM Personal Computers and Personal Computer XT microcomputers to perform a number of computing jobs simultaneously. The Windowmaster allows users to open, close, expand, reduce or move windows on a CRT screen. In addition, users can reportedly switch from one task to another.

The package costs $495, the vendor said.

Along with Windowmaster, the vendor will also be showing its entire line of micro software, including the Word Right word processing package. Structured Systems Group is located at 5204 Claremont Ave., Oakland, Calif. 94618.

Century Data To Offer Winnie

LAS VEGAS — Century Data Systems, Inc. will announce a high-speed Winchester disk drive this week here at Comdex/Fall '83.

The average access time of the AMS 571 drive is 19 msec, and the unit's data transfer rate is 19.2K byte/sec, the vendor said. The disk reportedly accomplishes this by combining 32,000 byte/track with a five-disk platter configuration. The product also utilizes 19 thin-film heads.

The AMS 571 costs $13,500 and includes the basic drive, power supply, desktop enclosure and all interfaces.

Further information is available from Century Data Systems, 1270 N. Kraemer Blvd., Anaheim, Calif. 92806.

This Week at Comdex/Fall '83

Rosscomp to Unveil Tape Subsystem, Drive

LAS VEGAS — Rosscomp Corp. will announce its Series 70 tape drive subsystem and D5160 ½-in. streaming tape drive at Comdex/Fall '83 here later this week.

According to the vendor, the Series 70 handles up to 160M bytes of storage and supports several industry-standard interfaces. The system is available either in portable desktop or rack-mountable versions. The subsystem unit may be configured with either one or two of the company's Series 80 (Model D160-90) ½-in. 160M-byte streaming tape drives and includes its own self-contained power supply and cooling system.

Single-unit OEM pricing for the desktop Series 70 with one Series 80 drive is $2,995; the price for the two-drive version is $3,695. Single-unit pricing for the rack-mounted, single-drive subsystem is $2,895; the price for the two-drive version is $3,595.

The D5160 ½-in. tape drive provides 160K bytes of backup in less than 20 minutes, according to the vendor.

The product also supports either 90 or 130 in./sec tape speeds allowing transfer rates of 90K or 130K bytes, respectively. The D5160 can be configured with one of three single-board subsystem controllers, which facilitate communications between a host processor with a Sasi interface and disk drives with either the Q2000, SA1000 or Storage Module Drive interfaces, the vendor said.

Price will be announced at the show, and further information is available from Rosscomp, 16643 Valley View Ave., Cerritos, Calif. 90701.

Xcomp To Show Disk Drives For Micros

LAS VEGAS — Xcomp, Inc. will be exhibiting its line of microcomputer disk drives here this week at the Comdex/Fall '83 show.

On display will be the XF-30, which offers a format capacity of 31M bytes and features a voice coil head positioner. This, the vendor said, gives the unit full stroke seek times across 640 cylinders at 80 msec.

Also on display will be the XF-20, which features the same position technology as the XF-30 with a formatted capacity of 21M bytes, the vendor said.

The units are supported for the IBM Personal Computer using IBM's PC-DOS Release 2.0 operating system. They can also be used on other microcomputers using Digital Research, Inc.'s CP/M operating system. The XF-30 costs $3,995, and the XF-20 costs $3,395, the vendor said.

The vendor will also be showing its Toaster, a dual 5M-byte hard disk cartridge subsystem. The unit features two independent disk drives, each of which accepts a removable 5M-byte hard disk cartridge. The cartridges can be independently removed while the host processor system is operating. This, the vendor said, allows unlimited hard disk capacity.

The Toaster is supported on the IBM Personal Computer under Release 2.0 of PC-DOS. It can also be used on Apple Computer, Inc. Apple II and Apple III processors and processors using the CP/M operating system.

More information is available from Xcomp at 3554 Ruffin Road S., San Diego, Calif. 92123.

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Formerly the Data Communication Products Department of General Electric, we're now independently owned...and our new name is Genicom.

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What Makes for Unfair Promotion?

Q Several of my associates and I feel we are victims of reverse discrimination. One of our peers, a woman, was promoted to project manager ahead of us and in much less time than is usual.

None of us has anything against this woman; as a matter of fact, she is well liked and respected. However, we feel she was promoted prematurely, ahead of others with greater experience.

In our opinion, she was promoted unjustly so that management could point to at least one female manager in the management information systems (MIS) department. Should we express our concerns to management and/or take legal action?

A Perhaps you are a victim of reverse discrimination, or perhaps you have allowed your egos to get in the way of good judgment. We all tend to exalt our accomplishments and inflate their impact on the organization.

With the number of female MIS professionals approaching that of males, the MIS department is the last place one would expect an incident of reverse discrimination. I often find the top-ranking woman in a corporation to be associated with the information services function. To be sure, we have a long way to go before women achieve well-serving parity in MIS, but reverse discrimination is not the answer.

If this woman was promoted unjustly, I doubt that the decision was made by the people doing the promoting, but rather by people at a much higher level. If this is the case, management has probably done its homework and will be prepared to counter successfully any legal recourse.

If the promotion criteria had nothing to do with mainstreaming women into management positions, I would imagine the most qualified person got the job. In either case, my recommendation is to do nothing, for nothing is to be gained.

Q I'm one of two data processing instructors in the business school at a four-year college. At present, we only offer four support courses in DP. Recently, we received funding for two more instructors, and the dean has asked us to look into what it would take to offer a degree program.

We are considering adoption of the Data Processing Management Association's (DPMA) Model Curriculum for Computer Information Systems. How widespread is its acceptance? Do you feel that the curriculum provides an integrated and complete coverage of DP-related topics? If not, how would you recommend it be changed?

A More people are seeking information systems degrees than ever before, but there is little or no uniformity between curricula. Traditionally, information systems courses have evolved because of the availability and content of a particular book or a professor's special interest. Few, if any, are based on a coordinated plan for information systems education.

The DPMA model curriculum is one alternative; the Association for Computing Machinery curriculum is another.

Currently, over 150 colleges and universities in the U.S. and Canada are in various stages of adopting the DPMA model curriculum. The DPMA curriculum is designed to prepare students for employment as business applications programmer/analysts. Its developers make a distinction between programs in business data processing, management information systems and computer information systems. I submit that the distinction is a question of semantic interpretation.

The DPMA curriculum provides a good starting point, but I would not recommend its adoption as is. It is replete with redundancies; inconsistencies and ambiguities. I would recommend that you address these shortcomings and add courses to the existing required list that will provide the student with a functional knowledge of data communications, data base management systems, office automation, systems software and state-of-the-art hardware.

I want to encourage the DPMA Education Foundation to continue to provide universities with a leg up on curriculum development. The DPMA model curriculum would best serve the academic community if the course structure and the selected references were updated annually during these formative years.

Anyone interested in further details can contact the DPMA's Education Foundation at 505 Busse Highway, Park Ridge, Ill. 60068.

Long is a professor at Lehigh University, a DP consultant and author. If you have a question you'd like him to address, send it to Larry Long, Editorial Department, Computerworld, P.O. Box 880, Framingham, Mass. 01701.

Is your most productive asset all washed-out?

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Of course, there are less expensive anti-glare products available. But the nylon strands of mesh screens cause fuzzy images. While etched panels merely spread glare around and blur resolution.

Only Glare/Guard does exactly what an anti-glare panel is supposed to do. And that's getting your terminal user's attention out of the glare, and back onto the screen.

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Place a trial order from your dealer and install Glare/Guard on your busiest terminals.

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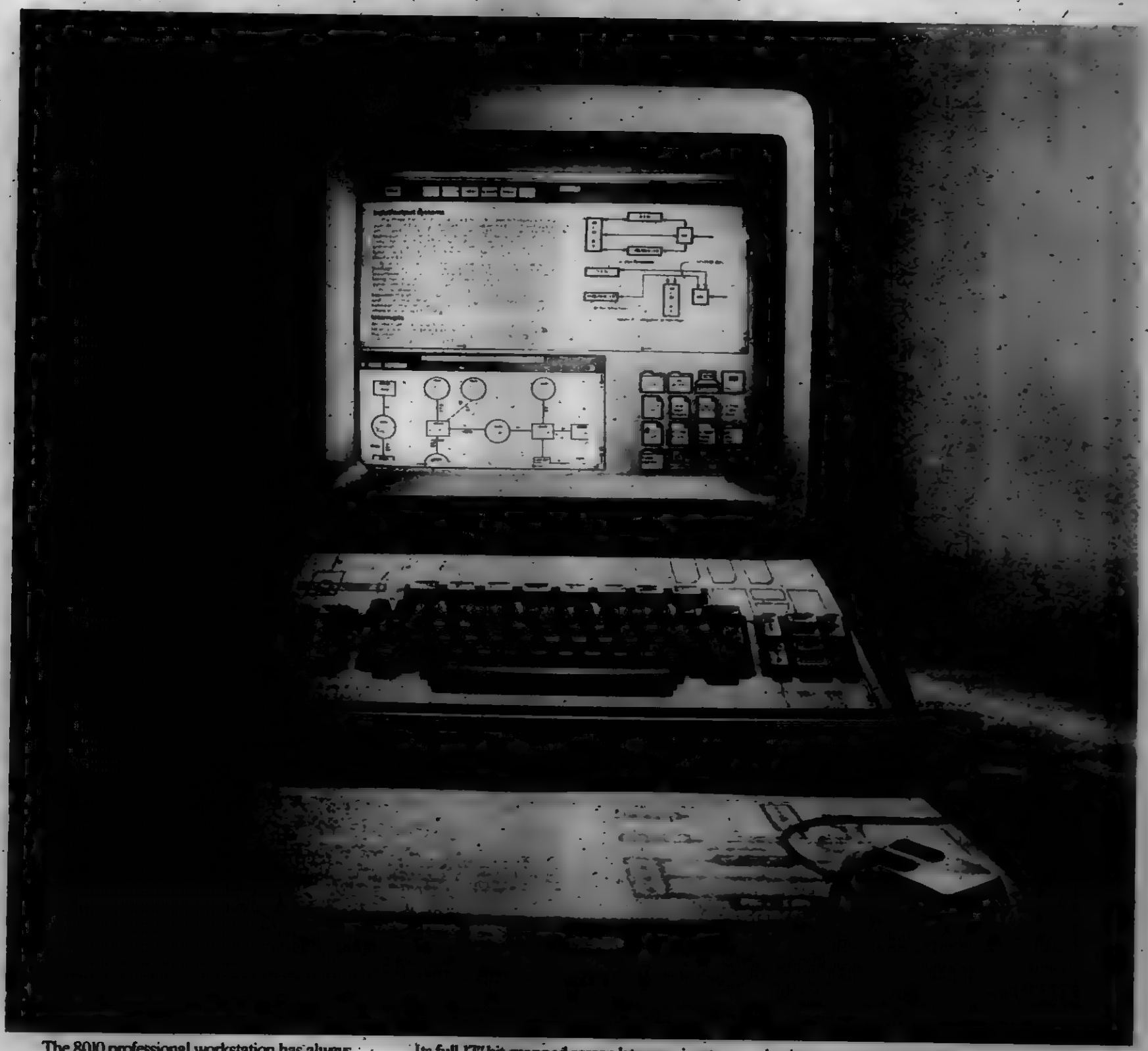

The 8010 professional workstation has always been known as a computer of dazzling capabilities, especially in its graphics, information processing and document preparation.

Team Xerox But what some people may not know is that the 8010 is also the key element in Team Xerox, a system of office machines designed to work together like a team.

When part of an Ethernet network, the 8010 can work with a wide array of word processors, mainframes, personal and business computers, printers, electronic mail and file services, facsimile terminals, communicating Memorywriters, other networks and, of course, other 8010's. It also provides 3270 and TTY emulation.

Its full 17" bit-mapped screen lets you view two full pages simultaneously and open up to six documents at a time without covering up a previous document.

It's also the only workstation that can create and print documents in more than a dozen languages, including Russian and, for the first time, Japanese (Katakana, Hiragana and Kanji).

While other workstations may use Xerox innovations like the mouse, icons, windows, property sheets and combined text and graphics, the 8010 simply does more with them.

For example, the 8010's extensive software is fully integrated, to allow you to work with text and graphics simultaneously. You can draw a flowchart right in the middle of a full page of text without having to resort to a separate program and limited buffer "scratchpad" or "clipboard."

In terms of capabilities, ease of use and overall value, the 8010 would have to be considered the stellar workstation in the industry.

For more information, call 800-527-1922 (in Texas, 800-442-0152), or send in the coupon. Or ask anyone who's ever used the 8010.

Xerox Corp., Box 470065, Dallas, Texas 75247.
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Optical Storage for Micros Will Upgrade Info Retrieval NCR Chief Tells Conference

By Jeffry Beeler
CW West Coast Bureau

SAN FRANCISCO — Huge increases in personal computer horsepower and the expected emergence of low-cost optical disk systems will "startlingly improve the state of the art in information retrieval," NCR Corp. Vice-President Donald Coleman said here recently.

During a Nov. 14 presentation at the annual International Information Management Congress, Coleman predicted the imminent introduction of optical disk systems costing less than $1,000 each.

Expected to arrive on the scene by the end of next year, the products will typically store 100M bytes of alphanumeric data or "billions" of pixels of video information, Coleman said.

Such a storage capacity will translate into 50,000 screen images or a half-hour video presentation, including sound, and will dwarf the capabilities of any personal computer disk system now on the market, he claimed.

Natural Partners

The optical disk modules' low prices coupled with their unprecedented storage capacities will make the products natural partners of today's rapidly improving personal computers, Coleman said.

Coleman, who heads NCR's data entry systems operation, expects the future union of personal computer systems and optical disk units to have a "significant" impact on the business world in general and information retrieval technology in particular.

Potential applications for personal computer systems configured with optical disk modules might include vocational training, reference data collection and storage of product maintenance information, Coleman said.

In addition to their superior storage capacities, optical disk systems are expected to offer at least one other significant advantage over their magnetic recording counterparts: the ability to store multiple forms of information — including alphanumeric, graphics, video and sound — on the same platter, Coleman said.

Not Without Trade-Offs

But for all their expected benefits, low-end optical disk systems will by no means be without their trade-offs. Compared with old standby technologies like computer output microfilm, for example, optical units are less portable, have longer turnaround times and require more expensive viewing devices, Coleman said.

Another drawback with optical storage systems is that, at least in the beginning, the products will be capable only of reading data, not of writing it — a shortcoming that will temporarily "limit their usability," Coleman added. A read/write feature is unlikely to be added to low-end optical disk systems until the mid-1980s.

The anticipated marriage of personal computers and optical storage units will coincide with three other "technology-driven" trends, all of which will also contribute to the advancement of information retrieval capabilities, Coleman said.

The three trends are the advent of improved information retrieval software, an explosion in the number of installed personal computers and rapid growth in the processing power of individual workstations.

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Its flexible jacket bends without damage, and optimizes media lifetime in contaminated environments.

It is from the same company who standardized the minifloppy with Shugart and the 5.25" Winchester drive with Seagate.

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The Dysan 3¼" Flex Diskette.

3¼" Flex Diskette is a registered trademark of Dysan Corporation.

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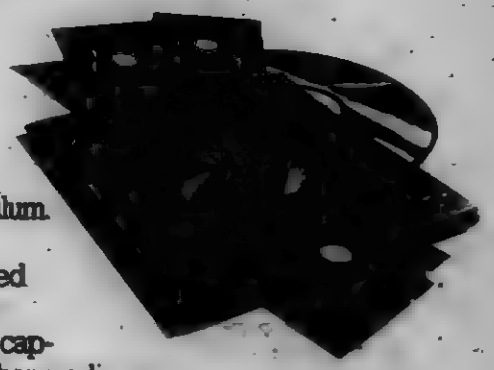

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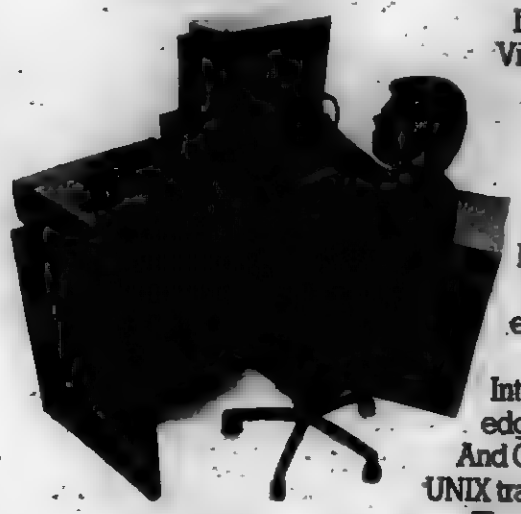

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Managers on the Move

Robert E. Herlihy

ROBERT E. HERLIHY has been appointed senior vice-president for W.R. Grace & Co. in New York. He heads Grace's Computer Technology and Operations Division.

Prior to joining Grace in 1968 as director of management science, Herlihy was with the General Electric Corp. for 10 years. He was named corporate vice-president at Grace in 1978.

Herlihy received a B.S. degree in civil engineering from Tufts University in 1953. He pursued graduate studies in mathematics and operations research at Cornell University. He also attended U.S. Naval Officer's Candidate School in 1954 and is a former lieutenant commander in the U.S. Naval Reserve.

• • •

JOHN B. CAMERON has been promoted to systems manager of information services for Delta Air Lines in Atlanta. Cameron served as manager of information services since 1981.

A 14-year Delta veteran, Cameron joined the airline as a ramp service agent in Memphis. He became an associate programmer in 1975 and was promoted to programmer the following year. In accordance with the airline's promote-from-within policy, he continued to be promoted to positions of increasing responsibility in Delta's Information Service Department.

John Cameron

Cameron attended Memphis State University.

• • •

STEPHEN D. TRISKO has been named director of management information services for Panduit Corp in Oak Brook, Ill. Trisko will be responsible for the development and implementation of all corporate MIS systems, as well as a significant upgrading of Panduit's hardware configuration.

Stephen D. Trisko

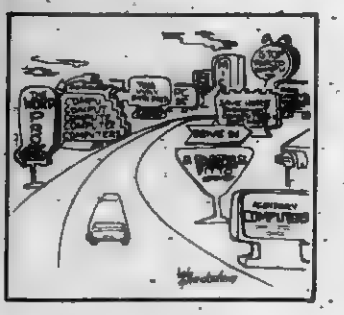
Before joining the manufacturer of wiring duct and cable ties, Trisko previously was manager of MIS for Siemens Gammasonics, Inc.

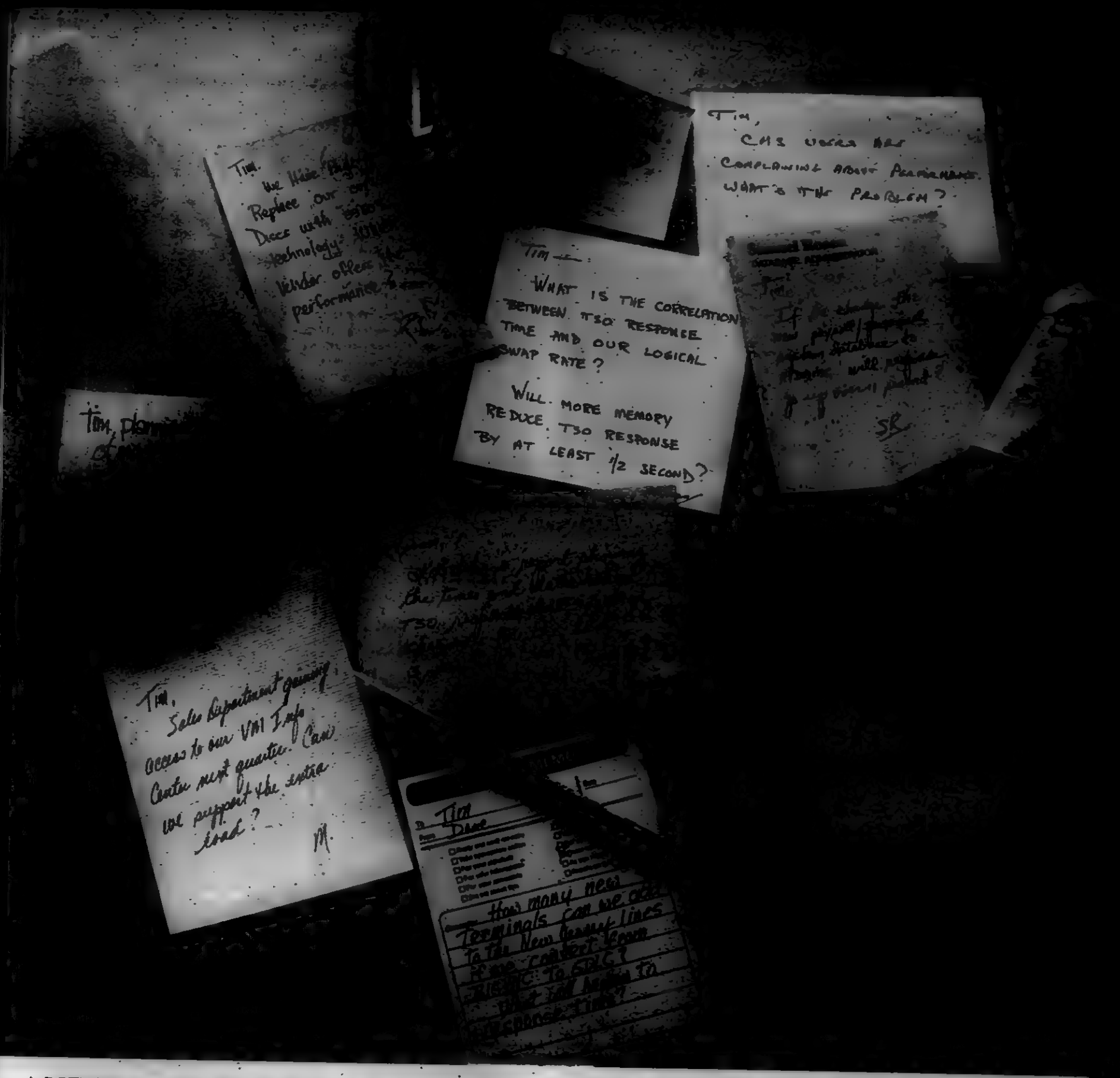
Trisko holds a B.S. degree in computer sciences from Roosevelt University and an MBA from Northwestern University.

• • •

DONALD L. KIDD has been appointed director of information management for Morton Thiokol, Inc. in Chicago, where he will be responsible for the management information services functions in the corporate office. He will also share the responsibility for providing direction to all the management information systems and office systems activities through out the corporation.

Kidd joined Morton Thiokol in 1978 after working for U.S. Steel Corp. He graduated from the University of Pittsburgh in 1961 with a B.A. in industrial management.





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In Annual Telecommunications Costs

International Net Saves Honeywell $1 Million

By Robert Batt
CW West Coast Bureau

PHOENIX — On an average day, the computer network at Honeywell, Inc.'s Large Computer Products Division transports more than 8.5 billion char./hour among 61 large- and 150 small-scale computer systems to six different countries.

With $6 million needed just to cover the annual telecommunications bill for the division's 4,000 employees, the Honeywell facility here began taking a long, hard look at how to cut costs. The results of that effort, company officials claimed, are savings of approximately $1 million each year.

When the cost-cutting project began, Gerry Bedore, manager of telecommunications for the division, considered five alternatives: dial-up networks; concentration and multiplexing ports; private branch exchange technologies for integrated voice and data; local-area networks; and Honeywell's own Distributed Systems Architecture (DSA) software. DSA was eventually selected, Bedore said, because of its capability to access immediately multiple hosts, concentrate data into packets and support multiple networks in Canada, the UK, France, Germany, Japan and Australia.

"My No. 1 priority was to control costs. Our charge was to cut down on operating expenses while increasing the productivity of our employees," Bedore explained. "Everything we used was stock right off the shelf. We didn't have the time or the staff to customize."

Honeywell's locations in Arizona and Massachusetts were connected via GTE Telenet Communications Corp.'s packet-switched network and to a Canadian location via a combination of GTE Telenet and Bell Canada's Datapac packet-switched network. Transatlantic service connected the network to public service networks in Europe — Transpac in France, PSS in the UK and Datex-P in West Germany. The DSA installation now supports a total of 18 international networks.

"My No. 1 priority was to control costs," said Gerry Bedore, manager of telecommunications for Honeywell's Large Computer Products Divison. "Everything we used was stock right off the shelf. We didn't have the time or the staff to customize."

With DSA software creating a distributed processing network, data can be stored, processed, accessed and exchanged among various Honeywell divisions and functions, Bedore explained. In Phoenix, the manufacturing facility can obtain inventory information and develop production schedules, while software engineers have access to many centralized data bases. The system reportedly enables communications between small computers, satellite computers and large-scale mainframe systems and is supported by just four people.

File Transfer Capability

Bedore said the file transfer capability of the network has become an important and valuable facility for saving resources and increasing productivity. Prior to the installation of DSA, data and program files were moved by hand between systems. Today, almost all files from Honeywell's DPS 6 small systems and DPS 8 large-scale computers are electronically transferred across the network.

Currently, the Honeywell manager estimates that his division is about one-third of the way toward fulfilling its long-range plan. Around 950 of the 3,500 terminal devices at the Phoenix locations are connected directly into the network. The measurement of 8.5 billion char./hour, he said, represents only 42% of the total capacity of the network.

A side benefit of the new system, Honeywell claimed, is that now the division can serve as a test site for newly developed DSA products. Currently, Bedore's organization is evaluating a new release of satellite software. Future plans include a pilot project for Honeywell's Office Automation System software releases and an intersystem electronic mail pilot.

With the advent of new Honeywell microprocessors, an interface for downline loading of terminals is also reportedly being planned for the division's network.

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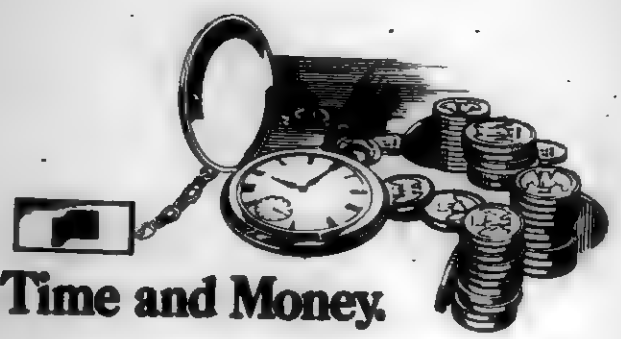

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Marine Firm Deep-Sixes Production Woes With Utility

WAUKEGAN, Ill. — The DP department at Outboard Marine Corp. here began searching three years ago for ways to improve both programmer productivity and turnaround time, scanning various interactive programming tools in the process.

Up to that time, programmers at the outboard motor maker developed programs using batch processing, submitting card decks and waiting for output. Paul Becker, systems programmer, began looking for utilities that allowed IBM's TSO functions to run on his shop's Amdahl Corp. 470V/6-II mainframe, "but without TSO's constraints, such as its overhead and single line editor," he said.

Becker tried one product on a 30-day free trial, but it did not support IBM's Tcam. Using it would have required creating and using an operating system with IBM's Vtam. When Becker tested that operating system on the product, documentation on creating user-defined commands was inadequate and the product did not have easy-to-use screen layouts.

At an early stage in his investigation, Becker obtained some product descriptions and manuals from AAI Systems, Inc. of San Ramon, Calif., which sells Acep. "We knew TSO, so we knew what the commands looked like," Becker said. "When we saw the Acep commands, they looked very much like TSO commands, which impressed us."

Another consideration was that Acep was capable of doing a general poll of each IBM 3270 terminal controller attached to the Amdahl system, unlike TSO, which required polling each individual terminal attached to the controller. Given the size of the department's teleprocessing network, this meant Acep would impose less overhead on the system.

Acep allowed programmers to do on-line editing of source modules, submit jobs in batch mode and look at batch job output on-line. "That alone accomplished 90% of our original goals," Becker recalled, and provided paper savings he termed "enormous," since intermediate compiles and tests did not have to be printed.

Another feature that impressed the outboard motor company's programmers was Acep's split-screen edit abilities, allowing each programmer to display on one part of the CRT screen any error messages from a compilation and the listing itself on another part.

One unanticipated benefit of Acep was a "poor man's word processing system" made possible by the full screen editor, Becker noted. The DP department has since purchased word processing software intended specifically for that task (Applied Data Resources, Inc.'s On-Line ETC), although an extension of the word processing capabilities gave the department a source data entry system that is still in use.

Another extension of this idea introduced electronic mail to Outboard Marine. With 11 operations in three states and Canada, it sometimes took a day for intracompany mail to travel between locations. However, the company already had several terminals and printers in each location linked to Waukegan, Ill.

Acep allowed users to create text files with nonconfidential messages; a menu in the electronic mail port of Acep allowed users to route the message to the printer located closest to the intended recipient. The messages are now sent instantly to those terminals, where they are printed and distributed.

The department's system, now anchored by an Amdahl 5860 mainframe, services 40 programmers and others at company headquarters here, as well as operations in 40 other locations. A network of 450 terminals runs under CICS/VS.

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ACM and Its Education Group to Host Meets

NEW YORK. — The Association for Computing Machinery's (ACM) 12th annual Computer Science Conference will be held Feb. 14-16 at the Franklin Plaza Hotel in Philadelphia.

Also scheduled at the hotel is the ACM Special Interest Group on Computer Science Education's (ACM/SIGCSE) 15th Technical Symposium on Computer Science Education, which will be held Feb. 16-17.

The first conference's technical focus is on three theme days titled "The Factory of the Future," "Coping with Small Computers" and "Social and Ethical Implications of Computers." Also, a panel session on the impact of Ada has been scheduled for Feb. 16.

Complementing the technical program will be an exhibit highlighting the latest products and services in the computing field. The conference luncheon will feature the ACM Doctoral Dissertation Award and awards to top finishers in the ACM International Scholastic Programming Contest. The contest will be held the evening of Feb. 15; also that evening, a film will be shown of early computers in action.

For members, registration for the full ACM Computer Science Conference costs $55, and one-day registration is $40. Nonmember fees are $90 for the full meet and $55 for one day. The cost for department chairmen is $80. On-site registrations and those received after Jan. 25 will cost an extra $20. The conference luncheon, which costs $18 per person, is not included in the above fees. ACM is located at 11 W. 42d St., New York, N.Y. 10036.

The ACM/SIGCSE Symposium will include "paper" sessions on teaching service courses, computer literacy, computer science projects, methods and approaches to teaching various subjects and faculty development. Special sessions will include computer science education in small colleges and in liberal arts colleges; accreditation of computer science programs, status of women in computer science and the role of mathematics in computer science education.

SIGCSE and the Computer Science Conference will sponsor joint sessions on social and ethical implications of computers, slated for Feb. 16.

Registration fees are $45 for ACM/SIGCSE members, $50 for nonmembers, $10 for students and $18 for the conference luncheon. More information about the Symposium is available from General Chairman Richard H. Austin, Department of Computer Science, University of Maryland, College Park, Md. 20742.

Simulation Meet Scheduled For April 18-20

NORFOLK, Va. — The Society for Computer Simulation is sponsoring the Simulators Conference, scheduled to take place here April 18-20.

The conference will touch on human factors engineering in simulator design; methods for solution of equation systems; development of simulator software; terminology, standards and regulations; simulation of operator environment; simulator computer system architecture; discrete system simulators; as well as training curricula, facilities and organizations.

Sessions of specific simulator applications will cover topics including power generation plants; aircraft; maritime; biomedical; processes; ground vehicles; and various research and development simulators, according to the sponsor.

Registration is $175 for the event. Further details are available from Charles Pratt, Executive Director, Society for Computer Simulation, P.O. Box 2228, La Jolla, Calif. 92038.

DP Acronym Book Out for Auditors

FRAMINGHAM, Mass. — MIS Training Institute, Inc. has published the "EDP Auditors' Acronym Dictionary," which contains definitions of hundreds of computer acronyms for DP and internal auditors.

The publisher said the 40-page, vest-pocket reference guide, which offers concise explanations of more than 300 acronyms, is designed to help auditing professionals unscramble the mystery of computer jargon.

The "EDP Auditors' Acronym Dictionary" is available for $5 plus $1 postage and handling from MIS Training Institute, 4 Brewster Road, Framingham, Mass. 01701.

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Hopper Receives ACM's '83 Award

NEW YORK — Commodore Grace Murray Hopper, U.S.N.R., is the recipient of the 1983 Association for Computing Machinery's (ACM) Distinguished Service Award. The award, which is bestowed by the association in recognition of long-term service to the computing community, was presented here last month during the 1983 ACM Annual Conference.

Hopper was cited by the ACM for her "wide-ranging, unstinting participation in the computing industry and its software technology, in government and in the promotion of the profession."

After graduating from Vassar College, Hopper earned her M.A. and Ph.D. at Yale University. In 1943, as a member of the U.S. Naval Reserve, she was commissioned lieutenant and assigned to the Bureau of Ordnances Project at Harvard University, where she programmed the first large-scale computer, the Mark I.

Currently, she is serving on active duty on the staff of the commander, Naval Automation Control. Hopper has published more that 50 papers on computer programming and received the first Data Processing Management Association's Computer Sciences "Man of the Year" Award, as well as the Harry Goode Memorial Award.

Also honored at the recent ACM meeting were Dr. Seymour Wolfson and Dr. Richard Austing, who were each presented with ACM Outstanding Contribution Awards.

Dr. Wolfson, chairman of the ACM Conference and Symposia Committee since 1977, was cited for his leadership and dedication to the organization. He is an associate professor of computer science at Wayne State University in Detroit.

The award was also presented to Dr. Austing for his major contributions to the organization in the area of computing education. As a member of the ACM Education Board since 1970, Dr. Austing has taken a leading role in the formulation of three ACM recommended curricula, including the two-year Associate Degree Computer Programming Curriculum and the Doctoral Program in Health Care Computing. He is presently a faculty member at the University of Maryland.

CW File Photo

Grace M. Hopper

Deltak Offers Training Series On Vsam Issues

NAPERVILLE, Ill. — "Keeping Current" is the name of a newly released multimedia training series produced by Amdahl Corp. and available from Deltak, Inc.

The program presents technical information on Vsam performance considerations; IBM/VS performance through selected releases and features; planning, upgrading and maintaining IBM's ACF/Vtam-ACF/NCP network; cost-benefit perspectives on new MVS/SP1.3 features; and planning and implementing JES2 under MVS/SP1.3 storage management.

Each segment features a video and text that together require between one and three hours to complete, according to Deltak.

The course can be purchased for $1,750 or rented for $50 to $125/mo through Deltak's library plan.

Further details can be obtained from Deltak headquarters at East/West Technological Center, 1751 Diehl Road, Naperville, Ill. 60566.

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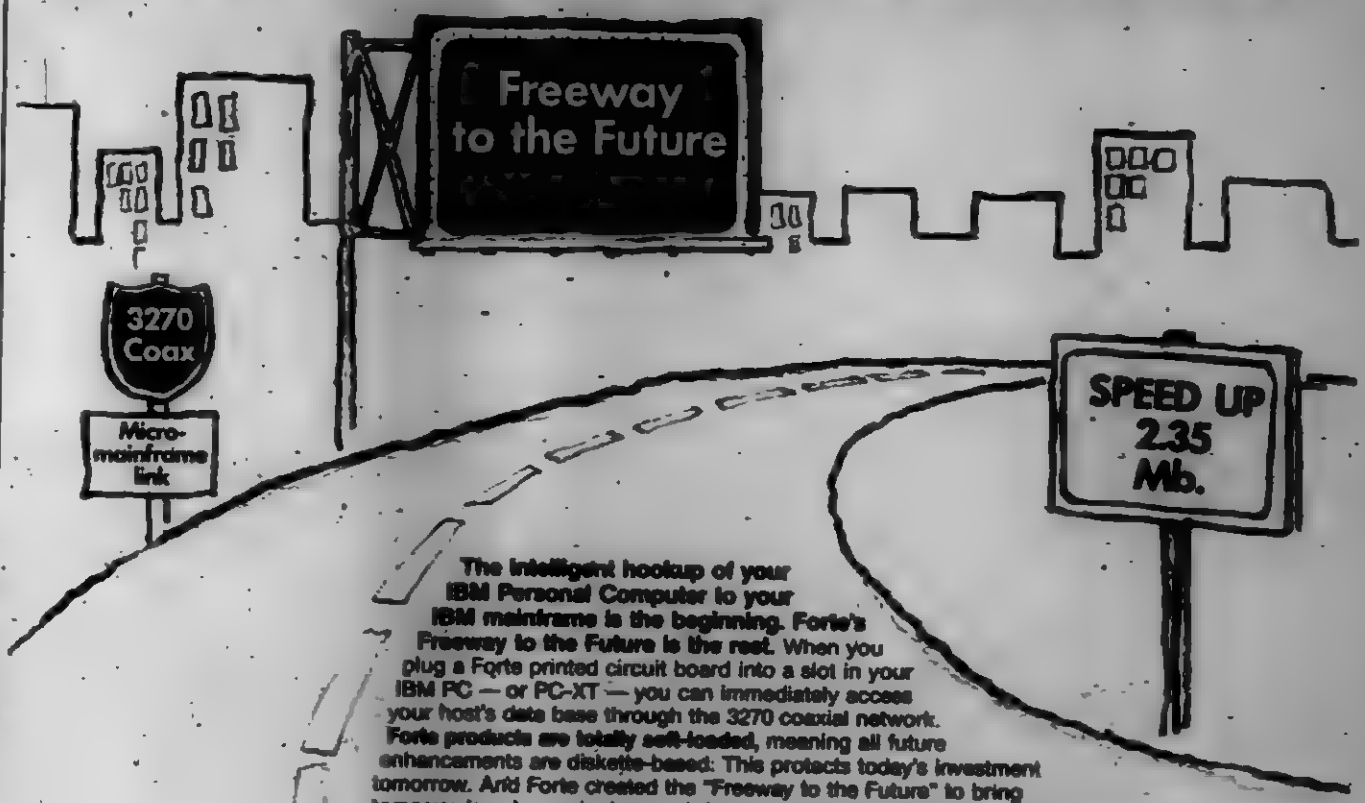

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Exxon Office Equipment Divisions Join Data

STAMFORD, Conn. — Exxon Office Systems Co., formed from three of the company's existing office equipment operations, was in search of a data base system at the end of 1980.

Each of the three operations had similar computer systems in place for accounting, order entry and inventory control. "We had to find a way — quickly and efficiently — to combine all that information [from the three companies] into a single data base from a host of field sales offices, manufacturing plants, warehouses and other field sites," according to Howard Maynard, Information Systems Director for Exxon Office Systems.

Exxon Office Systems, headquartered here, manufacturers and markets office automation products that include information processors, electronic typewriters, systems products, facsimile equipment and printers.

It has branches or agents in more than 110 locations in the U.S. and an international operation in Geneva, Switzerland, with branches in six primary European markets — the UK, West Germany, the Netherlands, Switzerland, France and Belgium. The company's products are marketed in other parts of the world by distributors.

In Search of a DBMS

In search of a data base management system (DBMS), "we looked at 'packaged' systems, but they didn't meet what we had set as our requirement for a totally comprehensive system," Maynard recalled. "There was, as far as we could see, no business that was exactly like ours. But if any company had to tailor a data base system to meet its own needs, we certainly had that capability."

The name for the system that emerged was Marketing Management System (MMS), a system used and developed by Exxon Office Systems to handle internal basic marketing, financial and service transactions on its IBM 4341 minicomputer.

The types of transactions break down into two general categories: those transactions required in the product ordering, installation and payment cycle; and those transactions required to support a product after it is installed at the customer's site.

The system has more than 500 computer programs supporting these functions and data bases with more than 800 data items. In addition, the Exxon Office Systems computer center processes between 50,000 and 100,000 individual transactions each day in support of the business.

Economies in replacing three redundant systems with one began to bear fruit

SWCC Slated For March 27

OKLAHOMA CITY, Okla. — The seventh annual Southwest Computer Conference (SWCC) will be held at the Myriad Convention Center here March 27-29.

The conference is a business and industry event running midweek, aimed at both management and technical personnel. Attendance at the 1983 SWCC was 10,000, and the 1984 turnout is expected to exceed that figure.

The conference will feature over 50 seminar presentations in addition to the 250 booths in the exhibition, according to a conference spokeswoman.

Admission is free with tickets, which can be purchased from the Southwest Computer Conference through P.O. Box 950, Norman, Okla. 73070.

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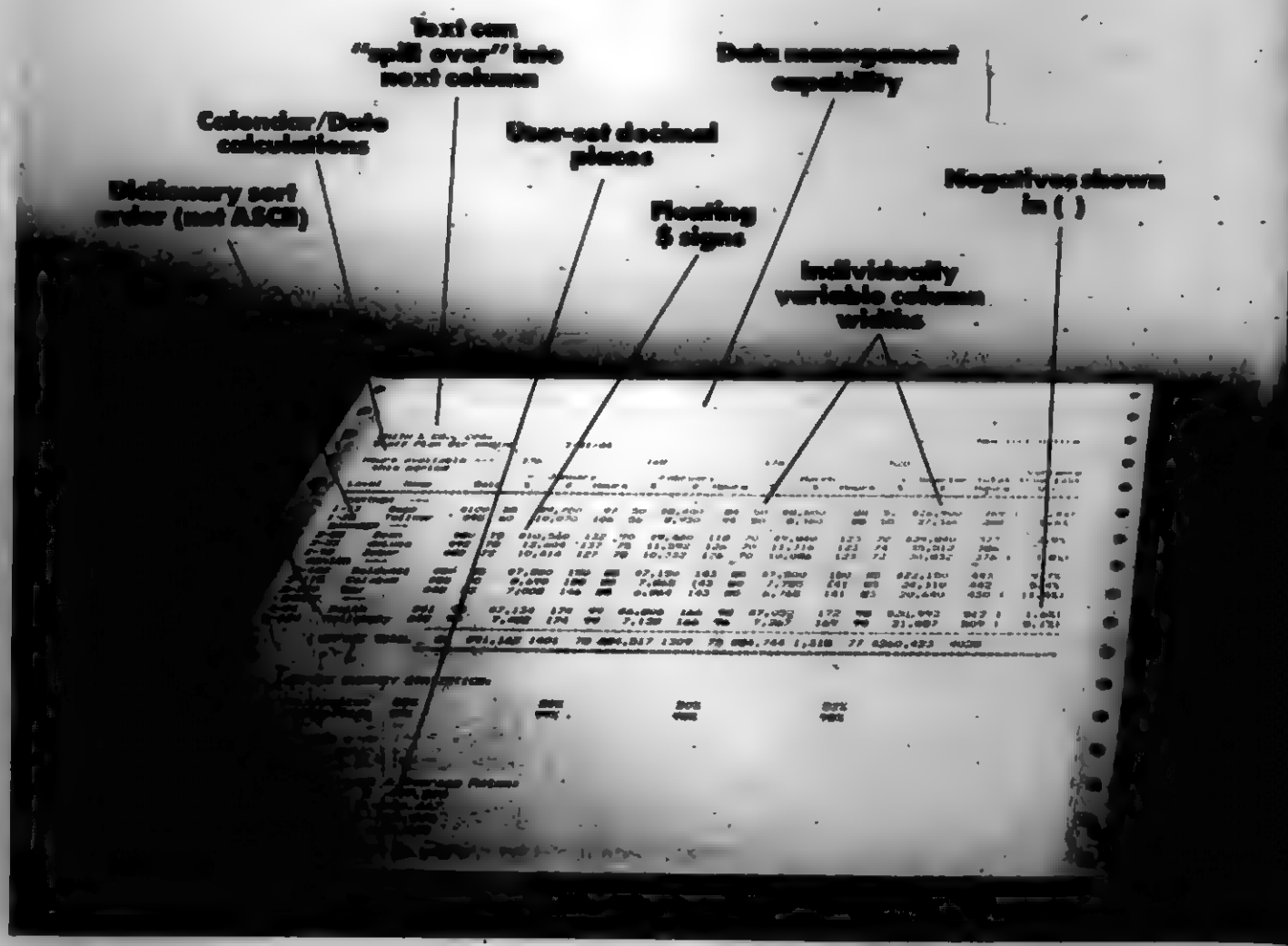

From Multiple Locations With Aid of DBMS

this year. The operating budget for Exxon Office Systems and its associated staffing levels is now substantially less than the total systems budget for the three companies that existed in 1980.

In addition, MMS strengthened control over processing transactions and managing the location and status of products. This stronger control comes from having the system respond to more than 40 of the company's geographical locations and by having appropriate users responsible for inputting data at the source of the transaction.

For example, a customer service dispatcher will directly key in information on a recently repaired machine. A branch administrator will input information on a new sale.

In addition, the system permits a strong control over the relationship between the sequence of the business transactions. It is impossible to record an installation transaction for a machine if the order has not been approved, allocated and shipped in the proper sequence, an Exxon spokesman said.

All the information is shared among locations, such as branches, headquarters and plants, and among functions, such as sales, business planning and accounting, so the information is highly "visible." If any facts are missing or wrong, the error becomes apparent and can be corrected quickly.

Implementing the Switch

All functions for all the products were implemented at the same time to eliminate the cost of building bridges between old and new systems.

"An early switch-over date was established with the understanding that whatever was necessary to meet the deadline would be done and that management could rely on that date for the company's planned reorganization and consolidation," Maynard explained.

Two branch offices in Connecticut and New York were used as a test for the system before going live at all locations. Initially, MMS was restricted to the basics necessary to process business transactions. Improvements, enhancements and interfaces with other systems came later, once the system was operating in a satisfactory manner.

During the workday, the field has information regarding new sales orders, equipment allocation, de-installation, open orders, product inventory, pending installations, customer bases and pricing. After normal working hours, the system processes this information to provide all of the functional groups with over 50 different forms of hard-copy reports by 7 a.m. the following day.

For the branches, this system has eliminated 90% of the paperwork flow back and forth between locations. In a matter of minutes, administration can enter a sales order.

"The turnaround time for its approval is a fraction of the time taken when orders were handled by mail," said Terry Palumbo, administrative manager of the company's Southern Connecticut branch.

The Future

MMS now exists as a smooth operating system handling all marketing, financial and service transactions. Exxon Office Systems has begun to build on the system to develop informational needs.

A system for reporting sales information using a relational data base system has begun to speed up the delivery of advanced business analysis data. It is updated by using both change logs and extracts of the transactions data base that are run daily.

"Now that we're fully prepared to answer our customers' questions professionally and quickly, we've begun the first phase of our informational efforts," Maynard said. "Using MMS, enhanced with our relational data base capabilities, we'll be able to answer the more complex questions from within our own organization for internal reports and analysis."

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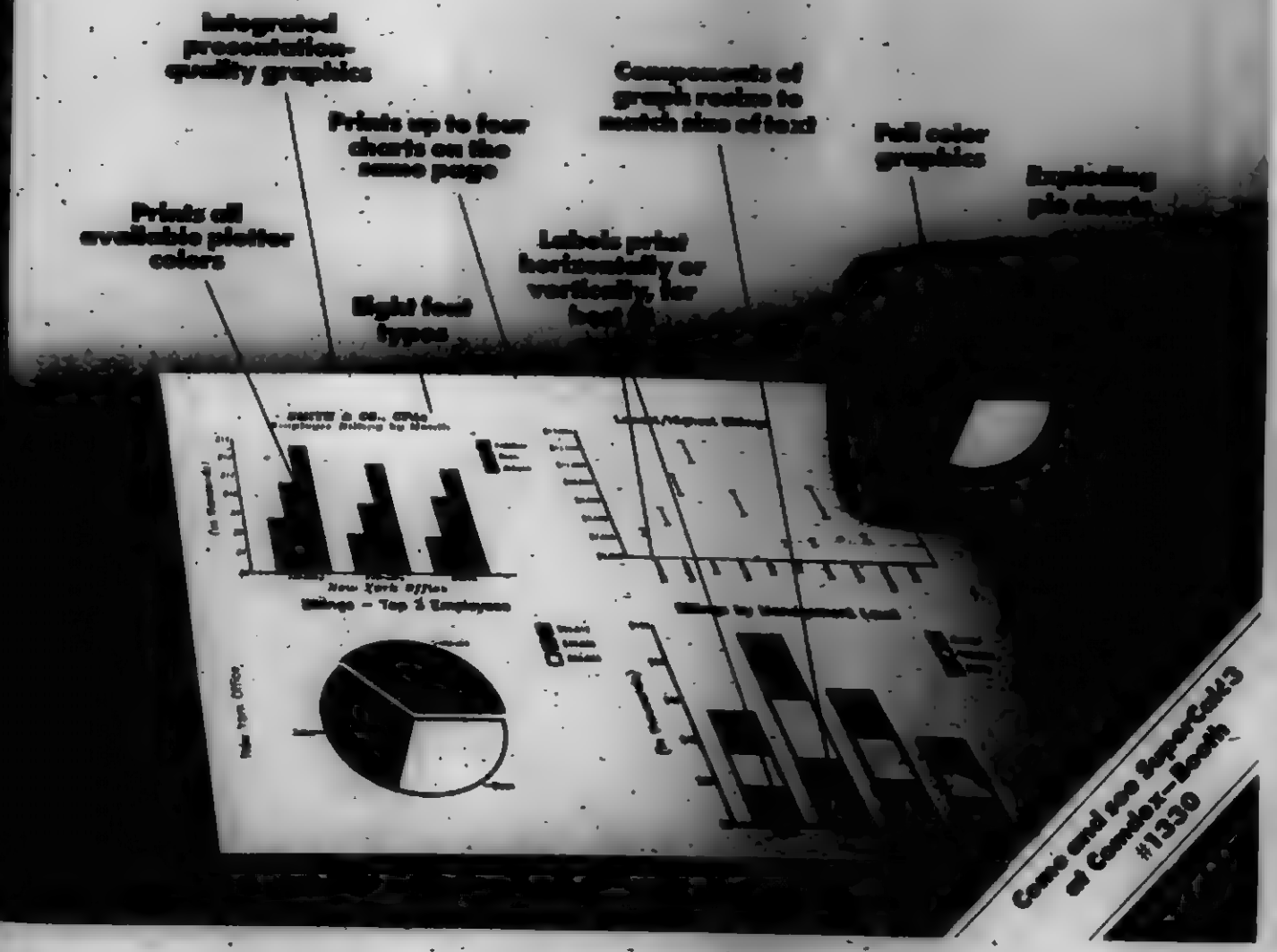

International Report

FROM THE CW INTERNATIONAL NEWS NETWORK

AUSTRALIA

RYDE, N.S.W. — A federal government project grant valued at $90,000 has been awarded to the software house of Kingdom Pty. Ltd. for the research and development of a software process to "redefine our concept of the data base." In its first commercial application, the software will provide a new procedure for the solution of numerical and logical problems without programming, a spokesman said.

MELBOURNE — The Australian Telecommunications Authority (Telecom) has requested contract bids for a videotex system without formally establishing a national videotex standard. Sources reported, however, that while inviting proposals from all videotex suppliers, Telecom has quietly named the popular French Prestel as the standard it will adopt, closing the door to the rest.

CANBERRA — Private investors have reportedly been excluded from any shareholding in Aussat Pty. Ltd., the Australian Satellite Operating Authority. However, the Australian Telecommunications Authority has been offered up to a 25% interest in Aussat. Speaking in the Federal Parliament last week, Minister of Telecommunications Michael Duffy said the government will ensure that Aussat remains a commonwealth-owned company.

FITZROY — Australian Systems Engineering Pty. Ltd. (ASE) has unveiled a software utility that is said to automate repetitive manual tasks in IBM MVS batch environments during "start tasks" or time-sharing "logon completes." The software, called Ecxa, transfers sysout from JES2 and JES3 spool to Ecxa data bases and performs its own basic checking plus any user-specified checking to determine if execution has been successful, ASE said.

SYDNEY — In a move to increase its penetration into the Australian marketplace, IBM is enlisting third-party vendors for its 4300 series sales community. Computer Power Group, a major Australian software supplier, has already supplied five 4300s to the federal government after receiving them from IBM at a special price, sources said.

BRAZIL

BRASILIA — ABC-Empresa Telematic is the name of a new computer company jointly established by Brazil and the French nationalized data processing giant, CII-Honeywell Bull. The new company, which is 60% owned by Brazil's ABC and 40% owned by Bull, will reportedly manufacture Bull's line of medium- to large-scale DPS-7 computers for banks and other large DP users. Production is slated to begin in the first quarter of 1984. The production agreement reportedly allows Bull to get around tough Brazilian import restrictions.

RIO DE JANEIRO — To interconnect its Brazilian branches, Brazil's Citibank will use a microcomputer network developed here by the Electronic Communication Center at Rio De Janeiro Federal University. The network was initially developed with Citibank funds; the operational phase of the Citibank project is slated for mid-1984. The bank selected the University's network, according to Citibank Vice-President Erich Wilmer, because of its extensive capacity and because all of the network's components are home-grown. Meanwhile, in Brasilia, Mucio Doria, Brazil's subsecretary of the Special Informatics Agency, declared his firm opposition to signing any contracts with multinational companies, such as IBM or Burroughs Corp., for banking terminals or banking software.

CHINA

BEIJING — China's largest computer, the System 757, has just been formally introduced here by the Computing Technology Research Institute. The supercomputer, all of whose components were made in China, is said to operate at speeds of 10 million instructions per second (Mips). It is based on a vector host processor with a 64-bit word length and a 4M-byte memory; it reportedly features vector computation capability, streamline architecture and parallel processing for large-scale scientific and engineering applications. The System 757 relies on a peripheral processor to handle housekeeping functions, relieving the high-speed host system. Available software for the 757 includes a multitasking operating system, vector Fortran, a compiler, assembler and a graphics package.

BEIJING — A computerized Chinese character editing and laser typesetting system developed by Beijing University has gone into mass production at Weifang Computer Manufacturers here. The typesetting system, which a spokesman claimed features an advanced information

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International Report

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compression technique and highly accurate laser output, is said to compete with many systems from abroad.

FRANCE

PARIS — Thomson-Brandt has unveiled its long-awaited optical digital disk called Gigadisc 1001 (GD 1001). The nonerasable medium measures 30 centimeters in diameter and is said to store 10G bytes of information on each face. It will be made available to the OEM market in two versions, one in a rack and one in a box. The optical disk is scheduled to be showcased during Comdex in Las Vegas this week, where Control Data Corp., Toshiba Ltd. and Storage Technology Corp. are also expected to introduce optical disks. To counter its foreign competition, Thomson has reportedly signed an agreement with Xerox Corp. to market the GD 1001 in the U.S. under the name Optimum 1000 via Shugart Associates.

JAPAN

TOKYO — Sony Corp. has signed an OEM contract with IBM to supply high-quality color display systems for the IBM 5080 product line, as well as for a computer-aided design and manufacturing system scheduled to be released by IBM next spring. The 20-in. display was originally developed for Sony's television product line.

TOKYO — Canon, Inc. has released a Japanese word processor called Canoword Mini 5. The machine is an all-in-one typewriter with keyboard, printer and LED display. Priced at $1,268, the system will be available Dec. 20.

TOKYO — Cadix, Inc. has released the Cadix Auto Digitizer System 4001, which can reportedly read drawings automatically. Users of the System 4001 can input drawings into the system up to 200 times faster than by hand, the vendor claimed. The system relies on a linear scanner, which scans the data for one minute, and a dynamic random-access memory scanner that processes color data. The price of the system, which is based on a super high-speed image processor to process images with hardware rather than software, begins at $212,766. It is scheduled to be shipped in January.

MEXICO

MEXICO CITY — It is vital for Mexico to define a national policy dealing with the impact of computer technology on the economy and on society, Jorge Gil Mendieta, director of the University Computing Program of Mexico, told the "Future of Information Science in Mexico" forum here recently. He also maintained that any revolutionary advances in technology can result in major problems when acquired and incorporated into the nation's economy. Mendieta further argued that the technologies associated with computing are linked inextricably to the economic and political lifelines of industrialized countries, and nations like Mexico must establish policies and strategies now to minimize the negative consequences of the economic crisis that has multiplied the costs of these services and products by a factor of six.

ACAPULCO — All software contracts should be registered with Mexico's National Register of Technology Transfers, according to Luis Vera Vallejo, a legal adviser specializing in data processing. Vallejo recommended enforcing stiff penalties and fines — up to 10,000 times the value of the contract — on companies that refuse to comply with the proposed ruling. Vallejo made the recommendations at the recent First Annual Conference of Latin American Users of McCormack and Dodge software here.

MEXICO CITY — During a recent conference called "The University View of Computing," Jose Warman, subdirector of Secofin Electronics Industries, contended that until universities "accept that they can see only one side of the computing coin," Mexico will not be able to establish a bond between the industrial, government and academic sectors. Warman accused universities of operating in a vacuum and likened Mexico's problem to an absurd theatrical drama with three peasants: the government, industry and the university.

WEST GERMANY

COLOGNE — The Society for Data Integrity and Data Security held its seventh annual meeting here recently, discussing legislation related to the protection of sensitive data. An amendment proposed by Federal Minister Friedrich Zimmermann was sharply criticized during the meeting by society members who felt that the measure might reduce data security and integrity. Bernd Hentschel, chairman of the society, warned conference attendees of the potential dangers of the amendment. Other topics discussed included the problems of handling personal data and implementing new technologies.

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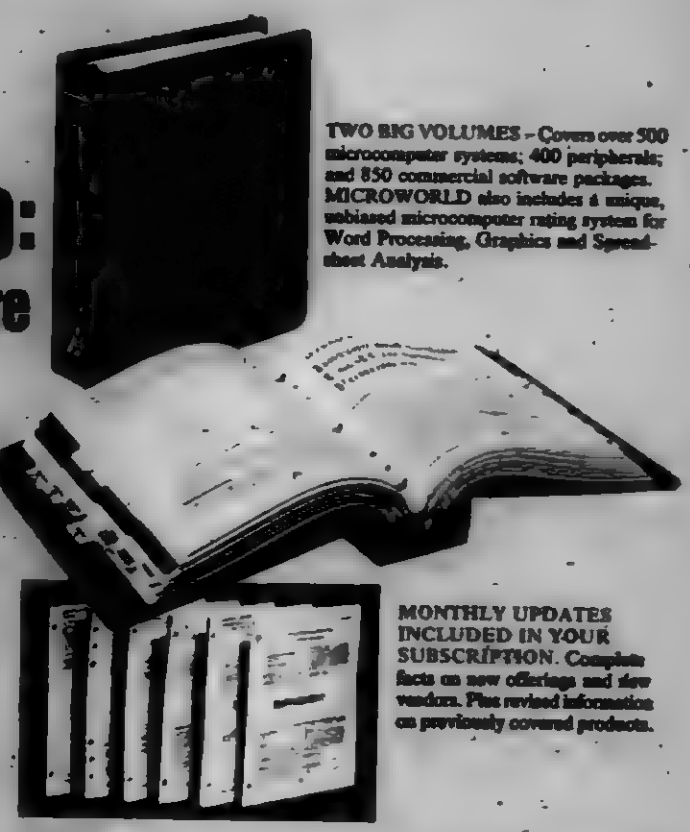

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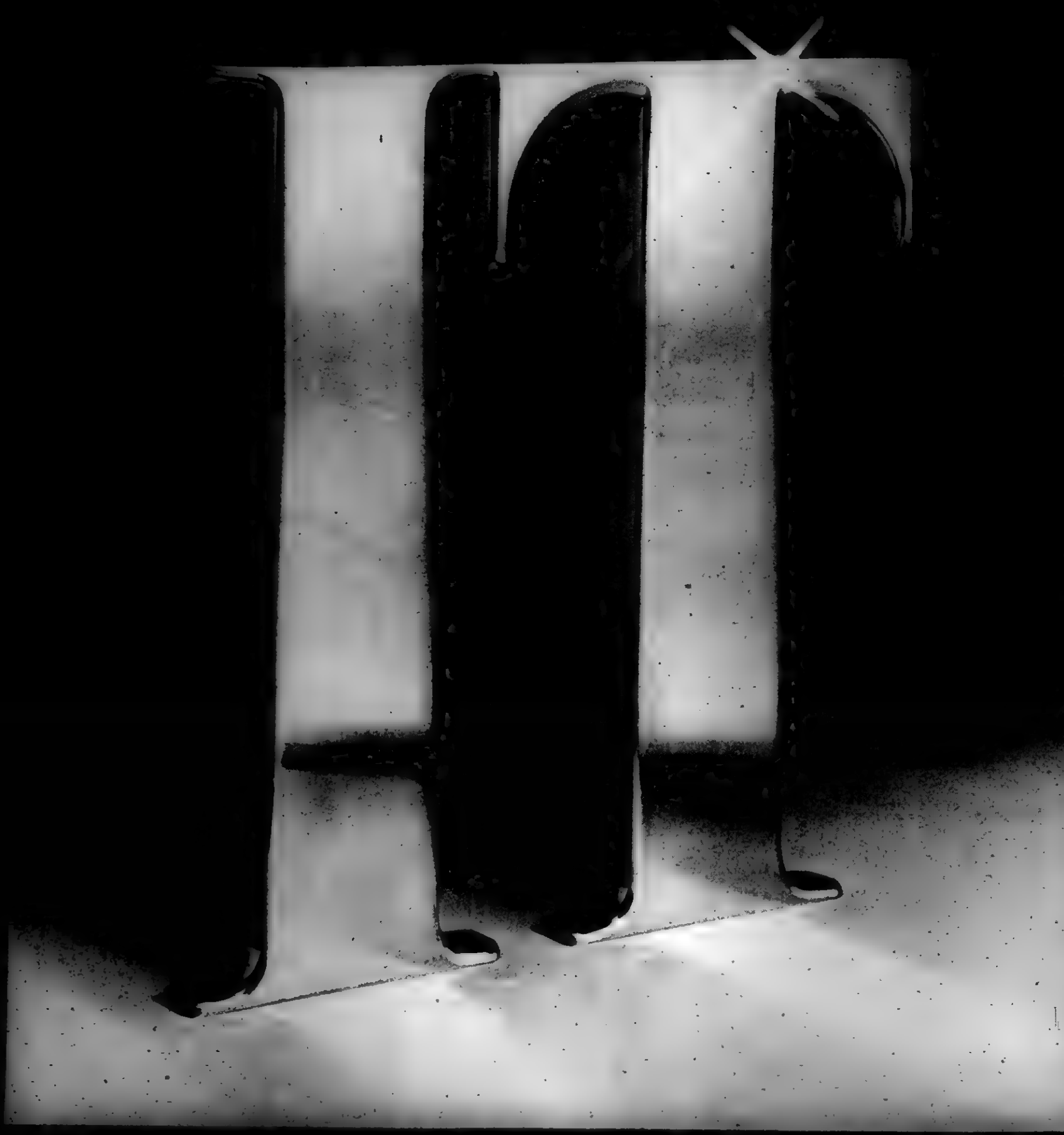

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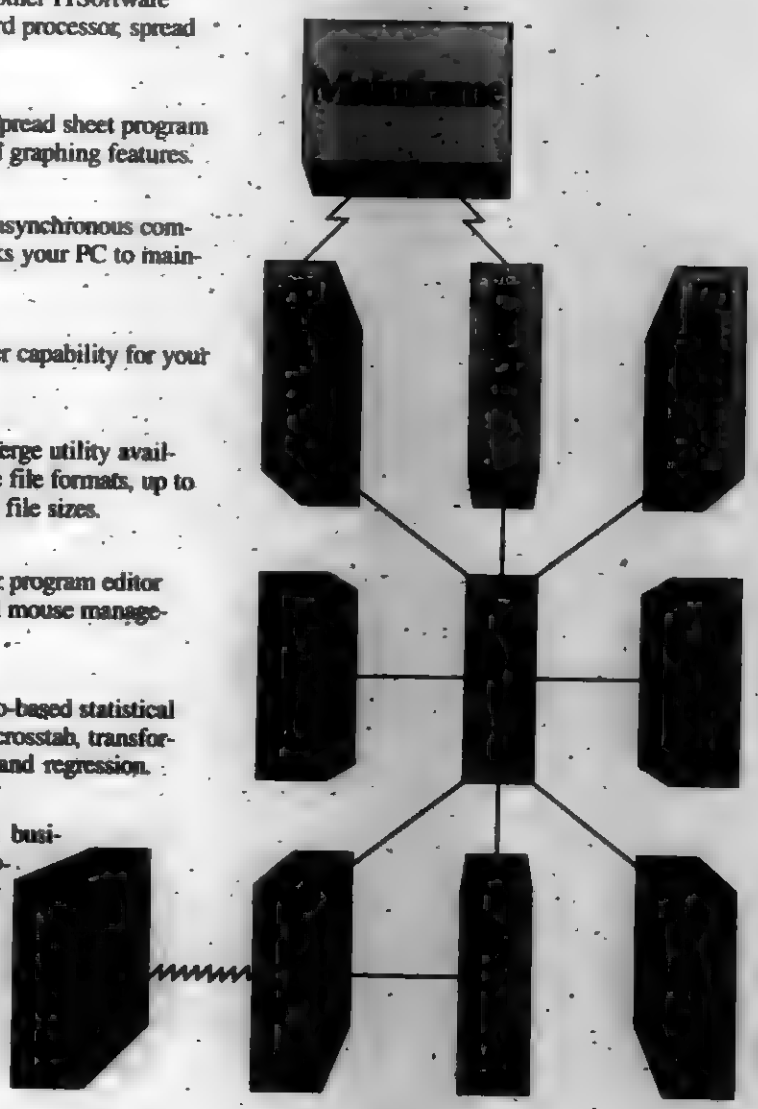

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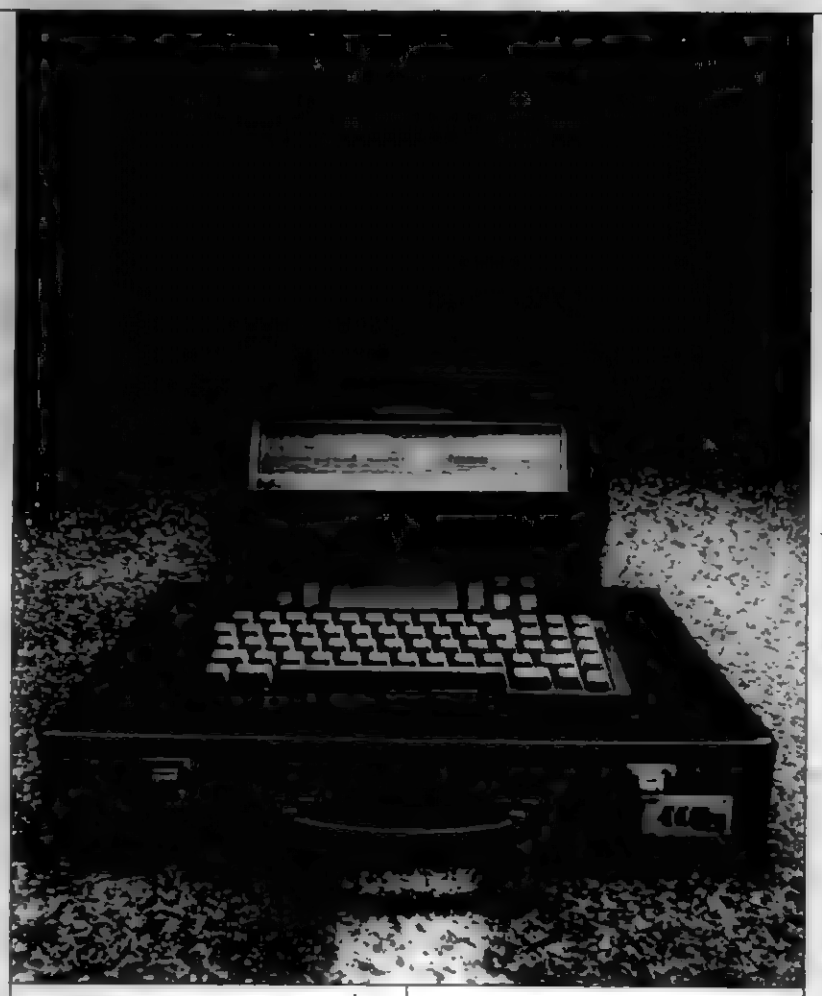

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DBMS Controls Flow of Engineering Projects

CHICAGO — Two data base management systems have engineered some significant information processing solutions for Harza Engineering Co.

The company has been providing management consulting services for public and private civil engineering projects since the late 1920s. Today it employs some 800 engineers and clerical workers to supervise a score of projects in the U.S. and overseas, mostly in the area of water management and control — dams, power plants and irrigation and flood-control programs.

"Over the years, monitoring all the information for each project involved a lot of man-hours," noted Mark Allen, a Harza construction engineer who handles systems applications for the field. "Correspondence with our outside vendors — who supply special electrical and mechanical equipment — status reports and payment information all had to be recorded and tracked continually."

Harza was well aware of a growing need for some type of computer data base system to record and monitor this information without the addition of a lot of personnel, Allen said. Specifically, Harza needed a system that would enable it to store information in a large mainframe and distribute that data to microcomputers in field sites around the country.

"Such a system could be used as a tool to relieve a large part of the paper-oriented functions of our field engineers," Allen said. "This would mean less time spent on recordkeeping and more time spent on project management."

About a year and a half ago, Harza purchased its first data base management software system, Relational Information Management (RIM), developed by Boeing Computer Services Co. RIM was installed on a Harris Corp. supermini and, Allen said, immediately proved its worth by cutting down the time it took to track drawings for equipment used in various construction projects. These drawings were prepared by both Harza engineers and outside vendors.

Tracking drawings is a time-consuming but critical task in completing a project. "An engineer needs to know exactly what drawings are required for a job, when they will be needed and who's working on them," Allen stated. "With RIM we can record the information just by typing it into the computer. Then we can do a query on the system periodically to find out which drawings are outstanding and which are completed. This saves a lot of time compared to doing the job manually.

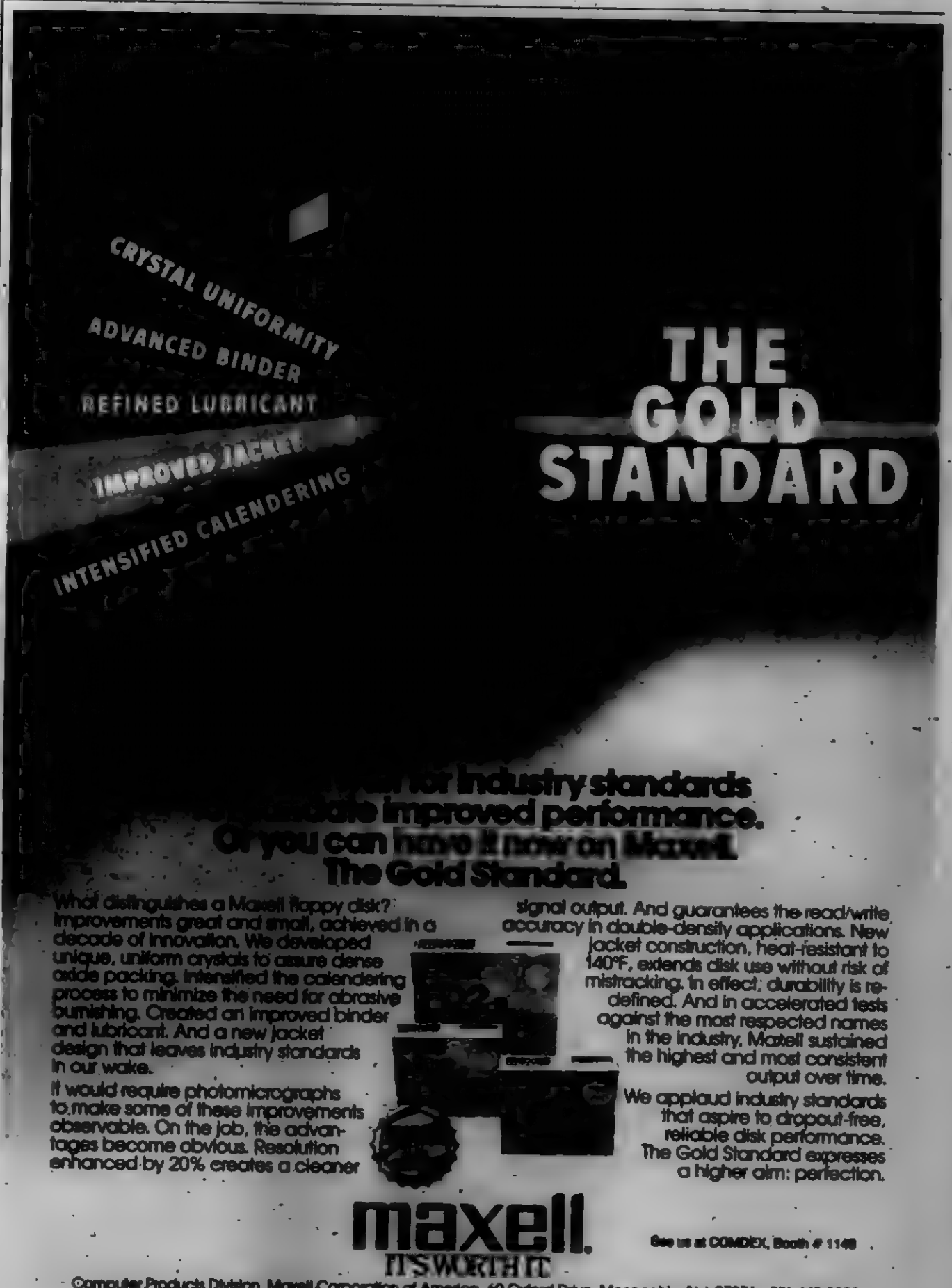
"Another area where RIM has been useful to us is tracking correspondence," Allen noted. "Each project generates a lot of correspondence between engineers and vendors on who's doing what, what is the status of a particular project or piece of equipment and why was it delayed or ahead of schedule. RIM helps us to get our hands on this information immediately."

Having met with success with RIM on its supermini, Harza then decided to try out Microrim, a relational data base management system for microcomputers manufactured by Microrim, Inc. of Bellevue, Wash. Wayne Erickson, Microrim founder and president, was the chief architect for RIM at Boeing.

As a relational data base management system, Microrim organizes data into tables of rows and columns. The tables form "relations," which can be combined to form new tables. When any transaction updates an entry, the data base automatically updates all other related elements. Because all the elements share some common relationship, the user can store, rearrange, retrieve, sort and present information in a systematic manner, according to Erickson.

The major advantage of Microrim for Harza has been the system's ability to exchange information with RIM. This allows data from the Harris minicomputer to be transferred to microcomputers in the field.

(Continued on Page 50)



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NEW ORLEANS — Major vendors of electronic payment systems will highlight their product offerings during the upcoming National Automated Clearing House Association (Nacha) Conference, slated to take place here March 18-21.

The theme of this year's meeting is "Who's Who in Electronic Financial Services." On hand to discuss the subject will be representatives from NCR Corp.; IBM; J.C. Penney Co.; General Electric Co.; and Visa U.S.A., Inc.

According to Nacha Conference Chairman Matthew Dillane Jr., the event will focus on "where we are, what's in store for the future and how we can manage and direct future electronic delivery systems." Dillane is vice-president and manager of corporate services at First National Bank of Kansas City, Mo.

Twelve concurrent sessions will amplify the conference's topics, which include treasury automation; corporate bank relationships; corporate trade payments; cost efficiencies in delivering electronic services; developing market plans; case studies; electronic fraud; U.S Treasury Department report; and point-of-sale systems.

Registration for the 1984 Nacha Conference is $495 for members and $625 for nonmembers. Further details can be obtained from Nacha headquarters at 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

Firm's DBMS Tracks Jobs

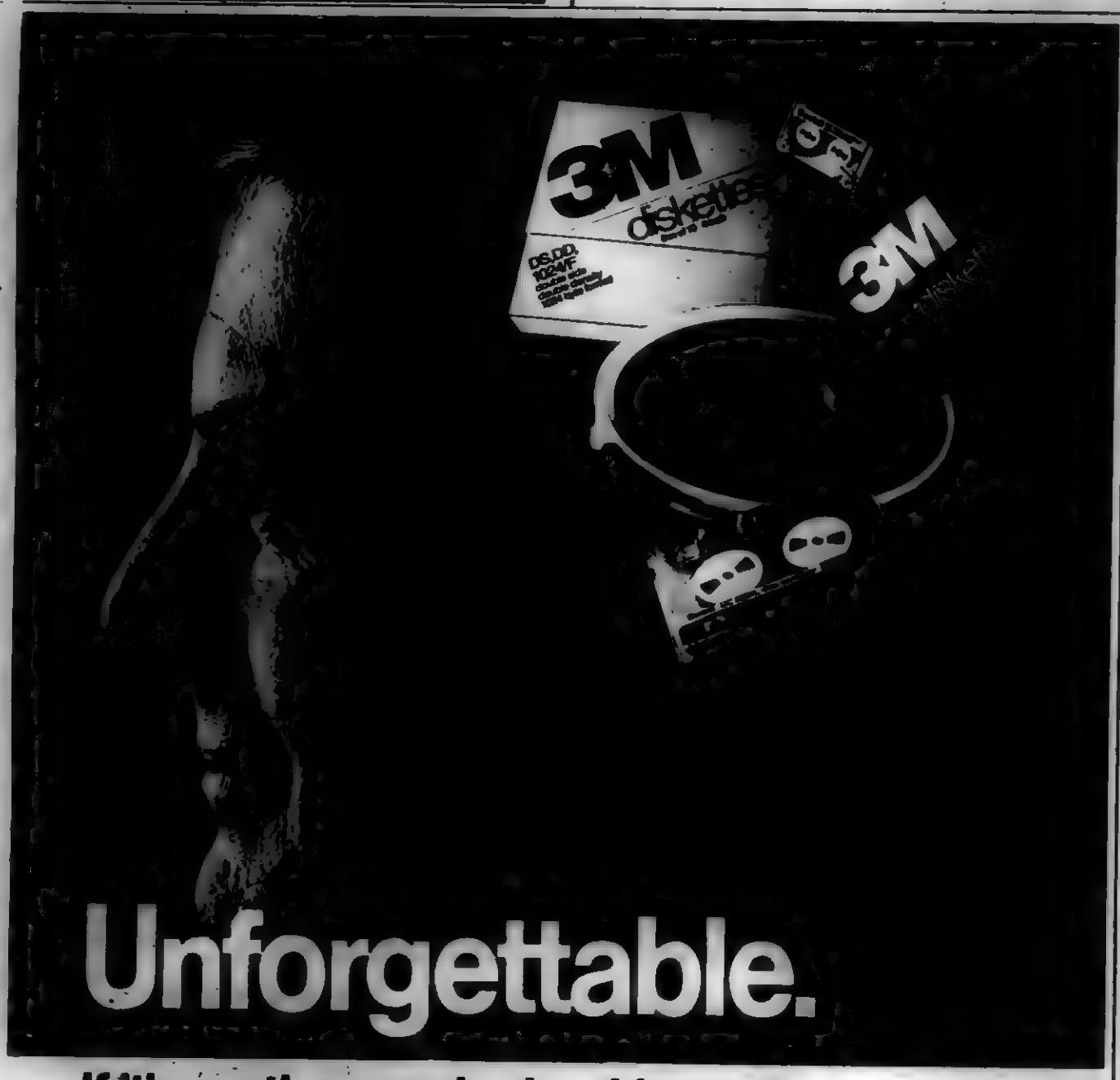
(Continued from Page 49)

Allen said Harza is currently trying to expand this capability into an on-going communication system between the home office and the field branches.

"We also send information on a micro-to-micro basis," Allen noted. "To do this, we send information over phone lines and set it into disks, then read it off with another micro."

Speaking of Microrim, Allen observed that "the latest version makes data entry easier because it provides a form on the screen that has prompts which tell you where to put the information in order to input it into the data base correctly. This is particularly helpful for the nontechnical user."

Moreover, Microrim was developed to provide reports that include a table with clear headings, a brief description of the information and the date. "If you have a package that makes setting up reports straightforward and easy, you save a lot of time," Allen said.



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Consumer Agency Using DBMS to Cut Backlog

WASHINGTON, D.C. — Faced with a legion of nagging problems, the Consumer Product Safety Commission (CPSC) decided to improve its applications system with the implementation of a data base management system (DBMS).

The existing applications system operating on the CPSC's IBM 3033 mainframe utilized IBM's DL/1, IMS and Storage and Information Retrieval System (Stairs) software. But the system was plagued with a variety of problems, including high maintenance costs, delays in responding to user needs, antiquated software design, redundant and fragmented files and awkward access to data for reporting purposes.

One reason for the high costs and long development delays, according to John Clements, chief of the Systems Analysis and Programming Division, was that up to 75% of the programming staff's time was spent on maintenance of existing programs.

"The situation was exacerbated over time by the deterioration of the quality of the program code, which was being patched and repatched," Clements said.

"Also, the DP staff was shrinking through attrition caused by reduction-in-force threats and greener pastures elsewhere."

Clements said the hierarchical nature of the data bases made it particularly difficult to keep up with user demands. In order to lengthen a field in a file, a programmer had to unload the whole data base, create a new schema and then reload the file.

Accessing data was also a problem because some data remained on sequential files while other data resided on DL/1 or Stairs files. Further, reporting was a problem because data had to be pulled across the various files.

A review team created within the commission set the following goals for the improvement of the applications system:

- Improved software maintenance and control.
- Faster response to user needs.
- Improved software quality.
- Increased productivity.
- Decreased overall costs.
- Implementation of newer technology.
- Centralized data files with easier data access.

The review team chose to implement an applications system based on Software AG of North America, Inc.'s Adabas DBMS and the Natural program development language. The first application updated with the new software, according to Clements, was the CPSC's National Electronic Injury Surveillance System (Neiss), which is an injury data collection system of selected hospital emergency room cases. The data collected through Neiss is used as a source for accident investigations conducted by the CPSC.

In May 1982, when the revision of the system was undertaken, the Neiss application ran under CICS with evening data collection by teletypewriter. Clements said the system inventory was comprised of some 287 functions, including 31 PL/I online macro-level programs, 74 PL/I batch programs, 46 batch reports, 15 different batch file maintenance and report procedures and 10 different utilities.

Development Time Cut

Begun in 1974, the initial development of the Neiss application had taken two calendar years and about 120 man-months to complete. Under the new DBMS, according to Clements, the application was completely rewritten — with enhancements to the old functions — in only seven calendar-months with 14 man-months of effort. The Neiss inventory was reduced to only 82 functions, including 50 on-line and batch Natural programs, four Adabas files and 25 batch reports.

"With the aid of this DBMS technology," Clements said, "it only took one-tenth the people resources and less than one-third the time to completely redesign, reprogram and reimplement the system as an interactive application."

With the introduction of Adabas and Natural, Clements explained, programmers could lengthen a field by executing a utility program while leaving the file in place. Under the old system, changes in file structure that required modification of all interfacing programs often took weeks to implement.

In contrast, Clements said, the modification of Natural programs could be done interactively in minutes.

As a result of the conversion to the Adabas DBMS, maintenance requirements have dropped to about one-thirtieth of the original effort, Clements said. Moreover, "quick response to user needs is now a manageable problem based on real priority and not just backlogs of requests. We have attained better software quality and increased productivity, and our costs have decreased because we have less software to pay for and support."

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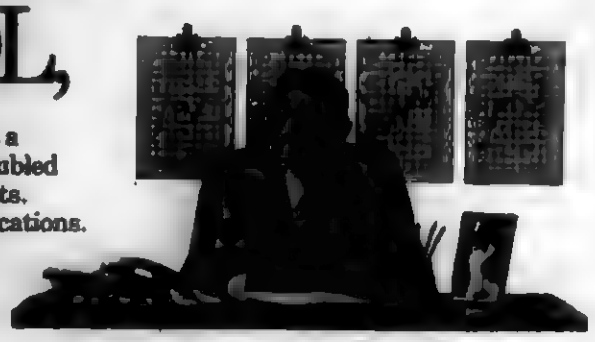

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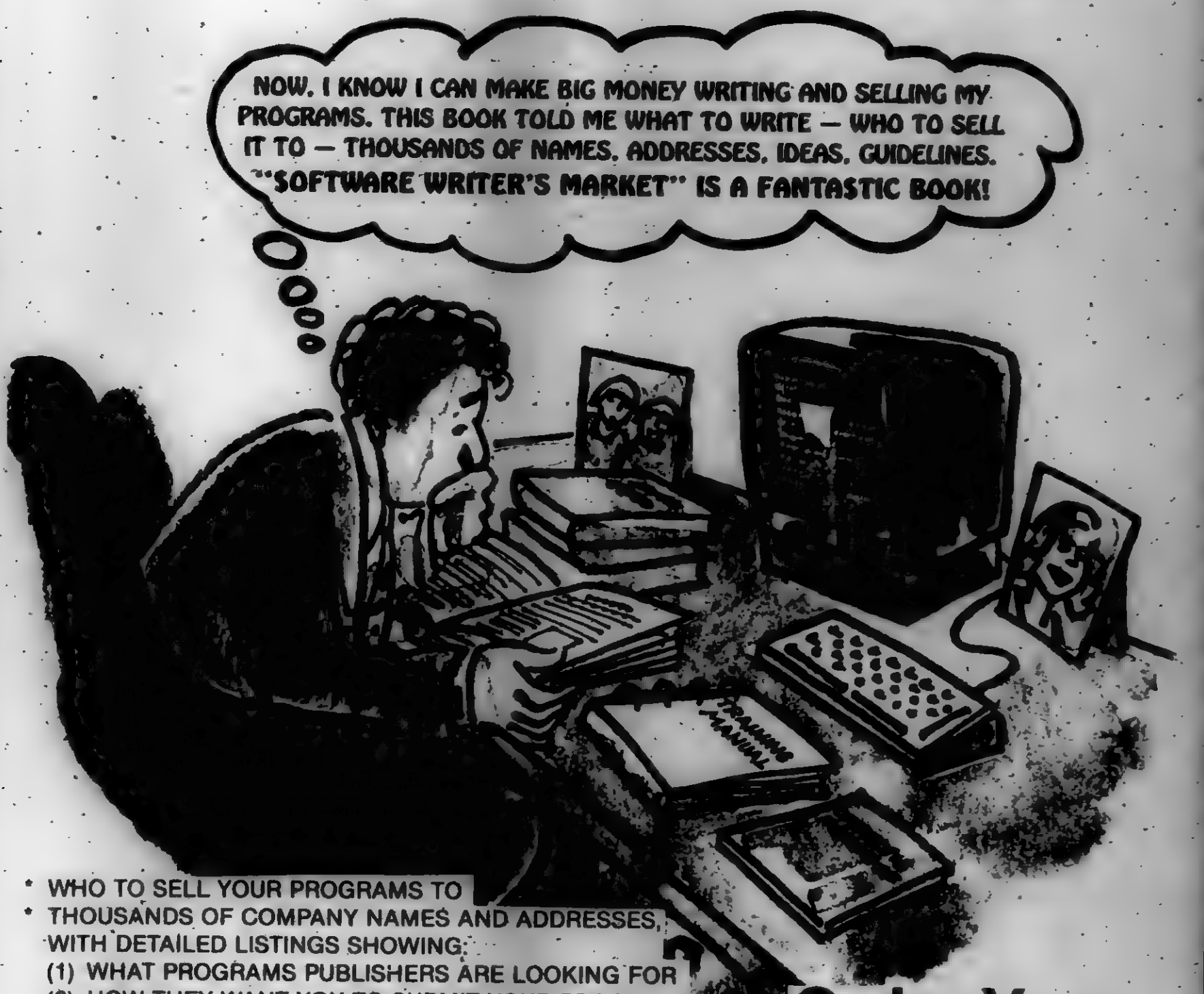

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Package Drives Programmers to Productivity

LOWELL, Mass — An organization based here that provides automated claims processing needed increased productivity for one of its client service operations. It found it in a software package.

Pilgrim Health Applications, Inc. (PHA), a subsidiary of Arthur D. Little, Inc., was contracted to provide customer information response services for Hertz Corp.'s Frequent Renter program and needed to automate the information data base. Previously, inquiry responses were accomplished manually from microfiche, and files included client registration and historical rental agreement data.

Initial system design focused on an enrollment range of 500,000 to 1.5 million individuals participating in the car rental company's preferred customer program. Such a system required immediate response to phone requests by renters seeking information on particular rentals, bonus points accumulated and awards eligibility.

PHA established goals to resolve all letter inquiries within 10 working days of receipt, issue program fulfillment awards within one week's time and answer all telephone queries on the spot.

An on-line access to computer files needed to be developed in a minimum time frame.

The company set as criteria for a software system an application generator, an integrated data base management system and an integrated data dictionary. The selection process focused on productivity, on-line application development, dynamic systems analysis, capability of developing applications without procedural languages within the application generator, immediate testing and checkout of applications components, automatic screen generation, automatic documentation of data structure and application processes and procedures and ease of maintenance, training and use.

Another requirement for the software package was the ability to fit in the host environment — a National Advanced Systems, Inc. AS/3000 mainframe running IBM's VM, VS1 and DOS — without systems software changes.

After reviewing products of a number of major software vendors, the company selected DB1 from Software Craftsmen, Inc. of Boston. "The software system met our criteria, and the vendor offered a trial installation and assistance in developing our first major application," according to Gordon McAdams of PHA.

The vendor claimed programmer productivity would improve and that PHA's application would be accomplished in 30 days, he added. Installation required approximately four hours and did not affect production of regularly scheduled work in any way, according to McAdams.

The definition of the data structure and transactions for query were defined by the company's analyst working with the vendor staff during the second day; on Day Three a test data base was loaded to test and evaluate each user screen. At that point the application was ready for end-user and management review, McAdams recalled.

The data for the Hertz application was available on tape from another system already in place.

McAdams explained how the data base was loaded and updated in a batch mode: "Some difficulty was experienced in using the features of DB1 in this environment, and the vendor was able to resolve these matters, although operation of the data base between a VS1 batch environment and VM/CMS was new to the vendor field-support personnel. The loading and proving of the data base was accomplished in three weeks."

On-Site Training

Training of the programmer/analyst for the system was held on-site and required 3½ days. This was performed in parallel with the application development.

Within three weeks the data base had been loaded and proved, and the application had been defined and loaded in anticipation of final review.

"At the end of the fourth week, the end users were trained in use of the system," according to McAdams. "In the initial group, only one individual had used a computer terminal prior to this training. A one-day training session was all that was required."

McAdams summarized the results: "The system has been in successful production for a period of two months. All goals for the improved service levels were met. Backlogs were disposed, and inquiry response is current.

"PHA's programmers have made major additions to the application, for example, adding a file of the historic information and setting up queries for this data. PHA is just beginning to feel the impact of this type of facility," he concluded.

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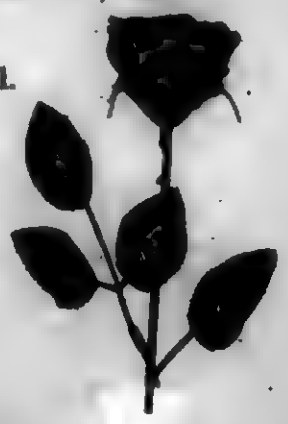

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ALL-DAY SESSIONS – 8:30 a.m. to 5 p.m.

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   Speaker: Susan H. Nycum, of Gaston, Snow, Ely Bartlett; Palo Alto, CA
2. **C Style and Portability**
   Speaker: Eric Allman, of Britton-Lee; Los Gatos, CA
3. **UNIX Systems Administration**
   Speakers: Ed Gould and Bob Kridle, of Mt. Xinu; Berkeley, CA
4. **Advanced Shell Programming**
   Speaker: Steve Bourne, of Silicon Graphics Inc.; Mountain View, CA
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/usr/group SESSIONS

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7. **Keynote Address** – 9 a.m. - 10 a.m.
   Speaker: Jack M. Scanlon, Western Electric Company
8. **Joint Session** – 10:30 a.m. - Noon
9. **UNIX in Government** – 1:30 - 3 p.m.
10. **Networks** – 1:30 - 3 p.m.
11. **Market Research and UNIX** – 3:30 - 5 p.m.
12. **Distributed UNIX** – 3:30 - 5 p.m.

THURSDAY, JAN. 19

13. **Microcomputer to Mainframe Communications** – 8:30 - 10 a.m.
14. **Compilers and Languages** – 8:30 - 10 a.m.
15. **Graphics Applications on Work Stations** – 10:30 - Noon
16. **UNIX Directions** – 10:30 - Noon
17. **UNIX to Microports** – 1:30 - 3 p.m.
18. **Applications** – 1:30 - 3 p.m.
19. **New Developments in Office Automation** – 3:30 - 5 p.m.
20. **Implementations** – 3:30 - 5 p.m.

FRIDAY, JAN. 20

21. **Case Studies in Office Automation** – 8:30 - 10 a.m.
22. **Databasing** – 8:30 - 10 a.m.
23. **UNIX Standards** – 10:30 - Noon
24. **Open Session** – 10:30 - Noon
25. **Graphics - Computer Graphics Systems & Applications** – 1:30 - 3 p.m.
26. **Joint Session** – 3:30 - 5 p.m.

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DBMS Helps Laboratories Provide Diagnostic Support

COLLEGE STATION, Texas — The Texas Veterinary Medical Diagnostic Laboratory here maintains a satellite laboratory in Amarillo, Texas. Together, these two facilities perform the onerous chore of full diagnostic support for thousands of veterinarians practicing in Texas and elsewhere.

Histopathology, bacteriology, toxicology, clinical pathology, serology, theriogenology and parasitology are among the services provided. The lab, a state agency, receives, processes and reports well over 60,000 cases per year.

In 1979, the lab signed a contract with the DP center at Texas A&M University to write an on-line case reporting and billing system. IBM's IMS data base management system (DBMS) and Cobol were utilized on an Amdahl Corp. 470V mainframe.

In late 1981, the director of the laboratory, Dr. Konrad Eugster, became concerned about the cost and reliability of the IMS DBMS.

In addition, attempts at retrieving the diagnostic data entered on the IMS in the previous two years (for descriptive studies) were unsuccessful.

In September 1981, Eugster hired Dr. Craig Carter as a computer section supervisor to study the feasibility of an in-house computer system for the lab.

The study revealed a probable cost-savings of up to $300,000 during the first five years of in-house operation with a minicomputer. But to realize such a savings, the system would have to be operational within a year.

"After the usual justification, specification and bid process, a Prime Computer, Inc. 550 II superminicomputer was installed at the laboratory in the fall of 1982," Carter said.

"Rexcom Corp.'s relational data base system was chosen over the Prime DBMS and others. Careful study of the Rexcom package during evaluations of the bids convinced us that it would be the best value and would offer the most functionality for our particular operation."

The Challenge

In October 1982, one programmer/analyst was hired, and development of the system began.

"The challenge at hand was to collect, validate and capture case history and laboratory data, allow timely real-time review and updating of cases and collation and printing of all related case data for mail out to the veterinarians," Carter said. "Also, we had to provide a retrieval system for all archived data. For instance, a veterinarian may wish to review all bovine cases in which a fibrinopurulent pneumonia along with a certain virus was found. In addition, a complete accounts receivable and billing system had to be written."

System Goes Live

The system went live Sept. 1 this year and consisted of over 90 Rexcom programs and files, 27 Cobol programs, 125 Command Procedure Languages, Prime's job control language and miscellaneous Fortran and assembler subroutines.

"Our larger report programs were written in Cobol," Carter said. "The system is currently handling about 4,000 customers [veterinarians in the field], and the case data base will grow to about 20,000 on-line records. The response time for retrieval of customer or case records stays flat at about three to five seconds depending on the mix of jobs and users."

According to Carter, the drudgery of systems design and programming has been eliminated with this system, leaving only logical decisions to make regarding data management.

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Hand-Held Computers Speed Service Reports

MILWAUKEE — After several hours of intricate electronic repair, the job is finally done. The equipment is back in perfect working order. The service technician, rather than reflecting on a job well done, now has to concern himself with completing those cursed service call reports and submitting them to the home office.

Sound familiar? Not anymore at Marquette Electronics, Inc., a manufacturer of high-tech computerized electrocardiogram equipment. The reason is that Marquette's service technicians use the very things that they are most comfortable with to compile and transmit their service call reports: computers.

With the use of hand-held computers manufactured by Quasar Co., Marquette technicians save time in writing out each report and mailing it to Marquette's headquarters here.

"We figure the hand-held computers will pay for themselves in just two years — even less depending on how much we can utilize them for diagnostic purposes," commented David L. Ivers, Marquette's vice-president of technical services.

He indicated that the use of the hand-held computers has resulted in more timely and accurate service call reporting and, therefore, more timely and accurate invoicing for service. After choosing the Quasar systems, Marquette began to develop software in January and had the service call reporting system on-line by May.

Speeds Submissions

Marquette has approximately 80 service technicians who prepare a total of 50 to 60 work orders per day. When the technicians were preparing them manually, they would tend to wait two or three weeks and then submit several at a time.

This resulted in service invoices being mailed as long as six weeks after the service was performed in some cases. Today, 80% of the service call reports are prepared and transmitted in the same week the service was performed, Ivers said.

Each technician's hand-held computer incorporates, among other programs, a program to provide "prompts" for the technician to enter the information that Marquette will need to record and invoice properly the service call he has made.

The computer "asks" the technician for such information as his identification number; the customer's account number, P.O. box number and address; repair start and stop dates and times; model number(s) of equipment serviced; parts numbers and quantities used; and other expenses incurred by the technicians in performing the work.

All of this is transmitted via a modem, also supplied by Quasar, over a Wats line to Marquette's internal computer system. From that point, each service report is edited for errors, used to prepare an invoice if necessary and then permanently filed, Ivers said.

The program that is used in the hand-held computer will eventually be modified to allow the technicians to solicit diagnostic information from the company's data base and to order repair parts from headquarters. Marquette's sales personnel do not file their sales call reports on hand-held computers, but there is such a possibility for the future. Computerized expense reports for sales and service personnel are other possibilities.

Each Marquette technician is issued one of the Quasar hand-held computers after he joins the company. The service call report program is included in each computer.

Although Marquette's application requires only the Quasar microcomputer and modem, combined with Marquette's own software, the Quasar hand-held computer is part of a portable computer system with three different microcomputers, 13 peripheral devices, adapters, such as printers and expansion modules, accessories and 16 software capsules that insert into the hand-held computer, Ivers said.

GM Expands Applications With OCR System

By Lynn Haber
CW Staff

WARREN, Mich. — Utilizing an optical character recognition (OCR) system, which can read both typewritten and typeset material, the staff at the technical center of a major automobile manufacturer here says it has expanded applications to degrees never before thought possible.

"We had applications in this organization and in this corporation which have been identified for years, but because of the massive amounts of manpower required to create the data base, we never did it," said Michael Flynn, manager of Environmental Activities Staff for General Motors Corp. (GM). "The scanning and processing system have allowed us to develop applications that before we just couldn't conceive of doing."

The Kurzweil Scanning and Processing System developed by Kurzweil Computer Products, Inc. in Cambridge, Mass., is used primarily for three applications. "The first application is taking old file copy, say from the 1960s to the present, and scanning it and then sending it to a data base for search and retrieval purposes," said Barbara Sullivan, assistant coordinator of operations at the technical center. "This department works with the government and has to make proposals to certain standards, and these old files represent all the copy [it has] had for these standards.

Electronic Communications

"Another application has to do with a department that works with overseas regulations. [It is] sending all copy to us, we're scanning it and electronically communicating it back to [the department], and it is formatting it for production of a manual."

The third application of the scanning system is in the production of GM reference manuals, previously produced by the company's photographic department.

The Kurzweil system utilizes artificial intelligence for inputting material directly to local-area networks or capturing text for editing on word processing systems. According to Michael Backler, a Kurzweil vice-president, the difference between his firm's OCR system and conventional OCRs is its ability to read typeset as well as typewritten material.

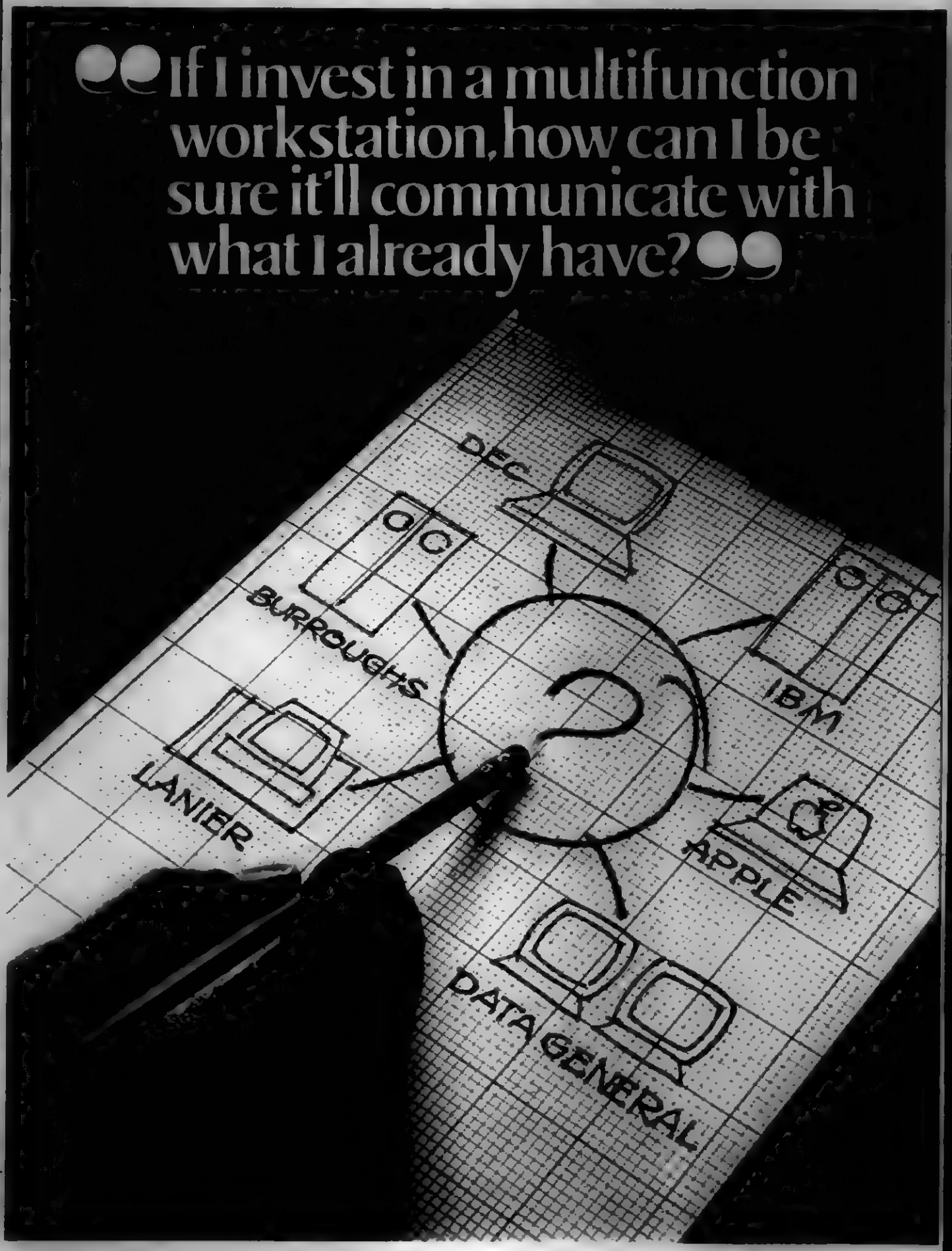
"The company was founded in 1974 with the idea to create first a product to convert printed text to speech — and not just typewritten material but typeset as well — and then at some future point expand to a commmercial version of the product," Backler said.

Originally, Kurzweil developed a system to convert text to speech for the blind. Today, the scanning and processing system converts printed information to computer-compatible form without rekeyboarding. Omnifont recognition software and specially designed hardware enable the company's system to read both typeset or typewritten material.

According to Flynn, it was not until 2½ years after first seeing a demonstration of Kurzweil's OCR system that GM bought the system. "While doing some consulting work, I read an article that this system existed, and I and a couple of other people went to Chicago to see one of the first applications of the scanning system. We concluded that it provided a real solution to a very large problem — capturing archival files," Flynn said. "About 2½ years later, I found a problem that this system was the solution for.

"When we were specifying the office system requirements for this organization, we recognized that we were going to be creating, storing, retrieving and manipulating text and documents in an electronic medium for all of our internal activities, but that we would have to interface with the outside world, which essentially was still being driven by paper," Flynn said.

"We decided then to provide an interface such that we could take all of this paper from the external world and convert it into the electronic media so that we could have a singular system."



In-House Fiche System Cuts Paper Use

Disk Maker Turns to COM for Info Management

LOUISVILLE, Colo. — In addition to producing disk storage equipment for sale to computer users, Storage Technology Corp. (STC) in 1979 held the dubious distinction of being one of the most prolific paper consumers in this state.

The paper deluge from financial statements, general ledger, payroll, field and manufacturing inventories and so forth was not without its mounting cost. In an average month, the DP department alone produced 60 million pages of computer-generated data. Storing the paper files was cumbersome and costly, and the expense of buying paper for office use was running over $3 million.

After a comprehensive study of the company's methods of information management, STC executives began to implement a computer output microfilm (COM) and micropublishing system in October 1979. Commenting on the COM acquisition, STC's corporate data center manager, Dick Mallot, said, "It was a matter of dollars and cents. Based on the projected costs and savings, we knew that storing and accessing data on microfilm rather than tape would be a good business decision."

Initially, STC used a micrographics service bureau in nearby Denver to convert its data from tape to film. But as the company grew, so did the need for updating large volumes of fiche data. The service bureau could not meet the daily work schedule required.

"Turnaround time was slow — often a week, a time frame we could not work with," Mallot said. "Many of the tapes being converted to COM contained data which was time-critical, and in order to have immediate access to data, we had to produce paper printouts in addition to film. When the microfiche was delivered, the paper was then thrown away, and the film was put into storage. Our requirement for immediate output led us to explore the benefits of an in-house COM program."

In-House COM

The decision was made to convert to in-house COM, and the system chosen was developed by San Diego-based Datagraphix Corp. "When you realize that each microfiche translates into 270 sheets of paper and that the cost of duplicating a full fiche is three cents vs. 20 cents for a single sheet of paper, you instantly recognize the savings value of the transition," Mallot said.

"The low cost of fiche duplication means that information can be made available to more users without the excessive cost increases and time delays involved with the paper duplication of major reports. Add to that the space saved in storage and the data retrievability, and you appreciate the efficiency of COM as an information management system.

"Because of the tremendous volume of information that we produce, searching through mounds of paper files is extremely time-consuming," Mallot continued. "Each microfiche is produced with a little header across the top edge, readable without a magnifying device. The title header identifies the information contained on that particular microfiche. Additionally, the retrievability of microfiche data is made even more efficient by using the index frame, which directs the reader to any specific piece of information."

Microfiche is produced on Datagraphix 4590 roll-film recorders or on a Datagraphix Mini Autocom cut-fiche system. STC also uses Datagraphix microprocessor-controlled Datamaster duplicators to make its end-user copies. All users have microfiche readers at their desks or nearby to promote access to the information.

Utilizing Datagraphix

(Continued on Page 60)

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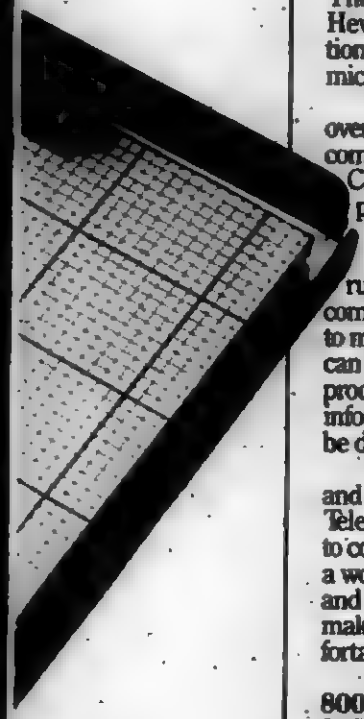

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Term to Begin Jan. 1

Lewis Chosen DPMA President

PARK RIDGE, Ill. — Carroll L. Lewis has been elected international president of the Data Processing Management Association (DPMA). His term of office will begin Jan. 1.

Lewis is owner and president of Commercial Data Corp. in Memphis, Tenn., where he is responsible for all marketing and applications operations of the firm.

A DPMA member since 1964, Lewis has served the association at chapter, regional and international levels. He has been instrumental in cultivating membership promotion and retention programs. He has also been involved in educational program development.

With 45,000 members, DPMA has more than 275 chapters in the U.S., Canada, Japan, Mexico and other countries. Its membership includes 32,000 computer management executives and 11,000 students majoring in computers in business.

Disk Maker Adopts COM

(Continued from Page 59)

Miniform software, a 16-bit minicomputer-controlled Autocom is a high-speed device designed to support a wide variety of input and output formats.

"We update many of our files and produce microfiche on a daily basis," Bert Shaw, manager of data operations, said. "And the turnaround time is short compared to the two weeks we used to wait when using a service bureau."

To micropublish and update its technical manuals, STC sends typeset, camera-ready manuals to a Denver micrographics service bureau. The manuals are then microphotographed onto titled and indexed microfiche, which are duplicated for distribution to STC field and home office staff. For updating, the company sends only the changed pages. The service bureau microprints the entire updated manual on a new master fiche.

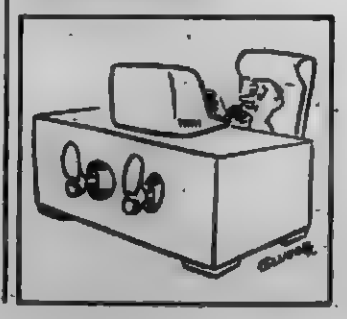
Educators Form National Council

TORONTO — The National Council of the Canadian Community of Computer Educators (CCCE) was recently formed at the Canadian Data Processing Education Conference.

The purpose of the CCCE National Council is to foster, encourage and promote quality data processing education across Canada, according to a group spokesman. This objective will be accomplished through activities of regional groups and activities at the national level.

Currently, there are member groups in Calgary, Alta., Toronto and Montreal.

Further information on the council can be obtained by writing to CCCE, 4th Floor, 1200 Bay St., Toronto, Canada M5R 2A6.



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Automated Passport Readers Helping to Spot Suspects Passing Through Customs

CHICAGO — The U.S. Customs Service is now using a computerized passport reader system to speed returning U.S. passengers through customs inspections.

When a passenger walks up to customs with a U.S. passport printed in computer-readable type, the customs inspector inserts it into the computer system.

The traveler's name, date of birth and passport number are read automatically and checked against information stored in the San Diego-based Treasury Enforcement Communications System (Tecs), a computerized information network operated by the Customs Service's Law Enforcement Systems Division.

Within seconds, while the inspector proceeds with other duties, such as checking the passenger's baggage declaration slip, a response to the inquiry appears on a CRT display. The officer then determines whether to pass the traveler through or summon another official to examine the baggage further.

OCR Devices

Currently at use in the international arrivals facility of O'Hare Airport here, the passport readers consist of specially adapted optical character recognition (OCR) devices manufactured by Caere Corp. of Los Gatos, Calif. Each unit is connected to a CRT terminal and hooked into Tecs.

This system also provides access to the Federal Bureau of Investigation's National Crime Information Center data base, which contains information on felons, smugglers and persons who have failed to declare items for customs tax.

Planning Research Corp. (PRC), an engineering and information systems consulting firm headquartered in McLean, Va., contracted with the Customs Service to install the automated passport readers.

PRC also designed and built the interface between the OCR equipment and the Tecs computer, as well as the automated system used by the State Department passport offices to produce the machine-readable passports.

"Most people are legitimate travelers, so a typical response from the Tecs computer will read 'No Record Found' on the inspector's screen," said Howard Bliss, manager of applications development at PRC's Systems Design Division. Bliss helped oversee installation of the passport readers and trains customs personnel.

On the other hand, if a passenger with an outstanding felony warrant attempts to pass through, Tecs will respond with 'Possible Match' and advise the inspector to ask the person for more identification. "If the individual is a suspected terrorist or criminal or is attempting to enter the country illegally, the inspector will flip a switch that immediately summons additional assistance to come to the lane and escort the suspect away," Bliss explained.

"As a matter of fact, the Customs Service apprehends more wanted felons than any other single government agency," he said.

As more U.S. citizens are issued machine-readable passports, the automated reader will also help the U.S. deal more effectively with terrorism by allowing the Customs Service to do a more thorough job of tracking people's movements in and out of the country. Currently, passengers are checked only against files of individuals with criminal records. With the application of Tecs, the Customs Service accumulates a record of each time an individual enters the U.S.

Presently, less than 20% of those in the U.S. who travel internationally hold machine-readable passports, but the State Department estimates that the number will increase to 50% by the end of 1984. The Customs Service has established automated issuance agencies in Chicago, Washington, D.C., Los Angeles, Miami and San Francisco. Eventually, machine-readable passport systems will be installed in 13 major cities, including New York, Philadelphia, Boston and Atlanta.

Long Lines

Until all the old passports are replaced, customs agents must continue to follow time-consuming procedures that, at times, can result in long lines of passengers waiting to be processed.

"With the new machines, the inspector can facilitate the movement of passengers, as well as identify lost or stolen passports, because the system queries the passport number in addition to name and date of birth," Bliss said. "The automated readers also eliminate human error that often results from keyboard data entry."

According to Bill Nowak, supervisory customs inspector at O'Hare International Airport, inspectors using the new system have significantly increased their efficiency. "The passport readers are very simple to use," he said. "After receiving less than 30 minutes of training, our personnel can operate the machines with no supervision."

During the next few years, the Customs Service will work with PRC to install hundreds of passport readers at major U.S. airports. With the summer Olympic games in Los Angeles less than one year away, the agency has selected Los Angeles International Airport as its next target site.

In the future, Bliss anticipates that other nations will follow the U.S. lead in issuing machine-readable passports.

"The move toward these new passports is the result of a standard published by the International Civil Aviation Organization," he explained. "A panel on passport cards worked for nearly 10 years to develop the standard, and the U.S. and European countries actively participated in this effort."

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Microfilm System Cuts Agency's Retrieval Time

SALEM, Ore. — The Oregon Department of Motor Vehicles (DMV) here claims it has improved the quality of its services by installing a microfilm system.

The microfilm system works in conjunction with two IBM 370/158 mainframes.

Some simple requests for information can be accomplished by calling the information on an on-line CRT terminal. For example, identifying the owner of a particular vehicle or license plate is a straightforward proces. But other requests are more complex, noted Doug Manthe, assistant administrator at the DMV.

For example, obtaining a list of all the previous owners of a certain vehicle requires searching original documents, such as a title. In Oregon, computer-indexed microfilm images of original documents make such inquiries easy, Manthe said.

The state's Motor Vehicles Division has information relating to vehicle titles and registrations and to driver's license suspensions stored on microfilm marked for automated retrieval. Manthe said the DMV has been microfilming title documents for some time. However, in the past year, the division adopted an indexing system that cut retrieval time from several minutes to a few seconds.

At the same time, he said, the DMV extended its microfilming and indexing operation to registration and driver's license suspension documents.

"Formerly," Manthe said, "vehicle registration files were paper envelopes stuffed with documents. They were filed in what we called 'blocks.' To find a specific document, you had to know which branch office it came in through, the date it passed over the counter and, preferably, what batch it was filed in.

"Now we can enter the license plate number or the title number or the owner's name on a computer terminal, and the display will lead us to the desired document-image's microfilm location. Once we load the right magazine into the Kodak [Corp.] IMT-150 microimage terminal and enter the location on the key pad, the image appears," he said.

Two Different Approaches

Because of the operating differences among driver's license and vehicle service branches served by the division, DMV uses two different approaches to microfilming incoming documents on its three Kodak Recordak Reliant 750 microfilmers.

In vehicle registration, there was a computer program in place that captured all data on titles and registration. Rather than adopt new software, the division enhanced its old program to index document images. Consequently, the vehicles service branch first keys data from documents and then microfilms them in the same order.

To help avoid errors, the computer produces a daily report listing all the documents sent to microfilming for verification, Manthe explained.

Because there was no equivalent program for driver's license information, the driver's license branch elected to "front end" microfilm suspension notices, conviction records, return envelopes and other documents in these files.

This means the documents are microfilmed before data is keyed. The microfilmer imprints each license document with a unique set of digits. When the documents go to data entry, these codes are keyed to create an index, according to Manthe.

The DMV's information retrieval system uses three sizes of image marks that are automatically applied by the microfilmers. The marks, which appear adjacent to each document image, are used by the IMT-150 units to locate specific images automatically.

For example, the driver's license system uses two sizes of image mark: one for batch identification sheets, another for individual items. The vehicle registration file uses three sizes.

The largest mark corresponds to the batch identification sheet, the middle one to images of actual title documents and the smallest to "source documents," such as change-of-address notices and requests for change of title.

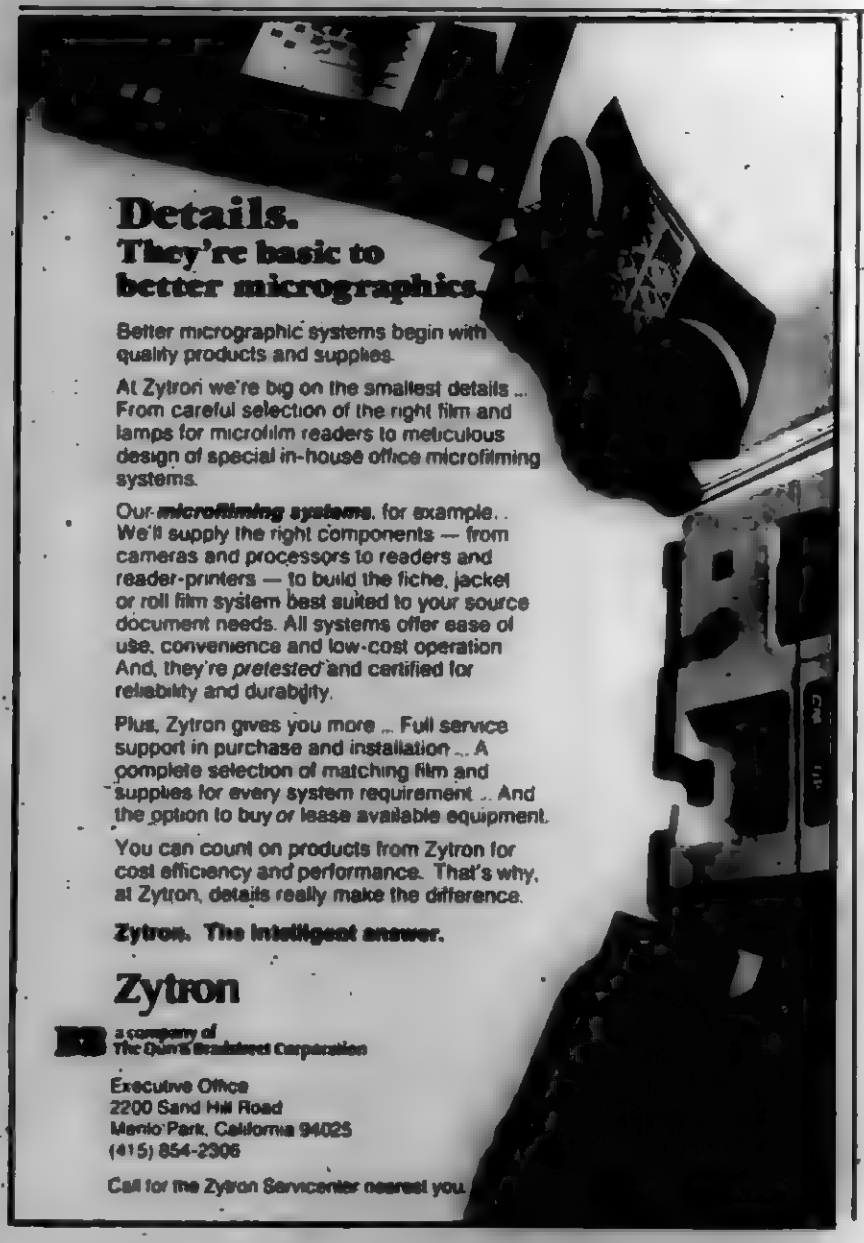
Individual microfilmers are set up to make the microfilming process as efficient as possible. The driver's license microfilmer, for instance, always produces a small index mark, except when the operator touches a foot switch.

The microfilmers accept a variety of documents in all weights and colors of paper, from title forms on heavy stock to lightweight carbonless forms and newspaper clippings.

According to Manthe, microfilming license suspension records and vehicle registration information has saved filing space; all of the division's suspension, registration and title documents are now contained on about 500 microfilm magazines. But the real savings, he said, is in personnel time spent looking up information to answer some 400 daily requests.

Oregon's population is relatively small, yet it is known as an innovative state in many areas — land-use planning, environmental control and fiscal management, to name a few.

In terms of applying microfilm and computer technology to problems of file space and information retrieval, Oregon once again has proved to be an innovator.



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Telecommunications Meet To Assist Developers, Execs

WASHINGTON, D.C. — Advanced telecommunications and information processing equipment and services will be featured at the Multi-Tenant Telecommunications Opportunities Conference and Exhibition Showcase to be held at Stouffer's National Center Hotel here Dec. 12-14.

The sponsor, Telestrategies, Inc., said the conference will highlight multitenant telecommunications opportunities by focusing on the multitenant marketplace and private branch exchange (PBX) regulation. Other topic areas to be covered are: in-building wiring, multitenant telecommunications marketing, multitenant system operations and the shared telecommunications arena.

The conference is designed, the sponsor said, to assist real estate developers and telecommunications executives in developing business strategies to meet "the opportunities posed by the inclusion of telecommunications enhancements in property development." Exhibitors at the conference will showcase equipment for end-user sharing, such as PBXs, customer billing equipment, word processing equipment, software and services, electronic mail and microwave and satellite equipment.

Among the scheduled speakers are Dr. Jerome Lucas, president of Telestrategies; Gardner McBride, executive vice-president of the Building Owners and Manufacturers Association; John Daly, telecommunications manager for Planning Research Corp.; Leonard Cozza, director of United Technologies Communication Co.'s Integrated Office Services; Robert Grant, district manager for the Central Services Organization; and Robert Schmidt, vice-president of operations for Telemanagement Service Corp.

The cost to attend the full three-day Multi-Tenant Telecommunications Opportunities Conference and Exhibition Showcase is $995. Further information can be obtained from Telestrategies, 6842 Elm Street, Box 874, McLean, Va. 22101.

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DPMAEF Elects New Regent

PARK RIDGE, Ill. — M. Herbert Schwartz, general manager at Software Quality Service, Bethesda, Md., has been elected to a three-year term on the board of regents of the Data Processing Management Association Education Foundation (DPMAEF).

Schwartz, an early advocate of managing quality objectives in the information processing profession, joins a six-member board.

Prior to his association with Software Quality Service, Schwartz served as statistician at the Federal Reserve Bank of New York; economist, chief analyst and director of data processing at the Federal Reserve Board; director of management information and telecommunications systems with the Atomic Energy Commission; vice-president at Citibank in New York; and concurrently, for more than 20 years, adjunct professor of management systems at George Washington University.

In professional activities, Schwartz was the program chairman for the DPMA 1983 Information Systems Education Conference and is the department editor for information systems management of the *Communications of the ACM*.

In addition, he has served as president of the Society for Management Information Systems, as a member of the American Management Associations Planning Council for Management Systems and chairman of the education committee of the National Economists Club.

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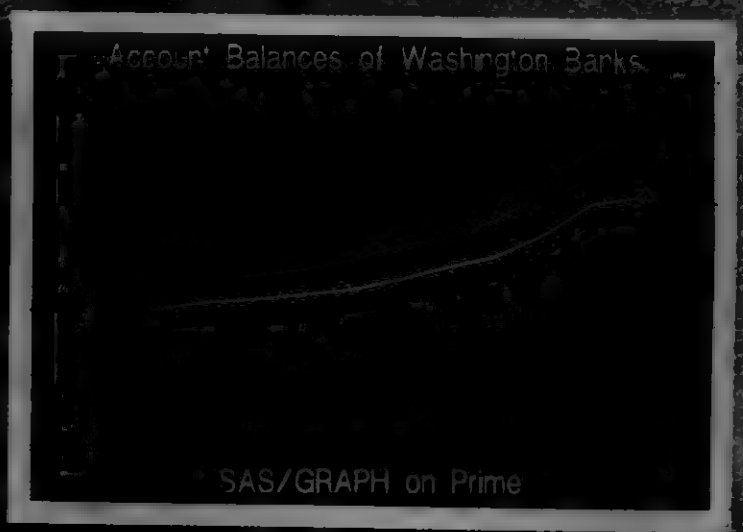

Hydrant Maker Tries to Put Out Security Fires

DECATUR, Ill. — Mueller Co. is a manufacturer of water and gas distribution equipment. Headquartered here, the family-owned concern also has manufacturing facilities in Albertville, Ala., Chattanooga, Tenn., and Clinton, S.C. Mueller's product line includes fire hydrants, and over 60% of the fire hydrants made in the country carry the Mueller name.

Mueller's data processing is distributed and spearheaded by an IBM 4341 processor here and 4331s in Chattanooga and Albertville. IBM's DOS/VSE, CICS/VS and DL/1 are key components of Mueller's software environment, according to Michael T. Leatherman, manager of technical support.

Historically, Mueller's data processing could be characterized as batch-oriented. Keypunch personnel created card input to key application systems that generated the manufacturing and financial reports management used to run the company, Leatherman said.

Over the last few years, Mueller has followed the trend toward on-line, real-time processing, and an increase in-CICS access to key data files has resulted. Currently, the company uses Management Science America, Inc.'s general ledger, accounts payable, accounts receivable and order entry packages. Mueller also uses IBM's Copics manufacturing software, according to Leatherman.

Concerned About Security

Since virtually all of Mueller's key data files are now accessible on-line, top management became concerned about data security. Management felt a need to control access to key files and asked the management information systems department to design and implement a data security system, Leatherman recalled.

Mueller's main objective was to implement a security system that eliminated or minimized the chance of an accidental update to a data file. This was a common security threat and possibly the most destructive. Although it is difficult to pick up a newspaper without reading about a teenager with a microcomputer dialing into a company's mainframe, Mueller felt the most vulnerable to internal terminal operators accidentially updating the wrong file. The system had to protect from within as well as from unauthorized external access.

The first step was to investigate the security measures offered by CICS. Mueller discovered CICS provided only 24 assignable security keys. Further, CICS only protected transactions; it contained no file protection, no program protection and no terminal control. The firm could not make certain terminals available only at certain times, and with CICS there was little control over who could do what. Based on these limited capabilities, Mueller decided to investigate data security systems marketed by independent software companies, Leatherman said.

The firm reviewed the packages available and found that they all provided a more complete security facility than native CICS. The concern was to select the package that offered not only the most comprehensive security system, but an easy method of implementation. The firm decided that the Surveillance package from Towers Systems, Inc. of Irvine, Calif., was the best available, according to Leatherman.

Surveillance protects virtually every CICS resource: transactions, programs, data files, data destinations, terminals, even fields within DL/1 or Vsam data records, Leatherman said.

Essentially, Surveillance employs a three-tiered security concept. A master operator allocates CICS resources to supervisor operators, who in turn distribute these resources to the various general operators under their control. This concept was perfect for Mueller because it provided for centralized control but decentralized administration and maintenance, Leatherman said.

The key to implementing Mueller's security system was good planning. In preparation for the installation of Surveillance, the firm analyzed the CICS Program Control Table and sign-on table to develop an initial security scheme. In many cases, Leatherman said, the firm made assumptions regarding access to certain resources. As a rule, access was not given if managers were not sure it was deserved. If a supervisor complained and the complaint was justified, that group's cluster could be changed in a matter of seconds, and the change was effective immediately. Once the package was installed, it took only four hours to implement the scheme using the menu screens.

Currently, every terminal on the network, both local and dial-up, is protected by Surveillance. On each terminal, particularly the dial-ups, only certain sign-ons are valid, and only a limited number of sign-on attempts are allowed before the offending terminal is locked out. This effectively eliminates any possibility of malicious security violations.

Additionally, other on-line systems such as IBM's Interactive Computer Control Facility are available only to certain individuals, and access is granted only after proper sign-on through Surveillance, Leatherman said.

How to put yourself into data communications And still keep tomorrow

Supermux® 380, can eliminate up to seven phone lines and seven modems—putting eight channels onto one line, with mixed speeds, mixed asynchronous protocols. The 380 is field expandable, so you can start with fewer channels and add as your needs grow. 380 capabilities include data

Infotron data communications products for the smaller system: modems, statistical multiplexers field upgradeable to 32 channels, accepting mixed transmission speeds, mixed protocols, and synchronous, asynchronous, and bit-synchronous inputs.

Increases Responsiveness at City Hall

Micro System Serves New York's Neighborhoods

NEW YORK — A microcomputer system has been installed at 35 Community Boards located throughout the five boroughs here to increase speed, efficiency and responsiveness in city government.

Each Community Board serves a cluster of neighborhoods, consisting of 100,000 to a quarter-million residents. Although established over 30 years ago, it was not until 1975 that an amendment to the city charter expanded the role of Community Boards to their present status of local city halls, close to the people, responsive to their needs.

Each board consists of up to 50 people, volunteers appointed by their borough president, who live, work or have a significant interest in their Community Board District. They, in turn, operate a full-time office within the community, staffed by paid professionals headed by a district manager.

Need for Computer

Bob Acito, district manager of Community Board No. 6, one of the 18 boards into which Brooklyn is divided, has a salaried staff that consists of two full-time workers, including himself, and two part-time employees. A total annual budget of $85,000 covers all expenses including salaries, rent, equipment, phones, and postage. Last summer, Acito recognized that if he had a computer system, his staff could do a far better job by responding more efficiently and effectively to his district's needs.

Acito was not alone in this evaluation. A number of district managers had come to the same conclusion: A computer system would be a valuable asset to their boards' operations. They elicited the interest of Denise Scheinberg, Mayor Edward Koch's right hand as Community Assistance Unit (CAU) director, and the Mayor's Office of Operations, and as a result, invitations to submit proposals were sent out to computer systems manufacturers.

In June of this year, 35 Zenith Data Systems Z-100 computers, each equipped with a dual floppy disk drive and a high-speed printer, were installed.

Sixteen Committees

Acito's board is organized into 16 separate committees, each handling a critical area of activities, such as housing, public safety, education, economic development, social services and budget. "Using manual techniques, we simply couldn't handle the mailings alone required to communicate to everyone we need to reach in order to make the committees effective," Acito said. "Now, with this system it's a snap."

Instructors from Erin Computer Learning Center (ECLC), headquartered in Farmingdale, N.Y., provided intensive on-site training at board offices.

There is a high level of enthusiasm for the new computer systems in the board offices. According to the district managers, they will now be able to take truly effective action in many areas where previous manual operations were inadequate.

The next step will be the integration of these individual systems into a Community Board network tying all the boards together, enabling each to communicate directly with other city agencies as well as to each other.

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INFOTRON SYSTEMS

Deltak Series To Expand On MVS/SP JCL

NAPERVILLE, Ill. — Deltak, Inc. has announced five courses representing the second half of its "MVS/SP Job Control Language" series.

The 10-course series, No. 23-OXX-ME, was developed in conjunction with Duotech, Inc. for presentation on Apple Computer, Inc.'s Apple II+ microcomputer.

Both Part I and Part II of this series were designed for anyone who codes and uses Job Control Language (JCL). Within the 14 to 19 hours required to complete Part II, the student learns how to create, use and manage partitioned data sets, how to code a variety of parameters for defining and controlling data sets and how to control execution, security and recovery, according to a Deltak spokesman.

The final two courses teach how to modify jobs for cataloging, create and execute cataloged procedures, use overrides when invoking cataloged procedures and read and interpret the JCL listing and its messages, the spokesman said.

The series was designed for self-instruction and is presented through videotapes and text. The courses are available for an average monthly rental of $50 to $125 per course, depending on volume. Purchase price is $1,750 per course, according to the vendor.

Further information is available from Deltak, East/West Technological Center, 1751 W. Diehl Road, Naperville, Ill. 60566.

In Overtime Within Year

Power Stabilizer Saves Pa. DP Site $500,000

HARRISBURG, Pa. — A power stabilizer costing $64,000 saved a large computer facility here an estimated $174,000 in hardware replacement costs and an estimated $500,000 in overtime within a year after installation.

The savings from drastically reduced failure rates were experienced at the main computer facility of the Pennsylvania Department of Public Welfare, according to Fred A. Wieseman III, director of the department's Bureau of Technical Services. Within the last two years, the department's data processing growth has exceeded 100% in processing power and has required 800 additional terminals, boosting the department's telecommunications network to more than 1,300 terminals throughout 67 counties processing 500,000 daily transactions. "With this type of rapid growth and enormous user dependence of the terminals to process this type of daily volume, power stabilization is mandatory," Wieseman said.

The central facility uses a Sperry Corp. 1100/84 processor running from a 60Hz to 415Hz MG frequency converter that automatically conditions utility power to the mainframe. However, until November 1982, there was no power conditioning or protection for the center's 60Hz peripherals, which include 100 Sperry disk drives and 22 controllers.

Downtime "Intolerable"

"Sometime in August 1982," according to Wieseman, "we became aware that the frequency of disk drive printed-ciruit board failures and failures of head disk assemblies was getting out of hand. The system was being interrupted and downtime was excessive, and this was an intolerable situation. As a result, we formed a task group which consisted of our DP operations director, James Gray, and representatives of the Sperry engineering group to survey exactly how many times we had system interruptions and the cause of the problem. The Sperry people installed a Dranetz power monitor to determine the quality of power we were receiving from our utility."

The survey covered the eight-month period from January 1982 to August 1982 and documented 20 printed-circuit board failures in the 5056 and 5046 controllers, 42 disk drive failures, 24 failures of 8470s and eight failures of 8450s, an average of eight printed-circuit board failures a month and two and a half head disk assembly failures a month, according to Wieseman.

"The average monthly cost for [printed-circuit] card and [head disk assembly] hardware replacements alone was $14,500, but far more serious was the havoc such fallout could cause in the field due to incorrect computation and other errors, lost processing time and overtime required every time our system would fail, causing downtime," Wieseman said.

"In fact," he added, "we actually documented the department's cost of overtime required by system downtime attributed directly to failures of 60Hz peripherals in September and October 1982 at $200,000. That was just for that two-month period."

The task force soon found the cause of the problem as revealed on the Dranetz power monitor tapes: periodic surges and sags coming into the 60Hz power system from the utility — spikes were recorded in excess of 100V on each input phase.

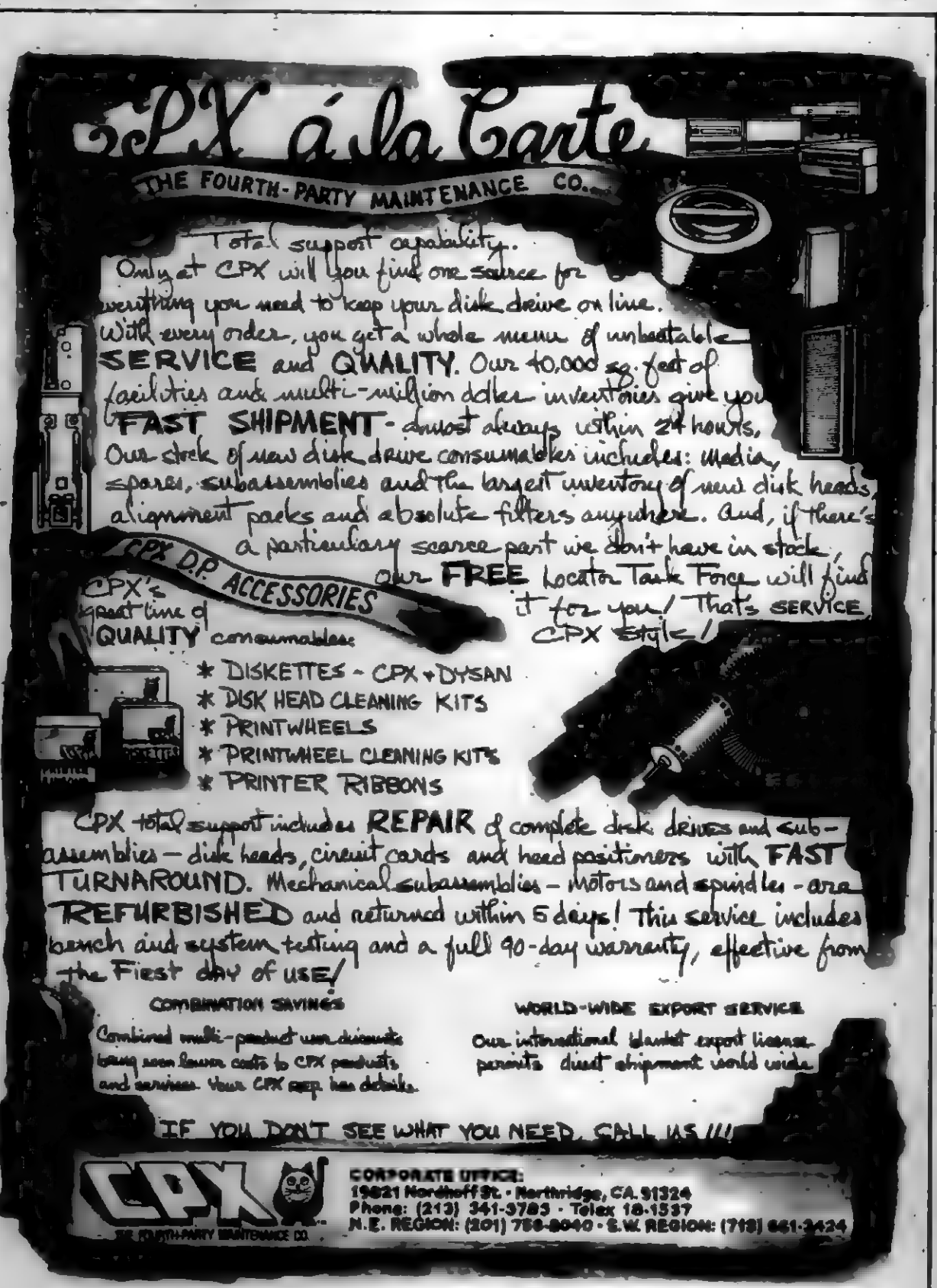
On the recommendations of the Sperry engineering group, the department decided to obtain a 300 kVA Piller 60Hz Motor Generator Power Stabilizer from K/W Control Systems, Inc.

Dramatic Reduction in Downtime

The results were more dramatic than expected. "We have now had a full year's experience since the Piller 60Hz Power Stabilizer was installed in November 1982," Wieseman said. "During that entire 12-month period, we have had a total of two printed-circuit board failures and one head disk assembly failure. Based upon the average failure rates we were experiencing before we installed the power stabilizer, we could have expected a total of 96 failed printed-circuit boards and 31.2 head disk assembly failures during that same period without the power stabilizer and, of course, a commensurate amount of system downtime."

The power stabilizer paid for itself within six months on the basis of printed-circuit board and head disk assembly hardware replacement costs alone. It also saved an estimated $500,000 in overtime costs directly attributed to power-related failures causing downtime to the peripheral equipment.

"My own conclusion is that conditioned power is imperative in any DP system, and not just for the mainframe but all 60Hz peripherals as well. This is particularly true of any on-line system such as ours which operates through a large telecommunications terminal network," Wieseman said.



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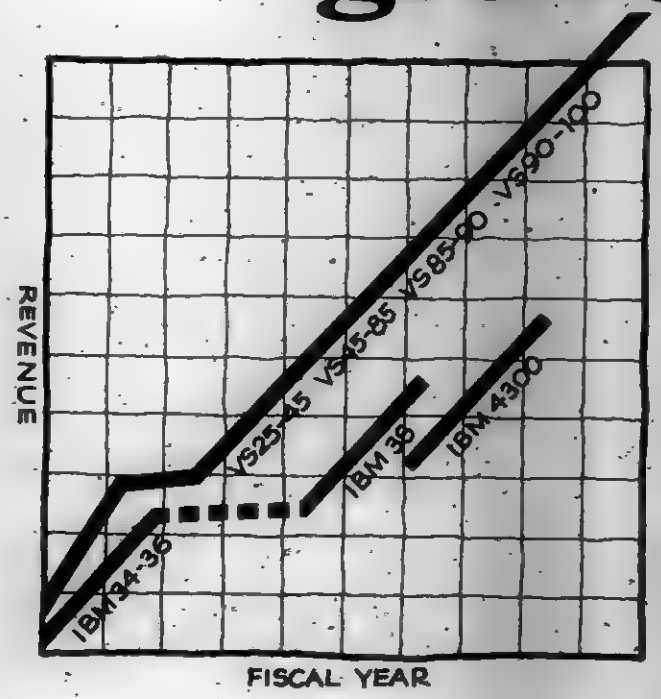

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Advertising Agency Turns To Computer Graphics For High-Tech Imagery

FORT LEE, N.J. — Inspired by video games, Michaels Advertising, Inc. wanted to use a high-tech approach to advertise its client's nickel plating method for circuit boards. The advertising agency hired a computer graphics firm to develop a three-dimensional *Star Wars* motif.

The advertisement, which cost $1,000 to develop, marked the first time computer-generated graphics were used in an industrial advertising campaign, according to Joe Michaels, president of Michaels Advertising.

The campaign was developed to illustrate a palladium-nickel alloy plating solution used by Englehard Corp. and sold to the electronics industry. The process is used to develop circuit boards, connectors and semiconductors. The nickel plating method can be substituted for acid-hard gold and other precious metals at less cost, Michaels said.

"After looking through magazines," Frank Alansky, vice-president of the Michaels agency said, the agency felt "computer graphics was the way to communicate the characteristics and merits of the palladium-nickel solution. The high-technology capabilities of computer graphics expressed and underlined the nature of the plating process. And conventional board art could not do what we wanted to do."

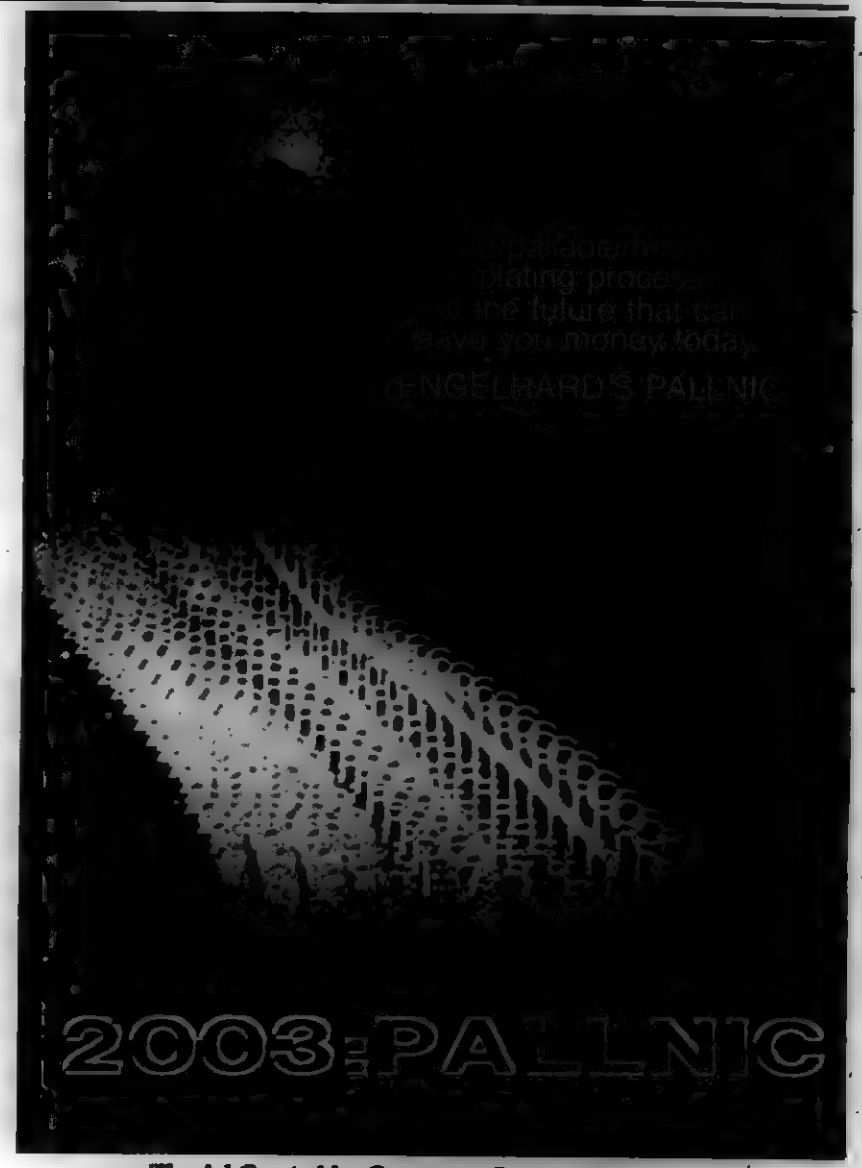
The ad centers around a globe in space, which symbolizes the worldwide application of the new plating solution. The ad uses gold color running into silver lettering to indicate the potential changeover from gold to the new, silver-colored palladium-nickel process, called Pallnic.

To compose the computer-generated artwork for the ad, Michaels Advertising in September 1982 commissioned Genigraphics Corp.'s New Jersey Service Center in Florham Park. Genigraphics, a manufacturer of computer slide-generating equipment, operates a nationwide network of 20 service centers that provide full-color, computer-generated graphics and slides.

Working from the sketch developed by Alansky, Genigraphics composed three preliminary versions of the ad using a Digital Equipment Corp. PDP-11/23 minicomputer.

Genigraphics used multiple drop-shadow and step-and-repeat techniques to produce the sweeping color shifts and text transitions that symbolized the changeover from gold plating (starting in 1973, when gold was cheap) to silver (stopping at the year 2003, when Engelhard ex-

(Continued on Page 71)



The Ad Created by Computer-Generated Graphics

WHAT TO LOOK FOR WHE
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Striving for Affordability

Statistical Software Maker Turns to Micros

LOS ANGELES — In the dawning of the microcomputer era, a software firm here faced a problem that many of its competitors were encountering. Because its software was available solely on large data processing systems, only professional organizations with sizable budgets could afford to use it.

What was needed for business and home applications was a smaller, more affordable desktop microcomputer to run statistical software, said Jerry Toporek, vice-president at BMDP Statistical Software, Inc. The company produces statistical software for all aspects of medical, educational and marketing research, as well as government and business operations.

At the same time microcomputers were gaining momentum, an intelligent workstation for the engineering and scientific market was being developed by Callan Data Systems, Inc., a young California company based in Westlake Village.

The use of the Callan hardware in the BMDP Statcat Microcomputer made the statistical software available for the first time at the desktop level, Toporek said. The company is presently working on a package for the IBM Personal Computer series, he added.

The laboratory and classrooms of the Center for Health Sciences of the University of California at Los Angeles were the breeding grounds of BMDP Statistical Software, where a team of statisticians and computing experts 20 years ago first developed the software now used on the BMDP Statcat Microcomputer. Orginally funded by the U.S. government, the software became a standard statistical package for research groups in education, medicine, government and business for analyzing and managing data.

Toporek explained the decision to link up with Callan: "After working with other microcomputer companies during the past year, we decided on Callan based on the high quality of the hardware, its price and our ability to interface effectively with the hardware and software staff."

A Statcat system includes the Callan CD100M workstation with a desktop terminal featuring the Motorola, Inc. 68000 processor, a 10M-byte Winchester disk drive, a 600K-byte floppy disk drive and 768K bytes of random-access memory (RAM).

Toporek said the company did not even consider getting into micro packages until the 68000 chip and the Unix operating system became available. "Unix had the power to run our programs, which require 350K to 600K bytes of memory. . . . We knew we needed the tools available in Unix," Toporek said.

According to Toporek, the BMDP output manager supports interactive use of the software. Entire session input and output may be viewed through horizontal and vertical scrolling on the screen. Data can easily be moved between the Statcat and other computer systems through serial communications or Xerox Corp.'s Ethernet local-area networks.

The complete set of BMDP programs in the 1983 release for mainframe computers is available for the Statcat. Programs feature data description, plots and histograms, frequency tables, missing values, regression, nonlinear regression, analysis of variance and co-variance, nonparametric analysis; cluster analysis, multivariate analysis, survival analysis and time series.

Other available software includes the standard Unix operating system with utility programs such as text formating; phototypesetting; compiling and editing; Jtalk, a program for terminal emulations and file transfer; and J, a full screen editor written by Network Research Corp.

Graphics Gives High-Tech Image

(Continued from Page 70)

pects its plating process to become the dominant technique).

Alansky estimated that the computer-generated art was created in just over five hours, compared with an estimated 90 hours required in traditional board-art illustrations, including time required to manually complete revisions and reworkings. "It would have cost us close to $5,000 in time charges alone to achieve similar effects manually, and I doubt that airbrushing, line illustration and four-color process work could do the job," he said. "Instead, using Genigraphics capabilities and services, it cost about $1,000, including all the changes, computer time and the 46mm slides."

Alansky composed the artwork and copy separately "because at the time we completed the graphics, the copy was not finalized. The design incorporated flexibility in the size of the art, which would need to be adjusted according to the amount of copy, and the copy was under constant revision."

The ad was completed by January 1983 and has appeared in a number of industry publications, including *Metal Finishing, Plating and Surface Finishing, Products Finishing, Insulation/Circuits* and *Electronic Packaging and Production.*

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By Providing Info to Handle Situation

Data Base Helps Clean Up Toxic Waste Spill

RICHMOND, Va. — When gallons of a highly toxic chemical spilled from a crippled truck here recently, the Henrico County Hazardous Incidents (Hit) Team turned to a computer to devise a response.

The Hit Team was notified early one morning that a tanker truck filled with perchloroethylene, a chemical used in dry cleaning, had overturned on Route I-95 here, spilling more than 200 gallons of the dangerous substance. Fire Captain R.C. Dawson, who heads the Hit Team, contacted the emergency room staff at Virginia Commonwealth University's nearby Medical College Hospital to prepare a response strategy.

Having already learned what was in the tanker from the injured driver, the emergency room team called on the university's Office of Environmental Health and Safety (OEHS) for information about treatment and cleanup procedures for perchloroethylene. Among the sources on which the OEHS staff relies is Occupational Health Services, Inc.'s Hazardline on-line data base, which offers subscribers information on 2,400 hazardous substances.

"When we accessed Hazardline through our [Hewlett-Packard Co.] HP 2621 terminal, we were able to determine the acceptable exposure levels and the respiratory protection and safety gear the Hit Team would need to handle the situation," said Robert Walter, an OEHS bio-safety specialist. "The data base also mapped out the requirements for reporting the spill and the proper cleanup methods."

Relying on the Hazardline information, the Hit Team responded to secure the accident scene, supervising the cleanup and the removal of the remaining perchloroethylene. "That system gave us the ability to determine whether or not we had the resources to handle the spill," Dawson said. "We knew exactly what protective equipment to employ, and we were able to clear the whole scene in just 20 hours. We were tickled to death, because something like this could have lasted for days."

In addition, the medical college staff isolated a portion of the emergency room, on the basis of Hazardline data, to deal with victims of chemical poisoning. According to Dawson, about 15 state troopers and highway workers who had arrived at the scene before the Hit Team were transported to the hospital suffering from symptoms of perchloroethylene exposure. All were treated and released.

"In preparing for a chemical emergency like this," Dawson explained, "we try to have at least two sources of information to plan a strategy. This computer-based system is an extremely important tool because it is updated daily. I feel it is the latest information you can get about a hazardous chemical. We also use several written reference works, but once you've spent a hundred dollars on one of these books, it's already out of date."

"This system is very helpful," OEHS' Walter said. "It allows us to access this information rapidly in an emergency without having to leave the office. It gives us up-to-date, basic material on a wide range of dangerous chemicals."

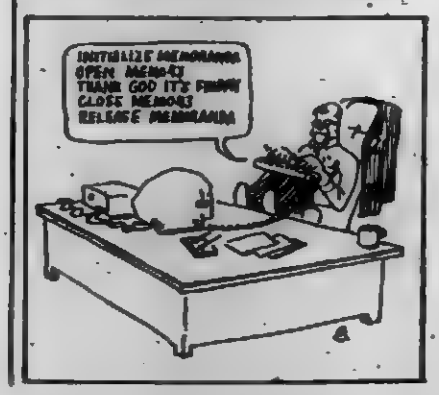
WCGA Names Kroell Assistant

WASHINGTON, D.C. — James H. Kroell has been named assistant to the president of the World Computer Graphics Association, Inc. (WCGA).

Kroell was director of conferences at the American Federation of Information Processing Societies, Inc. (Afips), where he was responsible for the annual National Computer Conference and the annual Office Automation Conference.

Prior to his association with Afips, Kroell was staff director of professional services at the American Institute of Chemical Engineers, where he directed the institute's international conference and exhibition activities. Kroell is a graduate of Marquette University's School of Business Administration.

Along with the National Computer Graphics Association, the WCGA is a sponsor of the annual Defense Computers-Graphics in the Building Process conference, scheduled for San Francisco in August. The WCGA can be reached at Suite 399, 2033 M St. N.W., Washington, D.C. 20036.



System Helps Game Maker Make Leap From Board To Video Game Market

BEVERLY, Mass. — While its main claim to fame may lie in producing games for the consumer market, Parker Brothers Co., does not believe in playing games in its development labs. As such, the firm uses a mainframe computer to help its traditional board-based games make the electronic jump to microcomputers.

The developer of the famed Monopoly board game is currently marketing its first series of games for home computers. In fact, the firm expects to sell 50 million games cartridges by year-end, making a sizable impact on the $900 million personal computer software market.

In December 1980, Parker Brothers started predevelopment efforts to enter the highly volatile video game software market. Predevelopment lasted until August 1981, when the software engineering staff began to program games using a Digital Equipment Corp. PDP-11/44 minicomputer. Equipping each programmer with a personal computer was considered, but it was decided that time-sharing on a minicomputer would be more effective. Using a mini would allow the firm to store highly confidential data in one place on hard disks, with data accessible only to the right people. Added to this, the Parker Brothers staff was familiar with DEC computers because it had used them previously.

"We knew from experience that the PDP-11's RSTS operating system was friendly. Its software capabilities included assembly and cross-assembly languages, which we needed to be able to take programs written on the minicomputer and download them into the emulator," said Donald C. Miffitt, director of electronic engineering.

Software development on the PDP-11/44 was a "problematic" success. Parker Brothers had hoped to use the minicomputer for five years. However, it took only five months to exceed its capacity. More horsepower was needed for the game maker's growing programming staff.

A range of options was considered: a network of PDP-11/44s, a larger PDP-11, DEC's VAX-11 line, the Decsystem-20 mainframes and systems from several other vendors. However, DEC computers were found to be comparable in price and performance to those of other vendors. The field was narrowed down to two contenders: VAX-11 and Decsystem-2060.

Two considerations tilted the scales toward the Decsystem-2060: an easier conversion from the PDP-11/44 to the 2060 than to the VAX-11 and the ability of a Decsystem-2060 to support more users than a VAX-11. The Decsystem's operating system, Tops-20, is also mature and powerful and provides a large, friendly time-sharing environment, Miffitt said.

The Decsystem-2060 was acquired in October 1982. The conversion effort took several weeks. Although software development was transferred to the 2060, the PDP-11/44 was retained for real-time applications for hardware development and for simulating filters, hardware and analog and digital signals.

The Decsystem-2060 supports a large number of terminals, both hard-wired and connected by dial-up telephone lines to users' homes. The mainframe provides the power required to support the Emax editor, assemblers and cross-assemblers (all of which demand much CPU time). In spite of the work load, the system has continued to provide excellent response time. "Uptime has been phenomenal," Miffitt said.

The Decsystem-2060's architecture, size and operating system have provided the game maker with a range of benefits. For example, the system is user friendly and includes a "?" prompt key that a perplexed user can hit to bring up a list of possible commands. Large-scale storage capacity lets users keep on-line listings of games and game codes. Electronic mail has enhanced communications, and Parker Brothers' secretaries use the 2060 for word processing.

Using a mainframe for software development has, in effect, removed all the usual boundaries faced by programmers, the engineering executive said. "We seldom have to say no to our people. Our staff feels that its productivity and effectiveness have increased since our acquisition of the mainframe. Given the extremely competitive market we are in, we need tools that heighten the productivity and creativity of our staff. Of all the tools at our disposal, the Decsystem-2060 continues to play the most central role," Miffitt said.

Meet to Cover Maintenance Of Software

MONTEREY, Calif. — Meir M. Lehman and Barry Boehm will speak on "The Laws of Software Maintenance" at the Software Maintenance Workshop, which will be held here Dec. 6-8 at the Naval Postgraduate School.

Lehman, head of the Department of Computing at the Imperial College in London, will update his "Five Constant Laws of Systems Evolution." Boehm, chief engineer of TRW Corp.'s Information Systems Division and author of *Software Engineering Economics*, will address the economic decisions and constraints that drive the software maintenance process into dynamic equilibrium.

Sponsored jointly by the Institute of Electrical and Electronics Engineers (IEEE) Computer Society, the National Bureau of Standards and the Naval Postgraduate School, the conference costs $115 for IEEE members and $145 for others. More information is available from the Software Maintenance Workshop, c/o IEEE Computer Society, P.O. Box 639, Silver Spring, Md. 20901.

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Package Boosts Programmers' Output at Bank

HARTFORD, Conn., — A large multiservice financial institution here has improved its documentation procedures by acquiring a systems software package designed to aid programmer productivity.

"Up to a few months ago we handled this documentation like most other companies — manually," said Monroe Glover, quality assurance officer for Connecticut National Bank's (CNB) data processing division. "Every programmer would be responsible for documenting all of his changes. This meant a programmer would be spending time writing, editing and proofreading. This cycle would often repeat itself two or three times. Additionally, secretarial support was required for typing. Or worse yet, errors would not be caught and Job Control Language (JCL) would be documented incorrectly."

The bank's IBM 3033, 3083 and 4341 mainframe computers are used to handle teleprocessing and batch processing needs of banking such as demand deposits, retail loans, Master Charge, trust management and investments, as well as system development projects. To meet its growing data processing needs, CNB employs over 80 programmers and plans to hire more in the future. With a staff of this size, CNB found it imperative to keep track of programmer productivity levels and job responsibilities.

"We help our programmers get what they need to use their time efficiently and effectively. We pride ourselves on applying automation wherever appropriate and keep abreast of the latest tools to relieve our programming staff of clerical and administrative functions whenever possible. However, there was one area where we were not accomplishing this goal — system run documentation," Glover said.

Corporate Mandate

Because of a corporate mandate for data processing to achieve and maintain a high level of efficiency and effectiveness, CNB began a search for a productivity aid for the documentation problem. They eventually purchased a product called JCLflowW, marketed by Consumer Systems, Inc., Downers Grove, Ill.

JCLflow automatically flowcharts systems and provides cross-reference reports using existing JCL as input, thereby relieving the programming staff of tedious documentation requirements. JCLflow accepts job or Proc input as well as instream JCL procedures, retrieves cataloged JCL procedures and data from user libraries, accesses the user's system catalog and maintains a master file of documentation data.

The software solved the problem of decreasing documentation time, relieving programmers of a clerical function. "Productivity in the documentation area is up dramatically since utilizing this product," Glover said. "Now we write the JCL, and JCLflow does the rest automatically."

According to Glover, additional benefits have been realized since using the new system. JCLflow is now used in many areas of the data processing divisions by both technical and nontechnical personnel. "The biggest plus is in data processing areas that interface with our bank customers, such as data control, operations and customer service," Glover continued. "These areas are staffed by personnel who do not have the same technical background as a programmer. They're not programmers, but they do need to understand job flow. With the new software they are able to become visually aware of the flow of a job by looking at the input and output produced, for example, flowcharts and reports. They get a better awareness of input and output. These people can see from the JCLflow reports the files used to produce the output for their users. Many customer problems are solved on the spot."

According to Glover, data control and operations personnel have utilized the product in certain problem determination operations. They take an application and a job, input it to JCLflow, which tells them what to do next in a step-by-step procedure. If an abnormal condition occurs, they use JCLflow to find out where the job went down and how to pick up and continue. Instead of getting a programmer involved, they can now solve these types of problems themselves.

Another application of the software by CNB is file maintenance and research. CNB uses the cross-reference reports produced by JCLflow for research purposes. Now that CNB is involved in many bank mergers and acquisitions, they frequently need to change and update files, as well as merge other files. Therefore, when a demand deposit file requires change, CNB needs to know what jobs could be affected by that change. The programming staff can now set up their tasks and carry them out using the cross-reference reports generated by JCLflow.

CNB has many large application development projects planned in the near future. "We plan to use the system in many phases of our application project life cycle," Glover said. "Because of its flowcharting capabilities and generation of reports, valuable time will be saved at the onset of the project."

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Faster Reaction Time Cuts Costs

System Helps Airline Manage Assets In-House

MONTREAL — Despite the disadvantages normally associated with self-management, Air Canada has become one of the few firms in North America to manage successfully its assets in-house.

Managers of the $1.25 billion pension fund, which is the seventh largest employer-sponsored fund in Canada, have introduced a unique computer system that is projected to save an additional $150,000 annually through improved reaction time to changes in today's volatile financial markets.

"By introducing a fully automated program in-house, the Air Canada fund has gained a much greater degree of vital information on a more timely basis," said Denis J. Groom, senior vice-president of corporate finance and planning.

Fund managers have traded monthly profit and loss statements for up-to-the minute, real-time snapshots, allowing them to determine from day to day the effectiveness of various investment decisions.

Tracks Settlements

The computer also tracks all settlements and dividends that become due and alerts managers when payments are not made promptly to the fund's account, either by security brokers, banks or trust companies.

Richard Chin, manager of research and investment accounting, said the system includes a Datapoint Corp. 6600 minicomputer with 256K-byte memory, DOS operating system, Datapoint 8220 terminals and two printers. "A difference of one or two days in settlements can mean a loss of hundreds of thousands of dollars annually for a fund as large as ours," Groom said.

By generating daily 30-day forecasts of incoming and outflowing cash, the Air Canada system also allows fund managers to look for investment opportunities to optimize cash on hand.

To maintain the pension fund's security, the computer monitors which individuals enter particular transactions. A planned extension of this tracking feature, Groom said, will allow individual analysts to identify their own trading activities and measure their investment performance.

Leapfrog Current Practice

The new system, installed six months ago, has helped the airline pension fund leapfrog beyond the current practice of partial automation. However, even partial automation is relatively new to the pension fund industry.

"A major factor behind this reluctance has been the need for strict privacy and confidentiality," Groom said.

"In order to buy and sell large quantities without major fluctuations in price, it is essential that as few people as possible have access to our trading information," he said. "Small closed systems like the minicomputer can now offer pension funds a degree of security they may not have been assured of achieving through large corporate shared-information systems."

Until several years ago, he said, most pension funds performed administrative activites totally manually, from monthly profit and loss statements to routine accounting entries and calculations of current assets.

"Often, the value of assets and the profit picture was changing even while the ink on the ledger was drying," Groom said. "This made it almost impossible to know how the fund was performing from day to day and to take timely advantage of opportunities."

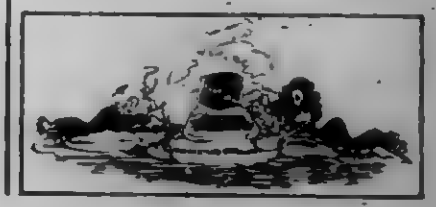
More recently, larger funds have brought in computer terminals to give investment analysts current prices for securities and commodities.

In addition, portfolio administration has been subcontracted to the banks and trust companies that actually hold the funds' securities.

These institutions provide varying degrees of automated services, such as reports on the maturity dates of securities, monthly statements and daily reports of cash on hand. Generally, however, daily information on current assets, earned income and cash forecasts are unavailable.

The fund has acquired Canadian marketing rights for the program's software and over the next year will begin marketing the system, known presently as the Air Canada Portfolio Management Information System. Chin said the software will be converted to the RMS operating system.

The Air Canada fund has performed well within the industry. Over the last five years, for example, its results have ranked among the very top in the Canadian community.



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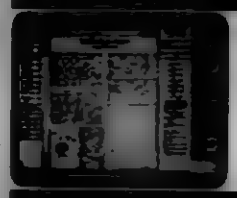

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OCR Scanner Increases Efficiency at Foundation

OKLAHOMA CITY, Okla. — When the staff at a medical research foundation here decided to modernize its text editing capabilities, the members wanted to be certain of getting good value for their investment. Specifically, they wanted to be sure that the foundation's shared-logic system was working efficiently, producing final documents quickly and accurately.

To ensure that the new system was not bogged down with input typing, the Oklahoma Medical Research Foundation acquired an optical character recognition (OCR) page reader that would scan typewritten pages directly into a Lanier Business Products, Inc. word processing system.

Founded in 1946 as a private, nonprofit medical research organization, the foundation also offers training for scientists in a wide range of areas, including major diseases and basic physiology.

Staff of 300

Located on the campus of the Oklahoma Health Center, which also contains facilities of the University of Oklahoma College of Medicine, the foundation now has a total of 300 employees, including staff members and laboratory personnel.

The OCR scanner has enabled the center's three operators to use their working hours more efficiently. And it has given the foundation's many secretaries, scattered throughout the research facility, access to the power of the word processing stations. Text that the secretaries key on IBM Selectric typewriters at their desks can be entered directly via the scanner into the word processor without rekeying, a foundation spokesman said.

This capability is a major advantage to the foundation's full-time scientific staff, some 75 Ph.D. and M.D. researchers who write scientific papers, reports and applications for research funds. The scientists work closely with their department secretaries, who understand their writing habits and specialized terminology and can therefore rapidly type drafts of manuscripts and other documents. This is of paramount importance especially when the work is subject to deadlines, as are applications for medical research funds.

To capitalize on the benefits of the OCR/word processor combination, typists and secretaries throughout the complex are asked to originate their material on Selectric typewriters, using a prestige elite font. They can edit the first draft with a red felt-tip pen that will not hinder the operations of the scanner.

Reading Rate

The Alphaword III scanner from Compuscan, Inc. can read the material at a rate of up to 300 pages per hour, with an accuracy of approximately one error in some 200,000 characters.

Once the material is scanned, it is automatically entered into the word processing system, consisting of a manager's workstation and four terminals. With multiple terminals, the operators can work on different documents or share different aspects of one large project.

After editing and formatting are completed, the material can be stored for later retrieval or distributed in revised letter-quality form via one of three available printers, choosing from a wide variety of print styles.

"With the Alphaword scanner, our Lanier word processor is free to be used for text editing and printing," said Lynne Greene, director of intramural support services for the foundation. "Without the scanner, considerable time would be spent within our Word Procesing Center retyping original material on the Lanier system."

"Given the complexity of some of our technical documents," Greene noted, "we sometimes go through several editing cycles on a single piece of work. If the addtions are lengthy, we ask the writer to submit them in typed form for scanning by the Alphaword OCR. In the end it saves us a lot of time."

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Key to Understanding Problem Solving

Natural Language Program Gaining Attention

By Patricia Keefe
CW Staff

AUSTIN, Texas — Ever wonder how that whiz in your department figures things out so quickly?

One key to unraveling the mystery of decision-making processes is thought to be natural language programs. Here at the University of Texas, experiments are underway using a natural language-understanding computer program capable of comprehending connected discourse at 5,000 words per minute.

Dubbed Isaac after physicist Sir Isaac Newton, the program was developed in 1975 by Dr. Gordon S. Novak Jr., an assistant professor in the computer science department here. Primarily used to illustrate physics problems, Isaac has received the attention of other scientists because of the program's relevance to studies of the way experts solve problems. Specifically, it offers the potential of codifying the rules that humans use to set up and solve problems — rules that in many cases have defied attempts at verbalization.

Multiple Sentences

Isaac is one of a few natural language-understanding programs capable of understanding multiple sentences about one topic. Most other programs understand commands sentence by sentence, according to Novak, who suggests Isaac as an illustration of the way computers can be used to aid all intellectual disciplines rather than being limited to numeric calculations. "That's where the big payoff from the computer revolution is going to come," Novak said. "Most of the world's work is nonnumeric. Even for engineers and physicists, computers are not just number processors. They are general symbol processors."

Moreover, "Isaac provides both a model of the processes human subjects use to solve the problems and a theory of how physical representations enter into these processes," according to an article published in *Science* (June 1980) co-authored by Dr. Herbert Simon, a Nobel Prize-winning economist and professor of psychology at Carnegie-Mellon University in Pittsburgh, Pa.

The article noted that a critical component of Isaac is a set of schemata, stored in long-term memory, that the program uses to construct physical representation [graphics], rather than translating syntactically from the natural language text directly into algebraic equations. As a result, the article continued, "Isaac gives us a very specific notion, both concrete and formal, of what the expert's internal representation of physical problems may be like and the schemata that provide the source of his physical intuition."

Isaac can solve about 50 different physics problems of the rigid body statics type, using a core of basic data and tools with which it has been equipped by Dr. Novak. The program is written in Lisp and was originally developed to run on a Control Data Corp. 6600, but has been run on Digital Equipment Corp. Decsystem-20/60s and Hewlett-Packard Co. desktop HP 98/36s, he said.

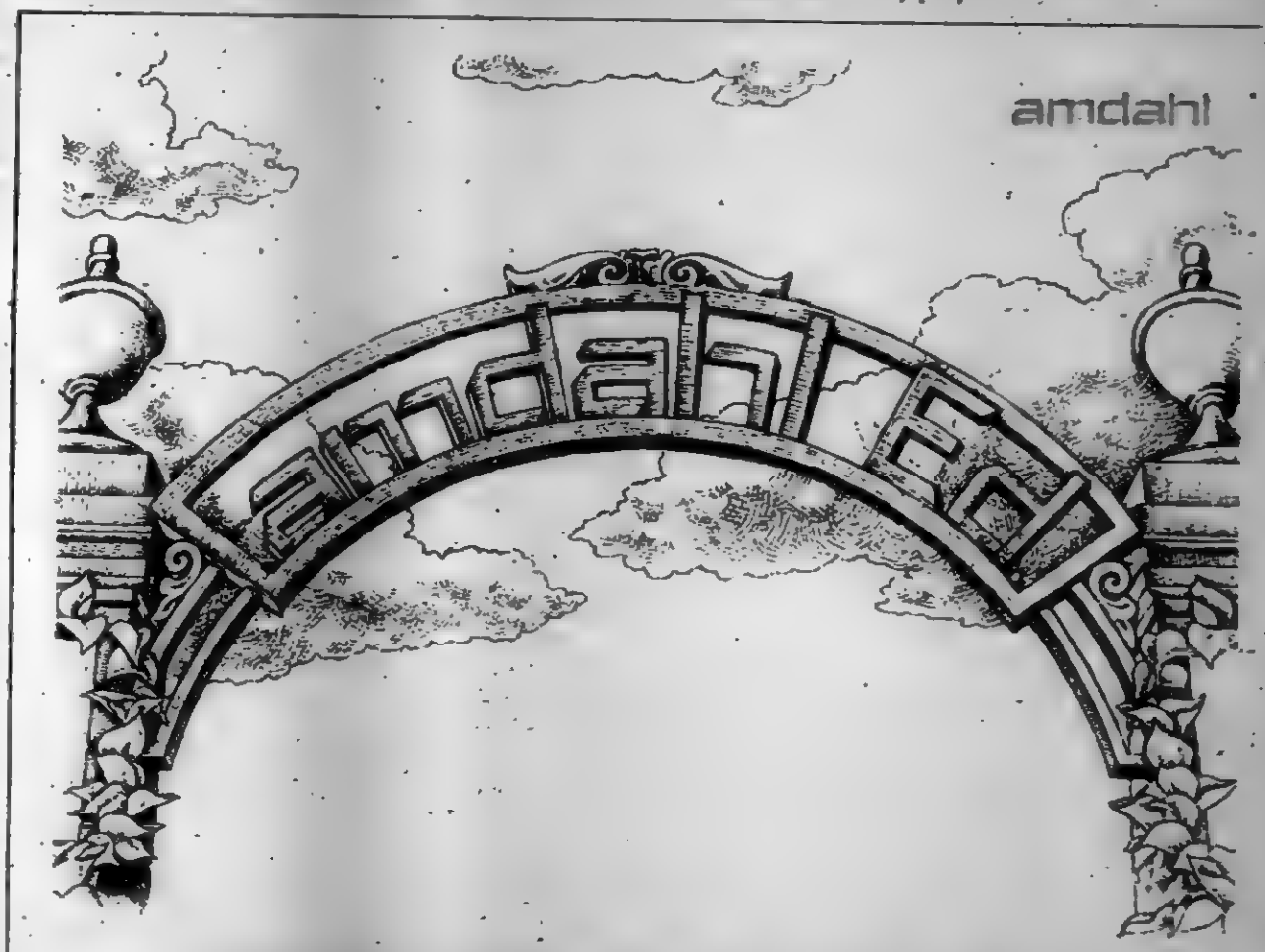
An example of a physics problem solved by Isaac is taken from "Schaum's Outline of College Physics" by Frederick Bueche:

"The foot of the ladder rests against the vertical wall and a horizontal floor. The top of the ladder is supported from the wall by a horizontal rope 30 feet long. The ladder is 50 feet long, weighs 100 pounds, with its center of gravity 20 feet from the foot, and a 150-pound man is 10 feet from the top. Determine the tension of the rope." Isaac's rapid answer is 120 pounds.

In creating Isaac, Novak found that "even in ordinary English, there's a great deal of reading between the lines that people don't realize they are doing." Novak asserted his research shows that an English sentence does not contain the message the sender wants to transmit. Instead, the listener is programmed to create a message out of what he or she already knows.

For example, by the time Isaac understood the meaning of a physics problem, the amount of data involved was found to be 30 to 50 times as much as was involved in the English in which the problem was stated. "This means that English is a very efficient way of transmitting ideas," Novak said. He added that programs like Isaac need to be coded with many human assumptions to provide better problem-solving modeling. He outlined a problem that involved two people carrying a weight on a pole. Since Isaac was never "taught" that, customarily, people carry weights between them, in solving the problem, it was forced to make a decision that resulted in placing the two figures on one side of the pole and the weight at the other end.

"Teaching a computer common sense is not impossible, but there is a huge amount of knowledge involved," Novak said. "We don't [yet] have a program that can learn the way people can.



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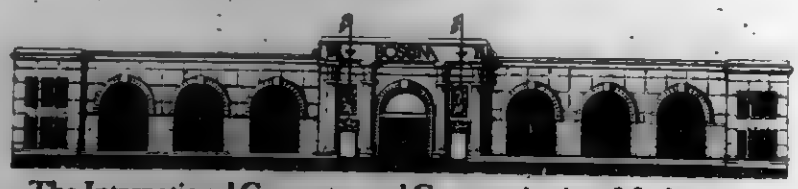

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Calendar

Week of Dec. 4

Dec. 5-9, San Francisco — **CICS/VS Application Programming.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Dec. 5-9, Denver — **Project Planning and Control Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Dec. 5-9 in Houston.

Dec. 5-9, Las Vegas — **The 24th National Computer Security Seminar and Workshop.** Contact: Education Department, Data Processing Society, Inc., 200 E. Loop 820, Fort Worth, Texas 76112.

Dec. 5-9, Memphis, Tenn. — **Information Modeling Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 5-9, Denver — **Advanced Systems Analysis.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 5-9, Washington, D.C. — **Ada Software Engineering.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 5-9, San Francisco — **Financial Modeling: A Structured Approach.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 6, New York — **CICS/VS Management Overview.** Contact: Teltech, 39 Broadway, New York, N.Y. 10006.

Dec. 6, San Francisco — **IMS Concepts and Facilities.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 6-7, Ann Arbor, Mich. — **Data Communications Networks: Planning, Analysis and Design.** Contact: The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

Dec. 6-8, San Francisco — **Personal Computers and Information Networks in a Wired Society.** Contact: Stanford Business Research Foundation, 825 San Antonio Road, Palo Alto, Calif. 94303.

Dec. 6-8, Toronto — **Implementing the Electronic Office.** Contact: ICA Telemanagement, Suite 210, 2175 Sheppard Ave. E., Willowdale, Ont., Canada M2J 1W7.

Dec. 6-8, Toronto — **The Second Annual Conference on Office Technology: Communications in the Electronic Office.** Contact: ICA Telemanagement, Suite 210, 2175 Sheppard Ave. E., Willowdale, Ont., Canada M2J 1W7.

Dec. 6-8, New York — **Advanced Dbase II.** Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 7th Ave., New York, N.Y. 10123.

Dec. 6-8, San Francisco — **Project Management Seminar.** Contact: McCabe and Associates, Inc., Suite 111, Twin Knolls Professional Park, 5501 Twin Knolls Road, Columbia, Md. 21045.

Dec. 6-8, New York — **SAS Basic Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Dec. 6-8, Monterey, Calif. — **Software Maintenance Workshop.** Contact: Software Maintenance Workshop, IEEE Computer Society, P.O. Box 639, Silver Spring, Md. 20901.

Dec. 6-8, Andover, Mass. — **Videotex and Teletext.** Contact: Institute for Graphic Communication, 375 Commonwealth Ave., Boston, Mass. 02115.

Dec. 6-8, North Attleboro, Mass. — **RPG-III Structured Programming Course.** Contact: Rick Sweeney, RTC Systems, Inc., 49 Plain St., Box 767, North Attleboro, Mass. 02760.

Dec. 6-8, Dallas — **SAS Applied Time-Series Analysis and Forecasting Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Dec. 6-9, Los Angeles — **Computer Network Design and Protocols.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held Dec. 13-16 in Boston.

Dec. 6-9, St. Louis — **Structured Requirement Definition.** Contact: Georganna Carson, Ken Orr and Associates, Inc., 1725 Gage Blvd., Topeka, Kan. 66604.

Dec. 6-9, Washington, D.C. — **Defining Software**

(Continued on Page 80)

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(Continued from Page 79)

Requirements. Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held Dec. 13-16 in Los Angeles.

Dec. 6-8, Arlington, Texas — **Data Communications Concepts and Systems.** Contact: Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181, Wellesley, Mass. 02181.

Dec. 6-8, Philadelphia — **Screen Design.** Contact: Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181, Wellesley, Mass. 02181

Dec. 6-9, Cary, N.C. — **Introduction to Data Processing Using SAS (OS).** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Dec. 6-9, Washington, D.C. — **Data Base Management Systems: Mini, Micro and Distributed Applications.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held Dec. 13-16 in San Diego.

Dec. 6-9, Washington, D.C. — **Microprocessor Software, Hardware and Interfacing.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045.

Dec. 6-9, Palo Alto, Calif. — **Hands-On Unix Workshop.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held Dec. 13-16 in Washington, D.C.

Dec. 6-9, Los Angeles — **Hands-On Pascal Workshop.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045.

Dec. 6-9, New York — **CICS/VS Command-Level Programming.** Contact: Teltech, 39 Broadway, New York, N.Y. 10006.

Dec. 6-9, Washington, D.C. — **Distributed Processing: Minicomputer and Microcomputer Implementations.** Contact: Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405. Also being held Dec. 13-16 in Boston.

Dec. 6-15, Culver City, Calif. — **The Fourth-Generation Language Focus.** Contact: Time-Sharing Applications and Consulting Services, Suite 800, 15910 Ventura Blvd., Encino, Calif. 91436.

Dec. 7, New York — **Word Processing With Wordstar.** Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 Seventh Ave., New York, N.Y. 10123.

Dec. 7, New York — **Making Information Work for You: Using Dbase II.** Contact: Grumman Data Systems Institute, Center for Professional Development, 280 Crossways Park Drive, Woodbury, N.Y. 11797.

Dec. 7-9, New York — **Data Communications I: Basic Concepts.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Dec. 7-9, New York — **SAS Processing Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Dec. 7-9, Denver — **Advanced Communications and Network Engineering.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 7-9, Washington, D.C. — **Financial Information Systems: Integrating Personal Computers.** Contact: National Institute for Management Research, Department PR, P.O. Box 3727, Santa Monica, Calif. 90403.

Dec. 7-9, Boston — **Data Communications.** Contact: Data-Tech Institute, 100 Myrtle Ave., Nutley, N.J. 07110. Also being held Dec. 14-16 in Chicago.

Dec. 7-9, Boston — **Local-Area Networks.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

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Dec. 7-9, San Francisco — **Computer Operations: Effective Network Design.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 7-9, Phoenix — **Network Communications Protocols.** Contact: Center for

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Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Dec. 7-9, San Diego — **The 1983 Association for Computing Machinery Conference on Personal and Small Computers.** Contact: Anne-Marie Claybrook, The Mitre Corp., P.O. Box 208, Bedford, Mass. 01730.

Dec. 7-9, Denver — **Telecommunications Management: Equipment Planning, Selection and Use.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 7-9, Arlington, Va. — **Unix.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705. Also being held Dec. 19-21 in Denver.

Dec. 7-9, New Brunswick, N.J. — **Data Communications.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held Dec. 12-14 in Boston and Dec. 19-21 in New York.

Dec. 8, New York — **Business Analysis with Multiplan.** Contact: Grumman Data Systems Institute, Center for Professional Development, 280 Crossways Park Drive, Woodbury, N.Y. 11797.

Dec. 8-9, New York — **Data Communications: Advanced Concepts, Products and Services.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 8-9, Orlando, Fla. — **Manufacturing Project Management.** Contact: Technology Transfer Society, Department MP, 3420 Kashiwa St., P.O. Box 3608, Torrance, Calif. 90510. Also being held Dec. 12-13 in Washington, D.C., and Dec. 15-16 in Boston.

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Dec. 8-9, Dallas — **Computer Networks Protocols, Standards and Compatibility.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 8-9, Orlando, Fla. — **Data Administration: Development and Practice.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

Dec. 8-9, Boston — **Data Base Design.** Contact: Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181, Wellesley, Mass. 02181.

Dec. 8-11, Toronto — **The World of Commodore Show.** Contact: Commodore Business Machines Ltd., 3370 Pharmacy Ave., Agincourt, Ont., Canada M1W 2K4.

Dec. 9, New York — **More Powerful Planning with Lotus 1-2-3.** Contact: Grumman Data Systems Institute, Center for Professional Development, 280 Crossways Park Drive, Woodbury, N.Y. 11797.

Dec. 9, Philadelphia — **Human Factors in Office Automation.** Contact: Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181, Wellesley, Mass. 02181.

Week of Dec. 11

Dec. 11-14, San Francisco — **Cause '83: Information Resources and the Individual.** Contact: Cause, 737 29th St., Boulder, Colo. 80303.

Dec. 11-15, San Francisco — **The Fourth Annual Data Training Conference and Expo.** Contact: Data Training, 176 Federal St., Boston, Mass. 02110.

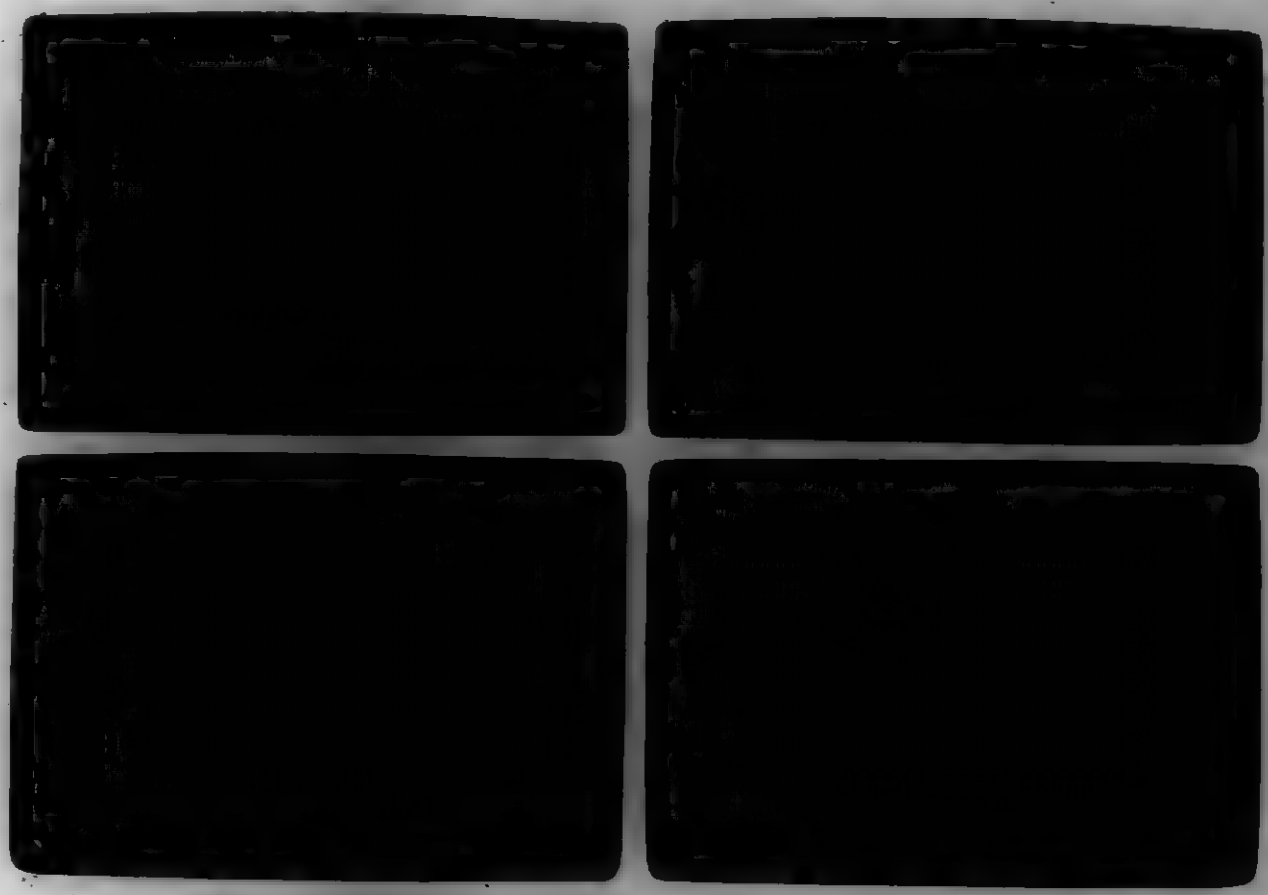
Dec. 12, New York — **Introduction to the IBM Personal Computer.** Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 Seventh Ave., New York, N.Y. 10123.

Dec. 12, Washington, D.C. — **IBM CICS/VS Concepts and Guidelines.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 12-13, San Francisco — **Integrating External Data Bases With the Corporate MIS.** Contact: Information Industry Association, Suite 400, 316 Pennsylvania Ave. S.E., Washington, D.C. 20003.

Dec. 12-13, Seattle — **Software: A Legal Briefing for DP Professionals.** Contact: The American Institute for Professional Education, Car-

(Continued on Page 82)



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negie Building, 100 Kings Road, Madison, N.J. 07940. Also being held Dec. 15-16 in Washington, D.C., and Dec. 21-22 in Fort Lauderdale, Fla.

Dec. 12-13, New York — **International Communications: Products, Technology and Regulation.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Dec. 12-13, Washington, D.C. — **Focus for the End User: Basic Report Preparation.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

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Dec. 12-13, Natick, Mass. — **Systems Analysis for DP Professionals and Users.** Contact: Kathy Shaw, Office of Continuing Education/ Higgins House, Worcester, Mass. 01609.

Dec. 12-13, Anaheim, Calif. — **Managing Projects in the Structured Environment.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

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Dec. 12-14, Gaithersburg, Md. — **Total Systems Reliability Symposium.** Contact: Total Systems Reliability, Symposium '83, IEEE Computer Society, P.O. Box 639, Silver Spring, Md. 20901.

Dec. 12-14, Nashua, N.H. — **Project Management and the Personal Computer.** Contact: New Hampshire Center, New Hampshire College, 2500 N. River Road, Manchester, N.H. 03104.

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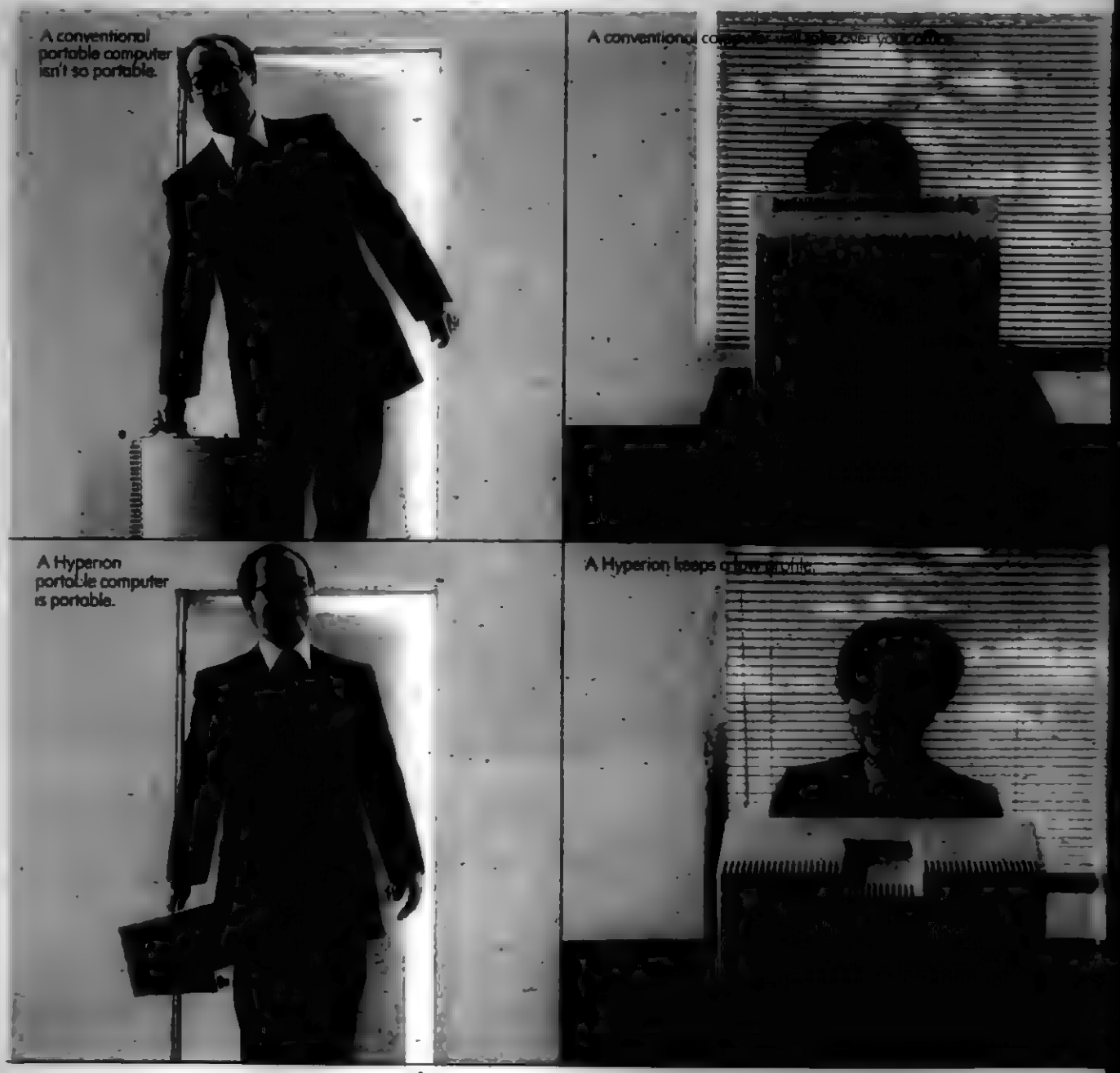

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Dec. 12-16, North Attleboro, Mass. — **System/38 Application.** Contact: Rick Sweeney, RTC Systems, Inc., 49 Plain St., North Attleboro, Mass. 02760.

Dec. 12-16, New York — **Introduction to Unix.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011.

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Dec. 12-16, New York — **Contemporary Computer Auditing: Integrity Controls.** Contact: Marge Umlor, EDP Auditors Foundation, 373 S. Schmale Road, Carol Stream, Ill. 60187.

Dec. 12-16, Salt Lake City, Utah — **Structured Design Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

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EDITORIAL

Think First, Legislate Later

High-technology smuggling today is not as simple a problem as rum-running was during Prohibition. When it comes to computers, the people who "have" must question the "have-nots" not only on their immediate industrial need for a particular machine, but also on its future application. Specifically, the question is whether that machine might someday be turned to the detriment of society, as in a military application.

Recently, West German authorities seized a Digital Equipment Corp. superminicomputer moments before it was to leave that country's jurisdiction on its way to the Soviet Union [CW, Nov. 21]. The DEC supermini is one of many pieces of high technology on a U.S. government-drafted list that are restricted for shipment to Communist countries. The restrictions are necessary, the government says, to protect U.S. technology and to prevent sophisticated computers from being used as military tools.

Unfortunately, the laws against such illegal activities are surprisingly weak. Even the U.S. House of Representatives is backing a bill that would further weaken the already threadbare Export Administration Act that recently expired. The House bill calls for a one-time licensing for multiple exports rather than the current method of approving each individual high-tech export. It would also cut the export administration budget by one-third and reduce the number of customs agents stationed at foreign ports.

We can't help wondering why, if computers and other high-tech items can be used as tools of war when placed in the wrong hands, so many people and organizations disagree with laws restricting computer shipments to foreign nations. Perhaps it is not the eventual use of computers that is the issue, but rather the possession of computer technology itself — an "I have it and you don't" problem.

Simply stated, the rules of the game dictate that if you agree with U.S. policies, you can enjoy the benefits of this country's high technology. If not, then your name is added to the list of have-nots.

There is no question that if a computer is slated to be plugged into a military application — and there is no exact way of knowing whether or not it will be — its shipment should be restricted. Right now, the easiest method for controlling exports is to restrict totally certain technology exports to specific countries.

But blanket restrictions might shut out nations that sincerely want to use computers for the benefit of their people. Further, they tend to stifle the free enterprise spirit of U.S. firms that want to spread their wares into foreign markets.

So before we enact any laws on exports, we must think why these laws are being written in the first place: Is it to stop soldiers from acquiring more high technology? Or is it to use computers as political carrots that are dangled before the heads of foreign states? Either reason has significant arguments in its favor. But they should not be confused in a hodgepodge of senseless overlegislation.

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LETTERS

Setting the Record Straight

The article "Businessman Gets Brief Sentence for Illegal Exports" [CW, Sept. 19] contains inaccurate and misleading information about our client, Guenther R. Nachtrab of Falls Church, Va.

From the syntax of the article, it is apparent that the U.S. Attorney's Office in the Eastern District of Virginia gave *Computerworld* misleading information about Nachtrab and the lawsuit filed against him in that district. So that the record may be absolutely straight, and Nachtrab's reputation not unfairly blemished anymore than it already is, I'll set forth the facts.

Nachtrab was convicted of nine counts of exporting commodities without first having obtained a valid export license. These commodities had absolutely nothing to do with Soviet Bloc countries, Eastern European countries or military hardware. All counts that alleged that Nachtrab either conspired or actually shipped goods, directly or indirectly, for use by Soviet Bloc countries, were dismissed by the court or acquitted by the jury. Nachtrab was found not guilty, and he was acquitted on every count that alleged shipment, directly or indirectly, to Eastern European countries.

In addition, none of the components in question was designed to military specification. There simply was no evidence of any of this activity by Nachtrab, and the official court record establishes this.

Nachtrab was convicted of failing to obtain a validated export license for the shipment of goods to Vienna, under U.S. Department of Commerce regulations, which require a license where the value of the shipment is in excess of $500.

Commerce experts testified at the trial that if a license application had been filed for those nine shipments, those applications would have been granted. Indeed, validated licenses had been granted by Commerce for shipment by Nachtrab to this particular consignee on several occasions. There was nothing about those particular shipments of electrical components other than the fact that they were on the Commodity Control List (not, as *Computerworld* suggested, on an embargo list) and that in the normal course of events, a license was required because of the value of the shipment, not because of the inherent nature of the good.

In fact, the Commerce witness at the trial admitted that each of these components could be shipped individually without a validated license since its individual value was less than $500.

Nachtrab was convicted of technical violations of the Export Administration Act, and he was acquitted of all counts that suggested by innuendo or alleged that he tried to export goods to Eastern Bloc countries.

Mark H. Tuohey III
Kirby, Gillick, Schwartz & Tuohey
Washington, D.C.

Five-Numeral Digits

I have used a date expressed in five-numeral digits, but not in Julian date form, in a large IMS shop and in an IBM CICS with Vsam shop. The edits and conversion from and to Julian, calendar and this other form of date are contained in a Cobol program for batch and in a Cobol program retrieved via a link in the CICS applications. I have found it to be easier handling date ranges spanning year-ends with this form of date than with Julian dates.

Chris Miller
Northwest Systems Development
Crown Zellerbach Corp.
Portland, Ore.

LECHT ON SCIENCE /Charles P. Lecht

Software Industry: The Chaos Before Creation

'After having been herded into the IBM corral, the software industry appears destined for yet further herdings. The unavailability of larger systems software documentation could corner software companies into seeking their fortunes in IBM's microcomputer marketplace alone; a condition of dangerous overcrowding could then seal their fate.

'Forced into forming from what at that moment appears to them to be an indissoluble bond to IBM's product cosmos, unwittingly concentrating on its Personal Computer family — Poppa PC/XT, Momma PC, Baby PCjr, and their micro in-laws the PC-in-a-3270 and the 370-in-a-PC, and yet others of questionable lineage — they will further weaken the capacity of still-persevering, non-IBM family computer systems companies to gain marketplace credibility for their own product innovations.'

In the larger community of software development houses, companies enjoying special relationships with microsystems manufacturers can be forgiven if their composure begins to slip a bit as they look for omens in Texas Instruments, Inc.'s announcement of the discontinuance of its TI 99/4A home computer. If another major microcomputer hardware company were to fail now, or even radically retrench, its anointed software developers could easily suffer the same fate as that which befell TI's privileged suppliers.

In an industry whose growth has caused nearly everyone, from cottage to corporation level, to be lured into its service by visions of windfall profits, allowing little time for what had once been the normal process of business "digestion" to assert itself in the usual, evolutionary way, the potential for much more widely distributed misery in the event of manufacturer collapse is vastly enlarged. Increased flogging of microcomputer success stories in America's flagship business newspaper, *The Wall Street Journal*, is converting sharpies and dimwits alike to the belief that overnight killings are more than just possible, if only they'll invest in a personal computer of it matters not what kind.

Just as in the case of the many who are stimulated to buy lottery tickets by a willful suspension of disbelief, a generous dollop of greed and the seductive grins of last Tuesday's winner lighting up the good, gray pages of New York's *Daily News*, the odds in favor of getting rich quickly are roughly nil.

The swelling numbers of would-be self-made men who rely upon their microcomputers to deliver their dreams of glory, taken in conjunction with the fact that the number of viable computer systems manufacturers is markedly decreasing, are impelling the lot to seek out the apparent shelter and security of the IBM-dominated marketplace. PCjr's appearance, after so much palaver on the plausibility of its existence, was like the signal delivered to the remaining microsystems manufacturers by a rifle shot whose message, but not its impact, had been muted by a silencer at the end of the barrel. IBM had fully and finally entered their marketplace, the last one from which it had been notable for its absence.

The PCjr turned out to be no paper tiger; its arrival on the scene meant that the others would find it rough going motivating anyone to invest in software product development for their systems. The Rubicon does appear to have been crossed; IBM's product momentum is now such that even IBM couldn't stop it — that's why the PCjr's arrival was so awkward.

The IBM 'Option'

The apparent absence of any current, serious contender for IBM's full marketplace will leave our software companies with little but the IBM "option," if volume is an issue. Micro and minicomputer companies are weakening; Univac Corp. has taken to thanging its name; Honeywell, Inc., Burroughs Corp. and NCR Corp. have sought refuge in increased specialization; and Control Data Corp. looks more and more like a service bureau bank. Only AT&T's new (and as yet unproven) information services company seems to pose a credible, competitive threat.

And after having been herded into the IBM corral, the software industry appears destined for yet further herdings. The unavailability of larger systems software documentation could corner software companies into seeking their fortunes in IBM's microcomputer marketplace alone; a condition of dangerous overcrowding could then seal their fate.

Forced into forming from what at that moment appears to them to be an indissoluble bond to IBM's product cosmos, unwittingly concentrating on its Personal Computer family — Poppa PC/XT, Momma PC, Baby PCjr, and their micro in-laws the PC-in-a-3270 and the 370-in-a-PC, and yet others of questionable lineage — they will further weaken the capacity of still-persevering, non-IBM family computer systems companies to gain marketplace credibility for their own product innovations.

Survival Options

The survival options of such companies will thus be limited to either specialization on their own or outright acquisition/absorption by an expanding IBM family of companies. Their dispirited software consorts then follow suit or else go under. Swelling competition caused by the swift migration of most software companies into the Blue software marketplace cannot help but propel many of them into an unsought struggle merely to survive. And as the independence of the software development community, including its growing number of software foundlings, is thus compromised or sapped, so will IBM's control over the market be enlarged.

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HUMAN CONNECTION /Jack Stone

Micro Market Disarray Confusing Buyers

You don't have to be a DPer to know that the marketplace is swamped with an overwhelming abundance of personal computers and a vast range of software, all of which makes for fascinating conversation.

However, the adrenaline doesn't really start to flow in a serious way until and unless you shop around for a machine that is to be funded from your own pocketbook, rather than from corporate coffers.

In my situation — characterized by an intensive, seemingly unending search for a portable/transportable machine with the power and cost and benefit of an IBM Personal Computer/XL, the weight of the lap model Radio Shack TRS 100 and the price of the Timex Corp. Timex 1000 — the breadth of options, compounded by the apparent impossibilities of fulfillment, has me flustered and confused, if not bewildered.

IBM Peanut

A friend and systems manager in a large organization leaked to me before announcement time that the IBM Peanut would be offered in a portable configuration. The day after Peanut was unshelled, I telephoned the local IBM Product Center for information, but the line was busy. I tried again later in the week, but it was still busy — and it's been that way ever since. I guess I'll wait until an IBM salesman calls.

I rather liked the 16K-byte NEC Information Systems, Inc. NEC PC-8200 lap computer, for a while anyway, particularly the $799 price. A set of applications programs (on cassette) is bundled in; except for one, they aren't terribly exciting to me.

The exception is a print-text formatter that is missing from its read-only memory-based word processing package. But the salesman never answered my request for prices for accessories, especially add-on memory. Later I found out why: A 32K-byte memory module, the minimum size upgrade, would have set me back another $400, or 50% of the base price. This seemed high to me, particularly because two years ago a 48K-byte memory replacement for my trusty Digital Research, Inc. CP/M-based Processor Technology Sol 20 was only $250.

Incremental Value vs. Investment

Then I looked at the incremental value vs. investment factors. For example, dumping in only another $400, for a total of $1,600, would net me a Kaypro, Inc. Kaypro II, which would be a much better buy for the money, in spite of its 8-bit design and tiring 30-odd pounds.

A 64K-byte machine, the Kaypro II is loaded with two 200K-byte drives and the usual complement of software, variations of which are routinely bundled into 8-bit transportables: two word processors and associated spellers, two Basic translators, a file manager, a mailing package, a spreadsheet program and a copy of the CP/M operating system. For only another $200, a total of $1,800, I'd get a Kaypro IV with two 400K-byte drives.

An even more smashing value is the new $400 Kaypro Microsoft, Inc. MS-DOS memory board upgrade, which endows the machine with a 16-bit capability, some level of compatibility with the IBM Personal Computer and 256K bytes worth of memory that can also be configured into a CP/M random-access memory drive.

Since I would be pushing $2,200, one could argue a good case for trundling over to the nearest Sears Business Center for the sale-priced Compaq Computer Corp. Compaq (IBM Personal Computer clone), coming in at $2,700, and about 20 pounds, except that the cost exceeds my budget.

If the truth be known, I'm looking seriously at a clearance-priced Osborne Computer Corp. Osborne I, about $800 in Washington, D.C. — down from its original price by about $1,000 — stripping out the $2,500 (list) worth of software packages, installing the programs on my Sol and then contributing the Osborne hardware to my favorite charity.

Letters to Stone should be addressed to him at P.O. Box 33699, Washington, D.C. 20033.

The Chaos Before Creation

(Continued from Page 87)

It is tempting to accept the preceding scenario as inevitable, but I, for one, do not. It's hard to believe that IBM would wish this to come about, despite the fact that the more successful IBM's marketing campaign is, the more likely it is to transpire. The increased dependence of software development activity upon IBM product announcements (and IBM's absolute control over products like VM) could, in the extreme, consolidate the computer software industry, from micro to macro, into something so close to a critical mass that a destructive explosion of discontent would become hard to avoid.

Amazingly, retardation of the benefits of continued computer systems innovation would result; any IBM plan for improved systems involving radically new architectures would expose it to a wave of politically irresistible protest; and each stroke of the design-change pen would draw it closer to a new spate of lawsuits and calls for its regulation as a de facto public utility. The once-independent software companies would quite naturally have to seek to prevent their collective investments from being transformed from a calculated bid for magnificent downstream profits into so much wastepaper.

'The now-completed synthesis (the rest is a mopping up operation) of the computer and communications industries is diminishing our need to deal directly with computer systems power manufacturing companies. We are now able to tap directly, and more easily, into a reservoir of applications know-how more related to the "know" than to the "how."'

This would lead IBM into the proverbial paradox of the "damned if you do, damned if you don't" variety. It goes this way. Its systems will have to be continuously improved, despite potentially heavy losses to its dependents if it is to remain both our national leader and internationally competitive. Nationally, monumental changes to the way computer systems technology is obtained are as close to being realized as are the imminent Integrated Systems Digital Networks.

Internationally, our technology is still high (if not first) on the list of exports contributing to a favorable manufacturing trade balance. It would be ironic, indeed, if our misgivings about a possible acceleration in domestic marketplace shakeout led us to pay too high a price for the perceived benefits of economic, political and technological equilibrium. But this would be the risk we ran if we restrained the forward momentum of our computer industry's development, for we might well then see other nations less sensitive to such questions of internal market balance overtake and race by us.

Solving the Paradox

Thus, laid out before IBM's leadership would be the debilitating challenge of solving the paradox of dealing with two mutually exclusive, yet coexisting, economic realities. International success would ensure national upheaval; national equilibrium would ensure international catastrophe. For a company whose national and international business is roughly equal, neither scenario is acceptable. And neither will occur.

Our general-purpose computer systems marketplace, now so firmly dominated by IBM, is undergoing rapid change. Its services component is increasing swiftly, and its information component is on the verge of exploding.

Other transformations are under way, too. Users tired of having to vault one technological hurdle after another in order to remain operational are becoming far less interested in acquiring general-purpose tools. With increasing regularity, they are coming to expect "canned" solutions to their business problems. They're tired of programming. New companies are being formed to serve this evolving marketplace; older companies, such as General Electric Co., are experiencing a new vitality; and AT&T's avowed intention to provide everyone else with an alternative source of data processing capability in its Integrated Services Digital Networks is convincing.

The now-completed synthesis (the rest is a mopping up operation) of the computer and communications industries is diminishing our need to deal directly with computer systems power manufacturing companies. We are now able to tap directly, and more easily, into a reservoir of applications know-how more related to the "know" than to the "how." For example, banking and publishing data processing services are becoming available directly through banks and publishers rather than from computer companies. All of these

(Continued on Page 94)

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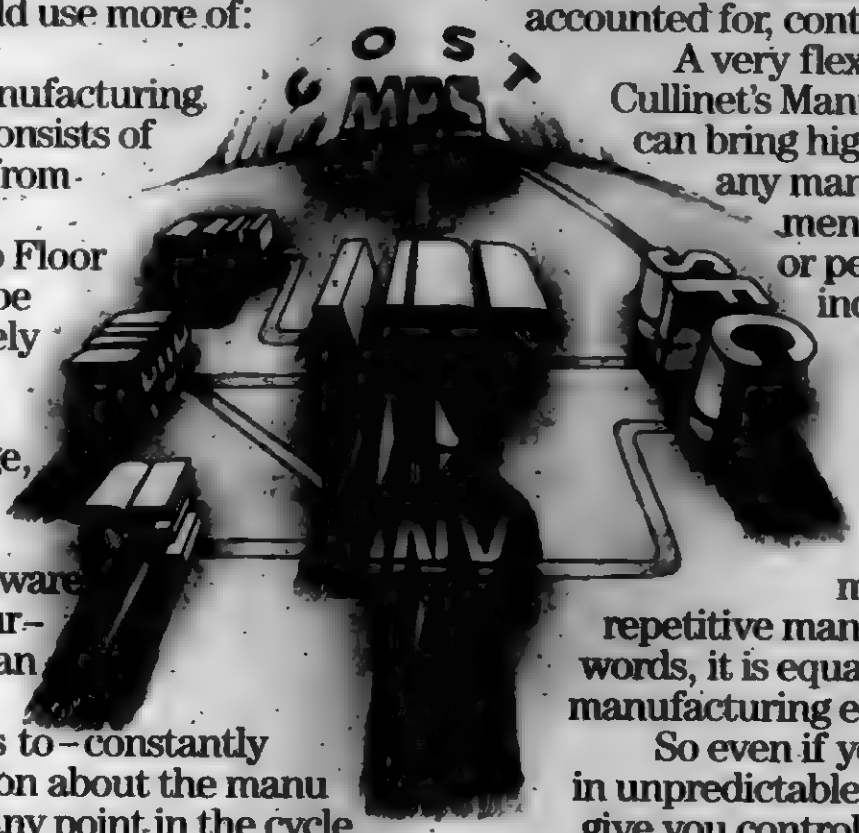

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READER COMMENTARY/Christine Joseph‡

Things to Do When the System Goes Down

If your system has a 98% uptime rate and you are diligent, very hard-working and responsible, then this article is not for you. If, however, your system hiccups, coughs, has frequent schizophrenic fits and enjoys restful afternoon naps, I offer assistance to fill in the empty, boring hours that you might have spent documenting, reading technical journals and otherwise improving your data processing skills:

- Complain about your salary.
- Complain about your manager and how you can do his job better than he can.
- Update your resume.
- Use the lovely squares, circles and other symbols on your template to achieve a masterpiece of high-tech art.
- Call Dial-a-Joke.
- Take the stress test given in any fitness magazine and discover that you checked "yes" to every question, and your cumulative score indicates an imminent breakdown.
- Call Dial-a-Prayer.
- Phone your technical support group and discover (again) the line is still busy.
- Do isometric exercises and hope no one sees you twitch.
- Water the plant on your desk that looks as though it has had a long, lingering illness.
- Get your eighth cup of coffee.
- Clean out your desk, and remove all old, rotting chocolate chip cookies that are sitting next to your Addidas running shoes.
- Throw out all 224 compiled versions of the same program that you were keeping "just in case."
- Improve your *New York Times* crossword skills after stealing a dictionary from the department secretary.
- Examine the local DP salary survey, and discover what you already know: You're underpaid.
- Examine *Computerworld* position announcements.
- Draw a face on the CRT using X's and Y's.
- Find out all the neat toys you can make with paper clips.
- Reflect on the fact that major drug dealers never have to go through this, and that each owns a Mercedes Benz. Consider a major career change.
- Investigate the cost of opening a fruit-and-vegetable stand on a good corner near your office.
- Do weight-lifting exercises using 5-lb quality assurance manuals.
- Revile the specs of the systems analyst.
- Make paper planes out of the standards manual.
- Denigrate the programming practices of your predecessor.
- Have a good laugh by reading management's idea of a five-year DP plan.
- Construct a Frisbee out of a disk drive.
- Rejoice in the fact that with the system down, you have the perfect excuse for not meeting the deadline you weren't going to meet anyway.
- Break into the snack machine after it eats up your last quarter.
- Crumple the systems analysts' flowcharts into little balls, and then see how many you can toss over your left shoulder into the wastebasket.
- Crucify a systems programmer on a tape drive.
- Condescend to sit with an end user and discover that the eight programs you've spent months working on do not in any way, shape, manner or form produce meaningful results.
- Leave the office, and take a brisk walk in the fall sunshine. Upon your return, discover that the system came up as soon as you left, but is now down again.
- Speculate freely on office romances and designate the recipients of the Mary Cunningham/William Agee Award.
- Dive into the pyramid swamping your "in" box, and uncover all of last year's technical updates.
- Browse through the standards manual, and discover that not one program you've written conforms with those standards.
- Detach some of the pretty, colored wires from inside your terminal, and see if you can put them back together again.
- Reach out and touch someone long distance, using any extension in the department (other than your own).
- Cast *The Wizard of Oz* using members of your department. It should be easy to find those without brains, without hearts and who need courage simply by examining the list of executive officers.
- Cast *Snow White* using members of your department. There is usually a plethora of talent available for the role of Dopey, so compile a list of understudies.
- Compose a *Fantasy Island* script on career pathing in your firm, bearing in mind that there are some miracles even Mr. Roarke cannot per-

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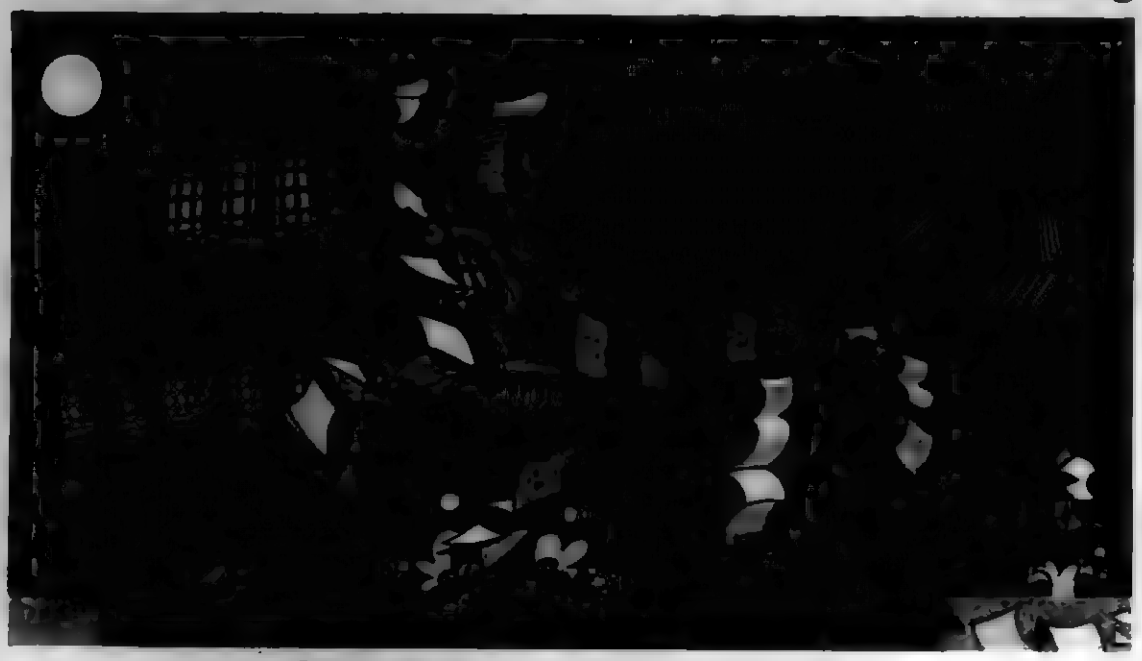
GREAT MOMENTS IN DUMP HISTORY



Trying to solve abends using these hex dumps can really tee a person off.

The Boston Dump Party.

It was no party trying to solve program abends or cancels using the old-fashioned hex dump. In fact, it was a downright taxing job.

Data Processing Managers used to go around harboring great concern about what effect these unwieldly dumps had on productivity.

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GETTING AHEAD IN DP/Donald J. Berardo‡

The Virtues of Imperfection

Imperfection is inevitable. Yet some people waste hours, days and years acting as though perfection is the only condition they can accept. These people don't get much done. Unfortunately, many DP technicians are perfectionists by nature. They want to create the perfect, bugless system.

But there comes a point when further effort is foolish, when trying to make the circle rounder just isn't worth the trouble.

The "80/20 Rule" says you will accomplish 80% of what you should if you concentrate on the 20% of your tasks that are most important. Another form of the 80/20 Rule states that doing something quickly is usually better than spending twice as much time just to complete that last 20%.

In short, take the task to its optimal level of return, and forget about perfection. There always comes a point at which you are doing more work for decreasing value. Knowing how to recognize this optimal point is one of the traits of a good manager.

An Example

For instance, let's say you're trying to create a system and are looking at the functions you're trying to accomplish. You know that exceptional situations sometimes occur, and the user tells you that whenever X happens, Y goes wrong. So do you tell your people to find a way to accommodate these situations? Not necessarily, because it may take hours to correct what may be a mere 2% error factor, which could be handled more efficiently manually.

The 80/20 Rule also applies to management functions. Some people spend twice as much time as is necessary writing memos that are more detailed than need be. Some managers get so intent on managing their employees' time that they require them to fill out complicated forms accounting for their workdays. While they are filling out these forms, they aren't producing anything. The search for perfect time management ends up hurting efficiency.

Applies at Meetings

The same rule applies at meetings. There comes a time at which the discussion of an issue loses some of its impact. The good manager knows when he has sufficient data to end the meeting and get to other tasks. The manager who feels he cannot make any decisions until every scrap of data has been hashed over won't make many decisions.

When deciding on a vendor, for instance, you must be able to judge when further research won't reveal much new information.

I'm not saying that thoroughness isn't admirable or that perfection isn't desirable. Nor am I recommending that you work at only 80% efficiency. Rather, working in the marketplace requires speed as well as thoroughness, and it's often more productive to risk imperfection than to insist on absolute perfection.

Berardo is a management counselor and career therapist. He is a vice-president with the Meld Group in West Hartford, Conn., publishers of a monthly newsletter on management development.

Tips for Filling Downtime Time

(Continued from Page 90)

form.

- Put the Fortran Coloring Book to good use, employing all the blue, red and yellow highlighter pens you stole from the supply cabinet and forgot to take home.
- Create an attractive toy for your cat, dog or gerbil by stapling backup floppy disks together.
- Examine the date on your IBM manuals, and find out that they are six years old.
- Uncover the hidden treasures in the pile beneath your desk. Discard anything that bites you.
- Remove all catsup, salt, pepper and sugar that is over two years old from your work space.
- Remove any small, black wiggling dots from the jar of Coffee Mate.
- Consult your daily horoscope in the newspaper, and discover that new opportunities await. Then call your local headhunter.
- Take your three-piece corduroy suit to the cleaners for its yearly pressing.
- Designate the weakest, wimpiest member of your department "Punk Hunk of the Month," and invite the individual to put a safety pin through his nose.
- Do the exercises in Tom Jackson's *The Perfect Resume*, listing all the accomplishments you could have had if the system were up.
- Write articles for *Computerworld* on "Over 50 Things to Do When the System Is Down."

Joseph is a systems analyst at Software Design Associates in Philadelphia.

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THE DATA CENTER /John P. Murray‡

What Are You Getting for Your MIS Dollars?

Sooner or later it happens (sooner when the economy is not robust): The chief executive officer (CEO), seeing management information systems (MIS) budget requests that continue to rise, asks, "What am I getting for the money I spend on MIS?"

The answer is difficult because so much of the basis for the answer is subjective.

There are rules of thumb that state that for a given industry, the MIS budget should be a certain percent of the organization's sales.

As a relative guideline, such a measurement has some validity. It does not, however, address what I believe to be the much more critical issue: the value being received for the amount spent.

Given the rapid advances in information processing technology and the ability to do things today that were at least impractical, if not impossible, five years ago, the use of a percent of sales as the only criterion to judge the appropriateness of the MIS budget is not a valid approach.

The critical issue, considering today's information processing technology, should not necessarily be the size of the MIS budget. It should be the question of the value received for that expenditure. Is an installation in a particular industry whose budget is 1% of sales doing a better job than the installation whose budget is 2% of sales? The answer is, "It depends."

As an example, the MIS manager does some research in attempting to answer the question from the CEO and, using only percent of sales, develops a case that shows that the MIS expenditures for the organization are about right or, perhaps, too low, based upon the industry rule of thumb or the average being spent in other organizations of similar size in like industry.

A third option — "We are spending too much" — has not been ignored. It just seems, as a practical matter, very unlikely that any MIS manager would come to such a conclusion on his own.

MIS' Contribution

The preceding only measures the MIS expense relative to other organizations. It does not address the more critical issue of the value of the MIS product or the overall contribution MIS is making to the organization.

Issues such as the overall level of MIS service, the effective use of the technology, the removal of obsolete hardware and software, the development of long-range MIS planning and the building of a competent, well-motivated staff all must be considered in order to come to an informed judgment about what you are getting.

Time spent in the consideration and analysis of the value of the work produced by the MIS department in comparison with what is being produced by other installations can prove helpful. These comparisons need not be limited to the specific industry in which the company operates.

The issue should be developed on the broad basis of service and progress; not solely what is being done in our specific industry.

Effective Comparison

The development of specific criteria that can be used for an effective comparison can prove to be helpful. Some of the items that might be included in such a list are:

- Reduction of the use of obsolete technology.
- Growth and development of staff.
- Development of comprehensive, long-range MIS plans and the effective follow-up on those plans.
- Awareness of, and effort to move to, technically sophisticated approaches that will move the organization ahead.
- Stability of the MIS operation.
- What is the perception of the service level of MIS within the MIS client areas?
- What is the perceived value of MIS to the growth and profit of the organization on the part of senior management?

How can judgments be made about these items? The MIS manager should be sufficiently aware of what is being done in the information processing industry so that some measurements can be developed. Also, the use of consultants should be asked to provide help.

The answer reflects the managerial skills of the MIS manager. If too little is being spent, this study should help the manager to secure additional funding. If too much is being spent, the review should help to develop a course of action to use the MIS resources better.

Murray is director of management information services for Ray-O-Vac Corp., Madison, Wis. He is responsible for worldwide MIS activities. Murray has 21 years of DP experience, 10 of which have been devoted to the management of data centers.

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READER COMMENTARY /Jerome Garfunkel

Cobol's Future: Move Toward Fourth Generation

It is interesting that the subtitle of Ken Meyer's, John Piggot's and Rod Grealish's In Depth article "Cobol" is titled "Will the Fourth Generation Reach Cobol?" [CW, Nov. 7].

The answer, to put it quite simply, is that the fourth generation better reach Cobol if Cobol is to survive beyond the current decade.

There are already a number of features in the current Cobol standard that suggest Cobol is indeed evolving into a fourth-generation language. These features include Report Writer, Sort and Search.

But the real evolution of Cobol to the fourth generation is very much symbolized by the Validate facility (and others) that is described in the article.

The acceptance of the Validate facility in the Codasyl Cobol *Journal of Development* is important not only as a new feature to be added to Cobol (a very important feature I might add), but as an acknowledgment of the immediate future of Cobol while it is being challenged by existing high-level (fourth-generation) languages.

Sitting in the wings for further consideration by the Codasyl Cobol Committee and the American National Standards Institute (Ansi) X3J4 Cobol Committee are other equally significant features that will help Cobol to evolve into the fourth generation of application development languages.

These other features include Update and Analyse, two facilities for handling "routine" file processing and file-matching logic of many application programs; a Data Base facility; a Screen Management facility; Intrinsic Functions; and a Generalized Cobol Macro Generating facility, which will allow users to describe their own high-level syntax to fit any specific application problem.

High-Level Micro Facilities

If Cobol is to survive as a viable application development tool, it must incorporate all of these high-level macro facilities. If it doesn't, the alternative is clear: Cobol will die a slow death. It will be increasingly ignored in favor of quicker, more efficient, more maintainable languages until the only use for Cobol eventually will be to protect the current inventory of application programs written in Cobol. Once that occurs, it will only be a short time, as application programs go through their normal life cycles, before Cobol is burnt out entirely.

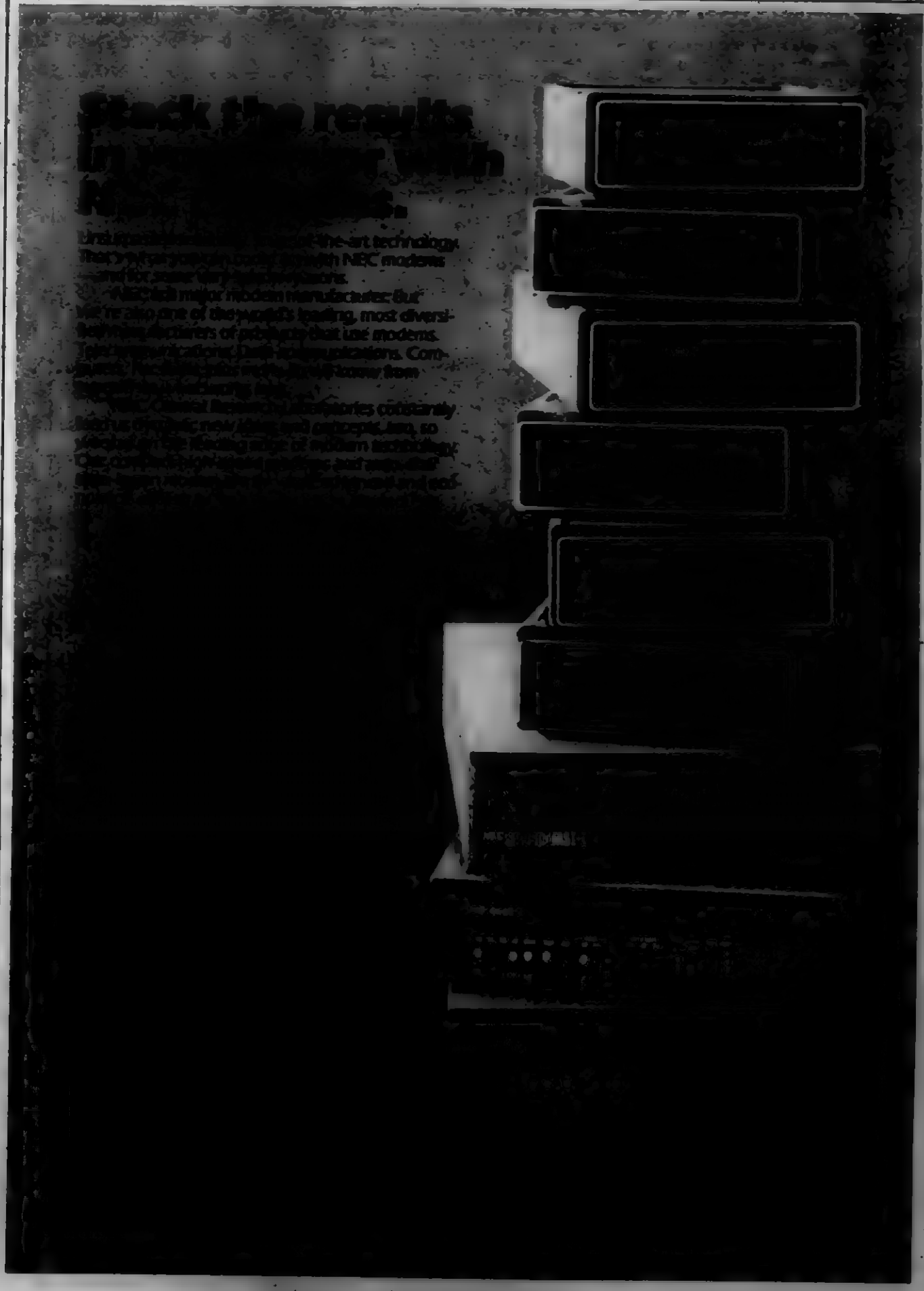
It is interesting to note that the current controversy over the upcoming Cobol-8X standard is terribly shortsighted. The issue of incompatibilities has so dominated all other issues surrounding the next Cobol standard that, as a result, much attention that should have been focused on more important issues, such as the speedy introduction to fourth-generation features, has been misdirected.

We have already seen two immediate casualties of this slow standardization process. Both Validate and Intrinsic functions could have and should have been incorporated into the upcoming Cobol-8X standard. But it now appears likely that they will not.

If Cobol is to survive, we must change the process by which languages evolve. In searching for a solution to this dilemma, the following proposal was formally made by me to the Ansi/Standards Planning and Requirements Committee /Programming Language Study Group for its consideration.

Programming language development and standardizatioh incorporates (at least) two distinct activities: The first activity is the addition

(Continued on Page 94)



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Cobol's Move Toward Fourth Generation

(Continued from Page 93)

of new features ("functionality") that, except for new Reserved Words, need not introduce any incompatibilities; the second activity includes changes and deletions which, due to their nature of clearly defining previously ambiguous and undefined (and implementor-defined) features inherently may cause incompatibilities with existing Cobol programs (both ANS standard conforming programs as well as programs using implementor extensions).

Current Controversy

While the current controversy in the Cobol community is specifically over those features in the later group (potential incompatibilities), a large number of very beneficial features in the former group (Evaluate, Reference Modification and so on) are being held up as hostages until the dilemma is resolved.

'Assuming the current five-year cycle of language revision (which, of course, is not the true case for Cobol), we can accelerate the pace with which we introduce new, beneficial, productivity-improving features to the language (that is, Data Base facility, Screen Management facility, Validate facility, Intrinsic functions and so on) and do so without causing the furor we have seen over the current Cobol revision.'

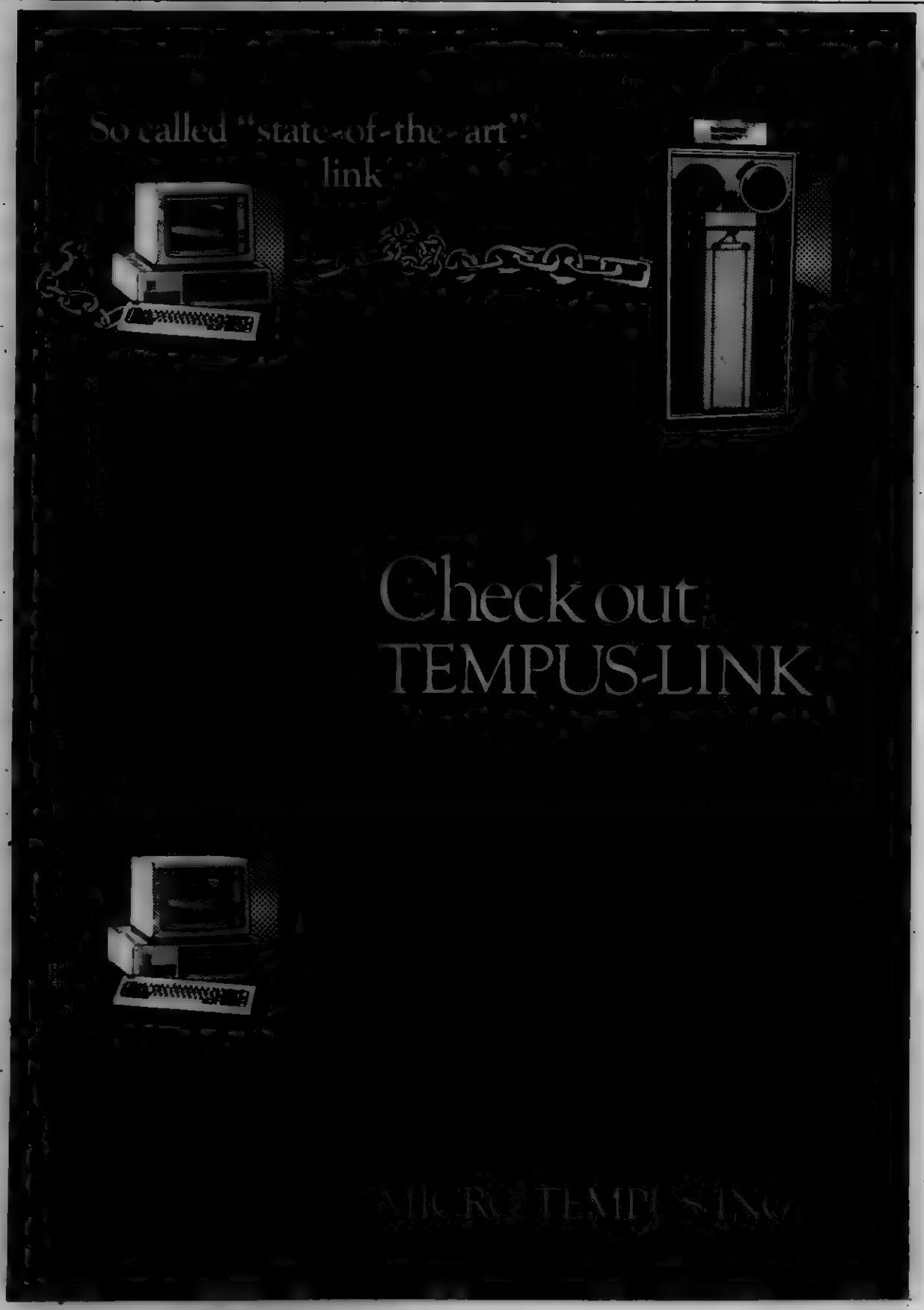
I suggest that the language development/standardization process recognize these two distinct categories of features and establish separate schedules of development work for each.

Assuming the current five-year cycle of language revision (which, of course, is not the true case for Cobol), we can accelerate the pace with which we introduce new, beneficial, productivity-improving features to the language (that is, Data Base facility, Screen Management facility, Validate facility, Intrinsic functions and so on) and do so without causing the furor we have seen over the current Cobol revision.

I suggest a two-year cycle for these features. Concurrently, we can slow down the clarification process (but certainly not abandon it lest we abandon our charter as an industry standards-making body) so as to give the data processing community more time to assimilate disruptive changes. Perhaps a 10-year cycle is more suitable for this process.

While I recognize that there might be many issues that overlap between the two categories, I am confident that proper guidelines can be described to deal with these issues.

Garfunkel is president of Jerome Garfunkel Associates, Inc., a training consultants firm located in Litchfield, Conn.



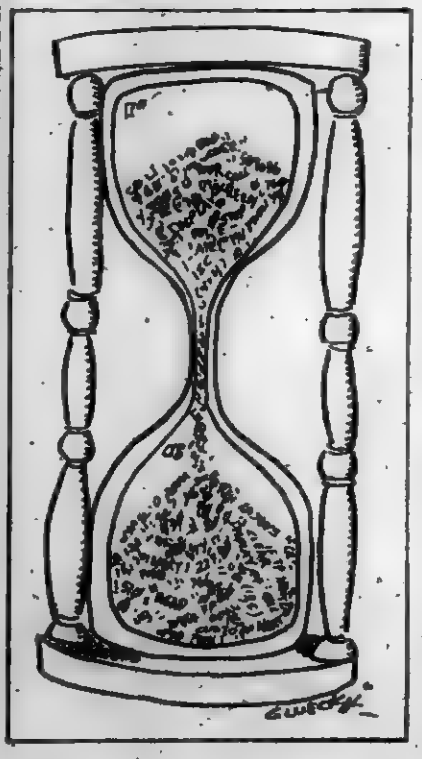
The Chaos Before Creation

(Continued from Page 88)

real, user-friendly sources will compete for the new marketplace, and all will need software to do so.

As of November 1983, there still reverberates throughout microland a cacophonous paean to America's brawling, bawling spirit of entrepreneurialism, adventurism, optimism and, perhaps, even capitalism. There is no more faithful (not to say musical) manifestation of American industry's robust health and inventiveness than in this spirit. New opportunities are opening to the software community as a result of the swiftly metamorphosing marketplace. It need only survive long enough to take advantage of them.

Lecht is chairman of Lecht Sciences, Inc., a New York-based think tank specializing in computer and communications technologies.



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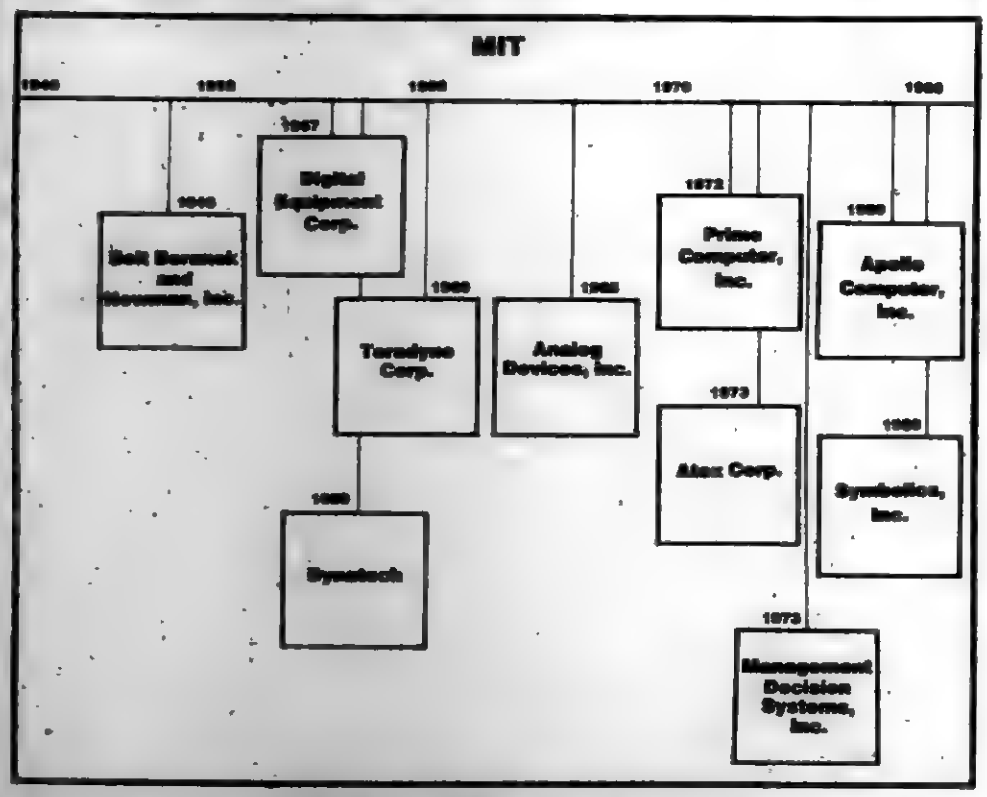
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From the Halls of MIT

ENTREPRENEURS

By Katherine Hafner
CW Staff

At 35, Jay Wurts is a pioneer. By the time he graduated from MIT with a bachelor's degree in electrical engineering, he was already selling a complex decision support system out of his basement to Fortune 500 companies.

Today the sandy-haired, blue-eyed president of Management Decision Systems, Inc. (MDS), who learned Fortran as a freshman in order to find a good summer job, sits at the helm of a company that boasts $25 million in annual sales, 250 employees and 90,000 square feet of office space atop a hill overlooking Rt. 128 in Waltham, Mass.

The company's mainstay is Express, an integrated software package developed by Wurts when he was only 19 years old. When MDS was formed by two MIT Sloan School of Management professors in 1970, Wurts joined the company as its first full-time employee. By 1973, the market had grown to fit the product, and today the company is expanding at an annual rate of 35%.

MDS is one of thousands of young companies that sprang from the halls of academe. Harvard, Northeastern, Boston University and dozens of other schools within a 15-mile radius of each other have all played their part in the creation of the technological ring that is Rt. 128. But as the circle continues to expand, none has been as consistent through the years in its contribution to high-tech enterprise as MIT.

Stanford University in Palo Alto, Calif., is generally considered to be MIT's West Coast counterpart, having exerted its own great influence on Silicon Valley. Starting with Fred Terman, a Stanford professor, and the invention of the transistor by William Shockley in 1947, Silicon Valley has mushroomed into its own city-state of technological innovation. Both institutions foster a distinct synergism between education and industry, MIT perhaps taking the more active role

Russell Noftsker
President
Symbolics, Inc.

Ray Stata
President
Analog Devices, Inc.

Jay Wurts
President
Management Decision Systems, Inc.

Charles Ying
Co-founder
Alex Corp.

Photo by R. Mami

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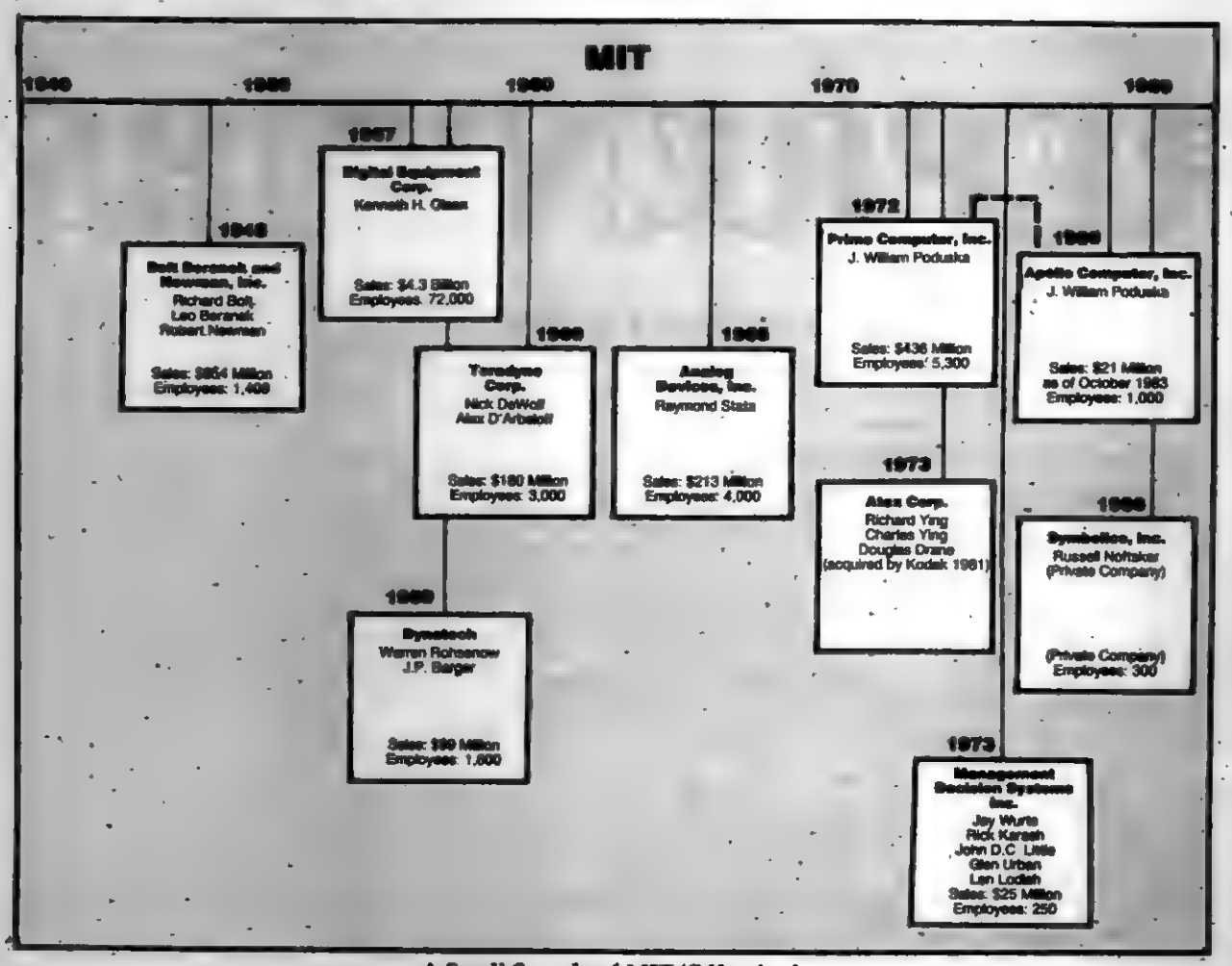

A Small Sample of MIT 'Offspring'

Short of cruising the length of Rt. 128 and the northern section of Rt. 495, it is almost impossible to chart the genealogy of the computer companies on Boston's periphery. It is generally agreed that MIT spin-off organizations number in the hundreds, but the institute itself maintains no count of the alumni, faculty and staff who have started their own computer companies.

As one seasoned entrepreneur noted, some 10,000 MIT graduates currently live in the greater Boston area. The institute grants 2,500 degrees every year, nearly half of them in engineering.

Cross-Pollination

Intensifying the difficulty of investigating the high-tech compound residing on "America's Technology Highway" is the fantastic amount of convoluted cross-pollination that has taken place ever since the end of World War II, when scores of MIT scientists were cut loose from military labs to form independent companies.

Perhaps most successful of all the MIT offspring who foresaw the profit to be had in computers is Kenneth H. Olsen, a former engineer at MIT's Lincoln Laboratory who founded Digital Equipment Corp. in 1957. To this day, many of Olsen's top managers at the $4.3 billion company once worked at MIT.

through an unabashedly commercial thrust. With a style and grace all its own, MIT has cultivated a special student — one perhaps lacking in the well-roundedness so highly touted elsewhere, yet possessing extraordinary intelligence and raw drive. MIT students are encouraged to pursue narrower fields of interest by similarly motivated professors. So a new generation of professionals has been born: imposingly competent entrepreneurs whose brainstorms have touched the lives of millions.

"Historically, every MIT president has stated publicly that MIT has an obligation over and above teaching to help graduates take jobs and go out into the marketplace," commented Richard Morse, an early innovator in high-vacuum technology and former lecturer at MIT's Sloan School.

"In almost every case [of Boston area entrepreneurship], there's probably somebody who has either taken a course or graduated from MIT," agreed John Shane, a general partner at the Palmer Organization, a venture capital firm in Boston. "It's pretty hard to miss the place."

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30 Medicine/Law/Education
40 Wholesale/Retail Trade
50 Business Service (except DP)
60 Government—State/Federal/Local
65 Public Utility/Communication Systems/Transportation
70 Mining/Construction/Petroleum/Refining
75 Other User

Vendors
80 Manufacturer of Computers, Computer-related Systems or Peripherals
85 Computer Service Bureau/Software/Planning/Consulting
90 Computer/Peripheral Dealer/Distributor/Retailer
95 Other Vendor

2. OCCUPATION/FUNCTION (Circle One)
11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Financial Officer
21 Director/Manager/Supervisor DP/MIS Services
22 Director/Manager of Operations/Planning/Administrative Services
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
35 OA/WP Director/Manager/Supervisor
38 Data Comm Network/Systems Mgmt
41 Engr/Scientific/R&D/Tech Mgmt
51 Mfg Sales Reps/Sales/Marketing Mgmt
60 Consulting Mgmt
70 Medical/Legal/Accounting Mgmt
80 Educator/Journalist/Librarian/Student
90 Other

3. COMPUTER INVOLVEMENT (Circle all that apply)
Types of equipment with which you are personally involved either as user, vendor or consultant
A. Mainframes/Superminis
B. Minicomputers/Small Business Computers
C. Microcomputers/Desktops
D. Communications Systems
E. Office Automation Systems

Olsen, who is still DEC's president, is perhaps an exception to the more general rule of floating entrepreneurship among MIT people.

"It's the rare person who's good at every stage of handling a corporation's maturity," commented David Ness, an MIT graduate who taught at the Sloan School for 12 years. "The guys who start it are usually so lousy at running it, they move from one to another to another, turning start-ups into a success."

Consider, for instance, the brains behind Apollo Computer, Inc., a three-year-old manufacturer of 32-bit scientific processor/workstations based in Chelmsford, Mass., which last month added two new systems to its product line, along with a host of software. Apollo's founder, Dr. J. William Poduska, had eight years earlier founded Prime Computer, Inc. in Natick, Mass. Before that, the MIT graduafe worked at Honeywell, Inc.

"Poduska was the junior guy in the computer center when I knew him in 1958," Ness recounted. "Poduska was notorious for being one of the best programmers. He used to pull really clever stuff."

His job at Honeywell was a direct result of work done as chief of the National Aeronautics and Space Administration's Man-Computer Systems Branch at the Nasa Electronics Research Center in Cambridge, where he had developed an operating system for use with Honeywell minicomputers.

And then there is Atex, Inc., whose founders, still in their 30s, now invest in other start-ups. In 1973, Charles and Richard Ying, brothers who attended MIT as undergraduates, developed an efficient method for text processing in an unheated loft in Lexington, Mass. Charles developed the hardware, based around a DEC PDP-11 minicomputer, and Richard wrote the code for the system.

According to Charles, who grew up in Hong Kong and attended a private school in Switzerland, he and Richard applied to MIT because it was one of the few American schools that waived the application fee for foreigners.

"We didn't know what MIT was," Charles said. "I just told Richard there was a school that didn't cost anything to apply to. We took the college boards and never even completed our application forms."

One of the first major undertakings for the company was to decide on a name. They set aside a day and filled a blackboard with possibilities based on the word "Lexington."

"We consulted friends with grey hair in the business community about the guidelines for picking a name. They said to keep it down to two syllables and start with an 'A' because at a trade show with alphabetical listings, people see it first. Finally the board got filled up and Atex was at the bottom of the board, so we said, 'That's it.'"

With "some great ideas" but nothing so concrete as a product to sell, they teamed up with Douglas Drane, a Harvard MBA, and set out to convince major publications whose writers were not only loath to give up their typewriters, but downright hostile toward computers, that Atex's idea for real-time composition was something to invest in.

"It's the rare person who's good at every stage of handling a corporation's maturity. The guys who start it are usually so lousy at running it, they move from one to another to another, turning start-ups into a success."

In November 1973, having pooled $2,700 in cash, they received their first order from *U.S. News & World Report*. With an advance of $100,000, they worked night and day to meet an initial deadline of mid-January designing the prototype for the system.

"They gave us the order on Thanksgiving Day of 1973. By the first week of January, we had to have a multiterminal system designed, working and editing with H&J (the ability to hyphenate and justify). We didn't even know what H&J was," he laughed. "I remember calling Doug

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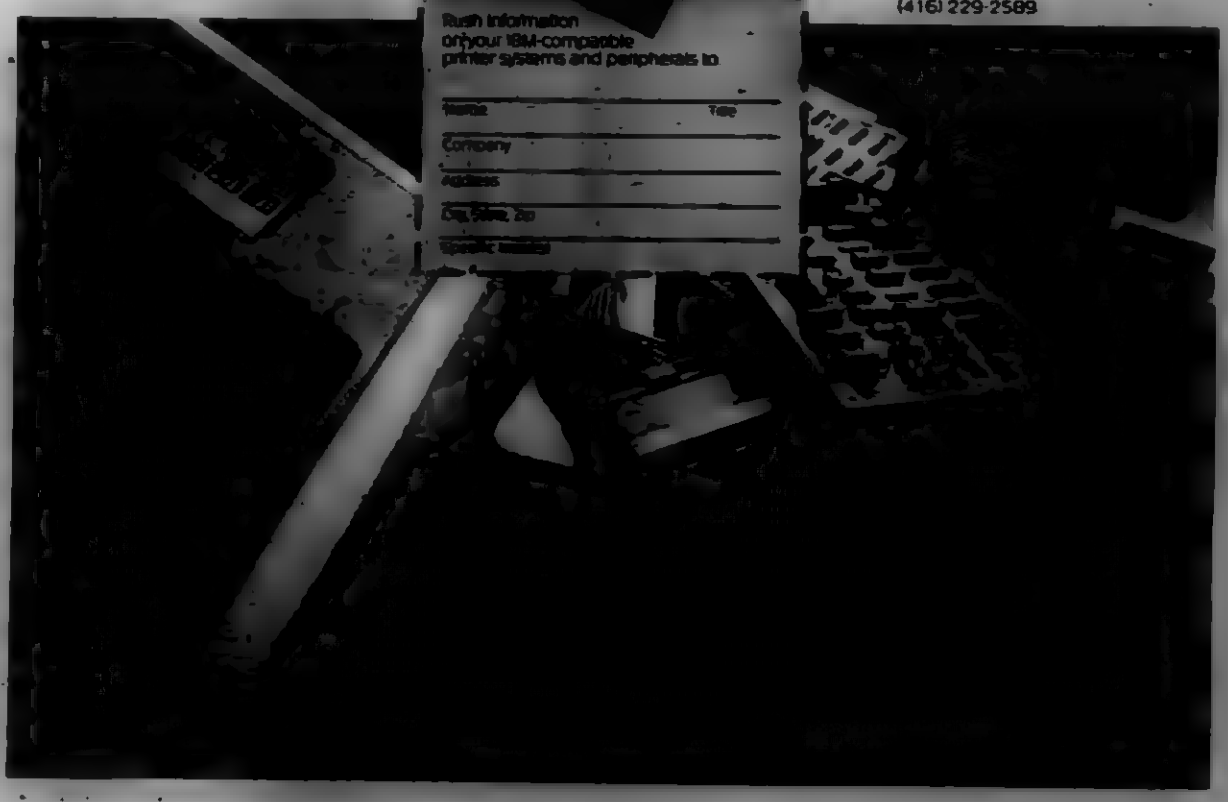

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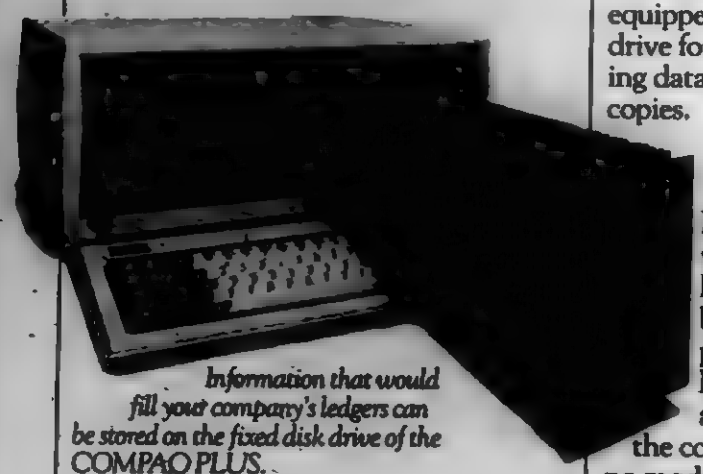

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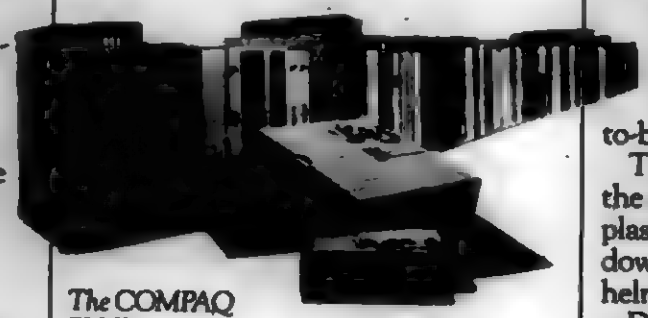
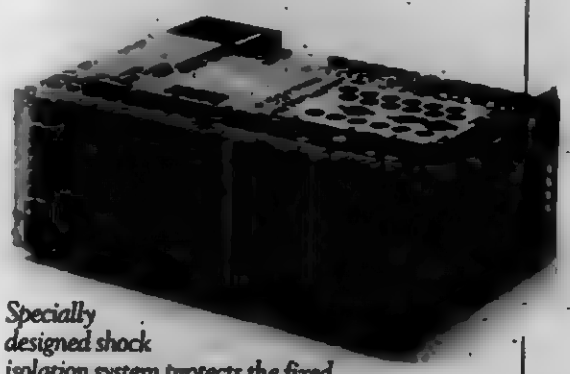


The COMPAQ PLUS runs all the popular programs written for the IBM Personal Computer XT.

You're buying a computer to solve problems. Why not have more problem-solving programs to choose from?



Specially designed shock isolation system protects the fixed disk from jolts.

Plus a traveler's toughness

Life can be tough on the road. A true portable has got to be tougher. The COMPAQ PLUS is.

Its integrated fixed disk drive is unique, designed specifically to travel. Rough roads and hard landings don't bother it because of a specially designed shock isolation system that protects the disk from jolts and vibration.

All the working components are surrounded by a uniquely cross-membered aluminum frame. This structure, common in race car design technology, strengthens it side-to-side, front-to-back, and top-to-bottom.

The outer case is made of LEXAN®, the same high-impact polycarbonate plastic used to make bulletproof windows and faceplates for space suit helmets.

Does a portable personal computer really have to be this tough? Take a good look at your briefcase and then decide.

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The COMPAQ PLUS is big where it counts.

The display screen is big. Nine inches diagonally. Big enough to show a full 25-line-by-80-character page that's easy to read even if you're leaning back in your chair.

The keyboard is full-sized and typewriter-style for easy control.

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If you're buying your first personal computer and you're not sure how much capacity you need, your choice is easier now.

Start with the COMPAQ Portable with single or double 320K byte diskette drives. If you need more capacity later, upgrade to the COMPAQ PLUS. A conversion kit is available that turns the COMPAQ Portable into a COMPAQ PLUS, complete in every detail and capability.

Plus a lot more

The COMPAQ PLUS also works with optional printers, plotters, and communications devices designed for IBM's personal computer family.

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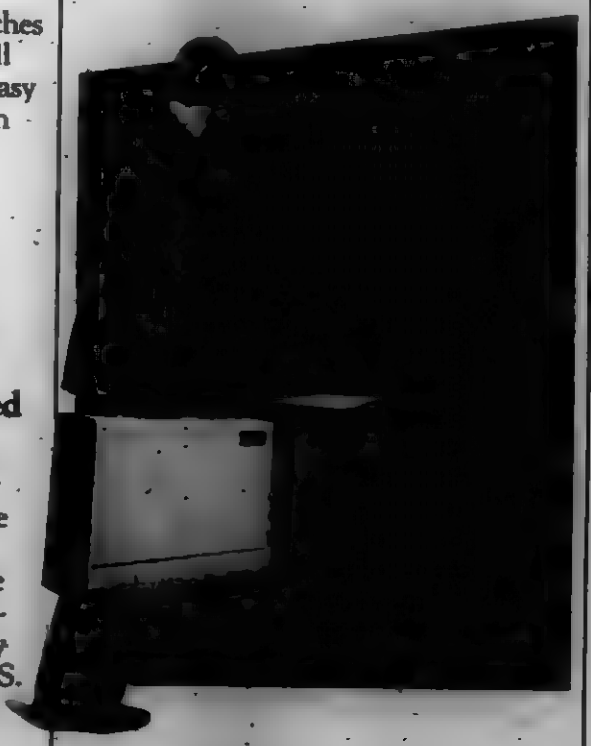
The COMPAQ Portable, the industry standard in portable personal computers. ▼

The problem-solving power of a high-performance desktop personal computer can now go where you need it.



It's got high-resolution graphics and text on the same screen. A detached keyboard. Programmable function keys. Expandable memory. Dozens of other features that simply make it do a better job of personal computing.

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IN DEPTH

on New Year's Eve. He's a Notre Dame grad and he was watching the [football] game. He said, 'I'd love to stay here and give you moral support, Charlie, but I've got to watch the game.'

"It wasn't a matter of how many hours we worked [to meet that deadline]," Charles said, "but how many hours of sleep we managed to squeeze in."

After convincing *U.S. News & World Report* essentially to underwrite the idea, "for the first time I appreciated the salesperson's job," Charles recalled. "You go in and talk for an hour and come out and have accomplished nothing."

Today, the Bedford, Mass.-based company, which was acquired by the Eastman Kodak Co. in 1981, supplies text processing systems to *The Boston Globe, The Christian Science Monitor, Newsweek* and *Reader's Digest*. When Kodak bought the company, the Yings and Drane profited handsomely, each receiving enough Kodak stock to retire before age 40.

Charles, 37, now splits his time between Seattle and Silicon Valley, investing in "young, deserving" start-ups with the same potential Atex had 10 years ago. Richard spends the bulk of his days on the road, investigating new prospects for investment with Charles.

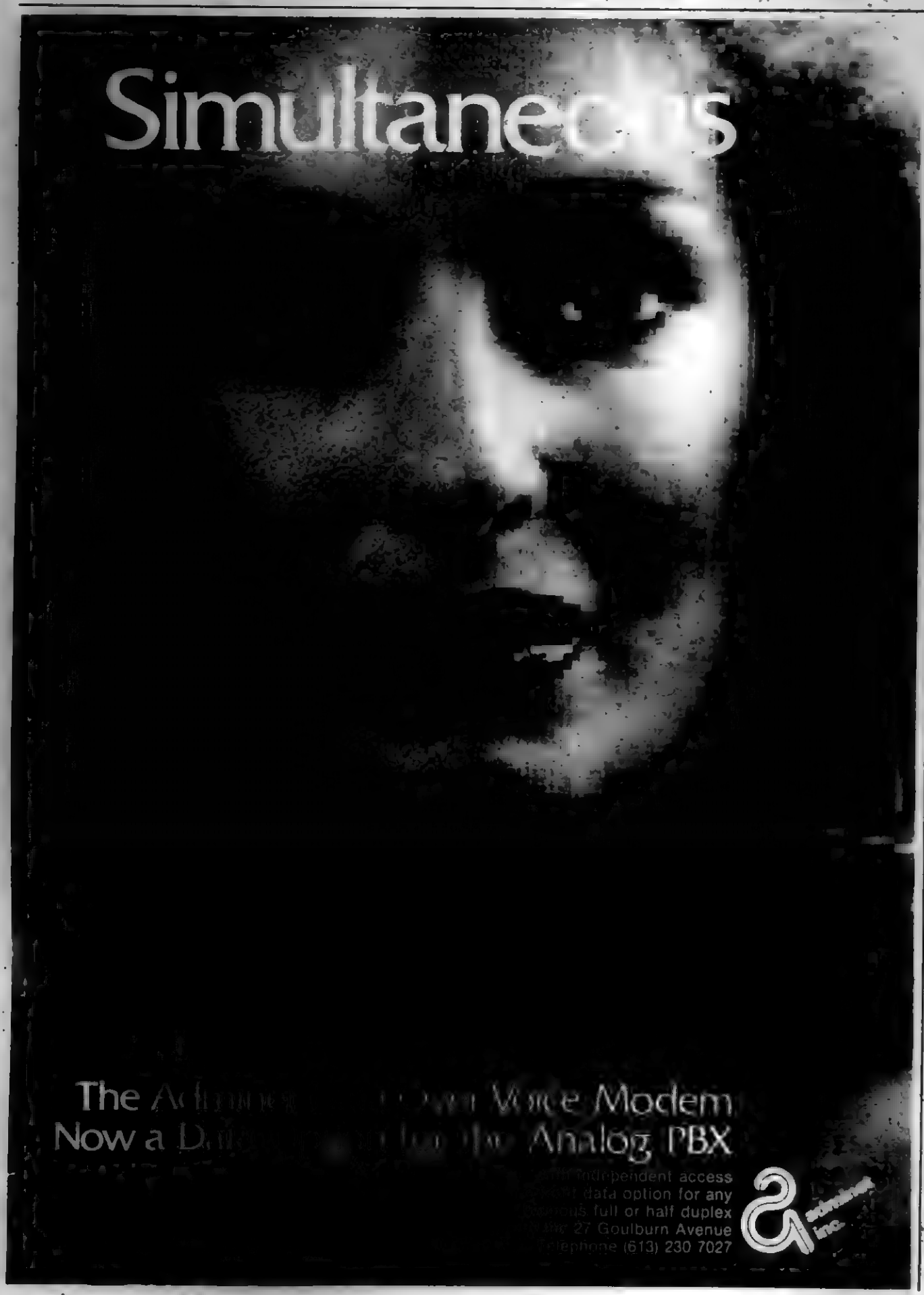
As humble a millionaire as you'll meet, Charles refuses to acknowledge that he might have been accepted to MIT on his own merits. "Maybe someone in admissions said, 'We've got two applicants from Hong Kong living in Switzerland. What's our quota for that?' And someone else said, 'Two.' "

While it is generally agreed that MIT is in large measure responsible for the proliferation of high-tech companies along the Rt. 128 corridor, pinning down precisely why it is that MIT produces so much entrepreneurial wherewithal is another matter.

More than any other place in the country, MIT encourages [entrepreneurship]," suggested Edward Roberts, a Sloan School professor who has closely followed the growth of companies along Rt. 128 and their relationship to the academic setting. "Unlike Harvard and Yale, where commerce and outside consulting are said to be detrimental, tearing apart at the fabric of the institution, MIT has no written policy, but there exists a long tradition in support of entrepreneurship here," Roberts said.

"Essentially, MIT is a strong institution that sticks to its knitting. The best places stick to their knitting. Whatever you do to a university, the principal thrust of the faculty is education and research, not outside commercial interests."

But there are those who disagree with Roberts' view of the MIT faculty and its role in Boston's industrial base. The Palmer Organization's Shane, who has had a hand in some 150 start-ups since he started in the venture capital business in 1946, sees open and deliberate encouragement at MIT for graduates to strike out into the commercial world, with faculty members as role models. "The faculty does a great deal of consulting. The idea of encouraging and stimulating new ventures is an important factor in making MIT such an important contributor. The institute has always tended to be quite liberal in what people could do. Students could work part-time, or the faculty



ENTREPRENEURS

could. At one time you could actually find industrial companies with phone extensions at MIT."

Shane points to a host of disparate elements in the greater Boston area that add up to create the necessary ingredients for commercial success among MIT graduates. "It's a combination of the university, the cultural and geographic uniqueness of Boston," he said. "All those things reinforce one another."

Yet another opinion is put forth by the Wharton School's Ness. "I think a major contributor to MIT's success is Boston traffic jams," he said. "In Minneapolis, everybody goes home at 4:30. At MIT, you wait until the traffic has subsided and you go have a beer at the faculty club and discuss ideas."

Perhaps part of the MIT spirit is captured in MDS' Wurts, whose relationship to his schooling was practically rather than academically oriented. By his sophomore year, the self-assured Wurts was already deeply entrenched in his own consulting practice, developing marketing models for large organizations.

"I'm convinced that I had the best undergraduate education of almost anyone I know," Wurts said. Although he was too busy with his business to attend many classes, the lectures he did attend were helpful in giving him ideas for work.

Management Decision Systems Headquarters in Waltham, Mass.

"Sometimes understanding the problem is harder than understanding the solution," Wurts said. "The other students were still struggling with defining problems. In my consulting, I knew what the problems were because I was faced with them every day and didn't have to conceptualize them in a classroom. The courses I took helped me with solutions to the problems."

When Wurts dropped his consulting practice to form MDS, he took an $8,000 pay cut. "I was making $12,000 when I first started at MDS," he said.

But if Wurts had any apprehensions about the prospects for success, to this day he doesn't let on. "I thought we'd be this successful after two years," he said.

"Entrepreneurs are eternally optimistic," commented Jeff Stamens, 38, senior vice-president at MDS and also an MIT graduate who has started his own share of businesses, typifying the floating entrepreneur. "A new company starts out being worth a billion dollars and the value goes down from there."

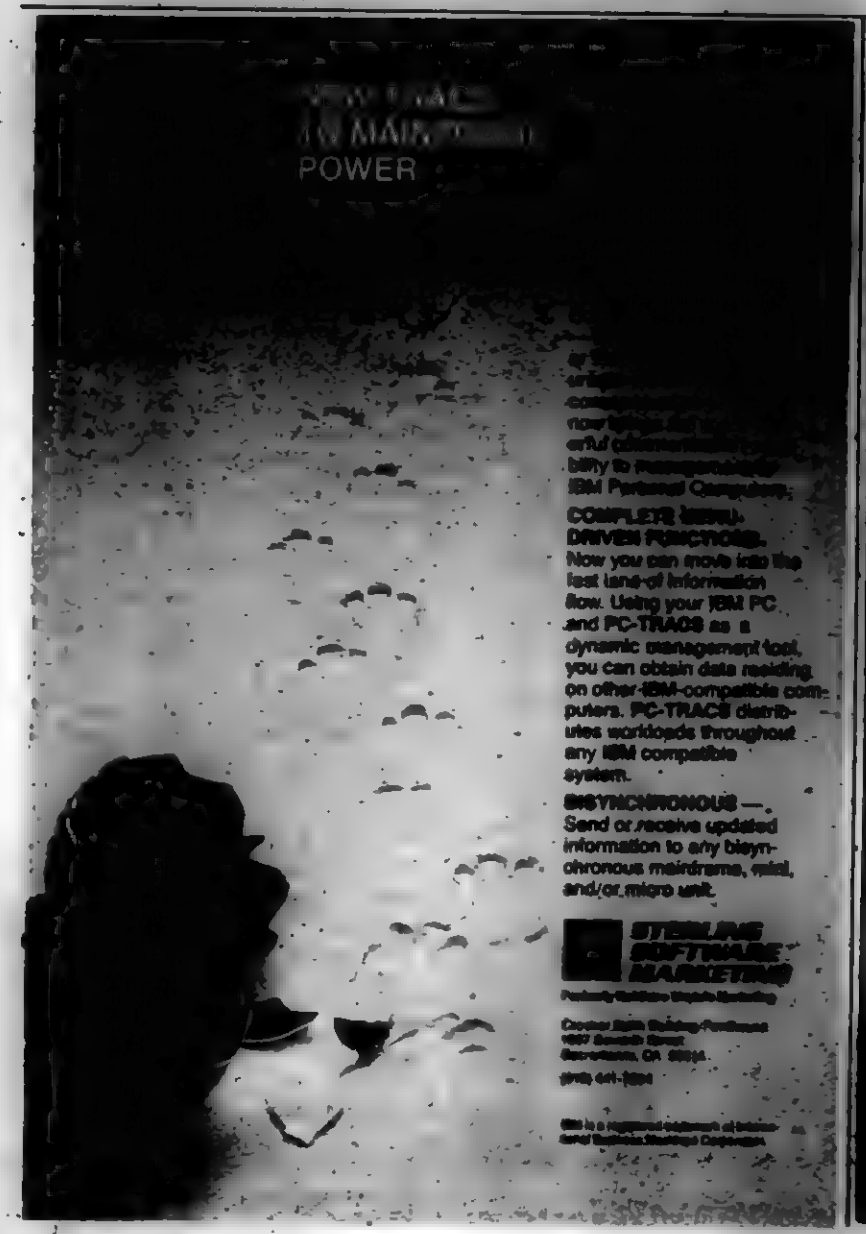
Wurts is, however, one of the first to acknowledge that MIT did not prepare him for all of the hurdles associated with starting a company. "At first I thought that just coming up with a good idea was enough," he said. "We were waiting for the wolf to beat a path to the door.

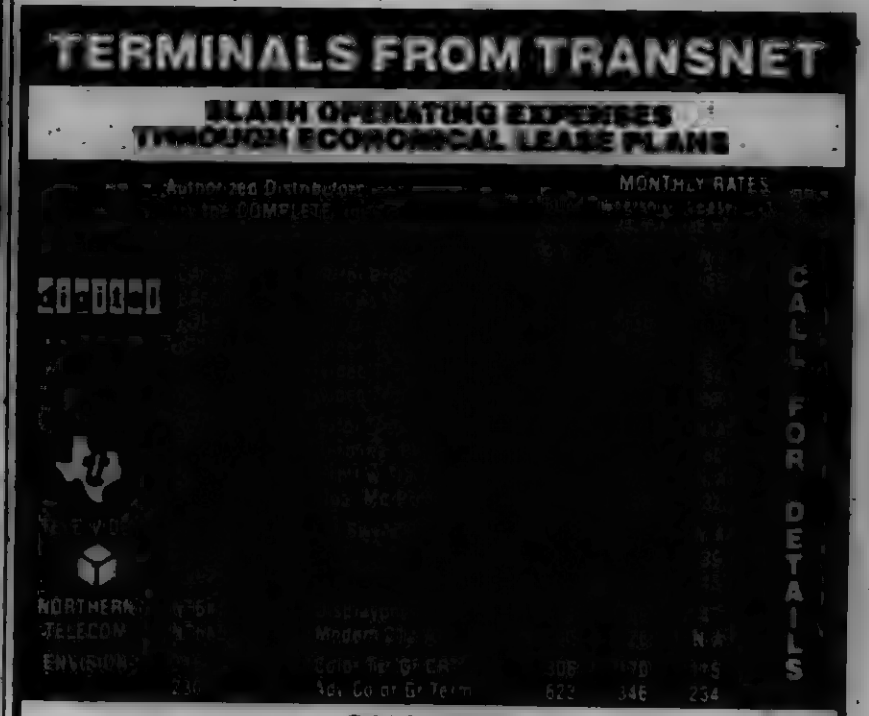
"Then we saw we needed things like documentation, and in 1977 I became convinced that we would never be a truly great company by just being great technically. So I looked at all the technological greats that are also very successful, such as Kodak, IBM and Polaroid, and we began to learn how to market our product."

"At engineering school at MIT, you hear about all the successful companies, but you have no real conception of the marketing world," Charles Ying agreed. "You think if you build a better mousetrap, then soon the whole world will be at your door."

Ray Stata, president of Analog Devices, Inc. in Norwood, Mass., said he learned how to run a company from "the school of hard knocks."

But despite the lack of formal business training available to him at





IN DEPTH

MIT, the institute was Stata's first and only choice as an undergraduate. "In electrical engineering, which was the area that interested me, MIT was regarded as the highest ranking school in the country and still is."

Stata is a soft-spoken man of 49 for whom commercial success appears to have been incidental to his work as an engineer. He founded Analog Devices in 1965 "in the boondocks of Cambridge."

Analog Devices manufactures integrated circuits used in data acquisition applications. "It also supplies products ranging from components to subsystems and systems for computerized measurement and control applications.

With no formal business training, Stata created a company that now employs 4,000 people and reports annual sales of $213 million. Analog's growth plan for the next four years includes hiring some 9,000 new employees worldwide.

Understanding Products, Markets

"There are more ways to get business training than going to business school," he said. "The real issues of high-tech companies are the products and the markets and whether or not you understand those issues.

"In 1970, there was a notable lack of professional management experience and knowledge [at Analog Devices]," Stata said. "That's when I took over as president and dedicated myself to learning more about the job of management and leadership. As we grew, those issues became paramount."

For Stata, who is originally from Pennsylvania, MIT had a "magnetic" effect, and once he finished school, he had no desire to leave the Boston area. "Ten percent of the enrollments at MIT come from Massachusetts, and 36% of the graduates stay here," Stata said.

Commercial Lure

MIT's knack for attracting talent is commensurate with the lure of commercial opportunity for its students, faculty and staff.

In 1966 Russell Noftsker, a graduate of New Mexico State College, went to MIT to do consulting on artificial intelligence. Soon thereafter, the MIT Artificial Intelligence Laboratory was formed, with Noftsker as manager.

According to Noftsker, now 41 and "one of the oldest in the company," the MIT AI lab was doing things that were "significantly beyond the computer industry. Nothing commercially available came close to serving the needs of AI research."

So it was partly "out of frustration on the technical people's side and because I thought it was a good opportunity" that in April 1980, Noftsker came out of semi-retirement to form Symbolics, Inc., a stone's throw from the MIT AI lab in Cambridge. Using Lisp as its principal language, Symbolics develops, manufactures and markets computer systems with integrated hardware architecture and software designed specifically for symbolic computing.

In stark contrast to the $500 in savings it took to start MDS, or the Yings' $6,000 personal investment in Atex, Noftsker solicited such investors as American Research and Development, General Electric Co. and General Instrument, who brought the total equity to $30 million. Today, Noftsker said, Symbolics ships more than $3 million in products per month.

Noftsker estimates that 80 Symbolics employees, or nearly 30%, came from MIT. But he scoffs at the suggestion that Symbolics goes so far as to recruit MIT affiliates.

"We only want good people, wherever they come from," he said. "In fact, early on, as we were founding the company, we decided we wanted enough variety that we wouldn't be inbred."

The abundance of talented MIT graduates Noftsker attributes to the institute's willingness to admit applicants who are not entirely well-rounded.

"MIT is unusual in that it not only admits but condones unusual people," Noftsker observed. "That is, people who are not necessarily socially adept, or people who are weak in parts of their academic background. But if they show promise, they can get in. A person might be mediocre in numerous things, but if they're outstanding in one thing, they can make it at MIT.

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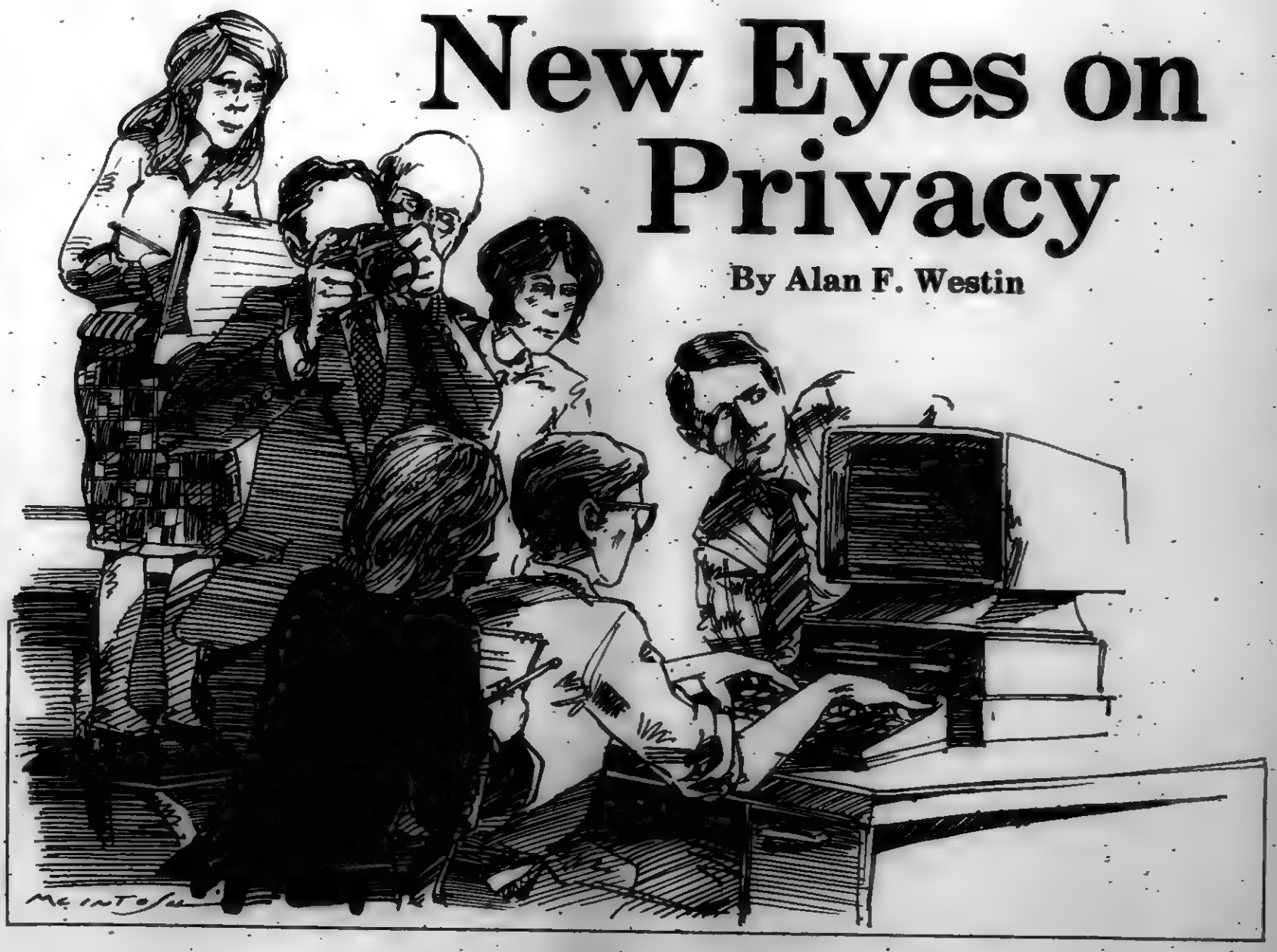
New Eyes on Privacy

By Alan F. Westin



Just when most organizations have addressed the issues of privacy and confidentiality in their DP systems and settled down to apply standards to expected, regular changes in the DP environment, a new threat to their sensitive information appears.

This menace isn't another monster shark headed for mainframes and dumb terminals. Nor is it the recently well-publicized threat of "hacker fish" nibbling away at telecommunications links. This time, it is more like a school of deadly little piranha, and their target is the sensitive data accumulating in millions of shiny new micros.

Like placid bathers on the shore, most organizations so far have either failed to see the new problem or are looking at only one facet of it. As part of a national study of the organizational and social impacts of office automation, we recently surveyed about 100 leading-edge users of CRT terminals. Included were the banking, insurance, credit, communications, manufacturing, utilities and service industries, as well as local, state and federal government agencies and nonprofit organizations.

About half of these sites are beginning to adopt security measures to protect sensitive office automation data from outside penetration. But in more than 90% of the organizations, management is not yet addressing the new policy questions as to privacy and confidentiality that are arising as microcomputers are adopted for clerical, customer service, professional and executive activities in the office.

In nine of 10 organizations, we found that management:

- Has not formulated policies specifying what data concerning the performance of individual CRT terminal operators should be collected and how any such records should be used for personnel purposes.
- Has not examined how personal computer record keeping might affect

the organization's compliance with regulatory duties, antitrust laws and other legal mandates.

- Has not defined what information should — and should not — be put into micros by professional and executive end users.
- Is not periodically auditing or even sampling the data that employees and executives are putting into their machines.
- Has not issued confidentiality rules concerning data in electronic mail and message systems and has not issued explanatory literature or held training sessions to acquaint new groups of end users with basic concepts of privacy protection for sensitive information.

Furthermore, in three-fourths of the organizations we examined, neither the DP nor legal departments have communicated to top management the need to develop new office automation privacy and confidentiality policies, though these groups should be the ones to bring such issues to top management's attention.

In short, office automation applications are creating important new privacy-policy issues for management. But, a large majority of organizations are so busy with the hardware and software aspects of OA that they have not begun to take these policy problems seriously.

In principle, office automation calls for many of the same rules of privacy protection that are required when organizations put sensitive personal data into DP systems. During the 1970s, five basic standards for such privacy protection emerged, known as "fair information practices" rules:

1. Information collected and stored about individuals should be limited to what is relevant and necessary to carry out the socially approved functions of the collecting organization.
2. Once collected, such information should be compartmentalized so that only those within the organization who need to know it have access to it.
3. Identified personal information should be released outside the collecting organization only when the subject has agreed to its disclosure or this is required by law.
4. Individuals about whom information is collected and stored should know what is being done, have opportunities to see data that is being kept about them and have a procedure for challenging the accuracy, completeness or proper use of their data. Exceptions to such subject access rights should be rare, only when demanded by a very strong competing circumstance.
5. Organizations must adopt security measures that will enable them to keep their promises of privacy and confidentiality.

These privacy principles became a general norm in American society in the 1970s. Federal or state statutes covered confidentiality regarding federal agency practices, credit reporting, employment and insurance investigations, law enforcement and medical records. Even in areas where laws were not enacted, hundreds of organizations adopted voluntary codes for handling personal data on customers, clients, employees, patients and students.

In three-fourths of the organizations we examined, neither the DP nor legal departments have communicated to top management the need to develop new office automation privacy and confidentiality policies.

In one sense, office automation trends call for extending these privacy standards from DP into the OA area, something that most organizations have not yet done. But there are also some important aspects of office automation that are different from the DP environment and may require either new policies or special procedures. Four of these were particularly apparent in our field visits:

1. Professional and executive OA applications are leading to data handling that can violate organizational and legal standards of data privacy. Files in DP systems are created and managed in a centralized organizational ethos. The system cre-

ators usually think about what data should be put in, who should see it and what regulatory duties or legal exposures may apply. In a return to individualism that is in one sense a great liberating force in organizations — bringing computer power to the end user — personal computers now allow the individual to decide what to put in.

In our site studies, we found end users mixing organizational data, personal data and data from outside sources in ways that absolutely startled the DP staffs who learned of such uses during our visits. Such activity can directly violate the organization's policies or legal duties regarding treatment of sensitive data.

In site studies, we found end users mixing organizational data, personal data and data from outside sources in ways that absolutely startled the DP staffs. Such activity can directly violate the organization's policies or legal duties regarding treatment of sensitive information.

2. OA information is being handled by end users who do not understand principles of information sensitivity. In the 1970s, perhaps 10% of the personnel in large organizations used terminals directly for their jobs; these were mostly DP professionals, closely supervised data entry clerks and a few staff or executive people in end-user departments. Now, between 25% and 40% of white-collar employees in these organizations are using terminals, predominantly for word processing, customer service and professional tasks. Estimates are that 80% of white-collar employees may be using terminals directly by the end of the 1980s.

What distinguishes these new users, whether clerical or executive, is that they have not been prepared by their professional backgrounds or by organizational instruction to understand information sensitivity, confidentiality principles or security techniques. They are like untrained recruits playing with live information ammunition.

3. Information in OA files is often more finished, refined and sensitive than DP data. As Robert Campbell, president of Advanced Information Management, points out, "Data in mainframes is usually raw — statistics, stocks, flows and so on. But information in word processors, micros and other office systems being used by management and often handled by secretaries is end-state information — full of sensitive organizational judgments about people, events and plans. It is potentially much more valuable to someone who is not supposed to see it, whether inside or outside the organization. Per ounce of information, it is much more sensitive than mainframe data."

4. OA creates new channels of information communication and distribution that can upset important confidentiality relationships. When written documents with confidential information are generated, someone — the author, the secretary, the meeting reporter — usually thinks about those to whom this particular item should be sent. Similarly, in DP systems, distribution and access channels are set by policy, usually with confidentiality interests well considered.

When micros are hooked into an organization's existing data system, however, and especially when electronic message systems are created, end users can suddenly send sensitive information all around the organization — jumping levels in the chain of command and crossing unit boundaries. Message senders start distributing data to people who ought not to get particular memos or reports, wrong distribution codes are inserted and sometimes distribution is left in the hands of word processing operators who do not know which information is confidential in relationship to which organizational member or unit.

When naive end users are plugged into message systems in organizations that have issued no guidelines to cover this activity, confidentiality breaches inevitably happen.

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With regard to these new vulnerabilities, we found two clusters of problems developing in the organizations we visited.

1. Client and customer files. Many organizations have advertised to their potential and existing customers a code of privacy or fair information practices, including what information is collected and stored about them and how a customer can inspect such data if he wishes. This code applies to bank and investment accounts, insurance files, credit-card accounts and health records. The same applies to state and federal agencies operating under fair information practices laws. Where organizations use primarily manual forms or input data to centralized DP systems, they have set rules for compliance with such policies by their employees.

With personal computers, however, loan officers are now creating their own files on prospective customers. Salespeople are opening up personal files on prospects. Purchasing agents are creating personal files on suppliers. Government employees can create personal files on welfare or social services clients or taxpayers. These users do not seem to appreciate the applicability of the manual file/DP file policies to their micro-file conduct.

To some extent, the micro uses we observed were the equivalent of the old "desk files" that organizational personnel used to keep and which are sometimes permitted under privacy rules as "temporary" and "tentative" records, not used to make "organizational" decisions. But we found that such records kept in micros tend to be stored without any destruction cycle and frequently include speculative and sensitive information or evaluative remarks that could violate customer privacy laws or organizational rules. Their presence could be highly embarrassing to top management if they were subpoenaed in a lawsuit.

Similarly, when management is unaware of what some employees have put into their micros, a customer might not be provided access to "all the data about him," producing potential legal liability for the organization. Similarly, the creation of OA message and mail systems can breach confidentiality rules regarding who within the organization is to see various kinds of sensitive client or customer data.

In one large financial services firm we visited, a middle manager commented: "I am responsible for seeing that we comply with federal and state privacy and consumer protection laws, equal credit opportunity laws and fair credit billing laws. I used to be able to control the flow of communications to be sure that we followed the requirements of those laws. Now, I notice that messages of all kinds are moving around the organization, both those discussing individual decisions and those discussing our policies.

"I don't know how long these are

Records kept in micros tend to be stored without any destruction cycle and frequently include speculative and sensitive information or evaluative remarks that could violate customer privacy laws or organizational rules.

kept in any kind of a central memory system or in the terminal of the sender or receiver. We might never have any problem, but it worries me that no one has set up rules for using this internal communication and message system the way we have for our older DP systems. I wonder what might happen if this got dumped some day as part of a regulatory agency inquiry or a customer lawsuit."

2. Employee and personnel issues. New privacy issues in using OA for personnel work cover a wide range, including: 1) managerial input into micros of observational data that could violate state employee privacy laws or privacy-oriented Equal Employment Opportunity (EEO) regulations; 2) creation of occupational health surveillance systems on medical department micros that may not be known either to employees or to unions (where a firm is unionized);

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3) creation of terminal-based systems for sensitive employee and executive data where this opens up broad confidentiality problems.

On the latter point, for example, one senior personnel executive we interviewed blasted the DP function in his organization (a financial services firm) for "always wanting to make personal data move around faster, putting it into the hands of everyone with a terminal. Just because it's technologically possible to put employee financial, benefits, health and other data on-line doesn't mean we really need to do that. Having hard copy available through batch processing is all we really need. The 'Mount Everest psychology' of the technologies is a real threat to our privacy policies."

The most widely publicized employee privacy issue in OA stems from the way that office systems make possible a total monitoring of the work done by clerical, secretarial and customer-service employees. OA software can generate records indicating when employees log on, leave their work, return and log out at the end of their shifts. Records can be produced on the number of keystrokes in a given period, the number of telephone calls taken, the transaction time for each claim processed or customer call handled and the number of errors detected.

Supervisory monitors can then collect such operator data on each employee within each work unit, display it for the supervisor to watch and also issue hourly or daily printouts, creating a detailed record of each operator's performance.

The capacity of employers to monitor without an employee's knowledge or to use the monitoring to apply unfair "speed-up" pressure has been attacked as an invasion of privacy by a broad coalition of critics. These include:

- Women's rights groups such as the National Association of Working Women. Mary Mitchell of the Boston "9 to 5" chapter attacked the use of OA monitoring by which "machines record every keystroke and every pause," with not only raises, but the worker's "very employment" tied to meeting quotas. The situation is like having an electronic foreman watching every move, every minute.
- Unions representing office workers, such as the Newspaper Guild; American Federation of State, County and Municipal Employees; Brotherhood of Railway and Airline Clerks; Communications Workers of America; Office and Professional Employees; Service Workers; United Auto Workers (which represents 100,000 white-collar employees); International Association of Machinists; and many others.

Unions are demanding collective-bargaining clauses that would either forbid automatic monitoring of individual video display terminal operators or require such records to be communicated to the employee, with work quotas set by union-management bargaining.

- Occupational health advocates, such as the Women's Occupational Health Resource Center. These groups attack automatic monitoring as creating an oppressive "assembly line" environment that increases emotional stress for clerical workers, contributes to eyestrain and leads to "alienating" work conditions.

As these complaints have mounted — drawing support from civil liberties groups, church social-action organizations and journalists writing about CRT issues — provisions to forbid employer monitoring of CRT operators have been written into regulation bills introduced in six states last year and are likely to be on the agenda in 15 to 20 states in 1984.

A typical provision, in the Massachusetts "VDT Safeguards Bill," states that "No employer may use a terminal to monitor the productivity of a VDT user on an individual basis."

In addition, warnings to operators that their employers would install "Big Brother Monitoring" have been a feature of unionization campaigns now focused on banks, insurance companies, universities, hospitals and other white-collar-intensive industries. This concern was one highly visible issue in the successful campaign of the Service Employees' International Union to organize the Syracuse, N.Y., claims office of Equitable Life Assurance.

A recent unfair labor practice suit filed against *The New York Times* also illustrates the problems created when management fails to address this issue directly.

The Newspaper Guild has charged the *Times* with installing, unilateral-

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ly, a log-in, log-out telecommunications system in its classified advertising department that the union says is a "Big Brother" attempt to get "complete control" over workers for "every second of the day" and effectuate a "management speedup."

Supervisors will now be able to track every minute of an employee's time, including "how many times an employee visits the toilet." Such use of office automation violates the collective-bargaining contract, according to the guild, since it changes basic conditions of employment without union consent. The guild said the system is also "an infringement of individual liberties" that "ill becomes a great newspaper that is also a champion of freedom of the press and individual liberties."

Though oral assurances were given by a supervisor that the log system would not be used for "disciplinary purposes" or to create unfair work quotas, union efforts to get management to give written assurance on how the system would be used were unsuccessful. As of July 1983, buttons began to be worn by *Times* employees saying, "1984 - 6th Floor."

In the nonunion firms we visited, employees are subject to the same concerns and uncertainties over "machine monitoring." Yet only a handful of these companies have developed a coherent policy on evaluating CRT work.

Given these new issues of privacy and confidentiality arising in OA settings, what ought to be done by organizations, and who ought to be doing it?

First, organizations moving heavily into office automation need to draw up an audit of how OA is being used in ways that handle identified client, customer and employee data. Categories need to be developed to identify which personal information flowing through OA systems is sensitive and the potential legal and regulatory exposures involved. Types of individual and group end users also need to be identified as creators and distributors of confidential information.

Second, a set of privacy and confidentiality standards or principles needs to be enunciated, based on an organization's existing rules for its manual and DP data or developed from the codes that many other organizations have adopted in recent years. This code would then be applied to the major privacy issues emerging in OA activities to develop appropriate policy guidelines.

The issue of monitoring CRT operators provides a good example. Defining acceptable standards of performance is as old as organized work itself, and setting norms individual employees should meet has been a part of the office since the days of the wax table. What is new — and requires new policy from managements — is how to use the monitoring capacities of office automation in ways that are perceived as fair to both employer and employee and

In the nonunion firms we visited, employees are subject to the same concerns and uncertainties over "machine monitoring." Yet only a handful of these companies have developed a coherent policy on evaluating CRT work.

that also meet notions of "humane" rather than "machine" measurement.

In terms of fair information practices, this policy means:

- Information should not be collected without the individual's knowledge.
- How the information is to be used should be disclosed.
- Unnecessary individual performance data should not be kept for unfairly long periods of time.
- Data should be used to evaluate the "whole context" of the employee, the task, the tool and the job setting, not just the log-in, keystroke or transaction records.

For example, in many of the organizations we studied, introducing OA for clerical and customer-service operations resulted in considerable system downtime or slow response time, changes in the data available to CRT operators in performing their

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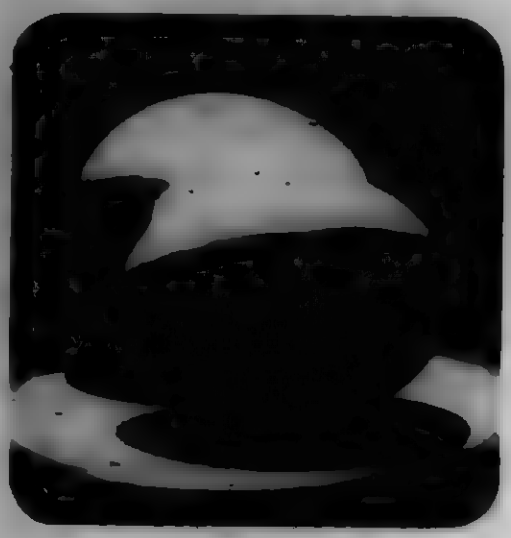

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jobs and new patterns of employee-customer interaction. A few of the companies we visited appreciated this. Management made it clear to the CRT operators that no pure "quantity"-oriented evaluations would be used as the basis for judging employees. Instead, group performances would be studied and discussed by supervisors on a work-unit basis, and individual performance reviews would be private sessions between supervisor and employee. All the problems created by installing new OA systems would be taken into account when arriving at "fair work" norms.

In organizations where unions are present, such discussions include participation by union representatives. At the U.S. Internal Revenue Service, for example, a joint management-union CRT evaluation project is under way with the National Treasury Employees' Union to define productivity norms and employee participation in productivity gains for a major new terminal system being implemented by the IRS.

Once new policies are established, organizations must communicate these clearly and strongly to end users and conduct appropriate training programs in privacy and confidentiality procedures. A routine of sampling or randomly auditing the contents of micros used at the work place needs to be instituted, as much for its value in creating policy consciousness on the part of end users as for what such audits will turn up in the end user's machine.

Whether auditing a manager's personal computer represents a violation of his privacy is an interesting issue. Following traditional legal doctrines, where examination of lockers, desks and on-premise briefcases of employees has been carried out to protect genuine security and confidentiality policies, advance notice of the audit policy is given to the employee, and the audits are done in a reasonable manner. The courts have sustained such activity as reasonable conduct by the employer.

As to *who* should be directing the application of privacy and confidentiality policies to new office automation systems, the obvious — and proper — candidate is the DP function. Personnel, medical, legal and public affairs departments may be aware that new issues are arising and will often have important insights to contribute to developing new policies and procedures. But it is the DP people in most organizations who have two decades of experience in applying privacy protection to automated information systems. It is their baby.

The time for action has come. Responsible business and government organizations should be addressing this issue now, especially if voluntary standards rather than regulatory intervention are to be the primary response of the next few years.

About the Author

Alan Westin is professor of public law and government at Columbia University. Author of four books and numerous articles on privacy in information systems, he is currently directing a national study of "The Workplace Impact of Using VDTs for Office Activities."

Westin is also president of Changing Workplaces, an information and consulting service in Englewood, N.J., that deals with the people aspects of technological change in organizations.

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Kanji Keyboard Chaos

By Raymond R. Panko

Imagine input and output in a language with 50,000 characters. What Japanese engineers are learning the hard way may help them leapfrog American technology in office automation.

The rich complexity of written Japanese has long delayed Japan's entry into office automation. No simple keyboard can hold the thousands of characters found in the country's three forms of writing.

Today, however, this roadblock is being broken, and the techniques the Japanese have created to handle the "keyboard problem" are making *pasocons* (personal computers) and *waapuros* (word processors) commonplace. These techniques, furthermore, could leapfrog the Japanese ahead of American and European word processing manufacturers, because Japanese solutions to the keyboard problem involve sophisticated grammatical analysis.

The spoken Japanese and Chinese languages have little in common. Spoken Japanese is polysyllabic and simple to pronounce. Spoken Chinese tends to be monosyllabic and richly tonal. Despite vast differences between the two

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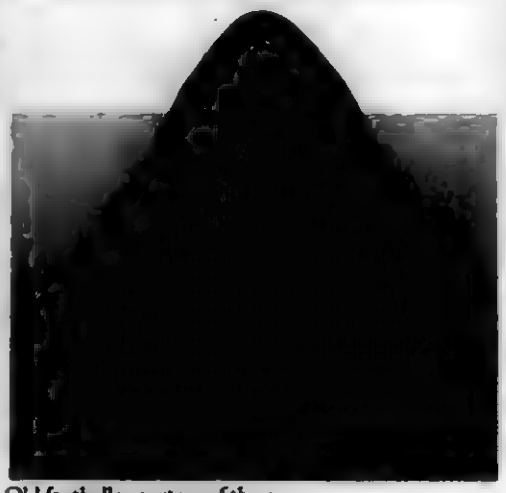

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spoken languages, Japan adopted China's written language as its own. Since written Chinese is ideographic with each ideograph representing a whole word, this adoption was fairly easy; but as a result, Japan now has a written language unrelated to its spoken one.

In Japanese, Chinese characters are called *kanji*. There are about 2,000 kanji in everyday use, but about 10,000 are used with some frequency, and a complete dictionary will contain about 50,000 kanji. So the two countries now have radically different spoken languages but similar written languages. (Time, of course, has caused the two written languages to drift apart.)

Over time, the Japanese moved away from pure kanji, developing two simpler phonetic forms of writing called *katakana* and *hiragana*. Each form evolved from sets of kanji with useful phonetic sounds. In each case, a simplified way of writing the selected kanji was developed. Katakana basically selected a few keystrokes from the original kanji character. Its *kana* (characters) tend to consist of a few straight lines. Hiragana, in turn, developed as simplified scrawls to represent each of the selected kanji. Its kana tend to be curvy.

Hiragana can express any Japanese word phonetically. So can katakana. Then why have two complete sets of phonetic writing? Because hiragana is used to write native Japanese words, such as the morning greeting *ohayo gozaimasu* (literally, "it is early"), while katakana is used to write foreign words such as *panko* (bread flour).

It usually strikes Westerners as odd to use two separate sets of writing for native and foreign words, but we do something like this in English, italicizing foreign words and phrases, such as *ohayo gozaimasu*. And just as foreign words such as "etc." gradually lose their foreignness in English and so lose their italics, long-standing foreign words in Japanese tend to pass from katakana to hiragana.

Then where does the huge kanji character set come into all this? It turns out that words expressed in hiragana and katakana may be ambiguous. For example, "bridge," "chopstick" and "edge" would be written and pronounced the same way in hiragana, as *hashi*. To give another example, "cloud" and "spider" are *kumo*. So the same sentence in hiragana might be read as, "See the cloud behind the bridge" or "See the spider behind the chopstick."

Whenever such ambiguity exists, the proper kanji — which is always unique — is used.

Written Japanese, then, is a mixture of three types of writing: hiragana, katakana and kanji. In traditional forms of printing, such as newspapers and books, the language is usually written in vertical columns, from top to bottom. The columns march across the page from right to left, and books and magazines begin at what Westerners would think of as the back cover. Most often, however, Japanese is written horizontally, especially in modern types of printing, such as technical papers, and also in many newspaper headlines. Then the characters are written left to right.

Building Keyboards

Because the Japanese are very interested in office automation, which they simply write "OA" in the Western script and pronounce "oh-aye," they have been struggling for years to build a reasonably simple keyboard, and to a large extent they have now succeeded.

The simplest approach to facing the keyboard problem is found in the cheapest personal computers. This solution is the use of katakana only, letting the user resolve ambiguities from context and ignoring the traditional foreign/native distinction. Katakana is used instead of hiragana because katakana consists mostly of straight lines, and even fairly inexpensive printers and displays can show it well.

But for real business uses, full written text in all three forms of script is required. To handle this need, a more expensive approach is taken in which both katakana and hiragana characters are put on the keyboard. A shift key allows the typist to switch between the two sets of characters. Katakana and hiragana characters are referred to, collectively, as *kana*. There are about 50 kana each in hiragana and katakana, so there is no difficulty in representing all kana on a normal-size keyboard.

The tricky part is handling the kanji, of course. The obvious way to

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handle them is to analyze each word as it is typed in kana. If the word is ambiguous, then the most probable kanji is inserted in the sentence, but the typist can select alternative kanji if the one inserted is incorrect. This method was the first way vendors used to handle kanji, and it is still the core approach taken by vendors today.

But if the user has to choose alternative kanji often, the typing process will be extremely slow. So, many of the products on the market in Japan now go a step beyond word frequency in selecting the "first-guess" kanji to insert in the sentence, and this added step could put Japan at the forefront of language processing by computer in the future.

This added step is grammatical analysis. Japanese products analyze the grammar of the typed sentence on the fly, selecting the most probable kanji on the basis of its grammatical position in the sentence. This feature greatly improves the chance of getting the first guess right so that the typist can merely go on.

Although spelling correction is popular on U.S. word processing systems, the additional wrinkles of adding on-the-fly word checking and grammatical checking represent a major step forward in user assistance. In the U.S., the addition of proofreading functions such as these is viewed as a jazzy feature, and development has been relatively unhurried. But in Japan, on-the-fly checking and grammatical analysis are make-or-break problems. If the Japanese develop expertise in these areas substantially before U.S. vendors, it would not be hard to imagine a strong flow of Japanese products into the West.

The Spoken Word

The Japanese are also pushing hard in voice recognition. Here, the key is the relative simplicity of the Japanese spoken language. Japanese vowels are extremely regular and are pronounced in the Spanish manner. In addition, Japanese lacks the tonal complexity of Chinese.

Given the small set of Japanese phonemes — about 50, depending on how one treats near duplications — it is possible to recognize individual phonemes easily. And the Japanese have long been able to do voice-to-kana translation for noncontinuous speech in which each phoneme is pronounced separately.

Because Japanese managers do not have the long history of college typing shared by Western managers, voice recognition is an obvious goal of vendors. The early success of voice recognition for noncontinuous speech is spurring intense work on the problem of recognizing continuous speech, in which sounds flow together.

It is too early to say how rapidly the Japanese voice typewriter will arrive, but when you consider that sophisticated Japanese word processors today sell for only $4,000 to $6,000 in Japan, complete with printer, it is fairly safe to project that the prices of these voice-driven machines will be competitive.

What About Chinese?

Word processors for Chinese are also being developed rapidly. Since the Chinese use pure ideographs — the Japanese kanji — and have no simplified form of writing like the Japanese kana, most efforts to produce Chinese word processors have involved giving each ideograph a numerical code.

Of course, no one wants to memorize 10,000 to 50,000 codes, so simplifications have been developed, notably the "three-corner coding method" developed in Taiwan. In this approach, 99 character "roots" have been identified. An ideograph is represented as a composite of one to three roots. These roots must be memorized, along with their two-digit codes.

To type an ideograph, the operator looks first at its upper left-hand corner. He then types the code for the root nearest that corner. That root is mentally removed from the character, and the operator next looks at the upper right-hand corner, again typing a code for the root in the remaining part of the ideograph that comes closest to that corner. Third, that second root is also removed, and if there is any part of the ideograph left, the operator looks at the lower left-hand corner and keys in the code for the remaining root. Three roots are enough for all ideographs.

In other words, each character is viewed as being an overlay of one, two or three basic roots. The overlays

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are peeled off one by one, and their codes are typed as this is done. The process sounds very cumbersome, but is not overly difficult for trained operators. I once observed an operator using the technique, and her speed was fairly good.

For managers and professionals, of course, a simpler method must be used. One approach is to put a limited number of phonetic symbols on the keyboard and to type the ideograph's sound. In Mandarin, spoken in Taiwan, for instance, all children are taught a phonetic alphabet with 37 sounds. Each sound is represented by an ideograph whose spoken form has that sound.

With this phonetic approach, using a Chinese word processor or personal computer should be much like using a Japanese word processor, although every word must be converted into an ideograph instead of just a phonetically ambiguous one.

In practice, the Chinese phonetic system is a good deal more difficult to handle than the Japanese system. First, there are different dialects of Chinese, and even within a "standard" dialect there are some regional differences. So while all Chinese will use the same written language, phonetic interpretation must be tuned to dialect.

Furthermore, just as spelling in English did not become standardized until fairly late in the history of our language, two Chinese who speak exactly the same dialect may type the same word differently in phonetic typing.

Despite these troubles, managerially and professionally oriented personal computers should appear for Chinese in the very near future.

In some areas of corporate information technology, Japan is on a par with the U.S. According to figures compiled by the Japan Institute for Office Automation (JIOA), for example, Japan had one general-purpose computer for every 853 employees in 1979, while the U.S. had one for every 843.

For general-purpose computers, the Japanese have "solved" the keyboard problem by programming in Fortran, Cobol and other Western programming languages which require only a bit of English.

Not surprisingly, the Japanese are ahead of the U.S. in some visually oriented technologies. In 1979, for instance, the U.S. had one facsimile machine for every 274 employees, while Japan had one for every 139. Of course, the U.S. also uses many text forms of electronic mail, which are rare in Japan.

But for word processors and personal computers, Japan still has a long way to go to catch up. In 1979, the Japan Institute for Office Automation could count only one word processor for every 23,740 employees in Japan, compared with one for 104.9 in the U.S. While personal computers were not counted, there probably were few in Japan.

A recent survey by the JIOA indicates that the process of catching up is at least beginning. Forty-eight percent of companies surveyed by the institute reported recently purchasing some personal computers, and 40% said that they had purchased Japanese word processors. It is too early to say how rapidly Japanese use of personal computers and word processors will grow, but the trends are strong.

The only weakness on the horizon is that the Japanese are jumping into word processing with stand-alone units, while in the U.S., clustered systems are becoming the norm. Clustered word processing systems are generally a firm's first step into the "systems era" of office automation and usually signal that the firm is at least beginning to understand the need for systems that allow information to flow freely throughout the office.

As the density of word processors grows in Japan, a gradual shift from stand-alone units to clustered systems will almost certainly occur, but Japan may be missing a chance to jump directly into the systems era.

About the Author

Raymond R. Panko is an associate professor of decision sciences at the University of Hawaii. He previously worked for SRI International.

His areas of specialty include office automation planning and electronic mail. Several of his articles on these subjects were translated for the Japanese publication, Jimu To Keiei. Wang Laboratories, Inc. sponsored Panko's travel this summer to Taiwan, Singapore, Hong Kong and Japan, where he gave seminars on office automation and corporate information management.

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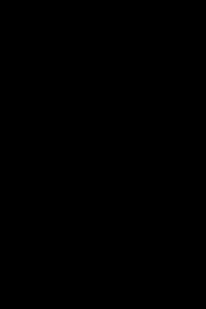
“AN IDEA WHOSE TIME HAS COME.”

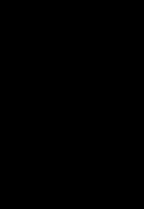
Cincom is pleased to announce a data base software architecture that is compatible across both IBM and DEC VAX™ hardware. We call this concept the Cincom IBM-DEC Connection. And it is, truly, an idea whose time has come.

For years now the concept of using IBM mainframes at the headquarters for Strategic purposes along with distributed DEC VAX minicomputers for operational or Tactical support has been a major goal of large organizations. Both the IBM and DEC VAX systems are ideal for these respective usages. Unfortunately, they are not compatible.



But now, leading organizations using IBM and DEC hardware can build, use and maintain a consistent, closely-compatible software approach to meet their Strategic, Tactical and Local information system requirements.

The Cincom IBM-DEC Connection provides a global consistency and compatibility of data base management and application implementation that will dramatically increase productivity of the information systems effort throughout the entire organization.



Supporting this advanced new architecture are the most recent innovations in systems and application software from Cincom: TIS,™ ULTRA and for manufacturing organizations MRPS.™ TIS is our comprehensive information system for the IBM mainframe environment that combines the latest relational data base technology with 4th Generation problem solving tools. ULTRA Interactive Data Base System™ is our newly released relational data base system for DEC VAX systems. And MRPS is our manufacturing control application software system compatible with both IBM and DEC VAX environments.

THE IMPACT:

THE CINCOM IBM-DEC CONNECTION DRAMATICALLY INCREASES THE PRODUCTIVITY AND QUALITY OF SYSTEMS IMPLEMENTATION.

Cincom has been supporting the world's largest and most advanced data processing departments for more than 15 years. In that time, working with over 5,500 users, we've gained a keen understanding of the problems facing today's MIS Director. One of the most important problems we've noticed is the need for a software architecture that will provide a common approach to application design and implementation across multiple-machine environments. The Cincom IBM-DEC Connection fills that need.

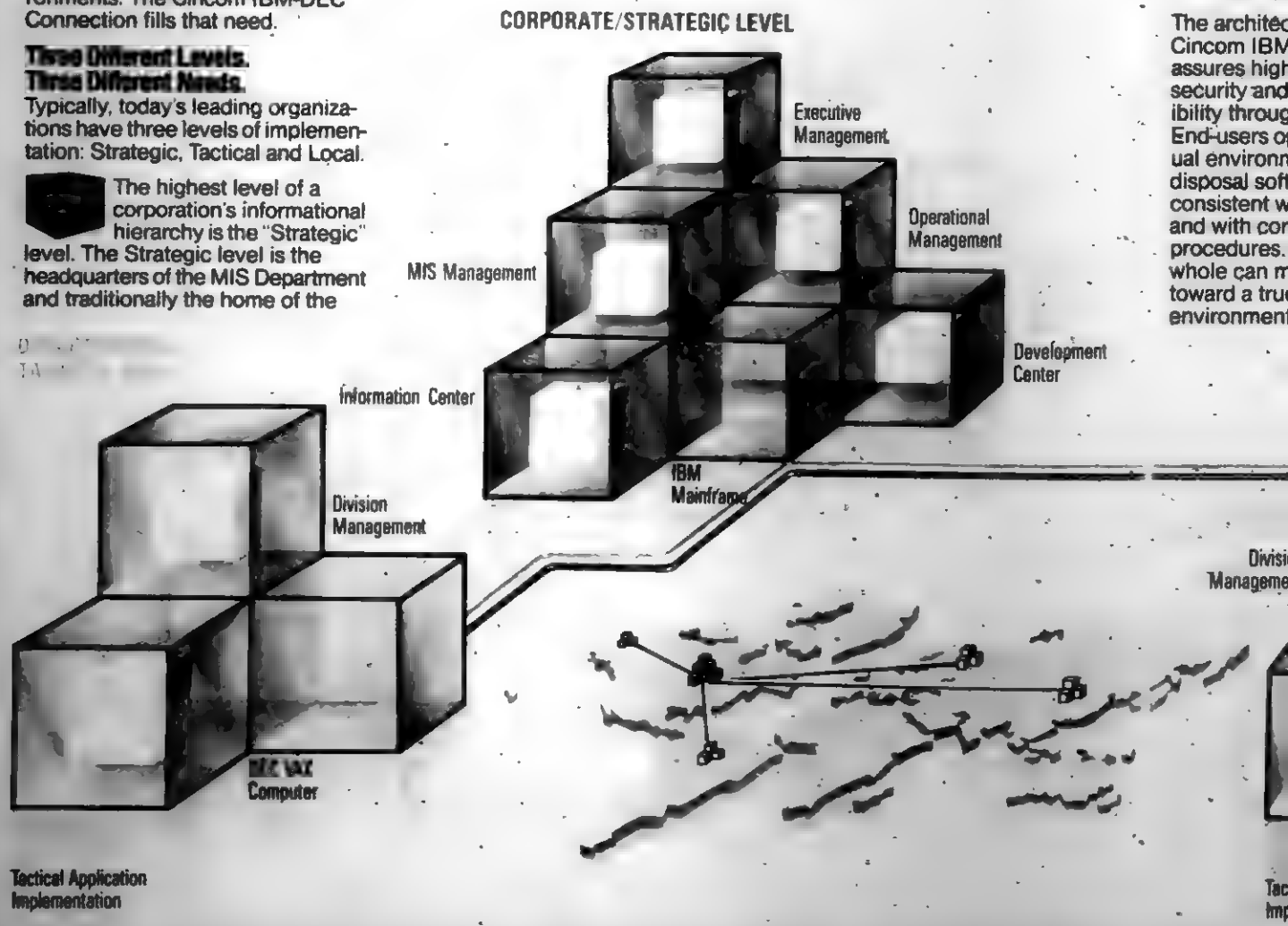
Three Different Levels. Three Different Needs.

Typically, today's leading organizations have three levels of implementation: Strategic, Tactical and Local.

The highest level of a corporation's informational hierarchy is the "Strategic" level. The Strategic level is the headquarters of the MIS Department and traditionally the home of the IBM corporate mainframe. Characteristics of the Strategic level typically include a powerful, high performance software system, a relatively large staff and end-user interaction in either the Development Center, the Information Center or both. It is here that long-term planning is conducted and operational information that supports the overall corporation is processed.

The next level is the "Tactical" level. This level of system implementation addresses the divisional or departmental information requirements with operational systems. Typically, the Tactical level is an extremely interactive environment. It is transaction oriented. And it is almost exclusively an on-line, real-time situation. The powerful DEC VAX minicomputer has proven extremely effective in this environment and holds a prominent position alongside mid-range IBM hardware in many organizations.

The third level in the informational hierarchy is the personal or "Local" level. These are the areas throughout the organization that provide end-users with the capability to meet their own personal or departmental information needs. Local systems must, of course, be easy to learn and use. Ideally, they will be linked to either the Strategic data base, the Tactical



THE ARCHITECTURE:

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POWERFUL. RELATIONAL. COMPATIBLE.
The software architecture of the Cincom IBM-DEC Connection incorporates three powerfully interactive information systems: TIS, ULTRA and for manufacturing organizations MRPS. Together, they provide the highest degree of compatibility and consistency available today across IBM and DEC VAX equipment.

The Foundation.
The building blocks of the Cincom IBM-DEC Connection architecture are TIS, our interactive, relational software system for IBM mainframes, and ULTRA, our interactive, relational, high performance data base system specifically designed for the DEC VAX.

With TIS at the Strategic level and ULTRA at the Tactical level, users have at their disposal a powerful, relational set of software tools which will facilitate implementation of even the most aggressive corporate information strategies.

The relational power of these systems comes from the nucleus of both TIS and ULTRA. With both systems, the **In-Line Directory** is the one component that interactively integrates all other components. The **Logical User View** component provides a relational view of data for both application programmers and end-users. This relational Logical User View also insulates users from data structures, the physical storage mediums and even the DBMS itself. **LUV** both protects the application investment and increases end-user efficiency. And, the advanced **DBMS** component provides support for normalized subject data structures and relational data association technology to provide power and efficiency for both application processing and end-user interaction.

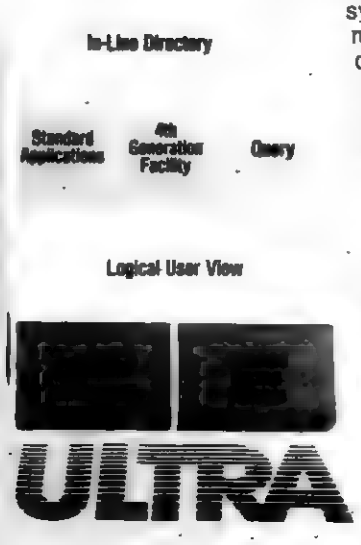
Because of their common architecture, applications are built the same way with both TIS and ULTRA. This means that applications in all levels of the corporation are implemented using one common and compatible approach. Once completed, applications can even be transported from one hardware to another with little or no change.

4th Generation Problem Solving Tools.
Two other components common to both TIS and ULTRA are **Intelligent Query** and **Reporter**. Together, they enable end-users to satisfy their own non-procedural, ad hoc

THE CONNEC
AT WORK:

Manufacturing Control Application Software.

The third system in the architecture of the Cincom IBM-DEC Connection is MRPS—our comprehensive manufacturing control software system that is compatible with both IBM and DEC VAX environments. Tightly integrated with TIS and ULTRA, MRPS provides a complete closed-loop manufacturing system. MRPS is a modular system and is capable of being fully integrated with a Tactical level DBMS such as ULTRA or a Strategic level system such as TIS. From production planning, to inventory control, to vendor analysis, MRPS provides manufacturing operations the information tools necessary to reduce costs dramatically.



The IBM-DEC Connection Is Cincom Systems.

With TIS operating at the Strategic level, and ULTRA operating at the Tactical level, the Cincom IBM-DEC Connection at last becomes a reality. Now, one common software architecture and one common approach to application development, implementation and data base management assures consistency and eliminates conversion across these two hardware environments. Rather than being locked into your software you now have total software flexibility. And, as your needs evolve, so will the technologies of Cincom Systems.

INSULATION FROM YOUR HARDWARE. INSULATION FROM YOUR DBMS.

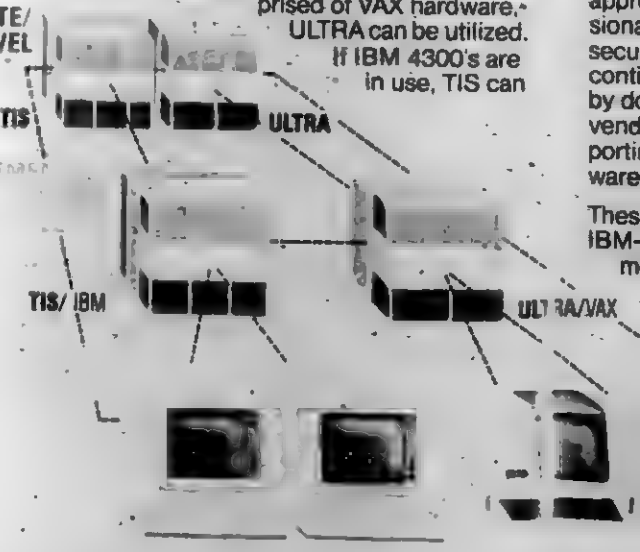
By implementing the Cincom IBM-DEC Connection virtually limitless information management opportunities now become possible. Because applications are insulated from both hardware and DBMS, restrictions from exploring new software strategies are drastically reduced.

Tailoring The Connection.

All corporations will, of course, have their own specific adaptations of the Cincom IBM-DEC Connection. However, here are two simple scenarios displaying how this common software architecture can be utilized in a corporation to provide a consistent approach to application development and implementation throughout the Strategic, Tactical and Local levels.

Scenario A depicts the consistency of the Cincom IBM-DEC Connection. Using TIS on the corporate mainframe, and ULTRA on the corporate level VAX computers, programs can be developed and utilized at either the Strategic or Tactical level. Or, they can be developed at the Strategic level and passed across to the Tactical level of the organization to run on either a VAX or an IBM processor.

If the Tactical environment is comprised of VAX hardware, ULTRA can be utilized. If IBM 4300's are in use, TIS can



requests in minutes instead of hours with virtually no need to be conversant with typical programming or data base logic.

Yet another 4th Generation relational component is **MANTIS.**™ Currently part of TIS and soon to be integrated with ULTRA, MANTIS is our application development language that combines the flexibility and ease-of-use of interactive, interpretive systems with the power and range of procedural languages. MANTIS fully supports the relational data view so desirable today. It provides complete beginning-to-end, on-line application development across virtually all types of on-line environments. And, MANTIS is so easy to learn, end-users at the Local level are able to write their own programs, often with no assistance from trained programmers.

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THE SOURCE:

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Cincom's long history of innovative software success stories is due, in part, to our long-term commitment to research and development and, in part, to our determination to bring to market the most advanced new software technologies. In the past five years, Cincom has invested more than $50 million into the research and development of new software technology. The result has been products like TIS, ULTRA, MRPS and MANTIS. And we plan to spend even more in the next five years. Our goal is to build and support the finest quality software of the latest design—no matter what the cost or effort may be. Nearly 30 percent of our people everyday are engaged in research and development activities towards this goal.

Supporting The Connection.

Another key to Cincom's success as an independent software vendor has been the level of support and service we provide our customers. More than 30 percent of our manpower resources are committed to one of the industry's largest worldwide support programs. And, because we have more offices around the world than any independent supplier, we are the perfect software choice for companies implementing global information strategies.

Expanding The Connection.

The Cincom IBM-DEC Connection is far and away the most effective long-term software strategy currently available to today's leading corporations. As your needs evolve, so will Cincom's IBM-DEC Connection and the products that make it so effective.

The idea of a common approach to application implementation regardless of hardware? It's an idea whose time has come. And it's an idea that is available today from the company with a reputation for software excellence: Cincom Systems.

Why Not Find Out More?

The Cincom IBM-DEC Connection can provide your company with the compatibility it needs to achieve a corporate-wide continuity never before thought possible. For more detailed information on how the Cincom IBM-DEC Connection can benefit your organization, simply call our Marketing Services Department today.

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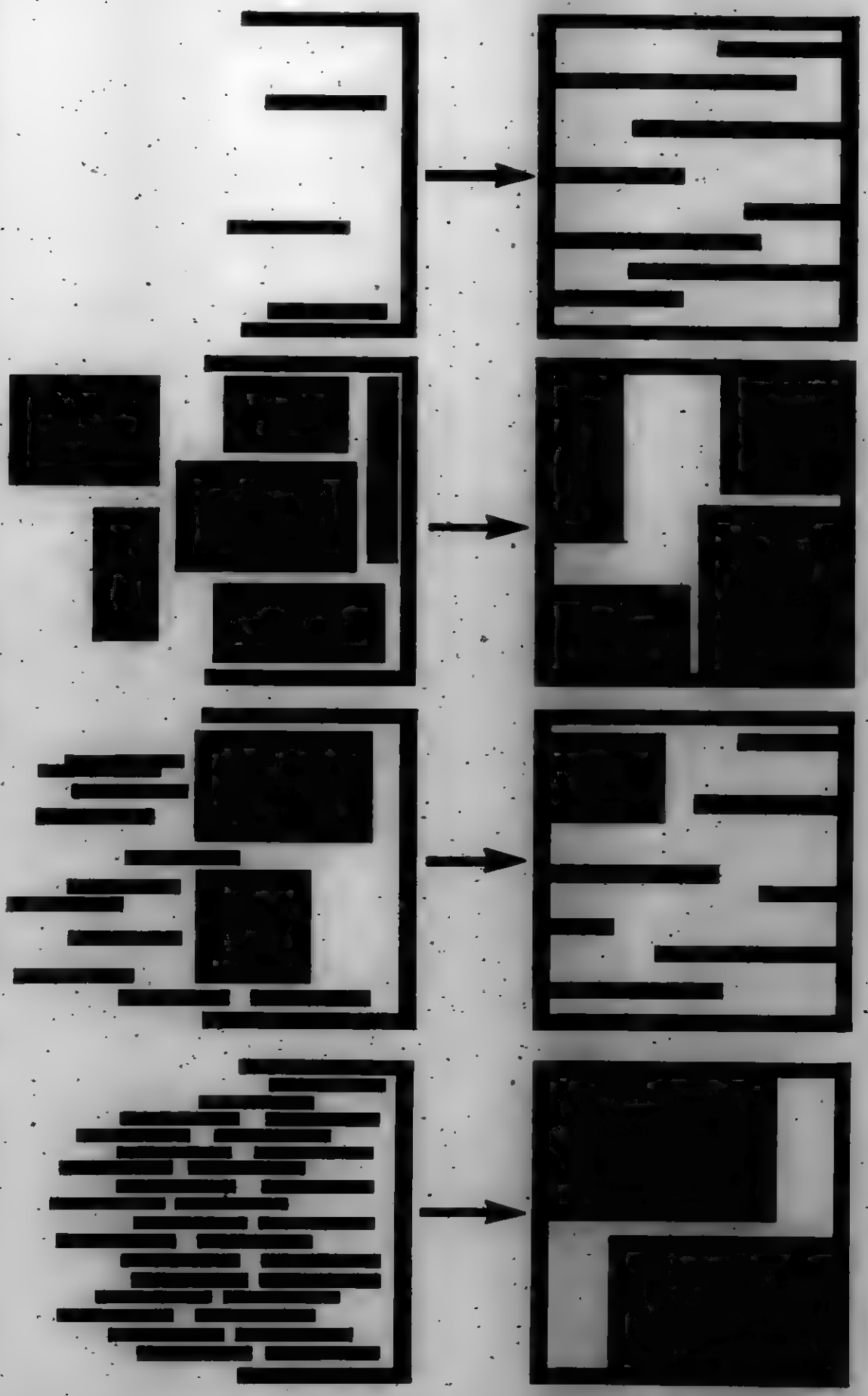
What Price Relational?



By William H. Inmon

It is currently the vogue to proclaim that relational systems are the solution to the many headaches of data processing, in much the same way the data base concept was touted a decade ago. But are relational systems the panacea that will address everything from productivity to user satisfaction?

It is true that relational systems unquestionably are much more flexible than their hierarchical or network brothers. But is there a price to pay for that flexibility?

Early relational pioneers such as Ted Codd and Chris Data are attributed with statements to the effect that "relational systems are not necessarily inherently poor performers" when it comes to response time. But in practice, there is every evidence that such is not the case. In both the minicomputer and mainframe environment, relational systems need huge amounts of resources to sustain any reasonable amount of performance.

Witness recent announcements about IBM's forthcoming DB2. At the product's introduction in New York last June, Sam Kahn, advanced data base products manager at IBM's Santa Teresa Labs, said projections showed DB2 using "significantly more systems resources, both machine cycles and memory," than IMS.

In analyzing relational systems in existing environments, the reasons why relational systems perform poorly can be isolated. From those reasons, it is safe to say that poor performance is, in fact, inherent to the relational environment, given today's hardware, software and economic climate.

The resistance to the notion that relational systems do not perform poorly goes back to the relational movement, itself, which has an academic founda-

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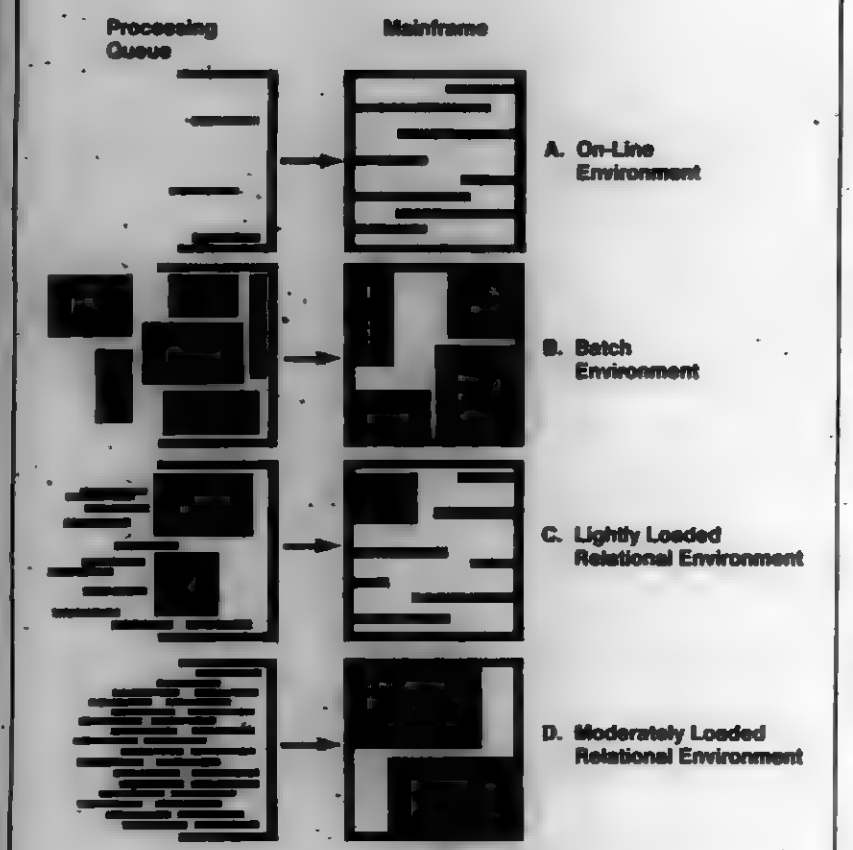

Figure 1. Processing Environments

tion. The relational movement is founded in a batch mentality. Relational proponents are always "keeping things under the covers." Indeed, the leading book on relational systems, Chris Date's *An Introduction to Database Systems* (Addison-Wesley, Reading, Mass.) makes no mention of I/O whatsoever and only mentions performance casually in three referenced places.

At the root of relational systems' inability to perform is I/O. In an on-line environment, I/O is the single most important limiting factor because I/O requires the execution of code to shift from electronic (or nanosecond) speeds to mechanical (or millisecond) speeds. This shift dictates that on-line performance relates more to I/O than any other factor.

The freedom of dynamic relationship is bought at the expense of having to search for data in diverse places and having to construct relationships dynamically. This expense shows up directly in terms of I/O.

There are two levels of I/O usage in the relational environment that cause difficulties — at the data access level and at the call level. Of the two, the difficulties at the call level are much more harmful, although the theorists almost exclusively center in on the I/O done at the data access level. The two types of levels will be discussed in depth.

The I/O difficulties at the data access level occur because relational data bases, in their normalized state, are very disjoint. A typical relational environment consists of many separate tables (or relations), none of which are physically connected. Because of this lack of connectivity and the disjoint data, the resulting system is very flexible. Relationships are formed dynamically.

But the freedom of dynamic relationship is bought at the expense of having to search for data in diverse places and having to construct relationships dynamically. This expense shows up directly in terms of I/O.

Hierarchical data bases are not nearly as flexible, but data is generally grouped together and relationships have been predetermined, thus reducing the amount of I/O that is required.

To understand better the nature of I/O at the call level and how it relates to performance, divide on-line activity into two classes — short-running activities and long-running activities. A short-running activity is one that uses very little I/O, such as, "Tell me the account balance of Delilah Perkinson."

A long-running activity is one that uses much I/O, such as a data base scan. An example of a long-running activity might be to select the highest account balance from a payroll data base where accounts of executives are considered. Now consider how machines react (at a very basic level) to activity flowing through them.

Nature of Machines

First consider what an on-line system looks like in terms of a queue, a processor and activity running through the processor, as shown by Figure 1A. The activity running through the processor is represented by small rectangles. Such an environment is like the Airline Control Program (ACP) environment. The airlines clerk has much function at his fingertips, but accomplishes the function a small piece at a time. To book a transcontinental trip, the first leg from New York to Chicago is booked, then another on-line acitivty is entered to book from Chicago to

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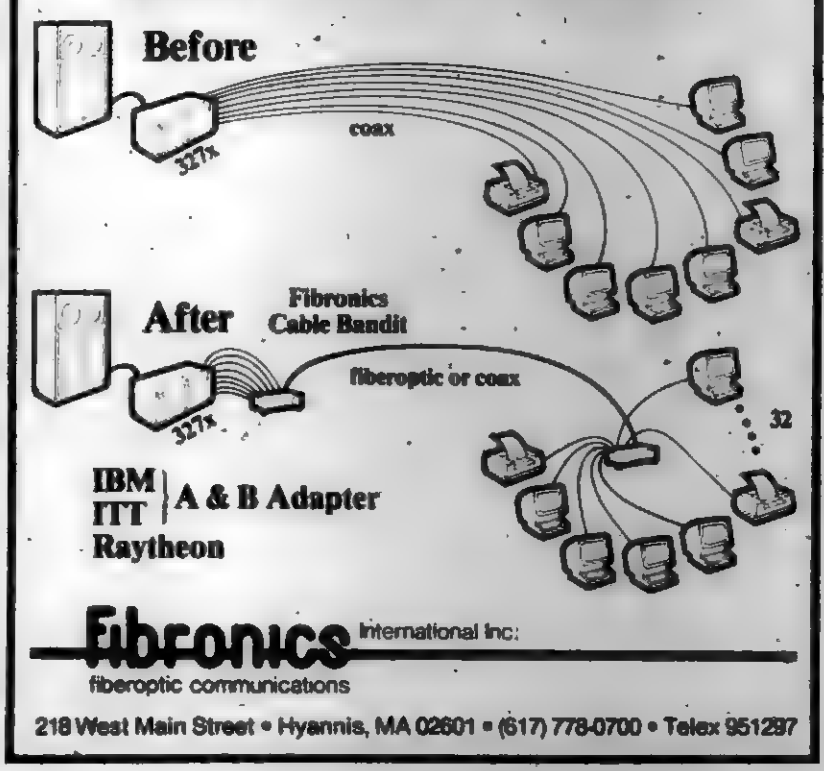

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Dallas. A third activity is entered to go from Dallas to Denver, and a final activity is entered for the leg from Denver to San Francisco.

In all, four small activities were entered, instead of a single, larger activity. And each of the small activities is achieved with very quick response time. Now consider what a batch environment looks like.

Figure 1B shows that large activities — data base scans, updates and so forth — are being run. A large rectangle represents a long-running job. In the batch environment, large programs are run, and turnaround is measured in terms of hours, if there is any amount of traffic on the system at all.

What happens when long- and short-running transactions are mixed, as is normal in the relational environment? Figure 1C shows this case. As long as there are few demands for system resources (that is, a very light transaction load), the two types of activities mix fairly well. But when there is anything close to approaching a heavy load, the system performs as shown in Figure 1D.

Here the long-running activities are "hogging" the machine. The short-running activities are queued behind them. At this point, response time is terrible. The system is running at the speed of the slowest activity. Fast-running activities cannot get at resources to execute.

A Typical Relational Day

To put the different characteristics of a machine into context, consider a typical day on a mainframe in a relational environment, as shown by Figure 2. At 8 a.m., users are able to get very good response time. When a user asks, "What is Delilah Perkinson's account balance?" the reply comes back in seconds. But at 10 a.m., the system is heavily used, operating at the speed of the slowest transaction. Now a user asks, "What is Bill Inmon's account balance?" and has to wait 45 minutes while the system is executing user requests that use many resources.

A more typical environment is shown at 1:30 p.m, where the response time fluctuates wildly, depending on what is in the system. Finally, at 7 p.m. the machine turns into an almost pure batch machine as data bases are loaded and so forth.

In Micro Environment

It has been suggested that going to the micro environment will solve the problems of poor response time that are typically associated with the relational environment. It is true that

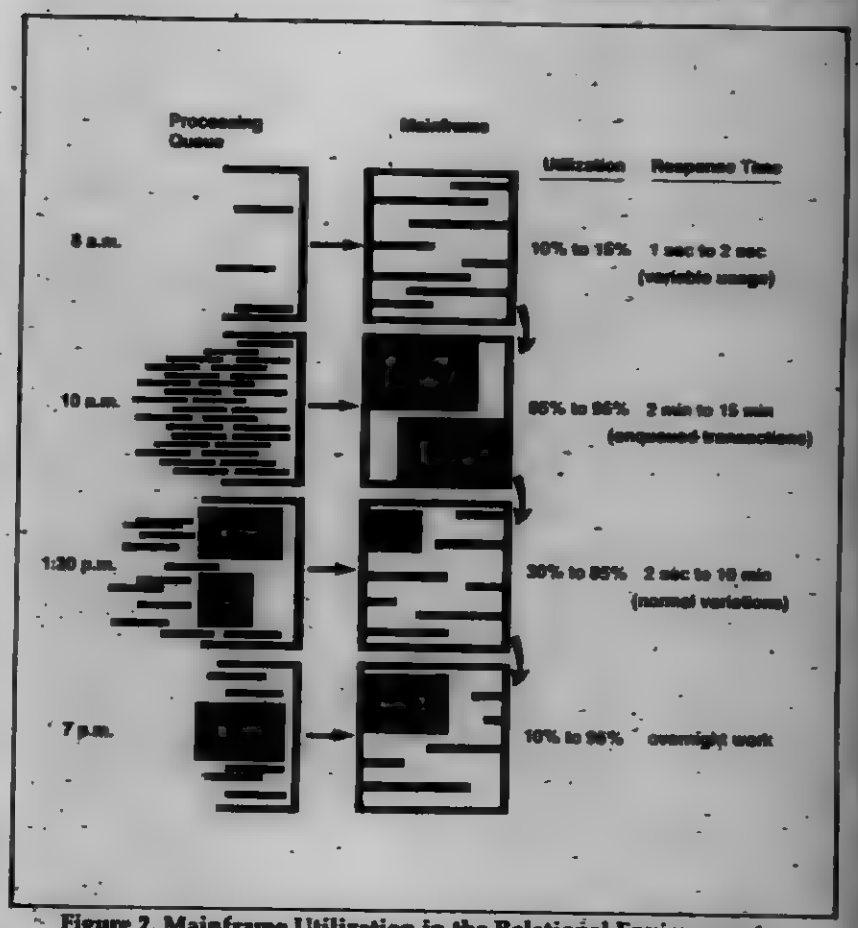

Figure 2. Mainframe Utilization in the Relational Environment

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once into the micro environment, there is no problem with impacting (or being impacted by) other programs, as is the case in the mini or mainframe environment. But there are some severe limitations to the micro environment. Some of them are:

- The amount of data being handled. Even in the micro environment, when there is a large amount of data to be manipulated (and "large" in the micro environment is far different from "large" in other environments), I/O takes up considerable time.
- Difficulty in getting the data to the micro in the first place.
- Difficulty in putting the data back in the mainstream when processing is done.

But a more basic problem is the fact that going to the micro environment means the data is taken off-line, which to a large degree defeats the purpose of the on-line environment. In other words, if data can be taken off-line (and thus removed from the on-line system), then the issue of performance is moot.

It is argued that hierarchical languages such as IMS can scan entire data bases as well as relational systems such as SQL. It is true that IMS *can* do data base scans, but in the on-line environment (that is, an on-line region), good design dictates that it not be done. IMS does have batch capabilities (BMP), but they are either not run at all in the daytime or else they are carefully checkpointed so that they use resources like on-line transactions. So data base scans are *not* a problem in a mature, on-line IMS environment.

But in a relational environment (typified by SQL), it is normal and natural to scan entire data bases. Relational systems, by fiat of their ease of use, do not place restrictions on the user. The user is as likely to scan data bases averaging account balances as the user is to seek information about a single account.

Control

But the real clinch comes in the control that is possible. In IMS, if there is an offensive transaction that does scan a data base, the transaction can either be debugged or removed. When it is removed, obviously it is no problem. When it is debugged, it is no longer capable of chewing up many resources. It is recompiled and put into object form. After that point, the user is not capable of abusing the system with the transaction.

But in the relational environment, no such controls are imposed. The nonprocedural nature of the relational environment is such that systems requests are handled interactively, not in a precompiled mode. The user is able to operate free-form at a terminal.

The very essence of the relational environment is user freedom. Imposing restrictions on the user (even if they make sense) goes against the relational philosophy.

Thus it is that with existing software and hardware, relational systems perform poorly. There is a price to the flexibility of relational systems, and unfortunately the vendors of relational software often choose to ignore that price.

Operating Systems Solutions

It is tempting to say that solutions can be found at the operating system level. One solution that has been tendered is the classification and segregation of long-running relational requests from short-running requests.

There are two problems with this approach. The first is that given the syntax of a language like SQL, it is very difficult if not impossible to separate requests. The problem is that until the request goes into execution, it cannot be determined whether it will be short-running or long-running. Ideally, requests could be separated at the syntax level.

The second problem with separation of requests is that it means that long-running requests will become second-class citizens. Instead of a long-running request taking 30 minutes to an hour to run, because it is segregated with other long-running transactions, it has a *much* slower time getting through the system — say 10 to 20 hours. The relational environment, in its attempt at user friendliness, does not make a distinction between long-running and short-running jobs.

A second operating system solution is that of removing a long-running activity from the system so that short-running activities can execute, then replacing the long-running activity into the system when the system is idle. This solution, too, has the

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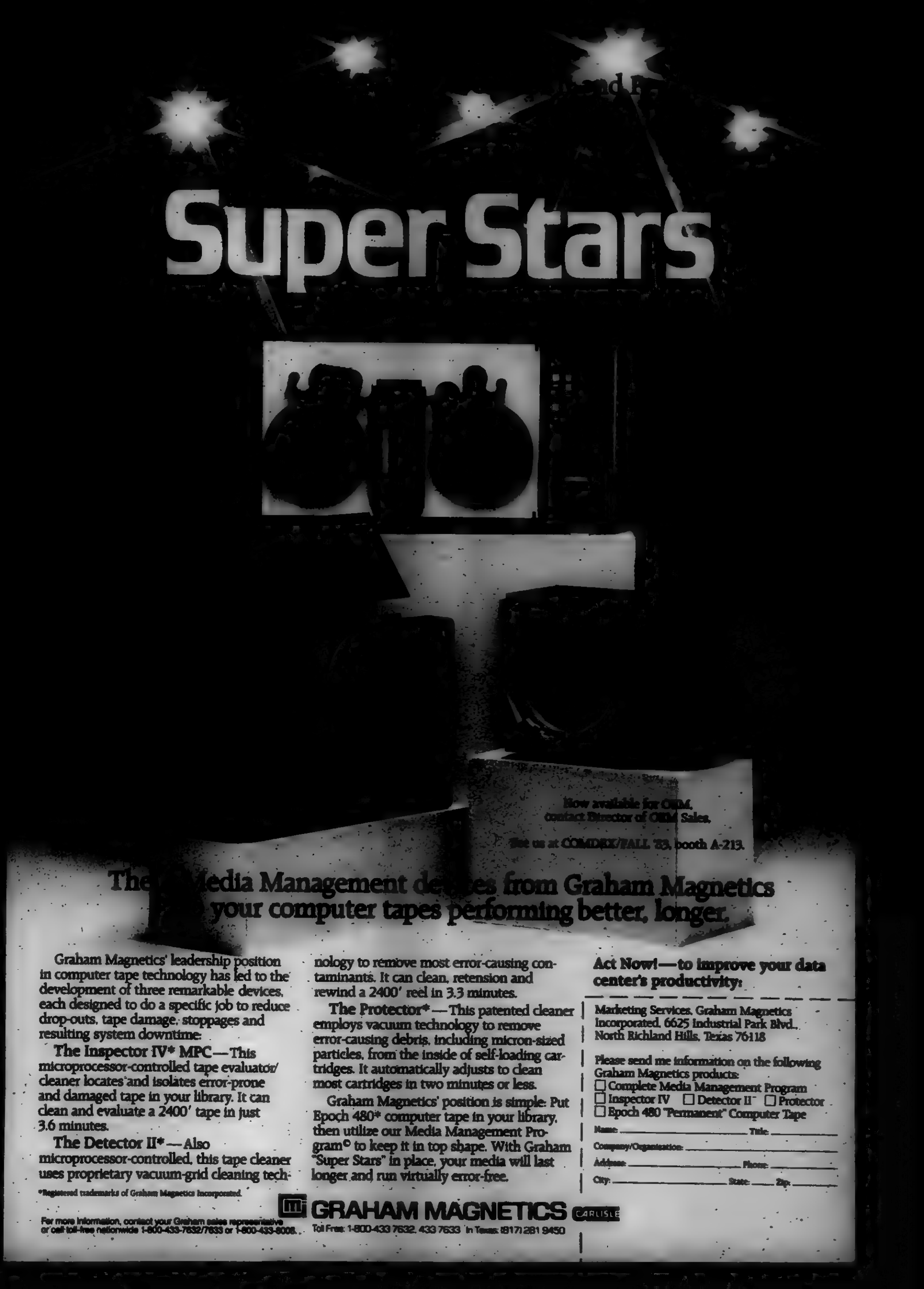

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effect of making long-running activities take even more time. But there is an even greater loss — the integrity of the program being executed.

For example, suppose a long-running activity is to sum up all the payroll for a given pay period. It goes into execution, going from one record to the next, adding up pay. Now suppose that halfway into the execution of the program, the pay calculation is interrupted. A shorter program comes in and does such things as add new employees, delete employees or perhaps change pay balances.

Now the pay calculation activity resumes where it left off. Is the value calculated going to be valid? Perhaps, but perhaps not. What if a new employee was added? What if an employee has been deleted? The integrity of the long-running activity has been destroyed.

Therefore, solutions at an operating system level are stymied at a fundamental level. On-line practitioners that have successfully operated the on-line environment have long known about the standard work unit, something that is violated at a most basic level by relational systems.

Hardware Solutions

In Codd's original specification of the relational environment, it was specified that content-addressable memory be used, rather than conventionally addressable memory.

There are difficulties with this approach, even though it exists commercially today (but not as a major market force).

The first problem is the economics of the situation. Content-addressable memory is expensive because of (among other things) the required customization at the hardware level. But there is even another problem. Even if such memory was cheap, all that it solves is the simultaneous searching of data — it does not solve the processing of the data.

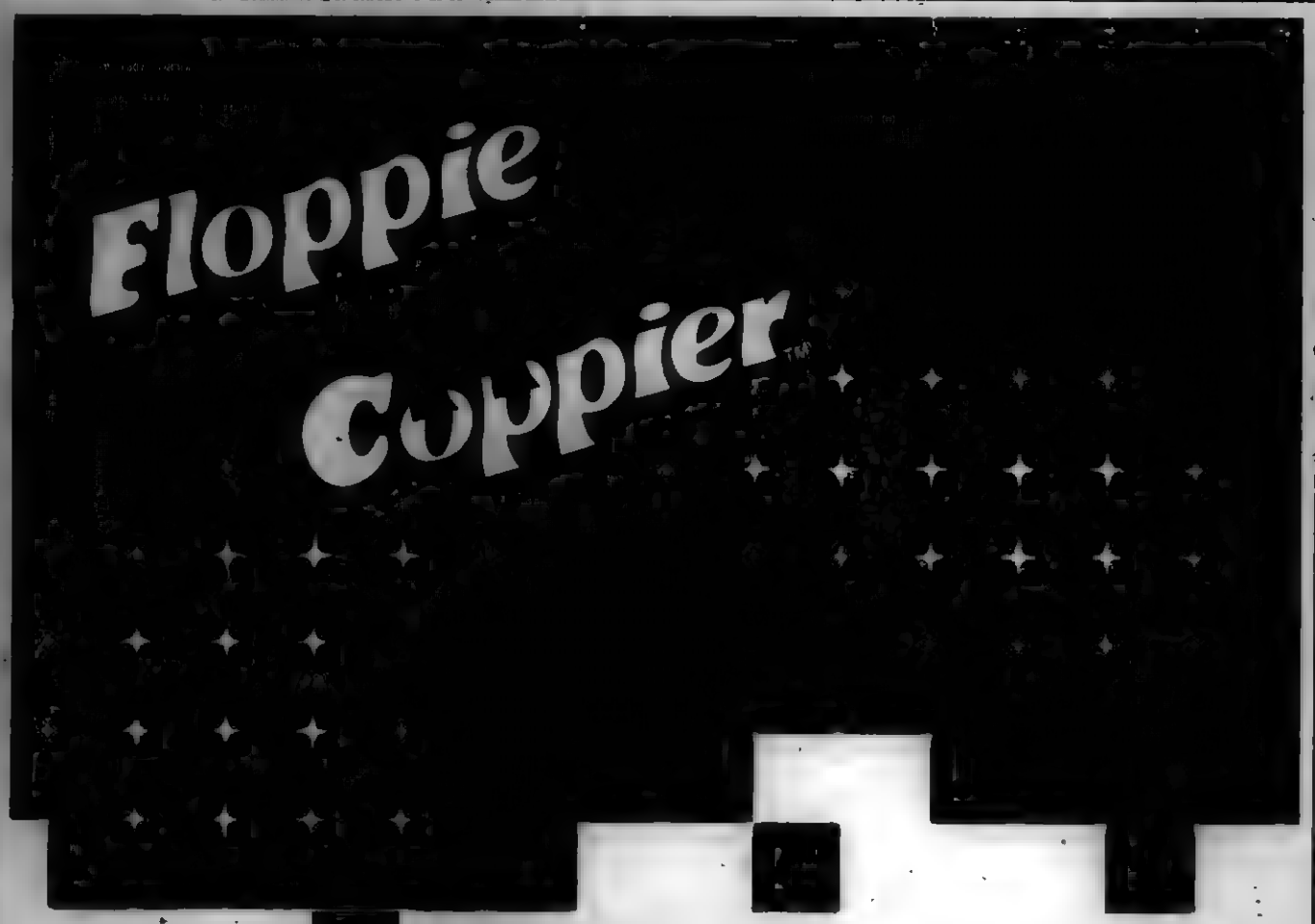
Even if much memory can be searched in nanoseconds, it still is processed single file. To make content-addressable memory effective requires parallel processors as well. At this point, the issues of data integrity become very clouded, not to say the least of the economic issues. If content-addressable memory is not commercially feasible, then coupled with parallel processors, it is certainly economically questionable.

So it appears that if the solutions to I/O lie in hardware, they are a long way (if ever) in coming. Until then, I/O will remain the dominant factor to on-line performance, and relational systems will remain inherently poor performers whenever there is anything more than a very light transaction work load or where there is much data.

Much has been said about user satisfaction, nearly all of it at the syntax level (which is surely important). But syntax represents only one aspect. Whoever says that performance is not an essential ingredient to user satisfaction reflects a batch mentality. Whoever ignores performance issues in the face of the reality of hardware, software and economics faces ridicule.

About the Author

William Inmon is director of Coopers & Lybrand in Denver. He has 16 years' experience in the large mainframe environment as a consultant, data administrator, programmer, manager and system architect.



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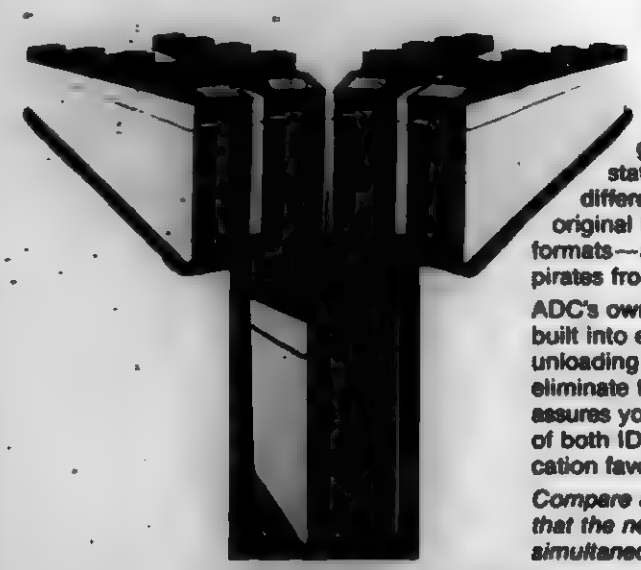

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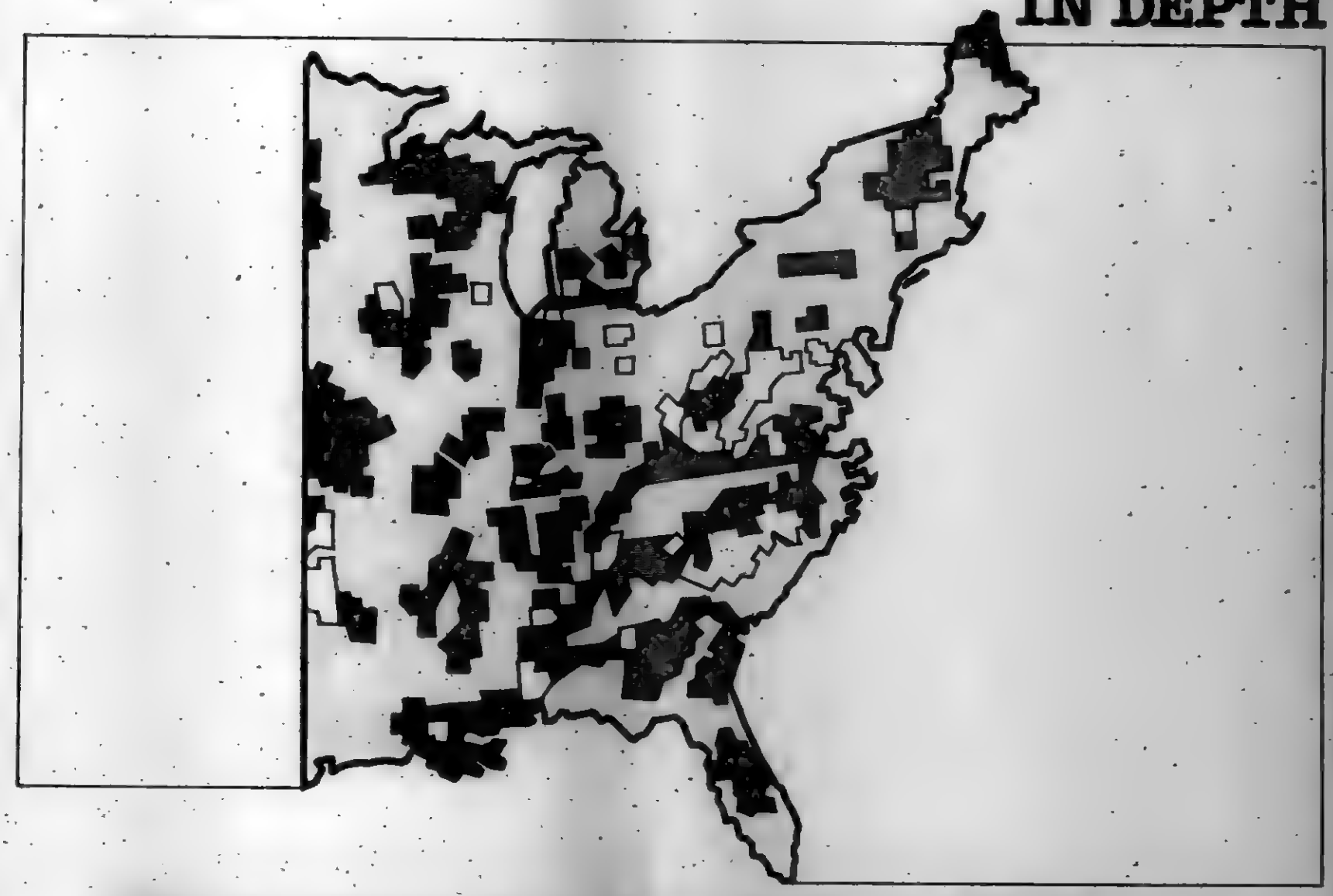

Mapping for Decision Makers

By Richard L. Nicholson

Decision support systems have traditionally conveyed information in tabular form and have not been able to display geographic information as maps. In fact, graphics of any form have only recently been introduced into DSS. But large-scale interactive mapping systems can be developed to suit DSS applications.

Improvements to the user interface focusing on conceptualization and control aids should allow decision makers to use interactive mapping systems as decision support tools. Recent attempts at user-friendly systems such as the Domestic Information Display System (Dids) have shown that development work in this area is both feasible and justifiable. Development in the areas of low-cost inquiry terminals and improved command structures is needed to provide decision makers with a friendly user interface.

Any study of DSS and their relationship to mapping systems should begin with a definition of these two products. A DSS is an integrated system of computer-based products, both hardware and software, that is used by managers to aid their decision making in semistructured decision tasks. A DSS does not replace managerial judgments, but instead aids the manager in making them. This focus does not mean that a computer system is incapable of supplying a single best answer to a managerial problem. If the problem at hand is highly structured and the associated decision-making process can be described in detail before the decision is made, then it is a programmable problem and the system can supply an optimal solution.

Examples of these structured types of decisions are the calculation of accounts receivable, budget analysis and inventory control.

If, however, the decision-making process cannot be described in detail because of the need for nonquantifiable data, then this semistructured decision cannot be made but can be supported by the computer system. Examples of semistructured decisions are the selection of industrial site locations, long-term forecasting and the determination of target product mar-

ket.

Large-scale interactive mapping systems are primarily designed to

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collect, manage and display geographical data. The purpose of these systems is not just the manipulation of maps, as is the function of automated drafting systems, but the management of a large geographic data base composed of graphics as well as attribute information. Every item of data in such a data base has, in some way, a spatial element that ties it to a geographic location.

This geographic association may take the form of a record describing a piece of equipment at a known location, such as a transformer for an electric utility company, or may be a collection of data describing a polygonal area, such as a tree stand for a forest products firm. Due to the interactive nature of these systems, they provide immediate on-line access to their data bases and should be able to support semi-structured decision tasks that require geographic data.

Studies of the decision-making process and of existing DSS have shown that there are common requirements a DSS must meet in order to be effective. The four most often cited requirements are:

1. DSS must provide specific graphical representations to assist the decision maker in conceptualization and a frame of reference for using the DSS (maps, bar charts, histograms).

2. DSS must support multiple paradigms since different types of decisions require different types of decision-making processes.

3. DSS must provide memory aids to the decision maker (for example, an electronic scratch-pad, recall of past reports).

4. DSS must provide aids to help the decision maker control the DSS and facilitate its use as a decision-making tool (for example, English-language commands and error messages, menus).

A common thread running through all four of these requirements is the dependence upon a well-designed "friendly" user interface. The DSS field has stressed research and design on the user interface and has made recent advances toward developing user-friendly systems. Typically, 60% of the software for interactive DSS applications is devoted to code related to the user interface.

Large-scale interactive mapping systems, on the other hand, have not stressed the user interface as strongly as DSS. Software for a typical interactive mapping application will only devote 35% of its code to the user interface. It seems obvious that if mapping systems are to function in a decision support role, the user interface must be much more highly developed.

Due to the heavy dependence upon a well-designed user interface for a successful DSS, the majority of problems reported by current users relate to inadequacies in this area. For instance, existing DSS do not provide the graphical representations that decision makers need for semistructured decisions. Tabular data is entirely adequate as a system response to a structured decision process since a single best solution can almost always be represented in this manner.

However, when a range of alternatives is necessary as a system response, as is the case with semistructured decisions, the provision of graphical representation becomes paramount. If the decision has a geographic ele-

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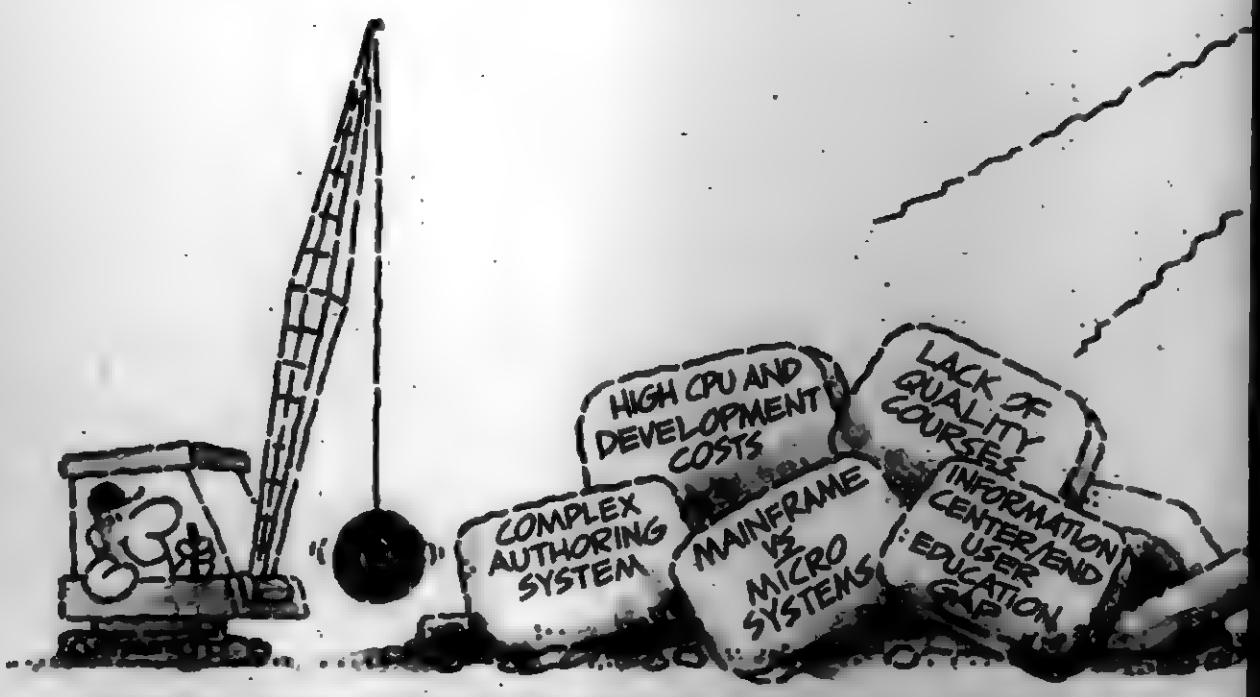

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MAPPING FOR MANAGERS

ment, such as the selection of a new facility site, the graphical representation must be in the form of a map. This problem relates directly to the first requirement of a DSS: the need to provide specific graphical representations.

A second problem cited by DSS users relates to the general "user-friendliness" of the system. The target user for most DSS is the manager or decision maker. Logically, this person should be interfacing with the system directly, without the need for expert advice or extensive training. This unfortunately is not always the case. Many managers employ a consultant or "middle man" to operate the system instead of using the system itself as a decision-making consultant.

This problem is especially acute in instances where interactive mapping systems are being used to provide decision support material. Due to the complexity of the user interface, operators of these systems are almost exclusively individuals possessing a highly technical background, thus effectively eliminating managers as system users. This problem relates to the fourth DSS requirement: the need to provide control aids.

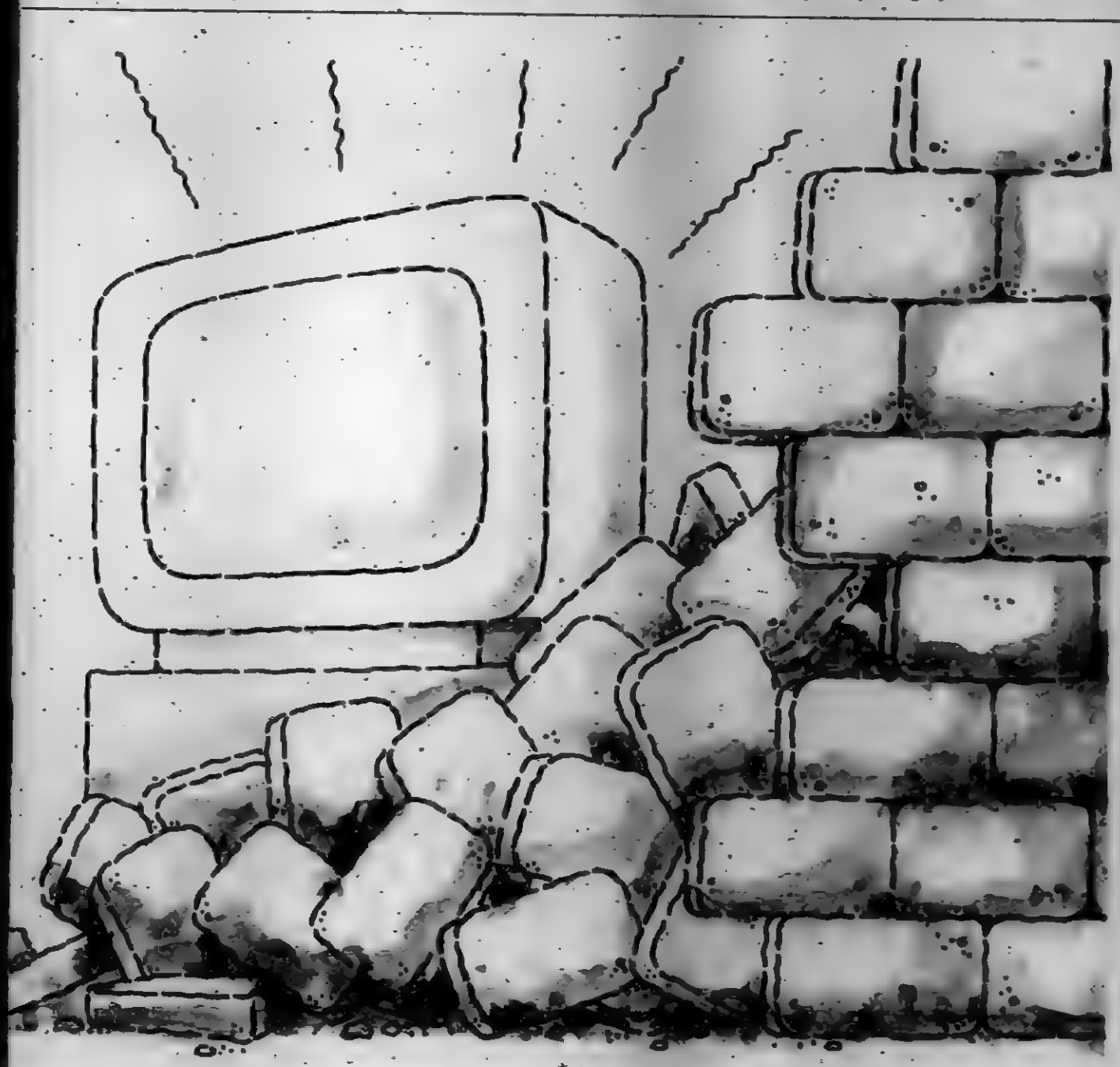
Interactive mapping systems can resolve some of the inadequacies of DSS simply by the fact that they are both interactive and able to display maps. However, in other aspects, they are greatly lacking as decision support mechanisms and need to be developed to meet the requirements of DSS. As previously stated, the requirement that a DSS provide graphical conceptualization aids has not been satisfied by most the current systems.

Interactive mapping systems are capable of providing the user with map displays on a timely basis and, if equipped with the proper software, can generate a full range of thematic and statistical (choropleth) maps.

Managers, when faced with a decision that is spatial in nature, normally use data presented in the form of maps, tables, graphs and pictures when analyzing the problem or selling the proposed solution to the affected parties. The decision maker carrying out these tasks is accustomed to working with ideas presented orally and in a written form on paper, transparencies and slides. If we want to design computer-based tools that will support the decision maker in these tasks, we must consider the characteristics of the intended user and the nature of the tasks carried out. Along these lines, interactive mapping systems must be given the ability to display bar charts, histograms, pie charts and other graphics familiar to managers in addition to the ability to display maps.

Most interactive mapping systems, whether by design or default, meet the DSS requirements of supporting multiple paradigms. A good DSS will not impose process upon the decision maker when a problem is semistructured, thus allowing the decision maker to arrive at a solution independent of system-induced bias. Many DSS ask the user explicit questions, the answers to which determine the next presentation.

Typically, there are far too many possible combinations of user actions to make a question-asking approach feasible. The ad hoc nature of queries and commands presented to users of mapping systems avoids this pitfall,



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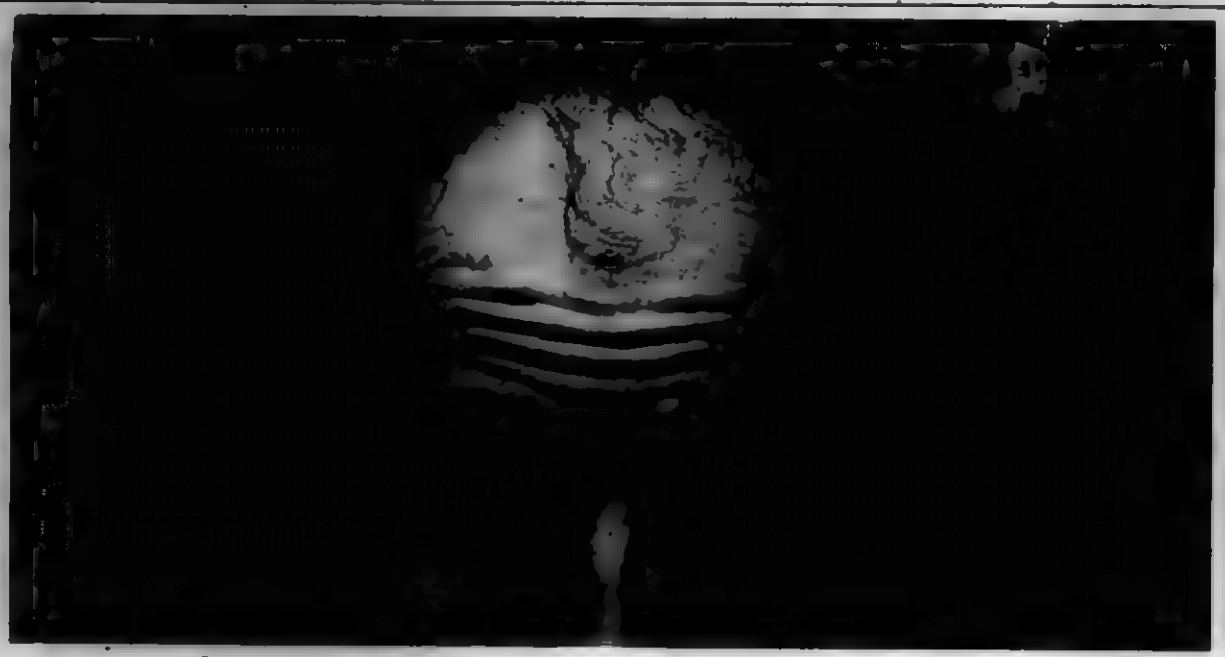
although often at the expense of user friendliness.

The third requirement of a DSS, providing memory aids such as an electronic scratch-pad, can also be satisfied by interactive mapping systems. Systems organized in a manner similar to Synercom's Informap system, where there is a provision for separate working and permanent storage areas, are particularly well-suited to this task. Under this type of organization, the data base is kept in a permanent storage area in which the data can be viewed, extracted for reporting and tabulation, or copied into working storage. No direct modification or editing or data is allowed in permanent storage. Working storage functions as a scratch-pad area where copies of user-defined geographic areas in permanent storage may be placed. Once in working storage the data can edited, added to, deleted and generally manipulated to test results of "what if" scenarios. Data in working storage can be saved for future reference or deleted after a conclusion has been reached by the decision maker using the system.

A manager should be able to sit down at a terminal; query the system for a map using simple place names and terms describing spatial relationships such as size, distance, adjacency; and view the map on the screen. Currently, this ability is not possible with any widely available large-scale interactive mapping system.



Providing control aids, the fourth requirement of a DSS, is an area where interactive mapping systems are in need of vast improvement. Much of the power of a well-designed user interface lies in the capability to present information in a variety of forms.

The same statistical data placed on a map, shown in a graph or shown in tabular format can lead to different user insights. Assuming that a user may want different representations of the same data at different times during the decision-making process, he needs a high degree of control over the presentations. This control must be "high-level" to be attractive to a decision maker since most do not want to interrupt problem-relevant thinking processes to cope with computer-imposed details.

High-level control can be provided through the use of English-language commands, menus or a combination of both. A manager should be able to sit down at a terminal; query the system for a map using simple place names and terms describing spatial relationships such as size, distance, adjacency; and view the map on the terminal screen. Currently, this ability is not possible with any widely available large-scale interactive mapping system.

Error messages are another aspect of the user interface that needs improvement. Managers quickly learn whether a system is a friend or foe when they make errors. A friendly system should give an informative message and provide help in correcting the error. Current use of error messages like "INVALID PARAMETER" means little or nothing to a manager, much less a programmer, and can be loosely translated as, "Something is wrong, and this is a wild guess at what it is."

Attempts have been made to overcome the aforementioned problems and develop a mapping-based DSS. One such example is the Domestic Information Display System, an interactive, menu-driven software system developed by the federal government. The system produces single and bivariate choropleth maps on color television monitors of socioeconomic data by county and congressional district at the national and state level and by census tract for standard metropolitan statistical areas.

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use. A voice can produce a meaningful map using the default parameters in a matter of seconds. More important, it is also easy to utilize the options to alter the color and class intervals, select windows on the data or highlight a particular class.

As previously stated, the decision maker must be given aids to conceptualize the problem, as well as control over system operation. These are paramount to the achievement of a friendly user interface. On a systems level, this interface can be viewed as a function of both hardware and software. The hardware aspect of the user interface may encompass a vast body of components, but for the purpose of this article will be limited to the terminal or workstation.

Virtually all of the large-scale interactive mapping systems on the market today supply workstations as the primary, and often the only, interface between the operator and the system. These workstations are designed for a specific purpose: the entry and editing of a geographic data base. They are also designed for a specific type of operator: an individual with a technical background who is familar with concepts common to the fields of cartography and drafting.

A terminal for DSS applications needs to be smaller and less imposing than the typical workstation. Ideally, it should be desktop size, fitting easily in the decision maker's office environment.

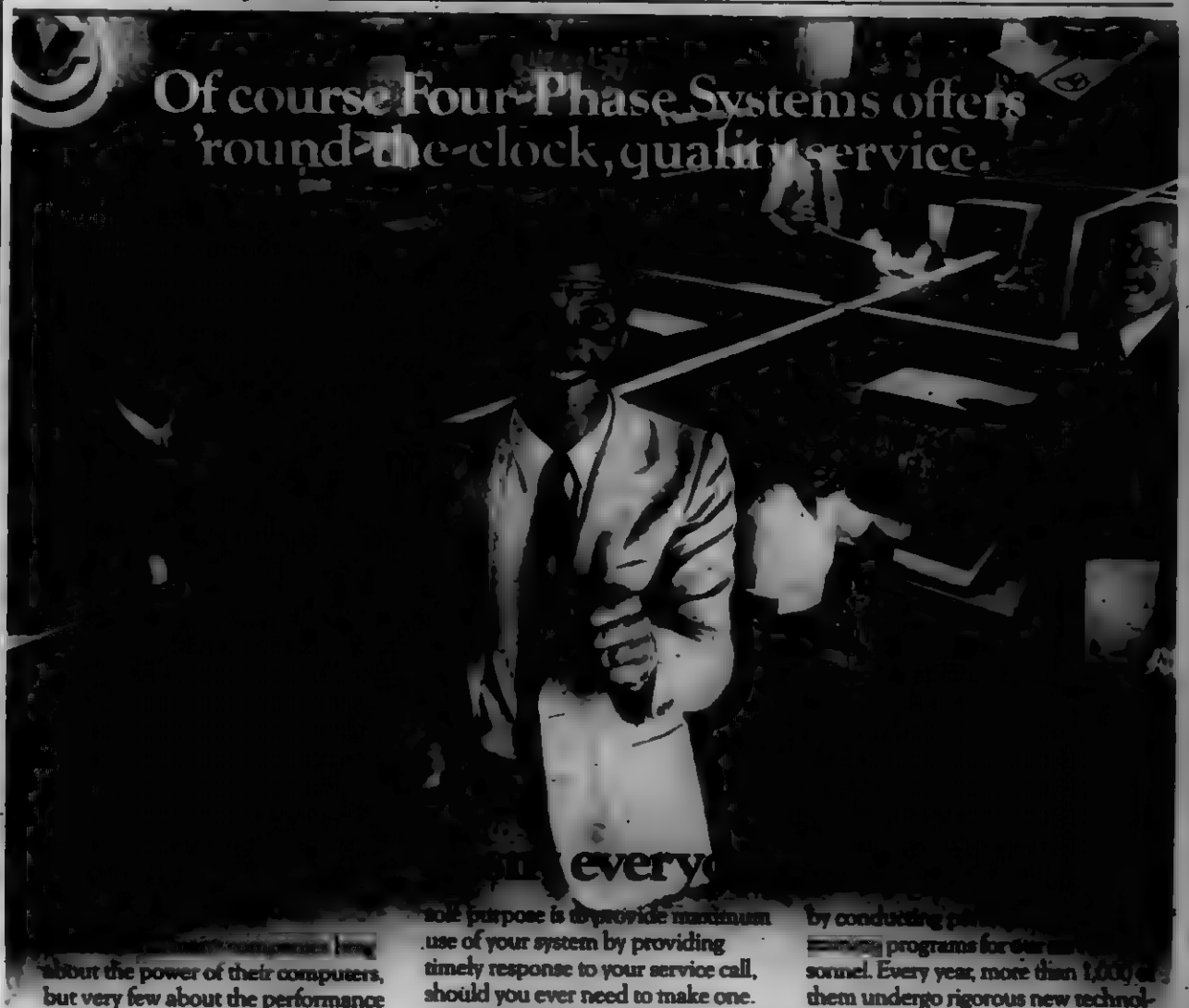
In today's market a typical workstation can range in cost from $50,000 to $100,000. A realistic cost goal for a DSS terminal would be $5,000, with $10,000 being the upper limit based on the amount of local processing involved.

A typical workstation consists of a digitizing table or tablet, a free-floating cursor, a keyboard and two CRT monitors. Recent products have relied upon high-resolution color raster monitors and have included local processing capabilities to offload the CPU. These workstations perform quite well within the bounds of their designed tasks, but are not suited to the type of user interface required of a DSS.

A terminal for DSS applications needs to be smaller and less imposing than the typical workstation. Ideally, it should be desktop size, fitting easily in the decision maker's office environment. It need not feature the sophisticated display capabilities of a typical workstation, but should include a low or medium-resolution color raster monitor on which text and graphics can be easily overlayed.

Like the workstation, the DSS terminal requires local processing capabilities to provide fast response times and the ability to operate as either a stand-alone system or in a network with the main CPU. In this manner, a large number of terminals can be supported without significantly degrading the overall system performance. Since the terminal will not be used for data entry or editing, but will be used to query the data base, a digitizing table is not necessary. However, some form of graphics input device such as a lightpen, joystick or mouse is required to allow the user to interact with the system through use of graphics menus.

Finally, the terminal must be relatively inexpensive. In today's market a typical workstation can range in cost from $50,000 to $100,000. A realistic cost goal for a DSS terminal would be $5,000, with $10,000 being the upper limit based on the amount of local processing involved. A terminal with the capabilities described above, when integrated with an interactive mapping system, could easily satisfy the hardware requirements for a user interface that is



about the power of their computers, but very few about the performance of their service. They make a lot of noise about their hardware and software, but when it comes to service, they clam up, or promise what they can't deliver. Let's face it, very few companies have the resources to offer both a quality product and quality service.

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Managers will not use the decision support resources of a mapping system unless the command structure is clear, concise and easy to learn. The use of menus is one method of providing this type of command structure. Although mapping systems now provide menus, they are still only rudimentary.

friendly enough for use by managers.

Many companies in the computer mapping industry are currently developing low-cost inquiry terminals that conform to the definition of a terminal for DSS applications. While this move is encouraging, development of software for the user interface is lagging far behind development of hardware. Of course, in some respects, software is more critical to the provision of a friendly user interface than is hardware.

Managers will not use the decision support resources of a mapping system unless the command structure is clear, concise and easy to learn. The use of menus is one method of providing this type of command structure. Although mapping systems currently provide menus, their development is still at a rudimentary level.

A successful menu approach should be based on a hierarchical tree structure such that the first menu displayed is the most general and allows the operator to select a number of more specific submenus. Each successively lower branch on the menu tree would allow the operator to specify more detailed or application-specific commands. Many software packages for personal computers have taken this approach and have proven to be effective in providing a friendly user interface.

Another type of command structure that has been ignored by the computer mapping industry is the use of English-language commands. Commercial software packages for data base management systems typically take this approach by providing a conversational command language that allows the user to retrieve information, design reports and perform arithmetic operations, all with simple English-like vocabulary and syntax.

Common commands in a data base managment system such as SELECT, DATA FILE, DESIGN FORMAT and CALCULATE could easily be applied to a mapping system. Users would then be able to select a given geographic area of interest, choose the colors and symbology for a display and retrieve statistical information based on the nongraphica attributes in the data base. A conversational tutorial, similar to the computer-aided instruction course offered by Digital Equipment Corp. and other suppliers of commercial software packages could be used to teach the manager how to use the mapping system in a self-paced, friendly way.

The computer mapping industry is presently facing the challenge to develop large-scale interactive mapping systems that can be used as decision support tools, as well as for collecting and managing geographic data bases. Research conducted within the managment science discipline has pointed the way for this development and has supplied a wealth of information on the requirements for a successful DSS.

By studying the problems encountered by current DSS users, the mapping industry can avoid many of the common pitfalls attributable to a poorly designed user interface. Pilot projects and studies such as Dids support the premise that the use of mapping systems in a decision support role is not only feasible, but attractive to the user community as well.

About the Author

Rick Nicholson is senior systems consultant for the marketing division of Synercom Technology, Inc., a Houston-based vendor of mapping information management systems.

He holds a master's degree in geography and is currently involved in design and development of mapping applications for the telephone industry. He previously published "Redistricting Cities: The Case of Buffalo, N.Y." for Ontario Geography.

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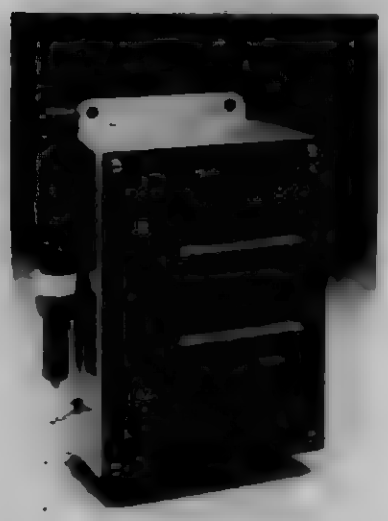

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SPECIAL REPORT

Protecting the Corporate Data Resource

Edited by Tom Henkel and Peter Bartolik

November 28, 1983

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Batch and On-Line Security — One Roof or Two?

By William Pollack
Special to CW‡

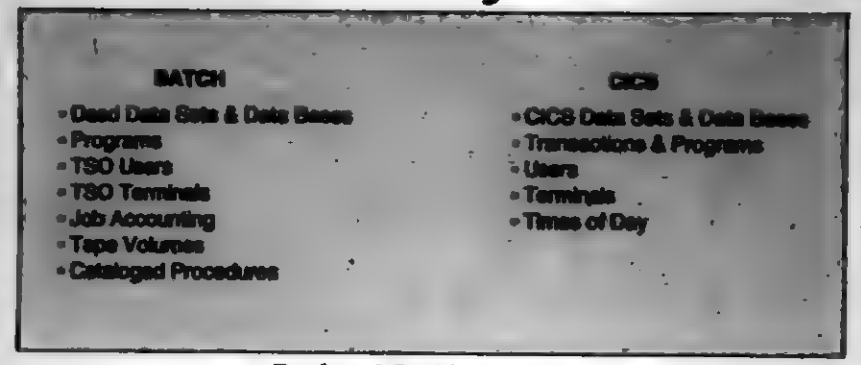
There are trade-offs involved in combining both batch and on-line security under a single roof.

One of the primary decisions that must be made when IBM CICS users evaluate security products is whether to purchase one package for batch jobs and another for CICS, or to attempt to incorporate all security needs under the aegis of a single product. The vendors that claim to address both batch and CICS security within a single product require IBM's VMS operating system.

The acquisition of a single software product for both batch and on-line use presents some obvious benefits. It is certainly more convenient to evaluate, purchase, install, maintain and support one product as opposed to two. Even when two products are involved, it may be easier, and probably less expensive, to deal with a single vendor than to purchase a batch system from one vendor and CICS security from another.

On a day-to-day basis, a single security package should be easier to maintain than two separate ones. In those cases in which a new resource was being added, a single security system maintenance update might be simpler to coordinate and less prone to error than two changes. However, upon closer examination of secured resources, this advantage is illusory.

Clearly the most sensitive resources in most data centers are direct-access files. Without proper security safeguards, anyone can read or update any disk data set. For batch, IBM Vsam passwords can address this exposure at open time.



Batch and On-Line Resources

However, all files that are defined to CICS are usually opened automatically at initialization time, and the protection that Vsam passwords can provide for batch jobs is not available to CICS.

In this case, password protection or a batch security product must safeguard every existing direct-access file to prevent jobs from illicitly updating them. A CICS security product, on the other hand, need only concern itself with those data sets which have been defined to CICS in the file control table or through a data base interface. Only the CICS data sets are common to both security environments.

Furthermore, the desirability of protecting CICS files within a batch security system is not as significant as it may seem.

Perhaps a payroll file, for example, should be read and updated on-line, but backed up in batch.

The uses of the file (read, browse, update, add, delete, allocate, purge) may vary from batch to CICS. Why permit centralized jurisdiction over both batch and on-line uses of the file when their respective functions can be completely independent? The single roof can be more of a headache than an advantage.

Grouped Into Transactions

CICS programs, which are grouped into transactions (the equivalent of batch jobs and steps) are written exclusively for CICS. There is generally no single program that will execute in batch mode as well as under CICS. That means there is a common resource name, "program," but in fact, there are no programs that are common to both batch and CICS.

In this case, there is no advantage in having a centralized security maintenance procedure. Just the opposite may be true, as a generalized system's maintenance may be more cumbersome than one designed specifically for batch or CICS.

There is a clear distinction between batch and CICS programs, so there is no need, and certainly no benefit, to securing them within a single product. When a batch program is added, batch security should be updated. For CICS, the new table entries can be coordinated with a CICS security update. The program and security modifications for batch and CICS are independent of one another and should be kept that way.

Typically, on-line users are assigned names and passwords in advance, which must be supplied in order to sign on at a terminal. Once the sign-on sequence has been successfully completed, a security package can monitor the resources that the interactive user is attempting to access.

While it seems as though we now have a common set of requirements that can be advantageously administered under one roof, this simplistic theory breaks down in practice. Even when a single person is authorized to use both IBM's TSO and CICS, the name and password are not necessarily the same for the two systems, and the capabilities are certainly different.

The sensitive files, programs and other protected resources that a TSO user must be prevented from accessing are undoubtedly disjointed from CICS files and programs. Even terminals are likely to be dedicated to TSO

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Start With Media Maintenance Plan

Maintenance Seen Key to Preventing Data Loss

By James R. Armstrong
Special to CW‡

The loss of corporate data can be rightfully termed a disaster. Depending on the degree, it could force a company out of business or could put a heavy strain on the company's resources.

Businesses, in most cases, carry insurance for the most obvious disasters, such as fires, floods, earthquakes and storms. There is also insurance for business interruption. These are all good coverages and are necessary for a company's survival.

But there are computer-room disasters that happen every day. These disasters come in the form of a "head crash," a dropped disk pack or cartridge, a cinched or stretched tape or a scratched tape or disk.

Maintenance Comes First

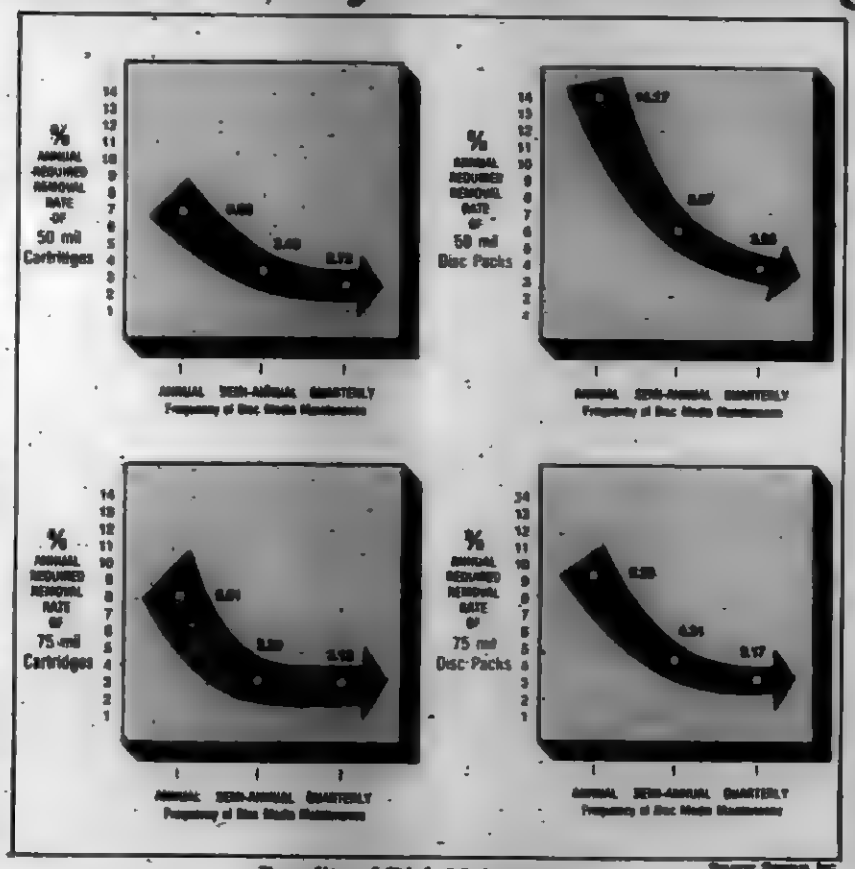
The best data recovery plan starts with maintaining media. In most cases, very little thought is given to making sure that data needed for recovery is there. This protection starts with establishing a recording media maintenance plan.

Magnetic recording tape used on many systems requires maintenance. There are various types of tape cleaners and tape cleaning services. This type of equipment and service provides a degree of protection.

But tape maintenance involves more than loading a reel of tape onto a tape cleaner and waiting for it to cycle its way through the reel.

The tape should be checked to verify that the components are within physical specifications. Often, flanges on the reel crack or are chipped. This causes problems when the tape is wound.

When the layers of tape are wound incorrectly, they press against the side of the flange, causing edge damage to the tape. This damage can be multiplied if the flanges have a crack or a chip. Reels with defects should be replaced before they cause problems.



Benefits of Disk Maintenance

Source: Scopus, Inc.

Tapes also require some sort of container to protect them from dust and contaminants in the air. These containers come in the form of canisters, seals (wraparounds) or automatic-load tape cartridges.

Many times, these containers are overlooked as the source of contamination. However, they do pick up and hold debris, which is then transferred onto the media.

All tape containers should be inspected to see that they are clean. Containers not meeting specifications should be discarded.

A high percentage of media problems is caused by the operator or the equipment. Improper maintenance of tape drives can cause innumerable tape problems. These include scratching the tape and cutting the edges.

Operators who mishandle the media are another problem. Most suppliers offer "care and handling seminars," which are designed to help train the operators. These seminars are usually given to employees at work and are often free.

Essentials for Plan

Operator training, media maintenance and drive maintenance are essential to the formation of a good disaster plan.

Head crashes, perhaps the most dreaded media problem, can in most cases be prevented by proper maintenance of the recording disk. The disk pack or cartridge is extremely sensitive.

The sensitivity of the disk pack or disk cartridge demands that special precautions be taken in handling this media. Operator mishandling or contamination will result in damage to the disk. This can be disastrous because the data, in most cases, is immediately lost.

Hard disk media that does not meet vendor specifications will cause a malfunction of the recording heads, which can result in head-to-disk interference. The head crash will result in loss of data and downtime on the disk drive.

Media Storage

Media storage is another problem. The cost of establishing a secure, environmentally controlled, fire-protected, off-site storage facility has become prohibitive to many companies. There are companies that provide shared facilities for media storage.

The operations manager considering such a service should look for a secure building that is equipped with a complete security system, including a Halon fire suppressant system and an intrusion alarm system.

The facility should also be manned around the clock and environmentally controlled for temperature and humidity.

It should have a controlled system for the deposit and retrieval of media and a courier service for regular pickup and delivery.

In addition, the facility must provide for emergency delivery of media within an agreed retrieval time (usually two hours). The transportation of emergency media should also be made in secure, environmentally controlled vehicles. The off-site storage company should provide a monthly inventory of all media storage.

Armstrong is president of Scopus, Inc., a Lowell, Mass., media storage firm.

Making Plans for DP Disaster Recovery Requires Special Insurance Coverage

By Jack M. Gross
And Alvin Arnell
Special to CW‡

More than 90% of all companies that manufacture and/or depend on data processing systems and experience a serious interruption or injury to their DP operations go out of business after the loss, according to a recent survey conducted by the Chubb Group of Insurance Companies.

A financial institution transfers over $6 billion dollars a day, and a disaster within its computer operation could result in the loss of hundreds of thousands of dollars in applied interest. More important is the potential loss of thousands of customers who could not depend on the facility's services. Then there is the cost of maintaining and utilizing a "hot" site from the moment the disaster occurs.

Using these figures as a yardstick, evaluate the potential loss to your company in the event of a disaster to your computer system. The loss does not mean dollars alone; the loss of the special services and goodwill you provide customers and the inability to deliver merchandise all have an impact on your ability to stay in business.

'Each level of computer system insurance requires a special approach in determining the correct coverage. Minicomputer installations are not insured in the same manner as mainframe installations.'

The risks call for special considerations and coverage by management. General liability, all risk and business interruption insurance do not cover actual computer systems or products. Nor does general liability coverage protect hardware or software or the expenses necessary to recreate vital documentation and software programs.

The risks unique to DP operations require special insurance coverage. DP insurance has to be custom-designed to suit your specific activities and installation, whether on-premises or off-site. Property insurance that covers factory equipment, typewriters, file cabinets and desks does not cover the intrinsic problems of computer processing.

Each level of computer system insurance requires a special approach in determining the correct coverage. Minicomputer installations are not insured in the same manner as mainframe installations.

Quantifying the attendant loss of software, operating systems and data is far more difficult. Your company may have spent years enhancing computer programs, and the personnel-hours necessary to recreate software and programs are many. Most policies will only pay for the blank media loss (a new tape, disk pack or raw film in the case of micrographics) and do not cover the cumulative value of the data stored. Standard policies do not cover the research and programming that would be required to recreate the programs.

(Continued on SR/6)

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DP Disasters Call for Special Insurance Coverage

(Continued from SR/3)

A third generation of the backup cycle, stored off-site and recycled frequently, reduces or eliminates the vulnerability and costs of creating anew, thus minimizing the risks inherent with on-site storage, whether the storage is in the same structure or in another of the company's buildings.

Most insurance companies will reduce premiums if a third-generation set is kept at an off-premises location that is not subject to employee manipulation or computer center disaster. The *EDP Examiners Manual* specifically states that all financial institutions should operate on a three-cycle system.

Computer theft and infidelity is a separate contract and is usually added on to the basic all-risk policy as part of the total insurance plan. Theft and manipulation of data have become greater hazards since the decentralization of computers and the proliferation of mini and micro units that can be readily accessed.

Professional liability protects companies providing DP services to customers. It is a separate and unique category of insurance risk coverage. Service bureaus, software developers, hardware manufacturers, consultants and systems designers have to be protected from malpractice suits filed by dissatisfied clients.

Part of this professional liability coverage is for "errors and omissions," errors in programming that accidentally erase programs or data.

Before insurance is purchased, management should attempt to assess the hazards and the potential dollars at risk vs. the costs of insuring equipment and facilities, employee fidelity, media reconstruction, extra expense, business interruption, errors and omissions, loss of items in transit and liability to customers as a result of electronic funds transfer activities.

With estimates of these costs, management can make reasonable decisions regarding the types and amounts of insurance to carry.

Gross is a partner in Jess E. Gross Co. of New York; Arnell is president of Vault Management Corp., Garden City, N.Y.

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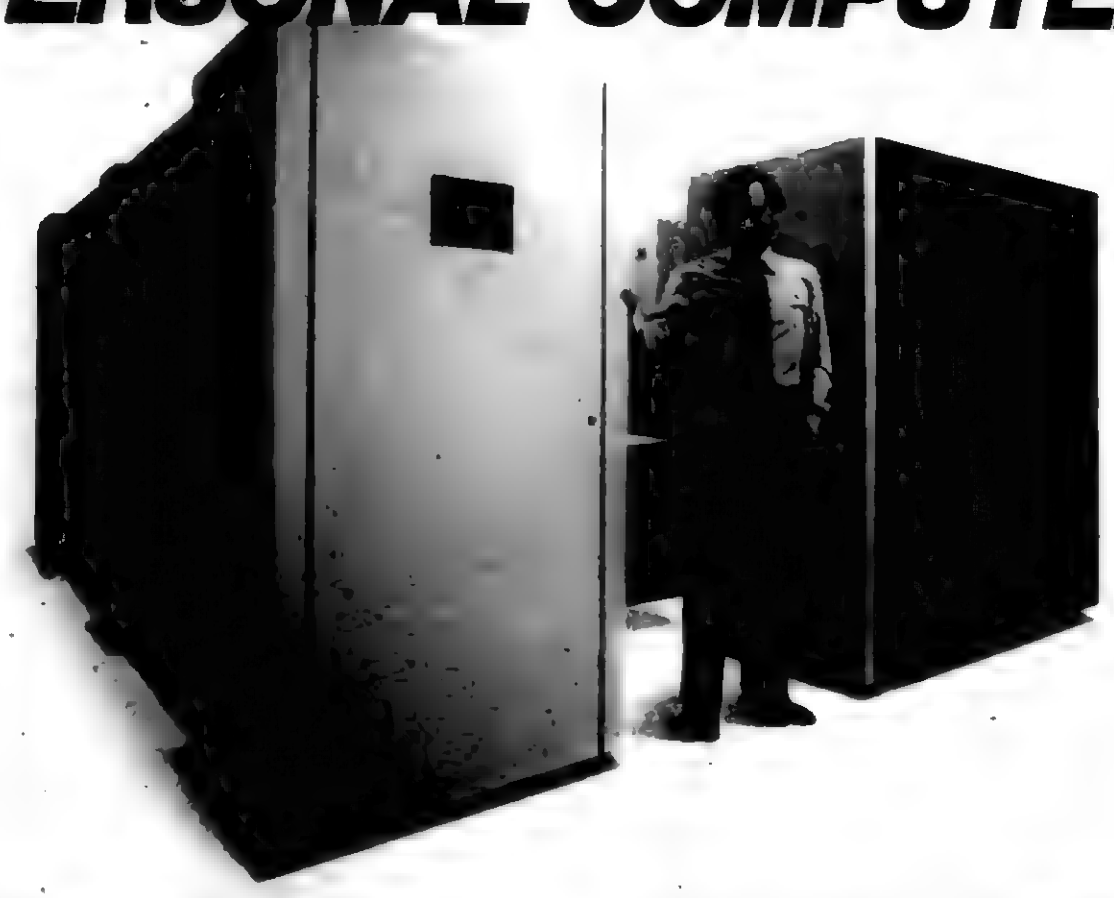

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Trade-Offs Involved In Security

(Continued from SR/2)

or CICS. Thus, the rules or "user profiles" that pertain to TSO and CICS will have little, if anything, in common. Therefore, there is no reason to combine their respective security definitions.

The remaining entries that appear in the accompanying chart (see chart on SR/2) are unique to batch or CICS, and there is certainly no benefit in having them protected by an integrated security system.

Batch jobs can be verified (and billed) by the accounting field on the job card, which has no meaning for CICS.

Tape volumes and cataloged procedures are also unknown to CICS users. Of course the CICS job itself can be protected by batch security rules. On the CICS side, time of day is especially critical in an interactive system, so it must be a resource that can be protected.

In summary, there is a great disparity among those resources that must be protected by batch and on-line access control systems. One of the presumed advantages of a single security mechanism — the ability to maintain resources centrally — becomes a myth. Only the single vendor and reduced price remain as benefits.

Pollack is an assistant vice-president for On-Line Software International in Glen Ellen, Ill.

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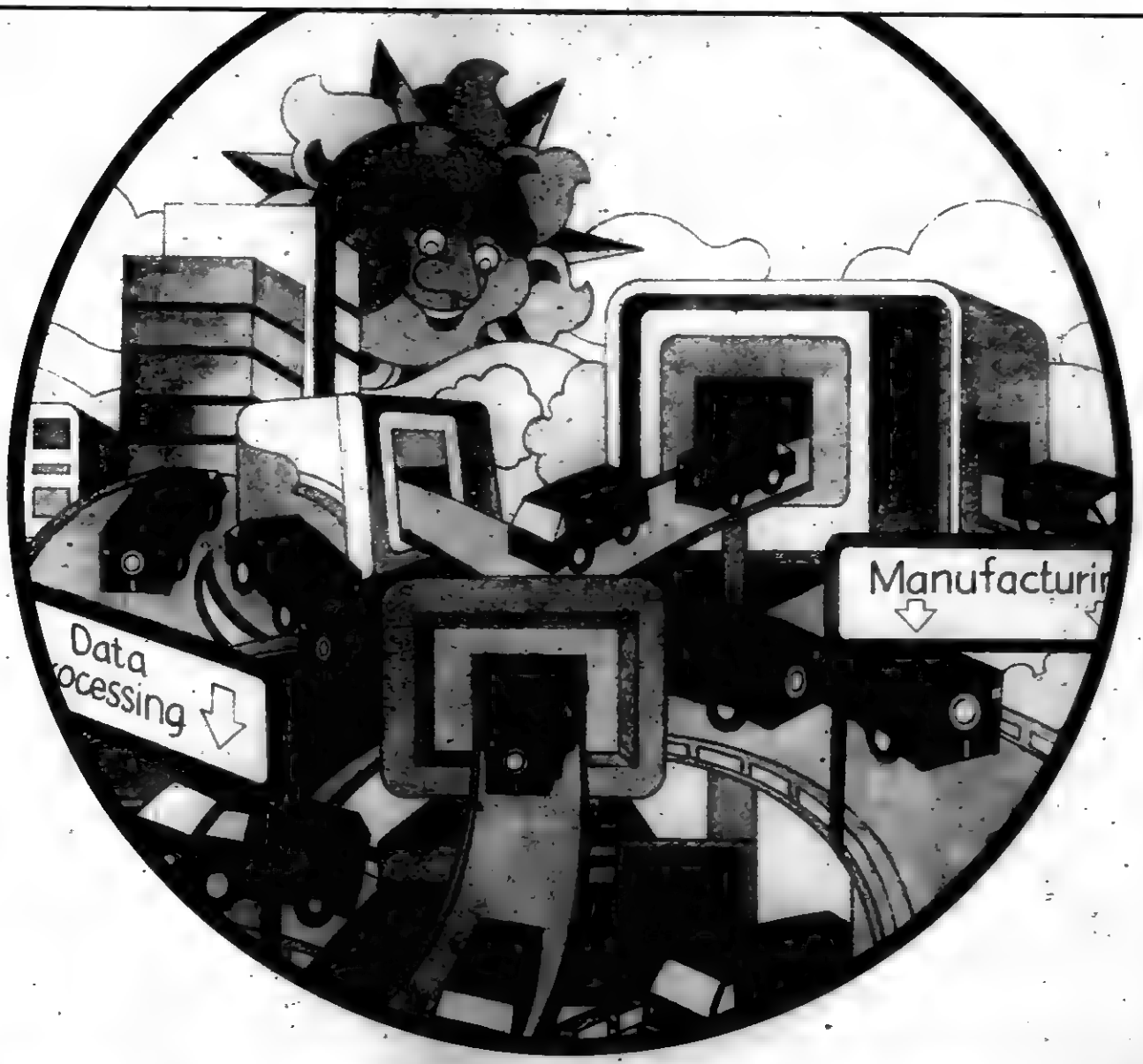

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Distributed Processing Holds Key to Security

By Raymond W. Marshall
Special to CW‡

Today, more users have direct access to microcomputers than ever before. While microcomputers often improve productivity, there can be side effects that jeopardize corporate data.

First, there is the proliferation of those talented, creative computer dabblers known as "hackers," who attempt to — and often succeed in — penetrating data security by tapping into the computer files of numerous corporations.

Second, with the popularity of the personal computer and use of floppy disks, it is very easy for a corporation's entire data base to go home with an employee in a briefcase or even a large pocket. Even in the office, there are many possibilities for damage, at enormous replacement costs, if it is possible to replace the data at all.

Capitalizing on micro proliferation is the goal of thousands of corporations. The ultimate challenge, however, may be tackling the erosion of data security procedures. However, there is an approach that can make this challenge more manageable.

The answer is a single, integrated, controllable distributed processing system that combines the best of present and emerging technologies. Such a system provides a link to a corporation's remotely placed micros and minis through a reliable communications network to a central host processor.

One of the major benefits of distributed processing systems is that they permit fast, inexpensive processing of data at the place where the work is done. This allows more frequent generation of control totals to ensure that files are in order. The control data, transaction files and their modification history can then be transmitted by each separate function to the host computer for further processing.

Another advantage of this configuration is that no part of the distributed system contains the company's total information picture for perusal by unauthorized personnel.

At the central host, the system accepts transmissions from each separate company function where it can test the modification history to ensure that the correct programs were used to generate the control totals.

Host Program

The central host program can then conduct total cross-checks on the data submitted from the separate functions at the distributed processing sites and generate trial balance information. The central host program is the sole place where consolidated data resides. Strong data security measures can be employed to restrict access to that data.

For users who decide to invest in a distributed processing system, there are several points that should be investigated to ensure that the system is secure.

Physical security must be stringent and comprehensive. A crack security team should guard the equipment around the clock. Extremely tight controls should monitor all entrances and key areas. Fire and intrusion monitors should be directly wired to local fire and police stations. An auxiliary power supply should be used when outside power goes down.

The same intense security should guard telecommunications systems. For example, at General Electric Information Services Co., we monitor our network around the clock, constantly scanning to be sure that everything is working as it should.

Tight Data Security

Tight data security is absolutely paramount. Users should be provided with a variety of protections including project and user identification, passwords and encryption, to name a few. Hiring an outside expert to test the security of your system should also be considered.

An unconstrained storage supply is essential. Not only must the capacity stay well ahead of the demand, but the equipment swaps should be done so delicately that there is no interruption or inconvenience to users with critical business programs.

Scrutinize the reliability of potential networks. They should have the capacity of handling present and future traffic, without any interruption and loss of data en route. They should be operational during normal business hours, including the office hours of facilities in other time zones. Be sure the network has the flexibility to accommodate your corporation's existing investment in hardware and software.

Finally, the increasing popularity of micros and minis dictates that the distributed system should be able to accommodate a wide range of terminal devices. The goal should be the

(Continued on SR/9)

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Every Employee Seen as Possible Threat

Personnel Security Policy Critical to Dispel Risk

By J. Van Duyn
Special to CW‡

A realistic appraisal of information security risks inherent in any corporate data processing environment is not complete unless it includes personnel security risks. These risks include every DP employee, ranging from data entry operator to maintenance programmer to management information systems (MIS) manager and director.

Sophisticated physical monitoring systems, security guards, effective systems and applications controls, encryption and internal and external DP auditors make it more difficult for a potential computer criminal to commit fraud, embezzle, sell confidential information, steal CPU time or sabotage the system.

But it is not enough. Unless there is a definitive and enforceable personnel security policy — based on management philosophy and covering everything from hiring, promotion, mandatory annual two weeks vacation to termination — no maximum or even relative information security can be achieved.

Granted that good human resources in the DP field are not easy to obtain; nevertheless, specific procedures for recruiting and hiring, which include conducting background security checks, must be established. Moreover, they are to be observed without exception even when the applicant is a highly valued DP professional such as an MIS manager, data base management systems administrator, systems programmer, telecommunications analyst or computer operations manager.

Three DP professionals — in two different cases — who worked at the DP facility of the University of Maryland Hospital in Baltimore were indicted in 1982 for computer-assisted embezzlements.

'Unless there is a personnel follow-up system to ensure that employees' perfomances and skills are routinely reviewed, updated and considered in a . . . career path, there is always the probability that a disgruntled employee . . . will turn to some form of computer crime.'

One case involved Eugene B. Slear Jr., the hospital's assistant director for DP finance and systems, and a member of his staff, Thomas M. Boyle Jr., a programmer/analyst.

According to the indictment, Slear and Boyle set up a couple of fictitious accounts in the hospital's accounts payable program, and from February 1980 to March 1981 the pair obtained $126,564. In addition, Slear accepted $41,095 in cash and merchandise as "gratuities" from a vendor to whom he awarded a $60,000 software contract.

The $126,564 embezzlement and $41,095 bribery came to light when the hospital's external auditors, Coopers & Lybrand, audited the DP operations. Both Slear and Boyle were arrested in July 1981, and later both men were released on bail.

Subsequently, Slear was found guilty of one bribery charge on which sentencing is pending and is

(Continued on SR/10).

Distributed Parts Are More Secure Than the Whole

(Continued from SR/8)

ability to use a whole range of devices, from relatively nonintelligent printer terminals to CRT terminals, hand-held data entry devices, personal computers and intelligent minicomputers.

Software that allows files to be password-protected should be used to prevent unauthorized personnel from browsing through or modifying the contents of sensitive data bases. Better yet, encrypt the contents of sensitive files and transmit them in encrypted form from personal computers to host processors to prevent intentional or accidental in-transit eavesdropping.

Some degree of separation of duties can be achieved by using distributed software that supports individual user account numbers.

Marshall is senior vice-president, Technology Operations, at General Electric Information Services Co. in Rockville, Md.

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Enforceable Personnel Security Policy Urged

(Continued from SR/9)

scheduled for trial Dec. 5 on a second bribery charge. Boyle, who pleaded guilty on Nov. 19, 1982, was sentenced Oct. 4 to an 18-month prison term, with eight months to be suspended, to be followed by five years of supervised probation.

Had there been a comprehensive personnel security policy in place, the hospital management could have avoided the financial loss and bad publicity. The fact of the matter is that if the hospital would have conducted a security check on the likable and knowledgeable Slear, they would have found that in 1973, he was convicted and served a sentence in Baltimore County for embezzling from a large company where he worked as a bookkeeper. [CW, May 31, 1982].

Just a year earlier at the same hospital, Barry Wyche, a computer operator hired in late 1980, was charged with embezzling $40,000 by submitting false invoices to the hospital's computer system [CW, Feb. 2, 1981]. He was caught by his alert supervisor in January 1981 and subsequently indicted, convicted and sentenced to serve five years in the Maryland Division of Corrections.

After Wyche was arrested, the hospital officials were chagrined to learn that the man not only had a criminal record, but that he was on probation for an identical offense when he was hired by the hospital. [CW, April 13, 1981].

Installed Security Checks

As is usually the case, after these two "incidents," the hospital hurriedly instituted background security checks for all its DP personnel and tightened the internal controls in its financial systems.

Now, a background security investigation that includes contacting the applicant's work references, checking with the proper authorities (meaning the Criminal Records Clerk's Office) and verifying the applicant's school records will eliminate DP staff with criminal records and phony degrees.

However, unless there is a personnel follow-up system to ensure that employees' perfomances and skills are routinely reviewed, updated and considered in a well-structured career path, there is always the probability that a disgruntled employee (without any previous criminal record) will turn to some form of computer crime.

An example is Lloyd Benjamin Lewis, the assistant operations officer at a Los Angeles branch of Wells Fargo Bank. He funneled some $21.3 million out of the bank (between September 1978 and Jan. 23, 1981) and into the hands of his mentor, Ross Eugene Field, also known as Harold J. Smith. He was able to accomplish this grand embezzlement by "fooling" the bank's computer system and also by not taking a vacation for over two years — something that went unnoticed by his superiors.

On Feb. 3, 1981, Lewis went to the nearest Federal Bureau of Investigation office and turned himself in. On June 1, 1982 Lewis was convicted and sentenced to five years in federal prison [CW, Aug. 17, 1981].

Defines Policies

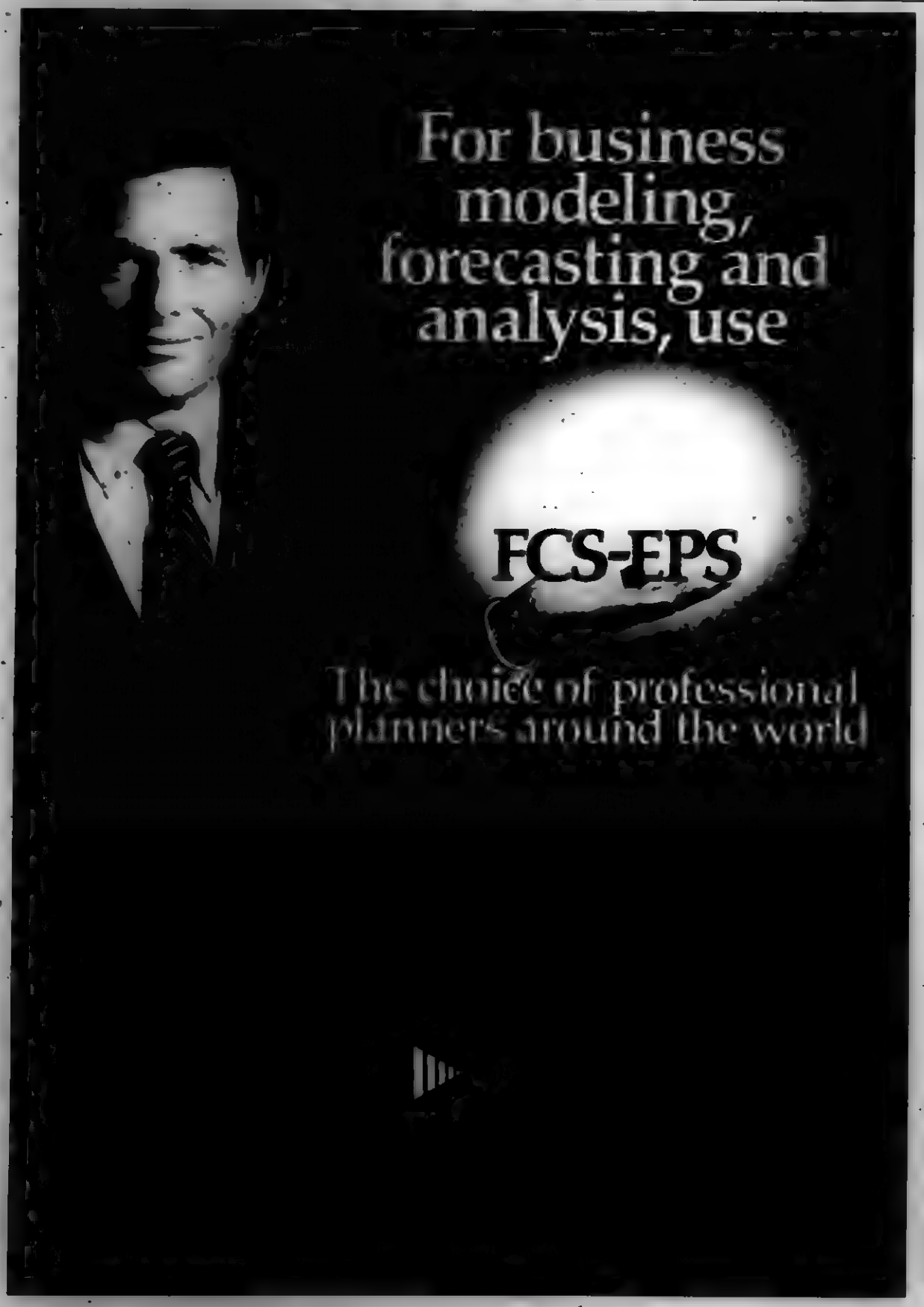
Furthermore, an effective personnel security and follow-up system does more than just prevent knowledgeable, productive DPers — who might possibly turn into disgruntled employees — to languish in low-level tasks. It also defines policies and procedures aimed at protecting corporate DP resources.

To begin with, it helps to have top management who is aware that DP personnel is one of the most valuable corporate resources and consequently is willing to view personnel as individuals rather than commodities. But if this prerequisite condition does not exist, it is up to the DP auditors and MIS manager to persuade top management to call in reputable management consultants who specialize in personnel security-related job evaluation/comparison systems to conduct in-house seminars.

The MIS manager can minimize, if not completely eliminate, job frustration and consequent possible security threats by communicating with his staff on a one-to-one basis. Thus, if a DPer shows any sign of discontent with the job by being absent too often or being persistently late for work or being less productive and/or less efficient than usual, the manager should talk to the employee as soon as possible. In the privacy of his office, the MIS manager can then try to find out what is bothering the employee.

And more often than not, the manager, by communicating directly with the person, has a good chance of resolving the problem and thereby removing a possible security threat.

Van Duyn is a DP management consultant in Loomis, Calif.



Jargon Identifies Criminal Data Access Methods

By Peter J. Haigh
Special to CW‡

Computer fraud has already taken a $100 billion toll on American business, and only 15% of detected frauds are reported to law enforcement officials.

Most computer crime involves neither technical sophistication nor modification of the actual programs. It is not the computer itself causing the problems; it is the lack of attention to what needs to be done in a changing environment.

As computer crime becomes more sophisticated, a new jargon has developed to identify various automated criminal methods.

Management should become familiar with these terms in order to identify and correct any potential problems before they become major disasters.

Data Diddling is by far the simplest and most common method used in computer crime. It involves changing data before or during input, which can be done by anyone having anything to do with creating, recording, transporting, examining or checking data.

For example, one might forge or counterfeit a document, exchange a valid computer tape disk or diskette with prepared replacements and neutralize or avoid manual controls.

The Trojan Horse method refers to extra statements being placed in a program so that the computer will perform unauthorized functions without altering those tasks for which the program was intended.

This is a very common method in computer-based frauds and sabotage and one of the most difficult to detect, requiring a very high level of technical DP knowledge.

A Logic Bomb is a set of instructions inserted into a program and processed at the appropriate time to execute unauthorized acts. In one case, instructions were inserted in the Trojan Horse method to reference the computer's day clock and execute on a particular date. When the date arrived, the instructions were activated, causing the erasure of an entire personnel file.

Salami Techniques are an automated form of crime involving the theft of small amounts of assets from a large number of sources. For example, with a demand-deposit accounting system in a bank, the program could be changed to reduce randomly a few hundred accounts by 10 or 15 cents and then transfer the money to a special account where it can then be withdrawn through normal methods.

Transactions of this magnitude are generally not reviewed by anyone, and since everything would be in balance, there would be no indication of a problem.

The salami technique can also be used in conjunction with a rounding method.

For instance, when interest calculations or payroll deductions are done, the rounding is all put into one account.

Data Leakage involves the removal of data or copies of data from a computer system. Several techniques can be used to leak data from the computer system. In some sophisticated situations, data has been combined with otherwise innocuous data and removed from the facility.

On the other hand, where corporate executives or planners are using microcomputers for their short- and long-range planning, a general lack of security or carelessness could open the way for highly confidential data on diskettes to be purloined.

(Continued on SR/12)

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Language Identifies Criminal Data Access

(Continued from SR/11)

copied or lost.

Scavenging is a method of obtaining information from jobs left in or around the computer room. Physical scavenging involves searching through trash barrels for copies of discarded computer listings or carbon paper. More technical and sophisticated scavenging involves searching through residual data left in the computer after a job has run. For one reason or another, the data stored in this temporary storage area was not completely erased, thus making it available to the sophisticated scavenger.

Accessing these files now and again can result in some very useful information. Recently, at a time-sharing service in Texas, a computer operator noticed that one particular customer would always request a "scratch" tape be mounted on a tape drive.

When he mounted the tape, he noticed that the read-tape light would always come on before the write-tape light, indicating that the customer was reading data from a temporary storage tape before he had written anything on the tape.

After a while, the computer operator became suspicious and reported it to management. A simple investigation revealed that the customer was engaged in industrial espionage, obtaining seismic data stored by various oil companies on the temporary tapes and selling it to other oil companies.

Physical Piggybacking involves an unauthorized individual, usually with his hands full of computer tapes, waiting for an authorized individual to open the door to the computer area and then following him in. Turnstiles, man-traps or a station guard can prevent this, but are seldom used. (A man-trap is a double-doored closet through which only one person can move with a single-key action.)

Electronic Piggybacking involves issuing system access on the basis of a password or other protocols. The trouble begins when a remote terminal is connected to the same line as the on-site terminal through the telephone-switching equipment and used by someone other than the designated operator; the computer senses only one terminal and one "authorized" user.

Strictly enforced procedures for issuing, changing and maintaining passwords or protocols will help avoid some of these dangers. Also, an automatic "time-out" of inactive terminals will help restrict access to unauthorized users.

Superzapping — Most computer systems have utility programs that execute quick fixes to data files or programs intended for use by key systems personnel. At a New Jersey bank, the computer operations manager used this utility program to correct some errors (at management's direction) in the demand-deposit accounting system's program.

He discovered how easy it was to make changes and proceeded to do so on behalf of himself and several acquaintances. By transferring funds from other accounts rather than making unilateral changes, the perpetrator was able to avoid detection until customers began noticing shortages in their accounts.

Does it appear that there are more issues than answers? Maybe that's because the need for answers will only follow a need for these issues to be addressed. Controls that limit access and provide a means of detection will take time and cost money.

Haigh is director of management consulting services with Main Hurdman, Certified Public Accountants, in Pittsburgh, Pa.

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In Operational Downtime, Losses

Environmental Control Could Save Millions

By Haus F. Levy
Special to CW‡

An environmental failure in an airline's reservations computer facility resulted in the loss of millions of dollars in a single day. A commodity exchange lost $500,000 in a single afternoon due to computer room downtime caused by a faulty cooling system. A stock exchange lost $4 million in a single day for the same reason.

With computer room hardware and software costs now exceeding $2,000/sq ft, an investment of $4 million for a typical 40- by 50-ft facility is commonplace. The potential loss of the use of a facility involving an investment of this magnitude demands careful selection of support equipment in order to avoid operational downtime and resultant business losses.

Reliance upon comfort air conditioning or otherwise inadequate cooling, filtration and humidification can cause any one of a number of environmental failures with resultant computer and peripheral downtime.

These environmental failures include system safety shutdown; read/write errors; head-to-disk interferences; head crash; temporary or permanent chip failure; connector interrupts and short circuits from silver migration; tape surface deterioration; condensation within equipment; corrosion; gibberish processing; hot spots; gold scavenging and intermittent or premature failure of printed-circuit boards.

To avoid these problems, computer room environmental control systems should have high cooling and low moisture-removal capacities to meet or exceed the requirements of computer and peripheral manufacturers. Thus, the system should be capable of maintaining temperature and humidity consistently throughout the room, while keeping both people and equipment comfortable.

Environmental systems should also be modular, so as to be easily located or relocated for maximum efficiency and economy as dictated by reconfiguration and expansion of the computer room.

Important Features

Wide-opening, easily removable doors to provide for quick service should be a design feature. System components selected for long life, such as low-vibration, fully hermetic compressors, are other features to be sought. Easy-to-reach components of standard, locally available design should be required, as well as a supplier with computerized access to records to afford speedy parts replacement.

Essential, too, are computerized controls that monitor and maximize energy savings. These should include fault-monitoring systems with memory and audible alarms along with temperature and humidity displays. Also highly desirable is a remote printer for hard-copy monitoring of all environmental operations.

One of the chief causes of computer room failure is reliance upon improperly designed environmental equipment. Yet avoidance of such hazards is easily accomplished — and with operating cost savings more than equal to the cost of the equipment.

For example, common electric or quartz humidifiers can cost as much as $80,000 over a 10-year period. Task-

(Continued on SR/15)

	ADM 11	ADM 12	ADM 24E
Programmable Function Keys	4 (Shiftable to 8)	16 (Shiftable to 32)	16 (Shiftable to 32)
Non-Volatile Function Keys	Optional	Standard	Standard
Function Key Legends on 25th Line	From Host	From Host	Standard Non-Volatile
No. of Pages of Display Memory	1	1	2 or 4
Display Memory Configurations (Plus 25th message/status line)	24 lines by 80 characters	(2) 24x80 or (1) 48x80 or (1) 24x158	User-Definable up to 96x80
Scrolling	Standard Scrolling	Smooth, Jump or Horizontal Scrolling Split Screen	Smooth or Jump Scroll Split Screen
Transmission Mode	Conversation Mode	Conversation or Block Mode	Conversation or Block Mode
Editing	Limited	Full Editing & Protected Fields	Full Editing & Protected Fields
Visual Attributes: Reduced Intensity, Blink, Blank and Reverse Video. Underline also on ADM 12 and ADM 24E	3 Embedded 1 Non-Embedded	5 Embedded or Non-Embedded, plus Full Screen Reverse Video	6 Embedded or Non-Embedded, plus Full Screen Reverse Video and Highlight
OEM Flexibility	Modifiable Set-Up Characteristics	Modifiable Set-Up Characteristics & Personality	Modifiable Set-Up Characteristics, Add to Program in ROM or Down-Line Load in RAM (56K ROM or RAM. Plus up to 22K Display Available) Room for add'l Logic

line print, transparent print, and display and print. There are four programmable function keys (shiftable to eight). And two levels of setup mode to reduce errors while still giving the operator maximum flexibility.

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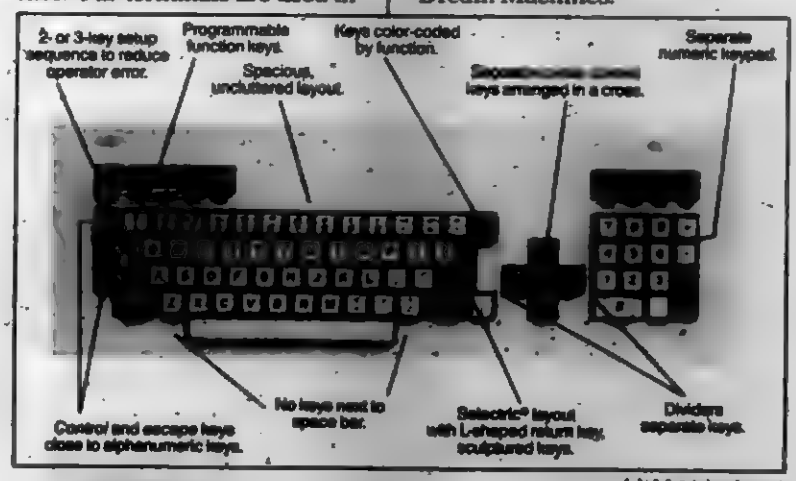

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Socially Acceptable to Steal Software Packages

Programs Seen Most Vulnerable to DP Piracy

By John Hurst
Special to CW‡

The concept of computer security, to most of us, automatically suggests the prevention of computer manipulation. There is, however, a much larger area of computer crime in our industry today and hence a much greater need for security to prevent such crime. This crime is the piracy of computer programs.

It is becoming obvious that some people who in their day-to-day lives would not consider stealing money or merchandise from a store have no such qualms about the theft of information. It has become socially acceptable to copy and use illegally programs and packages, which, if purchased, would provide income to their authors and developers. This theft has impact on the systems software house and on many end users who defray costs of development of a software package by selling it to other members of their industry.

But what can the developer really do to protect his investment? Recourse to traditional law enforcement does not appear to be the answer, nor do many of the often-tried protection schemes. Interestingly enough, the most likely opportunity for success in the protection of software appears to lie in a hardware technique. An overview of the current protection methods will make this clear.

Copyright laws have thus far been virtually useless in guarding software. This is, to some degree, a result of the relative cost-effectiveness of pirating programs vs. stealing written material. A book is cumbersome and costly to photocopy and not worth the effort; computer programs, however, are typically designed for a more limited market than books and are more costly, and because they are read by a machine, they are simple to copy. The temptation is almost too great to resist.

Overwhelming Problems

The temptation is bolstered by the relative impossibility of making copyright laws work for software. To date there has been no clearly successful copyright infraction suit because the problems are overwhelming. First, the program's developer must find the illegal copies; next, auditing every case of suspected piracy would be time-consuming, difficult and possibly not conclusive; and finally, even if the software developer has a clear "signature" in his software and can unquestionably establish piracy, it is unlikely that a settlement will enable him to recoup his legal cost.

Other legal means of protecting software are very hazy. Contracts and licenses have been devised to intimidate would-be pirates and aid in their prosecution. It is not clear, however, to what extent such schemes can be enforced.

"Public domain" is also an incipient problem the developer must face. Because knowledge cannot be owned, a developer must guard the source listings for his programs. II

(Continued on SR/16)

Environmental Control Seen Key to Avoiding DP Loss

(Continued from SR/13)

specific process cooling with evaporative pad humidifiers can eliminate this cost entirely because no power is required, and compressor operation is decreased. Similarly, the use of electric reheat instead of "free" hot-gas reheat for dehumidification without cooling can cost upwards of $30,000 over 10 years.

The solution is a task-specific system, which uses normally wasted compressor heat to eliminate these costly energy requirements.

Temperature zones in most parts of the country are below 50 F for at least half the year. Eliminate compressor operation during this period, as can be done with high-quality, task-specific environmental systems, and thousands of dollars are saved each year.

For example, 10-year savings for a 2,000 sq-ft computer room typically range from $150,000 to $175,000.

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Levy is president of AC Manufacturing.

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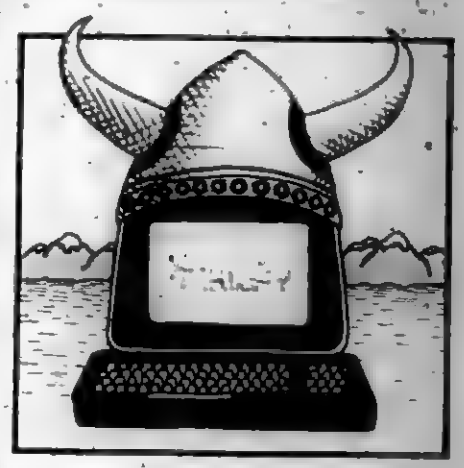

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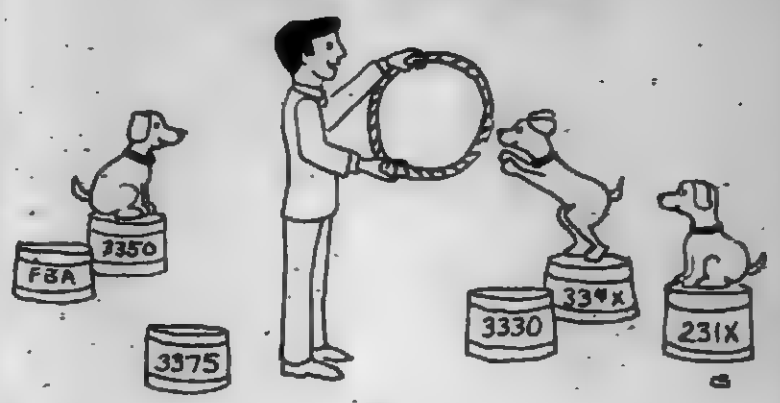

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Encryption Seen Effective Shield to Net Intrusion

By Stephen W. Leibholz
Special to CW‡

Serious workers in the field of computer security now generally acknowledge that the most cost-effective means of reducing the vulnerability of commercial on-line computer systems is the encryption and/or cryptographics authentication of the data flowing over remote circuits such as telephone lines, computer utility networks and packet nets.

The reasons are simple — communications circuits represent the least controllable and most accessible portions of a system, subject to random attack, sophisticated attack and plain old wiretapping; attack on a computer system via communications intrusion now represents fully one-half of the avenues of entry used by computer thieves; and intrusion by communications entry is relatively anonymous, cheap, remote and — most importantly — difficult to prove.

Consequently, these serious workers, as a class, have come to recognize that whatever security and auditing software is incorporated in the host of a computer network, encryption and/or authentication of the communications is a sine qua non of effective protection. And passwords are of almost no benefit.

Recognizing this need for effective protection, the government responded several years ago with the release of the Data Encryption Standard (DES) for commercial applications. DES is an encryption algorithm that uses both substitution and transposition to produce encrypted text from an original message. A 56-bit key (plus eight check bits) is used to control a given encryption.

DES is the first thoroughly tested and demonstrably strong cryptographic technique for commercial applications which has survived the rigors of code breaking by some of the best mathematicians in the world. Despite the fact that DES, as a mathematical technique, is far superior to other data protection methods presently available for commerical communications and networks and despite the fact that the computer security threat is growing at an exponential rate (approximately doubling every 2½ years) — the critics of DES are legion.

A frequent comment is that DES has been made deliberately weak. Commentators have hinted darkly at weak keys or "trapdoors," which, once discovered, will render DES as decipherable as "Run Spot Run." These commentators, some of whom regrettably have their own algorithms to put forward, are missing the point. There is indeed an Achilles' heel in many cryptographic protection systems, but it has nothing to do with the mathematics.

The 56-bit DES key represents a good design for commercial practice. Assuming that the cryptographic key is changed at least once a day, intruders would be faced with the task of testing 2^{56} possible keys in less than

(Continued on SR/18)

'DES [Data Encryption Standard] is the first thoroughly tested and demonstrably strong cryptographic technique for commercial applications which has survived the rigors of code breaking by some of the best mathematicians . . . [but] the critics of DES are legion.'

Computer Program Piracy Seen Serious DP Crime

(Continued from SR/15)

they are released, the programs are in danger of becoming public property. Lawyers are busy advising clients on the correct messages to include in their packages in order to prevent the programs from becoming public domain; unfortunately, no two lawyers seem to have the same opinion on such disclaimers.

Those who develop programs have invented a number of in-house software and hardware schemes to secure their software. The methods vary considerably, but there can be little doubt that there are few areas of the computer business that have received such great attention.

One notable example of a protection system too complex to be effective is found in the so-called copy-proof formats. These formats have generally been designed for microcomputers and involve an obscure way of putting data on the disk, which would interfere with the standard copy program used by a pirate.

Format Problems

The major problem with the formats, however, is that copying is also difficult or impossible for the legal customer, making systems backup very costly. And copy-proof programs are not unbreachable; the programs must be readable in order to be read into memory for operation.

A protection method that has become known for its use on the Digital Research, Inc. CP/M operating system is serialization. To serialize, some unused information is generally written into the middle of the program, which allows tracing to the person to whom the copy was sold. The idea is to "intimidate" buyers, but it is very hard to prove that the buyer allowed his package to be copied. Also, it's hard to find the copies to begin with, and serialization is a relatively expensive procedure.

Signature techniques are software or hardware devices that are checked by the system in order to allow access. The most often-tried are simple code signatures, which must be entered from the keyboard to allow the package to run. These, however, can be easily distributed by the buyer of a package to someone he has allowed to copy it and, therefore, offer no protection from unscrupulous customers.

The best potential protection devices are hardware signatures. These "black boxes," which plug into the computer, are individual to each buyer, but are controlled by the software supplier. Thus, there is no danger of the software being copied since it will not operate without the epoxy-sealed key, and this key cannot be easily reproduced. At the same time, unlike copy-proof systems, the software can be copied by the authorized buyer.

These problems, however, look very small when compared with the far more insurmountable drawbacks of other methods. Hardware signature devices offer the software developer sure protection for a small cost.

Hurst is a senior member of the technical staff at Point 4 Data Corp.

Data Encryption: How to Find The Right System

By Stephen Hicks
Special to CW‡

Finding the right data encryption system is not hard. Computer security systems are ready now for practical implementation, and the information needed to evaluate them is easily obtained.

No coding system can solve every computer security problem, but many systems can help reduce headaches. A basic rule is to use conservative and easy-to-use codes that have withstood repeated attacks by experts. Avoid experimental codes or codes with secret algorithms.

Most commercial uses will require:

- A computationally unbreakable code.
- A fast, easy-to-use management system.
- Portability over different computer operating systems (including communications security).
- Security that is key-depen-

(Continued on SR/20)

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Equal in Importance to Mainframe Safety

Developing a Disaster Recovery Plan for Micros

By Chris Oakleaf
Special to CW‡

Eventually it happens to everyone. You've been running for two hours without executing a save, and, whamo, the power fails, the line gets dropped, the system crashes, and you have to recover. So you reload what you were doing and start from scratch.

And how about the time someone dumped an ashtray with a lit cigarette into the trash. The printouts nearby went up in flames, and you had to have them reprinted.

Today, with the proliferation of personal computers, that trash fire could wipe out your inventory of floppy disks. If you have generated several trays of floppies and you expect to start from scratch, you had better realize that it will take you about as long to get where you are now as it took for you to get there in the first place.

Presumably you are in an environment with an existing mainframe. If so, your data center should, by now, have system backup and disaster recovery operations as a part of its day-to-day activity. The center at The Continental Group, Inc. in Stamford, Conn., does, so the company took advantage of existing mechanisms to provide the IBM Personal Computer user with disaster recovery, be it from fire, flood, sticky fingers or spilled coffee.

There are three pieces to the mechanism that was put in place at The Continental Group.

The first piece is VM Personal Computing, Inc.'s VM/Relay. This provides a menu-driven capability for sending unconverted data through a Hayes Microcomputer Products, Inc. Smart Modem to the mainframe. It also receives unconverted data from the mainframe to reconstitute a file or program.

The second piece, also from VM Personal Computing, is called Please. It runs under VM/CMS, and will upload or download files with a minimum of effort.

The third piece was built in-house, using STSC, Inc.'s APL*Plus. It is the controlling portion, which allows the user to track his storage and files. It allows the mainframe end to "talk" to the Personal Computer.

The menu system on the Personal Computer has an integrated Help facility so users may obtain immediate information on any portion of the system. The mainframe portion of the system also has an on-line Help facility concerning any portion of the system. The Personal Computer user may release the mainframe screen at any time to perform relay functions without losing the connection or continuity of operation.

A profile is provided to the user, which automatically dials the mainframe and loads the appropriate operation. The user is prompted to either "Backup," "Restore" or do "Housekeeping" against the files he has moved off the Personal Computer.

If he chooses Backup, he is transferred back to the micro to select the files he wants to move. The menu-driven system requires a minimum of key strokes to accomplish this. Once the files are selected and being sent, the user waits until he is prompted for comments for the files as they are moved into permanent storage on the mainframe. These comments will provide him with a reminder later on, should he happen to forget what his file names mean.

Selecting the Restore option will allow the user to move files off the mainframe and back onto the Personal Computer. He does this using the same "wild card" ability that is available on the micro. Files may be selected by storage date, by name or type or by a combination.

Again, once the user selects the files, the system moves them from permanent storage into temporary CMS storage and then downloads them to the micro.

If the user selects Housekeeping, he may list out the files currently in storage or drop those which are no longer of value.

Other considerations include the option to overlay files of the same name and type, under the supposition that the most current is the only one necessary. This is at the discretion of the user. Presumably, if he chooses not to overlay previous copies, then the comments will provide the vital information required to select the proper version to be restored.

While the system is fairly new, some users have already asked for an expansion that would allow them to move programs from one Personal Computer to another at various locations throughout the country. This provides a distinct savings over attempting to perform the same operation from Personal Computer to Personal Computer in terms of time and protection. For one thing, it eliminates the need to mail diskettes from place to place.

With the substantial investment being placed in the storage of data and programs on the Personal Computer, it is certainly at least as important to be able to provide disaster recovery for this level of system as it is for the mainframe.

Oakleaf is senior time-sharing analyst at The Continental Group.

Contingency Planning Must Begin With MIS

By John P. Murray
Special to CW‡

It seems unlikely that anyone who really understands the pervasive nature of the management information systems (MIS) function within an organization and the critical need to safeguard data and carry on data processing in the event of a disaster could be casual about the absolute requirement for a strong, regularly tested MIS contingency plan.

The reality is, however, that few organizations have effective MIS contingency plans in place. It is also unfortunate that the subject has very low priority in most MIS departments.

Until the person in charge of MIS decides to take appropriate action to put an MIS contingency plan in place, it is just not going to happen.

Developing an MIS contingency plan is not terribly difficult. It is also not terribly exciting. In fact, the process is rather mundane, particularly when compared with the other duties MIS executives deal with on a regular basis.

In addition, the rewards associated with the successful completion of a contingency planning project are usually limited because the occurrence of a severe disaster is rare. Usually, the only reward is in knowing the plan is good and that it is in place.

The essence of success with MIS contingency planning is the same as with any other MIS project. The same project principles apply: Developing a commitment to the project, performing the appropriate planning and offering direction and control make the effort successful.

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(Continued on SR/24)

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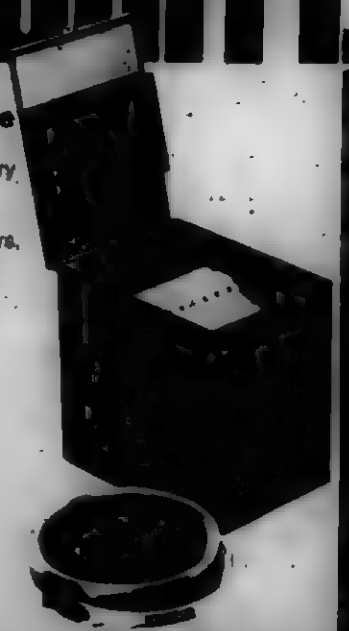

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Micro Protection Involves Physical Security

By Richard Baskerville
Special to CW‡

Security in small business microcomputer systems is often addressed only casually, if at all. Usually, the only security question raised during the introduction of the new microcomputer system is the issue of hardware failure. Rarely do issues of physical security or recovery from failures arise. Actually, the same techniques for protecting larger systems can apply to micros too.

Security of microcomputer systems revolves around physical security. While the system may be a desktop unit, it can still be protected. The placement of the unit in the office should be carefully considered. Wherever possible, it should be in a limited-access area. To the small business, this could be a small room near the operators which can be secured when unattended. If this is not possible, a scheme should be developed which disables the system when unattended. This might be as simple as shutting off power and

(Continued on SR/22)

Encryption Needed to Guard Networks

(Continued from SR/16)

24 hours; a theoretical special-purpose circuit capable of 100M bit/sec encryption could test about a million keys per second — about 86 billion transformations per day. But even this theoretical circuit falls short, by a factor of approximately a million, of the solution for a given key.

The weakness of some DES-based cryptosystems lies not in the mathematics, but in the implementation. The principal risk lies in the methods by which cryptokeys are stored and distributed. Any software implementation in which lists of key variables and other critical data can be accessed through the host computer is automatically vulnerable to attack by time-honored methods.

Even more critical are the methods by which these variables are distributed to the remote users. Good discipline requires that the keys be changed every working day; further good network discipline assigns different keys to different users (or different groups of users).

Key distribution is a problem that can be solved by technical means. Unless automated, the management of keys represents an onerous, boring and expensive overhead activity; the hard reality is that key management practices can — and do — rapidly become lax, and the systems therefore become vulnerable.

One solution involves the principle of coordinating the cryptographic key variable on-line in a protected way. The technique operates as part of the fundamental communications protocols, but does not interfere with existing network protocols and is itself secure from interception by wiretapping or attacks upon the host computer. The Sherlock Information Security System utilizes a three-tiered key management structure and operates entirely electronically.

Authentication Provided

Many user organizations do not require cryptographic protection of their data; in fact, the laws of some foreign countries specifically prohibit secret communications by commercial organizations. For these cases, the same process (and indeed the same hardware) that is used to provide cryptographic protection is used to provide authentication. Authentication of a message is the procedure necessary to assure that the message was indeed sent by the presumed station or person and that nothing was altered in the text.

Security practice requires that every time communications are restarted — in the morning, as the result of malfunction or as a result of interference by an intruder — the cryptographic key or its equivalent should be changed. A well-designed information security system will, among many other subtle details of design, provide for this practice.

DES, properly applied in a communications and computer information security system, offers the most realistic promise of ensuring the integrity of processed and transmitted data in the commercial environment. The supposed "weaknesses" of the DES algorithm are in reality sins of naive application, and a well-designed information security system based on DES can minimize the disasters resulting from the growth of computer crime.

Leibholz is founder and president of Analytics, Inc. He is a member of the Army Science Board and the U.S. Naval Intelligence Advisory Group.

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But Few Companies Have Them in Place

Disaster Cases Show Need for Recovery Plans

Special to CW‡

Although a major data processing catastrophe is something most organizations never experience, there are various degrees of severity for computer center disasters, ranging from temporary malfunctions of time-critical equipment to complete loss of facilities, equipment and records.

Disasters such as fire, flood, environmental problems, hardware and software problems and sabotage can and do happen. Unfortunately, management often tends to ignore these possibilities. If management reviews the impact of DP operations disasters and consciously chooses not to plan for such major disasters, then perhaps the risk is not serious enough to warrant taking precautions.

However, with corporate dependency on computer centers and information processing growing, the more typical situation indicates that when the computer center goes down, all company work is affected.

In today's competitive, fast-moving business environment, the importance of computers and information systems is quite evident. However, it is estimated that less than 50% of the Fortune 1,000 companies have plans in place to ensure continued availability of these valuable corporate resources. In addition, it is estimated that only one-half of the disaster recovery plans in place are workable. For smaller companies, the percentages indicate an even worse situation.

Case Studies

Disasters occur infrequently, thus management may tend to underemphasize the immediate need for a recovery plan. The following three cases, however, emphasize the need for disaster recovery planning:

● *Company A.* A 300W light bulb was left burning overnight in a supposedly fireproof tape vault for a large government computer center. The ceiling material next to the light began to smolder. The next morning when a computer operator opened the vault door to retrieve required tapes, the oxygen from outside the vault caused a fire to ignite in seconds. Attempts to turn off power to the computer center failed because the only power shutoff switch was located in a remote area behind the fire. Fire personnel poured water on electrical equipment that was still running. Before the fire was over, the entire computer center was destroyed.

Three major problems contributed to this disaster. First, the material used in the vault should have been fireproof, not merely fire resistant. Second, the master electrical shutoff switch should have been located near an outside door. Last, the computer center should have been designed to allow easier access by fire personnel. Proper disaster recovery planning would have identified these problems.

● *Company B.* In the early morning hours, a fire started in the warehouse of a medium-size manufacturing company. Before fire personnel arrived, the blaze spread to the administration building of the company. Upon review of the damage, the president of the company quickly realized that most of the company's accounting records, as well as all of the DP system, had been destroyed. The loss put the company out of business.

The major problem at this facility was the lack of a disaster recovery plan and the associated remote site storage of critical and necessary information. With the proper backup facilities and procedures in place, the company could have survived.

● *Company C.* A machine caught fire in the production area of a small manufacturing plant. Because of the close proximity to highly combustible material, fire personnel reacted promptly and efficiently, dispensing thousands of gallons of water into the manufacturing facility. Water also flooded the adjacent administrative offices and the computer center. Fortunately, an alert computer operator followed the published emergency shutdown procedures, eliminating the potential for fire and electrical damage in the computer [redacted].

The next day, computer service personnel inspected all computer equipment, giving the go-ahead to start up the facility only eight working hours after the fire. Published and practiced disaster procedures prevented a crisis.

Examples of disasters and potential disasters reemphasize the need to estabish a disaster recovery plan. An IBM study shows that over a 10-year period from 1968 to 1978 there were

(Continued on SR/21)

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Finding the Right Data Encryption System

(Continued from SR/16)

dent, not code-dependent. (In other words, only the keys and not the coding math need be kept secret.)

● Upward compatibility for future cryptographic developments.

In addition, larger applications may need central access control, network transparency and message authentication.

The first step toward meeting security needs is to decide which encryption system to use. The best approach is to opt for a code that has already been through fire. Codes that have survived repeated attacks by cryptanalysts and information theorists merit confidence. It also helps if a code has passed through a standards evaluation process; this provides a public forum on its properties. Some codes have undisclosed cipher algorithms — avoid them.

Most codes currently available are either single-key (conventional) codes or double-key (public-key) codes. Single-key codes use only one key for enciphering and deciphering, while double-key codes use a separate key for each function.

A number of practical and computationally unbreakable single-key codes are available. Two prominent examples are the Data Encryption Standard (DES), developed for the U.S. Bureau of Standards, and IBM's proprietary Lucifer cipher.

Both are product codes, combining several weaker codes into a single, very strong code. The only way to break a well-designed product code is to try every possible key so that a large enough key makes such a code computationally unbreakable.

The DES 56-bit key is suitable for short-term security. Long-term, archival or high-level security requires multiple keys and several passes through a DES chip. In 1976, Whitfield Diffie and Martin E. Hellman of Stanford University introduced the public-key code, a concept that has helped shape modern cryptography. Arcane mathematical tricks let these codes provide secure data transmission between people who have never even met, much less exchanged, cipher keys.

To achieve this, the user makes public his enciphering key. Once a file is enciphered under the public key, it can only be deciphered by a separate and secret deciphering key. Since the enciphering key is public anyway, no one has to worry about compromising it. It can do several things single-key codes cannot: time-stamped public-key signatures on integrated circuits to fight counterfeiting; blind signatures for funds payments that can be made untraceable; general signatures for compiled computer programs.

Authentication Problem

On the other hand, public-key codes do ultimately require as much authentication as secret-key codes. Some central authority must verify that the decoding key is not a forged version substituted by a clever opponent. In information theory, this is called the authentication problem.

A good automated system requires only that users pass the access procedures. The system itself should provide and protect randomized keys for enciphered data, keeping different classes of data (accounting, medical, engineering, source codes) separate under user control.

Protocols are the procedures and message formats used by various parts of the security system. Protocols can be complicated and should be handled automatically by the system.

Good solutions are available for most cryptographic problems, although no single approach will solve every problem. When evaluating candidate systems, it is helpful to isolate specific computer security needs into three categories:

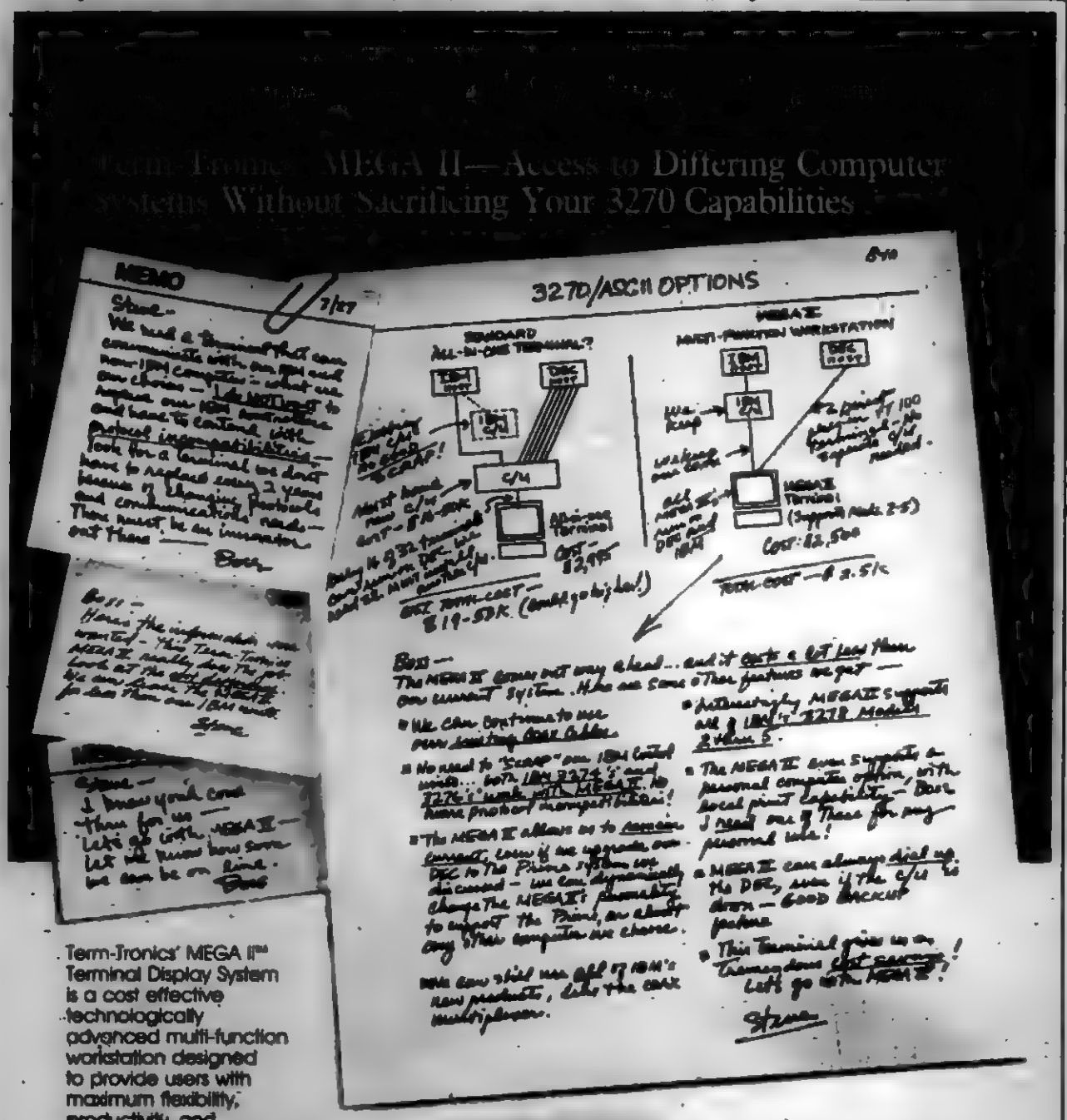
● Transparency. A system should automatically encipher off-line media, such as tapes and disks, at the operating system level, deciphering files only as they are called out.

● Individual encryption. The ability to encipher any file at any time should be independent of the automatic function. This allows private data to be secured separately.

● Communications. This boils down to the problem of key transmission in an open network. In large systems, the number of keys quickly grows unwieldy so a user cannot rely solely on his data base. Reliable key communications can be achieved via a key distribution center. This concept is explained in a U.S. government patent (Rosenblum, Patent No. 4,182,933).

In summary, although cryptography is a rapidly expanding field, current systems will remain usable and secure in the foreseeable future. The current state of the cryptographic art is such that users can have confidence in systems now developed.

Hicks is vice-president of research and development with Cydat, Inc., Burlingame, Calif.



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Without UPS, Computer Investment Seen Jeopardized

By Bob Martin
Special to CW‡

The capital investment in computer equipment is significant, and without a clean, uninterruptible supply of power to the system 100% of the time, that investment could be jeopardized.

An interruption of power can result in thousands of dollars in lost business, recovery time, equipment repair and re-entry of data. What is not so obvious is the potential for altered data files, which may have far-reaching results if undetected.

Many data center managers recognize that the uninterruptible power supply (UPS) system is the best method of protecting the investment in a computer. As the importance of reliable power becomes more evident to the data center manager, they are assuming more responsibility for selecting the power equipment for the computer room.

'Buying a UPS is more than merely buying a box and plugging it in. Today's data center manager needs to select a vendor who he believes will take total responsibility for supplying all the power to the computer center.'

Buying a UPS is more than merely buying a box and plugging it in. Today's data center manager needs to select a vendor who he believes will take total responsibility for supplying all the power to the computer center. Regardless of the manufacturer, most UPS systems fundamentally operate in the same manner, although engineering technology differences will vary in operating characteristics and reliability.

A UPS consists of a rectifier, an inverter and a static switch. The UPS receives raw commercial utility pow-

(Continued on SR/26)

Disaster Cases Reflect Need For Precaution

(Continued from SR/19)

more than 350 major DP catastrophies.

The most important element of any disaster recovery plan is the identification of critical company functions. The primary objective after a disaster should be to restore these critical functions. To accomplish these objectives, the designer of a disaster recovery plan must understand two things: the phases of events in disaster recovery and the key elements contained in a disaster recovery plan.

The five phases in disaster recovery are:

- Preparation.
- Protection.
- Recovery.
- Critical Operations.
- Normal Operations.

The key elements contained in a disaster recovery plan include:

- Introduction and assumptions.
- Staffing.
- Hardware.
- System software.
- Application software.
- Data files.
- Facilities.
- Operational procedures.
- Transportation.
- Supplies.

A major downfall of many disaster recovery plans is the lack of a periodic review and testing of the procedures. A disaster should be simulated so that the recovery procedures can be tested, ensuring that backup facilities work in the event of a crisis. Successful operation at an alternative computer site — using remote site backup equipment, programs, files and documentation — minimizes the impact of a real disaster. Periodic testing verifies the availability of an alternative site and ensures the compatibility of software. In addition, data records, supplies and operational procedures are checked.

Disaster recovery planning is a function that many organizations will never use. However, for those who choose not to spend the time and effort developing and maintaining a plan, the potential risk is high.

As evidenced by the examples of a computer center disaster, the time of an emergency is not the time to develop an emergency plan. Once a disaster strikes, your alternatives are limited.

Savaiano is a principal in the consulting firm of Industrial Management Associates based in Manhattan Beach, Calif.

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Physical Security Imperative to Micro Protection

(Continued from SR/18)

locking all program and data diskettes in a safe.

A common malady of many microcomputers' operating procedures is failure to back up files with optimum frequency. A rule-of-thumb gauge can be applied to give a rough approximation of such an optimum. An estimate can be made of the maximum amount of time that can be expended in recovering from a data destruction incident. That time duration becomes the backup cycle. For example, if a firm feels it can afford to spend a day recovering from a crashed disk, that firm should back up files daily. While the restoration of the data should not take up the entire recovery period in a microcomputer system, the remaining portion of the period will probably be occupied by processing the data that arrived during restoration.

Desktop microcomputer systems in small businesses often become the "property" of one office worker. This situation is a threat to the integrity of the data in the system. Errors can be made habitually which may not be identified for long periods. Even the smallest office should have at least two operators whose duties functionally overlap. For instance, receipts may be entered by clerk A one day, and by clerk B the next day. Clerk B would enter invoices the first day, and clerk A the next, and so on.

Access to data and programs should be as compartmentalized as possible. This can be implemented in the small business environment. Active diskette storage should not be the desktop area beside the machine. The diskettes should be secured by a specific individual. For example, the salesman might store the order entry and invoicing diskettes in his filing cabinet. The general ledger diskettes could be locked in the manager's safe.

Businesses purchasing microcomputer systems worry most about hardware failure. Yet too often, proven techniques for handling such failures are not employed. Vendors will encourage maintenance contracts and guarantee response time. "Loaner" equipment may be promised in event of failures. Whether such promises hold true is a factor of the integrity of the vendor.

But the microcomputer user can go further in protecting against such failure (sometimes at reduced expense).

Attractive Alternative

Microcomputer systems can be configured redundantly. This can be expensive if the application requires only the installation of a single, small desktop microcomputer. But if the application calls for a central unit with several terminals, there is an attractive alternative. Networking desktop microcomputers can effectively replace a central unit. This approach to system configuration inherently mimics the fault tolerance of newer processor designs. Portions of the system may fail, but partial processing capability is assured.

The expense of redundancy can be avoided in the smallest of systems through backup-site agreements. Under such a situation, the business would identify another nearby user of the same microcomputer system. Each business would agree to maintain a similar configuration to permit mutual backup sites. Since each installation profits from such arrangements equally, it is unlikely that any expense (other than configuration changes) would be incurred.

Avoidance of a complete loss of data can be promoted by transporting backup copies of program and data to off-premise storage. For the small business, this procedure can be as simple as having the manager regularly store old file dumps in his safe at home, or in a safe-deposit box at the bank.

All of these methods can be recognized as proven techniques of computer system security which have been implemented on a small scale. Small business microcomputers can be victims of the same failures and abuses that threaten their bigger counterparts. These systems (and the organizations they support) deserve to be protected in much the same way.

Baskerville is an assistant professor of computer science at Francis Marion College in Florence, S.C.

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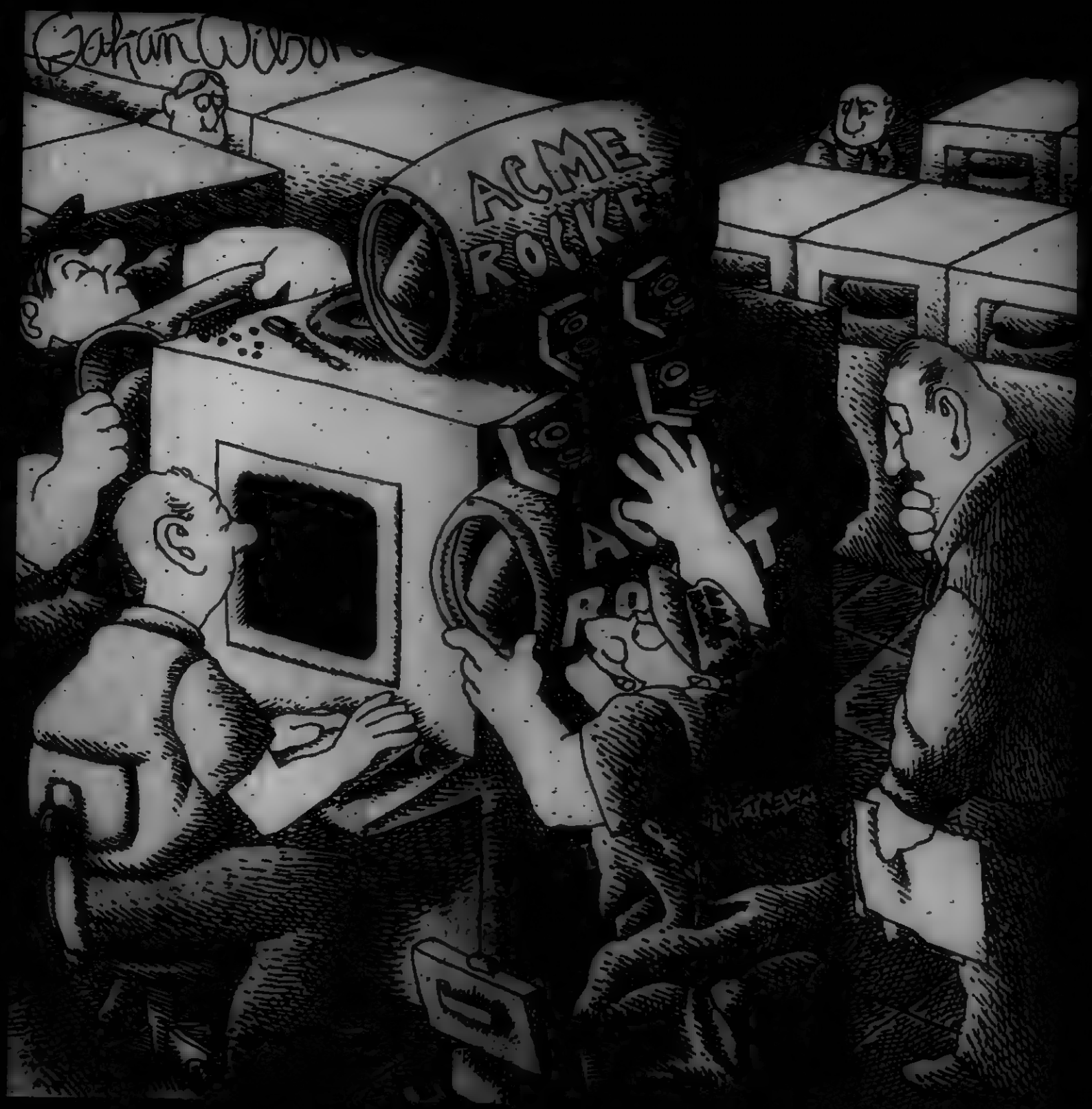

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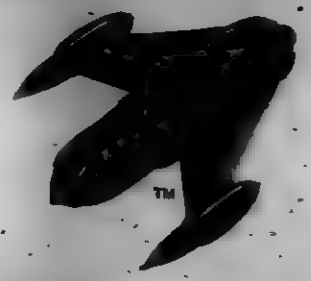

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Project Approach Key to Contingency Planning

(Continued from SR/17)

Several years ago, Ray-O-Vac Corp. used the following method to install a contingency plan.

The first step was to develop a presentation for Ray-O-Vac's senior-level management to explain the need for such a plan and to request the executives' support. The presentation outlined the pervasive and growing nature of MIS within Ray-O-Vac and the high degree of vulnerability the organization faced without a strong effective MIS contingency plan.

The fact that a recent review of the MIS function by a group of outside consultants had strongly recommended the development of a contingency plan helped gain the attention of senior management.

The presentation did not include technical jargon. There was not even the usual MIS attempt to "sell" senior management. The facts, if correctly presented, sell the need for an MIS contingency plan. The issue of contingency planning presents an opportunity for MIS to be viewed on a nontechnical basis. This may be a small issue, yet any time the MIS department can take a nontechnical approach in dealing with managers outside MIS, it is important to do so.

Once approval from senior management was obtained (a rather easy task once the issue was presented), an MIS employee was assigned specific responsibility for the development, implementation and testing of the MIS contingency plan.

A schedule was developed for the completion of the plan through the off-site testing phase. Appropriate milestones were set up for various phases of the project so that effective monitoring of progress could be carried out. The effort was, in fact, handled as any other MIS project would have been handled.

The tasks identified as a part of the process included:

- Defining the scope of the project.
- Identifying key components such as critical systems and programs.
- Prioritizing systems to be processed in the event of a disaster.
- Identifying key personnel, including outlining their specific duties in the event of a disaster and identifying each person's backup.
- Listing all vendors, with addresses and telephone numbers.
- Developing and controlling off-site backup tape (data) and form supplies.
- Selecting an off-site backup computer site.
- Developing a detailed contingency plan including documentation and testing of the plan on an ongoing basis.
- Continuing to refine the contingency plan based upon the test results.

After the development of the tasks had been completed, the process of building and implementing the contingency plan became a rather straightforward task.

This was not a full-time assignment. The idea was to devote sufficient time to the process so that the plan could be completed by a certain date, based upon a number of hours given to the subject each week. The goal was to make steady progress, not to push the plan through in the shortest possible time.

Project Approach Assurances

The result of using a project approach in the development of the Ray-O-Vac contingency planning effort was exactly the same as with any project. Using a project approach assured the following:

- Responsibility for the project was fixed.
- Attention, as a result of clear responsibility for success, was focused on the project.
- Progress and lack of progress were monitored, and required adjustments were made.

The probability of success using a project approach is considerably higher than is the case without such an approach.

A real problem, even after a commitment has been made to install an MIS contingency plan, is the tendency to assign the process a low priority. The contingency plan is usually worked on a "time-permitting" basis. If such an approach is condoned, it will be tantamount to a guarantee that little actual progress will be made.

There will always be "more important" areas of concern within MIS. The use of a project approach will help the MIS department achieve success with its contingency plan.

Clearly, disasters do not always happen to someone else. Regardless of good intentions, contingency planning cannot be done retroactively. The time to begin the process of contingency planning is now.

Murray is director of management information services for Ray-O-Vac, Madison, Wis.

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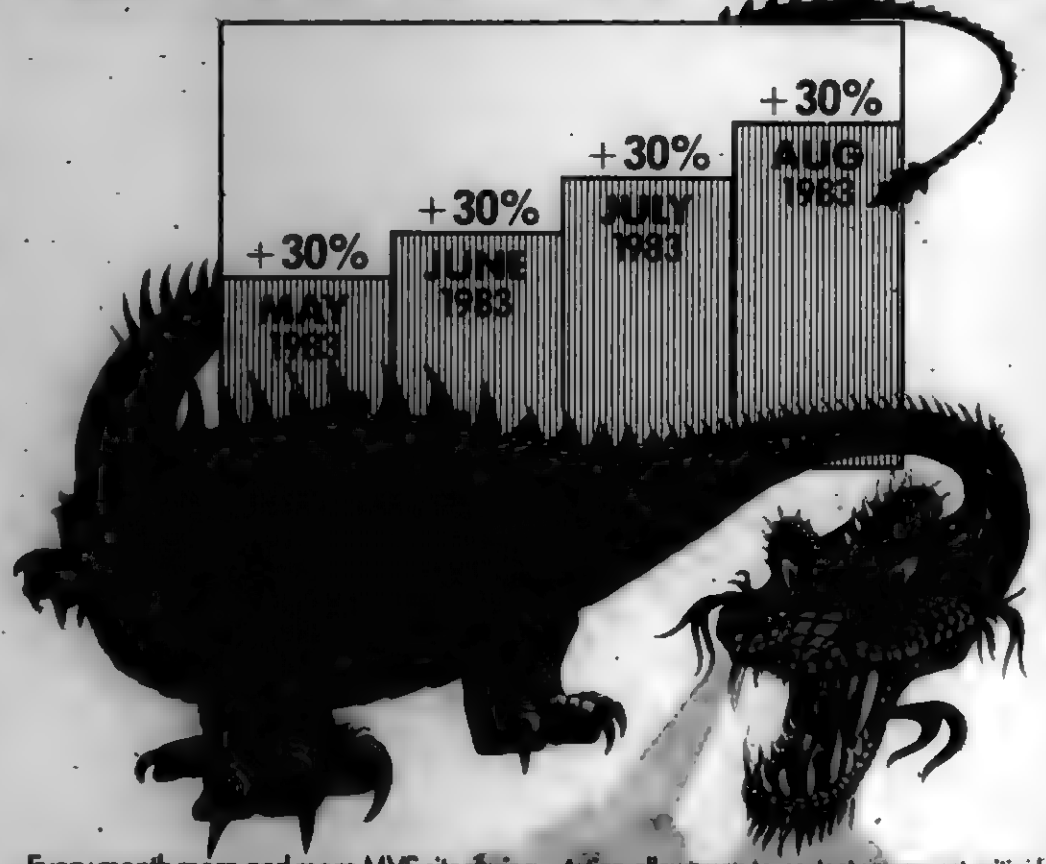

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More Than a Technical Accessory

Security Seen Business Management Problem

By Martin E. Silverman
Special to CW‡

The growing dependence of business on data processing resources and the well-publicized vulnerability of those resources have forced senior management to pay attention to DP security. For those responsible for DP security, now is a golden moment; you must educate senior management and mold the results into an improved security program that will benefit us all.

DP security can no longer be "applied" just before a system is ready to go into production. Security must be planned, engineered and monitored from the design stage of systems development through application obsolescence.

DP security is not the sole responsibility of the DP director and it is not a technical problem. It is a business management problem relating to the protection of a vital corporate asset — data — as valuable as the physical means of producing one's product or the intellectual and decision-making capabilities of management itself.

Even before the recent "hacking" incidents came to light, security had been discussed with increasing frequency in publications directed at senior management. The reasons are simple: dependency on the availability of data processing resources; expenditures on these resources; the evolution of minis and microcomputers; experiments with decision support and executive support and financial modeling systems that are "user-friendly" and "require no programming knowledge."

Need Intensified

The result is that the need for comprehensive DP security has intensified. In the microcomputer, executive-oriented arena alone, we are now distributing data for individualized "what if" analysis that used to require three signatures and four passwords to view.

This data is being left on floppy disks on unattended desks in scores of offices across the nation. Other data, entered directly by secretaries, analysts of all varieties and executives themselves, without the benefit of standards and edit procedures, is being used to generate management decisions that are accepted because they are "supported by the computer."

Clearly, DP security can no longer be considered the "technological add-on" controlled by the central DP resource. It must become an integral part of the corporate way of doing business. It must become a planning objective and a subject of concern for senior management. It is the responsibility of DP management to educate, to lead the development effort and to promulgate the results.

There are some keys to success that should be articulated in a presentation to management and some definitions of key program components that should be incorporated as objectives and areas for concern in any developing program.

It is imperative that management understand that a DP security program is not a "one-shot deal" — it is a comprehensive program that goes far beyond obtaining a good lock for the computer room door or the development of a regular schedule for changing passwords.

If DP security is to be meaningful, it will require changes in the methodologies now used to develop systems, acquire hardware and software and plan new computer-related product offerings. It will impact, although not necessarily negatively, daily operating procedures and will require the support of management at all levels if it is to be effective.

As the architect of a security program proposal, remember that few corporations will be prepared to overhaul completely their operations overnight. Any proposal must be evolutionary in nature. This will not only enable your organization to grow into its new environment, but will also enable you to sell the program in manageable pieces that do not place extraordinary demands on the corporate budget and bottom line.

Security must be monitored by an individual who is clearly responsible for its success; it cannot be the part-time responsibility of a data processing analyst. It cannot be delegated on a rotating basis. It must be awarded in a positive sense to an individual with access to management and the planning functions of the organization, and it must have a budget.

Silverman is a principal in Coopers & Lybrand's Information Services Consulting Group in Chicago.

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Survey: MIS Should Shoulder Security Burden

NEW YORK — Security is an issue not new to any information systems professional. In his own way, each contributes daily to the processing of data, a good amount of which is sensitive and confidential. How this data is protected both internally and externally is a matter of serious concern and utmost priority in today's business environment.

This is one of the findings of a recent survey by John J. Davis & Associates, an information management systems executive search firm based here. In addition to the security problem, the responsibility for the development of safeguards for information systems rests with management information systems (MIS) management.

According to the survey, the majority of respondents (78%) to the question: "Who is primarily responsible for systems security?" clearly placed the solution to the problem in the hands of MIS management. Others (11%) felt that internal auditors were responsible, while only a few (less than 4%) felt the users group should shoulder the responsibility.

Most respondents were extremely protective of their hardware. Over 92% said they had security in the area of terminal access, and 97% admitted to strict regulations regarding physical access to mainframes.

How data is protected, another key issue in the security function, was another focus of the survey. After hardware, the second most popular security area was found to be password access at the functional level.

Security Measures in Place

Some 90% of those responding said they had password security measures in place. Password security at the data level, however, apparently is another matter. Only 65% felt the need to institute security precautions at this point, the survey found.

As the area of communications undergoes rapid expansion, so will data base technology and usage.

Data base usage will also increase as a result of the move toward more distributed MIS environments. With this broadening of the user community, the need for more sophisticated security becomes obvious.

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UPS Seen Key To Guarding DP Investment

(Continued from SR/21)

er through the rectifier/charger and converts the power from ac to dc. The rectifier/charger also float-charges the battery that supplies additional dc power to supplement the rectifier in case of brownout or outages. The inverter then converts the supplied dc power into regulated, uninterrupted ac power and supplies it to the critical load.

Multiple UPS systems may be linked through a variety of configurations to supply either increased power for larger loads or for additional backup of the UPS. In the last several years, some manufacturers have started producing UPS systems utilizing power transistors in place of thyristors. This technology was ignored for years by conventional UPS manufacturers who were content to rely on "proven technology."

Power transistors in UPS systems permit the same miniaturization the computer industry enjoyed years ago. This new power transistor technology has resulted in smaller, lighter, quieter and more efficient UPS systems.

For the first time, the UPS can be placed on the computer room floor next to the equipment it protects. In fact, the data center manager of today may now consider the UPS a peripheral device.

Until recently, UPS systems protecting major computer installations were relegated to the basement or remote locations because of their large size and unacceptable noise level. This has changed with the introduction of the power transistorized UPS. Although detail specifications vary between manufacturers and rated sizes, the transistorized UPS is a better deal for the buyer.

Due to their enhanced converting efficiency, transistorized UPS systems have higher ac-to-ac efficiency, frequently 3% to 5% better than comparably rated thyristor models. This improved efficiency results in savings of utility costs.

Transistorized UPS units require no auxiliary circuits for commutation purposes. Power transistors have a high performance level in withstanding voltages and breakdown resistance. With fewer component parts, the new transistorized UPS is more reliable and requires less service.

Martin is president of Martin Associates, a marketing communications firm located in Plano, Texas.

Contingency Plan Must Be Workable

Testing Seen Integral to Disaster Recovery Plan

By Roy A. Schwartz
Special to CW‡

The implementation of disaster recovery in the mainframe environment need not be as painful as the introduction of many previous support technologies. Past experiences with packaged software, for instance, can provide a "how to" and "how not to" guide.

A few years ago, a marketing representative for a nationally known software vendor placed more than 100 trials of his company's new system software package. The product was a report generator designed to operate on IBM and plug-compatible mainframes. The placements, which were made in less than 30 days, enjoyed favorable market timing and vendor acceptance. But most of all, the appeal of the product was in its own documentation.

On paper, the package looked great. The installation, however, revealed, such significant problems that not a single licensing agreement was reached. If today we substituted a disaster contingency plan for the report generator, the results might prove far more costly than the personnel and computer-time expenses incurred with the software package.

Numerous Unworkable Plans

Yet there are numerous unworkable contingency plans in existence. They look as attractive on paper as the report generator that motivated so many trials. What's worse, even frightening, is that most companies don't know that their plans won't work and probably won't find out until it's too late.

In developing a disaster recovery plan, the first stage is awareness. Vendors refer to this stage as the "missionary step," and for a long time it had been the most challenging. That is changing. Regulatory agencies, auditors, industry associations, natural disasters, malicious acts, terrorism, accidents and media coverage have helped persuade vendors to take appropriate actions.

It is this first stage that has stimulated the development of so many untried contingency plans. One can argue, at this point, that at least there is a plan — although it is an unproven one. Some DP executives feel any plan is better than the no-action alternative still so common throughout the industry. This logic is acceptable only if one ignores the existence of other approaches to the problem.

These other approaches may be borrowed from the packaged software experience mentioned. Just as we have learned to justify software only if merited, our first question in disaster recovery might logically be: "Is a plan called for at all?"

There are a great number of variables that separate data processing environments — even those with identical hardware configurations. Dependencies on information systems may run from minimal to absolute. Companies with multiple, similarly configured sites may have needs differing from single-site operations or those with inconsistent hardware and systems. Distributed data processing, remote services, the type of industry, manual backup options, user requirements and seasonal needs are just a few of the factors that must be considered in choosing an automated service.

Impact Determined

The actual measure or impact on the company must be determined prior to the development of a plan. Evaluations from the financial, legal and goodwill aspects are imperative. Objective identification of essential services is also a prerequisite to recovery plans.

This predisaster recovery plan approach needs to satisfy those regulatory agencies, auditors, stockholders, directors and other interested parties asking the question: "To what extent will the company be affected in the event of an unplanned, prolonged interruption of data processing services?"

If the impact study reveals no risk to the company, no further action need be taken. However, a periodic reevaluation of that condition should be conducted to determine whether it should be continued. If, in fact, the study discloses the existence of sufficient negative impact, then the next step should be taken.

If users identify a need for a particular software function, they either develop it or purchase it. If development appears to be extensive, involving significant time and expense, and a suitable offering is available from a vendor, it is probably better to purchase. These same software con-

(Continued on SR/28)

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Disaster Contingency Plans Need Test Run

(Continued from SR/27)

siderations may be applied to the next step of disaster recovery planning, which is the actual recovery plan.

The choice of in-house development or vendor purchase becomes easier after identifying the contents required for the actual recovery plan. They include the written plan, off-site storage, interim processing, special insurance, technical considerations, activation procedures, reconstruction and, most important, an ability to evolve so as to maintain viability despite changes in personnel and systems.

Development of the actual recovery plan is only a beginning. It needs to be tested just as the impressively documented report generator needed to be tested to determine its value. The test should be at the computer site that will be used following an actual disaster.

Less Than Identical

Too many "identically" configured environments prove less than identical when activated with transported software. In one recent test, a company could not load its software despite what appeared to be hardware compatibility. A considerable amount of time and investigation revealed the problem was in the company's tape management system.

The package, which was licensed from a system software vendor, checked and found not only the wrong CPU identifier, but also the wrong CPU model. While the vendor's current release eliminated the identification requirements, the company was running one release behind.

A new release was required from the distantly located vendor. This took a great deal of time and might have proven very costly in an actual disaster. Such possibilities for error argue against a plan that does not include testing.

Packaged software is used regularly, so its value continues to be known. A good disaster recovery plan requires testing about four times each year. The testing provides valuable experience under "battlefield conditions" and proves the continuing viability of the plan. In addition, an annual surprise review coordinated by the chief executive officer is recommended.

Costs for planning and recovery services vary depending on computer configuration. "Surprisingly affordable" is a typical sentiment expressed by most companies after they obtain quotes for their own requirements.

Schwartz is currently the national sales and marketing manager for Policy Management Systems Corp.'s Disaster Control Services based in Atlanta.

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Trade-Secrets Thefts Prompting Tighter Controls

By Liliane Choney
Special to CW‡

Earlier this year, IBM took Hitachi Ltd. to court for stealing IBM trade secrets — and won. As a result of that suit, IBM launched an important policy, instituting tighter controls over its trade-secret information.

For example, IBM will no longer release trade-secret material, such as source code, in order to protect its market position. Other companies — such as those dealing with software products — will probably follow IBM's example.

But without IBM's clout, can these companies follow in IBM's footsteps? Can they continue in business without making source code available?

The end user is becoming more risk-conscious in protecting a software investment. He wants to know that he will be able to change, update or otherwise support the acquisition. He wants to know that the developer will be around to support his acquisition.

The DP industry is becoming all too familiar with the boom-and-bust syndrome: the young entrepreneur with a great idea, but little management experience; a good development team with inadequate financial resources or not enough time to test the product; and the company eager to make a quick buck and hoping to get out of the business before any maintenance problems arise.

All of this has led to bankruptcies in the industry, with the possibility of even more.

The software supplier can do what IBM is doing. It can restrict access to trade-secret materials — and still provide the user with reasonable business protection.

Software Escrow

Through an arrangement commonly known as software escrow, the supplier can furnish the user with controlled access to trade-secret materials. This arrangement is a type of insurance policy for the user or other beneficiaries such as the publisher representing the software developer; the OEM using the software as part of its system; the software distributor or the software investor.

Escrow arrangements that are typically suggested — through banks and media vaults — have offered only limited protection.

Banks lack the physical ability to preserve sensitive computer media. Safe deposit boxes where the media are stored are at the mercy of air-conditioning systems designed to serve weekday operations only.

Magnets, a vacuum cleaner running near the vault or a jump in the humidity and temperature are just some of the normally insignificant acts that could jeopardize the data integrity.

Vaults Inappropriate

Media vaults, while providing a secure physical environment for media storage, are designed for disaster recovery, but are inappropriate for handling the complexities of an effective escrow arrangement.

Because of these inadequacies, Data Securities In-

(Continued on SR/30)

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ACF2's transitional capability is also of important consequence. This allows easy movement from an unprotected environment to one where all the data is safe.

Of course, the reduction of overhead has also been instrumental in ACF2's success story because the system allows "access rules" to be interpreted with minimum I/O activity.

ACF2 also has real-time monitoring capability, along with detailed, comprehensive audit trails to detect instances of attempted unauthorized access, both when it occurs and after-the-fact. So you not only receive accountability, but also auditability.

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ACF2 is developed by SKK, Inc., Rosemont, Illinois.

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Tighter Vendor Code Control a Bane to Users

(Continued from SR/29)

ternational, Inc. has brought together a team of specialists to analyze key criteria carefully for successful escrow arrangements.

It was determined that a specialized facility should be used which offers legal, technical, physical and administrative protection for both parties involved in the arrangement. The facility should include:

- Appropriate use conditions. Simply saying the materials can be accessed is not sufficient. For example, a software vendor may allow a user access to materials for his own restricted use, but would not permit the materials to be "sold" to others.
- Appropriate release conditions. Because of fast-changing laws concerning both software and business bankruptcy, these conditions must be expertly drafted.
- Careful identification of the type of materials that need to be deposited, as well as the frequency of the deposits specified. Partial information can be just as useless as no information at all.
- Confirmation of the information requested. It is important to know that information is contained on the media and that that information is the material requested. A blank tape is worthless.
- Appropriate physical storage to preserve the integrity of the data.
- Insurance underwriting to protect media and data loss.
- Closing notice. The escrow agent should not make any commitment to escrow until all agreements are established and all materials appropriately received. At that point only should a closing notice be provided to both parties.

Once the escrow account is established, it is important to make sure that updates to the accounts are:

- Completed. Frequently, after the original deposit is made, the promise to make additional deposits is overlooked or forgotten, resulting in obsolete or useless materials.
- In line with the procedures established for the original deposit (confirmation of the information requested and appropriate physical storage).
- Acknowledged through activity notices. The escrow agent should notify the beneficiary of the escrow arrangement about updates made to the account.

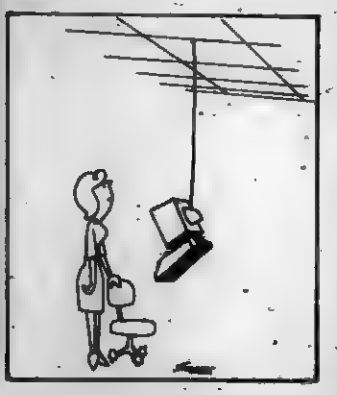
Sensitive Issue

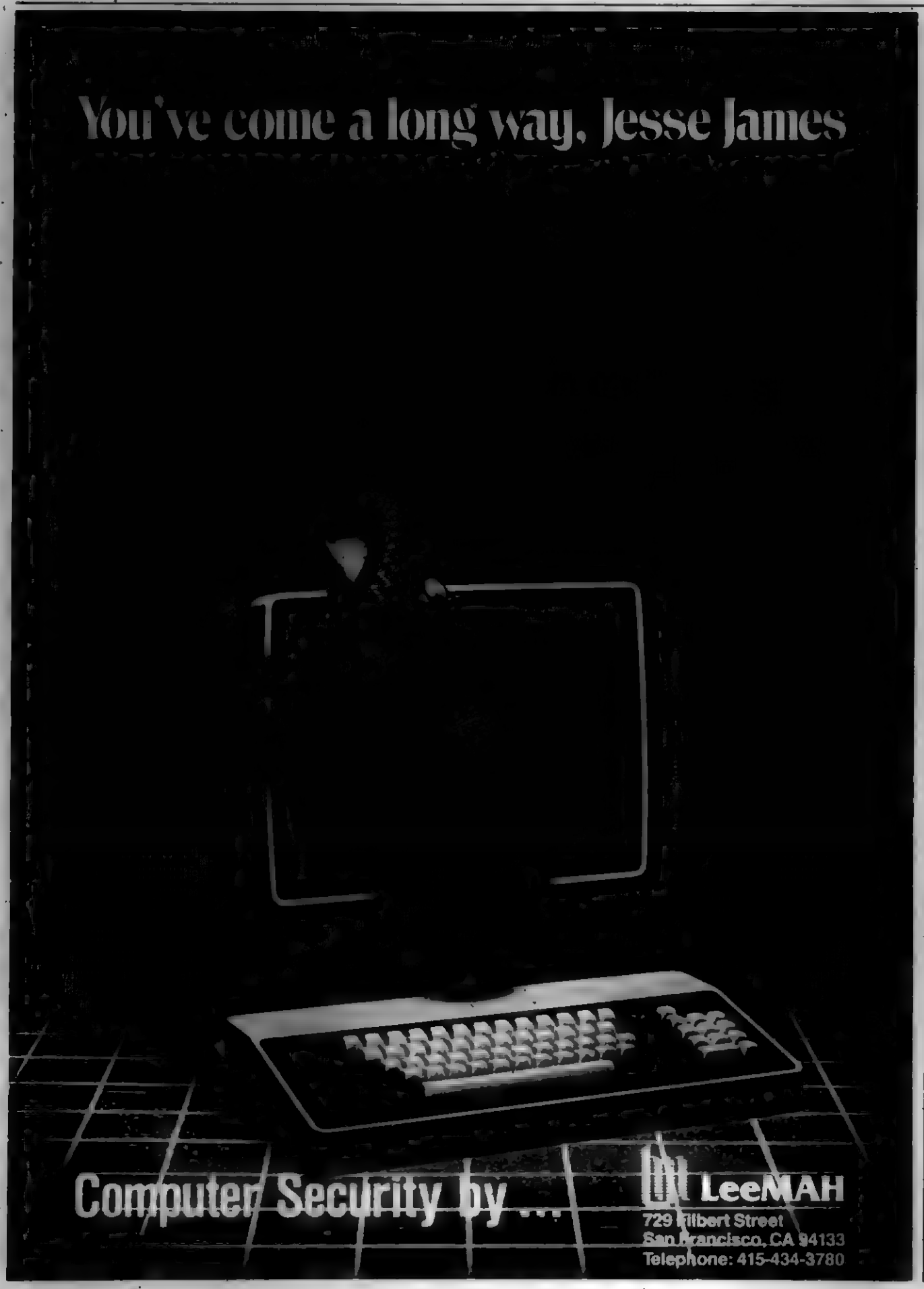
Access to the escrow account is the most sensitive issue. The escrow agent must be prepared to provide access only under the release conditions specified in the original agreement, which entails following precise administrative procedures and adhering to the legalities of the release conditions.

Because access is where the real value to the beneficiary is — and where the most exposure for the depositor lies — this responsibility must be handled by a third party who is trained to deal with such complex business arrangements.

Too often, unauthorized agents from either party attempt to access these materials or request the materials prematurely before the release conditions are met.

Choney is vice-president of Data Securities International, a La Jolla, Calif., software protection firm.





What happens in the computer industry in 1984 will profoundly affect the way you do business.

This January 2nd Computerworld is going to give you a very educated guess on how it will all fall out.

Computerworld's annual review and forecast issue will examine some of the major events of 1983 and put them in perspective. But this year the stronger emphasis is on what's *going* to happen in 1984:

- The January 1 divestiture of AT&T. What will the impact *really* be?
- When is the shakeout going to come in the Micro market? Who will the big players be and who'll be dropping out?
- The results of the *Computerworld* DP Budget Survey: Where is the DP/MIS exec's money going to go? Why?
- Technology. Just what are the R&D people *actually* working on?

Last year's software announcements and/or agreements will be looked at in light of which will come to reality in 1984. You'll get a close look at control, security and training issues and how they'll impact DP/MIS managers who spent 1983 off-loading applications to end-users and providing them with computing power.

The entire editorial staff of *Computerworld* is working full time to review the key events of 1983 and how they'll affect your business in 1984. So you'll get all the insight you need to do your strategic planning for the year ahead.

If you've got product or service ads that will help our readers make informed choices for 1984 — then you need to get color ads to us by December 9th and black and white ads to us by December 15th.

To reserve space in the combined December 26th/January 2nd special issue, call one of the sales offices listed below, or call Don Fagan, Vice President Sales/Marketing; Ed Marecki, National Sales Director or Kathy Doyle, Marketing Support Manager.

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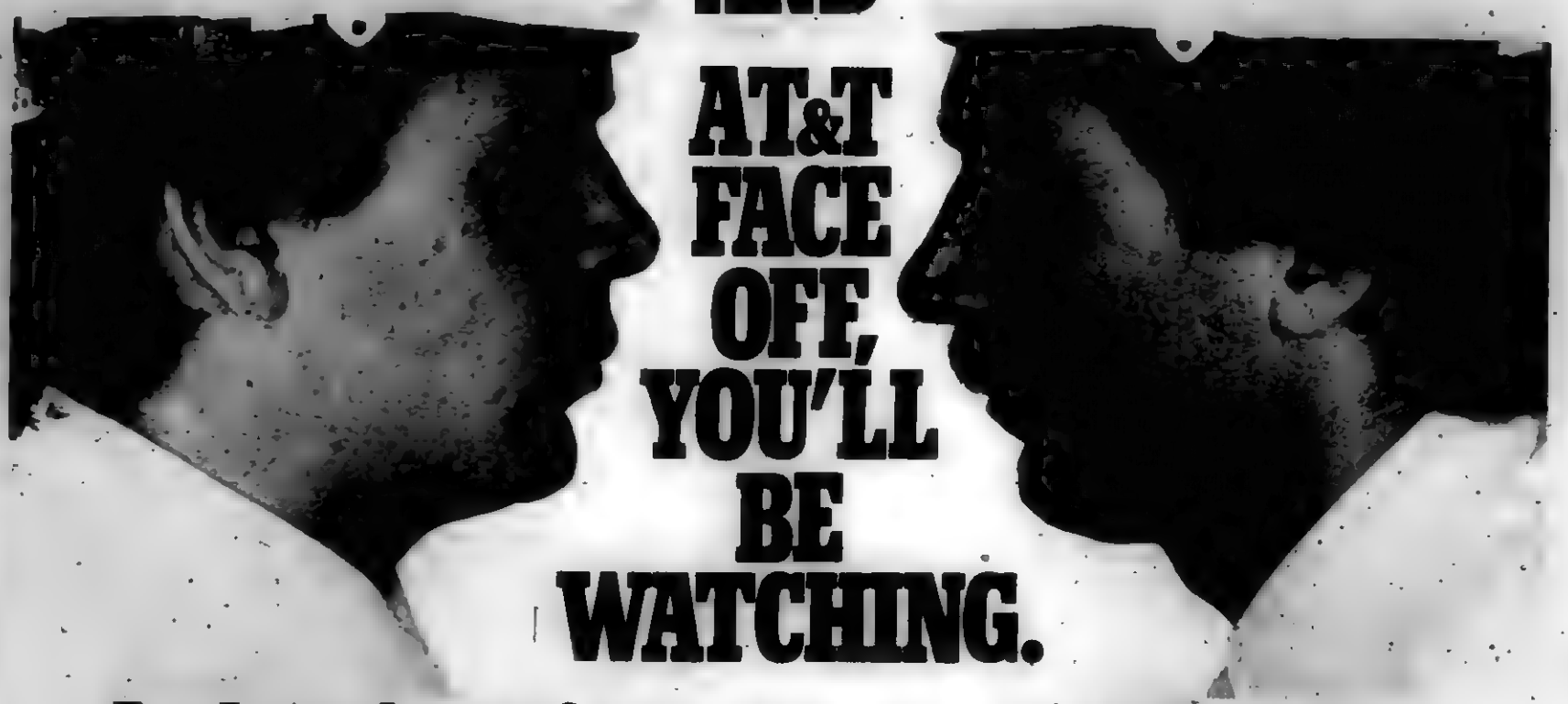

And you're going to have a terrific view...

When the industry giants clash next year, *Computerworld's* 16 years of experience in reporting on IBM and AT&T is going to make all the difference to you. The January 18th issue of *Computerworld On Communications* — entirely devoted to "IBM *versus* AT&T" — will give you an *insider's* look at the facts, the suppositions and the predictions.

You'll read about:

- The battle over the local area networks market.
- Workstation wars: How will AT&T compete with IBM for desk space?
- The PBX conflict: Will IBM make its own or continue to get outside technology?
- What other coalitions will be formed as competition heats up for DP/MIS/Communications budgets?

Computerworld On Communications is going to go behind those closed doors to get you all the answers — because we're experienced at asking *your* questions. And this is just the first of six issues of *On Communications* to be published in 1984. There'll be five more — on topics like Local Area Networks, State-of-the-Art Communications Technology at the Olympics, an AT&T Update, CATV, and Voice Communications. If you're one of *Computerworld's* 122,000 subscribers, you'll get each of these issues as a bonus with your *Computerworld* subscription.

As the marketplace for communications products opens up, new products — and new vendors — will emerge. If this is your marketplace, then you've got products our readers need to know about. You'll want them represented in this "IBM *versus* AT&T" issue. Just get your ad to us by December 9th.

To reserve ad space in the January 18th issue of *Computerworld On Communications*, call one of the local sales offices listed below, or call Don Fagan, Vice President Sales/Marketing; Ed Marecki, National Sales Director or Kathy Doyle, Marketing Support Manager.

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To Reduce Applications Backlog

Involve End Users With On-Line Systems

By Dixie Acker
Special to CW‡

Over the years data base management systems (DBMS) have been tried and tested and have proven to be well worth their investment. But information is not always readily available for end users. If the data cannot be accessed by the decision makers, the best DBMS in the world is of little or no value.

As end-user awareness of the benefits of automated processing increases, so does the applications backlog. There simply are not enough data processing professionals to respond to all requests.

The nonrepetitive, one-time requests of the end users represent 60% of the applications backlog. Even if the backlog were significantly reduced, information changes as rapidly as the business conditions it reflects. Since it is difficult to predict changes, it is virtually impossible to anticipate and schedule the information requests.

The only answer to the growing applications backlog is to involve end users with on-line systems. Although the solution sounds simple, beware of the pitfalls. Although end users clamor for accurate,

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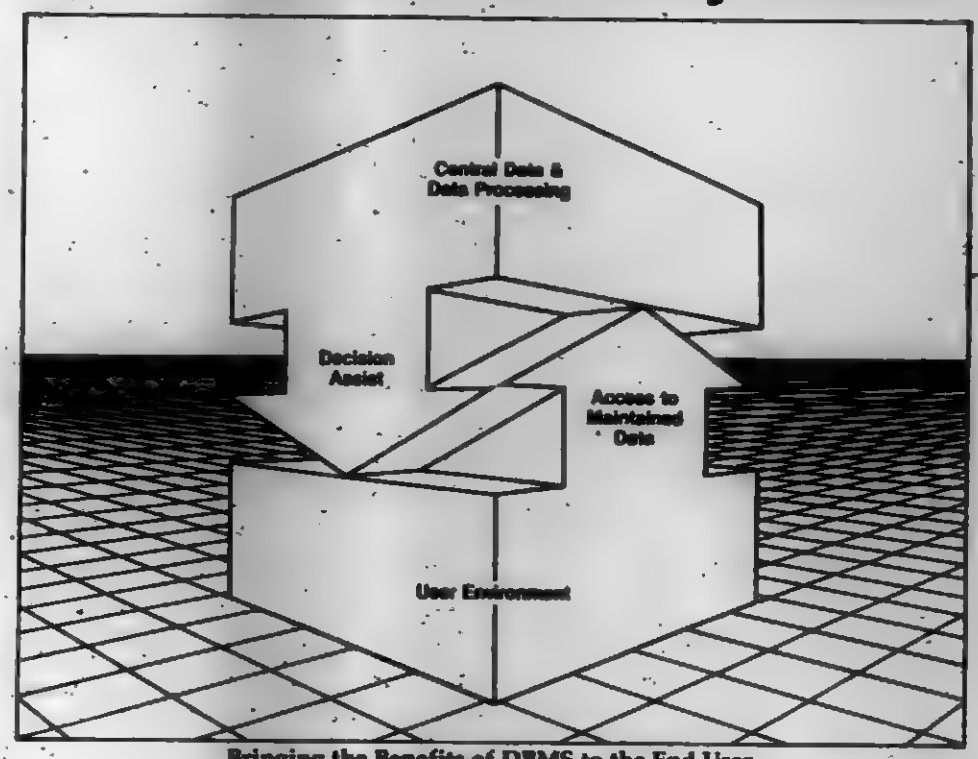

Bringing the Benefits of DBMS to the End User

Outside Information Services Seen Key to Better Management

By Steven Sieck
Special to CW‡

While on-line data base services are proliferating, few companies are integrating them effectively into their total data processing environment. In this first part of a two-part series, Steven Sieck describes the opportunities provided by external data bases.

How do you integrate outside information tapped by modem-equipped knowledge workers with corporate management information systems (MIS)? Of the issues raised by corporate America's ongoing occupation with personal computers, none is thornier or more immediate.

On-line, interactive information services, used intelligently, can make a crucial difference in management effectiveness. There are currently over 1,700 different data bases available on-line, according to Cuadra Associates, Inc.'s *Directory of On-Line Data Bases*. They are offered by over 100 on-line services.

The overwhelming majority of these are accessible by standard personal computer communications. At the same time, the increasing use of such services, especially by less experienced users, presents a formidable challenge to the formulation of corporate information management strategies.

During the last decade, MIS departments were justifiably obsessed with providing corporate management information about its own operations and

(Continued on Page 103

Pansophic Unveils Release of 'Gener/ol' For IBM CICS Use

OAK BROOK, Ill. — Pansophic Systems, Inc. has announced a release of Gener/ol Version 3.0, an interactive on-line program development and query system designed for use under IBM's CICS.

The base Gener/ol system (formerly known as SGT) consists of a number of editor/compilers that provide the facilities to create transactions or queries under CICS.

Version 3.0 includes an array sort that may be used to sort any array of fixed-length records, a spokesman said. Up to 32,767K bytes may be passed from one program to another.

Editor/compilers edit each statement

(Continued on Page 96)

Three methods to access virtual storage better.

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For Users of Cullinet IDMS

Payroll/Personnel System Debuts

WALNUT CREEK, Calif. — Integral Systems, Inc. (ISI) has announced its on-line Payroll/Personnel System for users of Cullinet Software, Inc.'s IDMS data base management system.

The system is written entirely in Cullinet's Application Development System/Online, in conjunction with Cullinet's Integrated Data Dictionary (IDD) and IDMS, a spokesman said. All schemata, subschemata, screens, programs and work records reside in IDD.

This provides on-line mapping capabilities and increased field-edit enhancements for screen painting and mapping. Attribute selection involves filling in the blanks of a multiple-choice question.

The Payroll/Personnel System is a modular package. Components include personnel management, payroll, applicant tracking, position control, application-level data security, benefits and pension administration. It ranges in price from $100,000 to $300,000, depending on modules and options selected, from ISI at 165 Lennon Lane, Walnut Creek, Calif. 94598.

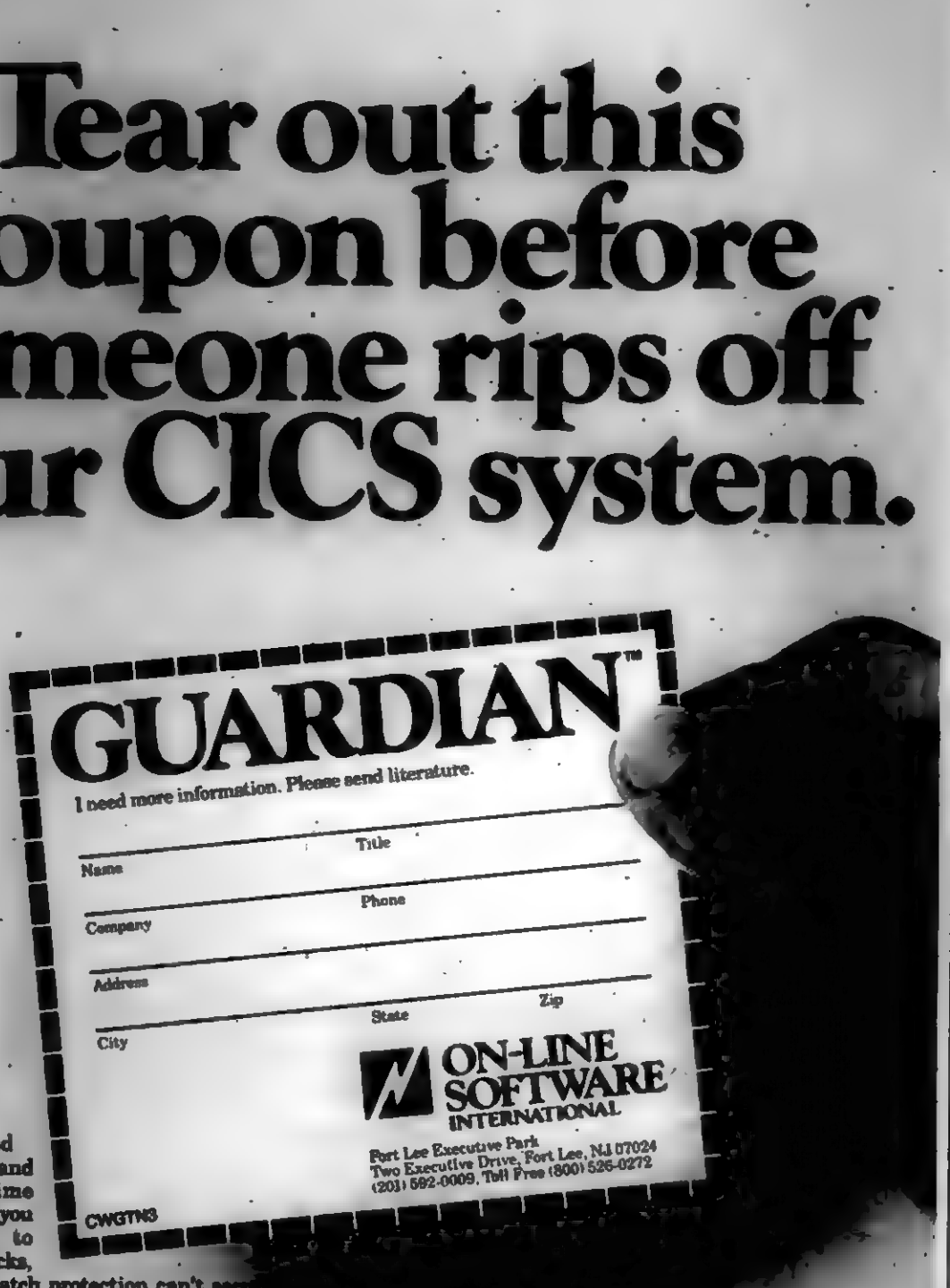
Update of 'Business Modeler' Announced for CICS/VS

OAK BROOK, Ill. — Business Model Systems, Inc. has announced Version 2.0 of its Business Modeler financial modeling and control system for IBM's CICS/VS running under IBM's MVS operating system.

System enhancements include an electronic spreadsheet with 9,999-line by 97-col. capability on a single spreadsheet, formatted screens with full prompting and function keys, facilities for printing at a system printer during an on-line session, printing at a cluster of attached IBM 3280-type printers during an on-line session, printing at remotely attached printers and submitting batch jobs for background execution, according to the vendor.

The price of $20,000 includes the first year's maintenance. Business Model Systems is at 2625 W. Butterfield Road, Oak Brook, Ill. 60521.

Tear out this coupon before someone rips off your CICS system.



Unauthorized data access and computer crime are problems you can't afford to ignore. And locks, guards and batch protection can't secure your CICS system at its most vulnerable point, your terminals.

That's why so many companies have turned to GUARDIAN,™ the security software so effective, it's become an industry standard.

GUARDIAN is comprehensive security. You can protect any number of users, terminals, programs, files and data bases in any combination you choose. And GUARDIAN's new techniques make it easy to define protection down to the field level.

[illegible] is easy to implement. Resources needing immediate protection are secure within hours of installation. It's also easier than ever to update GUARDIAN for new rules or personnel. Both temporary and permanent changes can now be made on-line. Most importantly, GUARDIAN provides reports in simple English, so it can be administered by non-technical personnel.

To find out more about the CICS security system with a proven track record, just follow the dotted line or call toll-free 800-526-0272. Don't wait.

Lehigh Enhances Simulator

BETHLEHEM, Pa. — Lehigh University has announced the Differential Systems Simulator, Version 2 (DSS/2), containing spatial discretization routines for initial-value ordinary and partial differential equations in one, two and three dimensions, with application to elliptic, hyperbolic and parabolic partial differential equations.

According to the vendor, DSS/2 is a library of transportable, Fortran IV subroutines for the numeric integration of systems of initial-value ordinary and partial differential equations.

DSS/2 runs on most mainframes. Its Fortran IV source code is available on 9-track tape for $1,000 from Whitaker Laboratory No. 5, Lehigh University, Bethlehem, Pa. 180215.

Version 3.0 Of 'Gener/ol' Unveiled

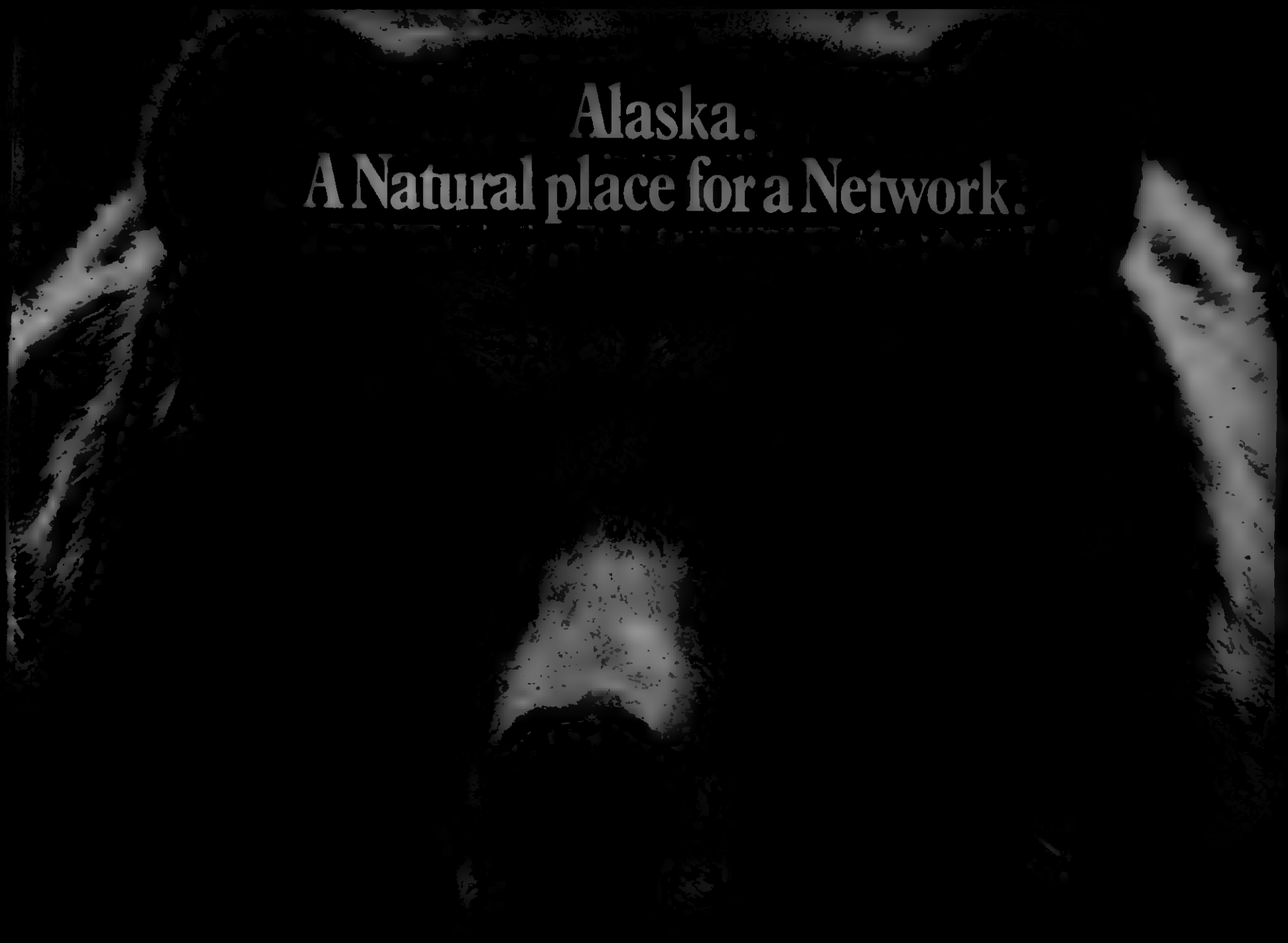
(Continued from Page 95)

as it is entered, flagging syntax errors, the spokesman said. The screen provides a detailed description of the error upon request.

There are six editor/compilers in the Gener/ol environment. Each one accepts the same commands where applicable. The language within Gener/ol is an interactive procedural language that is capable of handling scientific formulas.

Security is provided through a lock-and-key concept. A user may be automatically put into a directory or program upon sign-on.

The base price is $25,000 for IBM DOS and $35,000 for IBM OS. Pansophic Systems is located at 709 Enterprise Drive, Oak Brook, Ill. 60521.



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Get End Users Involved To Make Most of DBMS

(Continued from Page 95)

timely information, they find themselves a bit reluctant to become involved with "computereze." Also, due to a perceived loss of control, there has been a reluctance on the part of DP to involve end users with on-line systems.

However, with DP freed to concentrate on issues that require its expertise, it can act as a consultant to the end users. The entire organization benefits.

IBM's Information Center represents a new philosophy in computerization and has produced the need for more user-friendly systems. This forced change in technology has put query languages, report writers, decision support programs, graphics, personal computing and word processing in the hands of end users.

Subset of Info Center

A decision support system (DSS) can be thought of as a subset of the Information Center. A DSS used with a DBMS allows users to share information. A DSS is a wonderful tool that supports decision making and benefits data processing and end users alike. But there are considerations to be made before implementing one.

For example, each corporation should carefully weigh the pros and cons before sinking thousands of dollars into a complete DSS. An alternative might be to sign on with a time-sharing service to introduce DSS.

Staffing is another consideration. The systems support manager, who was for years the undisputed master of the company's computing power, and Cobol programmers are beginning to see themselves as endangered species.

If the DSS can be portrayed as an extension of data processing and can reduce some of the pressure, the two can coexist, and DP will welcome the reduction in the applications backlog.

Security is also a concern. Organizations recognize that with shared data it is necessary to maintain control of the mainframe data to ensure accuracy of corporate data. Control may be maintained in one of three ways: limiting access, with passwords, to only specific files; limiting certain files and data to be sent to specific terminals; or providing a data view in which security is at the file or information level.

With the high cost of phone lines for mainframe terminals, microprocessor solutions offer an attractive, low-cost solution to integrating the information needs of the business environment. Dependence on the mainframe is minimized if data is moved efficiently from the mainframe to the micro environment.

With the advent of the back-end processor, it is now possible to link micro systems to communicate not only with the mainframe but with each other as well. With a file server comes the capability for multiple users to share data in a local-area network.

Beyond the file server, the data base server extends that capability to include data definition, data integrity and data manipulation at a logical level.

Other new decision support products support "what if" decision modeling with a two-dimensional matrix or spreadsheet. The decision support software automatically maintains interrelationships among the conditional data.

Corporate decision makers should consider passing on the benefits of a DBMS to the end user via a DSS. But in weighing the pros and cons, they should ask themselves just how much a good decision is worth.

Acker is in the Marketing Support Group at Intel Corp.

Geisco System Manages Sales Order Information

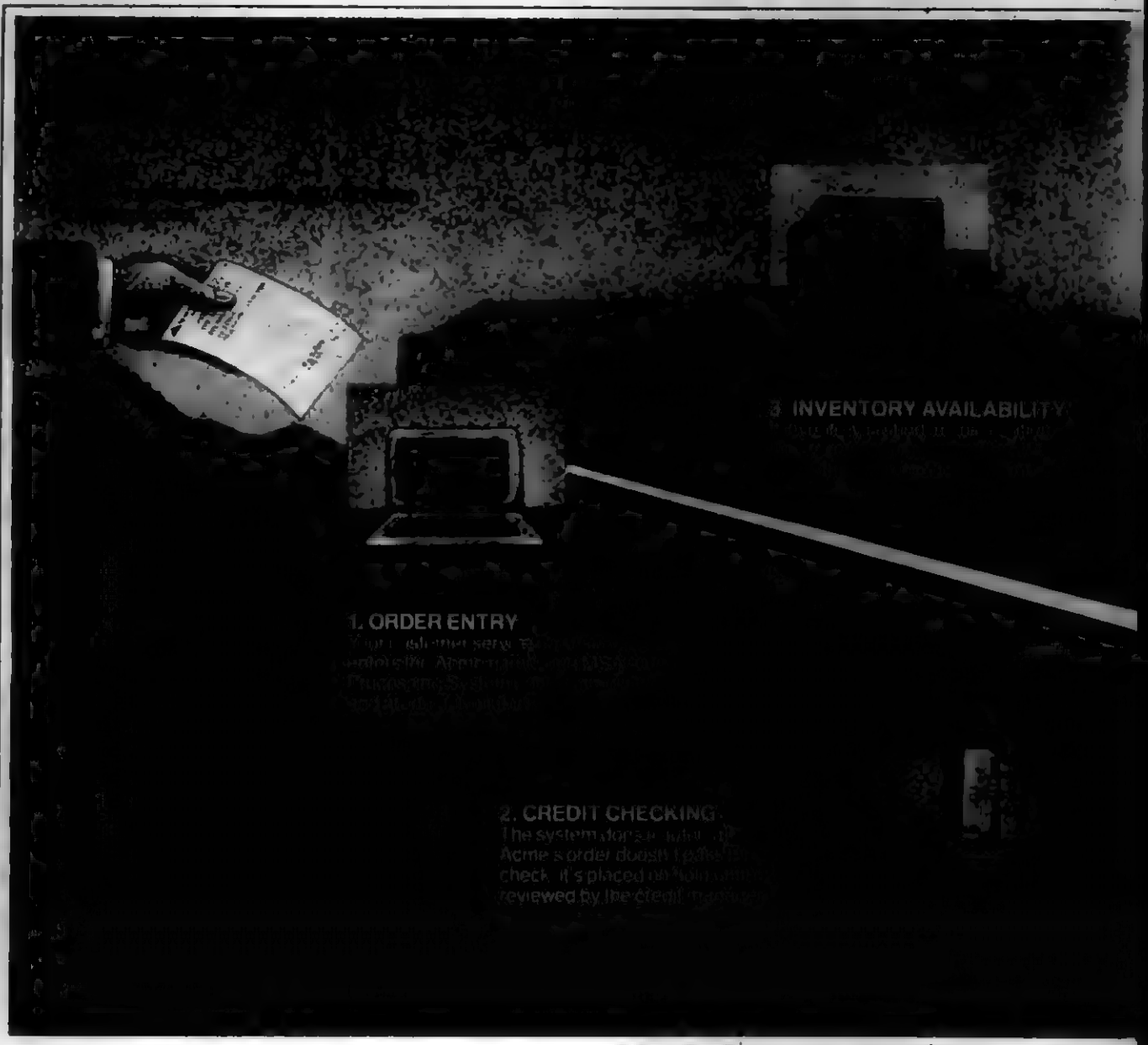
ROCKVILLE, Md. — General Electric Information Services Co. (Geisco) has announced the Sales Order Management (SOM) system, said to process and maintain sales order information as part of the firm's Mims/MFG application system for manufacturing planning and control.

The company said that SOM will track sales orders throughout their life cycles, from initial order entry through release, shipment and closing. An automated shipment function is said to produce pick lists and record shipment information for sales order items due to be picked and delivered.

The Mims/MFG package, which was designed for use with IBM mainframes, is based on GE's Mims, a fourth-generation, nonprocedural language and data base management system. It is a series of packages designed to enable manufacturers to plan and control manufacturing.

The Mims/MFG system also includes bill of material control, purchasing, production and inventory as well as parts control, material requirements planning, master scheduling and product costing modules.

The SOM module of the Mims/MFG package is priced at $10,000 for both IBM VM and MVS versions from Geisco, 401 N. Washington St., Rockville, Md. 20850.



MSA introduces the shortest distance between two points. New MSA Order Processing.

MSA's remarkable new Order Processing System keeps every order on track and on schedule.

It automatically checks credit and inventory availability. Schedules shipping. Bills customers. Immediately throws a red flag if there's a problem.

Then resumes the process when the problem is resolved.

It's the perfect way to keep your customers satisfied.

Now they won't have to wait while your customer service representative keys in line after line of information. The system automatically displays addresses, preferred shipment and other order-related information.

It also instantly checks current credit records, saving your service representative that time-consuming task.

Customer inquiries are a snap with MSA's

From Adesse

Two Subsystems Offered for IBM VM/SP Users

RIDGEFIELD, Conn. — The Adesse Corp. has announced two products for IBM VM/SP users: VM/SP Performance Analysis/Capacity Evaluation Subsystem (Pace) and Release 1.2 of the VM Terminal Simulation Subsystem (TSS).

According to the vendor, Pace was designed as a tool for system and application testing, performance analysis and prediction, capacity evaluation and stress testing.

The product executes in a virtual machine and drives an installation-defined configuration of IBM 3270 terminal devices, the vendor said.

Rental costs for the product range from $975 to $1,950 per month. The purchase price range is from $22,500 to $45,000.

TSS is a CMS program that executes in a virtual machine and makes it look like a standard Ascii or Binary Synchronous Communications IBM 3780 terminal, the vendor said. Using an automatic calling unit or manual calling facilities, the product connects to another system, called the external system, under user control. Once a connection is established, a conversation can reportedly be conducted between the user and the external system using TSS facilities.

Three new functions eliminate the need to use CMS disk storage as an intermediate staging area for files to be transmitted or received. Two new user exits are provided in Release 1.2 to extend an installation's ability to augment basic TSS capabilities.

The product is offered for $110/mo or can be purchased for $5,000. Adesse can be reached through P.O. Box 515, Ridgefield, Conn. 06877.

DG Unveils Four Packages For Eclipse MV Superminis

WESTBORO, Mass. — Data General Corp. has introduced four software packages for its Eclipse MV superminicomputer family, all developed by third-party vendors participating in the firm's Independent Software Vendor program.

Rapport from Logica, Inc. of New York is a data base management system (DBMS) that offers a relational approach to data management. According to the vendor, it provides a means for managing large or complex data structures. Prices are $15,000 to $57,000, depending on modules required.

Computer Modeling System (CMS) from Computer Modeling Ltd. of Framingham, Mass., is a decision support system that allows managers to develop computer-based, menu-driven applications. Designed to run on DG's Eclipse MV/Family Systems and the new Desktop Generator Systems, CMS offers unlimited model size, formatted screens, report generation, business graphics, multi-currency hierarchical consolidation, a Help facility and an on-screen tutorial, a spokesman said. It costs $1,750 to $8,950, depending on hardware configuration.

The SIR Database Software System from Scientific Information Retrieval, Inc. of Evanston, Ill., consists of:

- SIR/DBMS, a relational DBMS for business research data analysis.
- SIR/Host, a direct interface between SIR/DBMS and programs written in Fortran or some other host language.
- SIR/Forms, an integrated forms language for screen-oriented data entry that includes an interface to SIR/DBMS and major statistical packages and generates camera-ready tabular displays.
- SIR/SQL, an enfianced version of IBM's relational structured query language. The price of the SIR system ranges from $20,000 to $50,000.

Interactive Financial Planning System (IFPS) from Execucom Systems Corp. of Austin, Texas, is a modeling system for managers and analysts. It consists of six integrated subsystems — Executive, Modeling Language, Report Generator, Data File, Command File and Structure.

IFPS operates on all DG Eclipse MV/Family Systems under the AOS/VS operating system. It costs $40,000 for a five-year license for the Eclipse MV/4000 or $64,000 for a five-year license for the Eclipse MV/8000 II and MV/10000.

DG is located at 4400 Computer Drive, Westboro, Mass. 01581.

system. It lets you review the status of orders, prices, credit or inventory availability at a moment's notice. You can change orders easily.

And the system is flexible enough to handle special requests for shipping vendors, packaging, delivery dates or special handling procedures.

Just as important, MSA's online realtime system helps you control internal costs. It moves orders along without costly error or duplication of effort. It provides current information on pricing, discounts and special sales agreements with individual customers.

And it's a powerful tool for controlling inventory, since you can conveniently check on inventory status daily.

You'll find MSA's new Order Processing System flexible and easy to use. It works with the MSA Manufacturing System to let you schedule production more efficiently. And promise ship dates to customers more confidently. Of course, it's also perfectly integrated with MSA's Financial System.

If your company is ready for a dramatic improvement in your order processing, contact Robert Carpenter at (404) 239-2000. Or write Management Science America, Inc., 3445 Peachtree Road, N.E., Atlanta, Georgia 30326.

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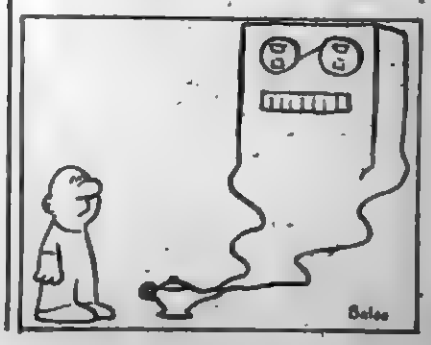

For Burroughs, IBM Users

File Transfer Software Bows

CINCINNATI — Intercomputer Communications Corp. (ICC) has announced the Intercom 300 and 300B file transfer software packages, said to allow advanced file transfers between Burroughs Corp. mainframes and IBM Personal Computers.

The Intercom 300 is said to enable the user to customize programs to meet specific system needs by transferring files between the IBM Personal Computer and a Burroughs mainframe and allowing batch file transfers to be initiated by either machine.

Application programs written on the Personal Computer can reportedly communicate with those on the Burroughs machine, and an automatic message routine is said to allow the user to specify sequences of messages.

Intercom 300B, available in three individual programs, is supplied as source code and provided on magnetic tape for the Burroughs mainframe.

The 300 is priced at $250, and the 300B costs $500 for the source code. More information is available from ICC at 3195 Linwood Ave., Cincinnati, Ohio 45208.

SPSS Announces Enhancement To 'SPSS-X TM'

CHICAGO — SPSS, Inc. has announced Release 2.0 of the SPSS-X TM Information Analysis System, which is said to ease the transportation of files across machine types with what the vendor labeled an Import/Export facility.

Designed for use with IBM's CMS, MVS and Digital Equipment Corp.'s VAX/VMS operating systems, SPSS-X TM reportedly facilitates the transport of data and dictionary information across machine types to allow end users to share access to information held in portable data files.

The vendor said, for example, that users at an IBM installation of SPSS-X can use the Import command to read a portable file created with the Export command at a DEC VAX-11 site. The vendor defined portable files as character files holding all of an SPSS-X system file, including the data dictionary with variable and value labels, missing value flags and printing and writing formats for each variable.

In addition, the package will translate characters from the portable file to match the character set in use at the receiving installation, reducing translation time, according to the spokesman for the vendor.

Release 2.0 of the SPSS-X TM package has an initial license fee of $4,000 from SPSS, 444 N. Michigan Ave., Chicago, Ill. 60611.

Forms Management System Debuts for DEC VAX-11s

BURLINGTON, Mass. — Interactive Systems, Inc. has announced a release of its Scope forms management system for use with Digital Equipment Corp.'s VAX-11 superminicomputers.

The release, labeled DEC-10/20, incorporates an improved user interface, more flexible programmer calls and improved functionality of the Scope forms editor, according to the vendor. The package reportedly will handle multiple forms per screen and the underlining or boxing of fields. Intrafield editing has been added to enable users to change selected characters in a field without altering the remainder of the data.

The version is also said to offer the ability to create a table of values for the validation of entered data. It provides a recently developed cut-and-paste capability allowing for the creation and modification of forms. Programs written with the new version of Scope can be run in batch mode with no modification.

DEC-10/20 will be available in the first quarter of 1984 for a license fee of $8,500 from Interactive Systems, 131 Middlesex Tnpk., Burlington, Mass. 01803.

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Portable Software Targets Computerized Manufacturing

CUPERTINO, Calif. — Enhansys, Inc. has introduced a portable software system that incorporates components for computerized manufacturing problem solving, including data access, analysis and presentation.

The system is aimed primarily at analytical professionals who use computerized equipment on the factory floor. The access and processing functions of the system are based on natural-language requests and require no knowledge of the underlying computer system, a spokesman claimed. The user interface offers natural-language control over mathematics and statistics processing, inquiry and reporting and graphics. It also supports electronic mail, word processing, planning and scheduling.

The system's transparent file access recalls data by common names, regardless of location. Its portability to different computer systems enables the user to work with one language.

System costs vary according to machine size, with a maximum of $5,250/mo from Enhansys at Suite 100, 20111 Stevens Creek Blvd., Cupertino, Calif. 95014.

Second Release of 'Unalter' Features Conversion Report

NEWTON, Mass. — Software Tools has announced the second release of its Unalter software package, which the vendor described as a language conversion processor for use in DOS and OS operating system environments.

Unalter is reportedly designed to reprocess Cobol programs using the Alter verb as the first step in the process of upgrading Cobol programs to Cobol 80 standards. The second version is said to feature a conversion report designed for maintenance documentation, which flags all program modifications made by Unalter. The vendor said the document can be included in the source code to enhance further program modification control, documentation and maintenance.

The Unalter system is priced at $750 from Software Tools through P.O. Box 191, Newton, Mass. 02168.

Spreadsheet Announced For System/36

SILVER SPRING, Md. — The Computer Marketing Division of Professionals Unlimited has announced the Executive Interactive Computational Algorithm (Exical/36) spreadsheet package for the IBM System/36 small business computer.

Exical/36 reportedly enables the user to define separately a model, the data entry for the model, the processing of the model and the reporting of the results. It is said to feature color display graphics through the IBM Model 5292 workstation and a Help function.

Exical/36 spreadsheet package is priced at $2,500 for a perpetual license, according to a vendor spokesman. More information is available from Professionals Unlimited, 3951 Lantern Drive, Silver Spring, Md. 20902.

Accounting Tool Gets Unix

GLENDALE, Calif. — Theta Business Systems, Inc. has announced a Unix version of its accounting software.

Scheduled for release on Jan. 1, 1984 are Unix versions of Theta's accounts receivable and payable, general ledger, order entry with inventory control, billing and sales analysis, payroll and Pascal development system modules. According to the vendor, the modules are fully integrated, and each can also be used as a stand-alone package, with the exception of the order entry system which requires the accounts receivable module.

Source code for each module is priced at $1,250, and object code is priced at $750 per module from Theta Business Systems, Suite 106, 1110 Sonora Ave., Glendale, Calif. 91201.

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FUNCTION/FEATURE*	CXI Availability	IBM Availability
3278/79 Models Supported		
3278 Model 2	NOW	1st Qtr 1984
3278 Models 3 and 4	NOW	Not Available
3279 Model 2A (base color mode)	NOW	1st Qtr 1984
3279 Model 3A (base color mode)	NOW	Not Available
3279 Model 4A (base color mode)	NOW	Not Available
NOTE: IBM does not produce a 3279 Model 4A (3440-character screen)		
Controller Connections Supported		
3276 Display/Controller	NOW	Not Available
3274 Controller	NOW	1st Qtr 1984
3274 Port 0 (for 3274-customization)	NOW	Not Available
Display Characteristics		
1920-character monochrome	NOW	1st Qtr 1984
1920-character color	NOW	1st Qtr 1984
Printer Support		
Screen Print to 3274-attached Printer	NOW	1st Qtr 1984
Screen Print to 3276-attached Printer	NOW	Not Available
Screen Print to PC-attached Printer	NOW	1st Qtr 1984
Screen Save to PC Disk File	NOW	Not Available
Operator Information Area (status line)	NOW	1st Qtr 1984
Concurrent Operation		
PC DOS Session	NOW	1st Qtr 1984
DOS 2.0 Print Spooling	NOW	Not Available
Keyboards		
Special 3270 PC Keyboard	Not Available	1st Qtr 1984
Keyboard Map Selection (including IPC) and national keyboards)	NOW	Not Available
Hardware Diagnostic and Dump Facility	NOW	1st Qtr 1984
Screen-Control Application Program Interface	NOW	Not Available
TSO and VM/CMS Multi-Mode File Transfer *NOTE: CXI can do this now and do it fast—full text and, for TSO, binary and compressed.*	NOW	1st Qtr 1984
SPF (System Productivity Facility) in Local Mode *NOTE: With PCOX/m3278/SPF, which CXI is jointly marketing with Phaser Systems, Inc., of San Francisco*	DEC. 1983	Not Available

*This table compares a PCOX-equipped IBM or IBM-compatible personal computer (running the PCOX/Control Unit Terminal Program) with an IBM 3270-PC running the 3270-PC Control Program (in the Control Unit Terminal Mode)

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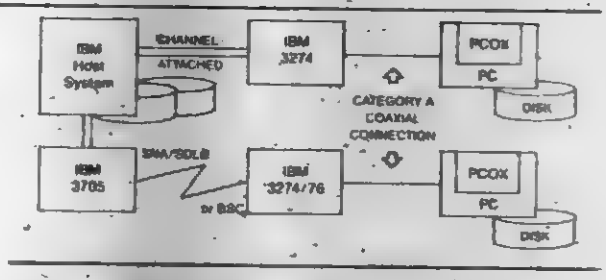

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For Both Batch and On-Line

IMS Programmers Get Nonprocedural Cobol

WAITSFIELD, Vt. — Three programming products from Computing Productivity, Inc. are said to give IBM IMS programmers nonprocedural Cobol for both batch and on-line data base referencing and for IMS/DC and CICS/VS terminal referencing.

Version 2.0 of IP3-DB adds nonprocedural data referencing verbs to Cobol that conform to Cobol syntax and semantic format, a spokesman said. This makes the Cobol application program independent of both Vsam and IMS access methods, data base architecture and status return codes.

Version 1.0 of IP3-DC and IP3-CICS provide nonprocedural Receive and Send verbs that conform to Cobol syntax and semantic format. The terminal referencing provided by these verbs is said to make the program independent of the IMS/DC architecture and CICS/VS command-level terminal referencing.

All three products eliminate the need for training in IMS/DC and CICS/VS programming and related debugging, the company said.

IP3-DB verbs operate in both batch and on-line programs and are portable across IMS and/or Vsam files. IP3-DB nonprocedural statements may be mixed into the same program with IMS and Vsam calls so that IP3-DB can be used for maintenance of the current Cobol program inventory, the spokesman claimed.

IP3-DC and IP3-CICS are completely integrated with IP3-DB. Nonprocedural data referencing to Vsam files and IMS data bases is achieved through IP3-DB statements in the on-line program.

IP3-DB is available on permanent license for a fee of $35,000. IP3-DC and IP3-CICS are each available for a license fee of $12,000.

Computing Productivity can be reached at Larrow House, Waitsfield, Vt. 05674.

POS Data Capture System Provides Retail Reporting

CUPERTINO, Calif. — Tymshare, Inc. has announced a new electronic point-of-sale (POS) data capture system that reportedly provides draft capture, headquarters reconciliation and comprehensive reporting to retailers and financial institutions.

According to the vendor, the point-of-sale data capture system is delivered by dial-up terminals through the company's Tymnet data communications network, which provides local access in more than 450 cities and 40 countries.

The system is said to feature the ability to handle different types of transactions electronically, including sales, credits, voids and post authorizations in addition to detailed transaction reports for banks or for merchants' corporate headquarters. The transaction reports show daily store-level activity. The system also provides for the transmission of depository tapes to the merchant's bank or processor.

According to the vendor, the point-of-sale service costs between 16 and 19 cents per transaction, depending on whether the terminal provided is bought or leased from Tymshare, located at 20705 Valley Green Drive, Cupertino, Calif. 95014.

Sales Manager Offers Support For HP 3000

CANOGA PARK, Calif. — A sales management information system for users of Hewlett-Packard Co. HP 3000 minicomputers was recently announced by Business Systems Associates, Inc.

The SMS/3000 reportedly includes sales information management features such as territory assignment and control, immediate lead identification and tracking, lead source analysis, client purchase patterns and profiles, sales cycle scheduling, sales progress monitoring, computerized customer file and mailing list management. A spokesman said the package enables the monitoring of sales progress by individual, by district or region and by entire sales area.

The package also includes electronic mail capability and a word processing and correspondence generation interface, the spokesman said. It is written in Cobol 11 and uses HP's Image data base management system and View/3000 screen forms.

The package is available immediately at a price of $15,000 from Business Systems Associates, 20942 Osborne St., Canoga Park, Calif. 91304.

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CW COMMUNICATIONS/INC.

Integrating Outside Information Seen Key

(Continued from Page 95)

performance. In the same 10 years, the number of user terminals accessing remote commercial data bases has zoomed from fewer than 50,000 to over 450,000, representing more than 600,000 passwords and subscriptions.

Partly as a result, many MIS directors found themselves in a not-so-peaceful coexistence with a then-flourishing remote computer services industry. Time-sharing's traditional appeal — that it could be used to provide end users with applications otherwise mired in in-house backlogs — is the same as the appeal of the personal computer.

Both have furnished end users with strategies to close the gap between what end users wanted and what MIS was able to provide. And while applications previously supplied by on-line computer service companies are being taken over by personal computers, the combination of the two presents a new generation of opportunities to multiply white-collar productivity.

Trends Behind Increase

There are several underlying trends behind the increase in terminals:

- Increasing awareness of the need for better access to external information.
- The ongoing coordination of data from various financial and other markets and the creation of new markets that exist only on electronic services.
- The falling costs of terminals, the gradual acceptance of public data networks and the dropping underlying costs of computers, storage media and transmission are making the electronic delivery of more information products feasible.

In 1982, the electronic information industry passed $1 billion in value. Link Resources Corp. research indicates that this market will continue to grow at an overall rate of abut 23% — reaching over $2.9 billion by 1987.

Every company needs to formalize its approach to integrating MIS and external information. If internal and external information is not brought into a coordinated setting, the corporation runs the risk of failing to use its full information resources.

On a more practical level, an overall strategy is needed to minimize the costs of outside services. A lack of planning can result in excessive costs. These are due to inefficient use by untrained users where in-house specialists or outside information brokers could perform the same function more cost-effectively. The excessive costs are also due to redundancy of on-line information requests and payments and to lack of information about the services available.

Tying every personal computer user into a central corporate data base will clearly increase the power and responsibility of MIS directors with regard to the use of outside information services. Unfortunately, this area is unfamiliar territory for many of them.

In putting together this strategy, one must recognize that the special needs of various constituencies within a company are very different. In most sizable organizations, there are three main types of on-line services users: professional and specialized, including lawyers, economists and investors; librarians; and casual, occasional users like managers and executives.

Many professionals have been using on-line data base services for many years and have adopted routine attitudes toward them. A recent Link study of over 1,000 end users of data base services found that 51% had been working with information supplied by on-line services for five years or longer. Forty-six percent had one to five people reporting to them, with another 26% responsible for managing six or more employees. One of the most striking findings about this group of users is that the personal computer has made relatively little penetration into their working environments. Only 27% said they had personal computers available in their departments, while 51% cited the availability of dumb terminals.

Sieck directs the Electronic Information Program at Link Resources in New York.

Accounting Aid For Series/1 Announced

TAMPA, Fla. — Consolidated Management Systems, Inc. has announced the Management Information Control System (Mics) accounting package for users of IBM's Series/1 computer system.

The management system consists of the following software applications: security system, accounts payable, accounts receivable, payroll, budget entry and control, general ledger and property control and depreciation, according to the vendor.

The product is written in Emulation Design Language and IBM Cobol utilizing the Indexed Access Method file structure. It costs $9,300 from Consolidated Management Systems through P.O. Box 290382, Tampa, Fla. 33687.

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The DEC Rainbow 100+ The Rainbow 100+ system uses industry standard 8088 and 8087 microprocessors, a 10 MB Winchester hard disk, a dual floppy diskette with 800 KB capacity and open access dual-port built in terminal emulator printer port and 128 KB of system memory.

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Astco Targets MVS, VS1 With Release 2.1 of 'Astute'

PALO ALTO, Calif. — Astco has announced Release 2.1 of Astute, a data set and catalog management system for IBM's MVS and VS1 operating systems which is said to enhance support for IBM Vsam data sets.

Astute's selection mechanism may be used to select any attribute of a Vsam object. Its reporting facility may be used to report this information, optionally sorted in ascending or descending order. This may be combined with Astute's preprocessing facility to produce a complete Vsam data set management system.

Also available in the new release are IBM MVS/XA support, a disk-to-disk copy facility and a redefine facility that generates define commands for any specified Vsam object.

Astute costs $7,000 on the first CPU. Astco is located at 926 Amarillo Ave., Palo Alto, Calif. 94303.

Design System Out for IBM Micro

STILLWATER, Minn. — Phoenix Performance Systems, Inc. has announced a computer-aided instruction computer courseware design system for use with the IBM Personal Computer.

Dubbed The Author Plus, the system reportedly enables the courseware generator to create on-line, interactive computer lessons on any topic. An enhanced version of the company's The Author system, it features extended use of function keys, learner option for page-back to previous frame, expanded graphics capabilities and full-screen text and graphics entry and editing.

The package is priced at $295 from Phoenix Performance Systems, 324 S. Main St., Stillwater, Minn. 55082.

Interactive Planning Tool Tracks SNA's Performance

WALTHAM, Mass. — BGS Systems, Inc. has announced Best/1-SNA, an interactive capacity planning package that models, evaluates and predicts the performance of IBM Systems Network Architecture (SNA) data communications networks.

The product offers end-to-end host/network capacity management, a spokesman said. It includes the ability to project the effects of increases or changes in work load on networks and their components; determine when performance will fall below standards; determine possible solutions for projected service problems; identify the causes and solutions for service bottlenecks; "tune" the network; calculate the consequences of network expansion on performance; and perform "what-if" functions for factors affecting network performance.

Best/1-SNA includes an automatic interface to BGS' Best/1-MVS or Best/1-VM capacity management packages for IBM mainframe operating systems. A user deciding whether to add terminals at remote locations can use Best/1-SNA to determine what the response time would be at the new terminals, what impact their addition would have on response time throughout the network and what adjustments would be required to meet response-time standards.

The package views all components of a network as well as their interrelationships, the spokesman said. It incorporates full screen, menu-driven operation based on IBM's System Productivity Facility, default values and on-line tutorial facilities. It generates a variety of standard reports.

Best/1-SNA has a base price of $22,500 per network site from BGS at One University Office Park, Waltham, Mass. 02254.

Graphics Tool Made to Fit IBM 5080 Series

BOULDER, Colo. — Precision Visuals, Inc. has announced that its DI-3000 graphics tools package will run on the IBM 5080 Graphics System.

DI-3000 can be used in engineering, scientific and computer-assisted design applications, a spokesman said. Capabilities include two- and three-dimension dynamic image transformation, complex polygon fill with colors or patterns, hardware picking and color table access.

The full complement of IBM 5080 input devices are supported, including a graphics tablet, lighted function key pad and valuator dials.

Written in Fortran, DI-3000 is an integrated system of 200 user-callable subroutines. It supports a variety of graphics terminals and hard-copy devices, allowing existing applications written under DI-3000 to be transported to the 5080.

Prices for a 25-year DI-3000 license on IBM processors are $12,000 for the 4300 series, $15,000 for the 3030 series and $19,000 for the 3080 series.

More information is available from Precision Visuals, which is located at 6260 Lookout Road, Boulder, Colo. 80301.

MVS Users... Clean Up Dataset Litter Fast... with DMF!

Are your whiskers in a twist about dataset litter? Not mine! Not since my Data Center Manager got me DMF!

Let's face it, datasets pile up. But since there's only so much space on your TSO volumes, you have to get rid of old data from time to time and make room for jobs that need to be done today.

With standard TSO (even with ISPF), it can be a dirty job ... listing the catalog, browsing each dataset, and deleting those you don't want.

Now you can make clean-up quick and easy with DMF, the Dataset Management Facility. For MVS users, it's the most powerful dataset maintenance tool available. Just look at these features:

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- ***Full screen display*** of dataset information from the system catalog or from on-line volumes, complete with six-way scrolling
- Extensive ***dataset selection criteria***, including use of "wild cards", prefix and suffix matching
- Extensive interactive ***"help"*** and ***tutorial*** capability
- ***Single character line commands*** for dataset manipulation such as edit, browse, delete, rename, catalog, etc.
- Maintenance of ***running totals*** of on-line space allocated and used
- Extensive ***reporting capabilities*** in batch and TSO line-oriented environments
- ***Erasure of secure information*** before dataset deletion.

DMF does more than clean up. Ever tried to locate a dataset when you can't remember the name? DMF finds it fast with a few keystrokes. It makes using TSO quicker and easier for just about everybody.

Tests show that DMF will do your dataset housekeeping in only 35% of the normal connect time, eliminate over 80% of your keystrokes, and save up to 50% of your CPU time! It means that your DMF will pay for itself in only a few weeks of regular use. What purrformance!

Don't get your whiskers in a twist about dataset litter. Clean up with DMF. Please call us at (416) 685-0590 and we'll be happy to arrange a free 30 day trial.

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Yes I am interested in knowing more about your DMF (Dataset Management Facility) Software product for users of IBM MVS operating systems

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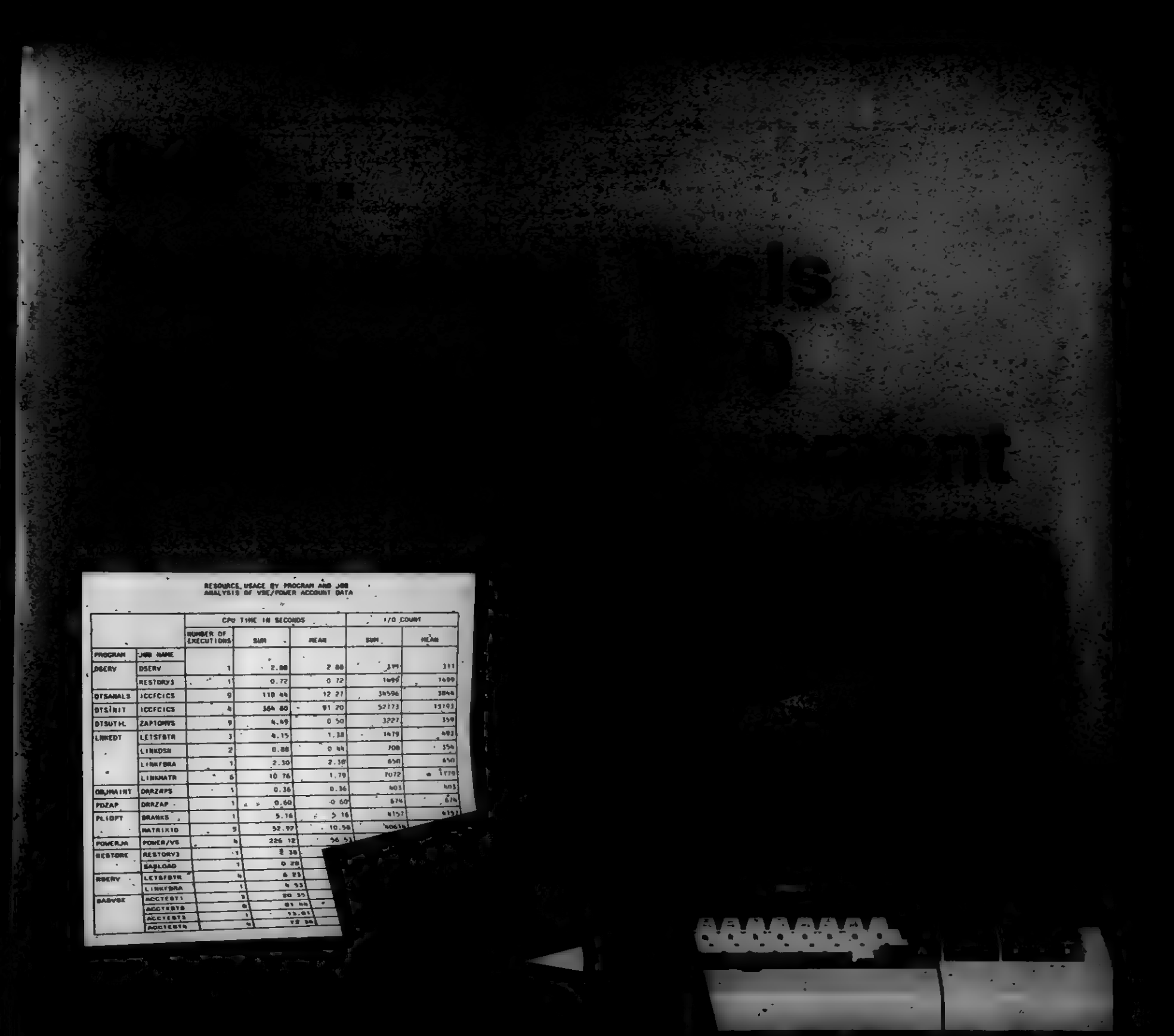

SAS®—always a leading performance measurement tool for IBM OS users—now offers VM/CMS, DOS/VSE and SSX users the power and flexibility of the SAS System.

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Call or write today. SAS Institute Inc., SAS Circle, Box 8000, Cary, NC 27511, USA. Telephone (919) 467-8000. Telex: 802505.

The SAS System is available outside the USA from the Institute's subsidiaries in Heidelberg, West Germany; Weybridge, Surrey, UK; Wellington, New Zealand; and Sydney, Australia; and from licensed distributors in Tokyo, Japan; Milano, Italy; Herzliya, Israel; and Singapore.

SAS saves time.

Micro Notes

The Basic Answer (TBA), a text processing utility designed to allow the programmer to construct Basic code in a structured manner, has been released by Logical Systems, Inc. TBA runs on the Radio Shack TRS-80 Models I, III, 4 or Lobo Systems' MAX-80. TBA Version 5.1 costs $69 and Version 6.x costs $79 from 8970 N. 55th St., P.O. Box 23956, Milwaukee, Wis. 53223.

The Answer in Computers has released **Security, Security-Plus and Security-Plus-Log.** Security provides password protection for all programs, with no modification to the operating system, for $50. Security-Plus, at $100, allows the additional option of password protection for individual files. Security-Plus-Log maintains a complete record of program and file activities and retails for $150. A demonstration disk is available at $25. The disk may be returned and credited toward the purchase of any package to Suite 7, 6035 University Ave., San Diego, Calif. 92115.

Walonick Associates, Inc. has released **Statpac,** a microcomputer data manager and statistical analysis package geared toward the professional research community. Features include write subfile, sort cases, descriptive statistics, cross-tabs and chi-square, correlation and regression, t-tests, analysis of variance and multiple variable response. Statpac can use data files that have been downloaded from mainframes or other microcomputer programs. In addition, Statpac files are readable by any word processor, although the package contains its own word processor-based file editor. It is available for the IBM Personal Computer XT, Victor Business Products, Inc. Victor 9000 and Radio Shack TRS-80 Models III and 4 for $400 from 5624 Girard Ave. S., Minneapolis, Minn. 55419

Courseware, Inc. has introduced the **Apple Authoring System,** the first in a series of software authoring packages for personal computers, which allows teachers and business educators who lack programming skills to create interactive, self-paced computer-based lessons. It is designed for the Apple II and IIe personal computers and is available for $255 from 10075 Carroll Canyon Road, San Diego, Calif. 92131.

Lifetree Software, Inc. has announced the addition of **Volkswriter Deluxe** to its Volkswriter line of office automation software for the IBM Personal Computer and Personal Computer-compatibles. Volkswriter Deluxe includes a text-merge feature, which uses Volkswriter's files to maintain mailing lists, create label sets and create personalized form letters. Volkswriter is compatible with spreadsheets such as Lotus Development Corp.'s Lotus 1-2-3 and works with data base managers such as Ashton-Tate's Dbase II. It retails for $285 from Suite 315, 411 Pacific St., Monterey, Calif. 93940

Radio Shack has released **Videotex Plus,** a communications package for disk system Radio Shack TRS-80 Models I, II, 4 and 12 computers. Offered for $49.95 at Radio Shack Computer Centers and participating Radio Shack stores and dealers, both the Model I/III Videotex Plus package and the Model II, 12/16 Videotex Plus package allow communication with any computer information service such as Compuserve, Inc.'s Compuserve and Dow Jones & Co.'s News/Retrieval.

Minicomputer Modeling, Inc. has announced that **Data Model,** a menu-driven system for financial modeling and spreadsheet management is now available for IBM-, Wang Laboratories, Inc.- and Microsoft, Inc. MS-DOS-compatible computers. Data Model's "Virtual Spreadsheet" design allows an unlimited number of individual spreadsheets to each contain 500 col. and 30,000 rows. "Multidirectional Consolidation" capability permits any number of consolidations to be performed in any direction. Permanent licenses, which include enhancements and updates for one year, are $1295. More information is available from Suite B, 1507 Queen Anne Ave. N., Seattle, Wash. 98109.

Software Automation, Inc. has introduced **Salvo,** a fourth-generation language for the personal computer. Salvo combines a relational data base management system and a natural language interpreter, allowing users to give English commands to the computer, to retreive and/or manipulate data and to develop applicaitons without detailed programming. Salvo retails for $495. Information is available from 14333 Proton Road, Dallas, Texas 75234.

Idris, a Unix-like operating system from Whitesmith Ltd. is now available for Digital Equipment Corp.'s Professional 350 computer. It will be sold under a joint marketing agreement with DEC. Idris alone costs $550; it can be purchased with a C compiler for $1100 and with C and Pascal compilers for $1250 from 97 Lowell Road, Concord, Mass. 01742.

(Continued on Page 108)

KEY TRONIC Refines
The Televideo-925*
Keyboard

key tronic

Sperry Updates OS/3 for System 80, 90 Users

BLUE BELL, Pa. — Sperry Corp. has announced Release 8.1 of its OS/3 operating system, which features enhancements to the Data Base Management (DMS) system for Sperry System 80, 90/30 and 90/40 users.

Also, Sperry announced enhancements to the Escort language system, including a new report system that is said to allow users to create, display and manipulate files as tabular reports. The system also features the capability to display multiple records of a file on a single screen without multiple transmissions, according to a spokesman.

Sperry said the Escort system, designed for use in the OS/3 environment, enables users to perform data entry, transaction processing, reports, queries and computation with English language commands. The enhanced version is said to offer improved enter, update and change commands, and the capability to access uncataloged files.

The OS/3 operating system now reportedly features improved file access performance for data utilities, sorts, IBM's IMS and user-written programs compiled under Release 8.0 of RPG-II, Cobol and Fortran. In addition, the package offers an accelerated load directory search function, which has enhanced the resident loader to use an indexed search algorithm when searching the directory load library.

In addition, the operating system is said to include a new resident shared code loader, which Sperry claims will improve the performance of any product that uses shared code by reducing the number of inputs and outputs required to load a shared code module. A data management file sharing feature reportedly permits users to access a specified file in the read and write modes without restriction.

The DMS data base management system for the OS/3 environment has been enhanced to include start-up control of optional features, a new error message when invalid pointers are detected, additional preprocessor validation, space inventory page processing, recovery file allocation and cancel and swap error trapping. The improvements to OS/3 are available to System 80 Model 4 and Model 6 users immediately and will be available to Model 8 users with the expected introduction of Release 8.2 in the first quarter of 1984.

The Escort software for the System 80 Models 4 and 6 can be leased for $79 monthly, and the DMS data base management system for the System 80 Models 4 and 6 is available for $233 monthly from Sperry, Computer Systems, P.O. Box 500, Blue Bell, Pa. 19424.

Utility Allows Report Printing On CICS Printer

MINNEAPOLIS — Davis, Thomas and Associates, Inc. recently announced a software utility for printing reports on IBM CICS/VS network printers, reportedly eliminating the need for IBM Power/RJE telephone lines and equipment.

DTAprint runs as a task under CICS and provides the capability to print or view reports that reside in the Power/VSE list queue on the CICS/VS IBM 3270 terminals or 3280 series printers attached to the network, according to a spokesman for the vendor.

The package reportedly can restrict access by terminal to selected Power queue classes and will optionally log which reports have been printed by which terminals. It allows users to print specific pages of a report, rather than the entire report, the spokesman said.

The package utilizes standard IBM DOS/VSE and Power/VSE options and can be leased for $120 per month or purchased for $2,400 from Davis, Thomas and Associates, Suite 301, 8800 Highway 7, Minneapolis, Minn. 55426.

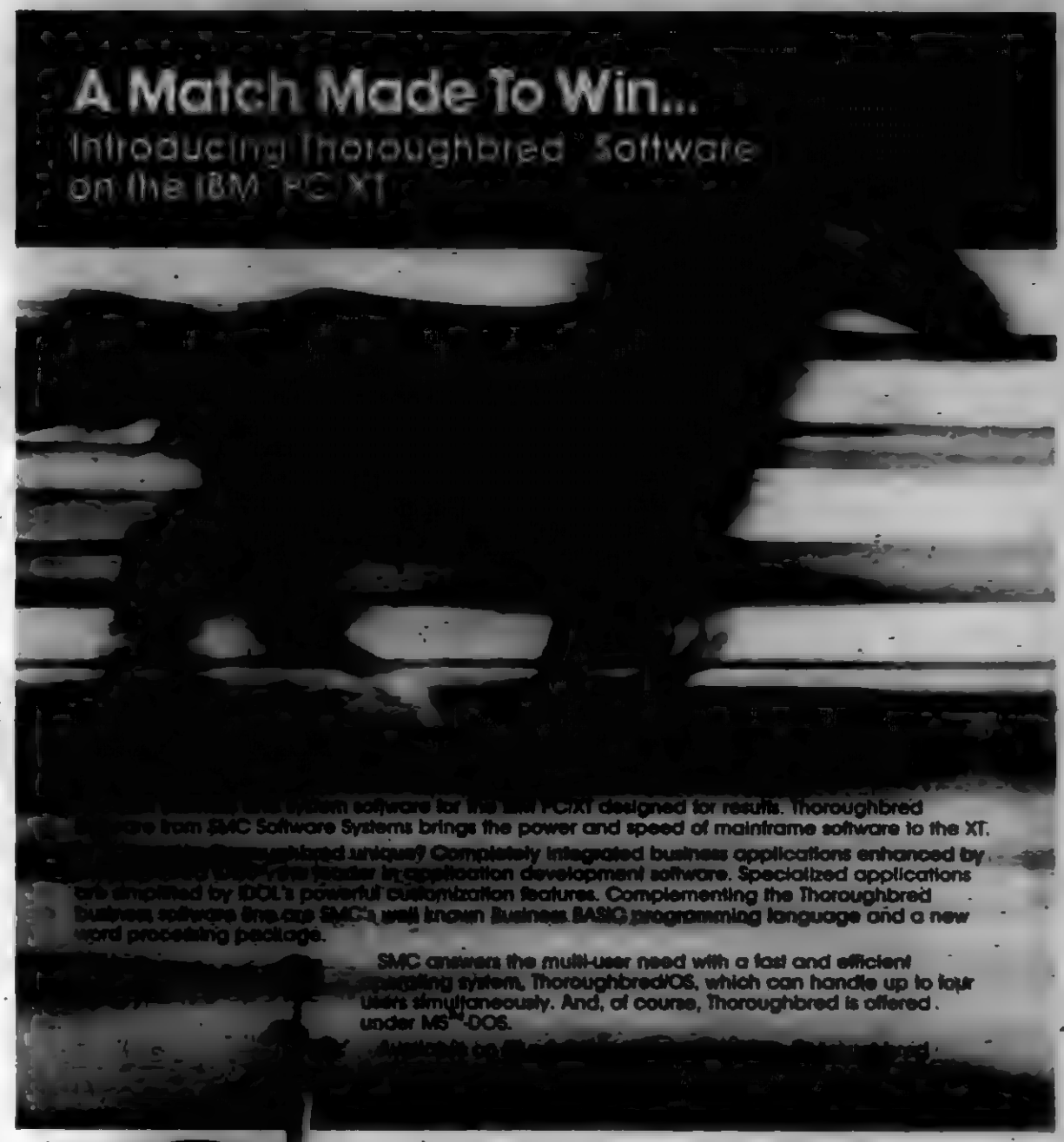
Payroll Service From Bradford Out for Micros

TEANECK, N.J. — Bradford National Computer Services, an affiliate of Bradford National Corp., has announced its Payroll/Human Resources service, which the vendor said can be accessed through most current microcomputers.

The service is said to allow subscribers to utilize 500 earnings and 500 deduction categories for each employee, 200 user-defined fields, 94 standard reports, a variety of specialized reports and an on-line adjustment transaction feature that enables one entry to adjust an entire payroll.

The vendor said all tax jurisdictions are incorporated into the system along with a standard range of banking services that are available to customers. The system also generates employee benefit statements and historical information.

The Payroll/Human Resources service may be accessed 24 hours a day at a cost of $3/connect-hour from Bradford National Computer Services, 1500 Palisade Ave., Teaneck, N.J. 07666.



Micro Notes

(Continued from Page 106)

Structured Software Group, Inc. (SSG) has reduced the prices of its **financial and productivity software packages** up to 50%. Prices now range from $100 to $595. Previously, the packages were priced from $200 to $1200. Included in the price reductions are general ledger, accounts receivable, accounts payable, Magic Worksheet, Word Right and Qsort. SSG is also offering the Magic Worksheet package free with the purchase of any two other SSG packages.

Lion Micro Systems has announced the **CP/M Recovery** program, which is said to eliminate data and text memory loss due to systems crashes, program errors, disk failures and other causes. CP/M Recovery reportedly allows the user to recover memory, conduct editing on data within memory (including control characters) and save the data in any disk file. CP/M Recovery runs on Digital Research, Inc.'s CP/M operating system and is available from Suite 122, 2 Dallas Communications Complex, Irving, Texas 75039.

Tymshare, Inc. has introduced **PC/Focus**, a data base management system designed to run on the IBM Personal Computer, which uses non-procedural English sentences instead of conventional progamming. It is indentical to Tymshare's mainframe Focus in design, function and capabilities. PC/Focus is available from 20705 Valley Green Drive, Cupertino, Calif. 95014.

OZ: Management Control, a software package that integrates data analysis, graphics and reports, has been announced by Fox & Geller, Inc. OZ has a built-in variance analysis system that can pinpoint and explain budget variances and is the only progam for micros that offers this capability, according to a company spokesman. A version for the IBM Personal Computer will be available in January 1984 for approximately $500, and versions for other personal computers will follow. Information is available from 604 Market St., Elmwood Park, N.J. 07407.

Marc Software International, Inc. has announced **Muse Word Processing**, a word processing package for the Eagle Computer, Inc. personal computer and Eagle 1600 series, which offers a scientific typing feature with 13 levels of superscripts and subscripts. Special character sets provide Greek and math characters. Muse also features a spelling checker, mailing list processing, advanced document selection capability and document recovery system. Muse sells for $595 for a single copy, with discounts of up to 70% for mulitiple copies from Suite 200, 260 Sheridan Ave., Palo Alto, Calif. 94306.

Imaginator 2 enhancement system for the Heath/Zenith H-29 and Z-29 series of computers has been released by Cleveland Codonics, Inc. The Imaginator 2 features a 500,000 pixel/sec vector-drawing rate to illuminate its 672- by 500-pixel display. Dual on-board processors eliminate any graphics load on the computer. The memory may be arranged in horizontal, vertical or rectangular formats. The package, including installation and operating instructions, costs $895 from the vendor at 18001 Englewood, Cleveland, Ohio 44130.

The Software Systems Division of Science Management Corp. has announced the availability of its multiuser operating system, **Thoroughbred/OS**, for the IBM Personal Computer XT. Thoroughbred/OS supports the full line of Thoroughbred software and comes with a Business Basic that contains all the arithmetic functions needed for running business applications. It retails at $795, with discounts to distributors and retailers. Further information can be obtained from the vendor at 1011 Rt. 2, P.O. Box 6800, Bridgewater, N.J. 08807.

Professional Software, Inc. has introduced **Wordplus-PC**, featuring the Built-in On-Line Spelling System (Boss), a spelling checking program that features a 90,000-word electronic dictionary, with space for an additional 10,000 words provided by the user. During document editing, the Boss automatically locates and highlights any misspelled word and provides up to eight suggestions for correct spelling. Wordplus-PC is currently being shipped for the IBM Personal Computer to computer dealers, with versions for the Texas Instruments, Inc. Professional Computer, the Digital Equipment Corp. Rainbow and the Victor Business Products, Inc. Victor 9000 to follow. Professional Software is located at 51 Fremont St., Needham, Mass. 02194.

A **series of documents** describing the Unix V operating system is available from Western Electric Corp. Included are: product-release documentation, which lists the major features of Unix System V, order No. 3010909, for $20; transitional aids, which are a collection of documents needed to move from System III to Unix System V, No. 301-908, for $10; The Users Manual, No. 301-095, for $35; The Administrators Manual, which supplements the Users Manual, No. 301-906, for $15; and the Error Message Manual, available only to licensees and intended for operators and adminstrators, No. 301-907. Copies of the documents are available from IDC Commercial Sales, Western Electric through P.O. Box 26205, Indianapolis, Ind. 46226.

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'Emu' Allows IBM Micro To Copy Dasher

COLUMBIA, Md. — Rhintek, Inc. has introduced a software package said to allow the IBM Personal Computer to emulate Data General Corp.'s Dasher terminals. Called Emu, the package will also operate on the IBM Personal Computer XT and many of the IBM-compatible personal computers.

Consisting of assembly language software that bypasses the disk operating system, the package is capable of achieving a 9.6K bit/sec terminal-emulation rate. Competitive systems that are written in compiled Basic or use the DOS or Bios calls are reportedly limited to continuous rates of 2.4K bit/sec or less.

Although the package was designed for direct-connect applications, it can be used in remote and dial-up systems. The ability to perform file transfers at 9.6K bit/sec is included in the basic package.

Emu is able to transfer data to and from any PC-DOS file, even onto a different disk and through a complicated subdirectory structure, according to a vendor spokesman. The software is distributed on a non-copy-protected diskette to allow the user to move the package to a fixed disk and make backup copies for his own protection and archival purposes, a vendor spokesman said.

The license to use the software on one machine is $95. The first 200 orders to be received will be filled at an introductory price of $75.

The source code is available to those who need to make their own custom modifications.

More information is available from Rhintek through P.O. Box 220, Columbia, Md. 21045.

Customized Telemiser Selects Low-Cost Routing

ONTARIO, Calif. — Communique Telecommunications, Inc. has introduced a stand-alone, real-time computer system for automatic calculation and selection of lowest cost routing of telephone calls. No private branch exchange (PBX) or Touch-Tone telephones are needed. The Telemiser is a custom-programmed, microprocessor-based system that can be added to a PBX or key station unit telephone system to select the lowest cost line available at the time of the call.

Routing is based on software calculations of the call's destination, the time of day, the time of week and the user's contract with AT&T and other long-distance carriers such as GTE Sprint and MCI Communications Corp. Calculations also include the amount of cumulative line service usage to date in each billing period to take advantage of rate breaks where applicable, a vendor spokesman said.

Since it converts rotary telephone pulse signals into tone signals, the system allows the use of long-distance companies such as MCI and Sprint (which require tone signals) with rotary telephones. It will also add any access codes necessary to use the alternate phone companies.

The Telemiser functions between the user's telephone and the PBX or key station unit telephone system and is said to be compatible with any telephone system as long as the local telephone company has already installed a standard RJ21X block.

Based on software-driven computer control of digitized voice transmission, the system supports a maximum configuration of 500 lines. To make a call, the user dials 10 digits, which are intercepted by the least cost router. The system performs the least cost routing and places the call.

Custom-Programmed Telemiser

Also offered is an optional capability to monitor telephone usage and prepare management reports on utilization by connecting a video terminal or printer to the system, the spokesman said.

On-line diagnostics and video warnings are provided to alert users to problems on particular lines or trunks so corrective action may be taken. The system also maintains a data base of this information so management reports can be prepared for evaluation of existing utilization of lines, trunks and service mixes.

If a power failure occurs at the customer site, the Telemiser connects the trunk lines in a bypass mode so calls can continue to be made. An independent battery backup reportedly maintains clock timer information during power interruption.

The minimum three-line by three-line configuration is priced at $25,000, not including software. "The software for a system of this size is estimated to cost from $3,000 to $5,000 because it is very site dependent," according to company president Michael T. Finnin. "Its cost depends on how many services users have and what kind of configurations need to be prepared for them."

The system is available in a vertically or horizontally configured 5¼- by 19-in. housing. More information is available from Communique Telecommunications, 4015 Guasti Road, Ontario, Calif. 91761.

Data-Sat Receiver Supports Data Networks

MOUNTAIN VIEW, Calif. — Modulation Associates has introduced a satellite receiver for corporate data nets.

The Data-Sat reportedly allows reception of high-volume, point-to-multipoint 56K bit/sec data information. As a stand-alone receiver, data capability can reportedly be added to a user's already existing earth terminal.

An optional demultiplexer is also said to be available for electronic mail, reservations or network control capabilities. Priced at $3,800, the receiver is available from Modulation Associates at 897 Independence Ave., Mountain View, Calif. 94043.

EFT Control Top Priority In Finance

By Bill Picton and Will Greene
Special to CW‡

Adequate control of the electronic funds transfer (EFT) function is a top priority for financial institutions, particularly if a newly developed, automated system is involved. Having the proper answers to basic questions can mean the difference between a well-controlled system and a multimillion dollar exposure.

A security-and-control review can minimize risks and answer many of the following questions:

- Can messages be lost, duplicated or illegally entered?
- What protection is there against changed, corrupted or incorrectly delivered messages?
- Can delayed, accelerated or undelivered messages be prevented or detected?
- How can messages be protected from illegal monitoring?
- Are there appropriate controls over availability of funds, kiting, repatriation of funds, foreign exchange variances, compensation liability and privacy violation?

Security-and-Control Review

Financial institutions routinely process and transfer sensitive data and funds through widely distributed data communications networks. Substantial resources

(Continued on Page 114)

AT&T Announces Four Modems

MORRISTOWN, N.J. — AT&T Information Systems has announced four modems for sending and receiving data over telephone lines.

The Dataphone Direct/Acoustically Coupled Modems can reportedly transmit data through a telephone handset or through direct coupling to a telephone base unit.

The products include two modems designed for use with the AT&T PDE-200 Portable Data Entry Terminal to facilitate transmission of inventory data, meter readings or other data collected to centralized data bases.

Both types are said to communicate in full-duplex mode at 300 bit/sec and are compatible with AT&T's Dataphone 103 modem.

The general-purpose Dataphone modems are said to interface through a standard RS-232C connector to virtually any home or office computer or terminal. They also reportedly open communications with public data banks and time-sharing computer systems.

Priced from $165 to $210, the modems are available from AT&T Information Systems through 100 Southgate Pkwy., Box 1955, Morristown, N.J. 07960.

System Guards Against Computer Intrusions

RESTON, Va. — Analytics Communications Systems, Inc. has introduced a security system designed to guard against computer intrusions.

The Sherlock Information Security System protects computer systems and networks from intrusion. It provides positive message authentication and encryption for dial-up, dedicated and multidrop systems of private and public data in existing networks.

Sherlock requires no change in existing hardware, software, communications or operating procedures. It was designed to protect against intrusion and theft even by computer and wiretapping techniques and to provide a positive audit trail of authentication to individual users.

The Sherlock integrated system is priced at $1,995 from Analytics Communications Systems, 1820 Michael Faraday Drive, Reston, Va. 22090.

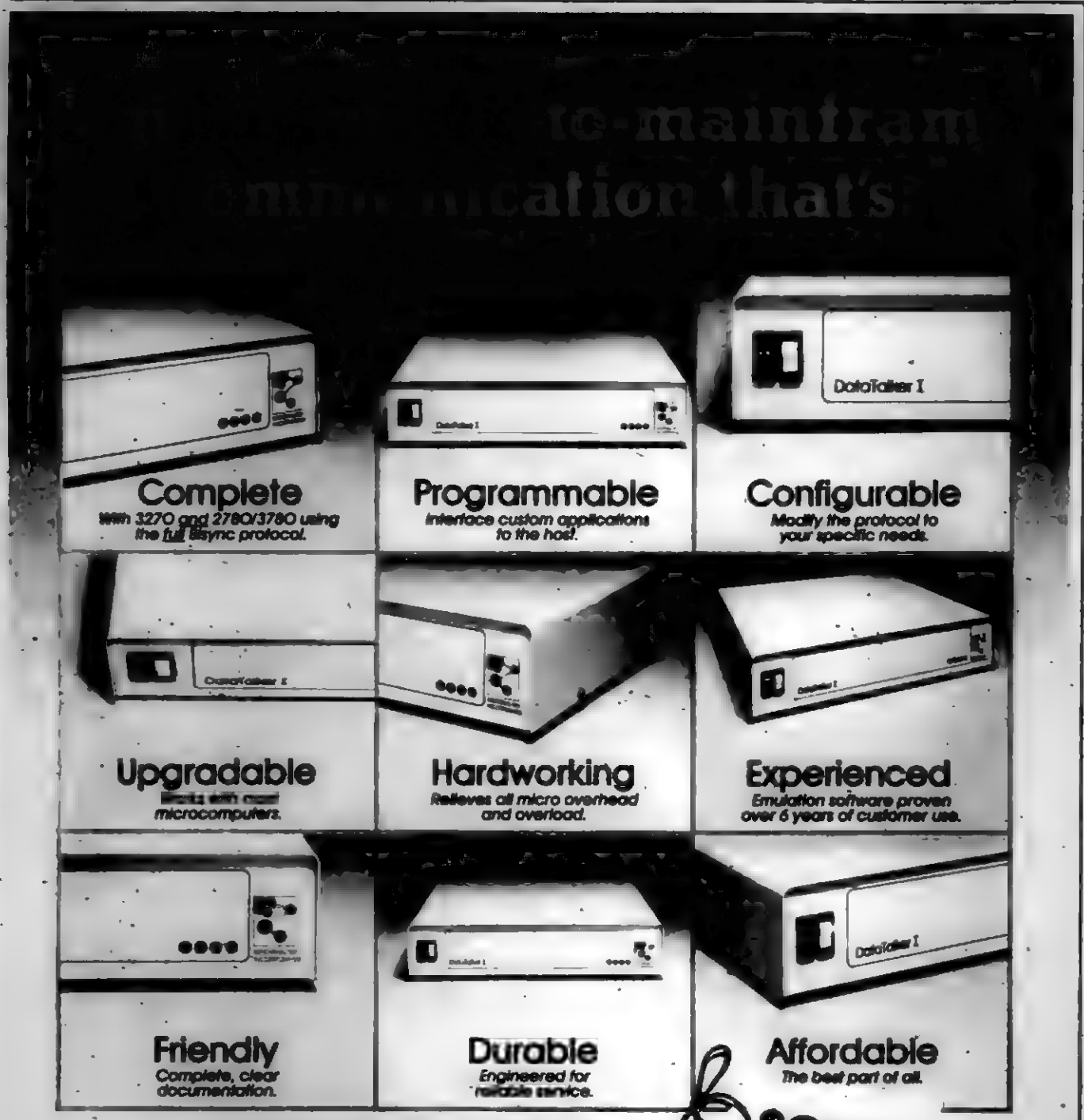
Terminal Unit Compatible With IBM 3274

RALEIGH, N.C. — CTI Data Corp. has introduced an IBM 3274-61C-compatible terminal control unit said to provide full functional capability with the IBM unit.

The CTI 3000/3 is said to feature IBM's protocol Binary Synchronous Communications and Systems Network Architecture/Synchronous Data Link Control communication capability to the host. Transmission speed on the unit is 9,600K bit/sec, with a separate port for dial-up diagnostics.

The CTI 3000/3 reportedly supports standard IBM Category A terminals, including the IBM 3178.

The unit is priced at $5,000 from CTI, 5275 North Blvd., Raleigh, N.C. 27604.



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Tool Offers Registers, Data Update

ANAHEIM, Calif. — Preston Scientific, Inc. has introduced a digital-to-analog conversion system for multichannel data systems, featuring 12-bit resolution, dual-rank input registers and 500-kHz data update.

The LCDAC12 Digital-to-Analog Conversion System is said to be specifically designed to interface with control logic available in most data acquisition and control systems. The system is said to be capable of direct installation in a range of data acquisition and control systems.

The principal application for the system is said to be in the function generator system for simulation or model testing and structural analysis. A dual-rank storage system is said to permit the random transfer of digital input data to a first-rank storage register for subsequent transfer to the digital-to-analog output.

A typical 64-channel system is priced at $14,900, with six-week delivery. More information is available from Preston Scientific at 805 E. Cerritos Ave., Anaheim, Calif. 92806.

System Connects To IBM Disk

LAKE ELMO, Minn. — C. D. Systems has introduced a communications system from the Azurdata, Inc. Scorepak hand-held terminal to an IBM disk.

Called the C.D. Systems Communicator, the system features a Racal-Vadic, Inc. 1250 modem operating at speeds of 1,200 bit/sec, and RPG programs, which process all data keyed or bar-coded on the Scorepak into fixed-length fields and records. The system was designed for use on an IBM 5251 or 5291 CRT. According to the vendor, no additional communications features or new device allocations are necessary.

The system is priced at $3,275 from C.D. Systems at 8270 Hidden Bay Trail, Lake Elmo, Minn. 55042.

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If the personals ad above looks like it may have been written by your lonely mainframe, call or write Execucom immediately and we'll tell you how you can get it an IFPS/Personal mate. If your mainframe doesn't have IFPS yet, call or write us today and we'll help you make your decision. Execucom Systems Corporation, 3410 Far West Boulevard, Austin, Texas 78731. **Call 1-800-531-5038** or in Texas or Canada, **call 512-346-4980.**

EXECUCOM

IFPS, IFPS/Personal are registered trademarks of Execucom Systems Corporation.

IBM Micro Given System For Transaction Monitoring

CHICAGO — Automation Design, Inc. has introduced an on-line transaction monitoring system located at the terminal site, where work session scripts are said to be executed locally.

Mort is for use on an IBM Personal Computer, connecting to the host as an IBM 3278 terminal, according to a vendor spokesman. The tool is said to work independently of any system application, application software or line protocol.

Mort is said to report "think time," data entry time, response time, elapsed time, key count and number of transactions monitored. These items are then said to be reported by total, minimum, maximum and average.

Priced at $2,495, Mort is available from Automation Design, at Suite 650, 350 N. Clark, Chicago, Ill. 60610.

Package Targets Retail Industry

EBENSBURG, Pa. — Kimbro Data, Inc. has introduced an interactive communications package for the retail industry, said to poll Data Terminal Systems, Inc. electronic cash registers either through modems or directly.

DTS/Comm is composed of three sections: the Handler, to perform IBM's Binary Synchronous Communications protocol; the Driver, to back up the cash register's program, restore the cash register program in the event of a cash register failure and receive cash register reports and send messages to the register printer; and Data Extraction, to program formats into usable files and reports.

For use on Burroughs Corp. B20 minicomputers, the package costs $1,700 from Kimbro Data through Box 373, Ebensburg, Pa. 16116.

Two-Way Communications Offered for IBM Micro

SAN JOSE, Calif. — Vynet Corp. has introduced the V1000 series, a family of system-level products said to allow multiple users to engage in remote two-way communication with an IBM Personal Computer through a push-button telephone.

The V1000 provides up to eight channels that can be configured under software control for either voice or data. It is reportedly a fully integrated voice/response solution to the problem of communicating with a computer without terminals or modems, the vendor said.

The V1000 allows users to call or be called by the computer and to receive information in a spoken form from a program or data base. Users can respond with Touch-Tone signals to computer queries for modifying the program flow and updating the data base, the vendor said.

Users requiring data communications applications can choose among a 300 bit/sec Bell 103-compatible or a 1,200 bit/sec Bell 202-compatible modem, GPIB (IEEE 488) support or IBM 3270 support.

The base price for an 8-channel V1000 is $7,315 in single quantities. Operating system software options are $1,500, with licensing arrangements for quantity purchasers. Vynet is located at 160B Albright Way, Los Gatos, Calif. 95050.

Security System Supports CICS For OS, DOS

NEW YORK — On-Line Software International has announced the Guardian 1.3 on-line CICS security system support of CICS Release 1.6.

The product is available for IBM mainframes and compatible computers and supports CICS for both OS and DOS systems. The security system offers automatic protection for transactions, programs, files, terminals and DL/1 and IDMS data base management systems, the vendor said.

One of the product's enhancements permits restriction of activity on the basis of transaction contents without the need for application program changes. Another enhancement offers protection of Vsam files and data bases from unauthorized access on the basis of actual file contents, according to the vender.

The price for computer use of the product is $20,000 for DOS and $27,500 for OS. Further information is available from On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

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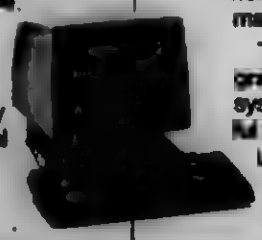

Users Love Us For Our Ease of Operation.

New users find Davox terminals very friendly to use, reducing the time needed to learn new functions.

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And Everyone Loves Us For Our IBM* Personal Computer Attachability.

Davox terminals are the first designed to connect directly to any IBM Personal Computer, providing instant access to off-the-shelf PC programs.

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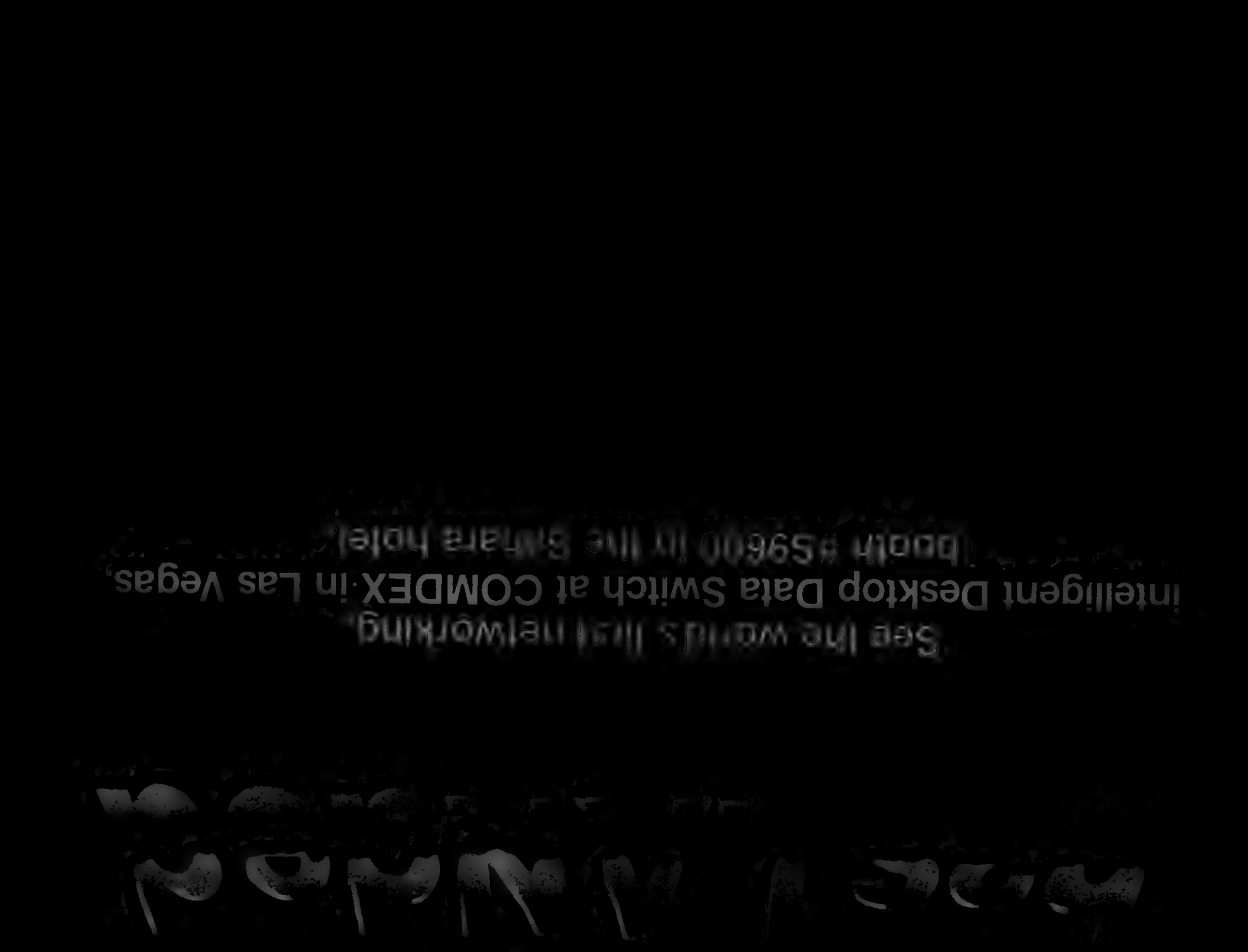


Adequate Control of EFT Top Financial Priority

(Continued from Page 109)

are being expended on systems to facilitate this transfer activity, and dramatic increases are expected.

In order to assess effectively the security exposures of these critical systems, a program can be implemented to examine and evaluate the technical and operational security in funds and data transfer systems according to established message processing and application-specific risk criteria; identify and document existing, missing and inadequate controls; test the system to ensure that controls perform as intended; and document conclusions and recommendations in a formal report to management.

The basic concern is loss of funds through intentional or accidental [redacted]

The objective of a review of EFT is to evaluate the risk of funds loss through assessment of specific controls over loss or duplication of transactions, compromise of transaction integrity, inaccurate reporting, delayed or accelerated message delivery, system failure and recovery and adequacy of audit trails.

Security reviews should be mandated according to the risk associated with the system. A system that electronically records monetary activity and/or disburses cash is a prime candidate for review. These systems include:

- International funds transfer systems.
- Domestic funds transfer systems.
- Branch teller systems.
- Automated teller machine systems.
- Credit card systems.
- Point-of-sale networks.

A controls review will provide comprehensive documentation of the functional system flow and controls by an objective third party; identification of any major design weaknesses to facilitate corrective action prior to or following system implementation; and identification of significant data processing control alternatives.

This will lead to implementation of a security review methodology that can be continued and updated by internal staff and independent, authoritative assessment of the system controls as a basis for insurance qualification.

Security-and-Control Review

The review audit develops an in-depth understanding of the system, documents the system through a series of general and specific functional flowcharts of key system components, determines boundary controls associated with the transfer or transformation of data into or out of a system or from one functional component to another within a system and determines process control associated with the integrity and computational accuracy of data within a given functional system component.

Once the system controls have been documented, a matrix-based risk analysis is performed to evaluate control adequacy. This will identify existing, missing and inadequate controls; analyze and test selected controls; and develop conclusions and recommendations.

Performing a security-and-control review will not guarantee that funds cannot be lost, but it will serve to identify the potential risks in a system and provide the recommendations to enhance controls in an EFT environment.

Picton and Greene are management consultants in Peat, Marwick, Mitchell & Co.'s San Francisco office. Picton, a senior manager, specializes in security and DP audit issues. Greene, a manager, focuses on data communications systems. Both have performed security reviews at several major financial institutions.

Programmable Net Controller Added to Terminal Line

SKANEATELES FALLS, N.Y. — Welch Allyn, Inc.'s Industrial Products Division has added a programmable network controller to its terminal line said to handle up to 31 stations.

The HBD-NC is configured for RS-422 multidrop and handles and combines data between terminals and a host computer via full- or half-duplex communication. The controller is also compatible with the firm's line of bar code readers, a spokesman said. The HBD-NC controller can be configured from any on-line remote decoder or terminal by simply scanning a custom bar code menu.

The data rate between the controller and satellites is 19.2K bit/sec; the rate between the controller and host computer is selectable from 300 bit/sec to 9.6K bit/sec.

Individual terminals can be located up to 4,000 ft from the controller and addressed with their respective identification numbers.

The controller communicates with satellite stations via RS-422 multidrop and to the host computer via RS-232C or RS-422.

Welch Allyn is located at Jordan Road, Skaneateles Falls, N.Y. 13153.

Striving for Cost Reductions

Comm-Pro Interface Ties X.25, SNA

REDONDO BEACH, Calif. — Comm-Pro Associates has announced an interface for its X.25 network access software and IBM's Systems Network Architecture (SNA).

The Ship21 package reportedly provides a bridge for coupling X.25 and SNA networks. According to the vendor, this means that an installation can take advantage of the cost-effectiveness of X.25 communications facilities and still use the IBM SNA program products, including CICS/Vtam and TSO/Vtam.

The 3270 device does not have to be dedicated to a particular host application or a particular host at all, according to the vendor. The terminal operator has the option of selecting the host and the host system with which he wishes to communicate, the vendor said.

A typical cost for the system is $800/mo, which includes a base price of $500 with an additional $100 charge for the emulator program and $200 for NCP.

The vendor is located at Suite A2, 121 Torrance Blvd., Redondo Beach, Calif. 90277.

Datec Unveils Three-Modem Line

CHAPEL HILL, N.C. — Datec, Inc. has announced the Personal Access Link (PAL) line, a series of three modem devices.

The PAL 103 is a Bell 103-compatible device with a speaker and an autocall unit. The PAL 212 is an asynchronous-only 212 device with speeds up to 1,200 bit/sec.

The PAL Plus modem is an integral modem compatible with the IBM Personal Computer, the IBM XT and the Compaq portable computer.

The PAL modems are priced at $195 for the 103, $449 for the 212 and $599 for the PAL Plus. Datec is located at Suite 116, 200 Eastowne Drive Chapel Hill, N.C. 27514.

Emulation Device Eliminates Interface Board

LAS CRUCES, N.M. — K-Systems, Inc. has announced a Digital Equipment Corp. VT100 emulation printed-circuit module device said to eliminate the need for an interface board.

The TFL-100 provides an RS-170 composite video output, parallel channel to the computer, serial channel for a keyboard and auxiliary serial channel. The auxiliary channel can be used as a printer port, the vendor spokesman said.

Installing into a standard VT100 backplane and displaying at a rate equal to 75K bit/sec, the TFL-100 includes features such as 80 or 132 col. and nonvolatile setup parameters. The device is available for $675.

More information is available from K-Systems , 3902 Lilac St., Las Cruces, N.M. 88005.

Tellabs Unwraps Line Driver, Multiplexer

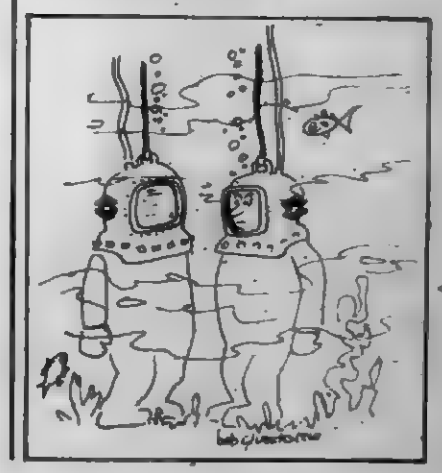
LISLE, Ill. — Two data communications products, an asynchronous line driver and a multiplexer, have been announced by Tellabs, Inc.

Tellabs' 3010 asynchronous line driver interfaces a remote terminal with a Tellabs 330 Dataplexer, 331 Xplexer or computer via a four-wire metallic transmission facility. The 3010 supports full-duplex asynchronous data transmission over four-wire facilities for distances up to two miles at 9,600 bit/sec or for longer distances at lower rates.

The line driver derives balanced differential transmit and receive signals via its internal circuitry at one end and accepts an EIA RS-232C-compatible interface at the other end. The 3010 can be switch-optioned either DTE or DE configuration.

Tellabs' 330B Dataplexer allows up to 32 independent data channels to share a single composite data link interface. In addition to a standard RS-232C interface, the 330B features the Plexerlink interface, an integral digital line driver/receiver that provides 64K bit/sec communications over common wires for distances of a mile or more, the company said.

Tellabs' 3010 line driver costs $100 each; the 8-channel 330B Dataplexer costs $2,600. Tellabs is located at 4951 Indiana Ave., Lisle, Ill. 60532.



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Monroe Systems Unwraps 16-Bit Intel-Based Micro

MORRIS PLAINS, N.J. — Monroe Systems for Business, a subsidiary of Litton Industries, Inc., has announced the System 2000, a 16-bit microcomputer based on Intel Corp.'s 80186 microprocessor.

The vendor claims the system is three times faster than other commercially available microcomputers.

The System 2000 comes with Digital Research, Inc.'s CP/M 86 and Microsoft, Inc.'s MS-DOS operating systems. A basic system includes a CPU, two built-in, dual-density floppy disk drives with a capacity of 640K bytes per drive and a basic main memory capacity of 128K bytes. Main memory is expandable to 896K bytes, and disk capacity can be expanded to 20M bytes with the addition of an optional 10M-byte hard disk drive.

The unit is equipped with a 12-in. amber monochrome CRT terminal with a 2,000-char. capacity. Character display can be standard, reverse, underlined, high intensity, blinking, nondisplay white and nondisplay black. The keyboard has a standard typewriter layout with a separate keypad, the vendor said.

Ten application-defined function keys are included on the system to allow up to 40 different functions. Four user-defined program keys are also included, the vendor said.

Integrated into the System 2000 are two RS-232C serial ports with programmable transmission rates to support asynchronous or synchronous protocols at speeds ranging from 75 bit/sec to 19.2K bit/sec.

A parallel printer port and five expansion slots are included with the system. The system was designed to support Basic, Pascal, Fortran, Cobol and C programming langages, the vendor said.

The Monroe System 2000

A basic System 2000 costs $3,695, the vendor said from Monroe Systems for Business, The American Road, Morris Plains, N.J. 07950.

Memorex Tape Drive Boasts Size, Shape Of 5¼-In. Floppy

SANTA CLARA, Calif. — Memorex Corp. has announced a 130M-byte, dual-mode, ½-in. tape cartridge drive that has the same size and shape as a 5¼-in. floppy disk drive.

Called the Model 1110, the unit was designed to provide backup for Winchester disk drives used with microcomputers.

The 1110 provides both start/stop and streaming modes of operation. A proprietary tape-picking system is used to pull the tape from the cartridge and onto an internal take-up reel. The drive then operates in a reel-to-reel mode.

The drive has a 130M-byte capacity in streaming mode, where it can operate at 75 in./sec. In start/stop mode, the unit can operate at 50 in./sec and can store up to 83M bytes of memory.

The unit is capable of searching and rewinding at 150 in./sec and can transfer data at 225K byte/sec in a streaming mode, according to Memorex.

The self-threading cartridge uses 400 feet of tape in a sealed housing.

The drive's cost begins at about $1,000 per unit. The vendor is located at San Tomas at Central Expressway, Santa Clara, Calif. 95052.

CATEGORY	MICROS	CRTs
Reducing the Mainframe Load	8	0
Independence of Other Devices	10	0
Price/Performance	7	4
Security	6	6
Geography	8	4
Ease of Use	8	7
TOTAL SCORE	47	21

Usefulness of Microcomputers vs. CRT Terminals

Source: Laventhol & Horwath

Price-Performance Gap Blurring Between Micros, CRT Terminals

Second of Three Parts

By Eric B. Jacobs and Allen Sneider
Special to CW‡

'Price has . . . been a significant factor in delaying the spread of micros vs. CRT terminals. (But) the price gap between micros and CRT terminals has been rapidly narrowing.

The business world has undergone not an evolution in the way computers are used in business, but a revolution. All of this has resulted from the development of something as tiny as the semiconductor chip, combined with some creative, problem-solving software.

It is helpful to contrast this generic history of micros and business software with a quick look at CRT terminals. While micros have been available for some time, there were significant limiting factors that made their use awkward and which restricted them to either the forward-thinking or those with the time and inclination to play with the new toys.

In contrast, CRT terminals have been around long enough to allow development of user-friendly software. However, business users of mainframe hardware and CRT terminals have been dependent on mainframe vendors for applications software. A cottage industry has developed for writing software for microcomputers. These software tools have spurred the hardware development of the micros, making them cheaper, more powerful and more useful.

Hardware changes occurred more slowly in the CRT terminal market. The reason

(Continued on Page 122)

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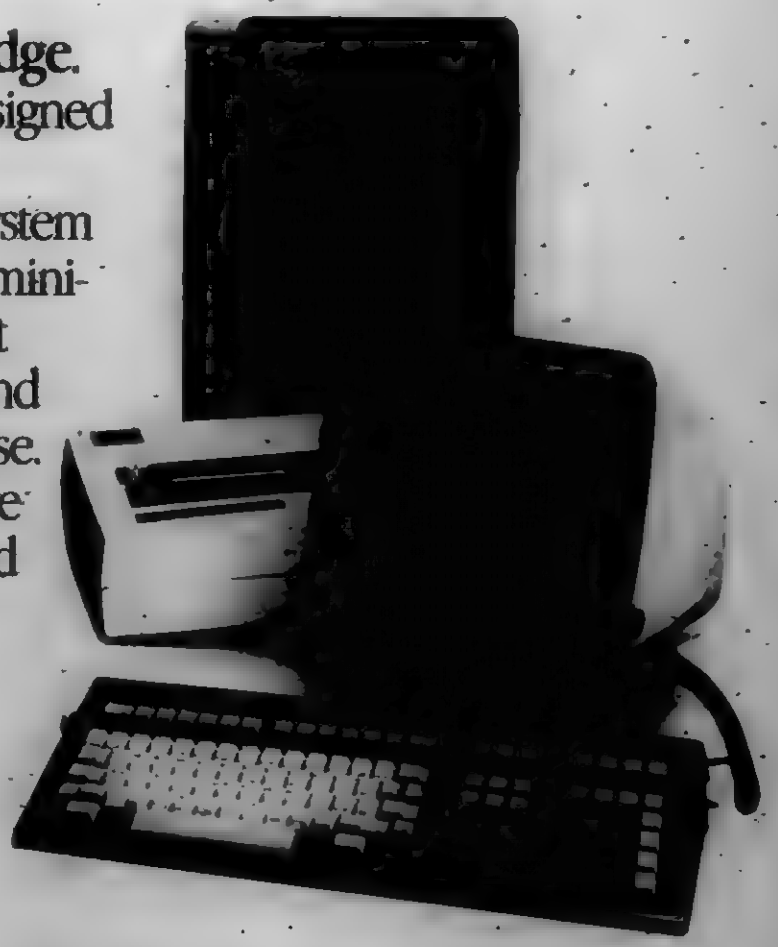

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Uses an Enhanced Version of Unix

Dual Systems Inaugurates 16-Bit 83/80 System

BERKELEY, Calif. — Dual Systems Corp. has introduced a 16-bit computer system that uses an enhanced version of the Unix operating system.

Called the 83/80, the system has 512K bytes of dynamic random-access memory, expandable to 3.25M bytes. It also includes an industry-compatible storage module device disk controller that reportedly yields average transfer rates of 800K byte/sec in read mode and 560K bytes in write mode. The controller supports either one or two 80M-byte hard disks.

Backup memory consists of an 8-in. floppy disk drive with 1M byte of storage capacity. A 9-track, 1,600 bit/in. tape drive system is also available, complete with Unix tape driver software. Approximately 35M bytes can be stored on tape in Ansi/IBM form, according to a spokesman for the vendor.

The system's four-channel serial RS-232C I/O boards use direct-memory access for all output for enhanced system throughput. Two additional serial I/O boards may be added for a total of 12 ports.

The C programming language comes standard with Unix, which incorporates enhancements from the University of California at Berkeley. Optional languages include Fortran-77, Pascal, Basic and RM/Cobol.

A real-time operating system is available.

Application software includes word processing, electronic spreadsheet and a relational data base management system, a spokesman said.

The 83/80 is available now for $20,990, which includes Unix, an 80M-byte disk and a one-year warranty.

More information is available from Dual Systems, 2530 San Pablo Ave., Berkeley, Calif. 94702.

Processors Announced For HP 3000

MOUNTAIN VIEW, Calif. — Computer Capabilities Corp. has introduced a line of transaction processors designed to work with Hewlett-Packard Co.'s HP 3000 superminicomputers using VPlus, HP's standard terminal handler.

The Vantage family includes software that will automatically create VPlus forms for any data set within Image — HP's data base management system — and compile them in batch. The processors will then generate add, change, delete and inquire transactions for each data set specified. There is also a version available for applications that use only one data base, as well as a version which handles updates to multiple data bases. multiple data bases.

Vantage has a VPlus monitoring system that reports on response times, provides a VPlus message handler, controls access to terminals and applications and measures the efficiency of terminal usage. The monitoring system also includes a program debugging facility.

Vantage systems range in price from $1,200 to $8,500 from Computer Capabilities at Suite 122, 465-A Fairchild Drive, Mountain View, Calif. 94043.

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CRT Terminals Seen Catching Up With Micros

(Continued from Page 117)

is that there was not much impetus to change until the relatively recent studies of human factors that created an entirely new buzzword for use in discussing workstations — ergonomics. That simply means that if a person is going to use a micro or a CRT terminal for an extended length of time, he should be protected from harmful radiation, excessive eyestrain and poor posture.

Changing information processing methods and policies is not easy for any company that has made a significant investment in human and financial resources to develop a workable system. Many firms have held back micro investments until there was absolute proof that it could be cost-justified and that micros fit in with overall corporate policies.

Lack of Communications

Another factor that had significantly held back the use of micros was the lack of good communications software. The early micros were reasonably good at communicating with an identical twin (another model of the same computer), but that was about the limit — "user-friendly" communications is a very new thing.

In contrast, CRT terminals were never expected to communicate with anything other than a mainframe computer, and the communications were completely handled by the mainframe.

Price has also been a significant factor in delaying the spread of micros vs. CRT terminals. The price gap between micros and CRT terminals has been rapidly narrowing. With IBM becoming the de facto standard, there is a highly competitive marketplace evolving. Certainly, CRT terminals are also getting cheaper. Eventually, micros and CRT terminals may be indistinguishable.

Perhaps this would be a good time to break from a history lesson and define some terms. The term "micro" means any device with its own self-contained memory and local storage. The term "CRT terminal" means any device that is dependent on another computer to perform its processing and/or storage.

There are six major areas where CRT terminals can be compared with microcomputers: mainframe load, independence, security, price, geography and ease of use.

The chart on Page 117 is an admittedly biased rating based on a scale of zero through 10 for each of our six categories.

Probably the most significant area where microcomputers have a huge advantage over CRT terminals is in considering the load on a company's mainframe computer.

If you can function independently of your co-workers, you are in control of when your work gets done. If, because you and all of your co-workers need to do work requiring the computer between 2 p.m. and 5 p.m., the system's average response time would have to increase if you were all using CRT terminals. If the increase was dramatic enough (say to a 3- to 5-second response time) you could kiss your productivity goodbye.

Sure, if you need some data that someone else created to help you make up your budget, for example, you need to have access to it. The magic of a microcomputer is in letting you work on it independently of the mainframe once you have retrieved the needed information. Also, by eliminating your dependence on the mainframe, you are not inconvenienced by untimely system crashes, system overloads or system backups.

The price/performance ratio of micros is rapidly decreasing. A small micro capable of performing the ordinary business functions of word processing, spreadsheets and communications, can now be purchased for under $2,000.

Jacobs is the national director for information and data processing for Laventhol & Horwath, a certified public accounting firm headquartered in Philadelphia.

Sneider is a partner in Laventhol & Horwath's Boston office.

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Records Retention Stressed for Info Managers

By Jean Ciura
Special to CW‡

Record managers have long recognized that the vitality and existence of a corporation depends upon how well it manages and utilizes its information.

This information takes various forms, from paper to magnetic tape. However, the content, not the form, determines the value of each record and the programs. Corporate management must evaluate these records, adopt policies to preserve or destroy them regularly and create a complete and consistent program for record retention.

The cornerstone of this program is the corporate records-retention schedule. The schedule itself is a simple document that outlines retention, maintenance and destruction guidelines for each major record series. A record series is a body of information, in any form, that serves a common and unique function for a corporation.

'Managers concerned with the information practices of their corporation face an awesome task. Often, beginning a [records management] program can be as difficult as completing it successfully.'

The schedule is designed in particular as:

- A list of all corporate records that serve various functions in all corporate departments and divisions.
- An authorized statement for projected retention, transfer and destruction of records.
- A timetable for the process of aging, recycling and storage of records.
- A vehicle for the continual appraisal of retention requirements, including administrative, state and federal regulations.

Retention schedules are also complete programs, including inventories and appraisals, systems designs and protection planning. These programs are started by a corporatewide appraisal and inventory of inactive and active records retained and generated in each department.

Managers should assign staff members who are familiar with the record generation practices of each department to collect this data. Often, consultants are retained by larger corporations to prepare the inventory and draft a schedule.

Basic Information

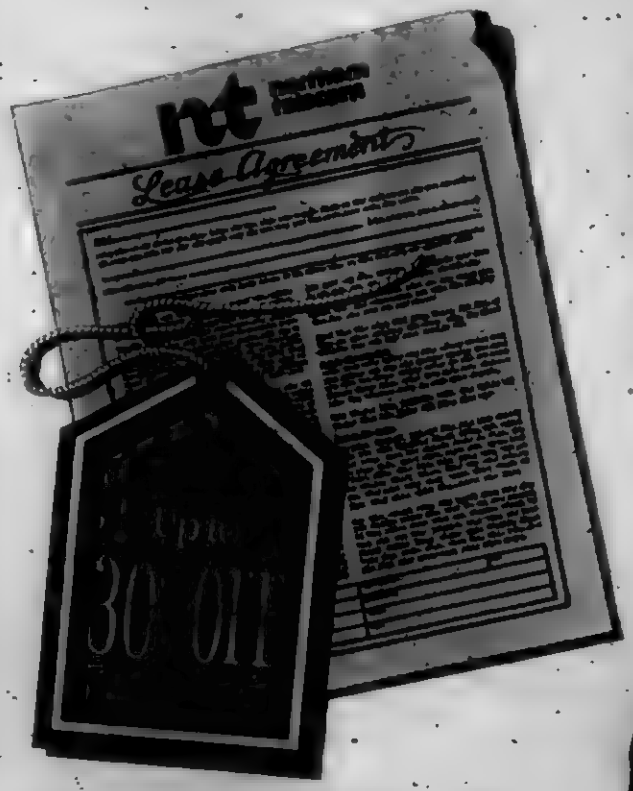
In any event, the inventory of corporate records must include basic information on the record series, including a complete description, inclusive dates and the size of the record retained in active and inactive areas.

Inventory data should also appraise the existence of duplicates, problems in file management and the importance these records have in the relation to the activities of the corporation as a whole.

The inventory must indicate whether any documents have been destroyed in the record series so that supporting documentation can be retrieved and saved for future use.

Once this data has been collected and organized, the draft schedule is prepared. This schedule should list each series by department and the recommended retention periods for active storage and destruction. Special instructions for microfilming, transfer and vital-records scheduling may also be included. The draft schedule is distributed to departmental managers, corporate representatives and legal coun-

(Continued on Page 126)



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CAD Workstation Announced for Drafting Sites

TULSA, Okla. — Bruningcad, Inc. has announced Spectra, a computer-aided design (CAD) workstation designed to adapt to a variety of drafting environments.

The modular configuration of Spectra features a compact pod that houses an expandable CPU, incorporating a Motorola, Inc. 68000 microprocessor; a 14.5M-byte Winchester disk drive; a dual 3½-in. disk drive; and a drawer for disk storage.

The system also features a 19-in. color CRT monitor that is suspended above the user's work area by a moveable arm.

Users access the system with either a four-button mouse or a modular keyboard. A D-size plotter, with a media storage compartment, is also included as standard equipment.

Spectra is compatible with all previous Bruningcad systems and is expandable into larger networked arrangements. It supports the firm's Easydraf2, a two-dimensional mechanical drafting package, and Arcade, an architectural design package. It will also be able to support a soon-to-be-released, three-dimensional design and analysis package, accordng to a spokesman for the firm.

More information on the system, which costs $45,900, is available from Bruningcad at 6111 E. Skelly Drive, Tulsa, Okla. 74135.

Printer Allows Mobile Output

FOSTER CITY, Calif. — Teletex Communication Corp. has introduced an 80- to 132-col., 3-lb, battery and ac-powered thermal matrix printer that makes mobile output possible for users of portable and hand-held computer systems using an RS-232 interface.

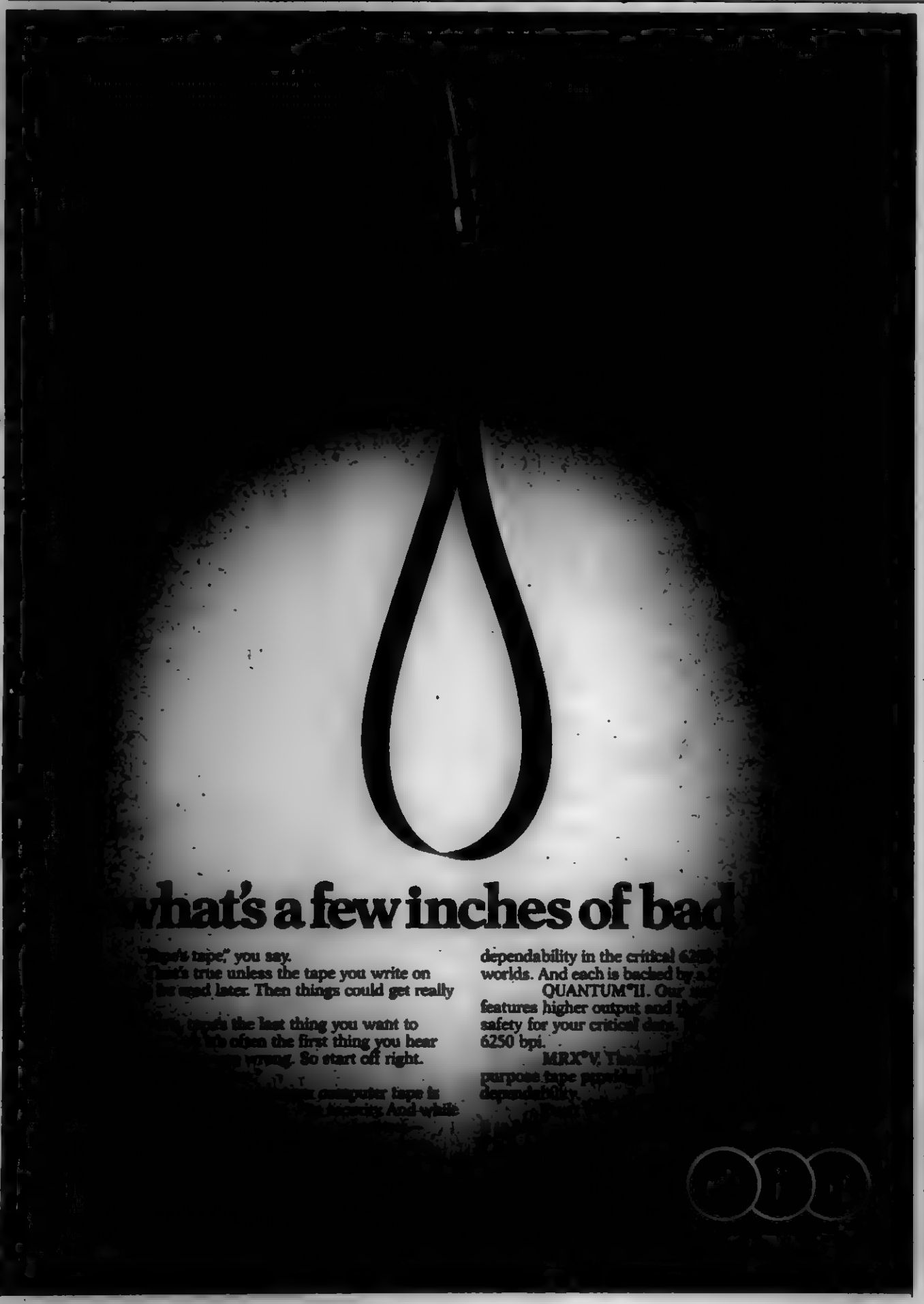
The 1280 Portaprint uses rechargeable or replaceable 6V batteries that provide between 4,000 and 5,000 lines of print. The printer may also be powered through a standard ac outlet.

In the battery mode, which enables users to operate the unit in remote, powerless locations, the bidirectional printer features up to 40 char./sec print speed. Powered through an ac outlet, the speed reportedly can be double.

Portaprint can produce a variety of character sizes and densities, as well as specialized letter, line and dot-by-dot placements, the vendor said.

Portaprint features graphics printing for charts and graphs; condensed printing, which enables users to place 132-col. spreadsheets and other wide printouts within standard 8½- by 11-in. paper; bold or shadow printing, a feature that is generally used to highlight headings; and oversized printing, a feature that enlarges characters to any height or width needed.

The Portaprint is priced at $199; the vendor expects to begin volume shipments in the second quarter of 1984. Teletex Communications is located at 3420 E. Third Ave., Foster City, Calif. 94404.



Monitor Fits IBM Micro

LOS ANGELES — Roland DG has introduced the MB-122 monitor, a monochrome CRT device said to be compatible with the IBM Personal Computer.

The monitor features a nonglare screen, full 2,000-char. display, 720- by 350-pixel resolution and a panel brightness control.

Dimensions of the MB-122 are 12.4 in. by 14.2 in. by 14.2 in. The input terminal is a nine-pin video jack, which is included with the monitor, the vendor said.

Amber and green-phosphor CRTs are available. Prices are $240 and $225, respectively, according to the vendor.

Additional information is available from Roland DG at 7200 Dominion Circle, Los Angeles, Calif. 90040.

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Records-Retention Program Seen Vital for Info Managers

(Continued from Page 123)

sel for their appraisal and authorization.

Authorizations on retention periods must be assigned on the following basis:

- Administrative requirements: The immediate user must determine how long the record is needed in an active state and the rate of retrieval normally assigned to the record.
- Fiscal requirements: The accounting manager or corporate treasurer will appraise the fiscal requirements of the corporation and the necessary documentation for reporting to state and federal agencies. Fiscal retention requirements for each state must be carefully applied. In addition, these retention periods must be suspended in case of an audit, and managers must be prepared to amend the schedule accordingly.
- Legal requirements: This appraisal can be completed only by the corporate legal counsel, a secretary or a member of the executive board. All records relating to the concerns of ownership, licensing, patents and product are included in this appraisal. Special concern should be directed to vital-records protection by the corporate advisers once the basic legal retention periods have been applied.

Targeted for Destruction

Once the final schedule has been prepared, all records must be targeted for destruction. This process includes the orderly transfer of records to storage, the indexing of storage areas and the eventual authorized destruction of inactive records. Management should also adopt a records-management program for the proper creation and utilization of corporate information, including forms and reports design, vital-records protection and disaster-recovery planning.

It is best that these responsibilities be assumed by the manager of information services and the director of administrative services. Assuming this task, they must coordinate the records-management activities of each department to protect the vital records in a secure manner.

Several forms of protection are available for vital records. Storing the original or duplicate in an off-site center is most preferred by records-management professionals. The vital records must be cycled off-site regularly.

Once the period of retention has expired, these records may be returned to a company storage center for the duration of their retention. Underground vaults or professional off-site centers may be used by corporations. However, managers must evaluate professional off-site centers carefully.

It is impossible to outline here all the elements in a corporatewide records-management program, but the basic aspects of such a program have been described briefly. Managers concerned with the information practices of their corporation face an awesome task. Often, beginning a program can be as difficult as completing it successfully.

General Guidelines

What follows are some general guidelines to beginning the records-management program area:

- Managers should enlist the active cooperation and support of corporate executives. Often, a consultant is requested to address the needs of a management program and outline the particular phases of the project.
- There are no easy remedies or quick solutions; records-management programs depend upon the careful appraisal, retention and preservation of corporate information. Each phase outlined above must be completed carefully by staff members.
- Information management is a complete system; no scheduling program can operate by itself. Schedules are designed to be revised and amended. Legal counsel and fiscal managers must inform the responsible party when any action occurs that may affect the destruction of corporate information.
- Any records-management program, to be effective, must involve every corporate department and division. Partial measures are not effective or lasting.
- If the corporation does not have the expertise to design such a system, advice should be sought from outside sources. Professional associations can recommend experts in the fields of records management, systems design and disaster-recovery planning.

The most important aspect of any management program is for managers to address needs before a corporation is involved in an unfortunate situation, such as patent infringement, product liability, licensing disputes or tax audits. Prevention is the cure for neglected information programs.

Ciura is a consultant with Record Controls, Inc. in Addison, Ill., and is co-authoring the company's forthcoming publication on record-retention scheduling.

Discmaster II Fits Apple II

BROWNSBORO, Ala. — Data Cue, Inc. has introduced the Discmaster II board, said to allow the user to connect two 8-in. or two 3½-in. double-density disk drives to Apple Computer, Inc.'s Apple II or compatible microcomputers.

The package includes software drivers, which run under Apple's DOS 3.3, Pascal 1.1 and Microsoft, Inc.'s version of Digital Research, Inc.'s CP/M operating system. These drivers allow the user to use existing disk drives in concert with drives controlled by the Discmaster II board, the vendor said.

The package includes installation and integration instructions and costs $265, the vendor said.

Further information is available from Data Cue, 5696 Highway 431 S., Brownsboro, Ala. 35741.

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Desktop Dot Matrix Printer Boasts Daisywheel Quality

NEWBURY PARK, Calif. — Advanced Matrix Technology, Inc. (AMT) has introduced a desktop dot matrix printer designed to eliminate the need to purchase separate hard-copy output devices for word processing, spreadsheet, graphics, general accounting and overhead transparency output.

The AMT Office Printer reportedly offers business users the print quality and flexible paper-handling capabilities of a daisywheel printer with the speed, multiple font support and performance characteristics of a dot matrix device. There are three printing modes: letter-quality output at 45 char./sec, draft quality at 100 char./sec and high-speed data processing at 250 char./sec.

Courier 72, Letter Gothic 12 and Gothic 17 fonts are provided as standard features. Optional fonts include proportional, scientific OCR-A for optical encoding, Code 39 for bar-code applications and foreign languages. Font generation software is also available for creating custom fonts.

The AMT Office Printer with black ribbon costs $3,195. AMT is located at 1157 Tourmaline Drive, Newbury Park, Calif. 91320.

Adaptec's Winchester Drive Supports Up to Seven CPUs

MILPITAS, Calif. — A 5¼-in. Winchester disk drive controller designed for multiuser, multitasking microcomputer operations has been introduced by Adaptec, Inc.

The ACB-5500 controller can support up to seven host CPUs and four disk drives, including fixed or removable drives, the vendor said.

Other features of the controller include command chaining, which allows several controller commands to be executed with one host command; noninterleaved operation, so all information on a given track can be accessed on one rotation of the disk; enhanced 32-bit ECC polynomial plus parity; and reserve/release capabilities to support shared file and shared disk applications.

In addition to the controller, Adaptec is offering a very large-scale integration three-chip set, the ACS-5500, which enables users to license and manufacture the controller board.

The ACB-5500 is priced at approximately $300. Further information is available from Adaptec, which may be reached at 580 Cottonwood Drive, Milpitas, Calif. 95035.

Trilog Extends Colorplot Line Of Printers

IRVINE, Calif. — Trilog, Inc. has introduced Colorplot-II, the latest addition to its nonstop-printing family of line printers.

Colorplot-II provides 75 to 300 line/min printing, two pitches of compressed printing, DP and letter-quality printing. Colorplot-II is software-compatible with the company's original Colorplot model, the vendor said.

Trilog's dual print head nonstop-printing concept provides a backup print head, with the second head continuing to print at half speed if the other print head fails, according to the vendor.

Colorplot-II produces up to 256 colors by making three passes over the page. By interspersing dots of the primary colors, the entire spectrum of colors can be printed, the company said.

The cost of Colorplot-II is $6,900, with quantity discounts available. Additional information is available from Trilog, 17391 Murphy Ave., Irvine, Calif. 92714.

Electronic Drive From Dilog Eyes IBM Micros

GARDEN GROVE, Calif. — Dilog PC Products, a division of Distributed Logic Corp., has introduced an electronic disk drive for the IBM Personal Computer and Personal Computer XT.

The unit is said to be a compatible, hardware-implemented, random-access memory-based replacement for the XT's floppy disk drives, the vendor said.

The unit plugs into any I/O slot of the Personal Computer or XT and offers data access and up to 50 times faster throughput than floppy disks, the vendor claimed.

According to the vendor, the unit allows continuous scrolling of documents, instantaneous look-up of records, high-speed sorting of data and other disk-bound processes to proceed without the start-stop aspect of typical floppy disk operation.

Priced at $1,595, delivery is available in 30 days. More information is available from Dilog PC Products, 12800 Garden Grove Blvd., Garden Grove, Calif. 92643.

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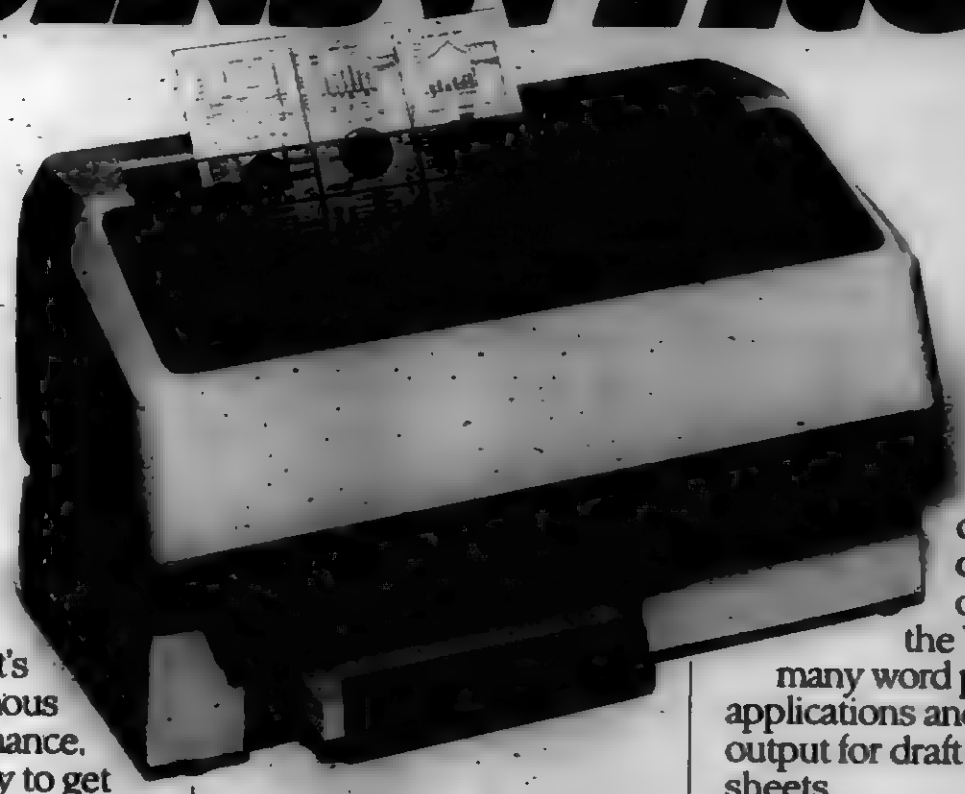

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Planning Ahead Can Minimize Risks of DP Disaster

By Nidal Jedeed
Special to CW‡

Preventing physical disasters in DP centers does not have to be a matter of luck. A number of steps can be taken to minimize the risks and keep DP staff under control.

In the context of physical security, the risk factors are spelled out in most computer manuals under the titles "Operating Specifications" or "Operating Environment."

Specifications for operating a computer system safely include: temperature, humidity and power requirements.

The effects of exceeding a vendor's specifications can vary from stressing hardware (resulting in higher maintenance costs and downtime) to considerable equipment damage. In some cases, the complete destruction of the computer and its peripherals is possible.

In one case, an air-conditioning failure in an unattended computer center caused the temperature to exceed 120° F. This resulted in extensive damage to disk drives and memory boards.

After identifying the risk factors, careful consideration must be given to the installation of a system to monitor the total computer environment. Desirable features in such a system include:

- All sensors in one package. This eliminates the multiple supplier and interfacing problems.
- A central panel to display current status of alarms. This eliminates the confusion of multiple alarms.
- Display of current temperature and humidity with site-selectable alarm thresholds.
- Remote alarm capability.
- An automatic dialer to call and deliver alarm messages at remote locations such as the security office or the homes of DP staff.
- Interrogation of the monitoring system remotely by DP staff via telephone.
- Capability to delay or prevent automatic power-up to the computer system after blackouts or brownouts to minimize power surges and allow an orderly computer power-up.
- Capability to shut down the computer automatically if corrective action is not taken within a specified time limit.

One still might say that a disaster is really a matter of luck. That might be true, but taking the above steps will load the dice in your favor. You may not have to say, "It wouldn't have happened if only we had . . ."

Jedeed is operations manager of innovations for Control, Inc. in San Jose, Calif.

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Plug-In Module Ties Printers To IBM Minis

ARLINGTON, Mass. — Interface Data Electronik, Inc. has introduced a plug-in interface module said to make Qume Corp. Sprint 11 Plus daisywheel printers compatible with IBM System/34, 36 and 38 minicomputers.

The Interface Module Q IBM 34-38 is integrated into the printer and enables coaxial connection, including cable-through attachments. It connects locally via coaxial cable or remotely to an IBM 5251-12 CRT terminal. Emulation of IBM 5225 and 5256 printers is possible, the vendor said.

The printer is a low-profile, desktop unit available in alternative models with printing speeds of 40 or 55 char./sec with automatic bidirectional printing. The printer utilizes Qume 96-char. print wheels. More than 130 type styles are available, the vendor said.

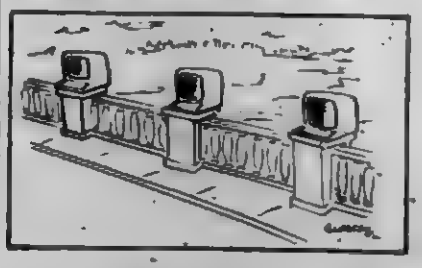
Prices for the product start at $3,790. More information is available from Interface Data Electronik, 1365 Massachusetts Ave., Arlington, Mass. 02174.

I/O System Connects Readers to IBM Micro

SAN GABRIEL, Calif. — Addmaster Corp. has announced an I/O system (including cables and programs) said to make its 510 Reader Punch, the 612-2 Reader Transmitter and the 651-2 Reader Transmitter Spooler usable with the IBM Personal Computer RS-232C port.

The system reportedly gives the user the capability of reading and punching tapes in Ascii, EIA or Baudot code or as a straight hexadecimal number, the vendor said.

The programs cost from $50 to $100; the cable costs $39.75, Addmaster said from 416 Junipero Serra Drive, San Gabriel, Calif. 91776.



Electronic Notebook Unit Announced by Datec

COLORADO SPRINGS, Colo. — Datec, Inc. has announced the Electronic Notebook, a battery-powered, immersible, portable data capture and processing unit.

Designed for data capture with editing and processing in harsh environments, the unit features ruggedized construction, full Basic programmability and up to 504K bytes of main storage used for processing and as a solid-state disk. Bidirectional transfer of programs and data files with a host computer is standard.

Removeable batteries, rechargeable in the unit or in a separate charger, power the unit from 16 to 30 hours of field operation. Rechargeable backup batteries protect the contents of memory and can drive the real-time clock for over 90 days, the company said.

The Electronic Notebook includes a full alphanumeric keyboard, 80-char. display and two RS-232C I/O channels. An optional bar code scanning wand is available for applications such as inventory, production monitoring and vehicle fleet control.

The unit costs $3,295 from Datec at Suite 2114, 2860 S. Circle Drive, Colorado Springs, Colo. 80906.

Onyx Cuts Cost of Service Program

SAN JOSE, Calif. — Onyx Systems, Inc. has lowered the price of its Professional Service Program by 25%.

The service program, which applies only to new Onyx equipment, covers installation, on-site warranty repairs and on-site service for one year, including parts and labor.

The on-site service is provided by RCA Data Services with Onyx directly accountable for the service. RCA has approximately 400 service technicians nationwide and maintains a stock of spare parts for Onyx equipment.

On-site service is available between 9 a.m. and 5 p.m. Monday through Friday, with a response time within 24 hours. An option is available for 24-hour coverage, 365 days a year.

The cost varies according to the user's system, and prices start at $800.

The vendor, a manufacturer of multiuser 8- and 16-bit microprocessor-based business systems, is located at 25 E. Trimble Road, San Jose, Calif. 95131.

Newsletter Introduced For Lawyers

LARKSPUR, Calif. — Law Office Guide in Computers (Logic) has introduced a monthly newsletter specifically for lawyers and legal administrators.

Logic also announced the availability of its "Law Office Guide in Computers 1984 Directory."

The independent newsletter, which accepts no advertising, reportedly features articles and reviews on a wide range of computer topics of interest to law firms, including hardware, software, systems, word processing, telecommunications and product announcements.

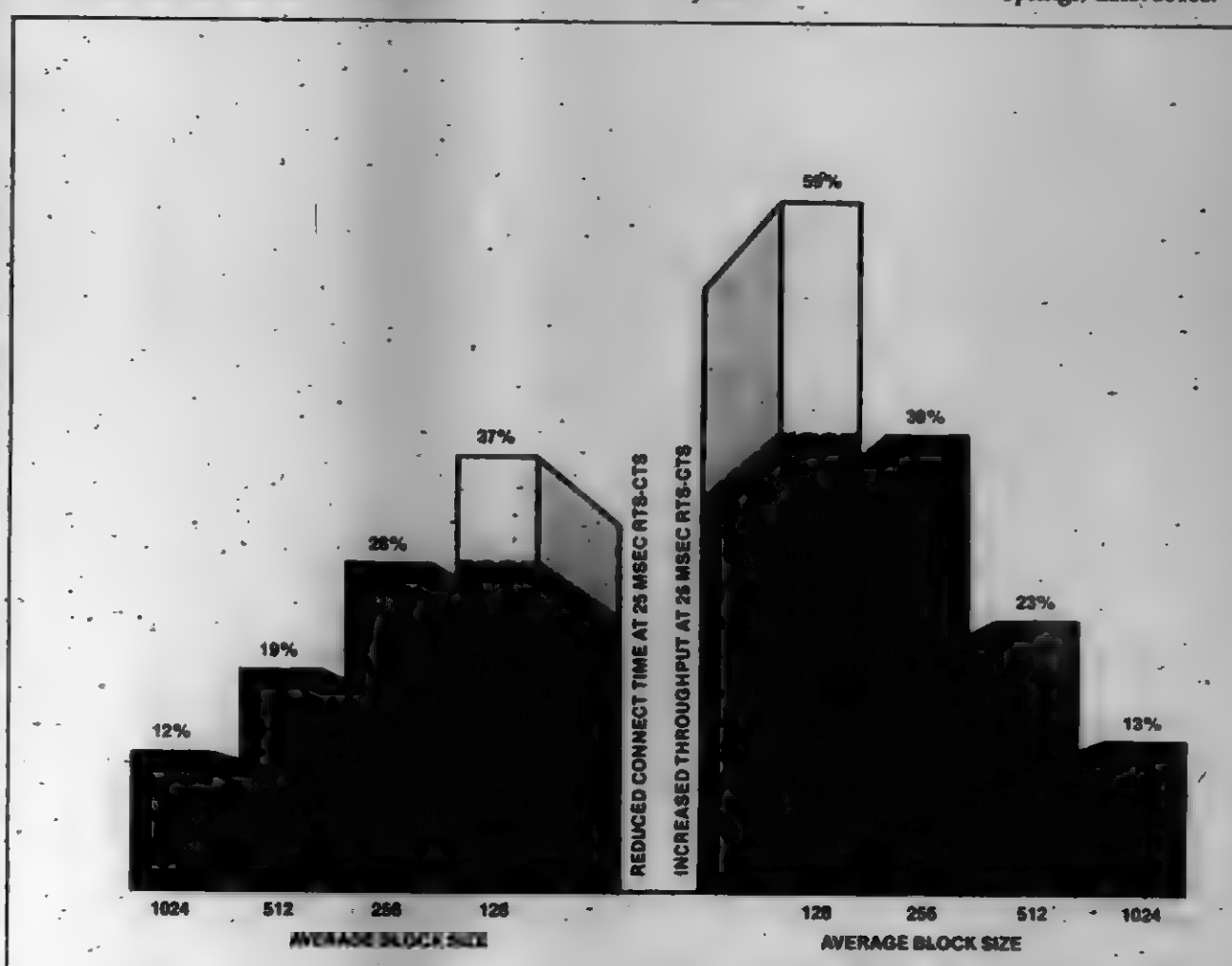
Also included are user interviews, purchasing guidelines, consultants, reader exchange, "Tips of the Month" and information about publications, conferences and other trade shows, according to the vendor.

The 1984 directory is said to contain detailed product and service listings and is cross-referenced with a guide and three types of indexes to facilitate its use.

An annual subscription to the newsletter is $120. The directory is $10.

A charter subscription to both publications saves $30, according to a spokesman for the firm.

Logic can be reached through P.O. Box 701-B, Larkspur, Calif. 94939.



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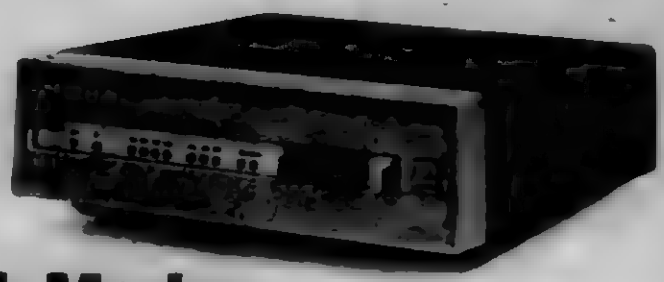

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Medical Practice System Based on Mumps

NEW YORK — Creative Socio-Medics Corp. has introduced a Mumps-based medical practice management system.

Called the Comprehensive Medical Practice System (CMPS), it supplies the medical provider with management information processing, including patient history, third-party claim processing, billing and accounts payable, according to a spokesman for the vendor.

The practitioner can reduce Medicaid claim processing from an average of 40 days to 10 days through use of an acceptable magnetic media, the vendor said.

The system enables the medical provider with a minimum of training to begin with a single-station system and easily expand it to fit the needs of the practice, up to seven stations.

The system has a plug-in design and self-contained training module. Full system operation is achieved within four hours of self-training by the user, the vendor said.

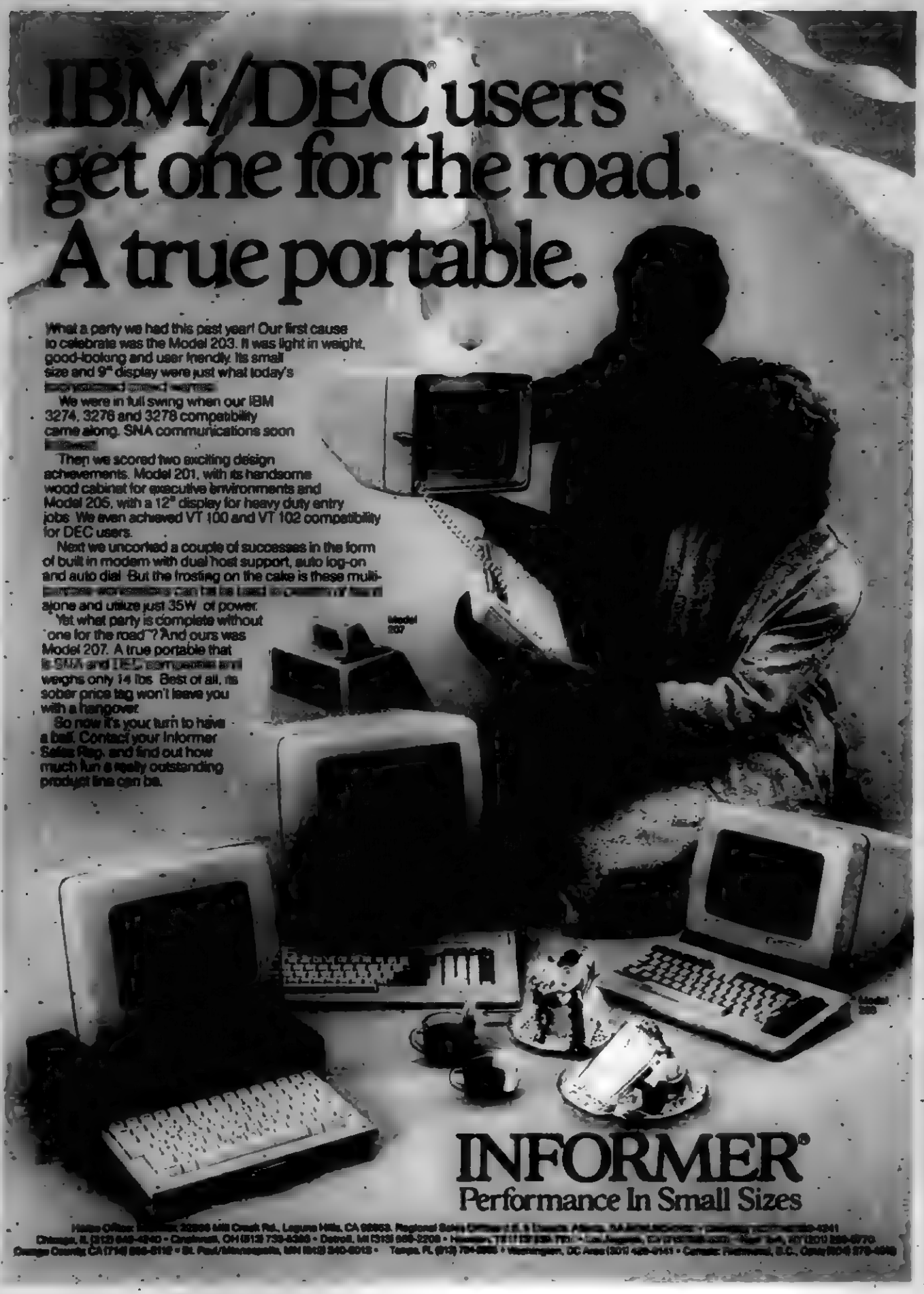
The system includes a Digital Equipment Corp. Professional 325 desktop processor, a video terminal, detachable keyboard, dual disk drives, software and a dot matrix printer with tractor drive. Service and support are provided by Hotline 800 telephone service and free on-site hardware from DEC.

Features include multitasking, multiuser capability, table-driven functions and menu-driven screens, the spokesman said.

Optional add-on software modules include word processing, scheduling, graphics, general ledger, payroll, accounts payable and electronic spreadsheet, according to the vendor.

The $9,500 price includes free on-site maintenance for one year from DEC, the vendor said.

More information is available from Creative Socio-Medics, 16 E. 32nd Ave., New York, N.Y. 10016.



Printer Card Targets Apple Micros

BURLINGTON, Mass. — Texprint, Inc. has announced Print-It, a software-independent, color graphics printer/plotter card for Apple Computer, Inc.'s Apple-II, II+ and IIe computers.

According to the vendor, all Apple graphics or text screens can be copied by any printer by pushing a button. The kit consists of the plug-in card, a push button, a printer cable and a small plug-in control board.

Print-It is priced at $299.

Further information is available from Texprint, 8 Blanchard Road, Burlington, Mass. 01803.

Keyboard Alternative To IBM Out

FRAMINGHAM, Mass. — Tang Data Corp. has introduced a DIN keyboard as an alternative to the IBM Personal Computer keyboard.

Designated the DIN-83, the keyboard features raised bump keys, according to DIN standards.

It features a capacity switch with an option for 15 additional function keys, the vendor said.

The keyboard is silent and has a replaceable key switch. Priced at $269, DIN-83 is available from Tang Data, which is located at 100 Eames St., Framingham, Mass. 01701.

Utility Scores a First

Fiber-Optic Cable Extends Local Net

By Jim Bartimo
CW Staff

DES MOINES, Iowa — When Iowa Power and Light Co. wanted to extend its local-area network from one building to three, it used fiber optics to solve cabling problems unique to a company that deals with power cables every day.

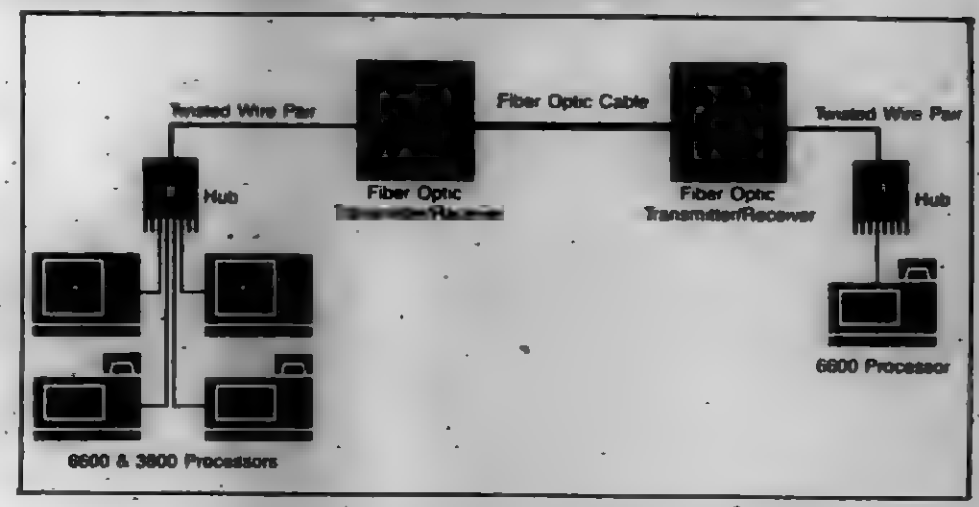
Iowa Power is a gas and electric company based here that serves a quarter of a million customers in 26 counties throughout central and southwest Iowa.

Its local-area network handles the data from more than 345,000 electric and power meters and data entry for customer calls and credit arrangements. Through the use of the network, the firm was also able to provide on-line data processing for its billing and accounts receivables department.

When most companies start wiring buildings together, there is little problem with renting underground conduits. But Iowa power "already had high-powered wires on the right of way underground," so coaxial cable could not be laid next to it for fear of creating a fire hazard, according to the company's telecommunications manager, Roland Johnsen.

Microwave was not considered because "that's hard to deal with when you have a lot of tall buildings around," Johnsen said.

So, in order to extend its Datapoint Corp. Attached Resource Computer (ARC) local-area network, fiber-optic cable was used. "We were the first in Iowa to pull fiber-optic cable in high-voltage ducts," Johnsen said. In fact, the company is thought to be the first to extend an ARC network to a fiber-optic network, according to a Datapoint spokesman.



Iowa Power and Light ARC Local-Area Network

Part of the reason for the extension was that the part of the company providing gas was broken into a second company. Although it is in another building, the gas company still uses the Datapoint equipment and the newly installed Burroughs Corp. dual processor for data entry applications, according to Bob Keefe, manager of system support.

Of the three buildings connected by the fiber-optic cable, two were one-third of a mile away and the third was more than a mile away. While the company has had the ARC network for four or five years, intrabuilding communications had been handled via 9,600 bit/sec lines and modems. The connection of fiber-optic cable to the ARC network was achieved through Datapoint's specially customized hubs and fiber-optic transmitters and receivers from Canoga Data Systems, Inc. (see diagram). Transmission now occurs at 2.5M bit/sec, Keefe said.

While Johnsen is completely satisfied with the operation of the network, Keefe said that sometimes a Datapoint environment is a disadvantage. "Even though Datapoint's electronic mail is good — planning for the future is difficult because there's not much software available."

Another disadvantage is that the more than 25 Datapoint terminals must communicate through the six Datapoint 6600 and one 3800 small business systems.

Office Ware

Applied Microsystems, Inc. has announced **PC-Profs**, an interface that allows IBM Personal Computer and Personal Computer XT users access to the mainframe electronic mail system. PC-Profs permits the user to select items such as a file cabinet, in/out trays, note pad and trash can from a menu and facilitates document creation and retrieval and electronic mail.

The system requires an IBM Personal Computer or XT with color graphics and a modem. The user must have access to a mainframe supporting the IBM Professional Office System application.

The program costs $250, with corporate licenses available at $5,000, the vendor said, through P.O. Box 832, Roswell, Ga. 30077.

Megahaus Corp. has released an updated version of **Megawriter**, a word processor with mail merge, for the Apple Computer, Inc. Apple II and IIe microcomputers. Improvements include a faster boot time, setable tabs and the ability to read and write both Apple DOS files such as Visicorp's Visicalc print files. It costs $99.95 from Megahaus, which is located at 5703 Oberlin Drive, San Diego, Calif. 92121.

Ceres Software, Inc. has released four software packages for the Radio Shack Model 100 portable computer. **Elf-Writer** features a viewing mode that permits the user to see how a document will be formatted before it is printed; **Elf1&1** features computational entry including an entry display, running total and memory as well as square root, percent, exponent and change sign key; **Elf-Cop** is a file manager system; and **Elf-Banker** performs banking and financial calculations. Each package costs $24.99 from Ceres Software through P.O. Box 1629, Portland, Ore. 97207.

Zenrad Controls Co. has released **Zen 3**, a screen editor with a relocatable linker. It is written in Zilog, Inc. Z80 code and supports Digital Research, Inc.'s CP/M operating system. Two assemblers, a debugger, monitor, calculator, justification, printer support, file management, titles and page numbering are included.

Recognizing the microcomputer's proliferation in the office, Computerworld will continue to publish microcomputer word processing, electronic mail and certain other types of software under this heading and section.

It is available on 8-in. IBM 3740 or 5¼-in. North Star Computers, Inc. formatted diskettes for $100 from Zenrad at 1575 APS, Santa Barbara, Calif. 93103.

Microart Corp. has announced **Image** word/graphics processor, Release 4.0, a screen-oriented word processing program that integrates graphics drawing capability for Digital Equipment Corp.'s Rainbow 100 personal computer. Image's features include the capability of simultaneously "windowing" any page from any other Image file and extracting from that page any section, regardless of location or graphic content for inclusion within any other file.

Image Release 4.0 runs under CP/M 86-80 on any Rainbow 100 personal computer having a minimum of 64K-byte memory. It costs $295 from Microart, located at Suite 961, 200 Market Building, Portland, Ore. 97201.

Satellite Software International has released Version 3.0 of its word processing system **Wordperfect**. Confidential documents can now be locked or unlocked with a password known only to the user, and the option to eliminate single lines at the top or bottom of the page is included.

The list price of $495 includes a spelling dictionary, math, automatic footnotes, text columns and a built-in print spooler that allows editing while printing.

A version of Wordperfect for DEC's Rainbow 100 has been released by the vendor at 288 W. Center St., Orem, Utah 84057.

Inview, a mouse-driven software package that allows IBM Personal Computer users to access several applications through "windows" and exchange data among them is available from Graphicon Software, Inc. Inview works with almost any package written for PC-DOS Version 1.1 and 2.0.

A minimum number of windows requires 256K bytes of random-access memory. Inview operates with floppy or hard disk systems and will work with monochrome monitors.

It costs $295 from distributors and dealer networks. Information is available from Suite 10, 399 Sherman Ave., Palo Alto, Calif. 94306.

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Acquisitions Tied to Rising Capital Needs

By Bill Laberis
CW Staff

A month ago, word was that Computer Corp. of America (CCA) was on the auction block, mulling the offers of suitors hungry for the company's Model 204 data base management system (DBMS), its market mainstay.

Pansophic Systems, Inc. and Management Science America, Inc. (MSA) were each rumored to have courted CCA, with Pansophic's interest getting to the offer stage. Their interest was not surprising, given the paucity of DBMS companies that could be considered for sale and the desire of mainframe applications and utilities software companies to branch into the DBMS area.

Nor was it surprising when CCA announced two weeks ago that it had, in fact, been acquired in principle by a Canadian insurance giant seeking to diversify into high-growth niches. What was surprising to some merger and acquisition watchers was the price paid by Toronto-based Extendicare Ltd. for CCA — $40 million.

"This [CCA] deal is a good example of what's happening in general regarding mergers and acquisitions of software and service companies," according to Ann Morley, who tracks acquisition activity for International Data Corp. (IDC), a Framingham, Mass.-based market research firm.

"There are more deals than ever being put together, and the dollar value of a typical deal is increasing," Morley said. "There's a push to become a one-stop shop in [software], which makes a company like CCA very attractive and helps bid up its acquisition price . . . With today's capital requirements beyond the means of many

(Continued on Page 144)

Illustration by Kristin VanWalkenburgh

Software Marriages Seen Leading Rush To Acquisition Altar

By Bill Laberis
CW Staff

"Marriage is a great institution, if you marry the right girl."

In this way, Gilbert Mintz, a partner at Broadview Associates, a Fort Lee, N.J., mergers and acquisitions marriage-maker, summed up the hot acquisitions environment in the $26 billion software and services industry.

This year will witness more such corporate marriages than ever (see related story), with a rush to the altar likely in the remaining six weeks of the year, analysts predict.

One of the hotter acquisition candidates had been the data base management system (DBMS) vendors, two of which — Mathematica, Inc. and Computer Corp. of America (CCA) — were bought up in the last four months. But in the DBMS area now, the number of potential suitors outstrips the number of companies that can be considered

(Continued on Page 144)

Bizcomp's Patent May Cause Legal Bind for Modem Makers

By Robert Batt
CW West Coast Bureau

SUNNYVALE, Calif. — Scores of users and manufacturers of command-driven modems may shortly find themselves in a legal bind as a result of a patent recently granted to Michael Eaton, president of Business Computer Corp. (Bizcomp), based here.

High-speed modem manufacturers such as Racal-Milgo, Inc. and Codex Corp., as well as firms that incorporate command-driven modems in their products, are likely to be affected by the patent, industry sources claimed.

In fact, one major manufacturer, Hayes Microcomputer Products, Inc., has already signed a licensing agreement with Bizcomp, under which the Atlanta-based firm will reputedly pay several million dollars to Bizcomp in return for use of the modem

(Continued on Page 138)

Michael Eaton

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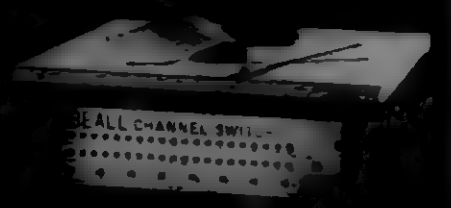

John Beall & Company, Inc.

HP Reports Strong Earnings Gains For Fourth Quarter and Year

PALO ALTO, Calif. — Hewlett-Packard Co. recently reported strong earnings gains for both the fourth quarter and the year, touching off a stock trading spree that bid up the company's stock.

Earnings for the year were up 13% to $432 million, or $1.69 per share, compared with $383 million, or $1.53 per share in 1982. Sales in the period totaled $4.7 billion, up 12% from the $4.2 billion revenue mark posted the previous year.

For the quarter, earnings rocketed 32% to $147 million, or 57 cents per share, up from $111 million, or 44 cents per share.

Fourth-quarter orders of $1.3 billion were 26% greater than orders from the same period a year ago. Domestic orders were particularly strong, up 33%. The company reported that orders for its touch-screen personal computer, the HP 150, are meeting company expectations, with HP having signed on key franchises.

Commenting on HP's results, John A. Young, president and chief executive officer, said, "We continue to see strength in the order picture, particularly in the U.S. . . . However, we have yet to see significant improvement in international order levels."

For Customer Acquisitions

HP Finance Co. Established

PALO ALTO, Calif. — Hewlett-Packard Co. has announced the establishment of a wholly owned subsidiary, the Hewlett-Packard Finance Co., designed to finance its customers' equipment acquisitions.

HP has also formed a financing and remarketing division to market and administer all HP product leasing and the resale of HP computers.

The new entities were designed to help meet interest in leasing HP equipment for medical, analytical, computer and test and measurement equipment, the company said.

In the past, the company entered into financing contracts with customers wanting to lease equipment and funded the contracts through arrangements with commercial banks. The new subsidiary will enable HP to offer its customers competitively priced financing and better accommodate growth anticipated in its customer-financed activities.

Joseph A. Barr, former sales finance manager at HP, has been named president of HP Finance, while Donald Schmickrath, former controller for the Business Development Group and the Information Products Group, has been named general manager of the financing and remarketing division.

Commenting on the newly formed operations, Barr said, "By tapping the public-debt markets, we hope to lower significantly the cost of financing our programs for customers," adding that HP expects to finance its operation with commercial paper and medium-term notes.

Tandem Reports Slow Growth, Flat Earnings

CUPERTINO, Calif. — Earnings growth slowed considerably at Tandem Computers, Inc. in fiscal 1983, with the company reporting virtually flat earnings of $30.8 million, or 76 cents per share, compared with $29.8 million a year earlier.

Total sales in the period also reflected slowing overall growth throughout the year, rising 34% to $418 million, up from $273 million in 1982. Growth in both earnings and sales were below the quantum leaps that characterized Tandem's financial results in recent years.

For the fourth quarter, profits rose 5% to $8.8 million, or 21 cents per share, up from $8.3 million the same period a year earlier. Sales in the quarter rose 35% to $101 million, compared with last year's sales of $76 million.

James Treybig, company president, said the company achieved success in asset management and inventory control during the year. He also said Tandem has begun production of its TXP, a 32-bit version of its Non-stop line of fault-tolerant processors.

Equatorial Bids For Satellites

MOUNTAIN VIEW, Calif. — Equatorial Communications Co. has applied to the Federal Communications Commission (FCC) for permission to construct, launch and operate two communications satellites that would expand the company's data network services.

Equatorial provides its customers with satellite data communications networks, which include 2-ft diameter receiving dishes called micro earth stations to which data is beamed from satellite transponders the company currently owns aboard Western Union's Westar IV satellite.

The proposed $200 million Equastar satellite system, if it is approved by the FCC, would be launched from the U.S. space shuttle in 1987.

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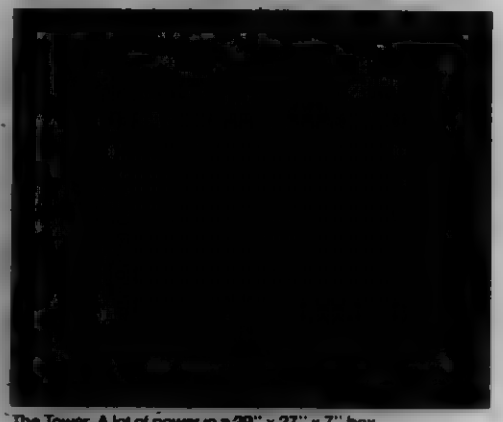
1983. A Very Good Year.

NCR introduced the Tower, a UNIX™ based microcomputer with the power of a mini.

NCR designed the Tower for UNIX, today's de facto operating system standard for multi-user 16-bit microcomputers. Then NCR made a number of enhancements to make the Tower easy to use at any level of computer sophistication.

NCR added a full featured, menu-driven database that you create in English. The Tower can be programmed in BASIC, Pascal, COBOL, and FORTRAN as well as UNIX's own language, "C". Spreadsheets, word processing and color graphic software are available now from NCR as well as from third-party UNIX software developers.

The Tower can communicate with any existing computer system from desktops to mainframes. Communications capabilities include SNA, X25, RBS, Tower-to-Tower, and Tower-to-Terminal networking.



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Modem Mart at Bizcomp President's Command?

Modem Patent May Put Users, Vendors in Bind

By Robert Batt
CW West Coast Bureau

The granting of U.S. Patent No. 4,387,440 to Business Computer Corp.'s (Bizcomp) president, Mike Eaton, marks the culmination of a five-year effort to take advantage of the rapidly growing intelligent modem market.

Eaton first began his project to develop a command-driven modem while at Stanford University, where he was studying for a doctorate degree in electrical engineering.

In 1979, Eaton invented his first direct-connect modem incorporating a microprocessor with an instruction set that allowed for automatic dialing, command control over setting up the operating parameters, including both pulse and tone dialing, and a self-testing capability.

That same year Eaton set up Bizcomp to market the product, and in early 1980, he shipped his first product and applied for a patent.

"It seemed at the time that this modem would fill a much-needed gap in the market, but we had no idea how big that market would become," Eaton commented in a recent interview. Some industry experts believe the patent applies to a large percentage of modems now being installed or shipped.

Getting the patent approved by the U.S. Patent & Trademark Office in Washington, D.C., however, proved no easy task. Eaton said the bureaucrats in the nation's capital decided that his reputed invention was a suitable candidate for its Quality Control Program — a random in-depth look at certain products to ensure that the patenting process is working correctly. This procedure, according to Bruce Miller, Bizcomp's marketing manager, delayed approval by at least a year. "However, we feel the extra care which the Patent Office took in verifying our claim should deter competitors from challenging the patent," he added.

It was not until June of this year that Eaton finally got the legal go-ahead to claim the invention as his own. For the Sunnyvale, Calif.-based firm, the decision now opens many doors.

Bizcomp sees its hard-won patent as a way to inject much-needed cash into the company and allow it to expand its present line of 1,200 bit/sec intelligent modems with integrated voice capability.

(Continued from Page 135)

design technologies covered by the patent.

"After making several patent searches, we felt that some of the modems manufactured by Hayes clearly fell within the claims of the Eaton-Bizcomp patent. When we looked at whether we should contest the patent, we felt that the legal process involved would be long and arduous and that the market offers too much potential to be slowed by legal action of that kind," explained Scott Hobby, attorney for the Atlanta law firm of Powell, Goldstein, Frazer and Murphy, which represented Hayes in the

Protects Basic Techniques

According to Bizcomp, the patent protects basic techniques used to control command-driven modems, including most of the current generation of autodialing modems widely used on terminals and computers, as well as modems with serial interface capabilities (as opposed to bit-mapped parallel devices) and intelligent modems that can distinguish between modem commands and transferred data.

It does not cover standard modulator/demodulator models or modems that have no advance capabilities beyond transmitting analog signals into digital code.

"We do not yet know for certain how many companies are affected by this patent, but we think it is at least 80. So far we have notified 38 of them and offered to negotiate a licensing agreement," Eaton commented in a recent interview.

The company is asking its competitors for a licensing fee of between .5% and 8% of net sales accruing from the use of the patented technique, and it is currently negotiating with seven of the companies reached.

The Bizcomp chief executive warned he will fight those companies that refuse to abide by the patent ruling, and he claimed his company has already set aside $600,000 in legal fees to pursue his claims over the next few years.

"We believe that over the next three years, this patent will bring in between $6 and $16 million in additional revenue," Eaton said.

The Bizcomp strategy, Eaton said, is to line up licensing agreements with major modem manufacturers in a bid to convince other vendors to do likewise.

The company's view is that with the market for modems currently flourishing, most users and vendors will choose to pay up rather than get embroiled in a legal tangle that could damage customer confidence, according to Eaton.

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IECC Addresses Pollution Issues

SAN JOSE, Calif. — In response to the discovery over the past two years of at least 50 chemical spills in Santa Clara County, five computer industry and area business organizations joined together in January 1982 to form the Industry Environmental Coordinating Committee (IECC) here.

Member organizations include the American Electronics Association (AEA), the Semiconductor Industry Association, the Santa Clara County Manufacturing Group, the Electronics Association of California and the Peninsula Industry and Business Association.

The purpose of the IEEC is to "address [pollution and regulation] issues in a positive, proactive manner," according to Alan Foster, a spokesman for the AEA and an IECC member.

One of the committee's first efforts involved working with local and state personnel over a 12-month period helping to shape the regulation of hazardous chemical storage under what has been called the Santa Clara County Model Ordinance, Foster said.

Among the groups involved in that project were the Silicon Valley Toxics Coalition (SVTC), comprised of local home owners, environmentalists and union activists (see related story); the Regional Water Control Board; the Santa Clara County Fire Chiefs Association; and the state Department of Health Services, he added. The ordinance has since been passed, in part, by 11 of the 15 municipalities in the county.

Foster said the group was formed after it became apparent that the same industry people kept showing up at meetings concerning the ordinance. "It became obvious that there was some duplication of effort and that we were all working together on local issues affecting Santa Clara County," he said. Foster noted that despite the SVTC's contention that some 90 leaks emanating from underground chemical storage tanks have been found, the leaks are of varying degrees.

EPA Chooses Calif. County For Study On Pollution

By Patricia Keefe
CW Staff

SAN JOSE, Calif. — What was once known as the agricultural "Valley of Heart's Delight" is in danger of becoming the Silicon Valley of Contamination, according to some Santa Clara County environmentalists. As if to underline those fears, the Environmental Protection Agency (EPA) has chosen Santa Clara County as the site for a $500,000 pollution study.

Although an EPA spokesman denied any connection between the study and pollution problems in the county, the chairman of the Silicon Valley Toxics Coalition said he found that hard to believe. "Over 90 chemical leaks — primarily emanating from high-tech companies — have been confirmed in the area over the past two years," charged coalition chairman and attorney Theodore G. Smith. Moreover, industrial air pollution and storage of highly volatile gases present other hazards that county environmentalists are attempting to monitor and alleviate, he said.

The EPA, however, insists the study is simply part of a pilot program also under way in Baltimore and Philadelphia. Building on existing environmental studies in the county, the EPA project will integrate data involving air, water and land to demonstrate how the polluting and subsequent cleanup of one medium affects the others, the spokesman claimed. It is said to be an attempt to "move beyond traditional single-purpose approaches to environmental management." The spokesman was unable to provide any specifics of the planned study.

He added, however, that one reason the county, also the home of Silicon Valley, was chosen was the "high quality of state and local environmental experts [located there]."

Reverse Unpopular Image

Smith suggests another motive: In an attempt to reverse an unpopular image acquired in the last few years, the EPA thinks that by "sprinkling money in here, they can claim they helped solve our problems." Regardless of the EPA's reasoning, Smith said his group is willing to work with the federal agency on the study — once it figures out what the EPA plans on doing, that is. The Silicon Valley Toxics Coalition is a group of environmental activists and labor unions seeking to limit the use of toxic chemicals in the workplace. The coalition was formed as one response to the discovery of over 50 tanks leaking hazardous chemicals into drinking water supplies, including 1,1,1,trichloroethane (TCA), a solvent used to clean silicon chips. TCA is linked to a number of health problems and was found to cause cancer in laboratory mice in a study released earlier this year by the National Toxicology Program.

In late 1981, trichlorethyene (TCE) and TCA were found to have leaked

(Continued on Page 141)

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Japan Still Has Long Way to Go

U.S. Lead in DP Market Seen Not Threatened

WASHINGTON, D.C. — U.S. computer makers are so entrenched in world markets that there is no reason to believe they are seriously threatened by foreign competition, congressional researchers recently reported.

"There are few concrete signs that this dominance by U.S.-based firms is threatened," the Office of Technology Assessment (OTA) said in a 563-page report on U.S. international competitiveness in electronics.

"Relative positions within the world computer industry will continue to shift, stimulated in many cases by new applications of computing power," the OTA said. It added that "as the industry continues to evolve, the technological leads of American firms are likely to shrink, and competitive positions may become more difficult to maintain.

"Nevertheless," the study continued, "The U.S. lead in worldwide marketing of data processing systems is so large that prospective challengers such as Japan cannot hope for more than modest success over the rest of the century."

Discussing the reasons for U.S. strength in this sector, the OTA report suggested that "American firms have done a much better job than their foreign competitors of balancing what the available technology can do against what customers for data processing systems have wanted to accomplish."

Foreign Vendors

The OTA elaborated on that point by noting that although foreign firms have sometimes been able to match U.S. hardware, foreign vendors have not been as adept at producing software and developing new applications as have U.S. firms.

The study cautioned, however, that with the development of new applications, such as desktop computing and office automation, foreign firms may gain greater market share than they have captured in mainframe computer systems.

Turning to Japan

Turning to Japan, the most vigorous competitor, the study said that even that country will continue to lag behind American companies. The OTA noted, for example, that even with concerted government-sponsored research and development efforts, Japan, though committed to surpassing U.S. industry, still has a long way to go.

The study remarked that "the leading Japanese exporter of computers, by a large margin, is IBM-Japan — despite the fact that it has been barred from many of the government programs that have aided other [Japanese] computer manufacturers."

"While IBM has abundant resources and technology to compete effectively against Japanese computer firms, other American manufacturers may face increasing difficulty in the future," the OTA added. The report suggested that "although the U.S. industry is not immediately imperiled, the federal government could help ensure future competitiveness through better developed, more consistent industrial policy, particularly one supporting technology development and technical education."

On the subject of industrial policy, the report stated that such policy action cannot offer "any sure prescriptions that can guarantee the future competitiveness of our microelectronics or computer sectors." But, the OTA said, "a 'business-as-usual' approach is unlikely to prove sufficient to maintaining U.S. competitiveness."

EPA Chooses Calif. County For Study

(Continued from Page 139)

from underground storage tanks owned by Intel Corp. and Fairchild Camera and Instrument Corp., respectively, allegedly contaminating some water supplies in the valley [CW, Feb. 22, 1982]. However, a follow-up investigation completed in June 1982 found only sporadic incidents of chemical contamination, according to county water officials [CW, June 28, 1982].

The coalition has assisted in the development of a model ordinance that requires permits for storing hazardous chemicals and makes installation of double-walled storage tanks mandatory.

Underground storage of toxic chemicals reportedly was called a "significant source of contamination" in a report released in April 1982 by the State Assembly Office of Research. Moreover, Smith contends it constitutes "a terrible fire and explosive hazard with the potential for catastrophic problems."

The ordinance has been adopted in part by 11 of the 15 municipalities in Santa Clara County.

Wang Plans To Buy 15% OF VLSI

LOWELL, Mass. — Wang Laboratories, Inc. last week announced its intention to buy 15% of VLSI Technology, Inc., a custom integrated circuit maker based in San Jose, Calif.

The minority equity purchase would cost Wang about $34 million and would make Wang VLSI's largest shareholder. At present, Wang is one of the firm's biggest customers for custom-designed chips. Last year Wang scuttled plans to produce its own chips.

Wang's move to buy a piece of a custom chip maker follows similar minority purchases made by other major systems makers in the past year. IBM in 1982 bought a major stake in Intel Corp., which supplies IBM with much of the processing circuitry for IBM's Personal Computer lines, and both Sperry Corp. and Digital Equipment Corp. this year purchased a minority stake in Trilogy Ltd., which hopes to market its new wafer design for large mainframes.

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CWA Chief: High-Tech Unionization Is Coming

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Communications Workers of America's (CWA) President Glenn Watts recently predicted a wave of unionization in high-technology industries, which today are mostly nonunion.

Addressing a Nov. 16 meeting sponsored by the Information Industry Association, Watts offered the recent contract agreement between CWA and AT&T and the Bell operating companies as a model for future labor-management relations. That agreement, he said, is characterized by job training and retraining programs for workers displaced by technology, income protection arrangements for workers if personnel levels are cut and new, extensive management-worker cooperation plans.

Noting that change is a constant in a high-tech society, Watts called management-labor cooperation "a powerful tool" and said "those companies that practice worker participation will come out the winners." He called for a federal industrial policy that includes "consensus building" among all levels of the economy to ensure continued U.S. competitiveness in world markets.

Pointing to the convergence of telecommunications and computer technologies and industries, Watts said one major remaining difference between the two sectors is that while "the telecommunications industry is substantially organized . . . the manufacturing of all this new equipment is a mixed bag and is not substantially organized.

"There is a new wave of organizing that has not come about yet," he said, predicting, "we will see a substantial amount of organization in this area."

High-technology industries, such as computer manufacturers, in their early stages have been characterized by entrepreneurial management and highly trained, highly motivated technical personnel, Watts commented. He added that has changed and workers are seeing they have the same needs for union protection that workers in older industries found.

The question is not whether these new industries will organize, but who will do it, according to Watts. "If the unions are not successful," he said, "the workers, out of self-interest, will organize themselves.

Asked if he sees the CWA becoming more active in attempting to organize other high-technology sectors, Watts noted that his union has organized a number of noncommunications entities. "If you talk, you communicate," he said, indicating that the CWA considers any worker unit a fair target for CWA membership. "We'll organize anything that moves," Watts said.

Copyright Bill For Semi Designs Gets GOP Boost

By Robert Batt
CW West Coast Bureau

WASHINGTON, D.C. — The efforts of semiconductor manufacturers to obtain copyright protection for chip designs have received a major boost from the Republican Task Force on High-Technology Initiatives.

The newly created 140-member Task Force, spearheaded by California Rep. Ed Zschau, has decided to support the Semiconductor Chip Protection Act — H.R. 1028 — which would prevent unauthorized copying of semiconductor circuit pattern designs and supposedly protect U.S. firms from the losses they now suffer as a result of pirate competition.

Currently, no form of intellectual property law includes semiconductor designs, and a successful design, which may cost the originator up to $100 million to produce, can, according to advocates of legislation, be copied by a competitor through simple photographic reproduction for as little as $50,000.

The support of the Republican caucus is seen on Capitol Hill as critical to the eventual passage of legislation in the House of Representatives. Up until this time, the impetus for passing H.R. 1028 has come mostly from Democratic members of the House. The intervention of the GOP legislators is seen as a move likely to ensure the success of the bill.

According to the Semiconductor Industry Association (SIA), which represents the majority of large U.S. chip manufacturers, the threat of piracy dramatically reduces the incentive for companies to make the research and development investments that new products require.

Passage of H.R. 1028, which is cosponsored by 20 congressmen, or its companion bill in the Senate — S. 1201 — would amend Title 17 of the U.S. Copyright Act to include semiconductor masks — the materials containing the designs that allow devices to operate in a particular manner.

While specifically prohibiting the unauthorized copying of semiconductor mask designs, proponents of the legislation said the bills would protect the right of competitors to "reverse engineer" through studying chip designs and then producing chips that might have the same function but are of different design.

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Software Deals Seen Leading Acquisitions Rush

(Continued from Page 135)

targets for sale.

According to Thomas Lawton, editor of the Belmont, Mass.-based *Computer Services Report*, privately held Cincom Systems, Inc., maker of the Total DBMS, has no intention either of going public or being acquired. The same holds true of publicly held Cullinet Software, Inc. and Software AG, he said.

"This is why CCA sold so high," Lawton said of its $40 million sale price paid by a Canadian insurance company's subsidiary.

With slim acquisition pickings in the DBMS area, who are the other hot acquisition candidates, and who are the hungriest buyers?

Analysts point out that several of the bigger service companies, such as Electronic Data Systems Corp. and Computer Sciences Corp., have been actively acquiring small ($1 million to $5 million) service companies in specific geographic areas to broaden market penetration.

"It's a quick — and if done right — effective way for the service firms to build market share," said Ann Morley, acquisitions watcher at International Data Corp. in Framingham, Mass.

Lawton cited Anacomp, Inc. as one troubled service company likely to seek an acquisition partner. After turning a profit for several consecutive years, Anacomp lost nearly $4 million on record sales of $172 million in fiscal 1983, posting an even greater loss of $12 million in the first quarter ended Sept. 30. Sales, too, plunged 25% to $36 million.

"They don't have the cash to continue much longer," Lawton said. "They'll either have to split up the company or be acquired."

Mergers Tied to Rising Capital Need

(Continued from Page 135)

good small companies and the difficulty for even large companies to build a product from the ground up, acquisition activity is very high."

Statistics bear out the accuracy of Morley's observations. In the first six months of 1983, Broadview Associates, a Fort Lee, N.J., merger consulting firm, logged 61 acquisitions of software and service firms totaling more than $400 million. This is an amount equal to all the acquisition activity in 1982.

Broadview estimates further that more than $1 billion will be spent acquiring software and service companies in 1983, with the greatest activity coming traditionally at year's end. IDC predicts that acquisitions of software and service firms will top 150 this year, with a continuation of acquisition growth into 1984.

Moreover, a projected 35% compounded annual growth rate in software and services revenues is attracting a number of non-high-tech, diversified firms to the acquisition arena. These diversified, non-high-tech buyers tend to leave the acquired company's management to its own devices after paying the purchase price, an arrangement that makes these buyers attractive "marriage partners," according to one acquisitions analyst.

Why the heightened interest in the buying and selling of software and service companies, including the purchase and sale this year of several industry notables.

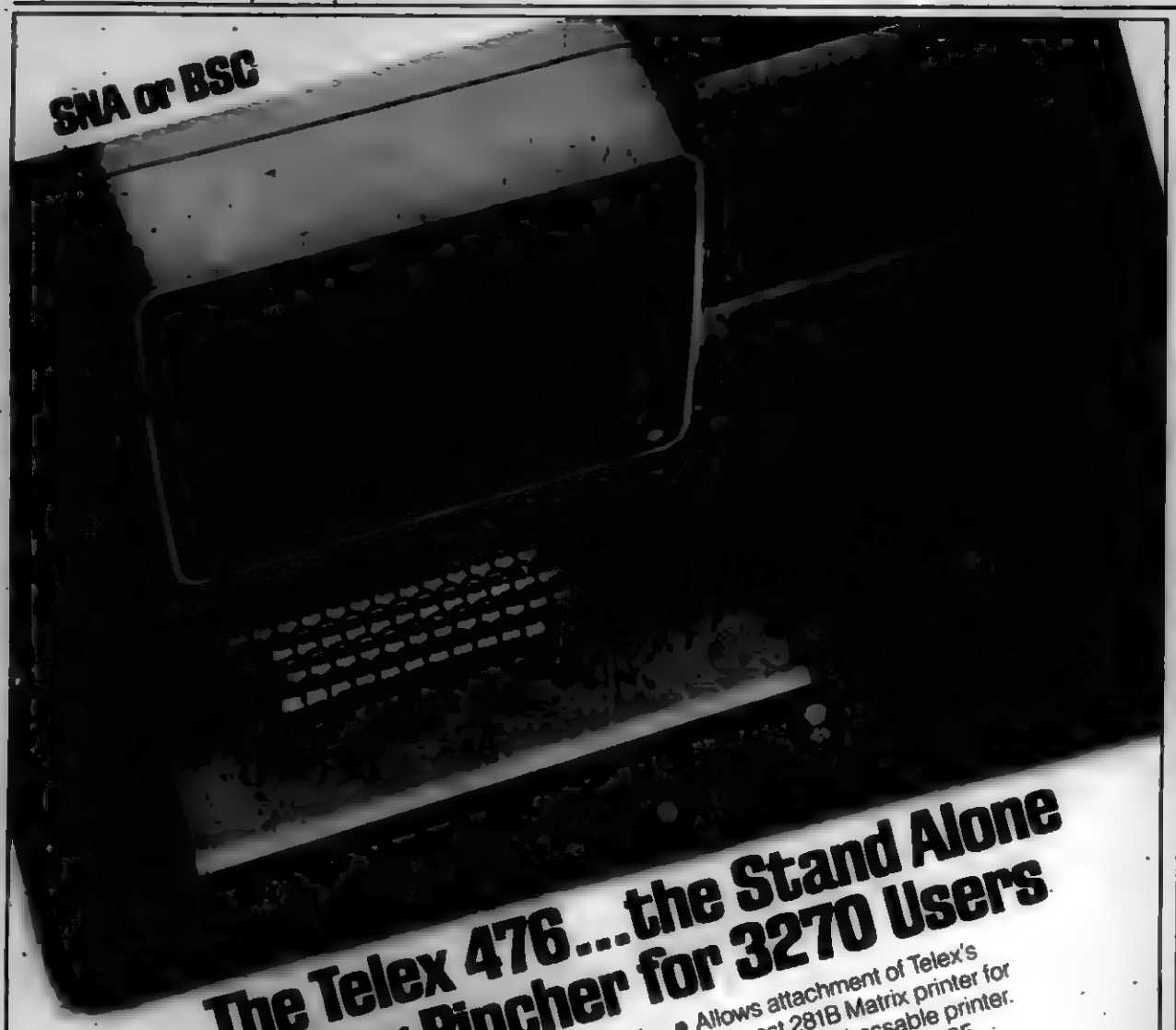
'Dual Skills Requirement'

Regarding software companies, one reason can be found in the "dual skills requirement" of successfully developing and marketing a mainframe package, according to Gilbert Mintz, who founded Broadview Associates 10 years ago. Mintz said that today's markets are characterized by a high degree of specialization and "niche orientation." Penetrating new software markets requires the technical skills to write and install packages as well as the business, marketing and entrepreneurial skills to sell the packages in particular horizontal markets.

"You need big bucks to play both games if you're trying to expand into new areas today," Mintz said. "Acquisition is the fastest, safest and surest way of penetrating new markets." Rumblings emanating from the financial community have also added to acquisition activity. Due to the declining fortunes in recent months of many high-tech stocks traded over-the-counter, investors have begun "backing off from many new issues of high-tech companies going public," said Thomas Lawton, publisher of the *Computer Services Report* in Belmont, Mass.

As a result, going public is becoming a less viable course for raising sorely needed capital, and acquisition is a correspondingly more attractive route, Lawton said.

The undeniable need to raise hefty sums of capital for research, development and marketing was cited as the chief reason for seeking an acquisition partner by the presidents of both McCormack & Dodge Corp. [CW, March 28] and Mathematica Products, Inc. [CW, Aug. 8].



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Acquisition a Viable Route to Corporate Growth

By Bill Laberis
CW Staff

As competition in the computer services industry has heated up in recent years, several leading companies have incorporated aggressive acquisition efforts into overall growth plans, in some cases using the acquisition route as the primary growth vehicle.

Computer Sciences Corp. (CSC), a $700 million-plus service company based in El Segundo, Calif., is one of the more aggressive acquisition-oriented companies. In fact, CSC has for some time employed an acquisition specialist, whose function is to seek out and buy smaller companies to fit into the company fold.

Steve Elias, CSC's corporate director of acquisition, termed the company's acquisition posture "a prime corporate direction," highlighted by Elias' reporting directly to the chairman of the board. For the right acquisition, Elias said, CSC will provide him with "whatever it takes ... to acquire a company we want," adding that all acquisitions to date have been made with cash.

A year ago, CSC paid $20 million for Houston-based Associated Credit Services (ACS), which itself was the size of many other service companies, grossing about $27 million. Elias said CSC has allowed ACS to retain "just about as much" autonomy as it enjoyed before acquisition, with the exception that ACS' private telecommunications network has been replaced by CSC's Infonet.

However, CSC is not bound by set rules regarding the autonomy the company will grant the management of companies acquired, Elias said. Acquisitions made in the medical claims processing area, for example, are fully integrated into CSC's claims operations. But in general, it is CSC's "absolute desire ... to retain management of companies" they buy.

Asked if he looks over his shoulder at the acquisitions of CSC's staunchest competitor, Electronic Data Systems Corp., Elias said the two companies often seek different acquisition candidates. "I don't see a great deal of competition in the [acquisition] marketplace," he said. "I try to look ahead, not over my shoulder."

Completed Third Acquisition

Buffalo, N.Y.-based Computer Task Group, Inc. (CTG) has similarly been active in the acquisition arena, using its acquisitions both to penetrate new markets and to deepen its coverage in selected geographic areas. Earlier this month, the $50 million-per-year service company completed its third acquisition of the year, buying Data Structures, Inc., a professional service firm in New York.

With its latest purchase, CTG will have added 110 people to its 1,200-person work force, less than half the number of employees added via internal growth, according to John P. Courtney, executive vice-president.

Courtney said the acquisition process at CTG is carried out in steps "and is active as opposed to reactive, as much as we can make it."

Initially the company targets a geographic area it wishes to penetrate or expand into, then dispatches an acquisition specialist to survey acquisition candidates in that area. First, contact is made by mail, followed by personal contacts before the dickering process begins. Courtney said that the pickings are slim in many areas. "Most companies for sale are not really the best, and the ones that are good are often pretty expensive."

Show Sponsors Break Ground On Exhibit Hall

SAN MATEO, Calif. — Producers of the Semicon/West trade show recently broke ground on a privately funded exhibit hall that will be turned over to county officials after 10 years.

The Semiconductor Equipment and Materials Institute (Semi), sponsor of the Semicon/West trade show held annually at the San Mateo County Fairgrounds, funded the $1.5 million hall under agreement with the San Mateo County Board of Supervisors.

Semi will recoup its investment by using the hall rent-free during Semicon/West shows and receiving other revenues generated by the hall. After the investment is paid off over an estimated 10-year period, the hall will become the property of the county, a Semi spokesman said.

The 100,000-sq ft building will provide space for more than 500 exhibits, increasing the number of exhibit spaces at the fairgrounds and at a nearby complex to 1,700, according to the Semi spokesman. Last year, nearly 700 exhibitors attended the show, while another 100 exhibitors were turned away for lack of space, according to the spokesman.

According to James C. Morgan, president of Semi and president of the Santa Clara, Calif.-based Applied Materials, Inc., "The project is believed to be the first time a show producer has made a commitment to build an exhibit hall." No public funds will be used in construction, he added.

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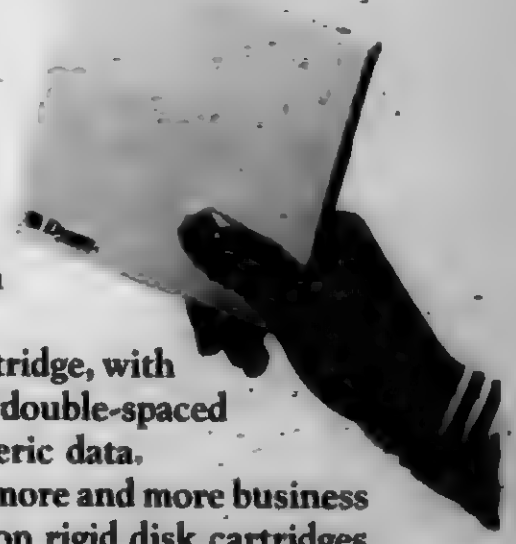

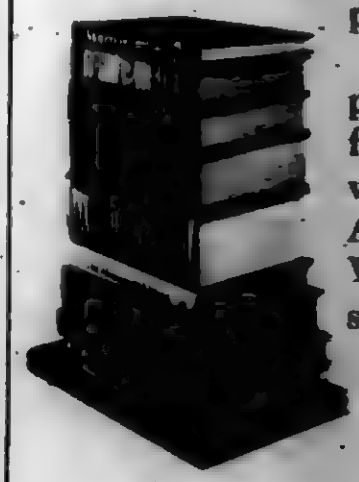

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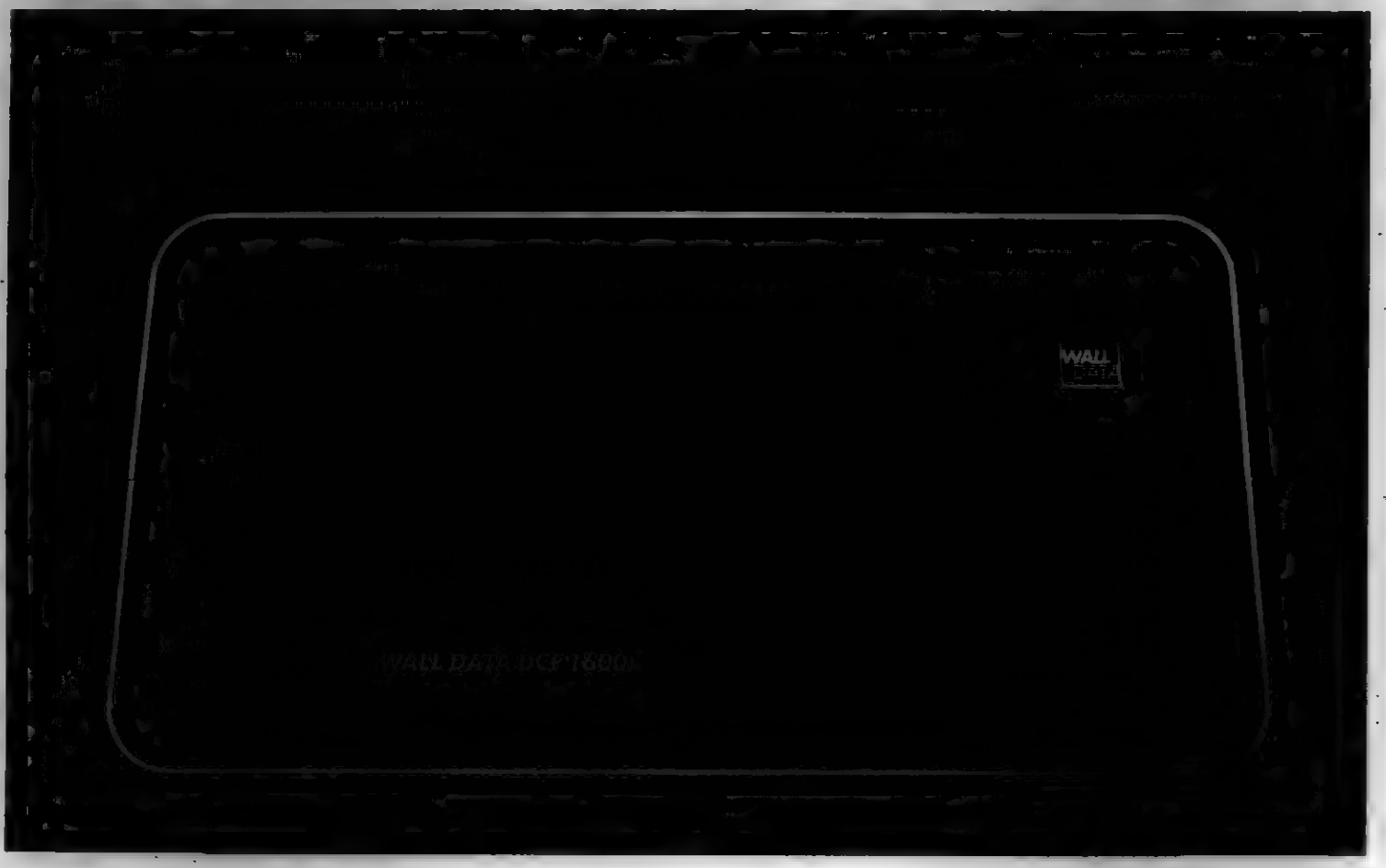

THE COMPATIBILITY DILEMMA

The need for compatibility among the wide range of computer systems and terminals in the modern corporate communication network has never been greater.

The use of distributed systems to solve business problems brings computer power to the end-user, and poses a growing challenge to network compatibility with mainframe hosts.

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Executive Corner

● **William E. Blasdell** has been named vice-president of systems programs at Calma Co.

● **Frank R. Jerd** has been named vice-president of sales at Telex Computer Products, Inc.

● **Joseph J. Porfeli** has been named vice-president and general manager of GTE Telenet Communications Corp.'s Network Applications and Terminals business units.

● **Thomas S. McCaffrey** has been named vice-president, worldwide marketing, in the Computer Systems operations of Sperry Corp.

● **Guy H.B. Shaffer** has been named director, information processing systems, at RCA Government Communications Systems.

● **Stanley W. DeVaughn** has been appointed vice-president, communications, at Xebec.

● **Jamy Faulhaber** has joined Lecht Sciences, Inc. as president, replacing founder Charles P. Lecht, who will continue as chairman and chief executive officer of the company.

● **William Minchin** has been appointed vice-president of manufacturing at Auragen Systems Corp.

● **Richard V. Paulson** has been named a vice-president and general manager, development, of Computervision Corp.

● **William G. Stapp** has been promoted to vice-president of data processing for Hogan Systems, Inc.

● **James F. Ferenz** has been appointed vice-president of manufacturing at Fortune Systems Corp.

● **Roy J. Moffa**, former program manager for Digital Equipment Corp.'s 32-bit micro VAX computers, has joined Pixel Computer, Inc. as president and chief executive officer.

● **Dr. Phillips W. Smith** has been appointed president, chief executive officer and a member of the board of directors of CAE Systems, Inc.

● **Zoran Simic** has been appointed vice-president of manufacturing at Tymshare, Inc.

● **Roger Norris** has been promoted to vice-president, sales, for Lee Data Corp.

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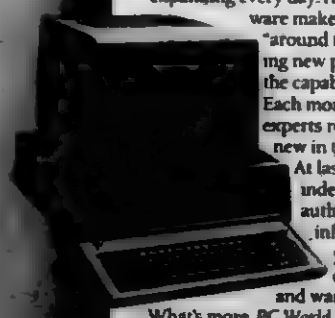

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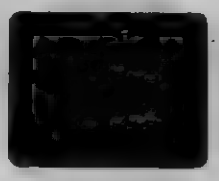

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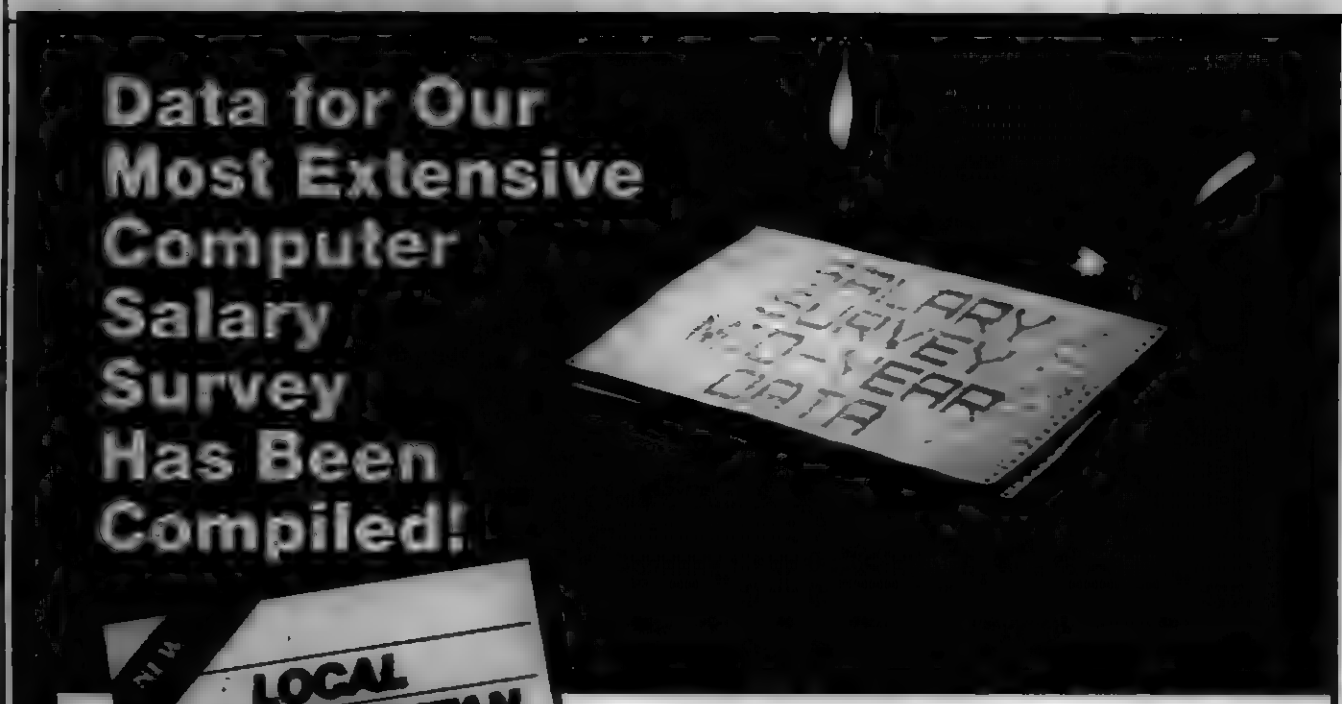

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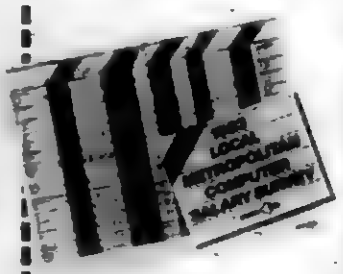

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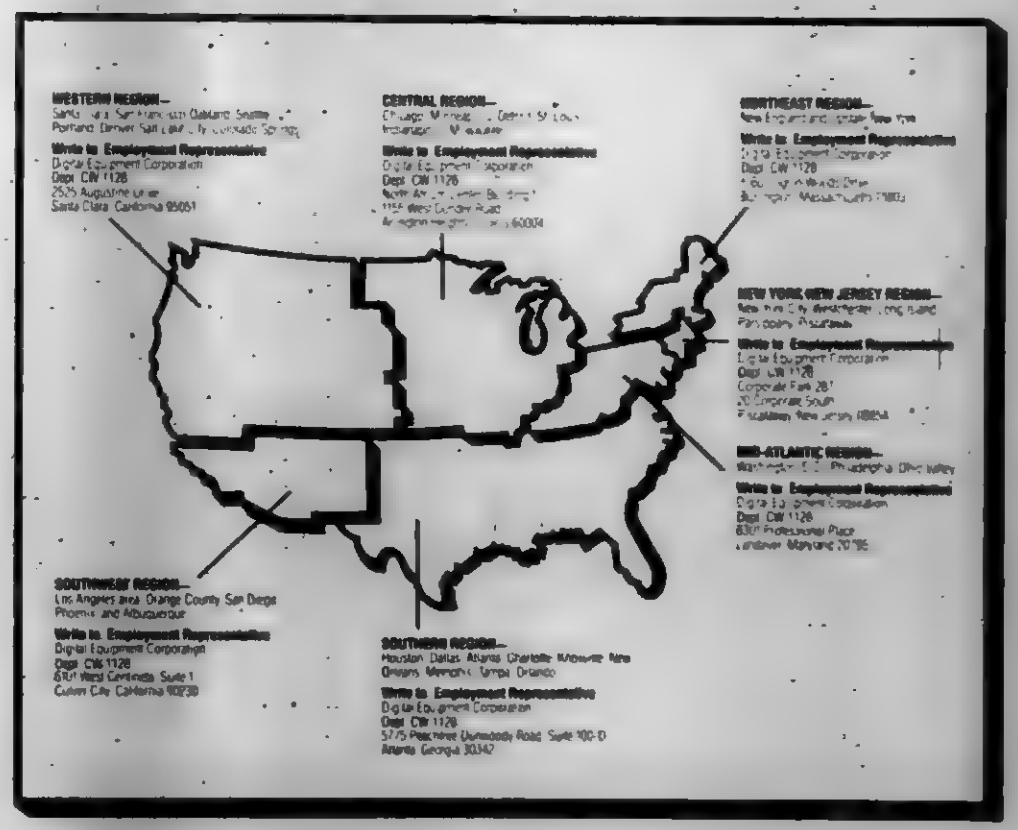

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The introduction of the 4115 set new standards for High Resolution Computer Display Terminals. Its development includes many state-of-the-art techniques to produce high-performance graphics with unmatched display quality. The continued development of this product as well as development of future products requires that we add engineering staff. If you are interested in working on an industry leader and with a firm recognized for technological innovation, you may want to consider one of the following positions.

Sr. Software Engineers
Design major firmware enhancements & firmware modifications to the 4115

Software Engineers
Participate in the design of 3D graphics transformations

Software Engineers
Design/implement/test firmware for new products based on 4115 technology

Hardware/Software Engineers
Design and write microcode for a bit-slice picture processor used in new graphics terminals

Electronics Engineers
Contribute to the development of new products in the 4100 series of Graphic Display Terminals

Microelectronics Component Engineers
Expand the utilization and application of VLSI technology in graphics systems and participate in the development of the next generation of graphics display products

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McDonnell Douglas Automation Company (McAuto), a divisional company of the McDonnell Douglas Corporation has openings in St. Louis, Missouri for experienced Systems Programmers.

McAuto offers challenging opportunities in a state of the art computer services company. St. Louis offers all of the benefits of a major metropolitan city, a pleasant pace of life, and is affordable. We also offer a comprehensive compensation and benefit package.

Positions available in our Health Services and Operations Divisions.

Responsibilities of the positions include:
- Systems Programming utilizing IBM/MVS, TANDEM, VM/CMS, DOS/VSE and Assembler.
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- Development of IDMS Data Base environments.
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- Program products support and installation.
- Project management.
- Mini-micro support.

Qualifications include:
- BS or equivalent in Math or Computer Science.
- 3+ years systems programming experience in one of the above areas.
- Specialized systems programming experience desired.

If you are interested in these exciting opportunities please send your resume in confidence to:

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Dept. K050-164
P. O. Box 516
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Dataserv Computer Maintenance is expanding nationwide. We now have immediate openings in major cities and will be adding more in the near future.

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We now have immediate openings in these cities for these positions:

San Diego, California — FIELD ENGINEER
Immediate opening for experienced Field Engineer for support of IBM 3600 banking equipment.

Des Moines, Iowa — FIELD ENGINEER
Excellent opportunity for experienced Field Engineer to work on 327X, 3420 and 3211 equipment.

Richmond, Virginia — FIELD ENGINEER
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Dataserv will soon have additional opportunities for field engineers and technical specialists in several other major cities throughout the United States. If you are considering a change in employment, contact Dataserv for a review of what we have to offer.

For immediate consideration and more information call **Toll Free — 800-328-6729** or send your resume to: **Bev Walters, Dataserv Computer Maintenance, Inc., P.O. Box 3003, Hopkins, MN 55343.** We are an equal opportunity employer and all inquiries are considered confidential.

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Application closing date: January 15, 1984. May be extended without notice if qualified applicants not available. Send detailed resume, and the names, addresses and telephone numbers of three professional references to:

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ISC SYSTEMS CORPORATION
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The Washington Metropolitan Area Transit Authority is seeking an MIS Analyst who will be responsible for reviewing existing management information systems, programs and reports to identify system needs, including hardware/software requirements, omissions and deficiencies. Develops programs to test and troubleshoot microprocessor based systems. Prepares needs assessment, researches findings, identifies options and coordinates proposed changes and/or enhancements. Translates system enhancements based upon user operational reviews into new or modified computer programs.

QUALIFICATIONS: Bachelor's Degree in Computer Science, Engineering, Mathematics or a related field. Considerable and progressively responsible experience in system analysis, computer programming or data base maintenance.

Starting Salary $32,600 or commensurate with experience. Please submit resume with salary history no later than DECEMBER 9, 1983 to:

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Fortune

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Att: Personnel Department

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Applications are invited for a position as Director of a Program in Computer Science. The Director is responsible for coordinating the College's offerings in computer science, for developing new courses in this area at the intermediate and advanced levels, and for directing an interdisciplinary concentration in Computer Science. Of primary importance are the ability to provide leadership in curriculum development and a commitment to excellent undergraduate education. Assistant Professor rank (Ph.D completed) preferred; 3-5 year appointment. This is a newly created position, and continuation of the program and the position beyond five years is subject to review. Preferred starting date is September 1984. Applicants should submit a resume and have three letters of reference sent to Prof. John R. Boccio, Chairman, Dept. of Physics, Swarthmore College, Swarthmore, PA 19081. Deadline for applications is February 15, 1984. *An Equal Opportunity Employer.*

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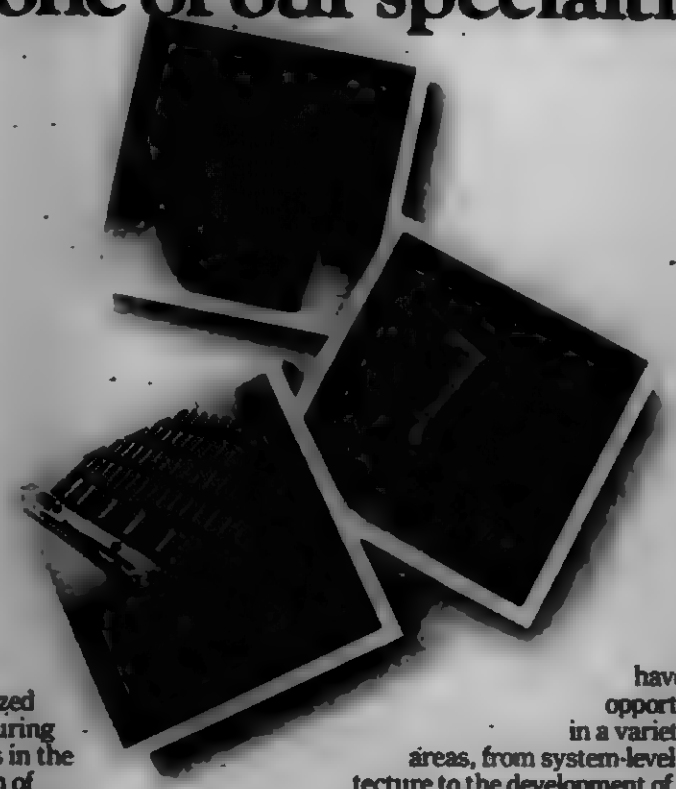

From computerized manufacturing operations in the production of Kodak disc film to the design and fabrication of output driver chips for business systems equipment, computer professionals at Kodak excel at thinking small.

But Kodak's commitment to computer technology is big. Across the board, we have need for experienced, technically oriented computer scientists and software engineers.

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DOE Contracts Internal Audit Group
Los Alamos, New Mexico Office

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Position requires degree in Engineering, Math or Physics or equivalent computer programming experience. Knowledge and demonstrated experience with large computer codes in designing of original software and modification of existing software using PRIME and/or DEC VAC is also required.

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This position is either GS-12 or GS-13 grade level, depending upon qualifications and experience. It offers competitive salary, excellent career benefits and professional growth opportunities. Please send your Personal Qualifications Statement (SF-171) to:

U.S. Department of Commerce
National Bureau of Standards
Administration Building, Room A-128
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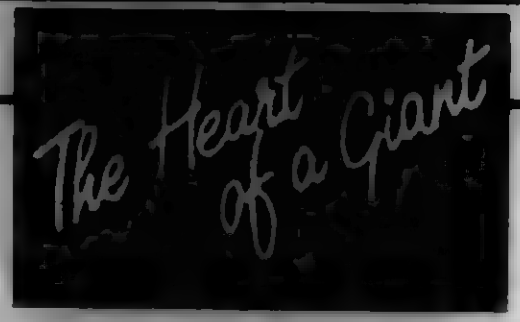

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Intermediate/senior/manager level positions require BS/MSEE or CS and 3+ years related experience. Use of Assembly languages and OS to exercise hardware of large-scale computer systems, plus a working knowledge of high-level languages and system architecture. Field engineering, system test or prototype bring-up experience.

Join our quest for excellence. Call either Bob Tyler or Sam Oseki, or send your resume to Amdahl Corporation, MS-300, Dept. 11-180, P.O. Box 470, Sunnyvale, CA 94086. We are an equal opportunity employer through affirmative action.

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Required experience:

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Highly desirable:

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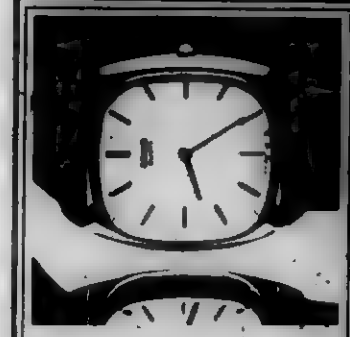

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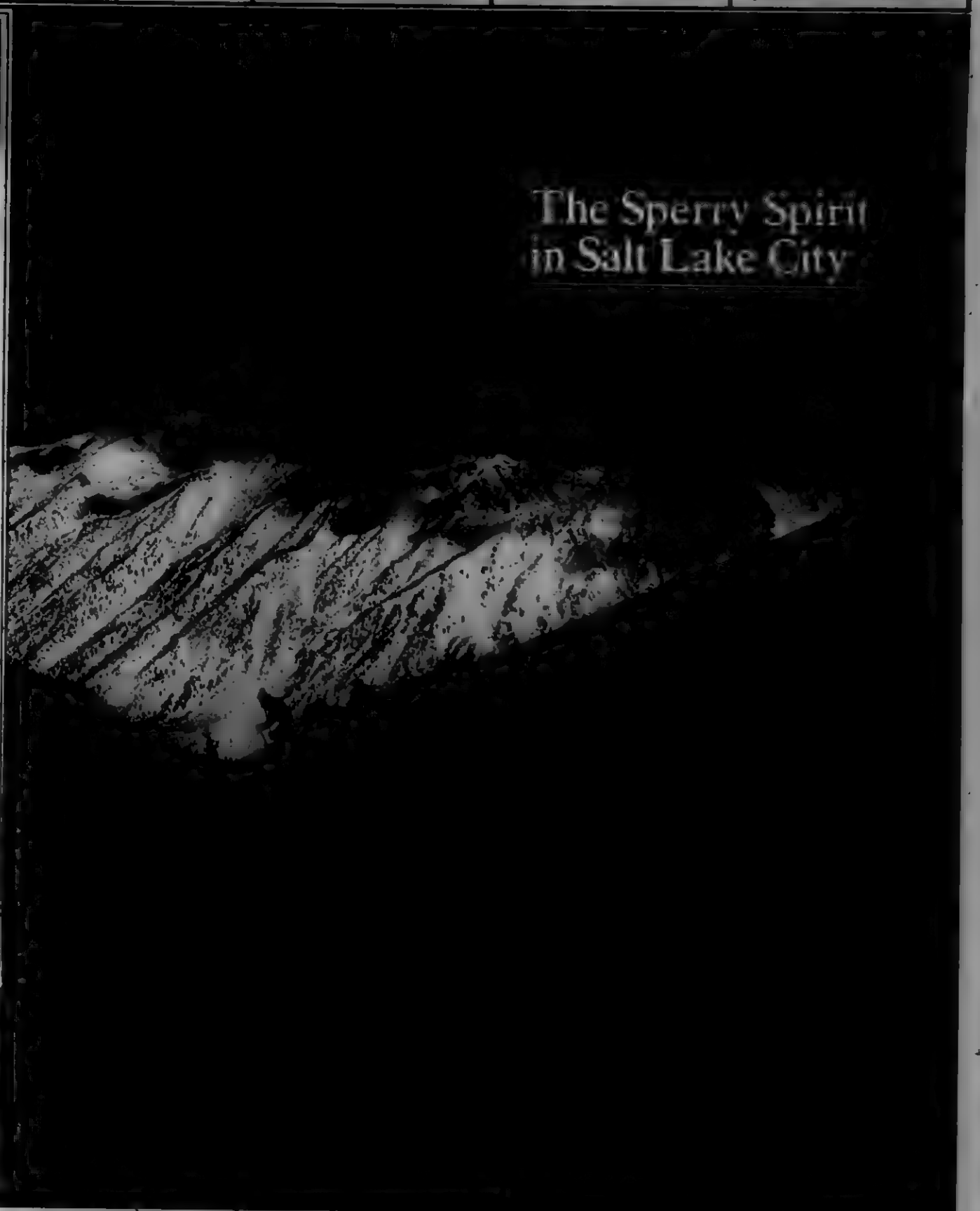

Data Processing

DATA CENTER MANAGEMENT

We're a bank . . . but we're different!

Provident is an aggressive regional bank holding company with a real management commitment to upgrading our data processing systems.

We are a state of the art shop using MVS, CICS, TSO and VSAM. Next year we will be moving into a new data center and installing IBM 4300 series CPUs.

Two people are needed now to help plan and staff our data center and provide leadership in the systems software and operations areas. These are "ground floor" opportunities for individuals who want to participate in developing a data processing facility "from scratch".

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This "hands-on" working manager will be responsible for installation, support and "tuning" of MVS and associated software. Candidates should have five years directly applicable experience-MVS installation and support, hardware and software selection, and capacity planning. Familiarity with JES2 architecture and internals, TSO/SPF, Assembler Language and COBOL are essential; additional familiarity with ACF/VTAM, NCP, CICS and Parmelee desirable.

Manager, Data Center Operations

The person selected will manage computer operations, scheduling and control functions of our new data center. Duties will include supervision of employees and vendor representatives to ensure proper operation and maintenance of all DP equipment, and development of operational standards and procedures. Preferred candidates will have three or more years supervisory/managerial experience in an MVS installation, and a total of ten or more years in an IBM data processing environment. Experience in both batch and online environments, and exposure to an automated scheduling system, will be desirable.

For confidential consideration, address your resume to Stu Martin

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(800) 237-6487

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Brockway, Inc. (NY), a major manufacturer of glass, plastic and metal containers seeks a Teleprocessing Analyst to join us at our Fortune 500 headquarters located in Brockway, PA.

The selected candidate will possess a strong working knowledge of SNA/SDLC communications protocol with at least 3 years of systems software support in an IBM shop using MVS, VTAM, NCP, Assembler, VM and COBOL. A BS degree is essential, preferably in Computer Science. Possessing excellent organizational/planning skills you will be responsible for maintaining a cost efficient communications network between end terminal users and the main computer facility as well as monitoring, evaluating, troubleshooting, and planning configurations to provide hardware/software support for our teleprocessing network.

Join our team of experts in an atmosphere of challenging opportunities. Our salary is commensurate with experience along with an attractive benefits package. For prompt attention, you are invited to forward your resume along with salary requirements in confidence to: Lawrence Kutsch, Manager Salaried Employment, BROCKWAY, INC. (NY), McCullough Avenue, Brockway, PA 15824.

Brockway

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In fifteen years Boole & Babbage has become a world leader in the development of both software products and educational and consulting services designed to facilitate, plan for, and optimize the management of large IBM and compatible computer systems.

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◆

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The ideal candidate possesses a minimum of three years sales experience, preferably in systems software, with proven ability and a record of successes. A college degree is preferred.

The position has a six-figure earning potential as well as excellent growth and management prospects.

SYSTEMS ENGINEERS

The ideal candidate possesses a minimum of five years experience in large IBM mainframe, MVS/VM software. Superior "people" skills are a necessity.

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Boole & Babbage offers an outstanding benefits package. If you are committed to MVS and IMS systems, we would like to hear from you.

For either position, resumes should be sent to Personnel Director, c/o Boole & Babbage, Inc., 2185 Butterfield Road, Suite 102, Oakbrook, IL 60521.

Boole & Babbage

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Tools : Education : Experience

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For prompt consideration forward your resume with salary history to: **Lis Fjelstad, TECHNICON DATA SYSTEMS CORPORATION, 5885 Glenridge Drive, Atlanta, Georgia 30328.** We are an equal opportunity employer m/f/h/v. Principals only, please.

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Technicon Data Systems Corp.

Rapid growth of major international consulting firm has created Senior Consultant and Consultant positions with our Chicago-based practice.

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- 3-5 years structured COBOL background
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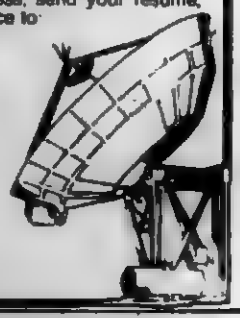

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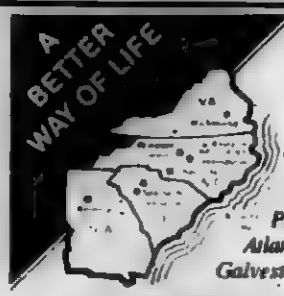

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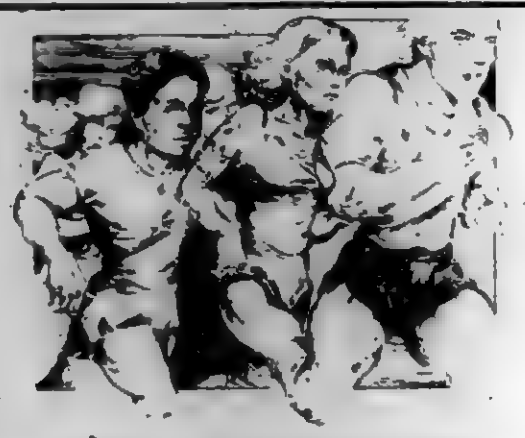

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Your three years experience as a MVS Systems Programmer coupled with at least one year in support of Minicomputer Systems are key qualifications for this positions; BSCS preferred. An understanding of Multi-vendors in support of your activities is essential.

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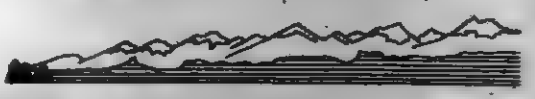

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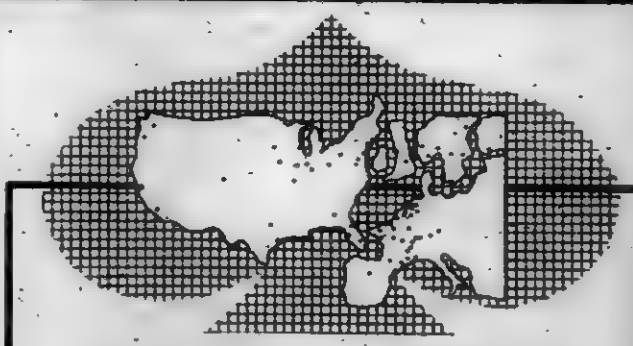

PULLING IT ALL TOGETHER

DASD CORPORATION, a member of the Cap Gemini Sogeti group, is an internationally established data processing consulting firm and a leader in the consulting services industry. We specialize in SOFTWARE DEVELOPMENT, CONVERSIONS and PROGRAMMING SUPPORT and we're pulling it all together in terms of FLORIDA career opportunities and real challenge for qualified professionals.

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Assembler	IMS DB/DC	FOCUS
DIBOL	CICS(Command or Macro)	

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PARS/ACP Programmer Analysts

Position requires one or more years programming experience in a PARS/ACP environment, a good working knowledge of assembler language and airline control/PARS concepts. A working knowledge of SABRETALK is desired. Responsibilities include problem analysis, program specifications, coding and testing of SABRE application software supporting marketing and flight systems.

Degree preferred. Openings exist in Tulsa and Dallas.

IMS Programmer Analysts

Position requires one or more years of IMS applications development experience using structural methodologies preferably Yourdon. Responsibilities include problem analysis, development of program specifications, coding, testing, and documentation preparation. A good working knowledge of IMS, PLI and JCL required.

Degree preferred. Openings exist in Tulsa and Dallas.

Data Base Analysts/Support

Position requires three years program and design experience and minimum of one year DBA physical/logical design experience. A degree is preferred as well as experience in TSO/SPF and IMS utilities.

Openings in Tulsa.

ACP/TPF Systems Programmers

Position requires three or more years experience in ACP/TPF operating systems internals and indepth knowledge of assembler language, VM/CMS required. Responsibilities involve development of state of the art ACP/TPF enhancements, Applications Development tools, and Data Base Support utilities. Provides support to a multi-processor, ACP environment.

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VM Performance Analyst/Capacity Planning

Position requires two years experience in VM software or VM performance management, and working knowledge of VM/370 system software. Good written and oral communication skills, and a degree are desired. Responsibilities involve the analyzing, monitoring and establishing the workload guidelines for VM processor complex.

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Openings exist in two areas. The respective qualifications are:

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The selected individual will conduct market research and analysis relative to the personal computer marketplace. Major responsibilities include assisting and generating the publication of new product proposals, business proposals, and marketing plans. Other duties include assisting in product test marketing, seminars, and demonstrations, as well as the development and maintenance of long range strategic planning.

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You should have broad experience in installation support and/or technical evaluations of mid to high range DBMS products, inquiry languages, report writers and related user productivity tools Familiarity with Datapoint hardware and software products and product planning and/or program management experience is desirable. Good presentation skills essential

Both positions require a degree in Computer Science or Business (or equivalent experience) and at least 6 years experience in marketing development/support in the computer industry DATAPOINT offers an excellent salary and complete benefits For immediate consideration, please send your resume with salary history to Nancy Ragle, Datapoint Corporation, 9725 Datapoint Dr MS G-05-301, San Antonio, Texas 78284 We are an equal opportunity employer m/f/h

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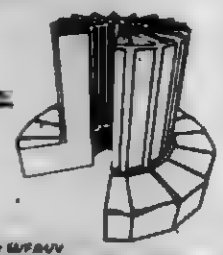

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Working in our IBM 3033/MVS operation, your responsibilities will include design and implementation of COPICS related tasks, systems studies and draft specifications, testing and documenting systems and user training. The selected candidate will be an excellent communicator with 2 years experience in Manufacturing Systems Implementation or systems analysis, COBOL and IMS-DL1. Degree preferred.

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A minimum of 2 years of experience in COBOL/Assembler, CICS, IMS-DL1 data base programming, COPICS package and CICS debugging experience a plus. Responsible for programming and/or package maintenance, designing and preparing test procedures, specifications and time estimates. Excellent communications skills are essential. We are a package shop dealing with IBM COPICS products.

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Ulster reserves the right to extend this deadline. Ulster County Community College is an EO/Affirmative Action Employer.

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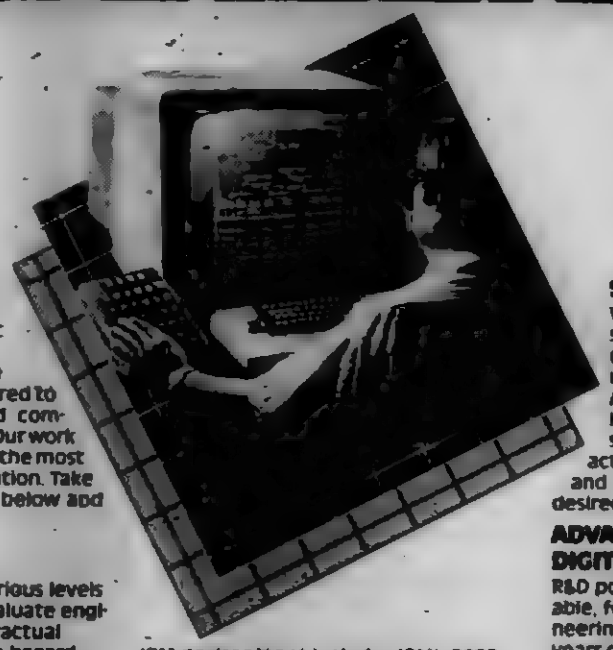

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In this position, you will design and develop programming systems for processing management and central data on IBM 3033, 3081 and 3084 systems. In addition, you will analyze customer and project systems requirements and negotiate new or revised programming systems for effective computer processing. You should have a proven track record of progression through Business Systems, Applications Programming, Data Base Design and Analysis, or Data Processing Systems Analysis. Our current IBM environment includes IBM's 3033, 3081 and 3084 mainframes with IBM's MVS/SP and IBM's VM/SP. Programmer productivity aids include CMS and TSO/SPF. The Business programming language is COBOL. A BS in Computer Science, or Math and six to eight years of experience is desired.

SOFTWARE ENGINEERS

We have openings in all aspects for skilled people with a minimum of a BS and 3 or more years experience in scientific data systems.

DATA COMMUNICATIONS NETWORK SYSTEMS SPECIALISTS

Specialists are needed to perform network design, planning, coordination, installation and troubleshooting system with knowledge of network configuration, circuit testing, modem strapping. A BS CS/EE & 6-8 years of experience desired.

SYSTEM PROGRAMMERS

We are currently seeking professionals with expertise in either operating systems programming using EXEC 1100 internals or IBM Assembler experience with IBM IMS, OS/MVS internals to software systems design and development activities. A BS in Computer Science and 4 or more years experience desired.

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University Center at Binghamton
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DIRECTOR OF THE COMPUTER CENTER

The Director is a senior administrative officer with responsibility for computer services for SUNY-Binghamton and a network of other SUNY institutions. Computer services include instructional support, research applications, administrative data processing, a campus-wide word processing network and a regional teleprocessing network.

SUNY-Binghamton is centrally located in one of the highest concentrations of high-technology industries in the nation, including IBM, Bendix, General Electric, Singer-Link, Stavin and Universal Instruments. SUNY-Binghamton enrolls over 11,750 students and is one of the four doctoral-granting University Centers of the 64-campus State University of New York. Its academic programs are organized into the School of Arts and Sciences (Harpur College), the Thomas J. Watson School of Engineering, Applied Science, and Technology, the Schools of Management, Nursing, General Studies and Professional Education, a Department of Physical Education and Athletics, and the Graduate School. The University also supports seven specialized research centers and (in cooperation with the Upstate Medical Center) a Clinical Campus. Research and teaching are supported by Libraries holding over 1,000,000 volumes and extensive microforms and journals collections.

The main computer facility consists of a NAS Advanced System 6 with processor assist and 6 million bytes of main storage. The system currently supports 360 on-line interactive terminals and 14 remote job entry locations. In addition, the campus has recently purchased a DEC VAX 11/780 with 8 million bytes of memory storage for academic computing purposes. The institution is also installing a campus-wide word processing network utilizing DECmate II work stations and a VAX 11/780.

The Director must have demonstrated managerial capability, planning and budgeting expertise, a thorough knowledge of hardware and software applications, and a strong commitment to user service. Experience in a complex, highly integrated computing environment is essential. Effective writing skills and the ability to explain technical issues to non-technical audiences are essential. A PhD degree in an appropriate field is highly desirable. Salary is highly competitive with an exceptionally attractive benefit package.

The Search Committee will begin formal screening on October 31, 1983 and will continue until a suitable candidate is found. Applications and nominations should be sent to Mr. Dean S. Hoo, Chair, Search Committee for Computer Center Director, SUNY-Binghamton, Binghamton, New York 13901. Applications should consist of a Letter of Interest, Resume, and at least three Letters of Recommendation. References should send Letters of Recommendation directly to the Chair.

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Software Techniques Inc., an international consulting firm which specializes in the analysis, design, and development of business automation systems, has immediate openings for DATA COMMUNICATIONS SPECIALISTS and PROGRAMMERS/ANALYSTS with experience in RSTS/E or VMS. Send resume and salary requirements to:

Richard G. Lowe
Software Techniques, Inc.
5242 Katella Avenue
Los Alamitos, CA 90720

McNEESE STATE UNIVERSITY
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Applications are invited for tenure-track faculty positions in Computer Science to begin in January or August, 1984. A Ph.D. in Computer Science (any area) is preferred. A M.S. with potential for Ph.D. will be considered. Responsibilities include developing curriculums, teaching at the graduate and undergraduate levels, as well as conducting research. Salary and rank are negotiable. Send letter of application, resume, complete transcripts and three letters of reference to Dr. George Wood, Head, Department of Mathematical Sciences, McNeese State University, Lake Charles, LA 70609. Phone: (318) 477-2520, 3428.

SYSTEMS ANALYST-Design, anal., impl. computer systems. Maint./Enhance systems & provide vital skills to ensure successful & cost effectv. operation. 3 yrs exp. or 3 yrs in programming. Bach. in ComSci., Math. or Physics. Knowl. of COBOL, CICS, PL/1, & IMS DB/DC. $33,000 p.a. 40 hrs/5 days/wk. **SEND RESUMES** to MJ, 8428 Adams Dr., Gutenberg, NJ 07093.

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Computer Industry

Independent weekly newsletter located in Washington, D.C. area seeks top-notch information industry journalist to direct editorial output. Successful candidate will have minimum 3-5 years experience covering data processing/data communications industry in-depth knowledge of industry leaders, especially IBM, a must. Will manage staff of 2-3 reporters. Salary negotiable depending on experience. EOE-M/F. Send resume, clips, cover letter, and salary requirements to:

CW-84321
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These positions will be in distributed database systems, distributed operating systems, graphics and image and voice information processing. Requirements include an MS or PhD in Computer Science or equivalent experience.

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COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
375 Cochituate Road, Box 880, Framingham, MA 01701/(617) 879-0700

We are looking for more of the finest, most dedicated computer professionals we can find; those who are prepared to help us meet the challenge of our promising future. As a "state-of-the-art" data processing service firm we are involved in the telecommunications, data base technology, conversions, software design and auditing for diversified clients coast to coast. Our Dallas office currently has the following positions:

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Data Processing

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Must have minimum of 3 years' Assembler programming experience. Requires good background in VM/370 architecture and internals, CMS structure and diagnostic interface experience.

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You will assist with design review, design coordination and product planning. Other responsibilities include current/future product research and consulting to the Marketing Department.

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Will manage effort to build test cases and stress test all Candle software products prior to shipment. Also responsible for ensuring user friendliness of Candle products, good documentation and ease of installation. Systems programming background as well as quality assurance experience in large scale environments [redacted].

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Computer Engineering Consortium
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(602) 994-3775
2370 N. Hayden Rd. #159-613
Scottsdale, AZ 85251

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a company of The Dun & Bradstreet Corporation

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Tricia Vengarajan
DunsNet, Inc.
Personnel Administrator
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Please send confidential resume to: Professional Recruiting Manager, IBM Corporation, Systems Products Division, Dept. 924P, 3605 Highway 52 No., Rochester, MN 55901.

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AMERICAN EXPRESS

Programmer/Analyst

The Modesto Bee has an opening in its computer department for a Programmer/Analyst. Two years applications programming experience required as well as fluency in COBOL and BASIC languages. Experience on DEC equipment with RSTS operating systems and knowledge of FORTRAN desirable. Competitive salary and excellent company benefits. Applications and resumes accepted through Wednesday, December 14 until 4:30 p.m.

The Modesto Bee
Personnel Department
1325 H Street
P.O. Box 3929
Modesto, CA 95352
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5334 West 95th Street
Chicago, Illinois 60638

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Vice President, Employee Relations
Bear Creek Corporation
2518 South Pacific Highway
Medford, Oregon 97501

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- A minimum of 4 years COBOL programming experience in an IBM OS/MVS environment along with one and/or the other: at least 2 years IMS Data Base (DB and/or DC) OR 2 years ALC applications programming experience.
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Blue Cross of California

Equal Opportunity Employer

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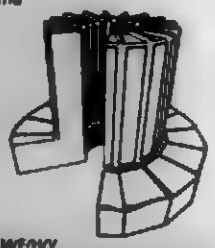

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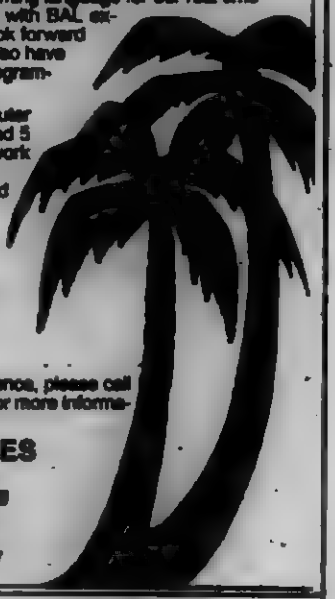

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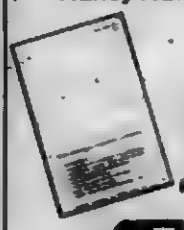

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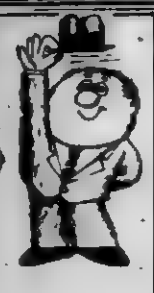

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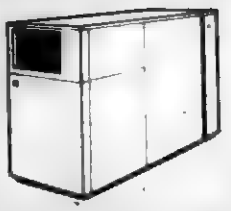

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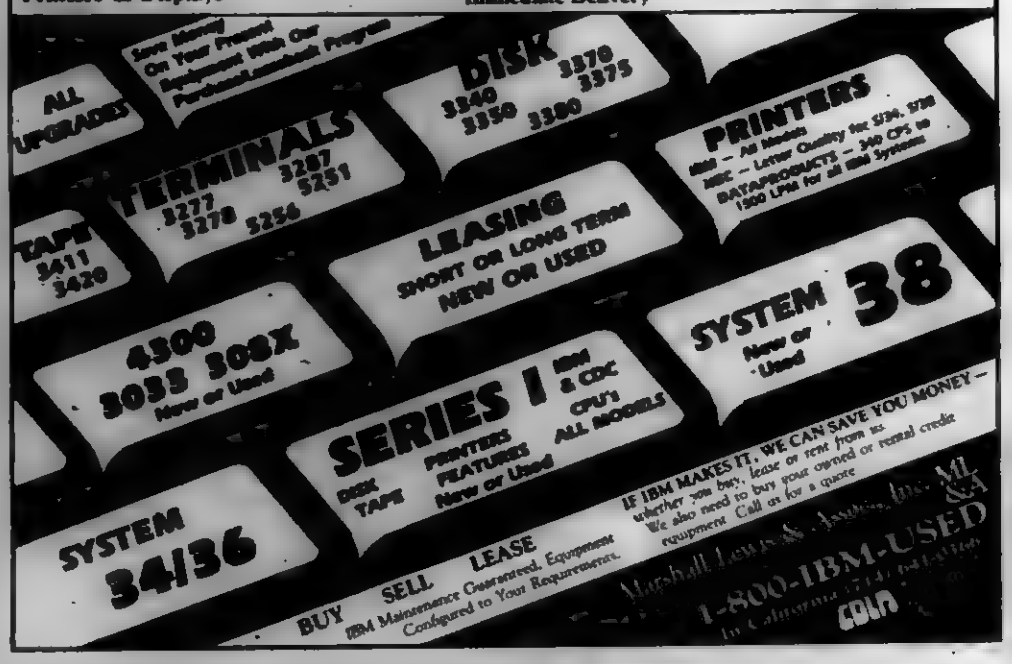

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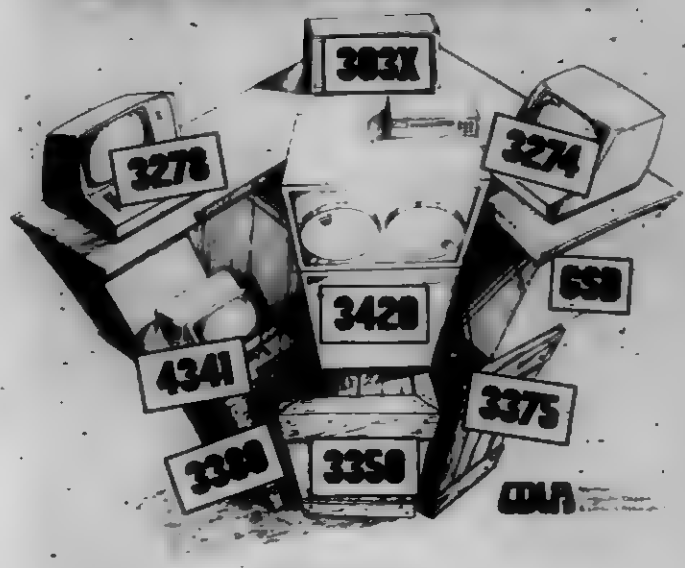

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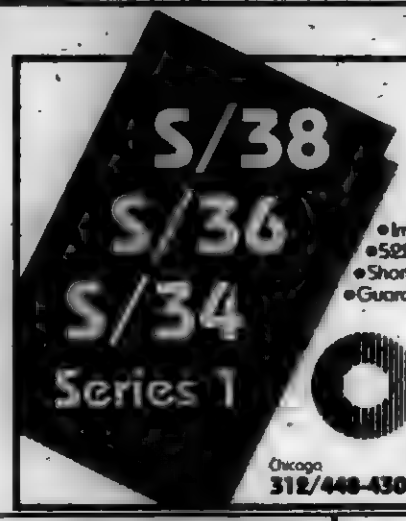

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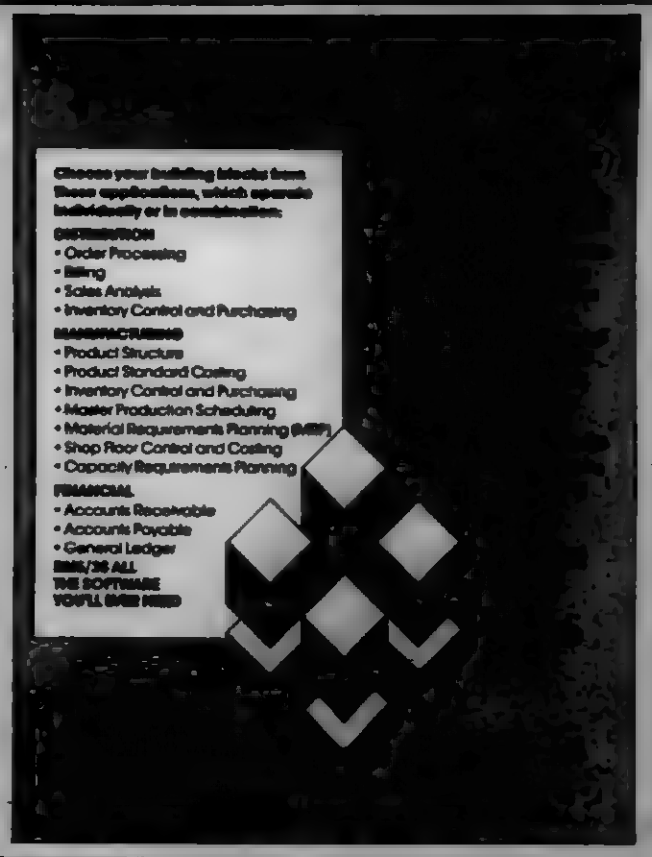

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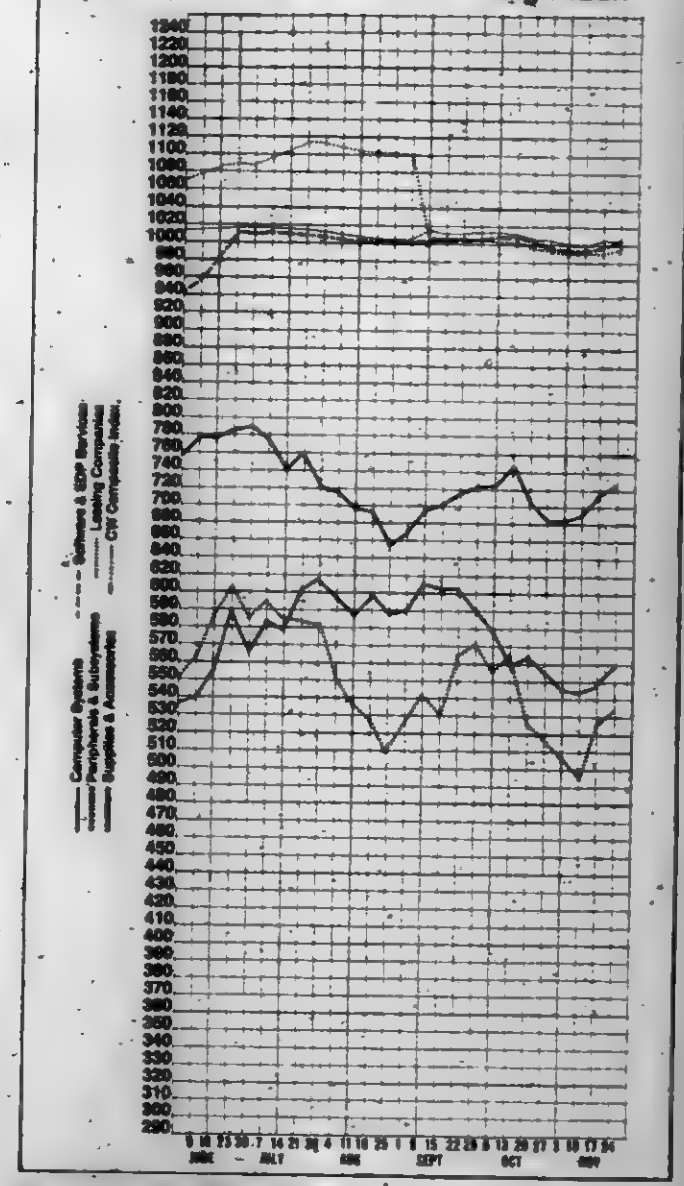

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		1982-83 RANGE	CLOSE NOV 22 1983	WEEK NET CHANGE	WEEK PCT CHANGE
COMPUTER SYSTEMS					
O	ALPHA MICROSYSTEMS	11- 24	16	- 3/4	-3.6
O	ALTOS COMPUTER SYST	4- 38	8 1/8	+ 1/8	+1.4
A	AMDAHL CORP	9- 30	18 5/8	- 1/8	-0.8
O	APPLE COMPUTER INC	18- 63	21 1/2	+1 1/2	+7.5
N	AT&T	80- 79	69 1/2	+1 3/8	+2.1
N	BURROUGHS CORP	29- 92	40 3/4	+ 3/8	+1.2
O	COMPUTER AUTOMATION	8- 17	8 1/2	- 1/8	-3.7
A	COMPUTER CONSOLES	8- 26	26 3/8	+1	+3.9
A	CONTROL DATA CORP	21- 62	44 1/8	-1 3/4	-3.8
O	CONVERGENT TECHNOL	18- 41	24	+ 3/8	+2.6
N	CRAY RESEARCH INC	20- 58	36 1/4	+2 3/8	+6.8
N	DATA GENERAL CORP	10- 41	37 1/4	+ 7/8	+2.4
N	DATAPOINT CORP	12- 38	27 1/8	- 3/4	-2.6
N	DIGITAL EQUIPMENT	62-132	72 7/8	+3 3/8	+9.2
A	EECO INC	6- 15	14	- 1/8	-0.8
A	ELECTRONIC ASSOC.	5- 15	5 3/4	0	0.0
N	FLOATING POINT SYST	18- 44	32 1/2	- 1/4	-0.7
N	FOXBORO	22- 47	35 3/8	+1 3/8	+4.0
O	GENERAL AUTOMATION	3- 18	11 1/8	- 3/8	-3.2
N	GOULD INC	20- 44	33 3/8	+1 7/8	+6.1
N	HARRIS CORP	25- 91	38 7/8	+ 3/8	+2.3
N	HEWLETT-PACKARD CO	22- 69	64 3/4	+1 1/8	+2.0
N	HONEYWELL INC	60-134	134 1/4	+4 1/8	+3.1
A	IDR	57-134	123	-1 3/4	-1.4
O	IPL SYSTEMS INC	3- 14	8 1/2	+ 3/4	+13.0
N	M/A-COM INC	21- 39	33 1/8	-1 3/4	-7.0
O	MAGNUSON COMP SYSTS	2- 9	3 3/8	0	0.0
O	MANAGEMENT ASSIST	7- 18	17 1/2	+ 1/8	+0.7
N	MATSUSHITA ELEC(ADR)	47- 77	75 3/4	+1 1/8	+1.5
O	MODULAR COMPUTER SYS	6- 15	7 7/8	- 1/8	-1.5
N	MOHAWK DATA SCI	10- 18	13 3/4	0	0.0
N	MOTOROLA INC	90-148	130 3/4	-1 1/8	-0.7
N	NAT'L SEMICONDUCTOR	22- 80	51 1/2	- 1/4	-0.4
N	NCR	38-130	130 1/2	+2 3/4	+2.0
A	PERKIN-ELMER	17- 37	28 7/8	+2	+7.1
N	PRIME COMPUTER INC	11- 30	18 3/8	+1 3/8	+11.8
O	SPERRY CORP	31- 67	44	- 1/2	-1.1
N	TANDEM COMPUTERS INC	14- 40	37 3/4	+3 5/8	+10.6
N	TANDY CORP	34- 80	37 3/8	- 7/8	-2.2
O	TELEVIDEO SYSTEMS	14- 41	26	+2 3/8	+10.1
N	TEXAS INSTRUMENTS	71-178	133 1/4	-3 3/4	-2.7
O	VECTOR GRAPHICS INC	2- 14	2 3/8	0	0.0
A	WANG LABS "B"	12- 42	34	0	0.0
A	WANG LABS "C"	11- 42	34 3/8	- 1/8	-0.3
A	WESCO+CORP	35- 90	47 3/8	+1 1/8	+2.4
LEASING COMPANIES					
O	BOOTHE FINANCIAL CP	11- 28	28 1/4	+2 3/4	+8.3
N	COMPUTCO INC	7- 42	18 3/8	+1 5/8	+8.8
N	CONTINENTAL INFO SYS	3- 18	10 1/4	+ 1/2	+5.1
A	DPF INC	3- 19	10 7/8	+ 1/8	+0.8
A	U.S. LEASING	19- 47	33 3/4	+ 3/8	+1.0
COMPONENTS					
O	ADVANCED MICRO DEV	13- 39	30	+1 1/8	+3.9
O	ADV'D SEMICONDUCTOR	12- 39	34 1/2	+ 1/2	+1.4
N	ANALOG DEVICES INC	10- 42	40 7/8	+1 1/2	+3.8
O	ANALOGIC CORP	20- 37	23	- 1/4	-1.0
N	APPLIED MAGNETICS CP	19- 37	31 1/4	- 3/8	-1.8
N	TERADYNE	10- 28	26 3/4	- 1/4	-0.8

EXCH: N=NEW YORK; A=AMERICAN; P=PACIFIC; B=BOSTON; L=INSTITUTIONAL; M=MIDWEST; O=OVER-THE-COUNTER
B-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

		1982-83 RANGE	CLOSE NOV 22 1983	WEEK NET CHANGE	WEEK PCT CHANGE
SOFTWARE & EDP SERVICES					
O	ADVANCED COMP TECH	1- 4	3	0	0.0
A	ADVANCED SYSTEMS INC	8- 22	17 3/4	+ 3/4	+4.4
O	ADS COMPUTERS INC	7- 32	27	+1 1/8	+4.8
B	AMERICAN SOFTWARE	21- 31	31 3/4	- 3/8	-2.3
A	ANACOMP INC	6- 23	9 1/8	+1 1/8	+16.1
O	ANALYSTS INTL CORP	9- 20	13 1/2	-2 1/8	-10.2
A	APPLIED DATA RES.	8- 27	21 1/2	+ 3/4	+3.6
O	ASK COMPUTER SYSTEMS	8- 21	18 3/4	+1 1/4	+7.1
B	ASTRODYNE COMP INS	1- 7	2 3/4	0	0.0
N	AUTOMATIC DATA PROC	21- 44	35	+ 3/8	+1.0
O	CDA COMPUTER ASSOC	9- 17	13 3/4	+ 1/2	+3.7
O	COMPUTER ASSOC INT'L	8- 25	24	-1 1/2	-5.9
O	COMPUTER HORIZONS	8- 30	12 1/8	+ 1/4	+2.0
A	COMPUTER NETWORK	4- 16	8 1/2	+ 1/2	+6.3
A	COMPUTER SCIENCES	11- 23	18	+ 3/4	+4.3
O	COMPUTER TASK GROUP	8- 22	15 1/4	+ 3/4	+5.1
A	COMPUTER USAGE	2- 12	11 1/4	+ 3/4	+7.1
B	COMPUTONE SYSTEMS	5- 20	8 1/8	- 3/8	-4.7
N	COMSERV CORP	5- 20	9 1/8	- 1/8	-1.3
B	COMSHARE	7- 13	10 3/4	- 1/8	+1.1
B	CULLINET SOFTWARE	12- 30	23 3/8	+1 3/8	+6.3
B	CYCARE SYSTEMS INC	8- 17	17 1/2	0	0.0
A	ELECTRONIC DATA SYST	18- 42	38 1/2	- 3/4	-1.9
A	HOSKIN SYSTEM INC	21- 33	30	- 1/4	-0.8
N	GENERAL ELECTRIC CO	49- 70	70	+ 7/8	+1.3
B	GTE CORP	38- 48	46 3/4	+1	+2.1
N	INFORMATICS INC	18- 34	33	+2 3/4	+11.8
O	INFOTRON SYSTEMS COR	22- 43	34 3/4	- 3/4	-2.1
O	KEANE ASSOCIATES	4- 10	7 1/4	0	0.0
A	LOGICON	8- 21	20 3/4	+1 3/4	+9.2
O	MCI COMMUNICATIONS	13- 34	15 1/8	+ 3/4	+5.2
O	MGMT SCI AMER INC	8- 30	22	+1 1/4	+6.7
O	MATHEMATICAL APP GRP	10- 22	16	0	0.0
A	MICOM SYSTEMS INC	23- 50	45 3/4	+1	+2.2
O	MOHAWK-WANG CP	8- 22	16 1/4	- 1/8	-0.7
O	NATIONAL DATA CORP	9- 20	13 3/8	+ 3/4	-3.7
O	ON-LINE SOFTWARE INT	17- 27	18 1/2	- 1/2	-2.6
O	PANSOPHIC SYSTEMS	8- 30	20 3/8	- 3/8	-2.0
A	PLANNING RESEARCH	8- 21	17	+ 3/8	+2.0
O	POLICY MGMT SYSTS CP	15- 38	31 1/4	+ 3/4	+2.0
O	PROGRAMMING & SYS	1- 10	5 3/8	- 1/8	-2.3
O	REYNOLDS & REYNOLD	17- 32	28	+ 1/2	+1.8
O	SEI CORP	11- 34	33 3/4	0	0.0
O	SHARED MEDICAL SYST	15- 43	43	- 1/2	-1.1
O	SCIENTIFIC COMPUTERS	8- 16	10 1/2	+ 1/4	+2.4
O	SOFTWARE AG	9- 17	16 3/8	+ 1/4	+2.6
N	TYMSHARE INC	12- 30	26 1/2	+3 3/8	+14.5
A	UDS CORP	5- 18	13 3/4	+ 1/4	+1.8
A	UNIV CORP	7- 17	11 5/8	+1 1/8	+10.2
PERIPHERALS & SUBSYSTEMS					
P	AM INTERNATIONAL	2- 7	4 5/8	+ 3/8	+8.8
A	ANDERSON JACOBSON	8- 25	8 1/2	+ 1/4	+2.7
O	AUTO-TROL TECHNOLOGY	8- 25	21	+ 1/2	+2.4
O	BANCTEC INC	7- 33	15 3/4	+ 1/4	+1.6
A	DECMATE INT'L	6- 19	7 1/2	+ 1/8	+1.5
A	DELTA DATA SYS	5- 60	48 3/4	+1	+2.0
O	CAMDEX CORP	2- 6	1 3/4	- 1/8	-6.6
P	CENTRONICS DATA COMP	8- 28	18 7/8	-1 1/4	-6.2
A	ISTEC CORP	4- 18	10 1/2	+ 3/8	+3.7
O	COMMITRONICS	2- 20	8 1/2	+ 3/8	+4.8

		1982-83 RANGE	CLOSE NOV 22 1983	WEEK NET CHANGE	WEEK PCT CHANGE
O	COMPUTER DEVICES INC	1- 21	3 1/8	- 1/8	-22.2
O	COMPUTER TRANSCEIVER	4- 12	4 3/8	0	0.0
N	COMPUTERVISION CORP	19- 59	46 1/8	+3 1/4	+7.6
N	COMRAC CORP	17- 38	17 3/8	+1 3/8	+8.7
A	DATAPRODUCTS CORP	16- 41	29 1/8	+ 1/4	+0.8
B	DATARAM CORP	9- 12	10 1/8	+1	+0.8
B	DATA SWITCH CORP	13- 41	32 1/2	+3	+10.1
O	DATUM INC	2- 17	9 1/8	- 3/4	-7.9
O	DECISION DATA COMPUT	3- 15	11 1/2	1/4	-2.1
O	DOCUTEL-OLIVETTI	11- 28	13 3/8	+ 7/8	+7.0
N	ELECTRONIC M & M	5- 11	7 5/8	+ 1/2	+7.0
O	EVANS & SUTHERLAND	18- 30	24 3/4	0	0.0
.O	GANDALF TECHNOLOGIES	8- 22	8 1/8	- 3/8	-4.4
O	GEN'L DATA COMM IND	6- 20	20 1/2	+1	+5.0
O	GREAT SOUTHWEST IND	4- 8	8	0	0.0
N	HAZELTINE CORP	7- 31	23 3/8	+1 1/2	+6.8
A	ICOT CORP	3- 16	8 1/8	- 1/8	+0.7
O	INFORMATION INTL INC	10- 22	13 3/4	- 3/8	-2.6
B	INTEL CORP	17- 49	42 3/8	+1	+2.3
O	IPL SYSTEMS INC	3- 14	8 1/2	+1 3/4	+13.0
A	LUNDY ELECTRONICS	7- 15	12 3/4	+ 3/8	+3.1
O	MEGADATA CORP	9- 19	12 1/2	+1	+8.6
A	MSI DATA CORP	18- 37	28 3/8	3/8	1.3
O	MOSPIUM CORP	7- 28	23 1/2	+1	+4.4
B	NETWORK SYSTEMS CORP	18- 39	33 3/4	+ 1/4	+0.7
B	NO AMERICAN PHILIPS	48- 70	70	+ 7/8	+1.3
A	NORTHERN TELECOM LTD	22- 48	45 1/4	+2	+4.7
O	OKE+	3- 8	3 3/8	0	0.0
B	PARADYNE CORP	14- 30	18 1/8	- 3/8	-2.0
O	PENRIL CORP	7- 18	14 1/8	+ 1/8	+0.9
O	PHOENIX AMERICAN INC	1- 12	12	+ 1/8	+1.0
O	PLESSEY CO (ADR)	26- 41	36	-2 1/2	-7.8
O	PRINTRONIX INC	23- 34	29	- 1/4	-0.8
B	QUOTRON CORP	9- 26	11 3/8	- 1/8	-1.4
A	RAYTHEON CO	42- 68	45 1/4	+ 3/8	+0.8
A	RECOGNITION EQUIP	8- 17	13 1/2	-1 3/8	-10.7
A	ROLM CORP	46- 84	58 1/2	3/8	-1.0
B	SANDERS ASSOCIATES	32-126	33 3/8	1 3/8	2.8
B	SCAN DATA	1- 3	3 1/8	0	0.0
O	SCAN-TRON CORP	13- 18	14 3/4	+1	+7.7
N	SCIENTIFIC ATLANTA	15- 29	18 7/8	+1 1/2	+8.6
N	STORAGE TECHNOLOGY	19- 33	19 3/8	+ 3/8	+2.1
O	SYKES DATATRONICS	3- 11	6 7/8	0	0.0
O	SYSTEMS & COMP TECH	30- 30	28 1/2	+1 1/8	+4.0
A	T BAR INC	7- 17	16 3/8	+1 1/8	+7.4
A	TAB PRODUCTS CO	8- 30	25 1/8	+1 1/8	+13.6
O	TANDON CORP	19- 35	32 3/8	+1 3/8	+4.7
A	TEC INC	8- 13	9 3/8	- 1/8	-1.0
N	TEKTRONIX INC	34- 67	60 1/8	3/8	-0.6
N	TELEX	9- 32	24 7/8	0	0.0
O	TESDATA SYSTEMS CP	3- 17	10 3/4	- 1/8	-1.1
A	TIMEPLEX INC	7- 29	25 1/8	+2 1/8	+9.2
O	VISUAL TECHNOLOGY	8- 26	10 3/4	+1	+9.6
SUPPLIES & ACCESSORIES					
N	AMERICAN BUS PROD	11- 30	28 7/8	- 1/8	-0.4
N	BARRY WRIGHT	13- 33	31 3/4	+1 1/8	+3.7
A	DUPLEX PRODUCTS INC	17- 36	29 3/8	- 1/8	+1.0
N	ENNIS BUS. FORMS	8- 20	20 1/8	+1 3/8	+6.9
N	3M COMPANY	49- 90	87 3/4	+2 3/8	+2.7
A	MOORE CORP LTD	26- 51	49	+ 1/2	+1.0
O	STANDARD REGISTER	11- 34	31 3/4	+1	+3.2
O	WALLACE BUS FORMS	11- 33	32 1/2	+1 7/8	+6.1

15 pointed questions to ask MSA or any software supplier

These questions will help you when you sit down with individual software companies.

They're tough questions. Relevant ones. And any supplier who is worth his salt should be able to answer them without backpedaling.

Ask MSA

We'll answer all these questions to your satisfaction—plus any others you may have.

In fact, we're probably the best equipped to answer them. Because MSA is the software company. We offer the most complete line of totally integrated systems in the software industry, including financial, human resource and manufacturing.

So you avoid the headache of trying to tie together individual systems. (And the even bigger headache of adding to them.)

With MSA's integrated systems, there's no unnecessary duplication of data or effort. Reporting is faster. All your company's information is more timely and accurate—and in the right form.

Our technical edge comes from experience

Staying ahead is easier for a company that's steeped in software technology. MSA has spent years developing, refining, testing and enhancing our systems.

This year alone, we'll invest $25 million to make sure all our systems are technologically razor sharp. That gives us a decided advantage over flash-in-the-pan technology that may not have the bug-free logic of a more experienced system.

It also gives you a decided advantage over "custom" systems you have to update yourself.

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Maintenance includes keeping your system up-to-date technologically. Enhancing it with new features that make it work even harder for you.

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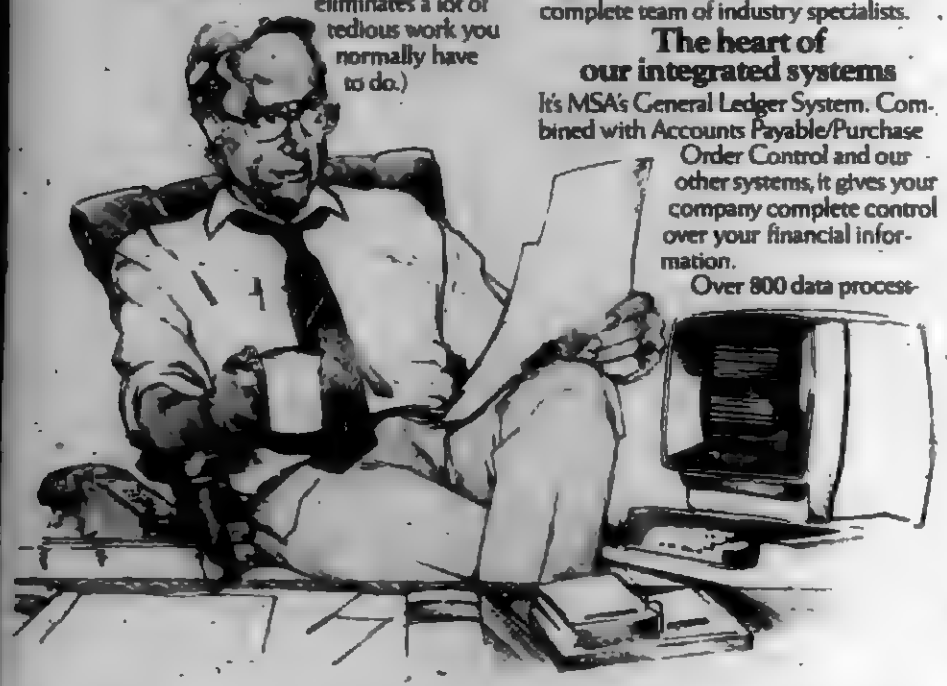

Save this box. It can help you make an intelligent software decision.

1. Can you offer us a complete range of software systems designed to work together?
Or will we have to piece together a patchwork of systems?

2. Are your systems just record keepers, or can they really help us make decisions?
Can we pull together information from any of our integrated systems? In exactly the form we want it?

3. Can you provide business software for both mainframe and microcomputers?
Do you develop this software yourself or do you simply market it for another company?

4. Are your systems truly online so all of our information is current?
How many of your systems are online? How secure are they?

5. Will my company have to be the one that discovers the bugs in your brand new system?
Just how long have your systems actually been used, and how have they been tested?

6. Will you update your systems as technology advances and regulations change?
What are some of your most recent updates? Will you keep us current on regulatory changes?

7. Do your systems really do everything you say they will?
Or will we have to change them or add to them to get the features we want?

8. How long have you been in business?
What are your revenues? What is your growth record? Where will your company be five years from now?

9. How many systems has your company installed?
How many of these were installed in the past six months? How many of your earlier customers are still using —and liking—your systems?

10. Do your financial systems handle unlimited foreign currencies?
Do your financial systems use a common set of currency exchange rates?

11. Can you link our executives' computers directly to the mainframe—so they can get their own information?
Is that software available right now?

12. How will you make sure our own people thoroughly understand your system?
Do you have educational centers near us, or will we have to travel all the way across the country to find one? Will you be there to help during installation and after?

13. How many of your people specialize in software for my industry?
How many accountants work for you? Human resource specialists? Manufacturing experts?

14. Do your systems have built-in features that make them easier to use?
What happens if someone needs help figuring out a feature? Do you have online documentation that's easy to understand?

15. As my business changes will your system be flexible enough to change with it?
Or will we have to pay a lot to revamp it? Or even regenerate it?

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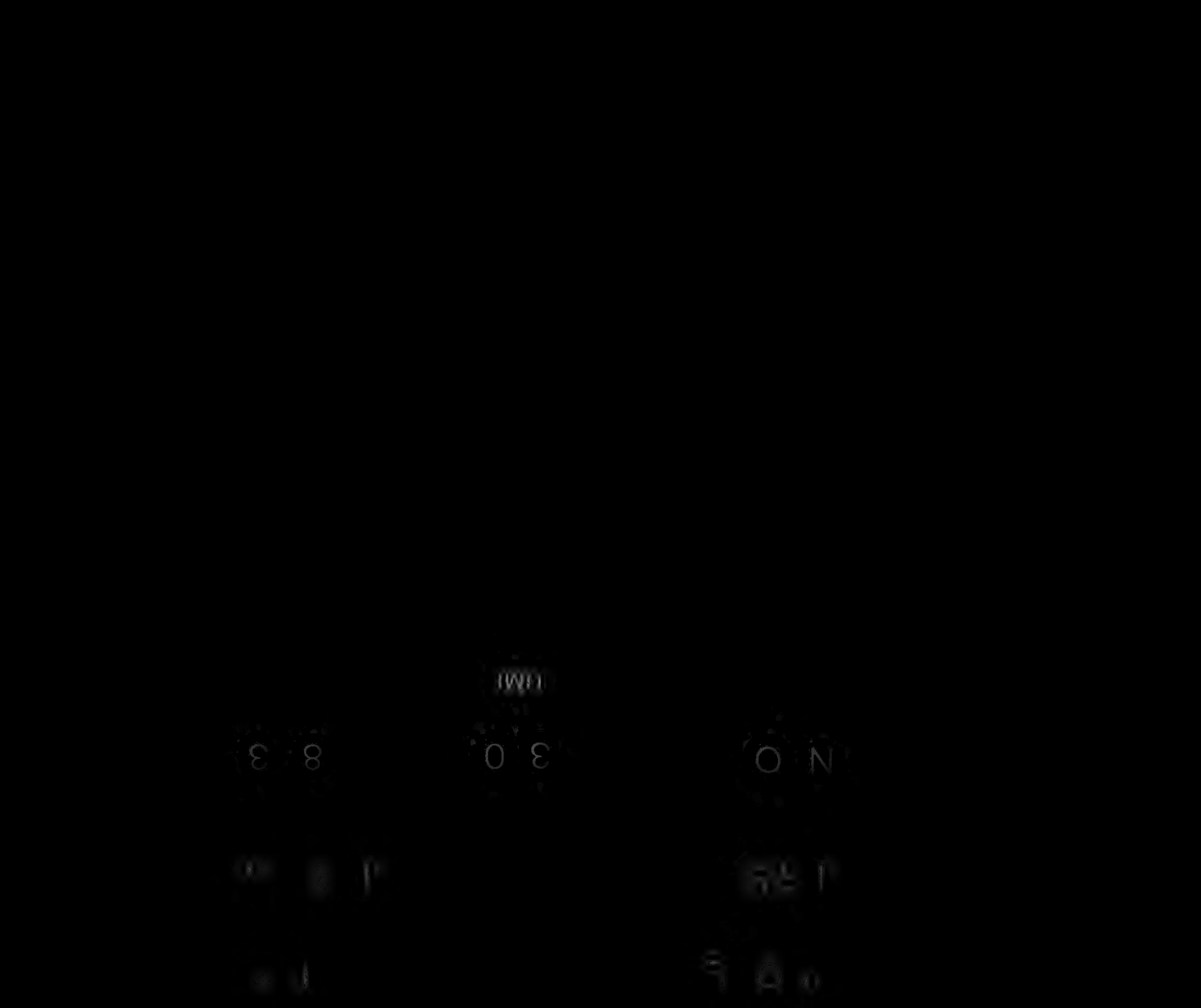

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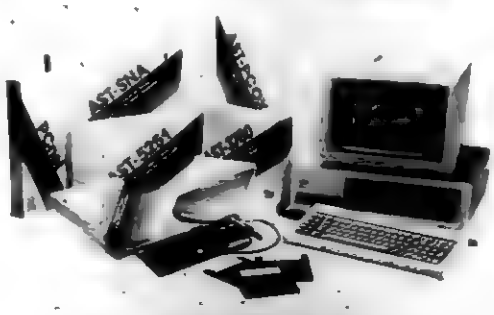

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E·X·T·R·A·!

Just as the mighty evergreens that crown the forest floor have grown from tiny seeds, the Micro Mission has metamorphosed from an embryonic concept into a concrete reality.

This issue of *Computerworld Extra!* is dedicated to marking the boundaries of microcomputer use in corporate data processing.

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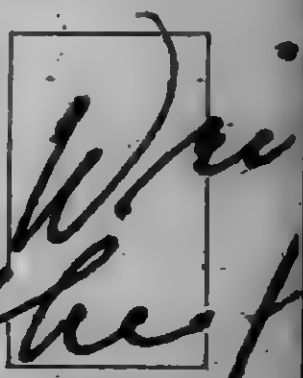

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Second-class postage paid at Framingham, Mass., and additional mailing offices PN127428. *Computerworld* **(ISSN-0010-4841) is published weekly, except: March (7 issues), June (5 issues), September (6 issues), November (5 issues), December (5 issues) and a single combined issue for the last week in December and the first week in January by CW Communications/Inc., Box 880, 375 Cochituate Road, Framingham, Mass. 01701.**

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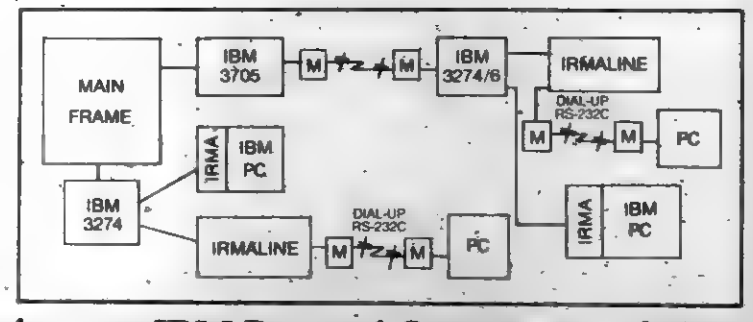

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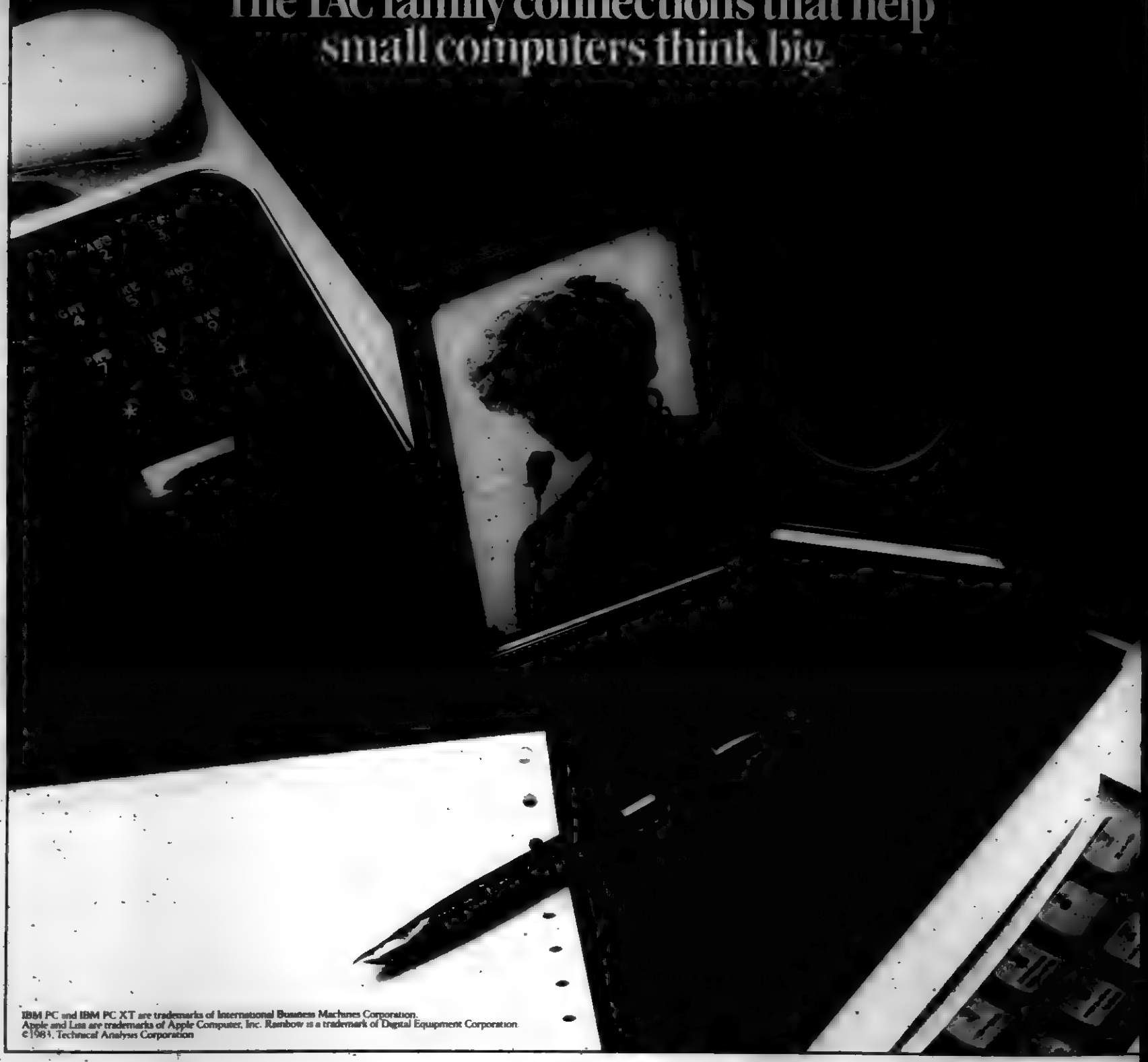

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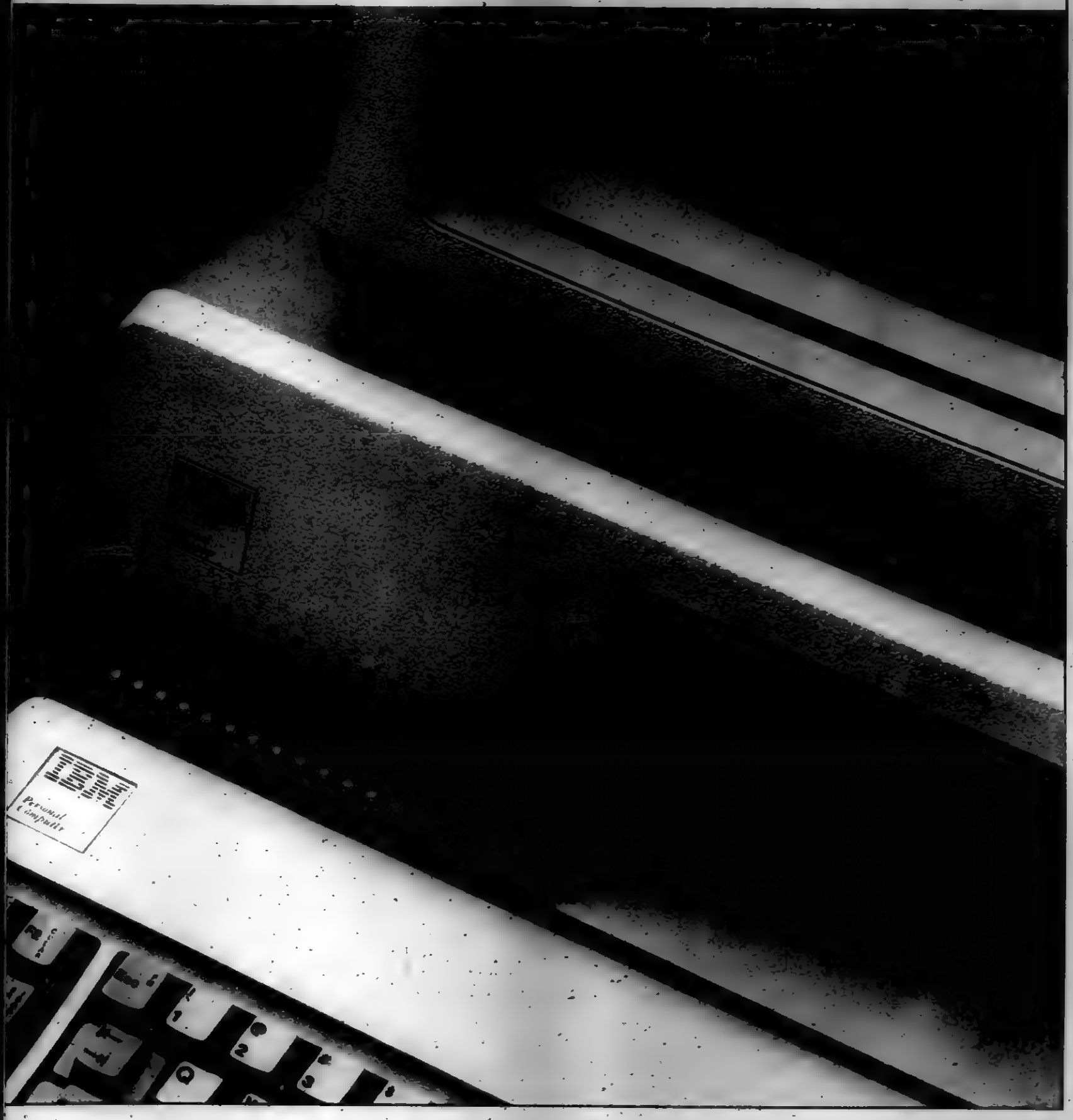

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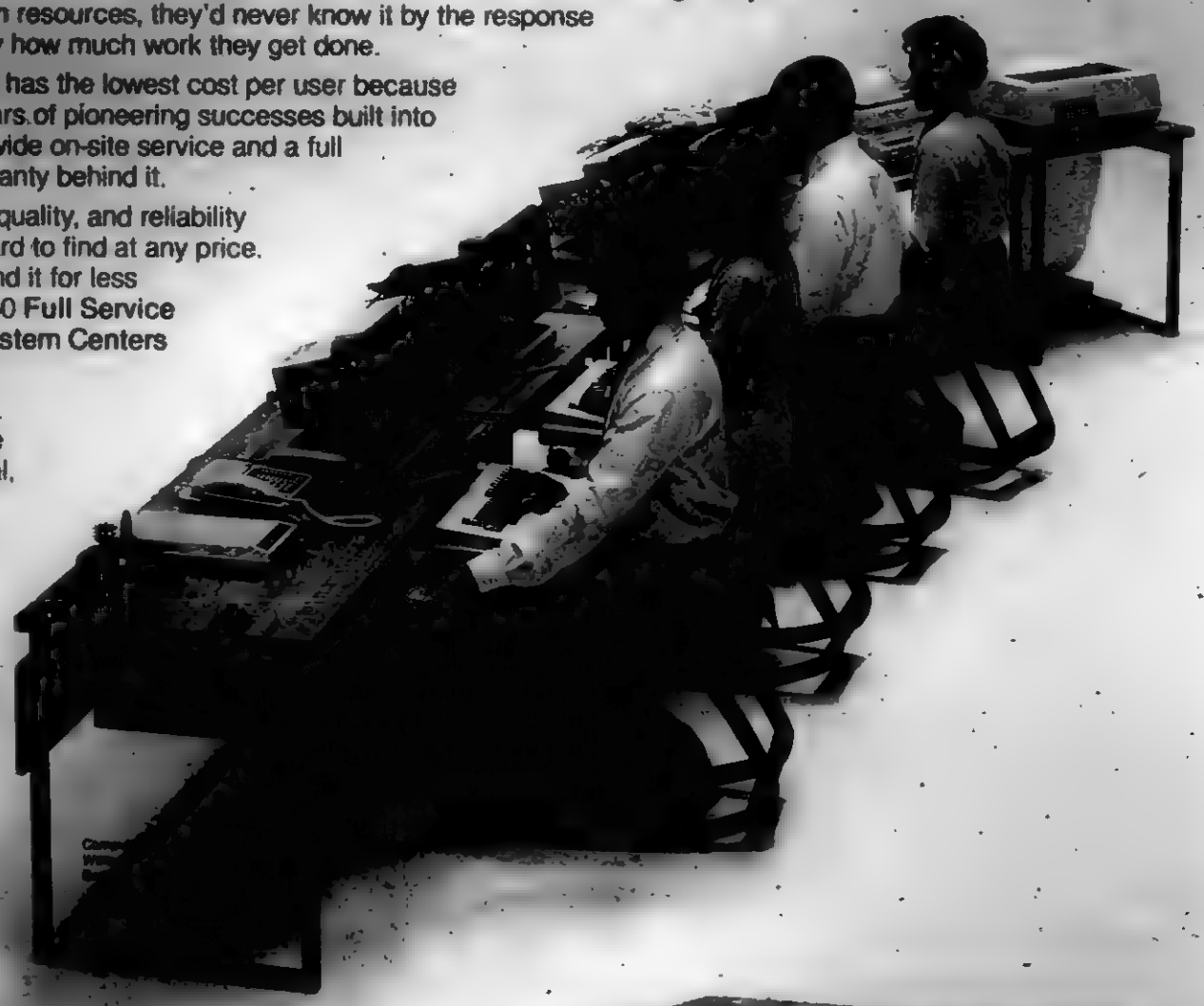

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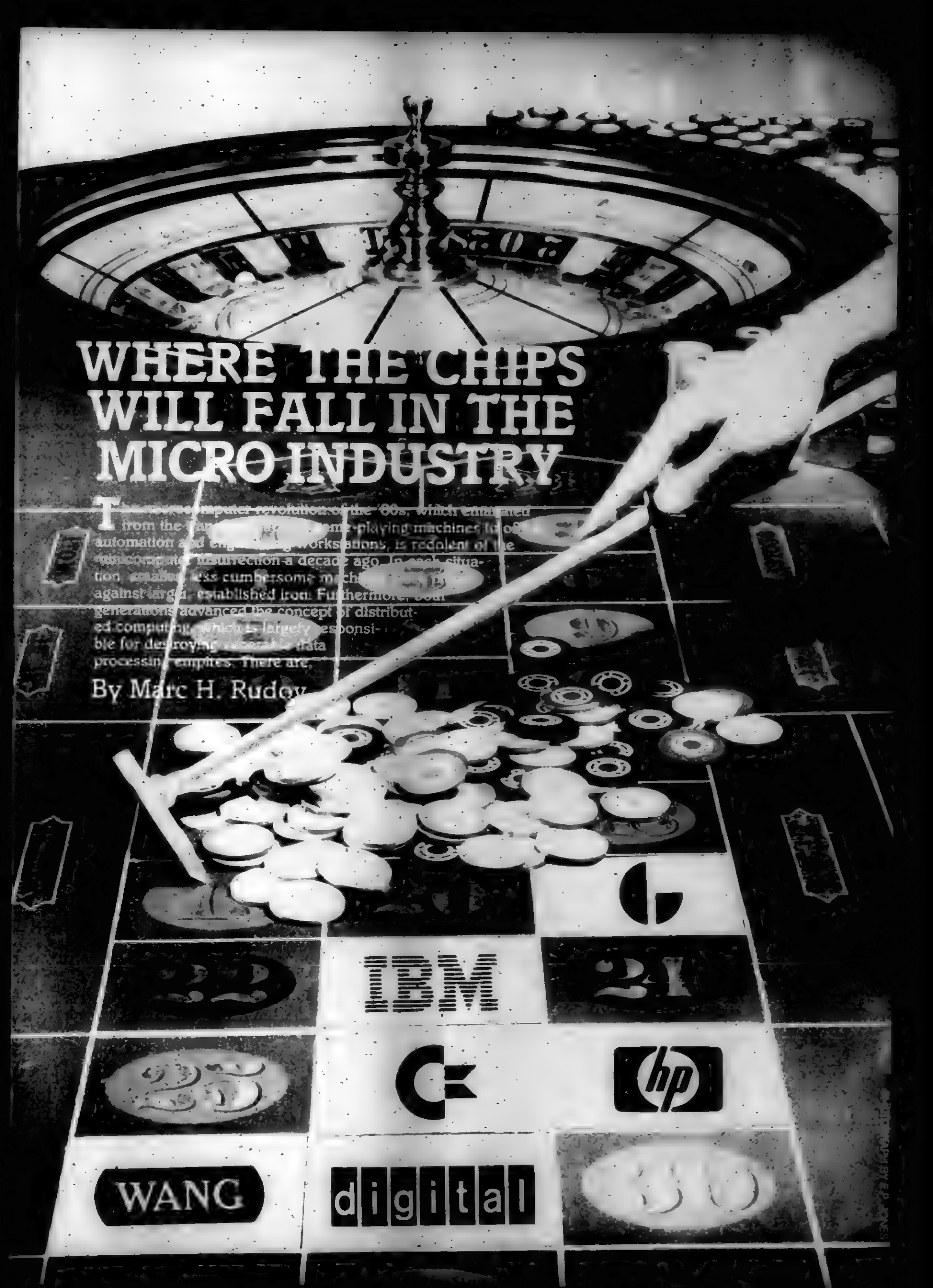
WHERE THE CHIPS WILL FALL IN THE MICRO INDUSTRY

The [illegible] computer revolution of the '60s, which emanated from the [illegible] game-playing machines to office automation and engineering workstations, is redolent of the [illegible] insurrection a decade ago. In each situation, smaller, less cumbersome machines [illegible] against large, established foes. Furthermore, both generations advanced the concept of distributed computing, which is largely responsible for destroying [illegible] data processing empires. There are

By Marc H. Rudov



MICRO MISSION

however, some notable differences.

When minicomputers entered the scene in the late '60s and early '70s, they were mostly sold to high-tech implementers without any vendor-provided programming assistance. Notwithstanding, the opportunity to touch and control a computer was a radical departure from the restrictions engineers were used to in a mainframe environment. They relished doing their own programming, system generations and system diagnostics on the new minicomputers.

As time progressed, minicomputer vendors began pushing their wares into the commercial environment. These vendors quickly discovered that business-oriented customers did not have the same fervor for programming as their engineering counterparts. Because the minicomputer vendors had no applications software to offer, their computers had to be sold through OEMs and system integrators, who custom-tailored applications programs for each end user.

Since the majority of OEMs were very poor marketers, their businesses often faltered and died, leaving many end users with no software support. Subsequently, the end users turned to the computer manufacturers for help. The manufacturers typically refused all responsibility.

With the lead of Apple Computer, Inc., microcomputers appeared on the market in the late '70s. Initially, these machines were purchased by hobbyists and affluent gadget collectors. By the time the '80s arrived, however, declining hardware prices, de facto operating systems standards and a plethora of off-the-shelf microcomputer applications software prompted many businesses to delay minicomputer purchases and seriously consider buying micros. Many of these small desktop systems were even more powerful than the minicomputers they replaced.

How could this happen again? Why were minicomputer manufacturers blind to this revolution, just as mainframe vendors once refused to believe their customers would defect and purchase minis? Perhaps the answer lies in the management of typical computer companies.

Most mainframe and minicomputer manufacturers have been founded and managed by engineers, who found it more natural catering to technically oriented data processing managers. This was reflected in the products these manufacturers produced, the people they hired and the marketing strategies they developed. Despite the constant clamoring among large computer users for vendor-supplied applications software, the cries for solutions fell on deaf ears.

On the other hand, although many microcomputer companies were also founded by engineers, they developed products with the less technical end user in mind. This strategy required their organizations to be staffed with professionals possessing consumer backgrounds — a novel and somewhat resistable concept in most technical circles.

Once the microcomputer revolution was seen to be genuine, producing shipments of 271,000 units worth $864.7 million in 1980, the astonished mainframe and mini vendors scampered to develop market share

The old aphorism, "Fool me once, shame on you; fool me twice, shame on me," is being expressed indirectly through new competitive measures taken by these and other vendors. Again, nobody wants to miss obvious market opportunities.

pirating strategies. IBM, Wang Laboratories, Inc., Data General Corp., Digital Equipment Corp. and Hewlett-Packard Co. now offer microcomputers to complement their respective product lines and sell as independent products. The old aphorism, "Fool me once, shame on you; fool me twice, shame on me," is being expressed indirectly through new competitive measures taken by these and other vendors. Again, nobody wants to miss obvious market opportunities.

It might be too premature to claim that minicomputer vendors are now market-driven, but they are making progress toward that end. In fact, they are becoming so attuned to user needs that one has to wonder what will become of the independent microcomputer manufacturers, such as Apple. If mainframe and mini vendors can produce microcomputers that operate with both proprietary and industry-standard operating systems, providing their owners the luxury of high applications programs availability, these customers cannot lose by maintaining this distribution channel.

According to Venture Development Corp., the professional microcomputer segment, which is growing 40% annually, will experience a tremendous shakeout within the next 18 months. This shakeout will occur for several reasons. First, many vendors that market IBM Personal Computer look-alikes are finding large corporations continuing to buy from

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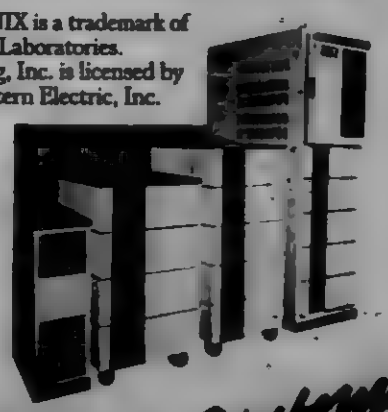

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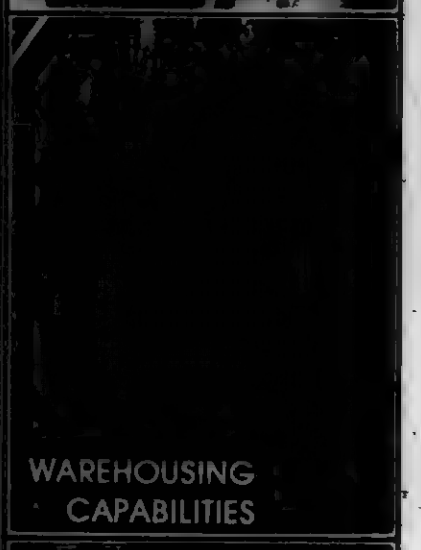

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MICRO MISSION

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The fact that IBM currently owns more than 25% of this business suggests the importance in the Fortune 500 office of the IBM name. This is especially noteworthy, because it only took IBM two years to attain this stature. It is even more astounding that IBM will book close to $2 billion this year in micro shipments alone.

Independent microcomputer vendors, or those with no other significant products, are encouraged to look elsewhere for their customers. Hundreds of thousands of small businesses exist that would never buy anything larger than a microcomputer. They are almost always looking at the short-term and for inexpensive products. The need for a migration path within a family of products is seldom considered or required by this group.

The university environment is providing an expanding opportunity for microcomputer vendors. The days of standing in line for an unoccupied terminal at the college computer room are fast becoming history. An increasing number of schools are requiring their students to purchase microcomputers for various courses. Drexel University, Boston University, Rochester Institute of Technology and Carnegie-Mellon University are just a few examples.

Microcomputer shipments in the data acquisition market will also grow dramatically. Data acquisition systems are used in laboratory and industrial environments for gathering information from experiments and product tests. The market for data acquisition systems based on micros is increasing at an annual rate of 44.7%. There are two basic reasons for this growth. First, they cost much less than conventional data acquisition systems. Second, microcomputer-based systems can be used for multiple purposes such as word processing and laboratory budget management, as well as for monitoring and controlling experiments.

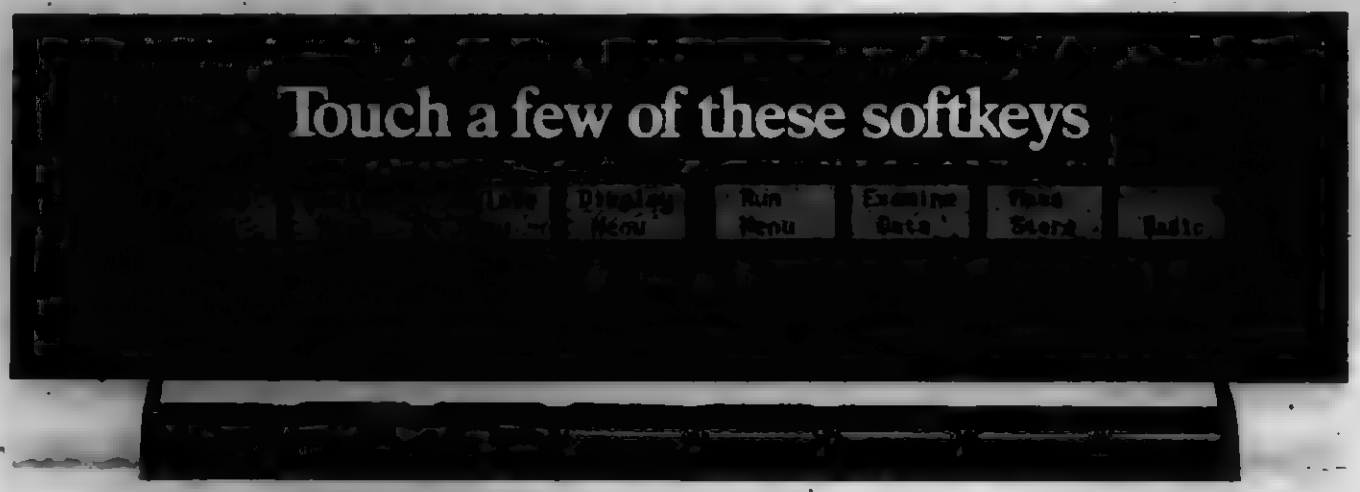
Technology has also played an important role in the microcomputer revolution. The first systems used 8-bit microprocessors as their CPUs. Today's systems take advantage of the newest very large-scale integration technology, which enables manufacturers to employ 16-bit and 32-bit microprocessors in their designs. Data General, for example, designed two separate microprocessors into its new microcomputer systems. One is used for running its proprietary AOS operating system and the other for handling industry-standard Digital Research, Inc. CP/M or Microsoft, Inc. MS-DOS operating systems.

Furthermore, new technology has advanced the design of portable and briefcase-sized microcomputers for the traveling executive. Accordingly, enhancements in flat-panel screens have reduced the power requirements for these systems.

The abundance of microcomputer users has spawned a need for these people to communicate remotely with data bases and each other through their machines. With so many different machines available, universal communications protocol for microcomputers has been developed by Microcom, Inc. of Norwood, Mass. The Microcom Networking Protocol (MNP) now appears to be the de facto standard for the microcomputer industry. In fact, GTE Telenet Corp., the packet-switching network provider, recently announced adoption of the MNP. This will enable GTE's customers owning micros to access Telenet uniformly, provided their machines have the MNP capability.

The future of the microcomputer belongs to those vendors that can both understand and accurately prejudge the activities within their respective market segments. The two computer revolutions described in the beginning of this article are examples of what can happen when assumptions supersede executions in product marketing. There is no substitution for good market research and accurate timing. Vendors that cut corners in marketing during slack periods will soon be watching the microcomputer revolution from the grandstand. ♦

Rudov is a consultant with Venture Development Corp., Wellesley, Mass.



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The influx of microcomputers into large corporate environments continues to accelerate. In spite of this, the capabilities of these machines, when viewed as an integral part of the corporate data processing resource pool, remain barely applied. As a result, information management problems that could be solved by integration into the corporate processing mainstream remain unresolved.

Consider corporate micros used solely as stand-alone devices. Micros used in this way provide application flexibility and portability of computing power for individual users. In terms of overall corporate information management capabilities and controls, however, this approach has several shortcomings. Many of the operations performed on the micro are duplicated on the mainframe [illegible]

By Robert Zeichner and [illegible]

micros. Besides causing duplication of effort, this creates an uncontrollable and unreliable duplication of corporate information in various states of modification and availability.

This effectively undermines any attempts at information control. In addition, since printers and hard disks are typically not shared, costly hardware is also duplicated. Furthermore, the spread of stand-alones is difficult to monitor and control, and management information systems (MIS) personnel may be justified in not supporting them.

The greatest shortcoming is that stand-alone micros tend to be starved for fresh data. If their micro applications are to produce usable results, decision makers must operate with corporate information that is current and correct. One way to gather that information is to have a mainframe report generated and key the needed data into the micro.

This approach is costly in terms of labor, security, materials and keying errors, and the time lag involved may not be acceptable. In addition, to further complicate matters, the results of the micro operations often need to be placed back in the corporate data base, requiring even more reporting and data entry.

Some users try to overcome the time lag problem by transcribing data using a mainframe time-sharing terminal instead of waiting for reports. It is not unusual to see a terminal and a micro on the same desk. In terms of turnaround time, this approach is certainly better than the report and data entry approach, but it still has drawbacks. In particular, the cost in dollars and desk space of maintaining a terminal and a micro is quite high. Users are also faced with learning the operation of a second device. Many have moved to the first level of mainframe integration in the form of terminal emulation.

Terminal emulation hardware and software are available for a number of different mainframe and micro combinations, and they are widely used. Terminal replacement is, in fact, a major cost-justification factor for micros. The use of corporate micros as terminals provides some justification for MIS involvement in their standardization, purchasing and support.

Even with terminal emulation, there is still a need to transcribe and key data. This has led some corporations to implement file-transfer capabilities for micros. With this capability, users transfer the data needed for their micro applications directly to and from the mainframe over the same communications link used for terminal emulation. The need for manual data transfer through reporting and data entry is eliminated. This puts data control largely back under MIS control and fully justifies MIS involvement in corporate micro implementation and support.

The greatest shortcoming is that stand-alone micros tend to be starved for fresh data. If their micro applications are to produce usable results, decision makers must operate with corporate information that is current and correct.

The ability to transfer information between micros and the mainframe data base holds the potential for full utilization of corporate micro resources. Offloading information for processing on micros and uploading the results makes it much easier for micro users to get the fresh data they need. Since users are now sharing centrally stored information, the uncontrolled spread of corporate data is drastically reduced, and information control is returned to the information management division.

Shifting text processing, executive decision-making applications and other human speed-limited applications from the mainframe to more appropriate micros frees mainframe and communications network capacity for more suitable tasks. Unfortunately, file-transfer

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capabilities also raise some new questions and concerns, most of which are not directly addressed by the current crop of file-transfer products.

Security to prevent unauthorized users from accessing and copying corporate data is certainly a major concern. It is also critical to protect data from unauthorized and uncontrolled updates. The physical security of diskettes containing sensitive data is an issue. Many of these concerns can be met through the imposition of strict rules and procedures on file-transfer users. Others can be met through logical implementation of existing mainframe data access control systems.

Unfortunately, these systems are not typically designed to meet the unique needs of micro and mainframe data transfer users. Therefore, they must be applied in a sledgehammer fashion. As a result, existing information management control systems alone can provide the needed security, but only at the expense of ease of use and flexibility.

Certain performance factors must also be considered. In particular, file-transfer activity cannot be permitted to hinder production operations on the mainframe or the network. This can be handled effectively by establishing appropriate mainframe processing priorities. In fact, the previously mentioned ability to offload tasks to the micros through file transfer may improve overall system response times.

Though not subtle or efficient, it is possible to answer these and other concerns by using current transfer products and judiciously applying existing information access control techniques. However, a much better solution is possible.

Current file-transfer products have opened the door for a much better approach but, in general, have failed to employ fully the capabilities and features users really need and want. Most, in fact, simply move files. This is sufficient for some applications but makes others impractical or impossible, thereby preventing complete micro integration and use. A more extensive set of transfer tools and capabilities is required.

A complete file-transfer package should, of course, support both mainframe-to-micro (download) and micro-to-mainframe (upload) transfers. Both text data and binary data transfers must be fully supported in both upload and download modes. In some text-oriented communications systems, achieving this capability can be much more difficult than it seems. Nonetheless, the overall system is severely limited without this flexibility, so it must be available. These capabilities represent the bare minimum; full micro integration, however, requires a more thorough design.

A file-transfer request should be able to be initiated from either the mainframe or a micro. For example, with the micro running a file-transfer monitor program, the mainframe should be able to request a transfer of data to or from that micro. This feature could be extremely attractive in data acquisition and off-hour or unattended transfer applications (for instance, micro hard disk backup). Furthermore, it allows the shifting of activity to use the mainframe and network more fully in off-peak periods. This ability to initiate transfers from the host will become even more attractive as multitasking micro operating systems become more prevalent and the monitor can be made a concurrent micro task.

Security mechanisms should be an integral part of the file-transfer system. When micros are used as terminals, the restrictions of the screen applications subject users to de facto field-level security. When transferring files, these restrictions no longer exist. Thus, it may often be desirable to restrict upload and download access to specific fields in a record set. The file-transfer security mechanisms should provide transfer security down to the field level. Furthermore, since transfers can be initiated from either the micro or the mainframe, transfer controls must be provided for both micro and mainframe data. Only then can information management personnel fully secure corporate data.

The use of file-transfer profiles on the mainframe provides an excellent mechanism for implementing this security scheme. The data structure of a typical profile is shown in Figure 1. Each profile defines the record set to be transferred and contains a list of users having valid access. A profile also contains sufficient information to identify the fields that may be accessed — all fields being a permissible special case.

In addition, each profile defines the transfer record formats. Given this information, the transfer handling programs can assemble and transfer information from accessible fields in the proper format. Ideally, each profile also contains default record selection keys. The user can be allowed to override these keys and can also be permitted to select a subset of the accessible fields for actual transfer.

The profiles, therefore, act like predefined report-generation control files with optional overrides. They direct the selected and correctly formatted information to or from an authorized user's device. Users actually initiate a transfer by simply providing the transfer handling program with the name of the desired profile. Therefore, once a profile is established, authorized users can quickly and easily initiate transfers of the indicated information.

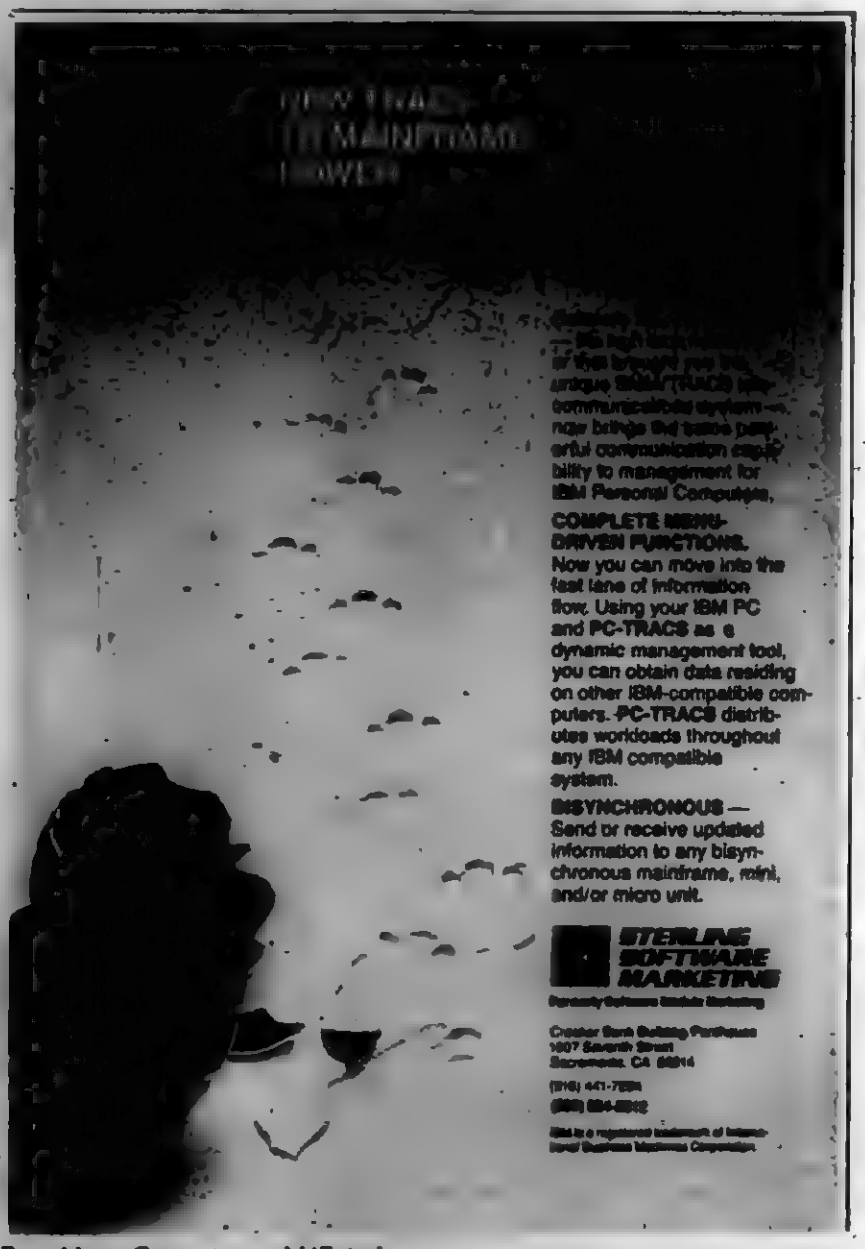
Combined with the password and information access protection already existing on the host, this profile system provides excellent security, flexibility and ease of use. Further levels of security can be added. For instance, additional password controls on transfer access can be implemented by attaching passwords to the user codes on the profile list of valid users. Each profile can differentiate read (copy) and write (update) access privileges.

It may also be desirable to deny file-creation privileges to selected users in selected areas. This can be accomplished using simple access tables in work areas.

The basic elements of a profile-based transfer systems are illustrated in Figure 2. To add to the usefulness and flexibility of the overall system,

Record Set Name
(Valid User Table) Usercode 1 / Password / Access (U, D or UD) Usercode 2 / Password / Access (U, D or UD)
(Host Format Table) Fieldname 1 / Type / Start Byte / Length Fieldname 2 / Type / Start Byte / Length
(Transfer Format Table) Fieldname 1 / Type / Start Byte / Length Fieldname 2 / Type / Start Byte / Length
(Record Selection Keys) Key 1 Key 2

Figure 1. Transfer Profile Structure



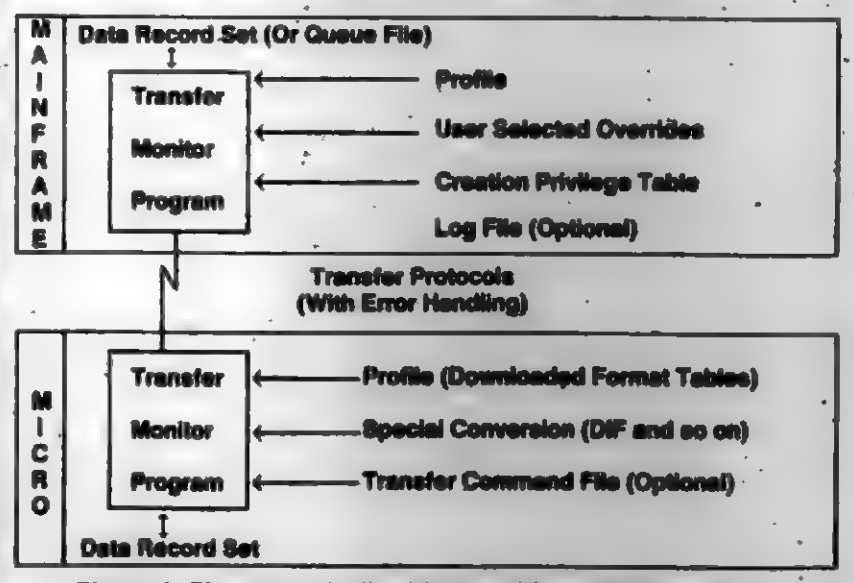


Figure 2. Elements of a Profile-Based Transfer System

the file-transfer package includes tools for translating special micro storage formats. These translators permit storage of shared files on the mainframe in a standard format, thus allowing otherwise incompatible applications to share information. Similarly, the ability to upload queue files for submission to mainframe spoolers enables micro applications to use mainframe printers as output devices. Both of these capabilities are attractive.

The ability to pass files containing file-transfer command sequences to the file-transfer handling programs is also desirable. This allows users to initiate often-used transfers with minimum keying and allows user programs to request transfers. In the same vein, the use of well-defined and well-documented transfer protocols can allow relatively simple creation of custom interfaces to the file-transfer system.

With appropriate transfer mechanisms in place, it is possible for micro programs to access mainframe data as if that data were on the micro's own disk. The user can create virtual diskettes on the mainframe, format them and read and write with them as if they were in the micro drives — but more slowly, or course. Files created on the virtual diskettes afe marked to allow or disallow shared [illegible]

There are some variations of this virtual diskette concept. Unfortunately, since these virtual diskettes are formatted, it is difficult to access their contents from the mainframe or from media-incompatible micros. The benefits of this concept can be retained while overcoming this formatting problem by using virtual files.

Instead of mounting an entire virtual diskette that requires specific formatting, the user attaches to his micro diskette selected virtual files created on the mainframe. As a result, the user's microcomputer applications can access the virtual file as if it were a standard local file.

Since the file is actually stored on the host in a standardized format, it can easily be accessed by the host and media-incompatible micros. Furthermore, information from the file can be transferred as needed using the profile-based transfer system.

File-transfer systems incorporating some of these concepts do exist for various mainframe and micro configurations. No system, however, incorporates the complete design. As a result, no system presently uses the complete capabilities of fully integrated corporate micros.

If fully implemented, the transfer system described would easily support a number of difficult or impossible applications. Since micros could securely upload and download information, data could be transferred between otherwise data-incompatible micros by way of mainframe staging files. This would certainly provide the means for electronic mail, both data and text.

Expensive printer and plotter resources could be shared between micros by redirecting output through shared areas. Combined with the ability to share word processing files, this would greatly enhance the cost effectiveness of microcomputers used as word processing stations.

Combining existing Ansi versions of programming languages for the micro with file transfer would make it possible to offload projects for development and testing. This could speed development turnaround.

Furthermore, the ability to use the broad variety of inexpensive off-the-shelf micro packages to meet many individual processing requirements can have a positive impact on existing application request backlogs.

These ideas represent only a few of the feasible possibilities for fully integrated, fully utilized microcomputers. The design outlined here opens the door to those possibilities. Therefore, corporations seeking to gain the full control and benefits of their information and computing assets should establish such a design as an integral component of their microcomputer strategies.

The tools are coming, and corporations and vendors with the aggressive foresight to plan for them will dominate in the '80s. ♦

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Zack is vice-president of product marketing, and Guthrie is a technical research manager for Digital Communications Associates, Atlanta.

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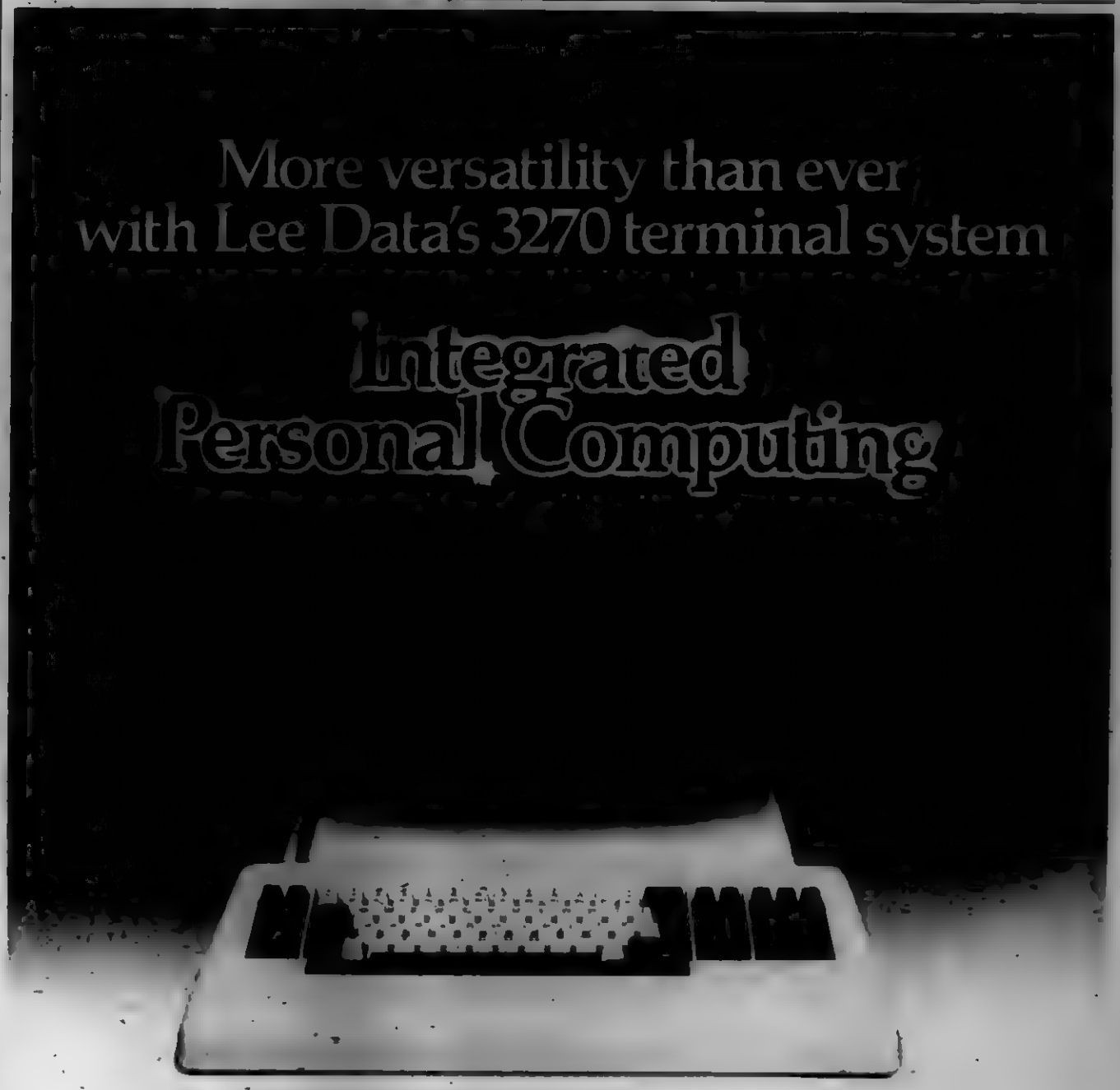

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William F. LePre is director of management information systems (MIS) in the metropolitan New York region for Arthur Andersen & Co. He has been in the data processing industry for 23 years. In his capacity as MIS director, he is responsible for all internal data processing, including personal computer coordination. LePre is also on the board of governors of the Microcomputer Users Group, which consists of 25 companies in the metropolitan New York area.

WILLIAM F. LePRE

William L. O'Neil is director of microcomputing at The First Boston Capital Group, Inc., Tarrytown, N.Y. With two people under him and nine consultants working with him, he is responsible for every aspect of microcomputers, including research and development, software and operational support. He owns $40,000 worth of his own microcomputer equipment and holds an honors degree in artificial intelligence.

WILLIAM L. O'NEIL

TABLE

GARY A. SCHNORR

Gary A. Schnorr is manager, data systems support at General Foods Corp., White Plains, N.Y. He has been involved in General Foods' microcomputer program since its inception 2½ years ago. He helped set up the firm's microcomputer center and is currently supporting that center throughout General Foods. He is also on the board of governors of the Microcomputer Users Group.

MATT FITZSIMMONS

Matt Fitzsimmons is owner and president of Computamatic, White Plains, N.Y. He is also an adjunct professor at Pace University, where he teaches MIS. He is program director and a founder of the Microcomputer Users Group.

ROUNDTABLE

It wasn't long ago that the proliferation of microcomputers — or personal computers — built to the point of "explosion," a term commonly used to describe their burgeoning popularity. In the wake of the explosion, micros have begun to assume their rightful position in the work places of the world.

This Computerworld Extra! *roundtable was organized to examine the new roles of micros and shed some light on where they are and where they are headed. This new generation in computers has brought with it a new wave of problems and users. For instance, security is more important because micros can be picked up and moved by anybody.*

A lot has been said and written about linking micros and mainframes, but how many organizations are actually doing it? Networking is another hot topic, but who's really doing it and why?

It may seem strange to some old-time DPers, but a generation of computer users that were weaned on microcomputers is presently coming of age. The members of this generation have different expectations and aspirations than their predecessors. Their fresh attitudes may put them in an advantageous position.

We called together a diverse group of experts charged with leading their firms' efforts in the microcomputer area to find out where they stand on the issues. They sat down at the behest of Extra! *Editor Bruce Hoard and took a couple of hours to hash over the pertinent points of their micro programs, running the gamut from acquisition and implementation to security and training.*

Let's start by talking about security.

Fitzsimmons: A fellow said to me the other day: "If you have a hard disk in a micro and you walk in and it is gone, it is almost like a data processing manager walking into the machine room and finding it completely empty."

The point is that my hardware, my peripherals, my software and, most importantly, my data are gone. To say, "Well, I backed up my hard disk on a tape," is probably not good enough if you have sensitive data that is on that hard disk. It is probably now out of your control and out of your firm.

LePre: Security is an issue. Ironically, it is amazing. We have not had a machine or a component disappear.

Anyway, way back when, I designed a lock for the personal computer — the access, the actual entry into the back of the personal computer where the key head and the cassette recorder are one.

Well, I designed a neat little lock that made it impossible to get into the machine. Then I contacted a company in New Jersey that made tamperproof screws with a special tool. All of our 64 New York office machines have those special screws on them. Whenever we need service, we have to go around with this special screwdriver or adapter to get access to the machines. We didn't tie them down with the plate and drill the holes.

We did set up a procedure so that if you are using a pool machine, you draw the key to the lock of that machine and the key pad. You give your ID card, use the machine and secure it when you are finished. Then you return the key pad and the key and you get your ID card back.

Schnorr: The security of the physical device and software is the responsibility of the machine's owner. And it ranges — managers are responsible for the equipment, they are responsible to make sure that their data is secure and that access to the equipment is secure.

It ranges from a locked office to the anchor pads, key pad, locking a machine down, bolting it to a table, securing the software in locked cabinets.

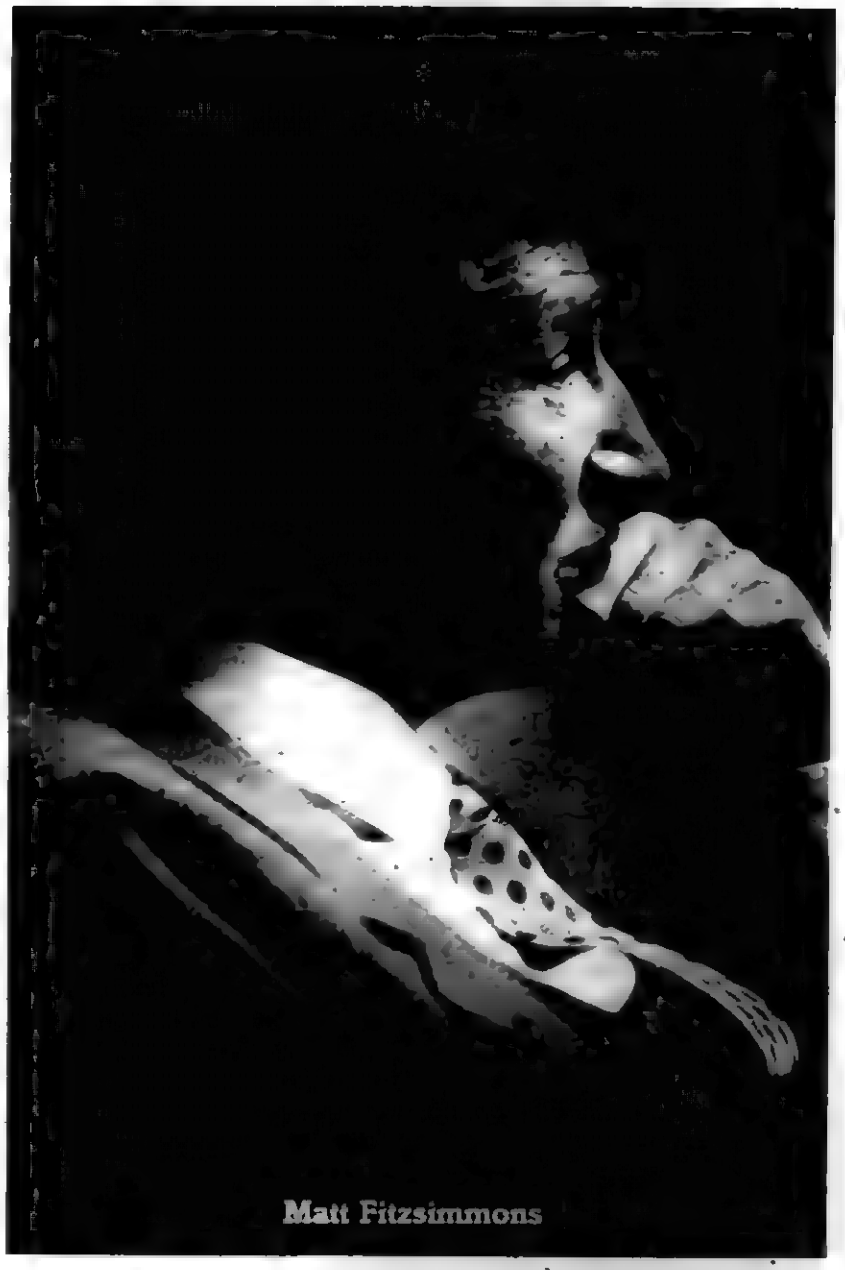
Most of them have identified someone in their organization that has additional responsiblity associated with keeping the machine in place, maintaining it, assuring that it is locked at night and that the room is locked.

So far, we haven't had any problems. We haven't lost a piece of equipment. I think the worst case we had was when someone crashed a floppy disk.

O'Neil: We make each person responsible for his own personal computer, be it on his desk or in an associated area or even in the home.

We have on-site security with a security network here in the building. Fortunately, we have never had anything stolen either, but it can be a real bad problem.

Protecting the data is also a problem. When we bring the clients in, we train them about some of the things that can go wrong, about how you can destroy a disk, about hard disk crashes and so on.

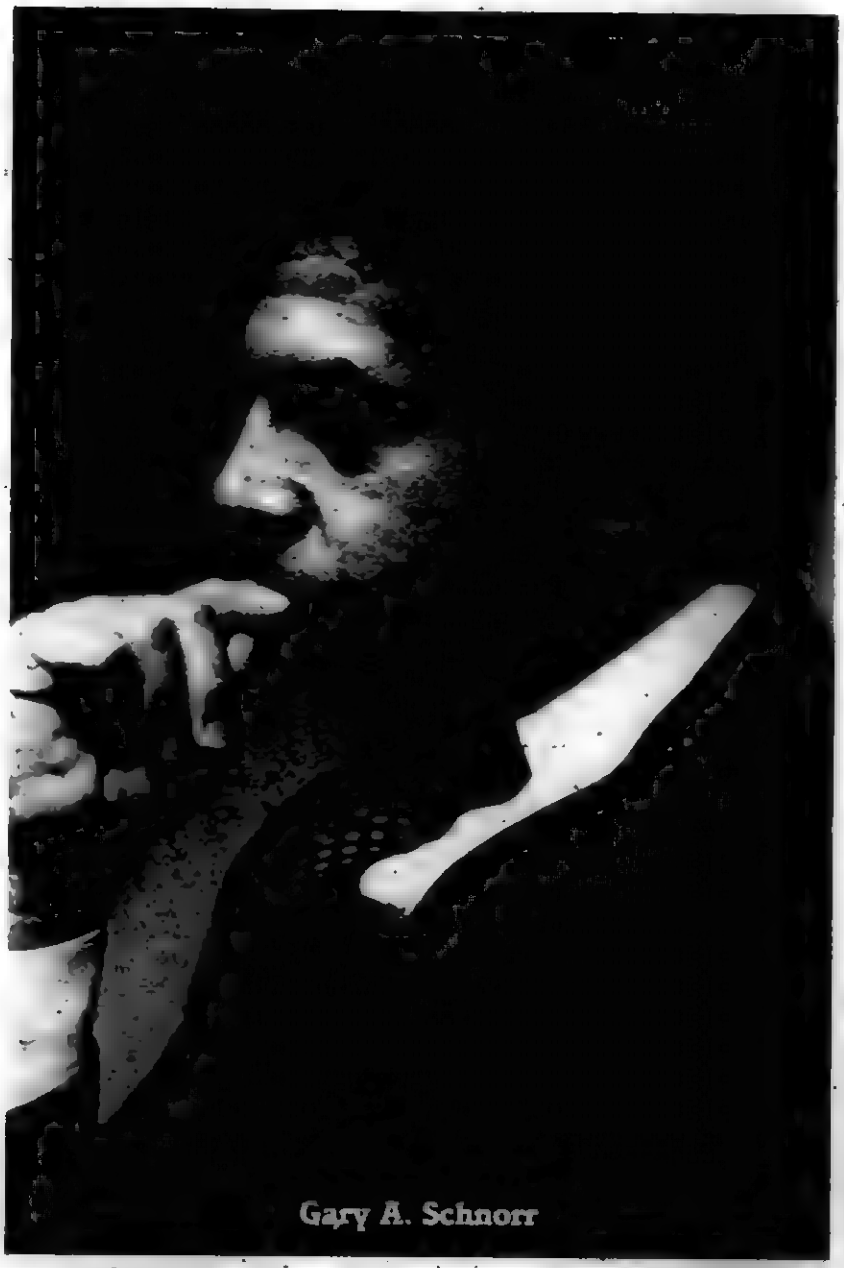

Matt Fitzsimmons

Let's discuss information centers. A lot of people have different ideals about what they are and what they do. What are their strengths and weaknesses?

Fitzsimmons: The information center concept involves a situation where people set up terminals in a room and try to get end users to come in and do their own programming using some kind of data base retrieval language. The [management information systems (MIS)] department would have to write the data manipulations programs, but the end users would manipulate the data, structure their own reports and print it out.

My opinion is that the concept did not work. The reason is the complexity of software. It was more than

William F. LePre


Gary A. Schnorr

most end users would tolerate.

Therefore, the whole idea of information centers was to offload the work that was put on program analysts, to get the more routine tasks in the hands of the end user.

In every company, there are a few sophisticated users that can handle it. On a percentage basis, there are not many people who could come in and effectively use an information center.

A micro seems like an extension of that information center. Unfortunately in some cases, the information center has such a poor reputation that many people felt it would taint the reputation of the micros. So, they said all micros would be in completely separate organizations.

Other companies were relatively successful with information centers, and, therefore, they incorporated micros.

LePre: We are setting up a resource center now. It is a pretty neat idea. It is or will be a subset of our professional education development area.

Schnorr: We have been supporting end-user computing for years, probably before IBM coined the term "information center." The idea is to have some means for users to have access to the information that resides on the host of time-sharing computers.

Our approach now is to look at all of our users as potential clients of either personal computers, time-sharing or any of the other facilities that we provide.

What we are doing is setting up technology centers providing facilities in both our major locations in Westchester County, [N.Y.] where we will display not only personal computers but also computer graphics systems. We will look at things like teleconferencing facilities, videotex, workstations and executive workstations. We want to make those centers showplaces where we can show people what we see down the road and what types of things are available today. We are taking more of a marketing approach to getting to the user base.

Let's discuss networking. How are you going about networking? What problems are you having with it? Do you find that vendors are able to supply the solutions for local-area networks? How do you view that particular situation?

O'Neil: When I approached local-area networking, I went to look for books that were written 20 years ago. What were the first problems with the IBM system? How do I protect the data to say that this guy is in an update mode? How does this guy pull the record and get it ready to put back because I need that information also?

L. O'Neil

MICRO MISSION

Fitzsimmons: It seems to me you are trying to make communications completely transparent to your end user, so he doesn't know that the machine is communicated.

O'Neil: That's exactly right.

Schnorr: My situation is that most of my users have no interest in networking or don't even know what it is right now. And they are not driving the situation. We are going about it cautiously and slowly.

There was a need for a particular person or group of people within an area that had some information that needed to be processed more effectively. The micro was put in to support that. There wasn't a need for tremendous amounts of information from outside sources or even from sharing data within that group.

We will do networking in a prototyping situation. We will be setting one up in the next few months. We wired our new headquarters building in anticipation of networking, but to date, we do not have any local-area networking in place. We are taking our time in evaluating it.

Fitzsimmons: I am not convinced that a personal computer has the capability to do networking effectively.

The few people I know who do network tell me it is really brute force when they copy a hard disk onto a personal computer. I don't know anyone who is doing truly interactive processing by way of a networking arrangement.

Do you find that networking is still in the dark ages? You know, I have been to these silly discussions about what kind of wire runs through the wall and the network.

I can't believe that this whole industry is being reduced to a pedestrian problem of what kind of wire is going to run through the wall.

Schnorr: I don't think it is in the dark ages, but in its infancy. There are good networking schemes out there. Some of the ones that are on the market provide the functionality that the manufacturer is trying to sell.

And we are probably about a year away from the introduction of some very interesting products in the networking area.

I think one of the things that will make a difference is if IBM finally comes out with a networking scheme. We will hold off until we see what that is or what Systems Network Architecture is going to be supporting.

What impact has the microcomputer explosion had on data processing professionals?

Fitzsimmons: I have had better luck hiring people who are not true

experienced data processing people, who have learned something about computers in school, who have the interest, the desire, the motivation and none of the bad habits.

Schnorr: I have had a similar experience. I think DP people tend to bring a complexity to it and try to spend so much time relating the micro to other pieces of equipment that they have worked with or other experiences that they have had.

Fitzsimmons: Think about that youngster coming to work for your company who literally has ten years' experience with computers. You are going to sit down with him and say, "Wait, you cannot touch that program because I am a Cobol programmer and I — only I — will manipulate that data."

Schnorr: And in ten years when these sixth and seventh graders are out of school, when they come into business, they are going to expect something on the desktop.

Fitzsimmons: I see this whole thing putting pressure on the MIS professional to be more professional, to develop expertise in data base and large-scale systems development and the other data manipulations. And this means that all those people in the middle could be in very deep trouble.

LePre: Take a look now at how the DP or MIS professional is having a more meaningful say within the firm.

It is amazing. You are actually seeing MIS professionals becoming a major part of the senior management firm.

O'Neil: You are absolutely right. Where at one time it was only controllers . . .

LePre: You were a like a back door troll.

O'Neil: Well, that is because they used to lock computers away in a back room someplace and only a certain select few had the combination to get in.

Fitzsimmons: The MIS professionals will have to give up some of this power that they have assumed over the past few years. They are going to have to begin to turn that over to the end user.

Schnorr: It has always been the users' information. And now, through distributive processing and personal computers, we are seeing people recognizing that they can handle their own information.

I think our responsibility as managers, MIS people, is to provide a certain amount of knowledge to those users along with our experiences.

A lot has been said about senior management's reluctance to accept personal computers. Have you people found there is a reluctance among top management to accept this technology on a personal computer?

Schnorr: I don't think top managers are ever going to be users of personal computers in the sense that most people use them today. They certainly are not going to be involved in programming. They are decision makers, not information processors.

Consequently, whatever device ends up on their desk or in their office is going to be something that can give them information when they want it in a simple form. It is not going to be the personal computer.

Fitzsimmons: I find the senior managers are interested in the technology. They want to know what it can do for them.

Schnorr: They are interested because they see the potential for that type of thing down their organization. They see that a lot of tasks are being done manually in the grass roots of their organization. This probably could be done a hell of a lot more effectively. They are looking for solutions to those problems because those problems are their problems.

Consequently, they are interested in the technology, not necessarily for their desk.

Fitzsimmons: And they are also willing to just sit down and hit the keys. There is a school of thought that says that senior managers won't type — never.

Schnorr: The chairman of the board used [Visicorp's] Visicalc a few months ago, and he had a very good time at it.

O'Neil: I am pleased over senior management's idea that could make our system work on a micro, to dedicate it to a micro. When you decentralize with micro processing, it is in each individual office. The office is 1,000 miles away or 2,000 miles away. As a result, it was a big step for our management, the senior vice-presidents and president, to say, "It is going to be done on the micro, and I am pleased to be part of it."

Schnorr: We all are. All of us probably had a personal interest in it before we got involved in it.

Fitzsimmons: They either have to accept these micros, learn how to manage them or we are going to

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- **85** Computer Service Bureau Software/Planning/Consulting
- **90** Computer Peripheral Dealer Distributor Retailer
- **95** Other Vendor

2. OCCUPATION/FUNCTION (Circle One)
- **11** Pres Bd Chmn /Owner /Partner General Manager
- **12** VP Assistant VP
- **13** Treasurer Controller Financial Officer
- **21** Director Manager Supervisor DP MIS Services
- **22** Director Manager of Operations Planning Administrative Services
- **23** Systems Manager Systems Analyst
- **31** Manager Supervisor Programming
- **32** Programmer/Methods Analyst
- **35** OA WP Director Manager Supervisor
- **38** Data Comm Network Systems Mgmt
- **41** Engr/Scientific/R&D Tech Mgmt
- **51** Mfg Sales Reps Sales/Marketing Mgmt
- **60** Consulting Mgmt
- **70** Medical/Legal Accounting Mgmt
- **80** Educator Journalist/Librarian/Student
- **90** Other

3. COMPUTER INVOLVEMENT (Circle all that apply)
Types of equipment with which you are personally involved either as user, vendor or consultant
- **A.** Mainframes/Superminis
- **B.** Minicomputers/Small Business Computers
- **C.** Microcomputers/Desktops
- **D** Communications Systems
- **E.** Office Automation Systems

have some big problems. Senior management knows it.

LePre: And we are making sure that senior management knows it.

What have you been doing in the area of training and education?

Schnorr: The training courses that we began were on Visicalc. They have expanded now to other spreadsheet programs, graphics, word processing, communications, data-based programs — initial setup and introduction to the machine, what it is and what it does.

And that was twofold: a top-down, bottom-up approach to training. The training program began with an executive awareness program.

We purchased equipment for senior management to use for a period of anywhere from four to six months. We gave them some hands-on training for a day or so, showed them how to use the machine and provided them with a certain amount of software, normally Visicalc. We also gave them some game packages, a data base program and possibly communications if they had any interest in getting into something like [Source Telecomputing Corp.'s] The Source or Dow Jones [& Co., Inc.'s News/Retrieval Service.].

Between the people in the Westchester area and the field locations, we've probably trained over 3,000 people now in hands-on sessions — that is, everyone with their own personal computer in front of them.

LePre: We started our training program from the top down. We have, as part of our audit provisions, professional and educational divisions within a division. It is quite an elaborate training program for both clients and in-house people. Our training program started out with the partners. Now, almost every partner has been through the training, certainly the greatest majority of them. We've gone from senior managers to managers, down to senior staff.

O'Neil: The area of education in which we feel we have done well is in encouraging the production development staff to bring the personal computers home. In so doing, they learn the uses of the microcomputer system and then bring that education back to the job with them. Our productivity level is high here because of this approach.

What kind of utilization program do you have?

LePre: We have set up a pool concept. The pool supports equipment breakdowns, meaning we will go out and literally swap-out a component. For example, the pool supports an overworked user. He will come in, give us a charge code and sit down at a personal computer for "X" period of time at an established rate — hourly, daily, weekly, whatever — and we will support him.

Schnorr: Actually, our program began prior to the release of the IBM machine, so we didn't know what the box was going to look like at the time. We have some Apple [Computer, Inc.] and Radio Shack units in place. Our approach to support a micro was one more driven by the software.

We have continued that policy. We are still looking more at the application first, identifying the best way to satisfy that application, which may or may not be with a micro at all. In that case, it is moved to the time-sharing environment or to the host environment.

More and more, the migration now is toward the IBM Personal Computer, but organizations that have Radio Shack equipment in place continue to purchase some Radio Shack equipment.

Fitzsimmons: As I recall, Gary, you had a five-year plan that General Foods put together. You went through giving everyone A, B and C priority projects: A, the resources; B, if anything falls out, we will get resources; C, the projects that never get done. As I recall, you looked at the Cs and tried to figure out how many of those are candidates for micros.

Schnorr: Exactly.

Fitzsimmons: What percent of those did you find actually ended up on a micro?

Schnorr: More than half were probably suited for micros. Some of the others were resolved through other means — better administrative controls and that type of thing — but a good percentage of them fit the micro environment.

We didn't say, "This is your manager. This is your micro." Our support of micros was more toward a machine that was placed in an area for a functional group. We exposed as many people as possible to it. And that was to leverage the amount of equipment that we were placing in the organization.

What software are you using here and what kind of decisions went into acquiring it?

Schnorr: We support certain packages — the spreadsheets, the graphics, the data base and the other programs — but we haven't limited ourselves in saying that those are the only packages we will support.

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- why you must involve the user from Day 1 if you want the new system to be a success
- what tools make it easy for the user to explain the current system, to understand the new system, and to catch design mistakes early in development
- how to avoid creating piles of paperwork that no one ever looks at
- what data flow diagrams are, why you should use them, and how to use them so they're helpful — not a pain in the neck
- how and when data-dictionary techniques can help you describe the data for the system
- how to design the files or database for a system
- how to break the system down into logical functions and programs
- how to use structured programming to cut programmer time, speed up testing, and make the system easier to maintain
- how to simplify documentation — and yet have all the information you need to make changes later on

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Most of the tools you'll find in this book, like data flow diagrams, data dictionaries, and structured programming aren't new. But let's face it. Much of what's been said about them is useless when it comes to developing a modern, interactive business system.

In contrast, this book focuses on *practical* ways to use these tools. And it fits all the steps together into a single method that works.

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3. **User instructions:** How to provide concise and complete user instructions or the reason not to write user manuals. (For the [illegible] system, the user manual is only 11 pages long.)
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Now I admit, not everyone will reach that level of productivity. There are just too many variable factors you can't control. Still, I'm convinced you'll improve your productivity if you use this method.

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MICRO MISSION

packages, and then we also provide a library or research function so that we will stay abreast of what is happening in the industry. We look at new packages as part of our center. We purchase the program and review it to see if it has applications. Recently, we looked at [Software Arts, Inc.'s] TK*Solver, and in the process, we did a review in our newsletter.

O'Neil: We make recommendations to the customers in word processing, spreadsheet, accounting and data base.

An extensive analysis went into each one of them. We broke down each of the packages depending on their needs. Some make better workstations, some spreadsheets, some accounting packages. Some are better than others.

As an example in the accounting packages area, we analyzed seven before we chose one. Our approach is to see what we can fit on the micro first and how it interacts with the mainframe.

Let's talk about hardware.

Fitzsimmons: Who would have thought that Osborne [Computer Corp.] would all of a sudden lose business? A year ago they were a high roller. How many people can vouch for them? It gets into this same issue of hardware.

Schnorr: I think we are going to see a shakeout.

Fitzsimmons: Do you think people are concerned about the 120 companies that may end up as less than 20 a year from now? I find companies are reluctant to throw their weight with any one manufacturer other than the obvious IBM, since that would put them right in the mainstream for years. Users are hesitant to go with another manufacturer, because they simply don't know if that company is going to be here a year or two from now. Also, they don't know about the support required for maintaining multiple machines, different operating systems and all those types of problems.

Schnorr: I don't ever see us going beyond three manufacturers. It may not be the three that we have now. We have already dropped support of Radio Shack equipment other than what is in place. We will not place any new equipment, but we will continue to support Apple and IBM on a long-term basis. We have a very strong base in Wang [Laboratories, Inc.] equipment.

When the shakeout occurs, it is going to be with a lot of fringe manufacturers — firms that have a box that may be a very good, but have not been an established mainframe computer manufacturer.

O'Neil: Take a look at IBM with its availability problem. I can think of eleven multifunction cards. Now everybody has the multifunction cards. They get their warehouse stocked and say, "Buy mine, buy mine, buy mine," and there are no machines to put them in. ♦

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UNRAVELING NETWORK ARCHITECTURE

The implementation of communications products for personal computers are unlike those of most personal computer-oriented products. Communications development embraces most of the complex aspects of system software, such as real-time processing, multitasking and performance, as well as the problems of dealing with a user interface. The recent explosive growth of personal computers in the business community of communications products to interface personal computers into existing networks is growing rapidly.

Communications software for microcomputers are encountering difficulties when trying to create reliable, consistent and supportable software that will be used in literally hundreds of different configurations. It is impossible to anticipate the gauntless number of ways that

communications devices are going to be used. The problem is compounded by large corporate communications networks built using a mix of protocols.

Some of the successful approaches to building complex communications products in the past have not proven effective for developing similar products on the current generation of personal computers.

One example of a successful approach can be illustrated by the development of an IBM 3220 Information Display System emulator from Pathway Design, Inc. The IBM 3270 family of communications products has been the de facto mainframe standard for years. A complete line of 3270-compatible terminals, printers and cluster controllers is available from many companies for attachment in communications networks. Products that allow various personal computers to connect into networks — both Binary Synchronous Communications (BSC) and Systems Network Architecture (SNA) — and to emulate 3270 devices are just now becoming available.

It is not easy to build products that emulate the IBM 3270 product line. There are many obstacles that must be overcome to provide a robust product that will instill user confidence in its completeness and correctness. The product requires hardware and software that must be integrated to provide the optimum solution from a cost-performance and flexibility standpoint. However, the various forms of available hardware solutions from different personal computer suppliers compound the problem.

There are now over 100 personal computer manufacturers. Even though a majority are using either the Zilog, Inc. Z80 or Intel Corp. 8088 microprocessors, the many different configurations of memory and peripherals introduce significant portability problems. Volumes have been written on the merits of portable software, but the very nature of the personal computer market has given that term new meaning.

The correct architectural rules must be applied and adhered to if portability is to be achieved. Portability is not typically a primary concern of the user population. However, it is increasingly important to the developers of products to reduce costs in providing products across a wide vendor base.

To follow the implementation of SNA on a personal computer, examine the IBM model of SNA layered communications:

- End-user services.
- Network services.
- Presentation services.
- Data flow control.
- Transmission control.
- Path control.
- Data link control.

Each layer performs a limited number of coordinated functions that together create the SNA environment.

In an SNA environment, functions within each of the layers are likely to be performed concurrently. In a multitasking operating system, each layer could be implemented as a task. Since the current popular operating systems — Digital Research, Inc.'s CP/M and Microsoft, Inc.'s MS-DOS — do not provide multitasking, alternatives have to be evaluated for the implementation of an SNA emulator.

Both operating systems are small and do not impose any significant restrictions. Therefore, it is a simple matter to create a small multitasking environment within the confines of a single program.

This approach is hindered by the performance and memory capacity of the personal computer. However, the newer, professional class of personal computers, with large memory capacities and faster processors, will go far in alleviating development and support problems.

The primary components of a multitasking system are a scheduler/dispatcher, intertask communications services, interrupt handlers and the tasks. The scheduler/dispatcher should be designed to follow the performance bottlenecks associated with the data flow as it passes from task to task. As long as the scheduler/dispatcher is kept simple, it will usually migrate to new system architectures with relative ease. A difficult aspect of building a portable dispatcher is keeping the functions of the dispatcher separate from the function of the tasks.

Many implementors will

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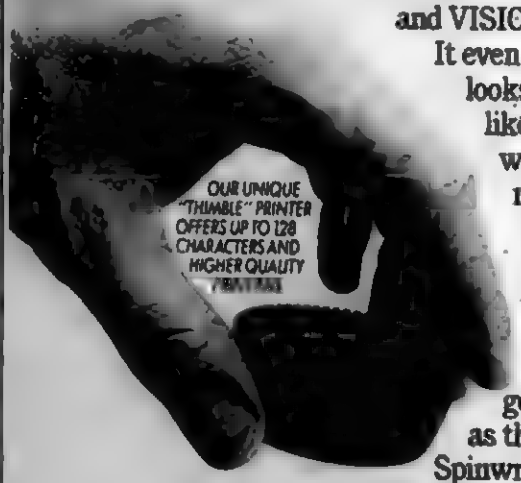

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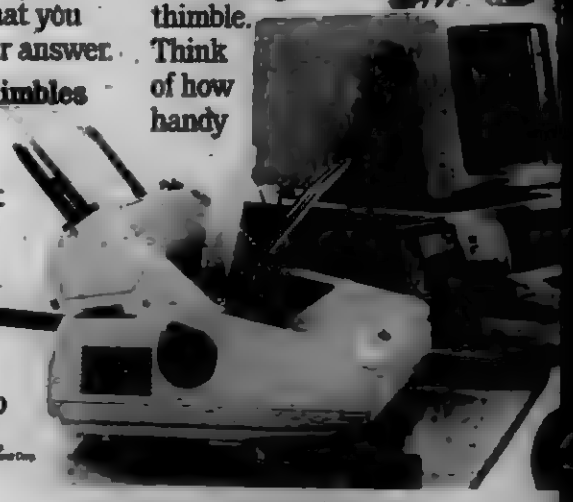

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be tempted to mesh the scheduler/dispatcher functions closely to the tasks, but this will lead to significant problems as the product continues its evolution.

The intertask communications services should also be kept simple, straightforward and task-independent. For enhanced performance, pointers to the data should be used rather than physical data moves between tasks. This implementation-specific architecture should not be known by the tasks that will be using the intertask communications services. The maximum size of each message should be kept to a reasonable length — for example, 256 bytes to 512 bytes.

When building a multitasking system of this type, keep in mind that the software may be moved to a larger, full-function operating system in the future. Larger operating systems typically impose greater restrictions on the availability of shared memory, shared code, message size and dispatching queue ordering. These restrictions must be kept in mind when designing a multitasking environment that will increase portability.

Therefore, the implementation of the system can be achieved by having each task structured as a subroutine where the scheduler/dispatcher determines which subroutine or task is to be called. By keeping the interfaces clean, migration will not pose any difficulties.

Starting from the bottom of the SNA layers, the data link control layer is the first to be implemented. IBM defined a specific protocol, Synchronous Data Link Control (SDLC), for use in its SNA architecture. SDLC is SNA-independent, and other protocols can be substituted, although it has rarely been done.

SDLC is easily implemented by dividing it into two sublayers: physical and logical. The physical sublayer is concerned only with the management of the communications hardware, the electrical interface and the media. This includes RS-232 signaling, block code checking for error recovery and the processing of the data being transmitted or received. This is also typically the first layer to interface to the

NETWORK ARCHITECTURE

memory management and intertask communications primitives of the multitasking operating system

The logical sublayer is the processing of an error-free frame by SDLC. An address byte, control and optional data are in the frame. This layer will determine the disposition of the frame and send it up to the next layers. Likewise, it will determine if the upper layers have completed any work for the host and will apply the appropriate framing around the data and send it to the host when polled.

By keeping these two sublayers separate, the effort to migrate to a new system is simplified. Typically, only the physical sublayer will have to be rebuilt due to hardware or language differences. The logical sublayer should be kept immune to these changes and is typically implemented in a higher level language. Performance is still a key issue at this level, since SDLC messages are timed by the host.

If the emulator takes too long before responding to an outstanding message, the host will continue to the next station on the network and try again later. Such timeouts will be logged as errors and might cause the host to shut down the offending line if it occurs too often during the course of the day.

The next layer, path control, is well-defined and straightforward to implement. There are no time-critical events from this point upward, although the system must be performance-sensitive in order to gain user acceptance. In this layer, the incoming frames are logically linked together and routed to the proper SNA session. This layer is still independent of SNA commands and must adhere to a simple set of rules.

At this point, the SDLC and path-control specific information on the frame may be eliminated, since the upper layers do not use any of the information. Rather than eliminating the SDLC and path-control fields, they can be reused by the intertask communications system for passing control and synchronization information between the tasks. The scheduler/dispatcher should not be task-sensitive. It is the task's responsibility to synchronize the SNA-related

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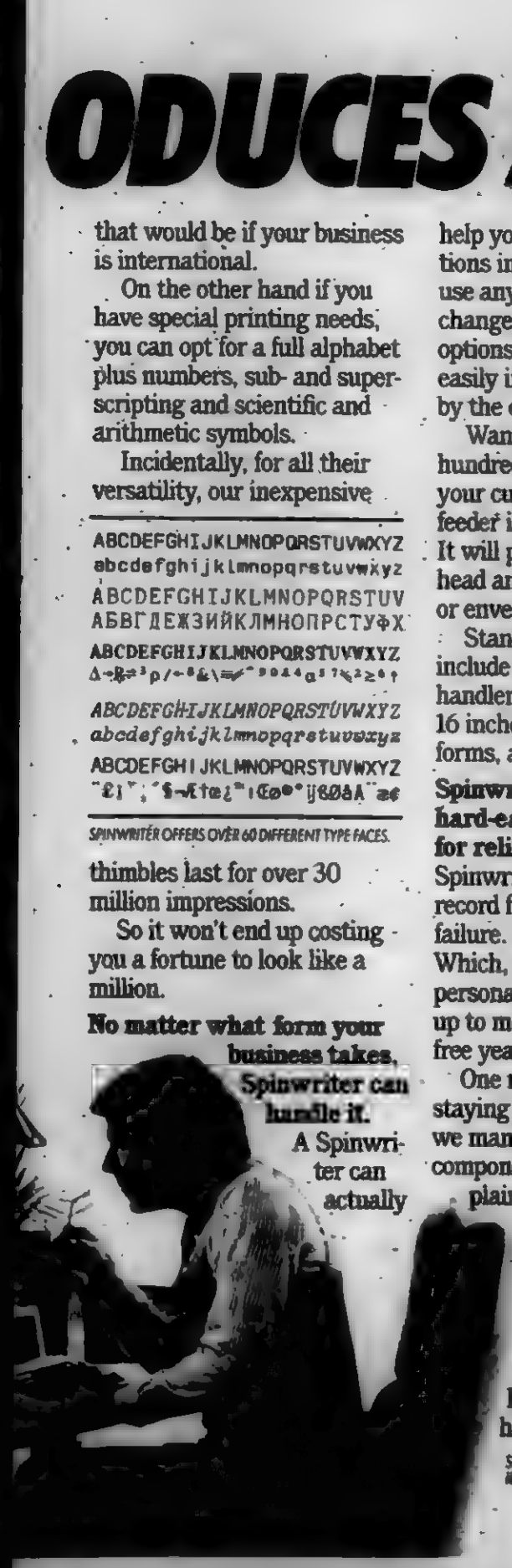

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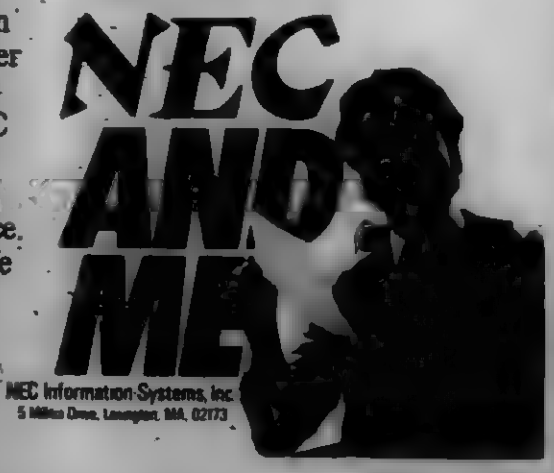

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events. Any aid that the multitasking system provides should be kept generic to each task.

While SNA has always been presented as a layered architecture, there is actually a fair amount of smearing between the remaining upper layers. The transmission control, data flow control, presentation services and network services are severely coupled in a true SNA environment. This complicates implementation in that the optimum solution requires shared data constructs between the layers. But some operating systems may make sharing data difficult, if not impossible. Care must be exercised in the selection of an architectural solution.

One favored way is to hide the data construct via procedure calls. Obviously, this method produces a fair degree of overhead, in both memory size and processor speed. A compromise entails a procedure that returns a pointer to the data structure for the session in question. If the multitasking system does support data sharing, then the routine merely returns a pointer to the session table.

If data sharing is not supported, the routine could hide this by obtaining a copy of the session information and allow the layer to modify the local copy. Eventually, the layer would be finished with the session information and could return it to the master copy. Access to a particular session table would be managed by semaphores, keeping the table synchronized.

To complicate matters more, path control and transmission control may bypass adjacent layers and pass data directly to the network services layer.

The functions performed by transmission control, data flow control and network services exceed the scope of this article. A high degree of familiarity must be achieved by the design and implementation team before making any architectural decisions regarding these layers. Although IBM has several significant documents covering SNA and its implementation, the architecture is incomplete. There are many gaping holes that will become traps for the unwary.

This was not intentional, but SNA is such a large, complex communications system that it was inevitable. The documentation can only be used as a guideline, and many hours of host time are necessary to reverse-engineer some portions of these layers.

The end-user layer performs the 3270 emulation and is well-defined in its functions and services. With only small additional effort, this layer can be designed so large portions of code can be shared when used in a BSC environment.

The greatest difficulty in architecting the end-user layer is that the status line contains information maintained by the lower layers, such as the condition of the communications line. An architectural decision must be made about which layer should control the status line information and its presentation on the display. The most portable and easily supported approach is to keep all display functions isolated in the end-user layer. The lower layers are concerned only with the proper transport of data between two end points.

Only the lowest layer and highest layer have any device specificity. All the other code remains completely untouched in the majority of migrations to other systems. This is a significant departure from typical communications product development. This approach provides an increasingly stable base for adding new functions and services. IBM is constantly adding new services to SNA. To even stand a chance of keeping up with IBM, a third-party supplier must build a modular, supportable migratable system.

By properly building an architecture for a system, vendors can gain greater confidence in their products and can begin to offer significant support options. The only way to create supportable, acceptable and successful products is to exercise care and deliberation in the design process, to create experimental code to test an architectural premise and to consider all the options in the user environment. ♦

Wise is vice-president, research and development, and Mangiaratti is vice-president, manufacturing and support, at Pathway Design, Inc., Wellesley, Mass.

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E·X·T·R·A·!

It is an indisputable fact that the growing popularity of personal computers, in particular the IBM Personal Computer, has caused the most dynamic growth in the history of the software industry. The vast number of software products available today boggles the mind.

The word processing marketplace undoubtedly has experienced the major brunt of this force. Keeping abreast of the latest products and industry trends is a major feat, and the average businessman faces an overwhelming task when selecting a word processing program for his microcomputer. The task involves three concerns: how to shop, where to buy and what to buy.

Three of the most popular methods on how to shop are summarized below. Whichever method you use, take a very serious inventory of your word processing needs and determine what type of work you expect your word processing program to do. If you don't know, ask the person who does your typing.

The first method involves visiting local dealers and requesting a demonstration. This may be the most effective method of shopping since it allows firsthand observation. The trick is to find a knowledgeable and objective salesman who will demonstrate the right

By Susan Harmon

products. Bring along a list or a sample of the types of documents you produce. And do not hesitate to take your secretary or whoever will be using the software along with you.

The second method is to read magazine articles. Reviews of the latest (and not so latest) word processors abound in every computer publication. This is an excellent way to pick up information, since the authors are actual users of the product.

An ancient, tried and true method is word of mouth. This is often more effective than advertising. However, when considering a recommendation, consider the source. Are your word processing activities similar?

If the majority of your work centers around producing long documents with constant revisions, some of the features you may want include:

- Automatic pagination, which causes page breaks to occur after the appropriate amount of text has been entered.
- Disk buffering, which allows you to edit a document larger than the size of your memory.
- Dynamic screen editing, which offers easy and responsive editing techniques.
- Automatic footnote placement and numbering.
- Print spooling, which permits simultaneous printing and editing (background printing).
- Print queuing, which allows you to send several documents to the printer at once.

There are several products on the market that handle long documents well. The best page break handler on the market is Micropro International Corp.'s Wordstar. Although most word processing packages offer automatic pagination, Wordstar shows page breaks dynamically on the screen while you are editing. The page breaks will reflect line spacing, top and bottom margins, headers and footers, as well as the paper length. For example, if you change the line spacing, Wordstar will automatically determine the new number of lines per page.

You can, of course, force your own page breaks as well as set up conditional paging to protect charts and tables from being broken up. Wordstar allows print spooling, but not print queuing. Another dynamic page breaker is Satellite Software International's Wordperfect. Wordstar has a bit of an edge since it reflects unusual line spacing more accurately and displays which page breaks are natural and which are forced. However, Wordperfect offers great print queuing and, in fact, comes closest to emulating the shared logic systems of dedicated word processors in that regard.

Wordperfect features a system commands menu that allows total control over the printer type, the printer status and the various print jobs without leaving the current document. Wordstar has always been considered one of the slickest editors around; it can now share that distinction with Wordperfect 2.3. Wordperfect is quick and responsive. Unlike Wordstar, the text automatically adjusts as you move through it. Wordperfect also allows a vast amount of cursor movements; the user can determine precisely how many characters or lines the cursor will jump in any direction. Both Wordstar and Wordperfect also display double and triple spacing on the screen.

Wordstar offers automatic hyphenation decisions during paragraph adjust, and Wordperfect offers hyphenation decisions as you are typing. Wordperfect has one unique advantage in that it stores and remembers all format settings and changes with each document, including margins and tabs, double-spacing, indents and so on. There is no need to reset them with each editing session. This function's major drawback is that the user must find and delete a setting before changing it, which can be tricky for a beginner. Both Wordstar and Wordperfect sell for $495.

If you need to work with several documents at one time, take a look at The Final Word, from Mark of the Unicorn, Inc., or Perfect Writer, from Perfect Software, Inc. The Final Word has a feature called 12-12! — text buffers that can hold other documents or other programs to be called in at will. Its State-Save feature allows you to return to your original document as you left it. The Final Word also has complete crash recovery in case of a temporary computer failure, which is a lifesaver when you are editing a large document.

Perfect Writer has seven text buffers plus two screen windows that allow you to view and edit two documents simultaneously.

The Final Word does not display page breaks, and Perfect Writer does this only on the IBM Personal Computer version. They both, however, allow you to view the text before printing to check for accurate page breaks. The Final Word costs $300, and Perfect Writer costs $495.

Other products that offer multi-window displays are Visicorp's Visiword, Select Information Systems, Inc.'s Select and Emerging Technology Consulting, Inc.'s Edix/Wordix. Visiword costs $375, Select costs $$495 and Edix/Wordix costs $390. With the exception of Wordstar, all of the products mentioned above allow you to produce multiline headers and footers.

The ability to move blocks of text is essential when editing long documents. Just about every word processor offers this feature, but the approach varies with the product.

Footnotes can be automatically generated using The Final Word, Perfect Writer, Wordperfect, Edix/Wordix and Benchmark from Metasoft Corp. Benchmark also offers automatic page break display, multiline headers and footers, conditional paging, widow and orphan protection, print spooling and print queuing. However, because of the necessity to switch to a command mode for cursor movement as well as editing, it is not as dynamic as Wordstar or Wordperfect. Benchmark sells for $495.

Although Benchmark displays page breaks dynamically, it also offers a view mode, called formatting to the screen, during which temporary changes can be made before printing the file. These changes will not affect the stored document. Like Wordperfect, Benchmark stores format settings although it does this through the use of panels or format screens that are not user-accessible through the text, as they are in Wordperfect.

Another handy tool while editing lengthy text is the ability to put place markers in a file. Wordstar permits 10 place markers, easily accessed at any time. In fact, even without them, Wordstar will return the cursor to its position prior to the last issued command, such as search and replace. Multimate, from Softword Systems, Inc. is the only product I know of that actually allows you to store place markers with your document. Multimate costs $495.

The ability to move blocks of text is essential when editing long documents. Just about every word processor offers this feature, although the approach varies with the product. Most products allow you to store the text in a temporary buffer until you decide what to do with it. Lexisoft, Inc.'s Spellbinder allows you to add more text to the buffer, instead of writing over what is already there. It sells for $495. Wordstar dynamically highlights the marked portion of text; you can easily fiddle around with the size, and it remembers the last marked block.

Some of the others cause you to delete temporarily the text you are moving or copying, while putting it into the buffer. This makes me nervous. Suffice it to say, moving text, like search and replace, has become a standard feature.

Search and replace is another important feature for long documents. It has also become common in word processors today. Edix/Wordix will allow you to use wild card characters such as "*" and "?" to indicate a certain pattern for search and replacement strings. You can instruct it to look only at the beginning or the end of the line.

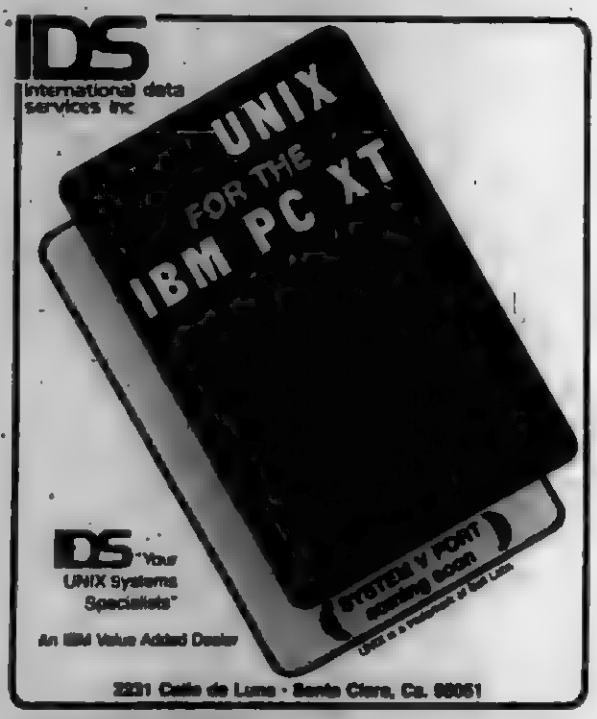
You can then request a pause for confirmation before replacements are made. After accepting the first few substitutions, you can change your mind and tell it to continue with all replacements without pause. However, I contend that Wordstar has the most full-featured search and replace. Wordstar searches forward and backward, as do Wordperfect and Perfect Writer, and will optionally search for uppercase and/or lowercase, whole words only, hard carriage returns or a specified number of occurrences.

Wild cards will match any character, any symbol or any character other than "." — for example, off limit characters. It will replace globally or selectively and will search and delete. The other word processors offer some of these functions, but not all. However, that is quite a list, and Wordstar may offer more than the average user cares about.

If you often prepare repetitive documents such as legal contracts or insurance forms, take note of Benchmark, Perfect Writer and Multimate. They each allow you to assemble a document automatically from a library file of standard paragraphs. Multimate was conceived from the Wang Laboratorties, Inc. word processor and is similar to it in design and execution.

Because Multimate is a page-oriented word processor with a physical page limit of 150 lines, it does not feature dynamic pagination like Wordstar, Wordperfect, Perfect Writer or Benchmark. However, it does have an automatic as well as a manual pagination to give the user full control over the page breaks. Multimate also features disk buffering, multiline headers and footers, orphan and widow control, print spooling and print queuing. It does not offer automatic footnotes or conditional paging.

Wordstar shows justification or ragged right on screen, but it displays printer controls for special effects such as boldface and underline. Although you can suppress these controls, what you see is not exactly what you get. The same is true for Perfect Writer. Wordperfect displays bold and underscore, but does not



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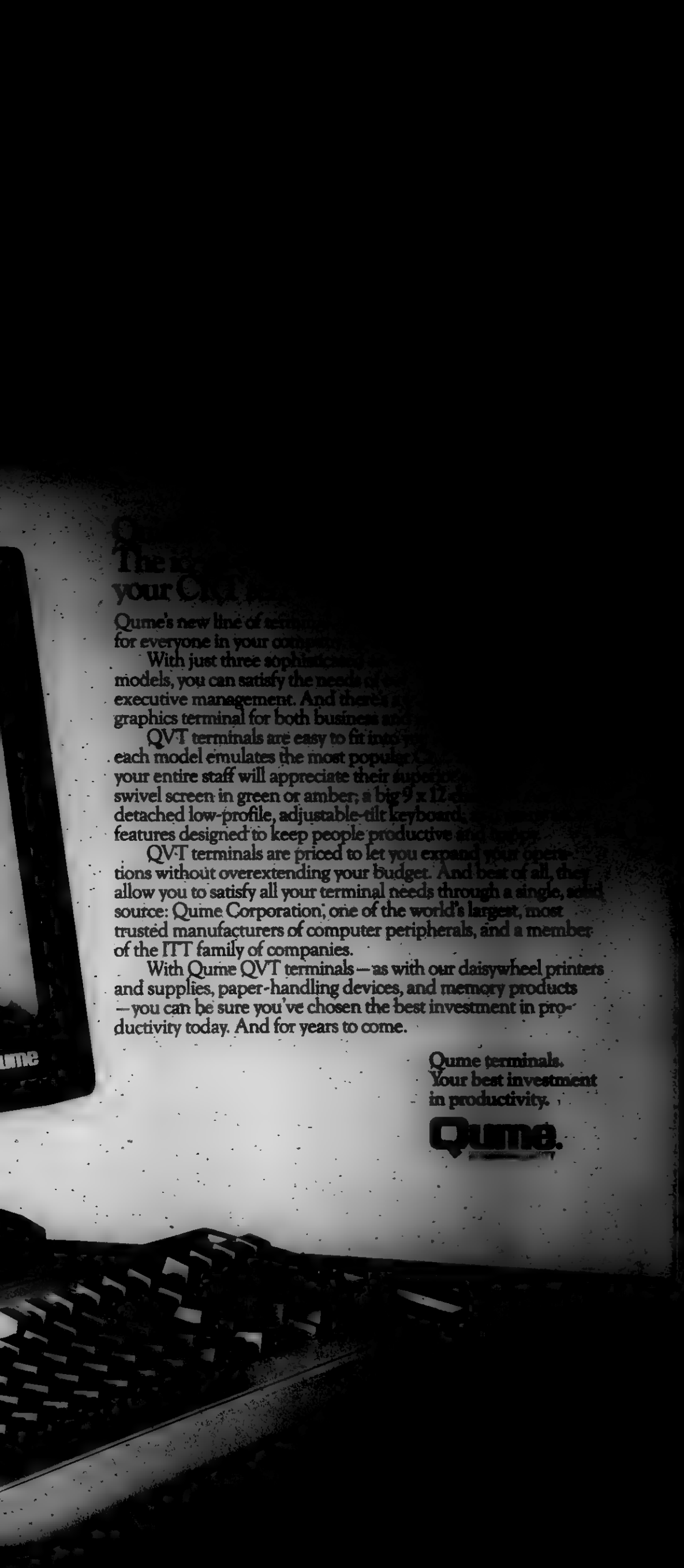

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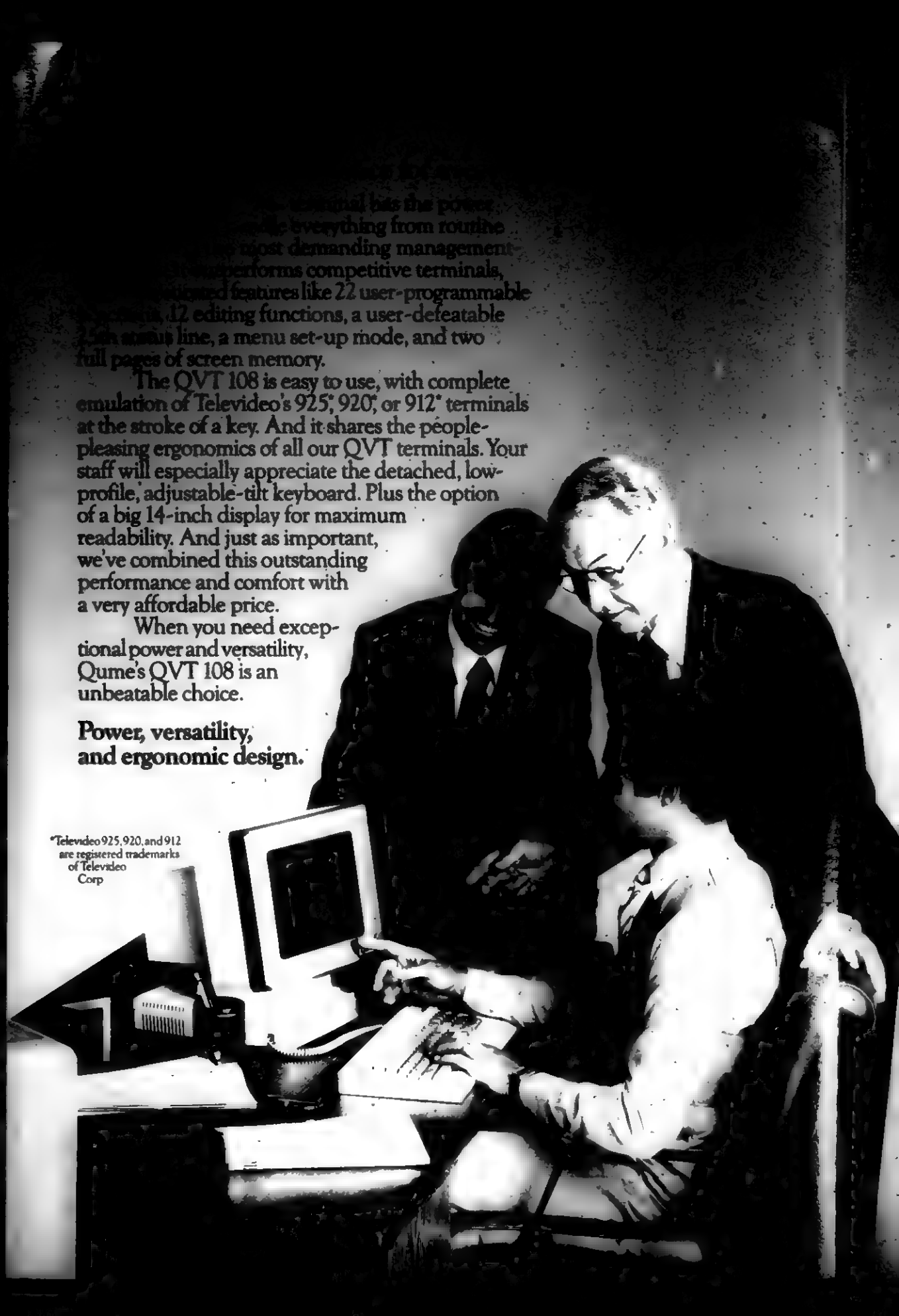

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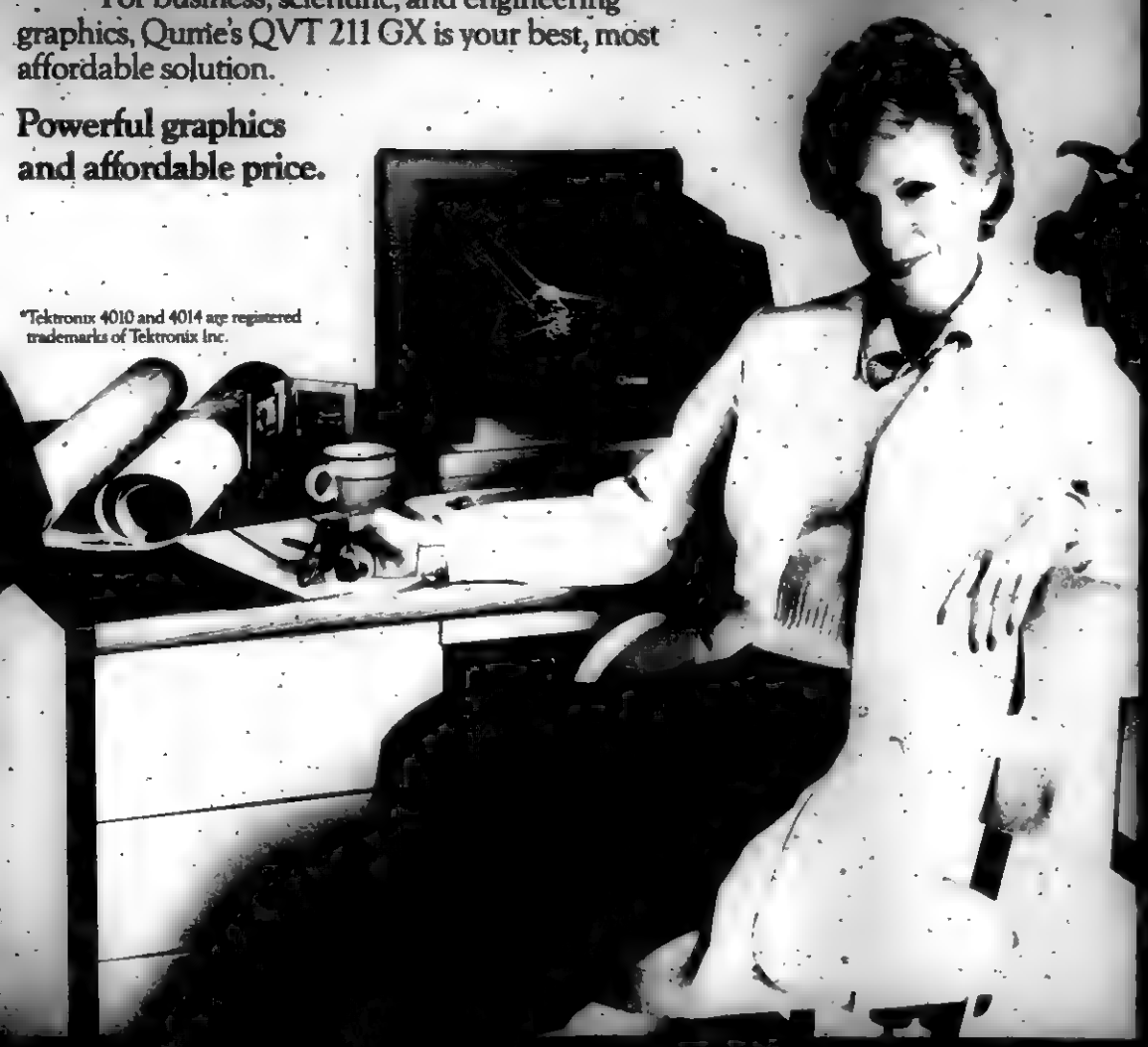

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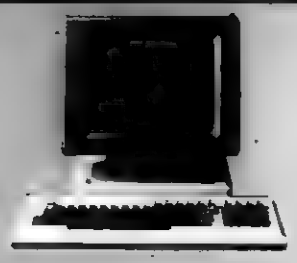	Data entry; order entry; data inquiry and updating; information retrieval; electronic mail; clerical word processing **QVT 102™**	Block and conversational modes • local editing • 12 preprogrammed functions • line-drawing character set • 25th status/set-up line Emulates Hazeltine 1500, Lear Siegler ADM 3A/5, and Televideo 910
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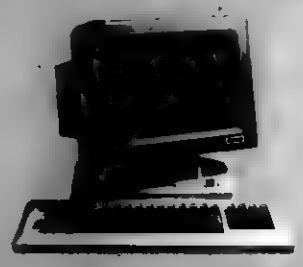	Transaction processing; report preparation; creation of business forms; access control; labor costing; scheduling; inventory control; word processing; accounting and general ledger functions; econometrics **QVT 108™**	Block and conversational modes • local editing • 22 user-programmable functions • 2 pages of screen memory • line-drawing character set • 25th status/set-up line • bidirectional auxiliary port Emulates Televideo's 925, 920, [illegible]
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display justification. Perhaps Easywriter II from IUS Ltd. comes the closest to showing exactly what will be printed, since it shows special effects as well as justification. However, since it is a page-oriented system, you can only see one page at a time. I like to see everything on the screen while I am editing, including dynamic formatting as well as the ruler line, which is why I like Wordstar and put up with the printer control characters. Easywriter II costs $300.

However, I concede on the issue of specialized format requirements. Computers have not come that far yet. If you produce specially formatted documents, neither Wordstar, Wordperfect, Benchmark nor Multimate will suit you in the long run. If you produce documents with outlines, tables of contents, indexes, multiple columns and so on, you look for the format specialists.

The concept of style sheets or specially prepared format designs is becoming extremely popular, and several word processors specialize in this feature. A fine example is Powertext from Beaman Porter, Inc., which lists for $399. The product comes with several preset format sheets that you can use or alter. You can also prepare your own. You simply indicate exactly where you want the text to appear on the page by answering a few simple questions. The concept is that of a steno pad. You input who the letter is to, who it is from and what you want to say: first paragraph, second paragraph and so on. Before you actually type the text, you indicate what it is — for example, the addressee, the closing and so on. Powertext formats according to your specifications, and it prints correctly formatted.

Although Powertext does not offer print spooling, print queuing or dynamic editing display, it is a powerful formatter. It will create a table of contents, multiple columns and even text in a box for special reports. As a user, I found the command menus a bit confusing and the fact that word-wrap must be turned on manually a bit disconcerting, but Powertext's unique formatting capabilities far outweigh its disadvantages. Additionally, it provides a less powerful mode that will allow you to create dynamically displayed text.

Emerging Technology's Edix/Wordix is a similar product that actually separates the editor and print formatter into two different programs. But it provides a huge amount of power. Edix/Wordix offers multiline headers and footers, labeled and automatically numbered lists, section numbering and table of contents, page and section numbers in headers or footers and automatic footnoting, as well as forms design.

Like The Final Word, Edix/Wordix provides 12 text buffers and will display up to four windows. Edix/Wordix offers up to 18 Help displays to assist in extravagant formatting. Powertext and Edix/Wordix specialize in special formatting. They are not, however, alone in this field.

Both The Final Word and Perfect Writer offer outline formatting, table of contents and indexing. Perfect Writer features an advanced set of prestructured formatting commands. This set allows you to number automatically, center many lines at once, produce a quotation environment and produce any specialized format in the middle of a standard document, which can be viewed before printing. The possibilities are limitless. Preprinted forms can be handled by Benchmark, Wordix/Edix and Wordplus-PC from Professional Software, Inc. Wordplus-PC sells for $395.

There are a number of word processing packages available which, although weak in the editing department, have some very unique printer capabilities. Peachtree Software, Inc.'s Peachtext (formerly Magic Wand) is a fine example of a product that can perform magic on the printer. Using its conditional printing capabilities, it can be used to mass-produce campaign letters to contributors based on the size of the financial endowment. The letters vary with the amount of generosity. Peachtext costs $395.

Sorcim Corp.'s Superwriter is another example. It can use its capability of reading variables and performing conditional printing to do a similar function.

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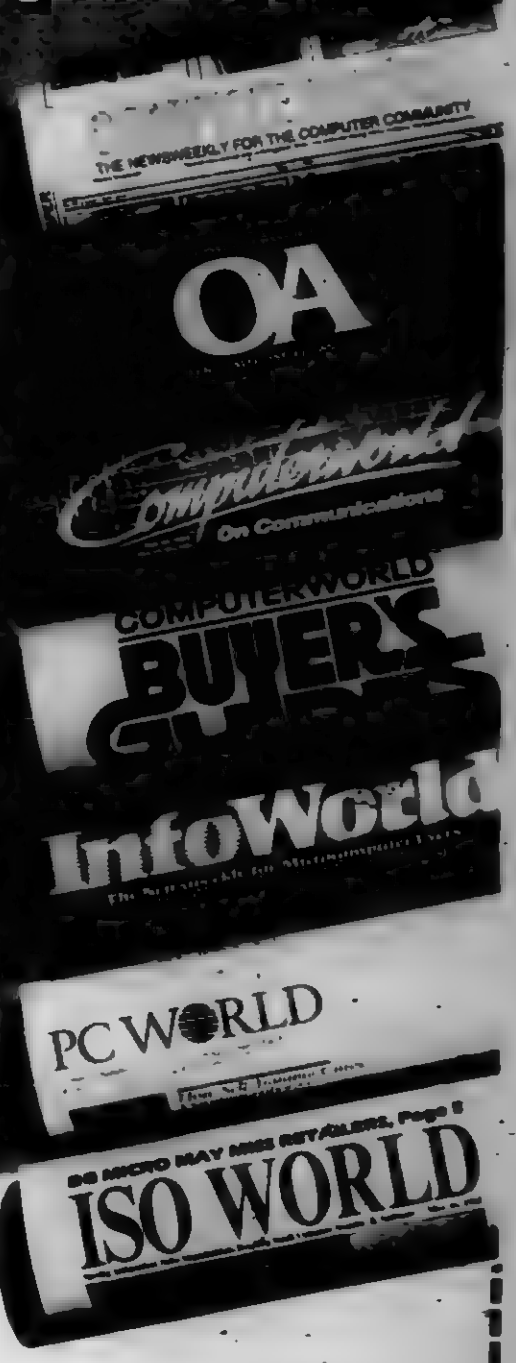

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Superwriter is, as mentioned above, weak in the editing area. Although the basic editing is dynamic, all of the formatting is done through special coding, again offering a view mode before printing. Superwriter lists for $295.

Word processing on micros is more and more beginning to resemble the dedicated word processors. This is partly because many packages are being written for specific computers such as the IBM Personal Computer and the Digital Equipment Corp. Rainbow with their many function key possibilities. More importantly, power is being added in the form of more advanced features. Wordperfect offers math and multicolumn formatting. Benchmark also offers math and, along with WordPlus-PC, handles business graphics. Spellbinder offers math, multicolumn formatting, a sort feature and more.

Another feature borrowed from dedicated word processors is the concept of the document history or comment sheet, which can include information on author, typist, subject matter, revision dates and so forth. Superwriter, Benchmark, Peachtext, Visiword and Multimate are among those that offer this feature. In fact, Multimate features key word indexing of documents through the document history sheet.

Wordstar set a precedent by introducing the marketing concept of modular program design. Instead of including some of these advanced features in Wordstar, Micropro offers them in separate products. Mailmerge performs file and mail list merging; Spellstar checks spelling; and Star Index generates outlines, tables of contents and indexes.

Wordperfect includes a merge function. A special sort program and a spelling checker are offered separately. Spellbinder has a merge but not a spelling program. Peachtext includes a merge function as well as a limited math function, and spelling is extra. Edix/Wordix also offers merge capabilities, but spelling is extra. Multimate offers merge and will soon include spelling.

There are separate spelling and merge packages for Benchmark, Perfect Writer, Visiword and Easywriter II. Both Select and Superwriter include a speller and a merge program. Currently, The Final Word does not offer either capability.

Macros are in. They have always been around, but now they are regarded as sexy, and they are becoming more popular and more user-friendly. Macros offer the ability to store a repetitive sequence of commands or keystrokes under one key. It is almost like programming your own function key. For example, Benchmark requires the user to access panels to alter page formats, print styles and tab lines requiring a series of keystrokes. You can avoid these panels by assigning the often-used keystrokes to one key.

Macros are also offered by Multimate, Edix/Wordix, Wordperfect and Spellbinder. In fact, Spellbinder uses its own predefined macros to give you mail merge, sort, column printing and calculator functions. Spellbinder also includes M-speak, its own programming language. Macros can save laborious keystroking, and, when set up in advance, they can facilitate the use of the software by relative novices.

Before running out and buying any of the above packages, consider this question: Who is going to be using the product? All of these are fine products, but many of them have a defined user group. For instance, The Final Word and Spellbinder are not suitable for the average secretary, partly because neither product has any secretary-oriented training guides or tutorials. Their level of sophistication is aimed toward a more experienced user. The Final Word has defined its market as professional or technical writers.

Lexisoft is totally rewriting Spellbinder's documentation and also making its macros easier to use. This should widen its potential user market considerably. For the last several years, the product best known for its friendliness and ease of learning has been Select. Its famous Teach facility, which is included with the product, brought computerized word processing to offices that have a problem of high turnover and need a very low learning curve.

Once a simple program, Select has improved increasingly over the years. Today, Select features on-screen displays for bold, underline, justification, two viewing windows, document assembly and more. Version 3.0, soon to be released for all formats, will include keystroke memory, saving tabs, decimal tabbing and printer interrupt to change font styles.

With the advent of the personal computer, a new user group is emerging — the executive or management professional. If every other white-collar professional will have a computer on his desk in ten years, it is obvious that computers will be used by more than just typists. For executive word processing, you need a program that is easy to learn and use. Power is not as important.

WORD PROCESSING

My vote goes to Volkswriter from Lifetree Software, Inc. Without a doubt, it is the easiest word processor to learn. I was able to understand 75% of it within 20 minutes without the manual. It is not disk-buffered, and it does not display dynamic page breaks, although it does have a view mode. In addition, it does not display bold or underscore. It does have a file-include statement to insert other files while printing, and it has an international version that supports special foreign characters.

However, avid fans of Volkswriter who feel they have sacrificed power for ease of use should take heart. Lifetree is releasing its deluxe version, which will include horizontal scrolling, text merge, dynamic page breaks, disk buffering, footnote generation and printer configuration for the user. It will support five different fonts. Volkswriter costs $195.

Visiword is another executive word processor. It is completely menu-driven and easy to learn. Visiword features windows, horizontal scrolling, on-screen justification, table of contents generation and a complete on-screen tutorial. Perfect Writer and Wordperfect also include

	Word-Star 3.3	Word-Perfect 2.8	Volks-Writer	Final Word	Select 2.0	Microsoft Word 1.0	Wordplus-PC	Super-Writer
Memory	64K	128K	64K	64K	64K or 128K	128K	128K	64K
Operating System	CP/M-80, CP/M-86, PC-DOS	PC-DOS	PC-DOS	PC-DOS, CP/M MS-DOS, Venix	CP/M-80, CP/M-86 PC-DOS, MS-DOS	PC-DOS, MS-DOS	PC-DOS	CP/M-80, CP/M-86, PC-DOS
List Price	$495	$495	$195	$300	$495	$375	$395	$295
Automatic Hyphen	Yes	Yes	No	No	No	Yes	No	No
Column Move	Yes	Yes	No	No	No	Yes	Yes	No
Horizontal Scroll	Yes (256)	Yes (158)	No	No	No	Yes (256)	No	No
Automatic Indent	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Decimal Tab	Yes	Yes	No	No	Yes	Yes	Yes	No
Bold, Underline Display	No	Yes	No	One or the other	Yes	Yes	Yes	View only
Justification Display	Yes	Yes	View only	Yes	Yes	Yes	No	View only
Double Spacing Display	Yes	Yes	View only	No	No	Yes	No	View only
Page Break Display	Yes	Yes	View only	No	Yes	Yes	No	View only
Window Display	No	No	No	2	2 — View only	8	No	No
Outline Format	No	No	No	Yes	No	No	No	No
Conditional Paging	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Automatic Footnotes	No	Yes	No	No	No	Yes	No	No
Copy Files	Yes	No	No	Yes	Yes	Yes	No	No
Disk Buffering	Yes	Yes	No	Yes	Yes	Yes	No	No
Automatic Backup	Yes	No	No	Yes	Yes	Yes	No	Yes
Print Spooling	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Print Queuing	No	Yes	No	No	No	Yes	No	No
Proportional Printing	No	No	Yes	Yes	No	Yes	Yes	Yes
Column Print	No	Yes	No	No	No	Yes	No	No
Document Assembly	No	No	Limited	Yes	Yes	Yes	No	No
Table of Contents	Extra	No	No	Yes	No	No	No	No
Math	No	Yes	No	No	No	No	No	No
Merge	Extra	Yes	No	No	Yes	No	Yes	Yes
Spelling	Extra	Extra	No	No	Yes	No	No	Yes
Training Guide	Yes	No	No	No	Yes	Yes	No	Yes

MICRO MISSION

on-screen tutorials. For all of its power, Wordperfect can be tricky, but is made easier to learn by the fact that all commands are accessed by the function keys on the IBM Personal Computer and a command template is included. Additionally, a smaller, easier version called Personal Wordperfect is available. It is missing many of the advanced features, but not the basic power, and the price is greatly reduced from $449 to $195.

Products like Visiword, Multimate, Wordplus-PC, Wordperfect and Easywriter II were written specifically for the IBM Personal Computer and therefore utilize the function keys fully, which is a real aid to learning commands.

The version of Benchmark on the DEC Rainbow also takes full advantage of the function keys. However, the learning curve is a bit higher for products like Wordstar, Spellbinder, Peachtext, Superwriter and The Final Word. These products have crossed over from CP/M versions that had to operate on a wide variety of keyboards and are highly dependent on control/key command sequences and format coding from the keyboard. Whichever word processor you choose, investigate the kind of training assistance offered with it.

Although not yet in the top 20, there are two products that demand honorable mention in any general overview. Microsoft, Inc.'s new product Microsoft Word lays claim to all of the features discussed above and more. It has not been released yet, but it promises to include eight editing windows, multiple font selection, print spooling, print queuing, displayable super and subscripts as well as italics, horizontal scrolling, proportional spacing, footnotes, automatic paragraph adjust and a two-course training guide as well as on-screen tutorials and Help screens.

That is just half of its intended capabilities. You can store from one character to 10M bytes in a glossary under a one-character reference name. Then, by either typing the names or selecting from the glossary directory, you can assemble a lengthy document using this boilerplate material.

Microsoft Word also offers dynamic condensed capitalization, which allows you to reduce in size logos or trademark systems for superscripting. Although the initial release will not include a merge or a spelling program, both, along with other advanced features, are planned for a future release. Whether or not future versions will be modular in concept has not been made public. Microsoft Word lists for $375.

Microsoft is capitalizing on the new mouse technology by offering the optional purchase of a mouse along with the product. The difference is $100 in price, but there is none in functionality. Executives may find that the mouse facilitates their operation of the software. Certainly, less keyboarding is involved. The command structure will be the same as Multiplan — an easy transition to make for current users.

This may give the old veteran Wordstar a true run for its money. But Micropro will also soon release Wordstar/Mailmerge 4.0, which will include all features available today in any word processor and more. It will be an interesting confrontation.

Techwriter, written by Computer-Mart, Inc., has been around for about a year on Northstar Computer, Inc.'s micro, the Northstar Advantage. It will soon be released on CP/M-80 for the IBM and the Apple micros. Techwriter is a scientific word processor that does amazing things. It performs all of the ordinary functions, including the fastest search and replace I have ever seen.

Techwriter also generates tables of contents, indexes, multiple columns and includes a merge function. The clincher is that it displays super and subscripts and Greek symbols on screen with the touch of one key. It also features an equation mode as well as access to a glossary containing symbols such as radical signs and sigmas. It displays equations as they will print.

The glossary function also features a quick and easy way to produce a letter with its envelope and design-your-page numbering format. With the exception of the formatting commands, all of the functions are accessed through the many function keys of the Northstar Advantage. The same will be true for both the Apple and IBM versions.

Techwriter comes with the most complete reference manual I have ever seen, and a training guide for all versions will be available soon. Additionally, numerous Help screens assist the user in learning the product. Techwriter is currently being used in many major universities all over the country. If you produce highly specialized technical or scientific documents, Techwriter may be a wise choice. Its price is not available yet.

If you need to combine word processing with other functions such as mail list creation and spreadsheet generation, consider buying a family of products. Many companies, including Visicorp, Perfect Software, Micropro, Sorcim, Microsoft and IUS, market a family of compatible products.

Besides the obvious file compatibility advantage, products within the same family generally use similar command structuring. Micropro, Sorcim and Microsoft products all share many commands within the family. If you prefer a cross section of products, check to see if they offer file compatability with other products.

Make sure that your software is totally compatible with whatever printer you choose. If you do not see it on a list of installable printers, but still hear "No problem," run the other way. The Final Word and Perfect Writer win the printer compatibility award. They claim intimate knowledge of over 40 printers.

Many products rely on printer tables which, while giving many more options, can be a problem if you do not know what you are doing. In the long run, it pays to buy from a dealer that will install and support your printer.

Select a word processor the way you would choose a car — consider utility, design and price. Go for the features that give you the best functionality, and try to get the most for your money. ♦

Harmon is a consultant with Transitions, Burlington, Mass.

	Tech-Writer	Bench-Mark	Perfect-Writer	Easy-Writer	Multi-Mate	Power-Text	Spell-Binder	Peach-Text 5000	Edix/ Wordix	Mai-Word
Memory	64K	128K	64K or 128K	64K or 96K	128K	64K	64K	128K	128K	128K
Operating System	CP/M-80	CP/M-86, PC-DOS, MS-DOS	CP/M, PC-DOS	PC-DOS, MS-DOS	PC-DOS	P-System	PC-DOS, CP/M	PC-DOS	PC-DOS, MS-DOS	PC-DOS, MS-DOS
List Price	Not available	$495	$495	$350	$495	$399	$495	$295	$390	$375
Automatic Hyphen	Yes	Yes	No	No	No	No	Yes	No	Yes	No
Column Move	Yes	Yes	No	No	Yes	No	No	No	No	Yes
Horizontal Scroll	Yes (127)	Yes (155)	No	No	Yes (156)	No	Yes (159)	No	Yes (256)	Yes (128)
Automatic Indent	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Decimal Tab	Yes	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes
Bold, Underline Display	Yes	No	No	Yes	No	No	No	No	No	Yes
Justification Display	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes
Double Spacing Display	No	No	No	No	No	No	No	No	No	Yes
Page Break Display	Yes	Yes	Yes — IBM	No	No	No	No	No	No	Yes
Window Display	No	No	2	No	No	No	No	No	4	2
Outline Format	Yes	No	Yes	No	No	Yes	Yes	No	Yes	No
Conditional Paging	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	No
Automatic Footnotes	Yes	Yes	Yes	No	No	Yes	No	No	Yes	No
Copy Files	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Disk Buffering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Automatic Backup	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes
Print Spooling	Yes	Yes	Yes	Yes (96K)	Yes	No	Yes	Yes	No	Yes
Print Queuing	Yes	Yes	Yes	Yes (96K)	Yes	No	Yes	No	No	Yes
Proportional Printer	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No
Column Print	Yes	No	No	No	No	Yes	Yes	No	No	No
Document Assembly	No	Yes	Yes	No	Yes	No	Yes	Yes	Yes	No
Table of Contents	Yes	No	Yes	No	No	Yes	No	No	Yes	Yes
Math	No	Yes	No	No	No	No	Yes	Yes	Yes	No
Merge	Yes	Extra	Extra	Extra	Yes	Yes	Yes	Yes	Yes	Extra
Spelling	No	Extra	Extra	Extra	No	No	No	Yes	Extra	Extra
Training Guide	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes

E·X·T·R·A·!

THE POLITICS OF IMPLEMENTATION

ILLUSTRATION BY RICH TENNANT

The widespread use of microcomputers, or personal computers, is creating a political schism between the more traditional data processing personnel, DPers with microcomputer expertise and nontechnically oriented micro users. Sometimes this results in the development of separate competing functions within an organization.

Several factors must be considered in order to comprehend and avoid office politics and counterproductive professional antagonism. Most of the office politics surrounding the introduction of microcomputers is due to a combination of factors: administrative considerations, zealous vendor marketing, the relative merits of using large

By Don L. Eddy and Connie L. Gordon

MICRO MISSION

mini and mainframe systems vs. microcomputers for data processing functions and perceived instrusions on DP professionalism.

Over the past 10 years, rapid technical advances and reduced production costs have fostered and nurtured the microcomputer industry. Technological innovations have made the reduction of the size of computers possible to the point where sophisticated computers can now occupy a small fraction of the space formerly required, with large data storage and processing units requiring no more than microcomputer space.

Since the introduction of microcomputers, innumerable companies specializing in their production have sprung up, and many have also disappeared. Leading computer manufacturers such as Burroughs Corp., Digital Equipment Corp., Honeywell, Inc. and IBM have developed microcomputers to claim a share of the market. Specialized off-the-shelf software packages have been developed to run on various microcomputers.

Technical journals, specialized magazines and product-oriented users groups have sprung forth to share information and to meet the ever-increasing needs of both DP professionals and hobbyists. Despite all of these resources, a serious void exists. To date, there are no magazines or journals specifically oriented toward the non-data processing business professional.

Misunderstandings among users have arisen concerning the capabilities and benefits of microcomputers. In many respects, these misunderstandings parallel those that accompanied the introduction of the initial computer systems in the late '50s and early '60s. These same misunderstandings are leading to problems similar to those experienced during that period.

Vendors have and continue to market their microcomputers as a panacea that will, with the use of prepackaged software packages, make many clerical and managerial tasks more efficient and less expensive — in terms of developmental costs of software and in minimizing turnaround time and production costs. In addition, when a manager's microcomputer is idle, an administrative assistant may use it as a word processor.

With nontechnically oriented users given data processing capabilities, their dependence on a centralized data processing operation to develop and produce specially designed business graphs and spreadsheets is minimized or eliminated. Now, project management reports and data base management-like software packages, as well as word processing capabilities, are available to the non-data processing user. Of equal importance, stand-alone microcomputers can be fully under the user's control.

In view of what is publicized as a relatively modest investment, these claims are quite appealing to the business community. Although the cost of the first one (approximately $4,500) appears low, it is the cost of the other 100 to 200 units ($450,000 to $900,000) that is the bottom line. These microcomputers can be so productive that everyone in an organization believes that they deserve one. The problem, then, is one of control via corporate policy.

As with larger computers, there is a lack of industrywide standards for microcomputers. These differences cause a multitude of technical misunderstandings that can only be resolved with the intervention of knowledgeable microcomputer experts.

For example, not all microcomputers use the same operating systems: Programs developed to run on one operating system will not function on another. Not all microcomputers use the same or even similar versions of programming languages, rendering many programs inoperable on different units. Processing and storage capabilities vary between microcomputers, depending on the amount of memory — both in terms of read-only memory and random-access memory — in each respective unit. Electromagnetic storage media — for example, cassette tapes, 3-in. 5¼-in. and 8-in. floppy diskettes and hard disks — are usually mutually exclusive and may not be used interchangeably on a microcomputer. Furthermore, information usually is not readily transferable from one storage media to another.

Businesses that currently have large computers usually want to network microcomputers with other microcomputers and with their large computers or minicomputers. This presents another set of technical problems. In larger data processing systems, communications procedures vary. The same is true between microcomputers. Therefore, interfacing or networking microcomputers with one another or with minicomputers or large computers requires the skills of data communications experts.

Aside from the technical problems associated with networking computer hardware, administrative management, file management and file security are rather complex problems. Files on minicomputers and large computers reside in one location — on magnetic tape or on disk. Data processing personnel are responsible for regularly creating backup copies of data files. Access to viewing, copying, modifying and deleting data files on larger computers is usually controlled by a security system.

In contrast, files on microcomputer are highly portable. Regardless of

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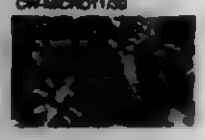
CW-MICRO11/28



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THE SOFTWARE ENGINEERS

the storage media used — for example, cassette, floppy diskette or even portable hard disk — the location of the files is determined by the user. They are not in one central location. Thus, it is imperative that procedures be carefully established to inventory and control microcomputer files. Together with provisions for system, storage media and file structure compatibility, the establishment of reasonable controls and procedures can result in the prevention of redundancy of effort and the creation of shared information resources for greater office productivity.

Care must also be taken to copy these files routinely and protect them from environmental damage — for example, damage from heat, humidity, dust, electromagnetic erasure and damage due to handling.

In-house squabbles over microcomputers cover a multitude of topics and professional and political concerns. For example, who should be involved in deciding to purchase microcomputers — upper or middle level management, end users, data processing personnel or a

In-house squabbles over microcomputers cover a multitude of topics and concerns. For example, who should be involved in deciding to purchase microcomputers?

combination? Who should carry out equipment and prepackaged software evaluations, recommendations and selection? Should there be a formal or informal program established to introduce microcomputers and train the end users in their use? If so, who should conduct the training — data processing personnel or the administrative staff? Who should be responsible for the maintenance of the microcomputer and software acquired? If software programs require interfacing, who will be responsible for the development of the required software — the end users or data processing personnel?

Aside from a dichotomy being drawn between DP personnel and microcomputer users, there is a distinction between traditional data processing personnel and those with microcomputer knowledge. Some of the more traditional DP professionals tend to downplay the importance of using and integrating microcomputers in a multifaceted computer configuration. Some may realize that it presents an important breakthrough in technology, but think they are old to learn about it. Others totally ignore microcomputers, considering them to be a passing fad.

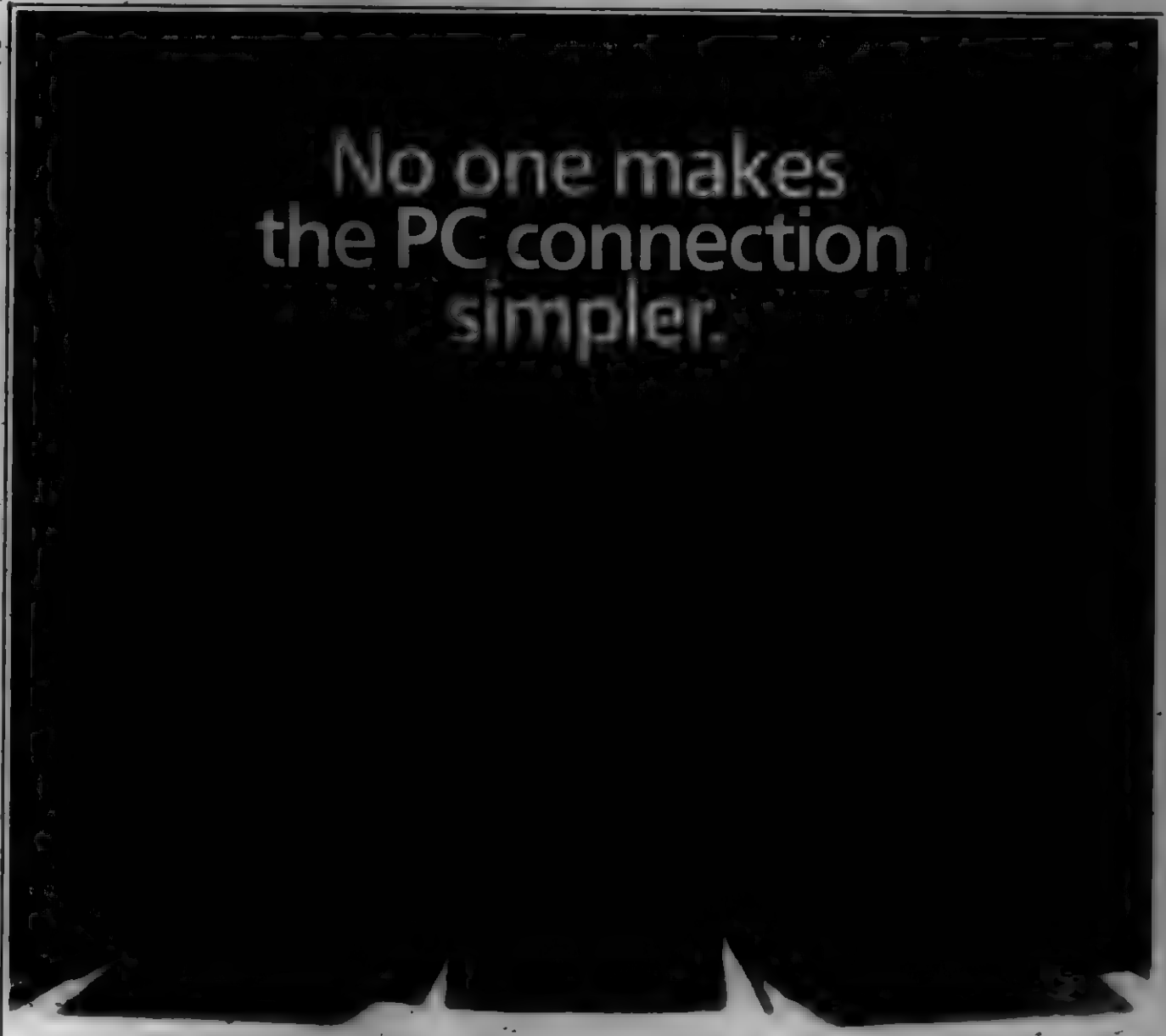
Microcomputers acquired as part of a formal business information systems plan have higher rates of acceptance, use and productivity. They are researched and purchased in an orderly manner and are used as stand-alone processing units, in a network of microcomputers or integrated into a larger data processing system. All stages of acquisition use and projected use of microcomputers

Should there be a program established to introduce microcomputers and train the end users in their use?

are carefully defined by the user. Future usage is projected, and there is a clear statement of the involvement and extent of responsibility of all personnel associated with the various stages of this process.

In brief, a formal business information system plan clearly states the intended use of the microcomputers, the goals and objectives of using them, alternate methods of reaching the stated objectives, as well as the business issues and impacts involved in acquiring the desktop systems — in terms of the anticipated office productivity improvement opportunities, the problems and their potential solutions.

A logical structured approach toward obtaining and using microcomputers is always preferable. However, it



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TEXAS INSTRUMENTS

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may only minimize, not eliminate office politics surrounding microcomputers.

In most instances, microcomputers are acquired more casually. Occasionally, microcomputers are desired as high-technology status symbols to adorn someone's desk. More often though, executives, managers and support staff request and purchase microcomputers to perform specific processing functions. Aside from preliminary probing questions about the relative merits of various highly advertised microcomputers, data processing personnel are not consulted before the units are purchased by individual users. Conversely, when data processing personnel purchase microcomputers for users, they tend to do so without adequately determining true user requirements.

With these acquisition approaches, the buyer tends to have little or no knowledge of the problems likely to be encountered. Office productivity improvements are almost expected to coincide with the insertion of the unit's electrical plug into a wall socket. The user usually views microcomputer technology as a solution to office productivity problems, rather than a tool to improve office productivity. The machine is viewed as an end in itself, rather than a means to an end. Consequently, companies are experiencing an increase in the computerization of the unnecessary, which is counterproductive.

To offset the perceived microcomputer threat, the reaction of some data processing personnel is to put user-friendly software in large computer systems. This usually results in near-term requirements to increase the size and cost of the larger computer system. Moreover, this action provides a false sense of security for data processing personnel and added income for the large computer vendor.

As processing functions are taken over by the user, the need for data processing to justify more fully all of the activities, responsibilities and practices associated with the larger system increases. Hence, microcomputers may threaten current practices and planned expansion of the larger computer system.

There are innumerable books, seminars and short courses offered by a variety of firms, educational institutions, professional associations and vendors to familiarize technical and nontechnical users with microcomputers and software packages. Currently, only a small percentage of data processing professionals have been involved with microcomputers in the business environment. Some data processing professionals are only recently becoming acquainted with microcomputers, and some are developing expertise.

Most microcomputers and software packages have been specifically designed to be user-friendly. Therefore, nontechnical personnel are having little difficulty working with them. Programming languages commonly used on microcomputers appear to be easy to learn and tend to lull the user into a false sense of expertise. These languages are actually somewhat difficult to use and master without a thorough knowledge of fundamental computer programming concepts and controls.

The aim of the user-friendly design effort is to make computer processing functions accessible to more users — which it has. At the same time, it has created untold numbers of seminars and self-trained microcomputer "experts". Most of these "experts" are merely conversant in microcomputer terminology, technology and software. Very few of them actually have in-depth understanding of computer systems and the controls and procedures needed to create, maintain and manage an efficient, productive computer operation.

Office politics occurs universally at every organizational level. It involves the garnering of power and the appropriate maneuvers to accomplish an individual's or group's objectives. Sometimes those involved lose objectivity and place personal interests over a well-moderated business perspective.

While the user is best suited to define his own processing needs, there are many technical questions and problems that those well-versed in micros are best equipped to address.

Other more basic fears lie beneath the more obvious questions of expertise in planning, selecting and using personal computers.

Large computer and minicomputer installations are expensive. Aside from the initial purchase and installation cost, they require a staff of data processing professionals to maintain, manage, program applications, disseminate information and assist users on an ongoing basis. In effect, the computer installation is a localized service, or in some cases a series of localized in-house services, providing for an organization's information processing needs.

The introduction of microcomputers is perceived to present several threats to personnel in more traditional data processing environments. With massive advertising and educational campaigns and the ever-increasing use of microcomputers in schools, homes and offices, a demystification process has occurred.

Now, the end user is no longer dependent on data processing to meet all of his processing needs. With users given the ability to meet their own immediate information needs, the backlog of data processing requests is removed. As a result, data processing experiences a loss of control over certain processing functions. As this process occurs, the need for data processing to train and educate the users increases.

Nontechnically oriented microcomputer experts may offer well-meaning but inaccurate or inappropriate advice on the management, responsibilities and functions of the central data processing divisions. In response, data processing professionals may downplay the beneficial aspects of microcomputers, insisting that all processing be accomplished on the larger system. This may also occur when data processing wants to expand or upgrade its facilities: Clearly, a reduction of processing requests undermines these plans. Alternatively, if snubbed in the planning, selection and management phases of acquisition, data processing personnel may choose not to provide direction and guidance for the microcomputers. They simply wait for problems that overwhelm the users to arise before taking over.

Another important factor in this political situation involves the language of data processing. Specialized terminology evolves with each discipline and is intimately associated with specialization and professionalism. Today, much of the esoteric jargon of the data processing profession has become common English usage. Now, many young children discuss the different functions of random-access memory and read-only memory and peeks and pokes, as well as the relative merits of various computer chips and of volatile and nonvolatile memory. Thus, the popularization of professional terminology is perceived as yet another intrusion into the realm of the data processing professional.

Office politics occurs universally at every organizational level. It generally involves the garnering of power and the appropriate maneuvers to accomplish an individual's or group's objectives. Sometimes those involved lose objectivity and place immediate personal and professional interests above a well-moderated business perspective.

Whether microcomputers are acquired in a well-planned, well-executed manner or not, animosities will arise over them, and political tensions will mount. In order to minimize these problems, microcomputers must be recognized for what they are — tools to achieve greater office productivity, not as ends in themselves.

Perhaps because microcomputers are modestly priced and affordable to a broad consumer base, the care taken in justifying, researching, planning, acquiring, introducing and maintaining larger systems is not taken with microcomputers.

The creation of a successful computer system, be it large or small, requires input from and the cooperation and expertise of numerous people with diverse backgrounds. Upper and middle level management, other users and data processing professionals should be involved in planning, acquiring and establishing microcomputer systems. The exact mix of those involved is situational and best determined by knowledgeable management within the framework of formal information business system planning. ♦

Eddy and Gordon are principals in Office Futures Now, Greenwich, Conn.

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BREAKING GROUND

A BILLION-DOLLAR COMPANY IMPLEMENTS AN INNOVATIVE PERSONAL COMPUTER POLICY

P

Individuals can now have powerful computing capability at their desks. At one time, computers were expensive, and people's time was less expensive. Today, computing power is cheap and getting cheaper. The economy of computing has swung dramatically, and this change requires a rethinking of how information resources are managed. It is wise for organizations to take advantage of the new economics and adapt to the personal computing trend.

Setting a personal computing policy is complex and has many implications. Here is a case history of how one company established its personal computing policy. It

MICRO MISSION

involves a billion-dollar company headquartered in a major industrial city. Corporate and divisional office staff exceed 1,000 employees in the headquarters city. The company has over 20,000 employees and sells products throughout the U.S.

The company saw that personal computing offered great opportunities to improve productivity and effectiveness and to save money. It also recognized that deploying personal computers was complex and not without significant risk. Inaction was seen as an invitation to chaos.

The company has a substantial investment in software, hardware and training in an IBM mainframe environment. The applications development backlog was consequential. Over a year ago, the company established an office automation task force to review and evaluate the implications of office automation. The task force was composed of executives and middle managers representing the operating divisions, administration, finance, purchasing, data processing and other staff functions.

The issue of personal computers was one of several topics on the task force agenda. One of the operating

At the outset, members of the task force made three critical observations about personal computing. First, personal computers and office automation should become part of the company culture in a conscious and planned way, rather than in a chaotic and disorganized way...

divisions had already purchased two microcomputers. One was in a division manager's office. The other was used for division planning. Within the division, one forward-looking manager and one technically oriented staff member were internal champions for the personal computer. They used the micro extensively themselves and trained interested co-workers in its use.

In this nonthreatening and supportive environment, microcomputer use grew steadily. By the time the task force began meeting, the micro was being carefully scheduled so that it could be used by the many people who needed it. Individuals within the division and throughout the headquarters were requesting their own micros and were asking for personal computer support.

At the outset, members of the task force made three critical observations about personal computing. First, personal computers and office automation should become part of the company culture in a conscious and planned way, rather than in a chaotic and disorganized way. Second, there is enough information available to make sound decisions about the implementation of a personal computer policy. Third, the company had never implemented a personal computer policy before. There were important technical, cultural and business issues involved. Outside expertise was seen as invaluable in light of the considerable impact micros were expected to have.

The company selected a consulting firm to assist in the office automation and personal computer area. The key criteria for selecting a consulting firm were competence, breadth of experience, complete independence and professionalism. References were checked carefully.

The consulting firm was given reasonable opportunity for data collection and was named as advisor to the office automation task force on matters of microcomputer policy.

...Second, there is enough information available to make sound decisions about implementing a personal computer policy. Third, the company had never implemented a personal computer policy before.

The firm was assigned to advise the task force on its full range of alternatives, and the task force would make the policy recommendations to the corporate officers.

Thirteen issues that merited consideration for this particular company were identified. These issues included initiation, justification, product selection, compatibility, procurement, implementation, training, programming, maintenance, user support, monitoring, control and general education.

While each of the issues was important to this company, four issues required considerable attention and discussion. Each of these are discussed below.

Perhaps the most critical question in any company is who will be responsible for monitoring and implementing personal computing. In every company, there are four groups, each with an important role. These

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groups are the information systems department, communications, end users and office administration.

Personal computer evaluation, selection and implementation are complex technical undertakings. In general, the information systems department has the charter to understand and implement information technology.

While many personal computers are used on a stand-alone basis today, it is clear that they will need to communicate tomorrow. The communications will be to the corporate mainframe, to specialized minicomputers, to public data bases, to other personal computers and to a variety of other services. The ultimate success of micros depends on establishing an adequate communications infrastructure. The communications function can play an important role.

End users have been the personal computer pioneers in many companies. Personal computers are confusing to them in some ways, but end users see the need and understand the benefits. They are demanding personal computing. As pioneers, they have had direct control of their micros. Now that microcomputers are becoming accepted, it is no wonder that end users are reluctant to give up that control to a staff organization.

Office administration has been serving the needs of the office and clerical worker for a long time. Office services people understand the needs of the professional, administrator, secretary and clerk. They have been focusing on the individuals' requirements for decades and can claim insight of the culture into which microcomputers must be placed. Their job has been thankless at times, but they have learned how to be responsive on a personal level.

In the subject company, as in most corporations, the pros and cons of who would be responsible for personal computers were complex. The information systems department had genuine interest in micros. At the same time, information systems was implementing a major new system that was seen as essential to accomplishing overall corporate goals and objectives. The applications development backlog was already substantial. In addition, the information systems department had developed procedures for handling the big systems projects. Resources were already in short supply, and the information systems department was not oriented to serving individual users.

In this company, communications responsibilities were divided among different departments. Therefore, no communications department was positioned to play the leadership role for personal computers.

End users were the first users of micros. They did not want their use to be impeded or obstructed in any material way. At the same time, the users recognized that resources had to be made available to nurture and support personal computer users companywide. The user divisions were willing to share some control over personal computing if they were provided specialized support and greater assistance.

Corporate administration and other staff departments were the first in the company to identify the need for overall office automation planning. The administrative staff examined many of the personal computer alternatives and were early supporters of micros within the company. They had been a catalyst in the formation

BREAKING GROUND

End users have been the personal computer pioneers in many companies. Personal computers are confusing to them in some ways, but end users see the need and understand the benefits.

of the office automation task force and had exercised leadership in evaluating advanced office technologies.

The issue of responsibility and control was ultimately resolved. Currently, the chief administrative manager is responsible for implementing microcomputer policy, setting micro standards and providing micro support to the end users. The information systems department provides the technical and advisory staff to support the end users. The division executives have the final authority for the implementation of micros within their division. These executives also have the ultimate responsibility for monitoring personal computer use.

This approach does not fit every company, but answers all the major concerns of this company. The decisions for control of personal computers fit the corporate culture and match the skills of the different individuals. The administrative executive ensures that micros address the needs of the individual office worker. The information systems department provides qualified technical employees.

Personal computer technical staff stay on the information systems staff to ensure that an adequate career path is available and to provide added technical guidance. While this kind of dual reporting would be a nightmare in some environments, it works well for this company.

The division managers are held

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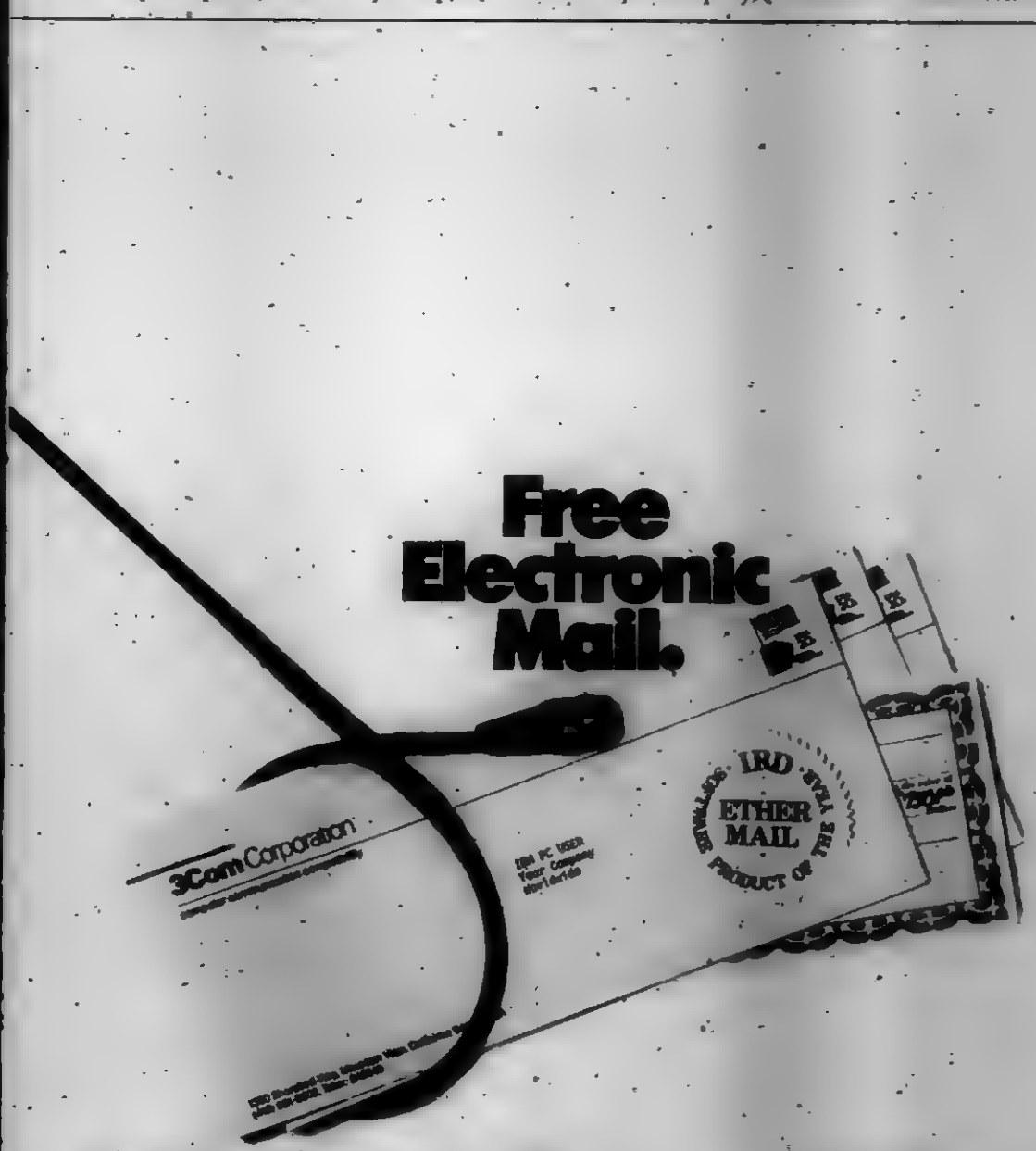

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MICRO MISSION

accountable for their respective division's performance. It was agreed that their authority must be final with regard to micros within their divisions. In practice, division management will look to the personal computer support staff for guidance. Division management will not often overrule the support staff as long as the support staff has the proper business and service orientations.

Another major question that arose was whether to standardize on a single micro vendor, select a few standard products or open the door to any micro that best meets the needs of a particular application.

Selecting a single vendor had both advantages and disadvantages. A single vendor would greatly simplify training, concentrate support skills and offer purchasing leverage. The ability to tie the micro together in the future would be greatly simplified, and the problem of accessing the mainframe would only have to be solved a single time.

On the other hand, a personal computer that is good for one task may be unsuitable for others. As technology evolves, integration problems that look awesome today may soon become trivial. One vendor may not be able to address all the company's needs at a reasonable price.

The company's policy decisions with regard to standardization are similar to those made in some other companies. The approach has broad applicability. A small number of products are approved as standards. Products are then chosen from the approved list to meet specific applications needs. The technical staff reviews new products and recommends changes to the approved list when it is necessary to do so.

In the event a job cannot be accomplished practically from the approved list, there is a mechanism established to allow deviations from the list.

Purchasing is assigned the responsibility to procure the hardware and expedite its delivery. Purchasing is acquainted with the applicable technologies and is expert at negotiating the best terms.

The company had traditionally viewed every purchase with great care and deliberation. How much justification would be required and who would be responsible for putting the justification together?

The task force recommended that several personal computer requests by end users be approved on a commonsense basis without formal justification. The feeling was that more experience with personal computers in end-user departments was needed before the full benefits could be appreciated. After this experience, it would be easier to list the benefits and justify the micros.

The task force felt that it could not infringe on the divisions' authority to establish its own justification procedures after the initial personal computer placements were made. The end users would be responsible for making their own case to their own division management. The personal computer support staff would advise and assist the users, but it was the requester who was responsible for getting approval.

The consensus of the task force was that too-elaborate justification would be detrimental. Since each part of the company was represented on the task force, it is expected that micro requests will be encouraged and that the justification efforts required will not be disproportionate to the size of the investment.

The company decided to offer micro support through a corporate personal computing center. The primary objective of the personal computing center was to serve end users by:

- Helping evaluate micro solutions to end-user information problems.
- Providing personal computer training and simple support to the end users.
- Making personal computers available so that end users could test drive them.
- Monitoring micro developments.
- Offering a sympathetic ear and helpful hand to users with personal computer problems.

The personal computing center could be characterized as a personal computing store within the company. Users could get specific information or they could browse. A micro hot line was also implemented so that a frustrated user could telephone with a question while still sitting in front of his microcomputer. Finally, some services from the information center concept would be made available to help meet some of the end-user computing needs that were poorly suited to personal computers.

Today, the company has a personal computer policy in place. Microcomputer use is encouraged, and its benefits are expanding. It is expected that micros will ultimately be an integral part of the information/office architecture.

Today, the company has a personal computer policy in place. Microcomputer use is encouraged, and its benefits are expanding. Since the policy was established with an eye toward overall office automation objectives, it is expected that micros will ultimately be an integral part of the overall information/office architecture.

The key elements of this company's policy-making success can be summarized as follows:

- Establishing a high-level task force representing all the parts of the company and dominated by no single division.
- Seeking the assistance of experienced, professional and objective consultants.
- Understanding all the issues and exploring all the options before trying to make any decisions.
- Discussing the critical decisions openly and eliciting the views of all interested parties.
- Putting the policy and first-level procedures in writing, explicitly assigning specific authority and responsibility.
- Keeping a broad perspective and considering the implication of other information, communications and office technologies.

Microcomputers can and should be a powerful tool in your company. They are so important that they must be implemented in an intelligent and forward-looking way. The development of a corporate personal computer policy is essential. ♦

Ulrich is president of Walter E. Ulrich Consulting, Houston.

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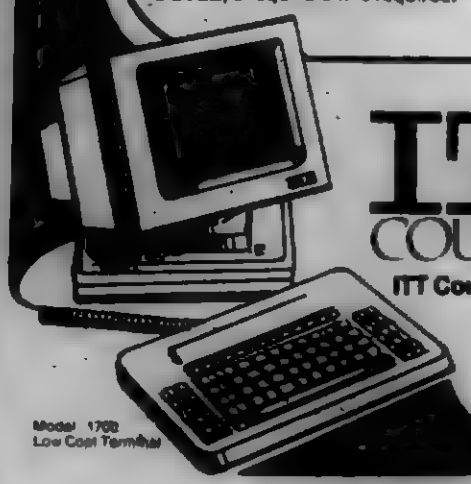

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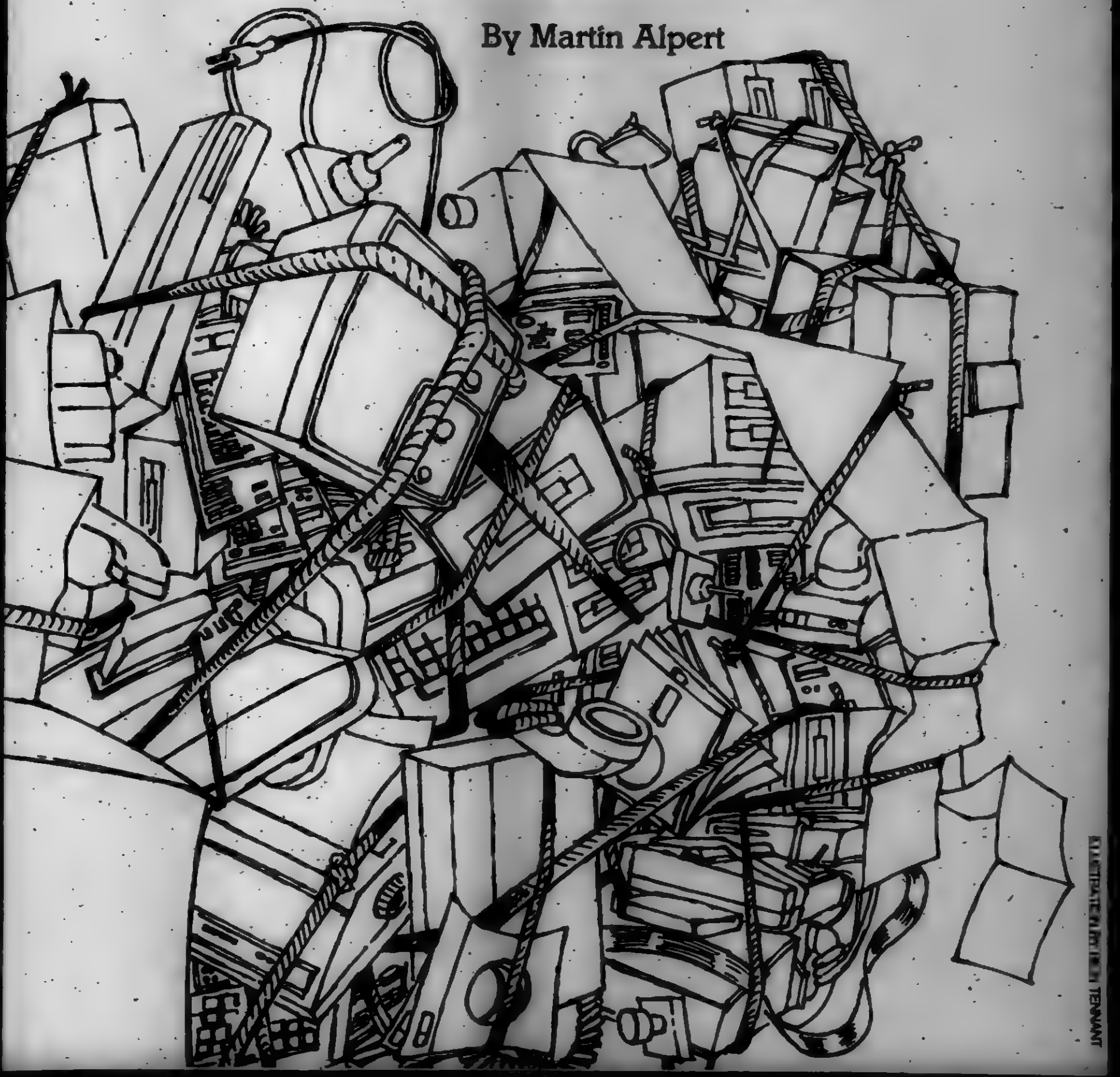
PERIPHERALS: FIT TO BE TIED

Much of the functionality and applicability of personal computers is due to the availability of peripherals. For many, this is a hobby that has become an industry and promises to contribute to the computing revolution in which communications is supplanting transportation.

In 1982, there were distinct personal computer product omissions such as Winchester, expansion slots and memory. In 1983, the IBM Personal Computer XT and IBM expansion and Winchester units arose as an answer to these omissions. This has resulted in a

By Martin Alpert



ILLUSTRATED BY TOM TENNANT

MICRO MISSION

legitimization of the Winchester and the concept of an expansion cabinet. As is typical when IBM enters a market, the result is increased sales of these programs even for the third-party manufacturers. Most likely, there will be greater needs in memory and higher capacity Winchesters as a result of improved and more demanding software such as desk emulators, lab emulators and networking.

In 1982, the peripheral manufacturer needed to develop applications packages to support the hardware. In 1983, with IBM's PC DOS Version 2.0 operating system, the ability to add drives for the hardware was added. In the future, multitasking — the ability to run several programs at the same time — will be made available. Improved user interaction software will also be available. People like to know; they do not like to learn. The new wave of desk emulators provides an easy path to be able to use the full functionality of the computer without a long and demanding learning curve. This same support is necessary for implementation of peripherals.

Compatibility with the personal computer was the only major requirement in 1982, but this year, compatibility with look-alikes and other peripherals has become more important. IBM has developed guidelines for software developers. Similar guidelines are necessary for hardware developers. These will constitute an important and difficult requirement as more systems become available with various degrees of computer power and as these systems begin to communicate with each other.

Quality, reliability and support have been and will continue to be of greatest importance to the peripheral industry. They are key to establishing and maintaining user confidence in products and companies. Peripheral manufacturers need to solve problems, not just provide products. This requires very strong support with integration of software and hardware.

Pricing has become more competitive in 1983, but will stabilize. Companies need to provide adequate capital for growth and appropriate support of products. There are also price increases due to the allocation of parts. Furthermore, companies that have not been pricing products appropriately will begin to have financial problems. This will result in a painful lesson for many of the smaller companies and the industry as a whole.

There will be a continued trend toward multiple duplication of products. This is unfortunate because there is such a tremendous need for differentiated products. This is partly due to the low cost to enter the market. However, this will change as technology advances and the cost of new product development escalates. Product promotion and marketing have become the major cost in selling new products.

A synergism has developed between the computer manufacturers and third-party peripheral manufacturers, and the growing availability of peripherals has resulted in increased computer sales. For example, the availability of analog-to-digital converters has led many users to purchase computers that are to be used in the laboratory.

Classification	% Influence	Future Significance
Product First	25	↓
Retail Price	20	—
Dealer Margins	15	—
Configurations	10	↓
Software Support	9	↑
Compatibility	7	↑
Performance	6	↑
Support	5	↑
Name Recognition	2	↑
Ease of Use and Installation	1	—

Figure 2. Priority Profile for Commodity Products

Commodity Product Profile	Specialty Product Profile
General Use	Industrial/Scientific, Education
Very Large Market Size — For Limited Number of Products	Moderate Market Size — For Large Number of Products
Multifunctionality	Unifunctionality
Mail Order Potentially Viable	Requires More Support
Traditional IBM Market	IBM Viewed as Overpriced
Types of Products: • Winchester • Multifunction (Memory) • Networking* • Graphics*	Types of Products: • A/D • IEEE 488 • Video Digitizer

* Not yet proven

Figure 1. Commodity vs. Speciality

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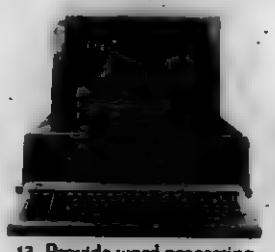

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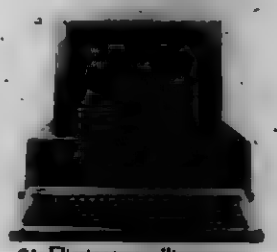
16. So you free up data processing resources...

17. And you don't have to key in data yourself.

18. Use MSA's Manufacturing System data to produce a cost/margin analysis with PeachCalc...

19. Make a capacity analysis using a PC and mainframe manufacturing information...

20. Summarize your findings in a report using PeachText...



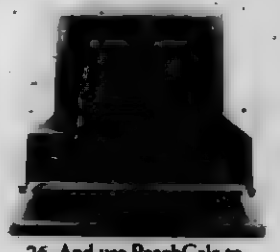
21. Eliminate spelling errors with a built-in Spelling Proofreader

22. Analyze overtime percentage on your PC, using data from MSA's Payroll/Personnel System...

23. Make timely manpower adjustments to maximize productivity...

24. And revise departmental salary projections on your PC.

25. Download vendor history from MSA's Accounts Payable System...



26. And use PeachCalc to do comparative analysis.

27. Use PeachLink to download information from both MSA and non-MSA online mainframe systems,...

28. Create custom online formats with Easy-Screen™.

29. Or use standard formats provided by MSA.

30. Download a financial report from the mainframe to your PC...

Turn Page▶

31. Add footnotes to a balance sheet using PeachText...

32. Project next month's income with PeachCalc...

33. Change sales estimates and recalculate income projections instantly.

34. Download names and addresses from your mainframe...

35. Use the List Manager and PeachText to do a mailing informing customers of a special announcement...

36. Or create a mailing to vendors requesting bids.

37. Using personal computer telecommunications, access up-to-the-minute exchange rate information...

38. Use PeachCalc for float analysis...

39. Display current exposure with a graph...

40. Update MSA's mainframe Foreign Exchange System.

41. Use PeachLink to distribute mainframe data to your other offices across the country...

42. Use a PC at those remote locations to print reports...

43. Graph expenses by location, department or by a single product line...

44. Print checks in remote locations from mainframe Accounts Payable data.

45. Create a salary administration worksheet on a PC using MSA's Payroll/ Personnel System...

46. Produce a workforce utilization model using PeachCalc...

47. Monitor turnover using Business Graphics...

48. And, for a printed copy, route your Business Graphics output to a plotter or printer.

49. Use PeachLink to get economic data from MSA's Forecasting and Modeling System...

50. Use PeachText to prepare a corporate planning policy document...

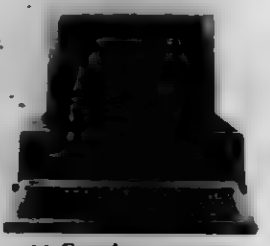
51. Refer to a built-in Random House® Dictionary while writing the report.

52. Link to mainframes under operating systems OS, DOS, and SSX...

53. Use all standard online monitors, including CICS, IMS-DC, IDMS-DC, TSO, CMS and ICCF.

54. Assist your auditors by giving them access to mainframe data...

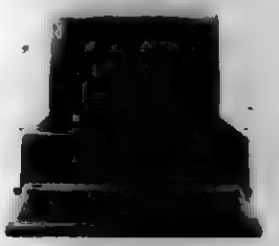
55. And the convenience of PeachText word processing...



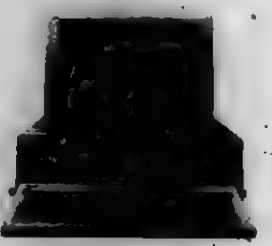
56. Give them access to current customer and vendor information for letters of confirmation...

57. And an easy way to prepare notes to consolidated financial statements using PeachText.

58. Extract delinquent customer invoice information from your Accounts Receivable System...



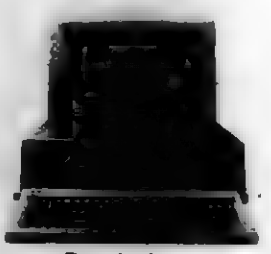
59. Personalize a dunning letter with your micro software...



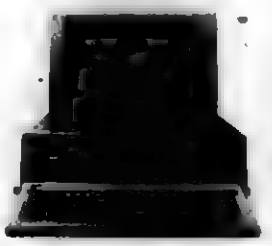
60. For help, call up 30 synonyms instantly using PeachText's Random House® Thesaurus.

61. Use mainframe Inventory and Purchasing data to graph inventory use by department on your PC...

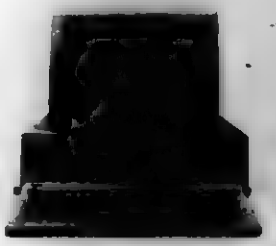
62. Make a purchase order adjustment without leaving your workstation.



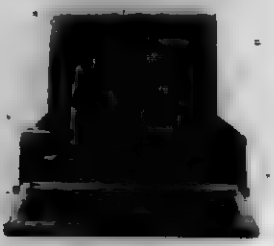
63. Download current balances from General Ledger to graph actual vs. planned...



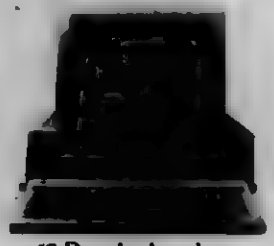
64. Do a breakeven analysis by department.



65. Analyze overtime percentage by department on the PC using MSA's Payroll/Personnel System...

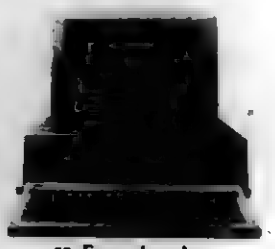


66. Use PeachText to prepare a memo summarizing your analysis and attach it to a graph.

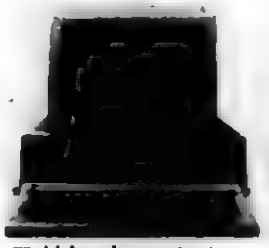


67. Download employee data for an upcoming salary review...

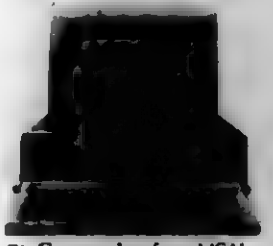
68. Complete the salary review on your PC...



69. Enter the salary adjustment from your PC to the mainframe...



70. Make salary projections on your PC using mainframe payroll data.



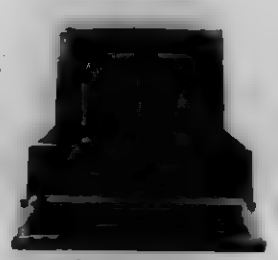
71. Capture data from MSA's Fixed Assets System...

72. Use PeachCalc to create a lease amortization model...

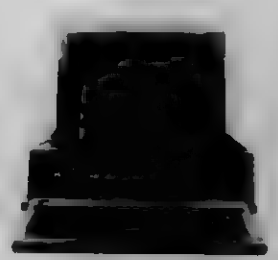
73. Perform a TEFRA depreciation analysis.

74. Get database-to-database transfer with Database Sharing...

75. Download an entire report with the touch of one key...



76. Access it instantly, without data processing involvement...



77. Enjoy a realtime environment, no waiting for batch processing.

78. Access available funds data in MSA's Budgetary Control System...

79. Use PeachCalc to project expenditures through year-end.

80. Download data from MSA's Capital Expenditure Tracking System...

81. And analyze cash flows for an investment analysis decision.

82. Dial up subscriber databases to access current credit information for customers...

83. Use PeachCalc to analyze information and set credit limits...

84. And update your mainframe Accounts Receivable data.

85. Allow only authorized personnel access to the mainframe, due to built-in security.

86. Instantly express numbers in bar, line and pie charts or other business graphics.

87. Add footnotes to mainframe reports, or customize mainframe documents.

88. Produce up to nine different kinds of graphs and charts with mainframe information.

89. Get HELP if you need it, with a built-in feature that guides you through the system.

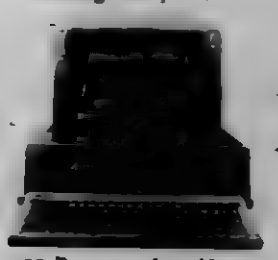
90. Organize your information and mailing lists with your own List Manager.

91. Use mainframe information with the Business Graphics System to produce slides and transparencies.

92. Work productively at home, by dialing up the mainframe from your own personal computer.

93. Make late changes to reports generated on the mainframe.

94. Do budget forecasting using PeachCalc and your PC.

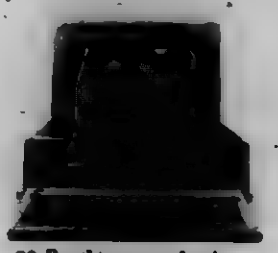


95. Review profit and loss [redacted] notice on your PC.

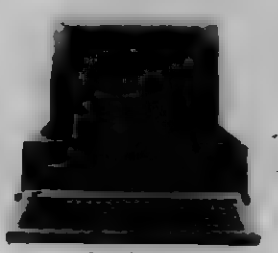
96. Improve the productivity of your staff with simple-to-use software for personal computers...

97. Enjoy the convenience of a complete menu-driven system...

98. Use over 20 pre-defined applications from MSA.



99. Put this new technology to work for your company immediately...



100. Install it in less than one hour.

Backlogs? Rush requests? Now they're a thing of the past.

MSA's new Executive Peachpak II™ links your company's personal computers directly to your mainframe. So executives can get to vital information without waiting for print-outs.

Best of all, this hot new technology is available from MSA *right now.* (In fact, it's already working for companies across the country.)

Ideal for use with the newly announced IBM® 3270-PC

While other companies are still trying to work the bugs out of their initial offerings, MSA already has its *second* successful mainframe-to-micro product: Executive Peachpak II.

It offers such advanced features as Database Sharing, MSA's database-to-database transfer technology that lets you get all the mainframe information you need instantly.

And a Universal Interface with most micro software packages including Peachtree Software, 1-2-3™ from Lotus, and VisiCalc.™

Executive Peachpak II also includes PeachCalc,™ an electronic spreadsheet. A Business Graphics System for color charts and other graphics. Telecommunications that let personal computers talk to each other—or link to resources such as Dow Jones News/Retrieval.® PeachText,™ a complete report production system that lets executives edit and footnote reports. A List Manager for organization. And PeachLink,™ the software that links your PCs to the mainframe.

This mainframe-to-micro technology is also available in two other packages: Administrative Peachpak, which includes comprehensive word processing functions. And Graphics Peachpak, for color graphs and charts.

MSA's revolutionary new link means you can now deal with one software company that supplies all the advanced mainframe and micro systems your company needs. And the software that links them together.

Free personal computer...

...with your qualifying purchase of MSA mainframe software and Executive Peachpak II.

For details on how to get your free personal computer contact Robert Carpenter at (404) 239-2000. Or write "Free Computer Offer," Management Science America, Inc., 3445 Peachtree Road, N.E., Atlanta, Georgia 30326. This offer expires December 31, 1983, so act today.

MSA
The Software Company

Only MSA makes the mainframe link to personal computers this productive

Executive Peachpak II and PeachLink are trademarks of Management Science America, Inc. PeachCalc and PeachText are trademarks of Peachtree Software, Inc., an MSA company. DIF is a trademark of Software Arts, Inc. 1-2-3 is a trademark of Lotus Development Corp. VisiCalc is a trademark of VisiCorp, Inc. Random House is a registered trademark of Random House, Inc. Dow Jones News/Retrieval is a registered trademark of Dow Jones & Company, Inc.

Furthermore, the same computer used in the lab will be used in both the user's office and his secretary's office. In addition, an after-after market is currently developing. This market is for the peripherals used by the peripherals. For example, people who purchase a BSR X10 controller need the BSR X10 and submodules as well.

Another interesting phenomenon is the differentiation between product life cycle and market life cycle. For example, there was a very brisk market for memory initially. This has changed to a multifunction board market. The market life cycle for memory still exists, but the product life cycle has changed.

The market segments that have distinct peripheral requirements are business, industrial and scientific, home and education. In the business market, IBM has been well-known and respected. There is a feeling that you cannot go wrong with IBM and that owning an IBM computer is a sign of success. The peripheral needs of this market are simple but the volume of the market is large. They include commodity-type products such as memory. Future needs will be more related to communications, such as telephone support. They are sensitive to initial support.

In the industrial and scientific area, IBM has an image of being overpriced and has not been well-represented. This is changing, though, as recognition of the Personal Computer as an industry standard grows and as the availability of multiple specialized peripherals also grows. The volumes in this sector are moderate, and there is also a greater sensitivity to ongoing support.

Classification	% Influence	Future Significance
Product First	25	↓
Software Support	25	↑
Performance	15	→
Retail Price	15	→
Support	10	↑
Retail Margins	6	→
Name Recognition	5	↑

Figure 3. Priority Profile for Speciality Products

IBM is well-known and respected in the home market. Peripherals specifically for the home have been low-volume products. This market segment, though, will be one of the fastest growing segments in the future. Users in this market are sensitive to support at the initial installation. The peripheral manufacturer has an increased responsibility to provide easy-to-use, well-documented and highly reliable products for this market, since it includes many first-time users.

The educational market has also recognized the Personal Computer as an industry standard and is beginning to implement a large variety of peripherals with an emphasis on visual and audio processing.

The commodity products are found primarily in the business segment, whereas the speciality products are found more in the industrial and scientific and education markets. The home market segment currently appears to be functioning with the specialty product profile, but long-term is expected to act with the characteristics of a commodity product profile. These characteristics are defined in Figure 1 on Page 52. The user priority profits for each of these segments are defined further in Figure 2 (Page 52) and Figure 3.

The distribution channels used have primarily been through dealers. There will be increased support through distributors in the future. Mail order for selected commodity products may be viable, but this channel can offer only limited support. This support is important to the large number of first-time computer users. Institutional sales, in which IBM sells in large volume to one company, are a viable market for third-party peripherals. The OEM market is increasing rapidly as products are being developed around the personal computer. International sales are also increasing as the personal computer attains greater acceptance in these markets.

The viability of the third-party peripherals market depends on supporting IBM products. This involves implementing new technology rapidly, developing more specialized products with hardware and software support and providing an emphasis on communications products.

The peripheral market is growing rapidly along with the personal computer market. Personal computer users are seeking new functions for their micros, and these functions are provided by peripherals. Therefore, a cumulative pattern is resulting in a rapidly growing third-party hardware market. It is these peripherals that give personal computers a personality. ♦

Alpert is president, Tecmar, Inc., Cleveland.

If buying a car was like buying software, you'd see a lot of these on the road.

A flashy vehicle. No doubt the result of several great ideas. But hard to drive with the performance you expect.

Until now, buying business software was similar, a lesson in irregular mechanics. Sure, you can put together all of your own pieces, but will the resulting vehicle give you the performance you expect? If you need consistent operation, easy response, smooth on the straights yet tight on tough corners, we have the answer.

Executec software: the secret's in the system.

One completely integrated software system provides decision support and office automation in a uniform, consistent environment. Software that gives you the power to challenge the total range of business problems by using one synergistic structure.

SeriesOnePlus: simplicity plus power.

We call it SeriesOnePlus. You'll call it incredible. Start with the programs you need most — word processing, spread sheet analysis, data management, and the Execu/BUS* master program. Assemble any of the eight additional programs available** for even more problem-solving capability. Now you can easily command the resources you constantly need at your fingertips.

The benefits are simple to achieve.

Your capability develops quickly since all programs respond to similar commands. And you can transfer data between any combination of programs with just a few keystrokes. The result lets you concentrate more on your ideas, and less on the system details. That means more productivity, the performance you expect.

It's your choice. You could drive an impractical machine like the one here, or the new model of productivity — Executec SeriesOnePlus.

A time for simplicity.
A time for sophistication.

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SeriesOnePlus is available on the IBM® PC, Pronto® Series 16, Durango Poppy®, DEC Rainbow®, Wang® PC, Victor® 9000, and many other 16-Bit MS-DOS computers.

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MATRIX MANIA: THE EXPANSION OF SPREADSHEETS

The usefulness of the electronic spreadsheet in financial applications is so widely known and seems so self-evident that it is strange to remember that less than five years ago most businessmen had not heard of Visicorp's Visicalc. And it is even stranger to recall that Visicalc was once the only electronic spreadsheet, the innovative progenitor of business-oriented software for micros. Today, the challenge is not to understand what the electronic spreadsheet is and how to use it, but to make a rational and optimal choice among the numerous and diverse offerings. It is necessary to do this without investing more time than one would save choosing the software.

Although Visicalc is available for just about every micro above the level of a toy and has some unquestionable virtues, not the least of which is its widespread knowledgeable user base and the numerous books on its application, there are significant features available on other electronic spreadsheets. These spreadsheets offer the user new flexibility, whether in learning materials, ease of use, formatting reports, built-in advanced functions, or integration of other generic types of software within the same package. There are literally dozens of good electronic spreadsheet packages, some standalone and some intergrated with other generic functions. This article will consider five: Context Management Systems' Context MBA; Lotus Development Corp.'s Lotus 1-2-3; Microsoft, Inc.'s Multiplan; Advanced Visicalc; and Micro Data Base Systems, Inc.'s Knowledgeman. The first four spreadsheets are in widespread use and foreshadow the newcomer with a particularly distinctive feature. Now that

include more than functional characteristics. They include ease of use, speed of operation, quality and comprehensiveness of the learning and reference materials, the responsiveness of the vendor and prospects for future enhancements.

The importance of each criterion depends on the type of user you are. Are you a beginner with micros or a novice with some hands-on experience? Are you a DP professional who knows how to get acquainted with hardware, software and operating systems? Are you patient with detail and willing to study a manual meticulously to ferret out specifics on what interests you? Or are you an executive who wants instant results and who wants to press a button and have the machine work in a self-evident way? Are you willing to trade some of your time for eventually having facility to use advanced functions or is instant capability of paramount importance to you? Do you prefer to learn something by reading about it, hearing about it or trying it?

The way you apply the criteria also depends on the type of applications you have. Are they large complex models, using data from various sources and likely to be stored in different files? Will you need to use complex mathematical functions? How important is graphic representation of data? Will you want to produce professional-looking reports for presenting to others or will the barebones results of your analysis, obtained as quickly as possible, be enough to meet your critical needs?

Elaborate learning materials will not be helpful unless you use them. Think about this. If you would rather be taught by someone how to use a package than study the learning materials on your own, then your choice of package will be guided to some extent by the availability of knowledgeable associates who will help you. And if they are all using Multiplan, for example, then that is the package you would do well to consider if it meets all your other criteria sufficiently.

If you feel you need to take a course — most people do not, except to build confidence — then you are constrained to packages for which courses are taught. But if you are willing and able to work alone with self-instruction materials, then your choices are wider.

Learning and reference materials vary in type, quantity and quality. All of the packages discussed here are of satisfactory quality or better.

However, specific offerings do differ. The tutorial portion of the manuals for Advanced Visicalc and Multiplan each take you step-by-step through examples you should perform on your system as you go. In my view, this is a good way to learn. The manual for Context MBA includes a similar step-by-step tutorial. In addition to the manual, Multiplan provides a tutorial diskette with sample data on it so that you can practice the commands before knowing how to create a new file. Knowledgeman also offers demonstration diskettes. Currently, the manufacturer of this newest offering has indicated that still further learning materials will become available.

Lotus 1-2-3 provides an outstanding tutorial diskette. It consists of six lessons, each on the basics of a different aspect of the package, such as getting started, spreadsheet, data management and graphics. The many more advanced features of 1-2-3 are not taught on the tutorial diskette. You must use the reference manual with the package.

Knowledgeman also provides a tutorial, but getting started with this package is more complex than with some packages. The newcomer to micros may have difficulty.

Help On-line, a feature of Multiplan and Lotus 1-2-3, lets you access an explanation of commands without exiting your work.

The most important differences between electronic spreadsheets include reporting flexibility, built-in advanced functions and the ability to set up complex functions or procedures tailored to your own application. One of the most irritating limitations of the early Visicalc was the inability to vary the width of a column to conform to the width of one's data. Formatting possibilities are now very rich, and each of the five examples offers impressive, but not identical reporting capabilities.

These include formatting of individual cells, variable-width columns, incorporating graphics and text within the same report as the spreadsheet, producing spreadsheet results as bar charts, selectivity of rows and columns for a report. None of these functions were available originally.

Hundreds of functional characteristics could and have been isolated for comparison purposes. In my book, *Mastering Micros* (Petrocelli Books, Inc.; Princeton, N.J; July 1983), I identify 93 that are just related to advanced spreadsheets. Some of these are reproduced in the figure below. In general, however, two or three particular functions will make the difference to a given user, depending on the application. For example, an important function is the ability to sort rows. One user may never need this function, while another will be seriously inconvenienced without it.

Look for the one that has everything you need and which you find comfortable to learn and use. Obviously, if you already have a computer, you must also ensure that the package you want runs on it.

If, for example, you are building econometric models, note that Multiplan provides a function to allow you to solve recursive equations. You could also do this with 1-2-3 by setting up a macro. If you do not know what recursive equations are, but want to upgrade from early Visicalc to a more flexible package, then your best bet might be Advanced Visicalc, which retains the same command structure you have already learned. The figure shows the distribution of several functional characteristics, a small subset of those possible to find.

The integration of other generic types of software with the electronic spreadsheet has been attracting considerable attention in the corporate environment.

The results of a financial analysis performed using an electronic spreadsheet can be dramatized and made more senior executive-friendly with well-chosen graphics. A written report would include text as well as columns of numbers. You might also want to use the data processed in your financial analysis in different report formats available in data management software. Thus, graphics, data management and text processing software, if integrated or easily transferred to electronic spreadsheet software, allow you to produce all the elements of your analysis, not just the number crunching.

Furthermore, the information may need to be communicated to a corporate data center's mainframe. Therefore, compatible communications software would be a useful add-on. One or more of these generic categories of software are available with some electronic spreadsheet packages.

It should be noted that the data management available in Knowledgeman goes far beyond the simple sorting and selecting of records available in other spreadsheet packages. Knowledgeman contains a full-fledged relational data base management system comparable to Ashton-Tate's dBaseII and in some ways more powerful. This function can be particularly significant for applications developers.

On the other hand, it is not as easy and quick to learn and use as much of the other software. It will probably be selected by the user who needs a powerful data base management facility first, with the electronic spreadsheet of secondary importance. A significant advantage of this package is that elements from the tables built using the data management capability can be used in the electronic spreadsheet. Lotus 1-2-3 allows storing of spreadsheet data as records in a file, with consequent convenience and memory conservation. In this, as in selecting software for any other functional characteristics, it is best to examine and try out a capability that is important to you, rather than depending on specifications or reviews. Reviews should be used as guides, only to point you toward feasible packages.

Remember that responsible software publishers seek to improve their products, and often new releases of a given package will contain new features. The commitment and reputation of the software publisher may be a worthwhile consideration.

It should be remembered that responsible software publishers seek to improve their products, and often new releases of a given package will contain new features. The commitment and reputation of the software publisher may be a worthwhile consideration in selection.

Several aspects of each of the example packages are worth citing. An aspect of Multiplan that is worth considering is that Microsoft's text processing package, Microsoft Word, contains the same command structure as Multiplan. If you know one, the ease of learning and using the other is obvious. Whether Microsoft will enable files to be transferred from one to the other can only be speculated on at this time. Furthermore, since Microsoft Word may be operated with the Microsoft Mouse, that capability can be anticipated for Multiplan at some point, too.

Visicalc IV, which may be available by press time, is described as having graphics capabilities and other features beyond those incorporated into Advanced Visicalc. Watch for this.

In addition, Lotus Development has expressed a commitment to produce software in the 1-2-3 family, which will add to the generic capabilities for business use. Knowledgeman's manufacturer has announced its intention to add to the array of tutorial materials available. As a new offering, Knowledgeman can be expected to develop further.

By focusing on your own needs first, and then and only then on what is available, you will be able to keep your head amid the dazzling number of options available. ◆

Blank is vice-president, management information systems, domestic institutional banking, Chase Manhattan Bank, New York.

	Context MBA	Lotus 1-2-3	Multiplan	Advanced Visicalc	Knowledgeman
Split Screen	4	8	4	2	No
Name Cell or Variables	Yes	Yes	Yes	No	*
Net Present Value	Yes	Yes	*	Yes	*
Internal Rate of Return	Yes	Yes	*	Yes	*
Linear Regression	No	*	*	No	Yes
Sort Rows	No	Yes	Yes	No	Yes
Recursive Equations	No	*	Yes	No	*

** Not built-in, but provides facility to do*

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Functional Characteristics of Advanced Spreadsheets

E·X·T·R·A·!

The portable personal computer is becoming one of the most promising productivity tools available to today's executive. By eliminating the need to take the information processing power with them when they travel, portable computers are changing the way the world does business and creating unprecedented opportunities for increased personal productivity.

These portable machines, which are slightly larger than pocket calculators, the size of a small briefcase, are riding the wave of the burgeoning personal computer market. The portable computer industry is less than three years old and the personal computer industry is less than seven years old. Even though these new industries are still in their infancy, there are already more than 150 manufacturers of portable computers. Sales which [illegible] 45% [illegible] portable computers [illegible] approximately $4 [illegible] 1982 and [illegible] analysts [illegible] $23 [illegible]

impressive, the market growth for portable computers is expected to be even more mind-boggling.

Research firms across the country predict that portable computer sales will increase nearly tenfold during the next five years. The $434-million market of 1982 is predicted to grow to more than $4.5 billion by 1987, and one New York-based marketing research firm predicts that two out of three personal computers sold in 1987 will be portable models.

The popularity of the portable computer reflects fundamental changes in the business world. In the recent past, the vast majority of executives did not have access to any kind of information processing power. But with the introduction of personal computers in the office and with increasing availability of on-line data base services, managers have come to depend on information processing capabilities throughout their daily routines.

A portable computer is self-contained and can be moved from one place to another without requiring two hands or the aid of a colleague. More specifically, portables either fit snugly within a briefcase or they require their own specially designed case.

With dozens of portable computers on the market, it has become hard to keep up with what is being offered. It has become just as difficult to determine exactly what a portable computer is. Broadly speaking, a portable computer is self-contained and can be moved from one place to another without requiring two hands or the aid of a colleague. More specifically, portables either fit snugly within a briefcase or they require their own specially designed carrying case.

All but the high-end, full-function portables trade off power or feature to achieve portability. Some have tiny, hard-to-read display screens. Others sport condensed keyboards other than the standard Qwerty arrangement with which the majority of today's business world is familiar. Many portables cannot support the bulk of today's personal computer peripherals, and the majority cannot run most of the applications software being written for the industry's standard machines, such as the IBM Personal Computer and Personal Computer XT.

Today's portables can be divided into several descriptive catagories: the handheld units, the lap-top computers, the transportable units and the integrated portables. These machines range in weight from several ounces (the handheld units) to more than 30 pounds (the transportables).

The handheld units, just as their name implies, are typically not much larger than a hand calculator and generally run on batteries. They are limited in function and are normally little more than a combination of a hand calculator and data entry terminal.

The lap-top computers fit smartly into most briefcases and are considerably more powerful and capable than the handheld types. However, these versions have limited display screens and limited memory. They are also limited by the applications programs they can run.

The most popular category — the transportable units that are approximately the size of a small suitcase — offer full personal computer capabilities in a self-contained unit that can be moved easily from the office to wherever an executive needs complete computing power. Approximately half the manufacturers in the portable market offer computers that fit into this category.

Products in the other category — integrated portables — have been introduced in the last year and do not readily compare with portable models in the mainstream of the market. They are similar to transportables, but also have printers, acoustic couplers, modems or other special-function peripheral capabilities. These descriptive categories provide a basic yardstick for comparing visual differences between machines. Another way to look at the market for portables, however, is to categorize them by their use. When looking at utility, two general characteristics emerge that broadly define the marketplace. At the low end are special-function portables — small machines, usually lap-tops, that perform specific applications and address the needs of certain well-defined niches in the market. These trade off much of the power and many of the features of full-function personal computers in return for smaller size.

At the high end are full-function personal computers that are also portable. For many corporate and professional executives, the prime consideration is whether the portable computer is powerful enough to perform all the computing tasks that the personal computers they work with at the office can perform. The corporate user is also concerned about whether the portable computer can run the largest base of professional productivity and applications software possible and can support the

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standard hardware enhancements and peripherals found in most corporations.

In a growing number of instances, that involves acquiring IBM-compatible machines, since the IBM Personal Computer has become an industry standard and the computer of choice in a constantly growing number of organizations.

A full-function portable computer makes no compromises. It trades no features in achieving portability and provides the processing power, expandability and upgradability needed by today's executives.

When it comes to processing power, 16-bit power is now standard. And many of the most popular business and productivity software programs also require at least 128K bytes of random-access memory as well as a substantial amount of disk storage. Full-function portables usually have at least one 320K-byte disk drive, and the most popular and useful accommodate two.

Corporate executives are becoming increasingly familiar with today's improved information services and productivity tools, which results in their desire to have the most up-to-date information when and where they need it. For this reason, flexible information processing resources have become synonomous with increased productivity.

When today's executive is needed for analytical decision making in a regional office, at a board meeting two floors up or during the year-end crunch that might require work at home, he needs on-site access to computing power. And portable computers provide the flexibility of taking that power where it is needed.

Many Fortune 1,000 companies have set corporatewide standards for personal computers to improve personal productivity throughout the organization. And in the majority of cases, they are standardizing around the IBM Personal Computer and Personal Computer XT. The next step for most of these organizations has been to leverage on the standards they have set by adding portables that are compatible with the desktop personal computers in their offices.

Uses for portable computers seem limitless. For example, Citicorp in New York is developing a worldwide network of IBM Personal Computers and Compaq Computer Corp. Portable Computers. This network will give Citicorp inspectors around the world the ability to access the data base of the corporation's international network of mainframe computers.

Therefore, inspectors have independent data processing power for operations and financial auditing of Citicorp's branches and affiliates in more than 90 countries.

PORTABLE PRODUCTIVITY

Portables are also found in a number of major financial institutions in which field personnel and account representatives have stored client information on floppy disks that can be carried along with the portable computer. It is easy to keep the stored data current and to provide more accurate "what if" estimates of the possible future performance of their client's investments.

But portables are not only for those who travel. Many companies are buying them for work in-house because they are easy to move from office to office or from office to conference room. Other companies have found that their executives prefer them simply because they take up less space on their desks and fit more comfortably into their working environment.

Executives are becoming familiar with today's improved information services, which results in their desire to have the most up-to-date information. For this reason, flexible information processing resources are synonomous with increased productivity.

At home, portables are convenient not just because they can be easily carried to and from the office, but also because they fit more comfortably into the executive's weekend work space. It is no longer necessary to turn the study or den into a computer room with a multicomponent desktop unit.

On a more personal level, many companies are using portables in programs to introduce general managers and executives to the world of computing. Because portable computers fit so well in the office and can be moved so easily, they are much more personal machines, aiding nontechnical individuals to overcome their computerphobia.

Such applications barely scratch the surface of portable computer use. And these applications generally refer only to the higher end portables — that is, the full-function machines that are every bit as powerful as the high-performance desktop computers. These models are but one segment of the portable computer industry.

As executives and managers become more sophisticated computer users, they will attack more difficult business problems and will require more extensive computing power.

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MICRO MISSION

For this reason, it is extremely important that the portable computer have the potential for adding internal memory, external storage and the growing array of peripheral devices that greatly expand the portable's capabilities.

Also, as better local-area networking schemes become available and as more and more portables act as intelligent terminals used to access corporate data bases, it will become increasingly more important that the portable computers can be upgraded. This requires the ability to use the array of micro-to-mainframe links that allow users to access corporate data bases and give the portable the ability to act as an intelligent terminal — which in the case of an IBM shop means 3270 emulation. Generally, it means anything that enables the user to function as an integral part of the expanding corporate information infrastructure, rather than simply using the computer strictly for personal stand-alone applications.

Functioning as part of the corporate information structure requires compatibility with corporatewide hardware and software standards. IBM compatibility is important, because IBM's Personal Computers have cornered the largest portion of the personal computer market.

Compatibility with these machines is available in various degrees. The corporate purchaser must consider whether the portable model will support all the hardware peripherals and run all the applications software that will be required. The most powerful units will support all peripherals designed for the IBM Personal Computers and run without modification all the software written for those machines.

Applications software packages available for the IBM Personal Computers and IBM Personal Computer-compatibles provide the largest base of personal productivity solutions available. In addition, more sophisticated applications software is becoming available for business planning, financial management and accounting functions.

These more powerful software programs, such as Lotus Development Corp.'s 1-2-3, Visicorp's Vision and Quarterdeck Office System's DesQ, when running on high-performance portable computers, are initiating an entirely new generation of personal productivity.

These programs provide corporate users the convenience of moving automatically from an expansive electronic spreadsheet to graphs and line charts and to word processing capabilities that allow for drafting financial reports and other business summaries.

With Vision and DesQ, users can work on the screen with more than one program at a time. These new packages, which are becoming more commonly known as operating environments, allow users to split their display screen into several different work areas. Users then can view and manipulate the data stored in a number of programs simultaneously.

The dramatic personal productivity gains made possible by this new computing generation are just beginning to surface. And the coupling of these sophisticated software products with the increasingly more powerful, full-function portable computers is creating more productivity opportunities. Essentially, executives have all the power of the high-performance minis of just several years ago available in a portable package.

These opportunities will become even more prominent as the fruits of portable computer manufacturers' research and development efforts surface in the market. Anyone familiar with this market over the past several years knows the general trend, typified by products such as the early pocket calculators in the '70s.

The first models were bulky and expensive, but technological advances reduced considerably the tools' size and price while significantly bolstering functionality and power. The same is happening — and will continue to happen — with portable computers as manufacturers continue their substantial investments in future product development.

More powerful microprocessors, including the 32-bit micro on a chip, should eventually be available, as will smaller, denser forms of media and better flat-panel display technology. And those examples are but the most obvious.

It appears that portable computer manufacturers will move in one of two directions. Some will offer smaller but more powerful, high-performance, full-function portables that make no trade-offs in achieving portability. These will be most useful to the manager who requires all the power and software availability of a desktop computer in a portable package. Others will continue to cater to specialized, vertical markets with portable models designed to perform specific applications that sacrifice full functionality for portability.

Users concerned about which vendor to buy from should look for manufacturers that display a corporatewide commitment to quality. This commitment must extend from product development to manufacturing quality to excellent distribution channels to top customer service.

The successful portable computer manufacturers will be those that address this commitment over the long term and, in addition, those that can react quickly in a dynamic market. ♦

Murto is vice-president of marketing, Compaq Computer Corp., Houston.

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E·X·T·R·A·!

A NETWORKING PRIMER

Connecting a business personal computer to a company's data communications network opens up a wide range of possibilities for shared processing between the big corporate mainframe and the small desktop model. The possibilities are endless, but there are problems.

One place to start is to ask what the big computer thinks the little computer is. This is not a personality issue, but a serious question concerning the protocols used for communications and information interchange.

The easiest way to connect a personal computer to a network is to have it emulate a terminal. As far as the mainframe knows, nothing is different; nothing has changed. It communicates with the terminal in the same way that it already communicates with existing terminals connected to it — well, almost exactly. Since computers can transmit faster than people can type, there may be some changes required. These are discussed below.

The emulation may be provided by software, hardware or firmware. Software emulators are sold on a diskette that, when read into the personal computer and executed, gives the micro the capability to communicate employing one or more relatively simple terminal protocols. More

By Marshall D. Abrams

complex terminal emulators are packaged on a circuit board that plugs into the personal computer. The board contains hardware, firmware and possibly additional memory to support more complex protocols.

The program controlling the personal computer has to be able to emulate the communications protocol of the chosen terminal. Purchasing or writing this software requires knowledge of exactly what this protocol is.

In data communications, protocol refers to all the rules and procedures that must be followed in order for two entities to communicate and interoperate. A protocol usually incorporates a number of existing standards and may introduce some new areas of standardization.

Sometimes the protocol is well-defined by a public standard such as Ansi X3.64-1979. This standard defines a set of encoded control functions to facilitate data interchange with full-screen addressable video terminals and other two-dimensional addressable devices. These control functions are an extension to the Ascii code set. The types of controls include editing functions, formatting and the specification and control of input.

Sometimes the protocol is defined by a vendor — for example, the IBM 3270 series of terminals. These terminals are defined by IBM specification documents, which make it possible for other vendors to build compatible terminals.

Both public and vendor protocols involve standards documents that specify the communications protocols employed by the terminals. Such documents provide a firm design target. In addition, the documents provide an authoritative reference to decide questions of right and wrong if it becomes necessary to do so.

A third alternative is the "common law" of terminals, which is derived from precedent. The precedence is usually based on some prior example of the terminal art. The most common way of naming a protocol is to refer to the first or predominant terminals to use it. For example, the most common citation of precedence is TTY-compatible. TTY is an abbreviation for Teletype, an asynchronous terminal produced by Teletype Corp.

If pressed, the person citing the precedence will probably come up with Models 33 and 35 as the prototype. Unfortunately, these models were uppercase only and lacked a number of features currently taken for granted. There are newer TTYs, including Models 37 and 40, but most terminals claiming TTY-compatibility support less than 100% of the features of these terminals. In addition, they may sport various unilateral extensions or new features that the vendor thinks the market will appreciate.

If the micro and the mainframe recognize and respect each other as computers supporting appropriate protocols, the possibility of distributed processing exists. Files can be transferred between computers under control of file-transfer protocols. Electronic mail can be exchanged under control of computer-based message system protocols. Anything that can be done between computers on a network — when the computers conform to the network protocol — can be accomplished. This is limited, of course, by the capacity of the small computer.

Note the dependence on protocols. In fact, when the issue escalates to networks, the set of protocols is called an architecture. Not many personal computers today support a network architecture, but it is wise to be alert for future developments.

It is necessary to examine the functions and problems of using the small business personal computer in cooperation with the corporate mainframe over a data communications network. The most common terminal programs that emulate TTYs — admittedly an imprecise specification — will be discussed first.

If the micro and the mainframe are to engage in any form of distributed processing, information must be transferred between them. This is called file transfer, even if less than an entire file is exchanged.

File transfer from the micro to the mainframe is not much of a problem. As far as the mainframe is concerned, it is accepting input typed by the user at a terminal. The user must first issue an appropriate command to the mainframe to input information into a file. Some operating systems have a command that does this directly; others require the use of an editor to accept such input.

Next, the user instructs the small computer to transmit a file. When the transmission is completed, the user must send another command to the mainframe to inform it that input is terminated and that the file should be closed.

Mainframe-to-micro file transfer is accomplished by first setting the personal computer to capture or copy everything it receives from the mainframe. The copy may be stored on disk or in memory. It probably can be toggled on and off by use of function keys. Once the small computer is ready to receive, the user instructs the mainframe to send the desired file to the terminal. When the transfer is completed, the user instructs the small computer on file disposition.

Sometimes one of the computers transmits faster than the other one can accept. The solution to this problem is flow control. Flow control gives one computer the ability to tell the other to stop transmitting and subsequently to resume transmitting. The TTY prototype for flow control was the paper tape reader. The computer could turn it on and off as necessary by transmitting the Ascii control character Device Control (DC)1 and DC3. These characters are also known as X-ON and X-OFF.

Other control characters can be employed, and the principle remains the same. In the IBM world, similar control characters were used to lock and unlock the keyboard of the 2741-type terminal to prevent the user from sending input when the computer was unable to accept it.

These same control characters are usually interpreted to halt and resume input from the personal computer emulating a terminal to the mainframe. The small computer's terminal emulation program must recognize these characters and take appropriate action: It must stop immediately without losing any data.

In most cases, this protocol is symmetrical. The small computer emulating a terminal can control output from the mainframe using the same control characters. A difficulty occurs when the mainframe only operates in half-duplex mode — that is, it transmits or receives, but not both at the same time. In this case, the mainframe cannot receive a control character such as DC1 to stop transmitting. This is a serious problem that may require extensive programming to overcome — if, indeed, it is solvable.

A related problem has to do with a required short interval at the end of each line transferred, where a line is defined to terminate with a carriage return or a line feed. One computer may need a short time interval to process a line before beginning to accept the next one. In addition, the mainframe may be programmed to allow time for the terminal to return the printing element to the left margin.

One way to allow the required time is to pause. But since timing is a complexity sometimes omitted, an alternative is to transmit a number of nonprinting characters to fill the required time. The delete or rub-out characters can be used. The file capture program on the small computer should be able to discard these padding characters on receipt.

If the mainframe sends other control characters at the beginning of each line, the terminal emulator must also be able to filter these. It is common for IBM operating systems to transmit a DC3 at the beginning of each line, and this must be removed by the terminal emulator.

This is probably the most complex problem in using asynchronous terminal protocols. TTY protocol does not have a suitable answer to error control. It provides parity for error detection, but this is so close to useless that most systems provide the option of turning it off. Parity error detection is often not used because it only provides an indication that an odd number of errors have occurred. The common operating system responses to a parity error do not provide a convenient correction mechanism.

An alternative to parity for users inputting at terminals is echoing.

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With this method, characters input from the terminal are not displayed locally, but are transmitted to the mainframe and then retransmitted back to the terminal for display. Transmission errors in either direction cause the display to differ from what the user tried to type. If the user detects the error, he may use an editor or some other manual method for correction or may retransmit the data. Echoing is not appropriate for communications between two computers.

The most common treatment of errors is to ignore them. Despite the ostrich-like appearance of this approach, it may be the best thing to do under certain circumstances. One such circumstance is when the communications network provides error control internally. The only communications link that does not have error detection and correction is the one between the micro emulating a terminal and the network.

There are a number of programs available, however, for various personal computers to provide error control. In general, they all adapt some aspects of more complex protocols to the asynchronous communications environment. Some sort of check-sum is calculated and added to each transmission unit, which may be a variable length line or a fixed length block. If the receiving equipment detects a check-sum violation, then retransmission is used until an error-free transfer has been accomplished.

Both big and small computers must have programs to implement this error control protocol. Since the personal computer will probably implement the protocol entirely in software, the check-sum will not be as sophisticated as those used in synchronous protocols. As a result, the probability of an undetected error will be higher than is normally expected in synchronous transmission, but much lower than in unprotected asynchronous communications.

There are many other aspects to consider. There are many synchronous protocols in use today, including many character-synchronous protocols as well as the newer bit-oriented protocols. The character-synchronous protocols are generally identified by the model of the terminal they initially supported.

There are some terminal emulation products available for personal computers that support the more popular synchronous protocols, making it possible to replace one of these terminals with a personal computer.

In addition, the 3270-type terminal has two components, which may be packaged separately or in one unit. The first component is the workstation, consisting of the keyboard, display and associated electronics. The other component is the controller, which provides a protocol translation function between the computer to which it is attached and the workstation.

One terminal emulation method for personal computers is to emulate the workstation connected by a network to a centrally located controller. In this case, the connection to the workstation is often a coaxial cable. The emulation is provided by an expansion board that plugs into the personal computer and accepts the coaxial connector.

When considering file transfer between computers, it is important to differentiate between types of files. The sequential (Ascii) character stream class of files is the lowest common denominator file transferred among computers. It contains only a sequence or stream of Ascii characters. The Ascii standard definitions for these characters are observed.

In addition to the 96 printing characters, such files may contain functions such as carriage return, line feed, new page, horizontal tab and vertical tab. Assuming that the output device can respond correctly to the control characters and has sufficient rows and columns, a file of this class can be transferred among computers and displayed, printed or manipulated.

The second class of files contains embedded commands in addition to text. The purpose of these commands is to inform a text formatter or word processor program how the text is to appear when printed. These commands may or may not include printing characters. If they do include printing characters, they may be position-dependent. For example, some commands begin with a period in Column 1. Nonprinting commands may use some Ascii control characters in nonstandard ways or may include codes that are outside the Ascii character set.

File transfer involving embedded commands requires command conversion. There should be a one-to-one correspondence between commands on different systems. If there is not, the conversion becomes complex and is given a more descriptive name of protocol converters.

The third class of files, structured data files, includes everything beyond the two file types discussed above. In addition to the obvious complex structures of data bases, indexed files and PL/1, even numbers other than positive integers introduce problems. For numbers, questions arise concerning word size, binary or binary coded decimal representation of numbers, internal representation of negative integers and floating point.

Like embedded command text files, file transfer requires a protocol converter that is knowledgeable of source and destination structures. Such a converter could be written on a bilateral case-by-case basis.

Big computer support for more complex terminals is readily available. The simple serial scrolling glass-TTY terminal is being superseded by a full-screen addressable terminal. Terminals of this type include those which conform to Ansi X3.64, such as Digital Equipment Corp.'s VT-100; those which support IBM 3270 protocols; and others that have their own protocols.

The question of full-screen addressability protocols is independent of the synchronous/asynchronous protocol question. The VT-100 is an asynchronous terminal; the 3270 is synchronous.

Since a full-screen addressing terminal cannot be expected to receive information from the mainframe in a sequential character string, it is difficult to transfer data from the mainframe to the micro when the latter is emulating one of these terminals. One approach is to stop output from the big computer whenever a screen is filled with data and to scan that screen sequentially in order to capture the data. This is obviously a more complex data capture operation than for a simpler terminal.

The mainframe may support a limited number of protocols, at least for full functionality. If users need to connect another terminal type to this computer, it is necessary to provide protocol conversion. Protocol conversion includes synchronous/asynchronous protocols, alternate full-screen addressability protocols, structured data protocols and different communications protocols within the same synchrony. Protocol converters that perform some of these functions are currently available.

If the personal computer's terminal emulator produces a protocol different from the one the mainframe supports, a protocol converter is needed. The protocol converter may be software running in the mainframe, its communications front end or it may substitute for the front end or for the cluster workstation controller. It may be more cost-effective to emulate simpler terminals and to provide protocol conversion than to emulate more complex terminals. But features such as error and flow control should be considered along with cost. ◆

Abrams is an internal consultant on data communications, personal computers and related security at the Mitre Corp., McLean, Va.

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GOING TO BAT FOR DIVERSITY

In 1887, Buck Ewing changed the course of professional baseball history by inventing the padded catcher's mit. He reasoned that since different players have different needs, each player should use a glove designed for his particular position. Ewing's logic rings as true today as it did when his New York Giants won the pennant in 1888.

In the microcomputer market today, managers are realizing that a policy of uniformity in microcomputers may be a mistake. While the temptation is strong to encourage only one kind of microcomputer in an organization, such uniformity has hidden disadvantages. A team does not perform as well when each player must use a tool that is not suited for any specific position. All the players compromise, and

By Todd D. Doe[illegible] and Thomas J. Kosnik

effectiveness suffers. If we accept Ewing's wisdom and avoid uniformity, then the next temptation is to wait and buy later. There is a definite cost of foregoing the benefits that microcomputers can yield.

Because micros have quick payback, users can afford to reevaluate their needs often. The manager who bought an earlier microcomputer still faces the same broad choice available to the manager who hesitated, but the early adopter had reaped the first computer's benefits in the meantime.

There are over 300 hardware vendors clamoring for attention in the microcomputer marketplace, according to the 1983 *Computerworld Buyer's Guide*. In order to identify which microcomputers may be the best choice for specific needs within a company, it is helpful to create a framework that defines various types of users. This framework isolates two aspects of people's jobs: the diversity of their tasks and where those tasks are done. Combining the dimensions of mobility and task diversity yields a matrix with four quadrants. Each quadrant has a unique combination of characteristics, and each has distinct needs to be met by different microcomputers. The matrix, along with examples seen in various organizations, is illustrated in Figure 1. This segmentation points out that categorizing employees' needs based only on job title, functional area or management level is often misleading.

As shown in Figure 1, the nature of people's tasks can be labeled on a continuum ranging from one specialized task to many diverse tasks. At the specialized end of the spectrum, tasks have more structured routines. People on this end of the spectrum must master their area of specialization and are less concerned with coordinating the efforts of people in unrelated areas of the organization.

People at the diverse end of the spectrum are expected to be conversant in the jargon of many departments in the organization. There is less predefined structure to jobs at this end of the spectrum. A person's role is to contribute to several activities rather than to execute one activity.

Mobility is the second dimension used to differentiate people's needs. Microcomputers have injected more flexibility into the conception of the work place. People's tasks no longer need to be dependent on where the rest of the organization is. Professionals whose jobs require constant travel are at the high-mobility end of the spectrum. Their work pace should not be set by other organizational constraints. People at this end of the spectrum need to communicate often with others outside of the organization.

At the low-mobility end of the spectrum are people who are more reliant on the resources of their surrounding organization to be productive. Their tasks require heavy internal communications. They do most of their work in one location.

The four combinations of mobility and task diversity identify distinct segments within the same organization (see Figure 1). People in the high-mobility, specialized task quadrant need a tool designed to help them perform their tasks while away from the home office. This is labeled the "Outfielder" quadrant. Outfielders in baseball must move quickly, catching fly balls and throwing to the appropriate baseman. The outfield position involves less coordination with other team members than the infield positions. The outfielder's tool, his glove, is designed to help him do his specific task. Microcomputers should also be task-specific tools in this quadrant.

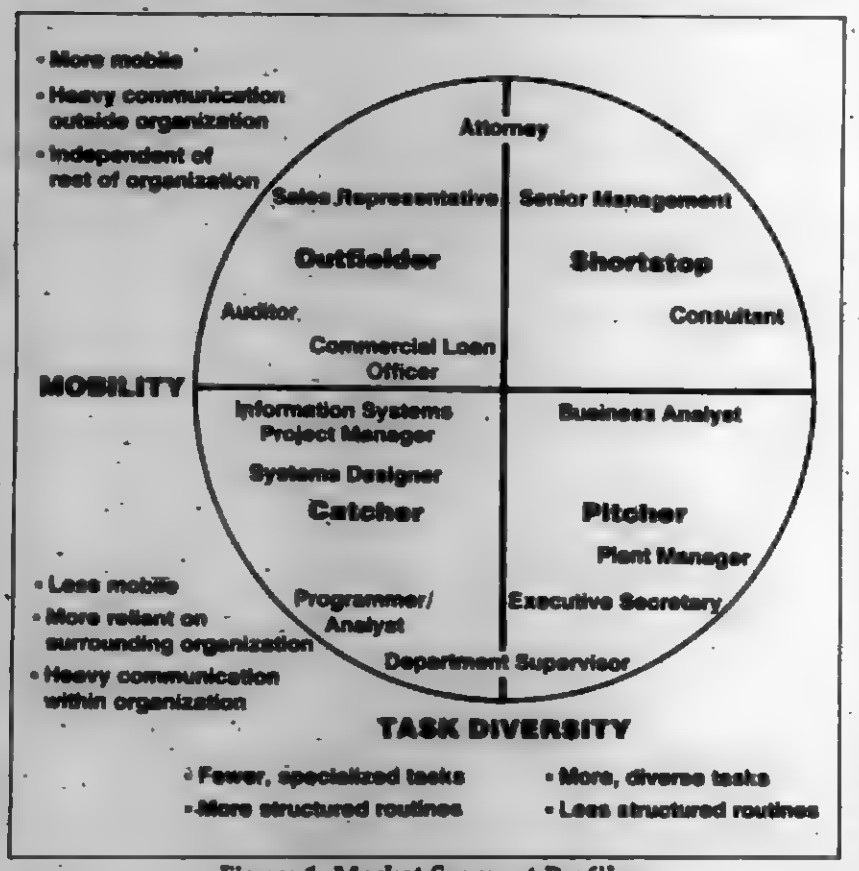


Figure 1. Market Segment Profile

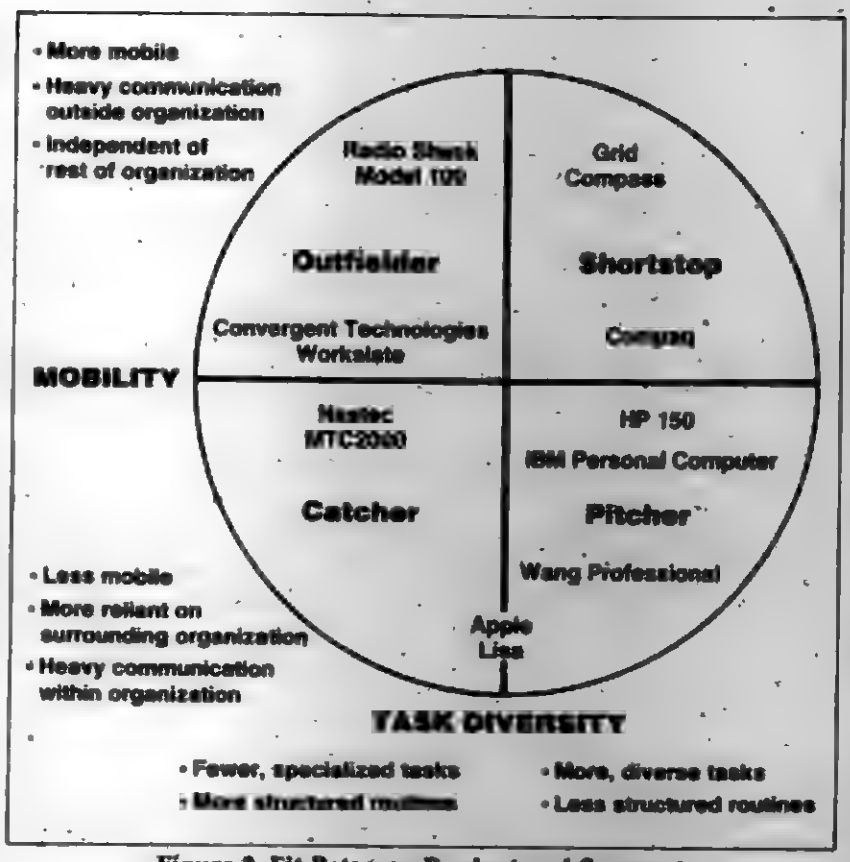


Figure 2. Fit Between Product and Segment

"Shortstop" refers to the quadrant with high mobility and diverse tasks. Like the shortstop, whose job changes depending on the batter's strengths, people in this quadrant must be versatile. They need a portable tool that makes them more productive whether they are dealing with words, numbers or pictures.

The low-mobility, specialized task quadrant is labeled "Catcher." The catcher of a baseball team wears cumbersome protective gear, an indication of how dependent he is on his teammates' performance. The catcher communicates constantly with the pitcher and other infielders. His primary task is to catch a projectile whistling his direction at almost 100 mph — and do it 150 or so times per game without missing.

The analogy holds in business as well. People in the "Catcher" quadrant need gear that is designed to accomplish a few specialized tasks, often involving heavy communications within the organization. For example, an information systems project manager can use a tool to help plan steps of a project and allocate and track resources in each phase.

"Pitcher" describes someone in the low-mobility, diverse tasks quadrant. The pitcher also communicates with team members, but the pitcher's tasks are more varied than those of the catcher. The nature of the pitcher's job requires him to use more individual discretion. He must coordinate players with various roles. One business example is a plant manager in a chemical company. This person must deal with union negotiators, chemists, common carriers and senior management. The manager's microcomputer must handle a wide variety of applications software and be able to send and retrieve messages and numerical data within the organization.

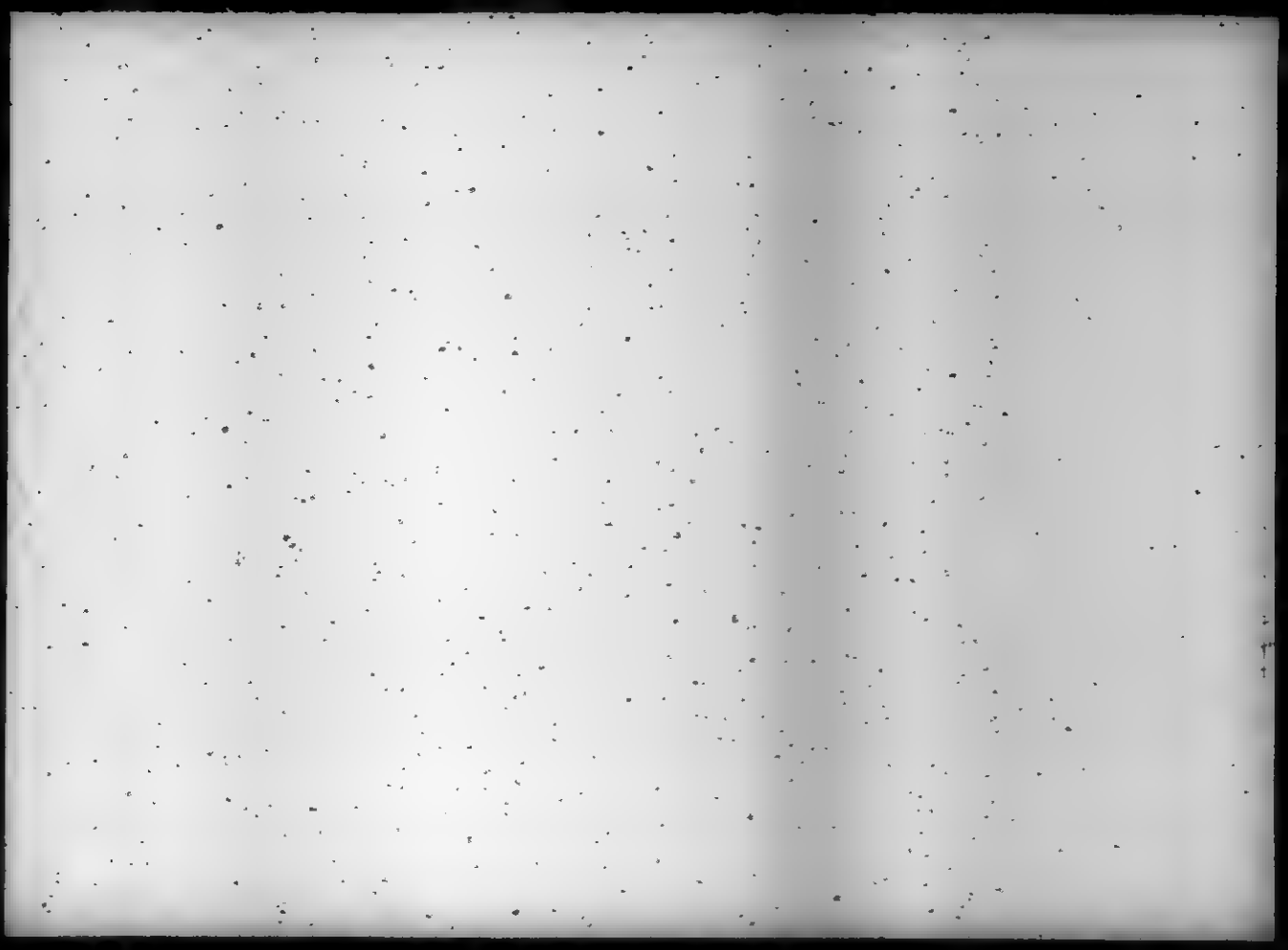
As a demonstration of how to apply the mobility-task framework, we have assembled nine microcomputers that are best suited for one of the four segments identified. The criteria used in selecting the representatives

- *Single user.* The microcomputers considered contain their own processing and storage capabilities. Host-based personal computing alternatives such as Information Builders, Inc.'s Focus or Mathematics Products Group, Inc.'s Ramis were not considered.
- *Direct experience.* We limited our selections to microcomputers that we could use ourselves to assess key strengths and weaknesses. Models that have been announced, but were unavailable for evaluation, were not eligible.
- *Anticipated payback less than one year.* Pricing was only a factor in relation to the anticipated benefits. We chose alternatives whose payback could reasonably be exected to be less than one year.
- *Distinctive advantage.* We narrowed the field of attractive candidates within a segment by choosing products with features that we felt would be valued as competitive advantages by people in that segment.

Market share was not a consideration in this evaluation because aggregating by overall popularity is contrary to our point: that the key to success is to consider the needs of separate market segments within an organization. Figure 2 shows which product fits into each particular segment.

Two attractive products for the "Outfielder" are Convergent Technologies, Inc.'s Workslate and Radio Shack's TRS-80 Model 100. Workslate is a dream come true for the person on the move who manipulates lists and analyzes numbers. Model 100 is better suited for the person who does a large amount of writing and editing.

The Grid Systems Corp. Compass and Compaq Computer Corp.'s Compaq Portable Computer are appropriate for the "Shortstop" category, which includes mobile professionals involved in many diverse activities. The Compass is revolutionary in several respects. It boasts tremendous power and storage, including a 16-bit CPU, 256K bytes of random-access memory (RAM), strong follow-up support, innovative features such as



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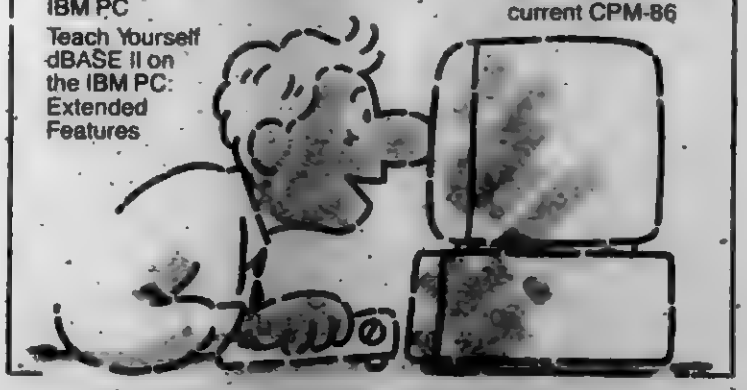

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MICRO MISSION

384K bytes of bubble memory and a flat, electroluminescent display and flexible communications capabilities. The Compaq is bulkier but cheaper, with more conventional components such as disk drives instead of bubble memory and a CRT instead of an electroluminescent display. The Compaq's claim to fame is complete IBM Personal Computer compatibility. Like it or not, the ability to run any software that is designed for the industry leader is a significant benefit.

Although both are considered portable computers, there is quite a difference between lugging the 30-lb Compaq through airports and carrying the 10-lb Compass. More importantly, the two systems are used somewhat differently at a client's location. The Compaq is an excellent tool for text editing, planning or number crunching behind the scenes. The Grid Compass works well there, but is also elegant enough — and unobstrusive enough — to use in a conference room while working with clients. In addition, the uniform global commands make the Compass extremely easy to learn and to use. The Compass' higher price must be weighed against these advantages.

People in the "Catcher" quadrant need tools to help them perform their specific tasks. Any microcomputer suggested for this category must be linked to the specific vertical application that it will simplify. For example, the Nastec Corp. MTC2000 is a workstation for systems designers. Its ability to intermingle text, diagrams and programming code make it convenient for programmers and systems designers to document and control a software development project.

The Apple Computer, Inc. Lisa is an excellent tool for specialized tasks such as construction project planning or software design. Even so, Lisa is on the border between the "Catcher" and "Pitcher" quadrants because professionals facing a variety of tasks can also use its six software applications. Lisadraw, for freehand graphics, and Lisaproject, for planning and managing work, are powerful tools that have not been seen on any other microcomputer. Anyone from a project manager to a financial analyst to an advertising account executive can use them to produce higher quality results in less time. With Apple's recently announced price cut, Lisa is a bargain for a wide variety of users.

The "Pitcher" quadrant is the most populated and the one most heavily targeted by microcomputer vendors. People in this quadrant need a broad variety of applications software and the ability to retrieve information from many sources in the organization.

IBM has leveraged its dominance in the mainframe computer market to become a reliable standard in the microcomputer industry as well. The IBM Personal Computer and XT have a wide selection of available software for business applications.

The new Hewlett-Packard Co. HP 150 is another versatile power horse for people in the "Pitcher" quadrant. A unique feature is its touch-screen interface. Time will determine if the marketplace will reward HP by considering that feature a valuable benefit. Its novelty is intriguing, but we often found ourselves reaching further to touch the screen than we would have reached to hit a function key. Still, the HP 150 represents a tremendous value. It is priced to compete directly with the IBM Personal Computer, yet it processes information two-thirds faster than the Personal Computer and compares favorably along other performance and ease-of-use criteria. In organizations with HP 3000 installations, the HP 150 can prove especially useful by accessing the HP communications network.

Another attractive microcomputer for "Pitchers" is the Wang Laboratories, Inc. Professional. It is best suited for people in an organization that already has a dedicated office automation system like the Wang OIS. The Professional is a powerful standalone tool, but somewhat overpriced unless you can exploit its feature of document compatibility with other Wang word processing systems.

Today, all professional ball players use gloves designed specifically for their positions. But at one time, customizing a glove was the innovation that gave the New York Giants a competitive advantage and immortalized Buck Ewing. Now, microcomputers pose a similar opportunity to business professionals. How can you benefit from the lessons of baseball history?

First, remember that different players on any team need different equipment to make their best contribution to the team's performance. Second, professionals without the leverage of personal computing are like ball players without gloves. Unless the opponent also lacks such equipment, even a very talented team will have a tough time winning. Third, the life of a particular brand of microcomputer may not be much longer than a baseball season. This fact reinforces the point that competitive advantage is reason enough to equip your team with what is available today. The increased revenues and profits from a winning season dwarf the cost to equip a team properly. Go for the pennant. ●

Doersch and Kasnik are office information systems consultants with American Management Systems, Redwood City, Calif.

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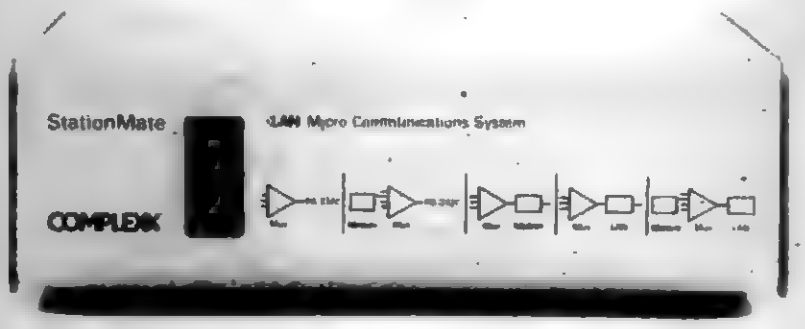

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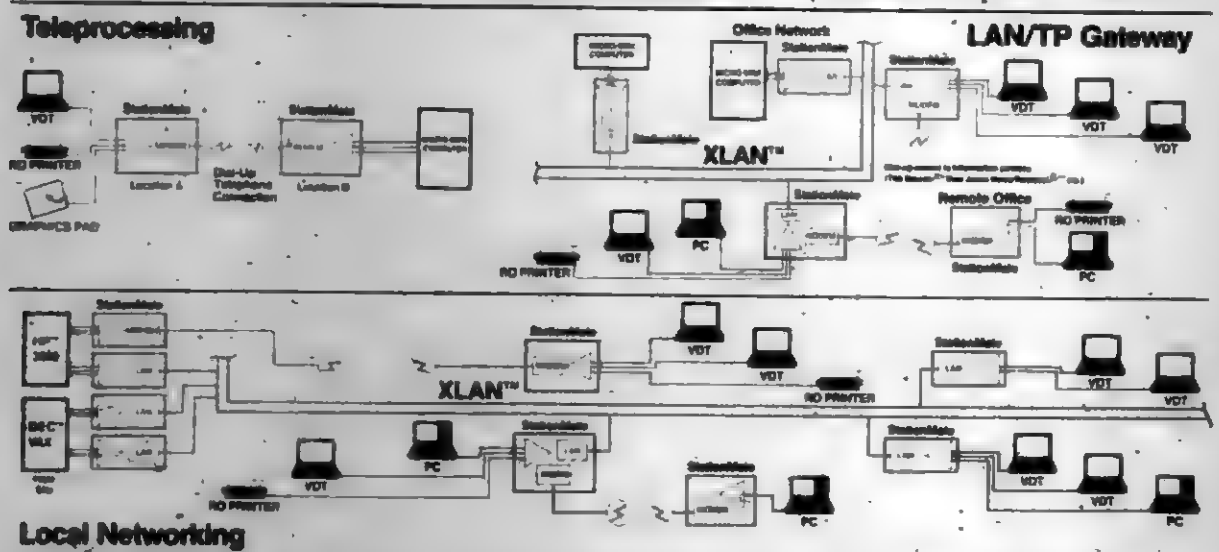

E·X·T·R·A·!

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The information center is proving to be a revolution[illegible] ping managemen[illegible] d accurate busine[illegible] cause information [illegible] they can take many forms — from sim- to complex. Their worth is limited only by the degree of research and planning that goes into them.

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make more timely and accurate business decisions by using automated systems and facilities.

The impetus behind the movement toward information centers is the need to convert large quantities of data more rapidly into concise information. Fundamentally, this need stems from the convergence of computing technology with the availability of software and management's increasing awareness of the value of automated systems or computer literacy.

Information centers enable information systems management to make the most productive use of their information systems professional staff. They enable end users to respond to their own ad hoc information needs via the information center deliverables. This significantly reduces the ad hoc applications backlog within the information systems group.

The figure on the right summarizes the major aspects of the information center strategic planning process. As an organization considers its information center planning, the following four areas should be addressed in order:

- *Potential information center user requirements analysis.* During this planning activity, managements must thoroughly analyze and define the different types of activities to be performed within the information centers.

Managements have made many assumptions about their understanding of the potential user requirements. They have assumed they understand the types of software, hardware and support deliverables necessary to fulfill the information needs. Managements have not devoted enough time to understand fully or anticipate the changes and growth that can occur once information centers are established.

- *Potential information center user knowledge and expertise.* The information center user knowledge level and expertise must be assessed. Management must chose which of two philosophies to implement first: user self-sufficiency or information systems dependency.

- *Preparing for information center implementation.* During this portion of the planning process, attention is given to three implementation issues. These are the physical characteristics and attributes of information center environments, the potential phases or evolution through which the information centers will pass and the functional activities to be performed.

Managements should anticipate a rapid movement through five phases of their information center activities. The phases are initial independent information needs, multiple independent information needs, integration of multiple application and data, expanded application processing and total business planning and analysis.

Information centers tend to pass through all five major phases within 18 to 24 months. A thorough analysis of the software to be utilized to fulfill the functional activity sets is necessary. Without a thorough analysis, managements can anticipate moving through several iterations of software in trying to fulfill the users' requirements.

- *Understanding and managing information center operations and proliferation.* The final phase of the information center strategic planning process deals with anticipating what will happen within the information centers as they are brought into operation. Management must anticipate growth patterns or proliferation and the need for resource requirements planning. It must assess the initial capital requirements and ongoing or recurring operating expenses.

Without some form of resource capacity planning, there may be a significant impact on the production systems environments as information center utilization expands. Management must continually audit and test the logic used to assess planned vs. actual user resource requirements.

The entire planning process must be more thorough in assessing the types of software systems required. Some managements try to fulfill too many of their requirements with a single software system.

The categories of software required in an information center are quite diverse. Management must first consider the generic categories of software that may be necessary and the time intervals over which they will probably evolve.

Between the ninth and the 18th month, considerable new incremental software is introduced as a result of more inexperienced users being introduced to the center. These new users generally do not have the background or understanding needed to use this software. Therefore, a need for more user-friendly software develops.

During the initial independent information needs phase, there are many viable hardware delivery systems to fulfill the center's processing requirements. These include standard 3270-like on-line terminal devices, stand-alone personal computer systems and remote computer services facilities. Delivery systems initially used to implement information centers were nested around standard 3270-like devices. The majority of these devices are used to fulfill production system user requirements. Most managements believe that personal computers and remote computer services systems are the best delivery systems to fulfill decision support system user requirements.

Remote computer services are viable when the decision support user has experience with more sophisticated application software and computing facilities. In most instances, hardware delivery systems are currently in place within the organizations.

One of the major factors influencing the choice between personal computers or remote computer services is the type of base application software provided, such as Visicorp's Visicalc and Lotus Development Corp.'s 1-2-3. Frequently, the decision support system user requirements are more sophisticated than those that can be delivered. In such cases, the user requires more time-sharing-based deliverables that feature more powerful computing resources and sophisticated software. The remote computer services companies offer sophisticated financial planning and analysis systems.

Within the sixth to 12th month of information center operations, the user and information systems managements recognize the need for integrating multiple independent information needs and a variety of data. This need expands the hardware delivery system resource requirements for more computing and I/O capacity. With these expanded needs, a requirement to integrate personal computers into the large-scale in-house computing or remote computer services environments develops rapidly. Additionally, demand for expanded processing resources and data access via the on-line 3270-like terminal devices also expands.

Particular attention must be given to assessing the type of hardware delivery system required by the production support system user as compared with the decision support system user. Difficulties with protocols and operating characteristics coupled with the communications bit/sec rates are the most frequently encountered problems.

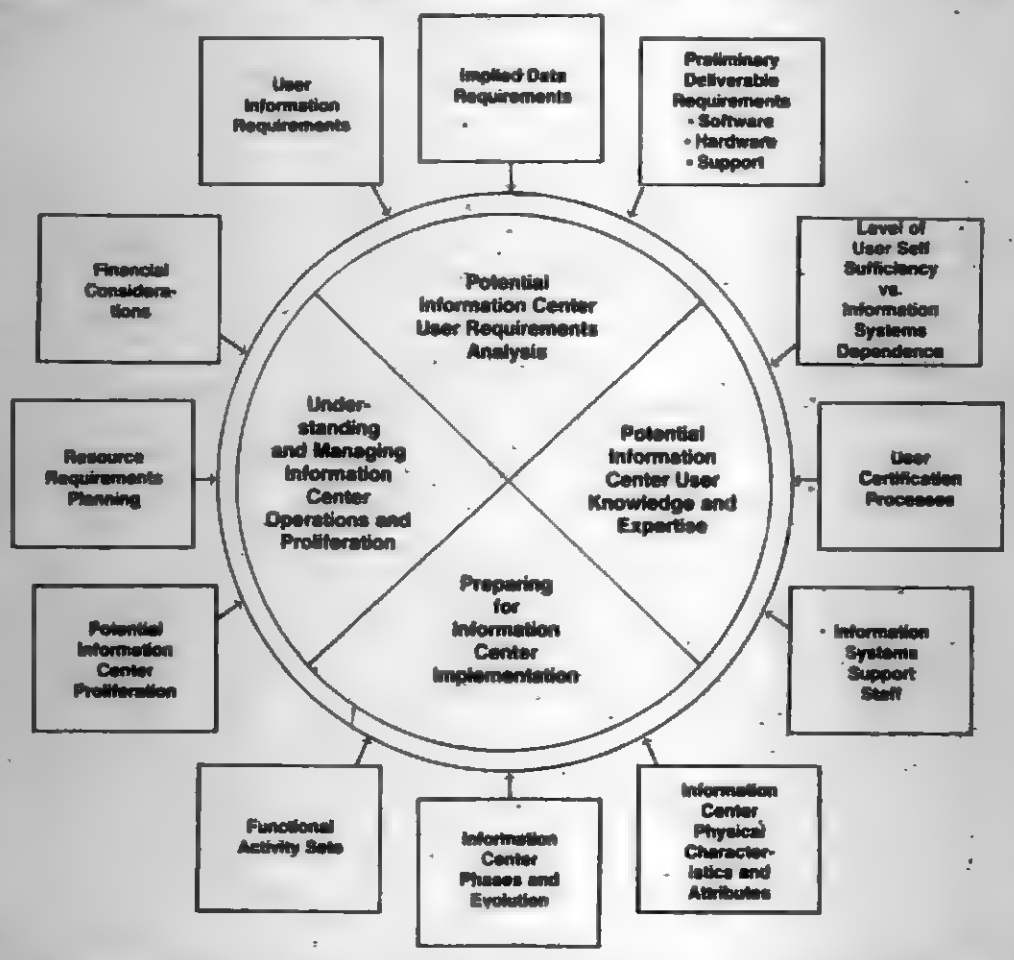
As an organization enters the expanded application processing phase, there is a continued expansion in the demand for hardware processing resources. There is a need for more integration of the personal computer devices and possibly the introduction of distributed minicomputer facilities. The minicomputers, as situated in the information centers, act as communications controllers and begin to provide expanded capabilities for pre- and post-processing activities.

The amount of data extraction and data manipulation activities between the information center user's device and the larger host mainframe operating environments expand significantly. At this point, data base management systems and application development facilities are definitely sought.

These types of software systems introduce a requirement for more powerful local and centralized host processing resources. As the users pass through the expanded application processing activities, a need develops for various kinds of workstations.

One of the major and most commonly unfulfilled hardware requirements found in information centers is local networking. The facilities and capabilities to connect multiple remote, stand-alone information center hardware devices easily and cost effectively are required in the later stages of information center evolution. A corporate local computing device policy should be devised well in advance of initiating information center activities.

The role and relationship of the information center support staff is a critical component of the overall information center deliverables. The support staff assists the users to define further their information needs and, in doing so, provides direction in selecting the proper information center resources to respond to the users' requirements. This staff fulfills the role of an educator: It helps the users understand how to use the center's resources.



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This support staff also minimizes the impact of the information center activities on the host processing resources.

During initial information center support group staffing, particular attention must be given to development of a support staff charter or mission statement. There is a need for specialists with distinct professional skills in end-user software, remote computing devices, education and training, on-site information center support and remote computing services.

When an organization is following much slower development and integration of its information center, the full-time availability of these specialists is certainly not necessary. However, it is extremely important that specialized expertise be available in all stages of the planning process and subsequent implementation. Within the first six months of establishing an information center environment, incremental education and training requirements will appear. These requirements will be significantly more diverse and complex than was originally believed. This is a result of considerably more software capability being introduced into the information center environment.

Organizations attempting to deliver information center training via conventional classroom approaches must develop a considerably larger education and training staff than originally planned. Audiovisual delivery systems have been found to be more acceptable in fulfilling the education and training requirements. The audiovisual programs, however, must be augmented with some type of hands-on experience. Organizations have successfully developed combination audiovisual and hands-on workshop programs that satisfy the education and training requirements.

Many audiovisual programs are being augmented with a computer-based training component that adequately fulfills the hands-on training experience necessary. In many cases, this audiovisual computer-based training is being delivered via microcomputer-based systems. ♦

Mills is president of Dialogues Research Service, Dallas.

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Smartmodem 1200 for all computers with an RS-232C interface; Smartmodem 1200B plug-in board for the IBM PC.

Smartmodem Specifications:
Low Speed Data Format: (Smartmodem 1200 and Smartmodem 300) Serial, binary, asynchronous: 7 or 8 data bits; 1 or 2 stop bits, odd, even or no parity (0-300 bps).
High Speed Data Format: (Smartmodem 1200) Serial, binary, asynchronous: 7 data bits: 1 or 2 stop bits, odd, even, or fixed parity or 8 data bits, 1 or 2 stop bits, no parity (1200 bps).
Dialing Capability: Touch-Tone® and rotary-dial pulse dialing.
Command Buffer: 40 characters.
Commands: (unnecessary with Smartcom II software) A: Immediate answer. A/: Repeat last command. C: Transmitter Carrier. D: Dial command, including simple dialing, waiting for second dial tone, auto-dialing and other features. E: Local echo. F: Full/half duplex. H: Switch hook. M: Audio monitor. O: On-Line. P: Pulse dialing. Q: Quiet mode. R: Reverse originate/answer mode. S: 17 "Set" commands speed, escape code character, number of rings to answer on, etc. S?: Checks operational parameters above. T: Touch-Tone dialing. V: Verbal result codes.
Result Codes: (can be numerical/verbal): 0/OK: Command line ok. 1/Connect: Carrier detected. 2/Ring: Phone is ringing. 3/No Carrier: Carrier lost or never heard. 4/Error: Error in command line. 5/Connect 1200: Carrier detected at 1200 bps. (Smartmodem 1200 only.)
Audio Monitor: Two-inch speaker with volume control.
Rear Panel: On-off switch, power jack, RS-232C connector, modular phone jack connector, volume control.
Operation: Full or half duplex.
Data Rate: 0-300 bps and 1200 bps for Smartmodem 1200; 0-300 bps for Smartmodem 300.
Interface: RS-232C.
Intelligence: Z8™ microprocessor with 4K byte control program for Smartmodem 1200; Z8 microprocessor with 2K byte control program for Smartmodem 300.
Modem Capability: Bell System 103 or 212A compatible originate or answer mode for Smartmodem 1200; Bell System 103 compatible originate or answer mode for Smartmodem 300.
Receive Sensitivity: -50dBm for Smartmodem 1200; -45dBm for Smartmodem 300.
Transmit Levels: -10dBm.
Registration: FCC registered for direct connect to the nationwide phone system. Connects with modular jacks RJ11W, RJ11C, RJ21W, RJ21C, RJ41W, RJ41C.
Power Pack: U.L. listed 120VAC, 60Hz, 13.5VAC output.
Size: 1.5" x 5.9" x 9.6"

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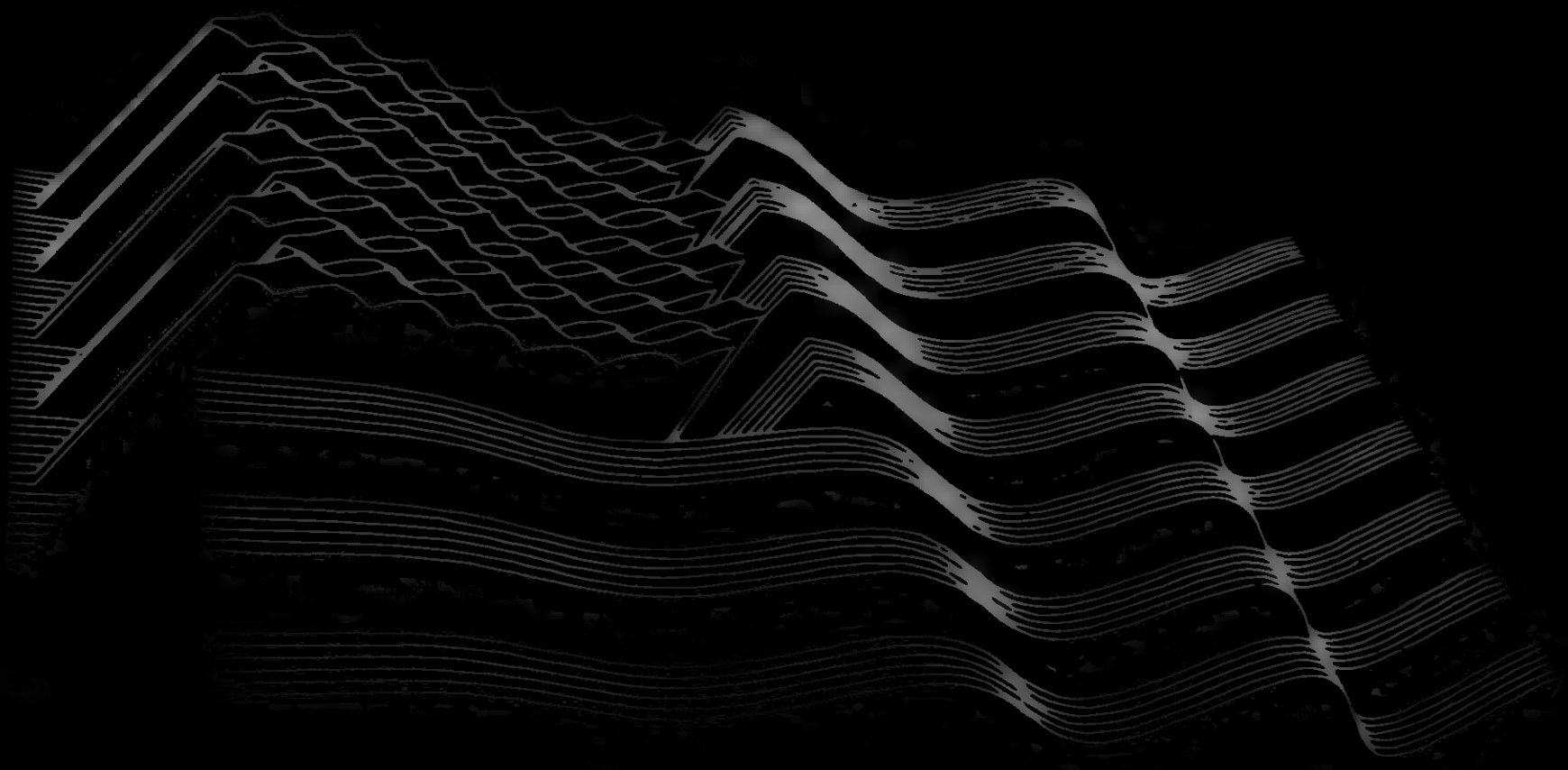
THE NEW WAVE OF COMPUTER GRAPHICS

By Alexis Driscoll and Robin Howard

Computer graphics is emerging as an essential tool for time-pressured managers. Sales of graphics software are projected to grow at a rate of 40% per year through the '80s, making graphics one of the fastest growing markets in software. What can DP managers do to meet the growing need for graphics without increasing the drain on their personnel and systems? One solution is distributed graphics for microcomputers.

Graphics is a valuable tool for managers for several reasons. Studies have shown that visual presentation of information markedly increases both the speed and volume of comprehension. Meetings are on the average 28% shorter, which is a boon to managers who are estimated to spend up to 60% of their time in meetings. Ease of comprehension aids the manager in reviewing and analyzing data. In addition, graphics presentations are attractive to business users because they have been shown to be more persuasive. As a result, the demand for business graphics

(Continued on Page 78)



A Guide to Graphics Software

	Business & Professional Software, Inc.'s Business Graphics	Decision Resources, Inc.'s Chartmaster	Innovative Software, Inc.'s Fastgraphs	Feros Microsystems, Inc.'s Graphpower	Graphic Communications, Inc.'s Graphwriter	Software Publishing Corp.'s PFS: Graph	Visicorp's Visitrend/ Plot	Lotus Development Corp.'s 1-2-3
Operating System:								
DOS	Yes	Yes	Yes	No	No	Yes	Yes	Yes
UCSD's P-System	Yes	No	No	Yes	Yes	No	No	No
Product Aids:								
Command Format	English	Menu	Menu	Menu	Menu	Menu	Menu	Menu
On-Screen Help	Yes	No	No	No	Yes	No	No	Yes
Documentation:								
Tutorial — Diskette	Yes	No	No	No	No	No	No	Yes
Tutorial — Manual	Yes	Limited	No	Yes	Yes	No	Yes	No
Data Handling:								
Nontime Series	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Data Extraction:								
Text Files	Yes	No	No	Pascal only	No	No	No	Yes
Sylk Files	Yes	No	No	No	No	No	No	No
DIF Files	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Graph Types:								
Line	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dash Types	5	8	8	8	5	0	0	0
Symbol Types	8	0	8	0	4	4	6	6
Bar:								
Horizontal	Yes	Yes	Yes	No	Yes	No	No	No
Clustered	5	24	6	Varies	8	4	2	6
Stacked	Yes[a]	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pattern Types	7[b]	8	9	5	8	8	3	8
Three-Dimensional	No	No	Yes	No	No	No	No	No
Pie:								
Exploded Slice(s)	No	Yes	Yes	No	No	No	No	No
Scattergram	Yes	Yes	No	No	Yes	No	No	No
Symbol Types	8	8	0	No	4	0	8	8
Multiple Graphs/Chart	Yes	Yes	Yes	No	Limited	Yes	Yes	No
Sequenced Presentations	Yes	No	Yes	Yes	No	No	No	Yes
Axes:								
Range Control	Yes	Limited	No	Yes	Yes	No	Yes	Yes
Scale Control	Yes	Limited	No	Yes	Yes	Limited	Yes	No
Screen Color:								
User-Specified	Yes	Yes	No	No	Yes	No	No	No
Screen Colors	16	16	3	0	10	4	0	3
Text:								
General Title	1 line	4 lines	1 line	5 lines	3 lines	1 line	1 line	2 lines
Legends	8	24	8	Varies	8	4	8	8
Horizontal Axis	1 line	2 lines	1 line	1 line	1 line	1 line	No	1 line
Vertical Axis	1 line	2 lines	1 line	1 line	1 line	1 line	1 line	1 line
Floating Text	Yes	No	No	No	No	No	Yes	No
Statistical Functions:								
Min., Max., Sum	Yes	No	No	No	No	No	Yes	No[e]
Mean, Var., Std. Dev.	Yes	No	No	No	No	No	Yes	No[e]
Curve Fitting:								
Linear	Yes	Yes	No	No	Yes	No	Yes	No[e]
Constant	Yes	No	No	No	No	No	No	No[e]
Logarithmic	Yes	Yes	No	No	Yes	No	Yes	No[e]
Parabolic	Yes	No	No	No	No	No	No	No[e]
Sinusoidal	Yes	No	No	No	No	No	No	No[e]
Exponential	Yes	Yes	No	No	Yes	No	No	No[e]
Curve Smoothing	Yes	No	No	No	No	No	Yes	No[e]
Distribution	Yes	No	No	No	No	No	No	No[e]
Point Generation	Yes	No	No	No	No	No	No	No[e]
Hardcopy Output:								
Dot Matrix Printers	31	0	0	0	0	11	3	13
Letter Quality Printers	20	0	0	0	0	1	0	0
Plotters	29	20	10	2	7	8	0	3
Suggested Retail:	$350	$175	$295	$495[d]	$395[c]	$140	$300	$495

The information in this table is believed to be correct based upon vendor documentation, but cannot be guaranteed.

[a] When drawing stacked bars on a plotter, there will be color overlap.
[b] When using a plotter, patterns are limited to those which can be accessed by the plotter itself.
[c] The basic Graphwriter set ($395) supports a limited number of graph types. Area charts and other more advanced graph types require the extension set ($590).
[d] Graphpower is available at two different prices: $295 for use with the HP 7470 and $495 for use with the HP 7220.
[e] All statistical functions and data manipulation must be performed through manual entry of the formulas within the spreadsheet section of the package.

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- ☐ **PCI 3780/SNA:** SNA/SDLC to BSC 3780 emulation.
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is increasing and will continue to do so. The type of situation that requires business graphics places a special burden on the department, creating a problem for the information manager providing graphics. Executives operate in a data environment fundamentally different from production applications. Decision support and the presentation of analysis often require data over a longer time frame. They involve more summarization and less detail. When the analysis involves current or projected data, that data is often dynamic, sometimes variable or uncertain and often difficult to define.

In addition, the situation giving rise to the demand is different. Ad hoc needs and last-minute changes are frequent, making rapid turnaround essential. Presentation graphics are often customized, requiring close interaction between the manager and the program.

When all graphics capability is located in the DP department, the increased demand for nonstandard output places a new strain on the facility. One solution is to cut loose those nonstandard, nonroutine tasks by implementing microcomputer graphics software.

When all graphics capability is located in the DP department, the increased demand for nonstandard output places a new strain on the facility. One solution is to cut loose those nonstandard, nonroutine tasks by implementing microcomputer graphics software.

Business graphics on microcomputers resolves the problem from both sides. Use of micros relieves DP services of tasks that are unnecessary or inappropriate. From the manager's perspective, the ability to interact with the program eliminates the problems of an intermediary between the manager and the system. Managers can get the graphs they want. This interaction is essential both to analysis of data and to customizing graphs. Secondly, since they or their staff create the graphs themselves, they control the turnaround time. They get the graphs when they want them.

Turnkey systems, which provide hardware (usually minicomputers) and software dedicated to graphics, offer some excellent graphics capabilities. However, when they are contrasted with personal computers that have off-the-shelf software, there are several trade-offs to consider.

The first trade-off is cost. Turnkey systems cost in the range of $35,000 for up to approximately six units. Add-ons cost approximately $12,000 to $15,000 each. By contrast, a standalone micro unit including hardware and software costs less than $5,000. In many cases, the hardware is already in place, reducing the expense to a range of $200 to $600.

The second trade-off is the cost-benefit ratio. In the realm of micros, cost is not the distinguishing feature. Even if both the cost of the micro and software are considered, when compared with a turnkey system, it is possible to purchase approximately 80% to 90% of the capability for 10% to 15% of the cost — or less.

The last trade-off involves the tactical issues raised by a turnkey system's cost. A high price provides an argument for centralization of the expensive resource in order to maximize utilization. This centralization is directly contrary to the intent of distributing graphics capability to the user. Much of the ease of access, if not ease of use, is sacrificed.

Before evaluating programs, it is essential to determine the needs that the programs must serve. Until recently, presentation was the primary function of business graphics, and it is still the most basic and first-used application.

The more important the presentation is, the more aesthetic options are required of a program. How much control over the visual image is required? User needs may be defined within the following parameters:

- *Graph types.* How many are there and how sophisticated? Can you overlay one graph on another, such as a line above bars? Can you place two graphs side by side on one axis, such as a line beside bars? Can you create horizontal bars? Can you have more than one graph on a single page?
- *Range of axes.* How many variables can be displayed, including legible labels? Some programs can accept many data points but cannot legibly display 24-month labels. Can you control the frequency or appearance of labels?
- *Control of axes.* Does the program calibrate the range? Can you set the range?
- *Color selection.* How many colors are available for screen presentations and slides? How many can be displayed on the screen at one time? Can the users specify background as well as foreground color? Does a color program display on a monochrome monitor?

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● *Text on graphs.* How many titles are there? What types: axis or legends? Are they vertical as well as horizontal? Can titles be placed anywhere on the graph such as numbers on top of bars? How many fonts are possible? Can you create word charts? How many fonts can appear on one screen?

● *Selection of fill, line, mark and grid type.* How many options are there? Can you specify them or are they in a fixed cycle?

As managers have become more accustomed to visual data through the use of presentation graphics, demand for analytic graphics has increased and will continue to increase. Many simple forms of analysis may be performed within certain micro graphics programs.

It is essential to determine the sophistication of the analysis to be performed. Trend analysis should be considered. Is spotting trends visually the extent of analysis or is curve fitting required? How much statistical analysis is required? Is drawing a trend line sufficient or should the program generate points along the curve as well?

Data transfer and manipulation should be considered. How extensive is the data? How much manipulation does it require? Some programs transfer data, with varying degrees of ease, between spreadsheet programs and graphics programs. Some programs allow simple data manipulation within the program itself.

Do managers receive information routinely? If so, there are programs that allow the creation of standardized graphs similar to those produced on a mainframe. Parameters of the graphs can be established once, and subsequent users need only edit data.

Once an application profile has been developed, there are two other variables to consider: desired output and time. Output varies considerably in quality, time and cost. For particular informal presentations, monochrome charts produced on a printer are quicker and less expensive than color charts produced on a plotter. These options, as well as the ability to create slides and transparencies, are not only a function of the hardware; but also of the software's ability to interface with it. Some programs also allow the presentation of sequenced displays on the monitor in place of slide shows.

Where software is concerned, less time is not necessarily a function of more money. Some programs that are comparably priced are slower than others. Programs vary in the time it takes to process an entry. More importantly, programs vary in the time it takes to load, change graph styles, change data and transfer data. When multiple charts are produced, time becomes an important factor.

Once users' needs are determined, the programs to meet those needs can be evaluated. There are several criteria to apply.

A program chosen for one application, such as analysis or presentation, should contain a breadth of options associated with that application. If the program contains several applications, such as analysis and presentation, opt for sophistication. Some multiple applications programs, particularly within integrated programs, are excellent introductions to graphics, but are outgrown very quickly even by inexperienced users. Expect user sophistication to grow rapidly at first. Similarly, expect a proliferation of data requests and opt for a program that most easily acquires data from a multitude of sources.

If the program contains several applications, such as analysis and presentation, opt for sophistication. Expect user sophistication to grow rapidly at first. Similarly, expect a proliferation of data requests and opt for a program that most easily acquires data from a multitude of sources.

Currently, there are no truly portable graphics products available for microcomputers. However, some products can become standards in a micro environment if the same program is available on several of the major brands of micros. In an environment in which several brands are already in place, user training is simplified. In addition, user retraining is not required as users change or add different brands.

The addition of peripherals will constitute the richest and most prolific growth where graphics is concerned. The ability to grow in a logical and controlled pattern requires software that interfaces with a broad range of peripherals.

Software must be able to utilize the logical intelligence of peripherals. Without this ability, the performance of peripherals such as plotters and printers will be constrained with regard to such items as scaling, fill types, font styles and color.

The importance of ease of use cannot be overstated. Managers need a program that is easy to learn and easy to use. The first prerequisite is

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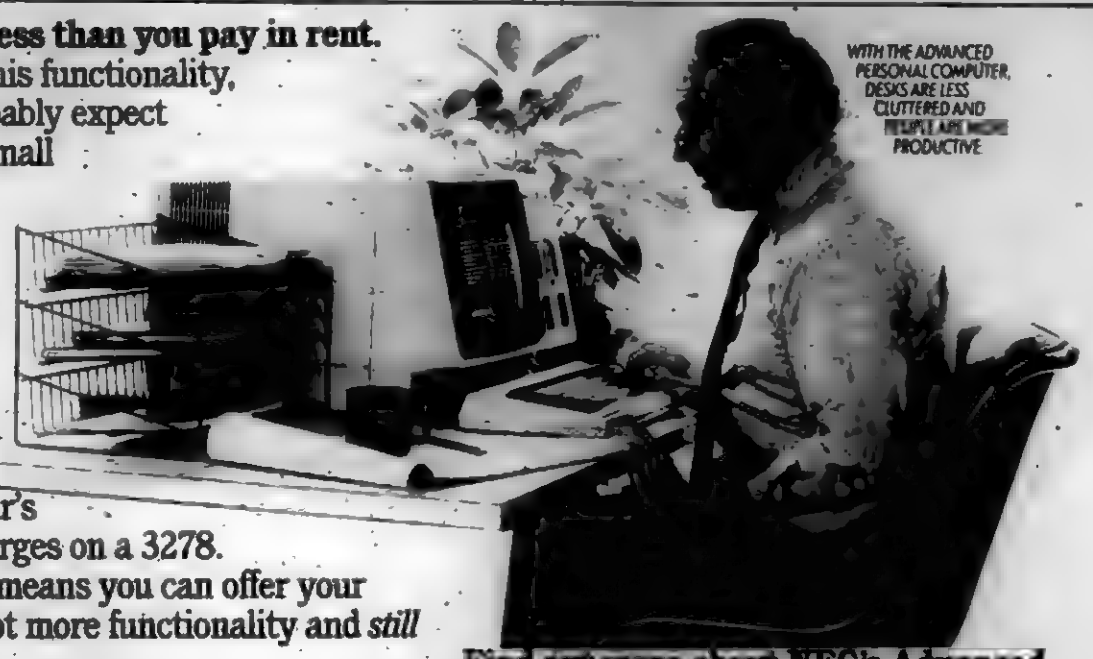

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either menus or English-like commands. Menus have the advantage of being easy to learn at first, but a common complaint is that more experienced users find them awkward and slow. If a high turnover of users is expected, then menus may be the best choice. However, users who expect to use the program frequently will likely opt for a command interface with English-like commands.

If the program is meant to customize graphics or experiment with data, it should be easy to use. Standard formats are only easy for producing standardized graphs. It should be easy and quick to change your mind about the type of graph, graph elements and data input. It should be easy to preview the graph while it is being created.

When choosing between two comparable programs, choose the one with better documentation. Documentation that is thorough and easy to understand is the key to users learning the program and developing their skills. It should include a tutorial with exercises for the novice and a variety of reference materials for the experienced user. On-screen tutorials are an excellent tool for overcoming reluctance to interact with the program. Look for a comprehensive reference section within the manual and foldout or pocket charts for quick reference. In addition, look for comprehensive Help screens within the program.

Telephone customer support, in which the manufacturer answers user questions about the program, can deflect much of the onus of training and troubleshooting from information managers. Support varies among vendors. Some have formal customer support programs, while others deal with questions on an ad hoc basis. Some have toll-free numbers; others do not. Since questions will continue to arise as user skills develop and equipment is added, quality customer support is an essential time-saver.

When micro graphics is introduced to a firm, the use of graphics and its variety of uses tend to mushroom shortly thereafter. When first surveyed, many potential users cannot conceptualize their graphics needs. However, once graphics is accessible to them and they become familiar with its capabilities, either directly or through others, applications multiply. Users also become more sophisticated in their skills. In addition, some of the demand for graphics comes from the recipients of graphs, not the creators. Executives soon discover the value of graphics presentations and demand more of them. For all these reasons, it is wise to allow options for expansion when making initial purchases.

Although expansion may be an upgrading to more sophisticated programs or hardware, it may also be just a proliferation. The two should not be mistaken. Not every application requires an 8-color plotter or a statistical package. Planned expansion will consider upgrading equipment, but also the provision of a variety of options regarding speed, quality and capacity.

The micro invasion of the office is a fact. But microcomputing is personal computing. The name is an index of its use. It is not a replacement for the tasks normally performed by DP departments, but rather a supplement. It has the added advantage of relieving DP of current tasks that drain its resources, tasks that are better performed elsewhere.

Graphics is an excellent example of such a task. With the advent of microcomputers, many nonstandard, ad hoc graphics tasks can now be located where they belong — with the user.

Graphics is just being introduced into the business environment in quantity. Now is an ideal time for professionals concerned with information management to intervene to assure that this new wave of information processing is properly managed. ♦

Driscoll is a marketing consultant and a Masters candidate at MIT's Sloan School. Howard is a product manager for Business & Professional Software, Inc., Cambridge, Mass.

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*MICROSYSTEMS—March 1983
**THE ERGONOMICS NEWSLETTER—August 1982

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NEWSPAPER

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper — Second-class postage paid at Framingham, Mass. and additional mailing offices ©1983 by CW Communications/Inc.

; $44/year — December 5, 1983 — Vol. XVII, No. 49

Inside

after settling with Hi-[illegible] Ltd. in a celebrated trade-secrets theft suit, IBM has strengthened its pursuit of two other companies accused of conspiring with Hitachi to transport IBM secrets abroad. **Page 2.**

• • •

"We're just doing our own thing," is how Chairman of the Board and Chief Executive Officer John J. Cullinane sums up his success in steering Cullinet Software, Inc. in the often turbulent software industry seas. **Page 17.**

• • •

Data from an airplane's high-flying on-board computers presented in court as evidence helped nab two drug dealers and may have set a legal precedent. Also, while still up in the air over what exactly happened, investigators of the recent KAL airlines disaster in Russian airspace are apparently nearing a conclusion. **Page 4.**

• • •

IBM's VM operating system may seem to be a software vehicle for all seasons, but there are security problems lurking within its system and file access abilities. **Page 67.**

• • •

McCormack & Dodge Corp. has been ordered to pay more than **$2 million** to a small software company for violating a contract involving international sales of an M&D package. **Page 123.**

• • •

Sperry Enters Micro Vendor Fray With IBM-Compatible, 16-Bit Unit

By Jeffry Beeler
CW West Coast Bureau

LAS VEGAS — Sperry Corp. last week made its long-delayed debut as a microcomputer vendor with the introduction of an IBM-compatible personal computer that reportedly outperforms the industry giant's Personal Computer and Personal Computer XT by 50% and costs 10% less.

Though unable to run its own supplier's software, the 16-bit Sperry machine boasts compatibility with its IBM rivals down to the bit level, a company spokesman said during a press conference at Comdex/Fall '83 here. The system uses the same I/O bus architecture, memory organization, disk formats, graphics organization and keyboard as the IBM Personal Computer and XT.

Like its Big Blue counterpart, the Sperry micro also supports either Version 1.25 or 2.0 of Microsoft, Inc.'s MS-DOS operating system, the spokesman said. The result is that the personal computer runs an assortment of widely used application programs, including:

- Micropro International Corp.'s Wordstar, Spellstar and Mailmerge.
- Ashton-Tate's Dbase II.
- Microsoft's Multiplan.
- Assorted products from Peachtree Software, Inc.

Through its optional 3270 Binary Synchronous Communications or 3270 Systems Network Architecture/Synchronous Data-Link Control communications protocols, the Sperry personal computer can reportedly connect to IBM host mainframes. The machine also comes with an optional Uniscope communications protocol that allows the product to attach to Sperry's 1100 series or OS-3-based CPUs. Standard with the micro is an RS-232 port capable of supporting asynchronous transmissions.

Among its other purported advantages, the Sperry personal computer provides color graphics resolutions of up to 640 by 400 dots, twice the sharpness of its IBM competitors, the company claimed.

In several respects, the announcement of Sperry's first microcomputer marks an abrupt and drastic departure from the vendor's traditional way of doing business. In the past, the company has concentrated on providing mainframes and has distributed its products exclusively through its direct sales force.

But with the advent of its personal computer, Sperry is greatly expanding its existing channels of distribution to include dealers and independent sales organizations as well as its own internal selling force, the spokesman said.

The arrival of the Sperry personal

(Continued on Page 10)

Photo by D. L. Wells

Frogs weren't the only things leaping for attention last week at Comdex/Fall '83. Also featured:

- *A bareknuckled jab by major micro software vendors to incorporate windowing capabilities into their products. Page 7.*
- *A variety of hardware products, including a plethora of new portable computers. Page 13.*
- *A 16-bit desktop computer from Tandy Corp. that features MS-DOS compatibility. Page 10.*

Additional Comdex coverage begins on Page 7.

CRT-Equipped Public Phone To Debut From AT&T in '84

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — The CRT terminal, the telephone and the credit card — probably the three most used items today — have recently been brought together by AT&T as a new product and service to be offered throughout the country beginning in January. The product is a CRT-equipped public telephone that can be accessed by using a special credit card.

Dubbed the Card Caller, the telephone is considered to be the initial vehicle for new on-line information services, according to company officials who, at a press conference held last week, pointed to videotex, electronic message services and teleshopping as on-line possibilities for the unique telephone.

However, shortly after the AT&T announcement, MCI Communications Corp. said it would begin installing public telephones, equipped with charge card readers, at Washington's National Airport this month; the readers will enable Visa and Master Card users to make charge calls regardless of whether they are MCI subscribers. According to a company spokesman, MCI plans to install its new telephones in airports, hotels and other public locations in the nation's 30 largest cities by the end of 1984. The company hopes to lease many of these locations from local telephone companies, the spokesman added.

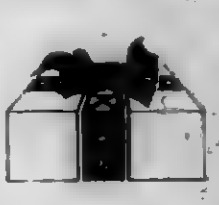
As presently configured, AT&T's Card Caller telephone includes a 7-in. black-and-white screen able to display 16 lines of 32 alphanumeric characters each. It gives the user

(Continued on Page 6)

'Tis the Season to Rejoice For Mail-Order DP Staffers

By Jim Bartimo
CW Staff

While some people may dread the advent of the Christmas shopping season, there are those in a select group of retail data processing departments who are actually thankful this week to see the season finally arrive.



Mail-order houses spend nine months of the year planning for the three months from September to the first week of December — considered to be the peak mail-order shopping season. By the time the traditional Christmas shopping season rolls around, the few weeks before Christmas, business at these firms starts to wind down.

However, the unusual business of selling by mail presents some equally unusual issues for DP personnel.

The first consideration is the lopsided schedule. Calendar and appointment book retailer Baldwin Cooke Co. of Chicago services approximately 500,000 customers during the Christmas season. "That's 65% of our total business done in just two months," according to data base administrator Bob Mueller. "We spend the rest of the year trying to make [this time of year] easier."

Some mail-order houses see an increase of 100% in business, while others have their total sales increase by a factor of 10 or 15, according to one seasoned mail-order executive.

Another unusual problem is garnering customers for the Christmas season during the down season, which reaches its nadir in July.

Baldwin Cooke mailed out five million to six million catalogs to gain its half-million Christmas customers, and that led the nine-member DP department to implement some heavy-duty list processing on its Burroughs Corp. 5900 mainframe.

Another company that maintains a list of about four million names is gift retailer Direct Order Sales Corp., which puts out the Clymer's catalog

(Continued on Page 6)

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Second-class postage paid at Framingham, Mass., and additional mailing offices. Computerworld (ISSN 0010-4841) is published weekly except February 19, August, April 15, August, May 13, August, June 10, August, July 4, August, September 5, August, October 17, August, November 21, August, December 19, and a single combined issue the last week in December and the first week in January by CW Communications/Inc. Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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Computerworld can be purchased on 16 mm microfilm through University Microfilms Inc. Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. Computerworld is indexed, write to Circulation Dept. for subscription information.

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IBM Charges Four More, Broadens Suit Against National Semi, NAS

SAN FRANCISCO — In an apparent attempt to pressure the companies to the bargaining table, IBM has broadened its civil suit against National Semiconductor Corp. and its subsidiary, National Advanced Systems, Inc. (NAS).

In an amended complaint filed Nov. 25, IBM added four more names to the complaint it originally filed more than a year ago. Accused of charges including conspiracy to steal trade secrets, unfair competition and breach of contract were former IBMers Raymond J. Cadet and Jonathan A. Fram; NAS employee Barry B. Saffaie; and Tabassom Ayazi, identified as a worker for a DP employment agency.

Cadet, Saffaie and Ayazi were also indicted by the federal government in 1982 in connection with a Federal Bureau of Investigation probe into the alleged theft of trade secrets that were passed on to Hitachi Ltd. of Japan.

Those charges were dismissed on a technicality, although the government is appealing the dismissal.

Out-of-Court Settlements

An IBM spokesman noted that 19 defendants, including Hitachi, have settled with IBM out of court, Hitachi for a purported $300 million and other concessions [CW, Nov. 14]. National Semi and NAS are the last corporate defendants against which IBM still has charges, although neither was named in the government's criminal suit, in which Hitachi pleaded guilty.

'Contrary to published reports, IBM has not specified the amount of damages it is seeking against National Semi and NAS . . . [but] the secrets heist . . . was essentially engineered by a "joint information gathering team" created by National Semi and NAS.'

The spokesman also said that, contrary to published reports, IBM has not specified the amount of damages it is seeking against National Semi and NAS. He did say, however, that the value to IBM of the trade secrets allegedly stolen is between $750 million and $2.5 billion.

The secrets heist, IBM has claimed in court testimony, was essentially engineered by a "joint information gathering team" created by National Semi and NAS.

National Semi and NAS had not responded to the amended complaint at press time.

Corrections

Due to an editing error, the author of the first of a three-part article entitled "Are Micros Really Better Than CRTs?" [CW, Nov. 21] was mistakenly identified as John Butler. The story and subsequent stories in that series, which concludes with this issue, were written by Eric B. Jacobs and Allen Sneider, both with Laventhol & Horwath, a certified public accounting firm headquartered in Philadelphia.

A unit price of $24.95 was quoted for the AJ 4048 full-duplex, dial-up modem from Anderson Jacobson, Inc. [CW, Oct. 17]. The correct price for the modem is $2,495.

A story entitled "Subcheck Release 1.0 Supports 'JCL-Check'" [CW, Nov. 21] failed to note that Subcheck Release 1.0 from Triangle Software Co. is available only for IBM TSO users.

In a story titled "Encryption Endorsed as Way to End Hacking Plan" [CW, Nov. 21], due to misinformation supplied to *Computerworld*, it was incorrectly stated that IBM had removed all its data encryption devices from the market. In fact, IBM continues to offer its Model 3845 and 3846 data encryption devices as well as the Model 3848 cryptographic unit through its National Accounts Division and its National Marketing Division.

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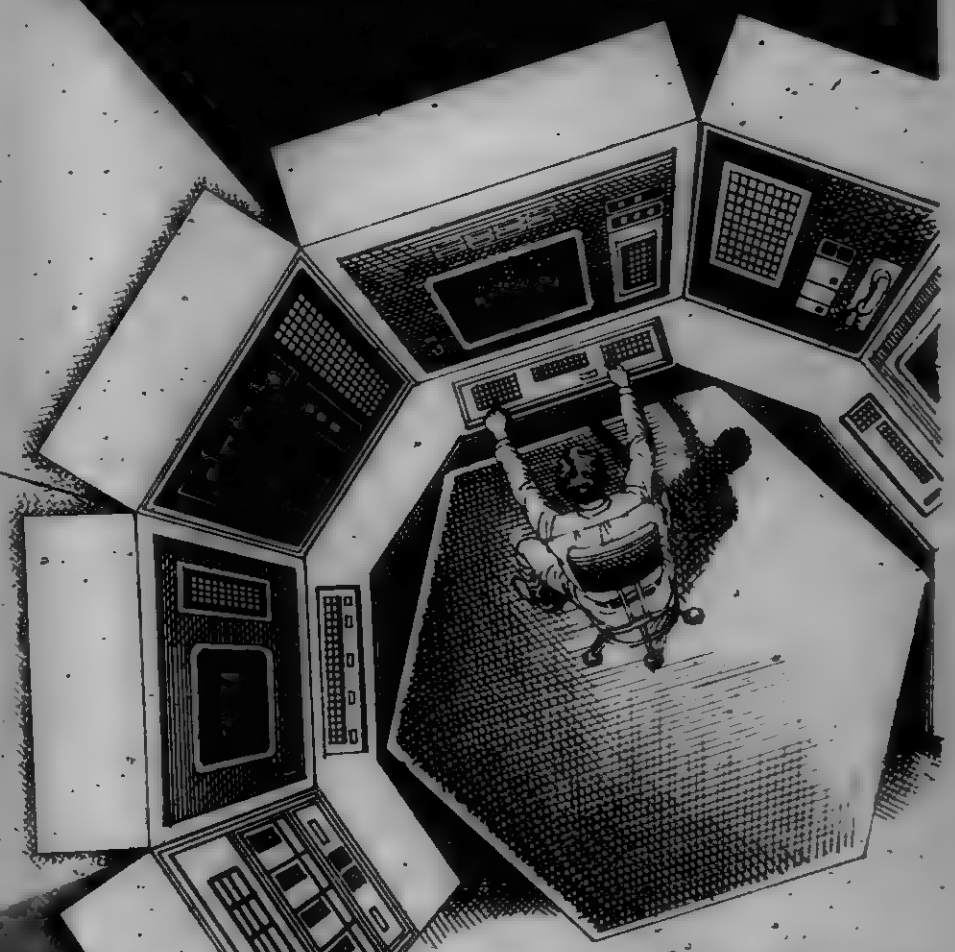

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DP Memory Bank Helps Win Court Conviction

By Patricia Keefe
CW Staff

MONTGOMERY, Ala. — In what could be a precedent-setting move, the U.S. Attorney's Office presented as last-minute evidence data from the memory banks of a flight computer to help clip the wings of two of three alleged cocaine smugglers.

After an October trial, two of the defendants, William Willis and Omar Ashad Mahdi, were convicted on four charges: importation of cocaine, conspiracy to import cocaine, possession of cocaine and conspiracy to possess with intent to distribute, U.S. Attorney of the Middle District of Alabama John Bell said. "The computer evidence was absolutely crucial to the importation charge," Bell said, adding that he did not believe he would have "gotten to the jury" without it. Sentenced Nov. 21, Willis and Mahdi received 24 years and 14 years in prison, respectively.

The third defendant, David J. Newcomb, was mistried, according to Bell, who filed a motion to "dismiss [the charges] with leave to reindict."

The case revolved around a plane loaded with 815 pounds of cocaine which, the prosecution held, could have come from Cancun, Mexico, and points south before landing here Aug. 3. The defendants were arrested Oct. 4 by U.S. Drug Enforcement Administration (DEA) agents. Also involved in the investigation were agents from the Alabama Bureau of Investigation and the Montgomery Police Department.

Information from the memory banks of the plane's Texas Instruments, Inc. 9100 airborne navigational receiver/computer — used for long-range navigation — was presented as evidence to prove the prosecution's theory that the plane had come from Mexico and possibly from Columbia as well. The computer's memory banks were "queried" by expert witness Thomas Butler, who testified for the prosecution.

Butler, who retired as a lieutenant colonel from the U.S. Air Force, is co-owner of Executive Pilots International here, holds an airline captain's license and a mechanics license, is a certified Gold Seal flight instructor and graduated from the University of Southern California's Advanced Safety School.

Bell and the agents involved in the case had never before heard of information based on a computer's memory being presented as evidence in court, and Butler thought it might be the first time a computer was used to win a conviction on drug trafficking.

Bell said he encountered no objections from U.S. District Court Judge Truman Hobbs when he attempted to introduce the computerized information as evidence. The attorneys for the three defendants, however, objected. They claimed that during the three-month period between the time the plane was seized and the time the computer's data was examined in court, anyone could have tampered with the navigational data, punching in whatever figures he wanted.

Turn to Memory

Bell first hit upon using the computer's memory when he attempted to have some drawings on a hand-written map found in the plane's cockpit interpreted by Butler. "He was familiar with the computer involved; I had no idea it had memory. He queried the computer on a Monday before the trial, and testimony was taken on a Tuesday," Bell said.

Stored in the computer's memory were several way points, or possible stops in a flight plan, including a point on the Yucatan peninsula of Mexico, according to Butler. The first checkpoint was near Cancun, a town on the eastern tip of Mexico. He testified that Cancun is a landfall, or checkpoint, to avoid Cuba and that pilots flying from South America to Alabama would have wanted to fly around Cuba. Butler, who flew combat missions in the Cuban area during the 1962 Cuban Missile Crisis, explained that it is very dangerous to fly over Cuba.

Although he did not find any way points for Columbia, Butler pointed out that the computer's memory is limited and, as the flight progresses, at some point, the computer runs out of way points, erases old points and adds new ones.

Other checkpoints stored in the computer's memory include two areas in Alabama, another in Mississippi by the Gulf of Mexico and a far-northern point, possibly Greenland. These points could have been used as navigational checkpoints by a pilot planning to fly from Columbia north into the U.S., but bypassing Cuba, Butler testified. Further, he said, points in a circle near Mobile, Ala., indicate a point at which the pilot "circumvented any attempts to pick them up" via high-altitude or low-altitude flying.

As a result of the successful use of the computer data as evidence, Butler said DEA officials told him they are "very interested in my capability to [serve as an expert witness decoding flight computer memories]." Noting that the various flight computers are "cheap, — from $900 to $30,000, that's pocket change to drug traffickers" — Butler predicted that "you'll see computers used more often in court."

Although it is possible that drug traffickers will "get smart" and erase the tapes after each flight, Butler pointed out they don't expect to get caught, and many probably won't take the precaution.

Computer Input Error May Be Responsible For Korean Jet Flying Into Soviet Airspace

By Patricia Keefe
CW Staff

MONTREAL — A one-digit human input error may be the reason why Korean Airlines flight 007 flew into Soviet airspace Sept. 1, where it was subsequently shot down. And, although the navigational computer system could have provided indications that the 747's flight plan was off-route, it appears the KAL 007 flight crew may not have attempted to cross-check their position.

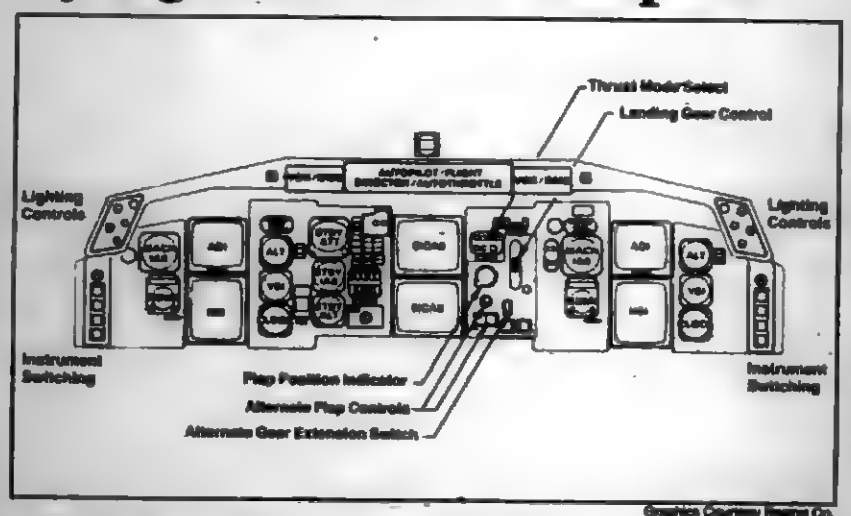
That explanation is among several possibilities under investigation by the International Civil Aviation Organization (ICAO) here, according to a spokesman. A seven-member investigation team was scheduled to report its results to the 33-member ICAO council Dec. 16. The report is expected to reach the council next week. There are 151 member countries belonging to ICAO, including the U.S., the Soviet Union and South Korea. Representatives of these three countries are not on the investigating team.

The Soviets have maintained the plane was on a spy mission for the U.S. and that it was shot down only after repeated attempts at radio contact. Initially, Soviet spokesmen denied the plane had been shot down. All 269 people on board are presumed dead, and various searches for the flight recording devices have been called off.

Three Systems

The 747 was equipped with three computerized, independent inertial navigational systems made by Litton Industries, Inc. They are the primary navigational tools utilized when flying over an ocean. When connected to the plane's automatic pilot, the navigational system devices guide a plane from one way point to another without any help from the crew.

Prior to takeoff, the pilot is supposed to punch in the latitude and longitude coordinates of his position, along with various way points. This data must be punched in manually on a key pad, similar to a Touch-Tone telephone, into each of the three inertial navigational system devices, the ICAO spokesman explained.



Graphics Courtesy Boeing Co.

The pilot's main instrument panel includes CRT displays for primary flight instruments (ADI, HSI) and for the engine indication and crew alerting system (EICAS). The other primary flight instruments (airspeed, vertical speed, altimeter, RDMI and clock) are driven by digital computers and provide improved accuracy and reliability.

A Litton Industries spokesman added that all three members of the cockpit crew normally take part in this operation. After each coordinate is punched in, a numerical response appears on the digital display unit and should be checked to make sure it matches what is written on the flight plan, he said. If correct, the information is entered into the computer's memory.

A software modification that would have allowed the pilot to input the numbers into all three systems simultaneously was not in place on KAL 007, according to the ICAO spokesman. The lack of this modification means the pilot would have had to punch in an incorrect coordinate three separate times. With another recent software modification, which KAL 007 did not have, "you literally can't make a [coordinate] error beyond a certain distance, say 10 miles, from where you taxied into the terminal," the spokesman said.

The inertial navigational system devices now in place on most airliners will automatically reject any error in latitude, but will accept an error in longitude, he continued. Therefore, if an input error was made, it would have been in longitude. The spokesman estimated that an error in longitude of 10° would have placed the airliner at least 206 miles off course to the north. As the flight progressed, the computers would have guided the plane 300 miles too far west — into Soviet airspace — shifting from a longitudinal to a latitudinal difference, according to the spokesman.

After reaching a distance of 150 miles from Anchorage, Alaska, and up to 150 miles before reaching Tokyo, the plane is out of reach of land-navigational systems known as very high-frequency omnidirectional radio stations. Therefore, its crew would have to rely upon computer checks and other flight instruments to determine the correctness of its course, the spokesman continued.

"There are many ways of computing distance and cross-checking errors. Of course, the big mystery is how this could have happened," he said, agreeing that flight crews commonly check their positions during flight. "If used correctly, you can query the computer and see how far off track you are," the ICAO spokesman added.

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Insight on Tech's Role Spells Success for DP Exec

By John Gallant
CW Staff

NEW YORK — The notion that a computer is nothing more than a tool is the key to understanding how Robert Herlihy operates.

While it may appear simplistic, that idea has propelled Herlihy to the top ranks of one of the nation's largest companies, putting him at the helm of a DP'ship of state with more than 2,000 employees and a $75 million annual budget. It is also a notion that has helped him keep that budget constant for the better part of a decade while actually reducing the size of his DP staff.

Herlihy, 52, was recently named senior vice-president of the Computer Technology and Operations Division (CTOD) of W.R. Grace and Co., an international giant with interests in chemicals, natural resources and consumer services that are expected to generate more than $6 billion in sales this year.

In addition to three Digital Equipment Corp. Decsystem-2060 mainframes and a staff of 50 at corporate headquarters here, Herlihy oversees some 160 other mainframes and 2,200 DP professionals spread throughout Grace's 100 operating divisions worldwide.

Along with supplying computer resources to corporate headquarters, Herlihy's organization serves as a consulting team to the operating units. "The operating unit usually doesn't have the experience on which to base important computer decisions," Herlihy explained. "We help them in selecting hardware and personnel and in purchasing and developing software. We're a central source of experience that they can call on in the computer field."

The service role inherent in that

Robert Herlihy

'You can't become so enamored of this profession that you lose sight of the needs of business. . . . It's something you can't overlook.' — Robert Herlihy, senior vice-president of the Computer Technology and Operations Division of W.R. Grace and Co.

structure suits Herlihy quite well. "You can't become so enamored of this profession that you lose sight of the needs of business," Herlihy said. "That's an important thing for people in this field to learn; it's something you can't overlook. You can't just be a technical expert, you have to serve the patron of your art — the business that supports you."

"I think a lot of data processing professionals mistakenly think they have to create large, centralized empires. That's wrong. These empires become so large and bureaucratic that they're totally inefficient. I'm trying to keep my operation running efficiently with the smallest number of people possible. It's the old Marine motto, 'I'm looking for a few good men.'"

Herlihy has practiced that theory during his climb up the corporate ladder. He was named to his previous position of corporate vice-president of CTOD in 1978 after having served as director of management science since joining Grace in 1968. Prior to that, Herlihy spent 10 years with General Electric Co., serving first as an engineer and later as a computer services consultant at GE's corporate headquarters here. A graduate of Tufts University, he served as a lieutenant commander in the U.S. Naval Reserve after graduating from Naval Officer's Candidate School.

During his reign at the Computer Technology and Operations Division, Herlihy has managed to hold the DP budget constant while maintaining high service standards — a remarkable feat in light of inflationary pressures. He has also reduced the size of the headquarters DP staff from a high of 85 to the current level of 50. Herlihy's future plans, though, are even more ambitious.

'More Working in Offices'

"We're seeing more and more people working in offices as opposed to factories," Herlihy said. "But the office has been off-limits to the productivity tools, such as scientific management techniques, that we have used in the factory. We're going to concentrate on making the office a more productive part of the company. We don't just need hardware — we can easily buy that — we need insight. It's my job to make Grace a lighthouse to others in the industry, to show them that this can be done."

Herlihy will approach that task with the same philosophy that has made him successful thus far. "I don't see how you can be a so-called information czar," he said. "The information manager has to recognize that things are changing, technology is diffusing power through such things as the personal computer. You have to realize that your role is to make others as effective as they can be. You have to be a facilitator, giving the right tools to the right people."

Success as a facilitator requires long-range planning — a function that Herlihy sees as a critical part of the DP professional's role and one that is often lost amid more mundane details. The absence of that planning has resulted, in Herlihy's view, in the underutilization of the tools of technology.

"Our ability to recognize the power of these tools has been weak. The advances have been so great, and our use has been so mediocre. We haven't done all that much with these things in the last 20 years," Herlihy said.

"But we're waking up, and I think our use will change remarkably in the future. Maybe we'll do something a little more interesting with this technology in the years to come."

Only those who understand the changing role of the information manager will share in that future, Herlihy said.

"The alert people will understand that the DP professional is beginning to play a more important role within the organization. He may have a new title, but his knowledge of the information field will be key. Not everyone will make it, but those who recognize the changes will play a critical role. I hope I'll be one of those."

DP Shops Get Break From Hectic Holiday

(Continued from Page 1)

from Nashua, N.H. With Wang Laboratories, Inc. VS80 and VS90 minicomputer systems, Clymer's analyzes catalog circulation to determine the customers who continue to shop by mail.

"The hot areas of the country are not geographic — they're demographic," according to Clymer's president, Tim Litle, who uses his system to determine which of his many catalog recipients actually become customers.

One advantage to mail-order marketing is the absence of any extensive billing applications. Since most orders come in with checks, money orders or credit card numbers, bills are not sent out. Making mail-order sales is primarily a two-step process of order entry and shipping.

Despite the break in billing procedures, mail order is not without its accounts receivable problems. Clymer's found that credit card orders are sometimes fraudulent, so the company now runs credit authorization applications for itself and for outside catalog companies.

"Banks are not geared up for mail order," Litle said, pointing out that mail-order forms ask for the credit card number, but cannot guarantee that the number is that of the customer who is ordering. Clymer's matches all credit card customers against a list of known "bad guys" who have histories of giving bad credit card numbers.

Other common applications are order entry, general ledger, inventory management, marketing and purchasing. "We also analyze product profitability and maintain an online inquiry system for customer service," Litle said.

While most of the relatively small mail-order companies are winding down this week, one of the largest in the country is just beginning its busiest season. Montgomery Ward & Co. of Chicago supports a nationwide network of catalog houses supported by four data centers.

"Each data center manager meets with the catalog houses to deal with the doubling and tripling of business," according to Irv Hammer, director of computer services for Montgomery Ward. "The order is placed in the catalog house, polled by the data processing department, put through order entry and shipped in a one- to three-day turnaround."

The busy holiday season translates into the addition of equipment for Montgomery Ward. Much of the equipment added is for additional data lines to support the extensive IBM Systems Network Architecture network of IBM 3033 and 3081 mainframes and 5,000 CRT terminals.

CRT-Phone Combination To Bow From AT&T in '84

(Continued from Page 1)

step-by-step instructions in English on how to complete a call. Later, AT&T plans to provide foreign-language calling instructions.

The new AT&T card eliminates the need for a user to punch his telephone credit card number into a Touch-Tone pad or give the information verbally to a human operator, as is required with the present telephone company calling card. Instead, the user inserts the AT&T card into a reader that is built into the new telephone, and the billing information — encoded magnetically on the back of the card — is input automatically.

The first Card Caller terminals will be installed next month at the greater Cincinnati airport. By the end of next year, AT&T Communications plans to install 5,000 Card Callers in airports, hotels and similar public locations, according to Marketing Vice-President Frank Blount.

He added that the new credit card will be mailed to 47 million customers next month. Blount noted that AT&T is also investigating the "smart card" — a credit card with an embedded microprocessor chip that can be used for teleshopping as well as a variety of other financial services.

AT&T Communications, successor to AT&T's Long Lines Division, will supply all of the company's domestic and international long-distance services after breakup of the Bell system Jan. 1.

At present, there are no plans to link the Card Caller with an electronic mailbox service, but the terminal has the technical capability to do so, Lew Chakrin, an AT&T Communications official, said.

Chakrin also said the interactive capability built into the phone will support future enhancements.

Already a Buzzword

Software Offerings Reflect Windowing Craze

CW at Comdex/Fall '83

By Jeffry Beeler
CW West Coast Bureau

LAS VEGAS — Software debuts last week at the Comdex/Fall '83 show graphically illustrated the extent to which the infant phenomenon of windowing has already become an industry buzzword and a subject of intense user interest.

Some of the personal computer software field's best known names, including Digital Research, Inc., used the fifth annual gathering of computer retailers as the springboard for formally introducing their first windowing capabilities.

At the same time, Lotus Development Corp. announced a $495 revised version of its existing Lotus 1-2-3 integrated software package. The revisions will broaden 1-2-3's compatibility to allow the product to operate with Apple Computer, Inc.'s Apple II and IIe, according to a Lotus source. Lotus is located at 55 Wheeler St., Cambridge, Mass. 02138.

Joining Digital Research and other established software vendors in announcing windowing products at Comdex was a flock of younger, slightly less familiar publishers, such as Trillian Computer Corp., which unwrapped a window interface for IBM's Personal Computers.

In addition, a number of other software firms — including industry stalwarts like Microsoft, Inc. and Visicorp — came to the show to demonstrate publicly windowing packages they had already officially introduced.

Visicorp, for example, showed its Vision package of integrated application programs, which the company finally began shipping late last month after an extended delay. Microsoft, meanwhile, displayed its windows software, which was announced in mid-November in New York.

Other vendors that demonstrated recently introduced windowing products at Comdex included Quarterdeck Office Systems, Inc. and Structured Systems Group, Inc., developer of Window Master. Quarterdeck's contribution to the show's lineup of windowing exhibits was DESQ, which reportedly allows applications from different publishers to be integrated without reprogramming.

Reasons for Trend

The reasons for the personal computer field's strong accent on windowing technology are as clear as clean glass — and almost as varied. For Western Electric Vice-President Jack Scanlon, the current proliferation of windowing software packages reflects the industry's belated recognition that "the human mind is really a parallel processor, not a serial processor."

Until recently, Scanlon said during a Nov. 29 Comdex interview, personal computers were designed as if the human brain were capable of performing only one task at a time and operated accordingly. In other words, the interface between users and their micros was serial and, therefore, much too narrow in bandwidth to permit people to work with any semblance of naturalness.

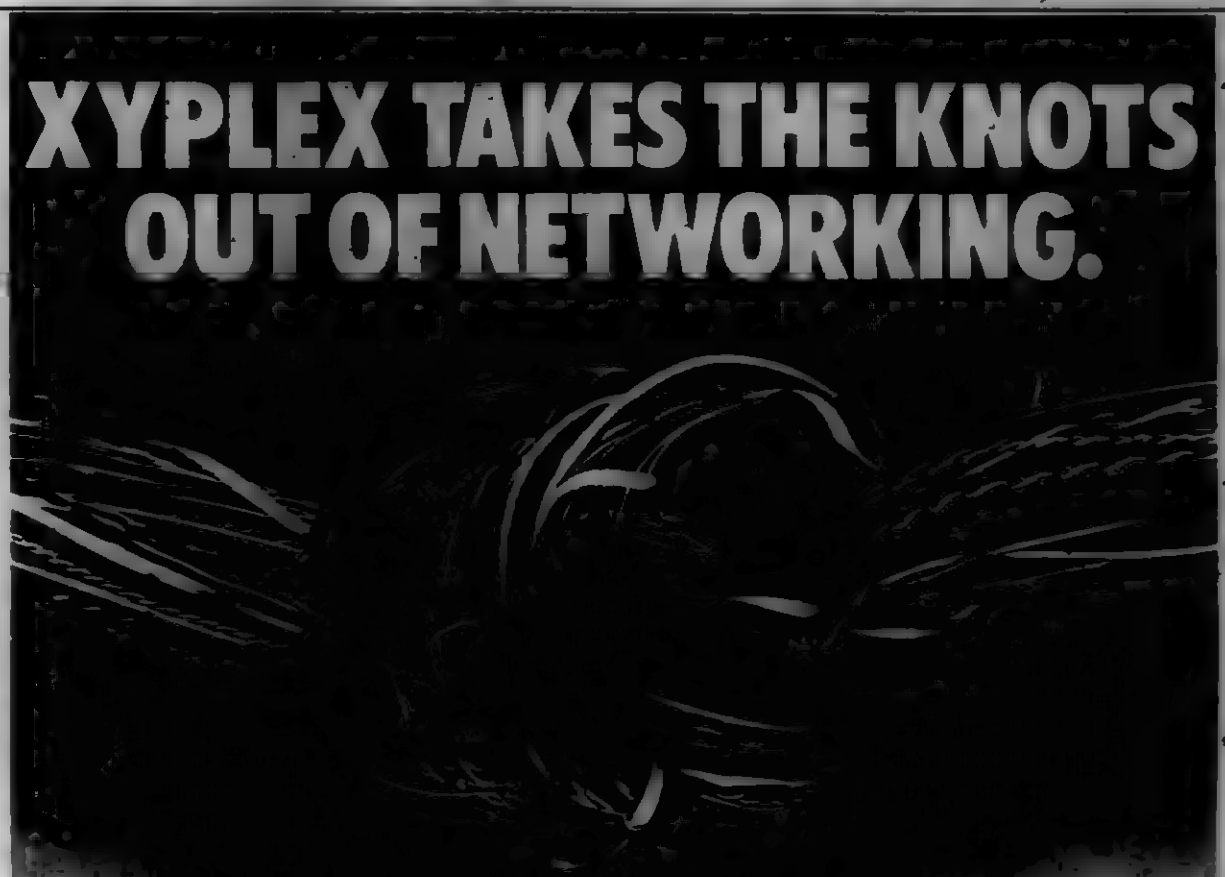
Scanlon's sentiments were echoed by Microsoft's accounts manager Jan Lewis, who credited windows with allowing personal computers to work in much the same way as conventional, manual office procedures.

With windowing, the indispensable ability to swap back and forth at will among a number of concurrent applications can now be effectively simulated on a personal computer. But although windows are electronic analogs to manual information processing methods, "they go one step beyond because they prevent things from getting lost, as sometimes happens when papers are stacked three or four layers deep on a desk," Lewis explained.

Perhaps representative of the first generation of software windowing products is one of Digital Research's two revised versions of its Concurrent CP/M operating system. Announced last week at Comdex, the modified Concurrent CP/M provides a windowing capability for the IBM Personal Computer and, at a starting price of $150, will be sold only through retail stores. Digital Research is located at 160 Central Ave., Pacific Grove, Calif. 93950.

In other window-related Comdex developments, Quarterdeck last week announced the signing of an agreement that will make DESQ available with NCR Corp.'s personal computer.

News of the accord coincided with the introduction of Trillian's Visuall, a window interface for the IBM Personal Computer, Personal Computer XT and the PCjr. Visuall costs $100 and is available from Trillian at 129 Central Ave., Los Gatos, Calif. 95031.



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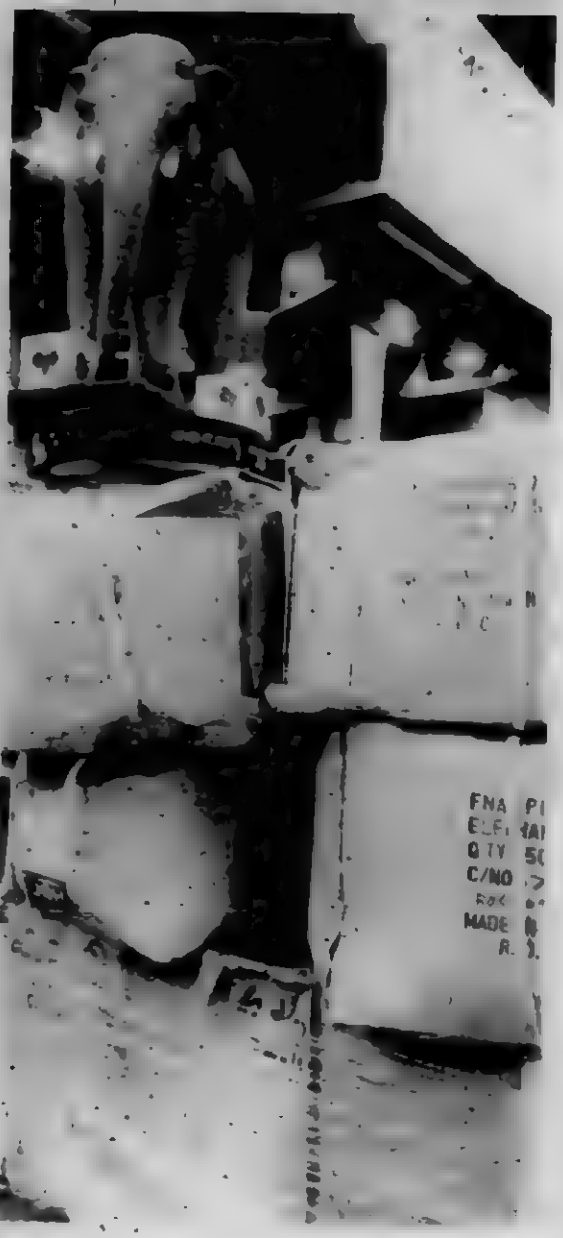


Just moments after the show opened, attendees crowded the exhibit floor (above). Elephant Memory Systems' mascot (left) guards crated giveaways, and later at Comdex (bottom right), patient show goers line up at booths staffed by safari-hatted helpers. Ziggy is all set to help Zenith Data Systems (right).

Photos by
David Lee Waite

Current Standards 'Short-Term'

Chaos in Micro Standards Arena Seen Growing

CW at Comdex/Fall '83

By Robert Batt
CW West Coast Bureau

LAS VEGAS — The present chaotic situation concerning de facto standards in the microcomputer industry will intensify rather than abate, attendees at Comdex/Fall '83 were told here last week.

Speaking at a plenary session on "De Facto Standards in the Micro Jungle," Rodney Zaks, president of Sybex, a Berkeley, Calif.-based micro publishing firm, said the industry will witness many more standards before it sees less.

"We are on the threshold of many new products and standards. All the standards we are seeing today are short-term standards that will not be dominant for long because the microcomputer industry is driven by user acceptance of new products," he told his audience.

Zaks, author of 15 books on the computing industry, said it is likely that new types of standards will emerge as the microcomputer industry continues to flourish.

For example, he asserted, standards will probably emerge for the latest technology — "hot button" windowing (split terminal screens that allow users to view different sets of data concurrently) — as well as for operating environments and integrated packages.

A totally new area will arise, he claimed, in which industry standards from chip and integrated circuit manufacturers will emerge. "With the declining cost of hardware, it is now economic to have software standards because chips are being developed that will allow users to go from one standard to the next," Zaks continued.

At the same time, Zaks added, these new phenomena will blur the distinctions between products and perhaps make standards less important.

Also speaking at the session, Chris Yalonis, director of the microcomputer group at Creative Strategies International, Inc. (CSI), a San Jose, Calif.-based market research firm, said IBM Personal Computer compatibility is the major issue surrounding personal computer industry standards.

Currently, he said, 85% of all micro software development is geared toward the IBM Personal Computer and Personal Computer-compatible market. "In creating standards, the larger the installed base of hardware and software that a product has, the greater its potential and momentum and the slower it is to die," he asserted.

The setting of standards, Yalonis added, cannot be confined to operating systems or disk drives. They must also include documentation, user interfaces and tutorials. "Failure to do so may lead to the emergence of consumer watchdog groups and government intervention," he warned.

Another session speaker, James Dow, president of Microcom, Inc. based in Norwood, Mass., said standards in communications are necessary if the predicted increases in productivity are to be realized.

He drew attention to the benefits that standards have for both users and manufacturers in a fast-growing industry.

For users, Dow remarked, the benefit comes from having a wider selection of compatible equipment and the ability to communicate with other systems. For equipment manufacturers, the advantage of standards, particularly in the office automation arena, is the reduction of research and development costs and the ability to link up their products with those of other vendors.

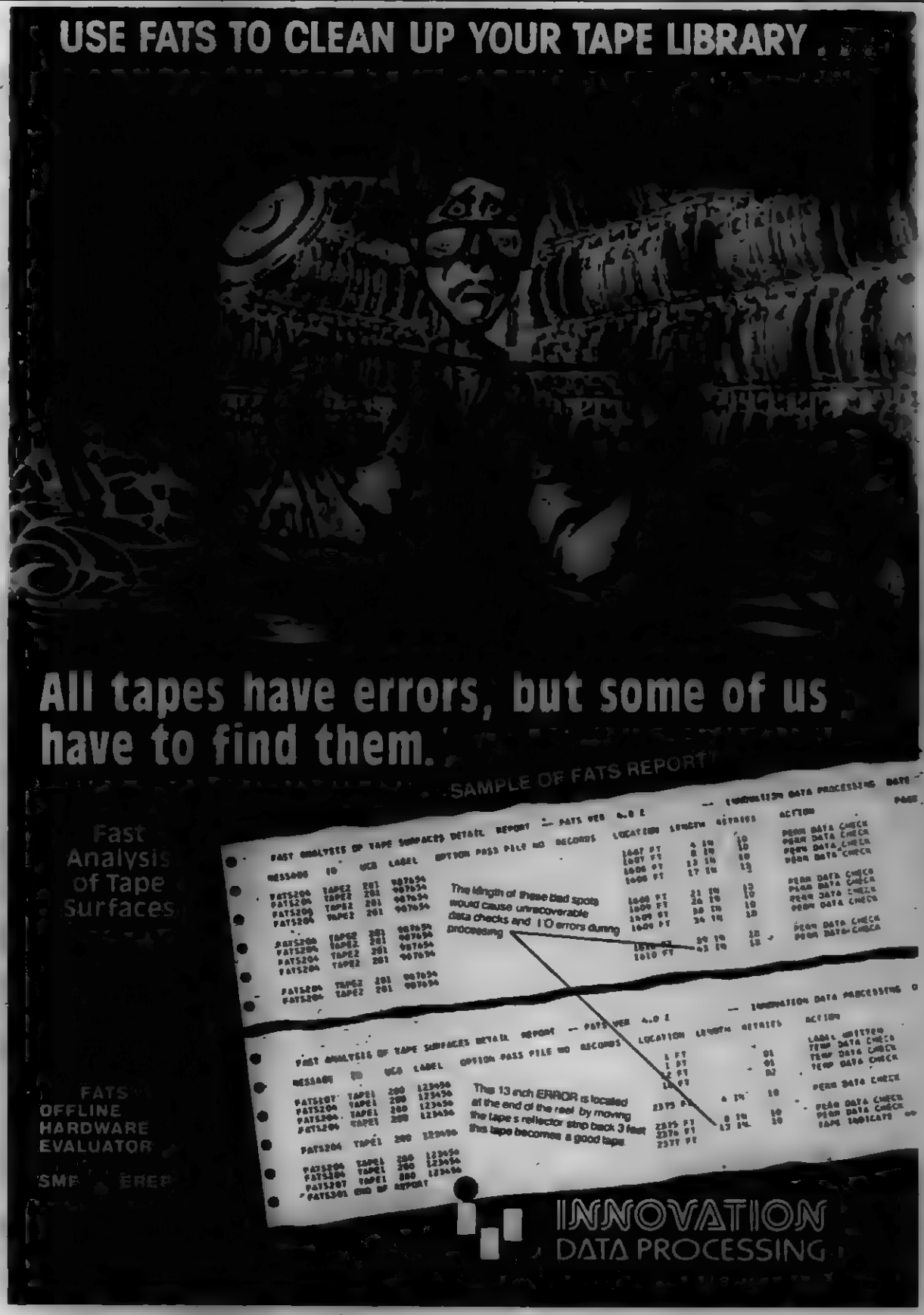
IBM Micro Users Get Program List

SANTA CLARA, Calif. — The PC Software Interest Group has announced the publication of the "Directory of Public Domain (And User Supported) Software for the IBM Personal Computer."

Listings are from programs from computer clubs, bulletin boards and individuals around the country. Programs include financial and stock market analysis, word processing, communications, data bases, Basic utilities, games using color graphics, Pascal and assembly language programs, programming languages, graphics drawing utilities, spreadsheet templates, random-access memory disks and print spoolers.

Copies of the book are available for $2.95 plus $1 shipping and handling.

Further information is available from PC Software Interest Group, Suite 130R, 1556 Halford Ave., Santa Clara, Calif. 95051.



TRS-80 Model 2000 Aims at IBM Micro Users

CW at Comdex/Fall '83

By Robert Batt
CW West Coast Bureau

LAS VEGAS — A high-speed, 16-bit personal computer that runs under Microsoft, Inc.'s MS-DOS operating system and is aimed at the same Fortune 500 companies targeted by the IBM Personal Computer has been introduced by Tandy Corp.

Unveiled here last week at Comdex/Fall '83, the TRS-80 Model 2000 is not compatible with IBM microcomputers, but can run many of the same programs written for MS-DOS. In fact, Tandy — which will market the computer through its 1,000-plus Radio Shack outlets — designed the Model 2000 to take advantage of the increasing de facto standardization in the microcomputer industry created by MS-DOS and the IBM Personal Computer, according to the vendor.

Positioned between Radio Shack's entry-level Model 4 TRS-80s and its Model 12/16 products, the Model 2000 is built around Intel Corp.'s 80186 microprocessor. The 80186 was chosen over the more-established 8088 because enhancements on the new chip and the capacity of its data bus reportedly make it perform from three to six times faster than 8-bit-based MS-DOS computer systems.

MS-DOS software programs that will run on the new model include Microsoft's recently-announced MS-Windows productivity option and its Multiplan spreadsheet package; Management Assistance, Inc.'s Basic Four integrated accounting series; Ashton-Tate's Dbase II data base management program; Software Publishing, Inc.'s PFS File and PFS Report; and Softword Systems, Inc.'s Multimate word processing program.

A basic 2000 system with 128K bytes of random-access memory (RAM) and two 5¼-in. floppy disk drives totaling 1.4M bytes of storage is priced at $2,750. A 2000 HD system with a single floppy disk drive, 256K bytes of RAM and a built-in 10M-byte hard disk and controller costs $4,250.

Both systems can include either a 12-in., high-resolution monochrome monitor, the VM-1, priced at $249 or a high-resolution, color, 14-in. monitor, the CM-1, costing $799.

Radio Shack is located at 1800 One Tandy Center, Fort Worth, Texas. 76102.

Sperry Goes Micro, Offers IBM-Compatible

(Continued from Page 1)

personal computer also signals a sharp deviation from the company's established methods of hardware manufacturing. Once insistent on producing all of its own equipment in-house, the vendor is now delegating some of its production responsibilities to various outside contractors.

Although a few of the personal computer's constituent parts will be manufactured by Sperry itself, the job of assembling all the modules to form a finished product will fall to Tokyo-based Mitsubishi Electric Corp., the spokesman said.

Built around a 7.16-MHz Intel Corp. 8088-2 microprocessor, the Sperry personal computer can be outfitted with either floppy-diskettes or hard disks and comes with a choice of a low-, medium- or high-resolution color monitor. The machine can be configured into any one of seven models, the spokesman said.

An entry-level Sperry personal computer configuration with 128K bytes of main memory, expandable to 640K bytes, and a 320K-byte diskette costs $2,643. The largest of the machine's seven models, by contrast, starts at $5,753.

Shipments of the personal computer's floppy diskette-based configurations begin in January; while the system's hard disk versions are scheduled to be available next April from Sperry through P.O. Box 500, Blue Bell, Pa. 19424.

Video Course On Graphics Out

ATLANTA — The Association for Media-Based Continuing Education for Engineers, Inc. (Amcee) has introduced a videotape short course, "Introduction to Interactive Computer Graphics," designed to introduce the concepts of interactive computer graphics.

The course includes demonstrations of graphics applications and programming projects and problems and teaches techniques for creating mathematical representations of curves and surfaces; scaling; rotating and translating graphics; interactive design of curves and surfaces; and modeling three-dimensional objects, according to the vendor.

The course has a rental fee of $975. Purchase price is $4,810 from Amcee, 225 North Ave. N.W., Atlanta, Ga. 30313.

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Why?

Products, Enhancements Announced

DBMS for Micros Make Strong Comdex Showing

By Robert Batt
CW West Coast Bureau

LAS VEGAS — Relational data base management systems (DBMS) for personal business computers were much in evidence at Comdex/Fall '83 here last week, with several manufacturers introducing new products or system enhancements.

Alpha Software Corp., a Burlington, Mass., IBM-compatible software manufacturer, announced Alphabase V, a relational data base program designed to run on IBM Personal Computers and compatibles and the Professional Computer from Texas Instruments, Inc.

Alphabase V reportedly includes full screen editing of data, the ability to link up to four files when generating a report or entering data and the capability to reconfigure a data base at any time.

The new data base program can be integrated with other programs, including Lotus Development Corp.'s Lotus 1-2-3 work sheet files, Ashton-Tate's Dbase II DBF files, Microsoft, Inc.'s Multiplan Symbolic files and Visicorp's Visicalc DIF files.

At a press conference launching the new product, Richard Rabins, Alpha Software president, explained that reports are "painted" on the terminal screen by users, and they can contain up to three levels of control breaks with a number of statistical calculations available, including average, count, total, minimum and maximum.

Priced at $425, the package will be available in the first quarter of 1984 from Alpha Software: 30 B St., Burlington, Mass. 01803.

Another relational DBMS product for IBM Personal Computers was introduced at Comdex by Software Systems Technology, Inc. of College Park, Md.

Called XDB, the system, designed to run on the IBM Personal Computer, the Personal Computer XT and Personal Computer-compatible machines, is identical in form and function to IBM's SQL query language for mainframe relational data base systems, the vendor claimed. XDB, it said, combines XQL (extended SQL) with other modules, including report writer, graph writer, form processor, menu generator and transaction processor.

Users can reputedly configure their IBM Personal Computer into a workstation and use XDB to access data bases stored on mainframe computers.

Applications include accounting, inventory control, project management, personnel administration and sales information. Minimum system requirements are IBM's PC-DOS operating system, 128K bytes of memory, double-sided, double-density disk drives or a hard disk and a color or monochrome monitor.

The complete XDB system costs $750 and is available immediately from Software Systems Technology at Suite 206, 7100 Baltimore Ave., College Park, Md. 20740.

Enhancements Offered

Among those offering enhancements to their existing DBMS products at Comdex was MAG Software, Inc., which unveiled its new version of MAG/Base, the company's data management software for micros.

Called Release 4.0, it reportedly allows users continuous access to files in the data base through the use of a record-locking technique. With the new system, the vendor claimed, a single record is locked for half a second during update and then released in its new form back into the data base. This, according to MAG president, Greg Scott, avoids the problem of files being unavailable during peak multiuser periods.

Release 4.0 is said to be compatible with Digital Research, Inc.'s MP/M 86 and concurrent CP/M 86 operating systems, as well as its single-user CP/M and CP/M 86 systems. Compatibility also extends to IBM's PC-DOS and Microsoft's MS-DOS operating systems.

Available in the first quarter of next year, Release 4.0 will cost $295. Upgrade kits may be purchased for $200, and updates are available to existing MAG/Base users for $125 from MAG Software at Suite 305, 21054 Sherman Way, Canoga Park, Calif. 91303.

Enhancements to its DBMS product line were also introduced here by Micro Data Base Systems, Inc. They included a Report Definition Language facility for the company's MDBS III system, costing between $1,400 and $2,500, and an Interactive Screen Definition Utility for Screen Master, the company's I/O manager, costing between $450 and $700. Both products are available immediately from Micro Data Base Systems through P.O. Box 248, Lafayette, Ind. 47902.

CW at Comdex/Fall '83

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Apple Announces Enhancements for Lisa, IIe

By Jeffry Beeler
CW West Coast Bureau

LAS VEGAS — Apple Computer, Inc. last week upgraded its microcomputer line with two program-development aids for the company's Lisa system and five enhancements that for the first time migrate some of Lisa's technology to the firm's Apple IIe.

The software for the IIe signals the start of an ongoing effort by Apple to modernize periodically the 8-bit computer with technology originally developed for Lisa, according to a company spokesman. Both the Lisa and the IIe refinements were announced here last week during the fifth annual Comdex/Fall '83 conference and exposition.

CW at Comdex/Fall '83

On the Lisa side, the enhancements include Toolkit/32, which will be used for developing original applications from scratch, and Quick Port, which will reportedly allow other vendors' existing programs to be retrofitted to Apple's latest personal computer.

On the IIe side, the product additions include:

- Apple Works, a package of integrated spreadsheet, word processing and data base programs that reportedly allow different functions of the same application to be displayed simultaneously with data capable of being freely exchanged among the various displays.
- Workbench, a six-piece software development facility aimed primarily at technically sophisticated Pascal programmers.
- A Rana Corp.-developed co-processor that reportedly allows the IIe to support Microsoft, Inc.'s MS-DOS and thus greatly expands Apple's library of available user software.

Apple has also enhanced the IIe with its first mouse and hard disk unit, which runs under the company's recently introduced Pro DOS operating system.

Apple Works is also available in a modified Apple III version known as III E-Z Pieces.

Toolkit/32 reportedly allows programmers to write new, integrated application packages embodying Lisa's characteristic features.

Prices for the latest IIe and Lisa enhancements are as follows: $600 for Toolkit/32, approximately $2,200 for the IIe hard disk, $250 for Apple Works and $295 for III E-Z Pieces. Quick Port will be bundled with Lisa's programming languages, while each of Workbench's six constituent modules will be sold and priced separately. All the latest Lisa and IIe enhancements will be available early next year from Apple at 10260 Bandley Drive, Cupertino, Calif. 95014.

Desktop Micro Unveiled By Kaypro

Daniel Janal
Special to CW

LAS VEGAS — Kaypro Corp. unveiled a new desktop microcomputer here last week at the Comdex/Fall '83 conference, a 24-lb device similar to the firm's portable machines, but targeted at companies requiring a dedicated workstation as well as portable computers.

Called "Robie," the computer is smaller than the firm's suitcase-size Kaypro 4 and includes a built-in modem, real-time clock/calendar and a fan. It is also said to have a footprint smaller than most available transportable machines — 10 in. by 10 in. by 14 in. While not a portable, the machine reportedly can be easily moved. "Robie is portable in the same way a [standard-size] TV set is portable," David Kay, vice-president of marketing, said.

The desktop computer reportedly has the same capabilities and specifications as the Kaypro 4. It comes with 64K bytes of random-access memory, is built around a Zilog, Inc. Z80 microprocessor and runs with Digital Research, Inc.'s CP/M 2.2 operating system. The system also has two 5¼-in. double-density, double-sided floppy disk drives.

Robie's 9-in. green-phosphor screen displays 24 lines by 80 columns. In addition, the unit has a detachable keyboard that includes a numeric key pad, 72 text keys, 20 programmable keys and programmable cursor keys.

As with other Kaypro machines, software is bundled with Robie. Packages include Micropro International Corp.'s Wordstar, Perfect Software's Perfect Writer and a spreadsheet program.

Kaypro plans to make approximately 1,000 Robies by the end of the year. Although the exact price has not been established, Kay said Robie will cost under $2,000 and will be in stores by the end of the year.

Kaypro is headquartered at 533 Stevens Ave., Solano Beach, Calif. 92075.

Janal is business editor of the Rockland Journal-News in West Nyack, N.Y. He is a contributor to Infoworld, *where this story originally appeared.*

Japan, UK Join IBM-Compatible Arena

Show Draws Full House of Personal Computers

CW at Comdex/Fall '83

By Jeffry Beeler
CW West Coast Bureau

LAS VEGAS — An estimated 80,000 visitors to this city of slot machines and playing cards hit the product jackpot last week as the Comdex/Fall '83 show drew a full house of previously unannounced personal computers.

Included among the many aces in Comdex's new product hand was a system from ITT Courier Terminal Systems, Inc. that is said to be both hardware- and software-compatible with IBM's Personal Computer and Personal Computer XT. The firm used Comdex to mark its debut in the desktop business processor game.

ITT's Xtra system reportedly occupies 30% less desk space than its primary rivals and boasts an optional mouse as its user interface. The machine can also be configured with a 10M-byte Winchester disk unit and uses English-written window menus to display its commands.

Built around an Intel Corp. 8088 microprocessor, Xtra supports Microsoft, Inc.'s Basic and comes with a choice of two operating systems — ITT's own DOS 2.0 or Digital Research, Inc.'s CP/M 86. The micro is priced 5% lower than its IBM counterparts and is available from ITT Courier at 1515 W. 14th St., Tempe, Ariz. 85281.

Applied Computer Techniques Ltd. (ACT) also chose Comdex as the vehicle to launch its entry into the U.S. microcomputer arena.

The UK-based company's Apricot system crams an IBM-compatible processor; a two-line, 80-char. display; and twin 3½-in. microfloppy modules into a 17½-lb package that reportedly fits in a carrying case.

Available with a wide selection of standard application packages and three widely used operating systems, Apricot ranges in price from $2,495 to $3,190. It is available from Act North America at Suite 336, 3375 Scott Blvd., Santa Clara, Calif. 95051.

IBM Compatibles

In related developments at Comdex/Fall '83, OSM Computer Corp. added its name to the growing list of IBM Personal Computer-compatible suppliers, while Solaris Computer Corp. announced an IBM micro-emulation capability for asynchronous terminals.

Billed as the manufacturer's first venture into the IBM-compatible world, the OSM personal computer comes with the company's proprietary networking hardware and costs $2,795 from OSM at 665 Clyde Ave., Mountain View, Calif. 94043.

The Solaris offering, meanwhile, consists of a hardware add-on that reportedly allows asynchronous display units to mimic the IBM Personal Computer and supports standard application programs such as Lotus Development Corp.'s 1-2-3.

At present, the Personal Computer Emulator works only with Digital Equipment Corp.'s VT100 terminals and costs $2,795 from Solaris at 2797 Park Ave., Santa Clara, Calif. 95050.

Complementing the many introductions of IBM-compatible desktop micros was an equally large number of announcements on the portable and transportable personal computer front, including the latest addition to Pronto Computers, Inc.'s Series 16 family of personal computers, Commuter Computer Corp.'s Commuter system and Gavilan Computer Corp.'s SC unit.

Pronto characterizes its product, which incorporates an 8 MHz Intel 80186 microprocessor, as a 16-bit transportable supermicro. In an entry-level configuration, the system costs $3,200 from Pronto at 3730 Skypark Drive, Torrance, Calif. 90505.

The Commuter offering, by contrast, is described by its developer as a portable unit that is compatible with Apple Computer, Inc.'s Apple II. Configured with two 5¼-in. floppy disk units, Digital Research CP/M and a 9-in. amber display screen, the product sells for less than $2,000 and is available from Commuter at 19208 Dunvre Place, Northridge, Calif. 91326.

The Gavilan SC is basically a scaled-down version of the company's original mobile personal computer and supports Microsoft's MS-DOS operating system.

With its eight-line LCD, the product costs $2,995.

Gavilan also used last week's show to announce the addition of a 16-line LCD to the firm's existing personal computer, which previously had only an eight-line display. The enhanced product replaces its eight-line Gavilan predecessor and bears the same price tag — $3,995. Both the SC and its 16-line sister system are available from Gavilan at 240 Hacienda Ave., Campbell, Calif. 95008.

Panasonic Co. also dealt an IBM-

(Continued on Page 14)

Keynoter Upbeat on Software Standardization

CW at Comdex/Fall '83

By Jeffry Beeler
CW West Coast Bureau

LAS VEGAS — The emergence of portable operating systems like Unix is leading to major advances in software standardization and will provide users with numerous benefits, including improved programmer productivity and increased flexibility in configuring new systems.

That upbeat message comes from Jack Scanlon, vice-president in charge of Western Electric's Processor and Software Systems Division.

Speaking last week at Comdex/Fall '83, Scanlon predicted a "bright future" for software standardization and a prominent industry role for Unix and its many derivatives. "Unix will be a major player" in the emergence of accepted software standards, Scanlon said, "but it won't be the only player."

To a limited extent, the availability of Unix-like portable operating systems will streamline the development of new applications by enabling programmers to take increased advantage of reusable code, Scanlon said in his keynote address.

Potentially Reusable

Nearly every large user installation has a plentiful supply of old but still serviceable programs that apply to a broad assortment of applications. In fact, an estimated 25% to 50% of all applications code can be classified as potentially reusable, he said.

The problem with these tried-and-true programs is that each is typically written for a particular CPU and operating system and thus is inherently incompatible with many of the others.

But with a portable control program like Unix, these otherwise irreconcilable packages can be easily transferred to different systems and then tied together in Tinkertoy fashion, Scanlon said.

So rather than having to write every single line of code from scratch, programmers can simply select the necessary program modules from their stockpile of existing applications and then plug them together to help form new systems. Such a reliance on reusable code can minimize the amount of original programming involved in applications development and produce at least a modest increase in programmer productivity, Scanlon said.

The advent of portable operating systems will also relieve users of the worry of how to migrate their applications when their existing hardware is suddenly made obsolete by the latest advance in semiconductor technology. Unix and other products like it will allow users to "evaluate their hardware and software independently and judge each on its own merits."

IBM-Compatibles Hope to Hit Jackpot

(Continued from Page 13)

compatible Personal Computer hand at last week's show, featuring a built-in thermal printer for executives who want to print on the go. Called the Senior Partner, the suitcase-size computer has 128K bytes of memory and a single floppy disk drive with 320K bytes of storage. The computer costs $2,500 from Panasonic, located at One Panasonic Way, Secaucus, N.J. 07094.

Altos Computer Systems, Inc., NCR Corp. and Zilog, Inc. also introduced personal computers at Comdex. Altos expanded its multiuser micro series with a top-of-the-line system that supports up to nine concurrent terminals and 80M bytes of disk storage, according to a company spokesman. The 16-bit, Unix-compatible S986-40 starts at $12,990 and is available from Altos at 2641 Orchard Pkwy., San Jose, Calif. 95134.

Altos has also effectively doubled the external memory capacity of its existing 580 series personal computers and trimmed its 586 family from three models to two.

NCR announced a retail management systems package consisting of an NCR personal computer and software for inventory control and point-of-sale applications. Available in both floppy and hard disk versions, the dual-processor system has an entry-level price of $4,999 and is available from NCR, 1700 S. Patterson Blvd., Dayton, Ohio 45479.

The Zilog system is the latest addition to the company's line of Unix-based supermicros and supports up to eight users and 66M bytes of disk storage.

Priced at $18,950, the System 8000 Model 11-Plus is available from Zilog at 1315 Dell Ave., Campbell, Calif. 95008.

Finally, Teleram Communications Corp. unveiled two portable computers that feature battery-operated power supplies, are based on Zilog's Z80L microprocessor and offer up to 256K bytes of nonvolatile bubble memory. The T-5000 features a 16-line by 80-char. LCD, while the T-4000 has an eight-line viewing screen. Both feature the firm's Teletext text editing software as standard equipment and are compatible with Teleram's T-3500 desktop office system. The T-5000 and T-4000 are priced at $2,495 and $1,995, respectively. Teleram is headquartered at 2 Corporate Park Drive, White Plains, N.Y. 10604.

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With DP Skills On the Rise, Banks Concerned Over EFT Heists

By David Myers
CW New York Bureau

NEW YORK — The banking community is growing increasingly apprehensive about the possibility of large-scale electronic funds transfer (EFT) heists as the computer skills necessary for cracking bank security measures become more and more widespread.

So far there are only two successful EFT heists on record. In Switzerland a band of electronic robbers intercepted a Swiss bank's signal to another European bank and siphoned off funds. The thieves kept coming back for more, however, and their insatiability ultimately proved their undoing.

In Japan, a communications engineer at Nippon Telephone & Telegraph tapped a bank's leased line, obtained the account numbers for cash-card customers, counterfeited his own cards and grabbed 180 million yen a year until he was caught.

Few details are available about either case since security specialists called in to help in both instances signed nondisclosure agreements with the affected firms.

In the U.S.

In this country, however, nothing so dramatic has occurred. Despite bank-to-bank EFT networks like the Federal Reserve System's Fed Wire — a seemingly inviting target for a new breed of technically advanced criminals — no American financial institution has been electronically held up.

If any bank has been held up electronically, no New York bank officer will admit it. "It's something we don't talk about," a bank security officer told *Computerworld* privately.

On the other hand, bank officers point out that any financial institution which found itself the victim of an EFT rip-off would hush the matter up. "Just because I haven't heard of any [electronic thefts] doesn't mean there haven't been any," one New York bank vice-president said.

Experts in the area are more outspoken. They say the possibility of a multimillion dollar EFT heist, while less likely than other types of computer crime, is more dangerous because of the potential harm.

"The potential for loss is a trillion dollars a day," said Donn B. Parker, a senior management systems consultant at SRI International, Inc. "We're developing a well-financed criminal element with the skills, knowledge and access necessary to pull off such a job. That may be a believable scenario."

Parker and other electronic security authorities warn of what could happen if Third World terrorist gangs or drug smugglers were to get ahold of the technology necessary to tap the Fed Wire or another EFT line.

"I'm sure it's already happened. But the banks involved may not even be aware it happened," said James G. Lightburn, president of Mentor Associates, an Arlington, Texas, banking consultant.

Reagan OKs NBS DP Standards Plan

WASHINGTON, D.C. — President Reagan last week signed legislation that assures the National Bureau of Standards' (NBS) DP standards program will continue at its current level, which the administration had earlier recommended be cut by 70%.

The $10 million appropriated for the NBS Institute for Computer Sciences and Technology for the fiscal year ending Sept. 30, 1984 is the same amount the institute was given in 1983. The measure was contained in a U.S. Department of Commerce money bill signed last Monday.

When the 1984 budget was sent to Congress in early 1983, the White House recommended only $3 million for the Institute for Computer Sciences and Technology, explaining that the standards program should be taken over by the private sector.

Under the plan, the Institute for Computer Sciences and Technology would concentrate on several research and development programs and adopt privately developed standards for federal use where appropriate.

The plan ran into immediate opposition from parts of the DP and scientific communities; criticism also was voiced by some state legislators and members of Con-

Opponents of the plan argued the private sector was not in a position to take over the standards work and that the Institute for Computer Sciences and Technology performs valuable advisory functions for other governmental units that would be lost through the budget cut.

The White House then decided to reconsider its plan for Institute for Computer Sciences and Technology funding, and House and Senate committees voted to maintain the program at its existing level [CW, March 8 and April 18].

The legislation was passed Nov. 16 during the last week of the 1983 session of Congress.

Datacomm Briefs

FCC Rules on Services Bell Groups May Provide

WASHINGTON, D.C. — The Federal Communications Commission (FCC) decided late last month that the Bell operating companies, after divestiture, can offer new customer premises equipment (CPE) and enhanced services only through separate subsidiaries, with certain exceptions. Notably, if a Bell operating company can "demonstrate that some other organizational structure, such as a separate unincorporated division, will meet the same goals as a subsidiary," the other structure will be allowed.

Separate subsidiaries do not have to be established until June 30, six months after divestiture. Before then, the Bell operating companies can offer deregulated products and services directly. However, since the Modified Final Judgment settling the federal government's antitrust case against AT&T bars the Bell operating companies from offering information services, their unregulated activity will probably consist largely of offering terminal equipment.

Other key provisions of the FCC decision are that:

- The operating companies can install and maintain residential CPE and single-line business terminals for their separate subsidiaries, but not multiline telephones or any other terminals provided to business customers.
- Certain other activities can be consolidated. For example, charges for CPE sold or leased by a separate subsidiary can be included in bills for basic service sent out by the subsidiary's parent Bell operating company. Legal and other administrative services can be shared.
- Bell operating companies will be eligible to employ existing provisions of the Second Computer Inquiry decision to seek waivers of the separate subsidiary rule.

AT&T Seeks to Provide 800 Service for Canada

WASHINGTON, D.C. — AT&T has requested FCC permission to offer 800-number service between the U.S. and Canada, beginning Jan. 1. The service would enable callers throughout Canada to phone business locations in the U.S. toll free. Initially, AT&T 800 Service-Canada would be available to business customers in 11 southern and midwestern states, but by next July it would be available nationwide.

Telecom Canada has proposed the converse service, enabling U.S. callers to phone Canadian business establishments toll free. That service would begin May 1.

Both countries would establish three geographic service areas. In the AT&T offering, the areas would encompass 25%, 60% and 100% of Canada's telephone population. Customers subscribing to AT&T's service would also be able to obtain the enhancements the company now offers domestically in its Optional 800 Service, (formerly Expanded 800 Service).

Usage rates would be based on geographic area, hours of use, time of day and number of access lines. Reduced rates would apply during evening, night and weekend periods. There would also be an installation fee plus a $36.80 monthly charge for each access line.

ICA Complaint Charges Access Tariffs Burdensome

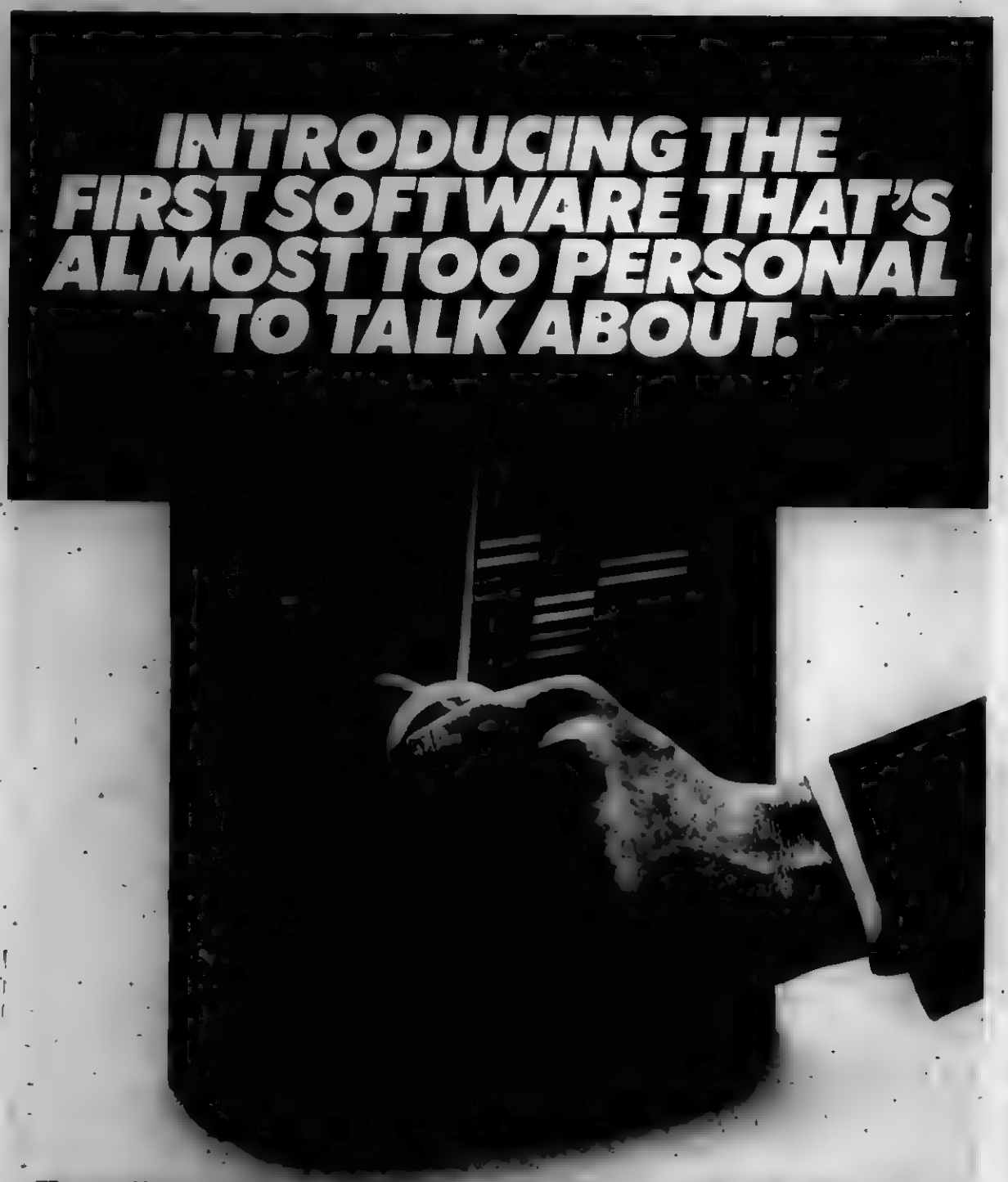
WASHINGTON, D.C. — The user must order and pay for his access circuit long before he actually uses it, according to a complaint lodged with the FCC by the International Communications Association (ICA) last month. The association was commenting on tariffs, filed in October by the Bell operating companies, which specify the terms under which local-access circuits will be offered, after divestiture, to interexchange carriers and private network operators. These tariff provisions, along with several others, will cost users a bundle while making it enormously more difficult to plan and operate telecommunications facilities, the association argued.

ICA's comment was one of several the commission received last month on the pending tariffs, which are scheduled to become effective April 3. Due to the volume of comments and widespread agreement that a lengthy investigation is necessary, it is likely to take some time after that date to resolve all the issues.

A key flaw in the tariffs, ICA said, is that the local telephone company would not have to keep an inventory of access circuits. Instead, users would be required to submit planned facilities orders to be sure of getting circuits when they are needed.

Since planned facilities orders have to be placed at least 24 months before they are activated, "an [interstate customer] must know fully two years in advance where its new facilities will be located, exactly what facilities it will need and, if applicable, where its customers will be located," ICA said.

The tariffs also require the interstate customer to prepay "one full year's monthly charges in three installments over no longer than the first 14 months following the order date," ICA said.



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Where's Cullinet Headed? A Frank Talk With John J. Cullinane

Cullinet Software, Inc. recently announced another round of record quarterly earnings, continuing a 50%-plus annual growth pattern that has seen sales grow from $12 million in 1979 to $78 million last year. But the splashy — some have called them brash — marketing tactics displayed by the Westwood, Mass.-based company this year have won it nearly as many critics as admirers.

Founder and Chairman of the Board John J. Cullinane hardly exudes flamboyance. Soft-spoken with a propensity for conservative suits and understated surroundings, he personally meets with every prospective customer who visits corporate headquarters. Although his company has grown to include more than 1,000 employees internationally, he believes it has retained a small-company atmosphere. His office does not include a computer terminal.

Cullinane was interviewed at Cullinet headquarters recently by Computerworld Senior Editor/Software Paul Gillin.

CW Photo by P. Gillin

What is the current status of the products you announced last April 19?

They are right on schedule, and that includes IDMS/R, the Information Database and the Personal Computer software, which will be available for beta release in January. They're now demonstrating them for customers and prospective custom-

Your announcements on April 19 inspired a great deal of controversy by using a very splashy marketing campaign and by preannouncing products which would not be generally available until at least January.

When you say we're controversial, that surprises me. Certainly we're out front. We're a tough competitor because we try to be very good at everything we do. So there's a kind of relentless quality to it.

April 19 was a whole new way of doing things. The style was a lot different than what we have been traditionally associated with. But the purpose of it was to create an awareness of Cullinet software in what at that time was a vacuum as far as awareness of software companies in the general business community.

I don't think we got very good treatment [in the trade press] but that's the way it is. We were just doing our own thing, but obviously this action was having a tremendous impact on competitors and other people in the software industry.

IBM followed by prereleasing DB2 by a year. What did Cullinet hope to accomplish by preannouncing its products? Have the results lived up to your expectations?

Definitely. First of all, we're not the only ones to announce things early. IBM has been doing it for years. So have our competitors. But historically we had a policy of never announcing anything till it was generally available. But in a lot of ways you do a disservice to your clients and prospective clients when you take that approach. And as you get a bigger customer base, it's more difficult to communicate all the things that you're doing. When you come out this way and announce, you're creating great awareness.

Secondly, and I think this is very significant, we have a demonstrated track record with our customers that we deliver in spades what we say we're going to do.

Will you do it again?

Yes, I'd do it again, sure. I would do it differently because I didn't really think of the impact that we were having on the industry or the trade press. I knew what it was doing to our competitors: We were driving them bonkers.

But at the same time it never occurred to me that we were causing problems for people trying to find out what we were announcing.

You have been putting a lot of emphasis on your new line of packaged applications recently. Currently, what has been the trend toward revenue growth in packaged applications in your company, and what percentage of your revenues now come from that market?

It's going up sharply. The last fiscal year it was only about 5%. It's now in the 25% range.

In the first quarter of this year which ended in July, we installed 27 general ledger systems, which is about equal to the same amount we installed in the previous three quarters [put together]. We installed 14 manufacturing systems, which was also about equal to the previous three quarters.

I forecast two years ago when we embarked on this program [to sell applications] that I expected within five years that 50% of our revenues would come from applications. That's on target.

The problems associated with applications are so significant that we avoided them [in the past]. When ADS [Applications Development System]/On-line became available, we had all the tools necessary to address the application business like it had never been addressed before. All of the on-line transactions of all of our applications are written in ADS/On-Line.

In entering this market, you're going to be competing against Management Science America, Inc. (MSA), one of the few software companies that's bigger than you. Would you contrast the styles of your two companies and describe how you will go head on against MSA when it already has such a strong market presence?

I think MSA is a very aggressive, powerful marketing organization with a wide range of products and a long track record in the financial applications business. Certainly they have a far more flamboyant marketing style than we do, and they've been very successful.

I don't want to necessarily single out MSA, but all the applications that I know of were designed in the '60s and reworked in the '70s. While they are functionally very good, the basic architecture has many drawbacks. The companies are going to have to take these applications and completely rewrite them using advanced data base technology. That's what we have done.

In announcing your line of integrated IBM Personal Computer software in April, you entered a market that is already saturated by spreadsheets, word processing and micro data base management systems from other vendors. Why did Cullinet opt to develop its own line of Personal Computer software rather than putting that research and development money into developing interfaces to existing packages?

Well, to some degree we have done that. We bought [Micro Data Base Systems, Inc.'s] Knowledgeman, and we bought [Micropro International Corp.'s] Wordstar.

But more importantly, the basic problem on the mainframe of lack of integration of software also exists on a personal computer. So we apply the same philosophy to the personal computer that we apply to the mainframe, mainly, a sophisticated and complete integrated solution to the personal computer software problem that would compete head-to-head with any others on the market, but their integration and ease of use would be far ahead of anything else on the market.

What do you expect to be done with those existing Lotuses and those existing Visicalcs? Do you think users are going to toss them away in favor of Cullinet software?

I don't think it's that simple. We will give them the capabilities to use those particular tools. The user will be able to make a judgment.

Will that be in another release?

Without getting into futures, that's a need and there's also a need for people with other kinds of computer hardware to access our Information Database. We'll be happy to work with those organizations to accomplish that.

Since Cullinet's acquisition of Computer Pictures Corp. last year, we've noticed the exit of a number of their executives. Considering that the value of a software company acquisition is its people, do you consider the price you paid for Computer Pictures to have been worth the benefits you received?

Oh, yes, it's the best deal we've ever made. It would have been cheap at twice the price. [Many of our key people are from Computer Pictures' staff.]

Our origins and marketing philosophy are in communications with the systems programmer. Theirs starts at the chairman of the board. So that's a magnificent complement of talent. Trendspotter [color graphics hardware/software system designed for executives] has been so overwhelmingly valuable in terms of presenting our software to senior management. It's like we spent 10 years wiring this building putting all the software together and all of a sudden somebody comes along and screws in a light bulb and it lights up. That's what Trendspotter is.

Cullinet's growth rate is over 50%. That must be very difficult for a large company to handle . . .

We used to grow at 67%, and we slowed down to the 50% level because it's not good to have a company growing so fast that the engine vibrates.

The financial community in one way doesn't like to hear you reduce, as I did two years ago. But at the same time they'll give you the credit for maturity. Our growth is very, very controlled.

Net to Link White House, 22 Federal Agencies

By Patricia Keefe
CW Staff

SILVER SPRING, Md. — By January, the White House expects to be linked to about 22 federal agencies via an electronic mail network that officials hope will improve efficiency and reduce paperwork.

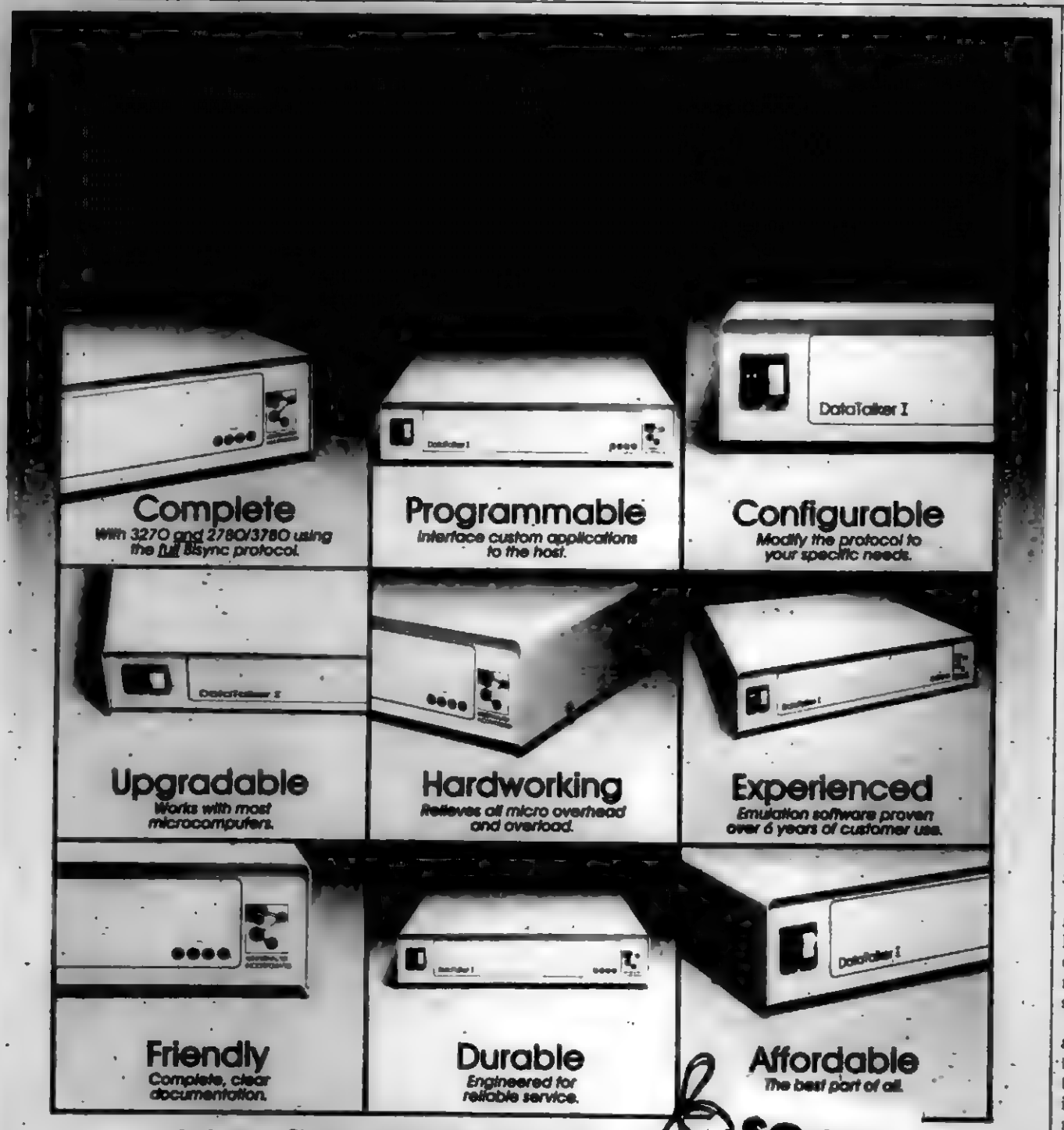
In partial operation since October, the system is the result of a White House contract with ITT Dialcom, Inc.'s time-sharing network for dial-in access to the vendor's data base of minicomputers located here. "The bottom line is that the White House is just another subscriber to our system," a spokesman for the vendor said.

However, given that the system will be used to transmit inter- and intradepartmental mail and documents, some of which may contain sensitive material, the White House and other federal agencies require a greater degree of security than does the average subscriber, the spokesman noted. With this in mind, the Justice Department had Federal Bureau of Investigation computer experts examine the system when it considered subscribing to ITT Dialcom's network two years ago. "To secure the contract, we had to undergo a security check, which we passed," the spokesman said.

Each address within the electronic system requires a password that can contain up to 20 letters, he added.

Originally, the White House was taking part in a pilot program designed by Compuserve, Inc. before issuing a general request for proposals for an electronic mail network, according to ITT Dialcom.

The vendor's system is hardware independent, and the White House is expected to use some of its IBM Personal Computers and Tektronix, Inc. computers, along with any other desktop terminals it already has, to access the network. Among those agencies that the White House can now be linked with are the Office of Management and Budget, the U.S. Department of Agriculture, the Energy Department, the Food and Drug Administration and the Justice Department. Among those ITT Dialcom expects to join up are the Department of Education and the Health and Human Services Agency.



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Dictionary Announced

NORTHBROOK, Ill. — *The Computer Database Thesaurus & Dictionary* is the latest publication from Management Contents.

The text contains some 3,500 computer, telecommunications and electronics terms and definitions, listed both alphabetically and hierarchically.

It also documents and explains how to access Dialog Information Services, Inc.'s Computer Database, an online data base that covers computers, telecommunications and electronics, compiled from 600 periodicals.

The publication is priced at $120, with discounts available. Further details may be obtained from Management Contents at Suite 5000, 2265 Carlson Drive, Northbrook, Ill. 60062.

Directories Out For DP Gear

LOS ANGELES — Business Applications Systems has announced the Computer User Group Directories for most types of hardware and software.

The hardware directories are broken down by machine type, and the software directories are broken down by interest type. There are directories aimed at users groups for particular professions and niche markets.

Prices for the directories range from $5 to $45. Examples of the available directories include Apple Directory ($45), Atari Directory ($35), [Digital Research, Inc.'s] CP/M Directory ($40), IBM-PC Directory ($35) and Business Directory ($20).

A catalog outlining prices for other directories is $1 from Business Applications Systems, located at 1734 Barry Ave., West Los Angeles, Calif. 90025.

In Interest of Legislative Efficiency

Alabama to Test Alert System With Red Tape

By John Gallant
CW Staff

MONTGOMERY, Ala. — Members of the Alabama state legislature here will do their bureaucratic best to bog down a recently installed computer system in red tape — all in the interest of legislative efficiency, mind you.

In a mock legislative session designed to test the system's capabilities, about 20 staff members plan to put the $500,000 Alabama Legislative Evaluation and Research Terminal (Alert) system through its paces under real-world conditions. They will input the most confusing bills that came before the legislature during the 1983 session to see if the system can digest them.

The mock replay takes place during the first week in December when House and Senate staff members, together with aides from the Legislative Fiscal Office and the Legislative Reference Service, run some 50 of last session's most convoluted bills through the system from start to finish.

"We took a small percentage of bills that we felt would cause the system problems. We chose bills that involved strange things like reconsiderations, vetoes, nonconcurrences and multiple amendments," computer supervisor Karry Fraser said. "This will give us a complete breakdown of a session to test the system fully."

Rigorous Workout

One bill will give the Alert system a particularly rigorous workout. "We have a bill in mind that will cover a lot of areas," Fraser explained. "S. 58 — the proposed new state constitution — had 153 separate legislative actions taken on it before it was passed by both houses. Unfortunately, it was later thrown out by the courts."

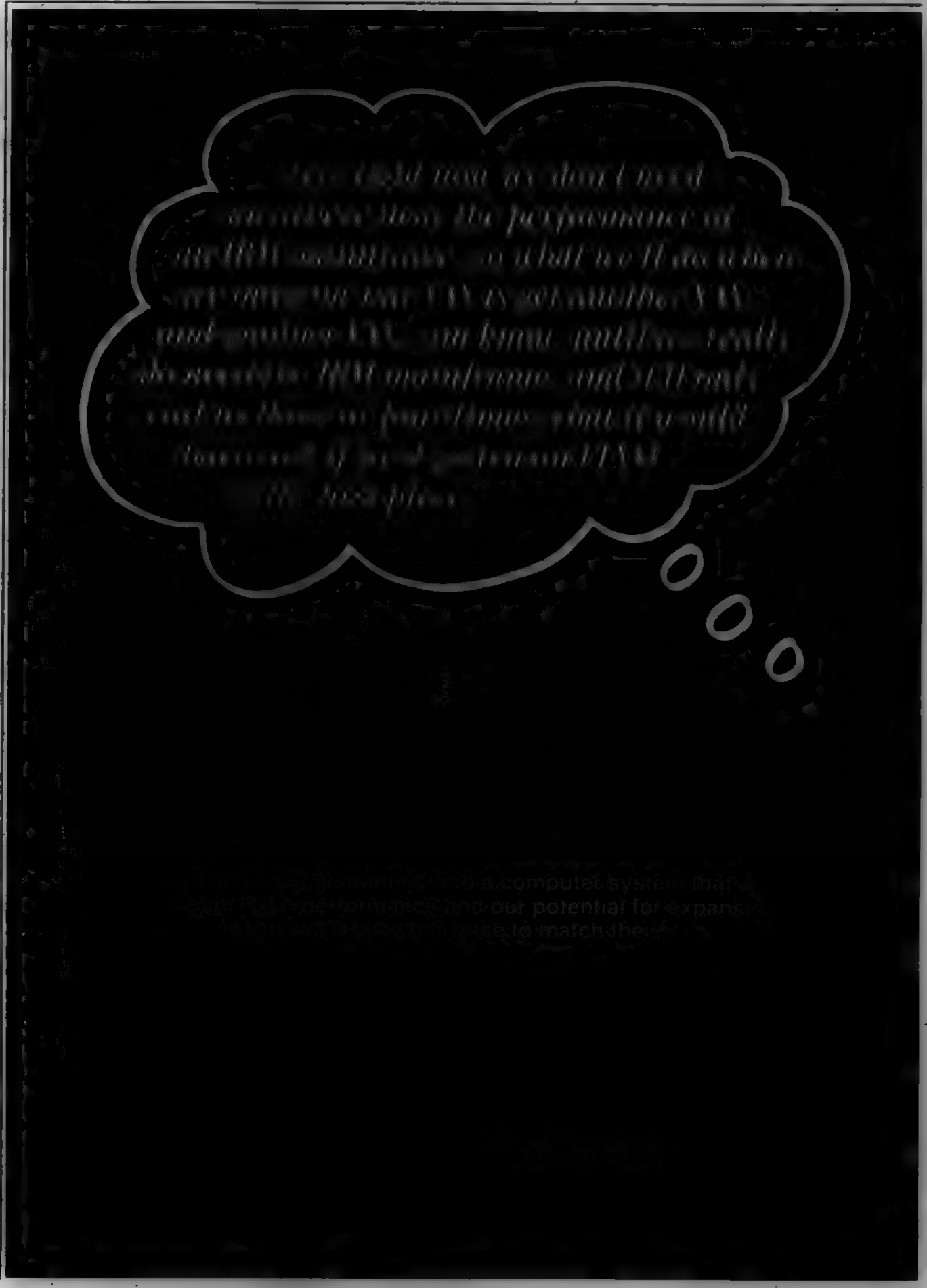
If all goes well, the Alert system will be ready for the 1984 legislative session scheduled to begin Feb. 7. "We are very excited about the implementation of this system," Fraser said. "We want to be better able to facilitate the needs of the legislators, and we hope to have any problems worked out after this practice session."

The Alert system is based on a Digital Equipment Corp. VAX-11/750 processor running under the VMS 3.4 operating system. Sixteen DEC VT102 terminals will be placed in common work centers throughout the Senate, the House of Representatives, the Legislative Fiscal Office and the offices of the Legislative Reference Service.

Staff members will use the system to produce first and second drafts of each bill, print legislative and committee calendars, draft committee reports and prepare documents for the secretary of state and the public. Each department involved in the mock session has been assigned a set of tasks similar to those it will be responsible for when the system is fully operational.

The system will utilize four separate software modules designed by Public Systems Associates, Inc. of Denver, a firm that also developed packages used by the Colorado and Louisiana state legislatures. One module will track the status of bills introduced in both houses of the legislature, and another — similar to a word processing module — will aid in bill drafting, according to Leanne Craft, systems analyst for Public Systems Associates.

In addition, a Boards and Commissions module will track the status of personnel appointments throughout the legislature, and a Statutory Retrieval module will update those portions of the Alabama statutory code and constitution affected by legislative action. The project team that installed the software has already run its own mock session, which "went very well," according to Craft.



Management Policies Seen Key to Security

By John Gallant
CW Staff

BOSTON — The future of information systems security rests not only on advances in technology, but on sound management policies as well.

Moreover, according to one of IBM's top security experts, external attacks on computer systems rank lowest among known threats to data integrity, despite the fictional drama of movies such as *War Games* and the recent publicity afforded to "hackers."

Speaking at a recent press seminar here, Harry DeMaio, IBM's director of data security programs, said the single biggest problem with most security systems today is the lack of a well-defined corporate security policy.

"Information systems security is as much a management problem as it is a technological problem," according to DeMaio. "People tend too often to look to technology to save them. But what is needed are clear management policies that are strictly enforced by responsible people within the organization."

Data Must Be Ranked

According to DeMaio, both management policies and security systems should be developed on the basis of a risk assessment strategy that ranks the value of the data to be protected.

"No security system is totally secure," DeMaio said, "and it is far too expensive to protect all of your data. Therefore, information must be ranked on the weight of its importance to the organization. On that basis, an acceptable level of risk can be determined."

That risk assessment, DeMaio explained, will indicate where those responsible for data security should concentrate their efforts and expenditures. Otherwise, "if you don't undertake that type of information ranking, you are left to decide whether everything, nothing or just randomly selected data should be protected," DeMaio said.

Error and Omission

DeMaio said his experience in designing data security systems has led him to rank error and omission — honest mistakes in both system design and use — as leading threats to information integrity. Aside from the untold loss of data integrity due to simple misuse, errors in system design provide an underlying environment DeMaio said aids and abets the next most important threats — dishonest and disgruntled employees.

"These first three threats account for the great majority of risk to data integrity today, and they all involve people who are authorized to use the information," DeMaio said. "Often a person becomes dishonest after uncovering an error or omission in the system. Most fraud is very simply the taking advantage of system design flaws."

To prevent that, according to DeMaio, management must push security all the way back to the design stage. The "virtuoso programmer" must be corralled and documentation emphasized. "Discipline in the DP environment and documentation of coding is key to security at the start. These prevent hidden misuse of the system, and documentation can later aid auditors in discovering abuse," DeMaio said. "Not enough effort has been expended on discipline on the design side."

Following fire and water damage, external attack trails the field in DeMaio's scorecard of threats to data integrity. "External attack has received a good deal of play recently, and that's quite justified. It's an important concern," DeMaio maintained. "But the fact is that proper protection against the first three threats will significantly reduce the chances of external attack."

Once the proper security system is in place, according to DeMaio, management's vigilance should not be allowed to wane.

"It's like the guy says at the beginning of that crime-stopper show," DeMaio said. "It's an on-going threat that we'll have to battle for a long time."

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Integrates Security, Personnel Functions

Federal Express Goes In-House for Security

By Katherine Hafner
CW Staff

MEMPHIS, Tenn. — In the view of Jim Schmiedicke, the issue of security cannot be stressed enough.

For that reason, Schmiedicke, director of personnel information systems for Federal Express Corp., heads a project that has already seen an investment of 30 man-years, or $1.5 million, and will probably see another $1.5 million invested before it is finished.

Called Prism, Federal Express' security system is part and parcel of the company's personnel system, keeping track of the position and whereabouts of some 17,000 employees. Capitalizing on a personnel system's "natural ability to disseminate information on employees' organizational and physical movements," Prism combines integral information on employee status with some fundamental security features, Schmiedicke said.

Federal Express was unhappy with the software packages it saw on the market when it began looking at security systems in 1980. So it decided to use two programmers to integrate the company's personnel system. The two-person staff has since increased to 12 full-time programmers and analysts.

"The basic problem we had was that in the administration of those systems, it's necessary for the administrator to create a paper-flow system that is not conducive to security," Schmiedicke explained. "If the security system is going into an area, you have to send out and get information back and build up the security data base. Since most managers put that low on their priority list, the information is delayed — if it gets there at all."

And because it is so difficult to maintain a sound data base in that respect, "the security department tends to ignore the administration and pretend its systems are secured when, in fact, they're not."

Moreover, in a security system restricted to security and nothing else, "people tend to share passwords," Schmiedicke added.

Full Integration

To eliminate these various problems, Federal Express' security system was built by "piggybacking onto an existing system where the flow of that information is natural," thus fully integrating the security and personnel systems, he said.

Therefore, whenever a change is made in a person's record, as to title and responsibilities, it is automatically entered into the security system, and the system can allow or deny access to certain records depending on that person's responsibilities.

"We've structured all the positions in the company hierarchically, then assigned them to their position," Schmiedicke said. "We record security authorization in the position record, so when we move an employee from organization A to organization B, he no longer has the authority he had."

With the Prism system, an employee attempting to gain access to a system is quizzed by the computer with two randomly chosen questions. According to Schmiedicke, Prism provides nearly 100% accuracy.

The on-line system, developed in Cobol and based on IBM's IMS data base management system, runs on an IBM 3081 mainframe. The phase currently under development, to be completed in 1984, will provide managers with an easy method for doing any personnel transaction on their own terminals.

Schmiedicke considers Prism unique. "Some companies out there, independently selling personnel and security systems, could make an awful lot of money if they realized that a combined personnel and security system could provide very large rewards," he said.

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For Tenants in Office Buildings

Landlord, United Telecomm to Build Private Net

By David Myers
CW New York Bureau

NEW YORK — Olympia & York, a far-flung landlord with 12 million feet of corporate rental space here, has hammered out a $100 million joint venture with United Telecommunications to establish a private network for tenants in its office buildings in nine U.S. cities.

Electronic mail, computer-to-computer transmissions, video teleconferencing and long-distance services will be provided by a private network to be known as Olympia Net, the two companies jointly announced here last week.

The latest telephone-company bypass operation drew expressions of concern from officials at New York Telephone Co., the Bell company due to be wedded to New England Telephone and re-christened Nynex on Jan. 1.

Albert L. Harper, assistant vice-president for service costs at New York Telephone, called Olympia Net's threat to the phone company's business significant. "We'll be losing some contribution to our income as a result," he said, though he wouldn't say how much.

New York Telephone lost the state government's intercity phone business to Eastern Microwave of Syracuse, N.Y., in September [CW, Sept. 26].

"This is just more evidence that we cannot sustain our pricing. We're not saying they [Olympia & York] shouldn't do that. The marketplace is sitting there. But let us compete for it, too. We can't [compete] with our hands tied by an unreasonable price structure," Harper said.

Meanwhile, Olympia & York tenants did not appear to be overwhelmed by the prospect of having a private carrier's city-to-city communications link in their offices. A data processing manager for an insurance firm renting space in this city from the Toronto-based land developer said Olympia Net did not really offer any new solutions to the company's networking problems.

A spokesman for Olympia & York said, however, that the office builder expected Olympia Net to attract new tenants to its complexes here and in Los Angeles; San Francisco; Boston; Chicago; Dallas; Hartford, Conn.; Springfield, Mass.; and Portland, Ore.

The network will consist of a private automatic branch exchange, bulk-rate long distance, telephone equipment, video teleconferencing in color and eléctronic mail.

Two different subsidiaries of Westwood, Kan.-based United Telecommunications will provide satellite capacity and data communications, according to a prepared statement announcing the joint venture.

The network will be managed by United Business Communications, a new subsidiary formed by the $2.6 billion telecommunications provider.

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Datawest '84 Set For Jan. 19-21

PASADENA, Calif. — Datawest '84 is slated to take place here Jan. 19-21, 1984. The event is being sponsored by the Information Processing Group.

The regional trade show will feature presentations on data processing solutions for manufacturing, accounting, the medical field, distributors and wholesalers employing from two to 200 employees, a conference spokesman said. Keynoting the event will be Manny Fernandex, president of Gavilan Computer Corp., who will speak on "The Portable Computer as an Executive Tool."

Registration for the event costs $95 for all three days, including the exhibition. A one-day registration fee is $45. Additional details may be obtained from the Information Processing Group, Suite 113-150, 350 S. Lake Ave., Pasadena, Calif. 91101.

Magazine Automates With Personal Computers

By Patricia Keefe
CW Staff

NEW YORK — *Popular Science* is not the first national magazine to move from a manual to an automated editorial and production system.

However, rather than going the traditional terminal-to-mainframe route, the magazine chose to use stand-alone personal computers, mainly because the initial investment was low and would allow it to take advantage of down-the-road technology the magazine's staff reports on every month.

Times-Mirror Magazines, Inc., the parent firm, owns four publications as well as a book division. Like many other monthly publishers — and unlike most newspapers and news magazines — the company has been slow to automate its editorial departments. John Fry, director of publications development for Times-Mirror Magazines, explained that monthlies do not have the same deadline pressures as other publications and may have been afraid of making computer decisions that might soon be obsolete.

Popular Science began to consider automating both its editorial and financial systems in 1981. However, the magazine did not want to tie itself to a large investment in a technology it believes will change greatly over the next few years, Editorial Director Hubert Luckett said. To examine the options available, a feasibility study was implemented, spearheaded by a six-member exploration committee that included the firm's DP manager, the new properties development manager, Luckett, the magazine's electronics editor and a number of "laypeople" representatives.

Among the criteria established for equipment selection were upgradability and flexibility, Luckett said.

"We wanted a company that would be around next year and that would do the job we wanted."

The systems examined included those from Atex, Inc. and "every other major manufacturer," he pointed out. The committee made its final decision six months into the study, which involved talking to dealers, users and actually testing how microcomputers could be used at the magazine. The decision was to purchase Xerox Corp. Model 820 computers.

The 820 personal computers were selected because they could be used for budgeting and planning work as well as for word processing, text editing and computer typesetting. The Xerox systems reportedly cost a third of what would be required for an Atex system and were not tied to a CPU that could crash the entire system, the editorial director explained. "This way, if one personal computer goes out, it's of small consequence. You can always borrow another one — you're not stuck," he added.

Popular Science purchased 22 Xerox 820 microcomputers, along with Microsoft, Inc.'s Wordstar software and a Diablo Systems, Inc. 630 printer. Delivered in three to four weeks, the system went on-line in 1981. The systems have since been upgraded to later models, the 820-II.

With the system, staff writers write to floppy disk, sending a hard copy (printed on the daisywheel printer) to the editor-in-chief and the managing editor and the floppy disk to the copyroom. In the copyroom, the contents of the floppy is transferred to a 10M-byte Winchester disk. After they receive the marked-up hard copy from the magazine's editors, the copy editors call up the story from hard disk on their personal computers and make the necessary changes. Twice a day, a copy of the disk is sent to the printers.

Training was not an issue. One personal computer was placed in the editorial area and was initially used by two staff members who were familiar with personal computers. After a while, Luckett said, "the envy and curiosity" of other staffers was aroused, and they would come over and ask if they could work on the machines, too. "In this way, we created a desire to learn rather than forcing the machines on people," he added.

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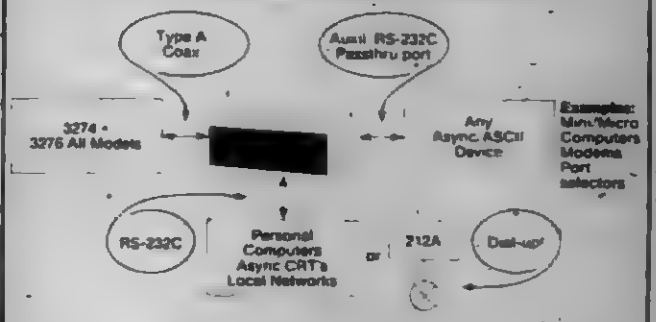

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International Report

FROM THE CW INTERNATIONAL NEWS NETWORK

AUSTRALIA

BLACKBURN — In an aggressive marketing stance aimed at strengthening its Australian penetration, Hewlett-Packard Pty. Ltd. has cut prices across the board by 14% to 32%. The average decrease on an HP minicomputer system is between 20% and 25%, with 32% discounts on terminals, a spokesman said.

BRAZIL

RIO DE JANEIRO — According to a study recently conducted by Abicomp, the Brazilian Computer and Peripheral Industry Association, Brazil's 1983 computer industry is expected to show a healthy 30% growth over 1982, creating some 75,000 jobs despite the country's economic troubles. The survey indicated that Brazil's information industries sold $145 million worth of equipment during the first half of 1983. Microcomputer sales accounted for the bulk of the activity, with 15,000 units sold.

SAO PAULO — At a recent press conference, Siemens AG President Helmuit Vervuert sharply criticized Brazil's controlled domestic market policies, stating that Siemens may reconsider continuing its Brazilian operation if the company is not allowed to participate in the digital equipment market.

JAPAN

TOKYO — Toshiba Corp. has released two small business computers called Tosbac System 5 Model 4, and Tosbac System 25 Model 5. The former is the new high end of the Tosbac System 5 series, featuring fixed magnetic 5-in. disks with 10M bytes of memory, expandable to 20M bytes, a spokesman said. It also has a main memory ranging from 96K bytes to 160K bytes. It is priced at $11,702. The Tosbac System 25 Model 5 has 8-in. fixed magnetic disks with 60M bytes expandable to 120M bytes of memory, according to the vendor. This model is able to handle four workstations and features a main memory of 126K to 512K bytes. This machine is priced at $23,404 and is scheduled for shipment in January, Toshiba said.

TOKYO — Nippon Electric Co. Ltd. and Sumitomo Chemical Co. Ltd. will jointly develop an Advanced Computer Aided Chemistry System (Acacs). The system will combine Sumitomo's chemical expertise with NEC's Acos mainframe and is slated to be completed in 1985. Acacs will be composed of a chemical compound and life activity information management subsystem, a molecular modeling subsystem, a solid display subsystem and an analysis subsystem, a spokesman said.

TOKYO — Apollo Computer Japan, Inc. has released a line of workstations that reportedly triple the performance rates of their former products for the same price. The DN460, DN660 and the DSP160 workstations each feature their own 32-bit CPU and high-resolution bit-map display and local-area networks. The products range in price from $58,838 to $80,285, the vendor said.

TOKYO — As more details of the company's legal troubles with IBM emerged, Hitachi Ltd.'s stock tumbled on the Tokyo Stock Exchange. The $300 million lawsuit settled against Hitachi is expected to impact the Japanese vendor negatively for many years to come, and stockholders reflected this situation as they scrambled to unload their shares. In Tokyo, the stock fell 3.8% in one day last week. In light of the company's situation, analysts are divided over whether Hitachi's users will remain loyal.

NEW ZEALAND

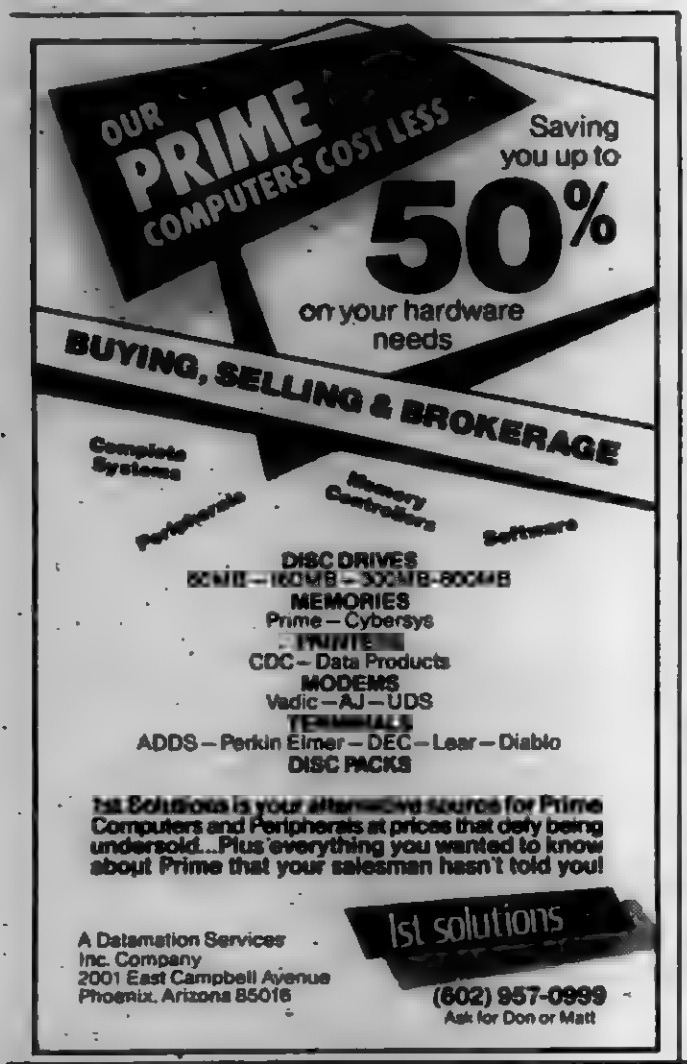
AUCKLAND — New Zealand Steel Ltd. plans to establish what is expected to be one of the largest information and manufacturing control systems in the country, following its order for a yet-to-be released Burroughs Corp. mainframe. The steel company is said to be constructing a new facility, including blast furnaces, at Glenbrook, south of Auckland, and will implement the Burroughs system as a key part of the project.

WEST GERMANY

BONN — Heinz Riesenhuber, minister of research and technology here, maintained that there must be more joint research projects that unite private and public interests in order to promote information technologies in West Germany. Riesenhuber made this statement during a recent meeting of the Society for Mathematics and Data Processing here. He argued that the main task in promoting information technology is to create "the necessary skeleton conditions for innovations." His strategy called for the provision of a more conducive infrastructure, "for example, [use of] the PTT's networks." The PTT is West Germany's postal, telephone and telegraph administration.

BONN — Dr. Christian Schwarz-Schilling, West Germany's minister of post and telecommunications, has assembled a team of nine external counselors to advise him on future technologies. Most of the committee members are top officers of high-technology companies such as Nixdorf Computer AG, AEG Telefunken and Siemens AG, sources reported. Critics of the new committee feel that the project is too partisan and that the advisers will not be able to make objective recommendations.

BERLIN — Cray Research, Inc. has signed a $5.5 million contract to supply a supercomputer to the West German Ministry of Science and Research here. The system is slated to be installed in the first quarter of 1984 for use by the Technical University and the Free University and by research institutes located in West Berlin. Applications running on the system will include basic university research, engineering and weather modeling.



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End Users
10 Manufacturer (other than com, uter)
20 Finance/Insurance/Real Estate
30 Medicine/Law/Education
40 Wholesale/Retail Trade
50 Business Service (except DP)
60 Government – State/Federal/Local
65 Public Utility/Communication Systems/ Transportation
70 Mining/Construction/Petroleum/Refining
75 Other User
Vendors
80 Manufacturer of Computers, Computer-related Systems or Peripherals
85 Computer Service Bureau/Software/Planning/ Consulting
90 Computer/Peripheral Dealer/Distributor/Retailer
95 Other Vendor

2. OCCUPATION/FUNCTION (Circle One)
11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Financial Officer
21 Director/Manager/Supervisor DP/MIS Services
22 Director/Manager of Operations/Planning/ Administrative Services
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
35 OA/WP Director/Manager/Supervisor
38 Data Comm Network/Systems Mgmt
41 Engr/Scientific/R&D/Tech Mgmt
51 Mfg Sales Reps/Sales/Marketing Mgmt
60 Consulting Mgmt
70 Medical/Legal/Accounting Mgmt
80 Educator/Journalist/Librarian/Student
90 Other

3. COMPUTER INVOLVEMENT (Circle all that apply)
Types of equipment with which you are personally involved either as user, vendor or consultant
A. Mainframes/Superminis
B. Minicomputers/Small Business Computers
C. Microcomputers/Desktops
D. Communications Systems
E. Office Automation Systems

Managers on the Move

WILLIAM G. STAPP has been promoted to vice-president of Data Processing for Hogan Systems, Inc. in Dallas.

Stapp has been with Hogan Systems since 1981. As director of data processing, he has been responsible for developing and maintaining the computer support system for Hogan's software development activities.

Most recently, Stapp was responsible for designing a unique personal computer-to-mainframe system, called Hogan Interactive Telecommunications System.

Before joining Hogan Systems, Stapp was a senior systems support representative in Dallas for a large computer manufacturer. He earlier served eight years as a software manager at Computer Language Research, Inc. in Dallas.

• • •

BRUCE J. DUNN has been appointed assistant director of data services for the city of Dallas.

In his new position, he will be responsible for the selection, implementation and development of the city's data base management systems and data services information center, microcomputer center and office automation.

Dunn was formerly data base administrator at CF & I Steel Corp. in Pueblo, Colo.

He earned his bachelor of science degree at Purdue University in West Lafayette, Ind., and his masters in business administration from Indiana University.

• • •

RICK KAMEN has been appointed to the newly created position of data processing systems manager for Reynolds/Leteron Co. in Torrance, Calif. In his new position, he will supervise all data processing activities and will oversee future system expansion.

Prior to joining Leteron, Kamen served as data processing assistant manager at Dixon Cadillac in Hollywood, Calif.

Previously, he had been data processing assistant at GEM Cadillac in Kingston, N.Y.

Since joining Leteron in 1982, Kamen has played a key role in setting up and maintaining Leteron's data processing systems.

• • •

DAVID MILLER has been promoted to assistant manager of systems and RICHARD McNEIL has been promoted to assistant manager of systems and development for Zurich-American Insurance Co.

Miller will be responsible for the development and maintenance activities of the company's New York data base list systems and collections systems.

Before joining Zurich-American Insurance, he was associated with Allstate Insurance Co. as a business systems installation analyst and with the state of Wisconsin as a program analysis supervisor.

Miller joined Zurich-American Insurance in April 1981 as a business systems analyst/programmer in the data services department.

He received a bachelor's degree in political science from State University of New York and a masters of science degree in special education/rehabilitation from the University of Tennessee, Knoxville.

McNeil will be directly responsible for the development, installation and maintenance of all claim-related systems.

He joined Zurich-American in October 1982 as a business systems analyst in the data services department.

Prior to that, he was associated with International Harvester Co. for seven years as a programming supervisor and with Bell & Howell as a systems analyst.

He received his bachelor's degree in computer science from Roosevelt University, Chicago.

• • •

LARRY W. CONKLIN has been named data processing manager of Afcom, Inc. in Casselberry, Fla. In his new position, Conklin is responsible for all electronic data processing services at Afcom.

Prior to joining Afcom, Conklin served as data processing manager for All State Pipe Supply in Jacksonville, Fla.

Before that he was a programmer for United Medical Services and later operations supervisor for Florida Medical Services, both in the Orlando area.

Conklin earned an associate in arts degree in business management from Florida Junior College in Jacksonville. He also attended the University of North Florida in Jacksonville.

Bruce J. Dunn

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Revenues Up by $5.50 per Patient Day

Pharmacy System Proves Quick Rx for Center

FAYETTEVILLE, N.C. — Administrators at Cape Fear Valley Medical Center here are feeling much better since an automated pharmacy system was installed in January. The system has improved pharmacy revenues by $5.50 per patient day, paying for itself in 15 days, according to Keith Hullender, manager of patient accounts at Cape Fear Valley.

The product is called Rxcom from McDonnell Douglas Automation Co. (McAuto). Hullender said that in addition to increasing pharmacy revenues, the system cut the center's suspense period from four days to two while nearly eliminating late charges from pharmacy altogether. "Our cash flow position has already been improved by $360,000, and additional revenues from pharmacy may approach $1 million this year," he said.

Cape Fear Valley Medical Center is an acute-care facility with 492 beds. The center accounts for more than 145,000 inpatient and 60,000 outpatient days per year. In addition to general acute care, Cape Fear Valley handles a large number of radiation therapy and rehabilitation patients.

Rxcom has automated the tasks of order entry and charge accumulation, according to Jimmy O'Briant, director of the pharmacy. "It allows us to devote more time to drug management, control and distribution," O'Briant said.

"Quality control has been improved because Rxcom acts as a fail-safe device, automatically detecting drug-to-drug interaction situations and calling potential conflicts to our attention as we enter orders. The drugs patients receive are monitored more carefully," according to O'Briant.

The center had been aware of problems in accounting and billing for pharmacy charges for some time, according to Torre Johnson, associate director for financial affairs.

"It's no secret that in a manual environment we had problems keeping track of charges for the more than 3,000 drugs we dispensed," O'Briant maintained.

Problems were further magnified because the staff had to operate short-handed for several months. "To complicate matters further, we've been in the process of converting to a unit-dose drug distribution system," O'Briant said. "The conversion has dramatically increased the demands on the time of those involved in the project."

Pressure to Automate

As time and manpower problems caused pharmacy late charges and errors to proliferate, the center's business office began to apply pressure to automate the pharmacy system, Hullender said.

They had been inundated by auditors from insurance companies with questions about bills, especially pharmacy charges. "One day we had $12,000 in late charges from pharmacy hit the system for accounts which had already been billed," he said.

The conversion to Rxcom was aided in part by the fact that the McAuto representative who assisted was an experienced pharmacist, Hullender said.

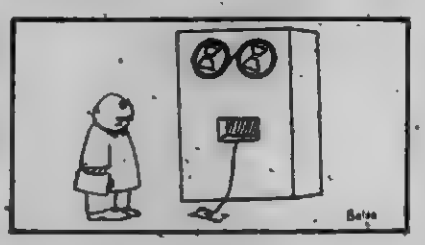
Rxcom operates as a stand-alone system. The pharmacy computer is configured with six terminals, five located in the pharmacy and a sixth in the computer room. Response time has been good, and downtime has been limited to the installation of minor enhancements.

With Rxcom, "pharmacy charges are now posted daily, three days earlier than before, and lost and late charges have been nearly eliminated," O'Briant noted. "I don't think our pharmacists would be overly receptive to the idea of working in a pharmacy that wasn't automated now."

Pharmacists now enter orders though CRT terminals. When an order is entered, charge information is automatically generated, captured and stored by the computer. The information is passed to the main computer on a daily basis. The main computer reads pharmacy data, posts charges to the proper accounts and generates patient bills.

"Now that our formulary is maintained on the computer, we don't have to worry about getting prices right," O'Briant said. "Rxcom automatically refers to a master price record when an order is placed. Price list additions, revisions and deletions are made only once. Our fill list is automated, too."

"We're nearly done converting to the unit-dose distribution system," Johnson said. "If it weren't for Rxcom, we'd probably be working on the conversion next year at this time."



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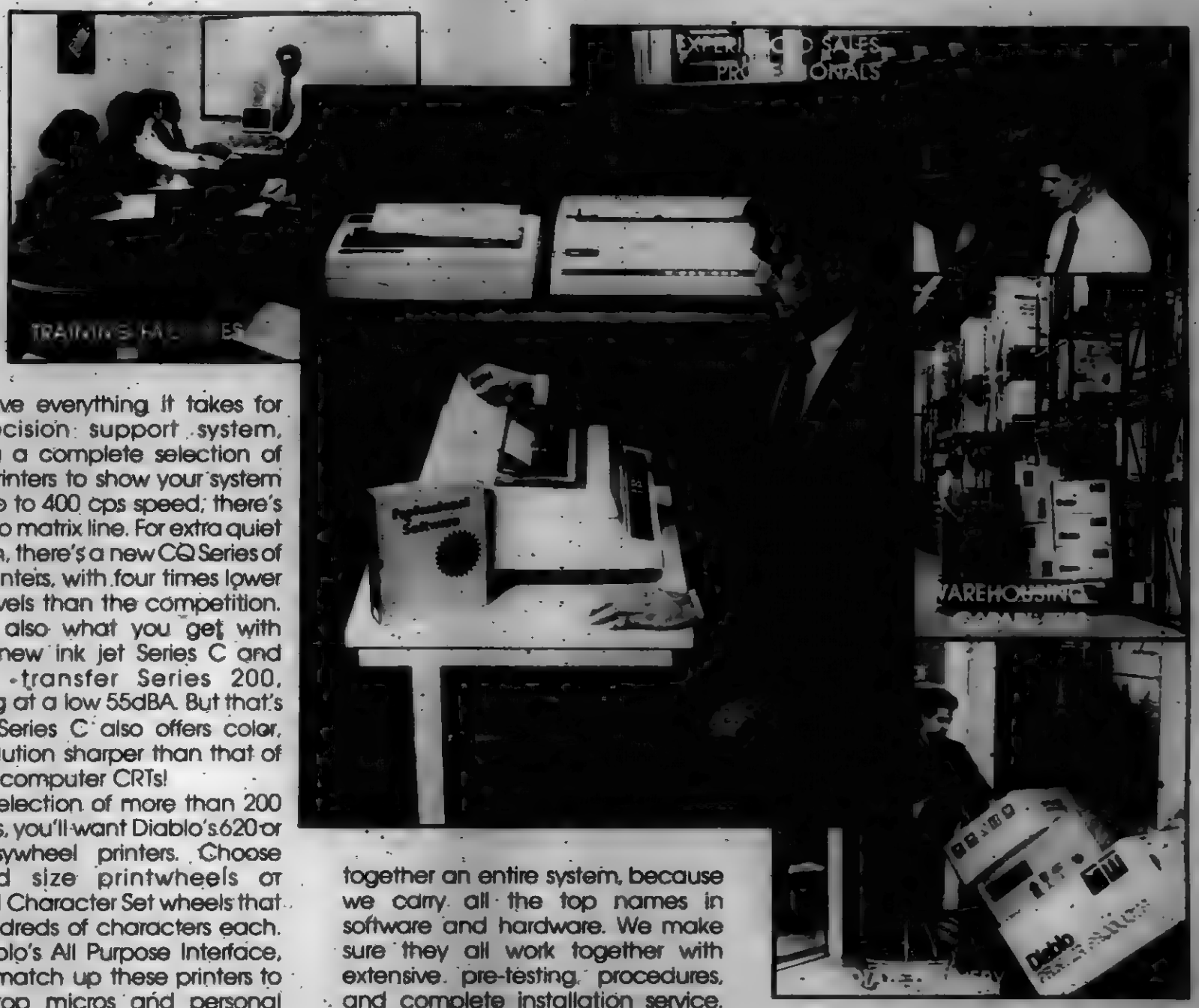

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For Mass Manufacturing

CAD System Aids Historical Object Remake

By Patricia Keefe
CW Staff

NEW YORK — A computer-aided design (CAD) system has helped a design firm here in what may be the first computer reconstruction of an historical object for mass manufacturing.

The object of all this attention is the Rosenschale (rose bowl), designed by turn-of-the-century Austrian architect Josef Hoffmann. While researching Hoffmann's work and Viennese modern house, the Palais Stoclet, Peter Arnell and Ted Bickford of the New York design firm Arnell/Bickford uncovered a photograph of the Viehna Werkstatte studios. In the photo was the Rosenschale. The modern-day counterpart of the 20th century photograph will be a nickel-and-silver fruit bowl, reconstructed in three dimensions in New York and soon to be manufactured in Italy for worldwide sale.

Alessi, an Italian manufacturer of tableware located in Crusinallo, expressed interest in manufacturing the bowl, which will sell for $70 to $80. Although it had a buyer and a product, Arnell/Bickford lacked a design. Since all that remained of Hoffmann's creation was a photograph, the designers turned to another New York firm, Digital Effects, Inc., a consulting firm that primarily has been involved in producing composites of live-action motion pictures with computer footage.

Using a Harris Corp. Model 500 system — which includes a minicomputer; up to 64 terminals; programmable I/O channel; control panel; 19M-byte throughput rate; and virtual, programmable and cache memories — and in-house software developed over a five-year period, Digital Effects was able to reconstruct critically the Rosenschale, Arnell said.

The phrase "critical reconstruction" is important because the best the CAD system could do is to reconstruct the bowl. It could not provide a complete copy. The reason is that the photograph does not provide enough information about the depth of the bowl or the construction or exact coordinates of its underside, according to Judson Rosebush, president of Digital Effects. Thus, the designers (and the computer) had to make some assumptions about the bowl, he said, adding that as a result, there was a certain amount of trial and error involved in the process.

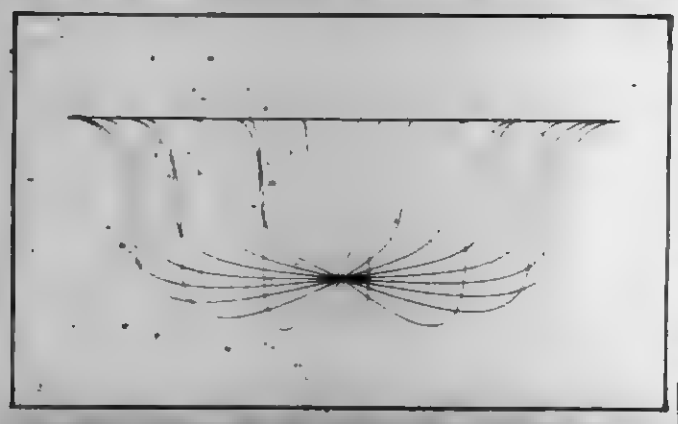
Calculating Measurements

In order to calculate correctly its measurements in all three dimensions, at least two photographs taken from two different angles and six points on the object would be necessary, Rosebush explained.

Working with the visible sectors of the bowl, programmer D.L. Deas began the process of establishing the bowl's contours. First the bowl was "scanned" into the computer, which located edges, boundaries and data points. These were "marked" on the screen by using a cursor. Rotating the bowl on the screen so that it could be viewed from different angles, the programmer transformed its shape and compared it to the original photograph.

After the on-screen studies, several prototypes were done in brass so that the designers could assess aspects of the evolving design, such as the shape of the bowl's bottom, thickness of its wall and detailing of its lip.

As a result of the success of this first project, Arnell/Bickford and Alessi are planning their next series of household objects to be "reconstructed" by CAD from drawings by other famed designers of past eras.



Computer Reconstruction (above) of Josef Hoffmann's Rosenschale (below).

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Security Aid Puts Bank's On-Line System in Line

FORT WAYNE, Ind. — When a bank here decided to tighten up its computer security, one of the first things it had to do was to make sure its on-line system was in line with its security goals.

Fort Wayne National Bank, with assets of $585 million and deposits of $480 million, has an on-line CICS system running on two IBM 4341s operating under DOS/VSE. The computers are located at the bank's headquarters here.

The bank's on-line system provides a central information file, balance inquiry, file maintenance, automatic teller machine (ATM) support and an on-line teller system that processes all transactions.

Supports Others

Three other correspondent banks in Indiana are also on the system, and the bank serves as a service bureau for five other banks. Approximately 140 tellers are on-line to the bank's system using IBM 3600 and 3270 terminals.

Prior to installing the on-line package, the bank used the basic security provided with IBM's CICS. However, to meet audit requirements, the data processing department developed its own security system under CICS.

"Both our external and internal auditors agreed that we should try to eliminate any possibility for error in our security," said Robert E. Arnold, assistant vice-president of technical support. "We had not experienced any incidents, but we wanted to close the door before any could occur."

"We especially wanted to increase the control over who is transacting and what transactions are being done," Arnold added.

Answer to Needs

After some investigation, the bank chose a security package called CICS On-line Security System (Coss), manufactured by Oxford Software Corp. "It seemed to be the answer to our needs," Arnold explained.

The bank was familiar with Oxford Software because it had been using the company's User Files On-Line (UFO) productivity tool for all its CICS program development.

The bank was impressed with UFO, particularly since its 25-person DP department was experiencing a problem typical among CICS programmers — a high turnover rate.

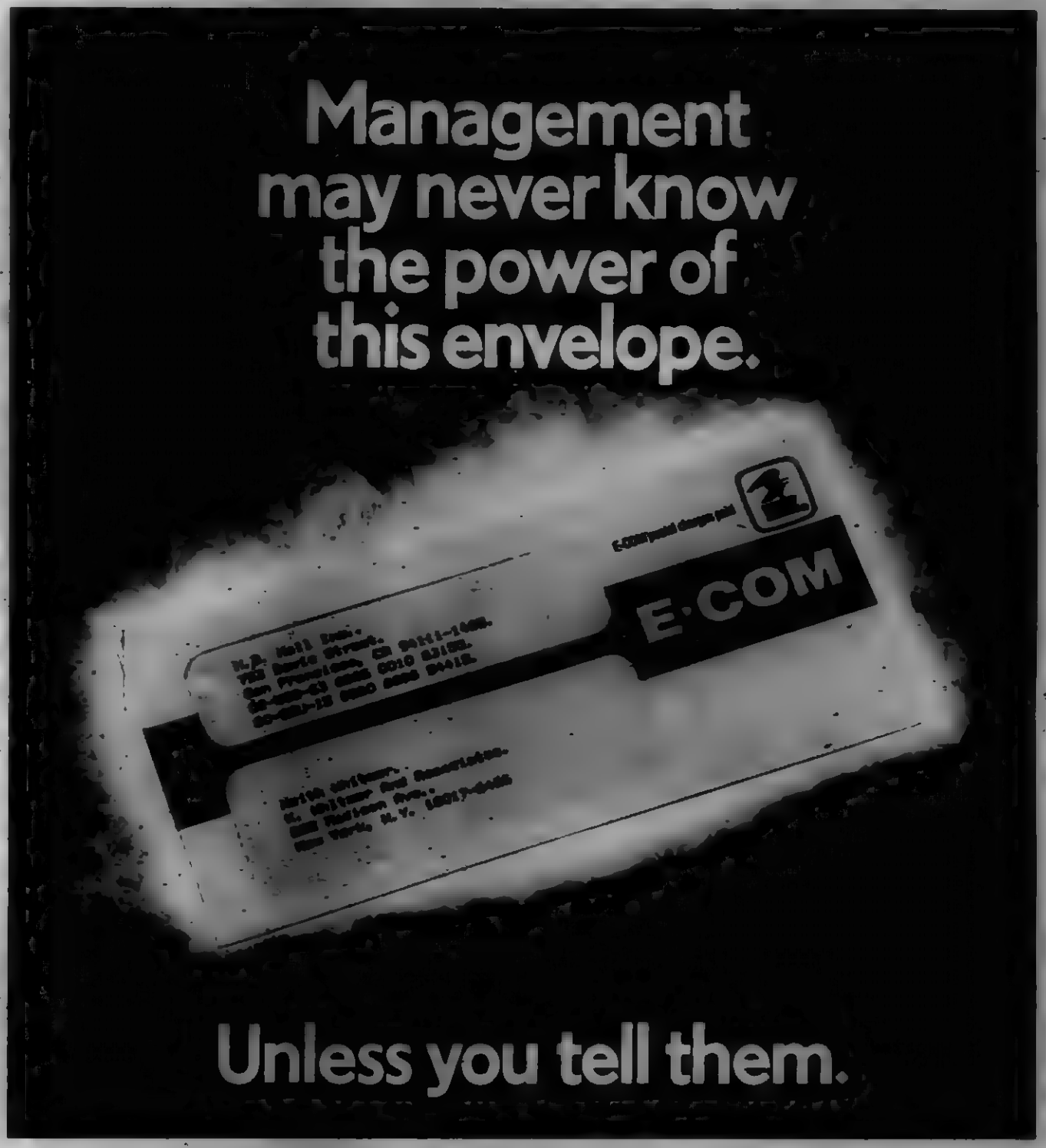
Qualified CICS personnel are hard to find, and training to develop CICS proficiency can be a difficult process, Arnold said. UFO had been used to teach CICS to new personnel and develop new software.

The success with UFO convinced the bank to become a beta test site for Coss when Oxford presented the opportunity. "The installation required only a couple of hours of work, and learning Coss involved merely reading the manual followed by some minor training," Arnold said. "The terminal operators only had to learn the new sign-on procedure."

Arnold is impressed with a number of Coss features. "A main advantage is that the user creates his own password, known only to him, so that no one else can have access to his data," Arnold pointed out. Coss also automatically signs off terminals after a specified time. "This feature prevents an unauthorized person from using the terminal if the operator walks away and leaves it on-line. Another advantage is that the bank can define very specific controls over the use of terminal transactions," Arnold continued.

For example, Arnold mentioned that they can define the transactions that an operator can perform, the files they use and the time of day when an operator can perform transactions.

"Ready-to-use security software greatly increases the productivity and cost effectiveness of our staff, and the fact that Coss is compatible with UFO is very advantageous," Arnold continued. He explained that since the bank has adopted UFO as its on-line application development system, it is especially useful to have Coss protect UFO resources.



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Added to Disaster Recovery Plan

Shared Contingency Facility Works for Insurer

By C. Joseph Marschall
Special to CW‡

BALTIMORE — The addition of a shared contingency facility to its disaster recovery plan has ensured peace of mind to a group of insurance companies.

The Maryland Casualty Co. (MCC), headquartered here, is the principal property and casualty company of the American General Group. MCC operates on a decentralized regional basis with eight regional offices and two subsidiaries, one each in Maine and Texas. Its assets, as of July, are $1.9 billion with projected premium writings of $1.1 billion for 1983. MCC operates within the independent agency system working with over 4,800 agents. About 250 of these agents are tied into the company's computer network — a figure expected to rise to 500 by the end of the year.

Many steps have been taken over the years to guarantee data security — an area of vital concern. The need for protection of data via off-site storage of critical files has been a factor in this security effort. The use of controlled access via user identification codes and passwords has been a proven deterrent to unauthorized access. These measures, however, do not provide enough protection from losses caused by a major disaster.

Early in the 1970s, a disaster recovery plan was developed by MCC to minimize losses to the DP facilities if a major disaster occurred. All of the critical operations within the company were identified, and key tasks were assigned to employees charged with the maintenance and testing of the plan itself.

Mutual Testing

In 1977, MCC and Blue Cross and Blue Shield (BC/BS) of Maryland signed a reciprocal agreement whereby the two insurers would function as a backup site for each other. The plan proved successful as mutual testing occurred at six-month intervals. The obvious flaw to such a plan is that it does not allow for what must be done when one (or both) of the reciprocal back-up site configurations changes, thus negating the ability of either site to be used as backup for the other.

Eventually, changes in hardware did force both companies to the realization that their mutual agreement was less than effective. Several things happened at this point: the completion of a new computer center at MCC's home office; an outside study of disaster recovery needs at the various American General Group subsidiaries was completed; and a search for alternate facilities was initiated.

The search for alternate facilities led to the discovery of many problems: Most firms were not willing to provide adequate test time to ensure compatibility; the need to invoke backup would probably occur at the worst moment for the host system and "empty-shell" facilities, vendor facilities or service bureaus all proved too costly.

All of these factors led to the development, by American General, of a shared contingency facility at the recently vacated MCC data center here. It commissioned a consulting firm to study all of its subsidiaries to determine the environment needed for this facility.

It was determined that the planned expansion of MCC's DP facilities could provide the American General Group with a shared contingency facility. An extra CPU could be maintained in the older, just-vacated data center, providing all of the backup facilities required for the existing preidentified critical jobs while the disabled computer center was being replaced or repaired. MCC would become its own backup while sharing the facility with the rest of the conglomerate.

MCC and BC/BS are currently holding talks on the status of their reciprocal backup agreement. Although the two companies' hardware is no longer compatible, MCC does expect to upgrade its IBM direct-access storage device (Dasd) system to the same level as did BC/BS.

If the five other data centers within the American General Group had chosen to do their own thing, they would have incurred far greater costs than with the shared contingency facility approach. For example, the lease on an "empty shell" is typically $1,500 per month — multiplied by 12 and again by five, and the result is $90,000. By contrast, the shared contingency facility will be free, beginning in 1984, after the recapture of some initial start-up costs.

The system already in place in the older site was configured with an IBM 3033N CPU with 8M bytes of storage and 12 channels of access. It has 32 spindles of IBM's 3350 direct-memory access devices and eight Storage Technology Corp. tape drives with the usual read/punch and printer. These are the minimum requirements identified by the consulting firm's study that would meet the "critical job" needs for all of American General's subsidiaries.

The shared contingency facility offers many advantages, including very fast restoration of DP services. It reduces security problems because administrative control is not relinquished to anyone outside of the companies involved. The cost to operate the facility is shared equally by the five major data centers within American General.

Marschall is assistant vice-president and director of internal audit at Maryland Casualty Co.

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Multiple Line Chart Formats	YES	NO
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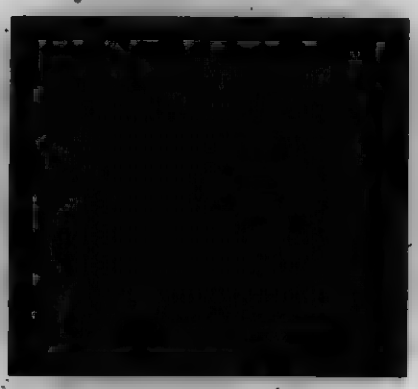

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Cuts 'Data Frustration'

Info System Grants Hancock Execs Quick Access

BOSTON — Data frustration had surfaced in the executive suites of the John Hancock Life Insurance Co. Complaints, however, did not center on the lack of data, but on the absence of a tool enabling corporate managers to present that information quickly and graphically.

In fact, one executive complained he felt "like a fighter pilot anticipating a sidewinder missile without the instruments to warn me to take corrective action."

Though Hancock maintains a large-scale IBM mainframe shop, executives expressed a need to have current data displayed for them in an easy-to-understand graphics format.

The system is geared specifically to the needs of the insurance industry, but the information that managers required often became available only a few days before meetings, leaving little time to assemble a graphics presentation. Further, data sometimes was added only hours before a meeting, making it virtually impossible to prepare visual aids in time.

Al Colby, Hancock's senior vice-president for DP, was assigned the task of researching executive information systems to find one that combined management analysis tools, graphics reports and ease of access. After consulting with the executive vice-presidents — Chairman of the Board John McElwee and President Jim Morton — the research team defined the requirements for the proposed management reporting system.

Primarily, the system had to accommodate the ad hoc retrieval of management information for use in graphics reports suitable for presentation.

Colby also wanted the system to be able to access data from the mainframe, but he did not want to rely on terminals that were completely dependent on it.

Finally, Hancock executives needed a microcomputer-based system that could maintain data downloaded from the mainframe, in addition to accepting outside information to provide a base for local application development.

The system that Colby eventually chose was Cullinet Software, Inc.'s Trend-Spotter. Based on an Altos Computer Systems, Inc. microprocessor, the Trend-Spotter package combined graphics software, a high-resolution color monitor and a separate touch screen to display a menu-driven access method.

Hancock installed four Trend-Spotter packages in 1982. Executives immediately put the graphics capabilities to use for boardroom presentations using the system's screen projection interface.

According to Colby, the Trend-Spotter system provides Hancock's executives with access to an IBM Model 3033A mainframe to download data for graphics reports. He said the system also offers the data storage capacity Hancock required and graphics systems software that could support future applications development.

In order to cut development costs and time, Hancock embarked on a joint program with Cullinet to develop applications modeled on life insurance industry needs.

Colby's team plans to establish an historical file enabling reports to reflect changes over time and also to identify procedures to clarify the source of all data downloaded from the mainframe.

In addition, Hancock is studying a plan to extend the Trend-Spotter system to department heads in sales and marketing.

Reference Book Released, Targets Communications

WASHINGTON, D.C. — A reference book on international telecommunications issues has been published by the George Washington University Center for Telecommunications Studies.

The 278-page book provides information on domestic and international agencies in the telecommunications field and includes sections on policies, laws and regulations on transborder data flow, telecommunications trade and intellectual property.

"Issues in International Telecommunications Policy: A Sourcebook" also contains essays by government and private sector authorities on the subject.

The book was edited by Jane Yurow, an attorney and consultant who was previously an official with the National Telecommunications and Information Administration.

The book is priced at $49.95 plus $2 for postage and handling ($6 for orders from outside North America). The book costs $35 per copy in orders of 10 or more books from Sourcebook, Center for Telecommunications Studies, George Washington University, Washington, D.C. 20052.

Personal Computers have opened up all kinds of possibilities throughout your company. Including some you'd rather not think about. Somehow a balance must be struck between the performance PCs offer, and the control you have to have in a local area network to make sense of the whole system. Somehow, costs, information and information processing resources have to be managed.

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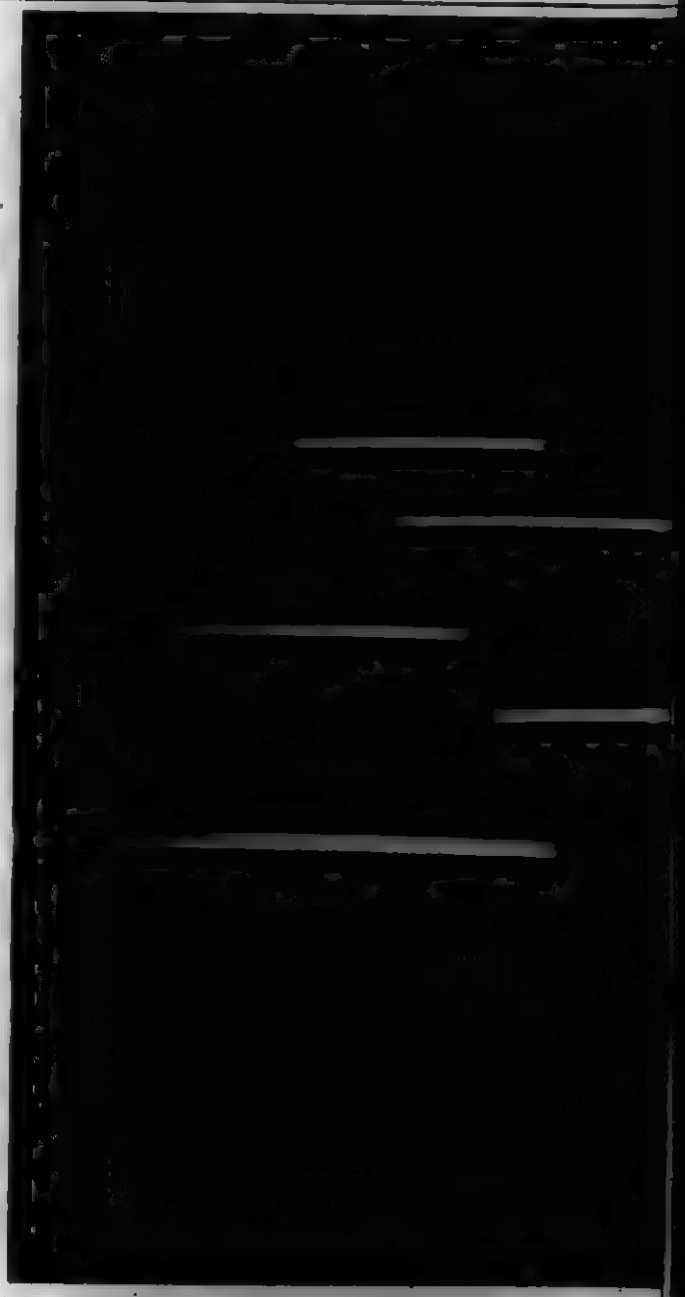

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When Is Consultant in Conflict?

Q Recently I unknowingly created a controversy within our company when I retained the consulting arm of the company that does our auditing. The corporate controller and I evaluated several consulting firms before selecting this company to help us with the design of a consolidated accounting system.

Now three officers of the company, including the president and several division general managers, have expressed concern about a conflict of interest. Their concern was prompted when the person who manages our annual audit activity advised our controller against engaging members of his firm to do work on accounting systems.

Should we continue with the original plan or seek help from another firm?

A Given that so many key figures are "concerned" and that your public accounting firm cannot present a unified front, I would recommend that you retain another firm.

I am not saying that management information systems (MIS) consulting and audit groups of the same firm can't have the same client. In this situation, however, it is apparent that you would be fighting unnecessary battles both internally and externally.

In addition there is a subtle point that should not be overlooked: the managing auditor lacks confidence in his firm's MIS consulting group. If he felt that group could do the job, he would have said so. I would guess that he is not willing to jeopardize his firm's bread-and-butter audit work for a one-time MIS job.

Q For those readers who must provide user education, here are some ideas from which they might benefit. The going is still slow at times, but overall our user education program is a success:

● *Start small.* Don't overwhelm the participants with an all-day session.

● *Demonstrate the benefit before teaching the technique.* Nothing interests people as much as showing them very quickly and dramatically how their work lives can be improved.

● *Use a variety of teaching techniques.* Some people learn visually, others learn by hands-on experience. Provide several approaches.

● *Don't make people feel foolish.* No one likes to appear inept, especially high-level managers. Use a nonthreatening teaching style. Give individual attention to those people whose skills are not up to the level of the rest of the group.

● *Teach what they want to learn.* Interest is inspired best by responding directly to what your staff wants to accomplish.

● *Offer an incentive for learning.* It would be wonderful to have top management say, "Those who receive this training will get a raise," but this seldom happens. However, you might try scheduling your opening session as a luncheon.

A You've made some good points. However, I am not in total agreement with your next to last point. In almost any user education program, there is a fundamental base of knowledge that users should have before they get "what they want to learn." The user doesn't always know what he wants to learn. Another manager responding on this same issue wrote, "We don't start by teaching the users to program computers; we start with a computer awareness approach that familiarizes users with applications and resources of value to their professional involvement."

Q I would like to pursue an MBA with an emphasis in MIS. Is there a list of universities that offer such degrees?

A *The Official Guide to MBA* (Education Testing Service, Princeton, N.J.) contains a list of all the MBA programs. In this guide, each program is cross-referenced to any of 15 areas of concentration, one of which is MIS. The guide is available in college bookstores.

The criteria of what constitutes an emphasis or concentration in MIS are not clear. I'm familiar with several of the MBA programs that claim MIS concentration, and entry-level Cobol is their most sophisticated course. However, the guide gives you a place to start.

Have you considered pursuing an M.S. in MIS? Some MIS-oriented MBA aspirants overlook this option.

Long is a professor at Lehigh University, a DP consultant and author. If you have a question you'd like him to address, send it to Larry Long, Editorial Department, Computerworld, P.O. Box 880, Framingham, Mass. 01701.

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Software Must Also Be Simple, Useful

Training Seen Key to Aiding Uneasy Micro Users

SAN DIEGO — After making a substantial investment to install microcomputers in their organizations, many corporate managers find that employees, uneasy about the change, balk at using the new systems.

However, General Dynamics Corp. has discovered a way to help employees feel more comfortable about using microcomputers to perform inventory control, accounting and personnel management functions.

"It's extremely important that employees receive proper training on the machines and that the software packages are simple yet useful," said Tom Davis, software engineer at General Dynamics' Data Systems Division here.

"With many software packages, people can't think of an immediate application and hesitate using the entire system," Davis added. "But when we demonstrated [Software Publishing Corp.'s] PFS:File, PFS:Report and PFS:Graph on [Apple Computer, Inc.] Apple II computers, they instantly felt comfortable."

According to Davis, his group recently completed a 10-week series of training sessions during which 500 General Dynamics employees received instruction on how to use the Apple/PFS system. "It takes only about four hours to teach employees all three packages," he explained.

PFS:File works like an electronic index card filing system. It enables users to design forms and to store, retrieve and edit information. With PFS:Report, users can print reports from data files that include calculations and automatic formatting. PFS:Graph allows users to produce color bar, line and pie charts.

In early 1982, the company installed four micros and began evaluating how employees adjusted. When results proved positive, additional machines were bought. Currently, 135 Apple IIs are in use throughout General Dynamic's West Coast facilities.

"As a large organization, we generate substantial amounts of data, and requests for reports are very common," Davis said. "As a result, we've shown our employees how to use PFS:File to record and file data on their computers rather than paper. They can design any type of form they want, and then change that form without reentering the information."

One engineer uses PFS:File to keep track of about 250 drawings, he continued. "Because those drawings move throughout the department from one engineer to another during the approval cycle, the software allows him to remain up-to-date on the status of each one."

The defense contractor also uses the report writer to produce the many types of reports needed for the U.S. government, Davis said. "With PFS:Report, reports are generated in a matter of minutes compared with the hours it would take to produce them manually," he said.

Instead of having secretaries search manually for a particular personnel file, managers can now locate and print the information that had been previously stored using PFS:File. If a report is required, PFS:Report can produce it. They can also develop bar, line and pie charts using PFS:Graph. "We can hand PFS:Graph to an employee and in less than an hour he is relatively proficient at using it," he said.

The company has now initiated a program that permits a salaried employee to buy an Apple and accompanying software programs, including the PFS packages, for use at home. Workers pay for the system through an interest-free, automatic monthly payroll deduction plan.

Financial Meet Slated For Chicago in March

CHICAGO — "Financial Information Systems — Integrating Personal Computers" is the theme of a three-day conference to be held here March 14-16.

Sponsored by the National Institute for Management Research (Nimr), the conference will focus on the application of new computer hardware, software, communications approaches and management techniques in integrating personal computers, financial information and management systems. The conference will also examine innovations and case studies with an emphasis on using personal computers in financial applications.

Aimed at financial managers, financial systems planners, DP managers, systems analysts and systems planners, the conference will feature sessions on the office of the future and its impact on financial systems, surveying and selecting hardware and software, financial systems in industry and incorporating automated auditing tools in financial applications.

The registration fee for the conference is $595 with discounts available for large groups. More information is available from Nimr through Box 3727, Santa Monica, Calif. 90403.

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Shipping Firm Sails With Satellite-Beamed Data

ASTON, Pa. — A microcomputer-based inventory system has helped a shipping company here become more competitive by decreasing its operating costs and streamlining ship operations. The system is said to be the first to send high-speed data communications over a voice channel over the U.S. Maritime administration's (Marad) Marisat satellite.

Federal law mandates that each ship carry a specified number and type of spare parts before it can leave port. Failure to comply can force a ship to stay in port until the required item is supplied which, in turn, can result in pay to an idle crew and lost revenues. But since physical inventories were rarely taken on ship, information to evaluate actual procurement requirements, and the ability to use common spare parts among vessels was unavailable.

Using a matching fund grant from Marad, this problem spurred Sun Transport, Inc., located here, to undertake a research project in October 1980 to examine how an effective shipboard and shoreside inventory system would track items, decrease operating costs and streamline operations. The project, titled Sun Transport Inventory Management of Spares (Stims), went on-line in early 1983 on two ships, and a third installation is planned for early 1984.

Sun Transport has estimated Stims has resulted in an annual inventory-related savings of $25,000 per year per vessel.

Stephen G. White and James H. Keyte of Sun Transport, in cooperation with Reohr & Co., a computer and management consulting firm located in Media, Pa., wrote a functional specification for the Stims system and looked for an inexpensive system small enough to be placed aboard ship, but powerful enough to handle the Stims project.

Some of the major system requirements were:

- An RS-232 synchronous port and 300 to 4,800 bit/sec transmission to interface with the optical scanner.
- An acoustic coupler port to establish communications with Materials Management Control System via telephone communications channels of the Marisat Satellite Communication System.
- Capability to handle up to a ½-sec delay in communications without generation of a time-out to allow for delay in transmission due to satellite communications.
- IBM 3780 emulation for communications with Sun Transport's shoreside computer.
- Dual floppy drives for backup purposes, a tabletop printer for generation of listings and messages, a 1M-byte diskette storage for data base and system and keyed index access of data.

Of the products studied, the IBM Model 5285 and the Texas Instruments, Inc. DS990 Model 1 microcomputers were chosen to test accurately for differences in shipboard durability and human engineering.

The IBM 5285 supports multiprogramming, and its 96K-byte internal memory can be configured into several partitions that operate independently. The DE/RPG programming language was suggested by IBM to create the Stims shipboard software, which consists of 10 programs designed to handle maintenance of the spare parts and requisition files, as well as additional programs to interface with the optical scanner and provide software (created by Reohr) for communicating from ship to shore. However, Sun Transport found DE/RPG's flexibility limited, which in turn would have limited the system's functionality.

As a result, it chose to go with the DS990 Model 1, which supports multiprogramming. It utilizes double-sided, double-density diskettes in its two disk drives and uses TI's TPL operating system and TPL programming language. Total internal memory is limited to 64K bytes. However, an overlay system, somewhat like virtual storage, reduces the need for a larger memory capacity.

Major Functions

The shipboard Stims system has several major functions. The first is to provide an interface to an onboard optical scanner for inventory management of spare parts. For backup purposes, manual maintenance of the spare parts data and the inventory file is also essential.

The shoreside programming was created by Reohr on Sun Transport's Qantel Corp. 332 minicomputer in Qantel's QIC-Basic. There are several major features of this software. One is to provide two-way communication of messages and data between several vessels and shore. Data and messages are batch processed on the ship and on shore and transmitted via satellite at regular intervals.

Shoreside processing also must store and maintain a duplicate data base on shore for each vessel and print requisitions on shore that have been transmitted from the ships. Delivery dates for requisitioned items must also be created and transmitted from shore.

The next task is to hook up the communications hardware and to provide the necessary communications software. A Telxon Corp. 787 portable data terminal with an attached bar code reader was the optical scanner chosen as most suited to the requirements of Stims.

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OA Strategy Pumps Income Into Heart Fund

OAKLAND, Calif. — With an office automation strategy aimed at information management, a chapter of the American Heart Association has increased campaign income by more than 25%, cut operating costs and enabled a small staff to run community programs more effectively.

Donor and volunteer information, as well as accounting and administrative data, is now maintained on a Wang Laboratories, Inc. VS 80 minicomputer with both word and data processing capabilities. The chapter's approach not only expedited and simplified recordkeeping, but also turned its data bases into powerful management and marketing tools.

The Alameda County Chapter is a member of the Heart Association's California affiliate. From its Oakland office, the chapter runs community programs, fund raising and educational classes for a metropolitan area with a population of 1.1 million.

The sheer size of the county, said Executive Director Clifford H. Lura, at times made the chapter's tasks "almost unbelievably difficult to perform for a staff of 10."

"That," Lura said, "is why we went looking for a computer."

Most important for the chapter was the ability to control its donor data base. The data was being kept on a mainframe computer at the association's National Center in Dallas, which acted as a service bureau for periodic updating of the donor files. That arrangement, Lura said, "was too centralized, and we had too little local control." The chapter also felt it needed word processing capabilities that could be interfaced with the data base.

The decision to install a Wang VS 80 system came after several months of studying office work-flow patterns and evaluating computer systems. The reason for this choice, according to Lura, was "the total integration between word processing and data processing." With 256K bytes of main memory, the system included a 90M-byte disk drive, two CRT display terminals, a daisywheel printer and a high-speed band printer. Two workstations have since been added.

The first priority in June 1981 was to convert the donor data base of nearly 70,000 records to the VS system. The procedure for recording contributions begins when two staff members run adding-machine tapes and enter the totals by category on a recap form as an auditing control. Next, the fund raising operator keys the contributions, creating records for new donors or adding the most recent gifts to the records of previous contributors. A computer-generated daily transaction register listing donors and gifts by category must tally with the recap sheet.

One staff member used to spend most of the day logging donations manually and packing the records for shipment to Dallas. A second staffer took almost as many hours to type receipts for memorial gifts. Today, said Lura, the entire procedure is completed in a maximum of 90 minutes. Some of the time savings are the result of a program that automatically produces personalized receipts for memorial gifts up to $50 and, for larger amounts, letters with a personal message from the president of the board of directors. "These are not filled-in blanks," stressed Lura. "They are printed in typewriter quality on letterhead paper."

Introduction of the personal letters has made "a considerable difference" in the chapter's income. "If you're able to carry on a personalized relationship with someone out there, it's going to make a difference in their feelings about you," commented Lura.

Income from the annual Heart Sunday neighborhood campaign also increased when the chapter switched to computerized recordkeeping for the more than 12,000 volunteers who take part each year. The forms used by telephone operators to recruit volunteers are no longer prepared by cutting and pasting sections of reverse directories on cards. Instead, a service bureau generates the cards by matching up a computer file of the previous year's volunteers' addresses with appropriate sections of reverse directories of the county. Every day during the telephone drive, the names of new volunteers are entered into the Heart Sunday file. Just before the actual campaign, a program cleans up the file by deleting any remaining names of volunteers who did not rerecruit.

Computer use for public and professional education programs and special events has allowed the chapter to save staff time while improving services. For example, by keeping its inventory of educational materials on the VS, coded for user, subject and title, the chapter can provide people interested in specific topics with customized lists of available publications.

Integrating New Technology Focus of Program

ATLANTA — Successfully accommodating the integration of new technologies into the human work environment is the goal of a new training program titled "Component 3: Managing the Human Aspects of Technological Change" offered by O.D. Resources, Inc.

This "change management" program was designed for management information systems and DP professionals charged with implementing technological change and was developed by O.D. Resources after eight years of consulting and management training work with a broad range of organizations. The course is intended to help managers realize planned increases in productivity and profits by fostering user support and acceptance of new systems.

The course focuses on techniques to help users prepare for new technology, determining when, how and to what extent users should be involved in planning for new systems, determining why users resist new technology and developing effective strategies for reducing resistance and unhealthy competition that can arise when new systems are installed.

O.D. Resources has scheduled six three-day sessions for 1984, including Jan. 16-18, March 19-21, May 21-23, July 23-25, Sept. 17-19 and Nov. 12-14.

The course fee of $600 per person is reduced to $500 if three or more persons from the same organization attend. O.D. Resources can be reached at 2900 Chamblee Tucker Road, Building 16, Atlanta, Ga. 30341.

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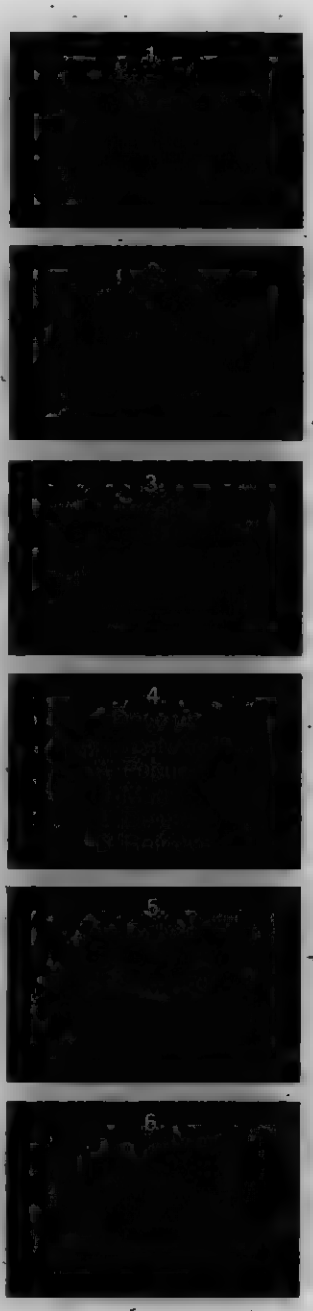

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Seminars on Cullinet's Database System will be held in the following cities during the coming weeks: Brattleboro, VT Dec. 9; Chicago/Bloomingdale, IL Dec. 8; Kansas City, MO Dec. 14; Macon, GA Dec. 15; New Orleans, LA Dec. 15; Toronto, ONT Dec. 15 and Wausau, WI Dec. 13.

Mini, Packages Help Police Reduce Paperwork

CHARLESTON, S.C. — The combination of a new minicomputer with data base management and statistical software packages is helping police officials here handle paperwork that has increased by more than 100% in the last few years.

With 250 sworn officers and 130 civilian personnel in a city that numbers 80,000 people, the Charleston Police Department faces a heavy load not only in maintaining law and order but also in processing its voluminous paperwork.

"We receive a total of about 75 to 100 incident reports per day," Planner Audrey Whetsell said. To augment the administrative work load, a highway safety grant was received in 1980, and officers increased their rate of writing traffic tickets. "This made paperwork processing literally impossible to keep up with," she said. "During a single year, the number of tickets written increased by 127%."

The department had no data base management system (DBMS) at the time, Whetsell said. "A Wang [Laboratories, Inc.] 2200T minicomputer was used to perform some records management and word processing tasks. But the software was slow, it lacked flexibility and could not be used for budgeting or court accounting."

A Wang 2200 MVP replaced the old system, and Aims Plus, Inc.'s Aims Plus 3.6 and Stat 2 software were acquired to handle the increased work load. Applications include servicing criminal, traffic and municipal courts through comprehensive records management, accounting, budget control, crime analysis and grant management.

'Couldn't Keep Pace'

"The docket is the heart of the court," Whetsell said. "It is a record of monies collected, depositions and ongoing case histories. Prior to receiving Aims, dockets had to be written by hand. On routine days, traffic court alone has at least 250 people on the docket. Clerks simply could not keep up with the pace."

Money is now collected at the window and placed in the cash register, the clerk makes an entry at a terminal, and the printer automatically generates a receipt. At the end of the day, the data base is searched, all transactions for that date are retrieved and accounts received are balanced out with whatever is on the register. A ticket inventory is maintained and the system is capable of printing jury summons and jury lists.

Lost tickets are no longer a problem, according to Whetsell. "At one time, there was no way to find out whether or not a ticket was missing," she said. "But by keying in the time each ticket arrived at the police department, the date it left each office on its way to the court and to the state highway department, it is easy to track them down."

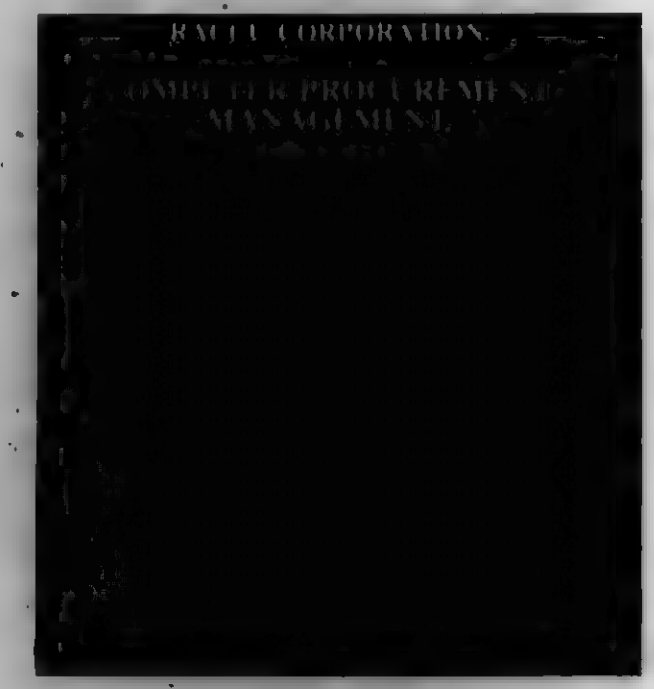
Data retrieval is also faster. "After ticket information is input, the tickets are sent to the court," Whetsell said. "And when someone comes in to pay a fine or mails in a payment, retrieval is instantaneous. The accounting portion can then be easily input and, if necessary, refunds can be made."

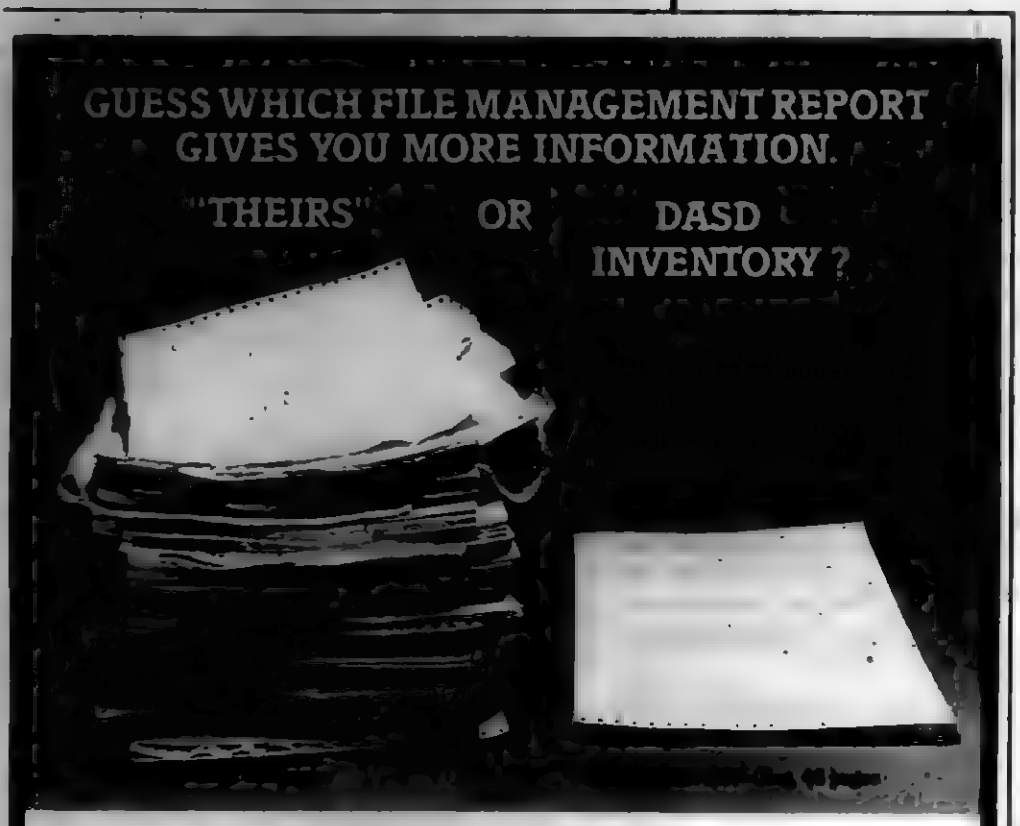
The system is also memory-tolerant. "If a person forgets or loses his or her ticket number, they need only remember the officer's name, or their own name," she said. Stat 2, the statistical portion of the Aims software is used in budget, traffic and crime analysis. "From traffic ticket data, we're able to determine exactly what time the incidents are occurring and perform statistical evaluations," Whetsell said. "By using bar graphs in crime analysis, we're able to plot types of offenses and correlate them with parameters, such as geographic location."

Response time analysis is another application. "We are able to input both the time a call requesting an officer was received and the time the officer arrived on the scene," she said. "From this, we determine if certain areas suffer unusually long responses."

The system is also used in administering grants. "I receive all of my quarterly reports from the computer," Whetsell said. "And all personnel overtime that comes from the police department to city hall is put on the system. Whenever I need to give information to whomever is coordinating a grant project, I can print out reports in any detail of grant spending."

The key to productivity increases has been the user-friendliness of the Aims software, Whetsell said. "Someone with little or no computer experience can use Aims to construct file and print designs," she said. "And this is a capability we didn't have with our old records management system. We are easily able to construct customized screens and menus ourselves without engaging an outside software consultant. A clerk can become operational on our system within two weeks."





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King to Head IEEE

NEW YORK — Dr. Donald D. King, president of the Philips Laboratories Divison of North American Philips Corp., has been elected president-elect for the Institute of Electrical and Electronics Engineers (IEEE). King will serve as president-elect during 1984 and will assume the office of president on Jan. 1, 1985.

King replaces Dr. Richard J. Gowen as president-elect; Gowan will serve as IEEE president during 1984. Gowen is vice-president and dean of engineering at the South Dakota School of Mines and Technology.

In his campaign, King focused on the need to improve the status of IEEE members and he cited continuing education for employed engineers as the institute's major issue.

King has been an IEEE member since 1946. He is also a member of the Microwave Theory and Techniques Society at MIT. He served as vice-chairman and chairman of the MIT Administrative Committee in 1963 and 1964, respectively.

With Specialized Application

Last Piece of Automation Puzzle Fits for Firm

By Paul Gillin
CW Staff

GREAT NECK, N.Y. — Finding the software for a specialized application is often like putting together a giant jigsaw puzzle. There is a wide range of tempting possibilities, but only one real solution. The management information systems (MIS) department at Litton Office Product Center discovered that hard fact when it started looking to automate its order processing, shipping and accounting functions at regional centers early last year.

The need for custom software that could be used at each Litton Office Product Center became apparent as the company's annual revenues began to approach $100 million. "The impetus was a lack of standard systems and the need for many features, especially inventory control," said Robert Amster, director of MIS.

The company found that no packaged applications were available for its large installed base of Datapoint Corp. hardware. In-house development was too expensive to be considered.

Consultants' Help

Litton elected instead to develop its application with the help of consultants from Diversified Data Services, Inc. of East Providence, R.I. Litton contributed three man-months of programming effort to the project, which was completed in less than seven months. For about the same price as a packaged application, Litton got customized software that was able to handle expansion, according to Amster.

The system went on-line in mid-July at Litton's Los Angeles sales center and will be installed in six other locations within a year, Amster said. Based on a Datapoint Corp. 6600 processor with 256K bytes of main memory, 60M bytes of disk storage and six on-line terminals, it provides order entry, item picking, inventory, accounting and contract management facilities for the regional sales office and warehouse.

Nearly the entire order process is now automated, Amster said. Order entry data is used to generate automatically a picking form in the warehouse that is used to select merchandise. The picking form is checked against the shipment, and incomplete shipments are highlighted.

The system automatically notes shortfalls in shipments and generates a back-order picking document, Amster said. The back-order form goes to the warehouse to await the arrival of the needed materials.

Receivables are automatically updated in batch every night based upon the completed shipping forms. Bills are also generated in batch and are ready for mailing the next day. This procedure, which once consumed 24 to 48 hours manually is now completed in less than 12 hours, Amster said.

The system balances both on-line and batch processing. During the day, it is entirely on-line for features like cash application, inquiry, contract proposals, order entry and file maintenance. At the end of the day an operator performs file backups and chooses the options the system will run in batch at night. Updating and bill generation is handled in off-hours without operator intervention, Amster said.

The software also includes a contract proposal and ordering system tailored to Litton requirements. "The contract is automatically set up with items and prices and the customer conceivably could start ordering the next day."

When an order is input the software automatically matches the customer number and, if the customer is under contract, matches the quoted prices with the order and generates appropriate bills.

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OA Seen Route to Efficient Use of Managers

By Phil Hirsch
CW Washington Bureau

GENEVA, Switzerland — Widespread use of on-line office systems will result in more efficient utilization of supervisors and managers, according to the managing director of Plessey Telecommunications and Office Systems Ltd., Desmond H. Pitcher.

Pitcher was a featured speaker here recently at Telecom '83, a quadrennial worldwide telecommunications conference.

Today in banks, government agencies, stores and other establishments which deal directly with the public, those who staff the service positions receive training that equips them to perform routine functions, but requires frequent intervention by supervisors to handle special situations, Pitcher explained.

An Alternative

Office automation provides an alternative to this scheme, he maintained. It allows the person at the public service desk or counter (if given more training and if provided with a computer-based "expert" system) to replace the supervisor in many situations where he is now required.

Somewhat better trained service personnel could then report to fewer supervisors, who would still be accessible via the expert system, to deal with nonprogrammed difficulties.

Another area where the indirect benefits of on-line office systems are apt to justify their costs involves industries where production is being decoupled from marketing, according to Pitcher. Companies that market fashion clothing and computer-based office systems are two examples, he added.

These firms "can now find production organizations, typically in Korea, Hong Kong, Taiwan or Singapore, that can provide products to their specifications at low cost with very little delay.

"This separation of functions requires . . . very close communication between the marketing and production organizations, but not such close communication as . . . in integrated firms where development and production are typically in the same building," Pitcher explained. "It is improved communication, particularly telecommunications, which has made it possible to operate in a flexible, market-oriented fashion despite the distances involved," he maintained.

Pitcher said that despite all the attention and investment being devoted to wideband communications services, the bulk of future office terminals will operate at 2.4K bit/sec.

The higher speed facilities being touted by communications carriers will be useful primarily for special-purpose applications, such as those involving complex graphics, he contended.

Most office terminals will operate at 2.4K bit/sec because this rate can be accommodated easily by existing telephone circuits, and it permits video display screens to be filled at "an acceptably rapid rate."

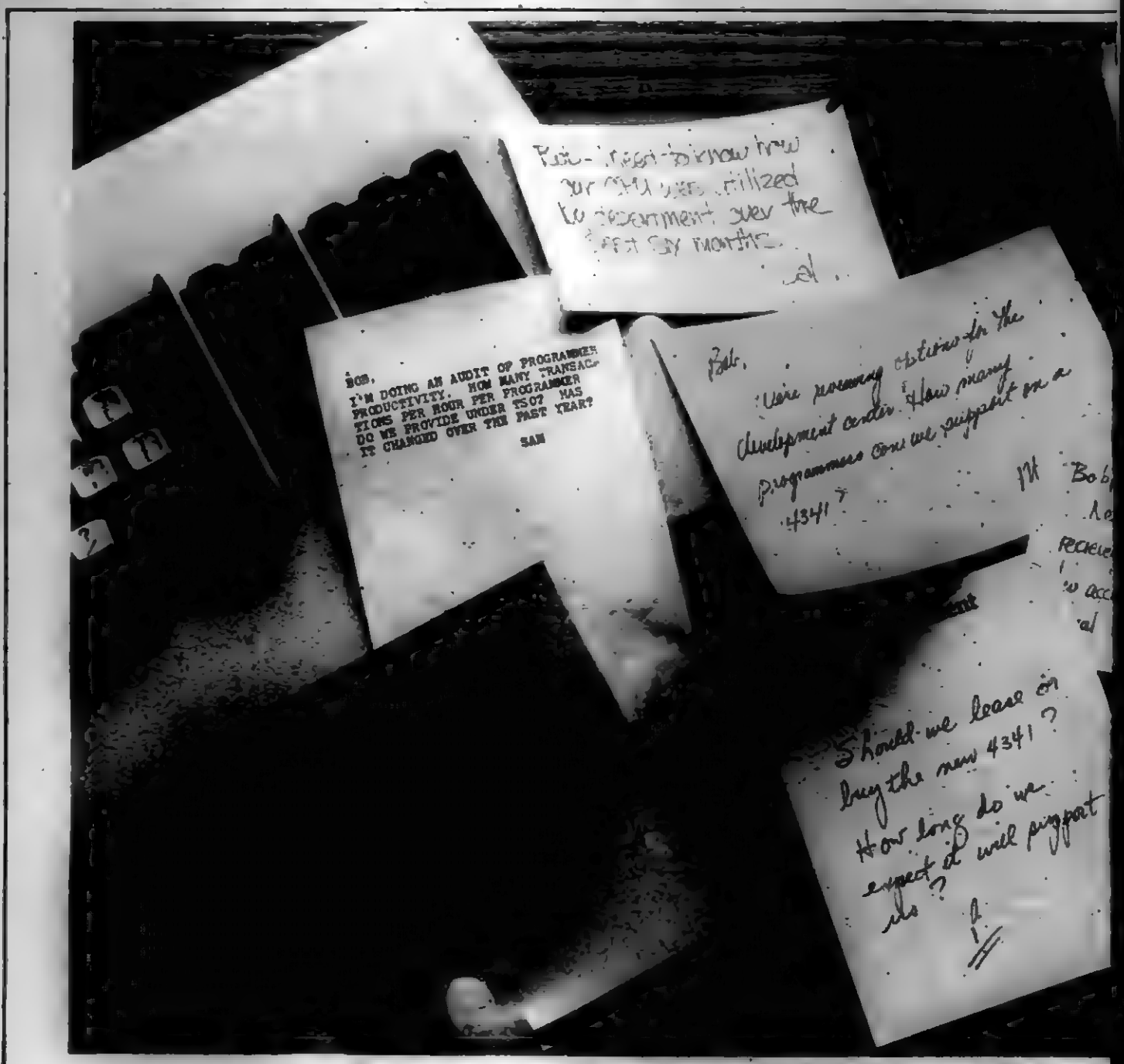
Micro Guide Released

ROCKVILLE, Md. — "The Price Performance Guide" is the name of a recently released personal computer directory from the Management Training Institute, Inc.

The 44-page text itemizes microcomputer system features, capabilities and pricing, according to the publisher. It also rates the various product offerings based on a theoretical "standard" formula.

When a system is measured against the standard, the result of the equation is a single price-performance indicator, a spokesman explained. Business and professional micros with starting retail prices of about $1,000 have been rated.

The guide is priced at $19.95. Further details may be obtained from the Management Training Institute, which is located at 11317 Old Club Road, Rockville, Md. 20852.



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Claims Net Differences Limit Integration

British Engineer Skeptical of ISDN Technology

By Phil Hirsch
CW Washington Bureau

GENEVA, Switzerland — Although integrated services digital networks (ISDN) promise users much more cost-effective service, the reality may be more modest than the rhetoric, according to the recently retired chief engineer of the British Telecommunications Authority.

Philip T. F. Kelley, now an independent consultant, was among those speaking here recently at Telecom '83, a quadrennial worldwide telecommunications conference. He is among the architects of Britain's ISDN system and has played a key role in development of international data communications standards.

One of his main points at Telecom '83 was that incompatibilities among presently separated communications networks will limit the amount of integration that can be achieved with ISDN technology.

In the case of packet-switched networks, for example, "Integration ... is complicated because there is little or no commonality other than in the transmission area," he said. "It remains to be seen whether the special switching modules needed to support a packet-switched net can be integrated into ISDN switches."

Terminals present a related problem, he said. England now has four networks in operation. They offer telephony, telex, packet-switched data transmission, and leased, point-to-point data transmission at speeds up to 2M bit/sec. A switched version of this latter service is "likely within 18 months," and a pilot ISDN is due next year.

"It is necessary to ensure that data terminals on the various networks can intercommunicate," Kelley said, otherwise "integration of all data services into an ISDN is virtually an impossible objective. As data communications and computer communications grow, it becomes imperative "to communicate with those customers whose terminals are now connected to a dedicated network."

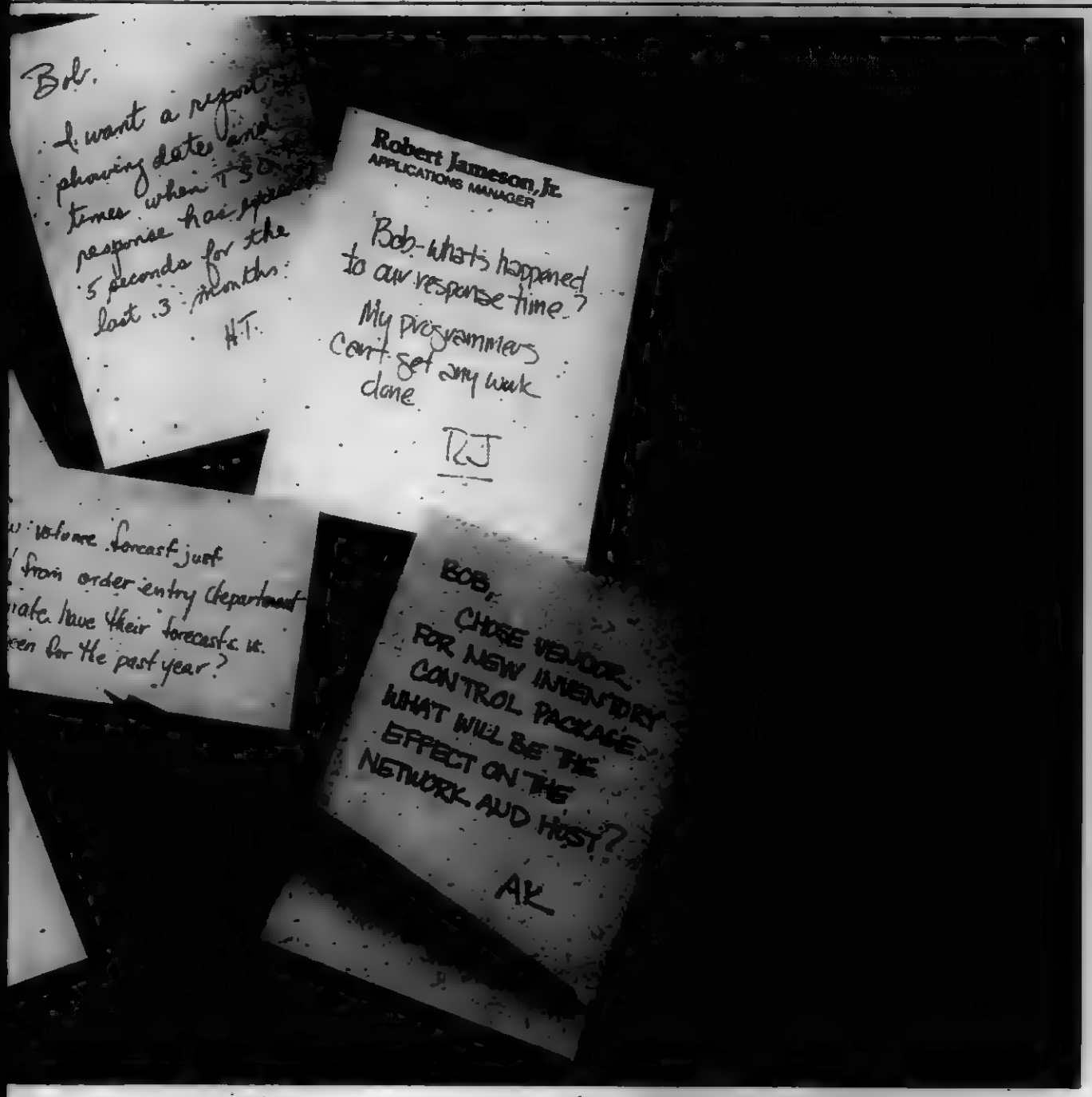
Using a common local loop to connect a terminal with presently separate transmission networks is one way of solving this problem, he said. However, common access lines, even though they reduce the number of circuit links the subscriber must lease or rent, may not reduce his costs.

Additional Facilities

Additional facilities have to be installed at either end before an analog local loop can carry digital signals simultaneously or alternately, Kelley explained. A key question, he added, is whether the cost of these facilities exceeds the cost of a second access circuit.

Introduction of any internetworking unit "introduces complex routing, call setup and tariffing problems," Kelley contended. Technically, they can be solved, "but if the charges levied for calls between terminals on different networks are made up of a call charge for each network used, plus a charge for use of the internetworking unit, then this is likely to make migration to an ISDN difficult in the early stages. Administrations may, therefore, be able to influence migration ... by means of their charging policies."

In theory, "It is difficult to disagree with ISDN concepts," Kelley said, "but many administrations have committed considerable resources to providing dedicated networks for telex, packet, circuit and leased-line data services. "There are still very few countries which have plans for a true ISDN capable of providing all services on a single network. ... Perhaps in the end, integration may well be restricted to the local-access and transmission networks with dedicated switching modules serving particular customer needs," he said.



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Pacific Communications Meet Set for Jan. 8-11

HONOLULU — The sixth annual Pacific Telecommunications Conference (PTC) will be held Jan. 8-11 at the Sheraton-Waikiki Hotel here.

PTC cosponsors include the Pacific Telecommunications Council, the state of Hawaii, the University of Hawaii at Manoa, the East-West Center and the Hawaii chapter of Women in Communications. Simultaneous interpretation from English to Spanish and Japanese will be available during the major sessions.

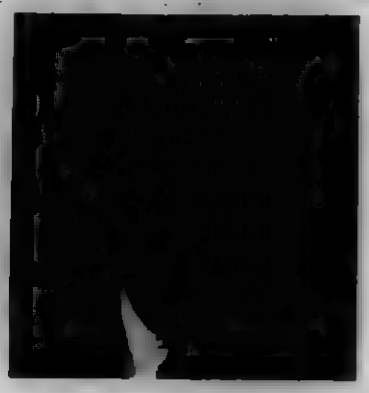
The conference theme is Telecommunications for Pacific Development, and it will focus on basic telecommunications needs. Each day of the meeting will open with a plenary session featuring high-level keynote speakers and in-depth studies of telecommunications in the region. Presentation of papers and responses will follow. A plenary round table will complete the daily agenda.

Keynote speakers include Armando Vargas Araya, minister of information and communication for Costa Rica and former director of the Center of Telecommunications for the Third World; Lionel H. Olmer, undersecretary for international trade with the U.S. Department of Commerce; and Tetsuro Tomita, deputy director general of the Telecommunications Policy Bureau, Ministry of Posts and Telecommunications, Japan. Other speakers will address the changing Pacific business environment, Pacific basin development and future needs for telecommunications.

Council-related meetings are scheduled for Jan. 8 and Jan. 10. Also, an exhibit will be ongoing as part of the conference.

A conference workshop, cosponsored by the council and the East-West Communication Institute (EWCI), will open with a public program Jan. 8. Intensive daylong sessions for workshop registrants only are set for Jan. 12-13 at the institute's East-West Center. Topics include a look at telecommunications futures, needs assessment, principles of data communications, economic and financial aspects and forecasting techniques.

Registration fees for members of the Pacific Telecommunications Council, the university and EWCI is $300; for nonmembers the fee is $375. There is an additional charge of $35 per person for the conference banquet and $50 per person for the workshop. The council is located at Suite 303, 1110 University Ave., Honolulu, Hawaii 96826.



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Publication Lists Tools For Finance

CHICAGO — Longman Financial Services Publishing has announced "The Buyer's Guide to Financial Services Software," a directory that shows financial services professionals where to find microcomputer software.

The guide features more than 400 full-page listings for banking, insurance, stocks and bonds brokerage, financial planning, commodities trading and real estate, according to the company.

Program listings detail what the program can do, what the hardware and operating system requirements are, what documentation is provided, what kinds of service and support are provided and how much the program costs.

The guide costs $75 from Longman Financial Services Publishing, Department PSM, 500 N. Dearborn St., Chicago, Ill. 60610.

'Don't Bother Me Now, I'm Out Managing the South 40.'

Inventory System Helps Drive Adap Chain

AVON, Mass. — After a comprehensive information gathering period, the president of American Discount Auto Parts (Adap) here knew exactly what he needed for his 30 discount auto parts stores.

He needed a computer system that would include point-of-sale (POS) terminals and a management system for inventory control. President Fran LaBrecque found intelligent cash registers available as POS terminals and computer-based inventory control systems, but no one system that answered both needs.

"We're a retail chain, so we need POS terminals," LaBrecque explained. "And we have 25,000 inventory part numbers to keep track of in each store, so we need an inventory system."

The systems are installed at each of Adap's 30 stores in the New England area. Each system consists of a single computer that supports two slave terminals. The slave terminals are used as cashier POS terminals, and the computer itself serves as the "manager's terminal," used for inventory control and other functions — including a specially designed electronic mail system.

The computer system is a Datapoint Corp. 1560, a desktop-size processor with an integral screen and keyboard and I/O ports for extra terminals and a modem. Each of Adap's 1560s has 128K bytes of internal memory and 10M bytes of Winchester disk storage, according to Jack Vinchesi, director of management information systems at Adap.

The POS terminals are standard Datapoint 8220 nonintelligent workstations with 24-line by 80-char. screens. The 8220s sit on top of electrically controlled cash drawers. A 40-col. dot matrix "slip printer" that prints the customer's receipt on standard 3.5-in. paper is beside the POS terminal. The four function keys that are standard on the 8220 have been relabeled: Yes, Void, Backup and Help.

'Special Interface'

The three devices that make up each POS terminal are all controlled by a single port on the 1560. This is done by using what Vinchesi calls a "special interface" which routes the signals to the right device on the basis of special control codes sent by the 1560.

An autodial, autoanswer modem allows for communications with Adap's mainframe at headquarters. Communication takes place in background mode so the users are not aware of the process. Attached to the 1560 is a standard Datapoint matrix printer for printing management reports.

The software system takes up to 12,000 to 15,000 lines of code, noted Jim Barry, software development vice-president for Datastations, Inc., the Avon, Mass., firm that wrote the software for Adap.

All the programs were written in Databus, the Datapoint high-level, business-oriented computer language. The screen of each POS terminal displays a menu of four things the cashier can do: handle a regular sale or tool rental; handle credits for returned goods; handle special orders; and shut down for daily readings.

For regular sales, the terminal asks for the vendor's part number and then responds with the item's price and description. The cashier operator hits the No key to end the transaction. The terminal then asks if the items are taxable and adds the tax if they are. The sales slip is then printed by the slip printer with a copy retained inside the printer.

The sold items are automatically subtracted from the inventory file after the purchase is made. The system records the type of payment — cash, check or credit card.

For items that are returned, the terminal asks if they are resalable, then adjusts the inventory file if they are. Special orders involve deposits for items that have to be ordered, final sales of ordered items when they are picked up and refunds for items not available.

The manager's terminal offers a menu with a wide variety of functions. The manager can make an inquiry into the inventory file to see if a part is available. If he needs to ship a part to another store, a shipping manifest can be printed automatically. The terminal can also be asked to list all depleted inventory items.

The specially designed electronic mail system allows for such things as memos and directives to be sent from corporate headquarters to all the stores simultaneously. The stores can receive transmissions without interrupting their normal activity. The system has been set up to allow for transmission of information from the stores back to corporate headquarters each evening.

"We estimate that the systems save each store 60 to 70 man-hours per week, mostly on accumulated little things. The clerks don't have to waste time searching through catalogs looking for the price of each item. We can respond to phone inquiries much faster," Vinchesi said.

"The manager saves about 40 minutes each evening with the automatic depleted inventory list. It adds up to about a full-time clerk in each store. And it means our people can spend time on the floor with customers making sales," Vinchesi continued.

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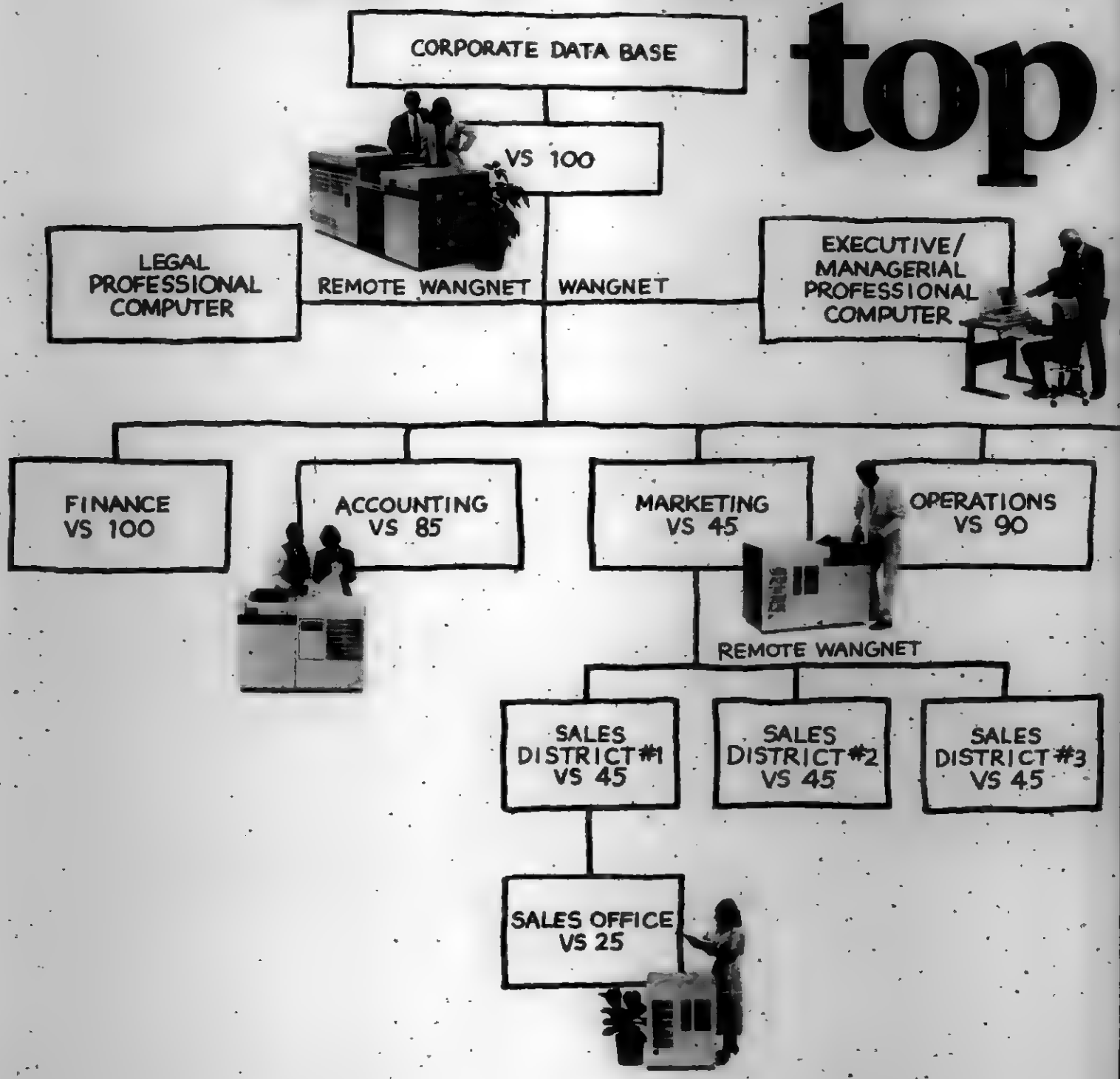

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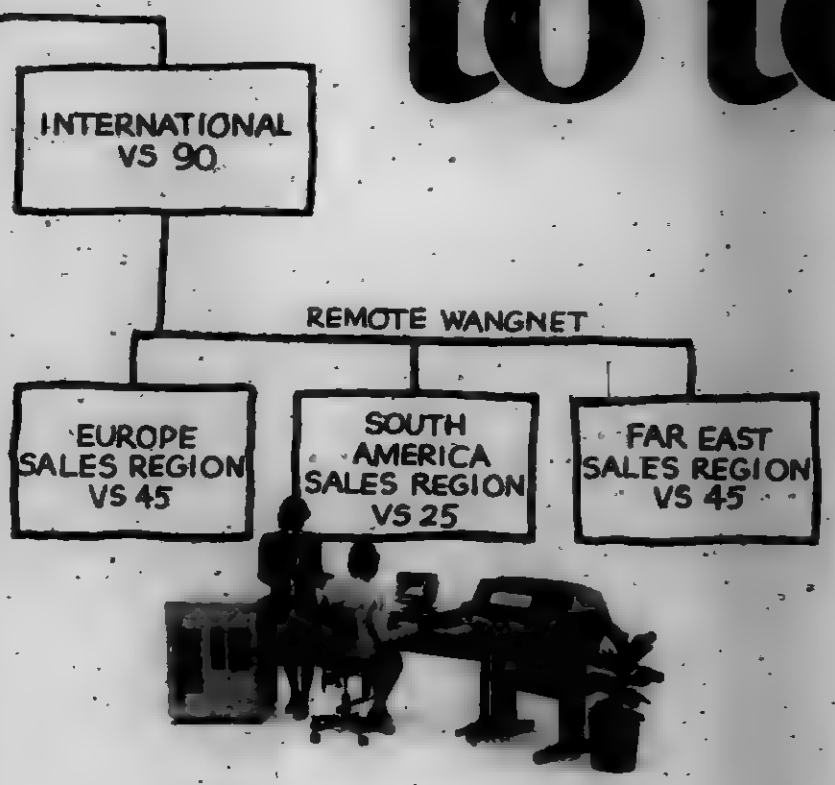
computers compatible to bottom, bottom to top.



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In Move to In-House

Security Package Protects Energy Firm's Data

TORONTO — When a $4.5 billion energy company headquartered here decided to move its applications in-house from a service bureau in April 1982, it had a lot more to consider than lower prices and convenience. It had to ensure that all data processing systems remained secure throughout the conversion. Therefore, phased implementation and software security were high priorities.

"We had to be sure the information was at least as secure under our roof as it was under the service bureau's," said security officer Graham Edwards at Gulf Canada here. "We researched all of the leading IBM MVS operating system access control packages and found Top Secret satisfied the greatest amount of our requirements."

One of the most important features of Top Secret, marketed by CGA Software Products Group, Inc. of Holmdel, N.J., is its controlled pace of implementation that does not affect day-to-day operations, Edwards said. Gulf Canada was able to secure some resources quickly while defining others, leaving the remainder under the data set password protection of the service bureau. Both methods of security have coexisted with full protection of resources.

"Top Secret protects a wide range of facilities and provides for different modes of implementation by facility," Edwards said. "At the present time, we're implementing Top Secret for TSO and batch, and we are preparing to pick up the IBM CICS users and define them to Top Secret."

Four Security Modes

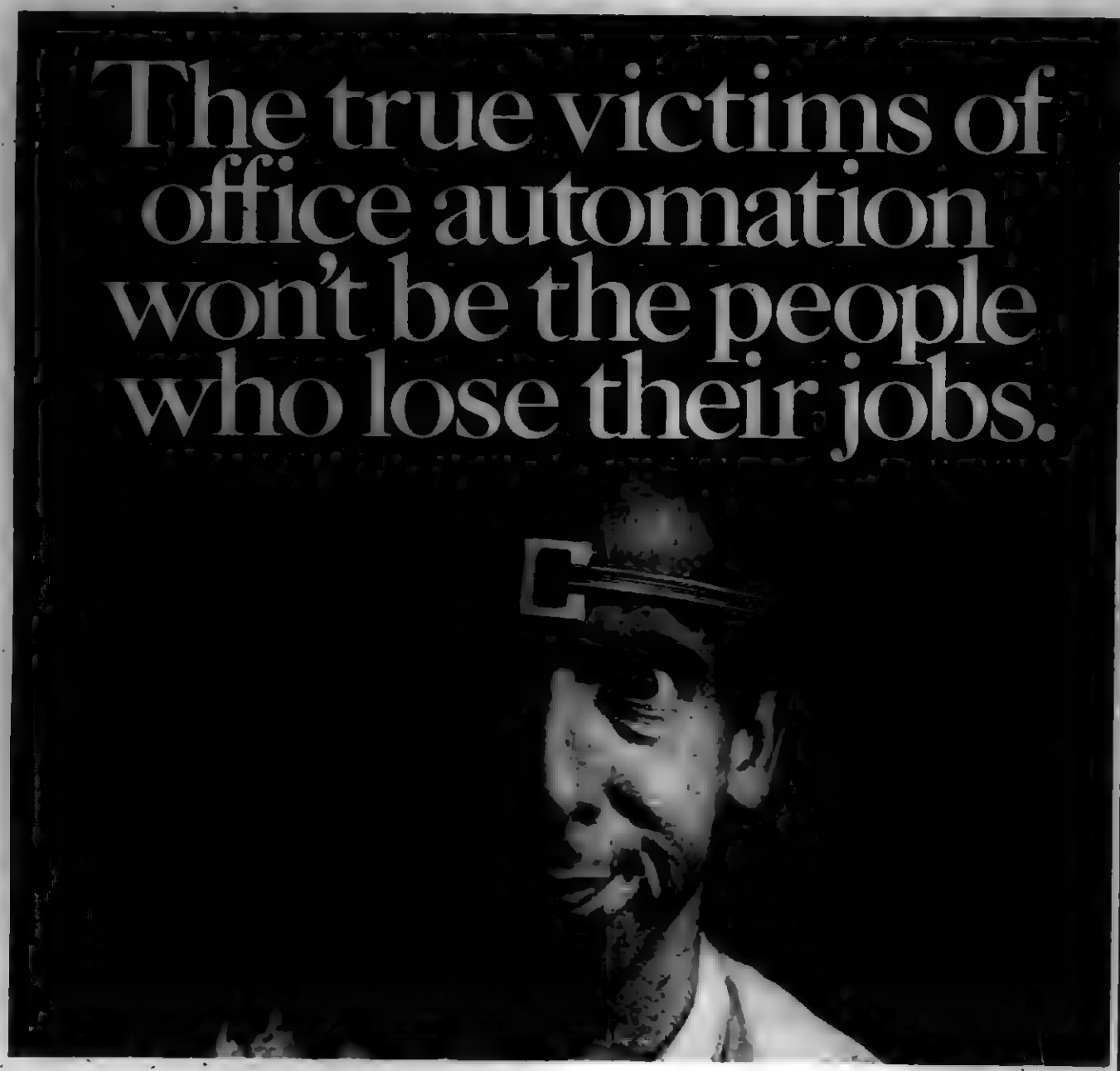
Top Secret provides four security modes. In the Dormant mode, Top Secret is installed but not actively validating activity. To give the security administrator time to get definitions and authorizations correct, the Warn mode flags violations, but does not result in a failed request. Once users are defined, the administrator can shift to the Fail mode, where access to unauthorized files is denied and the administrator is made aware of the violation. In the IMPL mode, users not yet defined to Top Secret execute normally, but are restricted when attempting to access defined resources.

Gulf Canada is implementing Top Secret by application rather than by facility. "The first system we brought in was the Employee Information System, which includes payroll, pensions and other employee benefits for over 10,000 employees," Edwards explained. "After implementing this system, we decided we would be better off defining our other applications differently. This is no problem for Top Secret. It accommodates changes after implementation has begun."

For the initial application, Information Services defined a department and gave that department ownership of the files, Edwards said. For other applications, it plans to have the production files reside in one department and cross-authorize them as they are needed. Once defined, the rest of the applications to Top Secret will go up quickly. They are expected to be fully implemented within the year.

"Because of its interface and internal design, Top Secret will remain compatible with present and future MVS operating systems, as well as a wide range of other vendors' software that uses the security interface," Edwards added. "We look at this as protection against operating system modifications."

Edwards views his security program as a form of insurance. "We want to protect our files against outsiders and the inadvertent destruction of files by insiders," he said. "Although we have had few incidents of computer abuse, our concern is for potential problems."



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Insurer Christens Info Center, Net Upgrade

By Robert Batt
CW West Coast Bureau

PALM SPRINGS, Calif.— Just over a year ago, Connecticut Mutual Life (CML) Insurance Co. began two parallel projects designed to implement an advanced network to support its 90 general agencies throughout the world.

The two projects — dubbed Oasis II and Information Center — were described in a paper presented at the recent Enterprise Information Systems Forum by Theodore Stein, assistant vice-president at the $35 billion insurance firm.

As of November, CML has installed 1,000 personal computers and along the way has implemented what is believed to be the first Systems Network Architecture/Synchronous Data Link Control (SNA/SDLC) network of personal computers for its 2,500 full-time agents and 6,500 brokers.

In addition, Stein claimed, the projects have resulted in the setting up of a corporate "computer store" complete with a service depot supplying 24-hour turnaround and a nationwide hardware service and spawned a new software firm — Software Systems, writers of the Multimate system.

Today the CML shop consists of an IBM 3081-K mainframe with 24M bytes operating under the MVS/SP 1.3 operating system and supporting some 175 IBM 3270 terminals and 300 IBM Personal Computers at the home office and some 700 IBM Personal Computers in the field.

Upgrading the System

The object of the Oasis II project, Stein said, was to upgrade and extend the company's existing Oasis system, "a 1972 vintage, 90-node, nationwide, bisynchronous, host-terminal network."

The network conversion began in October 1982 and was completed by May of this year. Key features include 700 IBM Personal Computers and 100 CA20 protocol converter boxes. The Personal Computers emulate dumb terminals and communicate asynchronously via direct-connect and dial-in facilities to a CA20 protocol, which converts to 3270 SDLC and feeds leased lines to the home-office IBM 3705 and 3081 mainframes.

Software comprises original network applications, compiled Basic Personal Computer stand-alone programs and off-the-shelf Personal Computer vendor packages, according to the paper.

Through the computer store concept, Stein said, 450 Personal Computers plus peripherals and software have been sold outright to the company's sales force with a service depot at the home office for all Personal Computer hardware maintenance.

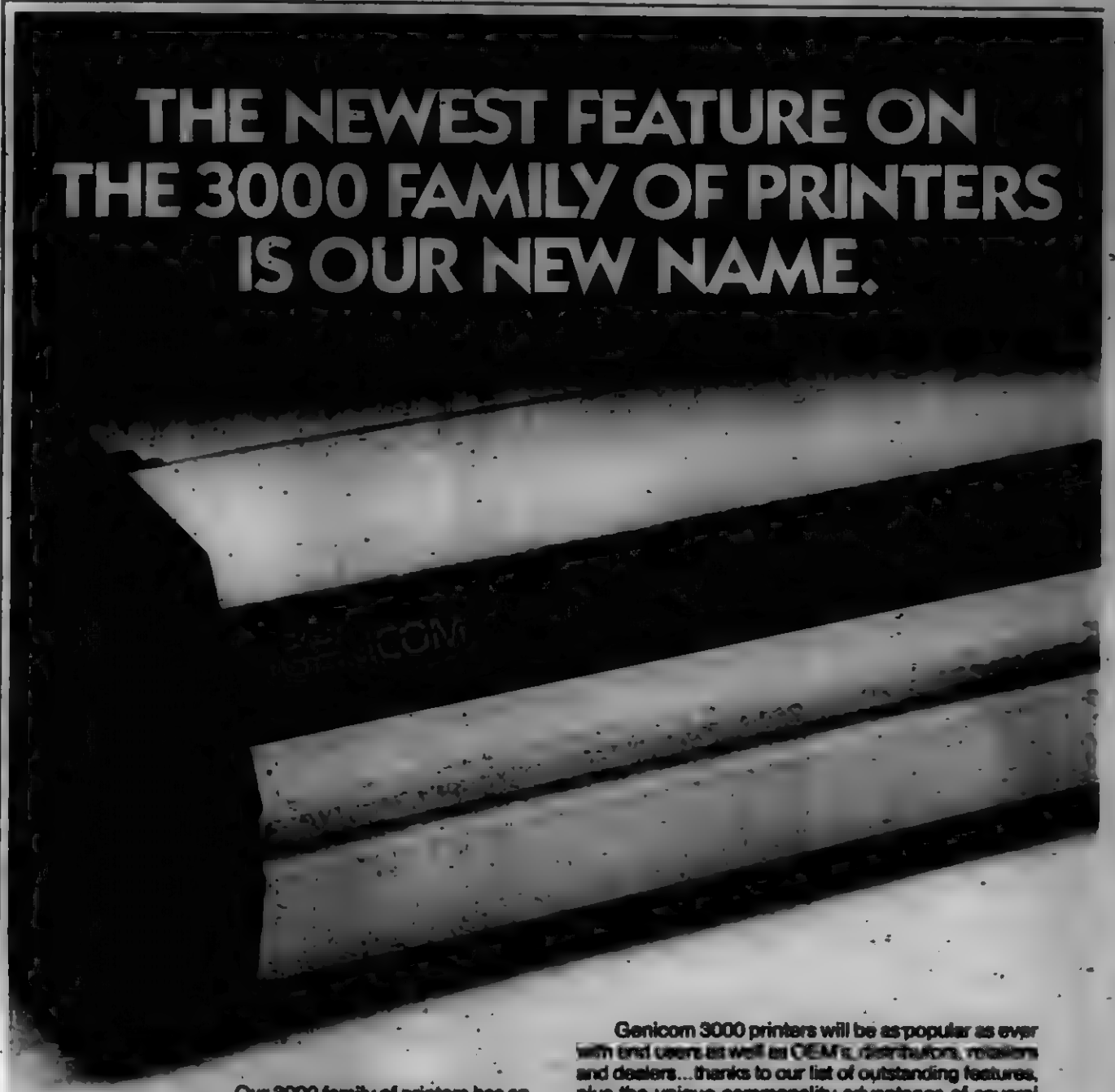
"We see Oasis II as an initial step toward distributed processing, which will eventually encompass shared files, local-area networks, local mini-host computers and host/[Personal Computer] shared processing facilities," Stein explained.

The objectives of the Oasis II project, he said, include:

- Providing local intelligence for word processing, additional sales support and administrative functions.
- Extending computing capability to any location, especially to support agents.
- Protecting and sharpening the company's so-called "technological edge" in life insurance marketing.
- Converting the network architecture to SNA/SDLC to enable future design and communications flexibility.

Describing the Information Center project, Stein said it was designed to parallel Oasis II in the home office, supporting IBM Personal Computers for stand-alone and multipurpose applications.

Equipment was installed for Oasis II development including hardware, communications, application development and vendor software. About 100 Personal Computers are now devoted to that support and development, Stein claimed. In January 1982, the Information Center project was announced, and today there are 200 Personal Computers installed in user areas, he added.



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System Helps Center Interpret Cardiac Cycles

GAINESVILLE, Fla. — At the University of Florida medical center here, doctors are utilizing computer technology to help interpret, quantitatively, videotapes of heart contraction patterns in patients who may be at medical risk.

Videotapes of the human heart, produced by an echo device similar to sonar, are analyzed by computers to spot muscle damage, leaks and inflammation without surgery.

"It's a twist on computer graphics technology. Usually, the computer crunches numbers into pictures," said Dr. Leslie Oliver, a computer science professor at the University of Florida. But Oliver and Dr. Edward Geiser, a cardiologist at the university's health center, are making a computer work in the other direction, turning pictures into data to uncover problems invisible to the eye.

"We use the computer mainly to look at heart wall motion, how the heart pumps and any disease which alters that pump function or any treatment that we use to improve it. The diagnosis can be assisted or the assessment of the treatment's success can be quantified by using the computer," Geiser said. "It's used in any situation, not only heart attack, where the heart wall is compromised in terms of its muscular pump function."

The University of Florida researchers began working on the idea of using computers and digital capabilities in echocardiograph assessment during the early summer of 1979. A breakthrough occurred in July 1982 with the development of the Quantic 1200 computer, built for the researchers by Bruce Franklin, Inc. of Seattle.

"What the Quantic actually has over other equipment currently on the market is the ability to take in a whole cardiac cycle and then to define all of the borders on every one of those frames — 30 of them — automatically, instead of requiring a person to trace them off of the stopped frame," Geiser said.

Original methodology in echocardiograph assessment was for a technician to trace individual video frames of heart wall motion manually using a light pen.

"We've shown that there's approximately a 35% to 38% reduction in variability on the heart borders using the computer to define them as opposed to doing them manually," Geiser said.

Approximately 20 to 25 computers have been sold and are being used as research procedures at medical facilities around the country.

According to Geiser, it takes about four minutes for the computer to generate all of the borders automatically. Previous manual digitization methods took about an hour and were not as accurate.

Future improvement on the computer technology will occur in the area of edge detection, according to the researchers.

"We would like to see more advanced work on the automated image processing portion of the program. Given the video image, the program is going to analyze every frame in the cardiac cycle, but we require that the operator first give the program a rough estimate of where it is initially," Oliver said. "We look for the operator to set a region of interest initially, and we would really like the program to be free of that. It would make one less step for the operator.

Sugi Meet Set For Jan. 15-18

HOLLYWOOD BEACH, Fla. — The ninth annual SAS Users Group International (Sugi) Conference, sponsored by SAS Institute, Inc., will be held here March 18-21, 1984.

Over 2,000 registrants are expected to attend presentations on using the SAS system for capacity planning and evaluation; econometrics and operations research; education and consulting; graphics; information systems; interactive techniques; portable SAS; posters; and statistics.

Early registration for Sugi '84 is $75. Further information can be obtained from SAS Institute at SAS Circle, Box 8000, Cary, N.C. 27511.

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Keith Barlow

Could Boost Productivity, Cut Backlog

Management, Not Tech, Seen Development Cure

By Jeffry Beeler
CW West Coast Bureau

SAN FRANCISCO — Large user organizations could significantly boost their programmer productivity and cut their need for program maintenance if they would only require their software development efforts to conform to sound management practices, according to Gopal Kapur, chief of Kapur & Associates, Inc., a consulting firm.

Many of the most serious problems currently facing corporate management information systems departments — heavy applications backlogs and programmer ineffectiveness — stem more from poor systems management than from inadequate technology, Kapur said here at an Association for Systems Management meeting.

Yet in their efforts to increase programming productivity and improve software quality, most central computing departments continue to seek solutions in technology rather than management, Kapur said.

Nowhere is this overemphasis on technological remedies more graphically illustrated than in the business world's current romance with personal computers, which many systems managers hope eventually to place on every end user's desk.

Although they are often portrayed as an information systems cure-all, micros have the potential, in fact, to aggravate greatly the very problems they were expressly created to solve.

"Using conventional [mainframe-based] techniques for developing new systems, a typical programmer produces about eight software errors a day," Kapur said.

At that rate, a serious systems-related problem can be a comparatively long time in the making. "But with micros, a mess that used to take months to create can now be accomplished by the end of the afternoon."

Increasingly Urgent

So the current proliferation of personal computers in the big business world is making the adoption of effective DP management practices increasingly urgent.

Some of the key elements of sound systems management include a formal maintenance-reduction plan, careful definition of functional specifications and the use of other aids like program prototypes, structured walkthroughs and automated "specwriters."

If large corporations were to embrace these components of software engineering and structured methodology, they could cut their maintenance work load by 70% and boost their programmer productivity by at least 35%, Kapur said.

Dismaying Findings

The problem, however, is that most user organizations rarely if ever put formal DP management techniques into practice. A recent survey conducted by Kapur and his associates produced a number of dismaying findings:

- Only a comparative handful of large businesses have developed a formal plan for maintaining their software.
- Program maintenance is "severely neglected" and is typically treated as a "second-class activity."
- Structured walkthroughs have gone largely unused.

Kapur's survey also uncovered a widespread failure by large corporations to define adequately their program specifications or to create a standard list of items that must be included in all specifications.

"At least 50% of all applications, systems and telecommunications programs contain signficant amounts of identical functions," Kapur said. Moreover, an estimated 40% to 80% of source code and logic can be generated by prototypes.

TIS

"TIS™ is truly a remarkable software system. With TIS operating at both the Strategic and Tactical levels of our organization, we now have a sophisticated software system capable of evolving as the needs of the company evolve. As far as I'm concerned, TIS is giving Best Western International the kind of next generation technology we need."

—Keith Barlow

Best Western International is the world's largest lodging chain. In the fast-paced lodging business, total control of accurate and timely information is no luxury. It's a vital necessity. For this reason, Best Western demands advanced software that can grow as its needs grow.

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After a careful evaluation of several systems, Best Western chose TIS—Cincom's powerfully integrated data base management and application development system and winner of the Associated Information Managers' (AIM) Outstanding Information Technology Award.

TIS was brought up quickly. It was first used in a Strategic capacity to implement corporate payroll and personnel applications. Now, TIS is being used in both Strategic and Tactical operations throughout Best Western International to develop applications for financial, marketing, supply and other functions. And, because the TIS Intelligent Query language provides easy access to corporate information, end-users are discovering that they can meet their own information needs without the aid of trained programmers.

TIS helped solve Best Western's immediate needs. More importantly, with TIS Best Western International now has a migration path to the future —with little concern for obsolescence.

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- A new Data Manipulation Language so powerful only four commands are needed to handle even the most complex logical data base processing: GET, INSERT, UPDATE, DELETE.
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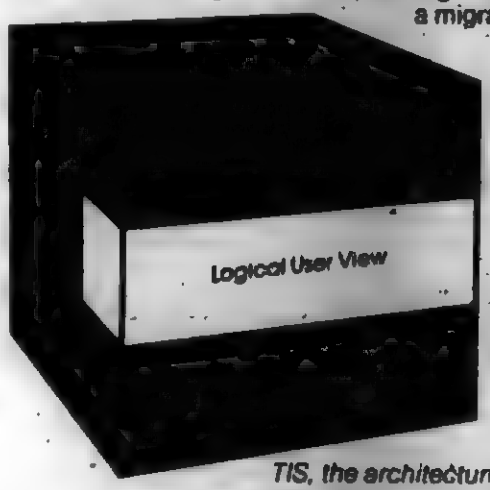
TIS is giving Best Western International a migration path to the future. Isn't it time to find out what TIS can mean to the future of your company? For more information, or for answers to your specific questions, contact our Marketing Services Department, 2300 Montana Avenue, Cincinnati, Ohio 45211.



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Within any asynchronous, bisynchronous or SNA/SDLC protocol environment, you can now mix and match a wide range of micros with just one user interface and thus, one user training program. The MicroTAM products support 8080, 8085, Z80, 8086 and 8088 microprocessors under CP/M, CP/M-86, Concurrent CP/M, MS-DOS or PC-DOS operating systems.

The MicroTAM product family includes:

- **ACCULINK™**, for error-free communications in the asynchronous world. ACCULINK supports binary or ASCII file transfer with error checking and automatic retransmission at speeds up to 19.2K bps. Features include menu prompting, extensive phone support, three sets of protocol (handshake) characters, terminal emulation, wild card options, compiler for user-written macros, invocable command macros and flexible configuration. The MicroTAM ACCULINK series includes local computer center software for DEC VAX, DECsystem-10, DECsystem-20 and PDP-11.
- **BIS-3270™**, **BIS-3780™**, and **BIS-HASP™**, for bisynchronous communications. These packages provide the most complete terminal emulation across any protocol environment. Standard features include user initialization module, error checking, hardware diagnostics, and line trace.
- **MICRO-SNA/3270™** communications software supports SNA/SDLC communications between microcomputers and IBM or IBM plug-compatible host systems. The microcomputer can communicate over point-to-point or multi-point telephone lines with host systems that support IBM 3274/3276 or 3276 devices. With full screen and keyboard emulation of the 3270 terminal you get local print key support, real or logical 3284, 3286 or 3287 printer support and a send file capability which permits off-line data entry of 3270 records and subsequent transmission on an automatic or semi-automatic basis.

MicroTAM packages have been optimized for all variables - architectures, operating systems, protocols - on each individual microcomputer and therefore offer the highest possible level of performance relative to the device being emulated. Since MicroTAM products are optimized to utilize individual microcomputer architecture, including the standard UART/USART whenever available, additional communication hardware is seldom required. For direct connection to IBM 3274/3276 cluster controllers via coaxial cable, the MicroTAM line also includes COAXXSYS™, a hardware/software product that allows micros to emulate 3278 display stations.

MicroTAM products are brought to you by Micro-Integration, Inc. and IE Systems, Inc., the team that gave IBM its bisync 3270 emulator. Building on years of experience in both microcomputer technology and data communications, we now offer a single source of micro-to-micro/mini/mainframe capability for every alternative connection strategy.

27 micro manufacturers are currently committed to offering the MicroTAM family of products as participants in the MicroTAM logo plan. We have also adapted MicroTAM products for a wide variety of other micros. Such adaptations are available directly from IE Systems.

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Mail House Handles Volume With Move to Laser Printing

ATLANTA — The transition from impact printing to nonimpact laser printing has worked positively for a direct-mail house here in terms of servicing existing clients as well as attracting new business.

One of the nation's largest printers, Foote and Davies, Inc.'s (F&D) Atlanta direct-mailing facility generates enough volume to warrant its own Zip Code. The company also has printing facilities in San Francisco and Lincoln, Neb. Over one-half billion pieces are mailed each year, and annual mailings from Atlanta alone equal the total U.S. Postal Service output for one day.

About 65% of F&D's total laser printer output is in the form of mailing labels, all of which are produced on the Datagraphix, Inc. Model 9810 laser printer.

F&D first began to look at laser printers in August 1980. Currently, there are several laser printers on the market, all of which offer the user high-speed output. The Atlanta mailer selected the Datagraphix Model 9810 for two reasons.

Shorter Paper Path

First, the 9810 has a shorter paper path than other laser printers, which is important when producing pressure-sensitive labels. The shorter paper path means fewer sharp turns for the labels, resulting in greatly reduced waste and jamming. Also, downtime is greatly reduced, a real advantage for any mail house working with tight deadlines and high output volumes.

Second, the fuser temperature of the Datagraphix 9810 is lower than other laser printers. With a higher fuser temperature, the glue applied to the back of these labels has a tendency to melt, another source of potential problems.

Robert Lindsay, vice-president of applied computer technology for F&D, believes that laser printers are the best machines available for generating the millions of labels his firm produces each year.

"The 9810 is a very sophisticated printer and offers several major advantages. First, turnaround is almost four times faster than what we were achieving with impact printers. We can now produce one million labels in just 4½ hours, as compared with the 16 hours required by our impact printers. Second, we can offer our customers the ability to be creative — to design labels utilizing different font styles, character sizes and logos," Lindsay explained.

In the direct-mail business, response rate is everything, and the more creative the design of the mailing, the better the response rate, Lindsay said. "Anything that helps us in this area ultimately improves sales and profitability, and the 9810 printer has helped our company assist clients in this important way. It's a great selling point," he added.

Another capability of the laser printer which has resulted in major cost savings to F&D customers is the Mailing Acceleration Program (MAP). MAP allows material to be mailed through the U.S. Postal Service at the highest discount rates possible by sorting printed material (such as catalogs) down to the individual mail carrier level. With the 9810, this is a relatively simple process, Lindsay said. The client includes programming for sort marks along with names and addressees on its computer tapes, and the sort marks are automatically printed on the labels. F&D's binder/mailing equipment does the rest.

Boldface Endorsements

Printing labels on the laser printer allows the Atlanta mailer to print endorsements required by the Postal Service in boldface on the mailing piece for easy viewing by mail carriers and to vary the message. The customer is assured of retrieving unclaimed material, and mailing lists can be corrected as required. An impact printer can print the endorsement on the label, but is limited to the same type style and size as the name and address and the same message on each label. Here again, the laser printer provides flexibility which results, ultimately, in higher cost-efficiency and decreased waste.

Because of the clarity of its output, the laser printer also lowers optical character recognition (OCR) error rates. Lindsay explained that some clients use OCR coding on the pressure-sensitive mailing labels affixed to their catalogs and other material. These codes provide information about the person receiving the mail. When an addressee receives a catalog and places an order, the mailing label is peeled off the front cover, affixed to the order form and returned to the client's order department where OCR scanners read and record this data.

Although impact printers also provide this capability, laser printers have dramatically improved the quality of OCR output, according to Lindsay. As a result, clients can now take advantage of state-of-the-art OCR capabilities, use the pertinent customer data and operate at a much higher rate of efficiency for targeting their mail campaigns, he added.

Meet to Address Micro Security

ATLANTA — MIS Training Institute, Inc. has announced that its Micro Technology and Auditing Conference will be held at the Westin Peachtree Plaza here Feb. 27-29.

The conference was organized in response to growing microcomputer security and control concerns among the audit and data processing communities, the institute said.

Sessions to be offered include "Recovery Management for Microcomputers," "Developing an Organizationwide Micro Strategy," "Encryption," "Communications Interfaces to Micros," "Micro Data Base Systems" and "The Portable Audit Office."

The cost to attend the Micro Technology and Auditing Conference is $650. More information is available from MIS Training Institute, 4 Brewster Road, Framingham, Mass. 01701.

Service Bureau Feels Boost of Move to On-Line

CANTON, Ohio — When slow response time and an excessive amount of batch work began to bog down the accounts payable system at a service bureau here, the move to a totally on-line environment became a necessity.

Management at Canton Computer Services (CCS) — a local service bureau with some 200 clients — was becoming increasingly dissatisfied with the performance of the existing accounts payable system, which often took as long as five hours to batch process daily invoice updates.

"The system was degrading our computer service, and it was really killing us with slow response times," explained CCS President James Rutledge.

Adding to the problem of sluggish response was the fact that CCS' Hewlett-Packard Co. Model HP 3000 supermini was swamped with batch jobs.

"The excessive amounts of batch work were not being handled very efficiently by the HP 3000," Rutledge said. "We really needed a system that could provide on-line processing and updating."

Checking Options

CCS began to investigate the options for a faster, more efficient accounts payable system to replace the existing software that had been purchased from Software International Corp. After reviewing a variety of packages, CCS chose Chicago-based Abacus Data Systems' EZPay on-line accounts payable package.

Because transactions can be processed immediately, according to Rutledge, the greatest benefit CCS has reaped from using the EZPay system is improved response time.

The amount of time needed to update an invoice on one of CCS' 40 HP Model 2622 terminals has been reduced from the previous level of nearly five hours to less than one minute. Daniel Paisley, vice-president of CCS, estimated that the time reduction, on average, has been about 60% for each job.

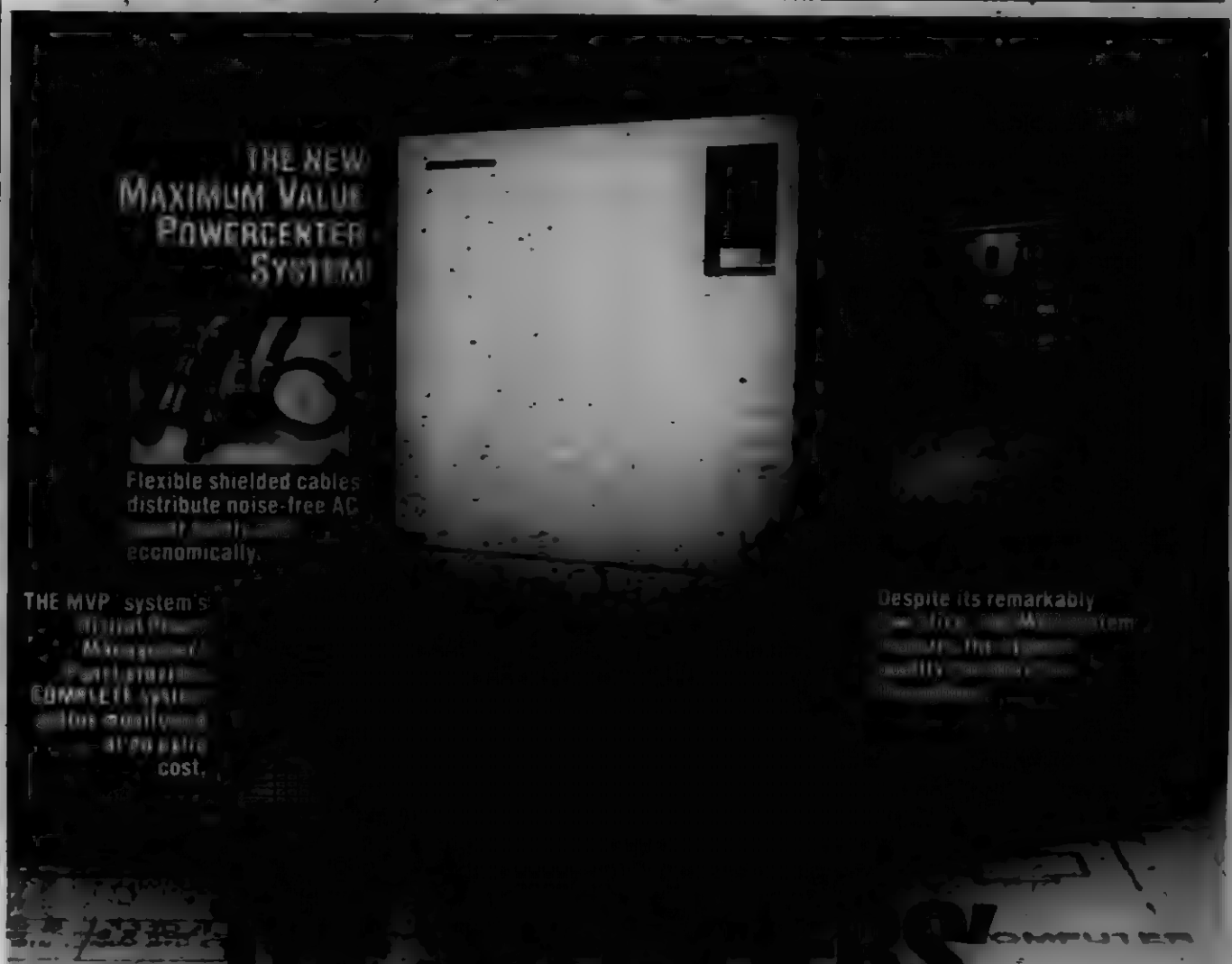
In addition, all accounts payable transactions are currently driven by interactive user menus, which have simplified and minimized the number of screens needed to complete a given job, Rutledge said. Options and reports are now selected simply by keying in a coded number — in contrast to the previous system, which required users to pass through a large number of screens in order to utilize those capabilities. The system also allows CCS to process vendor inquiries by account number, vendor name or Zip Code.

The Abacus Data System accounts payable package has also given CCS the flexibility to process advance, on-account and partial payments. The package has enabled CCS to select vouchers for payment processing either by specifying a due date for the entire system or by individual vendor selection. The company has also taken advantage of the system's check reconciliation program, which gives CCS the capability to clear an entire block of accounts payable checks in one step. The operator is able to review this process and interrupt if necessary.

According to Rutledge, the new accounts payable system can also be modified much faster and has reduced the need for debugging. "Abacus' programs have very adequately satisfied our needs," Rutledge said. "We felt their programs were written as well as any we had seen, and they were easy to follow for program changes, too."

More important to both Rutledge and CCS was that end users were satisfied with the transition. In general, the amount of time needed to train new users has been minimal — usually less than three hours per customer.

CCS is committed to providing a more efficient environment for its clients, Rutledge explained, and EZPay's flexibility has successfully accommodated the different needs of those customers. "In the end," Rutledge said, "we felt Abacus' product was better for our needs than any of the competition's products."



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Calendar

Week of Dec. 11

Dec. 12, New York — **IMS Concepts and Facilities.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 12-13, Palo Alto, Calif. — **Effective Usage of Cost/Schedule Data.** Contact: Technical Marketing Society of America, Department EUCSD, P.O. Box 3608, 3420 Kashiwa St., Torrance, Calif. 990510. Also being held Dec. 15-16 in Los Angeles.

Dec. 12-13, San Diego — **Multiuser Systems and Local-Area Networks Forum.** Contact: Future Computing, Inc., 900 Canyon Creek Center, Richardson, Texas 75080.

Dec. 12-13, Boulder, Colo. — **Device-Independent Computer Graphics Seminar.** Contact: Precision Visuals, 6260 Lookout Road, Boulder, Colo. 80301.

Dec. 12-14, Denver — **Project Leadership Laboratory.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 12-14, Dallas — **DOC/VSE Job Control Language.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 12-14, Chicago — **Advanced Communications and Network Engineering.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 12-14, New York — **Data Communications Concepts and Facilities.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 12-16, New York — **Auditing in the Contemporary Computer Environment.** Contact: Marge Umlor, EDP Auditors Foundation, 373 S. Schmale Road, Carol Stream, Ill. 60187.

Dec. 12-16, Boston — **CICS/VS Command Level Coding.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 12-16, Orlando, Fla. — **CICS Programming.** Contact: Harris Software Services, 6220 S. Orange Blossom Trail, Orlando, Fla. 32809.

Dec. 12-16, Chicago — **CICS/VS Macro Level Coding.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 12-16, New York — **Vsam.** Contact: Sys-Ed, One Park Ave., New York, N.Y. 10016.

Dec. 12-16, Cleveland — **DOS/VSE Job for Applications.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 12-16, Washington, D.C. — **MVS/SP (XA) Internals.** Contact: Linda Barcikowski, Computer Systems Research, Inc., 40 Darling Drive, Avon, Conn. 06001.

Dec. 12-16, San Diego — **Dbase II.** Contact: Alexandra Communications, 661 Massachusetts Ave., Arlington, Mass. 02174.

Dec. 12-16, Fort Lauderdale, Fla. — **How to Develop an Effective Long-Range Data Processing Plan.** Contact: Keston Associates, 11317 Old Club Road, Rockville, Md. 20852.

Dec. 12-16, Boston — **IMS Application Programming Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 13, Cary, N.C. — **SAS Services Workshop.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Dec. 13, New York — **Spreadsheets Using Lotus 1-2-3.** Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 7th Ave., New York, N.Y. 10123.

Dec. 13, Silver Spring, Md — **Computer Networking Symposium.** Contact: IEEE Computer Society, P.O. Box 639, Silver Spring, Md. 20901.

Dec. 13, Washington, D.C. — **Artificial Intelligence.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held Dec. 14-16 in Washington, D.C.

Dec. 13-14, Washington, D.C. — **Multi-Tenant Telecommunications Opportunities.** Contact: Telestrategies, Suite 102, 6842 Elm St., McLean, Va. 22101.

Dec. 13-14, Chicago — **Financial Analysis for Telecommunications Professionals.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Dec. 13-14, New York — **Personal Computers: A Hands-On Experience.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 13-14, Washington, D.C. — **The 15th National Data Systems Forum and Exhibit.** Contact: Transportation Data Coordinating Committee, Suite 606, 1101 17th St. N.W., Washington, D.C. 20036.

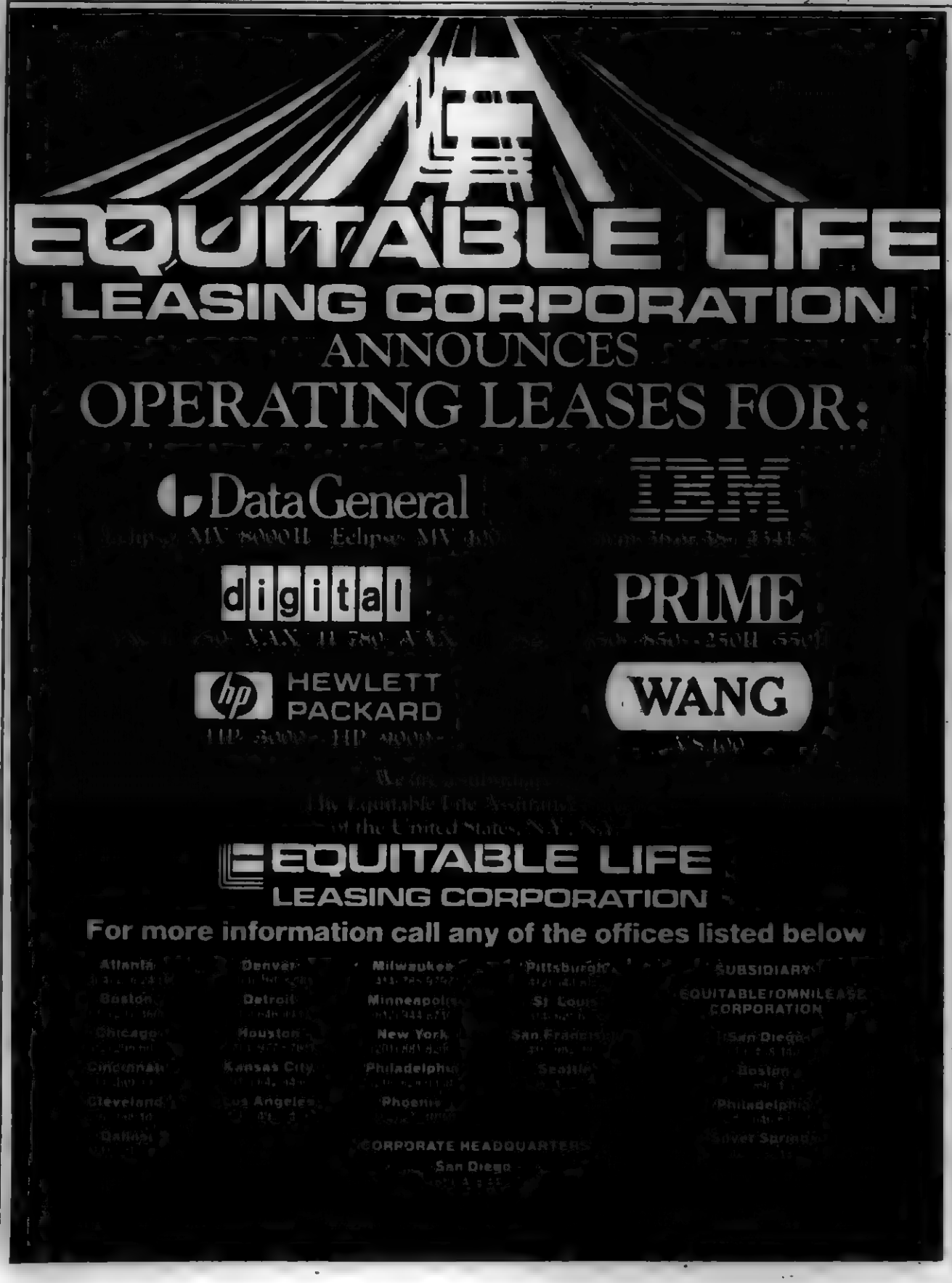
Dec. 13-14, Washington, D.C. — **IBM CICS/VS Systems Design Concepts.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 13-14, Washington, D.C. — **The World of Electronic Data Interchange.** Contact: Transportation Data Coordinating Committee, Suite 606, 1101 17th St. N.W., Washington, D.C. 20036.

Dec. 13-15, Chicago — **National Data Base and Fourth-Generation Language Symposium.** Contact: Digital Consulting Associates, Inc., 339 Salem St., Wakefield, Mass. 01880.

Dec. 13-15, Washington, D.C. — **Structured Analysis and Design.** McCabe and Associates, Inc., Twin Knolls Professional Park, Suite 111, 5501 Twin Knoll Road, Columbia, Md. 21045.

Dec. 13-15, San Francisco — **SAS**



Calendar

Processing Course. Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Dec. 13-16, Boston — **Distributed Processing, Mini and Microcomputer Implementations.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, P.O. Box 45405, Los Angeles, Calif. 90045.

Dec. 13-16, Los Angeles — **Designing with 16-Bit Micros.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045.

Dec. 13-16, Washington, D.C. — **Computer Graphics.** Contact: Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405.

Dec. 13-16, Boston — **Designing Effective Man/Machine Interfaces.** Contact: Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405.

Dec. 13-16, Washington, D.C. — **State-of-the-Art Robot Systems.** Contact: Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405.

Dec. 13-16, Palo Alto, Calif. — **Programming in C: A Hands-On Workshop.** Contact: Ruth Dordick, Integrated Computer Systems, 6305 Arizona Place, Los Angeles, Calif. 90045.

Dec. 14, Waltham, Mass. — **Adapt Vendor's Day.** Contact: Chris Riopel, Conifer Computer Services, 370 Main St., Worcester, Mass. 01608.

Dec. 14, New York — **Introduction to DBase II.** Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 7th Ave., New York, N.Y. 10123.

Dec. 14, New York — **Files on the Unix System.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011.

Dec. 14-15, San Francisco — **Recovery/Restart.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Dec. 14-15, San Francisco — **How to Analyze and Evaluate the Cost and Service Impacts of the New Tariffs, Access Charges and Divestiture on Your Telecommunications Network.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Dec. 14-15, New York — **Systematic Software Testing.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 14-15, Wilmington, Del. — **Computing Center Risk Analysis and Assessment.** Contact: Computing Center Risk Analysis and Assessment Seminar, University of Delaware, 2800 Pennsylvania Ave., Wilmington, Del. 19806.

Dec. 14-15, Cary, N.C. — **SAS Color Graphics Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Dec. 14-16, Dallas — **Data Communications for Microcomputers: Acquisition, Application and Implementation.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 14-16, Tampa, Fla. — **Data Base Management.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705. Also being held Dec. 19-21 in Dallas.

Dec. 14-16, Washington, D.C. — **Multi-User Communication Systems and Networks.** Contact: Continuing Engineering Education, George Washington University, Washington, D.C. 20052.

Dec. 14-16, New York — **Microcomputers: A Guide to Selection and Application.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 14-16, Dallas — **Network Communications Protocols.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705. Also being held Dec. 19-21 in San Francisco.

Dec. 14-16, Cary, N.C. — **SAS Basics Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

Dec. 14-16, New York — **Data Communications II: System Design.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Dec. 14-16, Chicago — **Computer Operation: Effective Production Scheduling and Control.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

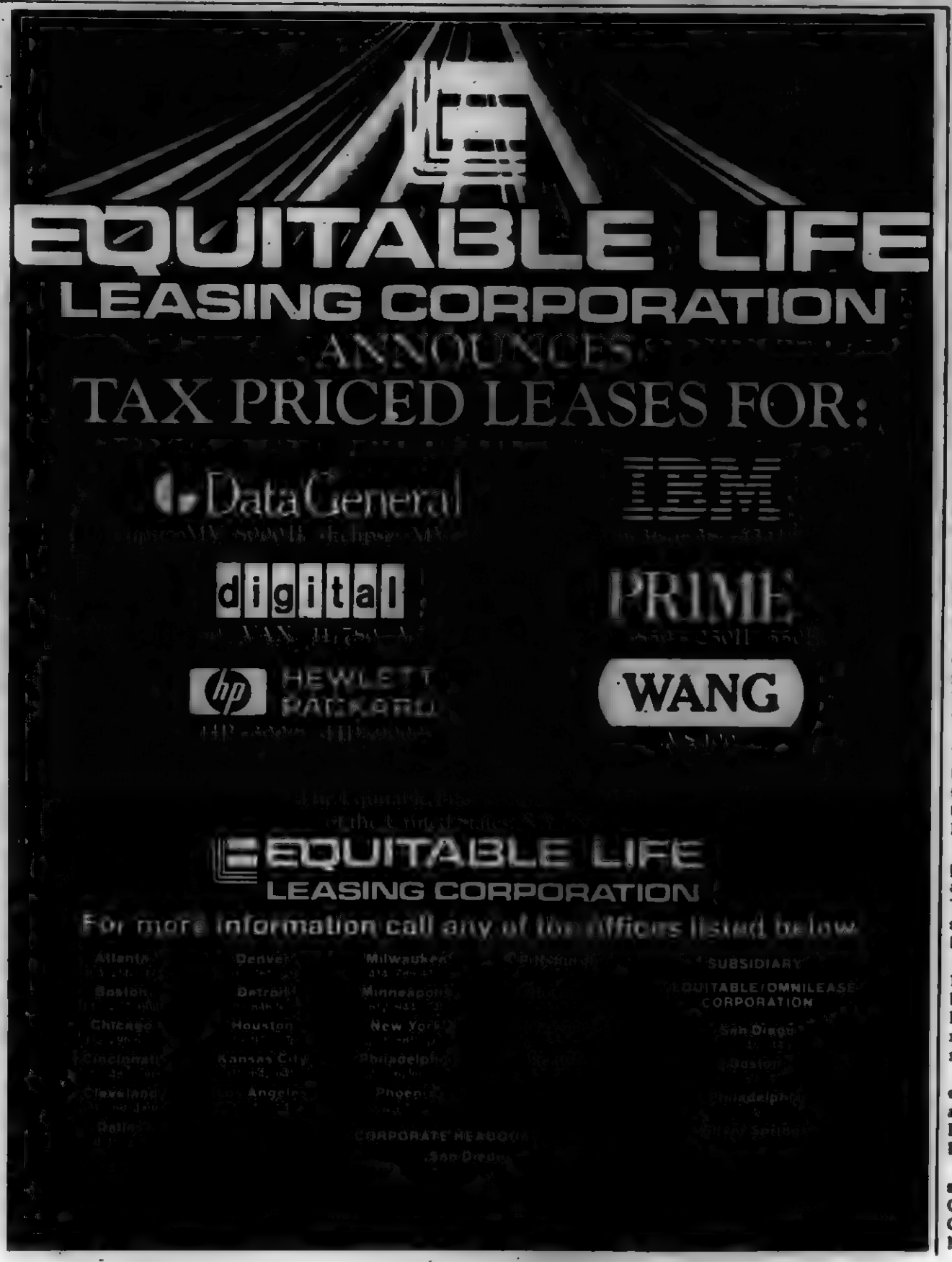
Dec. 14-16, Washington, D.C. — **Local-Area Networks.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705. Also being held Dec. 19-21 in San Jose, Calif.

Dec. 14-16, San Francisco — **Computer Performance Measurements and Capacity Planning: Tools and Techniques.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 15-16, San Francisco — **The 1983 Architecture Technology Desktop Computer Local Networks Forum.** Contact: Architecture Technology Corp., P.O. Box 24344, Minneapolis, Minn. 55424.

Dec. 15-16, New York — **Computer Networks: Protocol, Standards and Compatibility.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 15-16, San Francisco — **Personal Computer Local Networks.** Contact: Architecture Technology Corp., P.O. Box 24344, Minneapolis, Minn. 55424.



EDITORIAL

Time for DP Crime Bill Is Ripe

For the sixth year in a row, the U.S. Congress has managed to avoid taking definitive action on any of the proposed bills designed to make computer abuse a federal crime.

What is Congress waiting for? Based on mail from *Computerworld* readers, many information processing professionals would like to know the answer to that question.

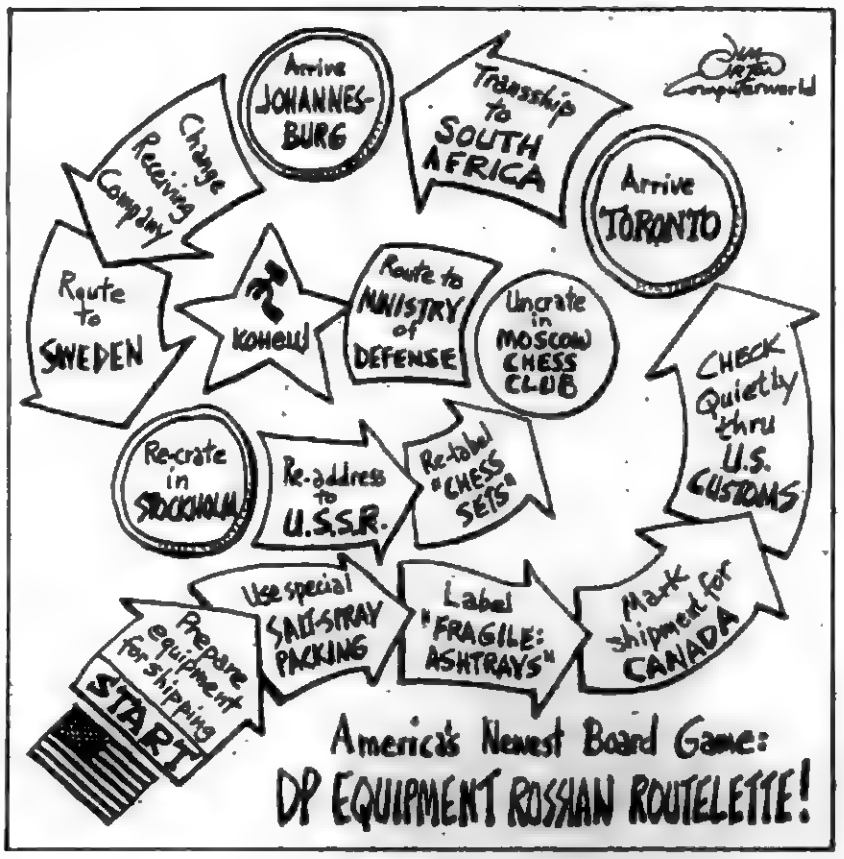
Computer misuse and illegal access to information carried on computerized data bases has been a growing concern for management information systems executives. It took quite some time for the general public to join these executives in their awareness of the problem. But judging from the immense amount of media coverage devoted to hackers, such as the Milwaukee "414" group [CW, Aug. 22] and the group that allegedly obtained illegal access to corporate systems through GTE Telenet Corp.'s public packet-switched network [CW, Oct. 24], the potential for abuse and misuse of computer systems and data bases is now recognized by most thinking individuals. Yet the U.S. Congress still puts off addressing the issue.

Not all members of the legislature are afflicted by the procrastination apparently affecting the congressional body as a whole. Bills designed to set various penalties for unauthorized computer use have been drafted by Rep. Bill Nelson (D-Fla.), Rep. Lawrence Coughlin (R-Pa.) and Rep. Daniel A. Mica (D-Fla.) [CW, Nov. 28]. But these representatives would seem to be in the minority.

Outside of these bills, which have yet to be voted on, the closest our representatives have come to acknowledging officially that computer-related crime exists and does, in fact, constitute a problem was calling one of the alleged hackers before its Science and Technology Subcommittee on Transportation, Aviation and Materials — apparently to get first-hand input on how the computer abuse was pulled off [CW, Oct. 3].

While applauding the idea that as much information as possible should be gathered and evaluated before passing a law on computer crime, *Computerworld* must seriously question how much more time is required to learn enough to implement some deterring legislation. After all, back in 1977, when the first computer crime bill was proposed, the Milwaukee hackers varied in age from nine to 16 years old; and these children and adolescents obviously managed to become very familiar with computers during that time. One might reasonably expect that lawmakers could do the same.

Congress usually moves very slowly on bills in which a public mandate is not putting pressure on representatives to speed the bills along. Perhaps the time has come for DP professionals to let their representatives know that a computer crime bill deserves serious consideration before six more years pass and more hackers grow up to try their hands at computer and information abuse.



LETTERS

'Sizzle' or 'Steak'?

I found Charles P. Lecht's article "DP Lawyers: Hessians of U.S. Tech Revolution" [CW, May 16] interesting. While I disagree with his universal condemnation of all lawyers involved in computer matters, I must concur with many of the criticisms contained in the article.

There is no special competency examination that must be passed before someone can claim that he is a computer lawyer. All you need is a law degree and a self-proclaimed expertise in the field.

It used to be that you could establish your so-called expertise by writing a couple of general-interest articles on computer law for the trade press, supplemented by speeches at various industry functions. If someone was particularly lucky, he could convince an editor to let him write a regular column on current legal issues. It didn't really matter that most of the materials published under his name were actually written by law clerks or young associates. The important thing was to get his name out there in the industry. Frequency, not quality of articles, was the key.

Unfortunately, success begat imitators. Suddenly, the trade press was flooded with articles by upstarts trying to horn in on these self-proclaimed experts' turf.

At first, the "old boys" were able to use their contacts at the various publications and conferences to maintain a certain measure of visibility. However, the new generation of computer lawyers not only outnumbered them, they were more articulate, harder working and, in some cases, fervently devoted to quality, not only in their writings and speeches, but in the services rendered to their clients as well. As a result, many of the so-called experts found themselves losing clientele.

When you lose your market share to competitors and your gimmicks no longer garner you the business they used to, what do you do?

You do what every other business does — you come up with a new gimmick. In the detergent business, when sales sag, you repackage your product and claim that it is new and improved. Apparently, you do the same thing in the computer law field as well. The latest in packaging seems to be the creation (and promotion) of computer law departments and high-tech law groups within certain law firms.

The public relations people have really gone into high gear on this one. *Computerworld* and virtually every other computer publication have carried their press releases. And there are probably more such announcements in the hopper awaiting publication.

What next? Green stamps? Perhaps they will follow the lead of the airlines with a "frequent client" program: For every 10 hours of legal services, you get a first-class upgrade — one hour of partner's time at associate's rates.

Are these firms so hard up for business that they have to resort to such gimmicks? There are many firms and sole practitioners that have a steady flow of new clients, as well as repeat business. Their gimmick? They do a good job for their clients and word gets around. a recommendation from a satisfied client is the best advertising a lawyer can get.

If you do need legal advice in your business, you have two choices. You can go for the "sizzle," the firm that has fancy offices and flashy public relations, or you can go for the "steak," the firm that does a good job and has many satisfied clients. They may be one in the same — or they may not be. Check around.

Michael D. Scott
Attorney
Manhattan Beach, Calif.

DATA PAST

Five Years Ago
Dec. 4, 1978

TORONTO — Subfreezing temperatures and the area's first seasonal snowstorm failed to keep the crowds away from the Canadian Computer Show and Conference at the International Centre of Commerce. More than 12,500 people attended on opening day, with conference attendence up 25% for the three-day show.

Ten Years Ago
Dec. 5, 1973

WASHINGTON, D.C. — The special Watergate prosecutor's office confirmed plans to use computerized signal enhancement techniques, used by the Central Intelligence Agency, in an effort to reconstruct the 18 minutes of a tape erased by then-President Nixon's personal secretary, Rose Mary Woods.

HUMAN CONNECTION/Jack Stone‡

A Dose of Automation for Home Health Care

Many Americans are learning from experience that the care of aging family members and friends who do not require continual medical attention should, if at all possible, take place in the home environment rather than the hospital or nursing home. However, the problem that must be faced in such situations is not only arranging for competent professionals and paraprofessionals, often on a 24-hour basis, but handling the administrative work attendant thereto — all of which is no small feat.

Annola Lakey is the founder and owner of the newly formed Laurel Ridge Home Care organization in Penn Argyl, Pa., which provides a comprehensive answer to family requirements for such care. Having been involved in the health industry in one way or another over the past decade, she recognized the need for a single source of home care services in her area.

Because all of her clients require a tailored program, she interviews each family for an in-depth survey and assessment of needs for personnel, facilities, transportation, special diets, administration and all the other myriad factors that are involved in home care. For example, personnel may include registered or practical nurses, home aides, dental hygenists, physical therapists or even home companions.

In addition, she's planning to set up for the processing of Medicaid/Medicare claims, with the intent of relieving all the burden of paperwork from her clients. Even more impressive are her thoughts on an automation plan for her firm.

"Since we've just started up, we are focusing on the development of our internal manual procedures, keeping in mind what we will need in the future, which will probably be quite extensive," she said.

Staff Records

"Let's take the case of staff records, which in most firms is fairly routine. Here we are hiring a large number of part-time employees, each of whom may be working for a half-dozen clients over the course of a month; so in this instance we are facing a rather complicated time card, client billing application.

"Of course, even before we get into keeping the time distribution straight, we have to address the scheduling situation. You see, before assigning one of our employees we must take into account the constraints under which the employee must operate. For example, some are limited with respect to the days and time of day they can work; others are limited in transportation; and others cannot do heavy work.

"In addition, we have to computerize the client preferences of the employee. This need may seem somewhat unusual, but that is not the case.

"Many of our staff are older women who find in family home care much more than a means of earning part-time income and seek to be with clients with certain types of infirmities or in certain age categories. These individuals develop new and significant relationships with their clients, often receiving as much love and affection as they give.

"Then there are a number of applications dealing with day-to-day patient care that are now possible with the new technology."

Portable Computers

"I am particularly impressed with the briefcase-size portable type of computer for our business, which can be downloaded with programs and files from our office computer. As each person takes on a new client, we can provide records of the original interview and a schedule of the various tasks to be accomplished," Lakey said.

"In addition, we can include an interactive program that interrogates for patient progress reports each day, in much the same way as nurses maintain records of patients in hospitals with advanced automation.

"Computers in our field will have an ever-growing importance. They are relatively new, to be sure, since most home care in the past was a cottage industry. Nowadays, the machines will not only make our service more efficient, but will help us to improve the quality of the service we render, which is the goal for which we continually strive."

READER COMMENTARY/Marc S. Friedman‡

Ensuring Software Delivery, Completion

Software packages and software development services represent an increasing sector of the computer marketplace. As a result, we have witnessed the proliferation of small and medium-size software suppliers. It is often difficult to distinguish among the many new firms and to determine reliability. Therefore, purchasers must protect themselves by taking the necessary steps to ensure delivery or completion of a project.

A small or medium-size software house can, at times, offer a user personalized care and a continuity of service unavailable from a "mega-supplier." Moreover, as a result of less overhead, a small or medium-size software supplier can frequently offer a more favorable price for its product.

Unfortunately, there is a darker side to the picture. Software packages and development services are also marketed by small, undercapitalized companies that, in order to survive, are compelled to "pyramid" their software projects, that is, to use the proceeds received from today's customer to complete the software project promised to yesterday's customer.

Multiple Risks

There are multiple risks in the acquisition of software from an undercapitalized supplier. First, there is a risk that the supplier will not have the resources to complete an installation that it has already started. The cost and disruption to the user resulting from the supplier's abandonment of a software project can far exceed the purchase price of the software itself.

Second, although a shoestring software supplier may complete a project, subsequent financial collapse of the supplier can result in the discontinuance of service by those who are most familiar with the software. Moreover, if a software supplier goes out of business, future upgrades or revisions of the software may be unavailable.

While most software suppliers are dedicated, hardworking and financially sound, the existence of financially shaky suppliers requires that a potential user of software exercise extreme caution in selecting a software vendor. Once a user has shopped the software market and selected a supplier, the user should request that the supplier provide sufficient financial data — such as its last three annual financial statements — to evaluate its financial condition.

Furthermore, the user, through its own credit department or bank, should conduct a thorough credit check to make certain that the software supplier would be a good credit risk. After all, if you sell $25,000 worth of goods on credit and if the customer fails to pay, your damages will, in most instances, be limited to the $25,000 purchase price. In contrast, the damages resulting from a supplier's failure to complete a $25,000 software project may far exceed the purchase price.

Once a software vendor is selected and its financial condition has been sufficiently established, a software contract should be drafted that addresses all aspects of the supplier-user relationship. An ideal software contract should:

- Describe in detail the software being acquired and the functions it is to perform.
- Specify the procedures for development and installation.
- Provide identifiable progress benchmarks.
- Define the standards required for acceptance of the software.
- Set forth the rights and remedies of the user if the software fails.

Equally as important is a "contract scheme" directed at ensuring against the bankruptcy, business termination or disappearance of the software supplier during the project. While there is no foolproof method for protection against these risks, certain contract provisions can reduce the likelihood of peril to a user.

The most important protection is the sequence of payments contained in the software contract. Payments should be spread over the full term of the contract, much like periodic progress payments under a building construction contract. The final payment should not be made until the software has met the agreed-upon acceptance criteria. As an example, a software contract might provide:

- 10% of the purchase price upon execution of the contract.
- 20% of the purchase price upon delivery of the software documentation.
- 30% of the purchase price upon the installation of the software at the user's site.
- 40% of the purchase price upon the software meeting the agreed acceptance criteria.

Obviously, there is a multitude of variations on the "periodic progress payment" theme. The payment provisions in a particular contract will depend, in large part, on the financial resources and negotiating skills of the supplier and user or their attorneys. Payment of the purchase price in advance is, indeed, perilous and must be avoided.

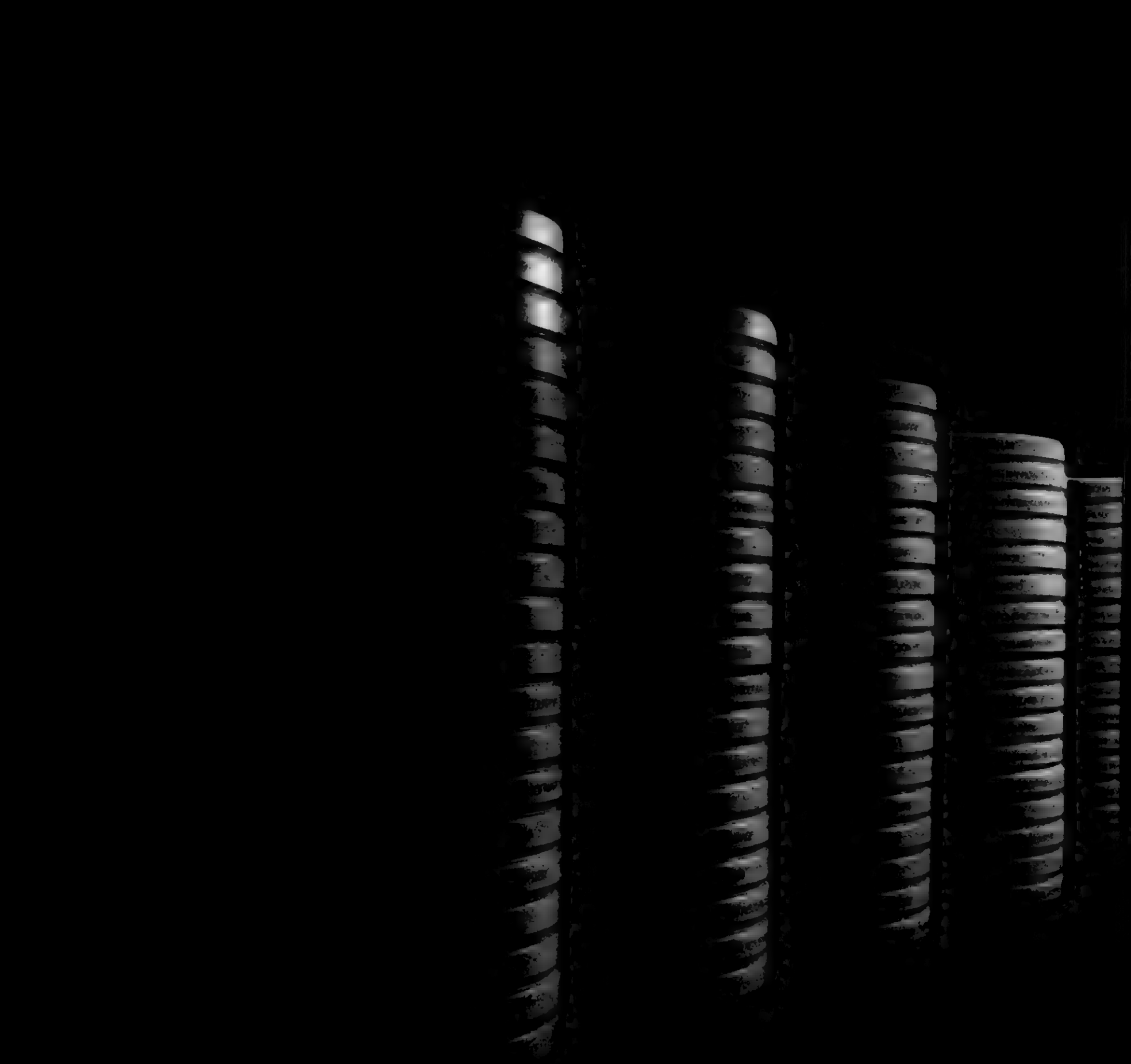
There are several methods that a software user may be able to negotiate to secure or guarantee that the software contract will be fully performed. For example, the user could insist upon guarantees of payment and performance by the individual principals of the software supplier or its corporate parent or affiliate, if any. A user could insist upon a payment or performance bond issued by a reputable insurance company.

It may be possible to negotiate a contract providing that until the software has passed the required acceptance test, all or most of the progress payments be held in escrow by a third party or at least be retained in a joint escrow account requiring the signatures of both the supplier and user for withdrawal.

Finally, special risk insurance carriers may ensure against the failure of the software supplier to install a software system successfully. However, the premium charged by an insurance company would be prohibitively high for most users.

A small software supplier with no established financial track record may still be the best buy for a prospective user. In such an instance, the user should not be afraid to do business with the supplier, as long as the user is assured, to the extent possible, of the continued financial viability of the vendor and the successful installation of the software system or at least the return of the purchase price, if the supplier should wither away.

Friedman is a lawyer with Kalb, Friedman and Siegelbaum in Roseland, N.J.



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HEWLETT PACKARD

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READER COMMENTARY/Charles P. Lickson

How DPers Can Become 'Law Literate'

Recently, a friend of mine who is in the time-sharing end of the computer business told me his company inadvertently erased earned income records for outside contractors for over 300 time-share clients. This means that hundreds of individuals won't receive their Internal Revenue Service Form 1099s for the year involved.

The extent of the disaster to the client companies that must account for all the money they paid out to these outside contractors has not even been tabulated as yet. One instruction error (the dangerous word "ERASE") has created untold havoc for the clients and potentially astronomical legal liability for the time-share company.

How far down will this liability spread? If a lawsuit arises (of which there can be little doubt), who will get sued? Can a negligent employee hide behind his boss, the company, the computer or the program? Can the client be blamed and, if so, what will that mean?

Questions like these have to be answered and, sad as it is to say, as computer-usage spreads, so will the problems created by humans and machines.

Today it is a necessity for people dealing with the fierce, little electronic brains to understand some basic law. People in the data processing field must become "law literate" if for no other reasons than to be able to defend themselves adequately against liability and become sophisticated consumers of computer goods and services.

Law Literate

In my opinion, those in the computer field will be law literate if they have a basic understanding of the following generalized areas of computer law:

- The legal vulnerabilities inherent in technology and in using computers.
- Protection of users and consumers of hardware and software, including basic understanding of contract rights and warranties.
- Property rights in hardware/software, including methods of protection such as copyrights, trade secrets, patents, antitrust and contracts designed to determine ownership.
- Technology and tort law: liability for negligent and nonnegligent torts (noncontractual legal wrongs).
- Privacy considerations including who can access data, what data can be accessed, of what use the data may be put, who owns data, liability for privacy violations and legal methods of protection of data.
- Computer crime as an emerging problem, including use of computer in a crime, improper access (penetration) and criminal responsibility.
- Computer evidence: what can be legal evidence and how it can be used.
- Computer legislation: what is happening in the area of regulation, why is it happening, and how can this regulation affect computer people and computer usage.

How one becomes law literate is the next problem. Many colleges and universities offer basic introductory courses in law.

An important warning is in order: A basic business or commercial law course or textbook will adequately introduce concepts such as contracts, torts, crimes and other areas of law, but will not provide the special insight necessary to put these topics in the unique perspective for computer-related application of the basic principles.

It is interesting to note that the legal profession itself is not yet fully cognizant of the special nuances of computer law. There are, however, more and more publications and treatises on the subject arriving on the scene. While these were designed primarily for trained attorneys, they are a very good source for exposure to legal considerations.

Often an employer or agency will have a legal staff. Presumably, this staff will have at least one person who is sufficiently knowledgeable in computer law and capable of adequate communication with nonlawyers to be able to brief someone on the above-named areas.

Another caveat is in order here (with all due respect to those in the legal profession): Many attorneys live in an ivory tower. This can mean either that they have not kept up with such a new area as computer law or that they know what they are talking about, but are unable to talk about it effectively with nonlawyers.

As recognition of the need for a closer relationship between law and technology spreads, more will be said and printed on this vital topic. Professionalism in the computer field will demand this type of knowledge, and it is sure to come in the near future.

Lickson, who practiced law for 15 years, is a principal of The Computer Law Group, Inc. in Westport, Conn.

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READER COMMENTARY/Robert W. Hassett

Impact of Apple vs. Franklin Decision

On Aug. 30, the U.S. Court of Appeals for the 3rd Circuit filed an opinion deciding that operating system computer programs contained only within computer hardware (in this case, on chips) can be the subject of copyright.

According to the opinion, engineers at Franklin Computer Corp. copied operating system programs developed and used by Apple Computer, Inc. so that programs designed for the Apple II computer could also be run on the Franklin Ace computer. Apple Computer filed suit claiming copyright infringement. Apple Computer requested that the trial judge bar Franklin from using, copying or selling those programs until the trial of the case, an understandable request inasmuch as the final trial could be delayed for years.

In deciding whether to grant a request of this type, the courts generally consider two factors. First, is the moving party likely to prevail on the merits of the case at the trial? Second, what are the relative harms that will occur to each of the parties if the motion is granted, as opposed to if the motion is denied?

Four-Front Attack

In addition to the usual legal arguments on procedure, Franklin's attorneys argued that the programs, or portions of the programs, were not protectable under the copyright laws anyway. They launched a four-front attack.

First, they argued that at least a portion of the programs were written in machine language, more an engineering than a written phenomenon. Since copyright laws apply to expressions, not engineering phenomena, the programs were not subject to copyright.

Second, some of the programs were contained on a read-only memory (ROM), which was only a three-dimensional device rather than in a written code that could be protectable under copyright laws.

Third, the operating system programs constituted ideas as opposed to mere expressions, copyright laws not being applicable to ideas.

Franklin's attorneys also argued the "big guy, little guy" point that Franklin might be out of business if the motion were granted. If the motion were denied, Apple Computer would suffer, at the most, only the loss of some sales.

The trial court had denied Apple Computer's motion. It reasoned that it was unclear at that juncture that the copyright laws applied. It bought the "big guy, little guy" argument that the harm to Apple Computer of denying the motion was greatly outweighed by the harm to Franklin of granting the motion. The stage was thus set for the appeal by Apple Computer.

Reversed the Ruling

The 3rd Circuit Court of Appeals reversed the ruling of the trial judge and sent the case back down for further determinations. The Court of Appeals held that:

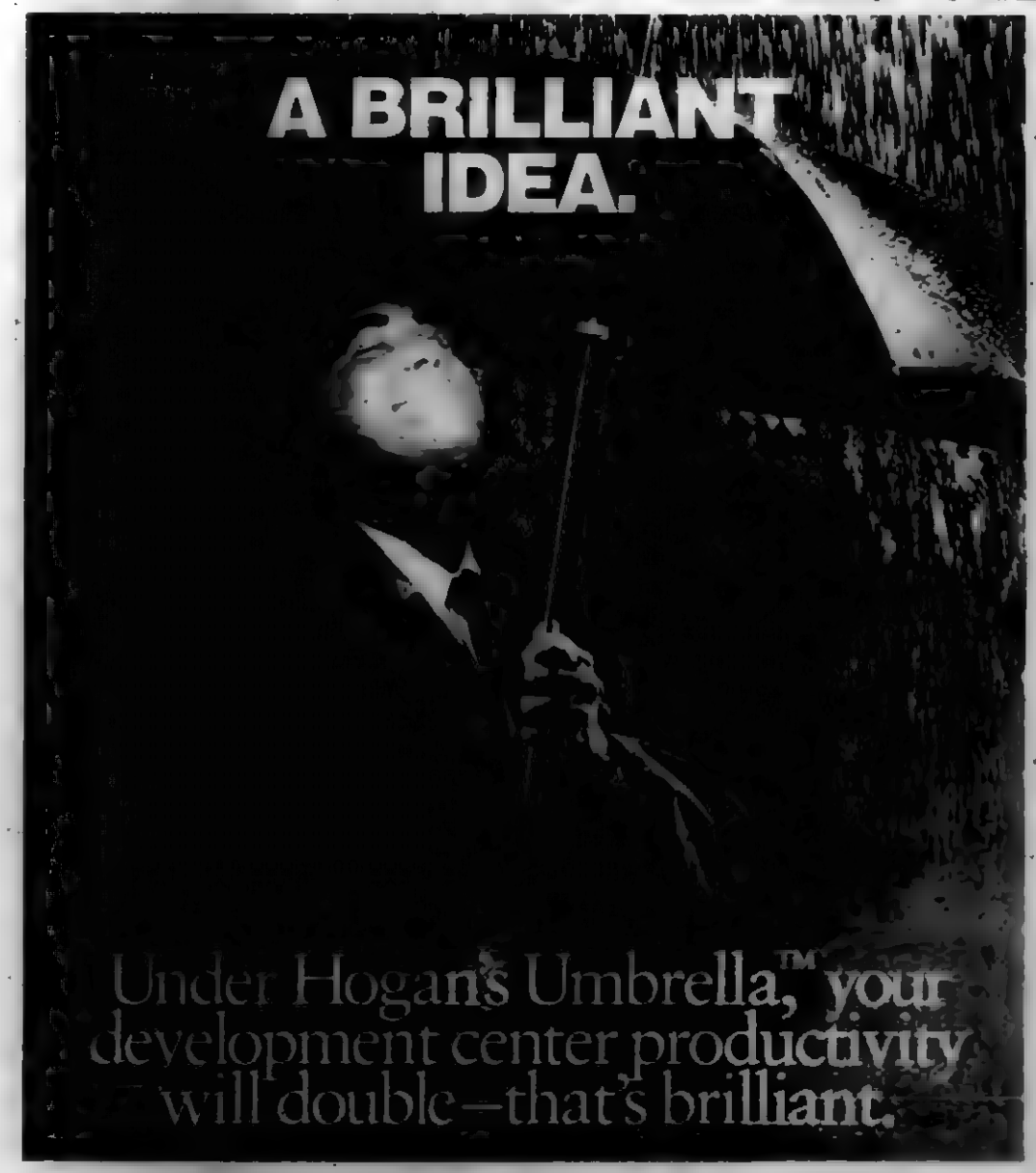
- Programs in machine language were copyrightable.
- Whether programs were contained on a ROM or anywhere else made no difference.

'Franklin's attorneys also argued the "big guy, little guy" point that Franklin might be out of business if the motion were granted. . . . The trial court had denied Apple Computer's motion. . . . It bought the "big guy, little guy" argument that the harm to Apple Computer of denying the motion was greatly outweighed by the harm to Franklin of granting the motion. The stage was thus set for the appeal by Apple Computer.'

The court also said that where properly "copyrighted material was concededly copied," the balancing of harm tests normally applied in the determination of whether to grant a preliminary injunction was inapplicable: So much for the "little guy" whose actions were taken with wide-open eyes. The Court of Appeals left two questions open for further determination by the trial judge.

First, the Court of Appeals restated the doctrine that it is only the expression of ideas, and not the ideas themselves, that can be copyrighted. The court went on to adopt the rule that if an idea may be expressed in only one way, the idea and expres-

(Continued on Page 62)



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READER COMMENTARY/Floyd McWilliams†

People Make Systems Work: A Lesson

Roger is a dynamite manager. That's why he rose to director of management information systems (MIS) at Dynamo Industries. Dynamo was in the throes of moving into the leading edge when Roger described his program to install homegrown software into each of the company's 15 divisions and link them together into the Dynamo data base.

Roger's boss, Larry, vice-president of operations, was a little leery of this. The other vice-presidents had complained to him of the inadequacies of the systems. He said, "Shouldn't we consider purchased software?"

Roger said, "We're going to install Account Master, the industry's leading accounting package, into our Grungetown plant and our own homegrown version in our Fairview plant. Based on user feedback, you can decide which system to install in the remaining 13 plants."

Larry said, "That certainly makes sense. Who will be heading up the installation teams?"

"Picking them was tricky," Roger answered. "We have to send somebody who really knows the Dynamo system to install it. I've chosen Barry Brilliant. The problem with Grungetown is that nobody wanted to stay there for six months. Luckily, we have a Grungetown native, Mary Modest, who is willing to give it a shot, if she's made supervisor of accounting once the system is installed. Here are their resumes."

Barry's resume showed an M.S. in computer science, a list of acronyms that would sink the *Queen Elizabeth II* and credit for every major Dynamo system. Mary's resume showed an AAS from Grungetown Community College, acronyms of Cobol and JCL and maintenance programming on the systems Barry had designed (her career had been spent making Barry's systems work). Larry quickly decided that he had been conned. Certainly, Barry should do a better job than Mary, unless, of course, the purchased system is far better than the homegrown one.

Barry went to Fairview to, as he put it, "show those local yokels how to take advantage of my superior system." He gave orders to everyone, including the plant general manager. When the general manager suggested that Barry might want to work with the Fairview MIS Steering Committee, comprised of the general manager and his staff, Barry said, "Oh, alright, I'll keep you posted on progress every two weeks or so."

Three months later, at his third such meeting, Barry had to admit, "This is going to take longer than I'd expected. You people are making this a lot harder than it has to be." Barry quit two weeks later, and his replacement managed to finish the project 10 months to the day after it started — "Only four months late," as Roger put it.

Ideas on Adapting the System

Meanwhile, Mary had a nice return to her hometown, where, in her words, "I hope to make things a lot easier for all the people who'll be using this system." She was delighted to find that Grungetown's MIS Steering Committee had two lifelong friends on it, as well as a first cousin once removed on her mother's side. She readily set up weekly meetings with the committee. She reported back to Roger, "They keep coming up with such good ideas on how to adapt the system to their needs, as well as shortcuts, that I wouldn't be surprised if we finish a little ahead of schedule." They finished three weeks ahead of schedule.

Roger quit when Larry mandated that all 15 plants were going to use Account Master. "It's a far superior system than ours," Larry said. "Not only is the feedback from Grungetown far more positive, but Account Master was installed by a less experienced analyst in half the time."

Mary may have had less academic training, fewer years with Dynamo and less lofty credentials, but she was far more experienced with people.

This brings me to a maxim for technical managers. Simply stated, "People make systems work (and not the other way around)."

McWilliams is an information systems supervisor, responsible for office automation, with the RF Communications Group of Harris Corp. in Geneva, N.Y.

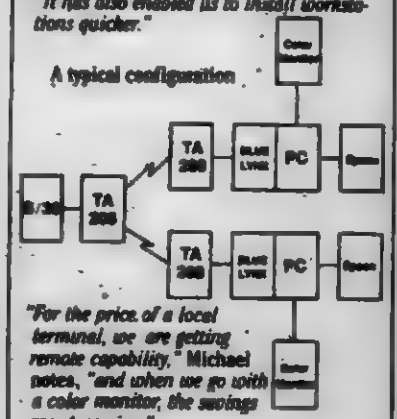
How Michael Krieger "dumped the dumb"

Michael Krieger is DP manager of *Augustus Fashions, Inc.*, a leading manufacturer of quality men's and women's clothing. His responsibilities include providing efficient communications between the firm's Manhattan factory and two showrooms, and its warehouses on Long Island and in New Jersey.

Before BLUE LYNX, Augustus Fashions had an IBM System/34 with local terminals only. Now they use the S/36 with BLUE LYNX-equipped IBM Personal Computers as remote terminals at their several locations – including the homes of the company's executives.

"BLUE LYNX has eliminated the need for us to waste thousands of dollars on IBM remote workstations," Michael says. *"It has also enabled us to install workstations quicker."*

A typical configuration



"For the price of a local terminal, we are getting remote capability," Michael notes, *"and when we go with a color monitor, the savings are staggering."*

BLUE LYNX terminal packages include:

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READER COMMENTARY/Michael H. Coden, Frederick W. Scholl and Judith T. Scholl‡

Light-Wave, Local Net Tech Offer DP Security

The recent misuse of one small computer network implies a potential for catastrophe. Since the number of computers connected with public telephone networks is so vast and the ease with which these computers may be accessed is remarkably abundant, only the implementation of new technologies can help to minimize such a catastrophe. In the two decades since time-shared computers were developed at MIT, millions of commercial, government and institutional computers have been connected to the public telephone network, even though no public access is intended.

The power of a computer network is its ability to switch together various combinations of computer equipment at different times to perform different tasks. The most convenient, available and largest switching system is the omnipresent public telephone network and its various specialized, but still publicly accessible, offspring.

So convenient are the public telephone networks that many organizations use them to interconnect computer equipment on the same property, in the same building and even on the same floor. After two decades of accumulation, the number of computers accessible by telephone is staggering.

Unauthorized access to computers via a specialized network is truly child's play. It is only slightly more difficult to pick a standard telephone Area Code and local business exchange (both three digits) and to let the computer dial combinations of the remaining four digits. In a few hours, a list of all computer telephone numbers on Wall Street or in Washington would be compiled. This dialing could be done from Moscow, probably through some nearby Western European city, as easily as from Milwaukee.

New Technologies

Computers must and can be detached from the telephone networks. The new technologies of local-area networks and light-wave communications (fiber optics and line-of-sight light beams) make possible virtually untappable computer nets. Nets using these technologies are not only independent of the telephone system, but also provide greater performance and cost less to operate.

In a building or on a government, institutional, commercial or industrial complex, all computers can be connected with fiber-optic cable. These cables, which transmit information as light through hair-thin strands of glass, are virtually impossible to tap.

When cables cannot easily be used, such as crossing a public road or between buildings in a city, line-of-sight infrared visible light beams can safely and securely transfer vast quantities of information. Unlike microwaves, invisible infrared light can be focused into beams so narrow that they are virtually impossible to tap. Many such narrow light beams of the same frequency can operate simultaneously and not interfere with one another, making unnecessary frequency allocation and interference control by the Federal Communications Commission. Moreover, infrared light beams are the same safe, invisible portions of sunlight that warm the Earth, enabling life as we know it to exist.

Link to Public Phone System

Some computers will need connection to the public telephone system for specialized long-distance data transfers or permitting homework in the "computer cottage" industry. These applications are limited, specific and easy to control. Fundamental principles of security dictate that a well-designed factory, power plant, bank, office building or military base has limited entry points, even if the facility covers hundreds of acres.

With few entry points, access is easily and accurately controlled. Similarly, a well-designed computer net needs only one of its computers linked to the telephone network for its specific public-access needs. Once this "security guard" computer is satisfied, it makes connections via the local-area net. Industry experience shows that more than 80% of DP network information never leaves the local area.

Government and industry must secure their computer networks and data. The technologies of light-wave communications and local-area networks make this possible while improving network performance and lowering network cost. The accumulation over two decades of computers connected to telephone systems must immediately be converted from public to private interconnection.

Coden is chairman of the board of directors of Codenoll Technology Corp. in Yonkers, N.Y., and the Scholls are directors and officers at Codenoll, which is a manufacturer and supplier of light-wave local-area networks.

An Amdahl data communications network can pay for itself in six months.

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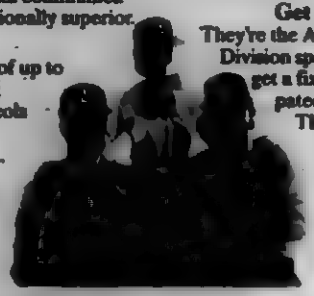

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In October, 1970, a company was formed expressly to build one product. A mainframe computer that would outperform the manufacturer that owned the market at that time. Today, this company is an international success story, a phenomenon.

A Look at Apple vs. Franklin Decision

(Continued from Page 59)

sion are said to be the same thing and, in that situation, even the expression may not be copyrighted.

Subject of Debate

The question of what is an idea has long been the subject of debate; but the Court of Appeals went on to say that the general function of translating source code into object code qualifies as an idea. The court cautioned that even though the function of translating such code in general was an idea, the function of translating any particular programs, such as Apple-compatible software, was not covered by this noncopyrightability rule if translation of other non-Apple-compatible software could be accomplished by different expressions.

'Every case must be considered on its own facts. However, the copyright laws bar copying or publishing materials without permission of the owner, not the use of them. Purchasers would generally not be considered infringers.

'In addition, the few appellate courts that have decided the issue have held that wrongfully copied materials in the possession of subsequent purchasers are not subject to seizure for copyright infringement, with limited exceptions related to imported copies.'

Second, the court left it to the trial judge to decide whether Apple Computer had properly complied with the statutory formalities pertaining to copyright registration.

Although Apple Computer has overcome major obstacles in the lawsuit, it would, for the following reasons, be premature to say that Franklin has lost the case at the trial level:

- It may be determined that one or more of the most important operating programs were governed by the idea-expression merger doctrine and are, therefore, not copyrightable.
- It may be determined that various copyright registrations procedures were not followed.

It should be noted that if Franklin does lose the lawsuit, but survives the damages awarded, Franklin can be positioned to develop its own programs to obtain Apple Computer compatibility.

Not Copied

Indications are that the operating systems for the other major compatibles were not copied. This decision would, therefore, be unlikely to affect companies manufacturing most of the other compatibles.

If Apple Computer ultimately prevails, what effect, if any, will this decision have on purchasers of the Franklin Ace? Will these people be considered to be infringers of the Apple Computer operating system? Are these systems subject to seizure?

Every case must be considered on its own facts. However, the copyright laws bar copying or publishing materials without permission of the owner, not the use of them. Purchasers would generally not be considered infringers.

In addition, the few appellate courts that have decided the issue have held that wrongfully copied materials in the possession of subsequent purchasers are not subject to seizure for copyright infringement, with limited exceptions related to imported copies.

Regardless of the ultimate outcome of this case, the opinion will presently discourage any producer or intended producer of compatibles from copying operating system programs. In most cases, the risk will far outweigh the development cost savings.

Hassett is an attorney at Rubin & Hassett in Atlanta, Ga.

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'Promacs' Version Of Cobol Generator Out for IBM CICS

VALLEY FORGE, Pa. — An additional version of the Promacs Cobol Program Generator has been announced by Management and Computer Services, Inc. for IBM CICS environments.

The Promacs/CICS software reportedly generates on-line applications programs with the ease of Promacs, used in batch environments, according to a spokesman for Management and Computer Services.

The product has been described by the vendor as a command-level CICS Cobol generator, on-line "paint-the-screen" CICS map generator and batch Cobol generator.

Promacs uses free-form, high-level commands to produce executable structured Cobol code.

Programmers can use Promacs as a utility, file maintenance tool, report generator and applications development system, in addition to the CICS uses, the vendor spokesman said.

Pricing starts at $18,000 for DOS users and costs $24,000 for OS users. Management and Computer Services is located at Great Valley Corporate Center, Valley Forge, Pa. 19482.

Reducing Security Risks Associated With VM Access

By Barry L. Abramson
Special to CW}

. IBM's VM operating system is being utilized more and more these days — due in part to its ability to run guest operating systems and the interactive capabilities of its CMS. But users of VM should be aware of the security problems associated with system and file access under VM.

The city of Philadelphia's Department of Streets utilizes VM/SP Release 1 and, in almost all cases, a given individual would have his own virtual machine with an associated read and write password for accessing that machine.

Each VM system functions as though it were a real computer with printers, punchers, readers and so forth. After logging on to a VM system, a user is able to create and modify data files, source programs and macros (execs). Additionally, the user has the capability to link and access files on any other virtual machine.

Upon transferring to my current department, I realized that one virtual machine would have to be shared among six divisions and that adequate security measures would need to be implemented to prevent loss of data due to any type of system failure, unauthorized access of the virtual machine and tampering of files, which the user is not authorized to access.

After having suffered a disk crash and

(Continued on Page 70)

ADR Announces Translator Interface For OS/MVS Sites

PRINCETON, N.J. — Applied Data Research, Inc. (ADR) has introduced the Librarian Access Method (LIB/AM), an interface to IBM language translators and utility programs for IBM OS/MVS environments.

LIB/AM is an option to ADR/The Librarian, a source program management system that reduces the number of I/Os and the amount of CPU time required to manage source modules.

LIB/AM enables IBM language processors and utilities to access data directly from Librarian master files without requiring programming changes. Members in a Librarian master file can be referenced as if they were members of a partitioned data set.

Any IBM partitioned data set can be converted to a Librarian master file. Through normal IBM JCL conventions, LIB/AM also allows multiple members from different Librarian master files and conventional partitioned data sets to be combined into a single job stream.

LIB/AM reportedly eliminates the need for intermediate work files and reduces space on IBM's JES spooling queues. LIB/AM has been verified on MVS/SP1.3 and JES2 4.1, with Assembler H, Assembler F, OS/VS Cobol, PL/I Optimizer, a linkage editor, various utilities and user-written programs.

The permanent license price for LIB/AM under MVS is $4,000. The permanent license price for the Librarian under MVS is $11,200. Monthly, three- and five-year leases are also available from ADR, CN-8, Route 206 and Orchard Road, Princeton, N.J. 08540.

CICS Development System Targets DOS, OS, MVS Users

JERICHO, N.Y. — Computer Associates International, Inc. has introduced CA-Flexiscreen, an IBM CICS application development system for IBM DOS/VSE, OS/VS1 and MVS users.

CA-Flexiscreen was designed for on-line query and update functions by end users, a spokesman said. No coding is required to define records, create forms or develop CICS programs.

The product provides access to files not previously defined to CICS by allowing users to define files dynamically to CICS without changing or recompiling the CICS file control table. Once a file has been defined in this way, any CICS user can access it until CICS is terminated. Screen-building capabilities are included.

The system consists of seven major functions. The data record definition facility is used to describe a file and data record. The screen builder handles the formatting of screens, editing of attributes and delimiters, creation of menus and documentation screens and all file maintenance, the spokesman said.

The screen print utility provides hard copy of all user screens. The validation table facility defines tables using an on-line table definition. The DL/1 data base facility works like an I/O exit and describes an area of contiguous storage called "flat" record. The file handler performs all processing tasks on the screen such as data collection, file maintenance, field validation and user exit processing. The batch extract facility processes all data collection records for users.

CA-Flexiscreen is priced at $17,500 for DOS/VSE users and $23,000 for OS/VS1 and MVS users from Computer Associates, 125 Jericho Tnpk., Jericho, N.Y. 11753.

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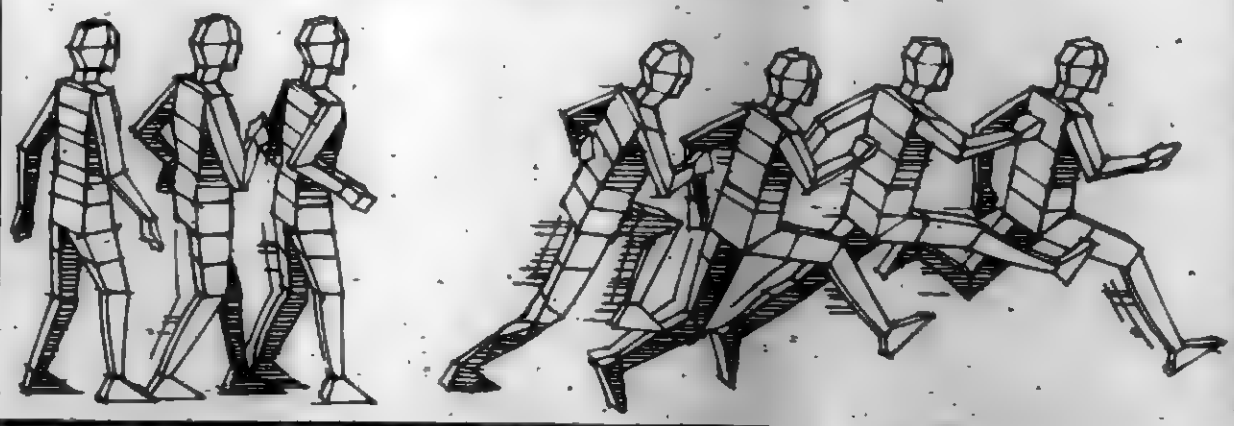

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Pcam Designed to Link Series/1, IBM Micros

SAN FRANCISCO — H & A Computer Products, Inc. has announced the Personal Computer Access Method (Pcam), which the company described as a link between the IBM Series/1 minicomputer and the IBM Personal Computer or Personal Computer XT.

Pcam reportedly allows the transfer of files or the accessing of records between the IBM systems through a telephone link or local attachment. The link can be initiated either by the Series/1 or the Personal Computer, and a Pcam utility is provided on both the Series/1 and the Personal Computer to copy data sets or parts of data sets.

The vendor said the Pcam utility can also be used to save Personal Computer data files on the Series/1, pass data to an application program or retrieve a data file from the other machine. The system reportedly also utilizes a record format that identifies true binary-value fields and converts them to the proper order for the receiving machine.

Personal Computers using Pcam require 96K bytes of memory and an asynchronous communications adapter. The system runs in compiled Basic under DOS 1.1 or 2.0, and the Series/1 must be running under EDX Version 3 or 4 and must have an asynchronous-capable attachment card.

The Pcam system is priced at $900 for the Series/1 and $100 for each Personal Computer. A corporate license allows unlimited use of Pcam within an organization for $2,500, the vendor said. H & A Computer Products can be reached at Suite 204, 30 Hotaling Place, San Francisco, Calif. 94111.

DG Interpreter, Compiler Added to AOS/VS Software

WESTBORO, Mass. — Data General Corp. has added both an interpreter for program development and a compiler for system efficiency to its AOS/VS operating system software.

The AOS/VS Basic compiler is intended to be used with the interpreter and can run compute-bound programs up to 100 times faster than when the programs are just interpreted, a spokesman said. It is intended for general-purpose, interactive time-sharing and allows users to use Basic to run large applications, particularly those that are CPU-intensive.

The compiler utilizes the operating system's standard code generator, optimizer and run-time environment. Compiled programs written in AOS/VS Basic can call and be called by programs written in other AOS/VS compiled languages.

The AOS/VS interpreter includes a built-in text editor. Program statements are entered directly into the interpreter, which checks syntax as codes are entered. The interpreter also includes a built-in debugger that allows programmers to execute all or part of a program and trace a program's flow and assignments — all interactively, the spokesman said.

The compiler and interpreter software is available to current AOS/VS Basic users as an enhancement. Those who have the firm's Software Subscription Service receive the enhancements free of charge.

Prices for AOS/VS Basic range from $3,600 to $7,000, depending on the system configuration, the spokesman said from DG in Westboro, Mass. 01581.

HP Electronic Spreadsheet Offered for HP 3000 Users

PALO ALTO, Calif. — Hewlett-Packard Co. has introduced an interactive electronic spreadsheet for its HP 3000 computer.

Visicalc/3000 is an enhanced version of Visicorp's Visicalc program, designed to run on the entire HP 3000 business computer product line. The system also can receive and manipulate Visicalc worksheets from HP's and other vendors' personal computers, the company said.

Multiple users can simultaneously budget, track, forecast and plan. According to the vendor, files from other Visicalc worksheets can be uploaded to the HP 3000 computer and then used by Visicalc/3000. Both Visicalc and Data Interchange Format files can be used by the spreadsheet.

Additional features include online Help, larger work sheet size, formatting options, variable column widths, accidental cell erasure protection, multiple windows and expanded printing capabilities.

The price for Visicalc/3000 is $4,000, according to the vendor. As an introductory offer, initial copies of the package will be priced at $2,500 through March 30, 1984. Additional information is available from HP, located at 3000 Hanover St., Palo Alto, Calif. 94304.

WHAT TO LOOK FOR WHE
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Part 2 of Series

Benefits of Corporate On-Line Info Summarized

By Steven Sieck
Special to CW‡

The information retrieval needs of the end-user managers and executives who work with personal computers and have casual needs for electronic information services are very different from those of specialized professional users. The typical new personal computer users need special management information systems (MIS) direction in utilizing outside services and applying them to internal data and systems.

Many managers and other end users want to update their information-gathering and disseminating habits across the board — outside the existing MIS and information center structures. The resulting questions are just beginning to be asked in many places: Whose budget pays for on-line services? How can I maximize the integration of outside information with internal information resources? What services are available from network or software vendors to optimize the use of outside data bases? Who should train and assist users?

The advantages to users of utilizing on-line information services can be summarized as follows:

- *Time savings.* The ability to get facts immediately, rather than having to send for them or do laborious manual research.
- *Selectability.* Publicly available computer services enable users to scan the contents of millions of documents from thousands of different sources in order to find the exact information they need.
- *Flexibility.* Electronic information services allow users to look at information in several ways. Especially in applications involving numeric data, the ability to use a set of integrated on-line analysis tools and to mix different sets of data together can be key to solving a user's problem.

'To determine their charges, on-line information suppliers use connect time, subscriptions and per-information unit charges. Connect time charges are easy to understand. But time is not a good measure of the value of the information gathered.'

But what do outside information services do to justify on-line budgets for end users? In the corporate functions pursued by engineers, managers and planners, what is on-line, instant access to information actually worth?

That is a question that has yet to be answered with much confidence in the on-line information business. The biggest reason for on-line industry uncertainty is the potential of the personal computer to bring power to gather and download more information in a smaller period of time. User-programmed automatic searching, in which personal computers are equipped with software that knows what information the user needs and where and when it is likely to be most cost-effectively retrieved, is quietly revolutionizing the on-line information business.

There are several capabilities that should be considered in order to optimize the use of outside information services. These include automatic dialup and logon capabilities, which eliminate the need to memorize or keep track of the complicated codes usually required to access a public service. Another capability is storage of common search routines, so that automatic updates of commonly accessed information can be totally automated — saving time and money. In addition, another useful function is software that facilitates removing information from an on-line system in a form that maximizes the ease of utility with which it can be sorted, analyzed or graphed using local computing power.

A basic decision in planning for on-line services is speed of transmission. Today, since most outside services use asynchronous communications protocols, the choice is essentially between 300 bit/sec and 1,200 bit/sec. The 300 bit/sec is a little slower than a good reader would normally absorb words, whereas at 1,200 bit/sec the screen fills up too quickly to be read without pausing to display one page at a time.

To determine their charges, on-line information suppliers use connect time, subscriptions and per-information unit charges. Connect time charges are easy to understand. But time is not a good measure of the value of the information gathered. Thus, the widespread use of personal computers is forcing the on-line services and their information suppliers to change their pricing mechanisms in the direction of fixed subscription fees and per-information unit charges.

There is still time to prepare for this shift and the implications it holds for a company's ability to compete effectively in the external environment. To ignore the connections to outside services while in the midst of micro-to-mainframe implementation could be a serious mistake in planning for the utilization of information resources — one that could leave your company isolated in an increasingly plugged-in world.

Sieck directs the Electronic Information Program at Link Resources in New York.

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Two Packages Target Users of IBM's VM/SP

ARLINGTON, Va. — VM Systems Group, Inc. has announced two software packages for users of IBM's VM/SP operating system.

The V/Temp package is said to provide a command by which the user can obtain temporary disk space, and it reportedly gives users a link to one of a pool of permanent "temporary" disks. Long channel programs and system overhead associated with the Define and Format processes are thus avoided. According to the vendor, when a linked disk is used, it can be reacquired after a system failure, reducing the chances of restarts and lost files.

In addition, a TEMP command of the V/Temp package reportedly can replace a sequence of four commands and responses with a single command to simplify user training.

The V/Find package is said to give the systems or assembler language programmer a command that searches either virtual or real memory for a specified hexadecimal or Ebcdic character string. The command is said to respond with either the address at which the string begins or a statement that the string does not exist. The command will also give a range of addresses to be searched.

V/Find and V/Temp are licensed for three years at $1,370 and $2,050, respectively, from VM Systems Group, 3123 N. Military Road, Arlington, Va. 22207.

Taking Security Measures for Use of VM

(Continued from Page 67)

losing two-and-one-half days' work, I now back up our department's disk to tape on a daily basis. The procedure also writes a listing of those files copied to a system printer, thereby verifying that the backup is completed. A less-than-complete listing could indicate a device error — disk or tape.

When a user invokes the editor to open a file, an exec first checks to see if the file already exists. If it does not, the user is asked if he would like to create a new file. If the response is "yes," the exec then asks the user for the division code, the unit/section code and a unique four-char. combination that best represents the purpose of the file. This is all linked with the department code in front and becomes the file name (the first of three parts within a CMS file).

CMS provides a Listfile command to determine which files are on the disk. I wrote an exec that controls the use of this command, thereby ensuring all divisions that no one else will be able to access a listing of their files. All users are able to get a list of all "limited-access" files.

When the Listfile command is invoked, the user is shown a screen that describes the use of the command and asks if the user wishes to continue. If the response is "yes," the screen clears, and the user is asked if he wishes to view a list of private files, limited access files or both. The procedure for creating a file is used once again.

The file mode is changed on all private files, and a listing is then stored in a file and shown to the user. This file is displayed on the screen for any subsequent Listfile requests during that terminal session. When the user goes to log off, the file with the listing is erased, and the file mode is restored to its original identification.

Another concern was erasure of files by a user. With CMS, a user could erase all files on any accessed read-and-write disk by typing in "ERASE ***," which is not a very comforting thought to users. This problem was overcome by writing an exec that prohibits the use of this command altogether. All users must submit a written request for any given file to be erased.

Only the system coordinator can turn the execs in the security system on or off by invoking yet another exec and providing the appropriate password when prompted. Any other attempts to engage this exec on the virtual machine causes the machine to log itself off.

When the system coordinator does invoke this exec, yet another exec turns on all security measures when the session is terminated. Furthermore, the exec that turns the system on and off is stored with a file mode, which cannot be accessed by any other virtual machine attempting to link to your machine.

There is no guarantee that the system cannot be penetrated, but steps can be taken to prevent most of these occurrences, both from other virtual machines and from within our own. Future versions of the VM operating system may or may not offer additional security. Thus, the responsibility for ensuring system and file security rests with the managers and users of these facilities.

Abramson is the management information systems coordinator for the city of Philadelphia's Department of Streets.

Billing System Operates on VS

RIVER EDGE, N.J. — Cliff Data Systems, Inc. has announced Time-Bill, a multipurpose time and billing system that operates on all members of Wang Laboratories, Inc.'s VS family of computers.

Some of the product's features include file maintenance, payroll time entry and corrections, payroll interface, accounts receivable interface, billing time entry or adjustments, invoice edit and printing and job cost (gross margin) reports, according to the vendor.

The price is $5,000 from Cliff Data Systems, 111 Kinderkamack Road, River Edge, N.J. 07661.

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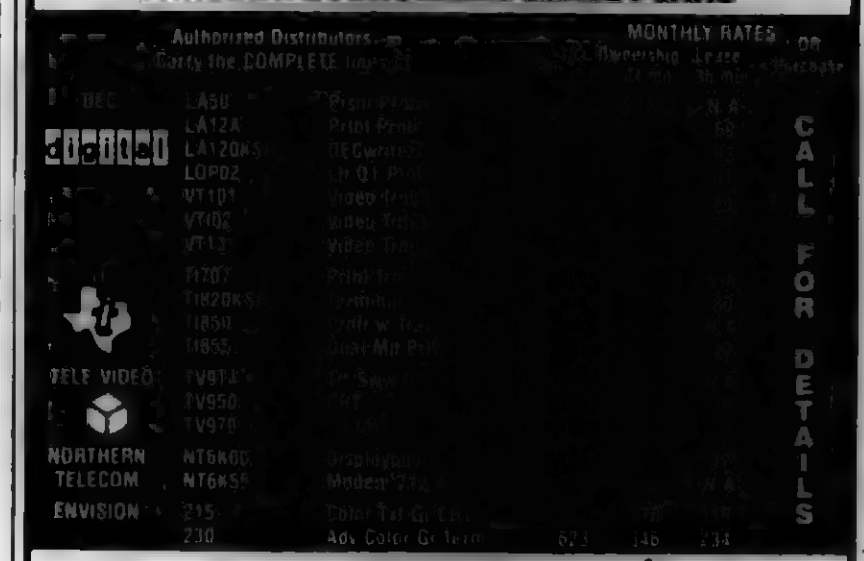

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'Tubes' Boasts Facilities To Increase VM Flexibility

MOUNT FREEDOM, N.J. — Macro 4, Inc. has announced Tubes, a software system that provides IBM's VM operating system users with facilities to increase the flexibility of using VM.

Some of the product's features include a sign-on screen that can be used to prevent unauthorized users from accessing the system. Up to 12 systems can be accessed concurrently with no logoff and logon or reset and dial processes required to transfer from one system to another, a spokesman said.

The user needs no knowledge of IBM CMS logon procedures or of different dial procedures for each system, and a defined menu screen, which details all the facilities available to a user, is provided for each user, the vendor said.

A one- or two-year lease, at $150/mo, is available from Macro 4, 1 W. Hanover Ave., Mount Freedom, N.J. 07970.

T/S Service, VAX-11s Get 'Bankmaster'

BURLINGTON, Mass. — Strategic Information has announced the Bankmaster package for use with the company's nationwide timesharing service and Digital Equipment Corp.'s VAX-11 minicomputers.

Bankmaster reportedly allows financial intermediaries to integrate financial planning into a data base-driven, modeling, reporting and graphics system.

The package is said to allow users to utilize a single data base for all applications, and the data base can be supported by the automated transfer of data from subsystems and the general ledger, a spokesman for the vendor said.

Strategic Information said Bankmaster accepts any level of data detail and can be used for daily portfolio management, budgeting, asset and liability management and strategic planning.

The package's modeling capabilities allow users to build multimodel frameworks for complex organizations, according to the spokesman.

Bankmaster is suited for consolidation and merger and acquisition analysis, and it allows users to adapt quickly to changing balance sheet structures dictated by regulatory change, a spokesman said.

Bankmaster is priced between $25,000 and $135,000, depending on configuration, the spokesman said.

It is also available on a basis at a cost of $17.50 per connect hour, with no subscription fee, according to the Strategic Information spokesman.

More information on Bankmaster is available from Strategic Information, which is located at 80 Blanchard Road, Burlington, Mass. 01803.

SKK Offers ACF2/MVS Update

ROSEMONT, Ill. — SKK, Inc. has introduced Release 3.1.4 of ACF2/MVS, a security system that is said to guard against unauthorized access to computer data in an IBM MVS environment.

The new release has added several enhancements to the system to accommodate improvements to MVS, including MVS/XA, and to several IBM subsystems such as CICS, TSO, SPF and NJE networking systems.

One added feature, the Lookaside Buffer, provides support for an installation to validate and either allow or disallow system access to any CPU in a network, while the user is defined at only one CPU in the network, a spokesman said. Support is provided for a transient data base of user logon identifications entering a network node. All data access authorities or restrictions remain in force regardless of the CPU being accessed.

Other features include enhanced access rule writing capabilities, which govern who can access data and under what circumstances, and a password encryption process that allows passwords to be sent from one network node to another.

ACF2/MVS Release 3.1.4 is available on a perpetual license agreement for $29,700 from SKK, 10400 W. Higgins Road, Rosemont, Ill. 60018.

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Menus of features and functions, visual prompts and terminal-resident soft keys guide even novice data users through correct operation easily. And soft keys can also be downloaded from your host computer for single key activation of program commands. As an advanced business telephone, the Displayphone unit brings the convenience of voice features such as directory dialing to data calls, and allows simultaneous voice and data communications.

In addition to its ease of use, the Displayphone terminal offers powerful data access capability. It is an asynchronous terminal that can also be configured to operate in IBM 3270 and other sophisticated computer environments. This flexibility gives users high speed access to a full range of corporate and public data bases.

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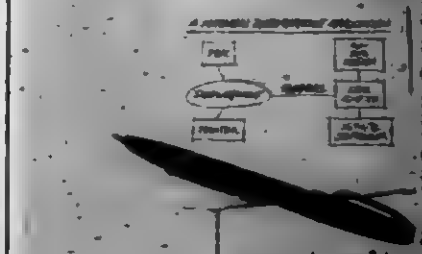

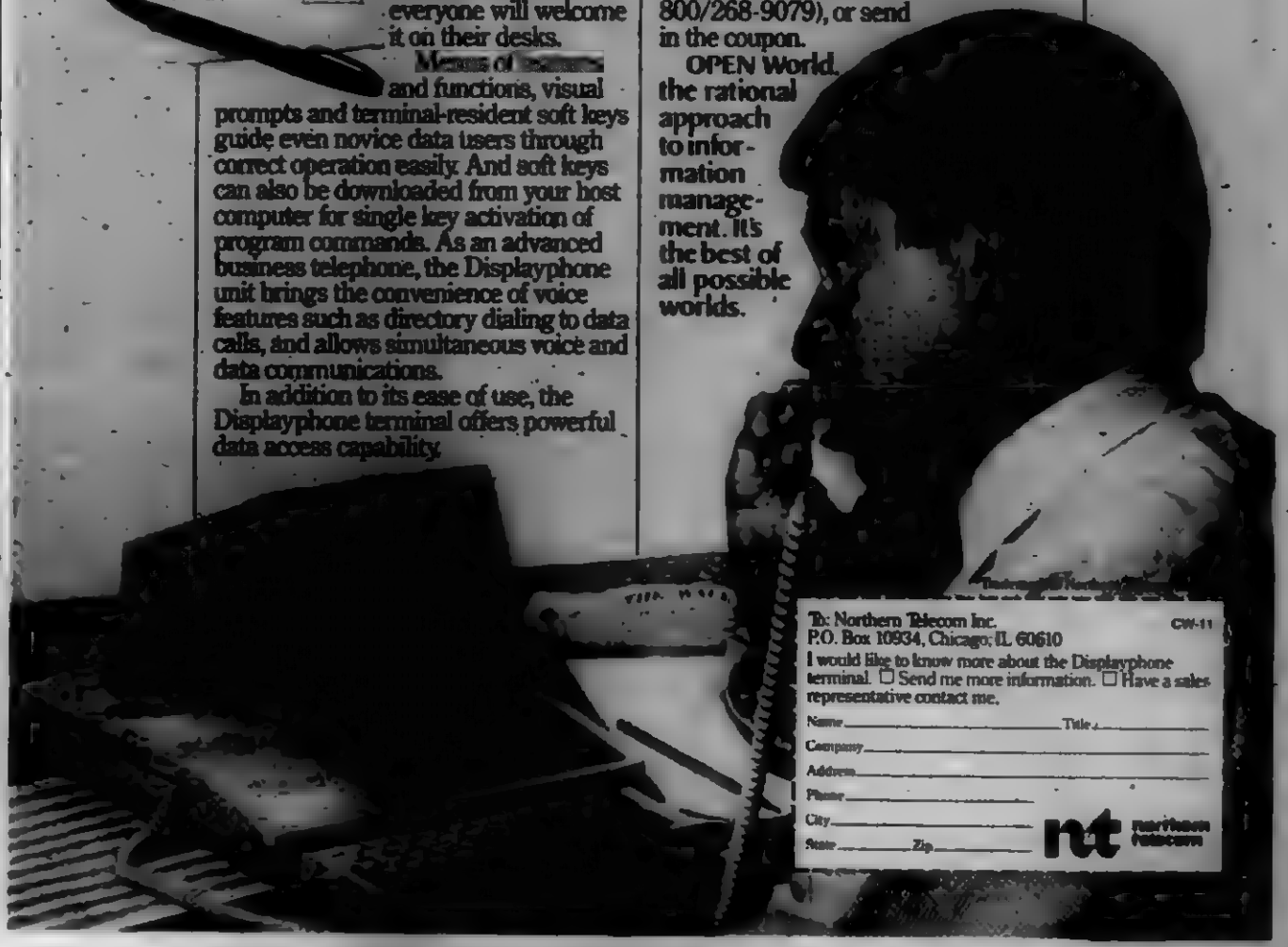

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Data Retrieval System Announced by NDX

McLEAN, Va. — NDX Corp. recently announced a data retrieval system said to provide users of a variety of systems with high-speed access to data.

Creatabase reportedly allows users to instantly find any occurrence of a phrase or number or a combination of both. Searches may be conducted through unstructured text and through every structured data field by content, without creating key fields or indexes, a spokesman said.

The package is available for use with Cray Research, Inc.'s Cray-1; Control Data Corp.'s Cyber series; Sperry Corp.'s 1100 model; IBM's VM/CMS operating system; Tandem Computers, Inc. computers; Hewlett-Packard Co.'s HP 3000; and Wicat Systems, Inc. systems.

Without programming, users can specify an unlimited number of records in a file, an unlimited number of fields in a record and unlimited length and complexity of search criteria.

The package is available for lease starting at $473/mo and for perpetual license starting at $15,000. NDX is located at Penthouse A, 8260 Greensboro Drive, McLean, Va. 22102.

Security System Fits Wang OIS

SHERMAN OAKS, Calif. — Glenn A. Barber & Associates, Inc. has announced the OIS Security-Plus system, which is said to provide control over access rights for users of Wang Laboratories, Inc.'s OIS system.

According to a vendor spokesman, the Security-Plus system was designed to provide control over access rights to any word processing document, library or advanced function application. The system is also said to be compatible with the regular Wang OIS security system.

The system reportedly provides a number of different security levels, including physical security, user password, logon procedure, menu screens, programming, file protection, user program access and workstation restrictions. Users may only access documents, libraries and functions that the system administrator has cleared.

The license fee for OIS Security-Plus is $1,000 for the initial CPU copy, and additional copies are available at a 40% discount from Glenn A. Barber & Associates, Suite 302, 15010 Ventura Blvd., Sherman Oaks, Calif. 91403.

Managers Of PDP-11s Get Tool Kit

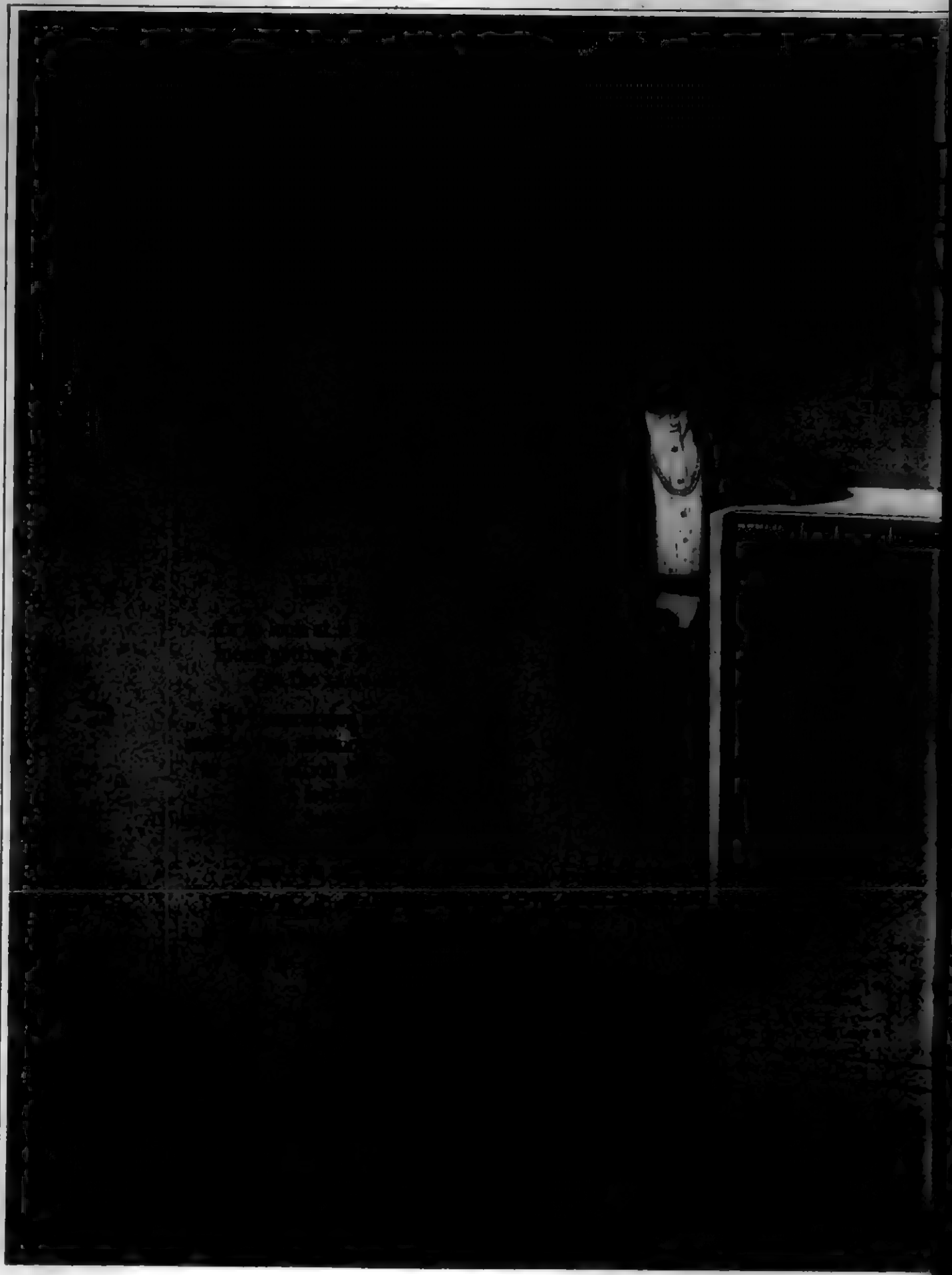
PAWTUCKET, R.I. — Orbis, Inc. has announced Sleuth-Hound, a tool kit for Digital Equipment Corp. PDP-11 system managers who need to troubleshoot user terminal problems or manipulate user terminals on DEC RSTS/E operating systems.

Sleuth-Hound is said to reduce the time needed to support terminal users. It allows support personnel to determine immediately the proper diagnosis of terminal problems. In addition, the software is said to provide hard-copy documentation of telephone line transmission noise.

The product can be applied to troubleshoot any configuration, including local 20-mA, local and remote EIA circuits. Dial-up and leased lines are supported, and diagnostic tests are provided to identify problems that might occur in communications components, a spokesman said.

Sleuth-Hound also provides a method to examine what a user is typing at a remote location, force data to a terminal as though the user typed it and send messages to the screen of a remote terminal, according to the vendor spokesman.

The product costs $349 from Orbis, located at 174 Armistice Blvd., Pawtucket, R.I. 02860.



Manufacturing Module Out for RMS/38 Line

OAK BROOK, Ill. — Professional Computer Resources, Inc. has announced a manufacturing module for its RMS/38 line of software for the IBM System/38 processor.

The RMS/38 manufacturing module reportedly conforms to standard material requirements planning (MRP) principles and contains seven applications that can be purchased separately, including product standard costing, inventory control and purchasing, master production scheduling, MRP, shop floor control and costing and capacity requirements planning.

Written in RPG-III, the system is said to feature relational data base design and maintenance mode of logical files. It is reportedly an online, interactive system for accessing the data base and generating user-defined reports, inquiries and graphics. The manufacturing module can be integrated with other RMS/38 modules, including the distribution and financial modules.

The individual applications of the RMS/38 manufacturing module are priced between $8,000 and $15,000 from Professional Computer Resources, which is located at 2021 Midwest Road, Oak Brook, Ill. 60521.

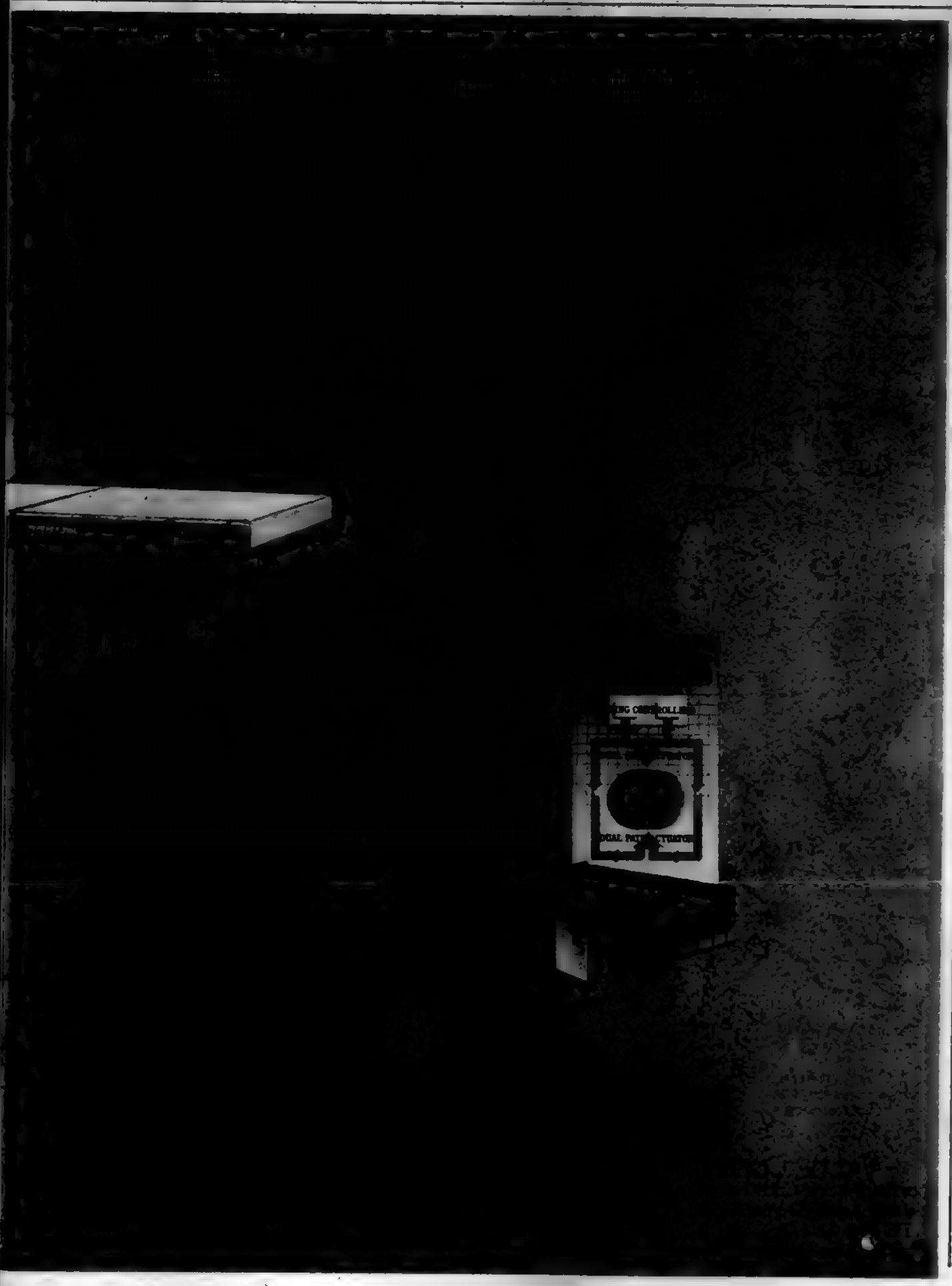
BSO System Tests 68000 Software

WALTHAM, Mass. — Boston Systems Office (BSO) has announced the BSO/Debug system for testing and modifying Motorola, Inc. 68000 microprocessor software.

According to the vendor, the system incorporates a symbolic debugger for use by assembly language and BSO/Pascal programmers. BSO/Debug features include support of programs as large as 16M bytes, program patch ability while debugging, unlimited trace data storage capability and user-definable instructions.

Reportedly, BSO/Debug allows users to examine and modify variables and memory locations, and trace and breakpoints can be set upon modifications to variables as well as symbolic locations. The debugger is available on the Digital Equipment Corp. VAX-11, PDP-11 and Micro PDP-11 computers under DEC's VMS, IAS, RSX and RSTS operating systems.

The BSO/Debug for the Motorola 68000 microprocessor is licensed for $5,000 from BSO, which is located at 469 Moody St., Waltham, Mass. 02154.



Execucalc Gets Option

NEW YORK — Parallax Systems, Inc. has released a color, business graphics option for Execucalc, its mainframe spreadsheet program.

The graphics option was designed to allow IBM VM and MVS users of Execucalc to plot results from the spreadsheet in line graphs, bar charts, histograms, pie charts and high/low/close graphs.

The graphics option may be licensed for $5,000 with Execucalc or as a stand-alone product for $6,000, the vendor said.

IBM Graphic Data Display Manager software is required to operate the graphics package.

Parallax Systems is located at 60 W. 9th St., New York, N.Y. 10011.

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Dmas Application Package Gets Update

WARWICK, R.I. — Daily & Wolcott, Inc. has announced Version II of its Multi-Company Support System for use with IBM's Distributors Management Accounting System (Dmas) II on IBM System/34 and System/36 small business computers.

The enhanced package is said to allow users of Dmas II to process up to 10 separate companies and is designed to allow transaction registers to be printed for each company in the installation. The vendor said Version II offers a significant reduction in processing time, and users will be able to run multicompany registers as often as necessary providing the Dmas II registers have not been run.

The vendor said a logical flow has been introduced with the package that allows a user to make necessary modifications. The Multi-Company Support System does not modify any of the IBM code.

Version II is priced at $750 for the System/34 and $850 for the System/36, including source code, according to the vendor. Daily & Wolcott is located at 120 Lavan St., Warwick, R.I. 02888.

From IBM System/38

Fusion/4 Adds Micro Interface

LARKSPUR, Calif. — Fusion Products International recently announced that Fusion/4 Version 2.0 contains an IBM Personal Computer interface allowing nontechnical users to produce reports and queries from any data resident within an IBM System/38.

Using Fusion/4, users reportedly can create interchange files compatible with the virtual diskette feature of the IBM Personal Computer; the files can contain data from up to 10 System/38 files.

Output files developed with the package's retrieval processor reportedly can be reformatted to interface with any program in the system and pass data between two data files.

Fusion/4 is available for $5,000 from Fusion Products International, 900 Larkspur Landing Circle, Larkspur, Calif. 94939.

Finance Tool Introduced For Prime Users

OAK BROOK, Ill. — Business Model Systems, Inc. has announced a version of its Business Modeler financial planning and control system for Prime Computer, Inc. computers.

Some features of the system are the Minitplan subsystem, which is an electronic spreadsheet with 9,999 lines by 97 col. able to be displayed on a single spreadsheet; formatted screens with full prompting; number of models limited only by disk capacity; report generator that allows users to design, modify and produce reports; and ability to transfer data from one model to another, according to the vendor.

The price is $14,000 from Business Model Systems, 2625 W. Butterfield Road, Oak Brook, Ill. 60521.

Enhanced Editor Unveiled, Runs On Series/1 EDX

SAN FRANCISCO — H & A Computer Systems, Inc. has announced Series/1 Super Editor, an enhanced version of the company's full screen editor, Exedit.

The release runs on IBM's 3101 block-mode terminals as well as 4978 and 4979 terminals. Some of the product's commands include tabbing, global find and change, explicit data set allocation, full screen paging control, viewing other files, list volume directory, load another program and fast merge from other files, the vendor said.

Exedit works with the Series/1 EDX operating system Versions 3 and 4 and is priced at $590 for each Series/1 or $2,590 for a corporate license.

Further information is available from H & A Computer Systems, Suite 204, 30 Hotaling Place, San Francisco, Calif. 94111.

Software Guide Out For IBM Micros

PRIOR LAKE, Minn. — Micro-Information Publishing has introduced "The Software Guide for IBM Personal Computers & XT."

The 1,036-page directory contains product descriptions for over 2,950 programs from over 1,165 software vendors, a spokesman said. Designed to help IBM Personal Computer owners locate and compare the functional value of any class of programs, the directory also contains contact information and pricing for every program listed, the vendor said.

The guide costs $19.95 from Micro-Information Publishing, 15420 Eagle Creek Ave., Prior Lake, Minn. 55372.

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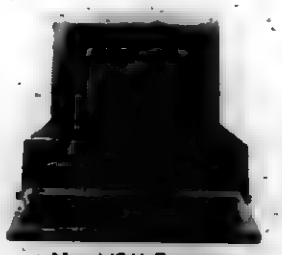

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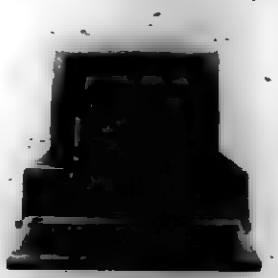
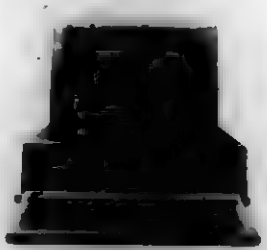
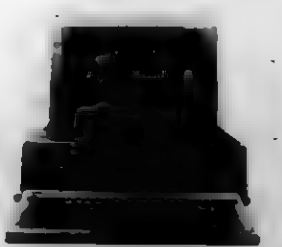


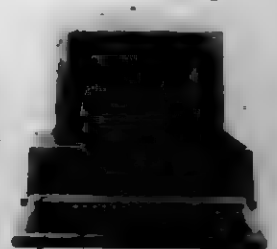
3. Access entire mainframe files, so you can work with large amounts of information at one time.



4. Choose the exact mainframe information you need, as much as you need, in the form you need.



5. Use it with Peachtree Software, 1-2-3™ from Lotus, DIF,™ VisiCalc™ or other micro software.



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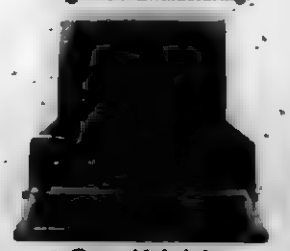

8. Or establish dial-up access with regular telephone lines.

9. Interface mainframe data directly to typewriters, graphics plotters, and printers...

10. And automate your office economically.

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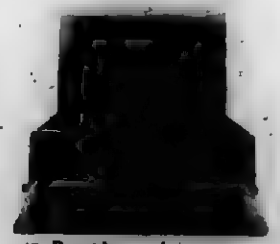
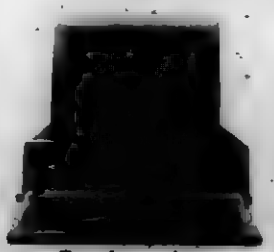
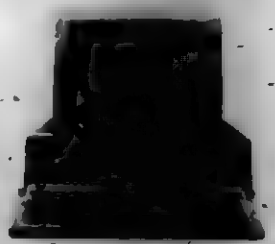
12. Give executives the management tools they need with Executive Peachpak II...



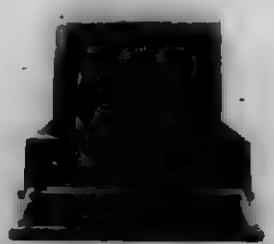
13. Provide word processing and mainframe access to administrative assistants with Administrative Peachpak...



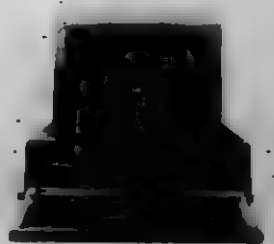
14. Give the graphic arts department direct mainframe access with Graphics Peachpak.



15. Save time because mainframe data is automatically loaded into your PC...

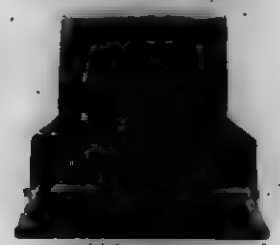


16. So you free up data processing resources...



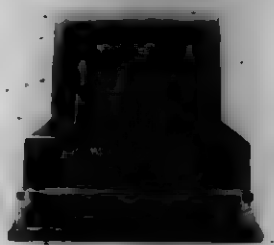
17. And you don't have to key in data yourself.

18. Use MSA's Manufacturing Systems data to produce a cost/margin analysis with PeachCalc...

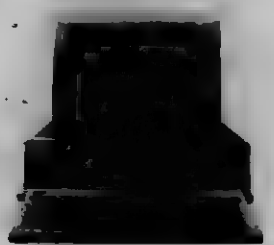


19. Make a capacity analysis using a PC and mainframe manufacturing information...

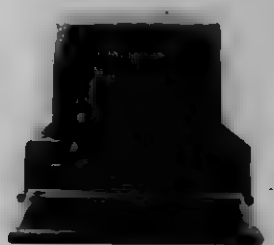
20. Summarize your findings in a report using PeachText...



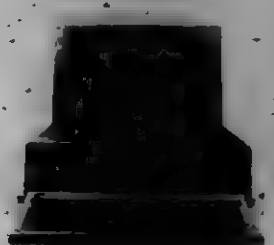
21. Eliminate spelling errors with a built-in Spelling Proofreader.



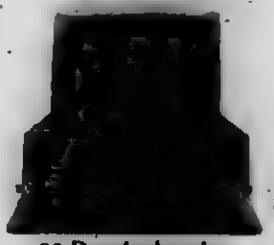
22. Analyze overtime percentage on your PC, using data from MSA's Payroll/Personnel System...



23. Make timely manpower adjustments to maximize productivity...

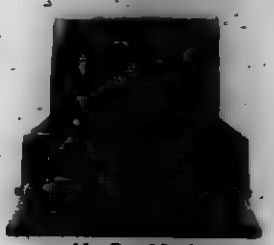


24. And revise departmental salary projections on your PC.

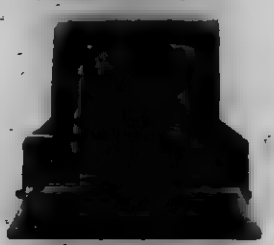


25. Download vendor history from MSA's Accounts Payable System...

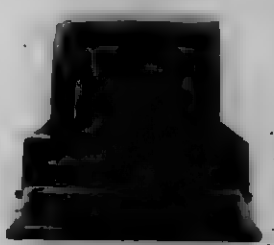
26. And use PeachCalc to do comparative analysis.



27. Use PeachLink to download information from both MSA and non-MSA online mainframe systems...



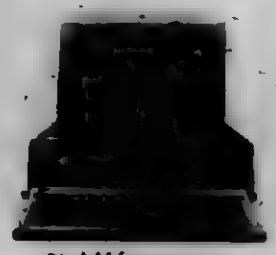
28. Create custom online formats with Easy-Screen.™



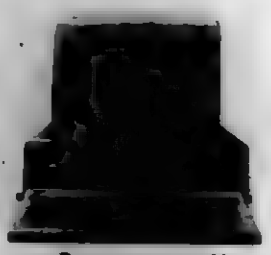
29. Or use standard formats provided by MSA.

30. Download a financial report from the mainframe to your PC...

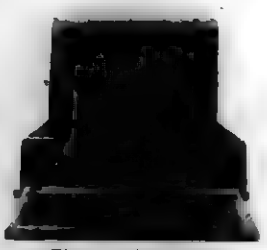
Turn Page ▶



31. Add footnotes to a balance sheet using PeachText...

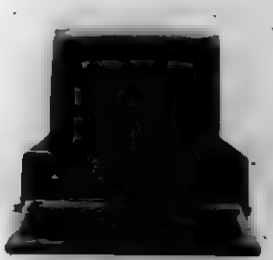


32. Project next month's income with PeachCalc...

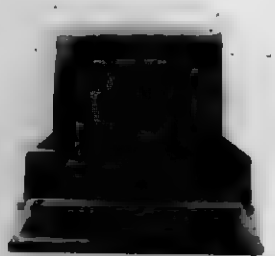


33. Change sales estimates and recalculate income projections instantly.

34. Download names and addresses from your mainframe...

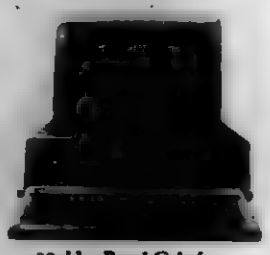


35. Use the List Manager and PeachText to do a mailing informing customers of a special announcement...

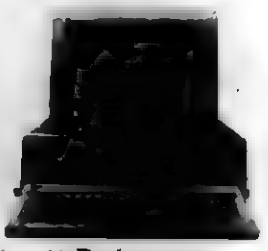


36. Or create a mailing to vendors requesting bids.

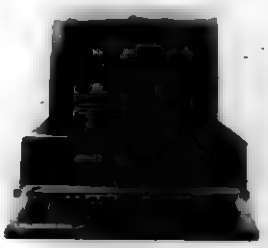
37. Using personal computer telecommunications, access up-to-the-minute exchange rate information...



38. Use PeachCalc for float analysis...

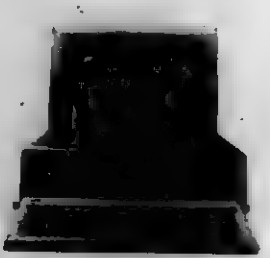


39. Display current exposure with a graph...



40. Update MSA's mainframe Foreign Exchange System.

41. Use PeachLink to distribute mainframe data to your other offices across the country...

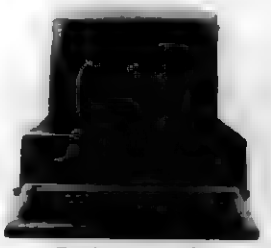


42. Use a PC at those remote locations to print reports...

43. Graph expenses by location, department or by a single product line...

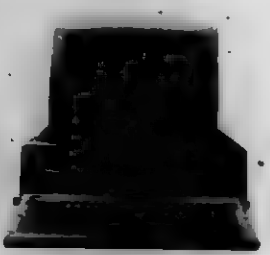
44. Print checks in remote locations from mainframe Accounts Payable data.

45. Create a salary administration worksheet on a PC using MSA's Payroll/ Personnel System...



46. Produce a workforce utilization model using PeachCalc...

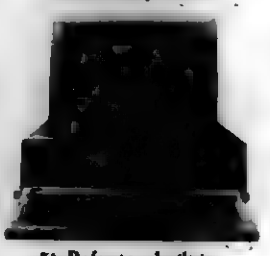
47. Monitor turnover using Business Graphics...



48. And, for a printed copy, route your Business Graphics output to a plotter or printer.

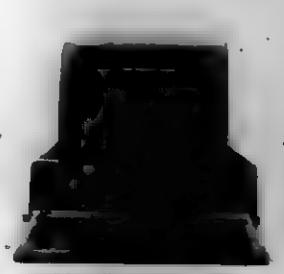
49. Use PeachLink to get economic data from MSA's Forecasting and Modeling System...

50. Use PeachText to prepare a corporate planning policy document...



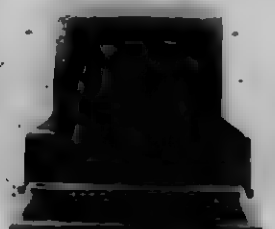
51. Refer to a built-in Random House® Dictionary while writing the report.

52. Link to mainframes under operating systems OS, DOS, and SSX...

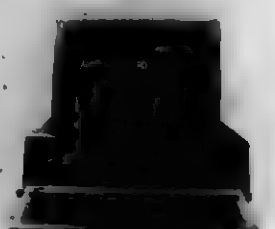


53. Use all standard online monitors, including CICS, IMS-DC, IDMS-DC, TSO, CMS and ICCF.

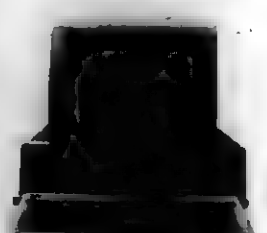
54. Assist your auditors by giving them access to mainframe data...



55. And the convenience of PeachText word processing...



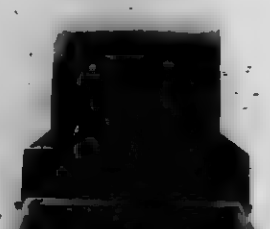
56. Give them access to current customer and vendor information for letters of confirmation...



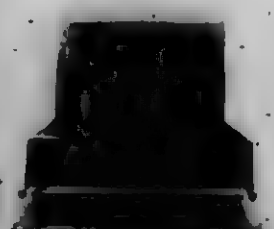
57. And an easy way to prepare notes to consolidated financial statements using PeachText.

58. Extract delinquent customer invoice information from your Accounts Receivable System...

59. Personalize a dunning letter with your micro software...



60. For help, call up 30 synonyms instantly using PeachText's Random House® Thesaurus.

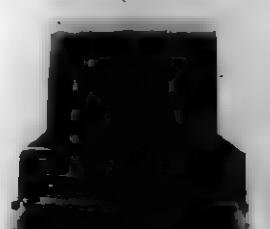


61. Use mainframe Inventory and Purchasing data to graph inventory use by department on your PC...

62. Make a purchase order adjustment without leaving your workstation.

63. Download current balances from General Ledger to graph actual vs. planned...

64. Do a breakeven analysis by department.



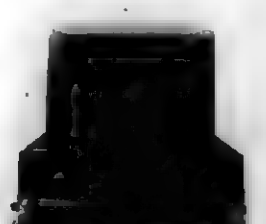
65. Analyze overtime percentage by department on the PC using MSA's Payroll/Personnel System...

66. Use PeachText to prepare a memo summarizing your analysis and attach it to a graph.

67. Download employee data for an upcoming salary review...

68. Complete the salary review on your PC...

69. Enter the salary adjustment from your PC to the mainframe...



70. Make salary projections on your PC using mainframe payroll data.

71. Capture data from MSA's Fixed Assets System...

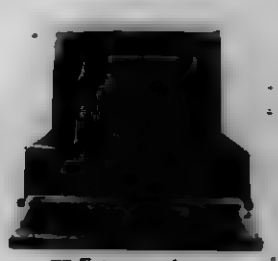
72. Use PeachCalc to create a lease

73. Perform a TEFRA depreciation analysis.

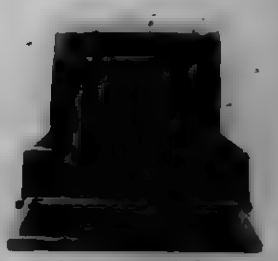
74. Get database-to-database transfer with Database Sharing...

75. Download an entire report with the touch of one key...

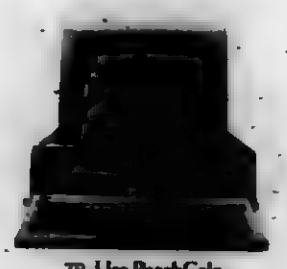
76. Access it instantly, without data processing involvement...



77. Enjoy a realtime environment, no waiting for batch processing.



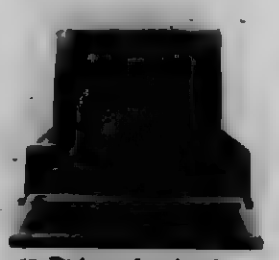
78. Access available funds data in MSA's Budgetary Control System...



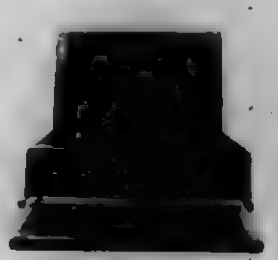
79. Use PeachCalc to project expenditures through year-end.

80. Download data from MSA's Capital Expenditure Tracking System...

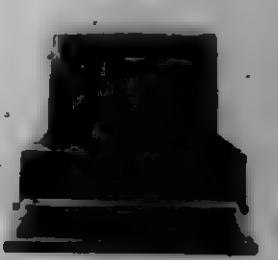
81. And analyze cash flows for an investment analysis decision.



82. Dial up subscriber databases to access current [illegible]



83. Use PeachCalc to analyze information and set credit limits...



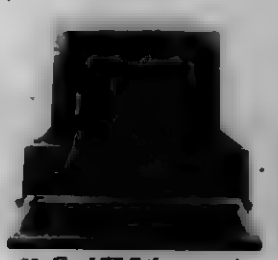
84. And update your mainframe Accounts Receivable data.

85. Allow only authorized personnel access to the mainframe, due to built-in security.

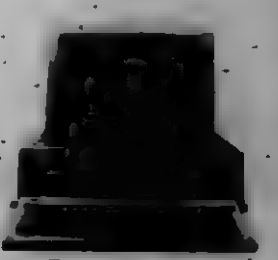
86. Instantly express numbers in bar, line and pie charts or other business graphics.

87. Add footnotes to mainframe reports, or customize mainframe documents.

88. Produce up to nine different kinds of graphs and charts with mainframe information.



89. Get HELP if you need it, with a built-in feature that guides you through the system.



90. Organize your information and mailing lists with your own List Manager.

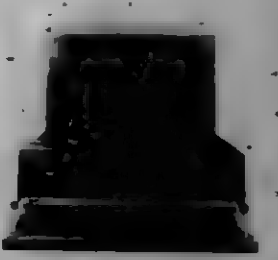
91. Use mainframe information with the Business Graphics System to produce slides and transparencies.

92. Work productively at home, by dialing up the mainframe from your own personal computer.

93. Make late changes to reports generated on the mainframe.

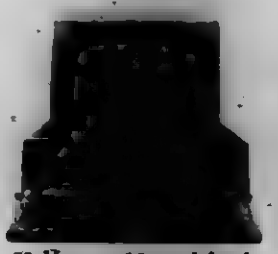
94. Do budget forecasting using PeachCalc and your PC.

95. Review profit and loss [illegible] notice on your PC.

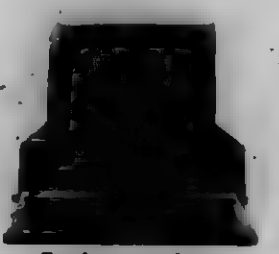


96. Improve the productivity of your staff with simple-to-use software for personal computers...

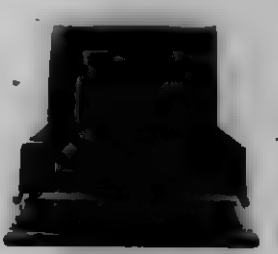
97. Enjoy the convenience of a complete menu-driven system...



98. Use over 20 pre-defined applications from MSA.



99. Put this new technology to work for your company immediately...



100. Install it in less than one hour.

Backlogs? Rush requests? Now they're a thing of the past.

MSA's new Executive Peachpak II™ links your company's personal computers directly to your mainframe. So executives can get to vital information without waiting for print-outs.

Best of all, this hot new technology is available from MSA *right now.* (In fact, it's already working for companies across the country.)

Ideal for use with the newly announced IBM® 3270-PC

While other companies are still trying to work the bugs out of their initial offerings, MSA already has its *second* successful mainframe-to-micro product: Executive Peachpak II.

It offers such advanced features as Database Sharing, MSA's database-to-database transfer technology that lets you get all the mainframe information you need instantly.

And a Universal Interface with most micro software packages including Peachtree Software, 1-2-3™ from Lotus, and VisiCalc.™

Executive Peachpak II also includes PeachCalc,™ an electronic spreadsheet. A Business Graphics System for color charts and other graphics. Telecommunications that let personal computers talk to each other—or link to resources such as Dow Jones News/Retrieval.® PeachText,™ a complete report production system that lets executives edit and footnote reports. A List Manager for organization. And PeachLink,™ the software that links your PCs to the mainframe.

This mainframe-to-micro technology is also available in two other packages: Administrative Peachpak, which includes comprehensive word processing functions. And Graphics Peachpak, for color graphs and charts.

MSA's revolutionary new link means you can now deal with one software company that supplies all the advanced mainframe and micro systems your company needs. And the software that links them together.

Free personal computer...

...with your qualifying purchase of MSA mainframe software and Executive Peachpak II.

For details on how to get your free personal computer contact Robert Carpenter at (404) 239-2000. Or write "Free Computer Offer," Management Science America, Inc., 3445 Peachtree Road, N.E., Atlanta, Georgia 30326. This offer expires December 31, 1983, so act today.

MSA
The Software Company

Only MSA makes the mainframe link to personal computers this productive

Executive Peachpak II and PeachLink are trademarks of Management Science America, Inc. PeachCalc and PeachText are trademarks of Peachtree Software, Inc., an MSA company. DIF is a trademark of Software Arts, Inc. 1-2-3 is a trademark of Lotus Development Corp. VisiCalc is a trademark of VisiCorp, Inc. Random House is a registered trademark of Random House, Inc. Dow Jones News/Retrieval is a registered trademark of Dow Jones & Company, Inc.

Compiler Enhancements Out For RPG-II on System/36

FALLS CHURCH, Va. — Dexel Systems Corp. has introduced four RPG-II compiler enhancement packages for the IBM System/36.

The packages may be used in conjunction with each other or separately. Features include the ability to evoke another System/36 job or submit a job to the job queue from within an RPG program; access diskettes directly from the diskette reader in an RPG program; close and reopen a disk or printer file in an RPG program; and read the System/36 disk volume table of contents, according to a vendor spokesman.

Each package costs $395, with a $100 discount per additional package ordered from Dexel Systems at 5203 Leesburg Pike, Falls Church, Va. 22041.

Runs on Burroughs Machines

On-Line Program Generator Bows

FLAGSTAFF, Ariz. — Flagstaff Software, Inc. has announced the Screen-Dynamics system, which is an on-line program generator for the Burroughs Corp. B1000, B5000 and B6000 series computers.

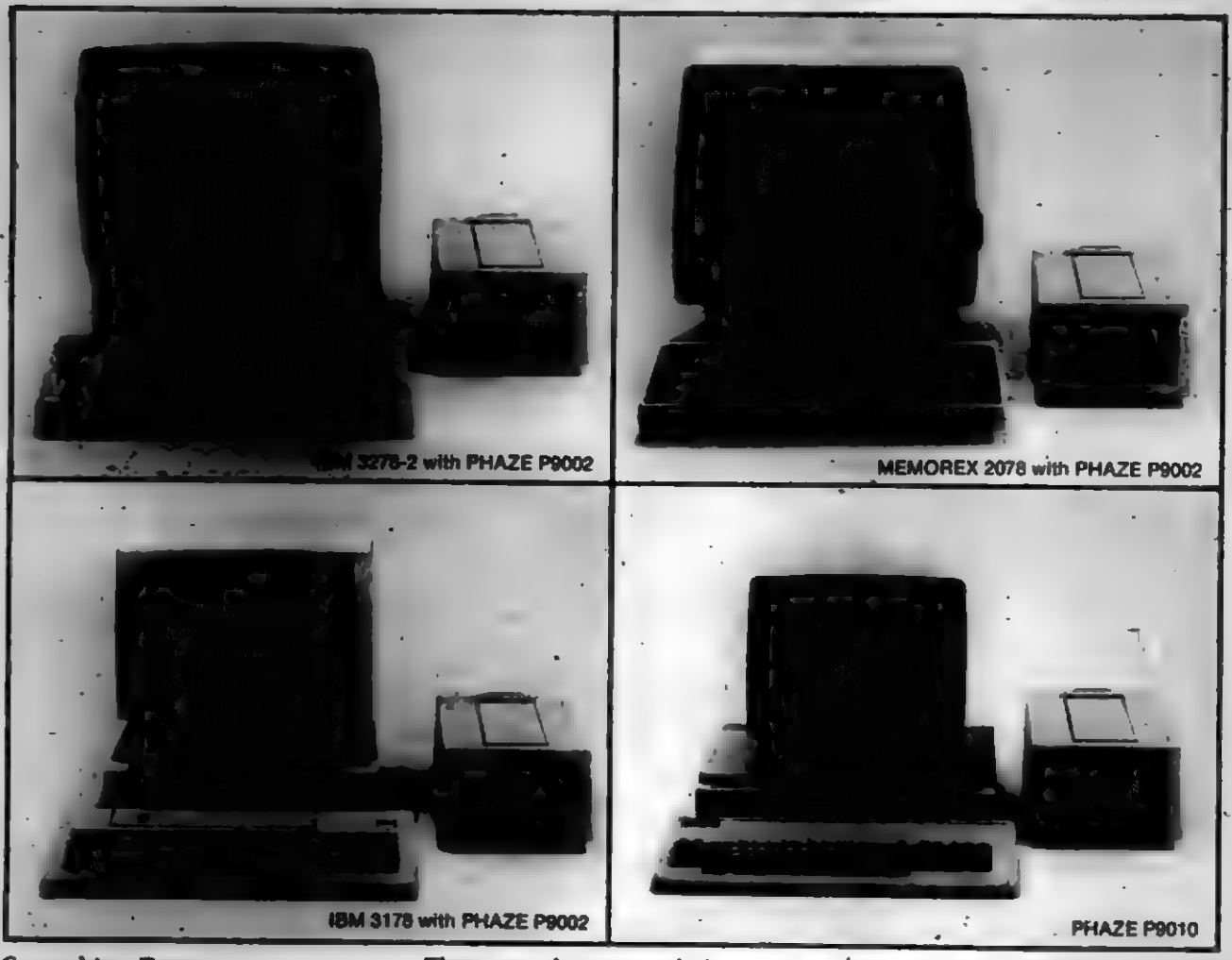
The vendor said the package allows programmers to create executable Cobol on-line programs faster than by hand-coding, and it produces programs incorporating multiple screens in various hierarchies of design. It is available in either a Cobol 68 or Cobol 74 version.

With Screen-Dynamics, the programmer paints screen formats on the CRT screen, specifying hierarchical relationships and program parameters. The package is said to offer a maintenance feature that provides a method for modifying an existing screen in any program.

Screen-Dynamics is priced at $750 from Flagstaff Software, 114 N. Leroux, Flagstaff, Ariz. 86001.

Now, Personal Computing Power on any 3270 Compatible Terminal.

From PHAZE.



Something Better.

Our P9002 Information Processing Facility is a PC-compatible computer upgrade that can attach directly to any 3270 controller-based system. And, unlike some of our competitors, our computer attaches not only to our own P3278 terminal, but to the entire range of 3278 plug compatible terminals — IBM 3178 and 3278, Telex and Memorex. That provides you with something more for your money. Something better.

Industry Standard Software.

Not only does the P9002 upgrade your 3278 terminal to a personal computer, but it also uses industry standard software, like MS-DOS and CP/M-86. That means that you get the benefit of software available for the IBM Personal Computer.

Upgrade It Yourself.

The P9002 features a computer and diskette module with two 320Kb disk drives. It connects directly to the terminal and the controller via standard coax cable and the entire installation can be done in less than 60 seconds. Without tools. And since the P9002 utilizes an IBM 3278 or equivalent for its keyboard and display, the operating configuration remains unchanged, so there is no operator retraining.

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'Multi-Lock' Controls Data Access

LAWRENCE, Mass. — Genesys Software Systems, Inc. has introduced Multi-Lock, a security module for the company's on-line Human Resource Management System. The module is a multiple-level security system, which allows users to be authorized to have partial access to data within a level, according to the vendor.

The system is based on an unlimited number of security "locks," each of which can contain an infinite variety of confidential statements or rules, the vendor said. Prior to Jan. 1, the price is $35,000. After Jan. 1, the price will be $40,000.

Genesys Software Systems is located at 10 Grafton St., Lawrence, Mass. 01843.

Guide Aids In Assessing MRP System

NATICK, Mass. — R. Michael Donovan, Inc. has announced the publication of "MRP: Is It Worth It?", which the vendor said is a guide to assessing the potential benefits of a computer-aided manufacturing resource planning (MRP) system.

The publication reportedly focuses on the benefits of MRP in terms of its effect on several corporate measures, offering tools to assess the impact of an MRP system on profit, the balance sheet, cash flow and financial ratio performance. The publisher said the publication is designed to provide clear guidelines for assessing the performance of an MRP system.

Topic areas covered in the publication include: "Planning and Control — The Key Objectives," "The Benefits and Costs of MRP," "Return on Investment," "Financial Analysis — Before and After," "Estimating Costs and Benefits" and "Projected Cash Flow."

Copies of the publication can be obtained for $2 each from R. Michael Donovan through P.O. Box 621, Natick, Mass, 01760.

For 4100 Series Users

Tektronix Drafting Package Out

BEAVERTON, Ore. — Tektronix, Inc. has announced the Plot 10 computer-aided drafting software for users of the company's 4100 series of locally programmable computer display terminals.

The vendor said the Plot 10 package can enhance the 4100 terminals with drafting functionality, enabling users to create engineering drawings, illustrations and presentation overheads. The package reportedly runs locally under Digital Research, Inc.'s CP/M 86 operating system in Tektronix local programmability.

Plot 10 reportedly is designed to utilize features of Tektronix terminals and access dynamic graphics which speed image construction and allow pictures and text to be moved around the screen. The hardware's local memory enables any portion of the drawing to be locally stored and redrawn with changes. Local zoom and pan enable the enlargement of any section of the drawing to show detail.

License fee for the Plot 10 system is $1,600 from Tektronix, through P.O. Box 500, Beaverton, Ore. 97077.

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IBM Micro Gets 'Perfect Link'

BERKELEY, Calif. — Perfect Software, Inc. has announced Perfect Link, a telecommunications program for the IBM Personal Computer that allows communications with electronic mail systems, information services and other computers.

The system is preconfigured to work with eight popular information and communications services, a spokesman said. An automatic dialing and logon capability allows users to define all relevant parameters for one-button access. The product is compatible with Perfect Software's Perfect Writer word processing package.

A new, wireless disk file transfer system allows the Personal Computer to read and write diskettes from computers using Digital Research, Inc.'s CP/M and CP/M 86 and Microsoft, Inc.'s MS-DOS operating systems, the spokesman said.

In addition, Perfect Link can transfer files via modem to practically any communications system, utilizing the X-Modem protocol transfer standard, the spokesman said.

Perfect Link costs $149 from Perfect Software, 702 Harrison St., Berkeley, Calif. 94710.

Tools Offer DEC Conversion

LONG BEACH, Calif. — The PI Consulting Group, Inc. has announced a package of development tools to convert Point-4 Data Corp.'s Interactive Real-Time Information System to run on Digital Equipment Corp.'s PDP-11 and VAX-11 systems.

PI Consulting's programs provide for the conversion to DEC's RSX-11M, RSTS/E and VAX/VMS.

The average price for the conversion of 100 modules is between $15,000 and $25,000. PI Consulting Group is at 5150 E. Pacific Coast Highway, Long Beach, Calif. 90804.

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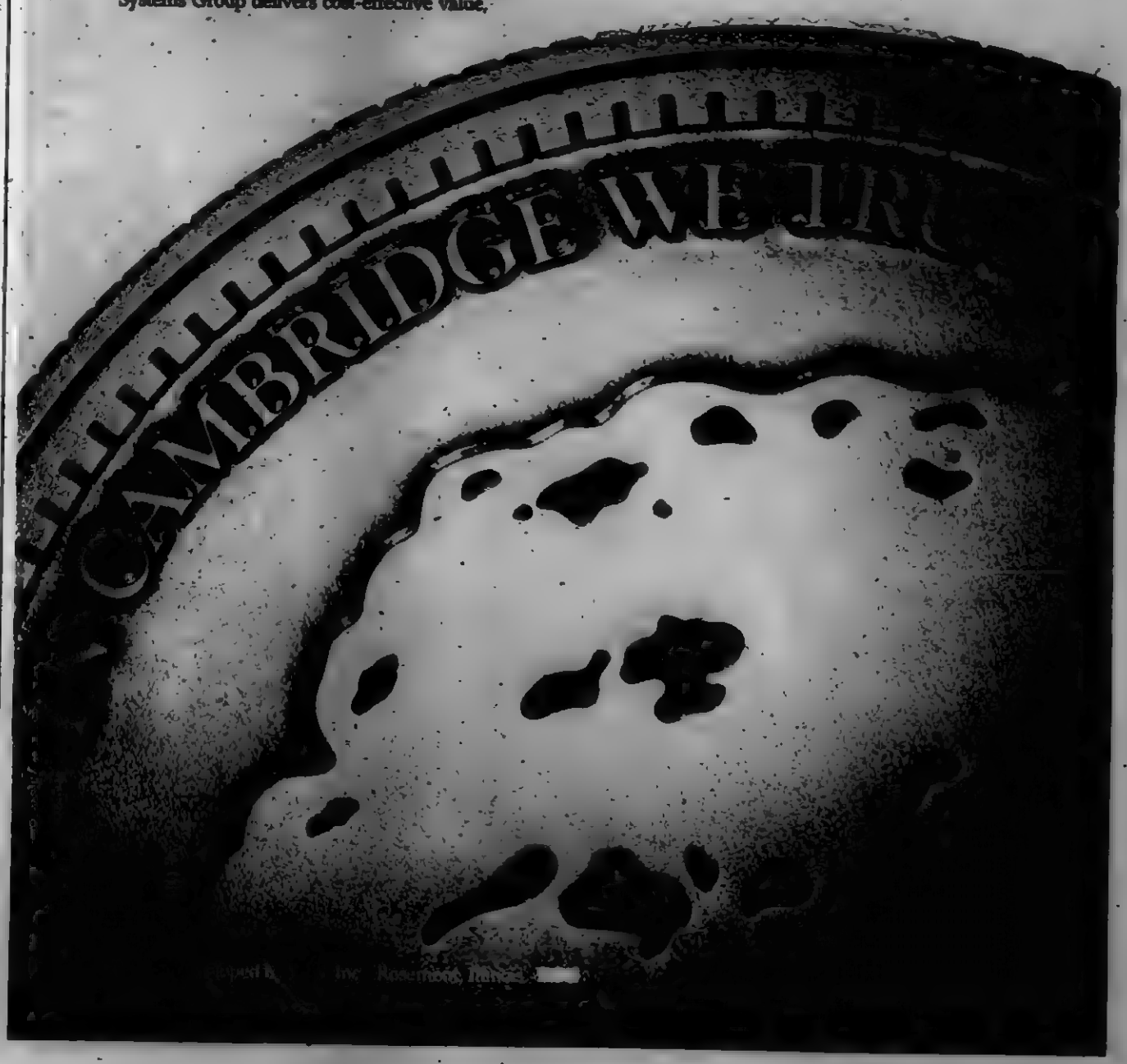
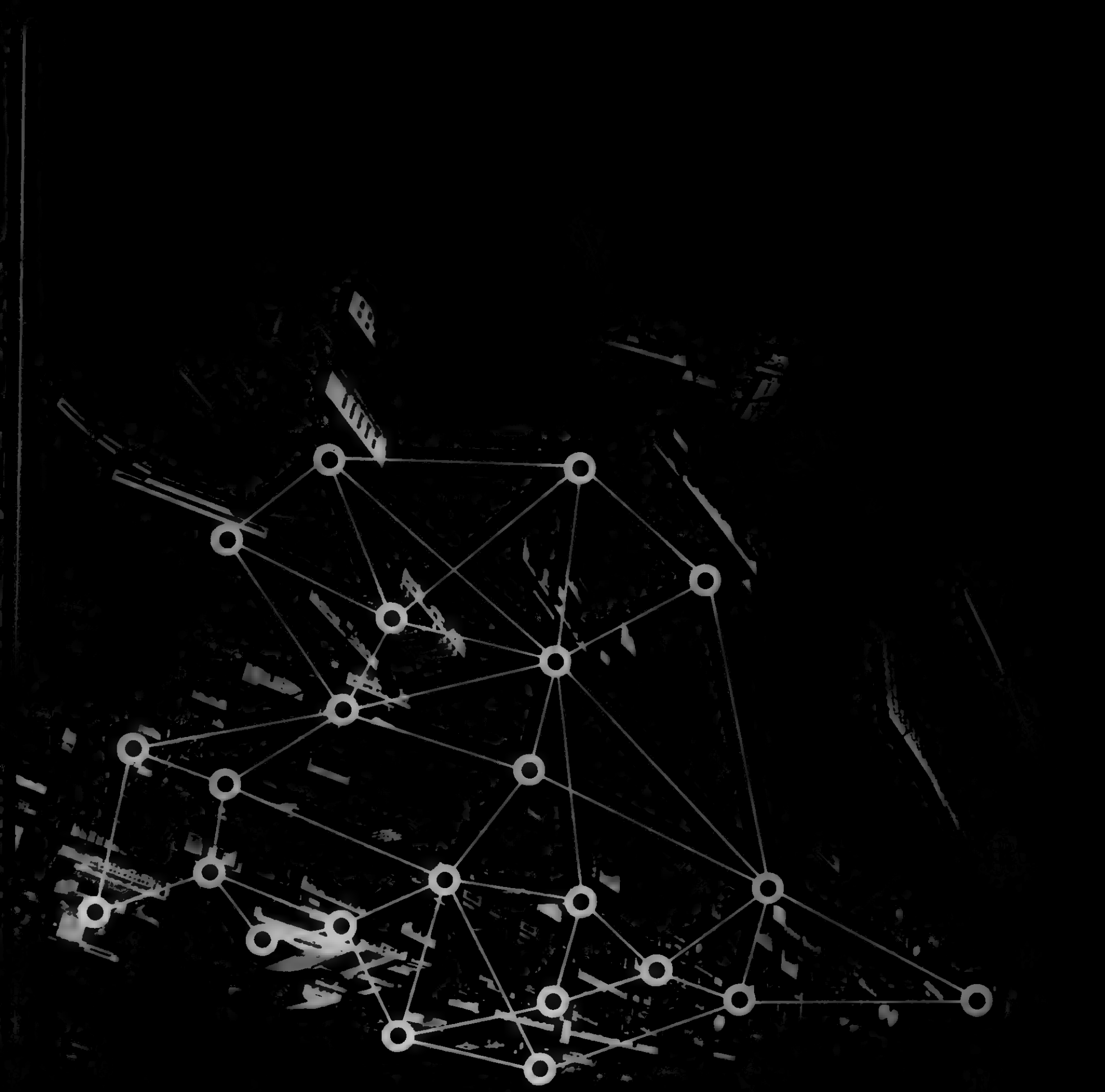
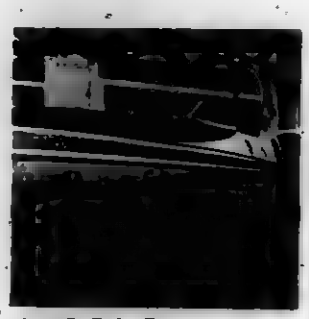


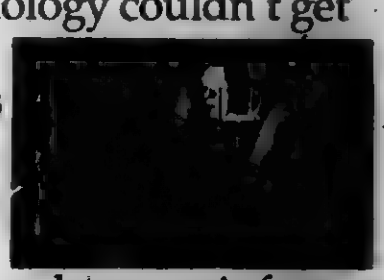


At NASA's Ames Research Center, hundreds of scientists share hundreds of programs on one large computer network:

Digital's.



Aircraft design. Space biology. Computational fluid dynamics. Infrared astronomy. Interplanetary exploration. At NASA's Ames Research Center, the technology couldn't get more advanced. That's why Ames scientists share a network of over 50 of Digital's computers and two large mainframes.



Everyone on the Ames network has access to almost every computer on it. Researchers share not only data, but software, utilities, and peripherals as well. A program written anywhere is often useful everywhere on the network, so there is practically no duplication of effort and almost no need to retrain users when new programs are added. The savings, in time and money, are substantial.

The Ames network is an open-ended system. It has grown from one computer to over 50 in just eight years, with minimal disruption of service during its continuous expansion. Thanks to Digital's compatibility, even across generations, it wasn't necessary to replace any of Digital's computers. They simply added to them.

So if you're considering a network,

talk to Digital. We'll show you how you can start as small as you want. And grow as large as you need.

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Facilities Control System Backs IBM Series/1 Mini

NATICK, Mass. — Inconix Corp. has announced the General Purpose Automation Executive (Gpax), said to be a facilities control system for the IBM Series/1 minicomputer.

According to the company, the package gathers and analyzes data and performs control actions to conserve energy and maintain space environments. It is said to be suited for general-purpose, sensor-based process control applications, and it operates on the Series/1 under the Event Driven Executive.

The package is designed for use with Inconix's Cinch-Pac intelligent, distributed single-board controller and its Cinchnet local-area network as a distributed front end.

Gpax is priced at $5,000 from Inconix, 10 Tech Circle, Natick, Mass. 01760.

'Library Scan/Replace' Unveiled for System/34, /36

ALBANY, Ga. — The firm of 34/36 Ware has announced the Library Scan/Replace System for users of the IBM System/34 and System/36 processors.

According to the vendor, the menu-driven system allows users to locate and replace any string of up to 16 characters in procedure or source members. All scan and replacement processing reportedly occurs in a work file created from group members within a library or from the entire library, and the user's library is not affected until the user reviews a listing of modifications to the work file and selects a menu option to return the work file to the original library.

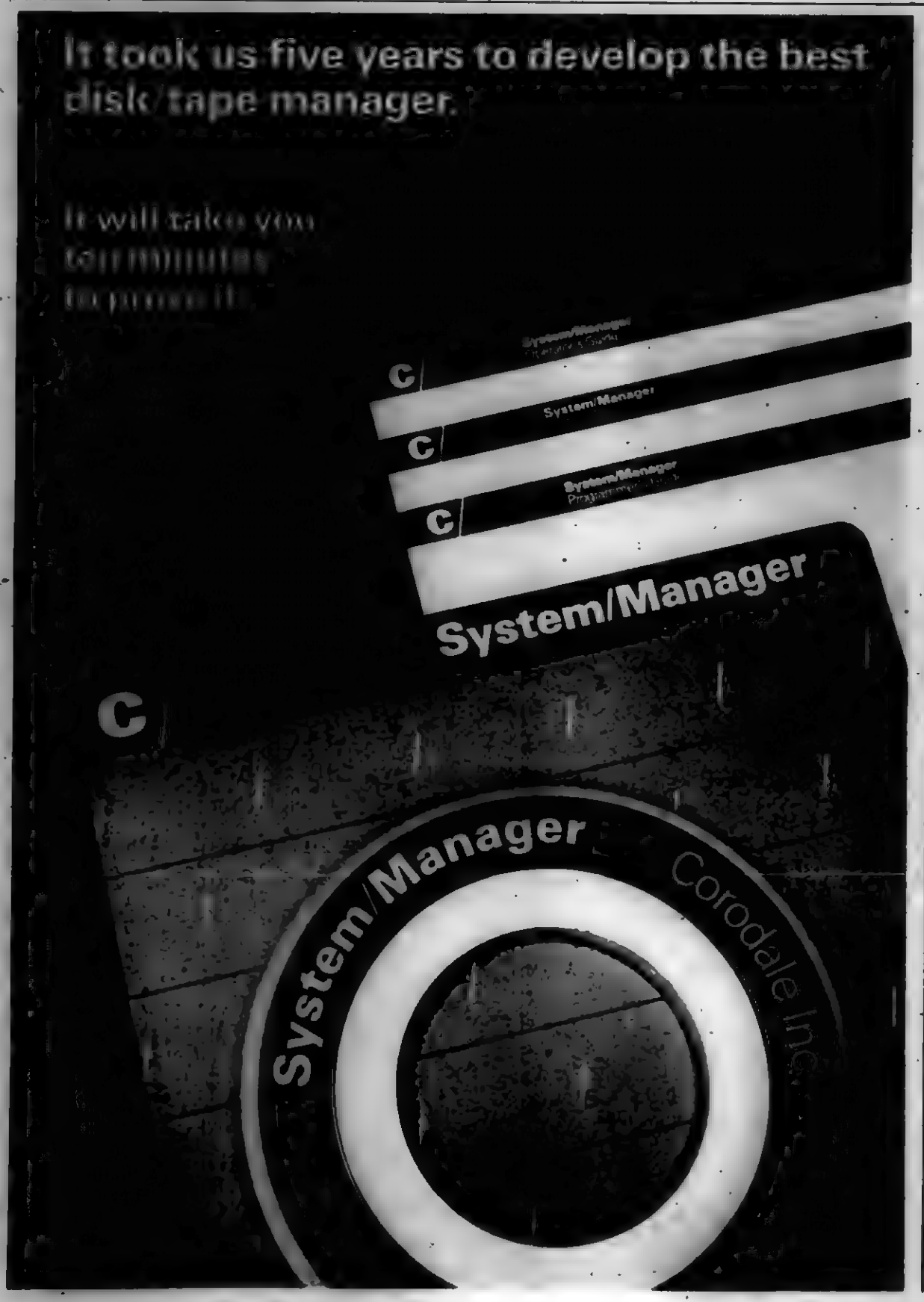
The system is priced at $149 from 34/36 Ware, 213 Lockett Station Road, Albany, Ga. 31707.

Crwth Updates 'Using ADRS II'

SANTA MONICA, Calif. — Crwth Computer Coursewares has announced an updated version of its Using ADRS II, an interactive tutorial system developed for users of IBM's ADRS II departmental reporting system.

According to the vendor, the system is compatible with IBM's Interactive Instruction System; Goal Systems International, Inc.'s Phoenix presentation system; and Boeing Computer Services Co.'s Scholar/Teach 3 presentation system. It is said to simulate ADRS II and enables users to execute commands to create a data base and fill it with data.

The 10-hour course can be leased for $2,800 a year or purchased for $6,000 from Crwth at Suite 200, 613 Wilshire Blvd., Santa Monica, Calif. 90401.



ATS Course Covers System/38

WOODLAND HILLS, Calif. — Automated Training Systems, Inc. (ATS) has announced Advanced CL Programming, an audiovisual training course for the IBM System/38.

The course was designed around a demonstration system that combines audiocassettes with moving displays, the vendor said. Included in the course are nine audiocassettes, four manuals and workbooks with visuals and text.

The course also includes a floppy diskette, on which are sample commands and programs, a message maintenance system, a Help system and the demonstration system.

The course is priced at $795.

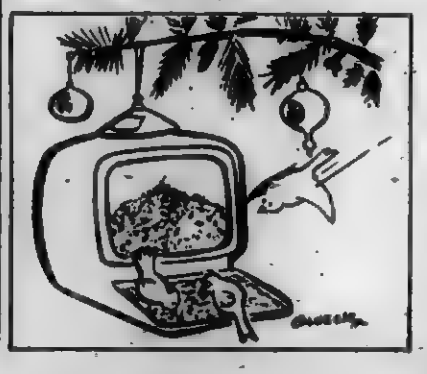
ATS is located at Suite 107, 21250 Califa St., Woodland Hills, Calif. 91367.

Kipi Unveils User Service

WHITE PLAINS, N.Y. — The American Society for Information Science and Knowledge Industry Publications, Inc. (Kipi) recently announced a data base user service.

The service features an annual print directory; data base dictionary; a monthly newsletter, "Data Base Alert"; telephone access to the editorial staff, Data Base Hotline; and Data Base On-Line Access, which will make the directory available to on-line searchers.

All services, including one free hour of search time, are available for a yearly subscription price of $185 from Kipi, 701 Westchester Ave., White Plains, N.Y. 10604.



Report Definition Language Out for MDBS III DBMS

ARLINGTON HEIGHTS, Ill. — Micro Data Base Systems, Inc. (MDBS) has announced Report Definition Language (RDL), a new facility for its MDBS III data base management system (DBMS).

RDL allows a user to specify the characteristics of a report and the prompting behavior of a program that generates the report. It also handles all sorting, control breaks, formatting and computation.

The firm has also released the Interactive Screen Definition Utility (Isdu) for its I/O manager, Screen Master. Isdu can build or revise a screen dictionary interactively, including manipulation of frames, menus, pictures, windows, colors and editing without affecting existing application programs.

Initial releases for both products will be under IBM's PC-DOS, Microsoft, Inc.'s MS-DOS and Unix on the Digital Equipment Corp. PDP-11.

List prices for RDL range from $1,400 to $2,500, depending on environment. Isdu prices range from $450 to $700, depending on environment. Both are available from International Software Enterprises, Inc., Suite 400, 85 W. Algonquin Road, Arlington Heights, Ill. 60005.

Utility Update Targets Users Of CICS/VS

MINNEAPOLIS — Davis, Thomas and Associates, Inc. has announced Release 3.1 of its DTADOC package, which the company described as an on-line print-log function utility for CICS/VS users in the DOS/VSE Release 3 environment.

Release 3.1 of DTADOC is said to feature programmed function key support, data location by character string and uppercase translation for text processing users. The package reportedly allows CICS/VS users to view the DOS/VSE hard-copy (console) file utilizing IBM's Model 3270 terminal. The vendor said users can scan the hard-copy file in any direction, selecting by partition, job name or date.

The DTADOC package can be purchased for $600 or leased for $30/mo from Davis, Thomas and Associates, Suite 301, 8800 Highway 7, Minneapolis, Minn. 55426.

Harris Enhances Graphics Tool

FORT LAUDERDALE, Fla. — The Computer Systems Division of Harris Corp. has announced Release 1.5 Patran-G interactive graphics software for users of the company's superminicomputers.

The software is a pre- and post-processor system for geometry construction, display and editing of three-dimensional finite-element models, a spokesman said. It allows design data bases for different types of engineering analyses, such as structural, thermal or dynamic, to be established using the same computer-aided design model. Substructure models can be mixed to make an entire system model.

The price is $8,000 from Harris' Computer Systems Division, 2101 W. Cypress Creek Road, Fort Lauderdale, Fla. 33309.

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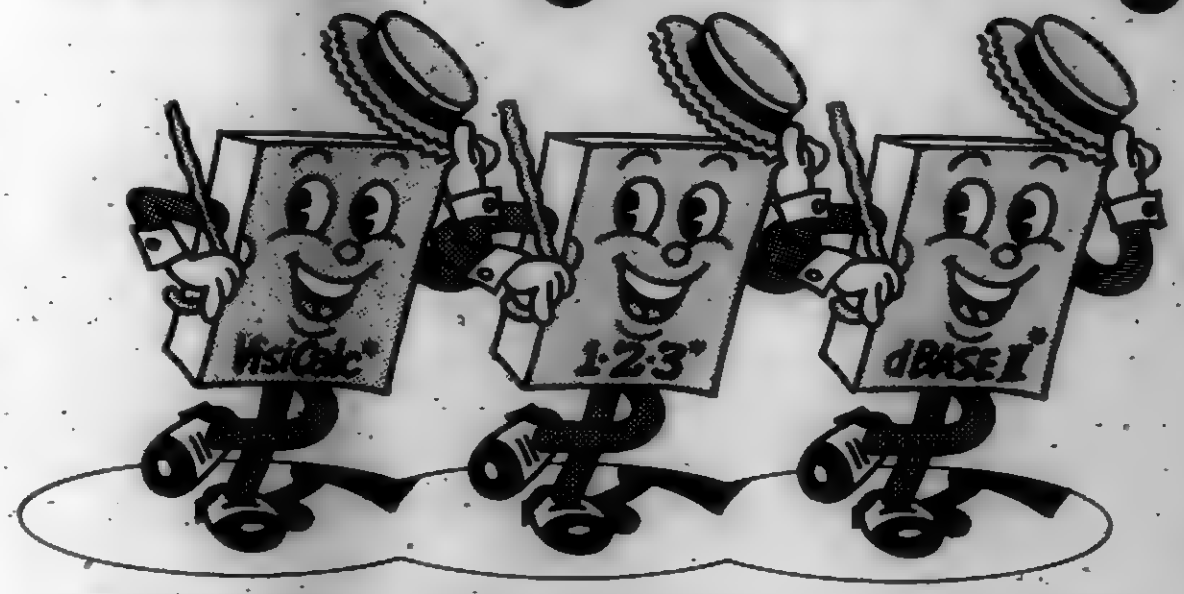

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Micro Notes

Structured Design, Inc. has introduced **Programmable Array Logic (PAL) Burner**, which reportedly combines full design, simulation and programming aids in a single product. The PAL Burner programs all currently produced PALs, both 20- and 24-pin devices, from Monolithic Memories, Inc.; National Semiconductor Corp.; Texas Instruments, Inc.; and Advanced Micro Devices, Inc. It accommodates multiple users and is compatible with virtually all computers through an RS-232C interface, the vendor said. The PAL Burner is priced at $3,000 from Suite 7, 1700 Wyatt Drive, Santa Clara, Calif. 95054.

The new version of **PIE:Writer 2.2** from Hayden Software Co. features 40 or 80 columns on a single diskette, instant transition between printing and editing modes and configures with any system. Configuration with seven of the most used 80-col. boards is reportedly automatic. PIE:Writer 2.2 requires an Apple Computer, Inc. Apple II or IIe and 48K bytes or 64K bytes of memory. It costs $149.95 from the vendor at 600 Suffolk St., Lowell, Mass. 01853.

Co-Triple Computer Systems, Inc. has announced **Pcut**, a multitasking Digital Equipment Corp. VT100 terminal emulator for the IBM Personal Computer. It provides VT52/100/102 emulation allowing full use of DEC VAX-11 and PDP-11 full-screen functions such as EDT and Phone. It also supports color and file transfer. Pcut is available for $125 from the vendor at 570 Hood Road, Unit 15, Markham, Ont. L3R 4G7.

Salvo, a fourth-generation language for the IBM Personal Computer, has been introduced by Software Automation, Inc. It combines a relational data base management system and a natural language interpreter which allows development of applications without detailed programming, the vendor said. Salvo with documentation and tutorial costs $495 from the vendor at 14333 Proton Road, Dallas, Texas 73234.

Eagle Enterprises has announced Version 3.0 of their **Citation** electronic filing system, which features improved data formats, a new interactive search capability, reduced random-access memory requirements and use of data compression techniques. Citation stores, retrieves and cross-references information in three formats: journal/periodical, book references and notes related to companies or persons. IBM's PC-DOS version for the IBM Personal Computer requires 96K bytes of memory, while the Digital Research, Inc. CP/M 80 version requires 48K bytes. Citation sells for $185 from 2375 Bush St., San Francisco, Calif. 94115.

Three Office Packages Released for Apple III Users

CUPERTINO, Calif. — In an announcement aimed at strengthening the image of the Apple III as Apple Computer, Inc.'s major office product, the firm recently jointly released three software packages for the Apple III.

The III E-Z Pieces is a word processing, data base management and spreadsheet package from Haba Systems, Inc. of Van Nuys, Calif. Up to 12 files can reside on the desktop manager, and information can be transferred from a spreadsheet or data base to a word processing document. A spreadsheet document can be created by reading Visicorp's Visicalc or Data Interchange Format files. The spreadsheet reportedly can run up to 999 rows by 126 columns. The word processor displays text on the screen as it will appear on the document. The product costs $295.

Haba's Habadex enables Apple III users to track telephone costs, store as many as 6,000 names, addresses and phone numbers, automatically dial numbers, develop mail lists and keep track of calendars and appointments. Records may be kept of all calls from a specific phone or extension. Including the Habaphone plug-in interface phone card, the product costs $595. Haba Systems is located at 15154 Stagg St., Van Nuys, Calif. 91405.

Apple and Brock Software Products, Inc. also announced the Keystroke Data Base Manager and Keystroke Report Generator. The data base is said to be powerful enough to handle most small business applications. When used with Apple's ProFile hard disk, users can access up to 32,000 records with the same response time as for a few records. The report generator enables users to take data from the data base and report it in a columnar format.

The Data Base Manager costs $249, and the Keystroke Report Generator costs $149 from Brock, P.O. Box 799, Crystal Lake, Ill.

'PC Connection' Ties DG's Iris To IBM Micro

IRVINE, Calif. — Point 4 Data Corp. has introduced the PC Connection, software that enables an IBM Personal Computer or any Personal Computer-compatible computer to operate utilizing Microsoft, Inc.'s MS-DOS operating system in conjunction with any multiuser computer that employs Data General Corp.'s Iris operating system.

According to a spokesman, the product allows the Personal Computer to be used in a stand-alone mode, employing the centralized storage subsystem of the Iris computer for programs and data files. Alternately, the user may operate with the Personal Computer as an interactive workstation performing Iris business applications.

In the Iris mode, the Personal Computer acts as a conversational Iris workstation and supports all Iris functions.

Available during the first quarter of 1984, the PC Connection will carry a licensing fee of $550. Point 4 Data is located at 2569 McCabe Way, Irvine, Calif. 92714.

Moving Out And Up to Executive Offices

By Herbert Z. Halbrecht

Is there anything inherently desirable or detrimental in training as a data processing professional for a move into profit-center management? Until recently, the prospects were slim for DP managers to be promoted into general corporate management.

Twenty-five years ago, a General Electric Co. executive predicted that one day everything would be run by or affected by computers. He forecast that virtually the whole GE headquarters building on Lexington Ave. in New York City would be a maze of computers linked to each other, creating the most colossal computer of all. Since he would be the principal architect of this computer colossus, and the only one who really could oversee its operation, naturally he would be the logical choice for company president.

Some data processing executives still hold this view. They assume that because computers and information technology affect all functions and operations of the company and because they have the intelligence to control the systems area, they can run the company.

This is not to say that a move from chief information executive (or whatever the title) to profit center general management cannot be or is not possible. But in many cases, these new general managers would probably have made the transition from whatever career they were pursuing. While information management happened to have been the particular vehicle, most attained or are attaining general management positions by mastering a major corporate resource, possessing superior people management skills and demonstrating the brains, guts and style befitting the management of their particular companies.

They have displayed an awareness not only of the business issues facing their companies but also of how their DP resources and skills can be brought to bear

IN DEPTH

on those business issues.

While coming from the information management area is now less of an obstacle to moving into senior general management in the majority of corporations, it does not provide a major advantage over experience in other significant functional areas when it comes to vying for general management positions.

However, outstanding general management opportunities are developing in enterprises where information and telecommunications technology are integral to products and services intended to provide a marketing edge. Banks and financial service organizations in particular (and insurance companies, to some degree) are moving at a breakneck pace to develop such products and services. Information technology no longer serves a strictly administrative, back-office support role.

Our experience in banking and financial services shows multiple career paths for information systems professionals. The first is, obviously, up the information services ladder. Second is a move out of information services into a product or line management capacity where banking or financial services knowledge, for example, while important, does not overshadow expertise relating to the development and delivery of the new breed of products and services.

A third opportunity is to move into strategic planning in those organizations where, again, electronic technology is critical from a marketing and product differentiation point of view. Companies as widely varied as Digital Equipment Corp., Massachusetts Life Insurance Co., Investors Diversified Service, Beatrice Foods Co., Wells Fargo Bank and Scott Paper Co. have executives in charge of strategic planning who either used to lead the information services section or still do but have added planning to their portfolio.

Many information management executives are no longer as anxious to move into top general management slots at, say, manufacturing companies as they are to take senior management positions in companies largely driven by electronics technology. In these positions, senior information professionals can achieve their general management ambitions without having to abandon their original area of expertise.

About the Author

Herbert Halbrecht is president and founder of Halbrecht Associates, Inc. in Stamford, Conn., an executive search firm specializing in management sciences.

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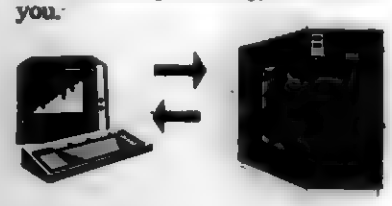

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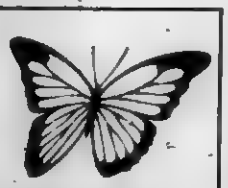

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(In Depth editor George Harrar interviewed the following executives about their career paths leading from data processing to general management.)

DuWayne J. Peterson
Executive Vice-President and Administrator
Automated Data Processing Group
Security Pacific National Bank

I started like most people in DP, with engineering, then went into sales and up through the chairs in the MIS world. But I changed companies as I moved along. I came from RCA to Security Pacific as senior VP in charge of DP, then to group executive vice-president.

You're always striving for more responsibility. I realized that I was good as a leader, with good communications skills and understanding of the businesses that I was dealing with. I was a person who got the job done. I took risky jobs and made them happen. Each time there was a feeling that I could accomplish more and more.

The only way to achieve financial results is to go into general management. You have to want to do that. The advice I give is that you should stop and take stock of what you want. General management is getting further away from technical expertise and more involved with people management and personnel. I'm good at it.

Probably the main change in style from DP to general management is managing time better. You have to be very effective with time management, be able to prioritize your work. That can be difficult to learn. If you're lucky, somebody tells you about it. But I probably learned the hard way.

I haven't walked away from the DP function. That's still part of my responsibility, but there are other things as well. This is probably the easiest way to make the switch from DP.

I'm 51 now. I report to the president. There's no other place to go. I would be less inclined to move into some other business rather than continuing to keep moving here. Somebody with my background will be the next president here. Our next president will have to come through this job. That doesn't mean I'm going to be president — I doubt I will. The next president will come from the next generation five or 10 years younger than I.

There's still the stigma of specialty about MIS, that it doesn't apply to some of the business, is not as business-oriented. I think that's wrong, and the idea will go away in another generation. You may not have an MIS function in the future, it may be spread out through the company.

I don't think the stigma held me back. I have senior vice-presidents reporting to me. They run miniature operations of mine, so they have to be generalists. We concentrate the technical in the traditional DP area. We're trying to make our managers as interchangeable as possible. We're starting a movement with this so in five or 10 years we'll see a change. Managers are coming and going now, mainly going into other parts of the bank. At this stage, it would be difficult for any other group manager to come into my job and do it. We aren't interchangeable yet as managers at this group level. I think that's wrong.

'Probably the main change in style from DP to general management is managing time better. You have to be very effective with time management, be able to prioritize your work. That can be difficult to learn.'

There's tremendous pressure in this job because we're running a 24-hour, seven-day-a-week operation that the bank depends on. It is always very stressful that things might not go right.

You have to have close-in management. I run what I call a "no-surprises" operation, keeping everyone aware of the risks and mistakes and, hopefully, also some of the good things, too.

In terms of financial compensation, you're talking magnitudes of difference from DP to general management in terms of salary, perks and

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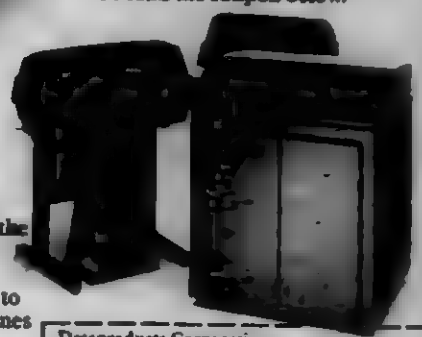

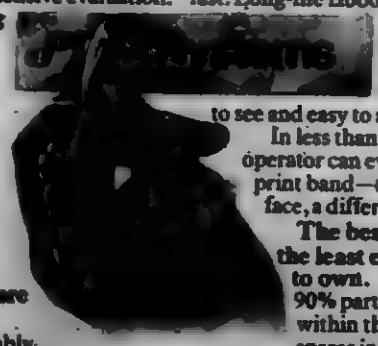

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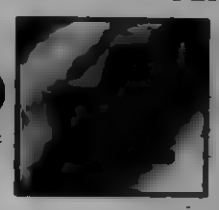


IN DEPTH

other benefits. But you also earn that — you're expected to work harder and do more . . . give a pound of flesh.

I have the most interesting job in the bank. I'd do it all over again in the exact same way. I have two sons, and they're doing it the same way, learning the technical side first.

Albert B. Crawford Jr.
Corporate Marketing
Finance and Planning Manager
Digital Equipment Corp.

General management implies line management. My position now doesn't quite fit that mold, but I'm certainly in the mainstream of the corporation, not related to MIS. I had been corporate director of information services. I moved to my current position in September — I was tapped for it.

In general management, one has more influence in establishing the position of the business or enterprise. MIS continues to be a support function. Some people actually call it a necessary evil rather than an investment to be managed. I like the high technical content of MIS; nevertheless, it constrains one in trying to contribute to the business.

My responsibilities now are to help the marketing function itself, establish tools for analysis of the business, to identify the profitability of various lines of business, to measure and report the performance of various market segments, including profitability, market share and growth. As kind of an additional hat, I am director of strategic planning. I provide the planning process to the rest of the corporation: provide integrated strategic thinking, marketing planning and strategies, support of the market strategy, manufacturing and sales support and, finally, very important, the human resource aspect. All that strategic support is provided in an integrated way.

I'm an engineer by education, both electrical engineering and industrial engineering with an emphasis on operations research. That was my formal postgraduate training. While a career officer with the Army Signal Corps, I spent the bulk of my career in general management related to computers and communications research and development. I was with the Army for 26 years, then retired and joined Digital in late 1976.

There are transferable skills and abilities from the Army to Digital. I worked in project management, interfaced with purchasing and the aerospace industry. I dealt with extensive budgets and planning processes. All that experience is transferable.

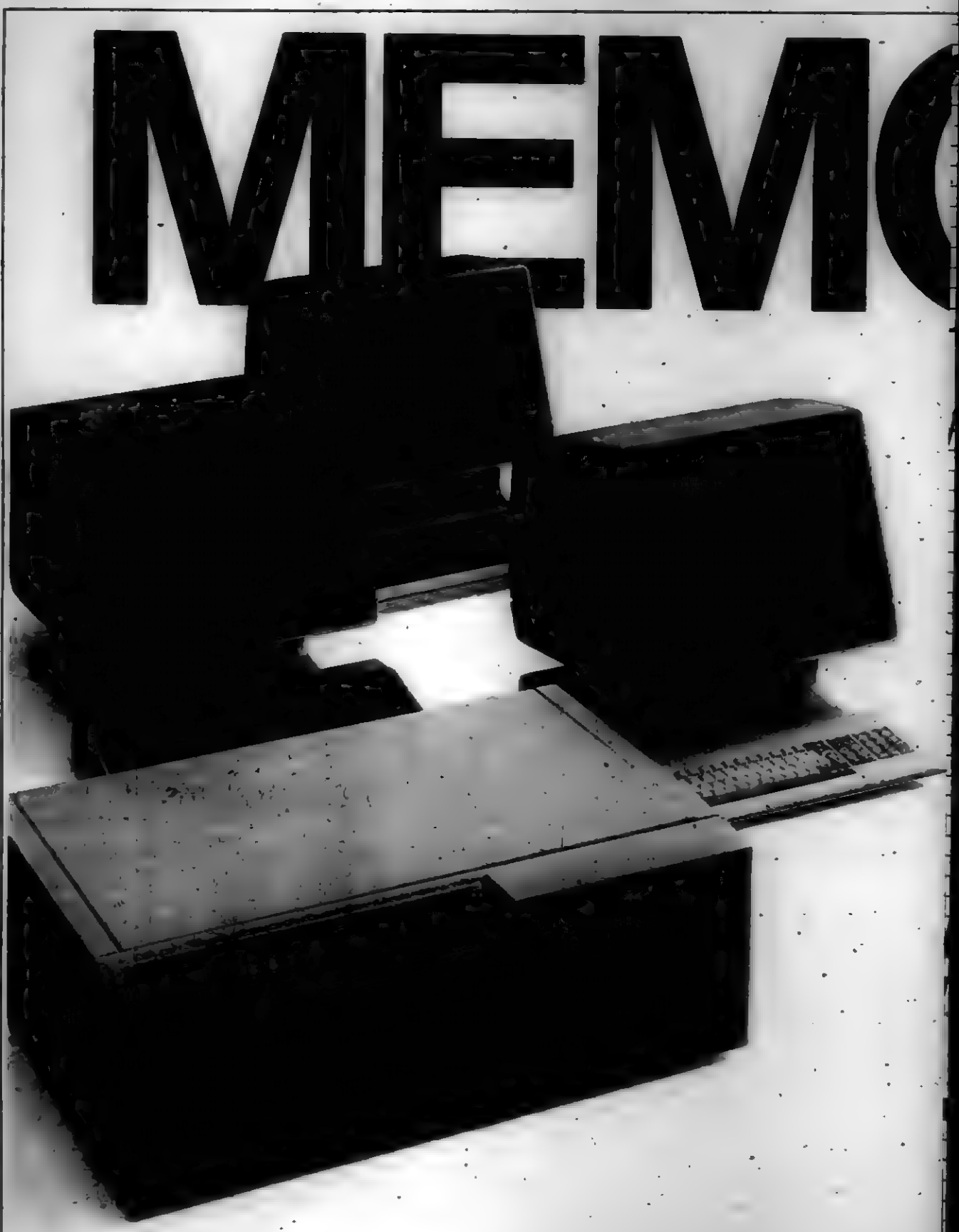
The motivation is higher in business and industry as compared with the Army. There's a higher degree of freedom in the attempt to maximize the contribution of the individual by avoiding unnecessary bureaucracy, for instance. The challenge to the manager is to provide a minimum structure to avoid chaos.

'People work best if they feel that they are participating in the decision rather than having it dropped on them by fiat.'

My management philosophy is one of participating management. I was already trying to practice that in the Army. People work best if they feel that they are participating in the decision rather than having it dropped on them by fiat.

I guess in business, one has to aspire to a profit-and-loss position — to be accountable for the profit and loss of a business. I did not dislike the MIS position, by the way, particularly in this company where MIS was not only contributing internally but providing the vendor a showcase for how to run a multibillion-dollar company. We took the leading edge in things like artificial intelligence, advanced office automation, video conferencing, in either a pilot or real form. The company recognized how it could use MIS as a strategic tool.

I think we helped create a strategic computing vision of how Digital could use the technology not only to make the company more productive and efficient but also to penetrate the market more effectively in commercial data processing.



MOVING OUT AND UP

IN DEPTH

In working with my peers — directors of other large companies — they tell me they worked with a generally more conservative management. They didn't have the opportunity to innovate. At Digital, we had the early use of electronic mail; which went into production five years ago.

I think we have the largest network probably of any large business; that has been a real test bed of products that we will market to the outside world. The data network is very advanced, very large and very effective in tying a multinational company together. We have internally helped define and in some cases helped to design products marketed outside.

'MIS is considered a drawback if it's your only specialty. General management doesn't understand or appreciate that DP gets a very broad view of a business. To go in and automate any function, you really have to understand it. The MIS director spends the time to understand manufacturing, marketing and other areas.'

MIS is considered a drawback if it's your only specialty. General management doesn't understand or appreciate that DP gets a very broad view of a business. To go in and automate any function, you really have to understand it. The MIS director spends the time to go in and understand manufacturing, marketing and other areas.

My observation is that the kingmakers, the senior officers, don't really appreciate that. They look on the MIS director as a technician. In one sense, it's caused by behavior on the part of the MIS director — he has to show he has business acumen. It will be a little bit self-correcting if the technology begins to crack the boardrooms and they understand better what the MIS director does.'

Herman Cain
Vice-President
Philadelphia Region
Burger King Corp.

I graduated from college in 1967 with a bachelor of science degree in mathematics and went to work as a mathematician for the Department of the Navy. I went away for one year to get a master's degree from Purdue University in computer science. That was my introduction to the whole information management, information systems field.

After spending 5½ years with the Navy, I decided I wanted to change careers, going from a highly technical area as a mathematician — model building, analysis, fire control systems — to the private sector. I went with the Coca-Cola Co. in Atlanta, working with the corporate management science group. It was a situation where I basically had to apply the skills I had acquired as a mathematician to a totally different environment.

I was the group manager of management science. Reporting to me at that time — there was no one. It was a title: group manager, management science. While I was with the government, I had about 15 people reporting to me, but at Coke I was a one-man, high-level analyst type.

It was four years before I left Coke and went to the Pillsbury Co. in Minneapolis as a manager of management science. I started out with about six people reporting to me; then I was promoted to director of business analysis and had about 15 people reporting to me — management science people, mathematicans and computer scientists, statisticians and one economist. We were in charge of economic analysis and forecasting. My group provided analytical problem-solving skills for the company. We developed the forecasting models used for all consumer products.

At that time, Pillsbury had a Honeywell, Inc. 6000 series. We were more model builders than systems builders. After a year and a half, I was promoted to director of information systems for one of the divisions. There I was going from a management science environment to an information systems environment, not because I had all that much hands-on

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IN DEPTH

experience in computer science, but that's where Pillsbury made a conscious decision to put me because I had the technical background and a degree in information systems.

They also recognized at that point my abilities to manage people, manage an organization, deal with technical concepts and communicate with management. I don't have an MBA. I believe in self-teaching. I believe in learning as much as I can wherever I am, no matter whether it applies to my current situation or not.

'I used to think that you really didn't need to get your hands dirty and learn about a business that you were basically making decisions about day in and day out. But I now know from experience that it is absolutely necessary.'

When I got to the point of managing and motivating a lot of people to do a good job to be creative, I developed a very simple philosophy, the one I still use today — that's to treat people the way I want to be treated, period. It doesn't make any difference whether you're talking about computer people, business people . . . If you basically use this approach in dealing with people, you're going to be fairly successful.

Pillsbury sought me out because of some of the skills, interpersonally and communication-wise, that I had demonstrated. It was also around that time that Pillsbury acquired Green Giant Corp., and one of the main responsibilities I faced was how do I integrate the information systems function — meaning the people, the systems, the hardware and the budgets — into one unit.

Management's concern during this integration process was that we avoid a computer disaster, keep some key people from leaving and be sure we could run some systems critical to the business. So they perceived it as more of a people issue than a technical issue. Between the two organizations, we had an abundance of technical expertise, in terms of information systems people, model builders, programmers, etc. It was a question of getting them all to come together, establishing a direction, some goals, and then getting people to follow that.

'I believe in self-teaching. I believe in learning as much as I can wherever I am, no matter whether it applies to my current situation or not.'

After that, I moved to a corporate position again — vice-president of systems and services — because of the job I had done there and recognition I had gotten. I was basically the strategic officer for the entire operation. I was the person responsible for all our general strategic direction as it related to information systems and information management.

I was an officer of the company, but a staff officer, it was not general management. What I define as general management is when you have the responsibility for managing a profit center or an investment center, which is a profit-generating entity of the corporation. Corporations exist to make money. In general management, you directly control what relates to making money for that corporation. Also, general management means you are no longer specialized.

When I was vice-president of systems and services, I was specialized. My specialty was information systems/information management — that was the area of the entire corporation that I was responsible for. After doing that job for about a year and a half, I made a conscious decision that I wanted to get into general management, and I talked with various principals within the corporation and tried to determine how I could best do that.

One thing was very clear: If I wanted to get into general management, at some point I was going to have to learn the basics of the busi-

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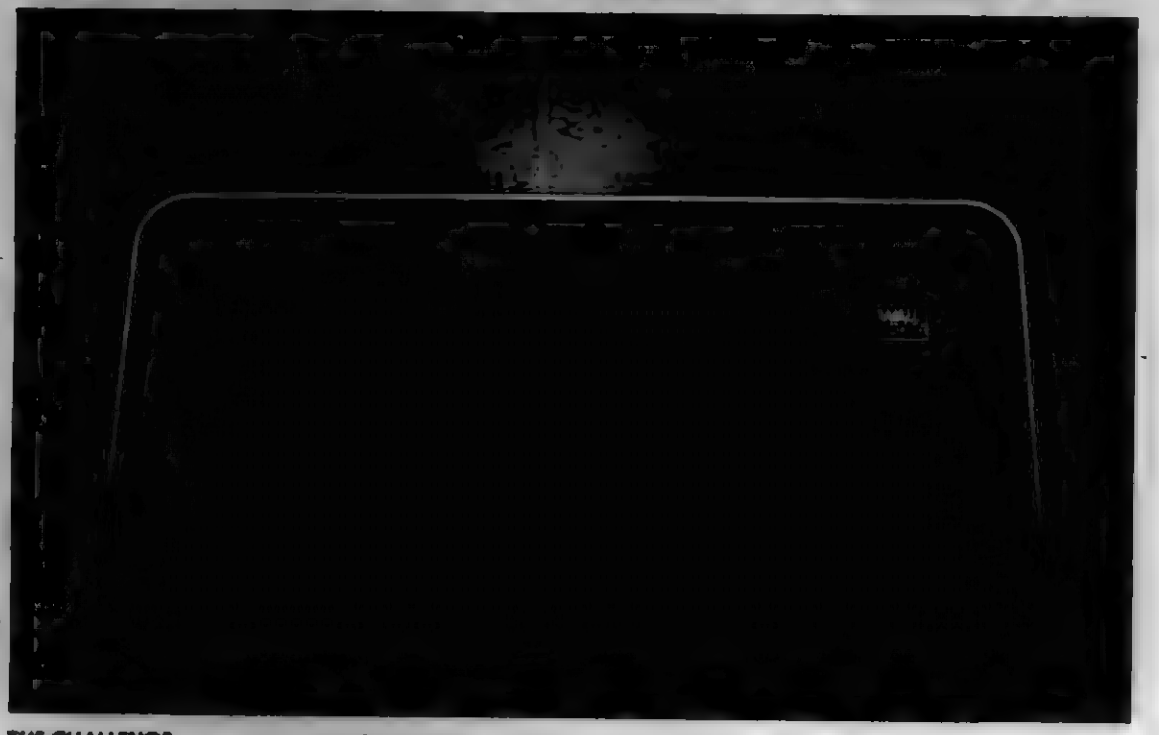

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ness I was going to be a part of. It's unreal to think that you're going to move from vice-president of a specialized area to vice-president of a general management area. I used to think that you really didn't need to get your hands dirty and learn about a business that you were basically making decisions about day in and day out. But I now know from experience that it is absolutely necessary.

I moved from that job into now being vice-president and general manager for Burger King, for one of its operating regions. The region is a profit center. I report to a senior vice-president who represents a division of Burger King that is an investment center. As a profit-center manager, I make all decisions relating to items that affect the profit and loss of that region. Right now, the position of general manager of the Philadelphia region encompasses all Burger King activity within a seven-state area. That represents $325 million of Burger King sales a year, which I am responsible for overseeing. It represents 400 Burger King restaurants, some 1,600 direct employees. My profit contribution represents about 14% of Burger King's total profit for the year.

'People are people are people. Any time you deal with a group of people, in any given capacity, your responsibility is to try and understand where those people are coming from. The principles of motivation, productivity and leading people are transparent to whatever discipline you're dealing with.'

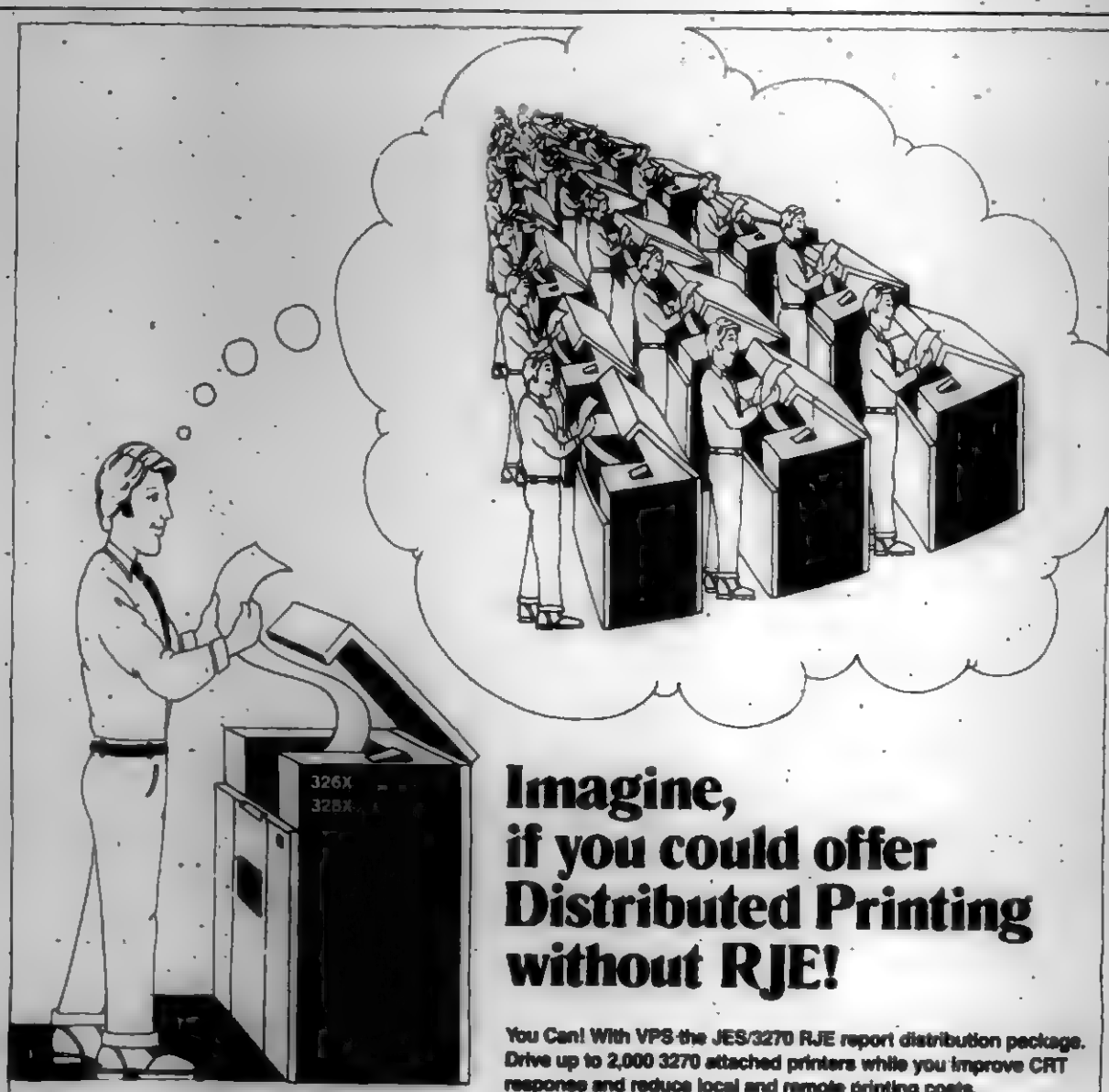
Burger King is wholly owned by Pillsbury, so I'm still within the same corporation. Pillsbury is basically a holding function, and so there was nothing really to get into at that level in general management there. You had to get into one of the divisions. So I explored all the divisions and finally got down to Burger King.

You start at the bottom, but at the bottom of a fast-track program. I resigned my position as vice-president of Pillsbury in order to become an employee of Burger King with no guarantees that I ever was going to become a vice-president again. The only thing they promised me was that I would move along rapidly through the various stages . . . all the way back into the restaurant.

I learned by actually working all the positions in a Burger King restaurant: up through assistant manager levels, restaurant manager level, district manager level, franchise district manager level, area manager level. I moved along as I became more familiar. It's training, but I actually had to hold these jobs. I was actually responsible for a restaurant for three months during this time. I was the manager responsible for opening and closing, all the day-to-day activities, hiring and firing, equipment maintenance, you name it. That's the way you understand the guts of the business.

People are people are people. Any time you deal with a group of people, in any given capacity, your responsibility is to try and understand where those people are coming from in order to relate to them. Computer people just coincidentally happen to deal with computers. Operations people just coincidentally have to deal with opening and closing restaurants every day. The principles of motivation and productivity and leading people, those are transparent to whatever discipline you're dealing with. You're still faced with tough decisions relative to people.

My goal was eventually to get where I am now, quite frankly. My goals beyond this point are to become even more integral to the management of the Burger King organization. At some point, I might like to move into division management and become a senior vice-president and division officer and maybe become an executive officer. If ever I were to become so successful in Burger King that there wasn't anything else for me to do, sure [I'd look elsewhere]. But you're talking 20 to 25 years away at this point. Burger King is big enough to satisfy all my ambitions at the present time.



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CW Photo by Marjorie Magowan

The Knowledge Gateway System To Information Access

By Forest Woody Horton Jr.

Data, document and literature assets accumulate all over the company — a few in the magnetic tape library, some in filing cabinets, more in the corporate information center and libraries, much in the mail and message centers and a lot more in people's heads. This internal data is in a variety of different storage and handling media including electronic, microform and hard copy.

External data sources are also proliferating in media, form and content. And to top it all off, this information is stored in widely separated locations — in the same office or building, across town, in some other city or in a remote corner of the world.

In short, the total information resources needed for decision making and problem solving are, in the aggregate, disorganized, fragmented and compartmentalized. Yet we are marching ahead in lock step to develop decision support systems (DSS) as if the tasks of identifying both internal and external information resources, accessing them, searching through them and extracting precisely what we need (no more, no less), were straightforward, simple and "logical," like designing an inventory control or personnel/payroll system.

The mindset of the DP/MIS community that was applied to designing and developing the "classic" data processing number-crunching applications of the '50s, '60s and early '70s is being applied to the information management challenges of the '80s and beyond. It just won't work.

Not too long ago, decision makers' primary problem was a lack of information. Today, the problem is not a lack but an

IN DEPTH

overabundance of data and not enough of just the right kind of information needed. Nearly every executive complains that his "in box" brims with unsolicited garbage.

At the same time, the number of new information and knowledge sources increases every day — particularly the newer on-line data bases and all of the related information products and services that help us find and use the data we need. These include, for example, library and information networks, software products, abstracting and indexing services, computerized searching aids, data collection and analysis facilities, information-on-demand and information-broker services, on-line vendors and telecommunications networks, current awareness services, document delivery services and more.

Expert systems, knowledge-based systems and conventional decision support systems are not enough because none of them grapples head on with the problem of differentiating the full spectrum of end users as to their information needs.

Virtually every one of these information products and services lays claim to helping the end user sort through the maze of information sources by a wide variety of means: digesting, summarizing, abstracting, compacting, synthesizing and so on. But even with all of these "aids," we seem to be falling further and further behind.

Knowledge-Based Systems

To cope with the information explosion, one promising avenue that got a fast start was the area of expert systems. Most readers will already know that expert systems preprogram extensive decision rules used by professionals in disciplines such as medicine and law to assist in diagnostic, discovery and exploration tasks. In the case of medicine and the health sciences, for example, we already have a number of expert systems "on the shelf" that allow physicians, laboratory technicians and other health-care professionals to interact with the computer iteratively until a likely answer is found.

In these areas, the "expert" is the collective knowledge and wisdom of the theorists and practitioners who have contributed to their respective disciplines and fields of interest.

A related family of information management tools is referred to as knowledge-based systems (KBS). Here the idea is, once again, to zero in on the specialized knowledge needed by end users to utilize effectively and efficiently some knowledge-based system, such as the body of chemical, geological, medical, physical, psychological or other scientific information. . .

Instead of transitory and transactional data, such as receipts and issues in an inventory control system or new hires and attritions in a personnel system, the information base is a standing body of scientific or technical knowledge that reposes in the formal literature base (that is, in established book texts, in periodicals, in scientific proceedings of conferences and so forth).

In both the expert system and the KBS, however, the end user must be an expert himself — or at least have a thorough grounding in the field — in order to use the system. The layman simply could understand neither the technical terms nor the underlying logic of the decision rules employed.

In a sense, the knowledge gateway system (KGS) we are about to address in greater detail is a kind of expert system, but the "expert" is the collective wisdom of the reference librarian, and the "knowledge base" is the body of knowledge in library and information science on how reference librarians, information counselors and related professionals interact with end users ("patrons," as the librarian is wont to call them) in negotiating questions and answers (See Figure 1 on In Depth/12).

Expert systems, knowledge-based systems and conventional decision support systems are not enough because none of them grapples head on with the problem of differentiating

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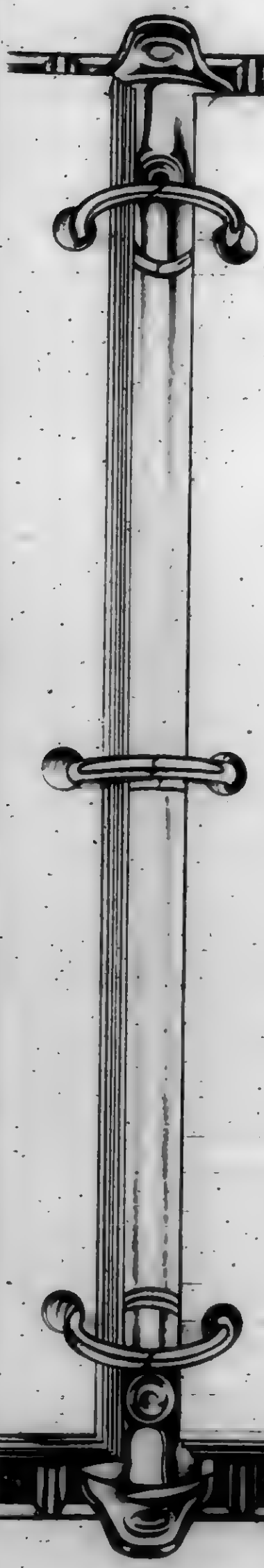

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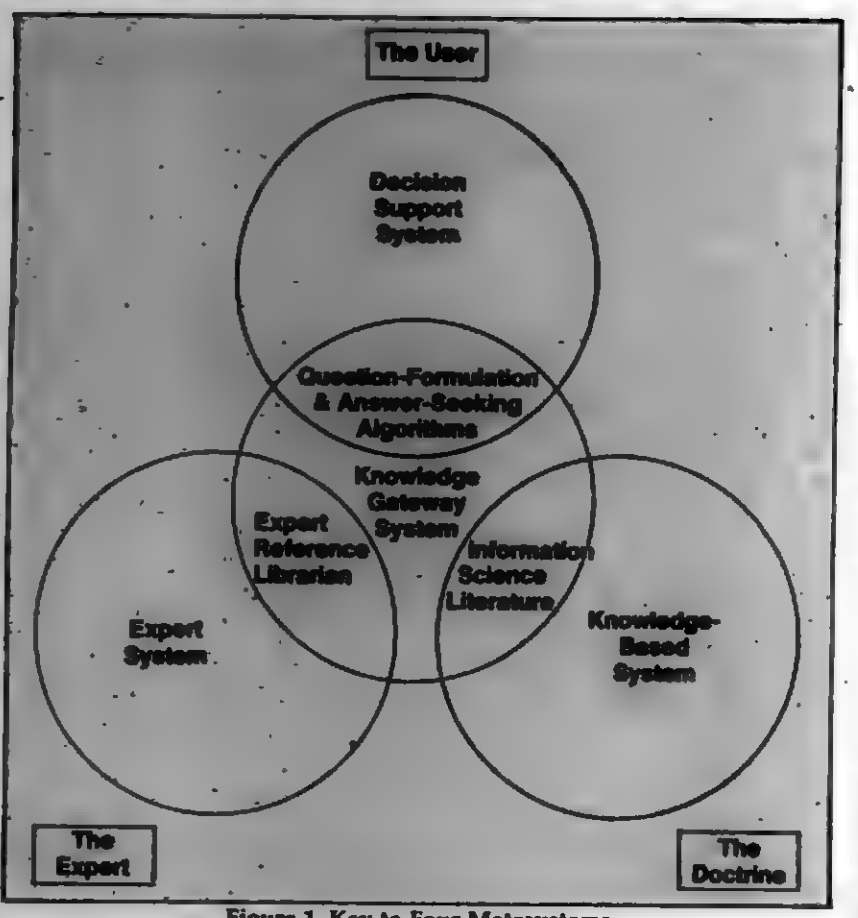

Figure 1. Key to Four Metasystems

the full spectrum of end users as to their information needs. The fatal flaw in existing approaches is the assumption that all users are a homogenous class; if we could just make them smart enough to ask the right questions and learn to find the right sources of information, then the answers would be found at the press of a button.

Helping personal computer end users/decision makers wend their way through the information availability and accessibility labyrinths lies at the core of the KGS challenge. Decision makers need knowledge, hence the "knowledge" in the KGS. They need to look beyond the four walls of their companies, hence the "gateway" in the KGS. And decision makers must depend on a systematic approach to cope continuously with the entire access and utilization process, hence the "system" in the KGS.

DSS Flaw

Designers of DSS seem to think that data, information, and knowledge resources are "waiting in the wings" as if to appear on cue by magic when the end user needs them, precisely formatted in the way he is most comfortable using them. At best, DSS designers seem to visualize the beginning and the end of the DSS architecture as a kind of super data directory.

Some DSS proponents have talked about artificial intelligence (AI), but don't seem to have much of an idea of where AI research should be going to help them in conceptualizing DSS. Most are entranced by the expectation of some kind of "neurological breakthrough" that would allow the brain to be emulated on a microchip! I suggest they don't hold their breath too long.

AI certainly is important. And so are data directories and data dictionaries. But how can we blend them together into a practical working information management tool?

How the KGS Works

The KGS is a software product package that could be designed to run either on a floppy or hard disk or on the central mainframe. Optimally, if run on remote personal computers, the KGS should be tied into the organization's central computer system, since KGS data base storage requirements are too large and the attendant information processing needs too complex to be run entirely within the resources of resident micro storage.

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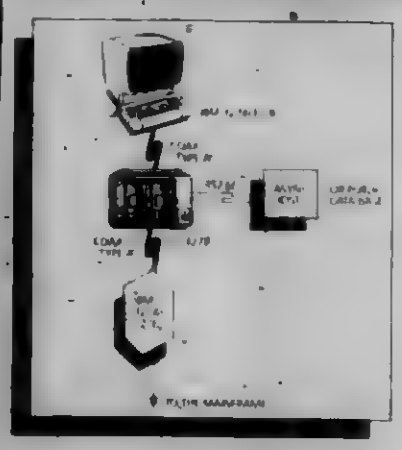

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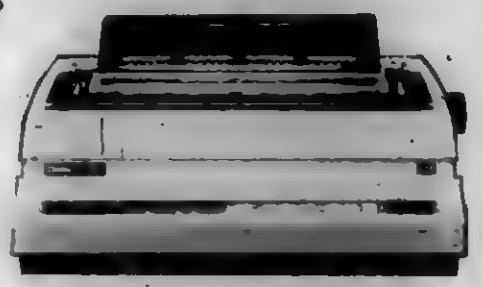

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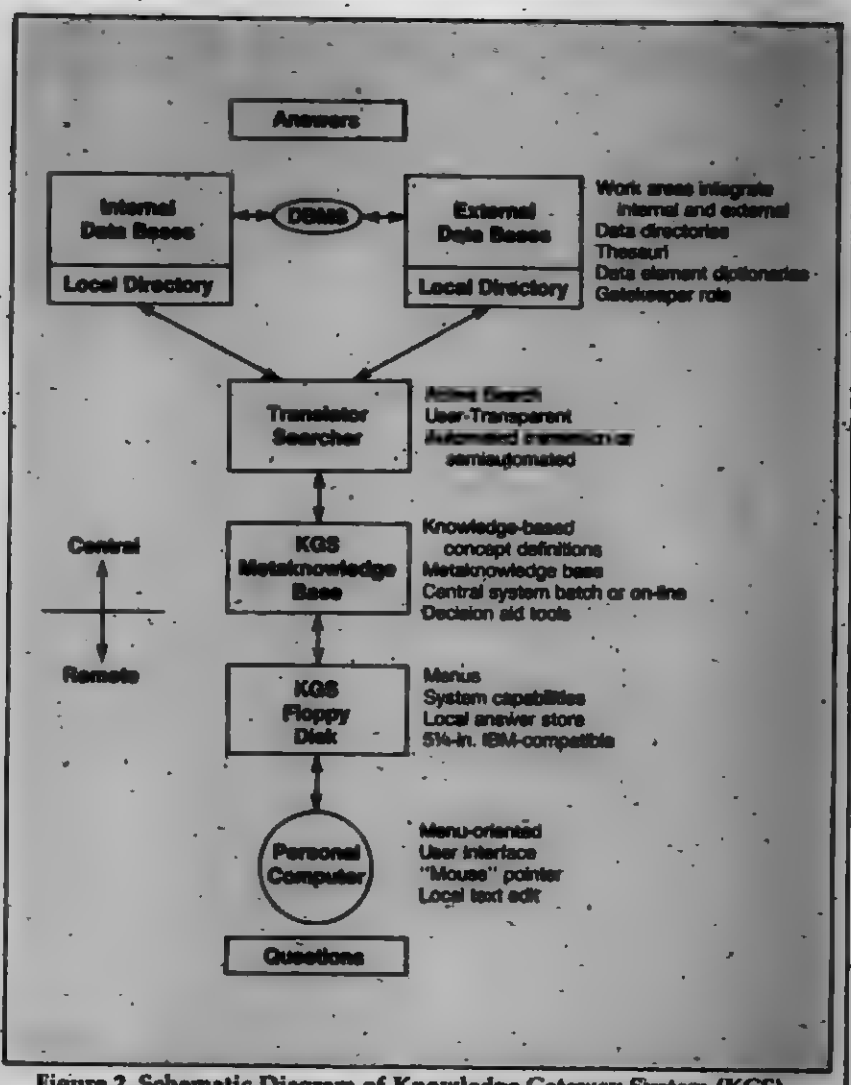

Figure 2. Schematic Diagram of Knowledge Gateway System (KGS)

The KGS is not an electronic encyclopedia, although information within either electronic or print encyclopedias may be contained organically within a KGS data base or, in any event, accessed by the KGS as an external data source.

serving a discrete purpose. To start with, a "user imprint" module is required that locks onto a number of parameters aimed at ascertaining the status of the user. The reference librarian, for example, "negotiates" questions not only to find out what the inquirer wants, but more important, to allow the inquirer to find out himself what indeed it is that he wants. In this question-negotiation process that would be dealt with in the user imprint module, the program would interrogate the end user in various ways.

For example, how well has he defined his problem already? How much does he already know about the subject? How much detail does he need? How quickly does he need the information? No two individuals will have precisely the same user imprint module because two end users are ever confronted with precisely the same information problem.

Moreover, even if they were, their "cognitive screens," as the psychologists call them, are different, so that they view even precisely the same information differently. A definitive answer to one may be merely "interesting data on the way to an answer" for another.

A second module might be called the "query module," aimed at helping the inquirer structure the question (the "search," as on-line people call it). It is at this stage that thesauri, and controlled and uncontrolled vocabularies, on-line searching aids, data element dictionaries and the famous Boolean operators (for example, "this, but not that") come into play.

Finally, the third module might be called the "referral module." At this point, we move from formulating the question to seeking an answer. We may move directly to an on-line search of a data base, but not necessarily. Internal KGS data bases would also contain very extensive compendia of print resources that may or may not have electronic indexes to help access them. Or perhaps microform holdings will contain the answer.

In some cases, based on the results of the user imprint modules and query modules, the end user will need

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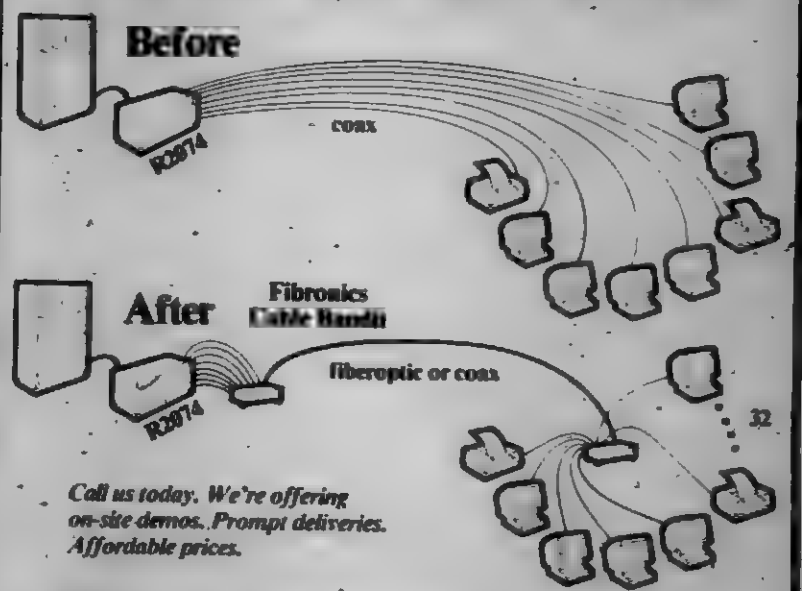

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only a further source with whom he can consult. In other cases, a definitive answer may be required. In the case of the latter, full text may be needed, or perhaps only an abstract or summary.

Figure 2 (on In Depth/13) is a schematic diagram of the major components of a KGS as that concept is being espoused and developed by the Defense Systems Management College (DSMC) at Fort Belvoir, Va. DSMC has initiated a research project call the Program Manager's Support System (PMSS). The PMSS is intended to provide defense program managers with an automated tool to assist in making nonroutine and unstructured decisions in the defense acquisition environment.

As the IRM concept comes to many companies, one of the major tasks of the director of corporate information is to harness and mobilize the talents of different information specialists. The KGS challenge is certainly a multidisciplinary one.

The PMSS is oriented to the future and will address "Should I?" and "What if?" types of questions. currently they are exploring the usefulness of a KGS as a component of the PMSS.

The KGS is not an electronic encyclopedia, although information within either electronic or print encyclopedias may be contained organically within a KGS data base or, in any event, accessed by the KGS as an external data source.

Certainly, if an end user wants to find out everything there is to know, for example, about aardvarks or zooplankton, he may directly search one of the existing on-line electronic encyclopedias (for example, Gale Research Co. has its *Encyclopedia of Associations, Biography Master Index* and *Book Review Index* all available commercially on-line as well as in print form).

However, many other end users face a question-formulation challenge that does not permit them to go directly to the indexed subject until they have thought through more carefully what it is they really need.

Developing the KGS

We have already mentioned the key role of the reference librarian, but other company professionals such as the corporate records manager, the information systems department, the DP/MIS center, the industrial engineering department and the graphics and forms people all have a KGS design and development role to play. Because each of these supporting information disciplines has its own distinctive bias and point of view, it may be prudent for the company to consider using the information resources management (IRM) department as the lead agent to coordinate and synchronize the work of these various groups.

As the IRM concept is coming into place in many companies, implicitly one of the major tasks of the company's director of corporate information is to harness and mobilize the talents of all of these different information specialists. The KGS challenge is certainly a multidisciplinary challenge if there ever was one. Indeed, at the Defense Systems Management College, officials are already referring to the KGS as a challenge with many parallels to the Operations Research/Management Science (OR/MS) of World War II in bringing together many disciplines to cope with war-related projects such as submarine detection and the development of sonar.

In the largest corporations, perhaps the talents and skills already exist to develop a KGS. But in medium-size and smaller companies, out-of-house software developers may need to be used — either to take on the total job or to develop selected modules. Suppose, for example, your company wanted a 5-1/4-in. IBM-compatible KGS prototype software product that could be operated in the broad end-user computing environment. What are the options?

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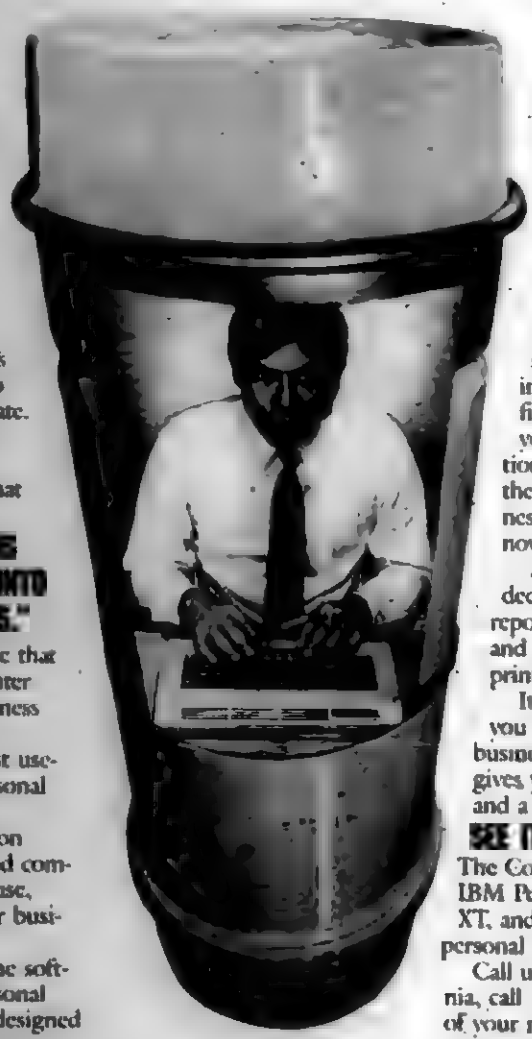

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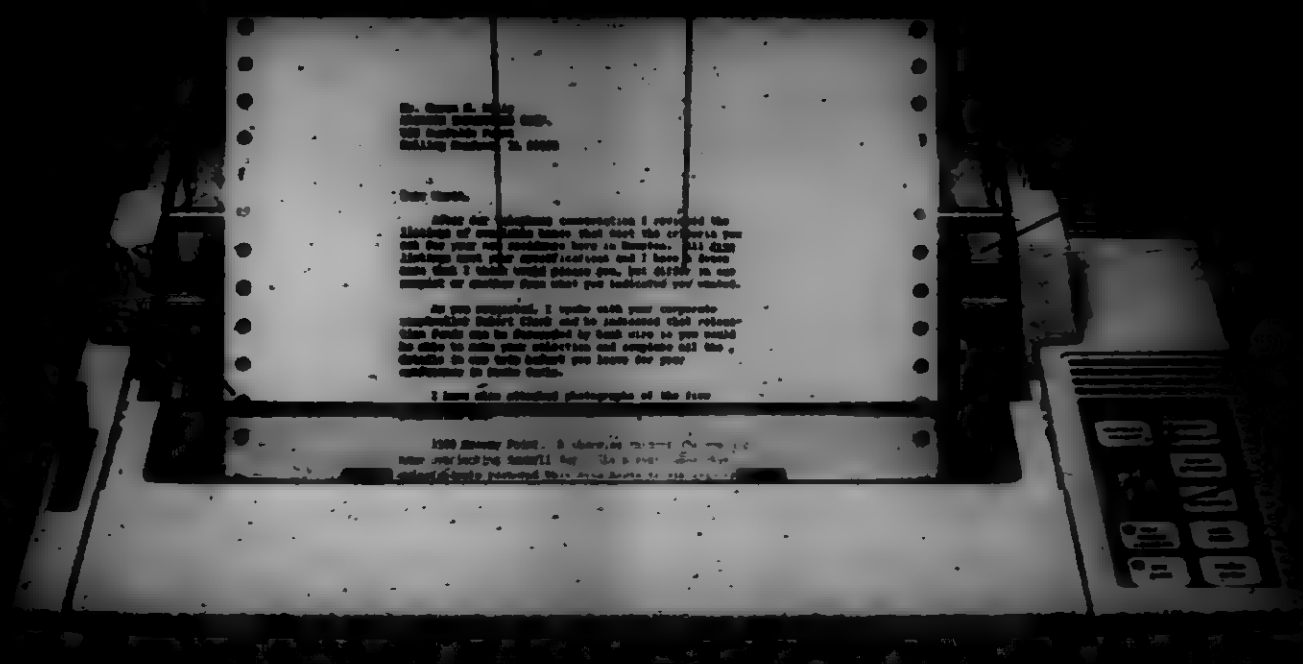

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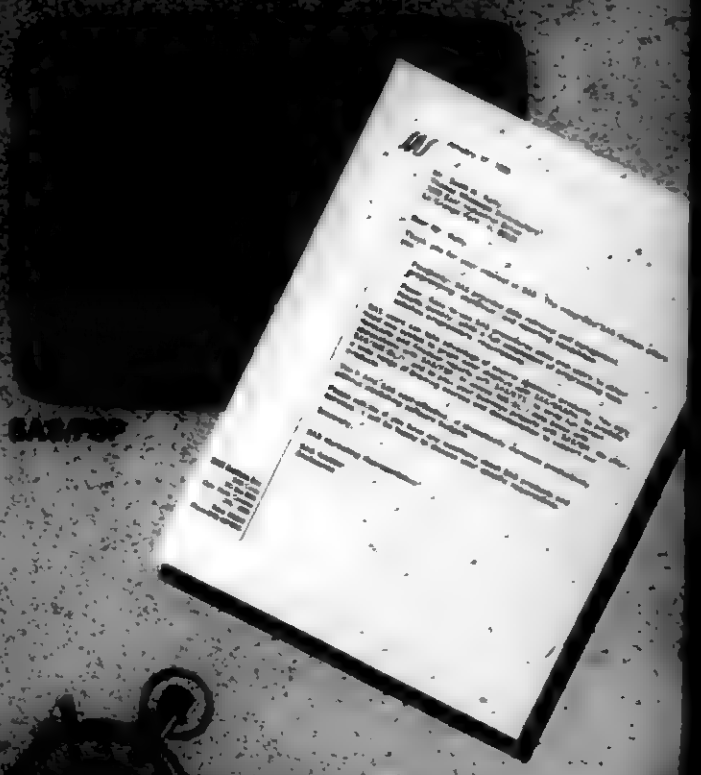

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Summary

Every librarian knows that the client-helping process is an extraordinarily complex one that requires patience and a give-and-take frame of mind. Mutual trust is not the least important ingredient. Clearly, then, just transferring a "manual" reference librarian search process algorithm onto a floppy disk (dare we say "librarian-on-a-disk?") is as culpably simplistic as putting the pages of a hard-copy book onto a CRT screen. Videotex and teletext developers can already tell us horror stories of how they tried to do that and failed.

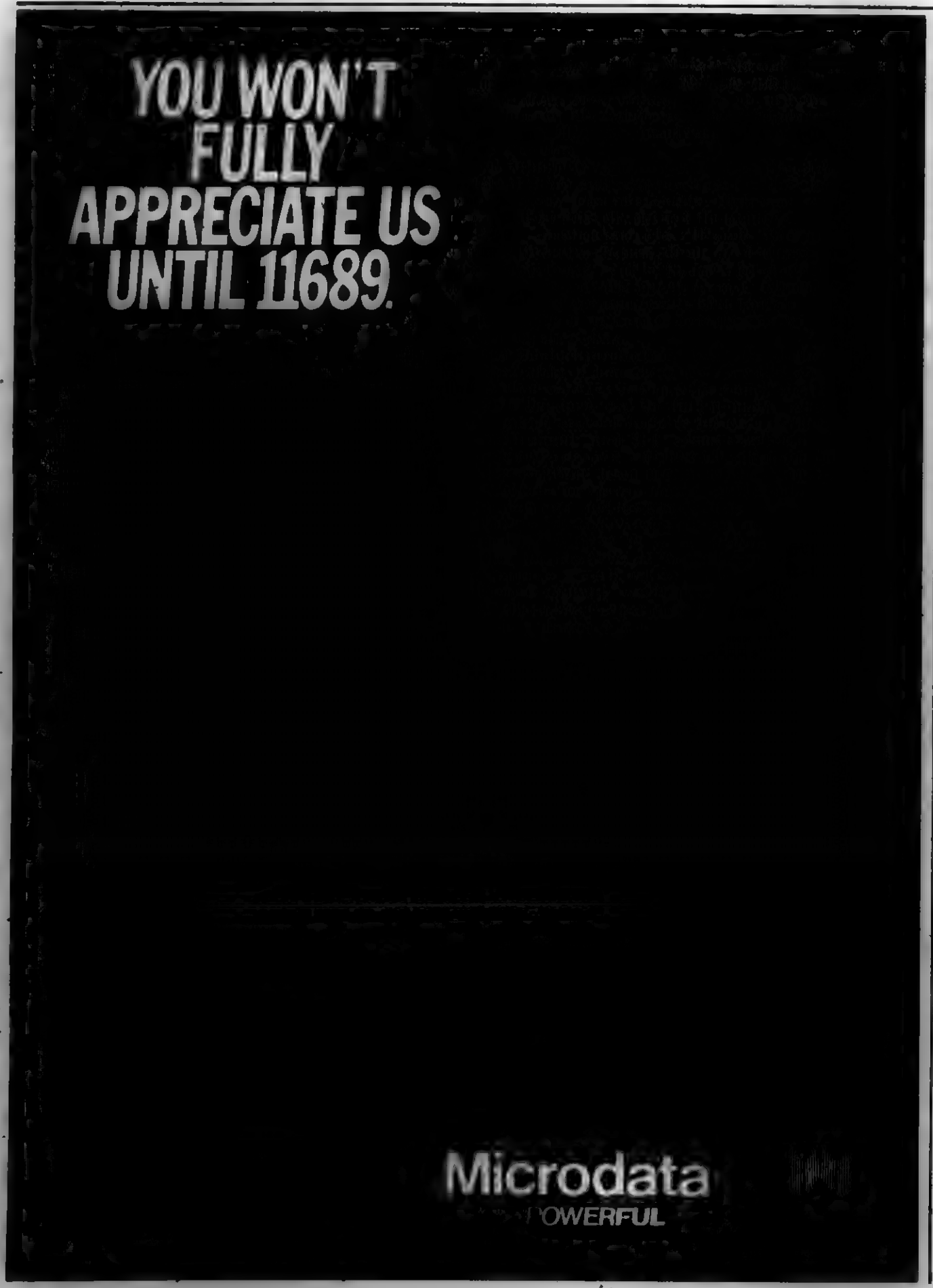
Certainly, printed guides, directories, handbooks, manuals and other secondary information-seeking tools all have their place. The KGS won't supplant them, but rather will augment them.

It would seem axiomatic that the best KGS will be those in which the fairly complex underlying software will be invisible or transparent to the personal computer user.

Sooner or later the personal computer users in the finance department, the marketing department, the manufacturing department, the research and development department and elsewhere are going to come to the conclusion that while they may have become "computer literate" and know how to make the machine sing like a violin, they are still "information illiterate." That is, they still don't know how to ask the right questions and know the right answers when they see them.

The smart company will have a KGS on hand at that moment in time, ready to throw into the battle. But don't be misled into thinking software shelf products are going to do the job. They might help, but in the end, each company is going to have to tailor its KGS to its own unique needs and situation. Now is the time to start in that direction.

The rapid spread of information technology is significantly magnifying the problem of information exchange, accuracy and retrieval. The need for a KGS is fundamentally an information resources management challenge.



About the Author

Forest Woody Horton Jr. is a Washington, D.C.-based consultant specializing in information management.

From 1975 to 1978, Horton directed the Information Management Study for the Commission on Federal Paperwork, which was responsible for promulgating the concept of information resource management.

Prior to that, Horton directed MIS and DP staffs for the Executive Office of the President, the State Department, elements of the Department of Defense, the Environmental Protection Agency and the General Services Administration.

Horton is author or editor of five books in the information management field and has been a contributing editor to a half-dozen information-related publications. He has also held teaching tenures at several universities, including the University of Maryland, Syracuse University and American University.

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POLICY PERIOD
FROM 01/01/84
TO 01/01/85
AGENT NUMBER 027
AGENT Frank J. Davis
NAMED INSURED Atlantic Holding Co.
AND ADDRESS Boston, Mass.

Insuring Against Data Processing Losses

By Nancy P. James

Each month, a major computer manufacturer adds hundreds of thousands of dollars in labor and materials to a highly specialized research and development test bed that has no duplicate. The risk of property loss increases proportionally to the company's investment in the research.

Fire at the test-bed site could quickly cripple the business, with no means of recovery. Delays in bringing a product to market might never be made up in a highly time-sensitive technical environment. Financial restoration would be crucial to this company's survival.

The absence of insurance for financial restoration closes the doors of an estimated 80% of all businesses that suffer a direct, major loss at their data processing facilities. The accidental destruction of a disk pack could mean months of lost development time and expense.

Creating backups on a regular basis is identified as essential to the safety of the work files and the uninterrupted continuation of the project plan. The risk of loss cannot be completely eliminated, however, and efforts to assure a project's survival often require the support of an insurer.

The insurance industry, classically conservative, has responded slowly to the needs of the technical community. Lloyd's of London lost $340 million in the late 1970s from claims on lease insurance provided to Itel Corp. on canceled IBM

The insurance industry, typically conservative, has not kept up with the unique risks of the DP environment. MIS directors need to educate themselves about the options available and find a skilled guide to the marketplace.

IN DEPTH

leases. Since then, that insurer has been reluctant to continue in the computer insurance market.

Not having suffered such misfortune in the early years of data processing insurance, The St. Paul Fire & Marine Insurance Co., Chubb Group of Insurance Companies and Fireman's Fund Insurance Companies are now active suppliers of data processing insurance.

Identifying Exposure

Agents skilled in analyzing the exposures faced by a given data processing house or business are extremely rare. Most independent insurance agents are unfamiliar with the unique exposures faced by DP-related businesses. In fact, most have been reluctant to automate their own offices; fewer than 10% of all independent agents use in-house computers.

A number of risks faced by DP-related businesses require coverage other than property insurance. The burden of identifying these areas of exposure usually falls on the DP manager or business owner. The associated costs are largely developed from the business's disaster recovery plan.

Water from sprinkler systems can be as damaging as fire, and smoke as damaging as water. Erasure of critical data files by accident or power surge can be as catastrophic to the data processing shop as fire.

As the cost of hardware continues to decrease, the direct property exposures become a less significant part of the total risk. The company suffers indirect losses when it pays for data reconstruction, loses income and must lease outside processing facilities.

Insurers such as The St. Paul support agents and their clients by providing a "blanket earnings and expense" form, which does not require that a fine distinction be made between business interruption and extra expense exposures. The form serves a variety of industries and needs, but is particularly important to the data processing market when the technical information gap between agent and data processing manager, between electronic specifics and insurance limitations, requires more solid coverage than guesswork can provide.

Fortunately, most agents and insureds do not get caught in the information gap, but the potential is increasing.

David Kaiser, underwriting officer for The St. Paul, identified a need to reinforce both the agent's and the company first line underwriter's knowledge of DP-associated risks. Such risks still represent a relatively small percentage of the hundreds of policy submissions coming across an average commercial underwriter's desk, so interest as well as knowledge is understandably low, according to Kaiser. High-tech expertise decentralized to the branch office has been identified by The St. Paul as a necessary force to encourage insurance sales in that market.

The Fireman's Fund Insurance Companies, according to Tony Kjellgren, director of product development at corporate headquarters in Novato, Calif., has recognized assistance to clients through their agents as a critical need of the high-tech manufacturer, service organization or data processing department. Each of the fund's 55 branch offices has skilled loss-con-

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If you're happy with the computer you now own, we're happy for you. Because we both know what you went through to buy it.

More than likely, it was a long year's education that sent you into a complex maze of trial and error. You spent a lot of time asking questions in computer stores. More time hunting for answers in computer books. Even more time investigating all the hardware, let alone software options you had to consider.

It was a hard way to get what you needed. A year that earned you an honorary degree in computer engineering and the status of a computer buff.

But just between us buffs, would you recommend a year like that to a friend?

FOR THE FIRST-TIME BUYER, KAYPRO IS A GODSEND.

We think the hard way is the wrong way to have to buy a computer. After all, a business person shouldn't be required to make decisions better left to an engineer.

Trying to find compatible interfaces and software packages alone would drive most people up the wall (remember?).

So, we've taken a different approach to making and selling our Kaypro II. Rather than a starter system, with options you buy piece for piece, it's designed with all the integrated hardware and software it needs to be fully functional.

Off the shelf, Kaypro II is completely ready for business. We think that's what the first-time buyer really needs.

IT'S A COMPLETELY INTEGRATED SYSTEM.

Since we don't consider a monitor, disk drives, interfaces or other hardware as optional extras, all Kaypro's hardware comes complete in an integrated system. Except, of course, for a printer. As you know, some people don't need one. And those who do must decide whether they need dot matrix or letter quality printing.

What's complete on a Kaypro II?

64K RAM, Z-80 microprocessor. A 9" green screen monitor. Dual disk drives, the same used by IBM. A detachable keyboard that's more complete than you'll find on the latest Apple. Built-in interfaces for both a printer and communications.

In other words, all the hardware you'd recommend to a first-time buyer. In one complete package.

IT COMES COMPLETE WITH SOFTWARE.

While businesses can be very different, the fact is that 95% of all business needs can be fulfilled by a series of three business applications programs. Word Processing/Spelling, Data Base Management and Financial Spreadsheeting.

It's the software that's optional with other computers.

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INSURING AGAINST DP LOSS

IN DEPTH

trol engineers who are available to work directly with the client to identify necessary areas of specialized insurance needs.

The Chubb Group specializes in high-tech manufacturers and prides itself in counting some of the nation's largest manufacturers among its insured. The Chubb considers itself first in the market for setting forms and standards, while providing the broadest possible comprehensive coverage.

The data processing insurance specialist, however, can greatly assist the business manager in identifying and analyzing critical exposures to loss: Telephone service industries, for example, may need to replace dedicated data communications lines, which may rest squarely on the business's critical path to recovery. Any business deriving its income from customer data transmittal for processing may be in serious trouble if fire or other peril destroys its data lines. Finding emergency premises from which to operate does not solve the problem of line installation. Not only may contractual obligations to customers be jeopardized, but an entire client base may be lost.

One suburban service bureau with the assistance of a DP insurance specialist was able not only to identify its potential exposures in the event that data communications lines were lost in a fire, but also to identify and assess various technical solutions. Well aware that New England Telephone Co. could not promise any time frame short of six weeks for data line restoration, the service bureau was faced with serious problems of providing continuous service to its customers.

Installing minicomputers at each customer site to process data with service bureau software may seem a viable solution until the consequences of the plan are explored. Every existing customer, once familiar with the minis, would potentially be lost as a repeat source of billing revenue, even if a turnkey system sale resulted. Income and extra expense costs for emergency communications restoration can easily be transferred to an insurer, but the lost market can never be regained. This exposure cannot readily be measured or insured.

The St. Paul Fire & Marine, aggressively pursuing the DP insurance market, has developed a plan with the American Electronics Association (AEA) to offer insurance package coverage to AEA members through a limited number of participating agents. The actual coverage package does not differ from packages available through any St. Paul agent, but a group dividend (this year exceeding 13%) is returned to each participating AEA member.

The St. Paul has also targeted a specialized package for members of the Association of Data Processing Service Organizations, Inc. (Adapso). The St. Paul underwriters report that they have been greatly assisted with valuable technical resources by both AEA and Adapso members.

In addition, The St. Paul has modified wording to strengthen its newer forms, providing extended coverage. One such example under the property damage liability form is the long-held position that insurance will pay for resultant damage caused by faulty work, but not for repair or replacement

But it too comes complete with a Kaypro.

And with its CP/M operating system, Kaypro II is capable of running thousands of other business programs, to fill more specialized needs.

IT SELLS FOR $1595, COMPLETE.

People are bound to ask you how much they should spend on a computer. There is, of course, an obvious answer: as little as possible and still get a serious business system, complete with all the functions they need.

At $1595, Kaypro II is the least expensive serious business system we know of on the market today.

There are basic starter systems advertised for less. But their optional hardware and software can double or triple their basic price. So they can end up costing $2000-$3000 more than a Kaypro.

A good example is an Apple IIe. With a hardware configuration comparable to Kaypro II's, complete with comparable software, it lists for an average price of $4400. $2805 more than a Kaypro.

IT OFFERS MORE MEMORY FOR THE MONEY.

Since disk drive memory capacity is always a concern, once again the idea is to get the most for the money. With two disk drives, Kaypro II gives you 400K for $1595. With equivalent hardware, an IBM gives you 320K for about $2800. And Apple IIe gives you 286K for about $2400.

So once again, Kaypro II delivers.

IT HAS POWER TO SPARE FOR WHAT MOST BUSINESSES NEED.

The more you love computers, the more tempting it is to recommend a 16-bit vs. 8-bit machine. You know that 16-bit systems are a little faster and have more power to run longer programs.

However, 16-bitters are far more expensive than the 8-bit variety. And, unfortunately, have only a handful of business applications software packages that really take advantage of them.

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Operating System CP/M 2.2	Wordstar word processing The Word Plus
User Memory 64K	Profit Plan spreadsheet
Disk Drives 2 drives, 400K, unformatted	M-Basic 12 Games
Interfaces 1 Serial 1 Parallel	Uniform—allows computer to 'read' and 'write' TRS-80, Osborne, Xerox disks
Keyboard Detached, 63-key with numeric keypad	**Dimensions** Height: 8 inches Width: 18 inches
Software included: Perfect Writer word processing	Depth: 15½ inches Weight: 26 lbs. (portable)
Perfect Speller	

Considering the real needs and budget limitations of most small businesses, why suggest a company limo when a good company car will do?

Since 75% of all micros sold today are 8-bit systems, it's indicative of their capacity to take care of business. We'd stick with a Kaypro II.

IT CAN PAY FOR ITSELF FASTER THAN MORE EXPENSIVE COMPUTERS.

Every business person wants a computer to pay for itself in increased productivity. And the faster the better. Perhaps on this count alone, Kaypro II is worth recommending.

As a fully functional business system for $1595, Kaypro can win the payout race hands down.

IT'S BECOME A LEADING SELLER THANKS TO COMPUTER BUFFS, LIKE YOU.

In fact, Kaypro II is one of the best sellers in the $1000-$5000 price range. And it got there largely because of the enthusiastic word of mouth, and word of press, of computer enthusiasts. Many of whom, after building their own systems, bought a Kaypro II as their second computer.

So you certainly won't be alone if you recommend Kaypro II to anyone shopping for a first computer.

Or look at it this way. Once you tell people about the complete business computer for $1595, they'll probably stop bugging you with a lot of questions.

They may even forget to ask why you didn't buy a Kaypro II for yourself.

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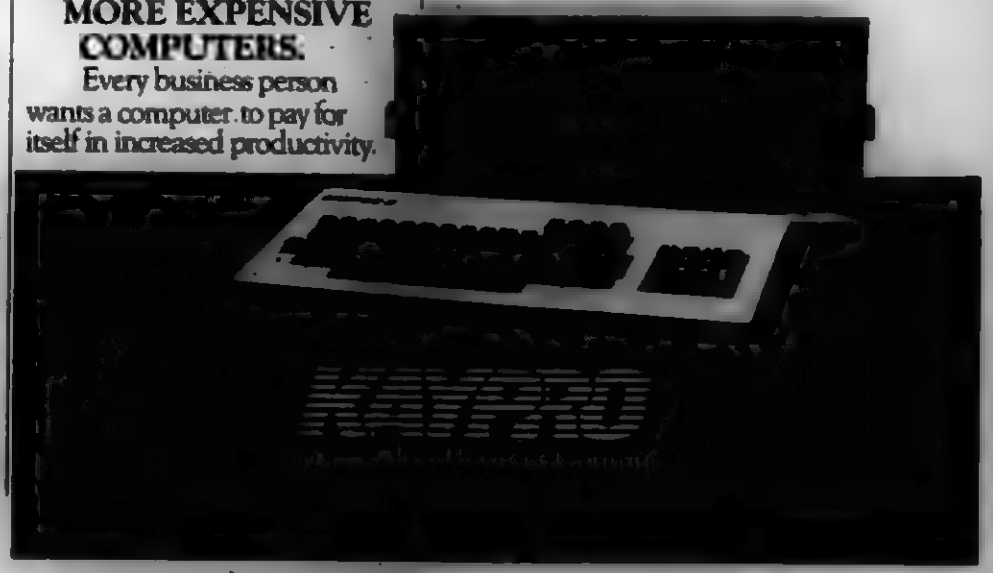

of the fault itself. In cases where short-circuiting in computer equipment may cause fire, customary insurance would respond to damages caused to all property excluding the defective computer. The very new forms now include damage to the faulty computer itself.

A second area of possible confusion arises in the "errors and omissions (E&O)" coverage exclusion of physical loss damages or loss of use resulting from physical loss of tangible property. There may be natural confusion on the insured's part here, since not only is there a clear need for uniform coverage of both tangible and intangible losses, but also no apparent reason for such losses to be excluded.

At this juncture, however, the needs of the electronics industry part from the classic divisions of insurance. Insurance has always made a very definite distinction between tangible and intangible as well as direct and indirect losses. These important distinctions are very carefully bounded so that various products do not overlap or provide duplicate coverage. The standard property damage liability form responds to claims of tangible, physical property damage.

The newer E&O professional liability forms respond in cases of lack of performance and the financial consequences of faulty software. The potential headache of the general liability insurer and the professional liability insurer quarreling over whether a tangible loss has occurred and which insurer should respond is solved by purchasing both coverages from the same insurer. The St. Paul and the Chubb Group have recognized this problem and stated that liability losses will be covered consistently on behalf of the insured, while the company will contend with the problem of assigning the loss to the appropriate product line.

Other major carriers are waiting to see the effects of this aggressive posture on the part of these few insurers before entering into a competitive position. The consequence to the data processing industry is a scarcity of products from which to choose. In addition, the products that are available have no standard form and vary so widely that it becomes difficult to judge the relative strengths of one against another.

One of the most potentially dangerous situations arises when the insurance policy makes no mention of an exposure as either covered or not covered, leaving adjustment of a resultant claim to the discretion of the company. Only unhappiness and litigation results from such situations, which ultimately damage both parties. So a careful choice of insurers at the outset is prudent.

The DP Insurance Package

Currently, coverages are better packaged than purchased separately or spread over two or more companies. Mandatory coverages of every package are property, building and/or contents and general liability in-

Many agents customarily use some form of checklist to review the needs of each client with regard to both form and content of coverage. All commercial insurance clients require review of the need for replacement cost coverage, blanket values, agreed amounts and deductible levels. Property needs for transit, bailees, valuable papers and accounts receivable, among many available forms, should be carefully reviewed.

Recommendations for liability coverage usually begin with the comprehensive general liability form with "nonowned & hired auto" added (which usually must be purchased separately in Massachusetts). Boiler and machinery, umbrella liability, crime, glass and owned auto coverages are customary to complete a commercial account.

Each of the insurers mentioned offers standard and specialty "manuscripted" coverages tailored to the needs of the client. The amount of specialization depends upon the size and operational scope of the risk. Costs can vary dramatically, depending entirely upon how individual exposures to loss are seen by the insurer and how profitable or competitive the particular line of coverage is expected to be.

The property insurance needs of the DP shop vary from the typical checklist commercial coverage in the areas of mechanical breakdown, power surge and all the specifically tailored coverages already discussed in this article. Then the "earnings and extra expense" costs must be carefully analyzed and completed to develop alternative plans for self-in-

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IN DEPTH

surance and transferral of risk, either to an insurer or by some other means, such as contractually.

Particular liability needs immediately suggest the very specialized "data processors errors and omissions" coverage, which involves determining contractual obligations and associated exposures to suits of negligence and failure to perform. John Swords of the Chubb Group Boston office stated that the Chubb has identified product errors and omissions liability in the data processing field as the new legal "hot button," which will heighten awareness of the need for E&O insurance coverage.

Many data processing manufacturers, now self-insured either through choice or through ignorance of available insurance protection, will be seeking coverage as litigation in this area increases.

Kaiser of the St. Paul agreed that data processors' E&O insurance is an important and often overlooked line of coverage. Kaiser added that transferring to an insurer liability now limited contractually can offer a high-tech company a valuable edge over its competitors. Data processors E&O insurance is, however, the least purchased E&O coverage to date, given its exposure, according to Kaiser.

Care should be taken by all DP managers or manufacturers, though, not to force their present insurers into providing E&O coverage as an accommodation to a large casualty-property package account. Doing so can be disastrous, possibly resulting in the customer, following a loss, becoming a "distressed line" looking for coverage through surplus insurers at a much increased price.

Insurers such as The St. Paul and the Chubb Group, who are in the market for the long term, can look at any single exposure over a broad base of industrywide statistics and consequently sustain a loss from any individual customer, while maintaining price and market availability.

Product liability, particularly if foreign exports are involved, can be an area where coverage may be difficult to place with an insurer. Many specialized computer applications are excluded from standard coverage, including medical diagnostic machines, electronic funds transfer systems and any class of mathematical calculation supporting very high-risk operations.

Acceptance of any class of risk is still often completely at the discretion of an underwriter who is most probably not adequately equipped to assess the potential for loss. Refinements to liability forms to adapt to the needs of the electronics field have just begun to be recognized by the insurance industry.

Unfortunately, oversights in the analysis of potential exposure to loss can happen all too easily. The simple and common situation of employees taking terminals back and forth from their work places to their homes can be a very vulnerable and expensive area of oversight. Most computer floater policies purchased by DP managers are written with only minimum transportation coverage and are not true "floater" forms, as the term implies.

Full transportation coverage of equipment is much more expensive, because of the obvious risks involved, and is ordinarily not warranted for a DP shop with only stationary computer equipment. All too often, however, expensive specialized terminals will be part of the DP shop operation and in need of full "all-risk" transportation coverage against breakage and theft while being transported to and from secondary locations.

Only a solid understanding of the nature of usual DP shop operations can assist an agent in directing inquiries to the data processing manager about potential exposures. The dynamics of the high-tech industry itself necessitate more frequent review of the client's needs for coverage.

Identifying each exposure to loss is, then, crucial to the overall business continuation plan. Only after an exhaustive analysis can the business owner or manager clearly understand which exposures should be retained (self-insured) and which are better transferred to an insurer.

About the Author

Nancy James began her DP career in 1970, concentrating in insurance-related systems work. She has managed agency automation and interface projects representing major carriers, consulting houses and independent system vendors. James founded her own insurance agency in Concord, Mass., last year.

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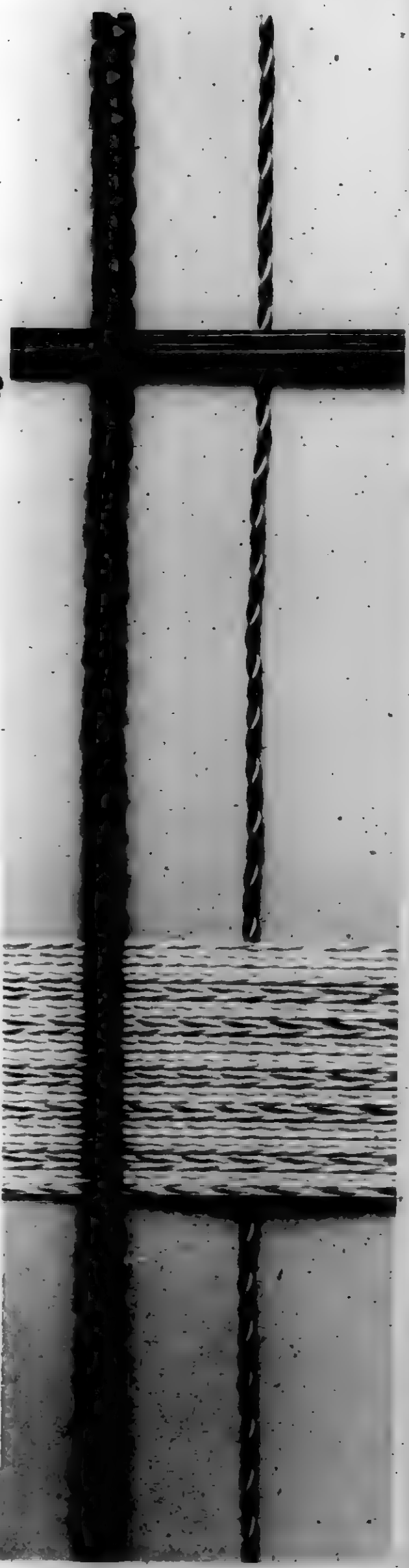

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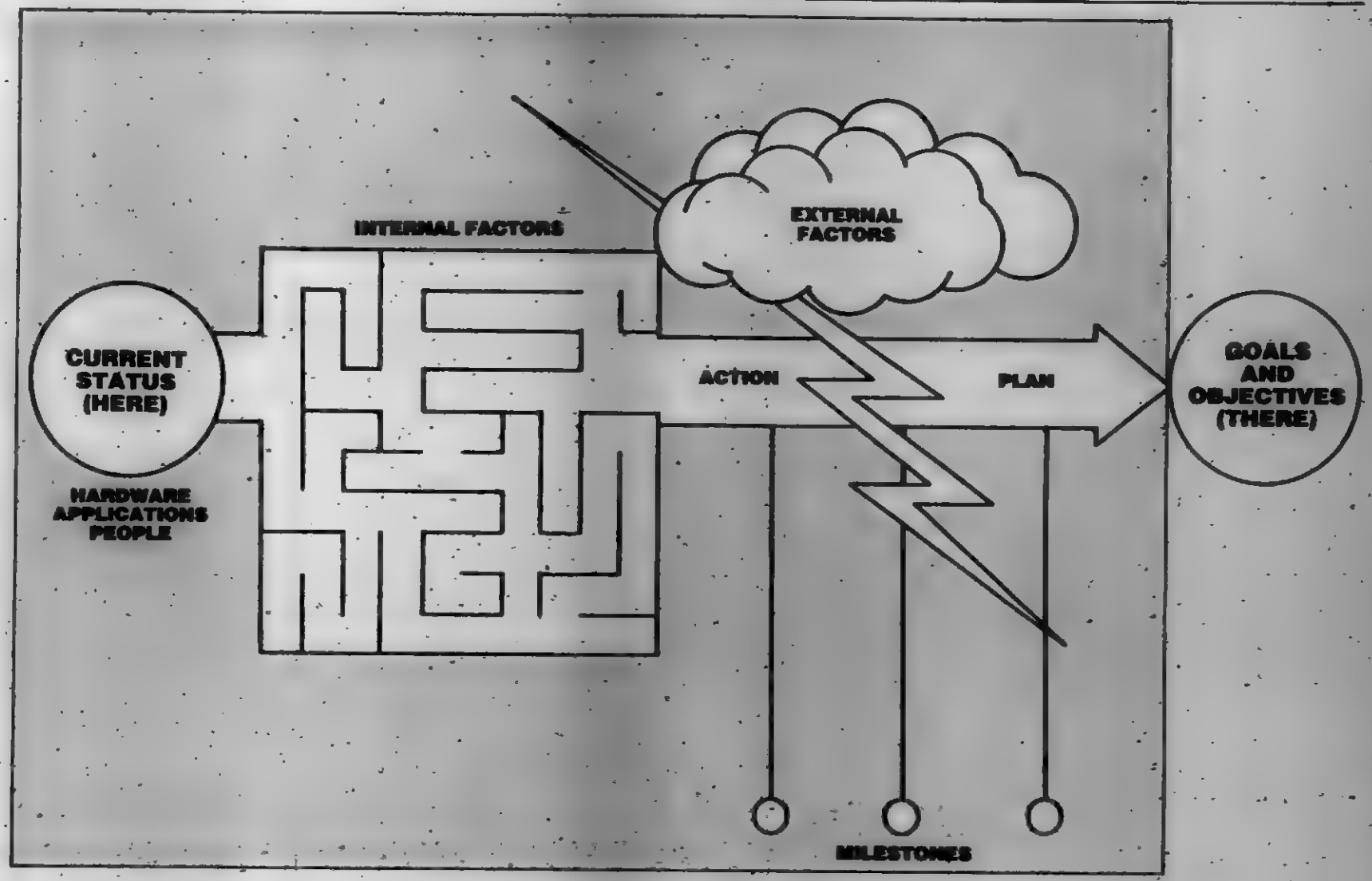


Adapting DP Strategy To Management Style

By Robert E. Lief, Robert D. Dodge and Ralph L. Ogden

Broad strategic corporate objectives should dictate DP objectives which, in turn, determine operating goals and specific plans of action.

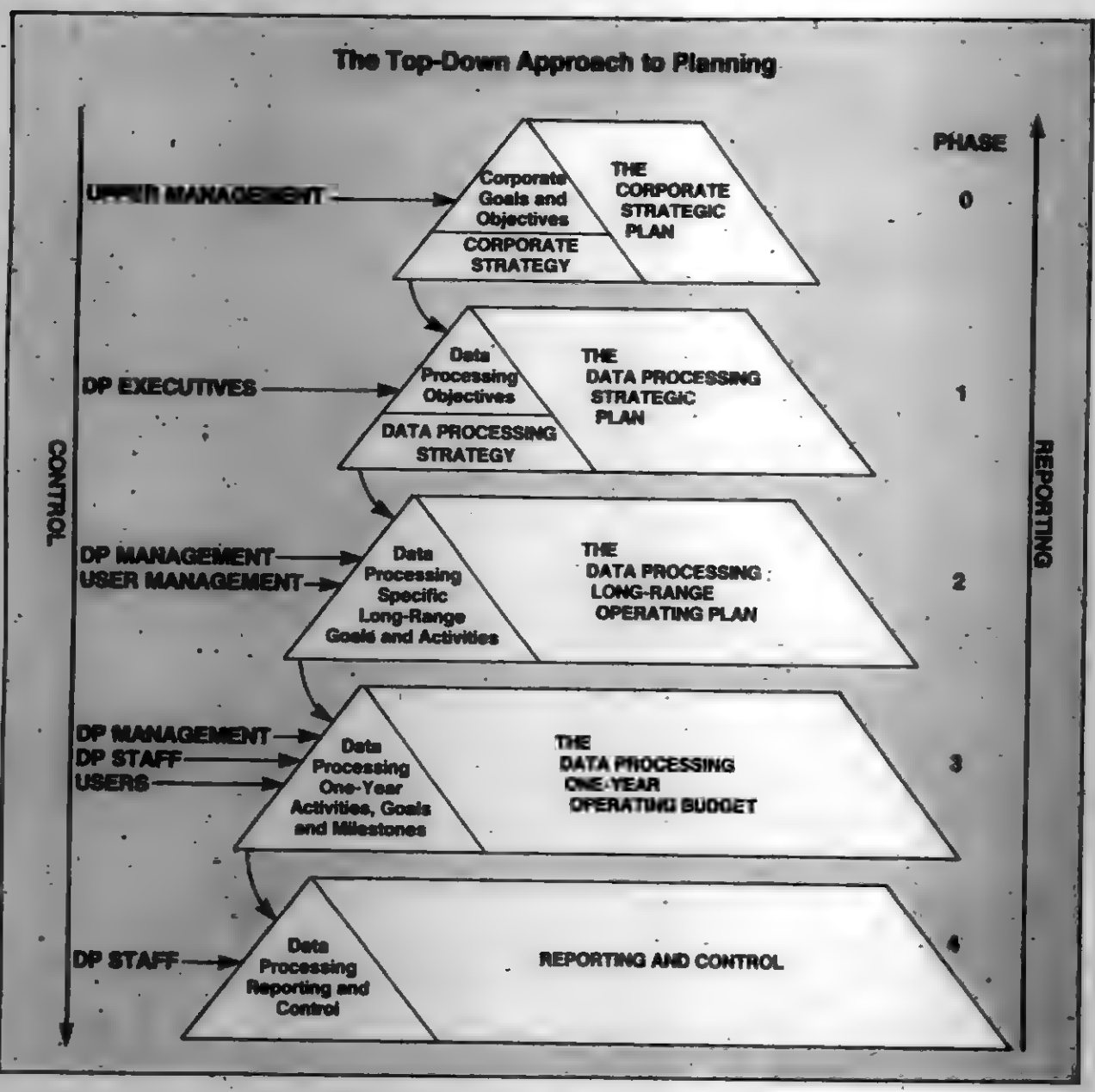
Most data processing organizations are governed by bottom-up corporate influences. Users communicate short-term, need-it-yesterday requirements to systems analysts who then set out to satisfy them, often unaware that they may have diverted human and machine resources in conflict with corporate objectives.

To ensure that DP efforts support, rather than sidestep or oppose, corporate objectives, decisive action must be taken to redirect the driving force on DP to be top-down. Broad strategic corporate objectives should be the basis for strategic DP objectives which, in turn, dictate operating goals in the form of specific action plans. This effort requires no less than a complete reorientation of DP management, upper management and operating management and a redefinition of the roles they must assume. Formalizing the planning process facilitates this reorientation.

This article is based on Fluor Corp.'s experience in implementing the formal planning process throughout its information systems organization. Fluor provides worldwide engineering, construction, procurement and project management services to energy, natural resource, industrial, commercial and utility clients.

The components of its plan are as follows:

- *The Corporate Strategic Plan.* Statements of corporate objectives, goals and approaches that establish the business direction and environment.
- *The DP Strategic Plan.* Statements of DP objectives and approaches that establish the direction and environment of



the DP organization.

- *The DP Three-Year Operating Plan.* Major actions, goals and milestones that support the objectives in the DP and corporate strategic plans.
- *The DP Operating Budget.* Decision packages that concisely present the costs and benefits of the projects and functions included in the upcoming year's DP budget.
- *Reporting and Control Mechanisms.* Procedures, formats and organizational structure that facilitate progress and financial reporting against the decision packages.

Phase Zero: The Corporate Strategic Plan. Most well-managed corporations have a strategic planning function that is charged with developing directions over a three- to five-year horizon. These plans often address such issues as company expansion, diversification, relocation, new technology, product distribution and marketing. However, unless your enterprise is primarily a DP company (a software house, for example), it is unlikely that the corporate strategic plans will contain much specific direction in the area of DP except for some general "motherhood" statements. In general, the people responsible for developing corporate plans understand little about DP and almost certainly not enough to look forward and set direction.

It is therefore incumbent upon DP management to take the initiative to implement its own strategic planning process. While the process will be DP-oriented, it is imperative that any directions and strategies developed be supportive of those set at the higher corporate level.

We have designated the corporate strategic planning process as "phase zero," because the corporate plans should already be in place when DP starts its process. For those DP executives who find themselves in a corporation without a well-defined strategic plan, there is still hope. If your company has no formal corporate plan, you will have no explicit directions or constraints with which you must be consistent. However, you should know enough about the implicit strategies to assure consistency with them.

Phase One: The DP Strategic Plan. Several questions need to be asked at the start. The most obvious are:

- Who will participate and in what capacity?
- Who will review and approve the plan?
- How will DP secure the support of top management?
- How long is the planning horizon?
- How will the plan be organized?
- What will the plan contain?
- What DP objectives and strategies can be derived from the corporate strategic plan?
- What will be done with the plan when it is complete?

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In most cases, the answers are highly dependent on the size and structure of the DP organization and the corporation, the degree of computerization of company functions, the previous track record of DP in the corporation and the nature of the company's products or services vis-a-vis new technology.

Who will participate and in what capacity? Certainly, the top DP executive in the company must be the driving force. He should be the one who mandates and supports this process, providing overall direction, carefully reviewing and assessing the impact of each strategic decision before approval. He must also be the principal communication link to upper management outside the DP organization, for it will be essential to gain that management's support.

DP line organization management should participate by making comments and suggestions after reviewing rough drafts. For two reasons, it should not, as a matter of procedure, be directly involved in generating the plan. First, these managers, typically in charge of application development, production support or computer operations, are extremely busy, unable to devote the magnitude of effort this strategic planning process requires. Second, there is a risk of conflict of interest. For example, top DP management may want to dismantle an empire that a line manager is trying to build. For small companies, this may not be a problem, but in multinational corporations with distributed responsibility for DP, it can be difficult to keep everybody pursuing the same objectives via the same strategies.

Who will review and approve the plan? Obviously, top management in the DP organization must approve both the process and the content. However, senior operating management must also "buy in" to the DP planning process because it will be the operating units who will be required to participate in subsequent phases of the process and who will feel most of the impact of the plans in the form of level and quality of service from DP.

How will DP secure the support of top management? First, top management must be informed about the purpose and methodology of the planning process before it is initiated. This job will require the diplomatic expertise of the top DP executive to assure top management that DP is undertaking this effort on management's behalf, to provide better service. The plan, while dealing with DP issues, must meticulously avoid as much "computerese" as possible without introducing too many loopholes or "weasel clauses" that could be subject to different interpretation by different parts of the DP organization. Finally top management must have final veto power over any part of the DP plan. After all, DP is a service organization, a monopoly business within the corporation, and top management ultimately pays the bills and takes the consequences. All these actions should help to raise the comfort level of these executives.

How long is the planning horizon? Again, the answer is primarily a function of the type of business. In a high-tech industry, two years may be about the limit of what one can envision with a comfortable degree of reliability.

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IN DEPTH

In a very stable environment, such as the banking industry, a five- to 10-year planning horizon may be acceptable. For most businesses, however, a three- to five-year horizon seems most practical. It is compatible with other planning horizons in business and government and also seems to approximate the frequency of major technology injection into DP.

How will the plan be organized? Some latitude can be taken, based on the type of company and DP organization. However, the basic elements of the strategic plan can be defined as follows: mission statement, objectives, strategies and directives and assumptions.

If certain aspects of DP are ignored by the corporate plan, they are fair game for the creative thinking of the DP organization, provided there is no conflict with other, non-DP strategies in the corporate plan, such as those dealing with financial performance.

The mission statement is a concise declaration of the overall purpose of the DP organization. Objectives are broad, timeless statements of direction: "Standardize all accounting systems throughout the corporation." Strategies are the specific methods or approaches to be employed in achieving a stated objective: "Promote standardization by installing a data base management system and a data administration function."

Directives and assumptions form the constraints and define the environment in which the plan must be developed. Directives are explicit orders, usually from top management: "Maintain a ceiling on the staff levels in the DP organization." Assumptions are factors not explicitly stated that may be inferred from the corporate strategic plan or the general business situation: "Assume 10% growth through 1987."

What will the plan contain? The most obvious subjects to be addressed in a DP strategic plan are as follows:

- Structure of the DP organization.
- Hardware capacity and configuration.
- New application development.
- Productivity and competence of the DP staff.
- Injection of new technology.
- Computer security.
- Financial performance.
- Administrative policies and procedures.

This list is by no means complete but should serve as a useful starting point for developing specific objectives and strategies.

What DP objectives and strategies can be derived from the corporate strategic plan? This depends heavily on whether references to DP are explicit, vague or nonexistent in the corporate plan. Explicit strategies such as "Decentralize DP" must be taken at face value. Vague statements such as "Enhance user productivity through increased use of the computer" can be massaged and interpreted to form specific DP strategies, provided they are still consistent with the original corporate strategy.

If certain aspects of DP are ignored by the corporate plan, they are fair game for the creative thinking of the DP organization, provided there is no conflict with other, non-DP strategies in the corporate plan, such as those dealing with financial performance.

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and direction are useless if there is no mechanism to accomplish them and measure the results. Completion of the DP strategic plan marks the end of phase one and the beginning of phase two, development of specific operating plans for DP's support of user organizations. These operating plans will be consistent with the DP strategic plan in the same way that the DP strategic plan was consistent with the corporate strategic plan (or, if there was no corporate strategic plan, with the wishes and blessing of top management). To reiterate, this is a top-down planning approach, designed to cause DP to be driven by the corporations' objectives.

The astute planner must be able to distill meaningful information from statements that are general and tainted with political overtones. He must be a visionary who can discern trends from scanty or unverifiable data and extrapolate them to make predictions.

Phase Two: The DP Operating Plan. Once a DP strategic plan has been developed and approved by upper management, it becomes the responsibility of the DP organizations to transform the general strategies into specific actions and goals that can be realistically achieved within some specific time period. This job is most effectively done by preparing a DP operating plan that incorporates these actions and goals and spans a time period of typically three to five years.

This phase of the planning process requires the heaviest participation of the user community to define fully their systems requirements in terms of applications development, maintenance, hardware, service levels and security. The DP organizations must integrate with these requirements their own activities and goals regarding such strategic issues as methodology, data base, hardware configuration, organization, training, productivity and assimilation of new technology. The operating plan should be developed at the proper levels of the organization, where there is a clear understanding of the corporate goals and objectives as well as firsthand knowledge of data processing issues and technology.

The objectives of the DP operating plan can be summarized as follows:

- To ensure that the DP organization understands and fully satisfies its users' requirements.
- To increase user and management visibility to DP activities.
- To improve the formal communication and reporting mechanisms between DP and the using organizations.
- To ensure effective utilization of DP resources, human and machine.
- To provide a mechanism for forecasting hardware, software, personnel and capital requirements.
- To improve communication within the DP organization.
- To ensure consistency of DP planning with corporate business planning.

The content and organization of the DP operating plan can be divided into two categories: background information that defines the environment and assumptions under which the plan has been developed; and a "goals and activities" section that provides specific statements of what will be done and when (see diagram on In Depth/25).

Within the category of background information, three components can be identified: current inventory of resources (people and machine); assessment of internal capabilities (staff and systems); and assessment of external factors (user organizations and business climate).

The inventory of resources is essentially a snapshot of the DP organization. It should consist of organizational charts identifying people, functions and staff levels (the human resource side) and an inventory of all hardware: mainframes, terminals, peripherals, communications processors, mini and microcomputers (the machine resource side). In addition, it is advisable to inventory all operating software products, including operating systems, compilers, data base management systems and application generators in order to define

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further the current arsenal of available tools.

The assessment of internal capabilities is an honest self-evaluation of DP within the company, written in narrative form, describing both real and perceived strengths and weaknesses. A typical slate of criteria for evaluation is as follows:

- Staff professionalism, competence, productivity.
- Quality and reliability of systems in the applications portfolio.
- User or client satisfaction.
- Ability to manage human and machine resources.
- Financial performance.
- Position relative to the competition and the state of the art.

This list should be expanded and tailored to meet the needs of your particular organization, but it is representative of the flavor of the internal capability assessment.

The assessment of external factors can be a lot more elusive to develop. It is a statement of those parameters, conditions and constraints that will influence the direction of DP but are beyond the control of the DP organization. The astute planner must be able to distill meaningful information from statements that may be general and tainted with political overtones. He must be a visionary who can discern trends from scanty and/or unverifiable data and extrapolate them to make predictions.

Some of the required data will be in company files and trade publications. Most of it will have to be aggressively sought by the DP planners, using whatever skills and communication channels they can.

Among the factors that may affect DP plans are changes in the type of company business (new services or products), technological advances, changes or growth in external organizations, manpower availability and changes in the company's economic situation.

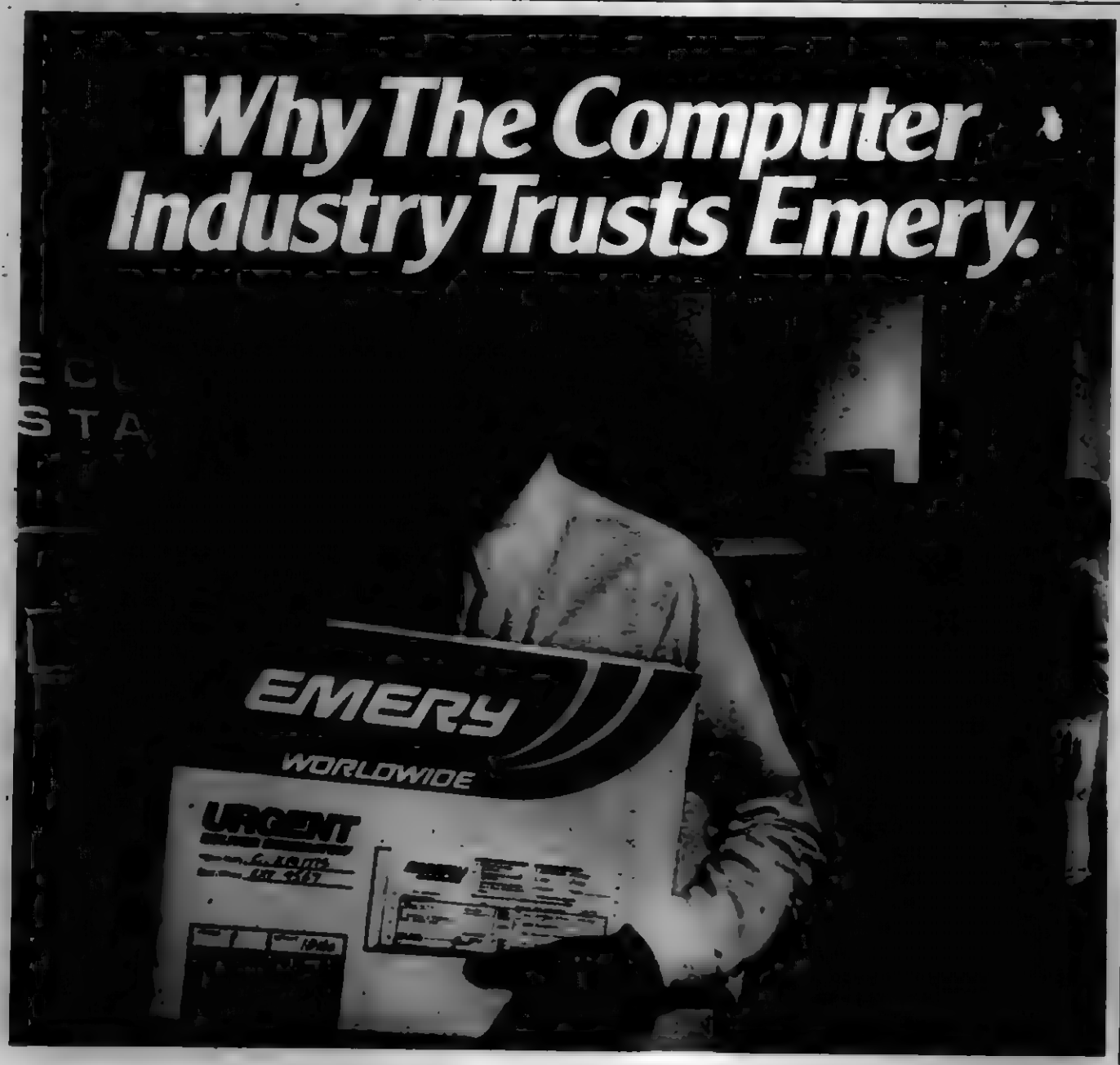
All these and more must be considered. The background information, once developed, establishes the starting point and the environment in which DP can plan for the future.

The goals and activities section is the part of the operating plan that contains specific actions for achieving the objectives set forth in the strategic plan. The various organizations within DP, working in close cooperation with their users, establish specific goals, which are then subdivided into activities and milestones. The goals must be quantifiable, measurable and, most important, feasible.

The most convenient format for this information is an action plan that lists each goal, its related activities and milestones, a proposed timetable and a responsible person or organization.

When formulated, the operating plan must first be double-checked for consistency with the DP and corporate strategic plans. It should then receive the full blessing and support of user management and upper operating management to ensure a concerted effort to achieve the goals. Once approved, it is, in essence, a contract between DP and the rest of the corporation.

To begin executing the contract, DP must now move on to phase three, the development or extraction of a one-year operating budget from the first year of the operating plan.



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Phase Three: The DP Operating Budget. Once an operating plan for DP has been developed, it will be necessary to allocate funds for implementing the plan. If your company is like many, upper management perceives DP as a "black hole" into which enormous sums of money flow, but out of which very little tangible progress emerges. Hence, management keeps tightening the purse strings. With limited funds and current methods of planning and management, many DP organizations consume most of their budget just keeping things running.

If upper management is sold on and actively supports this top-down planning process, it may be more receptive to new company DP objectives and projects, because it recognizes that the DP plan is simply an extension of corporate strategy. If management is still reluctant to ease funding restrictions, the technique of zero-based budgeting may be just the mechanism to convince it that the DP organization is serious about expending its scarce resources in the most beneficial way for the corporation.

Zero-based budgeting may be just the mechanism to convince management that DP is serious about expending its scarce resources in the most beneficial way for the corporation.

Simply stated, the premise of zero-based budgeting is that each activity and project must be justified on the basis of its own benefits and costs, with no assumption that activities currently in progress should be automatically continued at their present level of funding.

This zero-based budgeting activity can be designated as phase three of the planning process. The objective is to extract the first year of the operating plan and subject it to the zero-based budgeting process, which can be summarized as:

1. Start from scratch and fund the organization as dictated by requirements identified in the operating plan, not by historical precedents.
2. Each major function, activity, capital expenditure or project comprises a "decision unit." These may include ongoing department functions, such as operation of a mainframe, or projects such as development of a new application.
3. Decision units are divided into "decision packages." Packages within the same decision unit all propose to undertake the same function, activity, capital expenditure or project, but at incremental "levels of effort."
4. A decision package contains all the information sufficient for management to make an informed judgment of its merits. This information should, at least, be the following:
   - The description and purpose of the proposed activity, function or project.
   - The alternative approaches considered but not recommended (and why).
   - The benefits of approving the decision package, both tangible and intangible.
   - The consequences of not approving the decision package.
   - The estimated cost and manpower requirements of the entire decision package, along with supporting detail.
5. Completed decision packages are ranked in order of priority by the DP organization (in close communication with operating management), and the final ranking is approved by upper management.
6. A "level of affordability" is set by upper management based on economic realities and degree of aggressiveness with which it wishes to implement the plan.
7. A line is drawn in the priority ranking list where the cumulative cost begins to exceed the level of affordability.
8. All decision packages above the line are approved. Those below it are deferred or eliminated.

There are many benefits to be realized from zero-based budgeting. The resources (money and manpower) are allocated optimally, according to strict order of priority as agreed to by DP, operating and upper management.

The only area for hot debate is in the vicinity of the cutoff line. All other decision packages are either

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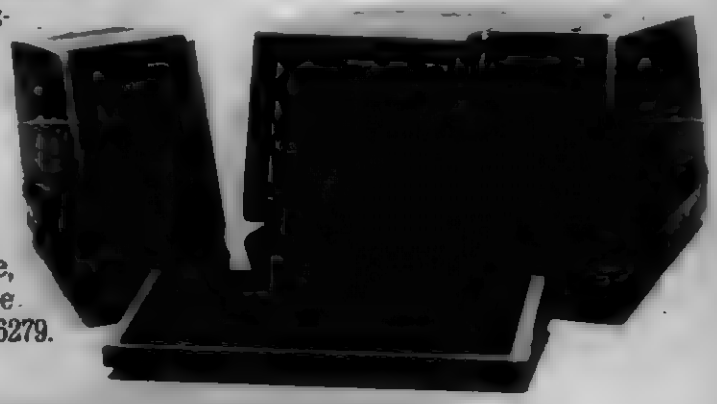

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obvious winners or losers.

The company can react quickly to situations that require budget revision. The level of affordability can simply be moved up or down and new activities approved or previously approved activities deferred. (How often has everyone been told to "cut 10%" even though it may not have been the best method of adjusting the budget?)

The use of decision packages provides upper management with visibility to all DP activities and facilitates communication, reporting and control.

Since each incremental level of effort (funds or manpower above and beyond the base level) is a separate decision package, it is ranked based purely on incremental cost, benefit and priority. As a result, the levels of approved activities are theoretically optimal.

There are certainly pitfalls to avoid in the process. Zero-based budgeting, as a buzzword, often strikes fear in the hearts of middle management, which perceives it as a precursor to the "ax falling" and hence doesn't give it full support. Installation of zero-based budgeting rarely goes smoothly the first time. There is a good deal of reorientation of management thinking required before it is fully effective. The process can be overly burdensome if too many decision units and packages are generated at too great a level of detail.

Once the decision packages above the level of affordability are approved, it is a simple matter of mechanics and arithmetic to transform the cost detail contained in the packages into a traditional department budget. When implementation of the decision packages begins, we enter the final phase of the process, management reporting and control, which ensures that everything is going according to plan.

Phase Four: Management Reporting and Control. Now that the DP organization has begun the implementation phase of its one-year operating plan (budget), it is incumbent upon them to keep management in the DP organization and upper management informed about progress and problems regarding the plan and to provide management with a mechanism for controlling and redirecting when necessary.

This is, then, phase four of the overall planning process. The reporting mechanism should be developed to tie back to the original decision packages in the approved one-year plan. The typical management summary report would incorporate information such as current status of the milestones in the various decision packages vs. their targets (on schedule, ahead, behind or complete). In addition, actual financial data should be collected by decision package and reported as planned vs. actual man-hours and dollars expended.

As far as management control is concerned, the mechanisms to be employed are highly dependent upon the corporation's management style. But regardless of style, it is absolutely essential for management to follow up on the progress being made against all DP plans, the one-year plan, the operating plan and the strategic plan. Provision should be made to adjust the plans to changes in business conditions, and upper management must assert its charter to make any organizational changes to ensure that the plans are fully supported and implemented.

Most important, the thing to bear in mind is that this planning process is by no means ideal. It must be adapted to the specific environment. It cannot be considered a static formula, but one that evolves as a result of the driving forces of management style, corporate goals and technological change.

About the Authors

Robert Lief has worked in the data processing organization of Fluor Corp. in Irvine, Calif., for 10 years. He has served as an analyst in engineering application development and, most recently, in the planning and control organization that provides direction to all the DP entities worldwide within Fluor.

Robert Dodge has more than 15 years' experience in DP, the last 13 at Fluor. He has managed the engineering and graphics applications group and the operations group and currently oversees the corporate planning and control organization.

Ralph Ogden is vice-president, operations support, for Fluor. He serves as a member of the Information Systems Task Force, which has responsibility for computer operations, systems and programming, office automation and telecommunications in support of Fluor's engineering and construction units.

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To $800 Million Business, Study Says

Voice-Grade Modem Shipments Booming

WELLESLEY, Mass. — Shipments of voice-grade modems have this year grown to an $800 million business, according to a recent study by Venture Development Corp. (VDC) based here.

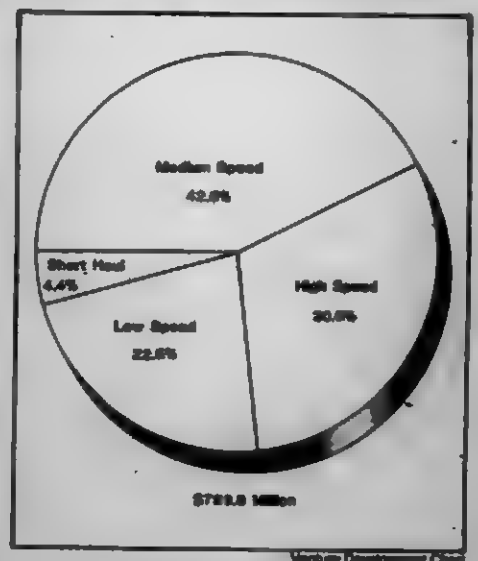
Despite predictions in the 1970s that all-digital data transmission facilities would usurp the voice-grade modem's domain, the market prospered throughout that period, according to *Voice Grade Modems: A Strategic Analysis*. The study also predicted that industry shipments would more than double by 1987.

"The growth of the voice-grade modem market, which will be in excess of 20% per year, will be fueled by the continued growth in data commnications networking, timesharing and data base applications, and the accelerating growth in communications requirements for automating the factory and the office," the study said.

Medium-speed voice-grade modems handle communications between 2,400 and 4,800 bit/sec and account for the largest of the four product segments. They will remain the largest through 1987 when they will account for 43.1% of industry shipments. Low-speed modems are in first place when one counts the number of units shipped.

More than twice as many low-speed modems are shipped than are medium-speed modems. According to VDC, almost two million low-speed modems will be shipped in 1987 compared with approximately one million medium-speed modems in the same year.

High-speed modems which operate at data rates greater than 4,800 bit/sec will account for less than 250,000 units shipped in 1987, but will account for the second largest share of voice-grade modem revenues because of their high average selling price.



1983 Modem Shipments

Although there are more than 75 voice-grade modem manufacturers, 90% of the business is controlled by nine vendors indentified by VDC as: AT&T; Codex Corp.; General Datacomm, Inc.; IBM; Paradyne Corp.; Racal-Milgo, Inc.; Racal Vadic, Inc.; Rixon, Inc.; and Universal Data Systems, Inc. AT&T is the leader in all market segments except for short-haul, voice-grade modems.

The study is available for $2,790 from Venture Development Corp., One Washington St., Wellesley, Mass. 02181.

TI Unveils Series To Link Its Micros With Ethernet

DALLAS — Texas Instruments, Inc. has announced a series of products that allows its Professional Computer family to be compatible with Xerox Corp. Ethernet local-area networks and be linked with other Ethernet-compatible computers such as IBM's Personal Computer.

Called Etherseries, the products also allow TI's microcomputer systems to share peripherals, exchange data and serve as electronic mail stations, the vendor said.

At the same time, the firm announced a software emulation package that allows its Professional Computer to act as a remote terminal to an IBM or IBM-compatible Systems Network Architecture (SNA) mainframe computer.

Consists of Five Products

Etherseries, developed for TI by 3Com Corp., consists of five products: Etherlink, Etherseries User Software, Ethershare, Etherprint and Ethermail. It can be installed on any portable or desktop TI Professional Computer with 128K bytes of random-access memory running under Microsoft, Inc.'s MS-DOS Version 2.1. A typical configuration includes a network server that is dedicated to providing shared resources for eight to 10 users, a spokesman said.

Etherlink includes a user-installable Ethernet interface board that plugs into one expansion slot in the computer and reportedly allows it to interface to the network. The board also includes the Ethernet Data Link Controller and transceiver.

(Continued on Page 94)

'Passkey' Boasts Integration Of IBM, Ascii Hosts Within Net

SAN JOSE, Calif. — Systar Corp. has introduced a new program said to make IBM and asynchronous Ascii hosts compatible within a communications network.

Passkey allows asynchronous micros, minis and mainframe computers manufactured by Sperry Corp., Digital Equipment Corp., Data General Corp. and others including IBM to be integrated into IBM System/34, 36 and 38 environments. Conversely, it permits the IBM System/34, 36 and 38 to be integrated into existing networks of asynchronous hosts and terminals, the vendor claimed.

Passkey is a component of Gateway, the vendor's communications front-end system, which supports the X.25 packet-switched network protocol. Gateway uses the IBM Series/1 as the single point of connection for all network devices.

The combined price for the Gateway and Passkey package is $27,000, with the Passkey component priced at $5,000. The Passkey as a stand-alone module costs $13,000 from the vendor at Suite 208, 1762 Technology Drive, San Jose, Calif. 95110.

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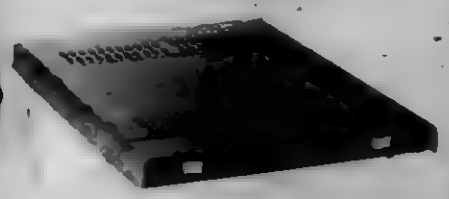

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Teleray Research Unwraps Ansi Dual-Mode Terminal

MINNEAPOLIS — Teleray Research Division of Research, Inc. has announced an Ansi X3.64 terminal, the Model 7-DEC, a dual-mode, multipage unit, which is software-compatible with Digital Equipment Corp.'s VT102 in one mode and in the other mode is user-definable (code-loadable) or compatible with the company's Model 10.

Some of the product's features include text editing, programmable functions and block transmission operations. It has two pages of display memory, either volatile or nonvolatile. Display memory can reportedly be reformatted by redefining logical line length and page length.

The price is $1,370. Further information is available from Research Inc., Teleray Research Division, through P.O. Box 2464, Minneapolis, Minn. 55424.

Data Service Unit Ties to DDS

SIMI VALLEY, Calif. — A high-speed, wideband data service unit developed to interface with Bell's Dataphone Digital Service (DDS) was recently announced by Teleprocessing Products, Inc.

The TP-556 reportedly operates on DDS links at 56K bit/sec and features built-in test generators and detectors. According to a company spokesman, the unit's circuit design provides reduced power drain, and a front panel display provides information on network status.

The unit is available as a stand-alone device or in high-density rack-mounted cards. Priced at $750, it is available from Teleprocessing Products, 4565 E. Industrial St., Building 7K, Simi Valley, Calif. 93063.

VT Software Out for PDP-11 Running RT-11, TSX-Plus

RICHMOND, Va. — Horizon Data Systems has announced Virtual Terminal (VT) software for Digital Equipment Corp.'s PDP-11 minicomputers running under the RT-11 and TSX-Plus operating systems.

VT combines file transfer capabilities and virtual terminal interaction. The product does not require special software in remote computers, according to the vendor.

Keyboard commands control most link characteristics including parity, transmission speed, X-On/X-Off, character echo and call origination and termination. The product provides full support for autodialing modems and permits calls to be placed from any terminal, including dial-in units, without physical access to the modem, the vendor said.

The price is $650. Further information is available from Horizon Data Systems, 1901 Wildflower Terrace, Richmond, Va. 23233.

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Package Links IBM Micros To MAI Minis

VANCOUVER, B.C. — Sigma Computer Resources has introduced a communications software package said to link the IBM Personal Computer to Management Assistance, Inc. (MAI) Basic Four minicomputers.

The PC-B4 terminal emulator allows the IBM microcomputer to access any type of MAI host system as a standard MAI 7270 video display terminal at 9,600 bit/sec. The package includes text file transfers, the ability to send output from the Basic Four to a local IBM Personal Computer printer and the ability to print text files from the IBM Personal Computer on the Basic Four printer, a vendor spokesman said.

The price for the package ranges from $500 to $2,000 depending upon the size of the system. More information is available from Sigma Computer Resources, 801-1155, W. Georgia St., Vancouver, B.C., Canada V6E 3H4.

Burroughs, IBM Get Emulators From Cybernex

TORONTO — Cybernex Ltd. has introduced an update to its Burroughs Corp. terminal emulator and an IBM terminal emulator.

The Cybernex SA-830 Burroughs TD830, 98X and E.T. 1000 terminal emulation package has been enhanced to include 16-page memory, concatenation with autobypass, serial and parallel printer support and 10 programmable function keys. The enhanced terminal is available for $1,695.

Also introduced was the XM3270 terminal which — when used in conjunction with a protocol converter — is said to provide access to IBM systems with little or no operator retraining. It is available for $1,295.

More information is available from Cybernex through P.O. Box 911, Station U, Toronto, Ontario, Canada M8Z 5P9.

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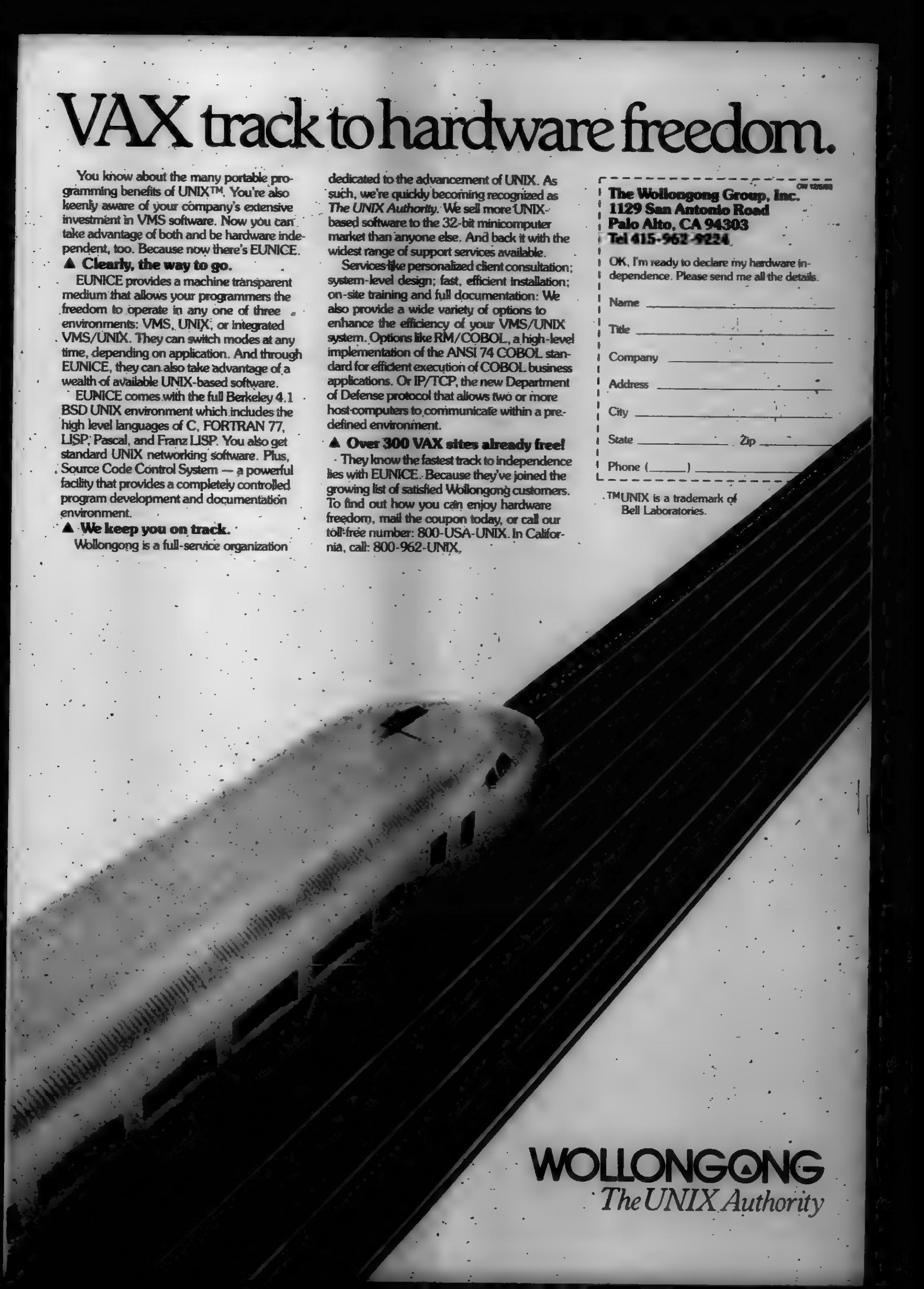

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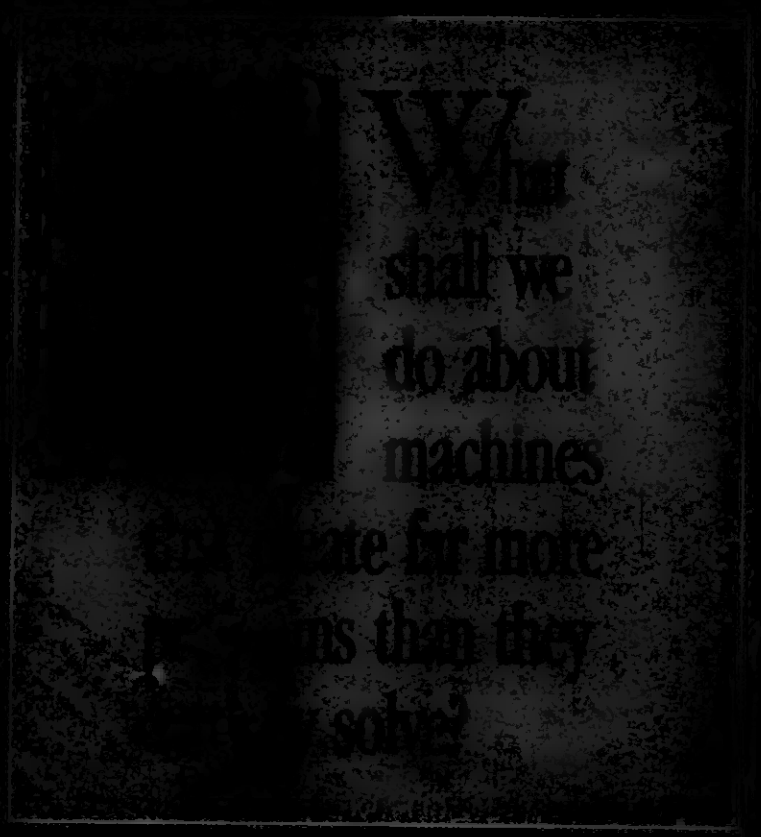
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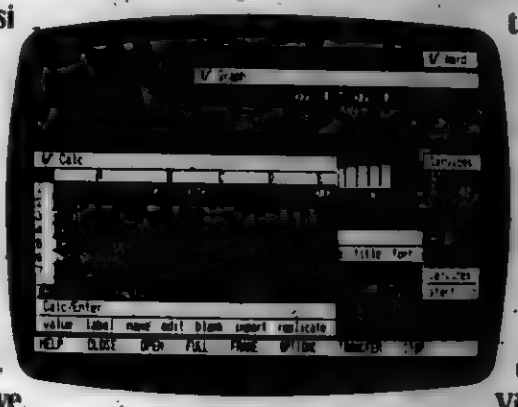

Even more impressive, their strength is actually boosted when these applications are *combined*. Making maximum use of multiple electronic windows and a mouse, Visi On instantly transfers data between applications, demonstrating depth of integration to an unprecedented degree. Instead of doing just one job at a time, the user may move from project to project, backed up always by the full power of the machine.

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The Visi On system also provides the basis for a complete package of communications programs. With applications software soon available, Visi On will allow personal computers to emulate both asynchronous and synchronous terminals.

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From Any Point on Net

Decentralized System Touts Control of X.25 Nets

ALEXANDRIA, Va. — Dynatech Packet Technology, Inc. has unveiled a modular, decentralized network control system said to offer automatic control of the firm's X.25 packet-switching networks from any point on the network.

Unlike traditional network control systems that reportedly utilize a centralized general-purpose processor to perform control functions, the Dynapac network control system features seven specific-purpose processors, each of which is dedicated to one particular aspect of network control, a spokesman said. These processors are interconnected via the network and can operate anywhere along the network route.

Because processors are scattered along the network, components can be distributed to eliminate the possibility of communications bottlenecks due to central CPU failure, the spokesman noted.

The seven processors incorporated within the network control system design include:

- A multiloader, which loads operating software to network devices.
- A configuration processor that holds a file of commands that alter the configuration pre-specified time.
- A status and statistics processor, which checks the status of devices, trunks and ports.
- A diagnostic control processor, which consolidates all diagnostic access to one point that can be simultaneously used by up to eight technicians.
- An alarm processor, a central point where all network alarms are directed.
- A billing control processor, which collects all call records issued by switches.
- A mainframe processor, which collects data from the status and statistics processor and from the billing control processor and provides new files to both the configuration processor and multiloader.

The complete Dynapac network control system costs $95,000 from Dynatech Packet Technology, 6464 General Green Way, Alexandria, Va. 22312.

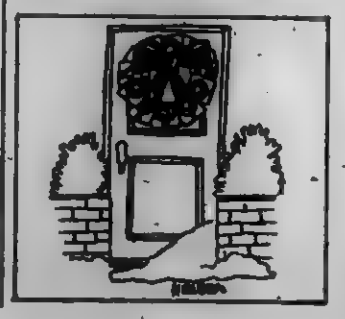
Calltext Line Changes Text To Speech

MOUNTAIN VIEW, Calif. — Speech Plus, Inc. has announced the Calltext family of products said to combine a telephone interface with text-to-speech technology to convert serial Ascii text to speech in real time.

Products include a module for the IBM Personal Computer and compatible personal computers, an RS-232 peripheral unit that operates under control of any host computer and a programmable system that operates up to six channels simultaneously while interfacing with the host computer, the vendor said.

Each of the products can be programmed to answer the telephone, obtain text data from a host data base and supply the text data in voice to users. The products are also designed to initiate calls, according to the vendor.

The products include the Calltext 5000 Telephone/Voice Module, the 5050 RS-232 Peripheral and the 5100 Multichannel Programmable System and are priced at $2,700, $2,975 and $9,800, respectively. Further information is available from Speech Plus, 461 N. Bernardo Ave., Mountain View, Calif. 94043.



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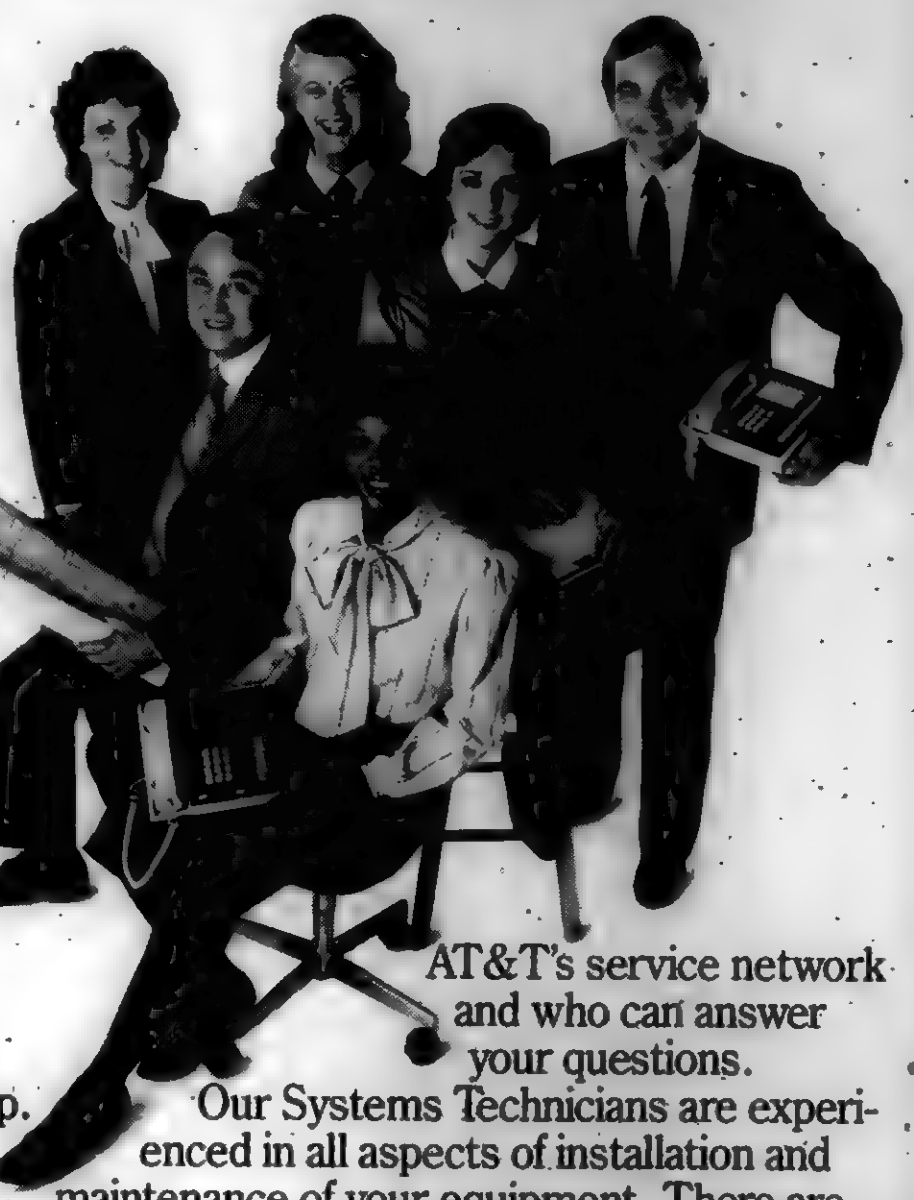

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Prentice Releases Series of Modems

SUNNYVALE, Calif. — Prentice Corp. has announced three modems for a variety of data communications applications.

The P-208A/B is a rack-mountable version of the company's synchronous (4,800 bit/sec) 208A/B modem. The product is compatible with the Bell 208A and B, and it is registered with the Federal Communications Commission for direct connection to the dial network. The price is $1,650.

The ALD/1 is a full- and half-duplex asynchronous (1,200 to 9,600 bit/sec) unit designed as an alternative to long-haul modems for short-haul applications, according to the vendor. The modem is available in stand-alone and rack-mountable versions at $300 and $200, respectively.

The 9629 synchronous (9,600 bit/sec) modem is a rack-mountable version of the company's 9629 stand-alone unit. According to the vendor, the modem is suitable for operation over four-wire 3002-type unconditional leased lines in point-to-point applications. The price is $2,650.

Further information is available from Prentice, 266 Caspian Drive, P.O. Box 3544, Sunnyvale, Calif. 94088.

System Ties Storage Unit, Micros

PLEASANTON, Calif. — General Micro Business Systems has introduced a networking system said to link the Sunsol Systems Universal Mass Storage unit to the Eagle Computer, Inc. series of microcomputers.

The Net*Set is included with the purchase of a Sunsol system and is said to make it possible for Eagle systems to share a common network arrangement with other Eagles or 20 other brands of computers. It utilizes the mass storage system and offers a range of storage capacities. Up to 64 users and seven operating systems can share a single Sunsol unit.

Prices start at $1,995 for the 8M-byte storage unit, and the Net*Set carries a $300 installation fee. More information is available from Sunsol through P.O. Box 1777, 1072 Serpentine Lane, Pleasanton, Calif. 94566.

Security System Provides Authentication

RESTON, Va. — Analytics Communications Systems, Inc. has introduced the Sherlock Information Security System, a second-generation security system.

The product provides positive message authentication and encryption for dial-up, dedicated and multi-drop systems of private and public data in existing networks. The system requires no change in existing hardware, software, communications or operating procedures, the vendor said.

The product's Authenti-Key contains control and memory chips with a master key and personal authentication date, which, used in combination with a random key generator produces combinations that can only be unscrambled by using similar keys. New codes are used for every communication session and are validated twice, according to the vendor.

The price is $1,995. Further information is available from Analytics Communications Systems, 1820 Michael Faraday Drive, Reston, Va. 22090.

TI Offers Series To Link Micro With Ethernet

(Continued from Page 85)

Ethershare divides mass storage into volumes, which are allocated to users as space is requested. A user can access up to four volumes at a time and can be restricted to one or several groups of people in the network, the spokesman noted. This requires a minimum of 256K bytes of memory and a Winchester disk drive to operate.

Allows Shared Printers

Etherprint allows users in the network to share printers, eliminating the need for a dedicated printer, while Ethermail lets the local-area network serve as an electronic mailbox, allowing messages and replies to be sent to and from any user in the network.

Etherseries for TI's computers and IBM's Personal Computer will be available in February 1984 and costs $899 for Etherlink, $96 for the Etherseries User Software, $500 for Ethershare, $500 for Etherprint and $750 for Ethermail.

The SNA software for the Professional Computer allows the systems to emulate a standard IBM 3276 Model 12 control unit/display station with a 3287 printer. Data transmission occurs at 4,800 bit/sec on a switched line and 9,600 bit/sec on a leased telephone line, the spokesman claimed. The software requires 128K bytes of user memory and a synchronous/asynchronous communications card with an external modem to run emulation. It costs $675 and will be available in February.

More information on Etherseries products and the SNA software can be obtained from TI through P.O. Box 402430, H-691, Dallas, Texas 75240.

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These run under VMS or EUNICE for VAX users, or UNIX for PE 3200 users.

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Implementing a Disaster Recovery Plan

By Les Gilliam
Special to CW‡

This is the first of a two-part series providing a guide to disaster recovery planning. This week the author explains the steps involved in developing such a plan — appointing a planning team, conducting a review of the DP center and operating practices and evaluating physical security. Next week, the focus will be on the advantages of off-site storage and some of the available options.

Unless you have in place a well-planned and functioning disaster recovery plan, you could wake up some morning only to discover your company has been brought to its knees by a disaster for which you have no contingency plan.

To avoid this scenario, it is vitally important to obtain executive management support and funding for the development and maintenance of a disaster recovery plan. A written policy, letter of authority or "charge to the troops" is of great importance in setting the right priority on the project as well as gaining cooperation from users and others outside the organization.

The next step is to appoint a disaster recovery plan team, giving careful consideration to the representation on the team. Be sure to include computer operations, systems development and selected users. Although the team members will vary depending on the company and its DP function, four to eight people is within the proper range. A smaller number makes it easier to schedule meetings and reach decisions. A larger number usually achieves wider support, more effective decisions and more people to do the work.

The most important appointment to the team and the person most critical to the success of the project is the disaster recovery coordinator. Initially, this person should be devoted almost fulltime during the development of the disaster recovery plan and should allot sufficient time thereafter to keep the plan up to date and to conduct periodic tests.

The disaster recovery plan team will organize the project, issue instructions to the coordinator as well as other team members, monitor and report the progress of the project and oversee the completion and implementation of the plan. Thereafter, this team will meet periodically — say two to four times per year — to monitor the plan, ensure that the plan is kept up to date, consider any newly unveiled vulnerabilities or exposures to loss and implement new emergency policies and procedures as needed.

The Second Step

The second step involves conducting an audit of the data center and its operating practices to identify the major exposures to loss, which should be corrected immediately, before beginning to develop the disaster recovery plan. Outside help and company auditors may be needed to conduct this review. There are checklists available from several sources that are useful in conducting a complete review.

The review must include the physical location of the data center and nearby risk sources; the construction and physical condition of the building, floors, walls and ceiling materials used and their fire-retardant characteristics; the condition of the roof and rain and storm damage exposures; the existence of trash or combustibles where unnecessary; the use and location of fire and smoke detection equipment; the location of fire hydrants; and the distance and time from the nearest fire station.

Safety and emergency policies and procedures should be reviewed and a determination made of employee attitudes toward safety, evacuation procedures, appropriate emergency equipment supplies, proper lighting, instructions for shutdown at emergency time and the ex-

(Continued on Page 104)

Solid Backup Seen Most Critical Issue In Disaster Recovery

By John A. Jackson
Special to CW‡

While most managers believe they have adequately backed up critical files, they also discover that these backups are inadequate to support recovery from a major computer center disaster.

Providing adequate backup, off-site storage and recovery for critical files and other supporting documents is the

(Continued on Page 104)

HP Cuts Prices of Series 500 Workstations

PALO ALTO, Calif. — Hewlett-Packard Co. has cut the hardware and system maintenance prices for its HP 9000 Series 500 workstations by up to 50% and has further enhanced the product with a Unix-compatible local networking capability.

HP has also upgraded the 32-bit engineering systems with the addition of a 19-in. color graphics monitor that reportedly boasts 1,024-by-768 pixel resolution and eight planes of display memory.

In the wake of HP's recent enhancements, the cost of a complete 9000 Series 500 system has dropped by an average of 25%, with a 25% to 50% price cut for CPU and random-access memory (RAM) subassemblies. For system maintenance, the price reductions range from 35% to 50%, according to a company spokesman.

Credit for the cost cuts reportedly goes to a fivefold improvement in the yields of the HP 9000's constituent Nmos III "superchips," which provide three to eight times greater circuit density than conventional commercial components.

Accompanying the recent price cuts was the announcement of the HP LAN 9000, a local networking package that reportedly permits the interconnection of Series 500 processors running HP-UX, the firm's enhanced version of Unix.

Software for the package resides in an HP 9000 host processor and can be downloaded through a dedicated HP-IB interface to a microprocessor-based local networking unit, which forms the interconnection scheme's heart. The local networking unit is the module that allows the host CPU and other Series 500s to be interconnected through a 10M bit/sec Ethernet-compatible coaxial cable.

Users of the LAN 9000 can reportedly gain remote access to files, transfer them among CPUs, automatically transmit data between concurrently running processes and start or stop systems activities anywhere in a network, the vendor added.

The HP 9000's 19-in. display unit reportedly generates about one million pixel/sec and is intended for supermini-class applications such as very large-scale integration design automation and printed-circuit board logic simulation.

With its external graphics processor, the color module costs $21,700, compared with $5,035 for the complete LAN 9000 package, including networking software, firmware, transceiver and cables. More information is available from HP, 3000 Hanover St., Palo Alto, Calif. 94304.

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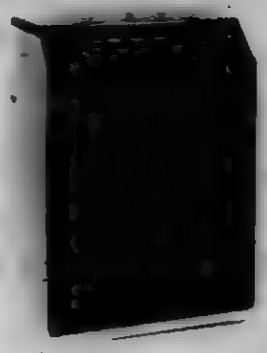

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Security Issue Seen Moot Between Micros, VDTs

Last of Three Parts

By Eric B. Jacobs and Allen G. Sneider
Special to CW‡

Much has been written regarding computer security. With respect to micros vs. CRT terminals, the point is moot.

Security can be enhanced when using a micro because of the ability to remove sensitive data from a computer, store it on a floppy diskette and keep it in a secure location. CRT terminal users cannot do that. However, the importance of the security depends on which side of the computer you sit.

If you saw *War Games*, you realize the military didn't really care whether its security was breached by a micro or a CRT terminal. The same is true of those companies whose computers have been entered by unauthorized users.

If a company's professional staff is spread across the country, you must consider the issue of telephone line charges. Whether you use a micro or a CRT terminal, a public data network will probably be used. However, if you can retrieve the data you need, say good-bye to the network, do your processing and get back onto the network to upload your modified data back to the host computer, your total line costs just have to be cheaper.

Portable microcomputers can also be used to give computing power to a firm's clients. A lot of work can be done at the client's location without ever having to access a mainframe. That can also be done with a CRT terminal.

Ease of use is another important factor. The various micros and application software now on the market vary dramatically in this area. At times, using a CRT terminal is slightly easier that using a micro, especially when you have rote tasks to be performed.

It is only a matter of time until new voice recognition and response systems, wedded to the micro, free the user of his need for the keyboard. Indeed, there is presently a large group of people who will not use either a micro or a CRT terminal because they are convinced that to do so will somehow make them typists.

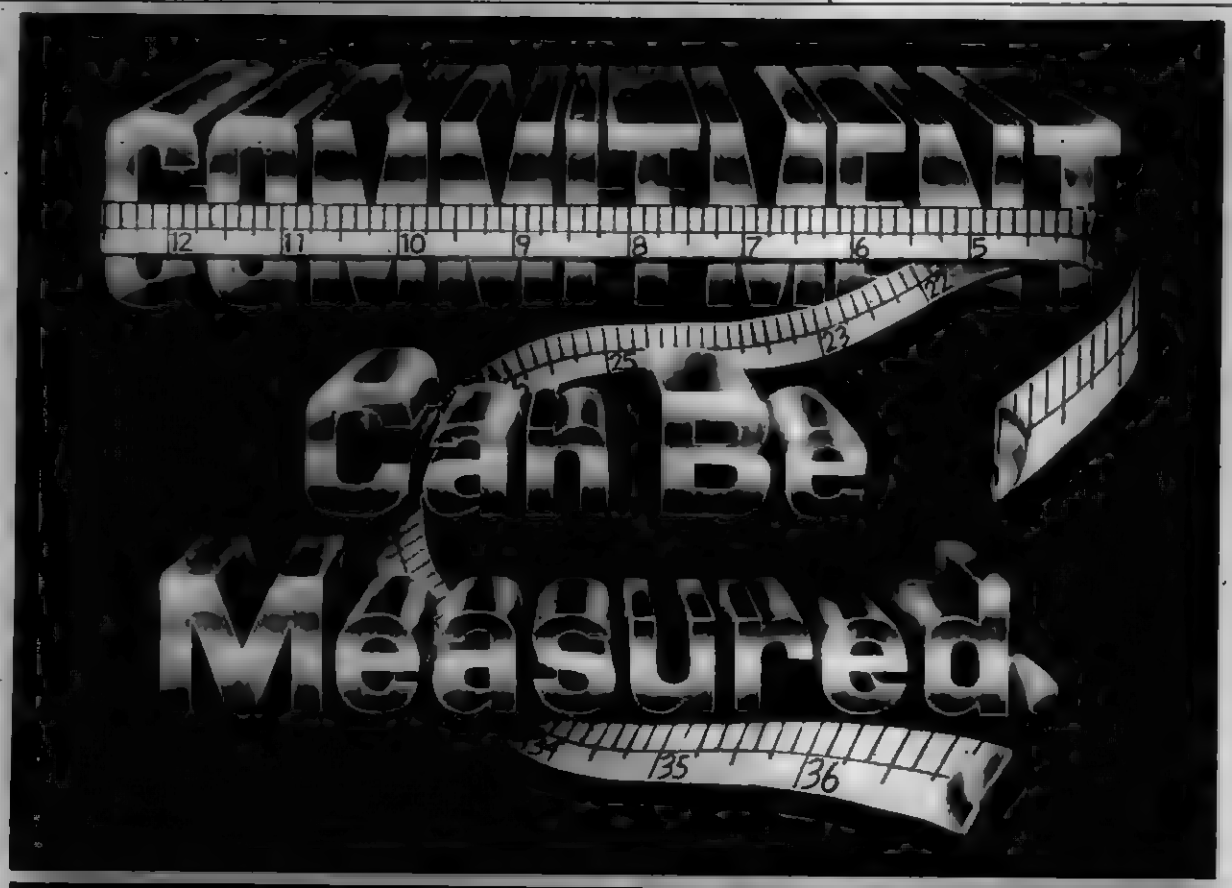
Jumping on Bandwagon

Many people, however, are quickly jumping on the computer bandwagon because the micros of today have become so easy to use. In a few years, an entire generation of computer-literate graduates from our country's schools will begin to enter the business community. Most of these schools don't use CRT terminals because first, micros have become much easier to use, and second, they can't afford the cost of running a mainframe to support them.

In general, the micro is more powerful than the CRT terminal, just as user-friendly, more effective in reducing the rapidly increasing demand for computer power and is price/performance competitive. It has also been shown to be more effective to service a geographically dispersed group of people with micros rather than CRT terminals.

One thing is certain: We haven't seen anything yet in the development of microcomputers for business use. The most advanced systems of today will be looked upon as antiques in the not-too-distant future. CRT terminals still have a place in today's business environment, but micros are better than CRT terminals now and will become even more so in the future.

Jacobs is the national director for information and data processing for Laventhol & Horwath, a certified public accountant firm headquartered in Philadelphia. Sneider is a partner in Laventhol & Horwath's Boston office.



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Adequate Backup Key to Disaster Recovery Plan

(Continued from Page 97)

most important issue in disaster recovery planning.

Of course backup and recovery are not the only issues in developing and maintaining disaster recovery plans. In order for a company to have a comprehensive disaster recovery plan, it must work through the entire plan development process. One approach to this process, successfully tested with dozens of major companies, includes a number of major steps:

- Applications risk analysis.
- Disaster strategy development.
- Records backup and recovery.
- Alternate site selection.
- Development of the plan.
- Documenting user department procedures.
- Developing a maintenance and testing approach.
- Testing and acceptance of the plan.

All organizations require data files, supporting documents and procedures. Recognizing this problem is one thing, addressing it turned out to be quite another for two reasons: First, the manual effort required to identify the critical input files would seriously delay the development of the disaster recovery plan. Second, the effort required to track and maintain the inventory of off-site files was far beyond most organizations' staffing and commitment levels.

Using the computer to solve the problem it created was one solution. The information needed was there, inherent in the MVS and VS1 System Management Facilities accounting files. Organizing that data would enable companies to review it and use it to lessen the otherwise lengthy manual effort.

This spurred development of a concept called Contingency Planning System (CPS). Specifically, CPS generates the following information to assist in identifying the computer and data resources required to process the critical applications for any organization:

- Computing Resources — for each program in a job stream, the system provides: wall clock time (elapsed time), CPU time, maximum memory required, I/O (EXCP) counts, I/O time, I/O unit and data set counts by device type and system output volumes and times.
- Summary Data — for all jobs selected, the system summarizes the computing resources required to process the work load. This information includes: maximum number of disk and tape units, total print capacity, inlines, total CPU time, total wall clock time, maximum work space per job step and disk volume requirements.
- Data Files — for each data file required, the system provides: Job Control Language name (DD Name), access type (I/O), data set name (including generation number); device type, volume serial information and direct-access storage device space.
- Off-Site Storage Information — the system provides specific information on data sets that are required to support the contingency work load and their backup and off-site storage status. This information is determined by user-supplied data and/or access to commercially available tape library software.
- Vital Records Backup Documentation — provides an organized work sheet approach for determining the proper version of data files that need to be off-site protected and the procedures for restoring these files to production status.

Jackson is vice-president of CHI/COR Information Management, Inc. in Chicago.

How to Plan For Recovery If Disaster Hits

(Continued from Page 97)

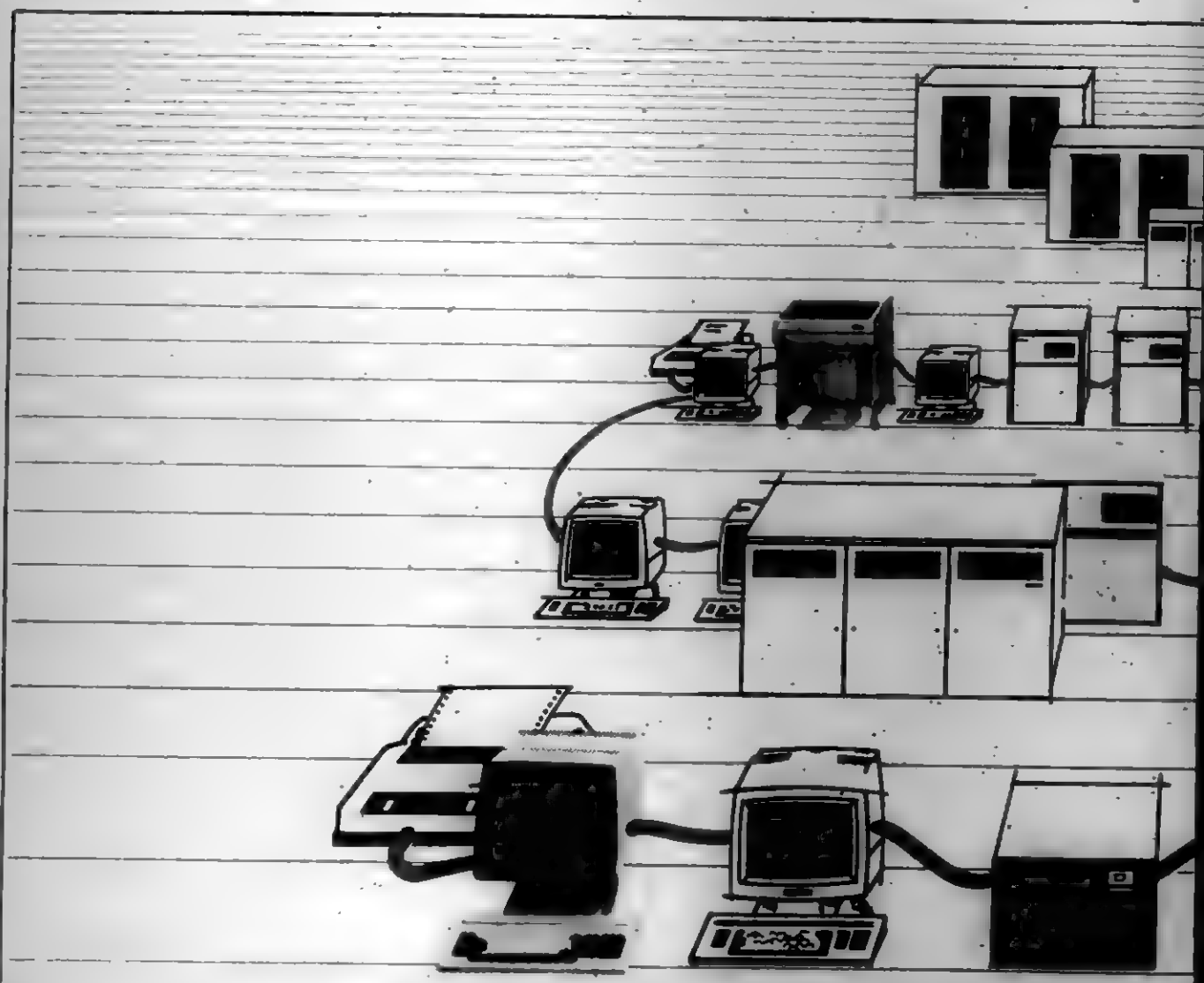
tent of insurance coverage.

One of the areas that is often difficult for an insider to evaluate objectively is physical security. People would rather not have the inconvenience of guards, badges or locked doors or having to be approved to enter the building or data center. Nevertheless, the weaknesses of the physical security system should be identified in order to ensure that access to unauthorized persons will be denied — day and night — via all entrance and exit points.

However, damage to the company and its information resources can occur without violation of any physical security barriers. There are areas and ways in which data can be destroyed, stolen or altered, either intentionally by unauthorized sources or accidentally. Therefore, data entry and editing procedures, job scheduling, report distribution, media control and backup, change control, accidental destruction of data, passwords, access codes and communications lines should be subject to data security.

Finally, be aware that one of the most significant sources of exposure are employees. A review of hiring and screening practices may uncover a point at which much exposure could be reduced. Likewise, good employee appraisal and counseling practices may help in identifying disgruntled employees.

Gillum is a consultant based in Ponca City, Okla.



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Seismic Bracing for Computer Room Seen Key

By Nelson J. Cyr
Special to CW‡

LOS ANGELES — The most serious problem facing many businesses today is the general lack of seismic bracing for computer room raised flooring and equipment cabinets, according to Peter I. Yanev, author of *Peace of Mind in Earthquake Country* and president of EQE, Inc. of San Francisco.

Yanev addressed capacity crowds at three separate sessions of a workshop entitled "Building Preparedness" Oct. 14 at the Business and Industry Emergency Conference held in the Los Angeles suburb of Santa Fe Springs.

"The heaviest nonstructural dollar losses resulting from future major earthquakes will be due to destroyed or damaged computer equipment and related business interruptions," Yanev said, adding that earthquakes are no longer just a California concern.

"Earthquake-related code for computer room raised flooring and utility gas lines is nonexistent," he warned. "As a result, collapsed flooring and falling computer equipment is the most serious potential problem facing businesses today in terms of earthquake risk."

Raised flooring supporting one-half to one million dollars worth or more of sophisticated computer equipment should have seismic bracing, Yanev counseled. "Additionally, your computer cabinets should be either strapped to adjacent walls to keep them from tipping over or foot-mounted securely to the foundation below the false floor. And don't pinch pennies on ½-in. bolts where ¾-in. bolts can just as easily be installed to give you that extra margin of protection," he added.

Yanev told workshop participants that the first step in managing and reducing corporate earthquake risk is determining and understanding the potential risk to their specific buildings.

"This gives you a choice," Yanev said. "You can either ignore the risk or take steps to mitigate it." Two steps that Yanev recommended include retrofitting existing structures and designing new structures to be earthquake resistant.

"Retrofitting can be, in some cases, as simple as bolting heavy-duty steel braces to structural beams in order to secure them properly to the foundation," he said. In his research of over 16 major earthquakes worldwide, steel structures have been found by far to be the most earthquake resistant.

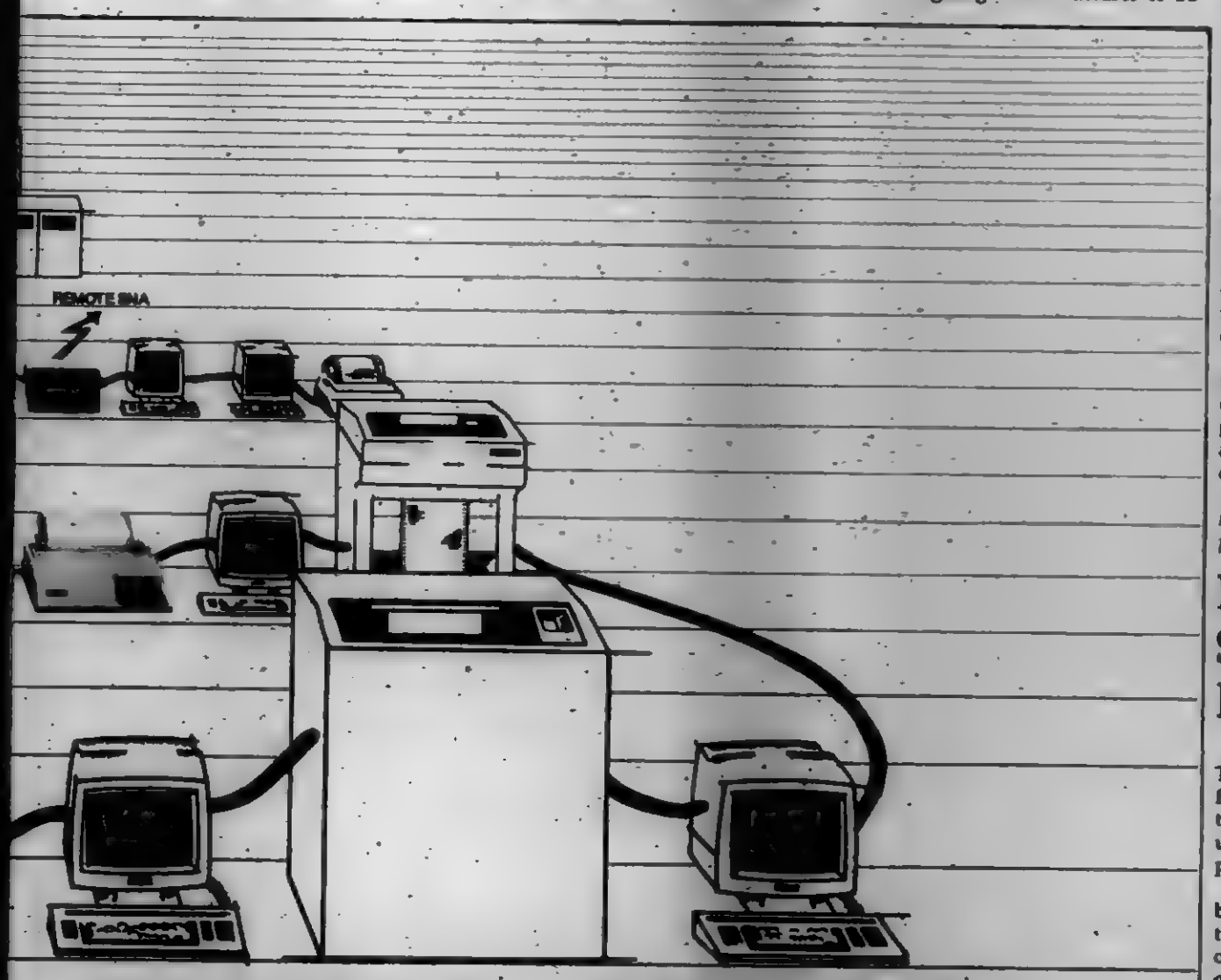
"Structures built of brick are particularly vulnerable," Yanev stated. "Coalinga [Calif.], for example," he said, "is probably now one of the safest cities to be in since 100% of the brick buildings were destroyed in the May 2, 1983 6.5 magnitude quake."

Yanev warned his audiences to beware of the false security inherent in the "built-to-code" fallacy. "Building to code is like cooking from a cookbook," he said. "Two cooks can use the same recipe but the results may be miles apart. It's all in the manner of interpretation and personal application."

Elaborating on EQE's Earthquake Risk Reduction Program, Yanev said the program was divided into three phases. Phase I consists of conducting a seismic risk survey and developing a corporate strategy data base, including estimating the cost of earthquake insurance.

"Phase II includes detailed seismic risk identification and estimated costs for a facility strengthening program, while Phase III is the selection and implementation of the risk reduction program," Yanev concluded.

Cyr is a contingency planning specialist in Los Angeles and is presently employed with Union Bank.



four distinct controllers—and multiple coaxial links of up to 10,000 feet each—to any of those LANs.

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Of course, such a system would have SNA compatibility. But it would also have a set of capabilities to dramatically increase efficiency and throughput, while reducing hardware configuration and support cost in any environment. Capabilities like multi-host and multi-personality support, application and address switching, session swapping and system printing.

This system would have an IBM-compatible personal computing option "built into" the network, not "bolted on" at the workstation—an option that would let you assign true 16-bit computing power, maintain overall MIS control, and share expensive resources, like hard disks and letter-quality printers.

Such a system would offer a full range of printers, including matrix, correspondence, and high-volume, high-speed models—all designed for maximum efficiency and convenience. And it would boast an intelligent display station that displays more than just data, but a mastery of ergonomic and aesthetic design as well. With multi-screen formats, anti-glare screen, low-profile keyboard, and a tilt-and-swivel pedestal that gives the station the smallest footprint in the industry.

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Matrix Printer Said to Target Minis, Micros

KENT, Wash. — Mannesmann Tally Corp. has introduced a multifunction, high-speed serial dot matrix printer that was designed to be used in high-performance minicomputer or microcomputer applications.

The MT-440 is available in a number of versions, including models that produce draft-quality copy and operate at 400 char./sec and letter-quality models that run at 100 char./sec. In addition, the printer comes in a bar-code printing version that also prints text and runs at 270 char./sec, a spokesman said.

The printer includes a paired-tractor paper-handling system that pulls paper into the printing area while also pulling paper from the printing area into the output bin. Friction feed for single-sheet and letterhead printing, as well as bottom feed, are standard equipment. The printer also incorporates a full dot-addressable graphics capability.

The MT-440I, the draft-quality-only version, costs $2,395; the MT-440L, which adds letter-quality capabilities, sells for $2,695; and the MT-440D, which prints bar codes and optical character recognition characters as well as text, is priced at $2,995.

Mannesmann Tally is located at 8301 S. 180th St., Kent, Wash. 98031.

Fit IBM 370, 30 Series, 4300 Series

Two Array Processors Added to FPS-5000 Series

BEAVERTON, Ore. — Floating Point Systems, Inc. has added two more array processors to its FPS-5000 series family that can be attached to IBM 370, 30 series and 4300 series mainframe computers.

The FPS-5500 and FPS-5600 processors contain a high-speed data streaming interface that allows IBM mainframe users to off-load numerically intensive calculations from their machines to the array systems for high-speed processing, a spokesman said.

Control, data and status-information flow between the two machines are handled by the interface, while data transfers or status queries can be controlled by programs based on the host machine or on the array processor using IBM's block multiplexer with data streaming.

All systems in the 5000 series offer a base configuration of 256K words of data memory, 12.5K words of table memory, a general-purpose control processor and a single floating-point co-processor. Depending on the model, program memory is upgradable to 16K or 32K words.

Performance figures for the processors range from a maximum of 30 million floating-point operations per second (Mflops) with the FPS-5500 series to a maximum of 48 Mflops with the FPS-5600 series. Prices for both systems start at $98,000 and $134,000, respectively, with first deliveries scheduled for April 1984.

Floating Point Systems can be reached through P.O. Box 23489, Portland, Ore. 97223.

Eagle Computer Unwraps Micro Systems

LOS GATOS, Calif. — Eagle Computer, Inc. has annbounced three microcomputer systems, including one with hard disk storage and one that is a transportable version, that are compatible with the IBM Personal Computer and Personal Computer XT.

The Eagle PC Plus XL is a desktop system featuring 10M bytes of hard disk storage, while the PC Plus relies on up to two floppy disk drives for data storage. Both machines can be optionally equipped with high-resolution monochrome and color graphics adapter boards and monitors and are bundled with the firm's Eaglewriter word processor and Eaglecalc financial planning software. They also feature a minimum of 128K bytes of random-access memory, expandable to 640K bytes on a single CPU board, a spokesman explained.

The Plus XL system costs $4,295, while the PC Plus costs $2,395 for a single floppy disk version and $2,795 for a double disk drive system.

The Eagle Spirit is a portable, dual floppy disk version of the firm's Spirit XL computer. It features a 16-bit architecture, built-in graphics capabilities and a basic 128K bytes of main memory. The transportable system features a 9-in. CRT screen and runs under Microsoft, Inc.'s MS-DOS, Digital Research, Inc.'s CP/M 86 and GW Basic, an IBM Personal Computer-compatible language. The system costs $3,295.

All three systems reportedly feature a high degree of IBM compatibility and can run most off-the-shelf programs written in the Basic language for the IBM Personal Computer. They also feature a 105-key IBM Selectric-type keyboard with 84 data keys, 10 function keys and a 10-key numeric pad.

All the computers have four available IBM Personal Computer-compatible slots for options as well as two serial ports and one parallel port for printer, modem or mouse connections.

Eagle Computer is located at 983 University Ave., Los Gatos, Calif. 95030.

DXY-800 Plotter Gets Graphics From Micros

LOS ANGELES — Roland DG has introduced the DXY-800 eight-pen intelligent X-Y plotter, designed to get professional-quality graphics from personal computers.

The maximum plotting size of the DXY-800 is 11 in. by 17 in. Features include a serial (RS-232) and a parallel (Centronics Data Computer Corp.) interface, 16 different print sizes and 8K-byte on-board memory to help simplify commands, a vendor spokesman said.

The plotter is said to operate with a wide range of software packages for many different applications. The DXY-800 eight-pen plotter costs $995. The vendor is located at 7200 Dominion Circle, Los Angeles, Calif. 90040.

Insuring DP Equipment Seen Key After Disaster

By Jack M. Gross
and Alvin Arnell
Special to CW‡

While many firms work to develop disaster recovery plans, one area that is sometimes overlooked is making sure a firm has enough insurance to replace adequately a computer system in the event of a disaster.

The following are types of insurance normally obtained to provide protection against the hazards inherent in a data processing environment.

The data processing policy is a multiple-peril policy designed to provide various types of DP coverage. It is modularly constructed so that it can be adapted to the insured's particular DP environment. Specific coverage available and guidelines for its evaluation are:

- DP equipment and facilities — provides coverage of physical damage to the data center and owned equipment. (Insurance of leased equipment should be obtained when the lessee is responsible for hazard coverage.)
- Media (software) reconstruction — covers damage to DP media, which is the property of the insured and for which the insured may be liable. Insurance is available for on-premises, off-premises or in-transit situations and covers the actual reproduction cost of the property. Considerations in determining the amount of coverage needed are programming costs, physical replacement and backup expense.
- Extra expense — designed to cover the extra costs of continuing operations following damage or destruction at the data processing center.
- Business interruption — provides centers offering outside services reimbursement for monetary losses resulting from suspension of operations because of physical loss of equipment or media.
- Valuable papers and records — covers actual cash value of valuable papers and records (not defined as media) on the insured's premises against direct physical loss or damage.

'The data processing policy is a multiple-peril policy designed to provide various types of DP coverage. It is modularly constructed so that it can be adapted to the insured's particular DP environment.'

Errors and Omissions

Insurance is available that provides protection against claims arising as a result of negligent acts, errors or omissions of the insured that occur in the performance of DP services for others. These policies commonly contain the following exclusions:

- Employee dishonesty.
- Libel, slander or defamation of character.
- Liability of others assumed by the insured under contract or agreement.
- Liability of loss or damage to property of others.
- Personal or bodily injury or sickness.
- Liability arising out of advice on methods, procedures, practices and so forth.
- Liability for preparation of income tax returns.
- Loss caused intentionally by or at the direction of the insured.

This type of coverage has become increasingly more difficult to obtain, and premiums, which are normally based on a percentage of outside processing revenues, are often considered high. In addition, the method that insurance companies use to apply the deductible amount to a claim varies.

For example, if a program error caused an overpayment of interest to 1,000 savings accounts, some policies would apply the deductible to each account rather than to the entire overpayment amount. That method would severely limit the value of the policy to a financial institution. Servicers must review their operations and the feasibility of this type of insurance.

Fidelity Coverage

Bankers blanket bonds, excess fidelity insurance and commercial blanket bonds cover loss from dishonest or fraudulent acts by employees.

In a financial institution operating its own data facility, fidelity coverage is normally provided under Standard Form No. 24, concerning bankers blanket bonds. In the case of off-premises processing arrangements (independent data centers, facilities management groups, affiliates or subsidiaries) where processing is not performed by the financial institution's employees, fidelity coverage has been extended to include the servicers' personnel as insured under the bankers' blanket bond.

To qualify for this coverage, the DP services must be provided under a contract between the servicer and the insured. This additional coverage may be deleted by amendment. In addition to fidelity coverage provided by the user, independent proces-

(Continued on Page 108)

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3278/79 Models Supported		
3278 Model 2	NOW	1st Qtr 1984
3278 Models 3 and 4	NOW	Not Available
3279 Model 2A (base color mode)	NOW	1st Qtr 1984
3279 Model 3A (base color mode)	NOW	Not Available
3279 Model 4A (base color mode)	NOW	Not Available
NOTE: IBM does not produce a 3278 Model 4A (3440-character screen)		
Controller Connections Supported		
3276 Display/Controller	[illegible]	[illegible]
3274 Controller	NOW	1st Qtr 1984
3274 Port 0 (for 3274 customization)	[illegible]	Not Available
Display Characteristics		
1920-character monochrome	NOW	[illegible]
1920-character color	NOW	1st Qtr. 1984
Printer Support		
Screen Print to 3274-attached Printer	NOW	1st Qtr 1984
Screen Print to 3276-attached Printer	NOW	Not Available
Screen Print to PC-attached Printer	[illegible]	1st Qtr 1984
Screen Save to PC Disk File	NOW	Not Available
Operator Information Area (status line)	NOW	1st Qtr 1984
Concurrent Operation		
PC DOS Session	NOW	1st Qtr 1984
DOS 2.0 Print Spooling	NOW	Not Available
Keyboards		
Special 3270 PC Keyboard	Not Available	1st Qtr 1984
Keyboard Map Selection (including APO and national keyboards)	NOW	Not Available
Hardware Diagnostic and Dump Facility	NOW	1st Qtr 1984
Screen-Control Application Program Interface	NOW	Not Available
TSO and VM/CMS Multi-Mode File Transfer	NOW	1st Qtr 1984
NOTE: CXI can do this now and do it fast—full text and/or TSO, binary and compressed		
SPF (System Productivity Facility) in Local Mode	DEC. 1983	Not Available
NOTE: With PCOX/m3270/SPF which CXI is jointly marketing with Phaser Systems, Inc., of San Francisco		

*This table compares a PCOX-equipped IBM or IBM compatible personal computer (running the PCOX Control Unit Terminal Program) with an IBM 3270-PC running the 3270-PC Control Program (in the Control Unit Terminal Mode).

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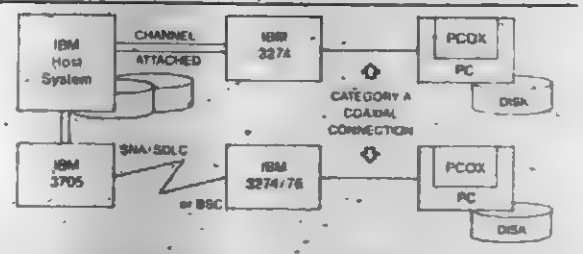

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To Back-Up Winchesters

Memorex Unwraps 130M-Byte Tape Drive

SANTA CLARA, Calif. — Memorex Corp. has introduced a 130M-byte, dual-mode tape cartridge drive. Called the Model 1110, the drive is intended to provide backup for high-capacity Winchester disk drives in the micro and supermicro market.

The Model 1110 provides both start/stop and streaming modes of operation. A proprietary tape-picking system is used to pull the tape from the cartridge onto an internal take-up reel. The drive then operates in reel-to-reel mode, permitting accurate tape guidance and tension control.

Drive capacity is 130M bytes formatted in streaming mode at 75 in./sec and 83M bytes in start/stop mode at 50 in./sec. The unit searches and rewinds at 150 in./sec and transfers data at the rate of 225K bit/sec in the streaming mode.

The self-threading cartridge uses 400 ft of Memorex ½-in. computer tape in a sealed housing measuring 4 in. by 4 in. by 1 in.

Memorex has said that it is planning to propose that the cartridge be adopted as the industry standard by the American National Standards Institute.

The tape drive utilizes the Enhanced Small Tape Interface, a compatible subset of the emerging standard Enhanced Small Device Interface.

Beta test sites for the cartridge tape drive are scheduled for the first quarter of 1984, and evaluation drives are planned for the second quarter. Volume shipments are scheduled for the third quarter.

The 1110 is priced at less than $1,000 per unit in large quantities. Memorex is located at San Tomas at Central Expressway, Santa Clara, Calif. 95052.

Insurance Policy for DP Gear Key for Disaster Recovery

(Continued from Page 107)

sors frequently purchase their own fidelity insurance via a commercial blanket bond.

Independent processors operated as proprietorships may not be able to include the proprietor under this bond. Therefore, serviced financial institutions must assure themselves of coverage.

Media Transportation

One hazard in off-premises data processing is the potential loss of or damage to items in transit between the data center and the serviced financial institution. The standard bankers blanket bond or special provisions in other forms of policies provide limited coverage under certain specified conditions. In addition, when media is transported via a carrier for hire, the insured can apply for an "interpretive letter" from the underwriter of the blanket bond extending the coverage to the carrier. Normally, the letter will restrict coverage to nonnegotiable property and to the named carrier.

When media is delivered by mail, special data processing transit coverage is available to financial institutions from only a few underwriters. This insurance was designed to cover the transportation of items to and from a DP center, the cost of reconstruction and the tracing of lost instruments. This policy usually specifies that the insured must make a copy of all documents covered before they are forwarded to the processor.

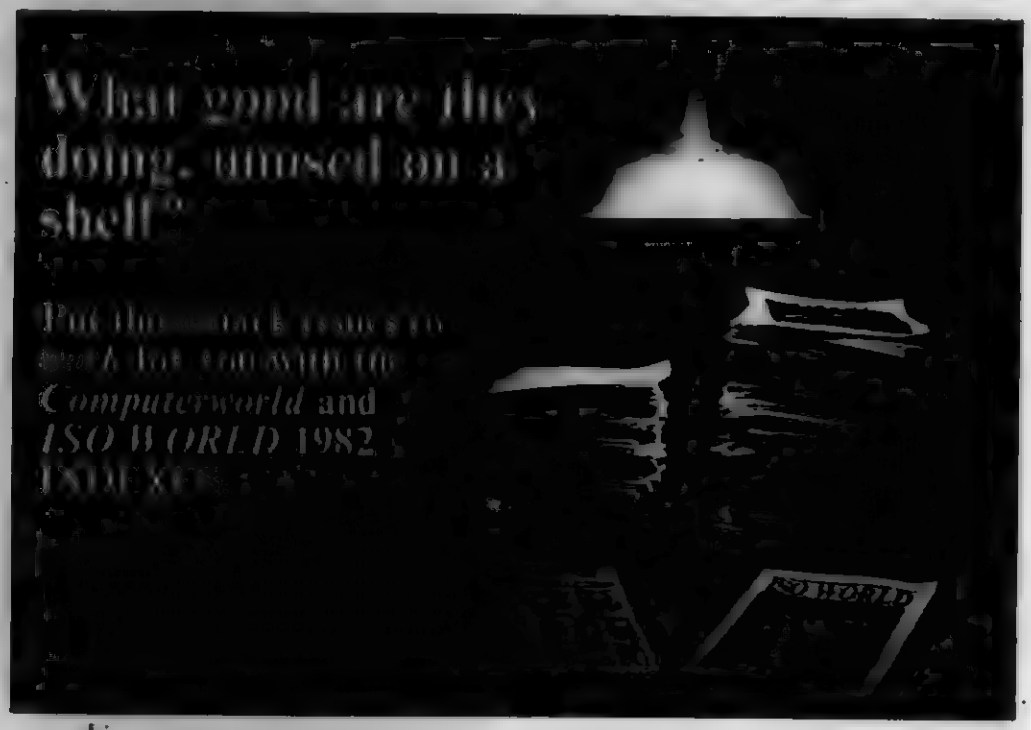
Coverage is extended to transportation and dishonesty or collusion by delivery employees. Under policies of this type, coverage usually is not limited to nonnegotiables. This is significant since many nonvoided, nonrestrictive and negotiable items are being sent to outside data facilities.

Transit coverage wording in the policy usually specifies that all documents must be filmed or otherwise copied. When the policy does not specifically state that data be filmed prior to being transported and the work is not filmed, management should obtain from the insurance carrier a letter that describes the carrier's position and coverage in the event data is destroyed.

The development of electronic funds transfer (EFT) has resulted in the need to review available insurance, including:

- DP equipment coverage for EFT equipment located off premises.
- Extension of bankers' blanket bond coverage to each automatic teller machine on the network.
- Liability insurance coverage for each automatic teller machine location.

Gross is a partner in Jess E. Gross Co. in New York; Arnell is president of Vault Management Corp. in Garden Grove, Ill.



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ISO	Modems	45
CBN/ISO	Retail Stores	53

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Xerox Turnkey Based on IBM 4321

LOS ANGELES — Xerox Computer Services, Inc. has announced a turnkey manufacturing system based on an IBM 4321 superminicomputer.

The system includes a variety of features designed to make the software available to nontechnical users, a spokesman said. The package consists of a 4321 with 1M bytes of main memory, an IBM 3262 310 line/min printer, an IBM 3370 571M-byte disk drive, a tape unit, an IBM 3278 terminal and a 3178 terminal.

The software incorporates interactive, integrated manufacturing, financial, distribution, marketing and procurement functions, the spokesman said. Manufacturing applications include procurement management, cost planning and control, material requirements planning, master production scheduling, production control and inventory management. Its distribution modules are receivables management, sales management and order management. Financial management is accomplished through accounts payable and general ledger applications.

The turnkey system is priced at $250,000. More information is available from Xerox Computer Services at 5310 Beethoven St., Los Angeles, Calif. 90066.

Infoscribe Inaugurates Demand Document Printer

SANTA ANA, Calif. — Infoscribe, Inc. has introduced its Infoscribe 700 demand document printer.

The printer is an enhanced version of Anacom General Corp.'s Series 160 dot matrix printer. All assets of Anacom's printer product line have been acquired by Infoscribe, the vendor said, allowing the firm to expand its own product line.

According to the vendor, a demand document printer has paper-handling tractors located below the machine's platen, a design feature that allows preprinted forms to be torn off at the last print line so that the next form is ready to be printed immediately.

Enhancements made for the Model 700 include new electronics, a new stepper motor, better acoustical packaging and improved printing mechanisms. The printer drive electronics were redesigned to parallel those found in other printers in the Infoscribe line.

The tractor drive stepper motor in the printer has been upgraded from a 7.5 degree stepper to a 1.8 degree stepper motor to provide higher torque for pulling paper through the printer, the vendor said.

Print quality is being improved with minor adjustments to the existing 9 by 9 dot matrix print- head mechanism. The Model 700 prints at 150 char./sec, with character density selectable from 5 to 16.5 char./in. in normal, expanded and compressed modes.

The Model 700 is available with a parallel interface or serial RS-232 interfacing at rates up to 9,600 char./sec.

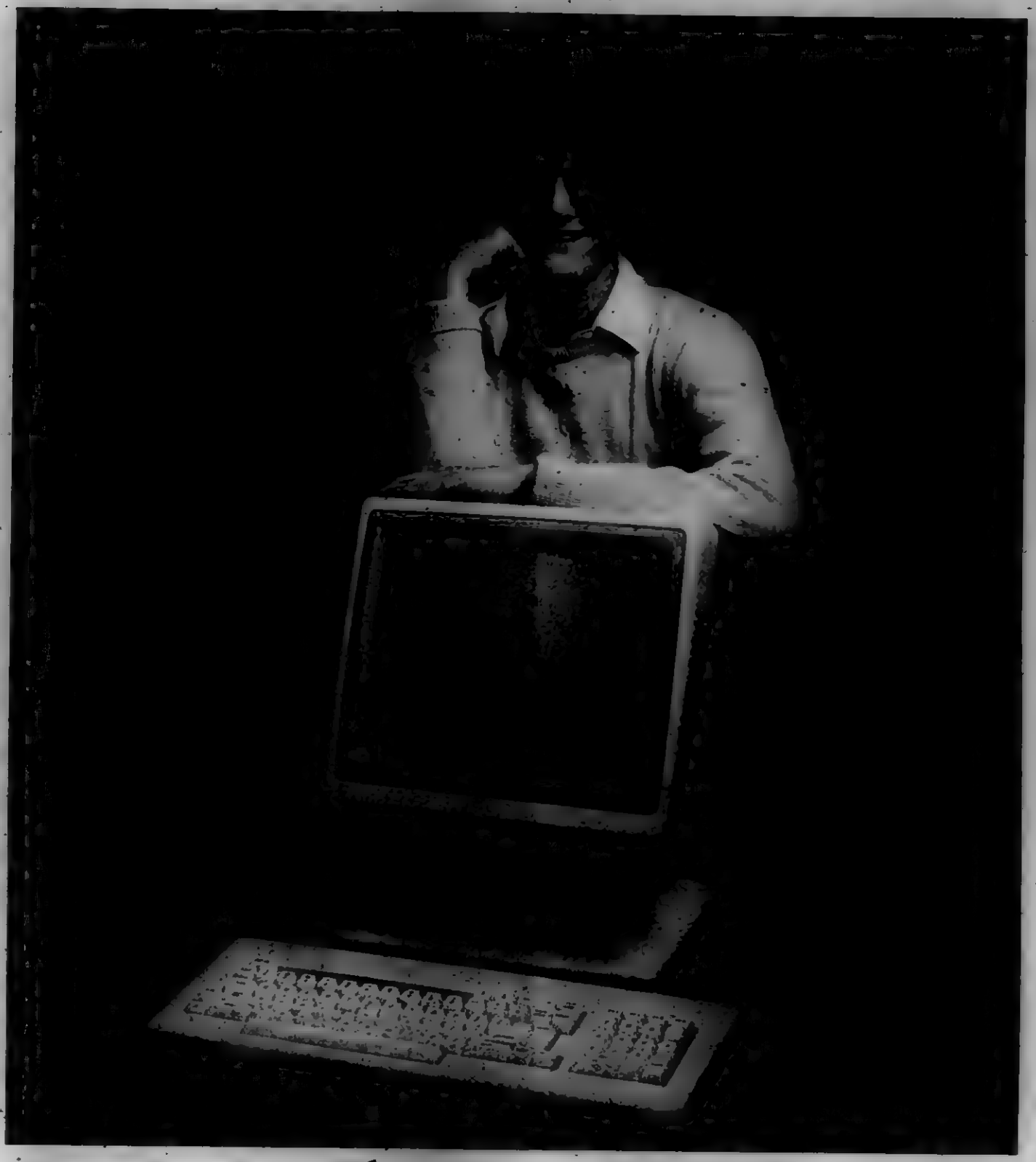
The Model 700 is priced at $1,895, with OEM discounts available. More information is available from Infoscribe at 2720 S. Croddy Way, Santa Ana, Calif. 92704.

Tape Drive Handles 130M Bytes

ENGLEWOOD, Colo. — Electronic Processors, Inc. has announced a high-performance, ½-in. cartridge tape drive with 130M-byte capacity.

The product, called STR-Stream II Model 130, addresses the need to cover the growing market for small-size, high-capacity rigid disks; according to the vendor. It is a dual mode drive with both start/stop and streaming capability. Its streaming capacity is 130M bytes formatted, and the start/stop capacity is 83M bytes, the vendor said. Its data transfer rate is reportedly 225K byte/sec in the streaming mode.

The Model 130 is priced at $1,500. Deliveries are slated for the second quarter of next year. Further details can be obtained from Electronic Processors at 1265 W. Dartmouth Ave., P.O. Box 569, Englewood, Colo. 80110.



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Three Miniature Reel-to-Reels Introduced by Memtec

SALEM, N.H. — Memtec Corp. has introduced the Companion 510I, 520I and 540I, three miniature reel-to-reel tape drives.

The tape drives are used for backing up 5¼-in. Winchester disk drives and include a controller.

The three models are full-height and in the 5¼-in. footprint. They offer 10-, 20- and 40M-byte formatted storage capacity, respectively, in the streaming mode, according to the vendor.

The recording medium is a removable 450-ft by .150-in. high-density 4-track digital cassette. The drives are set for either 30 in./sec or 90 in./sec and provide transfer rates of 24K byte/sec and 72K byte/sec, respectively, for the 510I model and 37.5K byte/sec and 112.5K byte/sec for the 520I unit.

The 540I provides transfer rates of 37.5K byte/sec or 112.5K byte/sec, the vendor said.

Prices start at $600. Further information is available from Memtec, Keewaydin Drive, Salem, N.H. 03079.

MPI Introduces Series Of Disk Drives

CHATSWORTH, Calif. — A series of microfloppy disk drives that use 3½-in. flexible media, but operate through a standard 5¼-in. interface, has been introduced here by MPI, a subsidiary of CTS Corp.

The Model 321 and Model 322 drives feature 500K bytes of single-sided storage and 1M byte of double-sided storage capacity. The drives represent MPI's entrance into the high-capacity microfloppy marketplace, the vendor said.

The drives are reportedly plug-compatible with standard, double-sided, double-density, 96 track/in. 5¼-in. drives. In addition, their media format, 80 tracks per side, make them compatible with standard 5¼-in. drives as well, the vendor said. Plug and data format compatibility reportedly allows users to download double-sided, 5¼-in. software packages to the unit's 3½-in. diskettes with no modification.

The Models 321 and 322 are priced at $155 and $190, respectively. Further details can be obtained from MPI at 9754 Deering Ave., Chatsworth, Calif. 91311.

Storage Terminal Features Color Graphics

IRVINE, Calif. — Psitech has introduced a local storage color graphics terminal with the ability to store from 150 to 450 frames or blocks of screen information for local storage, editing and retrieval.

The GTC 419X is a dual processor color graphics terminal that uses one processor as the graphics engine and the other as the interface to the user.

The GTC 419 features 512 by 480 high resolution (.031 mm pitch), 19-in. display, 8 of 4,096 colors, fully programmable keyboard and three character sets (one in read-only memory, two programmable).

According to the vendor, the terminal includes an industry-standard graphics command language. The system includes three ink jet printer/plotters and the Xerox Corp. Diablo ink jet printer at $1,250. Several I/O options, including joystick, mice, tablet and trackball, are available. Two RS-232 ports are standard.

The Model GTC 419 costs $8,895 from Psitech, 16902 Von Karman, Irvine, Calif. 92714.

To Personal Computers

Interface Cable Links Printer

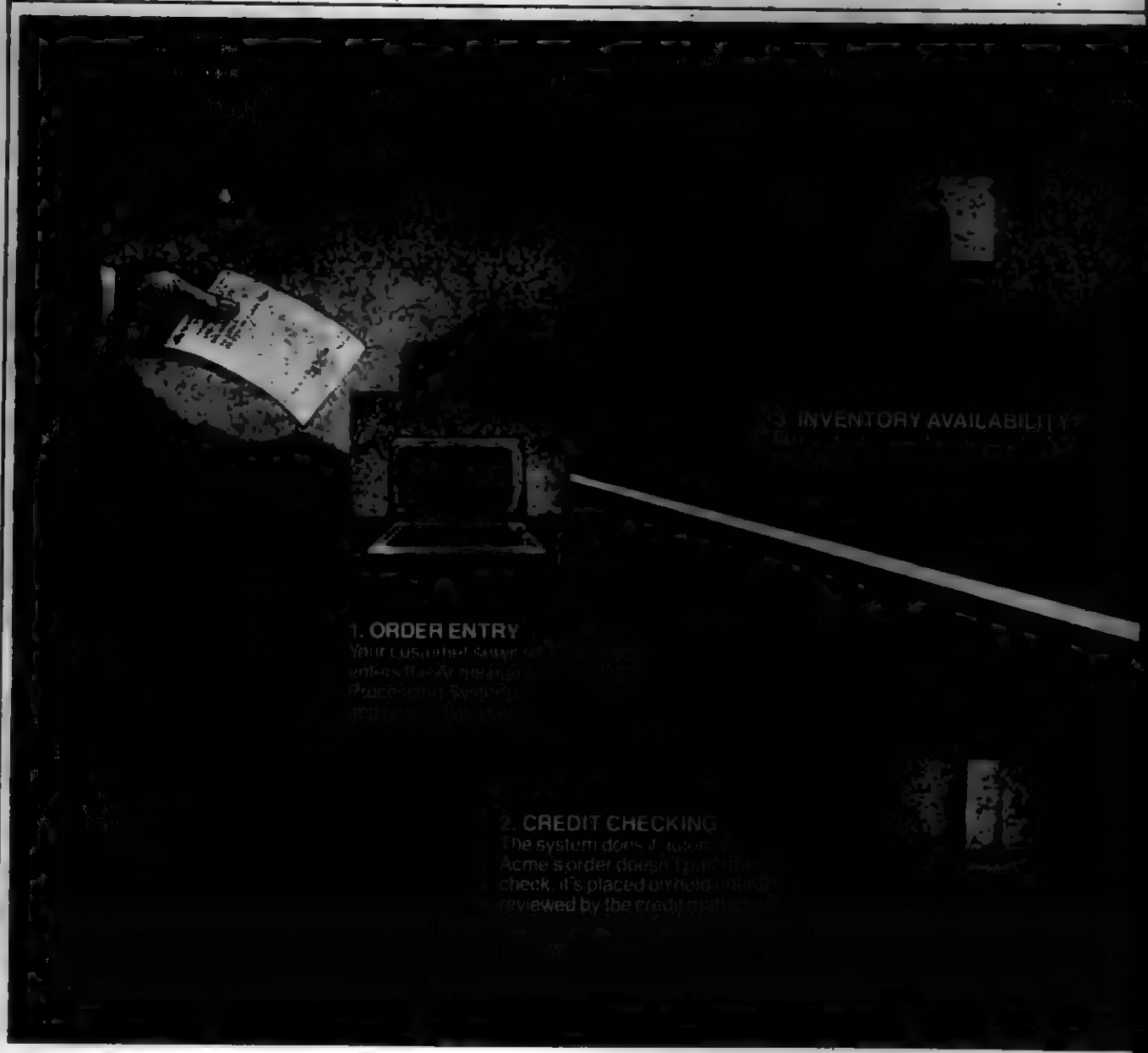
CAMPBELL, Calif. — Alphacom, Inc. has introduced an interface cable that links its 80-col. Alphacom 81 universal printer to personal and small business computers that are compatible with Centronics Data Computer Corp. computers or RS-232 ports.

The Alphacom 81 was introduced in June of this year, primarily designed for home computer users who wanted hard-copy or word processing functions. The interface allows users to link the printer to a variety of computers by plugging the cable into the printer's cartridge-like slot.

The Alphacom 81 has a speed of 100 char./sec and combines a single-chip microprocessor with an Olivetti THM-125 dot matrix print mechanism. The unit is packaged in a low-profile, lightweight, impact-resistant plastic housing.

The product has a wraparound facility for printing lines longer than 80 characters. It recognizes standard Ascii control or action codes for changing the printing mode. Codes include carriage return, line and multiline feed, right justification, form feed and graphics control.

The Alphacom 81 interface cable for computers with Centronics and RS-232 ports is priced at $44.95. Other interface cables range from $44.95 to $59.95. All are available now. Alphacom is located at 2323 S. Bascom Ave., Campbell, Calif. 95008.



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Customer inquiries are a snap with MSA's

SPS Launches MMP Printer Aimed at Hard-Copy Tasks

PALO ALTO, Calif. — Synergy Printer Systems, Inc. (SPS) has announced a printer said to perform all hard-copy tasks required by major computer users. The Multi-Mode Printer (MMP) is compatible with most Digital Equipment Corp., Hewlett-Packard Co., Burroughs Corp., Data General Corp. and IBM computers.

In the data processing mode, the MMP reportedly operates at 300 or 600 line/min. While in the graphics mode, the printer delivers 1,200 to 2,400 or 2,400 to 4,800 dot line/min.

In addition to variable print speeds up to 600 line/min, it is equipped with flexible character fonts at two, four and eight times normal width and normal height, the vendor said.

MMP is equipped with extensive character sets, includes ruled-line generator, block characters and engineering characters, slant or bold formats. Also included are full graphics capabilities.

The price of the MMP with a Dataproducts New England, Inc. or a Centronics Data Computer Corp.-compatible parallel interface or an RS-232 serial interface and 300 line/min capability is $4,500. With 600 line/min capability, the price is $6,000 from SPS at Suite B, 4020 Fabian Way, Palo Alto, Calif. 94303.

Tape Coupler Introduced

GARDEN GROVE, Calif. — A magnetic tape coupler said to offer Digital Equipment Corp. TS-11/TSV05 emulation for a wide range of ½-in. drives, including group-coded recording start/stop streaming and Cipher Data Products, Inc.'s Cachetape, is now available from Distributed Logic Corp. (Dilog).

The Model DQ132 is a quad-size coupler module that requires no external power when plugged directly into a single slot in the computer backplane, the vendor said. It incorporates an extended 1K-byte data buffer and handles direct-access memory burst size of 4 bytes with dynamic autothrottle control. The module reportedly will control up to four drives, with switch-selectable interrupt vectors for the second, third and fourth drives.

For performance, the module will transfer data at 600K byte/sec and has 18- or 22-bit addressing to access up to 2M bytes of computer memory. In addition, the coupler's compatibility includes full emulation and diagnostics for TS-11/TSV05 while running under DEC's RT-11, RSX-11 and RSTS.

The Model DQ132 costs $2,050. Dilog is located at 12800 Garden Grove Blvd., Garden Grove, Calif. 92643.

Gesp-753 Guards Against Spikes, Has Noise Filter

OWENSBORO, Ky. — A voltage spike protector with built-in noise-filtering capabilities has been introduced here by the Microwave Products Department of General Electric Co.

The GE Spike Protector (Gesp)-753 was designed to protect computers, audio and visual devices and sensitive solid-state equipment from sharp spikes in electrical voltage, according to the vendor.

The product's voltage-surge suppressor and noise filter safeguard a multitude of solid-state electrical equipment, including computers, stereos, video equipment, televisions, household appliances and typewriters, especially during electrical storms, the vendor noted.

The Gesp-753 is priced at $48.75 from GE's Microwave Products Department at 316 E. 9th St., Owensboro, Ky. 42301.

Service Plans Out for Products By MDS Qantel

HAYWARD, Calif. — MDS Qantel, Inc. has unveiled five service plan options available on all of the company's products.

The five plans include Guaranteed Up-Time, Standard, Flex, Basic and Deferred.

Response time on the options ranges from an average of three hours to a maximum of 48 hours. The price level of each program is set as a fixed percentage, ranging from 70% to 125% of the basic monthly maintenance (list) price and varies according to the service delivered.

Further information is available from MDS Quantel, 4142 Point Eden Way, Hayward, Calif. 94545.

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system. It lets you review the status of orders, prices, credit or inventory availability at a moment's notice. You can change orders easily.

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Just as important, MSA's online realtime system helps you control internal costs. It moves orders along without costly error or duplication of effort. It provides current information on pricing, discounts and special sales agreements with individual customers.

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You'll find MSA's new Order Processing System flexible and easy to use. It works with the MSA Manufacturing System to let you schedule production more efficiently. And promise ship dates to customers more confidently. Of course, it's also perfectly integrated with MSA's Financial System.

If your company is ready for a dramatic improvement in your order processing, contact Robert Carpenter at (404) 239-2000. Or write Management Science America, Inc., 3445 Peachtree Road, N.E., Atlanta, Georgia 30326.

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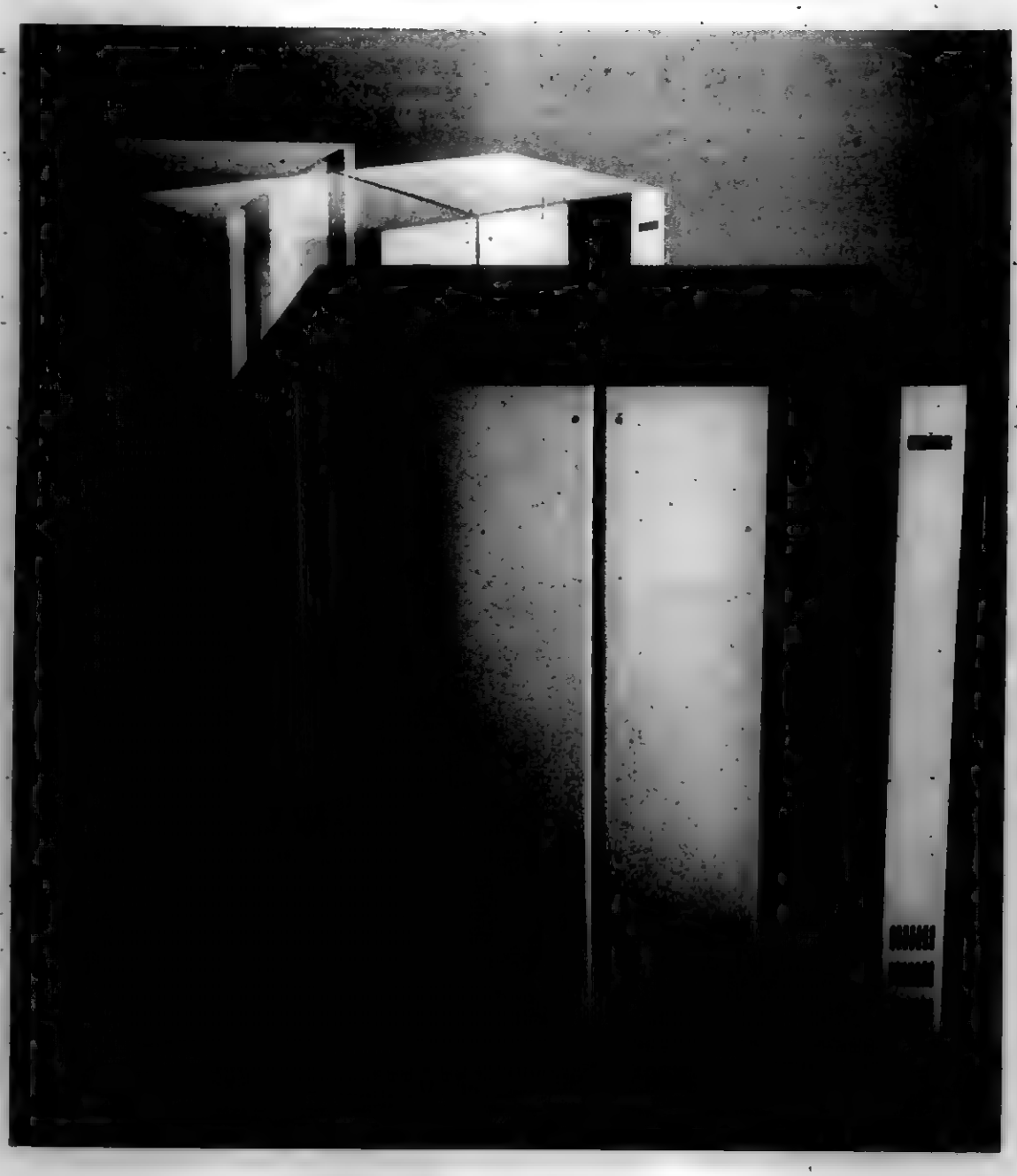

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For more on the Prime 9950, or on the entire Prime family of compatible computers, call **1-800-343-2540** (Mass., 1-800-322-2450), or write Prime Computer, Prime Park, MS 15-60, Natick, MA 01760. In Canada call 416-678-7331. In Europe write, One Lampton Road, Hounslow Center, Hounslow, Middlesex, TW3 1JB, England. In the Far East, write Unit 1005, Tannery Block, 35 Tannery Road, Singapore 1334.

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Computerworld's annual review and forecast issue will examine some of the major events of 1983 and put them in perspective. But this year the stronger emphasis is on what's *going* to happen in 1984:

- The January 1 divestiture of AT&T. What will the impact *really* be?
- When is the shakeout going to come in the Micro market? Who will the big players be and who'll be dropping out?
- The results of the *Computerworld* DP Budget Survey: Where is the DP/MIS exec's money going to go? Why?
- Technology. Just what are the R&D people *actually* working on?

Last year's software announcements and/or agreements will be looked at in light of which will come to reality in 1984. You'll get a close look at control, security and training issues and how they'll impact DP/MIS managers who spent 1983 off-loading applications to end-users and providing them with computing power.

The entire editorial staff of *Computerworld* is working full time to review the key events of 1983 and how they'll affect your business in 1984. So you'll get all the insight you need to do your strategic planning for the year ahead.

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To reserve space in the combined December 26th/January 2nd special issue, call one of the sales offices listed below, or call Don Fagan, Vice President Sales/Marketing; Ed Marecki, National Sales Director or Kathy Doyle, Marketing Support Manager.

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Office Ware

Datatek Industries, Inc. has released the Datatext word processing software system for Digital Microsystems, Inc. computers using the Digital Research, Inc. operating systems CP/M and CP/M 86. A modified version is also available for other 8- and 16-bit microcomputers. Datatext has capabilities similar to those found on mainframe systems and uses embedded English commands rather than control code sequences to format text. The list price for Datatext is $450 from Datatek Industries, 2621 Enterprise Road, Clearwater, Fla. 33515.

Minisoft Office Systems has introduced Miniword, its Hewlett-Packard Co. HP-3000-based word processing package that operates on the IBM Personal Computer and the HP 150. In addition, Miniword provides a link between the HP 3000 minicomputer and the IBM Personal Computer or HP 150 personal computer so that complete file and document transfer can be accomplished.

Miniword is a full-featured word processing package offering function key-driven operation, full screen Help and data base access for mass mailing. The introductory price is $295, and inquiries should be directed to the firm at 1161 116th Ave. N.E., Bellevue, Wash. 98004.

Martin Marietta Data Systems has entered the microcomputer market with a 10-program series of software for the IBM Personal Computer and IBM-compatible personal computers, ITSoftware. Six programs are currently available. The central program in the series is Keepit, a relational data base program that allows the user to move data or perform calculations on a data file and then use the results in any personal computer-based spreadsheet, graphics or statistical analysis program. Mailing lists and tables produced by Keepit can also be utilized by most word processors. Keepit costs $4,350 from IT-Software, P.O. Box 2392, Princeton, N.J. 08540.

Other programs include Calcit, a spreadsheet program for $400; Linkit, a personal computer to mainframe and personal computer to personal computer dial-up, asynchronous communications program for $150; Passit, an IBM 3270 emulation program that can be used with IRMA and Forte boards for high-speed data transfer from personal computer to mainframe at $250; Sortit, a sort/merge utility for DOS-based machines at $125; and Editit, a full screen text editor with color windows and mouse management at $150.

Nonprofit Groups Found Joining Rush to Automate

BOSTON — An annual survey of 500 cultural, educational, charitable, advocacy and other nonprofit organizations has shown that more than 60% of the respondents purchased new computers for office automation in a recent 18-month period.

Released recently by Rousmaniere Management Associates, the survey also found that nearly 28% of the 171 respondents acquired computers in the first six months of 1983, and 84.5% have added new information systems since 1980.

"The rush to automate is likely to continue, for nearly 80% [of the respondents] predicted that their use of computer technology will 'increase significantly' over the next two years," the survey said. "Spending on computers is rising sharply even though there are funding difficulties throughout the nonprofit world."

Literacy Not Universal

Despite the tidal wave of office automation, the study noted, computer literacy is by no means universal among nonprofit executives. Asked whether they considered themselves to be computer literate, 61% of the respondents in the cross section said yes, while 39% said no.

"This self-described computer literacy is most common among chief financial officers, with chief executive officers divided between the two camps," the study said. The survey showed 53% of chief executive officers regarding themselves as computer literate and the remaining 47% lacking basic computer know-how.

"Self-confessed computer illiteracy is highest among program officers, where it reaches a striking 82%," the study noted. "Generally, computer illiteracy remains most common among small organizations, with museums, social service agencies and advocacy groups the leading holdouts."

The survey also found that:

- Computers are used primarily for financial management and WP.
- Other key computer uses are delivery of programs or services, followed by fund-raising, membership, executive decision making and research.
- Forty-five percent of the respondents now rely on in-house computers rather than outside resources.
- Nonprofit groups typically have been spending 2% to 3% of their annual budgets on information systems.
- While generally satisfied with their computers, nonprofit executives singled out a number of problem areas, including funding, development of appropriate software and documenting costs and benefits.

'The rush to automate is likely to continue . . . . Spending on computers is rising sharply even though there are funding difficulties throughout the nonprofit world.'

"These numbers demonstrate clearly that nonprofit administrators are rapidly learning to turn computer technology to their advantage," the survey concluded. "Problems remain, and choosing the right computer system for any particular nonprofit [organization] is a process requiring careful consideration, but the trend toward automation seems irresistible in virtually every corner of the nonprofit community."

Copies of the "1983 Survey of Computer Technology in Nonprofit Organizations" are available for $40 each from Rousmaniere Management Associates, 111 Washington St., Brookline, Mass. 02146.

'Lisaterminal' Ties Lisa to DEC Units

CUPERTINO, Calif. — Apple Computer, Inc. has introduced a communications product said to allow the Lisa personal computer to interact with most mainframe and minicomputers, including those from IBM and Digital Equipment Corp.

Lisaterminal data communications software allows the Lisa to emulate DEC VT100, VT52 and TTY terminals and exchange information via a modem with computers supporting asynchronous protocols. In addition, users can gain access to remote mainframes and information services, such as Computserve, the Source and others.

The Apple Cluster Controller is said to convert an IBM Systems Network Architecture/Synchronous Data Link Control or Binary Synchronous Communication protocols to asynchronous protocols. It comes equipped with either three or seven serial RS-232 ports to allow combinations of up to seven Lisas or serial printers to be attached to the IBM 3270 network, an Apple spokesman said.

Lisaterminal is available from authorized dealers for $295, and the controller ranges in price from $4,500 to $7,080. More information can be obtained from Apple Computer at 10260 Bandley Drive, Cupertino, Calif. 95014.

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Efficient Techniques Found to Cut Costs

Survey: Big Law Firms Taking Advantage of OA

CHICAGO — Lawyers active in the area of law office management are putting computers and other office management technology to increased use, and large firms are leading the trend, according to a recent survey released by the American Bar Association's Economics Section of Law Practice.

In the area of office technology, 67% of those in private practice reported that they use a word processor with a screen display. According to the survey, more than 95% of offices with at least 20 lawyers have word processing equipment. Most firms with between two and 19 lawyers have similar office equipment, as do 37% of the solo practitioners.

The most common uses of word processing equipment are drafting and editing original documents and preparing documents based on standard forms, according to the survey. However, only some 13% of the firms in the survey use word processing regularly to transmit information to other word processors.

In a related area, 51% of the private practitioners in the survey said their firms use data processing. More than 80% of firms with at least 20 lawyers put data processing to use, and 26% of solo practitioners use data processing.

The most common data processing functions in law firms are recording hours and timekeeping, client fees and billing, client disbursements and advancements, bookkeeping of financial records, management reports, maintenance of client lists and general ledgers.

In general, the survey indicates that "efficient office management techniques make a great deal of difference" to a law firm's financial health, said a member of the survey team.

The study costs $1,000, with discounts available to bar associations. More information is available from the American Bar Association, 1155 E. 60th St., Chicago, Ill. 60637.

Plug-In Circuit Reconfigures Wang Terminals Into Micros

LENEXA, Kan. — Computer Concepts Corp. has announced a plug-in circuit said to make it possible for any terminal in a Wang Laboratories, Inc. 2200 computer system to emulate a microcomputer.

Called Micro-Bridge, the circuit fits into an available I/O slot of any Wang 2200 computer system. Micro-Bridge lets the Wang user take advantage of inexpensive personal computer software without the added cost and complications of totally separate microcomputer hardware, the vendor said.

According to the vendor, Micro-Bridge reconfigures any Wang serial-type terminal into a microcomputer with all the benefits of the existing system, including a printer, Winchester-type hard disk memory and tape backup systems.

The 8-bit Micro-Bridge is a complete 64K-byte microcomputer running Digital Research, Inc.'s CP/M operating system. In use, it allows CP/M peripheral names to be assigned to resources within the 2200 system, a spokesman said.

Micro-Bridge sells for $1,995. Each circuit reportedly includes the CP/M operating system, as well as a spreadsheet software package.

Computer Concepts is located at 8375 Melrose Drive, Lenexa, Kan. 66214.

OPS-2000 System Adapted to Fit Workstations

CAMBRIDGE, Mass. — Interleaf, Inc. recently announced that its OPS-2000 office publishing system has been adapted to operate on Sun Microsystems, Inc.'s stand-alone or networked workstations.

The OPS-2000 is a computer-aided publishing system that was designed to produce illustrated documents. It incorporates such features as advanced multiple-font word processing, business graphics, diagraming and high-speed laser printing.

The printing system can also be outfitted with a mouse, supplementing the unit's keyboard for data entry and execution, according to a spokesman for the firm.

The OPS-2000 software can be purchased bundled with Sun Microsystems' II/120 workstation for $62,500. The 16-bit workstation includes a 19-in. display, low-profile keyboard and mouse.

Interleaf is located at 955 Massachusetts Ave., Cambridge, Mass. 02139.

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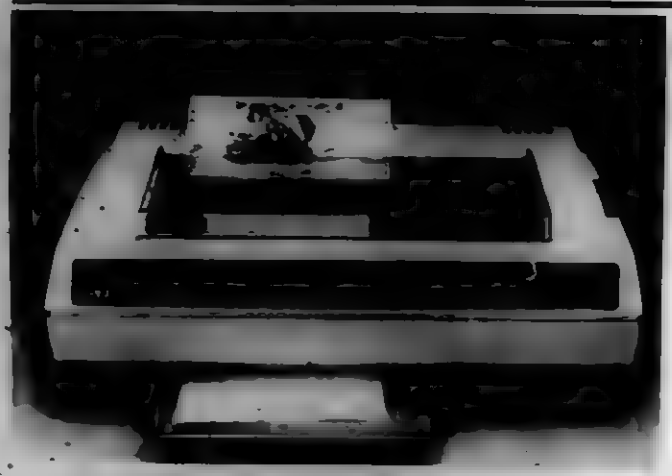


North Atlantic Industries' Qantex Model 7065

Runs at 300 Char./Sec

Quantex Unveils Matrix Printer

HAUPPAUGE, N.Y. — North Atlantic Industries, Inc.'s Quantex Division has unveiled a multimode serial dot matrix printer that can operate at up to 300 char./sec and is capable of on-line font storage.

The Model 7065 operates at a variety of speeds: 300 char./sec for high-speed draft copies, 250 char./sec in a compose mode and 125 char./sec for near letter-quality reproduction. The unit can also run at 65 char./sec for letter-quality output, a spokesman said. The unit is fully compatible with printers manufactured by Epson America, Inc. and Diablo Systems, Inc., he noted.

The Model 7065 can store up to three letter-quality fonts on-line, reportedly without requiring a change of print wheels. Standard word processing fonts offered are Trend and Courier. Emphasis, Cubic, Script and Italics are available as options.

When used as part of a data processing system, the printer accepts download parameters from a host computer using escape code sequences. The Model 7065 is escape-code-compatible with Digital Equipment Corp.'s LA120 printer. These codes are said to allow the selection of up to eight different character sets, a variable forms length of one to 256 lines, vertical tabs and margins, horizontal tabs and margins and vertical pitch.

The printer can operate bidirectionally and is controlled by a Zilog, Inc. Z80A microprocessor. It also contains the standard 4,700-byte input buffer and internal diagnostic checks, the spokesman pointed out.

The Model 7065 costs $1,995, with deliveries slated for March 1984 from the firm at 60 Plant Ave., Hauppauge, N.Y. 11788.

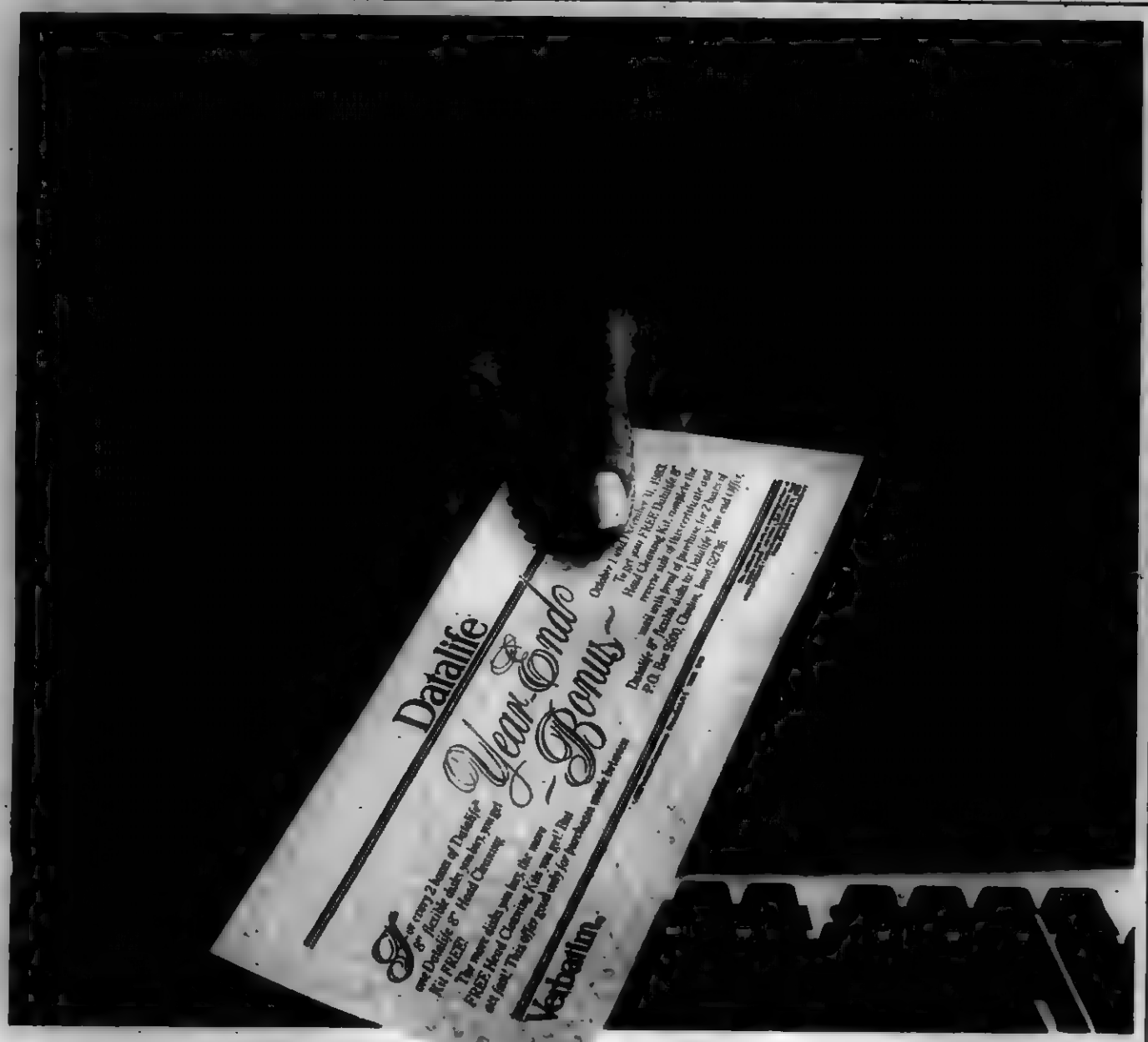
Interface Ties Typewriters To IBM Micro

TORONTO — A software-based interface that allows IBM electric typewriters to be used with IBM Personal Computers as letter-quality printers has been announced by Wordlink Systems, Inc.

Wordlink II consists of a number of floppy-disk-based programs and a cable that plugs into the computer's parallel output port. Once connected, the typewriter prints at about 200 word/min, approximately three times faster than average manual typing speed, a spokesman for the firm said.

The system operates with IBM Models 50, 60, 75 and 85 electric typewriters and is intended to be used as a backup to a traditional printer or as the main printer system in small applications.

Wordlink costs less than $100. Additional information can be obtained from the firm at Suite 211, 1 Eva Road, Toronto, Canada M9C 4Z5.



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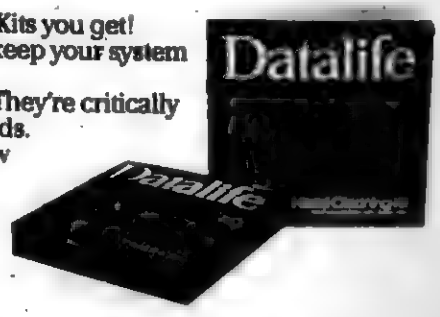

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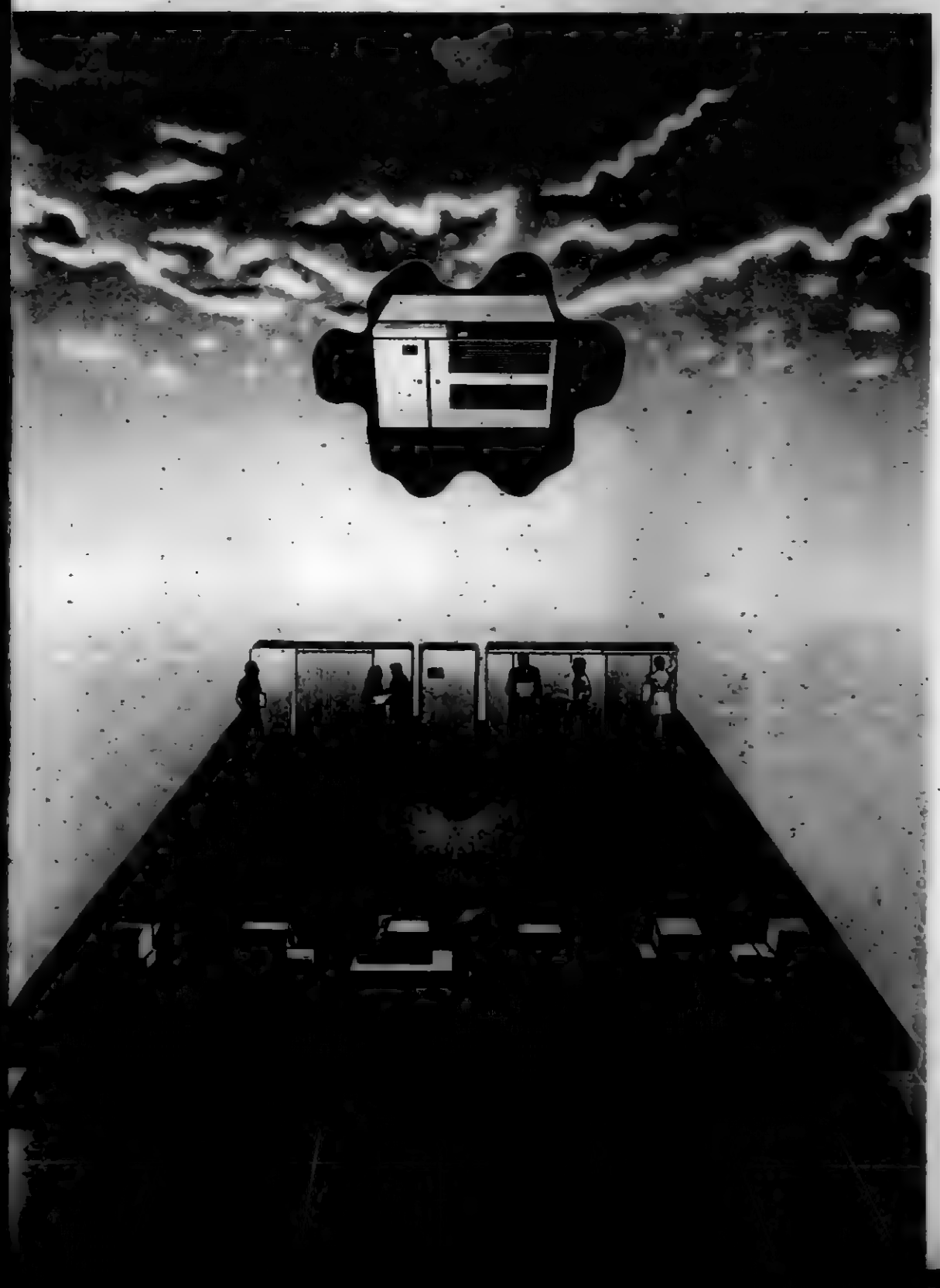

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Adapso to Fight SEC In Court Over CPA Dispute

By Bill Laberis
CW Staff

ARLINGTON, Va. — The Association of Data Processing and Service Organizations, Inc. (Adapso) will take its long-standing dispute with the Big Eight accounting firms to U.S. District Court.

In particular, Adapso will seek action against the U.S. Securities and Exchange Commission (SEC), asking the court to order the SEC to conduct a formal inquiry into the conduct of certified public accountant (CPA) firms that sell DP services to their audit clients. Adapso's decision to go to court followed an SEC action on Nov. 22 that declined to honor Adapso's request for a definitive SEC ruling on the propriety of CPA firms' selling DP services to audit clients [CW, Aug. 29].

The SEC's refusal to take any action on Adapso's petition for a ruling "took about 10 minutes to decide," said David Sturtevant, Adapso executive director, who was present at the Nov. 22 hearing. The SEC,

(Continued on Page 126)

M&D to Pay $2 Million For Contract Violations

By Paul Gillin
CW Staff

BELLINGHAM, Wash. — McCormack & Dodge Corp. must pay more than $2 million to a small software firm here for contract violations involving international sales of McCormack & Dodge's GL/Plus general ledger package. The ruling stems from a suit brought last year by ABC Management Systems, Inc., which makes the ABC report writer.

Judge Marshall Forrest issued a directed verdict in the Superior Court of Whatcom County last week concluding that McCormack & Dodge had violated a domestic marketing agreement by selling an enhanced version of ABC under the name of Fast (Financial Analysis System) to international clients as a subsystem of GL/Plus.

The judge also stated that he will enjoin McCormack & Dodge from selling internationally the GL/Plus package with the Fast subsystem. Final written findings and conclusions are expected by Dec. 8.

The jury ruled that McCormack & Dodge's misappropriation of ABC was "willful and malicious" and ordered the company to pay ABC and its president, Vernon Ruskin, a 9.2% royalty on non-U.S. sales of GL/Plus with the Fast subsystem. The jury set the initial damages at $1.4 million, but Forrest doubled damages for all international sales of GL/Plus after Jan. 1, 1982, which will bring the total amount to more than $2 million.

McCormack & Dodge Chairman James M. McCormack said the decision will have no effect on current international users of GL/Plus. "McCormack & Dodge does not believe that the court's decision is correct or fair," he said. "We had a different perception of the marketing rights of the Fast report writer portion of GL/Plus based on the substantial changes we made to it over the years." He said the company has not decided whether to pursue further court action on the matter or to seek an amicable agreement.

The judge also dismissed a claim filed

(Continued on Page 128)

Fall in Price/Mip Seen Threat to Trilogy

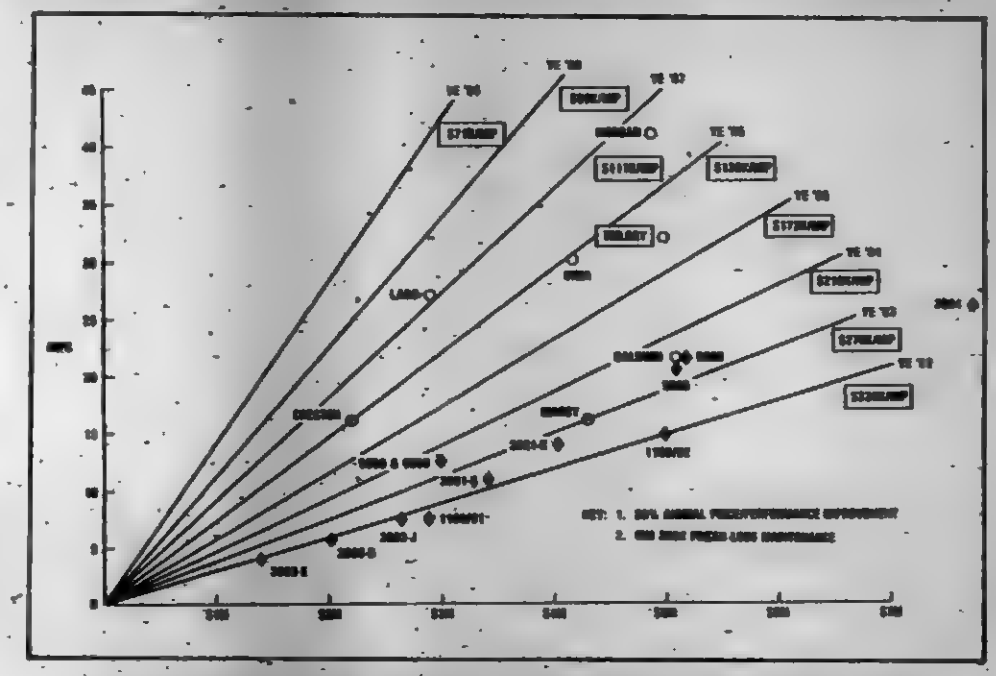
By Robert Batt
CW West Coast Bureau

PALM SPRINGS, Calif. — Rapidly dropping hardware costs will present a serious problem for new IBM plug-compatible manufacturer Trilogy Ltd., as it attempts to take on Big Blue in the large-scale systems market, a senior industry analyst claimed.

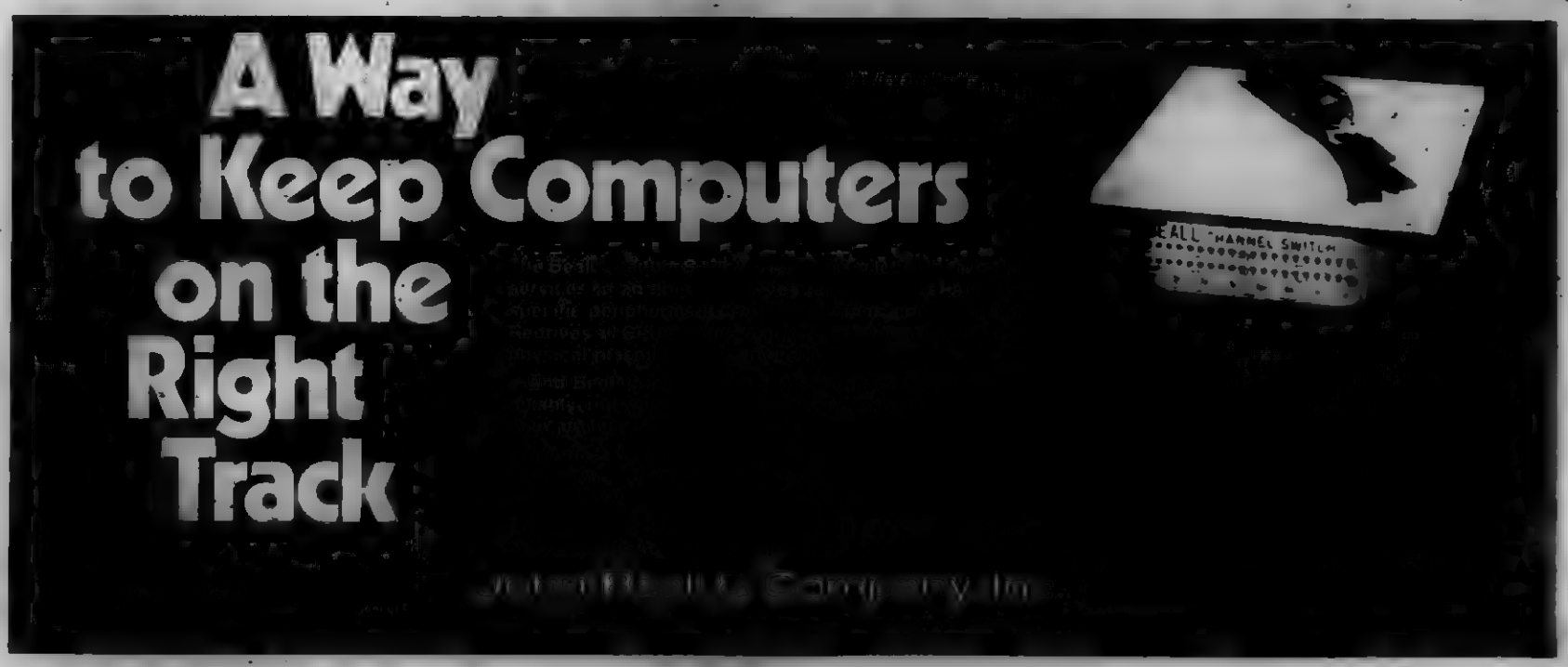
Speaking here at the recent Enterprise Information Systems Forum, Edward Carr, vice-president of marketing for Market Search, Inc., said the rapid fall in the price of millions of instructions per second (Mips) power is diluting the technological advantage that Trilogy plans to hold over IBM.

Carr told the Forum, sponsored by Enterprise Information Systems, Inc. that in 1982, the price per Mip was in the order of $338,000. At that price, Trilogy's planned product processing advantage over IBM of around 50% would have yielded great dividends. However, he continued, by the time the Santa Clara, Calif.-based manu-

(Continued on Page 128)



Price/Performance Large-Scale Processors: Sperry, Trilogy, NAS, Amdahl



'Reflect Improving Relations'

Liberalized Tech Export Rules With China Aired

By Patricia Keefe
CW Staff

WASHINGTON, D.C. — The Reagan administration this month unveiled the specifics of the liberalized technology export rules concerning trade with China. The announcement followed the recent levying of a $50,000 fine against an electronics firm, partially owned by the Chinese government, that was accused of illegally exporting U.S. technology.

The rules "reflect the improving relations between the U.S. and China," a Commerce Department spokesman said, and move China into the same export controls category applied to friendly and nonallied nations. This category bars shipment of specific military equipment.

"Already, we have seen a large increase in inquiries and definitely do expect more [application] activity," the Commerce spokesman said. Some industry and government observers expect the new rules to boost the value of U.S. technology exports to China to as much as $2 billion next year, double the expected value of this year's exports.

The liberalized rules will allow vendors to assume they may export their "dual-purpose" wares unless told to do otherwise [CW, July 4]. "Dual-purpose" refers to DP and telecommunications technology that is designed for civilian use but can be converted to military applications.

Among the computer equipment that will now be considered "routinely exportable" to China are:

- Most medium-scale mainframes and general-purpose computers.
- Virtually all 16-bit microcomputers.
- U.S.-made microchips — except for the most advanced designs.
- Computerized instruments, recording equipment, semiconductor production apparatus, a variety of microcircuits and oscilloscopes.

A spokeswoman for the American Electronics Association (AEA) applauded the liberalized export rules, saying, "We are very supportive and very pleased with the way the regulations were drawn. The levels are very good and will be very profitable for our members."

The AEA has estimated that the easing of China export controls will free 75% of all U.S. export license requests from lengthy Commerce, Defense and State Department review.

However, U.S. vendors should be aware that Commerce will continue to turn over applications concerning some technologies for review by the Coordinating Committee, a Paris-based commission made up of Japan and the North Atlantic Treaty Organization countries, except Iceland.

Also, although debate is continuing on the issue, vendors still will not be able to apply for "bulk licenses," which provide blanket approval on a variety of products destined for a variety of end users, the Commerce spokesman said. This means applications must still be processed on a single-transaction basis.

MAI Reports 86% Decline In Earnings

By David Myers
CW New York Bureau

NEW YORK — Squeezed by a $33,000 loss in the fourth quarter, Management Assistance, Inc. (MAI), makers of the Basic Four line of minicomputers, suffered an 86% decline in earnings in its year ended September 30.

MAI earned just over $1 million in the 12 months after earning $7.5 million last year. Revenues inched up by 5% to $376 million from $358 million despite a 2% slip in sales of Basic Four equipment.

Climbing service income from the company's Sorbus division fueled the rise in revenues.

Paul B. Lazovick, vice-president for investor relations at MAI, blamed what he claimed was MAI's 99% tax rate for the company's fourth-quarter loss and year-end earnings decline.

"With that sort of tax burden, it's hard to keep money on the bottom line. We have no tax benefits currently utilizable," Lazovick said.

But securities analysts who track the computer maker found other reasons for MAI's fiscal woes.

Joseph R. Kapka, a Santa Clara, Calif.-based analyst with Bateman Eichler Hill Richards, said MAI "hasn't set the world on fire. They've had an aging product line on the market that they've been slow to replace."

MAI is not hampered by a unique set of problems, according to Elliot Schneider at Gruntal & Co. here. "There is IBM and the rest of the industry — and life is hard for the rest of the industry. [MAI has] been chopped at from below and pushed at from above," Schneider said.

However, Kapka said, MAI's performance seems to have "bottomed out," and he pointed to the introduction in October of its Series 8000 as a hopeful sign.

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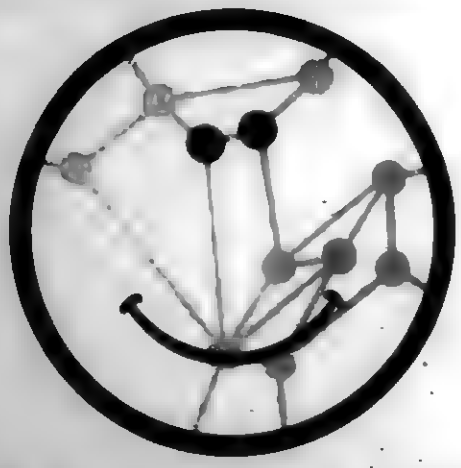

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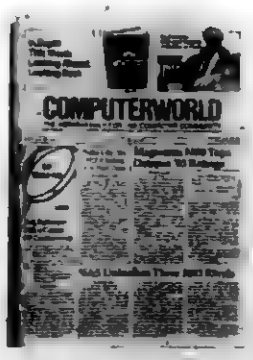

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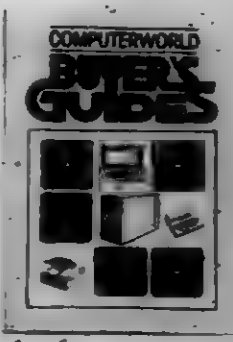

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   75 Other User _____
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   85 Computer Service Bureau/Software/Planning/Consulting
   90 Computer/Peripheral Dealer/Distributor/Retailer
   95 Other Vendor _____

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   12 VP/Assistant VP
   13 Treasurer/Controller/Financial Officer
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   22 Director/Manager of Operations/Planning/Administrative Service
   23 Systems Manager/Systems Analyst
   31 Manager/Supervisor Programming
   32 Programmer/Methods Analyst
   35 OA/WP Director/Manager/Supervisor
   38 Data Comm Network/Systems Mgmt
   41 Engr/Scientific/R&D/Tech Mgmt
   51 Mfg Sales Reps/Sales/Marketing Mgmt
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   C. Microcomputers/Desktops
   D. Communications Systems
   E. Office Automation Systems

MDS Qantel Sues Former Employee for Theft

By Jeffry Beeler
CW West Coast Bureau

HAYWARD, Calif. — A supplier of small business systems has sued one of its local competitors for allegedly stealing the plaintiff's confidential technical data and then trying to reproduce the material at a commercial photocopying service.

MDS Qantel, Inc.'s complaint accuses the company's former senior customer engineer, Robert Benson, of "misappropriating" proprietary Qantel technology after he quit the firm last January to become president of nearby Digiserve, Inc.

The suit also accuses Benson's wife, Joan, of transporting the stolen documents, many of which were stamped "Qantel confidential" in red ink, to a local photocopying center in an unsuccessful effort to have the materials duplicated.

In addition to alleging theft of its trade secrets, Qantel charges the Bensons and Digiserve with breach of confidential relationship and unfair competition.

As compensation for the purported misdeeds, the complaint seeks an unspecified sum of damages and demands a halt to Digiserve's Qantel-related hardware maintenance business. Based in neighboring Concord, Calif., the defendant company sells and services Qantel products and thus competes with the plaintiff and its parent organization, Mohawk Data Sciences Corp.

A response to Qantel's allegations of business misconduct was sought last week from Digiserve's president. But the inquiry was immediately referred to the defendants' attorney, Thomas Latham, who dismissed the suit as unfounded.

"Evidence will show that Digiserve was in lawful possession of the documents it has been accused of stealing," Latham said. "My clients are innocent of any wrongdoing."

Filed in Contra Costa County (Calif.) Superior Court on Nov. 15, Qantel's complaint has prompted a local judge to grant a temporary restraining order that forbids Digiserve from using or disclosing its allegedly

(Continued on Page 134)

Adapso to Fight SEC in Court

(Continued from Page 123)

Sturtevant said, reminded the Adapso representatives that it had ruled on similar requests in the past and "didn't want to revisit the matter all over again."

In 1981, a new and more conservative five-member SEC rescinded a previous SEC ruling that appeared to limit somewhat the scope of the CPA firms' activities relating to the sale of DP services.

Sturtevant said that the swiftness with which the SEC dispatched with Adapso's latest request has left the question of just how carefully the SEC examined Adapso's petition "open to conjecture."

"This kind of thing could help us in court," Sturtevant said in a phone interview. "All we're asking is that the SEC look carefully at the facts we have presented and make a ruling based on what we have found."

The SEC declined comment on its latest action.

Sturtevant did not know when Adapso would take its case to court, but added that its filing for court action would occur "in the very near future."

Adapso's opting for a legal fight represents another chapter in a battle with the CPA firms that goes back several years and which has heated up considerably as the Big Eight accounting firms — and Arthur Andersen & Co. in particular — have become increasingly prominent in the sale of DP services. To many of Adapso's 575 members, DP services comprise the bulk of revenues.

Adapso has argued that the sale of DP services to a CPA firm's audit clients compromises the spirit of the independent audit, a procedure governed in part by regulations set by the SEC and the Federal Trade Commission. Adapso has claimed that Arthur Andersen alone will realize more than $250 million in 1983 in DP service revenues, much of that coming from sales to its audit clients.

In the past, some Adapso members have threatened court action against individual Big Eight firms, although the Adapso main body has opted for an initial excursion through the regulatory bureaucracy.

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Falling Hardware Costs Seen Threat to Trilogy

(Continued from Page 123)

facturer ships its first product in 1985, the price per Mip in large-scale processors will be down to $173,000, and by 1989, it will be just $71,000.

"From this point of view, one can see that Trilogy's strategy is not that aggressive. Indeed, it is only one price/performance sector ahead of IBM," said Carr, a former manager of competitive analysis at Sperry Corp.

Such a differential between IBM and Trilogy may not be sufficient, he added, when one considers that Trilogy will probably have spent $500 million on developing its processor before the first product is shipped.

In one of the most successful funding exercises of any new computer company, Gene Amdahl, cofounder of Trilogy and former chairman of plug-compatible vendor, Amdahl Corp., has raised more than $250 million through a research and development limited partnership; venture capital financing; and most recently an influx of funds from Digital Equipment Corp. and Sperry, in return for access to Trilogy's chip technology. The company is now in the process of going public.

Trilogy is betting all this money, and more, which it is currently raising, on a new wafer technology that promises to pack the circuitry of the 4,000 individual integrated circuits found within a mainframe computer on just 40, 2½-in. wafers. The effect, Trilogy claims, is to reduce greatly the physical size of machines built with the wafers while reducing both power consumption and the amount of internal wiring that can lead to failures.

"I think Gene Amdahl has some good product ideas, and he has raised a lot of money, but I think this time around IBM will be waiting for him," Carr said, referring to Amdahl's successful launching in the 1970s of the IBM PCM rival that bears his name.

"It may be that Trilogy will not be able to support all the systems necessary to have its project be successful," he added.

A major problem facing the company, Carr said, is the development of software for its processor. With IBM aware of the competitive threat posed by Trilogy, it is possible, he suggested, that Big Blue might amend its widely used MVS system and make it much more difficult for Trilogy to be compatible

Another serious problem facing Trilogy, he said, is the need to balance I/O capacity with computing capacity. If the PCM vendor introduces a machine with processing power in excess of 35 Mips, it may have trouble finding the disk capacity to support such performance.

Furthermore, Carr said, users can expect IBM to replace its four-processor 3084 mainframe with a two-processor system, thereby rapidly accelerating IBM capacity at the high end of the computing range and providing competition not only with Trilogy, but also with PCMs who currently have more powerful machines, such as Amdahl, Fujitsu Ltd. and Hitachi Ltd.

Matsushita, ECD Reach Settlement

NEW YORK — Matsushita Electric Industrial Co. Ltd. of Japan and Energy Conversion Devices, Inc. (ECD) of Troy, Mich., have announced the settlement of a suit brought by ECD concerning Matsushita's recently announced erasable optical memory products.

Instead of prolonging litigation, the companies have decided instead to cooperate in research and development in the optical memory field, Matsushita said in a recent statement. Under the agreed-upon settlement, ECD will grant royalty-bearing patent licenses to Matsushita for these products and will perform consulting work for the development of optical memory products.

The agreements are subject to approval by the Japanese government.

M&D to Pay Over $2 Million In Damages

(Continued from Page 123)

by McCormack & Dodge against ABC, Ruskin and Software International Corp. of Andover, Mass. McCormack & Dodge alleged that it owned an exclusive license to the ABC package and charged that ABC had violated its contract with McCormack & Dodge by granting Software International the right to sell Fast with an interface to Software International's general ledger package.

Software International licenses the basic and advanced versions of ABC and sells it as a stand-alone package under the name of the Financial Modeling and Reporting System.

The judge also ruled in Software International's favor in a cost claim it filed against ABC and a counterclaim against McCormack & Dodge for reimbursement of legal expenses incurred in arguing the McCormack & Dodge claim against Software International. The amount of the awards in the two claims will be contained in the final findings.

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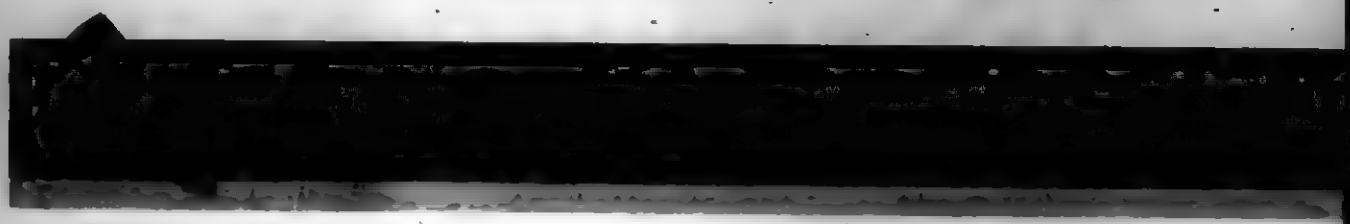

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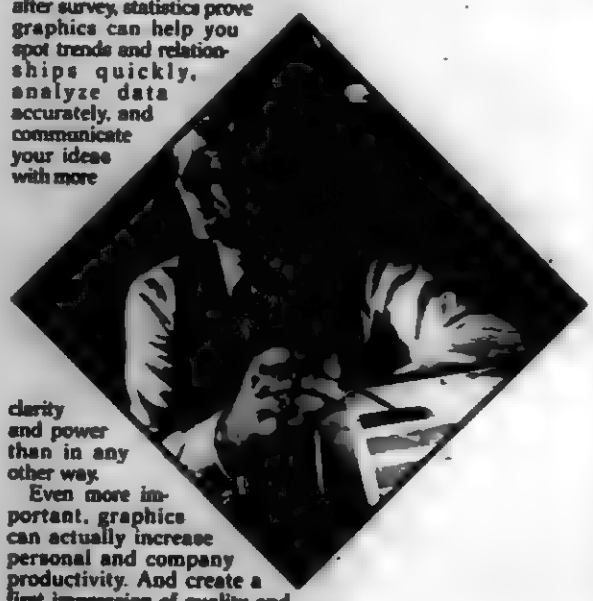

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In a fascinating research project conducted by The University of Pennsylvania, 123 MBA candidates were involved in a study designed to test the effectiveness of business graphics in meeting situations. The results were startling. In the group where visual aids were used:

- **Meetings were shorter:** The study showed a 28% reduction in meeting length when transparencies were used.
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- **The decision process was accelerated:** 64% of study participants said they made their business decisions *immediately after the visual presentation.* When overheads were not used, the control group said they delayed decision-making until *some time after the group discussion following the presentation.*
- **Presenters with visual aids were perceived as being more professional, persuasive, credible and effective than those not using visual aids.**

Now, with the new HP 7475A Business Professional's Plotter, your meetings can have immediate and productive results like these.

How the quality look of HP graphics can help

The way you present your information can be equally as important as the actual information you're presenting. And that's where the new HP 7475A Business Professional's Plotter lets your professionalism shine through.

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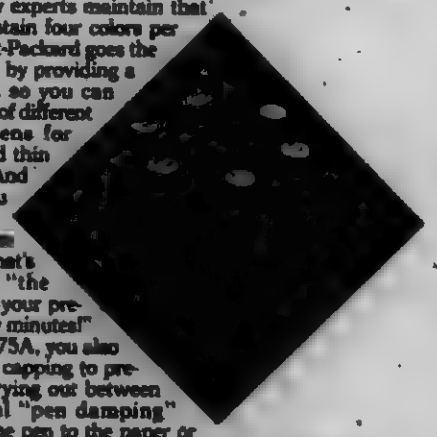

With the HP 7475A, you also get automatic pen capping to prevent pens from drying out between uses, and special "pen damping" (gently lowering the pen to the paper or transparency) to increase pen life and ensure better line quality... use after use after use. You also get a rainbow of 10 colors to choose from, in two line widths.

Your choice: 2 paper sizes and today's most popular graphics software packages

While most professional business applications will be satisfied with standard 8½ x 11" paper or transparencies, the HP 7475A adds the

Large Enterprises Seen Biggest Buyers

Exec: Micro Hardware Mart to Exceed $22 Billion

By Robert Batt
CW West Coast Bureau

PALM SPRINGS, Calif. — Today's $10 billion worldwide market for personal computer hardware will rise to over $22 billion by 1986, the Enterprise Information Systems Forum held here recently was told.

Robert Fertig, president of Enterprise Information Systems, Inc., the Greenwich, Conn., market research firm that sponsored the event, said medium-size to large manufacturers, financial firms, government agencies and educational institutions would be largely responsible for the increase in demand. Large enterprises alone account for about 40% of all DP dollars spent, Fertig noted.

As a result, he said, personal computers, terminals and multiuser workstations will continue to impact minicomputers and mainframe products and vendors.

The advent of the 32-bit personal computer will have sweeping effects on the computer industry, Fertig predicted. Microprocessor performance and functional capability will improve by a factor of six between 1980 and 1985; multiple functions and multiprocessing and distributive processing will be the norm; and with the integration of data, images, text and voice I/O, the compound media will arrive.

At the same time, Fertig pointed out, the personal computer software industry is in a state of flux, and the product leaders of today may not be tommorrow's leaders. "Indeed, this industry may not be able to support all the software and hardware suppliers," he warned.

Bundling, unbundling and discounting are some of the key forces at play in the market, according to Fertig. Operating systems, data base management systems, visual shells and applications decisions are the keys to future growth, productivity and profits or to corporate chaos, he asserted.

On the subject of operating systems, Fertig said that the market is steadily moving toward the Unix operating system because it has the capability to support 32-bit machines. He predicted that micros running under the MS-DOS and CP/M operating systems will soon have a Unix capability.

Market requirements, he noted, are different and changing for each industry segment and application area, whether it be the large corporation, the education sector, small businesses or the home.

Variables to Consider

Variables to be considered, he said, include performance levels, functionality, price sensitivity, support requirements, distribution channels and the level of user interface.

Fortune 1,000 companies, Fertig noted, often require Systems Network Architecture support, integrated data processing, office automation and transaction processing solutions, local support and compatibility between existing equipment.

"It is becoming more difficult for data processing professionals to establish objectives and requirements, to match these objectives and needs with anticipated software and hardware developments and then make a correct decision," Fertig told his audience.

Distribution channels are also changing, he observed, with both direct sales forces and company stores growing in importance. OEMs and distributors, on the other hand, are declining. "Those vendors with the right mix of distribution channels will do well, while those who do not will suffer," he concluded.

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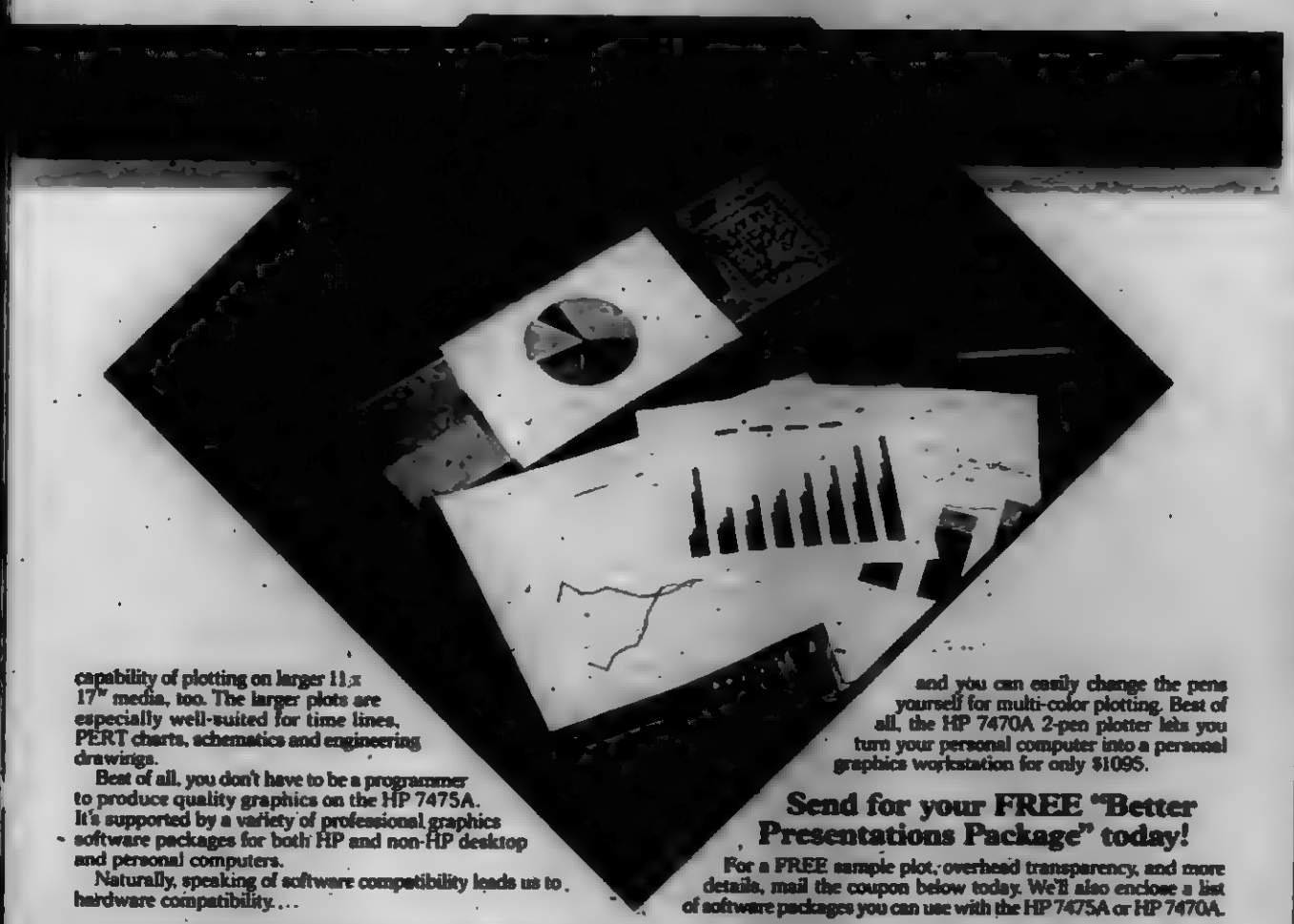

capability of plotting on larger 11 x 17" media, too. The larger plots are especially well-suited for time lines, PERT charts, schematics and engineering drawings.

Best of all, you don't have to be a programmer to produce quality graphics on the HP 7475A. It's supported by a variety of professional graphics software packages for both HP and non-HP desktop and personal computers.

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NCR Establishes Tech Centers For Vendors

DAYTON, Ohio — NCR Corp. has established three technical support centers designed to assist third-party vendors adapt their software and hardware products to the company's line of personal computers and networking system.

Each center will be equipped with NCR's file-sharing and networking system and a variety of NCR personal computers for converting and testing programs and accessories at the center, according to a spokesman for NCR.

Loaner systems will also be available. The centers are located in San Diego; Liberty, S.C.; and Augsburg, West Germany.

According to Donald E. Coleman, NCR vice-president, the centers will supply technical documentation and information as well as training and assistance.

The centers also complement NCR's Software Publishing organization, established earlier this year as a function to identify, evaluate, license and market software productivity and application products for its personal computers, the spokesman for NCR said.

Market Demand Seen Driving Micro Software

By Robert Batt
CW West Coast Bureau

GREENWICH, Conn. — Market demand will play an increasingly powerful role in the development of the personal computer software industry, according to a report released last week.

"Personal Computer/Microcomputer Software-Strategies for Success," written by Enterprise Information Systems, Inc. (EIS), reported market pull will drive most smaller software vendors to push technology in a direction which most easily satisfies near-term market demand, while long-range hardware research and development will become the primary domain of large companies.

"It will become increasingly difficult to achieve product differentiation by hardware or distribution means alone. Software will become the most critical factor in achieving product differentiation, market visibility, account control and profits," the report said.

Software selection, acquisition and implementation strategies have become the dominant aspect for all major industry participants, the report maintained.

According to EIS, the near-to-mid-term future will be characterized by more powerful and less expensive microcomputer hardware, more functional and expensive software environments and a shift in value-added and profit margins from hardware to software.

"Success as a systems manufacturer or systems integrator will very heavily rely upon software strengths. Software holds the key to many of the major planning issues facing most systems manufacturers. Successful computer automation for most users will become largely dependent upon corporate software planning and implementation strategies," the report claimed.

However, it continued, the software industry also has some high hurdles to clear. The late 1980s will be characterized by a local-area network/distributed data processing environment inundated with powerful, 32-bit, third-generation supermicros.

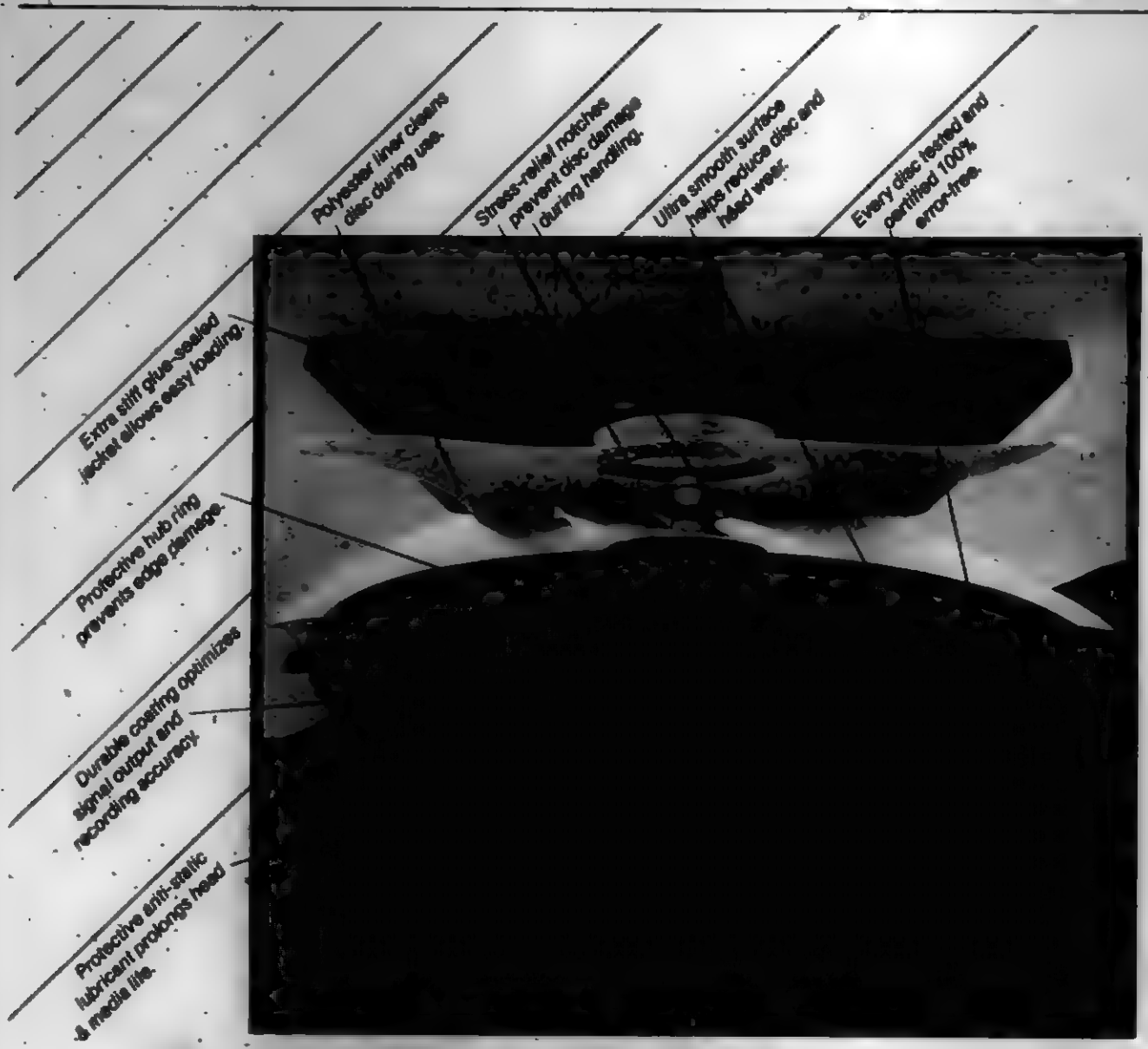
"Unfortunately, the major independent software suppliers have yet to produce system software which can adequately leverage this technology and at the same time support the legacy of previously written software packages," it said.

A Strategic Issue

As a result of the market turmoil, the report continued, for users and vendors alike, software planning has become a vital, long-term strategic issue in a fast-paced, dynamic environment that also demands tactical flexibility and an immediate response to near-term software environments.

"Unable to market and support a broad range of software packages, vendors are being pressured to make many fast-response, and often highly speculative, software planning decisions," the report contended.

"Personal Computer/Microcomputer Software-Strategies for Success" is priced at $950 and is available from Enterprise Information Systems, Box 1154, Greenwich, Conn. 06836.



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Firm Alters Organization

WASHINGTON, D.C. — Comsat General Corp. has announced a corporate reorganization designed to improve overall business activities and has also announced the election of new senior officers.

John L. McLucas, president of Comsat's World Systems Division, has been elected to the newly created position of executive vice-president and chief strategic officer. In this capacity, he will be responsible for the development and integration of Comsat's strategic business planning, marketing and new business relations.

Succeeding McLucas at the World Systems Division is Joel Alper, who earlier this year was appointed vice-president of the division.

Forecast to Affect Federal Marketplace

GSA Sets Single-Vendor Micro Pact Rule

By Andrew Mohr
Special to CW‡

The General Services Administration (GSA) recently issued a multiple-award schedule contract solicitation for the purchase of microcomputer hardware, software and maintenance known as the FSC Group 70, Section C schedule.

The schedule broadly defines microcomputers for use in an office environment and affirms GSA's policy of making Section C the sole supply schedule for the sale of microcomputers to the federal government.

Multiple-award schedule contracts are indefinite-quantity contracts awarded to numerous vendors. GSA uses schedules to permit agencies to buy commercially available items without delay or expense entailed in conducting a formally advertised or negotiated procurement for each purchase.

To ensure that the government receives a fair deal, the GSA negotiates discounts from a vendor's commercial price list before awarding a schedule to the vendor. After award, the government is not obligated to buy any goods or services from the contractor.

According to the solicitation, the GSA will award a single Section C for each make or model or line of hardware offered. In addition, the GSA will award separate schedules for software and third-party, nationwide maintenance. Leasing is not solicited.

The Section C solicitation represents a change in the GSA's method of procuring microcomputers. Under last year's schedule, the GSA had solicited to procure personal computers, which it defined as microprocessor-based, stand-alone computers dedicated to use by one person at a time. During the administration of the schedule, however, the GSA expanded Section C to encompass multiuser, multitasking equipment, including systems servicing up to 64 [redacted]

This current Section C solicitation reflects this trend by expanding its scope to include "end-user computers and computer software for use in an office environment."

The expansion of Section C will greatly affect the federal marketplace. Currently, vendors can sell or lease microcomputers under the GSA's FSC Group 70 Section A schedule — a broad schedule encompassing a wide range of general-purpose machines. Under Section A, the GSA permits the same make or model or line of products to be sold by numerous vendors.

Under the section C solicitation, however, the GSA will award each make or model or line of products to only one contractor. This will drastically reduce the number of vendors selling microcomputers to the government and will give the contractor who wins a Section C schedule a virtual monopoly on the products he offers.

It should be noted that agencies are not required to use Section C and may procure from nonschedule vendors. But to do so, agencies must comply with the more rigorous regulations governing the acquisition of nonschedule products. This tilts agencies toward scheduling procurements and gives Section C vendors a strong advantage.

Equally as important, the GSA announced, is the fact that starting in fiscal 1985, all products included under Section C will no longer be allowed on Section A. This will leave Section C as the sole schedule for microcomputer products. As a result, microcomputer vendors now on Section A could be frozen out of the schedule marketplace if they do not respond to the Section C solicitation.

Since the GSA's definition of Section C automatic data processing equipment products is rather broad, microcomputer vendors interested in selling to the federal government should consider responding to the Section C solicitation.

Mohr is an associate at the law firm of Cohen & White in Washington, D.C., specializing in federal procurement and computer law.

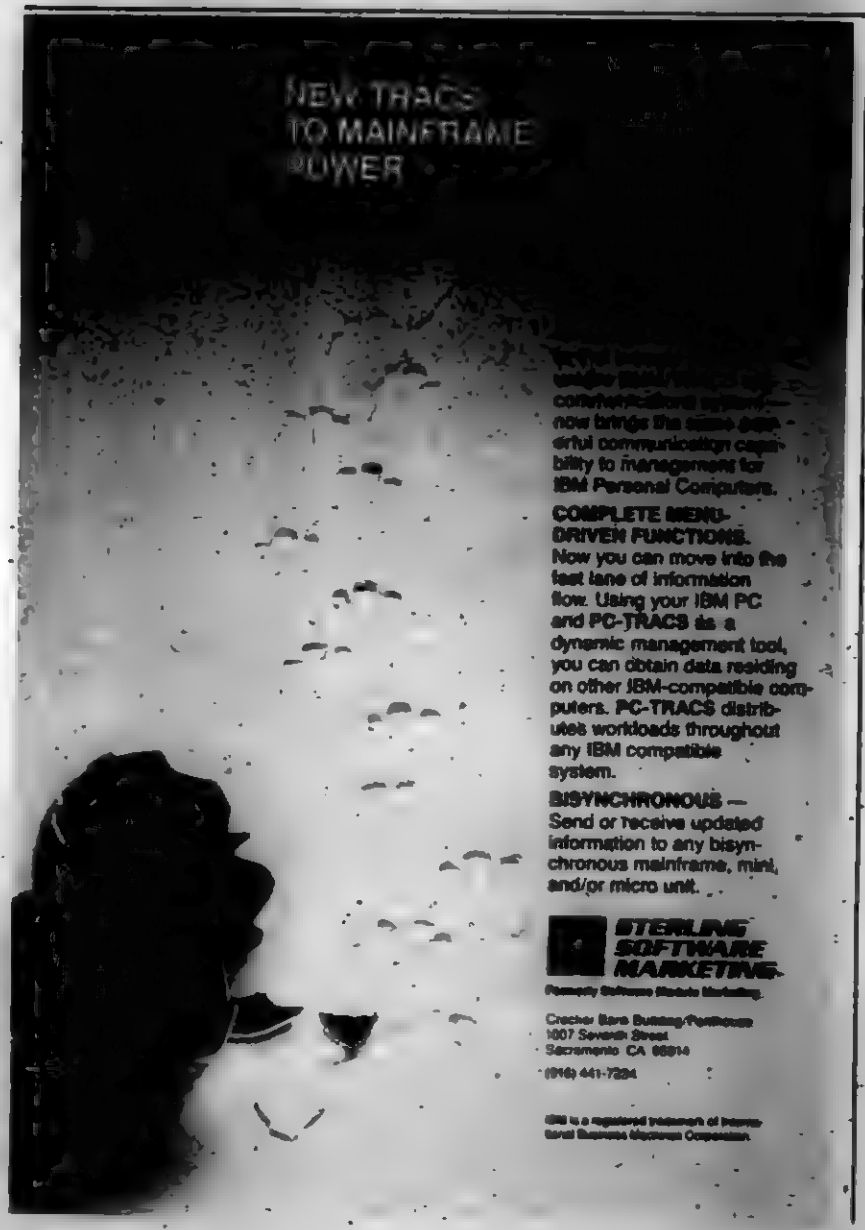
Study Focuses on Micro Use

WELLESLEY, Mass. — Nearly half the portable computer users today are using their devices for scientific and engineering applications, a recent study by Venture Development Corp. here found.

Data entry accounts for 30% of the portable use applications, followed by graphics with 24%, although the graphics work performed is mostly simple business graphics, such as pie and bar charts, the study reported.

In addition, "The Portable Briefcase Computer and Terminal Industry 1982-1987: A Strategic Analysis" found that portables, unlike word processing terminals, lack ergonomic features, with very small displays that make it difficult to detect errors until the text is put into hard-copy form.

The report is priced at $2,790, a vendor spokesman said. More information is available from Venture Development at 1 Washington St., Wellesley, Mass. 02181.



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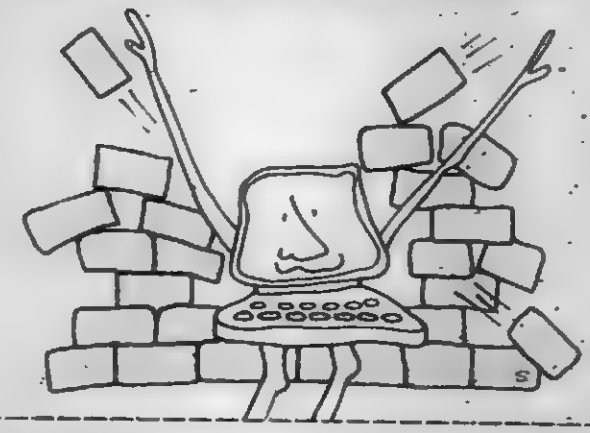

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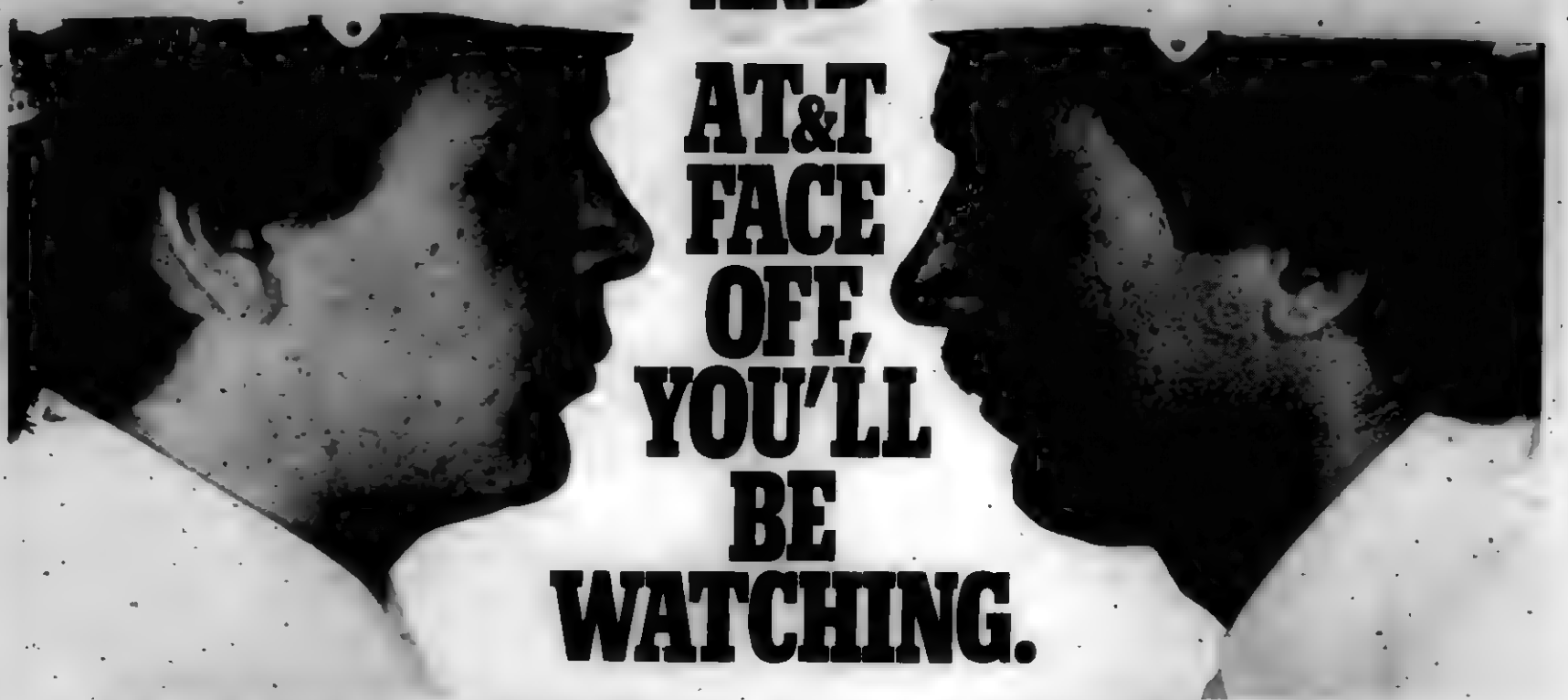

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Stemming From Microchip Advances

Microelectronics Mart Showing Massive Growth

By Bohdan O. Szuprowicz
Special to CW

While the video game and home, personal and portable computer industries are in the throes of their respective shakeouts, there is a massive revolution under way in the basic microelectronics industry. It stems from rapid technological advances in very large-scale integration (VLSI), or microchips, leading to customization of increasingly complex user-designed electronic circuits and products.

The impact of these developments on the marketplace is from the accelerating pace of new product introductions coupled with an increasing number of inevitable shakeouts among companies that are unaware of or unable to keep up with technological innovations. For some it will spell disaster, but for others, opportunity knocks like never before.

Traditionally, semiconductor companies produced standard integrated circuits, which are used in automobiles, calculators, video games, computers and telecommunications. Today's developments in VLSI computer-aided engineering (CAE) systems make it possible to custom design and profitably manufacture specialized chips cheaper, faster and in relatively small quantities. Tomorrow, engineers may communicate directly with integrated circuit producers, eliminating, in the process, droves of programming and data processing prima donnas.

'Today's developments in VLSI . . . make it possible to custom design and profitably manufacture specialized chips . . . Tomorrow, engineers may communicate directly with integrated circuit producers, eliminating, in the process, droves of programming and DP prima donnas.'

Custom-designed microchips already account for about 25% of the semiconductor industry output. By 1990, they are expected to make up 50% of the total as the industry explodes to an estimated $90 billion during the next 10 years. Customizing the output of such a vast and crucial industry will have a pronounced effect on all electronic information processing sectors of many industries.

At present, the greatest change is taking place within the semiconductor industry itself, and the changes are largely unnoticed and little understood by outsiders.

Established suppliers such as Motorola, Inc., Intel Corp., Texas Instruments, Inc. and the Japanese firms are reassessing their policies and rounding up capital for necessary new investments. If you, like Intel, can get IBM to invest in your company, you may satisfy your capital needs for the time being. But not everyone will be so lucky.

Nevertheless, new start-ups unburdened by obsolete production facilities are proliferating. They offer customized microchip services and products to large and small users. It takes $50 million to $75 million to get an up-to-date VLSI microchip factory up and running, but venture capitalists and knowledgeable investors do not seem to be intimidated, and the funds keep coming.

LSI Logic, one of the more prominent new VLSI custom-design start-ups, raised $162 million, more than any other high-technology start-up in history, when it went public last May. Offered at $21 per share, the stock rose swiftly to almost $30 per share in the aftermarket. Despite the Wall Street corrections of recent months, it is still holding firmly above its issue price at about $22.

VLSI Technology, Inc. is another custom microchip start-up that raised $52 million in February, going public at $13 per share without even being profitable. Again, despite the rough markets, the stock was doing rather well at $17 per share in mid-September. Zymos Corp., the third custom microchip start-up to go public recently, did not hit the market until July at $12.50 per share and is the only start-up of the three whose stock is still trading below the offering price.

Waiting in the wings is International Microelectronic Products, Inc., another VLSI custom microchip start-up that has already received about $29 million in venture capital financing. The company expects its revenues to skyrocket from $3 million in fiscal 1983 to $22 million in 1984 and will probably be going public in October. California Devices and Cypress Semiconductor are two other well-financed ventures in this business that are undoubtedly going public in the near future.

The new VLSI custom microchip manufacturers owe much of their success to the advances in specialized CAE workstations based on sophisticated software and powerful 32-bit supermicrocomputers like those built by Apollo, Inc., another relative newcomer. The market for these systems is exploding from a mere $18 million in 1982 to almost $450 million by 1987, with a $1 billion market potential by the end of the decade almost a certainty.

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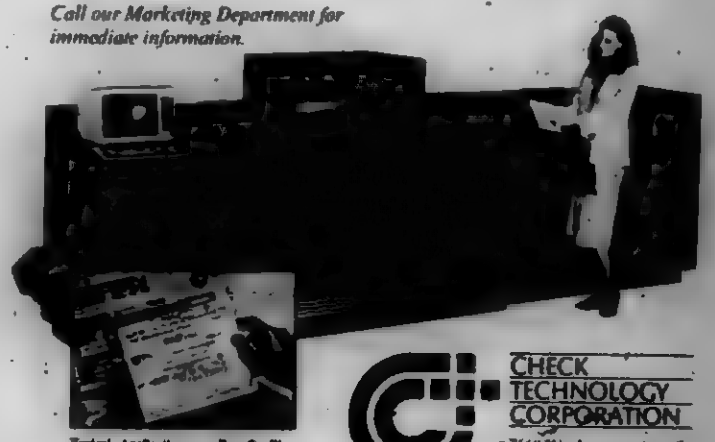

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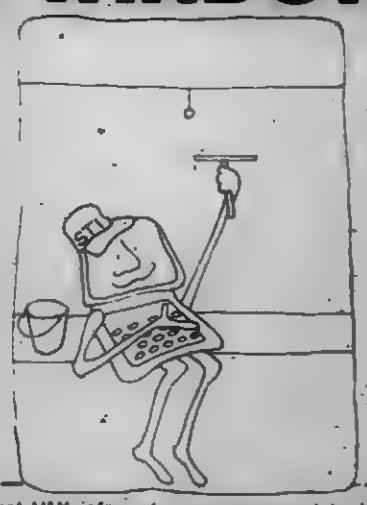

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McDonnell Douglas to Acquire Tymshare

By Paul Gillin
CW Staff

ST. LOUIS — In a move that will catapult McDonnell Douglas Automation Co. (McAuto) into the ranks of the three largest processing services vendors, McDonnell Douglas Corp. last week announced an agreement in principle to acquire Tymshare, Inc., the Cupertino, Calif.-based supplier of the popular Tymnet value-added communications network.

The announcement signals a move into new markets for McAuto, which is a major supplier of processing services for the health care, manufacturing and engineering industries but offers relatively little in the area of financial services.

McDonnell Douglas will purchase Tymshare's 12 million outstanding shares of stock in the deal, bringing the total value of the acquisition to about $372 million. McDonnell Douglas will also have the option to purchase 2.25 million of Tymshare's unissued shares at $31 per share. The definitive agreement is subject to approval of the boards of directors of both companies.

Tymshare revenues in 1982 were $297 million while McAuto's revenues were $326 million. Tymshare posted a small loss for the first nine months of 1983.

A spokesman said the acquisition will have little effect on current Tymshare customers but noted that Tymshare will cease to exist as a separate entity sometime after the definitive agreement is announced, no later than Dec. 23.

McAuto President Robert A. Fisher said, "Cost savings could be realized through optimizing the ways in which we combine, focus and direct our separate functions." A spokesman said the statement can be read to indicate the decreased staff will be needed to provide the same level of service but added that "it would be premature to think that there would be any reductions in the area of personnel."

Fisher said McAuto will use Tymnet to expand its financial service offerings, an area which makes up over a third of Tymshare's annual revenues. "Tymshare's technology allows the interconnection of companywide systems of considerable size and depth without major development efforts and on a cost-competitive basis," he said.

Current Tymshare offerings include the Telecheck check guarantee service and a digital credit card authorization system. The company also offers tax processing. Fisher said the company would strongly pursue the electronic clearing house concept, which provides for information exchange within entire industries.

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Cincom Systems To Build DBMS For SGS Micros

PHOENIX, Ariz. — The Systems Division of SGS Semiconductor Corp. and Cincom Systems, Inc. have penned an agreement whereby Cincom will develop a data base management system (DBMS) for SGS' Unix-based microcomputers.

The development of Total, Cincom's DBMS, will make the tools of material requirement planning and product and inventory control available on SGS' microcomputers for the first time, SGS stated.

The DBMS will be available on SGS' UX16-20 and Samson systems during the first quarter of 1984 and will be priced at $6,000 on both systems. The DBMS will be marketed through SGS sales offices and representatives.

MDS Qantel Sues Couple For Theft of Data

(Continued from Page 126)

stolen trade secrets.

The suit has also triggered action by the county Sheriff's Department, which obtained a writ of possession and raided Digiserve's business premises on Nov. 16. The search-and-seizure operation netted three boxes of confidential Qantel property, including printed information and software-laden magnetic tapes, the plaintiff said in a recent prepared statement.

Included in the confiscated documents were circuit designs, schematic diagrams and technical descriptions of Qantel hardware, according to recently filed court papers.

The discovery of Digiserve's alleged trade-secrets theft occurred in early November when Joan Benson reportedly delivered a batch of secret Qantel documents to a commercial photocopying shop and asked to have the materials reproduced.

Because the papers were prominently marked "Qantel confidential," the shop's owner hesitated to fulfill the request and called the Bensons to find out whether the proposed copying was authorized.

"Joan Benson told him that if he returned the documents to her she would later return them with a signed statement that she had permission to copy these documents," said Qantel's lawyer, Les Holt.

IBM to Emerge as Market Winner, Report Says

Micro-to-Mainframe Mart Forecast to Explode

NORWALK, Conn. — Micro-to-mainframe communications products and services have entered a period of "explosive growth," with IBM likely to emerge as the market winner, according to an in-depth report from International Resource Development, Inc. (IRD).

The 224-page report, titled "Micro-to-Mainframe Communications — Hardware and Software Markets," predicts that users will spend more than $500 million on micro-to-mainframe communications in 1984, compared with $220 million in 1983.

IRD said a survey it conducted of 40 Fortune 500 U.S. corporations showed that 46% of these firms were already implementing formal corporatewide programs for connecting microcomputers to corporate mainframes, while another 44% were conducting studies or pilot programs in this area. Only one of the companies surveyed, IRD claimed, had decided firmly against allowing micros access to corporate mainframe computers.

IBM, the report added, has now moved off the sidelines with the introduction of its 3270-PC and XT-370, both products aimed at micro-to-mainframe communications. Big Blue, it asserted, is also likely to announce an integrated 3270/voice terminal and perhaps also a new line of intelligent modems which will further strengthen its position in the market.

The report describes a three-phase pattern of micro-to-mainframe communications:

- First, the early adopters bring micros into the corporation and develop applications that seem to revolutionize business methods.
- Secondly, MIS is "scared to death," but other professionals bring in increasing number of micros. This stage is now ending, IRD claimed.
- Finally, MIS regains control of the computing resource and acquisition policies.

"The past five years have been a rough period for DP professionals, and particularly for the MIS directors," noted Steven Weissman, a researcher at IRD. "Many MIS directors have been fighting three battles at once in the areas of corporate office automation, telecommunications and personal computers. While many of these battles have been lost, the war seems to have been won, and MIS directors have regained control of the entire corporate computing activity," he asserted.

According to IRD, control over micro-to-mainframe communications will automatically lead to dominance over the office automation and telecommunications functions.

The report added that with the assertion of MIS authority over the use of micros with mainframes, users have begun clamoring for access to mainframe data in easily usable form. This, the market research firm contended, has started a competitive spree among vendors to produce user-friendly tools, with more than 100 hardware manufacturers and 300 software suppliers scrambling to meet the demand.

Microcomputer system vendors and the manufacturers of add-ons and peripherals are expected to be the biggest winners from the near-term rapid growth of the market, IRD said.

The report is priced at $1,850 and is available from IRD, 30 High St., Norwalk, Conn. 06851.

Micro Software Mart Still Seen Penetrable

By Robert Batt
CW West Coast Bureau

PALM SPRINGS, Calif. — Opportunities still exist in the crowded microcomputer software field for those companies that combine market savvy with the ability to reach worldwide markets.

This was the advice given to would-be software development entrepreneurs by David Cole, president and chief executive officer of Ashton-Tate at the Enterprise Information Systems Forum, held here recently.

Cole maintained that application software sales will grow by 50% per year to reach a market size of $600 million by 1987.

Overall Penetration

Cole outlined a number of factors that are key in achieving overall market penetration. These, he said, include brand-name recognition; the ability to source one's own product; and access to significant financial resources and economies of scale.

Also important, according to Cole, are such factors as easy-to-use software; the ability to exploit rapid technological development; and the capacity to manage hyper-growth.

"When selling to corporate users, it is important to be recognized as a reputable, long-term source of products, to have an effective direct sales force, to have software bundling arrangements with top manufacturers and the ability to offer user training and education," he added.

(Continued on Page 136)

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Computerworld Argentina is *Computerworld's* new sister publication serving the Argentina computer community.

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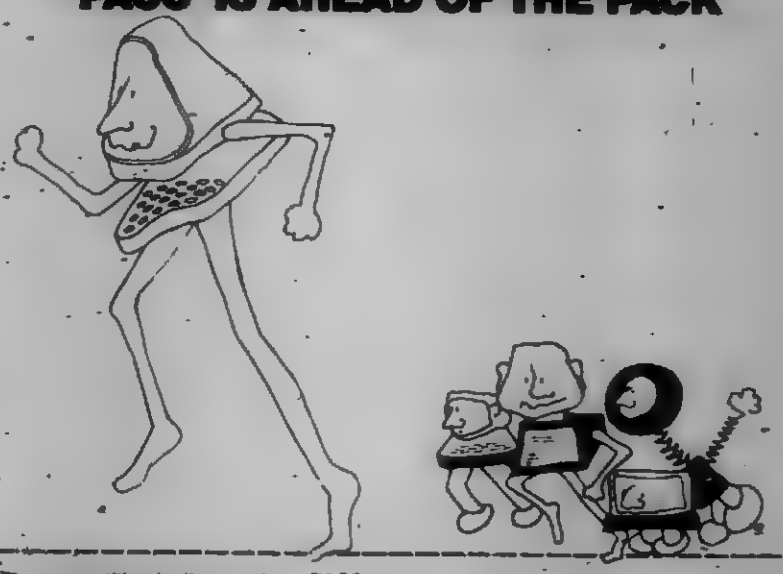

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Intel, Digital Research Ink Pact to Develop Unix Version

SANTA CLARA, Calif. — Intel Corp. has announced an agreement whereby Digital Research, Inc. will develop a version of Unix System V operating software for the Intel IAPX 286 microprocessor.

The agreement follows by six months an announcement by Bell Laboratories that it had entered into an agreement to produce a version of Unix System V for the 286 microprocessor.

Delivery of the validated System V port is scheduled for the third quarter of 1984, a spokesman for Intel said.

The operating system, once accepted, will be owned by Western Electric, which directs the activities of Bell regarding Unix, while Intel and Digital Research will have the nonexclusive right to market object-code versions of the software to their customers.

Software Opportunities Seen

(Continued from Page 135)

In the vertical applications arena, products that require minimal user implementation time will be the winners, Cole suggested.

Crucial Functions

In such a market, such functions as targeting for specific niche products, being aware of user needs and implementing effective distribution networks for specialized applications are especially crucial, according to Cole.

"Today, virtually all systems software is bundled with hardware. This has resulted in extreme price competition bidding for OEM contracts, and so good OEM relationships are crucial," he declared.

Addressing trends in the general applications software market, Cole said that developers must form relationships with top hardware manufacturers.

The industry is growing increasingly international in nature, providing for greater barriers to successful entry into the market, Cole asserted.

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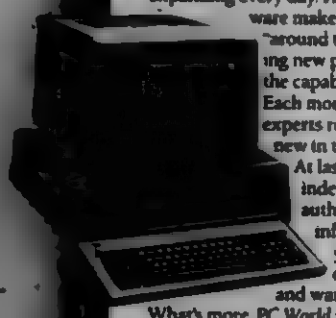

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Supershorts

Dunsplus, Inc., a company of Dun & Bradstreet Corp., has been granted permission by **Lotus Development Corp.** to sell the Lotus 1-2-3 program as part of an integrated computer service based on the IBM Personal Computer. Called Dunsplus, the service includes communications abilities that permit access to mainframe computers and to computer information networks.

Tektronix, Inc. has formed a new subsidiary, Tektronix Development Co., which will sponsor or invest in projects or companies at start-up or at early stages of growth. Investment is expected to be primarily in technologies developed within Tektronix that are outside the interest areas of existing Tektronix divisions.

• • •

As part of its continuing program of aid to higher education, **Harris Corp.** has provided a Harris 800 superminicomputer to Mississippi State University's Electrical Engineering Department. Students are expected to use the system for research in microelectronics, communications and control systems.

• • •

In what it termed an affirmation of the computer industry's de facto acceptance of the 3½-in. standard for microfloppy applications, **Memorex Corp.** has received a large order from **Shugart Associates, Inc.** for 3½-in. microfloppy disks.

• • •

NCR Corp. will use **International Microsystems, Inc.'s** business application software programs on its line of personal computers for the business and professional market. Under the software licensing agreement between the companies, 23 software programs covering a broad range of business management operations will be available to NCR personal computer users beginning in November.

• • •

Computer Sciences Corp. has been awarded a contract valued at more than $30 million over a five-year period by AT&T Communications to maintain and enhance the Trunks Integrated Records Keeping System, which was developed by Bell Laboratories. The work will be performed at AT&T Communications' Cincinnati data center.

• • •

Sony Communications Products Co. has consolidated its microcomputer and office products marketing organizations. The new organization, Sony Information Products, is headed by Robert J. Bryson, vice-president of sales and marketing.

• • •

NCR Corp. has announced support of the ST412 HP interface standard for high-capacity, high-performance Winchester disk drives introduced last month by Seagate Technology, Inc. The company will support the standard internally at the board and chip levels in conjunction with the systems-level small computer systems interface. NCR has also signed an agreement with **Supersoft, Inc.**, which gives NCR the rights to repackage and sell any of over 30 Supersoft software packages under the NCR name.

• • •

Perfect Software, Inc. has signed an agreemenf to provide **Hewlett-Packard Co.** with adaptations of its line of productivity software packages, including packages compatible with the HP 150 personal computer.

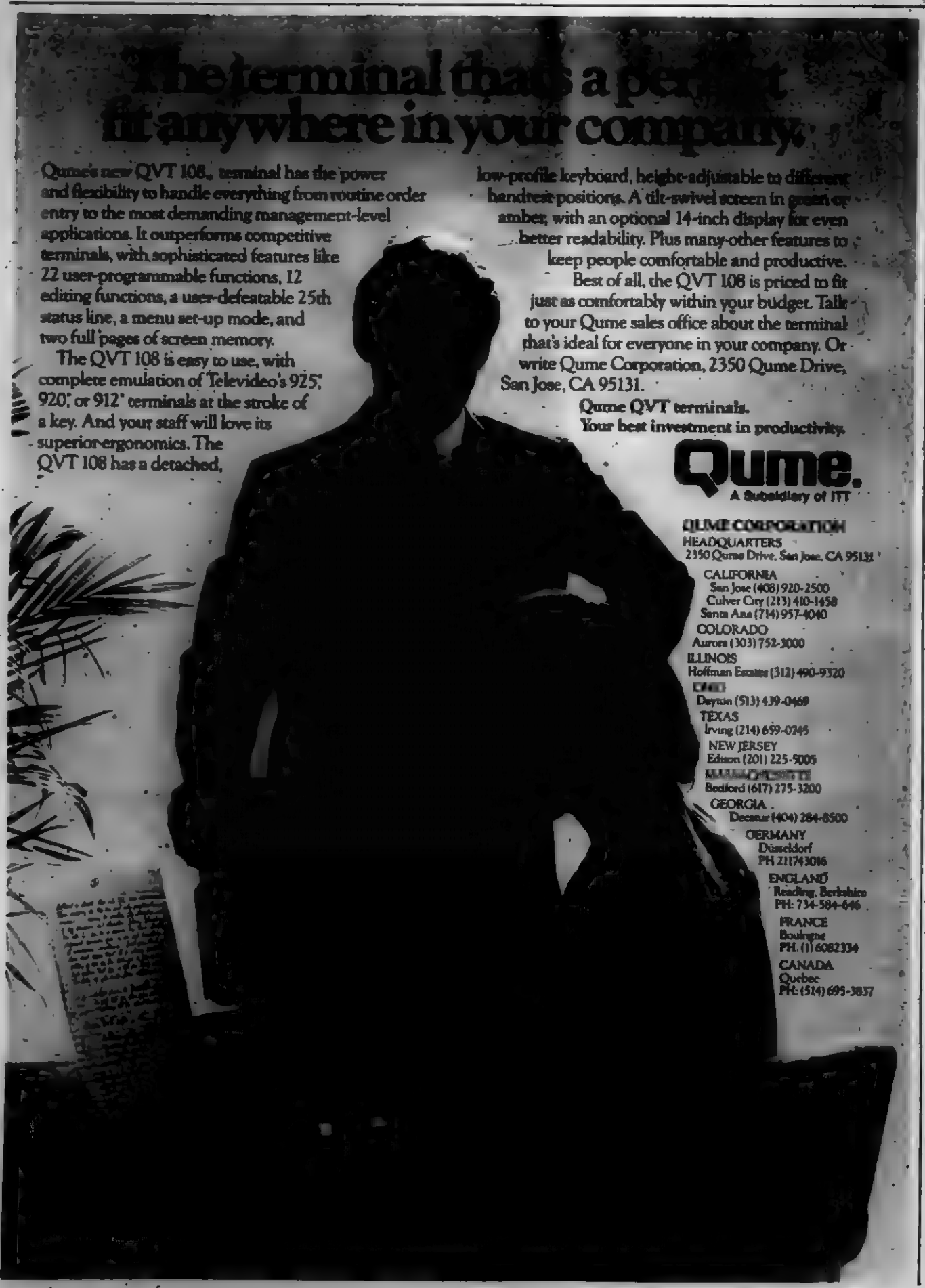
• • •

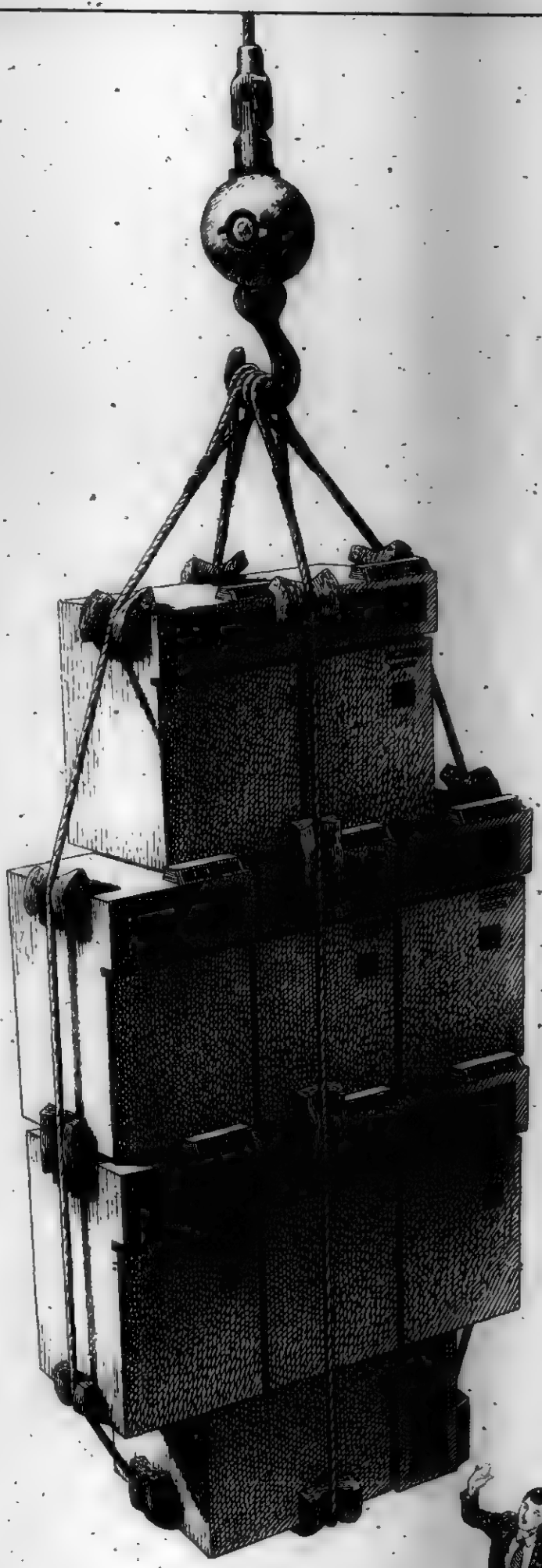
Hewlett-Packard Co. has established two new operations to handle worldwide personal computer distribution and to provide support to HP retailers and direct sales customers. The Personal Computer Distribution Operation will manage worldwide distribution of HP personal computers and related software, peripherals, supplies and accessories. The Personal Computer Field Operation combines all HP personal computer field activities including selling, training, support and merchandising.

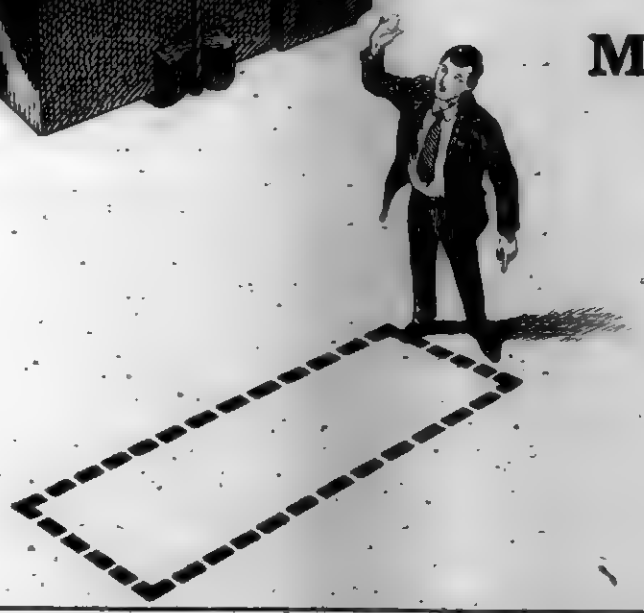
• • •

Robert D. Schmidt, vice-chairman of the board and head of corporate marketing

(Continued on Page 140)







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Strategic solutions to storing, sharing and moving data.

Supershorts

(Continued from Page 138)

at Control Data Corp., has been reelected chairman of the board of the **Computer and Business Equipment Manufacturers Association (Cbema)**. William P. Conlin, senior vice-president and president, industry systems, at Burroughs Corp. was reelected as Cbema vice-chairman.

• • •

Wang Laboratories, Inc. and **TRW, Inc.** submitted a joint proposal for a dual-cable, broadband local-area network standard to the Institute of Electrical and Electronics Engineers' 802 Standards Committee's RF Technical Advisory Group for consideration at its recent meeting in Silver Spring, Md. The proposal cited two major reasons for establishing a standard: first, both companies believe that the increased demand for such systems makes standardization essential; and second, they agree that single-cable standards are not readily adaptable to dual-cable networks because the requirements for the two are widely different.

• • •

Burroughs Corp. has created a worldwide marketing organization with responsibility for corporate international and domestic marketing. Robert F. Holmes was named president of the new organization and a corporate senior vice-president.

• • •

GTE Telenet Communications Corp. has certified a total of 100 X.25 interface products developed by major computer hardware and software vendors for use with the Telenet public data network. Included are products from Burroughs Corp., Associated Computer Consultants and Data General Corp.

• • •

Intecom, Inc. and **Perkin-Elmer Corp.** have announced certification of a common data interface for linking Intecom's integrated business exchange with Perkin-Elmer Series 3200 computers and office equipment. The interface supports RS-232C primary and secondary signaling requirements for synchronous or asynchronous data.

• • •

United Telecommunications, Inc. and **Control Data Corp.** have announced an agreement in principle for the formation of a joint venture to develop a new generation value-added data communications network and for the purchase by Control Data of the principal assets of United Telecom's remote computing services subsidiary, United Information Services. The joint venture will bring together the resources of Uninet, Inc., United's data communications network subsidiary, and Control Data to design and develop Uninet II, a packet-switched synchronous and asynchronous network. Through Uninet, United Telecom will have a majority interest in the joint venture.

• • •

The Association of Data Processing Service Organizations' (Adapso) Fellowship/Grant Program has made awards ranging from $250 to $1,200 to 29 students to help finance their education in computer science. The students were selected on the basis of academic and personal achievements, faculty recommendations and financial need. Funds were provided by Adapso member companies including AGS Computers, Inc.; Cincom Systems, Inc.; Informatics General Corp.; Interactive Data Corp.; Tymshare, Inc.; University Computing Co.; and Xerox Computer Services, Inc.

• • •

Mohawk Data Sciences Corp. (MDS) has signed a contract with the New York State Department of Mental Hygiene, Information Support Systems, under which MDS will supply 173 Series 21 data processing systems for a statewide network. The contract is valued at approximately $3.9 million.

• • •

NCR Corp. has announced support of the ST412 high-performance interface standard for the high-capacity, high-performance Winchester disk drives introduced last month by Seagate Technology, Inc.

• • •

Columbia University has been designated a Center for Advanced Technology by the New York State Science and Technology Foundation. Columbia's center, specializing in computers and information systems, is one of seven advanced technology centers being created in the state in various disciplines to encourage economic growth and employment in high-technology fields.

• • •

The Information Industry Association has released its second industrywide survey, with all indications pointing to continued growth in 1984 and beyond. The survey, conducted by A.S. Nielsen Co., disclosed that in 1982 approximately 28% of information revenue was delivered in machine-readable form and that revenues for electronic delivery systems increased 25.4% in 1982 over 1981. Net profits industrywide were up 14.7% to $950 million. The survey found there are 1,249 U.S.-based companies in the field, and nearly 189,000 people were employed in the U.S. in 1982 by the information business.

• • •

Dynatech Packet Technology, Inc. will provide X.25 equipment for the new Bankers Trust Co. World-

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Compaq Computer
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Phaze Information Machines
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Roland DG
RTCS/Real Time Computer Science Corp.
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Software Solutions
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Wednesday, February 1, 1984
User Sessions:

The Benefits of the IBM PC for Small Businesses
Financing Options and Tax Advantages
Add-Ons and Peripherals: What's Out There?
Software: What's Available and How to Find It
What Do the Compatibles Have To Offer?
Case History: How I Became Compatible With My PC
Medical/Dental Applications for the PC

Supershorts

wide Network. The network will connect to public networks through packet-switching systems provided by Northern Telecom, Inc. and Dynatech Packet Technology and is expected to be operating in certain locations in Asia, Europe and North and South America by mid-1984.

• • •

Sperry Corp. has signed an agreement with **Megatek Corp.**, which provides for the integration of Megatek's Template graphics software into Sperry application program products. Template supports both interactive and batch mode operations and over 100 output devices including raster and vector, low- and high-resolution and storage and refresh displays.

Sorbus, Inc. has begun selling a line of microcomputer software packages through its network of retail Sorbus Station computer support centers. Initially, Sorbus Stations in Chicago and Santa Ana, Calif., will offer 350 packages aimed at the business, home and educational markets from more than 50 manufacturers.

• • •

Three California newspaper organizations have formed a joint venture to operate a videotex service aimed at the state's agribusiness. The service, Grassroots California, joins **Videotex America**, a joint venture of Times Mirror Co. of Los Angeles and Infomart of Toronto; **McClatchy Newspapers**, publisher of *The Bee* newspapers in Sacramento, Fresno and Modesto, Calif.; and **TBS, Inc.**, publisher of the *Bakersfield Californian*.

• • •

Motorola, Inc. has decided to add an $18.5 million automated microchip assembly line at the company's East Kilbride, Scotland, facility to handle all production for Europe. The automated assembly unit is in addition to a $100 million investment to double capacity of wafer fabrication and test facilities currently under way at East Kilbride.

• • •

Eastman Kodak Co. and **Drivetec, Inc.**, San Jose, Calif., have announced a licensing agreement that permits Kodak to manufacture a high-capacity-flexible disk drive based on a Drivetec configuration for use with personal computers. The Kodak flexible disk drive should be available the first quarter of 1984.

• • •

Affiliates of **AT&T** and **GTE Telenet Communications Corp.** have joined the North American Telecommunications Association (Nata), the trade organization of competitive telecommunications equipment suppliers. The affiliates, AT&T Information Systems and GTE Network Systems, enter as associate members, a new membership category for telephone companies and their affiliates created by the Nata board of directors in July.

• • •

NCR Corp. and **Custom Silicon, Inc. (CSI)**, a Lowell, Mass., supplier of custom integrated circuits, have signed an agreement making CSI the exclusive design center for NCR's Microelectronics Division in the New England area. Under the agreement, CSI will provide engineering and marketing support for the development of custom integrated circuits that can be manufactured in NCR's fabrication facilities. CSI will utilize NCR's standard cell libraries as the design building blocks, as well as NCR's Semicustom Design System.

• • •

Unidata Systems, Inc. has closed its hardware division. The company is exploring merger and acquisition opportunities.

• • •

Marketing Information Systems is a new resource book from **International Information Management Congress (IMC)**. The book describes what is called an original and profitable concept in business information retrieval systems in which a system is designed and administered by the business itself. The book provides a model system for the reader that can be adopted in whole or in part. Orders for the book, IMC-134, which costs $39, should be sent to Subscription Sales, P.O. Box 34404, Bethesda, Md. 20817.

• • •

To foster the education of technical personnel seeking careers in computer-aided design, the **MIT Lowell Institute School (LIS)** and **Racal-Redac, Inc.** recently developed a joint education program that allows LIS students to attend classes at Racal-Redac's training facility in Westford, Mass. Each course will be taught by LIS faculty, who will be assisted by Racal-Redac training instructors.

'Gesundheit'

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Thursday, February 2, 1984
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Starting Your Own Retail Store
Franchise vs. Independent Operations
Retailers: Is Your Mix Mixed Up?
Save the Sale: Sell a Compatible
Promotions that Produce
Handling Your PC Customers: Sales, Support, and Service

User Sessions:

The Anatomy of the IBM PC
Defining Levels of Compatibility Between Systems
Overview of Compatibles: Desktops and Portables
Word Processing Software
Database Management Software
Business Graphics Software
Analyzing Your Software Requirements
Overview of Major Business Applications Software
A Look at Integrated Software: What's Out There?

Friday, February 3, 1984
Dealer Sessions:

Distribution Channels for the PC and Compatibles
Improving Retailer/Vendor Relationships
Problems and Pitfalls of Corporate Account Sales
Profits in the PC Aftermarket
Future Directions in Operating Systems
Survival Strategies for the IBM PC Marketplace

User Sessions:

Introduction to PC Communications
Micro to Micro Communications
Micro to Mainframe Communications
Word Processing Software (Repeat)
Database Management Software (Repeat)
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User Sessions: The PC in the Corporate Environment

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Nickels & Dimes

Apollo Computer, Inc. has reported 1983 third-quarter net income of $3 million, or 15 cents per share, compared with net income of $203,000, or one cent per share for the same period in 1982. Net sales for the first nine months were $52.9 million, compared with $10 million for the comparable period last year.

$ $ $

Lee Data Corp. has announced revenues of $22.6 million for the second quarter ended Sept. 30, an increase of 78% over last year's second quarter. Net income for the period rose 60% to $4.6 million.

$ $ $

Applied Data Research, Inc. has announced revenues for the first three months ended Sept. 30 of $24.8 million, up 48% from first-quarter 1983. Earnings per share were 60 cents, up 190% from 21 cents per share for the comparable period last year.

$ $ $

Communications Corp. of America has reported a net loss of $382,922, or nine cents per share on revenues of $16.3 million, for the first quarter ended Sept. 30, compared with net income of $410,204, or 13 cents per share, on revenues of $13 million for the comparable period last year.

$ $ $

Management Science America, Inc. has reported third-quarter revenues up 45% over the same period in 1982 to $30.2 million and a net loss of $350,000, or two cents per share. Revenues for the first nine months increased 46% to $87 million, while net income for the period increased to $574,000, or three cents per share, up from $262,000, or two cents per share.

$ $ $

Computervision Corp. has reported third-quarter revenues of $104 million, an increase of 31% over the comparable 1982 quarter. For the nine-month period, revenues increased by 18% to $288.4 million, and net income reached $24.9 million, or 87 cents per share.

$ $ $

Triad Systems Corp. has reported net sales and service revenues for the fiscal year ended Sept. 30 of $90.8 million, up from $82.3 million in 1982. Net income for the year was down to $2.2 million, or 29 cents per share, compared with $3.3 million, or 46 cents per share a year ago.

$ $ $

Computervision Corp. has reported that quarterly revenues exceeded $100 million for the first time in the company's history. Third-quarter revenues hit $104 million, up 31% over the comparable 1982 quarter. Net income was $9 million, or 32 cents per share. Revenues for the nine-month period increased 18% to $288.4 million, and net income reached $24.9 million, or 87 cents per share.

$ $ $

Scientific-Atlanta, Inc. has reported a 29% increase in first-quarter sales to $96.9 million and net earnings for $2.5 million, compared with sales of $75.3 million and a $6.1 million loss for first quarter last year.

$ $ $

Computer Automation, Inc. has reported revenues of $12.1 million and a net loss of $2.9 million, or $1.04 per share, for the first fiscal quarter ended Sept. 30.

$ $ $

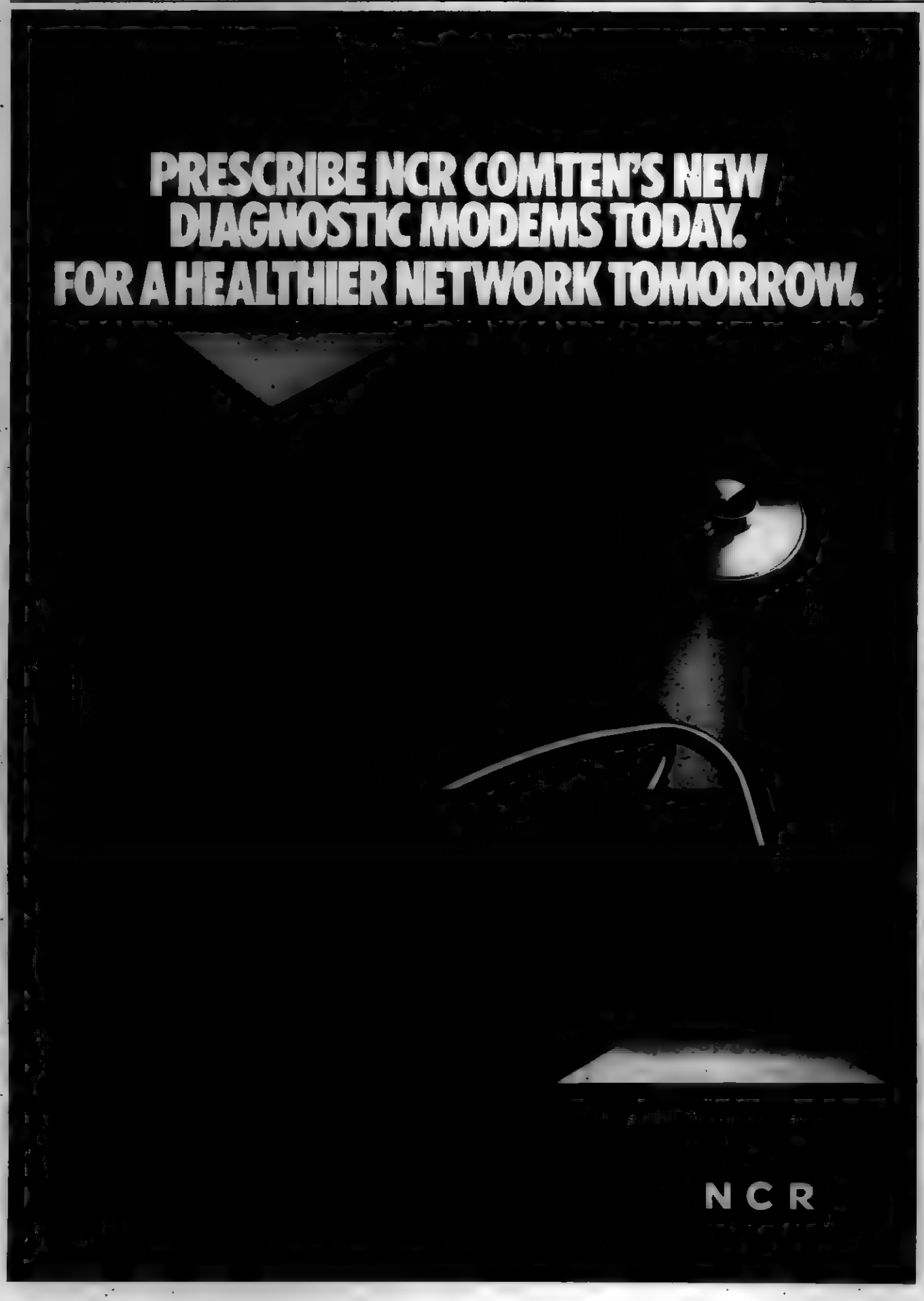
Cado Systems Corp. has reported third-quarter revenues of $13.5 million, up 42% from third quarter a year ago. Revenues for the nine-month period were $37.2 million, up 38% over the comparable period last year.

$ $ $

Convergent Technologies, Inc. has reported revenues for the first nine months ended Sept. 30 of $118.2 million, up from $54 million for the same period last year. Net income for the period was $11 million, or 30 cents per share, compared with $6.9 million, or 27 cents per share last year.

$ $ $

The Ultimate Corp. has reported second-quarter revenues of $15.7 million and net earnings of $2.2 million, increases of 66% and 104%, respectively, over second quarter last year.



POSITION ANNOUNCEMENTS

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c/o Computer Services Department
Central Washington University
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EEO/AA/Title IX Institution

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You will perform the strategic business related functions of data administration. Duties will include data analysis, modeling and planning to develop our corporate data architecture and data base migration plan.

Your background should include experience in system design and programming. You will need expertise in data analysis/modeling or data base design for transaction processing systems in a DBMS environment. Knowledge of banking applications is preferred.

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In this position you will identify violations of policies, standards and procedures related to data access and control. You will also design, implement and administer methods to control access to our computer resources.

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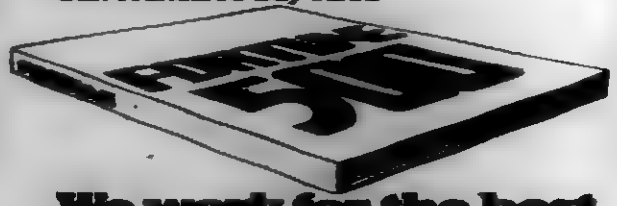

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To pursue these opportunities further, call or send your resume with salary history to:

Mr. Karl J. Dambsky
Director, Information Services

ENTRE

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(703) 560-6960

Sorry, no entry level positions are available at this time.

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Burns Brothers Inc. is a Portland, OR wholesale and retail firm dealing in auto automotive related businesses. We wish to present a rare opportunity to that individual who desires to work hard, learn a new programming language, work in a hands-on environment and who loves to program.

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Send resume or call:
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SYSTEM PROGRAMMER/COORDINATOR
Job Order No. 416758

Design, develop, and integrate overall two-level On-Line systems for inter-process asynchronous communication on DEC-2060 computer with ISI's SCOPE/AMU as data-base software to assist shipping automation requirements. Consult with system users and improve system operating efficiency. Have in depth knowledge of DEC20-Assembler/Macro, DBMS-SPSS interface, VRH-Q graphics, CBL-74 with DBMS Ada, ISAM/RMS file compose utilities, and TOPS-20 operating systems. Must have background in maritime shipping management and be familiar with DEC-2060's On-Line systems design and Datexam's TELEX operation. B.S. Degree in Computer Science & M.S. degree in Marine Science. 40 hrs/week, $22,500/year. CONTACT: La. Dept. Employment Security, 1991 Woodside Blvd., Baton Rouge, La., 70806.

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The successful candidate should have four or five years experience in the design and process of financial applications. Experience with the IBM System 38 preferred.

We offer a competitive salary commensurate with experience plus an excellent benefits package including paid relocation expenses.

For immediate consideration, please send resume including salary requirements to: Mr. D.A. Reed, Personnel Department, Inspiration Consolidated Copper Company, P.O. Box 4444, Claypool, AZ 85532.

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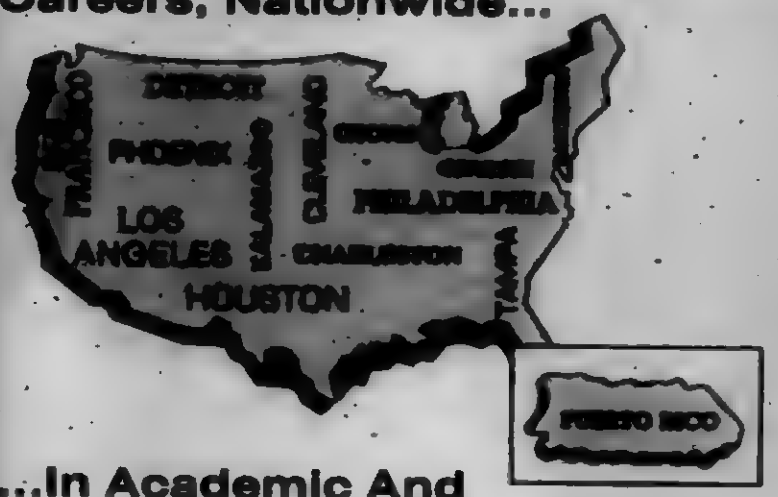

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- SYSTEMS PROGRAMMERS
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These positions are at many of our on-site locations across the U.S. and at our corporate headquarters. Make the choice that challenges! Send your resume, with salary history/requirements to: Manager, Corporate Recruiting, Dept. CW-25, SCT, Great Valley Corporate Center, 4 Country View Road, Malvern, PA 19355. An Equal Opportunity Employer, M/F.

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In this lead position, you'll need 10 or more years experience in the design of minicomputer based real time systems. Strong experience in either the PDP 11 Series computers, RSX 11M Operating System, Macro Assembly language or micro-based financial terminals and terminal networks is also required. Experience with communication protocols and "C" language is a plus.

Applications Programmer

You'll design systems and write programs for financial applications. To qualify, you must have 3-5 years experience in business applications, preferably financial (banking would be ideal), the ability to handle a DEC PDP 11 with RSX 11M Operating System, an understanding of Assembly language, and experience utilizing minicomputer assembler to design related software. You should currently be working in an on-line real time multi-tasking environment. Good documentation skills would be a plus.

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PROGRAMMER ANALYST TO: $30,000 3000 experience. CICS, MACRO. Will also require extensive user interface.

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(716) 328-0870

SYSTEMS ANALYST/ PROGRAMMER

Orlando area electronics manufacturing company is seeking a Systems Analyst/Programmer responsible for the planning and day-to-day supervision of the administrative data processing functions and computer operations

This position involves software updating, implementing new manufacturing and accounting applications assisting users in developing data processing goals and objectives programming in FORTRAN and/or COBOL, and coordinating efforts with vendors

A Bachelor's Degree in Computer Science and a minimum of 2 years experience with MRP systems is required FORTRAN programming experience is a must; HR 3000, ASK MANMAN systems and COBOL experience would be a plus

We offer a competitive starting salary commensurate with experience Company benefits are extensive including medical/dental/life and disability insurance, tuition reimbursement, and employee stock bonus plans This hands-on programming position offers an excellent opportunity for career development and advancement Interested applicants should call or send their resume to

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IDMS PROFESSIONALS

Florida Coast Location

Harris Government Systems Sector, a communications systems designer for a variety of government applications with over $1/2 billion in sales, 8,000 employees and a strong growth record seeks talented MIS personnel with experience in IDMS Data Base Management Systems.

PRINCIPAL SYSTEMS ANALYST - We seek an individual with experience in planning top-level information resource needs. Duties will include data resource planning, data base structure and network planning, development of data modeling methodology, and data dictionary administration. Qualified applicants will possess at least 8 years of experience, 4 of which should be in data base applications (preferably IDMS). IBM hardware and software technical background and good communication and management skills. A BS in Computer Science is required and an MS is preferred.

SENIOR SYSTEMS ANALYSTS - Duties include senior responsibility for large software development in an IBM MVS environment, the design of business information systems, and the determination of user requirements. Candidates should possess strong system analysis skills, solid data base knowledge (preferably IDMS), and knowledge of high level language such as FOCUS. A BS in Computer Science, strong technical and leadership skills and a minimum of 6 years experience are required.

We are part of the Harris Corporation, a Fortune 200 Company and Florida's largest industrial employer. Located in a Florida East Coast resort area, where you will earn nationally competitive income and excellent benefits while paying no state or local income taxes and enjoy the lower cost of Florida living.

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HARRIS

Director of Communications

To $45K to Start DOE

The City of Seattle seeks a creative, experienced individual to administer the Communications Division of the Department of Administrative Services. This Division is responsible for managing the City's telephone and radio systems and equipment, and for the development and implementation of plans for new or alternative systems. The City's existing telephone system includes a CENTREX installation with 3,900 lines and 5,500 stations, and over 400 private lines with related equipment. The City's annual costs for telephone services and equipment will be $3,000,000 in 1983.

The Director of Communications will be expected to play a leading role in the formulation of City plans and standards for telecommunications development which could include replacement of the existing CENTREX system. The Director will be assisted by a staff of 16 in managing, operating, and maintaining the City's telephone and radio equipment and systems.

The successful candidate for this position will have at least five years of management experience in a large organization, preferably in the area of communications. In evaluating applications, the selection committee will look for practical experience in the following areas:

- managing large telecommunications systems with a diverse user base.
- assisting users in defining telecommunications requirements and selecting solutions.
- project planning and scheduling.
- specifying new telecommunications equipment and systems, including PBXs, and evaluating bid proposals.
- managing the cutover to a new system.
- preparing operating and capital budgets.

The City provides a very attractive vacation and benefit package, including medical and dental coverage. As an equal opportunity employer, the City encourages applications from women and minorities.

Interested applicants are invited to submit a letter of application and resume including salary history by December 21, 1983 to:

City of Seattle ● Department of Administrative Services
Attn: Ms. Wahl Curtis 400 Yesler Building Seattle, Washington 98104

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CW-84384
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Box 880
Framingham, MA 01701

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Candidates must also possess (1) at least 5 years of experience in IBM DOS/US(E) operating systems, (2) at least 5 years experience in IBM DOS assembly language, (3) in depth knowledge of DASD management software and in particular the particular product in consideration.

Salary will be between $31,000 and $33,000 per year with full company benefits. Qualified candidates should send resumes in confidence to Job Service of Florida, 3421 Lawton Road, Orlando, FL 32803.

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Progressive IBM System 38 MOD 7 shop needs Programmer Analyst for current and future applications. Qualifications should include System 38 experience and proven track record. We provide a competitive salary and benefits package as well as career growth. If you're looking for an opportunity with a future send your resume in confidence to:

Wayne Berge
Mystic Color Lab
12 Roosevelt Ave.
Mystic, CT 06355

SYSTEMS ANALYST - 1 yr temp. project invlvg. new issue of policies, as well as financial aspects of entering deposits, payments & withdrawals. 3 yrs exp. or 3 yrs programming. Must have indepth knowl. CICS Command Level, VM/CMS & VSAM. $32,000 per yr. 40 hrs/5 days/wk. **Spindelle & Assoc., 1133 Ave. Americas, NY, NY 10036.**

SYSTEMS ANALYST

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GERMANY

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The candidate should have a thorough knowledge of Unix and Unix-tools with extensive experience in development of complex systems software.

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We offer challenging work in consulting and programming. Our salaries commensurate with experiences. Benefits include more than five weeks holidays P.A. We will give you any assistance for your move to Munich, a place where recreational activities are unlimited and the cultural and educational amenities are numerous. Basic knowlege in German is helpful.

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Dr. Coldewey
Daniel GmbH
GS-Muenchen
Peter-Anders-Strasse 3
D-8000 Muenchen 60
West Germany

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Qualified individual should submit resume, including salary requirements to:

NORDICA USA, INC.
Attention: John Fasshauer, D.P. Manager
6 Thompson Drive
Essex Junction, Vermont 05452

NO AGENCY RESUMES ACCEPTED

SYSTEMS ANALYST

We are looking for creative people with 1-2 years experience interfacing with various aspects of systems design and practical Business - Financial applications in a large complex manufacturing environment. Immediate consideration to MBA with 4 year undergrad degree in Computer Science or related field. Good interpersonal-/communication skills.

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Ulster reserves the right to extend the deadline. Ulster County Community College is an EO/Affirmative Action Employer.

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IBM 38

IBM System/38 Specialist needed to oversee and coordinate the implementation and modification of package software. An excellent working knowledge of the System/38 and RPG III are required. Call or write Babbitt Brothers Trading Company, Personnel Dept., P.O. Box 1328, Flagstaff, Arizona, 86002; (602) 774-8711, Ext. 209.

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The University of Maryland University College seeks computer science faculty to teach undergraduate courses on U.S. military bases in Europe or Asia. Ten-month renewable appointments are available beginning August 1984. Candidates should have work beyond a master's degree in computer science or a related field and one year's recent teaching experience. U.S. citizenship is required. Benefits include transportation, a currency adjustment allowance and military base privileges (PX, commissary, etc.). Frequent travel and the cost of schooling make these positions difficult for those with children. Send your resume to Dr. Paul N. Hinrichs, Overseas Programs, The University of Maryland University College, College Park, MD 20742. AA/EOE.

EASTERN

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Eastern Airlines is currently seeking programmers who have at least one year of IBM Assembler Language experience. Initially you will complete a training program in ACP/PARS for our reservations system. Programmers with BAL experience learn ACP/PARS quickly and look forward to a rewarding and successful career.

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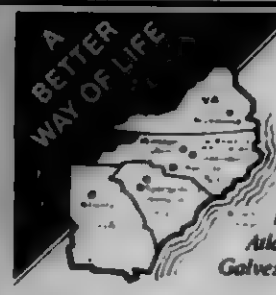

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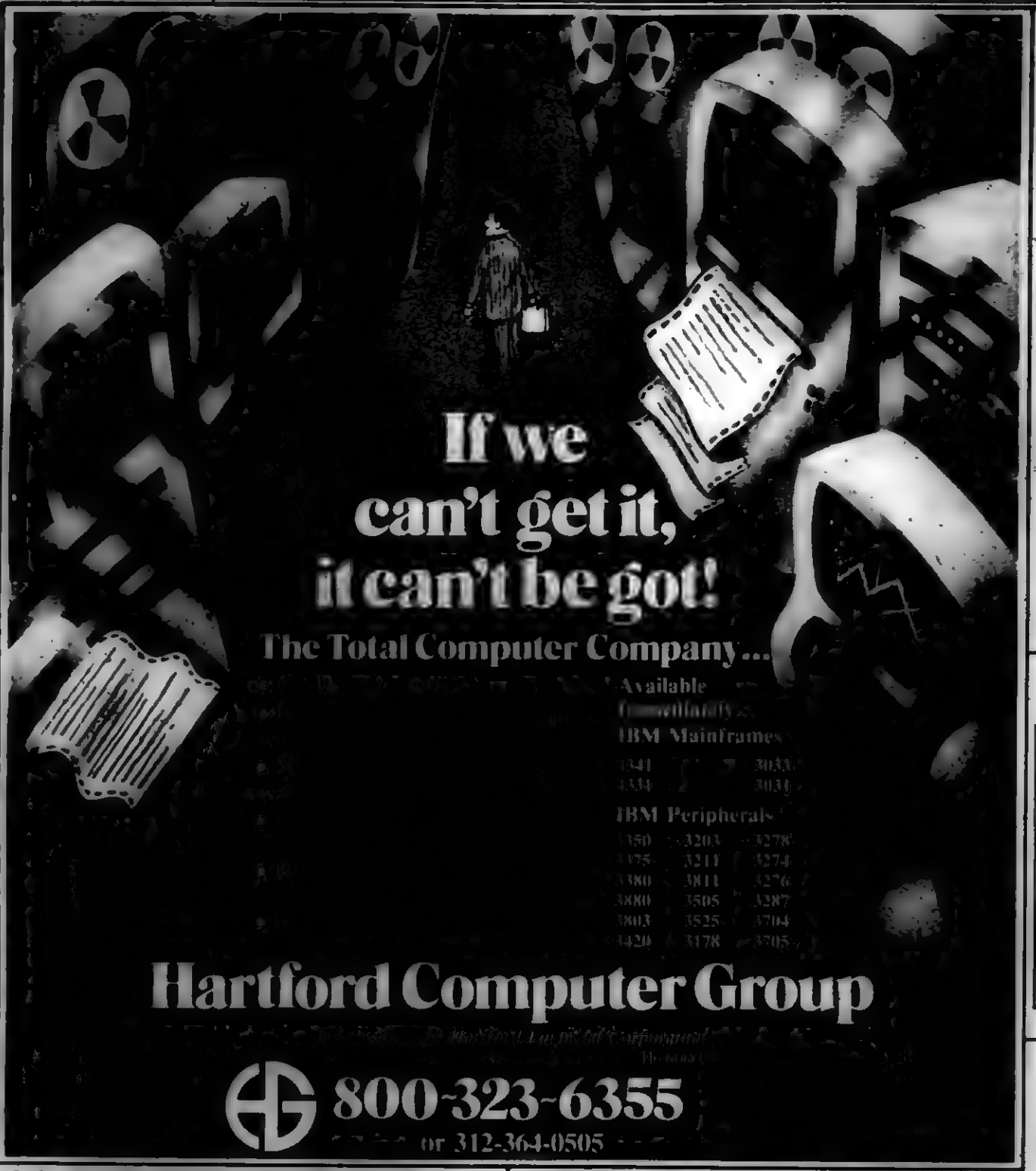

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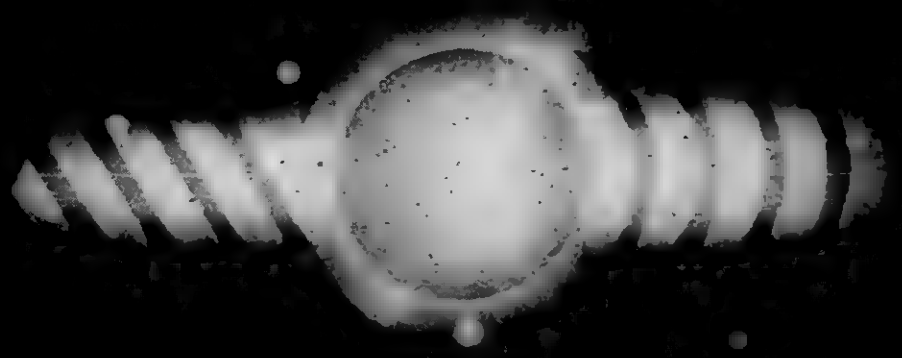

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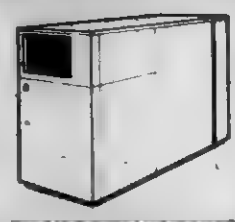

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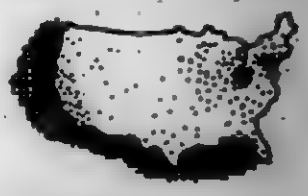

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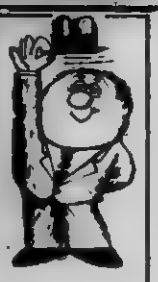

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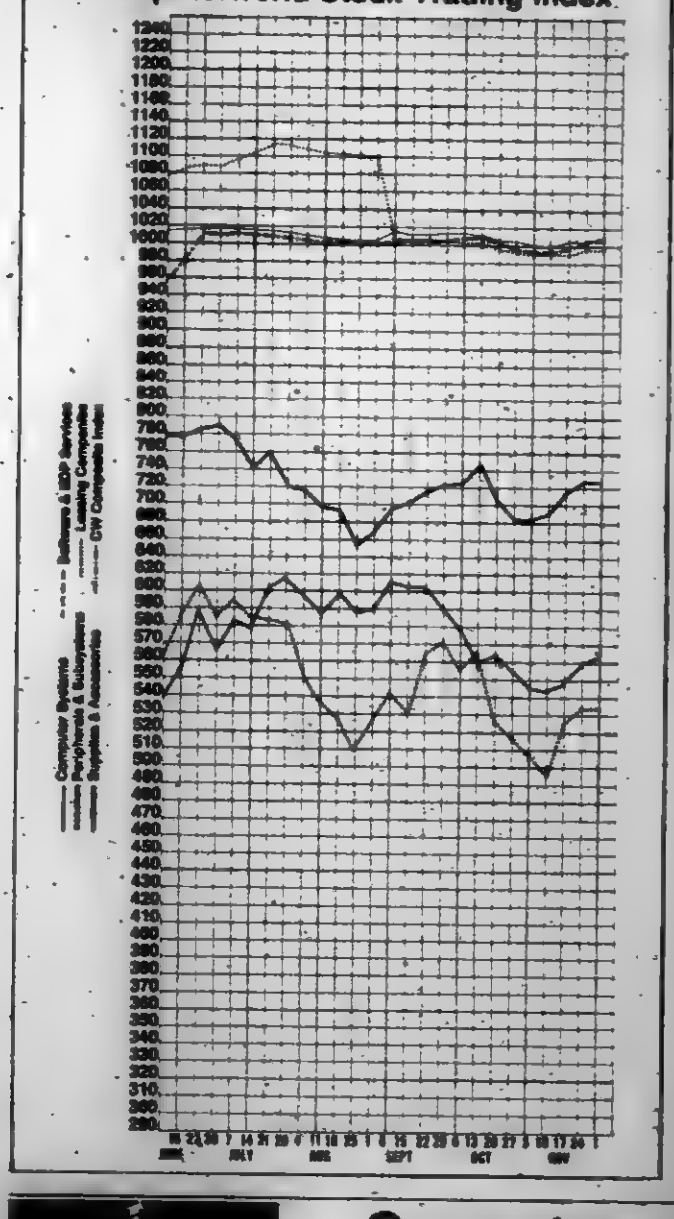

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CLOSING PRICES WEDNESDAY, NOVEMBER 30, 1983

All statistics compiled, compound and formulated by TRADE QUOTES INC Cambridge Mass. 02139

		1982-83 RANGE (1)	CLOSE NOV 30 1983	WEEK NET CHANGE	WEEK PCT CHANGE
COMPUTER SYSTEMS					
B	ALPHA MICROSYST 1	11- 24	14 1/2	+ 1/2	+3.6
B	ALTOS COMPUTER SYST	9- 28	8 3/4	- 1/8	-1.4
A	ARGAAL CORP	9- 30	28 1/4	-1 3/8	-7.0
B	APPLE COMPUTER INC	19- 63	39 3/8	-1 3/8	-3.2
A	AT&T	69- 78	78	- 1/2	-0.7
B	BARROUGHS CORP	69- 98	97 3/8	-1 3/8	-1.0
B	COMPUTER AUTOMATION	9- 17	9 1/2	0	0.0
A	COMPUTER CONSOLES	9- 28	23 5/8	+3	+14.6
B	CONTROL DATA CORP	21- 82	44 1/4	+ 1/8	+0.3
B	CONNERGENT TECHNOL	15- 61	23 1/8	- 7/8	-3.6
N	CRAY RESEARCH INC	29- 97	34 3/8	-1 5/8	-3.9
B	DATA GENERAL CORP	19- 51	34 7/8	-1 3/8	-3.8
B	DATAPOINT CORP	11- 38	28 7/8	- 3/8	-1.3
B	DIGITAL EQUIPMENT	62-132	88 3/8	-3 1/4	-3.5
A	DECCO INC	9- 16	13 7/8	- 1/8	-0.8
B	ELECTRONIC ASSOC.	9- 15	9 3/8	0	0.0
B	FLOATING POINT SYST	19- 64	39	+2 1/2	+3.8
B	FORDATA	23- 47	37	+1 5/8	+4.6
B	GENERAL AUTOMATION	3- 16	11 1/8	+ 1/8	+1.1
B	GRID INC	19- 44	28 1/4	-2 1/8	-6.8
N	HARRIS CORP	29- 81	48 3/4	+1 7/8	+4.0
N	HEWLETT-PACKARD CO	38- 49	38 3/4	+1	+2.6
N	HONEYWELL INC	69-138	134	- 1/4	-0.1
N	IBM	97-134	117 3/8	-3 3/8	-2.8
B	IPL SYSTEMS INC	9- 14	7	- 1/2	-7.0
B	IVA-CON INC	21- 38	21 5/8	-1 1/2	-6.5
B	HARRISON COMP SYSTM	7- 9	3/8	0	0.0
B	MANAGEMENT ASSIST	7- 15	11 1/2	+1	+9.7
B	MATSUSHITA ELECT(ADR)	47- 70	77 5/8	+1 7/8	+2.4
B	MODULAR COMPUTER SYS	9- 18	9 3/8	+ 1/2	+5.3
B	NEWMAN DATA SCI	10- 38	16 1/2	+ 3/4	+4.8
N	MOTOROLA INC	82-148	141	+2 1/4	+1.6
N	NAT'L SEMICONDUCTOR	9- 30	18 3/8	- 3/4	-4.4
N	NCR	38-128	124 1/8	- 3/8	-1.0
B	PERKIN-ELMER	17- 37	28 1/8	-1 3/8	-4.6
N	PRIME COMPUTER INC	11- 36	15 3/8	- 3/4	-4.9
N	SPERRY CORP	23- 42	42 3/8	+ 3/8	+0.1
B	TANDEM COMPUTERS INC	14- 48	28 1/4	-1 1/2	-5.5
B	TRIDT CORP	24- 68	38 3/8	+2 1/8	+5.9
B	TELEVIDEO SYSTEMS	14- 44	38 1/8	+ 1/4	+1.2
N	TEXAS INSTRUMENTS	71-176	134	+ 3/4	+0.6
B	VECTOR GRAPHICS INC	3- 14	2 5/8	+ 1/4	+10.5
A	WANG LABS "B"	13- 46	28 1/8	- 1/2	-1.4
A	WANG LABS "C"	17- 46	33 3/4	- 3/8	-1.6
B	XEROX CORP	38- 86	68 1/2	+ 7/8	+1.9
LEASING COMPANIES					
B	AMERICAN FINANCIAL CP	11- 28	21 1/2	- 3/4	-3.3
B	CENTISCO INC	7- 16	12 3/4	0	0.0
B	CONTINENTAL INFO SYS	7- 24	22 1/2	+ 1/4	+1.1
B	DPF INC	7- 25	22 1/2	+ 3/4	+3.7
B	U.S. LEASING	19- 47	32 1/2	+ 3/4	+2.3
COMPONENTS					
B	ADVANCED MICRO DEV	13- 38	36	+1	+2.9
B	ADV'D SEMICONDUCTOR	11- 38	28 1/4	+ 3/4	+2.1
B	ANALOG DEVICES INC	23- 42	41 5/8	+ 3/4	+1.8
B	ANALOGIC CORP	9- 17	9	-1	-10.0
B	APPLIED MAGNETICS CP	19- 57	48 3/4	-4 1/8	-7.8
B	TOMAHYNE	14- 32	28 1/4	-1 1/2	-4.8

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		1982-83 RANGE (1)	CLOSE NOV 30 1983	WEEK NET CHANGE	WEEK PCT CHANGE
SOFTWARE & EDP SERVICES					
B	ADVANCED COMP TECH	1- 8	3	0	0.0
O	ADVANCED SYSTEMS INC	9- 22	16 1/2	+1 3/4	+8.8
B	AGS COMPUTERS INC	7- 32	28 1/4	+1 1/4	+4.6
O	AMERICAN SOFTWARE	23- 31	31	- 3/8	-1.2
N	AMACOMP INC	9- 33	9	- 1/8	-1.9
B	ANALYSTS INTL CORP	9- 20	12	- 1/2	-11.1
B	APPLIED DATA RESL	9- 37	36 3/8	- 1/8	-0.3
B	ASK COMPUTER SYSTEMS	9- 30	19	- 1/8	+1.3
B	ASTRASYNE CORP INC	1- 7	6 5/8	- 1/8	-1.8
N	AUTOMATIC DATA PROC	21- 64	56 3/8	+ 3/8	+1.0
O	CDA COMPUTER ASSOC	9- 17	14 7/8	+1 1/8	+8.1
O	COMPUTER ASSOC INT'L	9- 28	28 1/2	- 1/2	-10.4
O	COMPUTER HORIZONS	9- 28	12 1/4	0	0.0
O	COMPUTER NETWORK	9- 13	9 5/8	+ 1/8	+1.3
B	COMPUTER SCIENCES	11- 33	32	+1 1/8	+3.6
B	COMPUTER TASK GROUP	9- 22	15 1/2	+1 1/8	+8.1
O	COMPUTER UNDER	3- 22	13	+1 1/8	+9.7
B	COMPUTERS SYSTEMS	9- 28	7 3/4	+1 3/8	+22.2
B	CONNERY CORP	7- 28	8 3/4	+1 3/8	+21.7
B	CONNMARK	7- 13	10 7/8	+ 1/8	+1.1
B	CULLINET SOFTWARE	17- 38	43	- 3/8	-0.8
B	CYCARE SYSTEMS INC	9- 27	17 3/4	+ 1/4	+1.4
B	ELECTRONIC DATA SYST	19- 42	38 1/4	-1 1/4	-3.1
B	HORAN SYSTEM INC	27- 43	38 1/4	- 3/4	-1.9
B	GENERAL ELECTRIC CO	69- 98	97 1/8	+1 1/8	+1.2
B	GTE CORP	38- 56	56 1/8	+ 1/2	+1.0
B	INFOGRAFIX INC	15- 36	28 3/4	+ 3/4	+2.7
B	INFOTRON SYSTEMS CORP	19- 43	28 1/2	+1 3/4	+6.5
B	KEANE ASSOCIATED	9- 18	9 3/4	- 1/2	-4.9
B	LOGICON	9- 32	30 3/8	- 1/8	-1.2
B	MCI COMMUNICATIONS	13- 38	16 1/4	+1 1/8	+7.4
B	MOST SCI AMER INC	13- 38	28 7/8	+1 1/8	+4.0
B	MATHEMATICAL APP GRP	19- 32	19 1/2	+ 1/2	+2.6
B	MICOM SYSTEMS INC	9- 28	14 1/2	+ 3/4	-1.8
B	MORROW-MERGED CP	9- 22	9 3/4	+ 1/2	+4.8
B	NATIONAL DATA CORP	9- 22	21	+1 1/8	+5.3
B	ON-LINE SOFTWARE INT	17- 37	22	+1 1/2	+12.8
B	OMNITECHNIC SYSTEMS	9- 22	21 1/8	+1 1/8	+5.3
B	PLANNING RESEARCH	9- 21	17 3/8	+ 3/8	+2.2
B	POLICY MGMT SYSTS CP	19- 38	38 7/8	-1 3/8	-4.3
B	PERKINSELMER & SYS	11- 8	8 3/8	0	0.0
B	REYNOLDS & REYNOLD	11- 28	28 1/2	- 1/2	-1.8
B	REI CORP	11- 36	36 1/2	+ 3/4	+2.1
B	SHARED MEDICAL SYST	19- 43	37 3/8	- 5/8	-1.6
B	SCIENTIFIC COMPUTERS	7- 11	11	- 1/8	-1.7
B	SOFTWARE AG	9- 17	12 3/8	+1 1/8	+10.2
B	TYMSHARE INC	19- 37	37 3/8	+1 1/8	+4.2
B	UAS CORP	9- 17	12 3/8	+1 1/8	+10.0
B	WYLY CORP	7- 17	11 1/8	+ 1/8	+1.1
VEHICLES & SERVICES					
B	AM INTERNATIONAL	9- 7	4 1/8	- 1/8	-10.0
A	ANDERSON JACOBSON	9- 28	10 1/8	- 3/8	-3.6
B	AUTO-TRAIN TECHNOLOGY	9- 28	11 1/8	+ 3/8	+1.7
B	BASCTEC INC	7- 28	13 1/4	- 1/2	-3.1
B	BUSINESS INT'L	9- 11	9 3/8	- 3/8	-10.0
B	COLT INDUSTRIES & NEW	9- 28	28 1/2	-2 1/8	-6.8
B	COMMODORE CORP	9- 9	9	0	0.0
B	CENTRONICS DATA CORP	9- 28	10 3/8	+1 3/8	+16.3
B	CETEC CORP	9- 28	10 1/8	+ 1/8	+1.3
B	COMMTRONICS	7- 28	8 3/8	+ 1/8	+2.8

		1982-83 RANGE (1)	CLOSE NOV 30 1983	WEEK NET CHANGE	WEEK PCT CHANGE
B	COMPUTER DEVICES INC	1-.23	1	+ 1/8	+14.2
B	COMPUTER TRANSCEIVER	9- 12	9 1/8	- 3/4	-15.3
N	COMPUTERVISION CORP	19- 33	44	+2 1/8	+5.0
B	COMMAC CORP	17- 38	18 1/2	- 7/8	-4.5
B	DATAPRODUCTS CORP	19- 41	19 1/2	+ 1/8	+0.6
B	DATAPOINT CORP	19- 41	19 3/8	+ 1/8	+0.6
B	DATA SWITCH CORP	19- 41	19	- 1/8	+0.6
B	DELTA DATA CONTROL	7- 14	7 1/8	- 1/8	+1.7
B	DECUTEL-OLIVETTI	11- 38	1 1/8	+ 3/8	+2.8
B	ELECTRONIC M A A	9- 11	9	+ 3/8	+4.3
B	EVANS & SUTHERLAND	9- 28	28 3/8	+ 1/8	+0.4
B	GENERAL TECHNOLOGIES	9- 28	28 3/8	+ 1/8	+0.4
B	HEN'L DATA CORP IND	9- 28	28 3/8	+ 1/8	+0.4
B	GREAT SOUTHWEST IND	9- 28	9	0	0.0
B	GUILLOTINE CORP	9- 28	28 3/8	+ 1/8	+0.4
B	ICOT CORP	9- 28	4 1/8	- 1/8	-2.9
B	INFORMATION INTL INC	19- 28	4 1/8	- 1/8	-2.9
B	INTEL CORP	11- 48	41 3/4	-1	-2.3
B	IPL SYSTEMS INC	9- 14	7	+ 1/2	+7.6
B	LANDY ELECTRONICS	9- 11	9 1/8	+ 3/8	+4.3
B	NEBRASKA CORP	9- 28	12 1/8	+ 1/8	+1.0
B	NBI DATA CORP	9- 28	28 1/8	+ 1/8	+1.0
B	NANDA CORP	9- 28	28	- 3/8	-1.3
B	NETHORK SYSTEMS CORP	9- 28	28 1/2	- 1/2	-1.7
B	NS AMERICAN PHILIPS	19- 38	37 3/8	+ 1/8	+1.0
B	NORTHERN TELECOM LTD	19- 48	48 1/8	+ 7/8	+1.8
B	OMEN	9- 9	9	0	0.0
B	PANAVINE CORP	9- 28	28 1/8	+ 3/8	+1.3
B	PENRIL CORP	7- 14	11 1/8	+ 1/8	+0.7
B	PERKIN AMERICAN INC	7- 11	11	0	0.0
B	PLESSEY CO (ADR)	19- 41	41	+1	+2.5
B	PRINTRONIX INC	19- 41	28	- 0	0.0
B	QANTEC CORP	9- 28	9	0	0.0
B	RAYTHEON CO	42- 68	68 3/4	-1 1/8	-1.6
B	RECOGNITION EQUIP	9- 17	12 3/4	+ 1/4	+1.0
B	RELM CORP	9- 17	11 1/2	+ 3/8	+3.4
B	SANDERS ASSOCIATES	19- 28	28	+ 3/8	+1.3
B	SCAN DATA	1- 1	3/8	0	0.0
B	SCAN-TRON CORP	19- 28	28	+1 1/8	+4.4
N	SCIENTIFIC ATLANTA	19- 28	28	- 1/8	-1.3
B	STEINMAN TECHNOLOGY	19- 28	15 1/8	- 1/4	-1.6
B	SYKES DATATRONICS	9- 28	9	+ 7/8	+1.4
B	SYSTEMS & COMP TECH	19- 28	28 1/2	+1	+3.6
B	T BAR INC	1- 11	10 3/8	0	0.0
B	TAB PRODUCTS CO	19- 28	28	+ 1/8	+0.4
B	TANDON CORP	9- 28	21	-1 3/8	-7.6
B	TEC INC	9- 28	9	+ 3/8	+4.3
B	TELTRONICS INC	19- 28	28	- 1/8	-0.4
B	TELEX	19- 28	28 1/8	- 3/8	-1.3
B	TERMATA SYSTEMS CP	9- 17	12 3/8	+ 3/8	+3.1
B	TIMEPLEX INC	9- 28	28 1/8	- 3/8	-1.3
B	VISUAL TECHNOLOGY	9- 28	28 3/8	+1	+3.6
SUPPLIES & ACCESSORIES					
B	AMERICAN DAS PRNTR	11- 28	28 1/8	+2 3/8	+9.2
B	DANDY ARTIST	9- 28	28	0	0.0
B	DUPLEX PRODUCTS INC	19- 28	28 3/8	- 3/8	-1.3
B	GRAFIX SUB. PRNTR	9- 28	28	- 3/8	-1.3
B	3M COMPANY	19- 28	28 1/8	- 3/8	-1.3
B	HOUSE CORP LTD	19- 28	28 1/8	- 3/8	-1.3
B	STENOMARK COMPUTER	11- 28	28 1/8	- 3/8	-1.3
B	WALLACE BUS FORMS	11- 28	28 1/8	- 3/8	-1.3

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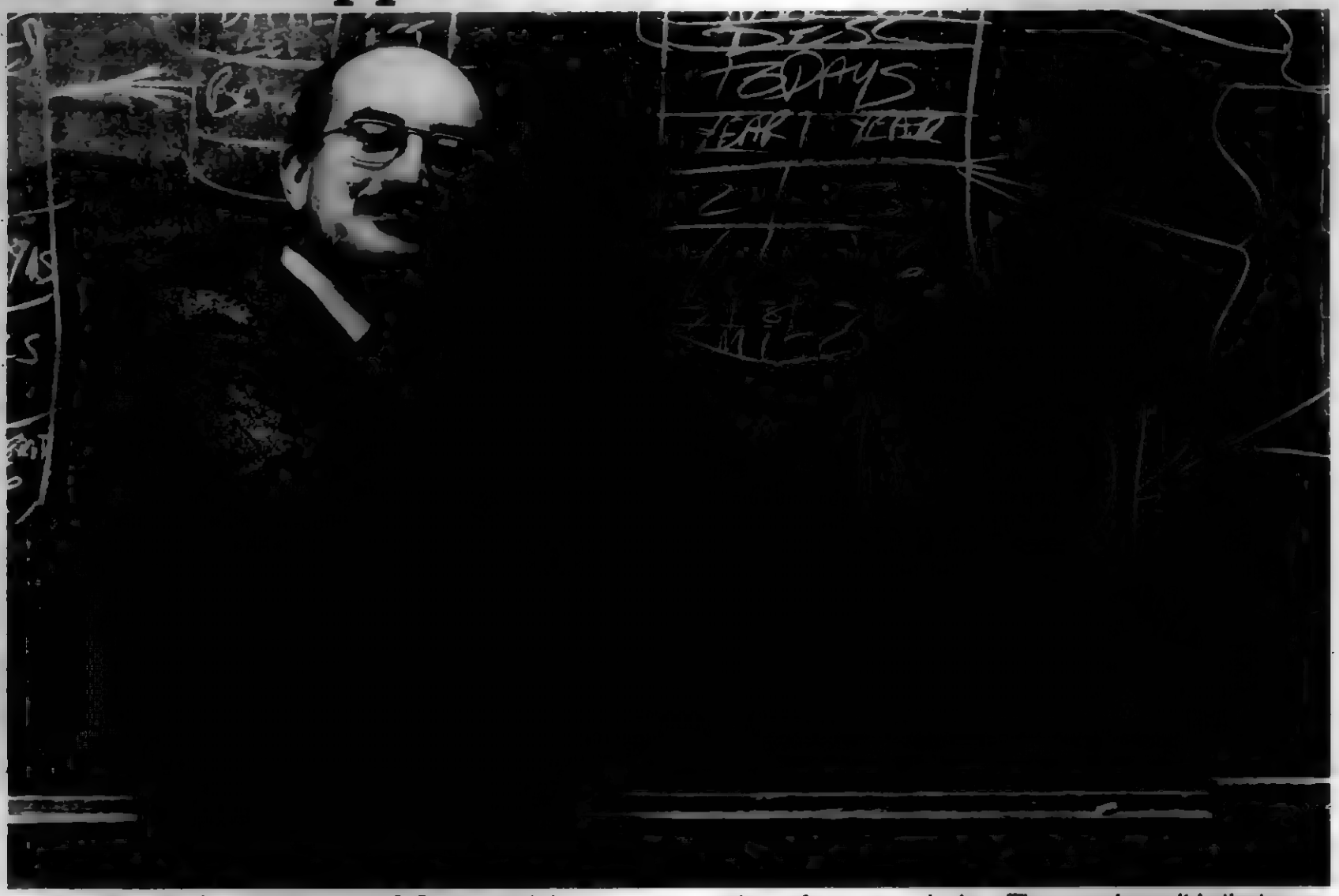

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VOL 17
ISSUE 49 A
DE 7 1983
UMI

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OFFICE AUTOMATION

COMMUNICATIONS

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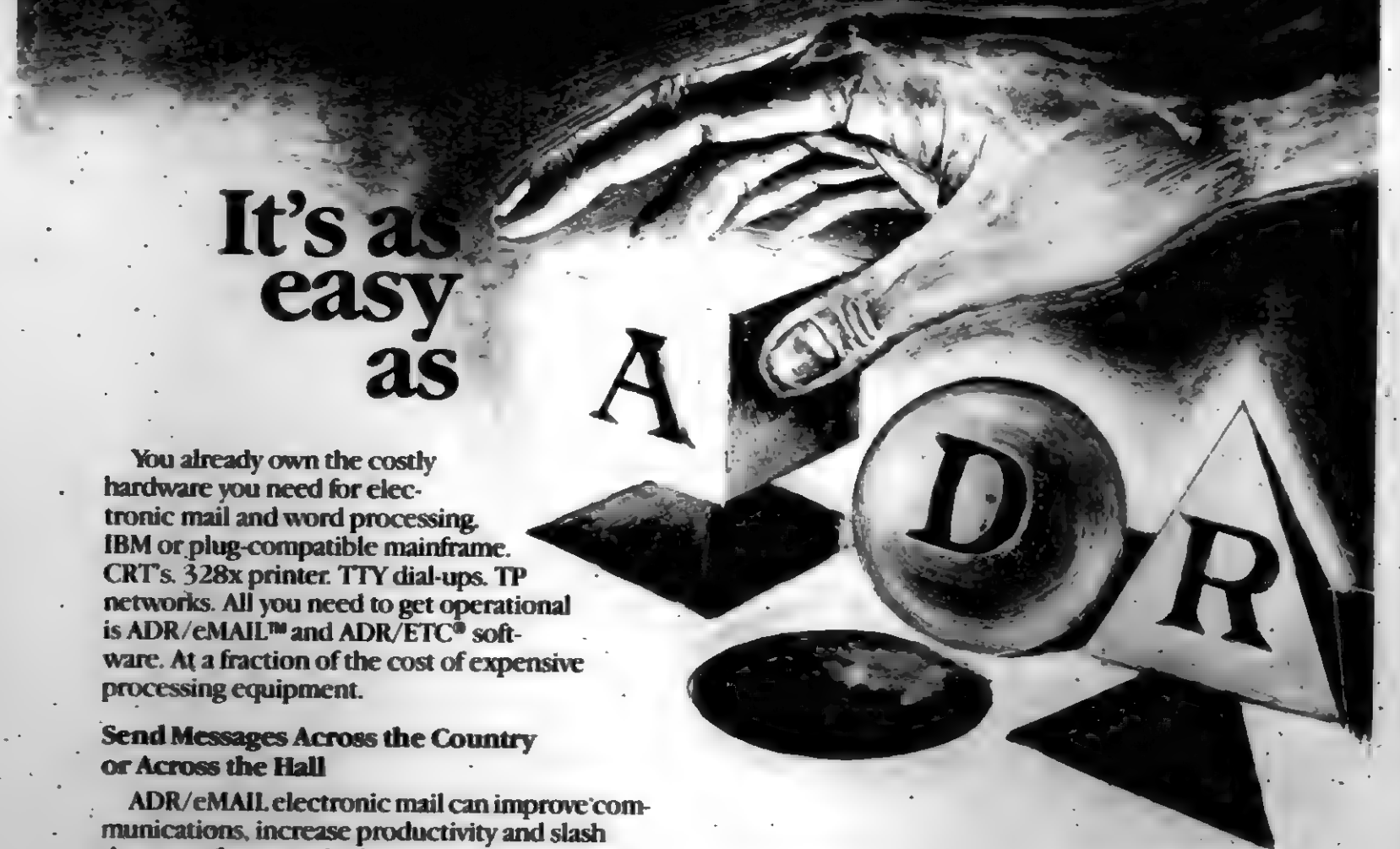

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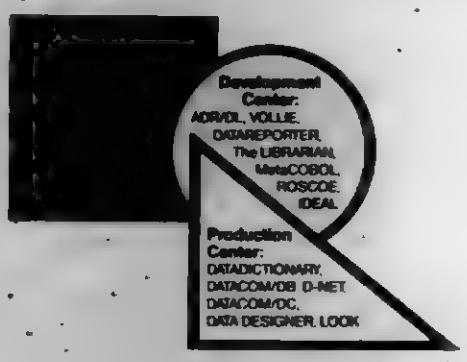

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Communications is a catalyst for the integrated office. Capabilities are developing rapidly, and users need to stay on top of the issues and technologies. (Photo © 1983 George Dilloo)

COMPUTERWORLD

OA

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Second-class postage paid at Framingham, Mass., and additional mailing offices PN127420. *Computerworld* (ISSN-0010-4841) is published weekly, except, February (5 issues), April (5 issues), May (5 issues), June (5 issues), August (7 issues), September (5 issues), October (7 issues), November (5 issues), December (5 issues) and a single combined issue for the last week in December and the first week in January by CW Communications/Inc., Box 880, 375 Cochituate Road, Framingham, Mass 01701.

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Computerworld subscription prices: $1.50 a copy; U.S. — $44 a year; Canada, Central & So. America — $110 a year; Europe — $165 a year, all other countries — $245 a year (airmail service). *Computerworld OA* prices: $5.00 a copy; $12.00 a year. Four weeks notice is required for change of address. Please allow six weeks for new subscription service to begin.

Computerworld can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106 Phone: (313) 761-4700. *Computerworld* is indexed; write to Circulation Dept. for subscription information.

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COMMENT

Nobody ever said it would be easy. But why does it have to be so hard? And when it comes to putting together an integrated communications system, it doesn't seem as though it's going to get any simpler, either. The number of choices in communications technologies is resulting in advanced office systems being developed on a piecemeal basis. An integrated system is critical, but because the best technology for interconnecting the office has yet to appear, that system is nearly impossible to achieve today.

The current state of communications is at best confusing and at worst a disaster waiting to happen. The controversy over baseband and broadband has subsided, only to be replaced by a discussion over whether the preferred option is the PBX, the local-area network or a combination of the two. Voice and data are only beginning to be merged, and we won't see a workable answer to that for some time. Satellite technology, wide-band networks and gateways have not yet stood the test of time by achieving wide user acceptance and usage.

In addition, the AT&T breakup has plunged both vendors and users into a quandary. All are waiting to see what will happen when the split between AT&T and the operating companies is complete.

Another aspect of the communications dilemma is a result of the personal computer explosion. Although personal computers started out as standalone devices, users very quickly sounded the cry for communications capabilities to the mainframe data base. Satisfying this demand will require careful planning, and the answer to the micro-mainframe link (even with IBM's recent announcement) is not yet completely satisfactory.

Even standards are not the communications Messiahs some people want them to be. Even after they have been agreed upon and accepted, standards alone cannot be expected to be complete solutions to the diverse communications problems that are so often specific to an individual company.

No one strategy will integrate the various communications devices and networks. Once again, it is up to users to make do. The best strategy for users today is to plan very carefully for an open systems architecture to facilitate all their communications needs — both the known quantities of today and the unknown and not-yet-thought-of business and communications needs of tomorrow.

Hopefully, this flexibility will enable them to adapt when communications technologies do mature.

FORUM

By Karen Rancourt

A new burden has been placed on DP personnel. Many non-DPers assume that, because DPers work with computers, most if not all of them must be office automation experts.

Many of my conversations begin like this: "So, how's it going with OA?" The middle part of this exchange has some variations, but, finally, at some point the other person in this conversation will blurt out — always in exasperation — "Exactly what the hell is office automation?"

Their relief becomes apparent when my initial response underscores the fact that there is no one universally accepted definition of OA and there probably never will be. Talk to an OA vendor and OA is that company's product line. Ask a financial analyst, and OA is a user-friendly electronic spreadsheet. Ask a salesperson and OA is the fastest way to book an order. It all depends on who's answering the question.

Nevertheless, the most important point to be made about OA is that while it does include hardware, software, technology and tools, it is more than that. OA must be viewed as a process, an activity, if its true potential is to be realized. For example, if you were on a business trip (an activity, yes?) and you were asked how your trip was, it would be a narrow response if you focused on the plane you took, the car you rented and the subways you used to get around the city. This tells us something about how you traveled, but it tells us nothing about why you were traveling and what you hoped to accomplish.

Many attempts at understanding OA have a similar limitation; we talk about how we're going to do something faster and more efficiently and we stop there.

At some point we need to consider not those information processing tasks that can be automated, but why we are doing them in the first place. In other words, what is the business of your office? Why does someone continue to keep you on the payroll? What do you need to do to have your senior management look at your accomplishments and say, "You Have Been Successful."

Increasing the number of memos created from six to 10 is probably not going to get you kudos from senior management, but pinpointing bottlenecks in your information processing and doing

STANLEY

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FORUM

something that increases your effectiveness probably will.

In any discussion on OA, it is important to note the differences between efficiency and effectiveness. If you are cranking out irrelevant paperwork, OA can probably help you crank it out in less time than it is presently taking you. But who wants to be remembered for being efficiently ineffective? Definitely not good epitaph material.

It is obvious that OA's greatest potential should be in increasing our business effectiveness. When we have figured out what we need to do, then it makes sense to concentrate on improving how we do it. Office automation has stemmed from interchanging and reversing these priorities — trying to improve efficiency before defining exactly what has to happen to make us effective businesspeople.

In addition, a third factor, prodages OA as a process, an activity; this emphasis is important because it immediately removes the typical tendency of the initiated to equate OA exclusively with hardware and software.

This working definition views OA as a nonstatic process. This is significant because it points out that OA must be flexible — always subject to modification and enhancement as the interplay changes between people, organizations, technologies and tools.

In short, once a commitment is made to explore OA possibilities, the commitment and resulting decisions must be periodically revisited.

All too often, attempts are made to force-fit people and their organizations with available technologies and tools. This happens because a basic and important underlying principle is either misunderstood or ignored.

It is too convenient to say

Many of my conversations begin, "So, how's it going with OA?" Finally, at some point the other person in this conversation will blurt out — always in exasperation — "Exactly what the hell is office automation?"

ductivity, needs to be considered also. Beware of anyone who guarantees that "OA is going to increase your productivity." There is a raging, polarized battle taking place about this issue of OA and productivity. One camp takes the position that "if it can be done, it can be measured." Another takes the position that creating, massaging and interpreting data and information require skills that are difficult, if not impossible, to assess in terms of productivity.

It is easy to see the merits of both positions. Traditional approaches to productivity (especially those developed with regard to manufactured products) that establish baselines and I/O ratios are not easily transferred into information processing arenas. Yet, if something is a bona fide accomplishment with a stated beginning and ending, there should be some methodology for measuring it.

It is safe to say that newer and more appropriate ways of defining and measuring knowledge productivity will eventually emerge and make the above dichotomy unnecessary. In the interim, participants in this type of discussion might want to acknowledge the complexity of the productivity-office automation issues and let it go at that.

How, then, can you define OA? A definition that has worked well for me is: "Office automation is an ongoing dynamic process comprised of people, organizations, technologies and tools, interrelated to meet business goals and objectives."

This definition is appropriate for many reasons. First, it packwork." People do not resist change for the sake of resisting change; they resist change when they do not understand why it is being introduced or what its benefits are supposed to be. If the change being introduced is not understood by those it will affect, morale and productivity can plummet and attempts will be made to make it appear as if the change itself is at fault. In reality, it is the process used to make the change which is preventing successful integration.

It is amazing how obvious the importance of this dictum is and how decision makers continue to violate it. Stated simply, all OA explorations and decisions should involve the people OA will ultimately affect.

Finally, our definition requires a constant tie-in with the business goals and objectives for which a group or organization are accountable. OA decisions are dependent upon these business goals and must reflect procedural or action steps taken to help reach them.

In other words, the stated business goals and objectives of a group or organization address what needs to be accomplished. The office automation process can help address how to accomplish them. OA

Rancourt, who holds a Ph.D., works for Wang Laboratories, Inc. She is presently establishing an OA resource center for the international management information systems group.

LETTERS

Ecom: Yes, But . . .

The generally laudable content of *Computerworld OA*'s article on the Postal Service's Electronic Computer Originated Mail service ("Ecom — How Special the Delivery?" August 1983) is diluted by a series of inaccuracies. We would like to clarify those inaccuracies in order to guard against a common problem that has plagued our Ecom system — the recycling of misinformation about Ecom, its evolution and its posturing by the Postal Service.

Early on, the article states the "initial motivation" for Ecom "sprang from a general dissatisfaction of the U.S. Postal Service." In truth, Ecom arose from the Postal Service's mandate to use the best available technology for the efficient transportation of the mails. The commitment to this mandate has helped the Postal Service achieve a high level of satisfaction rating in a recent Roper poll. (A far cry from the author's claims of general dissatisfaction.)

The assertion that Ecom emerged as a result of "extensive study done for the post office by RCA" is a misinterpretation of what those studies were designed to accomplish. RCA's studies related to an Electronic Mail Message System, which was dropped after the RCA studies and which bore little resemblence to the present Ecom system.

The article also asserted that the Postal Service has operated in the red since 1945; in fact, in fiscal years 1979, 1982 and 1983, the Postal Service recorded surpluses. In the past six years of operations, the Postal Service's surplus years have almost exactly offset its deficit years in the period. In effect, the service has broken even.

The article suggests a "fully mature" Ecom system will handle 25 billion to 50 billion pieces of mail annually. The Postal Service estimates that 500 million pieces of first-class mail now have the potential to be transported via telecommunications and Ecom. Although we expect some very healthy growth in the future, we do not anticipate growth to the range of 25 billion to 50 billion pieces. Those numbers are higher than any known current estimate.

The explanation of the "USPS processing station" — what we call a Serving Post Office — arbitrarily assigns the functions of the private sector carriers to Ecom operations. It is, in fact, Ecom carriers certified to input Ecom messages to our 25 Serving Post Offices who handle "a variety of magnetic tape, floppy diskettes . . . (or) hard-copy information . . . hand carried to their site for input."

The Postal Service's role is no more than to receive the electronic transmissions of the carriers, convert the impulses into hardcopy messages and automatically insert them into envelopes for delivery as first-class mail within two working days if received before midnight — not 5:00 p.m.

The most serious error of substance occurred when the author reported that "Serving Post Offices communicate the electronic mail to other processing stations through a combination of satellite and Bell Digital Data Service links." The Postal Service has *absolutely no electronic linkage* for message transmission between its Serving Post Offices. Moreover, we have no development programs under way.

There is a subsequent statement regarding what the author claims is a "rigorous certification process." This might have been true initially, but for the past year, certification procedures and requirements have been greatly simplified, including eliminating the requirement for users to test in all three formats. A potential user need only transmit test messages in the format intended for use. In addition, we have trained more technical representatives to assist firms applying for certification to facilitate and substantially shorten the entire process.

In balance, the article did a good job of explaining the Ecom system to *Computerworld OA* readers.

Karen T. Uemoto
Director
Office of Ecom Operations
U.S. Postal Service
Washington, D.C.

Spinning Plates

In the article on integrated Software (CW OA, Oct. 12), the definitions of multitasking and multiprocessing are mutually indistinguishable.

Although it is true that a multitasking system may share processor power among multiple applications, it is also true that such a system may share processor power among multiple tasks within the same application (if the application is sufficiently sophisticated).

The distinction is not a trivial one. The spinning plate analogy offered for multiprocessing is actually appropriate to multitasking, but is not appropriate to multiprocessing.

The key attribute of multiprocessing is the existence of multiple processors within a single system, thus providing an environment wherein true simultaneous processing is possible. To expand the spinning plate analogy to a multiprocessing environment requires that more than one performer (processor) be dispatched to keep the various plates (processor or tasks) spinning.

Robert C. Meltzer
Proprietor
RCM Software
Kettering, Ohio

OA

NEWSBRIEFS

MAYNARD, Mass. — For Digital Equipment Corp., Oct. 18 will be remembered as "Black Tuesday." Caught by surprise, DEC hastily announced that its first-quarter earnings would be sharply lower than expected (the drop turned out to be 72%).

The announcement set off a massive selling of DEC shares on the New York Stock Exchange, and the company's stock fell more than 21 points for the day. In a space of three days, DEC fell a total of more than 32 points to a 12-month low of 67.

The company reported that net earnings fell to $15.9 million, or 28 cents a share, from $56.8 million, or $1.02 a share a year earlier. Revenues rose 16% to $1.07 billion from $927.5 million.

The company said lower earnings were the result of smaller-than-expected shipments of personal computers and from the inability to manufacture and ship new products.

WASHINGTON, D.C. — MCI Communications Corp. has launched a nationwide electronic postal system that reportedly makes possible high-speed delivery of letters and other written communications. The system is said to position MCI as a major competitor to overnight mail delivery services.

Called MCI Mail, the telecommunications-based system offers a variety of delivery systems, including instant delivery, four-hour delivery, overnight delivery by noon and next-day delivery by local regular mail.

The system reportedly can deliver mail anywhere in the continental U.S. at prices as much as 90% lower than comparable time-sensitive mail services.

According to MCI, the new system also places the company in the market for electronic mail generated by personal computers, word processors, electronic typewriters and data terminals.

NEW YORK — AT&T has decided to make major changes to its Picturephone Meeting Service in hopes of making videoconferencing a commercial success, according to a report in the *Wall Street Journal*.

The Picturephone Meeting Service, introduced in 1981, has not met AT&T's expectations and the company has decided to switch suppliers for the two-way equipment, which alters television signals into a form that can be transmitted between distant conference rooms. The new equipment is considered to be more efficient than that currently used by AT&T.

AT&T signed an agreement with Compression Labs, Inc., a San Jose, Calif. firm. Compression Labs will supply an AT&T unit with a new video system for installation in AT&T's Picturephone Meeting Service conference rooms, which are open to the public and for private use by corporations.

ROCHESTER, N.Y. — Xerox Corp.'s Service Group has announced that it will provide service for Osborne personal computers.

Under an agreement between Osborne Computer Corp. and Xerox, full authorized service will be provided nationwide for Osborne I and Osborne Executive I portable computers under the Xerox Americare service program.

The agreement was reached as a result of the continuing financial troubles of Osborne, which filed for bankruptcy in September.

Current Osborne owners who have had extended warranties validated by Osborne before Sept. 13 have been assured of full-service coverage, provided they purchase a two-year Xerox Americare contract. Dealers will be given the opportunity to offer their customers one-year or two-year service contracts at the time of purchase of an Osborne computer.

CAMBRIDGE, Mass. — BBN Computer Corp. has changed its name to BBN Communications Corp. Company officials said the name change reflected the expanded product and service capabilities in the field of wide-area data communications.

The company was founded in 1979 as a wholly-owned subsidiary of Bolt Beranek and Newman, Inc. to provide commercial products based on its research in network technology.

NEW YORK — By 1990, voice synthesis sales will be $1.45 billion and voice recognition sales will be $1.05 billion, according to a prediction made by the Diebold Group, Inc. management consultants.

Though 1982 sales of speech synthesis and voice recognition sales were only $65 million, Diebold said that dramatic cost-performance advances are being made in voice technology which will cause the market growth.

Diebold also announced that nearly 100% of 64 major corporations it surveyed on office automation had "near-complete penetration by word processing" and are progressing to broader usage within the organization.

The Diebold report "Stages of Growth in Office Automation," pointed out that it is no longer enough to design a simple office application for use within a limited environment. It is essential to think in terms of a comprehensive global system to support the organization's total needs.

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NEWSBRIEFS

Diebold also published a study on paths to success for major users of electronic mail. For more information contact The Diebold Group, Inc., 475 Park Ave. S., New York, N.Y. 10016.

NEW YORK — A directory that reportedly makes it easy for users of facsimile machines to reach each other has been announced by the Greenfield Information Services.

The facsimile directory lists corporations with their facsimile machine locations and telephone numbers. It also contains information on compatibility and personnel to contact.

Listings in the directory are free. The directory, which is scheduled to be published in early 1984, will cost $45. For more information contact Greenfield Information Services, 551 Fifth Ave., N.Y. 10176.

WELLESLEY, Mass. — Price is only a secondary factor when a company is selecting office and communications equipment, according to a report by Venture Development Corp.

The study, "Office Automation Survey: Analysis of Acquisition and Use of Office and Communications Equipment," notes that the reliability of a machine, the available features or functions and the ease of use are the primary influences on a purchase decision.

The report costs $1,850 from Venture Development Corp., One Washington St., Wellesley, Mass. 02181.

WASHINGTON, D.C. — Can you use your portable computer on an airplane? In many cases, the answer is no.

The Federal Aviation Administration (FAA) has left the decision up to the individual airlines, and several large carriers have banned computers on their flights.

The fear is that the compufers might interfere with the plane's electronic navigation equipment, although computer manufacturers and the FAA reportedly tend to doubt that possibility. Nevertheless, five airlines — American, United, Eastern, Western and Continental — have banned the use of computers in flight. For more information, contact the individual airlines.

WELLESLEY, Mass. — The private branch exchange (PBX) business dwarfs all other competing communications signal routing methods and will continue to do so for the foreseeable future, according to a study by Venture Development Corp. (VDC).

The study, "Competitive Signal Routing Methods," pointed out that even in 1987, the PBX market will be 10 times as large as the local-area network market.

This will be the case despite the explosive growth forecast for local-area networks and the moderate growth forecast for PBXs, the report said.

The study is available for $2,790 from VDC, One Washington St., Wellesley, Mass. 02181.

NORWALK, Conn. — AT&T is planning to introduce a microcomputer system within the next six months, according to a report by International Resource Development, inc. (IRD).

The 237-page report predicts that the system will be 32-bit architecture based on Western Electric's Bellmac microprocessor and that the software will be based on Bell Lab's Unix operating system. The report also predicts that this new system will upstage the IBM PC. IRD has additionally published a report forecasting severe disappointments for nonimpact printer manufacturers in the personal computer and office automation market segments.

The report, "Non-Impact Printers in the U.S.," said that low-cost, daisy-wheel and matrix-impact printers are becoming so inexpensive that many of the fancy new nonimpact printers are not finding buyers.

"Microcomputer Operating System Strategies" is available for $1,650 and "Non-Impact Printers in the U.S." for $985 from IRD, 30 High St., Norwalk, Conn. 06851.

MORRISTOWN, N.J. — *The Guide to Voice Store and Forward Systems* (2nd edition) is available from Probe Research, Inc.

The report evaluates voice store-and-forward systems and analyzes the major stand-alone, PBX-integrated, TAS/RCC-oriented and office-integrated system entries on the market, according to its publisher.

The guide is available for $165 from Probe Research, Inc., P.O. Box 590, Morristown, N.J. 07690.

DELRAN, N.J. — The results of a survey of 6,000 microcomputer users are available from Datapro Research Corp. "The Datapro Reports on Microcomputers" rates systems, peripherals and software.

The report is said to cover 126 models from 57 vendors, 19 primary operating systems, 13 of the most popular software packages and 90 of the most popular peripherals. According to the survey, the most popular systems were the Apple II Plus, which accounted for 19.2% of total responses, and the IBM PC, with 13.7% of the responses. The report is available for an annual subscription fee of $600 from Datapro, 1805 Underwood Blvd., Delran, N.J. OA

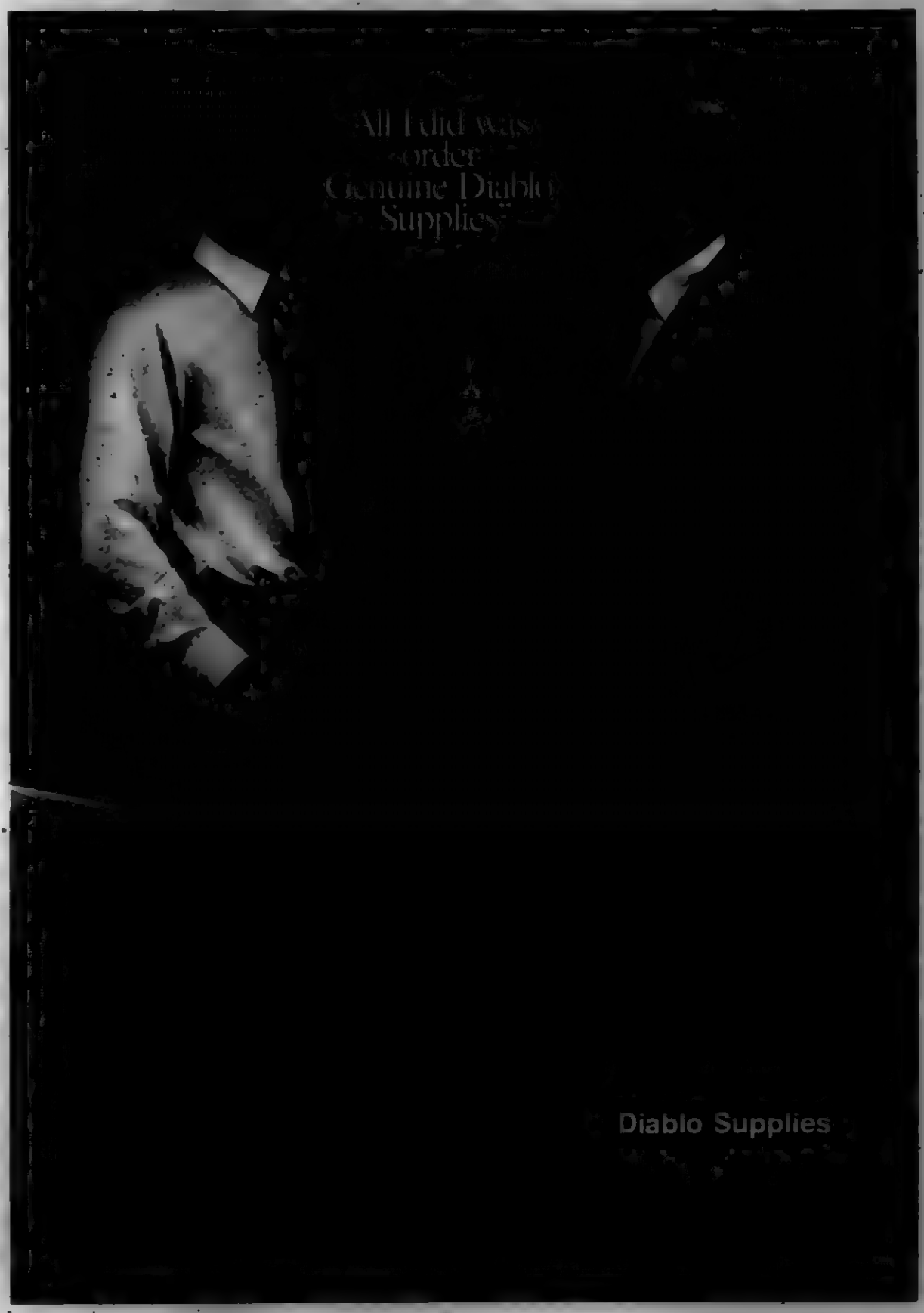

ILLUSTRATION BY ANATOLY DVERIN

DSS & OA Insights & Challenges

By Peter G.W. Keen

Many innovations stimulated by the decision support systems (DSS) movement since the late 1970s have now become standard aspects of data processing, management science and office technology. Now it is time to assess DSS' contributions to the overall application of information technology in organizations and to attempt to integrate DSS and DP instead of trying to define their differences.

The historical conflict between DSS and DP really reflected some early warning signals to DP that it needed to change its role and become more responsive to a broader range of potential clients. DP now faces some significant challenges, which are mainly being attacked on a piecemeal basis. However, the DSS experience offers substantial insight into these challenges and, often, solutions. The main problems DP faces are the following:

- The shift from a DP monopoly to a free market for computer services.
- A shortage of personnel for systems development at a time of exploding demand for information systems.
- The need and desire to create a data architecture for the organization.
- The need to define a strategy for office automation.

The emergence of the free market is a particular dilemma. DP has had substantial or even

full control over the acquisition and direction of information technology. Its costing methods, planning practices and management processes have been monopolistic.

Suddenly, DP has had to adjust to a situation where almost any type of service is available from outside suppliers, and user managers are no longer willing to rely solely on DP. The breadth and quality of these services, especially in the area of end-user languages, microcomputers and financial planning packages, challenge the DP monopoly to revise its strategies, priorities and management practices. It has to move from being a manufacturing and operations department to becoming an information company, focused on marketing, service and product development.

In many ways, DSS was the first free market effort. They are discretionary systems: Managers do not have to use them. As a result, DSS designers had to learn from the very beginning how to appeal and sell to a "consumer" who may have had little or no experience with computers.

The lessons to be learned are invaluable for DP:

- Development has to start from the customer's perspective and must be based on direct and empathic study of work, workers and the organizational context of work.
- The decision to adopt an innovative information system is based on value, not cost.
- Complex systems can be evolved from well-phased simple components, thus reducing risk and speeding up delivery.
- End-user languages and fast development tools (such as APL and application generators) provide the base for responsive service, especially to meet ad hoc needs.

The DSS implementor's skills are exactly those that DP needs to complement its abilities in formal project management, disciplined testing and installation of large systems — valuable practices too often not demonstrated by DSS builders!

The shortage of development staff — business-oriented analysts even more than programmers — is the major single constraint on DP's ability to

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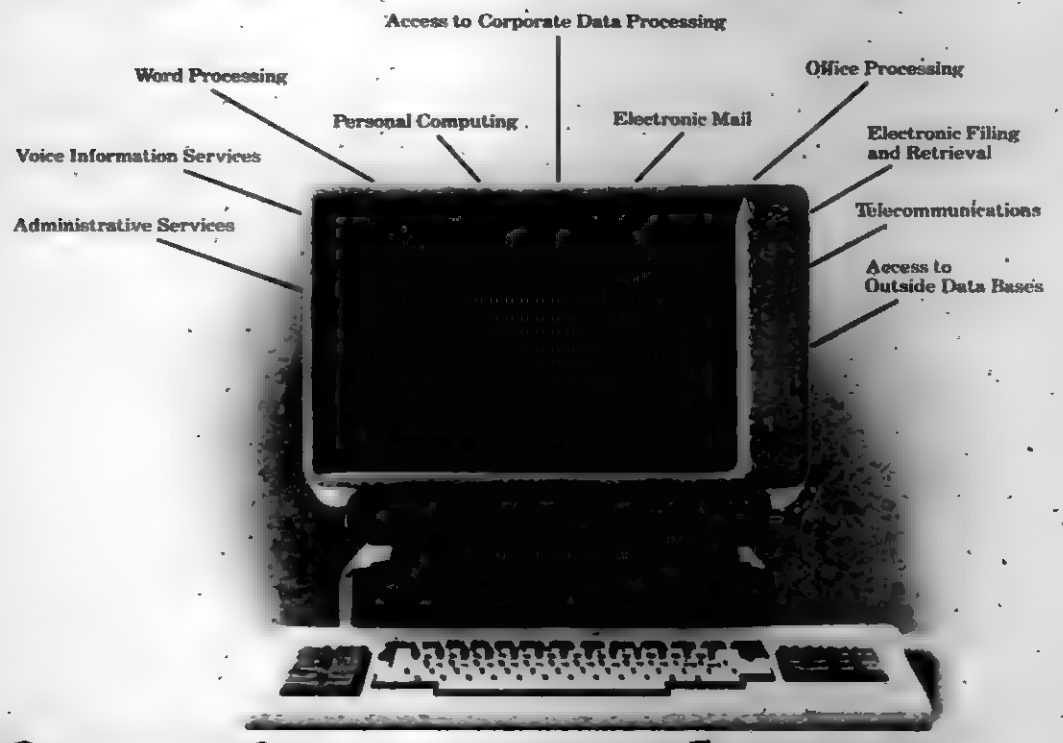

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meet demand for information systems.

In the short term, the problem will get worse, not better. Current backlogs often amount to several years. Maintenance takes 50% to 70% of personnel. Hidden backlogs — systems that line units need, but do not bother to ask for because they know DP cannot deliver them — can be measured in man-centuries. More important, many factors are increasing demand: the free market; the rapidly improving quality and costs of hardware, software and communications; increasing expectations and sophistication of users; and the growing potential and actual contribution of information technology to key aspects of decision making, business and operations. Outside companies and entrepreneurial ambitions drain off skilled DPers.

At present, the only way out of this problem is to shift from programming languages, which require DP personnel, to end-user tools that allow nonprogrammers to develop their own systems with only limited support from DP. Examples of such tools include financial modeling languages, inquiry languages and report generators and interactive graphics packages.

The DSS experience has much to offer DP in resolving the first two problems: responding to the free market and shifting to end-user tools. The third problem, the definition of a data architecture, is an area where, if anything, DSS have confused the issue and perhaps even impeded progress. The term "architecture" is used here with the same meaning as with network architecture: a clearly-defined general structure, set of protocols and standards, and hierarchy or set of layers that provide a blueprint for specific implementations.

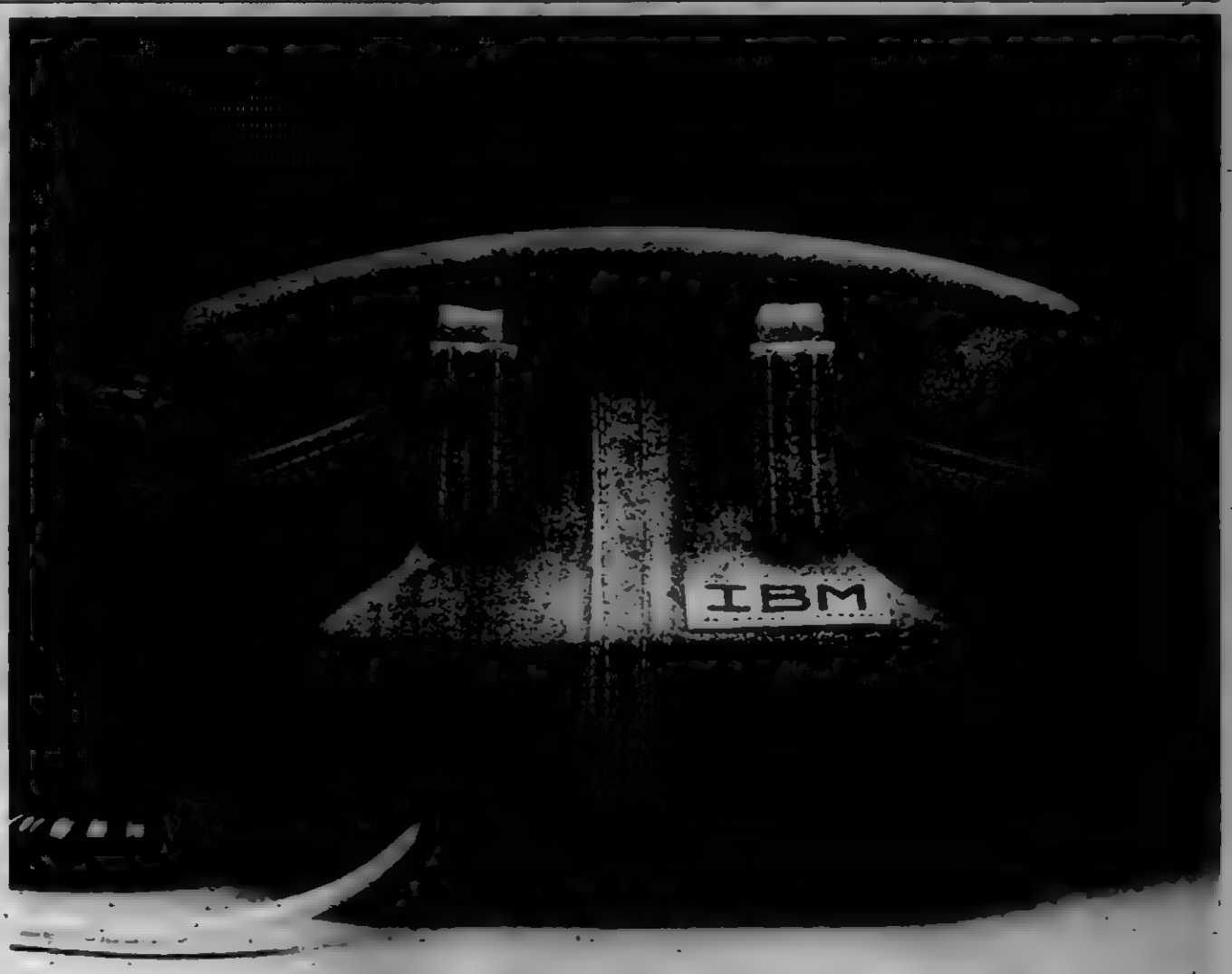
DSS have generally been most effective in applications involving models that need only a little data. The early enthusiasm of DSS builders for APL reflects this. The result has often been ad hoc data management, informal data bases and little effort to draw on DP's data resources.

Gradually and in a piecemeal fashion, DP is evolving a data architecture toward a state where the term "information resource management" is actually meaningful. Until recently, the set of tape and disk files (measured in acres of real estate occupied, rather than in megabytes or gigabytes) was not a resource worth managing. It consisted of information that was available but not accessible.

Information resource management goes well beyond data base management software. It includes new organizational roles and procedures; a business-based model of information flows and uses; and, in effect, an accounting system, vocabulary and discipline for managing data equivalent to that for managing the financial resource.

If DSS has much to offer DP about ways to operate in the free market, DP has even more to teach DSS about data management. At times, DSS has seemed to focus on models without data and DP on data without models (and the analytic frameworks they reflect).

DP's fourth problem is to define a real strategy for OA. Plenty of promises, expectations, pilots, frameworks, buzz words and ads exist, but very few companies have evolved a coherent, organizationwide strategy. Tactics dominate and vague terms like "productivity" and "office of the future" substitute for demonstrated commitment, plans, implementation and payoff. In many ways, DSS has been the dry run for office automation — or rather office technology, a more general term that recognizes



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we cannot and should not automate office activities, but will support them.

Information resource management is the integration of DSS, DP and office technology. The problems described above have been creeping up on DP for some time. Too often, it openly reacted like a plant manager. DP executives and their staff saw their jobs as keeping the assembly line running, being efficient and juggling some incredibly complex short-term pressures: operations, maintenance, fire-fighting and project management. Innovations like DSS were seen as diversions — or intrusions.

The DSS implementor's skills are exactly those needed to complement DP's abilities in formal project management, disciplined testing and installation of large systems.

Today, many of the ideas of DSS seem commonsensical. In 1975 when the movement built up momentum, they seemed radical.

DSS began its intrusion with a tremendous advantage in technology: the terminal. It quickly extended this advantage by focusing on fast development languages, such as Express and APL. At that time, DP was virtually locked into batch processing and traditional programming languages, especially Cobol. It could not quickly or easily shift its technical base.

DSS builders began with a technical base that allowed them, in Gulden and Arkush's phrase, to "cherry pick." They were able to take easy applications — an ad hoc model in two days, an APL simulation of the creation of the universe in five lines of code and 30 hours, a working prototype in a day and new routines added overnight.

A lot of the success of DSS has come from boasting about such small systems, from being in the right place with the right application concept and from understanding what to work on, with fast flexible development tools. DSS builders need to stop talking about how effectively they can build the little systems — DP has picked up on that technology. Anyway, using APL, anyone ought to be able to develop a model in one-tenth the time required in Cobol or Fortran.

Another aspect of DSS as intruder is that it is primarily not a technical concept, but one of application. It hit DP from the side; DSS emphasized the need for functional expertise — understanding of marketing, finance or strategic planning. DSS broke open the traditional communication patterns and relationships between builders and users of information systems; it bypassed the formal DP organization and went directly to users.

In the long term, that can cause fragmentation of effort and loss of coordination. At the same time, however, these processes created a new class of customer and set standards of service and responsiveness that have significantly contributed to changing managers' views of computers — from seeing them as a problem to recognizing them as an opportunity.

Perhaps the most important aspect of the DSS intrusion for the long term is its focus on what people with no technical background like to do at terminals.

DSS are discretionary systems; managers can choose to use them or ignore them. They can adapt them to their idiosyncratic needs and styles of thinking. Providing discretionary systems was not part of DP's mission. DP was in the business of providing mandatory systems — systems that have to be used as part of the organization's ongoing operations.

When the user can simply ignore the system, designers focus very carefully on features that entice consumers to buy their services and products — flexibility,

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ease of use, low cost and convenient access. Lacking an organizational base, DSS had to see the "user" as a real person.

The overall goal of office technology is to diffuse terminals throughout the organization and to persuade people to use them for key aspects of their work — communication, queries, text-handling, analysis and administration. Office technology and DSS are now basically identical, and DSS was the dry run for office technology. Office technology looks remarkably like DSS, with an important exception — it is not an intruder. DP is obviously looking for the opportunity to take charge of office technology, the major potential source of massive organizational productivity gains in the mid-1980s.

Office technology grows by pilots, research and development, prototypes and learning. This is the knowledge base of DSS. DSS designers' skills are of fundamental value if DP wants to take the technical tools of office technology and have them accepted quickly and institutionalized. Applications of modern information technology stand or fall by flexibility and ease of use. An inflexible system is one that has a potential use not accommodated in the design. Some aspect of the nature of the task and its context was overlooked or misunderstood. Similarly, ease of use requires close contact with the direct understanding of users and uses. Perhaps the key single characteristic of DSS builders is their willingness to learn how things work, to find out how people think and do their jobs and to get to know the organization. It is mainly this attitude that has shaped DSS design techniques, by which complex systems are evolved out of simple components.

Office technology integrates DSS and DP — neither can really contribute to office technology by itself. DSS is the experience base. But if it is indeed the dry run for office technology, it has been finessing a key issue: the difference between strategy and tactics. With office technology, most companies have at least abandoned the all-or-nothing approach to systems building, in which complex innovations are launched with no market research or pilots, but with delivery dates of next month.

Unfortunately, many of them never get beyond pilots and initial fragmented applications. They get stuck in tactics. There are few organizations with a real strategy for office technology, but many with lots of applications. Strategy requires a mandate for the use of the computing resource, clear business criteria for selecting and evaluating opportunities, and a well-defined long-term commitment. The real issue is authority, for planning and for pushing down a business vision to all levels of the organization.

DSS almost entirely lacks such a mandate. Very few DSS groups have gone beyond cherry picking to create a department with a charter. It is not enough to be building lots of systems.

The charter — or the opportunity to create it — is with DP. There has to be some overall coordinator of the computing resource, of which DSS is a facet. When DSS's skills and DP's organizational influence coalesce, strategy and tactics merge. OA

Keen is chairman of Micro Mainframe, Inc. in Cambridge, Mass. His current research lies in the areas of decision support systems, telecommunications and business policy and strategic computing education. In this article, he examines the events forming DSS and OA today. In the first issue of 1984, Keen will examine the role of DSS in the future.

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OFFICE AUTOMATION ROUND TABLE:

What's Next in OA?

How far off is real integration in the office? What will it mean to users when it does arrive? Three OA experts met with Computerworld OA's editor, Ann Dooley, to discuss what the integrated office will look like and how it will change the organizations and people who use these developing technologies.

Rick Richardson is a partner in Arthur Young and Co.'s national office in New York and is responsible for directing the company's research and technology.

Will Zachmann is vice-president of corporate research at International Data Corp., a Framingham, Mass.-based research company.

John McGuillan, a consultant based in Cambridge, Mass., assists users and vendors in planning for OA and advanced communications systems.

What is the status of office automation today? Why hasn't implementation proceeded as quickly as was expected a few years ago?

McGuillan: If you try to add up the winners and losers, you'll see some interesting trends. Some things — personal computers and word processors, for example — are runaway winners. Others — electronic mail, local-area networks and voice — got off to a slow start. The rapidly implemented systems are small-scale, personal and local. The ones still to mature are the shared large-scale infrastructure systems that require central coordination. It's always harder for organizations to build roads and highways than it is for individuals to buy cars.

Rick Richardson ▸

> ***"We need to begin strategic planning for OA even if it doesn't pay for itself."***

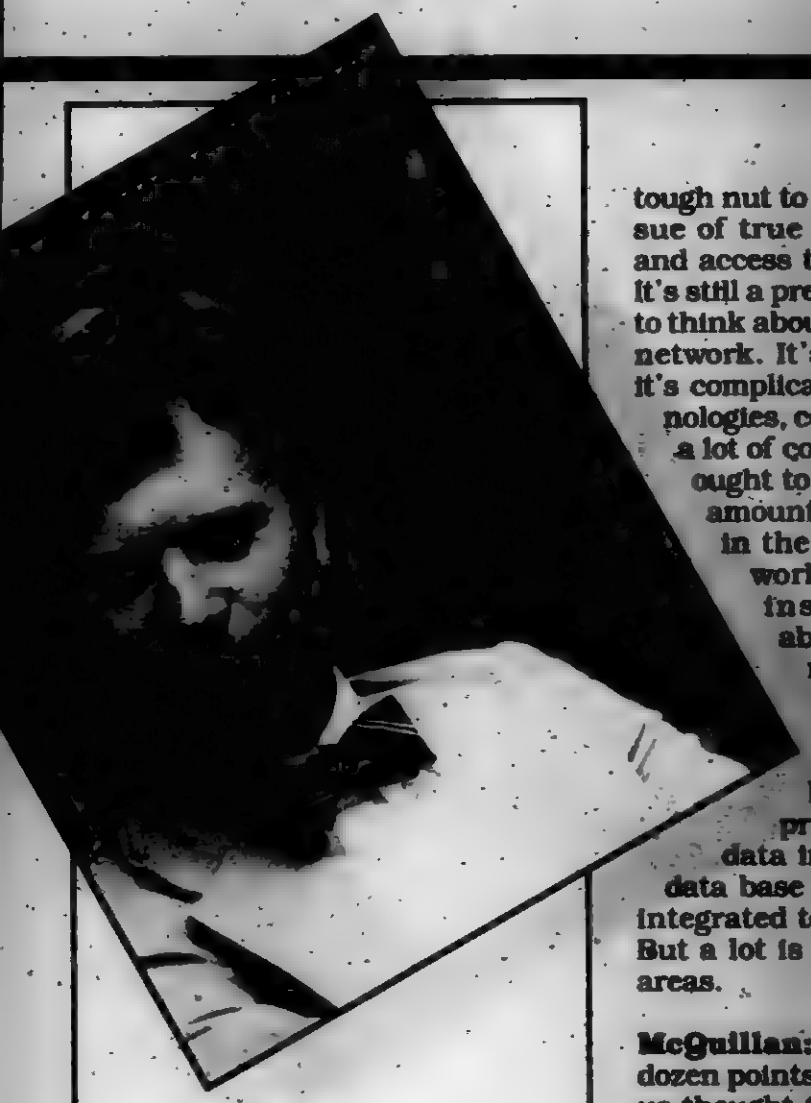
Are you saying the problem is organizational bureaucracy?

McGuillan: I'd have to say yes to that. You have to have someone who is in charge, and that person has to have a commitment from the top to spend the large amounts of money required. For example, installing a communications infrastructure like a PBX with the necessary protocols and formats is very expensive.

Richardson: There are two other issues. Automation is usually justified through increases in productivity, but it's awfully difficult to apply classical input vs. output measurement to white-collar staff. How do you begin to weight one better decision that keeps a firm from going off in the wrong direction and creating a whole host of problems? The second issue is that no one group within information technologies is really ready to run the gauntlet and go do it.

Zachmann: If you really look, some tremendous things have happened in OA. The most obvious ones are the surge of personal computers into large organizations and the tremendous growth in information center operations. Another area of tremendous activity has been in word processing. WP has moved out of a strictly specialized environment into the hands of lots of people who didn't do it before, on either strict word processors or personal computers. The

Will Zachmann ▸

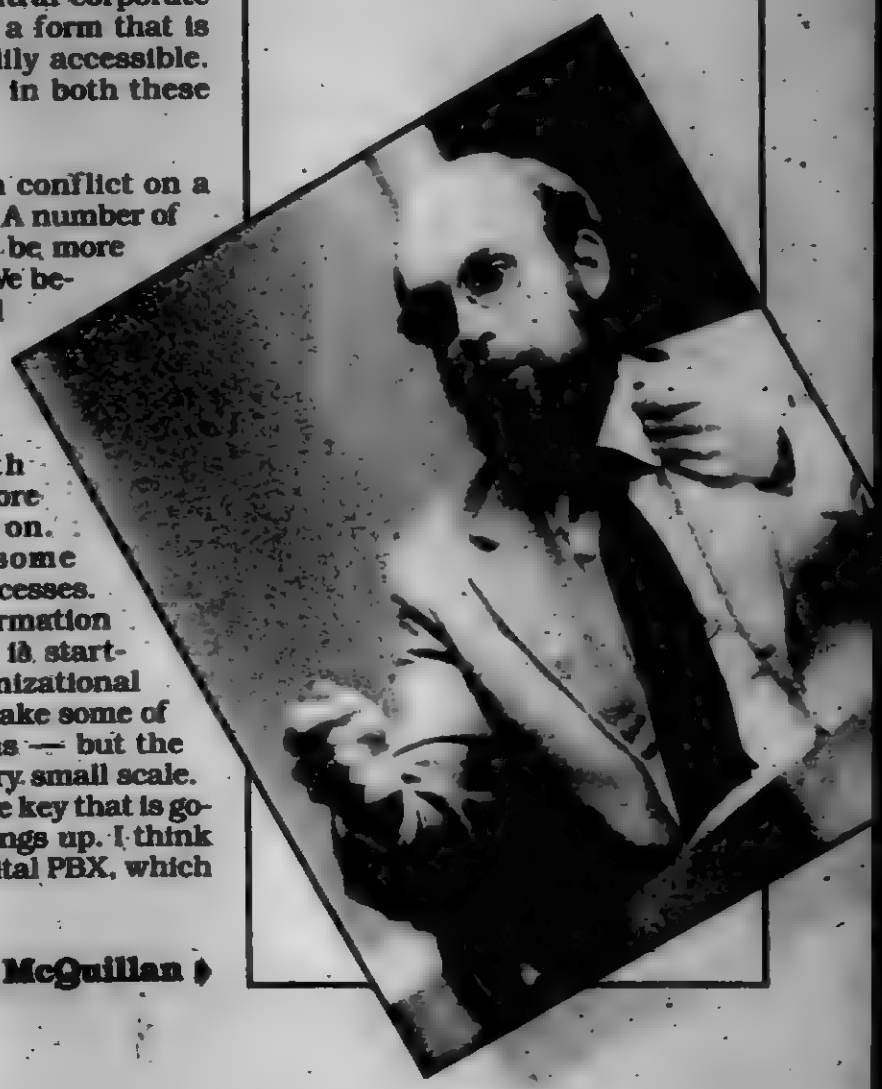


tough nut to crack, though, is the issue of true local-area networking and access to corporate data bases. It's still a pretty scary thing to a user to think about putting in a local-area network. It's fairly expensive and it's complicated by competing technologies, competing standards and a lot of competing views of how it ought to be done. A tremendous amount of activity can be seen in the area of work area networks or typical Ethernet installations with only about eight or nine terminals attached. Access to corporate data bases has also been slow to take off, not for any hardware or software problem, but because the data in the central corporate data base is not in a form that is integrated to be readily accessible. But a lot is going on in both these areas.

McGuillan: We're in conflict on a dozen points already. A number of us thought OA would be more widespread by now. We believed we would all have fancier terminals on our desks and we'd be able to communicate in voice and data with more people, with more information and so on. There have been some very encouraging successes. I agree that the information services department is starting to have the organizational clout and charter to take some of the necessary actions — but the successes are still very small scale. I'm still looking for the key that is going to really open things up. I think its going to be the digital PBX, which

John McGuillan

"Most cost-justification in this business is really just a lot of garbage."



"Those who manage the OA transition effectively will be the winners in the future — others will just die."

PHOTOGRAPHY BY SUSAN BLAKENEY

satisfies a lot of concerns — including cost-justification, for one. Other technologies will fall under the mantle of the PBX and it might turn out to be the keystone for integration.

[redacted]: We have a basis for an excellent point-counterpoint here!

I could not disagree more fundamentally. The digital PBX is a real ho-hummer in some ways. It provides no functional capacities of any significance that aren't already included in an existing telephone switch. People generally have a real desire to have some sort of panacea, some sort of fix-everything solution. Some basic limitations in the architecture of PBXs make them unsuitable for building the systems we really need.

The one important thing local-area networks provide — that PBX cannot and will not in the foreseeable future — is the ability to handle nonconnected high band with very high-speed burst-travel. And that's the key to building true systems of the future.

I think users are putting in local-area networks at a pretty good pace and that pace is now accelerating.

What are some of the other problems?

Zachmann: One of them is what happens when a tremendous amount of our communications is with people not on our system.

I'm still not convinced electronic mail even makes sense. The paper-based environment has made one important contribution: It's a classic standard of integration — we can all read it, put it in a briefcase and use it. And that's true no matter what technology we use to file it, copy it or save it away.

We have some horrendous leaps to make before we can make that statement about the electronic environment.

McQuillan: We also need to make the technology more intuitive. Using a computer should be like driving a car — once you learn it, it should come naturally.

It will be quite a few years before that happens, but I'm an optimist.

Zachmann: The tools we're talking about should not be user-friendly, they should be user-transparent. We need systems that are natural extensions of the functional capabilities of the human being.

Some of this has already occurred. Personal computers proliferated because people started writing software that was easy to use and that provided solutions. The single package that deserves the most credit for this is Visicalc. Now we're seeing newer generations, like 1-2-3, that have overshadowed Visicalc.

Are you saying that as technologies become more user transparent and more sophisticated, their use will naturally spread?

Zachmann: I'm saying that three additional steps are needed for a successfully integrated system. The first is the user interface; the second is communications, which will probably involve a PBX and also local-area and work-area network technologies. The third is access to the corporate data base, and that's really a system development problem at the corporate data base.

"Using a computer should be like driving a car — once you learn it, it should come naturally."

Richardson: When the electronic tool stops being "a computer," corporate America's executives will really start using it. Another group — the diehard, power user base — will always use it. They are the people who just enjoy the technology and feel comfortable with it.

Zachmann: Learning Basic programming is going to be as fundamental a part of the educational process as learning multiplication tables was when we went to school. That is a fact. Anybody who doesn't believe that will happen is sitting in the world of the past.

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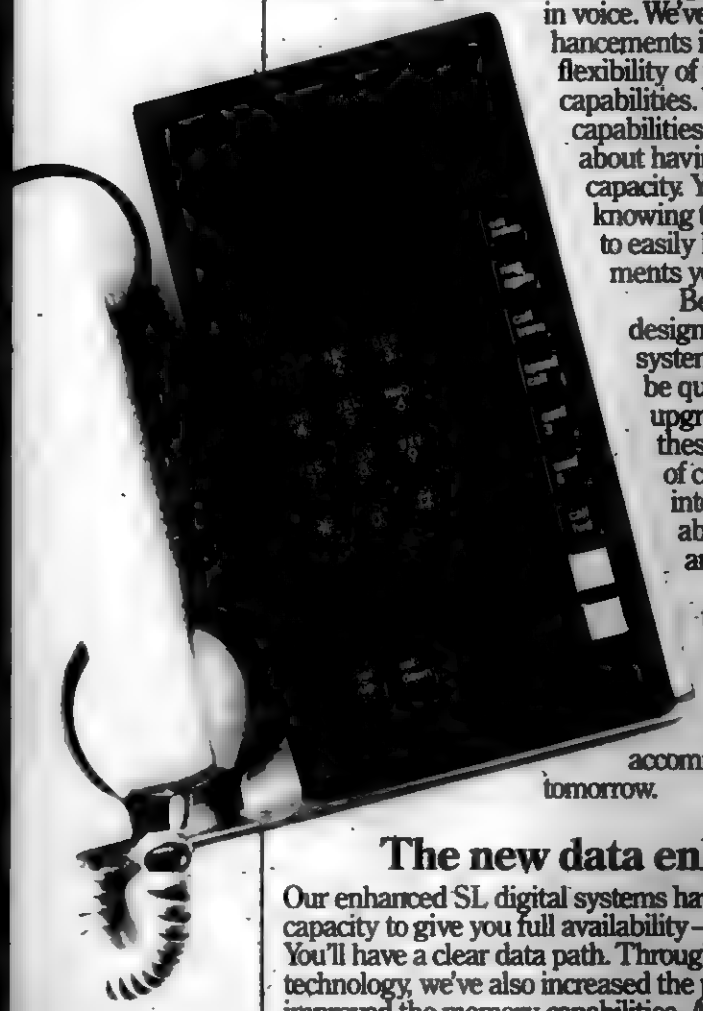

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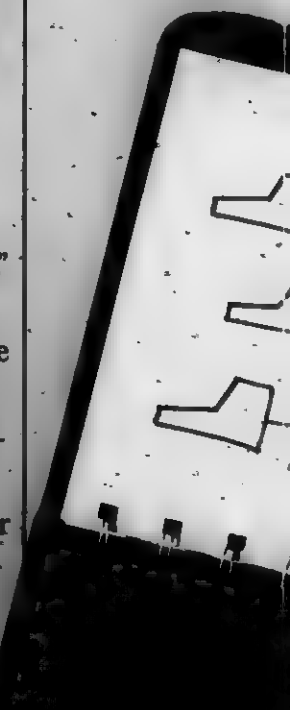

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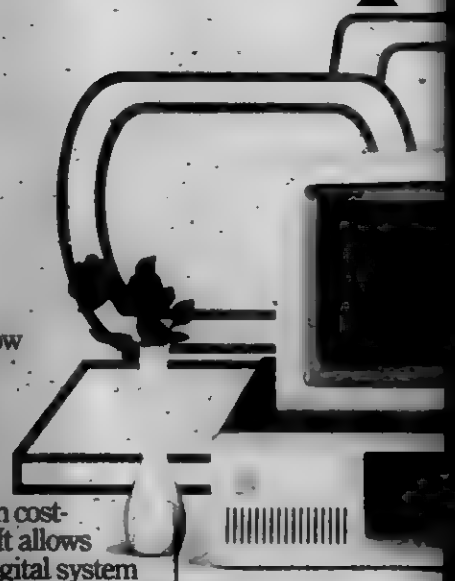

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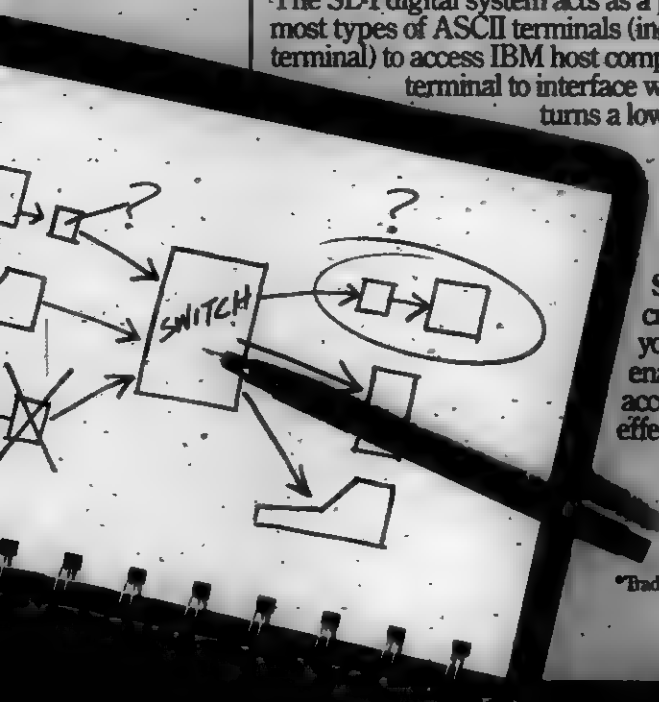

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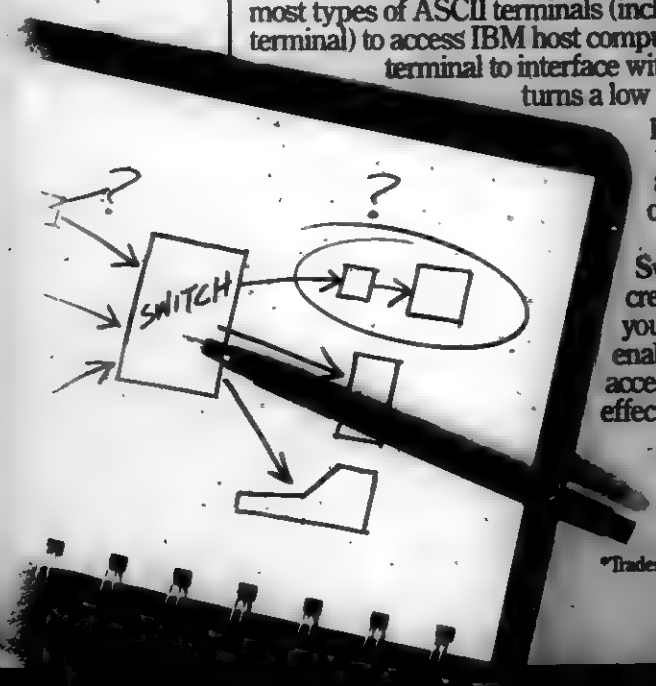

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Northern Telecom offers even more solutions to your information management problems.

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The SL-1 digital system with **Integrated Voice Messaging** can. Internal and outside calls are automatically answered and messages recorded for retrieval at a convenient time. This new SL-1 digital system enhancement gives you an open voice messaging system that can quickly and easily put an end to lost messages and unanswered calls—and increase your organization's productivity.

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Richardson: The point I am making is that we are stepping onto a transition bridge between where we are now and where we would like to be when this whole infrastructure is built.

We don't have classes on how to use the telephone, it just happens. Electronic tools will eventually get to the level where computer literacy really isn't an issue any more. The interface will be so transparent that you will just use it, the same way you use anything else.

I'm not certain that in a generation anyone is going to get turned on by today's technology. We don't get turned on by the telephone — we just have one.

McQuillan: I agree that teaching programming has some value, but teaching the use of applications programs has a lot more. I'm not sure the penetration is going to be as high as we think in management ranks — quite a lot of managers don't deal with words and numbers. They deal with face-to-face meetings. They give judgments or impressions and have people who do things for them.

Richardson: The far more critical issue is that we aren't addressing the informal or shadow systems. For years, people have built up around their jobs a paper-based shadow system that does certain things. The micro has been a wonderful avenue of implementation to really automate these systems — systems that can never be a part of a major corporate data base because they need to be tailored to the way someone worked.

McQuillan: I think we've come up with an interesting point here. We have three factors, user transparency, communications infrastructure and corporate data base access. We all agree we need them, so that's not the issue. The issue is which is hardest? In what order do they come in and how are we going to have it all happen?

Transparency is important, but it's a gradual evolutionary phenomenon. The other two are more global decision-making processes that corporations need to make. Communications infrastructure is extremely difficult because it deals with a lot of different levels.

Data base access is particularly hard; not only is it an organizational technical problem, it's also a policy problem. We can be optimists about transparency and we can see the beginnings of success in communications infrastructure, but the data base access will be more of a problem.

Zachmann: I call it distributed resource systems. Instead of looking at the mainframe out, we did a reversal where we look from the desk out. The question is no longer "What can we take off the big computer and put somewhere else?" Now it's become "What can't the thing on the desk do? What does it have to go somewhere else to do?"

We are still applying the old models. We will really get off the runway on integrated office systems and building this electronic nervous system — the office of the future — when a change in thinking occurs. This will happen when people start building around the models of the future instead of taking new technologies and using them to sort of soup up the models of the past.

What about the people who are getting a little information now and want more, but can't get at it? Once they get a taste, they want a whole lot more. That's very frustrating, and it can even turn some users off.

McQuillan: I would say that the big obstacle is corporate planning and policies. A lot of corporations don't want people to do that now. They're afraid there will be seven versions of next year's sales forecast and no one of them will be completely correct — it's a consistency and security problem. People may just carry the floppy disks home in their briefcases.

There are technical obstacles, but that's the good news. The bad news is that the policy obstacles are much harder and they can't be solved by a faster and bigger or cheaper box.

People are developing corporate policies for personal computers and that's the first step. A lot of them, quite wisely I think, are writing these policies with a one-year time price. They are saying, "We're going to put this policy into place for a year, and probably use PCs. Then we'll see how it goes."

How common are corporate plans for the use of microcomputers?

Richardson: They're starting, but just barely. The awareness levels have been raised enough that people are less concerned about "standardization" and more about optimum use of resources.

Our basic posture is to put technology in the hands of our people rather than just saying they are going to use an ABC or an XYZ with the following four packages. Most organizations are not at the stage of deciding they are ready to begin with an interface through IMS or whatever else the case may be.

Instead, they're saying that the data they need to make a decision today may clearly not be the same data they need tomorrow — let alone the format or the periodicity of the data.

We have two big issues. One is on the user side: knowing what's there and how they get at it. The other is on the designer's side, and it's combating a mindset of building a fairly static system when in this case an open architecture system is needed.

"We have three factors, user transparency, communications infrastructure and corporate data base access. We all agree we need them, so that's not the issue. The issue is which is hardest? In what order do they come in and how are we going to have it all happen?"

Zachmann: What ultimately is necessary is to examine the nature of information flows in the organization. Where does information enter the system? How does it move through it? What happens to it? Where is it stored? Where do you eventually get rid of it? Until you establish those flows, the probability of having any real integrated plan for developing this kind of corporate nervous system is very low, and the solutions will always be partial.

Complex organizations have to be organized by design, plan or idea from the top down. They don't happen accidentally.

McQuillan: In other words, organizations have to take the evolutionary approach, not the system design approach of bringing in a few things here and there and hoping some will hit.

Zachmann: Too often personal computers are thrown into an organization with the hope they will make it evolve into a healthy organization.

Those who manage the OA transition effectively will be the winners in the future; others will just die.

Richardson: We also haven't focused enough on what the organizational impacts are going to be. Will jobs be enriched or displaced? Will middle managers dwindle away like the minicomputer when top executives have technical facilities for information now provided by middle managers?

What effect do you think the technologies are going to have on OA in the next five years? What are they going to do for the user in the corporate environment?

Richardson: I can't predict, but I can say what I'd like to have happen. I'd like to be able to pass information — regardless of what it is — to wherever I want. I don't want to be restricted by transforming a thought into textual symbols in a word processor and then passing those textual symbols over a data PBX digital switch.

If the communication happens to be visual, then I want to send it visually. If it's oral, I want to send it orally. I want to see architectures like Vision and Lisa and all the rest that are the beginnings of the intuitive interface reach the level of communication where we don't have to depend on traditional forms of data conversion and passing and unconverting bridges and so forth.

Zachmann: First, I think personal computers and what they evolve into will become the office workstations, more and more replacing dedicated terminals or word processors or other specialized hardware.

Second, networking will take off over the next five years.

Third, the mainframe processors of today will start to move toward specialized data base servers or high-speed computational servers probably with relational data base software. This software will be hardware-assisted, so that basic operations that are inherently difficult to do on a standard architecture can be handled by distributed data base machines.

We're talking about three basic areas. The first is the workstation and the interface with the personal computer, with better and better software.

The second is the communications backbone — baseband technologies for work area networks and broadband technologies for local true area networks.

The third is on the side of basic large corporate data management: evolved mainframes and data base machines with relational data base capabilities supported by hardware. These will provide much easier to use large data base engines that will start to solve the problem of access into the large data base.

McQuillan: Obviously, I agree with some things Rick and Will are saying. In five years we'll see personal workstations that can support considerable artificial intelligence. In the next year or two we should see this support on mainframe operating systems and mainframe applications. So the breakthrough of expert base systems will occur.

Another significant area will be in value-added services available on a public basis. I think deregulation is going to make a significant difference. The local operating companies are going to be offering voice mail, protocol conversion and digital PBX.

I think we will see more progress for OA intercompany than intracompany.

Zachmann: Another likely change will be in the ability to assess the difference between good performance and poor performance, particularly on the part of professionals and managers. I think they are the people who will be most under the gun in the future.

The biggest opportunities exist for those who are capable of performing well and taking advantage of the new opportunities the technology provides. But these same people could also be the biggest losers. This will happen where the biggest organizational resistance is directed toward middle- to upper-level managers and professionals who, in fact, exist in a fairly comfortable cocoon of ineffective information systems. When these managers achieve a certain level of seniority and status, the question of whether they are doing a good job or not is unanswerable for most other people in the organization. A number of middle and upper management nonperformers risk being exposed by a better information system. That is precisely where the biggest "people" impact will enter.

Richardson: How are we going to pay for all this?

Downstream, somehow, this stuff has to begin to make economic sense.

"In the early mainframe days, we heard that these systems would reduce the number of people necessary. They didn't; they did nothing but increase the number of people we have. But they did make us more competitive and, as our competitors automated, we were forced to get better automation."

McQuillan: Let me throw out a slightly different answer — I think some people have a terrific opportunity on their horizon. These are the folks who right now are narrowly defined as trainers, but who helped facilitate, explain, train and motivate the use of all this technology. The sky is the limit for them because an endless series of new things are coming down the road. These things need to be explained and put into context for the people who will then go ahead and use them.

Zachmann: Personally, I find building an office of the future to be an utterly irrelevant business aim. The only reason for investing in any of this technology is that it lets you run a business better, do your job better or be more effective. Maybe it makes you able to survive more competitively.

That's why an organization ought to analyze the ways it is going to pay for that information architecture. There are clear and demonstrable costs to slow-moving information. People haven't seen the bottom line yet; until they do, they would be fools if they spent lots of money chasing technology for its own sake.

I spend most of my time looking at technology, but I would be the last person to advocate it as a thing in itself. It is only relevant if it does something for you — if it lets you do something better.

Richardson: I think the three of us would agree that some portion of whatever we implement is clearly going to make us more efficient and effective contributors to organizational and individual productivity.

However, that change may not always be measurable. It becomes a presupposed requisite for work. Management may well have to focus on the fact that there is just going to be that technology on the desk. The only way we can effectively and adequately compete for personnel is to put in a system.

Will this be an automatic evolutionary attitudinal change? Or will it take a certain amount of training of executives before they realize you can't put everything on a balance sheet?

Zachmann: Managers should not accept the inevitability of technological change. I personally don't buy the argument that automation is going to be there, so you just have to have it. Maybe that will be the case, but an organization should analyze the benefits of automation and implement it because of those benefits. This implementation should not be based upon some fuzzy or will-o'-the-wisp or "gee-whiz" technology. Gee-whiz technology in and of itself is not the basis for a good business decision.

McQuillan: I don't agree, Will. First of all, I've looked at a lot of cost-justifications, as I'm sure you have, too. Probably 80% of them are pure bunk. Most cost-justification in this business is really just a lot of garbage.

I agree with you that it is important to try to show cost-justification, but the fact of the matter is many people don't do it well. And is it necessarily a disadvantage if there is no strong cost-justification? I've looked at a lot of electronic mail systems that are cost-justified and I've come to the conclusion that cost-justifying an electronic mail system in advance is the kiss of death!

I know a number of organizations that have very carefully figured out where electronic mail would be cheaper than other systems, and they've tried to make it happen in their area. And it has happened — in that area and nowhere else. Contrast that situation with one where people have brought in electronic mail and said, "We will have a survival of the fittest. It will replace telex, telephone and letter in our organization." Price, speed or effectiveness — whatever it is, people will go with it, either consciously or unconsciously.

In other words, let the cost-justification happen in the real world over a six-month or one-year period. And then you'll find considerable success with electronic mail. A firm may still may end up spending more money than it used to, but if it has become more efficient and effective, maybe it's worth it. Plan, yes — cost-justify, no.

Richardson: We can't ignore the fact that the availability of technologies raises the level of expectation of those we hire and those who work for us. In the early mainframe days, we heard that these systems would reduce the number of people necessary. They didn't; they did nothing but increase the number of people we have. But they did make us more competitive, and as our competitors automated, we were forced to get better automation.

You couldn't give someone an office space today without a telephone — it just wouldn't make any sense. Yet, management is still not attuned to a situation where, although nothing may change in the next year, a long-term trend is in process. Soon, in addition to cafeteria benefits, employees will be looking for specific things in the form of technology. It may be a cost of doing business and maybe we need to begin strategically planning to pay for it even if it doesn't pay for itself.

I don't think management has yet realized that this access to information they're seeking will change the fabric of their company. OA

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Apple Tries To Pull Together An Office Strategy

By Glenn Rifkin

Not long ago, the future of Apple Computer, Inc. was as sunny as the skies above its sprawling Silicon Valley headquarters. The six-year-old personal computer maker had achieved legendary status as the fastest growing company in U.S. corporate history. Apple, its admirers said, had singlehandedly created the personal computer industry and had managed to stay at the top of that industry by pushing a solid product (the Apple II) and a unique image.

By the beginning of this year, however, there were clear signs that all was not well with the innovative company. Needing new leadership and direction, Apple enticed John Sculley to leave Pepsi Cola and become president. Sculley immediately set out to reorganize and redirect the company. He brought in William Campbell from Kodak Corp. to centralize the company's floundering marketing operations and consolidated Apple's manufacturing sites. He also halted Apple's in-house production of disk drives, deciding it was cheaper to buy the product.

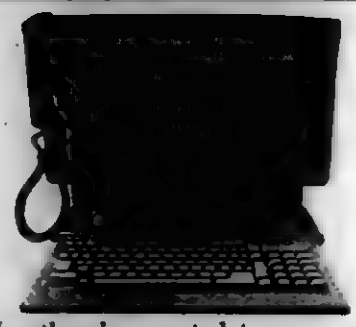
The internal rumblings and disappointing sales of Apple's heralded Lisa resulted in a fall in the company's stock, which reportedly had made millionaires of some 300 employees. From a high of 65 the stock fell to 20, and earnings were seriously down — they nosedived 73% in the fourth quarter. Though it was a gloomy summer and fall in Cupertino, Calif., the morale among the company's 4,700 employees remained strong.

With 1984 just around the corner, Apple has gone on the offensive to create an image as a multiproduct, multichannel company. The new strategy is a response to the industry realities that caused Apple to stumble during 1983. As the new year approaches, Apple faces a laundry list of question marks that industry analysts feel must be properly addressed for the company to survive. Among those questions is the following: Can Apple create a name for itself in the office?

Although the company admits it is not in a position to become a major office automation vendor, Apple realizes its personal computers have already made it onto thousands of desks in offices around the country. The company is convinced that, in its Lisa personal computer, it has a technology that will make its presence felt in both large and small office settings. As Barry Smith, product marketing manager for personal office systems, put it, "Lisa will be our flagship product in the office. It is a new foundation for the personal computer industry. It will force the industry in a major new direction."

Of course, Apple was trumpeting Lisa's praises in January 1983 when the product was first announced. Unfortunately for Apple,

GET EVERYBODY ON BOARD.



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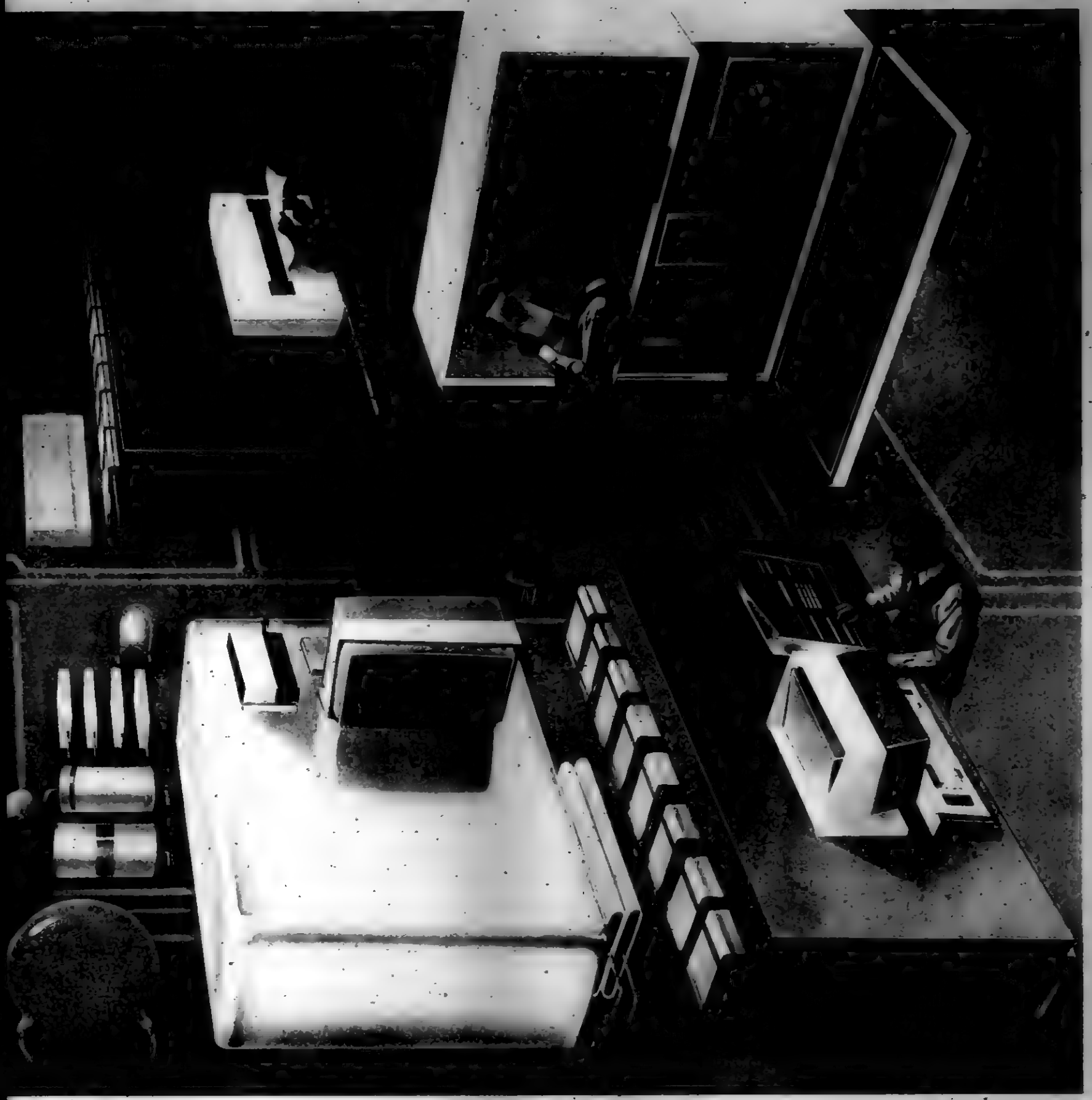

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the response didn't match the excitement. Although industry watchers praised the power and elegance of the 32-bit 68000 microprocessor and were suitably impressed by the friendly mouse and innovative graphics package, the buying public simply wasn't ready to open its pocketbook for a $10,000 machine. Criticism mounted as the interminable five-month wait crawled by before the product shipped.

Besides the high price, critics pointed out, Lisa wasn't compatible with anything, including other Apple products. Also, four of its six bundled software applications were said to be mediocre; Lisadraw and Lisaproject, while impressive, didn't do many people much good.

"What they tried to do is sell Lisa as an integrated, turnkey system like the Xerox Star. The Star was a ludicrous failure, and why Apple thought it could succeed where Xerox failed still puzzles me," said Michael Hammer, president of Hammer & Assoc. consulting firm.

Apple has heard all of the criticism and has responded by dropping Lisa's price for the fully configured system to $8,190, an 18% cut. It has also unbundled Lisa; the system hardware can be purchased alone for $6,995, with the six software applications available for $195 to $395. Apple has actively encouraged third-party software development for the Lisa and feels its open architecture makes it an inviting receptacle for developers.

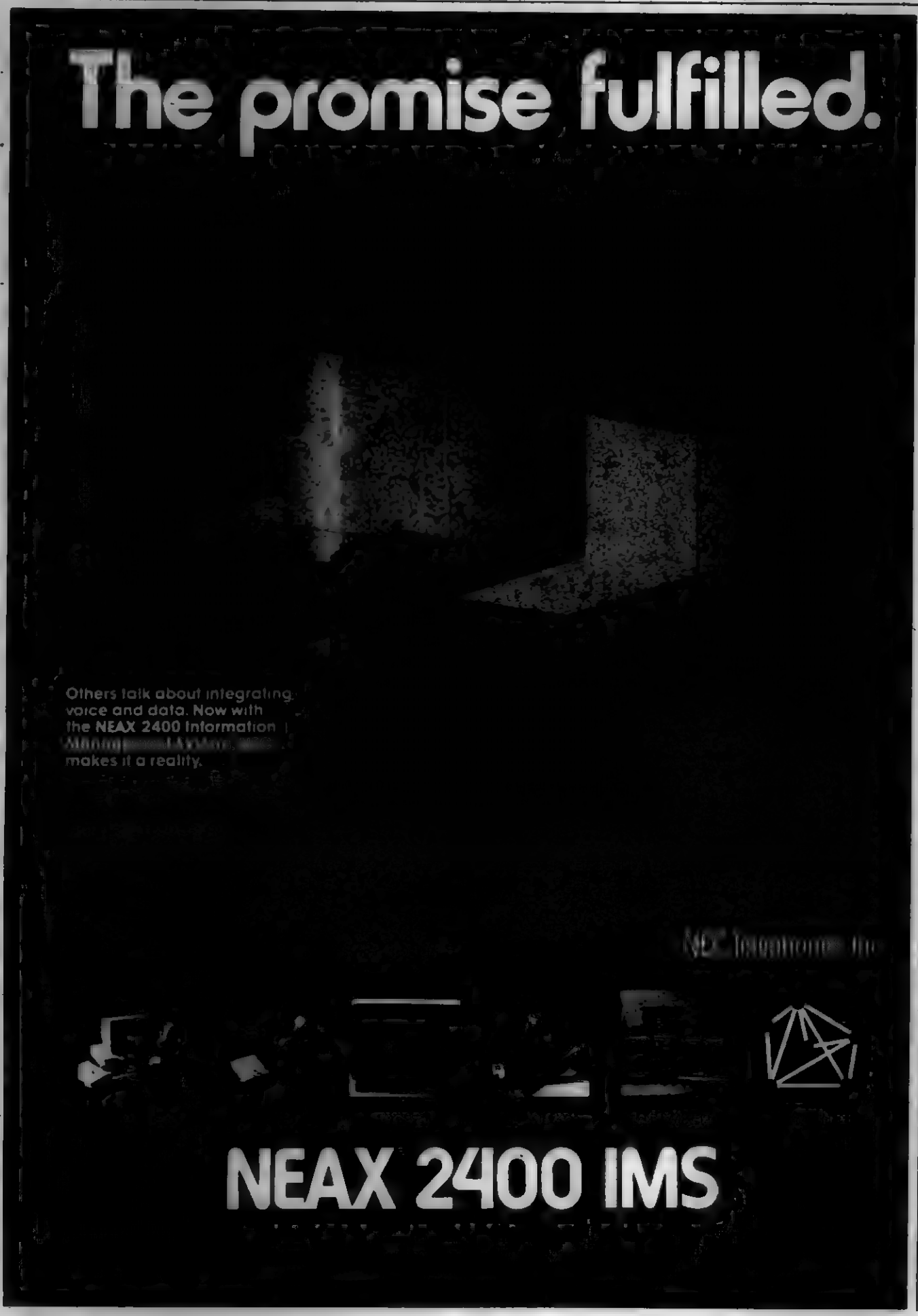
Most important, last month Apple began to ship Lisaterminal and the Apple Cluster Controller, communications packages that reportedly allow Lisa to interface with an IBM mainframe and outside data bases and to emulate the Digital Equipment Corp. VT100 and IBM 3270 terminals. Coming soon, the company has stated, is Applenet, a local-area network that will allow Apple's products to work together as a system for the first time. Smith indicated that Lisa would be compatible with other Apple products and the Unix, MS/DOS and CP/M environments in 1984.

Floyd Kvamme, executive vice-president of sales and marketing for Apple, admitted the company made a serious error in announcing Lisa five months prior to shipping. For most products in the office, he said, people want to plan in advance, but the five-month wait was too long.

Kvamme stated strongly, however, that Lisa was "not off to a bad start." He pointed out that the price reduction was not in response to criticism, but was merely following up on what Apple had promised in February. The company said it would set the price and unbundle the software once Lisa was in production.

"We probably allowed the hype to get too big," Kvamme acknowledged. "There was not a chance we were going to ship 30,000 Lisas. We've shipped between five and 10,000 since June. Is that a bad start? We don't think so."

The start, however, is not the key. Where Apple finishes in the office race is what concerns the company now. The Apple IIe, one of the industry's best sellers, will remain targeted to the home and education market. The Apple III has had disappointing sales and is reportedly going to be repositioned for vertical markets through OEMs. According to Smith, Apple realizes the Apple IIs and IIes that are in the office generally came in "through the back door" — brought in by individuals who had seen Apples at home or elsewhere. Lisa will have to come into the office through the front door, Smith said, but it will be possible to get the Lisa on the approved personal computer list of companies if users can see the machine.



Gaining access to the office will not be easy. According to industry analysts, Apple is not perceived as an office vendor and must have an organized communications strategy for its products even to be considered. Tim Caffrey, analyst at International Data Corp. (IDC), pointed out that the personal computers in the office have moved beyond the market Apple established three years ago. Management information systems (MIS) departments are more sophisticated now about personal computers and are demanding communications. Hammer added that the recent announcements by IBM and Digital Equipment Corp. (the IBM PC XT/370 and the DEC Microvax — see Page 6) will make it even tougher for a product like Lisa to be taken seriously.

"If I were a software developer, I wouldn't waste time thinking about Lisa. Events move so quickly in this industry that Lisa is already history," Hammer said.

Apple, which invested four years and more than $50 million in Lisa's development, is not about to give up that easily. In fact, Lisa's 68000 microprocessor and its facile mouse will form the basis for future Apple offerings, including the much-talked-about Macintosh. Kvamme said Apple's entire product line would have mouse interfaces in 1984.

What Apple is banking on is that if a potential buyer gets a chance to use the Lisa, it will sell itself. "We can't outmarket IBM, so we had to come up with a better product. We've got to tell the world that to buy a personal computer without seeing an Apple is a mistake," Kvamme stated." To this end, Apple has stepped up its national advertising (to the tune of $50 million) and has boosted its licensed dealers to 1,650 (dealers licensed to sell Lisas number 150, with a target of 500). "We hope that the advertising makes people aware of Apple and that the ease of use will make people push for the products," he said. "By getting a few to think that way and then a few more, we will sell our products. You don't broadside into the office."

Apple has carefully considered its options in the office. It has targeted both the market and the individuals within that market for its products. Unable to offer a systems solution like the IBMs, DECs and Wangs, Apple is looking to the individual professionals and managers in the office who have a variety of applications needs from their workstation. That knowledge worker, Smith pointed out, must not only do analysis, but must be able to communicate that analysis as well.

The combination of Lisa's innovative graphics capabilities along with the communications potential of Lisaterminal and the Apple Cluster Controller will make Lisa a very attractive tool for that line of worker, according to Smith.

The key advantage of Lisa, Kvamme added, consists of its strengths as a personal productivity tool. The fact that a user can be up and running on a Lisa in about 20 minutes and can effectively use its integrated software without complicated switchovers make Lisa worth its asking price, he said. Kvamme also stressed that Apple products are designed to allow end users to be the first line of service and support. "Lisa is a strong tool if it is put in the right place," said Rick Wohleber, manager of systems development for Rockwell International in Dallas. "On the right desk, the price can rapidly be recovered."

'We probably allowed the hype to get too big, [but] we've shipped between 5,000 and 10,000 Lisas since June. Is that a bad start? We don't think so.'

Floyd Kvamme of Apple Computer, Inc.

Unfortunately for Apple, first impressions are difficult to change. Caffrey of IDC said that the Lisa, even at $7,000 for the hardware, is still "a lot of money. It's going to be a matter of convincing people that the capabilities are really necessary. In a way, the Lisa packs too much power."

Smith said that although Lisa might seem high-priced to the home user, the OA manager views the price range for a professional workstation to be in the $10,000 to $15,000 range, and Lisa comes in on the low end of that.

Apple has also taken a pragmatic stance toward its target market. Though it would welcome business from the Fortune 500 companies, Apple is looking toward the mid-size to small organizations for a more receptive audience for its pitch. Smith explained that Fortune 2000 companies make up merely 30% of the market, and Apple would concentrate on the other 70%. "There is less of a commitment to IBM in the smaller companies; in places that do less than $5 million in revenues, MIS doesn't even exist. Since we are dealer-based, this is a more receptive market for us."

Hammer, however, is pessimistic about Apple's chances as an OA vendor in either large or small companies. "My clients aren't interested in Apple at all, and the smaller market is still uncertain. The key there is the distribution channel. Places like Businessland are the wave of the future for small businesses and the question is whether Apple will be the system of preference in those places."

For Apple to succeed on a widespread basis in the office, industry watchers believe, getting the chief executive officer to play with a Lisa is simply not enough. The DP or OA manager who brings in the systems must be the moving force behind Apple's entry.

Kvamme pointed out that if the MIS manager is the type who "tells the user what he wants" Apple could easily be locked out. But if that manager is concerned with servicing end-user needs and if there is end-user involvement in the decision making, Apple can be a major force. "DP managers are the prime vendors of systems to their companies," Kvamme said. "If a DP manager services user needs and recognizes that not everyone wants to be a technical authority, we have a good shot."

Patty Seybold, editor in chief of the Seybold Report, said Apple could get around the MIS manager if it plays up the right audience. The personal computer surge was a grass-roots phenomenon and if users stampede in the direction of Lisa, MIS will likely go along with it, she said. Seybold is skeptical of that happening: "IBM is starting to play its PC cards and the pace is increasing. It will be harder for Apple to stay afloat. Lisa technology, if not Lisa itself, might get them into the office, but Lisa users tend to be more esoteric folks — people playing with graphics. The active business person has no time to play with those things. Lisa may end up as an important OEM product."

The keys to holding off IBM for Apple are its data communications capabilities and the availability of software for the Lisa. Both areas are receiving top priority from Apple. Making good on its promise to unbundle Lisa and present opportunities for third-party software development, Apple has announced two development products, Quickport and Lisaport. According to Bruce Blumberg, manager of third-party products and development tools, Quickport provides a simple way to integrate existing applications into Lisa's world, while Lisaport is designed to create Lisa-like applications. More than 155 developers reportedly have Lisas and are at work on software.

Russell B. Aldrich, manager of Apple's MIS/Advanced Products programs, explained that Applenet, the long-awaited local-area network being developed along with Cullinet Software, Inc., had been put on hold. Originally designed as an Ethernet-based proprietary network, Apple took a step back when "it appeared Ethernet would not be the answer." Cullinet and Apple have parted ways on the deal, saying only that "the project was bigger than we both thought it would be."

Apple will modify its plans when IBM announces its network, Aldrich said. A new direction, based on a private branch exchange rather than cable-type design will be implemented. "We're not going to be the supplier of large corporate networks, so we're trying to make the connection without adding cable. We listened to our customers and their biggest fear is running more cable. The holdup hasn't set us back very far. The network should be announced and ready to go in the first or second quarter of '84," he said.

It is clear that 1984 will be a critical year for Apple. The Macintosh, reportedly a Unix-based, more constrained and less expensive version of Lisa, is expected to have a major impact on the company's future. Steven Jobs himself, Apple's 28-year old cofounder, is heading up the Macintosh effort. Apple's other founder, Stephen Wozniak, has returned to the company after a two-year hiatus; his return is said to bespeak the seriousness with which Apple views its current situation.

With IBM unwrapping its big guns, industry analysts remain skeptical of Apple's chances in the office. As Caffrey of IDC declared, "They have their work cut out for them." OA

Rifkin is staff writer for Computerworld OA.

Don't Be Fooled By PC Buying Myths

By Richard Strauss

Seeking help with the myriad tasks threatening to drown him, a businessman enters a computer store. He emerges an hour later, a bemused expression on his face, a collection of computer magazines under his arm and a flock of esoteric computer terms circling his brain. Instead of finding the help he sought, he is wondering where he will ever get time to learn enough about computers to define what he needs. Inside the store, the salesman is satisfied that he has started another potential customer down the road of self-education in the arcane art of selecting and using a computer.

Actually, the salesman trapped the businessman in one of the most common computer myths, the idea that the customer must be able to define his needs in computer terms before he can select the machine he wants. The businessman will now spend months educating himself, using time he could more profitably have devoted to his business or family. In the end, he may be hopelessly confused. If he does pick his way through the technical terms, he may weigh himself down with equipment that may or may not actually help him. He has not saved time — he has acquired a new and unwanted hobby.

A number of myths surround the purchase of a personal computer, and buyers need to be aware of them. For example:

1 ***You have no business buying a personal computer if you don't know the difference between a byte and a bit or a floppy and a Winchester and if you can't specify how many bits and bytes you want on them.***

Every day, salespeople convince small computer customers that something is wrong with them because they do not know computer terminology. The problem actually lies not with the customer, but with the computer industry. Purchasing a computer should not be any more complex than buying a car. When you go to the automobile showroom, the salesman doesn't demand that you talk about compression ratios, gearing and other esoteric subjects. Instead, you discuss your transportation needs. After these are defined, you try out the car to see if it feels right and does what you want it to do.

The computer salesman should do the same thing. Instead of talking about bits and bytes or floppies and Winchesters, he should help define needs in the customer's terms, then guide him to combinations of computer equipment and programs that will meet those needs. Dealing with technical terms should be the salesman's job, not the customer's. This is most applicable to the one-person/one-machine situation. If multiple units are being bought to fit into an organization's overall system, the situation becomes more complicated.

2 ***You must read large numbers of assorted computer magazines before you will begin to know what you want.***

Computer magazines are informative: They can help the potential first-time purchaser understand what his computer can and cannot do, and they can suggest new, cost-effective applications to those who already own computers. However, such magazines can also draw the purchaser's attention away from what he wants to do with the computer.

The first-time user should find a publication that offers an appropriate comfort level. Available choices include general computer magazines and a number of specialized publications that cover the use of computers in specific businesses.

3 ***The higher the price, the better the machine.***

Attempting to learn computer terminology is not the only possible trap awaiting the potential purchaser of a desktop computer. Just as harmful

Purchasing a computer won't be so hard if you remember that your application needs should determine what you select. And . . . if you don't believe everything you hear.

is the idea that higher price necessarily means better quality. New and more powerful personal computers are being developed constantly. As each comes on the market, older models are labeled outmoded and their prices are cut. The microcomputer that sold for $5,000 two years ago costs $2,000 or less today, but newer machines are selling for the same $5,000 and are commonly regarded as inherently better because they have more computer "power."

Actually, they may not be better. Sometimes the higher price is based simply on what the market will bear. And the lower priced alternative will do the same job equally well. Furthermore, a machine that is better in absolute terms may not actually offer a particular purchaser any real advantage over a lower priced and less capable model. Computers come in all prices and sizes. The model that handled a task efficiently last year is not necessarily outmoded just because a newer machine is now available. If the task is the same, the old machine can do it just as well this year and may be the most cost-effective choice.

Software is another major concern. Often, small computers appear on the market with practically no available programs. If a buyer selects one of these he may have the latest in hardware, but he will not be able to do much with it until the software for his word processing, bookkeeping and other needs becomes available. A $5,000 paperweight is no bargain.

4 *Wait to buy a personal computer because, with prices going down, you will get more for your money by waiting.*

This is the opposite of the "more-expensive-is-better" approach. Because computer prices are dropping, the buyer is always better off waiting a few months for a better deal, according to this myth.

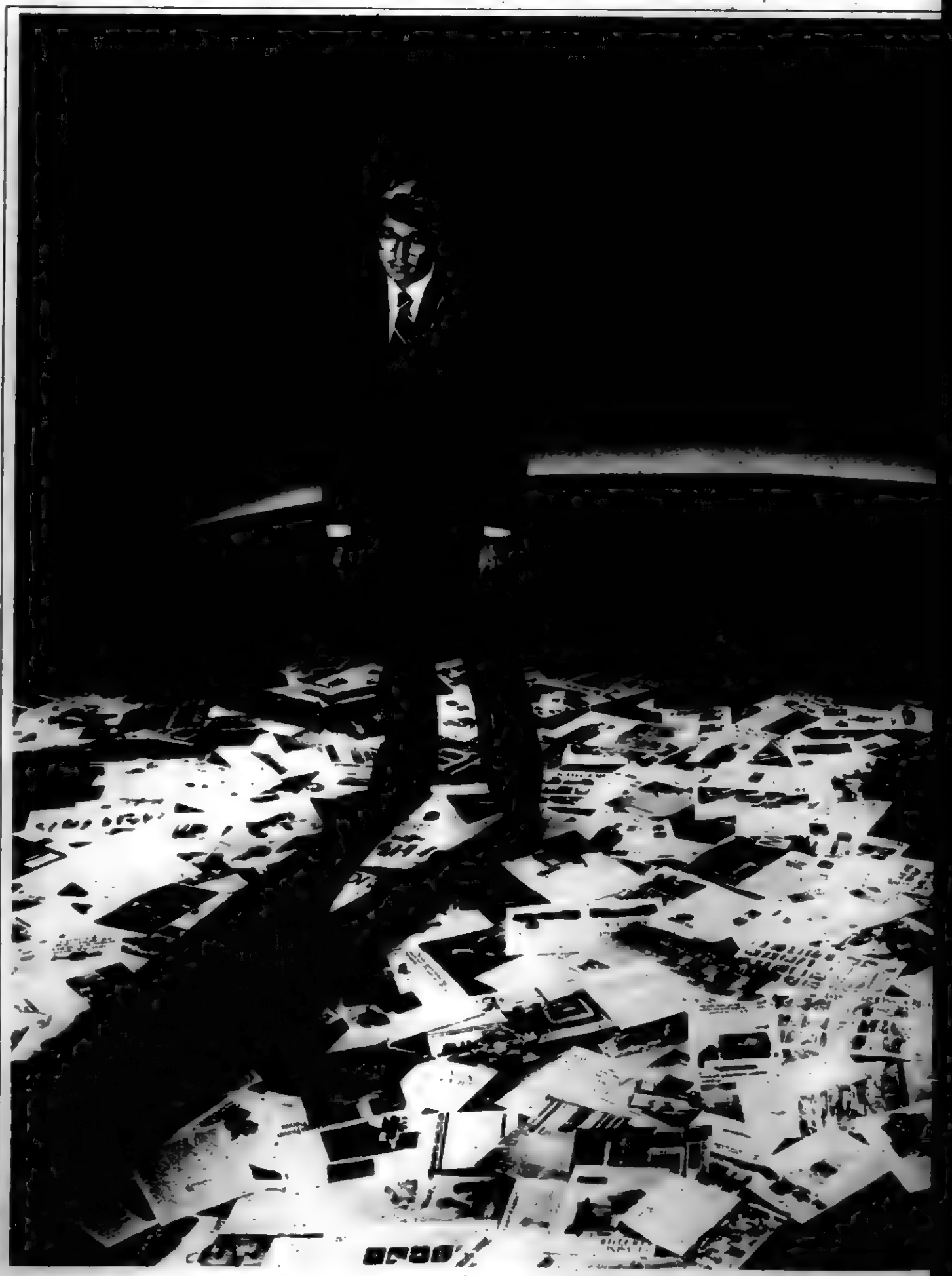
The three-decade drop in the price of computer power is one of the most spectacular events in the post-war economy. In spite of often horrendous inflation rates and generally top pay on all levels of the computer industry, the headlong development of new electronics technologies has caused computer prices to fall precipitously — and the end is not in sight. Eniac, the first true electronic computer, cost millions of dollars in 1946. Today, more powerful machines are being sold for less than $2,000 in retail stores. Tomorrow, the price may be down to $500.

Against this background, it is often tempting to put off a computer purchase. A year from now, that machine and its peripherals and programs will all cost much less; the money itself will be worth less. If the purchase is barely cost-justified today, it will be a bargain in a year.

Such a belief is based on a failure to look at the company's needs. If the computer is cost-justifiable and time-justifiable today, it will save the company more money than it will cost. If the purchase is put off a year to save $3,000 in purchase price, but the company loses $50,000 in efficiency for lack of that computer in that year, the net result is a loss, not a small saving. Also, the user will be that much further behind in expertise on the computer and will still be doing his job the "old-fashioned" way, while his competitors are already using a computer.

5 *You need to find specific packages for your precise needs.*

Because general software won't satisfy these



needs, you should buy the personal computer that offers the most software.

Having heard this myth, the computer purchaser tries to find software that fits his needs precisely in order to use his computer effectively. This attempt leads the purchaser to believe that the computer with the most software available is the best choice. It also often leads him back to the myth that he must thoroughly educate himself on computers — or at least software — before he can buy anything.

In fact, most business needs may be effectively met with general, off-the-shelf software available for all business microcomputers. The same WP program can be used effectively for composing letters and business reports. The same electronic spreadsheet can handle the bookkeeping needs of a variety of businesses. Even if a particular program does not meet your needs precisely, it may add so much efficiency to your operation that it will still be of great value. The relevant question, therefore, is not what computer has the most software available, but what computer can most cost-effectively fill your needs.

Choosing a system is a three-step process. The first and most important step is carefully defining your present and future needs. This is the basis of effective computer purchase and it is the one step you must do yourself. You should define your needs in business terms, not in computer language.

After you have defined these needs, you can begin the second step — working with computer sales people to determine what software fills those needs.

The third and final step is selecting the computer hardware that, at the least cost, most adequately runs this software. The selection may be the latest machine on the market or a dependable older design. It may have many extras or it may have few. The important thing is that it will do the job at less cost and with maximum efficiency.

One effective way to define your needs is to answer a list of questions based on the capabilities of the small professional computer. A general list cannot cover all special needs, but it can help you to decide what basic uses you may or may not have for a microcomputer.

• Are you keyboard literate?

If you refuse to use a keyboard, you will have no personal use for WP — although your secretary may find it invaluable. You may want to use a touch-screen system that allows you to order the computer to complete selected functions or to find certain information by touching the correct order on the screen.

On the other hand, if you type well and prefer to compose your own letters and reports, you might find WP alone will justify the cost of your desktop computer. Any good WP package will double to triple the speed of composition and editing and will produce a better looking, error-free final draft.

• Would you like to prepare your own presentation? If so, would you like to make your own graphs and illustrations?

If you enjoy these activities, you will want a graphics package to create the kind of graphs you like from data you feed into your computer. If you also want to draw pictures, you will need a more advanced package.

• On what media do you want your graphs and illustrations to be presented?

Different computer peripherals will allow recording on 35mm film, transparencies or printed on paper.

• Where will the data

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and text for your presentations come from? Who would you like to review and edit your pieces? If you are taking your information from a central mainframe, it makes sense to connect your desktop machine to it with a network. This setup will allow you to get what you need on demand without having to reenter data at your desk.

If you want your boss to read the drafts you prepare, it may be more efficient to network your desktop machine to his and send the drafts directly from one computer to the other.

• Do you prefer to dictate your drafts or editing changes or to write them on the keyboard? When you review a draft, would you like to hear your dictation while you read the typed text? If you answer yes to these questions, you may want to consider a voice digitizer, which allows the computer to record and replay voice messages. For example, a voice digitizer can be used to edit copy on screen, using a program that marks a piece of text to be changed automatically when you dictate the change. When your secretary goes through the text afterwards, the digitizer plays back your comments as each marked passage is reached.

• Do you do a lot of comparisons of figures — experimental, budgetary, statistical or financial? Where do these numbers come from? If you do much work with figures, you will want either an electronic spreadsheet that allows you to set up your own system or some sort of specialized software package to run the comparisons for you. If your figures come from a central computer, networking your machine to it will greatly increase your efficiency. If you use financial models constantly, you will probably want a specialized financial modeling program.

• Do you use the phone often, and do you play telephone tag? Are you flooded with message slips? Would you like to prioritize phone calls?

One way to get rid of telephone tag is electronic mail, which allows you to send written messages either directly to the other person's computer or to a central storage data base. The central storage allows you to avoid constant telephone calls by storing messages for the recipient to receive when he is available. This setup also overcomes the problem of conflicting time zones.

Another way to avoid the flood of message slips is voice digitization connected to the telephone lines. With this system, the computer can record incoming messages and prioritize them for you, avoiding paper message slips.

• Do you keep tickler files, or do you wish you kept them?

Computerizing a tickler file system removes the drudgery from the task and ensures that nothing is lost or overlooked.

• Do you wish you had access to timely information like airplane schedules or stock and bond prices?

After you have defined your needs, the best way to know if a particular personal computer will meet them is to try it.

If so you may want to subscribe to a data base management program to keep and automatically cross-reference those files.

• Do you solve complex formulas on a calculator?

If all you do is add and substract, a hand calculator is your best answer. If you need to handle complex mathematical functions, a calculator program for your computer may be a great aid.

Other questions to ask are how important are the time-zone problems in communicating; do you know what a financial model is, and do you use them; and do you keep a set of your own personal files of information.

After you have defined your needs, the best way to know if a particular personal computer will meet them is to try it. Computer manufacturers should be able to demonstrate how their equipment can solve your problems. In addition, their retailers have excellent demonstration systems and services. The situation will vary according to your needs, but they may offer to let you try the system in your office. These special efforts by manufacturers and retailers mean they are serious about helping to solve your business problems — not just about selling you a computer. OA

Strauss is marketing manager of the Personal Computer Group at Digital Equipment Corp., Maynard, Mass.

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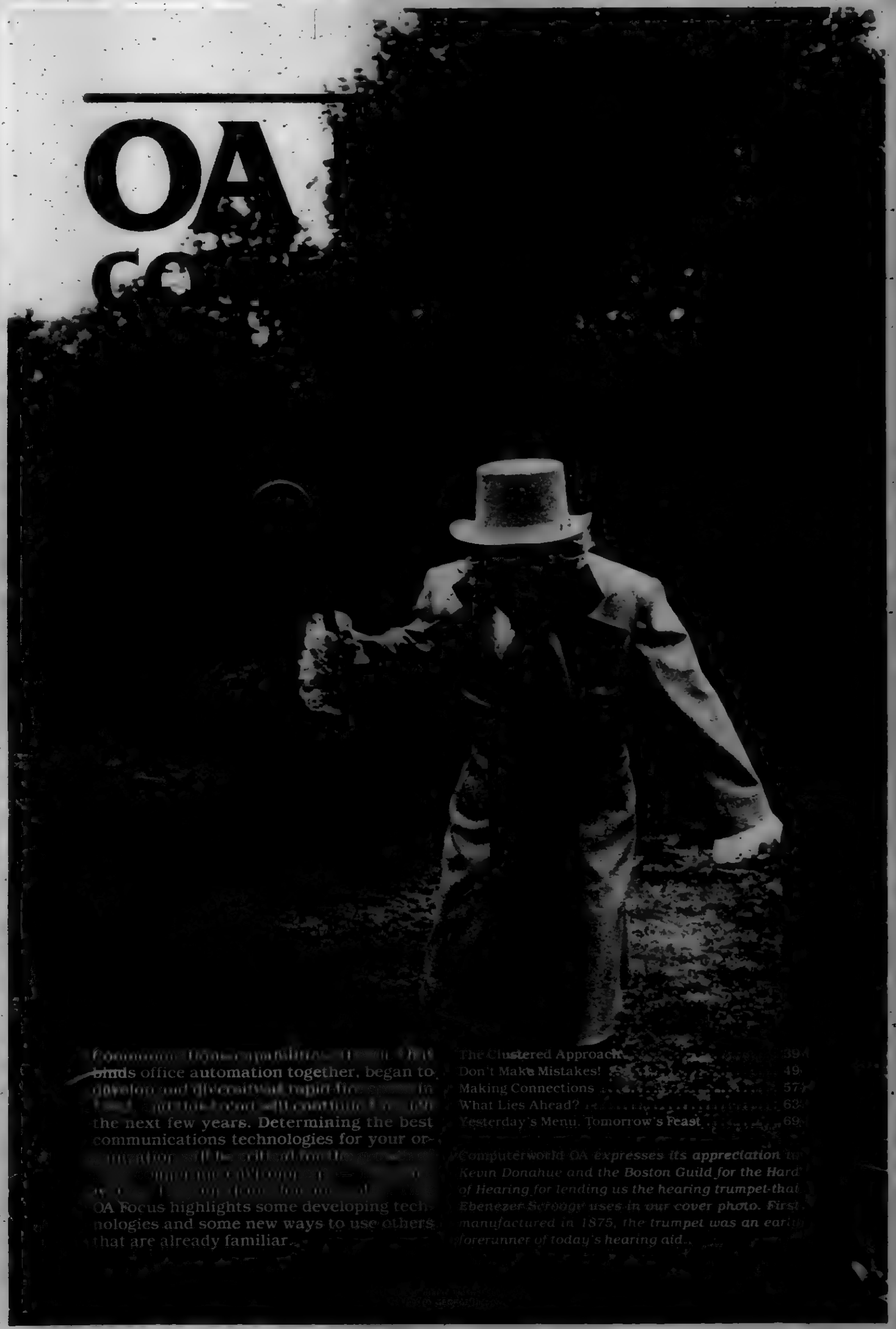

Communications capabilities that unite and office automation together, began to develop and diversify at rapid-fire speed in the past year and will continue to do so in the next few years. Determining the best communications technologies for your organization will be critical to the success of your office automation efforts.

OA Focus highlights some developing technologies and some new ways to use others that are already familiar.

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Yesterday's Menu, Tomorrow's Feast 69

Computerworld OA expresses its appreciation to Kevin Donahue and the Boston Guild for the Hard of Hearing for lending us the hearing trumpet that Ebenezer Scrooge uses in our cover photo. First manufactured in 1875, the trumpet was an early forerunner of today's hearing aid.

If you're buying communications products, something's coming to you this February that will make your job a lot easier.

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Designed to give you a valuable, one-stop information source for communications vendors and products, this *Buyer's Guide* includes all the tools you need to make the right communications choice:

- Software and hardware product listings, including multiplexers, modems and couplers, PBX's, protocol converters, communications processors and many more . . .
- Vendor profiles that include company name, address, contact information, and primary markets served.
- An industry-specific editorial section that's designed to keep you right up to speed on communications. We'll give you an overview of communications processors. We'll examine things like the near-term and future impact of communications on organizations. You'll get a concise look at the major product offerings from a user perspective and an expert's look at the most important issues in the communications marketplace.
- In addition to its comprehensive listings and editorial, the *Computerworld Buyer's Guide* will give you pages of detailed ads for communications products that you can refer to all year long.

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BUILDING MICRO NETS

THE CLUSTERED APPROACH

By Aaron Goldberg

One of the first peripherals to be attached to the personal computer after floppy disk drives and printers was the modem. This device opened a completely new range of computing vistas for the personal computer user. Although the low-speed modems of the late '70s are now a thing of the past, the emphasis and planning needs for personal computers have grown exponentially, culminating in the personal computer/3270 clustered workstation.

Management information systems (MIS) planners must comprehend and examine a number of separate issues when planning for personal computer use as part of a com-

munications, coherent network.

The most important of these factors are the following:

- Standardization of personal computers.
- Data security and integrity.
- Examining the communications type and environment.
- User interfaces and training.
- Identifying applications.

In the following analysis, we will examine each of these sections in detail and provide information on the present level of development and the likely migration within the next 12 months.

One key consideration in setting up a useful communications network of personal computers is ensuring that the personal computers used in the organization are not so diverse that they make interconnection impossible.

If the brand selection process is not limited in some way, totally integrated communications may at best be a dream.

This may seem to be an elementary point, but it is of primary importance. If the base of devices to be interconnected is too diverse, other planning efforts will be in vain. In most organizations, significant ad hoc purchases of personal computers have been made and continue to be made.

If the brand selection process is not limited in some way, totally integrated communications may at best be a dream.

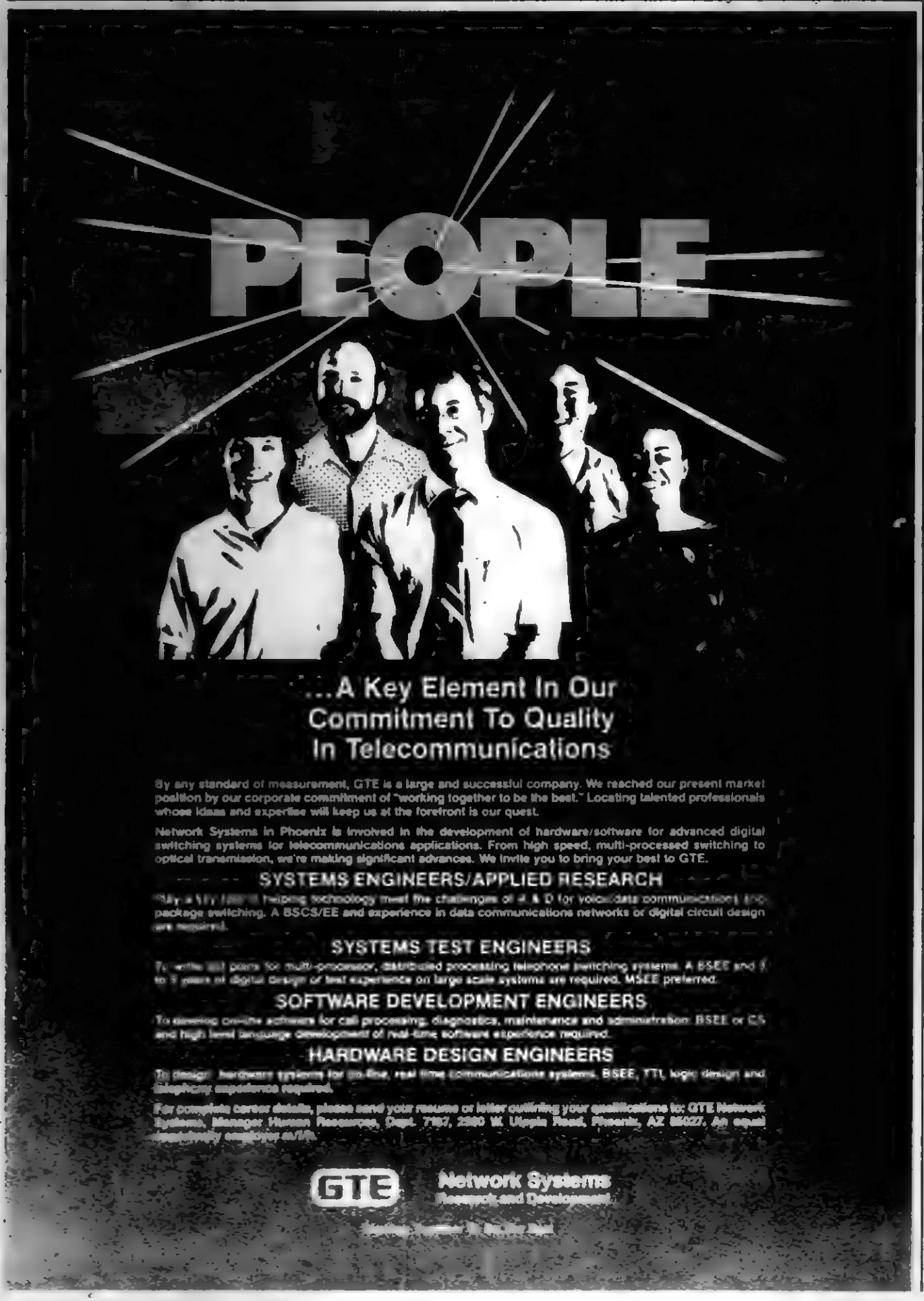
Although no single philosophy of controlling personal computer purchases will work across all organizations, a number of different methods of approaching the situation will provide the desired results. One useful approach has been proactive planning, a generic factor in approaching the brand selection process for personal computers.

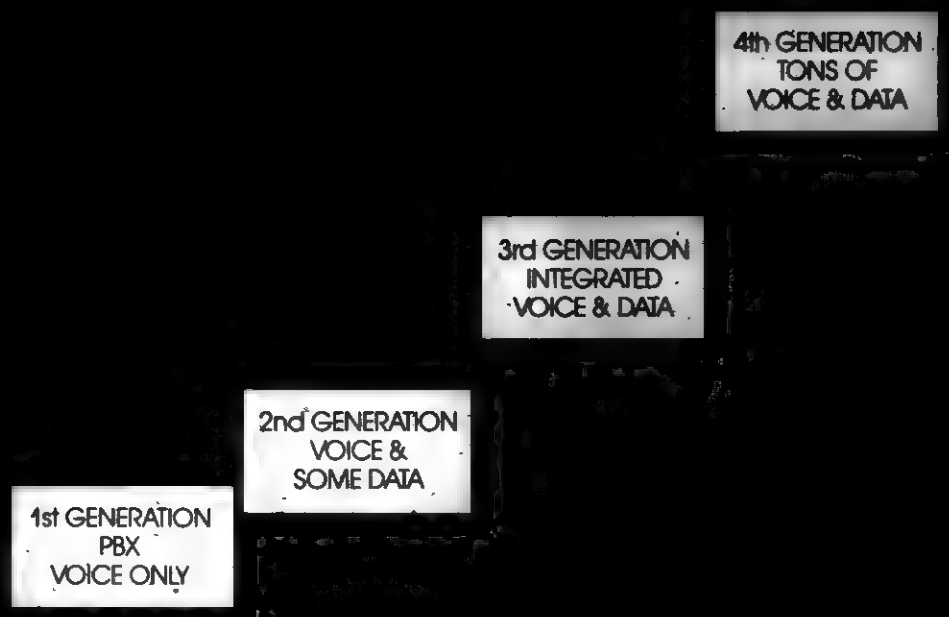
In proactive planning, potential users are identified and contacted prior to the beginning of their decision-making process. Proactive planning can also allow the MIS organization the luxury of true planning rather than reacting to the situation.

Even with the so-called "all-connective" networks, problems will occur. These problems will mainly involve less popular equipment, which the manufacturer's or third party's specific network interface was not built to handle.

Security is the largest fundamental operational problem in the use of personal computers with mainframe data and access. There are numerous worries concerning obsolete data, theft of data and access to confidential data. Each of these concerns is magnified as the number of on-line users with some access to the system increases.

Many MIS organizations with dynamic data bases are concerned that decisions are being based on data that has changed in some proportion since it was downloaded from the host data base. It is usually difficult to fix blame for this problem. In many cases, users are unaware that the data is updated as frequently as it is. In other instances, the data may be subject to wide cyclical fluctuations; taking a





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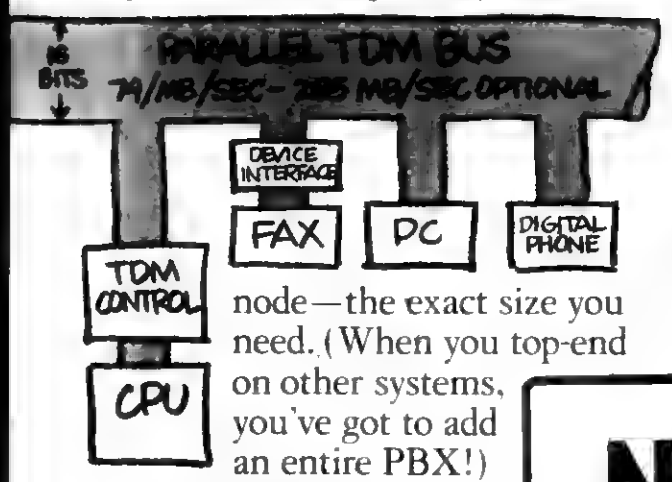

node—the exact size you need. (When you top-end on other systems, you've got to add an entire PBX!)

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BY THE TIME SERIAL ARCHITECTURE GETS TO THE DESK THE PATH IS VERY SMALL

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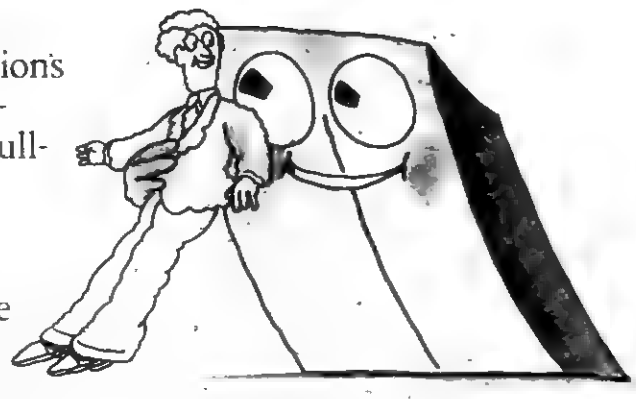
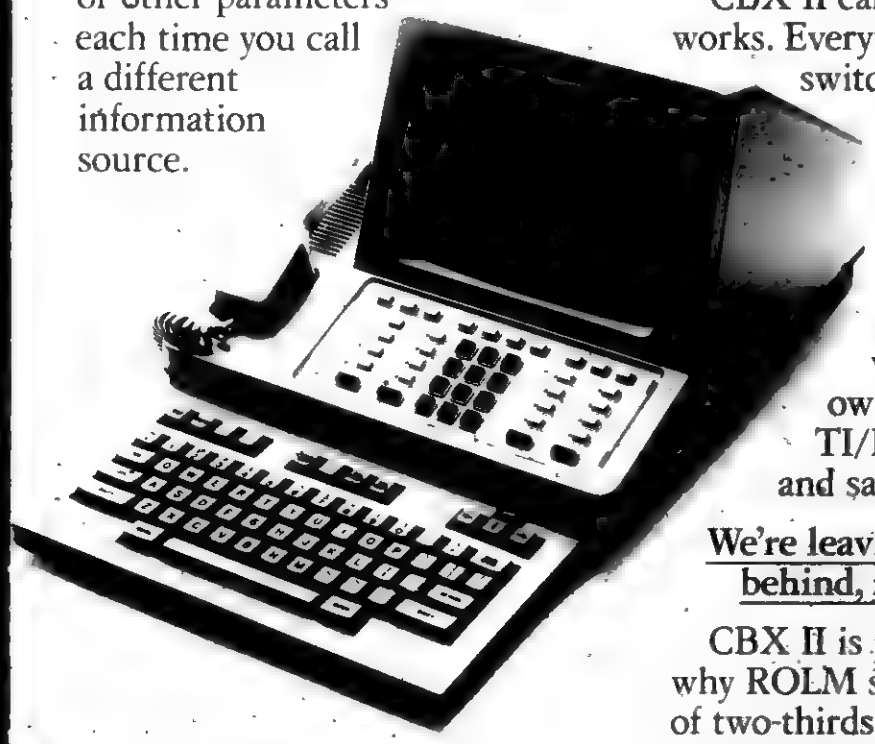


Auto-dialing of computers and data bases makes calling your computer as easy as calling home.

You can pre-store log-on sequences and terminal profiles, so there is no changing baud rates or other parameters each time you call a different information source.



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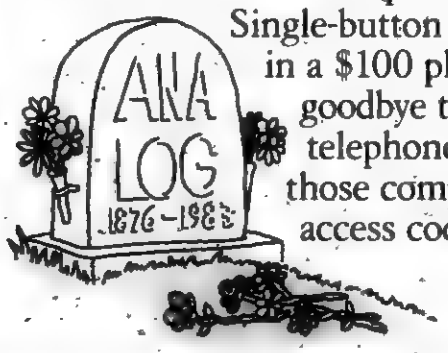

Or the ROLMphone 240—more feature buttons, multiple lines, and a built-in, hands-free speakerphone.

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"snapshot" of any period in time will be misleading.

The theft of data in a machine-readable format has long been a problem for the MIS organization. In the past, the worries were relegated to the data center itself and to those who would be able to take a computer tape from the facility. With personal computer access and the ability to store a megabyte or more on a floppy diskette, however, more leaks in the organization can occur.

Because of the remote and relatively unsupervised operation of the personal computers, there is greater belief that theft can and will occur.

The one area in which the MIS organization has the greatest opportunity to prevent concern is that of unauthorized access to confidential data. It is unlikely that a data base that has been secure against past intrusion will be intruded upon by the mere presence of personal computers. Problems can occur, however, when coworkers exchange passwords for certain applications. This practice can be especially dangerous if supervisory personnel allow their passwords to be known. Education of new users should be mandatory when they are allowed mainframe access.

As stated earlier, the 3270 will be a major method of communication between mainframes and personal computers. Whether it is the best alternative has yet to be proven. Understanding the personal computer user's present communications needs helps to shed light on this question.

Most of today's personal computer users' applications tend to be stand-alone. Host communications becomes necessary to download files and other information in a batch mode.

Because very few corporate users are presently in a highly interactive environment, the 3270 may not be the ideal communications medium for the personal computer user organization in a large organization. Local-area or work-area networks with a 3270 or Systems Network Architecture gateway may well be the best solution to this problem.

Research into local-area network use tends to support this theory. In most cases, the local-area network supports fewer than 10 users, and they all share some information. In the large organization, an environment in which 10 users share the network and gateway could lead to efficiencies in the use of 3270 lines and could allow the MIS group to extend some control over the data that resides on the network disk.

The thought that personal computer users should have the equivalent of an Irma board (Technical Analysis Corp.'s coaxial cable link between Personal Computers and 3270 networks) highlights the fact that the personal computer users all have the wrong device — a 3278 or 3178 might have been a better choice.

Because of the remote and relatively unsupervised operation of the personal computers there is greater belief that theft can and will occur.

An additional argument for providing the 3270 capability as an unseen background task to the user is the training required to make all personal computer users conversant in 3270 syntax. The mere thought of training 500 non-DP personnel in this environment is frightening.

The problem of designing the user interfaces and providing training in the use of communications cannot be overlooked. One major reason for buying a solution to this problem is that at many large organizations, the MIS staff does not have the time or the talent to design the personal computer user network right now. In addition, if the development project takes 18 months to complete, it will be impossible to implement the system fully because of the

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number of ad hoc networks that will exist by the time it is completed.

This is an important point. In the same ways that personal computers appeared on an ad hoc basis, personal computer networks or communications schemes will also appear. A major impetus to purchase a communications capability for personal computers, rather than have MIS design one, is that the purchased system can be implemented now.

To ensure that the personal computer communication integration scheme is well received and is put to use, applications with broad appeal to the user community must be implemented. This means categorically that the applications will be oriented toward some type of office productivity application.

To ensure that the personal computer communications integration scheme is well received and is put to use, applications with broad appeal to the user community must be implemented.

Such applications allow the user organization to achieve some measurable gains in the productivity of workers; more important, they generate among these workers not only the perception but also the fact that the personal computers are truly doing something useful.

Electronic mail is the first application many large users implement. Electronic mail solves the telephone tag problem or alleviates delays of interoffice mail. In addition, the application is generally easy to learn and has fairly simple operational demands. The positive aspects of being on the network also allow users of the communicating personal computers to generate interest among nonusers; in addition, they function to reduce the anxiety levels of those who fear personal computers in particular and all computers in general.

Personal computers are used primarily in the office environment of most large organizations; if that is understood, the particular company can develop applications suited to its office needs. Reporting systems, calendars that tie to vacation and sick day reporting and information broadcast are additional applications that have worked for some organizations. The application should be chosen according to three criteria:

- It should be used at least once daily.
- It should be an automated replacement for a manual application.
- It should have accessability to a wide user group.

In summary, large organizations with large numbers of personal computers installed will have a definite need for communication. The form of this communication for office productivity applications will be difficult to predict, but will probably use some kind of 3270 protocol for communications with the host.

The existence of the 3270 gateway is virtually assured with the renewed dependence upon the central MIS organization for keeping track of data, communications and management of computing resources. However, the existence of subnetworks of some other type of communications protocol will also be virtually assured.

For MIS organizations, the time is now for implementation of communications capability and the linking of personal computers.

There are steps that any organization must take to ensure the security of data and the coordinated use of the mainframe installation. However, if too much time is taken in providing these capabilities, users will then take network design matters into their own hands and will create the potential for chaos. OA

Goldberg is research manager at International Data Corp.'s Santa Clara, Calif., office.

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BLOCKING VS. NONBLOCKING

DON'T MAKE MISTAKES!

By Sally Pringle

Not so very long ago, the private branch exchange was a simple telephone company-controlled electromechanical device used primarily for voice communications. Those days are far behind us now. Today's PBX is a customer-controlled digital communications system capable of transmitting simultaneous voice, data and, eventually, video signals over a standard two-pair telephone wiring network.

Office communications systems have evolved over separate but parallel paths. Voice and data systems are now converging. State-of-the-art PBX today provide a cost-effective approach to integrate the traditionally separate

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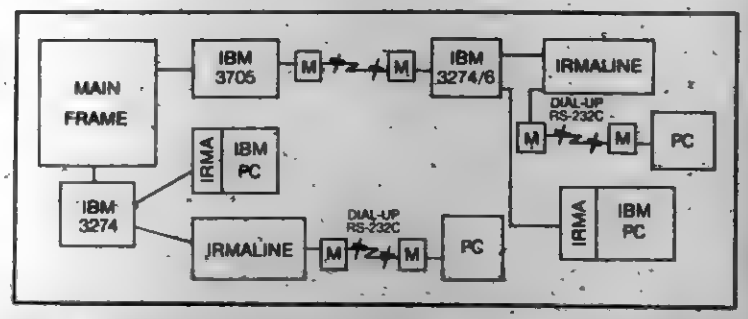

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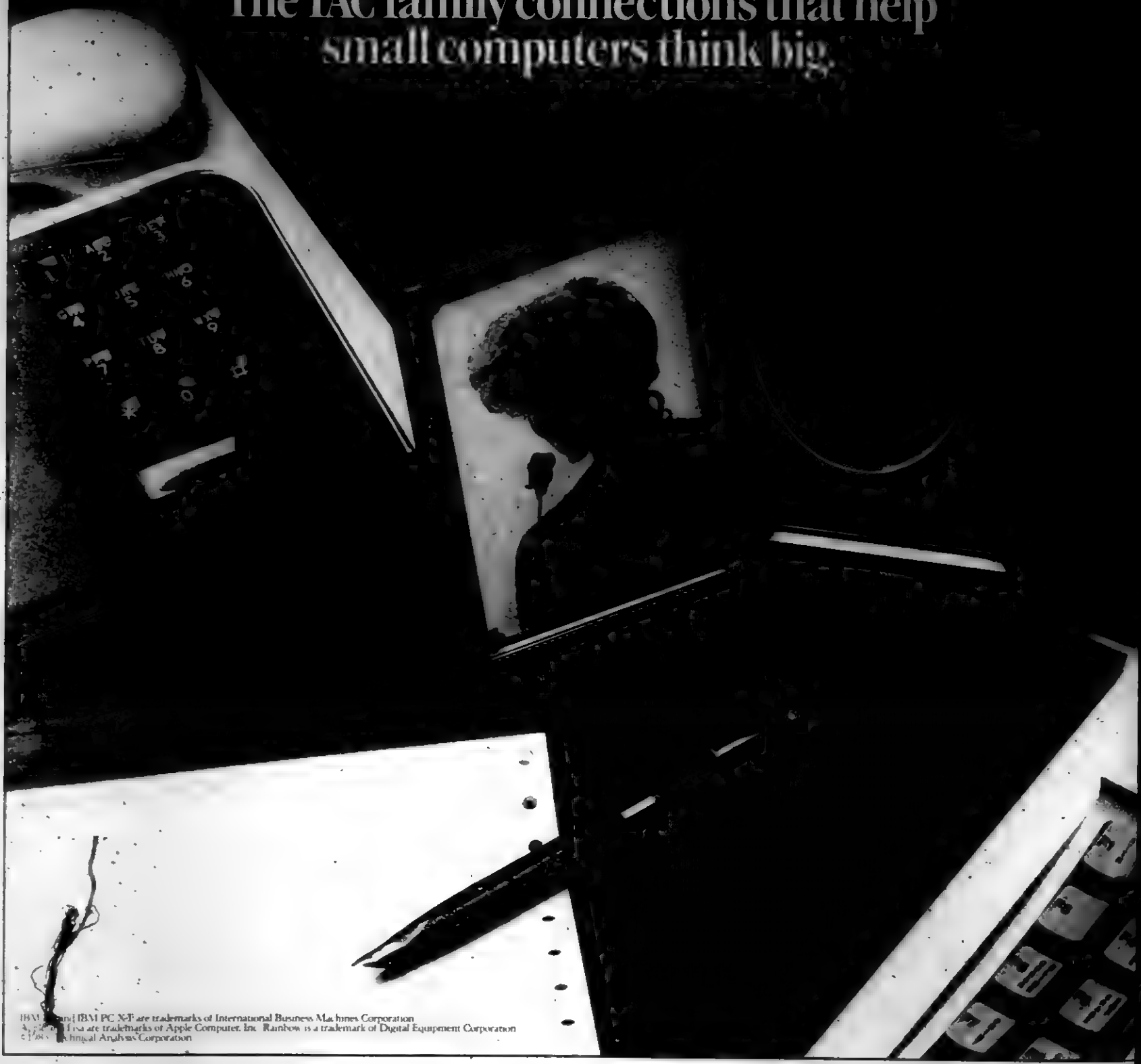

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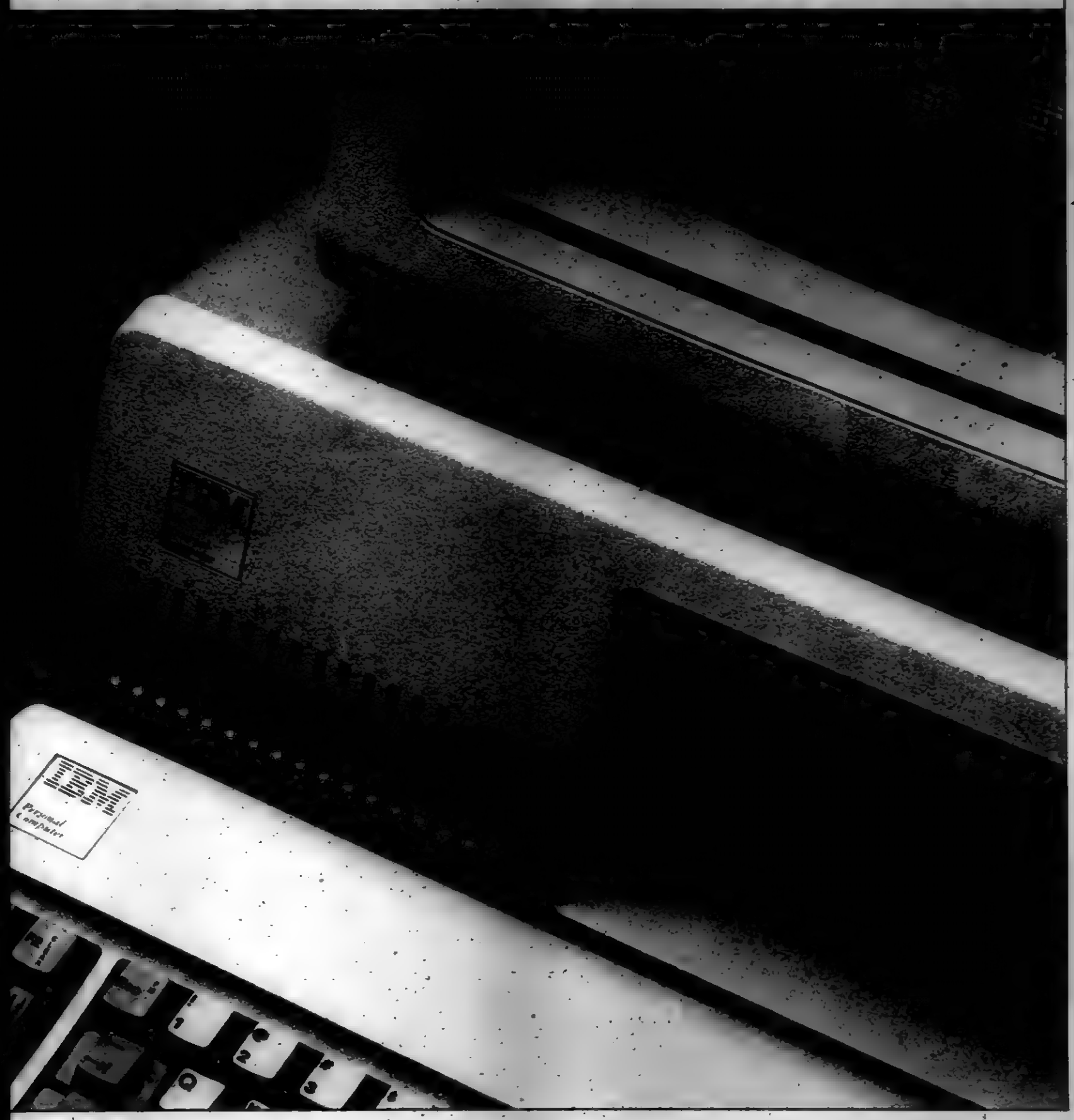

technologies of voice, data and office automation into one manageable system.

Utilization of high-speed, nonblocking switch matrices allow high-speed data transmission over common telephone wiring. This is a driving force for further expanding the PBX role as a local-area network. Utilization of inexpensive and existing two-pair telephone wiring eliminates expensive conventional coaxial cable data networks and facilitates ease of expansion.

Virtually every desk is already wired for telephone and, therefore, for data service. In addition, advanced PBX technology is capable of supporting more workstations overall than any other technology at a competitive price per line while supporting a multitude of different vendors' products.

The ability of the PBX to support voice and data transmission simultaneously without degradation of service depends on whether the basic design of the switch is blocking or nonblocking.

A blocking switch physically cannot allow 100% access to all users; instead, it restricts the number of users allowed through the switch at any one time. Once all traffic paths are in use within the switch, additional users are blocked by a busy signal and not allowed on the system.

A nonblocking switch will allow all voice and data devices installed on the system to be in use at the same time. System capacity is not affected by physical connection patterns and the addition or deletion of voice or data devices will not require traffic engineering. Real-time processor capacity is sufficient to handle the maximum expected volume of voice-and-data traffic. Many interpretations

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Smartmodem 1200 for all computers with an RS-232C interface; Smartmodem 1200B plug-in board for the IBM PC.

Smartmodem Specifications
Low Speed Data Format: (Smartmodem 1200 and Smartmodem 300) Serial, binary, asynchronous. 7 or 8 data bits, 1 or 2 stop bits, odd, even or no parity (0-300 bps).
High Speed Data Format: (Smartmodem 1200) Serial, binary, asynchronous. 7 data bits, 1 or 2 stop bits, odd, even, or fixed parity or 8 data bits, 1 or 2 stop bits, no parity (1200 bps).
Dialing Capability: Touch-Tone® and rotary-dial pulse dialing.
Command Buffer: 40 characters.
Commands: (unnecessary with Smartcom II software) A: Immediate answer. A/: Repeat last command. C: Transmitter Carrier. D: Dial command, including simple dialing, waiting for second dial tone, auto-dialing and other features. E: Local echo. F: Full/half duplex. H: Switch hook. M: Audio monitor. O: On-Line. P: Pulse dialing. Q: Quiet mode. R: Reverse originate/answer mode. S: 17 "Set" commands speed, escape code character, number of rings to answer on, etc. S?: Checks operational parameters above. T: Touch-Tone dialing. V: Verbal result codes.
Result Codes: (can be numerical/verbal): 0/OK: Command line ok. 1/Connect: Carrier detected. 2/Ring: Phone is ringing. 3/No Carrier: Carrier lost or never heard. 4/Error: Error in command line. 5/Connect 1200: Carrier detected at 1200 bps. (Smartmodem 1200 only)
Audio Monitor: Two-inch speaker with volume control.
Rear Panel: On-off switch, power jack, RS-232C connector, modular phone jack connector, volume control.
Operation: Full or half duplex.
Data Rate: 0-300 bps and 1200 bps for Smartmodem 1200; 0-300 bps for Smartmodem 300.
Interface: RS-232C.
Intelligence: Z8™ microprocessor with 4K byte control program for Smartmodem 1200. Z8 microprocessor with 2K byte control program for Smartmodem 300.
Modem Capability: Bell System 103 or 212A compatible originate or answer mode for Smartmodem 1200; Bell System 103 compatible originate or answer mode for Smartmodem 300.
Receive Sensitivity: -50dBm for Smartmodem 1200; -45dBm for Smartmodem 300.
Transmit Level: -10dBm.
Registration: FCC registered for direct connect to the nationwide phone system. Connects with modular jacks RJ11W, RJ13C, RJ12W, RJ12C, RJ13W, RJ13C.
Power Pack: U.L. listed 120VAC, 60Hz, 13.5VAC output.
Size: 1.5" × 5.5" × 9.6"

(some of which are self-serving) exist for this relatively simple concept among PBX vendors today, and they should be clarified.

Industry controversy over whether a blocking PBX can adequately handle data in addition to voice traffic ended with AT&T's announcement of Release 2 software and hardware for the System 85. Release 2 gives customers the option to select a nonblocking matrix at additional cost.

Three configurations are now available: the original blocking mode, with a one-in-500 chance of blocking; a new "essentially nonblocking" mode, which costs 5% extra and has a one-in-a-million chance of blockage; and a new nonblocking mode, which frees time slots on approximately 4,000 ports for open connections.

Many vendors' voice switches can accommodate "add-on data" capabilities, and they claim these switches can be configured to be "virtually" or "essentially" nonblocking, as in the case of System 85's essentially nonblocking architecture. The System 85 can be installed initially with a one-in-a-million chance of blocking, but fluctuations beyond original voice or data traffic predictions can substantially alter the blocking odds at any given time. This can mean extensive ongoing traffic engineering throughout the life of the system.

To explain the predominance of blocking architectures in today's highly competitive PBX market, it is necessary to trace the evolution of the basic switch. This is normally done by generations; because of advertisers' hype, however, judgments should not be based on these indistinct categories. The term "generation" is simply a convenient way to mark major technological industry trends and changes.

All systems built prior to 1975 are considered first generation. They are voice-only and employ analog circuit-switching technology. AT&T's Dimension typifies this kind of PBX.

These switches were not designed for data and can transfer it only through modems. This, of course, does not integrate voice and data, but transmits each separately over a different path. The result is often a separate data wiring network established and maintained in addition to the voice network, at double the total network expense. Another serious problem here is that modem-controlled data transmission is expensive and limited to relatively low speeds.

Second generation refers to digital PBX systems introduced between 1975 and 1980. Representatives of this type of switch include Rolm Corp.'s CBX family and Northern Telecom, Inc.'s SL family. These switches employ computerized techniques to convert analog voice signals to digital code for digital transmission through the switch.

Although these switches were orginally designed to be voice-only, they have been modified to allow add-on data. Because voice and data are integrated at the switch rather than at the telephone, additional cabling (up to five pairs in some cases) is required between telephone and PBX to perform data switching functions.

However, for numerous reasons, data comes at great expense to these systems.

First, separate ports are required for voice and data, which degrades system size and performance.

Second, these systems come equipped with 8-bit or 16-bit processors and they were originally sized for voice-only call processing. Often these proprietary processors simply were not designed to handle combined voice and data, which can result

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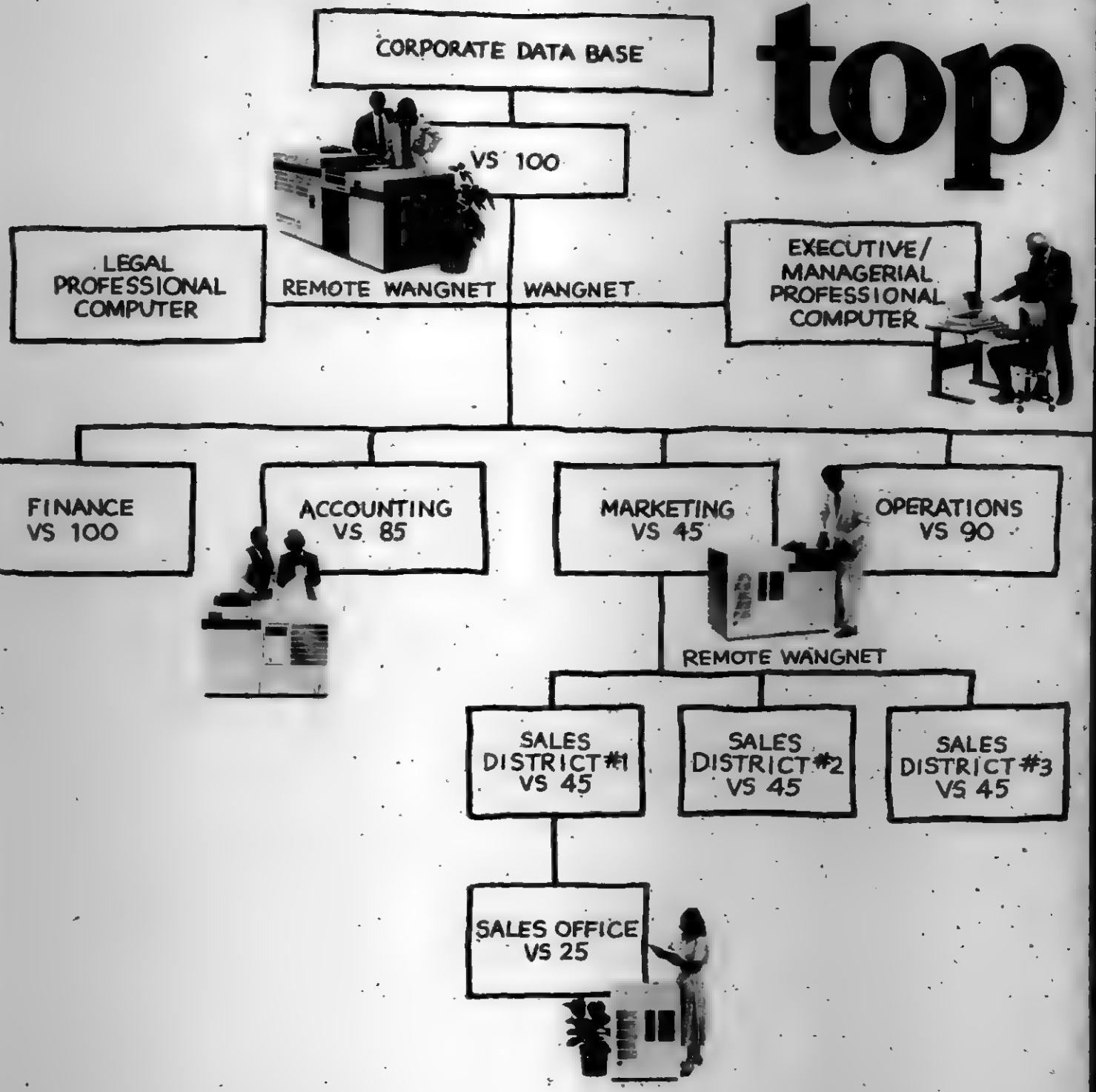

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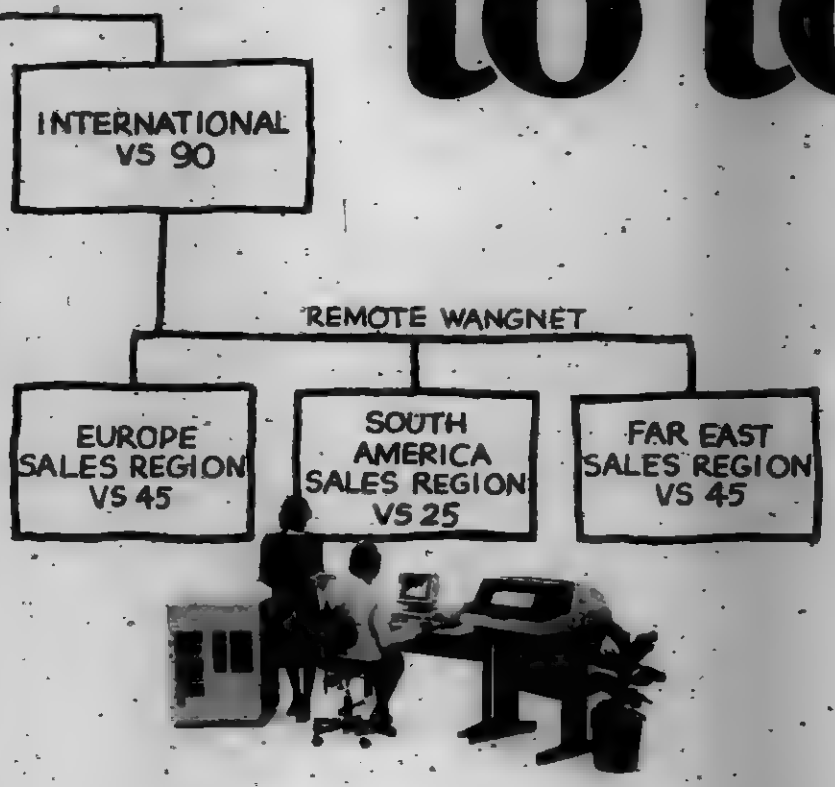

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in processor real-time constraints on the system.

Third, current limitations on memory size can inhibit feature implementation and performance and deter or limit software enhancements. These factors cause data traffic to have an adverse impact on the second-generation PBX.

In both first and second generations, switching matrices were extremely expensive compared with today's prices. In order to control equipment costs, a trade-off was reached in product design so that a prescribed portion of PBX users could make calls simultaneously and excess users would receive a busy tone. As a result, a smaller, less expensive blocking switch could cost-effectively service a proportionately larger group of users. Contention for the switching matrix is fundamental to first-generation and second-generation PBX architecture. Although this may be adequate for a PBX intended to switch voice only, data switching can severely reduce such a matrix's throughput.

The most pervasive argument for investing in a nonblocking PBX is that it has more flexibility to accommodate future growth and applications.

The traditional traffic analysis and engineering studies used as a basis in first-generation and second-generation switch designs were based on CCS calculations and did not make allowances for data traffic. Data requirements vary according to the user. It is difficult if not impossible to perform accurate translations of present and, more important, future usage into a voice-only-based CCS formula.

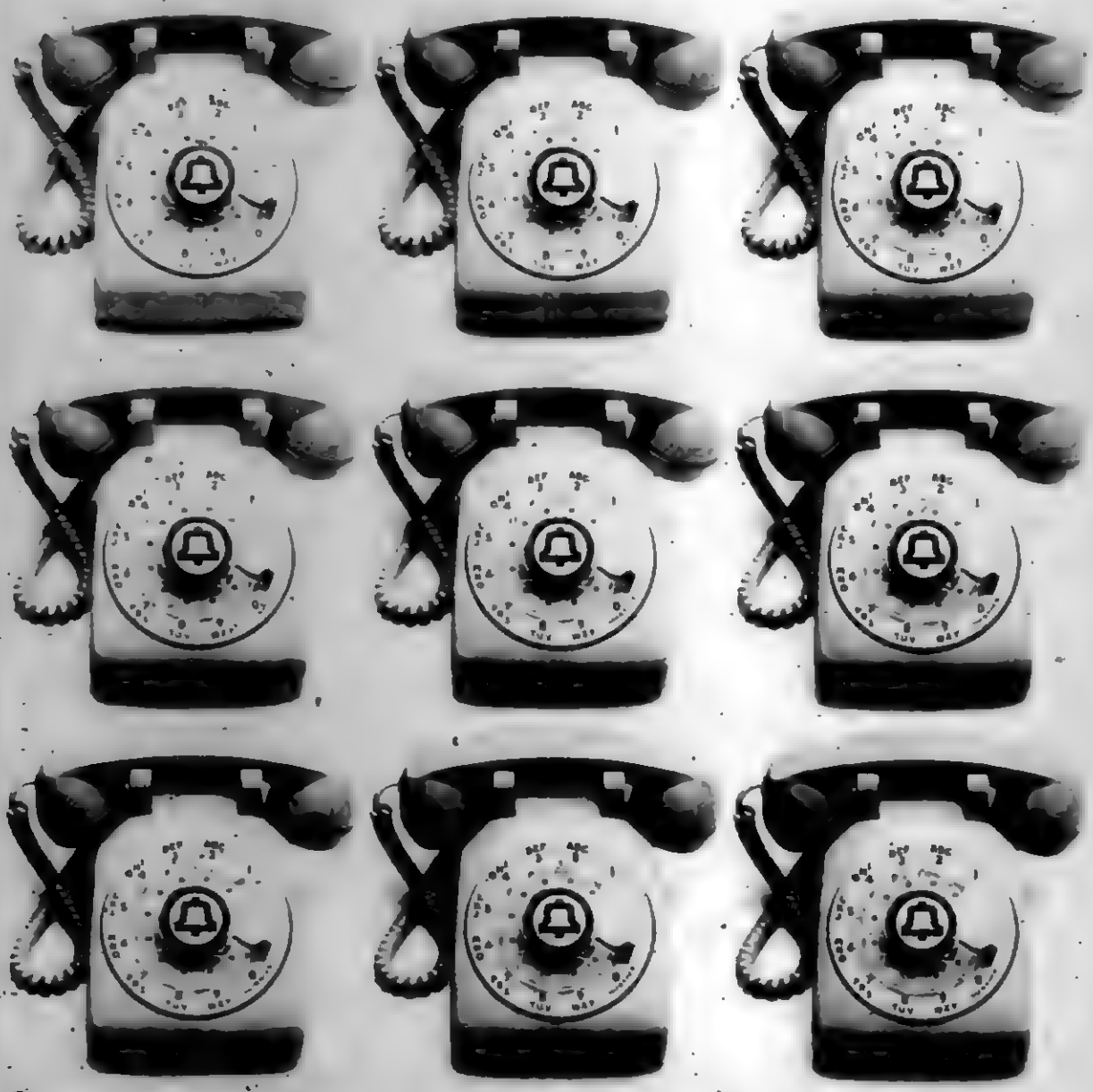
Data transmitted is of two types: short, bursty traffic (as in local-area networks) or long, conversational exchanges (as in time-sharing systems). In both cases, connect and holding times for data calls are entirely different from those for voice calls, which are traditionally estimated at 10 minutes of off-hook time per hour per telephone.

The optimum environment for blocking switches is a static one, preferably with no data traffic. Unless present and future data requirements can be predicted accurately by physical location and data traffic volume and then converted to voice traffic formulas or CCS, a blocking switch will require costly additional system-reconfigurations every time there is a shift in the volume and type of data traffic within a given system. If switch cost is based only on the initial purchase price, without taking into consideration the associated reengineering costs of moves, additions and changes, then a blocking switch may initially appear cheaper.

The most pervasive argument for investing in a nonblocking PBX is that it has more flexibility to accommodate future growth and applications. This is extremely important as dependance on data continues to increase. A truly nonblocking system eliminates expensive initial and ongoing traffic balancing and allows the movement, addition or change of devices without reengineering the entire system. This fact alone will also help guard against premature obsolescence.

At this point, a nonblocking architecture appears to handle high-speed data, low-speed data, voice and video in a nonblocking mode at costs comparable to other technological offerings. In the near term, the acquisition of the established first-generation and second-generation switches may appear to be a safe decision, but it is often difficult to determine truly "safe" choices in the rapidly changing technologies. CW

Pringle is a market research analyst with Intecom, Inc. of Allen, Texas, a manufacturer of communications switching systems for voice and data transmission.



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LOCAL NETS AND PBX

MAKING CONNECTIONS

By Edward Horrell

Although local-area networks have stimulated a great deal of discussion, they are not being installed as rapidly as many would believe.

The technology of local-area networks has been greatly developed, but users seem to be very undecided about the type of network (or networks) to install.

Generally, local-area networks fall into two categories: broadband or baseband. Broadband local-area networks use frequency division multiplexing technology, which allows multiple data streams concurrently on the same media. Frequency division multiplexing breaks the wide band-

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width into narrower bands, each of which is used for a separate channel.

The medium involved is usually coaxial cable.

Because the telephone set is found with much more frequency than data terminals, using its cable plant is an attractive way to reach most users.

Baseband local-area networks utilize time division multiplexing technology on a demand-oriented (CSMA/CD) or predictive (token bus) basis. Time division technology is based upon the establishment of a channel intermittently, usually at regular intervals, to connect the terminal device to a common channel. The media for this type of network are usually twisted-pair, coaxial cable or fiber optics.

Arguments are voiced regularly about which of these concepts is superior. Depending on the specific application, each appears to have a position of acceptability in the marketplace.

As the need for extremely high transmission rates becomes prevalent, the cost of baseband interfaces will become a deciding factor.

The most commonly discussed advantage of the private branch exchange as a local-area network is the use of the telephone cable plant for the data switching. In some cases, the coder/decoder is located in the switching cabinet, as with Northern Telecom, Inc.'s SL-1 system; in others, it is in the telephone set itself, as with some proprietary sets from Rolm Corp. and Western Electric Corp. In either case, common cabling can be used for simultaneous voice and data communication.

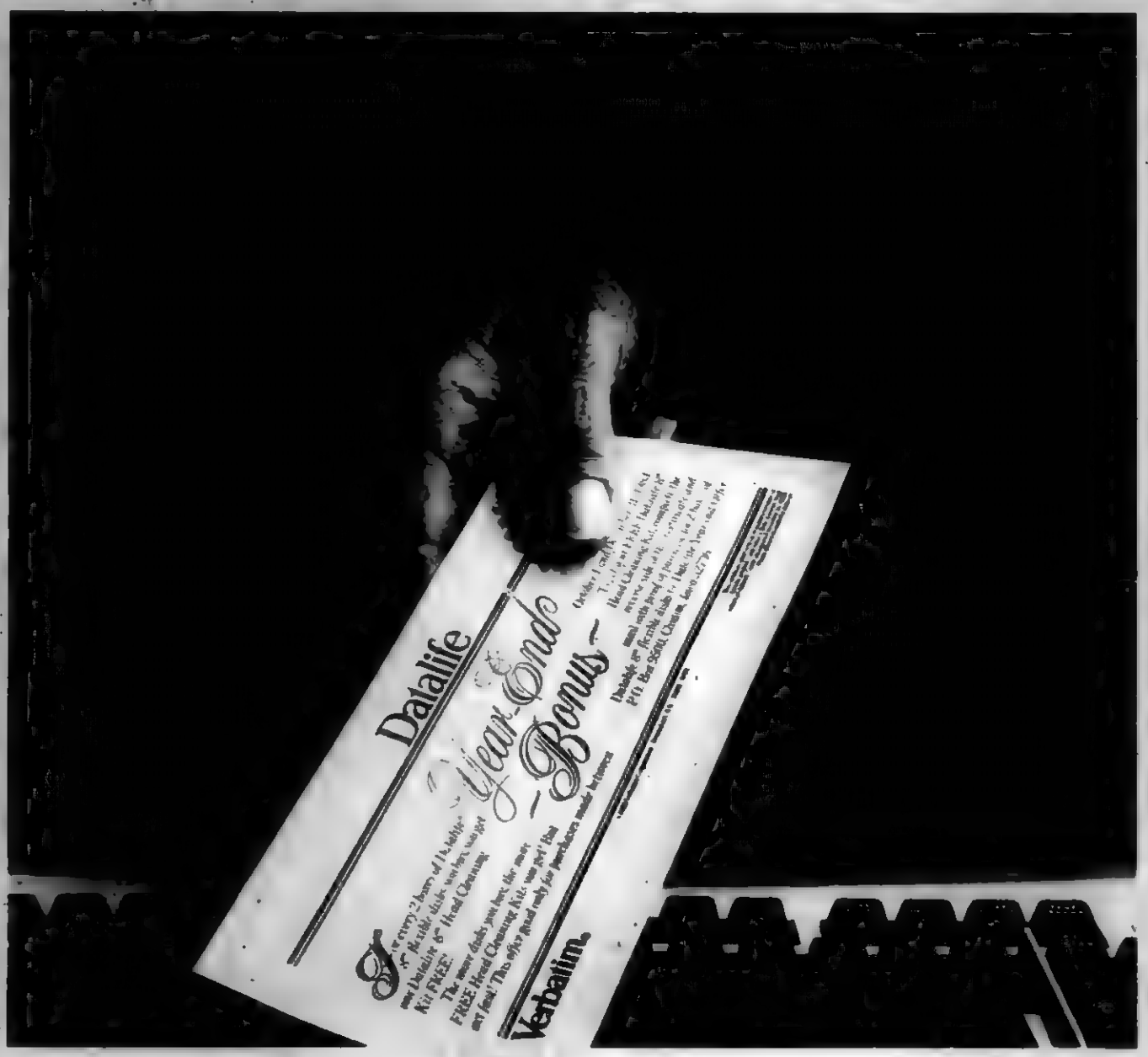
Because the telephone set is found with much more frequency than data terminals, using its cable plant is an attractive way to reach most users. Therefore, one beneficial local-area network objective is met very quickly — the relatively inexpensive premise-distributed cable.

Although early digital PBX generally supported only low-speed Ascii/teletypewriter-type devices, most leading manufacturers now support a wide range of protocols and transmission speeds. A 3270-emulation is now prevalent, with Systems Network Architecture announcements being made as well as direct connections to mainframes.

Coupled with continued increases in transmission speeds, these announcements indicate the further feasibility of the PBX for local-area network applications.

In fact, indications are that twisted pair will reliably support speeds of well over 2M bit/sec — a far cry from the early 9,600 bit/sec rates or even the more present 56K bit/sec.

An even closer look indicates that the PBX has still more advantages for local-area network applications. One of the most significant and rarely discussed advantages is modem-



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pooling. Through modem-pooling, the user of dial-up modems for off-premise data transmission can share modems among various users.

Instead of a modem being dedicated to an infrequently used terminal device, it can now be accessed on an as-needed basis by numerous users.

The benefit of shared devices is statistically as beneficial as the comparable concept of PBX trunks vs. private lines.

In other words, fewer modems serve more users. As off-premise data bases become more and more popular, modem pooling will be a virtual necessity for PBX local-area network users.

Most of the leading PBX manufacturers are emphasizing the development of combined voice/data terminals. These terminals are usually modemless, utilize twisted-pair media and provide simultaneous voice conversations and data transmission.

Most newer proprietary electronic telephone sets are also equipped with an RS-232C adapter for connections to nonproprietary terminals, if so desired. With the introduction and development of electronic telephone instruments, traditional 1A2-type sets that were popular for so many years — and are still in widespread use in the field — were made obsolete.

In addition to the inherent benefits of the PBX/local-area network concept, the features of the PBX itself offer numerous built-in advantages for local-area network applications. One of these features is the ability to queue on a busy terminal or computer port.

Another is the expanded use of traditional call detail recording used in conjunction with data switching for charge-back purposes to internal users.

In spite of the many advantages of the PBX/local-area network, inherent disadvantages also exist. Once again, individual users must understand the applications and needs of their particular companies.

The most obvious disadvantage of the PBX/local-area network is that both office systems and telephone system operate off the same processor or processors. This creates a risky situation in the event of system failure. In addition, system testing, hardware reconfigurations and software upgrades can affect the entire office system environment.

It should be noted, however, that some experts would argue that the single system concept is not a disadvantage, but is actually an advantage over separate local-area networks.

At least on paper, the current bandwidth capabilities of PBX puts them at a disadvantage in comparison with separate local-area nets. Current PBX offer data switching capabilities of around 56K bit/sec; one manufacturer, Intecom, Inc., currently offers data rates at 1M bit/sec. Traditional local-area networks offer rates of well upwards of 10M bit/sec.

The most obvious disadvantage of the PBX/local-area net is that both office systems and the telephone system operate off the same processor. This creates a risky situation in the event of system failure.

Ztel Corp.'s recently introduced Private Network Exchange system offers multiple-ring topology at rates of 10M bit/sec and provides a unique approach to PBX/local-area network issues. It looks more like a local-area network than a PBX.

The transmission rate issue, however, must be closely reviewed by each user for each application. Paying for large bandwidth capabilities is useless if the application doesn't call for it.

Another disadvantage of the PBX/local-area network is the capacity of the CPU.

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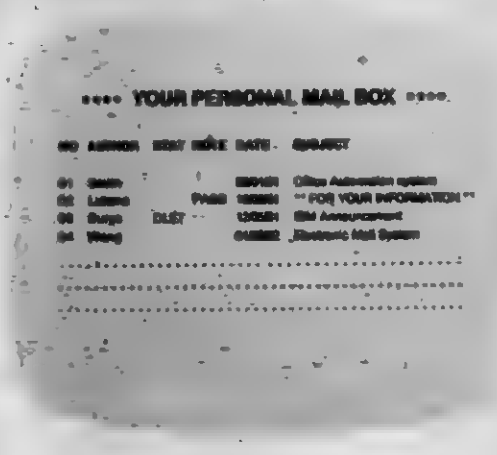

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products, a finite number of ports are available for voice/data connection.

In future, the point will come when the physical capacities of the system will be exhausted.

The problem for the volatile company, then, is one of planning.

How does such a company project growth? Does it purchase the larger processor now and grow into it, or wait and go through the trauma of changing CPUs later? And when it does reach that ultimate growth point where extra processing power is required, is it forced to buy a powerful additional CPU to handle a small number of devices? Unfortunately, the modularity of PBX is not sophisticated at the present.

In spite of numerous issues and possible pitfalls, the PBX will offer a natural migration opportunity for the implementation of local-area network capabilities and will provide a viable alternative for implementation.

When the decision is made to use the PBX/local-area network concept, the project manager then faces issues which are critical for implementation, such as the following:

- **Backup power.** The reliance upon one network for voice and data signaling can be disastrous in a power failure. Is the PBX/local-area network equipped properly for power failure? Is it uninterruptable? Is the intent to power CPUs, telephone sets and terminal devices?

If not, what are the effects for the users?

- **Cable plant.** In spite of vendor claims of simultaneous voice and data over universal cabling (twisted pair), many current PBX offerings require additional pairs of wire for such features as proprietary sets, central power and data switching. Are all jacks equipped for all functions?
- **Maintenance guarantees.** The local-area network concept itself assumes communication among a proliferation of devices. It must be assumed that these devices are installed and maintained by a number of different vendors. Where does the PBX vendor's maintenance responsibility begin and end?

If terminal devices are acquired from the PBX vendor, do they carry the same guarantees (for example, response time commitments) as the switch itself?

- **Growth.** Is the PBX equipped to handle an influx of devices that might be added to the network? If not, what are lead times for additional required equipment?
- **Moves and changes.** Assuming the PBX vendor has traditionally handled moves and changes of telephone-type devices, who will be responsible for moves and changes on the PBX/local-area network? The vendor? The user? What are the costs?

These are only a few of the issues that must be addressed when deciding whether to implement the PBX/local-area network concept. In spite of the numerous issues and possible pitfalls, however, the PBX will offer a natural migration opportunity for the implementation of local-area network capabilities and will provide a viable alternative for implementation.

One final point: Although the PBX/local-area network concept can be a total system application for some users, many will find that a combination of PBX and broadband/baseband local-area networks will best suit their needs.

With most PBX manufacturers developing gateways to separate local-area networks, many users will find a multinetwork environment feasible and attractive. CA

Horrell is president of Mitchell & Horrell, Inc., consultants in telecommunications management located in Memphis, Tenn.

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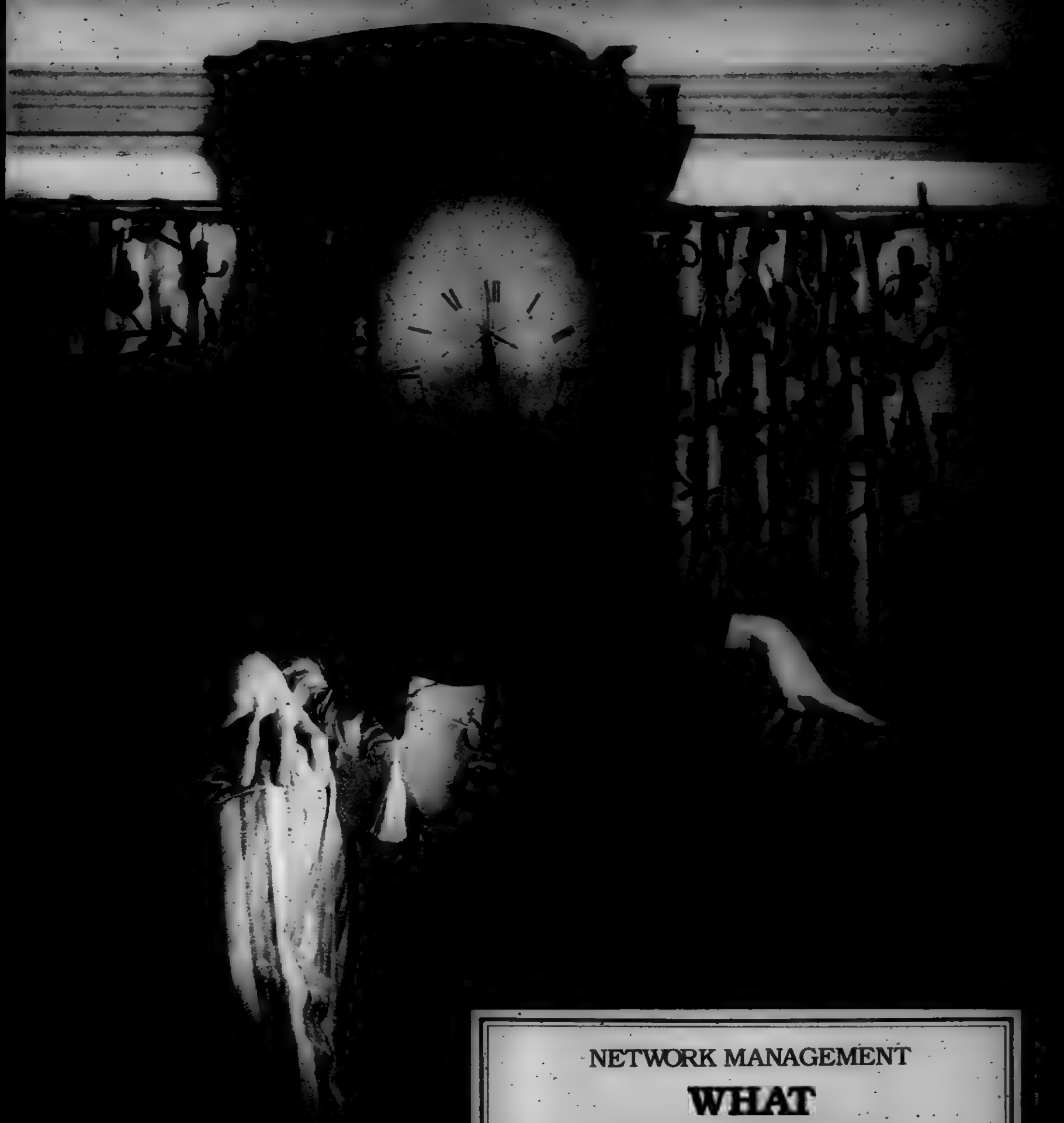

NETWORK MANAGEMENT

WHAT LIES AHEAD?

By T.E. Craven

Network management has always been one of the most important and difficult problems network operators face. With the deregulation of AT&T, this task will become even more difficult, and managers will be hard pressed to determine what the future holds for their organizations.

Private and public network systems are increasingly more complex, often including the use of hybrid digital/analog facilities. In addition, the number and size of private networks being commissioned is increasing at a very rapid rate. Most of these networks are assembled from commercially available multiplexers, nodal processors and modems

and tailored to the user's requirements — which alter with time and business circumstances. And, although this customization solves one user need, its cost is high: increased diagnostic and performance problems.

Many equipment manufacturers provide excellent diagnostic aids for their own equipment, but they cannot provide equivalent facilities for other elements of the network. As a result, the operator faces a major challenge just staying abreast of what is happening in the network. The recent spate of mergers and acquisitions, (especially in the banking and savings and loan industry) are bringing together networks of dissimilar design and making a bad situation worse.

Most network operators take a very serious view of network management, and this concern is reflected in the proliferation of companies that are offering add-on diagnostic and performance measuring systems. This market is currently running at $200 million per year in equipment installations and will rise to approximately $2 billion by the end of the decade.

Most of these systems effectively add another layer of networking in an attempt to find out and control what the underlying level is doing. The better systems also provide information to the user in easily understandable form — for example, through a graphics display. Overloads or potential failures may be indicated by alarms that sound when preset limits are reached.

Until now, network operators have at least been able to rely on the knowledge that, with few exceptions, one company owned the copper connecting wires. True, in certain parts of the country, different jurisdictions existed and this occasionally caused problems when faults had to be pinpointed to a specific line segment.

With the breakup of AT&T, the user's situation is going to be considerably worse. Many leased lines will now go through several jurisdictions: those of the local and remote operating companies and of the long-haul operator. As things get more confused, that long-haul operator may be AT&T, a reseller or a provider of alternative facilities — for example, the companies now laying optical fiber down railbed rights of way.

The effect of this situation on the network operator is that he is now going to have to take responsibility for many management functions and diagnostic tests previously carried out for him by the telephone company. The provider of a leased line will be interested in giving a good service level to its users. However, it is also obvious that the major motivation of the new local operating companies' management will be to show a profit. Before they use expensive resources to find and fix a problem, these companies will want to be certain that problem is within their jurisdiction.

One effect of the AT&T breakup is that the network operator is now going to have to take responsibility for many management functions and diagnostic tests previously carried out for him by the telephone company.

The next two or three years are clearly going to be difficult while network operators and providors of service learn to cope with the new situation and the new rules.

During that time, well-informed and intelligent network operators will be well advised to find the greatest protection they can.

The solution will not merely be providing better diagnostic equipment to find out whether the fault is in XYZ's equipment or the network equipment. If it is in the XYZ equipment, which operating company line has the problem? Because of the nature of the AT&T breakup, the places where jurisdiction changes ground are simply not accessible to the network operator. Clearly, more reliable equipment and equipment capable of working satisfactorily in noisy line conditions will be part of the answer, and great pressure will be put on manufacturers to provide such equipment.

However, that's not the answer, either. Pressure is also being exerted in precisely the opposite direction. The breakup of AT&T is having another effect: The cost of leased lines themselves and the

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provision of other facilities such as bridging is expected to rise rapidly. The first skirmishes in this war for both data communications and voice service are currently being fought. Both the technical press and the general-interest newspapers are charting the day-to-day victories and setbacks as the various elements of the telephone companies attempt to redistribute the expenses and revenues formerly spread right across AT&T. The cost of leased lines has been increasing for years and it won't be reversed by the effects of deregulation.

In self-defense, network operators are putting pressure on manufacturers to provide equipment that uses expensive facilities more efficiently, is capable of operating at high line speeds, uses complex data compression techniques and so on. Generally, more complex equipment is more sensitive to the environment and more error prone than simpler lower speed devices. Falling back to simpler, slower methods in case of trouble is a reasonable and well-used solution to these problems. But that solution implies the ability to monitor performance and reliability of the line segments.

If the operator cannot easily comprehend the information being presented, he is unlikely to make correct or timely decisions. It must be easy to monitor usage, track costs and isolate problems.

And there's the catch. Again, better and simpler diagnostic equipment is part of the answer and will no doubt be forthcoming. The real solution lies in the area of continuous monitoring and control.

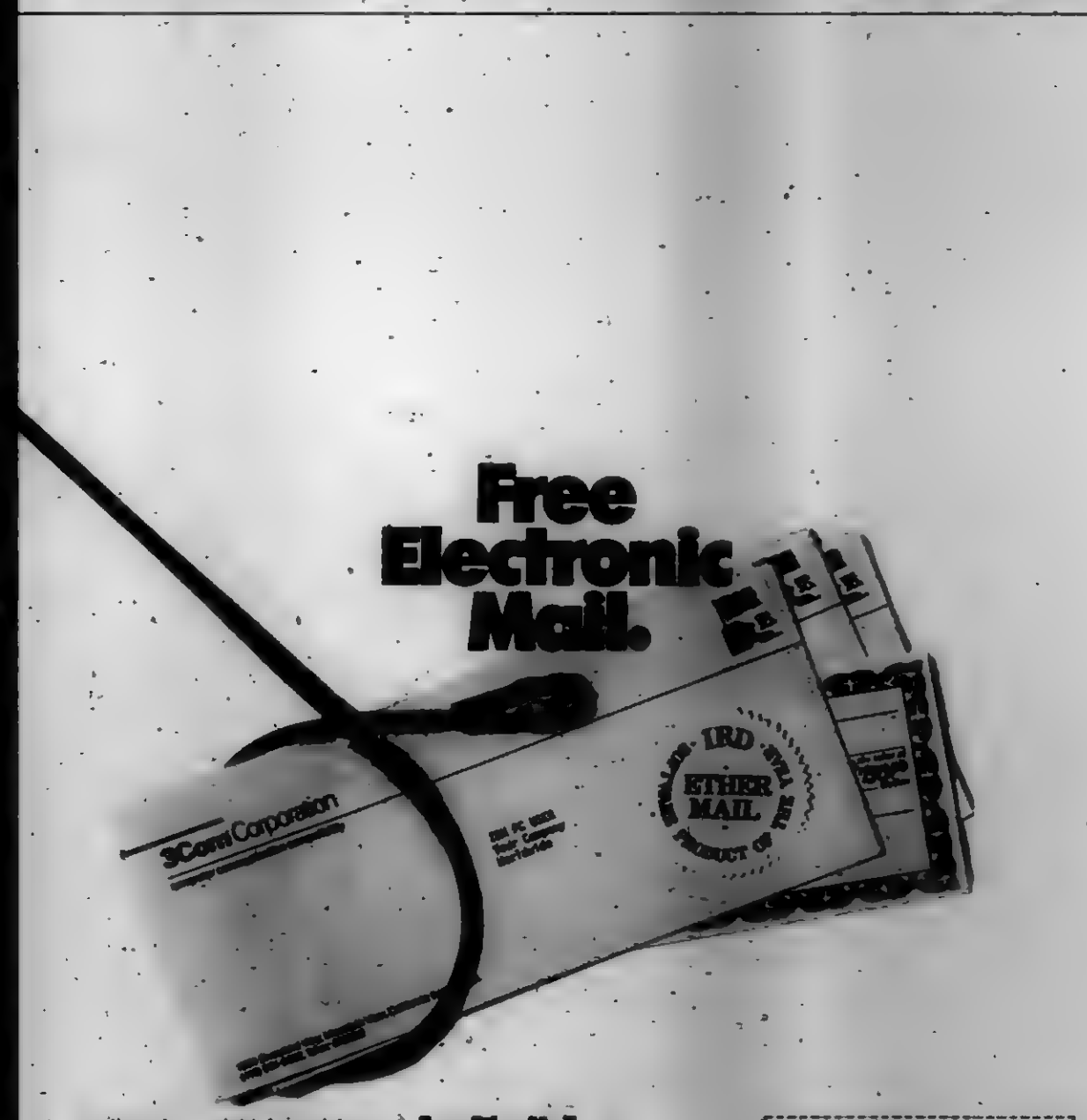
Consequently, the future will undoubtedly require more and more extensive network management facilities. A few years ago, users wanted to know all about the performance of the network — throughput, bandwith, number of bits and speed. When the discussion turned to network management, interest dropped markedly. Now the situation is completely reversed. Those with network experience ask first about the network management capability; if they are satisfied with your answer, they may listen to what you have to say about performance.

Despite the present and continued success of companies selling the bolt-on network management facilities, it is difficult to anticipate the way any network will grow and change. Network management should be a built-in property of the network components themselves. Data on network elements and line segment performance should be gathered on a routine basis and made available so that the operator can make informed decisions. Whether provided internally from the network elements or externally, the network management system should provide the user with very comprehensive information about current and past performance of the network. At least the following should be available:

- Error statistics, the number of bits or blocks an hour handled by the network in various parts, ideally on a port-by-port, node-by-node, line-segment-by-line-segment basis. The data base should be updated at regular intervals to detect statistical variations by the hour of the day, day of the week, equipment type or line speed.
- Response time, measured on a path-by-path and by-direction basis.
- Loading, both line and node.
- Utilization, both terminal and port.
- Directory of network elements.

All the above categories must be contained in a data base with manipulation tools that allow relevant statistical and operational data to be presented to the user in an easily understood manner. If the operator cannot easily comprehend the information being presented, he is unlikely to make correct or timely decisions. Essentially, it must be easy for the operator to monitor usage, track costs and isolate problems.

What does all this tell us about making choices in today's environment? What guidelines can a user follow in adding to an existing network or commissioning a new one? An intelligent user will look for excellent network management capabilities, either pro-



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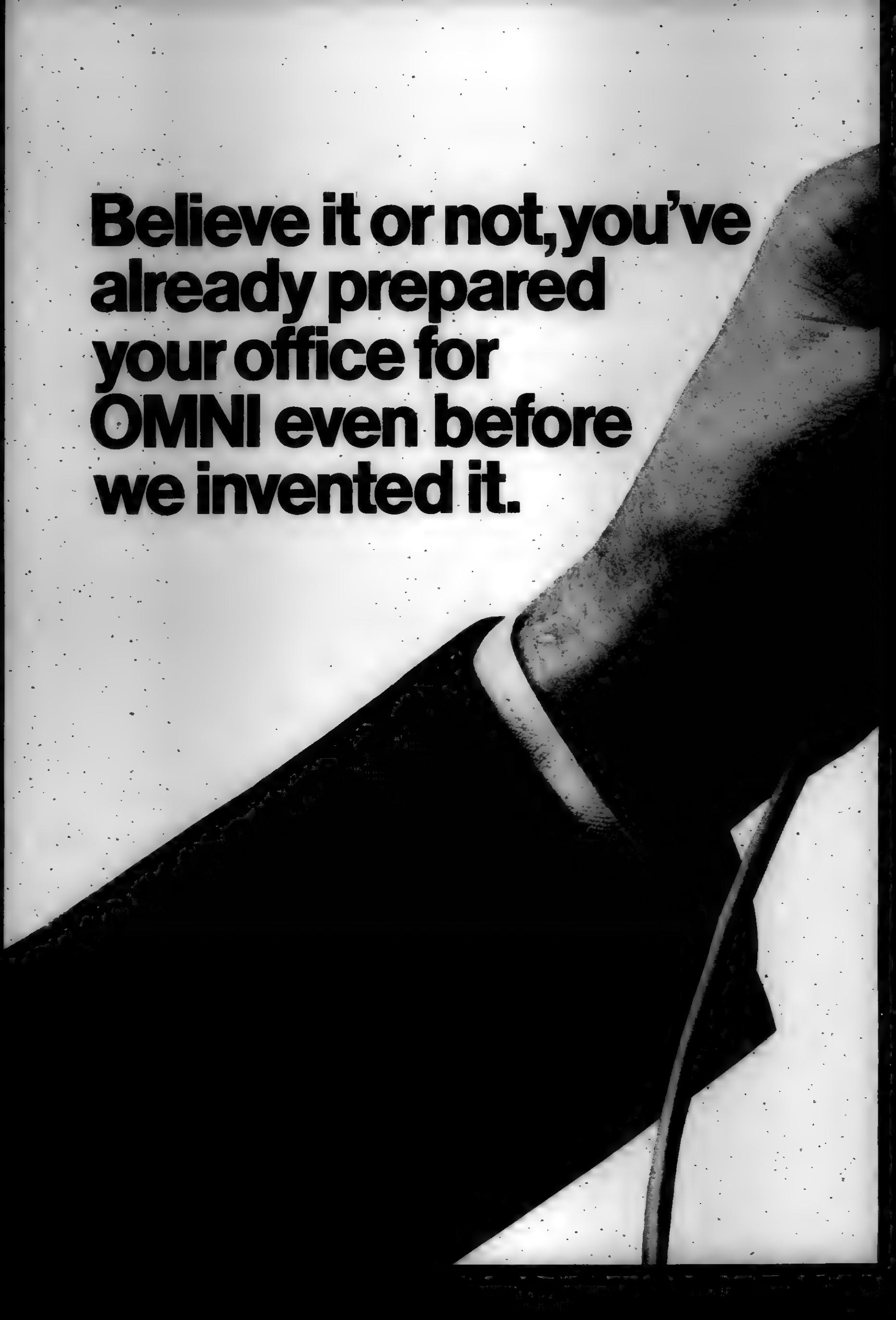

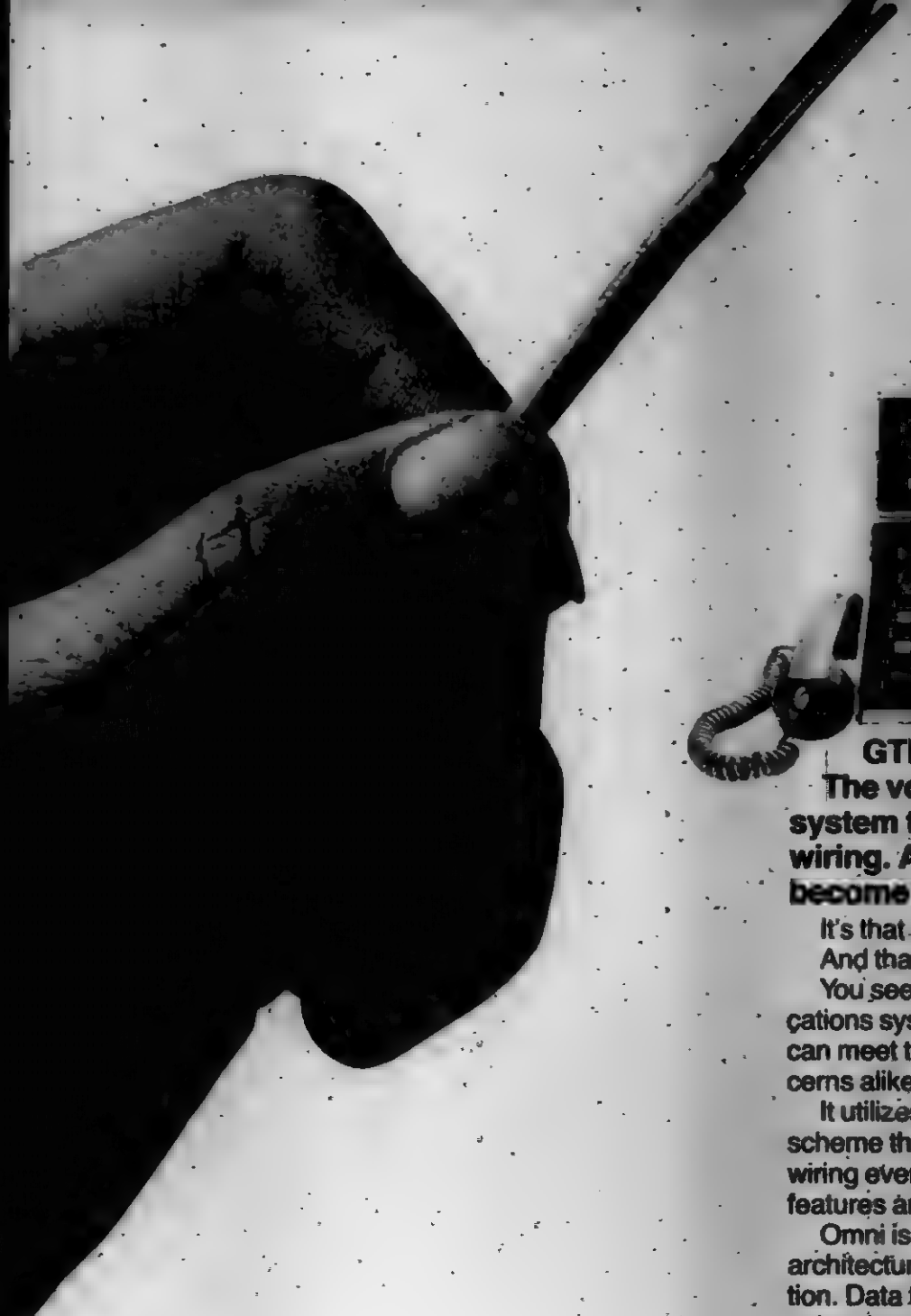

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vided inherently in the network elements or externally by means of a specially designed system. The former choice is far more preferable: it is more complete and has access to information that is difficult to provide to an external system. If the elements are designed properly, they will cope easily with changes and additions to the network.

At a minimum, the network management system should provide the functions listed above. Furthermore, a modern system should provide more than mere statistics to the operator — it should in a very real sense manage the network. Sufficient diagnostic capability should be available to enable close identification of existing or potential problems and, as far as possible, to track them down to the source. As pointed out earlier, this may not be an easy task in the aftermath of the break-up of AT&T.

It should be possible to apply diagnostics for any part of the network from any point. This implies a single coherent technology for the design of all portions of the network, independent of transmission speed and media.

A main user requirement is that current problems be solved and potential problems avoided. This means that a key element of network management is restoral of the system for the user. If this is to be possible, the network manager not only must have the ability to amass and analyze information, but must have under its control any redundant elements or backup facilities provided. Reconfiguring completely automatically or under user control will be necessary to allow the operator to let noncritical parts of his network remain nonoperational, rather than disrupt critical functions during a restoral activity.

Methods of providing restoral must be carefully designed at the outset. With the current tendency for line installation service cost to escalate rapidly, careful design must minimize user cost of redundancy features. One clear advantage can be found in the use of dial-up as a temporary alternative until a repair can be effected. If the subsequent reduction in potential line performance is acceptable to the user, dial-up provides a very low-cost backup capability. However, only certain network configurations can make use of this method without a high overhead in automatic answering equipment.

Another aspect of the management function should be for the network manager to keep a record and control of the network configuration at all times.

A complete network management capability faces a major obstacle in the form of different technologies and equipment now used in the various parts of networks, mostly governed by line speeds. For example, the gateways between existing local-area networks using high-speed coax and wide-area networks using the telephone system usually mean one thing to the operator — he won't have good visibility of all his network functions.

The total data network, whether inplant, intraplant, intrastate or interstate, should ideally be transparent to network management. It should be possible to apply diagnostics for any part of the network from any point. This criterion implies a single coherent technology for the design of all portions of the network, independent of transmission speed and media.

So far, no single product has covered this broad spectrum of user requirements. In the future, however, multiplexers and network nodes will undoubtedly offer considerably more functionality and support everything from basic multidrop lines through data chaining and distributed switching systems, with fully compatible modular elements. They will also support existing protocols as well as new ones; be able to access other network standards, such as X.25 and Systems Network Architecture; and will support satellite operations and data/voice communications. OA

Craven is director of technical support for Doelz Networks, Inc. in Irvine, Calif.

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A LOOK AT '83 AND '84

YESTERDAYS' MENU TOMORROW'S FEAST

By Glenn Rifkin

For years, the leading computer makers have been promising that communications would soon become a major priority. The best, it seemed, was always yet to come. In 1983, the promises continued, but numerous events showed that, this year, vendors were finally getting serious about communications.

Though many factors contributed to this proliferation of communications activities, the burgeoning office market has been as much a driving force as anything. For office automation to be of use to anyone, practical and cost-effective communications is a widely agreed upon must. In

1983, communications grabbed a lion's share of the headlines. If industry analysts are correct, in 1984 those headlines should be turning into hands-on reality in the office.

In communications, if 1983 was the year of anything, it was the year of the announcement. Major vendors in both computing and telecommunications areas unveiled long lists of products and capabilities that carried 1984 delivery dates.

Although announcing a product is a long way from delivering on its promise, the direction of most announcements made it clear that vendors were finally responding to users' needs. "Communications has always been looked at as a distinctive issue, but the most important trend in 1983 was that communications was viewed as an integration issue," said Walter Ulrich, president of Walter E. Ulrich Consulting in Houston. "It became obvious that single-medium systems were deficient and there must be an integration of all technologies."

The divestiture of AT&T continued to generate news throughout 1983. Ulrich called the move toward divestiture "the most dynamic restructuring of an industry that I can think of. There's nothing to match it." Despite the interest in the direction of AT&T's Advanced Information Systems and the independent operating companies, industry watchers viewed 1983 as a year of disappointment with AT&T. "We had heard great promises about workstations and other products, but AT&T was shackled in '83. They were really not able to show their cards," said Dixon Doll, president of the DMW Group, Inc. of Ann Arbor, Mich.

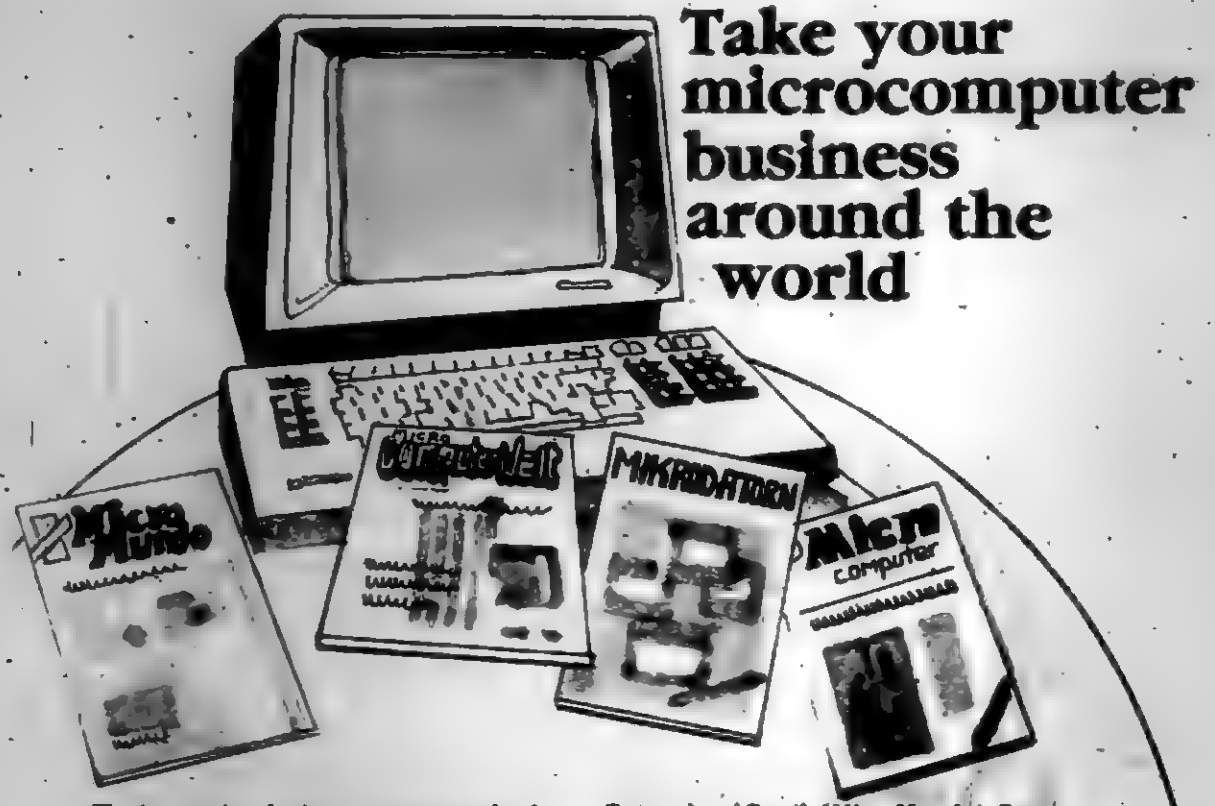
Doll anticipates an impressive line of products from AT&T when divestiture officially takes place on Jan. 1, 1984. His concern is whether or not AT&T is too late in the office market. "There's no doubt that they can do a good job in the OA area, but how many companies are willing to live with multiple workstations on the desktop? AT&T is fighting a tough challenge and will have to give some good reasons to go with them. Their problem will be a marketing one, not a technical one," he said.

AT&T and other telecommunications vendors will also face stiff competition from the newly emancipated operating companies, according to Paris Burstyn, an analyst with Arthur D. Little Decision Resources in Cambridge, Mass. "People thought the operating companies would have close ties to the mother camp, but that hasn't happened at all," Burstyn explained. "In fact, it is just the opposite. That bodes for tremendous competition in telecommunications in '84. The operating companies will come to the office and say 'we can be your one-stop shopping place for communications.'"

Though the shadow of divestiture covered the communications industry, both systems vendors and independent communications vendors refused to slow their efforts. If anything, the prospect of things to come made communications issues more important than ever.

One of the major trends in 1983 was the teaming of private branch exchange (PBX) vendors and major computer manufacturers. Some critics suspected system vendors might just be protecting their territory from PBX makers, but others felt the long list of partnerships was a clear indication that user demands were forcing collaborations. Among the significant ventures in 1983:

- IBM purchased 15% of Rolm Corp. and indicated Rolm would be its partner to link computers with telephones in the office.
- Data General Corp.



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signed an agreement with Northern Telecom, Inc. to allow Northern Telecom's Displayphone to work within DG's Comprehensive Electronic Office (CEO) system.

• Hewlett-Packard Co. signed agreements with Rolm, Northern Telecom and Intecom, Inc. while committing itself to the PBX as its principal communications network in the office.

• Honeywell, Inc. and Swedish-owned Ericsson Information Systems established a research company to develop voice and data communications products for the U.S. market.

• Digital Equipment Corp. and Northern Telecom announced a jointly developed computer-to-PBX interface standard.

"It makes sense for companies to take advantage of each other's expertise," said Edward Horrell, president of Mitchell & Horrell, Inc. of Memphis, Tenn. "The trend toward the connection of noncompatible terminal devices through a PBX has been talked about. In 1983, companies started doing it."

In fact, the PBX has emerged from 1983 as a major office technology and is being seriously considered as a local-area network substitute for many applications. PBX vendors, seeking higher speed and high-capacity services with lower costs, provided evidence that they will be a significant force in the local-area network market.

AT&T's Advanced Information Services introduced its Dimension AIS/System 85 digital PBX, which features a separate CPU from the one that switches voice and data. This additional CPU will reportedly handle voice store and forward and electronic mail. "The System 85 should really give the Rolms and Northern Telecoms a run for their money," said George Colony of Forrester Research, Inc., a Cambridge, Mass., consulting firm.

Ztel, Inc., an Andover, Mass., firm, displayed a communications system called the Private Network Exchange (PNX), which is said to combine the voice features of a PBX with the data transmission capabilities of a local area network. Scheduled for March 1984, the PNX reportedly offers a much wider bandwidth for high-speed data switching, as well as voice and video communications. If the product performs as stated, it could become very significant in the PBX vs. local-area net debate, according to Horrell.

Despite tremendous interest in 1982, the local-area network market was "fairly flat" in 1983, according to Colony. "We didn't see nearly the velocity we had predicted." He attributed this to users' waiting for IBM to announce its local-area network, an event predicted for the first or second quarter of '84. Colony said he foresees great movement in that market after the IBM announcement and predicts that it will speed up deliveries from all local-area network vendors.

Stating the obvious, Ulrich called the IBM local-area network "extremely significant." Although it won't be introduced officially until early 1984, the IBM network is reportedly based on a token-passing baseband approach. It is destined to become a de facto standard for the industry and, according to the International Resource Development of Norwalk, Conn., will lead to a "blurring of the distinction between the voice world, the 3270 network world, the Ascii terminal world and the personal computer world."

Though many vendors have decided to wait for IBM to make a move, 1983 saw a major breakthrough for Ethernet, Xerox Corp.'s local-area network. In June, the Institute of Electrical and Electronic Engineers' (IEEE) 802 Standards Committee voted to approve the CSMA/CD local-area network upon which Ethernet is based. Major vendors, such as DEC and Intel, gave strong indications they would increase their support for Ethernet in 1984. Though Ethernet has not caught on in the office as its originators hoped, it has remained a viable factor in the local network debate.

Other major vendors are remaining steadfast in their search for their own standards in the local network market. Wang Laboratories, Inc., for example, stood by its Wangnet offering in 1983 and has recently announced a joint proposal with TRW, Inc. for a dual-cable broadband local-area network standard "designed to meet the information transfer needs of broadband network users." The two companies stated that there is a growing demand for such systems and have submitted the proposal to the IEEE 802 Standards Committee for consideration.

Colony also predicted that AT&T would introduce a local-area network in 1984, but cautioned that its impact would be minimal initially because of the scarcity of AT&T products to attach to the network. "IBM has the right idea," Colony explained. "They waited until they had about 3 million potential nodes to tie to their network before showing it. AT&T will be like Xerox. What good will a network be without products to tie to it?"

The influx of personal computers into the office in 1983 was a driving force for the search for standards in the network market. "Most business users appreciated that if they were to do meaningful work on a personal computer, they would need communications. Communications is an absolute imperative and I think the vendors realize it," Doll said.

Tom Elliott, analyst at International Data Corp. (IDC) added that, driven by personal computers, the local-area network market will take off: "1984 will be a good year for network vendors."

Although many vendors have decided to wait for IBM to make a move, 1983 saw a major breakthrough for Ethernet, Xerox Corp.'s local-area network.

Vendors are also realizing that the PBX is becoming a more attractive local-area network alternative. Telephone wiring is already installed everywhere and customers are cool to the thought of adding more cable to already overstuffed ceilings and floors. Although questions have been raised about PBX capacity for voice and data transmission on a scale needed to be a true local-area network, the trend appears to be in the direction of an integration of technologies rather than one single answer.

Doll expects to see local network emulation capabilities from all major PBX manufacturers in 1984. He is convinced that a priority for next year includes the integration of multivendor networks: "We haven't done much on that up to now. Vendors have recognized the need to coexist with IBM. That was the first step. In 1984, they are going to realize they need to coexist with a lot of other equipment besides IBM."

DEC, acknowledging that an IBM link was essential, made a major announcement in 1983 with the introduction of its DECnet/SNA Gateway, which allows VAX superminicomputers to access IBM SNA resources. The move reportedly affirmed DEC's direction of compatibility with IBM.

Of course, IBM did not sit idle in '83. Out from under the antitrust cloud that shadowed it for 13 years, IBM began to flex its office muscles in 1983. Toward the end of the year, it began to show it had no intention of being a follower in the communications field. Along with the investment in Rolm, IBM announced a stream of products and enhancements that provided the long-sought-after connectibility among its products.

Industry consultants were particularly impressed with the communications potential of the recently announced IBM 3270 PC and the IBM PC XT/370 in closing the micro-to-mainframe gap. Those products, due out in early '84, reportedly give IBM the ability to access host processor applications in the VM/CMS operating environment and concurrently use those applications with programs running under PC-DOS.

The linkup of micro to mainframe was among the hottest issues of 1983, with others besides IBM addressing the question. Software makers like Cullinet Software, Inc. and Visicorp did announce products to accomplish the task, but these also carried 1984 delivery dates.

Colony pointed out that the hype is overhanging the technology; the reality of creating the micro-to-mainframe linkup is tougher to complete than had been thought. "With the 3270 PC and the PC XT/370, a lot of those problems will go away. I think third-party developers will take advantage of these products even faster than IBM itself."

Going into 1983, Ulrich said, the value of the microcomputer was less than it is now because there was no practical micro-to-mainframe link. The ability to download and share files through communications links makes the micro an invaluable OA product, he said.

IBM also came closer to realizing its 1980 promise to link its office systems when it announced enhancements to its Distributed Office Support System (Disoss) and Professional Office Systems (Profs).

Doll pointed out that though most of the Disoss environment had been built around "klugey" IBM processors such as the 8100, Big Blue is starting to make connections to their newer products. He predicted a direct PC-to-4300 linkup sometime in 1984.

According to Doll, 1983 was also the year IBM made it clear that its Document Interchange Architecture-Document Content Architecture (DIA-DCA) would be as important in the next 10 years as SNA has been since 1975.

Announced in 1982, DIA-DCA is a protocol architecture for the office environment and sets standards for document handling and document formatting. In 1983, compatibility with the architecture, which operates within a Disoss environment, was announced for IBM's 8100, Displaywriter, 5520 and Scanmaster products. Dale Kutnick, executive director of the Boston-based Yankee Group, predicted that in the third quarter of 1984, IBM would announce DIA-DCA compatibility for its Personal Computer.

"When that happens, there will suddenly be more than 2 million nodes in that environment and DIA-DCA will become the de facto standard in the office," Kutnick said.

DIA-DCA is important because the architecture is ideally suited for professional office automation; it facilitates the transfer of documents, not just data. "The whole point of office automation is that professionals want to see documents, not data," Kutnick said.

This year, Doll pointed out, the other major office automation vendors such as Wang and DEC recognized that they could not offer only proprietary solutions for their office systems and they announced intentions to seek compatibility with DIA-DCA.

"Many orphan vendors will offer compatability with DCA in 1984. They wanted to in 1983, but DCA was like a train going by at 150 miles per hour," Colony added.

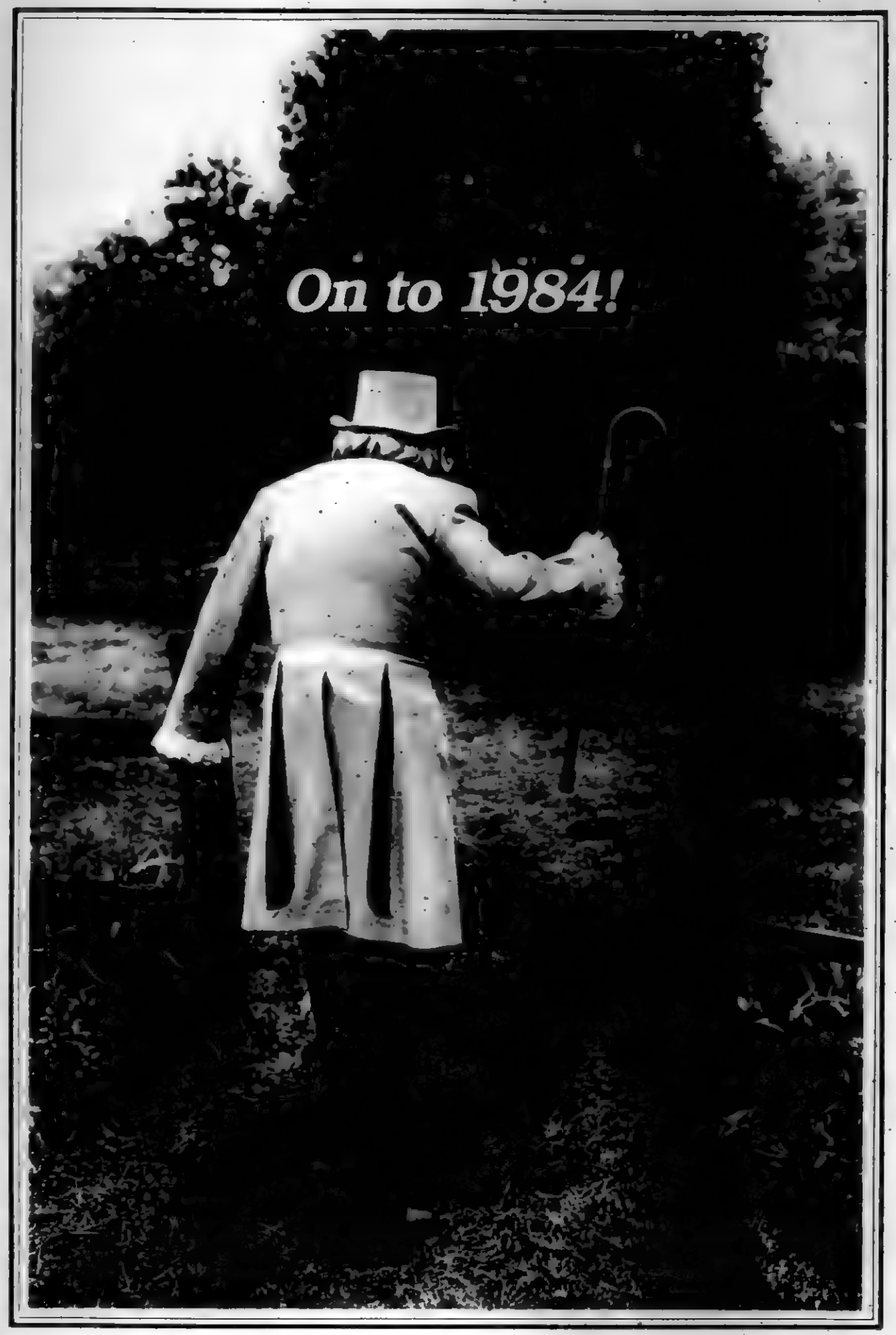
IBM is also expected to be a major player in the PBX market in 1984, according to a report from International Resource Development, Inc. With its connection to Rolm, IBM may emerge as the leader in data/voice workstations, intelligent telephones and other PBX-linked OA devices.

"IBM's ability to set standards and add respectability to new kinds of products will do much for the overall peripherals marketplace, an area taking on increasing importance to vendors as the sales of full-fledged PBXs continue to slow. Thus IBM is expected to do for PBX add-ons what it did for personal computers," the report concluded.

In 1983, it also became apparent that there would be increasing stress on the terminal device as the ability to communicate within networks and with the mainframe increased. Industry consultants agreed that one significant trend was the increase in the number of workstation choices available to meet increasing demands. As consultant Horrell pointed out, the changes will come in the terminal devices and not in the networks: "It makes sense to upgrade the terminal device because, once installed, the network isn't going to change."

Ulrich offered the opinion that the increasing availability of both long-haul and local-loop communications would have a significant impact in 1984. The industry is finally seeing the fruits of the great spirit of deregulation that proliferated in 1979. Technological advances and a freer opportunity for competition (in such areas as the 10 gigahertz frequency range) will produce the greatest change in communications since the FCC was established, Ulrich predicted.

New technologies like cellular mobile radio transmission (which uses a large amount of lower powered radio cells) will free many local communication channels. In New York, construction began on a $350 million satellite communications center, Teleport, which will include key switching points to carry voice, video, data, facsimile and teleconference signals throughout the metropolitan area.



OA will also feel the effects of such new express mail services as MCI Communications, Inc.'s MCI Mail, which addresses the problems of reaching people who are off the network. MCI is suddenly a major player in the electronic mail arena with the ability to send instant, four-hour, overnight or next-day mail from anyone with a word processor, personal computer or data terminal.

Ulrich called it a revolutionary system — the user gets charged only for sending mail, not for logging in. MCI estimates the new system will be 90% less expensive than other time-sensitive mail services.

"This announcement will greatly enhance the public's awareness of office automation. OA systems are usually marketed just to OA managers, but MCI is going to the general public with this one," Ulrich said.

Inevitably, the realities of next year will fall short of the hype that surrounds the vendor announcements. It is beyond question, however, that 1984 will be a most significant year for communications.

The big push in this market, will make the competition fierce. The winners will win big, Horrell said, and "the weaklings are going to bite the dust." OA

Rifkin is a staff writer for Computerworld OA.

Facing the Future's Expert Systems

By Robert Keller

The power of the computer is rapidly becoming available to virtually everyone in our society, regardless of training or educational background. The new age of computing, which I prefer to call the Age of the End User, is supported by significant advances in several areas. Of particular near-term interest are artificial intelligence systems which allow direct user-computer communications, techniques for storing knowledge as opposed to factual data and devices that can manipulate the physical environment.

Natural communication between end user and computer is perhaps the most enabling feature of the new generation of systems. It means, for example, being able to address the computer in natural, conversational English. For now, we are still bound to use a keyboard. Within the decade, however, technology for voice recognition is likely to be commercially available and the keyboard will be used more for specialized input such as mathematical equations.

Techniques for storing connections between facts rather than just the facts themselves are allowing the computer to appear to have a human-like understanding of real-life situations. These intelligent expert systems have been applied to planning and decision-making activities outside the office and are now ready for use in the business environment.

Perhaps the least publicized area of the new revolution is artificial intelligence robotics, devices that can see, hear and intelligently manipulate their physical environment. With the refinement of techniques by which a machine senses its environment, devices will appear which combine all three major artificial areas: natural communication, intelligent understanding and action in the physical world.

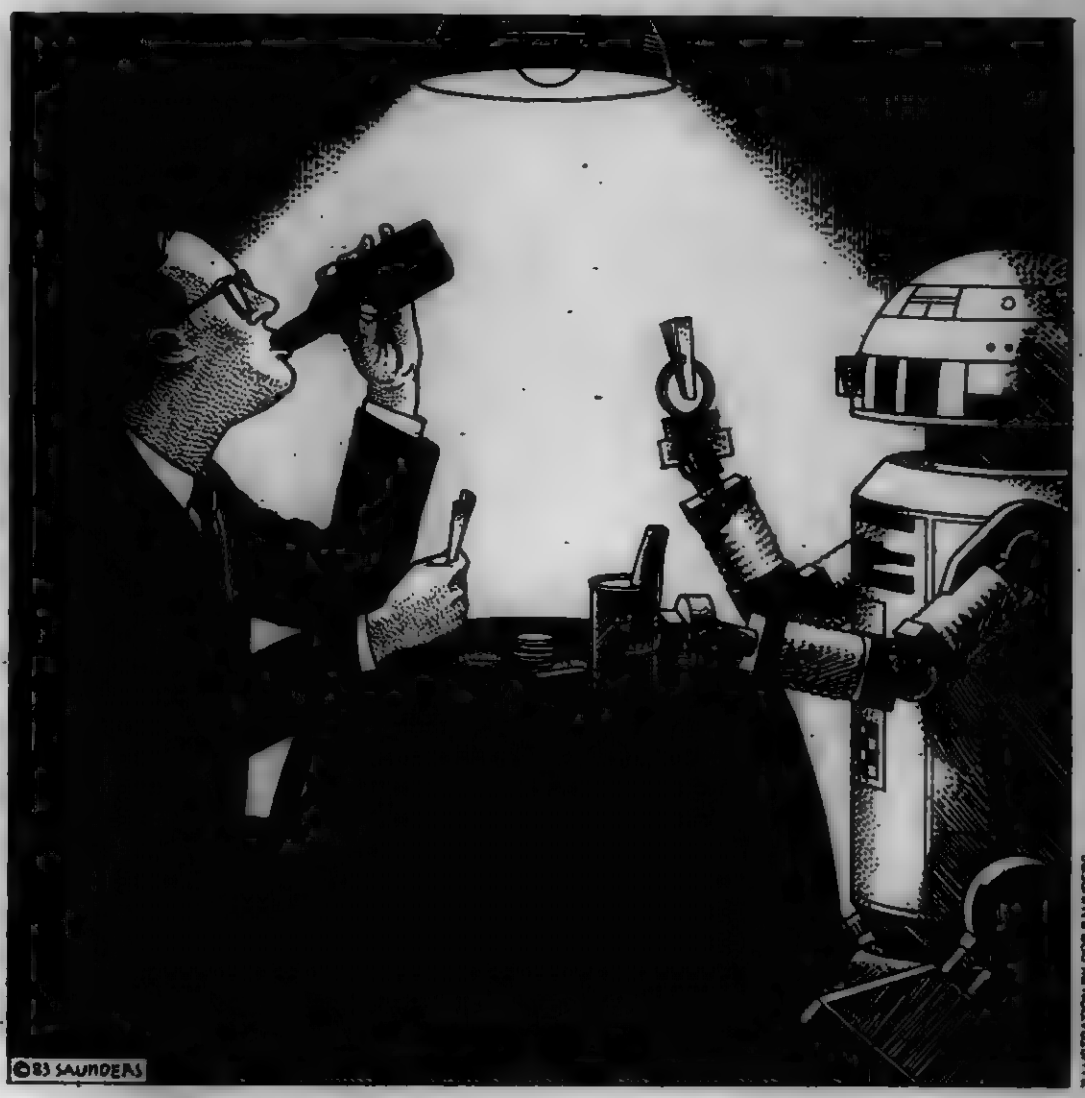


ILLUSTRATION BY ROB SAUNDERS

Underlying all types of systems is a new emphasis on integration. In the new age office, the order of the day is systems integrated either with each other directly, through common knowledge bases, or by sharing a common communication medium: natural English.

For a better understanding of the possible effects of the artificial intelligence tools, let's take a tour of the office and see how the tools are and might be applied in practice.

Personal service is an important part of a visitor's introduction to our company; it is therefore unlikely that we would want to replace the receptionist with a robot. Nonetheless, many tasks performed in this area require skills that could be relegated to an intelligent computer.

The telephone system is one example. Most central switchboards no longer have patch cords, but they have an equivalent electronic nightmare of lights, and prescribed sequences of button pushings to accomplish message switching, recording and paging. The telephone of the future will need no buttons because "dialing" will be made possible by voice commands. Why not just give the receptionist an ultra-miniaturized wireless lapel microphone and headset tuned to the company's expert message-handling system?

In this scenario, an incoming call will still be answered by the recep-

tionist, but much of the follow-up can be handled by the system.

For example, the receptionist might say to the system, "A call for Ms. Reynolds." The system would understand the complex details of finding this person and connecting her to an incoming call.

This procedure may include simply ringing her phone or it could mean analyzing her computer-stored calendar, interacting with her secretary to discover where she is, forwarding the call to another number or perhaps paging Ms. Reynolds. All the while, the caller is kept informed automatically of the progress of the search.

If Ms. Reynolds cannot be located, the receptionist is notified and once again establishes personal interaction with the caller. The system may be invoked again: "Please take a message and route it to electronic mail for Ms. Reynolds."

Another use of artificial intelligence is in the area of computer-aided instruction, an application of expert system technology in which the computer becomes an intelligent teacher for a particular subject. The training center of the near future will still contain live teachers, but their roles may tend to move toward consultation and designing the protocol of teaching systems for their areas of expertise. The actual instruction in basic concepts could be done through student interaction with an intelligent computer tutor.

The main characteristics of the new computer trainers are an expert understanding of a particular field, an ability to tailor training to the skill level of different students and facilities for mixed initiative training. That is, the student may explore the knowledge base in a query mode, or the system, detecting possible deficiencies in the student's understanding, may take over the questioning.

Intelligent tutors have been applied to training in electronics, steam plant operation, programming languages and other areas. These systems are equally applicable to other office training situations. In fact, any area is a candidate for an intelligent tutor if it requires training of novices and if a well-defined knowledge base can be developed for the area.

Many administrative tasks also require careful examination and analysis of forms against certain standards. Reviewing expense reports is a classic example of such work, and in situations where many people travel frequently, controlling expense reports is a tremendous burden.

Why not establish a knowledge base that contains the rules of acceptability of expense reports and let an expense expert system evaluate them? Not only can the system make intelligent judgments about the acceptability of the report, but it might also make adjustments automatically to bring the report within acceptable guidelines.

In still another important area of the office, the long bare conference table of today could be replaced in the future by a table with a workstation at every location. Each station would be both a personal computer and a link to a central mainframe. Communication with the machine might be by voice input of natural English statements, by keyboard or by some graphics input device such as a digitizing tablet.

In addition, a centralized projector and screen would allow common viewing of information from the computer as desired. Local screens and graphics printers would allow each individual to review material before presentation to the group.

The mainframe contains large knowledge

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bases on every aspect of the company's business, including sales, financial and competitive information as well as general economic and other knowledge from the world at large. Although companies have collected and stored such information for a long time, it is only recently that the technology has been available to manipulate such information easily and intelligently, to have the system use decision factors from many areas to draw meaningful conclusions. We now have the technology to produce decision support systems capable of making real decisions in the same way an expert in the field would do.

The DP department, too, is likely to see dramatic changes in hardware and tools available for building and maintaining systems.

Fortran, Cobol and other such languages will certainly not disappear for a long time. They are, however, likely to become vestiges of a past age to be emulated on the newer machines as a temporary convenience. Basic business systems are likely to be rewritten in a form that can take advantage of new capabilities for speed, flexibility and intelligence.

System development in the new age office will tend to become an on-line interactive process between analyst and user groups. In such an arena, user wishes, depicted possibly as data flow diagrams, will be rapidly turned into working prototype systems by connecting various primitive functions or behaviors in unique ways.

Symbolic hardware processors and very high-level software techniques are available now. These applications are either possible now or well within the realm of possibility in this decade. Whether they are actually done depends more than ever on the computer service consumer. The Age of the End User brings with it not only new facilities, but also a new responsibility for end users to guide the application of technology in directions that will be truly useful.

We can draw an analogy to the television industry. If you have a television set you can choose any of several programs to view, but your choices are limited to those preprogrammed by the station. Changes in the station's offerings are based on feedback from viewers, but this feedback is generally remote and indirect and frequently results in changes that are somewhat off the mark.

Until recently, the end user, the consumer of computer services, has been cast in a similarly passive role. Hardware and software technology have been evolved by people who are often several steps away from daily contact with the systems they build and from the people who use the systems.

With the advent of interactive television, viewers can provide immediate feedback. Similarly, in the new computer age, the end user has the opportunity to become a cocreator of the systems he uses. The future office will be as you, the end users, envision it.

Where is automation going? The answer to that question lies in your answer to questions like those that follow. What is your vision of the office of the future? How could your work be more effective if you had a fast, intelligent, tireless assistant who speaks your language?

The time is now for end users to envision and take charge of their future relationship to a very user-friendly, intelligent computing environment. OA

Keller is president of Renaissance International Corp., which consults in the field of artificial intelligence and teaches seminars in artificial intelligence in cooperation with Yourdon, Inc.

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Image Processing

A new technology knocks on the office door, but is it an important office tool or merely a niche product?

By Glenn Rifkin

At the same time that a majority of office automation planners are still attempting a smooth implemention and integration of such basic tools as data processing and word processing, an even newer office technology is making its debut.

Image processing — the digitization, transmission and, perhaps most important, integration of text, graphics and data — has recently made the giant step from idea to reality. And, depending on who is talking about it, this breakthrough represents either an essential office tool or a specialized niche product near the bottom of the OA priorities list.

Datacopy Corp., a small firm in Palo Alto, Calif., announced in Sep-

tember that it was introducing an electronic digitizing camera that interfaces with the IBM Personal Computer. However, interest in image processing really began to soar when Wang Laboratories, Inc., unveiled its Professional Image Computer (PIC) in October.

Positioned as part of Wang's Professional Computer line, the PIC system can reportedly process images, words and data while achieving full networking capability with all of Wang's office products via Wangnet. The major difference between the Wang and Datacopy systems is that Datacopy offers only a high-resolution camera with no application software and no networking capability. The Datacopy system is less expensive than the PIC system, but Datacopy is only offering its product to the OEM market at the present time.

The Wang system includes a desktop camera-like scanner that digitizes images and a high-resolution monitor that can display that image. When the image is on the screen, it can be manipulated and integrated with text and data using a variety of image processing software. It can also be transmitted locally or remotely within Wang's office systems.

The ability to integrate images with text and data within the workstation environment moves the technology from the facsimile level to an area in which it becomes a potential contender for a significant slice of the OA budget.

Although Wang is the first of the major office vendors to announce an image processing system, it is undoubtedly not the last. Datacopy, which sells its camera in the OEM marketplace, has already sent systems to Hewlett-Packard Co., Apple Computer, Inc. and IBM for a closer look.

In fact, IBM has indicated strongly that its Scanmaster facsimile terminal, which already has the ability to scan and transmit images over a variety of IBM office systems, will soon have a high-resolution monitor for image and text manipulation. If and when that capability is announced, IBM will certainly emerge as a major factor in the image processing arena.

Wang has scored points by being the first to announce integrated image processing, according to Robert Costain, vice-president at Dataquest, Inc., a San Jose, Calif.,

consulting firm and subsidiary of A.C. Nielsen Co.

Although some OA watchers have expressed skepticism about where the technology fits into the office, Costain takes another view: "I don't see image processing as just another OA option. I see it as an absolute fundamental necessity for the office."

Wang obviously agrees and, in fact, identified image processing as a key piece of the OA puzzle in early 1979, according to John Thibault, director of office systems marketing. Although he said the market will truly emerge in the next two to three years, Wang's announcements don't indicate the company is trying to shoehorn the product into the office.

Despite the excitement among vendors concerning this emerging technology, not everyone is convinced image processing is all that significant.

"Many of our top 100 accounts are ready for this product and have asked for imaging capabilities directly," Thibault explained. "Everybody may not need a PIC today, but we hope that in two years everyone will want one."

At Datacopy, James P. McNaul, vice-president of marketing and planning, stated that imaging is going to become an inherent part of OA and credited Wang with legitimizing that step. Predicting a potential billion-dollar market as early as 1985, McNaul said prospective users include a large percentage of workers using clustered WP, standalone WP and personal computers.

"Image processing will offer businesses a chance to incorporate graphics into their documents in a way they never have before," McNaul said. "We're used to graphics in all parts of our work life, but we don't use them in reports because of the cost. With office communications and laser storage coming together and with costs falling at the same time, imaging is going to be vital."

IBM, with its high-speed Scanmaster 1 facsimile machine now capable of running Distributed Office Support System (Disoss) 3.1, has the potential to turn that product into an imposing image processing system. Scott Bower, IBM product administrator, said the system currently addresses two major office issues — priority mail and filing — and acknowledged that the ability for Scanmaster to interface with a high-resolution monitor was a "known priority." He indicated that that capability was close at hand and was simply a matter of software development.

Despite the excitement among vendors concerning this emerging technology, not everyone is convinced image processing is all that significant. Though Wang's announcement generally was greeted with admiration for the technical achievement, there was much skepticism among consultants and users about both the specific product and the technology. There has been criticism that the resolution on image processing systems must be of higher quality for it to be of use for anything more than low-level graphics. In addition, the call is out for an optical character recognition (OCR) capability which would allow each character to be defined individually rather than in the bit-mapped mode. This would result in far lower storage requirements and would allow type to be manipulated and interpreted in any font style.

Amy Wohl, president of Advanced Office Concepts, agreed that there is a need for integration of images at the desktop level, but she insisted that the price is simply too high. Wang has offered three configurations of the PIC system ranging from $12,115 without a scanner to $26,730 fully configured. "There is only a limited market for a $26,000 product. I can see a genuine use in specific applications, but it doesn't fit well into the world of mixed workstations," Wohl stated.

Helen C. Barnes, vice-president of the Equitable Bank in Baltimore, Md., added, "It may not be long before we say, 'How did we live without this?' But to do any-

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thing in quantity, you won't be able to convince management to spend $15,000. For it to be widespread, it will have to be in the $5,000 range."

Another serious criticism involves the storage capacity necessary to handle the image processing systems. The Wang system, for example, employs a 10M-byte Winchester hard disk that can reportedly handle only 100 to 120 pages of image-processed information. The number of bytes needed to digitize images in a bit-mapped display is based on the density of the image and can be very high. Companies interested in the technology agree that future directions for storage will focus on laser optical disks, currently an unproven and high-price medium.

"For image processing to be widespread, it will have to be in the $5,000 range."

Thibault of Wang countered the charges by arguing that the user is getting not only the image processing capability, but also a personal computing workstation at the same time. For those with Wang Professional Computers installed already, image processing reportedly can be achieved for less than $5,000 by purchasing only a scanner and a high-resolution monitor. "We don't feel that pricing will make or break a product. When you look at the return on your investment, the cost per user is very low," he said.

Thibault admitted that Wang must achieve a more cost-effective storage mode. However, he pointed out that it is unlikely that the system will be required to store information in a stand-alone mode very often because the PIC can integrate with Wang's VS/IIS, VS/Alliance, OIS, and Professional Computer product lines. "Imaging does eat up a tremendous amount of memory, but you'll see that changing in the next year or so," added IBM's Bower.

Perhaps the most serious stumbling block for image processing is whether an actual need for the technology exists in the user community. Though OA managers tend to agree there might be certain special applications, the feeling is that imaging doesn't have a widespread appeal.

"It may be a lot cleaner way to handle image integration, but it's not a necessity," said F. Richard Lennon, vice-president of administration for Gulfstream Aircraft and formerly director of MIS for the Essex Group. "If we see a need at all, it is certainly in the latter phases of the OA process."

Kavin Moody, director of systems planning and research for Gillette Co. in Boston, said imaging might be of some limited use to certain niche markets, but "as a general OA requirement for the masses, I don't see it. Your business would have to be very heavily graphics-oriented and not already computerized. Often, what vendors think a product is good for and what we end up using it for don't correlate at all."

"I think what we've seen so far belongs in the class of the Xerox Corp. Star," Wohl said. "It's more sizzle than steak."

Wang is not scheduled to start shipping its PIC product until sometime in 1984, and it is too early to judge response. Dale Kutnick, executive director of

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the Boston-based Yankee Group, predicted that Wang would sell only 5,000 of the systems the first year.

Wang and the other office vendors are well aware of the criticism, but remain committed to image processing. Costain of Dataquest acknowledged that image processing would develop slowly and pointed out that the market has broken into three categories.

The most advanced area has been computer-generated graphics, the first stage of image processing, according to Costain. The second category consists of large record storage systems, a newer technology with many systems still coming to the market. The third category began with the Wang announcement — a higher value, lower volume image processing integrated into the information handling system.

Although the vendors are hesitant to pigeon-hole themselves, they tend to agree the banking and insurance industries, along with the federal government, are prime targets for image processing. Prior to image processing, the bales of incoming documents that could not be keyed into the system became the stuffing material for endless file cabinets. Now, proponents say, documents can be digitized, sent around an information network and either stored as needed or discarded immediately.

Costain said he feels that as more vendors come on-line, image processing will soon be accepted as a given. Images can add tremendous value to a document. "Images are so fundamental in the office that adding image processing to a system is an absolute necessity. Wherever you find a high value image-containing document, you have a good candidate for this system."

At Hewlett-Packard, there is active interest in image processing. Alex Morgan, of the personal office computing group, said interest in such a system has picked up substantially in the last year. "In the next couple of years, image processing will be as active a market as business graphics today," he added.

Before image processing, bales of paper documents became the stuffing material for endless file cabinets.

For its PIC system, Wang has targeted the professionals and managers as the potential market. Ri Regina, a Wang marketing manager, said one example of the value of the system is the ability to key in whole documents, including handwritten notes in the margins. "Sometimes the most important thing about a document is that handwritten note. It may affect the entire impact of the document. Before, you couldn't key that into the system. Now you can key it in and send it through electronic mail."

"The market," said Harold Kinne of Future Computing, Inc. in Richardson, Texas, "has outstanding potential."

Thibault added that as soon as vendors conquer the OCR question and cut storage costs, image processing will be mandatory. "The only missing piece of the OA puzzle then will be voice processing." OA

Rifkin is a staff writer for Computerworld OA.

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Micros and MIS: Bridging the Gap

A micro to mainframe link has not been perfected yet. Even when the technology is ready, a number of issues will need to be resolved.

By Jim Rutledge

ILLUSTRATION BY KATHERINE MAHONEY

The proliferation of personal computers is a mixed blessing for corporate DP or management information systems (MIS) managers.

On one hand, the responsibility for applications development is distributed to the department where the problems are understood. This allows the DP manager to avoid the tremendous applications backlog problem that has plagued DP departments for the last 10 years. Central DP departments have simply been unable to respond to user requests for new applications. Backlogs in excess of two years are not uncommon.

On the other hand, however, this distribution of applications development has created a nightmare for the DP manager, who must maintain intersystem compatibility and data sharing. Central DP owns and controls the data for the corporation. A breakdown in this data management function would result in complete data anarchy.

Information contained within the corporate data base is the most up to date and accurate. Until recently, however, the growing number of personal computer users within corporations had no direct access to that corporate data via their personal systems. In many cases, if the user attempts to get corporate data, he must still go through indirect and convoluted means, spending considerable time formatting that data for use in the personal computer.

Consequently, many personal computer users do not and cannot base their processing and decision making on valid corporate data. The processing result might be tidy and thorough, but it is only as good as the data used to arrive at an answer. If there were some way to provide a path between the microcomputer and mainframe (especially mainframe data and data base techniques), the value of the smaller systems would be enhanced immeasurably. Practically no one doubts that the personal computer is a valuable decision-support tool anymore. New spreadsheet tools, coupled with lower pricing and increased memory and storage capacities, have brought respectability to the personal computer.

In short, if personal computers and microcomputers could be integrated into the corporate data base and DP environment, the full potential of both the machines and the users would be unleashed. A corporation's knowledge would be turned into wisdom, resulting in meaningful and usable reports for effective decision making.

Some new product offerings are aimed at satisfying the above requirements. Software-only solutions are constructed around terminal emulator packages; other products combine both hardware and software (see Figure 1 on Page 83). Most products fit the first category: They attempt to glue these two diverse computer classes (mainframes and micros) with software adhesive. Without a doubt, an answer to the problem can be fashioned using software. The question remains, however, whether that is the best solution.

From the end user's standpoint (in this case the user who has a personal computer), the software-only solution does provide access to the corporate data. But this solves only one dimension of the total problem. Emulating a 3270 terminal, for example, allows access to mainframe data, but it also thrusts the personal computer user back into the environment from which he was trying to escape. He has two choices: He can use existing inquiries, which are rigid and difficult to use; or he can attempt to get new inquiries written, which will put him back into the two-year applications backlog arena. By choosing to emulate a 3270 terminal, he has also eliminated the

inherent power of the personal computer which attracted him to it in the first place.

If, however, the personal computer is emulating a batch terminal — for example, 2780/3780 protocol — the user has access to larger amounts of data.

But will that data be in a structure that is useful to him?

Mainframe data is usually structured within a data base management system (DBMS) that provides users many tools for accessing and updating data. These benefits are negated if the data is restructured into a flat file for transmission to a remote "workstation" — in this case, a personal computer. What the personal computer user wants and needs is a DBMS capability and supporting data structure at his machine.

Remember also that the personal computer was originally attractive to the user because it was easy to use and gave him access to a great deal of off-the-shelf software that could be readily tailored to fit his problems.

The software-only solutions for tying the mainframe to the microcomputer system do not generally provide the bridge between these personal computer tools and the data structure provided by the mainframe.

The mainframe-to-micro software solutions also create as many or more headaches for DP management. Central control of the data is still there to some degree, but how secure is that data when it has been moved to a personal computer with removable storage media?

Mainframe and data security can be rigidly maintained, but theft of downloaded data is often as easy as walking out the door with a floppy diskette.

Central DP financial managers are in for another surprise when they begin to tally up the costs of bringing personal computers into their existing

(Continued on Page 83)

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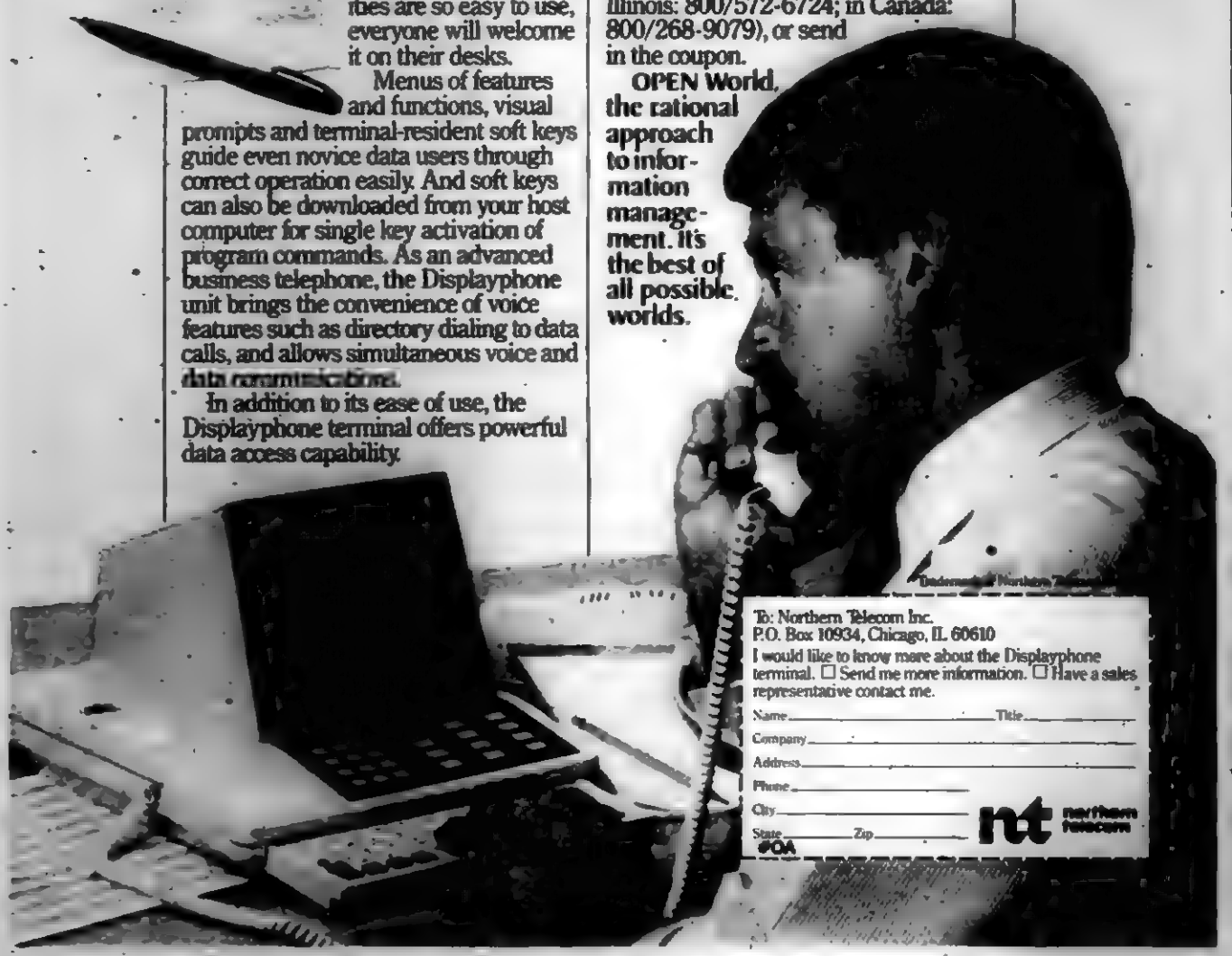

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Building The Link

To be effective, a system tailored for data base management system (DBMS) tasks should link multiple users through dial-up or direct links. A multiuser operating system ensures that the users can share data locally without degrading the efficiency of the central computer. Furthermore, a relational data structure and query tools provide "ad hoc" data requests typically not available to micro or personal computer users.

Integrated applications software allows users to do word processing, create and manipulate spreadsheets, create menus and forms and communicate using electronic mail. Optimally, users should have the choice of subsetting data extracted from the mainframe, using it with their own applications.

The end-user interface must be simple and straightforward. Ultimately, requests for mainframe data become extract instructions to the mainframe DBMS.

In essence, the microcomputer acts as an intermediary between the mainframe and the personal computer user group. The system is linked directly to the mainframe; personal computers and user terminals hook onto the microcomputer system. By taking advantage of applications residing in the micro system, a company can spread that software across all users connected to the network, avoiding the cost of redundant applications on each micro.

Knowledge workers can access the data needed to make timely decisions based on accurate data. The end result is return on investment in both capital equipment and personnel.

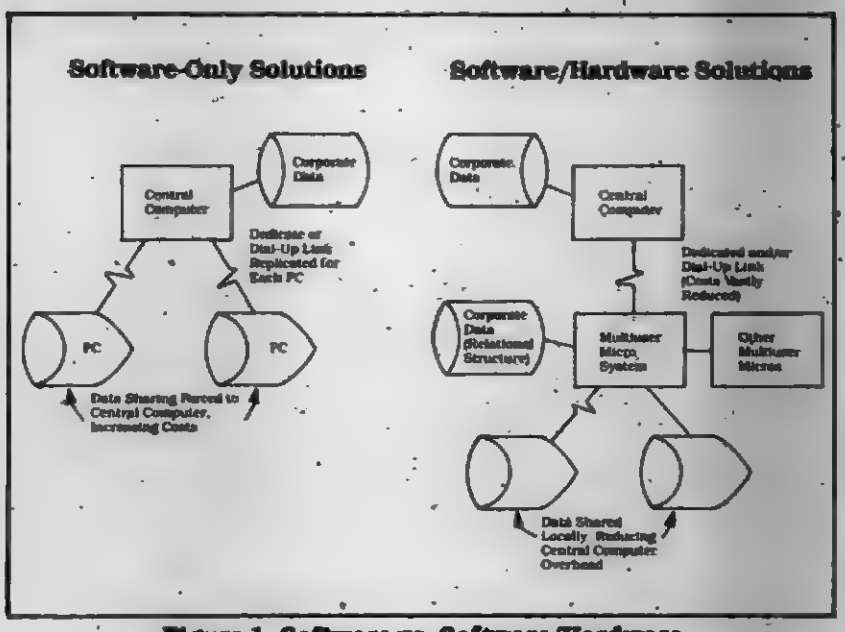

Figure 1. Software vs. Software/Hardware

Obvious:	**Personal Computer**	**$ 3,500**
	Hard Disk	**2,000**
	Software	**1,000**
	Printer	**500**
	Total	**7,000**
Hidden:	**Local-Area Net Connection**	**300**
	Shared Large Peripherals	**5,000**
	Shared Pipeline Expense	**2,000**
	Shared DBMS Systems and Application Software	**2,000**
	Shared Mainframe Power	**2,000**
	Other	**900**
	Total	**$19,200**
Workstation Total Cost:	**Grand Total**	**$26,200**

Figure 2. Real Workstation Cost

Source: The Gartner Group

mainframe and communications networks (See Figure 2 for a cost analysis).

With the advent of the new multiuser systems like Bell Laboratories' Unix or Microsoft Corp.'s Xenix systems, coupled with some of the really good relational DBMS software now available for these systems, the combined hardware/software solutions to the mainframe-to-micro link appear to be the most complete answer.

DP managers also realize better results from the combined hardware/software solutions. They are still insulated from the applications backlog because the end user has the tools to solve most of his own problems. Mainframe connect costs are kept down because multiple users share the data locally. There is only one host connect for a multitude of users. Data security is also better maintained; the multiuser Xenix systems generally use nonremovable disk devices. In addition, because there are multiple users per system, data is shared locally and not on the mainframe. This results in saving mainframe resources as well as communications costs.

Multiuser microsystems have been used in this article as examples of hardware/software solutions, because, to date, they have tended to comprise the most comprehensive solution of any of the products positioned into the mainframe-to-micro marketplace.

It is noteworthy that most products being announced are coming from companies that have traditionally sold into the mainframe DBMS market — a fact that tends to underscore the importance of mainframe data in today's microcomputer technology.

Remember, decisions and answers are only as good as the data available. OA

Rutledge is product marketing manager for Intel Corp.

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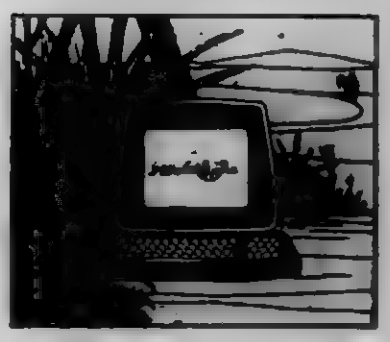

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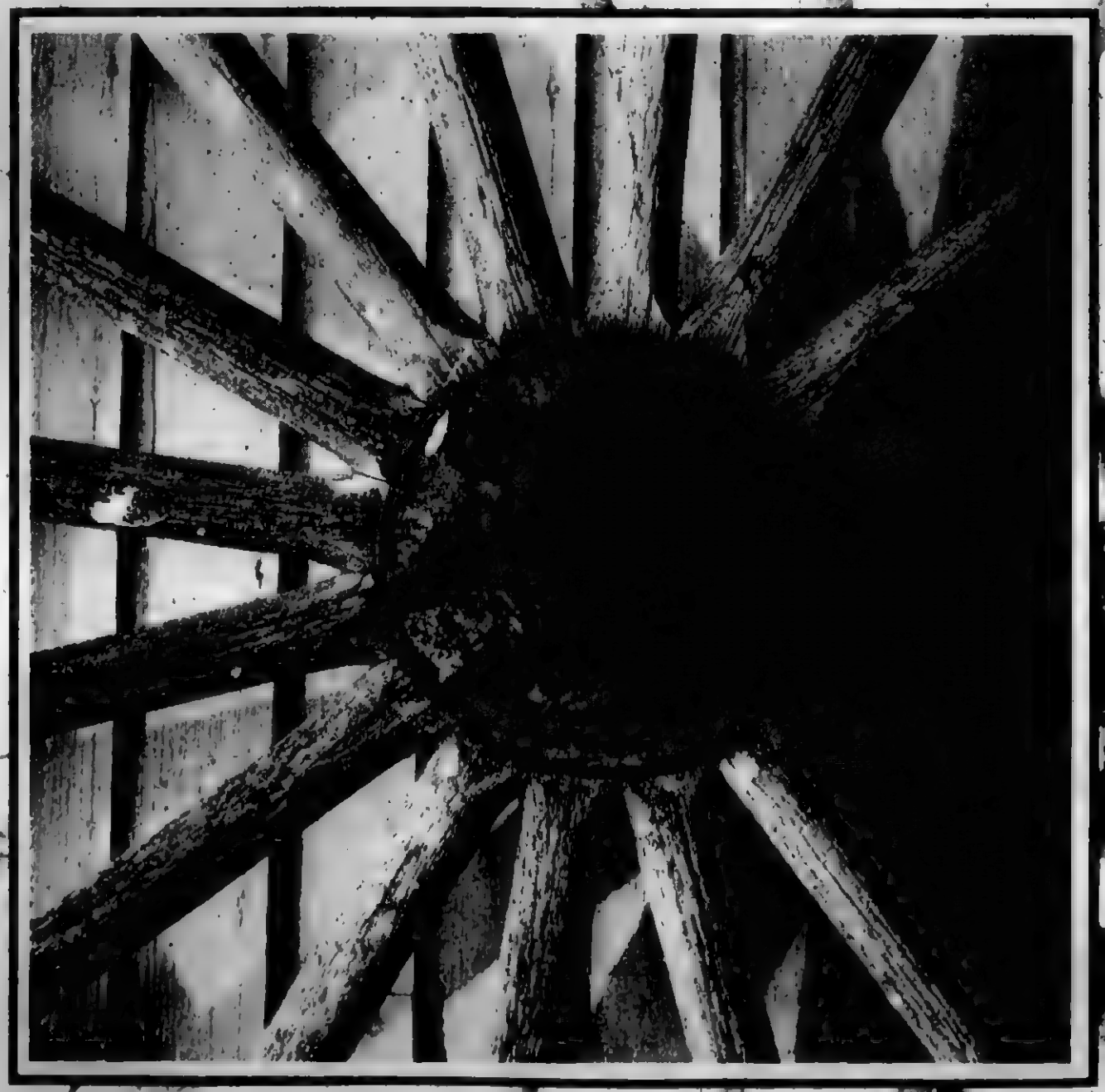

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Decentralization? Or Reinventing The Wheel?

By Kenneth M. Sullivan

Office automation has spread sophisticated computer power to many people who had little previous experience with DP. It is now time to look at the experience of the past several years and ask whether this decentralization has been a good move.

OA has advanced through several significant phases. In its early days, OA meant word processing, and many companies knowingly kept WP away from conventional central DP departments. The assumption was that OA was not related to large-scale DP and was best controlled by the people who actually used it.

Initially, WP consisted of small, stand-alone minicomputers supporting five to 10 secretarial workstations. As more people automated, computing needs inevitably grew larger and larger. There is a big difference between casual WP and a highly structured environment encompassing shared data bases, data management and electronic mail. Many companies now find that some OA centers have computer power rivaling that of the central DP department. Large

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Glossary:

ASCII (American Standard Code for Information Interchange). The language spoken by DEC, not by IBM (without PCI).
ASYNCHRONOUS Start-stop communications technique used by low-cost low speed ASCII terminals and Personal Computers.
CoaxFACE™ Exclusive PCI device provides RS232C interface to coax cables for attachment of ASCII terminals to PCI converters.
DEC Digital Equipment Corpora-

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tion. Used here as synonym for an ASCII host.
DECONVERTER (74D) Makes the IBM 3270 world ASCII-compatible.
FULL SCREEN The ability to modify an entire CRT screen of data without host interruption.
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PaperCRT™ ASCII hard copy keyboard terminals have all the versatility of 3278 CRTs with this PCI option.
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SDLC (Synchronous Data Link Control). Line protocol for data communications between IBM systems and terminals.
SNA (System Network Architecture). IBM's approach to data communications networking.
SNA/SDLC IBM communications; non-compatible with DEC (ASCII) communications (without PCI).
SYNCHRONOUS High speed, high cost data communications technique.
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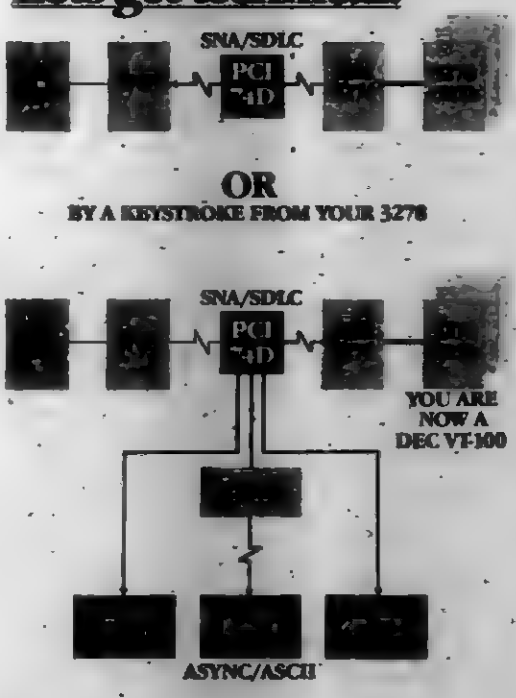

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PCI 75B/SNA: BSC 3275 to SNA/SDLC 3276 emulation.
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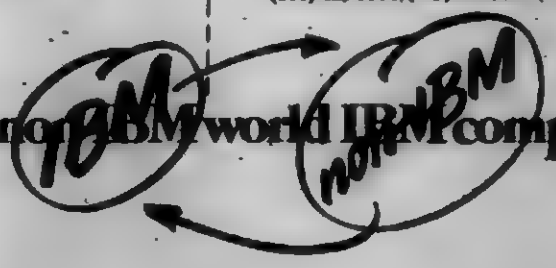


computers can do much more than basic word processing.

When excessive computer capacity exists, two things generally happen:

- Practitioners search for additional applications to fill their computers.
- Users become more sophisticated and begin developing their own DP applications to enhance job performance.

When these two trends occur, large OA installations begin competing with central computer facilities.

At McAuto, a computer service bureau and a division of McDonnell Douglas Corp., we have worked with both centralized and decentralized OA techniques. We have found that different user groups have different and sometimes incompatible needs.

Different user groups have different and sometimes incompatible needs.

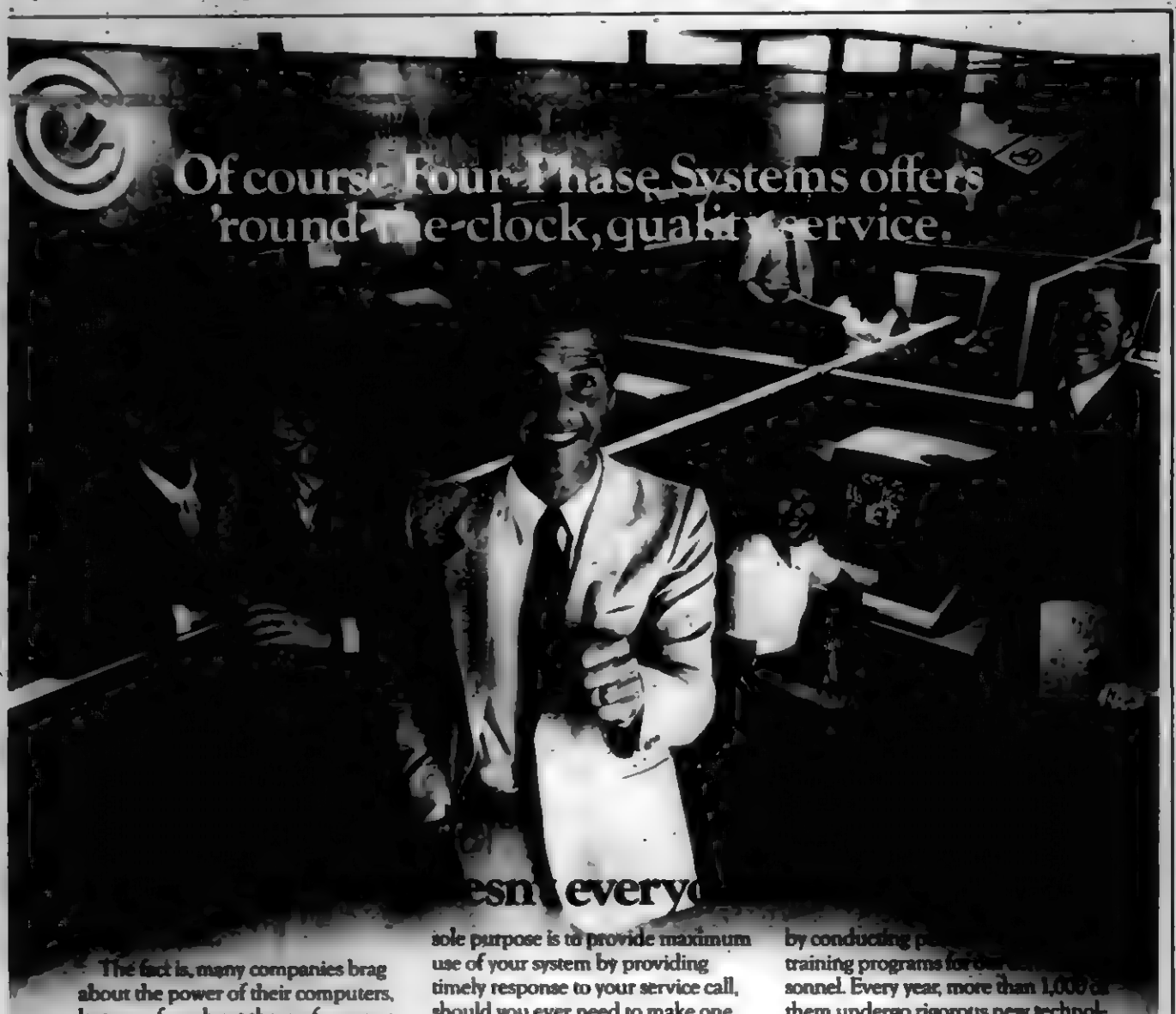
Serious modern WP began at McAuto and its parent corporation in early 1980. Initial installations consisted of dedicated small minicomputers with single-application WP software.

McAuto has a significant investment in large-scale IBM computers. Initially there was concern that OA would lead to a serious duplication of computer resources. However, IBM was slow in implementing OA software on central mainframes, and this allowed stand-alone WP to gain a significant foothold within the corporation. Eventually, IBM offered mainframe-oriented OA software, its Professional Office System (Profs). McAuto immediately implemented the software under the VM/CMS operating system on 4300 and 3033 class equipment.

Fundamental differences exist between Profs and standard WP systems running on dedicated distributed computers. Obviously, Profs runs in a shared environment on central mainframes. But there were other differences that were not initially apparent to the average user of McAuto services.

As implemented on dedicated minis and micros, WP is extremely user-friendly. Software and hardware are designed with the user, usually a secretary, in mind. Keyboards use an icon approach: Key symbols help operators perform tasks such as lookup, filing, block moving, insert and delete. Screen menus carefully lead the operator through various options in a way that is almost self teaching. The hardware itself is visually appealing and attractive in most office environments. Word processors have been designed with professional secretaries in mind. The assumption is that numerous short and medium-length documents will be done on a repetitive basis.

Manufacturers have enhanced their software to include information storage and retrieval and even low-level forms of DP. But with increasing sophistication, these systems become less like the friendly WP systems that started the whole movement. Ultimately, a point is reached where data management and telecommunicating are required. Stand-alone computers support secretaries extremely well because the machines are dedicated. Tying distant word processors together, however, is not a trivial ac-



The fact is, many companies brag about the power of their computers, but very few about the performance of their service. They make a lot of noise about their hardware and software, but when it comes to service, they clam up, or promise what they can't deliver. Let's face it, very few companies have the resources to offer both a quality product and quality service.

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tivity. Various network techniques are available, but they are expensive and require significant commitment from the entire corporation. Networks require acquisition of communications equipment, dedicated telecommunications lines, technicians and managers. And all this communicating turns the average secretary into the controller of a switching center.

What started as the simple replacement of typewriters then becomes an intricate computerized communications network.

McAuto managers realized a centralized approach to OA was appealing because it made use of existing mainframes. In most cases, inexpensive terminals were the only hardware needed to give a user full OA capability through products such as Profs.

Proponents of distributed and decentralized processing have often criticized this centralized approach, but this criticism has generally lacked any quantitative backing. What these critics are really saying is that dedicated computers are desirable primarily because the user exerts substantial self-control over his resources. For example, there is no concern over slow response during peak-hour bottlenecks that central DP operations inevitably face. In addition, small computers seem to be more reliable than bigger machines.

The question that is seldom considered is whether the decentralized approach actually saves any money.

Profs is generally not considered as user-friendly as most conventional WP systems. The biggest reason for this is hardware, specifically the 3270-type terminals that must be used. Most companies with IBM computers already have large numbers of these video terminals; access is easy and inexpensive because no new equipment is required. However, the principal disadvantages are that 3270s deal with information one screen at a time, thus scrolling is not possible and, since the keyboard is generalized, it has no visual icons to help invoke WP commands. Many secretaries find it inconvenient to remember, for example, that PF10 (program function key 10) advances the screen. They would prefer something like an upward arrow. Using the 3270 requires mental conversion to do many tasks.

However, this type of problem has little long-term effect. An experienced operator using Profs is no faster or slower than a seasoned secretary using a dedicated word processor. Any differences are caused by personal taste rather than technical capability.

When telecommunications becomes a part of OA and OA expands into the world of decision support, the capability pendulum begins to swing toward centralized computing. As always, there are tradeoffs, but central computers have some very important positive points:

Profs is generally not considered as user-friendly as most conventional WP systems. The biggest reason is that 3270-type terminals must be used.

- Most large central computer installations have mainframes that communicate with each other; as a result, incoming OA applications have a rich variety of resources to draw upon.
- Mainframe installations have developed sophisticated communications networks that generally reach to all corners of the corporation.
- Mainframes have huge amounts of on-line storage capacity.

These capabilities fit nicely with sophisticated OA requirements. If sending documents between terminals is required, why create another network when one already extends from the central computer complex? Profs takes advantage of central computers with its implementation of electronic mail, for instance. Documents to be mailed are filed in one central storage area on a mainframe. The receiving terminals

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are simply told that a document exists. When ready, the recipient accesses the central file for the document. This technique ensures instantaneous transmission.

Most conventional word processors use the "post office" approach, where an attempt is made to send a document directly to the receiving terminal. This is a hit-or-miss situation, and retries are necessary when there is line or terminal contention. Significant delays between sending and receiving are normal.

The true benefits of Profs are realized when managers, rather than secretaries, begin exploring OA. For nonclerical people, document preparation is not as important as the capability to communicate with a companywide base of terminals. Since short memos and notes are generally the extent of a manager's WP needs, sophisticated keyboards and text preparation techniques are seldom needed.

Perhaps the most important advantage for the busy executive is that data storage is handled by professionals in the central machine room. Distributed word processors depend on floppy diskettes or small hard disks located in user areas. Data storage is an important, time-consuming user responsibility. Under a centralized approach, this responsibility is shifted to the DP department, where elaborate backup techniques have already been developed.

If a corporation is worried about the proliferation of information caused by decentralized computers, then moving back into the central machine room has merit. There is a growing concern that companies have allowed too much decentralization of processing power. Communications between diverse pieces of hardware is difficult. Data tends to be duplicated and can become inaccessible to people with legitimate requirements. Many users who should be doing other things become highly paid computer operators.

Central computer facilities are viable and will remain that way precisely because of the problems inherent in distribution. Small computers are incredibly powerful and advance in capability yearly. Raw power, however, will never justify dispersing important corporate data bases. Issues of security, integrity and control are what continue to justify central machine rooms.

The central DP operation will always be around, and concepts like Profs make sense because they use existing resources to provide OA. Availability of in-place communications networks is an important aspect of this approach, and comprehensive data management and retention is a powerful fringe benefit.

For some, centralization is not a particularly exciting approach to OA — very little hardware is placed in the user's possession. A big part of distributed WP's success for secretaries has been that it gave users a chance to acquire computer equipment that enhanced and upgraded their jobs. Managers are not looking for job enrichment; they are looking for tools that will help them compete more successfully.

Using the power and telecommunicating capabilities of large computers is an important strategic choice. It cuts through the continual arguments about network architecture and equipment compatibility.

Centralization has some important advantages — it's here now, it works, it gives the manager what he needs in OA and it requires only a trivial capital investment. OA

If a corporation is worried about proliferation of information caused by decentralized computers, moving back into the central machine room has merit.

Sullivan, manager of accounting for McAuto, teaches computer science at Golden West College in Orange County, Calif., and has recently published a book entitled Practical Computer Cost Accounting.

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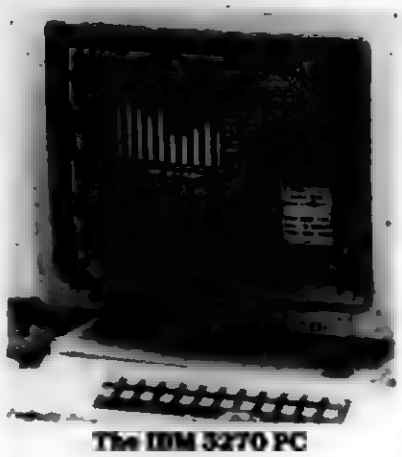

The IBM 3270 PC

NEW YORK — IBM, in what many industry analysts have termed the most significant office products announcement this year, unveiled its PC XT/370 and 3270 PC.

The PC XT/370 reportedly allows users to connect to a host processor operating under the VM/CMS operating system. This reportedly gives the desktop user all the power of the mainframe.

The IBM 3270 PC, which lets users tap the power of multiple host processors while retaining local microcomputer capabilities, allows users to run concurrently up to seven applications, four of which can emanate from a larger host, such as the 4300 or 3080 series.

The 3270 PC's windowing capabilities give IBM functionality similar to the Xerox Corp. Star and Apple Computer, Inc. Lisa workstations. For the PC XT/370, IBM also announced a control program that it said permits users to run many 370, 4300 series and 30 series programs unchanged on their desktops using familiar program languages and command procedures.

The PC XT/370 is priced at $8,995; the 3270 PC sells for $5,585. More information is available from IBM, Information Systems Group, 900 King St., Rye Brook, N.Y. 10573.

LOWELL, Mass. — **Wang Laboratories, Inc.**, in an effort to broaden the scope of office automation applications and to facilitate the systems integration of Wang and non-Wang environments, announced a series of products. The announcements included the following:

The Wang PIC

- The Wang Professional Image Computer, a system that utilizes a camera to scan images from a document; digitize the images; and then display, store, retrieve, alter or merge with text, and transfer those images. The PIC system is offered in several configurations priced at $12,115 to $26,750.
- Wang Office, a series of network-based software applications for Wang systems that provide time and task management, communications and information management tools.
- The Information Distribution System, a family of software products providing a pathway that supports services and applications between Wang VS systems and an IBM or IBM plug-compatible host over an IBM 3270 Systems Network Architecture or binary synchronous communications network.
- WP Plus, a new word processing editor.
- The Wang Professional Application Creation Environment, a relational data base management system and a set of application development tools for the VS computer family.
- Wang Systems Networking, a framework for Wang networking products.
- A new VS operating system environment with Unix support.
- The availability of the Wang Word Processing System Document Communication Specification and the Wang Information Transfer Architecture.

For more information contact Wang Laboratories, Inc., One Industrial Ave., Lowell, Mass. 01851.

MAYNARD, Mass. — **Digital Equipment Corp.** announced its Microvax-1, a 32-bit microcomputer capable of using many of the same programs as the VAX-11/780, the company's flagship superminicomputer.

Amid the clamor of exaggerated office automation claims, we hesitate to add to the din. But here at last is a product that can do just about anything you ask of it.

It's the Lanier Business Processor, newest brainchild of the company that's been a driving force in office automation for over forty years. Built into it are decades of experience at helping businesses be more efficient, be more productive, and streamline, streamline, streamline.

The Lanier Business Processor does indeed do virtually everything. A word processor that excels as a personal computer. A personal computer that out-word processes even machines designed to do nothing else. A workstation that can be networked to other Lanier systems or communicate via SNA through your host network. It's a modular business tool that you can add to, as your company's needs expand. You cannot outgrow it. It will never become obsolete.

You don't have to be an engineering genius to penetrate the secrets of the Business Processor, either. Thanks to Lanier's exclusive One Step™ system, it's incredibly easy to use. Within minutes you can take control. Your users waste less time becoming proficient. Non-typist executives, particularly, can use powerful spreadsheet tools or advanced word processing features in no time.

But revolutionary as our Business Processor is, expandable as it is, versatile as it is, what really sets it apart from the crowd is the depth of support we put behind it. Lanier offers you real person-to-person help. No canned pitch that never varies for us. We tailor each demonstration to your specific user needs. You see *exactly* how the Business Processor can fit into your office automation strategy. What's more, we'll work directly with your users, or through your Information Center.

We train your people before the equipment arrives. We watch over the installation like hawks to make sure it goes smoothly. Once your system is installed, if you have questions, our response is to send a real person, not hand you an '800' number to call.

State-of-the-art technology coupled with genuine support make Lanier the force that it is. A force, in the world of office automation, that could be pulling for *your* company.

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The desktop system represents the first step toward putting the VAX on a chip, according to DEC. The Microvax-I, intended for industrial, scientific and business use, will support as many as eight users simultaneously, DEC said. It holds 512K bytes of internal memory.

The unit, designed for runtime and memory-only applications sells for $9,995 from DEC, Maynard, Mass. 01754.

CAMBRIDGE, Mass. — PC/204, a four-product software link between IBM PCs and IBM mainframes, has been announced by **Computer Corp. of America** (CCA). The product is based on CCA's Model 204 data base management system architecture and incorporates Lotus Development Corp.'s 1-2-3 spreadsheet program.

The PC/204 contains communications capabilities, software integration, retrieval capabilities from the mainframe and a distributor capability that allows applications written in Model 204 user language to be executed partly on the mainframe and partly on the PC.

The PC/204, set for the first quarter of 1984, will cost $10,000 for the CPU with the Communicator, Retriever and Distributor package an additional $750 per PC from CCA, Four Cambridge Center, Cambridge, Mass. 02142.

COLUMBUS, Ohio — **Compuserve, Inc.** introduced its Executive Information Service, designed to offer the business executive access to business information. It features a comprehensive package of financial data, current news, decision-support research and communications options.

The service costs $139.95 for a hookup to the IBM PC; a standard hookup to any other personal computer is $89.95 from Compuserve, 5000 Arlington Centre Blvd., Columbus, Ohio 43220.

ROCHESTER, N.Y. — **Xerox Corp.** has unveiled its 5-lb portable briefcase computer, the Xerox 1810.

The product has a self-contained power source and offers a built-in appointment calendar, clock with alarm, four-function calculator, tape recorder and teletypewriter. It has 64K memory, LCD display screen and can reportedly operate up to 10 hours on rechargeable batteries. Its 8-bit processor is compatible with all CP/M software.

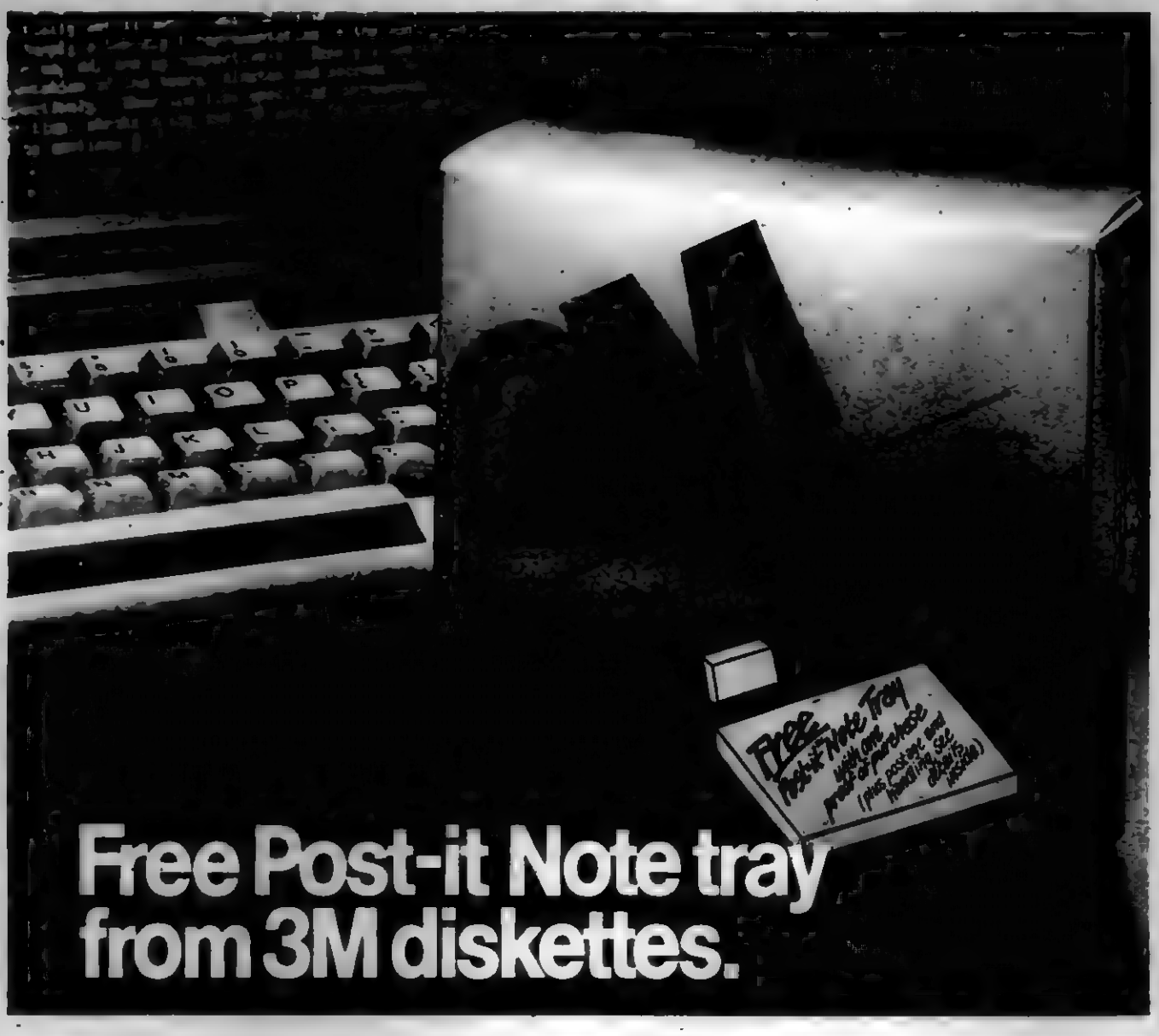
The recommended list price is $2,195 from Xerox Corp., Xerox Square, Rochester, N.Y. 14644.

DALLAS — **Philips Information Systems, Inc.** has introduced six new office automation products: the Information Processing System, a 32-bit superminicomputer that supports Philips workstations; the Conversational Management Information System, a mainframe resident software system that brings administrative and decision support capabilities to the workstation level; Megadoc, an advanced-technology laser-disk mass storage and retrieval device; the 3005 universal workstation, which adds hard-disk storage to the 3000 Series workstation family; the 1002, a cost-effective workstation for basic word processing and communications; and a local-area network.

For more information on the products, contact Philips Information Systems, 4040 McEwen, Dallas, Texas 75234.

WESTLAKE VILLAGE, Calif. — **Wordplex Corp.** announced two personal business computers — the Wordplex Desktop PC and the Wordplex Portable PC. Both are 16-bit microcomputers with 8088 microprocessors.

The main board has a minimum of 128K bytes of random-access memory internal memory and can support up to 512K bytes of



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TECHNOLOGY

memory. A fast-access 320K-byte double-sided floppy disk is standard on both models, with a second double-sided floppy or 10M-byte Winchester drive available as options. Both models are IBM-compatible and can run most software packages designed to run on the IBM PC. The Wordplex Desktop PC costs $2,696; the portable is $2,926 from 141 Triunfo Canyon Road, Westlake Village, Calif. 91361.

Apple Computer, Inc. has announced the Apple III Business System designed specifically for small to medium-size businesses. The system consists of an Apple III personal computer system with 256K bytes of memory and a built-in floppy disk drive; Profile, Apple's 5M-byte hard disk; a 12-in. monitor; Catalyst 2.0 Program Selection software from Quark, Inc.; and a system utilities product training pack. The system is priced at $5,330 from Apple Computer, Inc., 10260 Bandley Drive, Cupertino, Calif. 95014.

DALLAS — A desktop facsimile terminal that reportedly can communicate with computers and be integrated into office automation networks has been introduced by **Xerox Corp.**

The Telecopier 295 digital facsimile transceiver can receive computer information for printing or for redistribution to other facsimile units located anywhere around the world. The system is said to send and receive a page in less than 30 seconds.

The Xerox 295 has a base price of $4,600 from Xerox Corp., Office Products Division, 1341 W. Mockingbird Lane, Dallas, Texas 75247.

ELMWOOD PARK, N.J — **Fox & Geller, Inc.**, a developer and manufacturer of software for personal computers, has announced a business software tool called OZ: Management Control. OZ reportedly integrates data analysis, graphics and reports and offers managers financial control and three-dimensional views of data previously possible on mainframes or minicomputer systems.

OZ is scheduled for release in January 1984 for the IBM PC for $500. For more information contact Fox & Geller, Inc., 604 Market St., Elmwood Park, N.J. 07407.

ATLANTA — **Lanier Business Products, Inc.** has introduced the Lanier Business Processor 1000, a professional computer designed to serve as a professional computer, network device and data communications terminal. The product reportedly can be linked with other workstations in the Lanier Business System 5000 Network.

In addition, it will interface with existing office data communications systems using its 3270 SNA, 5780 communications or teletypewriter-Ascii capabilities. The system has dual 8- and 16-bit processors and configurations which include 128K bytes or 256K bytes of memory and costs $2,995 from Lanier Business Products, Inc., 1700 Chantilly Drive, N.E., Atlanta, Ga. 30324.

PALO ALTO, Calif. — Hewlett-Packard Co. introduced a touch-screen personal computer called the HP 150. The system works by touching the display rather than by keying in or using a mouse. The HP 150 is designed "to be the easiest computer for first-time computer users," according to HP.

The HP 150 uses an Intel Corp. 8088 16-bit microprocessor to run Microsoft Corp.'s MS-DOS 2.0 operating system. Programs available on the system include: Visicorp's Visicalc; Wordstar from Micropro International Corp.; and Condor Computer Corp.'s Data Base Manager.

The HP 150 is available for $3995 from Hewlett-Packard, 1820 Embarcadero Road, Palo Alto, Calif. 94303. OA

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CALENDAR

Dec. 7-8, New York — **Data Base Management Systems: Comparative Evaluation.** Also, New York, Feb. 8-9. Contact: Datamation Institute, Suite 803, 331 Madison Ave., New York, N.Y. 10017.

Dec. 12 and 14, New York — **PC Communications.** Contact: Women in Data Processing, Suite 2008, 310 Madison Ave., New York, N.Y. 10017.

Dec. 12-14, Washington, D.C. — **Personal Computers and Networking.** Also Dec. 14-16, Philadelphia; and Dec. 19-21, Irvine, Calif. Contact: Center for Advanced Professional Education (Cape), Suite 110, 1820 E. Gerry St., Santa Ana, Calif. 92705.

Dec. 12-15, Boston — **Conference on Human Factors in Computing Systems (CHI '83).** Contact: General Chairman Raoul N. Smith, GTE Labs, 40 Sylvan Road, Waltham, Mass. 02254.

Dec. 14-16, Washington, D.C. — **Local-Area Networks.** Also Dec. 19-21, San Jose, Calif. Contact: Cape, 1820 E. Gerry St., Suite 110, Santa Ana, Calif. 92705.

Dec. 14-16, Washington, D.C. — **Microcomputers: Tools of Today and Tomorrow.** Also, Jan. 11-13, Washington, D.C., and Feb. 6-8, San Francisco. Contact: The Institute for Professional Education, 1515 N. Court House Road, Suite 303, Arlington, Va. 22201.

Dec. 15-16, San Francisco — **Desktop Computer Local Networks Forum.** Contact: Architecture Technology Corp., P.O. Box 24344, Minneapolis, Minn. 55424.

Dec. 19, New York — **PC Planning.** Contact: Women in Data Processing, 310 Madison Ave., Suite 2008, New York, N.Y. 10017.

Dec. 19-21, Denver — **Unix.** Contact: Cape, Suite 110, 1820 E. Gerry St., Santa Ana, Calif. 92705.

Jan. 4-5, New York — **Strategic Planning for Information Systems.** Contact: Datamation Institute, Suite 803, 331 Madison Ave., New York, N.Y. 10017.

Jan. 11-13, Los Angeles — **Power of Personal Computers.** Also San Francisco, Jan. 23-25 and Dallas, Feb. 8-10. Contact: The Institute for Professional Education, 1515 N. Court House Road, Suite 303, Arlington, Va. 22201.

Jan. 16-17, New York — **Carl Machover on Business Graphics.** Contact: Frost & Sullivan, Dept. C2, 106 Fulton St., New York, N.Y. 10038.

Jan. 16-17, Boston — **Data Communications for PCs.** Also, Jan. 19-20, New Brunswick, N.J.; Jan. 30-31, Los Angeles; and Feb. 1-2, San Jose, Calif. Contact: Cape, 1820 E. Gerry St., Suite 110, Santa Ana, Calif. 92705.

Jan. 23-25, Washington, D.C. — **Decision Support Systems: Managerial Tools for Effective Decision-making.** Contact: The Institute for Professional Education, 1515 N. Court House Road, Suite 303, Arlington, Va. 22201.

Jan. 23-26, Miami, Fla. — **Managing Today's Work Place.** Contact: Facility Management Institute, 3971 S. Research Park Drive, Ann Arbor, Mich. 48104.

Jan. 24-25, New York — **Integrating Word Processing and Data Processing.** Contact: Datamation Institute, Suite 803, 331 Madison Ave., New York, N.Y. 10017.

Jan. 25-27, Washington, D.C. — **Managing Proliferation of Small Computers.** Contact: The Institute for Professional Education, 1515 N. Court House Road, Suite 303, Arlington, Va. 22201.

Feb. 6-7, New York — **Data Base Management Systems: Introduction to Technology and Design.** Contact: Datamation Institute, Suite 803, 331 Madison Ave., New York, N.Y. 10017.

Feb. 7-8, New York — **IBM.** Also, Feb. 14-15, San Francisco. Contact: The Yankee Group, 89 Broad St., Boston, Mass. 02110.

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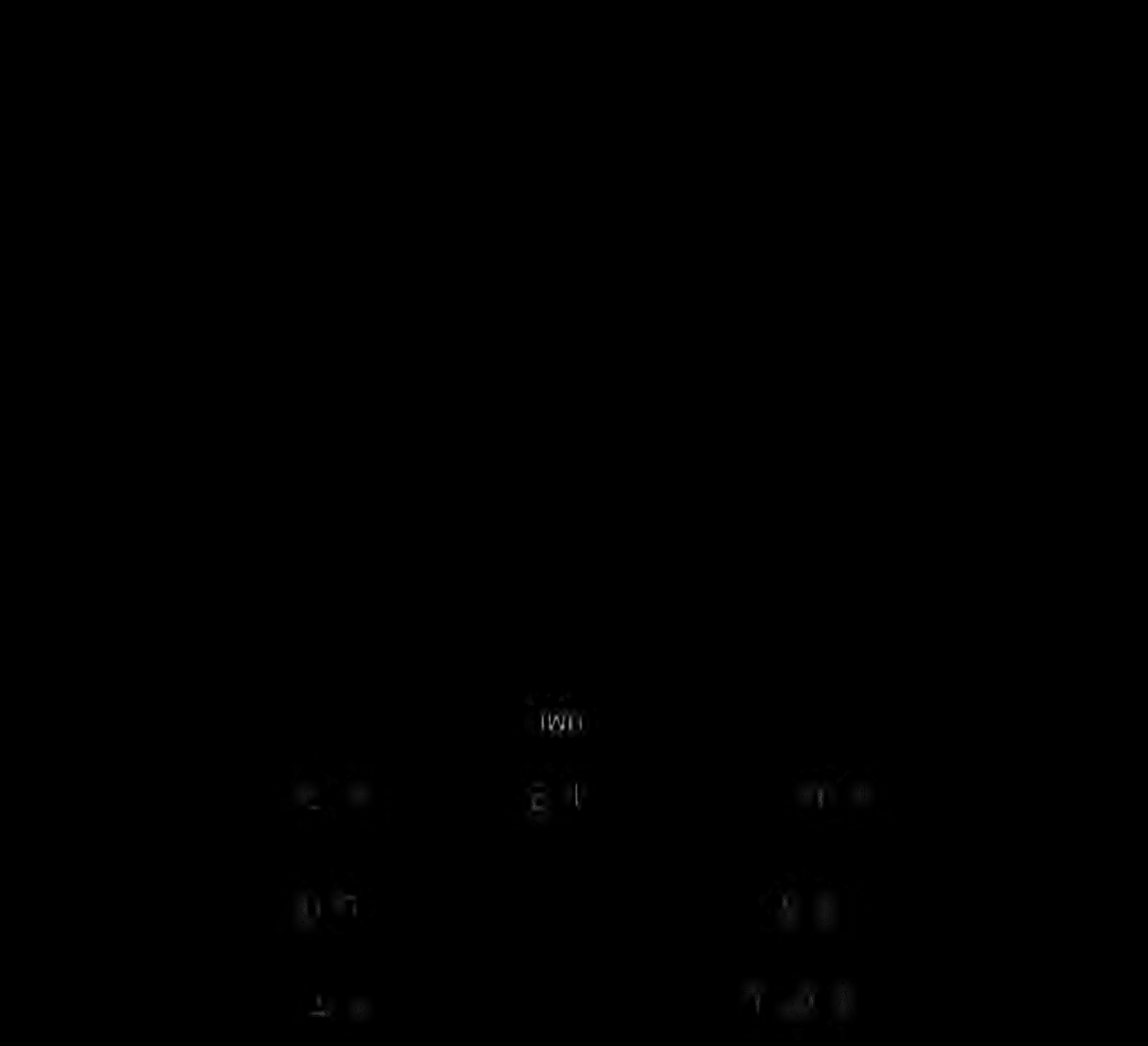

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Developers of Basic at Work on New Version

By Paul Gillin
CW Staff

HANOVER, N.H. — Nearly 20 years after the first version of Basic went online at Dartmouth College here, developers John G. Kemeny and Thomas E. Kurtz and a small staff are at work on a new version of Basic they hope will be adopted as the industry standard.

Kemeny

The two Dartmouth professors head True Basic, Inc., founded last August to create a Basic that is virtually identical to the American National Standards Institute standard expected to be completed late next year.

The first version of True Basic will be geared toward schools and colleges, an area in which Kurtz said Basic has significant shortcomings. It will include improved facilities for file access and subprograms and an embedded conversational user interface. Among the features of the interface will be enhanced screen management routines that allow programs to be viewed while executing, a built-in screen editor, a window manager and a Basic debugger.

True Basic programs will run without change on different vendors' machines, Kurtz said.

While students form the initial target audience, Kurtz did not rule out a business-oriented version in the future. "True Basic was conceived with education applications in mind, but any time a good version comes out, it's useful to programmers as well," according to Kurtz, whose company also plans to develop a range of educational software based on True Basic.

Richer Set of Guidelines

The Ansi standard will be the first comprehensive standard for Basic, which is currently offered in hundreds of different forms by various hardware manufacturers. More than 300 comments were received when the standard went through its first public comment period this summer.

Kurtz, who is chairman of the Ansi X3J2 Committee that is working on the

(Continued on Page 6)

NEWSPAPER

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper

Second-class postage paid at Framingham, Mass. and additional mailing offices ©1983 by CW Communications/Inc.

$1.50 a copy; $44/year | December 12, 1983 | Vol. XVII, No. 50

Inside

Perkin-Elmer Corp.'s unveiling last week of a "supermini micro" compatible with its 32-bit machines launched the company into the highly volatile high-end microcomputer marketplace. **Page 4.**

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A pair of government workers has been linked to an alleged embezzlement scheme involving the misuse of a mainframe and thousands of dollars in bogus welfare checks. **Page 7.**

• • •

"Scurrilous lies" are what AT&T's chairman called allegations that the company does not plan to pass on the reduced costs generated by the access charge plan. **Page 8.**

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A computerized criminal history system in Illinois has lost track of more than half its subjects, an audit report charges. **Page 12.**

• • •

The new president of Eagle Computer Corp. tells how his firm entered the IBM world. **Page 15.**

• • •

The "battle of the banks" took a new twist recently as two major financial institutions in New York announced plans to link their automatic teller machines to challenge Citibank for king of the ATM hill. **Page 79.**

• • •

Putting data in its place is a major concern of computer users, at least according to a recent report that predicts demand for disk storage and worldwide fixed disk revenues will more than double by 1986. **Page 105.**

General Mills to Feed IBM Credit Corp.

By Bill Laberis
CW Staff

ARMONK, N.Y. — In a move that portends more favorable computer lease rates for users in 1984, IBM Credit Corp. — IBM's leasing subsidiary — has taken on General Mills, Inc. as a third financing partner, *Computerworld* has learned.

Contacted last week, both General Mills and IBM Credit Corp. would only confirm that they recently reached a "partnership agreement" and declined to comment further. But a source close to IBM Credit Corp. said that the agreement means General Mills will join Metropolitan Life Insurance Co. and the brokerage firm of Merrill Lynch & Co. in providing IBM Credit Corp. with "substantial" cash to complete lease deals.

The combination of another source of relatively cheap cash and a tax year for General Mills that ends May 31 could give the two-year-old IBM Credit Corp. yet another competitive advantage that will force third-party lessors to write better deals than ever, according to one computer leasing analyst.

Further, sources last week said that IBM Credit Corp. in 1984 will begin compensating sales representatives from IBM's direct sales force who route lease deals to IBM Credit Corp. and, therefore, away from the third-party lessors. If this happens, it would put even greater pressure on the third-party lessors to write deals more favorable to users to counter IBM Credit Corp.'s aggressiveness.

Commenting on the General Mills-IBM Credit Corp. agreement, Charles Greco, who tracks computer leasing for Framingham, Mass.-based International Data Corp., maintained, "It's more whipped cream on the hot fudge sundae for IBM Credit Corp. This partnership will give them a reasonable source of money to do deals year-round. It's a strong signal that they'll continue to be very aggressive."

But a spokesman for the third-party dealers, James Benton, executive director of the Computer Dealers and Lessors Association, downplayed the

(Continued on Page 6)

Latest Harris Poll Uncovers Mixed Attitude About High Tech

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Nine out of 10 Americans believe high technology, particularly computers, makes life easier and better, but they also feel technology seriously threatens their jobs, their privacy and their children's futures, a new Louis Harris poll has found.

"On the surface, at least, I can report to you that there is a bright, new optimistic mood spreading across this nation as we enter what is now commonly called 'the emerging information age,'" Harris told a press conference here Wednesday. The pollster reported on the findings of his survey, sponsored by the Southern New England Telephone Co., at a Smithsonian Institution symposium titled "The Road After 1984: High Technology and Human Freedom."

Commenting on some of the "down-side nightmares" attending the information age, Harris added, "People are in a no-nonsense mood about the vast and sweeping changes they see coming from the veritable explosion of science and technology taking place about them." To the public, "freedom, pluralism, freedom of choice and privacy are precious commodities, the vital ingredients that make life worth living.

(Continued on Page 10)

Western Electric Unveils Switch For Local Net

By Phil Hirsch
CW Washington Bureau

NEW YORK — Western Electric unveiled a Virtual Circuit Switch (VCS) here last week to support a local-area network called Datakit. Through multiple VCS nodes, a wide-area network can be formed from multiple Datakits, the company said.

According to Western Electric, the new switch includes special design features that reduce message delay, permit the interconnection of many different kinds of terminals and computers, facilitate maintenance and simplify expansion and reconfiguration of the attached network (story on Page 8).

The Datakit VCS is the latest development in a marketing effort announced by AT&T Board Chairman Charles Brown at an international

(Continued on Page 8)

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Second-class postage paid at Framingham, Mass., and additional mailing offices. Computerworld (ISSN 0010-4841) is published weekly except Christmas (1 issue), April (1 issue), May (1 issue), July (1 issue), August (1 issue), September (1 issue), October (1 issue), November (1 issue), December (2 issues). The second and fourth issues in December are published on the last week in December and the third week in January by CW Communications/Inc. P.O. Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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Subscriptions: $40 a year in U.S. and possessions, $60 a year in Canada, Mexico & the Americas, $100 a year elsewhere. Back issues when available, $3.00 a copy. Change of address notices and subscription orders should be sent to Computerworld, Box 837, Framingham, Mass. 01701. Postmaster: Send Form 3579 (Change of Address) to Computerworld, Circulation Dept., Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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Scrooge

What might have happened if old Ebenezer had been a sort user!

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Scene: The computer center of Scrooge & Marley, a busy counting-house. Enter Bob Cratchit, systems programmer and father of a large family.

Cratchit: Excuse me, sir. I was wondering if I might have December 25th off.

Scrooge: Bah, humbug, Cratchit! You know we have all those sorts to run by the end of the year. And nobody to run 'em but that green kid you hired. What's his name?

Cratchit: Tiny Tim, sir. (Bravely) He's my son and he says it's our sort program that's causing the trouble. He thinks we ought to try SyncSort—

Scrooge: Humbug, man! Our sort is made by the World's Leading Hardware Manufacturer. (Jams on his hat.) Now be here all the earlier on the 26th!

Scrooge takes a solitary meal at his local fast-food outlet and then retires to his gloomy bedchamber. Perhaps as a result of what he has eaten—a tacoburger washed down by a low-calorie soda—he experiences a harrowing nightmare.

He is visited not only by the ghost of his former partner, Jacob "Damn the Software" Marley, but also by the Ghosts of Data Processing Past, Present and Future.

Ghost of DP Present (as he shows Scrooge the Cratchit family gathered for their holiday meal): Yes, a happy family, but—alas—one over whom a cloud hangs. Poor Tiny Tim...

Scrooge: Is there no hope for the little chap, Spirit?

Ghost: No...unless Tiny Tim receives a new sort program, his operations are...doomed!

When Scrooge finally awakens from his ordeal, he is a greatly changed man. Happy to be alive, he springs from his bed, throws open his windows and calls to a blue-jeaned youth in the street below.

Scrooge: You there, boy! Do y'know the fine, big sort program that hangs in the shop down the street?

Boy: Crikey, sir, you must mean SyncSort.

Scrooge: I do indeed. Run and tell 'em to send it here at once! A half crown if it arrives in less than five minutes. (Chortling) I'll send it along to Tiny Tim. If that doesn't goose up his sorting, nothing will.

From that day to this, no man keeps the holidays better than Scrooge, and nobody sorts better either. To Tiny Tim, who has just received his MBA, Scrooge has been a second father.

And to his other employees, who now enjoy ten paid holidays a year, Scrooge is as good a man and as good a master as anyone in the good old world of data processing!

"And happy holidays to one and all."

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With Multifunction Workstation

PE Moves Into Market for High-End Micros

By Tom Henkel
CW Staff

OCEANPORT, N.J. — Perkin-Elmer Corp. took its first step into the high-end microcomputer marketplace last week by unveiling a multifunction workstation that can function as a stand-alone computer or companion processor to the firm's line of 32-bit superminicomputers.

Called the Model 7350 Professional Computer, the workstation is based on Motorola, Inc.'s M68000 microprocessor and is said to be completely compatible with the firm's 32-bit computer line. In fact, PE claimed it plans to target the system as an entry level to its 3200 series line.

In a departure from PE's usual design philosophy, the computer also runs under a nonproprietary operating system from Unisoft, Inc. called Uniplus+, which is a version of Bell Laboratories' Unix System III operating system. However, applications software written in Fortran or Bell Labs' C language can be used on the 7350 or 3200 series processors running under PE's standard 32-bit OS/32 operating system, according to the vendor.

The 7350 features a modular design, up to 1M byte of user memory, a 15M-byte Winchester disk drive, two double-sided, double-density floppy disk drives, a CRT terminal and a detached keyboard. It is available in three configurations: a single-user professional workstation, a color graphics workstation and a multifunction cluster controller console.

Perkin-Elmer Model 7350

Multifunction Capability

The single-user workstation includes the Uniplus+ operating system and can be used for both software development and execution of applications programs. It includes 320K bytes of user memory and costs $8,400, according to the vendor. This workstation can be upgraded with additional terminals and memory, turning it into the multifunction cluster console.

The 7350 color graphics workstation is similar to the single-user workstation but adds a color graphics display featuring a palette of 27 colors, any 16 of which can be displayed simultaneously. The unit comes with 448K bytes of user memory and costs $10,400.

The multifunction cluster console model — the high-end version of the 7350 — includes 1M byte of memory and can handle up to three additional terminals for a four-user cluster configuration, the company said. The attached terminals are said to have access to all 7350 programming facilities and applications, except for graphics software, which is confined to the base terminal unit. The system costs $11,750.

Software Support

PE last week also announced support on its Model 7350 workstation for several third-party software packages. Among them:

- Finalword, developed by Unicorn, Inc. This word processing package is said to offer the ability to create lengthy documents, including footnotes, tables of contents and indexes. The package, which also features a full screen editor, is priced at $350 for a single-user configuration and at $650 for a multiuser configuration.
- Visiword by Visicorp, a less complex word processing package for users who occasionally produce and print short documents such as memos and letters. The package costs $395.
- Supercomp-Twenty, from Access Technology, Inc., an electronic spreadsheet program that allows users to perform complex tasks such as multidivisional long-range plans. The package includes financial analysis, production planning and engineering decision support. It costs $495 for a single-user configuration and $950 for a multiuser configuration.
- DI-3000 and Grafmaker, by Precision Visuals, Inc., a set of graphics tools for tailoring specific graphics applications. The tools are oriented toward scientific applications. Features of DI-3000 include two- and three-dimensional primitives, shading and patterns, data structures, interactive image manipulation and object modeling. The Grafmaker package reportedly allows users to create business-related graphics presentations including bar graphs, line graphs and pie charts. The DI-3000 graphics library costs $1,250, and the Grafmaker package is priced at $2,000.

Additional information is available from PE, which is located at 2 Crescent Place, Oceanport, N.J. 07757.

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BACK-UP NETWORK PLANNING

Orlando, Florida, February 6-8, 1984

EDP Security, Inc. is pleased to announce BACKUP NETWORK PLANNING, a seminar designed to provide a thorough grounding in this highly critical area.

An overview of data communications fundamentals will be followed by: computer physical security; data security; and contingency planning. Security measures necessary to control on-line data communications systems with particular emphasis on Password Management using the computer as detection system will be stressed. Analysis of existing Password Management software packages will be provided as well.

The highlight of the seminar will be a detailed analysis of the planning steps and tasks to design a backup network. The use of networks will be covered. Comprehensive case studies based upon real world experience, highlighting activation of a backup network will supplement the lecture material. Upon completion of the seminar, the attendee will understand:

- Fundamentals of data communications
- Vulnerabilities in on-line systems
- How to conduct an audit on communications' physical and data security
- What Password Management systems are available
- The specific strategies and planning steps involved in designing a backup network
- How to test and activate a backup network

Seminar Leaders:

This seminar has been designed by Robert P. Santis, President of EDP Security, Inc., widely recognized in the EDP security field, and Michael Jones who has developed a worldwide network control center for the U.S. Airforce.

BACKUP NETWORK PLANNING will be held at the Hilton at Walt Disney World Village Orlando, Florida on February 6-8, 1984. The cost of $695 includes a comprehensive workbook and cocktail reception.

(In addition, our standard disaster recovery seminar will be running simultaneously)

Call 617-[illegible] for additional information.

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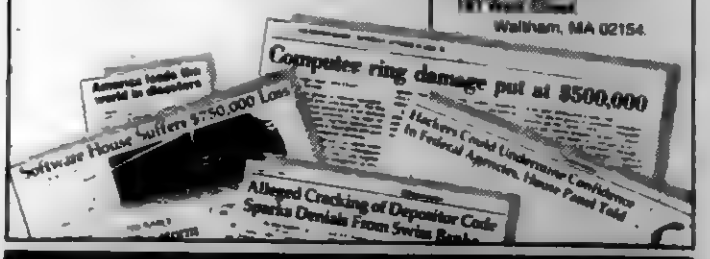

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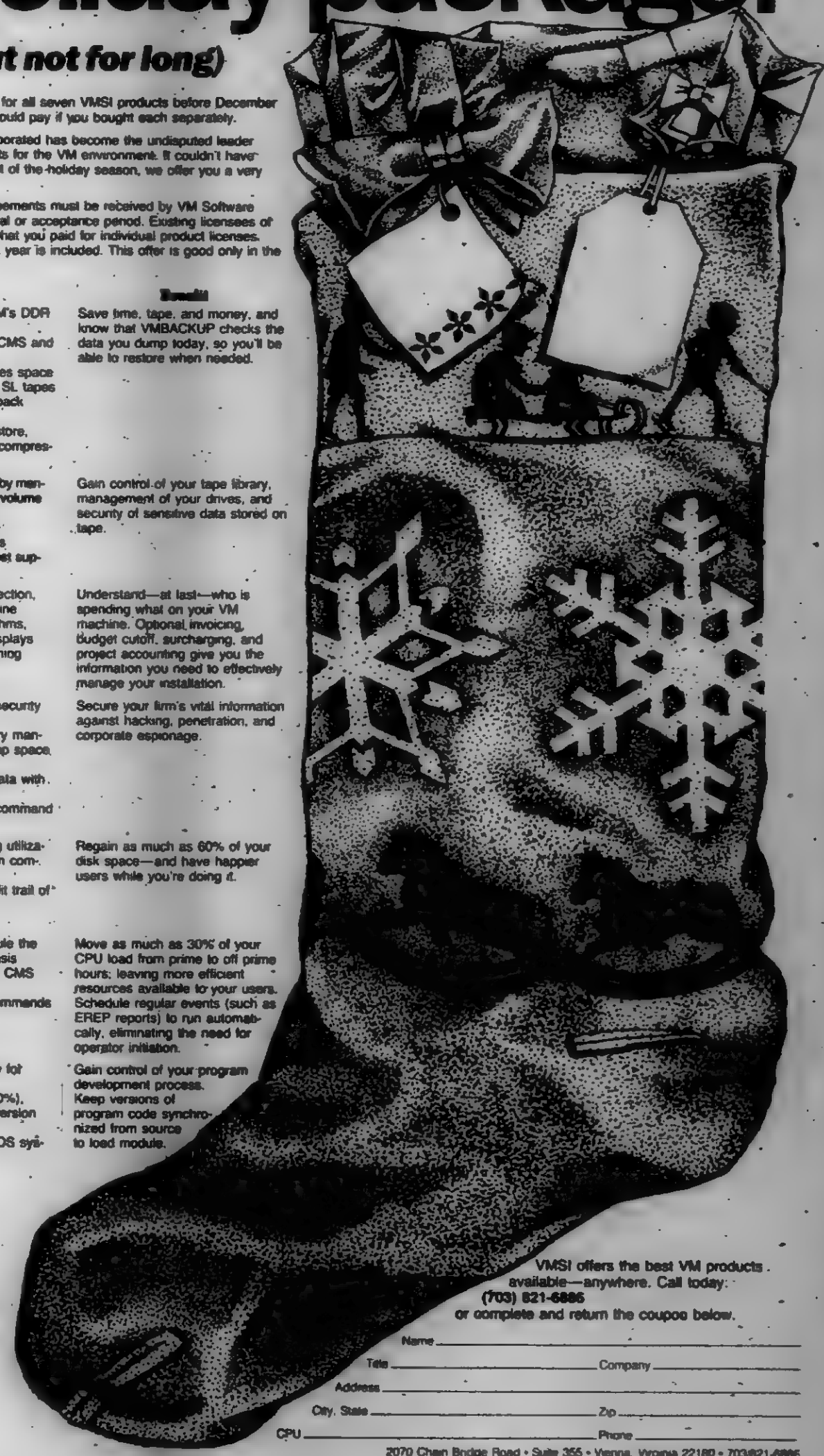
VMTAPE/ CMS	• Provides flexible control by managing any number of tape volume series and tape drives • Supports SL tape usage • Eliminates operator tasks • Offers full DOS/VSE guest support	Gain control of your tape library, management of your drives, and security of sensitive data stored on tape.
VMACCOUNT	• Performs complete collection, costing, and reporting online • Provides flexible algorithms, account structure, and displays • Performs capacity planning	Understand—at last—who is spending what on your VM machine. Optional invoicing, budget cutoff, surcharging, and project accounting give you the information you need to effectively manage your installation.
VMSECURE	• Offers comprehensive security for VM • Comprehensive directory management allows user group space, resource administration • Permits encryption of data with no source code changes • Uses simple end user command language	Secure your firm's vital information against hacking, penetration, and corporate espionage.
VMARCHIVE	• Saves space by moving utilization data to tape or disk in compressed format • Maintains complete audit trail of activities	Regain as much as 60% of your disk space—and have happier users while you're doing it.
VMSCHEDULE	• Permits users to schedule the virtual machine on any basis • Serves as substitute for CMS batch • Uses English-like subcommands	Move as much as 30% of your CPU load from prime to off prime hours, leaving more efficient resources available for your users. Schedule regular events (such as EREP reports) to run automatically, eliminating the need for operator initiation.
VMLIB	• Offers shared file facility for CMS • Saves space (usually 50%), provides auditability and version tracking • Interfaces to DOS and OS systems	Gain control of your program development process. Keep versions of program code synchronized from source to load module.



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General Mills Cash to Feed IBM Credit Corp.

(Continued from Page 1)
significance of the announcement. "IBM Credit Corp. has never had a lack of funds to do deals," Benton said. "IBM is holding all aces. But as long as they have to buy equipment at retail prices and are using funds from the private sector to do so, they'll continue to win some deals, and we'll get our share."

Benton acknowledged that he, too, has heard rumblings that IBM Credit Corp. might begin to compensate IBM salesmen for directing deals to IBM Credit Corp. rather than to third-party dealers. "If they do that, then we'd like the same opportunity," Benton said. "If [IBM Credit Corp.] is essentially going to pay a finder's fee, why shouldn't we? It would be pretty tough to go against them otherwise."

For IBM Credit Corp., the General Mills agreement could provide yet another competitive advantage that the third-party dealers simply cannot match without cutting into profit margins.

Already, IBM Credit Corp. is the only lessor with an AAA credit rating, enabling it to borrow more cheaply and, therefore, write better lease terms than the competition — or write the same lease deals and earn loftier profits.

Typically, the October-December time frame is the busy season for lessors, as investors seeking to shelter cash from year-end taxes dump funds into the leasing market, where purchases of new equipment qualify investors for valued tax write-offs.

But General Mills' tax year ends May 31. Thus, the cash-rich company could be providing IBM Credit Corp. with large infusions of cash at a time when other lessors are paying top rates for cash to swing lease deals.

"Add all these things together, and the [IBM] Credit Corp. will win any deal it wants," according to IDC's Greco, who projected that IBM Credit Corp. would write upwards of $1 billion in lease deals in 1984. Greco added, "They're just beginning. They will have a devastating impact."

Basic Developers at Work on New Version

(Continued from Page 1)
standard, said the new Basic will include a much richer set of guidelines. These will include standards for loops, selects, graphics, modeling and an optional model for business data processing, which includes templates for files with embedded Cobol-type programs and fixed-decimal math.

Structured constructs will provide for loop exits, single-line IF-THEN-ELSE constructs and a case mechanism. Facilities will be included for internal and external subprograms and multiline-defined functions. Several different file types will be included, such as display format files, two kinds of internal files and record and stream files, both accessed sequentially.

The need for a standard has become critical as the rapid acceleration of technology has surpassed the ability of the 1978 Ansi standard for minimal Basic to keep up, Kurtz stated.

Current versions lack good control structure, functions and procedures and good graphics. It is also virtually impossible to write software that runs on more than one kind of machine.

"It is important that there be a standard because future development can arise from that, rather than from the 200 or more versions out there," he said.

According to Kurtz, True Basic will be virtually identical to the standard, with modifications for educational use. "It will be more than just a compiler," he noted. "It will be a compiler-interpreter combination with an interface so that the user doesn't have to know any of the operating system."

True Basic will be tested at Dartmouth in January, with general release on the IBM Personal Computer slated for early fall.

The hardware choice reflects the power the developers expect the new version to attain. True Basic will require 128K bytes of main memory. "We purposely elected not to run on 64K-byte machines," Kurtz said.

However, implementations for other microcomputers may follow at the rate of one every three months, he added.

Seminars Set On Legal Issues

NEW YORK — Computer-related legal questions involving topics such as hardware and software distribution litigation, trade secrets, patents, copyrights, commercial user-vendor litigation and computer security will be addressed at Practising Law Institute seminars scheduled for New York and San Francisco next year.

The programs were designed for attorneys representing both users and vendors. A familiarity with commercial law and litigation is assumed; but no technical knowledge of computer operation is required.

The seminars will be held Feb. 16-17 at the New York Hilton and March 19-20 at the Four Seasons-Clift Hotel in San Francisco. They will be chaired by William A. Fenwick of Fenwick, Stone, Davis and West of Palo Alto, Calif.

The fee, including a course handbook, is $375. The handbook alone is available for $35 from the Practising Law Institute, 810 Seventh Ave., New York, N.Y. 10019.

'Micro Revolution' Topic of Conference

BLOOMINGTON, Ind. — The American Society of Information Science (Asis) has scheduled its mid-year meeting for May 20-23 with the theme "The Micro Revolution: Implications for the Information Age."

Joseph Weizenbaum, MIT professor of computer science, is slated to be the keynote speaker. He is expected to discuss the computer as a solution looking for a problem and examine the question of whether society is surrendering human responsibilities to the computer and technology.

Fees for the meeting at Indiana University are $90 for the full conference and $45 for a single day for Asis members, and $110 for the full session and $55 for one day for nonmembers. More information can be obtained from Stephen Harter, School of Library and Information Science, Indiana University, Bloomington, Ind. 47405.

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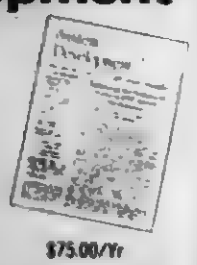

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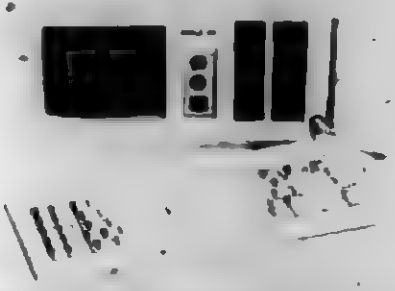

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Two Workers Fired for Alleged Welfare Scam

By Jeffry Beeler
CW West Coast Bureau

OAKLAND, Calif. — Two county government workers have lost their jobs after being linked to an alleged embezzlement scheme in which a mainframe under their control was misused to issue thousands of dollars in bogus welfare checks.

Implicated in the ruse are Willette Hutcherson, a former supervisor in the Alameda County (Calif.) welfare department's compliance unit, and one of her former clerks, Elizabeth Cole.

With the help of unidentified friends and past recipients of government aid, the pair allegedly falsified "at least dozens" of relief claims and apparently collected unauthorized payments from each, according to the department's chief financial officer, Jack Weir.

The precise value of the combined payments is still being computed and is unlikely to be known until law enforcement authorities complete their investigation at some unspecified time in the future, Weir said. But estimates that the fraud netted its perpetrators $300,000 "probably isn't unreasonable," he conceded.

As of Dec. 7, neither Hutcherson nor Cole had been formally charged with any wrongdoing in the case, although the matter had been referred to the Federal Bureau of Investigation, Weir said.

Until their recent dismissals, both women worked in an organization that takes its cues from state appeals officers who arbitrate disputes between relief recipients and the county welfare department. In the past, if an appeals officer ruled in a recipient's favor, the decision would be relayed to Hutcherson, who would authorize a payment by completing the necessary claims form.

In theory, the procedure should have worked without incident. But with Hutcherson in charge of the compliance unit, the process, Weir said, often degenerated into fraud.

As far as investigators can determine, according to Weir, the embezzlement scheme worked as follows: First, the suspects would approach a former welfare recipient whose case had been closed for at least a year and offer the individual a kickback in return for his cooperation in their scam. If the recipient accepted, his claims records would be pulled from the welfare department's manual file of closed cases. The suspects would then authorize a phony payment to a friend, neighbor or some other accomplice who had the same last name as the welfare recipient but a different first name.

If everything went according to plan, all the necessary claims information would be included in an input document. After signing the form and forging the signature of an unsuspecting co-worker, Hutcherson would allegedly have the recipient's case reentered into a nearby IBM 3033 Model Group N mainframe under a slightly different name belonging to the accomplice.

The mainframe, an MVS-based machine housed in the county's DP department, would then issue a bogus welfare check for the amount specified on the input document. Within a few days, the accomplice, armed with valid identification, would arrive at the welfare office and claim his check, which Weir said would later be divided among all the perpetrators.

A recent search of the welfare department's computerized payment records has convinced local law enforcement authorities that the fraud scheme had been operating for at least a year before it was detected. But the scheme's true duration has yet to be ascertained.

Suspicions about a possible fraud scheme surfaced only recently, when one of the welfare department's data entry clerks noticed some curious omissions on an input document authorizing a claims payment. Stumped and sensing something amiss, the clerk sought an explanation from an eligibility worker whose forged signature accompanied the form, Weir said. When the eligibility worker denied authorizing the claim and signing the document, an inquiry quickly ensued.

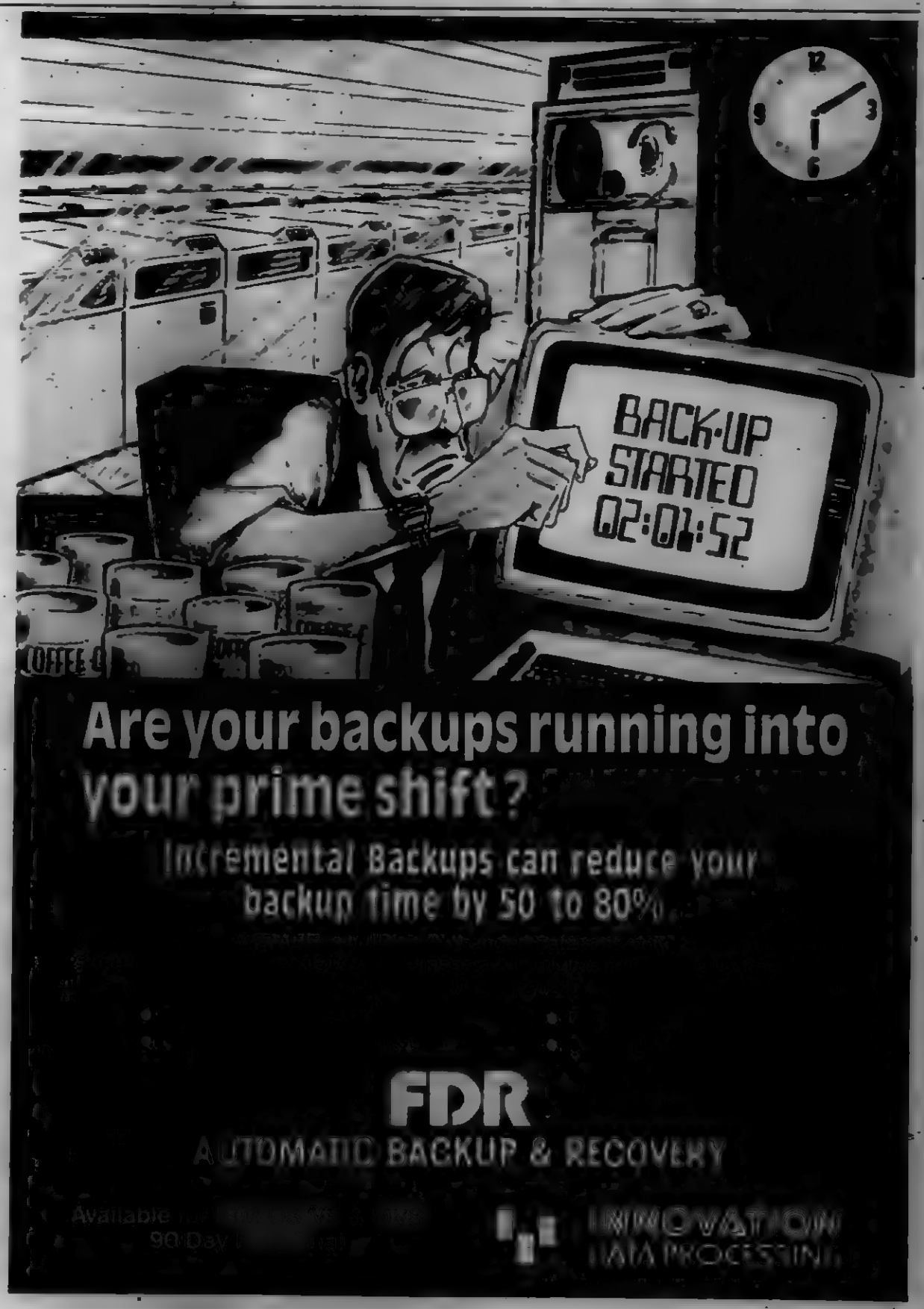
Ill. to Use EFT For Pension Pay

SPRINGFIELD, Ill. — A test program in which the state will use electronic funds transfer (EFT) to deposit retirees' pension checks into banks nationwide could lead to EFT payments for up to 100,000 people now collecting pensions and public assistance.

Comptroller Roland Burris reported that the state could save $5,000 in mailing costs if the 5,500 state retirees now using mailed direct deposit services participate.

Marine Bank in Springfield will handle the transfers in retirees' banks throughout the country for 1.8 cents per check, which Burris said is slightly more than it now costs Illinois to write a check.

Burris said that the service, scheduled to start Jan. 19, also is offered to 21,500 other retirees who do not yet have direct mail deposit, and eventually will be available to a total of 100,000 retirees and recipients of aid to the aged, blind and disabled.



AT&T's Brown Raps Critics, Policymakers

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Allegations that AT&T does not plan to pass on the reduced costs generated by the Federal Communications Commission's (FCC) access charge plan are "scurrilous lies," AT&T Chairman Charles L. Brown said last week.

Brown also described a pending House of Representatives telecommunications bill as "an unmitigated disaster" and referred to the lower charges paid by other common carriers for local access to the telephone network as "a license to steal."

Speaking less than a month before the divestiture of AT&T to an audience of editors and reporters here at the National Press Club, Brown suggested both in his prepared remarks and in a subsequent question-and-answer session that government policymakers are unwilling to accept the consequences of their actions — they want the industry made more competitive but will not recognize that this means pricing services according to their actual costs.

As the AT&T chairman put it, "At the eleventh hour, there seem to be some cold feet. The point apparently suddenly dawned that competition would redistribute costs . . . so that, in a competitive world, long-distance rates would be driven down and local rates driven up. . . . As a result, there is a flurry of 'twilight' legislation that attempts to retain the benefits to the local user of regulated monopoly — preserving the subsidy of local service by long-distance — while championing the concept of competition."

But, Brown said, "overpricing long-distance service . . . to maintain local subsidies will lead business users to bypass the [dial-up] network." He cited figures from Texas, Missouri and California indicating that bypass services are already a serious threat.

Near the end of his presentation, Brown added that the telecommunications marketplace cannot be "half regulated and half competitive." That would lead to "regulated competition," which he called the "worst of all solutions."

The "twilight legislation" Brown mentioned is a House bill (H.R. 4295) and a Senate bill (S. 1660) which would prohibit the FCC for at least two years after the divestiture of AT&T from imposing monthly surcharges on residential and single-line business users for access to the telephone network. According to a widely quoted House study, not enacting the legislation and allowing the surcharges to go into effect will reduce the long-distance carriers' costs by a little over $4 billion annually. Because AT&T is the dominant long-distance carrier, it reportedly will save about $3 billion to $4 billion annually, yet the interstate tariff it filed in October implementing the FCC plan reduces rates only $1.75 billion.

AT&T Communications, the company's former Long Lines Division, will account for "more than half of our revenues," Brown said, adding that, "over time, the long-distance field will be deregulated," thus creating "a level playing field" where AT&T can compete "under the same ground rules as our competitors."

Western Electric Unveils Datakit Switch

(Continued from Page 1)

telecommunications conference in Geneva, Switzerland, last October [CW, Oct. 31]. At that time, he reported that Western Electric, AT&T's manufacturing arm, would shortly begin offering a local-area network to telephone operating companies both for their own use and for resale to their customers.

At the same conference, IBM displayed but did not formally introduce its much-anticipated local-area network, which employs a token ring architecture. The Datakit VCS will compete directly against that token ring network, Western Electric officials indicated during interviews last week in Morristown, N.J.

One major difference between the two networks is that the VCS uses a centralized, hardware-based switch rather than a distributed, software-based system. The Western Electric officials contended that on local-area networks interconnecting a lot of terminals, a distributed arrangement increases end-to-end message transmit time. Company officials also said that because message data generated at each terminal passes other data en route to its destination, the IBM architecture is inherently less secure.

VCS Compatibility

The VCS reportedly is compatible with Local-Area Data Transport, which allows data to be transmitted at speeds of up to 56K bit/sec over conventional analog local loops for distances of up to five miles, and with the fiber-optic local- and long-distance cables being installed by many Bell operating companies.

In California, for example, Pacific Telephone & Telegraph Co. is building a statewide fiber-optic network and recently installed the first three fiber-optic local loops in San Francisco. Placing Datakit nodes at the ends of such a system and connecting terminals to the nodes would provide users with high bit-rate transmission end-to-end, Western Electric said.

Western Electric officials declined to disclose specific prices for the new switch, but said that it will be offered to telephone operating companies at prices competitive with those of other suppliers. Telephone companies may "retail" the Datakit VCS to their customers like a terminal — enabling the user to lease or buy the switch outright — or as a service, in which case the switch would be operated by the telephone company and used by the customer on a shared or dedicated basis.

The Datakit VCS unveiled last week handles only data in synchronous or asynchronous form, but voice transmission capability apparently is on the way. "Integration of voice and data will be handled within a family of products of which the present Datakit VCS is one component," J. W. Wilson, a Western Electric strategic planner, said.

Four of the seven newly created regional Bell operating companies, along with an unnamed U.S. government agency, have already purchased Datakit VCS, according to Product Planning Director R. S. Russell. The Datakit VCS will be demonstrated at the U.S. Telephone Association Midwestern Showcase in Kansas City, Mo., Jan. 17-19.

Datakit Details, Plans Outlined

Western Electric's Datakit Virtual Circuit Switch (VCS) will initially be provided with a Dataphone Digital Service analog 56K bit/sec interface. Interconnection with any RS-232C-compatible host computer or terminal will also be available, plus interfaces for Digital Equipment Corp. PDP-11/70 minicomputers and VAX-11 superminis, according to a press release issued from New York by the company last week.

An optical-fiber local trunk interface is planned during 1984; it will probably operate at about 8M bit/sec, Western Electric strategic planner J.W. Wilson added during interviews in Morristown, N.J., last week.

One of the VCS' key features is reportedly a specially designed contention resolution system, which Western Electric said significantly helps to reduce message transit delay. According to A.G. Fraser, the switch's chief designer, a packet of data can be routed through a VCS node in 100 to 240 μsec, depending on the traffic load.

"Over short distances employing trunks that operate in the megabit range — for example, within a building or campus — the total delay will be less than one millisecond per node," he added.

A typical Datakit network consists of synchronous and asynchronous terminals, together with host computers, connected to dedicated interface modules. The latter are housed within a single equipment cabinet — the VCS node.

In addition to terminal interface modules, the cabinet contains trunk interface, switch, switch control and timing modules. Each is mounted on a circuit card; the cards are interconnected by two 8M bit/sec buses.

Data is formatted in 9-bit bytes (including one for control) and packets containing up to 16 bytes. Data typically moves from sender to receiver along a virtual circuit. Data to and/or from nonpacketized terminals is converted at intermediate points, usually the corresponding terminal interface modules within the VCS node or nodes traversed by the message path.

The big advantage of the VCS contention resolution system, according to Fraser, is that it makes more efficient use of shared-channel capacity than carrier-sense multiple access with collision detection (CSMA/CD). When a Datakit terminal wants to send a message through the VCS, he explained, the interface module connected to that terminal transmits a binary address to the switch control module. If another module is trying to do the same thing at the same time, the signal sent by each will be altered. By comparing the two, bit by bit, all but one terminal is eliminated; the remaining terminal is the one granted access to the switch.

The main difference between this arrangement and CSMA/CD, Fraser pointed out, is that in the latter scheme all of the contending terminals have to back off and wait differing time intervals. Thus, the transmission time that elapses between the first try and the next one is lost.

AT&T already has an extensive Datakit network in place. Begun in 1981, it currently consists of 25 nodes interconnecting 50 time-shared computers and 600 terminals at four Bell Laboratories sites in two states.

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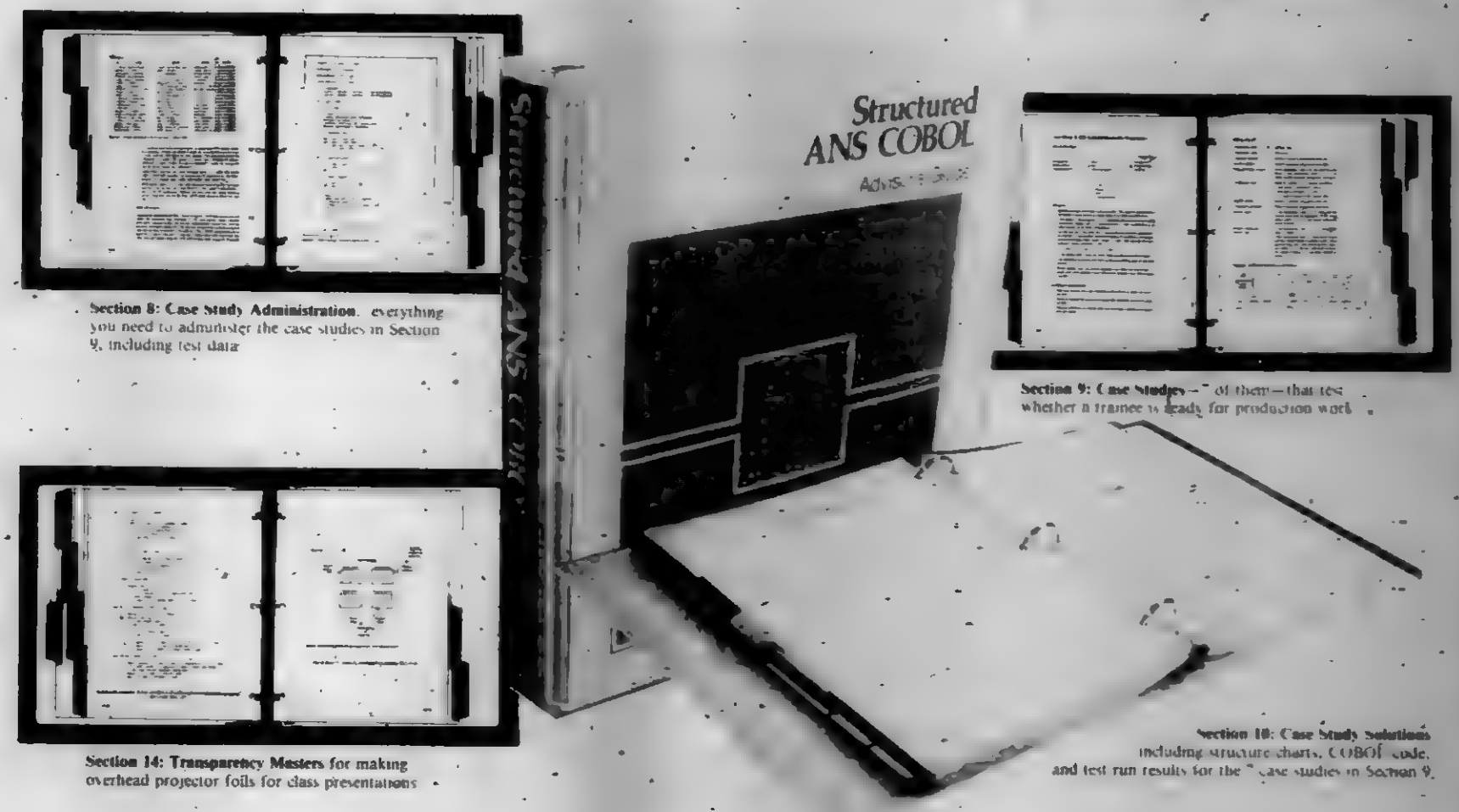

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Harris Poll Finds Mixed Attitude on High Tech

(Continued from Page 1)

Those who would use science and technology to repress freedom, to strip away pluralism, to destroy the human race in a war or wipe out the privilege of privacy will find a counterforce called the American people that will rise up and smite them, a force that will not be denied."

Harris said the poll by his Louis Harris and Associates, Inc. was "one of the most significant we've been privileged to conduct." Snet Chairman Alfred W. Van Sinderen said the poll's results require industry to do "something dramatic" to ensure new technological innovations do not create a public opinion backlash.

Within the last decade, Van Sinderen said, "major industries in the U.S. have gotten into deep trouble by not paying attention to public opinion." He cited the automobile industry's loss of market share to Japanese auto makers, who have supplied Americans with the small, more fuel-efficient cars they demand.

Van Sinderen said he hopes the poll will result in major public and corporate support for more humane implementation of technology.

More Good Than Harm

Giving some of the specific findings of the poll, which came from interviewing 1,256 randomly selected members of the adult public and four 100-member samples of "leaders" — members of Congress and their staffs, corporate executives, science editors and school superintendents — Harris said that "a huge majority," 83%, is convinced science and technology in the past has done more good than harm. A smaller majority, 68%, believe it will do more good than harm in the future.

Eighty-eight percent of Americans feel the computer will improve the quality of their lives. Forty-five percent of all adult Americans reported they know how to use a computer; one in 10 owns a home computer, and 39% more expect to buy one within five years.

But Harris warned that there is "a real prospect of a new 'have' and 'have-not' division in our society in terms of computer literacy." Of the 45% who know how to use computers, 62% are under 30 years of age, and only 10% are over the age of 65. Sixty-eight percent of the computer-literate have a four-year college degree; only 16% have not finished high school. And 67% of those with incomes exceeding $35,000 can operate computers, while only 23% of those with incomes below $7,500 claim the same ability.

The major concern Harris found was about privacy invasion by computers. Seventy-seven percent of Americans worry about this threat, up from 64% just five years ago.

Three Worst Risks

The three worst institutions for not safeguarding information and for improper data sharing are credit bureaus, loan companies and insurance firms, Americans participating in the poll said.

Also cited as threats to privacy, but by a smaller margin, were government welfare agencies, the U.S. Bureau of the Census, banks and public opinion research agencies. Only the Internal Revenue Service, the Federal Bureau of Investigation and local telephone companies "come off relatively well" among those tested, according to Harris.

Harris said the bottom line is that by 68% to 30%, the public is convinced that "if privacy is to be preserved, the use of computers must be sharply restricted in the future." However, by 61% to 35%, the four leadership groups disagreed with that assertion.

Yet both the public and the leaders, by wide margins, favored federal laws to make it a criminal offense for information-collecting businesses or organizations to violate personal privacy, to require that any information from a computer that might be damaging to people or organizations be double-checked before use, to impeach public officials who abuse privacy, to punish those responsible for computer errors that hurt individuals, to put companies out of business if they hurt privacy by sharing information and to set federal regulations on combining a person's data with other information about the same individual.

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Report to Cover Divestiture

BOULDER, Colo. — Cross Information Co. (CIC), plans to publish on Feb. 1 a 180-page report examining strategies for telecommunications management after the AT&T divestiture.

The report is expected to provide corporate strategic planners, telecommunications managers, data processing executives and office automation managers with long-range strategies.

It reportedly will focus on local-area networks, private branch exchange systems, data processing, integration with personal computers and teleconferencing.

The report will cost $400 if purchased before the Feb. 1 publication date and $500 thereafter. CIC is located at Suite B, 934 Pearl Mall, Boulder, Colo. 80302.

Statistics Accentuate the Positive And Negative of High Tech

WASHINGTON, D.C. — The following are some additional statistics from the Harris poll on the effects of technology on society:

On the positive side:

- Over 90% of those polled see a big rise in productivity through high technology in the work place.
- Nearly 73% believe computers will aid education.
- Sixty-six percent favor mandatory computer instruction for elementary school children, and 83% feel it should be extended to high school students.
- Americans view electronic mail positively (73%), whereas just two years ago 64% had a negative attitude toward it.
- Seventy-two percent like the prospect of obtaining shopping information and news through home computer systems.
- Ninety-five percent anticipate office automation will enhance their jobs by allowing access to information without the traditional red tape and time-consuming efforts required to get it.

On the negative side:

- Fifty-one percent believe computers threaten their privacy. The same is true of 53% of those who claim knowledge in computer use; 50% of those who are experienced computer users; and 55% of those who are members of Congress.
- Sixty-seven percent, up from 44% in 1974, believe personal information about them is being kept in files for purposes unknown to them.
- Most (84%) feel it would be easy to put together a file on them containing all their credit information, employment records, phone calls, where they have lived over the past 10 years, their buying habits, their payment record on debts and the trips they have taken.
- Seventy-eight percent feel such a master file would make them feel their own privacy was being violated.
- Just over 60% of the factory workers feel robots will hurt their livelihoods.
- Over 70% of the Americans surveyed believe factory automation will eliminate hundreds of thousands of jobs.
- Seventy-four percent of Americans worry that "profligate spending" will bust their home budgets as a result of using computerized buying and bill paying capabilities.
- Eighty-three percent worry that new uses of their telephones will cause their bills to rise dramatically.
- Sixty-seven percent worry that in offices "people will end up working for machines instead of using their brains and creativeness to do an effective job."
- Sixty-five percent worry that computers in schools will take away or eliminate many benefits students get from working directly with inspired teachers.

Public, 'Leaders' Disagree On Imminence of '1984'

WASHINGTON, D.C. — In his public opinion poll on the impact of technology on society, Louis Harris found that 69% of the general public believe that *1984* author George Orwell's fictionalized scenario of life with almost no personal privacy is "at least somewhat close." But a 59% majority of the leaders surveyed — members of Congress and their staffs, corporate executives, science editors and school superintendents — said it is "not at all close."

Taking other "Big Brother" visions from the Orwell novel, the Harris survey found that fully 87% of the public and 89% of the leaders think it is possible that "individuals will be threatened with disclosure of damaging facts about them" in the new information era. Only 47% of the leaders think such a development is likely, but a massive 70% of the American people think it will take place.

Eighty-six percent of both the public and leaders think it is possible "a government in Washington will use confidential information to intimidate individuals or groups it feels are its enemies." While only 39% of the leaders feel this is likely, 70% of the public does think it will happen.

Most of the public and the leaders, 79% and 78%, respectively, believe it is possible "confidential information will be used to take away the privacy, the freedom and the liberty of individuals and groups of individuals." Only 27% of the leaders see that as likely to happen, but 58% of the American people think it will happen in this country.

Taken Over by Government

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"Only 9% of the leaders felt that is likely to happen, but among the public, 37% think it is likely; only 24% of the public believe it will definitely not happen," the survey said.

Eighty-four percent of the public and 81% of the leaders believe it is possible for "closed circuit television to be used by the government to document compromising activities of many individuals." While only 39% of the leaders predict it will happen, 67% of the public see this development as likely.

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Ill. System Loses Track of Half Its Data Base

By Peter Bartolik
CW Staff

SPRINGFIELD, Ill. — The Illinois Department of Law Enforcement's computerized criminal history system was initiated to track the estimated 250,000 felony criminal cases filed annually in this state, but it has lost track of more than half of its subjects, according to a recent audit report.

The Illinois Criminal Justice Information Authority reported in November that almost 59% of the approximately 1.25 million arrest files in the data base contain incomplete records of final disposition. The authority charged that the lack of complete information in those records compromises the usefulness of the system, which prosecutors use to determine what charges to file and judges use to make bond and sentencing decisions.

Department of Law Enforcement spokesman Robert Fletcher told *Computerworld* that the agency does not disagree with the findings of the audit report but believes the report fails to consider the historical background behind the problems.

The department uses two IBM 3083 mainframes operating under MVS/SP along with 32 IBM 3850 disk drives and 20 IBM 3880 disk drives. The computer operation ties into the Federal Bureau of Investigation's automated National Crime Information Center and a statewide system known as Leads — Law Enforcement Agency Data Systems — by which police and court agencies with terminals may directly access the crime record data base.

Of the more than 600 police agencies in the state, 400 have direct access terminals, including more than half of the county sheriffs' departments and several judicial circuits.

The oversight authority that issued the audit report is headed by an appointed 15-member panel composed of three private citizens and representatives of all areas of law enforcement and the court system.

The authority reports to the governor and the state legislature and is charged with reviewing the law enforcement system and privacy and security issues.

James Coldren, senior research analyst for the authority and an author of the report, said last week that staffing priorities have resulted in the reporting system placing "more emphasis on arrests than dispositions." A factor greatly aggravating the problems, he said, is that two counties accounting for 50% to 60% of all dispositions — Cook and DuPage — have their own automated systems and send computer tapes to the Law Enforcement Department, which has not "figured out how to get these two computers to talk to their computer."

Process Problem

Fletcher said that the actual arrest-to-disposition process adds greatly to the problem. Police officers, he claimed, tend to file every possible charge when making arrests; state attorneys in each county tend to prosecute only the strongest charges and drop others without reporting back to the system; and judges often place defendants "under court supervision" for a set period, after which the record is technically expunged if no further criminal actions are reported.

"In an alarming number of cases, the courts never go back and clean up those records. They just don't have the personnel," Fletcher said.

He added that the criticisms of the system fail to note the historical background that caused the problem. When the legislature mandated the system in 1976, the department, Cook County — with "the largest trial court system in the world," according to Fletcher — and DuPage County had already established independent computer systems with different reporting procedures. (DuPage County has just about solved its automated reporting problem, and Cook County "is beginning to approach the problem," he added.)

In addition, the police and court departments in the other 100 counties each had their own filing systems, none using the Law Enforcement Department's method of assigning document control numbers based upon fingerprint files, which "created a staggering backload. We've been playing catch-up," Fletcher said.

When the original system was mandated, no provision was made for a uniform system of classifying criminal reports.

The legislature has since mandated that the Department of Law Enforcement establish a uniform system within two years, according to Fletcher. That, he added, will create "a human problem" with three tiers of elected officials in each of the 102 counties recognizing the need for improved reporting but resenting the costly imposition and fearing that the data may be manipulated to show them in a bad light.

Ulrich Named Chairman Of ICCA May Conference

HOUSTON — Houston management consultant Walter Ulrich has been named chairman of the Independent Computer Consultants Association (ICCA) National Conference, which will be held here next May 16-19.

Ulrich is president of Walter E. Ulrich Consulting, a firm that specializes in information, communication and office systems consulting. Ulrich, whose selection was announced by ICCA founder Steve Epner, was promotion chairman of the 1982 National Computer Conference in Houston.

Ulrich announced that the theme of the 1984 ICCA national conference will be interconnections, "the complex technical, business, networking and social issues of 1984."

The registration fee for Interconnections '84 is $150. More information is available from ICCA, a national association of independent consultants, in care of Walter Ulrich Consulting, Suite 450, 2626 S. Loop West, Houston, Texas 77054.

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Bricklin Says Software Still Has Way to Go

By David Myers
CW New York Bureau

NEW YORK — The concept of visual programming — which shows on a terminal screen "how the user envisions his data" — has not yet reached its final stages of development, according to the inventor of a much-imitated spreadsheet software package.

Daniel Bricklin, founder of Software Arts, Inc. and author of Visicorp's Visicalc, told an audience of securities analysts at a microcomputer seminar held here last week by the New York Society of Securities Analysts that high costs, beginning to wane, have until now kept the use of color and sound from becoming dominant feedback mechanisms in software development.

"In visual programming, you show on the screen how the user envisions his data, and you allow him to manipulate that data directly. The system gives him some feedback, which is extremely important. Color is very good for that," Bricklin said.

Future programs will be so natural to use that they will eliminate the issue of training, Bricklin said, explaining, "When someone gets into the passenger side of your car, you know whether he's shut the door simply by the sound. You don't need to be trained to recognize it. You just know."

Future software development also depends on how successful software houses are in attracting experienced marketers away from consumer electronics and electronic components makers, Bricklin said. The DP industry is not old enough to provide many experienced marketing executives, he pointed out.

Bricklin also noted that software firms, long favored by Wall Street because they were not capital-intensive, have begun to require more capital in order to outgrow their beginnings. "You must have an environment to attract good people, and you must have good computer equipment," he noted.

But the future of software development can be made rosier by such technical innovations as what Bricklin called the "highly interactive" display screen and such product introductions as Radio Shack's Model 2000 personal computer which, the software writer said, is "getting into minicomputer power with a [personal computer] screen."

Bricklin, who began his career as a word processing project leader at Digital Equipment Corp., said definitions of what is "natural and appropriate" in software programs all depend on "the people who are using them."

Menus are good for a generation that grew up ordering food in Chinese restaurants, but a younger generation "may be more comfortable shooting down their choices," Bricklin said.

Rosen Says Only Macintosh Can Prevent IBM Micro From Becoming Sole Standard

By David Myers
CW New York Bureau

NEW YORK — Unless Apple Computer, Inc. wins the fancy of a wide public with its Macintosh microcomputer, slated for introduction in January, the computer industry is on a trend that should see IBM's Personal Computer squeeze out all other architectures as the sole standard for 16-bit computers in this country.

That is what Benjamin M. Rosen, a venture capitalist and chairman of Compaq Computer Corp., maker of IBM-compatible microcomputers, told a group of securities analysts here last week at a seminar on microcomputers offered by the New York Society of Securities Analysts.

Ninety percent of the businesses that have installed personal computers have bought either IBM Personal Computers or a machine that duplicates its architecture, Rosen said. "The introduction of the PCjr [IBM's home computer] cements the idea of standardization" since it is compatible with both the floppy disk and hard disk versions of IBM's Personal Computer.

"The Macintosh is a machine with tremendous performance, . . . If 'Mac' makes it, there might be room in this market for another standard. If not, that means we have to think exclusively in the future in terms of the Personal Computer," Rosen said.

Microcomputer vendors that buck the IBM standard are telling customers to choose one style of architecture or another. "We think that is a very difficult strategy to follow if you want to be major," Rosen said, referring to his investment partners.

Rosen, who said he subscribed to the "one man, one machine" definition of the personal computer, noted that widespread adoption of the Personal Computer as a standard architecture "makes it easier for Japanese companies to enter this market. Two years from now, 90% of the [companies] turning out computers will be meeting these standards."

Rosen, a former investment counselor and newsletter publisher who led the $30 million capitalization of Compaq, said "exorbitant marketing costs" make it impossible for another $5 million start-up like Apple to get off the ground. Even so, opportunities in the DP industry are practically boundless, he said. Pointing to Compaq's growth from $5 million in the first quarter to $18 million in the second to $36 million in the third, Rosen said, "If you get any penetration at all, you will get big very fast."

Admitting that he and his partners sank $400,000 into Osborne Computer Corp., Rosen said such investments are worth the risk. There is a limit to how much an investor can lose if a company goes under, but there is no "upside limit" if a company takes off, Rosen pointed out.

His stake in Compaq is now worth $95 million, Rosen said.

Rosen listed five qualifications a firm fishing for capital must meet before he and his partners will invest in it: It must be managed by qualified people; it must be targeting an unfilled market need; it must be capable of developing and manufacturing products to meet that need; it must have a strong marketing group; and its founders must have "a strategic vision," that is, "What happens after the first product?"

Looking into the future, Rosen said he sees the portable computer segment of the market growing faster than the desktop segment.

Micro Boom Seen Boost to Software

NEW YORK — The arrival of personal computers on executives' desks has made software the overriding issue in the marketplace, stock analysts were told here last week at a microcomputer seminar held by the New York Society of Securities Analysts.

John F. McMullen, a consultant and former analyst, said personal computers have removed the data processing department as an intermediary for most business computer users. "The average end user is not someone who wants to — or should — involve himself in the special tools and terminology of the data processing professional," McMullen said.

With the coming of what several speakers at the seminar said is the widespread adoption of the IBM Personal Computer as the market standard, software choice may become the deciding factor in hardware purchases. "Software availability drives hardware," McMullen said.

Software expert Esther Dyson, editor and publisher of the industry newsletter "Rel-1," agreed that the performance of microcomputer hardware "is suddenly going to matter more as you can get software that stretches it to its limits." But Dyson dissented from industry gospel by saying that the software explosion will defuse the IBM compatibility issue. "You'll fight IBM not by being compatible but by offering [greater] performance," she said, speaking to IBM's rivals.

Dyson also said that adoption of the IBM Personal Computer as an industry standard will not mean adoption of Microsoft, Inc.'s MS-DOS, the basis of IBM's PC-DOS, as the industry's standard operating system software. "MS-DOS is the 'standard' now not because it is so great or because Microsoft is so strong, but because IBM is using it. I suspect by the end of 1984 IBM may well be using something else — if not instead of MS-DOS, then in addition to it."

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Transborder Data Flow Policy Supported: Survey

By Jake Kirchner
CW Washington Bureau

ROME — Although most countries have not formulated policies on transborder data flow, a recent survey found that the majority favor an international legal framework governing data flow policies.

"Governments and multinational business strongly support international cooperation to minimize sociocultural, vulnerability, trade, technical and sovereignty conflicts," said the Rome-based Intergovernmental Bureau for Informatics (IBI), which conducted the survey. "This cooperation should take the form of harmonization of national regulations, establishing an appropriate legal framework of international data transfers."

The IBI is an independent organization devoted to enhancing the use of information and telecommunications technologies in developing countries. It plans to hold an international conference on transborder data flow here next June.

Reporting on the results of its survey, data for which came from multinational corporations, government agencies and telecommunications authorities in 85 countries, the IBI said that only 39% of responding countries endorse the principle of free flow of information, a position supported by the U.S. government. The IBI said 58% of the countries support some legal framework governing data flows.

However, the survey found that 64% have not decided whether to tax information products and services at their borders, and 30% definitely will not do so. In a statement issued with the survey results, IBI Director General Prof. F.A. Bernasconi said the indecision on these and related issues makes this a critical time to consider data flows.

"Many countries have yet to formulate [data flow] policies, and these surveys indicate they may not impose severe restrictions or taxes on data imports and exports," Bernasconi said. Noting that respondents stressed the importance of data flows, he said "the international nature of [transborder data flow] brings with it a high degree of interdependence among countries; consequently, no country can effectively act unilaterally and, therefore, programs of multilateral cooperation and assistance are essential."

Other survey findings include:

- Most nations believe personal data transmitted outside the country should receive the same protection as in the country of origin.
- The largest users of international telecommunications, in order of volume, are: manufacturing and trading companies, air and sea transportation and financial and insurance services.
- Many African and Latin American nations said they will not permit access to international information retrieval and DP services.
- Up to 90% of multinational firms use or are planning international computer-to-computer systems.
- Half of the multinationals say data flow is important to company operations; 34% say it is not essential.
- Use of international computer-to-computer systems has not significantly changed the management of companies. One-quarter believe it has resulted in greater centralization, but 21% say just the opposite, and 28% say no change has resulted.

Documentation on the survey findings is available from the IBI's Department of Policies, B.P. 10253, 00144 Rome, Italy.

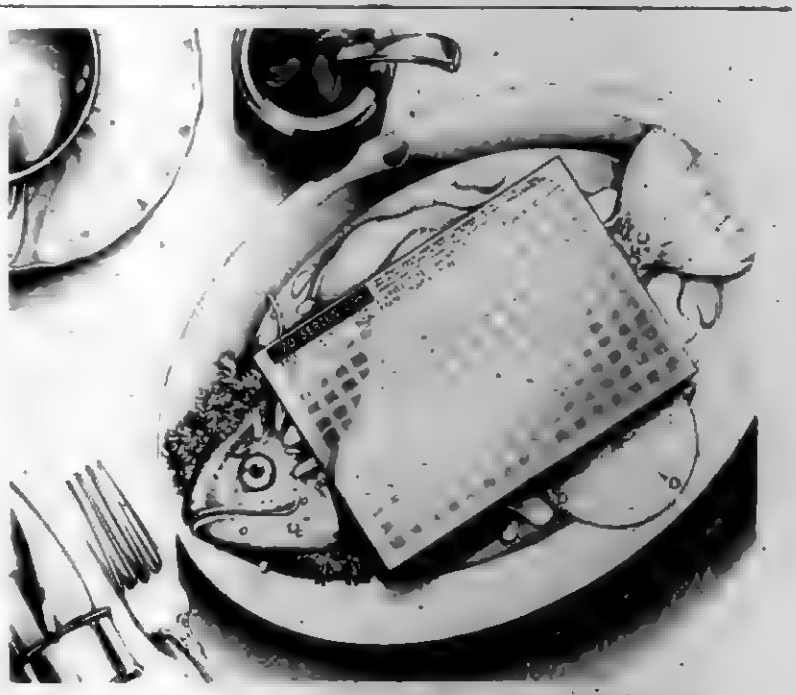
NBS Seeking Info On Power Problems

WASHINGTON, D.C. — The National Bureau of Standards (NBS) is seeking information on data loss or terminal and small computer damage caused by overvoltages or other electrical supply problems.

The bureau said it may develop a guide to the electrical requirements for reliable and safe operation of desktop computers, personal compufers, word processors and intelligent terminals if there is sufficient user interest and need.

The NBS Institute for Computer Sciences and Technology will soon release guidelines on power, grounding and safety requirements for operating large and medium-scale computer systems.

Data on power problems related to small machines should be sent to Steve Recicar, A216 Technology Building, NBS, Washington, D.C. 20234.



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Eagle Computer Chief Talks About the IBM World

Eagle Computer, Inc.'s market aggressiveness and rapid growth have made it a closely watched company since its founding two years ago. The manufacturer of IBM-compatible microcomputers made headlines last summer when its founder and president, Dennis Barnhart, died in an automobile accident the same day the company made its first public stock offering. Eagle withdrew that offering and reissued it a week later.

Concerns over the future of Eagle Computer after Barnhart's death were allayed several weeks ago, when Eagle announced three machines that are compatible with the IBM Personal Computer and Personal Computer XT: the Eagle PC Plus XL, a hard disk-based system; the Eagle PC Plus, a floppy disk version of the Plus XL; and a portable computer called the Eagle Spirit [CW, Dec. 5].

The introduction of the three machines reaffirmed Eagle's intention to be a major contender in the growing market for IBM-compatible personal computers, this time under the leadership of Ronald N. Mickwee, who was appointed to succeed Barnhart as president and chief executive officer. Mickwee, who joined the firm last April as chief operating officer, was interviewed recently by Marcia Blumenthal, editor of* Computerworld *Buyer's Guides.

You took over the presidency of Eagle Computer under tragic circumstances. How did the company come to terms with the accident?

The most traumatic aspect was the personal loss of a leader. My first decision as chief executive was to see to it the company didn't miss a beat. We rescinded the original stock offer, but we never closed our doors.

Eagle Computer's first product was the Eagle IIE series, an 8-bit Zilog, Inc. Z80A-based microcomputer that was not IBM-compatible. How did your firm switch gears into the IBM world?

Last November we decided to get into the IBM-compatible market, but our first product, the Eagle 1600 series, was mispositioned. It was Intel [Corp.] 8086[-based], not 8088-based, and featured some IBM compatibility.

We did not view this as an answer to the IBM Personal Computer, but we were not a large enough company to get the idea across to the marketplace that we were not doing battle with IBM. So our recent announcements were true entries into the IBM-compatible market.

Do you see IBM's announcement of the Personal Computer XT-370 and the 3270 Personal Computer as a further means of excluding IBM-compatible personal computer makers from the market?

The XT-370 is significant, but it has a limited market, mostly aimed at corporate users who are in the VM/CMS environment, which is not exactly a popular operating system. Moreover, IBM won't be delivering these products until next year, which gives us time to catch up, especially with regard to the 3270 Personal Computer announcement.

A few years ago there was a lot of hoopla over the IBM plug-compatible mainframe market, but that seems to have evaporated. Do you see the same thing happening to the IBM-compatible personal computer makers?

There are more disparities than similarities between the two markets, the primary reason being that with personal computers, there are millions of decision makers vs. tens of thousands of decision makers for high-end systems.

Today, within the corporate environment, we are seeing a lot more democracy taking place. A lot of people in companies who were never interested in computers are taking an interest in these systems. They can tell the DP manager they will salute his goal — IBM compatibility — but they want more flexibility in purchasing a particular product of their choice.

IBM compatibility is essential in selling into the corporate environment. [However], a vendor gets in the door with compatibility, but sells the differentiation in the product.

There's been a lot of talk about a shakeout starting in the personal computer marketplace. How does that talk affect companies such as yours?

The shakeout was inevitable. In the first, or "novelty," stage of the market, people are concerned with the engineering and technology aspects of the product. There is little standardization, and entry into the market is easy. This environment can easily support 150 to 200 vendors.

Now we are in the "definition" stage, where people are concerned about what comes out of the machine rather than what goes into it. And there is standardization. The major element, at least according to our philosophy, is IBM compatibility.

I think what you are seeing going on right now is an almost "hysterical celebration" by those people who are not computer-literate being able to go ask for a computer. They just say "IBM."

IBM may have a good chunk of the market, but it opened the market up by not making the machine a proprietary product. IBM invited vendors to make software and peripherals for its Personal Computer.

But your company is not yet selling directly into corporate accounts, where the big volume buys are. Will you be taking an end-user rather than distributor tack in the near future?

In general, we are sticking with a two-tier retail distribution channel, consisting of quality retailers who are mostly walk-in and those who have specialized sales forces that concentrate on Fortune 1,500 accounts.

We just extended our distribution channel with a major agreement with Computerland.

On a case-by-case, "rifle-shot" basis, we will court an end-user account, but only when we can smother them with service, like we have with [Avon Products, Inc.].

We do not intend, at least for the next two or three years, to create an end-user sales force to go head-on with IBM. It would be premature of us to be thinking that way. Victor Technologies is a good example of what can happen when you take that approach.

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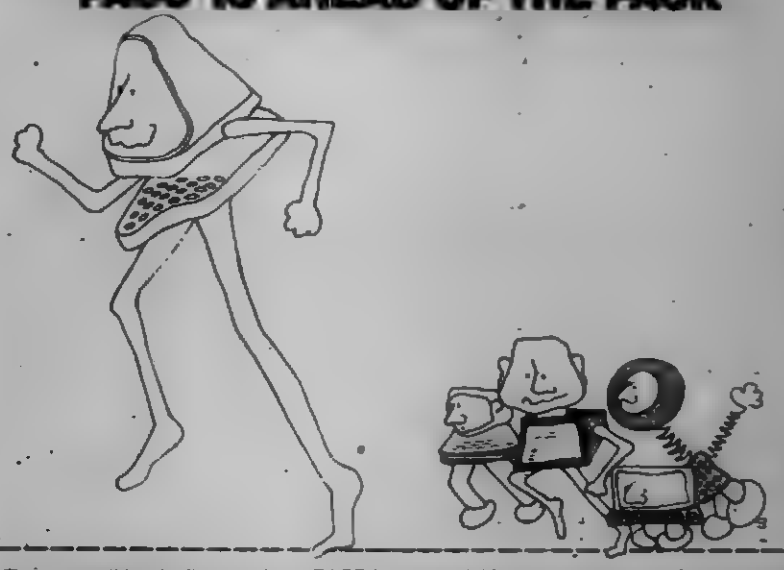

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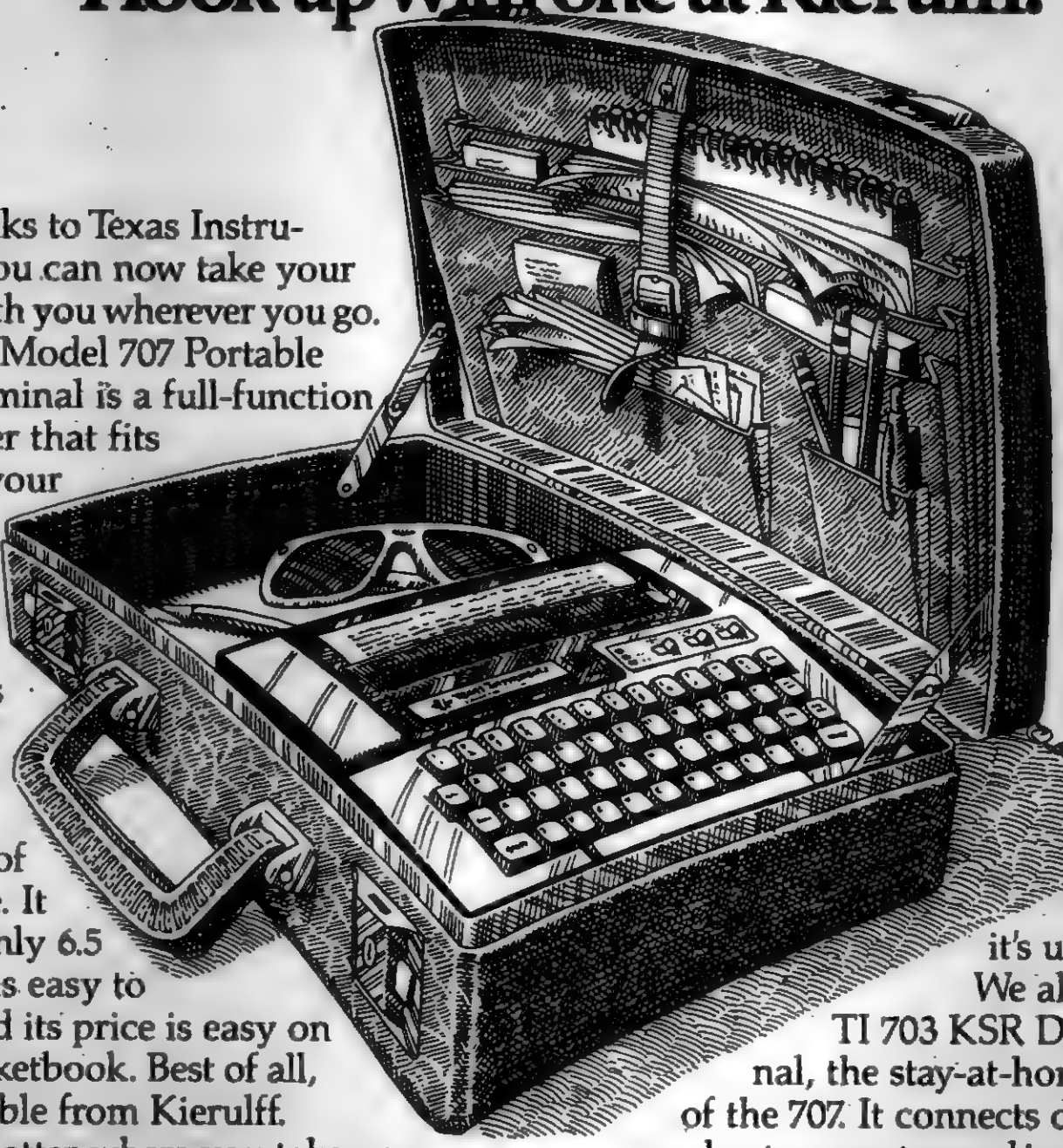

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30 Medicine/Law/Education
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50 Business Service (except DP)
60 Government–State/Federal/Local
65 Public Utility/Communication Systems/Transportation
70 Mining/Construction/Petroleum/Refining
75 Other User
Vendors
80 Manufacturer of Computers, Computer-related Systems or Peripherals
85 Computer Service Bureau/Software/Planning/Consulting
90 Computer/Peripheral Dealer/Distributor/Retailer
95 Other Vendor

2. OCCUPATION/FUNCTION (Circle One)
11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Financial Officer
21 Director/Manager/Supervisor DP/MIS Services
22 Director/Manager of Operations/Planning/Administrative Services
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
35 OA/WP Director/Manager/Supervisor
38 Data Comm Network/Systems Mgmt
41 Engr/Scientific/R&D/Tech Mgmt
51 Mfg Sales Reps/Sales/Marketing Mgmt
60 Consulting Mgmt
70 Medical/Legal/Accounting Mgmt
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90 Other

3. COMPUTER INVOLVEMENT (Circle all that apply)
Types of equipment with which you are personally involved either as user, vendor or consultant
A. Mainframes/Supermnis
B. Minicomputers/Small Business Computers
C. Microcomputers/Desktops
D. Communications Systems
E. Office Automation Systems

Supercomputer From Japan Previewed

DANVERS, Mass. — The much-discussed Japanese fifth-generation computer will contain many new technologies that will revolutionize the concept of computing, but Americans should not sell their own abilities short.

In a talk at the 1983 National Database and Fourth-Generation Language Symposium held here last week, George Schussel, president of Digital Consulting Associates, Inc., presented that view and gave a preview of characteristics he expects the forthcoming supercomputer to contain.

The Japanese machine will incorporate extensive parallel processing, "the first real major change in computing in many years," he said. Using a multiprocessor made up of one million parallel processors, the fifth-generation computer will achieve speeds of up to 10,000 million instructions per second.

Schussel said random-access memories (RAM) of up to 100G bytes are possible on the supercomputer. It will be oriented toward artificial intelligence applications with audio input and "learning" capabilities that will make it self-programming, he said. It will use a relational data base model with the ability to select information intelligently from very large data bases.

The supercomputer will translate languages and incorporate graphics in a native model. Small machines will be portable and may incorporate up to 100M bytes of RAM, he said.

However, Schussel advised the attendees not to underestimate the ability of American companies to compete. "The [Japanese] project is funded to the tune of $800 million and supports a basic research staff of 40," he said. "But IBM supports a basic nonproduct research staff of 2,000. Other American companies are pushing in the same direction."

High-Performance CPUs, 100G-Byte RAM, 300M-Byte Winnies Seen Dominating '80s

By Paul Gillin
CW Staff

DANVERS, Mass. — Random-access memories (RAM) of up to 100G bytes, 5-in. 300M-byte Winchester disks and CPUs with performance of up to 10,000 million instructions per second are among the technologies that will dominate the rest of the 1980s.

Those were among the predictions put forth by George Schussel, president of Digital Consulting Associates, Inc. in remarks at the 1983 National Database and Fourth-Generation Language Symposium held here last week.

Schussel said the rest of the decade will be characterized by continuing reductions in the price of hardware, a trend that has seen the amount of logic and memory that can be squeezed onto a chip quadruple every two years. He noted that 256K-byte memory chips are already in production, and a 1M-byte chip will be the next major innovation.

Micros and workstations will become omnipresent throughout the rest of the decade, he said. Micros will become so inexpensive and easy to use that they will replace typewriters within the next few years.

'Microcomputers and workstations will become omnipresent throughout the rest of the decade. ... Micros will become so inexpensive and easy to use that they will replace typewriters within the next few years.'

Major Change

The result will be "the first major change to hit the office in 50 years." The driving force, according to Schussel, will be the "personal computer workstation," which will combine such products as word processing, spreadsheet and links to the mainframe in a stand-alone product.

As a result, corporations will begin to distribute their data bases to optimize local processing at the workstations, and software developers will begin to explore new avenues to take advantage of the new distributed processing, he said.

Five-inch Winchester disks with up to 300M bytes of storage will bring new power to desktop workstations. Third-generation data base environments, which were built around large central data bases with lots of dumb terminals, will evolve into central clearinghouses of information and traffic cops that distribute processing to the local workstations.

Fourth-generation languages, currently being released at the rate of about one per week, will continue to proliferate, he said. This presents the potential for a Tower of Babel effect created by too many of these languages, but "there are hundreds of different products out there, and no shakeout seems to be emerging," Schussel said.

But in the micro realm, Schussel said, the proliferation of hardware will slow. The standard CPUs and operating systems that are now emerging will dominate the field for the foreseeable future, according to Schussel.

The result will be a changing role for DP, which no longer will represent the "priesthood" of information, he said. Users are becoming increasingly sophisticated about DP technology, creating an exciting new environment for new uses of information. They will make many mistakes in the process, but Schussel encouraged DP to be understanding and helpful.

CW Photo by P. Gillin

George Schussel

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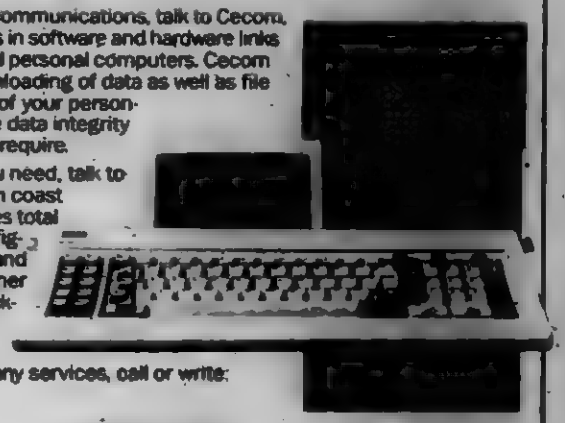

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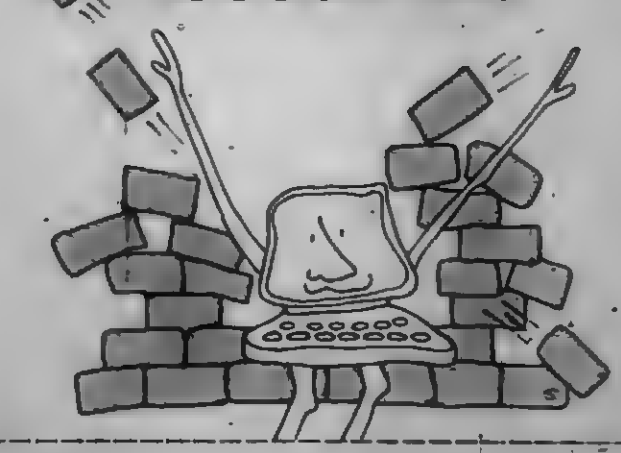

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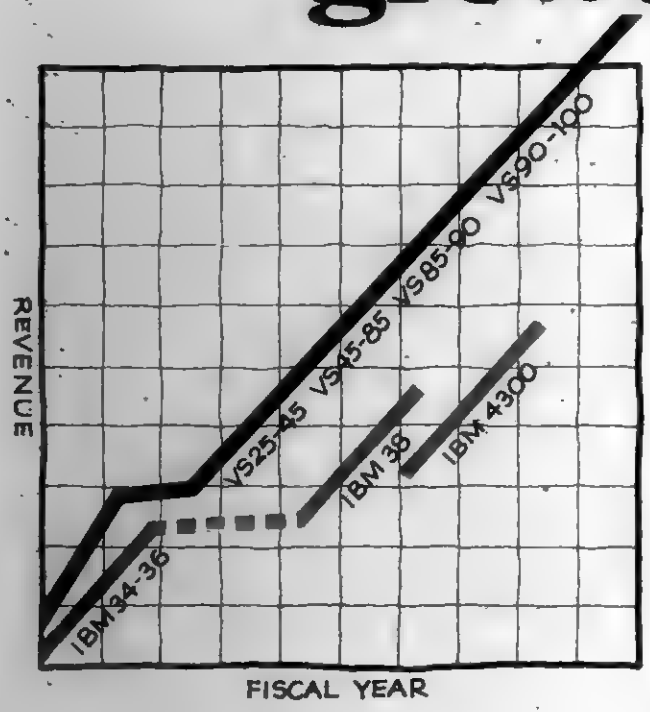

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Attendees at IDC User Briefing Told

Advances in Micro, Chip, Net Tech Seen for '84

By John Gallant
CW Staff

WASHINGTON, D.C. — A host of products based on the new generation of microprocessors, more capable personal computer software and the emergence of local-area network standards will be among the key innovations and events in information systems technology in 1984.

In addition, users can expect a new wave of portable computers — incorporating a variety of alternative human interface options — and all the uncertainties that will undoubtedly accompany the divestiture of AT&T, according to William Zachmann, vice-president of corporate research for International Data Corp. (IDC).

Speaking at IDC's first annual User Briefing Session here, Zachmann said that "in 1984, we will see the maturation of trends that began years before. Things are moving from the stage of research and development into the marketplace.

"In the area of divestiture, we'll be playing for high stakes, and we must think long and hard about our decisions. We are condemned to live in interesting times."

Development of the so-called third generation of microprocessors, including Intel Corp.'s 186/8 and 286, Motorola, Inc.'s 68010 and 68020 and others to be offered by AT&T, will spur the introduction of a "growing number of systems" based on these products, Zachmann said. He predicted that Intel's 186/8 would be the most important offering of the new crop, serving as the heart of the more innovative micro systems to be introduced in the future.

"At the single-user level," Zachmann said, "we will be seeing more capable personal computers and workstations appearing in 1984. Equally important, however, will be the growing role of microprocessor-based products for multiuser systems with capabilities that reach into the range of even the very large mainframe systems."

Among those multiuser, microprocessor-based systems, users can expect products from manufacturers such as Apollo Computer, Inc., Stratus Computer, Inc. and Synapse Computer Corp., Zachmann said. Also, hardware and software vendors will create "new alliances" in an increasing game of "leapfrog" in the microcomputer industry.

"We will continue to see more capability for the same money, or the same capabilities for less money," Zachmann said. "It will be a game of one-upmanship in the personal computer market."

Many of the micros also will offer innovative human interface devices, including advanced versions of the touch screen, track ball and mouse cursor controls and the beginnings of voice and biofeedback input mechanisms.

Software development in the micro area will be no less interesting, according to Zachmann, as vendors will attempt to utilize the larger memory capacity provided by the new microprocessors. Micro users can expect packages with sophisticated multitasking capabilities, relational data bases, artificial intelligence and self-teaching capabilities.

"Nobody in his right mind is targeting innovative software toward the mainframe," Zachmann said. "It's only logical to put in on the desktop."

In the communications area, Zachmann predicted that the emergence and acceptance of important standards for local-area networks will "reduce decision anxiety and confusion over networking schemes" for management. "Local-area network standards options emerging from the IEEE 802 [local-area network standards committee] will begin to give users vendor-independent capabilities."

But above all, 1984 will be the year of AT&T divestiture, what Zachmann called an era of "technopolitics."

"The original breakup agreement was amicably settled, but it's not generating a lot of enthusiasm now. This is a whole new ball game that will be decided by a very complex interaction of interests," he said.

The divestiture may well create problems that would not otherwise have occurred, according to Zachmann, jeopardizing permanently telecommunications competition in the U.S. Zachmann warned that "1984 will be the year of the AT&T breakup, a presidential election and rising phone rates for consumers. That's a potent combination."

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Managers Told to 'Watch for Telecom Puck'

By John Gallant
CW Staff

WASHINGTON, D.C. — When a reporter once asked Wayne Gretzky how he managed to stay on top of every play, the National Hockey League superstar replied that he did it by focusing on where the puck was going, not on where it was.

That anecdote holds great significance for end users in the dynamic field of telecommunications, according to George DeSalvo, director of communications technology services for International Data Corp. (IDC). Speaking at IDC's 1983 User Briefing Session here, DeSalvo said management will have to focus on "where the puck is going" in order to take advantage of new telecommunications businesses and services.

"An increasing number of things are going on in information processing. Most of them involve telecommunications," DeSalvo said. "The puck, so to speak, will be with executives and managers. They'll have to keep their eyes on new technology and the impact that these changes will have on their telecommunications budgets."

Demand for Bypass

According to DeSalvo, the telecommunications industry will be marked in 1984 by a heightened demand for bypass technologies, an increasing integration of systems with the development of communications protocols and a buy-not-build trend in the area of data communications networks. While cautioning users to expect higher costs, he also said they should expect to get more for their communications dollar.

"In terms of data communications networking, 'build or buy?' has become a real question thanks to all these new offerings," DeSalvo said. "The specific facilities you need may well be offered by one of these companies. And, with the industry trend toward standardization, the tilt is obviously toward buy."

DeSalvo said the divestiture of AT&T will have "an enduring impact on prices and services, as it marks the beginning of a new policy of deregulation of the telecommunications industry." DeSalvo likened the path of development in the communications field to the rise of Western civilization. We have passed through the "dark ages of communications regulation," he said, into the "reformation, which will begin with divestiture."

The IDC executive warned users that they face hard choices in regard to telecommunications systems and services: whether to remain with AT&T Communications and AT&T Information Systems — with the promise of lower rates and new equipment offerings — or whether to select from a variety of other communications companies. With some 70 products in the "development pipeline," according to DeSalvo, AT&T Information Systems will release more new products in the near future than AT&T did during its entire history.

DeSalvo told listeners to expect such products as personal computers, local-area networks and terminals from AT&T Information Systems during the first quarter of 1984 alone. Also in the area of new products, he said, users will be offered an increasing range of bypass technologies. DeSalvo ranked cellular radio as the "glamour challenger," sharing top contender honors with cable, fiber-optic and microwave technology.

"We are facing major changes due to forces outside the industry," DeSalvo said. "Users must be prepared to deal with deregulation and divestiture and the increasing demand for new technology and tools."

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Bringing New Host of Problems

Increase in Users Seen Changing Manager's Role

By John Gallant
CW Staff

WASHINGTON, D.C. — Increasingly capable microcomputers and the rise of end-user computing may have thrust the management information systems (MIS) manager into the role of the "sorcerer's apprentice" for whom "too much is happening at once."

Speaking at International Data Corp.'s (IDC) 1983 User Briefing here, John Gantz, editor of *The Tech Street Journal*, said MIS professionals are no longer just responsible for the "care and feeding of computers." They must now deal with the problems of device proliferation, software incompatibility, unmet end-user expectations and increasingly decentralized control over resources.

According to Gantz, 33% of white-collar workers had access to some type of business computer in 1982 and that number will increase to 75% by 1987. "This is an area of cataclysmic change. The telephone took 75 years to really penetrate business. The personal computer will do it in less than 10. We are witnessing the erosion of centralized control over the MIS budget as processing power becomes diffused throughout the organization."

"The MIS role is changing to encompass the coaching of end users, and that has an impact on the skills you will need to succeed in MIS management," Gantz said. "And that's in addition to everything you will have to learn about office automation, telephone management, business planning and personnel administration."

The confusion inherent in the changing MIS role may only be a reflection of what Gantz called the "chaos that characterizes the personal computer industry." Despite the claims of doomsayers, the micro industry is "exploding," and the forces that drive it are not those that affected the "old world of mainframes and minis."

Faster Rate Than Terminals

Gantz said that micros will soon reach shipment levels that the mainframe took 20 years to achieve and are currently being installed at a faster rate than terminals. "Tandy Corp. and Apple Computer, Inc. will join the billion-dollar club in about half the time it took DEC [Digital Equipment Corp.] to get there," he said. "The personal computer manufacturers have spurred a transformation, making this a purchase rather than a rental business.

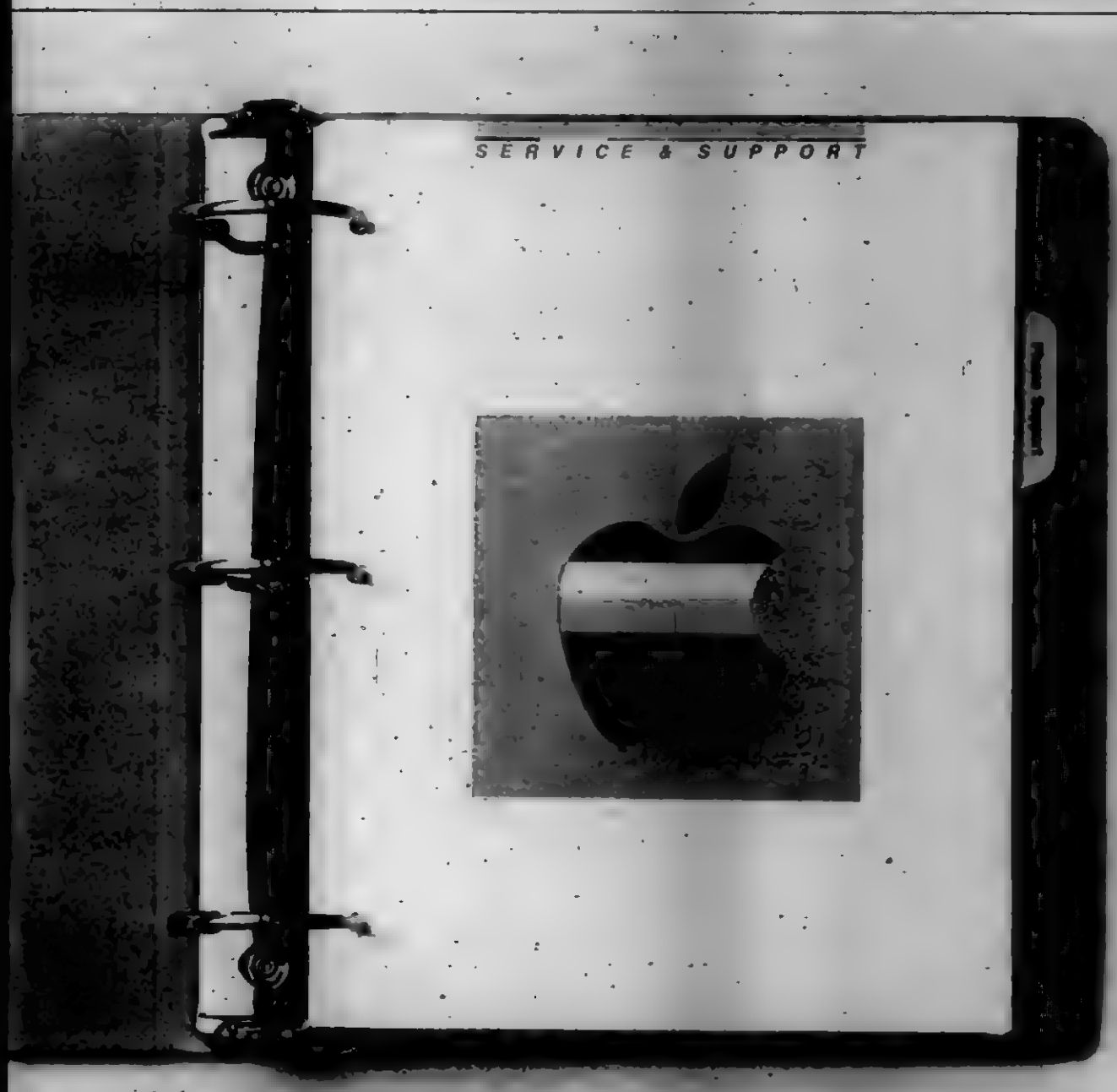
"The personal computer market is growing fast, too fast it seems for some people, such as Adam Osborne," Gantz added. "It is extremely difficult to develop any investment strategy. The industry is increasingly divided into the old guard and the new guard — the mainframe and minicomputer manufacturers and the personal computer manufacturers.

"In fact, much of the real growth for the old-guard companies has resulted from their entry into the micro market."

The micro market will be characterized in the future by the proliferation of hardware and software and distribution channel "craziness," according to Gantz. He said users can expect micro shipments to double each year, with "large organizational buys" becoming more common.

Also, "venture capital firms are pouring money into Unix-based products," Gantz said, "so you can expect to see a flood of them in a couple of years."

But above all, Gantz cautioned, MIS managers will face an entirely new world. "This is without a doubt a new world, and the micro is its herald. The forces that govern it are beyond our control, and its physics are elusive. This isn't anything shameful, it just makes for one hell of a management problem."



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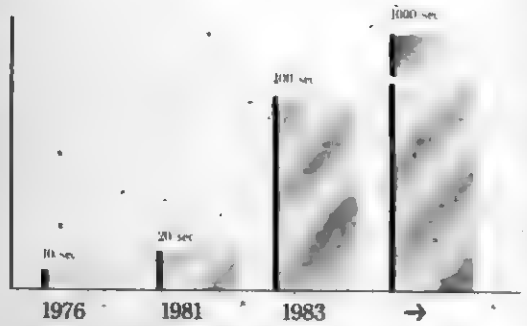
It's built around multiple parallel 32-bit processors. Each addressing 16 MB of physical memory and over a gigabyte of virtual memory.

To help memory keep pace with that kind of processing, TXP pulls 64 bits on each memory access.



Our success can be summed up in a second. *Transactions per second. Numbers unsurpassed in the industry. On-line systems that fit your needs today. And tomorrow. With more processing power on the way.*

The TXP system also features parallel data paths. Manipulating 32 bits of information in a single cycle, two 16-bit operations in the same cycle.

And TXP incorporates extensive pipelining, to process multiple instructions simultaneously. Each processor overlaps instructions in three levels: Fetching one, while preprocessing a second, while executing a third.

While helping TXP deliver full 32-bit power, for less.

Cache memory pays off in faster response times.

Cache memory is a high-speed data storage area between the processor and main memory. It lets the processor store more frequently used information closer. So it can get to it faster.

And our tests have shown that the TXP cache memory has a 98% "hit rate." Which means the requested data is virtually always nearby for fast access.

The result? Larger volumes of work can be processed in shorter amounts of time. Helping TXP to be even more productive.

Making cache memory pay big dividends.

A system you'll expand, not disband.

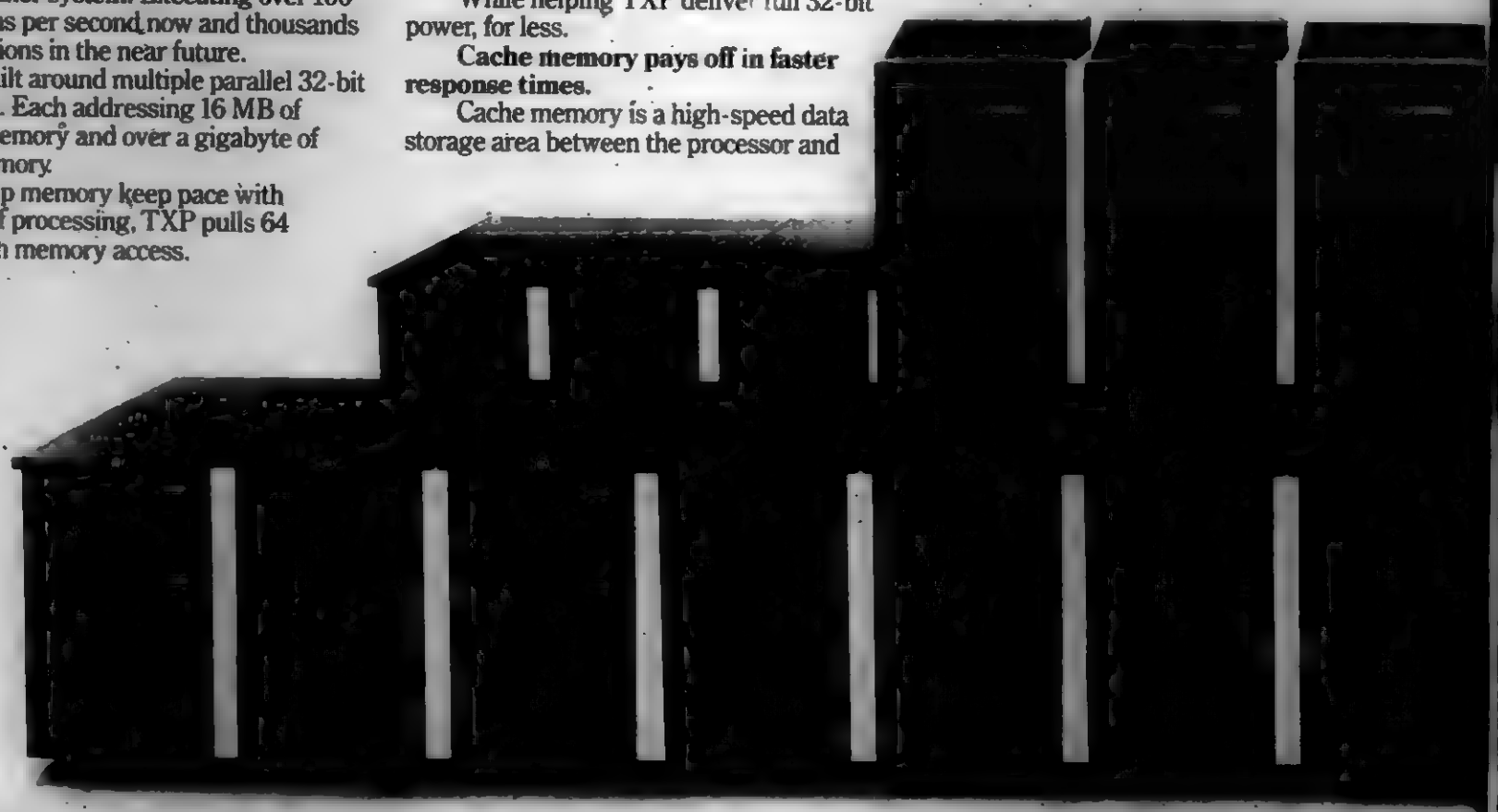
Most computer systems have very limited expandability. So if a company outgrows its computer's capacity, it usually means starting again from scratch.

Selecting and buying a larger and more expensive system.

Then reprogramming.

Then re-training.

Plus all the chaotic disruption and



XP

computer in business today.

massive loss of revenue that's unavoidable during the switch-over.

Not so with the TXP system.

It can expand from two to 16 processors. Increasing its power by a factor of eight.

That's more power than any of the largest mainframes.

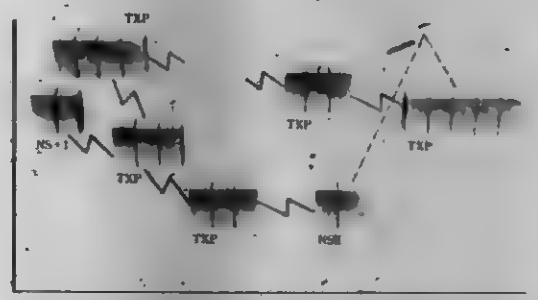
And the additional processors can be installed while TXP is running at full speed. No downtime. No reprogramming.

Still not enough power? Up to 14 TXP systems can be joined together by high-speed fiber optics. Linking the systems together as one computer with 224 processors.

But that still isn't the full potential of the TXP.

TXP systems at up to 255 sites can be joined in a worldwide network. Generating the power of over 4,000 processors.

And that gives TXP the most powerful on-line computer capacity in business.



The most powerful computer network in business today.
Users access a single unified global data base from any of thousands of terminals anywhere in the system.

Expandability our competition wishes they could disband.

NonStop™ system compatibility from the people who started it all.

TXP can process more information and support more programs, users and devices than any other computer designed for on-line transaction processing.

Devices you most likely already have. Even devices made by IBM.

But what if your company isn't quite ready for the TXP system's awesome power?

We suggest the Tandem NonStop II™ system. The second most powerful on-line computer in business today. The cost effective solution for medium to large corporations.

What if your company is somewhere between a Nonstop II and a TXP?

No problem. They can be combined. They can share the same data and programs. In fact, NonStop II and TXP processors can coexist in the same cabinets.

And what if your company needs even a smaller computer? We make a smaller computer. The Tandem NonStop 1+ system. Perfect for those low-volume sites where less processing power is needed.

Tandem literally wrote the book on NonStop™ transaction processing. That's because we introduced the first NonStop system.

Over eight years ago.

And for over eight straight years, despite attempts by others, we've continued to lead the industry.

Learn all about TXP, ASAP.

For complete literature, contact your local Tandem Sales Office.

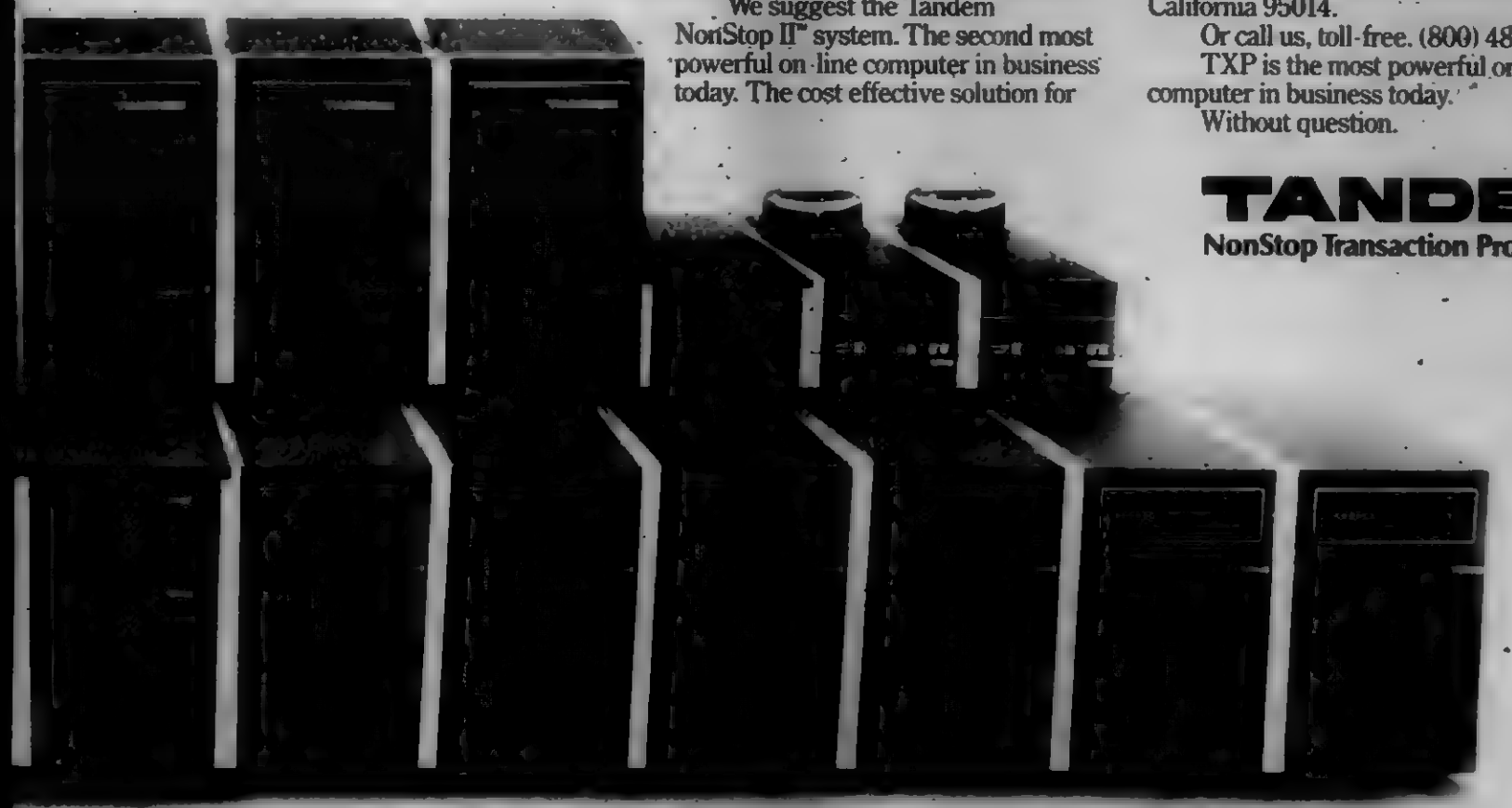
Or write Tandem Computers Incorporated, 19333 Vallco Parkway, Cupertino, California 95014.

Or call us, toll-free. (800) 482-6336.

TXP is the most powerful on-line computer in business today.

Without question.

TANDEM
NonStop Transaction Processing



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System Develops Cost Analysis for Photo Lab

TROY, Mich. — The unique problems of a photo processing laboratory — the large number of daily invoices, the complex pricing matrix, the extensive month-end closeout and the near impossibility of true cost analysis — make computerization a high-need priority. But as one lab based here discovered, those unique problems make photo processing firms difficult to computerize effectively.

Meteor Photo Co., one of the three largest commercial/industrial photo labs in the U.S., was founded in 1933. The company has grown at an average of nearly 17% per year, compounded, and today has almost 200 employees. Meteor services customers all over the U.S.

Company President Bernie Fitzgerald obtained the company's first computer in 1973, a Wang Laboratories, Inc. small business system. The system, however, was not upgradable, and Meteor quickly outgrew it.

Meteor switched in 1976 to a Data General Corp. Nova 3/12 and three years later moved up to a DG Nova 4X with 96M bytes of disk storage. It was used for accounts payable, receivable and billing and, as Fitzgerald said, "It was certainly an improvement over doing it all manually."

The system, however, was still less than ideal. "We really needed more efficiency. Plus, we wanted to do order entry, inventory and other functions on the computer, but it just wouldn't support us.

"The more we tried to do, the slower the computer got. With more than one terminal operating, the response time was seriously degraded. And this was a $55,000 system," Fitzgerald said. An upgrade was too expensive, he added.

Meteor then turned to Derderian, Kann, Seyferth and Salucci, P.C. (DKSS), a 40-year-old certified public accounting firm here and integrator of customized computer systems for business applications. DKSS is also a value-added reseller of Point 4 Data Corp. multiuser computer systems.

First Challenge

One of DKSS' first challenges was an analysis of the photo lab's complex pricing matrix. The pricing varied according to size, quantity and type of film for literally dozens of services, ranging from the simplest black-and-white quantity prints to complex special-effect slides and murals as large as 50 by 110 ft. Not only did the software have to handle all the many variations for pricing and billing, but Meteor required that all customers be given the lowest possible price on a quantity break.

DKSS set up a matrix schedule that significantly reduced the number of accesses and, therefore, increased the speed of operation.

The system was up and running by May 1982. It centers around the Point 4 Mark 5 high-speed, general-purpose minicomputer with 128K bytes of internal memory and runs under Point 4's Iris operating system.

Included in the Meteor system are two dot matrix printers, eight CRT terminals, four IBM Personal Computers acting as terminals and two 50M-byte disk drives.

"We started running 350 invoices per day with three or four line items per invoice," Fitzgerald said. "The five-day, month-end closeout was reduced to 24 hours, and we could continue with daily transactions while it was happening. Now our closeout is done on the first, and we've saved three people in the department."

Meteor also installed a terminal in the front lobby to do pricing on cash accounts and estimates a $1,000 per month saving on pricing errors as a result.

The system presently handles accounts payable and receivable, raw material inventory plus purchase order entry. The order entry system, as planned, will permit exact tracking of every order in the shop.

The outcome of the tracking will be the ability to do the nearly impossible in photo marketing — cost analysis, he said.

IBM System 34/36 business software: 9,000 companies choose Para Research

In just three years Para Research has become the world's largest supplier of IBM System 34/36 software. The quality and reliability that's built into our software has made it a standard among IBM users. It's proven in 9,000 companies ranging from the Fortune 500 to companies with 50 employees.

Our software is backed by comprehensive documentation and responsive customer support. And it's surprisingly inexpensive. Each system is user friendly, and provides the quick response and accurate reports you need to improve every part of your business.

New Technology – IBM/36

IBM's new System/36 offers a powerful, versatile alternative to other minicomputers or even the IBM personal computer. It's designed as a small business system, but can support up to thirty terminals. The key to the System/36 is advanced technology. For example, multiple internal processors control specific system components and functions – such as work stations, printers, communication lines, disk and tape drives.

A single computer processor can do only one thing at a time. With the multiple processor design of the System/36, all processors can work concurrently on their own specific tasks. This means that the entire system can do more than one internal processor managing all operations. A 2-byte data path speeds data retrieval from memory. Built-in error checking and recovery provide maximum reliability. Extensive self-diagnostic and problem solving features help users troubleshoot and diagnose problems on their own. It all adds up to one of the most thoroughly tested and reliable IBM systems ever.

Word Processing

Easy Text is an easy-to-use system with on-line documentation. "How to Use Easy Text", a self-instructional feature, provides on-screen instructions. Users with little or no experience can generate letters, memos, reports, mass mailings almost immediately.

Create documents up to 99,000 lines or 2,200 paragraphs of text. Create page designs up to 132 print positions wide. Scan for key words and phrases, move text within a document, include text from one document in another. Tabbing, automatic centering, manual hyphenation, boldface printing, underlines, long-line entry, optional new page printing and delete option safeguards. With Easy Text, every work station on your computer can function as a word processor. $750.

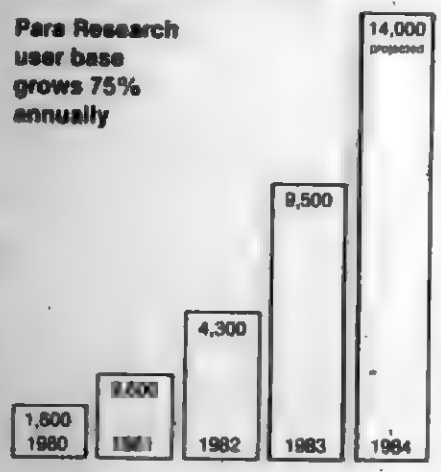
Financial Modeling

Easy Calc combines the best features of the best electronic worksheets. Use it for budgeting, cash flow analysis and sales forecasting with improved ease and power. Includes return on investment, depreciation and amortization. Create a spreadsheet in only 15 minutes. Create a format once and then store it for future use.

Build formulas of up to 96 characters. Create worksheets with 52 columns and 999 rows. Columns vary from 6 to 14 characters. Consolidate 998 worksheets into one. Print up to nine integers to the left of the decimal. That's $999,999,999.99! Built-in error detection pinpoints exact error position. Designed for multi-work station environments. Choice of on-line or batch calculations. Learn to use Easy Calc in only a few short hours. $1,200.

Accounts Payable

Handles every facet of accounts payable – from invoicing through issuance of checks. Management reports provide up-to-date information on all payables. New features allow you to: take a discount amount after discount date, select a single batch of vouchers for updating to open payables file; report status of every vendor on a vendor analysis report. Multiple line distribution for up to 19 accounts. Automatic discount option.



Full reporting for audit trails and processing of multiple accounting periods. System flags vouchers for payment. $1,200.

General Ledger

A multi-company system that can accommodate up to 99 companies and departments. Enables you to run different periods and different accounting years concurrently. Offers a variety of reporting options. Strategic Ratio, an added menu option, creates 30 different financial ratios to analyze assets, liabilities and equity. New features include: Run each company in the GL independently. Create a unique chart of accounts, run different year-end closings, print financial statements and reports for each company.

Design your own report formats. Maintain a file, run proof list from the same menu. New error message program locates and describes any problems. New reports include balance sheets and income statements broken down by department with percents and comparisons. $1,200.

Payroll

Payroll provides up-to-date costs of specific tasks for every department in your company. Employee master files for salary, hours and other payroll items are easy to maintain. User-friendly prompts provide complete instructions for each procedure. Up to 9 deduction types for each employee.

Multiple payroll data reports including check register, QTD 941s and 10 other reports. Runs payroll for 99 companies and any combination of companies. $1,500.

Fixed Assets

A complete depreciation scheduling program that produces two-year projections. Figures depreciation over user-specified fiscal periods based on the 1982 Economic Recovery Act using the Accelerated Cost Recovery System, the 1983 Reduced Basis ACRS or eight other standard depreciation methods. Separate depreciation for tax and book. Automatically produces general ledger entries. Accepts fully expensed or non-depreciable items for asset inventory control. A series of management reports tracks depreciation schedules, reports changes in those schedules, gives projections over a two-year period and reports assets subject to investment credit. $1,200.

Accounts Receivable

Available in open item or balance forward methods. For both methods, the system has cycle billing capability, allows printing of all statements on file or statements for specific customers. Provides up-to-date status of customer records, including current balance, aging, credit checking. Many report formats. Maintains a rolling 12- or 13-period history of customer activity. $1,200

Billing

Includes order entry and invoicing as well as analysis of inventory and sale of items within your company. You can generate picking ticket listings by warehouse or item number and maintain data on orders before shipping and invoicing. The system places order quantities in reserve until you confirm the order, then reduces the quantity on hand. This allows you to enter freight charges before the invoice is sent. $1,200.

Inventory

Gives your company complete control over inventory, both on hand and on order. It provides nine reports to let you know the status of every item at any time. Inventory costs based on four methods: LIFO, FIFO, average cost and replacement cost. Up to 999 cost levels to value your inventory on a FIFO and LIFO basis. Standard unit price plus five alternate prices per item. $1,200.

FREE Documentation

For any program you're interested in, we'll send you a perfect bound book of documentation. These books are printed on high quality paper and contain between 100 and 300 pages. Each book is filled with detailed file layouts, flow charts, screens and reports that take you through each program step-by-step. See for yourself why Para Research is the number one software company for thousands of employers.

To get your free manuals (or information on our line of IBM/38 accounting systems), call or write: Software Sales, Dept. CW16, Para Research Inc., 85 Eastern Avenue, Gloucester, MA 01930 (617) 283-3438.

International Report

FROM THE CW INTERNATIONAL NEWS NETWORK

AUSTRALIA

BRISBANE — Integraph eclipsed IBM at the 11th Australian Conference on Rural and Regional Planning Information Systems, according to sources here. IBM displayed its graphics program generator and geo-facilities data base packages, backed up by a wall full of hardware, including a 4331 mainframe system, four 3310 disk drives with 500M bytes of storage and an 8809 tape drive. But the IBM configuration drew much less attention than Integraph's single DSP042 Twin-Screen Graphics Workstation, linked by telecommunications lines to a Digital Equipment Corp. VAX-11/751 system back at the company's Sydney headquarters.

MELBOURNE — A recent national survey of 78 Australian colleges and universities found approximately 10% of last year's computer science graduates still seeking employment six months after completing their education.

BRAZIL

BRASILIA — Robeli Libero, president of IBM Brazil, expressed consternation over the market control policies of Brazil's Special Department of Informatics. Speaking at a recent conference before Brazil's House of Representatives, Libero said he could not understand why Brazilians who produce materials in Brazil are discriminated against simply because their employer's capital comes from somewhere other than Brazil. He went on to blame the government's nonapproval of IBM projects, including contracts to supply the domestic Brazilian market, and also contracts to export IBM products, for the drop in foreign sales: "IBM has tried to increase its exports. In recent years, it has increased from $94 million to $211 million. But today, we find it difficult to reach the $192 million mark," Libero stated. He also stressed IBM's contribution to the country's economy: "Last year our plant contributed more than $80 million to the Brazilian economy. IBM Brazil was the eighth biggest exporting company in Brazil in 1982."

CHINA

BEIJING — The First International Conference on Computers and Applications is slated to take place here next June 20-22. The event will be cosponsored by the Computer Society of the Chinese Institute of Electronics and the U.S. Institute of Electrical and Electronics Engineers.

FRANCE

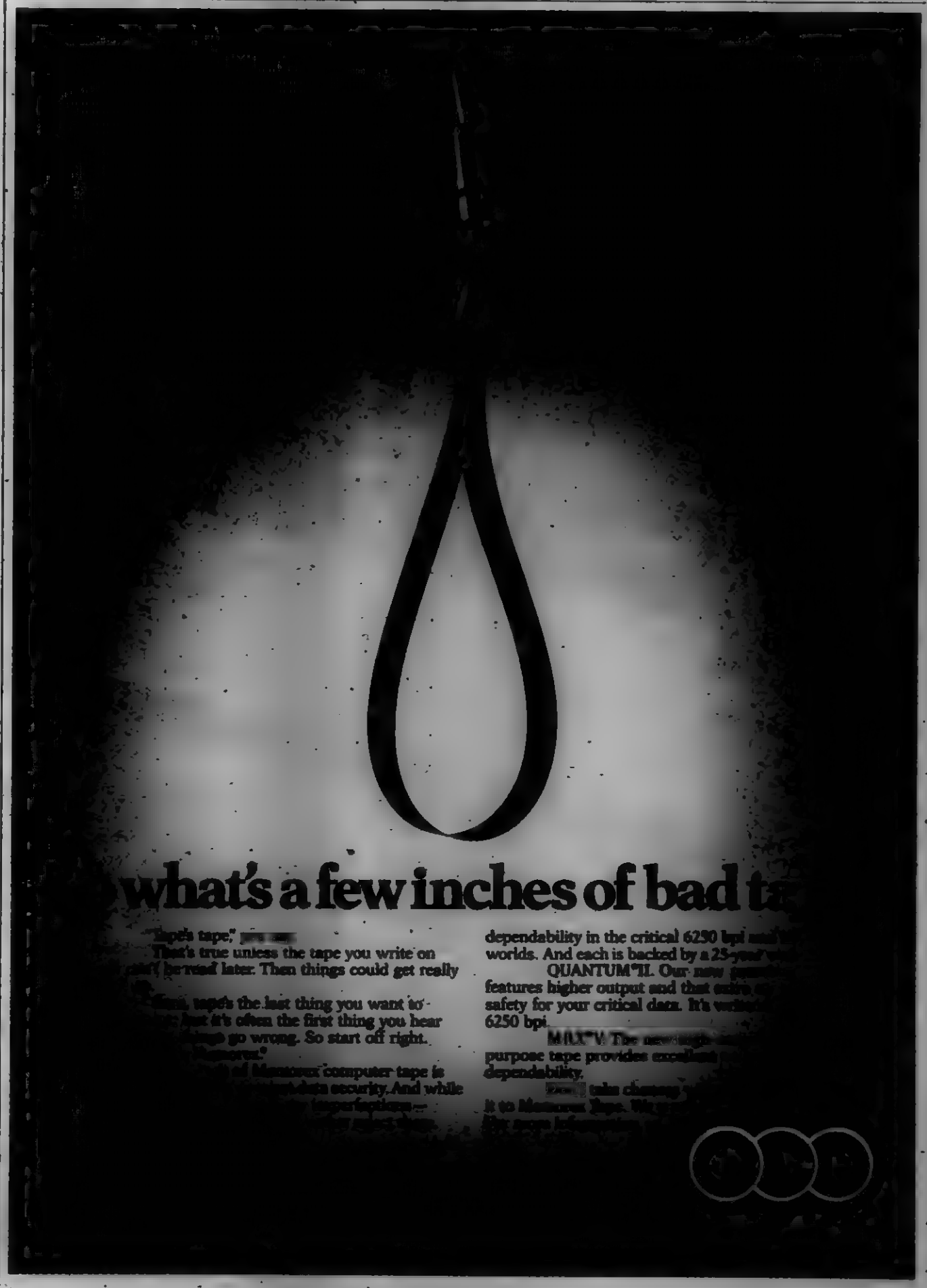
PARIS — Bull-Micral, the microcomputer subsidiary of the French conglomerate CII-Honeywell Bull, will reportedly concentrate all future efforts on the promotion and support abroad of its Prologue operating system. The company believes that the software can compete in the international market with Digital Research, Inc.'s CP/M as well as Microsoft, Inc.'s MS-DOS operating systems. Prologue, said to be compatible with American industry standards, is available in France with a data base management system called Dialogue for microcomputers from Victor Technologies, Inc. and Olivetti Corp. Future plans call for it to run on micros from IBM, Hewlett-Packard Co. and Texas Instruments, Inc.

PARIS — French President François Mitterrand announced his wholehearted support of computers in education. During a press conference last week, he said the Socialist government will earmark money to purchase computers for grade schools, as well as schools of higher learning "to democratize access to computers."

JAPAN

TOKYO — Nihon Digital Equipment Corp. along with Murata Data Equipment Co.,

(Continued on Page 26)



International Report

FROM THE CW INTERNATIONAL NEWS NETWORK

(Continued from Page 25)

Cadtec Co. and Mitsui Knowledge Industry Co. have jointly unveiled the TM Computer/Fax System, which is said to handle data, text and image. The system is comprised of a DEC minicomputer, Mitsui's TM Facsimile Interface Processor and electronic mail system and a Murata Murax facsimile terminal. It features a mixed mode for image and text; image data compression and expansion; communications speeds up to 9,600 bit/sec; storage up to 3.6G bytes; and two packet switching networks. Options include a telex interface processor and host computer gateways to IBM, Facom Ltd. and Hitachi Ltd. systems. Pricing on this product begins at $51,064.

TOKYO — Sony Corp. has announced a 20-in. monochrome high-resolution display monitor that combines the functions of a computer-aided design and manufacturing (CAD/CAM) station with a Kanji-character display system. The system features a display of 2820 by 2130 pixels, and can reportedly display some 170,000 different Japanese characters. According to a company spokesman, the system will be available sometime in 1984 for approximately $4,000.

TOKYO — Hitachi Ltd. has unveiled an extended addressing function for its M-280 and M-260 processors and its VOS 3 related software. The feature reportedly expands the size of a system's virtual memory from 16M bytes to 2G bytes by using a 31-bit addressing mode. The product is slated to be available during the third quarter of 1984.

OSAKA — Daikin Industries, Ltd. has released a luster-scanning-type graphics display system for CAD/CAM and image processing applications. The product is called Comtec DS300 Series and features 4,096 colors, a 110,000 line/sec drawing capability and three-dimensional graphics. It is priced at $24,681.

TOKYO — Hattori Seiko Co. has developed a wristwatch computer system comprised of a timepiece, keyboard and processor. The system is said to perform basic program applications as well as calculations, retain up to 2,000 characters of information and print out data. The watch/computer is priced at $230; domestic sales are slated for January.

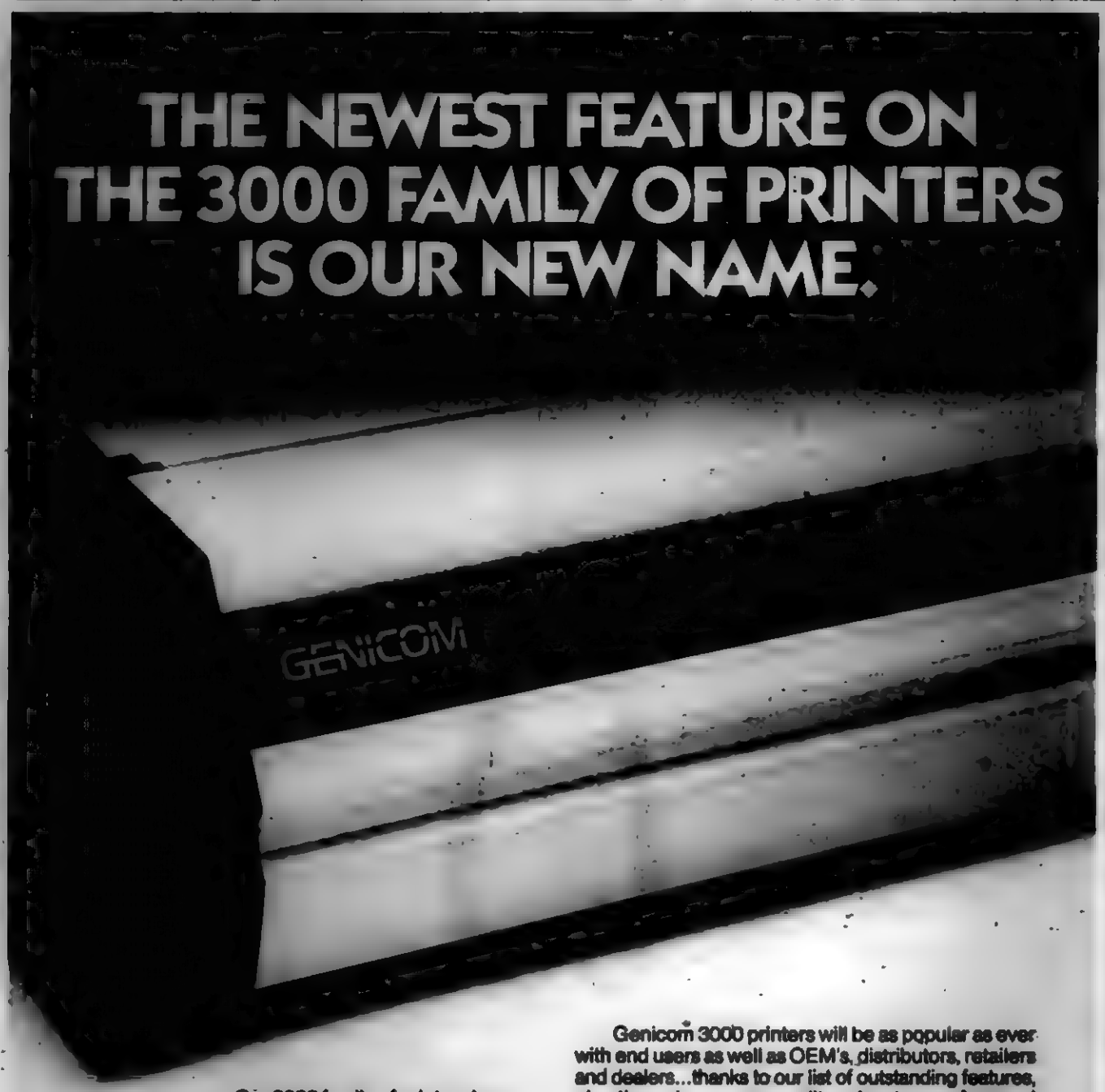
TOKYO — Mitsubishi Corp. has acquired 216,000 shares — a 5% interest — of Microrim, Inc., a software company based in Bellevue, Wash. Microrim is known for the development of the Microrim relational data base management system for microcomputers.

NORWAY

OSLO — Fellesdata, the data processing company of the Norweigan Savings Banks Association, has selected NCR Norge AS (the Norweigan branch of NCR Corp.) to supply all bank terminals, office automation equipment and automatic teller machines to its member banks. Beginning in 1985, NCR will deliver some 4,500 terminals to over 850 banks. The agreement, valued at $60 million, is thought to be the largest such contract ever signed in Norway. NCR beat out IBM and Ericsson Information Systems, Inc. to win the contract, sources said.

WEST GERMANY

BERLIN — According to IBM, its first videotex conference here was intended to provide practical hands-on user experience and demonstrate concrete problem-solving techniques with videotex. But many of the 600 paying attendees said they felt that the conference was conducted to reassure dissatisfied videotex users and present an image of IBM as a reliable and competent partner for videotex.



Our 3000 family of printers has an impressive list of features. But the most prominent new change on our printers is our new name.

Formerly the Data Communication Products Department of General Electric, we're now independently owned...and our new name is Genicom.

So the GE 3000 family is now the Genicom 3000 family. But while the name has changed, the product retains its established superiority.

The Genicom 3000 series of output printers still features speeds from 40 to over 400 cps. Single or dual mode printing. Type quality from EDP to NLQ. Multi-color printing. Graphics. Selectable type fonts. American craftsmanship and more.

Genicom 3000 printers will be as popular as ever with end users as well as OEM's, distributors, retailers and dealers...thanks to our list of outstanding features, plus the unique commonality advantages of several models all based on a single design.

And Genicom will also offer other products including our 2000 teleprinters and the soon to be introduced 4000 shuttle matrix printers. You'll find we have the same complete product line we had with GE.

Genicom. We have proven products, experienced personnel, established manufacturing facilities, a nationwide service network, plus a new commitment to excellence that stands behind our new name.

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Managers on the Move

JOHN GALA has joined Republicbank as vice-president of information systems and services in the operations group in Dallas.

Gala comes to Republicbank from Xerox Corp. where he served 18 years, most recently as its manager of information systems for the Office Products Division based in Dallas.

Gala attended the Rochester Business Institute, the University of Rochester and the Executive Program of the Harvard Business School. He served in the data processing section of the U.S. Army Reserves from 1964 to 1970.

• • •

JOHN LORE has been promoted to vice-president of information services at Avon Fashions, Inc. in Hampton, Va. He will be responsible for the company's computer operations and related informational areas.

He attended Middlesex Community College and Christopher Newport College and has taken numerous computer and systems development courses offered by industry sources.

• • •

JOHN BARNETT has been appointed management information systems manager for Jacuzzi Bros. Division; which is a subsidiary of Kidde, Inc. in Little Rock, Ark.

Jacuzzi manufactures pumps for homes, agriculture and industrial and municipal needs. Barnett joined Jacuzzi from Colt Industries' Central Moloney Transformer Divison at Pine Bluff, Ark., where he was manager of business information systems.

Barnett is a graduate of the University of Central Arkansas in Conway and holds a B.S. degree in mathematics.

• • •

MIKE OVERBY has joined CTS of Berne, Inc. in Berne, Ind., which is a division of CTS Corp. He is a System/38 supervisor and will be responsible for all operations concerning the System/38 computer.

Prior to joining the company, he was management information systems director for Avis Industrial of Upland, Ind. He also supervised systems and programming for seven manufacturing plants of General Tire and Rubber Co., in Wabash, Ind.

Overby received a degree in political science from the University of Pennsylvania. He attended American University in Washington, D.C., and Purdue University, where he received a degree in computer science.

• • •

SAMUEL M. JANNEY has been named systems manager of San Diego Office Supply and will be responsible for all of the firm's data processing operations.

Prior to joining the firm, Janney served as a senior system analyst at Database Decisions, Inc.

He graduated from Coleman College with a B.S. in computer science.

• • •

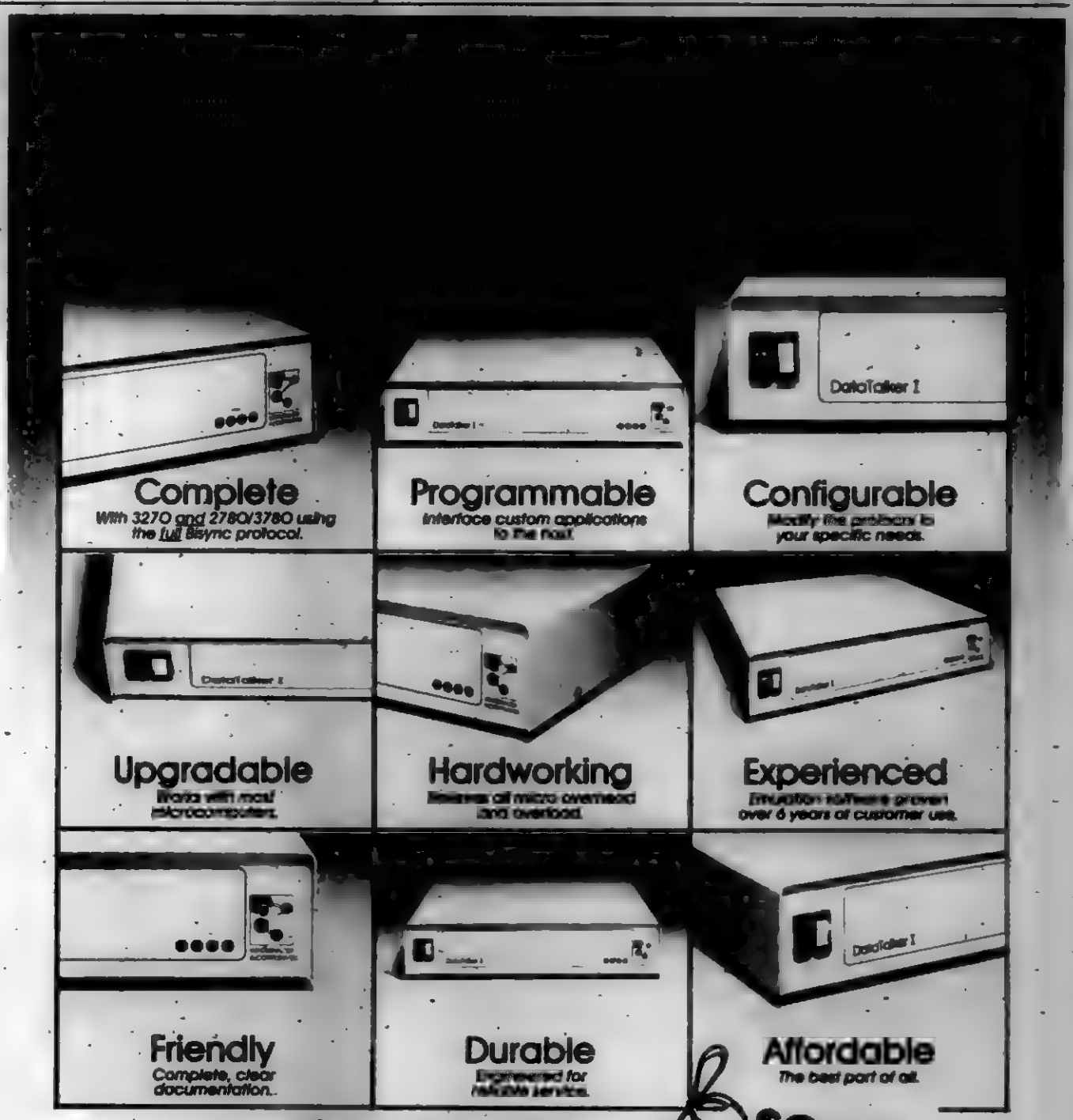
Fremont Indemnity Co. has announced the promotions of RONALD TUCKER to senior vice-president of administration and information systems and JERRY B. KATZ to vice-president of corporate business planning and development.

Tucker has served Fremont as vice-president of information systems for two years. In his new capacity he will continue to oversee the

(Continued on Page 28)

John M. Gala

John LoRe



Our DataTalker™ intelligent front-end processor allows your micro to emulate most IBM terminal systems. Yet it retails for about half of what you'd pay for conventional protocol conversion, software or hardware.

How do we know so much about micro-to-mainframe communications? Because we've been helping computer manufacturers solve their communications problems since 1978.

Ready to talk?

Call and ask for our Marketing Support Group. Or send in the coupon.

Either way, you'll find we speak your language. We welcome dealer/distributor inquiries.

Call 1-800-321-7785.

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Timeplex to Offer Courses On T-1 Transmission

WOODCLIFF LAKE, N.J. — Timeplex, Inc. plans to conduct a series of educational seminars next year to answer questions about the 1.544M bit/sec transmission, T-1.

The three-day courses will be taught by Timeplex network analysts and speakers from AT&T Communications (formerly AT&T Long Lines). They will focus on basic data communications and multiplexing concepts; T-1 background; analyzing equipment for T-1 applications; and case histories, including network topologies and tariff costs.

Sessions are scheduled for San Diego (Jan. 17-19); Dallas (Feb. 21-23); Tampa, Fla. (March 27-29); San Francisco (April 3-5); Chicago (April 24-26); Toronto (May 15-17); Boston (June 5-7); and Washington, D.C. (July 17-19).

Advance registration may be made by telephone or mail, but walk-in registration is on an as-available basis. The fee is $595 per person. Information may be obtained from Timeplex Seminars, 400 Chestnut Ridge Road, Woodcliff Lake, N.J. 07675.

Telecommunications Leaders to Assess AT&T Restructuring at Jan. 10 Meet

NEW YORK — Telecommunications industry leaders are scheduled to examine and assess the AT&T restructuring during a conference Jan. 10-11 at Marriott's Essex House here.

Sponsored by Dataquest, Inc.'s Telecommunications Industry Service, "The New Telecom Industry — Life After Divestiture" will feature speakers who will discuss the new business environment of the industry, strategies of leading market participants, AT&T's new structure, the structure and business activities of divested telephone operating companies, future telecommunications service offerings and the industry investment climate.

The conference is being given for professionals involved in strategic and tactical planning, marketing and engineering for companies in telecommunications industries.

The conference is the second in a focus conference series sponsored by Dataquest, a market research and planning subsidiary of A.C. Nielsen Co. Conference fees are $395 for Dataquest clients and $450 for nonclients.

Additional information is available from Dataquest, 1290 Ridder Park Drive, San Jose, Calif. 95131.

Managers On the Move

(Continued from Page 27)

company's data processing department, with the additional responsibility of directing personnel and administration activities.

He holds a bachelor's degree from California State University and a master's degree from the University of Southern California.

Katz will head research, planning and development activities at Fremont. He also assumes responsibility for the company's premium audit operation.

A graduate of the University of Louisville, Katz held several management positions in his five years with Fremont in the areas of underwriting, premium audit and collections.

His 12 years of insurance experience also include positions in administration, systems and procedures and data processing.

• • •

BRUCE G. CLARK has joined Brylane, Inc. in Indianapolis as vice-president of management information systems.

Prior to joining Brylane, he spent 13 years with Arthur Andersen & Co. in Columbus, Ohio, serving in the consulting division.

He graduated from Ohio State University in 1968 with an undergraduate degree in mechanical engineering and received his masters of business administration from Ohio State in 1970. He is a certified public accountant.

Brylane is a mail-order distributor of special-size women's wear and a division of The Limited, Inc. in Columbus.

• • •

KENNETH JULIEN CHIEF has been named financial officer of Cerprobe Corp. in Tempe, Ariz. In his new position, he will be responsible for the finance, accounting and information system activities.

Before joining Cerprobe, he was a division controller for Sanders & Associates, Inc., a high-technology manufacturer of government electronic systems and computer graphics.

Prior to working at Sanders & Associates, he was vice-president of C & A Co., Inc., a diversified manufacturing and development company.

He is a graduate of the State University of New York at Albany and received his graduate degree from Arizona State University's MBA for Executives Program.

matchmaker,

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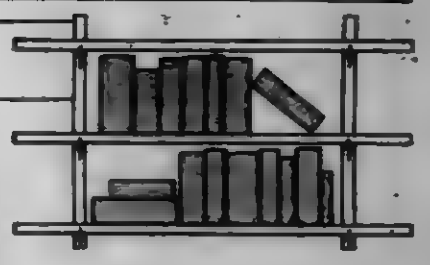
Off the Press



PRINCIPLES OF PRODUCTIVE SOFTWARE MANAGEMENT
By Michael W. Evans, Pamela Piazza And James B. Dolkas

Neither new programming languages nor innovative design methodologies suffice to solve software development problems. Better management is required, the same kind of management considered so valuable running other areas of the business.

Some managers consider production of code an intellectual exercise unable to be monitored, much less controlled. Programmers stubbornly fight for their freedom to create in their idiosyncratic styles because that's how they "do their best work."

The authors say that managers must convince software engineers to view projects as teamwork and the resulting systems as products of the entire data processing staff delivered to end users. If the programmer cannot take this larger view, he is not likely to care about the work before him aside from its being a personal challenge. He may feel it embarrassing or wasteful to submit to formalized procedures for, as an example, correcting a coding error he found himself.

Software development suffers severe "configuration management" problems, meaning what happens when people do work that builds upon the work of others, which was already built upon the work of others.

This book does not offer a theoretical, generalist's view of good management as the answer. The authors get down to the guts of running that peculiar work place inhabited by software developers. "Managing" here means attending to the details, such as monitoring data flow and source code changes.

Hardcover, 228 pages, $32.50, ISBN 0471-89796-5. John Wiley & Sons, Inc., 605 Third Ave., New York, N.Y. 10158

DECISION SUPPORT SYSTEMS
Edited by William C. House

If you believe that a powerful concept requires a straightforward definition, then the idea of decision support systems (DSS) isn't likely to appeal to you. Neither is this book.

Is DSS any system that aids decision making? Or is it restricted to "interactive computer-based systems which help decision makers utilize data and models to solve unstructured problems"? Does DSS only apply to upper management?

And from where did decision support come? Is it an outgrowth of management information systems (MIS), which picks up where its parent leaves off? Or a subset of MIS? Or a wholly separate development that grew nameleasly and aimlessly until the tag "decision support" tried to encompass it?

The experts gathered here in 18 chapters are not meant to define as much as to point in the direction of DSS. The book's thesis is that the best way to come to terms with an idea as nebulous as DSS is to direct many and varied viewpoints toward it. From contrasting opinions may come insight, clarity.

The attempt is much needed. DSS suffers, in general, from too much talk about what it means instead of how it applies in a business. There is some of that waste of time in this book, but authors such as Peter Keen, Ralph Sprague and Steve Alter mostly enlighten the reader about how decision support tools came to be and continue to be.

Part Two shifts to management style and decision support, specifically, how to gear the support to the manager's personal style. Artificial intelligence, as well as nonartificial intelligence (that is, human thinking processes), enters the decision-making discussion here. In this latter category there comes a rundown of right brain/left brain (intuitive/analytical) ways of handling problems. The qualifier "flexible" must be added to DSS in order to fit the help to the individual's way of using that help.

Paperback, 468 pages, $20, ISBN 089433-208-2. Petrocelli Books, Inc., 1101 State Road, Princeton, N.J. [illegible]

Books of Note

HOW TO PREVENT COMPUTER CRIME: A GUIDE FOR MANAGERS, by August Bequai: hardcover, 308 pages, $27.95, ISBN 0-471-09367-X. John Wiley & Sons, Inc., 605 Third Ave., New York, N.Y. 10158.

THE SOFTWARE CATALOG: MICROCOMPUTERS, produced from International Software Data Base: paperback, 1,020 pages, ISBN 0-444-00776-8. Elsevier Science Publishing Co., 52 Vanderbilt Ave., New York, N.Y. 10017.

Publishers wishing to have books considered for review or excerpting should direct books, prepublication galleys, press releases or catalogs to George Harrar, Book Review Editor, Computerworld, P.O. Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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PE Chief: Stress Mainstream Tech, Standards

By Robert Batt
CW West Coast Bureau

LAS VEGAS — The rapid pace of technological change is dictating the need for a new corporate strategy in minicomputers, according to Horace McDonell, president and chief executive officer of Perkin-Elmer Corp.

Speaking at a recent Comdex/Fall '83 session here on "Super Micro/Mini Markets," McDonell said the key to survival in today's changing market is to focus on mainstream computing technology, with an emphasis on standards.

"The computer industry has become an amorphous body of vertically structured markets. Today's realities dictate a new technological strategy, and we have decided we must draw on core technology from the mainstream of the computing industry while adding proprietary hardware and software to the specialized vertical markets we serve," McDonell told his audience.

PE makes superminis and micros for both business and scientific applications with a strong emphasis on financial services equipment.

McDonell, who has worked at PE since 1952, said higher fixed costs and lower variable costs brought about by rapid developments in very large-scale integration technology are causing the structure of the industry to change. Lower unit costs but higher front-end development costs are increasing the risk factor, while software is increasing as a percentage of the total systems cost, he added.

In this environment, McDonell continued, users are demanding standards at the supermini/micro level. "Users want to take advantage of cheap hardware. They want solutions without having to bear the high front-end costs as they have in the past — that is, they want standards."

De facto standards, McDonell noted, have already emerged in semiconductor technology, mini and micro software packages and operating systems. "This drive to standardization will not stop with micros. It will permeate the larger processor field, systems and networks. The technology is already here for this to happen."

In such an environment, McDonell declared, users will not be committed to one vendor. In recognition of this, he said, PE has adopted a product strategy based on industry standards in hardware and software with an emphasis on data communications such as IBM's Systems Network Architecture, Xerox Corp.'s Ethernet and CCITT X.25 for global packet-switching communications.

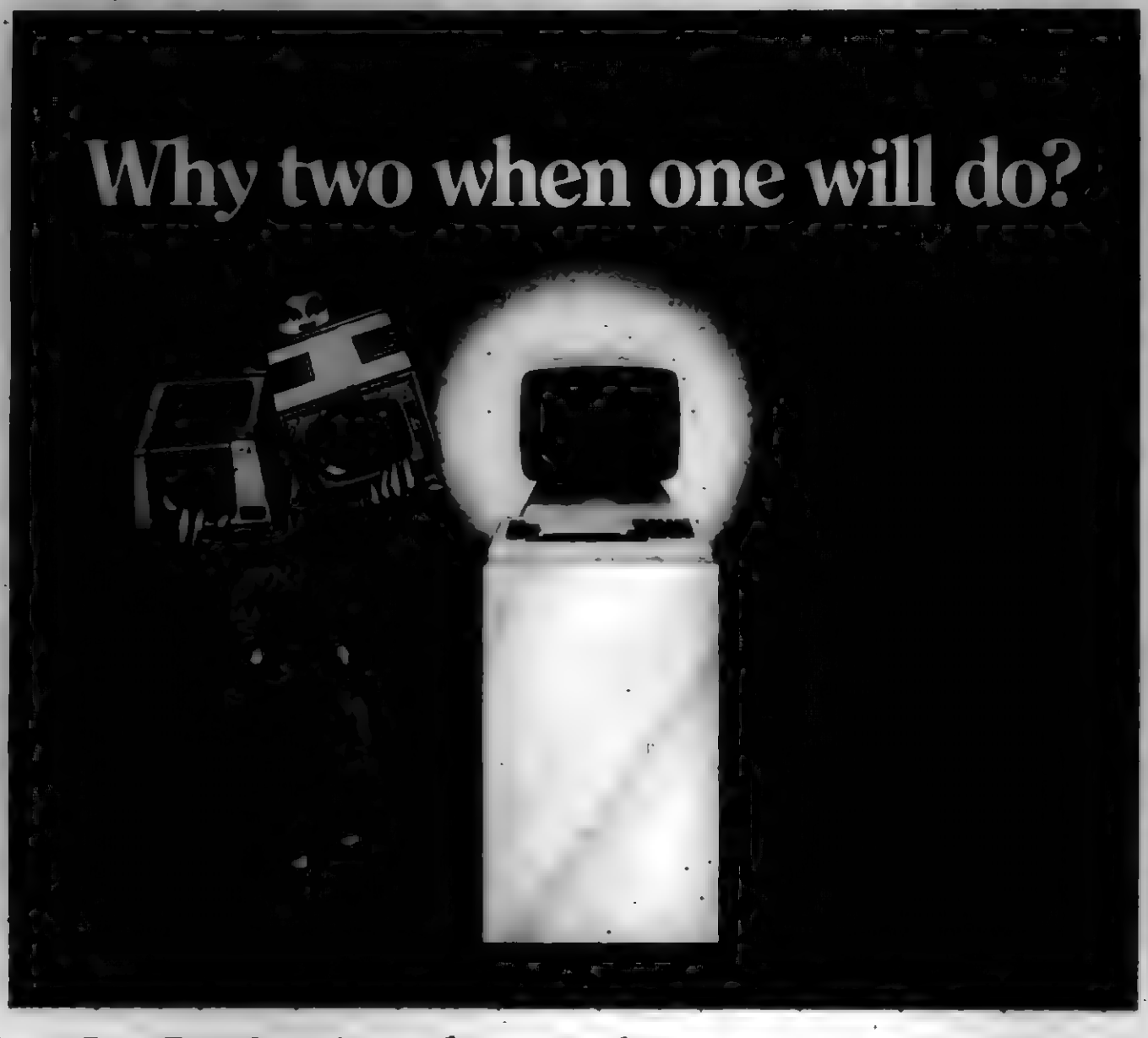
Software Portability

"In this new era of computing, there needs to be an emphasis on software portability. Customers want systems that can coexist with others, such as the IBM Personal Computer, and have cost-effective solutions. For this reason, vendors need to include value-added software to their product range," he stressed.

Also speaking about standardization at the Comdex session was Eileen Skrabutenas, senior analyst at Yates Ventures, a Los Altos, Calif.-based market research firm. Skrabutenas said the computer industry has room for several standards, depending on individual application needs.

"Minicomputer vendors are no longer isolated from standards in the micro area because users are no longer isolated from one another, particularly in large corporations," she said. Different vendors must cooperate in addressing the unsophisticated customer microcomputer base by recognizing that more support and standardization is needed, she added.

Companies such as PE and Digital Equipment Corp. should concentrate on taking their knowledge base and focusing on the low end of the mainframe market, where they can successfully compete against the IBM 370 and 4300 series replacements by building in greater and greater hardware capability, Skrabutenas said.



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DP-User Link Seen Tied to Micro-CPU Reality

By Robert Batt
CW West Coast Bureau

LAS VEGAS — The ability of microcomputers to take over duties previously performed by mainframes will depend on both technological and organizational developments, participants at the recent Comdex/Fall '83 were told.

Most experts have underestimated the difficulties of getting micros and mainframes to work together successfully, according to David Ferris, president of Ferris Corp., a San Francisco-based industry consulting firm.

Speaking at a session titled "Profiting from the Micro-to-Mainframe Connection," Ferris said that "A great deal of what passes for micro-mainframe links today is little more than terminal emulation. In practice, it has proved very difficult to get terminal packages working with large corporate networks and, as a result, most companies have been confined to statements of intention about future products rather than actual product announcements."

Better Liaison Needed

While much data could in the future be downloaded from mainframes to micros, Ferris said it will require more effective liaison between the data processing department and end users. DP, for example, will need to be involved in interpreting data for end users, while users will have to do a lot of work themselves if connections are to be made more easily.

Nevertheless, Ferris painted a picture of increased computing power for the end user and less pressure on the DP professional as a result of developments in personal computers.

"A lot of existing mainframe applications are going to be downloaded to micros, which will then act as back-end processors to existing business applications, displaying the output of the mainframe," Ferris claimed. The mainframe, he added, will act as a store-and-forward mechanism, with the CPU routing data to the appropriate peripheral, where it will be massaged and stored as information.

Speaking at the session, William Nisen, manager of decision support at Cullinet Software, Inc., said that in order to tie end-user micros to the mainframe data base, it is necessary for the DP department to control the use of microcomputer software in the corporation. "We believe the cornerstone of this effort lies on the host mainframe," he told his audience.

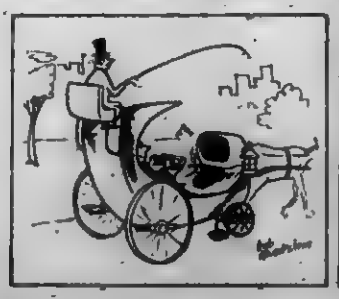
Requirements for a successful micro-to-mainframe link, he said, should include:

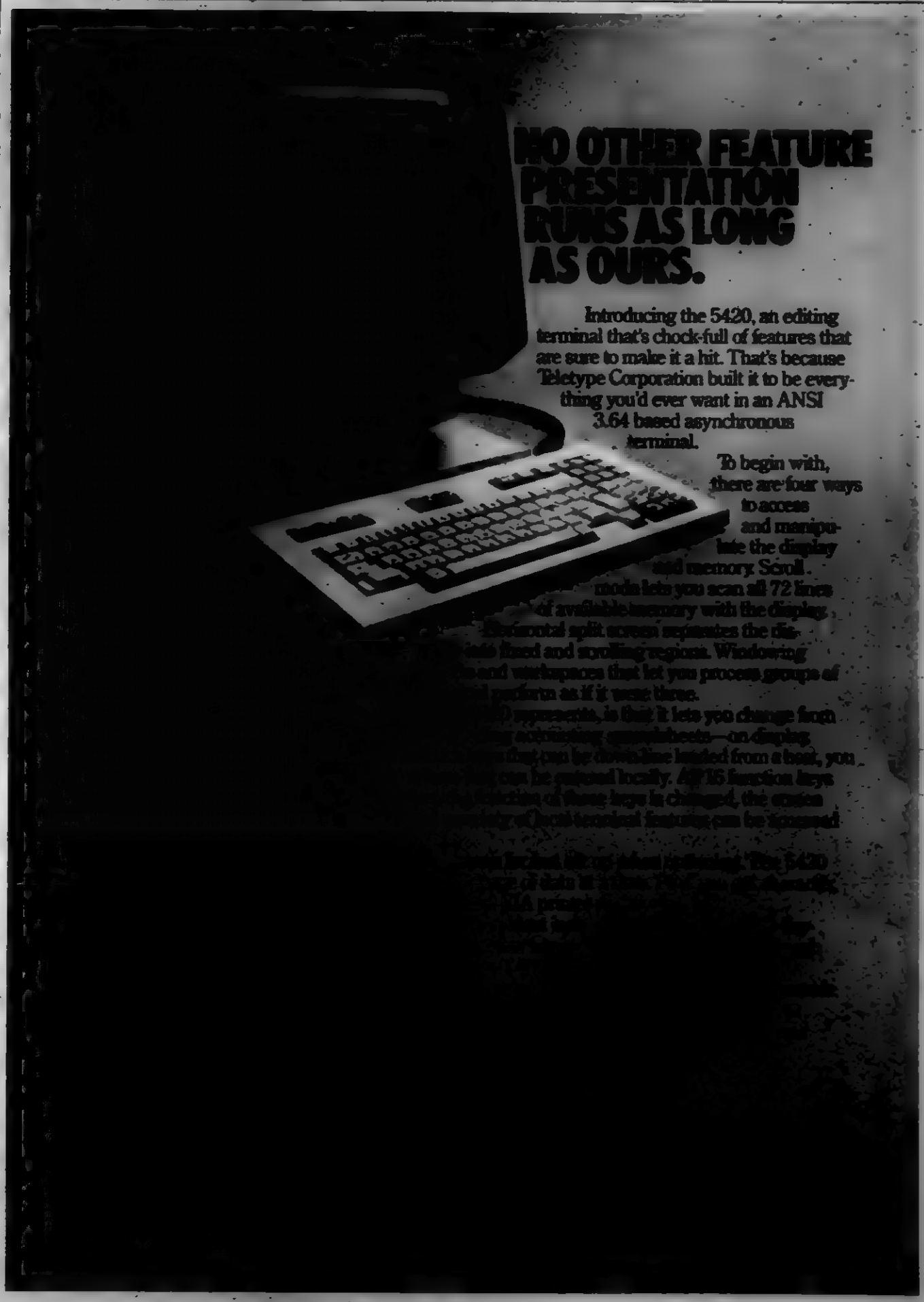
- Flexible communications.
- Integrated microcomputer applications.
- Support of multiple mainframe environments.
- Mainframe access to end-user data bases and online access to mainframes and terminals.

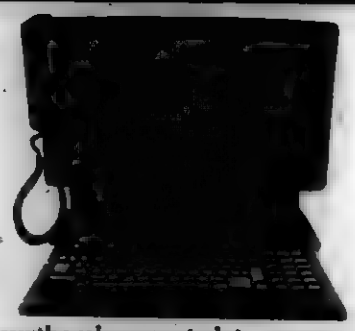
A third speaker at the session, Wilson Cooper, vice-president at Informatics General Corp., said users are demanding that DP management allow them universal access to information in the organization. However, he noted, there has been to date a lack of partnership.

"A situation has evolved in which the DP manager is looking to support the end user through the information center concept, but the end users have been adopting tools that do not have DP sponsorship," he said.

Products need to be developed, he remarked, which cater to the psychology of the data base administrator in an organization, who is typically very uncomfortable with end users accessing mainframe data. "The issue is whether DP is really interested in micro-to-mainframe links or whether they are just kicking tires to determine the future direction of technology," he concluded.







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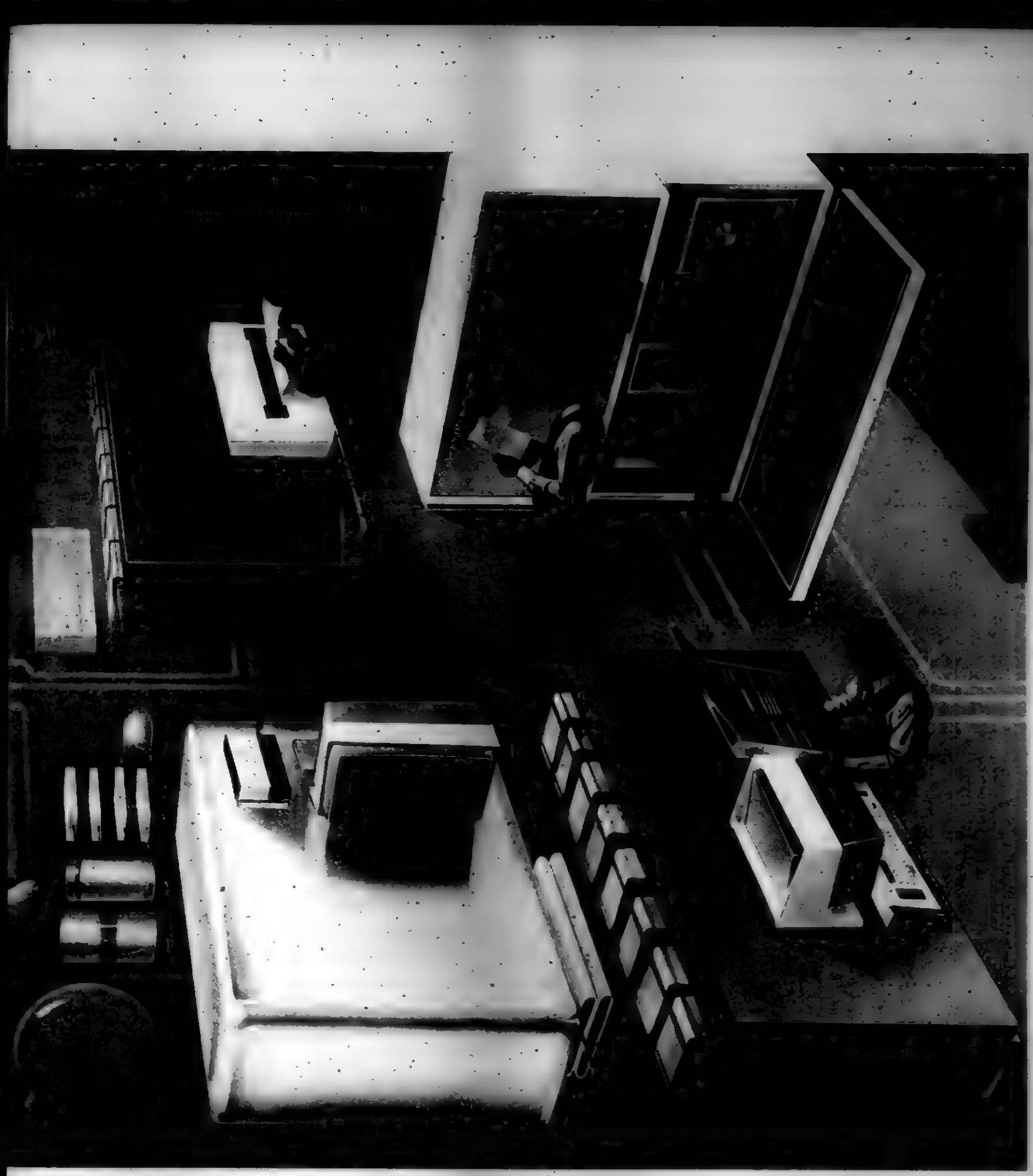
Managing and Storing Information—Locates documents, and retrieves and evalu-



ates contents quickly and easily with electronic files—while reducing the possibility of losing documents. An electronic "Mailbox" allows you to quickly determine which documents to read first. EDC reduces storing and filing costs with an electronic "Archives" that allows for either short- or long-term storage, and the "Wastebasket" which enables you to permanently delete items after a determined period of time. There's even an electronic "Calendar" that checks personal schedules and arranges mutually convenient meetings.

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EDC was developed by Bell Labs systems designers who now work for AT&T Information Systems Laboratories. AT&T Western Electric produces EDC, and AT&T Information Systems will maintain it with comprehensive, conscientious service from the largest service organization in the industry. To find out more, call toll-free 1-800-247-1212, Ext. 879M.

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SAS Users Group Conference Slated Today in Dallas

DALLAS — The first Regional Dallas Statistical Analysis System (SAS) Users Group meeting is scheduled for today from 9 a.m. to 3 p.m. at the Marriott Hotel on LBJ Freeway in Dallas.

The purpose of the group is to provide an information exchange between both users and nonusers of SAS Institute, Inc.'s SAS, according to organizer Kirk Lafler, an independent consultant specializing in fourth-generation languages.

Speaking at the conference will be Kim Trif, a systems engineer with Electronic Data Systems, Inc. Trif will relate his experience working with SAS on different applications.

A variety of application topics will be presented, including how SAS can be used for fourth-generation languages, reporting, system development and full-screen product development.

In the planning stages are SAS seminars in Los Angeles, San Francisco, Chicago, New York and Toronto, according to Lafler.

Registration for the Dallas group is $50 at the door. For information about the other seminars, Lafler can be reached through P.O. Box 1390, Spring Valley, Calif. 92077.

Merlin G. Smith

Smith Receives IEEE Award For Service to DP

CHICAGO — Merlin G. Smith of IBM, a director of the Institute of Electrical and Electronics Engineers (IEEE) Computer Society, has received the society's Richard E. Merwin Award for distinguished service to the computing profession.

The award, consisting of a certificate and $1,000 honorarium, was established in honor of the society's former president, the late Richard E. Merwin.

Smith is technical assistant to the vice-president for logic and memory at IBM's T.J. Watson Research Center in Yorkstown Heights, N.Y. His work has focused on large-scale integration and semiconductor components.

Smith is coauthor of "Limitations in Solid-State Technology," which was selected for republication in the IEEE History Committee's "Turning Points in American Electrical History."

Smith has worked as a volunteer with the IEEE Computer Society since 1966, serving as secretary, vice-president and president. He helped to establish the society's professional development programs, the Compcon fall conference and the Computer Society Press.

Softcon Meet Set for Feb. 21

NEW ORLEANS — The first annual Softcon conference for the software industry will be held here Feb. 21-23. Sponsored by Northeast Expositions, Inc., Softcon will cover computer software products ranging from video games to telecommunications systems.

The conference will include more than 60 seminars, panel discussions, forums and workshops, according to a spokesman. Speakers and panel members will include Mitchell Kapor, president of Lotus Development Corp., Jonathan Rotenberg, president of the Boston Computer Society, and Portia Isaacson, president of Future Computing, Inc.

Registration for the conference costs $30 to view exhibits only and $195 for the full conference program. More information is available from Northeast Expositions, 822 Boylston St., Chestnut Hill, Mass. 02167.

Fiber Optics Report Will Be Out in March

ROCKAWAY, N.J. — "Fiber Optics International," a monthly technical report on developments in the field of fiber optics, is planned for publication next March.

The monthly publication will include news briefs, a technical digest, applications, a "how to" section and special reports, according to its publisher, Technical Data Publishing Corp.

A one-year subscription is available for $160 in the U.S. and $200 in foreign countries. More information is available from Technical Data Publishing at 53 Lake Shore Drive, Rockaway, N.J. 07866.

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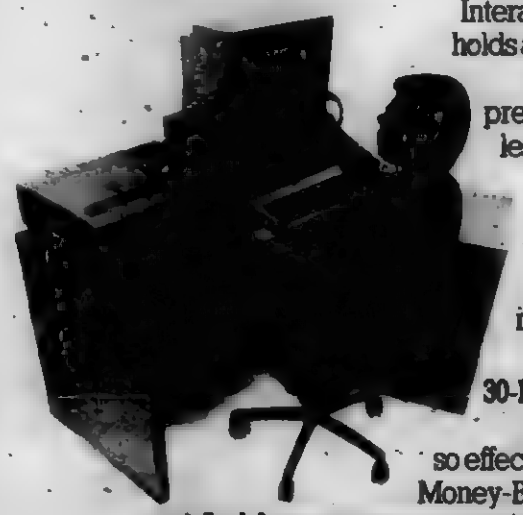

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Reorganization Spurred by Manager's Experience

By Leo Sharkey
Special to CW‡

DETROIT — For Detroit Edison, the impetus for what would seem to be drastic change came in September 1979, when David L. Peterson became manager of its Information Systems Organization.

The 44-year-old Peterson, who began his computer career at IBM several years ago as a systems engineer, joined Edison's data processing department in 1966. In 1974 he left the Information Systems Organization to work in the utility's fuel supply area. Those five years outside his old department provided an eye-opening experience.

"I finally knew what it was like to live in the other side of the community," Peterson recalled.

"I saw first-hand that there were some traditional DP things that just had to be changed. Primarily, a large backlog of applications in [the Information Systems Organization] had reinforced the conclusion among users that [it] was unable to service one's needs immediately," he said.

Radical Reorganization

As the new manager, Peterson's ambition was nothing less than a radical reorganization of his department. When upper management heard of Peterson's idea, it welcomed the kind of efficiency he was proposing. In recession-laden southeastern Michigan, the utility's kilowatt-hour sales had been declining. But Edison could not produce less electricity, even though industries were using less. To halt a power plant's motion, even momentarily, would result in a fatal flat spot on the turbine. With Edison strapped with fixed costs, the only savings alternative would be to operate more economically.

In their initial meetings in the spring of 1980, Peterson and directors from his department established three planning strategies.

"First of all," Peterson said, "we were going to be in the information business rather than the computer business. We wanted to make solutions to information problems, not to computer problems."

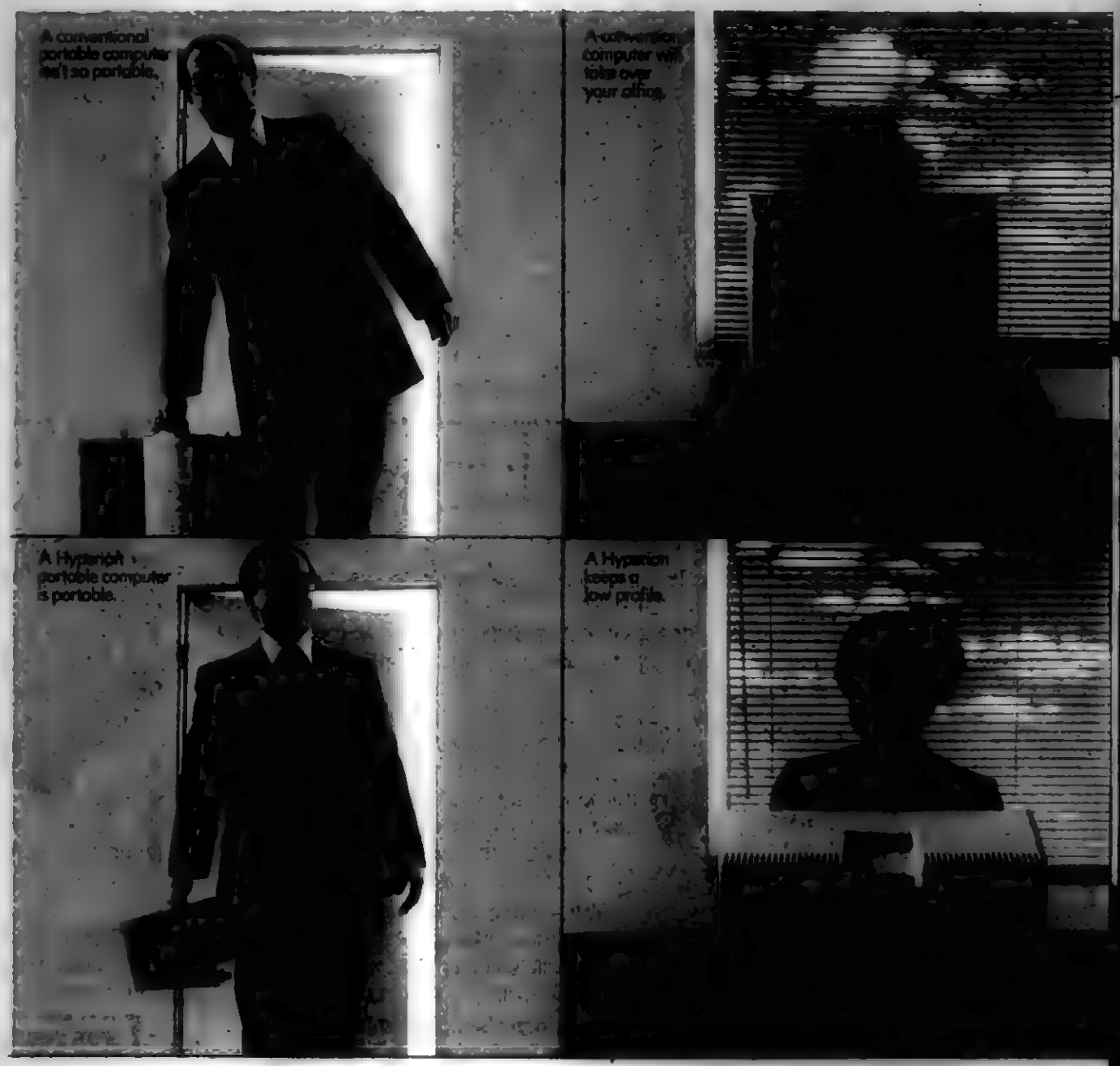
As an example of a computer problem, Peterson cited the computer applications for monitoring equipment in the power plants, which had traditionally accounted for much of the Information Systems Organization's responsibility. Right away, Peterson and the directors decided to relegate that function to the electrical systems area of the company.

As a second strategy, Peterson continued, "we wanted to establish firmly, especially in data base systems, the customer as the owner of the system. Generally, DP departments — at Edison and elsewhere — have looked upon themselves as the owners of systems. As a result, when there was a solution to come up with, the experiences of the users were overlooked. We had to change that.

"As a third strategy, we wanted to foster a do-it-yourself approach whenever possible, so the customers would be freed from the traditional one- to two-year backlog in [the Information Systems Organization]."

These two strategies called for customers becoming more knowledgeable about the computer. One way to accomplish that, Peterson decided, was to acquaint customers with the computer through small applications on microcomputers. For a base rate of $170/mo, a customer would be able to obtain a turnkey system of an Apple Computer, Inc. Apple II with 64K-byte random-access memory, one disk drive, a monitor, a printer and Basic and Visicorp Visicalc software. To sweeten the offer, there would be "free training, consultation, systems engineering support" and the free replacement of a part in the event it broke down.

As long as they were going to be in "business," Peterson related, they realized that one way to drum up business was to do what most businesses do — offer irresistible prices. The microcomputer bargain was a case in point.



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Edison Finds New Way to Build Computer Use

By Leo Sharkey
Special to CW‡

DETROIT — In an effort to improve computer usage at Detroit Edison here, the utility's Information Systems Organization recently came up with an original and effective program.

Manager David L. Peterson decided to transform his staff of 225 into a virtual company-within-a-company, which would set out to solicit business from other Edison employees, who would act as customers. Internal customer service representatives began publicizing free classes in computing and offering traditional DP functions as "new" services. For example, programmers began tailoring software to a customer's individual needs, and in-house customers were able to open time-sharing accounts, using the firm's IBM 3083 mainframe. Customers were also able to lease Apple II microcomputers and peripherals.

In the year and a half since implementing the program, computer usage at Edison has reportedly gone up about 30%. "A large number of new customers have been those who didn't think they needed a computer prior to all our publicity," said Peterson, who is currently on loan to the Michigan state government.

In particular, the time-sharing program, competitively named "Info Plus," soared to 571 accounts. The microcomputers were so popular that the demand for the 70 Apple Computer, Inc. Apple II units soon surpassed the supply. The current waiting list of nine customers has been typical.

An important but less tangible result of the new approach, Peterson said, is that attitudes toward the computer have grown friendlier, and a spirit of openness has been fostered between Edison's Information Systems Organization and other departments.

Establishing the in-house corporation has also had one unforeseen result — a 33% reduction in the Information Systems Organization. The reduction occurred when members of the staff transferred to other areas within the firm, Peterson pointed out. While working with the new program, vacating members became familiar with other opportunities within the company, found they liked those areas and joined them, he explained.

Easier Record Searching

One of the first customers to try the microcomputer was the Real Estate and Rights-of-Way Department. They found the Apple made it much easier to search the innumerable property records in Edison's vast, 7,800 square-mile territory in southeastern Michigan. Soon, the department left the microcomputer behind to graduate to a time-sharing account, primarily, Peterson said, to enable outlying offices to access the large data base in the mainframe at Detroit headquarters.

Virtual mountains of documents are presented when Edison's Rate Department appears before the government regulatory agency for rate hearings. What almost equals the onerous burden of preparing the documents is the frantic attempt to find answers for them when questions are raised during the hearings. But with the computer and with time-sharing, both jobs have been simplified.

The tax department had always eschewed data processing, since its once-a-year activity was not conducive to a mainframe application. Traditionally, preparing the corporate tax returns meant the regular staff and a few extra personnel worked overtime for a couple intense months, Peterson explained. But this year, tempted to try the reputedly simple microcomputer, the department leased from the Information Systems Organization an Apple II with Visicorp's Visicalc. Peterson described the results: "They were able to prepare returns with no overtime and a lot fewer bodies. They've gone on and identified other problems in their area and are working on them with the Apple."

Sharkey is a free-lance writer based in Ann Arbor, Mich.

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Study: PCjr to Open Competition in Home Mart

By James Connolly
CW Staff

FRAMINGHAM, Mass. — It might be a hobbled racehorse that relies on the IBM silks to win, but the IBM PCjr may make its mark by opening up the home computer market for still greater competition rather than stabilizing it.

That was one conclusion of a market impact study titled "IBM's PC Junior: No Chip Off the Old Block" recently released by International Data Corp., (IDC) a market research firm based here. The study contended that the PCjr lacks the innovation displayed by the IBM Personal Computer and that IBM limited what the PCjr can do so its lower price will not hurt the sales of its more expensive predecessor.

"Selling a system with all the capabilities of a [Personal Computer] for a lower price just didn't make economic sense for IBM," according to the report, which was coordinated by William F. Zachmann, vice-president of IDC's Office of Technology Assessment. "The other obvious alternative is to create a crippled version of the [Personal Computer] with artificial limitations built in and obstacles to third-party upgrades. That is, essentially, what IBM did with the PCjr.

"In a strategy similar to that previously followed in mainframe systems," the report maintained, "IBM built a system that deliberately does not take advantage of the capabilities of the underlying technology and artificially restricted the capabilities of PCjr."

Zachmann noted that Apple Computer, Inc., which is preparing its Mackintosh system for release, has a golden opportunity to offer a different product at less than the commonly anticipated $4,000 to $5,000 price. Also, other competitors may be encouraged to build less expensive, Intel Corp. 8088-based systems and to steal prospective IBM Personal Computer customers.

"What PCjr will do, once people begin to see reality through the myths, is to demonstrate that even big and powerful companies do not find major markets theirs for the taking and that smaller competitors who are sufficiently nimble can hold their own better than expected," the report said. "It is far too early to plan the wake for vendors other than IBM in the home market."

Moreover, the report added, "Another thing PCjr does is to remind other vendors what might be done if one really builds a less expensive 8088-based system that takes advantage of the capabilities of the processor instead of hobbling it."

The only serious bar to competitors, according to the report, is the shortage of 8088 processors.

The PCjr, which IBM introduced in November, is expected to be released in the first quarter of 1984 with a base price of $669 for a 64K-byte cassette-driven system and $1,269 for a 128K-byte floppy diskette-based model. The study maintained that contrary to IBM's original predictions that the PCjr's uses are limited "only by the imagination of the person using it," its limitations make it unsuitable for serious business uses.

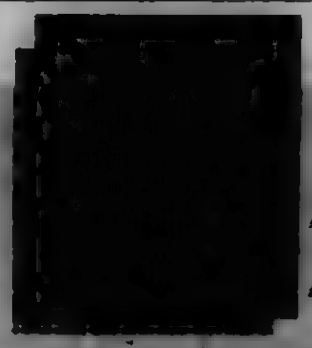
PCjr's Inadequacies

The PCjr's inadequacies, according to the report, include a maximum main memory of only 128K bytes, availability of only one disk drive, a "Mickey Mouse" keyboard, a lack of "public" expansion slots and a lack of function keys. "Competitively, it is very difficult to see where this product fits into the real world," IDC said.

The report noted that the PCjr makes low-end home systems such as those from Commodore Business Machines, Inc. and Atari Corp. and the discontinued Texas Instruments, Inc. home computer seem like bargains with their lower prices and full keyboards.

IDC said the PCjr is limited by a shortage of software when competing in the high-end home market.

The IDC report is available free of charge from IDC at 5 Speen St., Framingham, Mass. 01701.



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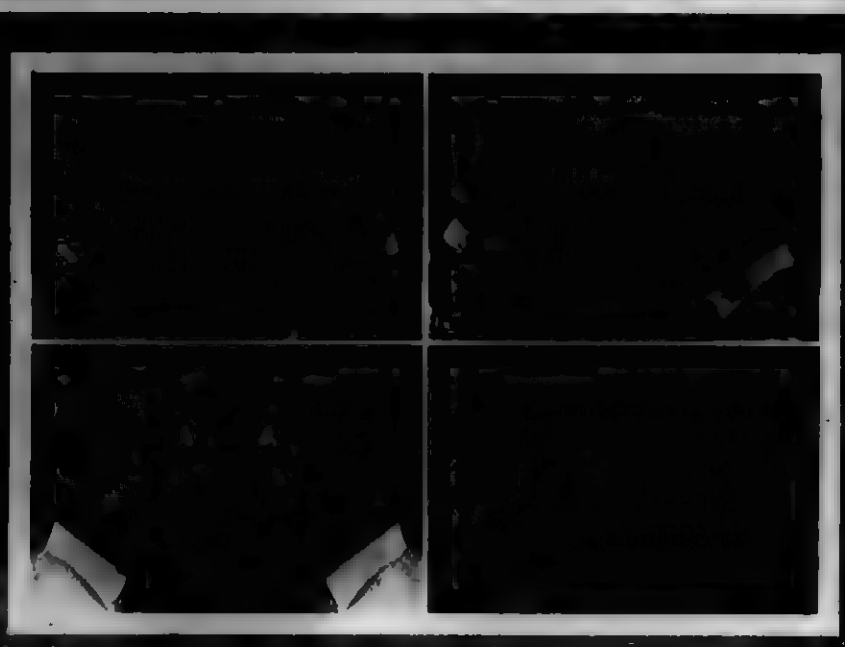

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Via Integrated Standards

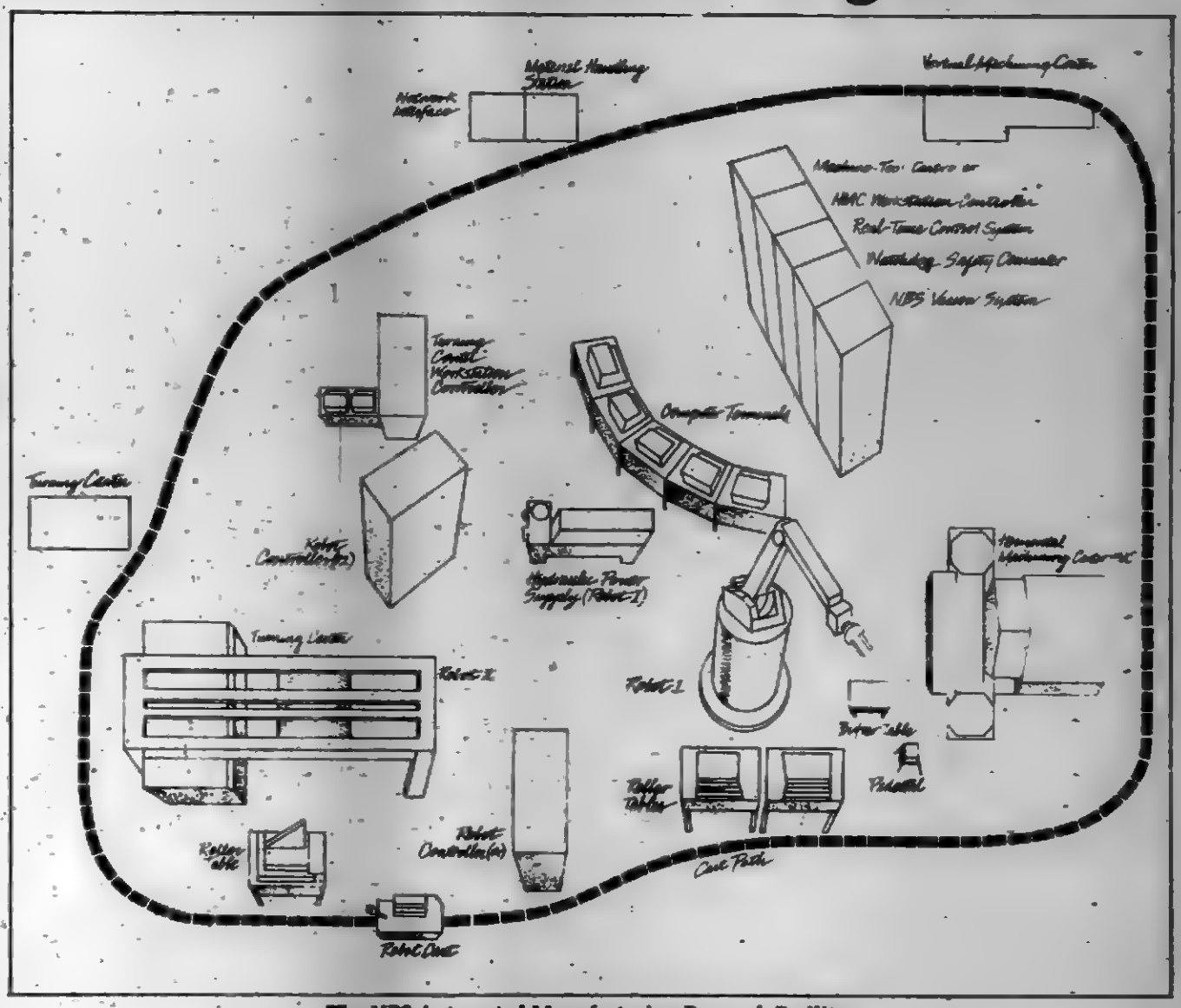
NBS Opens Automated Manufacturing Test Site

By John Gallant
CW Staff

GAITHERSBURG, Md. — Researchers at a prototype test facility are working toward the day when selecting automated manufacturing equipment is as easy as choosing a suit off the rack.

U.S. Secretary of Commerce Malcolm Baldridge marshaled appropriate fanfare to mark the recent opening of the U.S. National Bureau of Standards' (NBS) Automated Manufacturing Research Facility (AMRF) here, a unique computer-controlled machine shop that combines automated equipment from a variety of American manufacturers. The facility is geared to helping U.S. manufacturers remain competitive through the use of automated tools.

A big part of that mission involves the development of interface standards that accommodate the linking of different types of machinery. "NBS will use this system to test ideas for standardized computer and equipment links that will allow manufacturers to pick and choose the equipment they need without having to worry about whether or not it will be compatible," Baldridge said. "This approach reflects what the majority of our small and mid-size manufacturers need: a way to buy capital equipment one piece at a time from the best source and still be able to plug it all together in a functioning system."



The NBS Automated Manufacturing Research Facility

Important Components

Some of the more important components in the first stage of the AMRF, which is not expected to be fully operational until 1986, are a horizontal-axis machining center, an automated lathe, a robot cart that moves material between stations and two different models of industrial robots, one of which is equipped with an experimental vision system developed by NBS. The equipment — valued at about $2 million — has been loaned and donated to the facility by U.S. companies that, together with a number of universities, maintain research personnel at AMRF.

"We're attempting to construct a laboratory where we can test proposed interface standards in a real-world situation," Dr. James Albus, chief of NBS' Industrial Systems Division, said. "We're developing generic interfaces that will allow us to determine the critical parameters for judging other proposed standards. This is an evaluation and research tool that will be useful for industry until the year 2000."

The facility is important, Albus said, because hundreds of interface standards for automated manufacturing have already been developed. He said he expects "hundreds of thousands more" will be proposed in the years to come.

One of Albus' colleagues, Phillip Nanzetta, a technical assistant, said NBS researchers have already developed about 30 actual interfaces, consisting of both hardware and software, at the AMRF facility.

Three Levels

According to Nanzetta, the NBS-developed interfaces operate on three levels, between individual machines, workstations and "cells." A workstation consists of a machine tool, a ro-

(Continued on Page 40)

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With Fast Access to Insurance Data

Hand-Held Units Help Agents Tailor Policies

RICHMOND, Va. — Sales representatives at a major life insurance company here are using hand-held computers in the field to provide instant, individualized information on the company's products.

"What computers did was enable us to sit down and literally tailor a financial security plan that fits a client's particular needs and, at some later date, permit us within that same policy to revise the whole program," Samuel H. Turner, president of the Life Insurance Co. of Virginia (LOV), said.

Named the "LOV Machine," the computer assists sales representatives and brokers who sell the company's Universal Life Insurance. Introduced in January, the machines are currently being used by 2,000 LOV agents and brokers throughout the country.

"Universal Life Insurance is a contemporary form of life insurance," Turner said. "Previously, sales information was precalculated and printed in what we call a rate book. But there were problems with that method, such as inflation, people's needs changing over time and the fact that the system had no capability of accommodating changes in individual circumstances.

"The computer was a prerequisite to offering Universal Life Insurance; we could not have offered it without the technological environment that we have today."

According to Richard C. Moschler Jr., vice-president of systems development, the LOV Machine is a Panasonic Corp. RL-H 1800 hand-held computer system.

The software was written by the insurance company's programmers for their life insurance policies and packaged in the electronic programmable read-only memory, which is located in the back of the machine.

The computer is approximately 3½ in. by 9 in. by 1 in. in size and has 8K bytes of random-access memory.

"The basic reason for using the machine is for the sales reps who are selling the [Universal Life Insurance] products so they can have the computational support when they are at the point of sale," Moschler said.

"If they didn't have that support, they'd have to go back to the office and run to the microcomputers there, generate a written proposal and then get another appointment with the client and go back again," according to Moschler.

Sales Process

Using the computers makes a big difference in the sales process by cutting down on callbacks to clients, Georgia-based sales representative Jiles Parkham said.

"Because you're able to answer questions right at the location, the system has tangible results and helps make sales and close the case right there," Parkham said.

The computer also makes the sales transaction more personal. "Customers are intrigued. They think it's a unique and novel idea. They see their names on the computer, and it draws them into the process," Parkham added.

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NBS Opens DP Facility

(Continued from Page 39)

bot and material handling equipment, and a cell is a grouping of two or more workstations.

Emulation programs that are written in a variety of languages, operating on hardware interfaces such as a Digital Equipment Corp. VAX-11/780 supermini, provide instructions that allow one machine to "talk" to another.

The automated equipment also shares information from a common data base.

Major Step

"Simply putting this facility together was a major step," Nanzetta said. "Our first efforts are only rudimentary; in a sense, our work is just beginning.

"We hope to refine these existing interfaces and develop new ones, including sensor devices and machine tool controllers. The energy that went into this is similar to starting up a new company.

"It's exciting, and that's something special in a government facility," he added.

The manufacturers participating in the AMRF project include Hewlett-Packard Co.; Software Architecture & Engineering, Inc.; Westinghouse Unimation; Valeron Corp.; and the Brown & Sharpe Manufacturing Co. George Washington University, Lehigh University, Purdue University and the University of Kansas, the University of Maryland and the University Wisconsin have each contributed research grants and personnel to the project.

Main funding for the AMRF facility was provided by the U.S. Department of Commerce and the U.S. Navy.

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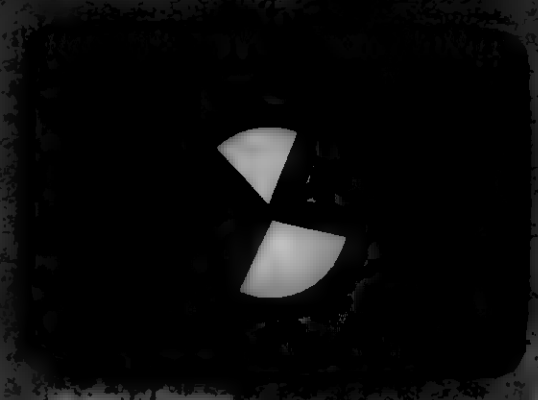

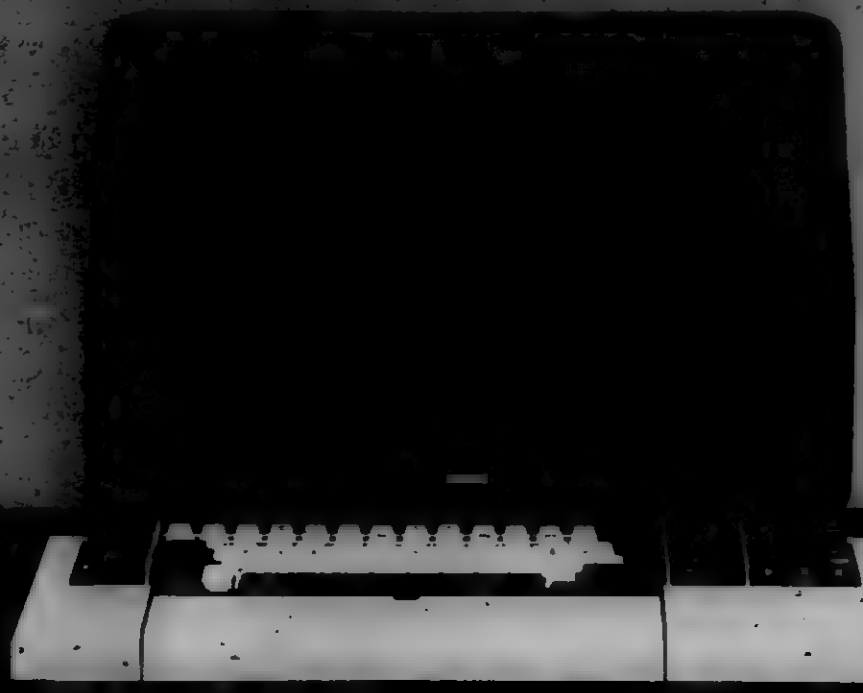

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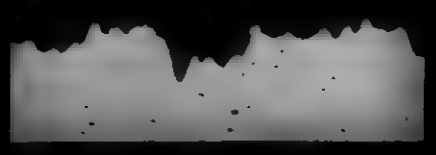

DEC Users Conference Set To Coincide With Dexpo

PRINCETON JUNCTION, N.J. — The first major independent conference for users of Digital Equipment Corp. computers will be held at Dexpo East '84 April 3-6 at the Bayside Exposition Center in Boston.

The conference will be sponsored by the Independent RSTS User Society (Irus) — the national independent DEC user group — with the support and cooperation of Expoconsul International, Inc., the organizers of Dexpo.

The DEC user conference is geared toward management-level individuals and will focus on information management strategies in the DEC user environment rather than with day-to-day technical problems, according to a release.

Major topics will include office automation, personal computers, communications, security and disaster planning, education, graphics, technology trends and other areas of interest to executives who depend on DEC equipment for their business information systems.

Additional information is available from Expoconsul International, 55 Princeton-Hightstown Road, Princeton Junction, N.J. 08550.

AMS Meeting To Address 'Megatrends'

NEW ORLEANS — "Megatrends for Managers" is the theme of the 65th International Conference of the Administrative Management Society (AMS), to be held here at the Marriott Hotel May 29-June 1.

The conference will also feature the Gulf Coast Computer and Office Show from May 29-May 31 at Marriott's Exhibition Hall.

Heading the conference program will be John Naisbitt, author of the book *Megatrends*, who will offer insights into the major trends reshaping society. Other speakers will include Amy Wohl, office automation consultant, who will speak on trends in office systems integration; Morris Massey, who will speak on boosting career effectiveness; and a three-nation economic panel featuring leading economists from the U.S., Canada and the UK.

The conference will feature more than 20 sessions and workshops. Other topics include adapting to personal computers, integrity in management, investment policies for small businesses, employee assistance programs, voice processing and the new office environment.

Registration fees are $395 ($365 for AMS members) or $295 without meal functions ($275 for AMS members). Sessions are also priced individually.

Further information is available from Conference Services, AMS, 2360 Maryland Road, Willow Grove, Pa. 19090.

'Up Until Now I Didn't Believe There Was Life Outside of High Tech.'

CDP Exam Questions Available in Instruction Manual

CHICAGO — The Institute for Certification of Computer Professionals (ICCP) and its Certificate in Data Processing (CDP) Council recently announced the release of 25% of the questions in the 1983 CDP examination.

ICCP will release every fourth question in the 1983 exam, 15 from each of the five sections, to be published in the institute's fourth edition of the CDP Instruction Manual. Coleman Furr, chairman of the CDP Council, said the questions are being published "to give candidates a better understanding of what the CDP exam is about and to help them prepare for it." The ICCP plans to release 25% of the questions annually.

According to Furr, each of the five sections of the CDP examination is reviewed annually and revised as needed. At the same time, major changes are made to one section in the exam. First administered in 1962, the CDP examination includes 100 to 125 new questions each year.

The CDP Instruction Manual, including the addendum in which the questions appear, can be purchased for $7.50. It is free of charge to review course instructors. The ICCP is based at 35 E. Wacker Drive, Chicago, Ill. 60601.

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Crosses Three Continents

Tracking System Aids Construction Project

PASADENA, Calif. — Parsons Corp. has the task of completing construction on a $1 billion crude oil refinery in Saudi Arabia by the end of 1984. To help meet this deadline, the international engineering and construction management firm has implemented a worldwide procurement tracking system that allows construction firms in Japan, France and the U.S. to communicate with the Middle East project site — an operation that crosses three continents.

To develop this procurement tracking system, which needed to be up and running in a matter of months to ensure completion of the project on time, Parsons combined its own processing and software capabilities with those of General Electric Information Services Co. (Geisco).

Parsons teamed up with Chiyoda Engineering and Construction of Yokahoma, Japan, and Technip Engineering and Design of Paris when it was awarded the construction management contract two years ago for the 250,000 barrel-per-day refinery to be built for Petromin and Shell Oil by the end of 1984. All three partners would be included in plans for the comprehensive procurement tracking system that would help ensure the project's timely completion.

Parsons had the in-house hardware and software for procurement reporting and data base management, but there was no mechanism in place for sharing information among the participating firms or the project site in Saudi Arabia.

"We had a very small amount of time to come up with a procurement tracking system that would work," Jerry Jahn, Parsons' manager of computer services, said. "The information system would reside in Pasadena on our existing hardware and use the procurement tracking software we had already developed. But beyond this basic plan, we had to examine some alternatives.

"We needed to perform on-line input and receive output and inquiries from locations in Japan, France, Saudi Arabia and the U.S. The alternatives included going with an available, commercial network or leasing satellite channels and building our own network specifically for this project," Jahn explained. "The solution ended up being Geisco's Mark III Shared Applications approach, which was to combine our existing resources with their worldwide teleprocessing network."

Geisco's shared applications capability enables clients to integrate their own processing and software capabilities with those of Geisco, providing on-line host to General Electric Co. host processing. Geisco enhanced Parsons' own resources by tying Parsons' in-house Prime Computer, Inc. 750 superminicomputers to Geisco's worldwide teleprocessing network, Jahn said. This allows the partners in France and Japan, as well as the project site in Saudi Arabia, to use the network and processing power to access the in-house machines at Parsons' headquarters here.

"Without the assurance of communications capability in France, Japan, Saudi Arabia and the U.S., we may not have been able to implement the system as quickly as we did," Jahn said.

Procurement Tracking System

The procurement tracking system now running on Geisco's teleprocessing network and on Parsons' in-house hardware is basically a large transaction processing and reporting system. A data base of material transactions is maintained, showing who is ordering, what was ordered, date of order, requisition date, scheduled ship and arrival dates, method of shipment and other pertinent data.

Summary and detailed reports of material shipping status are generated from files maintained by Geisco and the in-house Parsons hardware.

With the procurement tracking system, the project can be monitored and controlled without a duplication of effort or expenditures by the joint venture firms involved in the construction project.

Communications software developed by Geisco allowed the Parsons Prime 750, a Geisco Marklink minicomputer, the processing power of the Geisco network and terminals in Japan, France, Saudi Arabia and the U.S. to work together. The entire system, which includes the ability to access a very large data base from four major locations around the globe, must work smoothly at all times for the "team approach" to be of value.

The Marklink minicomputer allows Parsons' on-site personnel to handle the printing and processing of larger reports quickly. There are, however, not as many hard-copy reports as past procurement systems have often been required to generate. The philosophy of the Parsons Management Systems Department is to have as much processing performed in the interactive mode as possible.

"To handle applications for our type of business, I think the shared applications concept is ideal," Jahn said.

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EDP Auditors Foundation Prepares For Increase in Cisa Candidates

CAROL STREAM, Ill. — The Electronic Data Processing (EDP) Auditors Foundation is gearing up for an increase in the number of candidates expected to undergo its annual Certified Information Systems Auditor (Cisa) examination, scheduled for April 7.

The EDP Auditors Foundation, which bestows the title of Cisa on candidates who achieve a passing score, announced that it has expanded the number of foreign and domestic test sites from a total of 49 last year to 69 for the upcoming exam. The test has also been reduced from 400 questions to 350, a number that the foundation said will still accurately identify competent Information Systems Auditors.

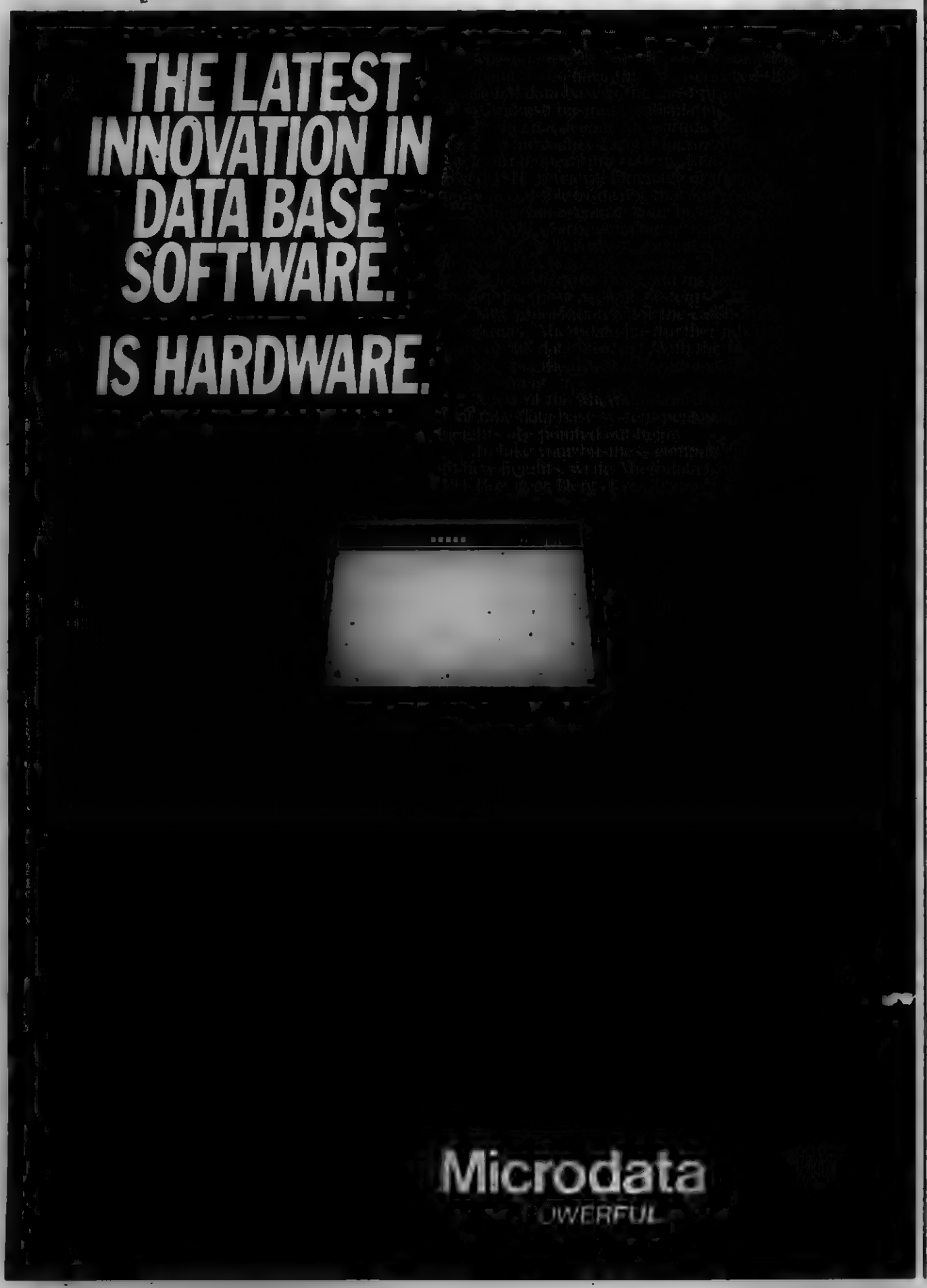
According to the foundation, the certification program was launched in 1981 with 650 candidates, a pool that had grown to 1,031 by 1983. The foundation expects more than 1,200 candidates for the 1984 exam. Successful candidates in 1984 will join some 1,400 others who have earned the Cisa title since the program began.

The six-hour exam, which is administered by the Center for Occupational and Professional Assessment of the Educational Testing Service, covers the areas of application systems controls, data integrity, systems development life cycle, application development, operational procedures controls, security, systems software, maintenance, acquisition, data processing resources and auditing.

The foundation's certification program also includes a recertification requirement, which was designed to ensure that those achieving the title of Cisa stay informed about accounting, auditing, management and DP developments within industry. To maintain certified status, Cisa members must participate in continuing education courses or retake the exam.

The fee for the Cisa examination is $185, and the EDP Auditors Foundation is offering two 50-question sample tests with questions from past exams for $7.50 each. The foundation has also made available its Cisa Study Guide and the Study Aid: Information Systems Audit Process for $20 each.

The study aids and more information can be obtained from EDP Auditors Foundation, 373 S. Schmale Road, Carol Stream, Ill. 60188.



Security Report Out for 1984

GAITHERSBURG, Md. — Federal Engineering, Inc. has announced the 1984 edition of the "Computer Access Security Report," which addresses the increasing threat of unauthorized computer access and how to guard against it.

The report analyzes the various access threats and explains why today's systems are so easily penetrated. It also describes the various protection techniques, how they function and which vendors are currently providing access security systems, the vendor said.

The price is $14.95, and more information is available from Federal Engineering through P.O. Box 2486, Gaithersburg, Md. 20879.

Test-Site Experience Leads to Purchase

System Speeds Typesetting for Publishing Firm

NEW YORK — When a publishing services firm here decided to replace its aging in-plant phototypesetting system with the latest in computer technology, it agreed to test a new product with the object of speeding up turnaround time.

The Atex, Inc. composition system previously used by Matthew Bender & Co., which provides publishing services for legal writers and editors, had become too slow and cumbersome for the company's needs. Also, "the Atex system could not perform a lot of the specialized composition functions we needed," explained William A. Musso, vice-president of production.

"In the past, we had done quite a bit of our composition work right at Informatics General Corp. using their earlier CS [Composition System] IV software, so we agreed to become a beta site for the newer CS V system," Musso said.

According to Musso, the publishing company had been planning to purchase a dedicated typesetting system, but Informatics suggested a general-purpose computer instead. CS V was installed as an application program running in a batch processing mode as a low priority task on a Wang Laboratories, Inc. Model 2200 VS100 minicomputer, which was included in the turnkey package provided by Informatics.

"Informatics caused us to reevaluate our requirements," Musso said. "At first, we didn't see the advantage of that type of arrangement, but upon closer examination we realized that it significantly improved the system design. All we could have done with a dedicated system is typeset, but with this system we can easily add software packages and do far more than just typesetting."

Tighter Pagination

The production department at Matthew Bender was particularly interested in setting tighter pagination and producing pages at a higher speed than was capable with the old system. During the testing, CS V reduced the number of pages to be printed by 10% and produced over 700 pages in an average of 1.4 seconds per page. The Wang system, which also supported 18 terminals and two line printers, performed other data and word processing tasks concurrently.

Following the test period, Matthew Bender went into full production with the CS V package. The firm now produces an average of 2,500 pages per week with the Informatics software, an amount that Musso said is about 10 times greater than that produced with the previous system. The company has also expanded the system architecture by installing two additional Wang VS100 minicomputers in its San Francisco editorial office.

When fully operational, all office automation tasks, in addition to the work of 150 legal editors and writers, will be handled by the Informatics system.

The San Francisco operation already has more than 100 users, and the company's publication files are currently created through a word processing package added to the system.

In addition to traditional print formats, Matthew Bender supplies legal information on floppy disks and through an on-line search and retrieval service — tasks that Musso said have also been simplified by the use of CS V.

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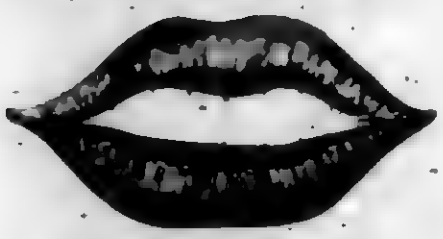

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Course Covers C Language

NAPERVILLE, Ill. — Deltak, Inc. has announced a multimedia training series said to provide an introduction to all aspects of the C programming language.

Called 7CT-C99 C Language Programming, the series is divided into 16 courses, each reportedly requiring between 1½ and two hours to complete. Upon completion of the entire series, a Deltak spokesman claimed, a student will know the language and its expressions, arrays, preprocessor, pointers and addresses, functions, storage classes, process library functions, I/O and structures and unions.

Courses are available for an average rental of $50 to $125/mo for each course, depending on volume. Purchase price is $1,750 per course. Deltak is at East/West Technological Center, 1751 W. Diehl Road, Naperville, Ill. 60566.

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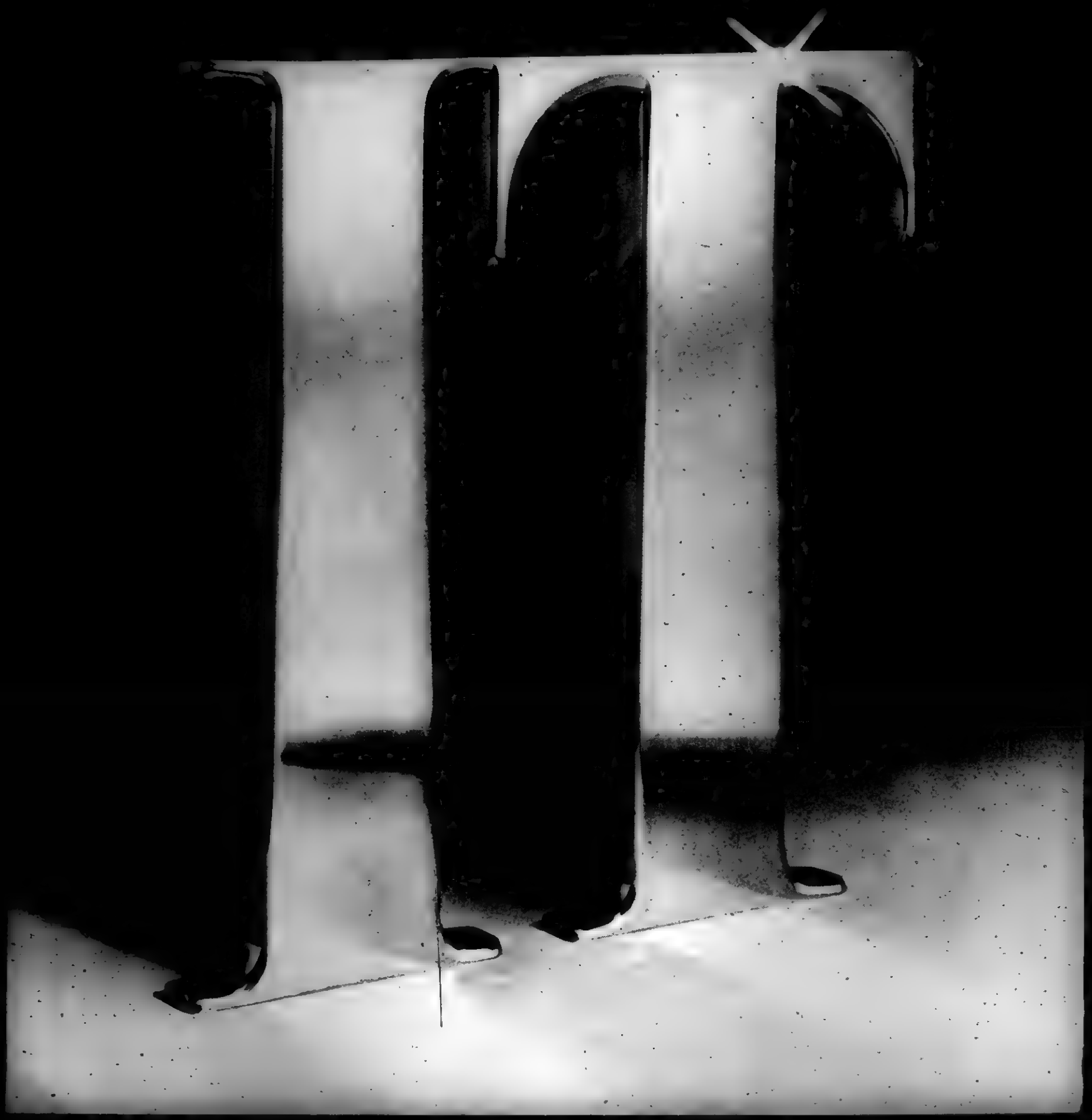

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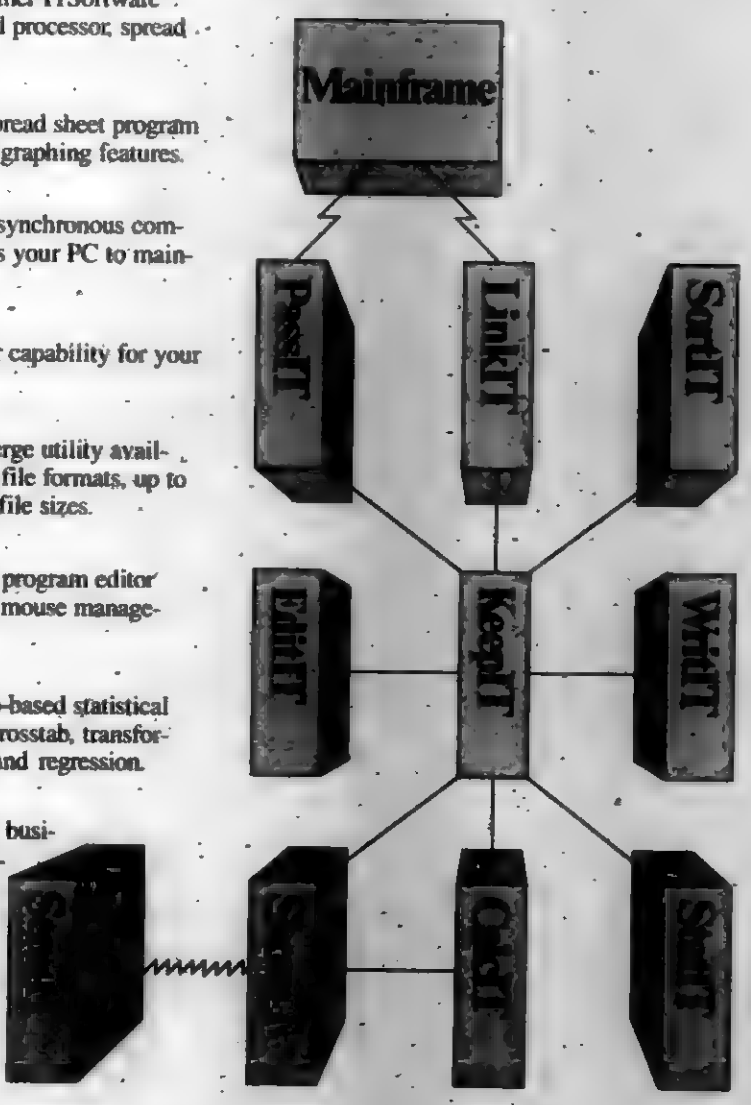

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Computer-Generated Output Gets New Look

Laser Printers Expand Direct-Mail House Service

DETROIT — High-speed laser printing technology has given a new and creative look to the computer-generated letters and mailing labels produced by a busy direct-mailing house here.

The firm of 3 P.M., Inc. is the Midwest's leading producer of computer-generated letters and standard 14- by 11-in. computer printouts. Starting in 1974, its Direct Marketing Division has focused its efforts on offering a broad spectrum of services, including output design and production. It is in this area that a high-speed, nonimpact laser printer has made such a difference.

The Detroit mailer utilizes Datagraphix, Inc. laser printers in lieu of traditional impact printers to achieve high-quality output. The flexibility of laser printers, combined with their fast throughput and increased cost-efficiency, has allowed the firm to expand the services offered to clients. In addition, customers can take advantage of the printer's creative design features to generate innovative, eye-catching material, producing increased consumer response rate.

The firm is primarily involved in the production of computer-generated letters and reports, all of which must be tailored to the needs of each individual customer. To be effective, these letters and reports must be read and acted upon by their intended audience. In the past, much of this material has been labeled junk mail and discarded by the recipient.

With believability as a major objective, in 1982 the firm decided to convert much of its output from impact printing to laser printing. The direct mailer felt that by relying solely on its impact printers for output, it was limiting its potential for attracting new customers as well as fully servicing its existing clientele.

After looking at products offered by firms such as Sperry Corp., Xerox Corp. (the 9700) and IBM (3800), it installed two Datagraphix Model 9820 laser printers later that year. This has allowed the firm to work closely with each customer to improve overall mailing success rates.

The major advantage of generating output on a laser printer is its ability to design report formats and letter layouts with the customer in mind. With a variety of typefaces, visual impact can be increased by combining two or more type styles on the same page.

Also, the ability to vary type size within a line, page or report enables the user to highlight different parts of the printed output. The result is a visually interesting piece, one which elicits a better response from recipients, thereby increasing the customer's return rate and potential profitability.

One recent trend in the field of direct mail that adds to the popularity of laser printing — and which has been vital to the success of 3 P.M.'s operation — is personalization of output. Peter Wahl, director of 3 P.M.'s Direct Marketing Division, outlined other advantages of the Model 9820.

"We were initially attracted to laser printing by its speed — four times as fast as our impact printers. This was of major importance to us, since we were trying to attract customers with jobs of eight million to nine million pieces," Wahl said. "Without high-speed printing capability, we could handle just a small percentage of this volume. The Datgraphix 9820 prints at speeds up to 21,000 line/min, so now we can handle jobs of almost unlimited size."

The 9820 machines also allow flexibility in the size of paper output. It allows 3 P.M. to print paper up to 16-in. wide and between 3½-in. and 14-in. long. "This is especially valuable when printing mailing labels," Wahl said.

Other Benefits

Another benefit is the 9820's capability to print from the very top of a page to the very bottom. "Other laser printers require a ½-in. margin at both ends of each page, and this not only wastes paper, but decreases the cost-efficiency of our printing," Wahl added.

The firm works extensively with automobile manufacturers, acting as a service bureau to produce dealer reports, inventory listings, price announcements and other printed materials. Many of these reports are mailed on a regular basis to locations around the country. By converting to laser printing, 3 P.M. was able to reduce the traditional 14- by 11-in. computer printout to 11- by 8½-in. simply by switching to a smaller font. Clients could then print the same amount of data at dramatic paper and mailing cost reductions with no loss of legibility, Wahl noted.

Since installing the Datagraphix printers, 3 P.M. has experienced a considerable increase in business volume. With so many new features to offer customers, the company has embarked on a major marketing effort of its own to attract customers and develop new applications for existing ones.

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To Focus on Electronic Payment

Nacha Meet Slated for March 18

NEW ORLEANS — Leading providers of electronic payment systems and services will detail future strategies for delivering electronic financial services during sessions at the National Automated Clearing House Association (Nacha) Conference, which is scheduled to take place March 18-21 at the Fairmont Hotel here.

The conference will include representatives from such electronic payment systems providers as NCR Corp.; IBM; J. C. Penney and Co., Inc.; General Electric Co.; Visa USA, Inc.; and Cirrus Systems, Inc.

The feature session of the conference will examine "the spectrum of the retail, finance and corporate worlds of electronic payments," Nacha said. The conference will also focus on the issue of managing and directing future electronic delivery systems, with special emphasis on strategic planning and marketing, according to the sponsor.

Session Speakers

Sessions will feature speakers such as David D. Fox, senior vice-president of the Greenwich Research Association, Inc., who will offer advice on developing market strategies for automated clearinghouse services. Fox is expected to unveil the findings of Greenwich Research's annual "corporate viewpoint" survey of electronic services of the Fortune 1,000 companies.

In addition, Roger E. Kline, principal of McKinsey and Co. of New York, will speak on "Successful Business Strategies Through Electronic Delivery Systems," in a session that will explore trends separating successful companies from unsuccessful ones.

John Farnsworth, senior vice-president of Chemical Bank of New York, and John Fisher, senior vice-president of Bancone Corp. of Columbus, Ohio, will chair a session on progress to date in the field of video home banking.

Other scheduled speakers include J. Robert Brubaker, Nacha president and senior vice-president of Equibank in Pittsburgh, Pa.; Ian Arnof, president and chief executive officer of the First National Bank of Commerce in New Orleans; and Douglas Pyne, managing director of Bankers' Automated Clearing Services Ltd. of Middlesex, England.

The registration fee for the 1984 Nacha conference is $495 for Nacha members and $625 for nonmembers.

More information about the conference can be obtained from Nacha, which is located at 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

Directory Lists Companies Serving DEC Users

BOSTON — Monosson Technology Enterprises has published "The Directory," which lists 535 companies with products and services for users of Digital Equipment Corp. computers.

Listings cover hardware, software, maintenance support, consulting and turnkey systems based on DEC products. Also listed are distributors, service bureaus and leasing companies.

The price of the directory is $25. More information is available from Monosson Technology Enterprises through P.O. Box 71, Kenmore Station, Boston, Mass. 02215.

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College Going With Mainframe for Student Users

TROY, N.Y. — Computing capacity at an engineering college here will double before the new year, allowing for an increase in the number of research, instructional and administrative applications.

Rensselaer Polytechnic Institute (RPI) will be installing a $2 million IBM 3081 Model Group D mainframe in its Voorhees Computer Center, replacing an IBM 3033 computer installed on the campus in 1978.

"The reason we're upgrading is because the growth, demand and use of computers primarily for academic; instructional and research use on campus has continued to grow," according to James Moss, the institute's director of computing services.

"While we're getting increasingly large numbers of other systems — microcomputers, minicomputers and other mainframe systems on campus, demand in all these areas is still growing," Moss said.

Heavy Use

According to Moss, nearly all of the 6,000 students on campus use computers.

"We typically run 150,000 time-sharing sessions a month. Right now, at this time of the academic semester we'll have 275 to 300 users simultaneously on the IBM 3033, and that's really as much as that system is able to handle," Moss said.

The installation will take place at the engineering college campus during the year-end break, and the computing center staff expects full operational status by Dec. 28.

The IBM 3081D consists of a dual-processor system with 16M bytes of memory, compared to the 3033's single processor with 12M bytes. The new computer has a cycle time of 26 nanoseconds, 40% faster than the 3033, and is capable of executing 11 million computer instructions per second, according to Moss.

"We actually considered eight different alternatives," Moss said. "The overall price/performance considerations, the state-of-the-art features and the upgradability were major considerations in the selection of the IBM computer."

According to the director of computing services, the 3081D will be able to accommodate more users, provide improved performance and support additional capabilities.

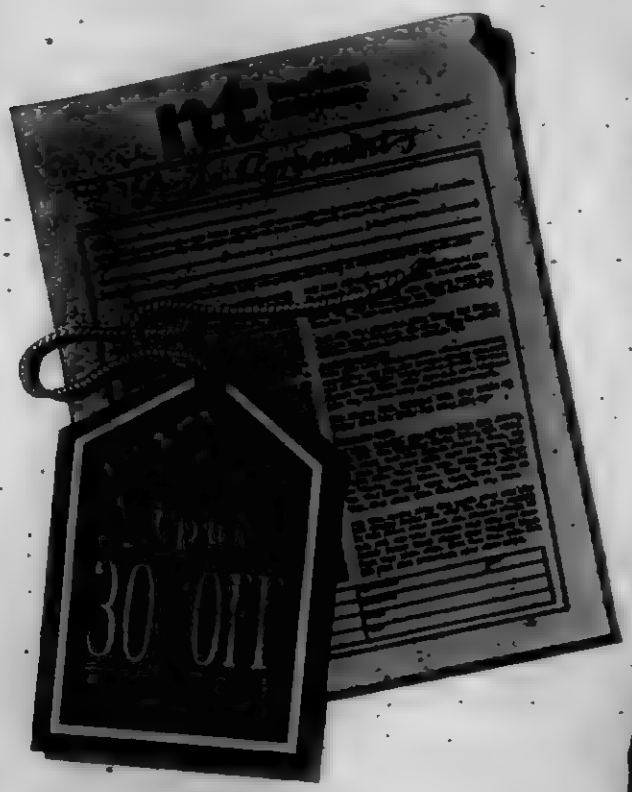
Michigan System

"We run a Michigan timesharing system, which is a non-vendor-supported operating system specifically for the university environment, originally written by the University of Michigan," Moss said. "We will be able to make some enhancements to that operating system because of the capabilities of the 3081D."

According to Moss, the price/performance ratio of the 3081D is "significantly better" than the system that is being replaced. "In simple terms, we're getting more than twice the capability for two-thirds the price that we paid for the 3033."

Moss sees the installation of the new computer system as part of a "continuous evolution" in the growth of the campus with modern technology.

"We've just completed wiring the campus with a voice-data switch. Each week we're bringing more data systems on the data capabilities through that switch, and at the same time we're making other developments on the campus network," Moss said.



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Symphony's Computer Hits Telethon High Notes

HOUSTON — At a recently held annual symphony fund-raiser radio marathon which ran continuously for 62 hours here, a computer system was used to help monitor sales of donated goods and services as well as to keep track of cash pledges made by thousands of radio listeners and supporters.

Throughout the event, commercial radio announcers and marathon officials at the Houston Symphony League's Seventh Annual Radio Marathon relied on the computer to learn what merchandise remained to be sold and how much money had been pledged.

When the computerized tabulation was done, the telethon had raised roughly $246,000 — about 25% more than last year — to benefit the orchestra.

Complicated Fund Raising

"Symphony societies all across North America use radio marathons to raise money, but the technique does have its complications," according to Sheron Drew, chairwoman of the Houston Radio Marathon.

"This year we received contributions of goods and services from more than 600 sponsors," Drew said. "Things got pretty hectic here as people rushed to call in with last-minute selections or to make outright pledges. We were pleased to have a way of quickly determining, during the live broadcast, precisely what was left to sell and how much money we'd raised. It would have been embarrassing to sell the same thing twice."

Donated by Honeywell, Inc., the DPS 6 computer system configuration included 768K bytes of main memory, 80M bytes of mass storage, eight CRT terminals and a 600 line/min printer.

Initial Training

Prior to the marathon, an initial crew of eight people was trained by a Honeywell representative on how to use the terminals.

Additional volunteers were trained on the spot as the marathon progressed and the crews changed shifts. Each day of the marathon, two technical staff people were on hand to answer specific computer operating questions as they arose.

Volunteers entered a name with every amount pledged into the computer, whether the call was for merchandise or for a cash contribution. Since the computer already was programmed with details on all donations, added information on items sold and funds pledged were available to volunteers upon request.

Sustained Excitement

"Computer control of this information not only helped sustain excitement during the marathon," Drew said, "but the Honeywell system also printed out names, addresses and invoices that enabled us to collect pledges and deliver certificates for purchased goods and services promptly after the event was over."

The league first became interested in using a computer system for its marathons when one of its representatives saw a demonstration of the Honeywell system in progress while in Canada the previous year. After contacting the computer company, an arrangement was secured for the use of the Honeywell DPS 6 system.

"Using a computer system is far better than going with a manual system," Drew said. "One of the greatest benefits was the accuracy of recordkeeping, something that was a problem with the manual method we relied on before."

According to Drew, the league would be very interested in utilizing the computer system for next year's marathon but would like to make some changes in the bookkeeping capacity and specificity of the program as it exists now.

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More Buzz

The ATL-008 is ANSI X3.64 terminal with VT-100 compatibility as well. It incorporates a full screen Terminal Configuration Manager (TCM) and combines with remarkable editing features, large RAM/ROM capacity for extended operations, and program download to provide maximum flexibility.

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AT&T's Move Toward DP, IBM's Micro Actions Seen Shaping Industry Future

By Robert Batt
CW West Coast Bureau

PALM SPRINGS, Calif. — The divestiture of AT&T and its move into the information processing arena, coupled with IBM's continued involvement in personal computers, will increase the rate of industry convergence and shift competitive advantage to established market leaders.

This was the message delivered to some 80 data processing professionals at a recent forum here by Greg Leveille, president of Micro-Edge, Inc., a Stamford, Conn.-based information and consulting services company.

Leveille, author of 30 books on high-technology products and markets, told his audience that the most volatile period of change in the computer industry is yet to come.

"In the Fortune 1,500 companies, user demand will become the most powerful driving force and the most successful vendors will be those most able to satisfy user demands. This has not been true to date," he remarked.

Users, he said, will increasingly desire cost-effective, multifunction microcomputer systems and network-level compatibility will become essential. Software leadership will also become a prerequisite for success, he added.

"Those who can manage increasingly complex configurations of equipment, bigger networks and larger data bases will be the firms that can give the best end-user service and most effectively leverage end-user power. The management of these trends will become a critical concern at the highest corporate levels," he predicted.

Leveille asserted that those vendors that can provide the greatest element of control to end users and can

(Continued on Page 54)

Productivity Tools Seen Coming Next Year

PALM SPRINGS, Calif. — Users will be offered many more productivity tools in 1984, according to a consultant who spoke at a recent forum here.

Among the offerings will be file management systems, data dictionary languages, spreadsheet planning facilities, interactive graphics, window management facilities, integrated communications and electronic documentation, Greg Leveille, president of Stamford, Conn.-based Micro-Edge, Inc., maintained.

Over the rest of this decade, he predicted, a host of product usage and development trends will emerge, including:

- A much higher ratio of terminals-to users.
- A much greater degree of resource sharing driven by the need for sharing network data base control.
- Much more user participation in software implementation and planning.
- A large increase in the use of multifunction workstations, sophisticated software and compound documentation processing.

"Firms that understand how to manage compound documentation in which a single document can contain data, voice, fax, graphics and image capabilities among other things, will be the firms that will be at the greatest competitive advantage," he concluded.

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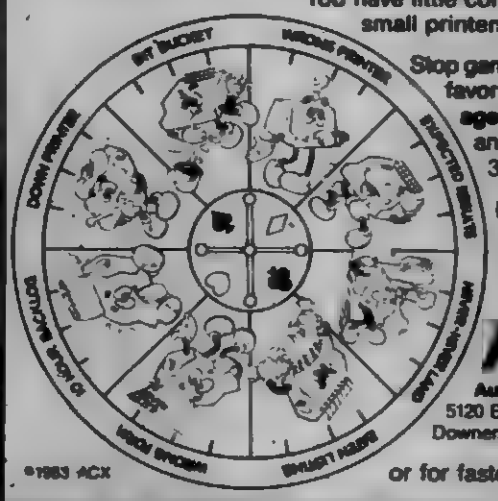

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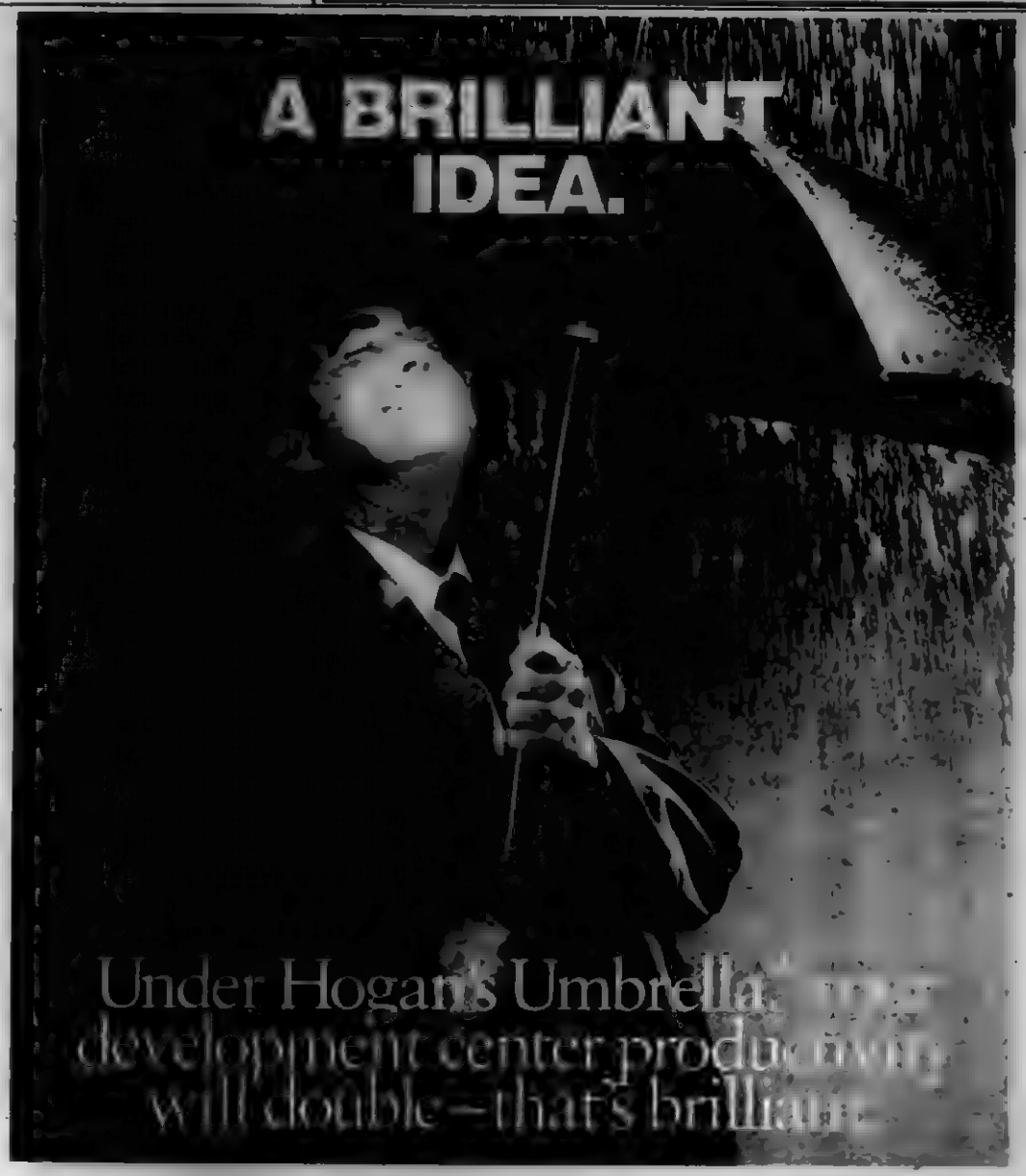

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Established Leaders to Gain Competitive Edge

(Continued from Page 53)
convert that control into successful results will emerge as market winners.

"There will be a convergence of product direction toward the final goal of integrated productivity tools," he said.

Leveille maintained that AT&T and IBM are adding a new tier to the computing industry structure by becoming their own independent software suppliers. "The applications delivery vehicle is changing dramatically. AT&T and IBM are changing the definition by which future users will compute and operate their business," he contended.

As an example of this trend, he cited recent enhancements to the Unix operating system by AT&T and the company's view that semiconductor manufacturers are potential value-added remarketers of Unix at the microprocessor level.

The consultant argued that as data processing enters the era of much closer working relationships between workstations and mainframes, software needs at the user level will become more sophisticated.

Vendors will need to accommodate extremely sophisticated data base management systems in the mainframe, new complex communications technology and long-range goals of management information systems planners in the top U.S. corporations, he stressed.

"We are moving into an era where it is perhaps feasible for an enterprise information system to be implemented on a corporatewide basis." In the past, Leveille commented, advances in technology such as IBM's Systems Network Architecture lacked the proper applications vehicle to make distributed data processing (DDP) a reality.

"They lacked the critical mass of personal computer workstations. Now IBM's Personal Computer has brought with it a sorely needed market leadership and stability that is helping to build this critical mass for large organizations. In 1984 the personal computer installed base will be large enough to facilitate large DDP environments," he claimed.

TI Book Out To Show Uses Of Micros

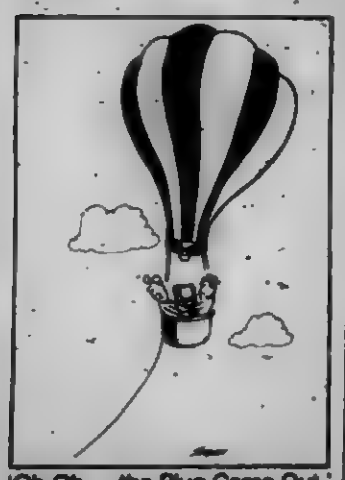
DALLAS — Texas Instruments, Inc. has published "Personal/Professional Computers — How Can They Help You?" written to help individuals evaluate the uses of a personal or professional computer.

The 256-page illustrated book shows the reader applications in the areas of financial planning, word processing, file and data management, accounting, project control, communications and graphics displays. The use of voice commands, coupled to a computer, in improving time management is also described, according to the vendor.

Some of the chapters in the book written by the staff of the computer science department at North Texas State University cover:

- Personal and professional computers in action.
- Hardware — the computer parts.
- Software — the computer programs.
- Business management and financial planning.
- Word processing.
- Information management.

The price of the book is $12.95. Further information is available from TI through P.O. Box 3640, MS 54, Dallas, Texas 75285.



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Bank Hones Keyboard Skills, Boosts Productivity

SAN FRANCISCO — Crocker National Bank here recently completed testing of a distributed data processing system planned for the bank which it hopes will increase the productivity of employees.

Crocker, the nation's 12th largest commercial bank, has experimented with the project at four regional centers in Northern and Southern California where keyboard-entry productivity increased an average of 41% and resulted in savings of nearly $1 million in reduced overhead, according to David Henley, a Crocker analyst.

In recognition of the fact that the cost of DP labor exceeds that of hardware, the bank assigned a task force to determine the ways to get the best results from its workers. Consisting of six of the bank's DP managers, the task force had three objectives: to identify areas in need of improvement, to see what was available on the market and to investigate if the proposed improvements were measurable.

The bank's task group found that of the many variables governing productivity, keyboard skills are among the most important. So a group of system operators at the four different Crocker sites underwent remedial training in keyboard skills.

"More banks are using data processing equipment now than a decade ago, but studies show that employee productivity has declined as much as 3% during the same period," commented Richard Littlehailes of Keyboard Productivity, Inc., the consulting firm that supervised Crocker's remedial training.

According to Littlehailes, one major reason for the decline is that few data systems operators ever receive a formal education in the fundamentals of "proper keyboarding."

"Most operators learned to key from typing classes they took in high school, but that kind of instruction is woefully inadequate," Littlehailes said. "Even in schools that offer computer courses, little attention is paid to teaching keyboard skills."

Testing of keyboard skills was limited to 60% of the operators who used document-proofing machines at centers in Los Angeles, San Francisco, El Segundo and Orange, Calif. The training lasted five days and consisted of nothing but remedial exercises at first. By the third day, participants were dividing their time between exercises and actual production work. On the fourth and fifth days, less time was devoted to exercises and review and more to production work.

"Not many keyboard operators understand the value of these basics," commented Steve Gledhill of Keyboard Productivity. "By using these skills, an operator can work for prolonged periods without becoming fatigued, blurry-eyed, sore in the back or emotionally stressed."

According to Henley, since the training sessions, Crocker has established an average throughput speed of 1,100 items per hour. Before training, the average throughput speeds of both veteran and novice operators combined at the four centers was slightly over 800 items per hour.

"We found that keyboard proficiency training significantly reduced the time it takes a newly hired proof operator to achieve our new production standard of 1,000 items per hour," Henley said. "It once took a new operator 9.8 months to reach the standard. Now it is reached in 3.6 months."

According to Henley, the bank saved $850 per day in salaries and overtime, or more than $220,000 per year per center.

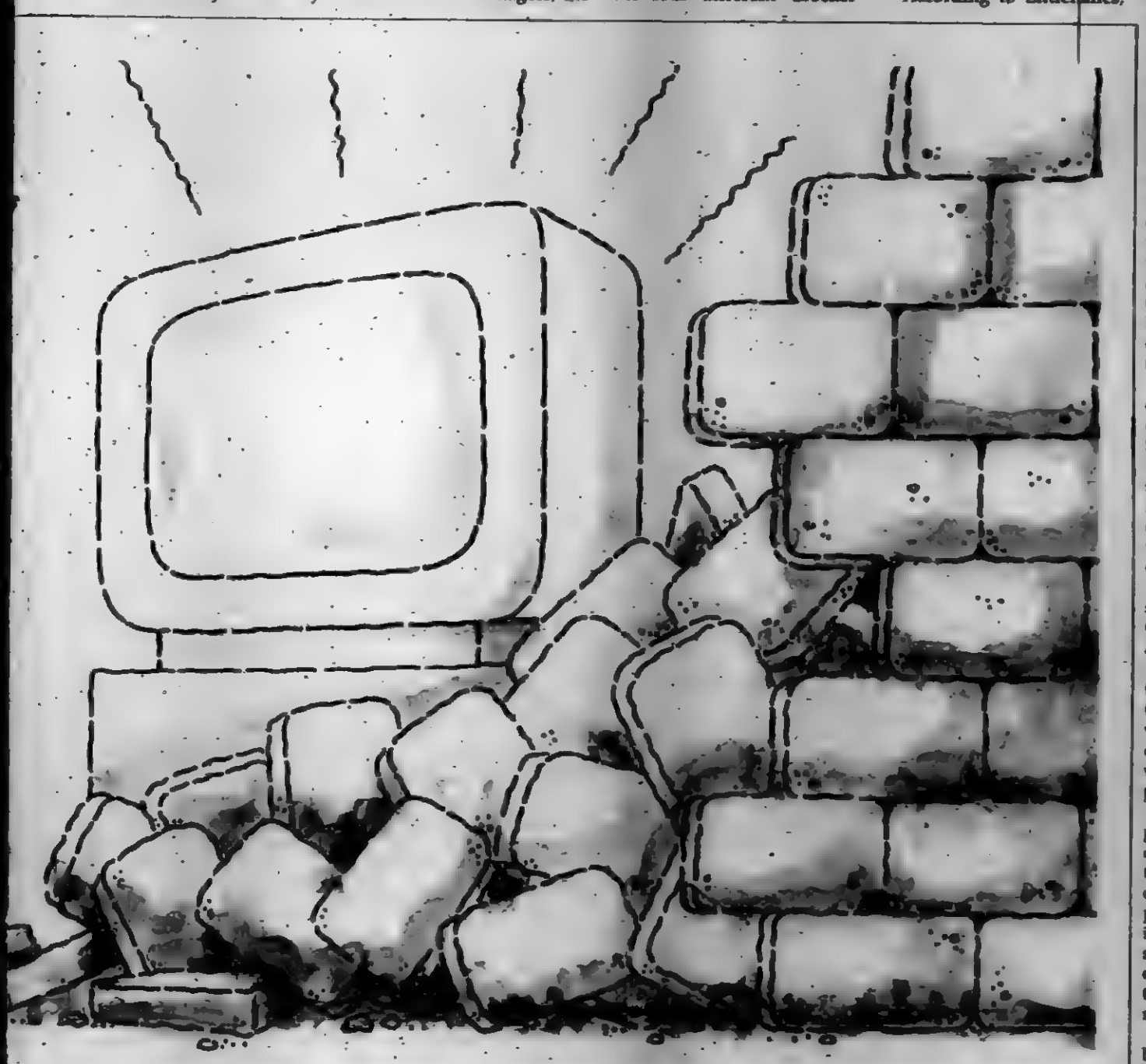

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Image Quality, Coordination Improves

Centralizing Microfilm Slashes Costs for State

EWING TOWNSHIP, N.J. — Until last March, record keepers in New Jersey stored vital statistics in a distributed fashion — they were kept in 17 warehouses scattered throughout the state. Thus, the business of microfilming the stored documents for use by various state agencies was a cumbersome and costly task.

In late 1981, an executive order directed the gathering of the state's microfilming activities under one roof. That order resulted in the construction of a centralized microfilming facility here and the purchase of approximately $250,000 of new micrographics equipment, nearly doubling the center's micrographics investment. Use of the new facilities and its planned expansion will save taxpayers an estimated $53 million over the next 10 years, the state has estimated.

Included in the center's equipment are 29 Eastman Kodak Corp. Recordak Reliant 750 microfilmers, 16 Recordak Micro-File machines, Model MRD-2, and two Recordak Micro-File machines, Model MRG-1. In addition, the center has two Kodak Prostar II processors and relies upon Kodak for much of its microfilm stock.

Vince Scardino, head of microfilming at the records center, explained that his group works as a service bureau for the state. "We don't retrieve images; we don't do any indexing. We just produce the microfilm for state agencies — in fact, every department in the state."

During its first year of operation, Scardino and William C. Wright, director of New Jersey's Division of Archives and Records Management, expect the records center to produce nearly 45 million microfilm images. This will be handled by a staff of 78, which is expected to grow to a full complement of 103 this year.

Prior to centralization, agencies were not unfamiliar with microfilm. But a big problem was the lack of understanding about how to employ microfilm equipment and personnel and a subsequent lack of productivity. "We'd often run into a situation where an agency might have three cameras but only two people to operate them," Scardino recalled. "People were used for everything but micrographics, so their time was misused."

'General Misunderstanding'

Another preconsolidation problem was a general misunderstanding of micrographics. "People in some of those agencies figured that if they just fed paper into one end of a machine, they'd get microfilm out the other end," Wright said. "They thought that was all there was to micrographics."

Poor image quality was another problem that plagued the agencies before microfilming was centralized. "Many agencies weren't even aware of state standards," Wright said. "So the agencies that did their own microfilming seldom had the equipment needed to analyze their microfilm to see if it met those standards, nor did they test microfilm and equipment sufficiently to have their machinery meet specifications."

With centralization of micrographics, all this is changing. All microfilm undergoes an image-by-image inspection to make sure that it meets state standards. Monthly tests are run on microfilm to monitor archival quality, and each morning sensitometry tests are conducted on the center's Houston-Fearless Corp. 76 processor and each of its Kodak Prostar II processors.

"The agencies did not run tests," Wright pointed out, "but if they had, it would have been terrifically expensive on an agency-by-agency basis."

Micrographics consolidation contributes to substantial savings in the cost of supplies as well, both in terms of chemicals and duplicate microfilms. Thanks to bulk purchases, Wright estimates that the cost factor for microfilm and chemicals this year has been slashed 30% overall.

All original microfilm is silver halide. But the vast majority of duplicating these days is done on diazo microfilm — something that simply did not occur prior to the center's opening. Duplicate microfilm, by tradition, had been processed on silver microfilm. "Diazo microfilm isn't quite archival quality, but you don't need that for working prints," Wright explained. "Diazo doesn't scratch or break — and where a 100-ft roll of silver duplicate microfilm costs $3.50, diazo is 68 cents for the same length."

By putting new equipment in the center, Scardino and Wright expect improved productivity. "Not only does new equipment not break down," Wright figured, "but our people know what it's for, how to operate it and what can be done with it."

Because all state purchases of microfilm equipment — including microimage terminals — must be approved by the center, a bevy of vendors "won't try to sell equipment to agency people that glows in the dark and is all mirrors, bedazzling somebody in an agency who really doesn't know about micrographics equipment," Wright observed.

Considerable Savings Expected

Judging from past experience, that should save the state considerable sums. Scardino recalled one operation in a state agency that had purchased $25,000 worth of microfilm equipment when all it needed was equipment worth $2,000. "The agency representative had been given a sales pitch, and he didn't know any better," Scardino said.

To avoid such misunderstandings, the center will sponsor educational seminars on micrographics, both for its own employees and for state agency, county and municipal representatives.

The belief is strong enough that every roll of 16mm microfilm that passes through a Reliant 750 microfilmer is "blipped," even though many of the client agencies do not yet have retrieval equipment sophisticated enough to take advantage of the "blip" or image mark feature. "We figure that within 10 years all microimage terminals used by the state will offer an automated search feature using image marks on the microfilm," Wright explained. "Therefore, we're producing all our microfilm that way now."

Wright stressed that the records center was designed to do one function — micrographics.

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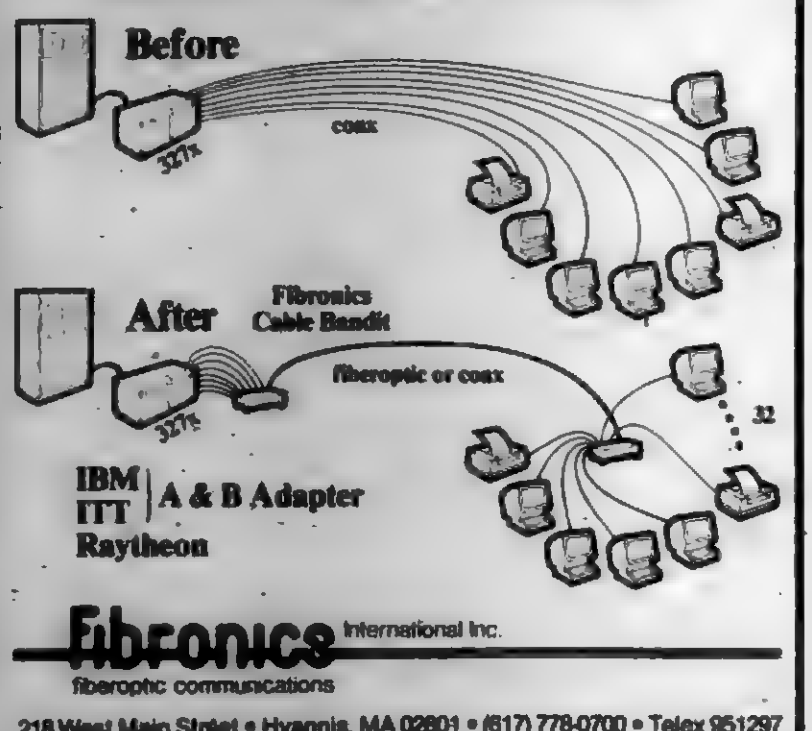

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Cimcom Conference, Exposition Slated for March

DEARBORN, Mich. — The Computer and Automated Systems Association of the Society of Manufacturing Engineers (Casa/SME) will sponsor the first Computer-Integrated Manufacturing and Communications (Cimcom) Conference and Exposition at the Washington, D.C., Convention Center March 13-15.

The conference and exposition will focus on software development and applications, beginning with manufacturing planning and continuing through the manufacturing control process. The evolution toward the paperless factory with an increasing emphasis on software will be the primary focus of Cimcom, according to Casa/SME executive director Tony Durham.

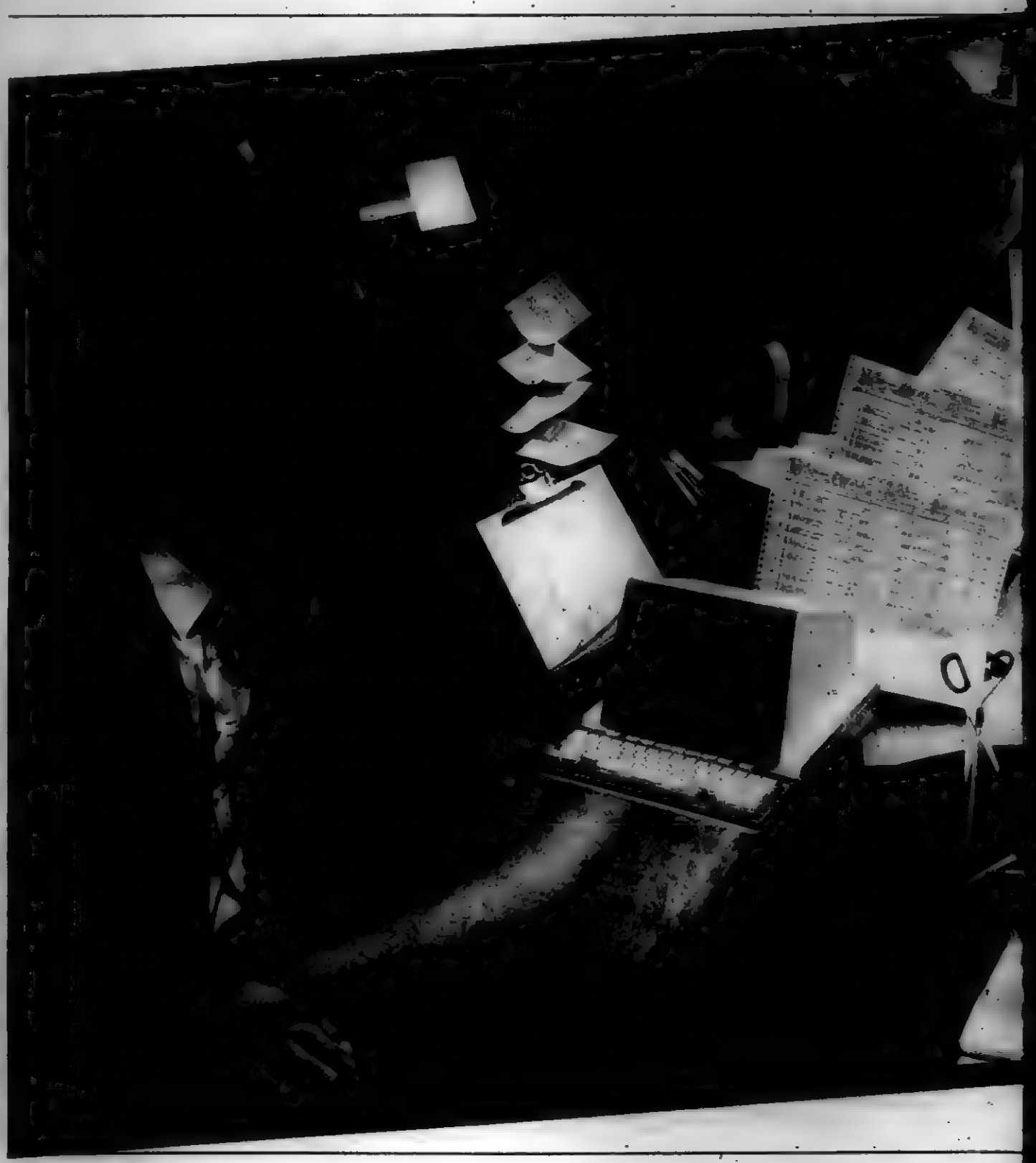
The conference will be comprised of a series of tutorials, including computer-aided engineering, state-of-the-art computer-integrated manufacturing, engineering/manufacturing data base, communications networking, information as a strategic resource, information systems engineering and government, planning, human resources and finance.

In addition, a symposium on computer-aided design (CAD) applications is scheduled for March 14, along with three multiday clinics on group technology, computer-aided process planning and practical applications of bar coding.

Exhibits will cover CAD/manufacturing, robotics, flexible manufacturing systems, automated materials handling, engineering analysis, automatic controls, programmable controls and inspection and quality assurance.

Registration for the tutorial portion of the conference is: for one day — $165 for members, $225 for nonmembers; two days — $295 for members, $355 for nonmembers; and three days — $395 for members, $455 for nonmembers. The symposium is $85. Fees for the clinics are: group technology — $435 for members, $490 for nonmembers; process planning — $315 for members, $375 for nonmembers; and bar coding — $295 for members, $355 for nonmembers.

More information is available from program director Sherry Willet, SME, 1 SME Drive, P.O. Box 930, Dearborn, Mich. 48121. Inquiries concerning exhibit space should be directed to Jim McLaughlin, SME Expositions Department, at the same address.



Video Classes From CA Out For IBM

JERICHO, N.Y. — Computer Associates International, Inc. (CA) has announced three video training courses for its CA-Dynam file management family for IBM DOS/VS(E) users.

The courses, aimed at specific CA products, are:

- The CA-Dynam/D training kit, which was designed to instruct users on such issues as the full audit trail and automatic catalog recovery, dynamic disk space management, automatic secondary allocation, security and control and comprehensive reporting on file usage.
- The CA-Dynam/T course, which includes instruction on automatic volume recognition and early device release, full audit trail and automatic catalog recovery, comprehensive reporting of all tape activity, vault location control and CICS interface, retention by cycle and date and period-end date.
- The CA-Dynam/FI modules, which are said to explain product features such as full audit trail and automatic catalog recovery, file independence, optimized block sizes, dynamic buffering, audit trail and audit report generator, Vsam file independence, unit record simulation and dynamic file sorting.

Prices for the courses are: $900 for CA-Dynam/D and CA-Dynam/T and $432 for CA-Dynam/FI. Further information is available from CA at 70 Jericho Tnpk., Jericho, N.Y. 11753.

Helps Link Rail Fleet

Railway DBMS Inquiry Aid Keeps Data on Track

TOPEKA, Kan. — The information systems department at a railway firm here has found that an inquiry tool for IBM's IMS data base management system (DBMS) can benefit data base administration as well.

Santa Fe Railway maintains a fleet of 70,000 rail cars and trailers and over 2,000 locomotives and operates 300 trains on an average day. Communication systems include an extensive intercity dial telephone, microwave network linking most stations on the railroad and a systemwide data and telegraph network controlled by a central computerized switching system here. The computer center includes one IBM 3081, two 3033s and one 4331; one Amdahl Corp. V8; and six Sperry Corp. 1182 multiprocessors.

The information systems department implemented IBM's IMS software in 1975 and formed a data base administration group shortly after, according to Duane Henson, a DP staffer. The staff consists of a data base administrator, a logical data base coordinator, a physical data base coordinator, a data communications coordinator and a data dictionary coordinator plus 13 data base technicians/systems analysts.

Santa Fe Railway is now in the early implementation phases of a three- to five-year project called the "Plus" system, which includes a major rewrite of most of its computer applications using IMS as the primary DBMS.

"Taking a look at our IMS system performance for July 1983, I found 97.7% uptime for our 24-hour-a-day, seven-day-a-week operation," Henson said. "An average of 50,000 transactions were performed per day with peaks to 64,000 and an average of 60 [batch message processes] started daily. Average data base calls per day ran around 10,000, and average response time was 2.1 seconds."

To allow users to retrieve information from the IMS data base, the company installed ASI International's ASI/Inquiry in June 1979. "Not only has ASI/Inquiry proven to be a 'user-friendly' product, it has also proven to be a '[data base administration]-friendly' product because of built-in controls which prevent abuse," Henson said. The company now has over 80 data bases defined to ASI/Inquiry, with access from over 480 termi-

Henson said on-line ASI/Inquiry transactions average 21,000 per day. ASI/Inquiry batch-message processes average seven per day. Total data base calls for ASI/Inquiry were approximately 70% of total calls per day.

Application programming personnel code dictionary definitions and update ASI/Inquiry's dictionary data base under Consumer Systems Services Group, Inc.'s Test IMS. Data base administration personnel execute the dictionary and security processes to update production data bases.

"Our inventory management department makes extensive use of ASI/Inquiry's auxiliary data base concept which provides dynamic logical relationships between two or more independent data bases," Henson said. "Several of the data bases allow previously existing batch programs to update off-line as Isam using the Isam/Vsam interface."

Another application area builds multiple indexes in one data base, which ASI/Inquiry uses to access waybill data via various keys. The department has also implemented segment exit subroutines to convert dates stored in various formats to a calendar date for display, Henson said.

Tuning efforts have included implementation of dynamic Binary Load/Dump for MVS and the installation of a solid-state drum in which the program load library is placed for high-volume transactions, including ASI/Inquiry.

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Calendar

Week of Dec. 11

Dec. 15-16, New York — **Shell Programming on the Unix.** Contact: Structured Methods, Inc., 7 W. 18th St., New York, N.Y. 10011.

Dec. 15-16, Washington, D.C. — **The Fourth-Generation System and Language.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 15-16, Houston — **Developing Business DP Systems.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 15-17, Houston — **The Fourth International Conference on Information Systems.** Contact: Professor H. Albert Napier, Management Department, University of Houston, Houston, Texas 77004.

Week of Dec. 18

Dec. 19, Chicago — **Structured Systems Development.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Dec. 19, New York — **Word Processing with Multimate.** Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 7th Ave., New York, N.Y. 10123.

Dec. 19-20, Chicago — **IBM's Systems Network Architecture: A Master Plan for Teleprocessing.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Dec. 19-21, San Francisco — **DOS/VSE Performance and Tuning.** Contact: Ken Carozza, Goal Systems International, Inc., 5455 N. High St., Columbus, Ohio 43214.

Dec 19-21, San Jose, Calif. — **Local-Area Networks.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Dec. 19-22, Los Angeles — **Vsam: Its Structure and How to Use It.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Dec. 19-22, Fort Lee, N.J. — **Vtam: From Start to Finish.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Dec. 19-23, Denver — **IBM 370 Assembler Language-Coding Workshop.** Contact: Steve Comstock, Steve H. Comstock, Inc., 256 A S. Monaco Pkwy., Denver, Colo. 80224.

Dec. 19-23, Orlando, Fla. — **Vsam Programming.** Contact: Harris Education Center, 6220 S. Orange Blossom Trail, Orlando, Fla. 32809.

Dec. 19-23, New York — **CICS Command-Level Programming.** Contact: Sys-Ed, One Park Ave., New York, N.Y. 10016.

Dec. 19-23, Chicago — **Structured Program Design/Structured Maintenance.** Contact: Georganna Carson, Ken Orr and Associates, Inc., 1725 Gage Blvd., Topeka, Kan. 66604.

Dec. 20, New York — **Advanced Lotus 1-2-3.** Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 7th Ave., New York, N.Y. 10123.

Dec. 22, San Francisco — **Shared Dasd Tuning.** Contact: Ken Carozza, Goal Systems International, Inc., 5455 N. High St., Columbus, Ohio 43214.

Week of Dec. 31

Jan. 3-6, New York — **Vsam: Its Structure and How to Use It.** Contact: Dianne Halper, On-Line

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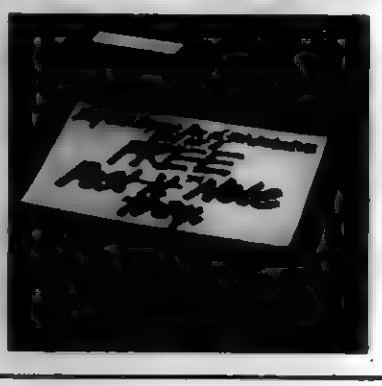

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Calendar

Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024. Also being held Jan. 3-6 in Los Angeles and Fort Lee, N.J.

Jan. 3-6, San Francisco — **CICS/VS Application Design.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Jan. 3-6, Boston — **CICS/VS Logic and Debugging.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024. Also being held Jan. 9-12 in San Francisco and Atlanta.

Jan. 4, New York — **Introduction to the IBM Personal Computer.** Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 7th Ave., New York, N.Y. 10123.

Jan. 4-6, Arlington, Texas — **Project Management and Control.** Contact: Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181, Wellesley, Mass. 02181. Also being held Jan. 10-12 in Boston.

Jan. 4-6, Orlando, Fla. — **Unix.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705. Also being held Jan. 23-25 in Minneapolis.

Jan. 4-6, Boston — **Networking Personal Computers.** Contact: Data-Tech Institute, 386 Franklin Ave., P.O. Box 569, Nutley, N.J. 07110. Also being held Jan. 11-13 in New York, Jan. 18-20 in Cincinnati and Jan. 25-27 in New Brunswick, N.J.

Jan. 4-6, Cherry Hill, N.J. — **Local-Area Networks.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705. Also being held Jan. 11-13 in Los Angeles, Jan. 18-20 in Indianapolis and Jan. 25-27 in Boston.

Jan. 4-6, Boston — **Communications Networking: Protocols, Standards and Techniques.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held Jan. 9-11 in Detroit, Jan. 17-19 in Minneapolis and Jan. 25-27 in Houston.

Jan. 5, New York — **Advanced Dbase II.** Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 7th Ave., New York, N.Y. 10123.

Jan. 6, New York — **Word Processing With Wordstar.** Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 7th Ave., New York, N.Y. 10123.

Jan. 7, New York — **Executive Briefing.** Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 7th Ave., New York, N.Y. 10123.

Week of Jan. 8

Jan. 8-11, Honolulu — **Pacific Telecommunications Conference '84 (PTC).** Contact: PTC '84, Suite 303, 1110 University Ave., Honolulu, Hawaii 96826.

Jan. 8-11, Fort Lauderdale, Fla. — **Cost-Effective Recognology in the Information Age.** Contact: Recognition Technologies Users Association, P.O. Box 2016, Manchester Center, Vt. 05255.

Jan. 9, New York — **CICS/VS Application Programming.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024. Also being held Jan. 11, 13, 16 and 18 in New York.

Jan. 9-10, New Orleans — **Using Small Computer Systems in Government.** Contact: United States Professional Development Institute, Using Small Computer Systems in Government, Department AB, 1805 Powder Mill Road, Silver Spring, Md. 20903. Also being held Jan. 23-26 in Atlanta.

Jan. 9-11, Washington, D.C. — **Managing Applications Development in the Federal Government.** Contact: United States Professional Development Institute, Managing Applications Development, Department A, 1805 Powder Mill Road, Silver Spring, Md. 20903.

Jan. 9-13, Orlando, Fla. — **Vsam Programming.** Contact: Harris Education Center, 6220 S. Orange Blossom Trail, Orlando, Fla. 32809.

Jan. 9-13, Boston — **Systems Analysis Workshop.** Contact: Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181, Wellesley, Mass. 02181.

Jan. 9-13, Dallas — **CICS/VS Application Programming.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024. Also being held Jan. 9-13 in Los Angeles and Fort Lee, N.J.

Jan. 9-13, Fort Lee, N.J. — **CICS/VS Internals.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024. Also being held Jan. 9-13 in Boston.

Jan. 9-13, San Diego — **Teach Your Computer Who's Boss.** Contact: Alexandra Communications, 661 Massachusetts Ave., Arlington, Mass. 02174.

Jan. 10, New York — **CICS/VS Application Design.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024. Also being held Jan. 12, 17 and 19 in New York.

Jan. 10, New York — **Introduction**

(Continued on Page 62)

Calendar

(Continued from Page 61)

to the IBM Personal Computer. Contact: Center for Advanced Data Processing, Suite 402, 450 7th Ave., New York, N.Y. 10123.

Jan. 10-11, New York — **Telecommunications.** Contact: Dataquest, Inc., 1290 Ridder Park Drive, San Jose, Calif. 95131.

Jan. 10-12, Houston — **Mainframe Seismic and Remote Sensing Applications of Optical Storage.** Contact: Technology Opportunity Conference, P.O. Box 14817, San Francisco, Calif. 94114.

Jan. 10-13, San Diego — **Hands-On Unix Workshop.** Contact: Ruth Dordic, Integrated Computer Systems, 6395 Arizona Place, Los Angeles, Calif. 90045. Also being held Jan. 31-Feb. 3 in Washington, D.C.

Jan. 11, New York — **Spreadsheets Using Lotus 1-2-3.** Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 7th Ave., New York, N.Y. 10123.

Jan. 11-12, Boston — **Writing With Power for DP Professionals.** Contact: Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181 Wellesley, Mass. 02181.

Jan. 11-13, Philadelphia — **Data Analysis.** Contact: Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181, Wellesley, Mass. 02181.

Jan. 11-13, Dallas — **Data Communications I-Basic Concepts.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

Jan. 11-13, Teaneck, N.J. — **Advanced Data Communications.** Contact: Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181, Wellesley, Mass. 02181.

Jan. 11-13, Seattle — **Data Security and Control.** Contact: Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181, Wellesley, Mass. 02181.

Jan. 12, New York — **Introduction to Dbase II.** Contact: Center for Advanced Data Processing, Inc., Suite 402, New York, N.Y. 10123.

Jan. 12-13, Orlando, Fla. — **IDMS Transaction Design.** Contact: Harris Education Center 6220 S. Orange Blossom Trail, Orlando, Fla. 32809.

Jan. 13, New York — **Word Processing with Multimate.** Contact: Center for Advanced Data Processing, Inc., Suite 402, 450 7th Ave., New York, N.Y. 10123.

Week of Jan. 15

Jan. 15-18, Fort Lauderdale, Fla. — **Integrating the Digital Office.** Contact: Interim Seminar Committee, One State Farm Plaza, Bloomington, Ill. 61701.

Jan. 16-17, Orlando, Fla. — **CICS Transaction Design.** Contact: Harris Education Center, 6220 S. Orange Blossom Trail, Orlando, Fla. 32809.

Jan. 16-17, Washington, D.C. — **The Super Micros: The New 32-Bit Microprocessors.** Contact: Continuing Education, George Washington University, Washington, D.C. 20052.

Jan. 16-17, Fort Lee, N.J. — **CICS/VS Peformance and Tuning.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Jan. 16-18, Philadelphia — **Cost-Benefit Analysis.** Contact: Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181, Wellesley, Mass. 02181.

Jan. 16-19, Boston — **Vtam: From Start to Finish.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Jan. 16-19, Boston — **Structured Programming.** Contact: Q.E.D. Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181, Wellesley, Mass. 02181.

Jan. 16-20, Dallas — **CICS/VS Application Programming: Macro Level.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Jan. 16-20, Los Angeles — **CICS/VS Application Programming: Command Level.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Jan. 16-20, Orlando, Fla. — **IDMS-DC Programming.** Contact: Harris Education Center, 6220 S. Orange Blossom Trail, Orlando, Fla. 32809.

Jan. 17-20, San Diego — **Programming in C: A Hands-On Workshop.** Contact: Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405.

Jan. 17-20, Anaheim, Calif. — **Microprocessor Software, Hardware and Interfacing: A Hands-On Workshop.** Contact: Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405.

Jan. 18-19, Fort Lee, N.J. — **Recovery/Restart.** Contact: Dianne Halper, On-Line Software International, Fort Lee Executive Park, Two Executive Drive, Fort Lee, N.J. 07024.

Jan. 18-20, Arlington, Texas — **Leadership: Managing and Influencing People.** Contact: Q.E.D Information Sciences, Inc., Q.E.D. Plaza, P.O. Box 181, Wellesley, Mass. 02181.

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AST Research
BOS National Inc.
BPI Systems Inc.
Benchmark
Robert J. Brady Company
Brown Disc Manufacturing
Business Computing
CDI
Celestial Software Inc.
Cermetek Microelectronics
Compaq Computer
Compuline Corporation
Computer Intelligence
Computer Roomers
ComputerKnowledge Corp.
Computerworld
Computex Corporation
Corona Data Systems
Contemporary ComputerWear
CPU Corporation
Creative Computer Products
Data Business Vision
Data Storage Solutions
Data Translation Inc.
Datacopy Corp.
Datamac
Decision Data Computer Corporation
Digital Communications Associates
Discortex Corp.
Distributed Logic Corp.
Emulex Corporation
ENVAX Systems Inc.
ESC Technologies, Inc.
Everex Systems Inc.
Ferox Microsystems Inc.
Hayden Book Co. Inc.
Hewlett-Packard Company
Human Edge Software Corp.
I.B. Magazette
Independent Computer Consultants Associates
Information Builders
Information Communication Corporation
InfoWorld
Intelligent Modems
Interface Inc.
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MICRO MARKETWORLD
Micro-Design Inc.
Microtek Lab
National Instruments
NEC
Novation
Novell
Omega Software
Omni Graphics
On Trak Data Systems
OSM Computer Corp.
Palantir Software
Panamax Line Conditioning
PC WORLD
Pencept
Performance Management Inc.
Personal CAD Systems
Personal Computer Age
Phaze Information Machines
Printronix
Que Corporation
Racal-Vadic
Roland DG
RTCS/Real Time Computer Science Corp.
Santa Clara Systems
Software Automation
Software Centers International
Software Solutions
Sorbus Service Division MAI
Sperry Corp.
Summagraphics Corporation
SWI International Systems
SYSPRINT, Inc.
Systems Management Associates
Tall Grass Technology
TCS Software
Televideo Systems Inc.
3 Com Corporation
3M Data Recording Products
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United Networking Systems Inc.
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Plus, we'll present personal computer experts from around the nation in an up-to-the-minute conference program. You'll learn how to choose and how to use the technology and equipment surrounding the PC family of microcomputers. Here's a complete listing of all conference sessions:

Wednesday, February 1, 1984
User Sessions:

The Benefits of the IBM PC for Small Businesses
Financing Options and Tax Advantages
Add-Ons and Peripherals: What's Out There?
Software: What's Available and How to Find It
What Do the Compatibles Have To Offer?
Case History: How I Became Compatible With My PC
Medical/Dental Applications for the PC

After Installing Two New Systems

Insurer Consolidates Policy, Claims Processing

BURBANK, Calif. — Getting the most action out of the least activity is the goal of most companies; however, it becomes particularly important to insurance firms whose reputations are often based on how quickly they respond to their customers' needs.

That is why Fairmont Insurance Co. here, specializing in writing workers' compensation insurance for businesses in California and serving more than 22,000 policyholders, decided to automate its policy and claims management systems. The firm grouped its departments into a single policy processing system, allowing it to create and update multiple records with a single entry wherever possible.

To orchestrate this system, the firm selected a Wang Laboratories, Inc. computer, a system on which "the word processing and data processing functions seemed to be most compatible," according to Wing Kwong, Fairmont's manager of data processing.

Fairmont's initial configuration in April of 1980 consisted of a single Wang VS80 computer with three workstations and one daisywheel printer. However, when the company moved to a new building in 1982, it added a second system, a VS100. The VS80 has 384K bytes of main memory, and the larger system has 1,024K bytes of memory.

Both processors support one 90M-byte and four 288M-byte disk drives, one tape drive, 28 workstations and nine printers. A VS80 system and four workstations with two printers are also located in Fairmont's division office in San Mateo, Calif. The company has also added one serial and two disk switching devices.

According to Joseph G. Havlick, president and board chairman at Fairmont, the word processing and data processing functions are "part of the hub of the wheel" at the company, where 19 departments rely on data processing to manage and retrieve information.

The key concept in automating policy management, according to Kwong, "was to develop a master file. Once we had that, we were able to capture data effectively." A simple name-and-address listing at first, the master file now contains policy, billing and claims information as well.

'One-Time Data Entry'

"Policy processing automatically generates entries for several files," said Michael J. Havlick, assistant manager of data processing. Besides the policyholder master file record, the software generates a record for the premium file. It produces a record of the application number, the date it was processed, the policy issued and the policy number. It also creates an entry for the policy index and a cash record for the agent's statement.

"What we're aiming for at Fairmont," Kwong explained, "is a one-step approach — one-time data entry."

Not only has repetitive data entry reportedly been eliminated, but data in interrelated files is also consistent and easily retrievable. Fairmont's cumulative policy index, for example, allows staff to answer policyholders' questions on the telephone.

The master file is also the source of billing information. Where policies require automatic billing, the master file indicates invoice amounts and intervals.

For policyholders who are billed on a payroll basis, another program generates periodic requests for payroll data, of which Fairmont sends out some 7,000 a month. Until this software was developed, according to Kwong, staff members would type three payroll requests in one pass.

If there was no answer to the first request, they had to search for and mail a second or third form.

Merged Into Master File

Claims processing software also draws on the master file. "We do that in batch mode, because we don't want to tie up a workstation while an operator tries to confirm some information," Kwong said. When all entries have been verified, a program generates the checks and merges the information into the master file.

Using the system has substantially cut the firm's overhead, according to Joseph Havlick. "We're doing with seven or eight people what would have taken 70 with manual procedures. And it's given us some competitive tools, such as the ability to mail out a computer-generated loss experience report within minutes of an agent's request. Basically, we are selling service and performance."

Joseph Havlick expects that future productivity increases will be realized as more programs using integrated data processing and word processing functions come on-line.

"We intend to be as automated as we can, both in word processing and in EDP," Joseph Havlick said. "By fully utilizing our data processing and word processing capabilities, we are creating very effective sales tools, not only for ourselves but also for our agents in the field."

The PC in the Law Office
PC's and Real Estate
Manufacturing Resource Planning with the PC
Investment Software for the PC
CPA Software: The Bottom Line
Software for Insurance Applications
Distributed Control Software for the PC

Thursday, February 2, 1984
Dealer Sessions:

Starting Your Own Retail Store
Franchise vs. Independent Operations
Retailers: Is Your Mix Mixed Up?
Save the Sale: Sell a Compatible
Promotions that Produce
Handling Your PC Customers: Sales, Support, and Service

User Sessions:

The Anatomy of the IBM PC
Defining Levels of Compatibility Between Systems
Overview of Compatibles: Desktops and Portables
Word Processing Software
Database Management Software
Business Graphics Software
Analyzing Your Software Requirements
Overview of Major Business Applications Software
A Look at Integrated Software: What's Out There?

Friday, February 3, 1984
Dealer Sessions:

Distribution Channels for the PC and Compatibles
Improving Retailer/Vendor Relationships
Problems and Pitfalls of Corporate Account Sales
Profits in the PC Aftermarket
Future Directions in Operating Systems
Survival Strategies for the IBM PC Marketplace

User Sessions:

Introduction to PC Communications
Micro to Micro Communications
Micro to Mainframe Communications
Word Processing Software (Repeat)
Database Management Software (Repeat)
Business Graphics Software (Repeat)

User Sessions: The PC in the Corporate Environment

Review of Policy and Planning Issues
Implementation Strategies
Use of PC to Mainframe Communications (Includes Security Issues)
Local Networking for the PC

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Three-day admission to all exhibits and conference sessions is $30.00. Admission to the exhibits only for three days is $10.00. Show hours run from [illegible] Wednesday and Thursday, February 1 and 2, and from 10:00 AM to 3:30 PM on Friday, February 3. Conference sessions run from 8:30 - 10:30 AM and 2:30 - 5:30 PM on all three days.
For attendee and conference information, call CW Communications at 1-800-225-4698
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EDITORIAL

Time for a Consensus

Much remains to be learned about the circumstances surrounding the seizure of sophisticated U.S.-manufactured computer equipment in Western Europe in recent weeks. The only clear conclusion that can be drawn at this point is that there is a strong need for U.S. government and industry cooperation on the security of technology.

"It reads like a Robert Ludlum novel," a spokesman for Digital Equipment Corp. told a *Computerworld* reporter following reports that components of his company's top-of-the-line VAX-11/782 superminicomputer had been intercepted first in West Germany [CW, Nov. 21] and a week later in Sweden [CW, Nov. 28] apparently en route to the Soviet Union. The equipment is banned from export to communist countries by order of the U.S. Commerce Department, which has determined the equipment could have military applications.

Intrigue is certainly a key component of the case: Obtained by an as yet unnamed New York company, the equipment was shipped aboard a Swedish vessel purportedly to a South African destination, but was apparently diverted to follow an itinerary that would have taken it through the ports of Hamburg, West Germany, to Helsingborg, Sweden, where it reportedly was to be shipped overland to a cold port where it would allegedly have been transferred right into the Soviet Union.

A colorful villain is another component: On-the-lam businessman Richard Mueller is reportedly the central character in the case. He was twice named by the U.S. government in illegal exports cases in the 1970s, banned from U.S. export in connection with the first case and a fugitive from a federal indictment in the second; reportedly in control of companies in South Africa and West Germany that played a role in the pass-through chain of export; named by UK newspapers as a KGB agent; and the owner of a $2 million vineyard in South Africa.

Those are the known items in this case, but the unknown facts that may have contributed to the almost successful heist are impenetrably lodged, not so surprisingly, in the midst of government bureaucracy.

With Mueller apparently playing a not so obscure role in the scam, a question that naturally comes to mind is why an export license was granted by the Commerce Department for the original shipment. But don't ask the Commerce Department because, one, the exporting company's identity is said to be confidential, and, two, information on the Mueller connection is protected by the all-encompassing claim that the entire matter is under investigation. Someone in the vast array of U.S. "intelligence" forces must have been keeping tabs on where Mueller was and what he was up to; any company with any connection to Mueller should have been named in some type of "red flag" list for administrators of export licenses.

The whole escapade has unraveled during a time when a little-publicized bitter battle has been waged over renewal of export regulations contained in the now-expired Export Administration Act. With the U.S. House of Representatives passing a relaxed bill that meets some of the concerns of some computer dealers and the U.S. Senate still unable to take action on a stricter version that would place more restrictions on imports, export regulation is currently being conducted under emergency powers invoked by President Reagan.

Clearly the VAX case has demonstrated that the Soviet Union is intent on obtaining embargoed technology. Perhaps it is time for U.S. government and industry to develop a consensus on what technology truly deserves embargo protection, how best to protect sanctioned secrets and how to coordinate effectively that protection.

'And in Other News . . .'

LETTERS

Further Explanation

Reaction to my In Depth article "Locking Up the Mainframe," [CW, Oct. 10, Oct. 17] has been gratifying. Numerous requests for reprints and additional information have been received from both within the U.S. and abroad. The office of Sen. William Cohen (R-Maine) has advised me that the article has been entered into the official record of the recent Senate hearings into computer and telecommunications security conducted by the Subcommittee on Oversight of Government Management, Committee on Governmental Affairs.

There is one point in the article that deserves additional explanation. My discussion of the history of computer security and the penetration exercises directed against the Honeywell, Inc. Multics operating system did not clearly state that the exercises were conducted in the early '70s against the early Honeywell 645 system and, thus, reflects unfairly upon the current Multics implementation.

Multics has since gone through several generations of enhancement to the extent that the current Multics operating system, implemented on the Honeywell Level 68/DPS or DPS 8/M computers, is considered to have one of the better security architectures. Multics has been accredited to run in a two-level classified time-sharing mode at selected U.S. Department of Defense (DOD) installations and is currently undergoing evaluation by the DOD Computer Security Center, where it is considered to be a candidate for the second highest level (B2: Mandatory Protection) of system security categorization.

For information on the DOD's "Trusted Computer System Evaluation Criteria," its "Evaluated Products List" or "Product Evaluation Bulletins," readers should write to DOD Computer Security Center, 9800 Savage Road, Fort George G. Meade, Md. 20755.

Robert P. Campbell
President
Advanced Information Management, Inc.
Woodbridge, Va.

Management Issue

Computer security is not a technical problem; it is a management issue.

Technical personnel and computer manufacturers tend to dismiss computer security as a faintly humorous subject that can be deferred until "next year when we'll have more time or money to deal with it." Evidently, the senior managers who depend on them for technical guidance will have to learn the hard way, one by one, about high-tech asset protection.

Computer security is not a ritual performed every two years or so by high-priced gurus from out of town. It is a serious management responsibility that must be addressed every day in a businesslike way.

Robert V. Jacobson
President
International Security Technology, Inc.
New York, N.Y.

Word Games

Knowing the frequency with which those at *Computerworld* encounter words such as "hardware," "software," "firmware" and "middleware," I suppose readers can excuse the headline "Package Eases Processing for Rainware Maker" [CW, Nov. 14].

Your underware is showing.

Don Striegel
The Indiana National Bank
Indianapolis, Ind.

LECHT ON SCIENCE / Charles P. Lecht

Moebius Strip Trip

The book titled *Powers of Ten*, written by Philip and Phylis Morrison and the office of Charles and Ray Eames and published by the Scientific American Library, is nothing short of marvelous. It provides us with a framework for speculating upon the future of computer technology and its ultimate rewards.

Based upon a film of the same name produced by the Eameses, it is a book that takes on the formidable task of increasing our appreciation for the relative size of the things making up our universe — from the astronomical to the subatomic. It sets out to do this by establishing a paradigm for the universe expressed in measurements based on powers of 10. It is as though the authors had provided us with a set of part metaphorical, part physical lenses with which to scan our universe. Related to the next lens in sequence by a tenfold difference in its power of magnification, and usable on the world's best telescopic, microscopic and intellectual equipment, each lens in the set allows us to pause and reflect on the nature of our physical world, within and beyond our natural senses.

Powers of Ten takes us on a journey that begins at the farthest reaches of outer space, roughly one billion light-years distant, and ends in the profoundest depths of inner space, where distances are expressed in "fermi." One billion light-years is, of course, the distance traveled by light at its constant rate of 299,270 kilometers per second over the course of a billion earthly years, or about 10 trillion trillion kilometers; one fermi is the distance across a single segment created by the division of one meter into 1,000 trillion equal such segments.

To put it all in terms that may succeed in leaving us with the impression that these distances may somehow be grasped, our sun is, on average, only 500 light-seconds distant from us, while our subatomic particles (if you can consider them particles at all) such as electrons, mesons and quarks are all measured in fermis or fractions of fermis. Naturally, nobody has ever seen one.

Skip Through the Universe

I was enraptured with this book; what fun to skip through our material universe, hopping from 10^{25} meters by declining powers of 10 to 10^{-16} meters, pausing at each step to contemplate the unique substance or state of the cosmos aggregated there. Twenty-five steps to our world, 16 further steps to a "place" inhabited by subatomic particles: We traverse a gossamer latticework sustained at one end by glistening clusters of galaxies embracing an unimaginable variety of stellar globes beyond which we have no perception and held together at the other by submicroscopic globules far too small ever to be actually seen, whose existence must be deduced solely from their effects. We switch from the outer world to the inner one, making the transition as smoothly as if we were in orbit and gliding through the twist of a Moebius strip, destined to take our place where microcosmic dust meets cosmic dust, the dust of creation.

The area of transition, between outside and inside, the twist on our metaphorical Moebius strip, sparks our imagination. We may, for example, envisage it as a passageway between the macroscopic and microscopic domains of our perceived universe.

Life goes through it, from the pulsing substructures of a single cell to the giant organic cooperatives of the higher forms; stellar explosions propel fragments of once-colossal systems through it as well, into a microscopic eternity. On either "side" of it, solids and gases mingle and play their ineffable games. Human life demands of us that we transmit this passageway twice — at least.

Component Technologies

Computer systems component technologies, by and large, have been in the passageway throughout the lifetime of our field (roughly 30 years). It is virtually impossible to come up with another example of an evolutionary phenomenon; one embodying this micro-to-macro/macro-to-micro rite of passage, that began in obedience to man's design and continues to remain thoroughly subject to his control, eluding, thus far, the subtle but decisive shift that would mark it as belonging to the ineluctable processes of the "natural" universe.

Tubes, cables, circuits, even the packaging have literally vanished before our eyes. The world's most powerful computers of 25 years ago, as typified by the Univac Lart (Livermore Atomic Research Computer), once housed in a 100,000 cubic foot altar/chamber, can now be contained on a single, silicon sliver of less than four cubic centimeters. Once commanding our respect if for no other reason than the cost of the facilities required to house it, it has now been reduced to tenement status, needing little more than a corner in a thermal coupling unit of less than one cubic foot. All its processor componentry has become invisible to the naked eye. The same is true of the monstrous Eniac "computosaur," with its 18,000 tubes and 30 graceless tons.

It's astonishing that as this phenomenon of implosion occurred, so did the order of magnitude of its associated powers multiply and multiply again. And as this phenomenon repeated itself, ever smaller, denser, more intricately choreographed subsystems emerged.

It happened so fast, this collapse in size and increase in power, that we are immediately reminded of stellar collapse, which creates such incredible concentrations of forces that unthinkable inversions of matter and energy occur. The process conjures, at its limits, the scarcely credible, but somehow unavoidable, postulations of "black-hole-like" systems whose power is so mighty that everything we've dreamed a computer might one day be able to do would in fact become possible — systems

(Continued on Page 67)

HUMAN CONNECTION / Jack Stone‡

The Personal Computer Retailing Market

The last episode of my agonizing quest for a new personal computer ended with my idea of buying an out-of-production Osborne Computer Corp. Osborne 1 machine, lifting the software from it and installing it on my indestructible, out-of-production Processor Technology Sol 20 and sending "Adam's folly" (that is, the hardware) out to pasture (that is, to a fully tax-deductible charity).

The pathetic part of the newest segment of the travesty is that I was serious about a retrogression to a latter-year technology. Near as I can figure, these days there's something approaching a $3,000 difference between a loaded Osborne 1 and an IBM Personal Computer with roughly comparable software facilities. That's a heavy price to pay for keeping up with the technology, particularly when I never had the time to explore, for example, most of the fun utilities that showed up with my operating system five years ago.

My search for the Osborne 1 began with the want ads, where I discovered the latest jargon in software nomenclature. Typically, the Osborne 1 came with "W/S, S/C, M/B, C/B and CP/M" (I'll leave it as an exercise for you to figure out what the acronyms mean.) I dutifully contacted the owners, but the machines were already sold off. "Big run on them," they purred.

'Computer Alley'

I decided to trek down to the "computer alley" in Washington, D.C., formerly known as K St., where one can now find more computer retailers than fast-food outlets or branch banks. However, en route I checked into the business section of the *Washington Post* to spot an ad for, I could hardly believe it, my machine (a vision from the heavens): a totally brand-new Sanyo Business Systems Corp. Sanyo 550 with the works — the complete Micropro International Corp. Star package, including Wordstar, Infostar, Calcstar, Spellstar and the companion Mailmerge, in addition to the usual Basic language services and Digital Research, Inc.'s CP/M.

But this machine was no broken-down 8 bitter. I was staring down the barrel of a genuine 16 bitter replete with Microsoft, Inc.'s MS-DOS and some measure of compatibility with Big Blue's Personal Computer. Further, the ad showed a modern monitor and a pair of 160K-byte disks (not as surfeit as my 296K-byte Micropolis disks, but good enough for us word processors). But the killer was the price: Only $1,599 — twice as much as the Osborne 1.

I'd never seen a Sanyo machine before, but the idea of all that capability for so little money simply captured my heart and soul. I raced down Connecticut Ave. and whisked along the "alley" to the advertiser's outlet. It looked a little battered as I entered the showroom, giving rise to my feelings of insecurity and hostile thoughts that hordes of "hackers" had arrived earlier and bought out the inventory. A young man waltzed over to me, sans coat and tie; I assumed he was the salesman, but was too busy packing up Sanyos for shipment to assume the professional attire.

"Yes, sir. Yes, sir. How may I help you?" he asked in a somewhat unctu-

"I am here to collect my personal Sanyo 550, and I'm not even going to inquire about the warranty."

"Oh, your choice is correct. The machine fits your needs exactly." He took out his order pad and pencil while asking, "Is delivery on Friday all right?"

"I'll take it now, if that's OK. Here's my check."

"Well, we really don't have any in stock just now," he said.

Rats. I knew I was late, although I really couldn't remember seeing the ad before, and I scour the paper daily for new machine announcements.

"If I have to wait, I have no choice. But can I at least see the demonstrator?" I pleaded, hoping against hope that he would let me close enough to fondle my new beloved.

"Well, sorry to say there is none around. In fact, we haven't really gotten our first shipment yet. Rumor has it they are hung up in customs on the West Coast."

"May I then look at the software documentation?" I asked.

"It's packed in with the hardware cartons."

"Any spec sheets around? Or sales literature?"

"Did you save the ad from today's paper?" he asked me.

"It is in my breast pocket, close to my heart," I informed him.

"What you see is what we've got. Just sign this order blank, and you're all set."

I told him that I suddenly remembered an appointment and would call him later in the week.

Letters to Stone should be addressed to him at P.O. Box 33699, Washington, D.C. 20033.

READER COMMENTARY/Raoul Pollack‡

Taking Threats of Terrorist Attacks Seriously

Terrorist attacks on computers and data processing personnel are not impossibilities. Many nations are currently addressing the issue of DP vulnerability at the government and industry level.

The issue of vulnerability has not escaped the attention of nations such as Sweden, France, Italy, Germany, Spain, Norway, Canada and Israel, which have voiced concerns that centralized systems are open to terrorist attacks.

In the U.S., vulnerability and security of information systems is on the agenda of congressional committees, the Federal Bureau of Investigation, the U.S. Department of Defense and many other government, corporate and private security institutions and experts. The emphasis, however, is on national emergency situations, and it is generally accepted that the priority given to vulnerability emanating from terrorist actions is relatively low.

There is growing danger from terrorist attacks on information systems. There's also a threat to the lives of DP personnel. In comparison to other types of threats (such as computer crime), little has been written on the subject.

Number of Attacks

How many attacks have actually been executed worldwide against information systems, DP personnel and installations? Very few estimates exist. The threat of terrorist attacks on information systems is of particular interest to American companies abroad. Of the 54 documented cases of DP-directed terrorism between 1969 and 1981, 22 attacks were directed against American companies abroad.

Published cases of terrorist attacks on information systems during 1969 to 1981 include the following figures:

- Argentina: 4.
- El Salvador: 1.
- France: 11.
- Italy (1973): 2.
- Italy (1976 to 1979): 27.
- UK: 1.
- West Germany: 1.
- Iran: 3.
- U.S.: 4.

There is no direct correlation between the number of terrorist attacks and the size of total damage to computer systems (some corporations do not report such attacks). In the case of large, sensitive and centralized information systems, one powerful bomb may knock out the entire network with enormous direct and indirect damage. Since the number of very large data bases and communications networks is increasing, the threats to such systems and their vulnerability is increasing as well.

This emanates from the determination of international terrorist organizations to destroy them as part of their political philosophy.

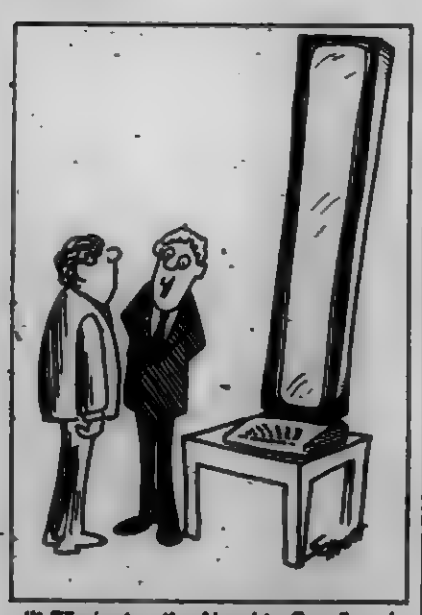
Protecting Against Terrorism

The first approach to protecting against terrorism involves dealing with security on the political, military and intelligence levels. This level deals with active fighting of terrorism and was defined in the Jerusalem Conference on International Terrorism in 1979.

The second level of security involves developing a structured program, which should anticipate explosive bombing and arson as the most probable type of terrorist attack. An important factor must be taken into consideration: The analysis of previous bombing attacks and arson against computer installations and personnel is a clear indication that the terrorists had inside information, emanating from professional DP personnel. This suggests that they knew where, how and when to place the bomb in order to cause maximum damage. In some cases, remote back-up sites were also destroyed.

Finally, protecting the DP center requires a disaster recovery plan that incorporates data backup and risk analysis features.

Pollack is chairman of the EDP Auditors Association in Israel.



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READER COMMENTARY/August Bequai

The Impact of White-Collar Crime

Two corporate officers were indicted on charges of accepting more than $2 million in kickbacks from one of their employer's subcontractors. A stockbroker was alleged to have used insider information to net $5 million in the stock market. And a dishonest manager was said to have sold his company's confidential five-year plan to a competitor.

While the news media and the business community turn their attention increasingly to computer-connected crimes and abuses, white-collar crime continues to grow. Annual losses are said to exceed $40 billion. Computer-connected crimes constitute only a fraction of these losses. The hacker's exploits are dwarfed by those of the professional white-collar criminal.

The impact of white-collar crime is felt by all sectors of our economy; no business or organization is immune. Although computer technology has greatly facilitated the ease with which white-collar crime can be perpetrated, it is not the cause. For this, we must look in large part to the ethics — or lack thereof — of corporate America.

Crimes by computer, although a fast-growing form of white-collar crime (especially as computers continue to proliferate), are dwarfed by other categories. For example:

- *Bribery, Payoffs and Kickbacks.* These account for more than $3 billion in annual losses. In one city alone, local businesses were forced to inflate contracts by as much as 10% in order to make up for the kickbacks to corrupt government officials.
- *Embezzlement.* This is committed by insiders in positions of trust; annual losses are said to exceed $2 billion.
- *Pilferage.* Dishonest employees bilk their employers out of more than $10 billion annually. More than 30% of small business failures are said to be connected to thefts by employees.
- *Industrial Espionage.* Marketing and merger plans, trade secrets and other confidential business information are often valuable to a company's competitors. Industrial espionage is currently a growing business, especially in the high-technology area. Losses are said to exceed $1 billion annually.
- *Commercial Counterfeiting.* This is said to be a $15 billion annual business. Counterfeit automobile parts and electronic components have been commonplace. The counterfeiter's future is assured.

New Avenues

Without a doubt, the computer has given rise to crimes that are endemic to it. But computers have also served to make it easier to commit the more traditional forms of white-collar crime. Although it can rightly be said that people, not computers, steal, it can also be said that computers have opened up new avenues for the dishonest.

What makes all of this even more frightening is that our criminal justice system — long ill-prepared to address the more traditional forms of white-collar crime — is now called upon to address white-collar crimes assisted by computer technology. That should concern us all. That is why we must place the problem in its proper perspective.

Bequai is a lawyer based in Washington, D.C.

Moebius Strip: Cosmic Journey

(Continued from Page 65)

whose size would be so minute that they could reside within or beside a human cell and so powerful that they could listen to and comprehend the messages emanating from the offspring of our primordial cells. In these cells is contained the mystery of life embodied in programs long lost to human consciousness for the regeneration of limbs, perhaps even for flying through the air or remaining indefinitely submerged in the waters of our planet.

And when this happens, our computer systems will provide us with the power to take then the next step: to duplicate in size the dust of creation, which (we postulated earlier) is a point in the destiny of anything that travels our metaphorical Moebius strip.

From here, they will be able to reemerge to reach the stars, whose glow we will use to illuminate our vision to gain the sight needed to sew them, galaxies and all, into a massive computer systems leviathan, of the size needed to address some really big questions, like who we are, and why, where we can go and by what route before universal entropy, if not nuclear war, obliterates us.

Lecht is chairman of Lecht Sciences, Inc., a New York-based think tank specializing in computer and communications technologies.

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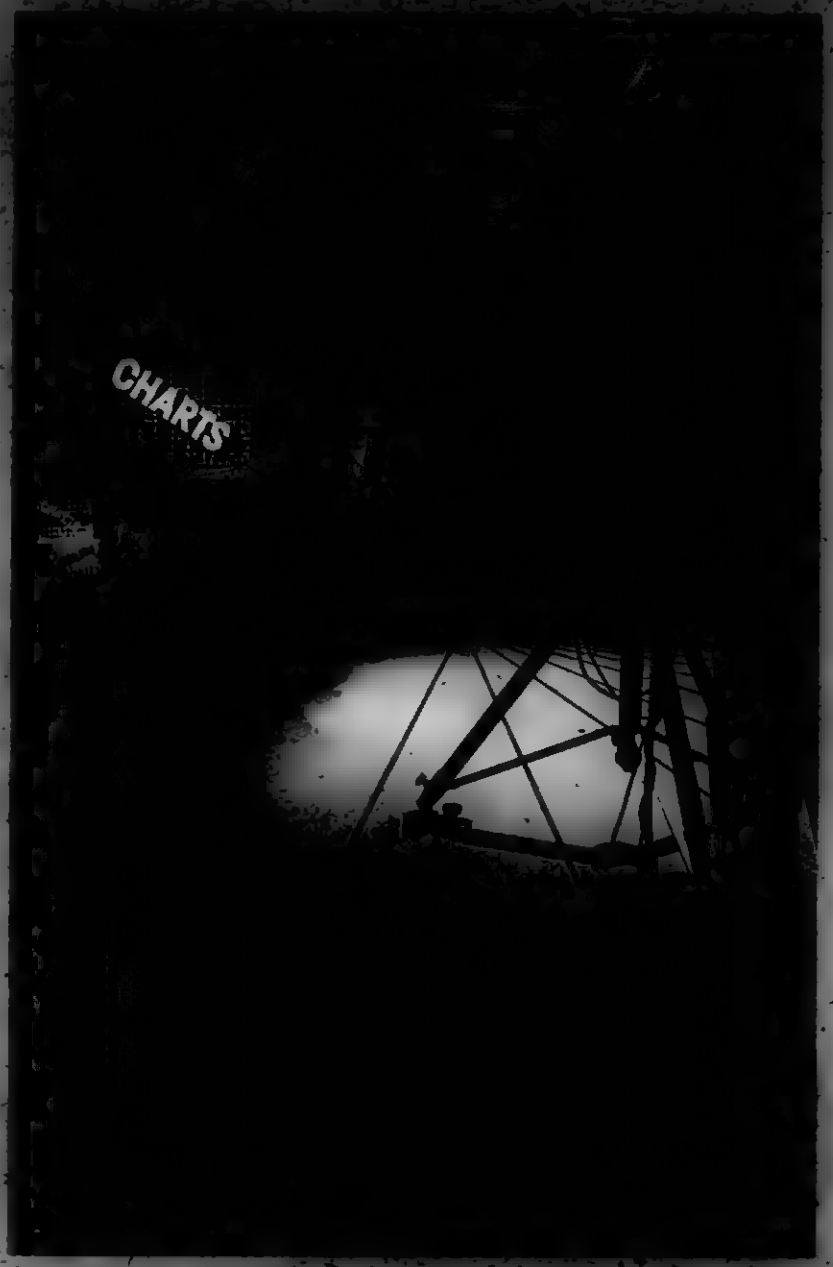

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By Parade of Vendors, Misleading Claims

Integrated Software Mart Seen Clouded

By Kathy Chin
Special to CW‡

LAS VEGAS — If anything can truly be said of the number of integrated software packages spewing forth from developers, it is that these multifunction application packages are leaving potential buyers confused, frustrated and intimidated.

Ever since Lotus Development Corp. made "integrated" the hottest buzzword in the business with its introduction of 1-2-3, almost every major company in the software business has declared that it will join the parade. Following them at Comdex/Fall '83 here was a host of lesser known companies whose offerings will further cloud the picture.

Also confusing the buyer is the fact that developers have adopted the word "integrated" to describe a gamut of products. The two most common applications of the term are products more properly called window managers and the true integrated applications.

Integrated applications, which combine the functions of several separate applications in a single package, are the most popular target for developers.

The rush to create them is so great that dozens of product announcements were made months before products were available for delivery.

Each company is labeling its product as the best solution to increasing productivity, but few brought their promises to market for buyers to judge. Buyers are still wrestling with the key question: Will these packages give them more for their money?

Industry pundits are slowly nodding yes, but with reservation. It seems they agree on one thing only: integrated software will do what it promises — provided buyers pick the right package.

The potential benefits of these programs to buyers are great. They promise to allow diverse applications to transfer data freely among themselves, eliminating much of the keyboard entry normally required for such movement. Integrated packages will also afford users common commands throughout those same applications, so operators need memorize only a few commands instead of the hundreds they may need to know to use current software.

Developers are also packing more applications into one package. Although 1-2-3 included just three applications — spreadsheet, data base and graphics — new products will double that number. Open Access from Software Products International of San Diego will feature six applications; Schuchardt Software Systems of San Rafael, Calif., will include seven applications in its Intesoft line, each of which can also be used independently.

Developers claim their intention is to mimic the typical office environment in which workers shift from one task to another whenever necessary, regardless of the nature of the tasks. Integrated packages are intended to make the movement from one application to another more natural and to minimize interruptions.

Critics, however, charge that developers are merely lusting after the popularity of 1-2-3, which has made Lotus a $40 mil-

(Continued on Page 72)

Integration Rush Seen Spurred By Changing Mart

The drive to create integrated software has been spurred by basic changes in the market and in hardware. Within the last three years, for example, 10M-byte hard disk drives have dropped in price from nearly $5,000 to under $2,000. More affordable hard disk prices have meant that software developers no longer worry about writing programs that quickly consume storage space and memory. Improvements in graphics terminals, computer speed and the popularity of mouse pointing devices have also contributed to vendors' efforts to create new environments.

(Continued on Page 72)

'Execustation' Release 1.1 Links Micros, Informatics Mainframes

FAIRFIELD, N.J. — Informatics General Corp. has announced Release 1.1 of its Execustation processing service, which the company said links personal computers to Informatics mainframes.

Reportedly, new features in Release 1.1 include automatic logon to an Informatics data center through GTE Telenet Communications Corp.'s Telenet, autodial support for the Hayes Microcomputer Products, Inc. Smartmodem and intelligent terminal capabilities.

In intelligent terminal mode, the user can capture and selectively print or save disk mainframe output, as well as edit and retransmit mainframe commands, a spokesman said.

Execustation software is priced at $200 a copy for users who meet the monthly minimum charge for mainframe processing of $300. Charges for file transfer are $50 per connect hour from Informatics, Data Services Operation, 6 Kingsbridge Road, Fairfield, N.J. 07006.

Nixdorf Inaugurates Dpex IV

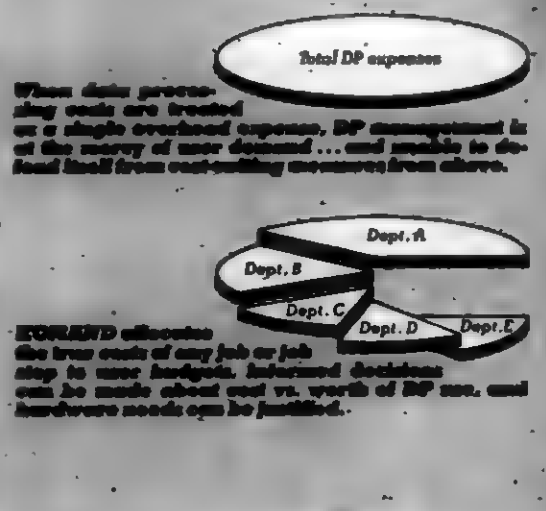
WALTHAM, Mass. — Nixdorf Computer Corp. has announced the Dpex IV, which the company described as an enhanced operating system for its 600 series of distributed data processing systems.

The new operating environment reportedly includes a communications facility, dubbed Nicom, that allows user access to the Binary Synchronous Communications lines of a 600 series system through editor programming.

The vendor said multiple 600 systems can be configured into a customer-defined and controlled network with the ability to share system resources, provide access to distributed data and exchange information under the control of user-written applications in either multipoint or point-to-point environments.

(Continued on Page 70)

OS/MVS-VS1 USERS: How to Distribute DP Expenses Equitably to User Budgets.



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For Wang VS Series

Wang, Cincom Offer Enhanced Total Version 2

LOWELL, Mass. — Wang Laboratories, Inc., in cooperation with Cincom Systems, Inc., has announced an enhanced Version 2 of Cincom's Total data base management system (DBMS) for use with Wang's VS series of processors.

Five Wang-unique enhancements have been made to Total, according to the companies. The package now features comprehensive administrator utilities, which include the ability to load and unload files, clear or verify link paths and unlock Total files for high-volume applications running on Wang Model VS45, VS80, VS85, VS90 and VS100 systems. The data base administrator reportedly can utilize a data base statistics package to monitor activity.

Another enhancement, multithread support, is said to improve the runtime performance of Total for a multiuser, multiprocessing environment. Specified at the time of data base creation, a third feature automatically provides a master file for any variable file record that is created without one. Total's security reportedly also has been enhanced, utilizing access codes that may be assigned to files, link paths and fields to prohibit users without the appropriate security level from viewing or updating confidential files.

Version 2 of the Total DBMS has a license fee of $20,000 from Wang, One Industrial Ave., Lowell, Mass. 01851.

'XPF/Cobol' Tests Cobol Programs in MVS

SUNNYVALE, Calif. — Boole & Babbage, Inc. has announced Extended Productivity Facility (XPF)/Cobol, which the company described as a full screen software tool for interactive testing and debugging of Cobol programs that are used in IBM's MVS environment.

XPF/Cobol reportedly offers a structured testing environment for interactive monitoring and control of Cobol program execution. The structured environment is modeled after IBM's System Productivity Facility. The company said the package increases programmer productivity during testing and debugging through its capability to provide full screen interactive Cobol program testing and analysis.

The package's Intercept Panel is said to give programmers a virtual window into programs at any stopping point, such as a breakpoint, an abend or an attention keystroke. The panel contains the primary command line, the last 10 executed Cobol statement numbers and the reason for the program's stopping. Using the feature, the company said, a programmer can monitor, run and move forward or backward through the program, request and receive information and monitor critical Cobol data items.

XPF/Cobol is priced at $30,000 for a perpetual license for the first CPU from Boole & Babbage, World Headquarters, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

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Our Name Is Our Business.

Nixdorf Offers Dpex IV System For 600 Series

(Continued from Page 69).

Bisynchronous enhancements to Dpex IV provide an alternate buffering scheme for logical communications I/O disk operations using a single dynamic memory block as a logical communications buffer. The buffer reportedly has a capacity of 245 characters, and each logical record is divided into one or more communications records, which are then passed individually to the transmit interface.

Enhancements in command macro execution allow users to enable and disable selectively the display of system menus. Nixdorf said this feature results in a decrease in command macro execution time and enables command macros to be initiated from both the mode selection and file processing Help-list menus.

Additional security has been provided with the operating system through operator statistics enhancements. The system maintains a detailed logon disk for diagnostic purposes in order to record any disk errors that may occur. The log contains information that can direct Nixdorf's field engineers to the source of most disk-related errors.

The operating system is also said to support recent hardware enhancements to the 600 series. The Dpex IV operating system can be purchased for $8,500 and is also available for a monthly license fee of $200 from Nixdorf, 300 Third Ave., Waltham, Mass. 02154.

Sperry Unveils Manufacturing Control System

BLUE BELL, Pa. — Sperry Corp. has introduced a manufacturing control system known as Univisa.

Based on the Sperry OS/3 operating system, Univisa was designed to run in an interactive mode to allow users to access information pertinent to manufacturing control.

The minimum hardware required is a Sperry System 80 equipped with 512K-byte memory expansion, one local workstation, a diskette subsystem, a 132-char./line printer and a Sperry 8419 disk subsystem unit.

The system includes the following modules:

- Bill of Material/Inventory Control is the basic building block of the system. It provides for interactively maintaining parent-component relationships in product structures. Among the retrievals available to users are single-level, indented and summarized bill of material explosions and where-used lists.

Other functions include reordering policy, inventory value classifications, order-point levels, economic order quantities, minimum and maximum inventory balances, historic usage, inventory allocated to manufacturing orders, inventory carrying costs, safety stock levels, physical and cycle inventory-taking assistance and inventory on-order data.

- Scheduled Receipts includes the interactive manufacturing order and purchase order functions. It provides control over replenishment orders for manufactured components, assemblies and raw materials to build the parent item being ordered.
- Material Requirements Planning is used to explode a time-phased master schedule of end products and spares through the bill of material. Requirements are netted against stock and also against on-order information.
- Production Costing and Shop Floor Control functions include maintenance of the work center plus routing files, routing and work-center retrievals, standard costing using routing and work-center files, shop packet preparation, work-in-process labor and material control, long-term capacity planning, shop-floor dispatching and lead-time generation.

Univisa is available immediately and has a monthly leasing charge of $350 for the entire software system. A combined hardware/software price is approximately $150,000, depending on plant size.

More information can be obtained from Sperry through P.O. Box 500, Blue Bell, Pa. 19424.

Planning Tool Out for VAX-11 Under VMS

ANN ARBOR, Mich. — Database Design, Inc. has announced the Information Planner, which the vendor described as a tool for strategic information systems planning on Digital Equipment Corp.'s VAX-11 series of computers in DEC's VMS environment.

According to the vendor, the Information Planner supports a variety of planning approaches, including the Critical Success Factors approach and James Martin's Strategic Data Planning Methods. The software reportedly is designed to define a collection of manageable projects for data base and application development that creates an integrated information systems environment to support the strategic business objectives of the enterprise.

The package is said to facilitate the creation of detailed designs for stable, shared data bases using the company's Data Designer package. Information Planner reportedly aids in the construction and analysis of a model of the activities an enterprise performs, the information required to perform them and how these activities and information needs relate to specific business problems and goals, existing systems and potential new projects.

A perpetual license for the Information Planner is priced at $25,000 from Database Design, 2020 Hogback Road, Ann Arbor, Mich. 48104.

Billing System Announced For Wang VS

ENGLEWOOD, Colo. — GPB Consulting, Inc. has announced Protabs, a time and billing system for use with the Wang Laboratories, Inc. Model VS computers.

Protabs reportedly is designed for use by professional service firms requiring time accounting, employee performance analysis and historical data capture. The package is also said to handle tasks associated with the billing process by providing such features as automatic write-up and write-down of fees, automatic contingent case handling, automatic retainer and trust accounting, multi-client billing and automatic allocation of cash receipts. The package allows for user modification and creation of billing formats, a spokesman said.

The Protabs system is available for $10,000 from GPB Consulting, 5655 S. Yosemite, No. 106, Englewood, Colo. 80017.

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Drive to Integration Seen Led by Changes in Mart

(Continued from Page 69)

The use of windows, previously considered a novelty found only in a select number of packages, is rapidly gaining acceptance in integrated software products. Cut-and-paste features, which provide the benefit of transferring or copying information from one application to another, are also becoming commonplace.

Telecommunications will rapidly become another standard in these products. Software developers are already contemplating their moves in the area. The next version of Lotus Development Corp.'s Lotus 1-2-3 will include communications abilities in addition to word processing, according to Lotus President Mitchell Kapor.

The cost of integrated software will also be coming down, according to analysts, putting these improvements within the range of more people. As prices steadily decline, the cost difference between two packages becomes less of a factor in determining which to purchase. Businesses will not hesitate to choose a $500 piece of software over a $300 program if the more expensive one will do the job, according to Robert Leff, president of Softsel, a distributor in Culver City, Calif.

"Value is relative," he said. "But you have to determine your priorities. Maybe your priority is ease of use, not cost."

Researchers surveying the field are also discovering that buyers of integrated packages may not be using the entire spectrum of applications. Observers warn that buyers should not make a purchase simply because a product does everything.

"Only buy what you need," advised Esther Dyson of Rosen Research in New York.

Auto-Trol Offers Upgrade To Its 'Series 700' Software

DENVER — Auto-Trol Technology Corp. has announced an enhancement to its Series 7000 Advanced Graphics software for mechanical design and manufacturing for use with the company's Advanced Graphics Workstation and Digital Equipment Corp.'s VAX-11 series of processors.

According to the vendor, Auto-Trol's Pascal-based Eagle graphics language gives the Series 7000 design and drafting capabilities using 32-bit processing. Eagle programs reportedly can be written in the native computer operating environment without tying up the graphics workstation, and an attribute structure provides bill-of-materials capability with graphics report generation.

The package is said to feature drafting and drawing production enhancements including Ansi or user-definable standards, complete units, text angle control and standard notes from text files. A shape-dragging feature allows the user to place figures dynamically for visualization before entering them into the model. The package also features hidden line elimination and full screen entity selection in all views displayed.

The Series 7000 package is included with the Advanced Graphics Workstation, which is priced at $130,000 from Auto-Trol, 12500 N. Washington St., P.O. Box 33815, Denver, Colo. 80233.

Flood of Integrated Packages Seen Confusing, Frustrating

(Continued from Page 69)

lion company in its first year.

"Lotus is what made the term integrated the word to use," said Esther Dyson, president of Rosen Research of New York.

To crack the lucrative integrated software market, vendors are touting an array of productivity tools that boast increased speed, more functions and more features than anything now on the market. Dyson, though, warned that many start-up companies are itching for sales and delivering goods that do not live up to the buyer's expectations.

"Users should not buy simply for the concept of integration," she warned. "I've seen more half-finished products than ever before. There have not been windows where there should be. There has not been good implementation. The user interface is not what it should be. It's not easy to use, and I find a lot of the stuff confusing and distracting."

Todd Corenson, market researcher at Enlon Associates in Cupertino, Calif., also expressed concern about many of the products that made their debut at Comdex.

"Windows in some products display only a limited amount of data, or they don't have scrolling, so you can't scan your document," he said. "And just because you have windowing, that doesn't automatically mean you have cut-and-paste features."

Chin is a reporter for Infoworld *magazine.*

BIM-EDIT vs. IBM ICCF:

Higher productivity is the better deal.

When you compare program editor cababilities there's no comparison between BIM-EDIT and ICCF. BIM-EDIT has more than 25 features that ICCF can't match. Time-saving, productive features like:

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- concurrent library member addition and deletion from batch and on-line
- immediate logoff from any point including mid-edit session
- logon returns immediately to logoff point and status
- log session maintained per user of commands and responses
- line block group commands — copy, move, delete (cc-cc, mm-mm, dd-dd)
- easy switching between concurrent edit and display sessions
- access to all system commands from any screen or session
- high-speed, highly functional POWER spool queue access
- spool access, edit, other session types, all use same scrolling commands
- multiple commands for one or multiple session may be entered at any time regardless of session type or position
- may end an edit session without permanently affecting the member
- hierarchical library directory structure
- edit lines up to 256 characters wide
- support for 3270 models 2, 3, 4, and 5
- dynamic adjustment of screen size support
- exit routines
- member name length up to 32 characters
- access control by sub-library, member, or access type
- Help screens
- implied objects of commands (uses last referenced member name)
- library directory always in alphabetical order

Compare the features. Compare the price. You'll agree, the higher productivity of BIM-EDIT is the better deal.

BIM has more than a dozen other DOS/VSE system software products, also performs systems programming consulting, and provides computer time services on a 4331-2 system.

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The companies invested in will complement one another in terms of available products, markets serviced, distribution channels and development resources.

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Executive Vice President, David A. Hutchison,
former DELTAK Group Vice President of Finance and Administration

Joining Mr. King and Mr. Hutchison on the Board of Directors will be
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noted industry author and lecturer,

Chester R. Mills,
leading EDP industry market researcher,

L.W. Alberts,
of the law firm of Defrees & Fiske, and

Martin J. Koldyke,
Partner, Frontenac Venture Company

The company also has established a Technology Council of key executives throughout the industry to advise on acquisitions.

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To Hasp-Supported Mainframes, Minis

Kaypro Computers Get Link

SOLANA BEACH, Calif. — Kaypro Corp. and Computer Marketing Associates, Inc. of Tallahassee, Fla., have announced Kaylink, a software product designed to work with minor hardware modifications that allows Kaypro computers to communicate with most mainframes and minicomputers supporting the Hasp protocol.

The product includes a modification to Kaypro's asynchronous communications port to include synchronous capabilities, a copy of the communications software and documentation, a spokesman said. Communications include error checking and correction, compression and decompression, transparent and non-transparent data, multileaved incoming data, emulation of a remote or host site and console, printer, card reader and card-punch data streams.

Kaylink is menu-driven and includes Help screens, high-level security and the ability to direct files to any combination of peripherals and consoles. The complete product costs $750 from Kaypro at 533 Stevens Ave., Solana Beach, Calif. 92075.

'Funds-PRO' Available For Stratus/32

NATICK, Mass. — Stratus Computer, Inc. and Consultec, Inc. have announced the availability of Consultec's Funds Transfer and Processing (Funds-PRO) software for the Stratus/32 continuous processing system.

Funds-PRO integrates funds transfer operations, provides position management capabilities and supports bank research and investigation activities, a spokesman said. It also supports communications with all major wire networks using standard communications protocols.

The Stratus/32 was designed to provide continuous operations in the event of failure of one or more functional components, the spokesman said.

The system uses comparative circuitry to detect errors automatically and duplicate components to achieve fault tolerance.

The price of the Funds-PRO system, including hardware, software and installation, begins at $550,000 from Stratus Computer, located at 17 Strathmore Road, Natick, Mass. 01760.

Cobol Generator Announced For Burroughs

FLAGSTAFF, Ariz. — Flagstaff Software, Inc. has announced Screen-Dynamics, an on-line program generator for users of Burroughs Corp.'s B1000, B5000 and B6000 series computers.

According to Flagstaff Software, the package allows programmers to create executable Cobol programs on-line faster than through hand coding, producing programs that incorporate multiple screens in various hierarchies of design.

The Screen-Dynamics program generator is available in either a Cobol 68 or Cobol 74 version.

The package reportedly paints screen formats on the CRT screen, specifying hierarchical relationships and program parameters. It offers a maintenance feature that provides a similar method of modifying existing screens in any program and will produce code reflecting the new screen.

Screen-Dynamics is available for $750 from Flagstaff Software, which is located at 114 N. Leroux, Flagstaff, Ariz. 86001.

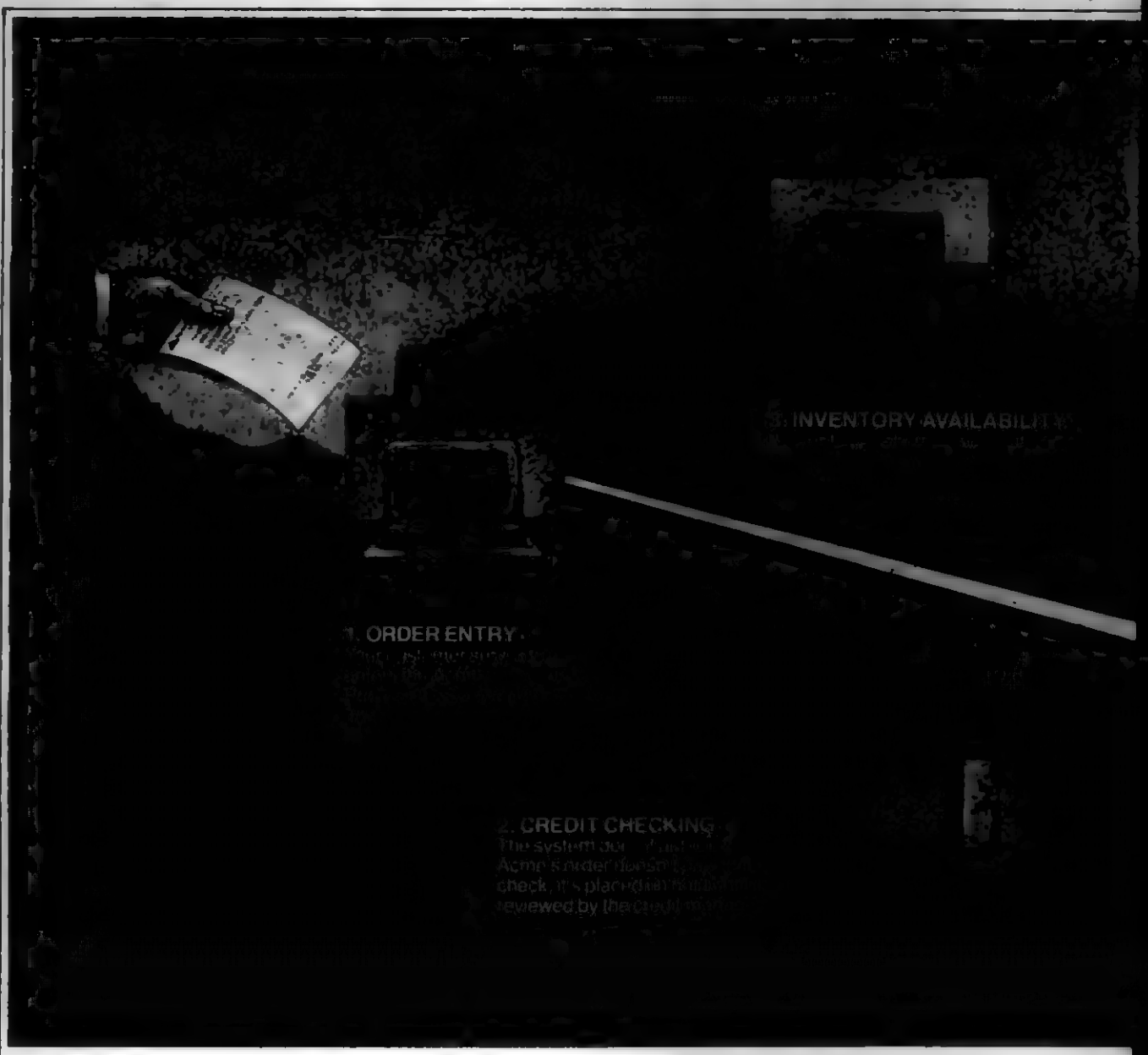
Western Electric Software Targets Teletype Terminal

LISLE, Ill. — AT&T Western Electric has announced software that reportedly enables programmers, engineers and editors to perform six jobs at the same time on a single terminal.

The software is being offered as three add-on packages to Unix System V, according to a spokesman. The software was specifically designed for Teletype Corp.'s 5620 Dot-Mapped Display (DMD) Terminal, an intelligent graphics terminal that runs under the Unix operating system.

By creating six windows in which to work, the software lets programmers speed the debugging and compiling process, while engineers can design separate parts of a project at the same time on one terminal and editors can develop graphics alongside the text they are illustrating, the spokesman said.

The packages, called the 5620 DMD Core Package ($1,600), the 5620 DMD Development Package ($6,000) and the 5620 DMD Text Processing Package ($1,000), are available separately from AT&T Western Electric, which can be reached through P.O. Box 25000, Greensboro, N.C. 27420.



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MSA's remarkable new Order Processing System keeps every order on track and on schedule.

It automatically checks credit and inventory availability. Schedules shipping. Bills customers. Immediately throws a red flag if there's a problem.

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It's the perfect way to keep your customers satisfied.

Now they won't have to wait while your customer service representative keys in line after line of information. The system automatically displays addresses, preferred shipment and other order-related information.

It also instantly checks current credit records, saving your service representative that time-consuming task.

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Program Gives IBM Micros Access to IBM Mainframes

IRVINE, Calif. — Megalink/3270, a micro-to-mainframe interface software program that provides the IBM Personal Computer, Personal Computer XT and PCjr with dial-up access to IBM mainframe systems, is available from The Mega Group, Inc.

Megalink allows IBM Personal Computer systems to function as either IBM 3278 monochrome terminals or IBM 3279 color terminals with no additional hardware, a spokesman said. File transfer capability is also included. Megalink is compatible with MVS/TSO, CICS and VM/CMS operating systems, as well as other environments using IBM 3270-type terminals.

Megalink supports four-color emulation of IBM 3278-type terminals and seven-color emulation of 3279-type terminals on Personal Computer models equipped with a color graphics board and color monitor. The program provides line-oriented communications and full 3270 terminal display capabilities and can be switched from line to full screen modes as well.

Megalink costs $5,000, which includes the software for 10 Personal Computers and the required mainframe communications software enhancements. The Mega Group is located at Suite 100, 2091 Business Center Drive, Irvine, Calif. 92715.

System Searches Text Files

FAIR GROVE, Mo. — MacKinney Systems has announced the availability of its Text Retrieval System/On Line, which is said to allow text searches using any word, combination of words or synonyms in the text.

The software was designed for use with any IBM mainframe running on IBM's CICS using Vsam files. It reportedly allows the user to search four billion books of four billion 79-char. lines and to retrieve unformatted textual data.

The text file reportedly may be updated on-line or in batch mode, and text may be printed on terminal printers if the optional CICS/Spooler is installed.

The system is offered for use in personnel skills inventory, catalogs, contracts, customer-client information, word processing with automatic filing, legal and medical research, position papers and other tasks.

The Text Retrieval System/On Line is available for $5,000, and the CICS/Spooler is available for $1,295. MacKinney Systems can be reached through Box 270 A, Rt. 2, Fair Grove, Mo. 65648.

Sales Package Aimed at Users Of HP 3000

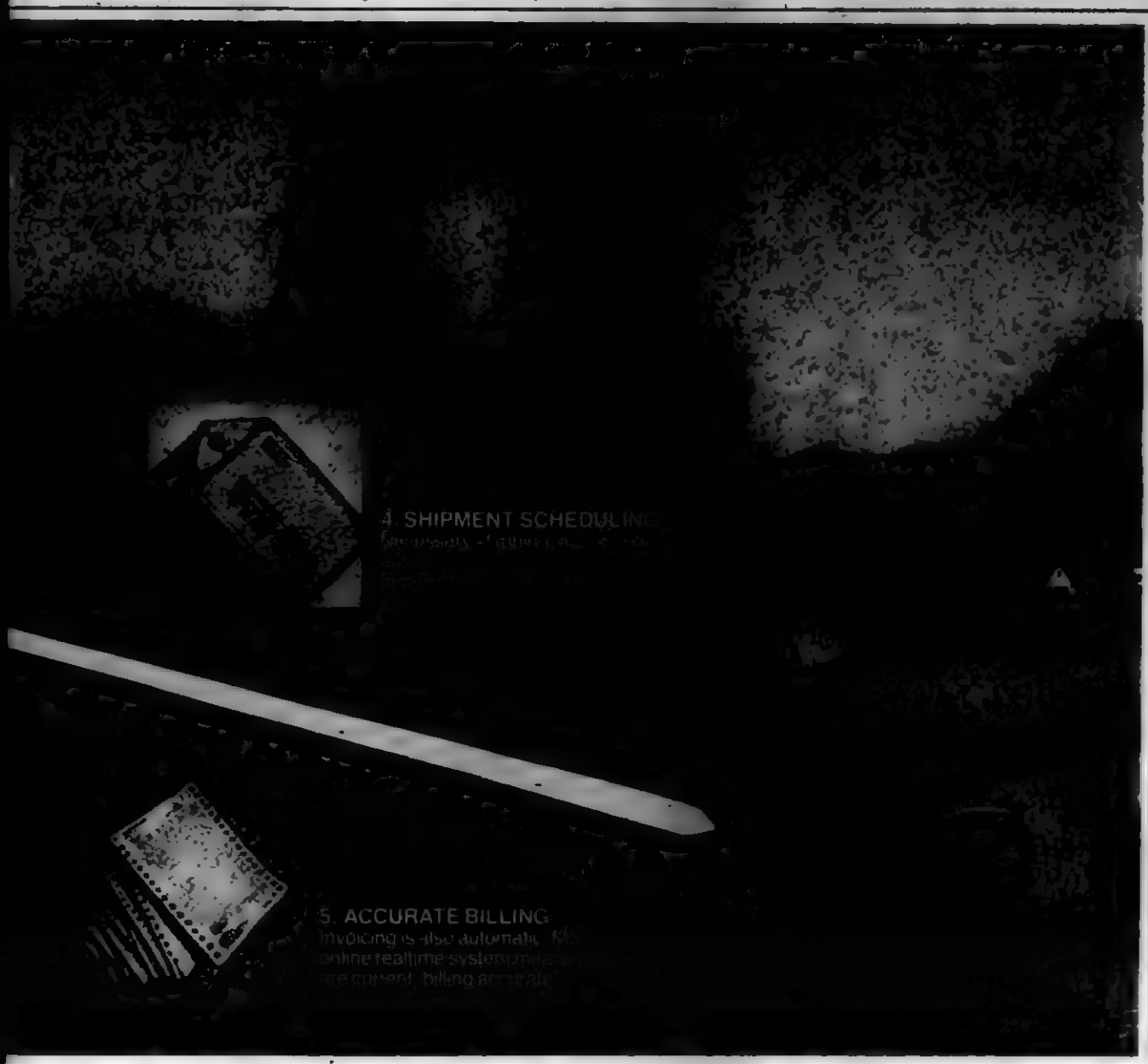
CANOGA PARK, Calif. — Business Systems Associates, Inc. has announced the SMS/3000 package, which it described as a sales management information system for Hewlett-Packard Co. HP 3000 users.

The package is said to be a stand-alone system for sales representatives and managers to help manage sales prospects from identification through close of sale. Unique company sales cycles, which allow for automatic scheduling of prospect activity, can be established within the SMS/3000.

Sales progress reportedly can be monitored individually or by district, region or entire sales area. The package includes sales information management features such as territory assignment and control, lead identification and tracking, lead-source analysis, client purchase patterns and profiles, sales cycle scheduling, sales progress monitoring, computerized customer files and mailing list management.

The package reportedly also includes electronic mail capabilities, and it features a word processing and correspondence-generation interface. Reports available through the system include a "pipeline" report to identify prospects as they move through stages of the sales cycle, a sales forecast report, a prospect rating report and an activity calendar.

The SMS/3000 sales management information system is priced at $15,000 from Business Systems Associates, 20942 Osborne St., Canoga Park, Calif. 91304.



system. It lets you review the status of orders, prices, credit or inventory availability at a moment's notice. You can change orders easily.

And the system is flexible enough to handle special requests for shipping vendors, packaging, delivery dates or special handling procedures.

Just as important, MSA's online realtime system helps you control internal costs. It moves orders along without costly error or duplication of effort. It provides current information on pricing, discounts and special sales agreements with individual customers.

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You'll find MSA's new Order Processing System flexible and easy to use. It works with the MSA Manufacturing System to let you schedule production more efficiently. And promise ship dates to customers more confidently. Of course, it's also perfectly integrated with MSA's Financial System.

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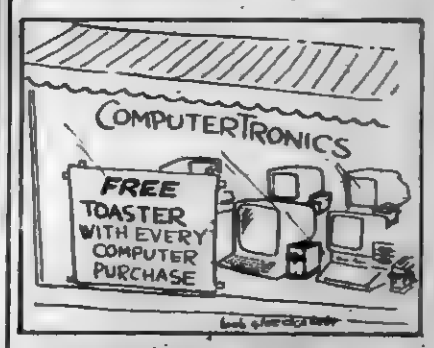

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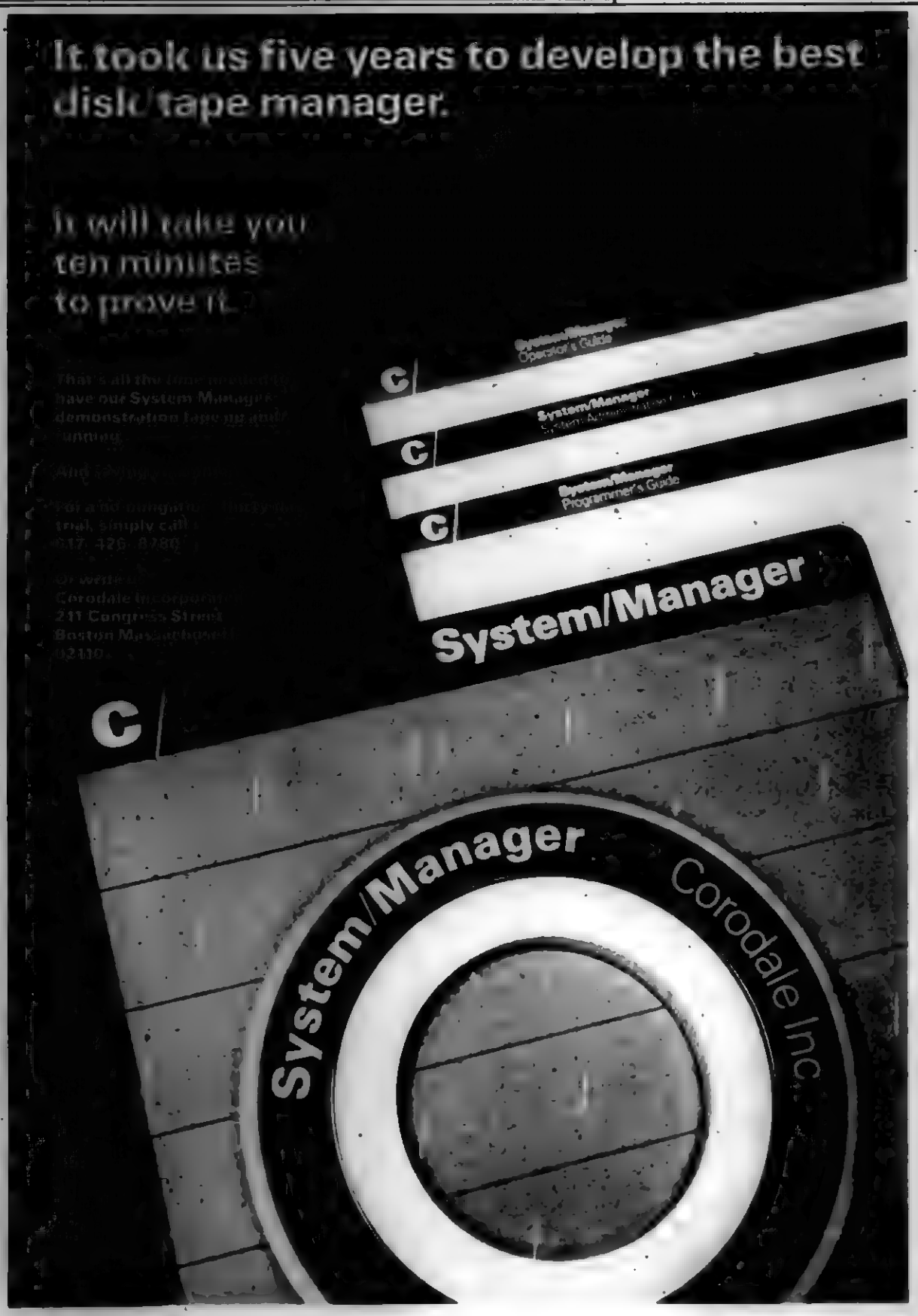
Report Writer Unleashed For IBM System/34, 36 Users

WINTER PARK, Fla. — Westmoreland Systems, Inc. has released Report Right, a customized report writer for IBM System/34 and System/36 users.

Utilizing Help text and on-line documentation, Report Right generates custom reports from the user's existing data files. The package features sorting and record selection, free-form or RPG calculation statements and interactive prompt screen and report designing. Once a report has been designed, it can be stored for later use or modification or can be output to a CRT terminal or printer, a spokesman said.

Included with Report Right is Westmoreland's Data Dictionary Documentation System, which provides a data dictionary, on-line documentation, flowcharting, procedure exploding, printer spacing chart, screen layout report, indicator usage report and cross-reference reports to document the relationships between fields, files, programs, procedures and menus.

Report Right, including the Data Dictionary system, costs $1,550. The Data Dictionary system purchased separately costs $750 from Westmoreland Systems, Suite 1, 228 Park Ave. N., Winter Park, Fla. 32790.



Software Series Debuts for Units From Tandem

SANTA CLARA, Calif. — Smith, Dennis & Gaylord, Inc., a software company here, has introduced the the first of a series of business and manufacturing application software for Tandem Computers, Inc. computers.

The release includes Tandem versions of its financial management and order management packages, which currently run on Hewlett-Packard Co. HP 3000 systems, a spokesman for the vendor said.

According to the spokesman, the software packages are not conversions of existing packages, but were rewritten to take advantage of Tandem features.

The base price for the general ledger system is $45,000; the order management system, packaged with an accounts receivable system, costs $9,000, according to the spokesman for the vendor.

More information on the software packages is available from Smith, Dennis and Gaylord, which is located at 3211 Scott Blvd., Santa Clara, Calif. 95051.

Fall Catalog Details Software Out for Micros

NEW YORK — Elsevier Science Publishing Co., Inc. has released the fall edition of "The Software Catalog" for microcomputers.

The 1,020-page catalog cross-references microcomputer software by system, operating system, language, applications, program name and microprocessor. It also provides a listing by vendors and full pricing information. It lists more than 28,300 software packages from 2,639 vendors.

The single-copy price is $69 with an update priced at $15. Standing orders for the annual fall and spring editions and updates are priced at $58.50 for each catalog and $12.75 for each update, according to a spokesman for the publisher.

More information is available from Elsevier, which is located at 52 Vanderbilt Ave., New York, N.Y. 10017.

Venture Unveils Service Merging Payroll, Personnel

NEW YORK — Chemical Bank has introduced Personnel/Paylink, a payroll and management service that integrates the separate functions of personnel and payroll systems.

According to the vendor, the service is targeted at both large and small businesses. It is offered as a joint venture of Chemical Bank and Information Service, Inc., a human resource systems specialist.

Personnel and payroll records include much of the same data, a spokesman said. The data base is accessed via a terminal that is operated within the customer's firm by in-house personnel. They perform all data entry, validation, inquiry, file updating and reporting from the terminal using simple English commands. No data intervention is necessary, the vendor said.

Service users are provided with the vendor's existing payroll processing service, which includes the preparation, signing and issuance of paychecks, direct deposit of employees' salaries, management of payroll taxes and the supply of management information reports, according to a spokesman for the vendor.

The price for Personnel/Paylink was not available at press time. However, additional information on the service can be obtained from Chemical Bank, located at 277 Park Ave., New York, N.Y. 10172.

Creates Vplus Form
'Autopilot' Supports HP's Image

MOUNTAIN VIEW, Calif. — Computing Capabilities Corp. has announced the Autopilot system for use with Hewlett-Packard Co.'s Image data base management system.

According to the vendor, Autopilot automatically creates Vplus (HP's standard terminal handler) forms for any Image data base. The package reportedly operates by analyzing an Image data base and passing form and field specifications to Formspec, the Vplus forms maintenance utility, which actually builds the forms file, a spokesman said.

The company explained that by replacing the manual entry of forms, the package reduces application development time and eliminates typographical errors. Autopilot reportedly permits users to perform high-overhead Formspec operations in batch mode so that forms file compilations and listings will not monopolize terminals and degrade system throughput.

Autopilot is available for $1,200, the spokesman said. More information can be obtained from Computing Capabilities, which is located at Suite 122, 465-A Fairchild Drive, Mountain View, Calif. 94043.

Directory Lists IBM Software

MOUNT LAUREL, N.J. — Software Plus, Inc. has published "Software Only," a directory of software and support for IBM hardware.

According to the publisher, the guide gives IBM users access to software sources, including third-party software sales organizations, custom packages and IBM-authored software. The 500-page, softbound directory reportedly lists over 700 organizations, with information on key people, locations, packages, support assignments and fees.

"Software Only" is priced at $160 from Software Plus, Plaza Office Center, Rt. 73 & Fellowship Road, Mt. Laurel, N.J. 08054.

Screen-Based Text Editor Fits Unix-Based 90X System

MOUNTAIN VIEW, Calif. — Pyramid Technology Corp. has introduced Extensible Macros (Emacs), a screen-based text editor that provides an editing environment for program development and text processing for the 90X, the vendor's Unix-based, 32-bit virtual memory computer.

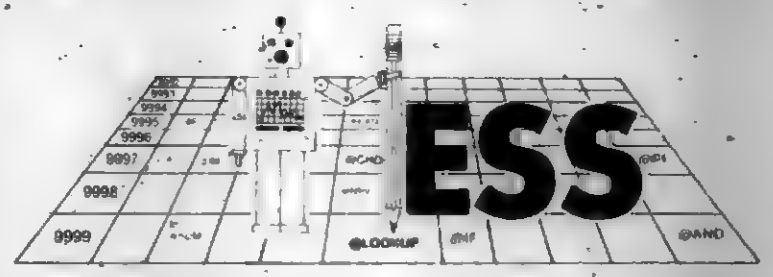
According to the vendor, Emacs can be viewed as a document construction set that uses editor building blocks and tools to construct programs and documents.

Users may access windows and buffers so that more than one text element can be edited, copied or compared at once. Emacs allows the user to create a shell window where he may interact with the 90X's operating system as one of the windows on the screen.

The core of Emacs is written in C language. Higher level extensions of Emacs were written in M-Lisp, a variant of the Lisp language.

Extensions provided by Pyramid for Emacs include tools to correct spelling, execute Unix programs, capitalize words and sentences, expand abbreviations, perform specialized editing when creating programs in C, search and manipulate Lisp code and send and receive electronic mail.

Emacs comes with a multiunit debugging tool for M-Lisp programs. The product is priced at $1,000 and is available now. The vendor is located at 1295 Charleston Road, Mountain View, Calif. 94039.



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Micro Notes

Lytron Systems, Inc. has announced **Lytronet Office Integration Software**, a package that integrates hardware and software so that a user can go from one software application to another without returning to the operating system and can pass or combine data from different software applications. The package consists of a menu driver, a tool for integrating software products, an electronic scratch pad, calculator and calendar, a communications facility for a local-area net, a project management system, an archival retrieval system and an electronic phone manager.

The product is designed to be used in stand-alone mode or in a local-area network under Microsoft, Inc.'s MS-DOS 2.0 operating system. The full package costs $1,000 from Lytron at Building 2, 1675 N. 200 West, Provo, Utah 84604.

GMS Systems, Inc. has announced **Power-Base**, a data base management system (DBMS) for the IBM Personal Computer and Personal Computer XT. The relational, hierarchical DBMS permits the user to define files and interrelationships and to control data entry using a fill-in-the-blanks procedure. All command and file selections are registered with the same three programmed function keys. The product costs $395 from GMS at 12 W. 37th St., New York, N.Y. 10018.

DEC Offers Professional 300 Tools

MAYNARD, Mass. — A new version of the P/OS operating system is among a series of software products announced recently by Digital Equipment Corp. for its Professional 300 series of microcomputers.

P/OS Version 1.7 includes performance and function enhancements, DEC said. It was designed to take advantage of increased memory and floating-point processing capabilities that are standard on all Professional systems. Its license is included in the system price. Media and documentation are sold separately for $175.

DEC's PRO/V7M is a complete Unix system for the Professional 300 series. It costs $695. RT-11 is DEC's single-user, real-time operating system designed to be operated on DEC's PDP-11 series, including the Professional 300. The single-user price is $700.

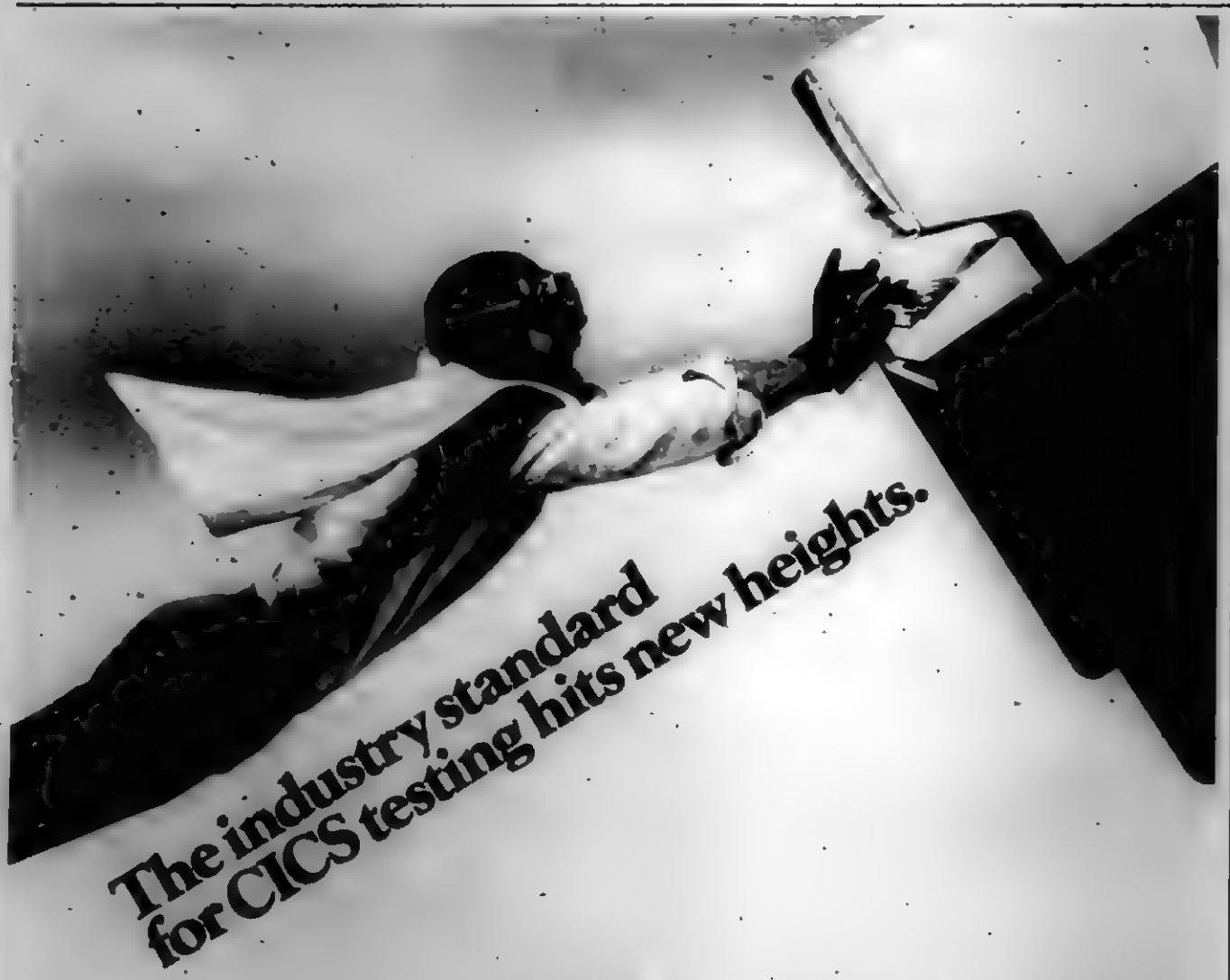
Softech Microsystems, Inc.'s UCSD P-System Version IV.I can now be installed as an application on P/OS to provide a portable application software environment. The price ranges from $250 to $975.

The PRO/Tool Kit was designed for use on the Professional 350. It is said to eliminate the need for a host system in Professional applications development and offers DEC RSX and VMS program development capabilities on the Professional 350. Licenses range from $295 to $495. The Professional Host Tool Kit Version 1.7 is an enhancement that provides improved performance and supports new languages and compilers, the spokesman said. It licenses for $4,000.

The Whitesmiths Ltd. C Compiler for the PRO/Tool Kit and the Professional Host Tool Kit supports the full C language and offers a library of support functions. It costs $550 for the PRO/Tool Kit and $1,100 for the Professional Host Tool Kit.

Application packages that are available include: PRO/Applications Starter Kit, an integrated package of business applications for computer novices, priced at $399; PRO/Datatrieve, an implementation of DEC's Datatrieve-11 interactive data management system for the Professional 350, priced at $495; Professional Inter-System Management, which enables a Professional under P/OS 1.7 to communicate directly with IBM mainframes, priced at $595; and RS/1, a new version of Bolt Barenek and Newman, Inc.'s RS/1 Research System for stand-alone use on Professional 350s with hard disks and color monitors, priced at $1,900.

More information is available from DEC, 146 Main St., Maynard, Mass. 01754.



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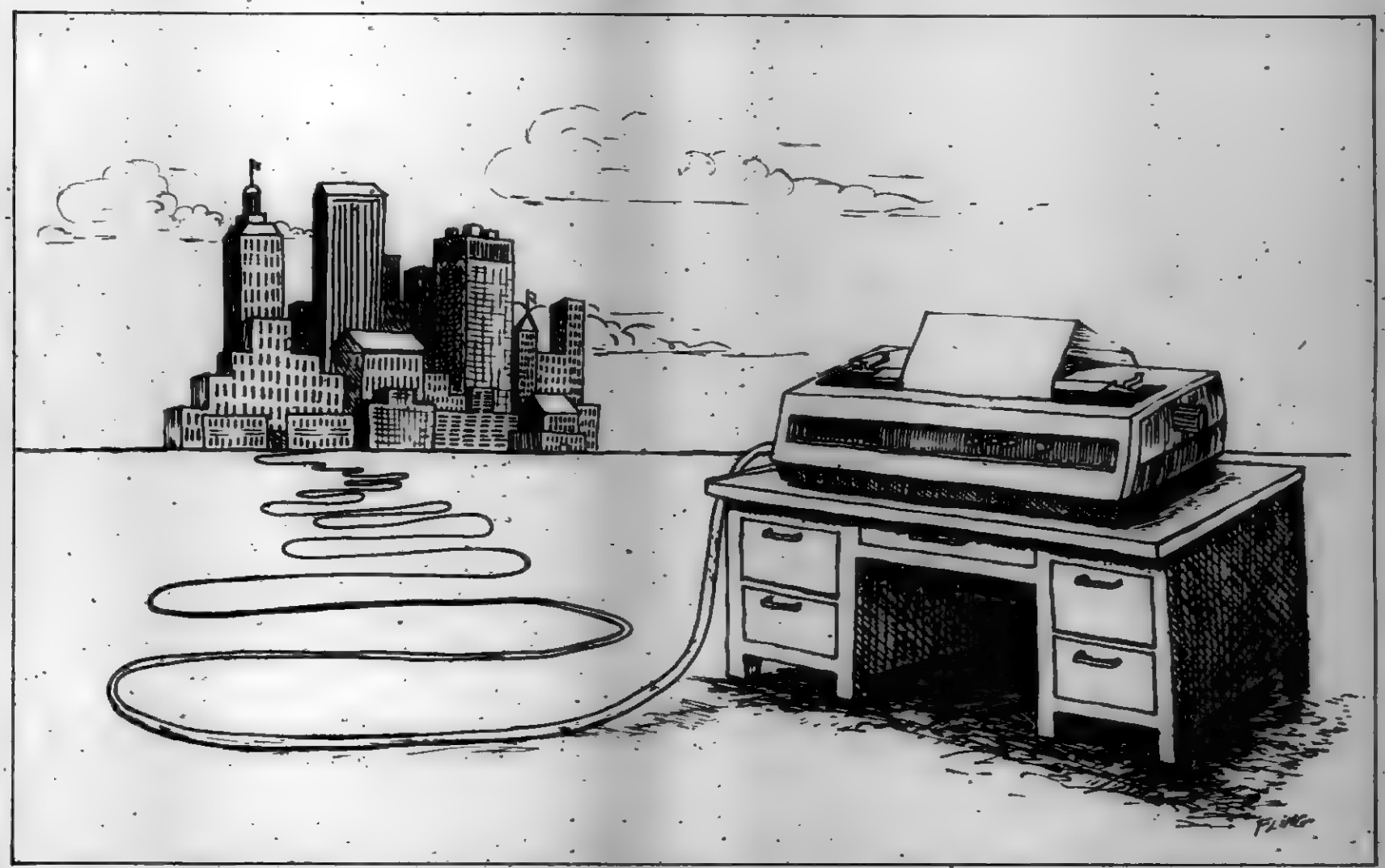

Distributed Processing Or Teleprinting?

By George Tuccio

Distributed printing is cost-effective for many companies that need to deliver hard-copy information to remote locations. Any applications requiring distribution of reports, with system controls on several levels, may benefit from this methodology. The key advantages are simplicity, relatively low cost and economies of volume as compared with overnight mail or distributed processing.

Smaller companies that need to deliver information to remote facilities can benefit directly from the cost effectiveness of this communications solution. Larger companies can cost-justify offering information systems services to locations that might not be able to support a distributed processing setup.

The cost of one software package is spread over many locations, and adding new sites becomes simple.

With a New York-to-California private leased line costing from $1,400 to $1,700 per month, many users are forced to review the ways they are using their communications networks. If they are handling inquiry and data entry transactions on the network, why not provide for transmitting bulk data? After all, the logical need of a business system is to find a faster and cheaper way of getting data from point A to point B (and C, D, E . . .).

As the central facility has its operations mix of annual, monthly, weekly and daily cycles, so has the remote user developed his. And as remote user installations mature and grow, their production cycles typically change, usually leading to the need for a daily-level frequency in their mix.

The one alternative always available

Larger companies may be able to cost-justify distributed printing in locations that cannot support distributed processing.

IN DEPTH

is the overnight mail. At $25 for every five pounds, sending a list of three-part invoices or orders could cost $150. Using that service 20 days per month would cost $3,000, and expenses would increase in proportion with volume.

A logical, twofold solution has developed. On the one side is strict and straight teleprinting: nothing more complicated then a central archive of reports available through some searching algorithm to remote users. Along with this approach goes the need for monitoring, system administration and security.

On the other side lies a more involved procedure of file transfer and distributed processing. Here the source data itself is made available to the remote user in file format; he can present the data in any form he wants. This alternative has its pros and cons. File transfer with distributed processing offers the advantages of flexibility and reductions in central operations work load. With distributed subsets of the central data base, the user can develop reports of his own. This capability reduces the number of special requests to central operations, helps to relieve backlog pressure and satisfies the user by immediately giving him what he needs: It offers long-term potential for new, more imaginative solutions to his needs and makes him comfortable in knowing the logical system/model exists for growth and unlimited support.

In addition, the user can take advantage of his processor's capabilities — perhaps graphics functions with a micro or, for more sophisticated needs, data manipulation using a mini. Of course, simple report generation is a breeze.

One of the disadvantages of distributed processing, of course, and one so significant it affects the very success of a project, is the problem of getting management's commitment to support staffing and operations. A printer, by itself, represents one level of commitment, but a processor is quite a different thing.

It is easy to underestimate costs, and management's expectations of an "expensive" distributed processing center can be unreasonably high.

Commitment, in this context, covers:

1. **Budget.** Staff salaries and quality will be quite close to those at the central processing site. There is no reason to expect less just because the hardware configuration is smaller. The staff's operating system and applications knowledge must be specialized for minicomputers, just as for mainframes. In addition, the time and expense of recruiting for the remote site must be considered.

2. **Goals and Expectations.** Long-term planning of milestones, objectives and

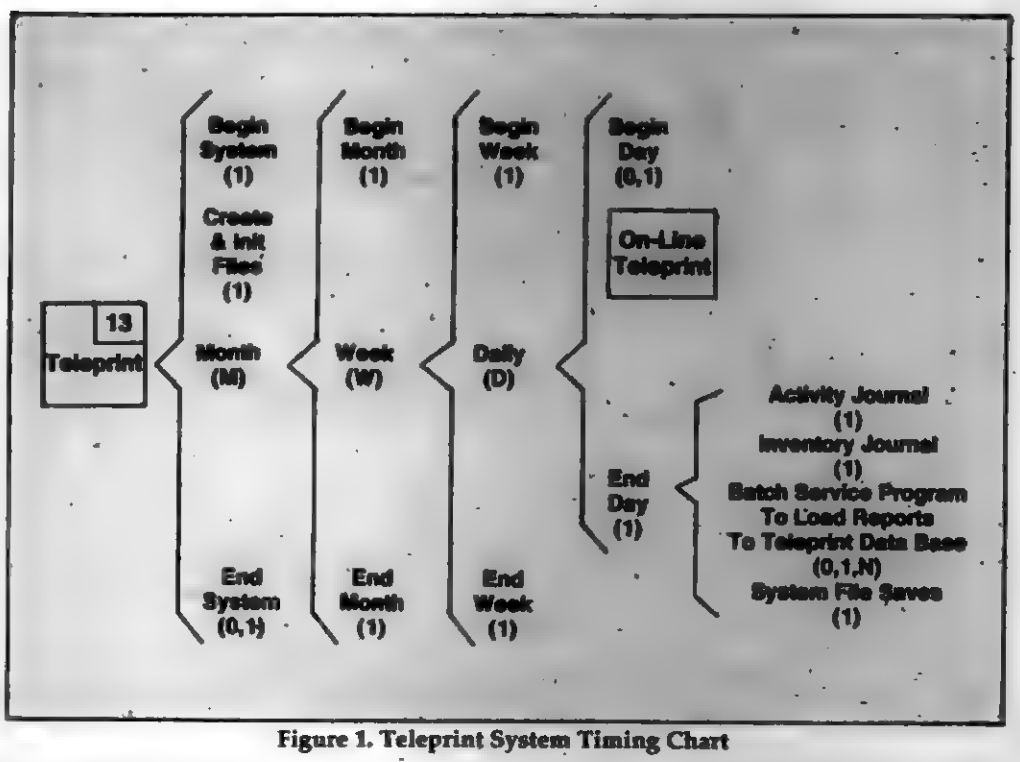

Figure 1. Teleprint System Timing Chart

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goals should be as careful and reasonable as it is for the central processor. There is no reason to expect much more from a smaller processor facility then a larger one. Systems are systems, and running and administering them requires the same conscientious work.

3. Communications. For successful integration of the overall network of processors, remote installations must not only be abreast of but also participate in events that affect everyone. They must be seen as an extension of the host facility. Therefore, communications channels must be created that are integrated into management's functions.

4. Maintenance. Since file transfer requires the remote processor to be up, occasional downtime can stop data transmission; maintenance contracts and procedures must be planned. Perhaps strapping the printer to the processor and to the communications line directly for teleprinting could provide more uptime for report transmission. In any event, downtime should be estimated and planned for accordingly.

The two above alternatives show two levels of commitment. Certainly not all installations require the commitment of a remote processor. Some merely need report transmission capabilities to support management or marketing functions or to receive orders. Of course, the transmission of files does open up future possibilities by allowing unlimited alternatives, but teleprinting in this case can serve as the backup for standard and necessary reports to dual-configured printers.

In addition, some reports do not need to be or cannot be sorted or altered and generated in another format. For legal or auditing purposes, some must not be changed: orders, payroll reports and checks, general ledger, accounts payable, newsletters, mail, reports and memos. For instance, one copy of a report may be on file to be available to many users via security procedures. Management may not want the data to be dispersed to other systems or, because a report is timely, may not want to make it available past a certain date. In such cases, the central site can delete the target data or report at one time, making it unavailable to all.

For these and other reasons, distributed printing has become an alternative attractive and right for many needs. Its economics and ease of implementation reinforce its attractiveness to management.

Just what is teleprinting? "Straight" teleprinting is defined here as the printing of reports by receive-only printers under the control of a processor remote to the printer. Also, reports are selected by a searching process of available reports by the operator who initiates the printing. "Report" is loosely defined as any print data organized in page format.

Following are the functional requirements of a teleprinting system.

Certainly not all installations require the commitment of a remote processor. Some merely need report transmission capabilities to support management or marketing functions or to receive orders.

1. Teleprinting first and foremost must be an integrated and well-rounded system of programs and procedures dedicated to ease of use, administration and efficiency. Single, stand-alone programs are hollow shells that poorly satisfy the logical model that teleprinting must support. Teleprinting should have a timing chart (see Figure 1) that covers all aspects of correctly operating the system to the best advantage of the shop and the users in the short as well as long term.

2. Teleprinting must be multiuser. One logical data base must contain all reports and control data. Although physically the data base should consist of two files (which support a fixed maximum number of reports up to a system limit), logically, all users should access one base. This design permits most efficient use of disk space and fast access

(Continued on In Depth/8)

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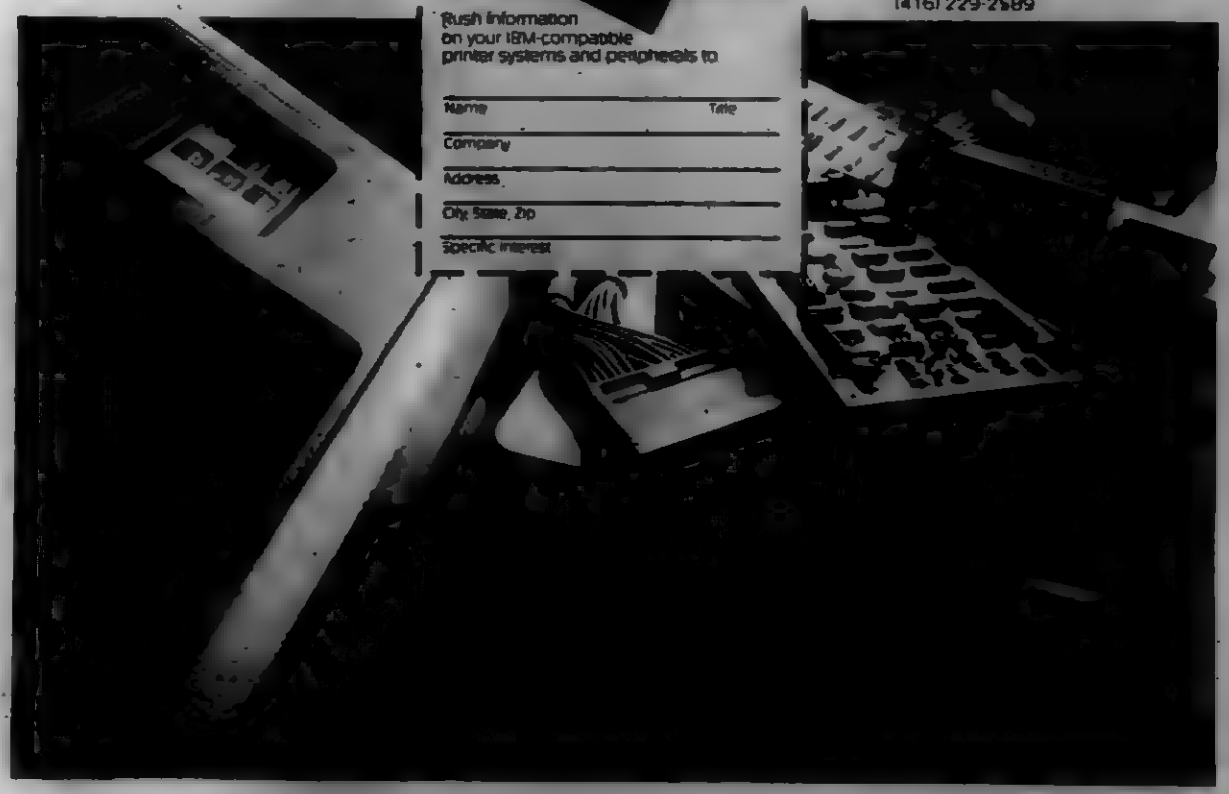

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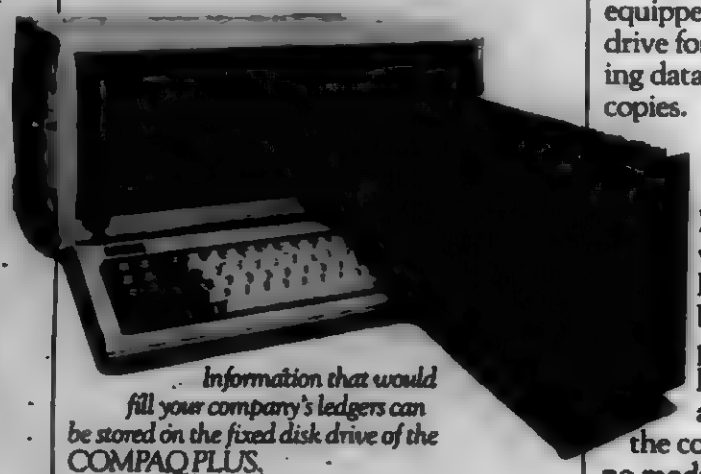

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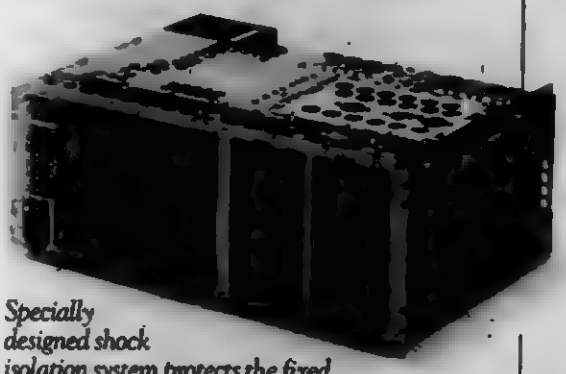

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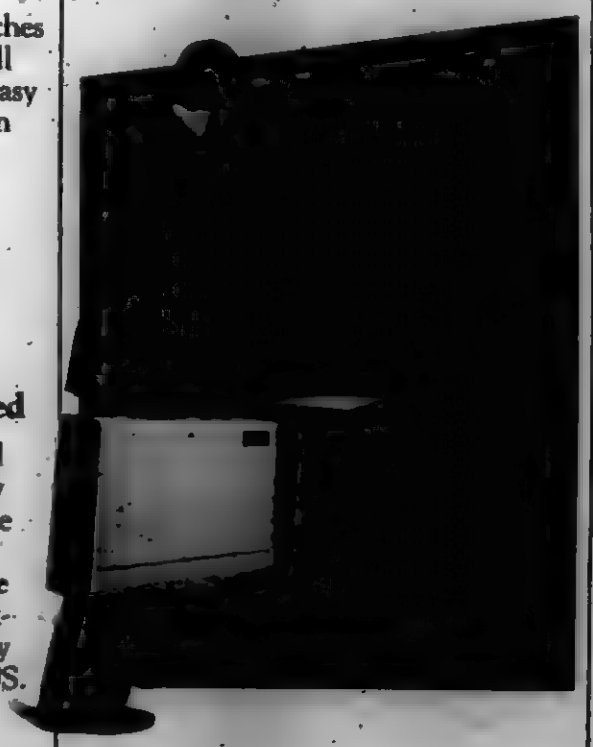

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Manufacturer Replaces Remote Processors

A vertically oriented manufacturing company recently needed a software package to transmit hard-copy reports to its remote facilities throughout the U.S. The company already had a communications network consisting of ground and satellite analog circuits that supported distributed processors in two locations. These processors were on lease and had a tape drive, disk drive and slow-speed printer. Each was valued at $30,000 to $50,000, including the peripherals. The lease cost was between $1,200 and $1,400 per month and included maintenance from the vendor, a well-respected minicomputer manufacturer.

When it became necessary to put a remote processing facility in the third plant, the company became concerned about the expense and decided to reevaluate its position. The plant's offices were nice, to be sure, but they became hot in the summer, and the target room for the facility was small. In short, the space and environment in the office portion of a large factory were not ideal to support a processor. But this problem was not the chief concern of the company's directors. Essentially they saw a commitment to a remote processor as an "overkill" solution to simple report dissemination.

Prior to implementing Teleprint software, the firm transmitted reports from a similar minicomputer at the central site to the remote facilities on a tape-to-tape basis. The tapes in turn had to be cycled and stored in both locations and represented a library. The remote sites verbally acknowledged receipt of the transmission and printed the reports from tape at their leisure.

Since the miniprocessor at central operations was also responsible for receiving order transmission (file transmissions) from large customers and more and more customers were offering this capability, the processor was getting too busy to support remote facilities. Device contention problems developed.

Besides the dollar and commitment overkill and device-contention issues, there came one final point that allowed teleprinting to replace remote processors. The information needed at the remote facilities was, to a large extent, fixed. That is, it had one format and did not lend itself to further analysis by the end user. In fact, transmitting a data file so the user could "massage" or otherwise process or prepare the data on a remote processor not only would be unnecessary, but could yield reports inconsistent with central operations. Synchronization or communications problems could develop.

The one issue most important to this small and growing business was control. Managers at the central office expected their orders to be carried out to the letter. There was no need to alter central office reports at all, and transmittal of hard copy was the only need.

Besides the transmittal itself, remote users would go on-line to the central site's processor via their terminals to perform data entry functions that updated master files in the nightly applications production runs (batch). This step completed a simple process that allowed efficient communications with, and control of, factories from a central executive committee.

The replacement of processors with printers purchased outright for $8,000 to $12,000 represented dollar savings. In addition, the company avoided the problem of potential processor obsolescence. The general offices could retain their control and monitor information dissemination, while the remote facilities received the information they needed.

In this case, technology considerations were reduced on several fronts:

1. Hardware: Service of a CPU, tape drive, disk drive and printer was replaced with service to only

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Trying to solve abends using these hex dumps can really tea a person off.

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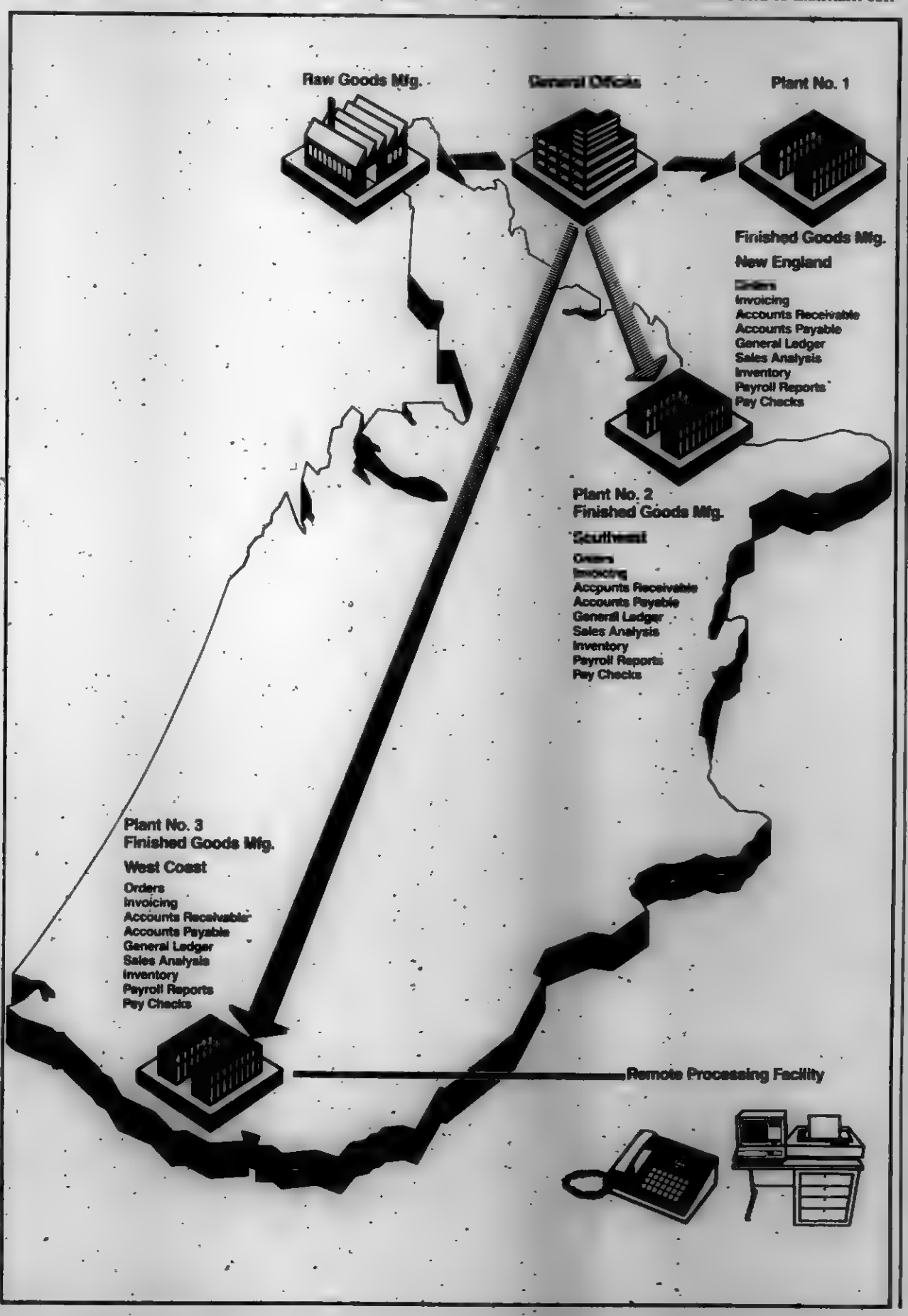
Teleprinting Fills the Bill

one high-speed printer.

2. Software: Operating system and other software problems resulting from unit failure or "other events" at the remote facility were no longer an issue. Teleprinting requires only a telephone circuit and simple printer controller to be operable.

3. Training: The process of developing an operator requires minimal time. Printer familiarity (via a printer user manual) and teleprinting software instruction (via a user manual) are essentially all an operator needs.

The company now enjoys distribution of its hard-copy information with the strict controls it finds necessary to get the finished product delivered on time and to maintain control over raw goods scheduling. With simpler remote facilities, it avoids the headaches associated with supporting expensive equipment in several locations. And, if the firm wants to add another remote facility that fits the same qualifications, it can implement one by putting in a line, a terminal and a printer that can be up and running within a week.



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IN DEPTH

(Continued from In Depth/3)

times, while maximizing distribution of reports across users without physical boundaries.

3. The system must contain various searching algorithms. Searching refers to the operator process of selecting the target report. The simplest, of course, is sequential search through the table of contents. However, via a more advanced data base table of contents, searching via other criteria becomes possible:

- By date or date range.
- By names that contain or begin with a given string.
- By subject or system.
- By owner or user name.
- By geographical location of the owner or user.
- First-in, first-out/last-in, first-out.
- From whom/to whom.

4. Reports can be started from a page number or restarted from where the user last left off (or anywhere else, of course). Printing can be interrupted by request at the terminal or by some process at the printer (such as automatic shutdown after off-line status continually for eight to 10 minutes). And, detail report information should be available after searching but before printing initiation such as total pages, last page printed, report date, name, pages to print, estimated time of print and comments.

5. The systems should allow simultaneous terminal monitoring by user *while* printing, indicating the current page printing, number of pages and lines printed and time remaining.

6. Local printing can be initiated by central operations to print reports on the host system printer, just in case a remote printer is *not* available.

7. Users should be able to communicate with each other through the teleprinting system, 25th-line messages and mailboxes as well as comments attached to reports. These communications reside on central files and are distributed through several rules. They provide flexibility and allow vital information to move around the information systems environment. An example of the use of the comment field associated with a particular report is: Please note data not accurate past Oct. 15, 1982.

8. A system administration function is necessary to a complete system. This function should be limited to authorized access by central operations only. These functions should include:

- Interactive analysis of the data base at a technical level including record location, physical keys, extent information and so on.
- Interactive monitoring of printers for queue volumes and status. This is a technical-level analysis that is reiterative and continuous and gives the analyst detail data regarding printer operation. It also allows network-level monitoring by Sysadmin and central (console) operations. For example, they can tell who is currently using the system.
- Console operations should be able to log people off individually or by groups and to send 25th-line messages to terminals or to idle (but logged) printers, individually or by group, storing messages for those logged off and delivering them when that person(s) logs on again (mailbox). Console operations should also be able to stop printers individually or by group with a notice output on the printer.
- The system should

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allow interactive creation/deletion of users. Qualifications for the user would include the maximum number of lines he is allowed to use, reports he is allowed to print and other limitations, if necessary. Of course, one more consideration at initialization time would be security privileges.

- Security privileges interactively set up the user to access or not access other users, groups, reports or groups of reports. By use of the control data base (that handles searching algorithms), it is possible to flag reports or groups of reports.
- New printer locations in the network can be set up interactively along with user, security and usage information that pertains to them. When is printing allowed? Printing by whom? For how long? Also included should be phone numbers of a user contact for calls, buffer sizes, service information and so on.
- Provision should be made for offloading or moving reports to tapes or other media. This can be of use for reorganizing the base and creating more contiguous extents on a large and old or mature data base.
- Interactive printer tests should aid in debugging or checking printers in question: log-on test, volume printing test, cycle-up/cycle-down repetitive-type test, tests with various buffer sizes and so on.

9. The system must be multithreaded. "Multiuser" does not automatically imply multithreaded, which means the *simultaneous* use of teleprinting by many users. At installation, teleprinting can be "gen'ed" (initially set up) for a maximum-load formula of users and for a number of simultaneous printers to keep the teleprint load from exceeding system and network limitations.

To repeat, simultaneous use is a must. This requirement means logical software considerations to control physical data base actions and more. Issues of immediate deletion (write) or deferred implied write actions (such as loading) come up and must be treated accordingly. There are a few ways to handle these logically before getting caught up in the physical aspects.

10. For users without printers or for making sure the correct report has been located before printing, a scanning function at the terminal allows several interesting schemes:

- The option of viewing the left side or right side (since reports are typically 132 characters across and terminals are 80 characters across).
- Searching for strings to identify the area you wish to view, then forward or backward movement to see more.
- User-arranged viewing of reports at the terminal. This means columnar rearrangement of the data as it comes to the terminal for viewing.

11. Central operations should be able to initiate remote prints locally. Consequently, teleprinting must have some intelligence to control the printers. Of course, this feature depends on the printer purchased. More is said on this below in the section titled "Cautions." For now, keep in mind that successful local initiation depends upon successful local control of the remote device.

12. The system should provide clever loading alternatives. There should be a few interactive and batch load mechanisms to take raw

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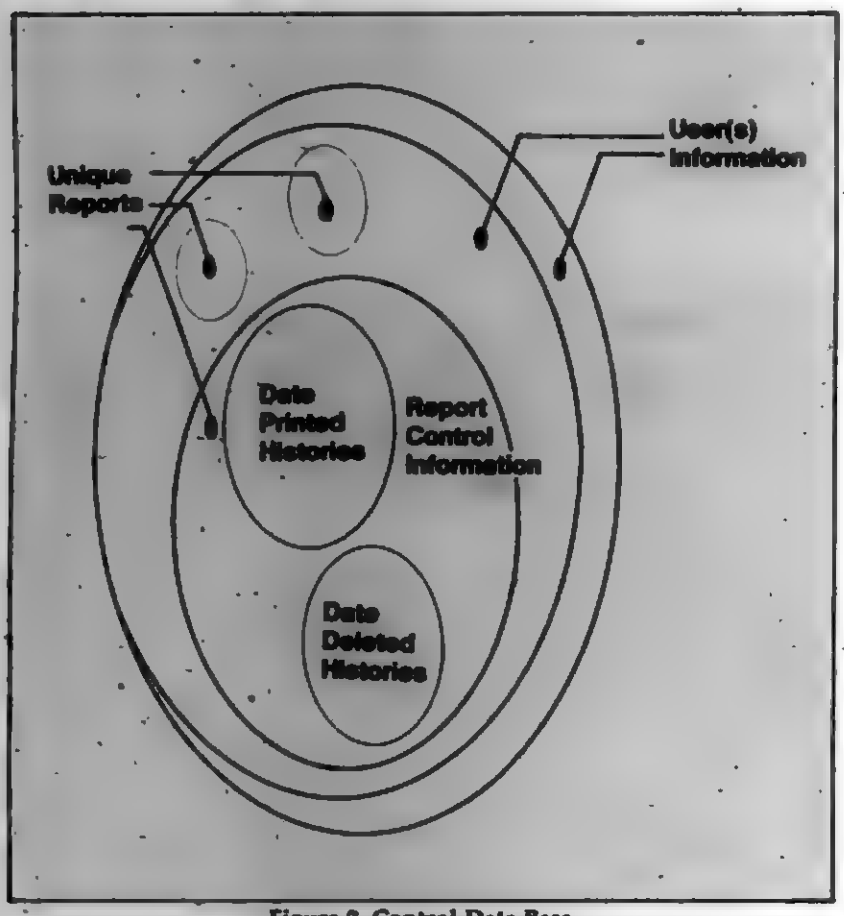

Figure 2. Control Data Base

report data and upload it to the teleprinting data base. This should make central operations' life easier and alleviate special program writes. Here is one of the places where the report may be titled and flagged with security information. Of course, defaults should be in place and updatable. That is, the defaults can be changed for subsequent loads *and* the report associative control data should also be updatable by central operations or system administration after the load.

- Users interactively create reports, memos and mail. Of course, the mechanism here falls into an issue area of requirement No. 6 (implied write privileges) and word processing software to allow inputting of text. This function therefore could develop into a moot issue as an overkill option for a teleprint system, but I feel it belongs here.

14. The system should have built-in printer control intelligence. Excessive instances of "bad status" from a printer such as transmission errors or busy conditions should cause automatic termination of that printer. The termination should be reported to the console and the user (if possible) and logged in the system files.

15. Probably the heart and success of teleprinting is the efficient and fast storage of mass report data. On-line disk space is getting less expensive, of course, but it is still a revered resource and should be used conscientiously. Compaction of report data is a very nice feature. Repetitive characters should be compacted and stored that way. An attractive feature on most minis (one in particular is the Honeywell, Inc. Level 6) is variable-length records, where the software work is handled by the operating system. User software is not needed to calculate record size before issuing the write. Only with this feature can substantial space savings be realized.

In addition, compaction statistics can be generated either by report or as overall group summaries for information purposes. These especially would be very interesting as percentage-type figures showing efficiency.

Design Details

To represent a sound teleprinting logical model, the data base must meet physical requirements as well as control and logical requirements. On the logical and control front, we have a need to store information and history data for system administration and user personnel. This data is low-speed, random-access-retrieval and low-speed, random-write-update in nature. In addition, the data

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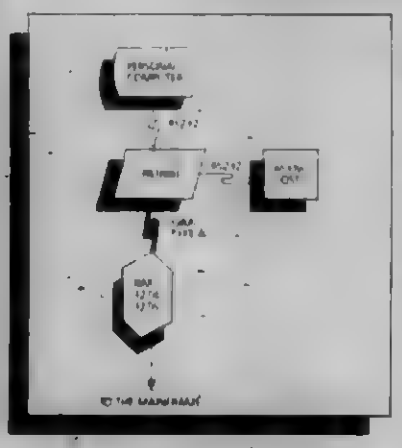

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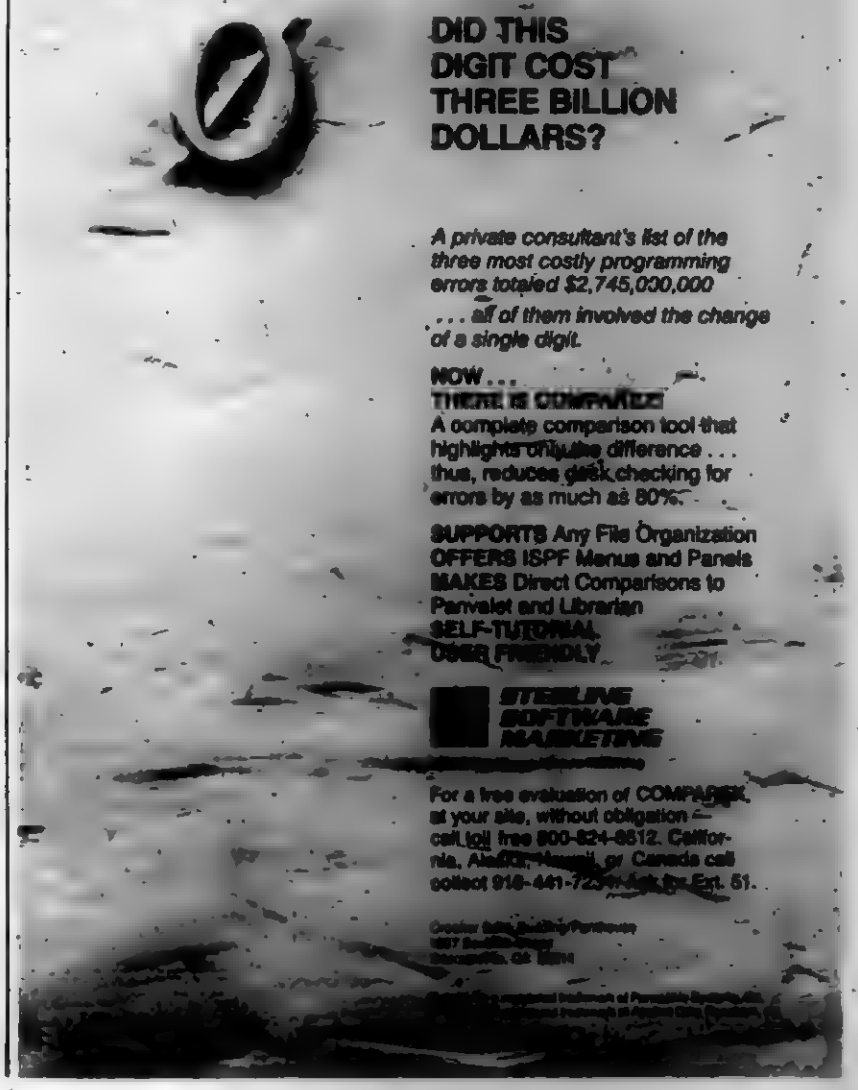

IN DEPTH

associations and relationships are complex. Figure 2 is a Venn diagram of the logical structure of this portion of the data base.

Complex searching and reporting schemes can only be realized if this control data base (CDB) is handled by a data base management system. A schema approach here is justified by offering a valuable data dictionary, as well as multithreaded access under system control and flexible logical/physical multipath access.

The CDB controls user statistics by reporting size allowed, size used, security privileges and other information not only at the user level but also at the report level. It is this area, physically, that is updated by system administration to create, delete and modify user and report data. The report data base (RDB) becomes nothing more than a physical workhorse vehicle to hold the voluminous target data.

CDB stores histories as well as offering a comprehensive, detailed report vehicle for current and past data. Periodic summary data becomes easily available with this sound data base structure.

It is interesting to note that the logical model for CDB is quite simple and a textbook example of the hierarchical data base. Certainly the implementation of this model is perfectly suited to any sound hierarchical data base system.

At this point, it is important to address one other aspect of teleprinting that is crucial to multithreading as well as offering sound communications. There are two key communications considerations at the root of this system. Each can be addressed separately.

The printers represent high-speed data devices that only receive data, but do so in an environment prone to transmission errors and retries. The communications supervisor should offer retry capability at its system level to relieve the teleprinting system from having to handle retries at its software level. Obviously this relief is only partial, and it is still the teleprinting software's responsibility to offer sound status checking and control of printer operation. But poor system-level control of errors can leave you with locked queues and network-level problems.

The terminals and the communications supervisor's control of these low-speed devices are another interesting aspect. For screen/menu conversation, retries are not an issue. For display/scan processing, retries and error handling from the system are important.

One other item is the transmit button on the terminal. Repetitive transmissions without intermittent responses can destroy some communications supervisors, overflowing queues and disconnecting devices. It makes life much easier if the communications supervisor or software environment prevents or controls this situation physically or logically where repetitive transmissions are ignored by the system before the teleprinting software.

The printers receive data in an environment prone to transmission errors and retries. The communications supervisor should offer retry capability at its system level to relieve the teleprinting system from having to handle retries at its software level.

In the Honeywell environment, TDS (sometimes called TPS) is a transaction processor that allows logical-level control of receives and sends by controlling the conversation based on program-level requests. Through the use of program flow techniques in conjunction with the Cobol SEND verb, this supervisor overrides terminal operator action and disregards multiple "impatient" transmissions. This relieves the network and the teleprinting software of a critical problem and further helps to make the teleprint software package a sound product.

Overall, a supervisor such as TDS allows for system-software-controlled multithreading, while efficiently using CPU resources through simultaneous usage of programs (reentrant code) and multiple copies of only working storage. TDS system-level options and calls also allow for

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IN DEPTH

a host of various transaction-level and interprogram communications.

Report Data Base

The only remaining item that is crucial to multithreading teleprinting is the special report data base (RDB) mechanism. Since RDB is a sophisticated relative file with pointers, extent handling and the like, it becomes obvious that write operations that alter the control structures' fields contained within RDB must be done carefully and individually. With the communications supervisor, such as TDS, this problem can be taken care of by creating a logical driver ("traffic cop") to control the execution and timing of the I/O module.

Reads get permission to happen concurrently, but writes, such as deletes and loads, have different requirements to be met before they are executed. The driver communicates on several levels with everyone, but passes I/O requests to RDB selectively and thus allows this complicated interface to occur.

A report data base must be conceived and physically designed with speed, efficient storage of bulk data on disk and self-maintainability in mind.

In our experience, we designed a relative file that will always fill each and every relative record number in the file until the entire file is filled, with no holes or gaps. This process requires some special control records on the file itself, but only a few (several hundred), and they reside in a reserved area of the file. File I/Os to these records are kept to a minimum and do not impede performance.

In order to take full advantage of a relative file, each relative record number (RRN) must be used. This is not a problem on the first usage of an empty file. After subsequent deletions of reports, "holes" begin to develop in the file. Again, subsequent loads can only fill the various holes, and so on (see Figure 3).

This situation introduces the concept of fragmentation and extent handling and can go on until there is extreme fragmentation of the file.

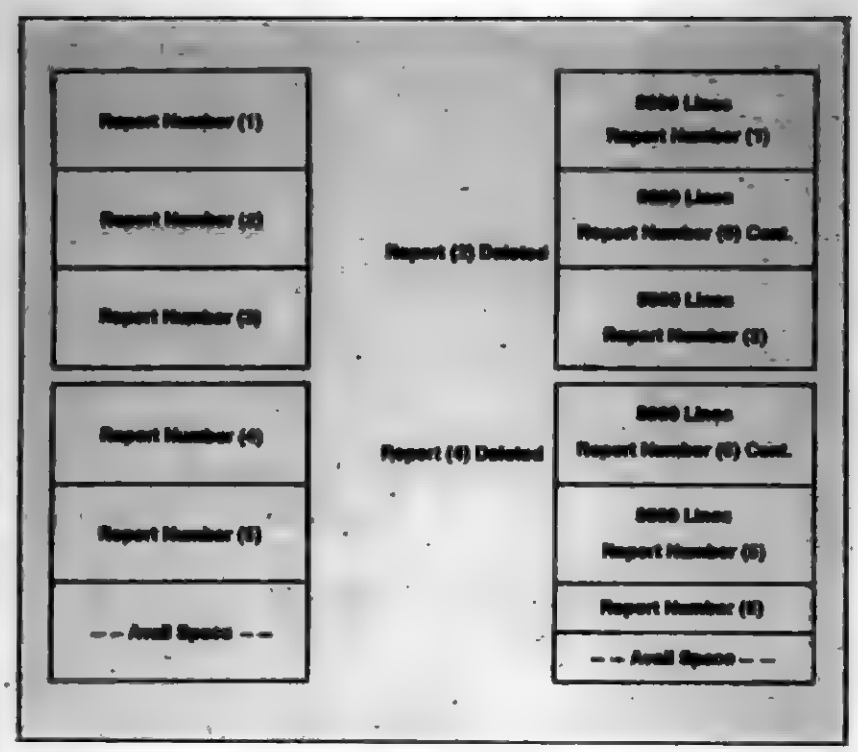

Figure 3

The self-maintainability of the file comes into play when report deletions occur and available space (extents) go back to the available space extent pool and are available for reuse.

The life cycle of the file is dynamic, to be sure, and control records earn their keep as they are worked extensively. However, the file does not need reorganizing unless system administration decides to do it to reduce head movement on a heavily fragmented RDB file. This kind of fragmentation occurs when old reports are left on file for a long time and only a select few are deleted. Imagine, if you will, a two-million-record archival data base of report-type data that rarely gets changed. It spans two physical drives, although it is one file (the operating system handles the physical considerations of access).

This is a prime example of the rare kind of situation that occasionally may call for explicit reorganizing. In most cases, data is usually discarded when it gets old. New reports replace the old ones, and the cycle completes itself.

Teleprinting not only can be used for normal production report distribution but also for special report distribution. Imagine company profiles on file, available for customers of a service company. These profiles may not change daily, but rather quarterly. In this case, the teleprinting system becomes a long-term repository of data, less dynamic and more static. This is not a problem, but the need to be able to reorganize becomes more realistic to prevent wild head contention on the disk drives.

Newsletters, memos, mail, insertion orders to publishers, orders to a factory and notices of product availability against inventory to customers become distributable through the use of teleprinting software.

Some Cautions

Like any other attractive product, teleprinting is not without its caveats. Distributed printing starts off with one assumption: A central CPU drives the remote devices.

The decision to use or not use distributed printing in your environment starts, of course, with an explicit need to distribute data without the use of a mail carrier or remote CPUs. Once the decision is made, for whatever reason, to use teleprinting, a series of issues present themselves regarding successful implementation.

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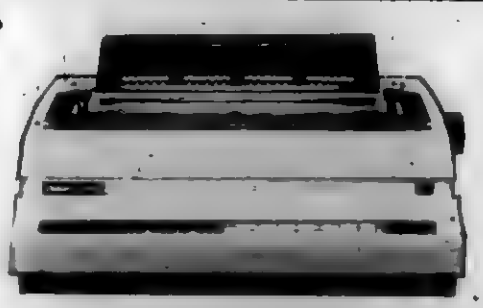

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IN DEPTH

Capacity analysis must ensure that the central CPU can adequately support the new set of programs and supervisor(s) necessary to operate the teleprinting system. Memory and CPU cycle times may not be there to support the product. The CPU must be able to satisfy the system quickly. Without quick service, printers will stall and teleprinting will perform poorly. Multiple printers seeking service simultaneously can cascade problems and degrade the entire teleprinting system and the whole host system as well.

The printers themselves are extremely important. Their selection is crucial to enjoy a very efficient and flexible system. During the selection process, it is important to consider a few issues:

1. Remote hardware presents remote service problems. These logistic problems must be handled and documented thoroughly from both a financial and a procedural point of view.

2. Controllability of the printers is also key. As a general rule, the more control you have over the printer, the better. A number of features can help in handling unattended, remotely initiated, printing.

3. The printer's ease of use will play a part in the overall long-term success of the system. Paper loading, ribbon changing and so on must be reasonably simple. Do not require that users wear smocks to print reports.

4. Buffer sizes and speed and other operational details must be mixed and measured to balance the network. The harmony of buffer sizes and speed prevents stalling and excessive attempts to fill a full buffer (busy status signals). Careful planning here will help prevent network overloading.

5. Network overload is a key issue. Printers operating at 300 line/min impose a tremendous load on the network and the communications supervisor. A 9,600 bit/sec modem can service the printer successfully. I have had six synchronous terminals operating off a single intelligent controller with the controller and a 300 line/min printer attached to a multiple interface unit (MIU). The MIU went into a 7,200 bit/sec channel on a split-stream modem. The other 2,400 bit/sec channel was used for backup file transmission between minis.

Although this is not the best way to configure a remote printer, it was an interim solution. It was, of course, impossible to transmit files over the 2,400 bit/sec channel simultaneously while printing over the faster one. However, the six terminals did not suffer too much while printing.

With line turnaround, you really shouldn't try to drive a printer past 200 char./sec. In any event, whatever your particular situation, design your network accordingly to drive these devices. Money spent on communications hardware, if necessary, would be well spent.

6. In terms of disk space, 100,000 print lines at 132 char./line can take up 20M bytes. Assuming that drives now will be accessed by many simultaneous users, head contention must be kept to a minimum, and other applications should be moved off and relocated. Can you afford the space? And can the drive support the activity?

7. If a user deletes a report but later decides he needs it again, sufficient cycling and backups and the procedures to access them must be implemented. This off-line archive becomes a resource or library, and its fundamental guidelines and rules for maintenance should be carefully thought out.

To summarize, teleprinting can be a very cost-effective method of meeting your logical needs. Relatively inexpensive in comparison with other alternatives, it operates as a system by itself and simply will transmit and print any report in page format. It is a remote spooler. It is simpler than the remote CPU approach and delivers data immediately with friendly user interfaces (the CRT screen and its menu-driven approach). Teleprinting is another way to take full advantage of the data circuits in the information systems environment.

About the Author

George Tuccio is founder of George Tuccio & Co., a two-year-old DP contracting firm based in New York City. The company serves minicomputer and mainframe users in the areas of systems design and implementation, maintenance programming, hardware and software benchmarks, conversions, data base and communications.

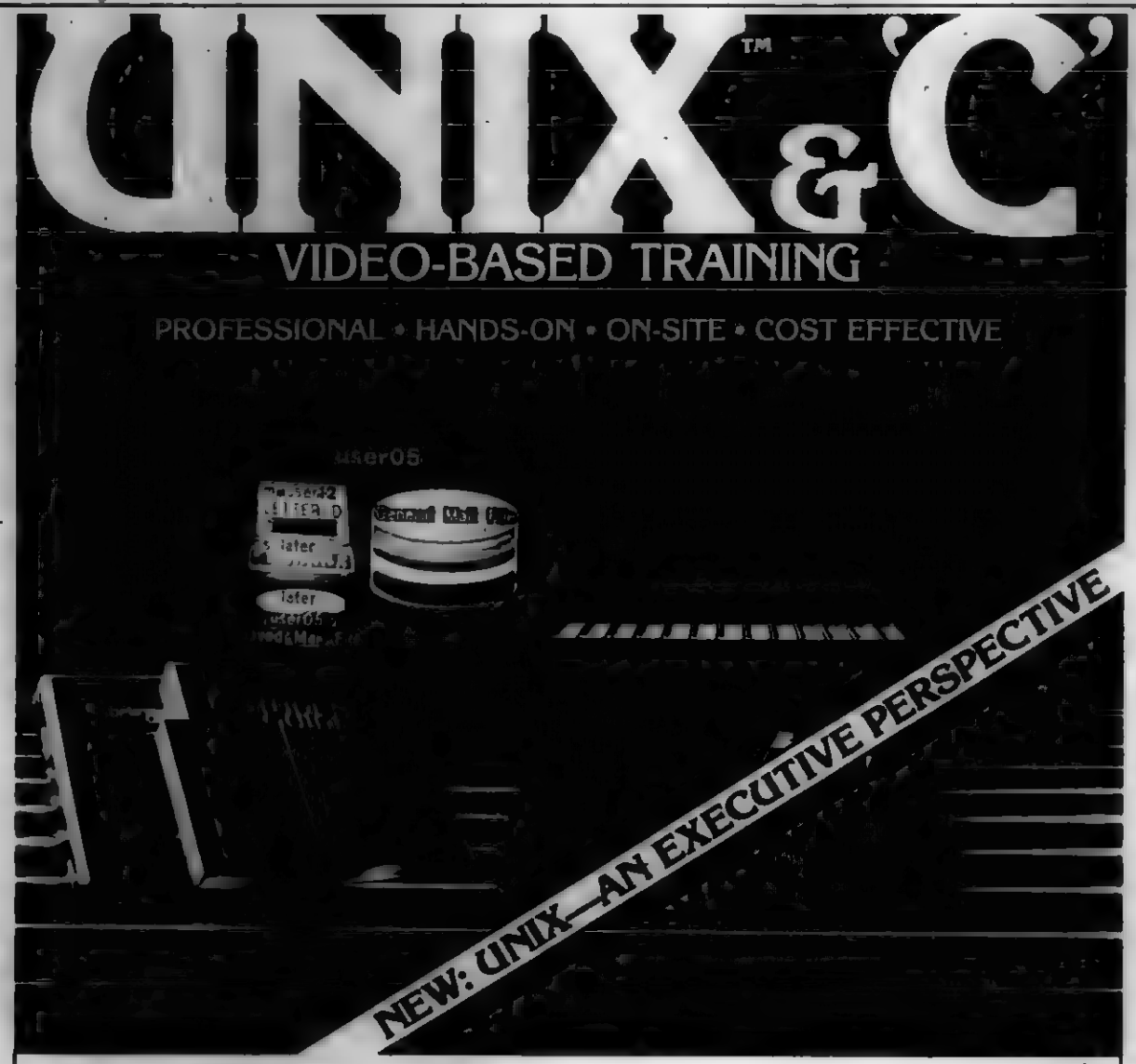

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Photo Courtesy of The Vault Co.

On-Site Hazards, Off-Site Safety

By Alvin Arnell

Professional off-site media storage facilities can satisfy all of an organization's requirements for securing and protecting data and documentation, as well as allowing fast access to it anytime in the event of an emergency.

Many private safe depositories, in addition to providing security for personal valuables, have installed media vaults. The benefits to the company requiring extraordinary protection for magnetic media and documentation are extensive.

The security measures for protecting safe-deposit valuables include:

- Environmental conditioning.
- Armed guards.
- Underwriters Laboratories rated (UL/9R) vaults and vault doors.
- UL/grade AA vault alarms.
- Accessibility at all times.

But in addition, separate media vaults have been designed to meet stringent specifications for the environmental protection of magnetic media.

These facilities should be reasonably accessible so that tapes, disk packs or other essential media can be retrieved within an hour or less in an emergency. Most of these facilities supply their own courier service to maintain secrecy regarding where materials are kept.

Many DP managers feel that there are sound alternatives to professional off-site storage facilities, but each alternative has its drawbacks:

- Bank vaults are far from suitable for

Storage vaults are designed to meet stringent specifications for the environmental protection of magnetic media and documentation.

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IN DEPTH

magnetic media storage. Unquestionably they provide "vault" security, but they lack every other characteristic of a sound data storage facility. Vaults are not accessible before or after banking hours and, in most cases, environmental conditioning, if any, is shut down at closing and over long holiday periods.

● On-site storage in another area of the building or another location in the same complex exposes magnetic media to the same disaster. In addition, magnetic media are handled by internal employees with access to originals and backups.

● Reciprocal data exchange between company divisions exposes data to nonprofessional handling and erratic transportation methods that expose data to all kinds of jeopardy.

● Public records warehouses lack, in many cases, even the most minimal standards of environmental and physical protection.

Assessing Storage Facilities

A number of cost factors should be considered:

1. Storage cost per unit of magnetic media per month.
2. Special charges for depositing or withdrawing magnetic media.
3. Start-up or initiation charges.
4. Special emergency charges. Do facilities provide 24-hour access, 365 days a year, without additional charges?
5. Courier charges. Can you use your own courier or must you use the one provided by the facility?
6. Fees for boxes, containers and the like.
7. Special charges based on the number of times you access tapes per day, week or month.
8. Special charges for contingency test plan services (other than for courier).

Many magnetic media vaults have been constructed in the basements of high-rise buildings. What happens if a sprinkler goes off or a water main or pipe breaks during the evening or on a weekend or holiday?

Off-Site Storage Check List

Because protection of vital records is their only business, off-site facilities provide:

● A high level of physical and environmental protection for magnetic data and micrographic records.

● Vault temperatures constantly maintained at 62°F (16°C) to 65°F (18°C).

● Relative humidity controlled at 50%.

● Vault rated by Underwriters' Laboratory.

● Armed guards.

● State-of-the-art alarm systems and central station response teams.

● Safe deposit boxes large enough to hold all backup documentation in a separate vault from the magnetic media.

● Noncombustible furniture, floor coverings and other construction materials.

● Specially engineered air-conditioning systems operated 24 hours a day, with standby units ready to take over in the event of a malfunction.

● Halon fire extinguishing systems that eliminate the need for sprinkler, chemical or foam-type extinguishers.

The vault is constructed so tightly and insulated so well that in the event of a total loss of power, environmental conditions and temperatures can be maintained for hours until service is restored. Backup generators are available in some facilities.

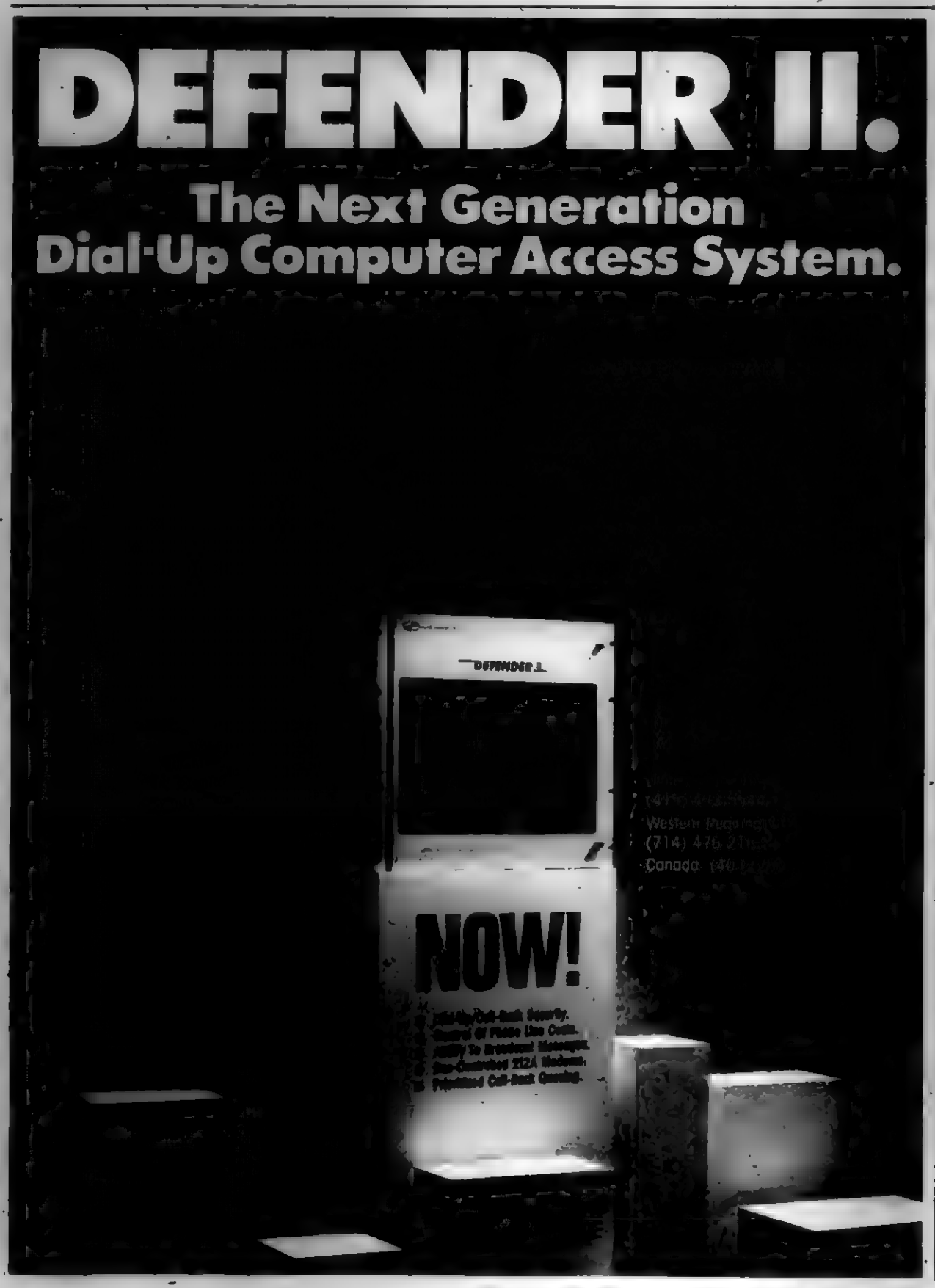
The vaults are constructed of reinforced concrete, heavy steel plates and special vault doors, and the vital records vault is isolated from the rest of the facility (a vault within a vault). This protection further insulates it from external environmental conditions.

Physical security measures include specially designed storage cabinets; state-of-the-art burglar entry systems; smoke, fire and temperature sensing devices; TV monitoring systems for the building and vault; and armed guards. All employees are thoroughly investigated and fidelity bonded.

All magnetic producing fields have been completely eliminated from the building and the vault. Radiation-measuring instrumentation is incorporated in the mantrap entry to the facility security interior.

Only facility employees (vault librarians) have access to the stored records vault; no unauthorized person can access the media vault.

Total anonymity is ensured. All systems are run by account numbers. No one knows where your backup



data is secured.

Some examples of the type of facility described here are Guardian Safe Depository, Data Security Division, Fair Lawn, N.J.; Private Safe Place Center/Data Bank, Beachwood, Ohio (Cleveland); MHA Safe Deposit, Newton Center, Mass.; San Diego Private Security Center/Data Security; The Vault Co., Atlanta.

A number of these facilities, as a service to the computer user community, run contingency disaster/recovery plan workshops. Speakers represent some of the leading experts in the country on data processing insurance, DP auditing for disaster planning and recovery and designing the disaster plan.

Complete information on these workshops, which have been recognized and accepted for continuing education credit by the EDP Auditors Foundation, may be obtained from Dialog Communications, 40-26 Broadway, Fair Lawn, N.J. 07410.

Security Overview

An uninterrupted DP operation depends upon provisions to prevent, detect and mitigate loss from damage or unauthorized use of equipment, personnel, software or data. Special measures against intentional and accidental threats should be included in these physical security measures.

Physical security cannot be regarded as an independent function. Procedures for backup (both hardware and software), housekeeping, auditing and documentation supplement the protection provided by physical security measures.

The physical security plan should be designed for maximum protection of every phase of DP operations, primarily to ensure and maintain the accuracy and continuity of operation. All of these aspects must be considered not only in the effectiveness of the security, but the cost of the program. Although it is not practical or possible to safeguard completely every aspect of a computer installation, a thorough evaluation of alternatives is important.

This evaluation should include an analysis of potential risks including the probability of occurrence, costs and remedies available to minimize exposure.

Physical security of the installation is only one of the many aspects that must be considered and coordinated with the entire data processing operation and "user" departments. Physical security alone cannot be regarded as an independent function. Control and procedures such as backup (for hardware and software), housekeeping, auditing and documentation supplement the protection provided by physical security [redacted].

System Vulnerability

The first and probably the most important aspect of data file media security is to recognize the greatest threat — the vulnerability of the system and the data files to the facility's own staff. Personnel security is vital to the overall security plan, especially when we direct our attention to the value of data stored in the computer — and on the various magnetic media used by the system. It is for this reason that controls over personnel and the assignment of security responsibility play a major role in establishing a sound operation. A spilled cup of coffee can do more damage than could probably be planned by someone attempting to penetrate the system.

Backup of operating system software, application software and documentation is an important phase of contingency planning. The operating system software must be backed up with at least two copies of the current version. Without it, the most sophisticated contingency plan is useless. Application software, which includes both source and object versions of all application programs, must be maintained the same way as the operating software.

Backup copies of the programs must be updated as program changes are made. Minor updates to backup copies may be made on a group basis, but major revisions or enhancements to application programs should be updated immediately. Storage, testing, cycling procedures and updating methods should be addressed in the contingency plan.

Documentation for the operating system and the application program must also be backed up. A complete set of documentation should be maintained at an off-site location. Documentation should include current copies of:

- A record of operating system options and modifications.

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- Application flowcharts.
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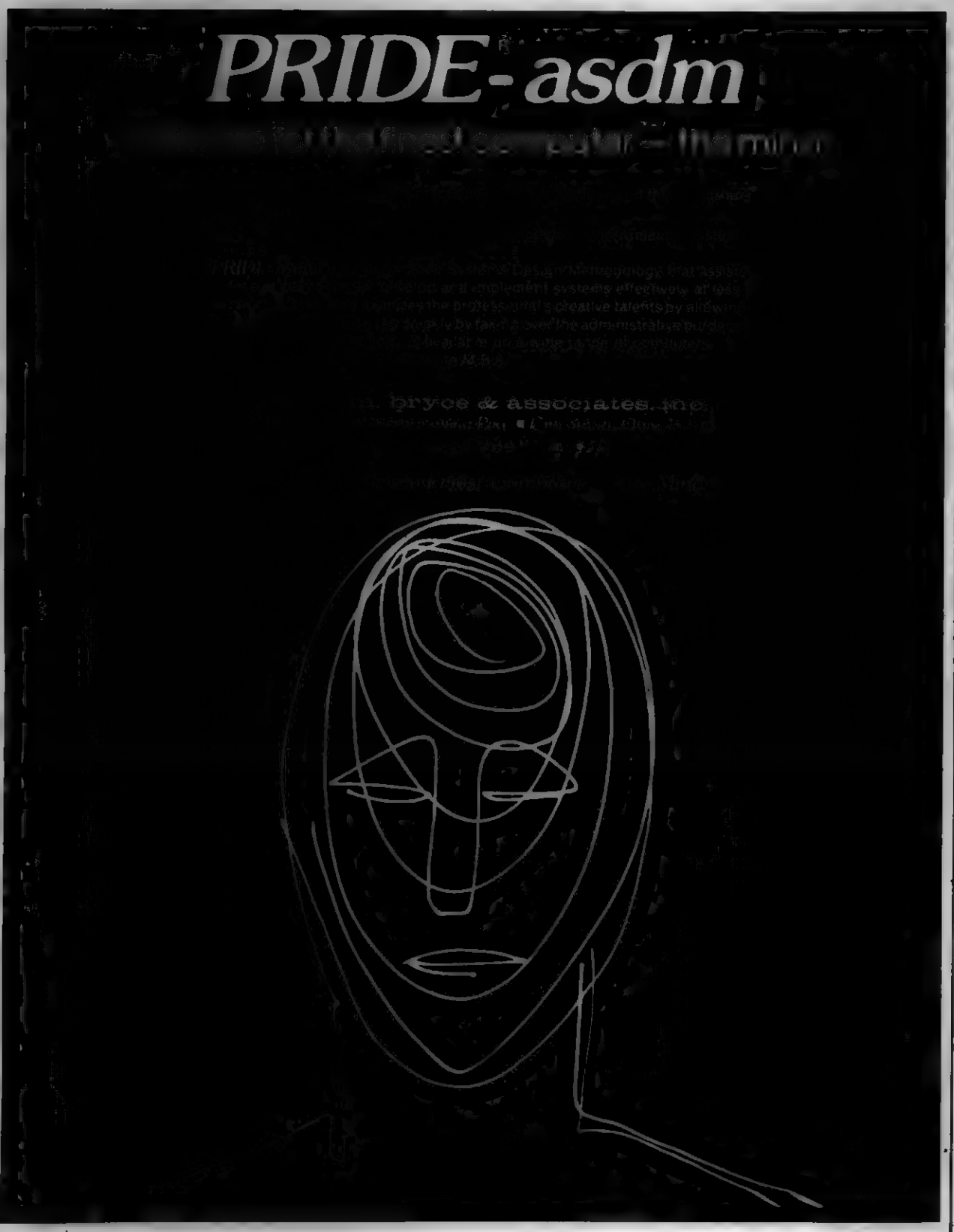
- Operators' run instructions.
- User manuals.

Procedure manuals are also necessary during recovery from a disaster. These would include manuals on systems and programming standards, documentation, file libraries, computer operation procedures and data control procedures — and most important, a copy of the procedures outlining plans for DP operations during emergencies.

Consider microfilming all manuals for off-site storage. Provision should be made at the backup (operations) site for microfiche or microfilm readers and hard-copy reproducers.

Consideration should be given to microfilming all manuals for off-site storage. Provision should be made at the backup (operations) site for microfiche or microfilm readers and hard-copy reproducers.

Retention of current data files or older master files and the transaction files necessary to bring them current is important to continue processing in the event of a disaster or operating interruption.



How Many Backups?

A three-cycle retention procedure is considered the minimum acceptable standard for tape and serial disk-oriented systems. The three-cycle retention system is usually called the "grandfather system." File A, referred to as the son, represents the most current master file and will be used as input for the next updating process. File B is referred to as the father generation because it was used to create File A. Similarly, File C is the grandfather because it was used to create file B.

At the end of the next updating process, a new son generation will be created. This will make File A the father generation and File B the grandfather, while the media that contained file C will become available for other uses. Generally, on-site backup consists of the father master file and the transactions necessary to bring the file current. Off-site backup would be provided by the grandfather master file and the transactions to perform two updates in order to bring it current.

Computer scheduling, which can range from an unwritten schedule to an automated one, is crucial to the operation of the system. It should:

- Prevent or detect unauthorized program execution and computer usage.
- Indicate when personnel should be in the computer room.
- Tell when the computer should be in use, who is responsible for attendance and how many operators are required.
- Prevent override of any hardware or operation systems.
- Indicate specific jobs that are to be run and assure that all authorized jobs are run.
- Assure that only operators are running equipment.
- Prevent operators from executing data- or software-altering utility programs without proper authorization.
- Indicate what programs should be in the system at any time.
- Prevent operators from having access to source programs or program listings or to documentation not required for processing scheduled applications.
- Prevent operators or any unauthorized person from obtaining access to data files and program libraries.
- Indicate what assigned programs each operator is allowed to execute in accordance with the schedule.

Even the most sophisticated system control features will lose much of their effectiveness if proper operating procedures are not instituted and maintained.

Lacking any restrictions, an operator can read, copy, execute, rename, delete or replace a program from the

OFF-SITE SAFETY

computer system libraries. The tape and disk file library should be controlled to prevent unauthorized use and destruction of data file media. The library should be protected from physical disaster in the same manner as the computer room. Magnetic tapes, disk packs and cards should be stored in a closed, environmentally controlled, dust-free, fire-resistant area. Removal of these files from the library should be allowed only when needed for processing.

The computer room should be "clean" of all magnetic media not being used at the time. Access to the library should be restricted to authorized personnel throughout all operating shifts. Computer operators should be denied access to program flowcharts, source decks, program listings and so on, since they do not need them to perform their duties. These items should be secured and maintained outside the computer room to prevent unauthorized changes to programs by operators.

Some basic considerations for controlling access to files and libraries are:

1. Assigning specific responsibility for maintaining production libraries. This assignment will help prevent a situation in which different versions of a program are stored in both the source library and object library. It will ensure that source programs supporting each object module are in the library and that all obsolete modules are promptly removed.

2. Providing proper authorization to operations personnel to support any changes to production libraries.

3. Denying access to magnetic media other than those required for processing applications.

4. Prohibiting operators from executing programs from test libraries during production runs. Cataloging is an important function of this activity, requiring such controls as: 1) proper authorization for placing a new version of a program into the production library, 2) verification that the program has been adequately tested and 3) a requirement that the documentation supporting the program has been developed or updated.

Use of three sites constitutes the most efficient and secure method of protecting the data.

The sites selected should be sufficiently remote from each other so that:

1. A local common occurrence should not affect all three sites.

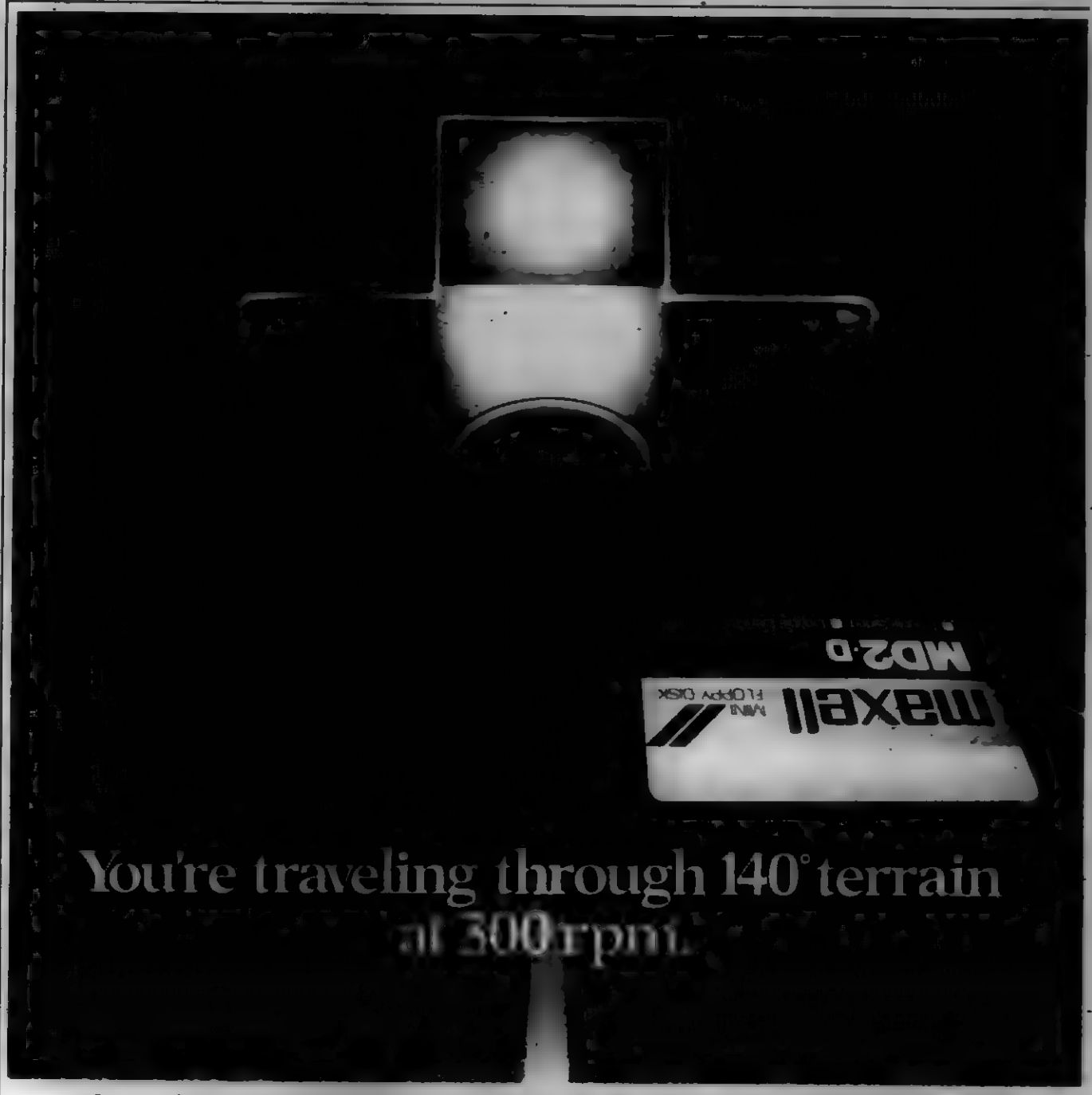
2. The data would be accessible on a 24-hour basis (or whatever operating schedule the processing requires).

In the case of the "second" edition, the distributing of data and documents to user departments remote to the data center in a secured facility, will usually satisfy the requirement.

A professional off-site media facility should serve as a final protection.

Corporate Involvement

Physical and environmental security for the entire data processing operation and magnetic media must be a total corporate coordinated program and not regarded as an independent project. Controls and procedures, such as backup, housekeeping, auditing (internal and external) and documentation supplement the protection and help mitigate exposure to and recovery from DP disaster.



IN DEPTH

Often it is difficult to quantify or assess the success of physical security efforts. However, with proper management support and employee training, the overall effectiveness of the data facility is enhanced through such safeguards.

An overall security plan includes:

- Physical protection of the data facility.
- Emergency procedures.
- A comprehensive contingency disaster/recovery plan.

This plan should be developed with the approval and involvement of top management and cover all functions in the DP operation. Senior management's commitment to security should be emphasized, and provisions for communicating security objectives to all employees should be clearly specified.

Security of the DP operation must be integrated with the security plan of the overall organization. Generally the responsibility of senior officials charged with implementation and administration falls into two areas: design of security techniques and procedures for the day-to-day security operations.

The key element in the expeditious recovery in the event of a disaster is a well-organized, off-site backup system.

Master files and the transaction files which need to be duplicated and/or rotated off-premises each day may vary from installation to installation. In any case, master files and transaction data files sufficient to recreate the current day's master files must be stored both on- and off-premises as backup for each application processed.

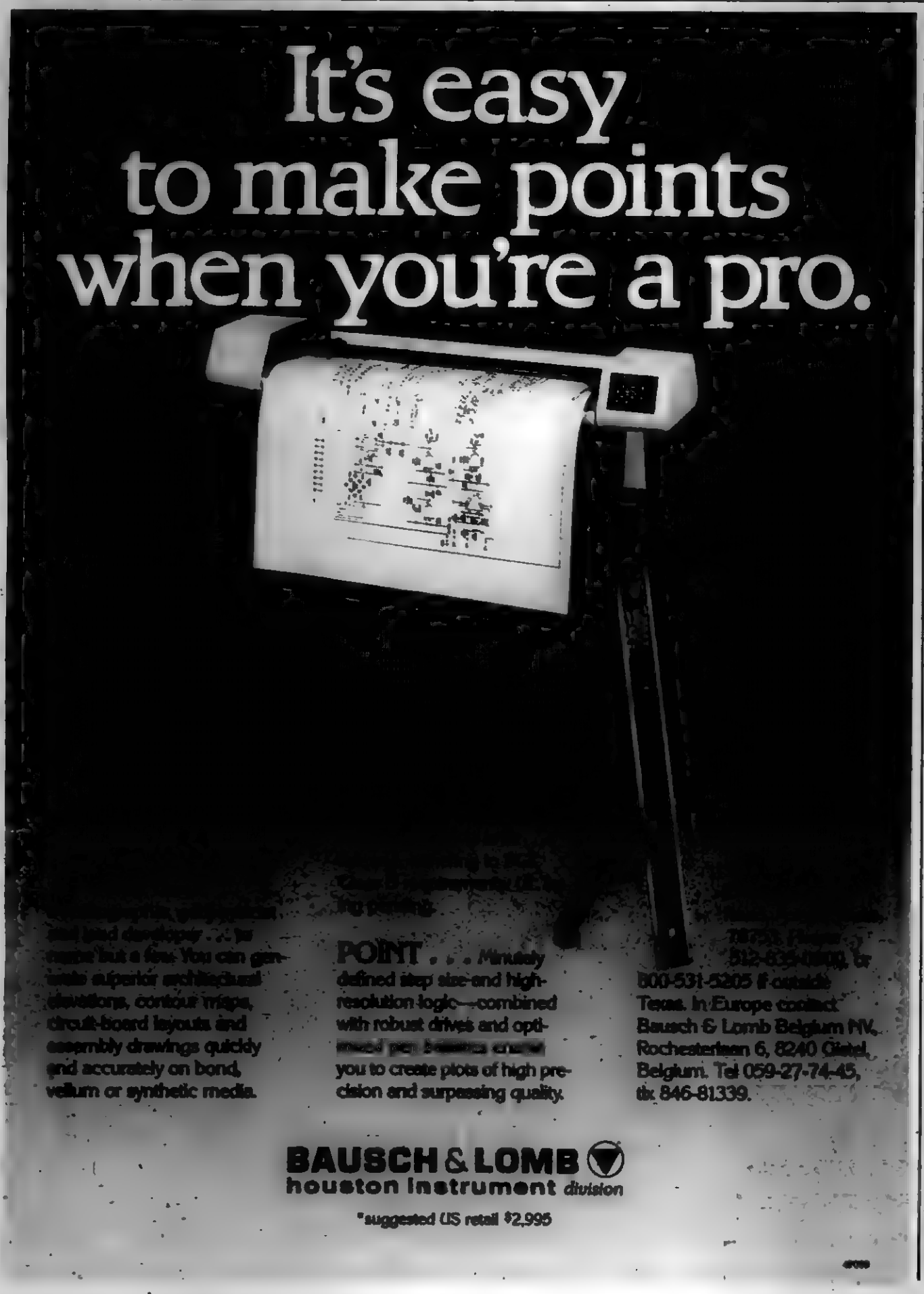
Serious consideration should be given to the security of data in an off-site location known only to key personnel of the DP operation. Insiders pose a greater threat to DP security than outsiders. The task of preserving the confidentiality of downloaded data is fast emerging as a tough issue. The availability of checking day-to-day backed up data from "clean" records is a vital security procedure. Therefore, the use of professional, high-security off-site vaults is an absolute necessity if the integrity of the day-to-day data is to be maintained.

Following is a wrap-up of requirements relating to file retention and off-premises security:

- Off-premises backup files must be maintained in machine-readable form.
- There should be no more than a two-day (or two-cycle) lag between the current master files and the files kept in off-premises storage to limit re-creation time in the event they are needed. (It must be possible to recreate the current master from the backup master and transaction files stored off-site.)
- New backup files must be rotated to off-premises storage before the old backup files are returned to the data center.
- The off-premises storage facility must have all of the environmental and physical security specifications outlined above.

About the Author

Alvin Arnell is president of the Dialog Consultants Division of Vault Management Corp., Fair Lawn, N.J. His company provides consulting services to firms that build media vaults and private safe depositories. In addition, the company runs seminars on contingency planning for its clients. Arnell is currently writing a book on disaster recovery, scheduled for publication next year by McGraw-Hill.



Software Protection:

A Step Beyond Copyright

By Fred M. Greguras

Proprietary protection of software through contractual provisions is essential when its owner wants more protection than is provided under U.S. Copyright Law. In addition, in many countries such as England, the availability of statutory protection under copyright law is unclear.

Contractual protection is important when trade-secret law or its equivalent is not well recognized in a jurisdiction. Even if statutory or common law protection is available, a contract provides more precision in the restrictions imposed on a user. A written agreement can also establish a licenser/licensee relationship rather than a sale of a copy of the software. A license permits a software owner to impose use and other restrictions on the product that may not be imposed on an owner of a copy.

A license agreement can be used to restrict the rights a licensee would otherwise have under copyright statutes, or it can protect both the form of expression and any trade secrets embodied in the software. The general principle of freedom of contract permits a software licenser to bind tightly the actions of a licensee.

The actual extent of protection sought in a particular licensing transaction would, of course, be based on the economic value of the software to be licensed, the leverage possessed by the respective parties and the need for "user friendliness" to close the transaction. Even the most "finished"-looking license agreement form proposed by a licenser can often be amended with a typewriter addendum.

Proprietary protection by contract, however, is not so easily implemented with mass-marketed microcomputer software. Forming agreements in this market provides a difficult planning challenge for software owners. Requiring that each transaction be implemented by a signed agreement would increase the costs and reduce the marketability of micro software. Nevertheless, for contractual proprietary protections to be effective, there must be an agreement with the party whose actions the licenser desires to restrict.

A licenser will usually provide the licensee only with the object code form of the software, that is, the executable form of the software. No software development documentation will be included, only a user's manual. Any documentation provided will often be included in the definition of the "licensed software," the subject matter of the license, and should be marked with appropriate copyright, trademark and other proprietary protection notices.

To assure the applicability of the protections in the license agreement, any updates or new releases of the software that may be provided under the license will also be included within the definition of licensed software by a careful licenser.

The source code form of the software is more valuable and, therefore, will cost more and be subject to more restrictions if it is licensed. If source code is provided, flowcharts, listings and other supporting materials may also be supplied. Such materials should be protected as part of the definition of the

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licensed software. If source code is licensed, a licenser's agreement form may provide that compiled versions of the source code as modified by a licensee are within the definition of the subject matter of the license. The purpose of this provision is to avoid disputes over ownership because of the difficulty of separating the underlying software from the modifications. The licensee should consider whether this property right in the modifications to the source code should be given up and, if so, what can be obtained in return.

This obligation of the licensee could pose problems under antitrust or technology transfer laws as a "free" grant back of an improved product. On the other hand, if the licenser provides updates and new releases to the licensee during the term of the license, the provision may not be a problem.

Protection in Reverse

The licensee should request a warranty of title and noninfringement from the licenser. This is proprietary protection in reverse since it is intended to protect the licensee against ownership claims of third parties. If the licenser is not the owner of the software, it should at least represent and warrant that it has the right to license the software.

The licensee should also seek an indemnification from the licenser against patent and copyright infringement and trade-secret misappropriation claims of third parties based on its use of the licensed software. This provision is one of the most important to a licensee in a license agreement.

In an indemnification provision, the issues are what options the licenser has relative to providing a remedy, what types of actions are covered and when the indemnitor's obligations and liability are triggered. The licenser's obligations and liability can begin when there is merely a threat of a suit, or at the time of actual filing of a suit, or following a judgment. A licensee should attempt to have the licenser's obligation and liability triggered early in the dispute process. The licensee should also assure that the licenser's indemnification obligation covers a settlement as well as final judgments.

A licenser may attempt to limit its indemnification obligation to one type of proprietary protection provision such as copyright, rather than covering claims based on trade-secret, patent or other laws. The indemnification may also be limited territorially, for example, to claims brought under U.S. copyright laws.

The licenser will want control over litigation and cooperation from the licensee in the event of any such litigation. The licenser's indemnity will usually be void if the licensee fails to notify the licenser promptly of such claims.

The licenser may attempt to limit its remedy for a breach of the noninfringement warranty to making the software noninfringing, to replacing it with a noninfringing product or to terminating the agreement and refunding some of the license fee. A licenser's initial proposal may not include a refund offer. These rights of the licenser can also be triggered by an opinion of counsel of the licenser that such a claim may arise.

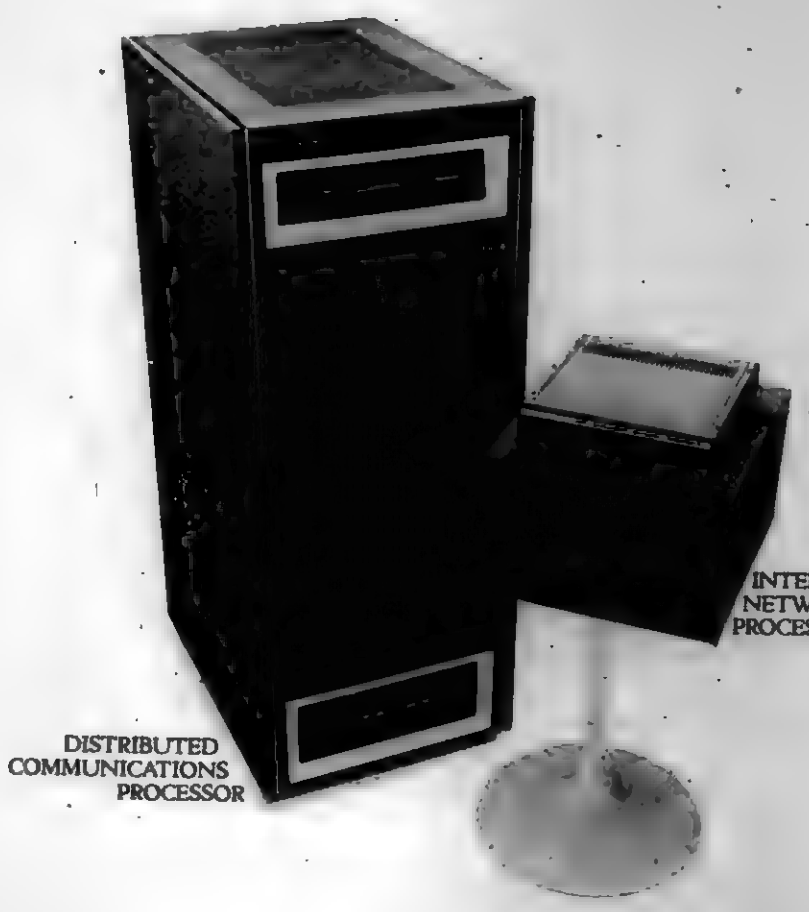
Words like "sole and exclusive remedy" should raise a red flag and intensify a licensee's review of an indemnification provision. A licensee should also determine whether the general limitation of liability and damages provision in the agreement applies to the indemnification. It may limit a licenser's damages to the amount of royalty fees paid by the licensee under the agreement.

Acknowledgment of Ownership

The licensee may be asked to acknowledge and agree to the licenser's ownership and method of proprietary protection of the software. For example, the licenser's form may state that the licensee agrees that the software is a trade secret. The licensee should weaken this provision to merely an acknowledgment of the licenser's claim to a method of proprietary protection rather than expressly agreeing to the method.

Acknowledging and agreeing that the software contains trade secrets could give the licenser an evidentiary boost in the event of a controversy. If the licenser relies on the law of trade secrets to protect its software, the license agreement should at least make it clear that the licenser considers the software to be a trade secret. The licenser will likely expressly reserve title to the software or at least

OH WHAT A YOU WEAVE.



have the licensee expressly agree that it receives no title. The license will usually contain a provision that the software is licensed, not sold, to support the position that the relationship is one of licenser/licensee and not buyer/seller.

Restrictions on Copying, Use

The specific purposes for which the licensee may use the software can be identified in the agreement. How much copying is permitted, if any, and for what purposes can be expressly identified. In some instances, the licensee may be obligated to keep records of copying and even to number such copies.

The license may limit the licensee's use to "internal purposes," which is intended to mean that the software may not be distributed or disclosed to third parties. For example, "Customer is authorized to use the product only for customer's internal purposes and only on a designated CPU using the operating system and at the site specified in Paragraph A. Customer agrees that it will not use or permit the product to be used in any manner, whether directly or indirectly, that would enable customer's customers or any third party or entity to use the product."

A licenser's form may prohibit the licensee from installing the software on a time-sharing system or other network of computers and from disclosing, disassembling, copying, sublicensing or renting the software other than as permitted in the agreement. The restriction on disassembly is important, even if the software is only copyrighted. A licensee must review the proposed license carefully to determine if the permitted uses satisfy its operational needs.

The rental prohibition is currently very important in the microcomputer software market in the U.S. because of the computer stores, software and other dealers that are renting software at a small fraction of the license fee. The seemingly obvious result is that the renter will copy the software rather than license it at the full fee. The time-sharing and computer network prohibition is also important because of the growth of time-sharing networks offering games and other application programs to owners of microcomputers with a communications capability. In the absence of an effective prohibition on such use, a licenser's expected economic return from its software could be seriously impaired.

The licensee will probably not have the right to assign the license agreement to a third party without the prior written consent of the licenser. The licensee should attempt to have the agreement state that such consent may not be unreasonably withheld.

Placement of Proprietary Notices

Even if statutory protection is unclear, it is important for a licenser to require that the licensee not remove any proprietary rights notice or legend and that such notice or legend be placed on each copy permitted to be made by the licensee. This can be a general requirement or the licenser can require specific language such as the Universal Copyright Convention notice:

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A licenser will usually liberally place appropriate legends and notices on the software and its documentation to inform customers, competitors, employees and others that the programs are confidential/trade secret and/or copyrighted and are provided to customers only under a license.

Notices on software can be present in human-readable form on the storage medium and in machine-readable form at the beginning and end of the program such that the notice is displayed and printed in human-readable form. An embedded binary version of the legend or notice and "salting" of meaningless routines in the software are helpful to a licenser in proving copying or misappropriation. The existence of common errors in two similar works is strong evidence of copying. Licensees who are considering infringement or misappropriation should be aware that more and more licensers are implementing this technique.

Under Section 405 of the U.S. Copyright Act, omission of a copyright notice does not invalidate

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copyright protection if the notice was omitted by a licensee who was in violation of an express written agreement that, as a condition of the licensee's rights to make a public distribution of the work, the notice be on the work. A recent court decision makes it clear that this must be an express condition rather than implied.

Restricting Use to CPU, Site

Use can be limited to a single computer (a "designated CPU") and a specified site, both identified in the agreement. The designated CPU can be identified by serial number or merely by type. An additional measure to deter improper use is to restrict use of the software to a specific operating system on the designated CPU at the specified site.

One narrow exception to this restriction may be when the identified computer fails to function properly, in which case the software may be temporarily used on a backup computer.

If the licensee has this right, it should ensure that a copy protect or other protection scheme does not prevent this right from being exercised. A licensee should also seek to have a ready means of transferring the software to another CPU if upgrading or replacement is desirable and if the software will be compatible with the new system. A licenser may require written consent to such a transfer. In such instances, a licensee should make sure that the licenser's consent may not be unreasonably withheld. For example, compare the following contractual provisions:

"Use on other than designated CPU: Notwithstanding the foregoing restrictions on use, customer may use the product on other than a designated CPU in the following circumstances: i) if a designated CPU cannot be used because of equipment or software malfunctions, customer may temporarily use the product on another CPU; and (ii) if a designated CPU is replaced by customer, customer may designate a successor designated CPU and use the product on that CPU. Customer must give [X] written notice and [X] must give its written consent (which shall not be unreasonably withheld) before these other uses are permissible."

"Authorized use of the products: [X] shall use the products only on the designated CPU located at the site specified in Paragraph [] or at such other site to which it may subsequently be transferred; provided, however, that [X] may use the products on a CPU other than the designated CPU when: (a) the designated CPU cannot be used due to equipment, software or other malfunction, in which case [X] may use the products on another CPU until the designated CPU is again available for use; or (b) [X] obtains the consent of licenser, which consent shall not be unreasonably withheld, to use the products on a CPU which [X] has selected as a replacement for the designated CPU."

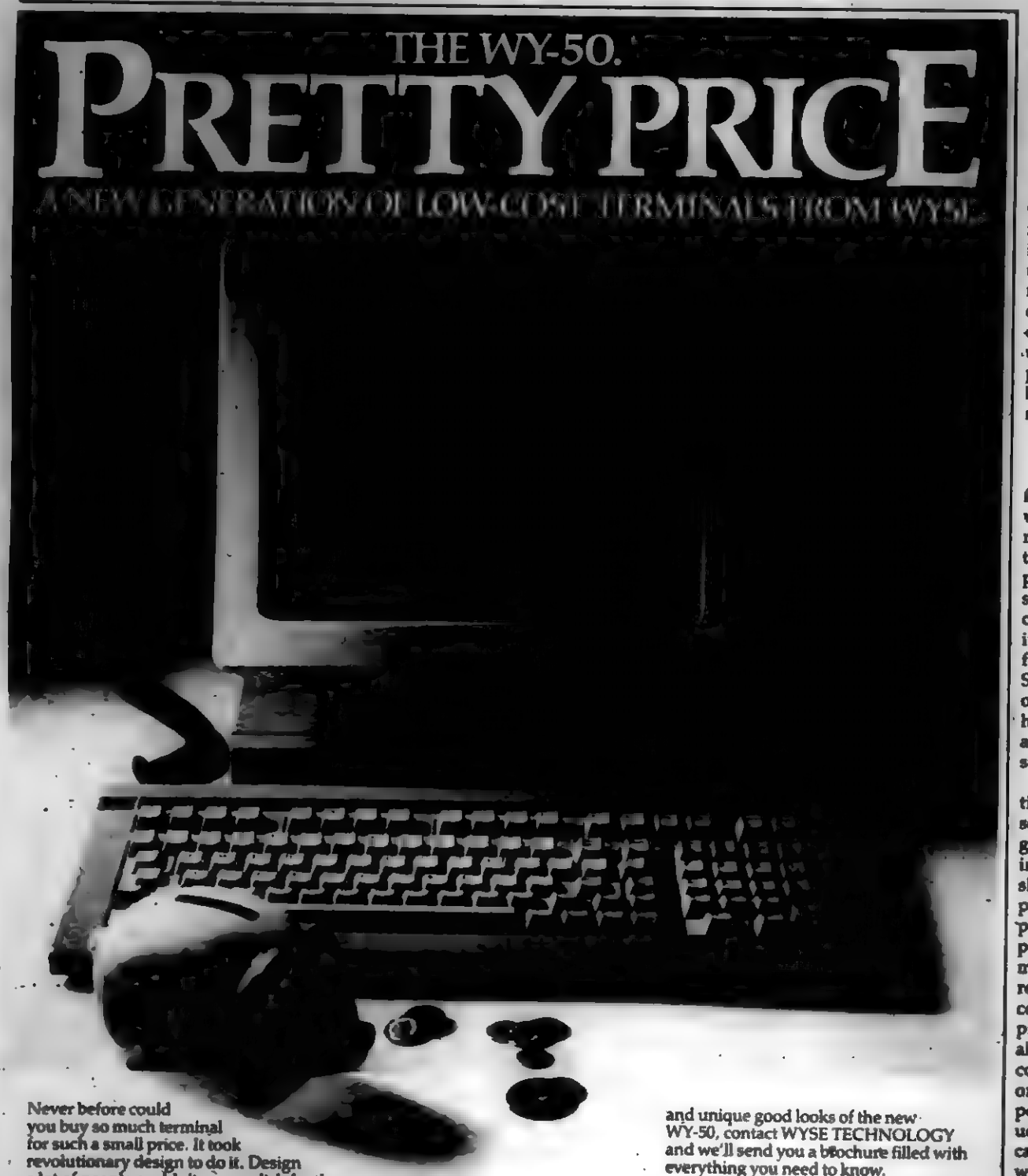
Termination or Expiration

The agreement will usually specify what happens to the licensed software and copies (or portions thereof) made by the licensee upon termination or expiration of the agreement, particularly when the licenser considers the software to be a trade secret. A licenser usually wants such items returned, but it may be easier for the licensee to destroy them. Some licensers want a greater level of assurance that the required action has been taken by the licensee, such as a certification or, in some instances, an affidavit. For example:

"Upon the expiration or termination of this agreement for any reason, the license and all other rights granted to customer hereunder shall immediately cease, and customer shall immediately: (i) return the product to [X] together with all reproductions and modifications of the product and all copies of any documentation, notes and other materials respecting the product; (ii) purge all copies and portions of copies of the product or any portion thereof from all designated CPUs and from any computer storage device or medium on which customer has placed or has permitted others to place the product; and (iii) give [X] a written certification that customer has complied with all of its obligations under this section. [X's] termination of this agreement and/or repossession of the product shall be without prejudice to any other remedies that [X] may lawfully have."

Other Provisions

Protection of a trade secret is unpredictable under statutory and com-



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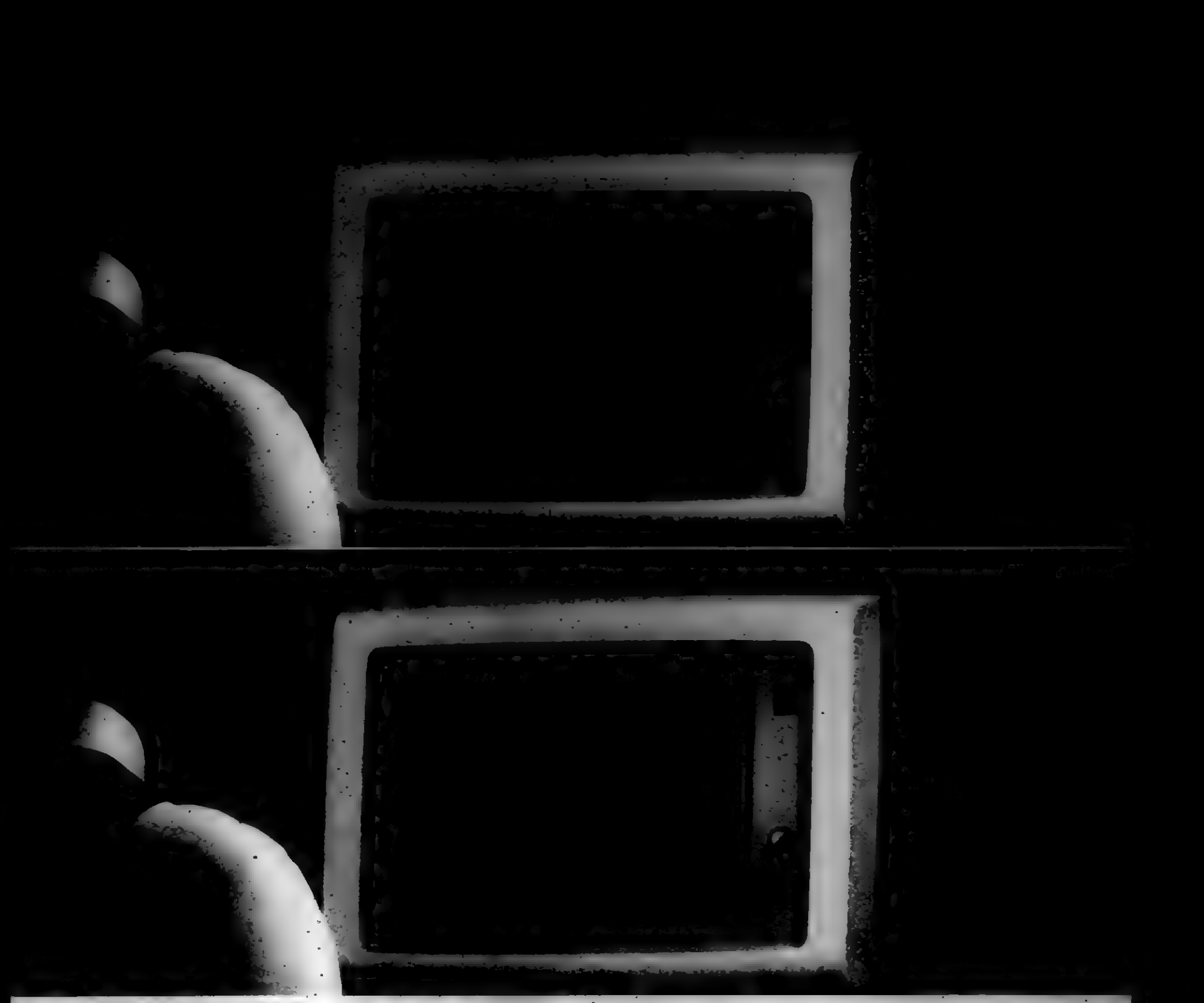

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mon law in many countries. One means of establishing a confidential relationship is through the obligations in a license which, of course, are only binding on a party to the agreement. The contract can define the parameters of trade-secret protection rather than leaving it to a potentially hostile court to create them retrospectively.

The licensee should seek to have certain exceptions to its obligations of confidentiality, such as if the software is or becomes a matter of public knowledge through no fault of the licensee, is rightfully received from a third party by the licensee, is disclosed by the licenser to a third party without a duty of confidentiality, is "independently" developed by the licensee or the confidential information was rightfully in the possession of the licensee prior to its receipt from the licenser. When one of these events occurs, the licensee's payment and other obligations should cease.

A licensee should be aware that it may be "tainted" and prevented from "independently" developing a program that performs the same or a similar function as a trade-secret product in its possession, even if it receives the product in object code only.

The licenser's form may require the licensee to take "all" reasonable precautions to prevent unauthorized use and disclosure and to otherwise protect the software. A licensee should seek to weaken this provision to merely taking reasonable precautions. If the "all" remains in the agreement, a licensee will virtually always be in default. On the other hand, the failure of a licenser to require the licensee to take at least reasonable precautions to protect a trade secret could have repercussions as to the software being a "secret" in other nations where the software is marketed.

Similarly, the agreement may require the licensee to keep the software "strictly" confidential. Again, a licensee should attempt to weaken this requirement to merely taking reasonable precautions. From a licenser's viewpoint, a standard more meaningful than "the same precautions taken by the licensee to protect it own confidential information" may be desirable.

The agreement may expressly limit access to the software to the licensee's employees, agents or subcontractors who have a need to know and may require the licensee to inform such entities and individuals who have access of the software's confidential nature and of their duty to keep it confidential. The agreement may also require the licensee to have such entities and individuals sign a written agreement confirming this duty.

With some sensitive software, a licenser may seek to secure contractual obligations directly from the licensee's employees, agents or contractors. The licensee should make sure that the scope of permissible disclosures covers actual operational needs.

Some licensees attempt to dilute the trade-secret nature of a software product by refusing to label it as a trade secret or as confidential in the license agreement, but agree to label it as "proprietary information." Whatever the label, the scope of a licensee's duties arises from the actual precautions the contract requires it to take. A confidential relationship can arise through such duties even if the label "confidential" is not used.

Remedies Provisions

Unlike under the U.S. Copyright Law, which provides for statutory damages, contract law has no statutory provision to ease a licenser's burden of proof of damages. Thus, a licenser's agreement form may contain a clause specifying how damages are to be calculated or providing for liquidated damages if the proprietary protection or other provisions are violated.

As contrasted with U.S. law, the laws of other nations, such as Japan, have a liberal attitude toward liquidated damages, and one may even stipulate punitive damages. Unless the amount is extremely unreasonable and socially unacceptable, such foreign courts are unlikely to invalidate such a contractual provision.

In addition to or in lieu of damages, injunctive relief can also be important to stop a breach of contract, or to prevent an anticipated breach, by the licensee of the proprietary protection provisions. A licenser's agreement form may also contain a provision that gives the licenser the express authority to obtain injunctive relief, because the concept of in-

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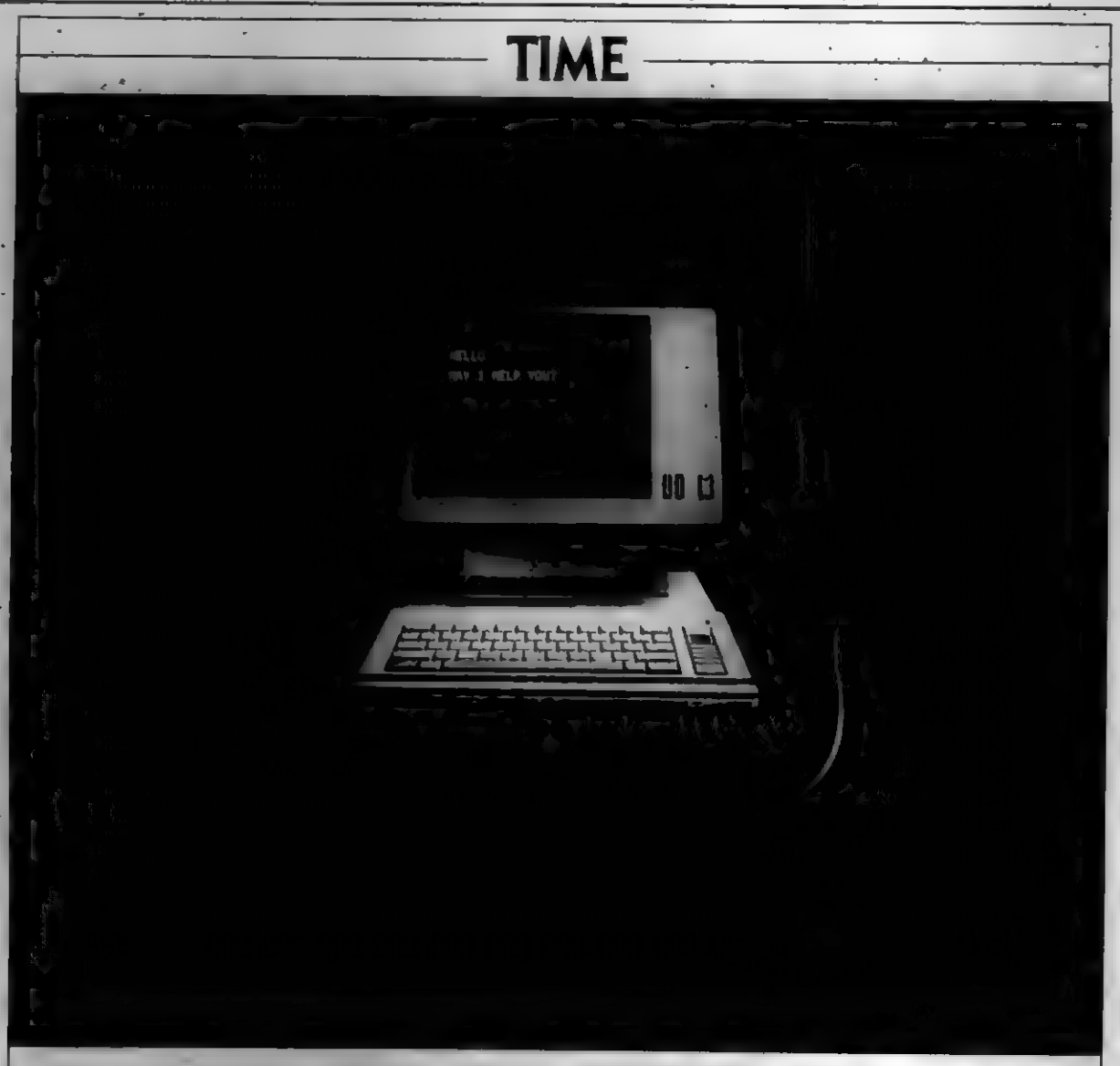

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junctive relief based on contract is not generally well-recognized.

Microcomputer Software

Since individual signed licensed agreements are not practical for mass-marketed software, if a "license contract" is to be formed, it must be done through packaging techniques. Packaging should be designed to assure that the potential licensee is aware of all of the proposed terms and conditions of the license prior to "acceptance." Acceptance can occur through the potential licensee opening the package and/or using the software, a so-called "unilateral" contract.

The packaging should be carefully designed to increase the probability that a potential licensee "accepts" the offer and that a use license contract is formed rather than merely a "sale" of a copy.

For example, the following "conspicuous" language, which, along with the agreement itself, is clearly visible to a customer prior to the transaction, will assist in making it a license rather than a sale:

"Microcomputer software ('licenser') provides the enclosed computer program (the 'program') and licenses its use only on the following terms and conditions. You should carefully read the terms and conditions before opening this package. Opening this package indicates your acceptance of these terms and conditions. If you do not agree with them, you should promptly return the package, unopened, to licenser or its authorized distributor, and your money will be refunded."

The legal enforceability of these unilateral license agreements is only now being tested, but this approach plus placement of copyright notices appears to be the most practical legal protection available for mass-marketed software. There are a variety of techniques being used, so a single lawsuit which focuses on a specific technique is not conclusive as to whether microcomputer software is sold or licensed.

Nevertheless, because of the need for user friendliness for marketing purposes, there appear to be only a few companies that actually form license contracts in this marketplace, primarily because the license is not visible prior to the purchase so there cannot be any acceptance on an objective basis. In other words, most transactions are sales. A visit to your local software emporium to browse through available products will demonstrate this point.

The bottom line is that there is a limited number of precautions that can be taken for microcomputer software. The alternative for a licenser is not to enter the marketplace.

Importance of Notices

The Universal Copyright Convention copyright notice should be placed in a conspicuous location in and on all forms of expression of software of all types, the media on which it is recorded and its documentation.

Even when it is unclear whether software is within the subject matter for copyright protection, notices should be placed in or on the software, its recording media and any accompanying documentation.

If trade-secret protection is also being used, the notice should so state along with a disclaimer of publication of the work.

In such instances, the license agreement should declare that the software is confidential and a trade secret and impose controls on the licensee to keep it a secret. In an international transaction, the relevant laws of both nations should be carefully reviewed.

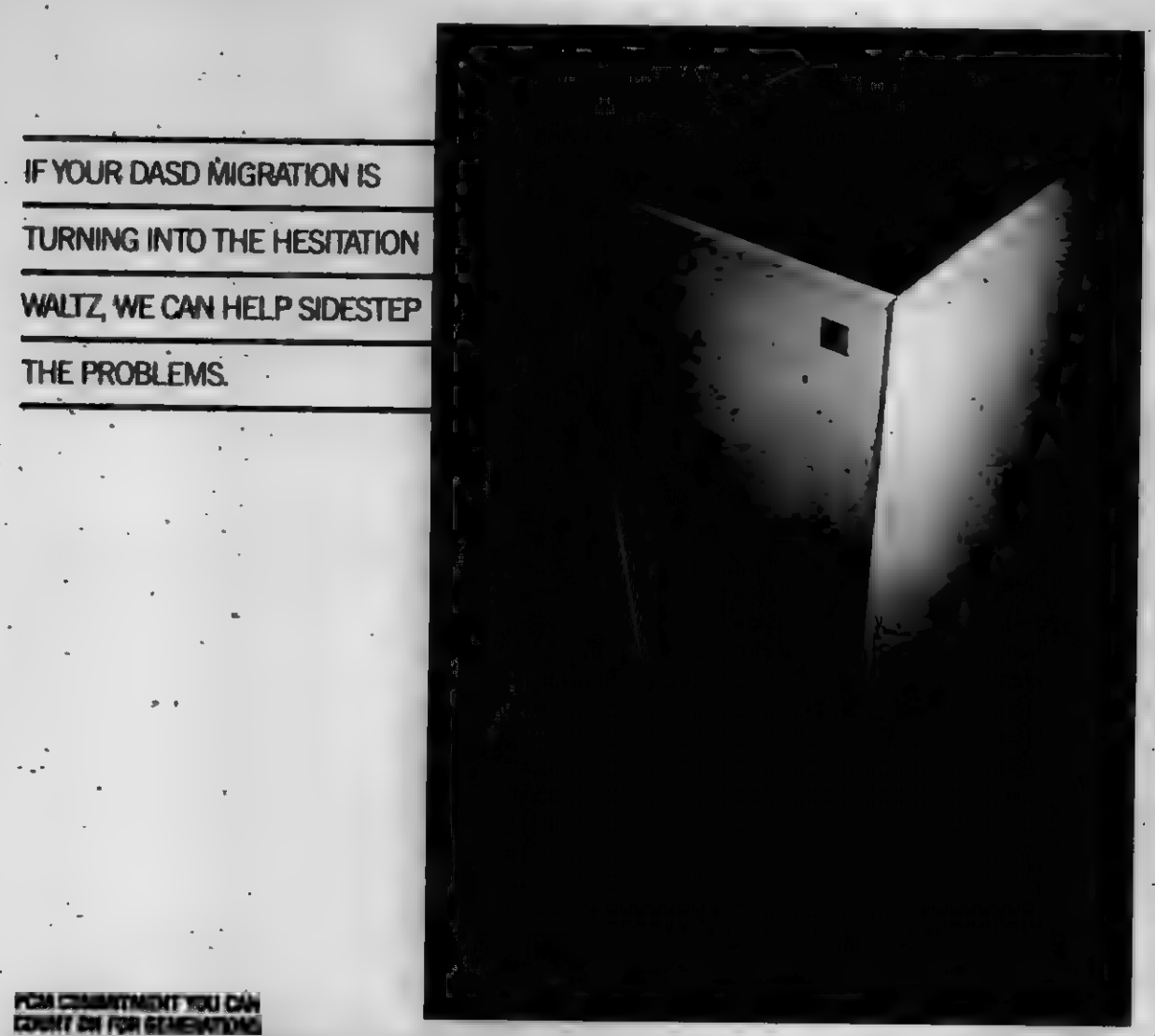
In the growing competition in the software marketplace, "user friendliness" in contracting is becoming increasingly important and must be carefully balanced against the scope and content of proprietary protection provisions.

Finally, legal protections should be backed up by practical precautions commensurate with the value of the software.

About the Author

Fred Greguras is an attorney with Fenwick, Stone, Davis & West in Palo Alto, Calif. He specializes in dealing with the legal problems of financing and operating high-technology companies, both domestically and on an international basis.

Greguras spoke on the topic of software protection at the recent Conference of the Section on Business Law of the International Bar Association, which was held in Toronto.



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CONTROL DATA

Modem Technology: The Quiet Evolution

First in a Two-Part Series

By Jean-Pierre Cahier

Special to CW‡

"Telephones link people." The slogan of the government-run French Postal, Telephone and Telegraph Administration (PTT) is true as well for machines. Links among computers, terminals and the telephone network are established via modems, about 500,000 of which have been installed in France.

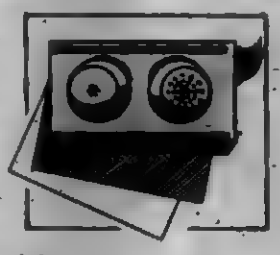
Although there have been no revolutionary developments in modem technology (comparable, for example, to those in software or disk technology), these "small boxes" have become quite common wherever computers are used.

And modems have undergone some evolutionary changes that have increased their speed, power, intelligence, quality of transmission, ease of maintenance, miniaturization, adaptability to different customer needs and decreased their price.

The future of modems looks even brighter when one considers new applications and possibilities of integration into videotex and personal/home computing products.

The arrival of single-chip modems, expected around 1985, should also invigorate this industry over the border line between information processing and communications.

The first notable development in modems is the increase of transmission speed, especially for synchronous, long-haul models; these running at 2,400 or 4,800 bit/sec replace those running at 1,200 bit/sec, and certain users looking for even higher transmission speeds acquire 9,600 bit/sec models.



Modems capable of transmitting 19.2K bit/sec (or around 15K bit/sec, as the standard is still being discussed) are beginning to arrive on the market.

The major factor pushing users toward higher speeds is cost-effectiveness — one has to take into consideration the price of the modem. For certain types of data transmission (for example, sending large data files), it is better to invest more money in transmission equipment to decrease the phone bill.

For other types (for example, multipoint nationwide exchange of data), one may prefer acquiring access rights to a computer network, rather than using modems and telephone (public or tie) lines.

Direct connection between modem and telephone network is superior to acoustic coupling. Except for applications requiring "portability," new modems do not use this type of coupling any longer, in which the microphone is a potential source of harmonic distortions.

Direct-connection models are also fairly priced and offer additional features not provided by acoustic couplers, such as autodial and autoresponse. These and derived features (redial, speed-dial and tone detection) are indeed quite popular and are being successively provided by most of the long-haul modems.

These are not, however, the only intelligent features of modems. As a result, one cannot say — as one might have in the 1970s — "you've seen one, you've seen them all." The presence, in certain modems, of microprocessors capable of executing one million instructions per second (Mips) and of running increasingly large amounts of software, allows for notable sophistication of functionality.

For example, today's modems have light indicators or LED to display diagnostic messages. The increasing impor-

(Continued on Page 80)

Micom Offers Protocol Tool, Terminals Get 3270 Traits

CHATSWORTH, Calif. — Micom Systems, Inc. has introduced a protocol converter said to provide a communications path for up to 12 asynchronous devices — either Ascii terminals or personal computers emulating asynchronous terminals.

The Micro 7400 protocol converter reportedly provides all standard IBM 3270 capabilities, allowing asynchronous terminals to access mainframe applications in the same manner as 3270 terminals would.

The device also features the ability to switch between two IBM host mainframes or between an IBM host and minicomputers in response to commands entered at the user's keyboard, according to a spokesman.

To the host computer, the Micro 7400 is said to appear as an IBM 3274 Model 51C Cluster Controller communicating either in IBM's protocol Binary Synchronous Communications or Systems Network Architecture/Synchronous Data Link Control.

Prices for the unit range from $2,250 to $4,750, the spokesman noted.

More information on the Micro 7400 protocol converter is available from Micom Systems, which is located at 20151 Nordhoff St., Chatsworth, Calif. 91311.

To Compete With Citibank

Challengers to Link ATM Nets

NEW YORK — Manufacturers Hanover Trust and Chemical Bank here have agreed in principle to link their automatic teller machines (ATM) in an effort to challenge Citibank's ATM hegemony in this metropolitan area.

Manufacturers Hanover, with 141 ATMs in the New York region, and Chemical, with 80, will offer consumer-side customers the luxury of withdrawing money from either bank's machines. The linkup, which could go on-line as early as next year, will be opened to other banks in the area as well.

Leonard E. Malkin, vice-president at Manufacturers Hanover, said the linkup's purpose was to "share ATMs to expand delivery capabilities." He acknowledged that both his bank and Chemical trail Citibank, which has over 550 ATMs dishing out funds in Greater New York.

'Keep it Simple'

Malkin said talks were being held with other New York area banks but declined to name them. "Our initial intent is to offer cash withdrawals and balance inquiries. We want to keep it simple," Malkin told reporters.

News of the pending linkup was greeted by the banks' customers with a mixture of relief and indifference. "I'll have twice as many machines to pull money from, but all that really means is that I won't have to walk as far to find a machine," one Chemical customer explained.

But the banking industry was less impressed. "This has nothing to do with technology. All they [Manufacturers Hanover and Chemical] are doing is sharing the expense of their networks. Neither one has sufficient volume to challenge Citibank," consultant George C. White Jr., a former vice-president at Chase Manhattan, pointed out.

Malkin responded by saying that "having to" share the expense of banking networks and "wanting to" are "two different things."

The Manufacturers Hanover vice-president added that access to the Cirrus System, a nationwide banking network, would not be offered as part of the linkup with Chemical.

Winterhalter Announces Emulator for IBM Micros

ANN ARBOR, Mich. — Winterhalter, Inc. has announced the Datatalker PC, a board-level communications product for the IBM Personal Computer and Personal Computer XT.

Called Datatalker PC, the communications device — which also operates with IBM Personal Computer look-alikes — enables host microcomputers to emulate up to seven different IBM terminals and reportedly communicate with IBM and IBM plug-compatible mainframes.

According to the vendor, the Datatalker PC is delivered complete with software on a diskette to enable the Personal Computer and the Personal Computer XT to look to the host micro like an IBM 3271, 3275 or 3276 interactive terminal or a 3780, 2780, 2968 or 2770 remote batch terminal.

The Datatalker PC allows full emulation with IBM's Binary Synchronous Communications (BSC) protocol, the company said. In fact, the unit's asynchronous port is capable of data rates between 150 and 19,200 bit/sec.

According to the vendor, the Datatalker PC will fit any backplane slot in the Personal Computer and XT, including the computer's fractional slots. The device reportedly requires 128K bytes of random-access system memory.

Datatalker PC is reportedly powered by the host microcomputer's power supply.

Available immediately, the product is priced at $695, which includes software and documentation.

Winterhalter is located at 3853 Research Park Drive, Ann Arbor, Mich. 48106.

AT&T Asks for State Regulators' Cooperation

DETROIT — Morris Tanenbaum, chairman of AT&T Communications, called on state regulators recently to work with the company in resolving regulatory and competitive issues facing the telecommunications industry.

AT&T Communications will provide long-distance and international services after the Bell system divestiture Jan. 1.

Addressing participants at the 95th annual gathering of the National Association of Regulatory Commissioners, Tanenbaum outlined AT&T's position on various issues confronting the telecommunications industry, including the preservation of universal service, discouragement of wide-scale bypass of the telephone network and the establishment of access charge plans on the state level.

"Unless we work together, all our stakeholders will suffer, including your constituents who are our customers," Tanenbaum said.

Tanenbaum noted that large business customers are already opting to bypass the national telephone system to avoid high access fees. He said that 39% of Southwestern Bell's largest Texas customers are currently bypassing the network, and another 17% plan to do so within three years. In Missouri, 54% of the large customers report that they are bypassing or will soon, and in California the figure is 45%, he added.

"Unfortunately, those who cannot bypass . . . will pay the penalty of the cost of abandoned facilities and loss of subsidies that the encouragement of bypass will produce," Tanenbaum said.

Dynatech X.25 Packet Switch Bows

ALEXANDRIA, Va. — Dynatech Packet Technology, Inc. has introduced an X.25 packet switch said to operate at speeds up to 64K bit/sec for use in the design and implementation of medium-, and large-scale packet-switching networks.

Multi-Switch X.25/HS is said to forward data arriving from one X.25 trunk to any other X.25 trunk. Available in two-trunk increments up to a total of 16 trunks, Multi-Switch X.25 can be ordered with RS-232C, V.35 or X.21 interfaces, a spokesman said.

Priced at $14,000 for a main chassis with four trunks and $3,500 for additional trunk cards with two trunks per card, the unit is available from the vendor at 6464-G General Green Way, Alexandria, Va. 22312.

Development Seen Gradual For Modems

(Continued from Page 79)

tance given to the ease of maintenance is not limited to the diagnosis of the internal malfunction of a modem. In case of an operational malfunction, the user is more interested in finding out which part of the system does not perform properly: the modem, the telephone line, the line controller.

More and more frequently, diagnostics obtained from the modem facilitate communications network maintenance. The problem is, however, approached differently by different manufacturers of modems, suppliers of telecommunications equipment and software engineers. For some, diagnostic actions are performed primarily on the modem and line level and the hardware used allows for locating the faulty component very quickly.

For others, network maintenance has to take into consideration the network's multiple physical and logical layers, so IBM modems provide numerous automatic and manual features for local diagnostics. But network maintenance is delegated to the transmission controller and central processor level.

These two approaches to communications network maintenance are not necessarily mutually exclusive. It is clear that the nature of applications cannot be ignored in any large telecommunications/information processing system: If in some bank some branches are closed on Mondays and some others on Saturdays, the network maintenance system could emit incorrect diagnostic messages if it was not aware of the bank's mode of operation — described by certain parameters of operating system or applications software.

Faced with this applications-oriented point of view, manufacturers of telecommunications equipment tend to oppose arguments for not moving network maintenance higher up from the modem/line level: additional burden on the central processor, specifics of certain physical transmission problems.

Intelligence on the modem level will allow not only for detection and analysis of any malfunctioning signals, but also for processing them directly and suppressing them.

Next Week: Single-Circuit Mo-

This article originally appeared in Le Monde Informatique, *Computerworld's French affiliate, and appears here as part of the CW International News Network. Cahier is a senior writer at* Le Monde Informatique.

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Best of all, System 1032 is fast and pretty. It answers complex queries almost instantly and produces presentation-quality reports with single commands.

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If you're a manager, you'll especially appreciate System 1032. Your users and programmers all use the same unified command language and data base concepts, so communication between them is easier than ever. And System 1032's careful human engineering drastically cuts your training costs and increases productivity.

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Board Allows IBM Micros To Emulate IBM Terminals

ANN ARBOR, Mich. — Winterhalter, Inc. has announced a board that reportedly allows the IBM Personal Computer and Personal Computer XT to emulate IBM terminals and to communicate with IBM-compatible mainframes and communications networks.

The Datatalker PC/Plus requires no cables or independent power supply. Communication is at data rates of 1,200 to 19.2K bit/sec through Bell 212, 201A, 201C, 208B, 209A and compatible modems.

The Datatalker PC/Plus requires a full card slot on the IBM micro and 64K bytes of system memory. It is reportedly user-configurable through the Personal Computer's keyboard and is said to allow users to modify the protocols being emulated.

Currently available, the Datatalker PC/Plus is priced at $895. Further information may be obtained from Winterhalter, located at 3853 Research Park Drive, Ann Arbor, Mich. 48104.

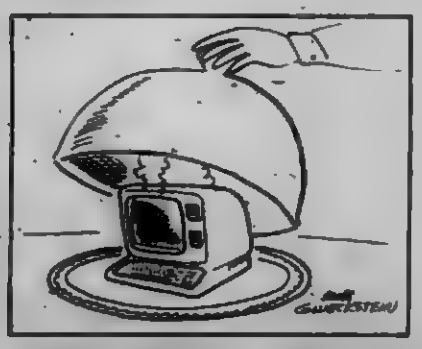
Device Upgrade Controls Access To Networks

SAN DIEGO — Staff Computer Technology Corp. has announced a new version of its access control device, The Key, a version said to offer network users 24 quintillion combinations of inquiries and responses.

The Key attaches to RS-232 serial ports and reportedly doesn't require hardware modification.

Before access is allowed to a protected computer, the computer sends a 64-bit number with control characters to the terminal requesting access. The Key reportedly intercepts the transmission and produces its 64-bit response.

The Key is now available at $300 for one unit and $225 per unit for an order of 100. Information may be obtained from Staff Computer Technology, 10457 J Roselle St., San Diego, Calif. 92121.



CSI-X.25 Data Concentrator Available From Cableshare

LONDON, Ont. — Cableshare, Inc. has announced the availability of its CSI-X.25 Data Concentrator, said to adhere to CCITT X.3, X.28 and X.29 standards and to complement the vendor's line of X.25 products.

The data concentrator is available in four-port increments and will reportedly concentrate up to 16 Ascii devices or computer ports to an X.25 packet network. Individual Ascii ports are said to support terminal speeds up to 19.2K bit/sec and most X.25 networks to 56K bit/sec. The concentrator reportedly supports dual-network links providing access to separate public or private networks simultaneously, a vendor spokesman said.

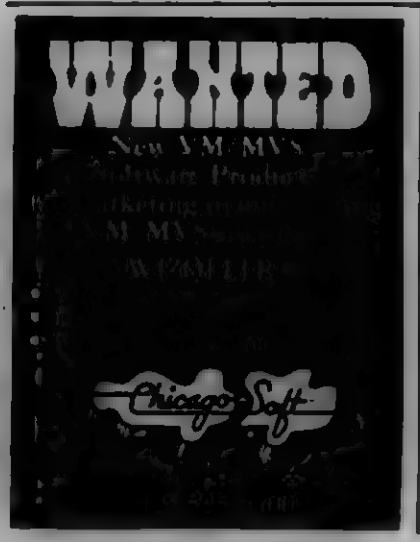
Priced at $2,700 per port for a four-port configuration, the concentrator is available from Cableshare, Box 5880, 20 Enterprise Drive, London, Ont., Canada N6A 4L6.

NEC Offers Direct-Drive Monitor

ELK GROVE VILLAGE, Ill. — NEC Home Electronics, Inc. has introduced a medium-resolution, direct-drive color monitor said to be compatible with the vendor's PC-8000 and PC-8800 and with IBM's Personal Computer.

At a resolution of 500 dots horizontally and 240 lines vertically and at 60Hz, the 14-in. JC-1460DA is said to offer 80-char. by 25-line display and eight- by eight-dot characters. The monitor also features 90° reflection and 10 MHz of video bandwidth, a vendor spokesman said.

Priced at $499, it is available from NEC Home Electronics at 1401 Estes Ave., Elk Grove Village, Ill. 60007.



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Note: InSci systems operate in IBM 370, 43XX, 30XX and compatible environments, and are TP monitor independent

HP Offers Fiber-Optic Test Products

PALO ALTO, Calif. — Hewlett-Packard Co. has entered the fiber-optics test market with two products designed for evaluation of fiber-optic components, modules and systems.

The HP 8150A optical-signal source is a universal light stimulus which uses a laser diode. Its main element is a large-bandwidth transducer with variable gain, which can be modulated wth electrical analog or digital signals from dc to 250 MHz. The transducer then delivers the optical equivalent at the power level programmed by the user.

The HP 8151A optical pulse-power meter, together with the HP 81511A optical head, is a fully programmable response-measuring instrument suitable for a wavelength range of 550 to 950 nanometers. It can measure peak values or average power of optical signals.

The HP 8150A optical-signal source is priced at $12,900, while the HP 8151A, including the HP 81511A, costs $8,900 from the Inquiries Manager, HP, 1820 Embarcadero Road, Palo Alto, Calif. 94303.

Firm Cuts Prices on Graphics Line

IRVINE, Calif. — Psitech has announced price reductions of 48% to 57% on its line of color graphics terminals, as well as a local storage capability for the large capacity Model GTC 419 terminal.

The Model GTC 214 and GTC 224 were reduced to $3,595 and $3,695, respectively, while the Model GTC 319 and GTC 329 were cut to $4,895 and $4,995, respectively, the vendor said.

The GTC 419 can store from 150 to 450 frames or blocks of screen information for local storage, editing and retrieval. The user may store a screen, retrieve a screen for editing, restore the screen or transmit it back to the host computer. Data from the host may also be downloaded to the terminal storage system. The GTC 419 is priced at $8,895 from Psitech at 16902 Von Karman, Irvine, Calif. 92714.

Modem Features Call Verification, Callback Aids

MOUNTAIN VIEW, Calif. — Tri-Data has introduced the Oz Guardian 1,200 bit/sec. full-duplex modem said to incorporate automatic answer verification and callback to enhance security and utility.

With answer verification, the product automatically screens incoming calls for a valid password before a call is connected. The optional callback feature allows the modem to disconnect incoming calls automatically after receiving the caller's password and then to dial the number in its memory associated with the caller's password.

Users can plug in the modem, which will remotely accept configuration data from a central site via the telephone line with the appropriate password. The unit will also support automatic dialing and complex log-on procedures, a vendor spokesman said.

Deliveries of the Oz Guardian are scheduled to begin the first of the year, at a price of $750 in single quantities. More information is available from Tri-Data at 505 E. Middlefield Road, Mountain View, Calif. 94039.

Module Offers Monitor Link To Terminals

TEMPE, Ariz. — Vidco, Inc. recently announced a universal video interface for data terminals and microcomputers with raster-scan CRT displays.

The Cvid 150, a 2-in. by 2-in. by .75-in. module, reportedly allows connection of external large screen monitors or data projectors to most data terminals and microcomputers and is designed to mount inside commercial data terminals.

The module weighs six ounces and mounts inside the terminal with double-sided foam adhesive tape, according to a company spokesman. Two coaxial cables, one for video input and the other for video output, and an eight-lead color-coded ribbon cable for power and synchronization signals are attached.

Priced at $350, the modules are available from Vidco, 2400 W. 10th Place, No. 4, Tempe, Ariz. 85281.

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Terminal Net Keeps Bank in Touch With World

WINSTON-SALEM, N.C. — The 1970s saw a series of sweeping events that dramatically influenced the direction and velocity of international money currents, forcing banks to exercise more ingenuity than ever before in order to meet the challenge of changing times.

Not least of these solutions involves a bank's telecommunications functions, according to W.W. Dunn Jr., vice-president and manager of international operations at Wachovia Bank and Trust Co. here.

It is in the telecommunications facility that the bank is routinely asked to perform functions ranging from minor personal courtesies to multimillion dollar corporate transactions.

The nation's 31st largest bank, Wachovia Bank maintains relationships with some 1,500 foreign banks.

Wachovia is meeting its international communications needs with an integrated, computerized multiport message communications system configured around Micronet terminals manufactured by Sidereal Corp.

Initially, the bank installed a Micronet 6, a single telecommunications terminal with six communications ports to accommodate dedicated and dial-up communications lines for sending and receiving traffic. The self-contained system is also said to permit operators to create and store messages concurrent with transmission and reception.

The terminal was tied to a paper tape machine that would input message tapes prepared on devices located in four key sections of the bank's international department.

"This was extremely inefficient," Dunn said. "Correspondence originating in administration, letter of credit, accounting and paying and receiving first had to be punched by an operator in one area. It was transported manually to the cable room to be read into the terminal, which then transmitted it to the time-sharing computer."

The solution, it appeared, was the replacement of the four paper tape machines with four desktop terminals strategically situated in the bank. All of the terminals connect to the bank's internal telephone system, a 300 bit/sec line.

With a potential of eight communications lines, the terminal has six ports assigned: two ITT 50 bit/sec lines, one 50 bit/sec Western Union line, one 1,200 bit/sec line outbound to a time-sharing computer, one port for the paper tape unit and one port dedicated to the inbound traffic from the terminals via an internal 300 bit/sec line.

"It is important to our system that every message of whatever kind involve the two-step process," Dunn said. "At no time will it be possible for any terminal to access the international network of ITT directly. Each message must be originated separately, sent on to the terminal and then placed into the computer for relay to its destination."

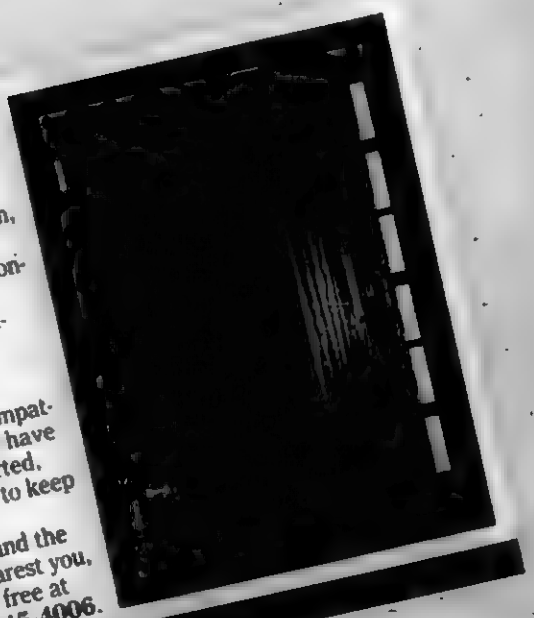
Terminals Incorporating CPU

The Micronet 20s in the system consist of terminals incorporating a CPU with 65K bytes of random-access memory (RAM), a video display and keyboard. The standard memory allows processing and storage of up to 400 lines of text, while the processor permits all of the functions of the terminal to be performed concurrently.

Washovia Bank's Micronet 8 is configured around a CPU with 256K bytes of RAM, with all message traffic placed on the system's 5M-byte hard disk for storage transferred to the printer only as requested.

In April, 1983, the bank implemented a tie-in with its central word processing system.

MEGABYTES FOR MINIBUCKS



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Tools Link CPT To DEC, IBM

MINNEAPOLIS — CPT Corp. has unveiled two products that are said to provide concurrent interactive communications and word processing between IBM and Digital Equipment Corp. host computers and CPT's 8100 and 8500 series computer systems.

The Interactive Display Emulator allows CPT workstations to access host computer data bases and applications programs at the same time as normal word processing. The emulator incorporates multiple windowing technology, which allows the user to view and edit two documents simultaneously.

The CPT 8276 Systems Network Architecture (SNA) Controller was designed to work with the display emulator and provides integrated IBM 3270 SNA for accessing IBM host computer networks. The controller can reportedly cluster up to seven CPT workstations and appears to the host computer as an IBM 3276 display station controller. Each of the clustered workstations emulates an IBM 3278-2 display station.

The 8276 controller can be used in dedicated or dial-up SNA/Synchronous Data Link Control networks, supports communications speeds up to 9,600 bit/sec and costs $7,000.

The Interactive Display Emulator software is priced at $250. Both products are available from CPT, 8100 Mitchell Road, P.O. Box 295, Minneapolis, Minn. 55440.

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Peripheral Products In Cartridge Tape Tech, Disk Drive Tech Debut

By Robert Batt
CW West Coast Bureau

LAS VEGAS — As expected, the bustling Comdex/Fall '83 exposition produced a plethora of new peripheral products, most notably in the areas of disk drive and cartridge tape technology.

With the microcomputer industry consuming an estimated 400 million floppy disks annually, vendors here were keen to show they have the higher capacity, higher performance products demanded by end users.

Atasi Corp. unveiled two new 5¼-in. Winchester disk drives, designed, it claimed, to meet the throughput and reliability demands of the emerging high end of the clustered multiuser microsystems market.

The new models, dubbed the 3065 and 3075, are said to deliver 65M and 75M bytes of unformatted storage, respectively. Both feature an average access time of 24 msec, thus improving system throughput by up to 50% over the industry average, the vendor stated.

The two models will be available for evaluation and system integration in the second quarter of 1984. The Model 3075 is priced at $1,950, the 3065 at $1,800. More information is available from Atasi at 2075 Zanker Road, San Jose, Calif. 95131.

Another manufacturer touting the virtues of increased storage capacity was Shugart Corp., which announced its double-sided, 3½-in. microfloppy disk drive. Shugart said its drive is capable of storing up to 1M

(Continued on Page 88)

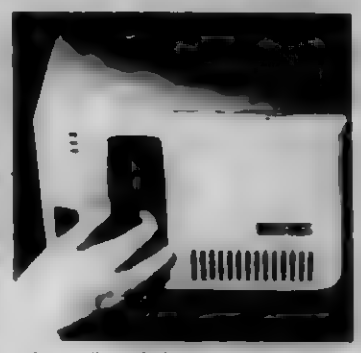
New World Unveils Winchester Disk Drive

PLEASANTON, Calif. — New World Computer Co. has introduced a high-performance, 5¼-in. Winchester disk drive.

The Turbo-Disc has 12 read/write heads on each side of the disk. The patented head-slider assembly reportedly is mounted on a parallelogram that moves the read/write heads across a rotating media surface in 1/12 the time and distance of a normal single head per surface drive.

The Turbo-Disc with a standard ST506/412 interface is available in three different configurations — the first two for the OEM market, the last for end users:

- A half-high, 5M-byte fixed drive with 24 heads (12 per disk surface) for $1,800.
- A half-high, 5M-byte fixed drive and a half-high, 5M-byte removable drive with a total of 48 heads for $2,325.
- A 20M-byte subsystem, with a configuration of 10M bytes, 5M bytes fixed and 5M bytes removable, plus 10M bytes of additional storage in the form of two removable cartridges. This subsystem costs $4,950 for all 20M bytes.



New World's Turbo-Disc

The subsystem includes a host interface board compatible with IBM, Apple Computer, Inc. and Digital Equipment Corp.'s S100 bus systems and multibus systems.

Additional cartridges are available at $695 each from New World Computer at 6624 Owens Drive, Pleasanton, Calif. 94566.

Disaster Recovery Planning: Off-Site Storage

By Les Gilliam
Special to CW‡

This is the second part of a two-part series on disaster recovery planning. This week, the author will focus on the advantages and need for off-site storage and some of the available options.

Most data centers today are engaged to some degree in making backup copies of vital information and storing the copies in some location away from the main computer room. It may only be a copy of a master file tape taken home and put under the bed, or it could be a truckload of information transported monthly to an underground cavern halfway across the country. In any case, it should be obvious that a disaster recovery plan will be almost, if not totally, useless if programs, data and documentation are not retrievable after a disaster has struck.

Data center management must select from those resources under its control for duplication and off-site storage of vital records. This could include control program tapes and disks, operating instructions, hardware/software configurations, floor diagrams, data entry instructions, system control and scheduling documentation, forms design information, wiring diagrams and architectural drawings.

System development people will select source and object programs, libraries, application and user documentation, system development standards, test data and so on. Users will be involved in determining data bases, historical files, transaction files and master files to be copied. All of these people must share in determining the dates or frequency for taking or supplying a backup copy, be it a machine readable media or hard copy. There may be legal or government requirements for protection of corporate resources that must be met.

Alternative Locations

The DP manager must consider the alternative locations for an off-site storage facility. Is it far enough away so that one man-made or natural disaster is unlikely to wipe out both locations? Is it close enough to minimize the cost and time delay of transporting information to and from the remote site? Does the off-site storage facility have adequate security protecting against the intentional destruction of both the data center and the off-site storage facility? Are there acceptable temperature and humidity controls to protect the media? What about fire and smoke detectors and automatic sprinkler systems? What will be the volume and frequency of deliveries to and from the off-site storage location? Who will manage the inventory, keep the records up to date and perform a periodic audit for contents and retrievability?

If your data center is totally destroyed, what will you need, in terms of processing capability, to survive until the data center is rebuilt? If it takes 12 to 18 months to reconstruct the building, then you would likely need to find a level of capacity on a par with what you operate today. But arranging for the remote site and equipping it will take time.

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(Continued on Page 93)

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Show Features Host of Peripheral Products

- (Continued from Page 87)
byte of information.

The Shugart 350 is a follow-up to the company's first microfloppy disk drive, the 300, and, according to the vendor, is intended for the desktop and portable computer applications market, where high performance in a compact package is required.

Designed to operate with the American National Standards Institute's working standard 3½-in. hard-shell cartridge media format, the new model also provides 6-msec. track-to-track access time and 80 tracks per side, the vendor claimed.

Evaluation units of the 350 will be available in the first quarter of next year, with volume deliveries slated for the second quarter. The price of the new model is $200. More information is available from Shugart at 475 Oakmead Pkwy., Sunnyvale, Calif. 94086.

In the cartridge tape subsystem field, Emulex Corp. unveiled its new ¼-in. product for the Digital Equipment Corp. LSI-11, PDP-11 and VAX-11 computer systems.

Designated the Vault, the new subsystem features Control Data Corp.'s ¼-in. cartridge tape streamer and the Emulex TC05 Q-bus or TC15 Unibus tape coupler. The package, the vendor claimed, emulates all functions of the DEC TS-11 ½-in. tape subsystem and operates in a manner completely transparent to the pertinent DEC operating software and diagnostic facilities.

The tape drive uses the 3M Corp. ¼-in. removable tape cartridge as its data storage medium. At up to 50M bytes of formatted capacity, a single cartridge can reportedly provide complete image backup equal to most of the popular 5¼-in. Winchester disk drives in operation today.

The price for the Vault subsystem is listed at $3,975. Standard delivery time is 30 days, with initial units becoming available for shipment on Jan. 1, 1984. Further information can be obtained from Emulex at 3545 Harbor Blvd., P.O. Box 6725, Costa Mesa, Calif. 92626.

In other related peripheral areas, Memorex Corp. announced two controller models that attach directly to the channel of an IBM processor.

The products are the 2074-S4A local controller, which reportedly operates in IBM's Systems Network Architecture (SNA), and the 2074-S4D, a non-SNA local controller. The two models are priced at $15,595, and shipments are slated for the third quarter of 1984.

More information is available from Memorex at San Tomas at Central Expwy., Santa Clara, Calif. 95052.

In other announcements, a digital color plotter with a range of business applications, including graphs, charts, diagrams and computer-assisted design graphics, was introduced by Panasonic Co.

Priced at $3,200, the new VP-6802P is said to simplify greatly the programming necessary to generate business graphics.

Panasonic also introduced two nine-pin serial dot matrix printers: the Model KX-P1092, which is said to be capable of printing up to 180 char./sec, and the Model KX-P1093, a 160 char./sec unit.

Both printers will be available in the first quarter of 1984 and are priced at $599 and $899, respectively.

More information is available from Panasonic at One Panasonic Way, Secaucus, N.J. 07094.

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Onyx Unveils Micros Utilizing Unix System III

SAN JOSE, Calif. — Onyx Systems, Inc. has introduced two microcomputers, both utilizing the Bell Laboratories' Unix System III operating system and bundled with the firm's business-oriented applications software.

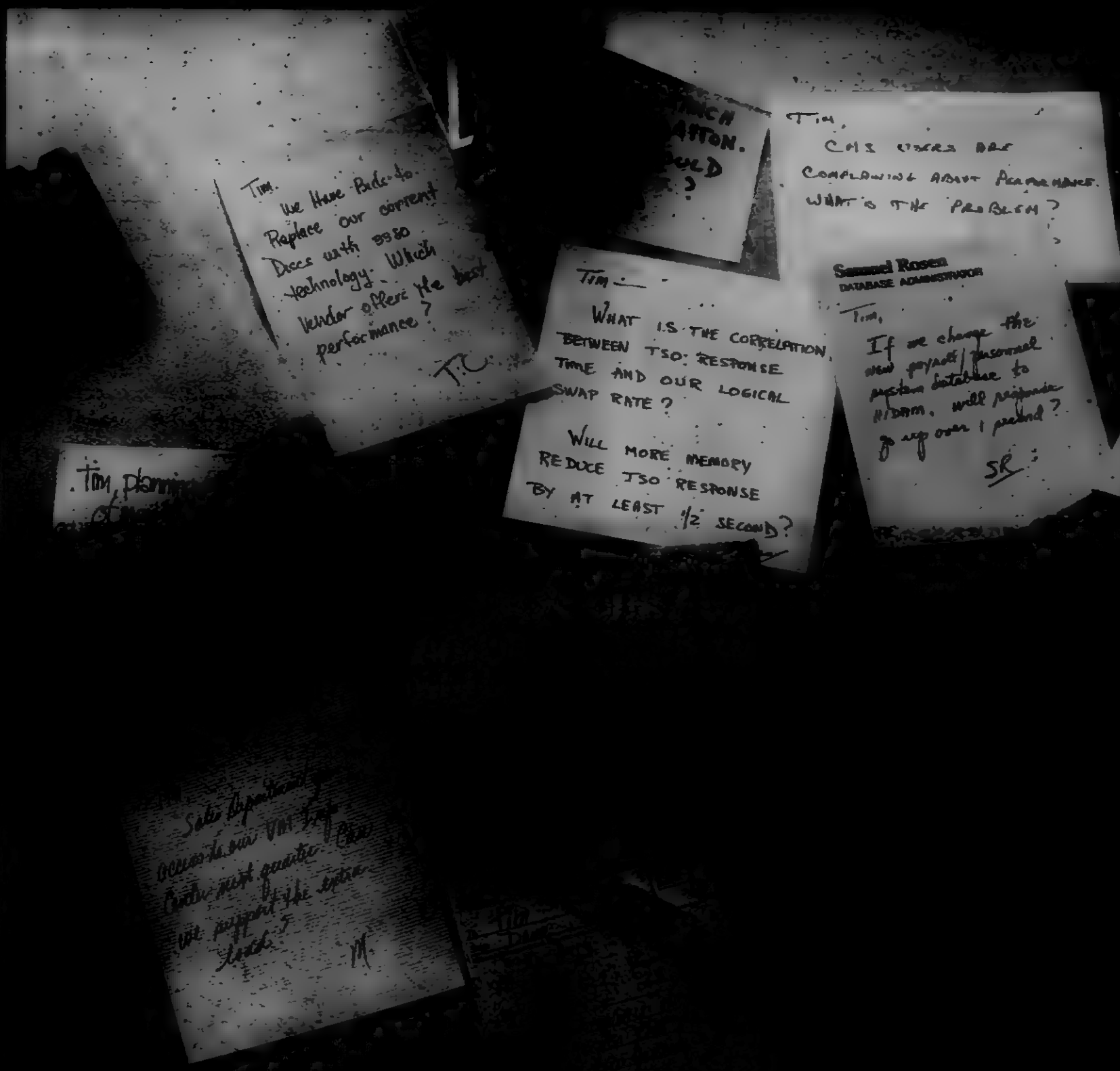
A key feature of the Model C5012V floor-standing unit and the C5012D desktop unit reportedly is that they allow vertical software developers to integrate their own applications programs into the computer's software menu system. Once there, the other developers' programs can share data with the integrated Onyx-produced software, a company spokesman said.

The desktop model is equipped with five serial ports for terminals, printers or modems, a Centronics Data Computer Corp.-compatible parallel printer port and an uninterruptible power supply port. It also includes a 5¼-in. Winchester disk drive with either 14M or 21M bytes of data storage and a 17M-byte unformatted cartridge tape drive unit.

Options for the C5012V floor-standing model include an additional 512K bytes of random-access memory, six additional serial ports and a second 5¼-in. Winchester disk drive. An option for both models is an Onyx Terminal with a 14-in., nonglare, green-phosphor screen and a 256 Ascii-based character set with business graphics.

The two units are scheduled for January delivery at a base system price of $11,990. The suggested retail price for the Onyx Terminal is $850.

Additional information on the products can be obtained from Onyx Systems at 25 E. Trimble Road, San Jose, Calif. 95131.



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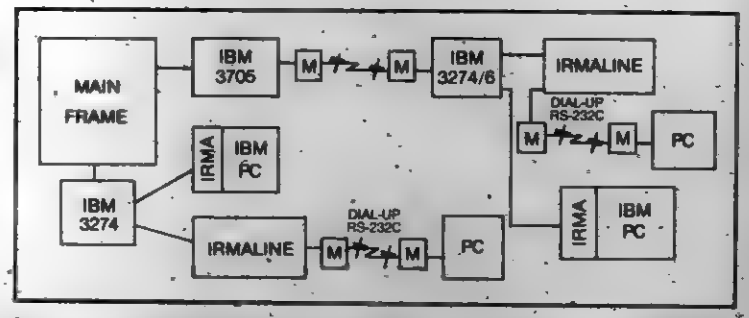

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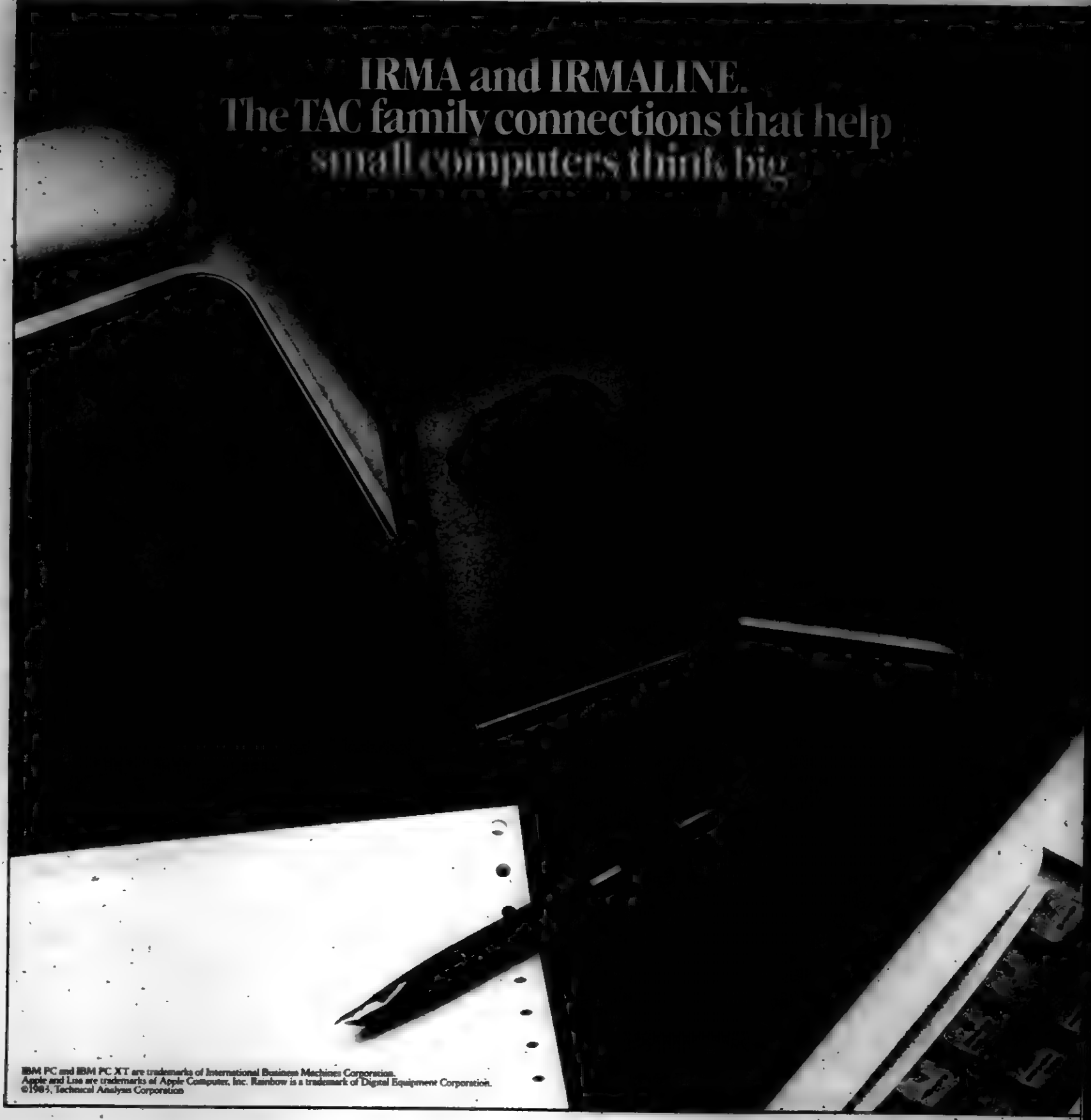

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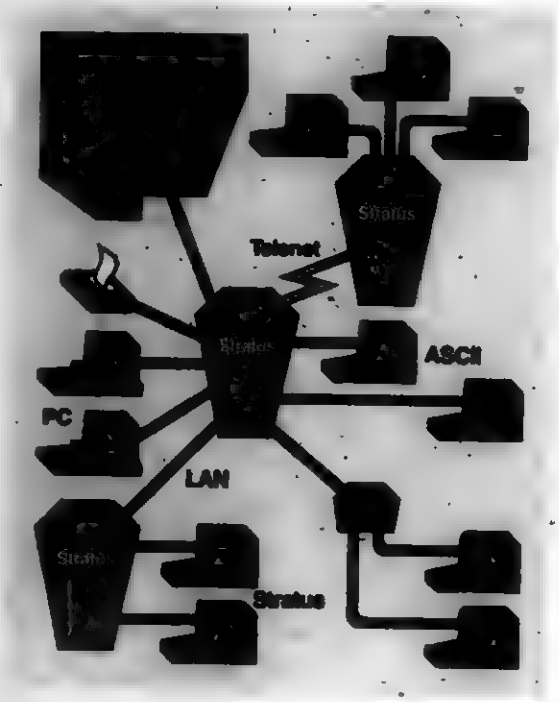

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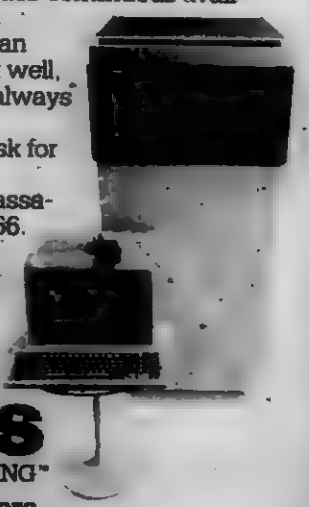

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HALESITE, N.Y. — Telebyte Technology, Inc. has introduced a user-installed, 9-track tape drive designed to allow the IBM Personal Computer to read and write mainframe computer tapes.

The TDX-1000 tape drive, interface board and cable are being produced by the TDX Peripherals Division of Telebyte Technology, a manufacturer of ½-in., 9-track, dual-density, reel-to-reel tape drives.

The system is reportedly designed to plug into a spare slot on the IBM Personal Computer with software installed by inserting a diskette. The system is controlled by standard IBM DOS commands and workable with any languages supported by the user's system, the vendor said.

The TDX-1000 reportedly can back up an IBM Personal Computer XT with a 10M-byte disk in five minutes or less.

The package is priced at $6,000 and is expected to be available in January.

More information can be obtained from Telebyte Technology at 148 New York Ave., Halesite, N.Y. 11743.

TPS Electronics Expands Data-Input Equipment Line

PALO ALTO, Calif. — TPS Electronics has announced an addition to its line of data-input equipment, a magnetic stripe reader specifically designed for the IBM Personal Computer.

The PC-500 reportedly incorporates a microprocessor that eliminates the need for any external software. It connects in series with the keyboard cable, does not affect keyboard operation and is transparent to any program.

The introductory price is $695. TPS Electronics is located at 4047 Transport St., Palo Alto, Calif. 94303.

Postdisaster: Storing Data Off-Site

(Continued from Page 87)

grinding to a halt, you need to identify as part of the disaster recovery plan project those systems and programs that are vital to the survival of your company. For example, "critical" systems must be back in operation within 24 hours. "Vital" could fall in the one to seven days reconstruction category. "Necessary" could be classified as accepting a seven- to 30-day outage. "Needed" would then encompass all other work to be processed if and when the capacity is available.

The listing and classifying of all systems and programs will be the starting point for determining the order in which you seek backup solutions, locations and facilities as well as the magnitude of your interim remote-site processing needs.

Reestablishing Operations

Assuming your data center is destroyed, what are the alternatives for reestablishing your DP operation at another site?

If you and another nearby company have similar hardware and software, it may be wise to consider a mutual-aid pact whereby the impaired company could operate on the other's system on a limited basis such as third shift and weekends for a limited time — 30 days or until another site can be reequipped.

Another alternative is a disaster recovery "hot site," where a service bureau or like firm has equipment installed and operable for you to move to on just a few hours' notice.

Finally, another option is a disaster recovery "shell" facility whereby the computer room, raised flooring, air conditioning, power, chilled water and, perhaps, limited communications lines are in place and available for you to install and operate equipment that you have acquired yourself.

Gilliam is a consultant based in Ponca City, Okla.

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Texprint Offers Decplot

Graphics Upgrade Out for DEC Professional

BURLINGTON, Mass. — Texprint, Inc. has introduced Decplot, a graphics upgrade module for Digital Equipment Corp.'s Professional high-end personal computer.

With Decplot providing direct plug-compatibility with the Professional operating system software, users can reportedly utilize their existing DEC LA120 printer/terminal to provide wide-carriage, high-speed printouts in both text and graphics. The plug-in electronic module provides a 1,700-dot addressable plotting feature over the entire page while reportedly maintaining the speed and reliability of the conventional text-printing mode of the LA120.

Decplot is said to conform to DEC's graphics protocol standards and is compatible with most DEC graphics terminals, systems and software products. Three simple commands and none of the Ascii control characters are required for plotting, according to the vendor.

The Texprint LA120 graphics upgrade option can reportedly be user-installed in less than five minutes and provides wide-carriage plotting of maps, charts and graphs. It is said to operate several times faster than DEC's LA50 printer/terminal.

Decplot modules are $595 each in single quantities, including a one-year warranty. Texprint is located at 8 Blanchard Road, Burlington, Mass. 01803.

Controller, Coupler Fit Intel, DEC

GAITHERSBURG, Md. — Mesa Technology Corp. (MTC) has introduced a Multibus group code recording (GCR) tape controller and bus-to-bus communication couplers for Intel Corp. Multibus and Digital Equipment Corp. computers.

The Multibus GCR tape controller brings GCR capability to the Multibus environment.

High-performance GCR tape is provided by the Telex Computer Products, Inc. 6250 and medium-performance tape by the Storage Technology Corp. 2920.

The controllers are called the Model 4100T and Model 4100S for the Telex and Storage Technology units, respectively.

The single-board controllers or complete subsystems are available immediately at a list price of $5,995.

The MTC bus couplers allow Multibus computers to communicate with DEC Unibus Q-Bus or another Multibus computer.

Each product is a self-contained board set that allows high-speed — up to 4M bit/sec — direct memory access memory-to-memory transfers.

The MTC Bus Couplers are composed of a single Multibus board (two for Multibus-Multibus communication), a DR-11 board, a pair of 25-ft interconnect cables, an IRMX-86 software driver for the Multibus board and documentation.

The Bus Couplers sell for $6,150 and are available in 30 days from MTC at 16032 Industrial Drive, Gaithersburg, Md. 20877.

Plug-In Module Links Wang 2200 to CP/M

NASHUA, N.H. — Users of Wang Laboratories, Inc.'s 2200 computer system can now access Digital Research, Inc.'s CP/M-based software programs with a plug-in module introduced by Computer System Designs (CSD).

The Model 2200CP/M is a plug-in card that enables Wang 2200 users to utilize additional languages such as Cobol, Fortran, Pascal, C, Forth and Microsoft, Inc.'s Basic, as well as a variety of applications such as word processing, data base and financial programs, a CSD spokesman said.

The 2200CP/M runs with standard Wang peripherals in a single or multiuser environment. Users can also run CP/M tasks on one terminal, while Basic-2 tasks are performed on other terminals. CP/M runs as a 2200 application and can be loaded or exited without affecting the status of other system programs, according to CSD.

With the appropriate boards, the plug-in module can support local and system printers, Wang and IBM disk formats, Lear Siegler, Inc. ADM3A terminal emulators and asynchronous communications.

The 2200CP/M plug-in package costs $995 and comes with a 64K CP/M I/O card, CP/M software on a CP/M diskette, 2200 Basic-2 programs on a Wang-compatible diskette, documentation, diagnostic procedures and manuals.

More information is available from CSD through P.O. Box 7370, Nashua, N.H. 03060.

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Compupro Disk 1A Supports Up to Four Floppy Disks

HAYWARD, Calif. — Any combination of up to four 5¼- or 8-in. floppy disk units can be supported by a controller recently introduced by Compupro, Inc. and shown at the recent Comdex/Fall '83 show.

The debut of the Disk 1A controller, which uses direct memory access arbitration, coincided with the announcement of a second Compupro product — a slave processor that reportedly adds 8-bit processing capabilities to 16-bit systems.

In addition to its Zilog, Inc. Z80B microprocessor, the single-board SPU-Z slave processor houses 192K bytes of random-access memory and two RS-232C I/O ports, according to a Compupro source.

Both the Disk 1A and the SPU-Z cost $695 from Compupro at 3506 Breakwater Court, Hayward, Calif. 94545.

Tape Drive System Fits IBM Micro

HALESITE, N.Y. — The TDX Peripherals Division of Telebyte Technology, Inc. has introduced an IBM-compatible ½-in., 9-track, dual-density tape drive system for the IBM Personal Computer.

The TDX-1000 provides both hardware and software interface capability to allow the IBM Personal Computer to read and write mainframe tapes. The system uses standard DOS commands or can be accessed through any of the languages supported by the user's system. The drives operate at 45 or 75 in./sec.

A complete package, including the TDX-1000 tape drive, an interface board and a 10-ft cable, is priced at $6,000 from the vendor at 148 New York Ave., Halesite, N.Y. 11743.

Data-Sud Systems Unveils VME Floppy Disk Board

TEMPE, Ariz. — Data-Sud Systems/U.S., Inc. has introduced a VME bus floppy disk controller board which provides governing, formatting and interfacing logic between itself and as many as four single- or double-sided, single- or double-density, 5¼- or 8-in. floppy disk drives.

The DSSEFDCONT-1 incorporates a floppy disk controller chip, which furnishes IBM 3740 or System/34 diskette formatting capabilities.

The board requires 24K bytes of memory, a spokesman said.

There is a hexadecimal display on the faceplate for disk status and disk test results. The board is delivered with standard firmware, which provides elementary commands for floppy disk management.

The commands include: floppy disk controller initialization, restore, disk format, track format, seek drive head, read and write sector, read track address, write and verify sector, read/write multiple sectors, motor on/off and on-data-request and on-end-of-command interrupts.

The address bus and the control bus have transistor-to-transistor-compatible buffered inputs, while the data bus has three-state transistor-to-transistor-compatible buffered I/O. The board requires 5V and 12V supply voltages and has an operating temperature of 0° C to 70° C.

Delivery of the product takes four weeks, and its price is $1,375, according to the vendor. The vendor is located at Suite J, 2219 S. 48th St., Tempe, Ariz. 85282.

Disk Module Expands Line Of Seagate Units

SCOTTS VALLEY, Calif. — Seagate Technology, Inc. has expanded its line of external storage units with an 8-in. Winchester disk module that reportedly stands only half as high as typical rival products.

Complementing the ST8100 disk system, which made its debut at the Comdex/Fall '83 show, is a companion controller that provides a choice of two integrated backup memory systems — a ¼-in. tape cartridge module or a floppy disk unit.

The ST9100 controller, built to conform to Seagate's 10M bit/sec ST412HP drive-level interface standard, supports up to two ST8100s, each of which holds 102.1M bytes, according to a company source.

Although pricing for the controller has yet to be specified, the disk system by itself costs $1,500 in large quantities from Seagate at 920 Disc Drive, Scotts Valley, Calif. 95066.

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If you've been looking for an IBM 3270 compatible terminal system that provides truly integrated multi-user computing capabilities and is flexible enough to handle a wide range of work station configurations and CP/M, MP/M and MS-DOS based programs, you've finally found it.

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CTi's 3000/1 Multi-function Terminal System offers you all of the 3270 functions that you would expect—plus truly integrated personal computing capabilities. As a multi-user controller, the 3000/1 can support up to 16 workstations or devices. And because of the built-in computing capabilities—and compatibility with CP/M-86, MP/M-86 and MS-DOS programs—it can turn any workstation into a powerful 16-bit computer with access up to 768K bytes of memory and 10Mb of Winchester disk storage. The CTi 3000/1—let us tell you more about it.

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IBM VAR

Ideadisk Line Gets Internal, External Models

BEDFORD, Mass. — IDE Associates, Inc. has announced the expansion of its Ideadisk line for the IBM Personal Computer and Personal Computer XT. The new products are a 10M-byte internally mounted, 3.9-in. Winchester disk drive and three externally mounted 3.9-in. Winchester disk drives providing storage in 10M-, 20M- and 40M-byte increments.

According to the vendor, the new 10M-byte internally mounted disk, placed in the slot provided for a second floppy drive, upgrades the storage capacity of the Personal Computer to that of the Personal Computer XT.

Each disk drive comes with all the necessary interface electronics, support software for IBM's PC-DOS 1.1 and PC-DOS 2.0, mounting hardware and cables.

An XPR Ideaplus combination card, which acts as the host adapter, is included with the product. An additional 64K to 256K bytes of dynamic random-access parity-checking memory, serial interface and clock can be ordered onboard the XPR Ideaplus.

Retail prices for the Ideadisks are: 10M-byte fixed, internal mount, $2,145; 10M-byte fixed, external mount, $2,495; 10M-byte fixed, external mount, plus 5M-byte removable, $3,545; 20M-byte fixed, external mount, $3,495; 20M-byte fixed, external mount, plus 5M-byte removable, $4,495; 40M-byte fixed, external mount, $4,925; and 40M-byte fixed, external mount, plus 5M-byte removable, $5,295.

More information is available from IDE Associates at 7 Oak Park Drive, Bedford, Mass. 01730.

Data Encryption Device Unveiled

SEATTLE — Cryptext Corp. has announced Transcryptor, a microprocessor-controlled data encryption device.

The unit blocks unauthorized access to computers and terminals and automatically encrypts messages upon transmission. The unit decrypts messages upon receipt and can be configured to provide managerial control over employee access to computers and files, the vendor said.

The Transcryptor is based on the Zilog, Inc. Z80A microprocessor and comes with two RS-232C ports. The unit is located between the terminal or processor and a modem or direct line. Encryption and decryption are automatic and do not require special operator commands, the vendor said.

The units cost $945 each. The vendor can be reached through P.O. Box 425, Northgate Station, Seattle, Wash. 98125.

Portable Unit Tests, Exercises Data Buses

BOHEMIA, N.Y. — ILC Data Device Corp. has introduced a portable instrument for exercising, testing and troubleshooting Aircraft Internal Time Division Command/Response Multiplex Data Bus (MIL-STD-1553) systems.

The BUS-68000 Data Bus Exerciser is said to feature either local or remote programming. Local programming is said to be via a front-panel, 24-pad keyboard and 10-char. alphanumeric display. Remote programming is accomplished with an 8-bit parallel I/O port or option IEEE-488 and RS-232 interfaces, according to the vendor.

Priced at $4,995, the units are available from ILC Data Device at 105 Wilbur Place, Bohemia, N.Y. 11716.

Print Spooler Allows Multiple-Port Usage

WATERTOWN, Mass. — Digital Laboratories, Inc. has announced Multispool, a multiple-port print spooler that allows up to five computers to share one or more printers simultaneously without interrupting the user work flow, according to the vendor.

The product is a 60K-byte memory buffered print spooler, compatible with a variety of computers and printers. No special software is required, the vendor said. Multispool receives output at 9,600 bit/sec.

The print spooler is priced at $995 from Digital Laboratories at 600 Pleasant St., Watertown, Mass. 02172.

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Expansion Card Announced For Apple II+, IIe Micros

ALBUQUERQUE, N.M. — Computer Technology Associates, Inc. (CTA) has announced an expansion card that is said to turn an Apple Computer, Inc. Apple II+ or IIe microcomputer into an erasable programmable read-only memory (Eprom) programmer.

CTA's Apple-Prom programmer includes hardware and software to program all common Eprom types without use of "personality modules" or other hardware modification, the company said.

Apple-Prom derives all programming voltages from the Apple bus power leads. Optional equipment includes an external programming console and cable, the vendor said.

Apple-Prom is priced at $149.95 from CTA at 1704 Moon N.E., Albuquerque, N.M. 87112.

CPS Unveils Filtering Device

PINELLAS PARK, Fla. — Computer Power Solutions, Inc. (CPS) has added a filtering device to its line of Electra-Guard surge suppressors said to stop overvoltage and noise damage and filter out harmful electromagnetic and radio frequency interference.

The Electra-Guard System 4 reportedly is a solid-state clamping device (plug-in model) that eliminates sub-microsecond overvoltage transients from electrical circuits. A filter is included between the input power line and three outlets, and it is compatible with 50Hz and 60Hz ac power mains. It is generally used for personal computers and office computer systems priced under $3,000.

Suggested retail is $79.95. CPS is located at Suite 203, 8800 49th St., Pinellas Park, Fla. 33565.

Dot Matrix Printer Debuts From Pueblo Instruments

PUEBLO, Colo. — Pueblo Instruments, Inc. has introduced the Pico-1, a dot matrix printer.

According to a company spokesman, the Pico-1 is a low-cost printer that works with low-cost computers, making it easier for the home computer user to implement word processing.

The 80 char./sec printer can be ordered with an adapter and a cable that allows it to be connected directly to the Apple Computer, Inc. Apple, Atari Corp. Atari, Texas Instruments, Inc. TI-99/4A and Radio Shack TRS-80.

The vendor also offers an interface board, the Tipi, which gives the TI-99/4A home computer user printing capability for under $399.

The Pico-1 is priced at $330. Additional information is available from Pueblo Instruments, which can be reached through P.O. Box 3367, Pueblo, Colo. 81005.

Comdisco Airs Plan to Open Recovery Center For N.Y. Area

ROSEMONT, Ill. — Comdisco Disaster Recovery Services, Inc. (CDRS) has announced the planned opening of its fifth disaster recovery center in January in the metropolitan New York area. It is said to be the only site in the world capable of meeting the requirements of multiple IBM 3081 users.

At 65,000 sq ft, the facility is reportedly the largest and most technologically advanced CDRS center to date.

Dubbed the "East Coast Super Center," the facility will be equipped with 3081 processors and a full complement of state-of-the-art peripherals, providing advanced communications capabilities for New York City clients as well as other large network users in the U.S., a spokesman for CDRS reported.

Utilizing the CDRS/Standby Network and the Comline 3 digital interface, the Super Center reportedly will offer customers immediate access to all CDRS facilities whether in a test situation or in an actual disaster.

Additional information is available from CDRS, which is headquartered at 6400 Shafer Court, Rosemont, Ill. 60018.

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Beck Manufacturing to Market Floppy Diskettes via Hot Line

WEST PETERBOROUGH, N.H. — Beck Manufacturing has announced that it will market its line of 5¼-in. floppy diskettes via a toll-free hot line.

The diskettes are available immediately in the Beck 25 Pack, a bulk package that includes 25 diskettes, hub-reinforcing rings, Tyvek envelopes, color-coded user labels and nonmetallic write-protect tabs.

The price for a single-sided, double-density diskette is $2.19, and a double-sided, double-density diskette is $2.79 from Beck Manufacturing, Box 111, Main St., West Peterborough, N.H. 03468.

With IBM or DEC Hardware

Xerox Division Offers Turnkey

LOS ANGELES — Xerox Computer Services, Inc., a division of Xerox Corp., announced a turnkey manufacturing system that includes Xerox software and either IBM or Digital Equipment Corp. hardware.

The IBM-based system includes a Model 4321 mainframe processor with 1M byte of memory, a Model 3262 310 line/min printer, a 3370 571M-byte disk drive, a Model 8809 tape drive, a 3278 console display and a 3178 display terminal.

The software includes interactive, integrated manufacturing, financial, distribution, marketing and procurement functions. The software also includes the firm's most current information center technology for the creation of customized reports and applications.

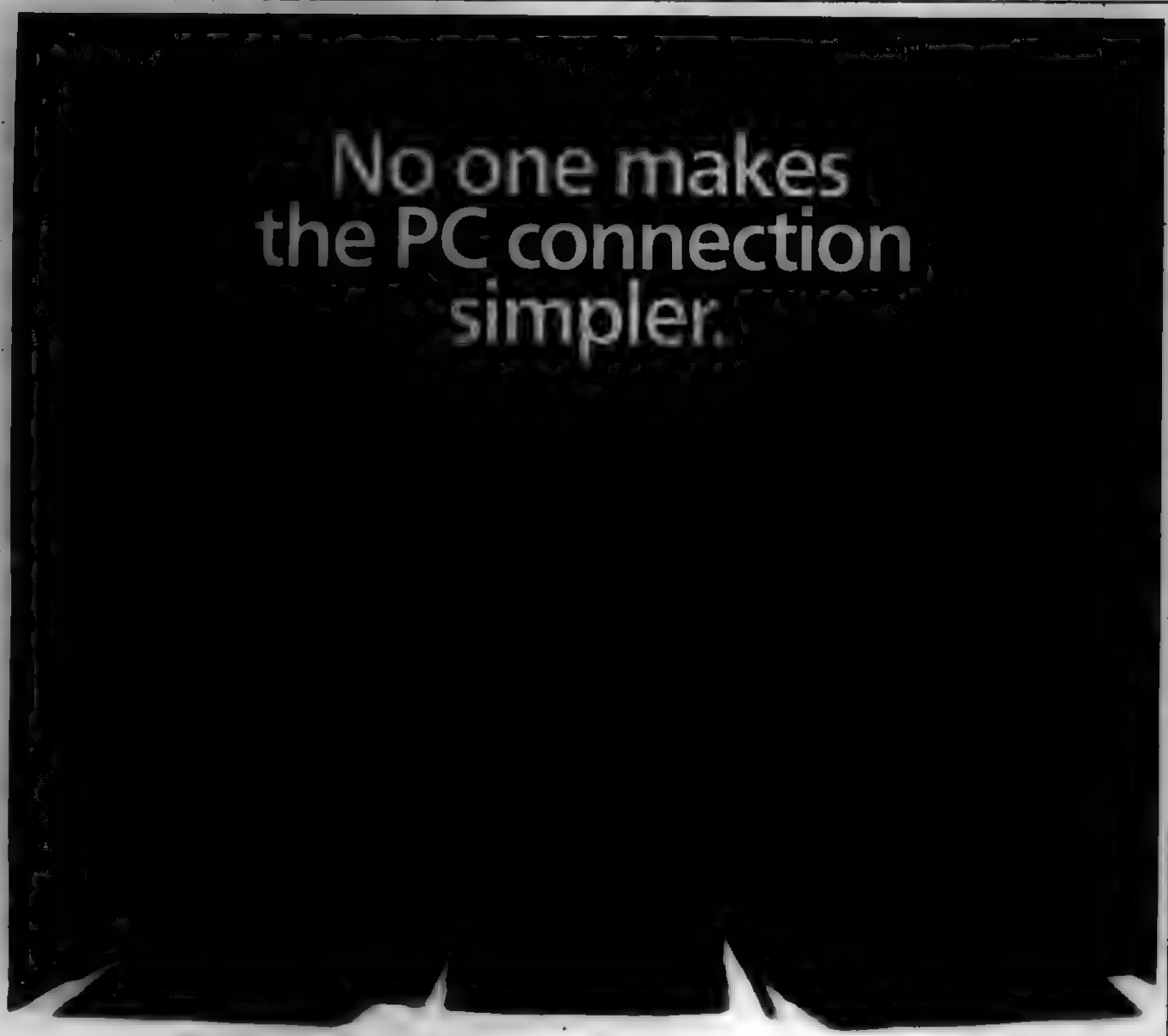
Management applications with the IBM 4321 include procurement management, cost planning and control, material requirements planning, master production scheduling, production control and inventory management. The distribution modules are receivables management, sales management and order management.

Offering nearly the same functional capabilities at a lower price, Xerox has also announced a turnkey system based on the DEC VAX-11/739 minicomputer.

The Xerox/Digital turnkey package includes the VAX-11/730 with 1M byte of memory, an RLO2 10M-byte removable disk drive, an RA80 121M-byte fixed disk drive, an RUA80 121M-byte disk drive with controller, a TU80 tape drive, an LA120 180 line/min printer and a VT100 video terminal, all DEC items.

The price of the IBM package is $250,000; the DEC system is $150,000. Both systems include a complete set of installation and support services.

The vendor is located at 5310 Beethoven St., Los Angeles, Calif. 90066.



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DT311 Out, Designed For Rainbow

MARLBORO, Mass. — Data Translation, Inc. has introduced the DT311 system, the first product in its PCDAX family of data acquisition and control add-ons for personal computers. Designed for the Digital Equipment Corp. Rainbow 100, the DT311 series is designed for data acquisition applications in laboratory research and industrial process control.

Operating under either CP/M or MS-DOS, the DT311 provides analog inputs, programmable gain, analog outputs, digital I/O, programmable clock and on-board multiprocessor. The complete system consists of an enclosure and the interface boards, as well as the LDT2801 series of analog and digital I/O option boards. Packages are also available for real-time software support of the systems.

Price of the basic DT311 system, including the enclosure, interface and a base LDT2801 board for analog I/O, is $1,495. The necessary software is priced at $495.

Data Translation is located at 100 Locke Drive, Marlboro, Mass. 01752.

Office Ware

Proportional Spacing on Wordstar is a book to help users of Micropro International Corp.'s Wordstar to print in proportional spacing directly from Wordstar. In addition, the book tells how to print two or more justified columns on a page and how to underline spaces between words. The techniques will work on all versions of Wordstar driving most daisywheel printers.

The book costs $20 from Writing Consultants, which is located at 11 Creek Bend Drive, Fairport, N.Y. 14450.

Correlation Systems has announced **Seekeasy**, a storage and retrieval program for microcomputers using Digital Research, Inc.'s CP/M. It accepts misspelled, imprecise or incomplete requests and displays the desired information in "most likely item first" order.

Seekeasy is self-prompting, with all required instructions always on the screen. Items are automatically filed by their entire contents, eliminating the need to select keywords. Seekeasy requires CP/M 2.0-2.2, 56K bytes of memory and a 24-line by 80-char. video terminal with direct cursor positioning. Seekeasy is available on 8-in. and 5¼-in. disks, according to a spokesman for the company.

It costs $235 from Correlation Systems, which is located at 81 Rockinghorse Road, Rancho Palos Verdes, Calif. 90274.

Controller Uses IEEE Standards

IRVINE, Calif. — Able Computer, Inc. has announced that its Easyway/E single-board Xerox Corp. Ethernet and Digital Equipment Corp. Unibus controller implements the IEEE 802.2 and IEEE 802.3 baseband protocol standards for local-area networks.

The vendor claimed that Easyway/E is the first single-board Unibus protection device to implement the standards in hardware and firmware. Easyway/E reportedly connects DEC PDP-11 and VAX-11 computer systems to an Ethernet network. The host protocol processor contains the Unibus interface, data link layer interface and transport protocol.

Priced at $7,200, Easyway/E is available from Able Computer at 1732 Reynolds Ave., Irvine, Calif. 92714.

Sixteen-Bit Unit Boasts Support of 32 T/S Devices

By Robert Ralt
CW West Coast Bureau

LAS VEGAS — A 16-bit office automation processor — capable of supporting up to 32 time-sharing devices for data processing users — was introduced here by Compucorp, Inc. at the recent Comdex/Fall '83 show.

The OA 3200 processor also offers communications with mainframes, including emulation of an IBM 3274/3278 Systems Network Architecture cluster, according to Compucorp.

Several I/O processors and four independent buses, including the IEEE 796 Multibus, are the key elements of the OA 3200 distributed processing architecture. They are said to relieve the CPU from real-time processes, thereby enhancing overall peripheral throughput and CPU performance.

For example, the network processors can reputedly function as gateways, routing packets between stations on different networks without CPU intervention.

The product also includes two front-end communications processors for supporting multiple local-area networks, global communications networks and standard local or remote terminals and devices, the vendor claimed.

Each OA 3200 is said to be capable of supporting up to four networks of 16 workstations, each connected through the company's Omeganet local-area network.

Multiple OA 3200 systems can be connected within the framework of Compucorp's network architecture to provide shared resources and services to multiple workstations and attendant printers and peripherals that are grouped in departmental networks and locally or remotely interconnected, the vendor added.

Motorola-Based CPU

The basic module is said to comprise a 10 MHz Motorola, Inc. 68000-based CPU, with error-correcting memory ranging from 256K to 2M bytes, a high-performance disk subsystem with one to three Winchester drives offering between 15M and 100M bytes of total formatted capacity and a 21M-byte cartridge tape drive for archival backup, loading and transfer.

The time-shared system can be expanded, the vendor explained, by simply plugging in new devices. Line speeds can range from 50 to 19.2K bit/sec, and modem controls are provided for attaching remote terminals.

Languages that can be used with the new system include Basic, Cobol, Pascal, Fortran 77 and C. End-user shipments are scheduled to begin in January 1984 at an entry price of $15,000.

Compucorp also announced at Comdex a new portable personal computer, Omegamite, with the reported capability to support Digital Research, Inc.'s CP/M applications. The product's primary application is a word processing package which, the vendor said, will allow report writing and the creation of project proposals.

Costing $2,995, Omegamite has between 64K bytes and 512K bytes of internal random-access memory, single or dual 655K-byte floppy disks and a communications modem. It is also optionally available in a 16-bit mode that is said to provide compatibility with the IBM Personal Computer from a processor, screen, diskette, keyboard and Microsoft, Inc.'s MS-DOS operating system level.

First shipments of Omegamite are expected in the first quarter of 1984 from Compucorp, 2211 Michigan Ave., Santa Monica, Calif. 90404.

NBI Enhances WP Software For IBM Micros

BOULDER, Colo. — NBI, Inc. has introduced an enhanced version of its word processing software for IBM's Personal Computer and the Personal Computer XT.

NBI Word Processing enables personal computer users to exchange information through two-way communications including a co-processor board with 64K bytes of memory and expansion capability of up to 192K bytes.

It can be used on the XT's hard disk storage system, eliminating the need for floppy disks, and costs $695 from NBI at Box 9001, Boulder, Colo. 80301.

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Package Out for E-Mail on IBM Micro

UPPER SADDLE RIVER, N.J. — Western Union Corp. has announced that Sydney Development Corp. of Vancouver, B.C., has unveiled a microcomputer software package in support of Western Union's Mailgram, the U.S. Postal Service's Electronic Computer-Originated Mail (Ecom) and Computer Letter services.

The Postman software package developed by Sydney will enable owners to originate Western Union Mailgram and Postal Service Ecom messages using an IBM Personal Computer, the vendor said.

The software, developed for use in conjunction with the vendor's message services, allows the user to compose letters, type "send" and have the letters transmitted to electronic mail, according to Western Union.

Postman is priced at $50 per package. Mailgram messages are $3 for the first page of text and $1.50 for the second page. Ecom messages range from 50 cents to $1.50 per page. The vendor is located at 1 Lake St., Upper Saddle River, N.J. 07458.

MSD Announces Device For Local-Area Micro Net

SAN JOSE, Calif. — MSD, Inc. has announced a networking device said to allow users of personal computers to set up a local-area network of up to 254 devices.

Using existing 110V lines, the Power Line Network (PLN) connects to the serial port of each computer and provides a communications rate of 2,800 bit/sec. The PLN unit contains 2K bytes of main memory for message storing or buffering.

Options available on the PLN include an 8-bit I/O port for interfacing with external logic or for sensing switch closures and a four-channel, 8-bit analog-to-digital converter.

The PLN costs approximately $500 per node from MSD, Suite B106, 1977 O'Toole Ave., San Jose, Calif. 95131.

TP 720 Printer Inaugurated By Televideo

SUNNYVALE, Calif. — Televideo Systems, Inc. has introduced a daisywheel printer said to include 100 print characters, proportional spacing and selectable pitch at 10, 12 or 15 char./in., printing 18 char./sec.

The TP 720 reportedly handles 13-in.-wide paper and includes a Triumph-Adler-compatible daisywheel and uses IBM Selectric cartridge ribbons.

The replaceable daisywheel can reportedly generate graphics and foreign language characters. Pitch, reset, form feed and pause functions are reportedly controlled from the printer's front panel.

The parallel version of the TP 720 is priced at $699; the serial version costs $785. More information is available from Televideo, which is located at 1170 Morse Ave., Sunnyvale, Calif. 94086.

Iris Provides WP Ability To Typewriters

MARKHAM, Ont. — Samanda Office Communications Ltd. has introduced its Intelligent Remote Input Stand (Iris), said to convert an electronic typewriter into a communicating word processor.

Iris provides commonly used word processing features, including repagination, automatic reformatting, search, replace, move, duplicate, copy, delete, print and stop.

According to the vendor, the exterior of the Iris looks like a secretary's copy stand, with the addition of a one-line, 40-char. LCD below the paper area. Iris has the capacity to store up to 48,000 characters in memory, depending on the model.

Iris can be incorporated into an office environment using either existing or newly purchased electronic typewriters. It is connected to the typewriter in minutes and plugged into a regular ac outlet, according to the vendor.

The product is available with 16K-char. memory for $1,500 with a modem and $1,250 without a modem; with 48K-char. memory, it is available for $1,583 with a modem and $1,333 without. Samanda Office Communications is located at 120 Gibson Drive, Markham, Ont., Canada L3R2Z3.

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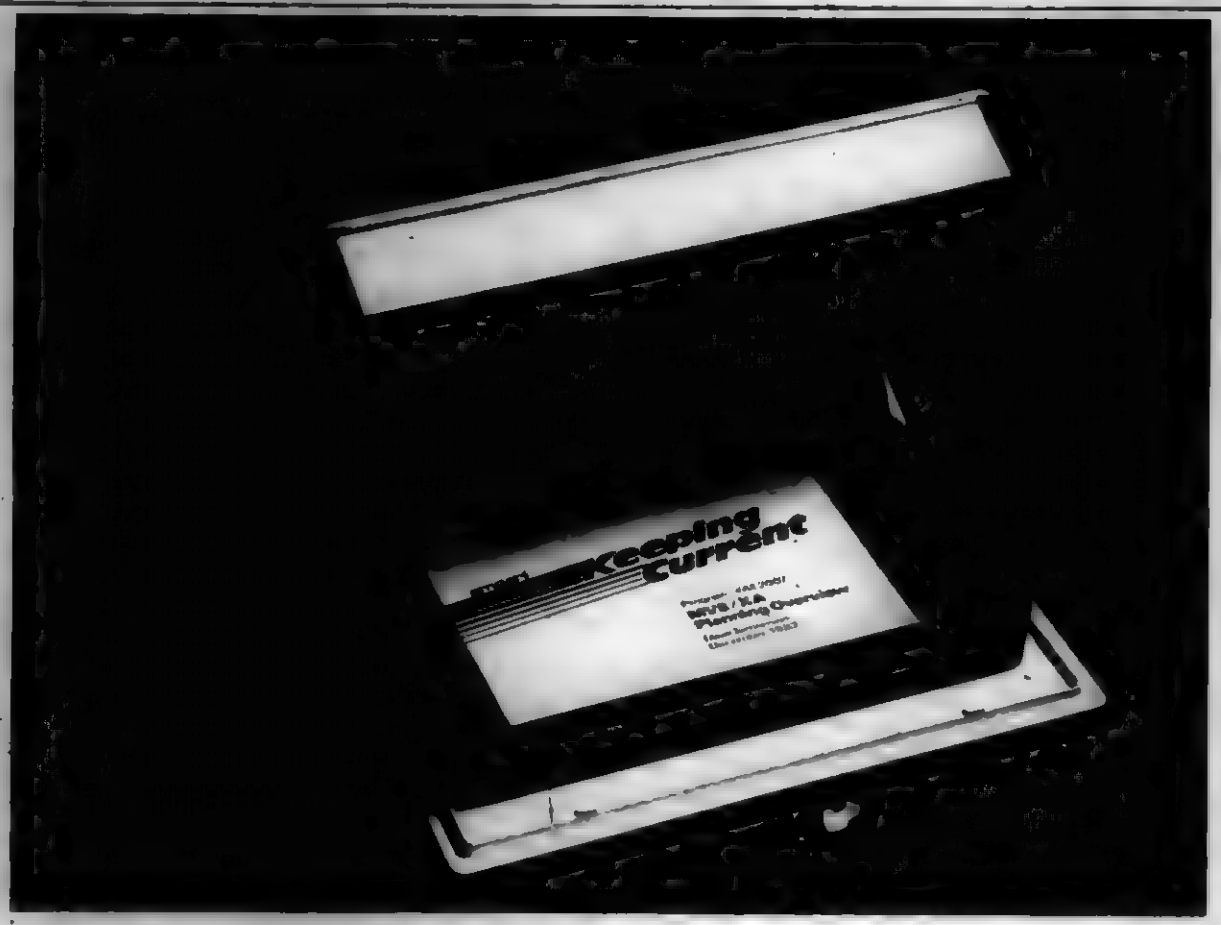

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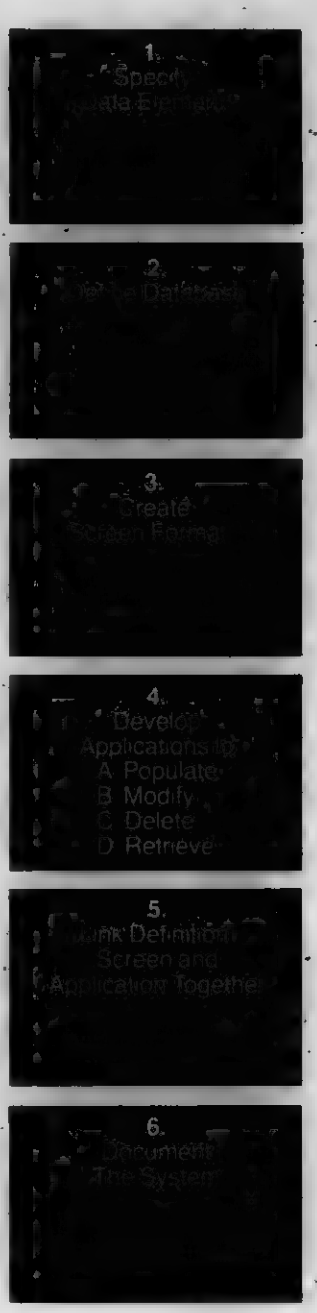

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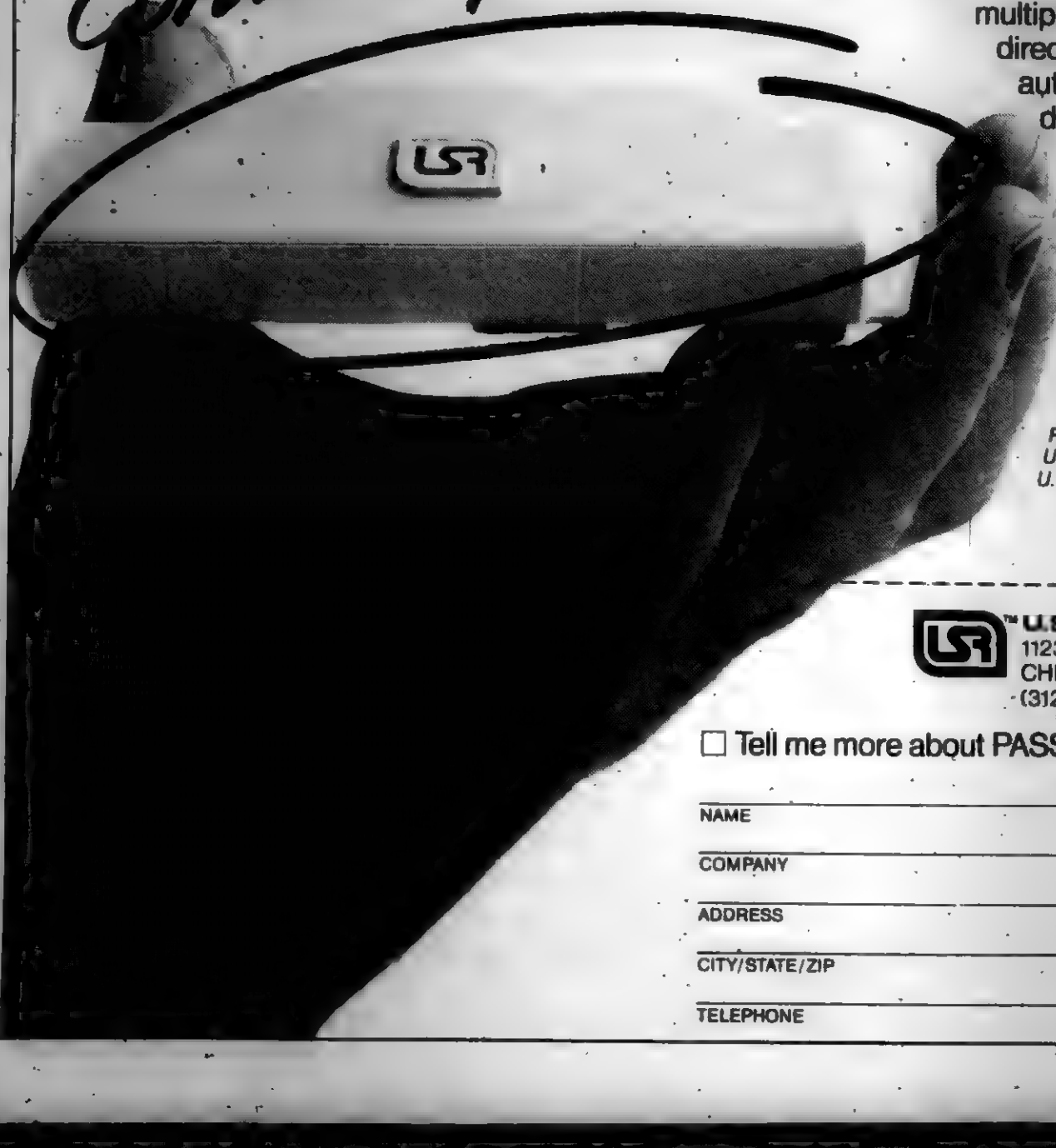

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Northern Telecom to Post 60% Gain in Earnings

By David Myers
CW New York Bureau

NEW YORK — Despite stiff price competition from other suppliers of private branch exchanges (PBX) and continuing losses from its office systems products, Northern Telecom Ltd. expects to post a 60% earnings gain this year.

Speaking to security analysts here recently, Walter F. Light, Northern's chairman and chief executive, said the company is prepared to match any PBX price cuts by Rolm Corp. and AT&T, but is not losing market share to either rival. The chairman continued that Northern Telecom's data processing systems and terminals are at last "flirting with the break-even level."

Northern expects 1983 worldwide sales to climb 7% over the 1982 level, approaching something over $3.2 billion, according to Donald A. Noble, chief financial officer for the company. What is more, if the

(Continued on Page 108)

Fixed Disk Revenues To Swell to $17 Billion By 1986, Report Predicts

MOUNTAIN VIEW, Calif. — Worldwide fixed disk revenues of $7.4 billion in 1982 will swell to nearly $17 billion by 1986 as computer users' appetites for storage continue to grow, according to a report released by Disk/Trend, Inc.

"The 1983 Disk/Trend Report" found that 5¼-in. Winchester drives below 30M bytes are the industry growth leaders, climbing from shipments of 240,000 units in 1982 to 1.1 million this year. However, smaller drives will gain 48% of the market within three years.

The report also found that worldwide shipments of IBM's 3380 disk drives will total 48,000 spindles this year, a volume that will heavily impact the plug-compatible disk drive competitors like Storage Technology Corp., Burroughs Corp.'s Memorex Corp. subsidiary and Control Data Corp. IBM will likely announce a double-density version of the 3380 next year, undercutting the market available to the manufacturers of plug-compatible drives which are just beginning volume shipments of 3380-like machines, the study reported.

Disk/Trend also found that:

- Fourteen-in. disk drives are rapidly fading in importance in OEM markets, and by 1985, 14-in. drives will retain their lead in unit shipments only in large disk pack drives and in fixed disk drives over 300M bytes.
- In 1982, the fastest growing manufacturer of OEM disk drives was Seagate Technology, Inc., with 41% of the worldwide shipments of 5¼-in. Winchester drives. The overall leader in this area, however, was CDC, with 45% of the market.
- Although total OEM revenues from removable disk

(Continued on Page 108)

Revenues in millions of U.S. dollars	1982 Shipments	Forecast 1983	1984	1985	1986
U.S. manufacturers					
IBM	2,825.5	3,630.6	4,245.4	4,892.8	5,371.1
Other U.S. captive	1,603.1	1,894.6	2,444.8	3,309.8	4,328.9
PCM	503.8	229.6	547.4	720.7	926.3
OEM	1,090.1	1,606.2	2,055.1	2,377.4	2,551.9
TOTAL UNITED STATES	6,022.6	7,367.0	9,292.7	11,300.8	13,178.2
Non-U.S. manufacturers					
Captive	1,101.2	1,363.1	1,845.5	2,045.9	2,221.7
PCM	57.2	169.2	294.8	319.3	366.1
OEM	222.5	431.8	639.5	891.8	1,177.0
TOTAL NON-U.S.	1,380.9	1,964.1	2,779.8	3,257.0	3,764.8
TOTAL WORLDWIDE REVENUES	7,403.4	9,331.1	12,072.5	14,557.8	16,943.0

Source: 1983 Disk/Trend Report

Consolidated Worldwide Revenues, All Moving-Head Rigid Disk Drives

IBM Micro Success Seen Buoyed by Momentum

Part One of a two-part series focusing on the IBM Personal Computer and Personal Computer-compatible world.

By Tom Wilmott
And Tim Caffrey
Special to CW‡

The introduction of the IBM Personal Computer in August 1981 was a momentous event in the short history of microcomputers. The 16-bit IBM product was clearly a business machine, and the business community embraced it quickly.

Given IBM's existing captive audience, the Personal Computer is attractive to management information systems (MIS) planners in larger organizations, whose end-users have been clamoring for workstations and computing power in the face of applications backlogs and long application development cycles. MIS planners grudgingly gave ground to the machine, hoping it would eventually turn into a 3270 terminal.

For some, the device was a banner to follow. For others, a reasonable alternative for organizational standardization. There were early software problems and a need for addi-

(Continued on Page 110)

Semi Sales To Retain Strength: SIA

PALO ALTO, Calif. — Worldwide semiconductor shipments by U.S. and European-based manufacturers should grow more than 18% in 1983, according to data just released by the Semiconductor Industry Association (SIA).

Third-quarter shipments, SIA said, topped $2.8 billion, bringing the 1983 year-to-date total to just over $7.8 billion.

(Continued on Page 116)

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IRD Study Examines Demand Rate For Channels

NORWALK, Conn. — Demand for U.S. satellite communications channels is growing faster than the supply of new transponders, and a combination of factors in the telecommunications and television markets will absorb new transponder capacity planned into the next decade, a recent study has found.

"Satellite Communications Services and Equipment Markets," drafted by International Resource Development, Inc. (IRD) here, claimed that this strong demand for satellite channels will have important implications for pricing of satellite transponders.

Joan de Regt of the IRD research staff said there exists the possibility of transponder pricing rising 30% to 40% above the levels of today. Although the supply of transponders, resulting from new satellite launchings, will be generally adequate through about 1987, the focus of attention in the industry will soon shift away from concern about supply and demand issues and toward fundamental problems of orbit and spectrum shortages, IRD found.

In the case of the U.S. domestic satellite industry, these predicted shortages will be worsened by the fact that South American, Central American, Caribbean and Canadian satellite communications needs must also be met by satellites occupying orbits similar to those used for domestic U.S. communications, the study said.

Business Use

An important unknown in the satellite supply-and-demand equation is the potential business use of videoconferencing, the study continued. "Teleconferencing, if it becomes popular, will just gobble up satellite channels," de Regt said.

On the business side, IRD found that revenues from transponder rentals in the U.S. are currently in the $400 million per year range and will rise to $1 billion within five years. Purchases of direct broadcast receivers will push total earth station sales past the $1 billion level by 1988 from the current $600 million level, with sales of "backyard" earth stations in the $3,000 to $6,000 range estimated to total 40,000 units in 1983.

The report is priced at $1,285 and is available from IRD at 30 High St., Norwalk, Conn. 06851.

Wang, Northern Telecom to Develop Link

LOWELL, Mass. — Wang Laboratories, Inc. and Northern Telecom, Inc. recently announced an agreement to develop a link between Wang computer systems and Northern Telecom's SL-1 digital business communications system.

The agreement provides a framework for developing an interface that allows the companies' products to be connected and to operate together effectively, while also providing for cooperation between the two to enhance interaction between their product lines, Wang said.

Wang also agreed to adopt Northern Telecom's Computer-to-PBX (private branch exchange) Interface (CPI) to connect Wang computers and the SL-1. The CPI is a specification that permits the SL-1 to accept data directly from a host computer without installation of add-on data modules at the computer ports.

As part of their agreement, Wang and Northern Telecom will work with customers to apply their integrated systems and to make them operational.

Commenting on the agreement, Desmond F. Hudson, Northern Telecom's president, said, "This agreement is a step toward [our] efforts to promote compatibility and connectivity among components of different information systems."

Commenting for Wang, Frederick A. Wang, executive vice-president, said the agreement "reflects Wang's strategy to work with a number of leading PBX vendors in order to provide customers with a flexible and open approach to office automation."

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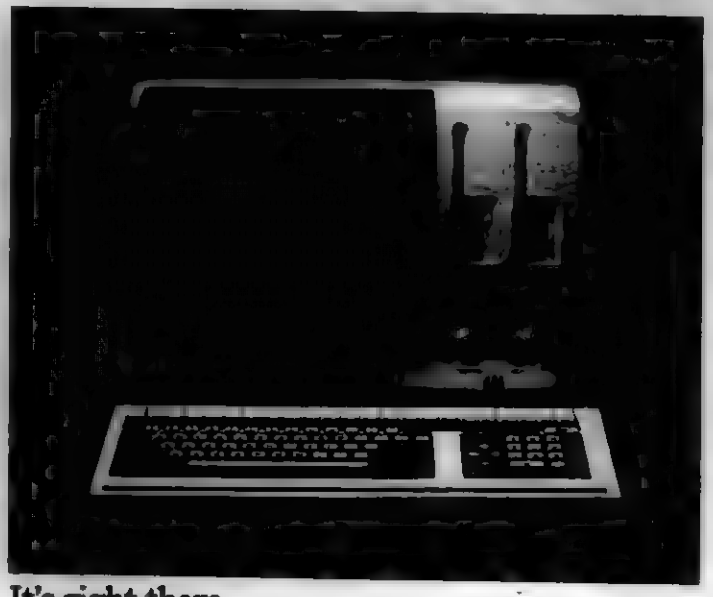

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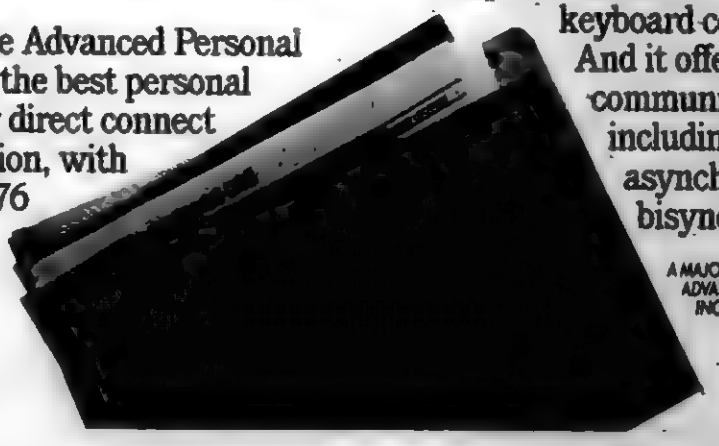

A MAJOR INSURANCE COMPANY IS USING THE ADVANCED PERSONAL COMPUTER TO GREATLY INCREASE WORKER PRODUCTIVITY.

Exec Reports at Comdex/Fall '83

HP to Gear Future Office Units Around HP 150

By Robert Batt
CW West Coast Bureau

LAS VEGAS — Hewlett-Packard Co. intends to gear its future office products strategy around the newly released HP 150 personal computer, according to Paul Ely, executive vice-president.

Speaking at a press conference at the recent Comdex/Fall '83 show, Ely said the company's goal with its touch-screen micro is to have a "significant" increase in its share of the personal computer market by year-end.

"We want to be, and think we must be, one of the top two or three suppliers of personal computers in the world over the long run," he maintained.

With HP making a late entry into the microcomputer market, Ely admitted the company has a lot of catching up to do. The organization, he claimed, is in the middle of making the structural reorganization needed to give it a viable office strategy.

"We see the personal computer as the centerpiece of the office, and with the HP 150 at the center of our product offerings, we see it as a winning strategy," Ely remarked.

The main missing link in its product lineup, he added, is a recognized secretarial-type word processor. "We want full-function word processing capabilities on our personal computers, and the HP 150 and its enhancements will play a key role in this strategy," he explained.

However, Ely asserted, the company has not done an effective job of marketing its already existing office products, such as its Desk Manager electronic work sheet, and correcting that deficiency is an urgent task.

To succeed, he remarked, the company must do a stellar job of distributing its personal computer. To that end, the company has put in place two distribution centers in the U.S. and one in Europe. To date, he added, more than 500 dealers and distributors, including major firms like Computerland Corp. and Micro Age Wholesale, Inc., have been signed up to participate in the HP 150 program.

Also speaking at the press conference, Cyril Yansouni, general manager of HP's personal computer group and the individual responsible for directing the HP 150 strategy, said the firm's objective is to have top-selling software packages available to run on the HP 150.

The company, he revealed, will shortly be announcing a series of packages to run on the product including Lotus Development Corp.'s 1-2-3 and Context Management Systems, Inc.'s MBA integrated software packages. Chang Laboratories, Inc.'s Microplan electronic work sheet will also be available to run on the HP 150, he said.

The company, Yansouni said, has received 200 inquiries from software developers since the HP 150 was announced two months ago, and the HP manager said he expects a total of 500 by the

(Continued on Page 116)

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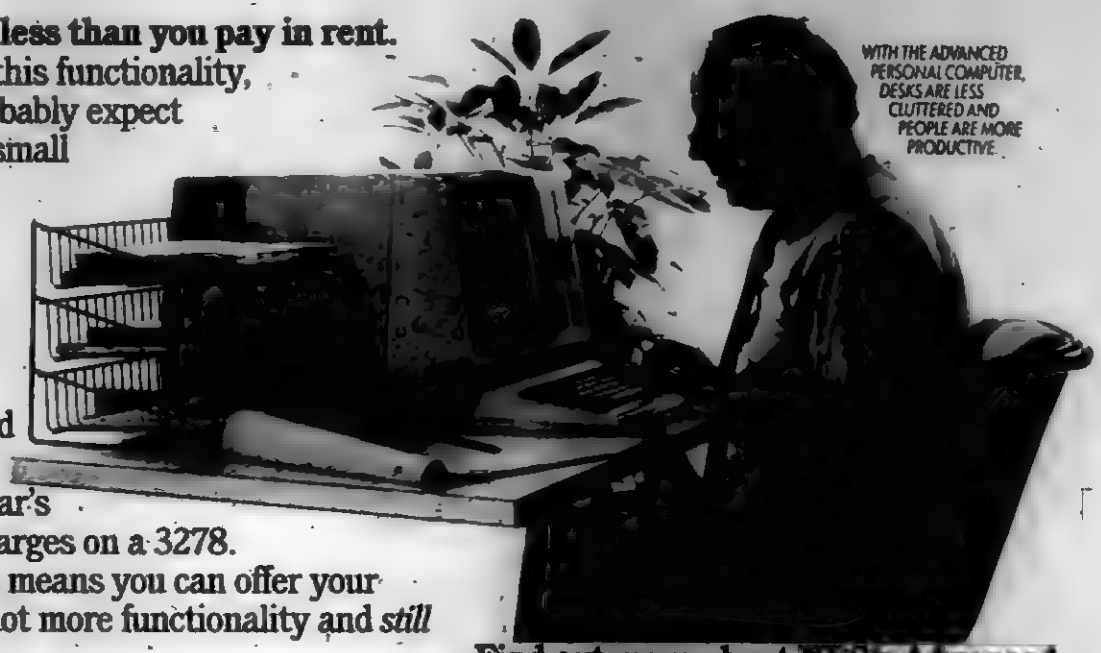

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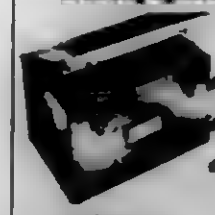

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Northern Telecom Expecting to Post 60% Gain

(Continued from Page 105)

Canadian telecommunications equipment maker reaches its goal of a 25% expansion, 1984 sales should top $4 billion, Light told securities analysts.

However, Light would not disclose sales and earnings figures for Northern's office equipment, a product line that has sputtered since the Mississauga, Ont.-based firm first entered the computer terminal mart in 1978, when it acquired Sycor, Inc. and Data 100 Corp. Analysts have been disgruntled with Northern's performance in that market, and some have gone so far as to suggest the company get out.

Even so, Light said office systems sales will account for around 4% of the company's revenues this year and about the same next year.

Systems achieved a 15% sales growth in the first nine months of 1983, after increasing by 2% last year, Light said.

The chairman added that one of Northern's goals is to have system sales catch up with digital-switching sales by 1988.

Northern was the first company to introduce a digital switch, and sales of its Digital Multiplex Systems family of products are expected to crest $800 million this year, according to Light.

In the PBX market, Light said Northern's success hinges on gaining a large share of the business of the divested Bell organization. Already two of the Bell operating companies have signed with Northern, while four others have signed with Nippon Electric Co., according to Light.

"The portion that is software is continually increasing. Today in large PBX and digital-switching systems, it is reaching the proportions of 70% software, 30% hardware. In a few years that will be 85% software, 15% hardware," Light said.

Gartner Banned From Using IBM Trade-Secret Info

BRIDGEPORT, Conn. — A Stamford, Conn.-based market research and analyst firm has been enjoined by a U.S. Federal District Court order from acquiring, disclosing or otherwise using any IBM trade-secret information.

The order also requires The Gartner Group, Inc. to return any IBM-protected information it may have, to identify any persons who might have disclosed such information in the past or future and to cooperate with IBM in any investigation of disclosures.

This latest action, which was mutually agreed upon by both companies, stems from IBM's recent filing of an amended complaint in its trade-secrets theft suit against Hitachi Ltd.; National Semiconductor, Inc.; National Advanced Systems, Inc.; and others.

Former IBMer

The amended complaint named as a codefendant Jonathon A. Fram, a former IBMer who left the company to work for Gartner [CW, Dec. 6]. Fram is alleged to have distributed valuable IBM documents containing trade-secret information that had been misappropriated.

According to a Gartner spokesman, Fram worked for the analyst firm from 1981, when he left IBM, until May of this year. He left Gartner voluntarily, the spokesman added.

IBM said it recognizes that Gartner has a right to continue its business interests, including forecasting trends, while Gartner said it is committed to the protection of legitimate trade secrets, saying the alleged events represent "at most an isolated occurrence."

Gartner added that the company did not admit to any wrongdoing, nor was any cash settlement or other compensatory award sought by IBM against it.

Fixed Disk Sales Forecast to Boom To $17 Million

(Continued from Page 105)

drives are expected to decline from 55% of the worldwide total in 1982 to 14% in 1986, sharp growth in unit shipments is expected from disk cartridge drives using 5¼-in. and smaller disks.

In addition to revenue and unit shipment projections for rigid disk drives in nine separate product groups, the report provides statistics and analyses of installed-drive populations, average selling prices, competitive market shares of manufacturers and a review of competing data storage technologies. The report also contains basic specifications on 604 rigid disk drives.

The report is priced at $925 from Disk/Trend at 1224 Arbor Court, Mountain View, Calif. 94040.

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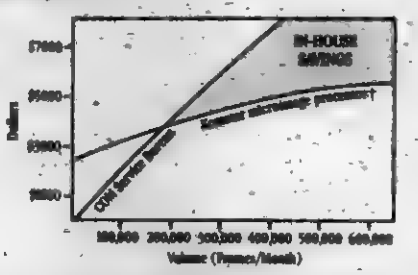

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IBM Micro Success Seen Buoyed by Momentum

(Continued from Page 105)

tional retail channels of distribution which would support a revenue stream sufficient for volume production and pricing sensitivity.

Through the winter of 1981-1982, software developers, peripherals suppliers and dealers contributed to the market enthusiasm. Deliberation turned quickly to magnetic attraction, and more momentum began to build behind the scenes. Hardware expansion boards were the first independent products to appear. Based upon a longer development cycle, software products began to straggle in for the fertile Microsoft, Inc. MS-DOS environment during spring 1982. Programmers enjoyed the flexibility of a larger 16-bit address capacity, especially for graphics. Before long, the software stampede cranked up in earnest.

By fall 1982 the market momentum was obvious, as more than 200,000 of the devices would be installed at the end of the year, while 1983 projections were going off the scale. During 1983, new and more sophisticated software products with integrated applications and compatible file structures were announced and delivered. These products were initially available on the IBM only. A crucial marketing edge had been established.

Thus, by the summer and fall of 1983, it was possible to make a clear case for the dominance of the IBM Personal Computer in many large organizations. Proving that the whole is greater than the sum of the parts, the Personal Computer realized its success not on the basis of continued technological superiority, but as a result of inexorable market momentum.

The market response to IBM's dominance has several faces. Each of these strategies, outlined below, has been dictated by the fact that IBM currently presents a formidable opponent to established vendors as well as to Silicon Valley start-ups:

● Strategy One: Attempt to surpass IBM through technical superiority. Rapid advances in the power of microprocessors and the sophistication of potential markets allow hardware engineers to design more power into desktop machines. The challenge for vendors following this strategy is to make sure their entries are competitive from a cost/performance perspective.

Apple Computer, Inc.'s Lisa, with its mouse and integrated on-screen applications, may be viewed as an attempt by Apple to step around IBM in its race for market share. As market analysis has shown, however, the Lisa price tag (although recently reduced $2,000) and independence from existing networking strategies have, to date, made it more a curiosity than a robust participant in the microcomputer market.

Hewlett-Packard Co.'s recently announced touch-screen model is an indication of the technical direction of future systems.

● Strategy Two: Potential IBM competitors can focus their products on specifically defined niche markets. In this instance, a vendor will sacrifice the possibility of attracting a wide following, but can succeed in effectively meeting demand from such vertical markets as physicians and lawyers.

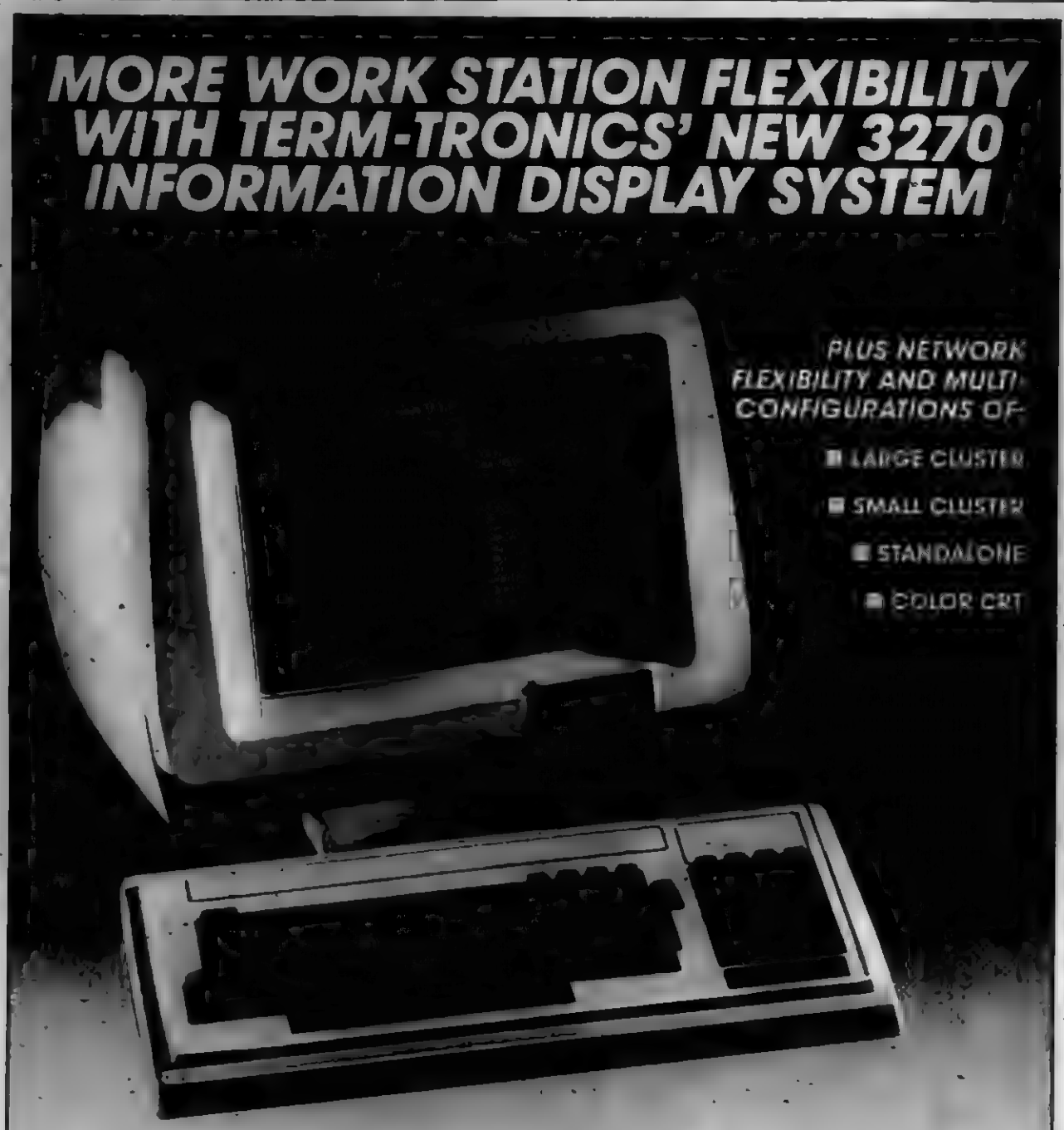
Vendors subscribing to this strategy develop proprietary systems with software appropriate to the computing needs of these vertical markets.

● Strategy Three: A third, and perhaps most precarious, strategy involves vendor attempts to capitalize on the success of the IBM Personal Computer by marketing their machines as clones capable of running the range of existing software designed for the IBM Personal Computer.

By taking advantage of this enormous base of existing software, manufacturers of IBM plug-compatibles can sell their machines to an audience sold on the functionality that the software is designed to deliver and to follow up with a favorable pricing policy.

Part II will appear in next week's Computerworld.

Caffrey is a market research analyst and Willmott is director of user programs at International Data Corp., Framingham, Mass.



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Burroughs Airs Expansion Plans

LAS VEGAS — Burroughs Corp. announced plans at the recent Comdex/Fall '83 exposition here to triple the size of its independent dealer network and back the expansion with new products aimed directly at the dealer marketplace.

Calling the expanded network a "keystone in Burroughs' marketing strategy," Edwin F. Carlson, president of the company's Business Information Systems Group, said the move will swell Burroughs' dealer network from the current 200 dealers to more than 700 by the end of next year. The company began building its network in 1982 when it announced the B20 microcomputer.

"We're confident that the dealers, who are people who know this industry well, will be impressed by both our products and our commitment," Carlson said. "Burroughs wants solid partnerships."

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TUESDAY, JAN. 17

ALL-DAY SESSIONS – 8:30 a.m. to 5 p.m.

1. **Software Contracts & Licences**
   Speaker: Susan H. Nycum, of Gaston, Snow, Ely Bartlett; Palo Alto, CA
2. **C Style and Portability**
   Speaker: Eric Allman, of Britton-Lee; Los Gatos, CA
3. **UNIX Systems Administration**
   Speakers: Ed Gould and Bob Kridle, of Mt. Xinu; Berkeley, CA
4. **Advanced Shell Programming**
   Speaker: Steve Bourne, of Silicon Graphics Inc.; Mountain View, CA
5. **Vi Editor**
6. **UNIX Systems on Local Area Networks**

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/usr/group SESSIONS

USENIX SESSIONS

WEDNESDAY, JAN. 18

7. **Keynote Address** – 9 a.m. - 10 a.m.
   Speaker: Jack M. Scanlon, Western Electric Company
8. **Joint Session** – 10:30 a.m. - Noon
9. **UNIX in Government** – 1:30 - 3 p.m.
10. **Networks** – 1:30 - 3 p.m.
11. **Market Research and UNIX** – 3:30 - 5 p.m.
12. **Distributed UNIX** – 3:30 - 5 p.m.

THURSDAY, JAN. 19

13. **Microcomputer to Mainframe Communications** – 8:30 - 10 a.m.
14. **Compilers and Languages** – 8:30 - 10 a.m.
15. **Graphics Applications on Work Stations** – 10:30 - Noon
16. **UNIX Directions** – 10:30 - Noon
17. **UNIX to Microports** – 1:30 - 3 p.m.
18. **Applications** – 1:30 - 3 p.m.
19. **New Developments in Office Automation** – 3:30 - 5 p.m.
20. **Implementations** – 3:30 - 5 p.m.

FRIDAY, JAN. 20

21. **Case Studies in Office Automation** – 8:30 - 10 a.m.
22. **Databasing** – 8:30 - 10 a.m.
23. **UNIX Standards** – 10:30 - Noon
24. **Open Session** – 10:30 - Noon
25. **Graphics - Computer Graphics Systems & Applications** – 1:30 - 3 p.m.
26. **Joint Session** – 3:30 - 5 p.m.

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(Select One:)	8:30 - 10 a.m.	7†		13	14	21	22
1 2 3 4 5 6	10:30 - Noon	8		15	16	23	24
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	3:30 - 5 p.m.	11	12	19	20	26	

†Keynote; session begins at 9 a.m.

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The right application software package — does the choice get blurred?

Help is on the way from *Computerworld* this January

The ever-increasing requests for office software; the demand for tools by programmers and users alike; the bewildering array of products to choose from — make the job of selecting applications software challenging and difficult. Here's what you'll get from this January's Special Report on Applications Software to make your job easier:

- The packaged decision: Should you buy, or develop in-house?
- Methods of selecting the best application for your needs.
- Modifying and maintaining packaged applications.
- Integrating applications from multiple vendors.
- Conversion stories.
- Integrating micro with mainframe applications.
- Applications for manufacturing.

You'll get information on who should select packaged applications. You'll read about the impact of application generation tools on selecting packaged solutions. And you'll get pages of fact-filled ads for products to keep you up-to-date on just what's new. If you buy, choose or recommend applications software products — you won't want to miss this special report in *Computerworld's* January 30th issue.

And if you've got packaged software products our readers want to know about — then you need to get your ad to us by January 13 to be included in the Special Report. To reserve space in this issue, call Don Fagan, Vice President Sales/Marketing; Ed Marecki, National Sales Director, or Kathy Doyle, Marketing Support Manager at (617) 879-0700. Or, call one of the sales offices listed below:

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Hurt by IBM Competition

Victor Execs Cite Misjudgment for Poor Showing

By Robert Batt
CW West Coast Bureau

LAS VEGAS — Victor Technologies, Inc. badly misjudged market demand for its 9000 series desktop computer, failing to recoup sufficient return on its investment in the system and precipitating huge losses in recent quarters.

This was the view of company officials, including Charles Peddle, Victor's founder, who spoke with *Computerworld* in an interview at Comdex/Fall '83 held here recently.

"With all the major users deciding to buy personal computers from IBM, our market did not expand as we had hoped," said Richard Couch, who was recently appointed Victor's executive vice-president and chief operating officer when Peddle stepped down as president and chief executive officer. "We have made substantial investments in the U.S. market, and we are now backing out of some of those investments."

After reporting second-quarter losses of $11.1 million, the company laid off almost 60% of its 3,000-member work force. Third-quarter results published recently revealed even worse financial trouble for the Scotts Valley, Calif.-based manufacturer; losses totaled almost $37 million on revenues of just $46 million. The company is in debt to the tune of about $100 million and, after going public in March, it has seen its stock plummet from a high of $20 to under $4 today.

Some industry observers have speculated that Victor's previous noncompatibility with the IBM Personal Computer world has cost it dearly in terms of market share in the U.S. The company has been more profitable in Europe, where compatibility with Big Blue is not such a hot issue.

In an attempt to reverse the recent disastrous slide in its market fortunes, Victor introduced a new diskette at Comdex designed to give its Victor 9000 desktop system compatibility with IBM's Personal Computer and Personal Computer XT software.

'We have made substantial investments in the U.S. market, and we are now backing out of some of those investments.'
— Richard Couch, recently appointed executive vice-president, Victor Technologies, Inc.

With the announcement of PlusPC, Victor attempted to defuse speculation that the company's survival was in doubt and talked about a "best of both worlds" corporate strategy.

"The addition of [Personal Computer] and XT compatibility expands the choice of available software applications that can be used on our 16-bit system, with literally thousands of ready-to-use packages already on the market," claimed Peddle, who now serves as Victor's vice-chairman. Personal Computer compatibility, he continued, also means that users can run their existing Personal Computer diskettes directly on the Victor 9000. "In this sense we feel we have the best of both worlds," Peddle maintained.

"Before the introduction of PlusPC, we were selling an IBM-similar product as opposed to an IBM-compatible one. With this new offering, we are taking the 9000 and adding to it the ability to interchange with IBM diskettes and run IBM programs, while not becoming an IBM look-alike manufacturer," Peddle remarked.

Just being a look-alike vendor, he said, confines a manufacturer to competing with IBM on a price basis only, thereby making firms very vulnerable to IBM's pricing strategy. Users are looking for products with higher capability than they can get with IBM, he said.

AT&T Proposes Satellite Services

WASHINGTON, D.C. — AT&T recently proposed to offer satellite transponder services which, the company claimed, would give its customers a broader range of options in meeting full- and part-time satellite communications needs.

In its filing with the Federal Communications Commission, AT&T proposed that its Skynet Transponder Service become available Dec. 31. The service would be offered by AT&T Communications, with three types of transponder channels available on a monthly, five- or 10-year lease basis. The channels would offer varying degrees of service protection, AT&T said.

The proposal also calls for part-time service to allow customers to meet occasional use requirements and augment full-time transponders during demand periods.

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IBM, AT&T Seen Restructuring DBMS Market

By Robert Batt
CW West Coast Bureau

LAS VEGAS — The increased market aggressiveness of IBM and the entry into the data processing arena by AT&T will radically alter the structure of the microcomputer industry over the next few years.

This was the main thrust of a speech delivered at Comdex/Fall '83 by Greg Leveille, president of MicroEdge, Inc., a Stamford, Conn.-based systems consulting firm.

Speaking at a conference session, Leveille said the two industry giants are bringing new levels of functionality to computing, which will place enormous pressure on existing suppliers of data base management systems (DBMS).

"IBM and AT&T are creating and defining new ways of doing business in the computing industry with an emphasis on network, data base and workstation management. This is putting pressure on DBMS suppliers to develop systems that will cater for this next market era," he asserted.

Big Blue and AT&T, Leveille noted, are increasingly becoming independent software suppliers. They are also introducing new standards in end-user support for the microcomputer industry, including better documentation and training aids, as well as encouraging more end-user participation.

"At the low end of the information processing market, we are moving out of the era of the personal computer and into the era of mainstream computing.

"This trend will create a new tier of companies in data base management systems — IBM, AT&T and others that have the resources to provide the new level of customer services that will come to be expected," Leveille told attendees at the conference.

The manufacturers best placed to take advantage of this trend, he continued, are those existing DBMS suppliers in the mainframe field who are now moving down to the micro are-

(Continued on Page 119)

HP's Office Product Strategy Keyed to Micro Introduction

(Continued from Page 107)

end of the year.

The firm is also expanding its open systems approach to hardware, he added, with three data communication vendors — Threecom Corp., Hayes Microcomputer Products, Inc. and Ven-Tel, Inc. — already signed up to develop personal computer peripheral products for the HP 150.

Referring to the company's decision to choose the 3½-in. floppy disk for its personal computer range, Yansouni claimed the product is faster and more reliable than the traditional 5¼-in. disk drive.

To back up its claims, the company released a paper at Comdex claiming the 3½-in. unit will become an industry-standard device. The paper outlined HP's mass storage strategy for the personal computer market. Requirements of a desired disk technology, it said, should include:

- Greater reliability than previous 5¼- and 8-in. storage systems.
- The ability to deliver improved price/performance ratios over a three- to five-year period.
- The capability to keep a company's computer products on a downward price curve, especially at the entry level, where price sensitivity is greatest.

Semi Market Will Grow 18% In 1983: SIA

(Continued from Page 105)

Preliminary data for October indicates a worldwide shipping rate of over $950 million, and the upward trend, expected to continue through the remainder of the fourth quarter, should put total 1983 shipments at close to $11.2 billion, compared with just under $9.4 billion in 1982, SIA stated.

This year's recovery has been led by the U.S. market, with shipments approaching $6.8 billion for calendar year 1983, a 21% increase over last year. Shipments to distributors have been 26.6% higher during the first three quarters compared with the same period last year.

While European-based semiconductor shipments have only risen 4.4% so far this year, recent indications point to a resurgence in the fourth quarter, during which shipments could exceed $880 million — an increase of more than 20% over the third quarter and an overall gain for the year of 10%, SIA added.

According to SIA, shipments to Japan by U.S. and European-based manufacturers should exceed $400 million for 1983, for a 13% annual increase. However, this ultimately means a loss of market share because the Japanese market is expected to grow by more than 20% during 1983.

ALFASKOP SYSTEM 41

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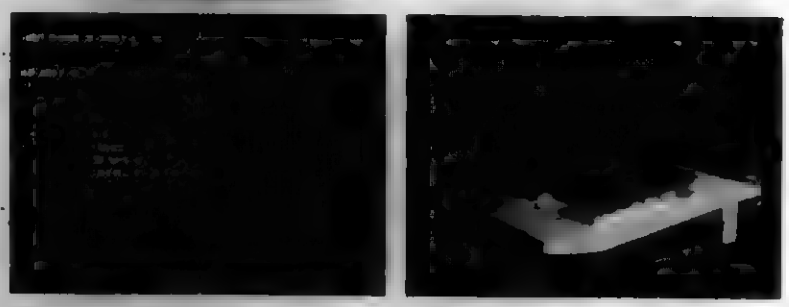

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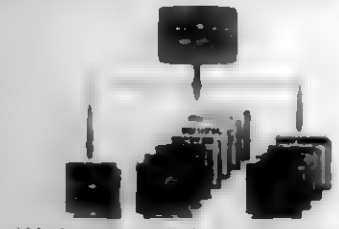

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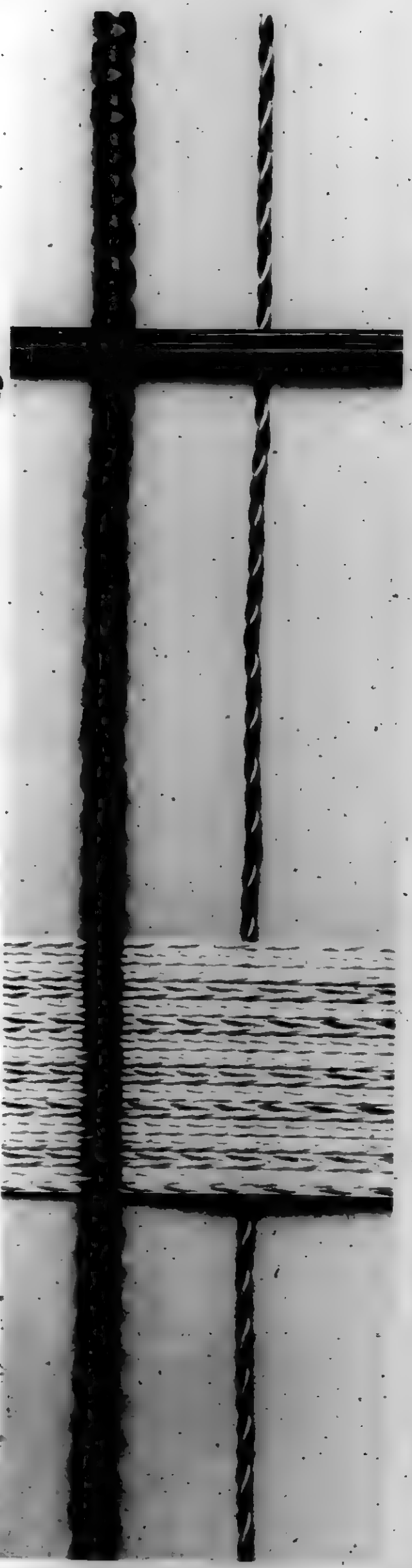

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IBM, AT&T to Alter Structure of DBMS Market

(Continued from Page 116)

na. These, he said, include Cullinet Software, Inc.; Oracle Corp.; Applied Data Research, Inc.; and Martin Marietta Data Systems, Inc.

According to Leveille, for microcomputer companies like Ashton-Tate, manufacturer of the popular Dbase II relational DBMS, the issue is whether they can move into the higher echelons of the data processing market and become broad-based suppliers.

"Ashton-Tate," he remarked, "has the resources to move upstream into the mainframe market. The question is whether it understands the need to do so and [has] the commitment to carry it through."

Also speaking at the session, Adam Green, chairman of Softwarebanc, Inc., an Arlington, Mass.-based software publisher, said multiuser compatibility will be crucial to DBMS products in the years ahead.

Currently, he said, single-user systems such as the IBM Personal Computer or Personal Computer look-alikes predominate. They will continue to do so, he asserted, while demand outstrips supply.

"However, as soon as production of these systems exceeds demand, manufacturers will be looking for other ways to sell more hardware," he said. "One of the best ways to do this is to create a multiuser operating system."

Digital Research, Inc., manufacturer of the widely used CP/M operating system, Microsoft, Inc. author of MS-DOS, and IBM are each moving in this direction, he claimed. With the emergence of the Unix operating system from AT&T, multiuser data base systems will come into their own, Green added, possibly as early as next spring.

"Over a period of two to three months, a window of opportunity will open up, bringing about a lot of changes in the data base market. Many current products will not work in the new environment, leading to a period of increased product innovation," he predicted.

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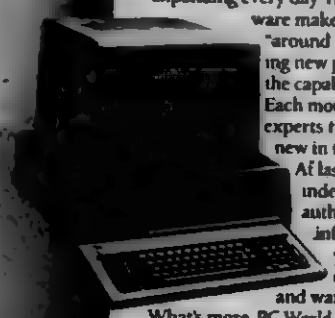

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Aggressive Jockeying Begins in Voice Tech Race

By Bohdan O. Szuprowicz
Special to CW‡

Voice-activated typewriters and word processors are among the most attractive future products now in development stages and are expected to become commercially available in large quantities within a few years.

As a result, companies large and small are aggressively jockeying for position in voice recognition, voice response and voice mail systems — technologies crucial to the development of such new products and services.

The major objective of voice technologies is to "humanize" the man-machine interface in office and factory environments. This may turn out to be a critical feature in many instances of rapidly progressing automation. The ability to give verbal commands to machines and receive immediate, unambiguous responses based on reliable data is an extremely attractive feature that also holds the promise of significant productivity improvements and abatement of [redacted]

Voice recognition equipment transforms speech input into digital format that can be processed by computers and peripheral office equipment into text or graphics. It is also the most sophisticated and difficult of all voice technology applications.

Speaker-independent devices, which can recognize a wide range of speakers and whose prices are reasonable, usually can handle only a small set of single word commands. Speaker-dependent machines require "training" by the individual speaker whose voice will be used to operate the systems and cannot be used universally.

Only a few systems at present can recognize continuous speech, and their vocabularies are limited while their prices are often exhorbitant. However, rapid progress in very large-scale integration (VLSI) microchips and fourth-generation software languages promises better solutions and lower costs for voice recognition technology in the very near future.

IBM and Nippon Electric Co. (NEC) of Japan appear to be the leading competitors in speech recognition research and development. IBM developed continuous voice recognition system and experimented with it for years. NEC not only makes such systems but has developed a speaker-dependent word processor recognizing unlimited Japanese vocabulary and a speaker-independent model limited to 128 words.

Confronting those giants are a number of small companies producing hardware and software for various stages of voice recognition technology. Each is developing new equipment while hoping for a breakthrough that will give them that unique competitive advantage.

Voice response from machines is another matter. It can take the form of voice coding, which consists of previous human voice played back on demand, or the robot-like voice synthesis technology, which reconstructs words from independent phonetic elements encoded in a chip.

But the most explosive of all voice technology markets for the moment appears to be the voice mail business, also known as voice messaging or voice store and forward. These systems are designed to digitize human speech without recognition and store it on magnetic disks for future transmission or retrieval by electronic mail systems or telephone. This market is growing at a rapid pace well over 100% annually by some estimates and is expected to get an added boost when AT&T formally breaks up into telephone operating companies, at which time telecommunications competition should begin in earnest.

Some well-financed start-ups, like Cygnet Technologies, Inc. and VMX Corp., are preparing product entries for this market. But lying in wait are the powerful competitors that control digital communications markets and provide the networks that voice mail systems must use.

They include such giants as AT&T, IBM, Fujitsu Ltd., NEC, Rockwell International Corp. and Siemens AG. A second-tier group includes firms such as Rolm Corp. and Wang Laboratories, Inc.

ICP to Host Awards Fete

INDIANAPOLIS — International Computer Programs, Inc. (ICP) will host its 13th annual ICP Million Dollar Awards ceremony and conference at the Registry Hotel in Dallas, April 25-26.

The awards are held annually to honor outstanding sales achievements in software, and more than 500 industry executives are expected to attend. The executive conference will be held in conjunction with the awards.

The 1984 ceremony will present more than 400 new awards in categories ranging from $1 million to $250 million. Additional awards will include the million-in-one awards for software products achieving $1 million in sales in one year.

More information on the ceremony and conference can be obtained from ICP at 9000 Keystone Crossing, Box 40946, Indianapolis, Ind. 46240.

Supershorts

AT&T has been awarded a major portion of the $335 million contract to design the first transatlantic lightwave cable system, TAT-8. **Standard Telephones and Cables Ltd.** of the UK and **Submarcom** of France were chosen to provide the other portions of the system by the 28 international telecommunications administrations and corporations who will co-own TAT-8. AT&T will supply terminal equipment, repeaters and 3,146 miles of undersea cable. Installation is scheduled to begin in 1986 and should be completed in mid-1987.

• • •

IBM has named **Project Software and Development, Inc.** (PSDI) a value-added remarketer for the IBM 4300 series of computers, enabling PSDI to sell its project management software, Project/2 together with IBM 4300 hardware.

• • •

Honeywell, Inc. has signed five-year, third-party maintenance service contracts with **Printronix, Inc.** of Irvine, Calif., and with **Pencept, Inc.** of Waltham, Mass. Sy Kraut, vice-president and general manager of Honeywell's Customer Services Division, called the agreements "a major step in Honeywell's plan to build a national third-party service business."

• • •

Hewlett-Packard Co. has consolidated its worldwide marketing and field selling activities for personal computers within its Personal Computer and Computer Marketing Groups.

• • •

Protocol Computers, Inc. has signed an agreement to provide **Northern Telecom, Inc.** with protocol converters for its SL-1 digital private branch exchange business communications systems. The converters will allow the SL-1 to emulate an IBM Systems Network Architecture/Synchronous Data Link Control controller, and the Northern Telecom terminals will be able to emulate IBM 3270-type terminals.

• • •

United Telecommunications, Inc. and **O&Y Equity Corp.** have announced the formation of a joint $100 million venture, Olympianet, which will provide an array of voice, data and video telecommunications services. Olympianet will be managed by United Business Communications, a new subsidiary of United Telecom formed exclusively to provide advanced telecommunications services to real estate developers.

Mergers & Acquisitions

Eastman Kodak Co. will acquire the assets of **Mead Digital Systems** (MDS) of Dayton, Ohio, a division of Mead Corp., under terms of a recent agreement. MDS will continue to operate as a Kodak subsidiary under the name Diconix, Inc.

Informatics General Corp. has acquired **Automated Health Services, Inc.**, a Chicago-based software firm, for an undisclosed amount of cash.

Florida Progress Corp., St. Petersburg, Fla., has acquired **Southeastern Computer Corp.** of Clearwater, Fla. Terms of the acquisition were not disclosed.

Genicom Corp. has announced a definitive agreement with **General Electric Co.** to purchase GE's Data Communication Products Business Department, including all operations in Waynesboro, Va., and Reynosa, Mexico. Genicom, a new company formed to run the business, will purchase the assets from GE for cash, notes and warrants. Owners of the new company include the New York investment firms of J. H. Whitney & Co. and Welsh, Carson, Anderson & Stowe III, as well as key GE employees headed by General Manager Curtis W. Powell, who managed the business for GE.

Disc Tech One, Inc., Santa Barbara, Calif., has acquired from the 3M Co. the assets and manufacturing operations of its 8-in. Winchester disk drives. Disc Tech One will offer the drives in 10M-, 20M-, 60M- and 90M-byte capacities with Ansi-, Storage Module Drive- and Priam Corp.-compatible interfaces.

Com Tel, Inc., Salt Lake City, Utah, has acquired **High Technologies, Inc.**, also of Salt Lake City, for an undisclosed amount of cash.

Honeywell, Inc. has acquired the assets of **Kraden Communications, Inc.** of Skokie, Ill., a firm that sells, installs and services on-premise voice communications equipment. It will operate as the Chicago area office of Honeywell's Communications Services.

Memorex Corp. has acquired the manufacturing rights for **DMA Systems Corp.'s** Micro-Magnum 5¼-in. fixed and removable Winchester cartridge disk drives and a half-height 5¼-in. Winchester cartridge disk drive. Memorex will manufacture and market the half-height drive as the Memorex 450, and DMA Systems will manufacture it as the DMA 360.

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Forecasts & Findings

Japanese Market Share

The Japanese computer industry should increase its share of the world's production of computer equipment from 10% today to 25% in 1988, but is unlikely to move past the U.S. unless it can develop a new technology, commercialized artificial intelligence, that will render obsolete IBM's current installed base of hardware and software, according to "Japan, Inc. in the Computer Market."

The 141-page report from Northern Business Information, Inc. claims the Japanese Ministry of International Trade and Industry-sponsored Fifth-Generation Project represents Japanese industry's long-term strategy to eliminate IBM's lead in architecture, silicon semiconductors and software. Japanese companies have the time and money to try and overcome U.S. distribution problems, and standard operating systems are placing them in a position to buy the applications programs needed for greater sales, according to the report.

In the short term the larger Japanese suppliers intend to compete in all major segments of the North American market, while the less established companies will go after the small business microcomputer market and the sale of peripherals to OEMs.

The report, priced at $995, is available from Northern Business Information, 66 W. Broadway, New York, N.Y. 10007.

Micro DBMS Mart Boom

The microcomputer segment of the market for data base management systems will become a billion-dollar market by 1985, and the market share of mainframe DBMS sales will decline from 47% in 1982 to about 18% by 1987, according to Creative Strategies International, Inc. (CSI).

In a recently released report, "Data Base Management Systems," CSI predicts the micro and minicomputer segments of the DBMS market will show the most dramatic growth over the next five years and will account for more than 80% of the total market at the end of that period. Declining prices, with minicomputer DBMS packages dropping 45% in price by 1987, continue to fuel user demand and auger well for suppliers, the report concludes.

The report provides analyses of industry and technological developments, market trends and growth and the strategies required for a strong position in the market. Priced at $1,450, it is available from CSI at Suite 275, 4340 Stevens Creek Blvd., San Jose, Calif. 95129.

MIS Appeasing Users

MIS directors have generally regained control of all corporate computing activities and acquisition policies, and most MIS departments are either implementing or studying formal corporate-wide programs to meet the clamor of end users for access to mainframe data in easily usable form, according to "Micro-to-Mainframe Communications — Hardware and Software Markets."

The report, recently released by International Resource Development, Inc. (IRD), predicts users will spend more than $500 million on micro-to-mainframe communications in 1984, compared with about $220 million in 1983, and notes that IBM has "moved off the sidelines" with new products and that AT&T is expected to enter the fray soon. A survey of large U.S. corporations found 46% of respondents already implementing programs for connecting micros to mainframes and another 44% conducting studies or pilot programs.

The report singles out the winners of today's market for communications products and looks at who are positioned to be the winners in tomorrow's market.

The report (No. 576), priced at $1,850, is available from IRD at 30 High St., Norwalk, Conn. 06851.

Not Enough Micro Dealers

There are not enough retailers to sell the 645 different products being offered by 174 personal computer manufacturers now operating in a market segment that will encompass $16 billion worth or equipment by 1986, a study from Strategic, Inc. found.

"Microcomputer Distribution — The Key Issues" states that the inadequacy of a distribution system that has to cope with a substantial growth rate will become a serious problem in the future.

Strategic predicted that the number of personal computers shipped will total about 4.5 million in 1985, causing both system houses and retailers to expand sales efforts into horizontal and vertical markets. Such markets, the study found, will require customized software and a sales and support staff familiar with each market segment.

Among more conventional distribution channels, one that the study found likely to succeed is the national or regional broker sales force, consisting of an individual salesman calling directly on end users with complementary product lines from different manufacturers.

The study is priced at $3,000 from Strategic at Suite 215, 4320 Stevens Creek Blvd., San Jose, Calif. 95157.

(Continued on Page 124)

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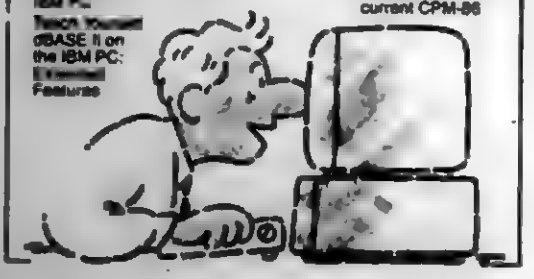
How to Use Your IBM PC with CPM-86 and Concurrent CPM-86



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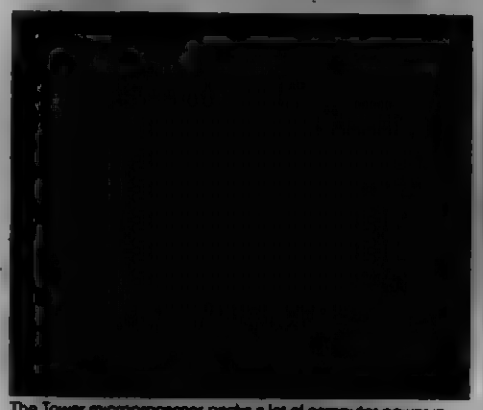

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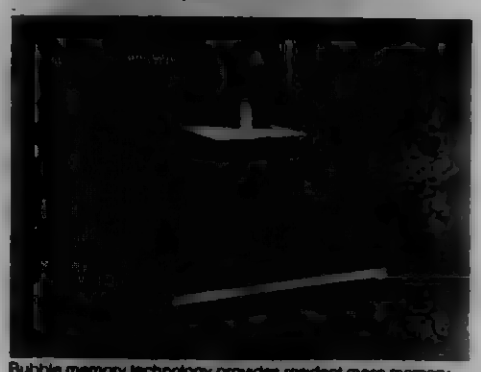

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Forecasts & Findings

(Continued from Page 122)

Pricing Services

Lack of quality data, misunderstood user requirements and major shifts in delivery modes are combining to complicate the problem of pricing processing services and integrated systems, according to a report issued by Input, Inc.

In addition, intense competition resulting from the maturing of these two market segments and the advent of the personal computer market has increased the importance of making prudent pricing decisions, according to the "Information Services Pricing" report.

The report claims that remote computing services vendors face particularly bleak long-term prospects, as in-house mainframes and minis as well as personal computers take away more remote computing service vendors. Batch and facilities management vendors, while facing brighter prospects, must be attuned to the growing price sensitivity of their client base.

The report is priced at $2,000 from Input, located at 1943 Landings Drive, Mountain View, Calif. 94043.

Semi Use to Grow

U.S. semiconductor consumption in 1984 will top the $10 billion mark, a solid 30% increase over 1983 consumption levels, according to a report from Dataquest, Inc.

The report, issued to Dataquest subscribers in conjunction with its Semiconductor Industry Services, said that 1983 seminconductor sales in the U.S. will reach $7.7 billion, a 23% increase over the previous year. This unprecedented demand is fueled by the continuing economic recovery, with the market characterized by stabilizing prices and the continued buildup of semiconductor inventories by the major vendors.

More information about the report is available from Dataquest at 1290 Ridder Park Drive, San Jose, Calif. 95131.

Micro Software Mart

The fast-changing pace of the microcomputer software market guarantees that what once was the norm will no longer be so, providing new opportunities for all vendors involved, according to a recent study by International Resource Development, Inc. (IRD).

"Microcomputer Software Packages" claimed that the majority of micro software companies today are struggling to survive in a confusing marketplace, facing multiple problems of targeting and identifying vertical markets and distributing efficiently. The report said further that Digital Research, Inc.'s CP/M operating software will gradually fade as a de facto standard, giving way to Microsoft, Inc.'s MS-DOS and the newer multi-tasking operating systems.

The burgeoning interest in integrated software packages will produce an end result of fewer packages sold at prices considerably lower than the cumulative price of individual packages that today perform the same functions, the study maintained.

The study is priced at $1,650 and is available from IRD at 30 High St., Norwalk, Conn. 06851.

Nickels & Dimes

Electronic Associates, Inc. has reported sales of $31.7 million for the first nine months of 1983, down 22% from $40.6 million for the same period last year. The company incurred a net loss of $8.5 million, or $3.01 per share for the period, compared with a net income of $3.2 million, or $1.13 per share for the first nine months of 1982.

$ $ $

Datapoint Corp. announced a marked improvement in profits for its first quarter compared with the same period a year ago, while reporting nearly flat sales. Profits for the quarter

(Continued on Page 125)

"TIS™ GIVES BEST WESTERN INTERNATIONAL NEXT GENERATION TECHNOLOGY."

Keith Barlow

Executive Corner

● **James B. Preston** has joined United States Satellite Systems, Inc. of New York as executive vice-president of marketing. Preston was formerly with IBM and Storage Technology Corp.

● **Jim Manzi** has been promoted to vice-president of marketing and sales at Lotus Development Corp.

● **Tom Scholl, Dan Fraley** and **Sheldon Revkin** have been named executive vice-presidents at M/A-COM DCC, Inc.

● **Roger Gower** has been named executive vice-president and chief operating officer at Qume Corp., a subsidiary of ITT.

● **Ron W. Brittian** has been appointed vice-president, corporate research and development, for Wyly Corp. and University Computing Co., Wyly's principal subsidiary.

● **Kathryn C. Gould** has been named vice-president of marketing at Oracle Corp.

● **Hal M. Moyers**, former senior vice-president, semiconductor group, at Texas Instruments, Inc., has joined Zymos Corp. as senior vice-president of operations.

● **William P. Conlin** has been named a vice-president of Sanders Associates, Inc. and president of its California Computer Products subsidiary. Conlin joins Sanders from Burroughs Corp., where he was a senior vice-president of the company and president of the Large Accounts Development Group.

● **C.B. Rogers Jr.**, senior vice-president and group executive of the Information Systems Group of IBM, has been elected to the board of directors at Rolm Corp.

● **David C. Turcotte** has been appointed vice-president, semiconductor operations, for Computer Systems at Sperry Corp.

● **James J. Verrant** has been appointed associate group vice-president, Information Systems International, at Honeywell, Inc.

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"TIS™ is truly a remarkable software system. With TIS operating at both the Strategic and Tactical levels of our organization, we now have a sophisticated software system capable of evolving as the needs of the company evolve. As far as I'm concerned, TIS is giving Best Western International the kind of next generation technology we need."

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Best Western International is the world's largest lodging chain. In the fast-paced lodging business, total control of accurate and timely information is no luxury. It's a vital necessity. For this reason, Best Western demands advanced software that can grow as its needs grow.

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After a careful evaluation of several systems, Best Western chose TIS—Cincom's powerfully integrated data base management and application development system and winner of the Associated Information Managers' (AIM) Outstanding Information Technology Award.

TIS was brought up quickly. It was first used in a Strategic capacity to implement corporate payroll and personnel applications. Now, TIS is being used in both Strategic and Tactical operations throughout Best Western International to develop applications for financial, marketing, supply and other functions. And, because the TIS Intelligent Query language provides easy access to corporate information, end-users are discovering that they can meet their own information needs without the aid of trained programmers.

TIS helped solve Best Western's immediate needs. More importantly, with TIS Best Western International now has a migration path to the future —with little concern for obsolescence.

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TIS is a totally integrated application development and information processing system. Its entirely new architecture is designed to meet a wide range of needs. Designed for complex, high volume data base environments, TIS provides:

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- An Intelligent Query language to provide instant information to end-users for virtually all ad hoc needs.
- A new DBMS component that provides unique data structuring capabilities with high performance.

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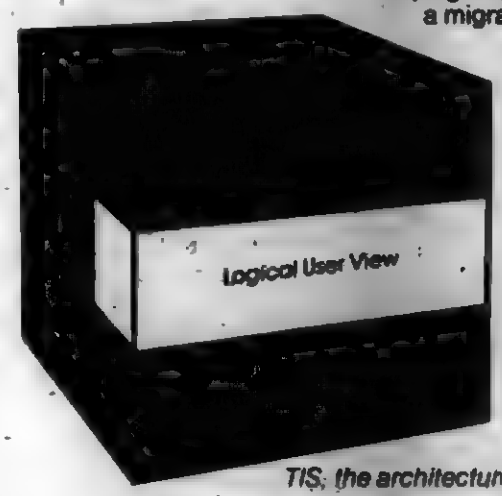
TIS is giving Best Western International a migration path to the future. Isn't it time to find out what TIS can mean to the future of your company? For more information, or for answers to your specific questions, contact our Marketing Services Department, 2300 Montana Avenue, Cincinnati, Ohio 45211.



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Nickels & Dimes

(Continued from Page 124)

were $13.4 million, or 27 cents per share, on sales of $140 million.

$ $ $

Nixdorf Computer AG has announced that revenues for the first three quarters of 1983 increased 20%, and orders rose 25% over the same period in 1982.

$ $ $

Comdisco, Inc. has announced net earnings of $51.8 million, or $1.78 per share, for the year ended Sept. 30, up 76% over fiscal 1982. Total revenues for the year were $543.2 million, compared with $472 million for 1982.

$ $ $

Wyly Corp. has reported income from continuing operations of $220,000, or 1 cent per share on revenues totaling $38 million for the third quarter ended Sept. 30., which was the first quarter to show a profit for the company in 1983.

$ $ $

M/A-COM, Inc. has reported record high sales, orders and a backlog for fiscal 1983, but earnings from continuing operations, as expected, were lower than fiscal 1982. Income for the year was $31.4 million, or 76 cents per share, compared with $41.8 million, or $1.08 per share, for fiscal 1982.

$ $ $

Moody's Investors Service has lowered its rating on **Storage Technology Corp.'s** 11¾% notes due during 1993 from Baa2 to Baa3 and on its 9% convertible subordinated debentures due during 2001 from Ba1 to Ba2. These actions, which affect $183 million of rated debt, reflect a sharp decline in operating margins, which is expected to result in an operating loss this year and to exert pressure on intermediate-term earnings.

$ $ $

Comserv Corp. has reported a net loss of $2.8 million, or 87 cents per share, on revenues of $3.8 million for the third quarter ended Sept. 30, compared with a net loss of $1,000, or 0 cents per share, for the third quarter of 1982.

The Goal News

LOGICAL beats PHYSICAL

For OS/VS

LOGICAL DUMP/RESTORE OFFERS VAST PERFORMANCE GAINS

We are pleased to report that the people who have tried FAVER/XP, the "smart" backup/restore system, are pleasantly surprised at the difference Logical makes.

Most people are used to a physical-design dump & restore system. To backup a single dataset across a number of packs, they have to physically back up each pack. The logical approach of FAVER/XP lets the system back up just the dataset you want, no matter how many volumes it occupies.

You can back up clusters, groups of clusters or an entire catalog this same way. It's much easier with FAVER/XP and everything happens faster.

Plus, FAVER/XP integrity-checks all VSAM datasets for errors before it backs up anything. If it finds anything, you know about it. If everything's OK, the backup runs automatically. You can rest easy that your backups are clean.

Just to be sure, though, you can invoke the COMPARE function to ensure that the backup tape contains exactly the same data as the disk.

VSAMAID/XP creates the only complete VSAM dataset management system available today.

FAVER/XP beats IDCAMS

In benchmark tests where an OS/VS installation runs back-up & restore routines using IDCAMS and FAVER/XP, FAVER/XP completes the tasks required in half the time.

These figures are taken from actual timings made by product managers at Goal Systems International, the authors of FAVER/XP. They cover 100 product installations spanning five years of operation.

"The difference in speed is due to a systems design that combines the speed of a physical dump/restore with the design philosophy of logical file access," said Theodore Pepper, Chief Developer at Goal.

Users amazed at the difference

When polled by this newspaper, users of FAVER/XP revealed that the Logical approach to backup & restore is genuinely faster, more accurate, and easier to perform.

Ralph T. Bryan, Systems Manager at Turbo Rubber Company said, "Here we had been operating all these years working our tails off just to do an accurate backup & restore. And FAVER/XP comes along and automates the task. It's about time.

"We had depreciated away our investment in our old physical dump/restore system years ago. It was time to buy FAVER/XP. We even ran 'em both for a few months, but now FAVER/XP is our standard."

Works with VSAMAID/XP for total VSAM management

Goal Systems International has revealed that they have an interface between the FAVER/XP Backup & Restore system and the VSAMAID/XP system which creates the only complete VSAM dataset management system available today.

During backup, the FAVER/XP special interface creates a historical file, which may then be used by VSAMAID/XP to create a "recommendations" report. The report tells resource managers how to manage VSAM datasets for optimum space allocation and resource utilization. VSAMAID/XP recommendations may be implemented with one command through the FAVER/XP Auto-Delete/Define facility.

FAVER/XP and VSAMAID/XP are great news for OS/VS installations. They are two of the Extended Productivity Systems from Goal Systems International. Both are available for a free trial. Call Goal Systems toll free today. 800-848-4640

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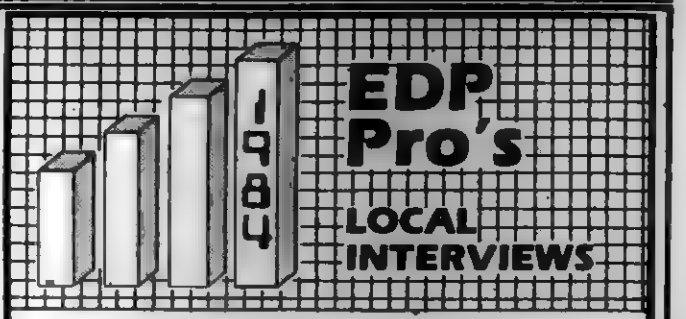

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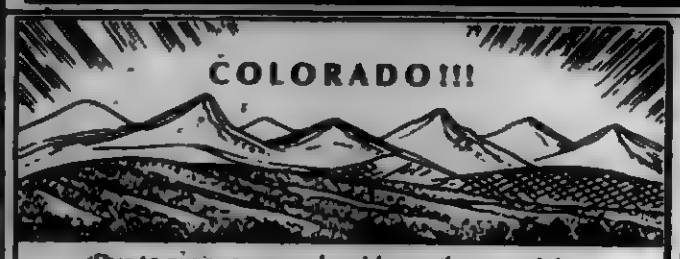

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Our new System 26KL, a 36-bit microcoded processor, has created exciting opportunities for those who are qualified and desire to live in the beautiful San Francisco Bay Area.

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Your primary responsibility will be to develop the marketing function of this start-up organization, growing with it as sales and profits increase. Many hats will be required: market strategy, direct sales, advertising, marketing management, and fiscal accountability.

If YOU are ready to wear our many hats, have more than 10 years experience in the computer industry of which five years is in sales/marketing management, and are experienced in DEC 10/20 sales, please contact us.

Manager/Software

We're looking for an ambitious, talented manager with proven techical skills on DEC 10/20 operating systems. The ideal candidate will know operating systems, I/O drivers, and communications, and will be adept in the design and implementation of code that enhances systems availability.

To qualify, you must have three to five years of programming experience on DEC 10/20 systems and a like number of years managing a technical systems group that performs systems design, enhancements, crash analysis and diagnostics.

Software Specialists

We have need for expertise in two areas.

The first area requires individuals who are experienced in crash analysis, design, coding, and debugging of existing operating systems and utilities as well as new software. We will be upgrading our present TYMCOM 10 and 20 operating systems, which run on DEC 10/20 hardware, by enhancing their performance, reliability, and availability.

The second area requires highly qualified senior specialists who are experienced in the design, coding, and debugging of our TOPS 10 and 20 operating systems. These individuals will work on the deployment of our new System 26KL, a 36-bit microcoded machine that runs TOPS 10 or 20 applications programs.

We seek individuals who can design and implement microcode as well as individuals who can design and implement both monitor and operating systems code for our System 26KL.

All positions are critical and require a minimum of three to five years of experience in the design, coding, and use of assembler language along with micro- or macro-coding of the DEC 10/20.

Sales Representatives

For those who have three to four years of success in the DEC 10 or 20 systems sales area, we have an attractive program that allows you to continue selling the 36-bit technology. You will be rewarded with a generous salary and commissions, travel reimbursement, and career advancement opportunities. A proven track record of continued successful performance is a must for this position.

Senior Design Engineers

We are looking for ambitious, talented digital design engineers with proven technical skills in computer system architecture.

Ideal candidates will have experience in designing I/O interfaces and micro-engine technology with specific application toward emulation of 36-bit computer architecture. To qualify, you should have five to ten years experience in this or similar work. BS/EE or BS CS required.

Send your resume and job preference, in confidence to: Computer Systems and Support; Division of Tymshare; 39100 Liberty Avenue; Freemont, CA 94538. Attn: JFS. Or call (415) 794-2416 and ask for Operator 15.

TYMSHARE

CSS, A Division of Tymshare
EQUAL OPPORTUNITY EMPLOYER m/f/h/v

S.W.I.F.T.

Society for Worldwide Interbank Financial Telecommunication

S.W.I.F.T. is an international organization owned by all major banks throughout the world. The company is operating a computer based worldwide network for processing financial transactions between member banks.

- In 1978 a total of 25 million transactions were executed by 586 member banks.

- In 1982 volume had increased to 250 million transactions involving over 1000 banks in 46 countries.

S.W.I.F.T. operates computer centers in the USA, Belgium and Holland using Burroughs medium systems.

Because of this continual expansion an opening currently exists in the USA for:

SYSTEM SUPPORT ANALYST

- The System Support Analyst is responsible for maintenance, development, testing and implementation of systems software for the live switch.

- S.W.I.F.T. is looking for a self-starter with inventiveness, commitment and the ability to work under pressure...BS/BCS or equivalent experience...Burroughs medium systems...Datacom experience a plus.

S.W.I.F.T. offers a competitive salary, excellent fringe benefit package and relocation assistance.

Forward resume in confidence to:

S.W.I.F.T.
PO Box 2005
Culpeper, Virginia 22701
Attn: Judy Clough-Martin
(703) 825-3000

EOE M/F/H

Business Applications Programmer

Optimistic about your future? We are.

With a significant increase in net earnings last year, we at Essex Chemical Corporation are looking ahead with confidence. We're a diversified manufacturer of a broad line of industrial chemicals. In supporting our Corporate, Divisional and Subsidiaries' Data Processing needs, you'll enjoy the positive outlook that comes with a growing company.

Your environment will be IBM System 38 RPG III. You will be joining an aggressive staff active in system development (80-90%). To qualify, you should have 3 years' experience programming in an on-line environment on IBM equipment (Systems 34 or 38 preferred); also experience in documentation/user training and some exposure to systems design. Certificate or degree preferred. Light travel required.

We offer an excellent salary and a complete package of paid benefits including medical, dental, prescription, pension and saving plans. Find out more about your advantages by forwarding resume, salary history and requirements to: Steve Valvano, Employment Representative, Essex Chemical Corporation, 1401 Broad Street, Clifton, N.J. 07015.

ESSEX CHEMICAL CORPORATION

An equal opportunity employer, m/f/h

Systems Programmers
Data Communications Specialists
DBMS Specialists
Computer Equipment Analysts
Capacity Planners

The Navy Finance Center, Cleveland, Ohio, has a large number of immediate openings for experienced ADP personnel in the speciality areas indicated. As one of the Navy's largest ADP establishments, we offer challenging technical and growth opportunities. Positions are permanent and are in the Federal Career Civil Service. No prior Federal service is required.

Candidates should have a minimum of three (3) years of experience working with large scale ADP systems (preferable IBM or compatible). Starting salaries will be $24,507 or $29,374 based upon qualifications. Send resume including salary history to: **Karen Sell, Navy Finance Center, Cleveland, Ohio 44199.** (216) 522-5323. An Equal Opportunity Employer.

Mercer University Atlanta Seeks Director of Academic Computing

Mercer University Atlanta, with campuses in downtown Atlanta and northeast Atlanta, includes schools or colleges in arts and sciences, business and economics, pharmacy and nursing. The University has experienced steady and rapid growth during recent years, and computer science education has grown especially fast.

The Director of Academic Computing will help plan, implement and develop a new computer science major. The Director will also oversee acquisition and operation of hardware and software for a wide variety of applications through an academic computing center for the Atlanta schools and colleges of the University. In addition to teaching, duties will include supervision of a staff of 3 to 5 people within 3 years.

Computer installation will include a medium sized mainframe computer system with operations distributed on campus via terminals and to users off campus via dial-up capabilities. A variety of languages and software systems will be operational to meet needs of various classes of users.

A Ph.D. in the area of Computer Science or Information Science is required, as is experience in an educational computing environment. Salary will be commensurate with experience and qualifications. Send application with resume to:

Office of the Provost
Mercer University
3001 Mercer University Drive
Atlanta, Georgia 30341

Equal Access/Equal Opportunity Employer

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APPLIC. PROG. experienced in structured coding & debugging of COBOL, PL/I & ADS/OL applics for DB/DC environments.

We offer competitive salaries, health & life insurance, sick leave & vacation, education plan, profit sharing and liberal expense benefits. Route your resume to:

MareL Inc.
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Seattle, WA 98109.

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Software Engineering Development

(NON-STOP COMPUTING)

Our client is looking for a systems professional with strong online software internals experience to become part of a team that will develop a family of new software products for non-stop computers (i.e. TANDEM, SYNAPSE, etc.).

The successful candidate should have 5 years experience in IBM 370 MVS architecture systems programming and preferably 2+ years in systems or applications development for TANDEM computers.

This is a unique opportunity to make the transition from traditional systems programming work into software product development NEW COMPANY with tremendous growth potential in an exciting industry.

We are consultants to management. If qualified, please send resume to, or call, Steve King, Professionals for Computing, Inc (Search & Personnel Services), One Maritime Plaza, Ste 1350, San Francisco, CA 94111 (415) 956-7120. Employer assumes fee.

professionals for computing, inc.

SOFTWARE CONSULTANTS

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Indecon is the leading Software Development firm in the Midwest. PERMANENT POSITIONS are available to work at client sites in CENTRAL INDIANA, CENTRAL ILLINOIS and CHICAGO. NO OVERNIGHT TRAVEL. If you have at least 1 1/2 years DP work experience you may qualify for the following positions.

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We offer competitive salaries, excellent benefits including PAID OVERTIME. Send resume with salary required and location preferred to Mr. R. Johnson-M0093.

Indecon, Inc.
925 Merchants Plaza East
Indianapolis, IN 46204

Standard Federal Savings is seeking individuals with financial backgrounds for the following positions

Programmer

Position requires 2-3 years of programming experience in a financial institution. Knowledge of COBOL and experience on Burroughs equipment are also mandatory

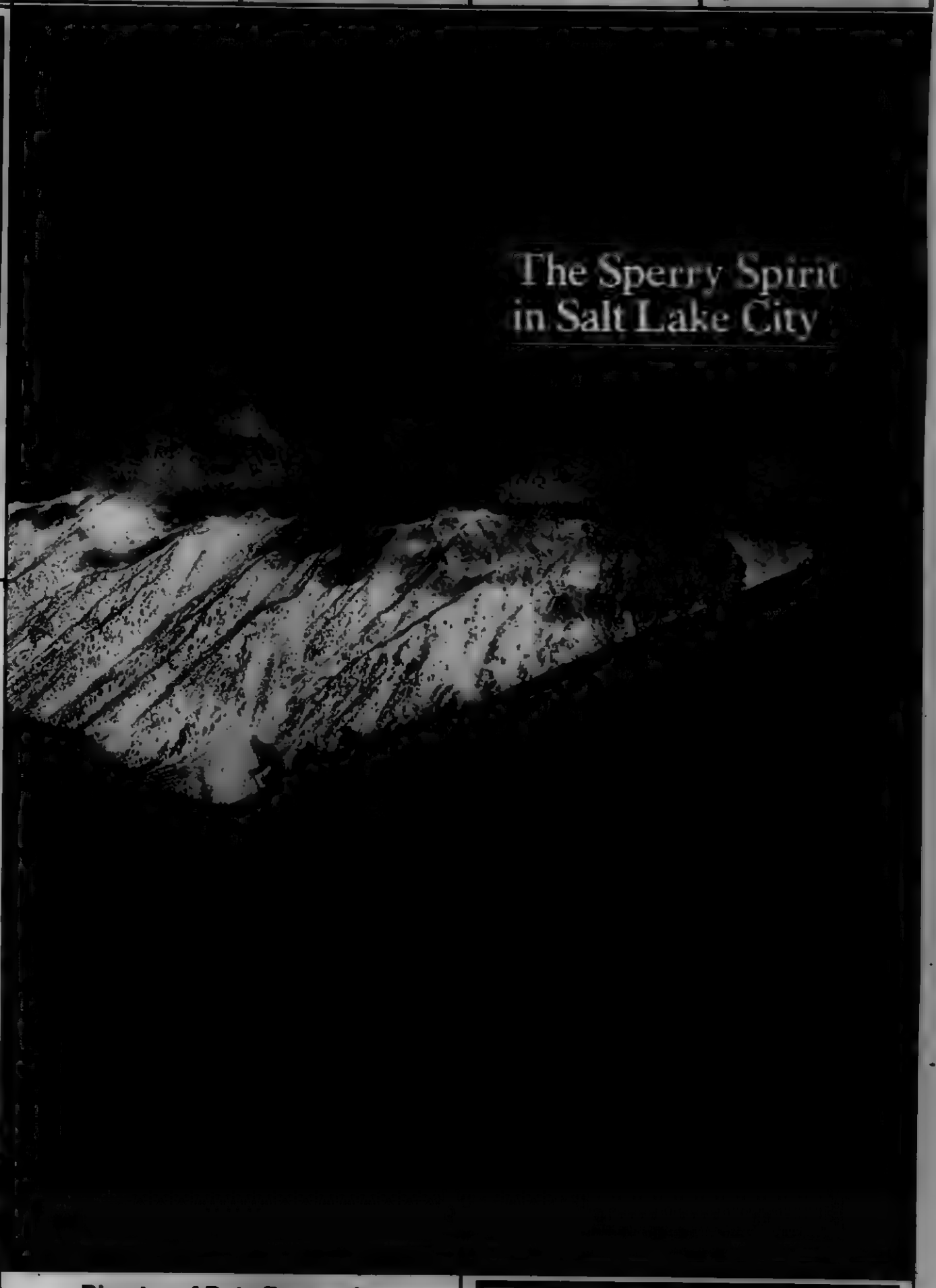
Systems/Methods Analyst

Position requires strong analytical abilities in work flow design and improvements, procedural development and cost/benefit factors. Effective communication skills, a minimum of 2 years experience and a 4 year college degree are also mandatory

Please forward resume to **Standard Federal Savings, Personnel Department, 2401 W. Big Beaver Rd., Troy, MI 48084.**

equal opportunity employer m/f

STANDARD FEDERAL SAVINGS



Director of Data Processing
Columbus Children's Hospital, Inc.

Columbus Children's Hospital, Inc. (CCHI), a multi-corporation organization centered around a progressive 313-bed university-affiliated pediatric hospital, is seeking candidates for the position of Director of Data Processing. CCHI is in the process of expanding the Data Processing Department to address the development of a comprehensive hospital information system using IBM's PCS. The aquisition of several on line financial software packages and the development of an information center are also being pursued

The Director will be responsible for the provision of data processing services to all CCHI subsidiary corporations. Data processing activities will include the development of policies and procedures, long-range planning, budgeting, systems analysis, programming, and the equisition and installation of hardware and software systems. The selected candidate will direct a staff of 33 data processing professionals. The technical environment includes an IBM 4341-M12 running under VM and DOS/VSE with CICS and DL/1

The qualified applicant must possess a Bachelor's degree and 5 years data processing experience with increasing management responsibility. Experience with IBM hardware and related systems software is also required. Previous experience within the health care industry is highly desirable.

The selected candidate will be offered an excellent salary and comprehensive benefits including relocation assistance. For immediate consideration, forward a resume and salary requirements in strict confidence to:

Director of Personnel
Children's Hospital, Inc.
700 Children's Drive
Columbus, Ohio 43205

An Equal Opportunity/Affirmative Action Employer

DIRECTOR OF SYSTEMS

Scott and White, a large diagnostic clinic and 625-bed teaching hospital consisting of a Multi-Specialty Group Practice in central Texas is seeking candidates for the position of Director of Systems.

Position is responsible for overall management, project review and control for computer assisted systems that support clinical and hospital operations and the operation of a pre-paid Health Plan. This is a large IBM shop.

Candidate should have a minimum of 3-5 years systems management experience at the executive level. Health care experience and an advanced degree in Data Processing or related field desired.

Send Resume to or Call Collect

Joe Rogers, Director of Personnel
SCOTT AND WHITE
2401 S. 31st
Temple, Texas 76508
(817) 774-3777
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Assess Your Career Opportunities as a Systems Development Professional.

PEAT MARWICK SYSTEM DEVELOPMENT CAREER SKILLS CHECKLIST

Take two minutes to fill out the system development career skills checklist below.

1. ☐ I am eager to explore the possibilities of a career as a management consultant.
2. ☐ I have three or more years of full time employment in data processing systems and programming.
3. ☐ I possess at least a bachelor's degree from an accredited U.S. institution.
4. ☐ I am proficient in one or more programming languages, on-line program development, structured design and programming, testing methodologies, etc.
5. ☐ My career goals include being a recognized professional system architect in the design, development and implementation of business application systems.
6. ☐ I look forward to the challenge and diversity of experience gained by working with client personnel at their sites within a metropolitan area or within a region of the U.S.
7. ☐ I possess excellent oral and written communication skills.
8. ☐ I desire to work with a project team comprised of industry, functional and data processing professionals who work together to deliver quality system solutions to today's business problems.
9. ☐ I would like to grow in technical and managerial knowledge and one day be a partner in Peat Marwick.

If you checked eight or nine boxes, we believe you could possess the personal drive and initiative to consider the highly demanding and economically rewarding career as a management consultant with Peat Marwick.
We are one of the world's leading professional accounting services firms with major consulting groups in 24 of our 100 locations nationwide.

Send this checklist, (or copy) with your resume and salary history to one of the geographic regions listed below:

Personnel Director
PEAT, MARWICK, MITCHELL & CO.
System Development Group

SOUTHEAST: 225 Peachtree Street, N.E., Atlanta, Georgia 30043
SOUTHWEST: 1601 Elm Street, Dallas, Texas 75201
MIDWEST: 1010 Market Street, St. Louis, Missouri 63101
FAR WEST: Three Embarcadero Center, San Francisco, Calif. 94111
NORTHEAST: 150 John F. Kennedy Parkway, Short Hills, N.J. 07078
MID-ATLANTIC: 1900 K Street, N.W., Washington D.C. 20006

PEAT MARWICK
An equal opportunity employer M/F

Data Processing Openings

We have immediate openings for experienced data processing professionals to work in our data processing organizations at corporate headquarters in Boise, Idaho. Qualified applicants will have experience on large scale IBM computer equipment using MVS, CICS, VSAM, TSO, ISPF and DL/1.

Programmer Analysts

You'll require a minimum of 3 to 5 years progressively responsible programming experience using COBOL, CICS and Mark IV. Project leader experience also is required to work with users in developing details of proposed systems to design, program, test and debug application programs of considerable magnitude and complexity. One position requires experience in developing financial models, preferably using EPS. Another requires a knowledge of personal computers using BASIC.

Project Manager

You'll direct a team in the design and restructure of a company-wide employee information system. This multi-year project requires strong data processing background with proven project management skills on large projects plus the ability to communicate effectively with senior management. Experience in DL 1 and the systems design using hierarchical data structures required. Experience with Mark IV and COBOL preferable.

A degree in Business with an advanced degree is preferable for all positions. Good compensation package and opportunities for growth. Please send resume with salary history requirements in confidence to ***Personnel Administrator, Employment Services Department, P.O. Box 50, Boise, Idaho 83728.***

Boise Cascade Corporation

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MVS/SP JES2, IDMS, CICS

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You'll have responsibility for planning, installation and performance tuning for our IDMS-based data center. Requirements include 2-3 years of DBMS experience. Strong knowledge of OS/JCL preferred.

SYSTEMS PROGRAMMER — COMMUNICATIONS

This position requires 3-5 years' experience with the following: NCP-IBM 3705 ACF/VTAM, SNA/SDLC, NCCF, NPDA, NPA, CICS, Heavy JCL, MVS/SP 1.3.

We offer challenging assignments, opportunities for growth, attractive compensation and a benefits package that includes relocation plus dental and profit sharing plans. Please send your confidential resume, including salary requirement and indicating area of interest to:

CCI COMPUTER CONSOLES INCORPORATED

T.C. Foley
Computer Consoles, Inc.
97 Humbolt Street
Rochester, New York 14609

Equal Opportunity Employer M/F/H/V

MICROCOMPUTER SOFTWARE SPECIALISTS

Several of our clients in northern California have urgent needs for more than 100 microcomputer software development professionals. Highly desirable experience includes:

- UNIX, MS-DOS, p Systems, and/or CP/M.
- C, LISP, PASCAL, LOGO, BASIC, FORTH.
- Degrees in Computer Science (with some experience).
- Graphics experience such as Lisa, Visi-On, STAR.
- Product Management in computer hardware or software.
- Software documentation.

These clients are among the leaders in microcomputers and provide exceptional financial and professional rewards. Positions range from Project Managers with base salaries into the upper $50s to Software Engineers in the $20K to $48K range. Many of these positions are available in the Bay Area, many in resort areas outside of the Bay Area (but still in northern California). Full relocation provided.

To inquire further about these opportunities and/or to make your next career step, call or write Tom Ahern or Bill Munch.

Systems Careers
558 Sacramento Street
San Francisco, California 94111
(415) 434-4770

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Needed in a dynamic, fast paced, large scale, multi-mainframe shop.

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Individuals who are qualified for primary responsibility assignments in these disciplines are invited to participate in the exciting state of the art opportunities we have to offer.

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Call or forward resume to:

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95 MADISON AVENUE
New York, NY 10016
(212) 684-6606

NCR PROGRAMMER

Must have at least one (1) year experience with Neat/3 Level I. Bank experience and Neat/3 Level II desirable. System is V8555M under B3 operating system. Salary is DOE. Send resume to:

Jim Gibson
CITIZENS NATIONAL BANK
P. O. Box 2752
Boise, ID 83701
(208) 336-5708

PRIME

PROGRAMMER ANALYST
SYSTEMS ADMINISTRATOR

At least 2 years COBOL, MIDAS and FORMS experience. Call or send resume to:

Personnel
TWS Inc.
6400 Westpark
Suite 180
Houston, TX 77057
(713) 781-5310

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PROGRAMMER ANALYSTS

To create new MIS capabilities supporting new NCR subsidiaries

A complete array of systems is required to support financial management, human resources, marketing management, and administrative responsibilities in a data base environment. The positions offer two-way communications with Corporate Headquarters and provide a chance to have worldwide impact and visibility at NCR.

Assignments will be broad in scope. They include defining and installing new systems for handling a full spectrum of business applications. Technically, assignments will include developing systems in a data base environment utilizing a variety of terminals, processors and local area networks. You will be using ITX, VRX, UNIX* and the latest NCR systems in an advanced Distributed Data Processing environment. You will be based at NCR World Headquarters in Dayton.

You must have at least 2-4 years of programming experience, good knowledge of COBOL, an understanding of general business concepts and systems, a BS degree and a results oriented approach.

Positions offer career progressions that can be along either technical or managerial lines within MIS or in divisional or corporate areas. Salaries are fully commensurate with experience and benefits are excellent.

For prompt response to these unusually exciting opportunities, please rush your resume including salary history to: **Mr. V.L. Mirre, Headquarters Employment, Dept. L55, NCR Corporation, World Headquarters, Dayton, Ohio 45479.**

NCR

Complete Computer Systems

An equal opportunity employer

*UNIX is a trademark of Bell Laboratories

DATA PROCESSING

Middle South Services is one of the nation's largest power systems. Middle South Utilities is our parent company and a major electric utility with multi-faceted data processing needs.

The following opportunities are now available in Engineering/Operations:

PROJECT LEADER with strong hands-on management background is needed to work on an on-line distribution, construction and operating system. Requires 1+ years experience as a first line supervisor or lead analyst on a medium to large scale system utilizing IMS DB/DC, and involving maintenance, enhancement and program performance.

ANALYST PROGRAMMERS require previous experience in scientific applications with a sound knowledge of PL1 and OS JCL. Though not required, knowledge of IMS/ADF or Fortran would be a plus, and computer applications development with exposure to a VM operating system would be helpful.

Due to our size and scope of operations we offer access for advancement, career stability, and an excellent salary with major benefits. For more information, call our number below, or to apply, directly send your confidential resume now to: **Byron Heath or Richard Jackson, MIDDLE SOUTH SERVICES, INC., P.O. Box 61000, New Orleans, Louisiana 70161.**

800-231-4481

In Louisiana, call collect (504) 569-4960 or 569-4962.

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EXPLORE SOHIO

The Trans-Alaska Pipeline, completed in 1977, is symbolic of the nation's search for energy independence, and the emergence of Sohio from a regional petroleum refiner-marketer to a strong, totally integrated energy corporation. We're now one of the nation's largest owners and producers of domestic crude oil.

Scientific Systems, a major division of Sohio's Cleveland-based Corporate Computing Center, delivers state-of-the-art computing capabilities to our large scientific user community. We are predominantly a CDC environment. Our premier processor is a CYBER 205, the largest commercially installed vector processor in the world. We are launching a new era of development, featuring advanced technological procedures, and need additional state-of-the-art professionals.

You will join a team of qualified professionals to design, develop, implement and operate major information and decision-support systems for the Scientific Systems division. We require 2-4 years of proven systems experience.

The ideal candidate will possess:

- BS degree in Computer Science or related field
- Excellent analysis and design skills with emphasis on experience with Control Data equipment
- Current knowledge of system design, data bases and software engineering
- Applications programming background
- Experience with FORTRAN and FORTRAN-77 and knowledge of Assembler or other languages
- Outstanding written and oral communication skills

Preferred candidates will possess experience in:

- Cyber Record Manager
- Network Operating System (NOS)
- Cyber Resource Management Systems

We offer an attractive total compensation plan and generous benefits. **Sohio's comprehensive relocation package for new hires includes all normal moving expenses. Homeowners also qualify for mortgage interest differential allowance, third party home purchase and other features typically restricted to internal transfers.**

Send your resume, detailing educational background, experience and abilities, in strictest confidence to:

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For Scientific: experience in the computer, communications, semiconductor, or aerospace defense industries.

Your name, resume, and present employer will not be given out without your permission.

For sincere personal service, please send a confidential resume to:

Dan Pullman (602) 274-5860
PULLMAN PERSONNEL
3033 North Central Ave., Suite 505, Phoenix, Arizona 85012

WE STAND APART.

Technicon Data Systems is acknowledged as a leader in advancing health care quality through modern technology. Our Medical Information Systems offer meaningful challenges and rewards to talented programming professionals.

Operating Systems

DOS Systems Programmers

Plan, install and maintain all DOS/VSE and DOS/VS systems software and related products, including CICS. Work directly with users on problem resolution and provide instruction for both DOS/VSE and DOS/VS. To qualify candidate should have at least two years experience as a Systems Programmer with primary responsibility for DOS/VS(E) and related products. Experience in a VM/CMS environment preferred.

VM Systems Programmers

Install and maintain VM and related software systems. Evaluate software packages for applicability to customer systems and interface with customers and vendors on problem resolution. Support our Data Center Services group, with primary contacts in Development, Technical Services and Computer Operations. An in-depth knowledge of CP, CMS, EXEC2, RSCS, PVM, VMAP, Smart and Script is required. Up-to-date working knowledge of DOS/VS (E) system software a definite asset.

Hospital Financial Systems

Systems Analysts

Reporting to a Product Manager, develop and implement new or enhanced products to meet customer needs, documenting specifications and providing contract liaison between customer and Development. The candidate should possess five to seven years experience in hospital financial/business office systems or operations. User experience may be applicable and hospital background is essential.

Programmer/Analysts

Bring your COBOL, CICS, VSAM and CMS background to our growing Financial Medical Systems group. You will need at least four years experience in COBOL programming to qualify with a minimum of two years each in CICS, VSAM and CMS. Data base background a definite plus. Hospital systems experience necessary. BA/BS Degree desired.

Product Support

Programmer/Analysts

Maintain programming levels and resolve problems in the application environment, with emphasis on analytical skills. BA/BS Degree in Data Processing preferred and one to two years BAL coding experience in an applications environment required. Systems analysis skills would be helpful.

Technicon Data Systems Corporation offers long-term, stable growth opportunity in a highly professional environment, with excellent salaries and competitive benefits.

Please forwrd your resume or letter of inquiry to **Professional Employment, Technicon Data Systems Corporation, 3255-1 Scott Boulevard, Santa Clara, California 95051. (408) 727-9400.** An equal opportunity employer m/f/h/v. Principals only, please.

TECHNICON

Technicon Data Systems Corp.

CAREER OPPORTUNITIES IN CENTRAL FLORIDA

DATA PROCESSING

McDONNELL DOUGLAS ASTRONAUTICS COMPANY

Titusville Division

Has immediate openings for Programmer/Analysts, Systems Programmers and Operations Specialists familiar with IBM 4300 Equipment and VM - DOS/VSE Operating Systems.

PROGRAMMER/ANALYSTS

Degree with minimum 3-years experience with CICS on-line applications and DL/1.

SYSTEMS PROGRAMMER

Degree or equivalent experience and a minimum of 3-5 years with DOS/VSE and telecommunications software.

DATA SERVICE ANALYSTS

Degree with at least 1-3 years experience in Computer Operations, Hardware, JCL and Production Scheduling.

OPERATIONS SUPERVISOR

Degree with minimum of 5 years experience in Computer Operations.

Please send a detailed resume indicating position(s) of interest and salary requirements in confidence to: Employment Department CW-1212. McDonnell Douglas Astronautics Company, TITUSVILLE DIVISION, 701 Columbia Blvd., Titusville, Florida 32780. PRINCIPALS ONLY.

WE REGRET WE CANNOT ACCEPT PHONE CALLS.

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An Equal Opportunity Employer

RFI/EMI

Computer Consoles, Inc., designs, develops, manufactures, markets, and services a variety of minicomputer-based fault-tolerant information systems. Located in Rochester, New York, we have all the cultural and educational advantages of a large metropolitan area as well as the ambience and scenic beauty of a small, relaxed town.

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SENIOR CERTIFICATION ENGINEER — RFI/EMI

You will be responsible for design cost impact on mid-volume computer production and test multi-unit electronic systems for compliance with FCC or VDE RFI EMI regulations. A B.S.E.E. and 3-5 years' experience are essential; UL/CSA exposure a plus.

We offer opportunities for growth, plus attractive compensation and benefits including relocation. For immediate consideration, send your resume with salary requirement in confidence to:

CCI COMPUTER CONSOLES INCORPORATED

Mr. T.C. Foley
Computer Consoles, Inc.
97 Humbolt Street
Rochester, New York 14609

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Programmer/Analysts with **IMS, DATA FLOW, DATA CATAL...**
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*We also have openings in Sommerset, N.J. for
Sr. Programmer/Analysts with **UNIX-C**

Send resume, along with salary history, to:
Mr. Fred Pawlaczyk
Corporate Technical Director

SSI

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HP-3000

PROGRAMMERS & ANALYSTS

We specialize in the placement of HP-3000 Analysts and Programmers and have numerous opportunities across the country for professionals with this experience. Our client companies include both small and large end-users as well as software development firms specializing on the HP-3000. Of particular interest is experience with MM3000, ASK, QUASAR, or RAPID.

For additional information regarding these positions, call Mr. Lee Martin:

(804)490-3966 or
Forward Resume to:

Fortune
Personnel Consultants of Virginia Beach
510 South Independence Blvd.
Virginia Beach, VA 23452

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300 DP Openings

Technical Writers Software Engr (2 yrs)	25 40K
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Insurance Prog Anal (2 yrs MVS, CICS)	25 28K
Prog Anal (2 yrs UNI 1100, 2200 1100)	23 32K
Prog Anal (2 yrs ADS, CICS or IDMS)	25 35K
Prog Anal (2 yrs NOMAD or 4GL IDEAL or TP)	25 34K
Prog Anal (2 yrs HP 3000)	25 30K
Sys Anal (3 yrs ADS, CICS or DMS)	25 38K
Sys Prog (2 yrs OS or DOS VSE)	25 38K
Sys Prog (2 yrs ADS, CICS or IDMS)	27 40K
Comm Sys Prog (2 yrs VTAM NCP SNA)	27 40K
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EDP Auditor (3 yrs EDP Audit IBM 370)	30 33K
Data Base Anal (2 yrs IMS)	25 45K

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Programmers

IBM's Thomas J. Watson Research Center in Yorktown Heights, New York has unique career opportunities for experienced programmers who can design and implement advanced computing services. Many programs originally generated by the Research Divisions Computing Systems Department to meet user needs have since become IBM products. These include the TSO Session Manager, MVS Hierarchical Storage Manager, VM Directory Maintenance, VM PASSTHRU, VM 3800 Device Support, MVS Resource Access Control Facility (RACF) and CVIEW.

Current openings are for work on—
VM Host-Workstation Communications • Single System Image for Multiple VM CPU's • Remote VM Applications • Teleprocessing Hardware, Engineering and Software • IBM Personal Computer Development • VM/CMS Reliability Analysis and Support • VM/CMS Network Support and Development • VM/CMS Data Base Systems Support and Development • UNIX™ • Local Area Networks and Gateways.

Qualifications

Applicants must have a good background in VM/CMS, PC/DOS or UNIX™ and related areas. In addition, these positions require strong ability to carry an idea from inception through completion, including implementation and testing.

Excellent Benefits

IBM's superior company-paid benefits program includes vacation, holidays, life insurance, tuition refund, medical, dental and retirement plans.

Write Today

To be considered confidentially for these positions, please send resume to: Mr. J. Oxton, IBM Corporation, Thomas J. Watson Research Center, Dept. CW-1212, P.O. Box 218, Yorktown Heights, NY 10598.

IBM

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The NS16000, Elegance Is Everything.

An elegant approach led to a very elegant solution — National's NS16000 microprocessor and its product family. The revolutionary top-down architecture delivers 32-bit power, and memory management capabilities on par with the latest mainframes. The upward-compatibility will accommodate a shift from 16- to 32-bit hardware. In essence, the NS16000 performs more like a computer than a chip, and we think that's a very elegant package.

A "Software-Intensive" Effort.

The NS16000 microprocessor is the springboard for an entire family of products currently being developed at National's Microprocessor Systems Division. The key to their success lies in the development of software that enhances the NS16000 family's performance, applicability, and elegance. From development through marketing, our "software-intensive" effort is rapidly gaining momentum as we develop demand-paged UNIX* systems based on Berkeley 4.4bsd and 4.2bsd for National's NS16032 and NS32032 microprocessors. We are also working with Bell Labs to define a version of SYSTEM V, . . ., etc., for NS16032 and NS32032. These developments are creating opportunities for software professionals to join us in the following areas.

Sr. Software Engineers: Language Tools Development

You will be involved with developing compiler code optimizer, linker, or debugger. Requirements include two to five years' of language tools development experience, including knowledge of "C", Pascal, FORTRAN, and UNIX.

Sr. Software Engineers: UNIX System Architect

You will be defining a version of SYSTEM V for NS16032 and NS32032. Two to five years' experience in UNIX kernel development is desired.

Sr. Software Engineers: UNIX Kernel Development

You will work on porting Berkeley 4.2bsd to NS16032 and NS32032 based microcomputer systems. Two to five years' experience in UNIX kernel development is desired.

Sr. Software Engineers: Networking

You will work with developing/porting networking software under Berkeley 4.2bsd on NS16032 and NS32032 based microcomputer systems. Two to five years' experience in networking protocol design and development is desired.

Software Engineers: UNIX Utilities Porting and Development

You will be involved with porting and developing UNIX utilities. One to five years' experience in UNIX is desired.

The Rewards Of Elegance.

The elegance and power of the NS16000 will become evident as more software is developed for it. And those who develop that software will reap the rewards, personally and professionally. That's definitely something to think about if you're ready to take on the challenge of our opportunities.

To learn more about National's Microprocessor Systems Division, send your resume to Dept. MS, National Semiconductor, P.O. Box 62499, Sunnyvale, CA 94088. We are an equal opportunity affirmative action employer. Principals only please.

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let's talk about your career.

National Semiconductor

Data Processing Manager

IBM SYSTEM 36

The Additive Products Division is a growing high technology company with a career opportunity available for an experienced IBM 34/38 System Analyst, who is ready to accept the challenge of being our Data Processing Manager.

Qualified candidates will have MANUFACTURING EXPERIENCE in the following areas:

- 2 years of RPG II programming, plus 1-2 years in systems analysis, 34/38.
- Experience in inventory and production software.
- AAS Computer Science or comparable training.
- Supervisory experience or a high level of managerial potential.

We are a $20M Division of the Kollmorgen Corporation dedicated to the manufacture of additive printed circuits. This key position, based in Riverhead, N.Y., will be responsible for starting our first broad based MIS distributive processing system. We are offering an excellent salary and benefits package.

Please send your resume in confidence to:

MR. SUSAN BLAIR

ADDITIVE PRODUCTS DIVISION KOLLMORGEN CORP.
(Formerly Photocircuits Riverhead)

P.O. Box 700
Aquebogue, N.Y. 11931

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Multiple openings with premier firms in mfg. software, and other industries, utilizing COBOL, TRANSACT, and doing coding modeling and design. Must have 2 yrs H.P. 3000 w/VIEW and IMAGE. Job #'s 8003, 8004, 8051 & 8056.

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IDMS DB/DC CONSULTANT

The successful candidate will provide DBA/DCA support for our two National Education Center MVS systems, including IDMS-DC system generation, monitoring and tuning. You'll devise and implement procedures to ensure efficient/effective student laboratory processing, create databases, dictionaries, and other files for lab exercises, and perform problem determination and resolution as necessary. Responsibilities will also include consulting with and advising course developers, instructors, and students; developing materials for use in internal training; and conducting courses, workshops, and supporting laboratory activities. To qualify, you'll need a thorough knowledge of Cullinet software products, installation and support and the ability to work directly with both Cullinet and customer personnel. Excellent communication and organizational skills are essential.

FINANCIAL APPLICATION SOFTWARE ENGINEER

In this software development role, you'll assume responsibility for the analysis, design and programming for accounts payable and general ledger software products. A minimum of 2-3 years' programming experience in an IBM mainframe environment, including On-line and Batch COBOL programming, is required. Financial background and database experience desired.

TEXT PROGRAMMER

Working within the Technical Communications Department, the successful candidate will create and maintain document formatting libraries in support of our in-house electronic publishing system. To qualify, you must possess a background in typography and experience with at least one document composition language. Knowledge of Versacomp and/or Script (DCF) is preferred; exposure to the Autologic APS 5 phototypesetter and IBM mainframe experience are desirable.

TECHNICAL WRITER

Interacting with development, editorial and production staff, this key professional will write user and system documentation for manufacturing applications software in a database environment, assuming responsibility for manuals from outline through pre-production. The position requires a self-motivated individual capable of maintaining demanding schedules. The ability to write clear, technical English is essential, and familiarity with manufacturing concepts such as MRP and/or manufacturing software is highly desirable. Exposure to database in an IBM environment is an asset.

To explore these exceptional opportunities, send resume with salary history, specifying position of interest, to John Veryzer, Dept. CW1212, Cullinet Software, 400 Blue Hill Drive, Westwood, MA 02090.

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MTI SOFTWARE PROJECT MANAGER

MECHANICAL TECHNOLOGY INC

MTI continues to grow as a leader in the field of machinery monitoring and diagnostic systems. As a result, we are looking for a self-starter interested in assuming a critical role in an advanced engineering organization.

- BS Engineering and/or Computer Science; 5+ years indepth experience in computer systems design. Should be proficient in systems level programming in ASSEMBLY, FORTRAN, and BASIC. Background in the area of vibration measurement and analysis would be a definite asset.
- Responsible for the overall technical direction of software projects to include computer systems software design, development of software specifications, detailed software design, and integration with the hardware systems. Will also be involved with customer interface, proposal writing, and supervision of technical personnel.

Individuals interested in professional growth and recognition, a high quality of living area, and a competitive compensation package should forward resumes in complete confidence to Ms. Vicki Smith, MTI, 968 Albany-Shaker Road, Latham, New York 12110, an equal opportunity employer, M/F/H.

PROGRAMMER

OPPORTUNITIES FOR ADVANCEMENT IN FLORIDA

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We are currently looking for a Programmer with NEAT/3 level 1 & 2 language experience. COBOL is a plus. Background in financial applications is a must; with NCR "CLASS" or CIF experience desirable. Environment is NCR 8552/2 MSO, under VRX using CUTO with over 150 ISC teller terminals and NCR 1780 ATMs. Only individuals with over 3 years experience are encouraged to apply.

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Implement Berkeley UNIX on our VAX systems, engineering work stations and IBM Mainframes. You'll evaluate UNIX CAD software for porting between EWS, VAX, and IBM. MS in Computer Science required, with 2 years UNIX Operating Systems and 1 year Berkeley UNIX [illegible].

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MS in Computer Science required, with 5 years experience in Sysgen and IBM 3081 maintenance using VM/SP Operating system.

Call Erik Hanson TOLL FREE at (800) 538-8460, ext. 2923 from outside California. From California call (408) 749-2923 COLLECT. Or send your resume to Advanced Micro Devices, Dept. CW-1212, M/S 87, 901 Thompson Place, P.O. Box 3453, Sunnyvale, California 94088. An equal opportunity employer. Principals only.

Advanced Micro Devices

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UTAH

Salt Lake City based billion - dollar bank is seeking an experienced EDP Auditor to evaluate quality and security procedures in the EDP area.

The successful candidate will have five year's experience with emphasis in report writing and support documentation. Previous supervisory experience and good PR skills would be an advantage.

We offer a salary commensurate with experience and excellent employee benefits plus all that Utah has to offer in recreation and family living.

Please send resume and salary requirements to Personnel Department:

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PROGRAMMER ANALYST

Progressive IBM System 38 MOD 7 shop needs Programmer Analyst for current and future applications. Qualifications should include System 38 experience and proven track record. We provide a competitive salary and benefits package as well as career growth. If you're looking for an opportunity with a future send your resume in confidence to:

Wayne Berge
Mystic Color Lab
12 Roosevelt Ave.
Mystic, CT 06355

DATA COMMUNICATIONS SPECIALISTS

DYNAMAC CORPORATION

Has immediate openings for all levels of Data Communications Specialists at their Southern Maryland Facility in Lexington Park, Maryland on the Chesapeake Bay.

Applicants should have experience in:

- Packet Switched Networks
- Local Area Networks (LAN)
- UNIVAC/TANDEM/DEC Data Communications
- Network Planning and Design

Must be able to troubleshoot data communications problems and use state of the art diagnostic equipment.

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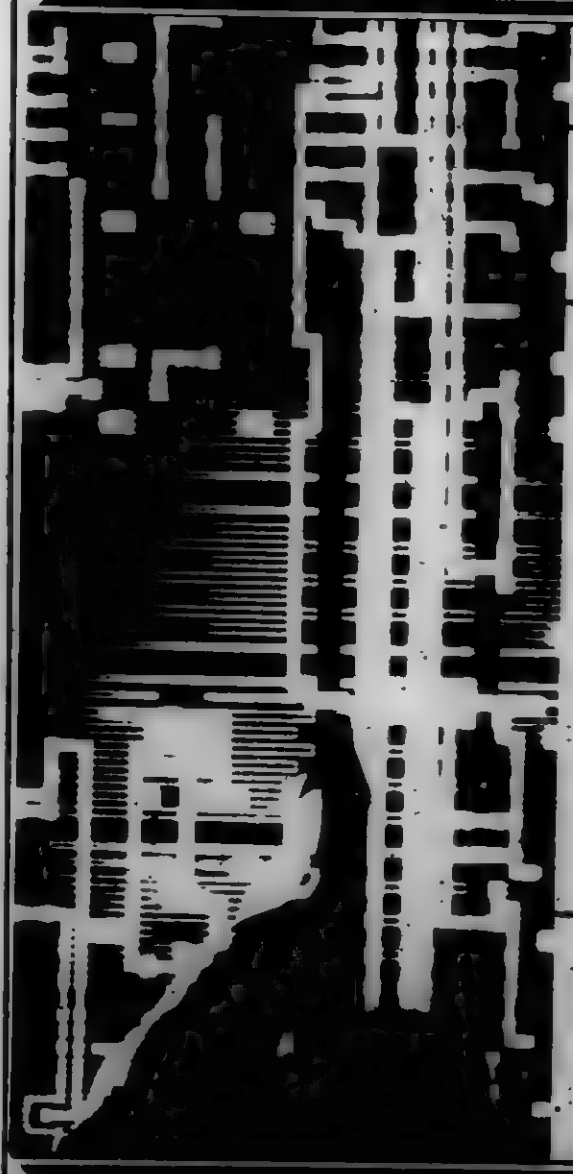
Qualified applicants should contact Personnel at (301) 468-2500 EXT 330 and send resume to:

DYNAMAC CORPORATION
c/o Personnel Department
11140 Rockville Pike
Rockville, MD 20852



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Our technical resources are vast. Our expertise is great. Our leadership is unquestioned. If you're in microelectronics, GE is the place to be. If you have ideas, and the ambition to turn them into realities, we'll free your imagination and unleash your potential to reflect the technical challenge of your career. Throughout all of GE's operations, the Micro-Electronics Center, which includes the Semiconductor Business Division and Intersil, is dedicated to accelerating the usage of VLSI in close cooperation with this division and Calma. From gate arrays to systems-on-chips and advanced VLSI design environments, our engineers and computer scientists are advancing technologies, directing the future course of microelectronics, and enjoying a higher level of professional challenge, growth, accomplishment and satisfaction than ever before.

Mountains, beaches, big city excitment, small town tranquility . . . they're all just minutes away. North Carolina's Raleigh Durham Chapel Hill area is renowned for its rich variety and quality of life.

[illegible] COMPUTER NETWORKS

Responsibilities include the design, planning, installation and support of the Division's worldwide communications network to support the Division's sales, manufacturing, financial and CAD requirements. You'll also select and control hardware and software, and consult on local computer and communications equipment selections. BSEE, BSCS or equivalent is required, as are 10 years MIS experience (at least 3 of them designing, installing or managing computer networks) as well as excellent analytical ability and presentation skills. Technical management experience or advance degree involving systems [illegible]

SYSTEMS PROGRAMMERS VAX/VMS

Reporting to CAD Systems Manager, you'll develop and maintain VAX VMS system-related software required for our own computer center. You'll provide support services for file transfer and other applications between VAX 11/780 and non-DEC systems, and codes in place for the customization of HASP interfaces from VAX systems to IBM and other mainframes, and develop code for file transfer between VAX 11/780 and GPIB devices using DEC IEC11 interface. You'll include support programs for several subscribers from VAX systems, and provide assistance to VAX Systems Manager as needed.

In addition to a BS or equivalent in Electrical Engineering or Computer Science, other requirements include: one year's systems programming experience with VAX VMS version V3.0 or higher; thorough knowledge of VAX VMS DCL, VAX 11 run-time library and systems service calls under VAX VMS; knowledge of or experience with communications hardware and software; two year's experience with VAX VMS utilities and command set; and a MS degree in Computer Science are also desirable.

SR. SYSTEMS PROGRAMMERS

Responsible for planning, installation and support of operating systems, data base and data communications software for IBM 3081 MVS environment. The project is to bring an IBM 3081 environment [illegible] communications and VAX 11/780 resident CAD software programs to establish a distributed CAD environment.

The individual selected will have BS degree or equivalent in Electrical Engineering or Computer Science, 3 years systems programming experience using the IBM 370 Architecture with IBM 3705 or Series/1 communications processors, experience with third party hardware and software, and at least 5 years experience in support of computer center customers. An MS degree or equivalent in Computer Science or Electrical Engineering is also desirable.

Make the logical career interconnection: plug into the vast career potential of GE. Send your resume to: Ernie Leskovec, GE Microelectronics Center, Mail Drop #C1212, One Micron Drive, Research Triangle Park, NC 27709.

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SENIOR SYSTEMS SOFTWARE PROGRAMMER

A major Wichita, Kansas manufacturing corporation has an immediate opening which will play an important role in the expansion and continued development of their Data Processing division.

The position requires a minimum of 3 years large IBM systems programming experience. Successful applicant will have current working experience in MVS/SP, JES2, VSAM and OS/JCL. This person will be key in an upcoming conversion to MVS.

Starting salary based on pertinent experience to include excellent benefits program and full relocation assistance.

Qualified applicants, please send resume to:

Larry Cecere
WILLIAM-LAWRENCE & ASSOCIATES
[illegible]
Wichita, Kansas 67202

Or call, 316/269-2042, from 8:00 AM to 5:00 PM, or 316/721-3831 after 7:00 PM and on weekends.

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data processing

SKK, INC. CAREER OPPORTUNITIES

Due to expansion, a well established data security software firm has outstanding career opportunities in the following areas:

TECHNICAL SERVICE AND SUPPORT

Two to three years MVS or VM system generation and maintenance. Strong assembler background a must. Good phone communication skills as well as debugging skills are required for customer problem resolution. JES expertise a major plus. Familiarity with VS1, ACF2 and other industry software products would be advantageous.

TECHNICAL WRITER

Three years DP experience in large scale installation with IBM MVS, VM or VS1 operating systems. Operations or an assembler background desired. Ability to do research and explain or document results. A FLAIR FOR MARKETING TYPE WRITING HIGHLY DESIRED. Minimum two years technical writing experience as well as assisting in writing product brochures and other public relations material. Able to work in a team environment.

USER SERVICES REPRESENTATIVE

Administrative customer support relative to SKK products. Participate in customer training, user presentations, user conferences, phone support, training class development, in-house education programs and special projects. Knowledge of MVS, VM and one or more foreign languages a major plus. 50% travel involved, local and/or onsite. Travel abroad may also be possible.

SKK, a progressive leader in an innovative field offers qualified candidates with an interest in data security and a strong desire to further their careers, competitive salaries and comprehensive benefits, including dental insurance. Call for more information or send resume in strict confidence to:

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10400 W. Higgins Road
Rosemont, IL 60018
Attn: Mr. Phil Baran
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needed in corporate HQs (Baltimore) for the development of mfrg. applications. Several opportunities exist for a technical pro with a minimum of 4 yrs. exp. using COBOL combined w/1-2 yrs. of CICS or IMS DB/DC. Environments provide user interface and project involvement designing large on-line data base applications. If you meet these qualifications, contact Jan Parks at 301/828-0788.

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HP-3000

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Graphics Display

"With the introduction of its model 4115 computer display terminal . . . Tektronix set new performance levels of raster-scan graphics displays and bit image manipulation."
April 11, 1983 EE Times

"Tektronix is plowing new ground with its model 4115 color raster system.'"
April 1983 The Anderson Report

The introduction of the 4115 set new standards for High-Resolution Computer Display Terminals. Its development includes many state-of-the-art techniques to produce high-performance graphics with unmatched display quality. The continued development of this product as well as development of future products requires that we add engineering staff. If you are interested in working on an industry leader and with a firm recognized for technological innovation, you may want to consider one of the following positions:

Sr. Software Engineers
Design major firmware enhancements & firmware modifications to the 4115

Software Engineers
Participate in the design of 3D graphics transformations

Software Engineers
Design/implement/test firmware for new products based on 4115 technology

Hardware/Software Engineers
Design and write microcode for a bit-slice picture processor used in new graphics terminals

Electronics Engineers
Contribute to the development of new products in the 4100 series of Graphic Display Terminals

Microelectronics Component Engineers
Expand the utilization and application of VLSI technology in graphics systems and participate in the development of the next generation of graphics display products

To Learn More . . .
. . . about the exceptional scenic, cultural and recreational resources of Oregon, plus our complete benefits package, including education and relocation, send your resume to P.H. Gribbin, Tektronix, Inc., PO Box 1000, MS-63-658, Wilsonville, OR., 97070.

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SOFTWARE ENGINEERS & DESIGNERS

Join a mid-size industry leader, developing "leading edge" product lines.

Our client who has contracted us to do a specialized search is a well-established manufacturer (not in the southwest) experiencing exceptional growth in a diversified line of microprocessor-controlled products. They have immediate needs.

SOFTWARE ENGINEERS

You should have 2-6 years (minimum) of software design experience, focused on Assembler language programming concepts. Your background must also include a 4-year degree (Computer Science, Computer Engineering, or Electrical Engineering) terminal experience, and solid working knowledge of operating systems (real time). Since you will be working primarily as a project team member, often interfacing with various functional areas, your interpersonal and communication skills should be well developed.

SOFTWARE ENGINEERS-DESIGNERS

In addition to all of the above qualifications, you should bring to the position a background of hands-on new product design and enhancements experience (preferably with microprocessors) and comprehensive knowledge of Assembler language.

These positions are with a "right size" company offering high visibility, an attractive compensation-benefits-relocation package, excellent upward mobility — all at a "good living" location. Tell us about yourself in a resume or letter, including salary history — convenient regional interviews will be arranged. Reply in confidence to:

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FIELD ENGINEERS

Dataserv Computer Maintenance is expanding nationwide. We now have immediate openings in major cities and will be adding more in the near future.

These are key positions and provide excellent opportunities that will lead to further promotion in a fast growing company. Excellent compensation plan and good fringe benefits for experienced individuals. Your potential for personal advancement with a $100 million plus company is the greatest right now as we expand.

We now have immediate openings in these cities for these positions:

San Diego, California — FIELD ENGINEER
Immediate opening for experienced Field Engineer for support of IBM 3600 banking equipment.

Des Moines, Iowa — FIELD ENGINEER
Excellent opportunity for experienced Field Engineer to work on 327X, 3420 and 3211 equipment.

Richmond, Virginia — FIELD ENGINEER
We have immediate opening for experienced I/O Field Engineer to maintain IBM disk and tape equipment.

Dataserv will soon have additional opportunities for field engineers and technical specialists in several other major cities throughout the United States. If you are considering a change in employment, contact Dataserv for a review of what we have to offer.

For immediate consideration and more information call **Toll Free — 800-328-6729** or send your resume to: **Bev Walters, Dataserv Computer Maintenance, Inc., P.O. Box 3003, Hopkins, MN 55343.** We are an equal opportunity employer and all inquiries are considered confidential.

dataserv

PROGRAMMERS AND ANALYSTS

SOUTHEAST & SOUTHWEST EXPANSION

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- BAL/PL1
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ATLANTA, GA 30341
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EOE M/F

DATA PROCESSING OPPORTUNITY

TEXFI INDUSTRIES, INC., a leading North Carolina textile manufacturer, is currently in need of the following seasoned professional:

SR. PROGRAMMER ANALYST - Financial Systems

Minimum 4 years experience on large mainframe with thorough knowledge of COBOL required. Prefer experience in MSA payroll, A/P, general ledger, ROSCOE and VS1 JCL.

TEXFI offers excellent salaries and benefits. If interested and qualified, please submit resume and salary requirements, in confidence, to: **ATTN: JOHN PHILBECK.**

TEXFI INDUSTRIES, INC.
400 English Road
Rocky Mount, N.C. 27801

An Equal Opportunity Employer M/F

M.I.S. MANAGER

Immediate opening. Responsible for direction, coordination, planning of M.I.S. activities. Must have a minimum of 3-5 years experience in hospital systems analysis, RPG programming and operation in IBM System 34-36 environment. Currently beginning installation of IBM H.P.M.S. software. Must have excellent interpersonal skills for coordinating an innovative information system. Please submit resume to:

Personnel Office
St. Joseph Hospital
297 Center Street
Bangor, ME 04401
Deadline for resumes 12/19/83.

SYSTEMS PROGRAMMER

International software firm seeks development candidate with knowledge of assembler/cobol language. Work with compilers - optimization algorithms/independent OS/BS/MS Degree. 3-4 years work experience. Excellent salary/ benefits. Send resume to:

COMPUTER ASSOCIATES INTERNATIONAL INC.
ATTN: Personnel Dept.
125 JERICHO TPKE.
JERICHO, N.Y. 11753
Equal Opportunity Employer M/F/H

Assistant/Associate Professor
Management Information Systems

A tenure track position available for the 1984-85 academic year. Teaching duties will consist of undergraduate and graduate courses in business statistics and/or computer concepts and management information systems. Applicants should have a doctorate or be near completion of an appropriate doctoral program, with appropriate professional experience. Eastern Washington University is accredited by AACSB at both the undergraduate and graduate levels. Vita should be directed to: Dr. Frank Mathes, Chairman, Management Hall Room 309, Eastern Washington University, Cheney, Washington 99004. Applications will be reviewed beginning December 31, 1983. AA/EOE M/F Employer.

AUTOMATED LOGISTICS SYSTEMS ANALYST

Direct a team of programmer-analysts to design and implement an automated logistics system in support of military field and depot maintenance activities.

A minimum of 5 years management experience in one or more of the following functional areas is required:

- **MILITARY STANDARD SUPPLY SYSTEMS**
- **FIELD MAINTENANCE CONTROL SYSTEMS**
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Experience is required in EDP project management in general and in the design or evaluation of logistical systems specifically.

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OS/VS Systems Software Developer will develop and maintain the SAS system supervisor and related components for the IBM OS/VS and MVS/XA environments. Use of IBM 370 Assembler as a programming language and exposure to OS/VS supervisor and data management services macros are required. Experience with the development and support of large software systems and the use of IBM service aids is desirable. Familiarity with operating system concepts, compiler design and implementation, PL/I, and the SAS system are significant assets. A bachelor's degree, preferably in computer science, or equavient experience is required.

VM/CMS Systems Software Developer will develop and maintain VM/CMS systems software for internal applications and Institute Program Products. Applicants must have a minimum of one year's experience as an OS/VS1 or OS/MVS systems programmer, and one year's experience as a VM/CMS systems programmer as the most recent job experience, including writing SVC traps, I/O traps, and applications requiring knowledge and use of Assembler as the primary programming language. A working knowledge of PL/I and SAS software is also desirable. A bachelor's degree, preferably in computer science, and excellent communication skills are required.

Compiler Systems Developer will be responsible for the design and implementation of a PL/I-like compiler. Applicants must have a MS in computer science or mathematics and a strong background in block structured languages, preferably in PL/I. Experience in design and construction of state-of-the-art compilers and familiarity with optimization and code generation issues are required.

Communications Systems Software Developer will develop and maintain the SAS system supervisor components for the IBM MVS, VM/CMS, and VSE environments that interface to communications terminals and access methods, such as the 3279, 3287, 3288, and ACF/VTAM. Use of IBM 370 Assembler as a programming language and knowledge of SNA protocols, 3270 data streams, and MVS or CMS supervisor services macros are required. Experience with the development and support of large software systems and the use of VTAM/NCP service aids is desirable. Familiarity with PL/I and the SAS system are significant assets. A bachelor's degree, preferably in computer science, or equivalent experience is required.

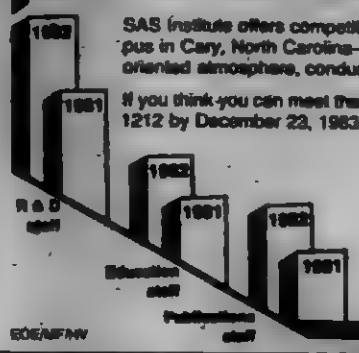
Microcomputer Software Developer will design and develop microcomputer software for Institute Program Products. Applicants must have in-depth knowledge of 8086 Assembler language, C language and IBM PC-DOS BIOS. A bachelor's degree in computer science or equivalent experience is required. Experience with full-screen and graphics drivers is highly desirable. Applicants must provide samples of related work experience.

Systems Programmer will assist the development of SAS software products on various minicomputer systems. Applicants must have a minimum of two years PL/I programming experience, working knowledge of SAS software, and experience with one of the following minicomputer systems: Digital VAX under VMS, DG MV under AOS/VS, or Prime under PRIMOS. A BS in computer science is required. Knowledge of SAS/GRAPH and SAS statistical procedures is desirable.

Testing & Documentation Systems Programmer will perform source code management functions; including documentation of procedures and consultation for SAS system developers on Digital under VAX. Applicants must have 1-2 years' data processing experience, with a working knowledge of PL/I and SAS. Candidates must have experience with IBM under TSO or VM/CMS, or one of the following systems: Digital VAX under VMS, DG MV under AOS/VS, or Prime under PRIMOS. One to two years' VMS experience is desirable. A BS degree in computer science or equivalent is required.

Minicomputer Programmer will develop SAS software for various minicomputers. The individual will write and maintain code and documentation, transport code, prepare master tapes, and educate users. A BS degree, preferably in computer science, and PL/I knowledge are required. Minicomputer experience, knowledge of SAS software, and Assembler language experience are preferred.

DG Minicomputer Programmer will be responsible for developing SAS software for the Data General minicomputer. Responsibilities include writing and maintaining machine-dependent code, reviewing documentation, transporting code from the VAX minicomputer to the Data General, and assisting in educating users. Applicants must have knowledge of PL/I and a BS degree, preferably in computer science. Experience with Data General minicomputers, knowledge of SAS software, and Assembler language experience are preferred.



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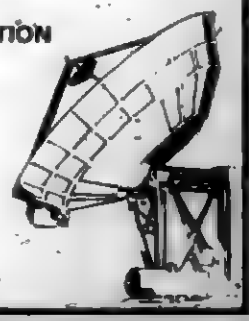

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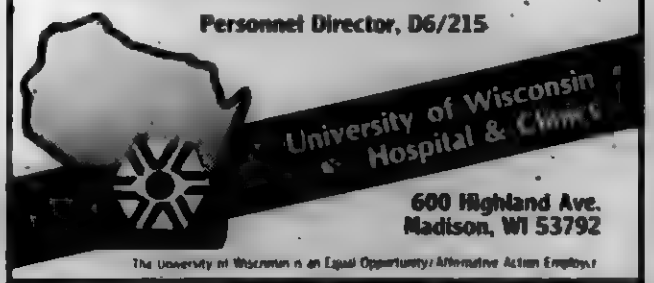

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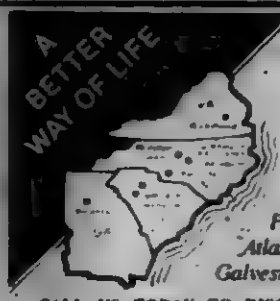

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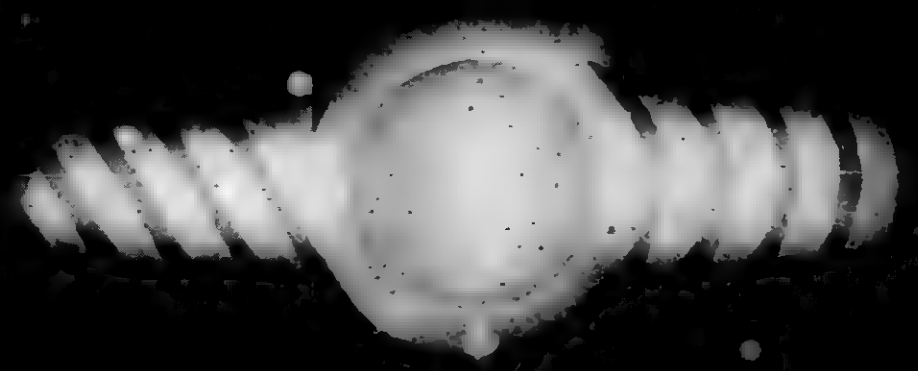

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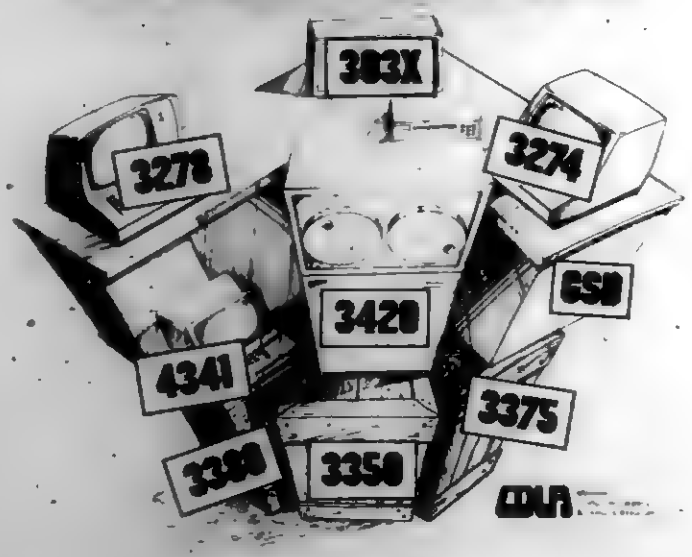

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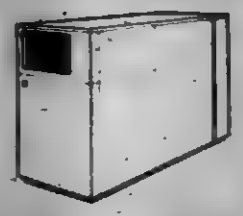

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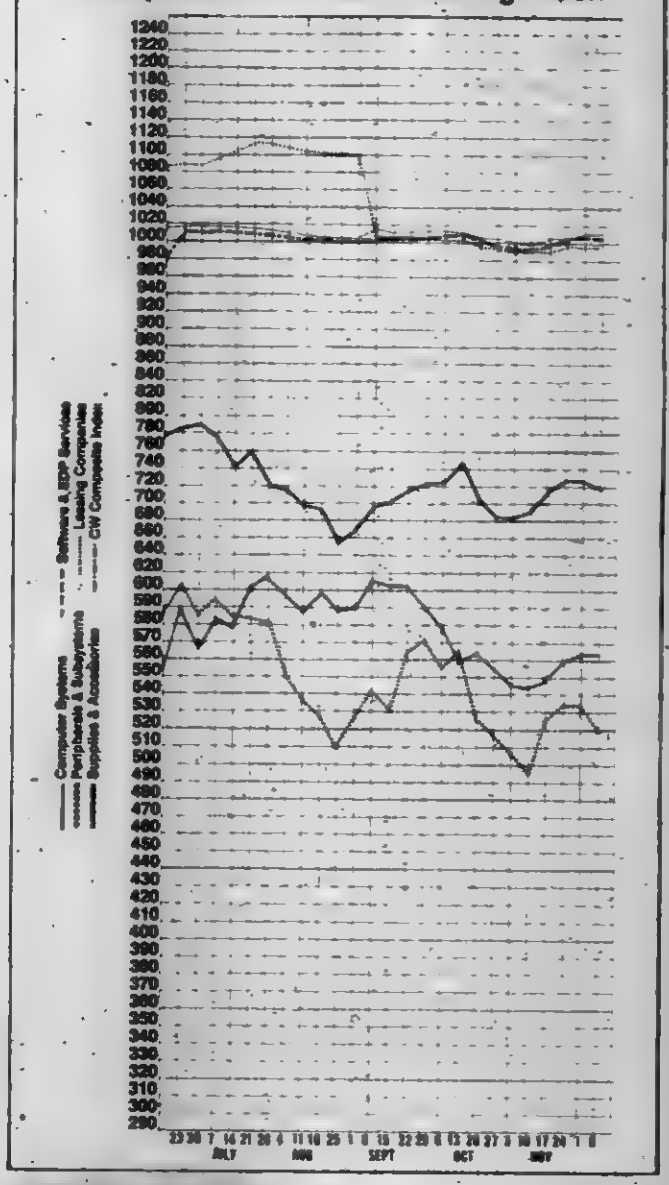

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Computerworld Stock Trading Summary

All statistics compiled computed and formatted by TRADE QUOTES Inc Cambridge Mass 02139

CLOSING PRICES WEDNESDAY, DECEMBER 7, 1983

COMPUTER SYSTEMS

		1982-83 RANGE ($)	CLOSE DEC 7 1983	NET CHANGE	NET PCT CHANGE
O	ALPHA MICROSYSTEMS	11- 24	18 1/2	+2	+13.7
B	ALTOS COMPUTER SYST	6- 28	9 3/4	+1	+11.4
A	ANIMAL CORP	9- 30	17 1/2	-1	-5.4
B	APPLE COMPUTER INC	18- 82	21	+ 3/8	+2.0
N	AT&T	60- 76	64- 1/8	+ 1/4	+0.2
N	BURROUGHS CORP	28- 56	47 3/8	+ 1/4	+0.7
B	COMPUTER AUTOMATION	6- 17	8 1/2	0	0.0
A	COMPUTER CONSOLES	6- 28	21	-2 3/8	-11.1
N	CONTROL DATA CORP	21- 62	45 1/2	+1 1/4	+2.8
B	CONVERGENT TECHNOL	18- 41	22 1/8	-1	-4.3
N	CRAY RESEARCH INC	20- 57	53	-1 5/8	-2.9
N	DATA GENERAL CORP	16- 41	39 3/4	-1 1/8	-3.2
B	DATAPOINT CORP	11- 38	29 1/2	+2 3/8	+8.8
N	DIGITAL EQUIPMENT	62-132	99 1/8	+ 5/8	+0.6
A	ECCO INC	6- 18	13 7/8	0	0.0
N	ELECTRONIC ASSOC.	5- 15	8 7/8	+ 1/8	+1.9
N	FLOATING POINT SYST	18- 46	34 1/4	- 3/4	-2.1
N	FONDORO	22- 47	38 3/4	-1 1/4	-3.3
N	GENERAL AUTOMATION	3- 16	12 5/8	+1 3/8	+12.2
N	GOULD INC	30- 44	32	+1 3/4	+5.8
N	HARRIS CORP	20- 53	38 3/4	-1	-2.4
N	HEWLETT-PACKARD CO	22- 48	41 1/2	+1 3/4	+4.4
N	HONEYWELL INC	80-137	127	+3	+2.2
N	IBM	97-134	119 1/4	+1 7/8	+1.5
B	IPL SYSTEMS INC	3- 14	8 3/4	-1 1/4	-17.5
N	M/A-COM INC	21- 35	21 3/8	- 1/4	-1.1
O	MASSBUSTER CORP SYSTS	3- 5	3 3/8	0	0.0
B	MANAGEMENT ASSIST	7- 18	18 5/8	+ 1/8	+0.8
O	MATSUSHITA ELECTIADO	47- 80	78 1/4	+1 5/8	+2.0
N	MODULAR COMPUTER SYS	6- 16	7 3/4	- 3/8	-7.0
O	NONAN DATA SCI	10- 18	18	+ 1/2	+2.6
N	MOTOROLA INC	82-140	130 7/8	-1 1/8	-0.7
N	NAT'L SEMICONDUCTOR	16- 69	17 5/8	+1 1/4	+7.6
N	NCR	38-138	133 3/8	- 3/4	-0.5
N	PERKIN-ELMER	17- 37	37 1/2	-1	-2.5
N	PRIME COMPUTER INC	18- 39	18 3/4	+1 1/8	+6.1
N	SPERRY CORP	21- 47	45 5/8	+3	+7.0
O	TANDON COMPUTERS INC	14- 60	35 1/4	-1	-2.7
N	TANDY CORP	30- 68	63 3/4	+6 1/8	+10.4
O	TELEVIDEO SYSTEMS	14- 41	18 3/4	-1 1/2	-7.4
O	TELNON CORP	8- 16	13	+1 1/4	+10.6
N	TEXAS INSTRUMENTS	71-176	133 7/8	- 1/8	0.0
A	ULTIMATE CORP	8- 24	17 1/4	-1 1/2	-8.0
B	VECTOR GRAPHICS INC	3- 14	8 1/4	- 3/8	-14.2
A	WANG LABS "B"	13- 45	32	-1 1/2	-4.4
N	WANG LABS "C"	11- 42	32 3/8	-1 3/8	-4.0
N	XEROX CORP	30- 80	48	+ 1/2	+1.0

LEASING COMPANIES

O	BOOTHE FINANCIAL CP	11- 28	23 1/4	+1 3/4	+8.0
N	COMDISCO INC	7- 43	30	+ 1/4	+1.2
B	CONTINENTAL INFO SYS	3- 16	8 3/4	- 3/4	-7.1
N	DPF INC	9- 19	13 1/4	- 1/4	-1.8
N	U.S. LEASING	19- 47	38	+1 1/2	+4.1

COMPONENTS

O	ADVANCED MICRO DEV	13- 38	34 3/8	+ 3/8	+1.1
O	ADV'D SEMICONDUCTOR	12- 38	34 1/8	- 3/4	-2.1
N	ANALOG DEVICES INC	10- 42	40 1/2	-1 1/8	-2.7
O	ANALOGIC CORP	20- 37	21	-1	-4.5
N	APPLIED MAGNETICS CP	19- 37	23 1/8	- 1/8	-2.4
N	TERADYNE	16- 38	38 1/4	+2	+2.0

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B-I-D PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
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SOFTWARE & EDP SERVICES

O	ADVANCED COMP TECH	1- 8	3 1/8	- 1/8	-3.8
O	ADVANCED SYSTEMS INC	8- 22	20 3/8	+1 1/8	+6.4
O	AGS COMPUTERS INC	7- 32	27 3/4	- 1/2	-1.7
O	AMERICAN SOFTWARE	20- 31	30 1/2	-1 1/2	-7.1
B	AMACOMP INC	6- 23	19 1/8	+3 1/8	+19.0
O	ANALYSTS INTL CORP	9- 20	13 3/4	- 1/4	-2.0
A	APPLIED DATA RES.	8- 37	32 1/8	+ 3/4	+2.3
B	ASK COMPUTER SYSTEMS	8- 21	17 1/2	-1 1/2	-7.8
B	ASTRODYNE CORP IND	1- 7	2 1/2	- 1/8	-4.7
N	AUTOMATIC DATA PROC	21- 64	36 3/8	+1	+2.8
B	CSA COMPUTER ASSOC	9- 17	14 3/8	- 1/8	-0.8
O	COMPUTER ASSOC INT'L	8- 35	28 3/4	- 3/4	-2.6
O	COMPUTER HORIZONS	8- 20	11 3/4	- 1/2	-4.0
O	COMPUTER NETWORK	4- 10	6 1/2	- 1/8	-1.8
N	COMPUTER SCIENCES	11- 23	18 7/8	+ 7/8	+4.8
O	COMPUTER TASK GROUP	8- 22	16 5/8	+ 1/8	+0.7
B	COMPUTER USAGE	2- 22	16 3/4	-2 1/4	-17.3
O	COMPUTONE SYSTEMS	5- 38	7	- 3/8	-0.8
O	COMSERV CORP	5- 20	8	- 3/4	-11.1
B	COMSHARE	7- 43	19 7/8	0	0.0
B	CULLINET SOFTWARE	18- 90	42 1/8	- 3/4	-1.7
NB	CYCARE SYSTEMS INC	9- 27	17 1/2	- 1/4	-1.4
B	ELECTRONIC DATA SYST	10- 42	38 1/4	-2	-5.2
O	HOGAN SYSTEM INC	10- 17	15 1/4	+ 1/8	+0.8
N	GENERAL ELECTRIC CO	48- 70	59 3/8	+1 1/4	+2.1
N	GTE CORP	38- 48	43 3/4	-2 1/2	-5.4
B	INFORMATICS INC	18- 34	28 1/2	- 1/4	-0.9
B	INFOTRON SYSTEMS COR	29- 43	36	- 1/2	-1.3
O	KEANE ASSOCIATES	4- 15	8 3/4	0	0.0
A	LEDLEON	8- 24	20 1/8	- 1/4	-0.8
O	MCI COMMUNICATIONS	13- 34	13 5/8	- 5/8	-3.8
O	MGMT SCI AMER INC	9- 33	28 3/4	-2 1/8	-6.8
B	MATHEMATICAL APP GRP	10- 22	10 1/2	0	0.0
B	MICRO SYSTEMS INC	23- 90	41 1/2	+3	+8.7
O	MONCH/A-WEBER CP	8- 22	8 1/2	-1 1/4	-12.8
O	NATIONAL DATA CORP	9- 36	21 1/8	+ 1/8	+0.5
O	ON-LINE SOFTWARE INT	17- 27	20 1/2	-1 1/2	-6.8
O	PANOPHONIC SYSTEMS	8- 20	20 1/8	-1 1/4	-5.8
N	PLANNING RESEARCH	8- 21	17 5/8	+ 1/4	+1.4
B	POLICY MGMT SYSTS CP	18- 38	28 3/4	-1 1/8	-3.7
O	PROGRAMMING & SYS	1- 8	4 1/8	- 1/8	-4.8
O	REYNOLDS & REYNOLD	17- 53	44 3/4	- 3/4	-1.6
O	SCI CORP	11- 34	28 1/4	- 1/4	-0.8
O	SHARED MEDICAL SYST	33- 63	34	-3 3/8	-8.8
B	SCIENTIFIC COMPUTERS	8- 14	10 3/8	+ 3/4	+7.5
O	SOFTWARE AG	9- 17	11 1/4	1 1/8	-8.6
N	TYMSHARE INC	12- 36	17 1/4	- 3/8	-2.1
A	URS CORP	3- 18	14 7/8	- 7/8	-5.8
B	UTLY CORP	7- 17	13 1/4	0	0.0

PERIPHERALS & SUBSYSTEMS

P	AM INTERNATIONAL	2- 7	3 3/8	- 1/4	-6.8
A	ANDERSON JACOBSON	8- 28	10 1/8	+ 1/8	+1.2
B	AUTO-TROL TECHNOLOGY	8- 28	22 1/2	+1 1/8	+5.2
B	BARETEC INC	7- 23	15 1/4	0	0.0
A	BRENTVE INT'L	4- 10	8 3/8	+ 1/8	+1.8
A	CALT.BENNETT & ASH	9- 30	23	+1 3/4	+7.9
O	CANBER CORP	1- 6	1 1/2	- 1/4	-14.2
N	CENTRONICS DATA CORP	9- 25	18 3/8	-2 1/4	-12.0
O	CEYEC CORP	4- 12	10 1/8	- 1/8	-1.2
O	CORRITRONICS	2- 20	8	- 3/4	-7.8

SUPPLIES & ACCESSORIES

B	AMERICAN DAD PRODS	11- 34	-32 3/4	+1 1/4	+3.8
B	BARRY WRIGHT	13- 33	24 1/2	- 1/4	-0.7
B	DATAPT PRODUCTS INC	12- 29	23 1/8	- 1/2	-2.0
B	DENNIS MFG. PERMA	9- 28	24 1/2	-1	-3.8
N	3M COMPANY	68- 88	88 5/8	0	0.0
B	MOORE CORP LTD	28- 61	44	- 3/8	-0.8
B	STANDARD REGISTER	11- 36	32 1/8	- 1/4	-0.7
N	WALLACE BUS FORMS	11- 33	24 3/4	+ 1/8	+0.2

15 pointed questions to ask MSA or any software supplier

These questions will help you when you sit down with individual software companies.

They're tough questions. Relevant ones. And any supplier who is worth his salt should be able to answer them without backpedaling.

Ask MSA

We'll answer all these questions to your satisfaction—plus any others you may have.

In fact, we're probably the best equipped to answer them. Because MSA is the software company. We offer the most complete line of totally integrated systems in the software industry, including financial, human resource and manufacturing.

So you avoid the headache of trying to tie together individual systems. (And the even bigger headache of adding IT to them.)

With MSA's integrated systems, there's no unnecessary duplication of data or effort. Reporting is faster. All your company's information is more timely and accurate—and in the right form.

Our technical edge comes from experience

Staying ahead is easier for a company that's steeped in software technology. MSA has spent years developing, refining, testing and enhancing our systems.

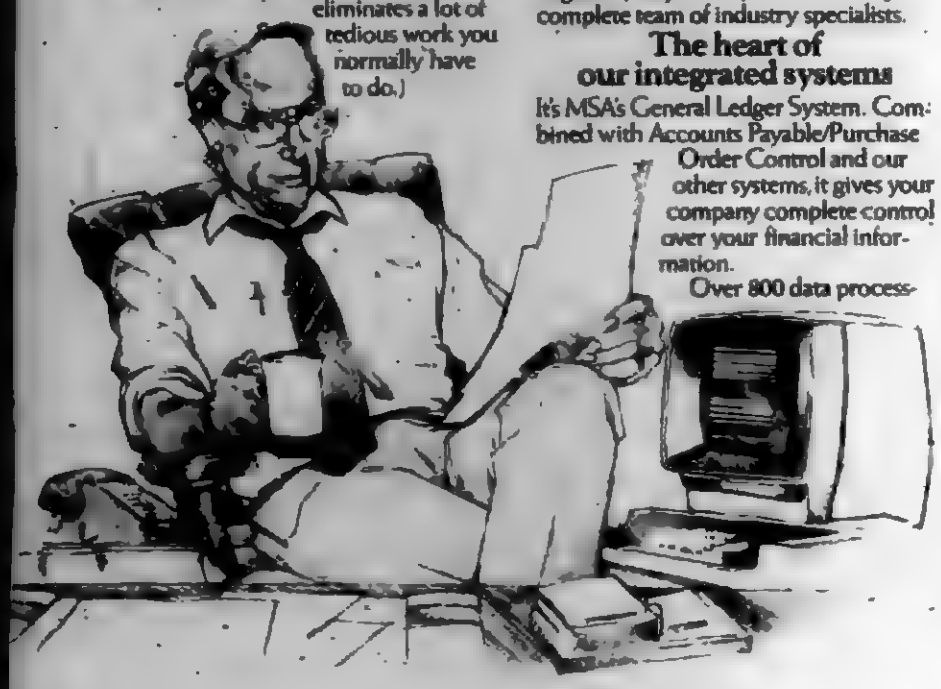
This year alone, we'll invest $25 million to make sure all our systems are technologically razor sharp. That gives us a decided advantage over flash-in-the-pan technology that may not have the bug-free logic of a more experienced system.

It also gives you a decided advantage over "custom" systems you have to update yourself.

MSA relieves you of that time-consuming burden. We update and enhance your software for a full year. Then we continue this service for a surprisingly low annual fee.

Maintenance includes keeping your system up-to-date technologically. Enhancing it with new features that make it work even harder for you.

And making sure it reflects changes in accounting procedures and government regulations, including 401(k), TEFRA, and FAS52. (That eliminates a lot of tedious work you normally have to do.)



Save this box. It can help you make an intelligent software decision.

1. Can you offer us a complete range of software systems designed to work together?
Or will we have to piece together a patchwork of systems?

2. Are your systems just record-keepers, or can they really help us make decisions?
Can we pull together information from any of our integrated systems? In exactly the form we want it?

3. Can you provide business software for both mainframe and microcomputers?
Do you develop this software yourself or do you simply market it for another company?

4. Are your systems truly online so all of our information is current?
How many of your systems are online? How secure are they?

5. Will my company have to be the one that discovers the bugs in your brand new system?
Just how long have your systems actually been used, and how have they been tested?

6. Will you update your systems as technology advances and regulations change?
What are some of your most recent updates? Will you keep us current on regulatory changes?

7. Do your systems really do everything you say they will?
Or will we have to change them or add to them to get the features we want?

8. How long have you been in business?
What are your revenues? What is your growth record? Where will your company be five years from now?

9. How many systems has your company installed?
How many of these were installed in the past six months? How many of your earlier customers are still using—and liking—your systems?

10. Do your financial systems handle unlimited foreign currencies?
Do your financial systems use a common set of currency exchange rates?

11. Can you link our executives' computers directly to the mainframe—so they can get their own information?
Is that software available right now?

12. How will you make sure our own people thoroughly understand your system?
Do you have educational centers near us, or will we have to travel all the way across the country to find one? Will you be there to help during installation and after?

13. How many of your people specialize in software for my industry?
How many accountants work for you? Human resource specialists? Manufacturing experts?

14. Do your systems have built-in features that make them easier to use?
What happens if someone needs help figuring out a feature? Do you have online documentation that's easy to understand?

15. As my business changes will your system be flexible enough to change with it?
Or will we have to pay a lot to revamp it? Or even regenerate it?

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7. Accounts Receivable
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10. Inventory & Purchasing
11. Payroll
12. Personnel Management & Reporting
13. ALLTAX™ Taxing System
14. Manufacturing Control System (MRP II)
15. Executive Peachpak™ II
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17. Peachtree Software™ office productivity systems for microcomputers

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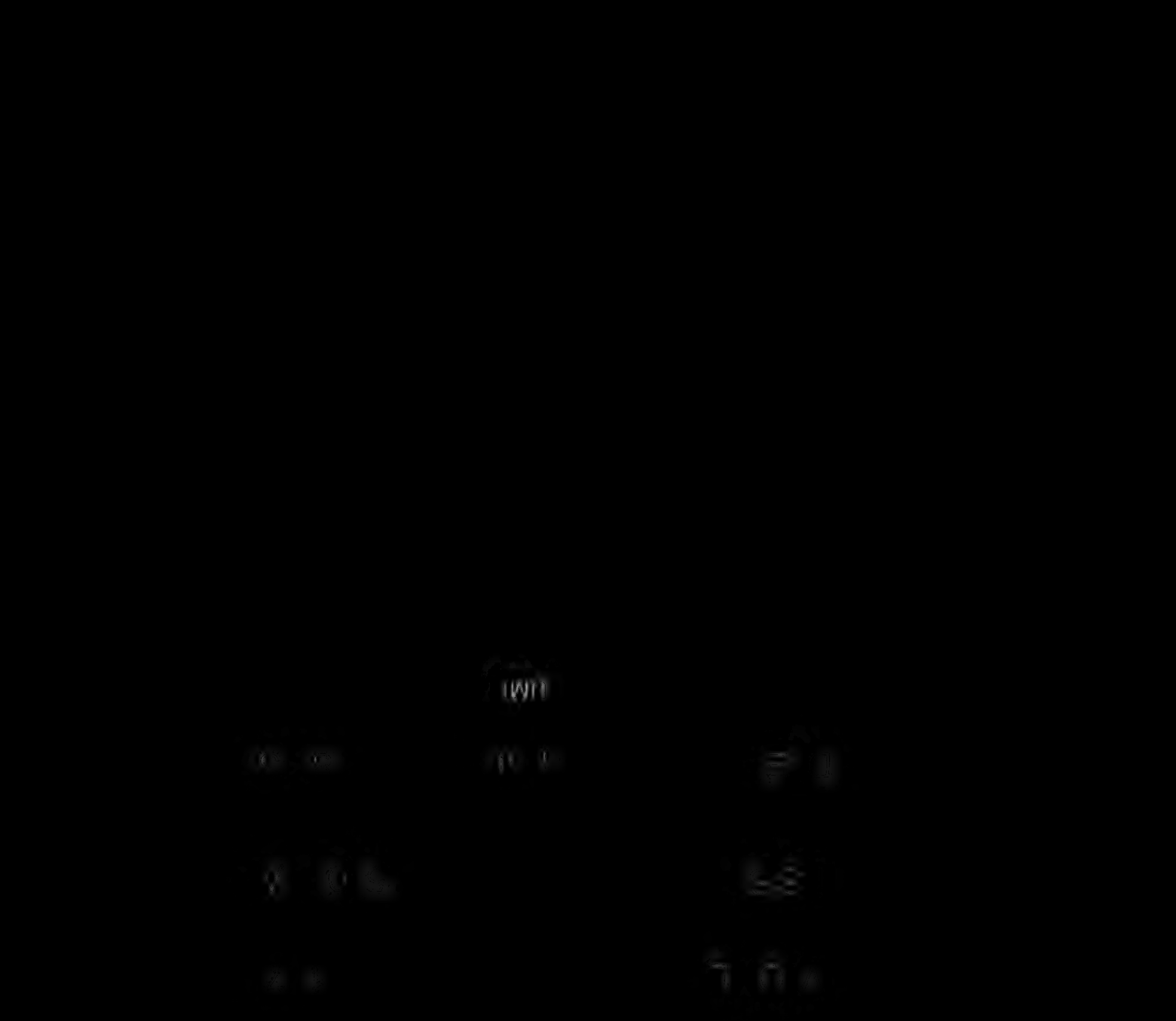

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Second-class postage paid at Framingham, Mass., and additional mailing offices PN127420. *Computerworld* (ISSN-0010-4841) is published weekly, except February (5 issues), April (5 issues), May (6 issues), June (5 issues), August (7 issues), September (5 issues), October (7 issues), November (5 issues), December (5 issues) and a single combined issue for the last week in December and the first week in January by CW Communications/Inc., Box 880, 375 Cochituate Road, Framingham, Mass. 01701

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Computerworld subscription prices: $1.50 a copy; U.S. — $44 a year; Canada, Central & So. America — $110 a year; Europe — $165 a year; all other countries — $245 a year (airmail service). Four weeks notice is required for change of address. Please allow six weeks for new subscription service to begin.

Computerworld can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. *Computerworld* is indexed; write to Circulation Dept. for subscription information.

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COMPUTERWORLD BUYER'S GUIDE Software

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About the Guide

The *Computerworld Buyer's Guide to Software* is a reference manual containing concise descriptions of software products and short profiles of the vendors selling these products. Software products included in this guide are for both large systems and microcomputers.

The guide has four major product sections — applications software, system software, data base management systems and utility software.

Product listing sections are preceded by a divider, with a fold-out tab identifying the products listed within that section. Applications software products, which account for approximately one-half of the products listed in this guide, are contained within three tab dividers entitled: Accounting (Section A); Manufacturing, Banking and Insurance (Section B); and Payroll/Personnel, Word Processing/Text Editing and Other (Section C). The remaining product listings are contained within three tab dividers entitled: System Software (Section D), Data Base Management Systems (Section E); and Utility Software and Applications Development Systems (Section F).

In cases where several different types of products are included within one tab section, a grey-colored page with a product classification identifier is inserted before the listings for that particular product grouping.

Preceding the product listings is a vendor profile unit (Section V).

The front of the guide has a magazine section featuring articles about the state of the industry, markets and technical information for specific product categories and issues concerning software.

Also featured in the guide are separate indexes which provide a method for quickly locating the diverse products listed in the guide.

PRODUCT LISTINGS

There are 24 distinct product classifications contained within the *Computerworld Buyer's Guide to Software*. In cases where a product does not fall into one of these categories it is listed in a section entitled "Other". Within each category, vendors are listed alphabetically.

Each product listing contains the package name; the specific application and/or industry for which the product is designed; the hardware and/or operating system on which the product runs; the amount of main memory required; the source language and availability of source code; pricing and installation data.

In some instances, vendors indicated their products were designed for more than one purpose. The secondary usage for these products is denoted by the specification entitled *additional product classification*.

In cases where a vendor's software package operates on both a microcomputer-based and a mainframe or minicomputer system, the product listing will be found in the section containing the listings for the larger system. Those packages designed for small business systems will be found in the listings for microcomputer software.

In an effort to keep this guide to a manageable size, the number of listings of software products offered by major hardware vendors were limited. In general no hardware vendor has more than 25 products listed. The major hardware vendors usually have a directory of their software offerings, which are available upon request to customers and interested parties.

Each vendor's product listing also contains a cross-reference directing the reader to the appropriate page for the vendor's company profile.

An example of a product listing is shown at right.

SOFTWARE AG OF NORTH AMERICA, INC.
NATURAL
Specific Application: Fourth-Generation Language Application System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: MVS; IBM 4300 Series: OS/VS1; IBM 3000 Series: DOS/VS, DOS/VSE
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $40,000
[redacted]
[redacted]
(See Vendor Profile Page V-99)

About the Guide

COMPANY PROFILES The company profile section of the *Computerworld Buyer's Guide to Software* contains each vendor's address and telephone number as well as a listing of key management, marketing or technical personnel within the firm. In addition, the profile includes the company's target markets, revenue, among other details.

An example of a typical entry is shown on the right.

COMPUTER BUSINESS APPLICATIONS, INC.
701 E. Third St.
Los Angeles, CA 90013
(213) 680-2241
Major Business: OEM Computer Systems; Systems House (Commercial OEM)
Target Industries: Retail; Finance
Target Applications: Merchandise Management; Accounting
Contacts:
Head of Software: Raul Acevedo
Year Established: 1979
Number of Employees: 15

INDEXING SYSTEM Each tab divider contained in this guide has a "Product Locater" index, which is appears at the end of each tab section. The Product Locater gives the name of the package, its price and the page on which the complete listing for the product is found. This facilitates the search for a software package if the reader knows the name of the product, but does not know the vendor of that product.

Operating Systems

A B DICK COMPANY CP/M RELEASE 2	$300	D-1	BOS	$300	D-1
AD/OS-APPLICATION DEVELOPMENT OS	$1,000 to $3,000	D-4	BUSINESS OPERATING SYSTEM (BOS V)	$400	D-1
BERKELY 4.1 UNIX	$20,000	D-6	C COMPILERS MWC/86	$500 to $6,000	D-3
BLISS/COBOL-MULTIUSER	$750	D-2	C EXECUTIVE	$300	D-3

THE ENTERPRISE FILE The Enterprise File is a data base containing information on the thousands of companies that produce or provide computer-related products and services. It is the source of listing information contained in the *Computerworld Buyer's Guide to Software.*

The project was started in April 1982 and is a complement to the International Data Corp. Data File, a well-known data base of end-user facilities.

Information is gathered and regularly updated by International Data Corp. through printed questionnaires and telephone surveys. To date the Enterprise file has records on nearly 12,000 companies and is targeting 35,000 to 40,000 products for inclusion in the file in the near future.

Note: Vendors were offered the option of placing their company name in a larger typeface than the standard listing size. Vendors were also offered the opportunity to add a boxed insert at the the end of their listing. These options were paid for by the vendors and should in no way be construed as an endorsement of these companies or products by the publishers of the *Computerworld Buyer's Guide to Software.*

Editor's Note

As computers fan out, finding their way onto desks throughout organizations everywhere and as more business functions are automated, the amount of software available to keep these systems humming grows in exponential progression. The *Computerworld Buyer's Guide to Software* reflects that theorem. This guide contains approximately 10,000 products from 3,200 vendors — and that's after weeding out a huge amount of software as well as limiting the listings of products offered by hardware vendors. Approaching the 800-page mark, this guide is certainly the bulkiest of the series which began last August with the *Computerworld Buyer's Guide to Computer Systems.* In fact, it took 14 tractor-trailer truckloads to distribute this issue of the series.

So what does all this proliferation of software mean? One theme the magazine section in this guide reflects is the concern with making computing power available to and easily accessed by managers and professionals in every industry. Articles in the magazine range from end-user computing issues to artificial intelligence, from mainframe-to-microcomputer links to microcomputer data base management sytems and information centers. It appears that end-user computing has come of age.

This year, vendors have certainly been busy bringing products to market for usage by people whose major function is not involved with management information systems (MIS). While many products will not be delivered until sometime next year, the future frontier of software has been charted.

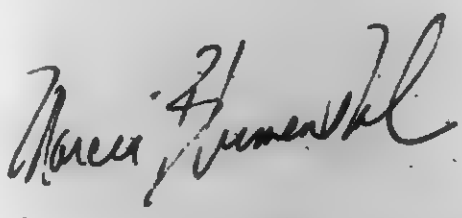
IBM, often criticized for letting small, independent companies take the lead in bringing innovative products to market, has responded to the demand for end user computing. Evidence of this is its introduction of DB2, a relational data base system for its MVS environment; its agreement with Artificial Intelligence Corp. to remarket Intellect, an artificial-intelligence-based product; its introduction of the Personal Computer-XT/370 and the 3270-PC, systems that bless the mainframe-to-micro link; and the emergence of Oxycalc, a mainframe-based spreadsheet package.

Likewise, other vendors have not been idly standing by watching the end-user computing parade. Cullinet Software, Inc.'s IDMS/Relational and other personal computer software offerings recognize the importance of the microcomputer to the professionals and managers in organizations. And Applied Data Research, Inc.'s Ideal, an applications development system for both technical and nontechnical users, also emerged during this past year. In addition to these products, Mathematica Products Group, Inc. introduced an "English" front-end for its Ramis II data base management system.

The introduction of new products that make it easier for end users to access corporate data is expanding the universe for software systems. But are MIS professionals ready to greet the new software frontier? The challenge is two-fold; not only are managers of information systems being called upon to evaluate software tools, making sure that they mesh with other corporate systems, but also they are being relied upon to create the environment that will ensure these new products are used efficiently.

A few years ago information processing managers spent a good deal of time worrying about programmer productivity — how to glean added performance from trained information system specialists. Programmer resistance to tools such as fourth-generation languages and prototyping was a topic of heated debate on the conference circuit. In some ways it is ironic that managers and professionals in corporate departments are quickly embracing the very products that were resisted by many information processing professionals who had long been oriented to a procedural approach to developing systems.

On the other hand, this phenomon may indicate that an entirely new environment was necessary to prod computing into taking the next step beyond.



Marcia Blumenthal

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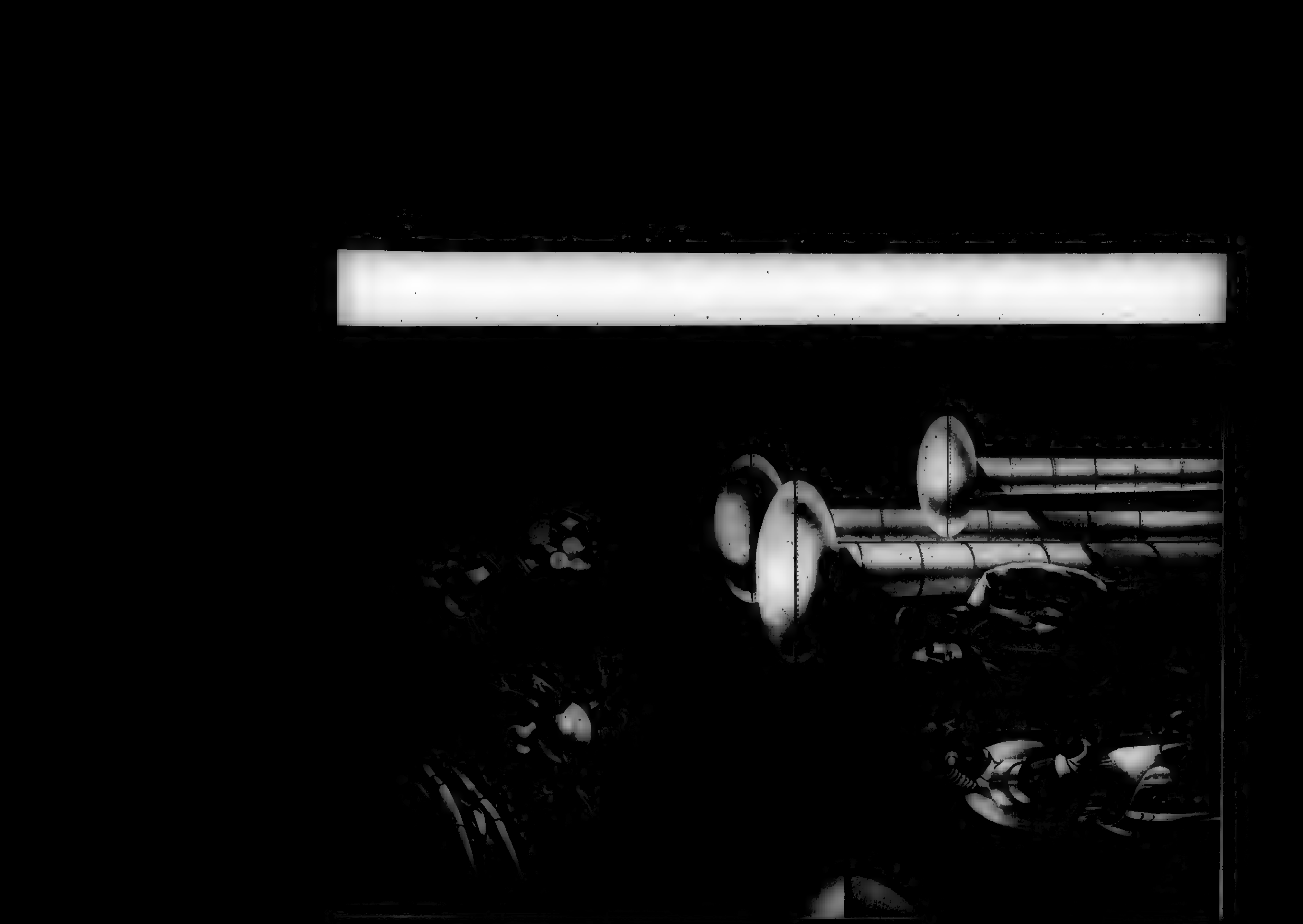
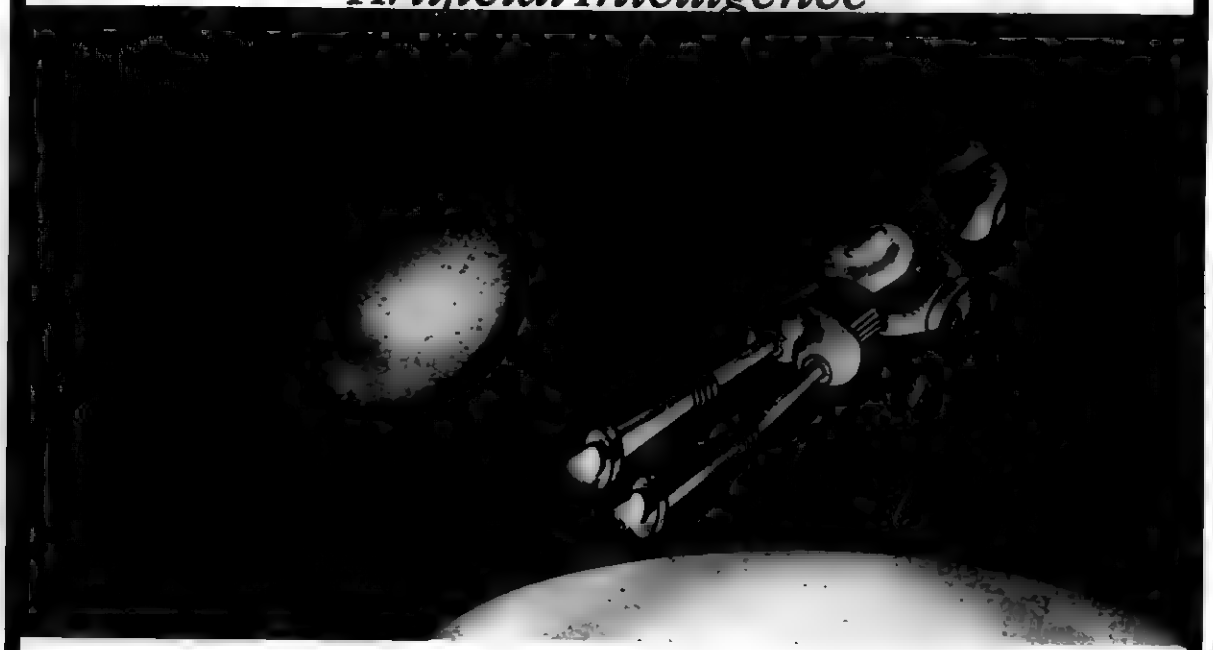
ILLUSTRATION BY CAMERON, INC.





A New Dimension In Software

By Dr. Larry R. Harris

Within the past two years, artificial intelligence (AI) has been propelled out of the research laboratory and into the commercial marketplace. Although there are relatively few AI-based products on the market today, the impact of these products is already being felt. Industry giants such as IBM and Digital Equipment Corp. have already begun to incorporate AI into their systems. The Japanese have placed AI at the center of their fifth-generation computer plans. Many others are scrambling to understand what this technology can offer and how it can be integrated into their product lines.

The field of computer science research known as artificial intelligence attempts to simulate human cognitive behavior using a computer. AI techniques rely heavily on symbolic representation and manipulation of data rather than on the number crunching normally associated with computers. By representing information symbolically, AI systems can carry out complex logical operations such as inference, planning, language understanding and so forth. These capabilities allow AI-based systems to perform much higher level tasks than their conventional data processing counterparts. Systems for performing medical diagnosis, minicomputer configuration and language understanding have already been built using AI technology.

The excitement surrounding AI-based products is due to the fact that AI systems allow a whole new class of problems to be solved. It is not that they solve a problem faster or better than it was solved before; in most cases, the problem could not be solved by computers at all. Thus, the promise of AI systems is that they allow entirely new areas of human endeavor to be automated. Furthermore, the improved man-machine interface offered by today's AI systems allows for experts to work with AI systems to address jointly problems that neither alone could solve.

The evaluation of conventional software systems such as data base management systems (DBMS) or applications packages has already evolved a set of procedures to ensure the proper fit between the user's needs and the product's capabilities. Evaluating AI-based software products is an extension of this methodology. But in addition to the normal caveats regarding software selec-

tion, there are two unique aspects of AI-based software of which buyers should be aware.

The first is that AI systems address such large and ill-defined problems that they cannot completely solve the problems in all cases. AI systems cannot carve out some neat area of functionality and completely resolve all the issues in that well-defined area. Rather, AI systems address a large problem area that is rarely well-defined, such as a medical diagnosis system, which will not always make the proper diagnosis. There will always be English sentences that an English-understanding system will not understand or scenes that a vision system will misinterpret. Since AI systems cannot solve a big problem in its entirety (remember that not even humans can do that), the burden is on the buyer to assure himself that the degree to which the system solves the problem is sufficient for the user's purpose. This is not always an easy determination to make before buying a system.

The second aspect of evaluating AI software is recognizing that AI software always demonstrates itself in an impressive fashion. This, in addition to the previous point, lays the groundwork for the system to be oversold. Often, the vendor is not solely at fault. Buyers, in their exuberance at seeing AI capabilities being performed, often extrapolate what they saw during the demo to a point well beyond the system's capabilities. Buyers must remember that demonstration problems are always chosen by a vendor because they show a system in its best light.

There are two classical solutions for buyers to employ for both of these problems. One is to check user references for a product. The other is to try a product out before purchasing it to assess its overall performance.

Checking user references for software products is a well-proven technique in evaluating all software products. For the reasons stated above, it is particularly important for AI software. Reference checking is perhaps the easiest way to determine whether a system addresses a sufficient amount of an overall problem. If other users have found a product to be a successful business tool, then the chances are much greater that it will work for you as well. But be careful of references to sites in which a system is in test or under evaluation. These may be signs of a system not being a fully usable tool. What you want to hear is that a system is "in production." If you cannot get a reference to a good production site, you should realize that you will be one of the pioneers in using the product. Someone, of course, has to be the first to put a product in production, but you should seriously consider whether that someone should be you.

After checking user references, the next step is to try the product out before purchase. This, of course, is the only way to be certain whether the product is going to be a useful tool for you. Unfortunately, the degree to which the system must be customized for your application may make the trial an expensive proposition for both you and the vendor.

A good compromise is to install the product on your machine with a demonstration application that is similar to your target application. From this test, you can get accurate performance data in your actual environment and also define the limits of the AI component of the system. This experience with the system will provide a much more accurate assessment of its capabilities than the sales demonstration, since you will be using the system yourself in a unconstrained mode. This information, plus the reference checks, should be sufficient to make the buy or not-to-buy decision.

AI Market Structure

The hierarchy in the diagram on page 12 shows the relationship of the existing AI market segments.

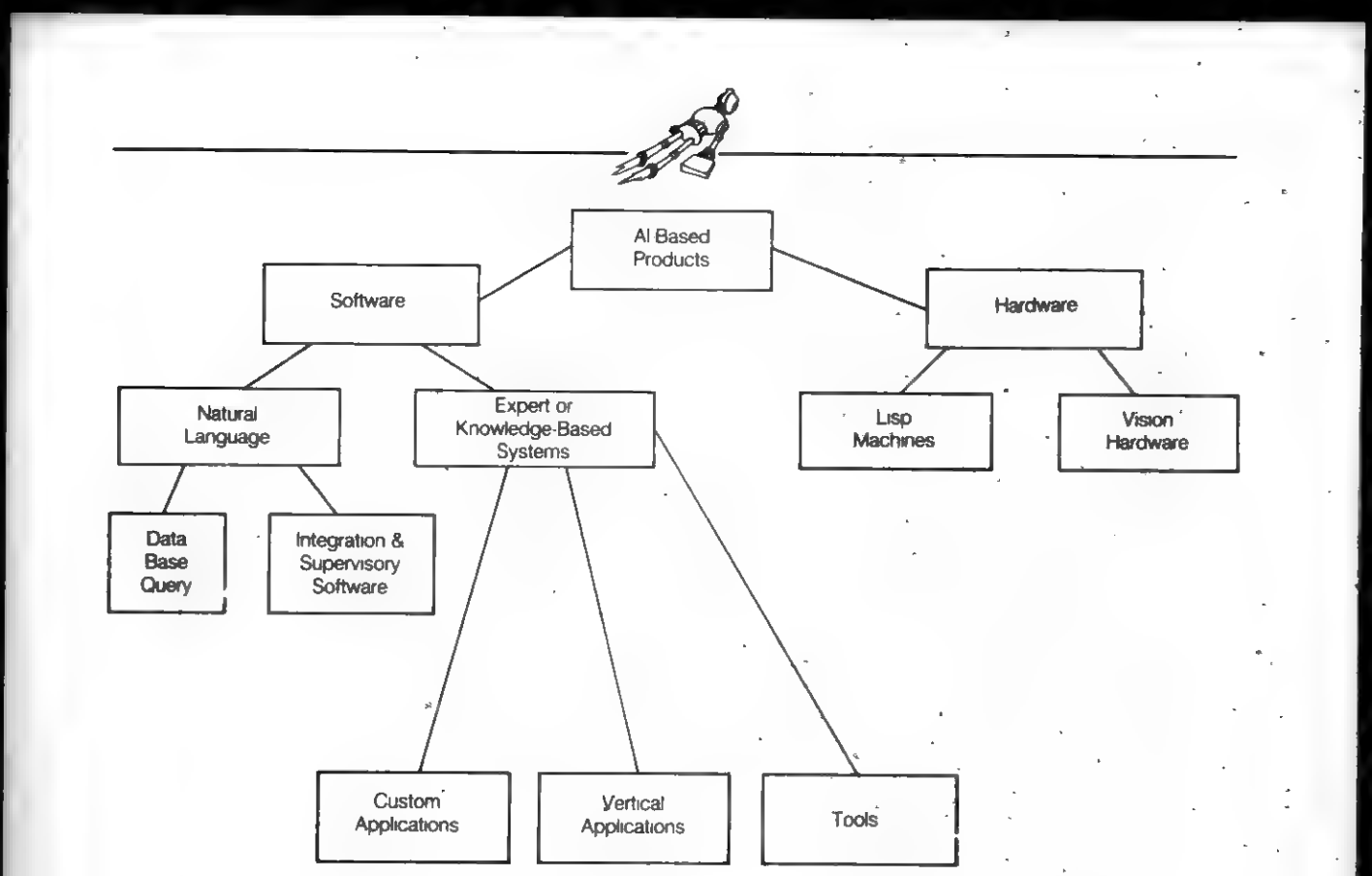
The first portion is software vs. hardware. In essence, all of the AI in any system lies in the software, but some of the application areas are so task-specific, such as vision and robotics, that it is easier to think of these as hardware devices since they are physically embodied in hardware.

Within the commercial software areas, there is the natural-language segment and the expert-systems segment. "Natural language" is a technical term that refers to the languages people speak, for example, English, French and Japanese. These are distinct from formal computer languages, such as Cobol and Fortran. The natural-language segment involves products that allow users to interact in ordinary English with computers.

Expert or knowledge-based systems are application-specific products that automate the way that human experts solve complex problems. These systems solve problems by building up a long chain of reasoning to lead from basic premises to a conclusion. Both the basic premises and the rules of inference that specify how facts can be chained together are defined by human experts. Together, these are known as the knowledge base.

The major market segments in the hardware category are Lisp machines, vision systems and robotics. The last two are relatively self-explanatory. Lisp machines are general-purpose computers that are optimized to run the Lisp programming language, the dominant programming language of AI research. Virtually all AI systems were originally developed in Lisp. As such, Lisp machines are excellent development environments for AI work, as well as delivery vehicles for the finished product.

Natural-language data base query is the first market into which AI products were introduced. Natural-language processing has been one of the classical components of AI research from its earliest days. It was an obvious first step to marry these techniques with existing DBMS technology.



AI Market Structure

In fact, the data base query environment provides a rather unique fit for the existing natural-language technology. Because the DBMS can act as an extensive dictionary of the words that appear in the data base, the natural-language processor has an easier task handling data base queries than it would in other applications, such as understanding newspaper articles.

The marriage with natural language is good from the data base point of view because data base systems have desperately been in need of a delivery vehicle to make the immense amount of data that is stored in today's data bases available to the decision makers for whom they were built. These decision makers do not know, nor do they want to learn, the formal query languages that come with data base systems. Since these managers already know English, natural-language technology provides this all-important delivery vehicle. An example of the differences between these two language types follows:

- *Formal Computer Language.* PRINT LNAME, 82-JUL-ACT-SALES, 82-JUL-EST-SALES, 82-JUL-ACT-SALES — 82-JUL-EST-SALES, (82-JUL-ACT-SALES — 82-JUL-EST-SALES) / 82-JUL-ACT-SALES, IF REGION=' NEW ENGLAND' AND 82-YTD-ACT-SALES < 82-QUOTA.
- *Natural Language.* I wonder how actual sales for last month compares to the forecast for people continue or punctuate.

  Under Quota in New England.

  Print a comparison of last name, 82-JUL-ACT-SALES and 82-JUL-EST-SALES of all sales people with region = Northeast & 82-YTD-ACT-% QUOTA < 100.00 .

  The number of records to be searched is 40.

Intellect

As of this writing, there is only one natural-language data base query product actually on the market — the Intellect system from Artificial Intelligence Corp. of Waltham, Mass. In addition, a number of other companies have either announced products or announced plans to build natural-language products: Cognitive Systems, Inc. of New Haven, Conn., which builds custom systems and interfaces to its advisory systems; Frey Associates of Amherst, N.H., which will run on DEC computers; Mathematica Products Group, Inc. of Princeton, N.J., which will interface with its Ramis; and Semantec of Sunnyvale, Calif., which will run on microcomputers.

The current installed base of natural-language query systems consists of the 150 copies of Intellect that have been installed, including versions of the product that have been installed under different trade names by OEMs. These include Cullinet Software, Inc., which markets Intellect as On-Line English, and Information Sciences, which markets Intellect

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SPERRY

as GRS-Exec. IBM markets versions of Intellect that interface with IBM software, SQL, Vsam and PGF, under the name Intellect.

In the next 18 months, you can expect to see a rapidly increasing number of installations of natural-language systems, due primarily to IBM's endorsement of the concept. The rush to introduce these products may compromise the true promise that natural-language systems can deliver. The result will be a few systems that will offer wider and wider functionality of data retrieval, analysis and reporting for the nontechnical end user.

Within the past year, a new use for natural-language technology has become important — the use of natural language as an integrator of other software tools within the information center. This allows nontechnical users to employ data base, graphics, modeling and statistical tools without having to become experts at using each individual system and without having to worry about how data is passed from one system to another.

In this environment, the user interacts with the natural-language component that partitions the work implied by the user's request among the various underlying software tools and then orchestrates the processing and transfer of data from one system to another until the user's request has been satisfied. This may mean taking data out of the human resources application files under the control of a DBMS, passing it through a statistical filter to summarize it and then passing the resulting data to a graphics system for final display of the result.

In this way, the user makes effective use of four software tools without necessarily even knowing it. This supervisory capability of natural language can leverage the use of the very powerful tools that already exist within the information center. Without this layer of integration, the user is forced to learn several command languages and transfer data across a number of different file formats. Since these tools are nearly always supported by different vendors, there is little consistency from one command language or file format to another. The result is that users end up making use of only one, or at most two, of the tools. The natural-language supervisor delivers the power of the available tools directly to the user.

Over time, more and more tools will fall under the natural-language umbrella, providing information center managers with the ability to customize a natural-language supervisory system for exactly those tools selected as best meeting the unique needs of their users.

Expert Systems

Expert systems simulate the problem-solving capability of human experts in a specific problem domain. For well-chosen problems, the effectiveness of knowledge-based systems can be extremely significant. DEC has stated that the Xcon system for configuration of VAX-11 computers has saved the company in excess of $10 million in its first year of operation. There are undoubtedly similar bottlenecks in almost every corporation that could benefit from this type of automation.

Unfortunately, there is an extreme shortage of "knowledge engineers" — people that construct these expert systems by interviewing human experts and encoding their expertise into the knowledge bases. The worldwide count of knowledge engineers is measured in the hundreds. For this reason, the construction of expert systems is done almost exclusively on a contract basis with a handful of companies that have a sufficient number of trained knowledge engineers.

The primary companies involved in this activity are Smart Systems Technology of McLean, Va., and Teknowledge of Palo Alto, Calif. Each of these companies has a staff of knowledge engineers with a track record of at least successfully building prototype expert systems. Teknowledge has, by far, the largest staff.

In addition, there are a number of start-up consulting companies being formed that claim to build expert systems. Unfortunately, the term "expert system" or even "knowledge-based system" is so loosely defined that it is hard to validate such claims. It is clearly a case in which the buyer must beware, and careful reference checking is strongly advised.

Other successful expert systems used commercially are Prospector from SRI International, which analyzes assay data to locate mineral deposits; Dendral from Stanford, which analyzes mass spectogram data to determine the molecular structure of organic compounds; and the dipmeter adviser of Schlumbeger-Doll, which analyzes oil well log data to determine the presence of the tools.

This segment of the expert system market involves companies specializing in single expert systems that will be of use to all the companies in a specific industry. The analogy to classical vertical applications such as inventory control systems or banking systems should be clear. For example, a company might be formed around an expert system such as DEC's Xcon and sell this capability not only to all the computer manufacturers, but to manufacturers of complex products in other industries.

There are no such vertical expert systems on the market today. However, there has been considerable talk about expert systems being built for the financial community. The likely companies to be involved in this market segment are Applied Expert Systems of Cambridge, Mass.; Cognitive Systems, Inc. of New Haven, Conn.; and Intelligenetics of Palo Alto, Calif.

In the next 18 months, you can expect a number of vertical applications that claim to be expert systems. Many vendors will feel that their existing payroll systems are experts at payroll, but only a few of

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these systems will include any of the AI technology that the name truly implies. But in a sense, it should not matter to the buyer. No one should buy an AI system simply because it contains AI technology. If the AI component does not offer some immediately evident advantages over classical systems, then it does not deserve to be selected.

In addition, there will emerge a handful of true AI-based expert systems that should receive rapid market acceptance once they become sufficiently "bullet-proof" to be cost-effectively installed in a variety of different companies. This process could easily take a couple of years, even after the prototype is complete. For this reason, there will only be a small number of expert-system products in mass distribution in the near future.

Some estimates of the number of trained knowledge engineers put the number at less than 100 in the entire country. Whatever the exact number is, it is clear that it is the limiting factor to the widespread proliferation of expert systems. The expert-systems tools market segment is meant to address this knowledge engineer bottleneck by providing tools to enable companies to build expert system applications with their own personnel.

Essentially, the tools consist of a knowledge-based editor for building and maintaining the knowledge base and an inferencing mechanism for applying the rules. This is the basic shell of an expert system. With several weeks of training, it is hoped that experienced DP personnel would be able to build expert-systems applications with proper use of the tools. The difficult part of the work that remains is the capture and codification of the human expert's knowledge and heuristics in a rule-based form so that the inferencing mechanism can solve problems.

The success of applications built in this way with the standard tools remains to be seen. It seems likely that several types of applications that are of relatively low complexity will be successfully addressed by these tools. Since the financial pay-back is not directly related to the complexity of a problem, some of the applications could have a very large financial impact on the organization. Over time, as the tools and the in-house experience improve, more and more taxing applications will be addressed.

Requirements Distinctions

There is an interesting distinction between the hardware requirements for using the tools to build the expert system and the hardware required to run the production systems. Efficient creation of the application may well require a mainframe or a dedicated high-end Lisp machine. On the other hand, once the application is complete, it may very well be possible to distribute the expert system on a personal computer.

In the near future, a handful of vendors offering tools for expert systems development will emerge. At this point in time, Software Architecture and Engineering, Inc. of Arlington, Va., and Teknowledge have announced plans to provide such a capability.

The Lisp programming language has been the language of choice for AI research for the past 20 years. The AI research centers at MIT, Stanford and Carnegie-Mellon University performed their work almost solely in Lisp in a time-sharing environment on DEC machines. In the late '70s, MIT began developing special-purpose hardware to execute the Lisp language. The result is a high-performance, single-user workstation for Lisp program development. Typically, Lisp machines include high-resolution bit-map graphics and sophisticated mouse-controlled window environments.

The market for Lisp machines is currently for AI research and development centers, but will spread to other environments as applications built to run on the Lisp machines reach the marketplace.

There are currently three companies actively marketing Lisp machine hardware: Lisp Machines, Inc. of Culver City, Calif.; Symbolics, Inc. of Cambridge, Mass.; and Xerox Special Information Systems of Pasadena, Calif.

Another area of AI-based hardware is in vision systems, used mainly for manufacturing quality control. Using AI image-processing techniques, these systems can analyze parts coming down the assembly line and decide whether to accept or reject them. These products tie into the more general area of industrial robots. The vision system can be programmed to interface with a variety of different manipulators to carry out more sophisticated assembly tasks.

The companies currently offering products in this area are Automatix of Burlington, Mass., and Machine Intelligence Corp. of Sunnyvale, Calif. In the next year and a half, we can expect to see more sophisticated vision systems for industrial robots and, perhaps, see some of the AI strategy and planning techniques applied to some of the nonindustrial robots.

The emerging field of commercial artificial intelligence promises a number of exciting entrees into areas that could not, until now, be successfully automated. These new capabilities will undoubtedly have a profound impact on the existing hardware and software markets. The structure of the AI marketplace is defined, and there are a few early entrants in the field. The real impact will be felt as the more established vendors begin integrating AI capability within their existing product lines. In many cases, this has already happened. This process will accelerate as the competitive advantages of AI capabilities become more evident in the marketplace. Thus, the stage is set for AI to take us into what *Business Week* calls "the second computer age."□

Harris is president of Artificial Intelligence Corp. in Waltham, Mass.

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STRAIGHT TALK

By Carol Shulman

If you're thinking of acquiring a fourth-generation language, it is probably because you need to reduce dependence on expensive programming expertise, put programming power directly into the hands of end users or reduce the proportion of the budget allocated to maintenance.

These are noble, worthwhile goals, and a fourth-generation language can certainly help achieve them, but the path to using these tools is an obstacle course strewn with pitfalls.

The term "fourth-generation language" has become a buzz phrase. Almost every software vendor claims to offer one. Even the process of identifying which products to evaluate has become a challenge.

The variety of capabilities of these products is

immense, ranging from stand-alone, special-purpose tools to fully integrated products based on data base management systems (DBMS). While buyers have little time to investigate the plethora of products before formulating their requirements, they must be careful not to miss valuable features simply because they don't know they exist.

When evaluating fourth-generation languages, there are four dimensions to consider in deciding how to utilize such a system:

- Who will use it: DP technicians or end users?
- Will it be used to build production applications or to satisfy ad hoc needs?
- Are applications model-oriented or record oriented?
- Will fourth-generation language products be used on a mainframe, micro or both?

Technicians vs. End Users. There's no need to belabor the obvious importance of this axiom. Suffice it to say that technicians want powerful functionality and will tolerate a less friendly interface to achieve it. Technicians are also well accustomed to procedural languages. End users, by contrast, perform fairly simple tasks. They would rather ask "what" rather than "how" and want the language interface to be as straightforward as possible. Fortunately, most vendors are explicit about the target audience for their product.

Production vs. Ad Hoc Applications. Many fourth-generation languages use more computer resources than standard languages such as Cobol. While this may be fine for a one-time, infrequent or short-lived application, especially if it cuts implementation time by a factor of 10, it may be a problem for production applications requiring heavy throughput or rapid response time. Fortunately, there are fourth-generation languages with Cobol-like operating efficiency.

Model vs. Record Orientation. Modeling is an effective solution for many decision-making problems in finance, marketing and planning. A model typically performs sophisticated operations on a relatively small set of data that is matrix-oriented, usually time-dependent, often a low-volume summary of production data and can be somewhat less current than the production data from which it is drawn.

Fourth-generation languages that support this type of use emphasize rapid construction of a model, provision of statistical and financial routines commonly required for modeling and "what if," goal seeking and simulation capabilities. They often provide only rudimentary facilities for interactive data entry, validation, maintenance and retrieval. Usually, they require the user to describe and store data as a matrix, with time being one matrix dimension. IFPS from Execucom Systems Corp.; Express from Management Decision Systems, Inc.; and Visicorp's Visicalc are well-known members of this genre.

Record-oriented applications, by contrast, typically involve fairly simple operations on a more voluminous set of data. Usually, this data is instance-oriented (one record/instance). It often requires production-system-level detail and may be drawn from several distinct physical files. Production data often has a natural structure that is not easily represented as a single, two-dimensional matrix.

Record-oriented fourth-generation languages usually provide more extensive data entry, validation, maintenance and retrieval capabilities and are far less constrained in the data structures they support. Often, they have much less sophisticated mathematical operators and functions than modeling tools, but more sophisticated sorting, selection and reporting capabilities.

Information Builders, Inc.'s Focus; Nomad, a product from National CSS, Inc., a subsidiary of Dun & Bradstreet; and Ramis, from Mathematica Products Group, Inc., are popular record-oriented fourth-generation languages.

Micro vs. Mainframe. Micros are penetrating the business market. Since most of them are purchased for end users, not technicians, a good fourth-generation language can dramatically increase their usability. While there are far fewer fourth-generation languages for micros than mainframes, they do exist. Some of them operate almost identically on both a mainframe and a micro. Such integration is one of the major trends in fourth-generation language development, for example, IFPS or System W from Comshare, Inc.

Many fourth-generation languages use more computer resources than standard languages such as Cobol. While this may be fine for a one-time, infrequent or short-lived application . . . it may be a problem for production applications requiring heavy throughput or rapid response time.

Until recently, all model-based systems were founded on two-dimensional data structures, one of which was usually time. This structure is adequate for many spreadsheet applications, especially when detailed data is not readily available.

However, as the quantity and detail of data available to the model builder increases — as it has in the past decade due to widespread penetration of computer-based record keeping — n-dimensional (a model consisting of more than two dimensions) capability becomes more and more useful. System W may be the first fourth-generation language to support n-dimensional modeling.

Model-based tools fit well with the following types of applications:

- *Financial Modeling* (pro-forma statement generation, cash

planning, capital budgeting and other spreadsheet-oriented systems).

- *Marketing Analyses* (advertising analysis, product-line sales analysis, buyer-behavior modeling and sales forecasting).
- *Business Planning* (econometric modeling).

Among record-oriented products, a trade-off must often be made between ease of use and execution efficiency, although this distinction is blurring. Still, many tools that yield Cobol-like operating efficiency are procedural and somewhat less friendly than their end-user oriented, nonprocedural, but less efficient counterparts.

Record-oriented fourth-generation languages usually provide more extensive data entry, validation, maintenance and retrieval capabilities and are far less constrained in the data structures they support.

This trade-off tends to mean that the more machine-efficient products are best used by programmers as substitutes for Cobol and other formal languages and for creating production applications. The friendly tools are more appropriate for end users to satisfy ad hoc needs without any programming at all. However, before accepting this standard division of labor, it is important to consider the following points:

- People are getting progressively more expensive than hardware. End-user-oriented tools may reduce programming and maintenance time enough to make the labor savings worth the extra machine cost for some production applications created by technicians.
- Great strides have been made in achieving machine efficiency and high ease of use in a single package. Particularly promising are application generators that automatically generate code with the efficiency of Cobol from high-level, nonprocedural, language-independent specifications.

To understand the total savings fully, any fourth-generation language should be evaluated for its impact on both human resource costs for development and maintenance and machine operating costs.

Most systems for end users are query-oriented. They differ primarily in the complexity of their functionality. Simple query tools tend to:

- Restrict inquiry to one record type at a time.
- Have limited data entry and update facilities.
- Have limited calculation power (they are limited to minimum, maximum, average, sum and so forth).
- Have limited control over output formats.

By contrast, the complex query systems often permit inquiry across several record types, with complex selection criteria. In the best products, the navigation from type to type is transparent to the user.

These products have sophisticated data entry and update facilities, including the ability to use files maintained outside the product's auspices; have calculation power approaching a modeling tool, with built-in statistical and financial routines; and include both a default, a simple display mechanism, a full-fledged, flexible report writer and graphics capability.

Of course, increased sophistication has a price. The complex packages cost more and are harder to learn.

Both kinds of tools are usually nonprocedural, that is, the user specifies what is desired, not how to produce it. They are usually interpretive, rather than compiled. These two factors account for their machine inefficiency relative to production-oriented systems.

Production-oriented tools are often procedural and usually produce compiled code. Many of these fourth-generation languages are outgrowths of DBMS products that began life as host-language calls (interfaces). Later, a higher level, self-contained language was added to improve programmer productivity.

Many entries in this category have expanded further, adding ad hoc inquiry, modeling capability and graphics output. Each of these features is available for separate purchase but integrate fully with other products to form a "suite" centered around the original DBMS.

Because they began life as DBMS, products in this category are stronger in data entry, validation and maintenance than those in any other category. They have the features automatically expected in a DBMS, such as the ability to define subschemas, specify security, provide for logging, restart and recovery and so forth.

Stand-alone application generators are non-DBMS, production-oriented products. They can usually operate against a number of file structures, that is, those they build themselves, Isam, Vsam, IMS data bases and others. They often generate Cobol or other language code that may then be modified as desired, compiled and loaded.

These products are often screen-oriented. An application is viewed as a menu, and each menu entry has an associated screen that is specified by actually drawing it on the screen. Nonprocedural information is added, such as field security, validation and derivation algorithms, and finally, any procedures associated with the screen, such as file retrieval or writing, are added.

The fourth-generation language automatically codes programs to present menus, parse and route user selections, call up and fill in screens and perform associated processing. Examples in this class include Mark V from Informatics General Corp. and Programmer from Pansophic Systems, Inc.

Several DBMS-based suites have

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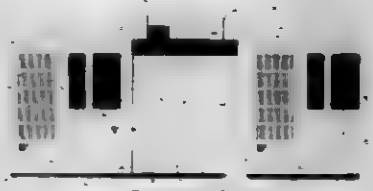

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recently incorporated application generators that produce code compatible with the DBMS component of the product family. This facility is intended to further improve technician productivity in creating and maintaining production data base applications. Examples include Ideal from Applied Data Research, Inc. and Natural from Software AG.

Here are the important trends in fourth-generation languages:

- Movement away from simple query toward complex query.
- Increased emphasis on interactive applications.
- Movement away from standalone, single-purpose tools toward integrated, multifunction packages.
- Increased ability to access many kinds of files.
- Increased operating efficiency without sacrificing ease of use.
- Provision of compatible products on both mainframes and micros.
- Increased emphasis on nonprocedural languages.
- Integration with word processing.
- Increased emphasis on use by nonprogrammers.

Any specific product is likely to be ahead in some of these capabilities and behind in others. This suggests that buyers investigate a vendor's enhancement history to plan part of their selection process.

There is no set answer, but the following list of features should be considered in addition to those already discussed.

1. Operating Environment. What hardware will it run on? Under what operating system? What are the core requirements? Is batch and/or interactive execution needed? (Hint: Don't buy a batch-only product.) What devices will it support? (Hint: Full-screen and graphics support are usually desirable.) How efficient will it be in execution?

2. Interfaces. Can the fourth-generation language call routines in other languages? Can other languages call the fourth-generation language? Can it access external files? (This is a must if it is to be used against existing data.) Can it access files maintained by your DBMS?

3. Data Structures. How does the user see the data: as a hierarchy, network, series of tables/files or a matrix? Is navigation automatic? What about the physical structure? What types of access (such as sequential, indexed) are supported? What data types are supported? How easy is it to reorganize data without changing programs? Will it support textual data, such as memos or reports? Can new structures be created dynamically?

4. I/O. What data entry, validation and derivation facilities are supported? Are default reports provided? A true report writer? Graphics? Textual formatting? Complex or simple queries? Automatic data base navigation?

5. Analysis Support. How complex can sorting and selection be? What functions are built-in? Statistical? Financial? Simulation?

6. Procedure Support. Can the user define procedures for repeated execution? Can these be parameter-driven? What logic control is provided — such as if-then-else, while-do? Can menus be defined? Screens? Are procedures interpreted or compiled?

7. Human Factors. Who is the intended user? What skills are presumed? What is the learning curve? Does it provide both novice and expert modes? How good is the documentation, including Help and error messages? Is the interface via commands, menus, English-like or mnemonic? Is the syntax consistent, including abbreviation rules? Is it procedural (how) or nonprocedural (what)? How well do these features match the user population? What magnitude of productivity increase has it proven to provide? (Do not underestimate the importance of good human factors in the success of fourth-generation languages.)

8. Vendor Credentials. What support is provided? How many are installed? What is the vendor's record on enhancements — does the company keep up with the times? Will it be there next year? In five years?

Although this list is by no means complete, it should be a caveat that there is a lot to consider before buying.□

Shulman is director of marketing for Database Design, Inc., a consulting, education and software firm specializing in information resource management.

Staging The Micro To Mainframe Link

By John King III

None of the differences between personal computers and mainframes would have mattered if the personal computer had stayed where computer vendors originally thought it belonged — in the home. But spreadsheets were invented, and personal computers found their way to the desk tops of professionals and managers, making it inevitable that these disparate types of computers would have to be connected. Now it is generally believed that these two types of systems tems must not only be connected, but must also work together as part of a total system.

Mainframe computers are large, expensive and complex. The complexity is necessary to allow them to serve concurrently many tasks and users. Most manufacturers' computers — even individual computer families from a single manufacturer — support a unique family of end-user terminals with their own character codes, line protocols and physical interfaces. What standards that do exist are de facto only. Each operating system and application software package also has its own format for handling dialogues with end users at terminals.

When compared with large mainframes, personal computers are simple for one reason: They have been designed to support only one user. Designers did not have to follow any standards related to large mainframe computers. The result is a variety of new

microcomputer operating systems, new terminal/screen dialogues and new data base formats.

Distributed processing was a wonderful concept, but it has not yet achieved its full potential because of the lack of software products for integrating different types of computers into complete systems. With personal computers, the problem is further aggravated because original hardware and software concepts were not designed for interconnection. The truth is that most microcomputer vendors, both large and small firms, never viewed their systems as anything other than stand-alone systems.

Major vendors of personal computer products are scrambling to add hardware and software capabilities that will allow their personal computers to interact easily with large CPUs. This effort is now beginning to have a major impact on the market. IBM is following the lead of smaller, more independent vendors and giving the Personal Computer a range of communications abilities. The challenge will now be for independent vendors to keep up with IBM.

For instance, IBM recently announced the capability for the Personal Computer to emulate the 3278 and 3279 display stations. With a special adapter, the Personal Computer can attach via coaxial cable to an IBM 3274 cluster controller. Previously this type of adapter was available only from smaller companies such as TAC and CXI. IBM goes one step further and provides software for file transfer to and from a host CPU. Based on recent public statements by its executives, Apple Computer, Inc. is expected to make a similar 3278-type capability available for its personal computers in the near future.

Because an integrated system is what users need to develop, it is impossible to attack the problem from one end only. Mainframe software and personal computer software must be developed in tandem so that they work together to achieve the user's desires.

What are the various pieces of hardware or software that must be in place to allow such an integrated, distributed system? The first requirement is for a physical interconnection. This means that the host computer and the personal computer must both have the hardware for communications as well as the software to drive that hardware. The connection can be through a remote communications facility using serial interfaces, modems and terminal-emulation software in the personal computer. Alternatively, a local-area network could be used to interconnect several personal computers.

The hardware to allow connections between micros and mainframes is already available from a variety of vendors . There is also a plethora of local-area network products, and most vendors have boards that permit serial communications through external modems.

But the physical connection is the easy part. The difficulty lies in the communications software. Should the personal computer perform like a simple Ascii glass teletype or like an IBM 3270? Should it perform like another manufacturer's terminal, or should it look like a large-size computer? At first you would think that you would want to make the personal computer look like a standard terminal. But the difficulty that this can lead to is that most terminals do not have the ability to receive or send data files to the computer; they are simply for the entry or display of data. They are not intended for storage. So emulating a particular terminal allows a micro no more capability by itself then it would have with any particular terminal.

After conquering the communications software issue, the third major requirement is for application-to-application software. This type of software is only now coming onto the market and represents a huge opportunity for the future. It consists of, for example, the ability to move information from the host data base management system (DBMS) on inventory to an application in the personal computer, such as word processing or spreadsheet. Some short-term solutions are very product- or application-specific. The long-term need is for more general packages that will be available for a wide range of host computers as well as personal computers.

The first software products coming to market in this area are either from those vendors whose software supports large CPU data bases or from other vendors wishing to tap into those host CPU data bases through personal computers. Visicorp, the company responsible for marketing Visicalc as well as other software packages for personal computers, has announced that it will offer personal computer software that will tie in very closely with the Mark IV data base system from Informatics General Corp. and with data base products from Applied Data Research, Inc. Cullinet Software, Inc. has announced that it will offer an IBM Personal Computer capability software package that will allow users to access data easily from their host DBMS. Other such relationships have been formed between University Computing Corp., a manufacuter of IBM mainframe software products, and Context Management Systems, Inc. for their Context MBA package for the IBM Personal Computer; and between McCormack & Dodge Corp. and Lotus Development Corp.

Many large organizations have had to develop their own software for personal computers that allows data displayed in terminal mode to be captured by a personal computer. Some of these programs include editors which allow selective capture of rows or columns of items and converting them to Visicalc-type files inside the personal computer's data base.

Despite this initial progress, to date no products have been introduced that allow easy, generalized access to IBM data bases such as IMS (DL/1) or the new DB2. Such

products are expected to be on the market soon from a variety of vendors — both IBM and independents. It is even thought that some of these will be compatible with IBM's query languages such as Query-By-Example and SQL.

The long-term solution to easy connection of personal computers to mainframes will not be through a wide diversity of software programs. Rather, it will be through the development of standards that will apply to products from a wide variety of hardware and software vendors. IBM has begun to push for acceptance of its new Document Interchange Architecture (DIA) and its Document Content Architecture (DCA) as standards that can be used throughout the computer industry. Regardless of how they are perceived from a technical point of view, it is highly likely that they will become every bit as much a fabric of the industry as has IBM's Systems Network Architecture. DIA and DCA are already being used in the implementation of software for some of IBM's Personal Computer products. These architectures will become standards for people writing software for IBM computers and, eventually, for other computers as well.

DIA is used as the common language and methodology for information exchange in IBM office systems. Displaywriters can easily transfer documents to the IBM 8100 running DOSF and onto the host CPU running the Distributed Office Support System (Disoss). This allows the document then to be displayed on a 3270.

IBM recently announced that Profs will have the capability to exchange text documents with the Displaywriter some time next year. Also, IBM recently released a statement of direction which demonstrated its intent to make office-oriented software for the System/38 compatible with both DIA and DCA. Unfortunately some older office systems such as ATMS may not be made DIA/DCA compatible in the near future, if ever.

Already, independent vendors are establishing their own protocols. Because so much communications on today's personal computers is done using the asynchronous Ascii terminal protocols, this has been used as the basis of the Microcom Network Protocol (MNP) from Microcom, Inc. This protocol is already supported by GTE Telenet Communications Corp., Apple and Visicorp. MNP is a generalized file transfer protocol, providing complete error checking even in asynchronous mode, that can allow transfer of data among diverse personal computers as well as personal computers and mainframes. While it remains to be seen how successful MNP will be, it has already attracted at least one imitator, Data Systems of Baton Rouge's Blocked Asynchronous Transfer protocol, or Blast.

What does a prospective user of a personal computer have to look for in order to hook up successfully to a mainframe? The need for the compatible terminal type as well as compatible software has already been mentioned. Just as important is the cooperation of the people running the mainframe computer operation. Because such computers are often run full-time with existing applications, the information center has been created in many organizations to support end-user computing. While some information center managers have tried to stifle the use of personal computers by supporting only terminals, there is a definite trend toward having full support for personal computers. This usually means that the information center staff is responsible for providing the software for the micros that will allow easy access to the data stored on the mainframes.

Another area that is receiving increasing attention is security. Movies and television have demonstrated that personal computers can be used to gain access to mainframe computers. Most software programs that run on host computers have very rudimentary security checking because designers did not anticipate how easily their systems could be broken into. Since microcomputers make it easier to crack large systems, it is anticipated that enhanced security will be required on virtually all large mainframe systems, and even some personal-computer-based data systems.

When information access is discussed it is usually from the perspective of downloading data from the mainframe to the personal computer. Normally, this will be the usual direction of data flow. However, there are applications that require uploading to the mainframe. The resolution to this problem will be to move the editing function from the mainframe to the personal computer — again, a solution that is now only beginning to be explored.

A related situation involves the proliferation of personal computers beyond the office environment — to the home and locations where portable systems can be used. This presents three additional problems to the typical computer operation. First, there are not enough dial-up facilities provided by most data communications operations. In most IBM shops, the preponderance of terminals are on dedicated lines. Secondly, security on dial-up facilities is inadequate for many sensitive applications. Finally, the diversity of personal computers, particularly portables, will require multiple versions of the cooperative software that runs in these systems. This is a costly situation and will be remedied only when particular personal computers become standard or when standard architecture is widely accepted.□

King is a vice-president with The DMW Group, Inc., a consulting group specializing in telecommunications and management information systems, located in Carmel, Calif.

Direction For The Information Age

Decision support systems (DSS) have been around for a decade, but the proliferation of microcomputers and their interfacing with mainframes have only recently popularized this approach to end-user computing.

Some advocates claim that the concepts of DSS and the software tools falling under that product category are finally delivering the early promises of management information systems by directly addressing management's need to become more effective rather than concentrating on further administrative cost efficiencies.

By Warren G. Briggs

Originally, DSS was a term used to identify software applications that supported less structured management decision-making activities. The term was used to play up the difference between this purpose and the use of computers for automating well-structured clerical and administrative tasks — the traditional data processing functions of payroll, accounting, inventory records and so on.

This growing acceptance of DSS is beginning to modify the early definition of decision support tools as the functionality of the software expands and as vendors discover the marketability of products categorized as decision support systems. Some functions and applications of these products are really not full decision support systems, but simply enable managers to browse easily into corporate as well as external data bases to discover emerging opportunities or problems or to be assured that all is under control.

The widely reported systems used by the chief executives of

Northwest Industries and Merrill Lynch, Pierce, Fenner and Smith are largely utilized for flexible online access to operational data several levels down into the organization — thus eliminating the delays and filters of traditional reporting systems. While these are huge systems, they rarely directly "support decisions," and might better be called "executive information systems." At the other extreme, the microcomputer spreadsheet packages, of which over a million have been sold at under $500 each, are hardly "systems" and are used by lower-level managers. Nonetheless, the simplicity and pervasiveness of these tools, and their recent interfacing with data bases make micro-spreadsheets the driving force of DSS applications.

DSS Software Functions

The spectrum of functions generally attributed to DSS-type software tools is summarized on page 29. Some DSS software tools provide many, or even all, of the functions listed, though perhaps at a cost in price, complexity and equipment requirements that exceed the benefits for some applications. Examples of comprehensive products include Express from Management Decision Systems, Inc.; Xsim from Chase Econometrics/Interactive Data Corp. (CE/IDC); Strategem from Integrated Planning, Inc.; and EIS from Boeing Computer Services Co. Other products originally noted for functions outside the DSS spectrum have had features and interfaces added so that they were able to compete in this marketplace. Examples include SAS Institute, Inc.'s statistical analysis system, Cullinet Software, Inc.'s data base management system and several data inquiry languages such as Information Builders, Inc.'s Focus, Mathematica Products Group, Inc.'s Ramis and Dun & Bradstreet Computing Services' Nomad.

The end-user orientation is a feature common to all decision support applications. This implies ease of use, responsiveness and self-documentation, which is not expected of mainline data processing software products. While there are obvious advantages of combining many functions into a single package, the unique power of more specialized packages is a trade-off that must be considered by the end user. For example, many of the newer spreadsheet packages include data manipulation, graphics and even word processing functions, but rarely deliver the performance of packages dedicated to those functions.

As recently as a year ago DSS software tools were segregated by whether they operated in the microcomputer or mainframe environment. However, dramatic and continuing cost-performance improvements and associated marketing thrusts have made the personal computer a distributed processing tool for accessing a variety of mainframe-linked information resources both contained within the corporate information structure and available from public services.

Access to Public Data: The most commonly available micro-mainframe interface involving DSS-type software products is the downloading of data from time-shared vendor sources into micro-based analysis and display packages. For example, CE/IDC offers the Financial Exchange package, which downloads data from its mainframe into a Microsoft Corp. Multiplan or Visicorp Visicalc microcomputer spreadsheet format. While this interface product is a simple and inexpensive supplement to well-known spreadsheet packages, users must have authorized access as subscribers to the CE/IDC financial and economic data.

Data Resources, Inc. (DRI) provides similar interfaces to microcomputer spreadsheets with two products, one directed towards more intensive users and one towards less intensive users. The former might use the DRI Link package and service to download data or the results of a mainframe program analysis into a Supercomp-20 spreadsheet package from Access Technology, Inc. for use on a supermicro. The less intensive user can access the DRI files with Visicorp's Visilink package, downloading so-called Datakits of information into a Visicalc format. Boeing Computer Services also provides a micro interface to their time-shared EIS modeling system and data banks.

Each of these products demonstrates the systematic and efficient distribution of the DSS functions between the micro and the mainframe. The micro serves as a terminal, while efficiently recalculating and displaying the consequences of repetitive "What if?" queries and other unstructured analyses typical of DSS user applications. Furthermore, the micro does these tasks at no incremental charge, with user-friendly software and the self-control, security and responsiveness features of a detached micro. Meanwhile, the mainframe does its part of the distributed functions through efficient large-scale, professionally updated data storage and powerful time-sharing packages for occasional use in financial modeling or statistical analysis calculations that are beyond the micro's capability.

Access to Private Data: Data downloading from an organization's transaction processing and accounting records often meets with important administrative as well as technical complications. For example, at a major bank noted for its progressive management and computer sophistication, the accounting department firmly denies access to all transaction and customer files, arguing that its responsibility for secure bookkeeping and customer privacy precludes any direct access for DSS-type applications, however useful or high-level such applications might be. Such an attitude is no doubt reaffirmed by recent press reports on the exploits by online hackers.

A product in development by Cullinet Software addresses the ad-

ministrative as well as technical interface to corporate records. Its Information Database package will extract and aggregate preauthorized items from a mainframe data base and provide for a buffered downloading to micro spreadsheet and analysis packages. The corporate data administrator can thereby establish and monitor which DSS end users can access which items.

Several leading vendors of mainframe-based DSS software have recently introduced microcomputer subsets of their products to address this demand for distributed functionality. Notable examples include Micro FCS and FCS-EPS from EPS, Inc.; and Interactive Financial Planning System (IFPS) and Micro/IFPS from Execucom Systems Corp.; Micro-Model and Model from Lloyd Bush Associates; Micro W and System W from Comshare, Inc.; and Microforesight and Foresight from Information Systems of America, Inc. Still other leading software vendors have developed versions of their mainframe product for the more powerful supermicrocomputers. Examples of this approach include Express from Management Decision Systems, Inc.; Strategem from Integrated Planning; and Cuffs from Cuffs Planning & Models, Ltd. These supermicro versions provide a less expensive way to introduce applications and service less complex requirements, while enabling growth as necessary to the full package through time-sharing or a corporate network to a mainframe.

Another trend, less obvious in the software products themselves than in how they are acquired and administered, is the integration of various computer-based activities into the institutional information resource. Data processing, office automation, telecommunications and DSS are being consolidated and coordinated at senior executive levels in many progressive organizations. This structural shift reflects the technical maturity of these activities, as well as their increasing importance to the organization. The challenge is to achieve the efficiencies of this consolidation without destroying the initiative which has enabled innovative applications using DSS tools.

A critical initial step in the evaluation and selection of any software product is a realistic and thorough assessment of current and potential end user needs. The nature of DSS applications complicates this process since these needs are much more difficult to define and anticipate than are typical data processing applications. Also, the skills, attitudes and expectations of the end users are critical to the software product evaluation. For example, a payroll, order entry or inventory control software project may indeed be large and complex, yet the inputs, processing and outputs are quite definable within reasonable ranges of predictability.

On the other hand, with DSS applications it is difficult to estimate how much ad hoc data inquiry, spreadsheet analysis, and reiterative graphics display end users will consume. Effective DSS applications inspire more questions — again in contrast to data processing applications where some end point is evident. DSS is obviously a supply-driven demand. If the results seem useful, resources are quickly exhausted, but (and just as important) a disappointing and oversold DSS application will be rejected and underutilized.

The coordination of end-user needs assessment is difficult in large organizations because of the obvious propensity for isolated requirements to be promptly satisfied with stand-alone microcomputer or time-sharing systems. Such initiative, often in spite of existing centralized controls on computer acquisition, has been important in demonstrating the value of DSS in its early stage. However, as decision support systems become involved in the corporate information structure and the potential costs and benefits escalate, a coordinated assessment process becomes essential. Much more is at stake in large organizations than simply a wrong choice among several microcomputer spreadsheet packages. At issue is the opportunity to enhance or to frustrate the productivity of key personnel whose daily cost exceeds the price of most micro packages.

Even worse than discovering a wrong choice among DSS software tools is the situation which sometimes arises when a successfully used system must eventually be replaced because it will be inadequate for future requirements. Again the contrast to data processing software changes is evident. If a payroll program, for example, needs to be replaced, only a few data processing and administrative professionals are involved, but with the replacement of a DSS tool the productivity of key managers is impacted.

One area which also requires critical thought when choosing a DSS is which executives to support. Before too much end-user demand is generated in this process, it is important to establish some criteria and priorities to help allocate the DSS resources. The critical success factor concept developed by Rockart and others at MIT has been useful in guiding large data processing project developments towards the highest payoffs. DSS applications have by now matured in some firms to the scale where it is worthwhile to concentrate on introducing these systems to the managers and professionals whose performance and productivity improvement are among the most critical to the organization.

This end-user needs assessment effort should result in at least a preliminary specification of what is needed and desired of a DSS software package for both immediate and eventual requirements. Answers to such questions as these should be sought:

- Which functions are essential or desirable?
- To what extent will DP experts support end users, as opposed to having end users developing their own skills with the

new package?

- What hardware resources are available? Is time-sharing a viable alternative? Are microcomputers and local-area networks emphasized?
- What special security and privacy issues may constrain data access and control?
- What data can and will be made available? Will there be administrative constraints? What will be the cost and value of vendor-supplied data, and will there be separately maintained records?
- What graphics are needed? What will be its function, for interactive analysis or presentation-quality reporting?
- What word processing and final-report formatting is needed?
- What types of financial modeling are desired? Spreadsheets or equations and financial or statistical functions? What about data access and manipulation; will downloading and consolidation capability be needed?
- Is compatibility needed with other vendors' software and hardware, such as external data bases, local data base management systems, micro networks, graphics, printers and plotters?

The next steps towards selecting an appropriate DSS software package include the development of prototype applications and comparative benchmark tests of computer resource requirements. No amount of vendor demonstrations can capture the realism of representative end users working with prototype implementation in their own environment. This exercise can shake out potential difficulties with end-user training, documentation, interfaces, and computer needs. It can also confirm or modify the end-user needs assessment, since with DSS-type "you really don't know what you want till you try it." Obviously vendors, consultants and in-house experts must participate in the prototype project, yet they must not obscure the end-user reactions. Eventually the experts must withdraw, and the product's ability to serve its users should be discovered early.

The development and running of typical benchmark applications are helpful for comparing some aspects of alternative DSS-type products, yet these tests are less useful criteria for end-user evaluation than they are for data processing software evaluation. In the payroll processing application mentioned earlier, the design of a benchmark test is quite straightforward and comparative results among competing packages can explain much of the relevant differences. By contrast, typical benchmark specifications are hard to prepare when end user needs are still evolving. Also, relative computer costs are a small part of the total comparison among alternative DSS packages. More relevant are harder to measure attributes such as user friendliness, flexibility, responsiveness, visual appeal and so forth.

A final step in this process is to look beyond the product itself to the health and attitude of the vendor. Obviously some excellent and innovative products come from new or obscure firms. But this is a risky as well as exciting industry, with hazards ahead even for those firms which are currently prosperous. A prosperous vendor is obviously more likely to continue providing modest cost updates and extensions to their product. Other advantages in choosing the best-sellers are that people skilled in using the product are more readily available, as are such supporting products as training seminars, textbooks and research publications. As with any rapidly growing industry, shakeouts and consolidations are beginning, and some innovative small software firms are joining established leaders. For example, Peachtree Software, Inc. is now part of Management Science America, Inc. and Mathematica Products Group, Inc. has been acquired by Martin Marietta Data Systems. Other entrepreneural products are being approved and marketed by large-systems firms, such as IBM and Digital Equipment Corp.'s microcomputer divisions.□

DSS Software Functions

- ***Data storage and retrieval:***
  - **Two, Three or More Dimensions**
- ***Data access from:***
  - **Local, Specially Prepared File**
  - **Public Data Sources**
  - **Time-shared Interface to DBMS**
- ***Data Analysis:***
  - **Tabular (Screen and Sort)**
  - **Graphic (Bar, Pie or Line Charts)**
  - **Statistical (Test Significant Relationships)**
- ***Modeling:***
  - **Spreadsheet Cells in Two Dimensions**
  - **Spreadsheet with Windows**
  - **Procedural or Nonprocedural Equations**
- ***Sensitivity Analysis:***
  - **Automated "What If?" Increments**
- **Risk Simulation, Monte Carlo**
- **Goal-Seeking Interactive Solutions**
- **Financial and Statistical Functions**
- **Optimization and Forecasting Algorithms**
- **Text Editing and Word Processing; Report and Graphics Generation**
- **Integration Among Above Characteristics**

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SPREADING THE WEALTH OF DBMS

By Shaku Atre

Vendors of data base management systems (DBMS) are sounding more like car dealers every year. They claim to have the best product that will fit any environment and do any type of processing. How does the DP executive wade through this morass of claims? Knowing the developing trends will help managers responsible for selecting DBMS products evaluate these systems. This article explains the major trends in DBMS — emerging data models, distributed data bases, data dictionaries, programming languages and applications developers, prepackaged applications software integrated with DBMS, report writers and ad hoc query facilities and product integration and so forth.

There are four major types of DBMS: hierarchical, network (Codasyl or non-Codasyl), inverted file and relational. These categories are not arbitrary, nor do they arise from vendor terminology. They describe the types of data models that a DBMS supports. A data model is a description of structural properties that define all entities represented in a data base and the relationships that exist among them.

The DBMS on the market today are neither purely hierarchical nor purely network, inverted file or relational; they are some combinations of these four types. Most of the DBMS that a buyer encounters have evolved over the years, and they have borrowed the features from each other's offerings. A DBMS is labeled as hierarchical or network when a large percentage of its architecture is based on a hierarchical or network data model. Although hierarchy is a subset of Codasyl-network architecture, the hierarchical DBMS are considered separately because of the eminent presence of IBM's IMS.

The inverted file is more of an implementation issue than an architecture. But there are some quite successful DBMS products that use this implementation feature as the basic architecture. As a result, they are also considered a separate category of software. Software AG's Adabas is an example of an inverted-file DBMS.

And then there is the relational category. It took about a decade after the advent of the relational model before relational systems became fashionable. Ironically, most DBMS have turned into relational products almost overnight.

It is important for buyers to familiarize themselves with features of relational systems so they can make educated evaluations of products. Many vendors claim they have relational DBMS products if they provide a table view of data. Many companies have incorporated relational-like features in their DBMS, with some vendors featuring more relational capabilities than others, but very few systems available today have pure relational designs.

Adabas, Cullinet Software, Inc.'s IDMS/R, Applied Data Research, Inc.'s (ADR) Datacom/DB and Computer Corp. of America's Mod-

el 204 all have relational features, but they are not wholly relational systems.

In a relational DBMS, the pointers are not stored with the data. The relational operators (for example, join, project and intersect) should be supported. In addition, relational systems must provide flexibility; the user should be able to add more attributes to a relation without affecting the other relations or existing applications.

There are two major classes of DBMS products available. One class consists of the products that hardware vendors market and support. The DBMS can be implemented only on the vendor's or on plug-compatible hardware. Users should avoid buying DBMS software simply because the hardware vendor offers the system. While many products from hardware vendors are good, these vendors may or may not have an interest in developing efficient software.

The other class consists of the products that independent software vendors market and support.

Vendors are moving towards providing a relational-type DBMS product. The announcement of IBM's DB2 has given relational systems a strong boost, just as the introduction of the IBM Personal Computer legitimized the micro. Other vendors will be spending more on research and development of their relational prototypes.

The performance of the relational DBMS leaves a lot to be desired when running on today's hardware. As a result, the vendors will have to provide a DBMS that will make use of all four data models and will support all views.

These views can be described as a layer cake. The bottom layer would consist of a network (Codasyl or non-Codasyl) with embedded pointers or of an inverted file without embedded pointers or a combination of both used for implementation. The second layer would provide a hierarchical view for applications programmers in the development center. The third layer would represent a relational or table view with a procedural language, and the top layer would be a fourth-generation, nonprocedural query language for end users of the information center.

IBM's IMS will continue to be a three-layered cake; that is, IMS will be implemented using a hierarchical view, but not with the network structure, although network structure enables the user to implement complete mappings more easily. The relational view will be supported by IBM's SQL. Query-by-Example (QBE) could be used for supporting the relational view, but it can also be implemented without IMS — the major drawback of QBE is its high resource usage. DB2 could also represent the top two layers.

The major benefit of implementing and using a DBMS is the interrelatability of data from different parts of an organization. But in some companies, the management and staff are not ready for "sharing." The DBMS of tomorrow is expanding its influence more and more on the user community. The successful DBMS will support the architecture depicted in the accompanying diagram on page 33.

The industry is moving toward a distributed data base environment. The major characteristic of a distributed data base environment is that it presents a "single-system image" to users. The central version of the data base will be stored on the mainframe, and individual parts, or "specific views" of the data base, will be downloaded onto microcomputers.

The "specific-view generator" would be transparent to users and could be a query type of interface. Users will be able to update the specific views using microcomputers, and these updates or changes will be batched and transferred to the central data base once, two times or a few times a day, depending on the urgency of updating data. The downloading capability will be supported by the DBMS.

What should the user do in order to be ready for this distributed environment? Distributed processing involves the distribution of data, functions, resources and responsibilities.

One solution is to design the data base so that it will be made up of many homogeneous modules that could be taken off and put together in assembly fashion. The specific-views concept would be difficult if this model was not used.

The DBMS could be implemented with specific views in an information center type of environment and with central views in a development center.

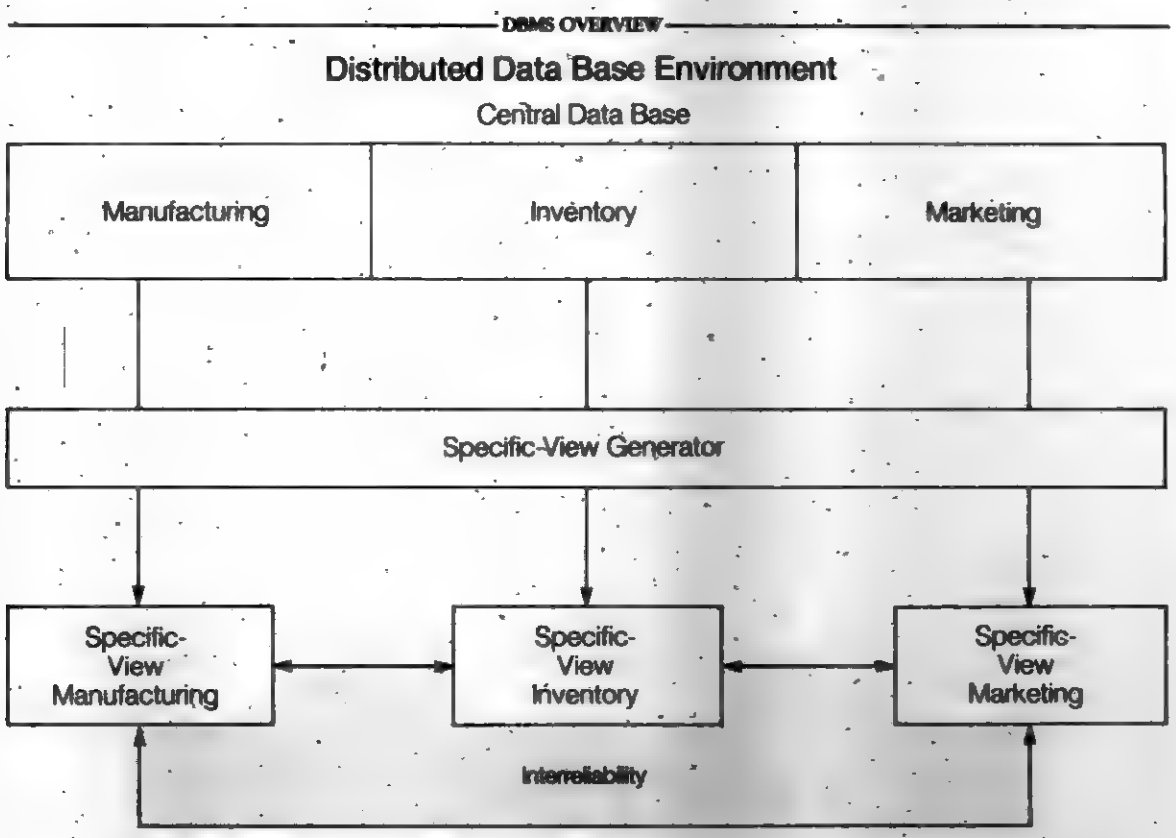
What are the implications of this trend? As relational systems and fourth-generation languages make the DBMS easier to access by users unfamiliar with data processing, microcomputers will play a greater part in the use of DBMS. Some recent software announcements are betting on that trend. Examples of these are IBM's DB2 with QMF and DXT, Cullinet's introduction of IDMS/R, Software AG's announcement of Natural 1.3 with relational operators and ADR's Ideal with relational operators.

Almost every DBMS vendor is jumping on the relational data model bandwagon, with vendors of Codasyl DBMS playing down their association with Codasyl.

The buyer should evaluate how much emphasis the vendor is expending on the marriage of micros and mainframes. The major winners on the micro side could be the IBM Personal Computer and its compatibles, Apple Computer, Inc.'s Lisa and Digital Equipment Corp.'s Professional Computer.

The buyer should try to determine:

- Does the vendor provide relational-like capability? If so, how will that be implemented?
- Is there any interface between the mainframe and micro? How is that implemented? What are the uploading and downloading capabilities?
- How can security be implemented; through physical, logical or encryption methods?
- Are there any prototypes or beta test sites already running?



Another major component of any DBMS product is the data dictionary. In a data base environment, one of the major objectives is the sharing of common data by multiple users. To realize the objectives of correct data, minimum redundancy and control of data usage, a centralized control mechanism is mandatory. The data dictionary is the primary means of satisfying these objectives. But the decision to acquire and to implement a data dictionary should not be taken lightly. The effective use of the data dictionary will probably require some organizational and procedural changes such as the addition of a person responsible for data dictionary or data base administration. Acquiring a data dictionary is a commitment, just as acquiring a DBMS is a commitment.

The software product is called a data dictionary. The data base created using the product also is called a data dictionary. The data dictionary stores such information about data as its origin, description, relationship to other data, usage, responsibility and format. It stores data about data. The data dictionary is a guide and contains "road maps" to the data base instead of raw data.

There are two types of data dictionary products: free-standing and integrated. A free-standing data dictionary package is a separate product in addition to the DBMS package, whereas an integrated data dictionary is a part of the DBMS product.

In the case of an integrated data dictionary, the data descriptions exist only once in the system, and the descriptions are stored in the data dictionary. In a free-standing data dictionary, an option exists whether the appropriate data descriptions will be retrieved from the data dictionary or supplied otherwise.

The characteristics of an ideal data dictionary system include:

- The data dictionary should be integrated with the DBMS. The evaluator should be very much concerned about the in-house developed bridges between the DBMS and nonintegrated data dictionary package.
- The data dictionary should support various versions of the documentation (for example, the test versions and the production version).
- The data dictionary should support the data base design process acatively.
- The data dictionary should support editing as well as integrity checking during production runs.
- The data dictionary should support on-line as well as batch processing.
- The data dictionary should have the capability of storing system as well as user-maintained information.
- The data dictionary should be

easy to use. It should have a feature for storing on-line transactions. The users should be able to initiate these transactions without having to remember procedural details.

- The data dictionary should be able to direct the data base processing activities to the proper destinations in distributed data base environments.
- Security and auditing features should be implementable with the help of the data dictionary.

There is a recent trend among suppliers of DBMS vendors toward having the dictionary as an integrator for all of the related software packages, including a query language processor, a teleprocessing monitor and applications development software, as well as support of the information center type of environment. Some examples are Cullinet's Integrated Data Dictionary (IDD), Software AG's Predict, ADR's Data Dictionary and Cincom Systems, Inc.'s Total Data Dictionary. However, some nonintegrated data dictionaries on the market do a good job. Examples of these are Data Manager from MSP, Inc., Data Catalogue from Synergistics Corp. and UCC Ten from University Computing Co.

IBM has not entered the arena of the integrated data dictionary wholeheartedly. It does not look as though IBM intends to integrate its IMS DB/DC dictionary with IMS in the true sense of integration. It remains to be seen whether in the next few years IBM will supply a data dictionary as microcode on 4300 and 30 series mainframes, as it has done with the System/38.

Although the industry has created a lot of hoopla about fourth-generation languages recently, it will be at least five years before there is a major investment in programs using these languages. That means programmers are most probably versed in the third generation rather than in the fourth; so in order to be able to create applications programs in the development center, the DBMS with a fourth-generation language would have to have an interface with Cobol.

The consumer should also investigate whether the vendor provides an applications development feature with the DBMS — not just for the batch world, but to be used in interactive mode for boosting the applications programmer's productivity. IBM is putting major emphasis on application development facility (ADF) for IMS, Cullinet is emphasizing ADS/On-line, Software AG is promoting Natural, ADR is marketing Ideal and Cincom is selling Mantis.

The major trend of the mid to late '80s will be prepackaged applications software that will have data integrated in the data bases, and this data will be able to be accessed via the DBMS. Of the DBMS vendors, Cullinet has already made a strong move into integrating a number of available applications systems with its IDMS data base system. A number of other DBMS vendors are working with the vendors of prepackaged software (for example, Software AG) to introduce DBMS-compatible versions of these products.

Any DBMS package that does not support a report writer or ad hoc query facility is doomed for failure. These facilities represent the decision support system or information center type of environment. The DBMS should directly interface with a report writer facility that allows users to select, retrieve and print data easily in an on-line mode. Output should optionally be directed either to a printer or to a terminal.

The ad hoc query capability should be available outside of the DP department for nonprogrammers, assuming proper security measures have been implemented. IBM's IMS contains a major hole in its product line when it comes to these facilities. QBE and SQL/DS tried to fill the void, but both require heavy resources. DB2 should run on MVS/XA as well as on VM/XA with QMF and DXT, but these products are said to be major resource hogs.

Intellect, marketed by Artificial Intelligence Corp. and by Cullinet as On-Line-English; Focus from Information Builders, Inc.; Ramis from Mathematica Products Group, Inc.; Software AG's Natural; and ADR's Ideal have varying degrees of user friendliness. Focus and Ramis seem to be quite successful.

The DBMS vendors will be emphasizing ad hoc query capability as well as the capability of developing prototypes before building the full-fledged system. With prototypes, users can see what system they are going to get and could recommend any changes early in the development phase.

The successful DBMS vendors will be integrating the following components (each piece charged for separately though) in the next two years:

- Data base manager.
- Teleprocessing monitor.
- Data dictionary.
- Report writer and fourth-generation query language.
- Applications development package.
- Auditing tools.
- Prepackaged software.
- Downloading and uploading capabilities between mainframe and micros.
- Graphics and statistical representation performed with micros.

As months pass, more and more publicly available data bases will be accessed and more and more novices will be using data bases on microcomputers. Without hesitation, it can be said that society will be more and more dependent on the data base technology.□

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PHOTO BY ED BRAVERMAN

Shaking Up The Uses Of Information

Today there are more than 100 products that claim to be data base management systems for microcomputers. Choosing the right system depends on the computer literacy of the end user. And price is not necessarily a good guide in the selection process.

By Gordon C. Everest

For most users of microcomputers, the data base management system (DBMS) is the most important piece of software acquired. The bad news is that it is very difficult to match various features from a bewildering array of choices to the particular needs of the buyer.

Whenever users need to keep files of data on a computer, they are foolish not to use a DBMS. A well-chosen DBMS can greatly reduce the cost of bringing data under control, of keeping it up to date and of developing data intensive applications systems. It can greatly increase the availability of information to those who need it, when they need it.

A DBMS provides a middle-of-the-road solution between acquiring an off-the-shelf applications package, which is often a heavily compromised solution to the user's needs, and building the system from scratch using some conventional programming language such as Basic or Pascal. For most users, writing their own programs is no longer a desirable alternative; it is too costly to build systems, takes too long to build them, and they are too inflexible once built.

The graduate school of management at the University of Minnesota has been surveying commercially available microcomputer DBMS for several years. The fourth edition of the survey will include more than 60

systems, all running on microcomputers. To be included in the survey, a system must cost under $25,000 for both hardware and software.

In the fall of 1980, 40 systems were identified, 70 in the spring of 1982, and today there are about 150 commercially available DBMS for micros. About 10 of these are no longer sold. With increasing rapidity, new and better systems are being brought to the marketplace, but new does not always mean better. The quality of available DBMS functions varies greatly.

There should really be nothing different about DBMS on microcomputers and DBMS on large mainframes. The needs of the users are the same, and all the required functions are the same. The main memory size of some microcomputers today equals the size of a memory partition available to the DBMS on most mainframes. What is different is the size of the files that can be created and the speed with which they can be processed.

Some mainframe or minicomputer DBMS vendors have already implemented their systems in microcomputers — IBM's Brads; Gemini Information Systems, Inc.'s DDQuery; Information Builders, Inc.'s Focus; Relational Technology, Inc.'s Ingres; Micro Data Base System, Inc.'s MDBS; Boeing Computer Services Co.'s Micro BCS-RIM; Oracle Corp.'s Oracle; and International Data Base Systems, Inc.'s Seed. All generally claim their systems to be functionally equivalent in the microcomputer versions.

Several vendors are currently hard at work developing interfaces between DBMS files on a host mainframe computer and a network of micros.

Making host computer data available to micros also has its drawbacks. Greater capability is needed to control access to private and confidential data. Furthermore, if local users are allowed to collect and enter data locally and update the central files, greater control and validation must be exercised to ensure data quality.

What is exciting about DBMS on microcomputers is the generally wider range of functions provided than is found on most mainframe products. Some systems available today include features such as high-level ad hoc query languages, powerful report generators, statistical and graphical output, data entry/display-screen management and menu handlers, even integrated with word processing and spreadsheet programs. The user is more in control of the data (and responsible for keeping it accurate and up to date).

Perhaps the greatest difference between mainframe and microcomputer DBMS stems from the assumed operating environment: The user of a microcomputer is inherently on-line. Most microcomputer software developers have paid much more attention to the screen interface, keeping the user appraised of what is happening, providing menus and Help screens and letting the user be more in control of the processing steps. It is expensive to redesign DBMS existing on large computers. Vendors are having a difficult time breaking out of the "batch processing syndrome." On-line products for use on the mainframe have only recently emerged — Cincom Systems, Inc.'s Mantis; IBM's DMS; Cullinet Software, Inc.'s Adds-Online; Software AG's Natural; and Sperry Corp.'s Mapper. The facilities of such systems are normal parts of many micro-based DBMS. In fact, a micro DBMS developer is sometimes better off never having known the big systems DBMS world. It is different to write a program knowing that the user is there every moment during execution.

When seeking a DBMS, the first step is to decide what type of user you are. At one extreme is the novice end user who needs a menu-driven system with screens for data entry, ad hoc query (by forms) and Helps, plus a comprehensive report generator. At the other extreme is the systems developer who needs a tool for building a turnkey system for a specific applications environment.

In between these two extremes is a command-driven system that always waits for the user to specify what he wants the system to do next. This implies that the user must first study the available commands before using the system. Generally, such a system will permit users to build up and to store sequences of command that can later be invoked from the command level or from within other command files. This allows the user to begin developing applications systems. In fact, with microcomputers, the distinction is increasingly fuzzy. The person at the terminal is at once the end user, the developer, the operator and the installation manager.

Many users who start out as novices soon become more sophisticated. They want to be able to prestore queries, report definitions and command sequences that they use over and over — perhaps they even want to set up something on the system for another novice user.

On the other hand, rarely should any consideration be given to writing any procedures in a conventional programming language such as Basic, Pascal or Cobol. Such languages, even augmented with a data manipulation language like that proposed by Codasyl, are low-level languages with respect to data processing. They require the user to navigate through a data structure, retrieving and processing one record at a time. Using languages at this level to build applications systems should be the last resort. On a microcomputer, it is not even acceptable to have exits to user-written code — such a facility is often an escape for the DBMS developer who did not do what he should have done in the first place.

Beyond the menu-driven interface, where the system controls the dialog, a good microcomputer DBMS will provide a high-level command language. A high-level

data language provides single commands that operate on the whole file at once, with the possibility of even operating on multiple files. Components of such a language select records from a file that satisfies a Boolean expression, projects named fields from those records, derives additional values for each of those retrieved records, presents the information from the records sorted, and with appropriate titles and headings, and calculates statistics (count, sum and so on) on certain fields for the whole file or at "control breaks." Commands should be available to invoke a user-defined or system default data entry/display screen or to generate a previously defined report.

Commands should be able to be given to the system for immediate execution or stored in a file for deferred execution. Such a command file can be treated like another command in the system. Also, a menu should be treated like another command, capable of being invoked as an immediate command or from within a command file. Likewise, taking a choice in a menu invokes another command or set of commands.

The above discussion is intended to provide a brief idea of what to look for in selecting a micro DBMS. A comprehensive DBMS providing menus for a novice user, a high-level command language for the more sophisticated user and facilities for the applications system developer is considerably more complex than a word processing system or a spreadsheet program. It is more difficult to design and build, and it is even more difficult to comprehend and use. Most word processors and spreadsheet programs are good to excellent. On the other hand, there are some pretty poor systems sold that purport to be DBMS.

The underlying simplicity of spreadsheet programs, like Visicorp's Visicalc and its clones — Microsoft Corp.'s Multiplan, Lotus Development Corp.'s Lotus 1-2-3 and Context Management Systems' Context MBA — may account for their predominance. This is also the case for word processing. It is easier to comprehend the underlying structure of the data or text and to conceptualize the operations on that structure.

One clear trend that is emerging is the increased integration of applications packages with DBMS. Lotus 1-2-3; Apple Computer, Inc.'s Lisa; and Epson America, Inc.'s QX-10 have integrated various parts of data base management, word processing, statistics, graphics, spreadsheets, financial modeling, time and project management and accounting. Visicorp's Vision and Micropro International Corp.'s Starburst provide mechanisms for integrating various software packages.

Is DBMS viable on microcomputers? Absolutely. This is evidenced by the large number of systems being offered for sale and actually being sold. Some vendors are reporting cumulative sales approaching 100,000 copies. Some systems on micros actually migrated from larger machines. The University of Minnesota has identified over 140 commercially available DBMS on microcomputers from Apple and Atari Corp. to supermicros based on Motorola, Inc.'s 68000 CPU. They range in price from being bundled in the price of the hardware to more than the cost of most micros.

Several factors could lead the buyer astray in choosing a system. First, price is no indication of a product's value. With the cost of selling one more copy being so low compared with the cost of development, the pricing of software is absolutely arbitrary.

Do not be misled by the reported number that has been sold. That is more a function of marketing than of technical excellence, ease of use or continued support. And the level of the marketing effort is often a function of which vendor was able to attract the most venture capital.

Beware of the premature announcement or the plans for a next version that will provide more functionality. Select a DBMS for what it is today. See it working on someone else's computer or as a demo, read the manual and try it out.

In order to pick the software and hardware properly, do some initial sizing of your needs. This means estimating file sizes to be stored on secondary storage or disk devices. Here are some guidelines:

- Floppy drives from 130K bytes to 170K bytes, such as on the Apple IIe, Atari or Commodore Business Systems, Inc. Commodore 64, will manage files with a few hundred average-size records, which is barely feasible for any serious records management.
- Lower capacity business micros with 350K-byte floppy drives, such as the IBM Personal Computer, Digital Equipment Corp. Rainbow, Osborne Computer Corp.'s Osborne I, and Texas Instruments, Inc.'s Professional Computer, as well as micros from Wang Laboratories, Inc., Televideo Systems, Inc., or Zenith Data Systems Corp., will manage files with several hundred to a few thousand records.
- Higher performance micros, such as Vector Graphic, Inc.'s Vector Graphic and Victor Technologies, Inc.'s Victor 9000, will handle files with several thousand records. Beyond this it is advisable to go to a hard disk system — for better speed on disk I/O as well as larger data capacity. Several of the better DBMS require hard disks for any practical and effective application, even though they may technically operate with dual floppies.

Most systems do a credible job of processing one flat file at a time in a single-user environment. However, look at your applications carefully. You may need to be able to process multiple files together. Such processing should not be available only in the command language (as it is only in Ashton-Tate's Dbase II and System Plus, Inc.'s FMS-80), but also in ad hoc query languages (for example, IBM's SQL and Oracle), report

writing and screens for data display and data entry.

The next significant jump in capability occurs when the system will let multiple users at different sites interrogate and update common data files. Such a capability is filled with pitfalls, and few do it well. Some vendors advertise that they do not need a central "file server." Unfortunately, without some locus of global intelligence within the system that services all requests to access data and manage locks, it is practically impossible to avoid a deadlock. Such systems simply pass the buck to the users. Two or more users in different rooms may be requesting data each other has and wait a long time before realizing that one of them must give up (be preempted) the data he is currently holding with lock on. Acquiring a local network with low-level record locking facilities is useless if the DBMS does not make use of that feature — something the multiuser label claims to do.

It is wise to look beyond the household names in DBMS. It is also wise to look beyond those that are heavily advertised or have purportedly sold thousands of copies. Look carefully at the features offered.

Some hardware vendors have (presumably) studied the available DBMS and recommend one or two for use on their systems. They may actually distribute the DBMS under an OEM arrangement with the vendor or may even provide it bundled in the price of the hardware. At least this means the software should work and perhaps be installed for the keyboard/screen codes on the hardware. It will probably be a good choice, but it may not be the best available system since such vendor arrangements are influenced by factors other than technical excellence. Of course, you must still be sure that it matches your needs.

A software publication recently surveyed readers and asked them to name specific software products they were using or planning to use. For micro DBMS, 40% (of the 110 respondents) said they were currently using Dbase II, with the next highest product in use garnering 7.3% of the respondents. In the coming year, 32.4% (of 108 respondents) were considering Dbase II; the next highest mentioned product getting 9.3%. When it comes to DBMS on micros, more people have bought or are considering Dbase II than any other product.

Although Dbase II may be popular, it will not necessarily meet the needs of corporate end users who have minimal knowledge of computer systems. This means that buyers should evaluate systems with their own environments in mind rather than be swayed by the popularity of a particular system.

So what are the strengths and weaknesses of Dbase II? It is a reasonably clean product, both in its design and its bug-free operation. Its usage mode is command driven only. It is possible to issue commands for immediate, ad hoc execution or to build them into a named command file and stored for later execution.

The serious Dbase II user should have a programmer's way of thinking about his task, since there are no menus to lead the user through the system. In fact, it is most distressing to the novice when upon loading the system, it presents him with a dot in Column 1, which means the system is asking "What do you want me to do for you today?"

The system lacks menus, a menu builder, Help screens, default data entry screens, access controls for security, a DATE type, a data item validation, subcounts or other statistics (except subtotals), sorting on more than one field at a time, error trapping from within a Dbase II program, a multiuser capability and derived items in the data definition. Of course, it is always possible for the user to write the low-level instructions to read the records one at a time from two files simultaneously and accomplish the desired processing. However, the purpose of a DBMS is to provide high-level facilities to enable faster system development and ad hoc data retrieval.

Once the DBMS is acquired, the real work has only just begun. You must study your information needs and design data files and major processes to meet those needs. The files must be formally defined in the DBMS. This may require adjusting your file design to fit best the architecture and limitations of the chosen DBMS. Next, you must collect the data and enter it into the computer system in machine-readable form (or transmit it from some other computer). Once the data is in the machine, you need to define output reports and user procedures in order for any special processing to be performed on the data files. All of this implies that people must take time to learn to use the system.

These activities all represent a very large investment of time and money — many times larger than the initial purchase price of the DBMS. The initial cost of the DBMS should be of no concern in deciding what to buy. The choice must be made wisely, assessing the subsequent impact on the user. The consequence of a poor selection costs much more than the few hundred dollars spent for a system. Anyone planning to make extensive use of a DBMS, in developing applications systems or training many users, is advised to seek outside expert help in making the selection decision. In this situation, the computer or retail store salesman is rarely able to give adequate advice.□

Everest is a professor of DBMS and management information systems in the Graduate School of Management at the University of Minnesota. He has published A Comparative Survey of DBMS on Microcomputers *and is a contributing author to the 1982 Codasyl Systems Committee report,* A Framework for Distributed Database Systems: Distribution Alternatives and Generic Architectures.

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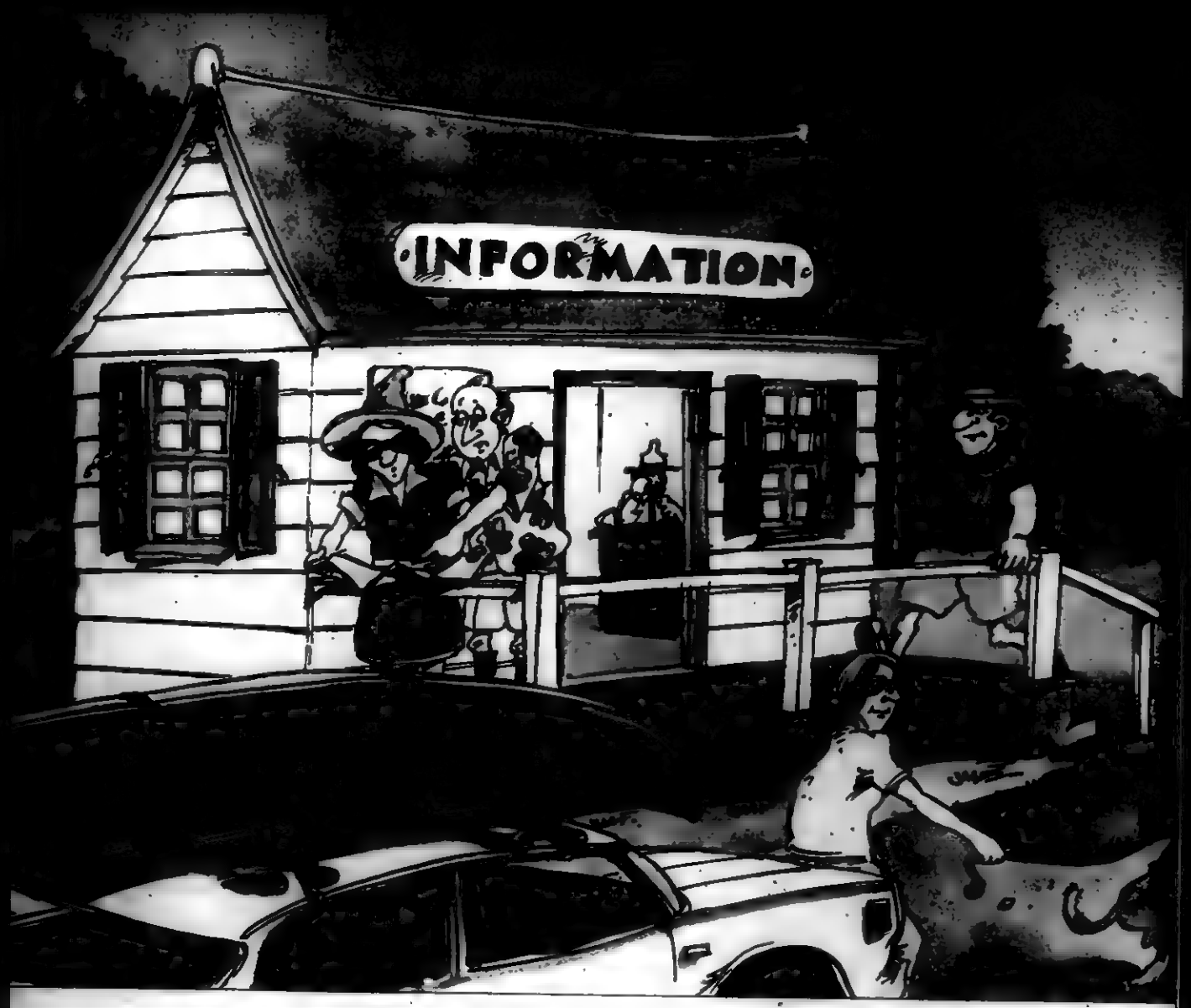

The Route To Information Access

The information center is becoming the gathering place for managers and professionals who want to use corporate data effectively. Although IBM laid the path for the creation of information centers, companies are finding new routes for delivering this service. This story is an overview of the current developments in information centers. The following story is a corporate view of the operation of one information center.

By Diane M. Flis

The Information Center, first introduced by IBM Canada in the mid-'70s, is evolving in new directions. While many DP sites instituted the information center concept using the IBM approach, many firms are enhancing the IBM model. The main functions of the information center are to facilitate end-user computer access, reduce programming backlog, educate management on the use of computers and to act as a liaison between the growing debate surrounding microcomputers vs. the mainframe. Today, one can find as many forms of the information center as there are corporations with them.

Simply stated, the information center was developed to supply computing power to end users on their terms. The purpose is to enable these users to access directly data and reports with a minimum of prior instruction. The IBM approach was to provide users with the software tools necessary to generate their own reports, manipulate and analyze data as well as modify existing reports. It appears that whatever form or structure the information center takes within a firm, its main objective is finding the best tools to solve a firm's business problems. The ability to provide quick responses to special information requests from users in a cost-effective manner, along with reducing the maintenance programming by DP, is a very desirable benefit. Just how successfully this has been accomplished depends on the organization and its methods of implementation.

ILLUSTRATION BY JON McINTOSH

Vincent T. Pica, first vice-president management information systems operations of E.F. Hutton & Co. in New York, felt that the traditional IBM concept of the Information Center "was not robust enough" for E.F. Hutton's needs. "Our users need a system that does more than retrieve files." E.F. Hutton is moving toward building a state-of-the-art system that it calls its Information Processing Laboratory (IPL). The IPL marries word processing, data processing, graphics and image processing applications. The IPL is built on top of the information center concept in the hopes of encouraging the orderly and efficient use of computer resources. "I wouldn't be surprised if we save $1 million this year," Pica predicted. "By osmosis alone, we will do things in a more efficient manner." Currently, Wang Laboratories, Inc. and IBM personal computers under Microsoft, Inc.'s MS-DOS are being used, with the intent of connecting to a larger system in the future.

Some centers are run under the close auspices of the DP department and others are handled as totally separate entities. Either type, or any variation of it, can be successful if users' needs are met while obtaining assistance from the central DP department.

The DP subsidiary of Fleet Financial Group in Providence, R.I., was given a mandate from its chairman of the board in 1981 to start an information center. He wanted the DP department to provide management with the necessary tools with which they could do business more aggressively and efficiently. "We went directly to IBM and received the textbook mode of the IBM Information Center," Thomas A. Benoit, manager of Fleet's information center, explained. Fleet follows the IBM guideline of not doing custom programming for users and tries not to compete with the central systems control group. "We maintain close control with our users and try to keep them out of any gray areas" Benoit explained. Fleet has started to move away from the IBM model by purchasing software vendors other than IBM. The center now mainly uses Focus, from Information Builders, Inc., and Intellect, from Artificial Intelligence Corp.

Conversely, Central Fidelity Services, Inc. in Lynchburg, Va., experienced a heavy backlog of applications development activity and found its users continually in need of simple one-time reports. "We figured that we had to have an information center for our bankers who wanted to design a report either for interim use or as a prototype for long-range use. And the solution nearest at hand was IBM," explained Bill Thomas, manager of the information center. Central Fidelity is still working with the IBM pilot while also working closely with its personnel department and other specialized areas in developing the center.

Sometimes the driving force for implementing an information center may come from users themselves, especially in situations in which these users feel DP is not receptive to their needs. Very often, due to a poor understanding of the program requirements, the user ends up with a system that does not deliver the information he wants. In this situation, the user may instead decide to go outside to purchase his own micro. When this happens, a corporation finds it needs someone to answer user pleas of help. This puts a new burden on technical personnel who do not really have the expertise to answer such questions. "We experienced a proliferation of micros into our staff headquarters, and we needed to maintain control," one information center manager said, noting this phenomenon was a major reason for establishing an information center.

The major point consistently mentioned by managers of information centers has been that in order to run a useful and helpful center, there must be a good working relationship between DP and end users in corporate departments. Consequently, many firms first established a mission and scope with the intentions of starting out small and then growing, with great concern given to the learning curve for those who staff and use the center. "At Fleet, we try to touch base at least once every quarter with all of our users just to monitor their progress" Benoit stated.

Some centers are run under the close auspices of the DP department and others are handled as totally separate entities. Either type, or any variation of it, can be successful if users' needs are met while obtaining assistance from the central DP department. Though many DP professionals fear losing control of the corporation's DP functions, and often the information center is indicative of this, in some cases the center has reduced burdens on the systems programmer and alleviated stress between DP and end users. E.F. Hutton's Pica explained that "no data processing professional will ignore a user's needs. The solution must be a better system. And the guy who doesn't solve the user's problem will ultimately just create a larger one."

No matter how adept end users may become in the use of data processing, it seems unlikely that the two can ever be totally separated. The instructing and directing of the end user, not to mention the care and maintenance of the systems themselves, will always be important functions of the DP professional. Data processing must look at each problem as a set of needs to be met. The function of the information center is to figure out how best to serve the user at the lowest cost. According to Benoit, "The information center is not meant to be a money maker — the main function is support." Most firms reported a positive acceptance from users and found

them very appreciative when the information center was able to adapt software to meet their needs. Of the many corporations now using the information center concept in hopes of alleviating backlogs, more work is needed to make the software easier to use. Even IBM, which pioneered the idea, seems to have a weak link in this area and has left much of the development to independent vendors. Comments from many firms indicated that IBM has given little assistance in this area, resulting in an expensive learning process for the information center. "IBM's technical support is severely lacking," one information center manager commented. In response to this inadequacy, the market for easy-to-use software seems to be growing considerably.

According to a 1982 study done by International Data Corp. (IDC) of Framingham, Mass., Mathematica Products Group, Inc., with its Ramis II package, was a leading seller. Mathematica's market share, based on U.S. independent software suppliers of nonprocedural DBMS-based packages, was 22%, compared with 18% for Information Builders with Focus and 12% for Infodata Systems, Inc. with Inquire. Competing with these three products is Nomad 2 by National CSS, Inc., which in the past, was only offered over its time-sharing network. National CSS would like the product to serve as the foundation of corporate information centers and has since announced that the product will be available as a stand-alone package to IBM's VM/CMS environment.

The National CSS staff intends to provide training to the in-house DP professional as well as to the consultant who will teach end users to access and manipulate the software. IDC expects the company to show significant revenues from the delivery of the repackaged Nomad 2 in 1983 and 1984. Culliner Software, Inc. also is working on a product to be geared toward the information center concept. It plans to introduce its product sometime next year.

IDC predicted that there will be overall growth for all vendors in information center-oriented products, such as report writers, financial planning packages, spreadsheet packages query systems. It is estimated that the marketplace for these systems will exceed $83 million this year.

But Big Blue has not totally ignored plans for information center software and has a range of products available. For financial model building, IBM's 'A Departmental Reporting System is highly used, as is SQL/DS — a relational query language for the IBM DOS/VSE environment. IBM's financial planning system APL is also popular. The problem with its products, according to many users, is that the information center user must learn a multitude of products. IBM is looking into the problem and has established a division for the sole purpose of reviewing all of the company's software, both existing and proposed. However, industry experts believe that it may be several years before any real progress is seen.

Impact of the Microcomputer

Firms are discovering that available microcomputer software is easier to use and learn than the typical information center software. Micros enable a user to control his functions more easily and helps him to become more relaxed with the DP aspects of business.

"Our information center would have taken off in a more traditional mode if the micros had not come onto the scene so strongly," Central Fidelity's Thomas said. He also found that given the choice, nine out of 10 information center users wanted micros. Because of these preferences, corporations are concurrently looking at personal computers for corporate use while developing their information centers. The cost of a personal computer is often equated with the price of an office copier, so when presented in that light, some firms are willing to go the personal computer route. Many centers find that the major thrust into the micro arena has been an unexpected development because they were planning on using mostly mainframes. The microcomputer has had a tremendous psychological impact in raising the level of computer literacy.

Security with personal computers is not easy to control, therefore sometimes a personal computer may not be the answer. Applications have varying requirements. Some have to be done on mainframes because of security, for example, employee evaluations, while others, such as seating arrangements, can be performed on micros.

Firms are discovering that available microcomputer software is easier to use and learn than the typical information center software. Micros enable a user to control his functions more easily and helps him to become more relaxed with the DP aspects of business.

According to Benoit, "You have to look for where the problem really lies and remember that your goal is to solve that problem. At Fleet, we sometimes recommend a personal computer and other times the mainframe. I see our role at the information center evolving into an umbrella structure. We are the consultants overseeing both the personal computer and the mainframe environments."

Some centers rely exclusively on the mainframe and do not see the personal computer figuring into their networks at all, while a number of other centers have based their approaches on outside time-sharing services. The concensus seems to be that whatever fits well into corporate policy is the direction the information center will take. There seems to be little doubt in anyone's mind that there

will be more cross-pollination between the different options available to the information center.

Directions

Where is the information center going? Clearly, today the information center is freely developing on its own, away from the original IBM model. Directors and staff of existing information centers are no longer dependent on IBM, and many who began with IBM have abandoned that structure. They now have the experience and knowledge to guide their organizations through the present multivendor environment.

Central Fidelity sees the information center as serving an interim function whose purpose will change once the interim phase has passed. This interim period will end once more computer literate employees come on board. "Today's youth has a far greater exposure of the use of computers as a tool than our present-day management," Thomas said. "They will bring into the corporation more education and skills by which they can use the computer for decision-making activities along with the traditional number-crunching functions." Thomas feels that once this transition period has ended, the information center will be a control center for managing the variety of software tools available to end-user departments.

Others see the information center as changing people's perception on how to do business and increasing the user's awareness of the tools available. But the information center will always be needed as an overhead support group. As the resources available to the information center are updated and expanded, the consultants can better advise and train users. The center may assume the role of a clearinghouse by offering up-to-date information on changing technologies.

Currently, there is a growing movement to link personal computers to mainframe data bases, which will greatly increase the need for the information center. As communications software becomes more powerful and sophisticated, more tools will be conveniently available to the end user. This will be just another way of bridging the gap between the traditional DP world and the business world.

The importance of the information center is directly linked to the importance of the executive's need for timely and understandable data. The sooner management receives the necessary information, the quicker business decisions can be made. The future success of any company will be determined by its ability to control and utilize large amounts of information, and if the information center can facilitate this, then the center is a success. It does not matter what shape or form the center takes; it only matters that it benefits the company. A combination of mainframe usage, microcomputer usage and time-sharing services seems to benefit the end user most since the proper tool can be used for each separate situation.

As one executive put it, "You can never learn how to drive a car if you are always being chauffeured. If you know how to drive the car, you have a say in where you go." The information center enables the user to have a say.□

Flis is an account manager with the Information Systems Planning Service of International Data Corp. in Framingham, Mass.

Getting There From Here

By Naomi Karten

Blue Cross/Blue Shield of Massachusetts, located in Boston, has deliberately departed from IBM's emphatic guidelines that information center staff must never program for end users. The decision to be flexible about this matter has yielded a dimension of productivity beyond that of the "pure" Information Center as envisioned by IBM, while providing a more challenging environment for information center staff.

To establish an information center, IBM recommends selecting and implementing user-oriented products, providing access to data and training and supporting users. But do not, the guidelines advise, write code for users, for in so doing, users will become dependent on you. This advice has merit; however, rigidly adhering to it misses what is the most important reason for the existence of an information center — to allow users quick access to data, or, as the popular expression goes, to enhance productivity. The emphasis, in other words, ought to be more on the quick access and less on the means of achieving it.

When the information center was established here three years ago, the mission was pure IBM-ese: to provide end users from all corporate departments with tools and techniques to allow them to access their data on their own terms. We selected, acquired and installed mainframe and microcomputer products, set

ILLUSTRATION BY JON MORTON

up training facilities and a hot line and established a walk-in center for user access to each product.

However, management's need for information should not have to be put on hold while awaiting the next training class, the next software release or the reformatting of the next file. We discovered that all too often the user was not yet appropriately trained when information was required, that the logic of the request was complex and more quickly satisfied by programmers, that the data was not in a format suitable for user access or that the information need could not be satisfied by end-user software, but was amenable to conventional programming techniques.

We were able to learn about the location and use of much of our corporate data. In pre-information-center days, ad hoc requests requiring data from both the IBM and Honeywell data bases often resulted in two or more DP departments dividing up the responsibility.

As a result of these observations, we resolved to take seriously the term "information center" — that is, literally to be a center for information. Our department name — Information Central — reflects this philosophy. Three basic objectives drive the center:

- To acquire and install end-user products, provide access to data and train and support users.
- To develop technical solutions to ad hoc requests for information, using the full range of installed software.
- To develop and make available general-purpose solutions to the common business needs of multiple user areas.

With the first of these objectives, our experiences have mirrored those of many other companies. The second and third objectives, however, have led to some interesting insights about the benefits of our approach to both users and DP

One of the first realizations was that two categories of software products are suitable to an information center environment: those that are paid for, acquired and installed specifically for the center and those that are free of charge insofar as the installation already has them. The free-of-charge category for Blue Cross Blue Shield of Massachusetts includes Syncsort, Inc.'s Syncsort and IBM's TSO command language Clist on our IBM mainframe and Honeywell, Inc.'s database language, IDS/Cobol, on our Honeywell mainframe.

In addition to its sort capabilities, Syncsort provides parameter-driven record selection, manipulation, formatting and reporting capabilities. Since so many file queries are logically simple ("Get me a list in certificate number sequence of all first-quarter claims between $100 and $1,000, excluding maternity claims"), Syncsort has been an ideal tool for use by information center staff. Furthermore, although Syncsort might not qualify as user-friendly, many users are capable of learning many of its parameters.

Clist-Based Systems

Though too technical for non-DP users, Clist has facilitated development of small systems and subsystems extremely quickly. A sampling of Clist-based systems we have developed includes:

- A series of data entry screens and data edits to support a planning department's collection of handwritten medical review data. It takes less than one day per person to develop, and the benefits include user-controlled, error-free data entry.
- A Job Control Language generator, which queries for and validates such things as accounting information, file names and whether the data is to be sorted. It takes one week to develop, and the benefits include customized, error-free Job Control Language for use with user (or programmer) code.

The policy of the center is never to write Cobol code if a faster alternative will do the trick. We have, however, built up a good-size library of Honeywell IDS/Cobol programs to extract data from our major Honeywell data bases. Whenever possible, we produce reports from such data bases by passing the data to a report generator. As an example, a frequent user need is to analyze data residing partly on the Honeywell mainframe and partly on the IBM mainframe. We are very impressed with the file manipulation capabilities of SAS Institute, Inc.'s Statistical Analysis System (SAS) and frequently do a Honeywell Cobol extract, a data transfer to IBM, a Syncsort extract of the IBM-resident data and an SAS file merge, analysis and report.

SAS code is written in-house whenever it is the most expeditious way to complete a user request. SAS is not only a tool to support users; we have developed SAS data analysis and debugging routines for use by other DP areas.

As a result of these programming activities, we have become more conversant with users' information needs than if we simply taught them a language and supported them. In addition, we became aware of the overlapping needs among departments, which was especially useful, for individual departments were not aware of this overlap. By coordinating all ad hoc requests, we are in a position to explain to users that, for instance, they can obtain the needed information from a report already generated in another department or we are already preparing a similar report and will run off an additional copy for them.

Frequently, we generate an extra copy or two of a report, knowing that eventually another user will ask for the same information. Not surprisingly, users frequently accept reports today that meet most of their needs rather than wait several weeks or months for

reports that are 100% to specifications.

In supporting so many areas, we were able to learn about the location and use of much of our corporate data. In pre-information-center days, ad hoc requests requiring data from both the IBM and Honeywell data bases often resulted in two or more DP departments dividing up the responsibility. Working with data from multiple and diverse sources has enabled us to become knowledgeable about these sources.

Personal Computer Support

Another way we have been able to support users is in personal computer work. One of the responsibilities of our information center is to provide end users with microcomputer training and support, as well as assistance with configuration analysis, acquisition, installation and software evaluation. These activities offer many opportunities to become aware of common business problems that are amenable to generalized solutions. We have developed several Visicorp Visicalc models that we documented for general distribution and demonstrated on demand. For 1984 budget preparations, we developed Visicalc spreadsheets to accommodate the needs of budget representatives from each major functional organization within the company.

By coordinating ad hoc requests, assessing overlapping needs and developing technical solutions, users receive information more quickly while DP benefits by the elimination of redundant and resource-consuming programming efforts.

As with any information center, patience, an outgoing personality and a strong service orientation are key requisites for staff members. Familiarity with business functions through experience in a user area is an important plus.

Although information center staff are technically trained, they do not need an extensive DP background. In fact, given one or two experienced programmers with supervisory capabilities, this environment is ideal for entry-level or junior-level programmers. In the past 2½ years, seven programmers have joined the department with DP training but little or no DP experience.

Although we have done little formal marketing of our services, word of mouth has worked well, and we have a continuous influx of requests. The result is a constant juggling of the work load in such a way as to please most of our users most of the time and still give immediate attention to numerous high-priority requests.

Given the scope and variety of the services provided by Information Central, it appears our approach has turned out to be a wise decision:

- With our end-user products, we are supporting a solid base of users capable of "doing it themselves," and we are continually assisting new users to become conversant with these products.
- By doing both training and programming, we have gained a broader sense of corporate objectives and business needs than many other DP and non-DP departments have.
- To respond to requests from all areas, we have developed a greater familiarity with our corporate data than many other DP departments have.
- To respond to user requests as quickly as possible, we have acquired a broader range of technical skills than many DP departments, and a bigger "bag of tricks" than most DP departments.
- By building a library of general-purpose and specialized solutions to business needs, we can support the greatest number of needs with the least amount of effort on the part of users, the rest of DP and ourselves.

In all probability, if we had put all our resources into the straight and narrow approach, we would have many more end users up to speed in preparing and running their own code. But by incorporating programming among our information center tools and techniques, we have been able to contribute much more to the overall efficiency of information usage within the corporation.

Karten is the manager of the Information Central Department at Blue Cross/Blue Shield of Massachusetts in Boston.

The Time Is Now

By Stephen L. Samson

With the second release of MVS/Extended Architecture (MVS/XA) now available, IBM has provided real improvements in performance, configurability, reliability, availability and serviceability, as well as additional function and device support. What these improvements add up to is strong motivation for converting MVS/370 systems to MVS/XA, if the XA hardware is already in place.

The latest MVS/XA release is the combination of MVS/SP Version 2, Release 1.1 (MVS/SP 2.1.1) along with the MVS/XA Data Facility Product (DFP), Release 1.1. It runs only on a CPU complex that provides the System/370 XA mode of operation. Processors capable of operating in this mode include all of the IBM 3080 systems: the 3083 uniprocessor, the 3081 dyadic and the 3084 dual dyadic. The IBM 4381 announced in mid-September can operate in XA mode as well.

MVS/XA is IBM's vehicle for delivering new functions at the high end of its product range, now and in the future. Many of the innovations in MVS/XA, such as the dynamic channel subsystem and enlarged virtual storage size, are useful at the low end as well and have been incorporated in the new 4381.

Based on experiential data now available from users, MVS/XA has been easy to install, and operating it comes easily to an MVS operations staff.

Previously, MVS/XA was hard to install on a production system and did not offer major performance improvements other than with

PHOTO BY ED BRAVERMAN

3380s and Dynamic Path Reconnect. It needed more real storage and provided no functional benefits other than the ability to use 31-bit addressing for applications programs and support for the 3084. Moreover, while providing some virtual storage constraint relief of 1.3M to 1.6M bytes below the 16M bytes "line," MVS/XA's larger control structures and added functions demanded 4M to 8M bytes of real storage beyond that required by MVS/SP 1.3.

As of Sept. 1, the second release of MVS/XA includes:

- A simplified installation procedure using IBM's System Modification Program-Extended (SMP-E) program, which eliminates the need for a full Sysgen (and subsequent reinstallation of other programs) to install MVS/XA.
- Support for the 3880 Models 11 and 13.
- Virtual storage constraint relief beyond Release 1 in both the base control program and in DFP of 400K to 600K bytes.
- Support for the MVS/SP 1.3.3 version of JES2.
- Global Resource Serialization support of Vsam data set sharing.
- Linklist enhancements for performance, integrity and operational flexibility: The limit of 16 data sets in the LNKLST concatenation is removed, and unauthorized libraries may be in the concatenation and optionally may remain unauthorized in use. (The two previous features provide the means to eliminate Joblibs and Steplibs in many applications jobstreams.)
- Introduction of a Linklist lookaside address space to contain the composite Linklist library directory, along with improved search algorithms and control and updating facilities. This eliminates the need for tuning to resolve conflicts between the management benefits of logically grouping modules in separate libraries on the one hand, and the poor performance of searching through concatenated directories on the other hand. There will be reduced need for extensions and modifications to the BLDL function.
- Generalization and increased flexibility by allowing SYS1.LOGREC to reside elsewhere than on the IPL volume, by supporting concatenated LPALIBs, and by supporting an arbitrary suffix for the IEAPAK member of SYS1.PARMLIB. These changes eliminate the binding of an IPL volume to a single system and, thus, make possible the sharing of IPL volumes across multiple systems.
- Vsam restructuring, including record management code above 16M bytes, I/O buffers also above the line, and up to 16 local shared resource pools per address space. The pools can reside above the line.
- Residence above 16M bytes of I/O buffers for virtual I/O (VI/O) data sets.
- Availability enhancements, including a separate address space for System Management Facility (SMF) and the ability to restart SMF after a failure.
- Serviceability enhancements, including the ability to suppress duplicate dumps.

There are many more detail-oriented changes in this release; the IBM announcement materials provide complete information.

A flippant answer to the question "When should you go to MVS/XA?" might be "As soon as you're ready." Given hardware that supports XA and an MVS environment, including the proper "positioning" releases and products as defined by IBM, the only reason to delay installing XA is an inadequate or unsupported element in the hardware configuration. MVS/XA requires more real storage than does MVS/370. If a system is storage constrained in MVS/370, it will be very storage constrained in XA.

Installation of MVS/XA, in all but very unstressed real storage environments, should be accompanied by an additional increment of main memory. The increment for the 4381 is 4M bytes or 8M bytes; 8M bytes is the only increment available for 3080 systems. Along with the 4381 announcement, IBM made available two new real storage sizes for the 3083 Model E (24M and 32M bytes) so a model upgrade is no longer needed if a 16M-byte 3083 Model E is to perform well under MVS/XA.

Unsupported devices include 2311 and 2314 disk storage devices and the 2305 Model 1 fixed-head file. IBM has been dropping support for these devices over time; the 2311 was not supported in MVS at all, and in MVS/XA, they are not even supported as virtual devices to set the formats of VI/O data sets.

Along with the initial announcement of MVS/XA, IBM introduced the notion of "positioning" — releases of MVS/SP 1.3 and key program products that, if installed before conversion to MVS/XA, permit near-transparent migration. The concept works and can be accomplished without unusual effort. On the other hand, MVS shops converting to XA from a level of MVS lower than SP 1.3 must assimilate a tremendous amount of change, most of it arising from the functions that were new in 1.3.

The ideal move is from a 3080 running SP 1.3.X and an SP level of JES2 or JES3, with some currently unused real storage and no system modifications. A carefully drawn migration plan would include the preliminary steps necessary to achieve this configuration while acquiring whatever MVS/XA training that might be needed.

Non-IBM software, such as library management systems, data base and data communications subsystems and performance monitors, which work on MVS/370 but not on XA, may impose a delay on migration or leave the XA system less useful than the 370 system. Users should consult their vendors well in advance of conversion to XA to ensure timely support. Some independent vendors have announced MVS/XA support for all applicable products.□

Samson is a senior systems engineer with Candle Corp., a software and consulting firm based in Los Angeles.

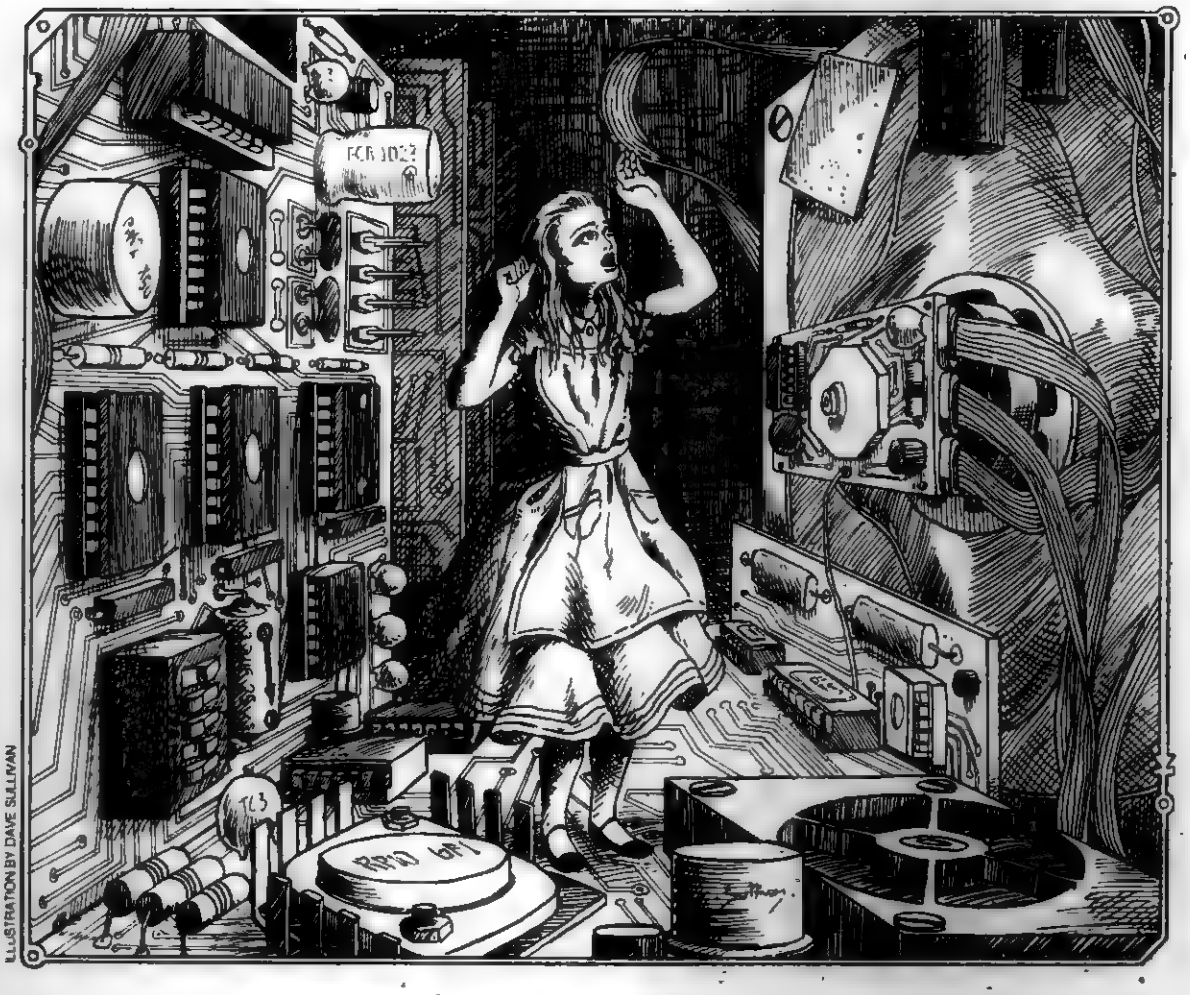

ILLUSTRATION BY DAVE SULLIVAN

Unraveling The Mysteries Of Micro Operating Systems

By Jeff Fox

Just as the number of microcomputers on the market keeps increasing, so do the number of operating systems that are available for these computers. A user today is confronted with a choice among many computers offering different operating systems and features.

An operating system is the program that actually runs the hardware of a computer. In the earliest microcomputers, the operating system consisted of 1K byte or less of code on read-only memory (ROM). The most primitive of these systems would require the operator to toggle in a boot program on front panel switches whenever the computer was powered up.

The second generation of operating systems included a boot program on ROM with keyboard input and video output and, perhaps, cassette or paper tape mass storage. The third generation of operating systems provided mass storage on a floppy disk. These operating systems usually defaulted to a version of Basic in ROM; in some cases, the operating systems

were hidden in Basic.

Early microcomputer disk operating systems offered the most primitive commands: Initialize a disk; Read Write a File; Catalog the files on a disk; Rename a file; and so forth. Each vendor offered its own unique disk operating system and standards evolved only when more than one manufacturer offered the same operating system on their computers.

There were two advantages to offering a standard operating system to the user. If users were already familiar with the features of a given operating system, they would be able to use the machine more quickly. Also, programs could be transportable to any computer that could run the operating system in which the program was written.

After a decade of growth, microcomputers have become very sophisticated. There are usually a number of different operating systems available for a specific microcomputer. The features offered by these systems are quite varied and should be examined individually.

Most, but not all, microcomputer operating systems support file I/O. At the command level, operating systems will recognize and respond to specific instructions to create files, load files, erase files, copy files and so forth. These same functions can be accessed by programs running under a given operating system through calls to specific locations within the operating system.

Through the use of compatible file structures, data stored by one program may be accessible from another program under the same operating system. It is also possible for an application program to read a file written under a different operating system if it was written with compatible hardware and all of the rules for the structure of the file were coded into the application.

This can be a very involved process, and most users must exchange data stored under different file structures with special conversion utility programs. Many of these types of utility tools are available, but if buyers anticipate performing conversions, they should check to see that vendors offer such conversion aids.

Concurrency

Concurrency, a form of multitasking, is the execution of more than one program at a given time in a computer. To do this, the operating system must switch between program tasks very rapidly. The controlling program in the operating system functions as the controlling task and coordinates the operation of other tasks. Multitasking operating systems do not all have the same features. The size or number of tasks vary from system to system, and the mechanisms by which tasks communicate with one another or the user also vary greatly.

The most simple implementation of multitasking may be a simple background print spooler. More sophisticated multitasking systems allow tasks to create, schedule and dispatch other tasks. In the most sophisticated operating systems there are numerous mechanisms to control the interaction of tasks. In these systems, tasks may be assigned priorities and may dynamically modify the priority status of other tasks.

The trend in microcomputer operating systems today is to offer multitasking capability, which expands the power of the system. Concurrent CP/M 86, for example, is an expansion of Digital Research, Inc.'s CP/M-86. Based on the enthusiasm surrounding the introduction of Apple Computer, Inc.'s Lisa, many vendors will try to offer multitasking with a window display so that users can interact with the system to perform more than one task at a time.

Multiuser operating systems are multitasking to switch control of the system between more than one user. In these systems, each user must be restricted from interfering with the operations of other users. Even for a single multiuser operating system the number of users will vary according to implementations and hardware configurations.

Every operating system has minimal requirements for its operation. These requirements may be broken down into memory requirements, mass storage requirements and I/O requirements.

The most primitive microcomputer operating systems need only a single ROM chip and very little random-access memory (RAM). Today's standard operating systems usually require a minimum of between 32K bytes and several hundred thousand bytes of RAM.

The trend in microcomputer operating systems today is to offer multitasking capability, which expands the power of the system. Concurrent CP/M 86, for example, is an expansion of Digital Research, Inc.'s CP/M-86.

Implementations vary in their use of memory, and the size of the operating system may be an important factor. If the operating system uses a large amount of the memory of a small microcomputer, there will be very little left for application programs and even less for their data.

Multitasking operating systems require not only sufficient memory space for each task, but also some form of memory management. This means that the memory must use a bank swapping mechanism or some form of logical vs. physical addressing. Without such a mechanism, an operating system would have to copy sections of memory byte by byte to be able to switch tasks. Most of the newer 16-bit micros have sophisticated memory management segment control built into the hardware.

The first requirement of a mass storage system is sufficient space to store the operating system itself. For this reason, some of the micro-

computer operating systems require a hard disk because floppy disks are simply not large enough.

For multitasking systems that need more memory than the system contains, there is a second requirement of mass storage: It must be fast enough to support virtual memory. Virtual memory is the technique of swapping sections of memory to and from mass storage in such a way as to simulate a larger memory space.

Not all multitasking systems use virtual memory, and not all operating systems that support virtual memory are multitasking. Virtual memory can be implemented on a floppy disk, but since speed is very important, virtual memory will usually require a hard disk.

Many large software houses are gambling that Unix will become an industry standard for microcomputers. They are investing large amounts of money to develop new versions of Unix to test this hypothesis.

I/O Requirements

The computer system selected may need minimal I/O functions in order to support a given operating system. There are several possible I/O restrictions.

Text output may require certain abilities such as a minimal number of characters per line, upper- and lowercase characters or character attributes such as blinking, bold and others. Text input may also require that certain characters or special keys be available from the keyboard.

Some operating systems make heavy use of graphics and will need specific graphics devices to operate. These systems require a high-resolution, bit-mapped graphics device for all output, text or graphics. This is because in an operating system such as Xerox Corp.'s Smalltalk, all text output is actually done in graphics.

Serial I/O may be supported through a particular type of hardware under a given operating system. Various synchronous and asynchronous communications protocols may be supported. Certain systems require serial ports — for example, in a multiuser system each user may be attached on a serial line.

Some special devices may be supported by operating systems. In particular, Smalltalk relies heavily on an input device called a mouse. The mouse is similar to a video game track ball. It is used to position a control cursor on the screen. Other devices that may be supported are light pens, touch screens and digitizing pads, among others.

Finally, some operating systems provide networking support. They allow more than one computer on the network to share resources. The interconnection of computers on the network will require a specific type of networking hardware. These can range from simple asynchronous communications links to very high-speed coaxial cable or light link.

Operating Systems Survey

CP/M from Digital Research was the first really popular standard operating system. CP/M stands for Command Program for Microprocessors. It was initially developed for the 8-bit Intel Corp. 8080 and the Zilog, Inc. Z80 family of microprocessors; later, it was written for the 16-bit 8086 family.

The greatest advantage that this operating system has over most others is the large amount of CP/M programs and literature available. CP/M versions have different memory requirements but some can run in as little as 32K bytes. This operating system will allow redirection of I/O to devices or files.

Concurrent CP/M is an operating system that allows more than one CP/M program to run simultaneously. This system offers the multitasking abilities of larger, more complex operating systems with the large base of programs available in CP/M. Digital Research's MP/M is similar to CP/M 86 and Concurrent CP/M 86, but in addition to the features they offer it has multiuser capabilities.

Microsoft, Inc.'s MS-DOS, also known as PC-DOS on the IBM Personal Computer, is a single-user operating system with many similarities to CP/M and CP/M 86. MS-DOS has become the most common operating system for systems with the 8086 and 8088 families of microprocessors. The range of products available for MS-DOS is already very large and still growing, and MS-DOS will support simple background print spooling. At least one manufacturer will soon offer a multitasking version of MS-DOS.

UCSD Pascal is nearly as popular as MS-DOS. This operating system was developed at the University of California at San Diego and features a very powerful version of the Pascal language. It is not limited to the Pascal language, however, and a very large number of programs are available for UCSD Pascal.

Unix is an operating system that was developed at Bell Laboratories for the Digital Equipment Corp. PDP-11 minicomputers and was then written for the Motorola, Inc. 68000 microprocessor. There has been a great deal of attention given to this operating system recently, with many vendors rushing to provide new versions of Unix for other microprocessors.

The new stripped-down versions of Unix that are available differ somewhat in their features. Generally, Unix is a multitasking, multiuser operating system with some very powerful features. I/O can easily be redirected to or from devices or files, and pipes can direct data from one program or task to another.

Unix has been very popular in the academic community. As university graduates have moved into industry, they have taken their preference for this operating sys-

tem with them. Unix offers some very powerful utilities, including output to phototypesetting and document complexity analysis.

The disadvantages to running Unix have been the high cost of purchasing versions of this operating system and the high cost of the minimal hardware requirements. Now that Winchester disks and dynamic RAM costs have lowered the cost of the minimal hardware needed for Unix, vendors are able to deliver lower cost versions of the system.

Many large software houses are gambling that Unix will become an industry standard for microcomputers. They are investing large amounts of money to develop new versions of Unix to test this hypothesis.

Xenix, from Microsoft, is very similar to Unix except that it has been developed specifically for microcomputers. It is currently available for the Zilog Z8000 and will soon be available for the 8086 and 8088.

Smalltalk is a language and operating system developed at Xerox. This operating system has been available on the Xerox Alto and will soon be available on Apple's Lisa. The Lisa comes with its own proprietary operating system, which offers many of the features of Smalltalk. This object-oriented language requires a bit-mapped graphics output and a mouse for input and a good deal of mass storage and memory. It will allow the development of programs that use its unique methods for user interaction.

Smalltalk has influenced vendors to offer some of the features developed in Smalltalk in packages for other operating systems. One of the most interesting is the use of windows for program output. The output screen is divided into sections called windows by the operating system, and multiple tasks can communicate with the user simultaneously through their own windows.

Forth, from Forth, Inc., is a language and operating system that is available for virtually all microcomputers. There are so many versions of Forth that it can cover a very wide range of power and cost. The smallest version of the system will run in under 8K bytes of memory, and yet may offer an interpreter, a compiler, an editor and even an assembler resident in the operating system. Large versions include the ability to compile applications for a completely different target computer system.

One advantage to this operating system is that, because it is in the public domain, the source code is available. For some systems it is possible to get a version of Forth with an editor, assembler, source code and a meta-compiler to compile new Forth systems all for the cost of a diskette.

Each of the microprocessor vendors offers various operating systems for the hardware configurations they sell. For each manufacturer there is usually a range of operating systems available that will offer more or less features. Since these operating systems are not available on other brands of computers, they will not become standards unless they are very popular in the user community and other manufacturers purchase the rights to these operating systems and make them available on other systems.

One of the more interesting recent developments in operating systems has been the silicon operating systems. These are operating systems that have the required hardware (interrupt controllers and memory management chips) integrated with the operating system software into special chips. This approach reduces chip count and produces faster, more standardized systems. Many manufacturers are offering these silicon operating systems.

Intel's 80186 and 80286 systems provide multitasking with more power and fewer chips than systems based on the 8086 or 8088. Intel also has the 432 chip series, which offers a multitasking, multiple-CPU operating system in microcode rather than in ROM.

Despite new developments in operating systems, users must examine their application needs and select operating systems that run those applications. If the user has already purchased microcomputer hardware, then he is generally limited to purchasing only those applications packages that will run on the operating system he has chosen.□

Fox is a consultant with the Office Automation Systems Group at the Bank of America in San Francisco.

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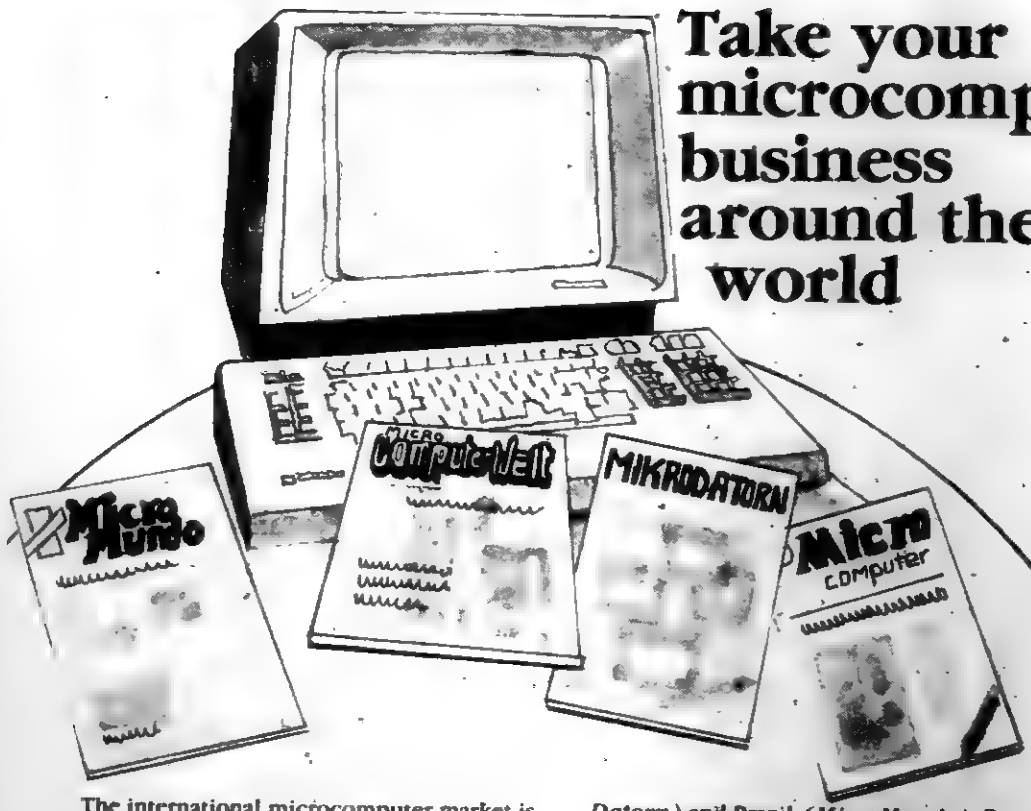

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AARDVARK SOFTWARE, INC.
783 N Water St
Milwaukee, WI 53202
(414) 289-9988
Target Industries: Accountants, Legal, Financial Planners
Target Applications: Tax Planning Financial Planning
Contacts:
Head of Sales Thomas J Beatty
Year Established: 1979
Number of Employees: 31

ABACUS ASSOCIATES
Suite 240
6565 W Loop S
Bellare, TX 77401
(713) 666-8146
Major Markets: Maintenance/Other Services
Target Industries: Energy Horizontal Market
Target Applications: Financial modeling
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software Larry Sofka
Year Established: 1969
Number of Employees: 5

ABACUS CORP.
1 Dukes Pkwy
P.O Box 410
Manville, NJ 08835
(201) 526-6909
Major Markets: Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Retail
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software Jack James
Year Established: 1967
Number of Employees: 12

ABACUS DATA SYSTEMS

5000 W. Bloomingdale
Chicago, IL 60639
(312) 745-0127
Target Industries: Distributon
Target Applications: HP3000
Contacts:
Head of Marketing: Eddie Li
Year Established: 1982
Number of Employees: 7

AB ASSOCIATES, INC.
1348 Eckles Drive
Tampa, FL 33612
(813) 932-9853
Target Industries: Electrical engineers
Target Applications: Circuit Analysis, Design Analysis
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1978
Number of Employees: 5

ABAX MANDELCO COMPUTER SYSTEMS
1 N. Main St.
P.O. Box 1097
Hutchinson, KS 67501
(316) 663-5041
Major Markets: Systems House (Commercial OEM)
Target Industries: Equipment; Oil; Manufacturing
Target Applications: Accounting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1975
Number of Employees: 8

ABBOTT COMPUTER SYSTEMS
Suite 704
300 S Harbor Blvd
Anaheim, CA 92805
(714) 956-3630
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau)
Target Industries: Medical, Business, Manufacturing Retail
Target Applications: Accounting Billing, Word Processing General Business
Net Sales: $100 000 — $500 000 (1982)
Contacts:
Head of Sales. D Avina
Head of Software Dennis Yu
Year Established: 1981
Number of Employees: 7

ABC MANAGEMENT SYSTEMS, INC.
Suite 3
805 Dupont St
Bellingham, WA 98225
(604) 682-3808
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1973
Number of Employees: 6

A.B. DICK CO.
Office Products
5700 W Touhy Ave
Chicago, IL 60648
(312) 647-8800
Major Markets: Component, Computer, Terminal/Peripheral, and Office Equipment Manufacturing, OEM (Computer Systems), Maintenance/Other Services, Miscellaneous Computer Supplies
Target Industries: Education, Government, Legal
Target Applications: Integrated Office Systems, OA
Net Sales: More than $100 Million (1982)
Year Established: 1904

ABS COMPUTER CORP.
4848 N.E 102nd St
Portland, OR 97220
(503) 255-5090
Target Industries: Consulting, Training and Education
Target Applications: Applications Software, Installation Maintenance
Contacts:
President: Mark R Smith

ABT ASSOCIATES
ABT Microcomputer Software
55 Wheeler St
Cambridge, MA 02138
(617) 492-7100
Target Industries: Apple II Users
Target Applications: Communications
Year Established: 1982
Number of Employees: 6

ABW CORP.
P.O. Box 1047
Ann Arbor, MI 48106
(313) 971-9364
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing
Target Applications: Graphics, DBMS
Contacts:
Head of Sales. Jill L. King
Head of Software/Engineering Thomas E Bell
Year Established: 1974
Number of Employees: 6

ACC
228 E Coat St.
Santa Barbara, CA 93101
(805) 963-8801
Major Markets: Component, Computer, and Communications Equipment Manufacturing, Systems House (Commercial OEM)
Target Industries: Manufacturing, Engineering, R&D, Government
Target Applications: Networking, Interfacing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Engineering: Ed Fash
Year Established: 1975
Number of Employees: 110

ACCESS TECHNOLOGY, INC.
6 Pleasant St.
Natick MA 01760
(617) 431-1775
Contacts:
Head of Sales: Russell Gee
Head of Software: James Spoerl
Year Established: 1980
Number of Employees: 25

ACCESS TELECOMMUNICATIONS
60 Shore Drive
Burr Ridge, IL 60521
(312) 920-7920
Major Market: Component Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Kerry Pratt
Year Established: 1970
Number of Employees: 15

ACCESS TWO, INC.
464 Wolcott Road
P O Box 6350
Wolcott, CT 06716
(203) 879-2501
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing
Target Applications: Manufacturing, Management
Year Established: 1980
Number of Employees: 6

ACCOUNT — A — CALL CORP.
4450 Lakeside Drive
Burbank, CA 91507
(213) 557-2954
Major Markets: Data Services (Service Bureau)
Target Applications: Telecommunications
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Michael Atlas
Year Established: 1971
Number of Employees: 50

ACCOUNTANTS COMPUTER CO. & TAX SYSTEMS, INC.
1613 Pinson St.
Tarrent, AL 35217
(205) 841-5541
Major Markets: Computer Manufacturing
Target Industries: Accounting, Tax Preparation
Contacts:
Head of Software/Engineering Jon Pesek
Year Established: 1983
Number of Employees: 10

ACCOUNTANTS MICRO SYSTEMS, INC.
1404 140th Place N.E
Bellevue, WA 98008
(206) 643-2050
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Accounting, Engineering, Architect, Legal
Target Applications: CAD/CAM
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales Karen Ward
Head of Software Brian Duthie
Year Established: 1980
Number of Employees: 50

ACCOUNTING & COMPUTER TECHNOLOGY, INC.
12344 E Northwest Highway
Dallas, TX 75228
(214) 327-7583
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Warehouse/ Storage, Distribution
Contacts:
Head of Software: John P. Holmes
Year Established: 1980
Number of Employees: 15

ACCOUNTING SYSTEM CORP.
59 Schoolground Road
Branford, CT 06405
(203) 481-4201
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau)
Target Industries: Oil; Property Management
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Tom Gallagher
Head of Software: Joseph Scignano
Year Established: 1971
Number of Employees: 25

ACCOUNTING SYSTEMS
63 Oakland Ave.
Pontiac, MI 48058
(313) 858-2455
Major Markets: Systems House (Commercial OEM)
Target Industries: Distribution; Manufacturing
Target Applications: Accounting; Job Costing
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1958
Number of Employees: 4

ACCUMEDIC COMPUTER SYSTEMS
45 W 34th St.
New York, NY 10001
(212) 736-0906
Major Markets: Systems House (Commercial OEM), Data Services

Vendors

(Service Bureau)
Target Industries: Medical
Target Applications: General Accounting, Billing
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales Vivian Auzer
Head of Software M Kollenscher
Year Established: 1977
Number of Employees: 16

ACCUSOFT, INC.
126 Alto St
San Rafael, CA 94901
(415) 459-7540
Target Applications: WP, Telex Processing
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980
Number of Employees: 5

ACE SOFTWARE, INC.
3805 Marlane Drive
P O Box 254
Grove City, OH 43123
(614) 875-4910
Major Markets: Data Services (Service Bureau)
Target Industries: Education, Cable TV, Farm Co-ops, Chemical
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales Cindy Rice
Year Established: 1977
Number of Employees: 11

ACORN DIGITAL
Suite 108
1882 36th Place N E
Bellevue, WA 98005
(206) 746-7077
Target Industries: Construction, Medical, Dental, Accountants
Target Applications: Accounting, Order Entry
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software Michael Heiser
Year Established: 1979
Number of Employees: 12

ACORN SOFTWARE PRODUCTS, INC.
Suite 705
1945 Gallows Road
Vienna, VA 22180
(703) 556-9788
Target Industries: Home and Personal Computers
Contacts:
Head of Software: Daphne Shore
Year Established: 1975
Number of Employees: 15

ACPI LTD.
Suite 113
One Old Country Road
Carle Place, NY 11514
(516) 248-7700
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Medical; Labor Unions, Legal
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1977
Number of Employees: 22

ACS DATA SERVICES, INC.
1940 Elm Hill Pike
Nashville, TN 37210
(615) 889-5830
Major Markets: Data Services (Service Bureau)
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1975
Number of Employees: 35

A.C.S. SYSTEMS
Suite 500
8260 Greensboro Drive
McLean, VA 22102
(703) 448-0080
Major Markets: Data Services (Service Bureau)
Target Industries: Manufacturing Retail
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software Al Garon
Head of Engineering Robert L Carlston
Year Established: 1980
Number of Employees: 19

ACT IV SYSTEMS, INC.
209 Tracy Creek Road
Bestal, NY 13850
(607) 748-0600
Target Industries: Manufacturing, Education
Target Applications: Program generator
Year Established: 1981
Number of Employees: 5

ACUMEN RESOURCE CORP.
Suite 1
4736 Main St
Lysle, IL 60532
(312) 963-2796
Major Markets: Systems House (Commercial OEM)
Target Industries: Accounting Firms, Attorneys, Cosmetics, CPA
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Robert W. Rodgers
Head of Software G Michalak
Year Established: 1979
Number of Employees: 3

ADAGE, INC.
Fulcrum Computer Group
P O. Box 18305
5711 Six Forks Road
Raleigh, NC 27609
(919) 848-0001
Major Markets: Systems House (Commercial OEM)
Target Industries: Government, Education
Year Established: 1975
Number of Employees: 500

ADDITIONAL RESOURCES, INC.
Suite 235
5725 Buford Highway
Atlanta, GA 30340
(404) 455-0464
Major Markets: Maintenance/Other Services
Year Established: 1976
Number of Employees: 10

ADDMASTER CORP.
P.O. Box 387
San Gabriel, CA 917780387
(213) 285-1121
Major Markets: Peripheral and Office Equipment Manufacturing, OEM
(Computer Systems)
Target Industries: Banking, Retail, Engineering, Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales Larry Wirtz
Year Established: 1956
Number of Employees: 200

ADL DATA SYSTEMS, INC.
50 Stratton St S.
Yonkers, NY 10701
(914) 423-3623
Major Markets: Maintenance/Other Services
Target Industries: Medical; Unions; Service
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software Solomon Gongola
Year Established: 1978
Number of Employees: 15

ADMINISTRATIVE DATA CORP.
512 Westline Drive
Alameda, CA 94501
(415) 522-2400
Major Markets: Systems House (Commercial OEM)
Target Industries: Insurance
Year Established: 1968
Number of Employees: 6

ADMINISTRATIVE INFORMATION SYSTEMS CORP.
150 N. Finley Ave
Basking Ridge, NJ 07920
(201) 221-0900
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau)
Target Industries: Medical
Year Established: 1977
Number of Employees: 10

ADMINS, INC.
P O Box 269
Cambridge, MA 02138
(617) 661-3206
Target Industries: Banking; Municipals
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1975
Number of Employees: 15

ADP
Network Services
175 Jackson Plaza
Ann Arbor, MI 48106
(313) 769-6800
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Sales Michael Sears
Head of Software Chuck Hoopes
Year Established: 1968
Number of Employees: 1,200

ADPAC CORP.
P.O. Box 3337
120 Howard St.
San Francisco, CA 94105
(415) 981-2710
Major Markets: Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales Robert Delamore
Year Established: 1963
Number of Employees: 20

ADP/AUTOMATIC DATA PROCESSING, INC.
405 Rt 3
Clifton, NJ 07015
(201) 365-7300
Major Markets: Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Financial, Insurance/Health Care -Small Business, Auto Dealers
Target Applications: DP
Net Sales: More than $100 Million (1982)
Year Established: 1949
Number of Employees: 14 300

ADP/AUTOMATIC DATA PROCESSING, INC.
Financial Division
4 New York Plaza
New York, NY 10019
(212) 344-6010
Major Markets: Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Financial
Target Applications: Brokerage, EFT, Commodities, Financial
Year Established: 1949

ADS SOFTWARE, INC.
P.O Box 13686
Roanoke, VA 24036
(703) 344-6818
Target Industries: Accounting
Target Applications: Accounting
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales Kenneth F Payne
Year Established: 1981
Number of Employees: 20

ADVANCED AUTOMATION CONCEPTS, INC.
3760 Lower Roswell Road
Marietta, GA 30067
(404) 973-0027
Major Markets: Computer Manufacturing; Systems House (Commercial OEM)
Target Industries: Energy Management; Process Control
Target Applications: Energy Resource Management
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Leonard Timmons
Head of Engineering: Frederick Brown
Year Established: 1978
Number of Employees: 12

ADVANCED BUSINESS SYSTEMS, INC.
215 W. Railroad St.
Montezuma, GA 31063
(912) 472-2341
Major Markets: Systems House (Commercial OEM)
Target Industries: Insurance
Year Established: 1979
Number of Employees: 5

ADVANCED COMPUTER CONCEPTS, INC.
1910 Robinhood St.
P.O Box 15710

Sarasota, FL 33581
(813) 923-1811
Target Industries: Manufacturing, Energy
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Charles Gilmore
Head of Software/Engineering: Beverly Kitaoka
Year Established: 1980
Number of Employees: 20

ADVANCED COMPUTER SYSTEMS, INC.
3131 S. Dixie Drive
Dayton, OH 45439
(513) 294-0586
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Medical, Banking, Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1967
Number of Employees: 35

ADVANCED COMPUTER TECHNIQUES
16 E. 32nd St.
New York, NY 10016
(212) 698-3600
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Banking, Medical, Manufacturing
Target Applications: Custom Application
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: Lesley Hersh
Year Established: 1962
Number of Employees: 350

ADVANCED CYBERNETICS
4 Park Plaza Road N.
Wyomissing, PA 19610
(215) 374-2207
Major Markets: Data Services (Service Bureau)
Target Industries: Insurance; Manufacturing; Retail
Target Applications: Accounting
Contacts:
Head of Sales: William Buoni
Head of Software: Steve Bobick
Year Established: 1969
Number of Employees: 90

ADVANCED DATA MANAGEMENT
1517 Main St.
Kingston, NJ 08528
(609) 799-4500
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Applications: DBMS
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Robert M. Gross
Head of Software: P. J. Woodrow
Year Established: 1969
Number of Employees: 32

ADVANCED DATA MANAGEMENT, INC.
1976 Sheridan Drive
Tonawanda, NY 14223
(716) 874-5650
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1975
Number of Employees: 23

ADVANCED DATA SYSTEMS, INC.
4010 Long Beach Blvd.
Long Beach, CA 90807
(213) 426-8155
Major Markets: Data Services (Service Bureau)
Target Industries: Accounting, Restaurant, Architecture
Year Established: 1969
Number of Employees: 25

ADVANCED INFORMATION MANAGEMENT
20 Kilby
Boston, MA 02109
(617) 367-1612
Target Industries: DP; Finance
Target Applications: DP; Financial
Contacts:
Head of Sales: Michael Ailes
Head of Software: Edward Tighe
Year Established: 1978
Number of Employees: 75

ADVANCED INFORMATION SYSTEMS, INC.
776 Bush Court
Columbus, OH 43299
(614) 846-6600
Major Markets: OEM (Computer Systems); Dealer/Distributor
Target Industries: Financial, Auto Dealers
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1979
Number of Employees: 8

ADVANCED MANAGEMENT RESEARCH, INC.
125 Wolf Road
Albany, NY 12205
(518) 458-1239
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Medical, Country Clubs
Target Applications: Business
Year Established: 1980
Number of Employees: 6

ADVANCED MICRO TECHNIQUES
Suite 209
1291 E. Hillsdale Blvd.
Foster City, CA 94404
(415) 349-9336
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software/Engineering: Ed L. Bank
Year Established: 1977
Number of Employees: 5

ADVANCED SOFTWARE PRODUCTS, INC.
Tower B
100 E. Linton Blvd.
Delray Beach, FL 33444
(305) 276-5080
Major Markets: Systems House (Commercial OEM)
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1976
Number of Employees: 12

ADVANCED SYSTEMS APPLICATIONS, INC.
P.O. Box 385
Bloomingdale, IL 60108
(312) 893-9055
Major Markets: Data Services (Service Bureau)
Target Industries: Insurance
Year Established: 1977
Number of Employees: 300

ADVANCED SYSTEMS CONCEPTS, INC.
22 Hudson Place
Hoboken, NJ 07030
(201) 798-6400
Target Industries: Banking, Commercial, Engineering, Education
Target Applications: DEC-IBM Communications
Contacts:
Head of Sales: Benjamin Rosenberg
Head of Software: David Schwartz
Year Established: 1981
Number of Employees: 10

ADVANCED TECHNOLOGY ENTERPRISES
3700 Park Blvd.
Palo Alto, CA 94306
(415) 493-5930
Major Markets: Office Equipment Manufacturing, Dealer/Distributor
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978
Number of Employees: 10

ADVANCED TECHNOLOGY SYSTEMS
800 Washington St.
P.O. Box 326
S. Easton, MA 02375
(617) 238-7033
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Manufacturing; Warehousing
Target Applications: Robotics, Conveyors; Inventory control
Net Sales: $1 Million — $5 Million (1980)
Contacts:
Head of Software: Tom G. McGinty
Head of Engineering: Al Tolivasa
Year Established: 1980
Number of Employees: 23

ADVENTURE INTERNATIONAL
P.O. Box 3435
Longwood, FL 32750
(305) 862-6917
Target Applications: Recreational
Year Established: 1978
Number of Employees: 30

AERONAUTICAL RESEARCH ASSOCIATES OF PRINCETON
Advanced Data Management
15-17 Main St.
Kingston, NJ 08528
(609) 799-4500
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Banking; Library; Commodity brokers
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Robert Gross
Head of Software: Peter Woodrow
Year Established: 1969
Number of Employees: 30

AFCAD SYSTEMS, INC.
314 Rt. 22
Green Brook, NJ 08812
(201) 752-0940
Contacts:
Head of Software: John Reber
Year Established: 1978
Number of Employees: 10

AGENCY COMPUTER SYSTEMS, INC.
Suite 200
1900 W. Big Beaver
Troy, MI 48084
(313) 649-1720
Target Industries: Insurance
Year Established: 1979
Number of Employees: 6

AGENCY DATA GUIDANCE, INC.
4430 Belden Village Ave.
Canton, OH 44718
(216) 492-4466
Major Markets: Systems House (Commercial OEM)
Target Industries: Insurance
Target Applications: Accounting, WP, Claim processing
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1972
Number of Employees: 31

AGLAND COMPUTER SYSTEMS
804 Main St.
Everly, IA 51338
(712) 834-2216
Target Industries: Agriculture
Target Applications: Grain Management, Financial Accounting
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1976
Number of Employees: 15

AGRI-DATA SYSTEMS, INC.
Suite 203
2001 E. Campbell
Phoenix, AZ 85016
(602) 944-1588
Year Established: 1971
Number of Employees: 6

AGRIMETRICS ASSOCIATES, INC.
P.O. Box 34190
Richmond, VA 23234
(804) 748-8176
Major Markets: Maintenance/Other Services
Target Industries: Poultry; Animal feed manufacturing
Year Established: 1986
Number of Employees: 20

AGS MANAGEMENT SYSTEMS, INC.
333 Market St.
Philadelphia, PA 19106
(215) 265-1550
Target Industries: Construction; Engineering; Manufacturing, R&D
Target Applications: R&D; Project Management
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1969
Number of Employees: 80

AIS / APPLIED INFORMATION DEVELOPMENT, INC.
823 Commerce Drive
Oak Brook, IL 60521

Vendors

(312) 654-3030
Major Markets: Component Manufacturing; OEM (Computer Systems); Dealer/Distributor, Maintenance/Other Services
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1968
Number of Employees: 300

AIDS
1130 S. 350 E.
Provo, UT 84603
(801) 373-2437
Major Markets: Systems House (Commercial OEM)
[illegible]
Head of Sales/Software: Tim Deardeuff
Year Established: 1980
Number of Employees: 8

AIMS-INC.
836 Ritchie Highway
Severna Park, MD 21146
(301) 544-0470
Major Markets: Peripheral Manufacturing; OEM (Computer Systems), OEM (Peripherals/Terminals); Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Education, Construction
Target Applications: Payroll; Budget, Scheduling, WP
Net Sales: $1 Million — $5 Million (1981)
[illegible]
Head of Sales: Gary Q. Green
Head of Software/Engineering: Steven Fox
Year Established: 1976
Number of Employees: 20

[illegible]
Suite 200
5000 E. Ben White Blvd.
Austin, TX 78741
(512) 385-0702
Contacts:
Head of Sales: Glen Watkins
Head of Software: Carol Rivman
Year Established: 1978
Number of Employees: 21

[illegible]
374 Delaware Ave.
Buffalo, NY 14202
(716) 855-0055
Year Established: 1979
Number of Employees: 17

[illegible]
6716 Production Ave.
San Diego, CA 92121
[illegible]
Major Markets: Computer Manufacturing; OEM (Peripherals/Terminals)
Target Applications: General Business; Software Development
Net Sales: $1 Million — $5 Million (1982)
[illegible]
Head of Software: William Allen
Year Established: 1979
Number of Employees: 10

ALEXANDER PROGRAMMING CORP.
420 Lexington Ave.
New York, NY 10117
(212) 986-1914
Target Industries: Banking
Year Established: 1972
Number of Employees: 12

ALLEN & ASSOCIATES, LTD.
4001 W. Green Tree Road
Milwaukee, WI 53209
(414) 352-2680
Major Markets: Systems House (Commercial OEM)
Target Industries: Distribution, Marketing, Property Management
Target Applications: Financial Modeling; Property Management
Contacts:
Head of Sales: Alan Greene
Head of Software: Susan Hamilton
Year Established: 1974
Number of Employees: 20

ALLEN M. ASHLEY
395 Sierra Madre Villa
Pasadena, CA 91107
(213) 793-5748
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1977
Number of Employees: 4

ALLIED INFORMATION SYSTEMS
Bunker Ramo Information Systems
35 Nutmeg Drive
Trumbull, CT 06609
(203) 386-2000
Major Markets: Terminal/Peripheral and Office Equipment Manufacturing, OEM (Peripherals/Terminals), Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Banking, Brokerage, Insurance
Target Applications: On-line Teller Terminal; Investment Information
[illegible]
Head of Sales: Paul R. Cooper
Head of Software: J. Wm. Howard Jr.
Head of Engineering: Robert Duggan
Year Established: 1929
Number of Employees: 1,900

ALPHA BETA DATA SERVICES, INC.
8640 W. 3rd St.
Los Angeles, CA 90048
(213) 271-1911
Major Markets: Computer Manufacturing; Data Services (Service Bureau)
Target Applications: Data Entry; WP
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Linda Ferrantino
Head of Software: Richard Lovelace
[illegible]
Number of Employees: 46

ALPHAMETICS
P.O. Box 339
Forestville, CA 95436
(707) 887-7237
Target Applications: Instructional; Games, Small Business
[illegible]
Number of Employees: 65

ALPHA SOFTWARE CORP.
12 New England Executive Park
Burlington, MA 01803
(617) 229-2924
Major Markets: Maintenance/Other Services
Target Industries: Retail
Contacts:
Head of Sales: Howard March
Year Established: 1981
Number of Employees: 15

ALPHA SYSTEMS LTD.
316 N. Michigan Ave.
Chicago, IL 60601
(312) 346-0707
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Legal; Accountants, Business Services
Target Applications: Accounting; Legal Billing, Communications, WP
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1979
Number of Employees: 8

ALPHA SYSTEMS, INC.
1329 Old Worcester Road
Framingham, MA 01701
(617) 620-0983
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Robert H. Lafleur
Year Established: 1974
Number of Employees: 5

ALPINE DATA SYSTEMS, INC.
8043 S.W. Cirrus Drive
Beaverton, OR 97005
(503) 641-8100
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Legal; Accountant; Architectural Engineering
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Byron Wilkes
Head of Software: William Montgomery
Year Established: 1977
Number of Employees: 84

ALR SYSTEMS & SOFTWARE, INC.
10334 Ellison Circle
Omaha, NE 68134
(402) 493-5502
Major Markets: OEM (Computer Systems), OEM (Peripherals/Terminals)
Target Industries: Distribution; Farming
Target Applications: General Accounting; Order Processing, Documentation; Inventory Control
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: George J. Kalil
Year Established: 1970
Number of Employees: 9

ALTERAC PRODUCTS, INC.
[illegible]
400 W. Cummings Park
Woburn, MA 01801
(617) 938-6611
Target Industries: IBM users
Year Established: 1981
Number of Employees: 12

THE ALTERNATE SOURCE
704 N. Penn Ave.
Lansing, MI 48906
(517) 482-8270
Year Established: 1980
Number of Employees: 4

AMALGAMATED SOFTWARE OF NORTH AMERICA, INC.
P.O. Box 1068
Malibu, CA 90265
(213) 456-7186
Target Industries: IBM Systems Users
Year Established: 1975

AMBERLAND CORP.
1 Broadway
Taunton, MA 02780
(617) 823-7400
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Accountants; Manufacturing
Target Applications: Inventory, General Accounting, Tax
[illegible]
Head of Sales: Carlton Caron
Year Established: 1976
Number of Employees: 25

AMCOR COMPUTER CORP.
Agency Records Control Corp.
1900 Plantside Drive
Louisville, KY 40299
(502) 491-9820
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Education; Government, Finance; Distribution
Target Applications: Finance, Distribution
[illegible]
Head of Software/Engineering: James Sexton
Year Established: 1970
Number of Employees: 65

AMDAHL CORP.
1250 E. Arques Ave.
P.O. Box 470
Sunnyvale, CA 94086
(408) 746-7116
Major Markets: Component, Computer, Peripheral and Communications Equipment Manufacturing; OEM (Computer Systems); Dealer/Distributor; Maintenance/Other Services
Target Applications: Project Productivity
Net Sales: More than $100 Million (1982)
[illegible]
Head of Software: Fredrick M. Trapnell Jr.
Head of Engineering: Bruce O'Beebe
Year Established: 1970
Number of Employees: 5,300

AMERICAN BUSINESS [illegible]
412 E. Walnut
Springfield, MO 65806
(417) 862-4304
Major Markets: Systems House (Commercial OEM); [illegible]
Target Industries: Real Estate; Medical, Government
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Kevin P. [illegible]
Year Established: 1950
Number of Employees: 14

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
4520 W Kennedy Blvd
Tampa, FL 33609
(813) 876-2032
Major Markets: Dealer/Distributor; Maintenance/Other Services
Year Established: 1976

AMERICAN AUTOMATED
P O Box 45055-Airport
Atlanta, GA 30320
(404) 768-3536
Major Markets: Data Services (Service Bureau)
Target Industries: Banking
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Thomas Garrett
Head of Software: James Sweezy
Year Established: 1966
Number of Employees: 25

AMERICAN BUSINESS SYSTEMS, INC.
3 Littleton Road
Westford, MA 01886
(617) 692-2600
Target Industries: Accounting; Finance
Contacts:
Head of Sales: Betty Baker
Year Established: 1978
Number of Employees: 12

AMERICAN COMPUTER & ELECTRONICS CORP.
Suite 242
2 Professional Drive
Gaithersburg, MD 20879
(301) 258-9850
Major Markets: Peripheral Manufacturing, OEM (Computer Systems); OEM (Peripherals/Terminals); Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Military; Telecommunication
Target Applications: Special Military Equipment, OA; Telephone Company Automation
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Dave Ercole
Head of Software: Kim Richeson
Year Established: 1965
Number of Employees: 100

AMERICAN COMPUTER TECHNOLOGIES, INC.
1821 Summit Road
Cincinnati, OH 45237
(513) 948-8607
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Retail, Manufacturing; Distribution; Printing
Contacts:
Head of Engineering: Richard Lozier
Year Established: 1979
Number of Employees: 35

AMERICAN COMPUTERS, INC.
Park Town Place
2200 Ben Franklin Pkwy.
Philadelphia, PA 19130
(215) 567-5353
Major Markets: Systems House (Commercial OEM)
Target Industries: Pharmacy; Printing, Automobile
Target Applications: Order Processing; Billing; Payroll; Accounting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Jim Greeley
Year Established: 1975
Number of Employees: 8

AMERICAN FRANKLIN CO.
Data Services Division
Franklin Square
Springfield, IL 62713
(217) 528-2911
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Gary Carter
Year Established: 1970
Number of Employees: 65

AMERICAN MANAGEMENT SYSTEMS, INC.
1777 N Kent St.
Arlington, VA 22209
(703) 841-6000
Major Markets: Systems House (Commercial OEM)
Target Industries: Oil and Gas; Government; Fortune 1000
Target Applications: Property Appraisals, Financial
Net Sales: $25 Million — $100 Million (1981)
Year Established: 1970
Number of Employees: 1,000

AMERICAN MICRO DYNAMICS, INC.
E. Tower Suite 760
4000 MacArthur Blvd.
Newport Beach, CA 92660
(714) 833-1487
Year Established: 1982
Number of Employees: 11

AMERICAN PHARMACY COMPUTER, INC.
3 Hillwood Park
Alabaster, AL 35007
(205) 663-5683
Major Markets: Computer Manufacturing
Target Industries: Pharmacies; Hospitals
Year Established: 1983
Number of Employees: 10

AMERICAN PLANNING CORP.
Suite 423
4600 Duke St.
Alexandria, VA 22304
(703) 751-2574
Contacts:
Head of Sales: Tim Alex
Head of Software/Engineering: Bill Gill
Year Established: 1976
Number of Employees: 14

AMERICAN RESOURCE SYSTEMS
Suite 300
2701 Union Ext.
Memphis, TN 38112
(901) 452-6130
Major Markets: Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Engineering: Patricia Pope
Year Established: 1973
Number of Employees: 17

AMERICAN SOFTWARE CORP.
187 E Blithedale Ave.
Mill Valley, CA 94941
(415) 381-1600
Target Industries: Real estate
Target Applications: Property Management; Property Analysis; Development Systems
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Engineering: Damon Brown
Year Established: 1979
Number of Employees: 12

AMERICAN SOFTWARE, INC.
443 E Paces Ferry Road
Atlanta, GA 30305
(404) 261-4381
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing; Distributor
Contacts:
Head of Engineering: Don Thomas
Year Established: 1970
Number of Employees: 125

AMERICAN SYSTEMS CORP.
1632 Denniston
Pittsburgh, PA 15217
(412) 421-4446
Major Markets: Systems House (Commercial OEM)
Target Industries: Auto
Target Applications: Warehouse
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975

AMERICAN SYSTEMS, INC. (MI)
820 N. Washington Ave.
Lansing, MI 48906
(517) 482-2715
Year Established: 1974
Number of Employees: 6

AMERICAN SYSTEMS, INC. (TN)
725 Melpark Drive
Nashville, TN 37204
(615) 386-4850
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Insurance
Target Applications: Insurance Rating and Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 10

AMERICAN VIDEO RESOURCES, INC.
5555 Columbia Pike
Arlington, VA 22204
(703) 379-8844
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Government; Education
Year Established: 1980
Number of Employees: 2

AMHERST SYSTEMS, INC.
132 Cayuga Road
Buffalo, NY 14225
(716) 631-0610
Major Markets: OEM (Computer Systems)
Target Industries: Engineering, Process Control, Retail
Target Applications: POS
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software/Engineering: Donald A Hess
Year Established: 1975
Number of Employees: 17

AMICON CORP.
101 Gregory Lane
Pleasant Hill, CA 94523
(415) 827-1416
Target Industries: Legal; Industrial
Target Applications: Billing, Property Management, Financial Systems, Spreadsheet
Year Established: 1978
Number of Employees: 10

AM INTERNATIONAL, INC.
Bruning Division
1800 Bruning Drive W.
Itasca, IL 60143
(312) 351-2900
Major Markets: OEM (Computer Systems)
Target Industries: Engineering; Manufacturing; Architecture
Target Applications: CAD; Two- and Three-Dimensional Drawing
Year Established: 1897
Number of Employees: 1,500

AMPERO SOFTWARE PRODUCTS
Suite 12A
5230 Clark Ave.
Lakewood, CA 90712
(213) 866-3783
Year Established: 1980
Number of Employees: 5

AMPERSAND CORP.
P.O Box M84
York, PA 17405
(717) 845-5602
Major Markets: Systems House (Commercial OEM)
Target Industries: Finance
Year Established: 1967
Number of Employees: 10

AMPORT AND ASSOCIATES
7880 Chagrin Road
Chagrin Falls, OH 44022
(216) 543-2411
Major Markets: OEM (Peripherals/Terminals); Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Chemical; Manufacturing; Insurance; Financial
Year Established: 1980

AMACOMP, INC.
Commercial System Division
12838 S.E. 40th Place
Bellevue, WA 98006
(206) 641-4990
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Manufacturing; Distributors
Net Sales: $1 Million — $5 Million (1981)

Vendors

Contacts:
Head of Software: William Glenn
Year Established: 1974
Number of Employees: 40

ANACOMP, INC.
Cleveland Computer Systems Division
1100 Keith Blvd.
Cleveland, OH 44115
(216) 579-0080
Major Markets: Systems House (Commercial OEM)
Target Industries: Banking; Industrial Control
Contacts:
Head of Software: Robert W. Porter
Year Established: 1969
Number of Employees: 70

ANACOMP, INC.
Bankserv Systems Division
1010 S. Kings Highway
Cherry Hill, NJ 08034
(609) 795-1515
Major Markets: Systems House (Commercial OEM)
Target Industries: Banking; Retail; Finance
Target Applications: Loan System; Time Deposit; Transaction Switching
Year Established: 1983
Number of Employees: 100

ANALOGIC CORP.
Converter Products Division
Audubon Road
Wakefield, MA 01880
(617) 246-0300
Major Markets: Component, Peripheral and Communications Equipment Manufacturing
Target Industries: Video; Process Control; Audio, Communications
Year Established: 1969
Number of Employees: 200

ANALOGICS, INC.
Suite 101
31332 Via Colinas
Westlake Village, CA 91362
(213) 991-2229
Major Markets: Dealer/Distributor
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977

ANALYSIS & MEASUREMENT SERVICE, INC.
4706 Papermill Road
Knoxville, TN 37919
(615) 588-9709
Major Markets: OEM (Computer Systems)
Target Industries: Industrial labs; Nuclear
Target Applications: Data Acquisition, Analysis; Monitor
Contacts:
Head of Software/Engineering: Kent Peterson
Year Established: 1977
Number of Employees: 20

ANALYSIS RESEARCH AND COMPUTATION, INC.
Suite 201
3701 N. Lamar
Austin, TX 78705
(512) 459-1941
Major Markets: Maintenance/Other Services
Target Applications: Logistics
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1974
Number of Employees: 10

ANALYSIS & TECHNOLOGY, INC.
Computer Division
P.O. Box 220
N. Stonington, CT 06359
(203) 599-3910
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Government
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Software: Michael Fleck
Head of Engineering: Dr. Herman Sheets
Year Established: 1969
Number of Employees: 550

ANALYST INTERNATIONAL CORP.
440 Cross Keys Office Park
Fairport, NY 14450
(716) 425-1622
Major Markets: Maintenance/Other Services
Net Sales: $25 Million — $100 Million (1981)
Year Established: 1966
Number of Employees: 700

ANALYTICAL DATA SYSTEMS, INC.
2901 Auburn Road
Auburn Heights, MI 48057
(313) 852-4550
Major Markets: Systems House (Commercial OEM)
Year Established: 1977
Number of Employees: 12

THE ANALYTIC SCIENCES CORP.
Information Sciences
1 Jacob Way
Reading, MA 01867
(617) 944-6850
Target Industries: Defense; Utilities; Real Estate; Banking
Contacts:
Head of Software: Stuart Greenberg
Year Established: 1966
Number of Employees: 475

ANATEC, INC. (ANACONDA ADVANCED TECHNOLOGY)
6360 Dublin Industrial Lane
Dublin, OH 43017
(614) 889-1041
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Chemical; Pharmaceutical; Food Processing; Utilities
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Gil Williams
Year Established: 1972
Number of Employees: 200

ANDERSON-BELL
5336 S. Crucker St.
Littleton, CO 80120
(303) 794-7526
Target Applications: Statistical

ANDERSON-DENTON ASSOCIATES, INC.
P.O. Box 1504
Hobbs, NM 88240
(505) 393-2718
Major Markets: Maintenance/Other Services
Target Industries: Government; Banking, Oil and Gas
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1980
Number of Employees: 7

ANDREW BELLINGHEIM ASSOCIATES
88 Rising Trail Drive
Middletown, CT 06457
(203) 632-5421
Target Industries: Manufacturing; Distribution
Target Applications: Accounting Systems; Direct Mail; Cash Management
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 1

ANDREW RUBEL & ASSOCIATES, INC.
Rubel Software Division
215 1st St.
P.O. Box 286
Cambridge, MA 02142
(617) 876-7993
Year Established: 1979
Number of Employees: 10

ANDROMEDA SYSTEMS, INC.
9000 Eton Ave.
Canoga Park, CA 91304
(213) 709-7600
Major Markets: Component, Computer and Terminal Manufacturing; Systems House (Commercial OEM)
Target Industries: Scientific
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1977
Number of Employees: 25

ANGELES COMPUTER, INC.
P.O. Box 1267
Port Angeles, WA 98362
(206) 452-7881
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Accounting; Auto Dealers; Small Business; Agriculture; CPA
Year Established: 1979
Number of Employees: 4

ANIMATION SYSTEMS, INC.
11317 Sunset Hills Road
Reston, VA 22090
(703) 471-0740
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing
Year Established: 1982
Number of Employees: 5

ANISTICS, INC.
640 Fifth Ave.
New York, NY 10019
(212) 541-6050
Major Markets: Maintenance/Other Services
Target Industries: Fortune 1000
Target Applications: Risk Management
Net Sales: $5 Million — $25 Million (1982)
Year Established: 1969
Number of Employees: 130

ANNSON CORP.
4350 Oakton St
Skokie, IL 60076
(312) 673-1184
Year Established: 1980
Number of Employees: 11

ANSWER CORP.
502A N. Second Ave.
Sandpoint, ID 83864
(208) 263-1213
Target Industries: Apple
Target Applications: Apple utilities
Contacts:
Head of Engineering: Jerry Tifft
Year Established: 1981

A. O. SMITH DATA SYSTEMS
8901 N. Kildeer Court
Brown Deer, WI 53209
(414) 357-2900
Major Markets: Data Services (Service Bureau)
Target Industries: Manufacturing; Engineering; Banking
Target Applications: CAD/CAM; ATM; Manufacturing Control
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Engineering: R. Y. Bodine
Year Established: 1961
Number of Employees: 225

A. P. COMPUTER PRODUCTS
8 Division St.
Holtsville, NY 11742
(516) 698-8636
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Small Business; Printing; Medical; Manufacturing
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Kathy Lyons
Head of Software: Jim Lyons
Year Established: 1979
Number of Employees: 14

APEX DATA GROUP
8464 E. Grant Road
Tucson, AZ 85715
(602) 298-1991
Major Markets: Systems House (Commercial OEM)
Target Industries: Accounting; Health Industry
Contacts:
Head of Software: John Armstrong
Head of Engineering: Sally Ponce
Year Established: 1977
Number of Employees: 35

APEX DATA PROCESSING, INC.
950 S. Eastern Ave.
Los Angeles, CA 90022
(213) 264-3600
Major Markets: Data Services (Service Bureau)
Target Industries: Manufacturing
Target Applications: MRP
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Jack Brown
Head of Software: John Capelu
Year Established: 1962
Number of Employees: 35

APL COMPUTERS, INC.
P.O. Box 167
Chappaqua, NY 10514

(914) 238-8700
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Construction
Year Established: 1977
Number of Employees: 2

APL CONSULTING SERVICES, INC.
Suite 604
2 Greenway Plaza E.
Houston, TX 77046
(713) 871-9719
Major Markets: Maintenance/Other Services
Year Established: 1981
Number of Employees: 10

APOLLO COMPUTER SYSTEMS, INC.
616 14th St.
Arcata, CA 95521
(707) 822-0318
Major Markets: Data Services (Service Bureau)
Target Industries: Education; Medical
Target Applications: Accounting
Contacts:
Head of Sales: Barbara Applewhite
Head of Software: Tracy McCurdy
Year Established: 1976
Number of Employees: 7

APPARAT, INC.
4401 S. Tamarac Pkwy.
Denver, CO 80237
(303) 741-1778
Major Markets: Component and Peripheral Manufacturing; Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: General Business, Application
Target Applications: Data Base
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: Lois Lauletta
Head of Software: Jean Matthews
Head of Engineering: Billy Roach
Year Established: 1978
Number of Employees: 35

APPAREL COMPUTER SYSTEMS, INC.
1485 Enea Court
Concord, CA 94520
(415) 827-3820
Major Markets: OEM (Computer Systems)
Target Industries: Apparel
Target Applications: Accounts Receivable, Production
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 35

APPLICATION DEVELOPMENT SERVICES
Suite 214
1700 E. Dyer Road
Santa Ana, CA 92705
(714) 751-7750
Major Markets: Maintenance/Other Services
Target Applications: Documentation; Inventory; Distribution
Net Sales: $100,000 —$500,000 (1981)
Year Established: 1977
Number of Employees: 7

APPLICATION DEVELOPMENT SYSTEMS, INC.
1530 Meridian Ave.
P.O. Box 6600
San Jose, CA 95125
(408) 264-2272
Target Applications: Programmer productivity, DBMS
Contacts:
Head of Sales: Edward F. Harris
Year Established: 1973
Number of Employees: 14

APPLICATION SOFTWARE CORP.
Suite 100
18010 Skypark Circle
Irvine, CA 92714
(714) 751-3090
Target Industries: Manufacturing; Distribution, Wholesale, Professional
Target Applications: Job costing; Membership and Property management
Contacts:
Head of Software: George Riviere
Year Established: 1974
Number of Employees: 50

APPLICATIONS PROGRAMMING
11 W. 2nd St.
Moorestown, NJ 08057
(609) 234-0099
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1966
Number of Employees: 6

APPLICATIONS SOFTWARE, INC.
21515 Hawthorne Blvd.
Torrance, CA 90503
(213) 540-0111
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1967
Number of Employees: 21

APPLIED ADVANCED MANAGEMENT RESEARCH, INC.
Suite 101
9740 Appaloosa Road
San Diego, CA 92131
(714) 578-3003
Major Markets: Systems House (Commercial OEM)
Target Applications: Generators; Critical task analysis, Financial modeling; Graphics
Year Established: 1977
Number of Employees: 50

APPLIED ANALYTICS, INC.
Suite 212
8235 Tenn-Randall Place
Upper Marlboro, MD 20772
(301) 627-6650
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Scientific
Year Established: 1980
Number of Employees: 5

APPLIED BASIC SYSTEMS, INC.
39 S. Main St.
Spring Valley, NY 10977
(914) 352-0959
Major Markets: Data Services (Service Bureau)
Target Industries: Retail
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1976
Number of Employees: 6

APPLIED BUSINESS SYSTEMS
4350 Upper Soda Road
Dunsmuir, CA 96025
(916) 235-4551
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Service, Mail Order; Wholesale Distribution
Target Applications: Documentation
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: J. W. Rhinesmith Sr.
Head of Software: Mario Gesselin
Head of Engineering: Edwin Snyder
Year Established: 1975
Number of Employees: 15

APPLIED BUSINESS TECHNOLOGIES, INC.
3712 Garrett Road
Drexel Hill, PA 19026
(215) 259-7676
Major Markets: Systems House (Commercial OEM)
Net Sales: $100,001 — $300,000 (1981)
Year Established: 1976
Number of Employees: 10

APPLIED COMMUNICATIONS, INC.
Marketing Communications Division
206 S. 108th Ave.
Omaha, NE 68154
(402) 330-3732
Major Markets: Maintenance/Other Services
Target Industries: Financial
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Software: Norman Lond
Year Established: 1975
Number of Employees: 130

APPLIED COMPUTER SYSTEMS, INC. (CO)
Suite 201
650 Corporate Circle
Golden, CO 80401
(303) 279-6473
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Small Business; Education
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Richard A. Leach
Year Established: 1979
Number of Employees: 7

APPLIED COMPUTER SYSTEMS, INC. (GA)
Suite F
4327 Memorial Drive
Decatur, GA 30032
(404) 292-1787
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1977
Number of Employees: 12

APPLIED COMPUTER TECHNOLOGY, INC.
60 S. Hartford Tnpk.
P.O. Box 1419
Wallingford, CT 06492
(203) 265-1828
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau); Dealer/Distributor
Target Industries: Distribution, Municipalities
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: David Chudleigh
Year Established: 1980
Number of Employees: 8

APPLIED CYBERNETICS, INC.
224 Camino Del Cerro
Los Gatos, CA 95030
(415) 651-3000
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing; Programming
Year Established: 1977
Number of Employees: 2

APPLIED DATA CORP.
2906 S.E. Loop 820
Fort Worth, TX 76133
(817) 293-0635
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Distribution
Year Established: 1978
Number of Employees: 7

APPLIED DATA RESEARCH, INC.
Rt. 206
Orchard Road
Princeton, NJ 08540
(201) 874-9000
Major Markets: Maintenance/Other Services
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Sales: E. Linwood Pearce
Head of Software: Martin A. Goetz
Year Established: 1959
Number of Employees: 825

APPLIED DATA SYSTEMS, INC.
Dealer Services Division
8233 Via Paseo Del Norte
Scottsdale, AZ 85258
(602) 998-3980
Major Markets: OEM (Computer Systems); OEM (Peripherals/ Terminals); Systems House (Commercial OEM)
Target Industries: Equipment Distributor, Manufacturing
Target Applications: Order Entry POS; Financial; Leasing/Renting; Maintenance Service
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Software: Ross Shaw
Year Established: 1975
Number of Employees: 72

APPLIED DATA, INC.
11 Grasmere Road
Ft. Lauderdale, CT 33309
(203) 787-4107
Major Markets: Data Services (Service Bureau)
Target Industries: Manufacturing

Vendors

Target Applications: MRP, Data Entry, Payroll; A/R, A/P, General Ledger
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Robert McNiff
Year Established: 1961
Number of Employees: 100

APPLIED DIGITAL COMMUNICATIONS, INC.
214 Flynn Ave.
Moorestown, NJ 08057
(609) 234-3666
Major Markets: Systems House (Commercial OEM)
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1973

APPLIED ELECTRONICS CORP.
638 Logan
Helena, MT 59601
(406) 442-6665
Major Markets: OEM (Peripherals/Terminals); Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Banking, Accountants, Small business, Legal
Target Applications: Accounting; Statistics, Billing, Communications
Year Established: 1977
Number of Employees: 8

APPLIED FINANCIAL SYSTEMS, INC.
951 Manners Isle Blvd
San Mateo, CA 94404
(415) 574-4940
Major Markets: Data Services (Service Bureau)
Target Industries: Banking, Corporations, Management
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Michael Allen
Year Established: 1968
Number of Employees: 100

APPLIED I
Suite 214
200 California Ave
Palo Alto, CA 94306
(415) 325-4800
Year Established: 1978
Number of Employees: 2

APPLIED INFORMATION MANAGEMENT SCIENCES, INC.
2813 DeSiard
Monroe, LA 71201
(318) 323-2467
Major Markets: Systems House (Commercial OEM), Dealer/Distributor
Target Industries: Wholesale Distribution, Oil and Gas, Accountants, Garment
Target Applications: Time and Charge, Accounting, Inventory
Year Established: 1968
Number of Employees: 12

APPLIED MICROCOMPUTER SYSTEMS, INC.
P O Box 53
Hudson, NY 12534
(518) 828-3565
Major Markets: Maintenance/Other Services
Target Industries: Health Care, Legal
Year Established: 1979
Number of Employees: 6

APPLIED MICROCOMPUTER TECHNOLOGY
59 Mount Hermon Road
Scotts Valley, CA 95066
(408) 438-1608
Major Markets: Systems House (Commercial OEM), Dealer/Distributor, Maintenance/Other Services
Target Industries: Distribution
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Dennis Silva
Head of Software: Brent Olander
Year Established: 1977
Number of Employees: 8

APPLIED PERSONNEL TIMESHARE
2400 Brown Ave
Bloomington, IN 47401
(812) 332-1006
Major Markets: Data Services (Service Bureau)
Target Industries: Manufacturing, Retail
Target Applications: Order Processing, Accounts Receivable, General Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Gary Eubanks
Year Established: 1969
Number of Employees: 2

APPLIED REALTIME SYSTEMS, INC.
Suite 100
1908 Clearview Pkwy.
Metairie, LA 70001
(504) 456-0660
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau), Dealer/Distributor; Maintenance/Other Services
Net Sales: $500,000 — $1 Million (1980)
Contacts:
Head of Software: S.W. Collins
Year Established: 1978
Number of Employees: 12

APPLIED RESEARCH, INC.
Suite 216
6151 W. Century Blvd.
Los Angeles, CA 90045
(213) 670-0811
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Year Established: 1979
Number of Employees: 200

APPLIED SOFTWARE TECHNOLOGY
170 Knowles Drive
Los Gatos, CA 95030
(408) 370-2662
Target Applications: Forms processing, Data base, Records
Year Established: 1981
Number of Employees: 21

APPLIED SOFTWARE, INC.
Suite 204
4440 P.G.A. Blvd.
Palm Beach Gardens, FL 33410
(305) 626-4818
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1973
Number of Employees: 5

APPLIED SOLUTIONS, INC.
1525 Madison Road
Cincinnati, OH 45206
(513) 281-0334
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Manufacturing; Distribution, Medical, General Business
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 15

APPLIED SYSTEMS, INC.
U.S. Rt. 4
Barrington, NH 03825
(603) 868-2844
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Education
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1969
Number of Employees: 8

APPLIED TECHNOLOGY
685 Howard St
Buffalo, NY 14206
(716) 847-2400
Major Markets: Component Manufacturing, OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Energy
Target Applications: Energy
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Robert Mahany
Head of Software: Clare Owens
Head of Engineering: Pete Fernandez
Year Established: 1974
Number of Employees: 45

APSO SYSTEMS, INC.
1400 Broadway
New York, NY 10018
(212) 221-6800
Major Markets: Systems House (Commercial OEM)
Target Industries: Apparel
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Mel Mintz
Year Established: 1978
Number of Employees: 12

APTECH COMPUTER SYSTEMS
135 Delta Drive
Pittsburgh, PA 15238
(412) 782-5550
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Lodging; Membership Organizations; Legal; Construction
Target Applications: Accounting; Hotel Management; Legal Management
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 45

AQE, INC.
810 Cardinal Lane
Hartland, WI 53029
(414) 367-5495
Major Markets: Dealer/Distributor
Target Industries: Insurance
Target Applications: Commercial Rating
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1978
Number of Employees: 15

AQUIDNECK DATA CORP.
P.O. Box 639
Newport, RI 02840
(401) 847-7260
Major Markets: OEM (Computer Systems); Data Services (Service Bureau)
Target Industries: U.S. Navy; Weapons
Target Applications: Weapons; Medical Systems; DEC VAX T/S
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Software: Everett Westcott
Head of Engineering: Ken Parker
Year Established: 1981
Number of Employees: 198

ARDAT SYSTEMS LTD.
5 Marine View Plaza
Hoboken, NJ 07030
(212) 269-1300
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Contacts:
Head of Sales: Mark Lobene
Year Established: 1975
Number of Employees: 110

ARCHITECTURAL COMPUTER SOFTWARE
P O Box 4811
Santa Barbara, CA 93103
(805) 966-4541
Year Established: 1979
Number of Employees: 3

ARENS APPLIED ELECTROMAGNETICS, INC.
4358 E. Diamond Ave.
Gaithersburg, MD 20877
(301) 258-0970
Major Markets: Data Services (Service Bureau); graphic systems
Target Industries: Antenna; Defense Intelligence
Contacts:
Head of Software: Virgil Arens
Year Established: 1969
Number of Employees: 18

ARGO DATA RESOURCE CORP.
Suite 123
4851 Keller Springs
Dallas, TX 75248
(214) 380-0050
Target Industries: Banking
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Bala Shagrithaya
Year Established: 1979
Number of Employees: 6

ARGONAUT INFORMATION SYSTEM, INC.
Suite 6
[illegible] Island Ave.

Oakland, CA 94610
(415) 444-5954
Year Established: 1971
Number of Employees: 50

ARIES INFORMATION SYSTEMS, INC.
Suite 370
7400 Metro Blvd.
Minneapolis, MN 55435
(612) 835-2366
Major Markets: Dealer/Distributor; Maintenance/Other Services
Target Industries: Cities, Counties; Education
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Jerry Peterson
Year Established: 1975
Number of Employees: 20

ARKANSAS SYSTEMS, INC.
Suite 202
[illegible] Kanis Road
Little Rock, AR 72205
(501) 227-8471
Major Markets: Maintenance/Other Services
Target Industries: Banking; General Business, Distribution
Target Applications: Central Information File
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Tom Major
Year Established: 1975
Number of Employees: [illegible]

ARRAY COMPUTER, INC.
24 Manor House Road
Newton Center, MA 02159
(617) 964-1894
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1973
Number of Employees: 5

ARMOR SYSTEMS
831 N. Mills Ave.
Orlando, FL 32803
(305) 898-5418
Target Industries: Dental; Real [illegible] Veterinary Services
Target Applications: Accounting; Inventory; Payroll; POS
Net Sales: $1 Million — $5 Million (1982)
Year Established: [illegible]
Number of Employees: 15

ARMSTRONG'S SYSTEMS HOUSE, INC.
28635 Hazelridge Drive
Rancho Palos Verdes, CA 90274
(213) 377-6559
Target Applications: Re-wholesale
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 1

ARNAYA, INC.
[illegible] Software Division
11223 S. Hindry Ave.
Los Angeles, CA 90045
(213) 417-3003
Year Established: 1981
Number of Employees: 70

ARNOOSH COMPUTER GRAPHICS
170 Knowles Drive
Los Gatos, CA 95030
(408) 370-1400
Major Markets: OEM (Computer System's); Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Architecture; Interior design; Facilities planning, Manufacturing
Target Applications: CAD/CAM
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software/Engineering: David [illegible]
Year Established: 1980

ARTHUR ANDERSEN & CO.
69 W. Washington
Chicago, IL 60602
(312) 580-0069
Major Markets: Maintenance/Other Services
Net Sales: More than $100 Million (1981)
Year Established: [illegible]
Number of Employees: 2,200

ARTHUR YOUNG & CO.
277 Park Ave.
New York, NY 10172
(212) 407-1500
Major Markets: Accounting and Consulting firm
Year Established: 1906

ARTIFICIAL INTELLIGENCE CORP.
[illegible]
Waltham, MA 02254
(617) 890-8400
Contacts:
[illegible]
Head of Software: Jeffrey Hill
Year Established: 1974
Number of Employees: 30

ARTISAN SOFTWARE TECHNOLOGY, INC.
Artisan Way
Colts Neck, NJ 07722
(201) 780-6907
Target Industries: Jewelry; News Distribution; Accounting
Target Applications: Accounting; Order Entry, Billing; Inventory
Net Sales: $100,000 — $500,000 [illegible]
Year Established: [illegible]
Number of Employees: 9

ART SCIENCE, INC.
[illegible]
N. Hollywood, CA 91601
(213) 985-5763
Target Industries: Professional
Target Applications: WP, OA; Spreadsheets
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1978
Number of Employees: 12

ARTS COMPUTER PRODUCTS, INC.
[illegible]
80 Boylston St.
Boston, MA 02116
(617) 482-6248
Major Markets: Component and Terminal Manufacturing, OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Education; Small Business
Target Applications: WP
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1977
Number of Employees: 58

ARTWORX
150 N. Main St.
Fairport, NY. 14450
(716) 425-2833
Target Industries: Distributors
Target Applications: Games, Educational, Utilities, General [illegible]
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Software, Dennis Zander
Year Established: 1981
Number of Employees: 7

ASA, INC.
[illegible] W. Dixon Park
3 Speen St.
Framingham, MA 01701
(617) 872-2709
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Distribution
Net Sales: $1 Million — $5 Million (1981)
Year Established: [illegible]
Number of Employees: 45

ASHTON, INC.
209 Tracy Creek Road
Vestal, NY 13850
(607) 748-0600
Year Established: 1969
Number of Employees: 9

ASHTON-TATE
10150 W. Jefferson Blvd.
Culver City, CA 90230
(213) 204-5570
Year Established: 1980
Number of Employees: 150

ASI COMPUTER SYSTEMS, INC.
P.O. Box 1527
Waterloo, IA 50704
(319) 235-6565
Major Markets: Systems House (Commercial OEM); [illegible]
Target Industries: Advertising; [illegible]
Net Sales: $500,000 — $1 Million (1981)
Year Established: [illegible]
Number of Employees: 12

ASI DATA SYSTEMS, INC.
P.O. Box 1755
Winter Park, FL 32790
[illegible]
Major Markets: Data Services (Service Bureau); Dealer/Distributor
Target Applications: Accounting; Inventory control; Property management
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1976
Number of Employees: 8

[illegible] INC.
730 Distel Drive
Los Altos, CA 94022
(415) 969-4442
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Manufacturing
Target Applications: Material Planning, Financials, [illegible] Accounting; Order Management
Net Sales: $5 Million — $25 Million [illegible]
Contacts:
Head of Software: Ken Fox
Year Established: 1974
Number of Employees: 350

A+ SOFTWARE, INC.
16 Academy St.
Skaneateles, NY 13152
(315) 685-6918
Target Applications: Documentation
Year Established: 1979
Number of Employees: 3

ASPEN SOFTWARE
P.O. Box 339-CW
Tijeras, NM 87059
(505) 281-1634
Target Industries: WP
Year Established: 1980
Number of Employees: 4

ASSOCIATED BUSINESS SYSTEMS, INC.
126 S. Hancock St.
P.O. Box 274
Rockingham, NC 28379
[illegible]
Major Markets: Systems House (Commercial OEM)
Target Industries: Accounting/Retail; Medical; Municipalities
Target Applications: Inventory; MIS
[illegible]
(1981)
Year Established: 1980
Number of Employees: 11

ASSOCIATED COMPUTER PRODUCTS, INC.
[illegible]
P.O. Box 304
Monroe, CT 06468
(203) 261-6504
Major Markets: Dealer/Distributor
[illegible]
(1982)
Year Established: 1976
Number of Employees: 25

ASSOCIATES III, INC.
Suite C
3230 Markville
Dallas, TX 75243
(214) 235-5992
Year Established: 1979
Number of Employees: 4

ASTEL, INC.
400 Hillside Ave
Needham, MA 02194
(617) 444-5551
Target Industries: Restaurants; General Business
Year Established: 1980
Number of Employees: 1,981

A. S. THOMAS, INC.
355 Providence Highway
[illegible]
(617) 329-9200
[illegible]
Target Industries: Metal Cutting
Target Applications: CAD/CAM
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1955
Number of Employees: 15

Vendors

ATHENA SYSTEMS, INC.
206 S. Broad St.
Pawcatuck, CT 06379
(203) 599-3061
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Applications: Graphics
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software/Engineering: Peter R. Bono
Year Established: 1978
Number of Employees: 10

ATLANTIC DATA SERVICES, INC.
Batterymarch Park
Quincy, MA 02169
(617) 770-3333
Target Industries: Banking
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: William Gallagher
Year Established: 1980
Number of Employees: 20

ATLANTIC MANAGEMENT SYSTEMS, INC.
320 Walnut St.
Philadelphia, PA 19106
(215) 922-7500
Target Applications: Project Management
Contacts:
Head of Sales: Lawrence Light
Year Established: 1970
Number of Employees: 50

ATOM SYSTEMS FISCAL, INC.
Suite 119
1765 Scott Ave.
Santa Clara, CA 95050
(408) 554-9922
Major Markets: Maintenance/Other Services
Year Established: 1979
Number of Employees: 2

AUD CYN ASSOCIATES, INC.
1259 Rt 46
Parsippany, NJ 07054
(201) 334-4042
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Contacts:
Head of Sales: Thomas Haselmann
Year Established: 1972
Number of Employees: 13

AUREUM CORP.
P.O. Box 1265
Laramie, WY 82070
(307) 745-8831
Major Markets: Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 4

AUSTEK SYSTEMS, INC.
2423 American Lane
Madison, WI 53704
(608) 243-0671
Major Markets: Maintenance/Other Services
Target Industries: Banking; Credit Bureaus
Contacts:
Head of Sales: Daniel Stein
Head of Software: Darryl Mataya
Year Established: 1981
Number of Employees: 8

AUSTIN MICRO SYSTEMS, INC.
Suite A121
3921 Steck Ave.
Austin, TX 78759
(512) 346-3954
Major Markets: Component Manufacturing; Systems House (Commercial OEM)
Target Industries: Insurance
Target Applications: Insurance
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1978
Number of Employees: 15

AUTODESK, INC.
16 St. Jude Road
Mill Valley, CA 94941
(415) 381-1819
Year Established: 1983

AUTODYNAMICS
300 Halls Mill Road
Freehold, NJ 07728
(201) 462-9400
Major Markets: OEM (Computer Systems); Maintenance/Other Services
Target Industries: Process Control
Target Applications: Training
Number of Employees: 200

AUTOLEASE DATA SYSTEMS
Suite 102
1503 S. Coast Drive
Costa Mesa, CA 92626
(714) 549-2256
Major Markets: Systems House (Commercial OEM)
Target Industries: Banking; Automobile Leasing
Target Applications: Accounting; Management
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1975
Number of Employees: 5

AUTOLOGUE DATA SYSTEMS, INC.
488 Lincoln Blvd.
Middlesex, NJ 08846
(201) 560-1170
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Auto Part Dealers
Year Established: 1978
Number of Employees: 20

AUTOMATED ACCOUNTING APPLICATIONS
Suite 355
5530 Corbin Ave.
Tarzana, CA 91356
(213) 343-4288
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 5

AUTOMATED ANALYSIS
14617 Victory Blvd.
Van Nuys, CA 91411
(213) 787-7700
Major Markets: OEM (Computer Systems); OEM (Peripherals/Terminals); Systems House (Commercial OEM)
Target Industries: Banking; Real Estate
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software/Engineering: Chiu Kee Chow
Year Established: 1972
Number of Employees: 5

AUTOMATED BOOKKEEPING CORP.
330 W. 42nd St.
New York, NY 10036
(212) 947-7741
Major Markets: Data Services (Service Bureau)
Target Industries: Law
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1959
Number of Employees: 6

AUTOMATED BUSINESS CENTERS
Suite 108
10205 Oasis Drive
San Antonio, TX 78216
(512) 349-3190
Major Markets: Data Services (Service Bureau); Dealer/Distributor
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1969
Number of Employees: 15

AUTOMATED BUSINESS SYSTEMS, INC.
182 Grand St.
Waterbury, CT 06702
(203) 756-8095
Major Markets: Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Telephone
Net Sales: $500,00 — $1 Million (1981)
Contacts:
Head of Sales: Lee Loveridge
Head of Software/Engineering: Tony Tamburro
Year Established: 1967
Number of Employees: 20

AUTOMATED FINANCIAL SYSTEMS, INC.
1016 W. 8th Ave.
King of Prussia Business Center
King of Prussia, PA 19406
(215) 337-3200
Target Industries: Financial
Contacts:
Head of Sales: James Greenwood
Year Established: 1970
Number of Employees: 50

AUTOMATED GRAPHIC TECHNOLOGY, INC.
117 N. Second St.
Minneapolis, MN 55401
(612) 341-3411
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Manufacturing; Fortune 1000
Target Applications: Graphics
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Software: James Schwarz
Year Established: 1981
Number of Employees: 15

AUTOMATED INFORMATION SYSTEMS, INC.
2951 Flowers Road S.
Atlanta, GA 30341
(404) 452-7890
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Manufacturing; Distribution
Contacts:
Head of Engineering: Linton Swindell
Year Established: 1979
Number of Employees: 15

AUTOMATED INFORMATION, INC.
6710 Clayton
St. Louis, MO 63117
(314) 644-4050
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Wholesale, Distributor; Legal, General Business
Contacts:
Head of Software: Ronald Thompson
Year Established: 1968
Number of Employees: 120

AUTOMATED INTERNAL MANAGEMENT SYSTEMS, INC.
Suite 720
5151 Beltline Road
Prestonwood Towers
Dallas, TX 75240
(214) 239-0711
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Advertising
Year Established: 1979
Number of Employees: 8

AUTOMATED PROFESSIONAL SYSTEMS
1450 Broadway
New York, NY 10018
(212) 869-9330
Major Markets: Computer Manufacturing
Contacts:
Head of Sales: Don Thompson
Year Established: 1978
Number of Employees: 14

AUTOMATED QUALS, INC.
3501 S. Corona
Top Floor
Englewood, CO 80110
(303) 761-2722
Target Industries: Manufacturing; Distributors, Construction, Printers
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1971
Number of Employees: 35

AUTOMATED RESOURCES GROUP, INC.
120 Pleasant Ave.
Upper Saddle River, NJ 07458
(201) 825-8100
Major Markets: Maintenance/Other Services
Target Industries: Publishing
Year Established: 1971
Number of Employees: 15

AUTOMATIC FORECASTING SYSTEMS, INC.
P.O. Box 563
Hatboro, PA 19040
(215) 675-0652

Major Markets: Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software/Engineering: David [illegible]
Year Established: 1976
Number of Employees: 6

AUTOMATION CONSULTANTS [illegible]
610 Santa Cruz Ave
Menlo Park, CA 94025
(415) 326-4031
Target Industries: Distribution; Construction; Landscaping; Advertising
Target Applications: Finance; Accounting
Year Established: 1976
Number of Employees: 4

AUTOMATION COUNSELORS, INC.
5728 Industry Lane
P O Box 511
Frederick, MD 21701
(301) 663-3700
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Government; Medical, Transportation
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1970
Number of Employees: 22

AUTOMATION SYSTEMS, INC.
Suite 1810
500 N. Michigan Ave.
Chicago, IL 60611
(312) 670-2660
Major Markets: Maintenance/Other Services
Target Industries: Finance; Medical
Year Established: [illegible]
Number of Employees: 27

AUTOMATION MANAGEMENT, INC.
[illegible] 410
[illegible]
P O Box 1641
Houston, TX 77057
(713) 488-7334
Target Industries: Accountants; Construction, Oil field service; Manufacturing
Target Applications: General business
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Robert [illegible]
Year Established: [illegible]
Number of Employees: 10

AUTOMATION PROGRAMMING & SERVICES, INC.
439 Sterling Place
Ridgewood, NJ 07450
(201) 652-7452
Major Markets: Systems House (Commercial OEM); [illegible]
Target Industries: Distribution; Accountants; Professional; Small [illegible]
Target Applications: Accounting
Year Established: [illegible]
Number of Employees: 10

AUTO SCRIPT, INC.
11 Mountain Ave.
Bloomfield, CT 06002
(203) 242-2358
Major Markets: OEM (Computer Systems); OEM (Peripherals/ Terminals); Systems House (Commercial OEM)
Target Industries: Retail
Target Applications: Retail Pharmacy
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: George W. Logemann
Head of Engineering: David W. Moyer
Year Established: 1978
Number of Employees: 15

AUTOMATIVE COMPUTER EXTENSIONS, INC.
Suite B
[illegible] Belmont Road
Downers Grove, IL 60515
(312) 971-1505
Major Markets: Dealer/Distributor
Contacts:
Head of Software: Steven Camcross
Year Established: 1981
Number of Employees: 3

AUXTON COMPUTER ENTERPRISES
Communications Division
[illegible]
200 E Robinson St.
Orlando, FL 32801
(305) 425-3300
Major Markets: Maintenance/Other [illegible]
Target Industries: Telephone; Telecommunications
Target Applications: Service order processing, Plant inventory; Order Billing, Plant Facilities
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Engineering: Richard Licupsi
Year Established: 1969
Number of Employees: 256

AVEMCO CO.
Improved Insurance Systems Division
[illegible]
300 W. Adams St.
Chicago, IL 60606
(312) 782-6520
Major Markets: Systems House (Commercial OEM)
Target Industries: Insurance
Target Applications: Accounting; Property; Policy Management; Reinsurance
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Dale Tyler
Year Established: 1975
Number of Employees: 25

AVIATION MANAGEMENT SYSTEMS, INC.
[illegible] 300
1385 S. Colorado Blvd.
[illegible], CO 80222
(303) 758-4441
Major Markets: Communications Equipment Manufacturing; Systems House (Commercial OEM); [illegible]
Target Industries: Aviation

Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Rick Hawrick
Year Established: 1979
Number of Employees: 5

AVPOST SYSTEMS, INC.
804 S State St.
Dover, DE 19901
(302) 734-0151
Year Established: 1979

AVP SYSTEMS, INC.
237 Washington St.
Marblehead, MA 01945
(617) 598-2716
Number of Employees: 5

AXIS PRODUCTS, INC.
2364 Middle Country Road
Centereach, NY 11720
(516) 588-5461
Major Markets: Maintenance/Other Services
Contacts:
Head of Sales: Thomas Ingala
Year Established: 1976
Number of Employees: 25

AYA ASSOCIATES, INC.
275-277 Forest Ave.
Paramus, NJ 07652
(201) 967-0770
Major Markets: OEM (Peripherals/ Terminals), Systems House (Commercial OEM), Data Services (Service Bureau); Dealer/Distributor; [illegible]
Target Industries: Manufacturing; Real Estate; Personnel Agencies; Legal
Net Sales: $500,000 — $1 Million (1981)
Contacts:
[illegible]
Year Established: 1978
Number of Employees: 15

AYDIN CORP.
Controls Division
401 Commerce Drive
Ft. Washington, PA 19034
(215) 542-7800
Major Markets: Component, Computer, Terminal and Communications Equipment Manufacturing
[illegible]
Year Established: 1967
Number of Employees: 390

AZREX, INC.
[illegible]
Burlington, MA 01803
(617) 272-8750
Major Markets: Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: David Fisher
Year Established: 1969
[illegible]

AZTEC, INC.
23265 S Points Drive
Laguna Hills, CA 92653
(714) 770-6406
Major Markets: Systems House (Commercial OEM); [illegible]
Manufacturing

Target Applications: CAD/CAM; Slide graphics, Business graphics
Year Established: 1979
Number of Employees: 25

AZRONETA, INC.
Sensor Based Systems Division
4102 148th St. N.E.
[illegible], WA 98052
(206) 881-5100
Target Industries: Food wholesalers; Food retailers; Drug wholesalers
Target Applications: Energy management, Direct store delivery; Order entry, Shelf price audit
Contacts:
Head of Sales: Ray Dawson
Head of Software: Earl Dunlap
Year Established: 1975
Number of Employees: 8

BABSON DATA, INC.
Suite 190
85 W Algonquin Road
Arlington Heights, IL 60005
(312) 956-1053
Major Markets: Maintenance/Other Services
Target Industries: Distribution; Manufacturing
Target Applications: Distribution, Manufacturing, Financial Control
Contacts:
Head of Software: Susan B. Baker
Year Established: 1978
Number of Employees: 11

BANCROFT COMPUTER SYSTEMS, INC.
Rt. 10 Box 595-A
[illegible]
W. Monroe, LA 71291
(318) 379-1377
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Software: Jerry D. Ingram
Year Established: 1972
Number of Employees: 6

BANKMATIC SYSTEMS, INC.
[illegible] S.W. Griffith Drive
P.O. Box WW 97075
Beaverton, OR 77005
(503) 643-2446
Major Markets: Systems House [illegible]
Dealer/Distributor
Target Industries: Banking
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Walter E. Cooney
Year Established: 1979
[illegible]

BARFIELD CONSULTING, INC.
2550 M St., N W
Washington, DC 20037
(202) 659-0590
Major Markets: Maintenance/Other Services
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1977
Number of Employees: 15

BARON DATA SYSTEMS
1700 Marina Blvd.
San Leandro, CA 94577
[illegible]
Major Markets: Systems House [illegible]
Target Industries: Legal

Vendors

Target Applications: Court Reporting
Contacts:
Head of Sales: Mark Silberman
Year Established: 1976
Number of Employees: 100

[illegible] BUSINESS CONTROL SYSTEMS, INC.
4330 Stafford S.W.
Grand Rapids, MI 49508
(616) 531-2202
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Retail; Commercial; Government; Education
Target Applications: POS
Contacts:
Head of Sales: Michael Goodyear
Year Established: 1961
Number of Employees: 20

BASIC BUSINESS SOFTWARE, INC.
P O Box 26311
Las Vegas, NY 89126
(702) 876-9493
Target Industries: IBM Personal Computer, Apple
Target Applications: Statistics; Finance; Utilities; General Business
Net Sales: $100,000 — $500,000
[illegible]
Year Established: 1978
Number of Employees: 8

[illegible] DATASYSTEMS, INC.
70 Worthington
Maryland Heights, MO 63043
(314) 434-8300
Target Industries: Manufacturing; Distribution
Year Established: 1975
Number of Employees: 25

BASIS, INC.
670 International Pkwy., No. 100
Richardson, TX 75081
(214) 699-8980
Target Industries: Medical; Dental
Target Applications: Accounting

BASSCO
7770 Cooper Road
Cincinnati, OH 45242
(513) 791-7876
Major Markets: Maintenance/Other Services
Net Sales: $100,000 — $500,000
[illegible]
Year Established: 1971
Number of Employees: 11

BASS SHIRD ASSOCIATES, INC.
20 W Ridgewood
P O Box 646
Ridgewood, NJ 07450
(201) 444-3411
Major Markets: Systems House (Commercial OEM)
Target Industries: Military; Industrial; Commercial
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980
Number of Employees: 5

BATTELLE SOFTWARE PRODUCTS
Division of Battelle Columbus Laboratories
505 King Ave.
Columbus, OH
(614) 424-5524
Target Industries: Fortune 1000
Year Established: 1929
Number of Employees: 3,000

BEACON SYSTEMS
8700 W 36th St
St. Louis Park, MN 55426
(612) 933-5577
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Agriculture
Year Established: 1979
Number of Employees: 10

BEAR COMPUTERS, INC.
102 N. Center
Bloomington, IL 61701
(309) 828-6031
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Banking; Legal; Manufacturing, Small Business
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Lars Osting
Year Established: 1978
Number of Employees: 14

BELL & MURPHY & ASSOCIATES, INC.
4100 McEwen Road
P.O. Box 402306
Dallas, TX 75240
(214) 386-0252
Major Markets: Data Services (Service Bureau)
Year Established: 1966
Number of Employees: 24

BEL THERMAL UNITS, INC.
Data Systems Division
2960 Ravenswood Road
Ft. Lauderdale, FL 33312
(305) 584-4372
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Manufacturing
Target Applications: Accounting; Payroll; Inventory; Billing
Year Established: 1980
Number of Employees: 5

BENEFIT ANALYSIS, INC.
842 Lancaster Ave.
Bryn Mawr, PA 19010
(215) 527-7400
Major Markets: OEM (Peripherals/ Terminals), Maintenance/Other [illegible]
Target Industries: Legal; Accounting, Insurance; Banking
Year Established: 1981
Number of Employees: 15

BENSMILLER COMPUTER SYSTEMS, INC.
P.O Box D
Whitsett, TX 78075
(512) 579-4551
Major Markets: Maintenance/Other Services
Target Industries: Police; Municipalities
Target Applications: [illegible] History
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1970
Number of Employees: 7

BENSON C. STONE & ASSOCIATES
P.O Box 28658
San Diego, CA 92127
(714) 485-7779
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975
Number of Employees: 5

BEST PROGRAMS
P O Box 2370
Alexandria, VA 22301
(703) 549-3663
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Applications: IBM Personal Computer
Year Established: 1982
Number of Employees: 6

BETTER SYSTEMS & DESIGNS
P.O Box 1567
Orange Park, FL 32073
(904) 264-2543
Target Industries: Distribution; Automotive; Welding; Wholesale
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 4

BGS SYSTEMS, INC.
One University Office Park
Waltham, MA 02254
(617) 891-0000
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Manufacturing; Financial; Insurance; Retail
Target Applications: Computer Capacity Management
Contacts:
Head of Software: Jeffrey Bugan
Year Established: 1975
Number of Employees: 100

BIBLIOGRAPHIC RETRIEVAL SERVICES
1200 Rt. 7
Latham, NY 12110
(518) 783-1161
Target Applications: DBMS
Year Established: 1976
Number of Employees: [illegible]

BIG SKY DATA SYSTEMS
1201 Grand Ave
Billings, MT 59102
(406) 252-2299
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Nonprofit
Year Established: 1975
Number of Employees: 25

BILLINGS COMPUTER CORP.
18600 E. 37th Terr.
Independence, MO 64057
(816) 373-0000
Major Markets: Computer Manufacturing; OEM (Peripherals/ Terminals); Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Retail; WP
Target Applications: Electronic Mail; Accounting; Program Development; [illegible]
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Stephen Hatch
Year Established: 1978

B. L. MOYLE ASSOCIATES, INC.
5788 Lincoln Drive
Minneapolis, MN 55436
(612) 933-2885
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1978
Number of Employees: 3

BOND COMPUTER SERVICES
100 Merrick Road
Rockville Centre, NY 11570
(516) 678-1223
Major Markets: Systems House (Commercial OEM)
Target Industries: Banking, Stock Brokerage, Business; Financial
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1977
Number of Employees: 46

BOSS AUTOMATED BUSINESS SYSTEMS, INC.
Suite M
1787 Tribute Road
Sacramento, CA 95815
(916) 920-8805
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Small business
Target Applications: Accounting; Payroll; Inventory
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1965
Number of Employees: 4

BOSS, INC.
[illegible]
6620 Harwin
Houston, TX 77036
(713) 780-7673
Major Markets: Maintenance/Other [illegible]
Target Industries: Banking
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1971
Number of Employees: 4

BRANCHWAVE DATA CORP.
200 N. Michigan Ave.
Chicago, IL 60601
(312) 236-8473
Major Markets: Maintenance/Other Services
Target Industries: Professional Service
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1972
Number of Employees: 15

BRECHMAN ENTERPRISES
7217 Bernadine Ave
Canoga Park, CA 91307
(213) 346-7024
Target Industries: Amway Product Distributors
Year Established: 1979
Number of Employees: 1

B & L SOFTWARE SYSTEMS, INC.
4225 Lake St.
Bridgman, MI 49106

(616) 465-6207
Major Markets: Systems House (Commercial OEM)
Target Industries: Foundries; Injection Molders; Die Casting; Plastics
Target Applications: Order Entry; Production Schedule, Costing
Year Established: 1976
Number of Employees: 6

BLUE RIDGE COMPUTER SERVICES
P.O Box 6816
Asheville, NC 28816
(704) 252-5124
Major Markets: Data Services (Service Bureau)
Target Industries: Fuel and Oil
Target Applications: Accounting
Year Established: 1982
Number of Employees: 2

BMDP COMPUTER SOFTWARE
Suite 202
1964 Westwood Blvd.
Los Angeles, CA 90025
(213) 475-5700
Target Industries: All Industries
Target Applications: Primary Research; Statistical Analysis
Contacts:
Head of Sales: Robert L. Hensley
Year Established: 1960
Number of Employees: 23

BMS COMPUTER, INC.
478 N Wiget Lane
Walnut Creek, CA 94598
(415) 938-2620
Target Applications: Systems Software
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1973

BOB WHITE COMPUTING & SOFTWARE, INC.
814 Commerce Drive
Oak Brook, IL 60521
(312) 887-1550
Major Markets: Data Services (Service Bureau)
Target Industries: Banking
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1972
Number of Employees: 65

BOEING COMPUTER SERVICES CO.
7980 Gallows Court
Vienna, VA 22180
(703) 827-4351
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Net Sales: More than $100 Million (1981)
Contacts:
Head of Sales: Ronald Koval
Head of Engineering: Orv Langdahl
Year Established: 1971
Number of Employees: 8,000

BONNECAZE, MCILROY & HARRISON
Suite 112
4125 Keller Springs Road
Dallas, TX 75234
(214) 484-0530
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 6

BONNER & MOORE COMPUTING CO.
2727 Allen Pkwy.
17th Floor
Houston, TX 77019
(713) 522-6800
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Year Established: 1957
Number of Employees: 150

BORMUTH ASSOCIATES
P.O Box 1744
Morganton, NC 28655
(704) 437-1470
Major Markets: Systems House (Commercial OEM)
Target Industries: Local Government, Furniture Manufacturing
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978
Number of Employees: 5

BOS NATIONAL, INC.
Suite 228
2560 Royal Lane
Dallas, TX 75229
(214) 484-2717
Major Markets: Maintenance/Other Services
Target Industries: Small business; DP departments
Year Established: 1981
Number of Employees: 4

BOURNE & CO. INC.
200 S Tryon St.
Charlotte, NC 28202
Target Industries: Church; Country clubs
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1968
Number of Employees: 5

BOWNE INFORMATION SYSTEMS, INC.
435 Hudson St.
New York, NY 10014
(212) 807-7260
Major Markets: Data Services (Service Bureau)
Target Industries: Architecture; Engineering; Insurance; Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1969
Number of Employees: 150

BPI SYSTEMS, INC.
3423 Guadalupe
Austin, TX 78705
(512) 454-2801
Major Markets: Maintenance/Other Services
Target Industries: Small Business; Retail
Target Applications: Accounting; Report Writing
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Engineering: K. Detpower
Year Established: 1979
Number of Employees: 100

BRADFORD NATIONAL COMPUTERS SERVICES
1500 Palisade Ave.
Teaneck, NJ 07666
(201) 833-1020
Major Markets: Data Services (Service Bureau)
Net Sales: $5 Million — $25 Million (1982)
Year Established: 1975
Number of Employees: 140

BRELLE COMPUTER
Highway 35
Fountain 9 Mall
Sea Girt, NJ 08750
(201) 449-8770
Major Markets: Systems House (Commercial OEM); Dealer/Distributor, Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 10

BREMER ASSOCIATES, INC.
115 Newbury St.
Boston, MA 02116
(617) 266-0616
Major Markets: Computer Manufacturing, Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Banking; Insurance; Manufacturing; Government
Net Sales: $1 Million — $5 Million (1982)
Number of Employees: 50

BREUER & CO.
54 Middlesex Trnpk.
Bedford, MA 01730
(617) 275-5810
Target Industries: Architecture; Engineering, Manufacturing
Target Applications: Financial; Cost accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 8

BRIDGE COMPUTER SYSTEMS, INC.
3055 Alvado St.
San Leandro, CA 94577
(415) 483-9786
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Agriculture; Trucking, Food Processing
Target Applications: Accounts Receivable, Accounts Payable; Payroll, General Ledger
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Lee Ann Fox
Head of Software/Engineering: Arthur Steele
Year Established: 1973
Number of Employees: 15

BRISTOL INFORMATION SYSTEMS, INC.
84 N. Main St.
Fall River, MA 02720
(617) 679-1051
Major Markets: Systems House (Commercial OEM)
Target Industries: Small business; Construction, Distribution
Target Applications: General Accounting; Cost Accounting, Billing
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Brad Vachon
Year Established: 1971
Number of Employees: 25

BRITTON LEE
14600 Winchester Blvd.
Los Gatos, CA 95030
(408) 378-7000
Major Markets: Computer Manufacturing
Target Industries: Business; Communications; Manufacturing; Military
Net Sales: $5 Million — $25 Million (1982)
Year Established: 1977
Number of Employees: 102

BRITZ SYSTEMS
1814 Capital Towers
Jackson, MS 39201
(601) 354-8882
Major Markets: Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Oil and gas
Target Applications: Royalty distribution, Billing; Well accounting; Lease inventory
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Gwen Padgett
Head of Software: Sam Monsters
Year Established: 1968
Number of Employees: 8

BROWN, SANDERS & ASSOCIATES
878 Hawksbill Drive
Satellite Beach, FL 32937
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Banking
Target Applications: Trust cost accounting, Commercial banking
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1976
Number of Employees: 12

BRS COMPUTERS, INC.
7 Westchester Plaza
Elmsford, NY 10523
(914) 592-5338
Major Markets: Systems House (Commercial OEM)
Target Industries: Dental
Target Applications: Dental
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1977
Number of Employees: 18

BRUCE PAYNE CONSULTANTS, INC.
666 Fifth Ave.
New York, NY 10019
(212) 581-5500
Major Markets: Maintenance/Other Services
Target Industries: Banking; Insurance; Financial
Contacts:
Head of Software: Christopher Payne
Year Established: 1946
Number of Employees: 100

BRUZAUD ASSOCIATES
Lakeside Center R.D. 3
Lake Hopatcong, NJ 07849

(201) 663-0224
Major Markets: Systems House (Commercial OEM), Dealer/Distributor
Year Established: 1968
Number of Employees: 3

BSA CO., INC.
1714 Brogan St
San Antonio, TX 78232
(512) 734-3814
Target Industries: Credit Unions
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1976
Number of Employees: 2

BSG CORP.
7674 Washington Ave S
Minneapolis, MN 55344
(944) 8180
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services, Miscellaneous Computer Supplies
Target Industries: Finance/banking; Retail; OEM Software and Hardware; Banking
Target Applications: Business/financial
[illegible]
Head of Sales: Ann Hanen
Head of Software: George L. Kuhn
Year Established: 1980
Number of Employees: 50

BST CONSULTANTS
P O Box 23425
Tampa, FL 33623
(813) 961-3902
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor
Target Industries: Engineering; Architecture, Public Accountants
Contacts:
Head of Software: Carlos Baldor
Year Established: 1977
Number of Employees: 22

BUCKINGHAM COMPUTER SYSTEMS
Division of KLS, Inc.
705 Pine St
Manchester, NH 03104
(603) 623-5827
Major Markets: Systems House (Commercial OEM), Dealer/Distributor
Target Industries: Retail
Target Applications: POS
Year Established: 1981
Number of Employees: 3

BUDGET COMPUTER SYSTEMS
505 N Rockwell
Oklahoma City, OK 73127
(405) 495-7300
Major Markets: Computer Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Accountants; Dental
Year Established: 1977
Number of Employees: 10

BUNKER RAMO ELECTRONIC SYSTEMS
31717 La Tienda Drive
P O Box 5009
Westlake Village, CA 91359
(213) 889-2211
Major Markets: Computer and Peripheral Manufacturing, OEM (Computer Systems)
Target Industries: Department Defense
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Software: P.H. Chang
Head of Engineering: Dr A D Scarbrough
Year Established: 1964
Number of Employees: 614

BURROUGHS CORP.
Business Machines Group
Burroughs Place
Detroit, MI 48232
(313) 972-7000
Major Markets: Component, Computer, Terminal/Peripheral, Communications Equipment and Office Equipment Manufacturing, OEM (Computer Systems); Data Services (Service Bureau); Dealer/Distributor, Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Financial, Distribution; Manufacturing; Education
Year Established: 1885

BURROUGHS CORP.
Burroughs Place
Detroit, MI 48232
(313) 972-7000
Major Markets: Computer, Communications Equipment and Office Equipment Manufacturing; OEM (Computer Systems); Dealer/Distributor, Miscellaneous Computer Supplies
Target Industries: Government; OA; Office Supply; Finance
Net Sales: More than $100 Million (1982)
Year Established: 1885
Number of Employees: 62,000

BURTON DATA SYSTEMS, INC.
26081 Stratford Place
Oak Park, MI 48237
(313) 968-0030
Major Markets: Maintenance/Other Services
Target Applications: Data Entry
Year Established: 1982
Number of Employees: 3

BUSH CONSTRUCTION, INC.
Bush Barry and Amy Road
P.O Box 327
Laurel, MS 39440
(601) 649-4111
Major Markets: Data Services (Service Bureau)
Target Applications: General Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1974
Number of Employees: 20

BUSINESS AUTOMATION, INC.
1440 S. State College Blvd,
[illegible] 5H
Anaheim, CA 92806
(714) 778-2021
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor; Maintenance/Other Services
Target Industries: Retail; Manufacturing; Distribution; Medical
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1975
Number of Employees: 15

BUSINESS COMPUTER CENTER
54 Washington St.
Haverhill, MA 01830
(617) 373-1599
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Medical; Legal; Retail; Small business
Target Applications: Accounting
Year Established: 1978
Number of Employees: 10

BUSINESS COMPUTER DESIGN, INC.
900 Jone Blvd
Oak Brook, IL 60521
(312) 920-1175
Major Markets: Maintenance/Other Services
Target Industries: Warehouse; Trucking, Finance; Utilities
Net Sales: $1 Million — $5 Million (1981)
[illegible]
Head of Sales: Randall J. Radtke
Year Established: 1973
Number of Employees: 15

BUSINESS COMPUTER SERVICE, INC.
1230 Smith St
Charleston, WV 25321
(304) 343-9471
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other [illegible]
Target Industries: Mining; Accounting; Legal; Distribution
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1983
Number of Employees: 27

BUSINESS COMPUTER SYSTEMS CORP.
1640 E. Gate
Garland, TX 75041
(214) 681-1331
Major Markets: Data Services (Service Bureau)
Target Industries: Insurance
Net Sales: $5 Million — $25 Million (1981)
[illegible]
Head of Software: Daniel Stewart
Year Established: 1[illegible]
Number of Employees: 152

BUSINESS COMPUTING SERVICE
133 W. De La Guerra St.
Santa Barbara, CA 93101
(805) 963-1387
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Real Estate; Mail Order, Radio & TV Subscription
Target Applications: Business
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1968
Number of Employees: 12

BUSINESS CONTROLS CORP.
507 Boulevard
Elmwood, NJ 07407
(201) 791-7661
Target Industries: Newspaper; Cable TV
Target Applications: Cobol Programming Aids
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Michael S. Agetoff
Year Established: 1971
Number of Employees: 30

BUSINESS DATA CORP.
4651 King St.
P.O Box 57256
Washington, DC 20037
(703) 671-1040
Major Markets: Data Services (Service Bureau)
Target Industries: Taxes
Target Applications: Accounting; Mailing Lists
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1972
Number of Employees: 4

BUSINESS DATA SERVICES, INC.
1867 Crane Ridge Drive
Jackson, MS 39216
(601) 982-2219
Target Industries: Retail Gas
Target Applications: MIS, Fixed [illegible]
Year Established: 1972
Number of Employees: 25

BUSINESS INFORMATION SYSTEMS
[illegible]
Fort Wayne, IN 46815
(219) 485-9671
Year Established: 1980
Number of Employees: 12

BUSINESS INFORMATION SYSTEMS, INC.
3313 Paper Mill Road
P O Box 268
Phoenix, MD 21131
(301) 628-2900
Major Markets: Data Services (Service Bureau)
Target Industries: Construction; Retail, General Business
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1976
Number of Employees: 4

BUSINESS MANAGEMENT SYSTEMS, INC.
9526A Lee Highway
Fairfax, VA 22031
(703) 591-0911
Major Markets: Systems House (Commercial OEM), [illegible]
Target Industries: Property management, Printing; Medical
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1977
Number of Employees: 14

BUSINESS PLANNING SYSTEMS, INC.
2 N. State St.
Dover, DE 19901
(302) 674-5500
Target Applications: Financial Modeling
Year Established: 1979
Number of Employees: 6

[illegible] PROFESSIONAL SOFTWARE, INC.
143 Binney St.
P.O. Box 11
Cambridge, MA 02142
(617) 491-3377
Target Applications: Business graphics
Contacts:
Head of Sales: Jack Gottlieb
Head of Software: George Mayforth III
Year Established: 1980
Number of Employees: 30

BUSINESS SOFTWARE, INC.
719 E. Mountain St.
P.O. Box 1347
Kernersville, NC 27284
Target Industries: Manufacturing
Target Applications: Data Entry
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1974
Number of Employees: 14

[illegible], Inc.
3132 50th
Lubbock, TX 79413
(806) 795-7832
Major Markets: Systems House (Commercial OEM)
Target Industries: Oil; Cotton
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977

[illegible] ASSOCIATES
46 Park St
Framingham, MA 01701
(617) 872-2558
Major Markets: Data Services (Service Bureau)
Target Industries: Manufacturing; High-technology
Target Applications: Accounting; Inventory tracking, Mailing lists
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1974
Number of Employees: 30

BUSINESS SYSTEMS GROUP
3659 Thousand Oaks Blvd.
Westlake Village, CA 91362
(805) 496-9462
Major Markets: Systems House (Commercial OEM);
Target Industries: Accountants; Government
Target Applications: CPA Accounting; Municipal Finance
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977

BUSINESS SYSTEMS RESOURCES, INC.
303 Wyman St
Waltham, MA 02154
(617) 890-2105
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Education
Year Established: 1976
Number of Employees: 20

BUSINESS SYSTEMS SOFTWARE, INC.
27 Kings Highway E.
Haddonfield, NJ 08033.
(609) 429-0229
Major Markets: Maintenance/Other Services
Target Industries: Municipality
Target Applications: Accounting
Contacts:
Head of Engineering: Charles J. Wolfe
Year Established: 1980
Number of Employees: 4

[illegible] SYSTEMS, INC.
2720 Wade Hampton Blvd
Greenville, SC 29615
(803) 292-0840.
Major Markets: Dealer/Distributor
Target Industries: Cable TV
Target Applications: Cable TV
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1978
Number of Employees: 16

B.W.C. SYSTEMS
112 S. Broadway
Blanchester, OH 45107
(513) 783-4511
Major Markets: Systems House (Commercial OEM); Dealer/Distributor, Maintenance/Other Services
Target Industries: Insurance
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: William D. Tedrick
Head of Software/Engineering: William Krantz
Year Established: 1977
Number of Employees: 6

BYRON HOPKINS & ASSOCIATES, Inc.
P.O. Box 450762
Atlanta, GA 30345
(404) 491-1288
Major Markets: OEM (Computer Systems); Dealer/Distributor
Target Industries: Wholesale; Manufacturing; Medical; Transportation
Target Applications: Accounting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1977
Number of Employees: 15

BYTEL
1730 Solano Ave.
Berkeley, CA 94707
(415) 527-1157
Major Markets: Maintenance/Other Services
Target Applications: Cobol
Year Established: 1981
Number of Employees: 6

CACI, INC. — FEDERAL
1815 N. Fort Meyer Drive
Arlington, VA 22209
(703) 841-7800
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Year Established: 1962
Number of Employees: 1,700

CADDI SYSTEMS, INC.
[illegible]
Omaha, NE 68134
(402) 397-3956
Major Markets: Maintenance/Other Services
Target Industries: Distribution; Country clubs, Restaurants
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978

CADLINC, INC.
1872 Brummel
Elk Grove Village, IL 60007
(312) 228-7300
Major Markets: Computer Manufacturing; Systems House (Commercial OEM)
Target Industries: Manufacturing; Mechanical Design
Contacts:
Head of Sales: Don Swanson
Head of Software: Michael Sterling
Year Established: 1981
Number of Employees: 65

CADMUS COMPUTER SYSTEMS, INC.
[illegible]
Lowell, MA 01852
(617) 453-2899
Major Markets: Computer and Peripheral Manufacturing; OEM (Computer Systems); Maintenance/Other Services
Target Industries: Technical OEM market; Corporate data centers
Target Applications: CAD/CAM; Text Processing Software
Contacts:
Head of Marketing: William [illegible]
Head of Software: James McHale
Head of Engineering: Al Backer
Year Established: 1983
Number of Employees: 50

CADO SYSTEMS OF KANSAS CITY
3170 Mercier
Kansas City, MO 64111
(816) 561-0522
Major Markets: Systems House (Commercial OEM);
Target Applications: General
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 5

CADRE CORP.
[illegible]
P.O. Box 47837
Atlanta, GA 30362
Major Markets: Systems House (Commercial OEM),
Target Industries: Manufacturing; Government, Research Labs
Target Applications: Cadregraphics; Graphics; Process Control; Distribution Processes
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Paul Butler
Head of Engineering: Ed Davis
Year Established: 1985
Number of Employees: 85

CADTEC CORP.
[illegible]
San Jose, CA 95131
[illegible]
Major Markets: Systems House (Commercial OEM)
Target Industries: Electric Systems Manufacturing; VLSI; Integrated
Target Applications: VSLI
Contacts:
Head of Software/Engineering: Wylie Robinson
Year Established: 1980
Number of Employees: 17

CAE SYSTEMS, INC.
1333 Bordeaux Drive
Sunnyvale, CA 94089
(408) 745-1440
Target Industries: Manufacturing, Government, Engineering
Contacts:
Head of Sales: Al Frugaletti
Head of Engineering: Michael Tabeck
Year Established: 1980
Number of Employees: 35

C.A.I.
1780 N.W. Highway 140
Garland, TX 75041
(214) 270-6485
Major Markets: Systems House (Commercial OEM), Dealer/Distributor
Target Industries: Oil and Gas, Manufacturing; Distribution
Target Applications: Oil and Gas
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1976
Number of Employees: 15

CALCULON CORP.
1301 Piccard Drive
Rockville, MD 20850
(301) 258-5300
Target Industries: Telecommunication, Government
Year Established: [illegible]
Number of Employees: 450

CALIFORNIA COMPUTER [illegible], INC.
3100 O St.
Sacramento, CA 95816
(916) 452-6174
Major Markets: Data Services (Service Bureau)
Target Industries: Wholesale; Retail; Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1969
Number of Employees: 5

CALIFORNIA COMPUTER TIMESHARING
[illegible]
Chico, CA 95926
[illegible]
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor
Target Industries: General business, Legal, Agriculture, Service bureau
Target Applications: Accounting; Applications generation
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1973
Number of Employees: 12

CALIFORNIA SOFTWARE PRO., INC.
525 N. Cabrillo Park Drive
Santa Ana, CA 92701
(714) 973-0440
Target Industries: Cross Industry
Contacts:
Head of Software/Engineering: H. B. Emerson
Year Established: 1975
Number of Employees: 20

Vendors

CALIFORNIA SYSTEMS ASSOCIATES
Suite 4
2941 Mesa Verde E.
Costa Mesa, CA 92626
(714) 546-9716
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Distribution
Target Applications: Manufacturing; Distribution, Property Management
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 13

CALL COMPUTER, INC.
1961 Old Middlefield Way
Mountainview, CA 94043
(415) 964-5331
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Small Business
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1971
Number of Employees: 12

CALMA
527 Lakeside Ave.
Sunnyvale, CA 94086
(408) 245-7522
Major Markets: Computer Manufacturing; OEM (Computer Systems)
Target Industries: Engineering; Mechanical, Architectural, Construction
Target Applications: CAD/CAM
Contacts:
Head of Sales: Jim Girard
Head of Software: John Bendow
Head of Engineering: George Senn
Year Established: 1969
Number of Employees: 4,000

CAMBAR BUSINESS SYSTEMS, INC.
P O Box 10067
Charleston, SC 29411
(803) 554-5500
Target Industries: Distribution; Manufacturing
Contacts:
Head of Software: Otis Register
Year Established: 1981
Number of Employees: 30

THE CAMBRIDGE SYSTEMS GROUP
2171 Elena Court
Los Altos Hills, CA 94022
(415) 941-4556
Contacts:
Head of Sales: Vic Town
Year Established: 1974
Number of Employees: 45

CAMPCO, INC.
Suite 180
44 Vantage Way
Nashville, TN 37228
(615) 244-3975
Target Industries: General Business
Target Applications: General Business
Year Established: 1979

CAMPLE CORP.
Suite 2404
10880 Wilshire Blvd.
Los Angeles, CA 90024
(213) 470-2277
Target Applications: Performance Monitoring
Contacts:
Head of Engineering: M. Sprinzen
Year Established: 1977
Number of Employees: 200

CANNON COMPUTER CO., INC.
10300 N. Central Expwy.
Dallas, TX 75231
(214) 691-3062
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software: Ted Harris
Year Established: 1968
Number of Employees: 20

CAPA
1345 Wren Lane
P.O. Box 356
Powell, OH 43065
(614) 436-8186
Major Markets: Dealer/Distributor
Target Industries: Law Firms
Target Applications: Legal time management
Contacts:
Head of Software: James McCreery
Year Established: 1978
Number of Employees: 6

CAPE COD COMPUTER CENTER
64 Enterprise Road
Hyannis, MA 02601
(617) 775-4647
Major Markets: OEM (Computer Systems); OEM (Peripherals/Terminals); Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Construction; Retail, Distribution, Services
Target Applications: Job Costing
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Timothy Bellmar
Year Established: 1976
Number of Employees: 9

CAPE DATA, INC.
Ocean Drive
Cape May, NJ 08204
(609) 884-8500
Target Industries: Education
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 5

CAP INFORMATION SYSTEMS
34th Floor
521 Fifth Ave.
New York, NY 10175
(212) 599-7000
Target Industries: Banking; Manufacturing; Retail
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Andrew Cosman
Year Established: 1979
Number of Employees: 60

CAPITOL COMPUTER SERVICE, INC.
P.O. Box 8244
Austin, TX 78712
(512) 477-3980
Major Markets: Data Services (Service Bureau)
Target Industries: Retail; Accounting; Financial
Target Applications: Retail Sales Reporting
Year Established: 1955
Number of Employees: 8

CAPRICORN COMPUTING
23866 Via Calzada
Mission Viejo, CA 92691
(714) 951-2021
Target Industries: Retail; Commercial
Target Applications: Financial; Hotel Accounting; Systems Utilities
Year Established: 1980
Number of Employees: 3

CAPRO, INC.
12781 Pala Drive
Garden Grove, CA 92641
(714) 891-1109
Target Industries: Business
Year Established: 1980
Number of Employees: 25

CAPSCO SOFTWARE
Mutual Insurance
Group and Claims Products
6300 N. River Road
Rosemont, IL 60018
(312) 692-6520
Major Markets: Systems House (Commercial OEM)
Target Industries: Insurance; Banking
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1973
Number of Employees: 50

CAPTRON, INC.
P.O. Box 2
Newtown, PA 18940
(215) 968-6789
Major Markets: OEM (Computer Systems); OEM (Peripherals/Terminals); Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Applications: DBMS; Financial
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: J. Scott Connard
Head of Engineering: Dennis K. Dunn
Year Established: 1970
Number of Employees: 12

CARE INFORMATION SYSTEMS
3009 S. 6th St.
Springfield, IL 62703
(217) 522-2273
Major Markets: Systems House (Commercial OEM)
Target Industries: Medical
Target Applications: MediCal billing; Insurance; Accounting
Contacts:
Head of Sales: Larry Pauline
Head of Software: Dream Rau
Year Established: 1982
Number of Employees: 6

CARLETON CORP.
44 Broomfield St.
Boston, MA 02108
(617) 482-9870
Target Applications: Report Writing
Year Established: 1979
Number of Employees: 22

CARLSON COMPUTER CORP.
7829 Sprinkle St.
Kalamazoo, MI 49002
(616) 323-1312
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Oil; Distributors; Legal; Insurance
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975
Number of Employees: 6

CARNEY ASSOCIATES, INC.
6000A W. Broad St
Richmond, VA 23230
(804) 288-8341
Major Markets: Systems House (Commercial OEM)
Target Industries: Retail fashions; Retail drugs
Target Applications: Remote job entry; Hand-held data entry; POS; Communications network
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: R. R. Gingras
Year Established: 1979
Number of Employees: 10

CARPENTER COMPUTER SERVICES
2775 Algonquin Road
Rolling Meadows, IL 60008
(312) 392-3360
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Insurance; Manufacturing
Target Applications: Coupon processing
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1970
Number of Employees: 32

CARTER, SCHAEFER & CO.
Suite 400
1500 S. Dairy Ashford
Houston, TX 77077
(713) 780-3695
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Education
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1981
Number of Employees: 6

CASE SYSTEMS ASSOCIATES, INC.
100 Center Ave.
P.O. Box 252
Crescent Springs, KY 41017
(606) 341-2600
Year Established: 1978
Number of Employees: 2

CASH MANAGEMENT SYSTEMS INC.
P.O. Box 8041
Akron, OH 44312
(216) 688-2241
Major Markets: Maintenance/Other Services
Target Applications: A/R
Year Established: 1977
Number of Employees: 10

CASS
4500 Ardmore
P.O. Box B
Okemos, MI 48864
(517) 349-3133
Contacts:
Head of Sales: Bentley Beal
Year Established: 1980
Number of Employees: 6

CASTLE SYSTEMS
3579 W. Columbus Ave.
Chicago, IL 60652
(312) 471-2200
Major Markets: Systems House (Commercial OEM)
Target Industries: Banking; [illegible]
Target Applications: Financial Modeling; Asset Liability Management; Project Management
Year Established: 1974
Number of Employees: 5

CASWELL SYSTEMS, INC.
49 White Pond Road
Stow, MA 01775
(617) 897-3044
Major Markets: Component Manufacturing; OEM (Computer Systems)
Target Industries: Stock exchange
Target Applications: Maintenance
Contacts:
Head of Sales: Charles Caswell
Head of Engineering: Richard Bagley
Year Established: 1975
Number of Employees: 6

CATALLACTICS CORP.
11 Salt Creek Lane
Hinsdale, IL 60521
(312) 920-3100
Major Markets: Maintenance/Other [illegible]
Target Industries: Financial
Target Applications: Securities Processing
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1967
Number of Employees: 55

CAVU SYSTEMS, INC.
26 Trumbull St.
New Haven, CT 06511
(203) 562-4979
Major Markets: Renpheral Manufacturing, OEM (Peripherals/ Terminals)
Target Industries: Training; Medical
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1981
Number of Employees: 10

CBASCO
P.O. Box 505
Fort Collins, CO 80522
(303) 493-3361
Major Markets: Maintenance/Other Services
Target Industries: Construction; Petroleum
Target Applications: Data Management, Trust-Fund Account System
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1971
Number of Employees: 5

THE CBORD GROUP
110 N. Meadow St.
Ithaca, NY 14850
(607) 272-2410
Major Markets: Systems House (Commercial OEM)
Target Industries: Education; Medical
Target Applications: Food Cost; Production Control
Contacts:
Head of Software: Bill Demaree
Year Established: 1975
Number of Employees: 12

CCH COMPUTAX, INC.
21535 Hawthorne Blvd.
Torrance, CA 90503
(800) 854-2751
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Accounting; Legal; Tax Preparation; Banking
Target Applications: Tax; General Accounting
Year Established: 1965
Number of Employees: 500

CC&S DATA PROCESSORS, INC.
358 N. Main
Wichita, KS 67202
(316) 262-1818
Major Markets: Data Services (Service Bureau)
Target Industries: Oil
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Ronald L. Cole
Year Established: 1981
Number of Employees: 12

CCSI
7227 3rd St. S.
P.O. Box 1082
St. Cloud, MN 56302
(612) 253-2170
Major Markets: Maintenance/Other Services
Target Industries: State/Local Government; Wholesale; Government; Distribution
Target Applications: General Accounting; Billing; Taxes
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Paul Wirtz
Year Established: 1974
Number of Employees: 50

C&C SYSTEMS SOFTWARE
14419 Rios Canyon Road
El Cajon, CA 92021
(619) 443-2499
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Year Established: 1975
Number of Employees: 4

C.E. DATA CORP.
2687 22nd Ave. N.
P.O. Box 10788
St. Petersburg, FL 33733
(813) 323-2277
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Accountants; Manufacturing; Construction; Contracting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1971
Number of Employees: 17

CDS COMPUTING, INC.
150 S. Main St.
Woodridge, NJ 07075
(201) 777-9555
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Publishing
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1970
Number of Employees: 30

Additional information provided for by vendor

CDS 2000

On-line interactive circulation fulfillment for trade publications. Complete systems includes security, company data base, one subscriber for multiple subscriptions, BPA STMT integrated reader service, list rental, paid and full presort mail system. 16- to 600-terminal systems.

CDS SYSTEMS, INC.
2672 Bayshore Frontage Road
Mountain View, CA 94043
(415) 961-2080
Major Markets: OEM (Peripherals/ Terminals), Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Construction
Target Applications: Cost Estimation
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 3

C.D. SYSTEMS, INC.
14614 Grover St.
Omaha, NE 68144
(402) 330-2310
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Distribution
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Fred Wolford
Year Established: 1974
Number of Employees: 20

CENTEC CORP.
11260 Roger Bacon Drive
Reston, VA 22090
(703) 471-8300
Major Markets: OEM (Computer Systems)
Target Industries: Manufacturing
Target Applications: Process Control; Management Systems
Contacts:
Head of Engineering: Charles M. Rowan Jr.
Year Established: 1975
Number of Employees: 75

CENTENNIAL SOFTWARE
Suite 660
Corporate Center III
7900 E. Union St.
Denver, CO 80237
(800) 525-2003
Target Industries: Investment Analysis, Financial
Year Established: 1982
Number of Employees: 4

THE CENTER FOR COMPUTER SYSTEMS, INC.
1850 Lee Road
Suite 304
Winter Park, FL 32789
(305) 629-1023
Major Markets: Systems House (Commercial OEM)
Target Industries: Mailrooms, Retail, Hotel
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980
Number of Employees: 5

CENTRAL POINT SOFTWARE, INC.
P.O. Box 19730-203
Portland, OR 97219
(503) 244-5782
Target Industries: Apple Users
Year Established: 1980

CENTURY ANALYSIS, INC.
114 Center Ave.
Pacheco, CA 94553
(415) 680-7800
Major Markets: OEM (Computer Systems); OEM (Peripherals/ Terminals)
Target Industries: General Marketing
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1975
Number of Employees: 80

CENTURY ASSOCIATES
3845 Viscount Drive
Memphis, TN 38118
(901) 362-5424
Contacts:
Head of Sales: Jeff McCormack
Head of Software: Al Nichles
Year Established: 1975
Number of Employees: 5

CENTURY DATA CENTER, INC.
1015 N. Fifth Ave.
[illegible]
(815) 939-3819
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Distribution; Construction, Restaurant, Inventory
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1971
Number of Employees: 8

CERRITAS COMPUTER SERVICES, INC.
Suite 1
4320 Atlantic Ave.
Long Beach, CA 90807
(213) 595-8807
Major Markets: Systems House (Commercial OEM)
Target Industries: Automotive; Beer Distribution
Target Applications: Graphics
Year Established: 1973

CE SOFTWARE, INC.
238 Exchange St.
Chicopee, MA 01013
(413) 592-4761
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services

Vendors

Year Established: 1981
Number of Employees: 14

CETEC BROADCAST GROUP
1110 Mark Ave
Carpinteria, CA 93013
(805) 684-7300
Major Markets: Systems House (Commercial OEM)
Target Industries: Radio; Accounting
Target Applications: Accounting
Contacts:
Head of Engineering: Robert Distler
Year Established: 1978
Number of Employees: 8

C/P DATA SYSTEMS, INC.
400 Franklin St.
Quincy, MA 02184
(617) 849-1690
Major Markets: Systems House (Commercial OEM)
Target Industries: Construction; Distribution; Legal
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1979
Number of Employees: 8

CFP, INC. (COMPUTERIZED FISCAL PLANNING)
351 W 3rd Ave.
Columbus, OH 43201
(614) 294-4756
Target Industries: Real estate; Construction; Medical; Pharmacy
Target Applications: Real estate management; Job costing; Medical billing; Investment analysis
Year Established: 1977
Number of Employees: 20

CFS, INC.
1600 V.F.W Pkwy
W Roxbury, MA 02132
(617) 566-0222
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: David Shepherd
Year Established: 1977
Number of Employees: 8

C.G.A. COMPUTER ASSOCIATES, INC.
Software Products Division
Suite 310
255 Rt 520 E.
Marlboro NJ 07746
(201) 946-8900
Major Markets: Dealer/Distributor
Net Sales: $5 Million — $25 Million (1982)
Year Established: 1968
Number of Employees: 20

CHAIN STORE SYSTEMS, LTD.
[illegible] E. Touhy Drive
Chicago, IL 60601
(312) 938-0171
Target Industries: Food; Drug; Liquor; Investment Management
Target Applications: Purchasing, Warehouse and Labor Management
Year Established: 1975
Number of Employees: 28

CHAMPAIGN COMPUTER CO., INC.
P.O. Box 350
Mahomet, IL 61853
(217) 586-4131
Major Markets: Systems House (Commercial OEM)
Year Established: 1977
Number of Employees: 6

CHAMPION COMPUTER CO.
9721 E. 61 St
Tulsa, OK 74133
(918) 492-1400
Major Markets: Systems House (Commercial OEM)
Target Industries: Religious, Accountants
Target Applications: General Accounting; Income tax
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975
Number of Employees: 8

CHAMP SYSTEMS, INC.
8355 Riverside Blvd
Sacramento, CA 95831
(916) 424-4066
Target Industries: Oil jobbers, General business
Target Applications: General accounting
Year Established: 1978
Number of Employees: 4

CHANG LABS
Suite 200
5300 Stevens Creek Blvd.
San Jose, CA 95129
(408) 246-8020
Target Industries: General Business
Target Applications: Financial, WP; DBMS, Graphics
Contacts:
Head of Sales: Godfrey Roberts
Year Established: 1981
Number of Employees: 20

CHAPMAN & ASSOCIATES
29605 Sea Horse Cove
Laguna Niguel, CA 92677
(714) 495-4153
Major Markets: Maintenance/Other Services
Target Industries: Finance; Banking; Insurance
Target Applications: Insurance; Accounting
Year Established: 1977
Number of Employees: 2

CHARLES RIVER DATA SYSTEMS, INC.
4 Technology Circle
Natick, MA 01760
(617) 655-1800
Major Markets: Computer Manufacturing; OEM (Computer Systems)
Target Industries: OEM; Education; Communications; Commercial Data
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Bill Ninas
Head of Engineering: Russell O'Connor
Year Established: 1973
Number of Employees: 80

CHASE DATA SYSTEMS
8100 Reading Road
Cincinnati, OH 45237
(513) 821-3939
Major Markets: Systems House (Commercial OEM)
Target Industries: Printing; Distribution
Target Applications: Data Management
Year Established: 1980
Number of Employees: 2

CHECK TECHNOLOGY SYSTEMS, INC.
51 S Clayton
Lawrenceville, GA 30245
(404) 446-0140
Target Industries: Financial
Target Applications: Check Processing
Year Established: 1980
Number of Employees: 5

CHELSEA INTERNATIONAL CORP.
Suite T-200
1718 P St. N.W
Washington, DC 20036
(202) 483-3777
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor
Target Industries: Professionals, Government
Target Applications: Project Management Systems
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 10

CHELTONIAN, INC.
Suite C
10085 Westpark Drive
Houston, TX 77042
(713) 781-2300
Major Markets: Systems House (Commercial OEM)
Target Industries: Energy; Engineering, Construction, Aerospace
Target Applications: Project management
Year Established: 1977
Number of Employees: 30

CHEM-SL, INC.
4833 Indian Hills Drive
Racine, WI 53406
(414) 637-4338
Major Markets: OEM (Computer Systems), Systems House (Commercial OEM)
Target Industries: Engineering; Industrial, Manufacturing
Target Applications: Process Control; Heat Treating, Scientific
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 5

CHEMSHARE CORP.
P.O. Box 1885
Houston, TX 77001
(713) 627-8945
Major Markets. Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor
Target Industries: Engineering-Chemical
Year Established: 1969
Number of Employees: 50

CHILSON'S MANAGEMENT CONTROLS, INC.
Suite L
9645 Arrow Rt.
Rancho Cucamonga, CA 91730
(714) 980-5308
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Agriculture-Poultry, Distribution
Target Applications: Egg Processing, Production
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1973
Number of Employees: 19

CHRIS SCHAEFER & CO.
Suite 225
800 W Belt S.
Houston, TX 77042
(713) 780-2617
Major Markets: OEM (Computer Systems), OEM (Peripherals/ Terminals), Systems House (Commercial OEM)
Target Industries: Manufacturing, Property Management; International Trade, Education
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales. Ken Bautsch
Head of Software: Sarah Savage
Year Established: 1976
Number of Employees: 25

CHRISTENSEN COMPUTER CO., INC.
1955 Shermer Road
Northbrook, IL 60062
(312) 480-0881
Major Markets: OEM (Peripherals/ Terminals); Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing; Tire Dealers, Education, Government
Target Applications: Accounting; Job Costing
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales. Scott Stewart
Head of Software: Willard Buerger
Year Established: 1978
Number of Employees: 15

CHUBB & SON, INC.
Chubb Computer Services
15 Mountainview Road
P.O Box 1615
Warren, NJ 07061
(201) 580-2201
Major Markets: Data Services (Service Bureau)
Target Industries: Insurance
Target Applications: Policy writing; Rating; Data management, Statement preparation
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Roger Greene
Head of Software: Len Seavey
Year Established: 1970
Number of Employees: 25

CHUCK DULIN & ASSOCIATES, INC.
310A Louisiana S E
Albuquerque, NM 87108
(505) 265-3591
Major Markets: Systems House (Commercial OEM)
Target Industries: Financial
Target Applications: Financial
Year Established: 1972
Number of Employees: 4

CIA (COMPUTER INVESTMENT ADVICE, INC.)
[illegible]

Corapolis, PA 15108
(412) 262-5661
Major Markets: Systems House (Commercial OEM), Dealer/Distributor
Net Sales: $100,000 — $500,000 (1981)
[illegible]
Head of Sales: Gary Tolfa
Year Established: 1980
Number of Employees: 12

[illegible], INC.
2850 W. Serendipity
Colorado Springs, CO 80917
(303) 574-4050
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Banking; Manufacturing, Legal
Target Applications: Accounting, Inventory
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Mike Fortin
Year Established: 1969
Number of Employees: 30

[illegible] & ASSOCIATES, INC.
Suite 295
11684 Ventura Blvd.
Studio City, CA 91604
(213) 760-8110
Major Markets: Maintenance/Other Services
[illegible]
Number of Employees: 9

[illegible] CORP.
Suite 319
[illegible]
Costa Mesa, CA 92626
(714) 641-1156
Target Industries: Medical; Legal; Dental; Veterinarian
Target Applications: General Ledger; A/P; Time Accounting; Medical/Dental Accounting
[illegible]
Number of Employees: 14

CMA GROUP, INC.
2311 Clark Building
Pittsburgh, PA 15222
(412) 281-9800
Major Markets: Systems House (Commercial OEM)
Target Industries: Corregated Container
Target Applications: Cost Estimating
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: W. G. Mout Jr.
[illegible]
Number of Employees: 5

CINCOM SYSTEMS, INC.
2300 Montana Ave
Cincinnati, OH 45211
[illegible]
Major Markets: Maintenance/Other [illegible]
Target Applications: Accounting; DBMS
[illegible]
Head of Sales: Dennis Yablonsky
[illegible]
Number of Employees: 750

CIRCADIA (QUEST RESEARCH)
Jay Computer Services
12267 Nicollet Ave
Burnsville, MN 55337
(612) 894-7752
Major Markets: Maintenance/Other Services
Target Industries: Small business
Target Applications: Accounting; Numerical Analysis
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1979

CIRCUIT RESEARCH CORP.
Suite 3
4 Townsend W
Nashua, NH 03063
(603) 880-4066
Major Markets: Component Manufacturing; OEM (Computer Systems), Dealer/Distributor
Target Industries: Manufacturing; Navigation
Target Applications: Industry Control; Auto Testing; Navigational Control; Energy Management
Year Established: 1975
Number of Employees: 14

[illegible] CORP.
Proprietary Computer Systems (PCS) Division
16625 Saticoy St.
Van Nuys, CA 91406
(213) 781-8221
Major Markets: Data Services (Service Bureau)
Target Industries: Finance; Manufacturing, Real Estate
Target Applications: Portfolio Management; Trust Banking; Real Estate; Economic Forecasting
[illegible]
Head of Sales: Del Letourneau
Year Established: 1970
Number of Employees: 180

CITIZENS AUTOMATED SYSTEMS
100 Central Plaza S.
Canton, OH 44702
(216) 489-3738
Major Markets: Data Services (Service Bureau)
Target Industries: Banking; Thrift; Service Bureaus, Insurance
Target Applications: Financial; Lending, Loan Tracking
Net Sales: $1 Million — $5 Million (1981)
[illegible]
Head of Software/Engineering: Tom Tuersley
[illegible]
Number of Employees: 65

CLARITAS CORP.
1911 N. Fort Meyer Drive
Arlington, VA 22209
(703) 841-9200
Major Markets: Maintenance/Other Services
Target Industries: Banking; Retail; Publishing; Insurance
Contacts:
Head of Sales: Bruce Carroll
[illegible]
Number of Employees: 50

CLARK & SLATER ASSOCIATES, INC.
18 Shawmut St.
Boston, MA 02116
Major Markets: Maintenance/Other Services
Target Industries: Industrial, Commercial
Target Applications: Energy Tracking
Year Established: 1970
Number of Employees: 20

CLASS (COOPERATIVE LIBRARY AGENCY FOR [illegible])
Suite 101
1415 Koll Circle
San Jose, CA 95112
(408) 289-1756
[illegible]
Number of Employees: 35

[illegible] DATA SYSTEMS
59 Kensico Drive
Mt. Kisco, NY 10549
(914) 241-3436
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor
Year Established: 1966
Number of Employees: 45

CLEAR SYSTEMS
Suite 404
309 Santa Monica Blvd.
Santa Monica, CA 90401
(213) 394-7740
Major Markets: Maintenance/Other [illegible]
Target Applications: User Interfacing
Year Established: 1979
Number of Employees: 2

THE CLEMENTE CO.
936 Alice Lane
Menlo Park, CA 94025
(415) 321-1617
Target Industries: Consulting Firms; Engineering, Architecture
Year Established: 1980
Number of Employees: 1

CLYDE DIGITAL SYSTEMS
[illegible]
3707 N. Canyon Road
Provo, UT 84604
(801) 224-5306
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: Gary Godfrey
Year Established: 1973
Number of Employees: 25

CMA, INC.
[illegible]
Sylvania, OH 43560
[illegible]
Target Industries: General business; Medical, Agriculture, Manufacturing
Target Applications: Financial, Manufacturing; Farm Management
[illegible]
(1982)
[illegible]
Number of Employees: 20

CMA MICROCOMPUTER
55722 Santa Fe Trail
Yucca Valley, CA 92284
(619) 365-9718
Major Markets: Component Manufacturing
Target Industries: Medical; Education, Dental
[illegible]
Administration; Accounting
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: M. Duarte
Year Established: 1976
Number of Employees: 148

[illegible] ASSOCIATES, INC.
21H Olympia Ave
Woburn, MA 01801
(617) 935-5551
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau)
Target Industries: Court Administration, Processing, Project Cost General Municipal Accounting
Target Applications: Project Cost Fund Accounting
Year Established: 1974

C, H, [illegible], INC.
Suite A
15210 32nd Ave. S
Seattle, WA 98188
(206) 241-1199
Major Markets: Systems House (Commercial OEM)
Target Industries: Medical, Dental
Target Applications: MIS, General Accounting
[illegible]
Head of Software: William English
Year Established: 1980
Number of Employees: 10

[illegible], INC.
560 Morley Court
Belford, NJ 07718
(201) 787-7496
Major Markets: Maintenance/Other [illegible]
Target Industries: Education; [illegible]
Target Applications: Office Scheduling, Billing; Analytic [illegible]
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 5

COBE CORP.
[illegible]
2001 W. Beltline Highway
Madison, WI 53713
(608) 274-7416
Major Markets: Systems House (Commercial OEM)
Target Industries: Financial
Target Applications: DBMS
Year Established: 1976
Number of Employees: 25

COBRASOFT, INC.
13666 Hawthorne Blvd., No. 5
Hawthorne, CA 90250
(213) 644-1135
[illegible]
Number of Employees: 6

CODASCI, INC.
[illegible]
Columbus, OH 43229
(614) 890-7080
Target Industries: Education; Distribution
Target Applications: Accounting; Inventory; Payroll
Year Established: 1970
Number of Employees: 5

THE CODE WORKS
[illegible]
5266 Hollister

Vendors

Santa Barbara, CA 93111
(805) 683-1585
Major Markets: Maintenance/Other Services
Year Established: 1978
Number of Employees: 10

COLE-LATER-TRUMBLE CO.
3199 Kleppger Road
Dayton, OH 45406
(513) 276-5261
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Government
Net Sales: $5 Million — $25 Million (1982)
Year Established: 1938
Number of Employees: 600

COLLECTION DATA SYSTEM, INC.
Suite H
31192 La Baya Drive
Westlake Village, CA 91362
(213) 706-3333
Target Industries: Collection Agencies

COLLIER-JACKSON, INC.
[illegible] Hoover Blvd.
Tampa, FL 33614
(813) 885-6621
Major Markets: Systems House (Commercial OEM)
Target Industries: Newspapers; Manufacturing; Distribution
Target Applications: Financial Systems
Contacts:
Head of Sales: Nick Roubos
Head of Software: Warren Fletcher
Year Established: 1975
Number of Employees: 62

COLOR TERMINALS INTERNATIONAL, INC.
799 Stephenson Highway
Troy, MI 48084
(313) 528-2787
Major Markets: Data Services (Service Bureau); Maintenance/Other [illegible]
Target Applications: Computer [illegible]
Year Established: 1981

COLUMBIA COMPUTING SERVICES
8611 S. 212th St.
Kent, WA 98031
[illegible] 872-0253
Major Markets: Data Services (Service Bureau)
Target Industries: Education
Contacts:
[illegible]
Year Established: 1968
[illegible]

COLUMBINE SYSTEMS, INC.
1620 S. Jackson
[illegible], CO 80210
(303) 279-4000
Target Industries: Broadcasting
Target Applications: Accounting; Traffic; Film
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Sue Thompson
Head of Software: Shuny Sugiura
Year Established: 1971
[illegible]

COMAGRAPH
768 Inwood Drive
Campbell, CA 95008
(408) 374-9000
Year Established: 1978
Number of Employees: 1

COMCATER INTERNATIONAL, INC.
65 S. Main St
Pennington, NJ 08534
(609) 737-1540
Target Industries: Food Management
Target Applications: Food Service
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Engineering: Dr. P. Sinha
Year Established: 1976
Number of Employees: 12

COMCODE ASSOCIATES
3989 Research Park Drive
Ann Arbor, MI 48104
(313) 665-8811
Major Markets: OEM (Computer Systems)
Target Industries: Drafting
Target Applications: Graphics Design
Net Sales: $500,000 — $1 Million (1981)
[illegible]
Head of Software: Dr. P. Daniel Trochet
Year Established: 1977
Number of Employees: 15

COMGROUP
521 S. W. 11th Ave.
Portland, OR 97205
(503) 226-1608
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Typesetting; WP
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Leton Dietz
Head of Software: Larry Wrenn
Head of Engineering: Bruce Craig
Year Established: 1974
Number of Employees: 9

COMLAW
2363 E. Stadium Blvd.
Ann Arbor, MI 48104
(313) 761-4666
Major Markets: Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Legal
Target Applications: Telecommunications; Research
[illegible]
Head of Software: James A. Eidelman
[illegible]
Number of Employees: 15

COMMARK DATA, INC.
Suite 105
165 W. Valley Ave.
Birmingham, AL 35209
(205) 942-3156
Target Industries: Construction; Distribution; General Business
Target Applications: Accounting; Job Costing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: John Cromeans
Year Established: 1976
Number of Employees: 18

COMM BASIC ASSOCIATES
7920 Chambersburg Road
Dayton, OH 45424
(513) 233-9904
Major Markets: Systems House (Commercial OEM)
Target Industries: Finance
Target Applications: Commodity analysis
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 20

COMMERCE OVERSEAS COMMUNICATIONS, INC.
200 Clearbrook
Elmsford, NY 10523
(914) 592-2100
Major Markets: Systems House (Commercial OEM)
Target Industries: Distribution; Aerospace
Target Applications: Accounting; General Business, Distribution
Year Established: [illegible]
Number of Employees: 75

COMMERCIAL BUSINESS SYSTEMS, INC.
118 S. Washington
P.O. Box 1439
Marion, IN 46952
(317) 662-9851
Major Markets: Systems House (Commercial OEM); [illegible]
Target Industries: Manufacturing; Retail, Banking; Medical
Target Applications: Accounting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: John A. York
Head of Engineering: Michael M. [illegible]
Year Established: 1975
Number of Employees: 8

COMMERCIAL COMPUTER SERVICES, INC.
Suite 402
3000 Dundee
Northbrook, IL 60062
(312) 480-9880
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Medical; Manufacturing; Commercial
Target Applications: Accounting; Inventory Control; Order Processing; Mailing System
Year Established: 1968
Number of Employees: 18

COMMERCIAL COMPUTER SERVICES, INC.
6043 N.W. 167th St.
Miami, FL 33015
(305) 556-7360
Target Applications: Financial; Accounting
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1977
Number of Employees: 17

COMMERCIAL COMPUTER SYSTEMS
10101 Slater Ave.
Fountain Valley, CA 92708
(714) 964-7454
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Net Sales: $500,000 — $1 Million (1981)
[illegible]
Head of Sales: Mike Holt
Year Established: 1974
Number of Employees: 10

COMMERCIAL DATA CENTER, INC.
1530 Dorothy Lane
Dayton, OH 45409
(513) 294-2707
Major Markets: Data Services (Service Bureau); Maintenance/Other [illegible]
Net Sales: $500,000 — $1 Million (1982)
[illegible]
Head of Sales: Tom Kenney
Head of Software: Robert C. Klan
Year Established: 1966
Number of Employees: 30

COMMERCIAL DATA CORP. (FL)
5100 N.W. 9th Ave.
Ft. Lauderdale, FL 33309
(305) 491-5121
Target Applications: Accounting; Financial Reporting; Documentation
Net Sales: $100,000 — $500,000 (1982)
[illegible]
Head of Sales: Jack Yung
Year Established: 1981
Number of Employees: 7

COMMERCIAL DATA CORP. (TN)
3637 Park Ave.
Memphis, TN 38111
(901) 452-9000
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Medical; Construction
Year Established: 1967
Number of Employees: 35

COMMERCIAL DATA SYSTEMS CORP.
Suite 201
2812 Newspring Road
Atlanta, GA 30339
(404) 436-6565
Major Markets: Systems House (Commercial OEM).
Target Industries: Wholesale; Pharmacies, Distribution
Target Applications: Accounting; Inventory; Payroll; Word Processing
Net Sales: $500,000 — $1 Million [illegible]
Year Established: 1980
Number of Employees: 8

COMMERCIAL DATA [illegible], INC.
481 Atwood Ave
Cranston, RI 02920
(401) 943-0602
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Distribution; Manufacturing
Target Applications: Accounting; Purchase Orders; Costing
Contacts:
Head of Sales: Lou Bestini

Head of Software: Dave Littlehale
Year Established: 1970
Number of Employees: 24

COMMERCIAL MICRO SYSTEMS, INC.
Suite 103
31360 Via Colinas
Westlake Village, CA 91362
(213) 991-6030
Target Industries: Wholesale; Distribution
Target Applications: Accounting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Mark Drangson
Year Established: 1977
Number of Employees: 8

COMMERCIAL PROGRAMMING SERVICES, INC. (CPSI)
3701 Shoreline Drive
Wayzata, MN 55391
(612) 471-8448
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978
Number of Employees: 20

COMMERCIAL SOFTWARE SYSTEMS
7689 W. Frost Drive
Littleton, CO 80123
(303) 761-8062
Major Markets: Systems House (Commercial OEM)
Year Established: 1981
Number of Employees: 3

COMMERCIAL SOFTWARE, INC.
420 Lexington Ave.
New York, NY 10170
(212) 490-0654
Major Markets: Systems House (Commercial OEM)
Target Industries: Finance; Telecommunications
Target Applications: Cost Allocating
Year Established: 1976
Number of Employees: 42

Additional information provided for by vendor

CSI serves a national marketplace comprised of large industrial, financial and government organizations. CSI's telecommunications products include a cost allocation and accounting system and a telecommunications equipment management system. CSI also specializes in securities industry applications.

COMMERCIAL SYSTEMS CORP.
555 Stage Road
P O Box [illegible]
Auburn, AL 36830
(205) 821-1147
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Utilities; Government, Education, Wholesale
Target Applications: Accounting; WP; Utility Management
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: George Herndon
Head of Software: George Kemp
Year Established: 1975
Number of Employees: 44

COMM/IT CORP.
111 Presidential
Bala Cynwyd, PA 19004
(215) 668-9222
Major Markets: Systems House (Commercial OEM)
Target Industries: Legal; Accountants
Target Applications: Accounting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1971
Number of Employees: 7

COMMONWEALTH SYSTEMS
334 E. Manon St
Lancaster, PA 17602
(717) 392-1700
Major Markets: Maintenance/Other Services
Target Industries: Government; Business
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software/Engineering: Michael Blaum
Year Established: 1977
Number of Employees: 6

COMM PRO ASSOCIATES
350 N. Sepulveda Blvd
Manhattan Beach, CA 90266
(213) 376-1344
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1973
Number of Employees: 3

COMM SOFT, INC.
2452 Ebaradero Way
Palo Alto, CA 94303
(415) 493-2184
Target Applications: Communication; Genealogy, Educational
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Curt Bowersock
Year Established: 1980

COMMUNICATIONS PROFESSIONALS
DTC 1-238701 E. Bay St.
Charleston, SC 29403
(803) 722-7572
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Year Established: 1978
Number of Employees: 5

COMPAC SYSTEMS, INC.
59E Cunningham Drive
Palatine, IL 60067
(312) 358-3906
Year Established: 1978
Number of Employees: 5

COMPACT DATA SYSTEMS, INC.
14849 Magnolia Blvd.
Sherman Oaks, CA 91403
(213) 783-8245
Major Markets: Data Services (Service Bureau)
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Patrick Conti
Head of Software: B. VanHeeren
Year Established: 1969
Number of Employees: 100

COMPAL, INC.
Systems Division
8500 Wilshire Blvd.
Beverly Hills, CA 90211
(213) 652-2263
Major Markets: Computer Manufacturing; Terminal Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM); [illegible]
Year Established: 1976
Number of Employees: 15

COMPCO COMPUTER SPECIALISTS
7110 W. Ford du lac
Milwaukee, WI 53218
(414) 438-0610
Major Markets: Component Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Dairy, Recreation; Accountants; Distribution
Contacts:
Head of Sales: John Howman
Year Established: 1975
Number of Employees: 16

COM-PHO CORP.
[illegible]
2633 E. 28th St.
Signal Hill, CA 90806
(213) 426-1706
Major Markets: Systems House (Commercial OEM)
Target Industries: General Business, Manufacturing; Distribution, Retail
Target Applications: Accounting
Contacts:
Head of Engineering: Carla Brooks
Year Established: 1981
Number of Employees: 5

COMPINFO, INC.
20 W. 64th St.
New York, NY 10023
(212) 246-7340
Target Industries: Financial; Manufacturing
Target Applications: Accounting
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 4

COMPION CORP.
1101 E. University Ave.
Urbana, IL 61801
[illegible]
Target Industries: Government; Banking
Net Sales: [illegible] (1981)
Contacts:
Head of Sales: Gary Tause
Year Established: 1977
Number of Employees: 58

COMPLETE BUSINESS SERVICES
[illegible]
Logan, UT 84321
(801) 752-5713
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Accountants
Target Applications: General Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1976
Number of Employees: 4

COMPLETE COMPUTER SYSTEMS
709 Masons Mill Business Park
1800 Byberry Road
Huntington Valley, PA 19006
(215) 938-0190
Major Markets: Systems House (Commercial OEM).
[illegible]
Maintenance/Other Services
Target Industries: Manufacturing, Distribution
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Joe O'Donnell
Year Established: 1973
Number of Employees: 22

COMPLEX SYSTEM, INC.
130 Cedar St.
New York, NY 10006
(212) 766-4324
Target Industries: Banking
Target Applications: Credit Letter, Document Collection, Commercial Loans, Foreign Exchange
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Arlan S. Freiman
[illegible]
Number of Employees: 40

COMPREHENSIVE SYSTEMS, INC.
142 Hawley St.
Graystake, IL 60030
(312) 223-2811
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Government
Target Applications: Accounting; General Business
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1974
Number of Employees: 12

COMPRESS
P.O. Box 102
Wentworth, NH 03282
(603) 764-5831
Year Established: 1979
Number of Employees: 7

COMP — RITE INTERNATIONAL, INC.
11450 W. Sample Road
Coral Springs, FL 33065
[illegible]
Major Markets: Systems House (Commercial OEM)
Target Industries: Law Enforcement; Rental
Target Applications: Accounting; Medical Billing, Country Clubs
Contacts:
Head of Sales: Martin Kaplin
Head of Engineering: Peter Alexander

Vendors

Year Established: 1973
Number of Employees: 60

COMPROG, INC.
P.O Box 1459
Burbank, CA 91507
(213) 848-1321
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Software: Paul Renick
Year Established: 1980
Number of Employees: 3

COMPUPRO SPECIALISTS, INC.
2090 Concourse Drive
St Louis, MO 63141
(314) 432-1160
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing; Distribution Retail
Target Applications: Prop mgmt; Accounting, BOM; Inventory
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1974
Number of Employees: 20

COMPTECH
10 Commerce St
Glastonbury, CT 06033
(203) 633-4648
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Food Services
Contacts:
Head of Software: Mark Berthiaume
Year Established: 1975
Number of Employees: 40

COMPUCOM
9307 Science Center Drive
New Hope MN 55426
(612) 535-4176
Major Markets: Systems House (Commercial OEM)
Target Industries: General Business; Industrial Control
Target Applications: Process Control
Contacts:
Head of Software: James Andrews
Head of Engineering: Lawrence Arvidson
Year Established: 1979
Number of Employees: 12

COMPUCRAFT COMMUNICATIONS
1725 Timberway
P O Box 1646
Richardson, TX 75080
(214) 234-2902
Target Industries: Manufacturing; Process Control
Target Applications: Computer-aided Dispatch, Process Control
Contacts:
Head of Software: Zeke Shashowa
Year Established: 1975
Number of Employees: 5

COMPUDAT SERVICES, INC.
P O Box 2135
Ashville, NC 28802
(704) 255-8627
Major Markets: Systems House (Commercial OEM)
Target Industries: Apparel; Travel; Discrete Manufacturing; Retail
Target Applications: General Business, Financial; MRP; Group Travel
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Terry Grindstaff
Year Established: 1966
Number of Employees: 21

COMPUDESIGNS, INC.
P.O Box 4543
Manchester, NH 03105
(603) 669-7460
Target Industries: Manufacturing
Target Applications: Accounting
Year Established: 1980

COMPU-DRAW
1227 Goler Houser
Rochester, NY 14620
(716) 454-3188
Major Markets: Maintenance/Other Services
Target Industries: Small business
Target Applications: Timesharing; Protocol Conversion; Mailing Lists
Year Established: 1982
Number of Employees: 6

COMPUMATICS, INC.
1619 Magnavox Way
Ft. Wayne, IN 46852
(219) 432-3406
Major Markets: Systems House (Commercial OEM)
Target Industries: Wholesale
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software/Engineering: Michael K. Culp
Year Established: 1970
Number of Employees: 18

COMPUMAX, INC.
2171 Sharon Road
P.O Box 7239
Menlo Park, CA 94025
(415) 854-6700
Target Industries: Small Business; Manufacturing; Professional, Retail
Target Applications: Data Base; POS
Contacts:
Head of Software/Engineering: Douglas Daetz
Year Established: 1973
Number of Employees: 24

COMPU-SHARE, INC.
3824 50th
Lubbock, TX 79413
(806) 792-3785
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Construction; Accounting
Target Applications: Business
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Neil Baldridge
Year Established: 1977
Number of Employees: 22

COMPUSEL, INC.
Suite A120
5455 Buford Highway
N Court Square
Doraville, GA 30340
(404) 451-1033
Major Markets: Systems House (Commercial OEM)
Target Industries: Dental Laboratories
Target Applications: List prospect
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 3

COMP-U-STAFF, INC.
1 Investment Place P-4
Towson, MD 21204
(301) 828-0788
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Manufacturing; Engineering, Banking; Insurance
Target Applications: Material Handling; CAD/CAM, Banking
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Douglas Sharp
Year Established: 1978
Number of Employees: 100

COMPUTAC, INC.
Hanover Road
P.O Box 579
Hanover, NH 03755
(603) 298-5721
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Wholesale; Food wholesaling; Magazines
Target Applications: Billing; Accounting; Return processing; Vehicle management
Year Established: 1980
Number of Employees: 60

COMPUTA-MARK, INC.
18285 Highway 108
Jamestown, CA 95327
(209) 984-4221
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Education; Home; Small business
Year Established: 1979
Number of Employees: 2

COMPUTAX SYSTEMS, INC.
7471 University Ave.
La Mesa, CA 92041
(714) 462-5420
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Contacts:
Head of Sales: Don Middleton

COMPUTECH CORP.
1177 Silas Deane Highway
Wethersfield, CT 06109
(203) 721-1096
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Insurance
Target Applications: Group Insurance
Year Established: 1975
Number of Employees: 30

COMPUTECH GROUP, INC.
Main Line Industrial Park
Lee Building
Frazer, PA 19355
(215) 644-3344
Target Industries: Engineering; Architecture, Contractors
Target Applications: Accounting
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: Skip Reardon
Head of Software: Gary Harpst
Year Established: 1980
Number of Employees: 16

COMPUTE-IT
P.O. Box 1033
Torrington, CT 06790
(203) 528-9193
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Engineering
Target Applications: Job Costing
Year Established: 1960
Number of Employees: 20

COMPUTER COMPUTING CORP.
7489 E. 46th Place
Tulsa, OK 45630
(918) 622-5305
Major Markets: Data Services (Service Bureau); Dealer/Distributor
Target Industries: Credit Unions; Social Services
Target Applications: Data Entry
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1969
Number of Employees: 55

COMPUTER ACCOUNTING SYSTEMS, INC.
Suite 433
3033 Excelsior Blvd.
Minneapolis, MN 55416
(612) 927-9911
Target Applications: Accounting
Year Established: 1977
Number of Employees: 10

COMPUTER AIDED DESIGNS, INC.
31 Milk St.
Boston, MA 02109
(617) 542-6181
Major Markets: Dealer/Distributor
Target Industries: Brokerage, Money Management; Financial
Year Established: 1980
Number of Employees: 10

COMPUTER APPLICATIONS CORP.
Program Products Division
Suite 318
2400 Poplar Ave.
Memphis, TN 38112
(901) 458-8630
Target Industries: Engineering; Architecture
Target Applications: Managerial Accounting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1973
Number of Employees: 16

COMPUTER APPLICATIONS SPECIALISTS
9900 Shoal Creek
P.O. Box 9163
Austin, TX 78766
(512) 453-3900
Major Markets: Systems House
Commercial OEM
Target Industries: Oil and Gas
Target Applications: Accounting; Production; Land Management
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Marvin Mori

Head of Software: Kenneth Rohen
Year Established: 1975
Number of Employees: 35

COMPUTER APPLICATIONS SYSTEMS, INC. (CASI)
1340 Neptune Drive
Boynton Beach, FL 33435
(305) 736-3500
Major Markets: Systems House (Commercial OEM)
Target Industries: Hotel; Banking; Publishing
Target Applications: Controlled Access, Time and Attendance
Contacts:
Head of Software: William Zoch
Head of Engineering: Basoom C. Dillon
Year Established: 1981
Number of Employees: 20

COMPUTER ASSISTANCE, INC.
Suite 108
11498 Lura Road
Dallas, TX 75234
(214) 869-1161

COMPUTER ASSOCIATES
Systems Products Division
125 Jericho Tnpk
Jericho, NY 11753
(516) 333-6700
Major Markets: Maintenance/Other Services
Target Applications: Automation; Management
Net Sales: $25 Million — $100 Million (1982)
Contacts:
Head of Sales: David Wardle
Year Established: 1972
Number of Employees: 385

COMPUTER ASSOCIATES, INC.
P.O. Box 328A
Southbend, IN 46624
(219) 232-7921
Major Markets: OEM (Computer Systems); OEM (Peripherals/ Terminals); Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Pharmaceutical
Target Applications: Pharmaceutical
Contacts:
Head of Sales: Larry Woods
Year Established: 1967
Number of Employees: 12

COMPUTER BUSINESS APPLICATIONS, INC.
701 E. Third St.
Los Angeles, CA 90013
(213) 680-0241
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Retail; Finance
Target Applications: Merchandise Management; Accounting
Contacts:
Head of Software: Rod Asmussen
Year Established: 1979
Number of Employees: 15

COMPUTER BUSINESS SYSTEMS (MA)
167 Moore Road
Weymouth Industrial Park
Weymouth, MA 02189
(617) 337-7799
Major Markets: Component Manufacturing; OEM (Computer Systems); Data Services (Service Bureau)
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Richard White
Head of Software: Donald White
Year Established: 1976
Number of Employees: 8

COMPUTER BUSINESS SYSTEMS (MI)
Suite 204
31850 Greenfield Road
Oak Park, MI 48237
(313) 968-6677
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Business; Medical; Manufacturing
Target Applications: Accounting; Office Management; Contract; Debt Management
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1978
Number of Employees: 6

COMPUTER BUSINESS SYSTEMS, INC.
P.O. Box 425
Stone Mountain, GA 30086
(404) 294-6161
Major Markets: Data Services (Service Bureau)
Target Applications: WP; Accounting; Payroll; Inventory
Year Established: 1970
Number of Employees: 15

COMPUTER CENTER, INC. OF MIAMI
P.O. Box 285
Opa-Locka, FL 33054
(305) 687-1234
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Real Estate; Airline
Target Applications: Accounting; Ticket Accounting; Keypunch
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Tom Johnston
Year Established: 1968
Number of Employees: 22

COMPUTER COMMUNICATIONS SPECIALISTS, INC.
6683 Jimmy Carter Blvd.
Atlanta, GA 30071
(404) 441-3114
Major Markets: Component, Computer, Peripheral and Communications Equipment Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor, Maintenance/Other Services
Target Industries: Utilities, Manufacturing, Retail; Wholesale
Target Applications: Data Entry; POS Polling; Badge Readers; Bar Code Readers
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: R. L. Pass
Head of Engineering: Dr. Dwight Jones
Year Established: 1977
Number of Employees: 30

COMPUTER CO.
1925 Westmoreland St.
Richmond, VA 23230
(804) 358-2171
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Medical; Banking; Airline
Net Sales: $25 Million — $100 Million (1982)
Year Established: 1980
Number of Employees: 600

COMPUTER CONCEPTS & SERVICES, INC.
1900 Clearwater Road
St. Cloud, MN 56302
(612) 253-2170
Major Markets: Systems House (Commercial OEM)
Target Industries: Government
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Monte Westphal
Head of Software/Engineering: Dan Sherman
Year Established: 1971
Number of Employees: 55

COMPUTER CONCEPTS CORP.
8001 W. 63rd St.
Shawnee Mission, KS 66202
(913) 677-4000
Major Markets: Component Manufacturing, Systems House (Commercial OEM); Dealer/Distributor
Maintenance/Other Services
Target Industries: Broadcasting
Target Applications: Business Administration
Contacts:
Head of Sales: Walter Dean
Head of Software: Greg Dean
Year Established: 1981
Number of Employees: 20

COMPUTER CONCEPTS, INC. (MD)
11333 Rose Road
Potomac, MD 20854
(301) 985-0650
Target Applications: Large Data Base IMS, CICS
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software/Engineering: Howard Knobloch
Year Established: 1971
Number of Employees: 15

COMPUTER CONCEPTS, INC. (OR)
8443 S.W. Beaverton Highway
Portland, OR 97225
(503) 297-4741
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Robin Shaylor
Head of Software/Engineering: Don Weidenweber
Year Established: 1974
Number of Employees: 5

COMPUTER CONSULTANTS
312 Hoyt St.
Dunkirk, NY 14048
(716) 366-0766
Major Markets: Systems House (Commercial OEM)
Year Established: 1975
Number of Employees: 12

COMPUTER CONSULTANTS & SERVICE CENTER
2001 Hanley Center
St. Louis, MO 63144
(314) 647-8891
Major Markets: Data Services (Service Bureau)
Target Industries: Banking; Printing; Manufacturing
Target Applications: Software Development; Data base Typesetting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Buzz Marchese
Year Established: 1964
Number of Employees: 25

COMPUTER CONSULTING & PROGRAMMING SERVICES
512 E. 32nd St.
Joplin, MO 64801
(417) 782-2753
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Applications: Inventory control, Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 3

COMPUTER CONTROL SYSTEMS, INC.
298 21st Terrace S.E.
Largo, FL 33541
(813) 586-1886
Target Industries: CPA
Year Established: 1977
Number of Employees: 5

COMPUTER CORNER
22 Beechurst Ave.
Morgantown, WV 26505
304 292-4785
Major Markets: Dealer/Distributor
Contacts:
Head of Sales: Mike Matz
Year Established: 1975
Number of Employees: 15

COMPUTER CORP. OF AMERICA
4 Cambridge Center
Cambridge, MA 02142
617 492-8860
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Applications: Electronic Mail System, CAM
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Peter Hale
Year Established: 1965
Number of Employees: 170

COMPUTER COVENANT CORP.
790 Farmington Ave.
Farmington, CT 06032
(203) 677-6663

Vendors

Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau)
Target Industries: Manufacturing, Job Shops
Target Applications: Job Costing, Product Scheduling, Order Entry, Financial
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1975
Number of Employees: 10

COMPUTER CURRICULUM
1070 Arastradero Road
P.O. Box 10080
Palo Alto, CA 94304
(415) 494-8450
Major Markets: Terminal Manufacturing, Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Education; Military
Contacts:
Head of Sales: David C. Munson
Head of Software: Dr. Robert Smith
Head of Engineering: Ken Chin
Number of Employees: 225

COMPUTER DATA ACCESS, INC.
1373 Broad St.
Clifton, NJ 07013
(201) 473-4700
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Auto
Target Applications: Inventory control, POS billing, Accounts Payable
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Roy Roberts
Head of Engineering: Edward [illegible]
[illegible]
Number of Employees: 55

COMPUTER DATA CORP.
31344 Via Colinas
Westlake Village, CA 91362
(213) 991-4060
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Distribution; Sales/leasing, Finance, Medical
Target Applications: Financial; Payroll; Distribution; Medical
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Lynn Wolf
Head of Software: Al Varey
[illegible]
Number of Employees: 50

COMPUTER DATA SYSTEMS, INC.
7315 Wisconsin Ave.
Bethesda, MD 20814
(301) 657-1730
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Government
Target Applications: Financial Account; Debt Management Collection
Contacts:
Head of Sales: Tom Green
Head of Software: Cliff Kendall
Year Established: 1967
Number of Employees: 1,050

COMPUTER DEVELOPMENT SERVICES, INC.
1851 Dana St.
Glendale, CA 91201
(213) 500-0228
Major Markets: Systems House (Commercial OEM)
Target Industries: Banking
Year Established: 1979
Number of Employees: 12

COMPUTER ENGINEERING ASSOCIATES, INC.
65 E. Main St.
Avon, MA 02322
(617) 588-6260
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services
Contacts:
Head of Engineering: Stanley J. Zavatsky
Year Established: 1979
Number of Employees: 40

COMPUTER ENTERPRISES LTD.
P.O. Box 122
Grand Haven, MI 49417
(616) 846-5610
Major Markets: OEM (Computer Systems)
Target Industries: Petroleum; [illegible]
Target Applications: POS
Year Established: 1982
Number of Employees: 3

COMPUTER GENERATION, INC.
3855 Presidential Pkwy.
Atlanta, GA 30340
(404) 458-2371
Major Markets: Maintenance/Other Services
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: Jackie Ward
Head of Software/Engineering: Carol [illegible]
Year Established: 1968
Number of Employees: 58

COMPUTER HEADWARE
P.O. Box 14694
San Francisco, CA 94114
(415) 647-8518
Target Industries: Professional; [illegible]
Target Applications: Information Retrieval, Query System
[illegible]

COMPUTER HOUSE
Electronic Business Systems Division
62 East St.
S. Portland, ME 04106
(207) 799-2208
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Accountants; [illegible]
Target Applications: Accounting
Contacts:
Head of Software/Engineering: Randy Rochwel
Year Established: 1977
Number of Employees: 14

COMPUTER INCOME PLANNING CORP.
122 E. 42nd St.
New York, NY 10168
(212) 867-4890
Major Markets: Data Services (Service Bureau)
Target Industries: Insurance
Target Applications: Product Administration
Contacts:
Head of Sales: Robert Remick
Head of Software: Norman Berkowitz
Year Established: 1978
Number of Employees: 12

COMPUTER INFORMATION ENTERPRISES
13030 Euclid
Garden Grove, CA 92643
(714) 534-0202
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Applications: WP, Network communications, Business software; Retail
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Craig Chandler
Year Established: 1975
Number of Employees: 8

COMPUTER INFORMATION SYSTEM CO., INC.
P.O. Box 1328
Vail, CO 81658
(303) 949-4736
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau)
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Bob Harteker
Head of Software: Rick Baumgartner
Year Established: 1973
Number of Employees: 6

COMPUTER INFORMATION SYSTEMS
165 Baystate Drive
Braintree, MA 02184
(617) 848-7515
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Retail
Target Applications: Financial
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Steve Lilly
Head of Software: Dick Levin
Head of Engineering: Wade Pooler
Year Established: 1976
Number of Employees: 30

COMPUTER INNOVATIONS, INC.
Suite J
10 Mechanic St.
Red Bank, NJ 07701
(201) 530-0995
Target Industries: System House; [illegible]
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1978
Number of Employees: 6

COMPUTER INPUT CORP.
1840 S. Elena
Redondo Beach, CA 90277
(213) 372-2177
Major Markets: Data Services (Service Bureau)
Target Industries: Government; Insurance, Education, Medical
Target Applications: Data Entry; Contract Programming
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Gary Kench
Head of Software: Ken Andersen
Year Established: 1969
Number of Employees: 427

COMPUTERISTICS, INC.
2 Skiff St.
Hamden, CT 06514
(203) 288-2834
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Applications: Accounting; Order Entry; Order Processing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Rolf Diegel
Head of Software: Tom Pape
Head of Engineering: Arne Lumas
[illegible]
Number of Employees: 100

COMPUTERIZED LIFE INSURANCE COMPUTATIONS
Division of International Marketing Consultants, Inc.
Suite 317
4200 S. Hulen
Ft. Worth, TX 76109
(817) 731-4161
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other [illegible]
Target Industries: Insurance
Target Applications: Replacement; Regulatory systems; Policy analysis
Year Established: 1977
Number of Employees: 5

COMPUTERIZED LODGING, INC.
Suite 720
3435 Wilshire Blvd.
Los Angeles, CA 90010
(213) 385-0291
Major Markets: Systems House (Commercial OEM)
Target Industries: Lodging
Net Sales: $1 Million — $5 Million (1981)
[illegible]
Number of Employees: 10

COMPUTERIZED PLANNING SYSTEM, INC.
6944 N. Point Washington Road
Glendale, WI 53217
(414) 351-6755
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Mark J. Becker
Head of Software/Engineering: [illegible]
[illegible]
Number of Employees: 5

COMPUTER LANGUAGE RESEARCH, INC.
2395 Midway Road
Carrollton, TX 75006
(214) 934-7681
Major Markets: OEM (Computer Systems); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Accountants; Banking, Accounting
Target Applications: Tax Process
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: D. Fell
Head of Software: James R. Bridges
[illegible]
Number of Employees: 1,200

COMPUTER MANAGEMENT CORP.
4969 Waters Edge
Raleigh, NC 27606
(919) 851-7300
Major Markets: Data Services (Service Bureau)
Target Industries: Legal; General Business
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Tom Badger
Year Established: 1968
Number of Employees: 80

COMPUTER MANAGEMENT, INC.
Suite 408
3 Piedmont Center
Atlanta, GA 30305
(404) 231-1221
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Dental, Medical; Country Clubs; Advertising Agencies
Target Applications: Credit Collection
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Engineering: Larry Dreeman
Year Established: 1969
Number of Employees: 150

COMPUTER MARKETING CORP.
[illegible] 200
3331 S. 900 E.
Salt Lake City, UT 84106
(801) 486-3401
Target Industries: Credit Unions; Distribution
Target Applications: POS; Accounting, Inventory Control
Net Sales: $500,000 — $1 Million (1982)
[illegible]
Head of Software: Kent England
[illegible]
Number of Employees: 15

COMPUTER MART, INC.
1395 Main St.
Waltham, MA 02154
(617) 899-4540
Major Markets: Dealer/Distributor
Target Industries: Small Business
Target Applications: WP
Year Established: 1975
Number of Employees: 10

COMPUTER MEDIA, INC.
140 N. LaGrange Road
LaGrange, IL 60525
(312) 354-7676
Target Industries: Manufacturing
Target Applications: Data acquisition, Testing, Communications
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 5

COMPUTER METHODS, INC.
10335 W. Oklahoma Ave.
Milwaukee, WI 53227
(414) 327-4471
Target Industries: Manufacturing
[illegible]
Number of Employees: 52

COMPUTER NETWORK CORP. (COMNET)
5185 MacArthur Blvd., N.W.
Washington, DC 20016
(202) 537-2500
Major Markets: Data Services (Service Bureau)
Target Industries: Government; Mail Management, Medical
Target Applications: Communication Mail Management
Net Sales: $5 Million — $25 Million (1981)
[illegible]
Head of Software/Engineering: A. C. Lewis
Year Established: 1967
Number of Employees: 150

COMPUTER NOOK
Pine Brook Plaza 6
[illegible] 46
Pine Brook, NJ 07058
(201) 575-9468
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Contacts:
Head of Sales: Robert Barker
Head of Software/Engineering: Terry Kearney
[illegible]
Number of Employees: 15

COMPUTER OPERATIONS, INC.
5001-J Forbes Blvd.
Lanham, MD 20706
(301) 459-2100
Major Markets: Computer Manufacturing
Target Industries: Manufacturing; Metal; Broadcasting
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1969
Number of Employees: 27

COMPUTER OPTICS, INC.
142 Crescent St.
Brockton, MA 02402
(617) 583-4400
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Accounting; Education, Manufacturing
Target Applications: Job Cost Analysis
Net Sales: $100,000 — $500,000 (1981)
[illegible]
Head of Software: Robert Rebeiro
Head of Engineering: Fredric D. Carter III
Year Established: 1979
Number of Employees: 10

COMPUTER PACKAGES, INC.
414 Hungerford Drive
Rockville, MD 20850
(301) 424-8890
Target Industries: Legal and Patent
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Software: Richard Peter
Year Established: 1968
Number of Employees: 16

COMPUTER PATIMENTS
Suite 66-C
1700 McHenry Ave.
Modesto, CA 95350
(209) 577-2989
Major Markets: Data Services (Service Bureau), Maintenance/Other Services
Target Applications: Business
Contacts:
Head of Sales: W. Langman
Head of Software: Raymond Rios
Head of Engineering: K. Lemay
Year Established: 1976
Number of Employees: 30

COMPUTER POWER
Suite 110E
661 Riverside Ave.
Jacksonville, FL 32204
(904) 358-1424
Major Markets: Data Services (Service Bureau)
Target Industries: Banking; Real Estate
Target Applications: Construction Loan Management, Inventory, Mortgage Services; General Ledger
Net Sales: $25 Million — $100 Million (1982)
Contacts:
Head of Sales: Gary Sneed
Head of Software: Albert W. Flack
[illegible]
Number of Employees: 175

COMPUTER PRODUCTS INTERNATIONAL
3225 Danny Park
New Orleans, LA 70002
(504) 455-5330
Net Sales: $1 Million — $5 Million (1982)
Contacts:
[illegible]
[illegible]
Number of Employees: 21

COMPUTER PROGRAMMING, INC. (CPI)
35½ S. Prospect Ave.
Park Ridge, IL 60068
(312) 692-2256
Major Markets: Dealer/Distributor; [illegible]
Target Industries: Distribution; Job shops; Collection agencies, Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Kyle M. Albrecht
Year Established: 1978
Number of Employees: 20

COMPUTER PROJECTS, INC.
98 Terrace Way
4 Seasons Executive Center
Greensboro, NC 27403
[illegible]
Major Markets: Systems House (Commercial OEM)
Target Applications: Data Communication; Electronic Mail
Contacts:
Head of Sales: Arnold F. Selby
Year Established: 1968
Number of Employees: 25

COMPUTER RESOURCES & TECHNOLOGY, INC.
20100 W. Greenfield Ave.
Waukesha, WI 53186
(414) 786-9171
Target Industries: Medical; Education, Manufacturing, Distribution
Target Applications: Financial; Billing, Invoicing, Scheduling
Net Sales: $1 Million — $5 Million (1981)
[illegible]
Head of Software: Dick Krug
[illegible]
Number of Employees: 32

COMPUTER RESOURCES INTERNATIONAL
[illegible] 200
1401 Hudson Lane
Monroe, IL 71201
(318) 387-2363
Major Markets: Systems House (Commercial OEM); [illegible]
Target Industries: Wholesale; Distribution
Contacts:
Head of Sales: James Baker
Head of Software: Glen Gordon
Head of Engineering: Ron Harvey
Year Established: 1976
Number of Employees: 15

COMPUTER RESOURCES, INC.
Rt. 4
Barrington, NH 03825
(603) 868-5337
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau), Dealer/Distributor
Target Industries: Education
Contacts:
Head of Software: William Schendt
Year Established: 1978
Number of Employees: 8

COMPUTERS & BUSINESS SYSTEMS, INC.
Suite 1004
1220 Broadway
P.O. Box 2954
Lubbock, TX 79408
(806) 763-6049
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau), Dealer/Distributor; Maintenance/Other Services
Target Industries: Insurance, Oil and gas; Food; General Business
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Charles H. Camp
Head of Software/Engineering: Tony Kite
Year Established: 1979
Number of Employees: 5

COMPUTER SEARCH INTERNATIONAL CORP.
1500 Sulgrave Ave.
Baltimore, MD 21209
(301) 664-1000
Target Industries: Executive recruiting
Year Established: 1980
Number of Employees: 4

Vendors

COMPUTER SECURITY INTERNATIONAL, INC.
718 Pine St.
Herndon, VA 22070
(703) 437-6969
Major Markets: Maintenance/Other Services
Target Industries: Banking
Target Applications: Risk Management
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Margery Mac Fawn
Year Established: 1980
Number of Employees: 7

COMPUTER SERVICE CO.
10903 Newlands Ave.
Richmond, VA 23233
(804) 270-4194
Target Industries: Insurance; Automotive; Accountants
Target Applications: Inventory Control; Client Write-up; Billing
Year Established: 1975
Number of Employees: 3

COMPUTER SERVICE CONSULTANTS
37 Jefferson Blvd.
Warwick, RI 02888
(401) 785-0300
Major Markets: Data Services (Service Bureau)
Target Industries: Construction; Wholesale — Dairies
Target Applications: Accounting
Year Established: 1968
Number of Employees: 25

COMPUTER SERVICES
1283 E. 820 S.
P.O. Box 233
Provo, UT 84603
(801) 377-2100
Major Markets: Dealer/Distributor
Year Established: 1976
Number of Employees: 5

COMPUTER SERVICES CO.
P.O. Drawer M
Wichita Falls, TX 76307
(817) 723-1497
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Retail; Finance; Oil; Loan
Target Applications: Balance sheets; Payroll; Accounting; Inventory Control
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Tom Garrison
Year Established: 1967
Number of Employees: 15

COMPUTER SERVICES CORP. (AL)
200 Bank for Savings Building
Birmingham, AL 35203
(205) 320-6800
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Medical
Target Applications: Physician's Billing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Roland B. Smith
Head of Software: Robert Bradley
Year Established: 1985
Number of Employees: 47

COMPUTER SERVICES CORP. (MD)
200 E. Joppa Road
Towson, MD 21204
(301) 825-2500
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: General Business Applications
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: David Fredericks
Year Established: 1972
Number of Employees: 14

COMPUTER SERVICES, INC.
Trantec, Inc. Division
1301 Broadway
P.O. Box 60
Paducah, KY 42001
(502) 442-7361
Target Industries: Banking
Contacts:
Head of Software: Lawrence Durbin
Year Established: 1981

COMPUTERS FOR BUSINESS, INC.
Suite 201
1446 Reynolds Road
Maumee, OH 43537
(419) 891-0444
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Applications: General accounting
Contacts:
Head of Sales: Tim Kearney
Head of Software: Donald P. Sparks
Year Established: 1981
Number of Employees: 5

COMPUTERS FOR YOU
2003 Van Ness Ave.
San Francisco, CA 94109
(415) 474-2772
Major Markets: Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing, Representatives, Dental; Legal; Educational
Target Applications: Order Tracking; Billing & Management; Time Billing; Administrative
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales/Software: Tom Hui
Year Established: 1981
Number of Employees: 10

COMPUTER SHARING CORP.
CSC Systems and Services Division
7851 Metro Pkwy.
Minneapolis, MN 55420
(612) 726-7784
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Legal
Number of Employees: 15

THE COMPUTER SHOP OF ABILENE
550 N. Fifth
Abilene, TX 79601
(915) 673-6708
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 5

COMPUTER SIGHT
Suite 503
2490 Channing Way
Berkeley, CA 94704
(415) 644-1688
Major Markets: Maintenance/Other Services
Target Industries: Medical; Energy
Target Applications: Scientific; General
Year Established: 1976

COMPUTER SOFTWARE FOR PROFESSIONALS, INC.
1615 Broadway No. 300
Oakland, CA 94612
(415) 444-5316
Major Markets: OEM (Peripherals/Terminals); Systems House (Commercial OEM)
Target Industries: Legal; Medical; Dental
Target Applications: Accounting; Billing; Cost Accounting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1976

COMPUTER SOFTWARE CONSULTANTS, INC.
200 Boylston St.
Chestnut Hill, MA 02167
(617) 964-4316
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: DEC users; Retail, Wholesale, Lumber Dealers
Target Applications: General Business, Inventory; General Accounting
Contacts:
Head of Sales: Hugh MacDonald
Head of Software/Engineering: Jeffrey Stulin
Year Established: 1971
Number of Employees: 11

COMPUTER SOFTWARE SPECIALISTS, INC.
5808 Cleo St.
St. Louis, MO 63132
(314) 997-5411
Major Markets: OEM (Computer Systems)
Target Industries: Banking; Financial
Target Applications: Mortgage Processing, Lending
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1972
Number of Employees: 7

COMPUTER SOLUTIONS, INC. (KY)
3728 Alexandria Pike
Cold Spring, KY 41076
(606) 781-3100
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Retail — Florist
Target Applications: Financial Reporting; Sales Reporting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Ellen R. Dernovshek
Year Established: 1976
Number of Employees: 6

COMPUTER SOLUTIONS, INC. (NJ)
50 Washington Terr.
E. Orange, NJ 07017
(201) 672-6000
Major Markets: Systems House (Commercial OEM)
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Jerry Heath
Head of Engineering: Tom McCarthy
Year Established: 1967
Number of Employees: 20

COMPUTER SOLUTIONS, INC. (TX)
711 Lake Air Drive
Waco, TX 76710
(817) 776-7655
Major Markets: Dealer/Distributor; Maintenance/Other Services
Target Industries: Trucking; Distribution; Manufacturing MRP
Target Applications: Cash Register Poll; Interfacing; Manufacturing
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1972
Number of Employees: 3

COMPUTER SOLUTIONS, INC. (WA)
2281 116th Ave. N.E.
Bellevue, WA 98004
(206) 451-1934
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Manufacturing; Distribution; Construction, Retail
Target Applications: Accounting; Job Costing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Bill Babcock
Year Established: 1977
Number of Employees: 10

THE COMPUTER SPECTRUM LTD.
5080 Peachtree Drive
Suite 205
Atlanta, GA 30341
(404) 458-1351
Major Markets: Dealer/Distributor
Year Established: 1978
Number of Employees: 3.

COMPUTERS PLUS — MONTICELLO
P.O. Box 854
Monticello, KY 42633
(502) 348-3000
Major Markets: Dealer/Distributor
Target Industries: Medical; Education; Small Business
Contacts:
Head of Software: Joel Belcher
Year Established: 1982
Number of Employees: 3

COMPUTERS STATIONED, INC.
11810 Page Service Drive
St. Louis, MO 63141

(314) 432-7019
Major Markets: Peripheral Manufacturing
Target Industries: Graphic Art
Target Applications: Graphic [illegible]
Contacts:
[illegible]: Kris Mullen
Head of Engineering: George Baltzell
Year Established: 1978
Number of Employees: 10

COMPUTER STRATEGIES, INC.
Suite 303
2675 44th St. S.W.
Grand Rapids, MI 49509
(616) 531-8160
[illegible]: Dealer/Distributor
Target Industries: Manufacturing; Distribution
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software: Joe Batteiger
Year Established: 1980
Number of Employees: 10

COMPUTER SUPPORT SERVICES
38 N. Second St.
Lewisburg, PA 17837
(717) 524-4424
[illegible] Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Manufacturing; Distribution
Net Sales: $500,000 — $1 Million (1982)
Contacts:
[illegible]
Head of Software: David Comosia
Year Established: 1973
Number of Employees: 11

COMPUTE-R-SYSTEMS
5165 Campus Drive
Plymouth Meeting, PA 19462
[illegible]
Target Industries: Legal
Target Applications: Billing; WP
Contacts:
[illegible]
Year Established: 1979
Number of Employees: 140

COMPUTER SYSTEM ARCHITECTS, INC.
30 Brattle St.
Cambridge, MA 02138
(617) 876-2686
Major Markets: Maintenance/Other Services
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Anna Marie Thron
Year Established: 1969
Number of Employees: 7

[illegible] & APPLICATIONS, INC.
[illegible]
6633 Portwest Drive
Houston, TX 77024
[illegible]
Target Applications: Accounting-financial, [illegible]
[illegible]
Number of Employees: 27

COMPUTER SYSTEMS & SOLUTIONS, INC.
3015 Plains
Amarillo, TX 79102
(806) 374-5865
Major Markets: Office Equipment Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM); [illegible]
Target Industries: Medical; Feedlots, Legal
Target Applications: Optical Card Reader
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Waldon Scott
Head of Engineering: Dan Carroll
Year Established: 1980
Number of Employees: 11

COMPUTER SYSTEMS ARCHITECTS
P.O. Box 12276
Columbia, SC 29211
[illegible]
[illegible] Data Services (Service Bureau)
Target Industries: Manufacturing; Nursing Homes, Distributors
Target Applications: A/P; A/R; General Ledger; Payroll; Inventory
Year Established: 1978
Number of Employees: 10

COMPUTER SYSTEMS ASSOCIATES, INC.
Suite B3
1690 Raymond Diehl Road
P O Box 13296
Tallahassee, FL 32317
[illegible]
Major Markets: Systems House (Commercial OEM)
Target Industries: Retail; Manufacturing; Service; Medical
Target Applications: Accounting; Payroll; Billing; Inventory
[illegible]
Number of Employees: 8

COMPUTER SYSTEMS DESIGN, INC.
1105 W Lincoln
P.O. Box 735
Yakima, WA 98902
[illegible]
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: David L. Lainweber
Year Established: [illegible]
Number of Employees: 4

COMPUTER SYSTEMS DYNAMICS
7100 Broadway
[illegible]
Denver, CO 80221
(303) 426-4220
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Wholesale; Retail; [illegible]
Target Applications: Accounting; Utility Billing; Job Costing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Dennis Spano
Year Established: 1975
Number of Employees: 30

COMPUTER SYSTEMS INTERNATIONAL, LTD.
Suite 501
841 Bishop St.
[illegible]
(808) 521-8741
Major Markets: Data Services (Service Bureau)
Target Industries: Financial
Target Applications: General banking
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1972
Number of Employees: 56

COMPUTER SYSTEMS RESEARCH, INC.
40 Darling Drive
Avon, CT 06001
(203) 678-1212
Major Markets: Maintenance/Other [illegible]
Target Applications: Training
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Joe Bacher
Head of Software: Joe DiOrio
Head of Engineering: Harry Dillman
Year Established: 1974
Number of Employees: 28

COMPUTER SYSTEMS SUPPORT CORP.
9112 Gaither Road
Gaithersburg, MD 20877
(301) 424-7870
Major Markets: Dealer/Distributor; [illegible]
Target Industries: Retail
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Ken Knipschild
Year Established: 1974
Number of Employees: 60

COMPUTER SYSTEMS TECHNOLOGY, INC.
9720 W. Bluemound Road
[illegible]
(414) 258-8110
Major Markets: Systems House [illegible]
Target Industries: Government — [illegible] Real Estate; Police
Target Applications: Financial; Voter registration; Utility billing; Property appraisal
Year Established: 1978
Number of Employees: 10

COMPUTER SYSTEMS, INC.
Suite 101
100 Dave Lyle Blvd.
[illegible]
[illegible]
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Industrial; Textile; Industrial Distributor
Target Applications: Order Entry; Inventories, Financials
Net Sales: $1 Million — $5 Million [illegible]
Contacts:
Head of Sales: Bill Forsyth
[illegible]
Year Established: 1967
Number of Employees: 50

[illegible]
2800 S. Rooney Road
Morrison, CO 80465
[illegible]
Major Markets: Computer Manufacturing; Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Engineering; Manufacturing
Target Applications: Visual Graphics, Engineering, Design
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1972
Number of Employees: 10

[illegible]
INC.
800 Delaware Ave.
[illegible]
[illegible]
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Transportation; Manufacturing; Financial
Target Applications: Programming; Professional Services; Consulting; Direct Mailing
Contacts:
Head of Sales: Stephen Kaldor
[illegible]
Number of Employees: 1,000

COMPUTER TECHNICIANS
[illegible]
7318 International Drive
[illegible]
[illegible]
Major Markets: Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Contacts:
Head of Sales: Pat Leone
Head of Software: Frank Tyniw
Year Established: 1979
Number of Employees: 14

COMPUTER TECHNICIANS, INC.
1177 Rt. 18
E. Brunswick, NJ 08816
[illegible]
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; [illegible]
Target Industries: Banking; Government; Manufacturing
[illegible]
Net Sales: $1 Million — $5 Million [illegible]
Year Established: 1977
Number of Employees: 50

COMPUTER TECHNIQUES, INC.
[illegible]
P.O. Box 282
Olyphant, PA 18447
(717) [illegible]
Target Industries: Manufacturing; Distribution, Transportation
Target Applications: General Accounting, MRP, BOM
[illegible] — $5 Million (1981)
Contacts:
Head of Sales/Software: Martin Moskowitz
Year Established: 1974
Number of Employees: 21

COMPUTER TECHNOLOGY, INC.
Suite 230
11101 N.E. 8th
Bellevue, WA 98004
[illegible]

Vendors

Target Industries: Manufacturing, All Wang VS Users
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Dan E. Enslow
Year Established: 1978
Number of Employees: 8

COMPUTER TERMINAL LTD.
1800 S. Minnesota Ave.
Sioux Falls, SD 57105
(605) 335-6464
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Applications: General
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Jerry Peckstampe
Year Established: 1978
Number of Employees: 35

COMPUTER TESTS, INC.
3900 Causeway Blvd.
Metairie, LA 70002
(504) 834-5363
Contacts:
Head of Software: George Moisant
Year Established: 1978
Number of Employees: 9

COMPUTER THOUGHT CORP.
1721 W. Plano Pkwy.
Plano, TX 75075
(214) 424-3511
Major Markets: Systems House (Commercial OEM)
Target Industries: Engineering; Military
Target Applications: Training Sys/Ada
Number of Employees: 15

COMPUTER TIME CHARE
1531 N. Lincoln
Loveland, CO 80537
(303) 663-1400
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor
Target Industries: Professional, Associations; Legal, Engineering
Target Applications: Proffessional Time and Billing, Membership Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Thayne Taylor
Year Established: 1979
Number of Employees: 11

COMPUTER TOOLBOX, INC.
1325 E. Main St.
Waterbury, CT 06705
(203) 754-4197
Major Markets: OEM (Computer Systems); Dealer/Distributor; Maintenance/Other Services
Target Industries: Programers
Target Applications: Development Tools, Communications
Year Established: 1979
Number of Employees: 3

COMPUTER USAGE CO.
Suite 500
1 54th St.
San Francisco, CA 94103
(415) 543-3940
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau)
Target Industries: Banking
Contacts:
Head of Sales: Jim Sperry
Head of Software: Frank Lazzeroni
Year Established: 1954
Number of Employees: 160

COMPUTERWARE SOFTWARE UNLIMITED
Suite 226
2129 Germantown Road S.
Memphis, TN 38138
(901) 754-8332
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales/Software: Michael Pfaff
Year Established: 1976
Number of Employees: 5

COMPUTERWARE, INC.
Suite 200
12801 Nicholson Road
Dallas, TX 75234
(214) 620-2091
Major Markets: Systems House (Commercial OEM)
Target Industries: Aviation; Telephone
Target Applications: Telephone Billing; Process Control; FBO Management; Telephone Facilty Management
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales/Software: E. L. Shockey
Year Established: 1978
Number of Employees: 32

COMPUTER WORKSHOP
322 Sheldon Ave.
Houghton, MI 49931
(906) 482-8009

COMPUTING, INC.
401 N. 117th St.
Omaha, NE 68154
(402) 330-1311
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing; Retail
Target Applications: Order Processing; Accounting
Contacts:
Head of Software: Bob Bohac
Number of Employees: 7

COMPUTING CAPABILITIES CORP.
Suite 122
465A Fairchild Drive
Mountain View, CA 94043
(415) 968-7511
Major Markets: Maintenance/Other Services
Target Applications: HP 3000 Users
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Software: Mike Castel
Head of Engineering: Douglas Meechum
Year Established: 1978
Number of Employees: 8

COMPUTING RESOURCES, INC.
579 Industry Drive
Seattle, WA 98188
(206) 575-1026
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Distribution; Pension administration
Target Applications: General Accounting, Pension
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1972
Number of Employees: 15

COMPUTING SERVICES
3501 W. University Ave.
Gainesville, FL 32607
(904) 372-3822
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Applications: Accounting; General business, Scientific
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Willard White
Head of Software: Marc Todd
Year Established: 1965
Number of Employees: 6

THE COMPUTOLL GROUP LTD.
171 Madison Ave.
New York, NY 10016
(212) 725-2000
Major Markets: Maintenance/Other Services
Target Industries: Commercial
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Harold Samuels
Year Established: 1967
Number of Employees: 29

COMPU-TONE, INC.
234 E. Colorado Blvd.
Pasadena, CA 91101
(213) 796-9371
Major Markets: Dealer/Distributor
Target Industries: DEC users
Contacts:
Head of Software/Engineering: Mike Otte
Year Established: 1981
Number of Employees: 7

COMPUTONE SYSTEMS, INC.
1 Dunwoody Park
Atlanta, GA 30338
(404) 393-3010
Major Markets: Component and Terminal Manufacturing, Data Services (Service Bureau)
Target Industries: Insurance; Agriculture
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Tom Marcopulos
Head of Software: Thomas C.
Head of Engineering: Jerry L. Wilson
Year Established: 1966
Number of Employees: 200

COMPU TRAC
P.O. Box 15951
New Orleans, LA 70175
(800) 535-7990
Target Industries: Investment
Target Applications: Stock Analysis
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software: Dr. James Schmit
Year Established: 1978
Number of Employees: 19

COMPUTROL, INC.
10820 Sunset Office Park Drive
St. Louis, MO 63127
(314) 965-2273
Major Markets: Maintenance/Other Services
Target Industries: Banking; Investment
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: George Miller
Head of Software: Holly Fuller
Year Established: 1975
Number of Employees: 25

COMPUTRON TECHNOLOGIES CORP.
Computron Software
150 Meadowland Pkwy.
Secaucus, NJ 07094
(212) 246-6990
Target Industries: Finance
Target Applications: Accounting; Inventory management; Purchase orders
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Wes Stukenberg
Head of Engineering: Elias Typaldos
Number of Employees: 20

COMPUVIEW PRODUCTS
1955 Pauline Blvd.
Ann Arbor, MI 48103
(313) 996-1299
Target Applications: Text Editing; Disassembler, Telecommunications;
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Brian Howard
Head of Software: Jeff Brown
Year Established: 1980
Number of Employees: 12

COMPUWARE CORP.
Systems Software
32100 Telegraph Road
Birmingham, MI 48010
(313) 540-0400
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Net Sales: $5 Million — $25 Million (1981)

COMSAT GENERAL INTEGRATED SYSTEMS, INC.
Division of Comsat Corp.
7701 N. Lamar Blvd.
Austin, TX 78752
(512) 451-7938
Major Markets: Systems House (Commercial OEM)
Target Industries: Electronics
Target Applications: CAD/CAM, Computer Aided Testing, Design; Test & simulation; Layout
Net Sales: $5 Million — $25 Million (1981)
Contacts:

Year Established: 1981
Number of Employees: 175

COMSHARE
1700 Market St.
Philadelphia, PA 19103
(215) 564-3404
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Applications: DP
Net Sales: $25 Million — $100 Million (1982)
Contacts:
Head of Sales: Craig Scobie
Number of Employees: 80

COMSIS CORP.
Suite 1208
2685 Marine Way
Mountain View, CA 94043
(415) 964-5911
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Government; Transportation
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Arthur Sosslau
Head of Software: Dr. Paul Tuan
Year Established: 1969
Number of Employees: 35

COMTEC, INC.
28366 Franklin Road
Southfield, MI 48034
(313) 358-1950
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Pharmacy; Manufacturing, Medical, HMO
Target Applications: Accounting
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1974
Number of Employees: 31

CONTECTRA SYSTEMS, INC.
105 Caramel Road
Commack, NY 11725
(516) 368-1679
Major Markets: Maintenance/Other Services
Target Industries: Medical; Small Business
Target Applications: General Accounting, Lab analysis
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales/Software: F. Hitschler
Year Established: 1973
Number of Employees: 2

CONTRAC, INC.
6606 Singletree Drive
Columbus, OH 43229
(614) 436-0850
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Shipping; Pre-Mail
Target Applications: Freight Bill Payment and Rate Retrieval, Management Information Reporting; Electronic Mail
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: E.F. Eisenberg
Head of Software: D.J. Shonebarger
Year Established: 1966
Number of Employees: 200

COMX CORP.
7929 S.W. Nimbus Ave
Beaverton, OR 97005
(503) 643-1075
Year Established: 1978
Number of Employees: 25

CONCAP COMPUTING SYSTEMS
60 98th Ave.
Oakland, CA 94603
(415) 635-5750
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Civil Engineering; Environmental
Contacts:
Head of Sales: Mark Kleszewski
Year Established: 1965
Number of Employees: 9

CONCENTRIC DATA SYSTEMS, INC.
Suite 018
18 Lyman St.
Westboro, MA 01581
(617) 366-1122
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 8

CONCEPTIONS UNLIMITED
N. Park St.
P.O. Box 257
Rochester, VT 05767
(802) 767-3116
Target Industries: Publishing
Year Established: 1978
Number of Employees: 9

CONCEPT IV COMPUTER SYSTEMS, INC.
Industrial Park Road
P.O. Box 1290
Albany, NY 12201
(518) 489-2611
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Retail, Manufacturing, Wholesale, Distribution
Target Applications: POS
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: James Hogan
Head of Software/Engineering: Manarna Irwin
Year Established: 1968
Number of Employees: 30

CONCEPTS IN SOFTWARE, INC.
Suite 401
7400 Metro Blvd.
Edina, MN 55435
(612) 831-1676
Major Markets: Systems House (Commercial OEM)
Target Industries: Professional; Wholesale distributors
Target Applications: General Accounting., Order entry; Inventory control
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1976
Number of Employees: 5

CONCORD COMPUTING
7 Alfred Circle
Bedford, MA 01730
(617) 276-1730
Major Markets: Terminal Manufacturing; Data Services (Service Bureau)
Target Industries: Banking, Retailing
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: James Crane
Head of Software: Steven Burton
Head of Engineering: Robert Doucette
Year Established: 1978
Number of Employees: 62

CONDATA, INC.
1809 Walnut St.
Philadelphia, PA 19103
(215) 569-4240
Major Markets: Data Services (Service Bureau)
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Donald White
Head of Software: C. J. Deegan
Year Established: 1967
Number of Employees: 15

CONDOR CORP.
P.O. Box 2311
Birmingham, AL 35201
(205) 967-8193
Target Industries: Pharmacy, Printing
Contacts:
Head of Sales: Charles Acker
Head of Software: James Barnes
Year Established: 1972
Number of Employees: 11

CONESTOGA DATA SERVICES, INC.
P.O. Box 4745
Lancaster, PA 17604
(717) 397-3174
Target Industries: Legal, Furniture, Mass transit; Trucking
Contacts:
Head of Software: Gregory E. Eshleman
Year Established: 1981
Number of Employees: 3

CONGRESSIONAL SYSTEMS, INC.
216 Canyon Valley
Richardson, TX 75080
(214) 356-4493
Major Markets: Data Services (Service Bureau)
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Jim Tamberton
Head of Software: Robert Galyon
Year Established: 1971
Number of Employees: 75

CONNECTIONS MANAGEMENT, INC.
5820 Stoneridge Mall Road
Suite 211
Pleasanton, CA 94566
(415) 463-2424
Major Markets: Systems House (Commercial OEM)
Target Industries: Trucking
Target Applications: Trucking Application, Freight Accounting, Vehicle Maintenance
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1979
Number of Employees: 5

CONRAC SYSTEM COMPONENTS
Conrac
1724 S. Mountain Ave.
Duarte, CA 91010
(213) 357-2121
Major Markets: OEM (Computer Systems); OEM (Peripherals/Terminals)
Target Industries: Government; Military, Aircraft
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Sales: Al Caputo
Head of Software/Engineering: Larry MaNeill
Year Established: 1948
Number of Employees: 250

CONSCO ENTERPRISES
1700 Broadway
New York, NY 10019
(212) 586-8701
Target Industries: General Accounting
Target Applications: Consolidation
Contacts:
Head of Sales: Don Goodman
Year Established: 1971
Number of Employees: 66

CONSOLIDATED COMPUTER SERVICES, INC.
Suite B
6854 Peachtree Corner E.
Norcross, GA 30092
(404) 447-5203
Target Industries: Wholesale distributors; Trucking, Purchasing
Target Applications: Accounting, General Business, Route Accounting, Purchasing
Contacts:
Head of Software/Engineering: Mike Cornelius
Year Established: 1971
Number of Employees: 11

CONSTRUCTION COMPUTER CONTROL CORP.
615 E. Michigan
Milwaukee, WI 53202
(414) 278-0500
Major Markets: Data Services (Service Bureau)
Target Industries: Construction
Target Applications: Job Cost; Accounting, Estimating
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: K. W. Koenig
Year Established: 1968
Number of Employees: 35

CONSTRUCTION DATA CONTROL, INC.
2183 Hawes Road
Tucker, GA 30084
(404) 934-4722
Major Markets: Data Services (Service Bureau)
Target Industries: Construction, Architects/engineers, Contractors
Target Applications: Accounting; Job Cost; Estimating
Net Sales: $500,000 — $1 Million (1981)

Vendors

Contacts:
Head of Sales: Law Love
Head of Software: Carey Carlan
Year Established: 1978
Number of Employees: 13

CONSTRUCTION INFORMATION SYSTEM
P.O. Box 484
Mill Valley, CA 94941
(415) 332-5073
Target Industries: Construction
Target Applications: Job Costing; Scheduling, Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales/Software: Peter J. [illegible]
Year Established: 1976
Number of Employees: 25

CONSUMER SYSTEMS SERVICES GROUP, INC.
1100 31st St.
Downers Grove, IL 60515
(312) 325-2102
Major Markets: Maintenance/Other [illegible]
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Paul Kessenich
Head of Software: Paul Kessenich
Year Established: 1968
Number of Employees: 150

CONTEL CORP.
600 W. Fifth Ave
Naperville, IL 60540
(312) 355-8168
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Construction; Job shops
Target Applications: Job costing; General Accounting; WP; Fuel Management
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Keith Lamb
Year Established: 1978
Number of Employees: 7

CONTEL DATA SERVICES CORP.
245 Perimeter Court Pkwy.
[illegible], GA 30348
(404) 391-8000
Major Markets: OEM (Peripherals/Terminals); Maintenance/Other Services
Target Industries: Telephone; Cable TV; Construction; Distribution
Target Applications: DDP; Remote switch maintenance
Contacts:
Head of Sales: J. D. Haughwot
Head of Software/Engineering: Dennis Perkinson
Year Established: 1982
Number of Employees: 162

CONTEL INFORMATION SYSTEMS
Network Management Systems Division
130 Steamboat Road
Great Neck, NY 11024
(516) 829-5900
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Manufacturing, Insurance, Securities
Target Applications: Real-time Processing, Telecommunications
Year Established: 1969
Number of Employees: 300

CONTEMPORARY RETAIL SYSTEMS, INC.
P O Box 1753
Roswell, GA 30077
(404) 256-6304
Major Markets: OEM (Computer Systems)
Target Industries: Retail
Target Applications: POS; Sales Analysis; General accounting; Inventory control
Contacts:
Head of Sales/Software: Yvonne Stenberg
Year Established: 1981
Number of Employees: 4

CONTEXT MANAGEMENT SYSTEMS
23868 Hawthorne Blvd
Torrance, CA 90505
(213) 378-8277
Target Industries: Corporate
Year Established: 1980
Number of Employees: 50

CONTINENTAL MANAGEMENT SERVICES, INC.
Suite 101
7925 N.W. 12th St.
Miami, FL 33126
(305) 592-8060
Major Markets: Data Services (Service Bureau)
Target Industries: Real estate
Target Applications: Property management; Financial reports
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Alfred Ross
Year Established: 1974
Number of Employees: 12

CONTINENTAL SOFTWARE, INC.
314 Washington St.
Jamestown, NY 14701
(716) 483-5225
Year Established: 1980
Number of Employees: 5

CONTRACTORS MANAGEMENT SYSTEMS
Suite 101
1760 Reston Ave.
Reston, VA 22090
(703) 435-3172
Target Industries: Estimators
Target Applications: Estimation
Year Established: 1970
Number of Employees: 15

CONTRACTORS SYSTEMS, INC.
1021 Ingleside Ave.
Baltimore, MD 21228
(301) 747-6115
Major Markets: Systems House (Commercial OEM)
Target Industries: Contractors; Manufacturing; Printing
Target Applications: Job costing; Payroll; Property management
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Max Wittelsberger
Head of Software/Engineering: Robert Deppe
Year Established: 1972
Number of Employees: 6

CONTRACT SERVICES ASSOCIATES
706 S. Euclid
Anaheim, CA 92802
(714) 635-4055
Target Industries: Accountants
Target Applications: Tax preparation
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1964
Number of Employees: 10

CONTRACT SOFTWARE SERVICES
114 E. 12th
P.O. Box 9447
Amarillo, TX 79105
(806) 373-9795
Major Markets: Maintenance/Other [illegible]
Target Industries: Manufacturing; Oil and Gas Wholesale
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Dr. Phillip Ganster
Year Established: 1971
Number of Employees: 3

CONTRAX SYSTEMS, INC.
3365G N. Arlington Heights Road
Arlington Heights, IL 60004
(312) 870-1555
Major Markets: Dealer/Distributor
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Warren J. Sherling
Year Established: 1977
Number of Employees: 8

CONTROL-C SOFTWARE, INC.
6441 S.W. Canyon Court
Portland, OR 97221
(503) 297-7153
Target Industries: Microcomputers
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: David Robboy
Year Established: 1980
Number of Employees: 15

CONTROL DATA CORP.
Brokerage Transactions Services., Inc. Division
80 Pine St.
New York, NY 10005
(212) 668-6100
Major Markets: Data Services (Service Bureau)
Target Industries: Banking
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: James O'Connor
Head of Software: William Allard
Year Established: 1970
Number of Employees: 200

CONTROL DATA CORP.
8100 34th Ave. S.
Minneapolis, MN 55417
(612) 853-8100
Major Markets: Component, Computer, Terminal, Peripheral and Communications Equipment Manufacturing; Data Services (Service Bureau); Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Manufacturing; Electric Utilities; Petrol/Mining; [illegible]
Target Applications: CAD/CAM; Computer-Based Education, Petroleum Exploration; Electric Engineering
Net Sales: More than $100 Million (1982)
Contacts:
Head of Sales: Richard Rickenbach
Year Established: 1957
Number of Employees: 57,000

CONTROL SYSTEMS, INC.
701 N. Pleasant St.
Jackson, MS 39202
(601) 969-9193
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Medical; Legal; Accountant
Target Applications: Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Claude Johnson
Year Established: 1964
Number of Employees: 35

CONTROL TRANSACTION CORP.
14 Industrial Road
Fairfield, NJ 07006
(201) 575-9100
Major Markets: Component, Computer, Terminal and Peripheral Manufacturing
Target Industries: Lodging; Retail
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1979
Number of Employees: 50

CONVERSION SYSTEMS
1120 Cathryn St.
Scalsburg, PA 16827
(814) 466-7753
Major Markets: Maintenance/Other Services
Target Applications: On-line [illegible]
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1980
Number of Employees: 4

CONVEY COMPANIES, INC.
[illegible]
One First National Plaza
Dayton, OH 45402
(513) 461-4021
Major Markets: Maintenance/Other Services
Target Industries: Banking; Retail
Target Applications: ATM software; Mortgage loan closing
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software/Engineering: [illegible]
Year Established: 1974
Number of Employees: [illegible]

CONWAY COMPUTER CONSULTANTS, INC.
[illegible]
P.O. Box 12801
[illegible]

Major Markets: Mammgnce/Other Services
Contacts:
Head of Sales/Software: Jack Conway
Year Established: 1979

COOPERS & LYBRAND
1251 Ave. of the Americas
New York, NY 10020
(212) 536-2984
Major Markets: Maintenance/Other Services
Target Industries: Banking; Health care; Financial; High technology
Contacts:
Head of Software: Stanley D. Halper
Year Established: 1910
Number of Employees: 1,200

COORDINATED SYSTEMS, INC.
1007 Farmington Ave.
W. Hartford, CT 06107
(203) 233-8248
Major Markets: Systems House (Commercial OEM)
Target Industries: Engineering
Target Applications: Job Costing; General Accounting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales/Software: George Layon
Year Established: 1972
Number of Employees: 8

CORDATUM
4720 Montgomery Lane
Bethesda, MD 20814-1331
(301) 652-5424
Major Markets: Systems House (Commercial OEM)
Maintenance/Other Services
Target Industries: Education; Transportation; Government; Information
Target Applications: Tennis Data Base Management; Computer-Aided Instruction
Net Sales: $500,000 — $1 Million (1980)
Contacts:
Head of Sales: Jim Trawick
Year Established: 1972
Number of Employees: 25

CORE AND CORE
3 Winding River Circle
Wellesley, MA 02181
(617) 237-4554
Target Applications: Financial Modeling
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Peter Brunone
Head of Software: Timothy Sorrell
Year Established: 1972
Number of Employees: 10

CORE, INC.
542 S.E. 5th Ave.
Delray Beach, FL 33444
(305) 276-3929
Major Markets: Peripheral Manufacturing; Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Manufacturing; Accountants; Agriculture; Broadcasting
Target Applications: Accounting; General Business
Contacts:
Head of Sales/Software: Florine Prewitt
Year Established: 1977
Number of Employees: 7

CORNUCOPIA SOFTWARE
P.O. Box 6111
Albany, CA 74706
(415) 524-8098
Target Industries: Small business
Year Established: 1981
Number of Employees: 4

CORODALE, INC.
211 Congress St.
Boston, MA 02110
(617) 426-6780
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1976
Number of Employees: 12

CORPORATE COMPUTER SYSTEMS, INC.
33 W. Main St.
Holmdel, NJ 07733
(201) 946-3800
Target Applications: Productivity Tools
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Joan Dillon
Head of Software: Tim Chase
Head of Engineering: Larry Hinderks
Year Established: 1977
Number of Employees: 25

CORPORATE DATA SCIENCES, INC.
3223 Mabury Road
San Jose, CA 95127
(408) 275-1400
Major Markets: Computer Manufacturing; OEM (Peripherals/Terminals)
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1979
Number of Employees: 14

CORPORATE DATA SYSTEMS
3720 Market St.
Philadelphia, PA 19104
(215) 222-7046
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Finance; Engineering
Target Applications: Program Deposit; Risk Management; Assets & Liability
Contacts:
Head of Software: William Enos
Year Established: 1980
Number of Employees: 15

CORPORATE SERVICES INTERNATIONAL
3410 E. McDowell Road
Mesa, AZ 85213
(602) 832-8230
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Medical; Accounting; Dental
Target Applications: General Business
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Donald Horrocks
Year Established: 1972
Number of Employees: 8

CORRUGATED SERVICES CORP.
2607B Interplex Drive
Trevose, PA 19047
(215) 639-9540
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing
Target Applications: Manufacturing; Accounting
Year Established: 1981
Number of Employees: 17

CORSTAR BUSINESS COMPUTING
1 Aqueduct Road
White Plains, NY 10606
(914) 428-5550
Major Markets: Component Manufacturing; Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Oil Distributor; Airlines; Publishing; Advertising
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Bernie Curran
Year Established: 1969
Number of Employees: 40

CORT DATA .
74-320 Highway 111
Palm Desert, CA 92260
(619) 340-3339
Major Markets: Data Services (Service Bureau)
Target Applications: General Accounting
Contacts:
Head of Sales: Janis Guymon
Year Established: 1974
Number of Employees: 10

CORTEX CORP.
55 William St.
Wellesley, MA 02181
(617) 237-2304
Major Markets: Systems House (Commercial OEM)
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Engineering: Richard Berthold
Year Established: 1977
Number of Employees: 30

COUNTRYSIDE DATA, INC.
Suite 201
710 N. Skyline
Addison, IL 60101
(312) 629-6500
Major Markets: Miscellaneous Computer Supplies
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1981
Number of Employees: 3

COURSEWARE APPLICATIONS, INC.
205 Berwash Ave.
Savoy, IL 61874
(217) 359-1878
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: George F. Traynor
Head of Software: Thomas M. Schweiger
Year Established: 1979
Number of Employees: 15

COW HAT COMPUTING
P.O. Box 515
Manhasset, NY 11030
(516) 365-4423
Target Industries: Education
Target Applications: Administrative; Scheduling; Attendance
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: David Alexander
Year Established: 1976
Number of Employees: 12

CPAIDS
1061 Fraternity Circle
Kent, OH 44240
(216) 678-9015
Target Applications: Accounting; Tax Preparation
Year Established: 1978
Number of Employees: 14

CPS BUSINESS SYSTEMS, INC.
1819 Buchanan
Abilene, TX 79605
(817) 692-7362
Major Markets: Systems House (Commercial OEM)
Target Industries: Oil and gas; Municipalities
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Paul Hughes
Head of Software: John Lamar
Year Established: 1977
Number of Employees: 53

CPSI
501 Bishops Lane
Mobile, AL 36609
(205) 344-8100
Target Industries: Commercial; Industrial; Medical
Target Applications: Accounting; Inventory; Job Costing; Building Management
Year Established: 1978
Number of Employees: 15

CRC INFORMATION SYSTEMS
1861 Star St. S.E.
Grand Rapids, MI 49507
(616) 942-8970
Major Markets: Systems House (Commercial OEM)
Target Industries: Real estate; Distributors; Manufacturing; Finance
Target Applications: Distributing costing; General Accounting; Inventory control; Long range forecasting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Don Bickowski
Head of Engineering: Richard Doran
Year Established: 1978
Number of Employees: 12

CREATIVE APPLICATIONS, INC.
Suite 201
1825 S. Wadsworth Blvd.
Lakewood, CO 80227
(303) 985-4488
Major Markets: Data Services (Service Bureau)

Vendors

Target Industries: Oil and Gas
Target Applications: Accounting; Financial Analysis; DBMS
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales/Software: Tom Atkins
Year Established: 1976
Number of Employees: 8

CREATIVE COMPUTER SOLUTIONS
2035 Landings Drive
Mountain View, CA 94043
(415) 964-3361
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Government; Credit Unions; Personnel
Target Applications: General Accounting; Equipment Maintenance
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Robert Fondiller
Head of Software: Steven Johnson
Year Established: 1976
Number of Employees: 15

CREATIVE DATA SYSTEMS, INC. (KS)
Sun Publications Building
I 435 — Metcalf
Overland Park, KS 66212
(913) 381-1109
Target Industries: Newspapers
Target Applications: Circulation control; Accounting; Advertising
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 10

CREATIVE DATA SYSTEMS, INC. (OH)
13500 Merchantile Road
Beachwood, OH 44122
(216) 464-4482
Major Markets: Systems House (Commercial OEM)
Target Industries: Retail
Year Established: 1978
Number of Employees: 32

CREATIVE MANAGEMENT SYSTEMS, INC.
1500 Planning Research Drive
McLean, VA 22102
(703) 556-2300
Target Industries: Telecommunications
Target Applications: Telephone Cost Accounting; Traffic Engineering
Contacts:
Head of Engineering: Edward Doran
Year Established: 1975
Number of Employees: 25

CREATIVE SOFTWARE DEVELOPMENT, INC.
7509 E. Kingston Pike
Knoxville, TN 37919
(615) 584-5105
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Beverage; Banking; Auto Dealers
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1973
Number of Employees: 5

CREATIVE SOFTWARE SYSTEMS
18813 Santa Isadora St
Fountain Valley, CA 92708
(714) 968-0845
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Manufacturing, Distribution, Freight Forwarders, Advertising
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 4

CREATIVE SOFTWARE, INC.
1051 Williamson St.
P O Box 3493
Madison, WI 53704
(608) 258-8668
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Bob Stabler
Year Established: 1977
Number of Employees: 10

CREATIVE SOLUTIONS, INC.
4801 Randolph Road
Rockville, MD 20852
(301) 984-0262
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Manufacturing, Press Contol
Target Applications: General Business
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 5

CRESSBILL SYSTEMS, LTD.
Cressmark
115 E. Main St
Smithtown, NY 11787
(516) 724-0333
Target Industries: Florists
Target Applications: Accounting
Contacts:
Head of Software: Edward Reuther
Year Established: 1981
Number of Employees: 7

CRI (COMPUTER RESOURCES, INC.),
5333 Betsy Ross Drive
Santa Clara, CA 95054
(408) 980-9898
Major Markets: Peripheral Manufacturing
Target Industries: DBMS
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Arlington Glaze
Head of Software: Dan Cohen
Year Established: 1976
Number of Employees: 25

CROMEMCO, INC.
1100 Pearl St
Brockton, MA 02401
(617) 588-1351
Major Markets: OEM (Peripherals/Terminals); Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Apparel; Textiles; Manufacturing; Distribution
Target Applications: Accounting; Manufacturing; WP; Modeling
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1985
Number of Employees: 20

CROSS INFORMATION CO.
Suite B
934 Pearl Mall
Boulder, CO 80302
(303) 499-8888
Major Markets: Maintenance/Other Services
Target Applications: Electronic Mail; Computer Teleconferences; OA
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Software: Andrew McKay
Head of Engineering: Michael D. Scott
Year Established: 1980
Number of Employees: 10

CROWN SOFTWARE SYSTEMS, INC.
1819 Marietta Blvd.
Atlanta, GA 30318
(404) 355-5461
Major Markets: OEM (Computer Systems); Data Services (Service Bureau); Manufacturing Representatives
Target Industries: Property Management; Freight; Distribution
Year Established: 1975
Number of Employees: 10

CRS WEST, INC.
18740 Pacific Highway
W. Lynn, OR 97068
(503) 635-6651
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Robert Thorn
Year Established: 1974

CSA COMPUTERS FOR BUSINESS
2285 E. Devon Ave.
Elk Grove Village, IL 60007
(312) 595-2820
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Legal; Manufacturing
Contacts:
Head of Sales: Fred Whittinghill
Year Established: 1973
Number of Employees: 17

CSA/CRT
5707 Redwood Road
Oakland, CA 94619
(415) 652-3221
Major Markets: Systems House (Commercial OEM)
Target Industries: Retail; Church; Financial; Insurance
Target Applications: Inventory Control; Accounting
Contacts:
Head of Sales: John Melvin
Year Established: 1982
Number of Employees: 30

CSC BUSINESS SYSTEMS, INC.
Suite 15
367 Civic Drive
Pleasant Hill, CA 94523
(415) 676-0242
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Distribution; Retail
Target Applications: POS; Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: David L. Eggert
Year Established: 1979
Number of Employees: 8

C-S COMPUTER SYSTEMS, INC.
200 S. Main St.
Manville, NJ 08835
(201) 526-9000
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Year Established: 1970
Number of Employees: 14

C S S RESEARCH CORP.
Suite 6-16
210 Goddard Blvd.
King of Prussia, PA 19406
(215) 265-9118
Target Applications: Accounting; Billing; Scheduling
Year Established: 1979
Number of Employees: 7

C-TEK SOFTWARE, INC.
43rd Floor Suite 4325
30 Rockefeller Plaza
New York, NY 10112
(212) 246-7733
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Finance
Target Applications: Modeling;
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: James J. O'Gara
Head of Software: Mark Gillen
Year Established: 1976
Number of Employees: 35

CTI LIBRARY SYSTEMS, INC.
120 E. 300 N.
Provo, UT 84057
(801) 373-0344
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Education;
Net Sales: $1 Million — $5 Million (1981)
Number of Employees: 8

CTI LTD., INC.
4455 LBJ Freeway
Dallas, TX 75234
(214) 661-9307
Major Markets: Maintenance/Other Services
Target Applications: Accounting
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1976

CUSICOMP CORP.
Berkley, CA 94704

(415) 540-5733
Major Markets: Component Manufacturing
Target Industries: Engineering, Manufacturing
Target Applications: Graphics, [illegible]
Contacts:
Head of Engineering: P. Mohan
Year Established: 1982
Number of Employees: 10

C/U BUSINESS COMPUTERS
103 N. Maple St.
Urbana, IL 61801
(217) 367-8346
Major Markets: Data Services (Service Bureau)
Target Industries: Construction; Professional Industry; Accounting
Year Established: 1967
Number of Employees: 5

CUFF'S PLANNING AND MODELS LTD.
201 E. 87th St.
New York, NY 10028
(212) 534-6404
Target Applications: Financial Planning
Contacts:
Head of Sales: John Churchman
Head of Software: David Combe
Year Established: 1972
Number of Employees: 15

CULLINET SOFTWARE, INC.
400 Blue Hill Drive
Westwood, MA 02090
(617) 329-7700
Major Markets: Data Services (Service Bureau)
Target Industries: Banking; Insurance; Manufacturing
Target Applications: [illegible]
Net Sales: $25 Million — $100 Million (1983)
Contacts:
Head of Sales: Frank L. Chisholm
Year Established: [illegible]
Number of Employees: 525

CULVERMI CORP.
245 W. Elmwood Drive
Dayton, OH 45459
(513) 435-2335
Major Markets: Dealer/Distributor
Target Industries: Banking; Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: John Lovelace
Year Established: 1978
Number of Employees: 41

CUSTOMATION, INC.
629 Amboy Ave.
[illegible]
(201) 738-4757
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Applications: Accounting; Dispatch systems; Inventory control; Personnel management
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: R. Haarn
Year Established: 1979
Number of Employees: 10

CUSTOM BUSINESS SYSTEMS, INC.
20th and Winchester Ave.
P.O. Box 67
Reedsport, OR 97467
(503) 271-3684
Major Markets: Systems House (Commercial OEM)
Target Industries: Radio Broadcasting
Contacts:
Head of Sales: Steve Kenagy
Head of Software: Wes Lockard
Year Established: 1976
Number of Employees: 12

CUSTOM COMPUTATION, INC.
Suite 601
1220 Broadway
Lubbock, TX 79401
(806) 762-6008
Major Markets: Maintenance/Other [illegible]
Target Applications: Graphics
Contacts:
Head of Sales: Dr. Peter Kalemen
Head of Software: Dr. Varjeman.
[illegible]
Year Established: 1980
Number of Employees: 5

CUSTOM COMPUTER SERVICE, INC.
Boxwood Industrial Park
P.O. Box 3030
Wilmington, DE 19804
(302) 998-0148
Major Markets: Data Services (Service Bureau)
Target Industries: Legal, Retail
Target Applications: Accounting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Robert Oratorio
Head of Software/Engineering: Ron Sanderson
Year Established: 1971
Number of Employees: 50

CUSTOM COMPUTER SPECIALISTS, INC.
300 Vanderbilt Motor Parkway
Hauppage, NY 11788
(516) 231-1156
Major Markets: Systems House (Commercial OEM), Dealer/Distributor; Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1981)
Contacts:
[illegible] Dirk Bocue
Head of Software/Engineering: Albert Chang
Year Established: 1979
Number of Employees: 12

CUSTOM COMPUTER SYSTEMS, INC.
[illegible] Chagrin Road
Kirtland, OH 44094
(216) 951-2112
Major Markets: OEM (Computer Systems); Data Services (Service Bureau), Dealer/Distributor
Target Industries: Construction; Manufacturing; Wholesale; [illegible]
Target Applications: Accounting; Job costing
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1979
Number of Employees: 4

CUSTOM COMPUTING, INC.
505 Kay St.
Kilgore, TX 75662
(214) 984-0639
Major Markets: Systems House (Commercial OEM); [illegible]
Target Applications: Accounting; School Administrations, Programming tools, Productivity Aids
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1976
Number of Employees: 10

CUSTOMIZED ACCOUNTING SYSTEMS
P.O. Box 5628
Winston-Salem, NC 27103
(919) 768-2990
Major Markets: Maintenance/Other [illegible]
Target Industries: Wholesale, Banking, Trucking, Government
Target Applications: General accounting
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Jerry Kight
Year Established: 1978
[illegible]

CUSTOMIZED INFORMATION SYSTEMS
Suite G
18093 Prairie Ave
Torrance, CA 90504
(213) 542-6670
Target Industries: Manufacturing
Net Sales: $500,000 — $1 Million (1982)
Contacts:
[illegible]
Year Established: 1972
Number of Employees: 16

CUSTOM MANAGEMENT SYSTEMS, INC.
[illegible]
Tallahassee, FL 32302
(904) 878-5155
Major Markets: Systems House (Commercial OEM)
Target Industries: Legal
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Scott Kadlec
Head of Software: Scott Simpson
Year Established: 1978
Number of Employees: 25

CUSTOM PROGRAMMING GROUP, INC.
1600 E. Lancaster Ave.
Paoli, PA 19301
(215) 296-3686
Major Markets: Systems House, (Commercial OEM)
[illegible]
Financial, Hospital Department Communications; Custom Software
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980
Number of Employees: 8

CUSTOMS SYSTEMS DEVELOPMENT, INC.
[illegible]
Wichita, KS 67211
(316) 262-1415
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1981)
[illegible]
Number of Employees: 10

[illegible]
Suite 200
3003 Knight St.
Shreveport, LA 71105
(318) 869-3041
Major Markets: Systems House (Commercial OEM), Dealer/Distributor; Maintenance/Other Services
Target Industries: Oil; Credit unions
Target Applications: Gas Accounting; Land lease management
Net Sales: $100,000 — $500,000 (1981)
Year [illegible]
Number of Employees: 2

[illegible]
[illegible]
Dallas, TX 75234
(214) 243-3421
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor; Maintenance/Other Services
Target Industries: Medical
Target Applications: Accounting; Inventory; Food Ordering; Invoicing
Net Sales: $5 Million — $25 Million (1981)
[illegible]
Number of Employees: 250

C & W INCOTEL LTD.
110 Penn Plaza
[illegible]
New York, NY 10119
(212) 594-8340
Major Markets: Systems House (Commercial OEM)
Target Industries: Banking, Airlines; Shipping, Military
Target Applications: Storm Forecasts, Message [illegible]
Contacts:
Head of Sales: John Phillips
Head of Engineering: Larry Reznick
Year Established: 1970
Number of Employees: 40

C E SYSTEMS
Division Of CX Corp.
2700 Rainer Ave. S.
Seattle, WA 98144
(206) 721-2120
Major Markets: Peripheral Manufacturing, OEM (Computer Systems), Manufacturing Special Systems
Target Industries: Photo Finishing
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Sales: Robert Morganstern
Head of Software: Ralph Jasva
Year Established: 1968
Number of Employees: 650

CYBER DATA
[illegible]
Elmont, NY 11003
[illegible]
Major Markets: Systems House (Commercial OEM), Data Services [illegible]
Target Industries: International trade; Distribution

Vendors

Target Applications: Distribution; Manufacturing; Accounting
Contacts:
Head of Software: Jack Pobesta
Year Established: 1980
Number of Employees: 24

CYRENIA, INC.
2330 Lincoln Way
Ames, IO 50010
(515) 292-7634
Major Markets: Dealer/Distributor
Target Industries: Agriculture; Medical; Education
Contacts:
Head of Sales: Tom Magel
Head of Software: Jeff Paup
Year Established: 1979

CYBERNETICS
245 Ann St.
E. Lansing, MI 48823
(517) 332-7656
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Year Established: 1978
Number of Employees: 10

CYBERNETICS, INC.
Suite 208
8041 Newman Ave.
Huntington Beach, CA 92647
(714) 848-1922
Major Markets: Dealer/Distributor
Contacts:
Head of Sales/Software: John Baughman
Year Established: 1975
Number of Employees: 12

CYBERNETICS RESOURCE CORP.
10 Maple St.
Port Washington, NY 11050
(516) 883-7676
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Legal; Accounting, Distribution; Banking
Target Applications: General Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Neil H. Waldmann
Head of Software/Engineering: Judith A. Smith
Year Established: 1976
Number of Employees: 18

CYBERTEK COMPUTER PRODUCTS, INC.
Mini Computer Systems Division
6133 Bristol Parkway
Culver City, CA 90230
(213) 649-2450
Major Markets: Systems House (Commercial OEM)
Target Industries: Insurance
Target Applications: WP
Year Established: 1978
Number of Employees: 15

CYBERX SYSTEMS, INC.
2 N. Riverside Plaza
Suite 2180
Chicago, IL 60606
(312) 454-1985
Target Applications: Payroll; Personnel
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Software: Richard Skipski
Year Established: 1974
Number of Employees: 50

CYCARE SYSTEMS, INC.
520 Dubuque Building
P O Box 1278
Dubuque, IA 52001
(319) 556-3131
Major Markets: OEM (Computer Systems); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Medical; Pharmacy; Finance; HMO
Target Applications: Insurance Billing; Accounts Receivable; Appointment Scheduling; Financial
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: James Dyer
Head of Software/Engineering: Richard Burgmeier
Year Established: 1969
Number of Employees: 300

CYES SYSTEMS CORP.
Suite 126
10400 W. Higgins
Rosemont, IL 60018
(312) 298-2586
Target Applications: Word Processing; Fuel Management
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 5

CYTROL, INC.
4620 W. 77th St.
Edina, MN 55435
(612) 835-4884
Target Industries: Finance; Travel; Transportation; Manufacturing
Target Applications: Inventory; Securities trading; Passenger ticketing
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software/Engineering: Johan Nik Kirkeng
Year Established: 1969
Number of Employees: 85

DABSCO, INC.
Dabsco Software Services Division
1544 W. Dorothy Lane
Dayton, OH 45409
(513) 294-5331
Major Markets: Data Services (Service Bureau)
Target Industries: Distribution
Target Applications: Accounting; Financial management
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Coreta Keller
Head of Engineering: William Martin
Year Established: 1981
Number of Employees: 77

DACAR SYSTEMS, INC.
1460 Wisconsin Ave.
Downers Grove, IL 60515
(312) 985-1100
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 4

DACOR COMPUTER SYSTEMS, INC.
13330 Bishop Road
P.O. Box 366
Bowling Green, OH 43402
(419) 352-3568
Major Markets: Systems House (Commercial OEM)
Target Industries: Automotive; Warehousing, Accountants
Target Applications: Automobile sales and distribution
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: George G. Stossel
Year Established: 1978
Number of Employees: 23

DAIS, INC.
825 W. Hamilton Ave.
Campbel, CA 95008
(408) 866-0300
Target Industries: Small Business
Target Applications: General ledger; Accounting; Budgeting
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1977
Number of Employees: 1

DAKOTA PROGRAMS OF BISMARCK
Suite 26
2900 E. Broadway
P.O. Box 2752
Bismarck, ND 58501
(701) 222-0285
Major Markets: Maintenance/Other Services
Target Industries: Medical; Banking; Manufacturing
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1980
Number of Employees: 3

DALCOR INTERNATIONAL, INC.
2416 Hillsborough Road
Nashville, TN 37212
(615) 383-0083
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Year Established: 1978
Number of Employees: 23

DALY & WOLCOTT, INC.
120 Lavan St
Warwick, RI 02888
(401) 781-2600
Target Industries: Manufacturing; Distribution
Target Applications: Accounts receivable; Inventory Control; Accounts Payable
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Frank Benson
Year Established: 1977
Number of Employees: 16

DAMAS DATA MANAGEMENT SYSTEMS, INC.
5308 N.E. Irving St
Portland, OR 97213
(503) 284-9677
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Emergency services; Religion; Education, Local government
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978
Number of Employees: 10

DANFORD CORP.
350 W. 5th St.
San Pedro, CA 90731
(213) 832-6401
Target Industries: Aerospace; Engineering
Target Applications: Graphics; Scientific; Engineering; Custom
Year Established: 1982
Number of Employees: 10

DAN G. HANEY & ASSOCIATES, INC.
P.O. Box 687
San Mateo, CA 94401
(415) 493-4094
Year Established: 1980
Number of Employees: 5

DARCOR
3349 Ridgelake Drive
Metairie, LA 70002
(504) 837-6297
Target Industries: Wholesale; Distribution; General Financial Application
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1975
Number of Employees: 12

DASD CORP.
9045 N. Deerwood Dr.
Milwaukee, WI 53223
(414) 355-3405
Major Markets: Data Services (Service Bureau)
Net Sales: $25 Million — $100 Million (1981)
Year Established: 1974
Number of Employees: 600

DASH DATA SYSTEMS, INC.
62 Monmouth Road
Oakhurst, NJ 07755
(201) 870-1515
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Direct mail; Publishing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Ivan Epperly
Year Established: 1977
Number of Employees: 12

DATA ACCESS CORP.
4221 Ponce de Leon Blvd.
Coral Gables, FL 33146
(305) 445-4555
Major Markets: Systems House (Commercial OEM)
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Charles Casanave II
Head of Software: Cory Casanave
Year Established: 1979

DATA ACCESS ENTERPRISES
1440 3rd National Building
Dayton, OH 45402
(513) 223-2150

DATA ANALAS, LTD.
P.O. Box 1626
Salina, KS 67401

(913) 823-6958
Major Markets: Systems House (Commercial OEM)
Target Industries: Government; Education; Administration
Target Applications: Utility billing; Government payroll; Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Engineering: Mark Johnson
Year Established: 1979
Number of Employees: 5

DATA ASSOCIATES, INC.
2390 N.W. Kings Blvd.
P.O. Box 812
Corvallis, OR 97339
(503) 757-8331
Major Markets: Data Services (Service Bureau)
Target Industries: Distribution; Medical; Oil jobbers; Magazine circulation
Target Applications: Financial; Inventory control, Sales order entry
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: James P.
Year Established: 1976
Number of Employees: 14

DATABASE DESIGN CORP.
2020 Hogback Road
Ann Arbor, MI 48104
(313) 971-5363
Target Industries: Banking
Contacts:
Head of Software: Al Hershey
Year Established: 1979
Number of Employees: 25

DATA MASS MANAGEMENT, INC.
6501 Loiedale Court
Springfield, VA 22150
(703) 971-7905
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Real Estate; Associations
Target Applications: DBMS
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of
Head of Software: Paul Langhan
Number of Employees: 60

DATABASE SYSTEMS CORP.
1345 E.
Phoenix, AZ 85016
Target Applications: General Ledger, DBMS; Financial Reporting
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software: Robert E. Wells Jr.
Head of Engineering: Paul R. Gilman
Year Established: 1978
Number of Employees: 35

DATA BASIC, INC.
Suite 100
Mt. Pleasant, MI 48858
(517) 772-5055
Major Markets: Systems House (Commercial OEM); Dealer/Distributor;
Target Industries: Small Business
Target Applications: Accounting; Order Entry-Inventory
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Terry Miller
Head of Software: Richard Tillmann
Year Established: 1980
Number of Employees: 41

DATA BASICS, INC.
Suite 110
11000 Cedar Road
Cleveland, OH 44106
(216) 721-3400
Major Markets: Systems House (Commercial OEM)
Target Industries: Construction; Architecture; Credit Union; Civil Engineering
Target Applications: Accounting; Job Costing; Payroll, Blending Contracting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Richard Martin
Year Established: 1974
Number of Employees: 17

DATABILITY SOFTWARE SYSTEMS, INC.
322 8th Ave.
11th Floor
New York, NY 10001
(212) 807-7800
Major Markets: Data Services (Service Bureau); Maintenance/Other
Contacts:
Head of Software: Richard Rupp
Head of Engineering: Robert Stachel
Year Established:
Number of Employees: 17

DATA BRAIN, INC.
P.O. Box 161
Fairhaven, MA 02719
(617) 994-3944
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Engineering; Government; Banking; Military
Target Applications: Technology control; Protocol, Data analysis
Year Established: 1979
Number of Employees: 9

DATA BREEZE
Medidentic
480 S. Northwest Highway
Park Ridge, IL 60068
Major Markets: OEM (Computer Terminals); Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Medical
Target Applications: Billing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Jane Bennett
Year Established: 1979
Number of Employees: 15

DATA BUSINESS VISION, INC.
Suite B
3510 Dunhill St.
San Diego, CA 92121
(619) 450-1557
Major Markets: Computer Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Business, Financial, Commercial
Target Applications: Graphics; Business
Contacts:
Head of Sales: Will Thomson
Head of Software/Engineering: Philippe Cousignoux
Year Established: 1981
Number of Employees: 25

DATA CARD CORP.
Troy Division
2331 S. Pullman St.
(714) 540-8565
Major Markets: Computer Peripherals Manufacturing; Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Banking; Insurance, Financial
Target Applications: Financial; Checking Accounts; Cash Management
Year Established:
Number of Employees: 120

DATA CENTER CORP.
8000 E. Prentice Ave.
Englewood, CO 80111
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Temporary employment; Property management; Manufacturing representatives; Development
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Jack Dalton
Head of Software: P. W. Lee
Year Established: 1973
Number of Employees: 6

DATA CENTER MANAGEMENT, INC.
1321 E. Morehead St.
Charlotte, NC 28204
(704) 377-1496
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Trucking
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1974

DATA COMMUNICATIONS CORP.
3000
Memphis, TX 38131
Major Markets: Communications Equipment Manufacturing; Systems House (Commercial OEM)
Target Industries: Broadcasting; Banking; Insurance; Medical
Target Applications: Sales; Traffic; Accounting; Master Control and Automation
Net Sales: $25 Million — $100 Million (1982)
Year Established: 1969
Number of Employees: 400

DATA COMMUNICATIONS SYSTEMS CENTER
1320 Greenway Drive
Irving, TX 75062
(415) 345-0611
Major Markets: Systems House (Commercial OEM)
Contacts:
Head of Sales: Pete Best
Head of Software: Norm Creech
Year Established: 1981
Number of Employees: 18

THE DATA CORP.
Suite 500
11777 Katy Freeway S.
Houston, TX 77079
(713) 493-4281
Major Markets: Systems House (Commercial OEM)
Target Industries: Legal; Education
Target Applications: Job Costing; Accounting, WP
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1970
Number of Employees: 17

DATA-COM SYSTEMS & SERVICES, INC.
4004 N. 6th
P.O. Box 4225
McAllen, TX 78501
(512) 631-2234
Major Markets: Data Services (Service Bureau)
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980
Number of Employees: 7

DATAGRAM OF ST. HELENS, INC.
50 West St.
St. Helens, OR 97051
(503) 397-6486
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Marjorie K. Lassey
Head of Software: Kenneth M. Lassey
Year Established: 1977
Number of Employees: 9

DATA
Suite 200
Rockville, MD 20852
(301) 984-7070
Major Markets: Systems House (Commercial OEM)
Target Industries: Beverage Wholesale; Restaurant; Fuel
Contacts:
Head of
Head of Software/Engineering: Richard Holcomb
Year Established: 1976
Number of Employees: 35

DATA CONTROL, INC.
640 N. LaSalle
Chicago, IL 60610
(312) 368-1377
Major Markets: Data Services
Target Industries: Medical
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Richard Ladon
Head of Software: Richard Yates
Year Established: 1970
Number of Employees: 6

Vendors

DATACOURT, INC.
2207 Anderson Road
Opelika, AL 36801
(205) 749-5641
Target Industries: Broadcasting; General Business
Target Applications: Traffic Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1976
Number of Employees: 8

DATA DESIGN ASSOCIATES, INC.
Suite 310
1250 Oak Mead Parkway
Sunnyvale, CA 94086
(408) 730-0100
Major Markets: Maintenance/Other Services
Target Applications: Financial
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: John Carroll
Head of Software/Engineering: David Lowry
Year Established: 1973
Number of Employees: 40

DATA DEVELOPMENT, INC.
1111 Rt 46 E
Little Falls, NJ 07003
(201) 785-9120
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Manufacturing; General business
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1969
Number of Employees: 25

DATA DIRECTIONS
770 Edgewater Drive
Oakland, CA 94621
(415) 632-4303
Major Markets: Maintenance/Other Services
Target Industries: Banking; Manufacturing
Target Applications: Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Stephen Anderson
Head of Software: Robert A. McCoy
Year Established: 1973
Number of Employees: 20

DATA DIRECTIONS, INC. (CT)
37 Jerome Ave
Bloomfield, CT 06002
(203) 242-8551
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Banking; Insurance; Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Patricia H. Downs
Head of Software: James C. Tsokalas
Year Established: 1977
Number of Employees: 60

DATA DIRECTIONS, INC. (TX)
Business Systems Group
Suite 205
1720 Regal Row
Dallas, TX 75235
(214) 637-1767
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Advertising, Architectural firms, Consulting firms
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Jim Torbert
Head of Software: Ronald B. Shaw
Year Established: 1978
Number of Employees: 5

DATA FINANCIAL SYSTEMS, INC.
P.O. Box 5498
Scottsdale, AZ 85261
(602) 998-1933
Major Markets: Systems House (Commercial OEM)
Target Industries: Management
Target Applications: Accounting, Agriculture
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Debra Ast
Head of Software: Roy Kingsley
Year Established: 1970
Number of Employees: 7

DATAFORMATION, INC.
3824 Barrett Drive
Raleigh, NC 27609
(919) 782-5382
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Construction; Wholesale, Distribution
Target Applications: Accounting; Construction management; Test control
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 4

DATA GENERAL CORP.
4400 Computer Drive
Westboro, MA 01580
(617) 366-8911
Major Markets: Computer, Terminal and Peripheral Manufacturing.
Net Sales: More than $100 Million (1982)
Contacts:
Head of Sales: Frank M. Kearsley
Year Established: 1968
Number of Employees: 14,545

DATA GRAPHICS
P.O. Box 11160
Macon, GA 31212
(912) 477-2322
Major Markets: Data Services (Service Bureau)
Target Industries: Government
Target Applications: Property appraisal
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales/Software: John Berry
Year Established: 1977
Number of Employees: 4

THE DATA GROUP CORP.
Information Services
80 Hayden Ave.
Lexington, MA 02173
(617) 863-0400
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Field Service; Manufacturing, Banking; Insurance
Target Applications: Hand-Helds; POS
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Buzz McArdle
Head of Software: John Maraganis
Year Established: 1979
Number of Employees: 100

DATA IMAGE CORP.
3736 Eubank N.E
Albuquerque, NM 87111
(505) 294-4094
Major Markets: Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 6

DATA INDEX, INC.
4390 Alpha Road
Dallas, TX 75234
(214) 386-3929
Major Markets: Systems House (Commercial OEM)
Target Industries: General Business
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: R. L. McIntire
Year Established: 1973
Number of Employees: 11

DATA INFORMATION SYSTEMS CORP.
9655 S. 78th Ave.
Hickory Hills, IL 60457
(312) 430-3990
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Banking
Target Applications: Financial software
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales/Software: Kathy Johnson
Year Established: 1978
Number of Employees: 65

DATA INTELLIGENCE SYSTEMS
19 Monsignor O'Brien Highway
Cambridge, MA 02141
(617) 227-5405
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Distribution
Target Applications: Food service; Vending; Restaurant Management
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: John L. Spencer
Head of Engineering: Robert J. Parkhurst
Year Established: 1972
Number of Employees: 21

DATAIR
2137 S. Lombard Ave.
Chicago, IL 60650
(312) 652-4840
Target Industries: Insurance; Banking
Target Applications: Pension Administration; Insurance
Contacts:
Head of Sales: Mickey Bass
Head of Engineering: Arron Venouziuo
Year Established: 1967
Number of Employees: 20

DATA LAB CORP.
200 W. Monroe
Chicago, IL 60606
(312) 236-8385
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Architectural, Engineering, Wholesale Distribution; Sub Conductors; Financial
Target Applications: Business Management; Scheduling; Project Management and Analysis
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Michael O'Connor
Head of Software: James Rice
Year Established: 1971
Number of Employees: 22

DATALEX CO.
Suite 410
850 5th St.
San Francisco, CA 94107
(415) 541-0760
Major Markets: Maintenance/Other Services
Target Industries: Fortune 1000
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Mark Bernardi
Head of Software: Don Tibbetts
Year Established: 1978
Number of Employees: 10

DATA — LINK SYSTEMS, INC.
1505 B. Judson Road
Longview, TX 75601
(214) 757-5122
Major Markets: Systems House (Commercial OEM)
Target Applications: Accounting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Gene McGregor
Head of Software: Ed Shaw
Year Established: 1959
Number of Employees: 9

DATALOGIC, INC.
115 Chestnut St.
Chattanooga, TN 37402
(615) 265-6605
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software/Engineering: Russ Miller
Year Established: 1977
Number of Employees: 30

DATALOGICS, INC.
325 W. Huron St.
Chicago, IL 60610
(312) 266-4444
Major Business: Terminals
Manufacturing; Systems House

(Commercial OEM)
Target Industries: Publishing; Insurance; Inplant
Target Applications: Typesetting
Contacts:
Head of Sales: Brad Lindroth
Year Established: 1958
Number of Employees: 40

DATA MANAGEMENT, INC. (CO)
10610 E. Bethany Drive
Aurora, CO 80014
(303) 751-8809
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Contractors, Distribution, Accounting
Contacts:
Head of Sales: Martin Mohr
Year Established: 1977
Number of Employees: 7

DATA MANAGEMENT, INC. (MN)
7601 Bush Lake Road
Edina, MN 55435
(612) 831-3350
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Manufacturing
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Keith Johnson
Year Established: 1981
Number of Employees: 9

DATAMARK CORP.
Suite 148
4300 W. Peterson
Chicago, IL 60646
(312) 545-2501
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: General Business, Insurance, Steel
Target Applications: Insurance Broker
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978
Number of Employees: 8

DATAMARK SYSTEMS, INC.
220 N. 1300 W.
Pleasant Grove, UT 84062
(801) 785-5023
Major Markets: OEM (Computer Systems)
Contacts:
Head of Engineering: Grant Dearden
Year Established: 1978
Number of Employees: 8

DATAMATIC, INC.
4130 Lien Road
Madison, WI 53704
(608) 249-1077
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Education; Finance; Utilities; Munycipalities
Target Applications: Payroll, Grading Scheduling; WP; General Accounting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1987
Number of Employees: 17

DATAMATIC SERVICES, INC.
6423 Scott Hamilton Drive
P.O. Box 4406
Little Rock, AR 72214
(501) 568-3110
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Banking; Distribution, Manufacturing
Target Applications: Route accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Dennison Yates
Year Established: 1965
Number of Employees: 53

DATAMATION, INC.
Suite 210
997 Old Eagle School Road
Wayne, PA 19087
(215) 687-4700
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Manufacturing, Distribution, Wholesale
Target Applications: Accounting; Order Entry; Inventory
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1977
Number of Employees: 25

DATAMATION SERVICES, INC.
7625 Rosecrans Ave.
Paramount, CA 90723
(213) 634-3000
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Distribution; Manufacturing
Target Applications: MRP; Order Entry
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales, Cork Auto
Head of Software: Darrel Galetano
Year Established: 1971
Number of Employees: 16

DATA — MAY
6868 Washington Ave. S.
Eden Prairie, MN 55344
(612) 941-0808
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Distribution, Insurance, Medical
Target Applications: Accounting; Manufacturing, Shipping, Sales Analysis
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1979
Number of Employees: 10

DATAMAX COMPUTER CORP.
Suite 404
3520 New Hartford Road
Owensboro, KY 42301
(502) 926-4781
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Wholesalers; Medical
Target Applications: Accounting; Statements, Insurance forms; Inventory
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1977
Number of Employees: 13

DATAMED RESEARCH, INC.
1433 Roscomare Road
Los Angeles, CA 90077
(213) 472-8825
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Applications: Business systems; UCSD operating systems
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1971
Number of Employees: 4

DATAMENTION
615 Academy Drive
Northbrook, IL 60062
(312) 564-5060
Target Industries: OEM; Professional Business, Mail
Target Applications: Managers packages, Educational
Contacts:
Head of Sales: Joe Manecilco
Year Established: 1977
Number of Employees: 9

DATAMERICA CORP.
P.O. Box 469
Fort Scott, KS 66701
(316) 223-5340
Target Industries: Accountants; Legal, Clinics
Target Applications: Accounting; Payroll, Billing
Year Established: 1978
Number of Employees: 10

DATAMETRICS
226 Meyran Ave.
Pittsburgh, PA 15213
(412) 621-7358
Major Markets: OEM (Computer Systems); Data Services (Service Bureau)
Target Industries: Higher Education
Target Applications: Statistical Analysis, Project Control
Year Established: 1965
Number of Employees: 9

DATAMOST, INC.
8943 Sutcnght
Chatsworth, CA 91311
(213) 366-7160
Major Markets: Maintenance/Other Services
Contacts:
Head of Sales: Sandy Wivlott
Year Established: 1981
Number of Employees: 24

DATANEX, INC.
P.O. Box 30008
Eugene, OR 97403
(503) 687-2581
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 5

DATAPEX, INC.
Suite B10
1240 Johnson Ferry Place
Marietta, GA 30067
(404) 971-5124
Major Markets: Systems House (Commercial OEM)
Target Industries: Medical; Legal, Accounting, Distribution
Target Applications: WP; Accounting, Inventory, Medical Data Management
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 8

DATAPHASE SYSTEMS, INC.
3770 Broadway
Kansas City, MO 64111
(816) 931-7927
Major Markets: OEM (Computer Systems), OEM (Peripherals/ Terminals); Systems House (Commercial OEM)
Target Industries: Libraries
Target Applications: Library Management; Information Systems
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Dean Jones
Head of Engineering: William F. Adietta
Year Established: 1971
Number of Employees: 50

DATA PLUS, INC.
1218 Massachusetts Ave.
Cambndge, MA 02138
(617) 547-4875
Major Markets: Maintenance/Other Services
Target Industries: Architecture; Restaurant
Target Applications: Office automation
Year Established: 1973
Number of Employees: 25

DATAPOINT CORP.
9725 Datapoint Drive
San Antonio, TX 78284
(512) 699-7000
Major Markets: Computer, Peripheral and Office Equipment Manufacturing, Maintenance/Other Services
Target Industries: General Business, Scientific, Government
Target Applications: Distributed DP; Word Processing, Office Automation, Electronic Messaging
Net Sales: Over $1 Billion (1982)
Contacts:
Head of Engineering: Victor D. Poor
Year Established: 1968
Number of Employees: 6,800

DATA PROCESSING CONSULTANTS
1219 Highway 641 S.
Paris, TX 75460
(903) 785-3551
Major Markets: Data Services (Service Bureau)
Year Established: 1976
Number of Employees: 4

DATA PROCESSING CONSULTING
1775 30th St.
Boulder, CO 80301
(303) 443-2547
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor, Maintenance/Other Services
Target Industries: Insurance; Travel

Vendors

Net Sales: $500,000 — $1 Million (1981)
Year Established: 1977
Number of Employees: 20

DATA PROCESSING CORP. OF DELAWARE VALLEY
1650 Rockwell Road
Abington, PA 19001
(215) 549-1111
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Manufacturing
Year Established: 1968
Number of Employees: 10

DATA PROCESSING DESIGN
Suite F
181 W. Orangethorpe
Placentia, CA 92670
(714) 993-4160
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Applications: Accounting; WP, Graphic
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Richard Marino
Year Established: 1971
Number of Employees: 42

DATA PROCESSING ENTERPRISES
914 S. Hoover St.
Los Angeles, CA 90006
(213) 380-7200
Major Markets: Data Services (Service Bureau)
Target Applications: General Business
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1967
Number of Employees: 75

DATA PROCESSING OF SELMA, INC.
Box 45-D
Rt. 2, Highway 80 W.
Selma, AL 36701
(205) 875-1600
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Retail
Target Applications: Accounts recievable; Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1974
Number of Employees: 6

DATA PROCESSING SERVICES, INC.
1448 W. Orange Grove Ave.
Orange, CA 92668
(714) 997-4333
Major Markets: Data Services (Service Bureau)
Target Applications: Financial
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Software: R. P. Centoni
Year Established: 1975
Number of Employees: 25

DATA PRODUCTS MAINTENANCE CORP.
9460 Telstar Ave No.3
El Monte, CA 91731
(714) 994-4180
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Applications: General Business
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1970
Number of Employees: 15

DATA PROFESSIONAL, INC.
1904 Leland Drive S.E
Marietta, GA 30067
(404) 952-0869
Major Markets: Data Services (Service Bureau)
Target Industries: Insurance
Contacts:
Head of Sales/Software: Donald Douglas
Year Established: 1972
Number of Employees: 2

DATA RESEARCH ASSOCIATES, INC.
9270 Olive Blvd
St. Louis, MO 63132
(314) 432-1100
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Libraries
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1975
Number of Employees: 20

DATAREX COMPUTER SYSTEMS
Suite 4
445 N. Capital
P.O. Box 577
Idaho Falls, ID 83402
(208) 529-4286
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Agriculture
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 6

DATA-RX, INC.
686 Lighthouse Ave.
Monterey, CA 93940
(408) 375-0772
Major Markets: Dealer/Distributor
Target Industries: Accountants; Professional
Target Applications: Accounting; Client Billing
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Silas Lum
Year Established: 1979
Number of Employees: 5

DATASCAN AMERICA, INC.
Suite 222
4675 N. Shallowford Road
Atlanta, GA 30338
(800) 241-1374
Major Markets: Peripheral Manufacturing
Target Applications: Information Retrieval and Reporting; Bar Graphics
Contacts:
Head of Sales: David Couchman
Head of Software: Joseph Richburg
Year Established: 1978
Number of Employees: 35

DATA SERVICE CENTER
Suite 1
3615 N. 44th
Lincoln, NE 68504
(402) 466-8479
Major Markets: Systems House (Commercial OEM)
Year Established: 1979
Number of Employees: 3

DATA SERVICE CENTER, INC.
324 Remington St.
P.O. Box 1842
Fort Collins, CO 80522
(303) 221-2880
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Applications: Payrolls; General Ledgers; Billing
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Marilyn Borys
Year Established: 1976
Number of Employees: 8

DATA SOLUTIONS, INC.
Suite 209
1015 E. Hillsdale Blvd.
P.O. Box 4251
Foster City, CA 94404
(415) 574-2262
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Non profit; Banks; Distributors; Food Distribution
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1977
Number of Employees: 20

DATA SYSTEMS
2214 W. Iowa
Chicago, IL 60622
(312) 235-2699
Year Established: 1980
Number of Employees: 3

DATA SYSTEMS CONSULTANTS, INC.
Suite 200
6633 E. State Blvd.
Fort Wayne, IN 46815
(219) 485-1695
Major Markets: OEM (Peripherals/Terminals); Systems House (Commercial OEM)
Target Industries: General Business; Agriculture; Wholesale
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Joe Kohnen
Year Established: 1977
Number of Employees: 9

DATA SYSTEMS FOR INDUSTRY
3942 Cerritos Ave.
Los Alamitos, CA 90720
(213) 493-4541
Major Markets: OEM (Peripherals/Terminals); Systems House (Commercial OEM)
Target Industries: Manufacturing; Distribution
Target Applications: Manufacturing and Distribution Management; Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Derek Richell
Head of Engineering: Jerry W. Hart
Year Established: 1975
Number of Employees: 25

DATA SYSTEMS OF BATON ROUGE
8939 Jefferson Highway
Baton Rouge, LA 70809
(504) 923-0868
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Distribution; Data communications; Apartment Management
Target Applications: Data Communications
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1971
Number of Employees: 15

DATA-TAX, INC.
710 E. Ogden Ave.
Naperville, IL 60540
(312) 369-2414
Target Industries: Accounting; Legal
Target Applications: Accounting; Tax Preparation; Tax Planning
Year Established: 1976

DATATEAM, INC.
Suite E
2895 W. Prospect Road
Fort Lauderdale, FL 33309
(305) 486-3311
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Banking; Insurance; Distribution, Retail
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: D. Russell
Year Established: 1979
Number of Employees: 42

DATA TECHNOLOGY INDUSTRIES
Software Division
701A Whitney St.
San Leandro, CA 94577
(415) 638-1206
Major Markets: Computer Manufacturing; OEM (Computer Systems); Dealer/Distributor; Maintenance/Other Services
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: Ted Eaton
Head of Software: Chris Iannone
Year Established: 1976
Number of Employees: 80

DATA — TEC
1211 Chestnut St.
Philadelphia, PA 19107
(215) 564-4133
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Medical; Banking
Target Applications: Accounting
Year Established: 1971
Number of Employees: 18

DATATEK SYSTEMS, INC.
Suite 300
101 E. 3rd
Amarillo, TX 79105
(806) 373-1056
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Retail; Feed Yards; Oil and Gas
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1982
Number of Employees: 15

DATATEL MINICOMPUTER CO.
3700 Mt. Vernon Ave.
Alexandria, VA 22305
(703) 549-4300
Major Markets: OEM (Computer Systems); OEM (Peripherals/Terminals); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Education; Banking; Government
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: Bill Peterson
Head of Software/Engineering: Jayne Edge
Year Established: 1968
Number of Employees: 250

DATA 3 SYSTEMS, INC.
P.O. Box 441
Santa Rosa, CA 95402
(707) 525-8500
Target Industries: Manufacturing
Year Established: 1979
Number of Employees: 15

DATA-TEACH, INC.
1910 Craigshire
St. Louis, MO 63141
(314) 426-3300
Major Markets: Dealer/Distributor; Maintenance/Other Services
Year Established: 1978
Number of Employees: 17

DATATRAC CORP.
Suite 415
188 Interstate N.
Atlanta, GA 30339
(404) 953-2999
Major Hardware Systems Focus: (Commercial OEM)
Target Applications: General Business; Accounting; Medical; Wholesale Distributors
Year Established: 1975
Number of Employees: 13

DATA TRAM, INC.
P.O. Box 888
Sandy Park, OR 97055
(503) 478-1467
Major Markets: Maintenance/Other Services; custom programming
Target Industries: Accountants
Target Applications: Accounting; Bookkeeping
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: M. Linden
Head of Software: M. Newton
Year Established: 1973
Number of Employees: 20

DATAVISION
Suite I
500 Bercut Drive
Sacramento, CA 95814
(916) 441-6863
Major Markets: Systems House (Commercial OEM)
Target Industries: Transportation; Construction; Property Management; Recreation
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: William Christiansen
Year Established: 1978
Number of Employees: 7

DATAVUE CORP.
1911 22nd Ave. S.
Seattle, WA 98144
(206) 322-5330
Major Markets: Component, Computer and Terminal Manufacturing; OEM (Computer Systems)
Target Industries: Financial; OA; CAD
Target Applications: CP/M; CAD; General Business
Contacts:
Head of Engineering: Dick Kretzmer
Year Established: 1974
Number of Employees: 50

DATAWARE, INC.
2565 Elmwood Ave.
Buffalo, NY 14217
(716) 876-8722
Major Markets: Maintenance/Other Services
Target Applications: Program comparators; File and compare utilities
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1968
Number of Employees: 28

DATA WEST
7333 E. Helms Drive
Scottsdale, AZ 85260
(602) 948-3240
Major Markets: OEM (Computer Systems)
Year Established: 1968
Number of Employees: 10

DATA WEST CORP.
P.O. Box 2064
Durango, CO 81301
(303) 259-4335
Target Industries: Government; Utilities
Target Applications: Accounting; Utility Billing
Contacts:
Head of Sales: Patrick Keating
Head of Software: Richard Brown
Year Established: 1975
Number of Employees: 6

DATAX, INC.
525 Krebs Ave.
P.O. Box 240
Demarest, NJ 07627
(201) 768-2154
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Data Services (Service Bureau)
Target Applications: Property tax Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: David S. Ayers
Year Established: 1972
Number of Employees: 14

DATCO, INC.
Suite A
865 W. 2nd.
Eugene, OR 97402
(503) 687-0070
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Insurance
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1976
Number of Employees: 6

DATEK, LTD.
3060 Pharr Court
Atlanta, GA 30305
(404) 262-2135
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Legal; Medical; Engineering
Target Applications: CAR microfilm
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Engineering: Kenneth Vaughan
Year Established: 1975
Number of Employees: 15

DATEX, INC.
2445 Belmont Ave.
Youngstown, OH 44505
(216) 744-0131
Target Industries: Government; Manufacturing; Service
Target Applications: Accounting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1973
Number of Employees: 12

DA-TRONICS
2962 N. Market Ave.
Canton, OH 44714
(216) 455-5383
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1981
Number of Employees: 25

DATRONIC SYSTEMS, INC.
Suite C
1729 N. Central Expwy.
Plano, TX 75075
(214) 422-7711
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software/Engineering: Cliff Levesque
Year Established: 1973
Number of Employees: 7

DATUM CONSULTANTS, INC.
Suite E
1801 Hicks Road
Rolling Meadows, IL 60008
(312) 991-6800
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Manufacturing; Associations
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Gerald J. Deddo
Year Established: 1980
Number of Employees: 13

DATUM RESOURCES OF HOUSTON, INC.
Suite 154
8610 Harwin Drive
P.O. Box 770038
Houston, TX 77215
(713) 784-1613
Target Industries: Oil and Gas; Government; Utilities; Distribution
Target Applications: Utilities; General Accounting; Land and Lease Royalty
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 7

DAVID COOK ASSOCIATES
6510 Abrams Road
Dallas, TX 75231
(214) 349-8900
Year Established: 1983
Number of Employees: 50

DAVID GROTH & ASSOCIATES, INC.
2031 S. Mt. Propect Road
Des Plaines, IL 60018
(312) 296-9675
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Construction; Manufacturing; Wholesale, Retail
Target Applications: Order Processing, Job Costing, Property Management, Inventory Control
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Gary Knight
Head of Engineering: Edward Bright
Year Established: 1975
Number of Employees: 10

DAVID R. BLACK & ASSOCIATES, INC.
Building I Suite 320
Penn Center W.
Pittsburgh, PA 15276
(412) 787-5100
Target Applications: Programmer Product
Contacts:
Head of Software: Martin Afonsi
Year Established: 1975
Number of Employees: 25

DAVISSON SOFTWARE SYSTEMS
P.O. Box 21002
Lansing, MI 48909
(517) 332-5989
Major Markets: Data Services (Service Bureau)
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1980
Number of Employees: 4

DAVIS CONSULTANTS, INC.
Suite 103
110 S.E. Grant
Ankeny, IA 50021
(515) 964-7153
Major Markets: Maintenance/Other Services
Target Industries: Construction; Distribution; Manufacturing; Insurance

Vendors

Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975
Number of Employees: 6

DAVID-LANE CORP.
3819 Geary Blvd
San Francisco, CA 94118
(415) 387-9295
Year Established: 1978
Number of Employees: 16

DAVIS COMPUTER CORP.
4019 Tujunga Ave.
P.O Box 1345
Studio City, CA 91604
(213) 506-8088
Major Markets: OEM (Peripherals/ Terminals); Systems House (Commercial OEM); Dealer/Distributor, Maintenance/Other Services
Target Industries: Law; Architect; Aerospace, Small to med Busness
Target Applications: Word processing, Data base
Contacts:
Head of Sales: Ruslan Moore
Head of Engineering C. W. Deen
Year Established: 1981
Number of Employees: 9

DB INC SOFTWARE ASSOCIATES, INC.
945 Riverside Drive
Methuen, MA 01844
(617) 682-6629
Target Industries: Personal computers
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales/Engineering: John Riordan
Year Established: 1977
Number of Employees: 3

DBIS (DESIGN AND BUILDERS OF INFORMATION SYSTEMS)
1 Mayfair Road
Eastchester NY 10707
(212) 933-4170
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing; Distribution; Retail, Pharmacy
Target Applications: Accounting; Distribution, Payroll; Pharmacy
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1966
Number of Employees: 22

DBMS, INC.
1801 Mill St
Naperville, IL 60540
(312) 961-5700
Target Industries: Data Base; Data Communication
Contacts:
Head of Sales: Raymond J. Nawara
Head of Software R. B Beaskow
Year Established: 1979
Number of Employees: 80

D. S. SOFTWARE CO.
2802 S.W. Myers Drive
Gresham, OR 97030
(503) 666-8162
Contacts:
Head of Sales: Pete Elgaal
Year Established: 1978
Number of Employees: 7

DCD CO.
Borg Enterprises
1601 W. River Road
Minneapolis, MN 55411
(612) 588-0551
Major Markets: Systems House (Commercial OEM), Dealer/Distributor
Target Industries: Manufacturing
Target Applications: Job Costing, Labor Efficiency; Shop Loading
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales Cindie Palmer
Head of Software Gary Hoff
Year Established: 1974
Number of Employees: 15

DEALERS MANAGEMENT SERVICES
Suite 1300
5203 Leesburg Pike
Falls Church, VA 22041
(703) 379-7171
Major Markets: Systems House (Commercial OEM)
Target Industries: Liquid petroleum
Target Applications: Fuel, Accounting
Contacts:
Head of Software: J. DeYoung
Year Established: 1981
Number of Employees: 15

DEBUGGE COMPUTER SERVICES, INC.
Suite 203
200 Central Ave.
Mountainside, NJ 07092
(201) 789-3222
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Manufacturing; Distribution; Lumber, Import/Export
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Anna Edson
Head of Software Edward Murphy
Year Established: 1978
Number of Employees: 15

DECISION MICROSYSTEMS, INC.
Suite 616
122 E. 42nd St
New York, NY 10168
(212) 682-2774
Major Markets: OEM (Computer Systems); Dealer/Distributor; Maintenance/Other Services
Target Industries: Legal, Banking
Target Applications: Micrographics; WP
Year Established: 1978
Number of Employees: 10

DECISION RESEARCH CORP.
Suite 725
1600 Kapolani Blvd.
Honolulu, HI 96814
(808) 949-8316
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Insurance; Car Rental
Target Applications: Accounting; POS, On-line Insurance
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1979

DECISION RESOURCES
P O Box 309
Westport, CT 06880
Year Established: 1981
Number of Employees: 20

DECISIONS DEVELOPMENT, INC.
115 E. Ninth St.
New York, NY 10003
(212) 254-8405
Target Industries: Banking
Target Applications: Financial analysis, Business planning; Corporate consolidation; Reporting
Year Established: 1972
Number of Employees: 7

DECISION SUPPORT SERVICES, INC.
215 First St.
Cambridge, MA 02142
(617) 492-5368
Major Markets: Maintenance/Other Services

DECISION SYSTEMS, INC.
200 Rt 17
Mahwah, NJ 07430
(201) 529-1440
Major Markets: Maintenance/Other Services
Target Industries: Government; Defense, Banking, Insurance
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1969
Number of Employees: 90

DEFARO SOFTWARE SYSTEMS, INC.
Suite 4
725 Fifth St.
Hermosa Beach, CA 90254
(213) 318-1661
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services.
Target Industries: IBM users
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Leslie Borg
Head of Software Julio DeFaro
Head of Engineering: Gary Abbott
Year Established: 1977
Number of Employees: 9

DEFINITIVE SYSTEMS, INC.
3156 University Drive N.W.
Huntsville, AL 35805
(205) 536-2625
Target Industries: Business Accounting
Year Established: 1980

DELOITTE HASKINS & SELLS
1114 Ave of the Americas
New York, NY 10036
(212) 790-0524
Major Markets: Maintenance/Other Services
Target Industries: Financial Institutions, Hospitals
Target Applications: Financial Management, Hospital Reimbursement
Contacts:
Head of Software: Robert Arnett
Year Established: 1956
Number of Employees: 25,750

DELPHI ASSOCIATES
5824 Forbes
Pittsburgh, PA 15217
(412) 521-2181
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Pharmacy; Accountants; Nursing homes; HMO
Target Applications: Accounting, WP, Report generation
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1974

DELPHI DATA SYSTEMS, INC.
9905 Hamilton Road
Eden Prairie, MN 55344
(612) 941-9182
Major Markets: OEM (Computer Systems), OEM (Peripherals/ Terminals), Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Manufacturing
Target Applications: Accounting; WP
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 10

DELTA COMPUTER SYSTEMS, INC.
P.O Box 1824
Altoona, PA 16603
(814) 944-1651
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Food Distribution; Health care; Fuel Oil
Target Applications: Home Health Care; Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Clay Figard Jr.
Year Established: 1960
Number of Employees: 50

DELTA COMPUTING SYSTEMS, INC.
P.O. Box 1585
N Platte, NE 69103
(308) 534-2520
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Legal
Target Applications: Document management
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1979
Number of Employees: 9

DELTA MACHINE CO., INC.
P.O. Box 5240
Brownsville, TX 78520
(512) 831-8201
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1937
Number of Employees: 23

DELTA PROFESSIONAL SYSTEMS, INC.
Suite 1617
5050 Poplar Ave.
Memphis, TN 38157
(901) 761-3272
Major Markets: OEM (Computer Systems);

Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Retail; Manufacturing
Year Established: 1978
Number of Employees: 12

DELTA SYSTEM CONSULTANTS, INC.
P.O Box 143662
Coral Gables, FL 33114
(305) 446-3638
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Government
Target Applications: Statistical
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1978
Number of Employees: 6

DESIGNCHILD SYSTEMS, INC.
6432 E. McDowell St.
Mesa, AZ 85205
(602) 830-4308
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Manufacturing
Target Applications: CAD/CAM, Optimization, Data entry; Inventory Controls
Head of Sales: H. Robert Sherlock
Year Established: 1978
Number of Employees: 15

DENNEN COMPUTER SYSTEMS, INC.
41 Harbor Plaza Drive
Stamford, CT 06902
(203) 357-8150
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Manufacturing; Distribution, Financial
Target Applications: Accounting; Inventory; General Ledger; Manufacturing
Year Established: 1968
Number of Employees: 30

DESCO COMPUTER SERVICES, INC.
P.O Box 177
Glanford, NY 12433
(914) 657-2036
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Rehabilitation agencies
Year Established: 1970
Number of Employees: 10

DESIGN AIDS, INC.
23852 El Casa Real
Laguna Niguel, CA 92677
(714) 831-5611
Target Industries: Engineering
Target Applications: Printed circuit automatic routing; Logic simulators; Wire wrap machinery
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1973
Number of Employees: 10

DESIGN DATA SYSTEMS CORP.
5270 N. Park Place, N.E.
Cedar Rapids, IA 52402
(319) 373-1571
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Sheet Metal; Architectual
Target Applications: Tooling Design; Architectual Design; CAD; CAA
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: James P. J. Williams
Head of Software: Kevin Kupkul
Year Established: 1977
Number of Employees: 12

DESIGNERS SOFTWARE
Suite 718
5400 Montrose
Houston, TX 77006
(713) 520-8221
Contacts:
Head of Software: Michael Griffin
Year Established: 1980
Number of Employees: 10

DESIGN STRATEGY CORP.
230 Madison Ave.
New York, NY 10017
(212) 370-0392
Target Applications: Systems Consulting, Communications, Systems Generation and Networking
Contacts:
Head of Marketing: Keith Doran
Head of Software: Ron Stenzel
Year Established: 1978
Number of Employees: 12
Net Sales: $1 million — $5 million

DESIGN SYSTEMS, INC.
15 Campus Drive
Somerset, NJ 08873
Target Industries: Credit unions; Leasing companies; Wholesale; Textile Manufacturing
Target Applications: Accounting packages; Inventory control
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1977
Number of Employees: 20

DESIGN SYSTEMS, INC.
P.O Box 12243
St. Louis, MO 63157
(314) 391-0450
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Year Established: 1976
Number of Employees: 30

DESKTOP COMPUTER SOFTWARE, INC.
303 Potrero St.
Santa Cruz, CA 95060
(408) 458-9095
Year Established: 1981
Number of Employees: 5

DESKTOP FINANCIAL SOLUTIONS, INC.
407 Main St.
Spotswood, NJ 08884
(201) 251-7191
Target Applications: Financial Planning; Budgeting; Forecasting; Financial Modeling
Contacts:
Head of Sales: Joel Weisenfeld
Head of Software/Engineering: Paul A. Taba
Year Established: 1979
Number of Employees: 5

DESKTOP SOFTWARE CORP.
228 Alexander St.
Princeton, NJ 08540
(609) 924-7111
Target Industries: Fortune 1000.
Year Established: 1981
Number of Employees: 15

THE DESTEK GROUP
830C E. Evelyn Ave
Sunnyvale, CA 94086
(408) 737-7211
Major Markets: Computer Equipment Manufacturing
Target Applications: Networking
Year Established: 1981
Number of Employees: 20

DEVA SYSTEMS SOFTWARE, INC.
Suite 203
4414 Centerview Drive
San Antonio, TX 78228
(512) 736-4281
Target Applications: VM
Contacts:
Head of Software: Barry Engelbrecht
Year Established: 1981
Number of Employees: 5

DEVELOPMENT ASSOCIATES
1520 S. Lyon
Santa Ana, CA 92705
(714) 835-9512
Major Markets: Communications Equipment Manufacturing; Systems House (Commercial OEM)
Target Industries: Telecommunications
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales/Engineering: R. F. Davis
Year Established: 1970
Number of Employees: 12

DEWAR INFORMATION SYSTEMS CORP.
221 W. Lake St.
Oak Park, IL 60302
(312) 524-1644
Major Markets: Computer Manufacturing; Dealer/Distributor
Target Industries: Newspapers.
Target Applications: Editing systems
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975
Number of Employees: 6

DEXEL SYSTEMS CORP.
5203 Leesburg Pike
Falls Church, VA 22041
(703) 931-2100
Target Industries: Insurance; Credit unions
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Richard Demerse
Year Established: 1978
Number of Employees: 40

DEXEL SYSTEMS CORP.
479 N. Potomac
Hagerstown, MD 21740
(301) 790-1177
Target Industries: Credit Unions; Radio Stations; Government; Agriculture
Target Applications: Share and Loan Accounting; Traffic and Billing; Utility Billing; Job Costing
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software: Doug Kern
Year Established: 1979
Number of Employees: 14

D. F. McNAMARA CO.
6075 Northwest Highway
Chicago, IL 60631
(312) 792-0646
Major Markets: Data Services (Service Bureau)
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1969
Number of Employees: 7

DHI COMPUTING SERVICE
P.O. Box 1427
Provo, UT 84601
(801) 373-8518
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor; Maintenance/Other Services
Target Industries: Savings and Loan, Banks, Credit Unions
Target Applications: Dairy; General Accounting, Payroll
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Pete Scholes
Year Established: 1952
Number of Employees: 120

DICKERMAN ASSOCIATES, INC.
66 Canal St.
Boston, MA 02114
(617) 367-5754
Major Markets: Systems House (Commercial OEM)
Target Industries: Propane; Retail
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Engineering: Brian Dereszniewicz
Year Established: 1977
Number of Employees: 8

DIDSBURG ASSOCIATES CORP.
1 Palmer Drive
P.O. Box 456
Londonderry, NH 03053
(603) 434-1584
Major Markets: Maintenance/Other Services
Target Industries: Insurance; Medical, Footwear, Publishing
Target Applications: Order Processing, Accounting; Inventory control; WP
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1967
Number of Employees: 5

DIEBOLD, INC.
818 Mulberry S.E.
P.O. Box 8230
Canton, OH 44711
(216) 489-4000
Major Markets: Component and Terminal Manufacturing, OEM (Computer Systems), Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Finance; Banking; Credit Unions
Target Applications: Security; ATM

Vendors

Net Sales: More than $100 Million (1982)
Contacts:
Head of Sales: Robert Barone
Head of Software: Frank D'Angelo
Head of Engineering: Al Warf
Year Established: 1859
Number of Employees: 6,000

DIGI-COM SYSTEMS, INC.
111 Broadway
New York, NY 10006
(212) 732-6655
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Banking; Insurance
Target Applications: Financial
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 5

DIGICOM, INC.
3701 Kirby Drive
Houston, TX 77098
(713) 526-5611
Major Markets: Systems House (Commercial OEM)
Target Industries: Oil Exploration
Target Applications: Seismic Data Processing
Contacts:
Head of Engineering: David Steele
Year Established: 1965
Number of Employees: 2,500

DIGITAL ANALYSIS CORP.
11313 Sunset Hills Road
P O Box 2850
Reston, VA 22090
(703) 471-0396
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Finance; Communication
Target Applications: Voice response; UNIX/C environment
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: E. A. Nichols
Head of Engineering: J. C. Nichols
Year Established: 1980
Number of Employees: 8

DIGITAL COLOR CORP.
Suite 12
[illegible]
Otay, CA 92011
(714) 423-0538
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Manufacturing; Finance
Target Applications: General Ledger, Inventory Control; Civil Engineering Software
Contacts:
Head of Software: Jack Trueblood
Year Established: 1976
Number of Employees: 16

DIGITAL ELECTRONIC SERVICES
4019 Greenwood Road
P.O. Box [illegible]
Shreveport, LA 71103
[illegible]
Major Markets: OEM (Peripherals/ Terminals); Dealer/Distributor

Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Eddie Banium
Head of Software: Mike Brantly
Year Established: 1977
Number of Employees: 30

DIGITAL EQUIPMENT CORP.
146 Main St.
Maynard, MA 01754
(617) 897-5111
Major Markets: Component, Computer, Terminal, Peripheral and Communications Equipment Manufacturing; Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Net Sales: More than $100 Million (1982)
Year Established: 1957
Number of Employees: 71,000

DIGITAL HEALTH CARE SYSTEMS, INC.
4141 N. Miami Ave.
Miami, FL 33127
(305) 576-1950
Major Markets: Systems House (Commercial OEM)
Target Industries: Nursing Home; Medical
Target Applications: Patient Billing; Payroll; Accounting; Medical Records
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Engineering: Steve Toback
Year Established: 1978
Number of Employees: 12

DIGITAL INTERFACE SYSTEMS, INC.
2390 Pipestone Road
P.O. Box 1408
Benton Harbor, MI 49022
(616) 926-2148
Major Markets: OEM (Computer Systems)
Target Industries: Manufacturing; Telecommunications
Target Applications: PBS Report Generation; Process Control; Testing Systems
Year Established: 1977
Number of Employees: 30

DIGITAL SYSTEMS CORP.
Suite 105
8410 N.W. 53rd Terrace
Miami, FL 33166
(305) 592-2928
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Applications: Accounting; General Business
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975
Number of Employees: 4

DIGITAL RESEARCH, INC.
P.O. Box 579
Pacific Grove, CA 93950
(408) 649-3896
Target Industries: OEM; Dealers; Distributors
Target Applications: Operating Systems; CP/M
Contacts:
Head of Engineering: Thomas Rolander
Year Established: 1977
Number of Employees: 200

DIGITAL SOLUTIONS, INC.
100 Menlo Park
Edison, NJ 08837
(201) 549-1700
Target Industries: Scientific; Construction
Target Applications: FUS; CAIS
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1970
Number of Employees: 35

DIGITAL SYSTEMS CORP.
3 Main St.
Walkersville, MD 21793
(301) 845-4141
Major Markets: Component and Computer Manufacturing; OEM (Computer Systems), Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: General Business
Target Applications: Accounting; Payroll; Inventory
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Thomas C. Tamaccio
Head of Software: John W. Ruwet
Head of Engineering: Robert Boyer
Year Established: 1975
Number of Employees: 85

DIGITAL SYSTEMS, INC.
P.O. Box 12
Columbia, SC 29202
(803) 799-4094
Major Markets: Computer Manufacturing; Dealer/Distributor; Maintenance/Other Services
Target Industries: Government; Utilities
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Harry Bonds
Head of Software: Greg Kennedy
Year Established: 1965
Number of Employees: 60

DIGITAN SYSTEMS, INC.
5007 16th Ave.
Brooklyn, NY 11204
(212) 436-3777
Major Markets: Component Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Manufacturing; Distribution, Professional; Food
Target Applications: General accounting; Inventory control; Shipping, WP
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Joseph Friedman
Head of Software/Engineering: M. Baumwalspinner
Year Established: 1976
Number of Employees: 20

DIGITECH CORP.
212 N. Rockton Ave.
Rockford, IL 61103
[illegible]
Major Markets: OEM (Computer Systems); OEM (Peripherals/ Terminals); Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Construction; YMCA; Credit unions
Target Applications: CAD/CAM; Data entry; WP
Contacts:
Head of Sales: Bill Wieringa
Head of Engineering: Louis Hall
Year Established: 1979
Number of Employees: 12

DIGITECH, INC.
97 Main St.
P.O. Box 97
Newton, NJ 07860
(201) 383-8919
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Year Established: 1978
Number of Employees: 2

DIGITRAN, INC.
Airport Road Highway 90 E.
Lafayette, LA 70508
(318) 237-0920
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Oil fields
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 24

DILITHIUM PRESS
Suite 151
5285 S.W. Ventura
Beaverton, OR 97116
(800) 547-1842
Target Industries: Publishing; Education; General Business
Year Established: 1975
Number of Employees: 48

DILOG CO., INC.
195 Buckhorn Lane
Reston, VA 22091
(703) 471-4172
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Aviation
Target Applications: Air Traffic Control; Weather; Radar
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1974
Number of Employees: 5

DIMEC, INC.
1806 Highway 35
P.O. Box 2228
Ocean, NJ 07712
(201) 531-2300
Major Markets: OEM (Peripherals/ Terminals); Systems House (Commercial OEM)
Target Industries: Distribution
Target Applications: Inventory Control
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: James E. Hunter
Head of Software: Joe Ziegler
Year Established: 1975

DIMEC MICRO SYSTEMS
648 S. River Drive
Tempe, AZ 85281
[illegible]
Major Markets: OEM (Computer Systems); Dealer/Distributor
Target Industries: Accounting; Medical
Year Established: 1978
Number of Employees: 40

[illegible]
[illegible]
Greenwich, CT 06830
(203) 629-2313
Major Markets: Systems House (Commercial OEM)
Target Applications: DBMS
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 10

DIRECTIONS, INC.
1740 N. Collins
Richardson, TX 75081
(214) 238-8250
Target Industries: Finance; Banking
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 20

DISC
[illegible]
Sacramento, CA 95827
[illegible]
Target Industries: Business
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1976
Number of Employees: 10

DISCIPLEDATA, INC.
110 S. Downey Ave.
P.O. Box 7058
Indianapolis, IN 46207
(317) 353-0584
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Religious; Nonprofit; Education
Target Applications: Subscription; Financial accounting; Fund/raising systems; Mailing list maintenance
Net Sales: $500,000 — $1 Million (1981)
Year Established: [illegible]
Number of Employees: 28

DISCO-TECH MICROCOMPUTER PRODUCTS
Division of Morton Technologies, Inc.
[illegible]
P.O. Box 1859
Santa Rosa, CA 95402
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Engineering; Land surveying; Utilities; Energy conservation
Year Established: 1979
Number of Employees: 5

DISCOUNT SOFTWARE GROUP
10150 W. Jefferson Blvd.
Culver City, CA 90230
(213) 837-5141
Net Sales: [illegible] — [illegible] (1982)
Contacts:
[illegible]
Head of Engineering: Ron Dennis
Year Established: 1980
Number of Employees: 25

DISK, INC.
3837 Naylors Lane
[illegible] MD 21229
(301) 486-0410
Major Markets: Maintenance/Other Services
Target Industries: Finance; Banks
Target Applications: Account Reconciliation; Combined Interest Report System; Retirement Report System; Correspondent Bank
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: H. Allen Luray
Head of Software: Albert M. Harris
Year Established: 1969
Number of Employees: 30

DIVELBISS CORP.
9776 Mt. Gilead Road
Fredericktown, OH 43019
(614) 694-9015
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Manufacturing test equipment
Target Industries: Engineering
Target Applications: Testing Control Equipment Machine Control; [illegible]
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1974
Number of Employees: 25

DIVERSIFIED DATA SERVICES
1950 Gervis St.
[illegible] SC 29201
(803) 799-0424
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Applications: Finshcial packages
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978
Number of Employees: 4

DIVERSIFIED ELECTRONICS, INC.
176 Mineola Blvd.
Mineola, NY 11501
(516) 746-4990
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Contractors
Target Applications: Payroll; Job costing; Order entry; Accounting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Richard Maletta
Year Established: 1975.
Number of Employees: 6

DIVERSIFIED MICROSYSTEMS
5696 Highway 431 S.
Brown, AL 35741
[illegible]
Major Markets: Computer Manufacturing; OEM (Computer Systems); Maintenance/Other Services; Manufacturing special systems
Target Industries: Medical; Manufacturing
Target Applications: Time Acquisition; Time & Attendance; Medical
Contacts:
Head of Sales: Waldemar Janke
Year Established: 1982
Number of Employees: 6

DIVERSIFIED PROGRAMMING, INC.
2010 N. Lehigh Ave.
Glenview, IL 60025
(312) 998-6240
Target Industries: Distributors
Year Established: 1977
Number of Employees: 3

DIVERSIFIED SOFTWARE SYSTEMS, INC.
Suite 205
996 Minnesota Ave.
San Jose, CA 95125
[illegible]
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1978
Number of Employees: 12

DJR ASSOCIATES, INC.
303 S. Broadway
Tarrytown, NY 10591
[illegible]
Target Applications: [illegible]
Year Established: 1978
Number of Employees: 15

DLH SYSTEMS, INC.
Suite 100
4502 Georgetown Place
Stockton, CA 95207
(209) 474-2900
Major Markets: Systems House (Commercial OEM)
Target Industries: Government; [illegible]
Target Applications: General Accounting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1975
Number of Employees: 22

DMW GROUP
2020 Hogback Road
Ann Arbor, MI 48104
(313) 971-5234
Major Markets: Maintenance/Other Services
Target Industries: Telecommunication
Target Applications: Network Design
Contacts:
Head of Sales: Mark Brown
Year Established: 1971
Number of Employees: 100

DONALD A. JACKSON & ASSOCIATES
25 Hillswood Drive
[illegible] CA 94947
(415) 892-5747
Major Markets: [illegible] Services
Target Industries: Oil
Target Applications: Accounting; Distribution
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1978

DONALD R. FREY & CO.
880 Alexandria Pike
Ft. Thomas, KY 41076
[illegible]
Target Industries: Local Government, Manufacturing; Distribution
Target Applications: Government Accounting, Billing, Order Processing
Year Established: 1974
Number of Employees: 10

DON'T ASK COMPUTER SOFTWARE
Suite B150
2265 Westwood Blvd.
Los Angeles, CA 90064
(213) 397-8811
Target Industries: Apple; Atari
Target Applications: Recreation
Year Established: 1981
Number of Employees: 25

D. P. ASSOCIATES, INC.
6218 Madison Pike, N.W.
Huntsville, AL 35806
[illegible]
Major Markets: Data Services (Service Bureau); Maintenance/Other [illegible]
Target Industries: Government
Target Applications: Data entry
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1970
Number of Employees: 144

DPCS, INC.
[illegible]
4500 Campus Drive
Newport Beach, CA 92660
(714) 557-9662
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Banking, Medical; Power companies, Credit unions
Target Applications: Credit unions; Medical billing, DOS/OS conversion
Net Sales: $1 Million — $5 Million [illegible]
Contacts:
[illegible]
Year Established: 1977
[illegible]

DP PROGRAMMING CO.
[illegible]
1201 Corpus Christie
Laredo, TX 78040
(512) 722-0431
Target Industries: Brokers
Year Established: 1978

DPS, INC.
[illegible]
Salt Lake City, UT 84115
(801) 486-8154
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
[illegible]
Accounting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978

DSFLS II
[illegible]
548 Broadway
New York, NY 10012
[illegible]

DRAFTEK
P.O. Box 1288
[illegible]
[illegible]
Systems); Data Services (Service Bureau)
Target Industries: Engineering; Manufacturing, Automotive
Target Applications: CAD/CAM; Operating Systems
Year Established: 1981
Number of Employees: 4

DSI/MED COMM
[illegible]
Lenexa, KS 66215

Vendors

(913) 492-8500
Major Markets: OEM (Computer Systems)
Target Industries: Pharmacy; Nursing Home
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Dennis Hendershot
Head of Software: Jim Crum
Year Established: 1976
Number of Employees: 12

DTRO, INC.
102 Webster St.
San Francisco, CA 94102
(415) 861-5454
Target Industries: Manufacturing
Target Applications: Inventory Control; Forecasting; Order Entry
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Ed Moore
Year Established: 1976

DUN & BRADSTREET COMPUTING SERVICE
NCSS Information Services Division
187 Danbury Road
Wilton, CT 06897
(203) 762-2511
Major Markets: Data Services (Service Bureau); Maintenance/Other
Contacts:
Head of Sales: Frank Lee
Head of Software: Ernest E. Keet
Number of Employees: 1,300

DUN & BRADSTREET COMPUTING SERVICES
TSI International Division
50 Washington St.
Norwalk, CT 06854
(203) 853-2884
Net Sales: $5 Million — $25 Million (1981)
Head of Sales: Ted Watson
Head of Software: Tony Percy
Year Established: 1967
Number of Employees: 180

Savoy, IL 61874
(217) 356-7542
Number of Employees: 35

DUQUESNE SYSTEMS
Two Allegheny Center
Pittsburg, PA 15212
(412) 323-2600

DURANGO SYSTEMS, INC.
3003 N. First St.
San Jose, CA 95134
(408) 946-5000
Major Markets: Computer Manufacturing; Peripheral Manufacturing; OEM (Computer Systems); OEM (Peripherals/Terminals)
Contacts:
Year Established: 1977

DUXBURY SYSTEMS, INC.
77 Great Road

(617) 263-7761
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975
Number of Employees: 5

DYATRON CORP.
Health Systems Division
Suite 105
3720 Sintron Road
Colorado Springs, CO 80907
(303) 633-2053
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Medical
Target Applications: Accounts
Year Established: 1977
Number of Employees: 25

DYER, WELLS & ASSOCIATES, INC.
4501 Circle 75 Parkway N.W.
Atlanta, GA 30339
(404) 955-2290
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Insurance
Target Applications: Claims systems; Group insurance systems
Contacts:
Head of Sales: James Wells
Number of Employees: 70

DYLAKOR
17418 Chatsworth St.
Granada Hills, CA 91344
(213) 366-1781
Target Industries: Accountants; Finance; Banking
Contacts:
Head of Sales/Software: Carol
Head of Engineering: Carolyn Cook
Year Established: 1968
Number of Employees: 33

DYNACON COMPUTER
410 E. Shore Road
Lindenhurst, NY 11757
(516) 957-6200
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Marinas; Wholesale distributors; Photography;
Target Applications: Payroll; Finance; General Ledger; POS
Contacts:
Head of Software/Engineering: John Wedekin
Number of Employees: 6

DYNALOGIC, INC.
Suite 101
1836 Westlake Ave. N.
(206) 285-1664
Target Industries: Government; Church; Education; Financial — Nonprofit
Target Applications: Accounting
Year Established: 1979
Number of Employees: 4

DYNAMIC CONTROL CORP.
1311 S. Semoran Blvd.
Winter Park, FL 32792
(305) 671-4483
Major Markets: Maintenance/Other Services
Target Industries: Medical; Patient Billing
Target Applications: Medical Records; Registration; Accounting
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1974
Number of Employees: 125

DYNAMIC GRAPHICS, INC.
Suite 405
2855 Telegraph Ave.
Berkeley, CA 94705
(415) 845-8180
Major Markets: Data Services (Service Bureau)
Target Industries: Petroleum; Energy; Mining
Target Applications: Graphic Software; Surface Mapping
Year Established: 1968
Number of Employees: 20

DYNAMIC MICROPROCESSOR ASSOCIATES
545 5th Ave.
New York, NY 10017
(212) 687-7115
Target Industries: Utilities; Communications; Systems houses
Target Applications: DBMS; Applications generation; Report generator; Communications
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Lee Rautenberg
Year Established: 1979
Number of Employees: 9

DYNAMIC RESOURCES, INC.
Suite 1014 S. Tower
225 Peachtree St.
Atlanta, GA 30303
(404) 577-5700
Target Industries: Real estate; Brokerage Industry
Target Applications: Property
Net Sales: $1 Million — $5 Million (1982)
Number of Employees: 14

DYNAMIC SCIENTISTS
7660 Gloria Ave.
Van Nuys, CA 91406
(213) 782-0820
Major Markets: Component and Communications Equipment Manufacturing; OEM (Computer
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1972
Number of Employees: 100

DYNAMIC SOLUTIONS, INC.
50 Lytton Ave.
Hartsdale, NY 10530
(914) 949-8058
Major Markets: Systems House
Target Applications: Project Management; Simulated Training; Management Training
(1981)

Year Established: 1971
Number of Employees: 5

DYNAMIC TELECOM SYSTEMS, INC.
1445 Summit St.
Columbus, OH 43201
(614) 262-1991
Major Markets: OEM (Computer Systems); Data Services (Service
Target Industries: Telecommunications; Hotel
Target Applications: Least cost routing; Call accounting; Direct addressing
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Steve Wagner
Head of Engineering: Joseph Danen
Year Established: 1980
Number of Employees: 60

DYNASTY COMPUTER CORP.
14240 Midway
Dallas, TX 75234
(214) 386-8634
Major Markets: Computer Manufacturing; Systems House (Commercial OEM)
Target Industries: Small business; Personal homes
Contacts:
Head of Engineering: John Tobia
Year Established: 1980
Number of Employees: 10

DYNATECH MICROSOFTWARE, INC.
(312) 470-0700
Major Markets: Dealer/Distributor; Maintenance/Other Services
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: John Bore
Year Established: 1980
Number of Employees: 30

DYNEX RESOURCES, INC.
44 Harbor Park Drive
Port Washington, NY 11050
(516) 484-1144
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Year Established: 1969
Number of Employees: 14

DYSERV, INC.
991 Goodale
Columbus, OH 43212
(614) 221-2716
(Service Bureau); Dealer/Distributor
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Engineering: David R. Smith
Year Established: 1971
Number of Employees: 25

DYX CORP.
10041 Whitehurst
(214) 341-4275
(Commercial OEM); Dealer/Distributor
Target Industries: Insurance; Banking

Target Applications: Financial Planning; Sales Proposal, Variable Life Insurance
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Karl B. Browning
Year Established: 1979
Number of Employees: 4

EAGLE COMPUTER SYSTEMS, INC.
P.O. Box 1020
Eagle, CO 81631
(303) 328-7229
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Government; [illegible]
Target Applications: Financial services, Accounting, Property accounting systems
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 6

EAGLE ENTERPRISES
[illegible] Beach St.
San Francisco, CA 94115
(415) 346-1249
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); [illegible]
Year Established: 1978
Number of Employees: 2

EAGLE SIGNAL, INC.
8004 Cameron Road
Austin, TX 78753
(512) 837-8300
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Communication; Municipalities; Government; Traffic
Net Sales: $5 Million — $25 Million [illegible]
Contacts:
Head of Sales: Larry Kirkpatrick
Head of Software: David Cockle
Year Established: 1921
Number of Employees: 150

EAGLE SOFTWARE PUBLISHING, INC.
Suite 409
993 Old Eagle School Road
Wayne, PA 19087
(215) 964-8660
Year Established: 1981
Number of Employees: 20

EASTERN COMPUTER SERVICES, INC.
228 Belleville Tnpk.
Kearny, NJ 07032
(201) 997-5500
Major Markets: [illegible]
Target Industries: Food; Forest [illegible]
Target Applications: [illegible] management; Profitability report; Accounting, Inventory control
Year Established: 1970
[illegible]

EBELING ASSOCIATES, INC.
1 Glen Ave.
[illegible]
(518) 377-8836
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Manufacturing; Medical
Target Applications: Management DEC Systems, Plant Simulation
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: T. Hood
Head of Software: D. Gestwick
Head of Engineering: Dr. R. Lydoane
Year Established: 1970
Number of Employees: 18

EBERT CORP., INC.
2929 Covington
Lansing, MI 48912
(517) 372-4773
Major Markets: Maintenance/Other Services
Target Industries: Real estate
Target Applications: Appraisal systems,
Net Sales: $1 Million — $5 Million (1981)
Year Established: [illegible]
Number of Employees: 33

ECOM ASSOCIATES, INC.
[illegible] W. Brownsear Road
Milwaukee, WI 53224
(414) 354-0243
Major Markets: Systems House (Commercial OEM)
Target Industries: Engineering
Target Applications: WP; Accounting; Engineering Calculations
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1973
Number of Employees: 11

ECOM SYSTEMS, INC.
[illegible] 240
2500 Mt. Moriah
Memphis, TN 38115
(901) 794-5501
Major Markets: Systems House (Commercial OEM)
Target Industries: Credit Unions; Banks, Financial Industry
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1974
Number of Employees: 30

EDOSOFT, INC.
P.O. Box 68000
Indianapolis, IN 46268
(317) 255-6476
Contacts:
Head of Software: Tim Lesley
Year Established: 1977
Number of Employees: 4

EDP MANAGEMENT, INC.
5485 Lake Murray Blvd.
La Mesa, CA 92041
(714) 462-5400
Major Markets: Maintenance/Other Services
Target Industries: Banking; Manufacturing
Target Applications: Facilities Management
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1972
Number of Employees: 30

EDP OF AMERICA, INC.
Cleveland Plaza Suite 202
123 N. Union Ave.
Cranford, NJ 07016
(201) 272-0770
Major Markets: Computer Manufacturing; Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Personnel; Retail; Distribution
Target Applications: Job Costing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: David Murdoch
Year Established: 1979
Number of Employees: 12

EDP SECURITY, INC.
[illegible] Ward St.
Waltham, MA 02154
(617) 890-6665
Target Applications: EDP Security
Year Established: 19[illegible]
Number of Employees: 9

EDUCATOR, INC.
38 Main St.
Hudson, MA 01749
(617) 562-8222
Year Established: 1980
Number of Employees: 10

EDUCATIONAL COMPUTING SYSTEMS, INC.
[illegible] Terrance
Oak Ridge, TN 37830
(615) 483-4915
Major Markets: Systems House (Commercial OEM); [illegible]
Maintenance/Other Services
Target Industries: Education; Science Business; Technology Business
Target Applications: CAI; CMI
Year Established: 1981
Number of Employees: 10

EDUCATIONAL METHODS, INC.
P.O. Box [illegible]
Denver, CO [illegible]
(303) 770-2571
Target Industries: [illegible] Education
Target Applications: Student Loans; Loan Servicing
Year Established: 1972
Number of Employees: 20

EDUCATIONAL TIMESHARING SYSTEMS, INC.
Suite 25
4122 E. Chapman Ave.
Orange, CA 92669
[illegible]
Major Markets: Systems House (Commercial OEM)
Target Industries: Education
Target Applications: Administrative Student Services
Contacts:
Head of Sales: Gary D. Goff
Head of Software: Jerry D. Lloyd
Year Established: 1980
Number of Employees: 8

EDUCOM.
P.O. Box 726
San Luis Obispo, CA 93406
(805) 489-0806
Year Established: 1981
Number of Employees: 4

EDUI-MARK SERVICES, INC.
28035 Dorothy Drive
Agoura Hills, CA 91301
(213) 706-0861
Major Markets: Maintenance/Other Services
Target Industries: Education
Target Applications: Computer Instruction
Net Sales: $1 Million — $5 Million (1982)
[illegible]
Head of Sales: Mike Leberman
Head of Software: David [illegible]
Head of Engineering: Sherwin A. Steffin
Year Established: 1979
Number of Employees: 50

EEC SYSTEMS
Suite C
[illegible] Boston Post Road
Sudbury, MA 01776
(617) 443-6376
Target Applications: WP
Year Established: 1980
Number of Employees: 10

EFAX CORP.
444 N. York Road
Elm Herst, IL 60126
(312) 279-9292
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Wholesale Distribution; General Accounting; Inventory Management, Insurance
Target Applications: Stock Location; Inventory Control; Claims Processing; Premium Accounting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Howard Lamon
Head of Software: Stephen Wipff
Year Established: 1976
Number of Employees: 15

EFFICIENT COMPUTING CO.
877 S. Adams
Birmingham, MI 48011
(313) 647-1820
Major Markets: Systems House (Commercial OEM)
Target Industries: Medical
Target Applications: Order Entry
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1972
Number of Employees: 12

E. F. HASKELL & [illegible], INC.
Suite 4121
1528 E. Missouri
Phoenix, AZ 85014
[illegible] 277-2531
Target Industries: Legal; Accountants
Year Established: 1978

EFT COMPUTER SYSTEMS, INC.
One Parmley Place
Summit, NJ 07901
(212) 947-7771
Target Industries: Banking
Target Applications: EFT
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1977
Number of Employees: 15

EK-RIB ENTERPRISES, INC.
[illegible] Summit St.
New Britain, CT [illegible]

Vendors

(203) 224-1240
Target Industries: Medical; Distribution
Target Applications: General Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1976
Number of Employees: 10

ELBIT USA, INC.
1350 Ave. of The Americas
New York, NY 10019
(212) 687-1510
Major Markets: Component Manufacturing, OEM (Computer Systems), OEM (Peripherals/ Terminals)
Target Industries: IBM Users; Military
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1973
Number of Employees: 5

ELCOMP SYSTEMS, INC.
1101 Forbes Ave.
Pittsburgh, PA 15219
(412) 562-9477
Major Markets: Systems House (Commercial OEM)
Target Industries: Medical
Target Applications: Insurance; Billing, Scheduling, Accounting
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 10

ELECTRONIC DATA SYSTEMS CORP.
7171 Forest Lane
Dallas, TX 75230
(214) 661-6000
Major Markets: OEM (Computer Systems); Data Services (Service Bureau), Dealer/Distributor;
Target Industries: Banking/Credit Unions, Health Care; Insurance;
Target Applications: Facility Management; Manufacturing; Accounting; Medical
Net Sales: More than $100 Million (1981)
Year Established: 1962
Number of Employees: 12,500

ELECTRONIC INFORMATION SYSTEM
P O Box 5893
Atlanta, GA 30304
(404) 353-2858
Year Established: 1977
Number of Employees: 3

ELECTRONIC LAB INDUSTRIES
100 W 22nd St.
P.O. Box 7167
Baltimore, MD 21218
(301) 366-8120
Target Industries: Software; Retailers
Year Established: 1982
Number of Employees: 2

ELECTRONIC PROCESSORS, LTD.
1225 5th Ave. N.
Birmingham, AL 35203
(205) 322-3459
Major Markets: Maintenance/Other Services
Target Industries: Credit Unions
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1977
Number of Employees: 40

ELITE SOFTWARE DEVELOPMENT, INC.
Suite 121
421 Highway No. 30
College Station, TX 77840
(409) 696-3328
Target Industries: Mechanical engineering; Construction, Architectural engineering, Electrical contractors
Target Applications: Design
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980
Number of Employees: 5

ELKE CORP.
998 Zane Ave. N.
Golden Valley, MN 55422
(612) 546-1779
Major Markets: Data Services (Service Bureau)
Target Industries: Manufacturing; Construction; Energy; Transportation
Target Applications: Equipment Maintenance
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Douglas Whaley
Year Established: 1977
Number of Employees: 10

ELLIS COMPUTING
3917 Noriega St.
San Francisco, CA 94122
(415) 753-0186
Target Applications: Languages
Year Established: 1977
Number of Employees: 1

ELSEVIER SCIENCE PUBLISHING
52 Vanderbilt
New York, NY 10017
(212) 867-9040
Major Markets: Maintenance/Other Services
Target Industries: Scientific; Educational
Contacts:
Head of Marketing: Michael Schnabel
Net Sales: $20 Million — $30 Million (1982)
Number of Employees: 150

THE EMBASSY INSTITUTE
901 Washington St.
Wilmington, DE 19801
(302) 654-6688
Target Industries: Accountants; Legal, Finance, Government
Target Applications: Tax Planning; Loan Amortization; Statistical Analysis
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1973
Number of Employees: 20

EMDA, INC.
133 N. Sangabriel Blvd.
Pasadena, CA 91107
(213) 795-5991
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau); Dealer/Distributor
Target Industries: Broadcast; Cable-TV, Car Rental
Year Established: 1977
Number of Employees: 5

EMPIRE 914, INC.
409 Ratzer Road
Wayne, NJ 07470
(201) 694-8200
Major Markets: Systems House (Commercial OEM)
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1970
Number of Employees: 7

EMPIRICAL RESEARCH GROUP
28206 144th Ave. S.E.
Kent, WA 98031
(206) 631-4855
Major Markets: Computer Manufacturing, OEM (Computer Systems)
Target Industries: Industrial; Education; OEM
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1974
Number of Employees: 11

EMPLOYEE COMMUNICATION SERVICES
757 Third Ave.
New York, NY 10017
(212) 758-6966
Target Industries: Banking
Year Established: 1972
Number of Employees: 20

ENERGY DATA SYSTEMS
1275 Drummer Lane
Wayne, PA 19087
(215) 964-1170
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Travel; Nuclear power; Manufacturing
Target Applications: Monitoring devices, Accounting
Year Established: 1978
Number of Employees: 25

ENERGY MANAGEMENT ASSOCIATES, INC.
Suite 200
100 Northcreek
Atlanta, GA 30327
(404) 261-5256
Major Markets: Maintenance/Other Services
Target Industries: Utilities
Year Established: 1975
Number of Employees: 15

ENERTEC, INC.
19 Jenkins Ave.
Lansdale, PA 19446
(215) 362-0984
Major Markets: Systems House (Commercial OEM)
Target Industries: Software Companies
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Gary Brownell
Head of Engineering: Chuck Landers
Year Established: 1977
Number of Employees: 15

ENGINEERED DESIGN CONCEPTS, INC.
160 Old Derby St.
Hingham, MA 02043
(617) 749-1794
Year Established: 1978
Number of Employees: 25

ENGINEERING ANALYSIS CORP.
25200 Narbonne Ave.
Lomita, CA 90717
(213) 530-3273
Target Industries: Engineering
Target Applications: Structural Analysis.
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1968
Number of Employees: 5

ENGINEERING MECHANICS RESEARCH CORP.
1707 West Beaver St.
Troy, MI 48084
(313) 643-6222

ENGINEERING — SCIENCE
Omicron Software Division
Suite 200
57 Executive Park
Atlanta, GA 30329
(404) 325-0770

ENGINEERING SYSTEMS CORP.
Suite 100
8551 Sherwin
Baton Rouge, LA 70808
(504) 769-2226
Major Market: Systems House (Commercial OEM)
Target Industries: Engineering; Architecture; Construction
Target Applications: Drafting; CAD
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 9

ENSIGN SOFTWARE
7337 Northview
Boise, ID 83704
(208) 376-4080
Target Industries: Small Business
Target Applications: Data Base
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1979
Number of Employees: 4

ENTECH ENGINEERING, INC.
800 Edenwood Road
P.O. Box 30258
Knoxville, TN 37930
(615) 691-3333
Major Markets: Data Services (Service Bureau); Dealer/Distributor
Target Industries: Engineering; Credit unions
Target Applications: Structural skills
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Randal Gilmer
Head of Engineering: Justin Brown
Year Established: 1971
Number of Employees: 24

ENTERPRISE TECHNOLOGY CORP.
305 Madison Ave.
New York, NY 10165
(212) 972-1660
Target Applications: DBMS
Year Established: 1978
Number of Employees: 10

ENVIRONMENTAL SYSTEM RESEARCH INS. (ESRI)
380 New York St.
Redlands, CA 92373
(714) 793-2853
Major Market: OEM (Peripherals-Terminals); Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Government; Forestry; Land Use Planning; Environmental Assessment
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Software: Scott Morehouse
Year Established: 1969
Number of Employees: 80

EPIC COMPUTER PRODUCTS, INC.
18381 Bandilier Circle
Fountain Valley, CA 92708
(714) 964-4722
Major Markets: Computer and Terminal Manufacturing
Target Industries: Manufacturing; Distribution
Net Sales: $5 Million — $25 Million (1982)
Year Established: 1981
Number of Employees: 20

EPICOR, INC.
3847 Fairmount Ave.
San Diego, CA 92105
(714) 283-6211
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Accountants; Wholesale, Contractors
Target Applications: Accounting; DBMS
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Donna Tebi
Head of Software: Randall Hunken
Head of Engineering: Richard Walters
Year Established: 1978
Number of Employees: 3

EQUINE MANAGEMENT SYSTEMS
21363 Lassen St.
Unit 110
Chatsworth, CA 91311
(213) 700-1124
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Agriculture
Target Applications: Farm management, Syndicate management; Breeding/Product reporting, Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 15

ERISCO, INC.
1700 Broadway
New York, NY 10019
(212) 247-2444
Major Markets: Data Services (Service Bureau)
Target Industries: Medical; Insurance, Banking
Target Applications: Claims Processing, Employee Benefits; Pension Records; Profit Sharing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Wayne Farrentino
Head of Software: Robert Pero
Year Established: 1968
Number of Employees: 100

ERNST & WHINNEY
National Office
2000 National City Center
Cleveland, OH 44114
(216) 861-5000
Major Markets: Maintenance/Other Services
Target Industries: Banking; Health Care; Manufacturing, Government
Contacts:
Head of Sales: J. Stephen Shattuck
Head of Software: G. Tim Orwick
Year Established: 1903
Number of Employees: 20,000

ESCA CORP.
13010 Northup Way
Bellevue, WA 98005
(206) 885-5077
Contacts:
Head of Sales: Morris Peterson
Head of Software: Edward Krzyzanowski

ESCCOMATE
5084 S. 107th St.
Omaha, NE 68127
(402) 331-8250
Major Markets: Maintenance/Other Services
Target Industries: Contractors
Target Applications: Piping Estimating; Accounting; Payroll
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1967
Number of Employees: 20

ESI
P.O. Box 5617
Tallahassee, FL 32301
(904) 224-5182
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Pat Fitzgerald
Year Established: 1977
Number of Employees: 50

ESP COMPUTER RESOURCES, INC.
Micro Department
1 Ash St.
Hollis, NH 03049
(603) 465-7264
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Applications: Data Manager System
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980
Number of Employees: 16

ESSERTIER SOFTWARE CORP.
919 14th St.
Hermosa Beach, CA 90254
(213) 379-1570
Year Established: 1979
Number of Employees: 4

ETHERTY COMPUTER CO., INC.
Suite 233
17872 Gardanar St.
Puente Hills Business Center
Industry, CA 91748
(213) 912-1534
Major Markets: Systems House (Commercial OEM)
Year Established: 1980
Number of Employees: 6

EYR STAR SYSTEMS
1316 N. Avalon Blvd.
Wilmington, CA 91744
(213) 835-2421
Major Markets: Computer Manufacturing, Systems House (Commercial OEM); Maintenance/Other Services
Year Established: 1971
Number of Employees: 25

EUROPRO, INC.
129 Saratoga St.
Petaluma, CA 94952
(707) 763-9700
Year Established: 1983

EVALUATION AND PLANNING SYSTEMS
1 Industrial Drive
Windham, NH 03087
(603) 898-1500
Major Markets: Maintenance/Other Services
Target Applications: Financial Planning; Forecasting and Analysis; Budgeting and Cash
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: Robert Peak
Year Established: 1973
Number of Employees: 200

EVANS GRIFFITHS AND HART, INC.
M Weiner III
Lexington, MA 02173
(617) 861-0670
Major Markets: Maintenance/Other Services
Target Applications: Data Entry; DBMS
Year Established: 1970
Number of Employees: 15

EVANS MORTON, INC.
Suite D5
7500 E. Pacific Road
Scottsdale, AZ 85250
(602) 998-2777
Target Industries: Education
Target Applications: Curriculum Administration management
Contacts:
Head of Software: Art Mascotes
Year Established: 1972
Number of Employees: 10

EVANSVILLE DATA PROCESSING
1919 S. Weinbach Ave.
Evansville, IN 47714
(812) 479-6951
Major Market: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Retail; Accounting
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1968
Number of Employees: 15

EVERGREEN CONSULTING, INC.
Suite 520
3407 West Sixth St.
Los Angeles, CA 90020
(213) 662-3337
Major Market: Maintenance/Other Services
Target Applications: IBM Comm Software
Net Sales: $500,000 - $1 Million (1981)
Year Established: 1978
Number of Employees: 6

EXCALIBUR COMPUTER SYSTEMS
1777 S. Harrison
Denver, CO 80210
(303) 758-5878
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Oil & gas
Target Applications: Land systems; Property, Accounting
Year Established: 1979
Number of Employees: 14

EXCALIBUR DATA SYSTEMS, INC.
Robert Shaw
Brooklyn, NY 11242
(212) 237-9317
Major Market: Systems House (Commercial OEM)
Target Industries: Manufacturing; Wholesale; Distribution
Contacts:
Head of Software: A. J. Grandezza
Year Established: 1974
Number of Employees: 3

EXECUCOM SYSTEM CORP.
3410 Far W. Blvd.
P.O. Box 9758
Austin, TX 78731
(512) 346-4361
Target Applications: Financial Planning
Year Established: 1976
Number of Employees: 250

EXECU-FLOW SYSTEMS, INC.
613 Morris Ave.
Elizabeth, NJ 07201
(201) 851-0750
Major Markets: Systems House (Commercial OEM)
Target Industries: Medical; Employment agencies
Target Applications: Billing; Patient Processing; Accounting
Contacts:
Head of Software: Ken Erb
Year Established: 1979
Number of Employees: 8

EXECURATIO, INC.
40 Collins Road
Weban, MA 02166
(617) 527-3900
Target Industries: Retail
Target Applications: Retail Inventory Control
Year Established: 1981
Number of Employees: 63

EXECUTEC CORP.
12200 Park Central Drive
Dallas, TX 75251
(214) 248-4200
Target Industries: Business; Banking
Target Applications: DP
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Software: T. R. Ramsey

Vendors

Head of Engineering: Larry Moyer
Year Established: 1981
Number of Employees: 21

EXECUTIVE DATA SYSTEMS, INC.
Suite 116
290 Interstate N.
Atlanta, GA 30339
(404) 955-3374
Target Industries: CPA; Construction, Real Estate
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Nancy Hooper
Head of Software: Laura Spann
Year Established: 1981

EXECUTIVE OFFICE SYSTEMS
323 N. Mountain Trail
Sierra Madre, CA 91024
(213) 355-5149
Major Markets: Systems House (Commercial OEM); Dealer/Distributer
Target Industries: Distributors; Utilities, Engineering
Target Applications: Water Billing; Job Costing
Year Established: 1980
Number of Employees: 2

EXECUTIVE TECHNOLOGY DATA SYSTEMS (ETDS)
Suite 120
28104 Orchard Lake Road
Farmington Hills, MI 48018
(313) 626-0770
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Accountants; Legal
Target Applications: General Ledger, Forecasting; Client Accounting, Practice Management
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: James K. Greiner
Head of Software/Engineering: James L. Ham
Year Established: 1973
Number of Employees: 10

Additional information provided for by vendor

ETDS has additional sales and support locations in Dallas — (214) 380-1660; Reading, Penn. — (215) 374-0770; Trumbull, Conn. — (203) 377-8557; and Madison, Wisc. — (608) 238-0561. We specialize in CPAware accounting systems for accounting firms and commercial businesses. We are an IBM var for the System/36 and System/23 Datamaster.

EXECUWARE
Suite 340
4530 Park Road
Charlotte, NC 28209
(704) 525-4551
Target Industries: Real estate; Banking; Accounting
Year Established: 1981
Number of Employees: 10

FALCOM SOFTWARE SYSTEMS
Suite 200
2301 Moulton Pkwy.
Laguna Hills, CA 92653
(714) 859-1604
Target Industries: Banking; Business
Target Applications: Financial, Business
Year Established: 1977
Number of Employees: 9

FALK ASSOCIATES, INC.
5 Powderhouse Lane
P.O. Box 182
Sherborn, MA 01770
(617) 653-2744
Major Market: Systems House (Commercial OEM)
Target Industries: Direct Mail; Banking; Insurance; Retail
Target Applications: Accounting, Loan Management; Customer Service, Inventory Management
Net Sales: $100,000 - $500,000 (1981)
Year Established: 1969
Number of Employees: 5

FALLON & ASSOCIATES, INC.
P.O. Box 1850
Upland, CA 91786
(714) 985-5088
Major Market: Data Services (Service Bureau); Maintenance/Other Services
Year Established: 1969
Number of Employees: 3

FARALLON CONSULTING, INC.
1594 Laurel St.
San Carlos, CA 94070
(415) 595-3530
Target Industries: Grocery; Restaurant; Distribution
Target Applications: Financial; Inventory; Order entry
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1981
Number of Employees: 3

FARLIN CORP.
3277 E. Grant Road
Tucson, AZ 85716
(602) 881-5876
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Nicholas Young
Head of Engineering: Paul J. Musser Jr.
Year Established: 1978
Number of Employees: 9

FARR BUSINESS SERVICES, INC.
P.O. Box 201
Aledo, IL 61231
(309) 582-5626
Target Industries: Agriculture
Target Applications: Accounting; Inventory
Year Established: 1979
Number of Employees: 9

FARMPLAN COMPUTER SYSTEMS, INC.
1055 Sunnyvale — Saratoga Road No. 1
Sunnyvale, CA 94087
(408) 746-0636
Major Markets: Computer Manufacturing; Systems House (Commercial OEM)
Target Applications: Agricultural
Year Established: 1980
Number of Employees: 10

THE FASEE GROUP
92 Main St.
Suite 108
Nashua, NH 03060
(603) 883-3212
Target Industries: General Business
Contacts:
Head of Sales: Alan Finkelstein
Year Established: 1979
Number of Employees: 24

F. D. CONSULTING, INC.
2040 Victory Blvd.
Staten Island, NY 10314
(212) 494-2600
Major Markets: OEM (Computer Systems); OEM (Peripherals/Terminals); Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Banking; Brokerage houses
Target Applications: Accounting
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1977
Number of Employees: 45

FEITH SYSTEMS & SOFTWARE, INC.
Suite E133
1 Bala Plaza
Bala Cynwyd, PA 19004
(215) 667-5575
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Manufacturing; Wholesale; Retail; Retail Management
Target Applications: Accounting; Inventory control; WP
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 4

FERNWEAR CORP.
Suite 104
11111 Richmond Ave.
Houston, TX 77082
(713) 266-5412
Target Industries: Manufacturing
Year Established: 1982

FERRIS MICROSYSTEMS, INC.
Suite 611
1701 N. Ft. Meyer Drive
Arlington, VA 22209
(703) 841-0800
Target Applications: Financial Planning; Graphics; Data Communication
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Richard Hykes
Head of Software: David Galland
Year Established: 1979
Number of Employees: 25

FIDDE SYSTEMS MANAGEMENT GROUP, INC.
420 Sherwin Road
Willoughby, OH 44094
(216) 946-9000
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Distribution; Manufacturing
Target Applications: Process Control; Inventory; Accounting
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software: John Paganinni
Year Established: 1969
Number of Employees: 90

FINANCIAL DATA PLANNING CORP.
2675 S. Bay Shore Drive
Miami, FL 33133
(305) 858-8200
Major Markets: Systems House (Commercial OEM)
Target Industries: Insurance
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1968
Number of Employees: 80

FINANCIAL DECISION SYSTEMS, INC.
28035 Dorothy Drive
Agoura, CA 91301
Major Markets: Data Services (Service Bureau)
Target Industries: Multi-state Corporations; Fortune 1000
Target Applications: Corporate tax; Finance
Contacts:
Head of Sales: William George
Head of Software/Engineering: Eric Marcus
Year Established: 1975
Number of Employees: 25

FINANCIAL FORECAST, INC.
P.O. Box 372
Mount Prospect, IL 60056
(312) 577-7037
Target Industries: Financial; Insurance
Year Established: 1975

FINANCIAL SOFTWARE OF AMERICA, INC.
P.O. Box 2084
Winter Park, FL 32790
(305) 645-3724
Target Industries: Banking
Year Established: 1978
Number of Employees: 20

FINANCIAL SOFTWARE, INC.
Suite 210
2200 Northlake Pkwy.
Tucker, GA 30084
(800) 241-8291
Target Industries: Accounting; Legal, Banking
Target Applications: WP; Financial; Time and Billing; Loan Processing
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Mark Tuell
Head of Software: Andy Young
Year Established: 1977
Number of Employees: 40

FINANCIAL SYSTEMS, INC.
P.O. Box 2012
Kearney, NE 68847
(308) 237-5995
Major Markets: Systems House

(Commercial OEM);
Dealer/Distributor;
Maintenance/Other Services
Target Industries: Banking; Agriculture; Financial
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1975
Number of Employees: 25

FINANCIAL TECHNOLOGY, INC.
Suite 805
812 N. Michigan Ave.
Chicago, IL 60611
(312) 280-0600
Target Industries: Finance
Target Applications: General Ledger; Financial Planning; Commercial Loan; Fixed Assets
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software/Engineering: Paul Kozierz
Year Established: 1969
Number of Employees: 20

FINGRAPH CORP.
960 Clock Tower Drive
Springfield, IL 62704
(217) 793-0884
Year Established: 1982
Number of Employees: 30

FINPAC CORP.
Forrest and Windsor Ave.
Narberth, PA 19072
(215) 667-8100
(Service Bureau)
Target Industries: Manufacturing; Oil
Target Applications: Business Accounting
Year Established: 1969
Number of Employees: 30

FINSERV COMPUTER CORP.
Schenectady, NY 12305
(518) 374-4430
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Lumber
Target Applications: Data entry; Inventory control
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software/Engineering: Al Gorski
Year Established: 1970
Number of Employees: 180

FIRESIDE COMPUTING, INC.
5843 Montgomery Road
Elkridge, MD 21227
(301) 796-4165
Year Established: 1979
Number of Employees: 3

FIRESIGN COMPUTER CO.
524 Union St.
San Francisco, CA 94133
Target Applications: Data Communications
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975
Number of Employees: 3

FIRST SYSTEMS CORP.
865 Manhattan Beach Blvd.
Manhattan Beach, CA 90266
(213) 546-5581
Target Industries: Manufacturing; Engineering
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1980
Number of Employees: 8

FISCHER MINIS SYSTEMS CORP.
4175 Merchantile Ave.
Naples, FL 33942
(813) 793-1500
Year Established: 1982
Number of Employees: 12

FISHER BUSINESS SYSTEMS, INC.
Suite 140
340 Interstate N.
Atlanta, GA 30339
(404) 953-1717
Major Markets: OEM (Computer Systems); Maintenance/Other
Target Industries: Retail; Restaurant, Distribution; Radio Broadcasting
Target Applications: POS
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Software: Jim Frier
Year Established: 1978

FITZ SYSTEMS, INC.
32 Broadway
New York, NY 10004
(212) 269-5540
Major Markets: Maintenance/Other
Target Industries: Financial; Insurance
Year Established: 1973
Number of Employees: 100

FLORIDA AUTOMATED
28 W. Beach Drive
Panama City, FL 32401
(904) 769-2131
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor
Target Industries: Aviation; Cable TV; Utilities
Target Applications: Flight School System, Billing, Remittance Processor; Accounting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Art Roth
Year Established: 1968

FLORIDA COMPUTER, INC.
99 N. W. 183rd St.
N. Miami, FL 33169
(305) 652-1710
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Utilities; Data Management; Data Communications
Target Applications: Accounting

FLORIDA DATA PROCESSING, INC.
151 Wymore Road
Altamonte Springs, FL 32201
(305) 869-7776
Major Markets: Systems House (Commercial OEM)
Target Industries: Construction; Manufacturing, General business; Medical
Target Applications: Accounting; Job costing; Inventory; BOM
Year Established: 1974
Number of Employees: 6

FOGLE COMPUTING CORP.
P.O. Box 5166
Spartanburg, SC 29304
(803) 574-3263
Major Markets: Systems House (Commercial OEM)
Target Industries: Banking; Marketing
Target Applications: Marketing;
Year Established: 1981
Number of Employees: 3

FOOD COMPUTER SYSTEMS, INC.
246 Scout Way
P.O. Box 109
DePere, WI 54115
(414) 337-2027
Major Markets: OEM (Computer Systems), OEM (Peopherals/ Terminals), Systems House (Commercial OEM)
Target Industries: Distribution
Target Applications: Order Entry; Inventory Control; General Accounting; Sales Analysis
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Kenneth R.
Number of Employees: 14

FOOTHILL ASSOCIATES
1730 N. Euclid
Upland, CA 91786
(714) 982-0666
Major Markets: Data Services (Service Bureau)
Target Industries: Manufacturing;
Bidding system, Cost estimates
Net Sales: $500,000 — $1 Million
Year Established: 1979
Number of Employees: 10

FORESIGHT, INC.
2741 N. 29 Ave.
Hollywood, FL 33020
Major Market: Systems House (Commercial OEM)
Target Industries: Manufacturing; Distribution; Medical
Accounting, Medical Management; Reservations
Year Established: 1976
Number of Employees: 30

FORMATION, INC.
Mt. Laurel, NJ 08054
(609) 234-5020
Major Markets: Computer Manufacturing; OEM (Computer Systems); OEM (Peripherals/ Terminals)
Target Industries: Manufacturing; OEM
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Engineering: Barry I. Kessler
Year Established: 1970
Number of Employees: 280

FORMS MANAGEMENT, INC.
Division of PerTrol International
Dallas, TX 75220
(214) 357-8161
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor
Target Applications: Paperwork control
Contacts:
Head of Software: John Hurd
Year Established: 1965
Number of Employees: 13

FORMULA CONSULTANTS, INC.
P.O. Box 544
Anaheim, CA 92805
(714) 778-1738
Contacts:
Head of Software: Tony J. Sapienza
Head of Engineering: Fritz Lorenz
Year Established: 1978
Number of Employees: 22

FORTEX SYSTEMS CORP.
1935 New York Ave.
P.O. Box 487
Huntington Station, NY 11746
(516) 549-4713
Major Markets: OEM (Computer Systems), OEM (Peripherals/ Terminals), Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Medical Supplies;
Target Applications: Data Entry; DP
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Claudio R. Ballard
Year Established: 1979
Number of Employees: 7

FORTH, INC.
2309 Pacific Coast Highway
Hermosa Beach, CA 90254
(213) 372-8493
Target Industries: Manufacturing; Engineering, Military
Target Applications: Process Control, Robotics, Instrumentation; Data Bases
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1977
Number of Employees: 30

FOUNDATION COMPUTER SYSTEMS
Suite 330
975 Walnut St.
Cary, NC 27511
(919) 467-7885
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales/Engineering: Tyler Bennett
Year Established: 1980
Number of Employees: 10

Vendors

FOX AND GELLER, INC.
P.O Box 1053
Teaneck, NJ 07666
(201) 837-0142
Target Industries: General Business
Target Applications: Applications Generator; Graphics
Year Established: 1980
Number of Employees: 20

FOY, INC.
100 McKinney St
Farmersville, TX 75031
(214) 672-7282
Target Industries: Manufacturing
Year Established: 1977
Number of Employees: 2

FRANKEL ENGINEERING LABORTORIES, INC.
P O Box 501
Reading, PA 19603
(215) 373-5205
Major Markets: OEM (Computer Systems); OEM (Peripherals/ Terminals)
Target Industries: Manufacturing; Apparel; Airlines; Credit Unions
Year Established: 1959

FRANKLEN COMPUTER SYSTEMS
715 Freemont
S. Pasadena, CA 91030
(213) 441-3123
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: CPA; Legal; Ambulance Service; Architects
Target Applications: Client Accounting; Property Management; General Accounting
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1974
Number of Employees: 20

FREY ASSOCIATES, INC.
Chestnut Hill Road
Amherst, NH 03031
(603) 627-1123
Major Markets: OEM (Computer Systems); OEM (Peripherals/ Terminals); Systems House (Commercial OEM)
Target Industries: Banking; Financial; Computer and Peripheral manufacturing
Target Applications: Data base; Computer security; A/R factoring; CAD/CAM
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software: S. Newcombe
Head of Engineering: H. Morse
Year Established: 1974
Number of Employees: 48

FRIENDS SOFTWARE CORP.
2000 Alcatraz Ct.
P O. Box 527
Berkeley, CA 54704
(415) 540-7282
Target Applications: Report writer; Statistics
Year Established: 1980
Number of Employees: 6

FRISON COMPUTER SYSTEMS, INC.
1707 Cope Ave. E.
St. Paul, MN 55109
(612) 770-5600
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Distribution
Target Applications: Manufacturing; Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 5

FRY COMPUTER CONSULTANTS, INC.
P.O Box 1847
Tustin, CA 92681
(714) 730-7707
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing, Distribution
Year Established: 1981
Number of Employees: 5

FUSION PRODUCTS INTERNATIONAL
900 Larkspur L.C. 105
Larkspur, CA 94939
(415) 381-1340
Target Applications: IBM users; DBMS
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1980
Number of Employees: 10

FUTURE SOFTWARE, INC.
P.O. Box 5581
Fort Worth, TX 76108
(817) 732-1687
Year Established: 1979
Number of Employees: 6

FYI, INC.
4202 Spicewood Springs Road
No. 204
P.O. Box 26481
Austin, TX 78755
(800) 531-5033
Major Markets: Systems House (Commercial OEM)
Target Applications: Data Retrieval
Contacts:
Head of Sales/Marketing: Russ Levinton
Head of Software/Engineering: Bill Brogden
Year Established: 1979
Number of Employees: 6

GALFO SYSTEMS
6252 Camino Verde Drive
San Jose, CA 95119
(408) 226-2377

GAMMA TECHNOLOGY, INC.
2452 Embarcadero Way
Palo Alto, CA 94303
(415) 856-7421
Target Applications: Data Communication
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1974
Number of Employees: 4

GARFIELD GROSSI & PUSTARFI, INC.
1101 Chestnut St.
Roselle, NJ 07203
(201) 925-5856
Target Applications: Accounting; Inventory
Year Established: 1978
Number of Employees: 6

GARY BERGMAN ASSOCIATES, INC.
14 Hickory Lane
N Brunswick, NJ 08902
(201) 247-2727
Target Applications: CICS
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1974
Number of Employees: 12

GARY BROWN ASSOCIATES, INC.
Suite 2
2226 Edwardia Drive
Greensboro, NC 27409
(919) 852-0550
Major Markets: Data Services (Service Bureau); Dealer/Distributor
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software/Engineering: John D. Barnes
Year Established: 1973
Number of Employees: 30

GARY HEATHERLY & ASSOCIATES
2001 Acoma Blvd.
Lake Havasu City, AZ 86403
(602) 855-9198

GAYLORD BROS., INC.
P.O. Box 4901
Syracuse, NY 13221
(315) 457-5070
Major Markets: Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Library; Education
Contacts:
Head of Engineering: Jim Dokoupil
Number of Employees: 300

G. B. ASSOCIATES
P.O. Box 3322
Granada Hills, CA 91344
Major Markets: Maintenance/Other Services
Target Industries: Engineering; Education; Small business
Target Applications: WP; DBMS
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1979
Number of Employees: 3

GBM DATA SYSTEMS
2030 Coolidge St.
Hollywood, FL 33020
(305) 925-0000
Major Markets: OEM (Computer Systems); Manufacturing; Hardware
Target Industries: Photo-finishing; Retail
Target Applications: Billing; Pricing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Engineering: M. Rochman
Year Established: 1967
Number of Employees: 25

GCN/HYDRONET SERVICES
Suite 12E
1036 W. Robinhood
Stockton, CA 95207
(209) 948-8222
Target Industries: Engineering
Target Applications: Paging Network
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1972
Number of Employees: 2

GERGERY SOFTWARE WORKS
P.O. Box 8028
Des Moines, IA 50301
(515) 262-6317
Major Markets: Maintenance/Other Services
Target Industries: Medical; Insurance; Small business
Year Established: 1980
Number of Employees: 3

GEJAC, INC.
P.O. Box 188
Riverdale, MD 20737
(301) 864-3700
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 10

GEM DATA PROCESSING CO.
Suite 2xx
Delmar, DE 19940
(302) 846-9553
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Applications: Financial; Job costing; Reservations; Personal Management
Year Established: 1978
Number of Employees: 7

GERASYS CORP.
11820 Parklawn Drive
Rockville, MD 20852
(301) 770-4800
Target Industries: Government
Target Applications: Accounting; Facilities management
Year Established: 1968
Number of Employees: 150

GENERAL AUTOMATION
1055 Southeast St.
P.O. Box 4883
Anaheim, CA 92803
(714) 778-4900
Major Markets: Computer Manufacturing; Dealer/Distributor; Maintenance/Other Services
Target Industries: OEM; Systems Houses, Banking
Target Applications: Industrial; Automobile
Net Sales: Over $100 Million (1981)
Year Established: 1967
Number of Employees: 1,700

GENERAL BUSINESS COMPUTERS
Suite 400
4321 Rose Road
Bethesda, MD 20816
(301) 654-1330
Target Industries: Retail; Wholesale
Contacts:
Head of Software: Pat Parks
Year Established: 1978
Number of Employees: 15

GENERAL COMPUTER CORP.
2045 Midway Drive
Twinsburg, OH 44087
(216) 425-3241
Major Markets: Systems House (Commercial OEM)
Target Industries: Medical; Retail
Target Applications: Retail Pharmacy; Dietary Radiology
Contacts:
Head of Engineering: Robert Phillips

Year Established: 1970
Number of Employees: 95

GENERAL COMPUTER SERVICES CORP.
371 Garver Road
Monroe, OH 45050
(513) 539-9217
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1968
Number of Employees: 15

GENERAL DATA SYSTEMS, LTD.
Marketing Division
1520 Locust St.
Philadelphia, PA 19102
(215) 985-1780
Target Industries: Insurance
Year Established: 1970
Number of Employees: 102

GENERAL DIGITAL INDUSTRIES, INC.
7703 Governors Drive
Huntsville, AL 35805
(205) 837-5305
Major Markets: Component, Computer and Terminal Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Manufacturing; System House; Software Development Firms, OEM
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software/Engineering: John D. Reynolds
Year Established: 1978
Number of Employees: 40

GENERAL ELECTRIC CO.
Manufacturing Computer Services Division
1 River Road
Building 6-133
Schenectady, NY 12345
(518) 385-9100
Net Sales: $1 Million — $20 Million (1981)
Contacts:
Head of Software/Engineering: J. Pennington
Year Established: 1967
Number of Employees: 50

GENERAL ELECTRIC CAE INTERNATIONAL, INC.
300 TechneCenter Drive
Milford, OH 45150
(513) 576-3821
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Automotive Manufacturing; Aerospace; Transportation
Target Applications: Engineering Analysis
Year Established: 1982
Number of Employees: 100

GENERAL ELECTRIC INFORMATION SERVICES CO.
401 N. Washington St.
Rockville, MD 20850
(301) 340-4000
Major Markets: Data Services (Service Bureau)
Year Established: 1964
Number of Employees: 5,000

GENERAL RESEARCH CORP.
The Software Workshop Division
P.O. Box 6770
Santa Barbara, CA 93111
(805) 964-7724
Target Industries: Government; Scientific
Target Applications: Software Tools
Net Sales: $25 Million — $100 Million (1981)
Year Established: 1975
Number of Employees: 160

GENERATION SYSTEMS, INC.
209 N. Main
Wheaton, IL 60187
(312) 665-0506
Target Applications: Accounting
Year Established: 1971
Number of Employees: 10

GENERATION SCIENCES, INC.
10 E. 40th St.
New York, NY 10016
(212) 532-8555
Major Markets: Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Bruce W. Tarr
Year Established: 1973
Number of Employees: 50

GENERIC SYSTEMS, INC.
2123 Mango Place
Jacksonville, FL 32207
(904) 396-7250
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Manufacturing; Construction; Lodging; Legal
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Jim Palmer
Year Established: 1972
Number of Employees: 7

GENESEE COMPUTER CENTER, INC.
20 University Ave.
Rochester, NY 14605
(716) 232-7052
Major Markets: Data Services (Service Bureau); Dealer/Distributor
Target Industries: R&D; Engineering, Management Services
Target Applications: Optics
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Engineering: Gary Gleason
Year Established: 1980
Number of Employees: 12

GENESIS COMPUTER SYSTEMS, INC.
676 3rd Ave.
Chula Vista, CA 92010
(619) 474-8241
Major Markets: Systems House (Commercial OEM)
Target Industries: Nonprofit; Churches, Education
Target Applications: Fund accounting
Year Established: 1981
Number of Employees: 9

GENESYS SOFTWARE SYSTEMS, INC.
10 Gresham St.
Lawrence, MA 01843
(617) 685-5400
Contacts:
Head of Software: Arthur Wilmer
Year Established: 1981
Number of Employees: 40

GENTRY, INC.
430 40th St.
Oakland, CA 94609
(415) 547-6134
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Business
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Engineering: Richard Gentry
Year Established: 1973
Number of Employees: 15

GERSLINGER ASSOCIATES, INC.
Suite 420
Ten Northfield Plaza
Troy, MI 48098
(313) 879-7070
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau), Dealer/Distributor
Target Industries: Manufacturing; Distribution, Automotive Suppliers
Target Applications: Accounting; Data Entry; MRP
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: John Kasko
Year Established: 1971

GEOGRAPHIC SYSTEMS, INC.
130 Main St.
Reading, MA 01867
(617) 942-0051
Target Industries: Insurance; Banking, Retail
Target Applications: Graphics; Mapping
Year Established: 1980
Number of Employees: 20

GEOGRAPHIX, INC.
[illegible]
(215) 925-6582
Major Markets: OEM (Peripherals/Terminals); Maintenance/Other Services
Target Applications: Graphics
Net Sales: [illegible]
(1982)
Year Established: 1980
Number of Employees: 2

GEORGE GOODE & ASSOCIATES, INC.
Suite 100
1 [illegible] Ave.
Dallas, TX 75[illegible]
(214) 690-0595
Major Markets: Computer Manufacturing; OEM (Computer Systems), OEM (Peripherals/Terminals); Dealer/Distributor
Target Industries: Communications; High technology
Target Applications: Interface equipment
Net Sales: $1 Million — $9 Million (1981)
Contacts:
Head of Software/Engineering: Doug Johnson
Year Established: 1976
Number of Employees: 32

GEORGE W. HALLAHAN & CO., INC.
1 [illegible] Park Rd.
Boston, MA 02135
(617) 782-6100
Major Market: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Distribution; Clubs
Target Applications: Communications
Year Established: 1979
Number of Employees: 12

G & G ENGINEERING
1922 Republic Ave
San Leandro, CA 94577
(415) 895-0798
Major Markets: Systems House (Commercial OEM)
Contacts:
Head of Sales: Michael Gifford
Year Established: 1980
Number of Employees: 25

GHARIS COMPUTER SYSTEMS
Suite W218
11325 Pegasus
Dallas, TX 75238
(214) 270-2609
Target Industries: Dental
Target Applications: Accounting; Patient history; Insurance; Billing
Year Established: 1980
Number of Employees: 3

GILBERT/COMMONWEALTH, INC.
P.O. Box [illegible]
Reading, PA 19603
(215) 775-2600
Major Markets: Maintenance/Other Services
Target Industries: Engineering
Target Applications: G-C Cue Package, Project Control System
Net Sales: More than $100 Million (1981)
Year Established: 1908
Number of Employees: 8,500

GILMORE RESEARCH, INC.
1470 N. Farnsworth Ave.
Aurora, IL 60505
(312) 898-4667
Target Industries: Manufacturing
Target Applications: General Manufacturing
Year Established: 1977
Number of Employees: 4

GLENN A. BARBER AND ASSOCIATES
Suite 2[illegible]
15[illegible] Ventura Blvd.
Sherman Oaks, CA 91403
(213) 6[illegible]
Major Markets: Maintenance/Other Services
Target Industries: [illegible]
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1980
Number of Employees: 25

GLOBAL HEALTH FOUNDATION
1300 Piccard Drive
Rockville, MD 20850
(301) 254-9[illegible]
Major Markets: Systems House (Commercial OEM)
Target Industries: Medical

Vendors

Target Applications: Medical Records, Order Communications; [illegible]
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: Michael Glickman
Head of Software/Engineering: Paul Rowny
Year Established: 1976
Number of Employees: 125

GLOBAL HEALTH SYSTEMS, INC.
1300 Piccard Drive
Rockville, MD 20850
(301) 258-9212
Major Markets: Systems House (Commercial OEM)
Target Industries: Medical
Target Applications: Medical Records, Financial, Patient Care
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1975
Number of Employees: 135

GMD SYSTEMS INTERNATIONAL, INC.
Suite 420
8601 Dunwoody Place
Atlanta, GA 30338
(404) 252-0482
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing
Target Applications: Mapics; IBM System/34 and System/38
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software/Engineering: John I. Diack
Year Established: 1981
Number of Employees: 80

GMP SYSTEMS, INC.
Suite M
1400 S. Village Way
Santa Ana, CA 92675
(714) 972-2000
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau); Dealer/Distributor
Target Industries: Manufacturing; Distribution
Target Applications: MRP; DRP; Financial
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Engineering: Dan Collus-Richards
Year Established: 1982
Number of Employees: 44

GNOSIS, INC.
1500 Chestnut St.
Philadelphia, PA 19104
(215) 387-1500
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing
Contacts:
Head of Sales: Max Liebow
Year Established: 1981
Number of Employees: 10

GOAL SYSTEMS INTERNATIONAL, INC.
5455 N. High St.
Columbus, OH 43214
(614) 888-1775
Major Markets: Maintenance/Other Services
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1975
Number of Employees: 55

GOLDATA COMPUTER SERVICES, INC.
2 Bryn Mawr Ave
Bryn Mawr, PA 19010
(215) 525-1036
Target Industries: Insurance
Target Applications: Accounting
Year Established: 1976
Number of Employees: 10

GOLDBERG ASSOC.
16034 Calvert St.
Reseda, CA 91335
(213) 207-1400
Target Applications: Sys Measurement Software; Gen Sys Software
Year Established: 1978

GOODE BUSINESS SYSTEMS, INC.
9434 N. 107th St.
Milwaukee, WI 53224
(414).355-6990
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Manufacturing; Distribution; Retail
Target Applications: Manufacturing; Accounting; Inventory; WP
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1973
Number of Employees: 70

GORDON BLACK ASSOCIATES, INC.
1551 Monroe Ave.
Rochester, NY 14618
(716) 275-9630
Major Markets: Maintenance/Other Services
Target Applications: Distribution; Financial, Professional
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1977
Number of Employees: 25

GORDON S. ROSEN ASSOCIATES
Airline Software, Inc.
Northside Plaza, Rt. 45
Pomona, NY 10970
(914) 354-1933
Major Markets: Maintenance/Other Services
Target Industries: Transportation; Airlines
Target Applications: Scheduling; Flight following; Inventory control; Accounting
Year Established: 1975
Number of Employees: 41

GOULD, INC.
SEL Computer Systems
6901 W. Sunrise Blvd.
Fort Lauderdale, FL 33313
(305) 587-2900
Major Markets: Computer Manufacturing; OEM (Peripherals/Terminals)
Target Industries: Aerospace; Military; Nuclear; Fossil Fuel
Target Applications: Flight Simulation; Energy Monitoring/Control; Lab Computation; Factory Automation
Contacts:
Head of Sales: Calvin Shoemaker
Head of Software: Robert Bergmam
Year Established: 1961
Number of Employees: 2,500

GRAFTEK, INC.
1777 Conestoga
Boulder, CO 80301
(303) 449-1138
Major Markets: Terminal Manufacturing; OEM (Computer Systems)
Target Industries: Plastics; Capital goods, Machinery; Numerical control
Target Applications: CAD/CAM; Graphics, Mechanical design
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Don Miller
Year Established: 1980
Number of Employees: 100

GRANADA SYSTEMS DESIGN, INC.
303 Fifth Ave.
New York, NY 10016
(212) 686-6945
Major Market: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Banking; Distribution, Textile
Target Applications: Billing; Banking package; Word processing; Voice [illegible]
Net Sales: $100,000 - $500,000 (1981)
Contacts:
Head of Software: Robert Acker
Year Established: 1979
Number of Employees: 8

GRAPHIC COMMUNICATIONS, INC.
200 Fifth Ave.
Waltham, MA 02254
(807) 895-8778
Target Industries: Graphics
Target Applications: Graphics
Contacts:
Head of Sales: David Wilcox
Head of Software: Doug Chamberlain
Year Established: 1981

GRAPHIC INFORMATION SYSTEMS TECH, INC.
Suite 24G
One Lincoln Plaza
New York, NY 10023
(212) 662-0263
Major Markets: OEM (Computer Systems); Maintenance/Other Services
Year Established: 1978
Number of Employees: 30

GREAT SWAMP SOFTWARE
7475 W. 5th Ave.
3rd Floor
Lakewood, CO 80226
(303) 238-5256
Major Markets: Systems House (Commercial OEM)
Year Established: 1980
Number of Employees: 8

GREAT PLAINS COMPUTER CO., INC.
Suite 309
545 Shoup
Idaho Falls, ID 83402
(208) 529-3210
Target Industries: Wholesale; Distribution
Year Established: 1977
Number of Employees: 12

GREG DINGER & ASSOCIATES
P.O. Box 3360
San Rafael, CA 94912
(415) 459-7513
Year Established: 1975
Number of Employees: 2

GROTON COMPUTER, INC.
[illegible]
Groton, CT 06340
(203) 445-2325
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Broadcasting
Target Applications: Accounting; Logging
Year Established: 1970
Number of Employees: 10

GROUNDSTAR SOFTWARE
Suite 200
2160 41St Ave.
Capitola, CA 95010
(408) 462-5250
Major Markets: Dealer/Distributor
Target Industries: Distribution
Target Applications: Accounting; Equipment management; Bill-of-material Processing
Year Established: 1980

GROUP OPERATIONS, INC.
Suite 500
1110 Vermont Ave. N.W.
Washington, DC 20016
(202) 887-5420
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Software: H. W. Morgan
Head of Engineering: N. Centracchio
Year Established: 1968
Number of Employees: 100

GRUMMAN DATA SYSTEMS
1111 Stewart Ave.
Bethpage, NY 11714
(516) 575-7668
Major Markets: Systems House (Commercial OEM)
Target Industries: Aerospace; Manufacturing; Engineering
Net Sales: More than $100 Million (1981)
Contacts:
Head of Sales: Lee Dubois
Head of Engineering: John Manning
Year Established: 1970
Number of Employees: 1,700

GRX SYSTEMS, INC.
1274 Geneva Drive
Sunnyvale, CA 94086
(408) 745-7720
Major Markets: Data Services (Service Bureau)
Target Industries: Manufacturing; Distribution
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Rob Dreig
Year Established: 1978
Number of Employees: 20

GRYPHONE SYSTEMS
P.O. Box 720
Cardiff, CA 92007
(619) 436-1455

G.S.S. COMPUTER SALES, INC.
6810 N.W. 16th St.
P.O. Box 9144
Fort Lauderdale, FL 33309
(305) 972-6210
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Automobile Dealers, Medical, Country Clubs
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Tom Sentar
Head of Software: Janis L. Kopp
Head of Engineering: Wayne Smith
Year Established: 1981
Number of Employees: 8

ST EVANS COMPUTER SYSTEMS, INC.
30100 Van Dyke
Warren, MI 48093
(313) 574-2220
Major Markets: Systems House (Commercial OEM)
Target Industries: Restaurants; Ad agencies
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1975
Number of Employees: 6

SYS COMPUTER SYSTEMS, INC.
3529 7th Ave. S.
Birmingham, AL 35222
(205) 252-9446
Major Market: Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Distribution; Retail, Manufacturing, Banking
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Software: Mark Kajdos
Year Established: 1980
Number of Employees: 28

GUILD, INC.
590 Danbury Road
Ridgefield, CT 06877
(203) 431-0411
Target Applications: Proto-typing
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1978
Number of Employees: 12

GULF EDUCATIONAL SYSTEMS, INC.
3444 Olympic Drive
Metairie, LA 70003
(504) 455-5500
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Accountants; Pharmacies, Telecommunications
Target Applications: General accounting
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1975
Number of Employees: 25

GULLEY COMPUTER ASSOCIATES
2300 E. 14
Tulsa, OK 74104
(918) 744-0100
Major Markets: Data Services (Service Bureau)
Target Industries: Engineering; Commercial
Year Established: 1970
Number of Employees: 6

GULL RESOURCE MANAGEMENT SYSTEM
Suite 203 S. Building
990 Washington St
Dedham, MA 02026
(617) 329-0600

GUNN ENTERPRISES, INC.
Suite 150
5615 Richmond
P.O. Box 27474
Houston, TX 77057
(713) 781-6911
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Professional
Target Applications: WP, Data Base
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1979
Number of Employees: 5

HABIT CONSULTING CO.
Litwin Road
P.O. Box 270A
Litchfield, CT 06759
(203) 567-5400

H & A COMPUTER SYSTEMS
Suite 204
30 Hotaling Place
San Francisco, CA 94111
(415) 434-3517
Major Markets: Dealer/Distributor
Target Applications: Application generation; System software
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software: Nick Nickerson
Year Established: 1978
Number of Employees: 22

HAMLIN, WILLIAMS, & ASSOCIATES, INC.
1894 Shelby Oaks Dr., N.
Memphis, TN 38134
(901) 388-6120
Target Industries: Banking; Medical; Television
Target Applications: Trust systems; Clinical; Advertising schedules
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1974
Number of Employees: 15

HANCOCK TECHTRONICS
33 W. Main St.
Hancock, MD 21750
(301) 678-6000
Major Markets: OEM (Peripherals/Terminals); Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Country clubs; Golf
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 8

HANCOCK DATA PROCESSING, INC.
P.O. Box 236
Wilbraham, MA 01095
(413) 732-9613
Target Industries: Construction; Moving, storage; Manufacturing
Target Applications: MRP
Year Established: 1970
Number of Employees: 10

HARD HAT SOFTWARE
P.O. Box 14694
San Francisco, CA 94114
(415) 647-8518

HARRIS CORP.
Information Systems Group
1025 W. Nasa Blvd.
Melbourne, FL 32919
(305) 727-9100
Major Markets: Computer, Terminal/Peripheral and Communications Equipment Manufacturing, Maintenance/Other Services; Special systems manufacturing
Target Industries: Manufacturing; Scientific, Government, Education
Target Applications: General Business, Scientific, Control, Engineering
Net Sales: More than $100 Million (1981)

HARRIS DATA SERVICE
11629 W. Dearborn Ave
Milwaukee, WI 53214
(414) 475-1760
Major Markets: Data Services (Service Bureau), Maintenance/Other Services
Target Applications: Accounting; Publishing; WP
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Randy Carr
Head of Software: Dave Szemore
Year Established: 1972
Number of Employees: 100

HARTE SYSTEMS, INC.
2125 Butterfield Road
Oakbrook, IL 60521
(312) 887-8630
Target Industries: Associations, Wholesale; Light Manufacturing, Distribution
Target Applications: Accounting; List maintenance; Order entry
Net Sales: $500,000 — $1 Million, (1981)
Year Established: 1980
Number of Employees: 10

HARTLEY SOFTWARE
123 Bridge St.
Dimondale, MI 48821
(517) 942-8821
Major Markets: Maintenance/Other Services
Target Industries: Education
Year Established: 1981
Number of Employees: 4

HARTRO COMPUTER SYSTEMS, INC.
537 Old Willets Path
Hauppauge, NY 11788
(516) 234-2811
Major Markets: Systems House (Commercial OEM)
Target Industries: Service; Accountants, Manufacturing; HVAC
Target Applications: Service dispatch, Job costing; Accounting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1980
Number of Employees: 10

HARVARD SOFTWARE, INC.
Software Park
Harvard, MA 01451
(617) 456-3400
Year Established: 1981
Number of Employees: 5

HARVEST COMPUTER, INC.
1253 Mass Ave
Cambridge, MA 02138
(617) 547-3289
Major Markets: Communications Equipment Manufacturing, Dealer/Distributor, Maintenance/Other Services
Target Industries: Education, Communication, Small Business; Finance
Target Applications: WP; DBMS; Accounting; Financial
Contacts:
Head of Engineering: Walter Sappolski
Year Established: 1980
Number of Employees: 31

HARVEST CORP.
120 Sylvan Ave
Angewood Cliffs, NJ 07205
(201) 947-7666
Major Markets: Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Retail
Target Applications: Accounting; Order entry
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 4

HAVERLY SYSTEMS, INC.
78 Broadway
P.O. Box 919
Danville, NJ 07834
(201) 627-1424
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau)
Target Industries: Oil, Forest Products
Target Applications: Linear Programming; Data Dictionary
Contacts:
Head of Software: Louise Van Piper
Year Established: 1962
Number of Employees: 35

HAWKEYE INFORMATION SYSTEMS
P.O. Box 1194
Reseda, CA 91335
(213) 881-4264
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 7

HAYDEN SOFTWARE
300 Trade St.
Lowell, MA 01863
(617) 937-0111
Contacts:
Head of Sales: Bruce Twickler
Year Established: 1980
Number of Employees: 50

H. E. MAYNARD & CO., INC.
235 Alpha Drive
Pittsburgh, PA 15238
(412) 963-8100
Major Markets: Data Services (Service Bureau)
Target Industries: Textiles; Ship Building

Vendors

Target Applications: Work Measurement
Contacts:
Head of Software: K. B. Zandin
Year Established: [illegible]
Number of Employees: 125

NCE COMPUTER CONSULTANTS
7305 Grapevine Highway
[illegible]
Ft. Worth, TX 76118
(817) 498-6350
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing; Wholesale, Retail
Target Applications: Accounting; Library processing
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975
Number of Employees: 5

[illegible] SYSTEMS, INC.
8404 Indian Hills Drive
Omaha, NB 68114
(402) 399-1400
Major Markets: Component and Communications Equipment Manufacturing; OEM (Computer Systems); OEM (Peripherals/Terminals); Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Banking; Petrochemical; Government
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Ron Gillespie
Year Established: 1969
Number of Employees: 45

NEALTH BUSINESS SYSTEMS
1300 Industrial Highway
Southampton, PA 18966
(215) 364-4136
Major Markets: OEM (Computer Systems); Data Services (Service Bureau); Dealer/Distributor; [illegible]
Target Industries: Pharmacies; Medical
Target Applications: Pharmacy; Medical
Year Established: 1980
Number of Employees: 11

N & E COMPUTRONICS, INC.
53 N. Peacock Road
Spring Valley, NY 10977
(914) 425-1535
Major Markets: Dealer/Distributor
Target Industries: Small Business
Target Applications: General Accounting; Video Games
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1978
Number of Employees: 29

NEI CORP.
1495 Steiger Lake Lane
Victoria, MN [illegible]
(612) 443-2500
Major Markets: Peripheral Manufacturing; Maintenance/Other Services
Target Industries: OEM; Systems [illegible]
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Engineering: Robert Pilat
Year Established: 1968
Number of Employees: 200

NEIBECK ASSOCIATES, INC.
One Carriage Court
Stony Brook, NY 11790
(516) 751-6835
Major Markets: Dealer/Distributor
Target Industries: Auto, Medical; Interior Design, Retail
Contacts:
Head of Software: Andrew P Heineck
Year Established: 1975
Number of Employees: 10

NELMBRAN SYSTEMS, INC.
Suite 205
1030 S. Winchester Blvd.
San Jose, CA 95128
(408) 246-8300
Target Industries: Manufacturing
Target Applications: MRP
Year Established: 1981
Number of Employees: 12

NEMENWAY CORP.
101 Tremont St.
Boston, MA 02108
(617) 426-1931
Target Industries: Industrial, Robotics, Lab Automation
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Jim Hemenway
Head of Engineering: Robert Grappel
Year Established: 1977
Number of Employees: 15

NENDERSON INDUSTRIES
45 Fairfield Place
W. Caldwell, NJ 07006
(201) 227-9250
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1974
Number of Employees: 72

[illegible] SYSTEMS, INC.
427 South Olathe Way
Aurora, CA 80013
[illegible]
Major Market: Maintenance/Other Services
Year Established: 1980
Number of Employees: 3

NERBERT FRIEDMAN & ASSOCIATES, INC.
100 Wilmot Road
Deerfield, IL 60015
(312) 948-7160
Target Industries: Manufacturing; Distribution
Target Applications: MRP; Order entry; Accounting; Production
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1971
Number of Employees: 11

NERITAGE COMPUTER CORP.
[illegible] Kohler Memorial Drive
Sheboygan, WI 53081
(414) 457-1422
Target Industries: Insurance
Target Applications: Property Insurance; Casualty Insurance
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: E. Wessel
Year Established: 1968
Number of Employees: 55

NERITAGE COMPUTING CORP.
Jewel Software Division
Suite 720
611 Anton Blvd.
Costa Mesa, CA 92626
(714) 662-6999
Contacts:
Head of Sales: Gilman C. Perkins
Year Established: 1982
Number of Employees: 40

NERMAN PORTER COMPUTER SERVICES, INC.
10580 S.W. McDonald St.
Tigard, OR 97223
(503) 639-0545
Major Markets: Systems House (Commercial OEM)
Target Industries: Distribution
Target Applications: Order Entry; Inventory; Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 4

NERMENET, INC.
Computer Products Division
1750 Union St.
San Francisco, CA 94123
(415) 474-3400
Major Markets: Systems House (Commercial OEM)
Target Industries: Professional
Target Applications: Office communications; Economic analysis
Contacts:
Head of Sales: Alice Kaplan
Year Established: 1981
Number of Employees: 35

NERSHEY DATA SYSTEMS, INC.
Suite L-101
One Woodside Drive
Richmond, IN 47374
(317) 966-4900
Major Markets: OEM (Computer Systems); Data Services (Service Bureau)
Target Industries: Manufacturing
Target Applications: MRP
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: William A. Zielazny
Head of Software: Robert E. Heavilin
Year Established: 1979
Number of Employees: 15

NEURISTIMA CORP.
P.O. Box 3441
Federal Way, WA 98003
[illegible]
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Legal
Target Applications: Accounting; Legal; MRP
Year Established: 1976
Number of Employees: 10

NEWITT ASSOCIATES
100 Half Day Road
Lincolnshire, IL 60015
[illegible]
Major Markets: Maintenance/Other Services
Target Applications: Benefits; Compensation; Management Consulting
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Engineering: Thomas Schmitz
Year Established: 1940
Number of Employees: 115

NEWLETT-PACKARD CO.
Corporate Headquarters
3000 Hanover St.
P.O. Box 10301
Palo Alto, CA 94304
(415) 857-1501
Major Markets: Component, Computer, Terminal/Peripheral and Office Equipment Manufacturing; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Engineering; Manufacturing
Target Applications: QA; CAD/CAM
Net Sales: More than $100 Million (1982)
Contacts:
Head of Sales: Jim Arthur
Head of Software: Andre Schwager
Year Established: 1939
Number of Employees: 67,000

NIGGINS OFFICE PRODUCTS, INC.
777 Broadway
S. Portland, ME 04106
(207) 767-3281
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; [illegible]
Target Industries: Government; Education; Manufacturing; Telephone Company
Target Applications: Grading; Attendance; Licensing; Telephone
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: David Higgins
[illegible]
Head of Engineering: Jim Bonbett
Year Established: 1960
Number of Employees: 31

NIGHER ORDER SOFTWARE, INC.
955 Massachusetts Ave.
Cambridge, MA 02139
[illegible]
Year Established: 1978
Number of Employees: 40

NIES, INC.
60 S. Hartford Trpk.
Wallingford, CT 06492
(203) 265-1828
Major Markets: OEM (Computer Systems)
Target Industries: Nursing Homes
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: David Chudleigh
Year Established: 1978

N & M SYSTEMS SOFTWARE, INC.
351 Evelyn St.
Paramus, NJ 07652
(201) 599-9111
Target Applications: Data Entry
Net Sales: $5 Million — $25 Million (1982)

Contacts:
Head of Software/Engineering:
Harold Mergard
Year Established: 1979
Number of Employees: 20

HOGAN SYSTEMS
Suite 400E
5060 Spectrum Drive
Dallas, TX 75248
(214) 386-0020
Target Industries: Finance
Target Applications: Systems Development
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Software/Engineering:
Robert Padgett
Year Established: 1977
Number of Employees: 175

HOLGUIN AND ASSOCIATES
5822 Como
El Paso, TX 79912
(915) 581-1170
Target Industries: Architecture; Engineering
Target Applications: Design and Drafting
Number of Employees: 70

HOLLARD AUTOMATION U.S.A.
3400-D W. MacArthur Blvd.
Santa Ana, CA 92704
(714) 641-2844
Target Industries: Manufactoring; Distribution, General Business
Contacts:
Head of Sales, Alan Routledge
Year Established: 1981
Number of Employees: 6

HOLLAMBER ASSOCIATES
P.O Box 2276
Fullerton, CA 92633
(714) 879-9000
Major Market: Maintenance/Other Services
Number of Employees: 20

HOLLARD SYSTEMS CORP.
Suite 303
3131 S. State St.
Ann Arbor, MI 48104—
(313) 995-9595
Major Markets: Maintenance/Other Services
Year Established: 1981
Number of Employees: 20

HOME COMPUTER SOFTWARE
1307 S. Mary No. 209
Sunnyvale, CA 94087
(408) 735-8400
Major Markets: Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Fred Flypes
Year Established: 1978
Number of Employees: 4

HOME COMPUTER SYSTEMS, INC.
Suite E
[illegible] Dale Drive
Pleasant Hill, CA 94523
(415) 676-0929
Major Markets: Systems House (Commercial OEM)
Target Industries: Automobile
Target Applications: Financing
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 5

HONEYWELL, INC.
Honeywell Information Systems
Honeywell Plaza
Minneapolis, MN 55408
(612) 870-5200
Major Markets: Computer, Terminal/Peripheral, Communications Equipment and Office Equipment Manufacturing, OEM (Computer Systems), OEM (Peripherals/Terminals), Data Services (Service Bureau), Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies; Special hardware
Target Industries: Manufacturing/Distribution; Government; Education, Airline
Net Sales: More than $100 Million (1982)
Year Established: 1955
Number of Employees: 25,000

HOPPER ASSOCIATES
30680 12 Mile Road
Farmington, MI 48018
(313) 851-6030
Major Markets: Maintenance/Other Services
Target Industries: Auto; Insurance; Banking; Credit Union
Contacts:
Head of Software: Joseph Thomas
Year Established: 1975
Number of Employees: 17

HORNS COMPUTER SERVICES
3822 N 25th
St. Joseph, MI 64505
(816) 233-5418
Major Markets: Systems House (Commercial OEM)
Target Industries: Insurance; Financial
Target Applications: Letter Writing; WP; Data Entry; Insurance
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1977
Number of Employees: 4

HOTEL INFORMATION SYSTEMS
Suite 150
400 Ellinwood Way
Pleasant Hill, CA 94523
(415) 827-1212
Target Industries: Lodging
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Stephen Nelson
Year Established: 19[illegible]
Number of Employees: 34

HOUGHTON MIFFLIN CORP.
[illegible] Division
P.O. Box 683
Hanover, NH 03755
(203) 674-1141

HOUSTON COMPUTER SERVICES, INC.
Suite 101
1221 Richmond / Building C
Houston, TX 77082
(713) 558-9900
Target Applications: Language processors
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Stephen Starke
Year Established: 1979
Number of Employees: 6

HOUSTON ENGINEERING RESEARCH CORP.
7250 Wynnwood Drive
P.O Box 3246
Houston, TX 77061
(713) 869-9371
Major Markets: Computer Manufacturing; OEM (Computer Systems); OEM (Peripherals/Terminals); Systems House (Commercial OEM); [illegible]
Target Industries: Chemical; Paper; Utilities
Target Applications: Tank Gauging; Auto Production Reporting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: John A. Chapman
Head of Engineering: Joseph Dryer
Year Established: [illegible]
Number of Employees: 50

HOUSTON TIME SHARING [illegible]
9444 Old Katy Road
Houston, TX 77055
(713) 461-5437
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau)
Year Established: 1973
Number of Employees: 12

HOWARD W. SAMS & CO., INC.
4300 W 62nd St.
Indianapolis, IN 46206
(317) 298-5400
Target Industries: Small business
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1980
Number of Employees: 600

THE HOWZE GROUP
[illegible]
Palmetto, FL 33561
(813) 749-0047
Major Markets: OEM (Peripherals/Terminals), Data Services (Service Bureau), Maintenance/Other [illegible]
Target Industries: Tax assessors; Tax collectors, Government; Real [illegible]
[illegible] appraisals
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: James A. Howze
Year Established: 1961
Number of Employees: 40

H/R COMPUTER SYSTEMS & SOFTWARE
[illegible]
Leominster, MA 01453
(617) 537-1202
Major Markets: Systems House [illegible] (Service Bureau), Maintenance/Other [illegible]
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales/Software: Ron Dagenais
Year Established: 1978
Number of Employees: 25

HUB COMPUTER SERVICES, LTD.
6117 S. Pennsylvania
Cudahy, WI 53110
(414) 271-2988
Major Markets: OEM (Peripherals/Terminals), Systems House (Commercial OEM)
Target Industries: Foundries; Machine shops, Agriculture; Manufacturing
Target Applications: Foundry chemistry; Time keeping; Accounting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1979
Number of Employees: 3

HUGH CORT COMPUTER
P.O. Box 7586
Birmingham, AL 35253
(205) 871-3590

HUMAN SERVICES COMPUTING, INC.
2020 University Ave.
[illegible]
(608) 231-2020
Target Industries: Medical
Target Applications: Clinical Information, Research Information; DBMS, Scheduling
Year Established: 1979
Number of Employees: 15

HUMAN SOFT
661 Massachusetts Ave.
Arlington, MA 02174
(617) 641-1880
Target Industries: Retail
Target Applications: Computer [illegible]
Contacts:
Head of Sales: [illegible]
Head of Software/Engineering:
Robert Putman
Year Established: 1983
Number of Employees: 15

HUNTER & READY, INC.
445 Sherman Ave
[illegible]
(415) [illegible]
Major Markets: Dealer/Distributor
Target Industries: Industrial, Avionics, Hermetics, Military
Year Established: 1981
Number of Employees: 20

H A W COMPUTER SYSTEMS, INC.
1078 N. Cole Road
P.O Box 4173
Boise, ID 83711
(208) 377-0336
Target Industries: IBM 370 w/Customer Information Control System
Target Applications: Electronic mail, CICS utilities
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 6

IAS CORP.
Mason Rd. No 2
West Willington, CT 06279

Vendors

(203) 429-1691
Contacts:
Head of Sales: Rob Sibley
Year Established: 1982
Number of Employees: 4

[illegible]
World Headquarters
Old Orchard Road
Armonk, NY 10504
(914) 765-1900
Major Markets: Component, Computer, Terminal/Peripheral, Communications Equipment and Office Equipment Manufacturing; Data Services (Service Bureau); Dealer/Distributor, Maintenance/Other Services, Miscellaneous Computer Supplies
Net Sales: More than $100 Million (1982)
Number of Employees: 350,000

ICAS COMPUTER SERVICES, INC.
160 Woodport Road
Sparta, NJ 07871
(201) 729-3197
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Maintenance/Other Services
Target Applications: Inventory Control; Accounts Receivable
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1976
Number of Employees: 35

ICCS CORP.
Suite 170
2554 Lincoln Blvd.
Marina Del Ray, CA 90291
(213) 821-9180
Target Industries: Entertainment; Television, Movie, Bowling
Target Applications: League Statistics; Residual Tracking; Production Costs
[illegible]
Number of Employees: 8

[illegible], INC.
[illegible] 200
5332 College Ave.
Oakland, CA 94618
(415) 428-0963
Target Applications: CAD/CAM
[illegible]
Number of Employees: 6

IDONIX CORP.
10441 Bandley Drive
Cupertino, CA 95014
(408) 255-5500
Major Markets: OEM (Computer Systems)
Target Industries: Financial; **[illegible]**
Target Applications: Color Graphics **[illegible]**
Head of Software/Engineering: Ron Pierce
Year Established: 1981
Number of Employees: 35

ICS SERVICES, INC.
P O Box 847
Grand Prairie, TX 75051
(817) 268-0952
Target Industries: General business; **[illegible]**
Target Applications: Order entry; Fixed-asset accounts; Job costing; Accounting
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1977
Number of Employees: 5

I C SYSTEMS, INC.
Computer Services Division
444 E Highway 96
P.O Box 43226
St. Paul, MN 55164
(612) 483-8201
Major Markets: Systems House, (Commercial OEM), Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Dental Laboratories, Medical Markets, Direct Market
Target Applications: General Accounting, Inventory Control, Production
Contacts:
Head of Sales Ken Rapp
Year Established: 1975
Number of Employees: 75

IDC CORP.
1630 N. 10th St
McAllen, TX 78502
(512) 630-1105
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor, Maintenance/Other Services
Target Industries: Airline, Healthcare, Nursery Grounds, Apartment
Target Applications: Accounting
Contacts:
Head of Sales: Norbert Kneis
Head of Engineering: John Moore
Year Established: 1977
Number of Employees: 20

IDEAL SYSTEMS, INC.
2911-13th St
P O Box 1043
Columbus, NB 68601
(402) 564-0586
Major Markets: Data Services (Service Bureau)
Target Industries: Utilities
Net Sales: $100,000 — $500,000 (1981)
[illegible]
Head of Sales/Software: Michael Korgie
[illegible]
Number of Employees: 20

IER CORP.
1916 Old Middlefield Way
Mountianview, CA 94043
(415) 968-2685
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
[illegible]
Number of Employees: 15

IE SYSTEMS, INC.
98 Main St.
P.O Box 359
Newmarket, NH 03857
(603) 659-5891
Target Industries: OEM
Target Applications: Communications
[illegible]
Number of Employees: 17

IFDS (INTERNATIONAL FINANCIAL DATA SYSTEMS)
P.O Box 888552
Dunwoody, GA 30356
(404) 256-6447
Major Market: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Banks; Accounting
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 17

IHC AFFILIATED SERVICES, INC.
Data Processing Department
Suite 2200
36 S State
Salt Lake City, UT 84109
(801) 533-8282
Target Industries: Health care; Medical, Financial; Administrative
Target Applications: Hospital **[illegible]**
Year Established: 1975
Number of Employees: 25

II SYSTEMS, INC.
763-A Concord Ave
Cambridge, MA 02138
(617) 868-1453
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Finance; Brokerage, Banking
Target Applications: Portfolios; Order Entry/Match, Networking
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Gerald Kuss
Head of Software: Gary Morgan
Year Established: 1971
Number of Employees: 75

IIT RESEARCH INSTITUTE
10 W 35th St
Chicago, IL 60616
(312) 567-4000
Target Industries: Manufacturing; Electronics
Target Applications: CAD/CAM; Inventory; Manufacturing
Net Sales: $25 Million — $100 Million (1981)
[illegible]
Number of Employees: 900

IMEX SYSTEMS, INC.
Suite 240 D
3080 Olcott St.
Santa Clara, CA 95051
(408) 496-6400
Major Markets: Data Services (Service Bureau); Maintenance/Other **[illegible]**
Net Sales: $100,000 — $500,000 (1982)
[illegible]

IMI — INFORMATION MANAGEMENT
14260 Shearwater Court
Clearwater, FL 33520
(813) 577-2756
Major Markets: Systems House (Commercial OEM), **[illegible]**
Target Industries: Government; Utilities
[illegible]

IMREX
321 E. Shore Road
Great Neck, NY 11023
(516) 466-5210
Target Industry: General Industry
Contacts:
Head of Marketing: David Citron
Head of Software: Greg Miller
Head of Customer Service: Kathleen Amorie
Year Established: 1978
Number of Employees: 34
Net Sales: $1 Million — $5 million

[illegible] ASSOCIATES, INC.
1909 K. St. N.W.
c/o Berens
Washington, DC 20006
(202) 296-3032
Major Market: Systems House (Commercial OEM)
Target Industries: Real Estate
Target Applications: Property Management; Modeling; Accounting
Year Established: 1973
Number of Employees: 5

[illegible], INC.
2 Frederick St.
Framingham, MA 01701
(617) 879-5955
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing; Education, End User
Target Applications: QA, Decision Support Systems
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Daniel O'Connell
Head of Software: Steven Ober
[illegible]
Number of Employees: 30

[illegible], INC.
7500 Bellaire Blvd.
NBC Building, 6th Floor
Houston, TX 77036
(713) 772-1927
Target Industries: Scientific; Education, Government
Net Sales: $1 Million — $5 Million (1981)
[illegible]
Head of Sales: Ron Reynolds
Year Established: 1970
Number of Employees: 85

[illegible]PTA, INC.
14114 Dallas Parkway
Dallas, TX 75240
(214) 385-6497
Major Markets: Maintenance/Other Services
Target Industries: Insurance
Target Applications: Policy administration; Agency support; Underwriting, Actuarial
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Engineering: Phillip Hughes
[illegible]
Number of Employees: 17

INCOM SYSTEMS
9515 Sandpoint Way N.E.
Seattle, WA 98115
[illegible]
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Small business; Construction; Marketing; Financial

Target Applications: Graphics
Contacts:
Head of Sales: Phil Fisher
Head of Software: Steve Mack
Year Established: 1982
Number of Employees: 7

[illegible]
53 Bradford St.
W. Concord, MA 01742
(617) 371-0550
Major Markets: Systems House (Commercial OEM)
Contacts:
Head of Software: Thomas J. Stoodley
Head of Engineering: Curt Jarvis
Year Established: [illegible]

INDEX SYSTEMS, INC.
5 Cambridge Center
Cambridge, MA 02142
(617) 492-1500
Major Markets: Maintenance/Other Services
Target Industries: Financial; Manufacturing; Transportation
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1969
Number of Employees: 180

INDIVIDUAL SOFTWARE
1163-I Chess Drive
Foster City, CA 94404
(415) 341-6116
Target Industries: General
Contacts:
Head of Marketing: Neal Savage
Year Established: 1981

INDUSTRIAL COMPUTER CORP.
Suite 1D
6810 Roswell Road
Atlanta, GA 30328
(404) 396-9395
Contacts:
Head of Sales: Nancy Boyce
Head of Software: Bill Masacre
Year Established: 1980
Number of Employees: 10

INDUSTRIAL NETWORK SYSTEMS
P.O. Box 1141
Grand Rapids, MI 49501
(616) 452-6916
Major Markets: Data Services (Service Bureau)
Target Industries: Distribution; Manufacturing
Year Established: [illegible]

INDUSTRIAL PROGRAMMING, INC.
Suite 134
100 Jericho Quadrangle
Jericho, NY 11753
[illegible]
Target Industries: Engineering; Manufacturing
Target Applications: Industrial Control
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software: David L. Rippa
Head of Engineering: David Glick
Year Established: [illegible]
Number of Employees: 15

INDUSTRIAL SYSTEMS, INC.
11931 124th Ave. N.E.
Kirkland, WA 98033
(206) 823-0508
Major Markets: Systems House (Commercial OEM)
Target Industries: Offshore Oil
Target Applications: Industrial
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Wayne Martin
Year Established: [illegible]
Number of Employees: 20

INDUSTRY DATA SERVICES, INC.
Suite 104
2560 Mission College Blvd.
Santa Clara, CA 95054
(408) 988-8311
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing.
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Gary Gibvson
Head of Software: Terry Corbet
Year Established: [illegible]
Number of Employees: 65

INFOCON CORP.
E. William Penn Highway
Rowena Building
P.O. Box 163
Ebensburg, PA 15931
(814) 472-6066
Major Markets: Data Services (Service Bureau)
Target Industries: Government.
Net Sales: $500,000 — $1 Million (1981)
Year Established: [illegible]
Number of Employees: 16

INFO-DATA SERVICES, INC.
817 Wyandotte
Kansas City, MO 64105
(816) 842-2611
Major Markets: Data Services (Service Bureau)
Target Industries: Manufacturing; Insurance; Real Estate; Banking
Target Applications: Inventory; Accounting; Property Management
Contacts:
Head of Sales: Sally Barber
Year Established: 1974
Number of Employees: 20

INFO DATA SYSTEMS, INC.
5205 Leesburg Pike
Falls Church, VA 22041
(703) 578-3430
Major Markets: Maintenance/Other Services
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Software: Dr. Robert Loene
Year Established: [illegible]
Number of Employees: 100

INFO-DESIGNS, INC.
Software Division
6905 Telegraph Road
Birmingham, MI 48010
(313) 540-4010
Target Industries: Retail; Distribution; Wholesale
Target Applications: POS; General Accounting, Time Management/Client Billing; Electronic Calendar.
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Dave Hall
Year Established: [illegible]
Number of Employees: 25

INFOGRAPHICS, INC.
Lido Peninsula
201 Shipyard Way
Newport Beach, CA 92663
(714) 675-4385
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau); Dealer/Distributor
Target Applications: Color graphics
Year Established: 1980

INFOMEDIA CORP.
[illegible]
801 Traeger Ave.
San Bruno, CA 94066
(415) 952-4487
Major Market: Data Services (Service Bureau); Maintenance/Other [illegible]
Target Industries: Construction; Engineering; Utilities, Petroleum
Contacts:
Head of Sales: Ruth E. Smith
Head of Software: Dr. Mel Pirtle
Year Established: 1976
Number of Employees: 25

INFO — PROS
Suite 132
2102 Business Center
Irvine, CA 92715
(714) 851-8975
Year Established: 1981
Number of Employees: 4

INFORMATICS GENERAL CORP.
21031 Ventura Blvd.
Woodland Hills, CA 91364
(213) 716-1616
Major Market: Data Services (Service Bureau); Maintenance/Other [illegible]
Target Industries: General Business
Net Sales: More than $100 Million (1982)
Year [illegible]
Number of Employees: [illegible]

INFORMATION AND SYSTEMS RESEARCH, INC.
410 Rouser Road
Airport Office Park
Building No. 1
Coraopolis, PA 15108
(412) 262-5507
Target Industries: Business
Target Applications: Program generators
Contacts:
Head of Software: Rick Roth
Year Established: 1975
Number of Employees: 17

INFORMATION AUTOMATION CORP.
[illegible]
[illegible]
[illegible]
Year Established: 19[illegible]
Number of Employees: 4

INFORMATION BUILDERS, INC.
[illegible] Broadway
New York, NY 10001
(212) 736-4433
Major Markets: Maintenance/Other Services
Target Applications: DBMS
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Software: Peter Mittelhan
Year Established: 1975
Number of Employees: 150

INFORMATION CONTROL CORP.
8337 Martinsburg Road
Mt. Vernon, OH 43050
(614) 393-0010
Major Markets: Maintenance/Other [illegible]
Target Industries: Manufacturing
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software/Engineering: Terry [illegible]
Year Established: 1978
Number of Employees: 16

INFORMATION DESIGN, INC.
[illegible] Charleston Road
Mountain View, CA 94043
(415) 969-7990
Major Markets: Peripheral Manufacturing, Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other [illegible]
Target Industries: Telecommunication, Financial; Engineering, Library
Target Applications: Data Retrieval
Net Sales: $5 Million — $25 Million [illegible]
Contacts:
Head of Sales: Dick Stein
Year Established: 1970
Number of Employees: 55

INFORMATION MANAGEMENT [illegible] CONSULTANTS, INC.
Suite 105
1008 N. Randolph St.
Arlington, VA 22201
(703) 522-5572
Year Established: [illegible]
Number of Employees: 35

INFORMATION MANAGEMENT TECHNOLOGIES
180 N. Michigan Ave.
Chicago, IL 60601
(312) 372-4222
Major Markets: Systems House (Commercial OEM)
Target Industries: Banking; [illegible]
Target Applications: Financial, DBMS — Manufacturing; Cash Management; Message Store and Forward
Net Sales: [illegible] — [illegible] (1981)
Year Established: 1974
Number of Employees: 80

INFORMATION MANAGEMENT SOFTWARE SPECIALISTS, INC.
P.O. [illegible]
Racine, WI 53401
(414) 632-1571
Target Industries: Manufacturing; Distribution; Food processing
Target Applications: Order processing, General accounting
Net Sales: $100,000 — $500,000 (1981)

Vendors

Contacts:
Head of Sales: Martin J. Clark
Head of Software/Engineering: Dean L. Cepukenas
Year Established: 1978
Number of Employees: 14

THE INFORMATION ORGANIZATION CORP.
2295 Vallejo St.
Suite 308
San Francisco, CA 94123
(415) 921-3796
Major Markets: Data Services (Service Bureau)
Target Industries: Legal; Banking
Target Applications: WP
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 2

INFORMATION PROCESSING ARCHITECTS
720 Union St.
Manchester, NH 03104
(603) 669-5134
Target Industries: Small Business
Year Established: 1978
Number of Employees: 2

INFORMATION PROCESSING CORP.
Interfirst Two
Dallas, TX 75270
(214) 744-5638
Major Markets: Data Services (Service Bureau)
Target Industries: Banking; Oil and Gas, Manufacturing; Advertising
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1969
Number of Employees: 90

INFORMATION PROCESSING, INC.
Suite 200
1850 Lee Road
Winter Park, FL 32789
(305) 647-3200
Target Industries: OEM
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Robert Roycroft
Year Established: 1964
Number of Employees: 22

INFORMATION RESEARCH ASSOCIATES, INC.
911 W. 29th St.
Austin, TX 78705
(512) 474-4526
Major Markets: Maintenance/Other Services
Target Industries: Software houses; Large CPU installations
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1973
Number of Employees: 15

INFORMATION RESOURCES, INC.
Suite 1800
470 E. Paces Ferry Road
P.O. Box 52661
Atlanta, GA 30355
(404) 231-3117
Major Markets: Data Services (Service Bureau)
Target Industries: Insurance
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1973
Number of Employees: 5

INFORMATION SCIENCE, INC.
95 Chestnut Ridge Road
Montvale, NJ 07645
(201) 391-1600
Major Markets: Data Services (Service Bureau)
Target Applications: Payroll; Personnel
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Software: Brian Aspland
Year Established: 1965
Number of Employees: 250

Additional information provided for by vendor

Information Science, the largest specialist in the field, started the industry in 1965. InSci software runs on IBM plug-compatible manufacturers' mainframes in non-data base and data base modes. Data base environments include IMS/DL-1, IDMS and ADABAS. InSci has an exlusive arrangement with Cullinet Software, Inc. to develop and market a payroll/personnel system for IDMS.

INFORMATION SOFTWARE & SERVICES, INC.
10 Industrial Park Road
Hingham, MA 02043
(617) 749-2620
Target Applications: Order entry; Inventory control; Financial; Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1974

INFORMATION SPECIALISTS, INC.
Suite 107
500 Stephenson Highway
Troy, MI 48084
(313) 583-2033
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Distribution, Medical; Financial
Target Applications: Inventory; Accounting, Payroll; Financial
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: William Craig
Year Established: 1979
Number of Employees: 22

INFORMATION STRUCTURE, INC.
Suite 350
910 15th St.
Denver, CO 80202
(303) 892-5626
Target Applications: [illegible]
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 3

INFORMATION SYSTEMS CONSULTANTS, INC.
Suite A
6812 N. 19th Ave.
Phoenix, AZ 85015
(602) 246-2494
Major Markets: Maintenance/Other Services
Year Established: 1974
Number of Employees: 13

INFORMATION SYSTEM DEVELOPMENT
165 Fairlane Drive
Athens, GA 30607
(404) 546-0192
Major Market: Maintenance/Other Services
Target Industries: Manufacturing; Insurance
Net Sales: $100,000 - $500,000 (1982)
Year Established: 1980
Number of Employees: 3

INFORMATION SYSTEMS ENGINEERING
217 Hayward St.
Cambridge, MD 21613
(301) 228-7232
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Oil — Fuel; Small Manufacturing
Target Applications: Degree Day Accounting; General Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: R. J. Murphy
Year Established: 1979
Number of Employees: 5

INFORMATION SYSTEMS OF AMERICA, INC.
5855 Jimmy Carter Blvd.
P.O. Box 47975
Atlanta, GA 30362
(404) 441-8800
Major Markets: Systems House (Commercial OEM)
Target Industries: Insurance; Finance; Utilities; Government
Target Applications: Accounting; Cash disbursements, Alpha search
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: James Garvey
Year Established: 1968
Number of Employees: 400

INFORMATION SYSTEMS, INC.
447 Patterson Road
Dayton, OH 45419
(513) 294-6777
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Accountants; Manufacturing; Art Museums and Galleries
Target Applications: Electronic Mail; Inventory Contol
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Terry Lynch
Head of Software: Ed Maize
Year Established: 1970
Number of Employees: 22

INFORMATION TECHNOLOGY, INC.
1345 Old Cheney Road
Lincoln, NE 68512
(402) 421-2482
Target Industries: Banking
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Dale M. Jensen
Year Established: 1976
Number of Employees: 50

INFORMATION UNLIMITED SOFTWARE, INC.
2401 Marinship Way
Sausalito, CA 94965
(415) 331-6700
Target Industries: OEM; Retail
Target Applications: WP; Accounting; Data management; Financial Planning
Contacts:
Head of Sales: William Lohse
Head of Engineering: Paul Chaison
Year Established: 1977
Number of Employees: 52

INFONOMICS, INC.
550 Newtown Rd.
Littleton, MA 01460
(617) 486-8976
Major Market: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Typesetting; Publishing; Library
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Sales: Nancy Dennis
Year Established: 1962
Number of Employees: 38

INFOSERVICES, INC.
1728 Montreal Circle
Suite 22
Tucker, GA 30084
(404) 934-0900
Major Market: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Finance
Target Applications: Financial; Income tax returns
Net Sales: $1 Million - $5 Million (1981)
Contacts:
Head of Engineering: Craig Engle
Year Established: 1978
Number of Employees: 17

INFOSOFT SYSTEMS, INC.
80 Washington St.
P. O. Box 640
Norwalk, CT 06856
(203) 853-5333
Major Markets: Maintenance/Other Services
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: Jarrold H. Coret
Head of Software: Richard L. Roth
Year Established: 1979
Number of Employees: 10

INFO-TRONIC SYSTEMS, INC.
Suite 206
246 S. River Ave.
Holland, MI 49423
(616) 392-5905
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Warehouse
Target Applications: Accounting; Inventory/Management; Payroll
Net Sales: $500,000 — $1 Million (1980)

Contacts:
Head of Software: Dave Fowler
Year Established: 1979
Number of Employees: 11

INMARK
6200 Pondexter Lane
Rockville, MD 20852
(301) 468-9499
Major Markets: Data Services (Service Bureau)
Target Industries: Small business
Year Established: 1974
Number of Employees: 3

[illegible], INC.
2150 Shattuck
Berkeley, CA 94704
(415) 843-8114
Target Industries: Banking; Videotex
Target Applications: Retail banking; Corporate Banking; Home banking; In-home shopping
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Darien Belenger
Year Established: 1973
Number of Employees: 10

INNOVATEK MICROSYSTEMS, INC.
[illegible]
Millerton, NY 12546
(914) 373-9003
Major Markets: Component and Communications Equipment Manufacturing; Systems House (Commercial OEM)
Target Industries: Manufacturing; Military
Target Applications: Process control
Net Sales: $100,000 — $500,000 (1981)
Contacts:
[illegible]
Year Established: 1980
Number of Employees: 3

INNOVATION DATA PROCESSING
970 Clifton Ave
Clifton, NJ 07013
(201) 777-1940
Target Industries: IBM (OS, VS, MVS)
Target Applications: Utility — System software
Year Established: 1972
Number of Employees: 25

INNOVATIVE COMPUTER APPLICATIONS, INC.
Suite E
1110 N. Coast Highway
Laguna Beach, CA 92651
(714) 494-5766
[illegible] Data Services (Service Bureau)
Target Industries: Medical
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1973
Number of Employees: 2

INNOVATIVE COMPUTING CORP.
[illegible] S. Brockins
Oklahoma City, OK 73112
(405) 848-8695
Target Industries: Trucking
Target Applications: Dispatching; [illegible]
Year Established: 1969
Number of Employees: 25

INNOVATIVE DATA SYSTEMS OF LOUISIANA, INC.
Highway 71 S.
P.O. Box 5100
Bossier City, LA 71111
(318) 747-1724
Major Markets: Systems House (Commercial OEM)
Target Industries: Electric Utility
Target Applications: Accounting; Inventory; Payroll
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1970
Number of Employees: 22

INNOVATIVE MANAGEMENT, INC.
7149 Fauna
Houston, TX 77061
(713) 644-2166
Target Applications: Dibol to Cobol; Program Language Conversion
Contacts:
Head of Software: John B. Wardlaw
Year Established: 1976
Number of Employees: 2

INNOVATIVE PROFESSIONAL SYSTEMS, INC.
Suite 102
1432 Great Neck Rd.
[illegible] Professional Center
Virginia Beach, VA 23454
(804) 481-9166
[illegible] Computer Manufacturing
Target Industries: Legal
Target Applications: Time dispersements, WP
Year Established: 1978
Number of Employees: 12

INNOVATIVE PROGRAMMING ASSOCIATES
One Airport Place
Princeton, NJ 08540
[illegible] 924-7272
Major Markets: OEM (Computer Systems); Data Services (Service Bureau)
Target Industries: General Business
Target Applications: General [illegible]
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: B. Cohen
Head of Software: G. Harshman
Head of Engineering: S. Nicolaysen
Year Established: 1980
Number of Employees: 40

INNOVATIVE SOFTWARE
[illegible]
9300 W. 110th St.
Overland Park, KS 66210
[illegible] 381-1000
[illegible] OEM (Computer Systems)
Target Applications: Data management, Graphics
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1975

INNOVATIVE SYSTEMS, INC.
[illegible] Fourth Ave.
Pittsburgh, PA 15222
(412) 391-2364
Major Markets: Maintenance/Other Services
Target Industries: Banking; Financial, Insurance
Target Applications: CIS Conversion, Marketing Information
Contacts:
Head of Sales: John Shiller
Year Established: 1968
Number of Employees: 20

INSOFT, INC.
P.O. Box [illegible]
Portland, OR 97219
(503) 244-4181
Target Industries: Accounting; Data Management; Educational; Entertainment
Year Established: 1980
Number of Employees: 10

INSTITUTE OF MODERN PROCEDURES
P.O. Box 10297
[illegible], VA 22310
(703) 922-8200
[illegible] Data Services (Service Bureau)
Target Industries: Government; Commercial
Target Applications: Wang
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1970
Number of Employees: 350

INSURANCE DATA COMPUTER SERVICE, INC.
1611 W. Harry
Wichita, KS 67213
[illegible] 269-9550
[illegible] Data Services (Service Bureau)
Target Industries: Insurance
Target Applications: Selling Tools; Financial Analysis; Estate Liquidation
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Robert Tiessen
Year Established: 1970
Number of Employees: 10

INSURANCE SALES SYSTEMS
Suite 4
8015 W. 63rd
Merriam, KS 66202
(913) 722-0965
Target Industries: Insurance
Target Applications: Sales presentations; Data Base
Year Established: 1980
Number of Employees: 4

INTECTRA, INC.
William Tell Division
2629 Terminal Blvd.
Mt. View, CA 94043
(415) 967-8618
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Manufacturing; Scientific, Banking; Engineering
Year Established: 1974
Number of Employees: 30

INTEGRAL BUSINESS COMPUTING, INC.
[illegible] Kenmore Ave.
Loma, CA [illegible]
(213) 539-0530
Major Markets: Systems House (Commercial OEM)
Target Industries: [illegible] Travel; Manufacturing, Distribution
Target Applications: Accounting; Inventory Control; Reservations
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1968
Number of Employees: 25

INTEGRAL SYSTEMS, INC. (ISI)
185 Lennon Lane
Walnut Creek, CA 94596
[illegible] 935-2661
Major Markets: Maintenance/Other Services
Target Applications: Payroll; Personnel
Net Sales: $5 Million — $25 Million (1981)
Contacts:
[illegible] A. Duffield
Head of Software: Kathy Urbelis
Year Established: 1972
Number of Employees: 125

INTEGRATED BUSINESS METHODS, INC.
2133 Wisconsin Ave. N.W.
Washington, DC 20007
(202) 965-5015
Major Markets: Data Services (Service Bureau)
Target Industries: Insurance
Target Applications: Data Entry; Billing, Claims Processing
Contacts:
Head of Software: Richard Haddaway
Year Established: 1957
Number of Employees: 150

INTEGRATED COMPUTER SERVICES, INC.
21 Charles St.
[illegible] CT [illegible]
(203) 227-4601
Major Markets: Systems House [illegible] (OEM)
Target Industries: Retail
Target Applications: Inventory; POS, General Accounting
Year Established: 1981
Number of Employees: 4

INTEGRATED DESIGN ENGINEERING, INC.
P.O. Box [illegible]
St. Louis, MO 63125
[illegible] 343-0008
Major Market: Peripheral and Communications Equipment Manufacturing; OEM (Peripherals, Terminals)
Net Sales: $500,00 - $1 Million (1982)
Contacts:
Head of Engineering: Bill Yakutis
Year Established: 1979
Number of Employees: 10

INTEGRATED MANAGEMENT SERVICES, INC.
Suite 160
350 Interstate N.
Atlanta, GA 30339
(404) 955-0195
Major Markets: OEM (Computer Systems); OEM (Peripherals/Terminals); Data Service (Service Bureau)
Target Industries: Banking; Medical; Retail, Finance
Target Applications: Personal [illegible] Collections
Net Sales: $1 Million — $5 Million (1981)

Vendors

Year Established: 1973
Number of Employees: 10

INTEGRATED MATERIAL CONTROL, INC.
P.O. Box 350
Aptos, CA 95003
(408) 688-0629
Major Markets: Terminal Manufacturing, OEM (Computer Systems), OEM (Peripherals/ Terminals)
Target Industries: Warehousing; Distribution, Manufacturing
Target Applications: Inventory Management, Space Management
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1980
Number of Employees: 12

INTEGRATED OFFICE SYSTEMS
309 N. Tioga St.
P.O. Box 73
Ithaca, NY 14850
(607) 272-6560
Major Markets: Data Services (Service Bureau); Dealer/Distributor
Target Industries: Insurance; Country clubs; Accounting; Legal
Target Applications: Time reporting
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Douglas C. Weatherby
Head of Software: Ken Deschere
Year Established: 1979
Number of Employees: 7

INTEGRATED PLANNING, INC.
336 Newbury St.
Boston, MA 02115
(617) 267-5914
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Applications: Corporate and Strategic planning, Budget control; Marketing analysis
Net Sales: Less than $100,000 (1981)
Year Established: 1979
Number of Employees: 14

INTEL CORP.
System Grove
2402 W. Beardsley Road
Phoenix, AZ 85027
(602) 869-3600
Major Markets: Computer and Peripheral Manufacturing
Year Established: 1979
Number of Employees: 20,000

INTELLIGENETICS
124 University Ave.
Palo Alto, CA 94301
(415) 328-4870
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Biotechnology
Target Applications: Molecular genetics, Artifical intelligence
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980
Number of Employees: 20

INTELLIGONICS CORP.
1200 Gough St.
San Francisco, CA 94109
(415) 474-0401
Target Industries: Medical, House Care
Target Applications: Rehabilitation Centers, Hosptal Software
Net Sales: Less than $100,000 (1982)
Year Established: 1980
Number of Employees: 6

INTERACTIVE ANALYSIS
315 Morgan Hall
Boston, MA 02163
(617) 495-6269
Major Markets: Maintenance/Other Services
Target Industries: Education, Data Analysis Users, Marketing Research
Target Applications: Data analysis
Net Sales: Less than $100,000 (1982)
Year Established: 1974
Number of Employees: 2

INTERACTIVE COMPUTER SYSTEMS CORP.
Part II West, Rt. 102
Londonderry, NH 03053
(603) 432-3211
Target Applications: Travel Expense Management
Year Established: 1978
Number of Employees: 8

INTERACTIVE COMPUTER SYSTEMS, INC.
9148 E. 38
Tulsa, OK 74145
(918) 663-4917
Major Markets: OEM (Computer Systems); Dealer/Distributor
Target Industries: Wholesale, Medical; Manufacturing; Engineering
Target Applications: CAD/CAM; CPA Writeup; Inventory Control; MRP
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Fred Gibson
Head of Software: Tom Revere
Head of Engineering: Charles Rowden
Year Established: 1980
Number of Employees: 3

INTERACTIVE COMPUTING
140 Kennedy Drive
S. Burlington, VT 05401
(802) 863-3434
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Manufacturing; Hospitals; Construction, Insurance
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: James Cobb
Head of Software: Bill Kitchey
Year Established: 1978
Number of Employees: 15

INTERACTIVE GRAPHICS SYSTEMS, INC.
Suite 223-224
20969 Ventura Blvd.
P.O. Box 1305
Woodland Hills, CA 91365
(213) 346-0549
Target Industries: Graphics; Engineering
Target Applications: CAD/CAM
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software/Engineering: Kenneth Wheaton
Year Established: 1975
Number of Employees: 10

INTERACTIVE INFORMATION SYSTEMS, INC.
10 Knollcrest Drive
Cincinnati, OH 45237
(513) 761-0132
Target Industries: Manufacturing
Target Applications: MRP II
Year Established: 1973
Number of Employees: 30

INTERACTIVE MANAGEMENT SYSTEMS CORP.
3700 Galley Road
Colorado Springs, CO 80909
(303) 574-5050
Major Markets: Systems House (Commercial OEM)
Target Industries: Small Business; Nonprofit; Rental; Masonry
Target Applications: Accounting; Job Costing; WP, Database
Year Established: 1978
Number of Employees: 23

INTERACTIVE MANAGEMENT SYSTEMS, INC.
375 Concord Ave.
Belmont, MA 02178
(617) 489-3550
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau)
Target Industries: Manufacturing
Target Applications: MRP II
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Gary Schmidt
Head of Software: Darrell Johnson
Year Established: 1974
Number of Employees: 80

INTERACTIVE SOFTWARE SYSTEMS, INC.
P.O. Box 3314
Englewood, CO 80155
(303) 294-0932
Year Established: 1978
Number of Employees: 7

INTERACTIVE SYSTEMS, INC.
131 Middlesex Tnpk.
Burlington, MA 01803
(617) 273-4420
Target Applications: Financial; Business Utilities
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales/Engineering: Gary M. Kuba
Year Established: 1977
Number of Employees: 40

INTERACTIVE TECHNOLOGY, INC.
Suite 150
1225 N.W. Murray
Portland, OR 97229
(503) 644-0111
Year Established: 1976
Number of Employees: 7

INTER-CARE SYSTEMS, INC.
2044 Armacost Ave.
Los Angeles, CA 90025
(213) 826-4500
Year Established: 1978
Number of Employees: 32

INTER-DATA ENGINEERING
8045 N.W. 36th St. S. 539
Miami, FL 33166
(305) 591-2312
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Medical; Engineering; Retail
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1979
Number of Employees: 4

INTERLINK, INC.
208 W. Mars
P.O. Box 134
Berrien Springs, MI 49103
(616) 473-3103
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Weekly newspapers; Trade magazines; Publishing
Net Sales: Less than $100,000 (1981)
Contacts:
Head of Sales: William E. Garber
Year Established: 1979
Number of Employees: 6

INTERMED SYSTEMS, INC.
4279 Washington Road
P.O. Box 3783
Evans, GA 30809
(404) 863-8463
Major Markets: Maintenance/Other Services
Target Industries: Medical
Target Applications: Patient billing/ records; Accounting; Admissions
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1975
Number of Employees: 11

INTERMETRICS
733 Concord Ave.
Cambridge, MA 02138
Year Established: 1969
Number of Employees: 400

INTERNATIONAL BUSINESS SERVICES, INC.
1090 Vermont Ave. W.
Floor 10
Washington, DC 20005
(202) 789-5200
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Government; Military
Target Applications: Training systems, Systems engineering
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Engineering: G. Richard Beckus
Year Established: 1969
Number of Employees: 370

INTERNATIONAL COMPUTER SYSTEMS
167 W. Washington
Sunnyvale, CA 94086
(408) 739-2222
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services

Target Industries: Small business; Engineering
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 5

INTERNATIONAL COMPUTING SYSTEMS
Suite 100
1850 N. Greenville Ave.
Richardson, TX 75081
(214) 699-1384
Target Industries: Scientific; Engineering
Target Applications: Communications; Security System; Process Control
Year Established: 1979
Number of Employees: 25

INTERNATIONAL DIGITAL ELECTRONICS ASSOCIATION
6 Westchester Plaza
Elmsford, NY 10523
(914) 347-3700
Major Market: Terminal Manufacturing, Systems House (Commercial OEM)
Target Industries: Communications
Target Applications: Communications
Year Established: 1979
Number of Employees: 25

INTERNATIONAL ELECTRONIC MACHINERY, INC.
P O Box 1818
Fort Collins, CO 80526
(303) 226-6672
Major Markets: Maintenance/Other Services
Target Applications: CAD/CAM; Language, Operating Systems
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1971
Number of Employees: 10

INTERNATIONAL MANAGEMENT SYSTEMS
Suite 217
4676 Admiralty Way
Marina Del Rey, CA 90291
(213) 822-2022
Major Markets: Maintenance/Other Services
Target Applications: Accounting
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software: Roger Erickson
Year Established: 1973
Number of Employees: 60

INTERNATIONAL MARKET RESOURCES, INC.
38 Garden Road
Wellesley Hills, MA 02181
(617) 235-8530
Major Markets: Maintenance/Other Services
Target Applications: Sales and Marketing; Graphics; Programmer productivity
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1973
Number of Employees: 4

INTERNATIONAL MARKETING CONSULTANTS, INC.
4200 S. Hulen
Fort Worth, TX 76109
(817) 731-4161
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Insurance; Stock Brokers
Target Applications: Insurance Comparison
Year Established: 1977

INTERNATIONAL MICRO SYSTEMS, INC.
8440 Mission
Shawnee Mission, KS 66202
(913) 677-1137
Target Industries: General Business, Churches, Schools
Target Applications: Accounting; Inventory, Costing, mailing list
Year Established: 1977
Number of Employees: 50

INTERNATIONAL PROGRAMMING LABORATORIES CORP.
102 Waterman St.
P.O. Box 2330A
Providence, RI 02906
(401) 272-6555
Major Markets: Dealer/Distributor
Target Industries: Manufacturing; Distribution, Construction, Banking
Target Applications: Mail list, Accounting, Payroll; Personnel
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1971
Number of Employees: 6

INTERPROCESS SYSTEMS, INC.
Suite 606
6065 Roswell Road, N.E.
Atlanta, GA 30328
(404) 257-1110
Year Established: 1976
Number of Employees: 7

INTERTEC
3625 Park Blvd.
Palo Alto, CA 94306
(415) 326-8900
Major Markets: Data Services (Service Bureau)
Target Industries: Manufacturing
Target Applications: Accounting; MRP — Netchange
Consulting
Head of Sales: J. A. Lazzaro
Year Established: 1970
Number of Employees: 80

INTRAN CORP.
Image Management Group
7401 Bush Lake Road
Minneapolis, MN 55435
(612) 835-8800
Major Markets: Systems House (Commercial OEM)
Target Industries: Printing
Target Applications: Form Design
Computer Graphics; Page Composition
Net Sales: Less than $100,000 (1981)
Consulting
Head of Sales/Engineering: Peter Preksto
Year Established: 1971
Number of Employees: 12

INTROL CORP.
647 W. Virginia St.
Milwaukee, WI 53204
(414) 276-2937
Consulting
Head of Software: Richard Pennington
Year Established: 1960
Number of Employees: 3

INTROLOGICS, INC.
Suite 200
24700 Northwestern Highway
Southfield, MI 48075
(313) 352-2740
Target Industries: Manufacturing; Medical, Accountants; Wholesale and Retail Distributors
Year Established: 1981
Number of Employees: 15

INVENTORY MANAGEMENT SYSTEMS, INC.
106 Glenwood Ave.
Minneapolis, MN 55403
(612) 339-9071
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Manufacturing
Target Applications: Wholesale, Retail
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 6

INVENTORY SYSTEMS, INC.
5011 Argosy Drive
Huntington Beach, CA 92649
(714) 891-5556
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Pharmacy; Medical
Target Applications: Materials management; Pharmacy management
Year Established: 1968
Number of Employees: 90

INVESTORS DATA PROCESSING, INC.
Suite 470
120 Oak Brook Center
Oak Brook, IL 60521
(312) 655-1300
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Financial
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1979

I.P. SHARP ASSOCIATES, INC.
1250 Civic Center Drive
Rochester, NY 14614
(716) 546-7270
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Airlines, Oil
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Software: Eric Iverson
Year Established: 1970
Number of Employees: 150

I.P.S., INC.
1827 W. Maryland Ave.
Phoenix, AZ 85021
(602) 944-4854
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Credit Unions; General Business
Target Applications: General Accounting
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1972
Number of Employees: 20

IPT (INFORMATION PROCESSING TECHNIQUES)
1306 E. Meadow Circle
Palo Alto, CA 94303
(415) 494-7500
Target Applications: Spreadsheets; WP, Business Graphics
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Diana Slocombe
Year Established: 1974
Number of Employees: 25

IRWIN BRENDLER & ASSOCIATES
12 Library St.
Framingham, MA 01701
(617) 875-1100
Target Industries: Retail
Contacts:
Head of Software: Doug Porter
Year Established: 1970
Number of Employees: 12

ISS-USA
85 W. Algonquin Road
Arlington Heights, IL 60005
(312) 981-9200
Major Markets: Maintenance/Other Services
Target Industries: OEM; Fortune 1000 Firms
Target Applications: CMMS, Asset Management
Year Established: 1982
Number of Employees: 120

ISI SYSTEMS, INC.
Acc-U-Rate Division
161 Forbes Road
Braintree, MA 02184
(617) 848-4600
Major Markets: Data Services (Service Bureau)
Target Industries: Insurance
Target Applications: Workman's compensation, Rating; Policy handling
Contacts:
Head of Sales: John T. Hale
Year Established: 1980
Number of Employees: 62

ISR SYSTEMS, INC.
P O Box 31363
Raleigh, NC 27612
(919) 781-7477
Target Industries: Banking; Textiles; Medical
Target Applications: Human resource systems
Year Established: 1980

ISSCO GRAPHICS
7146 Sorrento Valley Blvd.
Sorrento Valley, CA 92121
(619) 452-0760
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1970
Number of Employees: 200

ITHACA INTERSYSTEMS
200 E. Buffalo St.
P.O. Box 91

Vendors

Ithaca, NY 14851
(607) 273-2500
Major Markets: Computer and Terminal Manufacturing
Target Industries: Dealers; OEM
Target Applications: Graphics, Business, Education
Net Sales: $1 Million — $5 Million (1982)
[illegible]
Head of Sales: Andy D. Avanzo
Head of Engineering: Jeff Moskow
Year Established: 1978
Number of Employees: 100

[illegible], INC.
P.O. Box 433
Canton, CT 06019
(203) 528-9193
Major Markets: Systems House (Commercial OEM).
Target Industries: Manufacturing
Target Applications: Job costing
Year Established: 1965
Number of Employees: 14

JACK HENRY & ASSOCIATES, INC.
W. Highway 60
P.O. Box 607
Monett, MO 65708
(417) 235-6652
Target Industries: Banking
Target Applications: Banking
Net Sales: $1 Million — $5 Million (1981)
[illegible]
Head of Sales: Vern Caldwell
Head of Software: Jerry Hall
Year Established: 1977
Number of Employees: 54

JACK N. COLQUITT, C.P.A.
6615 Crown Ridge Drive
San Antonio, TX 78239
(512) 653-5504
Geographic Coverage: National
Number of Employees: 1

[illegible] & ASSOCIATES, INC.
10229 Lower Azusa Road
Temple City, CA 91780
(213) 575-7504
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing
Target Applications: Bill of material processing, MRP; Job costing, Financial
Net Sales: $1 Million — $5 Million (1981)
[illegible]
Head of Software: Fred Lambert
Year Established: 1969
Number of Employees: 25

[illegible] E. MATTHEWS, LTD.
25 W. 45th St.
New York, NY 10036
(212) 944-8822
Target Industries: Retail; Non-profit; Import and export, Advertising
Year Established: 1979
Number of Employees: 12

[illegible] J. BAGLIANI & CO.
13 Hillside Ave
Metuchen, NJ 08840
(201) 549-1314
Major Markets: Maintenance/Other Services
Target Industries: Insurance
Year Established: 1958
Number of Employees: 7

JAMES L. BELLERS & ASSOCIATES
6420 E. Main St.
Reynoldsburg, OH 43068
(614) 864-8806
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1978
Number of Employees: 10

JASON DATA SERVICES
24871 Pylos Way
Mission Viejo, CA 92691
(714) 770-7789
Net Sales: $100,000 - $500,000 (1981)
Year Established: 1971
Number of Employees: 2

JAX SOFTWARE DEVELOPMENT CORP.
Suite 133
2121 Corporate Square Blvd.
Jacksonville, FL 32216
(904) 725-7187
Major Markets: Maintenance/Other Services
Target Applications: Productivity Aids
Year Established: 1980
Number of Employees: 5

JAY LESLIE CORP.
Business Timesharing Service
5959 W. Loop S.
Bellaire, TX 77401
(713) 667-9994
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: C. F. Eslinger
Head of Software: Daniel Fickes
Year Established: 1979
Number of Employees: 5

J. D. EDWARDS & CO.
4949 S. Syracuse
Denver, CO 80237
Target Industries: Oil and Gas; Distribution
Target Applications: General Accounting, Order Processing
Net Sales: $1 Million —, $5 Million (1981)
Contacts:
Head of Sales: Rod McDonald
Head of Software: J. Thompson
Head of Engineering: D. Gregory
Year Established: 1976
Number of Employees: 47

J.E. CHAPLIN ASSOCIATES, LTD.
Suite 507
11 Broadway
New York, NY 10004
(212) 483-9685
Major Markets: Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Banking; Brokerage
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1980
Number of Employees: 42

JEFFERSON PILOT BROADCASTING, INC.
Jefferson Data Systems Division
501 Archdale Drive Executive Plaza
Charlotte, NC 28210
(704) 525-3901
Major Markets: Data Services (Service Bureau)
Target Industries: Broadcasting
Target Applications: Sales, Traffic; Accounting; Electronic News Room
Contacts:
Head of Engineering: Joe Abernathey
Year Established: 1968
Number of Employees: 48

JEM ASSOCIATES
459 Carlisle Drive
Herndon, VA 22070
(703) 471-9550
Target Industries: Retail
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975
Number of Employees: 9

JERVIS B. WEBB CO.
Ann Arbor Computer Division
1201 E. Ellsworth
Ann Arbor, MI 48104
(313) 973-7875
Major Markets: OEM (Computer Systems); Dealer/Distributor
Target Industries: Postal; Automotive
Contacts:
Head of Software: Joseph Oates
Year Established: 1965
Number of Employees: 40

THE JERLYN CORP.
5775-E Peachtree Dunwoody Road
Atlanta, GA 30342
(404) 252-9503
Major Markets: Dealer/Distributor
Net Sales: $100,000 — $500,000 (1982)
[illegible]
Head of Software: Jeff Whisnant
Year Established: 1981

J. GLASER & CO., INC.
332 S.Michigan Ave
Chicago, IL 60604
(312) 786-0377
Target Industries: Wholesale; Manufacturing; Mining
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975
Number of Employees: 8

JMI SOFTWARE CONSULTANTS, INC.
1422 Easton Road
Roslyn, PA 19001
(215) 657-5660
Year Established: 1980
Number of Employees: 13

J. M. SMITH CORP.
Smith Data Processing Division
P.O. Box 6052
Spartanburg, SC 29304
(803) 582-1216
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other [illegible]
Target Industries: Pharmacy; Government, Utilities
Target Applications: Fixed Asset Accounting, Billing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: William R. Cobb
Year Established: 1959
Number of Employees: 90

JNJ SYSTEMS CONSULTANTS, INC.
Suite 111
12111 Strathern St.
N. Hollywood, CA 91605
(213) 780-8161
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Banking; Retail; Manufacturing; Service
Target Applications: Financial; Business, Word Processing
Net Sales: Less than $100,000 (1981)
[illegible]
Head of Sales: S. Urquhart
Head of Software: J. Urquhart
Year Established: 1979
Number of Employees: 4

JOHN CAPPELLETTI ASSOCIATES
200 N. Glenoaks Blvd.
Burbank, CA 91502
(213) 846-7552
Target Industries: Police Departments; Chamber of Commerce
Year Established: 1980
Number of Employees: 7

JOHN B. LYNCH & CO.
740-A Industrial Drive
Cary, IL 60013
(312) 639-2351
Major Markets: Data Services (Service Bureau)
Target Industries: Manufacturing; Distribution; Finance
Target Applications: Accounting; Telephone Bill Paying
Net Sales: $500,000 — $1 Million (1981)
[illegible]
Head of Software: Fred Beach
Year Established: 1964
Number of Employees: 15

JOHN R. [illegible]
262 W. 77th
Indianapolis, IN 46260
(317) 255-1724
Major Markets: Systems House (Commercial OEM)
Year Established: [illegible]
Number of Employees: 3

[illegible]-LAIRD, INC.
6441 S.W. Canyon Court
Portland, OR 97221
[illegible]
Target Industries: Microcomputer
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: David Robboy
Year Established: 1977
Number of Employees: 15

JOHNSON SYSTEMS, INC.
[illegible]
[illegible]
McLean, VA 22102
(703) 821-1700
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: John Cunningham
Head of Software: Paul Anson
Year Established: 1971
Number of Employees: 110

JONES/HOSPLEX SYSTEMS, INC.
2 Park Ave.
New York, NY 10016
(212) 725-5818
Target Industries: Medical; Hospital
Target Applications: Financial; Medical
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software: Doris Lange
Year Established: 1973
Number of Employees: 20

JOSEKI COMPUTER CORP.
2604 Artesia Blvd. No. 5
Redondo Beach, CA 90278
(213) 374-3251
Target Industries: Business
Year Established: 1981
Number of Employees: 6

J. P. SAWYNEY AND CO., INC.
Sawfney Software
668 Seventh Ave.
New York, NY 10106
(212) 541-8020
Major Market: Data Services (Service Bureau)
Target Industries: Finance
Year Established: 1976
Number of Employees: 6

J. P. SEDLAK ASSOCIATES, INC.
335 William St.
New York, NY 10038
(212) 233-8780
Major Market: Data Services (Service Bureau)
Target Industries: Insurance
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1971
Number of Employees: 32

J. R. KINNAN & CO.
[illegible]
Worthington, OH 43085
[illegible]
Major Markets: OEM (Computer Systems); Data Services (Service Bureau)
Target Industries: Banking; Brokerage; Manufacturing
Target Applications: POS; CAM; EFT
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1969
Number of Employees: 19

JS DATA SYSTEMS, INC.
60 Westerville Ave.
Penafly, NJ 07670
(201) 573-1973
Major Markets: Dealer/Distributor
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980
Number of Employees: 5

JSI
210 Lincoln St.
Boston, MA 02111
(617) 482-9485
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Medical; Legal; Education; Small Business
Target Applications: Information Management Systems, Billing; Time and Record Keeping
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 35

JTS COMPUTER SERVICE, INC.
2507 Brownell Blvd.
Rochester, NY 14625
(716) 586-1340
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing; Distribution
Contacts:
Head of Software: Jim McLaughlin
Head of Engineering: Britton Reynolds
Year Established: 1980
Number of Employees: 31

J. VILLATTE, CONSULTANTS
P.O. Box 26
Thomaston, CT 06787
(203) 283-4232
Major Markets: Maintenance/Other Services
Target Applications: Text Processing
Year Established: 1968

JYACO, INC.
919 Third Ave.
New York, NY 10022
(212) 308-1130
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Banking; Insurance; Diamond Manufacturing; Hardware Vendors
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Robert Iamach
Head of Software: Frank Vafer
Head of Engineering: Larry Finch
Year Established: 1978
Number of Employees: 25

KABERT CORP.
Suite 348
5050 Quorum Drive
Dallas, TX 75240
(214) 233-8356
Target Industries: WP
Contacts:
Head of Sales: LaWayne Schrader-[illegible]
Head of Software: Mike Angle
Year Established: 1982
Number of Employees: 6

K-DATA CENTRE, INC.
P.O. Box 577
Camp Hill, PA 17011
(800) 233-1102
Major Markets: OEM (Computer Systems)
Target Applications: Accounting
Year Established: 1978
Number of Employees: 9

KAN ENTERPRISES, INC.
Suite 300
1491 Chain Bridge Road
McLean, VA 22101
(703) 893-7881
Target Industries: Retail; Medical; Manufacturing, Associations
Target Applications: Accounting; Inventory; Medical practice
Contacts:
Head of Software: Kenneth D. King
Year Established: 1979
Number of Employees: 4

KEANE, INC.
210 Commercial St.
Boston, MA 02109
(617) 742-5210
Target Industries: Financial; Insurance, Manufacturing
Target Applications: Claims Processing, MRP
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1967
Number of Employees: 375

KEE-SYSTEMS, INC.
3315 S. Memorial Pkwy.
Huntsville, AL 35801
(205) 882-0081
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Accountant, Vendors
Target Applications: Accounting; MRP; Office Management
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978
Number of Employees: 6

KEL-TRONIX
7823 Frosch Road
P.O. Box 19[illegible]
Charlotte, NC 28219
(704) 394-7365
Major Markets: Component Manufacturing, OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Textile
Target Applications: Raw Material Control; Process Control Planning; Business; Inventory Control
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 16

KENNEDY ASSOCIATES, INC.
6802 Mema Lane
Lincoln, NE 68[illegible]
(301) 441-1390
Target Industries: Trade Associations; Government; Education
Target Applications: Memberships and Subscriptions, Information Storage and Retrieval; Personnel Systems
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: Luther LaRue
Head of Software/Engineering: Janice R. Mengal
Year Established: 1976
Number of Employees: 10

KENNETH E. MORROW AND ASSOCIATES
Suite 212
[illegible] Long Beach Blvd.
Long Beach, CA 90807
(213) 595-8411
Major Markets: Systems House (Commercial OEM); Consultant, Civil Engineer
Target Applications: Static Analysis; Dynamic Analysis
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1973
Number of Employees: 1

KENT COMPUTER CORP.
Suite 140
9434 Old Katy Road
Houston, TX 77055
(713) 467-0077
Major Markets: Systems House (Commercial OEM); [illegible]
Target Applications: Accounting; Data Communications
Year Established: 1969
Number of Employees: 9

KENWOOD DATA ASSOCIATES, INC.
5642 W. Diversey Ave.
Chicago, IL 60639
(312) 637-4141
Major Markets: Maintenance/Other Services
Target Industries: Hospitals
Target Applications: Inquiry Tracking
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980
Number of Employees: 4

KERN PUBLICATIONS
Data Dynamics Division
106 Oven Hill Road
P.O. Box 1[illegible]
Duxbury, MA 02332
(617) 934-0445
Major Markets: Maintenance/Other Services
Target Industries: Engineering; Education, Manufacturing
Target Applications: CAD/CAM; Computer Graphics; Microcomputers
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1975
Number of Employees: 7

KEYBROOK BUSINESS SYSTEMS, INC.
2035 National Ave.
Hayward, CA 94545
(415) 887-[illegible]
Major Markets: Computer and Peripheral Manufacturing, OEM (Computer Systems); OEM (Peripherals/Terminals)
Target Industries: Fortune 1000; Government; Education, Small Business
Contacts:
Head of Software: John Row
Year Established: 1979

KEYES MANAGEMENT SYSTEMS, INC.
[illegible] S. Church St.
P.O. Box 278
[illegible], NC 27[illegible]
(919) 823-1[illegible]
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Dental; Apparel
Year Established: 1980

KEY FINANCIAL SYSTEMS, INC.
[illegible]
P.O. Box [illegible]
Point Pleasant, NJ 0[illegible]
(201) 227-8800
Major Markets: Systems House (Commercial OEM)
Target Industries: Banking
Target Applications: Bank Trust Accounting

Vendors

Net Sales: $1 Million — $5 Million (1981)
[illegible]
Head of Sales: James Melesky
Year Established: 1973
Number of Employees: 75

KEY MANAGEMENT, INC.
Suite 200
5201 Eden Circle
Edina, MN 55436
(612) 920-3781
Major Markets: Systems House (Commercial OEM)
Target Industries: Charitable; Fuel Oil; Construction; County Government
Target Applications: Financial; Distribution
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1970
Number of Employees: 22

KEYPOINT SYSTEMS, INC.
Corporate Headquarters
500 Standard Life Building
Pittsburgh, PA 15222
(412) 261-0187
Major Markets: Data Services (Service Bureau); Dealer/Distributor
Target Industries: Fortune 500
Target Applications: Data entry; Customer Information Control System Development
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1977
Number of Employees: 300

KEYSTONE COMPUTER ASSOCIATES, INC.
1055 Virginia Drive
Ft. Washington, PA 19034
(215) 643-3800
Target Industries: Banking; Government; Manufacturing
Target Applications: Accounting; Financial
Net Sales: $1 Million — $5 Million (1980)
Year Established: 1965
Number of Employees: 125

KEYSTONE DATA CONSULTANTS, INC.
24 E. Princess St.
P O Box 606
York, PA 17405
(717) 848-5666
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing; Engineering
Target Applications: POS; Accounting; Inventory Management; Industry Control
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 6

KPC COMPUTER SYSTEMS
800 Kincaid Towers
Lexington, KY 40507
[illegible]
[illegible] Data Services (Service Bureau)
Target Industries: General Business
Target Applications: Accounting; Inventory
Year Established: 1946
Number of Employees: 15

K. H. LITTLE, INC.
Suite 101
2 Linden St
Reading, MA 01867
(617) 944-2669
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Year Established: 1975
Number of Employees: 12

KIMBRO DATA, INC.
P O Box 373
Ebensburg, PA 15931
(814) 472-6597
Major Markets: Systems House (Commercial OEM)
Year Established: 1971
Number of Employees: 4

KINBROUGH COMPUTER SALES, INC.
3705 Kipling
Denver, CO 80033
(303) 425-0663
Major Markets: Systems House (Commercial OEM)
Target Industries: Banking; Medical; Wholesale Distributors; Municipalities
Target Applications: Accounting; Payroll; General Ledger
Year Established: 1976
Number of Employees: 25

KIM PETROLEUM COMPUTERS, INC.
Suite 21
1110 Morse Road
Columbus, OH 43229
(614) 888-1145
Target Industries: Oil and Gas
Year Established: 1976
Number of Employees: 12

KINBY COMPUTER SYSTEMS, INC.
314 U.S. Highway 22
Greenbrook, NJ 08812
(201) 469-6000
Major Markets: Systems House (Commercial OEM)
Target Industries: Fuel Oil
Target Applications: Scheduling Fuel Oil; Payroll; Accounting
Year Established: 1969

KITZMILLER SYSTEMS
253 S. Oxford Ave
Los Angeles, CA 90004
(213) 385-9388
Target Applications: General [illegible]
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978

KKI CORP.
3460 Oakdale Road
P O Box 4104
Modesto, CA 95352
(209) 526-8623
Major Markets: Systems House (Commercial OEM)
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Gary Postma
Year Established: 1975
Number of Employees: 22

KLAAS GILLMAN & SCHEICHTER
3033 Excelsior Blvd.
Minneapolis, MN 55416
(612) 927-9911
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Applications: Financial; Accounting
Year Established: 1965

KLEIN DIVERSIFIED ENTERPRISES, INC.
2122 Luann Lane
Madison, WI 53713
(608) 271-6623
Major Markets: Systems House (Commercial OEM)
Target Industries: Engineering; Legal; General business; Distribution
Target Applications: Time Management; Accounting; Inventory; [illegible]
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978
Number of Employees: 10

KMP COMPUTER SERVICES, INC.
703 Central Ave.
Los Alamos, NM 87544
(505) 662-5545
Major Markets: Systems House (Commercial OEM)
Target Industries: Cable TV
Target Applications: Accounts Receivable; Billing; Management Information
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 6

KNOXVILLE COMPUTER CENTER
1515 Magnolia Ave.
Knoxville, TN 37901
(615) 637-3330
Major Markets: Data Services (Service Bureau); Maintenance/Other [illegible]
Target Industries: Retail; Textile/Apparel
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: James Fultz
[illegible]

KOS & ASSOCIATES, INC.
Suite 203
McKnight Park Drive
Pittsburgh, PA 15237
(412) 367-7444
Major Markets: Dealer/Distributor
Target Industries: Utilities; Manufacturing; Banking
Target Applications: Process Control; Energy Management
[illegible]
Number of Employees: 20

KAR CUSTOM SOFTWARE, INC.
11048 Warwick Blvd.
Newport News, VA 23601
(804) 595-5400
Target Industries: Legal; General Business; Real Estate
Target Applications: Telephone Directory; Real Estate Forms; Receipts
Year Established: 1975

KRD INFORMATION SYSTEMS, INC.
2699 S. Bayshore Drive
Miami, FL 33133
(305) 858-5600
Target Industries: Medical; Distribution
Target Applications: Accounting
Net Sales: $5 Million — $25 Million (1982)
Year Established: 1958
Number of Employees: 52

KRELL SOFTWARE CORP.
1320 Stony Brook Road
Stony Brook, NY 11790
(516) 751-5139
Major Market: Dealer/Distributor
Target Industries: Educational; Recreational
Target Applications: Artificial Intelligence, Educational
[illegible]
Head of Sales: Jack Cohen
[illegible]
Number of Employees: 30

KSI COMPUTER SYSTEMS, INC.
Suite 230
2715 Mackey Place
Shreveport, LA 71118
(318) 688-5100
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Wholesale; Medical; Professional; Oil and Gas
Target Applications: Accounting; Inventory; Order Entry
Year Established: 1976
Number of Employees: 10

KUBERMAN, INC.
P.O Box 594
Winston-Salem, NC 27102
(919) 725-1915
Major Markets: Data Services (Service Bureau)
Target Industries: Legal
Target Applications: Legal Time & Billing; Accounting
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1974
Number of Employees: 15

LABORATORY COMPUTER SYSTEMS, INC.
139 Main St.
Cambridge, MA 02142
(617) 547-4738
Major Market: Systems House (Commercial OEM)
Target Industries: Scientific; Engineering
Target Applications: Image analysis; Graphics
Net Sales: $100,000 - $500,000 (1981)
Year Established: 1979

LABORATORY CONSULTING, INC.
2702 International Lane
P.O Box 1763
Madison, WI 53701
(608) 241-4151
Major Markets: Maintenance/Other Services
Target Industries: Medical
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978

LABORATORY MICROSYSTEMS
4147 Beethoven St.
Los Angeles, CA 90066

(213) 306-7412
Major Markets: Maintenance/Other [illegible]
Target Industries: Engineering; [illegible]
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: R. Wilton
Head of Engineering: G. Schuster
Year Established: [illegible]
Number of Employees: 5

LABORATORY TECHNOLOGIES CORP.
328 Broadway
Cambridge, MA 02139
(617) 497-1010
Major Markets: Computer Manufacturing
Target Industries: Scientific; Machine Control; Process Control
Contacts:
Head of Sales: Predrick Putnam
Year Established: 1981
Number of Employees: 9

LACHMAN ASSOCIATES, INC. [illegible]
Westmont, IL 60559
(312) 986-8840
Major Markets: Systems House (Commercial OEM)
Year Established: [illegible]
Number of Employees: 25

LA CROSSE COMPUTER SYSTEMS, INC.
124 [illegible]
La Crosse, WI 54601
(608) 784-7380
Major Markets: Systems House (Commercial OEM)
Target Industries: Dealers; Manufacturing; Trucking, Office [illegible]
Target Applications: Accounting; Sales Analysis; Commission Reporting
Net Sales: $100,000 — $500,000 (1981)
Year Established: [illegible]
Number of Employees: 7

LANGUAGE RESOURCES, INC. [illegible]
Boulder, CO 80301
[illegible]
Contacts:
Head of Sales: Ruth Higgins
Head of Engineering: Bruce Ravenel
Year Established: [illegible]
Number of Employees: 21

LAN SYSTEMS, INC. [illegible]
St. Paul, MN 55113
(612) 483-5221
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Newspaper; Publishing, Construction
Target Applications: Wholesale; Display Ads; Job Costing
[illegible]
(1981)
Year Established: [illegible]
Number of Employees: 20

LANTECH SYSTEMS
9861 Chartwell Drive
Dallas, TX 75243
(214) 340-3900
Target Industries: Engineering
Contacts:
Head of Sales: Darrell Foster
Head of Software: Art Olender
Year Established: 1980
Number of Employees: 12

LANC COMPUTING, INC. [illegible]
339 S. San Antonio Road
Los Altos, CA 94022
(415) 941-9310
Major Markets: Data Services (Service Bureau)
Target Applications: WP; Typesetting
Contacts:
Head of Sales: Robert Burns
Year Established: 1976
Number of Employees: 4

LASALLE COMPUTING, INC.
P.O. Box 116
Blue Bell, PA 19422
(215) 275-7058
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; [illegible]
Target Applications: Accounting; Process Control
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1979
Number of Employees: 10

LAURITS R. CHRISTENSEN ASSOCIATES, INC.
810 University Bay Drive
Madison, WI 53705
(608) 231-2266
Major Markets: Systems House (Commercial OEM)
Target Applications: Econometrics
Year Established: [illegible]
Number of Employees: 22

LAWSON ASSOCIATES, INC.
2021 E. Hennepin Ave.
Minneapolis, MN 55413
(612) 379-2633
Major Markets: Maintenance/Other Services
Target Industries: Medical; Manufacturing; Distribution; Retail
Target Applications: Accounting; Distribution; Inventory Control; Medical Claims Processing
Net Sales: $1 Million — $5 Million (1982)
Contacts:
[illegible]
Year Established: 1976
Number of Employees: 125

LAZAROV SOFTWARE SYSTEMS, INC.
Suite 416
1925 S. Vaughn
Aurora, CA 80014
(303) 755-1451
Target Applications: Financial modeling
Year Established: 1976
Number of Employees: 2

L.D.M., INC.
529 S. Second Ave.
Covina, CA 91723
(213) 967-1506
Major Markets: Systems House [illegible]
Target Industries: Pay TV; Medical; Bowling; Truck Leasing
Year Established: 1968
Number of Employees: 67

L. H. [illegible], INC.
Suite 103
914 Silver Spring Ave.
Silver Springs, MD 20910
[illegible]
Major Markets: Systems House (Commercial OEM); [illegible]
Maintenance/Other Services
Target Industries: US Navy; Associations; Small Business
Target Applications: OA; Data Management; Report Writer; Back End Processor
Net Sales: $100,000 — $500,000 (1981)
Year Established: [illegible]
Number of Employees: 3

LEADING EDGE PRODUCTS, INC.
221 Turnpike St.
Canton, MA 02021
(617) 828-8150
Major Markets: [illegible]
Manufacturing; Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: System houses, Computer Retail Stores
Target Applications: Accounting; [illegible] Education
Net Sales: More than $100 Million (1983)
Year Established: 1978
Number of Employees: 100

LEARNED-MAHN
2229 W. State St.
P.O. Box 1488
Boise, ID 83701
[illegible]
Major Markets: Maintenance/Other Services
Target Industries: Utilities; Non-profit
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Gary Mahn
Head of Software: Nancy Learned
Year Established: 1973
Number of Employees: 10

LEARNING TOOLS, INC.
[illegible]
Cambridge, MA 07139
(617) 864-8086

LEDE COMPUTER SYSTEMS
1334 Washington Ave.
Portland, ME 04103
(207) 797-5571
Major Markets: Systems House (Commercial OEM)
Target Industries: Medical, Dental
Target Applications: Dental Management
Contacts:
Head of Sales: Dan Prescott
[illegible]
Year Established: 1981

LEGAL [illegible] SYSTEMS, INC.
50 Franklin St.
Boston, MA 02110
(617) 426-1040
Major Markets: Data Services [illegible]
Target Industries: Legal
Target Applications: Accounting; Time Keeping
Contacts:
Head of Software: Gary Schulkens
Year Established: 1977
Number of Employees: 20

LEGAL INFORMATION SYSTEMS, INC.
P.O. Box 10302
Eugene, OR 97440
(503) 485-5631
Year Established: 1980
Number of Employees: 6

LEGEY AUTOMATION, INC. [illegible]
Arlington, TX 76012
(817) 274-0089
Year Established: 1980
Number of Employees: 3

LEGLER SYSTEMS CO. [illegible]
Orinda, CA 94563
(415) 254-1264
Target Industries: General Business
Target Applications: Accounting; General Business
Year Established: 1973
Number of Employees: 5

LELAND ASSOCIATES, INC.
Suite 308
10655 N.E. 4th
P.O. Box 4108
[illegible] WA 98009
(206) 453-9447
Major Markets: Maintenance/Other Services
Target Industries: Health care; Construction, Wholesale, Distribution
Net Sales: [illegible] — $500,000 (1981)
Year Established: [illegible]
Number of Employees: 5

LELAND COMPUTER SERVICES, INC.
Suite 146
8601 Dunwoody Place
Atlanta, GA 30338
[illegible]
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing; [illegible]
Year Established: 1978
Number of Employees: 48

LEMANS GROUP
26 W. King St.
P.O. Box [illegible]
Lancaster, PA 17604
(717) 295-1212
Major Markets: [illegible] Computer Systems); Systems House (Commercial OEM)
Target Industries: Banking; Financial, Savings/Loans
Target Applications: [illegible]
Contacts:
Head of Sales: Charles Parker
Number of Employees: 10

LEXICO ENTERPRISES, INC.
Test Systems
[illegible]
Silver Springs, MD 20910
[illegible]
Target Applications: Automobile Test Equipment
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Engineering: Patricia Timpanaro
Year Established: 1976
Number of Employees: 24

Vendors

LEXISOFT, INC.
P.O. Box 267
Davis, CA 95617
(916) 758-3630
Target Industries: Distribution; Retail
Target Applications: WP
Year Established: 1980

LFL DATA PROCESSING CONSULTANTS, INC.
1818 Ashland St.
Ft. Worth, TX 76107
(817) 735-8172
Major Markets: Maintenance/Other Services
Target Industries: Petroleum; General Business
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Steve Fisher
Year Established: 1980
Number of Employees: 5

LIBERTY SOFTWARE SYSTEMS, INC.
Suite 14
1955 S. Reynolds
Toledo, CA 43614
(419) 381-9852
Major Markets: Systems House (Commercial OEM)
Target Industries: Agriculture
Contacts:
Head of Sales: Alan J. Tope
Head of Software: Nancy Tope
Year Established: 1981
Number of Employees: 6

LIBRA PROGRAMMING, INC.
1954 E. 7000 S.
Salt Lake City, UT 84121
(801) 943-2886
Major Markets: Systems House (Commercial OEM)
Target Industries: Construction; Accountants; Radio Broadcasting; Distribution
Target Applications: Accounting; Property Management
Contacts:
Head of Engineering: D. Wernburg
Year Established: 1976
Number of Employees: 30

LIFEBOAT ASSOCIATES
1651 3rd Ave.
New York, NY 10028
(212) 860-0300
Target Industries: Manufacturing; Distribution
Target Applications: WP; Accounting; Graphics
Net Sales: $5 Million — $25 Million (1982)
Year Established: 1977
Number of Employees: 80

LIFE SCIENCE ASSOCIATES
1 Fennimore Road
Bayport, NY 11705
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Education; Scientific; Medical
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Joe Frank
Head of Software: Ruth Meno
Head of Engineering: Dirk Houben
Year Established: 1970
Number of Employees: 12

LIFETREE SOFTWARE, INC.
Suite 30
411 Pacific St.
Monterey, CA 93940
(408) 373-4718
Target Applications: Word Processing
Contacts:
Head of Sales: Doug Cahill
Year Established: 1982
Number of Employees: 6

LIGHTNING SOFTWARE, INC.
P.O. Box 11725
Palo Alto, CA 94306
(415) 327-3260
Target Industries: Education
Year Established: 1981
Number of Employees: 5

LINDBERGH SYSTEMS
41 Farhill Road
Holden, MA 01520
(617) 852-0233
Net Sales: $100,000 - $500,000 (1981)
Contacts:
Head of Sales/Engineering: Alison Wilson
Head of Software: Dave Lindbergh
Year Established: 1980
Number of Employees: 3

LINK SOFTWARE
Commerce Park 5000 6th Ave.
Altoona, PA 16602
(814) 946-3085
Target Applications: Custom Software
Year Established: 1980
Number of Employees: 2

LINK SYSTEMS
1640 19th St.
Santa Monica, CA 90404
(213) 453-1851
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Rick Gibson
Year Established: 1980

LINTEK, INC.
P.O. Box 10152
Elmwood, CT 06110
(203) 561-3005
Major Markets: Maintenance/Other Services
Target Industries: Nursing Homes; Manufacturing; Nurseries; Radio Stations
Target Applications: Accounting; Financial
Contacts:
Head of Software/Engineering: Ed Hanko
Year Established: 1980
Number of Employees: 11

LINTON SHAFER COMPUTER SERVICES, INC.
6 W. Second St.
Frederick, MD 21701
(301) 663-5132
Major Markets: Maintenance/Other Services
Target Industries: Accountants; Legal
Target Applications: Time Management; General Ledger; Fixed Assets
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1965
Number of Employees: 40

LIOCS CORP.
246 Janata Blvd.
Lombard, IL 60148
(312) 887-0420
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Wholesale; Distribution
Target Applications: Order Processing; A/R; Invoicing; Contract Services
Year Established: 1972
Number of Employees: 35

LIST PROCESSING CO., INC.
555 Waters Edge
Lombard, IL 60148
(312) 543-0100
Target Industries: Direct Mail
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Engineering: Larry Olson
Year Established: 1972
Number of Employees: 40

LITIGATION TECHNOLOGY, INC.
Suite 202
36 Malaga Cove Plaza
Palos Verdes Estates, CA 90274
(213) 373-0715
Target Industries: Legal
Year Established: 1982
Number of Employees: 3

LITTON SYSTEMS, INC.
Millenico Information Center
6701 Variel Ave.
Canoga Park, CA 91303
(213) 716-2000
Major Markets: Data Services (Service Bureau)
Target Applications: Financial; Engineering; Statistical
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Engineering: George Gerier
Year Established: 1968
Number of Employees: 300

LLOYD GUSH AND ASSOCIATES
155 Williams St.
New York, NY 10038
(212) 962-4004
Major Markets: Data Services (Service Bureau)
Target Industries: Banking; Manufacturing
Target Applications: Financial Planning; Modeling
Year Established: 1980
Number of Employees: 35

LLOYDS ELECTRONICS
Highway 281 S.
P.O Box 1249
Jamestown, ND 58401
(701) 252-7756
Major Markets: Dealer/Distributor; Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1980
Number of Employees: 8

L & M DATA SYSTEMS
47 Pond St.
Sharon, MA 02067
(617) 828-7758
Major Markets: Systems House (Commercial OEM)
Target Applications: General Business; Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 5

THE LOCKWOOD ASSOCIATION, INC.
Suite 107
1938 N.E. Loop 410
P.O. Box 17326
San Antonio, TX 78217
(512) 824-1439
Target Industries: Wholesale; Retail Lumber; Distribution
Target Applications: POS
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: David Richards
Head of Software: Al Volesky
Year Established: 1978
Number of Employees: 29

LOGICA, INC.
666 3rd Ave., 19th Floor
New York, NY 10017
(212) 599-0828
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Banking; Telecom; Defense; Space
Target Applications: Accounting; Communication; System Design
Contacts:
Head of Sales: Dr. Martin Feldon
Year Established: 1969
Number of Employees: 1,200

LOGICAL DESIGN CORP.
3333 W. 12 Mile Road
Farmington Hills, MI 48018
(313) 553-7510
Target Industries: Automotive; Manufacturing
Target Applications: Accounting
Contacts:
Head of Software: Gary Alexander
Year Established: 1979
Number of Employees: 20

LOGICAL MINICOMPUTERS OF ERIE, INC.
3411 West Lake Road
Erie, PA 16505
(814) 833-6621
Major Market: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Plastic; Government
Target Applications: Domestic Relations
Net Sales: $500,00 - $1 Million (1981)
Contacts:
Head of Software: Thomas Ward
Year Established: 1978

LOGICAL SYSTEMS
10150 Sorrento Valley Road
P.O Box 2676
La Jolla, CA 92038
(402) 331-1111
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Banking; Manufacturing
Net Sales: $1 Million — $5 Million (1981)

Year Established: 1978
Number of Employees: 6

LOGIC APPLICATIONS CORP.
1461 21st St.
Sacramento, CA 95814
(916) 446-2761
Target Industries: Insurance
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 5

LOGICON, INC.
Process Systems
10398 Democracy Lane
Fairfax, VA 22030
(703) 591-2450
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing
Target Applications: Industrial Auto; Transportation Monitoring; Process Control
Net Sales: $5 Million — $25 Million (1984)
Contacts:
Head of Sales: Paul F. Dimouro
Head of Software/Engineering: Ramona Bins
Year Established: 1958
Number of Employees: 100

LOGISTICON, INC.
4001 Burton Drive
Santa Clara, CA 95050
(408) 988-3811
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Warehousing; Grocery; Material handling
Contacts:
Head of Software: David Scott
Year Established: 1974
Number of Employees: 45

LOGISTICS DATA SYSTEMS, INC.
Suite 214
7805 Old Georgetown Road
Bethesda, MD 20814
(301) 986-XXXX
Target Industries: Food industry
Target Applications: Restaurant Accounting; Distribution; Space Management
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1974
Number of Employees: 8

LOGISTICS, INC.
2843 E. Grand River Ave.
E. Lansing, MI 48823
(517) 332-8145
Target Industries: Medical
Target Applications: Accounting; Order Entry
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980
Number of Employees: 9

LOGO COMPUTER SYSTEMS, INC.
368 Congress St.
Boston, MA 02210
(617) 451-2646
Target Industries: Education; Consumer
Target Applications: Graphics; List Processing; Music
Contacts:
Head of Engineering: Brian Silverman

Year Established: 1980
Number of Employees: 50

LOGISALES SYSTEM, INC.
Beaverkill, Road 3
P O Box 239
Roscoe, NY 12776
(914) 439-4833
Target Industries: Retail Petroleum;
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1973
Number of Employees: 5

THE LOGO CONSULTING CORP.
666 Old Country Road
Garden City, NY 11530
(516) 794-9200
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Insurance; Banking
Target Applications: Inventory; Financial
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: John C. Parisi
Year Established: 1970
Number of Employees: 10

LOTUS DEVELOPMENT CORP.
161 First St.
Cambridge, MA 02142
(617) 492-7171
Target Applications: Productivity Tools
Contacts:
Head of Sales/Engineering: Paul Salzinger
Year Established: 1981
Number of Employees: 21

LOUIS A. WRIGHT & ASSOCIATES, INC.
1158 S. Main
Plymouth, MI 48170
(313) 459-7760
Target Industries: Manufacturing; Finance, Distribution
Target Applications: Utility
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978
Number of Employees: 14

LOWELL SYSTEMS
180 Industrial Ave. E.
Lowell, MA 01852
(617) 458-4100
Major Markets: Systems House (Commercial OEM)
Year Established: 1982

L.T.C. SYSTEMS
1030 N. Wenatchee Ave.
Wenatchee, WA 98801
(509) 662-0042
Major Markets: Dealer/Distributor; Maintenance/Other Services
Target Industries: Professional; Nursing Home; Orchards
Target Applications: Accounting; Forecasting; Medical Records
Contacts:
Head of Software: Mike Develis
Year Established: 1981
Number of Employees: 10

LULLA APPLIED SYSTEMS
756 Harvest Drive
Lake Zurich, IL 60047
(312) 438-3811
Target Industries: Distribution
Target Applications: Accounting; Payroll, DP, Inventory Control
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1977

LUNDY ELECTRONICS & SYSTEMS, INC.
One Robert Lane
Glen Head, NY 11545
(516) 671-9000
Major Market: Peripheral Manufacturing, OEM (Computer Systems), Systems House (Commercial OEM)
Target Industries: Finance; Government, Utilities
Target Applications: Check Processing, Paper Handling
Net Sales: $5 Million - $25 Million (1981)
Year Established: 1934
Number of Employees: 500

LUPPER & LOGO, INC.
P.O. Box A-57
Hanover, NH 03755
(603) 643-4503
Target Industries: General Business
Target Applications: Financial Systems
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1972
Number of Employees: 36

L. W. JAMES & ASSOCIATES
1525 E. County Road 58
Fort Collins, CO 80524
(303) 484-5286
Major Markets: Dealer/Distributor
Year Established: 1970

MACHINE PAYROLL ACCOUNTING SERVICE
727 E. 16th Ave.,
Denver, CO 80203
(303) 832-9361
Major Market: Data Services (Service Bureau)
Target Applications: Payroll
Year Established: 1957
Number of Employees: 10

MACHRAL-SCHNEIDLER CORP.
815 W. Colorado Blvd.
Los Angeles, CA 90041
(213) 254-3456
Target Industries: Engineering
Year Established: 1966
Number of Employees: 70

M/A COM SIGMA DATA, INC.
Suite 1100
5515 Security Lane
Rockville, MD 20852
(301) 984-3636
Major Markets: Systems House (Commercial OEM)
Target Industries: Telecommunications; Government
Target Applications: Graphics; Record Management
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Robert Marino
Year Established: 1968
Number of Employees: 100

MADIC CORP.
Formerly Industry Data Services, Inc.
Suite 104
2560 Mission College Blvd.
Santa Clara, CA 95054
(408) 988-8311
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing.
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Gary Gibvson
Head of Software: Terry Corbet
Year Established: 1969
Number of Employees: 85

MADISON DATA SYSTEMS, INC.
325 Manville Road
Pleasantville, NY 10570
(914) 747-0455
Major Markets: Systems House (Commercial OEM)
Target Industries: Wholesale Distributors, Nursing Homes, Real Estate, Manufacturing
Target Applications: Accounting; Manufacturing, Control Applications
Year Established: 1984
Number of Employees: 10

MAGNICOM SYSTEMS SYSTEMS, INC.
1177 High Ridge Road
Stamford, CT 06905
(800) 243-5300
Target Industries: Broadcasting; Cable
Target Applications: General Business
Contacts:
Head of Software: Delane Bell
Year Established: 1965
Number of Employees: 50

MAGNUM COMMUNICATIONS, LTD.
Suite 415
320 Interstate N.
Atlanta, GA 30339
(404) 952-4940
Major Markets: Communications Equipment Manufacturing, Systems House (Commercial OEM)
Target Industries: Credit Unions; Banking, Retail, Finance
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Lindsay Gardener
Year Established: 1978
Number of Employees: 13

MAG SOFTWARE, INC.
Suite 305
21054 Sherman Way
Canoga Park, CA 91303
(213) 883-3267
Target Applications: Inventory; Accounting, Mail Listings; Office Automation
Year Established: 1979

M.A.I. BASIC FOUR CORP.
14101 Myford Road
Tustin, CA 92680
(714) 731-5100
Major Markets: Computer and Office Equipment Manufacturing, Systems House (Commercial OEM); Dealer/Distributor

Vendors

Target Industries: Distribution; Manufacturing
Net Sales: More than $100 Million (1982)
Contacts:
Head of Sales: Paul Olin
Head of Software: Roger Sparks
Head of Engineering: Robert Hery
Year Established: 1971
Number of Employees: 1,500

MANAGEMENT AND COMPUTER SERVICES, INC.
Great Valley Corporate Center
Valley Forge, PA 19482
(215) 648-0730
Major Markets: Maintenance/Other Services
Target Applications: System Development Cycle; Program Productivity; Operator Production
Year Established: 1966
Number of Employees: 50

MANAGEMENT ADVISORY COMPUTER SYSTEMS
P.O. Box 1197
Emporia, KS 66801
(316) 343-2720
Major Markets: Data Services (Service Bureau)
Target Industries: Education
Target Applications: Student Services, Physical Services
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Peter Rademacher
Year Established: 1977
Number of Employees: 10

MANAGEMENT COMPUTER SERVICE, INC.
2790 Fisher Road
Columbus, OH 43204
(614) 272-0202
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Auto Clubs; Insurance; Country Clubs; General Business
Target Applications: Accounting; Job Costing; Sales Analysis; Word Processing
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1966
Number of Employees: 55

MANAGEMENT COMPUTER SERVICES, INC.
1717 St. James St.
P.O Box 2045
La Crosse, WI 54601
(608) 784-0354
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau)
Target Industries: General Business, Federal Housing
Target Applications: Accounting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1970
Number of Employees: 6

MANAGEMENT COMPUTING CONSULTANTS
3941 Houma Blvd.
Metairie, LA 70002
(504) 455-2870
Major Markets: Maintenance/Other Services
Target Industries: Banking, Medical
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Gerald J. Thompson
Year Established: 1978

MANAGEMENT CONTROL SYSTEMS, INC.
2400 Lake Park Drive
P.O Box 723597
Atlanta, GA 30339
(800) 241-3306
Target Industries: Accountants, Property Managers
Target Applications: Financial Reporting; Practice Management, Tax Preparation, Payroll/Checkwriting
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Engineering: Charlie Patarelli
Year Established: 1973
Number of Employees: 125

MANAGEMENT CYBERNETICS
General Systems
P.O. Box 888467
Atlanta, GA 30356
(404) 393-1144
Major Markets: Systems House (Commercial OEM)
Target Industries: Insurance
Target Applications: Accounting; Policy Processing
Year Established: 1971
Number of Employees: 60

MANAGEMENT DECISIONS SYSTEMS, INC.
200 5th Ave.
Waltham, MA 02254
(617) 890-1100
Major Markets: Maintenance/Other Services
Target Industries: Fortune 1000; Banking, Industrial
Target Applications: Financial; Marketing
Year Established: 1967
Number of Employees: 200

THE MANAGEMENT GROUP, INC.
393 Totten Pond Road
Waltham, MA 02154
(617) 890-6580
Target Industries: Banking; Government, Finance
Target Applications: Report Generator
Year Established: 1968

MANAGEMENT INFORMATION SYSTEM GROUP, INC.
Suite 220
1710 Shadowood Lane
Jacksonville, FL 32207
(904) 398-2244
Major Markets: Maintenance/Other Services
Target Industries: Construction; Real Estate
Target Applications: Order Entry
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1980

MANAGEMENT INFORMATION SYSTEMS CORP.
35 N. Montford Ave.
Baltimore, MD 21224
(301) 732-4437
Major Markets: Systems House (Commercial OEM)
Target Industries: General Business, Government
Target Applications: General Business
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1979
Number of Employees: 8

MANAGEMENT PLANNING SYSTEMS
174 E. 16th St.
Eugene, OR 97401
(503) 484-1004
Major Markets: Maintenance/Other Services
Target Industries: Timber; Medical
Target Applications: Payroll, Accounting; Property Management
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1970
Number of Employees: 7

MANAGEMENT SCIENCE, INC.
400 Hot Springs Road No. 7
Carson City, NV 89701
(702) 883-0507
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing
Target Applications: Work Measurement; CAM
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Gerald Glaze
Year Established: 1983
Number of Employees: 46

MANAGEMENT SCIENCES, INC.
6022 Constitution Ave. N. E.
Albuquerque, NM 87110
(505) 255-8611
Target Industries: Engineering
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1977
Number of Employees: 8

MANAGEMENT SERVICES
P.O Box 291
Hallowell, ME 04347
(207) 622-7704
Major Markets: Systems House (Commercial OEM)
Target Industries: Municipal Government; Education
Target Applications: Administrative
Year Established: 1978

MANAGEMENT SERVICES, INC.
3 Corporate Square
Atlanta, GA 30329
(404) 321-0820
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Accounting; Systems, Construction Accounting
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1958
Number of Employees: 65

MANAGEMENT SOFTWARE SYSTEMS, INC.
7721 N Soledad Ave.
Tucson, AZ 85741
(602) 744-4102
Major Markets: Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Government; Retail Rental
Net Sales: Less than $100,000 (1981)
Year Established: 1974
Number of Employees: 4

MANAGEMENT SYSTEMS, INC.
652 Glenbrook Road
Stamford, CT 06906
(203) 357-0280
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: General Business
Target Applications: Transaction Processing, Communications
Number of Employees: 15

MANAGEMENT SYSTEMS OF WAUSAU
2000 Westwood Drive
Wausau, WI 54401
(715) 842-6941
Major Markets: Systems House (Commercial OEM); Dealer/Distributor, Maintenance/Other Services
Target Industries: Health Care
Year Established: 1967
Number of Employees: 400

MANAGEMENT VISTAS, INC.
Suite 303
2675 44th St. S.W
Grand Rapids, MI 49509
(616) 531-6160
Major Markets: Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing; Warehouse Distribution
Target Applications: MRP; CAD/CAM; Accounting
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Terry Vogtmann
Head of Software: Joe Batteiger
Year Established: 1980
Number of Employees: 10

MARAMATION, INC.
381 Sunrise Highway
Lynnbrook, NY 11563
(516) 887-7714
Major Markets: Systems House (Commercial OEM)
Year Established: 1971
Number of Employees: 15

MARATHON, INC.
2970 S. 9th St.
Kalamazoo, MI 49009
(616) 375-5300
Major Markets: Data Services (Service Bureau)
Target Industries: General Business; Local Government
Target Applications: Property Tax Billing, Fund Accounting, Appraisal
Contacts:
Head of Sales: Russell Post
Head of Software: Bob Golsek
Year Established: 1968
Number of Employees: 110

MARINTEAN SYSTEMS, INC.
5713 Ocean Ave.
Longdale, CA 90260
(213) 679-2145

Major Markets: Systems House (Commercial OEM)
Target Industries: Aircraft
Target Applications: Accounting, Order Processing
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977

MANOF COMMUNICATIONS SYSTEMS, INC.
Suite 1604
211 E 42nd St.
New York, NY 10017
(212) 490-2010
Major Markets: Communications Equipment Manufacturing, Systems House (Commercial OEM)
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Bill Sheeser
Year Established: 1977
Number of Employees: 10

MANTECH INTERNATIONAL CORP.
107 Ridgely Ave.
Annapolis, MD 21401
(301) 268-9010
Major Markets: Systems House (Commercial OEM)
Target Industries: Engineering; CAD/CAM, Manufacturing
Target Applications: CAD/CAM; Simulations, Modeling
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: J. Gebhardt
Head of Software: M. Smith
Head of Engineering: D. Griffin
Number of Employees: 600

MANUFACTURING CONTROL SYSTEMS, INC.
Niagara Falls, NY 14304
(716) 283-1814
Target Industries: Manufacturing;
Target Applications: MRP; Productivity, Accounting
Net Sales: $500,000 — $1 Million (1981)
Number of Employees: 12

MANUFACTURING DATA SYSTEMS, INC.
4251 Plymouth Road
P.O. Box 986
Ann Arbor, MI 48105
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing;
Target Applications: Numerical
Net Sales: $25 Million — $100 Million (1981)
Year Established: 1963
Number of Employees: 750

MANUFACTURING SYSTEMS INC. OF MILWAUKEE
3645 W. Elm St.
(414) 352-7505
Major Markets: Data Services (Service Bureau)
Target Industries: Manufacturing
Target Applications: MRP
Year Established: 1981
Number of Employees: 6

MANUFACTURING SOLUTIONS & SYSTEMS, INC.
1300 S. Calhoun Road
Brookfield, WI 53005
(414) 786-1172
Target Industries: Manufacturing
Target Applications: Process Control, Data Base Management; Scheduling; Material planning
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 4

MANUS SERVICES CORP.
1700 Westlake Ave. N.
Seattle, WA 98109
(206) 285-3260
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Distribution; Manufacturing, Government, Medical
Target Applications: General Accounting
Head of Sales: Gary Vowels
Number of Employees: 120

MARC SOFTWARE SYSTEMS
41 E Main St.
Freehold, NJ 07728
(201) 780-4004
Contacts:
Head of Sales: Harry Suckow
Head of Software: Tom Fenwick
Number of Employees: 6

MARCOM & ASSOCIATES, INC.
5042 Davis
P.O. Box 25324
Dallas, TX, 75225
(214) 369-6606
Target Applications: Documentation, Production Control
Net Sales: $100,000 — $500,000 (1981)
Number of Employees: 1

MARCO 4, INC.
1 W. Hanover Ave.
Mount Freedom, NJ 07970
Contacts:
Head of Software: Peter Hargrave
Number of Employees: 21

MARC SOFTWARE INTERNATIONAL
260 Sheridan Ave., No. 200
Palo Alto, CA 94306
(415) 326-7511
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing; Nuclear, Automobile, Aerospace
Net Sales: $1 Million — $5 Million

MARITIME DATA NETWORK, LTD.
102 Hamilton Ave.
Stamford, CT 06902
(203) 327-6433
Major Markets: Systems House (Commercial OEM)
Target Industries: Shipping
Number of Employees: 35

MARKETING DECISIONS, INC.
99 School St
Weston, MA 02193
(617) 647-1632
Major Markets: Data Services (Service Bureau); Maintenance/Other
Target Industries: Banking
Target Applications: Banking
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 8

MARKETING & SALES SOFTWARE, INC.
213 W. Institute Place
Chicago, IL 60610
(800) 621-7253
Year Established: 1982
Number of Employees: 7

MARKETNET TECHNOLOGIES, INC.
1900 W. Stadium Blvd.
P.O. Box 860
Ann Arbor, MI 48103
(517) 332-8841
Major Markets: Data Services (Service Bureau)
Target Industries: Retail Coin
Head of Sales: Craig Whitford
Year Established: 1983
Number of Employees: 8

MARKETRON, INC.
2180 Sand Hill Road
Menlo Park, CA 94025
(415) 854-5301
Major Markets: Systems House (Commercial OEM)
Target Industries: Radio and TV
Target Applications: Traffic, Accounting, Management; Sales and Research
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1969
Number of Employees: 100

MARKMAN & ASSOCIATES, INC.
191 Presidential Blvd.
Bala Cynwyd, PA 19004
(215) 667-9244
(Commercial OEM)
Target Industries: Textile
Target Applications: Payroll; Inventory Control; Adounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software/Engineering: Edward Keegan
Year Established: 1974

MARK/OPS, INC.
636 Beacon St.
Boston, MA 02215
(Service Bureau); Maintenance/Other
(1981)
Year Established: 1967
Number of Employees: 10

MARK WILLIAMS CO.
1430 W. Wrightwood
Chicago, IL 60614
(312) 472-6659
Target Industries: OEM; Distribution
Year Established: 1954
Number of Employees: 25

MARMEN COMPUTING, INC.
(906) 863-2611
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Manufacturing; Food Distribution; Fire Protection
Contacts:
Head of Engineering: Mark Ennis
Year Established: 1970
Number of Employees: 35

MARTIAN TECHNOLOGIES
Suite F
8348 Center Drive
La Mesa, CA 92041
(619) 464-2925

MARTIN MARIETTA DATA SYSTEMS
6801 Rockledge Drive
(301) 897-6000
Major Markets: Software House;
Target Industries: Business; Engineering; Distribution, Government, Financial; Manufacturing
Year Established: 1971

MARTIN AND STEARN, INC.
865 Manhattan Beach Blvd
(213) 546-4888
Major Markets: Component Manufacturing, Systems House (Commercial OEM)
Target Industries: Military
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Engineering: Gerald Pfiffer
Year Established: 1979
Number of Employees: 32

MARYLAND COMPUTER
2010 Rock Spring Road
Forest Hill, MD 21050
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Distribution, Assocations
Target Applications: Turnkey Packages, Inventory Control; Financial
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1976
Number of Employees: 30

MAS, INC.
Lexington, MA 02173
(617) 861-7300
Major Markets: Systems House
Target Industries: Accountants
Target Applications: Client Account
Contacts:
Head of Engineering: Jack Davies
Year Established: 1973

Vendors

MASON & MASON
Suite A-5
13340 Kit St.
Dallas, TX 75240
(214) 437-1840
Year Established: 1982
Number of Employees: 18

MASSACHUSETTS COMPUTER ASSOCIATES, INC.
26 Princess St.
Wakefield, MA 01880
(617) 245-9540
Major Markets: Maintenance/Other Services
Target Industries: Government; Manufacturing; Commercial
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software/Engineering: Charles Muntz
Year Established: 1981
Number of Employees: 40

MASSOGLIA AND ASSOCIATES, INC.
Suite 102
4970 Northwind Drive
E. Lansing, MI 48823
(517) 332-4700
Year Established: 1978
Number of Employees: 7

MASS SYSTEMS CO., INC.
28 Edgehill Road
Waltham, MA 02154
(617) 891-1874
Target Industries: Distribution; Construction
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1972

MASSTOR SYSTEMS CORP.
5200 Great America Pkwy
Santa Clara, CA 95050
(408) 737-2500
Major Markets: Peripheral Manufacturing; Systems House (Commercial OEM); Data Services, Maintenance/Other Services
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1979
Number of Employees: 150

MASTER DATA CENTER, INC.
24700 Northwestern Highway
Southfield, MI 48075
(313) 352-5810
Target Industries: Legal; Patent and Trademark
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Harvey L. Furstag
Year Established: 1972
Number of Employees: 37

MASTERS SOFTWARE CO.
P.O. Box 214
Sandy, UT 84091
(801) 571-7590
Target Industries: Legal; Medical
Target Applications: Accounting
Year Established: 1980
Number of Employees: 4

MASTERWORKS SOFTWARE, INC.
25834 Narbonne Ave.
Lomita, CA 90717
(213) 539-7486
Target Industries: Travel; General Business
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Steven Collins
Year Established: 1979
Number of Employees: 7

MASYS CORP.
415 Shelard Plaza S.
Minneapolis, MN 55426
(612) 546-9556
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Government; Legal
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975
Number of Employees: 5

MATHEMATICAL DATA SYSTEMS, INC.
17 E. 45th St.
New York, NY 10017
(212) 986-5985
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Marketg. research; Advertising
Target Applications: Mathematical Analysi; Statistical Analysis, Economic Analysis; Strategic Analysis
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1973
Number of Employees: 7

MATHEMATICA PRODUCTS GROUP
P.O. Box 2392
Princeton, NJ 08540
(609) 799-2600
Major Markets: Maintenance/Other Services
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Mark Berkowitz
Year Established: 1975
Number of Employees: 200

MATHS & ASSOCIATES, INC.
1606 Noose Neck Hill Road
Coventry, RI 02816
(401) 828-2506
Target Applications: MCR Mainframe
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Engineering: Kurt Gudmundson
Year Established: 1972
Number of Employees: 4

MATIC DATA SYSTEMS
Suite E
501 S. First Ave.
Arcadia, CA 91006
(213) 574-1877
Major Markets: Systems House (Commercial OEM)
Year Established: 1978
Number of Employees: 3

MATRIX SOFTWARE
315 Marion Ave.
Big Rapids, MI 49307
(616) 796-2483
Target Industries: Astrologers
Contacts:
Head of Sales: Michael Erlewine
Year Established: 1977
Number of Employees: 5

MATRIX SYSTEMS & SERVICES, INC.
Suite 101
1500 W. Loop N.
P.O. Box 4263
Houston, TX 77025
(713) 868-4494
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Insurance
Target Applications: Insurance Account; Marketing; WP; Policy Retrieval
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Software/Engineering: Tom Hollis
Year Established: 1971
Number of Employees: 84

MATRIX SYSTEMS, INC.
2120 Crestmoor Road
Nashville, TN 37215
(615) 292-7667
Major Markets: Office Equipment Manufacturing, OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Education; Government; Banking; Small business
Target Applications: Computer learning, Personal computers, Organizational Management
Year Established: 1981
Number of Employees: 5

MAX ULE & CO., INC.
6 E. 43rd St.
New York, NY 10017
(212) 687-0705
Target Industries: Investors
Target Applications: Ticker Screen; Tickertec
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1978
Number of Employees: 4

MAYORAS & HITTLE, INC.
731 Main St.
Lafayette, IN 47901
(317) 423-2617
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Government
Target Applications: Accounting
Year Established: 1981
Number of Employees: 9

MBP
7700 Edgewater Drive
Oakland, CA 94621
(415) 632-1555
Year Established: 1981
Number of Employees: 15

M. BITTLE & ASSOCIATES, INC.
1248 Springfield Pike
Cincinnati, OH 45215
(513) 761-8400
Target Applications: Systems Development

Contacts:
Head of Software: Bob Fountain
Year Established: 1971
Number of Employees: 20

MCAA (MINI COMPUTER BUSINESS APPLICATIONS)
2441 Honolulu
Montrose, CA 91020
(213) 957-2900
Target Applications: Applications Software; Training/Education
Year Established: 1974
Number of Employees: 85

MCC, INC.
Suite 710
8222 Douglas Ave.
Dallas, TX 75225
(214) 696-5301
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Construction; Advertising
Year Established: 1974

MCCLINTOCK CORP.
Suite 410
9655 S. Dixie Highway
P.O. Box 430980
Miami, FL 33243
(305) 666-1300
Target Industries: Engineering; Manufacturing
Target Applications: Engineering
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1977
Number of Employees: 10

MCCLUSKY COMPUTER CORP.
Suite 400
521 Northbelt
Houston, TX 77060
(713) 445-5544
Target Industries: Oil; Manufacturing
Target Applications: Process Control
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1973
Number of Employees: 18

MCCORMACK & DODGE CORP.
560 Hillside Ave
Needham, MA 02194
(617) 449-4012
Target Applications: Financial; Accounting
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Sales: Steven Weinburg
Head of Engineering: John Landry
Year Established: 1969
Number of Employees: 400

MC CORMICK & ASSOCIATES
7 N. Meridan St.
Indianapolis, IN 46204
(317) 636-2376
Major Markets: Maintenance/Other Services
Target Industries: Professional; Insurance; Manufacturing
Contacts:
Head of Sales: Joseph Bittelmeyer
Year Established: 1980
Number of Employees: 10

MCCRACKEN COMPUTER, INC.
2 Militia Drive
Lexington, MA 02173
(617) 862-3083
Major Markets: Maintenance/Other Services
Target Industries: Banking; Insurance
Year Established: 1971
Number of Employees: 40

MCCULLOUGH & ASSOCIATES
1401 N. Jesse James Road
P.O. Box 434
Excelsior Springs, MO 64024
(816) 637-8638
Target Industries: Manufacturing
Target Applications: MRP
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 3

MCDATA
1916 Old Middlefield Way
Mountain View, CA 94043
(415) 968-4370
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Manufacturing; Credit Union
Year Established: 1974
Number of Employees: 16

MCDONNELL DOUGLAS AUTOMATION CO.
P.O. Box 516
St. Louis, MO 63166
(314) 233-4718
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Medical; Doctors and Medical Clinics
Target Applications: Financial Systems; Data Collection; Patient Care Reporting
Net Sales: More than $100 Million (1981)
Contacts:
Head of Sales: Arthur M. Fancot
Head of Software: Philip Kreted
Head of Engineering: William T. Corvin
Year Established: 1970
Number of Employees: 1,000

MCGRAW-HILL BOOK CO.
1221 Ave. of the Americas
New York, NY 10020
(212) 997-3314

MCHUGH, FREEMAN & ASSOCIATES, INC.
1135 Legion Drive
P.O. Box 454
Elm Grove, WI 53122
(414) 784-8250
Major Product: CRT Peripheral Terminals; Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Manufacturing; Distribution; Printing
Target Applications: Data Entry; Programmer Aids
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Andy Gaba
Year Established: 1975
Number of Employees: 25

MCM ENTERPRISES
215 Hamilton Ave
Palo Alto, CA 94301
(415) 327-8080
Major Markets: OEM (Computer Systems)
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 5

MCP
Suite 210
2469 Aloma Ave.
Winter Park, FL 32792
(305) 677-6274
Target Industries: Medical; General Business
Contacts:
Head of Software/Engineering: Gary Brechvill
Year Established: 1979
Number of Employees: 6

MCRAE INDUSTRIES, INC.
Compsee Optical Data
P.O. Box 726
Mt. Gilead, NC 27306
(919) 439-6147
Major Markets: Component Manufacturing; Systems House (Commercial OEM)
Target Industries: Footwear; Hosiery; Apparel
Contacts:
Head of Engineering: Mitchell E. Batten
Year Established: 1979
Number of Employees: 10

MDCR, INC.
Suite 12B
760 Highway 18
E. Brunswick, NJ 08816
(201) 257-5700
Target Applications: DBMS
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1974
Number of Employees: 13

MDC SYSTEMS CORP.
1818 Market St.
Philadelphia, PA 19103
(215) 299-8213
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Government; Data Centers, Manufacturing; Communications
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1965
Number of Employees: 180

MDN SYSTEMS, INC.
Suite C
5701 Chicago Road
Warren, MI 48092
(313) 268-2250
Major Market: Systems House (Commercial OEM)
Target Industries: Manufacturing; Warehouse; Accounting
Target Applications: Accounting; MRP; Job Costing; Inventory
Year Established: 1979
Number of Employees: 6

MDG ASSOCIATES
Myte Myke Division
7325 N. Buffalo
P.O. Box 908
Orchard Park, NY 14127
(716) 662-6611
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Distribution; Manufacturing
Target Applications: Order Entry; Inventory; Accounting; MRP
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1972
Number of Employees: 12

MDS, INC.
2722 Hennepin Lane
Madison, WI 53704
(608) 249-2147
Major Markets: Systems House (Commercial OEM)
Target Industries: Housing; Legal; Financial
Target Applications: Tenant Accounting, Financial; Legal Accounting; Property Management
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: James Bevis
Head of Engineering: David Peeler
Year Established: 1980
Number of Employees: 30

MEASUREMENT CONCEPTS CORP.
1721 Black River Blvd.
Rome, NY 13440
(315) 337-1000
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Insurance; Real Estate; Manufacturing; Government
Target Applications: Accounting, Payroll, Data Base; Graphics
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1976
Number of Employees: 32

MECHANICAL TECHNOLOGY, INC.
968 Albany Shaker Road
Latham, NY 12110
(518) 456-4131
Major Market: OEM (Computer Systems); Systems House (Commercial OEM)
Year Established: 1961
Number of Employees: 125

MEDIA BUREAU INTERNATIONAL
410 N. Michigan Ave.
Chicago, IL 60611
(312) 644-0611
Target Industries: Advertising
Year Established: 1972
Number of Employees: 12

MEDIA CATALOGUE CO., INC.
2437 5th Ave. N.W.
Fayette, AL 35555
(205) 932-3733
Major Markets: Computer Manufacturing
Target Industries: Libraries
Contacts:
Head of Software/Engineering: Jon Pesek
Year Established: 1983
Number of Employees: 10

MEDIA CYBERNETICS, INC.
36 Columbia Ave.
Takoma Park, MD 20912
(301) 270-2272
Major Markets: OEM (Computer Systems)
Year Established: 1981
Number of Employees: 10

MEDIA SERVICES, INC./3M (FORMERLY KBM)
4 High Ridge Park
Stamford, CT 06905
(203) 329-1170
Major Markets: Data Services (Service Bureau)
Target Industries: Publishing
Target Applications: Advertising; Accounting, Billing, Order Entry
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1974
Number of Employees: 45

MEDICAL DATA SERVICES CORP.
905 Southlake Blvd
Richmond, VA 23236
(804) 794-2818
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Medical
Target Applications: Medical
Contacts:
Head of Sales: Mrs. B. J. Hobart
Year Established: 1962
Number of Employees: 400

MEDICAL/DENTAL COMPUTER SYSTEMS
57 E. Medical Drive
Bountiful, UT 84010
(801) 295-3567
Target Industries: Medical
Year Established: 1971
Number of Employees: 2

MEDICAL OFFICE SYSTEMS
615 S. Frederick Ave
Gaithersburg, MD 20877
(301) 840-2441
Target Industries: Medical
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: J. P. Siok
Head of Software: Robert Bowman
Year Established: 1980
Number of Employees: 12

MEDIQUIP, INC.
Mediquip
1185 Fernwood Blvd.
Annapolis, MD 21401
(301) 279-8700
Major Products: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Medical
Target Applications: Practice Management/General Finance; Medical History/Audio Exams; Nursing Home, Laboratory/Health
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software: Timothy Schelter
Year Established: 1978
Number of Employees: 10

MEGA COMPUTER CORP.
Suite B
1761 S. Escondido Blvd.
Escondido, CA 92025
(714) 746-6464

Vendors

Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Medical
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Sharon Martin-Woody
Head of Software: Ed Tietz
Year Established: 1977
Number of Employees: 7

THE MEGA GROUP, INC.
Suite 100
2091 Business Center Drive
Irvine, CA 92175
(714) 752-9533
Year Established: 1983
Number of Employees: 13

MEGALO SOFTWARE SYSTEMS
Suite 101
290 S. Broadway
Denver, CO 80209
(303) 778-7165
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Dental; Accountants; Medical; Manufacturing
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Donald C. Sherman
Head of Software: Melissa Dunning
Year Established: 1978
Number of Employees: 6

MEGASOFT COMPUTERS
2674 N. First St
San Jose, CA 95134
(408) 946-9230
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Wholesale; Church; Storage
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1978
Number of Employees: 22

MEGA WEST SYSTEMS, INC.
Suite 224
140 W. 2100 S.
Salt Lake City, UT 84115
(801) 467-0788
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Medical; Retail; Accounting; Trucking
Year Established: 1979
Number of Employees: 10

MELITA ELECTRONIC LABS, INC.
Suite 79
3731 Northcrest Road
Atlanta, GA 30340
(404) 971-9400
Major Markets: Component Manufacturing; OEM (Computer Systems); OEM (Peripherals/Terminals); Manufacturing Special Systems
Target Industries: Utilities; Retail; Hotel; Insurance
Target Applications: Dispatching; Verification; Automatic Call Process; Scheduling
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Chester Quinn
Year Established: 1979
Number of Employees: 12

MEMOTECH CORP.
Suite 200
7550 W. Yale Ave
Denver, CO 80227
(303) 986-1516
Major Markets: Component and Terminal/Peripheral Manufacturing; OEM (Computer Systems); Dealer/Distributor
Target Industries: Manufacturing; Retail
Target Applications: Graphics
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1980
Number of Employees: 56

MENTOR GRAPHICS CORP.
10200 S.W. Nimbus Ave. G7
Portland, OR 97223
(503) 620-9817
Major Markets: Systems House (Commercial OEM)
Target Industries: Computer; Aerospace, Semiconductor; Electronics
Target Applications: Electronic CAE
Contacts:
Head of Engineering: Steven Swerling
Year Established: 1981
Number of Employees: 60

MENTOR SYSTEMS, INC.
962 Delaware Ave
Lexington, KY 40505
(606) 231-0519
Target Industries: Government; Schools
Target Applications: Accounting; Payroll; Utility
Year Established: 1981
Number of Employees: 25

MERGENTHALER/MYCRO-TEK
820 W. 2nd St.
Wichita, KS 67203
(316) 945-5087
Major Markets: Computer and Terminal Manufacturing; Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Newspaper; Publisher; Video
Target Applications: Front-End System, Video
Contacts:
Head of Sales: Jerry Perkins
Head of Software/Engineering: David S. Gilbert
Year Established: 1974
Number of Employees: 180

MESON SERVICES CORP.
200 N. Denison
Gainesville, TX 76240
(817) 665-1441
Target Industries: Oil; Gas
Year Established: 1979
Number of Employees: 22

MESTA COMPUTER SERVICES
Suite 100
400 Penn Center Blvd.
Pittsburgh, PA 15235
(412) 823-7440
Major Markets: OEM (Peripherals/Terminals); Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Accounting; Legal, Medial, Education
Target Applications: Industrial Process Control, Retail/POS
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1970
Number of Employees: 70

METASOFT CORP.
Suite E
711 E. Cottonwood
Casa Grande, AZ 85222
(602) 836-0268
Target Industries: Word Processing
Target Applications: Word Processing
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Nick Kendle
Head of Software: J. Mikel Echeverria
Head of Engineering: Thomas A. Schollmeyer
Year Established: 1979
Number of Employees: 30

META SOFTWARE
1860 Broadway
New York, NY 10023
(212) 765-2787
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Medical
Target Applications: Hospital Systems
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Linda Bailey
Head of Software/Engineering: Eli Nahmias
Year Established: 1978
Number of Employees: 15

METHEUS CORP.
5289 Elam Young Pkwy.
Hillsboro, OR 97123
(503) 640-8000
Major Markets: Component Manufacturing, OEM (Computer Systems); OEM (Peripherals/Terminals)
Target Applications: CAD/CAM
Contacts:
Head of Sales: Weldon Gates
Head of Engineering: Hock Leow
Year Established: 1981
Number of Employees: 50

METRETEK, INC.
4450 Enterprise Court
P.O. Box 280
Melbourne, FL 32901
(305) 257-9700
Major Markets: OEM (Computer Systems); Manufacturing Special Hardware
Target Industries: Utilities; Vending Machines
Target Applications: Remote Data Control
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: John J. Courtney III
Head of Software: Richard Wright
Head of Engineering: W. T. Bushman
Year Established: 1977
Number of Employees: 38

METROCOM, INC.
1500 Southern National Center
200 S. College St.
Charlotte, NC 28202
(704) 374-1990
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Applications: DP
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Tarokh Taeli
Head of Software: Clint Collins
Year Established: 1971
Number of Employees: 14

METRO SYSTEMS, INC.
P.O. Box 4697
Tulsa, OK 74104
(918) 743-535
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Oil and Gas
Target Applications: Interest Billing; General Accounting
Net Sales: $5 Million — $25 Million (1982)
Year Established: 1961
Number of Employees: 100

MANUFACTURING SOLUTIONS & SYSTEMS, INC.
1300 S. Calhoun Road
Brookfield, WI 53005
(414) 786-1172
Target Industries: Manufacturing
Target Applications: Process Control, Data Base Management; Scheduling, Material planning
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 4

MHA SOFTWARE SERVICES, INC.
3610 N. 90th St.
Omaha, NE 68134
(402) 572-8040
Major Markets: Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978

MHT SERVICES, INC.
90 W. Franklin St.
Hackensack, NJ 07601
(201) 342-1321
Target Applications: Conversions; Custom Software
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1972

M. I. B. CHOCK
1048 24th St.
Santa Monica, CA 90403
(213) 828-4788
Major Markets: Consulting
Target Industries: Science; Engineering, Government, Medicine
Target Applications: Image Processing, Two and Three Dimensional Modeling, Cartography; CAD/CAM
Year Established: 1982

MICHIGAN BUSINESS SYSTEMS & SOFTWARE, INC.
1356 Portage
Kalamazoo, MI 49001
(616) 381-6300

Target Industries: Manufacturing; Chemical Distributor; Wholesale; Retail
Target Applications: Accounting; Manufacturing; Chemical Distributor; Advertising
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1976
Number of Employees: 7

MICRO-AP, INC.
[illegible] 200
7033 Village Pkwy.
Dublin, CA 94568
(415) 828-6697
Major Markets: Dealer/Distributor
Target Applications: Accounting; DBMS
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 6

MICRO ARCHITECT, INC.
618 Great Pine Road
Burlington, MA 01803
(617) 273-5658
Target Industries: [illegible]
Target Applications: Small Business
Contacts:
Head of Sales/Software: Tony Pow
Year Established: 1978
Number of Employees: 3

MICRO ASSOCIATES, INC.
Suite 510/LB 131
2300 Highway 365
Nederland, TX 77627
(713) 724-6583
Target Industries: Engineering; Construction
Target Applications: Accounting; [illegible]
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Chris Oliver
Year Established: 1980
Number of Employees: 15

MICRO-BASE CORP.
[illegible]
Dayton, OH 45459
(513) 439-4560
Major Markets: [illegible] Terminals); Systems House (Commercial OEM); [illegible]; Maintenance/Other Services
Target Industries: Police; Manufacturing, Library; Legal
Target Applications: [illegible] (Management)
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Emil Hirsel
Year Established: 1977
Number of Employees: 9

MICROBASE SYSTEMS, INC.
P.O. Box 24162
Indianapolis, IN 46234
(317) 877-4304
Major Markets: Maintenance/Other Services
Target Industries: Advertising
Number of Employees: 4

MICROBOL, INC.
233 W. Highway 436
Altamont Springs, FL 32701
(305) 862-7030
Target Industries: Small Business

Target Applications: Accounting; Medical; Club Management; Property Management
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1978
Number of Employees: 5

MICRO BUSINESS APPLICATIONS, INC.
12281 Nicollet Ave. S.
Burnsville, MN 55337
(612) 894-3470
Target Industries: Manufacturing; OEM, Retail
Target Applications: Accounting
Year Established: 1978
Number of Employees: 8

MICRO BUSINESS SOFTWARE
[illegible] Road
Willow Hill Building
Chichester, NH 03263
(603) 798-5700
Target Industries: OEM; Retail
Contacts:
Head of Sales: Pat Lueay
Head of Software/Engineering: Scott [illegible]
Year Established: 1980
Number of Employees: 50

MICRO BUSINESS SYSTEMS, INC. [illegible]
Suite B
7725 Broadway
Merrillville, IN 46410
(800) 448-1212
Major Markets: Systems House (Commercial OEM), [illegible]
Target Industries: Construction; Retail
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software/Engineering: Denise Trump
Year Established: 1971

MICRO BUSINESS SYSTEMS, INC. [LA]
3823 Gilbert
Shreveport, LA 71104
[illegible]
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Oil and Gas; Accounting
Target Applications: Accounting; Job Costing
Contacts:
[illegible]
Year Established: 1979
Number of Employees: 20

MICRO BUSINESS SYSTEMS, INC. (NY)
1 Crimson Ave. S.
Malverne, NY 11565
[illegible]
Major Markets: OEM (Computer Systems); OEM (Peripherals/Terminals), Systems House [illegible]; Dealer/Distributor; [illegible]
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales/Software: John Ward
Year Established: 1977
Number of Employees: 4

MICROCOMPUTERS CORP.
34 Maple Ave
Armonk, NY 10504
(914) 273-6480
Major Markets: Dealer/Distributor
Target Industries: Education
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1979
Number of Employees: 5

MICRO COMPUTER SYSTEMS
P.O. Bx . B
Okem . MI 48864
(517) 349-3133
Major Markets: [illegible] (Commercial OEM); [illegible]
Target Industries: Professional
Target Applications: General accounting, WP; Data Management
Net Sales: $100,000 — $500,000, (1981)
Contacts:
Head of Software: Tom Crites
Year Established: 1980
Number of Employees: 5

MICRO COMPUTER SYSTEMS, INC.
7709 S. Pennsylvania
Oklahoma City, OK 73159
[illegible]
Major Markets: Systems House (Commercial OEM)
Target Industries: Oil and Gas; Church; Pharmacy; Medical Specialists
Target Applications: Accounting; Billing, Inventory; Contributions
Contacts:
Head of Software: Brian Goldman
Year Established: 1979
Number of Employees: 6

MICROCOMPUTER [illegible]
Suite A
[illegible] Ventura Ave.
Woodland Hills, CA 91367
(213) 704-7800
Target Industries: Income Tax
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Gerald D. Smith
Year Established: 1978
Number of Employees: 10

MICRO CONTROL SYSTEMS, INC.
143 Tunnel Road
[illegible]
(203) 872-0602
Major Markets: [illegible] Manufacturing; OEM (Computer Systems); CAD Graphics
Target Industries: [illegible] Engineering; Education
Target Applications: CAD Three Dimensional Graphics
Year Established: 1981
Number of Employees: 15

MICRO CORP.
[illegible] Vienna St.
Philadelphia, PA 19107
(215) 627-7997
Major Markets: Systems House (Commercial OEM)
Target Industries: Professional
Target Applications: DBMS; Communication
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Paul Gross
Head of Software: William Barus
Year Established: 1978
Number of Employees: 10

MICRO DATA BASE SYSTEMS, INC.
P.O. Box 248
Lafayette, IN 47902
(317) 463-2581
Target Industries: Management information systems, DP; OEM
Year Established: 1982
Number of Employees: 25

MICRO DATA BUSINESS FORMS & SYSTEMS
5707 Lacey Blvd No. 104
Olympia, WA 98503
[illegible] 459-2000
Target Industries: Insurance; Retail; Contractors
Target Applications: Accounting; Job Cost; Membership Billing; Utility Billing
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1973
Number of Employees: 6

MICRODATA SOFTWARE DEVELOPMENT CO.
4 Gary Road
Union, NJ 07083
[illegible] 964-8790
Target Industries: Advertising, Education, Distribution, Non-Profit
Target Applications: Production; Registration, Billing, Sales Analysis
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 27

MICRO DIGITAL ASSOCIATES, INC.
12791 Western Ave., Unit C
Garden Grove, CA 92641
(714) 891-2363
Major Markets: Maintenance/Other Services
Year Established: 1976
Number of Employees: 5

MICRO FIVE CORP.
17791 Sky Park Circle
Irvine, CA 92714
(714) 957-1517
Major Markets: Component and Computer Manufacturing; OEM (Computer Systems)
Contacts:
Head of Sales: Mark Lewis
Head of Software: Art Shahan
Head of Engineering: Bruce Mann
Year Established: 1977

MICRO FOCUS, INC.
[illegible]
[illegible]
[illegible]
(415) 856-4161
Target Industries: Computer
Contacts:
Head of Sales: Paul Adams
Head of Software: Barry Oakley
Year Established: 1977
Number of Employees: 70

MICRO INSTRUCTIONAL, INC.
3453 N.W. 55th St.
Ft. Lauderdale, FL 33309
(305) 486-6880

Vendors

Major Markets: Maintenance/Other Services
Target Industries: Micro Users
Target Applications: Accounting
Contacts:
Head of Sales: Lenny Bayer
Year Established: 1982
Number of Employees: 14

MICRO-INTEGRATION, INC.
63 Maple St.
P.O. Box 335
Friendsville, MD 21531
(301) 746-5868
Target Applications: Micro data communications
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Kelly Wiseman
Head of Software: Frank Ross
Head of Engineering: Ernie Nichols
Year Established: 1978
Number of Employees: 15

MICRO LAB
2699 Skokie Valley Road
Highland Park, IL 60035
(800) 323-9063
Target Industries: Retail
Target Applications: DBMS
Year Established: 1981
Number of Employees: 35

MICRO LEARNINGWARE
360 Pierce Ave.
P.O. Box 2134
N. Mankato, MN 56001
(507) 625-2205
Target Industries: Education; Agriculture
Target Applications: Education; Farm telecommunications
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 4

MICROLINE
1701 W. Front
Tyler, TX 75702
(214) 592-3778
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Utilities; Insurance
Target Applications: Office Management; Accounting; DBMS; WP
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: John Eastlea
Head of Software/Engineering: David Kesler
Year Established: 1979
Number of Employees: 6

MICRO/MACRO SYSTEMS, INC.
25th Floor
10 Columbus Circle
New York, NY 10019
(212) 246-4242
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Direct Mail; Construction; Financial; Contractors
Target Applications: Accounting; Graphics; Scientific Data Aquesition; Payroll
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Gerald Greenberg
Year Established: 1968
Number of Employees: 30

MICRO MAIN CONSULTANTS
3325 N. Arlington Heights Road
Arlington Heights, IL 60004
Major Markets: Maintenance/Other Services
Target Industries: Finance; Insurance; Engineering
Year Established: 1981
Number of Employees: 3

MICRO MAINFRAME, INC.
215 First St.
Cambridge, MA 02142
(617) 547-5019
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Fortune 500; Banking; Insurance
Target Applications: Financial Packages; Decision Support Systems
Year Established: 1982
Number of Employees: 5

MICRO MANUFACTURING SYSTEMS
187 Shagbark Drive
Westerville, OH 43081
(614) 895-0738
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing
Target Applications: Inventory; Complete MRP; Job Costing; General Accounting
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1979
Number of Employees: 5

MICROMAX COMPUTER INTELLIGENCE, INC.
55 John St.
New York, NY 10038
(212) 964-6202
Major Markets: Maintenance/Other Services
Target Industries: VSAM
Contacts:
Head of Sales: Larry Weiss
Year Established: 1979
Number of Employees: 23

MICRO MED, INC.
4903 Vine St.
Cincinnati, OH 45217
(513) 242-3344
Target Industries: Medical
Target Applications: Accounting; Billing
Year Established: 1979
Number of Employees: 7

MICRO MIS, INC.
P.O. Box 1440
Amarillo, TX
(806) 372-3633
Major Markets: OEM (Computer Systems); OEM (Peripherals/ Terminals), Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Robert Muir
Head of Software: Joe McCarty
Year Established: 1978
Number of Employees: 17

MICRONETICS DESIGN CORP.
932 Hungerford Drive
Rockville, MD 20850
(301) 424-4870
Major Markets: Systems House (Commercial OEM)
Target Industries: Medical; General Business
Target Applications: Medical; General Business
Contacts:
Head of Software: Bernard Schoch
Year Established: 1980
Number of Employees: 10

MICRONETICS, INC.
1926 Hollywood Blvd.
Hollywood, FL 33020
(305) 925-2333
Target Industries: Accountants
Target Applications: Client Write-ups
Year Established: 1978
Number of Employees: 4

MICRON, INC.
10045 Waterford Drive
Ellicott City, MD 21043
(301) 461-2721
Major Markets: Maintenance/Other Services
Year Established: 1975
Number of Employees: 3

THE MICROPERIPHERAL CORP.
2565 152nd Ave. N.E.
Redmond, WA 98052
(206) 881-7544
Major Markets: Communications Equipment Manufacturing
Year Established: 1979
Number of Employees: 27

MICROPHYS PROGRAMS
1737 W. 2nd St.
Brooklyn, NY 11223
(212) 375-5151
Year Established: 1978
Number of Employees: 10

MICRO POWER & LIGHT CO.
Suite 224
12621 Hillcrest Road
Dallas, TX 75230
(214) 239-6620
Target Industries: Education
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 12

MICROPROCESSOR LABORATORIES, INC.
Suite 104
11111 Richmond
Houston, TX 77082
(713) 266-1415
Major Markets: Computer Manufacturing
Target Industries: Legal, Engineering, Medical; Oil and Gas
Target Applications: Property Management, WP, Legal Information System; Project Management System
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Donnie Caruthers
Year Established: 1975
Number of Employees: 30

MICROPRODUCTS
24627 Watt Road
Ramona, CA 92065
(619) 789-6510
Major Markets: Peripheral Manufacturing; Systems House (Commercial OEM)
Year Established: 1978
Number of Employees: 7

MICROPRO INTERNATIONAL CORP.
33 San Pablo Ave
San Rafael, CA 94903
(415) 457-8990
Target Applications: Business
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1978
Number of Employees: 200

MICRORIM
Suite A200
1750 112th N.E.
Bellevue, WA 98004
(206) 453-6017
Contacts:
Head of Sales: Frank Slovenec
Year Established: 1981
Number of Employees: 21

MICROSOFT
10700 Northup Way
Bellevue, WA 98004
(206) 828-8080
Target Industries: Manufacturing
Year Established: 1976
Number of Employees: 150

MICROSOFTWARE SERVICES
P.O. Box 776
Harrisonburg, VA 22801
(703) 433-9485
Year Established: 1982
Number of Employees: 3

MICROSPARC, INC.
10 Lewis St.
Lincoln, MA 01773
(617) 259-9710
Target Industries: Personal Computers
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Tammy J. Arico
Head of Software: David Szetela
Year Established: 1981
Number of Employees: 15

MICROTEK SYSTEMS, INC.
Suite 103
9801 Kenilworth
Riverdale, MD 20737
(301) 277-7707
Major Markets: Farming/Ranching; Manufacturing; Dealer/Distributor; Maintenance/Other Services
Target Industries: Lodging; Food Services, Restaurant; Fast-Food Services
Target Applications: POS; Front Desk Accounting
Contacts:
Head of Engineering: Ken Fischer
Year Established: 1977
Number of Employees: 100

MICROSTUF, INC.
Suite 140
1845 The Exchange
Atlanta, GA 30339

(404) 952-0267
Target Applications: Data Communications
Year Established: 1979
Number of Employees: 12

MICRO-SYSTEMS SOFTWARE, INC.
4301-18 Oak Circle
Boca Raton, FL 33431
(305) 391-5033
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Chris Walczak
Year Established: 1979
Number of Employees: 13

MICROSYSTEMS, INC.
Suite 102
2500 E. Foothill Blvd.
Pasadena, CA 91107
(213) 5F7-1471
Major Markets: Component Manufacturing
Year Established: 1977
Number of Employees: 10

MICROTECH BUSINESS SYSTEMS, INC.
3180 Pullman St.
Costa Mesa, CA 92626
(714) 557-8640
Major Markets: OEM (Computer Systems), OEM (Peripherals/Terminals), Systems House (Commercial OEM)
Target Industries: Wholesale; Manufacturing; Legal; CPA
Target Applications: Business Systems
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales/Software: Bill Gallucci
Year Established: 1976
Number of Employees: 28

MICROTECH EXPORTS, INC.
467 Hamilton Ave.
Palo Alto, CA 94301
(415) 324-9114
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 7

MICRO-TECH, INC.
Suite 3309
1188 Bishop St.
Honolulu, HI 96813
(808) 544-0988
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Engineering; Medical; Legal, Professional
Target Applications: Graphics
Year Established: 1981
Number of Employees: 8

MID AMERICA BUSINESS COMPUTER, INC.
12345 W. 95th St.
Shawnee Mission, KS 66215
(913) 492-5805
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Medical, Construction; Wholesale
Target Applications: Accounts Receivable; Insurance; Statistical Report
Year Established: 1978
Number of Employees: 23

MID-AMERICAN CONTROL CORP.
U.S. 60 W.
P.O. Box 57
Shelbyville, KY 40065
(502) 633-5700
Major Markets: Systems House (Commercial OEM)
Target Industries: Government; Education; Distribution; Retail
Target Applications: Accounting; Payroll, Order Entry; POS
Year Established: 1976
Number of Employees: 20

MIDAS SYSTEMS CORP.
2030 E. 4th St.
No. 146
Santa Ana, CA 92705
(714) 973-0722
Major Markets: Systems House (Commercial OEM)
Target Industries: Accountants; Professionals
Target Applications: General Accounting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1975
Number of Employees: 10

MID ATLANTIC DATA SYSTEMS
286 Rt 206
Flanders, NJ 07886
(201) 584-9040
Target Industries: Distribution; Manufacturing
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Paul Vulopas
Head of Software: Sam Vulopas
Year Established: 1976
Number of Employees: 7

MIDCO DATA SYSTEMS
101 E. Central Ave.
P.O. Box 86
Minot, ND 58701
(701) 857-1155
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Retail; Education; Medical; Professional
Target Applications: General Accounting
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1971
Number of Employees: 28

MIDCONTINENT DATA
501 S. Phillips
Sioux Falls, SD 57102
(605) 336-1112
Major Markets: Data Services (Service Bureau)
Target Industries: Cable Radio and TV
Target Applications: Accounts Receivable, Billing; Scheduling
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales/Software: Richard Busch
Year Established: 1975
Number of Employees: 15

MIDEC, INC.
267 Kappa Drive
Pittsburgh, PA 15238
(412) 963-6011
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing
Target Applications: Accounting; Control; Scheduling
Year Established: 1976
Number of Employees: 9

MIDPENN INDUSTRIES, INC.
Midpenn Data Services, Inc.
1625 N. Front St.
Harrisburg, PA 17102
(717) 238-7288
Major Markets: Data Services (Service Bureau)
Target Applications: General Accounting; WP
Net Sales: $100,000 — $500,000 (1981)
Contacts:
[redacted]
Head of Software: Diane Ruminski
Year Established: 1978
Number of Employees: 5

MIDWEST COMPUTER CENTER CO.
5785 Merle Hay Road
[redacted]
Johnston, IA 50111
(515) 276-3387
Target Industries: Job Shop Manufacturing; Contractors; Professional Billing
Net Sales: $100,000 — $500,000
[redacted]
Year Established: 1976
Number of Employees: 5

MIDWEST COMPUTER SALES
2010 Mall St.
[redacted]
Major Markets: Systems House (Commercial OEM)
Contacts:
Head of Software: Lloyd Johnson
Year Established: 1980
Number of Employees: 6

MIDWEST MICRO-TEK, INC.
[redacted]
Brooklyn Center, MN 55429
(612) 560-6530
Major Markets: Component Manufacturing
Net Sales: $500,000 — $1 Million (1981)
Year [redacted]
Number of Employees: 3

MIKRON [redacted]
[redacted]
(Commercial OEM); Data Services
[redacted]
(1981)
Contacts:
Head of Sales: Mike Diamond
Head of Software/Engineering: Ron Moutarder
Year Established: 1975
Number of Employees: 4

MILLER MICROCOMPUTER SERVICE
61 Lake Shore Road
[redacted]
Major Markets: Systems House [redacted]
Maintenance/Other Services
Target Applications:
Communications; Data Base; WP; Accounting
Year Established: 1977
Number of Employees: 12

MILTON ALLEN & ASSOCIATES, INC.
300 E. Ohio Building
1717 E. 9th St.
Cleveland, OH 44114
(216) 861-8100
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other [redacted]
Target Industries: Manufacturing; MRP
Target Applications: All Systems for [redacted]
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1968
[redacted]

MINICORP CORP.
5680 S. Syracuse Circle
Englewood, CO 80111
[redacted]
[redacted]
Target Industries: Oil; Mining
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software/Engineering: Richard Shapiro
Year [redacted]
Number of Employees: 40

MINICRON SBC CORP.
Suite 2810
350 Fifth Ave.
New York, NY 10118
(212) 736-7970
Major Markets: Dealer/Distributor; [redacted]
Year Established: [redacted]
Number of Employees: 35

MINDEX INFOSYSTEMS
[redacted]
81 Centennial Loop
P.O. Box 5241
Eugene, OR 97405
[redacted]
Target Applications: Data retrieval; DBMS
Year Established: 1980
Number of Employees: 2

MINICOMP SYSTEMS, INC.
[redacted]
Grand Rapids, MI 49508
(616) 949-9130
[redacted] House
(Commercial OEM)
Maintenance/Other Services
Target Industries: Lumber; Distribution; Wholesale; Beverage Wholesale
Target Applications: POS; Accounting, Order Entry
Year Established: 1976
Number of Employees: 9

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
2441 Honolulu Ave.
Montrose, CA 91020
[redacted]
Target Industries: Distribution; Manufacturing
Target Applications: Accounting; Job Costing; Inventory Management; MRP

Vendors

Year Established: 1974
Number of Employees: 35

MINICOMPUTER ASSOCIATES, INC.
Suite 24
2160 Royale Road
Sacramento, CA 95815
(916) 929-1930
Major Markets: Systems House (Commercial OEM)
Target Industries: Publishing; Accountants; Contractors; Property Management
Target Applications: Job Cost Accounting; Billing Systems; WP
Year Established: 1976
Number of Employees: 5

THE MINICOMPUTER CO.
110 S. 7th St.
Richmond, VA 23219
(804) 780-2938
Major Markets: OEM (Computer Systems); Dealer/Distributor
Target Industries: Medical; Commercial
Target Applications: A/R; A/P; General Ledger; Payroll
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1976
Number of Employees: 18

MINICOMPUTER CONCEPTS, INC.
One Ames Court
Plainview, NY 11803
(516) 349-1910
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Construction; Distibution; Banking; Manufacturing
Target Applications: MRP
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Richard L. Grane
Year Established: 1978
Number of Employees: 12

MINI-COMPUTER SUPPORT GROUP, INC.
[illegible] Mayfield Road
Warrensville Heights, OH 44128
(216) 663-2772
Major Markets: Systems House (Commercial OEM)
Target Industries: Country Clubs; Distribution; Trucking; Non-Profit
Target Applications: Financial; Job Costing; Payroll; Sales Analysis
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Engineering: Rick Nash
Year Established: 1978
Number of Employees: 13

MINICOMPUTER SYSTEMS, INC. (CO)
[illegible] 15th St.
[illegible], CO 80302
(303) 443-3347
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintanance/Other Services
Year Established: 1973
Number of Employees: 8

MINI-COMPUTER SYSTEMS, INC. (NY)
399 Fairview Park Drive
Elmsford, NY 10523
(914) 592-8812
Major Markets: Computer Manufacturing, Systems House (Commercial OEM)
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Jim Tomkins
Head of Software/Engineering: Chris Sanders
Year Established: 1969
Number of Employees: 150

MINI DATA SYSTEMS
Suite 303
2041 Rosecrans Ave.
El Segundo, CA 90245
(213) 640-0404
Major Markets: OEM (Computer Systems); Dealer/Distributor; Maintanance/Other Services
Target Industries: Manufacturing; Distribution
Target Applications: Typesetting; Graphics
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1975
Number of Employees: 20

MINIDATA SYSTEMS
1901 Olympic Blvd.
Santa Monica, CA 90404
(213) 828-2038
Target Industries: Accountants, Medical
Target Applications: Client Writeup; Accounting; Payroll
Year Established: 1978
Number of Employees: 2

MINI-SYSTEMS, INC.
308 Main St.
Orange, NJ 07050
(201) 678-5686
Major Markets: Systems House (Commercial OEM)
Target Industries: Government; Commercial
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978
Number of Employees: 11

MINITAB, INC.
215 Pond Laboratory
University Park, PA 16802
(814) 865-1595
Target Industries: Math/Statistics; Education; Engineering; Manufacturing
Target Applications: Data Analysis; Statistics
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Stephan L. Arnold
Head of Software: Jerry Lefkowitz
Head of Engineering: Brian L. Joiner
Year Established: 1975
Number of Employees: 12

MMPS SOFTWARE DEVELOPEMNT, INC.
Suite 104
31555 W. 14 Mile Road
Farmington Hills, MI 48018
(313) 855-3552
Major Markets: Maintenance/Other Services
Target Industries: Finance; Research
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Dave Adams
Head of Software/Engineering: Ronald Pavlak
Year Established: 1976
Number of Employees: 8

M. I. S. ASSOCIATES
220 Washington Ave. Ext.
Albany, NY 12203
(518) 456-3303,
Major Markets: Systems House (Commercial OEM)
Target Industries: Broadcasting
Year Established: 1978

MIS INTERNATIONAL, INC.
Suite 109
24655 Southfield Road
Southfield, MI 48075
(313) 552-0550
Major Markets: Component Manufacturing; OEM (Computer Systems)

MISOSYS
P.O. Box 4848
Alexandria, VA 22303
(703) 960-2980
Major Markets: Systems House (Commercial OEM)
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978

MIS SOFTWARE CORP.
570 W. Mt. Pleasant Ave.
Livingston, NJ 07039
(201) 992-3964
Year Established: 1973
Number of Employees: 9

MITCHELL & GAUTHIER ASSOCIATES, INC.
P.O. Box 685
Concord, MA 01742
(617) 369-5115
Major Markets: Maintenance/Other Services
Target Industries: Aerospace; Utilities; Chemical
Year Established: 1975

MITCHELL-HUMPHREY & CO.
2029 Woodland Pkwy.
St. Louis, MO 63116
(314) 991-2440
Major Markets: Systems House (Commercial OEM)
Target Applications: Financial Management
Year Established: 1977
Number of Employees: 10

MITZ, INC.
580 Sylvan Ave.
Englewood Cliffs, NJ 07632
(201) 569-7575
Major Markets: Systems House (Commercial OEM)
Year Established: 1978
Number of Employees: 20

MITTS DATA SYSTEMS, LTD.
17932 Halsted
Homewood, IL 60430
(312) 799-6510
Major Markets: Dealer/Distributor; Maintenance/Other Services
Year Established: 1975
Number of Employees: 20

MJ SYSTEMS, INC.
2246 Ivy Road
Charlottesville, VA 22901
(804) 977-2732
Major Markets: OEM (Computer Systems)
Year Established: 1976
Number of Employees: 10

MLB SYSTEMS, INC.
6 Chelmsford Drive
Muttontown, NY 11545
(516) 626-0892
Major Markets: Systems House (Commercial OEM)
Target Industries: Finance
Year Established: 1979
Number of Employees: 15

MOBIUS MANAGEMENT SYSTEMS, INC.
271 N. Ave.
New Rochelle, NY 10801
(914) 632-7960
Major Markets: Maintenance/Other Services
Target Industries: Banking; Transportation; Retail; Manufacturing
Target Applications: Output Management
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: Steve Koss
Year Established: 1981
Number of Employees: 8

MODERN COMPUTER SYSTEMS, INC.
218 River Ridge Circle
Burnsville, MN 55337
(612) 890-5410
Major Markets: Systems House (Commercial OEM)
Target Industries: Banking
Year Established: 1980
Number of Employees: 20

MODERN MANAGEMENT, INC.
Modcam
2401 Central Road
P.O. Box 668
Charlotte, NC 28211
(704) 542-6546
Major Markets:
Target Industries: Manufacturing; Government; Education; Utilities
Contacts:
Head of Sales: Richard Lawson
Head of Software: R. Lidbotten
Year Established: 1972
Number of Employees: 15

MODERN MICROCOMPUTERS
63 Sudbury Lane
Westbury, NY 11590
(516) 333-9178
Major Markets: Systems House (Commercial OEM)
Target Industries: Accountants
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: R. Marc Kin
Head of Software: Barry Beebe
Head of Engineering: Sam Ulan
Year Established: 1977

MODULAR DATA SYSTEMS, INC.
17250 El Camino Real
Houston, TX 77058
(713) 486-1712
Major Markets: OEM (Computer Systems); OEM (Peripherals/Terminals)

Target Industries: Chemical; Utilities, Metal
Target Applications: Data Acquisition, Colorgraphics
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Rick Groth
Head of Engineering: Joe Murdock
Year Established: 1977
Number of Employees: 32

MODULAR INFORMATION SYSTEMS, INC.
1403 W Colonial Drive
Orlando, FL 32804
(305) 422-4160
Major Markets: OEM (Computer Systems); OEM (Peripherals/Terminals)
Target Industries: Banking; Thrift
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: John C Kimble
Year Established: 1977
Number of Employees: 30

MONARK DATA SCIENCES CORP.
Seven Century Drive
Parsippany, NJ 07054
(201)-540-9080
Major Markets: Computer and Terminal/Peripheral Manufacturing
Target Industries: Hospitals, Retail Footware, Motor Vehicle
Net Sales: More than $100 Million (1981)
Year Established: 1964
Number of Employees: 5,300

[illegible] INC.
1122 B St.
Hayward, CA 94541
(415) 581-1996
Major Markets: Systems House (Commercial OEM)
Target Industries: Chemical; [illegible]
Target Applications: Graphics
Year Established: 1978
Number of Employees: 32

MONARCH DATA CORP.
161 William St.
New York, NY 10038
(212) 964-7300
Major Markets: Data Seevices (Service Bureau); Maintenance/Other Services
Target Industries: Property Management
Net Sales: $1 Million — $5 Million (1982)
Year Established: [illegible]

MONROE SYSTEMS FOR BUSINESS
Litton Industries
[illegible]
P.O. Box 9000R
Morris Plains, NJ 07950
(201) 540-7300
Major Markets: Computer and Office Equipment Manufacturing; OEM (Computer Systems); Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Banking; Accounting
Target Applications: Financial
Net Sales: More than $100 Million (1981)
Year Established: 1912
Number of Employees: 3,300

MONTEZUMA MICRO
P.O. Box 1069
Camp Verde, AZ 86322
(602) 567-4289
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Transportation
Target Applications: Scheduling; Information Retrieval
Year Established: 1972
Number of Employees: 6

MOORE COMPUTING SYSTEMS, INC.
2312 Kent St
Bryan, TX 77801
(713) 779-6329
Major Markets: Systems House (Commercial OEM)
Target Industries: Small Business
Year Established: 1979
Number of Employees: 3

MOORE DATA SYSTEMS, INC.
6965 Van Gogh Ave
Baton Rouge, LA 70806
(504) 928-1763
Major Markets: Maintenance/Other Services
Target Industries: Government; Education
Year Established: 1974
Number of Employees: 50

MORGAN-FAIRFIELD GRAPHICS
P.O. Box 85457
Seattle, WA 98105
(206) 632-1374
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Graphic Arts; Corporate Communications; Marketing
Target Applications: Graphics
Year Established: [illegible]
Number of Employees: 5

MORS CONTROLS
13900 49th St. N.
P.O. Box 1208
Clearwater, FL 33517
(813) 530-7571
Major Markets: Component Manufacturing; OEM (Computer Systems)
Target Industries: Manufacturing
[illegible]
Head of Marketing/Sales: James [illegible]
Head of Software/Engineering: Ron [illegible]
Year Established: 1976
Number of Employees: 30

MORRO ASSOCIATES, INC.
[illegible]
8133 Leesburg Pike
Vienna, VA 22180
(703) 734-9494
Year Established: [illegible]
Number of Employees: 55

MORLAN SOFTWARE
[illegible]
P.O. Box [illegible]
Irondale, OH 43932
(216) 532-1617
Year Established: 1979
Number of Employees: 2

MORROW COMPUTER, INC.
1140 Murfreesboro Road
Nashville, TN 37217
(615) 366-1979
Major Markets: Computer Manufacturing; OEM (Computer Systems)
Target Industries: Plant Maintenance
Target Applications: Plant Maintenance
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Roger Brown
Head of Software: Stan Morrow
Year Established: 1974
Number of Employees: 20

MORTGAGE CLOSING ASSOCIATES
1300 W 4400 S.
Ogden, UT 84403
(801) 621-3900
Major Markets: Systems House (Commercial OEM)
Target Industries: Finance; Mortage Banking
Target Applications: Real Estate; Loan Processing, Accounting; Loan Servicing
Year Established: 1974
Number of Employees: 12

MORTGAGE SYSTEMS & SERVICES
1400 N Burton Place
Anaheim, CA 92806
(714) 535-1166
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Year Established: [illegible]
Number of Employees: 46

MOSTEK CORP.
1215 W Crosby Road
Carrollton, TX 75006
(214) 466-6000
Major Markets: Component, Computer and Peripheral Manufacturing
Target Industries: Manufacturing
Year Established: 1970
Number of Employees: 3,800

MOUNTAIN SOFTWARE GROWERS, INC.
Suite 236
[illegible]
Houston, TX 77006
(713) 526-5349
Major Markets: Maintenance/Other Services
[illegible]
Target Applications: Transaction Process, Query Language, Reporting Writer
Year Established: [illegible]
Number of Employees: 25

MPI SYSTEMS
P.O. Box 1032
[illegible]
(803) 984-2121
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing
Year Established: 1978
[illegible]

MPS CO.
8 N Grant Drive
Addison, IL 60101
(312) 543-1788

[illegible]
Target Industries: Engineering
Year Established: 1980
Number of Employees: 2

MRP SYSTEMS
2027 Harpers Way
Torrance, CA 90501
(213) 533-7027
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing-Furniture; Manufacturing-Electronic; Textile Printing
Target Applications: DBMS; Reportwriter
Net Sales: $500,000 — $1 Million (1981)
[illegible]
Head of Sales: Allen Bennett
Head of Software: Spencer Grees
Year Established: 1975
Number of Employees: 6

M.R.C. SYSTEMS
[illegible]
[illegible]
Houston, TX 77081
(713) 771-7511
Major Markets: Component and Peripheral Manufacturing, OEM (Computer Systems)
Target Industries: Systems Integrators
[illegible]
Number of Employees: 4

MRM, INC.
[illegible]
2525 N. 124th St
Brookfield, WI 53005
(414) 786-8634
[illegible]
Services
Year Established: 1968
Number of Employees: 20

MRP, INC.
1430 M. S. Village Way
Santa Ana, CA 92705
(714) 972-2000
Major Markets: Systems House (Commercial OEM);
[illegible]
Target Industries: Manufacturing, Distribution, Medical
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Ron Wrightstone
Year Established: 1973
Number of Employees: 42

M R SOFTWARE
30 Swayze St.
W Orange, NJ 07052
(201) 325-0106
Major Markets: Systems House [illegible]
Target Industries: Accounting; Legal, Professional Insurance
Year Established: 1975

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
[illegible]
Target Applications: Financial Management; Cash Management;

Vendors

Human Resource Management, [illegible]
Net Sales: More than $100 Million (1983)
Contacts:
Head of Software: Dennis Vohs
Year Established: 1980
Number of Employees: 1,100

MSC/TBS
2155 S. 3270 W.
Salt Lake City, UT 84119
(801) 973-5800
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Transportation; Library; General Business
Year Established: 1968
Number of Employees: 125

M.S.I. SOFTWARE, INC.
P.O. Box 370
Osterville, MA 02655
(617) 428-4725
Target Industries: General Business
Target Applications: Accounting; General Ledger; Personnel
Year Established: 1981
Number of Employees: 7

MSP, INC.
131 Hartwell Ave.
Lexington, MA 02173
(617) 863-5800
Net Sales: $5 Million — $25 Million (1982)
Year Established: 1968
Number of Employees: 50

MUIR & ASSOCIATES
8313 N.W. 66th St.
Miami, FL 33166
(305) 593-5139
Major Markets: Systems House (Commercial OEM)
Target Industries: Exporting; Freight
Contacts:
Head of Sales: Pablo Perez
Year Established: 1981
Number of Employees: 4

MULTICEPT CORP.
1721 Black River Blvd.
Rome, NY 13440
(315) 337-1000
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Small Business; Insurance, Accountants; Medical
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Barry K. Moritz
Year Established: 1978
Number of Employees: 35

MULTIPLICATIONS, INC.
[illegible] Massachusetts Ave.
Cambridge, MA 02138
(617) 864-5510
Major Markets: Maintenance/Other Services
Target Applications: Utilities
Contacts:
Head of Sales: S. David Dorken
Year Established: 1967
Number of Employees: 50

MULTI-SOFT
[illegible] E. 10th St.
New York, NY 10028
(201) 744-6644
Target Applications: OEMS
Year Established: 1981
Number of Employees: 6

MULTI-SYSTEMS
3014 Robert T. Longway Blvd
Flint, MI 48506
(313) 235-3538
Major Markets: Component Manufacturing; OEM (Computer Systems); Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing; Medical
Year Established: 1977
Number of Employees: 15

MUMFORD MICRO SYSTEMS
P.O. Box 400
Summerland, CA 93067
(805) 969-4557
Year Established: 1979
Number of Employees: 5

MURDIX CONTROL SYSTEMS, INC.
5495 Marion St.
Denver, CO 80216
(303) 296-1790
Major Markets: Component Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Mining; Power; Water and Waste
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Marwin L. Larsen
Head of Engineering: Michael T. Eisenhauer
Year Established: 1962
Number of Employees: 24

MUNICIPAL APPRAISAL SERVICE CORP.
P.O. Box 551
Fall River, MA 02722
(617) 679-8100
Target Industries: Municipalities
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Angelo Marino
Year Established: 1968
Number of Employees: 80

MUNICIPAL MANAGEMENT ASSOCIATES, INC.
[illegible] Massachusetts Ave.
Cambridge, MA 02139
(617) 661-0744
Major Markets: Data Services (Service Bureau)
Target Industries: Municipalities
Year Established: 1975
Number of Employees: 5

MUSE SOFTWARE
347 N. Charles St.
Baltimore, MD 21201
(301) 659-7212
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Personal Computer; Acme Business
Target Applications: Business; Games, Education
Year Established: 1977
Number of Employees: 30

MUSYS CORP.
1752-B Langley
Irvine, CA 92714
(714) 730-5692
Major Markets: Computer Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor
Target Industries: OEM
Contacts:
Head of Software: Alan Warshaver
Year Established: 1980
Number of Employees: 10

MVT MICROCOMPUTER SYSTEM, INC.
Suite 110
31225 La Baya
W. Lake Village, CA 91362
(213) 991-8518
Target Applications: WP; General; Commercial
Year Established: 1977
Number of Employees: 5

MALA ASSOCIATES
718 Pine St.
Herndon, VA 22070
(703) 437-8969
Major Markets: Maintenance/Other Services
Target Industries: Accountants
Target Applications: Tax Systems
Contacts:
Head of Software: Jacob P. Masters
Year Established: 1978
Number of Employees: 5

NATIONAL ADVANCED SYSTEMS
[illegible] E. Middlefield Road
Mountain View, CA 94043
(415) 962-6000
Major Markets: Component Manufacturing; Computer Manufacturing; OEM (Peripherals/Terminals); Maintenance/Other Services
Net Sales: More than $100 Million (1982)
Contacts:
Head of Sales: Jerry Ungermann
Head of Software: Alan Cade
Year Established: 1975
Number of Employees: 2,400

NATIONAL COMPUTER UTILITY
One Elizabethtown Plaza
Elizabeth, NJ 07207
(201) 289-9433
Major Markets: Data Services (Service Bureau)
Target Industries: Utility Billing; Accounts Recievable; Traffic Violations
Contacts:
Head of Sales: Bob Kenney
Head of Software: Joe Maier
Number of Employees: 150

NATIONAL DATA COMMUNICATIONS, INC.
Suite 150
[illegible] Harvest Hill Road
Dallas, TX 75230
(214) 386-0600
Major Markets: Component, Terminal, Communications Equipment Manufacturing; OEM (Computer Systems); OEM (Peripherals/Terminals); Systems House (Commercial OEM)
Target Industries: Health care
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: H. Porter
Head of Software: C. McRae
Head of Engineering: M. Smith
Year Established: 1968
Number of Employees: 320

NATIONAL DATA CORP.
Rapidata Division
20 New Dutch Lane
Fairfield, NJ 07006
(201) 227-0035
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Fortune 1000
Target Applications: Financial
Contacts:
Head of Software: Norbert Kubilos
Year Established: 1967
Number of Employees: 300

NATIONAL DATA PROCESSING CORP.
716 S. 17th St.
P.O. Box 3393
Wilmington, NC 28406
Major Markets: Data Services (Service Bureau)
Target Applications: Payroll
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1967
Number of Employees: 22

NATIONAL DATA SERVICES, INC.
21835 Nordhoff St.
Chatsworth, CA 91311
(213) 882-7360
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Applications: General Ledger; Payroll; Job Costing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Marcia Pidcock
Head of Software: Larry Carter
Year Established: 1963
Number of Employees: 75

NATIONAL DATATEC, INC.
4055 Cy Ave.
Casper, WY 82604
(307) 265-4888
Major Markets: Systems House (Commercial OEM), Dealer/Distributor, Miscellaneous Computer Supplies
Target Industries: Architecture; Medical; Legal, Banks
Target Applications: General Accounting
Contacts:
Head of Sales: Barbara Tatro
Head of Engineering: Ray Gotlob
Year Established: 1979
Number of Employees: 14

NATIONAL E-P-T, INC.
Systems Development
[illegible] Jefferson Blvd.
Warwick, RI 02886
(401) 781-3850
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Government; Banking
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Donald LaChance
Year Established: 1978
Number of Employees: 62

NATIONAL PEI, INC.
Marketing Division
Suite 4500
500 S. Ervay
Dallas, TX 75201
(214) 742-5569
Major Markets: OEM (Computer Systems); Data Services (Service Bureau)
Target Industries: Banking; Personnel
Target Applications: Profit Sharing; Employee Benefits; Estate Analysis
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Charles R. Kee Jr.
Year Established: 1971
Number of Employees: 50

NATIONAL QUEST SYSTEMS CORP.
1113A Nelson St.
Rockville, MD 20850
(301) 424-4014
Major Markets: Systems House (Commercial OEM)
Target Industries: Lodging; Restaurant
Contacts:
Head of Sales: Bob Burns
Head of Software: Fred Schoettler
Head of Engineering: Eli Nadel
Year Established: 1977
Number of Employees: 9

NATIONAL INFORMATION SYSTEMS, INC.
Suite 130
20370 Town Center Lane
Cupertino, CA 95014
(408) 257-7700
Major Markets: Data Services (Service Bureau)
Target Applications: WP; Project Management
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: John Enyday
Head of Software/Engineering: Rich Samson
Year Established: 1972
Number of Employees: 50

NATIONAL MEDICAL COMPUTER SERVICES
7578 Trade St.
San Diego, CA 92121
(714) 566-9920
Major Markets: Maintenance/Other Services
Year Established: 1974
Number of Employees: 38

NATIONAL REAL ESTATE EXCHANGE, INC.
Systems Division
331 N. Maitland Ave.
Unit D-9
P.O. Box 475
Maitland, FL 32751
(305) 647-8739
Major Markets: Systems House (Commercial OEM)
Target Industries: Real Estate
Target Applications: Property Management
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software/Engineering: James L. Lawson
Year Established: 1973
Number of Employees: 10

NATIONAL TIMESHARING & DATA SERVICES
8404 Niagara Falls Blvd.
Niagara Falls, NY 14304
(716) 297-0553
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Medical
Contacts:
Head of Sales: Dennis Slawson
Head of Software: Edward Dinik
Year Established: 1968
Number of Employees: 70

NATIONWIDE DATA DIALOG
70 James Way
Southampton, PA 18966
(215) 364-2800
Major Markets: Data Services (Service Bureau)
Target Industries: DEC RSTS Sites
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1976
Number of Employees: 10

NCA CORP.
Design Automation Group
388 Oakmead Pkwy.
Sunnyvale, CA 94086
(408) 245-7990
Major Markets: Data Services (Service Bureau)
Target Industries: Discrete Marketing
Contacts:
Head of Engineering: John Shephard
Year Established: 1969
Number of Employees: 230

NC COMPUTER SYSTEMS, INC.
Suite 109
1 Anabelle Lane
San Ramon, CA 94583
(415) 820-2823
Major Markets: OEM (Computer Systems); Dealer/Distributor
Target Industries: Manufacturing; Retail, Drug Manufacturing
Target Applications: OA
Year Established: 1981
Number of Employees: 5

NCCS, INC.
2235 Meyers Ave.
Escondido, CA 92025
(619) 745-6006
Major Markets: Data Services (Service Bureau)
Target Industries: Dec Users
Target Applications: RSTS/E
Contacts:
Head of Sales: Richard Baldwin
Head of Software: John Hayden
Year Established: 1968
Number of Employees: 25

NCR CORP.
World Headquarters
1700 S. Patterson Blvd.
Dayton, OH 45479
(513) 445-5000
Major Markets: Component, Computer, Terminal/Peripheral, Communications Equipment and Office Equipment Manufacturing; Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Retail; Banking; Commercial/Industrial, Medical Education; Government
Target Applications: Transaction Processing
Net Sales: More than $100 Million (1982)
Year Established: 1884
Number of Employees: 63,000

NEAL NELSON & ASSOCIATES
Suite 1908
185 N. Wabash
Chicago, IL 60601
(312) 332-3242
Year Established: 1973
Number of Employees: 5

NELSON DATA RESOURCES, INC.
Suite 118
900 S 74th Plaza
Omaha, NE 68114
(402) 397-3030
Target Applications: Accounting; Inventory Control; Hospital Management
Year Established: 1978
Number of Employees: 7

NEPENTHE PROGRAMS
Suite F
44 3rd Ave.
Chula Vista, CA 92010
(619) 425-5501
Year Established: 1978
Number of Employees: 4

NESTAR SYSTEMS, INC.
2585 E. Bayshore Road
Palo Alto, CA 94303
(415) 493-2223
Major Markets: Communications Equipment Manufacturing
Contacts:
Head of Sales: W. Coleman
Head of Engineering: L. Shustek
Year Established: 1978
Number of Employees: 100

NETWORK COMPUTING CORP.
Suite 40
5301 77th Center Drive
Charlotte, NC 28210
(704) 525-6810
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Utilities
Year Established: 1971
Number of Employees: 90

NETWORK CONCEPTS, INC.
2 Ridgedale Ave.
Cedar Knolls, NJ 07927
(201) 285-0202
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Financial; Security
Contacts:
Head of Sales: Richard Ward
Year Established: 1979
Number of Employees: 15

NETWORK DATA PROCESSING CORP.
321 3rd St. S.E.
Cedar Rapids, IA 52401
(319) 365-8591
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Insurance; Education
Year Established: 1958
Number of Employees: 54

NEW ENGLAND MANAGEMENT SERVICES
240 Bradley St.
New Haven, CT 06510
(203) 787-3452
Major Markets: OEM (Computer Systems), Systems House (Commercial OEM)
Target Industries: Manufacturing; Insurance, Investment Counsel; Country Clubs
Contacts:
Head of Sales: John Landry
Head of Software: David DiVincenzo
Year Established: 1978
Number of Employees: 18

NEW ENGLAND TECHNOLOGY
226 S. St
P.O. Box 280
Hopkinton, MA 01748
(617) 435-9031
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor; Maintenance/Other Services
Target Industries: Resort; Insurance, Construction; Accounting
Target Applications: Reservations Management, Property Management; Villa Rental Program
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Thomas Collins
Head of Software: Paul Hale
Head of Engineering: James P. Mezger
Year Established: 1978
Number of Employees: 10

NEW ERA TECHNOLOGIES, INC.
Suite 922
2025 I St. N.W.
Washington, DC 20006
(202) 887-5540
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Small Business; Associations, Fortune 1000; Clearing Houses
Target Applications: Electronic Mail; Networks; Communications; Information
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Joan Schindel
Head of Software: Ed Berard
Head of Engineering: Ann Magin
Year Established: 1979
Number of Employees: 6

NEW GENERATION SYSTEMS, INC.
2153 Golf Course Drive
Reston, VA 22091
(703) 476-9143
Major Markets: Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1981
Number of Employees: 2

NEWPORT WEST DATA SERVICES, INC.
317 Saratoga Ave.
Los Gatos, CA 95030
(408) 395-1778
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Miscellaneous

Vendors

Computer Supplies
Target Industries: Distribution, Manufacturing, Civil Engineering
Target Applications: Inventory Control, Earthwork Systems
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 4

NEW WAVE SYSTEMS
12123 Washington Place
Mar Vista, CA 90066
(213) 475-8545
Major Markets: Peripheral Manufacturing, Dealer/Distributor; Maintenance/Other Services
Target Applications: Bar Code System
Contacts:
Head of Engineering: Tom Poliquin
Year Established: 1980

[illegible] COMPUTER SYSTEMS, INC.
415 Keith Drive
P O Box 17553
Greenville SC 29606
(803) 271-3076
Major Markets: Maintenance/Other Services
Target Industries: Beverage Bottling
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 7

N. F. SYSTEMS, LTD.
P O Box 76363
Atlanta, GA 30358
(404) 252-3302
Major Markets: Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1971

NIAKWA MANAGEMENT SERVICES
[illegible]
Northbrook, IL 60062
(312) 291-0850
Major Markets: Systems House (Commercial OEM)
Target Industries: Accountants; Distribution, Wholesale; Manufacturing
Target Applications: General Ledger, Billing, WP, Client Accounting
Contacts:
Head of Software: E. Darrell Lynds
Year Established: 1975
Number of Employees: 12

[illegible]
Suite 104
5839 Green Valley Circle
Culver City, CA 90230
(213) 670-8400
Major Markets: Dealer/Distributor; [illegible]
Target Industries: Systems Development, Engineering; Construction; Manufacturing
Target Applications: Project Planning and Control
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1972
Number of Employees: 28

NISUS CORP.
6420 Castleway Drive
Indianapolis, IN 46250
(317) 849-8936
Major Markets: Maintenance/Other Services
Target Industries: Medical, Manufacturing; Orthodontal
Year Established: 1981

NIXDORF COMPUTER CORP.
300 Third Ave
Waltham, MA 02154
(617) 890-3600
Major Markets: Computer Systems Terminal/Peripheral, Communications Equipment Manufacturing, Software,Maintenance/Other Services
Target Industries: Banking, Government, Insurance, Retail Transportation
Target Applications: Information Processing; Distributed Data Processing; Data Entry, OA
Net Sales: More than $100 Million (1981)
Contacts:
Head of Sales/Marketing: James Addlesberger
Geographic Coverage: International
Year Established: 1952
Number of Employees: 1,800

NIXDORF COMPUTER SOFTWARE CO.
6517 Everglades Drive
Richmond, VA 23225
(804) 276-9200
Major Markets: Mainframe Systems Software
Target Industries: General Industry
Target Applications: System Software
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Sam Holland
Year Established: 1973
Number of Employees: 127

[illegible], INC.
P.O Box 439
Shawnee Mission, KS 66201
(913) 384-2147
Major Markets: Data Services (Service Bureau)
Target Industries: Banking
Year Established: 1974
Number of Employees: 55

NOBLE PRODUCTION AND [illegible], INC.
15 W 228 George St.
Bensenville, IL 60106
(312) 860-1555
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Maintenance/Other Services
Year Established: 1971

NOESIS COMPUTING CO.
615 Third St.
San Francisco, CA 94107
(415) 495-7440
Major Markets: OEM (Computer Systems); OEM (Peripherals/Terminals); Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Associations; Publishing
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1976
Number of Employees: 12

NORAMSO
6475 N Wadsworth
Arzuada, CO 80003
(303) 428-2930
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing Representatives
Year Established: 1979
Number of Employees: 7

NORDATA, INC.
100 Rt 46
Mountain Lakes, NJ 07046
(201) 335-0050
Major Markets: Computer Manufacturing, Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Food Distribution; Manufacturing
Target Applications: Manufacturing; Food Distribution
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Joseph Torre
Year Established: 1979
Number of Employees: 12

NORTH AMERICA MICA, INC.
11772 Sorrento Valley Road
San Diego, CA 92121
(619) 481-6998
Target Applications: Project Management
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1978
Number of Employees: 1

NORTH AMERICAN COMPUTER CONSULTANTS
11 N. Skokie Highway
Lake Bluff, IL 60044
(312) 234-7212
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Associations, Unions, Medical
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: George Neumeier
Year Established: 1969
Number of Employees: 60

NORTH AMERICAN TECHNOLOGY, INC.
Strand Building
174 Concord St.
Peterborough, NH 03458
(603) 924-6048
Major Markets: Maintenance/Other Services
Year Established: 1979

NORTH COAST AUTOMATION
12768 Chillicothe Road
Chesterland, OH 44026
(216) 729-2200
Major Markets: Dealer/Distributor
Target Industries: Industrial
Target Applications: Engineering [illegible]
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1980

NORTH COUNTY COMPUTER SERVICES
2235 Meyers Ave.
Escondido, CA 92025
(619) 745-6006
Major Markets: Data Services (Service Bureau)
Target Industries: Education
Year Established: 1968
Number of Employees: 25

NORTHEAST DATA SYSTEMS
20 A St.
Burlington, MA 01803
(617) 273-2920
Major Markets: Systems House (Commercial OEM), Dealer/Distributor
Target Industries: Distribution; Manufacturing; Mail Order
Contacts:
Head of Sales: Dale Hicks
Year Established: 1976
Number of Employees: 35

NORTHEAST DATACOM, INC.
4 Tower Drive
Wallingford, CT 06492
(203) 265-3455
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau)
Target Industries: Banking; Manufacturing, Thrift
Year Established: 1969
Number of Employees: 135

NORTHEASTERN DATA [illegible], INC.
P O Box 998
Glens Falls, NY 12801
(518) 798-1334
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Applications: Accounting
Year Established: 1977
Number of Employees: 4

NORTHERN DATA SYSTEMS [illegible], INC.
360 U.S. Rt. One
Falmouth, ME 04105
(207) 781-3236
Major Markets: Systems House (Commercial OEM), Dealer/Distributor
Target Industries: Medical; Oil; Food
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Charles R. Burns Jr.
Year Established: [illegible]
Number of Employees: 23

NORTHERN DATA SYSTEMS, INC.
48 Constitution Drive
Bedford, NH 03102
(603) 472-8855
Major Markets: OEM (Computer Systems)
Target Industries: Medical; Government, Contractors; Manufacturing Distribution
Target Applications: Financial Accounting
Contacts:
Head of Sales: Wayne Williams
Head of Software: Paul Desmond
Year Established: [illegible]
Number of Employees: 120

[illegible], INC.
[illegible]
Minneapolis, MN 55403
(612) 871-7667
Major Markets: Maintenance/Other [illegible]

Target Industries: Manufacturing
Contacts:
Head of Sales: Brad Carlson
Year Established: 1973
Number of Employees: 14

[illegible] TELECOM, INC.
Electronic Office Systems
[illegible] Park
P.O. Box 1222
Minneapolis, MN 55440
(612) 932-8000
Major Markets: Computer, Terminal/Peripheral, Communications Equipment and Office Equipment Manufacturing; Maintenance/Other Services
Target Industries: Manufacturing; Banking; Government; Education
Target Applications: Inquiry/Response; Data Entry; Distributed Data; Remote Job Entry
Contacts:
Head of Sales: S.T.Oppenheimer

PORTLAND INFORMATION SYSTEMS CORP.
355 Prairie View Road
Chippewa Falls, WI 54729
(715) 723-4451
Major Markets: Systems House (Commercial OEM)
Target Industries: Auto Parts Distribution, Veterinarians; Farm Supply/Dealers, Chiropractors
Target Applications: Inventory; Billing, Accounting; Payroll
Year Established: 1977
Number of Employees: 12

NORTHWEST ANALYTICAL, INC.
1532 S.W. Morrison
Portland, OR 97205
(503) 224-7727
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Analytical Laboratories
Target Applications: Statistical Analysis
Contacts:
Head of Engineering: Lewis Halvorsen
Year Established: 1976
Number of Employees: 11

NORTHWEST DIGITAL SOFTWARE
Spring Valley Road
P.O. Box 2-743
Newport, WA 99156
(509) 447-2620
Target Industries: DEC PDP-11
Year Established: [illegible]
Number of Employees: 3

NORTHWESTERN CONSULTING GROUP, INC.
[illegible]
Longwood, FL 32750
(305) 788-3731
Major Markets: Systems House (Commercial OEM); [illegible]
Maintenance/Other Services
Target Industries: Manufacturing; CPA, Hotel, Distribution
Target Applications: General Business, Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Nelson Feliciano
Head of Software: Eddie Rodriguez
Year Established: 1978
Number of Employees: 15

NORTHWESTCO COMPUTING, INC.
1800 130th Ave. N.E.
Bellevue, WA 98005
(206) 881-5111
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Hotel; Utilities; Accountants
Target Applications: Accounting
Contacts:
Head of Software: Dwight DeLong
Year Established: [illegible]
Number of Employees: 23

NOUR SOFTWARE
Suite 216
3662 Catalla Ave.
Los Alamitos, CA 90720
(213) 493-3654
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing
Year Established: 1977
Number of Employees: 8

NOVA TAPE, INC.
1071 E. 52nd St.
Hialeah, FL 33013
(305) 681-6681
Major Markets: OEM (Computer Systems)
Target Industries: Engineering; Manufacturing
Target Applications: CAD/CAM
Year Established: [illegible]
Number of Employees: 20

NOVVA COMPUTER SYSTEMS, INC.
[illegible]
190 S. King
Honolulu, HI 96813
(808) 521-8011
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; [illegible]/Other Services
Target Industries: Construction; Legal, Medical
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Jim Gillon
Head of Software: Jeffrey Y. Oki
Head of Engineering: Dave Gramann
Year Established: 1969
Number of Employees: 55

N.P.R.L.
Suite 100
1004 Prince St.
Alexandria, VA 22314
[illegible]
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Communications; Telemarketing
Contacts:
Head of Sales: Ron Chaidrock
Head of Software: Keith Roberts
Year Established: 1981
Number of Employees: 6

NPS AUTOMATION SERVICES
[illegible] Jefferson Road
Morris Plains, NJ 07950
(201) 455-1311
Major Markets: OEM (Computer Systems); Dealer/Distributor; [illegible]/Other Services
Target Industries: Assessment; Manufacturing; Construction; Engineering
Target Applications: Drafting; CAD/CAM; Robotics; Design
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1971
Number of Employees: 100

NUCLEAR DATA, INC.
Golf and Meacham Road
Schaumburg, IL 60196
[illegible]
Major Markets: Computer Manufacturing; OEM (Computer Systems)
Target Industries: Nuclear
Target Applications: Radiation Detection
Contacts:
Head of Software: Raymond C. [illegible]
Head of Engineering: Gerald W. Gaughran
Year Established: 1956
Number of Employees: 200

NU-COMP SYSTEMS, INC.
2277 W. Highway 36
St. Paul, MN 55104
(612) 646-4507
Major Services: Maintenance/Other Services
Target Industries: Banking; Insurance; Legal; Contractors
Conclusion:
Head of Software/Engineering: Packey Howatt
Year Established: 1977
Number of Employees: 33

NUMERICAL ALGORITHMS GROUP, INC.
1131 Warren Ave.
Downers Grove, IL 60515
(312) 971-2337
Contacts:
Head of Sales: Dr. Peter Kemp
Year Established: 1976
Number of Employees: 3

NUMERI-COMP, INC.
703 Grove St.
Rockford, IL 61108
[illegible]
Major Markets: Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Engineering; Manufacturing
Year Established: [illegible]
Number of Employees: 10

NUTRI-SYSTEMS, INC.
426 E. Shields Ave.
Fresno, CA 93704
[illegible]
Target Industries: Agriculture
Target Applications: Dairy Cattle Records; Nutrition Records
Year Established: 1969
Number of Employees: 6

NUVATEC, INC.
261 Eisenhower Lane S.
Lombard, IL 60148
[illegible]
Major Markets: OEM (Computer Systems), Systems House (Commercial OEM)
Target Industries: Software Development; Technology Application; Processing Control
Contacts:
Head of Sales: Stephen E. Morris
Head of Engineering: David J. [illegible]
Year Established: [illegible]
Number of Employees: 54

NYPLAN
135 Lake St. S.
Kirkland, WA 98033
[illegible]
Target Applications: Financial Modeling
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Software: Derek Smith
Year Established: 1975
Number of Employees: 14

OAK SOFTWARE
[illegible]
300 S. Duncan
Clearwater, FL 33515
(813) 441-1219
Major Markets: Systems House (Commercial OEM)
Target Industries: WP
Year Established: 1977
Number of Employees: 5

OASIS SYSTEMS
3692 Midway Way
San Diego, CA 92110
(619) 291-9496
Target Industries: Navy
Year Established: 1972

OASYS CORP.
60 Aberdeen Ave.
Cambridge, MA 02138
(617) 491-4180
Major Markets: OEM (Peripherals/Terminals), Dealer/Distributor
Target Applications: [illegible] Development
Contacts:
[illegible] Joe Sunsight
Year Established: 1982
Number of Employees: 15

OCCIDENTAL COMPUTER SYSTEMS, INC.
[illegible]
29384 Seagirt Way
Malibu, CA 90265
[illegible]
Year Established: 1974
Number of Employees: 3

OBTAL, INC.
1951 Colony St.
Mountain View, CA 94043
(415) 962-8080
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: CAD/CAM, CIC
Target Applications: CAD/CAM
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Software/Engineering: Ralph H. Guditz
Year Established: 1977
Number of Employees: 10

OCTO LTD.
Martinsville Center
Martinsville, NJ 08836
(201) 753-6286
Major Markets: Data Services (Service Bureau)

Vendors

Target Industries: Publishing; [illegible]
Year Established: 1972
Number of Employees: 125

ODYSSEY SYSTEMS, INC.
[illegible] Miller Road
Cleveland, OH 44141
(216) 526-9933
Major Markets: OEM (Computer Systems); OEM (Peripherals/Terminals); Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing; [illegible]
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Timothy K. Quinlan
Head of Engineering, Boyd Scott
Year Established: 1977
Number of Employees: 17

OHANLON COMPUTER SYSTEMS, INC.
[illegible] 225
11058 Main St.
Bellevue, WA 98004
(206) 454-2261
Major Markets: Systems House (Commercial OEM); [illegible]/Other Services
Target Industries: Small Business
Target Applications: Business Management
Year Established: 1979
Number of Employees: 12

OIL INDUSTRY COMPUTER SERVICES, INC.
Suite 415
8700 Stemmons Expwy.
Dallas, TX 75247
(214) 631-1528
Major Markets: Systems House (Commercial OEM); [illegible] Other Services
Target Industries: Oil
Target Applications: Oil; Gas; Accounting; Financial
Year Established: 1955
Number of Employees: 21

OIL-TROMIX, LTD.
[illegible] 1240
1580 Lincoln St.
Denver, CO 80203
[illegible]
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Oil; Gas
Year Established: 1972
Number of Employees: 20

OIR, INC. (ORGANIZATION FOR INDUSTRIAL RESEARCH)
[illegible] Road
Waltham, MA 02154
(617) 890-4030
Target Industries: Manufacturing
Year Established: 1979
Number of Employees: 35

OLASSIC SYSTEMS CORP.
141 W. Jackson Blvd.
[illegible], IL 60604
(312) 786-1410
Major Markets: Data Services (Service Bureau)
Target Industries: Commodities
Target Applications: CAD/CAM; Video Transaction
Year Established: 1973
Number of Employees: 14

OLYMPIA COMPUTING CO.
7249 Capitol Blvd. S.
Tumwater, WA 98501
(206) 352-0922
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Education
Year Established: 1980
Number of Employees: 7

OLYMPIA DATA SYSTEMS, INC.
Suite J
295 Plus Park Blvd.
Nashville, TN 37217
(615) 361-8404
Major Markets: Systems House (Commercial OEM)
Target Industries: Real estate; Legal; Construction; Lending
Year Established: 1975
Number of Employees: 20

OLYMPIC SYSTEMS, INC.
410 Macklyn Ave.
Santa Rosa, CA 95405
(707) 526-1294
Target Industries: Manufacturing
Year Established: 1978

OMEGA COMPUTER CONSULTANTS, INC.
230 Northland Blvd.
Cincinnati, OH 45246
(513) 772-7167
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Distribution; Engineering
Target Applications: Graphics
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: R. Braley
Head of Software: S. Shoemaker
Year Established: 1978

OMEGA DESIGN
2522 Grand Canal Blvd.
Suites 4 and 5
Stockton, CA 95207
(209) 957-8631
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Medical; Distribution; Property Management; Legal
Target Applications: Professional; General Business, WP
Year Established: 1978
Number of Employees: 5

OMEGA MICROWARE, INC.
222 S. Riverside
Chicago, IL 60606
(312) 648-4844
Year Established: 1980
Number of Employees: 12

OMEGA SYSTEMS
160 N. Craig St.
Pittsburgh, PA 15213
(412) 681-7575
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Manufacturing; Unions, Retail; Wholesale
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Ralph Miller
Head of Software: Tom Whalen
Year Established: 1975
Number of Employees: 40

OMIKRON ASSOCIATES
1127 Hearst Ave.
Berkeley, CA 94702
(415) 845-8013
Major Markets: Component Manufacturing, Dealer/Distributor
Year Established: 1978
Number of Employees: 12

OMNI COMPUTER SERVICE
Highway 11 E.
P.O. Box Box 26
Piney Flats, TN 37686
(615) 538-5101
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Medical
Year Established: 1976
Number of Employees: 7

OMNI DATA SYSTEMS
1857 Craig Park St.
St. Louis, MO 63141
(314) 576-5757
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Beverage Wholesalers
Year Established: 1978
Number of Employees: 5

OMNI SOFTWARE SYSTEMS, INC.
146 N. Broad St.
Griffith, IN 46319
(219) 924-3522
Major Markets: OEM (Peripherals/Terminals); Systems House (Commercial OEM)
Target Industries: General Business, Accounting
Target Applications: Accounting; Graphics, Business
Year Established: 1977
Number of Employees: 8

OMNITRONICS
1015 Merrick Road
Copiague, NY 11726
(516) 842-1391
Major Markets: Systems House (Commercial OEM)
Target Industries: Retail; Wholesale; Medical; Legal
Contacts:
[illegible]
Year Established: 1974
Number of Employees: 5

OMNI 360 CORP.
[illegible] II
8700 W. 36th St.
St. Louis Park, MN 55426
(612) 933-5577
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Agriculture; [illegible]
Year Established: 1979
Number of Employees: 10

OMNIC CORP.
[illegible] Tower Hill Road
P.O. Box 309
Chaplan, CT 06235
(203) 455-0492
Target Industries: IBM Personal Computers
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1981
Number of Employees: 10

ON-LINE BUSINESS SYSTEMS
OBS Software Division
115 Sansome St.
San Francisco, CA 94104
(415) 391-9555
Major Markets: Data Services (Service Bureau)
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Sales: Robert Iger
Head of Software/Engineering: Gary Meyers
Year Established: 1981
Number of Employees: 300

ON-LINE FINANCIAL [illegible], INC.
900 Commerce Drive
Oak Brook, IL 60521
(312) 920-7800
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Banking
Year Established: 1970
Number of Employees: 125

ON-LINE SOFTWARE INTERNATIONAL
2 Executive Drive
Fort Lee Executive Park
Fort Lee, NJ 07024
(201) 592-0009
Target Industries: Manufacturing
Target Applications: Manufacturing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
[illegible]
Head of Software/Engineering: John [illegible]
Year Established: 1980
Number of Employees: 200

ON-LINE DATA SYSTEMS
Suite 200
2974 LBJ Freeway
Dallas, TX 75234
(214) 620-8000
Major Markets: Systems House (Commercial OEM)
Target Industries: Construction; Dispatch, Legal, Gas Retail
Target Applications: General Business; Cost Accounting; Scheduling; Planning
Contacts:
Head of Sales: J. R. Powers
Year Established: 1976
Number of Employees: 15

OPCODE, INC.
P.O. Box 3537-114
Austin, TX 78764
[illegible]
Major Markets: [illegible] Maintenance/Other Services
Target Industries: Scientific
Target Applications: Data [illegible] Reduction
Year Established: 1971
Number of Employees: 6

OPEN END SYSTEM
P.O. Box 2926
Newport Beach, CA 92663
(714) 631-3021
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Manufacturing; Clothing; Legal; Accounting
Net Sales: $5 Million — $25 Million (1982)
Year Established: 1978
Number of Employees: 20

OPEN SYSTEMS, INC.
430 Oak Grove
Minneapolis, MN 55403
(612) 870-3515
Target Applications: Accounting Software
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Mark Coronne
Head of Software: Tom Kuder
Year Established: 1976
Number of Employees: 60

OPTICAL RESEARCH ASSOCIATES
550 N. Rosemead Blvd.
Pasadena, CA 91107
(213) 351-8966
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Medical; Aerospace; Optical Contacts
Head of Engineering: Mr. Hilbert
Year Established: 1958
Number of Employees: 17

OPTICAL SYSTEMS DESIGN, INC.
3 Johnson Ave.
Medford, MA 02155
(617) 488-3049
Major Markets: Maintenance/Other Services
Target Industries: Aerospace
Year Established: 1976

OPTIMIZED SYSTEMS SOFTWARE, INC.
12379 Lynndale Ave.
Cupertino, CA 95014
(408) 446-3099
Year Established: 1981
Number of Employees: 5

OPTIMUM SYSTEMS, INC.
11800 S. W. Barnes Road
Portland, OR 97225
(503) 641-0100
Target Industries: Insurance; Finance Companies; Funeral Homes
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: R. H. Matthews
Year Established: 1976
Number of Employees: 10

OPTION 1
P.O. Box 5010
Woodland Hills, CA 91365
(213) 999-6250
Major Markets: Maintenance/Other Services
Target Applications: WP
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1978
Number of Employees: 5

OPT/TECH, INC.
5729 Pearl Road
Parma, OH 44129
(216) 842-7000
Major Markets: Component Manufacturing; Systems House (Commercial OEM)
Contacts:
Head of Sales: M. N. Parks
Year Established: 1976
Number of Employees: 4

ORACLE CORP.
Building 3, Suite 180
3000 Sand Hill Road
Menlo Park, CA 94025
(415) 854-7350
Target Applications: DBMS
Contacts:
Head of Software: Robert Miner
Year Established: 1979
Number of Employees: 40

ORBIS CORP.
P.O. Box 14818
N. Palm Beach, FL 33408
(305) 848-4004
Major Markets: Maintenance/Other Services
Target Industries: Scientific; Engineering; Simulation
Target Applications: Performance Monitor, Graphics, Utilities
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 6

OREGON SOFTWARE, INC.
2340 S. W. Canyon Road
Portland, OR 97201
(503) 226-7760
Target Industries: Engineering; Scientific; Education
Contacts:
Head of Sales: Alma Smith
Year Established: 1975
Number of Employees: 28

ORGANIZATION CHANGE CORP.
One Bristol Lane
Bloomfield, CT 06002
(203) 242-8462
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Applications: Human Resources Management
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: David B. Spece
Head of Software: James Tsokalas
Year Established: 1976
Number of Employees: 68

ORI, INC.
Headquarters
1400 Spring St.
Silver Spring, MD 20910
(301) 588-6180
Major Markets: Maintenance/Other Services
Target Industries: Government Agencies, High-Technology Companies
Target Applications: Engineering models
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Software: Fred Zuzman
Year Established: 1953
Number of Employees: 572

O. R., INC.
4415 W. Harrison
Hillside, IL 60162
(312) 449-9343
Major Markets: Data Services (Service Bureau)
Year Established: 1973
Number of Employees: 25

ORION SOFTWARE, INC.
Suite 200
430-J Totten Pond Road
Waltham, MA 02154
(617) 890-2223
Major Markets: Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: John Wilson
Head of Software: Wilton Rooks
Year Established: 1977
Number of Employees: 30

ORION SYSTEMS
3350 Scott Blvd.
Building 34
Santa Clara, CA 95051
(408) 727-3812
Major Markets: Systems House (Commercial OEM)
Target Industries: Medical
Year Established: 1974
Number of Employees: 28

OR/MS DIALOGUE, INC.
19 Rector St.
New York, NY 10006
(212) 425-2665
Major Markets: Data Services (Service Bureau)
Target Industries: Finance; Marketing
Target Applications: Decision Support; Information Analysis; Marketing Forecasting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Henry Abelman
Year Established: 1981
Number of Employees: 10

THE ORTHOCODE CORP.
P.O. Box 6191
Albany, CA 94706
(415) 753-3000
Major Markets: Dealer/Distributor; Maintenance/Other Services
Target Industries: Legal
Target Applications: Text-based WP
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 8

OUTPUT REPORTING, INC.
140 W. St. Charles Road
Villa Park, IL 60181
(312) 530-4010
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: C. J. Banakis
Year Established: 1979
Number of Employees: 9

OVATION TECHNOLOGY
1175 Dayton St.
Denver, CO 80204
(617) 825-1420
Target Industries: Petroleum Companies
Target Applications: Integrated Productivity Software
Contacts:
Head of Marketing: Michael Walrod
Head of Software: Robert Kutnick
Geographic Coverage: International
Year Established: 1983
Number of Employees: 28

OWL ASSOCIATES, INC.
P.O. Box 2303
Grand Junction, CO 81502
(303) 245-8363
Year Established: 1978
Number of Employees: 8

O-WP DATA PROCESSING
859 Conrad St.
Orlando, FL 32804
(305) 628-4717
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau)
Target Industries: Manufacturing
Year Established: 1971
Number of Employees: 6

OXFORD SOFTWARE CORP.
174 Boulevard
Hasbrouck Heights, NJ 07604
(800) 631-1615
Contacts:
Head of Sales: Dennis Crow
Year Established: 1975
Number of Employees: 125

PACE APPLIED TECHNOLOGY, INC.
7900 Sudley Road
Manassas, VA 22110
(703) 368-3300
Year Established: 1968

PACESETTER SYSTEMS, INC.
Suite 130
4141 Blue Lake Circle
Dallas, TX 75244
(214) 386-0241
Target Industries: Banking
Year Established: 1976
Number of Employees: 13

PACIFIC AREA COMPUTER SERVICE, INC.
Suite 211
577 Ala Moana Blvd.
Honolulu, HI 96813
(808) 531-2262
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Lodging
Year Established: 1977
Number of Employees: 11

PACIFIC BENCHMARK SYSTEMS, INC.
7188 Clairemont Mesa Blvd.
San Diego, CA 92111
(714) 292-4741
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1975
Number of Employees: 21

PACIFIC BUSINESS SYSTEMS
2817 Tongass
Ketchikan, AK 99901
(907) 225-4166
Major Markets: Systems House (Commercial OEM), Dealer/Distributor; Maintenance/Other Services

Vendors

Target Industries: Government; Airline, Legal
Year Established: 1981
Number of Employees: 5

PACIFIC COMPUTER
Suite 108
1094 Cudahy Place
San Diego, CA 92106
(619) 275-2211
Major Markets: OEM (Computer Systems), Dealer/Distributor
Target Industries: Education, Medical, Real estate, Contractors
Target Applications: Accounting; DBMS
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1981
Number of Employees: 3

PACIFIC SOFTWARE MANUFACTURING CO.
10th and Parker
Berkeley, CA 94710
(415) 540-5000
Target Industries: Micros
Target Applications: Communications, DBMS; Word Processing
Year Established: 1981
Number of Employees: 20

PAFEC ENGINEERING CONSULTANTS, INC.
Suite 810
5401 Kingston Pike
Knoxville, TN 37919
(615) 584-2117
Target Industries: Engineering
Target Applications: Finite Element Modeling; CAD; Geometric Design
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 6

PALLAS, INC.
Life Division
2606 Fortune Circle E. Drive
Indianapolis, IN 46241
(317) 243-7591
Target Industries: Insurance
Target Applications: Home Office Administration
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1979
Number of Employees: 170

PALM BEACH COMPUTERS, INC.
2541 Lantana Road
Lantana, FL 33462
(305) 967-1000
Major Markets: Component and Computer Manufacturing; OEM (Computer Systems)
Target Industries: Accounting; General Business
Contacts:
Head of Software: T. D. Farnsworth
Year Established: 1978
Number of Employees: 5

PANATTEL, INC.
11450 Markon Drive
Garden Grove, CA 92641
(714) 893-8521
Major Markets: Maintenance/Other Services
Target Industries: High Technology; Automotive
Year Established: 1971
Number of Employees: 21

PANSOPHIC SYSTEMS, INC.
709 Enterprise Drive
Oak Brook, IL 60521
(312) 986-6000
Year Established: 1969
Number of Employees: 375

PARAGON DATA SYSTEMS
927 E. King St
Winona, MN 55987
(507) 452-8833
Major Markets: Systems House (Commercial OEM)
Target Industries: Boundaries, Construction; Funds Accounting
Target Applications: Financial Accounting; Cost Analysis
Year Established: 1978
Number of Employees: 5

PARA RESEARCH, INC.
Whistlestop Mall
Rockport, MA 01966
(617) 546-3413
Major Markets: Data Services (Service Bureau)
Contacts:
Head of Software: Jeffrey Papows
Year Established: 1972
Number of Employees: 80

PARK AVENUE DATA SERVICES, INC.
458 Park Ave.
Worcester, MA 01610
(617) 756-4544
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Accountants
Year Established: 1970
Number of Employees: 9

PARKER COMPUTER SYSTEMS
P O Box 16386
Ft. Worth, TX 76133
(817) 429-6482
Major Markets: OEM (Computer Systems)
Target Industries: Medical; Legal
Year Established: 1980
Number of Employees: 5

PARK SOFTWARE
P O Box 202
Seattle, WA 98121
(206) 284-4025
Major Markets: Data Services (Service Bureau)
Target Industries: Employee Benefits, Timesharing
Year Established: 1978
Number of Employees: 15

PARK SOFTWARE
Northgate Station
P.O Box 202
Seattle, WA 98125
(206) 284-4025
Major Markets: Maintenance/Other Services
Year Established: 1980
Number of Employees: 3

PASS CORP.
12832 Garden Grove Blvd.
Garden Grove, CA 92643
(714) 636-2576
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Leasing; Mail order
Target Applications: WP; Order entry; Accounting
Contacts:
Head of Software: Mike Brooks
Year Established: 1969
Number of Employees: 50

PASSPORT DESIGNS, INC.
116 Calbrillo Highway
Half Moon Bay, CA 94019
(415) 726-0280
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Music-entertainment
Target Applications: Performance; Education; Synthesizer Capabilities
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Software: John Borowicz
Year Established: 1980
Number of Employees: 11

PASSWORD SYSTEMS, INC.
17 and 23 Lake St
Hamburg, NY 14075
(716) 649-3311
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Distribution
Target Applications: Accounting; General Ledger
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1971
Number of Employees: 5

PATHWAY DESIGN, INC.
177 Worcester St.
Wellesley, MA 02181
(617) 237-7722
Year Established: 1981
Number of Employees: 9

PATTERN SYSTEMS OF N.J.
1259 Rt 46
Parsippany, NJ 07054
(201) 335-7804
Year Established: 1981
Number of Employees: 45

PATTON CONSULTANTS, INC.
3699 W Henrietta Road
Rochester, NY 14623
(716) 334-2554
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Field Service; Manufacturing; Utilities
Target Applications: Inventory Management; Document Indexing; Equipment Records; Purchasing
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Joseph D. Patton
Head of Software: Lawrence Brust
Year Established: 1975
Number of Employees: 8

P. B. [illegible], INC.
3685 Enochs St.
Santa Clara, CA 95051
(408) 739-9070
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Manufacturing; Distribution
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1976
Number of Employees: 42

PBL ASSOCIATES
10 Cottage Ave
Point Richmond, CA 94801
(415) 234-4338
Target Industries: Banking; Distribution
Target Applications: Accounting
Year Established: 1969
Number of Employees: 35

PBL CORP.
P O Box 559
Wayzata, MN 55391
(612) 473-3769
Target Industries: Computer Retailers
Year Established: 1981
Number of Employees: 4

PBS COMPUTING, INC.
3550 N. Lexington
Shoreview, MN 55112
(612) 484-8800
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Accountants
Year Established: 1980

PCC SYSTEMS
Suite 108
110 Cypress Station Drive
Houston, TX 77090
(713) 537-5337
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Year Established: 1979
Number of Employees: 5

PCS SYSTEMS, INC.
P.O. Box 143
Penn Yan, NY 14527
(315) 536-7428
Target Industries: Medical; General Business; Software Developers; OEM
Target Applications: Accounting; DBMS, Operating Systems; Medical Nutrition
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1979
Number of Employees: 19

PDA, INC.
2121 Enterprise Road
Oak Brook, IL 60521
(312) 932-2200
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Manufacturing; Distribution
Contacts:
Head of Sales: Gerald Wolf
Head of Software: Jerry Christenson
Year Established: 1975
Number of Employees: 50

PDA ENGINEERING
1560 Brookhollow Drive
Santa Ana, CA 92705
(714) 556-2800
Major Markets: Data Services (Service Bureau)
Target Industries: Government; Engineering
Target Applications: Graphics; Structural Analysis
Net Sales: $5 Million — $25 Million (1982)

Contacts:
Head of Software: Louis Crane
Year Established: 1972
Number of Employees: 110

PDPS COMPUTER SERVICES
22 E. Mitchell Drive
Phoenix, AZ 85012
(602) 265-5311
Major Markets: Data Services (Service Bureau)
Target Industries: Medical
Year Established: 1968
Number of Employees: 20

PEACHTREE SOFTWARE, INC.
3445 Peachtree Road N.E.
Atlanta, GA 30326
(404) 239-3000
Target Applications: End User
Year Established: 1977
Number of Employees: 145

PEAT [illegible] MITCHELL & CO.
919 Third Ave.
24th Floor
New York, NY 10022
(212) 758-9700

PEGASUS SOFTWARE
P.O. Box 10014
Honolulu, HI
(808) 735-5013
Major Markets: Communications Equipment Manufacturing, Systems House (Commercial OEM); Dealer/Distributor
Target Applications: Scientific
Year Established: 1979
Number of Employees: 80

PENNINGTON SYSTEMS, INC.
[illegible]
Building C
Pennington, NJ 08534
(609) 737-2727
Major Markets: Maintenance/Other Services
Target Applications: Software Conversion; Data Entry; Utility [illegible]
Year Established: 1977

PENTA SYSTEMS, INTERNATIONAL
1 E. Chase St.
[illegible], MD 21202
(301) 244-0050
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing
Target Applications: Phototypesetting
Contacts:
Head of Sales: Jerry Ulbricht
Head of Engineering: Richard Moore
Year Established: 1969
Number of Employees: 105

PERCEPTION TECHNOLOGY CORP.
[illegible]
Canton, MA 02021
(617) 821-0320
Major Markets: Component and Peripheral Manufacturing; OEM (Computer Systems); OEM (Peripherals/Terminals); Systems House (Commercial OEM)
Target Industries: Banking; Manufacturing; Distribution; Engineering
Target Applications: Payroll; Credit Verifying; Touch Tone Response; Data Entry
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: James Van Bokkelen
Head of Engineering: Leon A. Farber
Year Established: 1968
Number of Employees: 45

PERGAMINE SYSTEMS, INC.
15530 Rockfield Blvd.
Building C
Irvine, CA 92714
(714) 855-3923
Major Markets: Computer Manufacturing, Dealer/Distributor; Maintenance/Other Services
Target Industries: Fortune 500
Contacts:
Head of Sales: Rick Diederich
Head of Software: Chris Cole
Head of Engineering: Gary Story
Year Established: 1979
Number of Employees: 8

PERFECT SOFTWARE, INC.
1400 Shattuck Ave.
Berkeley, CA 94709
(415) 644-3644
Major Markets: Systems House (Commercial OEM)
Target Industries: Retail; Insurance; Banking
Target Applications: Financial
Contacts:
Head of Software: Duncan Lindsay
Head of Engineering: Bob Wesson
Year Established: 1981
Number of Employees: 25

PERFORMANCE MANAGEMENT, INC.
1205 W. Loop N. 120-A
Houston, TX 77055
(713) 680-1781
Target Industries: Oil; Food
Year Established: [illegible]
Number of Employees: 20

PERFORMANCE SYSTEMS, INC.
30 Courthouse Square
Rockville, MD 20850
(301) 762-0300
Major Markets: Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Ronald Schubert
Year Established: 1978
Number of Employees: 20

PERICOMP CORP.
14 Huron Drive
Natick, MA 01760
(617) 237-4052
Major Markets: Computer Manufacturing, Systems House (Commercial OEM); Miscellaneous Computer Supplies
Target Industries: Tape Users
Target Applications: Accounting; Inventory Control, Planning
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1971
Number of Employees: 35

PERMISSION SOFTWARE
[illegible] Savannah St.
[illegible], NC 27406
(919) 275-5824
Year Established: 1982

PERSOFT, INC.
2740 Ski Lane
Madison, WI 53713
(608) 233-1000
Year Established: 1982
Number of Employees: 13

PERSONNEL DATA SYSTEMS, INC.
White Marsh Plaza
15 E. Ridge Pike
Conshohocken, PA 19428
(215) 828-4294
Target Applications: Personnel Payroll
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Charles Jefferies
Head of Engineering: Stephen Young
Year Established: 1969
Number of Employees: 50

PERSONNEL RESEARCH, INC.
1901 Chapel Hill Road
Durham, NC 27707
(919) 493-7534
Major Markets: Data Analysis
Target Industries: General Business
Target Applications: Affirmative [illegible]
Contacts:
Head of Software: Chris Northup
Year Established: 1979
Number of Employees: 14

PERTAME SYSTEMS
Suite 307
625 Ellis St.
Mountain View, CA 94043
(415) 962-8700
Major Markets: Systems House (Commercial OEM); [illegible]
Target Industries: Education
Contacts:
Head of Software: Duane Percox
Year Established: 1980
Number of Employees: 5

PETER T. [illegible] & CO.
International Bank Systems
611 E. Wisconsin Ave
[illegible], WI 53202
(414) 272-1313
Target Industries: International [illegible]
Target Applications: International Bank Accounts; Communications
[illegible] — $499,000
(1981)
Year Established: 1979
Number of Employees: 10

PETROCOMP SYSTEMS
Suite 940
1111 N. Loop W.
Houston, TX 77008
[illegible]
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Petroleum
Target Applications: Engineering
Contacts:
Head of Engineering: L. Youngblood
Year Established: 1979
Number of Employees: 24

PETROLEUM DATA SYSTEMS, INC.
[illegible] E. 18th Ave.
Denver, CO 80218
[illegible] 825-5467
Major Markets: [illegible]
(Service Bureau); Maintenance/Other Services
Target Industries: Oil — Gas; Mining
Target Applications: Land Lease Management, Gas & Oil Accounting; Accounting for Mining
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Charles Craig
Year Established: [illegible]
Number of Employees: 65

PETROLEUM INFORMATION CORP.
Computer Research
5161 Ward Road
Wheat Ridge, CO 80033
(303) 421-0644
Major Markets: Systems House (Commercial OEM)
Target Industries: Petroleum
Net Sales: $1 Million — $5 Million (1980)
Contacts:
Head of Sales: Joseph Hobbs
Year Established: [illegible]
Number of Employees: 25

PETROLEUM SOFTWARE SYSTEMS, INC.
8265 S. Walker
Oklahoma City, OK 73139
(405) 636-1567
Major Markets: Systems House (Commercial OEM); [illegible]
Target Industries: Oil; Gas
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: John W. Richardson
Year Established: 1978
Number of Employees: 20

PETTED MICRO SYSTEMS
8401 W. Layton
Milwaukee, WI 53228
(414) 529-2821
Major Markets: Dealer/Distributor
Target Industries: Accounts, Legal; Medical, Financial
Contacts:
Head of Sales: Peter Little
Year Established: 1979
Number of Employees: 6

PHANTOS RESEARCH
[illegible] Allegheny Ave.
Bosley Building
Towson, MD 21204
Major Markets: Systems House [illegible]
Target Industries: Accountants; Legal
Target Applications: WP; A/P; A/R; Time Accounting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Dana Morezak
Year Established: 1971
Number of Employees: 16

PHASE ONE SYSTEMS, INC.
Suite 830
7700 Edgewater Drive
Oakland, CA 94621
[illegible]
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Richard Wrenn
Head of Software: Tim Williams

Vendors

Year Established: 1977
Number of Employees: 40

PHASSOCIATES, INC.
8720 Old Courthouse Road
Vienna, VA 22180
(703) 281-5762
Major Markets: OEM (Computer Systems)
Target Industries: Government; Commercial
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1979
Number of Employees: 5

PHC, INC.
22 Metty Drive
P.O. Box 1108
Ann Arbor, MI 48106
(313) 994-0501
Major Markets: Component Manufacturing; Computer Manufacturing, OEM (Computer Systems); Maintenance/Other Services
Target Applications: Process Control
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1971
Number of Employees: 6

PHILIPS GROUP, INC.
6116 England St.
P.O. Box 14668
Houston, TX 77221
(713) 747-4733
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Oil and Gas; Construction, Architects, Fabricators
Target Applications: Job Costing; Rig Costing, Estimation For Architects and Contractors
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1949
Number of Employees: 30

PHOENIX ENGINEERING, INC.
22 3rd St.
Newport, VT 05855
(802) 334-5016
Major Markets: Systems House (Commercial OEM)
Target Industries: Retail; Engineering; Utilities, Government
Target Applications: Accounting; Inventory, Billing
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980
Number of Employees: 8

PHOENIX PERFORMANCE SYSTEMS, INC.
Suite 1
324 S. Main St.
Milltown, MN 55082
(612) 430-2900
Major Markets: Maintenance/Other Services
Target Industries: Education; Business
Year Established: 1978
Number of Employees: 5

PHOENIX SOFTWARE ASSOCIATES LTD.
P.O. Box 207
N. Easton, MA 02356
(617) 238-0168
Major Markets: Maintenance/Other Services
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Software: David S Hirschman
Year Established: 1979
Number of Employees: 10

PHOENIX SYSTEMS, INC.
1106 Ohio River Blvd.
Sewickley, PA 15143
(412) 741-8330
Year Established: 1980
Number of Employees: 7

PHONE 1, INC.
461 N. Mulford Road
Rockford, IL 61107
(815) 397-8110
Year Established: 1977
Number of Employees: 9

PHOTON SOFTWARE
A Division of Care Computers
636 120th Ave. N.E.
Bellevue, WA 98005
(800) 426-2675
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Nursing Homes
Target Applications: Accounting; Medical Records
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: James E. Ingalls
Year Established: 1969
Number of Employees: 130

PICKLES & TROUT
P.O. Box 1206
Goleta, CA 93116
(805) 685-4641
Year Established: 1976
Number of Employees: 15

PINNACLE COMPUTER SYSTEMS
P.O. Box 7336
San Jose, CA 95150
(408) 972-9191
Target Industries: Computer
Target Applications: Computer operator training
Contacts:
Head of Marketing: Judie Gordon
Head of Software/Engineering: Louis Gennaro
Geographic Coverage: International
Year Established: 1982
Number of Employees: 6

PIONEER SOFTWARE, INC.
4239 W. 150th
Cleveland, OH 44135
(216) 251-4900
Major Markets: Systems House (Commercial OEM)
Target Industries: Retail; Manufacturing
Target Applications: Accounting
Year Established: 1982
Number of Employees: 9

PISCES INTERNATIONAL CO.
2700 Merced St.
San Leandro, CA 94577
(415) 577-7194
Major Markets: Data Services (Service Bureau)
Target Industries: Engineering
Target Applications: CAE
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1982
Number of Employees: 45

PLANNING DATA SYSTEMS
Suite 1524
1601 Walnut St.
Philadelphia, PA 19102
(215) 665-1551
Major Markets: Systems House (Commercial OEM)
Contacts:
Head of Sales: Robert Pallone
Head of Software/Engineering: John M. Colvin
Year Established: 1979
Number of Employees: 4

PLANNING RESEARCH CORP.
1500 Planning Research Drive
McLean, VA 22102
(703) 556-1111
Major Markets: OEM (Computer Systems), Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Federal Government; Real Estate, State and Local Government; Public Safety
Target Applications: Information Systems; Message Switching; Fleet Management
Net Sales: More than $100 Million (1982)
Year Established: 1964
Number of Employees: 6,000

PLAYERS COMPUTER, INC.
140 Adams Blvd.
Farmingdale, NY 11735
(516) 694-4660
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau)
Target Industries: Manufacturing; Wholesale Distributors
Target Applications: Purchasing; Job Costing; Inventory Control
Contacts:
Head of Sales: Anthony Batestrino
Year Established: 1969
Number of Employees: 150

PLENARY SYSTEMS, INC.
9669 Wendell Road
Dallas, TX 75243
(214) 343-9901
Major Markets: Systems House (Commercial OEM)
Target Industries: Accounting; Legal; Small Business
Target Applications: Accounting; General Ledger
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1978
Number of Employees: 8

PLEX DATA BASE SYSTEMS, INC.
543 Monterey Pass Road
Whittier, CA 91754
(213) 308-0102
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing
Target Applications: General Finance
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980

PLYCOM SERVICES, INC.
P.O. Box 160
Plymouth, IN 46563
(219) 935-5121
Year Established: 1975
Number of Employees: 7

P.M.A. SYSTEMS
Suite 228
621 Mehring Way
Cincinnati, OH 45202
(513) 421-7071
Major Markets: Data Services (Service Bureau); Dealer/Distributor
Target Industries: Nursing Home; Property Management
Target Applications: Property Management, Accounting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978
Number of Employees: 8

PM COMPUTER SERVICES CO.
630 30th St. N.W.
Canton, OH 44709
(216) 489-1888
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Government
Year Established: 1966
Number of Employees: 30

PMS SYSTEMS CORP.
Suite 314
2601 Ocean Park Blvd.
Santa Monica, CA 90405
(213) 450-1452
Year Established: 1971
Number of Employees: 10

PMZ, INC.
11940 Brookfield Road
Livonia, MI 48150
(313) 422-3740
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing
Contacts:
Head of Software: James E. Clack
Year Established: 1980
Number of Employees: 4

POINT FOUR DATA CORP.
2569 McCabe Way
Irvine, CA 92714
(714) 754-4114
Major Markets: Computer Manufacturing; Dealer/Distributor
Target Industries: OEM; Systems Houses, General Business
Target Applications: Project Management; Code Generation
Net Sales: $5 Million — $25 Million (1982)
Year Established: 1969
Number of Employees: 200

POISE CO.
201 N. Nevada St.
Roswell, NM 88201
(505) 623-8554
Target Industries: Educational
Target Applications: Administrative
Year Established: 1977

POLICE DATA SYSTEMS
6500 Dublin Blvd
Dublin, CA 94568
(415) 828-7100
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services

Target Industries: Police; Fire Department
Target Applications: Dispatch; Records; Case Tracking; Crime Analysis
Year Established: 1978
Number of Employees: 15

POLICY DEVELOPMENT CORP.
11526 Sorrento Valley Road
San Diego, CA 92121
(714) 453-3301
Major Markets: Maintenance/Other Services
Target Industries: Magazine Publishing
Target Applications: Financial Forecasting; System Management
Contacts:
Head of Sales: R. Cohn
Head of Engineering: Donald R. Goyette
Year Established: 1973
Number of Employees: 14

POLICY MANAGEMENT SYSTEMS CORP.
1321 Lady St.
Columbia, SC 29202
(803) 748-2929
Target Industries: Insurance
Target Applications: Insurance
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Software: Leonard Harris
Year Established: 1974
Number of Employees: 800

POLYGON ASSOCIATES, INC.
9 American Industrial
Maryland Heights, MO 63043
(314) 576-7709
Year Established: 1978
Number of Employees: 7

POLYSYSTEMS, INC.
Suite 408
55 E. Jackson Blvd.
Chicago, IL 60604
(312) 663-5670
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Insurance; Finance
Contacts:
Head of Sales: Robert Arbugh
Year Established: 1971
Number of Employees: 25

PORTER DATA SYSTEMS, INC.
470 Bucheye Drive
Colorado Springs, CO 80919
(303) 599-5548

POTOMAC SOFTWARE LABS
7304 Burroughs Lane
Falls Church, VA 22043
(703) 7900-960
Major Markets: Maintenance/Other Services
Year Established: 1978
Number of Employees: 2

POTTERS PROGRAMS
25929 Gratiot
Roseville, MI 48066
(313) 772-0780

POWERSOFT, INC.
P.O Box 157
Pitman, NJ 08071
(609) 589-5500

Major Markets: Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 5

PRECISION MESTING SYSTEMS, INC.
35 Duane Lane
Demarest, NJ 07627
(201) 768-3213
Target Industries: Engineering; Manufacturing
Target Applications: CAD/CAM
Year Established: 1978
Number of Employees: 4

PRECISION VISUALS, INC.
6260 Lookout Road
Boulder, CO 80301
(303) 449-0806
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: John Thompson
Head of Engineering: N. Kielhaber
Year Established: 1975
Number of Employees: 34

PREDICTION SYSTEMS, INC.
200 Atlantic Ave.
P.O Box 276
Manasquan, NJ 08736
(201) 223-4572
Major Markets: Maintenance/Other Services
Target Applications: Forecasting; Modeling, Simulation
Year Established: 1974

PRIMAVERA SYSTEMS, INC.
Suite 224
29 Bala Ave.
Bala Cynwyd, PA 19004
(215) 667-8600
Major Markets: OEM (Computer Systems); Data-Services (Service Bureau)
Target Industries: Transportation; Distributor; Construction; Defense Control
Target Applications: Project Management, Graphics
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: Tom Concannon
Head of Software: Brian Mandel
Year Established: 1976

PRIME COMPUTER, INC.
Prime Park
Natick, MA 01760
(617) 655-8000
Major Markets: Component, Computer, Terminal/Peripheral; Communications Equipment Manufacturing; OEM (Peripherals/Terminals); Maintenance/Other Services
Net Sales: More than $100 Million (1982)
Contacts:
Head of Software: Edward J. Christiansen
Head of Engineering: Roland D. Pamper
Year Established: 1972
Number of Employees: 5,000

PRIME FACTORS
6529 Telegraph Ave.
Oakland, CA 94609
(415) 654-5090

Major Markets: Maintenance/Other Services
Target Industries: Banking; Manufacturing
Target Applications: Hardware/Software Encryption
Contacts:
Head of Sales: Joaquin I. Brant
Head of Software: Chad K. McDaniel
Year Established: 1979
Number of Employees: 10

PRINCETON EDUCATIONAL SOFTWARE
195 Nassau St.
P.O Box 1317
Princeton, NJ 08542
(609) 683-0044
Target Industries: Education
Year Established: 1981
Number of Employees: 3

PRINCETON SOFTWARE CO.
195 Nassau St.
P.O Box 1317
Princeton, NJ 08540
(609) 799-6231
Major Markets: Maintenance/Other Services
Year Established: 1981

PRINTERS COMPUTER SYSTEMS

150 Boyd Lane
P O Box 69
Estes Park, CO 80517
(303) 586-4355
Major Markets: Systems House (Commercial OEM)
Target Industries: Printing
Target Applications: POS
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Tom Mehlhorn
Year Established: 1977
Number of Employees: 3

Additional information provided for by vendor
Estimating — Office and customer copy
Order entry — Office and work order
Job costing — Actual and estimated
Paper inventory
Customer file
Production reports by:
- Employee
- Cost centers
- Operations

PRINTERS SOFTWARE, INC.
933 Rt 23
Pompton Plains, NJ 07444
(201) 839-8797
Target Industries: Printing; Publishing
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1979
Number of Employees: 10

PRISM COMPUTER SYSTEMS
175 W St
P.O Box 766
Friday Harbor, WA 98250
(206) 378-2929
Major Markets: Computer Manufacturing, Systems House (Commercial OEM)
Target Industries: Wholesale Distributor; Hotel
Contacts:
Head of Software: George Porter
Year Established: 1976
Number of Employees: 12

PRITSKER & ASSOCIATES, INC.
Lafayette
P O Box 2413
W. Lafayette, IN 47906
(317) 463-5557
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing; Banking, Steel and Aluminum; Pharmaceutical
Target Applications: Modeling Simulation
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1973
Number of Employees: 55

PROBLEM SOLVERS
12725 Dupont Ave S.
Burnsville, MN 55337
(612) 894-6230
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Wholesale; Maintenance, Equipment Maintenance
Year Established: 1980

PROCESS CORP.
163 Thorn Hill Road
Warrendale, PA 15086
(412) 776-3130
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Mining
Year Established: 1974
Number of Employees: 26

PROCESSOR INNOVATIONS
1 Main St. / Room 402
4th Floor
Estontown, NJ 07724
(201) 542-6500
Major Markets: Component Manufacturing, Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Microdesign
Year Established: 1978

PROCOM, INC.
Suite 106
2512 Chambers Road
Tustin, CA 92680
(714) 544-0801
Major Markets: Systems House (Commercial OEM); Dealer/Distributor, Maintenance/Other Services
Target Industries: Retail, Distribution, Manufacturing
Target Applications: Mail Order; Manufacturing Control, Alarm Monitoring, Financial
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1979
Number of Employees: 10

PROCORP INTERNATIONAL
Suite 207
14410 S. E. Petrovitsky

Vendors

Renton, WA 98055
(206) 271-1710
Major Markets: Systems House (Commercial OEM)
Contacts:
Head of Sales/Engineering: Eric Bass
Year Established: 1978
Number of Employees: 7

PROCOMP SYSTEMS, INC.
333 W 52nd St
New York, NY 10019
(212) 246-0074
Major Markets: Systems House (Commercial OEM)
Target Industries: Banking; Printing, Education, Small Business
Target Applications: Job Costing; WP; Accounting, Banking
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1981
Number of Employees: 5

PRODATA, INC.
12101 Menaul Blvd. N.E.
Albuquerque NM 87110
(505) 294-1530
Target Industries: Accountants
Contacts:
Head of Sales: Bill Cleland
Year Established: 1976
Number of Employees: 4

PRODUCT GROUP, INC.
90 Tanglewylde Ave.
Bronxville, NY 10708
(914) 779-2390
Major Markets: Systems House (Commercial OEM)
Target Industries: Marketing
Target Applications: General Management
Year Established: 1981
Number of Employees: 5

PRODUCTION SYSTEMS, INC.
230 2nd Ave
Waltham, MA 02154
(617) 890-4070
Major Markets: Component Manufacturing, Systems House (Commercial OEM)
Target Industries: Wholesale Distributors, Manufacturing
Year Established: 1950
Number of Employees: 32

PRODUCTIVE SOFTWARE SYSTEMS, INC.
Suite 111
100 Jericho Quadrangle
Jericho, NY 11753
(516) 433-7600
Target Industries: Banking, Engineering, Retail, Manufacturing
Year Established: 1980
Number of Employees: 9

PRODUCT RESEARCH, INC.
1070 Warfield Lane
Huntingdon Valley, PA 19006
(215) 947-7580
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Government; Small Business
Year Established: 1971
Number of Employees: 25

PROFESSIONAL BUSINESS COMPUTER SYSTEMS, INC.
12215 N. Scottsdale Road
Scottsdale, AZ 85253
(602) 948-5772
Major Markets: Systems House (Commercial OEM), Dealer/Distributor
Target Industries: Wholesale, Accountants
Target Applications: Accounting, WP, Financial Planning
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Bruce W. Goetze
Head of Software: Mike Guthrie
Year Established: 1974
Number of Employees: 7

PROFESSIONAL BUSINESS SYSTEMS, INC.
648 S. Perry St.
Montgomery, AL 36104
(205) 262-6910
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Religion, Professional
Target Applications: Churches
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: E. J. Akers
Year Established: 1980
Number of Employees: 11

PROFESSIONAL COMPUTER SERVICES, INC.
950 S. Eastern Ave.
Commerce, CA 90022
(213) 266-1703
Major Markets: Data Services (Service Bureau), Dealer/Distributor
Target Industries: Automobile, Furniture, Toy; General
Year Established: 1968
Number of Employees: 20

PROFESSIONAL COMPUTER STORE
650 Foothill Blvd.
La Canada, CA 91011
(213) 790-9054
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Contacts:
Head of Sales/Engineering: Kaye Koenig
Year Established: 1980
Number of Employees: 6

PROFESSIONAL DATA PROCESSING
4610 University Ave.
P.O. Box 55027
Madison, WI 53705
(608) 231-2900
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Applications: Accounting
Year Established: 1966
Number of Employees: 23

PROFESSIONAL DATA SERVICES
P.O. Box 548
Englewood, NJ 07631
(201) 871-3230
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Applications: Accounting
Year Established: 1967
Number of Employees: 9

PROFESSIONAL DATA SERVICES, INC.
708 E. Watauga
Johnson City, TN 37601
(615) 928-7641
Major Markets: Systems House (Commercial OEM), Dealer/Distributor
Target Industries: General Manufacturing
Target Applications: General Business Application
Year Established: 1976
Number of Employees: 5

PROFESSIONAL INFORMATION MANAGEMENT
315 Railroad Ave.
P.O. Box Drawer 280
Richlands, VA 24641
(703) 964-4018
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor
Target Industries: Coal Mining; Medical
Target Applications: Medical Accounts Recievable
Year Established: 1980
Number of Employees: 4

PROFESSIONAL INFORMATION PLANNING CORP.
Suite 176
11500 Olive Blvd.
St. Louis, MO 63141
(314) 997-7266
Major Markets: Systems House (Commercial OEM), Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing, Non Profit
Target Applications: MRP; Job Cost, Inventory Control; Fund Raising
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Gordon Wiegand
Head of Engineering: Mark Marker
Year Established: 1979
Number of Employees: 15

PROFESSIONAL SOFTWARE, INC.
51 Fremont St.
Needham, MA 02194
(617) 444-5224
Target Applications: WP; DBMS; Utilities.
Contacts:
Head of Sales: William Murray
Year Established: 1979
Number of Employees: 26

PROFESSIONAL SOFTWARE CONSULTANTS, INC.
221 N. Palafox St.
Pensacola, FL 32501
(904) 432-2402
Target Industries: Legal; Professional, Medical
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: Joe Hicks
Year Established: 1981
Number of Employees: 7

PROFESSIONAL SOFTWARE SOLUTIONS, INC.
910 17th St. N.W.
Washington, DC 20006
(202) 223-2724
Target Industries: Government; Medical; Legal; Small Business
Target Applications: DBMS
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Jeff Whitesell
Year Established: 1976
Number of Employees: 14

PROFESSIONAL SYSTEMS, CORP.
8540 Blue Ridge Blvd.
Kansas City, MO 64138
(816) 358-3000
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Medical; Manufacturing
Year Established: 1966
Number of Employees: 35

PROFIDEX CORP.
90 W. St.
New York, NY 10006
(212) 732-6795
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Telemarketing; Finance
Target Applications: Telemarketing; General Accounting, Sales Analysis
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1975
Number of Employees: 12

PROFIT MANAGEMENT SYSTEMS, INC.
Suite 350
3637 4th St. N.
St. Petersburg, FL 33704
(813) 822-1793
Year Established: 1981
Number of Employees: 9

PROGRAMART
30 Brattle St.
Cambridge, MA 02138
(617) 661-3020
Year Established: 1971
Number of Employees: 4

PROGRAMMER AIDS, INC.
135 S. LaSalle St.
Chicago, IL 60603
(312) 782-8825
Major Markets: OEM (Computer Systems)
Target Applications: Test Cover Analysis
Year Established: 1974
Number of Employees: 2

PROGRAMMING SERVICES & SUPPORT, INC.
Suite B
1601 Caledonia St.
La Crosse, WI 54601
(608) 781-3200
Major Markets: Maintenance/Other Services
Year Established: 1979
Number of Employees: 8

PROGRAM RESOURCES, INC.
Suite 100
1021 Westmore Road
Rockville, MD 20852
(301) 984-9020

Major Markets: Maintenance/Other Services
Target Industries: Government
Year Established: 1973
Number of Employees: 10

PROGRAMS FOR LEARNING, INC.
20 Elm St.
P.O. Box 954
New Milford, CT 06776
(203) 355-3452

PROGRAM SYSTEMS, INC.
Suite 205
2100 Data Park
Birmingham, AL 35244
(205) 983-[illegible]
Major Markets: Systems House (Commercial OEM)
Target Industries: Public Accounting; Retail
Target Applications: Accounting; [illegible]
Year Established: 1977
Number of Employees: 3

PROGRESSIVE PROGRAMMING
11016 Inwin Ave.
Bloomington, MN 55437
(612) 888-7658
Year Established: 1980
Number of Employees: 1

PROGRESSIVE SOFTWARE, INC.
[illegible] Walker
Oklahoma City, OK 73139
(405) 636-[illegible]
Major Markets: Systems House (Commercial OEM); [illegible]
Target Industries: Oil
Year Established: 1977
Number of Employees: 17

PROGRESSIVE SYSTEMS, INC.
80 Broad St.
New York, NY 10004
(212) 785-9200
Major Markets: Communications Equipment Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM)
Target Applications: Message Switching
Net Sales: $800,000 — $1 Million (1981)
Contacts:
Head of Sales: Thomas Flanagan
Head of Software: Vinnie Devita
Head of Engineering: Bill Walter
Year Established: 1979
Number of Employees: 20

PROJECT SOFTWARE & DEVELOPMENT, INC.
14 Story St.
Cambridge, MA 02138
(617) 661-1444
Major Markets: Maintenance/Other Services
Target Industries: Construction; Oil; Government; Utilities
Year Established: 1968
Number of Employees: 75

PROJECTS UNLIMITED, INC.
Datasystems Group
3600 Wyse Road
P.O. Box [illegible]
Dayton, OH 45414
(513) [illegible]

Major Markets: Component Manufacturing; Systems House (Commercial OEM); Dealer/Distributor; [illegible]/Other Services
Target Industries: Manufacturing; Distribution; Accounting
Target Applications: Job Costing; Inventory Control; WP; Order Processing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales/Engineering: D. Wyse
Head of Software: Rick Columbo
Year Established: 1951
Number of Employees: 65

PROJECT SYSTEMS CONSULTANTS
[illegible] 252
8401 Westheimer
Houston, TX 77063
(713) 974-1155
Major Markets: Maintenance/Other Services
Year Established: 1974
Number of Employees: 19

PRO-LOG CORP.
2411 Garden Road
Monterey, CA 93940
(408) 372-4593
Major Markets: Component and Computer Manufacturing; Manufacturing Subsystems
Target Industries: OEM; [illegible]
Target Applications: Industrial [illegible]
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Murray MacDonald
Head of Software: Dale Christensen
Head of Engineering: Helene MacDonald
Year Established: 1972
Number of Employees: 210

PROMETHEAN SYSTEMS, INC.
[illegible] 212
1123 5th St.
Santa Monica, CA 90401
(213) 394-4961
Major Markets: Systems House (Commercial OEM); [illegible]
Target Industries: Banking; Oil Companies
Target Applications: Accounting; DBMS; Corporate Reporting; Consolidation Systems
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: Ben Lovelace
Year Established: 1981
Number of Employees: 25

PROMPT BUSINESS INFORMATION SYSTEMS, INC.
8845 Tradeway
San Antonio, TX 78217
(512) 826-5204
Major Markets: Systems House (Commercial OEM)
Target Industries: Oil and Gas; Retail
Year Established: 1979
Number of Employees: 5

PROPHECY, INC.
Suite 124
1010 Carondelet
Kansas City, MO 64114
(816) 942-1[illegible]
Major Markets: OEM (Peripherals/Terminals); Dealer/Distributor; Maintenance/Other Services
Target Industries: Medical; Printing; Pharmaceutical
Target Applications: Medical; Typesetting
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Software: Lee Allan
Year Established: 1976

PROPRIETARY SOFTWARE SYSTEMS
9911 W. Pico Blvd.
Penthouse K
Los Angeles, CA 90035
(213) 553-2997
Target Industries: Aerospace; Government; Computer Manufacturing
Target Applications: Language Translation
Contacts:
Head of Software: Richard Gilinsky
Year Established: 1969
Number of Employees: 20

PROSOFT
P.O. Box 560
N. Hollywood, CA 91603
(213) 764-3131
Net Sales: $100,000 — $500,000 (1982)
Contacts:
[illegible] of Software/Engineering
[illegible] Tasso
Year Established: 1980
Number of Employees: 9

PRO SYSTEMS
[illegible] Otis
San Jose, CA 95120
(408) 997-1776
Target Industries: Recreation
Target Applications: Home Use; Games; Personal Computers
Year Established: 1977
Number of Employees: 5

PRO TRAN, INC.
MoDaTran Division
[illegible] Post St.
San Francisco, CA 94109
(415) 421-3132
Target Industries: Medical; General Business, Commodity Trade
Year Established: 1971

PRO-TURI SHARE
Suite 1
10700 Northrup Way
Bellevue, WA 98004
(206) 883-6550
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Accounting
Year Established: 1978
Number of Employees: 10

PRS CORP.
257 Central Park W.
[illegible], NY 1[illegible]
(212) 787-[illegible]
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Bruce Ratoff
Head of Engineering: Rick Santomauro
Year Established: 1978
Number of Employees: 5

PSI ENERGY SOFTWARE, INC.
14811 St. Mary's
Houston, TX 77079
(713) 496-4850
Major Markets: Maintenance/Other Services
Target Industries: Energy
Year Established: 1972
Number of Employees: 50

PSYCHOGRAPHIC RESEARCH
5 Wildwood Drive
Fairfield, OH 45014
(513) 874-5216
Contacts:
Head of Software: Nancy J. Jackson

PUSH-ROBERTS ASSOCIATES, INC.
5 Lee St.
Cambridge, MA 02139
(617) 864-8880
Major Markets: Maintenance/Other Services
Contacts:
Head of Software: A. L. Pugh III
Year Established: 1963
Number of Employees: 35

PYRAMID DATA LTD.
P.O. Box 10116
Santa Anna, CA 92711
(714) 639-1527
Target Industries: Small Business; CPA
Target Applications: DBMS; Spreadsheet
Year Established: 1974

PYRAMID SERVICE CORP.
1382 W. Third Ave.
Columbus, OH 43212
(614) 488-8289
Major Markets: Data Services (Service Bureau)
Target Industries: Motor Freight; Linguistics
Target Applications: ICC Accounting; Text Analysis
Net Sales: $100,000 — $500,000 (1982)
[illegible]
Number of Employees: 2

QANTEL CORP.
4142 Point Eden Way
Hayward, CA 94545
(415) 887-7777
Major Markets: Component, Computer, Terminal/Peripheral Manufacturing; OEM (Computer Systems); OEM (Peripherals/Terminals); Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Manufacturing; Transportation; Lodging; Retail
Contacts:
Head of Sales: John Moeller
Head of Software: Troy Lemons
Head of Engineering: Lou Pounalds
Year Established: 1969
Number of Employees: 800

QCS CORP.
Suite 919
[illegible] Euclid Ave.
Cleveland, OH 44115
(216) 861-4605
Major Markets: Systems House

Vendors

(Commercial OEM);
Dealer/Distributor
Target Industries: Financial; Manufacturing; Small Business
Year Established: 1980
Number of Employees: 7

GED INFORMATION SERVICES, INC.
170 Linden St.
P.O. Box 161
Wellesley, MA 02181
(617) 237-5656
Major Markets: Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1971
Number of Employees: 40

GEL, INC.
60 Fadem Road
Springfield, NJ 07081
(201) 379-7400
Major Markets: Component and Computer Manufacturing; OEM (Computer Systems); Dealer/Distributor; [illegible]
Target Industries: Electric Power; Oil and Gas; Water Control
Target Applications: Supervisory control and data acquisition
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1974
Number of Employees: 150

G METRICS, INC.
501 5th Ave.
New York, NY 10017
[illegible]
Major Markets: Systems House [illegible]
Maintenance/Other Services
Target Industries: Banking; Transportation; Financial; [illegible]
Target Applications: Operations; Accounting; Documentation; Office Automation
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1980
Number of Employees: 25

G.S., INC.
Baker's Twist Plaza
Suite 1106
P.O. Box 547
Greenville, SC 29602
(803) 232-2666
Major Markets: Systems House (Commercial OEM)
Target Industries: Medical
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Kevin W. Davidson
Year Established: 1976
Number of Employees: 16

G-SYSTEMS OF ST. LOUIS, INC.
Suite 139
100 Progress Parkway
St. Louis, MO 63043
(314) 434-2553
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Retail; Manufacturing; Medical; Distribution

Contacts:
Head of Software: Leroy J. Zurovec
Year Established: 1970
Number of Employees: 15

G-TYPE CORP.
3792 Realty Road
Dallas, TX 75234
(214) 241-4918
Major Markets: Dealer/Distributor
Target Industries: WP
Target Applications: WP
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1978
Number of Employees: 2

HUAD CORP.
1552 Dale Ave.
Highland Park, IL 60035
(312) 432-3210
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1972
Number of Employees: 10

HYADWETHOR SYSTEMS, INC.
Suite 1032
15760 Ventura Blvd
Encino, CA 91436
(213) 709-6580
Year Established: 1982

HYADSTAR CORP.
Suite 145
12700 Preston Road
Dallas, TX 75230
(214) 980-9601
Major Markets: Systems House (Commercial OEM)
Target Industries: Financial; Retail
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software/Engineering: Tom Streif
Year Established: 1976
Number of Employees: 40

QUALITY COMPUTER PRODUCTS
Suite A
81 Centennial Lodp
P.O. Box 5241
Eugene, OR 97405
(503) 485-5827
Major Markets: OEM (Computer Systems); Maintenance/Other Services
Year Established: 1980
Number of Employees: 2

QUALITY SOFTWARE, INC.
R.D.S./ 1 Otter Hill Court
Sussex, NJ 07461
(201) 875-3323
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing; Financial Accounting
Year Established: 1978
Number of Employees: 5

QUALITY SOFTWARE, INC.
80 Lords St.
Newton, MA 02158
(617) 965-2231
Major Markets: Maintenance/Other Services
Target Industries: Telecommunication
Target Applications: Telecommunication; Typesetting
Net Sales: $100,000 — $500,000 (1981)

Year Established: 1980
Number of Employees: 3

QUALITY SYSTEMS DEVELOPMENT CORP.
Suite 638
645 N. Michigan Ave.
Chicago, IL 60611
(312) 266-6060
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Contacts:
Head of Sales: Mike Drummer
Year Established: 1976
Number of Employees: 30

QUANTITATIVE SOFTWARE MANAGEMENT, INC.
1057 Waverley Way
McLean, VA 22101
(703) 790-0055
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services
Target Applications: Software Cost Estimating; Resource Planning
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Lauren Thayer
Year Established: 1978
Number of Employees: 8

QUANTUM INFORMATION SYSTEMS
860 N.W. 87th St.
Seattle, WA 98117
(206) 789-2888
Year Established: 1980
Number of Employees: 2

QUANTUM SOFTWARE SYSTEMS, INC.
7219 Shea Court
San Jose, CA 95139
(408) 629-9402
Target Industries: Government; Latin
Target Applications: WP; Telecommunications; Development Tool
Year Established: 1981
Number of Employees: 3

QUANTUM SYSTEMS, INC.
652 Papworth Ave.
Metairie, LA 70005
(504) 835-4200
Major Markets: Communications Equipment Manufacturing; Systems House (Commercial OEM)
Target Industries: Petrochemical; Environment
Year Established: 1976
Number of Employees: 30

QUARK, INC.
Suite 220
2525 W. Evans Ave.
Denver, CO 80219
(303) 934-2211
Target Applications: Business
Year Established: 1981
Number of Employees: 11

QUE CORP.
Suite 110
7960 Castleway Drive
Indianapolis, IN 46250
(317) 842-7162
Major Markets: Microcomputer Book Publishers
Contacts:
Head of Sales: Steve Hochman

Year Established: 1980
Number of Employees: 20

QUELO
843 N.W. 54th St.
Seattle, WA 98107
(206) 784-6018

QUEST, INC.
Suite B
30 Professional Center Pkwy.
San Rafael, CA 94903
(415) 479-0600
Year Established: 1978
Number of Employees: 15

QUEUE ASSOCIATES, INC.
3200 Sunset Ave.
P.O. Box 715
Ocean, NJ 07712
(201) 531-7881
Target Industries: Manufacturing
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1977
Number of Employees: 12

QUEUE SYSTEMS, INC.
Suite 200
6700 Freeport Blvd.
Sacramento, CA 95822
(916) 391-8972
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Utility and Power; Real-time Business, Process
Target Applications: Supervisory control and data acquisition; DBMS
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1980
Number of Employees: 30

QUICK TAX, LTD.
319 Clawson St.
Staten Island, NY 10306
(212) 351-6143
Contacts:
Head of Sales: Howard Pomeranz
Year Established: 1977
Number of Employees: 31

QUIC-N-EASI PRODUCTS, INC.
136 Quaker Hill Court
Langhorne, PA 19047
(215) 682-4560
Target Industries: General Business, Programmers
Target Applications: DBMS
Year Established: 1979
Number of Employees: 6

QUIET DESIGNS, INC.
2248-I Kaiser Dr.
Santa Clara, CA 95050
(408) 980-1010
Major Markets: Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: Retail; Dealers
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Marlene Fernandez
Head of Software: Lance Baker
Year Established: 1977
Number of Employees: 21

QUINTESSENCE COMPUTING, INC.
1016 A 6th
Austin, TX 78701
(512) 477-9036
Major Markets: OEM (Computer

Systems); Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Retail/Restaurant; Security
Target Applications: Medical
Year Established: 1978
Number of Employees: 8

QUINTREX DATA SYSTEMS
4245 First Ave. S.E.
Cedar Rapids, IA 52402
[illegible]
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Year Established: 1979

QUODATA
266 Pearl St.
Hartford, CT 06103
(203) 728-6777
Major Markets: Systems House (Commercial OEM)
Target Industries: Education; Nonprofit
Contacts:
Head of Sales: Ronald Cerri
Year Established: 1971

RACAL-REDAC, INC.
4 Liberty Way
Westford, MA 01886
(617) 692-4900
Major Markets: OEM (Computer Systems)
Target Industries: Engineering; Manufacturing
Target Applications: Computer-aided Design and Manufacturing; Circuit Analysis; Logic Simulation
Net Sales: More than $100 Million (1981)
Contacts:
Head of Sales: William J. Lee
Year Established: 1975
Number of Employees: 175

RACET COMPUTERS, LTD.
Suite 255
1855 W. Katella
Orange, CA 92667
(714) 997-4950
Year Established: 1978
Number of Employees: 16

RAC INFORMATION SYSTEMS, INC.
11 Middlenack Road
Great Neck, NY 11021
(516) 829-9500
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Stock Exchange; Medical; Finance
Target Applications: Data Base; Graphics; General Accounting; Marketing Research
Number of Employees: 16

RADIAN CORP.
P.O. Box 9948
Austin, TX 78766
(512) 454-4797
Major Markets: Component and Computer Manufacturing; OEM (Computer Systems); Dealer/Distributor; Maintenance/Other Services
Target Industries: Energy
Contacts:
Head of Sales: Ted Hudson
Year Established: 1968
Number of Employees: 650

RADIO COMPUTING SERVICES, INC.
177 N. Dean St.
Englewood, NJ 07631
(201) 567-3125
Major Markets: Systems House (Commercial OEM)
Target Industries: Broadcasting
Target Applications: Call Survey; Music Selection, Traffic; Accounting
Year Established: 1979
Number of Employees: 16

RADIX II, INC.
4586 Beech Road
Temple Hills, MD 20748
(301) 894-9300
Major Markets: Component Manufacturing; Systems House (Commercial OEM)
Target Industries: Government
Target Applications: Energy Management; Press Control
Contacts:
Head of Software: Kathleen McWilliams
Head of Engineering: Harold Vanderryt
Year Established: 1974
Number of Employees: 35

RAI BUSINESS SYSTEMS, INC.
2060 Rt. 22
Scotch Plains, NJ 07076
(201) 561-9100
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Applications: Utilities; Report Writer; Financial Modeling; Accounting
Year Established: 1972
Number of Employees: 10

RAIDN ENTERPRISES, INC.
3000 Hempstead Tnpk.
Levittown, NY 11756
(516) 796-4100
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Business; Legal; Accounting, Brokers
Target Applications: General Business; Accounting; OA
Year Established: 1980
Number of Employees: 9

RAK ELECTRONICS
P.O. Box 1585
Orange Park, FL 32067
(904) 264-0756
Contacts:
Head of Sales: Kathie Knox
Year Established: 1981
Number of Employees: 8

R. A. KOTTEMEIER & ASSOCIATES, INC.
Suite 250
443 N. New Ballas St.
St. Louis, MO 63141
(314) 432-0434
Target Industries: Manufacturing; Distributors
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 6

RAMAC COMPUTER CORP.
177 W. Carmel Drive
Carmel, IN 46032
(317) 844-0141
Major Markets: Systems House (Commercial OEM)
Target Applications: Accounts Payable; Accounts Receivable; General Ledger
Year Established: 1973
Number of Employees: 11

RANDALL RUSTIN
[illegible]
New York, NY 10023
Major Markets: Systems House (Commercial OEM)
Target Industries: Legal; Garment Manufacturing; Shipping
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1971
Number of Employees: 6

RAND INFORMATION SYSTEMS, INC.
98 Battery St.
San Francisco, CA 94111
(415) 392-2500
Major Markets: Data Services (Service Bureau)
Target Industries: Food Manufacturing; Distribution; Service Industry; Grocery
Target Applications: Order Entry; Inventory Control; Distribution, Purchasing
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: Richard J. Tognetti
Head of Software: R. Tribble
Head of Engineering: Richard M. Lion
Year Established: 1964
Number of Employees: 250

RAPIDATA
Division of National Data Corp.
20 New Dutch Lane
Fairfield, NJ 07006
(201) 227-0035
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Fortune 1000
Target Applications: Financial
Year Established: 1967

Additional information provided for by vendor

With sales offices in major cities, Rapidata provides advanced microcomputer applications including sales and marketing products, software for community banks, calc-plus, automatic forecasting, graphics, financial and economic data bases along with consulting, training and support services. Division headquarters — 20 New Dutch Lane, Fairfield, NJ (201) 227-0035.

RAPID DATA, INC.
215 N. Fifth St.
Redlands, CA 92373
(714) 793-2855
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Retail
Target Applications: Accounting
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1982
Number of Employees: 50

RATH & STRONG SYSTEMS PRODUCTS, INC.
14901 Quorum Drive
Dallas, TX 75240
(214) 980-0847
Major Markets: Maintenance/Other Services
Target Industries: Aerospace Manufacturing, Manufacturing
Target Applications: MRP
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Claude Holaman
Year Established: 1960
Number of Employees: 50

RATIONAL DATA SYSTEMS
205 E. 42nd St.
New York, NY 10017
(212) 697-5855
Target Industries: High Technology; Government; Airlines
Contacts:
Head of Software/Engineering: Francis Pardo
Year Established: 1978
Number of Employees: 5

RAXCO
Suite 200
6520 Powers Ferry Road
Atlanta, GA 30339
(404) 955-2553
Year Established: 1977

RAXIS INTERNATIONAL, INC.
2601 Fortune Circle E.
Indianapolis, IN 46241
(317) 247-1361
[illegible]
(Commercial OEM)
Target Industries: Banking
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 30

R.B.B. SOFTWARE PRODUCTS
125 N. Wade Circle
Anaheim, CA 92807
(714) 637-5965
Major Markets: Maintenance/Other Services
Year Established: 1975

RCS (ROZSA COMPUTER SYSTEMS), INC.
2116 A. Walsh Ave.
Santa Clara, CA 95050
(408) 727-7548
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Applications: WP; Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978

R.G. REES & ASSOCIATES
1188 Pershall Road
P.O. Box 13457
St. Louis, MO 63137
(314) 388-2211
Major Markets: OEM (Peripherals/Terminals); Dealer/Distributor; Maintenance/Other Services
Target Industries: Distribution; Burroughs Users
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978

Vendors

REAL DECISIONS CORP.
123 High Ridge Road
Stamford, CT 06905
(203) 358-8700
Major Markets: Maintenance/Other Services
Target Applications: Financial
Year Established: 1975
Number of Employees: 30

REALIA, INC.
10 S. Riverside Place
Chicago, IL 60606
(312) 346-0642
Major Markets: Maintenance/Other Services
Year Established: 1975
Number of Employees: 5

REALTIME ASSOCIATES, INC.
570 N. Highway A1A
P.O. Box 3435
Satellite Beach, FL 32937
(305) 777-1790
Major Markets: Systems House (Commercial OEM)
Target Industries: Energy; Printing; Manufacturing
Target Applications: Physical Tracking; Text Composition; Display Ad Management; Control Process
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Engineering: Dr. Harry Crouch
Year Established: 1979
Number of Employees: 14

REAL TIME COMPUTER SPECIALIST, INC.
101 E. Miller St.
Newark, NY 14513
(315) 331-6524
Major Markets: Systems House (Commercial OEM)
Contacts:
Head of Software/Engineering: Lisa Felock
Year Established: 1974
Number of Employees: 7

REAL-TIME MANAGEMENT, INC.
10 Middle St.
P.O. Box 1100
Bridgeport, CT 06601
(203) 367-8654
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Petroleum; Manufacturing; Footwear; Medical
Year Established: 1971
Number of Employees: 35

REALTIME SOFTWARE SYSTEMS, INC.
Realtime Engineering
23 Water St.
P.O. Box 409
Holliston, MA 01746
(617) 429-7766
Target Industries: Manufacturing; OEM
Target Applications: DBMS; Scientific, Industrial Control
Year Established: 1977
Number of Employees: 8

REALTY SOFTWARE CO.
Suite 229
1926 S. Pacific Coast Highway
Redondo Beach, CA 90277
(213) 372-9419
Target Industries: Real Estate; Property Management
Target Applications: Property Management
Year Established: 1978
Number of Employees: 3

R & E BUSINESS SYSTEMS, INC.
Suite 111
5310 Harvest Hill
Dallas, TX 75230
(214) 386-8911
Major Markets: Systems House (Commercial OEM)
Target Industries: Professional; Small Business
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1976
Number of Employees: 3

RECORDATA WEST, INC.
Suite 206
3030 W. Temple St.
Los Angeles, CA 90026
(213) 385-8895
Major Markets: Maintenance/Other Services
Target Industries: Legal; Accountants; Ambulance Industry
Year Established: 1966
Number of Employees: 15

RECORDS GROUP, INC.
609 Main St.
Ridgefield, CT 06877
(203) 329-8874
Target Applications: Business Graphics; Communications
Contacts:
Head of Sales: Lydia Fazio
Year Established: 1978
Number of Employees: 6

REDSHAW, INC.
103 Yost Blvd.
Pittsburgh, PA 15221
(412) 829-2100
Major Markets: Systems House (Commercial OEM); Miscellaneous Computer Supplies
Target Industries: Insurance
Target Applications: Policy Filing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: F. Grabowski
Head of Software: D. L. Ross
Year Established: 1975
Number of Employees: 30

RED WING BUSINESS SYSTEMS, INC.
410 Main St.
P.O. Box 19
Red Wing, MN 55066
(612) 388-1106
Target Industries: Agriculture
Target Applications: Financial management
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Software: Jon L. Isaakson
Year Established: 1979
Number of Employees: 8

RELATIONAL DATABASE SYSTEMS, INC.
Suite 503
1208 Apollo Way
Sunnyvale, CA 94086
(408) 746-0982
Target Applications: DBMS
Contacts:
Head of Sales: Laura King
Head of Engineering: Virginia Harrington
Year Established: 1980
Number of Employees: 16

RELATIONAL SYSTEMS INTERNATIONAL, INC.
PeerSoft
P.O. Box 13650
Salem, OR 97309
(503) 390-6880
Target Applications: Accounting; Credit Union
Contacts:
Head of Sales: Ray Stow
Year Established: 1980
Number of Employees: 30

RELATIONAL TECHNOLOGY, INC.
2855 Telegraph Ave.
Berkeley, CA 94705
(415) 845-1700
Target Industries: Government; Scientific
Year Established: 1980
Number of Employees: 47

REM ASSOCIATES
P.O. Box 527
New York, NY 10014
(212) 243-2416
Major Markets: Maintenance/Other Services
Target Applications: Utilities; Systems
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Hrair Ballan
Head of Software: Emily Hamonoff
Year Established: 1974

REMEX CORP.
6095 28th St. S.E.
Grand Rapids, MI 49508
(616) 942-9800
Year Established: 1971
Number of Employees: 30

REMOTE BUSINESS SERVICES, INC.
2 Gatewood Road
Norwalk, CT 06851
Major Markets: Component Manufacturing; Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Banking; Finance; Brokerage
Net Sales: $5 Million — $25 Million (1982)
Year Established: 1968
Number of Employees: 34

REMOTE COMPUTING CORP.
Division of Peer Systems Corp.
27 Bradburn Road
Stamford, CT 06903
(203) 322-8843
Target Industries: Financial
Target Applications: Management; Technical Analysis
Year Established: 1981

REMOTE DATA SYSTEMS, INC.
14640 W. Greenfield Ave.
Brookfield, WI 53005
(414) 782-3777
Major Markets: Maintenance/Other Services
Year Established: 1973
Number of Employees: 13

RENAISSANCE GROUP, LTD.
25 Bow St.
Portsmouth, NH 03801
(603) 431-3566
Target Industries: Insurance
Target Applications: General Business; Claims Processing
Year Established: 1980
Number of Employees: 10

RENDECK CORP.
1 Faneuil Hall Market Place
Boston, MA 02109
(617) 367-9180
Major Markets: Systems House (Commercial OEM)
Net Sales: $5 Million — $10 Million (1981)
Contacts:
Head of Marketing: Ian Woodhouse
Head of Software: David Wilkinson
Year Established: 1978
Number of Employees: 20

RENNASOFT TECHNOLOGY
1045 Detroit Ave.
Concord, CA 94518
(415) 676-5757
Major Markets: Component Manufacturing; Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Store Front Dealers
Contacts:
Head of Sales: Barbara Baylor
Head of Engineering: Victor Ivashin
Year Established: 1980
Number of Employees: 90

RESEARCH ENGINEERS, INC.
P.O. Box 2706
Cherry Hill, NJ 08034
(609) 983-5050
Target Industries: Engineering
Target Applications: Structural Engineering
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 4

RESOURCE DYNAMICS
Suite 1500
150 E. 58th St.
New York, NY 10155
(212) 486-9180
Major Markets: Systems House (Commercial OEM)
Target Industries: Real Estate; Architecture
Target Applications: Facilities Management; CAD; Office Space Design; Architectural Design
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: S. Morris
Head of Engineering: M. Colecino
Year Established: 1977
Number of Employees: 24

RESOURCE SYNAMICS, INC.
Suite J
4530 W. 34th St.
P.O. Box 10957
Houston, TX 77292
(713) 688-8145
Major Markets: Data Services (Service Bureau); Maintenance/Other Services

Target Industries: Oil; Gas
Target Applications: Accounting; General Ledger
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1976
Number of Employees: 5

RESOURCE SOFTWARE INTERNATIONAL, INC.
330 New Brunswick Ave.
Fords, NJ 08863
(201) 738-9604
Target Industries: Banking; Education; Manufacturing
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 4

RESPONSE, INC.
[illegible] 2nd St.
P.O. Box 86
Jackson, MN 56143
(507) 847-2700
Major Markets: Maintenance/Other Services
Target Industries: Banking; Seed Growers; Education; Pharmacy
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1978
Number of Employees: 12

REVEAL SOFTWARE, INC.
6 Chelmsford Drive
Muttontown, NY 11545
(516) 626-1166
Major Markets: Systems House (Commercial OEM); [illegible]
Target Industries: Brokerage; Account Executives
Target Applications: Registered Representative book, Portfolio Management; Automatic Price Update
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Al Battaglia
Head of Software: Mel Berman
Year Established: 1977
Number of Employees: 50

REYNOLDS & ASSOCIATES
Suite 108
33 Dinsmore Ave.
Framingham, MA 01701
[illegible]
Major Markets: Systems House [illegible]
Target Industries: Professional
Target Applications: General Accounting
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: S. Lugger
Year Established: 1980

REYNOLDS & REYNOLDS CO.
[illegible]
P.O. Box 1901
Dayton, OH 45401
[illegible]
Major Markets: Computer Manufacturing; Systems House (Commercial OEM); Miscellaneous Computer Supplies
Target Industries: Automobile; Medical; Commerce; Truck Dealerships
Target Applications: Accounting; Dealerships
Net Sales: More than $100 Million (1982)
Contacts:
Head of Engineering: H. Nicholson
Year Established: 1866
Number of Employees: 2,500

RGB SYSTEMS SOFTWARE
1 Penn Plaza
New York, NY 10001
(212) 695-5001
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Ross F. Amann
Year Established: 1971
Number of Employees: 20

RHINTEK, INC.
P.O. Box 220
Columbia, MD 21045
(301) 730-2575
Major Markets: OEM (Computer Systems), Maintenance/Other Services
Year Established: 1977
Number of Employees: 8

R. HUBBARD DESIGN GROUP
4801 N. Michigan Road
Indianapolis, IN 46208
(317) 844-4296
Major Markets: OEM (Peripherals/Terminals), Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Retail
Target Applications: POS
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1972
Number of Employees: 5

RICHARD M. WALSH ASSOCIATES
916 Oak St.
Scranton, PA 18508
(717) 346-3656
Major Markets: Systems House (Commercial OEM)
Target Industries: Insurance; Educational; General Business
Contacts:
Head of Sales: Robert G. Kearnes
Year Established: 1965
Number of Employees: 60

RICHARD W. KULBERG, C.P.A.
[illegible]
[illegible] N. Santa Anita
Arcadia, CA 91006
(213) 445-
Target Industries: Manufacturing
Target Applications: Accounting; Bill of Material, Inventory
Year Established: 1979
Number of Employees: 5.

RILEY SYSTEMS CORP.
[illegible] Wisconsin Ave.
Bethesda, MD 20814
(301) 986-[illegible]
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Small Business; Research, Foreign Countries; Government
Target Applications: Accounting; DBMS; Mailing, Statistics
Year Established: 1969
Number of Employees: 10

RINGGOLD MANAGEMENT SYSTEMS, INC.
P.O. Box 368
Beaverton, OR 97075
(503) 645-3502
Major Markets: Systems House (Commercial OEM)
Target Industries: Libraries; Real Estate
Target Applications: Inventory Control, Order Entry; Circulation Control
Contacts:
Head of Engineering: John Knapp
Year Established: 1981
Number of Employees: 4

RIVERDALE COMPUTING, INC.
[illegible] Fieldston Road
Riverdale, NY 10471
(212) 549-8044
Year Established: 1977
Number of Employees: 10

RIZZO DATA SYSTEM, INC.
577 Burlington Road
P.O. Box 458
Bridgeton, NJ 083020356
(609) 451-7964
Major Markets: Data Services (Service Bureau); Dealer/Distributor
Target Industries: Manufacturing; [illegible]
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975
Number of Employees: 11

R. J. MILLER CO., INC.
2956 Delaware Ave
Buffalo, NY 14217
(716) 877-7838
Major Markets: Maintenance/Other Services
Target Industries: Billing, Municipalities; Hospitals
Target Applications: Payroll, Benefits, Human Resources
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1971

R. K. RIDALL & CO., INC.
620 Tanglewood Lane
Devon, PA 19333
(215) 688-2513
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing
Net Sales: $500,000 — $1 Million (1982)
Contacts:
[illegible] G. Hutchinson
Year Established: 1976
Number of Employees: 9

R. L. SOUTHETT & ASSOCIATES, INC.
Suite 1000
[illegible] W. Douglas
Wichita, KS 67202
[illegible] 262-5077
Target Industries: Construction; Manufacturing; General Business
Year Established: 1974
Number of Employees: 18

RMS DATA SERVICES, INC.
326 Walt Whitman Road
Huntington, NJ 11746
(516) 423-4868
Major Markets: Data Services (Service Bureau), Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1979
Number of Employees: 3

ROBERT W. HUNT & ASSOCIATES
424 Skinner Building
Seattle WA 98101
(206) 625-9582
Major Markets: Maintenance/Other Services
Target Industries: Nonprofit
Year Established: 1978
Number of Employees: 5

R.O.C.I., INC.
1457 Ammons St.
Lakewood, CO 80215
(303) 234-1717
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau), Maintenance/Other [illegible]
Target Industries: Banking
Target Applications: Lease Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: David Fern
Head of Software/Engineering: Cory Hatcher
Year Established: 1971
Number of Employees: 20

ROKLAN SOFTWARE
Suite 512
3335 N. Arlington Heights Road
Arlington Heights, IL 60004
(312) 392-2525
Major Markets: Maintenance/Other Services
Contacts:
Head of Sales: Scott Hruska
Year Established: 1975

[illegible] SOFTWARE, INC.
[illegible]
1650 S. Amphlett Blvd
San Mateo, CA 94402
(415) 570-7422
Target Industries: Wholesale, Oil Jobbers
Year Established: 1981
Number of Employees: 5

ROMAN BUSINESS SERVICES
1201 30th St. N.W.
Canton, OH 44709
(216) 493-6974
Major Markets: Data Services [illegible]
Target Industries: [illegible] Political organizations
Target Applications: Computer systems, Political campaigns
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1980
Number of Employees: 4

ROSE PROFESSIONAL GROUP
815 E. Queenwood Road
[illegible] IL 61801
[illegible]
Major Markets: Systems House [illegible]
Target Industries: Nursing Homes
Target Applications: Patient Care,

Vendors

Financial, Cash and Cost Management
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Thomas J. Frevert
Year Established: 1977
Number of Employees: 40

BOSS SYSTEMS, INC.
Suite 210
1550 Embarcadero Road
Palo Alto, CA 94303
(415) 856-1100
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Banking
Contacts:
Head of Sales: Michael Novak
Year Established: 1972
Number of Employees: 100

BRITTON BATA, INC.
930 Fairport Industrial Park
Fairport, NY 14450
(716) 381-3090
Major Markets: Systems House (Commercial OEM)
Contacts:
Head of Software: Joseph Thuroff
Year Established: 1970
Number of Employees: 60

ROY N. BAILEY, INC.
1120 Ave of the Americas
New York, NY 10036
(212) 921-1648
Major Markets: Systems House (Commercial OEM)
Target Industries: Insurance; Retail; Publishing
Target Applications: O/P; A/R; General Ledger; Inventory Control
Contacts:
Head of Software/Engineering: Roy N. Bailey
Year Established: 1965
Number of Employees: 5

RSA PRODUCTS
1259 Rt. 46 Building 2
Parsippany, NJ 07054
(201) 335-7320
Major Markets: Maintenance/Other Services
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Richard Evans
Year Established: 1975
Number of Employees: 6

RSD (RESOURCES FOR SOFTWARE DEVELOPMENT), INC.
11120 N. E. 2nd
Bellevue, WA 98004
(206) 643-9090
Target Industries: Manufacturing
Target Applications: Accounting; Inventory Control
Year Established: 1981
Number of Employees: 3

R&R, INC. (ROCKY SMITH ENTERPRISES)
123 E. Broadway
P.O. Box 727
Cushing, OK 74023
(918) 225-6340
Major Markets: Peripheral Manufacturing; Data Services (Service Bureau)
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Thomas Watson
Head of Software: Chris Barnes
Head of Engineering: Doug Carson
Year Established: 1979
Number of Employees: 30

R. SHRIVER ASSOCIATES
1259 Rt. 46 / Building 2
Parsippany, NJ 07054
(201) 335-7800
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Applications: Accounting; Order Processing; Inventory, Personnel Payroll
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: T. Williams
Year Established: 1966
Number of Employees: 40

RSN ENTERPRISES
Suite 4
2232 N. 7th St.
Grand Junction, MI 81501
(303) 245-7583
Major Markets: Systems House (Commercial OEM)
Target Industries: Professional
Target Applications: Accounting
Year Established: 1982
Number of Employees: 3

R SYSTEMS, INC.
11450 Pagemill Road
Dallas, TX 75243
(214) 343-9188
Major Markets: OEM (Peripherals/Terminals); Systems House (Commercial OEM)
Target Applications: WP; DBMS; Report Generation; Office Manager
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Allan Henderson
Head of Software/Engineering: James R. Arnold
Year Established: 1977
Number of Employees: 9

RTCS/REAL-TIME COMPUTER SCIENCE CORP.
P.O. Box 3000-886
Camarillo, CA 93010
(805) 482-0033
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Applications: Real Time Systems
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software/Engineering: Art Baker III
Year Established: 1978
Number of Employees: 12

R.T.R. SOFTWARE, INC.
444 Executive Center
Number 225
El Paso, TX 79902
(915) 544-4397
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1978
Number of Employees: 4

RUF CORP.
1533 E.Spruce
Olathe, KS 66061
(913) 782-8544
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software: Randy Seager
Year Established: 1976
Number of Employees: 25

R.V. WEATHERFORD CO.
Computer Systems Group
1020 S. Arroyo Pkwy
Pasadena, CA 91105
(213) 682-3641
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Education; Insurance, Administration; Instruction
Target Applications: Insurance Rating; Attendance Keeping
Contacts:
Head of Sales: Joel Moriarty
Year Established: 1948
Number of Employees: 250

RYAN-MCFARLAND CORP.
609 Deep Valley Drive
3rd Floor
Rolling Hills Estates, CA 90274
(213) 541-4828
Target Industries: Science; General Industries
Target Applications: Program Development
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1970

THE SADDLEBROOK CORP.
101 Main St.
Cambridge, MA 02142
(617) 661-8100
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Banking; Thrift
Target Applications: Financial Planning Control Systems; Performance Modeling; Cost Accounting; Lending Applications
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Scott T. Caubask
Year Established: 1974
Number of Employees: 200

SAFE SOFTWARE SYSTEMS, INC.
12231 Manchester Road
St. Louis, MO 63131
(314) 965-3803
Target Industries: IBM users
Year Established: 1978

SAGE DATA, INC.
One Research Way
Princeton, NJ 08540
(609) 924-2003
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Contacts:
Head of Software: Joseph Morino
Year Established: 1973

SAGE SYSTEMS
3200 Monroe St.
Rockville, MD 20852
(201) 231-8686
Major Markets: Data Services (Service Bureau)
Target Industries: Government; CPA
Year Established: 1973
Number of Employees: 73

SAIC, INC.
417 W. Broad St.
Falls Church, VA 22046
(703) 532-9190
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Government
Target Applications: WP; Business
Year Established: 1962

SAADH ENTERPRISES, INC.
213 Hamilton Road
Teaneck, NJ 07666
(201) 836-4338
Target Industries: Publishing; Retail; Advertising
Target Applications: Accounting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1973

SALES PRODUCTIVITY SYSTEMS, INC.
595 W. Hartsdale
White Plains, NY 10607
(914) 682-0336
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Contacts:
Head of Engineering: W. Machrone
Year Established: 1980

SALINA OFFICE SERVICES CORP.
345 James St.
Syracuse, NY 13203
(315) 471-6666
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Nursing Homes
Target Applications: Accounting; General Ledger; Medicare
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: John Lowe
Head of Software: John Vahey Jr.
Year Established: 1971

SAN DIEGO SOFTWARE
P.O. Box 26116
San Diego, CA 92139
(619) 422-1049
Major Markets: Component Manufacturing
Target Industries: WP; IBM Users
Target Applications: Spreadsheet
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: J. Michael Stek
Year Established: 1979

SANTA BARBARA DATA CENTER
717 E. Yanonali St.
Santa Barbara, CA 93103
(805) 963-1859

Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Medical; Publishing; Textile
Year Established: 1983
Number of Employees: 70

SANTA CRUZ COMPUTER
10096 Soquel Drive
P.O. Box 1480
Aptos, CA 95003
(408) 662-3112
Target Industries: Manufacturing
Target Applications: Systems
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1979

SAS INSTITUTE INC.
P.O. Box 8000
Cary, NC 27511
(919) 467-8000
Target Applications: Business Graphics, Data Entry Editing; Modeling; Financial Reporting
Contacts:
Head of Sales: John P. Sall
Year Established: 1976
Number of Employees: 150

SATELLITE COMPUTING, INC.
4530 Professional Circle
Virginia Beach, VA 23455
(804) 499-9803
Target Industries: Distributors; Manufacturing; Education
Year Established: 1968
Number of Employees: 40

SATELLITE SOFTWARE INTERNATIONAL (SSI)
288 W. Center St.
Orem, UT 84057
(801) 224-8554
Target Applications: WP
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Judy Hopkins
Head of Software/Engineering: Alan C. Ashton
Year Established: 1979
Number of Employees: 20

SATURN SYSTEMS, INC. (SSI)
6875 Washington Ave. S.
Minneapolis, MN 55435
(612) 944-2452
Major Markets: Office Equipment Manufacturing
Target Applications: WP
Year Established: 1978
Number of Employees: 12

SATURN SYSTEMS, INC. (SSI)
3990 Varsity Drive
Ann Arbor, MI 48104
(313) 973-8422
Major Markets: Peripheral Manufacturing
Year Established: 1981
Number of Employees: 30

SAUER COMPUTER SYSTEMS
1750 S. Brentwood
St. Louis, MO 63144
(314) 962-0362
Major Markets: Systems House (Commercial OEM)
Year Established: 1975
Number of Employees: 30

SAYLES [illegible] & CO.
810 Quincy St.
P.O. Box 3140
Rapid City, SD 57701
(605) 342-5630
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Year Established: 1[illegible]
Number of Employees: 35

SAZTER
Suite 265
27520 Hawthorne Blvd.
Rolling Hills Estates, CA 90274
(213) 544-0337
Major Markets: Data Services (Service Bureau); Dealer/Distributor
Target Industries: Medical; Libraries; Publishing; Printing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Richard Marcellino
Year Established: 1976
Number of Employees: 190

SBAA MARKETING, INC.
Computer Services Division
1031 Rear Broadway
P.O. Box 971
Cape Girardeau, MO 63701
(314) 335-4257
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Medical
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978

S.B.C. SYSTEMS CO.
Suite 5220
1155 Hammond Drive
Atlanta, GA 30328
(404) 399-6321
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Insurance
Target Applications: Accounting; Actuarial Services; Pension; General Finance
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1977
Number of Employees: 3

SBD COMPUTER SERVICES CORP.
4744 Baltimore Ave.
Hydesville, MD 20781
(301) 864-9200
Major Markets: Data Services (Service Bureau)
Target Industries: Pension Fund; Communications
Target Applications: Communications
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1973
Number of Employees: 50

SBD COMPUTERS
4001 E. Greentree Campus
Marlton, NJ 08053
(609) 596-9100
Major Markets: Systems House (Commercial OEM)
Contacts:
Head of Sales: Ralph Baccellieri
Head of Software: Andrew Ritzie
Year Established: 1974
Number of Employees: 12

SCHLAES & YOUNG INFORMATION SYSTEMS, INC.
405 N. Wabash Ave.
Chicago, IL 60611
(312) 645-0808
Target Industries: Real Estate; Professionals
Year Established: 1982
Number of Employees: 5

SCHMIDT ASSOCIATES
7 Mt. Lassen Drive
San Rafael, CA 94903
(415) 499-8001
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Insurance; Government; Collection Agencies
Year Established: 1977

SCHUCHARDT SOFTWARE SYSTEMS, INC.
515 Northgate Drive
San Rafael, CA 94903
(415) 492-9330
Year Established: 1983
Number of Employees: 14

SCHUTZER ENTERPRISES, INC.
Suite 715
Graham Plaza
Bloomington, IN 47401
(812) 333-8888
Major Markets: Component Manufacturing; Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Manufacturing; Distribution
Target Applications: Accounting; Manufacturing Control; Labor Performance; Dental; WP
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1970

SCIENCE MANAGEMENT CORP.
1011 Rt. 22
P.O. Box 6800
Bridgewater, NJ 08807
(201) 685-9000
Major Markets: Maintenance/Other Services
Target Industries: Government
Year Established: 1946
Number of Employees: 800

SCIENTEK INSTRUMENTATION, INC.
P.O. Box 759
Shoreham, NY 11786
(516) 744-0400
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Medical; Education; Manufacturing; Engineering
Target Applications: CAD/CAM
Year Established: 1985

SCIENTIFIC & BUSINESS SYSTEMS, INC.
28th Floor
888 Seventh Ave.
New York, NY 10019
(212) 489-0490
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: D.S. Warner
Year Established: 1979

SCIENTIFIC SOFTWARE
P.O. Box 208
Wausau, WI 54401
(615) 845-2066
Year Established: 1981

SCIENTIFIC CALCULATIONS, INC.
7635 Main St.
Fishers, NY 14453
(716) 924-9303
Major Markets: OEM (Computer Systems)
Target Industries: Electronics, Military, Aerospace
Target Applications: Process Control
Year Established: 1963
Number of Employees: 200

SCIENTIFIC COMPUTER APPLICATIONS, INC.
115 W. 3rd St.
800 Wright Building
Tulsa, OK 74103
(918) 584-6197
Target Industries: Oil; Energy
Target Applications: Property Evaluation
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1969

SCIENTIFIC PROCESS & RESEARCH
P.O. Box 1268
Highland Park, NJ 08904
(201) 846-3477
Target Industries: Plastics Companies
Year Established: 1966

SCIENTIFIC SYSTEMS SERVICES, INC.
2000 Commerce Drive
Melbourne, FL 32901
(305) 725-1300
Major Markets: Systems House (Commercial OEM)
Target Industries: Electric Utilities; Industry, Chemistry, System
Contacts:
Head of Sales: W. Patrick Huff
Head of Software: John Redrup
Head of Engineering: Paul Bouchard
Year Established: 1966
Number of Employees: 230

SCM CORP.
KleinSchmidt Computer
450 Lake-Cook Road
Deerfield, IL 60015
(312) 945-1000
Major Markets: Data Services (Service Bureau)
Target Industries: Transportation
Year Established: 1948
Number of Employees: 50

SCORPION SYSTEMS, INC.
214 W. Patrick St.
Frederick, MD 21701
(301) 663-0539
Major Markets: OEM (Computer Systems); Dealer/Distributor
Target Industries: Legal; Real Estate
Target Applications: Mortgage Closings, Property Management
Net Sales: $100,000 — $500,000 (1981)

Vendors

Contacts:
Head of Engineering: Brian R. Blood
Year Established: 1979

SCOTT-HEALEY ASSOCIATES, INC.
Executive Park Tower
Albany, NY 12203
(518) 458-1512
Major Markets: OEM (Peripherals/Terminals); Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor, Miscellaneous Computer Supplies
Target Industries: Manufacturing; Equipment Dealers
Target Applications: Industrial Control
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales/Software: Joel Scott
Year Established: 1977

SCOTT & SCOTT COMPUTER CONSULTANTS, INC.
P.O. Box 27476
St. Louis, MO 63141
(314) 576-7727
Major Markets: Systems House (Commercial OEM)
Target Industries: Utilities
Target Applications: Planning; Design; Operation
Year Established: 1978

SCRIBE DATA SYSTEMS, INC.
210 Lincoln St.
Boston, MA 02111
(617) 482-4866
Major Markets: Systems House (Commercial OEM)
Target Industries: Publishing
Target Applications: Subscription fulfillment
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Barclay L. Miller
Year Established: 1976
Number of Employees: 10

SCS ENGINEERS
11260 Roger Bacon Drive
Reston, VA 22090
(703) 471-6150
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Engineering; Manufacturing; Distributions
Target Applications: Laboratory Automation, DBMS, Library Systems
Year Established: 1969
Number of Employees: 140

SDA PRODUCTS, INC.
8th Floor
71 5th Ave.
New York, NY 10003
(212) 741-5200
Major Markets: Maintenance/Other Services
Net Sales: $25 Million — $100 Million (1982)
Contacts:
Head of Sales: Paul Overdorff
Year Established: 1968
Number of Employees: 400

SDI
1700 S. El Camino Real
P.O. Box [illegible]
San Mateo, CA 94402
(415) 572-1200

Contacts:
Head of Sales: D. A. Carman
Head of Software: Richard Schroeder
Year Established: 1968

SEA DATA CORP.
Bridge Computer Co.
1 Bridge St.
Newton, MA 02158
(617) 244-8190
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM), Dealer/Distributor; Maintenance/Other Services
Target Industries: EGR, Scientific, Engineering
Contacts:
Head of Engineering: Ed Garcia
Year Established: 1981
Number of Employees: 30

SEATTLE TELECOM & DATA, INC.
2637 151st Place N.E.
Redmond, WA 98052
(206) 883-8440
Major Markets: OEM (Computer Systems); Dealer/Distributor; Maintenance/Other Services
Target Industries: Medical, Manufacturing, Distributors, Restaurants
Target Applications: Accounting, Costing, Payroll
Contacts:
Head of Software: Dave Corry
Year Established: 1972

SEBATA SYSTEMS, INC.
4710 Greenwich Road
Seville, OH 44273
(216) 769-2047
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau)
Target Industries: Finance; Distribution
Target Applications: Accounting; Order Entry, Mail List; Inventory
Year Established: 1971
Number of Employees: 35

SEED SOFTWARE
Suite 734
2300 Walnut St.
Philadelphia, PA 19103
(215) 568-2424
Major Markets: Maintenance/Other Services
Target Applications: DBMS
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1977
Number of Employees: 45

SEI CORP.
680 E. Swedesford Road
Wayne, PA 19087
(215) 687-1700
Major Markets: Data Services (Service Bureau)
Target Industries: Banking; Fiduciaries
Target Applications: Trust Accounting, Trust Management
Net Sales: $25 Million — $100 Million (1982)
Contacts:
Head of Sales: [illegible]
Head of Software: John Salidas
Head of Engineering: George Wagner
Year Established: 1968
Number of Employees: 450

Additional information provided for by vendor

SEI provides software, processing and wholesale transaction services to the financial industry:

FUNDTRAC securities management and accounting system

RELATIONSHIP banking system with consolidated customer statement

TRAN$FER money transfer system

TRUST-AID trust accounting and management information system

SEISMOGRAPH SERVICE CORP.
P.O. Box 1590
Tulsa, OK 74102
(918) 627-3330
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Energy
Target Applications: Seismic DP
Net Sales: More than $100 Million (1982)
Year Established: 1931
Number of Employees: 1,200

SELANAR CORP.
Selanar Graphics
4212 N. Freeway Blvd.
Sacramento, CA 95834
(916) 921-9700
Major Markets: Systems House (Commercial OEM)
Target Industries: Distribution; Manufacturing
Target Applications: Graphics; CAD/CAM
Contacts:
Head of Sales: Lee Ambrosini
Year Established: 1977
Number of Employees: 7

SELECT INFORMATION SYSTEMS, INC.
919 Sir Francis Drake Blvd.
Kentfield, CA 94904
(415) 459-4003
Target Industries: Business
Target Applications: Self Teach WP
Contacts:
Head of Engineering: Linda Gardner-King
Year Established: 1981
Number of Employees: 40

SELLERS SOFTWARE SERVICES CO.
470 E. Paces Ferry Road 309
Atlanta, GA 30305
(404) 237-0111
Major Markets: Systems House (Commercial OEM)
Target Applications: G/L
Year Established: 1978
Number of Employees: 6

SELVA SYSTEMS, INC.
167 Worcester St.
Wellesley, MA 02181
(617) 431-7576
Target Industries: General Business, Professional
Target Applications: Graphics
Contacts:
Head of Software/Engineering: Christopher Jans
Year Established: 1980
Number of Employees: 5

SENSIBLE SOFTWARE, INC.
6619 Perham Drive
W. Bloomfield, MI 48033
(313) 399-8877
Target Industries: Apple Computer User
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: Tracy Shelly
Head of Software: Roger Tuttleman
Head of Engineering: Charles Hartley
Year Established: 1978
Number of Employees: 10

SENTINEL COMPUTER CORP.
9902 Carver Road
Cincinnati, OH 45242
(513) 984-5622
Major Markets: Computer and Terminal Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Wholesale
Target Applications: Wholesale/Retail Distributors, Welding
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: John W. Peters
Year Established: 1978
Number of Employees: 45

SERCON CORP.
4611 N. Lindhurst
Dallas, TX 75229
(214) 691-3020
Major Markets: Systems House (Commercial OEM)
Contacts:
Head of Sales: William Simpson
Head of Software: Ken Breckenridge
Year Established: 1975
Number of Employees: 10

SGM
8830 Interchange
Houston, TX 77054
(713) 666-2701
Major Markets: Systems House (Commercial OEM)
Target Industries: Utilities; Oil and Gas, Nuclear
Target Applications: Supervisory Control and Data Acquisition
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: David Osina
Head of Software: Frank Kendall
Year Established: 1976
Number of Employees: 27

SHACKET DATA SERVICES, INC.
260 Edgemoor Road
Rochester, NY 14618
(716) 271-0770
Target Industries: Employment Agencies
Year Established: 1981

SHAFFER & SHAFFER APPLIED RESEARCH & DEVELOPMENT
3468 N. High St.
Columbus, OH 43214

(614) 267-3100
Major Markets: Maintenance/Other Services
Target Industries: Government; Banking
Target Applications: Financial Analysis, Statistical Analysis
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1972
Number of Employees: 6

SHAKER COMPUTER & MANAGEMENT SERVICES, INC.
990 River View Road
Schenectady, NY 12309
(518) 785-0976
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Construction; Municipal; Legal; Accountants
Target Applications: Order Entry; Job Costing; Engineering; Municipal Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales/Software: Alan Diedrich
Year Established: 1976
Number of Employees: 22

SHARED BUSINESS SERVICES, INC.
Suite 412
One Park Place
1900 Emery St. N.W.
Atlanta, GA 30318
(404) 355-8632
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Medical; Distribution
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Doyle Hagler
Head of Engineering: Edward Fordonski
Year Established: 1979
Number of Employees: 10

SHASTA GENERAL SYSTEMS
1329 Moffett Park Drive
P.O. Box 547
Sunnyvale, CA 94086
(408) 734-8360
Major Markets: Peripheral Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Medical; Dental; Accountants; Legal
Year Established: 1972
Number of Employees: 70

SHAW SYSTEMS ASSOCIATES, INC.
Suite 300
6620 Harwin Drive
Houston, TX 77036
(713) 782-7730
Target Industries: Banking
Year Established: 1967
Number of Employees: 30

S & H COMPUTER SYSTEMS, INC.
1027 17th Ave. S.
Nashville, TN 37212
(615) 327-3670
Contacts:
Head of Sales: Gary Manookian
Year Established: 1975
Number of Employees: 25

SHIRLEY SOFTWARE SYSTEMS
Suite 208
1936 Huntington Drive
S. Pasadena, CA 91030
(213) 441-5121
Target Industries: Engineering; Construction, Manufacturing; Software Development
Year Established: 1971
Number of Employees: 14

SHYCON ASSOCIATES, INC.
1 University Office Park
Waltham, MA 02154
(617) 647-5300
Major Markets: Maintenance/Other Services
Target Applications: Decision Support; Marketing; Logistics
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1974
Number of Employees: 15

SIERRA NATIONAL CORP.
5037 Ruffner St.
San Diego, CA 92111
(714) 277-4810
Major Markets: Computer Manufacturing, Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Accounting; Energy
Target Applications: Energy Control; POS; Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: David Forbes
Head of Software: Dennis Wilson
Head of Engineering: James Limb
Year Established: 1969
Number of Employees: 40

SIERRA ON-LINE
Sierra On-Line Building
Coarsegold, CA 93614
(209) 683-6858
Target Applications: Entertainment; Accounting; DNM; WP
Year Established: 1980
Number of Employees: 100

SIGMA SERVICES, INC.
235 Old Colony Ave.
Boston, MA 02127
(617) 268-7575
Major Markets: OEM (Computer Systems); Data Services (Service Bureau)
Target Industries: Construction; Real Estate; Dental
Target Applications: Financial Accounting; Mailing List Management
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Don Markey
Year Established: 1976
Number of Employees: 10

SIGMA SOFTWARE, INC.
248 Columbia Tnpk.
Florham Park, NJ 07932
(201) 966-1633
Year Established: 1978
Number of Employees: 58

SIGMA SYSTEMS, INC.
1508 Cotner Ave.
Los Angeles, CA 900253378
(213) 477-1421
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Education
Target Applications: Administration
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Jeanette Plantadosi
Head of Software: William J. Collard
Year Established: 1966
Number of Employees: 30

SIGMA TECH, INC.
24 Susan Drive
Chatham, NJ 07928
(201) 635-1949
Major Markets: Computer Manufacturing; Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Metal; Manufacturing, Paper; Chemical
Target Applications: Scrap Minimization, Resources Planning
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Drew Balich
Year Established: 1974
Number of Employees: 5

SIGNAL TECHNOLOGY, INC.
5951 Encina Road
Goleta, CA 93117
(805) 683-3771
Target Applications: Job Accounting; Signal Processes; DBMS
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Dr. Larry Pfeifer
Year Established: 1977
Number of Employees: 25

SIGNET LTD.
550 Southlake Blvd.
Richmond, VA 23236
(804) 794-2801
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Construction; Engineering
Target Applications: Accounting; Inventory; Shop Floor Control; Program Management
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Alfred M. Covington
Year Established: 1979
Number of Employees: 9

SILICON VALLEY SYSTEMS, INC.
1625 El Camino Real No. 4
Belmont, CA 94002
(415) 593-8344
Target Industries: Distribution
Year Established: 1981
Number of Employees: 20

SILTON AIDS, INC.
2407 E 38th St.
Los Angeles, CA 90058
(213) 585-1161
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Apparel; Manufacturing
Target Applications: Order Processing, Plant Loading; Accounting, Inventory Control
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Robert Sudalnik
Head of Software: William Snyder
Year Established: 1967
Number of Employees: 90

SIMCON, INC.
Professional Service Group
1945 Gallows Road
Vienna, VA 22180
(703) 448-8600
Major Markets: Maintenance/Other Services
Year Established: 1973
Number of Employees: 40

SIMPLAN SYSTEMS, INC.
300 Eastowne Drive
Chapel Hill, NC 27514
(919) 493-2495
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Manufacturing; Utilities, Banking
Contacts:
Head of Marketing: Caleb Greenberg
Geographic Coverage: International
Year Established: 1973
Number of Employees: 35

SIMPLE SOFT, INC.
Suite 101
480 Eagle Drive
Elk Grove, IL 60007
(312) 364-0752
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Retail; Financial; Real Estate
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Phil Rozewsky
Year Established: 1978
Number of Employees: 9

SIMTEK
P. O. Box 109
Cambridge, MA 02139
(617) 232-5020
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Education; Manufacturing; Retail
Target Applications: CAI; Simulation; Business Games
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1978
Number of Employees: 4

SIMULATION SCIENCES, INC.
Suite 250
1400 N. Harbor Blvd.
Fullerton, CA 92635
(714) 879-9180
Target Industries: Oil; Gas; Chemical
Target Applications: Process Simulation

Vendors

Contacts:
Head of Sales: James Byrne
Head of Engineering: Dr. Vince Vemauli
Year Established: 1966
Number of Employees: 60

SIMULATION SERVICES
[illegible] Blvd.
Chatsworth, CA 91311
[illegible]
Major Markets: OEM (Computer Systems); Maintenance/Other Services
Target Industries: Engineering
Target Applications: Simulation
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1975
Number of Employees: 25

SIMUTEK COMPUTER PRODUCTS, INC.
4897 E. Speedway Blvd.
Tucson, AZ 85712
[illegible]
Major Markets: Systems House (Commercial OEM); [illegible]
Target Industries: Professional; Small Business, Large Business; Departmental Uses
Target Applications: General Accounting; Graphics; Finance; Inventory
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1977
Number of Employees: 17

SINCLAIR OPTICS
[illegible] N. Main St.
Pittsford, NY 14534
[illegible]
Year Established: 1976
Number of Employees: 4

SIR, INC.
P.O. Box 1454
Evanston, IL 60204
(312) 475-2314
Major Markets: Systems House (Commercial OEM)
Target Industries: Education; Government; Commercial; Oil Exploration
Target Applications: [illegible]
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Lee Norris
Head of Software/Engineering: Barry Robinson
Year Established: 1976
Number of Employees: 30

SIRIUS CORP.
8106-B S. Memorial Pkwy.
Huntsville, AL 35802
(205) 881-2140
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Academic; Public and Corporate Libraries
Target Applications: Library Systems
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software/Engineering: Mike Murdock
Year Established: 1980
Number of Employees: 4

SKAMP COMPUTER SERVICES, INC.
10261 Yellow Circle Drive
Minnetonka, MN 55343
(612) 933-6300
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Distribution; Printing; Publishing
Target Applications: Order Entry; Accounting; Inventory Control; Sales Analysis
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1977
Number of Employees: 27

THE SLIDE CORP.
[illegible] N. Elm St.
P.O. Box 22106
Greensboro, NC 27420
(919) 273-1901
Target Industries: Financial
Target Applications: Management
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1980
Number of Employees: 26

SMALL BUSINESS SYSTEMS GROUP, INC.
6 Carlisle Road
Westford, MA 01886
(617) 692-3800
Target Applications: Accounting; Communications
Year Established: 1977
Number of Employees: 17

SMALL RECORDS ASSOCIATES, INC.
580 W. 97th St.
Lamont, IL 60439
(312) 739-5572
Year Established: 1981
Number of Employees: 3

SMALL SYSTEMS SOFTWARE, INC.
10135 Grange Ave.
Rockford, MI 49341
(616) 866-4315
Target Industries: Telecommunications; Process Control
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 4

SMART, INC.
[illegible] Cricket Lane
Wilton, CT 06897
(203) 762-3378
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Retail
Target Applications: POS
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Darius Simm
Head of Software: Emile Collins
Year Established: 1969
Number of Employees: 37

SMC SOFTWARE SYSTEMS
[illegible] Rt. 28
P.O. Box 3800
Bridgewater, NJ 08807
(800) 526-9962
Target Industries: Construction; Wholesale; Distribution
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: James MacInnis
Head of Software: Charles Gilman
Year Established: 1975
Number of Employees: 25

SMITH ANDERSON CORP.
71-866 Highway 111
Rancho Mirage, CA 92270
(619) 340-6688
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Year Established: 1978

SMITH, DENNIS & GAYLORD, INC.
Headquarters
3211 Scott Blvd.
Santa Clara, CA 95051
(408) 727-1870
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Health; Manufacturing; Financial Management; Agricultural Business
Target Applications: A/P; A/R; Radiology, Order Management
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Ben Richardson
Head of Software: Don Gaylord
Year Established: 1973
Number of Employees: 50

SMITH EDUCATIONAL ENGINEERING SERVICES, INC.
P.O. Box 244
Arlington Heights, IL 60006
(312) 394-3513
Year Established: 1979
Number of Employees: 25

SMYTH BUSINESS SYSTEMS, INC.
7100 Whipple Ave. N.W.
N. Canton, OH 44720
(216) 499-6350
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Retail
Target Applications: POS, Accounting; Inventory; General Business
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Gary W. Nelson
Head of Software/Engineering: J. Robert Duncan
Year Established: 1949
Number of Employees: 160

SNOWBIRD CORP.
Snowbird Village, VT 84092
(801) 742-2222
Target Industries: Resorts/Condominiums
Target Applications: Property Management, Time-Sharing
Contacts:
Head of Software/Engineering: Frank Spiker
Year Established: 1971
Number of Employees: 6

SOARING EAGLE SYSTEMS, INC.
4210 Stonehaven
Colorado Springs, CO 80906
(303) 576-4321
Major Markets: Dealer/Distributor
Target Industries: Government; [illegible]
Target Applications: Accounting; Taxes; Inventory Control
Year Established: 1977

SOFTECH MICROSYSTEMS, INC.
[illegible] W. Bernardo Drive
San Diego, CA 92127
(714) 451-1230
Contacts:
Head of Software/Engineering: C. A. Irvine
Year Established: [illegible]
Number of Employees: 100

SOFTLINK CORP.
[illegible] K
[illegible] Blvd.
Santa Clara, CA 95051
(408) 988-8011
Major Markets: Maintenance/Other [illegible]
Year Established: 1981
Number of Employees: 15

SOFTOOL CORP.
340 S. Kellogg Ave.
Goleta, CA 93117
[illegible] 964-0500
Target Industries: Software Development, Software Maintenance
Target Applications: Software Tools
Contacts:
Head of Software/Engineering: Richard Hug
Year Established: 1977
Number of Employees: 20

SOFT PRO SYSTEMS, INC.
4121 MacDonald Ave.
Richmond, CA 94805
(415) 234-5440
Major Markets: Systems House (Commercial OEM)
Target Industries: Banking; Legal; Manufacturing; Wholesale
Net Sales: [illegible] million — $5 Million (1982)
Year Established: 1978
Number of Employees: 5

SOFTRON, INC.
116 Rt. 17 N.
Upper Saddle River, NJ 07458
(201) 327-8014
Major Markets: Systems House (Commercial OEM)
Target Industries: OEM
Contacts:
Head of Sales: Dr. Anton Vierling
Head of Software Systems: [illegible]
Head of Engineering: Ken Brown
Year Established: [illegible]
Number of Employees: [illegible]

SOFTSYNC, INC.
14 E. 34th St.
5th Floor
New York, NY 10016
[illegible]
Target Industries: Education; Small Business
Target Applications: Utility; Educational; Small Business
Year Established: 1981
Number of Employees: 8

SOFTWARE AG OF NORTH AMERICA, INC.
11800 Sunrise Valley Drive
Reston, VA 22091
(703) 860-5050
Target Industries: Data Base Management System; On-Line Application Development Languages; T/P Monitor
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Donald M. France
Year Established: 1973
Number of Employees: 250

SOFTWARE ARCHITECTS, INC.
27 B. Griffith Lane
Ridgefield, CT 06877
(203) 438-5703
Year Established: 1981
Number of Employees: 2

SOFTWARE ARTS, INC.
27 Mica Lane
Wellesley, MA 02181
(617) 491-2100
Company
Head of Software/Engineering: Tracey Licklider
Year Established: 1980
Number of Employees: 80

SOFTWARE ASSOCIATES, Inc.
7297 General Lee Highway
Falls Church, VA 22042
(703) 241-0819
Major Markets: Maintenance/Other Services
Target Industries: Insurance; Law; Medical
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978
Number of Employees: 6

SOFTWARE BANK, INC.
861 Massachusetts Ave.
Arlington, MA 02174
(617) 641-1235
Major Markets: Maintenance/Other Services
Target Industries: Accountants
Target Applications: Accounting; Financial Modeling; Word Processing; DBMS
Year Established: 1981
Number of Employees: 20

SOFTWARE BROKERS INTERNATIONAL, INC.
8508 W. 45th
Tacoma, WA 98466
(206) 565-2368
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Medical; Banking; Distribution
Target Applications: Medical Office Management; General Ledger; Payroll
Year Established: 1981
Number of Employees: 2

SOFTWARE BUILDING BLOCKS, INC.
[illegible]
P.O. Box 119
Ithaca, NY 14850
(607) [illegible]
Year Established: 1983

SOFTWARE CLEARING HOUSE
771 Neeb Road
P.O. Box 36200
Cincinnati, OH 45236
(513) 451-6742
Target Industries: NCR Users
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Jack Ivers
Year Established: 1979
Number of Employees: 30

SOFTWARE CONCEPTS, INC.
Suite 1450
[illegible] Piedmont Ave.
Atlanta, GA 30308
(404) 659-1331
Target Industries: Banking; Textile
Target Applications: Balancing; Sale Box
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: Ronald R. Antinori
Head of Software/Engineering: Peter J. Tezza
Year Established: 1973
Number of Employees: 8

SOFTWARE CONNECTIONS
1800 Wyatt Drive
Santa Clara, CA 95054
(408) 988-3704
Year Established: 1981
Number of Employees: 7

SOFTWARE CORP.
1407 Clinton Road
Jackson, MI 49203
(517) 782-8160
Major Markets: Systems House (Commercial OEM)
Target Industries: Legal; Engineering; Real Estate; Library
Target Applications: Legal Accounting; General Accounting; DBMS
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 11

SOFTWARE CRAFTSMEN, INC.
40 Pickney
Boston, MA 02114
(617) 720-1079
Major Markets: Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1981
Number of Employees: 6

SOFTWARE DEVELOPMENT & MAINTENANCE, INC.
134 Spring Ave.
P.O. Box 668
Fuquay-Varina, NC 27526
(919) 552-5851
Major Markets: OEM (Computer Systems); OEM (Peripheral Terminals); Systems House (Commercial OEM)
Target Technologies: Banking; Manufacturing
Target Applications: ATM; Electronic Mail Transfer; POS; EFT
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software/Engineering: P. E. Truelove
Year Established: 1980
Number of Employees: 13

SOFTWARE DEVELOPMENT CORP.
Suite 2H
270 Amity Road
Woodbridge, CT 06525
(203) 397-2500
Target Industries: Retail Pharmacy; Medical; Legal; Financial
Target Applications: Remote Data Access; Loan Accounting
Contacts:
Head of Software: Terry Gibbeau
Year Established: 1976

SOFTWARE DYNAMICS
Suite G
2111 W. Crescent
Anaheim, CA 92801
(714) 635-4760
Major Markets: OEM (Terminal Terminals)
Contacts:
Head of Engineering: Ira C. Baxter
Year Established: 1977
Number of Employees: 3

THE SOFTWARE GROUP
1100 Crossroads Drive
Woodburn, OR 97071
(503) 241-4260
Major Markets: Systems House (Commercial OEM)
Target Industries: Legal; Medical; Wholesale; Manufacturing
Target Applications: Inventory Control; WP; Order Entry; Accounting
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1977

SOFTWARE HOUSE
1106 Massachusetts Ave.
Cambridge, MA 02138
(617) 661-9440
Target Applications: DBMS
Year Established: 1972
Number of Employees: 65

THE SOFT WAREHOUSE
912 Oceanview Terrace
P.O. Box 11174
Honolulu, HI 96828
(808) 734-5801
Target Industries: Engineering; Education
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1979

SOFTWARE INTELLIGENCE LABORATORY, INC.
80 Broad St. 30th Floor
New York, NY 10004
(212) 747-9000
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Banking; Finance; Manufacturing
Target Applications: Financial
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978
Number of Employees: 15

SOFTWARE INTERNATIONAL CORP.
1 Technology Drive
Andover, MA 01810
(617) 685-1400
Target Industries: All Industries
Target Applications: Financial Management, Accounting, Human Resources, Inventory Control
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: A. E. Maurras
Head of Software: C. J. Domoracki
Head of Engineering: R. Bretagne
Year Established: 1968
Number of Employees: 450

SOFTWARE ISLAND, INC.
Suite 102
5658 Mt. Allan Drive
San Diego, CA 92111
(619) 268-4741
Target Industries: Retail
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Greg Bryant

SOFTWARE MANAGEMENT SYSTEMS, INC.
84 Inverness Circle E.
Englewood, CO 80112
(303) 741-3179
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Construction; Engineering; General Industry
Target Applications: Accounting; Financial Management; Project Management
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales/Software: Michael Sutkowski
Year Established: 1978
Number of Employees: 30

SOFTWARE MODULE MARKETING, INC.
1567 7th St.
Sacramento, CA 95811
(916) 441-7234
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Carole Murphy
Year Established: 1974
Number of Employees: 60

SOFTWARE NORTH
3100 Glenn-Don Drive
Anchorage, AK 99504
(907) 333-4412
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Engineering; Manufacturing
Year Established: 1977
Number of Employees: 5

SOFTWARE PRODUCTS, INC.
Suite 451
4905 Del Ray Ave.
Bethesda, MD 20814
(301) 656-8660
Target Industries: Manufacturing; Government, Medical, Real Estate
Target Applications: Clinical Lab; Interval Ownership; Distribution; Military DP
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software/Engineering: Kenneth Leonard
Year Established: 1978
Number of Employees: 52

Vendors

SOFTWARE PRODUCTS INTERNATIONAL
Suite A
10343 Roselle St.
San Diego, CA 92121
(619) 450-1526
Target Industries: Distribution; OEM
Year Established: 1979
Number of Employees: 33

SOFTWARE PROGRAMMERS, INC.
14828 E. Firestone Blvd.
La Mirada, CA 90638
(213) 802-1925
Target Industries: Manufacturing
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1973
Number of Employees: 10

SOFTWARE PUBLISHING CORP.
1901 Landings Drive
Mountain View, CA 94043
(415) 962-8910
Target Industries: Small Business; Professionals; Manufacturing
Target Applications: Graphics; DBMS; Filing; Reporting
Contacts:
Head of Sales: Dennis Cerra
Head of Software: John Page
Year Established: 1980
Number of Employees: 53

SOFTWARE PURSUITS, INC.
Suite 800
444 Market St.
San Francisco, CA 94111
(415) 392-7171
Target Applications: IBM DOS
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: R. Schaal
Head of Software: L. Salvador
Year Established: 1975
Number of Employees: 20

SOFTWARE RESEARCH CORP.
140 Sheild St.
Hewtons, MA 02194
(617) 449-5310
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Software; Computer
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Allan Vecchio
Head of Software: Eduardo Becher
Year Established: 1978
Number of Employees: 18

SOFTWARE RESOURCES, INC.
Suite 210
186 Alewife Brook Pkwy.
Cambridge, MA 02138
(617) 497-5900
Target Industries: Finance; Banking
Target Applications: Portfolio Management; Securities Analysis
Contacts:
Head of Software: Harry C. Stern
Head of Engineering: R. F. Sutter
Year Established: 1980
Number of Employees: 15

SOFTWARE REVIEW CORP.
1 E. King St.
York, PA 17401
(717) 846-0247
Target Industries: Wholesale; Distribution; Inventory Control
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 5

SOFTWARE SEARCH GROUP
Suite 10
463 Greencraig Road
Los Angeles, CA 90049
(213) 476-4956
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Barter
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Robert Wolenik
Head of Software: Robert Shiefer
Year Established: 1976
Number of Employees: 8

SOFTWARE SERVICES OF AMERICA, INC.
370 Essex St.
Lawrence, MA 01842
(617) 681-0602
Target Industries: Banking
Target Applications: Teleysterns; ATM System
Contacts:
Head of Software: E. L. McDowell
Year Established: 1978
Number of Employees: 25

SOFTWARE SOLUTIONS, INC.
26 Computer Drive E.
Albany, NY 12205
(518) 458-1860
Major Markets: OEM (Computer Systems); OEM (Peripherals/ Terminals); Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Nonprofit; Medical; Manufacturing; Wholesale
Target Applications: Fund Raising Management; Medical Records Management; Data Encryption
Contacts:
Head of Software: Carolyn J. Peck
Year Established: 1978
Number of Employees: 5

THE SOFTWARE STORE
706 Chippewa Sq.
Marquette, MI 49855
(906) 228-7622
Target Industries: CP/M Minicomputer Market
Target Applications: POS Systems
Year Established: 1977
Number of Employees: 5

SOFTWARE & SYSTEMS DEVELOPMENT CO.
50 Mt. Pleasant Ave.
W. Orange, NJ 07052
(201) 325-8825
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979

SOFTWARE SYSTEMS
Science Management Corp.
1011 Rt. 22
Bridgewater, NJ 08807
(201) 685-9000
Target Industries: Distribution; Construction
Target Applications: Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales/Engineering: Jim Macinnis
Year Established: 1939
Number of Employees: 25

SOFTWARE SYSTEMS CONSULTING, INC.
2701 Spring Grove
Cincinnati, OH 45225
(513) 241-1045
Year Established: 1976
Number of Employees: 3

SOFTWARE SYSTEMS, INC. (MO)
1907 William St.
P.O. Box 1766
Jefferson City, MO 65101
(314) 635-5852
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980

SOFTWARE SYSTEMS, INC. (NJ)
321 Changebridge Road
Pine Brook, NJ 07058
(201) 227-2333
Target Industries: Wholesale; Manufacturing; Distribution
Target Applications: Order Entry; Sales Analysis; Inventory; Accounting
Year Established: 1971
Number of Employees: 10

SOFTWARE SYSTEMS MARKETING, INC.
1850 E. Southern
Tempe, AZ 85282
(602) 820-0515
Target Industries: Accountants; Contractors
Target Applications: Accounting; Job Costing
Year Established: 1975
Number of Employees: 4

SOFTWARE TECHNIQUES, INC.
Suite 101
5242 Katella Ave.
Los Alamitos, CA 90720
(213) 594-9405
Major Markets: Maintenance/Other Services
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software Sales Elements
Head of Engineering: Steven Davis
Year Established: 1979
Number of Employees: 20

SOFTWARE TECHNOLOGY FOR COMPUTERS
Industrial Park Annex
P.O. Box 466
Barnard, MA 02108
(617) 244-2590
Major Markets: Maintenance/Other Services
Target Industries: General Business
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 6

SOFTWARE TECHNOLOGY, INC.
Suite 12
620 N. 48th
Lincoln, NE 68504
(402) 466-7871
Year Established: 1979
Number of Employees: 5

SOFTWARE TOOLS
P.O. Box 191
Newton, MA 02168
(617) 647-0882
Year Established: 1979

SOFTWARE TOOLWORKS
Suite 1118
15233 Ventura Blvd.
Sherman Oaks, CA 91403
(213) 906-0414
Target Industries: Computer Manufacturers
Year Established: 1980
Number of Employees: 5

SOFTWARE '78
P.O. Box 5141
Fullerton, CA 92635
(714) 992-2230
Year Established: 1978
Number of Employees: 10

THE SOFTWARE WORKS, INC.
400 Cooper Center W.
Pennsauken, NJ 08109
(609) 662-0050
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Distribution; Education
Target Applications: MRP; Student Accounting
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1975
Number of Employees: 23

SOFTWORKS, INC.
7931 Old Branch Ave.
Clinton, MD 20735
(301) 868-4221
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: Donald Wood
Head of Software: Robert Fitzgerald
Head of Engineering: Claude Kinsey
Year Established: 1977
Number of Employees: 12

SOFTWRIGHTS, INC.
Suite 150
1401 N. Central Expwy.
Richardson, TX 75081
(214) 690-0596
Major Markets: Maintenance/Other Services
Contacts:
Head of Engineering: Dennis Jump
Year Established: 1982

SOLID SOFTWARE
Suite 881
5500 Interstate N. Parkway
Atlanta, GA 30328
(404) 952-7709
Target Industries: Property Management; Medical; Sales Order Entry; CPA
Target Applications: Micro
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1981
Number of Employees: 20

SOLUTION ASSOCIATES, INC.
Suite 1024
331 Fulton
Peoria, IL 61602
(309) 674-5290
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other [illegible]
Target Industries: Distributors; Legal, Manufacturing
Target Applications: Accounting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: David Schlacter
Head of Software: Murrel Rhodes
Year Established: 1977
Number of Employees: 10

SOLUTION DATA, INC.
943 N. Plum Grove Road
Schaumburg, IL 60195
(312) 843-7550
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing
Contacts:
Head of [illegible]
Year Established: 1981
Number of Employees: 8

THE SOLUTIONS GROUP, INC.
1006 Mopac Circle
Suite 2[illegible]
Austin, TX 78746
(512) 327-7412
Major Markets: Systems House (Commercial OEM)
Contacts:
Head of Sales: Thomas D. Grayson
Year Established: 1981

SOLUTIONS, INC.
13 State St.
P.O. Box 989
Montpelier, VT 05602
[illegible] 223-3300
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Banking; DP; Microcomputer
Target Applications: EFT; Micro/Mainframe Communication; Vsam, Communications
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Mary McGuire
Year Established: 1970
Number of Employees: 8

SOLUTION SYSTEMS, INC.
818 Montgomery Ave.
Narberth, PA 19072
(215) 668-4620
Major Markets: OEM (Computer Systems); OEM (Peripherals/Terminals); Data Services (Service Bureau)
Target Industries: Engineering; Market Research, Manufacturing
Target Applications: Data Management; Structural Analysis;Financial Modeling
Contacts:
Head of Engineering: Daniel A.Doyle
Year Established: 1980
Number of Employees: 6

SOLUTION TECHNOLOGY, INC.
Suite 218
[illegible] N. Federal Hwy.
Boca Raton, FL 33432
(305) 368-6226
Major Markets: Maintenance/Other Services
Target Industries: Engineering
Target Applications: Software Tools
Year Established: 1981
Number of Employees: 5

SONA INTERNATIONAL, INC.
1748 E. Garry Ave.
Santa Ana, CA 92705
(714) 751-5927
Major Markets: Data Services (Service Bureau)
Target Applications: Property Management
Net Sales: $100,000 — $500,000 (1982)
Year Established: [illegible]
Number of Employees: 4

SORCIM CORP.
2310 Lundy Ave
San Jose, CA 95131
(408) 942-1727
Target Industries: OEM, General Business
Target Applications: Pascal; Spreadsheets, WP; DBMS
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: L. Freade
Year Established: 1979
Number of Employees: 72

SOS, INC.
1107 Fairview Ave.
S. Pasadena, CA 91030
(213) 281-3803
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Printing, Distributor, Accountants
Target Applications: Accounting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Charles Jackson
Year Established: 1976

SOURCE DATA SYSTEMS, INC.
208 2nd Ave., S.E.
Cedar Rapids, IA 52406
(319) 366-7361
Target Industries: Medical
Target Applications: Accounting; Inventory Control; Order Communications, Patient Control
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1978
Number of Employees: 16

SOURCE ONE DISTRIBUTOR MANAGEMENT
1480 S. 11th St.
[illegible] MI 49009
(616) 375-8660
Target Industries: Distribution
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1970
Number of Employees: 10

SOUTHEAST MICRO-DATA CORP.
6220 S. Orange Blossom
Orlando, FL 32809
(305) 851-0913
Year Established: 1974
Number of Employees: 10

SOUTHERN COMPUTER SYSTEMS, INC.
2304 12th Ave. N.
P.O. Box 55473
Birmingham, AL 35255
(205) 933-1659
Major Markets: Computer Manufacturing, OEM (Computer Systems); Data Services (Service Bureau), Dealer/Distributor, Maintenance/Other Services
Target Applications: Data Entry
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Paul Scalise
Head of Software/Engineering: Mark [illegible]
Year Established: 1979
Number of Employees: 7

SOUTHERN SOFTWARE
1644 Shadow Moss
Germantown, TN 38138
(901) 365-7550
Major Markets: OEM (Peripherals/Terminals); Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Trucking; [illegible]
Year Established: 1976
Number of Employees: 6

SOUTHERN SYSTEMS, INC.
1602 W. Louisiana
P.O. Box P
McKinney, TX 75069
(800) 527-4548
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1977
Number of Employees: 14

SOUTH TRUST DATA SERVICES
P.O. Box 2554
Birmingham, AL 35290
(705) 254-5908
Major Markets: Data Services (Service Bureau)
Target Industries: Banking
Contacts:
Head of Engineering: Charles Murrell
Year Established: 1974
Number of Employees: [illegible]

SOUTHWEST COMPUTER SERVICES
[illegible] 1000
1515 Arapahoe
Denver, CO 80202
(303) 455-9312
Major Markets: Data Services (Service Bureau)
Target Industries: Oil and Gas
Target Applications: Accounting; Lease Records
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Dean Curry
Year Established: 1967
Number of Employees: 9

SOUTHWESTERN DATA SYSTEMS, INC.
Suite E
10761 Woodside Ave.
Santee, CA 92071
(619) 562-3670
Major Markets: Software Publishers
Target Applications: Educational, Business, Utilities, Communications
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978
Number of Employees: 11

SOUTH WEST SYSTEMS
Suite F
44 3rd Ave.
Chula Vista, CA 92010
(619) 425-5500
Major Markets: OEM (Computer Systems), Dealer/Distributor
Contacts:
Head of Sales: James McGinley
Year Established: 1982
Number of Employees: 3

SPACE TIME SYSTEMS CORP.
40 Croton Falls Road
P.O. Box G
Carmel, NY 10512
(914) 277-4512
Major Markets: Systems House (Commercial OEM)
Target Industries: Dental, Medical
Target Applications: Dental and Medical Management, Marketing Research
Contacts:
Head of Sales: Joel Wittels
Year Established: 1977
Number of Employees: [illegible]

SPARACINO ASSOCIATES, INC.
175 Blackberry Drive
Stamford, CT 06903
(203) 329-2256
Year Established: 1981
Number of Employees: 2

SPARKING CITY SOFTWARE CO.
[illegible] Center
P.O. Box 6535
Corpus Christi, TX 78411
(512) 855-4516
Target Industries: Banking; Bars
Contacts:
Head of [illegible]
Lushinsky
Year Established: 1980
Number of Employees: 3

SPARTACUS COMPUTERS, INC.
5 N. Park Drive
Bedford, MA 01730
(617) 275-4220
Major Markets: OEM (Peripherals/Terminals)
Contacts:
[illegible]
Head of Software: Michael Cassily
Head of Engineering: Michael Oyer
Year Established: 1981
Number of Employees: 30

SPEAKEASY COMPUTING CORP.
222 W. Adams St.
Chicago, IL 60606
(312) 346-2745
Target Industries: Engineering; Energy, Utilities, Financial
Target Applications: Economic; Financial, Graphics, Statistics
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978
Number of Employees: 10

SPECTRAL ASSOCIATES
3418 S. 90th St
Tacoma, WA 98409

Vendors

(206) 581-6936
Target Industries: TRS-80 Users
Contacts:
Head of Software: T. Rosenbaum
Year Established: 1981
Number of Employees: 6

SPECTRAPHYSICS
Mathematical Sciences Northwest
2755 Northup Way
Bellevue, WA 98004
(206) 827-0460
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Scientific
Year Established: 1965
Number of Employees: 100

SPECTRA VIDEO
39 W. 37th St.
New York, NY 10018
(212) 869-7911
Major Markets: Computer Manufacturing
Target Industries: Commercial
Target Applications: Business
Year Established: 1982
Number of Employees: 40

SPECTRO PRODUCTS
385 State St.
N. Haven, CT 06473
(203) 281-0121
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Laboratories
Year Established: 1967
Number of Employees: 9

SPECTRUM SOFTWARE
690 W. Fremont Ave.
Sunnyvale, CA 94087
(408) 738-4387
Target Industries: IBM Users; Apple Users, Finance; Engineering
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980
Number of Employees: 6

SPEEDATA, INC.
5708 Odana Road
Madison, WI 53719
(608) 274-3500
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Applications: Inventory; Payroll; Accounting; Bill of Materials
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Obert L. Bauer
Head of Engineering: Mark S. Nolte
Year Established: 1970
Number of Employees: 9

SPENCER SYSTEMS, INC.
1502 Lawrence Ave.
Ocean, NJ 07712
(201) 493-9080
Major Markets: Data Services (Service Bureau); Dealer/Distributor
Target Applications: Direct Mail
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1974

SPERRY CORP.
Township Line-Union Meeting Road
P.O. Box 500
Blue Bell, PA 19424
(215) 542-4011
Major Markets: Component, Computer, Terminal/Peripheral and Communications Equipment Manufacturing; OEM (Computer Systems); Maintenance/Other Services
Target Industries: Manufacturing, Public Sector, Distribution, Airlines
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1962
Number of Employees: 48,000

SPRINGFIELD SOFTWARE CORP.
1712 Pearl St.
Jacksonville, FL 32206
(904) 355-4291
Major Markets: Systems House (Commercial OEM)
Target Industries: Construction, Welding Supply, Printing
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1977
Number of Employees: 3

SPRINGWATER SOFTWARE, INC.
7032 County Road 37
Springwater, NY 14560
(716) 669-2587
Major Markets: Maintenance/Other Services
Target Industries: Financial
Target Applications: MIS
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1980
Number of Employees: 3

SPSS, INC.
Suite 3000
444 N. Michigan Ave.
Chicago, IL 60611
(312) 329-2400
Target Applications: Data Analysis; Statistical Software
Contacts:
Head of Sales: Susan Phelan
Head of Software: Louise Rehlang
Year Established: 1975
Number of Employees: 100

Additional information provided for by vendor

SPSS, Inc. is committed to the development of powerful and flexible software to organize, summarize and display information for commercial, government and research applications. SPSS systems: SPSS-X, SPSS Data Analysis System, SCSS, SPSS Color Graphics Option (post-processor to SPSS), IDA Interactive System, SPSS-11, and SPSS/Pro for the DEC Professional 350.

SRI, INC.
Engineering Solutions
1930 Shattuck Ave.
Berkeley, CA 94704
(415) 849-3458
Target Industries: Civil Engineering; Engineering
Target Applications: Pipeline; Chemical; Offshore
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1977
Number of Employees: 10

SSM MICROCOMPUTER PRODUCTS, INC.
2190 Paragon Drive
San Jose, CA 95131
(408) 946-7400
Major Markets: Component, Peripheral and Communications - Equipment Manufacturing
Target Applications: Data Communications
Contacts:
Head of Engineering: Malcolm Wright
Year Established: 1974
Number of Employees: 50

S.S.R. CORP.
Micro Computer Software
1600 Lyell Ave.
Rochester, NY 14606
(716) 254-3200
Major Markets: Dealer/Distributor
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Shea Reynolds
Head of Software: H. Robert Bondy
Year Established: 1969

STAFF COMPUTER TECHNOLOGY CORP.
10457 J. Roselle St.
San Diego, CA 92121
(714) 453-0303
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Applications: Process Control
Year Established: 1967
Number of Employees: 11

STANDARD COMPUTER SYSTEMS
2201 Regency Road
P.O. Box 466
Wilson, NC 27893
(919) 291-4417
Major Markets: Data Services - (Service Bureau)
Target Industries: Local Government
Target Applications: Property Tax Systems, Goverment Accounting; Payroll; Voter Registration
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1974
Number of Employees: 25

STANDARD DATA CORP.
1540 Broadway
New York, NY 10036
(212) 586-3100
Major Markets: Data Services (Service Bureau)
Target Industries: Pension Funds; Welfare Funds; Associations, Unions
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1969
Number of Employees: 93

STANDARD RESEARCH, INC.
P.O. Box 151
E. Lansing, MI 48823
(517) 351-6300
Target Applications: Financial Planning
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1974
Number of Employees: 15

STANDARD SOFTWARE SYSTEMS, INC.
681 S. Tustin
Orange, CA 92606
(714) 771-6862
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing; Brokerage
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1974
Number of Employees: 12

STANDARD CONTROLS, INC. (S.C.I.)
Micro-Sci Division
2158 S. Hathaway
Santa Ana, CA 92705
(714) 662-2801
Major Markets: Peripheral Manufacturing
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: Timothy Hanson
Year Established: 1980
Number of Employees: 30

STANDPOST COMPUTER GROUP, INC.
Rt. 2 Box 343
Afton, VA 22920
(804) 361-1180
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Small Business; Manufacturing
Target Applications: Property Management; Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software/Engineering: Robert E. Elcox
Year Established: 1977
Number of Employees: 7

STARDATA CORP.
Suite 300
801 N. Cass Ave.
Westmont, IL 60514
(312) 789-3344
Target Industries: Manufacturing
Target Applications: Source Code Generation
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978

STAR PLAN DATA PROCESSING, INC.
Suite 204
2040 W. Wisconsin Ave.
Milwaukee, WI 53233
(414) 933-0800
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Insurance; Legal; Manufacturing; Country Club
Target Applications: Accounting; Nutrition Analysis, Billing; Inventory
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Noah Dixon
Year Established: 1964
Number of Employees: 30

STAR SOFTWARE SYSTEMS, INC.
Suite 103
20600 Gramercy Place
Torrance, CA 90501
(213) 538-2511
Target Industries: Professional; Legal; Accountants; Program Management
Target Applications: Time Keeping; Property Management; Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Jim Hart
Year Established: 1979
Number of Employees: 10

START SYSTEMS
Suite 610
1120 Ave. of the Americas
New York, NY 10036
(212) 398-1717
Major Markets: Systems House (Commercial OEM);
Target Industries: Retail; Nonprofit; Banking, Insurance
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Ira Dodelman
Year Established: 1976
Number of Employees: 20

STATCOM CORP.
Suite 202
Austin, TX 78731
(512) 451-0221
Target Industries: Software
Target Applications: Program Productivity
Year Established: 1979
Number of Employees: 15

STATE OF THE ART SYSTEMS, INC.
Suite 21
2540 California Ave.
Mountain View, CA 94040
Major Markets: Systems House (Commercial OEM)
Target Industries: Labor Unions
Target Applications: Accounting; Information Systems; Job Dispatching
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 7

STATE OF THE ART, INC.
3183-A Airway Ave.
Costa Mesa, CA 92626
(714) 850-0111
Target Industries: Small business
Contacts:
Head of Sales: Dale Caravona
Head of Software: Warren Zindler
Year Established: 1981
Number of Employees: 60

STATION RESEARCH SYSTEMS
Suite 204
14677 Midway Road
Dallas, TX 75234
(214) 239-5331
Target Industries: Broadcasting
Target Applications: Music Inventory; Radio Music Research; Radio Station Marketing

Contacts:
Head of Software: Carl Barringer

STATISTICAL GRAPHICS CORP.
P.O. Box 1556
Princeton, NJ 08540
(609) 924-9374
Number of Employees: 6

STEELE DATA PROCESSING, INC.
4480 Refugee Road
Columbus, OH 43227
(614) 864-2550
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Year Established: 1968
Number of Employees: 64

STELLATION TWO, INC.
P.O. Box 2342
Santa Barbara, CA 93120
(805) 966-1140
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1980
Number of Employees: 7

STEPHEN G. LEVY, INC.
P.O. Box 2937
Seal Beach, CA 90740
(714) 730-6686
Target Applications: General Business
Year Established: 1978
Number of Employees: 10

STERLING DATA APPLICATIONS, INC. (SDA)
1105 W. Church Road
Sterling, VA 22170
(703) 450-4174
Major Markets: Systems House (Commercial OEM)
Target Industries: Government; Retail
Target Applications: Turnkey Systems
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Robert Cairo
Year Established: 1975
Number of Employees: 15

STEWART SYSTEMS CORP.
28 Travis St.
Boston, MA 02134
(617) 787-4700
Major Markets: Systems House (Commercial OEM)
Target Industries: Printing; Graphic Arts
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Software: Doug Smith
Head of Engineering: Frank Tibbets
Year Established: 1971
Number of Employees: 70

ST. JOSEPH DATA SERVICE, INC.
101 N. Second St.,
P.O. Box 4
St. Joseph, IL 61873
(217) 469-7384
Major Markets: OEM (Computer Systems), OEM (Peripherals/ Terminals), Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Agriculture; Insurance, Life Insurance
Target Applications: Farm Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Steven D Campbell
Year Established: 1965
Number of Employees: 13

ST. JOSEPH SYSTEMS
303 S. Main St.
P.O. Box 6488
Mishawaka, IN 46544
(219) 256-5548
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Dealer/Distributor; Maintenance/Other Services
Target Industries: Banking
Target Applications: Trust accounting
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1968
Number of Employees: 18

STOCKCO, INC.
14 College St.
Schenectady, NY 12305
(518) 372-5426
Terminals); Systems House (Commercial OEM);
Target Industries: Manufacturing
Target Applications: CAD/CAM
Net Sales: $100,000 — $500,000 (1981)
Number of Employees: 7

STOCKHOLDER SYSTEMS, INC.
1965 N. Park Place
(404) 952-3387
Target Industries: Banking
Target Applications: Automation Clearing House; Stockholder Accounting; Lease Accounting, Home Banking
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Year Established: 1971
Number of Employees: 40

STELTZ ENTERPRISES, INC.
Highway 41
P.O. Drawer 190
Pearl River, LA 70452
(504) 863-5714
Major Markets: Data Services (Service Bureau)
Target Industries: Building Material, Food Processors, Apparel Manufacturing
Target Applications: POS
Year Established: 1974
Number of Employees: 6

STOLZBERG RESEARCH ASSOCIATES, INC.
Stony Brook, NY 11790
(516) 751-4277
Target Industries: Manufacturing, Chemical, Distribution
Target Applications: Inventory, Accounting, Gas Inventory
Contacts:
Head of Sales: Marilyn Stolzberg
Year Established: 1978
Number of Employees: 4

STONES ASSOCIATES, INC.
P.O. Box 86
Carlisle, PA 17013
(717) 243-9212
Major Markets: Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Gas, Liquid Process, Water Treatment, Water Distribution
Target Applications: Pressure Flow Relativity
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Tom Coolidge
Head of Software: Donald Schroeder
Year Established: 1971
Number of Employees: 25

STONEWARE, INC.
50 Belvedere St.
San Rafael, CA 94901
(415) 454-6500
Target Industries: Government; Business Education
Target Applications: Graphics;
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1979
Number of Employees: 30

STORAGE TECHNOLOGY CORP. (STC)
2270 S. 88th St.
Louisville, CO 80028
(303) 673-5151
Major Markets: Component, Peripheral and Communications Equipment Manufacturing, OEM (Computer Systems), Systems House (Commercial OEM), Miscellaneous Computer Supplies
Net Sales: More than $100 Million (1982)
Contacts:
Head of Sales: Jake Scott
Year Established: 1969
Number of Employees: 15,000

STORED INFORMATION SYSTEMS
Hazlet, NJ 07030
(201) 739-9753
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services
Target Applications: Small Business Management; Information Management
Year Established: 1979

STRATEGIC DATA SYSTEMS
P.O. Box 1152
Sheboygan, WI 53081
Major Markets: Maintenance/Other
Target Industries: Insurance
Year Established: 1981
Number of Employees: 20

Vendors

STRATEGIC PLANNING ASSOCIATES, INC.
600 New Hampshire Ave. N.W.
Watergate 600
Washington, DC 20037
(202) 298-3300
Major Markets: Maintenance/Other Services
Target Industries: Financial
Target Applications: Strategic Planning
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Francois de Carbonnet
Head of Software: Mounir Badawy
Year Established: 1972
Number of Employees: 200

STRATUS COMPUTER
17 Strathmore Road
Natick, MA 01760
(617) 653-1466
Major Markets: Computer Manufacturing, OEM (Peripherals/Terminals)
Target Applications: Transaction Process
Contacts:
Head of Sales: J. Morgridge
Head of Software: R. Freiburghouse
Head of Engineering: G. Hendrie
Year Established: 1980
Number of Employees: 110

STRAUSS COMPUTER DEVELOPMENT, INC.
P.O. Box 409
Elmira, NY 14902
(607) 733-8550
Major Markets: Dealer/Distributor
Target Industries: Dental; Wholesale, Retail, Medical
Target Applications: General
Contacts:
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1979
Number of Employees: 3

STRUCTURAL MEASUREMENT SYSTEMS
545 River Oaks Pkwy
San Jose, CA 95134
(408) 263-2200
Contacts:
Head of Sales: Dave Formants
Head of Software/Engineering: Don Kientzy
Year Established: 1975
Number of Employees: 21

STRUCTURAL MEMBERS DESIGN GROUP
P.O. Box 3958
Charlottesville, VA 22903
804, 295-4804
Major Markets: Systems House (Commercial OEM)
Target Industries: Engineering
Target Applications: CAD/CAM

STRUCTURAL PROGRAMMING, INC.
83 Boston Post Road
Sudbury, MA 01776
Target Industries: Engineering; Manufacturing
Target Applications: Project Management, CAD/CAM
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1972
Number of Employees: 40

STRUCTURED BUSINESS SYSTEMS, INC.
175 Airport Blvd
Santa Rosa, CA 95401
(707) 526-0432
Target Industries: Manufacturing, Finance
Target Applications: Accounting, Payroll; Cobol-Oriented
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1979
Number of Employees: 12

STRUCTURED SOFTWARE SYSTEMS, INC.
1072 Inck Road
Mt. Holly, NJ 08060
(609) 267-1616
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978

STRUCTURE SYSTEMS GROUP
5204 Claremont Ave
Oakland, CA 94618
(415) 547-1567
Target Applications: Accounting, WP; DBMS, Productivity
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1976
Number of Employees: 35

STSC, INC.
2115 E. Jefferon St
Rockville, MD 20852
(301) 984-5000
Major Markets: Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Manufacturing; Finance, Government, Insurance
Target Applications: Accounting, Financial Planning; Conversational Mail; Decision Support
Contacts:
Head of Sales: Robert Schmidt
Year Established: 1969
Number of Employees: 400

STS, INC.
Suite 604
7751 Carondelet
St. Louis, MO 63105
(314) 725-2750
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Financial; Fleet Car Rental; Nonprofit Associations, Distributors
Target Applications: Financial; Inventory Control, Order Entry; Operations Control
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Kenneth H. Kaplan
Year Established: 1981

STS SYSTEMS, INC.
2 Landmark Square
Stamford, CT 06901
(203) 348-8055
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Petroleum; Fashion
Year Established: 1972
Number of Employees: 120

STYRON & ASSOCIATES
P.O. Box 5027
Statesville, NC 28677
(704) 872-8164
Major Markets: Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Manufacturing; Government
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979

SUBJECT WELLS & CO.
800 Enterprise Drive
Oak Brook, IL 60521
(312) 789-0240
Major Markets: Maintenance/Other Services
Target Applications: Accounting
Year Established: 1975
Number of Employees: 12

SUCCESS SYSTEMS, INC.
Suite 18
2231 Perimeter Park
Atlanta, GA 30341
(404) 458-0191
Major Markets: Systems House (Commercial OEM)
Target Industries: Food Brokers; Test Control
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Howard Spiller
Year Established: 1976

SUMMIT INFORMATION SYSTEMS CORP.
Management Support Systems
850 S.W. 35th St.
Corvallis, OR 97333
(503) 758-5888
Major Markets: Systems House (Commercial OEM)
Target Industries: Credit Unions
Contacts:
Head of Engineering: H. Thoennes
Year Established: 1980
Number of Employees: 74

SUNBELT COMPUTER SERVICES, INC.
9202 B. Markville Drive
Dallas, TX 75243
(214) 690-1325
Major Markets: Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Banking, Recreation
Target Applications: Financial Analysis; Golf Handicap
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Dan Beckham
Year Established: 1976

SUNBELT COMPUTER SYSTEMS
Suite 101
2455 E. 51st St.
Tulsa, OK 74105
(918) 742-0706
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Oil, Gas
Target Applications: Time Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Bruce Shamel
Year Established: 1980

SUNBURST COMMUNICATION, INC.
Software Division
39 Washington Ave.
Pleasantville, NY 10570
(914) 769-5030
Target Industries: Education
Year Established: 1982

SUN INFORMATION SERVICES CO.
1285 Drummer Lane
Wayne, PA 19087
(215) 687-8210
Major Markets: Data Services (Service Bureau)
Target Industries: Sun Company Affiliates, Banking; Process Investones, Project Management
Target Applications: Investment Management; Banking-Deposit Loan; Back-Up and Recovery
Net Sales: Over $100 Million (1981)
Year Established: 1975
Number of Employees: 400

SUNRISE DATA SYSTEMS
5 Manneview Plaza
Hoboken, NJ 07030
(201) 798-9110
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Banking
Target Applications: Investment Management
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 8

SUNTECH, INC.
P.O. Box 1828
Champaign, IL 61820
(217) 359-2112
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Rita Ahern
Year Established: 1978
Number of Employees: 25

SUNSET TECHNOLOGY CORP.
Suite D
804 Pearl
Boulder, CO 80302
(303) 449-7826
Target Industries: Medical
Target Applications: Office Management
Year Established: 1982
Number of Employees: 8

SWANSON ANALYSIS SYSTEMS, INC.
Johnson Road
P.O. Box 65
Houston, PA 15342
(412) 746-3304
Target Industries: Engineering
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1970
Number of Employees: 40

SYMBOLICS FINANCIAL SYSTEMS, INC.
1740 N. Rollins Blvd.
Richardson, TX 75081
(214) 238-5750
Target Industries: Banking

Target Applications: Mortgage Lending
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Robert L. Flynn
Year Established: 1978
Number of Employees: 25

SYNCSORT, INC.
560 Sylvan Ave.
Englewood Cliffs, NJ 07632
(201) 568-9700
Target Applications: Documentation; Sort/Merge Utilities
Contacts:
Head of Sales: William Prizivally
Head of Software: Harvey Tessler
Year Established: 1968
Number of Employees: 100

SYNERCOM TECHNOLOGY, INC.
500 Corporate Drive
Sugar Land, TX 77478
(713) 491-5000
Major Markets: Systems House (Commercial OEM)
Target Industries: Utilities; Engineering; Telephone
Target Applications: Thematic Mapping; Cable TV Network Design; Telephone System; Architectural
Contacts:
Head of Sales: Irv Lavine
Head of Software: Donald Golden
Year Established: 1969
Number of Employees: 170

SYNERGISTIC TECHNOLOGY, INC.
[redacted]
Cupertino, CA 95014
(408) 253-5800
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Applications: Structural Testing and Analysis
Year Established: 1978
Number of Employees: 9

SYNERGY, INC.
2337 18th St. N. W.
Washington, DC 20009
[redacted]
Target Applications: Econometrical/Statistical
Year Established: 1969
Number of Employees: 25

SYNERGY SOFTWARE, INC.
Suite 102
1836 Westlake Ave. N.
P.O. Box 55111
Seattle, WA 98155
[redacted]
Year Established: 1977

SYNERGY SYSTEMS, INC.
501 5th Ave.
New York, NY 10017
(212) 947-0660
Major Markets: Systems House (Commercial OEM)
Target Industries: Lawyers; CPA; Delivery Services
Target Applications: Financial
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979

SYNOR CORP.
100 Pennsylvania Ave.
Framingham, MA 01701
(617) 620-8800
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Banking, Manufacturing; Distribution; General [redacted]
Target Applications: Financial; Inventory; Production Scheduling; Time Management
Contacts:
Head of Sales: John Phipps
Year Established: 1981
Number of Employees: 10

SYNTACTICS CORP.
[redacted]
3333 Bowers Ave.
Santa Clara, CA 95051
(408) 727-6400
Major Markets: Maintenance/Other Services
Target Industries: Computer Manufacturing, OEM; Distribution
Target Applications: WP; OA
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Engineering: R. Salsbury
Year Established: 1980
Number of Employees: 12

SYNTAX CORP.
4500 W. 72nd Terr.
P.O. Box 8137
Prairie Village, KS 66208
(913) 362-9667
Target Industries: Accountants; Tax Consultants, Financial Planners
Net Sales: Less than $100,000 (1982)
Year Established: 1979
Number of Employees: 2

SYRACUSE DATA BASE
[redacted]
Fayetteville, NY 13066
(315) 637-6797
Major Markets: Systems House (Commercial OEM)
Target Industries: Retail
Target Applications: Small Business Accounting
Year Established: 1970
Number of Employees: 6

SYSCO COMPUTERS, INC.
[redacted]
400 E. Red Bridge Road
Kansas City, MO 64131
(816) 941-2445
Major Markets: Systems House (Commercial OEM); Data Services [redacted]
Target Industries: Medical; Manufacturing, Religious
Target Applications: Billing; Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Richard Canine
Year Established: 1976

SYSCOM, INC.
[redacted]
[redacted]
Miami, FL 33173
[redacted]
Target Industries: Shipping; Legal; Medical
Target Applications: Accounting; Property Management
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Richard Kennedy
Year Established: 1974
Number of Employees: 12

SYS-DYN CORP.
125 Morris St
Morristown, NJ 07960
(201) 538-4600
Major Markets: OEM (Peripherals/ Terminals); Systems House (Commercial OEM)
Target Industries: Banking; Insurance, Investment
Year Established: 1976
[redacted]

SYSTEC COMPUTER ASSOCIATES, INC.
[redacted]
Melville, NY 11747
(516) 673-1117
Major Markets: Systems House (Commercial OEM)
Target Industries: Wholesale; Manufacturing; Distribution, Blood [redacted]
Target Applications: Order Processing; Inventory Control; MRP; Accounting
Net Sales: $100,000 — $500,000 (1981)
[redacted]
Number of Employees: 5

SYSTEM APPLICATION ENGINEERING, INC.
[redacted]
Houston, TX 77042
(713) 783-6020
Major Markets: Systems House (Commercial OEM)
Target Industries: Energy; Power Plants, Insurance
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Joseph B. Grierson
Year Established: 1971
Number of Employees: 65

SYSTEMATICA
[redacted]
[redacted]
[redacted]
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Exhibition Display; Market Research
Target Applications: Simulation; [redacted]
[redacted]
(1981)
[redacted]

SYSTEMATICS, INC.
4001 Rodney Parham Road
Little Rock, AR 72212
(501) 223-5100
Major Markets: Data Services (Service Bureau)
Target Industries: Banking
Target Applications: General Banking
Net Sales: $25 Million — $100 Million (1981)
Contacts:
[redacted]
Year Established: [redacted]
Number of Employees: 1,500

SYSTEM AUTOMATION CORP.
[redacted]
Silver Spring, MD 20910
(301) 565-9400
Major Markets: OEM (Computer Systems), Systems House (Commercial OEM)
Target Industries: Associations; Clubs, Medical; Manufacturing
Target Applications: Accounting; Recruiting; Fund Raising
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: John G. Picarelli
Year Established: 1968
Number of Employees: 150

SYSTEMIC COMPUTER SERVICES
2802 34th St.
Lubbock, TX 79410
(806) 792-5177
Target Industries: Agriculture; Grain
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Joe Greer
Year Established: 1976

SYSTEMS ANALYSIS, INC.
5400 Farmington Road
W. Bloomfield, MI 48033
(313) 661-0350
Major Markets: Systems House (Commercial OEM), [redacted]
Target Industries: Manufacturing
Target Applications: MIS, Accounting, Job Costing, General Business
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Gerald Cross
Year Established: 1960
Number of Employees: 15

SYSTEMS AND ANALYSTS, INC.
[redacted]
[redacted]
(505) 347-2006
[redacted]
Number of Employees: 17

SYSTEMS & APPLIED SCIENCES CORP.
[redacted]
6811 Kenilworth Ave.
Riverdale, MD 20737
[redacted]
Major Markets: OEM (Computer Systems), Systems House (Commercial OEM), Data Services (Service Bureau), Maintenance/Other Services
Target Industries: Military; Aerospace, Government
Target Applications: Space Sciences, Telemetry, Instrumentation
[redacted]
Million (1981)
Year Established: 1973
Number of Employees: 800

SYSTEMS APPLICATIONS
101 Lucas Valley Road
[redacted]
(415) 472-4011
Contacts:
Head of Software: John Nordin

SYSTEMS ASSURANCE CORP.
16 Lafayette St.
P.O. Box 237
[redacted]
(207) 846-3761

Vendors

Target Industries: Insurance
Target Applications: Policy Management; Billing; Reporting
Year Established: 1976
Number of Employees: 20

SYSTEMS BY [illegible], INC.
2415 Parview Road
P.O. Box 328
Middleton, WI 53562
(608) 831-2262
Major Markets: Systems House (Commercial OEM)
Target Industries: Optical Labs; Retail Optometrists
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: D. Joseph Graber
Year Established: 1974
Number of Employees: 12

SYSTEMS BY MICA, INC.
6101 S. Rural Road No. 101
Tempe, AZ 85283
(602) 897-9576
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Industrial; Automotive, Food Wholesale
Target Applications: Warehousing; Accounting, Inventory; Payroll
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Ed Katz
Year Established: 1977

THE SYSTEMS CENTER
2988 Campus Drive
San Mateo, CA 94403
(415) 345-0611
Major Markets: Systems House (Commercial OEM)
Target Applications: IBM SNA; DDP
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: P. G. Schott
Head of Software: R. J. Ordahl
Year Established: 1981
Number of Employees: 45

SYSTEMS & COMPUTER TECHNOLOGY CORP. [SCI]
Great Valley Corp. Center
4 Country View Road
Malvern, PA 19355
(800) 523-0454
Target Industries: Education; Government
Year Established: 1968
Number of Employees: 850

SYSTEMS CONTROL, INC.
1801 Page Mill Road
Palo Alto, CA 94304
(415) 494-1165
Major Markets: Maintenance/Other Services
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Software: M. Liverwright
Year Established: 1968
Number of Employees: 400

SYSTEMS COORDINATION, INC.
P.O. Box 2500
Crystal River, FL 32629
(904) 795-2362
Major Markets: Maintenance/Other Services
Target Industries: Oil; Chemical; Power; Large Manufacturing
Target Applications: Maintenance Planning
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software: David Chase
Year Established: 1977
Number of Employees: 110

SYSTEMS DESIGN & DEVELOPMENT CORP.
28 W. Baltimore Ave.
Media, PA 19063
(215) 565-5660
Target Industries: Military; Commercial
Target Applications: Provisioning
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: James R. Gates
Year Established: 1969
Number of Employees: 15

SYSTEMS DESIGN ASSOCIATES
Suite 305
12300 Olive Blvd.
St. Louis, MO 63141
(314) 576-7250
Target Industries: Medical Systems; Labor Union System
Target Applications: Custom Programming
Year Established: 1975
Number of Employees: 5

SYSTEMS DESIGN LAB
Suite B
2612 Artesia Blvd.
Redondo Beach, CA 90278
(213) 374-4471
Year Established: 1979
Number of Employees: 5

SYSTEMS DESIGNS
1441 Park Ave.
Cranston, RI 02920
(401) 943-5820
Target Industries: Manufacturing; Medical
Target Applications: Accounting; Ambulance; Medical Supplies
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 8

SYSTEMS ENGINEERING TECHNOLOGY, INC.
10676 High Beam Court
Columbia, MD 21044
(301) 992-1818
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Medical; General Business
Target Applications: Business Management; Medical Records and Billing; CAI
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 10

SYSTEMS FOR HAZ MANAGEMENT
Suite 1620
235 Montgomery St.
San Francisco, CA 94104
(415) 391-1008
Target Industries: Government; Banking; Securities
Target Applications: Cash Management; Securities
Contacts:
Head of Software: Leslie Mallonee
Year Established: 1981

SYSTEMS GROUP
1601 Orangewood Ave.
Orange, CA 92668
(714) 633-4460
Major Markets: Computer Manufacturing, OEM (Computer Systems); Maintenance/Other Services
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Engineering: Lowell Dunn
Year Established: 1978
Number of Employees: 50

THE SYSTEMS HOUSE, INC.
Suite 304
9501 W. Devon Ave.
Rosemont, IL 60018
(312) 696-0300
Major Markets: Systems House (Commercial OEM)
Target Industries: Office Products; Paper
Target Applications: Distribution; Order Entry; Accounting; Inventory Control
Contacts:
Head of Sales: Michael Gerlach
Year Established: 1981
Number of Employees: 9

SYSTEMS INTEGRATION, INC.
Suite W308
6490 Excelsior Blvd.
St. Louis Park, MN 55426
(612) 925-0143
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Medical
Target Applications: Tumor Registry; Clinical Accounting; Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: David Thompson
Year Established: 1977

SYSTEMS MANAGEMENT, INC.
6300 N. River Road
Rosemont, IL 60018
(312) 698-4000
Major Markets: OEM (Computer Systems); Dealer/Distributor
Target Industries: Manufacturing; Distribution, Warehousing; Human Resource Management
Target Applications: MRP; Manufacturing Control System; Business Control Process; Human Resource Control
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Ken Trace
Year Established: 1969
Number of Employees: 94

SYSTEMS MARKETING CONSULTANTS, INC.
[illegible]
N. Andover, MA 01845
(617) 682-2380
Target Industries: Utilities; Manufacturing
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Richard J. Wronski
Year Established: 1979
Number of Employees: 25

SYSTEMS NORTHWEST, INC.
114 S. Franklin St.
Juneau, AK 99801
(907) 586-6140
Major Markets: Data Services (Service Bureau)
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Dave Petersoare
Year Established: 1976
Number of Employees: 18

THE SYSTEMS PRACTICE, INC.
2470 S. Winchester Blvd.
Campbell, CA 95008
(408) 248-2665
Target Industries: Manufacturing
Target Applications: Shop Floor Control; Work Order Tracking
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Software/Engineering: Carl Hagaman
Year Established: 1981
Number of Employees: 18

SYSTEM & SOFTWARE, INC.
Suite 500
1315 Butterfield Road
Downers Grove, IL 60515
(312) 960-1181
Major Markets: Systems House (Commercial OEM)
Target Applications: Industrial Control
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Jack Pon
Year Established: 1977
Number of Employees: 10

SYSTEMS OF THE FUTURE, INC.
35 Airport Road
Morristown, NJ 07960
(201) 267-4130
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: William Glynn
Head of Engineering: Peter Gourdry
Year Established: 1979
Number of Employees: 12

SYSTEM SOLUTIONS, INC.
7500 Hemlet Ave. S.
Minneapolis, MN 55408
(612) 871-5713
Target Industries: Retail
Target Applications: Accounting; Retail
Year Established: 1981
Number of Employees: 10

THE SYSTEMS SPECIALISTS
4414 Mitchell Lane
Austin, TX 78744
(512) 447-0038

Target Industries: Construction; Mining
Contacts:
Head of Sales: Doug Whaley
Head of Software: Wayne Foster
Year Established: 1978
Number of Employees: 10

SYSTEM SPECIALISTS, INC.
3900 Jackson St.
P.O. Box 4085
Alexandria, LA 71301
(318) 445-0262
Major Markets: Maintenance/Other Services
Target Industries: Home Furnishings; Retail
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1980
Number of Employees: 4

SYSTEMS PLUS, INC.
1120 San Antonio Road
Palo Alto, CA 94303
(415) 969-7047
Major Markets: Dealer/Distributor
Target Industries: Medical; Dealers; Distributors
Target Applications: Accounting; DBMS, Spreadsheets; WP
Year Established: 1980
Number of Employees: 30

SYSTEMS & PROGRAMMING INTERNATIONAL, INC.
177 N. Dean St.
Englewood, NJ 07631
(201) 567-3195
Major Markets: Systems House (Commercial OEM)
Target Industries: Communication; Banking
Target Applications: Message Switching; Electronic Mail; OA
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1971
Number of Employees: 45

SYSTEMS RESEARCH AND DEVELOPMENT CORP.
Maughan Drive
P.O. Box 12221
Research Triangle Park, NC 27709
(919) 549-0505
Major Markets: OEM (Computer Systems); OEM (Peripherals/Terminals); Data Services (Service Bureau)
Target Industries: Pharmacies; Libraries, Automotive Repair
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: James Dalton Jr.
Year Established: 1975
Number of Employees: 75

SYSTEMS RESEARCH CORP.
14677 Midway Road
Dallas, TX 75234
(214) 233-0665
Target Industries: System Houses
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1972
Number of Employees: 8

SYSTEMS RESOURCES CORP.
121 W. Edmund Place
Minneapolis, MN 55419
(612) 831-0125
Major Markets: Systems House (Commercial OEM)
Target Industries: General Business
Target Applications: DBMS
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Charles Lantka
Year Established: 1975
Number of Employees: 45

SYSTEMS SERVICES, INC.
P.O. Box 522
Hockessin, DE 19707
(302) 654-3250
Major Markets: Data Services (Service Bureau)
Target Industries: Wholesale; Construction
Target Applications: General Accounting; Inventory; Payroll; WP
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975

SYSTEMS SOFTWARE INTERNATIONAL, INC.
P.O. Box 160487
Miami, FL 33116
(305) 350-5458
Year Established: 1976
Number of Employees: 5

SYSTEMS SOFTWARE TECHNOLOGY CORP.
175 Fifth Ave.
Room 1101
New York, NY 10010
(212) 677-2200
Year Established: 1982
Number of Employees: 5

SYSTEMS SOFTWARE, INC.
Suite 500
19400 El Camino Real
Houston, TX 77062
(713) 488-6812
Target Industries: Energy
Target Applications: Supervisory Control; Data Acquisition; Oil Pipeline Flow Simulation
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1975
Number of Employees: 20

SYSTEMS SPECIALISTS, INC. (DC)
Suite 910
1772 Flora Road
Washington, DC 20016
(301) 656-3717
Net Sales: $100,000 — $1 Million (1981)
Year Established: 1973
Number of Employees: 16

SYSTEMS SPECIALISTS, INC. (TX)
Suite 142
4131 Belfast
Dallas, TX 75234
(214) 458-1368
Major Markets: Systems House (Commercial OEM)
Contacts:
Head of Sales: Dave McDonald
Year Established: 1975

SYSTEMS STRATEGIES, INC.
111 W. 54th St.
New York, NY 10001
(212) 489-8440
Major Markets: Systems House (Commercial OEM)
Target Industries: Banking; Brokerage; Terminal Manufacturing
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Ralph Caffero
Year Established: 1976
Number of Employees: 82

SYSTEMS TECHNOLOGY AUTOMATED RESOURCES, INC.
1201 Flower St.
Glendale, CA 91201
(818) 224-8041
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Pharmacy; Medical
Target Applications: Billing; Prescription; Management Reporting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Craig Freedman
Year Established: 1973
Number of Employees: 15

SYSTEMS UNLIMITED, INC.
Suite A
Storey Building
Aberdeen, NC 28315
(919) 944-7022
Target Industries: Education
Contacts:
Head of Software: Charles Owen Jr.
Year Established: 1976
Number of Employees: 7

SYSTEM SUPPORT SOFTWARE, INC.
2500 Kensington Plaza
Dayton, OH 45439
(513) 435-8514
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software: Larry Ledbetter
Year Established: 1972
Number of Employees: 12

SYSTIME CORP.
Suite L
11915 Barwick Road Drive
Rancho Cordova, CA 95670
(916) 635-1221
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Real Estate; Legal; Public Television
Target Applications: Membership; Inventory Control, Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1976

SYSTRAN CORP.
4126 Linden Ave.
Dayton, OH 45432
(513) 258-3594
Major Markets: Systems House (Commercial OEM)
Target Industries: Aerospace; Manufacturing
Target Applications: Process Control
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Jerry Girard
Year Established: 1977
Number of Employees: 50

SYSTRON CORP.
2700 Comet Ave.
Pontiac, MI 48057
(313) 772-5490
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Accountants; Unions
Target Applications: Accounting; Payroll
Year Established: 1978
Number of Employees: 8

SYSTRONICS, INC. (TX)
10841 Haddington Drive
Houston, TX 77043
(713) 467-1733
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Oil; Water Treatment
Target Applications: Pipeline Control, Off/On Shore Production; Data Acquisition
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Robert Haveson
Year Established: 1969
Number of Employees: 55

SYSTRONICS, INC. (AK)
1112 Cushman St
Fairbanks, AK 99701
(907) 452-5352
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Applications: Accounting; Project Report, Budgeting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Linda Manes
Year Established: 1975
Number of Employees: 16

SYTEK, INC.
P.O. Box 138
Berea, OH 44017
(216) 243-1613
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Manufacturing; Associations
Target Applications: WP; Membership, Accounting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Thomas Dudley
Year Established: 1975
Number of Employees: 9

TAB BOOKS, INC.
Monterey Ave.
Blue Ridge Summit, PA 17214
(717) 794-2191
Major Markets: Dealer/Distributor; Publisher
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: George Watkins
Year Established: 1965
Number of Employees: 200

TAB COMPUTER ASSOCIATES
210 E. Main St.
Batavia, NY 14020
(716) 343-8971

Vendors

Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980
Number of Employees: 6

TAFT CONSULTING, INC.
161 William St.
New York, NY 10038
(212) 964-3636
Major Markets: Systems House (Commercial OEM)
Target Industries: Government; Medical; Wholesale Distributors; [illegible]
Target Applications: Electronic Mail; Text Retrieval; WP; Message Switching
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1971
Number of Employees: 10

TAMI ASSOCIATES, INC.
11400 Lakin Place
Oakton, VA 22124
[illegible]
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975
Number of Employees: 2

TALQUIN CORP.
270 First Ave. S.
St. Petersburg, FL 33733
(813) 895-1784
Target Industries: [illegible]
Target Applications: Fleet Systems
Contacts:
Head of Software: Joseph L. Wytisz
Year Established: 1981

TAMARACK SOFTWARE, INC.
P.O. Box 247
Darby, MT 59829
[illegible]
Major Markets: Systems House (Commercial OEM)
Target Industries: Education
Target Applications: Information and Data Management
Contacts:
Head of Sales: Sally Daley
Head of Software: Dr. Richard Daley
Year Established: 1978

TANDY CORP.
Radio Shack
1600 One Tandy Center
Fort Worth, TX 76102
[illegible] 390-3011
Major Markets: Computer, Terminal, Peripheral and Communications Equipment Manufacturing; OEM (Computer Systems); Dealer/Distributor; Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Legal; Medical; Real Estate; General Business
Net Sales: More than $100 Million (1982)
Year Established: 1921
Number of Employees: 27,000

TARBELL ELECTRONICS
Suite B
960 Dovlen Place
Carson, CA 90746
(213) 538-4251
Major Markets: Component and Computer Manufacturing; OEM (Computer Systems); Systems House (Commercial OEM)
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1976
Number of Employees: 10

TASCON CORP.
1200 Beechwood Ave.
Nashville, TN 37212
(615) 385-0730
Major Markets: Systems House (Commercial OEM)
Contacts:
Head of Sales: Robert Bransford
Year Established: 1978
Number of Employees: 5

TCC, INC.
3429 Executive Center Drive
Austin, TX 78731
(512) 345-5700
Major Markets: Data Services (Service Bureau)
Target Industries: Insurance
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1968
Number of Employees: 350

TCI SOFTWARE
6107 W. Mill Road
Flourtown, PA 19031
(215) 836-1406
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Alfred Andrian
Head of Software: Robert Fraser
Year Established: 1981
Number of Employees: 3

TCS SOFTWARE, INC.
3209 Fondren Road
Houston, TX 77063
(713) 977-7804
Target Industries: General Business; Public Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Barbara Stafford
Head of Software: Richard Spitler
Year Established: 1975
Number of Employees: 21

TEC COMPUTER SYSTEMS, INC.
30 Tower Road
Newton, MA 02164
(617) 964-3890
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Manufacturing
Target Applications: Inventory Control; MRP; Job Status; Production Control
Year Established: 1975
Number of Employees: 40

TECHNALYSIS CORP.
6700 France Ave. S.
Minneapolis, MN 55435
(612) 925-5900
Major Markets: Dealer/Distributor
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: James Clark
Year Established: 1968
Number of Employees: 140

TECHNE SOFTWARE
Suite 210
3685 Mount Diablo Blvd.
Lafayette, CA 94549
(415) 283-6824
Target Industries: Banking; Retail; Engineering; Manufacturing
Contacts:
Head of Sales: David Bass
Year Established: 1982
Number of Employees: 11

TECHNICAL ANALYSIS CORP.
120 W. Wieuca Road, N.E.
Atlanta, GA 30042
(404) 252-1045
Major Markets: Component and Communications Equipment Manufacturing; OEM (Peripherals/Terminals); Systems House (Commercial OEM)
Target Industries: Theater; Accountants
Target Applications: Accounting; Graphics
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Gerald W. Buran
Year Established: 1953
Number of Employees: 60

TECHNICAL DATA SYSTEMS, INC.
5200 Maryland Way
Brentwood, TN 37027
(615) 373-3636
Major Markets: Dealer/Distributor
Target Industries: Legal, Accountants; Churches, Professional
Target Applications: WP; Accounting; DBMS; Spreadsheet
Net Sales: $5 Million — $25 Million (1982)
Year Established: 1977
Number of Employees: 55

TECHNICAL EVALUATION & MANAGEMENT SYSTEMS, INC.
520 Carlton Tower III
13601 Preston Road
Dallas, TX 75240
(214) 386-5764
Major Markets: Data Services (Service Bureau)
Target Industries: Pharmacy/Risk School; Health Research
Target Applications: Toxicology Research; Clinical Data Management
Contacts:
Head of Software: Dr. Richard Simms
Year Established: 1977
Number of Employees: 67

TECHNICAL RESOURCES, INC.
Suite 607
2222 Gull Road
Kalamazoo, MI 49001
(616) 343-9690
Major Markets: OEM (Peripherals/Terminals); Systems House (Commercial OEM)
Target Industries: Medical; Manufacturing, Distribution
Target Applications: Accounting; Medical Billing; Inventory
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software/Engineering: Richard Fant
Year Established: 1977
Number of Employees: 10

TECHNICAL SYSTEMS CONSULTANTS, INC.
111 Providence Road
Chapel Hill, NC 27514
(919) 493-1451
Contacts:
Head of Sales: Don Sinkiewicz
Year Established: 1976

TECHNICO, INC.
2501 Druid Park Drive
Technology Center
Baltimore, MD 21215
(301) 669-1400
Major Markets: Computer Manufacturing
Target Industries: Education; Small Business; Industrial Application
Target Applications: Training; Office Applications
Net Sales: $1 Million — $5 Million (1981)

TECHNICON DATA SYSTEMS CORP.
5885 Glenridge Drive
Atlanta, GA 30328
(404) 252-2661
Major Markets: OEM (Peripherals/Terminals); Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Hospitals; Clinical and Private Labs
Target Applications: Data Entry; Charge Capture; Data Collections; Payroll Cars
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Sales: Ransom J. Parker
Head of Software: Lee Murphy
Year Established: 1971
Number of Employees: 425

TECHNOLOGY CONSULTING CORP.
Suite 607
179 Allyn St.
Hartford, CT 06103
(203) 278-4800
Target Industries: Manufacturing; Insurance; Finance
Target Applications: Polling Application; General Business Application
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Michael Feldman
Year Established: 1979

TECHNOLOGY SYSTEMS, INC.
2 Griswold St.
P.O. Box 137
Darien, CT 06820
(203) 764-0051
Major Markets: Systems House (Commercial OEM)
Target Industries: Oil and Gas; Retail; Manufacturing; Distribution
Target Applications: Accounting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Andy Prince
Head of Engineering: Kitty Bain
Year Established: 1977
Number of Employees: 25

TECNTRONIC DATA SYSTEMS, INC.
1031 W. Andrews Highway
P.O. Box 5662

Midland, 79703
(915) 697-3174
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Oil and Gas Operators
Target Applications: Oil and Gas Accounting
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1978
Number of Employees: 12

TECHWARE COMPUTING CO.
9620 Executive Court Drive
St. Petersburg, FL 33702
(813) 576-3734
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Manufacturing; Sheet Metal
Contacts:
Head of Sales: Arnold Colbert
Year Established: 1981
Number of Employees: 40

TEC, INC.
421 N.W. 78th Terr.
Pembroke Pines, FL 33024
(305) 963-6305
Major Markets: Systems House (Commercial OEM)
Target Industries: Property Management; Accountants; Real Estate
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979

TEKCOR SOFTWARE, INC.
7529 Big Band Blvd.
St. Louis, MO 63119
(314) 962-6875
Target Industries: Accounting
Year Established: 1977

TEKELEC, INC.
2312 Walsh Ave.
Santa Monica, CA 90405
(213) 279-7300
Major Markets: Communications Equipment Manufacturing
Target Industries: Data Communication Engineers; Data Network Users
Target Applications: X-25 Packet Switching, SNA/SDLL Application
Contacts:
Head of Sales: Robert Hess
Year Established: 1971
Number of Employees: 13

TELCO RESEARCH CORP.
1818 Dexter St.
Nashville, TN 37208
(615) 383-2251
Major Markets: Maintenance/Other Services
Target Industries: Banking; Manufacturing; Insurance; Brokerage
Target Applications: Telecommunications Techniques; Optimization; Accounting
Contacts:
Head of Sales: Steve Wilkerson
Head of Software: Ann Caldwell
Year Established: 1975
Number of Employees: 46

TELECORP, INC.
135 Cherry St.
Milford, CT 06460
(203) 877-5431
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Automotive; Newspapers, Advertising; Manufacturing
Target Applications: POS; General Business Finance; Inventory Control
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1976
Number of Employees: 40

TELEHOUSE SOFTWARE CONNECTION, INC.
P.O. Box 6548
Torrance, CA 90504
(213) 516-9430
Major Markets: Data Services (Service Bureau)
Target Applications: Communications
Year Established: 1978

TELEPROCESSING, INC.
81 Main St.
Boston, MA 02109
(617) 367-8189
Contacts:
Head of Sales: Ross Gale
Head of Software: Norman Rasmussen
Year Established: 1980
Number of Employees: 5

TELESOFT
10629 Prospect St.
San Diego, CA 92121
(714) 457-2700
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Government; Manufacturing; Distribution
Target Applications: Ada
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1981
Number of Employees: 40

TELMAR GROUP, INC.
80 Park Ave.
New York, NY 10016
(212) 949-4640
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Advertising
Target Applications: Media Planning; Advertising Budget; Electronic Mail
Contacts:
Head of Sales: Harry Appel
Year Established: 1968
Number of Employees: 75

TELNI SYSTEMS, INC.
Suite 210
34605 Schoolcraft Road
Livonia, MI 48150
(313) 525-0440
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Applications: Accounting; Financial
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978

TELOS SYSTEMS, INC.
Suite 3050
2400 Ocean Park Blvd.
Santa Monica, CA 90405
(213) 450-2424
Target Industries: Aerospace; Military
Target Applications: Communications; Weapons
Year Established: 1969
Number of Employees: 600

TEMPORAL ACTIVITY PRODUCTS
1535 121 Ave., S.E.
Bellevue, Wash. 98005
(206) 746-2790
Target Industries: Music
Target Applications: Teaching
Year Established: 1974
Number of Employees: 7

TERMINALS UNLIMITED, INC.
350 S .Washington St
Falls Church, VA 22046
(703) 237-4000
Major Markets: OEM (Computer Systems); OEM (Peripherals/ Terminals); Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Robert Keigley
Year Established: 1981
Number of Employees: 110

TERRADATA
Suite 400
850 Glenn St.
San Francisco, CA 94105
(415) 981-2063
Target Industries: OEM; Petroleum; Energy; Geology
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Fred Lamble
Year Established: 1977
Number of Employees: 12

TERRA GRAPHICS
12 Bond St.
White Plains, NY 10603
(914) 428-8000
Year Established: 1982
Number of Employees: 3

TERRAMART KOREA
101 Howard St.
P.O. Box 7550
San Francisco, CA 94120
(415) 543-9320
Contacts:
Head of Sales: John Group
Year Established: 1977
Number of Employees: 40

TEXAS INSTRUMENTS, INC.
Data Systems Group
12501 Research Blvd.
P.O. Box 2909
Austin, TX 78769
(512) 250-7171
Major Markets: Component, Computer, Terminal/Peripheral and Communications Equipment Manufacturing
Net Sales: Many over $100 Million (1982)
Contacts:
Head of Engineering: George H. Hallmeier
Year Established: 1930
Number of Employees: 80,000

TEXAS PROCESSOR, INC.
4127 Commercial St.
San Antonio, TX 78229
(512) 690-9062
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Professional; Wholesale, Retail, Inventory
Target Applications: Accounting; Payroll, Medical, Dental
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Richard Brown
Head of Software: Sara Shepherd
Year Established: 1975

TEXAS SOFTWARE, INC.
Suite 790
4151 S.W. Freeway
Houston, TX 77027
(713) 627-8660
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Petroleum; Small Business
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Dana Ballantyne
Head of Engineering, M. Ballantyne
Year Established: 1981
Number of Employees: 10

THARP SYSTEM CORP.
1000 E. Main St.
Plainfield, IN 46168
(317) 839-2700
Major Markets: Data Services (Service Bureau)
Contacts:
Head of Software: Susan Tharp
Year Established: 1977

THE HUTCHISON CO.
Suite 9
2900 W. Northern Lights
Anchorage, AK 99503
(907) 248-2700
Major Markets: Systems House (OEM); Dealer/Distributor
Target Industries: Engineering; Legal, Professional
Contacts:
Head of Marketing: Sharron Soloman
Year Established: 1978
Number of Employees: 4

THERMON CORP.
Suite 108
131 N. Tustin Ave.
Tustin, CA 92680
(714) 835-9191
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Car Rental; Travel Agency; Medical
Target Applications: WP; Accounting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Scott Sampson
Year Established: 1972
Number of Employees: 10

THETA BUSINESS SYSTEMS
1110 Sonora Ave No. 108
Glendale, CA 91201

Vendors

(213) 242-7981
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Larry Jones
Head of Software: John Cumming
Year Established: 1975
Number of Employees: 7

THOMAN SOFTWARE
1821 Summit Road
Suite 107
Cincinnati, OH 45237
(513) 948-8700
Major Markets: Systems House (Commercial OEM)
Target Industries: Market Research, Pharmacy Manufacturing
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1970
Number of Employees: 5

THOMAS DATA SYSTEMS
[illegible]
Middletown, OH 45042
(513) 422-2036
Major Markets: Systems House (Commercial OEM); [illegible]
Target Industries: Government; [illegible]
Target Applications: Court Systems; Real Estate; Accounting; Film Library
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1980

THOMAS-LAGUNAS & ASSOCIATES, INC.
[illegible]
Brookfield, WI 53005
(414) 784-8080
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing; Distributors, Chemical; Aircraft
Target Applications: MRP; Sales Order Processing; Master Scheduling; Procurement
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1969
Number of Employees: 70

THOMAS DATA, INC.
[illegible]
Atlanta, GA 30338
[illegible]
Target Industries: Computer
Target Applications: System Generator
Year Established: 1969

THOUGHTWARE PUBLISHING CO., INC.
[illegible]
Grants Pass, OR 97526
(503) 476-1467
Year Established: 1982
Number of Employees: 15

3CI
[illegible]
Fort Collins, CO 80525
[illegible]
Major Markets: (OEM) Peripherals and Terminals; Maintenance/Other Services
Target Industries: Information Centers
Target Applications: Relational DBMS
Net Sales: $500,000 — $1 Million
Contacts:
Head of Marketing: John Hoxmeier
Head of Software: J. Curtis Wilcott
Geographic Coverage: International
Year Established: 1980
Number of Employees: 13

3M DATATRACK SYSTEMS, INC.
Suite 385
600 3rd Ave
New York, NY 10016
(212) 309-1938
Major Markets: Systems House (Commercial OEM)
Target Industries: Advertising
Year Established: 1970
Number of Employees: 16

THRESHOLD SOFTWARE
1832 Tribute Road
Sacramento, CA 95815
(916) 920-8169
Contacts:
Head of Sales: Nelson Tass
Year Established: 1982
Number of Employees: 2

THUNDERBIRD AUTOMATION GROUP, INC.
4301 E. 31st St.
Tulsa, OK 74135
(918) 744-8009
Target Industries: Banking; Finance
Target Applications: DSS
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: James Harris
Year Established: 1980
Number of Employees: 12

TICOM SYSTEMS, INC.
Suite 207
13470 Washington Blvd
Marina Del Ray, CA 90291
(213) 827-7118
Major Markets: Maintenance/Other Services
Target Industries: Professional; Legal; Medical
Target Applications: Office Management Systems; Word Processing
Contacts:
Head of Sales: David Backman
Head of Software: George Simons
Head of Engineering: Michael Hadjidonou
Year Established: 1978
Number of Employees: 14

TIDEWATER CONSULTANTS, INC.
Suite 311
330 Newtown Road
Virginia Beach, VA 23462
(804) 497-8951
Target Industries: Banking
Target Applications: Investment Trust; Payroll; DBMS; POS
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1976
Number of Employees: 25

TIGER SOFTWARE
11815 Sorrento Valley Road
San Diego, CA 92121
(714) 452-1341
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Manufacturing
Target Applications: Process Control
Year Established: 1972
Number of Employees: 5

TIMBERLINE SYSTEMS, INC.
10550 S.W. Allen Blvd
Beaverton, OR 97005
(503) 643-9481
Major Markets: OEM (Peripherals/Terminals); Systems House (Commercial OEM), Maintenance/Other Services
Target Industries: Construction; Property Management
Target Applications: Accounting; Estimating, Membership
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Randy Hare
Head of Engineering: Gary Archambeau
Year Established: 1971
Number of Employees: 95

TIME ACCOUNTANTS
1230 University Drive
Menlo Park, CA 94025
(415) 328-7877
Major Markets: Maintenance/Other Services
Year Established: 1971
Number of Employees: 4

TIME COMPUTER CORP.
6822 Hawthorn Park Drive
Indianapolis, IN 46220
(317) 842-8868
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; [illegible]
Target Industries: Accountants, Manufacturers Representatives; Real [illegible]
Target Applications: Accounts Receivable; Inventory; Payroll; Tax Preparation
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Bob Lueck
Head of Software: Alex Thompson
Year Established: 1978
Number of Employees: 5

TIME MANAGEMENT SOFTWARE, INC.
123 E. Broadway
P.O. Box 727
Cushing, OK 74023
(918) 225-6340
Major Markets: Peripheral Manufacturing, Data Services (Service Bureau)
Target Industries: Computer
Target Applications: Mass Storage Devices, Real-Time Applications; [illegible]
Year Established: 1982
Number of Employees: 30

TIME SHARE COMPUTER SYSTEMS
6500 Barry Road
Edina, MN 55435
(612) 929-3131
Major Markets: Data Services (Service Bureau)
Target Industries: Distribution
Contacts:
Head of Sales: Jack Guggisberg
Year Established: 1982
Number of Employees: 14

TIMESHARING CONSULTANTS
6420 E. Broadway
Tucson, AZ 85710
(602) 881-8888
Major Markets: Data Services (Service Bureau)
Target Applications: Accounting; Cobol Program Generator
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Richard Knopf
Year Established: 1974
Number of Employees: 40

TIMESHARING SERVICES, INC.
4080 Woodcock Drive
Jacksonville, FL 32207
(904) 398-2846
Major Markets: OEM (Peripherals/Terminals); Systems House (Commercial OEM); Data Services (Service Bureau), Dealer/Distributor
Target Industries: Engineering; [illegible]
Target Applications: General Business; General Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Barry Dacks
Year Established: 1980

TIMS, INC.
Meadows Office Complex
301 Rt. 17
Rutherford, NJ 07070
(201) 933-9222
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau); Maintenance/Other [illegible]
Target Industries: Travel
Target Applications: Accounting; Document Generation; Business Control
Contacts:
Head of Sales: Jack D. Young
Year Established: 1974
Number of Employees: 20

TINY C. ASSOCIATES
P.O. Box 269
Holmdel, NJ 07733
(201) 671-2296

TINY SYSTEMS, INC.
[illegible]
Richardson, TX 75081
(214) 699-0262
Target Industries: Manufacturing
Target Applications: Job Costing; Sales Analysis; Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977

TIPPER ASSOCIATES, INC.
[illegible]
Cincinnati, OH 45241
(513) 791-3805
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Scientific; Engineering
Target Applications: Planning; Scheduling, Investment Analysis
Year Established: 1976
Number of Employees: 17

T/MAKER CO.
Suite 206
[illegible]

Palo Alto, CA 94306
(415) 326-6103
Target Industries: Wholesale Distribution, Retail
Target Applications: WP; Spreadsheet; List Processing; File Management
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: Heidi Rolzen
Head of Software: Peter Rolzen
Year Established: 1979
Number of Employees: 4

TM COMPUTER SYSTEMS, INC.
[illegible] E. Burnside
Portland, OR 97214
(503) 232-1564
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Manufacturing
Target Applications: CAM
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Marco Della Gasperina
Year Established: 1980

TNL DATA SERVICES, INC.
Suite 501
15 Maiden Lane
New York, NY 10038
(212) 406-2220
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Target Industries: Brokerage; Securities Management, Banking
Target Applications: Portfolio Management; Tax Shelter Control; Foreign Exchange Trading; Mutual Fund Control
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Arthur G. Swahn
Year Established: 1980

TNW CORP.
3444 Hancock St.
San Diego, CA 92110
(714) 296-2115
Major Markets: Peripheral and Communications Equipment Manufacturing
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Pat Doering
Head of Software: Doug Gage
Year Established: 1977

TOMMY, INC.
4221 Malsbary Road
Building No. 1
Cincinnati, OH 45242
(513) 984-6605
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Contacts:
Head of Engineering: Greg Bodner
Year Established: 1978
Number of Employees: 55

TOM MUELLER & ASSOCIATES
5716 N. 19 St., No. 1
Phoenix, AZ 85014
(602) 264-5913
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Banking; Retail; Real Estate; Dental
Year Established: 1975

TOMORROW SYSTEMS, INC.
Highway 641 S.
P.O. Box 31
Paris, TN 38242
(901) 644-9140
Target Industries: Banking
Target Applications: Fixed Asset Accounting; Accounting; Inventory Control; Payroll
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Harold French

TOM (THE OFFICE MANAGER, INC.)
127 S.W. 156th St.
P.O. Box [illegible]
Seattle, WA 98166
(206) 246-7022
Target Industries: Distribution; Construction; Restaurant; Nonprofit
Target Applications: Accounting; Integrated WP
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Robert M. Gunn
Year Established: 1975
Number of Employees: 45

TONE SOFTWARE CORP.
1735 S. Brookhurst
Anaheim, CA 92804
(714) 991-9460
Target Industries: General Business
Target Applications: Program Productivity
Year Established: 1974
Number of Employees: 13

TOP DOWN SYSTEMS
Division of Office Express, Inc.
Suite [illegible]
414 Hungerford Drive
Rockville, MD 20850
(301) 251-9400
Major Markets: Maintenance/Other Services
Contacts:
Head of Sales: Skip Cashwell
Year Established: 1980

TOTAL SYSTEMS, INC.
Suite 671
8900 Keystone Crossing
Indianapolis, IN 46240
(317) 844-3282
Major Markets: OEM (Computer Systems); Dealer/Distributor; Maintenance/Other Services
Target Industries: Law Enforcement; Restaurant
Net Sales: $400,000 — $1 Million (1981)
Contacts:
Head of Sales: David Foxright
Year Established: 1979
Number of Employees: 8

TOUCHE ROSS & CO.
1633 Broadway
New York, NY
(212) 489-1600

TOUCHSTONE SOFTWARE CORP.
Suite 308
909 Electric Ave.
Seal Beach, CA 90740
(213) 594-9266
Major Markets: Systems House (Commercial OEM)
Target Industries: Medical
Contacts:
Head of Sales: Ray Norberte
Head of Software: Tom Chappell
Year Established: 1982
Number of Employees: 5

TOWER SYSTEMS, INC.
Suite 365
19782 MacArthur Blvd.
Irvine, CA 92715
(714) 752-8263
Target Industries: Insurance; Manufacturing, Finance
Target Applications: Tape/Disk Management, Cics Security System; Electronic Spreadsheet, OA
Net Sales: $5 Million — $25 Million (1981)
Year Established: 1973
Number of Employees: 100

TOWNE INDUSTRIAL CORP.
Applied Technology
685 Howard St
Buffalo, NY 14206
(716) 847-2400
Major Markets: Component and Communications Equipment Manufacturing; OEM (Computer Systems)
Target Industries: Education; Retail; Manufacturing
Target Applications: Energy Management, Data Acquisition; Machine Monitoring; Factory Automation
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Sheldon Lasda
Head of Engineering: Peter Fernandez
Year Established: 1973
Number of Employees: 35

TRAC LINE SOFTWARE, INC.
51 Alpha Plaza
Hicksville, NY 11801
(516) 935-7500
Target Industries: Manufacturing; Wholesale, Retail; Service Contractor
Target Applications: Inventory Control
Contacts:
Head of Sales: Ken Uporsit
Year Established: 1980
Number of Employees: 45

TRADESTREET RESEARCH
2050 Charlotte Plaza
Charlotte, NC 28244
(704) 376-2736
Target Applications: Financial Modeling, Cash Flow, Merchandising Model, Financial Planning
Year Established: 1970
Number of Employees: 6

TRAIL BLAZER SYSTEMS, INC.
2448 Walsdn Court
Palo Alto, CA 94303
(415) 858-2800
Major Markets: Systems House (Commercial OEM)
Target Industries: Trucking
Target Applications: Accounting; Routing, Freight Billing, Payroll
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Martin DeLaFuente
Year Established: 1972
Number of Employees: 21

TRANSACTION DATA SYSTEMS, INC.
5750 Major Blvd.
Orlando, FL 32805
(305) 351-1210
Major Markets: Systems House (Commercial OEM)
Target Industries: Pharmacy; Airline, Banking
Target Applications: Accounting; Message Switching, Package Switching, Virtual Terminal System
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Warren Wubker
Head of Software: Richard Jones
Head of Engineering: Charles Hall
Year Established: 1977
Number of Employees: 18

TRANSLATION SYSTEMS, INC.
530 Atlantic Ave.
Boston, MA 02210
(617) 357-9433
Target Industries: Computer Manufacturers
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1974
Number of Employees: 19

TRANS MICRO SYSTEMS, INC.
1731 N. First St.
San Jose, CA 95112
(408) 998-7118

TRANSPORTATION CONCEPTS AND SERVICES
20 Highland Ave
Metuchen, NJ 08840
(201) 548-1200
Major Markets: Systems House (Commercial OEM)
Target Industries: Transportation; Distribution, Manufacturing
Target Applications: Tariff Computerizing
Contacts:
Head of Sales: Terry Krysinski
Head of Software: Peter Polhemus
Year Established: 1974
Number of Employees: 10

TRANSPORTATION DATA EXCHANGE (TDE)
1732 N. W. Quimby
P.O. Box 10391
Portland, OR 97210
(503) 220-2600
Major Markets: Systems House (Commercial OEM); Dealer/Distributor, Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Motor Freight; Transportation
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Fred McDonnal
Head of Software: Sid Gregory
Year Established: 1980
Number of Employees: 45

Vendors

TRAN SYSTEMS, INC.
15775 Addison Road
Dallas, TX 75248
(214) 248-8737
Major Markets: Data Services (Service Bureau)
Target Industries: Utilities; General Business
Target Applications: Materials Management System; Human Resource System; Custom Systems
Contacts:
Head of Sales: Gary Boese
Year Established: 1982
Number of Employees: 175

TRIBASE APPLICATIONS TECHNOLOGY, INC.
20 Vesey St.
New York, NY 10007
212-285-3240
Major Markets: Systems House (Commercial OEM)
Target Industries: Banking
Target Applications: MIS; Payroll; Statistical Analysis, Data Analysis
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Philip Kornbluth
Year Established: 1980
Number of Employees: 6

TRIDATA CORP.
3057 College Heights Blvd.
Allentown, PA 18104
(215) 820-9577
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: County Government; Value Distribution; Hotel, Restaurant
Target Applications: Job Costing; Payroll
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Scott Schmaldinet
Year Established: 1976
Number of Employees: 11

TRI-DIGITAL SYSTEMS, INC.
2530 E. St. N.E.
Auburn, WA 98002
(206) 833-2523
Major Markets: Systems House (Commercial OEM)
Target Industries: Machine Shops
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979

TRIONICS, INC.
P O Box 11079
Baltimore, MD 21212
(301) 532-9079
Major Markets: Systems House (Commercial OEM)
Target Industries: Legal; Manufacturing
Target Applications: Accounting; Inventory Control; Manufacturing Control
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Karl Weiss
Head of Software: Stephen Krauss
Year Established: 1973
Number of Employees: 6

TRISTAR
2 Keystone Ave.
Cherry Hill, NJ 08003
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Wholesale, Distribution
Contacts:
Head of Sales: Richard Laskowski
Head of Software: Thomas Eaton
Year Established: 1969
Number of Employees: 50

TRISYS, INC.
P O Box 274
Shrewsbury, MA 01545
(617) 842-7861
Major Markets: Maintenance/Other Services
Target Industries: Insurance; Distribution; Manufacturing
Target Applications: CAD/CAM; Scheduling; Order Entry;
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Robert Roche
Year Established: 1977
Number of Employees: 15

TS COMPUTERS
11300 Hartland St.
N. Hollywood, CA 91605
(213) 769-6772
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Commercial
Target Applications: Accounting
Year Established: 1982
Number of Employees: 3

TSC SYSTEMS, INC.
20 S. Bruffey St.
Salem, VA 24153
(703) 389-0258
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Medical; Insurance; Wholesale
Target Applications: Manufacturing; Medical; Wholesale; Insurance
Year Established: 1978
Number of Employees: 7

TSI INTERNATIONAL
187 Danbury Road
Wilton, CT 06897
(203) 853-2884
Major Markets: Systems House (Commercial OEM)
Year Established: 1967
Number of Employees: 200

TSI TECHNICAL SUPPORT, INC.
Suite 315
17000 Preston Road
Dallas, TX 75248
(214) 931-2000
Target Industries: Textile Rental; Distribution; Oil; Gas
Target Applications: Route Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Leon Obrogge
Year Established: 1980
Number of Employees: 19

TTSS, INC.
1500 E. Jefferson St.
Rockville, MD 20852
(301) 881-1270
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Lodging; Banking; Restaurants
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Wolfgang Jakobsberg
Head of Software: Edward Groark
Year Established: 1969
Number of Employees: 12

TUDOR SYSTEMS, INC.
Suite 430
Charlottepark Executive Center
4651 Charlottepark Drive
Charlotte, NC 28210
(800) 438-5058
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Beverage
Target Applications: Route Accounting, Distribution; Inventory Control
Net Sales: $5 Million — $25 Million (1982)
Contacts:
Head of Sales: Don Sink
Year Established: 1971
Number of Employees: 20

TURNKEY BUSINESS SYSTEMS
111 W. Anderson Lane No. 300
Austin, TX 78752
(512) 458-1178
Major Markets: OEM (Computer Systems); OEM (Peripherals/ Terminals); Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Banking; Retail; Pharmaceutical; Oil and Gas
Contacts:
Head of Sales: J. Simpson
Year Established: 1981

TURN-KEY DISTRIBUTIVE SYSTEMS, INC.
82 Cummings Park
Woburn, MA 01801
(617) 935-2400
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Wholesale; Distribution
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Sumner Shore
Year Established: 1975
Number of Employees: 26

TURNKEY MINI COMPUTER SYSTEMS, INC.
7003 W. Broward Blvd.
Plantation, FL 33317
(305) 791-4578
Major Markets: OEM (Computer Systems); Data Services (Service Bureau), Dealer/Distributor; Manufacturing; Other Services; Retail
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Michael Hudson
Year Established: 1979

T & W SYSTEMS
7372 Prince Drive No. 106
Huntington Beach, CA 92647
(714) 847-9960
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM)
Target Industries: Education; Engineering, Architecture
Target Applications: CAD/CAM
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Chris Stamman
Head of Software: Paul Barr
Head of Engineering: Mike Lazear
Year Established: 1978
Number of Employees: 10

TYMSHARE
20705 Valley Green Drive
Cupertino, CA 95014
(408) 446-6000
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Finance; Manufacturing; Utilities, Government
Target Applications: POS; Tax Processing; Reservations
Net Sales: More than $100 Million (1982)
Contacts:
Head of Sales: W. F. Prince
Head of Software: L. Rakoczi
Year Established: 1966
Number of Employees: 4,000

UDS, INC.
1834 Oneil Land
San Antonio, TX 78208
(512) 828-6171
Major Markets: Data Services (Service Bureau)
Target Industries: Telephone
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1964
Number of Employees: 12

THE ULTIMATE CORP.
77 Brant Ave
Clark, NJ 07066
(201) 388-8800
Major Markets: OEM (Peripherals/ Terminals), Systems House (Commercial OEM)
Target Industries: Manufacturing; Distributing
Net Sales: $25 Million — $100 Million (1981)
Contacts:
Head of Sales: William Schmertz
Year Established: 1971
Number of Employees: 32

ULTIMATE MICROMAINFRAME, INC.
134 E 200 N.
Alpine, UT 84003
(801) 756-5824
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Insurance
Target Applications: Group Administration; Claims Processing
Contacts:
Head of Software/Engineering: Kent Boren
Year Established: 1980
Number of Employees: 10

U-MICROCOMPUTERS, INC.
300 Board St.
Stamford, CT 06901
(203) 359-4236
Year Established: 1982

UNIX COMPUTER DIVISION
1991 Boulevard E.
WestHawken, NJ 07087
(201) 348-6688
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Manufacturing; Distribution; Wholesale; Warehousing
Net Sales: $500,000 — $1 Million (1982)
Year Established: 1976
Number of Employees: 12

UNICOM
297 Elmwood
Providence, RI 02907
(800) 556-2828
Target Industries: Education; Business
Target Applications: Administration; Instructional; Management; Accounting
Year Established: 1978

UNICORN SYSTEMS CO.
3681 Wilshire Blvd.
Los Angeles, CA 90010
(213) 380-6874
Major Markets: Maintenance/Other Services
Target Industries: Manufacturing; Distribution; Legal
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Harold Strong
Year Established: 1970
Number of Employees: 25

UNIDATA
Newington Place
Newington, NH 03801
(603) 436-1100
Major Markets: Computer Manufacturing
Target Industries: General Business
Target Applications: Accounting

UNILOGIC, LTD.
Scribe Systems Division
160 N. Craig
Pittsburgh, PA 15213
(412) 621-2277
Target Applications: Document Production
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1979
Number of Employees: 25

UNIQ DIGITAL SYSTEMS, INC.
#205 E. 137 Terrace
Grandview, MO 64030
(816) 765-8887
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Communications
Target Applications: Process Control
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1975
Number of Employees: 8

UNIQUE AUTOMATION PRODUCTS
Suite G
15401 Redhill
Tustin, CA 92680
(714) 730-10102
Target Applications: Telecommunications; WP
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1976
Number of Employees: 5

UNIQUE COMPUTER CORP.
28 S. Water St.
Batavia, IL 60510
(312) 879-1566
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Software Development
Target Applications: Unix Development; DBMS
Contacts:
Head of Software: Jack Kreger
Head of Engineering: David Ludwig
Year Established: 1979
Number of Employees: 45

UNIQUE INFORMATION SYSTEMS, INC.
221 N. LaSalle
Chicago, IL 60601
(312) 332-2820
Target Industries: Lodging; Banking
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980
Number of Employees: 5

UNISOFT
P.O. Box 30094
Phoenix, AZ 85032
(602) 996-2125
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Retail; Wholesale
Year Established: 1979
Number of Employees: 2

UNISOFT SYSTEM CORP.
2400 Fourth St.
Berkeley, CA 94710
(415) 644-1230
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Charles Wasnik
Year Established: 1980
Number of Employees: 20

UNISYSTEMS, INC.
3340 Walnut Hill Lane
Dallas, TX 75229
(214) 350-6881
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Textile Retail
Target Applications: Route Accounting
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Cooke Leutwyler
Year Established: 1967
Number of Employees: 40

UNITED COMPUTERS INTERNATIONAL
234 S. Water St.
Cleveland, OH 44240
(216) 589-9417
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Applications: Accounting; Word Processing; Graphics
Year Established: 1980
Number of Employees: 5

UNITED EDUCATION & SOFTWARE
3020 N. Federal Highway
Fort Lauderdale, FL 33306
(800) 327-5505
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Education
Year Established: 1972

UNITED INFORMATION SERVICES
5454 W. 110th St.
Overland Park, KS 66211
(913) 341-9161
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Contacts:
Head of Sales: James Erikson
Year Established: 1967
Number of Employees: 1,400

UNITED SYSTEMS AND SOFTWARE, INC.
547 Mayfield Highway
P.O. Box 361
Benton, KY 42025
(502) 527-3594
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Construction; Gas Oil
Target Applications: Accounting
Year Established: 1977
Number of Employees: 7

UNITED TELECOM COMPUTER GROUP
Dial Software
2303 Forest St.
Philadelphia, PA 19103
(215) 568-2424
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: David Root
Year Established: 1977
Number of Employees: 50

UNITEK COMPUTER SERVICES, INC.
Suite C-211D
50 S. Beretania St.
Honolulu, HI
(808) 526-0881
Major Markets: Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Distribution; Accounting; Credit Unions
Target Applications: Job Costing; Accounting; Inventory Control
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1977

UNITRONIX CORP.
197 Meister Ave.
Somerville, NJ 08876
(201) 874-8500
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Distribution; Medical
Target Applications: Inventory Control; Accounting
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Walter Hazard
Year Established: 1976
Number of Employees: 21

UNIVAIR INTERNATIONAL
9024 St. Charles Rock Road
St. Louis, MO 63114
(314) 426-1099
Target Industries: Medical; Dental; Legal; Accountants
Year Established: 1972

UNIVENTURES
Suite 1
27 Buckthorn Way
Menlo Park, CA 94025
(415) 325-3263
Year Established: 1983
Number of Employees: 3

UNIVERSAL ANALYTICS, INC.
7740 W. Manchester Blvd.
Playa Del Rey, CA 90291
(213) 822-4422
Major Markets: Maintenance/Other Services
Target Industries: Engineering; MS/OR
Target Applications: VAI/Nastran; Staffing; Scheduling
Contacts:
Head of Sales: M. Jeff Morgan
Year Established: 1972
Number of Employees: 15

UNIVERSAL BUSINESS AUTOMATION, INC.
389 Passaic Ave.
Fairfield, NJ 07006
(201) 575-3566
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Distribution; Manufacturing
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979

UNIVERSAL COMPUTER SERVICE
Suite N
3940 W. Compton Blvd.
Lawndale, CA 90260
(213) 973-9921
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Temporary Employment, Insurance, Government
Target Applications: Accounting; Citation Tracking; Order Entry
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales: Cal Colwell
Head of Software: Jerry Chandler
Year Established: 1974
Number of Employees: 18

UNIVERSAL DATA RESEARCH, INC.
1331 Sheridan Drive
Buffalo, NY 14223
(716) 631-3011
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Small Business
Target Applications: Accounting; WP
Net Sales: $1 Million — $5 Million (1982)
Year Established: 1973
Number of Employees: 25

Vendors

UNIVERSAL DESIGN SYSTEMS, INC.
7308 W. Madison Ave.
Forest Park, IL 60130
(312) 782-7800
Major Markets: Data Services (Service Bureau)
Target Industries: Government
Target Applications: System and Data Conversion
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Allen Bahn
Year Established: 1968
Number of Employees: 20

UNIVERSAL MEMORY, INC.
80 Madison Ave
New York, NY 10012
(212) 532-7210
Major Markets: Data Services (Service Bureau)
Target Applications: DBMS
Year Established: 1978

UNIVERSAL SOFTWARE, INC.
Brookfield Office Park
Rt. 7
Brookfield, CT 06804
(203) 792-5100
Target Industries: Computer
Target Applications: Disk Space Manager; CICS Monitor; Job Accounting, Performance Monitor
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Bert Parrish
Head of Software: Eugene Gliserman
Year Established: 1970
Number of Employees: 20

UNIVERSAL SYSTEMS SERVICES, INC.
Suite 215
Valley Forge Executive Plaza
1150 First Ave.
King of Prussia, PA 19406
(215) 337-7077
Target Applications: Health and Occupational Safety; Payroll
Contacts:
Head of Sales: Joanne Bell
Year Established: 1971
Number of Employees: 5

UNIVERSITY COMPUTING CO.
Applications Software
UCC Tower
Exchange Park
Dallas, TX 75235
(214) 353-7100
Major Markets: OEM (Computer Systems); OEM (Peripherals/Terminals); Data Services (Service Bureau); Dealer/Distributor; Miscellaneous Computer Supplies
Target Industries: General Business
Net Sales: More than $150 Million (1981)
Contacts:
Head of Sales: Alan Huff
Head of Software: Wally Yost
Year Established: 1966
Number of Employees: 1,750

UNIVERSITY COMPUTING SERVICES CORP.
254 E. Main St.
Newark, DE 19711
(302) 368-0506
Major Markets: Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Government; Education; Military
Target Applications: OA; Text Retrieval, Electronic Mail, Text Management
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Robert Rahe
Year Established: 1978

UP-TIME SYSTEMS, INC.
Suite 200
1140 N.W. 63rd
Oklahoma City, OK 73116
(405) 843-8631
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Oil and Gas; Ranchers
Target Applications: General Accounting; Breeding; Billing
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1978
Number of Employees: 12

URBAN DATA PROCESSING, INC.
209 Middlesex Tnpk.
Burlington, MA 01803
(617) 273-0900
Major Markets: Data Services (Service Bureau)
Target Industries: Banking; Retail; Direct Marketing; Utilities
Target Applications: Consumer Marketing Information Systems; Geographical Coding By Address
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Craig Denton
Year Established: 1968
Number of Employees: 48

U.S. COMPUTERS, INC.
3815 S. Tacoma Way
P.O. Box 11285
Tacoma, WA 98411
(206) 584-7211
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Insurance
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Robert Gelb
Year Established: 1968
Number of Employees: 20

USER FRIENDLY SOFTWARE
Division of Alpha Merica, Inc.
1623 S. 21st Ave.
Hollywood, FL 33020
(305) 945-5318
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Net Sales: Unavailable (1981)
Year Established: 1967
Number of Employees: 20

USERS SYSTEMS, INC.
4341 Meadowland Circle
Sarasota, FL 33581
(813) 377-2478
Major Markets: Maintenance/Other Services
Target Industries: Financial; Banking
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1981
Number of Employees: 10

USMA COMPUTER CO.
Suite 521
310 4th Ave. S.
Summit Bank Building
Minneapolis, MN 55415
(612) 339-8047
Major Markets: Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Engineering; Manufacturing; Banking; Savings/Loans
Target Applications: Structural Analysis; Financial Modeling; Financial Planning; Budgeting
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1977
Number of Employees: 8

U.S. SOFTWARE CORP.
5470 N.W. Innisbrook Place
Portland, OR 97229
(503) 645-5043
Major Markets: Maintenance/Other Services
Target Industries: Systems Integrators
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975

U.S. TRAFFIC DATA SERVICE, INC.
20602 Stephens St.
St. Clair Shores, MI 48080
(313) 775-2080
Major Markets: Data Services (Service Bureau)
Target Applications: Accounting; Private Club Billing
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1974
Number of Employees: 17

UTILITY SOFTWARE, INC.
6113 Holland St.
Arvada, CO 80004
(303) 424-5189
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1978
Number of Employees: 3

UTICO COMPUTER SYSTEMS, INC.
899 Logan St.
Denver, CO 80203
(303) 831-7000
Target Applications: CPM Based Systems
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1980
Number of Employees: 15

VALLEY COMPUTER ASSOCIATES, INC.
27 Chapman St.
P.O. Box 948
Greenfield, MA 01302
(413) 774-5045
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: P. Scott Wallace
Head of Software: Michael Naughton
Year Established: 1974
Number of Employees: 7

VALLEY DATA BASE, INC.
50 E. Evan Hewes Highway
P.O. Box 2655
El Centro, CA 92244
(714) 353-0410
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Manufacturing; Professional, Retail, Professional
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Don Osborne
Year Established: 1980
Number of Employees: 7

VALPAR INTERNATIONAL
3801 E. 34th St.
Tucson, AZ 85713
(602) 790-7141
Major Markets: Systems House (Commercial OEM)
Target Industries: Education; Rehabilitation
Target Applications: Assessment
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Engineering: Wayne Button
Year Established: 1972
Number of Employees: 40

VALUATION SYSTEMS CO., INC.
Suite 3007
1722 S. Carson St.
Tulsa, OK 74119
(918) 583-8181
Target Industries: Real Estate; Banking, Finance
Target Applications: Debits; Accounting; WP; Property Management
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Sharon Nash
Head of Software: Hal Ellis
Year Established: 1975
Number of Employees: 6

VALUE COMPUTERS, INC.
498 N. Kings Highway
Cherry Hill, NJ 08034
(609) 482-2400
Major Markets: Maintenance/Other Services
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Robert Foley
Head of Software Engineering: James Elkin
Year Established: 1969
Number of Employees: 100

VALUE MANAGEMENT CONSULTANTS, INC.
1385 Parker Blvd.
Buffalo, NY 14223
(716) 838-5121
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Government; Education
Target Applications: Accounting; Student Demand Attendance Grades

Net Sales: $500,000 — $1 Million (1981)
Year Established: 1967
Number of Employees: 35

VAN AMBURG & ASSOCIATES, INC.
4637 Old Seward Highway
Anchorage, AK 99503
(907) 276-3553
Major Markets: OEM (Computer Systems); Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; [illegible]
Target Industries: Public Safety; Telephone
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software: Dave Crawford
Head of Engineering: Steve Czerski
Year Established: 1979
Number of Employees: 17

VANDATA
Suite 107
17544 Midvale Ave. N.
[illegible], WA 98133
(206) 542-7811
Major Markets: Maintenance/Other Services
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1973
Number of Employees: 4

VANTAGE COMPUTER SYSTEMS
125 [illegible] Deane Highway
Wethersfield, CT 06109
[illegible] 721-0644
Major Markets: Data Services (Service Bureau)
Target Industries: Insurance
Target Applications: Annuity Products
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1971
Number of Employees: 170

VARTRON CORP.
750 Welch Road
Palo Alto, CA 94304
(415) 328-2531
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Food Distribution; Cable TV
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Pat Vartanian
Year Established: 1976

VECTOR SYSTEMS CORP.
[illegible] Market St.
Philadelphia, PA 19104
(215) 387-8500
Major Markets: Data Services (Service Bureau); Maintenance/Other Services
Target Applications: Accounting; Inventory Control
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Thomas Bohen
Year Established: 1974

VEDA INFORMATION SYSTEMS CORP.
Suite 300
1225 Jefferson Davis Highway
Arlington, VA 22202
(703) 979-2700
Major Markets: Maintenance/Other Services
Target Industries: Military
Target Applications: Property Management; Military
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Software: Tom Vollman
Head of Engineering: Gary L. Talonen
Year Established: 1962
Number of Employees: 400

VENTURA COUNTY COMPUTER CENTER
3351 Telegraph Road
Ventura, CA 93003
(805) 656-1161
Major Markets: Systems House (Commercial OEM)
Target Industries: Retail
Target Applications: POS
Year Established: 1979
Number of Employees: 12

VENTURE COM, INC.
215 First St.
Cambridge, MA 02142
(617) 661-1230
Major Markets: Maintenance/Other Services
Target Industries: OEM, Engineering; Science; OA
Net Sales: $100,000 — $500,000 (1982)
Contacts:
Head of Sales: Gig Graham
Year Established: 1980
Number of Employees: 15

VENTAS TECHNOLOGY, INC.
[illegible] 245
2375 Zanker
San Jose, CA 95131
(408) 263-0646
Target Industries: Office Automation
Contacts:
Head of Sales: Dewayne Hendricks
Head of Software/Engineering: Joseph Tumminaro
Year Established: 1981
Number of Employees: 10

VERMONT INFORMATION PROCESSING, INC.
Hercules Drive
P.O. Box Box 470
Colchester, VT 05446
[illegible] 655-9436
Major Markets: Systems House (Commercial OEM)
Target Industries: Beverage
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1971
Number of Employees: 10

VERSA COMPUTING
[illegible] 104
3541 Old Conejo Road
Newbury Park, CA 91320
[illegible] 498-1284
Major Markets: Computer Manufacturing
Target Industries: Education
Year Established: 1979
Number of Employees: 10

VERTEX CORP.
Suite 205
[illegible] Memorial Road
[illegible], MD 20850
(301) 984-1565
Major Markets: Systems House (Commercial OEM)
Target Industries: Government; Military; Legal
Target Applications: Litigation Support; Accounting
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Louis K. McMillan
Head of Software: Donald E. Jamison
Year Established: 1967
Number of Employees: 20

VERTICAL SOFTWARE, INC.
502 E. War Memorial Drive
Peoria, IL 61614
(309) 688-2377
Major Markets: Systems House (Commercial OEM)
Target Industries: Agribusiness; [illegible]
Target Applications: Accounting; Commodities Charting
Contacts:
Head of Marketing/Sales: Robert [illegible]
Year Established: 1983
Number of Employees: 8

VETROL DATA SYSTEMS, INC.
2800 13th Ave.
Vero Beach, FL 32960
[illegible] 562-1621
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Construction; Country Clubs; Retail
Target Applications: Accounting; Cost Accounting; POS; Inventory [illegible]
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Read Johnson
Year Established: 1972
Number of Employees: 7

VIA [illegible], INC.
7177 Convoy Court
San Diego, CA 92121
(714) 578-5356
Target Applications: Analysis; Model Building
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Software/Engineering: A. D. [illegible]
Year Established: 1969
Number of Employees: 14

VIA SYSTEMS, INC.
78 Treble Cove Road
N. Billerica, MA 01862
(617) 667-7773
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Applications: CAD/CAM
Year Established: 1981
Number of Employees: 25

VIABLE, INC.
897 N W Grant Ave.
Corvallis, OR 97330
(503) 758-0521
Major Markets: Peripheral Manufacturing
Year Established: 1980
Number of Employees: 25

VIKING SOFTWARE SERVICES, INC.
2815 E Skelly Drive
Tulsa, OK 74105
(918) 745-6550
Major Markets: Maintenance/Other [illegible]
Target Applications: Data Entry; Graphics
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Brad Remley
Head of Software: Michael E. Glover
Year Established: 1981
Number of Employees: 10

VIRGINIA TEK, INC.
11440 Isaac Newton Square
Reston, VA 22090
(703) 471-5188
Target Industries: Electronic
Target Applications: CAM, Shop Control
Net Sales: $1 Million — $5 Million (1910)
Contacts:
Head of Software: Phil Summerset
Year Established: 1979
Number of Employees: 12

VIRTUAL SYSTEMS SOFTWARE, INC.
[illegible] Vincent St.
Long Beach, NY 11561
(212) 246-5314
Target Applications: Debugging
Year Established: 1978
Number of Employees: 10

VISICORP
[illegible] Zanker Road
San Jose, CA 95134
[illegible] 946-9000
Target Applications: Financial Planning; Scheduling; Customer Analysis, Business Graphics
Net Sales: $5 Million — $25 Million (1981)
Contacts:
[illegible]
Head of Software: Gene Buechele
Year Established: 1981
Number of Employees: 300

VISION DATA EQUIPMENT CORP.
35 Fuller Road
Albany, NY 12205
[illegible] 489-8182
Major Markets: Systems House (Commercial OEM)
Target Industries: Newspapers
Target Applications: Subscription; Accounting
Year Established: 1971
Number of Employees: 15

VISTA COMPUTER, INC.
[illegible] Executive Blvd.
Elmsford, NY 10523
[illegible] 592-8182
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Accountants; Publishing, Medical
Target Applications: Magazine Subscription; Accounting; Book [illegible]
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Engineering: Michael Bratch

Vendors

Year Established: 1977
Number of Employees: 25

VISTA SYSTEMS, INC.
900 State Road
Princeton, NJ 08540
(609) 921-0065
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Transit; Transportation
Contacts:
Head of Sales: Gary Hansen
Head of Software: James Fennessy
Year Established: 1981
Number of Employees: 27

VISUAL SYSTEMS CORP.
13251 Northend Drive
Oak Park, MI 48237
(313) 547-1555
Major Markets: Component Manufacturing; Maintenance/Other Services
Target Industries: Records
Target Applications: Data Processing
Contacts:
Head of Engineering: Gregory Martin
Year Established: 1974
Number of Employees: 40

VM SOFTWARE, INC.
Suite 220 S
7777 Leesburg Pike
Falls Church, VA 22043
(703) 821-6886
Contacts:
Head of Sales: Harry Gierhart
Year Established: 1981
Number of Employees: 24

VOLITION SYSTEMS
P O Box 1236
Del Mar, CA 92014
(714) 481-2286
Target Industries: Industrial; Education
Contacts:
Head of Engineering: Joel McCormack
Year Established: 1979
Number of Employees: 10

WADSWORTH ELECTRONIC PUBLISHING CO.
20 Park Plaza
Boston, MA 02116
(617) 423-0420

WALKER INTERACTIVE PRODUCTS, INC.
100 Mission St
San Francisco, CA 94105
(415) 495-8811
Target Applications: Financial
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Engineering: Pat Kelly
Year Established: 1981
Number of Employees: 120

WALLACE COMPUTER SERVICES, INC.
Business Data Division
Suite 1333
2 N. Riverside Plaza
Chicago, IL 60606
(312) 782-8115
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; Distribution, Government
Target Applications: Labeling, Bar Coding; Computer Graphics
Year Established: 1906
Number of Employees: 2,000

WALMAR COMPUTERS
1000 S.E. Stephens St.
Roseburg, OR 97470
(503) 673-6830
Major Markets: Dealer/Distributor; Maintenance/Other Services; Retail
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Connie Pawley
Year Established: 1979

WANG LABORATORIES, INC.
One Industrial Ave
Lowell, MA 01851
(617) 459-5000
Major Markets: Computer, Terminal/Peripheral, Communications Equipment and Office Equipment Manufacturing, Miscellaneous Computer Supplies
Target Industries: Banking; Insurance; Legal, State/Local Government
Target Applications: Data Entry; Electronic Mail, Human Resource Management; Programmer Utilities
Net Sales: More than $100 Million (1982)
Contacts:
Head of Sales: John F. Cunningham
Head of Software/Engineering: Frederick A. Wang
Year Established: 1951
Number of Employees: 19,200

WAREHOUSE SOFTWARE
Suite 12
4935 W. Glendale Ave.
Glendale, AZ 85301
(800) 421-3135
Major Markets: Systems House (Commercial OEM)
Target Industries: End User
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Sales/Software: Jack Abbott
Year Established: 1975

WARNER COMPUTER SYSTEMS, INC.
[illegible] Cedar Lane
Teaneck, NJ 07666
(201) 697-0110
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Insurance; Brokerage; Banking
Target Applications: Cash Management, Financial Modeling; DBMS, Electronic Mail; Word Processing
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Software: Dennis Gorman
Year Established: 1971
Number of Employees: 60

WATERS BUSINESS SYSTEMS, INC.
47 New York Ave.
(617) 879-2503
Net Sales: $5 Million — $25 Million (1982)
Year Established: 1978
Number of Employees: 20

WATSON, STEACH & CO.
1333 W. Pioneer Pkwy. No. 119
P.O. Box 701
Arlington, TX 76010
(817) 265-7371
Major Markets: Maintenance/Other Services
Target Industries: Private Clubs; Banking
Target Applications: Financial
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1977
Number of Employees: 5

WCS COMPUTER SERVICES, INC.
520 Amherst St.
Buffalo, NY 14207
(716) 877-2228

WESTERN COMPUTER SYSTEMS, INC.
1000 Bertelsen Road
Unit No. 1
Eugene, OR 97440
(503) 485-4222
Major Markets: OEM (Computer Systems); OEM (Peripherals/Terminals); Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Other Services
Target Industries: Wholesale; Publishing; Legal, Retail
Target Applications: POS; Bar Code, Optical Card Reader
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Jerry Easke
Head of Software: Brian Kern
Head of Engineering: Pat Downey
Year Established: 1977
Number of Employees: 10

WESTERN COMPUTING
537 E.Osborn Road
Phoenix, AZ 85012
(602) 274-0383
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Nonprofit; Market Research; Medical; Banking
Target Applications: On-line Interviewing
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Donald R. Johnson
Head of Software: E.L. Templeton, II
Head of Engineering: Nancy Cleary
Year Established: 1969
Number of Employees: 15

WESTERN NEW YORK COMPUTING
2129 Five Mile Line Road
P.O. Box 56
Penfield, NY 14526
(716) 381-4120
Major Markets: Data Services (Service Bureau); Dealer/Distributor; Maintenance/Other Services
Target Industries: Engineering; Credit Unions; Medical
Target Applications: Dental Billing; Full Service Accounting; Group Radiology
Net Sales: $1 Million — $5 Million (1982)
Contacts:
Head of Sales: Ray H. Hutch
Head of Software/Engineering: David [illegible]
Year Established: 1971
Number of Employees: 23

WESTINGHOUSE LEARNING CORP.
Westinghouse Information Services
P.O. Box 30
Iowa City, IA 52244
(319) 354-9200
Major Markets: Peripheral Manufacturing; Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Education; Government; Business
Target Applications: Optical Card Reader; Data Entry
Year Established: 1953
Number of Employees: 600

WESTINGHOUSE SYSTEMS, INC.
Suite I
228 Park Ave. N.
P.O. Box 2726
Winter Park, FL 32790
(305) 645-0040
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1981
Number of Employees: 5

WESTREND BUSINESS COMPUTERS
[illegible] Road
Carmel Valley, CA 93924
[illegible]
Major Markets: Systems House (Commercial OEM);
Target Industries: Professional; Business
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1982
Number of Employees: 16

WESTWARE SOFTWARE, INC.
2455 S.W. 4th Ave.
Ontario, OR 97914
(503) 881-1477
Target Applications: Accounts Receivable; Payroll; Inventory; Data Base
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1981
Number of Employees: 6

WHALEN COMPUTER SERVICES
Bennett Complex
P.O. Box 347
Millwood, NY 10546
(914) 677-5025
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Newspaper
Target Applications: Circulation; Advertising Billing; Production
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Robert Whalen
Year Established: 1971
Number of Employees: 30

THE WHEATLEY GROUP LTD.
425 Broad Hollow Road
Melville, NY 11747
(516) 466-9470
Target Industries: Insurance
Target Applications: Claims Processing, Premium Accounting
Net Sales: $500,000 — $1 Million (1982)
Contacts:
Head of Software/Engineering: John Ambos
Year Established: 1979
Number of Employees: 12

WHELAN ASSOCIATES, INC.
Gwynedd Plaza
P.O. Box 650
Spring House, PA 19450
(215) 643-7470
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Dental; Cemetery, Property Management; [illegible]
Target Applications: Lab Control; Marketing, Accounting; Cemetery
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Sales: Charles Whelan
Year Established: 1979
Number of Employees: 16

WHITESIDE ASSOCIATES
Suite 101
3011 Rainbow Drive
Decatur, GA 30034
(404) 243-1133
Target Industries: Manufacturing; Retail, Distribution
Target Applications: Accounting
Year Established: 1968
Number of Employees: 15

[illegible], LTD.
97 Lowell Road
Concord, MA 01742
(617) 369-8499
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Maria Diacidus
Head of Software/Engineering: Mark Krieger
Year Established: 1978
Number of Employees: 27

WHY SYSTEMS, INC.
16902 Redmond Way
Redmond, WA 98052
[illegible]
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Anne St. German
Head of Software: Wayne Yarnal
Year Established: 1978
Number of Employees: 18

WICAT SYSTEMS, INC.
1875 S. State St.
P.O. Box 539
Orem, UT 84057
[illegible]
Major Markets: Computer Manufacturing; OEM (Peripherals/ Terminals)
Target Industries: Education; General Business
Target Applications: Accounting; WP
Contacts:
Head of Software: Tom Seal
Head of Engineering: David Bailey
Year Established: 1976
Number of Employees: 450

WICHITA SOFTWARE CORP.
Suite 210
505 S. Broadway St.
Wichita, KS 67202
(316) 263-3311
Target Industries: Oil and Gas
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1982)
Year Established: 1978
Number of Employees: 6

WILD HARE COMPUTER SYSTEMS, INC.
P.O. Box 3581
Boulder, CO 80307
(303) 494-0221
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: D. Green
Year Established: 1971

WILKE/THORTON
Suite 101
200 Old Wilson Bridge Road
Worthington, OH 43085
(614) 885-3508
Year Established: 1981

WILLAT CORP.
440 Oakland Ave
Indialantic, FL 32903
(305) 727-2046
Major Markets: Systems House (Commercial OEM)
Target Industries: Optical; Analytical Labs
Target Applications: Optical [illegible]
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978

WILLIAMS COMPUTER SERVICES, INC.
Suite 5
2005 Nonconnah Blvd.
Memphis, TN 38132
(901) 345-8713
Major Markets: OEM (Computer Systems); OEM (Peripherals/ Terminals); Systems House (Commercial OEM); Data Services (Service Bureau)
Target Industries: Linen Route Accounting, Medical, Distribution
Target Applications: Linen Route Accounting; Drug Systems
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 25

THE WILLIAMSON GROUP
129 Mount Auburn St
Cambridge, MA 02138
(617) 497-6848
Major Markets: Computer Manufacturing, Systems House (Commercial OEM)
Target Industries: Education
Contacts:
Head of Software: Judy Hart
Year Established: 1979
Number of Employees: 16

WILMARK, INC.
Suite 3344
30800 Telegraph Road
Birmingham, MI 48010
(313) 540-2290
Major Markets: Maintenance/Other [illegible]
Target Industries: Manufacturing
Target Applications: Accounting
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1975
Number of Employees: 7

WILSON SYSTEMS GROUP
290 Elwood Davis Road
Liverpool, NY 13088
(315) 451-6445
Major Markets: Systems House (Commercial OEM)
Target Industries: Manufacturing; PBS, Legal
Target Applications: Time Accounting, Financial Management; Membership Applications
Year Established: 1978
Number of Employees: 7

WINNER'S CIRCLE
2438 Parker St.
Berkeley, CA 94704
(415) 845-4813
Major Markets: Peripheral Manufacturing, OEM (Computer Systems), Systems House (Commercial OEM); [illegible]
Year Established: 1970
Number of Employees: 6

WINSTON T. MCCLEERY CONSULTANTS
4920 Cottage Hill Road
Mobile, AL 36609
(205) 661-0833
Major Markets: Maintenance/Other Services
Target Applications: Preventive Maintenance, Inventory Control, Elite
Contacts:
Head of Sales: Michael Bullington
Year Established: 1969
Number of Employees: 15

WINTEK CORP.
1801 S. St.
Lafayette, IN 47904
(317) 742-8428
Major Markets: Computer Manufacturing; Maintenance/Other Services
Target Industries: OEM
Target Applications: Industrial Control; General Business
Contacts:
Head of Software: Stephen E. Beiter
Head of Engineering: James B. Wilson
Year Established: 1973
Number of Employees: 12

WINTERHALTER & ASSOCIATES, INC.
313 N. First St.
P.O. Box 2180
Ann Arbor, MI 48106
(313) 662-2002
Target Industries: Manufacturing
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Software: Nick Green
Head of Engineering: Dave Roach
Year Established: 1978
Number of Employees: 20

WISCONSIN MICROWARE
1 S. Park St.
Madison, WI 53715
(608) 255-9020
Target Industries: Agriculture
Contacts:
Head of Software: P. Wong
Year Established: 1981
Number of Employees: 3

WISNER ASSOCIATES, INC.
22134 Sherman Way
Canoga Park, CA 91303
(213) 884-5515
Major Markets: Data Services (Service Bureau)
Target Applications: Cash Flow Forecasting, Investment Management, Cash Management
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1972
Number of Employees: 31

WOLD DATA SERVICES, INC.
Suite 227
Nine E. Tenth St.
Holland, MI 49423
[illegible]
Major Markets: Systems House (Commercial OEM); Dealer/Distributor; Maintenance/Time Service
Target Industries: Telephone Companies, Electronics Manufacturing, Wholesale, Retail
Target Applications: Order Processing, Accounting; Site Management, Discreet Manufacturing
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: T. K. Singer
Head of Software: S. Hoppes
Head of Engineering: M. Rathbun
Year Established: 1978
Number of Employees: 7

THE WOLLONGONG GROUP, INC.
1135A San Antonia Road
Palo Alto, CA 94303
(415) 962-9224
Major Markets: Maintenance/Other Services
Target Industries: Engineering
Target Applications: Research Design
Contacts:
Head of Sales: Roger McKee
Head of Software/Engineering: Dan Ladermann
Year Established: 1980
Number of Employees: 55

WOLVERINE SOFTWARE CORP.
Suite 208
7630 Little River Tnpk
[illegible]
(703) 750-3810
Target Industries: Manufacturing; Computer Switch Systems
Target Applications: Discrete Event [illegible]
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1976
Number of Employees: 2

WOODBURY COMPUTER ASSOCIATES, INC.
15 Prospect St.
Paramus, NJ 07652
(201) 368-1040
Major Markets: Systems House

Vendors

(Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Applications: Accounting; Inventory Control; Job Tracking
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Sales: Al Semon
Year Established: 1974
Number of Employees: 15

WOOSLEY ASSOCIATES
604 Indian Home Road
Danville, CA 94526
Major Markets: Data Services (Service Bureau)
Target Applications: Processing Control
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1972
Number of Employees: 5

WORDPRO
152 Bank St.
P.O. Box 1111
Burlington, VT 05401
(802) 863-6531
Major Markets: Data Services (Service Bureau)
Target Industries: Direct Mail; Fundraising
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1979
Number of Employees: 5

WORLD-WIDE COMPUTER EXCHANGE, LTD.
15 Trafalgar Square
Wrentham, MA 02093
(617) 384-8681
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Television; Credit Unions
Target Applications: Billing; Scheduling
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1973
Number of Employees: 1

WORTH, AUGER & ASSOCIATES, INC.
Suite 550
235 W. MacArthur Blvd.
Oakland, CA 94611
(415) 652-1883
Target Applications: Financial Forecasting, Business Modeling
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Software/Engineering: Richard Auger
Year Established: 1973
Number of Employees: 4

XEROX CORP.
Headquarters
800 Longridge Road
P.O. Box 1600
Stamford, CT 06904
(203) 329-8700
Major Markets: Computer, Terminal/Peripheral and Office Equipment Manufacturing; Systems House (Commercial OEM); Maintenance/Other Services; Miscellaneous Computer Supplies
Target Industries: Government; General Business

Net Sales: More than $100 Million (1982)
Year Established: 1906
Number of Employees: 121,000

XIDAK, INC.
Suite 101
530 Oak Grove Ave.
Menlo Park, CA 94025
(415) 324-8745
Target Industries: Scientific, Engineering, Bio Technology
Target Applications: CAD/CAM
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1980
Number of Employees: 8

XIPHIAS
Suite 900
233 Wilshire Blvd.
Santa Monica, CA 90401
(213) 399-3283
Target Industries: Television, Microcomputer
Target Applications: Graphics
Contacts:
Head of Sales/Software: Gardner Ruffin
Year Established: 1978
Number of Employees: 3

XPHDEX CORP.
110 Trotwood Ave.
Westend Center
Columbia, TN 38401
(615) 388-7009
Major Markets: Systems House (Commercial OEM); Data Services (Service Bureau); Maintenance/Other Services
Target Industries: Manufacturing; Banking; Retail
Target Applications: Accounting; Process Control; Cost Accounting; Retail POS
Net Sales: $500,000 — $1 Million (1981)
Year Established: 1978
Number of Employees: 15

XXCAL, INC.
Suite 114
2001 Barrington Ave.
Los Angeles, CA 90025
(213) 477-2902
Major Markets: Systems House (Commercial OEM); Maintenance/Other Services
Target Industries: Employment Agencies; Client Tracking, Placement
Net Sales: $5 Million — $25 Million (1981)
Contacts:
Head of Sales: Eugene Gold
Head of Software: Steven Silver
Year Established: 1976
Number of Employees: 110

XYSION CORP.
7 Ridgedale Ave.
Cedar Knolls, NJ 07927
(201) 538-5111
Major Markets: Systems House (Commercial OEM)
Target Industries: Medical; Military; Commercial
Target Applications: Data Collection; Image Data Capture;. Graphics
Net Sales: $1 Million — $5 Million (1981)
Contacts:
Head of Engineering: Dr. Charles Chesney

Year Established: 1975
Number of Employees: 40

YARDLEY GROUP, INC.
20 Exchange Place
New York, NY 10005
(212) 425-3800
Major Markets: Systems House (Commercial OEM)
Target Industries: Commodities; Banking
Target Applications: Accounting
Contacts:
Head of Sales: Susie Schweber
Year Established: 1975
Number of Employees: 30

YSM COMPUTER SERVICES CORP.
1505 Logan Ave.
Youngstown, OH 44505
(216) 743-4101
Major Markets: Systems House (Commercial OEM), Data Services (Service Bureau); Dealer/Distributor
Target Industries: Professional
Target Applications: Time Reporting; Client Write-Up; Medical and Dental Billing; Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales: Kenneth J. McMahon
Head of Software: Bill Fleming
Year Established: 1970
Number of Employees: 26

YIPLOW CORP.
Suite 7967
1 World Trade Center
New York, NY 10048
(212) 524-7729
Year Established: 1981

ZATNO CORP.
Suite 607
421 7th Ave.
New York, NY 10001
(212) 736-7257
Net Sales: $100,000 — $500,000 (1981)
Year Established: 1978
Number of Employees: 6

ZELTNER ASSOCIATES, INC.
17271 Peggy Lane
P.O. Box 511
Southbend, IN 46624
(219) 299-0322
Major Markets: Maintenance/Other Services
Year Established: 1978
Number of Employees: 11

ZIA CORP.
P.O. Box 351
Morris Plains, NJ 07950
(201) 328-7177
Major Markets: Systems House (Commercial OEM); Dealer/Distributor
Target Industries: Banking; Brokers
Net Sales: $1 Million — $5 Million (1981)
Year Established: 1950
Number of Employees: 7

ZIEGLER & CO., INC.
1173 Boulevard N.E.
Orangeburg, SC 29115
(803) 534-3740
Major Markets: Maintenance/Other Services
Target Industries: Resort; Real Estate
Target Applications: Reservations; Accounting
Net Sales: $100,000 — $500,000 (1981)
Contacts:
Head of Sales/Software: William Ziegler
Year Established: 1974
Number of Employees: 10

15 pointed questions to ask MSA or any software supplier

1. Can you offer us a complete range of application software systems designed to work together?
Or will we have to piece together a patchwork of systems?

2. Can you link our personal computers directly to our mainframe—so managers can get their own information?
Is that software available right now?

3. Are your systems just record keepers, or can they really help us make decisions?
Can we pull together information from any of our integrated systems? In exactly the form we want it?

4. Can you provide business software for both mainframe and microcomputers?
Do you develop this software yourself or do you simply market it for another company?

5. Are your systems truly online—so all of our information is current?
How many of your systems are online? How secure are they?

6. Will my company have to be the one that discovers the bugs in your brand new system?
Just how long have your systems actually been used and how have they been tested?

7. Will you update your systems as technology advances and regulations change?
What are some of your most recent updates? Will you keep us current on regulatory changes?

8. Do your systems really do everything you say they will?
Or will we have to change them or add to them to get the features we want?

9. How long have you been in business? What are your revenues? What is your growth record? Where will your company be five years from now?

10. How many systems has your company installed?
How many of these were installed in the past six months? How many of your earlier customers are still using—and liking—your systems?

11. Do your financial systems handle unlimited foreign currencies?
Do your financial systems use a common set of currency exchange rates?

12. How will you make sure my people thoroughly understand your system?
Do you have educational centers near us or will we have to travel all the way across the country to find one? Will you be there to help during installation and after?

13. How many of your people specialize in software for my industry?
How many accountants work for you? Human resource specialists? Manufacturing experts?

14. Do your systems have built-in features that make them easier to use?
What happens if someone needs help figuring out a feature? Do you have online documentation that's easy to understand?

15. As my business changes will your system be flexible enough to change with it?
Or will I have to pay a lot to revamp it? Or even regenerate it?

If you're confused about buying software, arm yourself with these questions. They can help you make an intelligent software decision. And if you'd like to know more about software, talk to MSA. We can show you how to put together a total mainframe and microcomputer system that will solve your present problems, and take you into the future.

Now you've got the questions. Turn the page and get the best answers.

And for more information about MSA systems, contact Robert Carpenter at (404) 239-2000.

Or write Management Science America, Inc., 3445 Peachtree Road, N.E., Atlanta, Georgia 30326.

MSA
The Software Company

15 candid answers from MSA

1. MSA offers the most complete line of totally integrated systems in the software industry, including financial, human resource, manufacturing, and mainframe/micro products. So you avoid the headache of trying to tie together individual systems.

2. MSA's new Executive Peachpak II™ software can link your company's personal computers to your mainframe, so you can get to vital information without waiting for print-outs from data processing. It's available from MSA right now. (In fact, it's already up and running.)

3. MSA systems are decision support systems that pull the right information together in a form meaningful to the user. Flexible report writers and screen generators let you get at information quickly and easily.

4. MSA acquired Peachtree Software in 1981 and became the first and only vendor to offer a full line of software for both mainframe and microcomputers. We've planned our growth and the growth of our products, developing each system to work with the others.

5. All MSA systems are online and provide security for the user's database above and beyond typical online systems.

6. Our systems go through a stringent series of in-house tests by a quality control team, then they're tested by several customers before being released to our customer base. Thousands of successful installations prove MSA reliability.

MSA ready-to-install application software

1. General Ledger
2. Accounts Payable/Purchase Order Control
3. Budgetary Control/Encumbrance
4. Fixed Assets Accounting
5. Capital Expenditure Tracking
6. Forecasting & Modeling
7. Accounts Receivable
8. Order Processing
9. Foreign Exchange
10. Inventory & Purchasing
11. Payroll
12. Personnel Management & Reporting
13. ALLTAX™ Taxing System
14. Manufacturing Control System (MRP II)
15. Executive Peachpak II™
16. Peachtree Software™ business systems for microcomputers
17. Peachtree Software™ office productivity systems for microcomputers

7. MSA maintenance includes keeping your system up to date technologically. Enhancing it with new features. And making sure it reflects changes in accounting procedures and government regulations, including 401(k), TEFRA, and FAS52.

8. Our approach to software allows customers to define systems to meet their needs without modifications or customization. Ask any of thousands of satisfied customers.

9. MSA is the largest independent supplier of application software, with 1982 revenues of more than $100 million. Our growth rate has exceeded 45% annually over the last 10 years.

10. MSA's customer base exceeds 5,000 companies and 8,000 software packages. Customers on our maintenance program still have state-of-the-art software—and many have been MSA customers for more than 10 years.

11. MSA's Foreign Exchange System gives you the tools you need to make effective decisions about foreign cash management in any country and for any number of currencies. MSA's financial systems use a common set of currency exchange rates, so rates are always up to date.

12. Last year alone, we conducted more than 35,000 student days of customer training for over 1,800 companies. From training sessions to cassettes to complete documentation, MSA provides the most extensive Customer Education Programs in the industry.

13. We have industry-specialists in banking, health care, government, education, energy and insurance industries. MSA also has 100 CPAs, over 200 people dedicated to human resources, and over 100 in manufacturing.

14. In addition to the best documentation, MSA has an online HELP feature that helps guide users through the system.

15. MSA systems grow with you. As technology or regulations change, our systems change. As your organization changes, our modular approach lets you expand the capabilities of the system without modification, regeneration or reinstallation.

MSA
The Software Company

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ABACUS DATA SYSTEMS, INC.
EZPAY
Specific Application: On-Line Menu-Driven Accounts Payable
System Requirements: HP 3000: MPE
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4500
(See Vendor Profile Page V-1)

ABACUS DATA SYSTEMS, INC.
EZCASH
Specific Application: On-Line Menu-Driven Accounts Receivable
System Requirements: HP 3000: MPE
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4500

Additional information provided for by vendor

EZCASH (A/R) and EZPAY (A/P) are online, menu-driven multi-company systems. Integrated with G/L, they are part of Abacus' distribution system. Designed with IMAGE database and user-friendly menus, both offer powerful transaction processing flexible inquiry capabilities. Demo tapes are available for $50 each.

ABS COMPUTER CORP.
UNION ACCOUNTING MEMBERSHIP SYSTEM
Specific Application: Membership Accounting for Labor Unions
System Requirements: Datapoint: DOS, Digitex, Oasis
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $5,500
Number Installed to Date: 2
Date First Installed: August 1982
(See Vendor Profile Page V-1)

ABS COMPUTER CORP.
VIDEO TAPE APPLICATIONS SYSTEM
Specific Application: Accounting Rental for Video Tape Store, Inventory
Specific Industry: Retail
System Requirements: Datapoint: DOS, Digitex, Oasis
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: January 1983

ACCOUNT — A — CALL CORP.
COMPUTOLL
Specific Application: Usage Summary Analysis, Toll Comparison Analysis
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000; IBM 360/370 DOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1972
(See Vendor Profile Page V-1)

ACCOUNT — A — CALL CORP.
TUMS-TELEPHONE USAGE MANAGEMENT SYSTEM
Specific Application: Management Information, Accounting Allocation, Communications
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000; IBM 360: DOS, IBM 370
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1972

ACCOUNTING & COMPUTER TECHNOLOGY, INC.
JDE ELEGANT SOFTWARE
Additional Product Classification: Payroll/Personnel, Manufacturing, WP/Text Editing, Financial Modeling Languages/DSS
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Inventory Control, Oil and Gas, Payroll, Order Entry, Job Cost, Fixed Assets, Report Writer, Spreadsheet Processing
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Construction, Government, Oil and Gas
System Requirements: IBM System/34; IBM System/36; IBM System/38
Memory Required: 96.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3,000
Date First Installed: January 1977
(See Vendor Profile Page V-1)

ACPI LTD.
LAW OFFICE MANAGEMENT SYSTEM (LEGEM)
Additional Product Classification: WP/Text Editing
Specific Application: Word Processing, Time Management, Accounts Payable, General Ledger, Litigation Support
Specific Industry: Legal
System Requirements: IBM System/34, System/36 SSP
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $15,000
(See Vendor Profile Page V-2)

ACS DATA SERVICES, INC.
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Payroll, Inventory, General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370 DOS
Memory Required: 64.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1972
(See Vendor Profile Page V-2)

A.C.S. SYSTEMS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $8,000
Number Installed to Date: 2
Date First Installed: January 1983
(See Vendor Profile Page V-2)

A.C.S. SYSTEMS
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $5,000
Date First Installed: March 1983

A.C.S. SYSTEMS
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $10,000
Number Installed to Date: 2
Date First Installed: January 1983

A.C.S. SYSTEMS
ONLINE COLLECTION AGENCY SYSTEM
Specific Application: Letter Generation, Debtor-Tracking, Collection Audit
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $15,000
Number Installed to Date: 2
Date First Installed: 1982

A.C.S. SYSTEMS
ONLINE SUBSCRIPTION FULFILLMENT & MAINTENANCE
Specific Application: Subscription Listing and Management
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $10,000
Date First Installed: 1982

ADAGE, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Education
System Requirements: Microdata: Pick OS, Prime: Pick OS; Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1978
(See Vendor Profile Page V-2)

ADAGE, INC.
BUDGET PREPARATION
Specific Application: Budget Preparation
Specific Industry: Government
System Requirements: Microdata: Pick OS, Prime Pick OS, Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1978

ADAGE, INC.
CHECK RECONCILIATION
Specific Application: Check Reconciliation
Specific Industry: Government
System Requirements: Microdata: Pick OS, Prime: Pick OS, Honeywell Level 6: Pick OS, ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1978

ADAGE, INC.
CONTRACTOR BILLING
Specific Application: Contractor Billing
Specific Industry: Government
System Requirements: Microdata: Pick OS, Prime: Pick OS, Honeywell Level 6: Pick OS, ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1978

ADAGE, INC.
ELECTRIC AND/OR WATER/SEWER BILLING
Specific Application: Utility Billing and Collection
Specific Industry: Government
System Requirements: Microdata: Pick OS, Prime: Pick OS, Honeywell Level 6: Pick OS, ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1978

ADAGE, INC.
EMS BILLING
Specific Application: Emergency Medical Service Billing
Specific Industry: Government
System Requirements: Microdata: Pick OS; Prime: Pick OS, Honeywell

Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1978

ADAGE, INC.
EXCISE TAX BILLING & COLLECTIONS
Specific Application: Excise Tax Billing and Collections
Specific Industry: Government
System Requirements: Microdata: Pick OS; Prime: Pick OS; Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1978

ADAGE, INC.
FIXED ASSETS INVENTORY
Specific Application: Fixed Assets Inventory
Specific Industry: Government
System Requirements: Microdata: Pick OS; Prime: Pick OS; Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1978

ADAGE, INC.
FOOD STAMP PROCESSING
Specific Application: Food Stamp Processing
Specific Industry: Government
System Requirements: Microdata: Pick OS; Prime: Pick OS; Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1978

ADAGE, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Government
System Requirements: Microdata: Pick OS, Prime: Pick OS; Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $76

ADAGE, INC.
GENERAL LEDGER AND FINANCIAL ACCOUNTING
Specific Application: General Ledger
Specific Industry: Education
System Requirements: Microdata: Pick OS; Prime: Pick OS, Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1978

ADAGE, INC.
GENERAL MUNICIPAL ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Government
System Requirements: Microdata: Pick OS; Prime: Pick OS, Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1978

ADAGE, INC.
GRANT MANAGEMENT
Specific Application: Grant Management
Specific Industry: Government
System Requirements: Microdata: Pick OS; Prime: Pick OS; Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1978

ADAGE, INC.
INVESTMENT MANAGEMENT
Specific Application: Investment Management
Specific Industry: Government
System Requirements: Microdata: Pick OS, Prime: Pick OS; Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1978

ADAGE, INC.
LANDFILL BILLING
Specific Application: Landfill Billing
Specific Industry: Government
System Requirements: Microdata: Pick OS; Prime: Pick OS; Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1978

ADAGE, INC.
PURCHASING & FIXED ASSETS
Specific Application: Purchasing and Fixed Assets
Specific Industry: Education
System Requirements: Microdata: Pick OS; Prime: Pick OS, Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1978

ADAGE, INC.
PURCHASE ORDER-PREPARATION
Specific Application: Purchase Order
Specific Industry: Government
System Requirements: Microdata: Pick OS, Prime: Pick OS; Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1978

ADAGE, INC.
STUDENT ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Education
System Requirements: Microdata: Pick OS; Prime: Pick OS, Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1978

ADAGE, INC.
TAX APPRAISAL
Specific Application: Tax Appraisal
Specific Industry: Government
System Requirements: Microdata: Pick OS; Prime: Pick OS; Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1978

ADAGE, INC.
TAX COLLECTIONS
Specific Application: Tax Collections
Specific Industry: Government
System Requirements: Microdata: Pick OS; Prime: Pick OS, Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1978

ADAGE, INC.
TAX LISTING & BILLING
Specific Application: Tax Listing and Billing
Specific Industry: Government
System Requirements: Microdata: Pick OS; Prime: Pick OS; Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1978

ADAGE, INC.
TAX MAP DIGITIZING
Specific Application: Tax Map Digitizing
Specific Industry: Government
System Requirements: Microdata: Pick OS; Prime: Pick OS; Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1978

ADAGE, INC.
WATER/SEWER BILLING & COLLECTION
Specific Application: Utility Billing and Collections
Specific Industry: Government
System Requirements: Microdata: Pick OS, Prime: Pick OS, Honeywell Level 6: Pick OS; ADDS Mentor: Pick OS
Source Language: Data/Basic, Info/Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1978

ADMINISTRATIVE DATA CORP.
CLAIMS SYSTEMS
Specific Application: Client, Third-Party and Employee Benefit Claims Information
Specific Industry: Not Industry Specific
System Requirements: IBM System/34, System/36, System/38
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,750
(See Vendor Profile Page V-2)

ADP — AUTOMATIC DATA PROCESSING
ORDER ENTRY
Specific Application: Order Entry
Source Code Available: No
Number Installed to Date: 2500
(See Vendor Profile Page V-2)

ADP — AUTOMATIC DATA PROCESSING
GENERAL LEDGER
Specific Application: General Ledger
Source Code Available: No
Number Installed to Date: 2500

ADP — AUTOMATIC DATA PROCESSING
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Source Code Available: No
Purchase Terms: Monthly Service Fee
Number Installed to Date: 2500

ADP — AUTOMATIC DATA PROCESSING
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Source Code Available: No
Purchase Terms: Service Fee
Number Installed to Date: 2500

ADP — AUTOMATIC DATA PROCESSING
PURCHASE ORDERS
Specific Application: Purchase Orders

Source Code Available: No
Purchase Terms: Monthly Service Fee
Number Installed to Date: 2500

ADP — AUTOMATIC DATA PROCESSING
INVOICING
Specific Application: Invoicing
Source Code Available: No
Purchase Terms: Monthly Service Fee
Number Installed to Date: 2500

ADP — AUTOMATIC DATA PROCESSING
INVENTORY CONTROL
Specific Application: Inventory Control
Source Code Available: No
Purchase Terms: Monthly Service Fee
Number Installed to Date: 2500

ADS SOFTWARE, INC.
BOOKKEEPING SERVICES
Specific Application: Write-Up Work
Specific Industry: Public Accountant
System Requirements: CP/M 80; DOS
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $895
(See Vendor Profile Page V-2)

ADS SOFTWARE, INC.
CHURCH MEMBERSHIP CONTRIBUTION FUND ACCOUNTING
Specific Application: Accounts Receivable
Specific Industry: Churches
System Requirements: CP/M 80; DOS
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995

ADS SOFTWARE, INC.
GENERAL LEDGER & FINANCIAL STATEMENT
Specific Application: General Ledger and Financial Statements
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; DOS
Source Language: Mbasic
Source Code Available: $100
Purchase Terms: Purchase (license)
Price: $485
Number Installed to Date: 3,000
Date First Installed: October 1981

ADS SOFTWARE, INC.
INVENTORY
Specific Application: Inventory, Control
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; DOS
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $485
Number Installed to Date: 1,500
Date First Installed: September 1981

ADS SOFTWARE, INC.
INVOICING
Specific Application: Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; DOS
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $485
Number Installed to Date: 1,500
Date First Installed: 1981

ADS SOFTWARE, INC.
PAYABLES
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; DOS
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $485
Number Installed to Date: 1,500
Date First Installed: 1981

ADS SOFTWARE, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; DOS
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $485
Number Installed to Date: 1,500
Date First Installed: 1981

ADS SOFTWARE, INC.
PRIVATE MEMBERSHIP CLUB
Specific Application: Accounts Receivable
Specific Industry: Private Clubs
System Requirements: CP/M 80; DOS
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995

ADS SOFTWARE, INC.
RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; DOS
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $485
Number Installed to Date: 1,500
Date First Installed: 1981

ADS SOFTWARE, INC.
RESIDENTIAL COMMERCIAL CONTRACT SYSTEM
Specific Application: Automatic Billing for Contract Services, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; DOS
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995

ADS SOFTWARE, INC.
RETAIL FLORIST
Specific Application: Accounts Receivable, Wire Transfer, General Ledger
Specific Industry: Florists
System Requirements: CP/M 80; DOS
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $895

ADVANCED BUSINESS SYSTEMS, INC.
EASYPOST INSURANCE AGENCY MANAGEMENT SYSTEM
Additional Product Classification: Insurance
Specific Application: Accounting, Marketing
Specific Industry: Insurance
System Requirements: PC-DOS; Unix, Xenix, MS-DOS, CP/M 86, DX10, TRS-DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,600
Number Installed to Date: 60
Date First Installed: 1982
(See Vendor Profile Page V-2)

ADVANCED DATA SYSTEMS, INC.
ATARI — INTEGRATED ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll, Order Entry, Sales Analysis, Inventory Control
Specific Industry: Wholesale/Distribution, Retail, Medical, Construction
System Requirements: IBM System/34, DOS
Memory Required: 30.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $5,000
Number Installed to Date: 200
Date First Installed: 1982
(See Vendor Profile Page V-3)

ADVANCED INFORMATION MANAGEMENT
MAS-MULTIPLE ASSET SYSTEM
Specific Application: Financial Recordkeeping, Accounting
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM 370; IBM 4300 Series; OS; IBM 3000 Series
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1982
(See Vendor Profile Page V-3)

AGLAND COMPUTER SYSTEMS
AGLAND FEED FORMULA BREAKOUTS
Specific Application: Feed Production, Costing, Distribution, Least Cost Calculations
Specific Industry: Agribusiness
System Requirements: Burroughs B22, B21: Btos; Burroughs B90, B900, B1000: CMS
Memory Required: 384.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: November 1983
(See Vendor Profile Page V-3)

AGLAND COMPUTER SYSTEMS
AGLAND FERTILIZER
Specific Application: Selling, Blending, Spreading, Billing
Specific Industry: Agribusiness
System Requirements: Burroughs B22, B21: Btos, Burroughs B90, B900, B1000: CMS
Memory Required: 384.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: June 1982

AGLAND COMPUTER SYSTEMS
AGLAND GRAIN ACCOUNTING
Additional Product Classification: Inventory
Specific Application: Grain Inventory, Accounting
Specific Industry: Agribusiness
System Requirements: Burroughs B22, B21: Btos; Burroughs B90, B900, B1000: CMS
Memory Required: 384.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 40
Date First Installed: June 1978

AGLAND COMPUTER SYSTEMS
AGLAND G.L. AND FINANCIAL
Specific Application: General Ledger and Financial
Specific Industry: Agribusiness
System Requirements: Burroughs B22, B21: Btos, Burroughs B90, B900, B1000: CMS
Memory Required: 384.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 65
Date First Installed: June 1978

AGRI-DATA SYSTEMS, INC.
GENERAL ACCOUNTING
Additional Product Classification: Livestock Feed
Specific Application: General Ledger, Accounts Payable, Accounts Recievable, Sales Analysis
Specific Industry: Manufacturing, Livestock Feed
System Requirements: IBM System/34 and 36: SSP; Prime: Primos; DEC PDP: RT-11; IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Fortran, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: August 1981
(See Vendor Profile Page V-3)

AIDS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable

Specific Industry: Government
System Requirements: DG: R-DOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1981
(See Vendor Profile Page V-4)

AIDS
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Government
System Requirements: DG: R-DOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1981

AIDS
BUSINESS LICENSE
Specific Application: Monitors Business Licensing
Specific Industry: Government
System Requirements: DG: R-DOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1982

AIDS
CASH RECEIPTS
Specific Application: Point of Sale
Specific Industry: Government
System Requirements: DG: R-DOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1981

AIDS
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1982

AIDS
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Government
System Requirements: DG: R-DOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 200
Date First Installed: 1981

AIDS
UTILITY BILLING
Specific Application: Utility Billing
Specific Industry: Government
System Requirements: DG: R-DOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1981

AIMS, INC.
IBA
Specific Application: Industrial Budget and Accounting System
Specific Industry: Not Industry Sensitive
System Requirements: HP: MPE; PE: OS 32, Reliance
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $25,000
(See Vendor Profile Page V-4)

ALAN R. ROSEN, INC.
ARR ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 48.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
(See Vendor Profile Page V-4)

ALAN R. ROSEN, INC.
ARR GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 48.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000

ALAN R. ROSEN, INC.
ARR STATEMENT GENERATOR
Specific Application: Financial Statement Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 48.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500

ALPHA BETA DATA SERVICES, INC.
CASH DISBURSEMENT PROGRAM-VER.1
Specific Application: Cash Disbursements
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $500
(See Vendor Profile Page V-4)

ALPHA DATA SYSTEMS, INC.
CPA — CLIENT ACCOUNTING
Specific Application: General Ledger, Financial
Specific Industry: CPA Firms
System Requirements: DEC PDP-11: CTS-300, RSTS/E, DEC VAX: VMS, DEC Decmate: COS-310; DEC Rainbow: CP/M
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 150
Date First Installed: 1978
(See Vendor Profile Page V-4)

ALPINE DATA SYSTEMS, INC.
FIXED ASSETS DEPRECIATION
Specific Application: Fixed Asset Depreciation
Specific Industry: CPA Firms
System Requirements: DEC PDP-11: CTS-300, RSTS/E; DEC VAX: VMS, DEC Decmate: COS-310
Memory Required: 12.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 150
Date First Installed: 1980

ALPINE DATA SYSTEMS, INC.
LEGAL MANAGEMENT SYSTEM
Specific Application: Legal Timekeeping, Billing and Analysis
Specific Industry: Legal
System Requirements: DEC PDP-11: RT-11, RSTS/E, DEC VAX: VMS; DEC Decmate: COS-310
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $3,250
Number Installed to Date: 200
Date First Installed: 1978

ALPINE DATA SYSTEMS, INC.
PTM - PROJECT TIME MANAGEMENT
Additional Product Classification: Payroll/Personnel
Specific Application: Billing, Costing, Productivity Analysis, Payroll, Accounts Receivable, Accounts Payable, General Ledger
Specific Industry: Engineering, Architects
System Requirements: DEC PDP-11: CTS-300; DEC VAX VMS, RSTS/E
Memory Required: 128.0K bytes
Source Language: Dibol
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 150
Date First Installed: 1980

ALR SYSTEMS & SOFTWARE, INC.
DOLPAR
Specific Application: Integrated Time and Billing, General Ledger, Accounts Receivable, Accounts Payable
Specific Industry: Legal
System Requirements: Wang VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 1
Date First Installed: March 1984
(See Vendor Profile Page V-4)

AMBERLAND CORP.
CHECK-RECON-CR-VERSION 1
Specific Application: Check Reconciliation
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 14.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 1
Date First Installed: January 1981
(See Vendor Profile Page V-4)

AMBERLAND CORP.
INTERACTIVE ACCOUNTS PAYABLE SYSTEM
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 30.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 1
Date First Installed: January 1982

AMICOM COMPUTER CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11, RSTS/E, DEC VAX-11/750, VAX-11/780 VMS
Memory Required: 62.0K bytes
Source Language: Basic Plus II, Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $6,250
Number Installed to Date: 80
(See Vendor Profile Page V-4)

AMICOM COMPUTER CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, DEC VAX-11/750, VAX-11/780 VMS
Memory Required: 62.0K bytes
Source Language: Basic Plus II, Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $6,250
Number Installed to Date: 60

AMICOM COMPUTER CORP.
GENERAL LEDGER & FINANCIAL MANAGEMENT AMFACS
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, DEC VAX-11/750, VAX-11/780 VMS
Memory Required: 62.0K bytes
Source Language: Basic Plus II, Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $6,500 to $15,000
Number Installed to Date: 80

AMERICAN BUSINESS MACHINES CO.
COUNTY TAX BILLING
Specific Application: Property Tax Billing, Collection
Specific Industry: Government
System Requirements: TI 800

Series, 800 Series, 300 Series: DX-10
Memory Required: 128.0K bytes
Source Language: Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Date First Installed: 1977
(See Vendor Profile Page V-4)

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-5)

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
ASSOCIATION MEMBERSHIP ACCOUNTING
Specific Application: Association Membership
Specific Industry: Association Memberships
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
CLIENT WRITE UP
Specific Application: Bookkeeping, Prints 941 and W2 Reports
Specific Industry: CPA
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
OIL AND GAS INCOME DISTRIBUTION
Specific Application: General Accounting
Specific Industry: Oil and Gas Energy
System Requirements: DEC PDP-11/23, PDP-11/44, Decmate II
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 35
Date First Installed: 1977

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
ROUTE BILLING CONTROL
Additional Product Classification: Billing
Specific Application: Accounts Receivable, Trial Balance Billing
Specific Industry: Carpet Cleaning
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
SCHOOL GRADING AND ACCOUNTING (PRIVATE)
Additional Product Classification: Education
Specific Application: School Grading, Tuition Accounting
Specific Industry: Education, Private Schools
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)

AMERICAN COMPUTER & ELECTRONICS CORP.
ACCOUNTS PAYABLE
Specific Application: General Accounting
System Requirements: TI 990 Series DX-10
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1978
(See Vendor Profile Page V-5)

AMERICAN COMPUTER & ELECTRONICS CORP.
GENERAL LEDGER
Specific Application: General Accounting
System Requirements: TI 990 Series DX-10
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1982

AMERICAN COMPUTER & ELECTRONICS CORP.
LOCAL ACCOUNTS BILLING
Specific Application: Utility Billing
System Requirements: TI 990 Series DX-10
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1976
(See Vendor Profile Page V-5)

AMERICAN COMPUTER & ELECTRONICS CORP.
SERVICE ORDERS
Specific Application: Record Keeping
System Requirements: TI 990 Series DX-10
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1976

AMERICAN COMPUTER & ELECTRONICS CORP.
TOLL BILLING
Specific Application: Utility Billing
System Requirements: TI 990 Series DX-10
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1982

AMERICAN COMPUTER & ELECTRONICS CORP.
TROUBLE TICKETS
Specific Application: Record Keeping
System Requirements: TI 990 Series DX-10

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Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1976

AMERICAN COMPUTER & ELECTRONICS CORP.
WORK ORDER ACCOUNTING
Specific Application: Construction Record Keeping System
System Requirements: TI 990 Series: DX-10
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1976

AMERICAN COMPUTER TECHNOLOGIES, INC.
GENERAL ACCOUNTING
Specific Application: General Accounting
System Requirements: TI 300, TI 800, TI 800: DX-10
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: Yes
Date First Installed: 1979
(See Vendor Profile Page V-5)

AMERICAN MANAGEMENT SYSTEMS, INC.
COLLEGE & UNIVERSITY FINANCIAL SYSTEM
Specific Application: Financial System for Colleges and Universities
Specific Industry: Education
System Requirements: IBM 370: DS; DOS; MVS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 21
Date First Installed: March 1982
(See Vendor Profile Page V-5)

AMERICAN MANAGEMENT SYSTEMS, INC.
CORPORATE FINANCIAL SYSTEM
Specific Application: Financial Management
System Requirements: IBM 4300, 370, 3000 Series: OS/VSI, VMS, MVS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: January 1979

AMERICAN MANAGEMENT SYSTEMS, INC.
LOCAL GOVERNMENT FINANCIAL SYSTEM
Specific Application: Financial Management System for State and Local Government and Agencies
Specific Industry: Government
System Requirements: IBM 3030, 360/370 Series: DOS/VSE; DEC PDP-11/70: Cics
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 50
Date First Installed: August 1978

AMERICAN MANAGEMENT SYSTEMS, INC.
OIL AND GAS INFORMATION SYSTEM
Specific Application: Financial Management for Energy Industry
System Requirements: IBM 4300, 370, 3000: OS/VSI, VAX, VMS; MVS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: September 1982

AMERICAN RESOURCE SYSTEMS
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: 1976
(See Vendor Profile Page V-5)

AMERICAN RESOURCE SYSTEMS
SYSTEM/34 ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 75
Date First Installed: 1976

AMERICAN RESOURCE SYSTEMS
SYSTEM/34 GENERAL LEDGER FINANCIAL
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: 1976

AMERICAN SOFTWARE, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Source Language: Ansi Cobol
(See Vendor Profile Page V-5)

AMERICAN SOFTWARE, INC.
CAPITAL PROJECT ACCOUNTING
Additional Product Classification: Manufacturing
Specific Application: Project Accounting

AMERICAN SOFTWARE, INC.
FIXED ASSET ACCOUNTING
Specific Application: Fixed Asset Accounting
Specific Industry: Not Industry Sensitive
Source Language: Ansi Cobol

AMERICAN SYSTEMS CORP.
FII BUSINESS SYSTEM
Additional Product Classification: Banking, Insurance
Specific Industry: Automobile Dealers
System Requirements: Wang 2200 Series, TRS-80/III
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: $2,500
Purchase Terms: Purchase (license); Lease
Price: $2,500
Number Installed to Date: 78
Date First Installed: April 1975
(See Vendor Profile Page V-5)

AMICON CORP.
TAMBS
Specific Application: Legal Time Billing and Accounting
Specific Industry: Legal
System Requirements: DG: AOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 1
Date First Installed: January 1982
(See Vendor Profile Page V-5)

AMACOMP, INC.
DISTRIBUTION MANAGEMENT & CONTROL
Additional Product Classification: Construction
Specific Application: Order Entry, Inventory Control, General Ledger, Accounts Payable and Receivable, Payroll
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Prime; Microdata, GA Zebra: Pick
Source Language: Basic, English
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $13,500 to $15,000
Number Installed to Date: 100
Date First Installed: 1976
(See Vendor Profile Page V-5)

ANALYSIS & TECHNOLOGY, INC.
ACCRU-ACCOUNT CHARGING FOR RESOURCES
Specific Application: Charges User for Resources Consumed on Computer
Specific Industry: Not Industry Sensitive
System Requirements: DG: AOS
Memory Required: 64 0K bytes
Source Language: Fortran 5
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 5
Date First Installed: February 1982
(See Vendor Profile Page V-6)

ANDERSON-DENTON ASSOCIATES, INC.
GENERAL ACCOUNTING
Specific Application: General Ledger, Payroll, Accounts Receivable and Payable
Specific Industry: Oil and Gas Industry
System Requirements: IBM 34, SSP, IBM 36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 3
Date First Installed: March 1982
(See Vendor Profile Page V-6)

ANDERSON-DENTON ASSOCIATES, INC.
MUNICIPAL ACCOUNTING PACKAGE
Specific Application: General Ledger, Accounts Receivable and Payable
Specific Industry: Government
System Requirements: IBM System 34; SSP; IBM System 38
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 3
Date First Installed: June, 1981

ANDREW BELLINGHEIM ASSOCIATES
EASY CASH' AUTOMATED CASH APPLICATION
Specific Application: Accounts Receivable Cash Application
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: DOS/VSE; Sperry 1100, EXEC-8; VSL, MVS
Memory Required: 100.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $14,000
Number Installed to Date: 3
Date First Installed: December 1981
(See Vendor Profile Page V-6)

APEX DATA GROUP
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Manufacturing
System Requirements: Prime 2250, Prime 250, Prime 550, Prime 850: Primos
Memory Required: 500.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $7,500
Number Installed to Date: 500
Date First Installed: May 1979
(See Vendor Profile Page V-6)

APEX DATA GROUP
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Prime 2250, Prime 250, Prime 550, Prime 850: Primos
Memory Required: 500.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $7,500
Number Installed to Date: 500
Date First Installed: May 1979

APEX DATA GROUP
COST ACCOUNTING/JOB COSTING
Specific Application: Accounting, Job Costing
Specific Industry: Time Accounting, Insurance
System Requirements: Prime 2250;

Prime 250, Prime 550, Prime 850
Memory Required: 500.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $7,500
Number Installed to Date: 500
Date First Installed: May 1979

APEX DATA GROUP
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Manufacturing, Wholesale/Distribution, Banking/Financial, Education
System Requirements: Prime 7250, 250, 550, 850 Primos
Memory Required: 500.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $7,500
Number Installed to Date: 500
Date First Installed: May 1979

APEX DATA PROCESSING, INC.
INTERACTIVE MAP/3000
Additional Product Classification: Manufacturing, Banking, WP/Text Editing, Sort/Merge
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Inventory Control, MRP
Specific Industry: Manufacturing, Banking/Financial
System Requirements: HP 3000
Source Language: Cobol II
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-6)

APOLLO COMPUTER SYSTEMS, INC.
ACCOUNTS PAYABLE SYSTEM
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Lease
Price: $3,600
Number Installed to Date: 50
Date First Installed: 1979
(See Vendor Profile Page V-7)

APOLLO COMPUTER SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Lease
Price: $3,600
Number Installed to Date: 50
Date First Installed: 1979

APPAREL COMPUTER SYSTEMS, INC.
ACS ON-LINE SYSTEM 34
Additional Product Classification: Manufacturing
Specific Application: Order Processing, Customer Service, Manufacturing, Inventory Control, Sales, Accounts Receivable
Specific Industry: Manufacturing
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 80
Date First Installed: 1978
(See Vendor Profile Page V-7)

APPAREL COMPUTER SYSTEMS, INC.
ACS ON-LINE SYSTEM 36
Additional Product Classification: Manufacturing
Specific Application: Order Processing, Customer Service, Manufacturing, Inventory Control, Sales, Accounts Receivable
Specific Industry: Manufacturing
System Requirements: IBM System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 10
Date First Installed: 1983

APPAREL COMPUTER SYSTEMS, INC.
ACS ON-LINE SYSTEM 38
Additional Product Classification: Manufacturing
Specific Application: Order Processing, Customer Service, Manufacturing, Inventory Control, Sales, Accounts Receivable
Specific Industry: Manufacturing
System Requirements: IBM System/38
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 80
Date First Installed: 1978
(See Vendor Profile Page V-7)

APPLICATION SOFTWARE CORP.
CLIENT ACCOUNTING
Specific Application: Financial Statement, Client Write-Up, Employee Write-Up, Fixed Assets, General Ledger, Accounts Payable
Specific Industry: Banking/Financial
System Requirements: MAI/Basic Four Boss
Memory Required: 8.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1974
(See Vendor Profile Page V-7)

APPLICATION SOFTWARE CORP.
CLUB MANAGEMENT SYSTEM
Specific Application: Server Commission, Financial Statement, Membership, Receivables, General Ledger
Specific Industry: Clubs
System Requirements: MAI/Basic Four: Boss
Memory Required: 8.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1974

APPLICATION SOFTWARE CORP.
GENERAL ACCOUNTING
Specific Application: Financial Statement, Payroll, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: MAI/Basic Four: Boss
Memory Required: 8.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 5,000
Date First Installed: 1974

APPLICATION SOFTWARE CORP.
JOB COST MANAGEMENT
Additional Product Classification: Manufacturing, Payroll/Personnel
Specific Application: Payroll, Job Cost, Job Receivable, Estimating, Equipment Costing, General Ledger, Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: MAI/Basic Four: Boss
Memory Required: 8.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1974

APPLICATION SOFTWARE CORP.
PROFESSIONAL TIME AND BILLING
Specific Application: Financial Statement, Professional Time Keeping, Professional Time Billing, General Ledger, Accounts Payable, Disbursement Accounting
Specific Industry: Banking/Financial, Legal
System Requirements: MAI/Basic Four: Boss
Memory Required: 8.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1974

APPLICATION SOFTWARE CORP.
WHOLESALE DISTRIBUTION SYSTEM
Specific Application: Inventory Control, Order Processing, Financial Statements, General Ledger, Accounts Receivable
Specific Industry: Wholesale/Distribution
System Requirements: MAI/Basic Four: Boss
Memory Required: 8.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Date First Installed: 1974

APPLIED BASIC SYSTEMS, INC.
CUSTOM HOUSE BROKER SYSTEM
System Requirements: IBM System/32, IBM System/34, IBM System/36
Memory Required: 128.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-7)

APPLIED BASIC SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/32, IBM System/34, IBM System/36
Memory Required: 16.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 4
Date First Installed: 1982

APPLIED BUSINESS SYSTEMS
ACCOUNTS PAYABLE-ABS
Specific Application: Accounts Payable and Cash Disbursements
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: R-DOS, DG Eclipse: R-DOS
Memory Required: 64.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 30
Date First Installed: June 1978
(See Vendor Profile Page V-7)

APPLIED BUSINESS SYSTEMS
ACCOUNTS RECEIVABLE-ABS
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: R-DOS, DG Eclipse: R-DOS
Memory Required: 64.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 30
Date First Installed: June 1978

APPLIED BUSINESS TECHNOLOGIES, INC.
CAMPUS FINANCIAL MANAGEMENT
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Purchasing, Payroll,Personnel, Accounts Payable, Accounts Receivable
Specific Industry: Education
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 7
Date First Installed: July 1982
(See Vendor Profile Page V-7)

APPLIED COMPUTER SYSTEMS, INC.
CONVENIENCE STORE DIRECT STORE DELIVERY SYSTEM
Specific Application: Tracks Inventory Delivery and Sales
Specific Industry: Retail, Convenience

System Requirements: CA: Syclops
Memory Required: 256.0K bytes
Source Language: Sybol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 1
Date First Installed: May 1983
(See Vendor Profile Page V-7)

APPLIED COMPUTER SYSTEMS, INC.
FLORIST PACKAGE
Specific Application: Accounting for Florist Shops
Specific Industry: Florists
System Requirements: CA: Syclops
Memory Required: 16.0K bytes
Source Language: Sybol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 6
Date First Installed: June 1982

APPLIED COMPUTER TECHNOLOGY, INC.
WANG SYMPHONY
Additional Product Classification: Fund Raising
Specific Application: Management, Ticketing, Accounting, Fund Raising for Symphony
Specific Industry: Symphony
System Requirements: Wang 2200
Memory Required: 64.0K bytes
Source Language: Wang Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-7)

APPLIED DATA CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Wholesale/Distribution
System Requirements: DG: R-DOS; CP/M; MS-DOS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1980
(See Vendor Profile Page V-7)

APPLIED DATA CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Wholesale/Distribution
System Requirements: DG: R-DOS; CP/M, MS-DOS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1980

APPLIED DATA CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Wholesale/Distribution
System Requirements: DG: R-DOS; CP/M; MS-DOS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1980

APPLIED DATA CORP.
INVOICING
Specific Application: Invoicing
Specific Industry: Wholesale/Distribution
System Requirements: DG: R-DOS; CP/M, MS-DOS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1980

APPLIED DATA CORP.
TOPS DISTRIBUTION SYSTEM
Specific Application: General Accounting System for Wholesale Distributors **Specific Industry:** Wholesale/Distribution
System Requirements: DG: R-DOS; CP/M, MS-DOS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,995
Date First Installed: 1980

APPLIED DATA SYSTEMS, INC.
FINANCIAL MANAGEMENT SYSTEM FMS
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Financials, Payroll, Fixed Assets, Accounts Payable and Receivable
Specific Industry: Retail, Construction, Government, Equipment Dealers
System Requirements: TI: Dnos; TI: DX-10; Tandem: Guardian
Memory Required: 126 0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $10,000
Number Installed to Date: 100
Date First Installed: September 1978
(See Vendor Profile Page V-7)

APPLIED DATA SYSTEMS, INC.
LARGE BUSINESS SYSTEMS LBS
Specific Application: General Ledger, Accounts Payable and Receivable, Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10; Tandem: Guardian, Dnos
Memory Required: 256 0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 25
Date First Installed: March 1981

APPLIED DATA SYSTEMS, INC.
PARTS MANAGEMENT AND INVOICING
Specific Application: Order Entry, Inventory Control, Invoicing, Invoice Register
Specific Industry: Wholesale/Distribution, Retail; Construction, Government
System Requirements: TI: MS-DOS, TI: CP/M 80; Tandem Ctos; Burroughs B20 Btos
Memory Required: 126 0K bytes
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $400
Number Installed to Date: 1,000
Date First Installed: September 1976

APPLIED DIGITAL COMMUNICATIONS, INC.
INVOICING
Specific Application: Invoicing
Specific Industry: Engineering
System Requirements: DG Eclipse: R-DOS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-8)

APPLIED DIGITAL COMMUNICATIONS, INC.
JOB COST ACCOUNTING
Specific Application: Job Cost Accounting
Specific Industry: Engineering
System Requirements: DG Eclipse: RDOS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1978

APPLIED FINANCIAL SYSTEMS, INC.
THE AUTOMATIVE BOND SYSTEM (TABS)
Specific Application: Accounting for Bond Holders, Payment of Coupons and Registered Bonds.
Specific Industry: Banking/Financial
System Requirements: IBM: OS
Memory Required: 500.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1982
(See Vendor Profile Page V-8)

APPLIED INFORMATION MANAGEMENT, INC. (AIM)
AIM-GS
Specific Application: General Ledger Financial Reporting
Specific Industry: Not Industry Sensitive
System Requirements: Royal; Iris; Point Four; DG; Bytronix
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 50
Date First Installed: 1980

APPLIED INFORMATION MANAGEMENT, INC. (AIM)
CHECKOUT (ACCOUNTS PAYABLE CASH MANAGEMENT)
Specific Application: Accounts Payable Cash Management
Specific Industry: Not Industry Sensitive
System Requirements: Royal; Iris; Point Four; DG; Bytronix
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 50
Date First Installed: 1980

APPLIED INFORMATION MANAGEMENT, INC. (AIM)
MODMS
Additional Product Classification: Inventory Sales
Specific Application: Accounts Receivable, Order Entry, Billing Inventory Control and Sales Analysis
Specific Industry: Wholesale/Distribution, Retail
System Requirements: Royal; Iris; Point Four; DG; Bytronix
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 35
Date First Installed: 1979

APPLIED INFORMATION MANAGEMENT, INC. (AIM)
419 S. Eisenhower Lane
Lombard, IL 60148
(312) 953-2100
Major Markets: CPM (Peripherals/Terminals); Systems House (Commercial OEM); Dealer/Distributor; **Maintenance, Other Services**
Target Industries: Construction; Legal; Temporary Employment; **Office Systems Dealers**
Target Applications: POS; Bar Code; Accounting; Retail Transactions
Net Sales: $500,000 — $1 Million (1981)
Contacts:
Head of Software: Roger C. Pennell
Head of Engineering: Art McCreary
Year Established: 1979
Number of Employees: 18

APPLIED INFORMATION MANAGEMENT SCIENCES, INC.
COMPLETE OIL MARKETER'S PERPETUAL
Specific Application: Integrated Accounting for Petroleum Product Wholesalers, General Ledger, Accounts Payable and Receivable, Inventory
Specific Industry: Wholesale/Distribution
System Requirements: Onyx C5000, C8000 Oasis; DX-10
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 18
Date First Installed: April 1978
(See Vendor Profile Page V-8)

consco

Fast, accurate, fully automated consolidations from consco

We're the only people who do consolidations the right way. In fact, that's been our specialty for more than a decade.

Since our System is dedicated to consolidations, you can expect a lot more from it. Your accountants will be freed from the tedious tasks to do the more important things. And your management will get powerful, useful reports that just weren't possible before.

Our system provides:

- **automatic reconciliation and elimination of intercompany balances.**
- **multiple hierarchies (geographic, legal, etc.) including lower level consolidations (by groups, divisions, and so on).**
- **changes to hierarchies without reprogramming or restating past data.**
- **automatic creation of journal entries (tax, minority interest, etc.).**
- **no limit on the number of periods or kinds of data, including budgets, plans, and forecasts.**
- **currency conversion and planning using average, current, and historic rates in conformance with FASB 8 or 52.**
- **fast reports that allow multiple formats on a single page, ranking of any data, and preparation of analyses and operating statistics and schedules required by management, the SEC, and the IRS.**

The Consolidation System has interfaced with practically all the major General Ledger packages, as well as our customers' in-house systems. Of course, it also interfaces pretty neatly with our own Accounting Information System.

The CONSCO Accounting Information System (AIS), using relational architecture, brings all your data together so you can get the reports and analyses you need to run your business. CONSCO specializes in the tough jobs. Even if your requirements are so complex you thought you had to have custom software, AIS can handle your needs at packaged software prices.

Features of the Accounting Information System include the following:

- **all normal General Ledger and Subsidiary Ledger functions: accruals and reversals, standard entries, comprehensive allocation capability, detail analysis, and financial statements.**
- **absolutely no restriction on number of fields or field sizes.**
- **processing abilities are not limited to General Ledger data. Any number of subsystem and descriptive fields may be used for complete information processing.**
- **edit tables which incorporate full Boolean Logic. These tables may be changed at any time and may access any data field, hierarchical or otherwise.**
- **an unlimited number of budgets, revisions, projections, and statistics without the need for special account codes.**
- **unlimited time period history with the most efficient data storage organization.**
- **an extremely powerful Report Writer lets you use any data, even subledger and operations data, to create the reports your people need.**
- **full on-line capabilities for data entry, update, and inquiry.**

CONSCO's commitment to you does not end with our software. We offer on-site training and support, and our customers have formed a Users' Group.

Our customers include many of the largest companies in America (a customer list is available upon request).

If you're a complex, large organization, or if you have difficult problems that need mainframe software which goes beyond a mere General Ledger System, call or write CONSCO for more information.

CONSCO Enterprises Inc.
1700 Broadway, New York, New York 10019
212 586.8701

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APPLIED INFORMATION MANAGEMENT SCIENCES, INC.
LAMP
Specific Application: Family Billing, Accounts Receivable, General Ledger for Clinics and Offices
Specific Industry: Medical
System Requirements: Onyx C5000, C8000; Oasis; TI 990 Model 4; DX-10
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 8
Date First Installed: October 1980

APPLIED PERSONNEL TIMESHARE
CUSTOM INTEGRATED ORDER ENTRY, RECEIVABLES, INVENTORY CONTROL
Specific Application: Order Entry, Pending Order Control, Accounts Receivable, Inventory Control
Specific Industry: Manufacturing, Wholesale/Distribution, Retail
System Requirements: Prime 50 Series; Primos
Source Language: Fortran IV
Source Code Available: $20,000
Purchase Terms: Purchase (license)
Price: $20,000 to $50,000
Number Installed to Date: 4
Date First Installed: February 1981
(See Vendor Profile Page V-8)

APPLIED SYSTEMS, INC.
EXPENSE ACCOUNTING
Specific Application: Expenditure Fund Accounting System
Specific Industry: Government
System Requirements: North Star Horizon; DEC PDP-8: OS; DEC Decmate I, Decmate II
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 55
Date First Installed: 1978
(See Vendor Profile Page V-8)

APPLIED SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger With Double Entry System and Balance Sheet
Specific Industry: Education, Government
System Requirements: North Star Horizon; DEC PDP-8: OS; DEC Decmate I, Decmate II
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: 1976

APPLIED SYSTEMS, INC.
PROGRAM BUDGETING SYSTEM
Specific Application: Expenditure Fund Accounting System
Specific Industry: Education, Government, Nonprofit Organizations
System Requirements: North Star Horizon; DEC PDP-8: OS; DEC Decmate I, Decmate II
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 50
Date First Installed: 1976

APPLIED SYSTEMS, INC.
REVENUE SYSTEM
Specific Application: Codes Revenues
Specific Industry: Education, Government
System Requirements: North Star Horizon; DEC PDP-8: OS; DEC Decmate I, Decmate II
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: 1976

APPLIED SYSTEMS, INC.
SEWERAGE BILLING
Additional Product Classification: Report Generator
Specific Application: Prints Forms
Specific Industry: Government
System Requirements: DEC PDP-8: OS, DEC Decmate I, Decmate II: CP/M; North Star Horizon
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 50
Date First Installed: 1976

APPLIED SYSTEMS, INC.
TAX ASSESSMENT
Additional Product Classification: Report Generator
Specific Application: Tax Bill and Tax Book Procedures
Specific Industry: Government
System Requirements: DEC PDP-8: OS, North Star Horizon
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 50
Date First Installed: 1976

APPLIED SYSTEMS, INC.
WATER BILLING
Additional Product Classification: Report Generator
Specific Application: Prints Forms, Billing
Specific Industry: Government
System Requirements: North Star Horizon; DEC PDP-8: OS, DEC Decmate I, Decmate II: CP/M
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 50
Date First Installed: 1976

APRO SYSTEMS, INC.
APRO MANAGEMENT PACKAGE
Specific Application: Order Entry, Allocation, Inventory Accounts Receivable, Accounts Payable, Production, Sales Analysis, Raw Materials
Specific Industry: Banking/Financial
System Requirements: IBM System/34; IBM System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1979
(See Vendor Profile Page V-8)

APTECH COMPUTER SYSTEMS
AUTOMOTIVE CLUB MANAGEMENT
Specific Application: Automotive Club Management
System Requirements: Wang VS
Memory Required: 28.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $15,000
Number Installed to Date: 2
Date First Installed: January 1982
(See Vendor Profile Page V-8)

APTECH COMPUTER SYSTEMS
LAW FIRM MANAGEMENT SYSTEM
Specific Application: Time Accounting, Billing, Financial Modeling, Accounts Receivable; Payroll, Adverse Party Docket, General Ledger, Accounts Payable
Specific Industry: Legal
System Requirements: Wang VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $22,000
Number Installed to Date: 12
Date First Installed: February 1981

APTECH COMPUTER SYSTEMS
MUSEUM MANAGEMENT AND OPERATIONS
Specific Application: Collections Management, Membership and Donor Tracking, Fund Accounting, General Ledger, Payroll
Specific Industry: Museum
System Requirements: Wang VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $15,000
Number Installed to Date: 1
Date First Installed: January 1982

ARBAT SYSTEMS LTD.
BILLS & CREDIT
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11; DEC VAX: VMS
Memory Required: 512.0K bytes
Source Language: Aims Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1977
(See Vendor Profile Page V-8)

ARBAT SYSTEMS LTD.
INTEREST ACCRUALS
Specific Application: Interest Accruals
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11; DEC VAX: VMS
Memory Required: 512.0K bytes
Source Language: Aims Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 100
Date First Installed: 1977

ARBAT SYSTEMS LTD.
STATIC DATA & GENERAL ACCOUNTING
Specific Application: Static Data and General Accounting
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11, DEC VAX: VMS
Memory Required: 512.0K bytes
Source Language: Aims Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1977

ARGONAUT INFORMATION SYSTEM, INC.
AIS ACCOUNTS PAYABLE SYSTEM
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38; IBM 370; HP 3000; DEC VAX
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1977
(See Vendor Profile Page V-8)

ARGONAUT INFORMATION SYSTEM, INC.
AIS ACCOUNTS RECEIVABLE SYSTEM
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38; IBM 370; HP 3000; DEC VAX
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 75
Date First Installed: 1979

ARGONAUT INFORMATION SYSTEM, INC.
AIS GENERAL LEDGER BUDGETING SYSTEM
Specific Application: General Ledger, Budgeting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38, IBM 370; HP 3000; DEC VAX
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1976

ARGONAUT INFORMATION SYSTEM, INC.
AIS PURCHASE ORDER PROCESSING SYSTEM
Specific Application: Purchase Order Processing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38, 370; HP 3000; DEC VAX

Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible] **Installed to Date:** 75
Date First Installed: 1978

ARGONAUT INFORMATION SYSTEM, INC.
SALES ORDER PROCESSING/INVOICING SYSTEM
Specific Application: Sales Order Processing, Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/36, IBM 370; HP 3000; DEC VAX
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 75
Date First Installed: 1978

ARIES INFORMATION SYSTEMS, INC.
POBAS (PROGRAM-ORIENTED BUDGETING ACCOUNTING SYSTEM)
Specific Application: Integrated Fund Accounting for Government and Education
Specific Industry: Government
System Requirements: HP 3000: MPE, TI 900: DX-10; Honeywell DPS 6, DPS 7, DPS 8: Gcos 4; IBM 4300 Series, 370: DOS/VSE, OS
Memory Required: 96.0K bytes
Source Language: Cobol 68, 74
Source Code Available: Yes
[illegible] **Installed to Date:** 50
Purchase Terms: Purchase (license)
Date First Installed: July 1974
(See Vendor Profile Page V-9)

ARIES INFORMATION SYSTEMS, INC.
PROPAS PROPERTY ACCOUNTING SYSTEM
Specific Application: Fixed Asset Accounting
Specific Industry: Education, Government
System Requirements: HP 3000: MPE
Memory Required: 96.0K bytes
Source Language: Cobol 68, Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: December 1981

ARKANSAS SYSTEMS, INC.
CHECK RECONCILIATION SYSTEM
Specific Application: Check Reconciliation
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-9)

ARTHUR ANDERSEN & CO.
FIN-PAC/38 ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/36
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 17
Date First Installed: 1982
(See Vendor Profile Page V-9)

ARTHUR ANDERSEN & CO.
FIN-PAC/38 ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/36
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Lease
Date First Installed: 1983

ARTHUR ANDERSEN & CO.
FIN-PAC II ACCOUNTS PAYABLE
Specific Application: Accounts Payable Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3; IBM System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 280

ARTHUR ANDERSEN & CO.
FIN-PAC II ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3, IBM System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 100
Date First Installed: 1972

ARTHUR ANDERSEN & CO.
FIN-PAC II GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3, IBM System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 460
Date First Installed: 1972

ARTHUR ANDERSEN & CO.
OIL & GAS ACCOUNTING SYSTEM
Specific Application: General Accounting
Specific Industry: Oil and Gas
System Requirements: IBM System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 100
Date First Installed: 1977

ARTHUR ANDERSEN & CO.
RESPONSIBILITIES REPORTING SYSTEM
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/36
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 20
Date First Installed: 1981

ARTISAN SOFTWARE TECHNOLOGY, INC.
JEWELRY
Additional Product Classification: Inventory
Specific Application: Direct Mail, General Ledger, Purchase Order, General Accounting, Inventory
Specific Industry: Jewelers
System Requirements: Altos 8010, Altos 8011, Altos 8012, Altos 8013
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $2,500
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-9)

ASA, INC.
[illegible] INTEGRATED BUSINESS SYSTEM)
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Payroll, Order Entry, Inventory Control, Invoicing; Optional WP and Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: UNIX PC/IX 11; VMS, DEC VAX; CTS-300, [illegible]
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $16,000
Number Installed to Date: 30
Date First Installed: June 1981
(See Vendor Profile Page V-9)

ASI [illegible] SYSTEMS, INC.
SPECS
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Order Reference, Order Entry, WP, Payroll Commission, Financial Statements
Specific Industry: Manufacturing, Advertising
System Requirements: IBM Series/1 EDX, IBM Datamaster 23, IBM PC-XT; PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $7,000
Number Installed to Date: 60
Date First Installed: September 1978
(See Vendor Profile Page V-9)

ASI DATA SYSTEMS, INC.
INTEGRATED CHECK RECONCILIATION SYSTEM
Specific Application: Check Reconciliation
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 1
Date First Installed: August 1982
(See Vendor Profile Page V-9)

ASI DATA SYSTEMS, INC.
INTEGRATED JOB COSTING SYSTEM VERSION 3
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 3
Date First Installed: March 1981

ASI DATA SYSTEMS, INC.
INTEGRATED FIXED ASSETS & DEPRECIATION
Specific Application: Fixed Assets and Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 4
Date First Installed: July 1981

ASI DATA SYSTEMS, INC.
INTEGRATED ON-LINE ORDER ENTRY AND INVOICE
Specific Application: Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 5
Date First Installed: May 1981

ASK COMPUTER SYSTEMS, INC.
MANMAN/AP
Specific Application: Accounts Payable
Specific Industry: Manufacturing
System Requirements: HP 3000: Image, DEC VAX VMS
Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 350
Date First Installed: 1979
(See Vendor Profile Page V-9)

ASK COMPUTER SYSTEMS, INC.
MANMAN/FA
Specific Application: Fixed Assets Tracking, Expense Reporting, Depreciation Processing
Specific Industry: Manufacturing
System Requirements: HP [illegible]; Image; DEC VAX; VMS

Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $13,000
Number Installed to Date: 250
Date First Installed: 1981

ASK COMPUTER SYSTEMS, INC.
MANMAN/GL
Specific Application: General Ledger
Specific Industry: Manufacturing
System Requirements: HP 3000: Image, DEC VAX: VMS
Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 350

ASK COMPUTER SYSTEMS, INC.
MANMAN/OMAR
Specific Application: Sales, Order Entry, Accounts Receivable, Shipping, Invoicing
Specific Industry: Manufacturing
System Requirements: HP 3000: Image, DEC VAX: VMS
Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 400
Date First Installed: 1979

ASK COMPUTER SYSTEMS, INC.
MANMAN/OMAR PLUS
Specific Application: Inventory Control, Purchasing, Cost Accounting, Master Production Scheduling
Specific Industry: Manufacturing
System Requirements: HP 3000: Image, DEC VAX: VMS
Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $57,000
Date First Installed: 1982

ASK COMPUTER SYSTEMS, INC.
MANMAN/PLANMAN
Specific Application: Financial Modeling, Budgeting
Specific Industry: Manufacturing
System Requirements: HP 3000: Image, DEC VAX: VMS
Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: 1982

ASK COMPUTER SYSTEMS, INC.
MANMAN/SERVICEMAN
Specific Application: Services Contract Maintenance, Job Reporting
Specific Industry: Manufacturing
System Requirements: HP 3000: Image; DEC VAX: VMS
Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $27,000

ASK COMPUTER SYSTEMS, INC.
MANMAN/SERVICEMAN PLUS
Specific Application: Services Contract Maintenance, Job Reporting, Inventory Control, Purchasing, Cost Accounting, Master Production Scheduling
Specific Industry: Manufacturing
System Requirements: HP 3000 Image; DEC VAX: VMS
Memory Required: 256 0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $55,000
Date First Installed: 1983

AUTOLEASE DATA SYSTEMS
AUTOLEASE BATCH SYSTEM
Specific Industry: Auto Lease
System Requirements: IBM
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $75,000
Number Installed to Date: 50
Date First Installed: 1975
(See Vendor Profile Page V-10)

AUTOLEASE DATA SYSTEMS
ONLINE LEASE MANAGEMENT SYSTEM
Specific Application: Auto Leasing, Dealer Reporting, Account Management, Billing
Specific Industry: Auto Industry
System Requirements: DEC: RT-11, DEC: RSTS/E, IBM: CICS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $75,000
Number Installed to Date: 50
Date First Installed: 1975

AUTOMATED ACCOUNTING APPLICATIONS
A/C
Specific Application: A/C
Specific Industry: Not Industry Sensitive
System Requirements: Point Four: Iris, DG, Bytronix
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 14
Date First Installed: June 1982
(See Vendor Profile Page V-10)

AUTOMATED ACCOUNTING APPLICATIONS
A/P
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Point Four: Iris, DG, Bytronix
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $5,000
Number Installed to Date: 30
Date First Installed: January 1982

AUTOMATED ACCOUNTING APPLICATIONS
CLIENT ACCOUNT
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Point Four: Iris, DG, Bytronix
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000 to $10,000
Number Installed to Date: 112
Date First Installed: 1981

AUTOMATED ANALYSIS
GENERAL ACCOUNTING
Specific Application: General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $3,000
Date First Installed: 1978
(See Vendor Profile Page V-10)

AUTOMATED ANALYSIS
PROJECT CONTROL SYSTEMS
Specific Application: Project Control
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1980

AUTOMATED INTERNAL MANAGEMENT SYSTEMS, INC.
AIMS
Specific Application: Accounting, Production Job Cost, Media Analysis, Financial Reporting
Specific Industry: Advertising
System Requirements: IBM Datamaster, System/36
Source Language: Business Basic, [illegible]
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $17,500 to $35,000
Number Installed to Date: 45
Date First Installed: 1980
(See Vendor Profile Page V-10)

AUTOMATED GUILL, INC.
MINI-MIZ
Additional Product Classification: Manufacturing
Specific Application: General Accounting, Distribution, Manufacturing
Specific Industry: Not Industry Sensitive, Manufacturing, Wholesale/Distribution
System Requirements: DG: AOS, AOS/VS
Memory Required: 128.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000 to $95,000
Number Installed to Date: 200
Date First Installed: 1974
(See Vendor Profile Page V-10)

AUTOMATED RESOURCES GROUP, INC.
GL 3000
Specific Application: General Ledger
Specific Industry: Publishing
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 2
Date First Installed: 1983
(See Vendor Profile Page V-10)

AUTOMATION CONSULTANTS
JOB COST SYSTEM
Specific Application: Job Costing
Specific Industry: Manufacturing, Engineering, Legal,-Construction, Landscaping
System Requirements: CP/M; MS-DOS; R-DOS, Pick
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: November 1979
(See Vendor Profile Page V-11)

AUTOMATION MANAGEMENT, INC.
AMI NOTES RECEIVABLE
Specific Application: Notes Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT: MS DOS 2.0
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 5
Date First Installed: August 1983
(See Vendor Profile Page V-11)

AUXTON COMPUTER ENTERPRISES
BTCPP
Specific Application: Utility Billing, Accounts Receivable, Accounts Payable
Specific Industry: Telephone
System Requirements: IBM: DOS/VS
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Price: $11,500
(See Vendor Profile Page V-11)

AUXTON COMPUTER ENTERPRISES
COMPU NET
Specific Application: Accounts Receivable, Payment Processing, Message Rating, Distribution Toll Rating, Billing; On-Line Inquiry and Reporting
Specific Industry: Communications
System Requirements: IBM: DOS/VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Price: $150,000

AUXTON COMPUTER ENTERPRISES
SOP — SERVICE ORDER PROCESSING
Specific Application: Service Order Processing and Reporting

Learn more about Personal Computing, Office Automation or Communications in these video journals from CW Communications and Deltak.

Personal Computing:
A Business Perspective
Taped on location during CW Communications' COMPUTERWEEK conference, these six video sessions feature many of the biggest names in the microcomputer industry as they share their insights into the application of personal computers in the business environment. Each of the six tapes is 20-30 minutes long, and focuses on a specific issue. Available through Deltak singly or as a group.

- *Thinking Small for Big Business*
- *The Purchase Decision*
- *Finding a Vendor*
- *Sales Trends and IBM*
- *New Languages and Networking*
- *A Look Toward the Future*

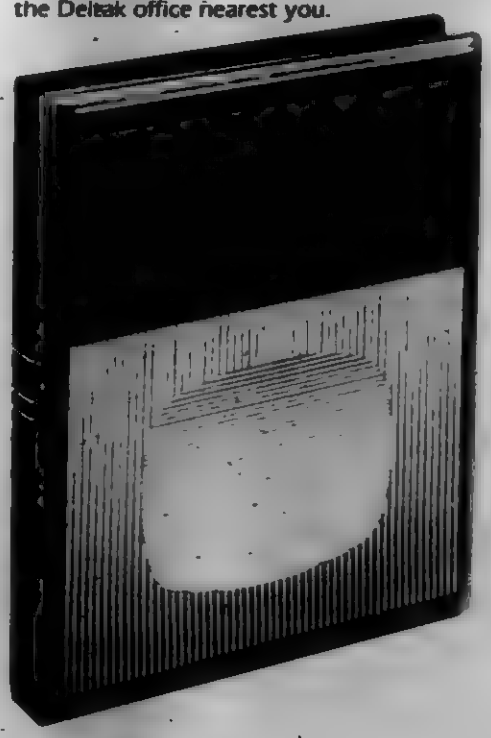
Office Automation: The Essential Issues
Last Fall, executives from around the country attended the OA Forum, a national conference conducted by CW Communications on the introduction, integration and implementation of office automation in today's business environment. Leading industry experts and top corporate managers discussed key office automation planning issues. These discussions are now available to you in seven carefully edited conference journals. Each journal is in full color, and 20-30 minutes long. They are available from Deltak singly or in a group.

- *The DP Role in Office Automation*
- *Planning for Office Automation*
- *The Fundamentals of Integration*
- *Some Specifics of Integration*
- *The Executive Workstation*
- *One Company's Experience*
- *Introducing Office Automation to Your Organization*

Communications
Leading experts in all areas of communications were recently taped at the 1983 Communication Networks Conference in New Orleans. The result was two brand new video conference journals of key interest to all levels of corporate and technical understanding:

- Communication Networks: Alternatives for the [redacted]
- Local Area Networks: The major considerations

All of these useful journals are available through Deltak, inc., 1751 Diehl Road, Naperville, IL 60566. To get more information, or to find out about rentals, just call Deltak Order-Entry at (312) 369-3000 (in Canada, (416) 678-9222), or check the white pages of your telephone directory for the Deltak office nearest you.



CW COMMUNICATIONS/INC.
Publishers of *Computerworld, InfoWorld, PC World, ISO WORLD,* and other leading computer publications around the world.

Specific Industry: Telephone
System Requirements: IBM: CICS/VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Price: $75,000

AVIATION MANAGEMENT SYSTEMS, INC.
AVIATION CHARTER CONTROL
Specific Application: Credit Card Reconciliation, Quote Dispatch, Flight Planning/Control, Recording, Invoicing, Billing, Aircraft Analysis
Specific Industry: Aviation
System Requirements: DG: Icos, R-DOS, AOS, AOS/VS
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,900 to $4,700
Number Installed to Date: 2
Date First Installed: June 1981
(See Vendor Profile Page V-11)

A V P SYSTEMS, INC.
THE SALES-USE TAX SYSTEM
Specific Application: Billing, Invoicing, Order Entry
Specific Industry: Manufacturing, Retail
System Requirements: Victor 9000: MS-DOS, CP/M 86
Memory Required: 12.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 75
Date First Installed: June 1978
(See Vendor Profile Page V-11)

BAKER DATA, INC.
ACCOUNTS RECEIVABLE SYSTEM
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/23, 11/70: RSTS/E, RT-11; HP 3000: MPE IV
Memory Required: 256.0K bytes
Source Language: DEC Dibol II, HP Quasar
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 91
Date First Installed: September 1974
(See Vendor Profile Page V-11)

BAKER DATA, INC.
ACCOUNTS PAYABLE, CASH MANAGEMENT SYSTEM
Specific Application: Accounts Payable, Cash Management System
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/23, 11/70: RSTS/E, RT-11; HP 3000: MPE IV
Memory Required: 256.0K bytes
Source Language: DEC Dibol II, HP; Quasar
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 83
Date First Installed: December 1975

BAKER DATA, INC.
GENERAL LEDGER/BUDGETARY CONTROL
Specific Application: General Ledger, Budgetary Control
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/23, 11/70: RSTS/E, RT-11; HP 3000: MPE IV
Memory Required: 256.0K bytes
Source Language: DEC Dibol II, HP Quasar
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,400
Number Installed to Date: 225
Date First Installed: 1975

BANCROFT COMPUTER SYSTEMS, INC.
FINANCIAL REPORTING AND GENERAL LEDGER SYSTEM
Specific Application: Financial Reporting and General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3, System/34, System/36, System/38
Memory Required: 20.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,600
Number Installed to Date: 650
Date First Installed: 1975

BASIC DATASYSTEMS, INC.
HEATING, VENTILATING, AND ACCOUNTING
Specific Application: Estimates, Accounting, Job Costing, Contractor Tables
Specific Industry: Insurance
System Requirements: Wang 2200
Memory Required: 128.0K bytes
Source Language: Wang Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 7
Date First Installed: 1981
(See Vendor Profile Page V-12)

BASIC DATASYSTEMS, INC.
RETAIL CARPET STORES SYSTEM
Additional Product Classification: Inventory
Specific Application: Accounting, Reservation Control, Inventory Control
Specific Industry: Retail
System Requirements: Basic Four; Pertec, Micro 5
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000 to $15,000
Number Installed to Date: 5
Date First Installed: 1982

BASIC DATASYSTEMS, INC.
THE STAR SYSTEM
Specific Application: Educational-Television, Station Scheduling Membership, Auction Accounting
System Requirements: Basic Four: Ibm
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Date First Installed: 1981

BEACON SYSTEMS
G.R.A.I.N.S.
Specific Application: Grain Records, Accounting, Inventory
Specific Industry: Agribusiness
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000 to $15,000
Number Installed to Date: 10
Date First Installed: December 1982
(See Vendor Profile Page V-12)

BEL THERMAL UNITS, INC.
MARKET MASTER
Specific Application: Real-Time Inventory, Order Entry, On-Line Customer Accounts
Specific Industry: Wholesale/Distribution
System Requirements: DEC PDP: RT-11, RSX-11M+
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: October 1981
(See Vendor Profile Page V-12)

BETTER SYSTEMS & SERVICES
WELDING SUPPLY SYSTEM [TESS]
Specific Application: POS, Inventory Control, Accounting for the Welding Supply Industry
Specific Industry: Wholesale Supplies
System Requirements: NCR: Imos; IRX; ITX
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,500
Date First Installed: 1982
(See Vendor Profile Page V-12)

BIG SKY DATA SYSTEMS
PROPERTY TAX ASSESSMENTS AND BILLING
Specific Application: Motor Vehicle Registration, Voter Registration, Utility Billing, District Accounts, Fixed Assets, Student Records, Scheduling
Specific Industry: Government
System Requirements: Alpha Micro AM 1000: Amos
Memory Required: 40.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Date First Installed: 1983
(See Vendor Profile Page V-12)

BILLINGS COMPUTER CORP.
LEGAL ACCOUNTING PACK
Specific Application: Legal Accounting
Specific Industry: Legal
System Requirements: Billings 500: BOS; Billings 6000: TURBO-DOS, Data
Memory Required: 56.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: 1980
(See Vendor Profile Page V-12)

BINEC COMPUTER SERVICES
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: PE 3200 SE OS
Memory Required: 768.0K bytes
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 10
Date First Installed: January 1983
(See Vendor Profile Page V-12)

BINEX AUTOMATED BUSINESS SYSTEMS, INC.
G. A. S. I. INTEGRATED SALES INVOICING
Specific Application: Integrated Accounts Receivable, Accounts Payable, General Ledger, Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Zenith: CP/M, OSM: Muse; DG: Bliss
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 45
Date First Installed: September 1978
(See Vendor Profile Page V-12)

BINEX AUTOMATED BUSINESS SYSTEMS, INC.
INTERACTIVE ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; DG: Bliss
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $1,000

Number Installed to Date: 75
Date First Installed: 1972

BINEX AUTOMATED BUSINESS SYSTEMS, INC.
INTERACTIVE GENERAL LEDGER
Specific Application: General Ledger, Departmentalized Budget Reports
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; DG: Bils
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $1,000
Number Installed to Date: 120
Date First Installed: 1972

B & L INFORMATION SYSTEMS, INC.
BLIS (B & L INFORMATION SYSTEM)
Specific Application: MIS, Accounting, Order Entry, Manufacturing
Specific Industry: Manufacturing
System Requirements: IBM System/34, System/36, System/23 Datamaster DOS, PC-XT, PC-DOS
Source Language: RPG-II, Cobol (XT)
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 84
Date First Installed: 1978
(See Vendor Profile Page V-12)

BLUE RIDGE COMPUTER SERVICES
ACCOUNTING
Specific Application: General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/32, System/34, System/36, System/38; SSP
Memory Required: 14.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 7
Date First Installed: April 1982
(See Vendor Profile Page V-13)

BORMUTH ASSOCIATES
AMBULANCE BILLING AND COLLECTION
Specific Application: Ambulance Billing, Collections
Specific Industry: Government (Restricted to Southeastern U.S.)
System Requirements: DEC PDP-11, RSX-11, VAX-11, VAX/VMS
Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,000 to $5,000
Number Installed to Date: 1
Date First Installed: July 1981
(See Vendor Profile Page V-13)

BORMUTH ASSOCIATES
SOCIAL SERVICES INFORMATION MANAGEMENT
Specific Application: Social Services Management
Specific Industry: Government (Restricted to Southeastern U.S.)
System Requirements: DEC PDP-11, RSX-11, VAX-11; VAX/VMS
Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license); Rental, Lease
Price: $5,000 to $15,000
Number Installed to Date: 1
Date First Installed: July 1982

BOS NATIONAL, INC.
BOS ACCOUNTS PAYABLE
Specific Application: Interactive Accounts Payable, General Ledger
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Microcobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $550
Number Installed to Date: 1,000
Date First Installed: 1978
(See Vendor Profile Page V-13)

BOS NATIONAL, INC.
BOS ACCOUNTS RECEIVABLE
Specific Application: Interactive Accounts Receivable
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Microcobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 1,000
Date First Installed: 1978

BOS NATIONAL, INC.
BOS GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Microcobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $550
Number Installed to Date: 1,000
Date First Installed: 1978

BOS NATIONAL, INC.
BOS INVENTORY CONTROL
Specific Application: Interactive Inventory Control
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Microcobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $550
Number Installed to Date: 1,000

BOS NATIONAL, INC.
BOS INVOICING
Specific Application: Interactive Invoicing
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Microcobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 1,000
Date First Installed: 1978

BPI SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: PC-DOS; CP/M, MS-DOS, APPLE-SOS
Memory Required: 64.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Date First Installed: 1983
(See Vendor Profile Page V-13)

BPI SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: PC-DOS; CP/M, MS-DOS, APPLE-SOS
Memory Required: 64.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Date First Installed: 1979

BPI SYSTEMS, INC.
BUSINESS ANALYST
Specific Application: Financial Projections
Specific Industry: Not Industry Sensitive
System Requirements: PC-DOS; CP/M, MS-DOS, APPLE-SOS
Memory Required: 64.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Date First Installed: 1983

BPI SYSTEMS, INC.
CHURCH MANAGEMENT
Specific Application: Church Management
Specific Industry: Church
System Requirements: PC-DOS; CP/M, MS-DOS, APPLE-SOS
Memory Required: 64.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1979

BPI SYSTEMS, INC.
GENERAL LEDGER/GENERAL ACCOUNTING
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: PC-DOS; CP/M, MS-DOS, APPLE-SOS
Memory Required: 64.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Date First Installed: 1979

BPI SYSTEMS, INC.
INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: PC-DOS; CP/M, MS-DOS, APPLE-SOS
Memory Required: 64.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Date First Installed: 1979

BPI SYSTEMS, INC.
JOB COSTING
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: PC-DOS; CP/M, MS-DOS, APPLE-SOS
Memory Required: 64.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Date First Installed: 1979

BPI SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: PC-DOS; CP/M, MS-DOS, APPLE-SOS
Memory Required: 64.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Date First Installed: 1979

BPI SYSTEMS, INC.
TIME ACCOUNTING
Specific Application: Time Accounting
Specific Industry: Not Industry Sensitive
System Requirements: PC-DOS; CP/M, MS-DOS, APPLE-SOS
Memory Required: 64.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Date First Installed: 1979

BRIELLE COMPUTER
GENERAL BUSINESS SYSTEMS
Specific Application: Accounting Functions
Specific Industry: Not Industry Sensitive
System Requirements: Apple III: APPLE-SOS, Fortune: Unix, Basic Four: SMC, IBM System/36, Series/1
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 50
Date First Installed: 1982
(See Vendor Profile Page V-13)

BREMER ASSOCIATES, INC.
FIRST - FUND RAISING INFORMATION RETRIEVAL
Specific Application: Alumni Development
Specific Industry: Not Industry Sensitive, Banking/Financial
System Requirements: IBM 370, 30 Series, 4300, 30: OS, DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
(See Vendor Profile Page V-13)

BREMER & CO.
BILL OF MATERIALS
Specific Application: Bill of Materials
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX-11M, DEC VAX: VMS

Memory Required: 32.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $3,500
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-13)

BREUER & CO.
KEYWORD INFORMATION MANAGER
Specific Application: Management Information System
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX-11M; DEC VAX: VMS
Memory Required: 32.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $4,000 to $5,000
Number Installed to Date: 12
Date First Installed: 1981

BRIDGE COMPUTER SYSTEMS, INC.
AGRICULTURE ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Agriculture
System Requirements: DG: Bliss; IBM System/34, System/36: SSP
Memory Required: 96.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,300
Date First Installed: 1980
(See Vendor Profile Page V-13)

BRIDGE COMPUTER SYSTEMS, INC.
AGRICULTURE ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Agriculture
System Requirements: DG: Bliss; IBM System/34, System/36: SSP
Memory Required: 96.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,200
Number Installed to Date: 30
Date First Installed: 1974

BRIDGE COMPUTER SYSTEMS, INC.
AGRICULTURE GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Agriculture
System Requirements: DG: Bliss; IBM System/34, System/36: SSP
Memory Required: 96.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,700
Number Installed to Date: 30
Date First Installed: 1974

BRIDGE COMPUTER SYSTEMS, INC.
AGRICULTURE PAYROLL
Specific Application: Payroll
Specific Industry: Agriculture
System Requirements: DG: Bliss; IBM System/34, System/36: SSP
Memory Required: 96.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $16,800
Number Installed to Date: 30
Date First Installed: 1974

BRIDGE COMPUTER SYSTEMS, INC.
AGRICULTURE BROKERAGE & JACKET ACCOUNTING
Specific Application: Truck Brokerage and Jacket Accounting
Specific Industry: Agriculture
System Requirements: DG: Bliss; IBM System/34, System/36: SSP
Memory Required: 96.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

BRIDGE COMPUTER SYSTEMS, INC.
AGRICULTURE EQUIPMENT USE/COST
Specific Application: Equipment Use/Cost
Specific Industry: Agriculture
System Requirements: DG: Bliss; IBM System/34, System/36: SSP
Memory Required: 96.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,800
Date First Installed: 1979

BRIDGE COMPUTER SYSTEMS, INC.
PACKER/SHIPPER BILLING
Specific Application: Billing
Specific Industry: Agriculture
System Requirements: DG: Bliss; IBM System/34, System/36: SSP
Memory Required: 96.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $18,100
Date First Installed: 1983

BRISTOL INFORMATION SYSTEMS, INC.
BIAS (BRISTOL INTEGRATED ACCOUNTING SYSTEM)
Specific Application: Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Vector: CP/M; Datapoint: DOS; MS-DOS
Memory Required: 64.0K bytes
Source Language: Databus, Bristol Business
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: December 1977
(See Vendor Profile Page V-13)

BRISTOL INFORMATION SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Account Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Vector: CP/M; Datapoint: DOS; MS-DOS
Memory Required: 64.0K bytes
Source Language: Databus, Bristol Business
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 100
Date First Installed: December 1979

BRISTOL INFORMATION SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Vector: CP/M; Datapoint: DOS; MS-DOS
Memory Required: 64.0K bytes
Source Language: Databus, Bristol Business
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 100
Date First Installed: 1975

BRISTOL INFORMATION SYSTEMS, INC.
BALANCE FORWARD ACCOUNTS RECEIVABLE
Specific Application: Balance Forward, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Vector: CP/M; Datapoint: DOS, MS-DOS
Memory Required: 64.0K bytes
Source Language: Databus, Bristol Business
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 25
Date First Installed: January 1982

BRISTOL INFORMATION SYSTEMS, INC.
BUSINESS
Specific Application: Integrated Corporate Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, CP/M 2.2
Memory Required: 32.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $900
Number Installed to Date: 100
Date First Installed: 1983

BRISTOL INFORMATION SYSTEMS, INC.
BRISTOLS INTEGRATED ACCOUNTING SYSTEM B
Specific Application: Integrated Corporate Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS/RMS
Memory Required: 32.0K bytes
Source Language: Databus
Source Code Available: $2,500
Purchase Terms: Purchase (license)
Price: $800 to $2,500
Number Installed to Date: 1,000
Date First Installed: 1972

BRISTOL INFORMATION SYSTEMS, INC.
FIXED ASSET MANAGEMENT
Specific Application: Fixed Asset Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Vector: CP/M; Datapoint: DOS; MS-DOS
Memory Required: 64.0K bytes
Source Language: Databus, Bristol Business
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 75
Date First Installed: June 1976

BRISTOL INFORMATION SYSTEMS, INC.
GENERAL LEDGER SYSTEM
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Vector: CP/M; Datapoint: DOS; MS-DOS
Memory Required: 64.0K bytes
Source Language: Databus, Bristol Business
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 200
Date First Installed: October 1972

BRISTOL INFORMATION SYSTEMS, INC.
ORDER ENTRY BILLING
Specific Application: Order Entry Billing
Specific Industry: Wholesale/Distribution
System Requirements: IBM PC: PC-DOS, Vector: CP/M; Datapoint: DOS; MS-DOS
Memory Required: 64.0K bytes
Source Language: Databus, Bristol Business
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 75
Date First Installed: March 1976

BRISTOL INFORMATION SYSTEMS, INC.
PROJECT MANAGEMENT AND BILLING
Specific Application: Project Management and Billing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Vector: CP/M; Datapoint: DOS; MS-DOS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 10
Date First Installed: 1978

BRISTOL INFORMATION SYSTEMS, INC.
PROFESSIONAL TIME ACCOUNTING
Specific Application: Professional Time Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Vector: CP/M; Datapoint: DOS; MS-DOS
Source Language: Databus, Bristol Business
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600

Number Installed to Date: 100
Date First Installed: December 1977

BRISTOL INFORMATION SYSTEMS, INC.
PROPERTY MANAGEMENT SYSTEM
Specific Application: Property Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, Vector: CP/M; Datapoint: DOS; MS-DOS
Memory Required: 64.0K bytes
Source Language: Databus, Bristol Business
Source Code Available: $50
Purchase Terms: Purchase (license)
Price: $800
Date First Installed: 1981

BRISTOL INFORMATION SYSTEMS, INC.
PURCHASE ORDER SYSTEM
Specific Application: Purchase Order System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS; Vector: CP/M; Datapoint: DOS; MS-DOS
Memory Required: 64.0K bytes
Source Language: Databus, Bristol Business
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: May 1978

BRITZ SYSTEMS
ART OPEN ITEM ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable - Open Item
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 28.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $99
Number Installed to Date: 30
Date First Installed: October 1981
(See Vendor Profile Page V-13)

BRUZAUD ASSOCIATES
AUTOMOBILE DEALER F&I SYSTEM
Additional Product Classification: Insurance
Specific Application: Finance and Insurance Car Sales Forms
Specific Industry: Auto Dealers
System Requirements: CP/M; MS-DOS, PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500 to $2,000
Number Installed to Date: 50
Date First Installed: August 1976
(See Vendor Profile Page V-13)

BURTON DATA SYSTEMS, INC.
GENERALIZED BOOKKEEPING SYSTEM
Specific Application: General Ledger System With Profit and Loss Balance Sheet, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DOS; CP/M; Datapoint; Zilog Z80
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,600
Number Installed to Date: 4
(See Vendor Profile Page V-14)

BUSINESS COMPUTER CENTER
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Micro Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 500
Date First Installed: 1979
(See Vendor Profile Page V-14)

BUSINESS COMPUTER CENTER
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Micro Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 500
Date First Installed: 1979

BUSINESS COMPUTER CENTER
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Micro Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 500
Date First Installed: 1979

BUSINESS COMPUTER CENTER
NEWSPAPER ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Micro Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 500
Date First Installed: 1979

BUSINESS COMPUTER CENTER
PHARMACY CONTROL
Specific Application: Pharmacy Control
Specific Industry: Not Industry Sensitive, Medical
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Micro Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 500
Date First Installed: 1979

BUSINESS COMPUTER DESIGN, INC.
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Order Entry, Inventory, General Ledger, Accounts Payable, Accounts Receivable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM System/36
Memory Required: 18.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $2,500
Number Installed to Date: 300
Date First Installed: May 1980
(See Vendor Profile Page V-14)

BUSINESS COMPUTER DESIGN, INC.
WAREHOUSING SYSTEM
Additional Product Classification: Manufacturing
Specific Application: Accounting and Distribution/Warehousing
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/34, IBM System/36
Memory Required: 18.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $14,000
Number Installed to Date: 12
Date First Installed: June 1981

BUSINESS COMPUTER SERVICE
BCS SYSTEMS
Additional Product Classification: Payroll/Personnel
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Inventory, Depreciation, Golf Handicaps, File Management, Time Clock, Time Accounting, Payroll, Posting
Specific Industry: Not Industry Sensitive
System Requirements: Pertec XL40; Unix, Xerox; Burroughs B2700
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,250 to $4,730
Date First Installed: 1978
(See Vendor Profile Page V-14)

BUSINESS DATA COMP.
CALENDAR
Additional Product Classification: Income Tax Preparation
Specific Application: Tax Accounting Calendar
Specific Industry: Accountants
System Requirements: NEC Astra: NEC OS, CP/M
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $8,000
(See Vendor Profile Page V-14)

BUSINESS DATA COMP.
CLIENT CHARGE
Additional Product Classification: Payroll/Personnel
Specific Application: Client Billing and Invoicing, Employee Statistics
Specific Industry: Legal, Enrolled Agents
System Requirements: NEC Astra: NEC, CP/M
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $8,000
Date First Installed: October 1983

BUSINESS DATA COMP.
INCOME TAX
Specific Application: Direct Keyboard Entry of Income Taxes
Specific Industry: Legal, Accountants
System Requirements: NEC Astra: NEC OS, CP/M
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $8,000
Date First Installed: October 1983

BUSINESS INFORMATION SYSTEMS, INC.
NEWSPAPER CIRCULATION PACKAGE
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Newspaper Circulation
Specific Industry: Publishing, Printing
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 9
Date First Installed: 1981
(See Vendor Profile Page V-14)

BUSINESS SOFTWARE, INC.
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: Inventory, Order Entry, Payroll, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B90, B800, B900, B1900 CMS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: $1,000
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 300
Date First Installed: 1979
(See Vendor Profile Page V-15)

BUSINESS SOFTWARE, INC.
WHOLESALE/RETAIL SYSTEM
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Order Entry, Invoicing
Specific Industry: Wholesale/Distribution, Retail
System Requirements: Burroughs B90, B800, B900, B1900: CMS

Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: $2,500
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 6
Date First Installed: 1983

BUSINESS SOLUTIONS, INC.
BSI COTTON ACCOUNTING SYSTEM
Specific Application: Accounting System for Cotton Gins and Cotton Buyers, Merchants
Specific Industry: Cotton
System Requirements: Mercator Model 2000; Onyx; Basic Four
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 3
Date First Installed: June 1982
(See Vendor Profile Page V-15)

BUSINESS SYSTEMS GROUP
CPA COMPREHENSIVE FINANCIAL REPORTING
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger and Payroll Reporting
Specific Industry: Banking/Financial
System Requirements: TI 990 DX-10; TI Business System 300, 600 Series: DX-10; TI Professional: MS-DOS
Memory Required: 20.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 25
Date First Installed: December 1978
(See Vendor Profile Page V-15)

BUSINESS SYSTEMS, INC.
CABLE TV MANAGEMENT SYSTEM
Specific Application: Billing, Late Charge, Notices, Work Orders, Reports And Accounting Functions
Specific Industry: Cable TV
System Requirements: DEC PDP-11/23 RSTS, DEC VAX: VMS
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 23
Date First Installed: 1981
(See Vendor Profile Page V-15)

B.W.C. SYSTEMS
HOME OWNERS RATING
Specific Application: Home Owner Insurance Rates
Specific Industry: Retail, Insurance
System Requirements: TRS-80: CP/M
Memory Required: 48.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 45
Date First Installed: January 1979
(See Vendor Profile Page V-15)

CADO SYSTEMS OF KANSAS CITY
CHURCH PACKAGE
Specific Application: Accounting Package for Churches
Specific Industry: Churches
System Requirements: IBM: MS-DOS; Televideo: TURBO-DOS, Oasis
Source Language: Basic, Basic Compiler
Purchase Terms: Purchase (license)
Price: $2,400
Number Installed to Date: 25
Date First Installed: 1981
(See Vendor Profile Page V-15)

CALIFORNIA COMPUTER BUSINESS SYSTEMS, INC.
RETAIL CLOTHING SYSTEM
Additional Product Classification: Inventory
Specific Application: Accounts Receivable, Inventory, Sales, Purchasing
Specific Industry: Retail
System Requirements: Burroughs B1000/ MCP
Memory Required: 256.0K bytes
Source Language: RPG-II, Cobol
Source Code Available: $24,000
Purchase Terms: Purchase (license)
Price: $24,000
Number Installed to Date: 1
Date First Installed: February 1982
(See Vendor Profile Page V-15)

CALIFORNIA COMPUTER TIMESHARING
AP
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
Source Language: Basic Extended
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $4,000
Number Installed to Date: 4
Date First Installed: 1983
(See Vendor Profile Page V-15)

CALIFORNIA COMPUTER TIMESHARING
CLAIMS G/L ACCOUNTING MGMT SYSTEM
Specific Application: Accounts Receivable, Accounts Payable, Job Costing, Cross Posting, Property Management, Financial Statements
Specific Industry: Not Industry Sensitive
System Requirements: BTI
Source Language: Basic Extended
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $9,500
Number Installed to Date: 35
Date First Installed: September 1978

CAMPCO, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS; Wang 2200 Series
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
(See Vendor Profile Page V-16)

CAMPCO, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200 Series, Wang VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000

CAPA
AGFAB-AGRICULTURE FABRICATION MANAGEMENT
Additional Product Classification: Payroll/Personnel, Manufacturing, Report Generator
Specific Application: General Accounting, Specialized Reporting, Fertilizer Formulation, Bill Of Materials for Farm Management
Specific Industry: Agriculture
System Requirements: Wang 2200 Series
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1980
(See Vendor Profile Page V-16)

CAPA
CAPAL/M
Additional Product Classification: Payroll/Personnel, WP/Text Editing
Specific Application: Full Accounting System, Time and Billing, WP, Critical Data System, Conflict of Interest for Law Firms
Specific Industry: Legal
System Requirements: Wang 2200 Series: OIS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: April 1980

CAPA
DISTRIBUTION PACKAGE
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Distributes School Supplies as Well as Books and Pennin
Specific Industry: Education
System Requirements: Wang 2200 Series
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)

CAPA
MAIL ORDER DISTRIBUTION MANAGEMENT SYSTEM (MODMS)
Specific Application: General Accounting, Tracking of Cash, Handling of Standard Invoices, Prepaid or Subsidized Orders
Specific Industry: Mail Order Houses
System Requirements: Wang 2200 Series
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: July 1981

CAPITOL COMPUTER SERVICE, INC.
FINANCIAL PACKAGE
Additional Product Classification: Payroll/Personnel
Specific Application: Integrated Accounts Payable, Payroll and General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34; SSP
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 8
Date First Installed: September 1982
(See Vendor Profile Page V-16)

CARNEY ASSOCIATES, INC.
CAI A/P
Specific Application: Accounts Payable
Specific Industry: Wholesale/Distribution
System Requirements: DG Eclipse: AOS/VS; DG Eclipse MV Series: -AOS
Memory Required: 512.0K bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 1
Date First Installed: April 1982
(See Vendor Profile Page V-16)

CARNEY ASSOCIATES, INC.
CAI F/A
Specific Application: Fixed Assets, Asset Maintenance
Specific Industry: Professional Services, Retail
System Requirements: DG Eclipse: AOS/VS; DG Eclipse MV Series: ACS
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,500
Number Installed to Date: 1
Date First Installed: January 1983

CARNEY ASSOCIATES, INC.
CAI G/L PLUS
Specific Application: General Ledger With Accrual/Deferral and Budget Additions
Specific Industry: Retail
System Requirements: DG C/150: AOS, AOS/VS
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 1
Date First Installed: April 1982

CARTER, ANHAEFER & CO.
PROPERTY TAX MGMT & COLLECTION SYSTEM
Specific Application: Management and Collection of Property Tax
Specific Industry: Education, Government
System Requirements: HP 3000: MPE IV
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 10
Date First Installed: February 1982
(See Vendor Profile Page V-16)

CARTER, SCHAEFER & CO.
SCHOOL FINANCE SYSTEM
Specific Application: Accounts Payable and Receivable, General Ledger
Specific Industry: Education
System Requirements: HP 3000: MPE IV
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 10
Date First Installed: December 1981

CARTER, SCHAEFER & CO.
VEHICLE OIL & GAS RECORDS
Specific Application: Vehicle Oil and Gas Costs Record Management
Specific Industry: Education
System Requirements: HP 3000: MPE IV
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 1
Date First Installed: June 1983

CASE SYSTEMS ASSOCIATES, INC.
CASEWARE GENERAL ACCOUNTING JOB COST, LOAN
Additional Product Classification: Manufacturing, Banking
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll, Order Entry, Invoicing, Job Cost Accounting
Specific Industry: Manufacturing, Wholesale/Distribution, Banking/Financial
System Requirements: Burroughs B20: Btos
Memory Required: 384.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,600 to $7,995
Number Installed to Date: 6
Date First Installed: February 1983
(See Vendor Profile Page V-16)

CASH MANAGEMENT SYSTEMS, INC.
ON-LINE ACCOUNTS RECEIVABLE SYSTEM
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370: OS, DOS
Memory Required: 150.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 3
Date First Installed: September 1982
(See Vendor Profile Page V-16)

CATALLACTICS CORP.
FUND ONE (VERSION 1.0)
Additional Product Classification: Banking
Specific Application: Funds Accounting, Valuation and Reporting
Specific Industry: Banking/Financial
System Requirements: IBM 3030 Series: OS/MFT; IBM 4300 Series: OS/MVT; IBM 360 370 Series: OS/VSI, MVS
Memory Required: 500.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease;
Date First Installed: July 1983
(See Vendor Profile Page V-17)

CBASCO
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
(See Vendor Profile Page V-17)

CBASCO
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 160
Date First Installed: 1975

CBASCO
BUSINESS ACCOUNTING SYSTEM
Specific Application: Accounts Payable, Accounts Receivable, Inventory Control, General Ledger, Financial Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 160
Date First Installed: 1975

CBASCO
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease

CCH COMPUTAX, INC.
THE PARTNER TAX PLANNING
Specific Application: Calculates Clients Tax Position
System Requirements: Televideo: TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $900
Number Installed to Date: 125
Date First Installed: September 1982
(See Vendor Profile Page V-17)

CCAS DATA PROCESSORS, INC.
CCAS SOFTWARE FOR OIL PRODUCERS/OPERATORS
Specific Application: Handles Accounting Functions including General Books and Financial Statements, Joint Interest Billing
Specific Industry: Oil Companies
System Requirements: Wang VS: VS
Memory Required: 98.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license); Negotiable
Number Installed to Date: 20
Date First Installed: 1981
(See Vendor Profile Page V-17)

CCSI
GOVERNMENTAL FINANCIAL SYSTEM
Specific Application: Financial System
Specific Industry: Government
System Requirements: IBM System/34: SSP; IBM System/36
Memory Required: 32.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: November 1982
(See Vendor Profile Page V-17)

CCSI
HIGHWAY COSTING SYSTEM
Specific Application: Cost Control
Specific Industry: Government
System Requirements: IBM System/34: SSP; IBM System/36
Memory Required: 42.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,995
Number Installed to Date: 21
Date First Installed: September 1982
(See Vendor Profile Page V-17)

C & C SYSTEMS SOFTWARE
TBAR
Additional Product Classification: Dental
Specific Application: Accounts Receivable, Patient Billing
Specific Industry: Medical, Dental
System Requirements: Datapoint
Memory Required: 64.0K bytes
Source Language: RPG, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 70
Date First Installed: 1975
(See Vendor Profile Page V-17)

C. B. DATA CORP.
(ALICE) ASSETS LIABILITIES CAPITAL INCOME EXPENSE
Specific Application: Client Write-Up, Fixed Asset Accounting, Professional Time and Billing, Payroll, Job Costing
Specific Industry: Wholesale/Distribution, Construction
System Requirements: DEC Micro PDP-11: RSTS; DEC PDP-11/23+: RSTS; DEC PDP- 11/24, PDP-11/44, PDP-11/60: RSTS
Memory Required: 2.0M bytes
Source Language: Basic Plus II
Purchase Terms: Purchase (license)
Price: $1,300
Number Installed to Date: 300
Date First Installed: January 1979
(See Vendor Profile Page V-17)

C. B. SYSTEMS, INC.
ACCOUNTS PAYROLL
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell Level 6; DPS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 65
Date First Installed: 1978
(See Vendor Profile Page V-17)

C. B. SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell Level 6; DPS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 65
Date First Installed: 1978

C. B. SYSTEMS, INC.
BANK RECONCILIATION
Specific Application: Bank Reconciliation
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell Level 6, DPS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 12
Date First Installed: 1981

C. B. SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell Level 6, DPS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 65
Date First Installed: September 1978

C. B. SYSTEMS, INC.
INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell Level 6; DPS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 65
Date First Installed: September 1978

C. D. SYSTEMS, INC.
ORDER ENTRY
Specific Application: General Ledger Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell Level 6: DPS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 85

C. D. SYSTEMS, INC.
PURCHASING
Specific Application: Purchasing
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell Level 6: DPS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 30

CETEC
MANAGEMENT ACCOUNTING PROGRAMS (MAPS)
Additional Product Classification: Payroll/Personnel, Radio Traffic Software
Specific Application: Interactive Radio Station Management System
Specific Industry: Radio Station
System Requirements: Digidyne S832: Digidyne Series 201
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 175
Date First Installed: June 1976
(See Vendor Profile Page V-18)

CHAMP SYSTEMS, INC.
FREIGHT RECEIVABLES
Specific Application: A Freight Billing System
Specific Industry: Trucking
System Requirements: Basic Four
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 2
Date First Installed: October 1982
(See Vendor Profile Page V-18)

CHELSEA INTERNATIONAL CORP.
INTERACTIVE GENERAL LEDGER ACCOUNTING
Specific Application: General Ledger With Overhead, Gross Sales and Project Cost Accounting
System Requirements: IBM PC; Exxon 650
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $300
Date First Installed: June 1983
(See Vendor Profile Page V-18)

CHEM-AL, INC.
GENERAL LEDGER RECEIVABLES INVENTORY PAYABLES EMPLOYEE PAYROLL SYSTEM (GRIPES)
Additional Product Classification: Payroll/Personnel, Data/File Management
Specific Application: General Ledger, Receivables, Inventory, Payables, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX-11M, RSTS/E
Memory Required: 48.0K bytes
Source Language: Basic, RS-Basic
Source Code Available: $400
Purchase Terms: Purchase (license)
Price: $2,400
Number Installed to Date: 5
Date First Installed: March 1983
(See Vendor Profile Page V-18)

CHILSON'S MANAGEMENT CONTROLS, INC.
CMC ACCOUNTS PAYABLE SYSTEM
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 1550: DOS
Memory Required: 64 0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $1,100
Number Installed to Date: 28
Date First Installed: January 1978
(See Vendor Profile Page V-18)

CHILSON'S MANAGEMENT CONTROLS, INC.
CMC FIXED ASSET SYSTEM
Specific Application: Fixed Assets and Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 1550: DOS
Source Language: Databus
Purchase Terms: Purchase (license); Lease
Price: $700
Number Installed to Date: 7
Date First Installed: June 1982
(See Vendor Profile Page V-18)

CHRIS SCHAEFER & CO.
CSCO FIXED ASSET ACCOUNTING SYSTEM
Specific Application: Designed for Depreciation, Accounting and Tracking Of Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 8
Date First Installed: 1981
(See Vendor Profile Page V-18)

CHRIS SCHAEFER & CO.
CSCO MANUFACTURING JOB COST SYSTEM
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Financial Report Generator, Payroll With Labor Distribution, Manufacturing Job Costing, Accounting
Specific Industry: Manufacturing
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50,000
Number Installed to Date: 8
Date First Installed: 1981

CHRIS SCHAEFER & CO.
CSCO TAX APPRAISAL ADMINISTRATION SYSTEM
Specific Application: Maintains and Stores Property Management
Specific Industry: Appraisal Districts
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1982

CHRISTENSEN COMPUTER CO., INC.
CCC STANDARD ACCOUNTING
Specific Application: Job Costing, Purchase Order, Bill of Materials, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Manufacturing
System Requirements: Alpha Micro 1042, Alpha Micro 1062: Amos, Alpha Micro 1000
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-18)

CIBAR, INC.
GAMBIT
Specific Application: General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $7,500
Number Installed to Date: 2
Date First Installed: July 1981
(See Vendor Profile Page V-19)

CIBAR, INC.
SFC-DATA COLLECTION
Specific Application: General Accounting, Process Control, MRP
Specific Industry: Manufacturing
System Requirements: UCSD-P
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $5,000
Number Installed to Date: 1
Date First Installed: February 1983

CIBAR, INC.
TIBS
Additional Product Classification: Manufacturing
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Process Control, MRP
Specific Industry: Manufacturing
System Requirements: Prime: Primos
Memory Required: 64.0K bytes
Source Language: Info
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $5,000
Number Installed to Date: 5
Date First Installed: January 1981

CIMS GROUP, INC.
ORDER PROCESSING
Specific Application: Corrugated Industry Order Processing
Specific Industry: Manufacturing
System Requirements: IBM 4300 Series, HP 3000: DG Eclipse
Memory Required: 256 0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $25,000 to $200,000
Number Installed to Date: 2
Date First Installed: 1981
(See Vendor Profile Page V-19)

CINCOM SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, EDOS, OS, MVS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-19)

CIRCADIA (QUEST RESEARCH)
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Inventory, Job Costing, General Ledger, Accounts Payable, Accounts Receivable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Unix; Oasis
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 25
Date First Installed: 1981
(See Vendor Profile Page V-19)

CIRCADIA (QUEST RESEARCH)
NURSING HOME SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: General Accounting and Nursing Home Activities
Specific Industry: Medical, Nursing Homes
System Requirements: Unix; Oasis
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $16,500
Number Installed to Date: 7
Date First Installed: January 1982

CISINETWORK CORP.
CORPORATE TRUST ACCOUNTING MANAGEMENT SYSTEM
Specific Application: Trust Accounting
Specific Industry: Banking/Financial
System Requirements: IBM 360,

370, 3000 Series: OS, MVT, MVS
Memory Required: 300.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1981
(See Vendor Profile Page V-19)

CISNETWORK CORP.
SHORT TERM INVESTMENT MANAGEMENT SYSTEM STMS
Specific Application: Investment Management and Accounting
Specific Industry: Banking/Financial
System Requirements: IBM 360, 370, 3000 Series: OS, MVT, MVS
Memory Required: 300.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 8
Date First Installed: 1981

CISNETWORK CORP.
TRUST ACCOUNTING FEE SYSTEM (AFS)
Specific Application: Trust Accounting
Specific Industry: Banking/Financial
System Requirements: IBM 360, 370, 3000 Series: OS, MVT, MVS
Memory Required: 300.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: 1981

C & L DATA SYSTEMS
MAIL ORDER PROCESSING (MOP)
Additional Product Classification: Mail Order Management
Specific Application: Order Entry, Inventory Control, Mail Order Processing; Subscription Ticketing and Reservation System
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Nonprofit Organizations
System Requirements: NEC Astra 200, Astra 230, Astra 250, Astra 270
Memory Required: 256.0K bytes
Source Language: Basic, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $10,000 to $20,000
Number Installed to Date: 7
Date First Installed: March 1981
(See Vendor Profile Page V-19)

C & L DATA SYSTEMS
LEGAL TIME ACCOUNTING
Specific Application: Time Disbursement, Billing, Accounts Receivable
Specific Industry: Legal
System Requirements: NEC Astra 200, Astra 230, Astra 250, Astra 270
Source Language: Basic, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $10,000 to $20,000
Number Installed to Date: 7
Date First Installed: March 1981

CMC ASSOCIATES, INC.
AP/3000
Specific Application: Multicompany Accounts Payable With Cash Requirements, Forecasting
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: $3,000
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 35
Date First Installed: 1977
(See Vendor Profile Page V-19)

CMC ASSOCIATES, INC.
AR/3000
Specific Application: Multicompany Accounts Receivable With Invoicing, Capability
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: $3,000
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 35
Date First Installed: 1977

CMC ASSOCIATES, INC.
CR/3000
Specific Application: Cash Receipts for Fund Accounting
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: $3,000
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 35
Date First Installed: 1977

CMC ASSOCIATES, INC.
FAR/3000
Specific Application: A Multifund Accounts Payable With Cash Requirements
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: $3,000
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 35
Date First Installed: 1977
(See Vendor Profile Page V-19)

CMC ASSOCIATES, INC.
FGL/3000
Specific Application: A Multifund General Ledger With Budgeting and Reporting Writer
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 35
Date First Installed: 1977

CMC ASSOCIATES, INC.
GL/3000
Specific Application: Multicompany General Ledger With Budgeting and Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 35
Date First Installed: 1977

C. M. COMPUTERS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS; IBM SUPER-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
(See Vendor Profile Page V-19)

C. M. COMPUTERS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS; IBM SUPER-DOS
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license), Lease
Number Installed to Date: 2
Date First Installed: 1982

C. M. COMPUTERS, INC.
HEALTH CLUB
Specific Application: Accounts Receivable, Member Monitoring
Specific Industry: Health Club
System Requirements: DG: R-DOS; IBM SUPER-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease

C. M. COMPUTERS, INC.
INVENTORY
Specific Application: Inventory System
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS; IBM SUPER-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 1
Date First Installed: December 1982

CMIX 2, INC.
OVERHEAD EXPENSE ALLOCATION/REALLOCATION
Specific Application: Analytic Processor for Distributing Overhead Expenses
Specific Industry: Not Industry Sensitive
System Requirements: Prime 850: Primos
Source Language: Fortran, Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-19)

COBASOL, INC.
FURNITURE RENTAL INVENTORY SYSTEM
Specific Application: Order Processing, Accounts Receivable, Inventory Control, Sales, Analysis
System Requirements: IBM System/34, System/36
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,500
Number Installed to Date: 2
Date First Installed: March 1983
(See Vendor Profile Page V-19)

COLLIER - JACKSON, INC.
CJ/ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE, DEC VMS
Memory Required: 32.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 52
Date First Installed: 1978
(See Vendor Profile Page V-20)

COLLIER - JACKSON, INC.
CJ/ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable, Cash Forecasting
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE; DEC VAX VMS
Memory Required: 32.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 17
Date First Installed: 1981

COLLIER - JACKSON, INC.
CJ/ADVANCED GENERAL LEDGER
Specific Application: General Ledger, Financial Reporting
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE, DEC VAX VMS
Memory Required: 32.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $18,000
Number Installed to Date: 11
Date First Installed: 1982

COLUMBINE SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/32, System/34, System/36, System/38 SSP
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 200
Date First Installed: 1974
(See Vendor Profile Page V-20)

COLUMBINE SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/32, System/34, System/36,

Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 250
Date First Installed: 1974

COMMAND DATA, INC.
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Payroll, Inventory
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP: RSTS/E, DEC VAX: VMS
Memory Required: 256.0K bytes
Source Language: Basic +, Basic +II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 50
Date First Installed: December 1977
(See Vendor Profile Page V-20)

COMMERCE OVERSEAS COMMUNICATIONS, INC.
GEN ACCOUNTING
Specific Application: Sales Order Processing, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: NEC: CP/M; Digdyne: CP/M
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 7
Date First Installed: January 1983
(See Vendor Profile Page V-20)

COMMERCIAL COMPUTER SERVICES, INC.
ACCOUNTING, MANUFACTURING, PAYROLL PACKAGE
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Bill/Materials, Accounts Receivable, Accounts Payable, Payroll, Inventory, Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, DEC VAX: VMS
Memory Required: 256.0K bytes
Source Language: Basic +, Basic +II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 60
Date First Installed: 1976
(See Vendor Profile Page V-20)

COMMERCIAL COMPUTER SERVICES, INC.
FINANCIAL SYSTEM IN HISPANIC
Specific Application: Accounts Receivable, General Ledger, Inventory, Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/38; IBM 4331: DOS/VSE
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $23,000
Number Installed to Date: 5
Date First Installed: 1982

COMMERCIAL COMPUTER SYSTEMS
SECOND TIME JOB SHOP MANAGEMENT
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Job Shop Management, Accounts Receivable, General Ledger, Order Entry, Payroll, Inventory
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP: RSTS/E, CTS-300; CP/M, CP/M 86, MS-DOS
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-20)

COMMERCIAL COMPUTER SYSTEMS
SECOND TIME ORDER ENTRY
Specific Application: Order Entry,
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP: RSTS/E, CTS-300; CP/M, CP/M 86; MS-DOS
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $895
Number Installed to Date: 100
Date First Installed: 1978

COMMERCIAL COMPUTER SYSTEMS
SECOND TIME-GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E; CP/M; CP/M 86; MS-DOS
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $895
Number Installed to Date: 100
Date First Installed: 1978

COMMERCIAL COMPUTER SYSTEMS
SECOND TIME-A/R
Specific Application: Accounts Receivable
System Requirements: DEC PDP: RSTS/E, CTS-300; CP/M; CP/M 86; MS-DOS
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $895
Number Installed to Date: 100
Date First Installed: 1978

COMMERCIAL DATA CENTER, INC.
INTEGRATED ACCOUNTING PACKAGE
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Order Entry, Payroll, Inventory
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: DOS/VSE, IBM 360: DOS
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 50
Date First Installed: 1968
(See Vendor Profile Page V-20)

COMMERCIAL DATA CORP.
COLLECTION AGENCY SYSTEM
Specific Application: Collection Processing
Specific Industry: Banking/Financial
System Requirements: Datapoint: RMS, DOS
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $11,500
Number Installed to Date: 2
Date First Installed: 1981
(See Vendor Profile Page V-20)

COMMERCIAL DATA CORP.
CPA TIME ACCOUNTING SYSTEM
Specific Application: Time Accounting
Specific Industry: Banking/Financial
System Requirements: Datapoint: RMS, DOS
Memory Required: 64.0K bytes
Source Language: Databus, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 2
Date First Installed: September 1981

COMMERCIAL DATA CORP.
LAWYER TIME ACCOUNTING SYSTEM
Specific Application: Legal Time Accounting
Specific Industry: Legal
System Requirements: Datapoint: RMS, DOS
Memory Required: 64.0K bytes
Source Language: Databus, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 2
Date First Installed: September 1981

COMMERCIAL DATA SYSTEMS CORP.
GENERAL ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel, WP/Text Editing
Specific Application: Fixed Assets, General Ledger, Accounts Payable, Accounts Receivable, Payroll, Word Processing
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS, AOS, SUPER-DOS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 10,000
Date First Installed: 1982

COMMERCIAL DATA SYSTEMS CORP.
WHOLESALE DISTRIBUTION
Additional Product Classification: Manufacturing
Specific Application: Billing, Inventory, Sales Analysis, Purchasing, General Ledger, Order Entry
Specific Industry: Wholesale/Distribution
System Requirements: DG: SUPER-DOS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1982

COMMERCIAL DATA SYSTEMS CORP.
WHOLESALE DRUG DISTRIBUTION
Specific Application: Inventory, Purchasing, Order Entry, Accounts Receivable
Specific Industry: Wholesale/Distribution
System Requirements: DG: R-DOS, AOS, SUPER-DOS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000
Number Installed to Date: 1
Date First Installed: April 1983

COMMERCIAL DATA SYSTEMS CORP.
WHOLESALE GLASS DISTRIBUTION
Additional Product Classification: Inventory
Specific Application: Inventory, Purchasing, Order Entry, Accounts Receivable
Specific Industry: Wholesale/Distribution
System Requirements: DG: SUPER-DOS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000
Number Installed to Date: 1
Date First Installed: April 1983

COMMERCIAL DATA SYSTEMS, INC.
FINANCIAL ACCOUNTING SYSTEM
Specific Application: General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: NCR: Imos, IRX, ITX
Memory Required: 96.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $27,000
Number Installed to Date: 84
Date First Installed: 1978
(See Vendor Profile Page V-20)

COMMERCIAL SYSTEMS CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive

System Requirements: DG: R-DOS, AOS, AOS/VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,400
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-21)

COMMERCIAL SYSTEMS CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS, AOS, AOS/VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 30
Date First Installed: 1978

COMMERCIAL SYSTEMS CORP.
ADMIS
Specific Application: Route Accounting for Electronic Games
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS, AOS, AOS/VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,500
Number Installed to Date: 30
Date First Installed: 1981

COMMERCIAL SYSTEMS CORP.
FINANCIAL MANAGEMENT SYSTEM
Specific Application: General Ledger, Budgets, Accounts Payable, Purchasing
Specific Industry: Government
System Requirements: DG: R-DOS, AOS, AOS/VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Price: $8,400
Number Installed to Date: 30.
Date First Installed: 1978

COMMERCIAL SYSTEMS CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS, AOS, AOS/VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 30
Date First Installed: 1978

COMMERCIAL SYSTEMS CORP.
UTILITY BILLING & MANAGEMENT SYSTEM
Specific Application: Utility Billing and Collections
Specific Industry: Government
System Requirements: DG: R-DOS, AOS, AOS/VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,500 to $9,500
Number Installed to Date: 30
Date First Installed: 1978

COMPAL, INC.
WORDPAL WORD PROCESSOR TIMEKEEPING BILLING
Additional Product Classification: WP/Text Editing
Specific Application: Word Processing
Specific Industry: Engineering, Legal
System Requirements: DEC Rainbow: CP/M 86, IBM PC: CP/M 86; Compal: CP/M 86; Compal 8200: Extended CP/M
Memory Required: 64.0K bytes
Source Language: Basic, Cbasic Compiler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $495
Date First Installed: 1978
(See Vendor Profile Page V-21)

COMPINFO, INC.
ADPACK
Specific Application: Integrated Financial Accounting System
System Requirements: Wang VS: VS, IBM 4300, 3000 Series. MVS, DOS/VSE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $50,000
Number Installed to Date: 1
Date First Installed: October 1981
(See Vendor Profile Page V-21)

COMPINFO, INC.
AEPACK
Specific Application: Integrated Financial Accounting System for Architectural Engineering Firms
Specific Industry: Engineering
System Requirements: Wang VS: VS, IBM 4300, 3000 Series: MVS, DOS/VSE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $40,000
Number Installed to Date: 3
Date First Installed: October 1982

COMPINFO, INC.
IB/PACK
Specific Application: Integrated Financial Accounting System for Investment Banking Firms
Specific Industry: Banking/Financial
System Requirements: Wang VS: VS, IBM 4300, 3300 Series: MVS, DOS/VSE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $60,000
Number Installed to Date: 2
Date First Installed: September 1982

COMPINFO, INC.
MICROLAWPACK
Specific Application: Financial Modeling for Law Firms Office System
Specific Industry: Legal
System Requirements: IBM PC: VS; Wang Professional: DOS/VSE, MVS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,000
Number Installed to Date: 3
Date First Installed: September 1981

COMPLETE COMPUTER SYSTEMS
CEMETARY MANAGEMENT
Specific Application: Billing
Specific Industry: Cemeteries
System Requirements: DG: R-DOS, DOS, AOS
Memory Required: 64.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-21)

COMPLETE COMPUTER SYSTEMS
FOUNDATION MANAGEMENT SYSTEM
Specific Application: Foundation Management
Specific Industry: Foundations
System Requirements: DG: R-DOS, DOS, AOS
Memory Required: 64.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000 to $40,000
Number Installed to Date: 2
Date First Installed: 1982

COMPLEX SYSTEM, INC.
DDA/GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Banking/Financial
System Requirements: IBM System/34, SSP; IBM System/36
Source Language: RPG, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
(See Vendor Profile Page V-21)

COMP-SITE INTERNATIONAL, INC.
GENERAL ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Payroll, Order Entry, Inventory, Job Costing
System Requirements: Bliss
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 200
Date First Installed: September 1978
(See Vendor Profile Page V-21)

COMP-SITE INTERNATIONAL, INC.
BASKETBALL CLUB SYSTEM
Specific Application: Membership File Management, Account Billing, Mail Outs, Printing
System Requirements: Bliss
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 10
Date First Installed: 1981

COMPTECH
FOCIS
Specific Application: Financial and Operational Accounting
Specific Industry: Food Service
System Requirements: DEC PDP-11/23: RSX, VAX 750 VSM, IBM 360 DOS, IBM 370: MVS
Memory Required: 256.0K bytes
Source Language: Cobol, Macro 11
Purchase Terms: Purchase (license)
Price: $10,000 to $25,000
Number Installed to Date: 1
Date First Installed: 1900
(See Vendor Profile Page V-22)

COMPUDAT SERVICES, INC.
APPAREL WHOLESALE/RETAIL AND DEPARTMENT STORE
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Payroll, Purchase Orders, Inventory Reports, Inquiry Into Inventory
Specific Industry: Wholesale/Distribution, Retail
System Requirements: Wang VS
Memory Required: 256.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $20,000 to $30,000
Number Installed to Date: 4
Date First Installed: 1982
(See Vendor Profile Page V-22)

COMPUDESIGNS, INC.
CASH/CREDIT MANAGEMENT SUPPORT (CCMSS)
Specific Application: Cash/Credit Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM System/36, IBM System/38 Mapics
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 15
Date First Installed: July 1982
(See Vendor Profile Page V-22)

COMPUMATICS, INC.
COMPUTER ASSISTED MANAGEMENT SYSTEM
Additional Product Classification: Distribution
Specific Application: Accounting, Order Entry, Inventory Control, Sales, Analysis
Specific Industry: Wholesale/Distribution
System Requirements: Burroughs: MCP
Memory Required: 323.0K bytes
Source Language: Cobol, Assembler

Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 60
Date First Installed: April 1971
(See Vendor Profile Page V-22)

COMPUMAX, INC.
MAXILEDGER
Specific Application: General Ledger
Specific Industry: Manufacturing
System Requirements: Xerox 820 CP/M 80; Heath/Zenith Z89 MS-DOS, NEC PC-800, Micropolis 16
Memory Required: 48.0K bytes
Source Language: Microsoft Basic, Basic Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 500
Date First Installed: 1981
(See Vendor Profile Page V-22)

COMPUMAX, INC.
MICROLEDGER
Specific Application: Chart of Accounts, Journal Data, Listing, Trial Balance, Profit and Loss
Specific Industry: Manufacturing
System Requirements: IBM PC, CP/M; Xerox 820 MS-DOS; NEC PC 8000, Micropolis 16
Memory Required: 48.0K bytes
Source Language: Microsoft Basic, Basic Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 500
Date First Installed: 1981

COMPUMAX, INC.
MICROPAY
Specific Application: Accounts Payable
Specific Industry: Manufacturing
System Requirements: IBM PC, CP/M, Xerox 820 MS DOS; NEC PC-8000; Micropolis 16
Memory Required: 48.0K bytes
Source Language: Microsoft Basic, Basic Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 500
Date First Installed: 1981

COMPUMAX, INC.
MICROREC
Specific Application: Accounts Receivable
Specific Industry: Manufacturing
System Requirements: DOS; Microsoft CP/M
Source Language: Microsoft Basic, Basic Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 500
Date First Installed: 1981

COMPU-SHARE, INC.
ACCOUNTS PAYABLE AP-11-VERSION 2
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/23; RSTS/E, DEC VAX; VMS/VMS
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 100
Date First Installed: June 1979
(See Vendor Profile Page V-22)

COMPU-SHARE, INC.
GENERAL LEDGER-GL-11-VERSION 4
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/23 RSTS/E, VAX-11 Series: VAX/VMS
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 100
Date First Installed: June 1978

COMPUTAC, INC.
MARC 9 - ACCOUNTS PAYABLE
Specific Application: Publishing, Retail, Distribution
Specific Industry: Publishing
System Requirements: Wang VS: DOS
Memory Required: 250.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 45
Date First Installed: January 1980
(See Vendor Profile Page V-22)

COMPUTAC, INC.
MARC 9 -RDA SYS
Specific Application: Publishing, Retail, Distribution
Specific Industry: Publishing
System Requirements: Wang VS: DOS
Memory Required: 250.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 45
Date First Installed: January 1980

COMPUTAC, INC.
MARC 9 - ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Publishing
System Requirements: Wang VS: DOS
Memory Required: 250.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 45
Date First Installed: January 1980

COMPUTAX SYSTEMS, INC.
BETA ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Accountants
System Requirements: Burroughs B90: CMS, Burroughs B900; Burroughs B1900
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,450
Date First Installed: 1979
(See Vendor Profile Page V-22)

COMPUTAX SYSTEMS, INC.
BETA ASSET DEPRECIATION
Specific Application: Asset Depreciation
Specific Industry: Accountants
System Requirements: Burroughs B90: CMS; Burroughs B900; Burroughs B1900
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Price: $750
Date First Installed: 1979

COMPUTAX SYSTEMS, INC.
BETA BANK RECONCILIATION
Specific Application: Bank Reconciliation
Specific Industry: Accountants
System Requirements: Burroughs B90: CMS, Burroughs B900; Burroughs B1900
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $525
Date First Installed: 1979

COMPUTAX SYSTEMS, INC.
BETA CLIENT ACCOUNTING
Specific Application: Client Accounting and After the Fact Payroll
System Requirements: Burroughs B90: CMS; Burroughs B900; Burroughs B1900
Memory Required: 256 0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,950
Date First Installed: 1979

COMPUTAX SYSTEMS, INC.
BETA LOAN AMORTIZATION
Specific Application: Loan Amortization
Specific Industry: Accountants
System Requirements: Burroughs B90: CMS; Burroughs B900; Burroughs B1900
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350
Date First Installed: 1979

COMPUTAX SYSTEMS, INC.
BETA RANDOM NUMBER GENERATOR
Specific Application: Random Number Generator
Specific Industry: Accountants
System Requirements: Burroughs B90: CMS, Burroughs B900, Burroughs B1900
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: 1979

COMPUTAX SYSTEMS, INC.
BETA TAX PLANNING
Specific Application: Tax Planning
Specific Industry: Accountants
System Requirements: Burroughs B90: CMS, Burroughs B900; Burroughs B1900
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,125
Date First Installed: 1979

COMPUTAX SYSTEMS, INC.
BETA PROFESSIONAL TIME, CHARGE AND BILLING
Specific Application: Professional Time, Charge and Billing
Specific Industry: Accountants
System Requirements: Burroughs B90: CMS; Burroughs B900; Burroughs B1900
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Price: $2,450
Date First Installed: 1979

COMPUTAX SYSTEMS, INC.
BETA 1040 TAX
Specific Application: Tax Returns
Specific Industry: Accountants
System Requirements: Burroughs B90: CMS; Burroughs B900; Burroughs B1900
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,225
Date First Installed: 1979

COMPUTE-IT
KEY DATA PROCESSING SYSTEM (KDPS)
Specific Application: Accounting
Specific Industry: Not Industry-Specific
System Requirements: HP: DOS; IBM PC: PC-DOS; Commodore: DOS; TRS-80 DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 125
Date First Installed: 1981
(See Vendor Profile Page V-22)

COMPUTEK COMPUTING CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 370
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200
Date First Installed: 1974
(See Vendor Profile Page V-22)

COMPUTEK COMPUTING CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Specific
System Requirements: IBM System 370
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200
Date First Installed: 1974

COMPUTEK COMPUTING CORP.
CREDIT UNION
Specific Application: Credit Union

Specific Industry: Not Industry Sensitive
System Requirements: IBM System 370
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Rental
Number Installed to Date: 200
Date First Installed: 1974

COMPUTEK COMPUTING CORP.
CREDIT UNION (CUROLS)
Specific Application: Financial
System Requirements: Basic
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000 to $25,000
Number Installed to Date: 7
Date First Installed: December 1982

COMPUTEK COMPUTING CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 370
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Rental
Number Installed to Date: 200
Date First Installed: 1974

COMPUTEK COMPUTING CORP.
IMPLEMENTATION
Specific Application: Financial
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 370
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Rental
Number Installed to Date: 200
Date First Installed: 1974

COMPUTER ACCOUNTING SYSTEMS, INC.
CPAS ACCOUNTS PAYABLE SYSTEM
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 16.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250 to $4,000
Number Installed to Date: 100
Date First Installed: 1971
(See Vendor Profile Page V-22)

COMPUTER ACCOUNTING SYSTEMS, INC.
CPAS ACCOUNTS RECEIVABLE SYSTEM
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 16.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500 to $5,000
Number Installed to Date: 100
Date First Installed: 1971

COMPUTER ACCOUNTING SYSTEMS, INC.
CPAS ORDER PROCESSING SYSTEM
Specific Application: Billing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 16.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500 to $9,000
Number Installed to Date: 100
Date First Installed: 1971

COMPUTER APPLICATIONS CORP.
COST-ACUMEN
Specific Application: Cost Accounting and Project Management
Specific Industry: Engineering, Architectural
System Requirements: TRS-80/II: TRS-DOS, CP/M, IBM PC: CP/M 86; Vector Graphics: CP/M; IBM PC: PC-DOS
Memory Required: 80.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 100
Date First Installed: September 1982
(See Vendor Profile Page V-22)

COMPUTER APPLICATIONS SPECIALISTS
ON-LINE OIL & GAS ACCOUNTING SYSTEM
Specific Application: Full Accounting and Management Information
System Requirements: DG MV Series: AOS/VS; IBM 3000, 4341 Series: MVS
Memory Required: 2.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $150
Number Installed to Date: 14
Date First Installed: January 1981
(See Vendor Profile Page V-22)

COMPUTER ASSOCIATES
CA-ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: General Business
System Requirements: IBM 360 DOS/VS, OS/VS1/MVS, DG Eclipse MV1: AOS/VS, VM/CMS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $27 to $30
Date First Installed: April 1983
(See Vendor Profile Page V-23)

COMPUTER ASSOCIATES
CA-ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: General Business
System Requirements: IBM DOS/VS, OS/VS1/MVS, DG Eclipse MV1: VM/CMS, AOS/VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $27 to $30
Date First Installed: April 1983

COMPUTER ASSOCIATES
CA-ASSET MANAGEMENT
Specific Application: Tracks Assets Through On-Line Inquiry Functions
Specific Industry: General Business
System Requirements: IBM 360 DOS/VS, OS/VS1; DG Eclipse AOS/VS, MV/4000, M600, C150; VM/CMS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20 to $30
Date First Installed: April 1983

COMPUTER ASSOCIATES
CA-FINANCIAL MANAGEMENT SOFTWARE/ACCOUNTS Receivable
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DG: MVT; IBM 4300 DOS; IBM 300 Series DOS, MVT
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $27,000
Number Installed to Date: 400
Date First Installed: 1978

COMPUTER ASSOCIATES
CA-FINANCIAL MANAGEMENT SOFTWARE/ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DG: MVT; IBM 4300 DOS; IBM 300 Series OS, IBM 370 MVS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $27,000
Number Installed to Date: 400
Date First Installed: 1978

COMPUTER ASSOCIATES
CA-FINANCIAL MANAGEMENT SOFTWARE/FIXED ASSETS
Specific Application: Fixed Assets Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 MVT; IBM 300 Series DOS, DG, OS, MVS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $27,000
Number Installed to Date: 400
Date First Installed: 1978

COMPUTER ASSOCIATES
CA-FINANCIAL MANAGEMENT SOFTWARE/GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DG: MVT; IBM 4300 DOS, IBM 300 Series OS, IBM 370 MVS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000 to $48,000
Number Installed to Date: 400
Date First Installed: 1978

COMPUTER ASSOCIATES
CA-FINANCIAL MODELING LANGUAGE TABULATION
Specific Application: Data Tabulation
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 MVT, IBM 300 Series DOS, MVS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 400
Date First Installed: 1978

COMPUTER ASSOCIATES
CA-FINANCIAL PLANNER
Additional Product Classification: Financial Modeling Languages/DSS
Specific Application: Financial Planning
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370/4300/300 DOS/VS OS/VS1/MVS, HP 3000 VM/CMS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000 to $30,000

COMPUTER ASSOCIATES
CA-GASPER
Additional Product Classification: Job Accounting
Specific Application: Job Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: MVT, 300 DOS, IBM 370 OS, MVS
Memory Required: 256.0K bytes

Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 1,000
Date First Installed: 1978

COMPUTER ASSOCIATES
CA-GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: General Business
System Requirements: IBM: DOS/VS, OS/VS1/MVS, DG Eclipse: AOS, DG MV 8000, MV 6000, MV 4000 VM/CMS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $48 to $52
Date First Installed: April 1983

COMPUTER BUSINESS SYSTEMS
DEBT MANAGEMENT
Specific Application: Collection System for Financially Troubled Businesses
Specific Industry: Banking/Financial
System Requirements: Burroughs: CP/M
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 2
Date First Installed: February 1982
(See Vendor Profile Page V-23)

COMPUTER BUSINESS SYSTEMS
GENERAL ACCOUNTING
Additional Product Classification: Manufacturing
Specific Application: Process Control, Inventory, Freight Accounting, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DG
Memory Required: 56.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1 000
Date First Installed: 1976

COMPUTER CENTER, INC. OF MIAMI
HOTEL
Specific Application: Hotel Accounting
Specific Industry: Hotel
System Requirements: Burroughs: MS/CP; Burroughs B20
Memory Required: 500 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500 to $6,000
Number Installed to Date: 1,000
Date First Installed: January 1983
(See Vendor Profile Page V-23)

COMPUTER CENTER, INC. OF MIAMI
LAND DEVELOPMENT INDUSTRY
Specific Application: Accounting
Specific Industry: Land Development
System Requirements: Burroughs: MS/CP; Burroughs B20
Memory Required: 500 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500 to $6,000
Number Installed to Date: 1,000
Date First Installed: January 1983

COMPUTER CENTER, INC. OF MIAMI
SMALL AIRLINES
Specific Application: Accounting
Specific Industry: Transportation, Small Airlines
System Requirements: Burroughs. MS/CP; Burroughs B20
Memory Required: 500 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,500 to $6,000
Number Installed to Date: 1,000
Date First Installed: January 1983

COMPUTER CONCEPTS & SERVICES, INC.
GOVERNMENT APPLICATION
Additional Product Classification: Payroll/Personnel, Voter Registration
Specific Application: Financial Accounting, Payroll, Highway and Law Enforcement, Costing, Property Taxes, Utility Billing, Voter Registration
Specific Industry: Government
System Requirements: IBM System 34; 36P; IBM 36
Source Language: RPG, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 60
Date First Installed: September 1979
(See Vendor Profile Page V-23)

COMPUTER CONCEPTS CORP.
THE BROADCAST SYSTEM
Additional Product Classification: Traffic
Specific Application: Order Entry, Commercial Scheduling, General Ledger, Accounts Payable and Receivable, Management Reports
Specific Industry: Radio Broadcasting
System Requirements: Wang 2200: Wang Basic II
Memory Required: 32.0K bytes
Source Language: Basic II
Purchase Terms: Purchase (license); Rental, Lease
Price: $35 to $50,000
Number Installed to Date: 230
Date First Installed: June 1975
(See Vendor Profile Page V-23)

COMPUTER CONSULTING & PROGRAMMING SERVICES
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Oasis; Ibis; Iris
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: September 1978
(See Vendor Profile Page V-23)

COMPUTER CONSULTING & PROGRAMMING SERVICES
DENTAL-MEDICAL
Specific Application: Statements and Doctor-Patient Analysis
Specific Industry: Medical, Dental
System Requirements: Oasis, Iris; Ibis
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1978

COMPUTER CONSULTING & PROGRAMMING SERVICES
RETAIL CARPET INVENTORY
Specific Application: Accounts Receivable, Accounts Payable, General Ledger
Specific Industry: Carpet
System Requirements: Oasis; Iris; Ibis
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1978

COMPUTER CONSULTING & PROGRAMMING SERVICES
RETAIL CLOTHING
Specific Application: Accounts Receivable and Payable
Specific Industry: Apparel
System Requirements: Oasis; Iris; Ibis
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1978

COMPUTER DATA ACCESS, INC.
THE PARTS HANDLER
Additional Product Classification: Payroll/Personnel, WP/Text Editing, Graphics, Sort/Merge, Data/File Management
Specific Application: Business for Wholesale Auto Parts Distributors
Specific Industry: Wholesale/Distribution
System Requirements: DG: DOS, ADS
Memory Required: 64.0K bytes
Source Language: DGL, Assembly, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $20,000
Date First Installed: 1973
(See Vendor Profile Page V-24)

COMPUTER DATA SYSTEMS, INC.
DMCS
Specific Application: Debt Collection and Accounts Receivable Control
Specific Industry: Government, Nonprofit Organizations
System Requirements: IBM 4330: MVS; IBM 4341: MVS; Honeywell: MVS; DEC: MVS
Memory Required: 150.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 105
Date First Installed: June 1975
(See Vendor Profile Page V-24)

COMPUTER DATA SYSTEMS, INC.
HARDWARE/SOFTWARE MANAGEMENT SYSTEM
Additional Product Classification: WP/Text Editing
Specific Application: Word Processing, General Ledger, Accounting
Specific Industry: Government, Nonprofit Organizations
System Requirements: IBM 4330: MVS; IBM 4341: MVS; Honeywell: MVS, DEC: MVS
Memory Required: 150 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 100
Date First Installed: June 1975

COMPUTER ENTERPRISES LTD.
ENERGY MODULE
Additional Product Classification: Payroll/Personnel
Specific Application: Sales, Inventory, General Ledger, Payroll, Degree, Date, Development Equipment
Specific Industry: Not Industry Sensitive
System Requirements: TRS; Victor 9000, Zenith: CP/M, XDS
Source Language: Basic
Source Code Available: No
Purchase Terms: Lease
Date First Installed: December 1982
(See Vendor Profile Page V-24)

COMPUTER GENERATION, INC.
TOTAL NON-CREDIT
COMPUTER TOLL (T.A.C.T.)
Specific Application: Agricultural Accounting and Management
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, DEC VAX, DEC 350
Memory Required: 512.0K bytes
Source Language: Fortran, Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 4
Date First Installed: January 1983
(See Vendor Profile Page V-24)

COMPUTER HOUSE
1040 TAX PACKAGE
Specific Application: Schedule 1040 Tax Forms
Specific Industry: Not Industry Sensitive
Source Language: Hibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-24)

COMPUTER HOUSE
DISTRIBUTION SYSTEM
Additional Product Classification: Manufacturing, Data/File Management
Specific Application: Sales Order Entry, Invoice Billing, Monthly Statements, Inventory Control, Sales

Analysis, Accounts Receivable
Specific Industry: Not Industry Sensitive
Source Language: Hibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 100
Date First Installed: 1978

COMPUTER HOUSE
FORMS PRINTING PACKAGE
Additional Product Classification: Manufacturing, Data/File Management
Specific Application: Billing, Inventory, Continous Printed Forms, Cut Sheets, Accounts Receivable, Change Orders; Shipping Labels, Order Entry
Specific Industry: Not Industry Sensitive
Source Language: Hibol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1983

COMPUTER HOUSE
FUEL OIL JOB
Additional Product Classification: Manufacturing
Specific Application: Liquid Inventory Control, Accounts Receivable
Specific Industry: Fuel Oil
Source Language: Hibol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 25
Date First Installed: 1982

COMPUTER HOUSE
FUEL OIL DEALERS PACKAGE (LICENSED)
Additional Product Classification: Payroll/Personnel
Specific Application: K-Factors, Delivery Tickets, Invoice, Budgets, Billing, Product Analysis
Specific Industry: Fuel Oil Dealers
Source Language: Hibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 150
Date First Installed: 1975

COMPUTER HOUSE
GAS STATION CREDIT BILLING AND ACCOUNTS
Specific Application: Credit Billing, Accounts Receivable
Specific Industry: Retail, Gas Stations
Source Language: Hibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 1
Date First Installed: 1981

COMPUTER HOUSE
INDEPENDENT INSURANCE AGENCY
Additional Product Classification: WP/Text Editing, Report Generator, Financial Modeling Languages/DSS
Specific Application: Agency and Direct Billing, WP/Text Editing, Financial Reports, General Ledger, Sales Analysis
Specific Industry: Insurance
Source Language: Hibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 50.
Date First Installed: 1980

COMPUTER HOUSE
MUNICIPAL
Additional Product Classification: Payroll/Personnel
Specific Application: Financial Reports, General Ledger
Specific Industry: Government
Source Language: Hibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 1
Date First Installed: 1981

COMPUTER HOUSE
PLUMBING SUPPLY OF SALE
Additional Product Classification: Retail
Specific Application: Inventory, Billing, Purchasing, Invoicing, Accounts Payable, Accounts Receivable
Specific Industry: Plumbing
Source Language: Hibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 1
Date First Installed: 1982

COMPUTER INFORMATION ENTERPRISES
BICARSA
Additional Product Classification: Manufacturing
Specific Application: Inventory, Sale Analysis, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM: EDX
Memory Required: 22.0K bytes
Source Language: PX-F
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-24)

COMPUTER INFORMATION ENTERPRISES
CHURCH MEMBERSHIP AND FINANCIAL SYSTEM
Additional Product Classification: Data/File Management
Specific Application: Membership Management, Accounts Payable, Accounts Receivable
Specific Industry: Church
System Requirements: IBM: EDX
Memory Required: 22.0K bytes
Source Language: PX-F
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: September 1982

COMPUTER INFORMATION ENTERPRISES
GIAPPAR
Additional Product Classification: Payroll/Personnel
Specific Application: Payroll, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM: EDX
Memory Required: 22.0K bytes
Source Language: PX-F
Source Code Available: Yes
Purchase Terms: Purchase (license)

COMPUTER INFORMATION ENTERPRISES
MOTOR VEHICLE DEALER SYSTEM
Additional Product Classification: Payroll/Personnel, Data/File Management
Specific Application: Support Sales, Inventory, Repair Order, Factory Warantee, Financials
Specific Industry: Motor Vehicle Dealers
System Requirements: IBM: EDX
Memory Required: 22.0K bytes
Source Language: PX-F
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1980

COMPUTER INFORMATION SYSTEM CO., INC.
ACCOUNTING
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Payroll
System Requirements: DEC 34; DEC PDP-11/23· RSTS/E: DEC 44; DEC 70
Memory Required: 256.0K bytes
Source Language: Basic Plus II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $10,000 to $86,000
Date First Installed: 1976
(See Vendor Profile Page V-24)

COMPUTER INFORMATION SYSTEMS
ACCOUNTS PAYABLE SYSTEM
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 512.0K bytes
Source Language: VAX Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000 to $15,000
Date First Installed: 1981

COMPUTER INFORMATION SYSTEMS
MERCHANDISE MANAGEMENT SYSTEM
Additional Product Classification: Manufacturing
Specific Application: Merchandise Management
Specific Industry: Not Industry Sensitive, Manufacturing, Wholesale/Distribution, Retail
System Requirements: DEC VAX: VMS
Memory Required: 512.0K bytes
Source Language: VAX Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30,000 to $100,000
Date First Installed: 1982

COMPUTERISTICS, INC.
INTERACTIVE A/R AND CREDIT MANAGEMENT SYSTEM
Specific Application: Accounts Receivable and Credit Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS-DOS, IBM 4030 Series: Idms, Cics, IBM 3000 Series: MVS, IMS
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $85,000 to $125,000
Number Installed to Date: 100
Date First Installed: 1975
(See Vendor Profile Page V-24)

COMPUTERIZED LODGING, INC.
COMPU SYSTEM II
Specific Application: Front and Back Office Accounting, Registration, Billing, Reservations
System Requirements: Basic Four; Series I; TI
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 130
Date First Installed: 1979
(See Vendor Profile Page V-24)

COMPUTERIZED PLANNING SYSTEM, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Basic Four; BBM
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 10
Date First Installed: 1983
(See Vendor Profile Page V-24)

COMPUTERIZED PLANNING SYSTEM, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Basic Four; BBM
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 10
Date First Installed: 1983

COMPUTERIZED PLANNING SYSTEM, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Basic Four; BBM
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 10
Date First Installed: 1983

COMPUTER MANAGEMENT CORP.
GENERAL LEDGER - CMC
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300· DOS/VS, DOS/VSE
Source Language: Cobol Structure
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500

Date First Installed: January 1974
(See Vendor Profile Page V-25)

COMPUTER MANAGEMENT SERVICES, INC.
ASSESSMENT AND TAXATION
Specific Application: Assessment and Taxation
Specific Industry: Government
System Requirements: Pick
Source Language: Basic
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 16
Date First Installed: 1977
(See Vendor Profile Page V-25)

COMPUTER MANAGEMENT SERVICES, INC.
FIS
Additional Product Classification: Payroll/Personnel
Specific Application: Comprehensive Financial Package for Government
Specific Industry: Government
System Requirements: Pick
Source Language: Basic
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 18
Date First Installed: 1977

COMPUTER MANAGEMENT SERVICES, INC.
POLICE MANAGEMENT
Additional Product Classification: Police Management
Specific Application: Comprehensive System for Police Management
Specific Industry: Government
System Requirements: Pick
Source Language: Basic
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 16
Date First Installed: 1977

COMPUTER MANAGEMENT SERVICES, INC.
PRISM-OPTICAL LABORATORY
Additional Product Classification: Payroll/Personnel, Optical Laboratory
Specific Application: Optical Lab Package
Specific Industry: Medical, Optical Industry
System Requirements: HP 2000
Source Language: Fortran
Purchase Terms: Lease
Number Installed to Date: 25
Date First Installed: 1974

COMPUTER MANAGEMENT SERVICES, INC.
THESIS-HIGHER EDUCATION
Additional Product Classification: Payroll/Personnel, Higher Education
Specific Application: Comprehensive System for Higher Education
Specific Industry: Education
System Requirements: Prime: Primos
Source Language: Cobol
Purchase Terms: Lease
Number Installed to Date: 3
Date First Installed: 1978

COMPUTER MANAGEMENT SERVICES, INC.
UTILITY BILLING
Specific Application: Comprehensive Utility Billing System
Specific Industry: Government
System Requirements: Pick
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 16
Date First Installed: 1977

COMPUTER MANAGEMENT, INC.
TRANSACTION SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Country Club Acounting System; Accounts Payable, General Ledger, Accounts Receivable, Payroll, WP, Inventory
Specific Industry: Country Club
System Requirements: : TI 300 Series: DX-10, IBM PC-XT PC-DOS
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 5
Date First Installed: 1982
(See Vendor Profile Page V-25)

COMPUTER METHODS, INC.
CMI PROFIT
Additional Product Classification: Manufacturing
Specific Application: Integrated Manufacturing Control, Costing and Planning System
Specific Industry: Manufacturing
System Requirements: Unix, Boss
Source Language: SMC Basic
Purchase Terms: Purchase (licende)
Price: $5,000 to $60,000
Number Installed to Date: 500
Date First Installed: 1975
(See Vendor Profile Page V-25)

COMPUTER POWER
RESIDENTIAL LOAN INVENTORY CONTROL
Additional Product Classification: Banking
Specific Application: Loan Production, Inventory Control, Marketing and Warehousing
Specific Industry: Banking/Financial, Mortgage Originator
System Requirements: IBM 370, 3030, 4331· DOS/VSE, OS/VS1
Memory Required: 1 0M bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Lease; Purchase (license)
Number Installed to Date: 54
Date First Installed: September 1978
(See Vendor Profile Page V-25)

COMPUTER RESOURCES & TECHNOLOGY, INC.
SCHOOL FUND ACCOUNTING AND PAYROLL
Additional Product Classification: Payroll/Personnel
Specific Application: Fund Accounting, Budgeting, Payroll
Specific Industry: Education
System Requirements: IBM System/36, IBM System/34
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $17,500
Number Installed to Date: 15
Date First Installed: June 1981
(See Vendor Profile Page V-25)

COMPUTER RESOURCES CORP.
FINANCIAL INFORMATION PROCESSING SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll, Project Cost
Specific Industry: Construction, Nonprofit Organizations
System Requirements: DEC PDP-11/23, 11/24, 11/44· RSTS/E
Memory Required: 128.0K bytes
Source Language: Basic Plus
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: 1972
(See Vendor Profile Page V-25)

COMPUTER RESOURCES CORP.
FIXED ASSETS ACCOUNTING & DEPRECIATION
Specific Application: Fixed Assets Accounting and Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/23, 11/24, 11/44. RSTS/E
Memory Required: 128.0K bytes
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,250

COMPUTER RESOURCES INTERNATIONAL
DISTRIBUTION MANAGEMENT SYSTEM I
Additional Product Classification: Manufacturing
Specific Application: On-Line Order Entry, Accounts Receivable, Sales, Inventory Control, Purchasing
Specific Industry: Wholesale Distribution, Retail
System Requirements: Honeywell DPS 6 Geos
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 13
Date First Installed: April 1982
(See Vendor Profile Page V-25)

COMPUTERS & BUSINESS SYSTEMS, INC.
FOOD BROKERAGE SYSTEM
Specific Application: Automated Handing of TWX
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse: AOS, AOS/VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 1
Date First Installed: January 1982
(See Vendor Profile Page V-25)

COMPUTERS & BUSINESS SYSTEMS, INC.
FORMS MANUFACTURING INVOICING SYSTEM
Additional Product Classification: Manufacturing
Specific Application: Job Control and Billing
Specific Industry: Not Industry Sensitive
System Requirements: Data General Eclipse: AOS, AOS/VS
Memory Required: 256 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: August 1982

COMPUTERS & BUSINESS SYSTEMS, INC.
JOINT INTEREST ACCOUNT SYSTEM FOR OIL
Specific Application: Base and Well Cost Control With Allocation of Cost, Billing and Tracking
Specific Industry: Oil
System Requirements: Data General Eclipse: AOS, AOS/VS
Memory Required: 256 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: June 1981

COMPUTERS & BUSINESS SYSTEMS, INC.
WHOLESALE LUMBER INVOICING AND INVENTORY
Specific Application: Job Control and Billing
Specific Industry: Wholesale/Distribution, Lumber
System Requirements: Data General Eclipse: AOS, AOS/VS
Memory Required: 256 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1983

COMPUTER SERVICE CO.
ACCOUNTANTS CLIENT WRITE-UP
Specific Application: Client Write-Up, Annual Report Generator
Specific Industry: Bookkeeping
System Requirements: Wang 2200
Memory Required: 32 0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 75
(See Vendor Profile Page V-26)

COMPUTER SERVICE CONSULTANTS
PAYROLL
Specific Application: General or Specific Payroll Applications
Specific Industry: Not Industry Sensitive
System Requirements: Prime 300; Prime 400: Primos; Prime 550, Prime 750
Memory Required: 64 0K bytes
Source Language: Fortran IV
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 1
Date First Installed: 1977
(See Vendor Profile Page V-26)

COMPUTER SHARING CORP. SERVICES
LAW OFFICE AUTOMATION
Specific Application: Business and Professional Accounting

Specific Industry: Legal
System Requirements: TI 300: DX-10; TI 600 DX-10; TI 800 DX-10
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $1,500 to $9,000
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-26)

COMPUTER SOFTWARE CONSULTANTS, INC.
TOTAL APPLICATION FOR [illegible]
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Payroll, Purchasing, Inventory, Order Entry
Specific Industry: Wholesale/Distribution, Retail
System Requirements: DEC PDP-11 Series: RSTS/E; DEC VAX: VMS
Memory Required: 2.5M bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 6
Date First Installed: November 1981
(See Vendor Profile Page V-26)

COMPUTER SOFTWARE FOR PROFESSIONALS, INC.
LEGALMASTER
Additional Product Classification: Calendar
Specific Application: Time Accounting, Billing, Accounts Receivable, Calendaring, Retainer Disbursement Accounting
Specific Industry: Legal
System Requirements: IBM System/23; IBM Displaywriter; IBM [illegible] IBM 5120
Memory Required: 32.0K bytes
Source Language: Basic Datamaster
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 800
Date First Installed: August 1978
(See Vendor Profile Page V-26)

COMPUTER SOLUTIONS, INC.
MICRO FLOWER
Specific Application: Receivable Sales Analysis, Wire Service Reporting
Specific Industry: Flora
System Requirements: MP/M, MS-DOS, CP/M, Unix
Memory Required: 32.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,995
Number Installed to Date: 112
Date First Installed: 1976
(See Vendor Profile Page V-26)

COMPUTER SOLUTIONS, INC.
SMARTS
Additional Product Classification: Payroll/Personnel
Specific Application: Encumbrance Accounting, Personnel Records, Attendance
Specific Industry: Education
System Requirements: HP
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $9,500
Number Installed to Date: 60
Date First Installed: July 1981

COMPUTER SOLUTIONS, INC.
VMRS PARTS INVENTORY CONTROL
Specific Application: Inventory Control
System Requirements: NEC Astra: Itos
Memory Required: 384.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 1
Date First Installed: January 1983

COMPUTER SOLUTIONS, INC.
WHOLESALE FABRIC DISTRIBUTION RECEIVABLE
Specific Application: Shipping, Purchase Order, General Ledger
Specific Industry: Wholesale/Distribution
System Requirements: NEC Astra: Itos
Memory Required: 384.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,500
Number Installed to Date: 1
Date First Installed: June 1981

COMPUTER SYSTEMS ASSOCIATES, INC.
BILLING
Specific Application: Billing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 65
Date First Installed: 1980
(See Vendor Profile Page V-27)

COMPUTER SYSTEMS DYNAMICS
AUTO PARTS DISTRIBUTION SYSTEM
Specific Application: Inventory Control, Order Processing, Accounts Payable, Accounts Receivable, General Ledger, Payroll, Purchasing
Specific Industry: Auto Parts
System Requirements: Point Four Mark 3, Mark 5: Iris, Computer Systems Dynamics: Iris
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $25,000
Number Installed to Date: 80
Date First Installed: 1978
(See Vendor Profile Page V-27)

COMPUTER SYSTEMS DYNAMICS
LUMBER & BUILDING MATERIALS MANAGEMENT SYSTEM
Specific Application: Accounts Payable and Receivable, General Ledger, Inventory Control, Order Processing, Payroll, Purchasing
Specific Industry: Wholesale/Distribution, Retail, Lumber and Building
System Requirements: Point Four Mark 3, Mark 5: Iris; Computer Systems Dynamics Vista: Iris
Memory Required: 64.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $35,000
Number Installed to Date: 60
Date First Installed: February 1975

COMPUTER SYSTEMS DYNAMICS
WHOLESALE/RETAIL DISTRIBUTION SYSTEM
Additional Product Classification: Payroll/Personnel, Distribution
Specific Application: Inventory Control, Order Entry Invoicing, Purchasing, Sales Analysis, Accounts Receivable And Payable, Payroll, General Ledger
System Requirements: Point Four Mark 3, Mark 5: Iris Computer System Dynamics: Iris
Memory Required: 64.0K bytes
Source Language: Extended
Source Code Available: Yes
Purchase Terms: Purchase (license), Lease
Price: $42,000
Number Installed to Date: 80
Date First Installed: 1980

COMPUTER SYSTEMS SUPPORT CORP.
BY TICKET INVENTORY MERCHANDISING (BTIMS)
Specific Application: Control Order Entry, Inventory, Delivery of Big Ticket Merchandise
Specific Industry: Retail
System Requirements: DG: R-DOS
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50,000
Number Installed to Date: 1
Date First Installed: November 1982
(See Vendor Profile Page V-27)

COMPUTER SYSTEMS TECHNOLOGY, INC.
FINANCIAL FUND ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Payroll, Accounts Payable
Specific Industry: Government
System Requirements: DG: R-DOS, AOS
Memory Required: 128.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1976
(See Vendor Profile Page V-27)

COMPUTER SYSTEMS TECHNOLOGY, INC.
REAL ESTATE PROCESSING
Specific Application: Tax Roll, Billing and Collection, Residential Tax Assessment
Specific Industry: Real Estate, Government
System Requirements: DG: R-DOS, AOS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1976

COMPUTER SYSTEMS-TECHNOLOGY, INC.
UTILITY BILLING
Specific Application: Utility Billing
Specific Industry: Government
System Requirements: DG: R-DOS; AOS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1980

COMPUTER TEXTS, INC.
USER HOSTED DIRECTORY (USHER-V)
Additional Product Classification: Payroll/Personnel, WP/Text Editing
Specific Application: General Ledger, Financial Statements, Accounts Payable and Accounts Receivable
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Medical, Legal, Construction
System Requirements: IBM System/38 CPF
Memory Required: 1.0M bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $24,600
Number Installed to Date: 1
Date First Installed: January 1983
(See Vendor Profile Page V-28)

COMPUTER TIME SHARE GOVERNMENTAL ACCOUNTING
Specific Application: Accounting
Specific Industry: Government
System Requirements: DG: Iris; Microtec: Iris, Bits
Memory Required: 64.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 3
Date First Installed: March 1981
(See Vendor Profile Page V-28)

COMPUTER TIME SHARE MEMBERSHIP ACCOUNTING
Specific Application: Membership and Association Tracking System
Specific Industry: Not Industry Sensitive
System Requirements: DG: Iris; Microtec: AOS, Bits
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,600
Number Installed to Date: 20
Date First Installed: January 1982

COMPUTER TIME SHARE PROFESSIONAL TIME AND BILLING
Specific Application: Profession Time Accounting
Specific Industry: Engineering, Legal, Insurance
System Requirements: DG: Iris; Microtec: Iris, Bits
Memory Required: 64.0K bytes

Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,800
Number Installed to Date: 15
Date First Installed: November 1981

COMPUTING RESOURCES, INC.
AUTOMATED BILLING & COLLECTION
Specific Application: Billing and Collection
Specific Industry: Banking/Financial
System Requirements: IBM 4300 OS/VS1
Memory Required: 300.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Date First Installed: 1980
(See Vendor Profile Page V-28)

COMPUTRON TECHNOLOGIES CORP.
CAS/IV ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: VS/OS; DEC VAX: VMS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $17,500
Number Installed to Date: 35
Date First Installed: November 1979
(See Vendor Profile Page V-28)

COMPUTRON TECHNOLOGIES CORP.
CAS/IV FINANCIAL MANAGEMENT SYSTEM
Specific Application: Integrated General Accounting Systems
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: VS/OS, DEC VAX: VMS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 100
Date First Installed: December 1979

COMPUTRON TECHNOLOGIES CORP.
CAS/IV GENERAL LEDGER
Specific Application: General Ledger and Financial Reporting System
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: VS/OS, DEC VAX: VMS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Number Installed to Date: 40
Date First Installed: December 1979

COMPUTRON TECHNOLOGIES CORP.
CAS/IV PURCHASE ORDERS/INVENTORY
Specific Application: Purchasing, Management and Control System
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: VS/OS; DEC VAX: VMS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $17,500
Number Installed to Date: 5
Date First Installed: November 1982

COMPUTRON TECHNOLOGIES CORP.
CAS IV/FIXED ASSETS
Specific Application: Fixed Assets Accounting and Management System
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: VS/OS; DEC VAX: VMS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: December 1982

CONTECTRA SYSTEMS, INC.
ACCOUNT PAYABLE SYSTEM
Specific Application: Accounts Payable, On-Line Storage of Invoices and Checks, Automatic Payment of Recurring Bills
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series I; Evolution; Data Media
Source Language: Basic
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-29)

CONTECTRA SYSTEMS, INC.
ASSET LIABILITY HEDGE
Specific Application: Locked-in Rate for Asset or Identity Hedge, Transactions
Specific Industry: Banking/Financial
System Requirements: Burroughs B7500; IBM; Data Media
Source Language: OL1, Fortran, PL1, Cobol
Purchase Terms: Purchase (license)

CONTECTRA SYSTEMS, INC.
CONSTRUCTION LOAN CONTROL
Specific Application: Detail Billing, Customer Control, Prepares Checks
Specific Industry: Banking/Financial
System Requirements: IBM Series I; Evolution; Data Media
Source Language: Basic
Purchase Terms: Purchase (license)

CONTECTRA SYSTEMS, INC.
GENERAL LEDGER SYSTEM
Specific Application: General Ledger, Accounts Payable System
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series I; Data Media, Evolution
Source Language: Basic
Purchase Terms: Purchase (license)

CONCEPTIONS UNLIMITED
FINANCIAL MANAGEMENT
Specific Application: Financial
Specific Industry: Publishers
System Requirements: Wang 2200; Wang VS
Memory Required: 32.0K bytes
Source Language: Basic, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $5,000
Number Installed to Date: 8
Date First Installed: November 1981
(See Vendor Profile Page V-29)

CONCEPTS IN SOFTWARE, INC.
ATTORNEY AND ACCOUNTANT TIME ACCOUNTING
Specific Application: Time Accounting and Billing System
Specific Industry: Legal, Accounting
System Requirements: Point Four; Iris
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-29)

CONCEPTS IN SOFTWARE, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Point Four; Iris
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 1
Date First Installed: 1982

CONCORD COMPUTING
CHECK WATCHER
Specific Application: On-Line Check Authorization System
Specific Industry: Retail
System Requirements: Tandem: Guardian
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $120,000
Number Installed to Date: 3
Date First Installed: October 1982
(See Vendor Profile Page V-29)

CONESTOGA DATA SERVICES, INC.
CARPET RETAIL
Specific Application: Inventory Control, POS
Specific Industry: Retail
System Requirements: IBM System/34: DOS; IBM System/36: DOS; IBM System/38: DOS
Memory Required: 48.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-29)

CONESTOGA DATA SERVICES, INC.
GAS/OIL WELL MANAGEMENT SYSTEM
Specific Application: POS, General Ledger
Specific Industry: Gasoline, Petroleum
System Requirements: IBM System/34: DOS, IBM System/36: DOS; IBM System/38: DOS
Memory Required: 48.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 3
Date First Installed: 1981

CONESTOGA DATA SERVICES, INC.
GENERAL LEDGER
Specific Application: POS, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: DOS, IBM System/36: DOS; IBM System/38: DOS
Memory Required: 48.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 3
Date First Installed: 1981

CONESTOGA DATA SERVICES, INC.
SPORTING GOODS/CLOTHING STORE
Specific Application: POS, General Ledger
Specific Industry: Retail
System Requirements: IBM System/34: DOS, IBM System/36: DOS; IBM/System 38: DOS
Memory Required: 48.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000
Number Installed to Date: 3
Date First Installed: 1981

CONESTOGA DATA SERVICES, INC.
STANDARD ACCOUNTING
Specific Application: Accounts Receivable, Accounts Payable
Specific Industry: Accounting
System Requirements: IBM System/34: DOS, IBM System/36: DOS; IBM System/38: DOS
Memory Required: 48.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 3
Date First Installed: 1981

CONRAC SYSTEM COMPONENTS
THE FOX
Specific Application: Account Management and Least Cost Router for Telephone Charges
System Requirements: Casts
Memory Required: 256 0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $16,000
Date First Installed: October 1982
(See Vendor Profile Page V-29)

CONSOD ENTERPRISES
CONSOD ACCOUNTING INFORMATION SYSTEM
Specific Application: General Ledger, Financial Reports, Profitability Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370; IBM 4300
Source Language: Cobol

[redacted] Yes
Purchase Terms: Purchase (license)
Date First Installed: [redacted]
(See Vendor Profile Page V-29)

CONSCO ENTERPRISES
CONSCO CONSOLIDATION SYSTEM
Specific Application: General Ledger, Financial Reports, Profitability Analysis
Specific Industry: Not Industry [redacted]
System Requirements: IBM 370; IBM 4300
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: [redacted]
Date First Installed: 1972

CONSOLIDATED COMPUTER SERVICES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: [redacted]
Number Installed to Date: [redacted]
Date First Installed: 1975
(See Vendor Profile Page V-29)

CONSOLIDATED COMPUTER SERVICES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Wholesale/Distribution
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 500
Date First Installed: 1975

CONSOLIDATED COMPUTER SERVICES, INC.
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: General Accounting, Accounts Payable, General Ledger, Payroll
Specific Industry: Not Industry Sensitive
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 450
Date First Installed: 1975

CONSOLIDATED COMPUTER SERVICES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 450
Date First Installed: September 1975

CONTINENTAL MANAGEMENT SERVICES, INC.
CASH DISBURSEMENT
Specific Application: Cash Disbursement
Specific Industry: Real Estate
System Requirements: IBM 360-50; DOS, IBM 370-138; DOS
Source Language: Cobol
Source Code Available: [redacted]
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-30)

CONTRACT SOFTWARE SERVICES
FIXED ASSET DEPRECIATION SYSTEM
Specific Application: Fixed Asset Accounting
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11; RT-11, RSTS/E, RSX-11
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995
Date First Installed: December 1981
(See Vendor Profile Page V-30)

CONTRACT SOFTWARE SERVICES
SALES LEAD SYSTEM
Specific Application: Tracks Customer Prospects
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11; RT-11, RSTS/E, RSX-11
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Date First Installed: December 1981

CONTRAX SYSTEMS, INC.
COMMERCIAL PROPERTY MANAGEMENT
Specific Application: Tenant Accounts Receivable
System Requirements: [redacted] 1; EDX
Memory Required: 64.0K bytes
Source Language: Dbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-30)

CONTRAX SYSTEMS, INC.
CONDOMINIUM PROPERTY MANAGEMENT
Specific Application: Tenant Accounts Receivable
System Requirements: IBM Series/ 1; EDX
Memory Required: 64.0K bytes
Source Language: Dbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: [redacted] to [redacted]

CONTRAX SYSTEMS, INC.
PROMPT BUSINESS SYSTEMS
Specific Application: General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/ 1; EDX
Memory Required: 64.0K bytes
Source Language: Dbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000

CONTRAX SYSTEMS, INC.
RENTAL PROPERTY MANAGEMENT
Specific Application: Tenant Accounts Receivable
System Requirements: IBM Series/ 1; EDX
Memory Required: 64.0K bytes
Source Language: Dbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000

CONTROL SYSTEMS, INC.
GENERAL ACCOUNTING
Specific Application: Inventory, Accounts Receivable, Accounts Payable, Payroll, General Ledger
Specific Industry: Not Industry [redacted]
System Requirements: Datapoint 1560; DOS; Datapoint 8600; RMS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: [redacted]
Date First Installed: 1981
(See Vendor Profile Page V-30)

CONTROL TRANSACTION CORP.
CTC PROVIDER SOFTWARE SYSTEM
Specific Application: Restaurant Control, POS, Inventory, Time and Attendance, Management Reports
Specific Industry: Restaurant
System Requirements: DG; CTC
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 600
Date First Installed: October 1975
(See Vendor Profile Page V-30)

CONTROL TRANSACTION CORP.
HOTEL ROOTS MANAGEMENT
Specific Application: Hotel Management
Specific Industry: Hotel
System Requirements: CTC 1000; CTC
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: June 1983

CONTROL TRANSACTION CORP.
TELEPHONE CALL ACCOUNTING
Specific Application: Hotel/Motel Front Desk Management
Specific Industry: [redacted]
System Requirements: CTC
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: June 1983.

COOPERS & LYBRAND
ACCOUNTS PAYABLE
Specific Application: Generalized Accounts Payable Audit Software Package
Specific Industry: Not Industry Sensitive
[redacted]
370; DOS/OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
(See Vendor Profile Page V-31)

COOPERS & LYBRAND
ACCOUNTS RECEIVABLE
Specific Application: Generalized [redacted] Package
Specific Industry: Not Industry Sensitive
[redacted]
370; System 34; DOS/OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000

COOPERS & LYBRAND
GENERAL LEDGER
Specific Application: General Ledger Audit Software
Specific Industry: Not Industry Sensitive
System Requirements: [redacted]
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000

COOPERS & LYBRAND
PAS-PORTFOLIO AUDITION SYSTEM
Specific Application: Assists the User With the Organizations Handling of Security Purchases and Sales, Capital Gains, Reported Income Collected
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370; DOS/OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000

COORDINATED SYSTEMS, INC.
VET
Additional Product Classification: WP/Text Editing
Specific Application: General Accounting, Reminder Cards, Sends [redacted]
Specific Industry: Medical, Credit [redacted]
System Requirements: Unix; CP/M; CP/M 86
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 1
Date First Installed: January 1983
(See Vendor Profile Page V-31)

CORE AND CODE
FINANCIAL MODELING SYSTEM
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: DEC System 10; Tops 10; DEC System 20; Tops 20
Memory Required: 100.0K bytes
Source Language: Fortran+, Macro
Source Code Available: No

Purchase Terms: Purchase (license); [illegible]
Price: $2,950
Number Installed to Date: 250
Date First Installed: 1972
(See Vendor Profile Page V-31)

CORPORATE COMPUTER SYSTEMS, INC.
REV 8302 G/L PLUS
Specific Application: General Ledger
Specific Industry: Banking/Financial
System Requirements: HP 1000
Memory Required: 40.0K bytes
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 10
Date First Installed: August 1982
(See Vendor Profile Page V-31)

CORPORATE SERVICES INTERNATIONAL
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: Includes Payroll, Accounts Receivable, Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: VM, IBM 370: VM
Memory Required: 1.0M bytes
Source Language: APL
Source Code Available: Yes
Purchase Terms: Purchase (license); [illegible]
Price: $10,000
Date First Installed: 1973
(See Vendor Profile Page V-31)

CORPORATE SERVICES INTERNATIONAL
MORSALES
Specific Application: Accounting Package for Life Insurance
Specific Industry: Insurance
System Requirements: IBM 4300: VM, IBM 370: VM
Memory Required: 1.0M bytes
Source Language: APL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $10,000
Date First Installed: 1970

CORPORATE SERVICES INTERNATIONAL
MULTI LEVEL MARKET PROGRAM
Specific Application: Comission Accounting for Multilevel Accounts
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: [illegible]
Memory Required: 1.0M bytes
Source Language: APL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $10,000
Date First Installed: 1980

CORPORATE SERVICES INTERNATIONAL
PENSION SYSTEM
Additional Product Classification: Pension Accounting
Specific Application: Accounting for Pensions and Pensions Users
System Requirements: IBM 4300: VM, IBM 370: VM
Memory Required: 1.0M bytes
Source Language: APL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $25,000
Date First Installed: 1970

CORRUGATED SERVICES CORP.
MCBA - ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS; Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,000
Number Installed to Date: 15
Date First Installed: April 1981
(See Vendor Profile Page V-31)

CORRUGATED SERVICES CORP.
MCBA - ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200; Wang VS
Memory Required: 32.0K bytes
Source Language: Basic, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,000
Date First Installed: April 1981

CORRUGATED SERVICES CORP.
MCBA - BILL OF MATERIALS
Specific Application: Bill of Materials
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS; Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,000
Number Installed to Date: 15

CORRUGATED SERVICES CORP.
MCBA - FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS; Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,000
Number Installed to Date: 15
Date First Installed: April 1981

CORRUGATED SERVICES CORP.
MCBA - GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200; Wang VS
Memory Required: 32.0K bytes
Source Language: Basic, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,000
Number Installed to Date: 15
Date First Installed: April 1981

CORRUGATED SERVICES CORP.
MCBA - ORDER PROCESSING
Specific Application: Order Processing
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS; Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,000
Number Installed to Date: 15
Date First Installed: April 1981

CORRUGATED SERVICES CORP.
MCBA - PURCHASE ORDER
Specific Application: Purchase Order
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS; Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,000
Number Installed to Date: 15
Date First Installed: April 1981

CORRUGATED SERVICES CORP.
SALES ANALYSIS
Specific Application: Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS; Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,000
Number Installed to Date: 15
Date First Installed: April 1981

CORSTAR BUSINESS COMPUTING
ACCOUNTING FOR VAX
Additional Product Classification: Payroll/Personnel, Inventory .
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Order Entry, Inventory, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 512.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 3
Date First Installed: 1982
(See Vendor Profile Page V-31)

CPS BUSINESS SYSTEMS, INC.
APPRAISAL DISTRICT
Specific Application: Tax Appraisal, Collection, Tax Billing, Utility Billing
Specific Industry: Government
System Requirements: TI
Memory Required: 356.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-31)

CPS BUSINESS SYSTEMS, INC.
OIL AND GAS SYSTEM II
Specific Application: Management Accounting for Oil and Gas Operators and Producers
System Requirements: TI
Memory Required: 356.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Number Installed to Date: 150
Date First Installed: 1976

CPSI
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: NCR 9050: Unix, Altos ACS 580: Xenix; Columbia MPC: CP/M 86, IBM-XT
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 40
Date First Installed: 1979
(See Vendor Profile Page V-31)

CPSI
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: NCR 9050: Unix; Altos ACS 580: Xenix; Columbia MPC: CP/M 86; IBM-XT
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 60
Date First Installed: 1979

CPSI
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Altos ACS 586, 68000: Imos, ZRS, Columbia MP/C: Unix, NCR 9050: Xenix; IBM XT: CP/M 86
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 30
Date First Installed: 1979

CREATIVE APPLICATIONS, INC.
GENERAL ACCOUNTING
Specific Application: General

Accounting, Cost Accounting and Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS; IBM 5120; TI Business System. APL
Source Language: APL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $15,000
Number Installed to Date: 15
Date First Installed: 1981
(See Vendor Profile Page V-31)

CREATIVE COMPUTER SOLUTIONS
SHARP
Specific Application: Accounting Package for Housing Authority
Specific Industry: Housing
System Requirements: Microdata: PICK
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1979
(See Vendor Profile Page V-32)

CREATIVE COMPUTER SOLUTIONS
TEMP
Specific Application: Package for Immediate Payroll, Invoicing for Temporary Personnel
Specific Industry: Temporary Employment
System Requirements: Microdata: PICK
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 2
Date First Installed: 1981

CREATIVE DATA SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 30
Date First Installed: June 1979
(See Vendor Profile Page V-32)

CREATIVE DATA SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Wholesale/Distribution
System Requirements: Wang VS: VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: 1979

CREATIVE DATA SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable for the Distributor
Specific Industry: Wholesale/Distribution
System Requirements: Wang VS: VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: 1979

CREATIVE DATA SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM System/36; IBM System/38
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 30
Date First Installed: June 1979

CREATIVE DATA SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Wholesale/Distribution
System Requirements: Wang VS: VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: 1979

CREATIVE DATA SYSTEMS, INC.
PURCHASE ORDER MANAGEMENT
Specific Application: Purchase Order Package for Distributors
Specific Industry: Wholesale/Distribution
System Requirements: Wang VS: VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: 1979

CREATIVE DATA SYSTEMS, INC.
SYSTEM FOR DISTRIBUTION
Additional Product Classification: Manufacturing
Specific Application: Accounting, Inventory, Purchasing
Specific Industry: Wholesale/Distribution
System Requirements: Wang VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 40
Date First Installed: 1979

CREATIVE SOFTWARE DEVELOPMENT, INC.
BEVERAGE MANAGEMENT SYSTEM
Specific Application: Route Accounting for Each Truck, Full Sales Reporting Capability and Tax Reports
Specific Industry: Beverage Industry
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,000
Number Installed to Date: 25
Date First Installed: March 1981
(See Vendor Profile Page V-32)

CREATIVE SOFTWARE, INC.
CSI ACCOUNTS PAYABLE (CSIAP)
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RSX
Memory Required: 256.0K bytes
Source Language: Fortran, Macro II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 2
Date First Installed: March 1983
(See Vendor Profile Page V-32)

CREATIVE SOFTWARE, INC.
CSI BUSINESS SYSTEM (CSIBS)
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive, Nonprofit Organizations
System Requirements: DEC PDP-11 RSX
Memory Required: 256.0K bytes
Source Language: Fortran, Macro II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 2
Date First Installed: March 1983

CREATIVE SOFTWARE, INC.
CSI GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RSX
Memory Required: 256.0K bytes
Source Language: Fortran, Macro II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 2
Date First Installed: March 1983

CRESSBILL SYSTEMS, LTD.
THE CRESSBILLER
Additional Product Classification: DBMS, Sort/Merge, Report Generator, Data/File Management
Specific Application: Billing and Account Maintenance
Specific Industry: Retail, Retail Florist
System Requirements: TRS: TRS-DOS
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: April 1981
(See Vendor Profile Page V-32)

CROWN SOFTWARE SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Multicompany Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1978
(See Vendor Profile Page V-32)

CROWN SOFTWARE SYSTEMS, INC.
GENERAL LEDGER
Specific Application: Multicompany General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1978

CRS WEST, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, SSP, IBM System/36; IBM System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: 1979
(See Vendor Profile Page V-32)

CRS WEST, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM System/36, IBM System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: 1979

CRS WEST, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM System/36, IBM System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: 1979

CSA COMPUTERS FOR BUSINESS
LEGA
Specific Application: Time and Accounting for Law Firms
Specific Industry: Legal
System Requirements: DEC Decmate RSTS/E, DEC VAX-VAX/VMS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000

Number Installed to Date: 500
Date First Installed: June 1979
(See Vendor Profile Page V-32)

CSA/CRT
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Point Four: Iris
Memory Required: 64.0K bytes
Source Language: Iris, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,850
Date First Installed: 1978
(See Vendor Profile Page V-32)

CSA/CRT
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Point Four: Iris
Memory Required: 64.0K bytes
Source Language: Iris, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,850
Date First Installed: 1978

CSA/CRT
GENERAL ACCOUNTING
Specific Application: Order Processing, Inventory Control, Accounts Receivable, Accounts Payable, General Ledger, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Point Four: Iris
Memory Required: 64.0K bytes
Source Language: Iris, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,500
Number Installed to Date: 100
Date First Installed: 1978

CSA/CRT
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Point Four: Iris
Memory Required: 64.0K bytes
Source Language: Iris, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,850
Date First Installed: 1978

CSA/CRT
POINT OF SALE GENERAL ACCOUNTING SYSTEM
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Payroll, Order Processing, Inventory Control And Purchase Order Processing
Specific Industry: Retail
System Requirements: Point Four: Iris
Memory Required: 64.0K bytes
Source Language: Iris, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Date First Installed: 1983

CBC BUSINESS SYSTEMS, INC.
WORKHORSE GENERAL ACCOUNTING PACKAGE
Specific Application: Inventory, Order Entry, General Ledger, Accounts Payable, Accounts Receivable, Payroll
Specific Industry: Wholesale/Distribution, Retail
System Requirements: Pertec 2000 MTX, Pertec 3000 MTX, Microfire 1000 SMC
Memory Required: 256.0K bytes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 30
Date First Installed: August 1979
(See Vendor Profile Page V-32)

CTI LTD., INC.
ACCOUNTS PAYABLE FOR THE S/34
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM CPF
Memory Required: 512.0K bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Date First Installed: September 1981
(See Vendor Profile Page V-32)

CTI LTD., INC.
ACCOUNTS RECEIVABLE FOR THE S/34
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM CPF
Memory Required: 512.0K bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: September 1981

CTI LTD., INC.
ACTION S/38 ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPF
Memory Required: 512.0K bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 12
Date First Installed: June 1982

CTI LTD., INC.
ACTION S/38 FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPF
Memory Required: 512.0K bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 8
Date First Installed: June 1982

CTI LTD., INC.
ACTION S/38 GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPF
Memory Required: 512.0K bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 10
Date First Installed: June 1982

CTI LTD., INC.
FIXED ASSETS FOR S/34 REPORTS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: IBM CPF
Memory Required: 512.0K bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: 1981

CTI LTD., INC.
FLOATING PRIME INTEREST RATE SYSTEM
Specific Application: Prime Interest Monitoring
Specific Industry: Not Industry Sensitive
System Requirements: IBM CPF
Memory Required: 512.0K bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1981

CTI LTD., INC.
G/L FOR S/34 REPORTS & SYSTEM CAPABILITIES
Specific Application: General Ledger
Specific Industry: Construction
System Requirements: IBM CPF
Memory Required: 512.0K bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Date First Installed: 1981

CTI LTD., INC.
JOB COST FOR S/34 REPORTS & SYSTEM CAPABILITIES
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CPF
Memory Required: 512.0K bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Date First Installed: 1981

CTI LTD., INC.
JOB COST CONTROL FOR S/34 REPORTS
Specific Application: Job Costing
Specific Industry: Construction
System Requirements: IBM: CP/M 2.2, CP/M 86, PC-DOS
Memory Required: 64.0K bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Date First Installed: 1982

CTI LTD., INC.
PAYROLL FOR S/34 REPORTS & SYSTEM CAPABILITY
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM CPF
Memory Required: 512.0K bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Date First Installed: 1981

CTI LTD., INC.
RETAINAGE FOR S/34 REPORTS & CAPABILITIES
Specific Application: Retain Reports
Specific Industry: Not Industry Sensitive
System Requirements: IBM CPF
Memory Required: 512.0K bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1982

C/U BUSINESS COMPUTERS
FIAS
Specific Application: Payroll, General Ledger, Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 40.0K bytes
Source Language: Basic, Assembler
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 4
Date First Installed: January 1983
(See Vendor Profile Page V-33)

C/U BUSINESS COMPUTERS
INV
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 40.0K bytes
Source Language: Basic, Assembler
Purchase Terms: Purchase (license)
Price: $1,100
Number Installed to Date: 3
Date First Installed: January 1983

C/U BUSINESS COMPUTERS
PO
Specific Application: Tracking Vendor Purchases
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 40.0K bytes
Source Language: Basic, Assembler
Source Code Available: $2,000
Purchase Terms: Purchase (license)
Price: $650

CULLINET SOFTWARE, INC.
CULLINET FINANCIAL SYSTEM/GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Banking/Financial
System Requirements: IBM 370, 3000, 4300 Series
Source Language: ADS-Online, Cuprnt
Source Code Available: Yes
Purchase Terms: Rental

Price: $100,000
Number Installed to Date: 19
Date First Installed: 1982
(See Vendor Profile Page V-33)

CALVERAS CORP.
RPS-PLUS
Specific Application: Match and Balance Payment Receipts
Specific Industry: Not Industry Sensitive
System Requirements: NCR 8200: Imos
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $8,500
Date First Installed: 1977
(See Vendor Profile Page V-33)

CABS FORMATION, INC.
CABS-CUSTOMATION ACCOUNTING & BOOKKEEPING SYSTEM
Specific Application: Accounts Payable and Receivable, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS, RMS
Memory Required: 64.0K bytes
Source Language: Databus, Datashare
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,500
Number Installed to Date: 60
Date First Installed: 1974
(See Vendor Profile Page V-33)

CUSTOM BUSINESS SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200: VP/MVP
Memory Required: 32.0K bytes
Source Language: Wang Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 150
Date First Installed: 1979
(See Vendor Profile Page V-33)

CUSTOM BUSINESS SYSTEMS, INC.
BROADCAST BUSINESS COMPUTER SYSTEM
Additional Product Classification: Broadcasting
Specific Application: Traffic Billing, Accounting, Office Management
Specific Industry: Radio Broadcasting
System Requirements: Wang 2200: VP/MVP
Memory Required: 32.0K bytes
Source Language: Wang Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 150
Date First Installed: 1979

CUSTOM BUSINESS SYSTEMS, INC.
GENERAL LEDGER/ACCOUNTS PAYABLE
Specific Application: General Ledger, Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200: WP/MVP
Memory Required: 32.0K bytes
Source Language: Wang Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 90
Date First Installed: 1980

CUSTOM COMPUTER SERVICE, INC.
CCS LAW BILL
Specific Application: Billing, Accounts Receivable, and Full Fee Credit Allocation
Specific Industry: Legal
System Requirements: Wang VS: VS
Memory Required: 512.0K bytes
Source Language: RPG-II
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-33)

CUSTOM COMPUTING, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS, RMS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $695 to $1,950
Number Installed to Date: 200
Date First Installed: 1976
(See Vendor Profile Page V-33)

CUSTOM COMPUTING, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS, RMS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $695 to $1,950
Number Installed to Date: 200
Date First Installed: 1976

CUSTOM COMPUTING, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS, RMS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $695 to $1,950
Number Installed to Date: 200
Date First Installed: 1976

CUSTOMIZED ACCOUNTING SYSTEMS
DISTRIBUTION APPLICATION SYSTEM PACKAGE
Specific Application: Order Entry, Inventory, Invoicing, Accounts Receivable and Payable, Sales Analysis, Purchase Orders, General Ledger
Specific Industry: Wholesale/Distribution
System Requirements: Burroughs B1000 Series MCP
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $24,000
Number Installed to Date: 2
Date First Installed: January 1983
(See Vendor Profile Page V-33)

CUSTOMIZED INFORMATION SYSTEMS
PROJECT COSTS
Specific Application: Project Cost
Specific Industry: Not Industry Sensitive
System Requirements: Univac 1100: OS 1100
Memory Required: 24.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: September 1981
(See Vendor Profile Page V-33)

CUSTOM MANAGEMENT SYSTEMS, INC.
CMS LEGAL MANAGEMENT SYSTEM
Specific Application: Billing, Accounting, Reporting, Dockets, Copier/Telephone Interface
Specific Industry: Legal
System Requirements: DG: R-DOS
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-33)

CUSTOMS SYSTEMS DEVELOPMENT, INC.
INVENTORY
Special Applications: Inventory Control, Order Entry
Specific Industry: Import/Export Distribution
System Requirements: Bytronix: Bits
Memory Required: 128.0K bytes
System Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $11,000
Number Installed to Date: 2
Date First Installed: December 1982
(See Vendor Profile Page V-33)

CUTLER-WILLIAMS, INC.
BOSS (BACK OFFICE SUPPORT SYSTEM)
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Receivable and Payable, Payroll, Daily Reporting, Income Journal
System Requirements: IBM System/38, IBM System/34
Memory Required: 128.0K bytes
Source Language: RPG-III, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: November 1979
(See Vendor Profile Page V-33)

CUTLER-WILLIAMS, INC.
MONEY AUTHORIZATION SYSTEM (MAS)
Specific Application: Monitor and Control Dollars for Lease Acquisition
System Requirements: IBM 4300: OS
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $50,000
Number Installed to Date: 1
Date First Installed: November 1982
(See Vendor Profile Page V-33)

C X SYSTEMS
MINI OPTIMATIC
Specific Application: Appraising and Billing
Specific Industry: Photofinishing
System Requirements: IBM Decmate
Memory Required: 16.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-33)

C X SYSTEMS
MINI-MICRO OPTIMATIC
Specific Application: Appraising and Billing
Specific Industry: Photofinishing
System Requirements: Decmate
Memory Required: 16.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000
Date First Installed: 1983

C X SYSTEMS
OPTIMATIC 38
Specific Application: Appraising and Billing
Specific Industry: Photofinishing
System Requirements: DEC PDP
Memory Required: 8.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 100
Date First Installed: 1978

CYBER DATA
FRWACT
Specific Application: Billing, Accounts Receivable and Payable, General Ledger, Currency Controls
Specific Industry: Freight, Custom House
System Requirements: IBM System/34: SSP, IBM System/36, IBM System/38; Wang VS 100
Memory Required: 96.0K bytes
Source Language: RPG-II, RPG-III
Purchase Terms: Purchase (license)
Price: $70,000
Number Installed to Date: 40
Date First Installed: June 1981
(See Vendor Profile Page V-34)

DACAR SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP, IBM System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 3
Date First Installed: 1982
(See Vendor Profile Page V-34)

DAGAR SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34; SSP, IBM System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 4
Date First Installed: 1982

DALY & WOLCOTT, INC.
ACCOUNT RECEIVABLE HISTORY
Specific Application: Credit and Collections
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM System/34, System/36, System/38
Memory Required: 180 0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 370
Date First Installed: June 1981
(See Vendor Profile Page V-34)

DALY & WOLCOTT, INC.
ACCOUNTS PAYABLE HISTORY
Additional Product Classification: Manufacturing
Specific Application: Accounts Payable
Specific Industry: Manufacturing, Wholesale Distribution, Retail
System Requirements: IBM System/34, System/36, System/38
Memory Required: 150.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 110
Date First Installed: September 1981

DALY & WOLCOTT, INC.
MULTICOMPANY SUPPORT FOR DMAS I
Specific Application: Allows Multicompany Support for IBM Dmas II
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/34
Memory Required: 40.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Price: $750
Number Installed to Date: 6
Date First Installed: September 1981

DALY & WOLCOTT, INC.
PURCHASING SYSTEM FOR DMAS I
Specific Application: Purchasing
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/34
Memory Required: 375.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $900
Number Installed to Date: 9
Date First Installed: July 1981

DARCOR
INTERACTIVE FIXED ASSETS MANAGEMENT SYSTEM
Specific Application: Fixed Assets Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM 5340
Memory Required: 48.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,200
Number Installed to Date: 6
Date First Installed: January 1983
(See Vendor Profile Page V-34)

DARCOR
INTERACTIVE GENERAL LEDGER AND ACCOUNTS
Specific Application: General Ledger and Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM 5340
Memory Required: 48.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,600
Number Installed to Date: 47
Date First Installed: October 1979

DASH DATA SYSTEMS, INC.
MOMS
Specific Application: Mail Order Management
System Requirements: Tandem; Honeywell DPS 6; HP
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 2
Date First Installed: October 1981
(See Vendor Profile Page V-34)

DATA ASSOCIATES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE 4
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 3
Date First Installed: August 1982
(See Vendor Profile Page V-35)

DATA ASSOCIATES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE 4
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 4
Date First Installed: January 1981

DATABASE SYSTEMS CORP.
GENERAL LEDGER
Specific Application: Multicompany Capabilities
Specific Industry: Not Industry Sensitive
System Requirements: Prime 250 II, 250 Primos
Memory Required: 125.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1978
(See Vendor Profile Page V-35)

DATA BASIC, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000: CP/M; Apple: MS-DOS
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 50
Date First Installed: February 1982
(See Vendor Profile Page V-35)

DATA BASIC, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000: CP/M, Apple: MS-DOS
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 50
Date First Installed: July 1982

DATA BASIC, INC.
COMMERCIAL PRINTER BID SYSTEM
Specific Application: Prepares Bids for Printer Companies
Specific Industry: Printer
System Requirements: Victor 9000: CP/M, Apple: MS-DOS
Memory Required: 64 0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 5
Date First Installed: February 1982

DATA BASIC, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000: CP/M; Apple: MS-DOS
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 150
Date First Installed: February 1982

DATA BASIC, INC.
ARCHITECTURAL ENGINEERING MASTER (EMAS)
Additional Product Classification: Payroll, General
Specific Application: Job Costing, Payroll, Accounts Receivable and Accounts Payable, General Ledger
Specific Industry: Engineering
System Requirements: Wang 2200: Basic 2, Wang VS: VS, Wang Professional: MS-DOS; IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic, Cobol
Source Code Available: $2,000
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 150
Date First Installed: June 1975

DATA CENTER CORP.
SOS
Specific Application: Applicant Search and Retrieval, Payroll, Invoicing, Accounts Receivable, Sales Analysis, and General Ledger
System Requirements: DG: DOS; IBM PC-XT: PC-DOS, R-DOS, AOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,500 to $9,500
Number Installed to Date: 20
Date First Installed: 1981
(See Vendor Profile Page V-35)

DATA CENTER MANAGEMENT, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11. RSTS/E
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 50;
Date First Installed: 1977
(See Vendor Profile Page V-35)

DATA CENTER MANAGEMENT, INC.
DCM ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RSTS/E
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 50
Date First Installed: 1977

DATA CENTER MANAGEMENT, INC.
DCM GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RSTS/E
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 50
Date First Installed: 1977

DATA COMMUNICATIONS CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable

Specific Industry: Radio Broadcasting
System Requirements: DG Eclipse: R-DOS; DG Eclipse S/140
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 125
Date First Installed: 1981
(See Vendor Profile Page V-35)

DATA COMMUNICATIONS CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Banking/Financial, Broadcasting
System Requirements: DG Eclipse: R-DOS; DG Eclipse S/140
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 125
Date First Installed: 1981

DATA COMMUNICATIONS CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Banking/Financial, Broadcasting
System Requirements: DG Eclipse: R-DOS; DG Eclipse S/140
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 125
Date First Installed: 1981

THE DATA COMPANIES
CPA SYSTEM
Specific Application: Control of Accounting Procedures
Specific Industry: Wholesale/Distribution, Legal
System Requirements: GA: Unix; DG: Pick; Zilog: Ioos
Memory Required: 64.0K bytes
Source Language: Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1977
(See Vendor Profile Page V-35)

THE DATA COMPANIES
GENERAL ACCOUNTING SYSTEM
Specific Application: Control of Accounting Procedures
Specific Industry: Wholesale/Distribution, Legal
System Requirements: GA: Unix; DG: Pick; Zilog: Ioos
Memory Required: 64.0K bytes
Source Language: Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: January 1977

THE DATA COMPANIES
JOB COST SYSTEM
Specific Application: Accounting, Inventory Control
Specific Industry: Wholesale/Distribution, Legal
System Requirements: GA: Unix; DG: Pick; Zilog: Ioos
Memory Required: 64.0K bytes
Source Language: Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Date First Installed: January 1977

DATA-COM SYSTEMS & SERVICES, INC.
DATA-COM ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 4
Date First Installed: April 1982
(See Vendor Profile Page V-35)

DATA-COM SYSTEMS & SERVICES, INC.
DATA-COM ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 4
Date First Installed: June 1982

DATA-COM SYSTEMS & SERVICES, INC.
DATA-COM GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 4
Date First Installed: April 1982

DATA CONSULTANTS, INC.
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Receivable and Payable, Payroll, Labor Costing
Specific Industry: Not Industry Sensitive
System Requirements: DG: DOS, R-DOS, AOS, AOS/VS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 150
Date First Installed: 1978
(See Vendor Profile Page V-36)

DATA DESIGN ASSOCIATES, INC.
ACCOUNTS PAYABLE/PURCHASE CONTROL SYSTEM
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series: OS, Burroughs: DOS, Honeywell: Cics
Memory Required: 160.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,200
Number Installed to Date: 150
Date First Installed: 1976
(See Vendor Profile Page V-36)

DATA DESIGN ASSOCIATES, INC.
FIXED ASSET ACCOUNTING
Specific Application: Controls Depreciation Expense, Completes Required Tax Forms and Manages Corporate Property
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series: OS, Burroughs: DOS, Honeywell: Cics
Memory Required: 70.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $17,000
Number Installed to Date: 250
Date First Installed: 1973

DATA DESIGN ASSOCIATES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series: OS; Burroughs: DOS; Honeywell: Cics
Memory Required: 160.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

DATA DIRECTIONS, INC.
ADVERTISING AGENCY SOFTWARE
Specific Application: General Accounting, Production, Media and Analysis
Specific Industry: Advertising
System Requirements: Onyx: Oasis, IBM PC: Unix; DEC VAX: Altos
Memory Required: 256.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $16,500
Number Installed to Date: 7
Date First Installed: 1982
(See Vendor Profile Page V-36)

DATA DIRECTIONS, INC.
OIL & GAS ACCOUNTING SYSTEM
Specific Application: Oil and Gas Accounting
System Requirements: DEC VAX: Vms
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Price: $32,000

DATAFORMATION, INC.
GENERAL ACCOUNTING
Specific Application: Inventory Control, General Ledger, Accounts Payable, Accounts Receivable and Payroll
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 100
Date First Installed: May 1976
(See Vendor Profile Page V-36)

DATA INTELLIGENCE SYSTEMS
ROUTE ACCOUNTING SYSTEM
Specific Application: Route Inventory Control, Scheduling, Forecasting
System Requirements: DEC PDP-11/23 RT-11
Memory Required: 32.0K bytes
Source Language: Macro, Dibol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $4,200
Number Installed to Date: 200
Date First Installed: February 1974
(See Vendor Profile Page V-36)

DATALOGIC, INC.
BUS
Specific Application: Utility Billing System for Local Government
Specific Industry: Government
System Requirements: NCR 8100: Imos II, NCR 8200: Imos III, NCR 9300: IRX
Memory Required: 96.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $4,000
Number Installed to Date: 40
Date First Installed: 1978
(See Vendor Profile Page V-36)

DATA MANAGEMENT, INC.
WOODWORKING INDUSTRIES MANUFACTURING PACKAGE
Specific Application: Manufacturing of Wood Products
System Requirements: DG: na
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 5
Date First Installed: 1981
(See Vendor Profile Page V-37)

DATABANK CORP.
COMPUTERIZED ACCOUNTING SYSTEM
Specific Industry: Steel Manufacturing
Specific Application: Financial and Inventory Package for Steel Industry
System Requirements: DG: AOS, A-DOS
Memory Required: 128.0K bytes
Source Language: Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $12,000
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-37)

DATAMATIC, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell; Datapoint, Burroughs
Memory Required: 128.0K bytes
Source Language: Cobol 77
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 150
Date First Installed: 1973
(See Vendor Profile Page V-37)

DATAMATIC SERVICES, INC.
GENERAL BUSINESS PACKAGE
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: DG CS Series; R-DOS, Icos
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: 1981
(See Vendor Profile Page V-37)

DATAMATION SERVICES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Construction
System Requirements: Prime 50 Series; Primos
Source Language: Fortran IV
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $7,500
Number Installed to Date: 20
Date First Installed: January 1978

DATAMATION, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Prime; Primos
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $5,000
Number Installed to Date: 45
Date First Installed: January 1975
(See Vendor Profile Page V-37)

DATAMATION, INC.
INTERACTIVE ORDER ENTRY/INVENTORY
Additional Product Classification: Manufacturing
Specific Application: General Ledger, Inventory, MRP, Accounts Payable, Accounts Receivable
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Prime; Primos
Memory Required: 526.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license), Rental, Lease
Price: $7,500
Number Installed to Date: 50
Date First Installed: January 1975

DATAMATION, INC.
OPEN ITEM ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Prime Primos
Memory Required: 526.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license), Rental
Price: $5,000
Number Installed to Date: 50
Date First Installed: January 1975

DATA-MAX
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: Payroll/Personnel, Accounts Payable, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-37)

DATAMERICA CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Imos; IRX; NCR: ITX, Idps
Memory Required: 80.0K bytes
Source Language: Ansi-4 Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,100
Number Installed to Date: 135
Date First Installed: February 1979
(See Vendor Profile Page V-37)

DATAMERICA CORP.
CPA CLIENT WRITE-UP SYSTEM
Specific Application: General Ledger Services
Specific Industry: Banking/Financial
System Requirements: Imos; IRX; NCR: ITX, Idps
Memory Required: 80.0K bytes
Source Language: Ansi-4 Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,100
Number Installed to Date: 140
Date First Installed: 1979

DATAMERICA CORP.
FIXED ASSETS ACRS SYSTEM
Specific Application: On-Line Interactive Depreciation Asset Control System
Specific Industry: Not Industry Sensitive
System Requirements: Imos; IRX; NCR: ITX, Idps
Memory Required: 80.0K bytes
Source Language: Ansi-4 Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,100
Number Installed to Date: 600
Date First Installed: September 1979

DATAMOST, INC.
PERSONAL LEDGER SYSTEM
Specific Application: Home Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE: APPLE-DOS; Apple II+
Source Language: Cbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $130
Date First Installed: 1983
(See Vendor Profile Page V-37)

DATAMOST, INC.
PROPERTY MANAGER SYSTEM
Specific Application: Income Property Record Keeping Includes Billing, General Ledger and Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE, Apple II+; APPLE-DOS
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: 1983

DATA PLUS, INC.
PROJECT MANAGEMENT SYSTEM
Specific Application: Project Management
System Requirements: Wang 2200: MVP
Memory Required: 28.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 2
Date First Installed: 1981
(See Vendor Profile Page V-37)

DATA PROCESSING CORP. OF DELAWARE VALLEY
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Lease
Date First Installed: 1969

DATA PROCESSING CORP. OF DELAWARE VALLEY
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Lease

DATA PROCESSING CORP. OF DELAWARE VALLEY
ORDER ENTRY BILLING
Specific Application: Order Entry Billing
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Lease
Date First Installed: 1969

DATA PROCESSING ENTERPRISES
ACCOUNTS PAYABLE
Specific Application: Accounts Payable, Expense Repayment
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DOS; IBM 370; IBM 4100, IBM 4300
Memory Required: 64.0K bytes
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 100
Date First Installed: 1974
(See Vendor Profile Page V-38)

DATA PROCESSING ENTERPRISES
ACCOUNTS RECEIVABLE
Additional Product Classification: Report Generator
Specific Application: Accounts Receivable and Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IMB 360: DOS, IBM 370, IBM 4300, IBM 4100
Memory Required: 64.0K bytes
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 300
Date First Installed: 1968

DATA PROCESSING ENTERPRISES
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DOS, IBM 370, IBM 4100, IBM 4300
Memory Required: 64.0K bytes
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: 1976

DATAREX COMPUTER SYSTEMS
ACCOUNTS RECEIVABLE
Specific Application: Open Item Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 3, IBM System/32; IBM System/34
Memory Required: 32.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $7,500
(See Vendor Profile Page V-38)

DATAREX COMPUTER SYSTEMS
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3, System/32, System/34

Memory Required: 32.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500

DATA SYSTEMS CONSULTANTS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: Virtual Cobol, IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,150
Date First Installed: 1977
(See Vendor Profile Page V-38)

DATA SYSTEMS CONSULTANTS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: Virtual Cobol, IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,150
Number Installed to Date: 40
Date First Installed: 1977

DATA SYSTEMS CONSULTANTS, INC.
ORDER ENTRY WITH SPLIT BILLING
Specific Application: Order Entry, Split Billing
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: Virtual Cobol, IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $1,650
Number Installed to Date: 45
Date First Installed: 1978

DATA SYSTEMS OF BATON ROUGE
THE BIG ACCOUNTING SYSTEM
Specific Application: Business Accounting
Specific Industry: Not Industry Sensitive
System Requirements: DG
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,800 to $3,800
Number Installed to Date: 100
Date First Installed: 1979
(See Vendor Profile Page V-38)

DATA SYSTEMS OF BATON ROUGE
THE BIG ACCOUNTS RECEIVABLE SYSTEM
Specific Application: Accounts Receivable
Specific Industry: Wholesale/Distribution
System Requirements: DG: AOS, AOS/VS
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,250

DATA SYSTEMS OF BATON ROUGE
THE BIG EQUIPMENT SALES RENTAL
Specific Application: Fixed Asset Management
Specific Industry: Equipment Sales and Rental
System Requirements: DG: AOS/VS, AOS
Source Language: Business Basic
Source Code Available: Yes.
Purchase Terms: Purchase (license)
Price: $3,800

DATA-TAX, INC.
1040 TAX PREPARATION
Specific Application: Preparation of Individual Tax Returns
System Requirements: DEC PDP-8: COS/310; DEC PDP-11: CTS-300/TSD 8, CTS 300
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,400 to $1,950
Number Installed to Date: 1,000
Date First Installed: 1976
(See Vendor Profile Page V-38)

DATATEAM, INC.
GENERAL ACCOUNTING SYSTEM
Specific Application: General Ledger, Accounts Payable and Receivable, Inventory Control, Billing
Specific Industry: Not Industry Sensitive
System Requirements: Pertec 2000, Pertec 3000, Pertec 3200
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $16,000
Number Installed to Date: 30
Date First Installed: 1978
(See Vendor Profile Page V-38)

DATA-TEK
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Payroll, Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000 to $10,000
Number Installed to Date: 30
Date First Installed: 1978
(See Vendor Profile Page V-38)

DATATEK SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Input Invoices to Be Paid, Prints Checks, Register Checks, Vendor Analysis
Specific Industry: Not Industry Sensitive
System Requirements: NCR 101: Imos; NCR 8200, Burroughs B1000
Memory Required: 80.0K bytes
Source Language: Neat/3, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 50
Date First Installed: 1973
(See Vendor Profile Page V-39)

DATATEK SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: NCR 101, NCR 8200: Imos; Burroughs B1800, B8
Memory Required: 80.0K bytes
Source Language: Neat/3, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 50
Date First Installed: 1972

DATATEK SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: NCR 101, NCR 8200: Imos, Burroughs B1800, B8
Memory Required: 80.0K bytes
Source Language: Neat/3, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 50
Date First Installed: 1973

DATATEL MINICOMPUTER CO.
ASSETS
Additional Product Classification: Equipment Rental
Specific Application: Order Entry, Contract Sales, Sales Analysis, Seperate Modules for Furniture and Machine Rental Businesses
Specific Industry: Wholesale Distributor, Office Equipment Dealers
System Requirements: Microdata Reality, Pick, Honeywell Ultimate
Memory Required: 512.0K bytes
Source Language: Obasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 65
Date First Installed: 1977
(See Vendor Profile Page V-39)

DATA TRONIC, INC.
ENGINEERING AND TIME ACCOUNTING
Specific Application: Accounting
Specific Industry: Engineering
System Requirements: IBM System/23, Datamaster
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 3
Date First Installed: September 1982
(See Vendor Profile Page V-39)

DATA-TRONIC, INC.
ORDER ENTRY
Specific Application: Order Processing
Specific Industry: Not Industry Sensitive
System Requirements: IBM Datamaster
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 2
Date First Installed: August 1982

DATATRAC CORP.
DATASTAT ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: TSX+
Memory Required: 64.0K bytes
Source Language: Dibol, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $1,500
Number Installed to Date: 40
Date First Installed: 1977
(See Vendor Profile Page V-39)

DATATRAC CORP.
DATASTAT ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: TSX+
Memory Required: 64.0K bytes
Source Language: Dibol, Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 40
Date First Installed: 1977

DATATRAC CORP.
DATASTAT GENERAL LEDGER
Specific Application: General Ledger, Client Write-Up Package
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11: TSX+
Memory Required: 64.0K bytes
Source Language: Dibol, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $1,500
Number Installed to Date: 40
Date First Installed: 1977

DATA TRAIN, INC.
BOOKKEEPER
Specific Application: Bookkeeping Service
Specific Industry: Not Industry Sensitive
System Requirements: DOS, CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-39)

DATA TRAIN, INC.
ETI-ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: Payroll, Accounts Payable, Accounts Receivable, General Ledger
Specific Industry: Not Industry Sensitive

Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)

DATA TRAIN, INC.
LIL-SHEEP
Additional Product Classification: WP/Text Editing
Specific Application: Letter Writer, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DOS, CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300

DATAVISION
ASSOCIATION BILLING
Specific Application: Billing Service for Associations
Specific Industry: Associations
System Requirements: DEC
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1975
(See Vendor Profile Page V-39)

DATAVISION
GOVERNMENT ACCOUNT SYSTEM
Specific Application: Accounting Package for Small Municipalities
Specific Industry: Government
System Requirements: DEC
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1975

DATAVISION
PROFESSIONAL TIME-BILLING
Specific Application: Billing Service for Professional Field
Specific Industry: Not Industry Sensitive
System Requirements: DEC
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1975

DATEX, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Engineering, Retail, Construction
System Requirements: IBM 3/15D; DOS, IBM System/34, IBM System/36, IBM System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1972
(See Vendor Profile Page V-39)

DATEX, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Engineering, Retail, Construction
System Requirements: IBM System/34; DOS, IBM System/36, IBM System/38, IBM 3/15D
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license), Rental, Lease
Date First Installed: 1972

DATEX, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
(See Vendor Profile Page V-39)

DATEX, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000

DATEX, INC.
CETA ALLOWANCE & PARTICIPANT TRACKING
Additional Product Classification: Payroll/Personnel
Specific Application: Participant Tracking, Payroll, Status Reports for Ceta Sponsors or Consortiums
Specific Industry: Government
System Requirements: IBM System/34; IBM System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Lease
Price: $500
Number Installed to Date: 3

DATEX, INC.
COMMISSION REPORTING
Specific Application: Commission Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500

DATEX, INC.
FIXED ASSET ACCOUNTING
Specific Application: Fixed Asset Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,200

DATEX, INC.
INTERACTIVE ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM System/38
Source Language: RPG-II, RPG-I
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500

DATEX, INC.
INTERACTIVE INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000

DATEX, INC.
INTERACTIVE ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,500

DATEX, INC.
INTERACTIVE GENERAL LEDGER & FINANCIAL
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM System/38
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500 to $3,500

DATEX, INC.
SALES ANALYSIS
Specific Application: Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000

DATUM CONSULTANTS, INC.
BUSINESS CONTROL PROGRAMS (BCPS)
Additional Product Classification: Payroll/Personnel, Sort/Merge, Report Generator, Data/File Management, Data Dictionary
Specific Application: Sales Analysis, Direct Mail, Payroll With Labor Distribution, Purchase Orders, General Ledger, Accounts Payable and Receivable
System Requirements: Microdata Reality; Reality, Microdata Sequel; Reality, Honeywell Ultimate; Pick; IBM Series/1 Pick
Source Language: RPL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 450
Date First Installed: March 1977
(See Vendor Profile Page V-39)

DATUM RESOURCES OF HOUSTON, INC.
DIRECT 3000
Additional Product Classification: Payroll/Personnel
Specific Application: Inventory Purchase and Sales Order, Personnel, Accounts Payable, Accounts Receivable, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: HP: MPE III, MPE IV
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000

DAVID GROTH & ASSOCIATES, INC.
ACCOUNTS PAYABLE SYSTEM
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 3: OCL; IBM System/34: OCL; IBM System/32: OCL; IBM System/36: OCL
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1977
(See Vendor Profile Page V-39)

DAVID GROTH & ASSOCIATES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 3-UNK: OCL, IBM System/34: OCL; IBM System/32: OCL, IBM System/36: OCL
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1977

DAVID GROTH & ASSOCIATES, INC.
FINANCIAL STATEMENTS
Specific Application: Financial Statements
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 3-UNK: OCL, IBM System/34: OCL, IBM System/36: OCL; IBM System/38: OCL

Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1977

DAVID SMITH & ASSOCIATES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 3-UNK: OCL, IBM System/34: OCL, IBM System/32: OCL; IBM System/36: OCL
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1977

DAVID SMITH & ASSOCIATES, INC.
PURCHASE ORDERS
Specific Application: Purchase Orders
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 3: OCL; IBM System/34: OCL; IBM System/36: OCL, IBM System/38: OCL
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1977

DAVIS-LANE CORP.
AMP-ASSOCIATION MANAGEMENT PACKAGE
Additional Product Classification: Payroll/Personnel
Specific Application: Association Management With Accounts Receivable, Accounts Payable, Inventory, General Ledger, Payroll
Specific Industry: Wholesale/Distribution, Retail, Nonprofit Orgafizations
System Requirements: Cartel
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 7
Date First Installed: September 1981
(See Vendor Profile Page V-40)

DBS (DESIGN AND BUILDERS OF INFORMATION SYSTEMS)
PROJECT/ENCUMBERED ACCOUNTING
Specific Application: Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: OS-65U; TURBO-DOS, CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
(See Vendor Profile Page V-40)

DCD SO.
JOB SHOP CONTROL SYSTEM
Additional Product Classification: Manufacturing, Sort/Merge, Program Generators/Aids, Application Development Tools, Operating Systems
Specific Application: Job Shop Control, Inventory, Bill of Material, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Manufacturing
System Requirements: IBM System/23, System/34, System/36
Memory Required: 64.0K bytes
Source Language: Basic, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $6,500 to $11,000
Number Installed to Date: 500
Date First Installed: January 1975
(See Vendor Profile Page V-40)

DEALERS MANAGEMENT SERVICES
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Energy
System Requirements: Wang VS: VS; Wang PC: VS; Wang 2200: VS
Memory Required: 32.0K bytes
Source Language: Basic II, Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 43
Date First Installed: August 1981
(See Vendor Profile Page V-40)

DEALERS MANAGEMENT SERVICES
FUEL PM
Specific Application: Fuel Accounting
Specific Industry: Energy
System Requirements: Wang VS: VS; Wang PC: VS, Wang 2200: VS
Memory Required: 32.0K bytes
Source Language: Basic II, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $13,000
Number Installed to Date: 43
Date First Installed: August 1981

DEALERS MANAGEMENT SERVICES
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: VS; Wang PC: VS; Wang 2200: VS
Memory Required: 32.0K bytes
Source Language: Basic II, Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 43
Date First Installed: September 1981

DEALERS MANAGEMENT SERVICES
INDUSTRIAL PACKAGE
Specific Application: Accounting
Specific Industry: Oil and Gas Fuels
System Requirements: Wang VS: VS; Wang PC: VS, Wang 2200: VS
Memory Required: 32.0K bytes
Source Language: Basic II, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $8,000
Number Installed to Date: 43
Date First Installed: September 1981

DECISION SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 250
Date First Installed: 1981
(See Vendor Profile Page V-40)

DEFARO SOFTWARE SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM System/36
Memory Required: 16.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 3
Date First Installed: March 1982
(See Vendor Profile Page V-40)

DEFARO SOFTWARE SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 3
Date First Installed: March 1982

DEFARO SOFTWARE SYSTEMS, INC.
DMSS
Additional Product Classification: Inventory
Specific Application: Order Entry, Billing, Inventory Control, Accounts Receivable, Accounts Payable, General Ledger, WP
Specific Industry: Wholesale/Distribution, Retail
System Requirements: IBM System/34 SSP, IBM System/36
Memory Required: 96.0K bytes
Source Language: DMSII
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 3
Date First Installed: May 1982

DEFARO SOFTWARE SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM System/36
Memory Required: 16.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 3
Date First Installed: March 1982

DEFARO SOFTWARE SYSTEMS, INC.
IBOM
Additional Product Classification: Manufacturing
Specific Application: Menu-Driven Interactive Bill of Materials
Specific Industry: Manufacturing, Engineering
System Requirements: IBM System/34 SSP, IBM System/36
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 7
Date First Installed: January 1983

DEFARO SOFTWARE SYSTEMS, INC.
MASS
Additional Product Classification: Data/File Management
Specific Application: Membership Administration Support, System Records, Dues, Late Notices, Accounts Payable, General Ledger, WP,Payroll
Specific Industry: Union Membership
System Requirements: IBM System/34 SSP, IBM System/36
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 1
Date First Installed: July 1982

DEFARO SOFTWARE SYSTEMS, INC.
ON LINE ACCOUNTS RECEIVABLE AND CASH RECEIPT PACKAGE
Specific Application: Accounts Receivable and Cash Receipts
Specific Industry: Retail
System Requirements: IBM System/34 SSP, IBM System/36
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: 1983

DEFARO SOFTWARE SYSTEMS, INC.
SCHOOL MANAGEMENT SYSTEM I
Specific Application: Student Records, Accounts Receivable, Billing, Cash Receipts, Registration, Scheduling, Grade Point Averages, General Ledger
Specific Industry: Education, Private Institutions
System Requirements: IBM System/34, IBM System/36
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 1
Date First Installed: 1982

DEFARO SOFTWARE SYSTEMS, INC.
SCHOOL MANAGEMENT SYSTEM II
Additional Product Classification: Payroll/Personnel, Data/File Management
Specific Application: Ad Management, Personnel Record, Equipment Inventory Management
Specific Industry: Education, Public
System Requirements: IBM System/34, IBM System/36
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 1
Date First Installed: July 1982

DELOITTE HASKINS & SELLS
AUDITAPE 2
Specific Application: Financial and Management Analysis and Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300: OS-DOS. IBM 3000 Series: OS-DOS, IBM System/34, System/38 RPG
Memory Required: 64.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500 to $8,000
Number Installed to Date: 40
Date First Installed: September 1982
(See Vendor Profile Page V-40)

DELOITTE HASKINS & SELLS
[illegible]
Specific Application: Consolidation/Form Currency Translation, Financial, Management Reporting, Modeling; Intercompany Reconciliation
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3308, 4331, 3800 Series: OS/MVS; IBM 4341: OS/MVS
Memory Required: 3.5M bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Timesharing
Price: $80,000
Number Installed to Date: 8
Date First Installed: July 1983

DELPHI ASSOCIATES
MEDIQUEST
Specific Application: Pharmacy Management
Specific Industry: Retail, Medical, Pharmacists
System Requirements: R-DOS
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: no
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 35
Date First Installed: November 1984
(See Vendor Profile Page V-40)

DELTA COMPUTING SYSTEMS, INC.
GENERAL LEDGER
Specific Application: Accounting and Bookkeeping System
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP, DEC LSI, DEC VAX
Memory Required: 192.0K bytes
Source Language: DSM-11
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 5
Date First Installed: 1981
(See Vendor Profile Page V-40)

DELTA COMPUTING SYSTEMS, INC.
PAYROLL
Specific Application: Accounting and Bookkeeping
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP, DEC LSI, DEC VAX
Memory Required: 192.0K bytes
Source Language: DSM-11
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 5
Date First Installed: 1983

DELTA PROFESSIONAL SYSTEMS, INC.
DELTA PUBLIC ACCOUNTING SYSTEM (DPAS)
Specific Application: Comprehensive Software for Practicing Accountants
Specific Industry: Public Accountants
System Requirements: Datapoint: DOS
Memory Required: 32.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 80
Date First Installed: 1979

DENNEN COMPUTER SYSTEMS, INC.
ORDER ENTRY
Specific Application: Order Processing, Invoicing, Inventory Control, Sales, Analysis, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS; DEC VAX: OS
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1983
(See Vendor Profile Page V-41)

DESCO COMPUTER SERVICES, INC.
WORKSHOP REPORTING SYSTEM
Specific Application: Analysis of Productivity, Rehabilitation System, Payroll
Specific Industry: Rehabilitation
System Requirements: Altos 800-7: MP/M
Memory Required: 32.0K bytes
Source Language: RM Cobol, Microsoft Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 2
(See Vendor Profile Page V-41)

DEXEL SYSTEMS CORP.
AIM
Additional Product Classification: Payroll/Personnel
Specific Application: Association Information Management, Membership Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM System/36; IBM System/38
Memory Required: 64.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-41)

DEXEL SYSTEMS CORP.
CMS
Additional Product Classification: Payroll/Personnel
Specific Application: Collection Management System
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS, IBM System/34, IBM System/36, IBM System/38
Memory Required: 64.0K bytes
Source Language: Basic, RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease

DEXEL SYSTEMS CORP.
CREDIT UNION MANAGEMENT SYSTEM
Specific Application: Share and Loan Accounting
System Requirements: IBM System/23, System/34, System/36
Memory Required: 64.0K bytes
Source Language: Basic, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000 to $15,000
Number Installed to Date: 80
Date First Installed: 1979

DEXEL SYSTEMS CORP.
ICAS
Specific Application: Insurance Company Accounting System
Specific Industry: Insurance
System Requirements: IBM System/34: SSP; IBM System/36: SSP, IBM System/38: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000 to $30,000

DEXEL SYSTEMS CORP.
RADIO STATION MANAGEMENT
Specific Application: Billing, Accounts Receivable, Radio Log System
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,300
Number Installed to Date: 50
Date First Installed: 1979

DHI COMPUTING SERVICE
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DOS/VS, IBM 370: DOS/VS
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 20
Date First Installed: February 1982
(See Vendor Profile Page.V-41)

DHI COMPUTING SERVICE
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DOS/VS, IBM 370: DOS/VS
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: August 1983

DHI COMPUTING SERVICE
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DOS/VS, IBM 370: DOS/VS
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 35
Date First Installed: November 1981

DICKERMAN ASSOCIATES, INC.
AMOCO JOBBER MANAGEMENT SYSTEM (JMS)
Specific Application: Route Optimization, Dispatching, Asset Management and General Accounting
System Requirements: Wang 2200
Memory Required: 64.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: December 1976
(See Vendor Profile Page V-41)

DIGITAL SYSTEMS, INC.
REACT
Additional Product Classification: Payroll/Personnel
Specific Application: Utility Billing, Customer Accounting, Payroll General Ledger, Accounts Payable, Inventory Control, Purchasing, Work Order Cost Accounting
Specific Industry: Rural Electric Companies
System Requirements: DEC PDP-11/24, PDP-11/44: RSTS/E; DEC VAX-11/730, VAX-11/750: VMS
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $65,000 to $135,000
Number Installed to Date: 51
Date First Installed: 1984
(See Vendor Profile Page V-42)

DIGITAL SYSTEMS, INC.
RECAP
Additional Product Classification: Payroll/Personnel
Specific Application: Multiservice Electric, Water, Sewerage, Refuse/Garbage, Gas, Payroll,

General Ledger With Fund and Encumberance Accounting
Specific Industry: Utility and Municipal
System Requirements: DEC PDP-11/24, PDP-11/44· RSTS/E; DEC VAX-11/730, VAX-11/7· VMS
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $65,000 to $135,000
Number Installed to Date: 15
Date First Installed: July 1981

DIGITAN SYSTEMS, INC.
FOOD SERVICE PROGRAM
Specific Application: Inventory Control
Specific Industry: Education, Government, Nonprofit Organizations
System Requirements: Digitan Systems DE/30: CP/M, Digitan Systems DE/40: Diginet CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $2,500
Date First Installed: 1981
(See Vendor Profile Page V-42)

DIGITAN SYSTEMS, INC.
INVOICE/AR
Specific Application: Accounts Receivable
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Digitan DE/3000; Digitan DE/4000
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 200

DIGITAN SYSTEMS, INC.
LABOR EMPLOYEE ADMINISTRATION PROGRAM
Specific Application: Member Maintenance
Specific Industry: Labor Unions
System Requirements: Digitan Systems DE/30· MP/M, Digitan Systems DE/40, Diginet MP/M
Memory Required: 128.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease

DIGITAN SYSTEMS, INC.
REGISTER INVOICING
Specific Application: Inventory Control
Specific Industry: Retail
System Requirements: Digitan Systems DE/30· CP/M, Digitan Systems DE/40· Diginet CP/M
Memory Required: 128.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease

DIGITECH, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Flex; CP/M
Memory Required: 56.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: 1978
(See Vendor Profile Page V-42)

DIGITECH, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Flex; CP/M
Memory Required: 56.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: 1978

DIGITECH, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Flex; CP/M
Memory Required: 56.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: 1978

DIGITECH, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Flex; CP/M
Memory Required: 56.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 500
Date First Installed: April 1980

DIGITECH, INC.
TIME COST ANALYSIS
Specific Application: Keeps Track of Billable Time
Specific Industry: Legal
System Requirements: Flex; CP/M
Memory Required: 56.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 30
Date First Installed: 1980

DIMIS, INC.
TOTAL-100, TOTAL-125, TOTAL-200
Additional Product Classification: DBMS
Specific Application: Order Entry, Billing, Accounts Payable, Accounts Receivable, General Ledger, Inventory Management, Sales Analysis, Promotions, Commissions, Automatic Pricing
Specific Industry: Wholesale/Distribution
System Requirements: Modcomp Classic I: MAX III, MAX I; Modcomp Classic II· MAX IV
Memory Required: 128.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $16,000 to $65,000
Number Installed to Date: 68
Date First Installed: September 1974
(See Vendor Profile Page V-42)

DISMS MICRO SYSTEMS
CLIENT PROGRAMMED ACCOUNTING
Specific Application: Write-Up System, After the Fact Payroll
System Requirements: North Star Advantage· CP/M; DEC Rainbow
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 200
Date First Installed: August 1978

DIVERSIFIED ELECTRONICS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: ; DEC PDP-11· RT-11; DEC VAX· VMS
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-43)

DIVERSIFIED ELECTRONICS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11· RT-11, DEC VAX· VMS
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 50
Date First Installed: 1978

DIVERSIFIED ELECTRONICS, INC.
BILLING
Specific Application: Billing
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 50
Date First Installed: 1978

DIVERSIFIED ELECTRONICS, INC.
GEN LEDGERS
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11· RT-11, DEC VAX· VMS
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 50
Date First Installed: 1978

DIVERSIFIED ELECTRONICS, INC.
ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11; DEC VAX· VMS
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 50
Date First Installed: 1978

DIVERSIFIED PROGRAMMING, INC.
GENERAL BUSINESS SYSTEM
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Inventory Control, Sales Analysis, Sales History, Processing, Invoicing
Specific Industry: Wholesale/Distribution
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $3,000 to $5,000
Number Installed to Date: 150
Date First Installed: 1975
(See Vendor Profile Page V-43)

DLH SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Government
System Requirements: IBM System/34, System/36· SSP
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 54
Date First Installed: January 1980
(See Vendor Profile Page V-43)

DLH SYSTEMS, INC.
BUDGET PREPARATION
Specific Application: Budget Preparation
Specific Industry: Government
System Requirements: IBM System/34, System/36· SSP
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,900
Number Installed to Date: 54
Date First Installed: January 1980

DLH SYSTEMS, INC.
FUND ACCOUNTING
Specific Application: Fund Accounting
Specific Industry: Government
System Requirements: IBM System/34, System/36· SSP
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 54
Date First Installed: January 1980

DLH SYSTEMS, INC.
UTILITY BILLING
Specific Application: Utility Billing
Specific Industry: Government
System Requirements: IBM System/34, System/36· SSP
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)

Price: $4,500
Number Installed to Date: 54
Date First Installed: January 1980

DONALD A. JACKSON & ASSOC.
PETROLEUM JOBBERS PACKAGE
Specific Application: Controls Accounting Responsibility for the Petroleum Jobber
System Requirements: Onyx· Oasis, IBM PC-XT· PC-DOS
Memory Required: 128.0K bytes
Source Language: Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $10,000 to $40,000
Number Installed to Date: 8
Date First Installed: September 1982
(See Vendor Profile Page V-43)

DONALD H. FREY & CO.
BUDGETARY CONTROL SYSTEM (BUCS)
Specific Application: Fund Accounting System
Specific Industry: Government
System Requirements: TRS-80/II: TRS-DOS, Burroughs B90: CMS, MCP; Univac BC/7; Univac System 80· OS/3 7.2
Source Language: Cobol, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 25
Date First Installed: 1977
(See Vendor Profile Page V-43)

DPCS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 5500 with 5MB
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 25
Date First Installed: June 1981
(See Vendor Profile Page V-43)

DPCS, INC.
COMPLETE CREDIT UNION SYSTEMS
Additional Product Classification: Payroll/Personnel
Specific Application: Credit Union Administrative Financial Control
Specific Industry: Banking/Financial
System Requirements: Datapoint 5500 with 5MB
Memory Required: 256.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 6
Date First Installed: June 1981

DPS, INC.
DPS ACCOUNTING
Additional Product Classification: Inventory
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Inventory Control, Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Molecular Computer· MP/M, HP 3000· MPE, Altos 580: MP/M
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000 to $24,000
Number Installed to Date: 20
Date First Installed: 1981
(See Vendor Profile Page V-43)

DPS, INC.
DPS TELEPHONE SYSTEM
Specific Application: Billing and Accounting for Rural Telephone Companies
System Requirements: Molecular Computer· MP/M; HP 3000· MPE; Altos: MP/M
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 3
Date First Installed: July 1982

DSI/MED COMM
MED-COMM RX
Additional Product Classification: Insurance, Pharmacy Management
Specific Application: Billing, Insurance, Prescriptions, Drug Interaction, General Ledger, Accounts Payable and Receivable, Payroll
Specific Industry: Medical, Pharmacy
System Requirements: TI 990, 300, 600, 800 Series. DX-10; Altos· COS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 41
Date First Installed: 1978
(See Vendor Profile Page V-43)

DYNACON COMPUTER
AUTOMATED PURCHASE ORDER
Specific Application: Use Inventory Control to Create Replacement Point of Sale
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 4
Date First Installed: 1981
(See Vendor Profile Page V-44)

DYNACON COMPUTER
FILM NEGATIVE LIBRARY
Specific Application: Maintains Client Negative Descriptions, Orders, Inventory and History
System Requirements: DG Nova
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 1
Date First Installed: 1981

DYNALOGIC
DYNALOGIC CONSTITUENT SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Constituent System
Specific Industry: Nonprofit Organizations
System Requirements: Wang VS: VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 1
Date First Installed: October 1982
(See Vendor Profile Page V-44)

DYNALOGIC, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000

DYNALOGIC, INC.
DYNALOGIC PROPERTY MANAGEMENT SYSTEM
Specific Application: Property Management Including General Ledger, Accounts Payable and Investment Analysis
Specific Industry: Real Estate, Investment Firms
System Requirements: Wang VS: VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 1
Date First Installed: March 1983

DYNALOGIC, INC.
DYNALOGIC SCHOOL DISTRICT ACCOUNTING SYSTEM
Specific Application: School District Accounting System Including General Ledger, Budget Accounting and Budget Preparation
Specific Industry: Education, Nonprofit Organizations
System Requirements: Wang VS: VS
Source Language: Cobol
Source Code Available: Yes
Price: $10,000
Number Installed to Date: 2
Date First Installed: September 1981

DYNALOGIC, INC.
PROPERTY MANAGEMENT SYSTEM
Specific Application: Property Management, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000

DYNALOGIC, INC.
SCHOOL DISTRICT ACCOUNTING
Specific Application: Accounts Payable
Specific Industry: Education
System Requirements: Wang VS: DOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000

DYNALOGIC, INC.
SCHOOL DISTRICT ACCOUNTING - PURCHASE
Specific Application: Purchase Order Control
Specific Industry: Education
System Requirements: Wang VS: DOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000

DYNALOGIC, INC.
SCHOOL DISTRICT ACCOUNTING - ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Education
System Requirements: Wang VS: DOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000

DYNALOGIC, INC.
SCHOOL DISTRICT ACCOUNTING - CENTRAL STORES
Specific Application: Central Stores Inventory
Specific Industry: Education
System Requirements: Wang VS: DOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
(See Vendor Profile Page V-44)

DYNALOGIC, INC.
SCHOOL DISTRICT ACCOUNTING - GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Education
System Requirements: Wang VS: DOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000

DYNALOGIC, INC.
SCHOOL DISTRICT ACCOUNTING A/R
Specific Application: Accounts Receivable
Specific Industry: Education
System Requirements: Wang VS: DOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000

DYNAMIC RESOURCES, INC.
CONSTRUCTION MONITORING
Specific Application: Monitors Accounting Functions Related to Hotel Construction Projects

Specific Industry: Construction, Hotel Construction
System Requirements: Datapoint: DOS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 2
Date First Installed: 1981
(See Vendor Profile Page V-44)

DYNAX RESOURCES, INC.
ACCOUNTS PAYABLE/38
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38 CPS
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 20
Date First Installed: March 1981
(See Vendor Profile Page V-44)

DYNAX RESOURCES, INC.
ACCOUNTS RECEIVABLE/38
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38 CPS
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,500
Number Installed to Date: 10
Date First Installed: March 1982

EMILIANI ASSOCIATES, INC.
MANUFACTURING THOUGHTWARE SYSTEMS
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: MRP, MRP II
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Construction
System Requirements: Prime: Primos
Memory Required: 1.0M bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $45,000
Number Installed to Date: 5
(See Vendor Profile Page V-45)

EBERT CORP., INC.
TAX ACCOUNTANT SYSTEM
Specific Application: Tax Accounting
Specific Industry: Government
System Requirements: IBM 4300 Series, Cics; DEC PDP-11: RSX-11; Univac: VMS, DEC VAX
Source Language: Cobol, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 45
Date First Installed: 1976
(See Vendor Profile Page V-45)

ECOM SYSTEMS, INC.
FACTS V
Specific Application: Credit Union Accounting
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11, RSTS/E, DEC VAX, VMS, DEC: PDP-11: RT11
Memory Required: 256.0K bytes
Source Language: Basic Plus, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 125
Date First Installed: 1974
(See Vendor Profile Page V-45)

EFFICIENT COMPUTING CO.
ACCOUNTING 1000
Specific Application: Accounting
Specific Industry: Legal, Wholesale/Distribution, Medical,
System Requirements: HP 1000: RTE-6, RTE-IVB, RTE-A
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-45)

EFFICIENT COMPUTING CO.
LAB 1000
Specific Application: Accounting, Billing
Specific Industry: Wholesale/Distribution, Medical, Legal
System Requirements: RTE
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease

EFFICIENT COMPUTING CO.
LAW 1000
Specific Application: Accounting
Specific Industry: Legal
System Requirements: HP 1000: RTE-6 RTE-IVB, RTE-A
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease

EFFICIENT COMPUTING CO.
MED 1000
Specific Application: Accounting
Specific Industry: Wholesale/Distribution, Medical, Legal
System Requirements: HP 1000: RTE-6, RTE-IVB, RTE-1
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease

EFFICIENT COMPUTING CO.
TIME 1000
Specific Application: Time Billing, Job Tracing, Job Costing, Accounting
Specific Industry: Wholesale/Distribution, Medical, Legal
System Requirements: HP 1000: RTE-6, RTE-IVB, RTE-A
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)

THE EMBASSY INSTITUTE
EMBASSY INST LIBRARY FOR TAX PLANNING
Specific Application: Computer Assisted Tax Planning
Specific Industry: Government
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1971
(See Vendor Profile Page V-46)

EMDA, INC.
RADIO STATION SYSTEM
Additional Product Classification: Scheduling
Specific Application: Daily Logs, Scheduling, Billing
Specific Industry: Radio Stations
System Requirements: DEC LSI-11: RT-11
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $12,000 to $60,000
Date First Installed: 1980
(See Vendor Profile Page V-46)

EMPIRE 214, INC.
APPLIANCE DEALERS AND BUYING COOPERATIVES PACKAGE
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: Inventory Control, Vendor Terms and Rebates, Accounting, Payroll
System Requirements: DG: MP/AOS, R-DOS, AOS, AOS/VS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Date First Installed: 1981
(See Vendor Profile Page V-46)

EMPIRE 214, INC.
ELECTRICAL PLUMBING AND SUPPLY
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: Complete Inventory Control, Accounting Functions and Payroll
System Requirements: DG: MP/AOS, RDOS, AOS, AOS/VS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Date First Installed: 1977

EMPIRE 214, INC.
FOOD DISTRIBUTOR'S PACKAGE
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: Inventory Control, Accounting Functions and Payroll
Specific Industry: Wholesale/Distribution
System Requirements: DG: MP/AOS, R-DOS, AOS, AOS/VS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Date First Installed: 1979

EMPIRE 214, INC.
MAIL ORDER DISTRIBUTORS PACKAGE
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: Inventory Control, Accounting Functions and Payroll
Specific Industry: Wholesale/Distribution
System Requirements: DG: MP/AOS, R-DOS, AOS, AOS/VS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10 000
Date First Installed: 1973

ENTECH ENGINEERING, INC.
ACCOUNTS PAYABLE SYSTEM
Specific Application: Accounts Payable
Specific Industry: Wholesale/Distribution; Retail
System Requirements: Datapoint 1560 DOS, Datapoint 4630 DOS
Memory Required: 96.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
(See Vendor Profile Page V-46)

ENTECH ENGINEERING, INC.
ACCOUNTS RECEIVABLE SYSTEM
Specific Application: Accounts Receivable
Specific Industry: Retail
System Requirements: Datapoint 1560 DOS, Datapoint 4630 DOS
Memory Required: 96.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed:

ENTECH ENGINEERING, INC.
GENERAL LEDGER SYSTEM
Specific Application: General Ledger
Specific Industry: Wholesale/Distribution, Retail
System Requirements: Datapoint 1560 DOS, Datapoint 4630 DOS
Memory Required: 96.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Number Installed to Date: 4
Date First Installed: June 1982

ENTECH ENGINEERING, INC.
LEGAL TIME ACCOUNTING SYSTEM (LTA)
Specific Application: Time Accounting, Billing, Invoicing
Specific Industry: Legal
System Requirements: Datapoint 1560 DOS, Datapoint 4630 DOS
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: September 1983

ENTECH ENGINEERING, INC.
TIME ACCOUNTING SYSTEM (TACCY)
Specific Application: Time Accounting and Production Reporting
System Requirements: Datapoint 1560, DOS, Datapoint 4630 DOS
Memory Required: 96.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: June 1981

ENTECH ENGINEERING, INC.
UTILITY BILLING SYSTEM
Specific Application: Utility Billing
Specific Industry: Wholesale/Distribution, Public and Private Utilities
System Requirements: Datapoint 1560, 4630: DOS
Memory Required: 96.0K bytes
Source Language: Databus
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: September 1982

EPICOR, INC.
ZAP
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Mults
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $7,000
Number Installed to Date: 45
Date First Installed: 1978
(See Vendor Profile Page V-47)

EPICOR, INC.
ZAR
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Mults
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $7,000
Number Installed to Date: 45
Date First Installed: 1978

EPICOR, INC.
ZAS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: Mults
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $7,000
Number Installed to Date: 45
Date First Installed: 1978

EPICOR, INC.
ZGL
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Mults
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $7,000
Number Installed to Date: 45
Date First Installed: 1978

EPICOR, INC.
ZTX
Specific Application: Tax Preparation
Specific Industry: Not Industry Sensitive
System Requirements: Zilog: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license), Rental, Lease
Price: $15,000
Number Installed to Date: 45
Date First Installed: 1978

EQUINE MANAGEMENT SYSTEMS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, DEC Micro/PDP-11
Memory Required: 256.0K bytes
Source Language: Basic Plus II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 80
Date First Installed: 1979
(See Vendor Profile Page V-47)

EQUINE MANAGEMENT SYSTEMS
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, DEC Micro/PDP-11
Memory Required: 256.0K bytes
Source Language: Basic Plus II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 80
Date First Installed: 1979

EQUINE MANAGEMENT SYSTEMS
HORSE TRAINING MANAGEMENT SYSTEM
Specific Application: Management and Accounting of Race and Show Horses
Specific Industry: Horse
System Requirements: DEC Rainbow 100: CP/M; DEC PDP-11: RSTS/E, DEC Micro/PDP-11
Memory Required: 256.0K bytes
Source Language: Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 1
Date First Installed: June 1983

EQUINE MANAGEMENT SYSTEMS
VETERINARIAN MANAGEMENT SYSTEM
Specific Application: Medical Records, Billing, Accounting
Specific Industry: Veterinary
System Requirements: DEC PDP-11: RSTS/E, DEC Micro/PDP-11
Memory Required: 256.0K bytes
Source Language: Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 1
Date First Installed: June 1983

ETR STAR SYSTEMS
MANAGEMENT INVESTMENT ACCOUNTING SYSTEM
Specific Application: Record Keeping, Order Entry, Financial Reporting and Projecting
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; CP/M 86, MS-DOS
Memory Required: 64.0K bytes
Source Language: GBS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,750
Number Installed to Date: 25
Date First Installed: January 1983
(See Vendor Profile Page V-47)

EVANSVILLE DATA PROCESSING
ABLE - GENERAL LEDGER AND MGMT REPORTING
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 Series: CTS-300, RSTS/E; DEC VAX-11: VMS
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $8,000
Date First Installed: 1986
(See Vendor Profile Page V-47)

EVANSVILLE DATA PROCESSING
RETAIL POINT-OF-SALE SYSTEM
Additional Product Classification: POS
Specific Application: Integrated Point of Sale, Accounts Receivable, and Inventory Control
Specific Industry: Retail
System Requirements: DEC PDP-11 Series: RSTS/E, DEC VAX-11: VMS
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35,000
Date First Installed: 1979

EXCALIBUR COMPUTER SYSTEMS
EXCALIBUR
Specific Application: Accounting Package for Oil and Gas Industry, Revenue Distribution, Land Management and Reserve Control
System Requirements: IBM 4300; DEC LSI-11: Pick; Prime: Primos; Honeywell DPS 6
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50,000 to $150,000
Number Installed to Date: 30
Date First Installed: 1978
(See Vendor Profile Page V-47)

EXCALIBUR DATA SYSTEMS, INC.
APPLIANCE INVENTORY SYSTEM
Specific Application: Appliance Manufacturing, Service Number Generation and Re... ing
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/34, System/36: SSP
Memory Required: 64.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1980

EXCALIBUR DATA SYSTEMS, INC.
DISTRIBUTION CONTROL SYSTEM
Specific Application: Integrated Distributor Control System, Inventory Checking, On-Line Order Taking, Sales Report and Analysis
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/34, System/36: SSP
Memory Required: 64.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1980

EXCALIBUR DATA SYSTEMS, INC.
INVENTORY STATUS SYSTEM
Specific Application: Real Time Inventory Status
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/34 SSP
Memory Required: 64.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease

EXCALIBUR DATA SYSTEMS, INC.
JOB COST & REPORT SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Job Cost and Reporting
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/34, Suystem/36: SSP
Memory Required: 64.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1980

EXCALIBUR DATA SYSTEMS, INC.
KMART ROUTING GUIDE
Specific Application: Routing Guide for Retail Chain
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/34 SSP, IBM System/36
Memory Required: 64.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1980

EXCALIBUR DATA SYSTEMS, INC.
ORDER ENTRY SYSTEM
Specific Application: Order Entry System for Mass Merchandising Outlets
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/34 SSP; IBM System/36
Memory Required: 64.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1980

EXECUTIVE TECHNOLOGY DATA SYSTEMS (ETDS)
DEPRECIATION AND AMORTIZATION SCHEDULES
Specific Application: Depreciation and Amortization Schedule Processing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/36; SSP; IBM System/34; SSP; IBM System/32: SCP; IBM System/23
Memory Required: 64.0K bytes
Source Language: RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000 to $1,500
Number Installed to Date: 500
Date First Installed: July 1975
(See Vendor Profile Page V-48)

EXECUTIVE TECHNOLOGY DATA SYSTEMS (ETDS)
GENERAL LEDGER ACCOUNTING & FINANCIAL REPORTING
Specific Application: General Ledger and Financial Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/36; SSP; IBM System/34; SSP
Memory Required: 24.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,100 to $6,100
Number Installed to Date: 400
Date First Installed: July 1975

EXECUTIVE TECHNOLOGY DATA SYSTEMS (ETDS)
SMALL BUSINESS ACCOUNTING & FINANCIAL REPORTING
Specific Application: Client Write-Up, General Ledger, Financial Statements, Accounts Receivable, Accounts Payable, Payroll
Specific Industry: Accountants
System Requirements: IBM System/36, System/34, System/32, System/23
Memory Required: 64.0K bytes
Source Language: RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500 to $6,150
Number Installed to Date: 450

EXECUTIVE TECHNOLOGY DATA SYSTEMS (ETDS)
SOFTWARE 1040
Specific Application: In-House 1040 Processing
Specific Industry: Accountant
System Requirements: IBM System/38; SSP; IBM System/36; SSP; IBM System/34; SSP; IBM System/32
Memory Required: 48.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: No
Purchase Terms: Annual License
Price: $2,400
Date First Installed: 1988

EXECUTIVE TECHNOLOGY DATA SYSTEMS (ETDS)
TIME AND EXPENSE MANAGEMENT SYSTEM
Specific Application: Management of an Accounting Practice
Specific Industry: Accounting
System Requirements: IBM System/36; SSP; IBM System/34; SSP; IBM System/32: SCP; IBM System/23
Memory Required: 64.0K bytes
Source Language: RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,200 to $5,500
Number Installed to Date: 250
Date First Installed: July 1975

FALK ASSOCIATES, INC.
STUDENT/PARENT LOAN MANAGEMENT
Additional Product Classification: Banking
Specific Application: Student Loan Accounting, Administrating, Reporting
Specific Industry: Banking/Financial, Education
System Requirements: Prime; DEC
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250,000 to $400,000
Date First Installed: March 1979
(See Vendor Profile Page V-49)

FARALLON CONSULTING, INC.
MULTI-LEVEL MARKETING
Specific Application: Accounting System for Multilevel Marketing Corporations
Specific Industry: Pyramid Retailing
System Requirements: Basic Four
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-49)

FARALLON CONSULTING, INC.
RACKJOBBER
Specific Application: Assists Rackjobbers in Pricing
Specific Industry: Wholesale/Distribution, Retail
System Requirements: Basic Four
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 5

FARLIN CORP.
ALPHA ACCOUNT
Additional Product Classification: Manufacturing
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $6,000
Date First Installed: 1978
(See Vendor Profile Page V-49)

FARLIN CORP.
ALPHA TAX
Specific Application: 1040 Income Tax
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 60
Date First Installed: 1979

FARLIN CORP.
MUNACC
Specific Application: Municipal Accounting System for Small Cities
Specific Industry: Government
System Requirements: Alpha Micro: Amos; North Star MS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 2
Date First Installed: 1983

THE FASSE GROUP
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DEC 10: Tops 10; DEC 20: Tops 20
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 40
Date First Installed: February 1979
(See Vendor Profile Page V-49)

THE FASSE GROUP
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DEC 10: Tops 10; DEC 20: Tops 20
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 40
Date First Installed: February 1979

THE FASSE GROUP
BUDGET
Specific Application: Budget Planning Package
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DEC 10: Tops 10; DEC 20: Tops 20
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 40
Date First Installed: February 1979

THE FASSE GROUP
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DEC 10: Tops 10; DEC 20: Tops 20
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 40
Date First Installed: February 1979

THE FASSE GROUP
IBMS - INTERACTIVE BUSINESS MANAGEMENT
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: General Ledger, Accounts Payable, Purchase Order Entry, Inventory, Accounts Receivable, Budget, Security System
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS; DEC 10: Tops 10; DEC 20: Tops 20
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: February 1979

THE FASSE GROUP
PURCHASE ORDER ENTRY
Specific Application: Purchase Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DEC 10: Tops 10; DEC 20: Tops 20
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,500
Number Installed to Date: 40
Date First Installed: February 1979

F. B. CONSULTING, INC.
DOHNSCO/D
Additional Product Classification: Manufacturing
Specific Application: Inventory, General Ledger
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: DG
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000 to $15,000
(See Vendor Profile Page V-49)

FIDDE SYSTEMS MANAGEMENT GROUP, INC.
FINANCIAL MANAGEMENT SYSTEM
Specific Application: Accounts Payable, Accounts Receivable, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell DPS 6 Gcos
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

Price: $6 to $18,000
Date First Installed: 1977
(See Vendor Profile Page V-49)

FINANCIAL DECISION SYSTEMS, INC.
CORPTAX-AMS
Specific Application: Asset Management System for Corporate Tax Department
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3000, 3700 Series: OS, DOS/VSE, MVS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Price: $10,000 to $15,000
Date First Installed: 1981
(See Vendor Profile Page V-49)

FINANCIAL DECISION SYSTEMS, INC.
FEDERAL PLANNING
Specific Application: Modeling and Analysis, Planning For Federal Corporations
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3000, 3700 Series: OS, OS/VSE, MVS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing

FINANCIAL FORECAST, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 450
Date First Installed: 1975
(See Vendor Profile Page V-49)

FINANCIAL FORECAST, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 450
Date First Installed: September 1975

FINANCIAL FORECAST, INC.
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 450
Date First Installed: September 1975

FINANCIAL FORECAST, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 450
Date First Installed: 1975

FINANCIAL SOFTWARE, INC.
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll
Specific Industry: Banking/Financial, Legal, Real Estate
System Requirements: IBM System/32, System/34, System/36 SSP
Memory Required: 36.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,600 to $12,500
Number Installed to Date: 200
Date First Installed: 1973
(See Vendor Profile Page V-49)

FINANCIAL TECHNOLOGY, INC.
GL FINANCIAL INFORMATION
Additional Product Classification: Financial Modeling Languages/DSS
Specific Application: General Ledger With Financial Planning, Budget Preparation
Specific Industry: Banking/Financial
System Requirements: Burroughs B1000 MCP; NCR
Memory Required: 40.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,500 to $35,000
Number Installed to Date: 250
Date First Installed: 1970
(See Vendor Profile Page V-49)

FINPAC CORP.
FRM (FINANCIAL RESOURCE MANAGEMENT SYSTEM)
Specific Application: Financial Report Writing, General Ledger, Accounts, Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 1.0M bytes
Source Language: Fortran Macro
Source Code Available: No
Purchase Terms: Purchase (license), Rental, Lease
Price: $30,000
Number Installed to Date: 6
Date First Installed: July 1982
(See Vendor Profile Page V-49)

FISHER BUSINESS SYSTEMS, INC.
RESTAURANT MANAGEMENT SYSTEM
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: Food Cost Control, Inventory Control, Payroll, Accounts Payable, Accounts Receivable, General Ledger
System Requirements: IBM PC, PC-XT; PC-DOS; TI Professional: MS-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 200
Date First Installed: May 1980
(See Vendor Profile Page V-49)

FLORIDA AUTOMATED RESOURCES, INC.
GENERAL AVIATION
Specific Application: Accounting for the Aviation Industry
Specific Industry: Aviation
System Requirements: Burroughs B20 Btos
Memory Required: 512.0K bytes
Source Language: Cobol, Basic, Focus
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-49)

FOOTHILL ASSOCIATES
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Instrumentation Laboratory Pixel: Unix
Source Language: Fortran 77
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 10
Date First Installed: March 1983
(See Vendor Profile Page V-49)

FOOTHILL ASSOCIATES
CONSTRUCTION BUDGETARY
Specific Industry: Not Industry Sensitive
System Requirements: Instrumentation Laboratory Pixel: Unix
Source Language: Fortran 77
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 10
Date First Installed: March 1983

FRANKLEN COMPUTER SYSTEMS
ACCOUNTS PAYABLE
Specific Application: Multicompany Accounting
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $850 to $1,500
Number Installed to Date: 25
Date First Installed: 1981
(See Vendor Profile Page V-50)

FRANKLEN COMPUTER SYSTEMS
ACCOUNTS RECEIVABLE
Specific Application: Multicompany Accounting
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $850 to $1,500
Number Installed to Date: 25
Date First Installed: 1981

FRANKLEN COMPUTER SYSTEMS
CPA-11
Specific Application: Client Accounting, General Ledger, Financial Reporting
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11; DEC Rainbow: CP/M 80; DEC Professional: CP/M 86
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500 to $5,000
Number Installed to Date: 100
Date First Installed: 1979

FRANKLEN COMPUTER SYSTEMS
TCB-11
Specific Application: Professional Time and Charge for Accounting Firms
Specific Industry: Accounting
System Requirements: DEC PDP-11: RT-11; DEC Rainbow: CP/M 80; DEC Professional CP/M 86
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200 to $2,500
Number Installed to Date: 25
Date First Installed: 1981

FRISCH COMPUTER SYSTEMS, INC.
FRISCH ACCOUNTING SYSTEM
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Order Entry, Purchase Order, Payroll, Inventory
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86, MP/M, MP/M 86
Memory Required: 48.0K bytes
Source Language: Pascal MT+
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $700
Number Installed to Date: 50
(See Vendor Profile Page V-50)

GARY BROWN ASSOCIATES, INC.
FIXED ASSET MANAGEMENT SYSTEM-ON-LINE
Specific Application: Fixed Asset Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23, System/34, System/36, IBM Systems/38
Memory Required: 27.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000 to $4,200
Number Installed to Date: 25
Date First Installed: 1982
(See Vendor Profile Page V-50)

GARY GILBERTSEN & ASSOCIATES
ACCOUNTING
Specific Application: Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,600
Number Installed to Date: 18
(See Vendor Profile Page V-50)

GARY GILBERTSEN & ASSOCIATES
CASH MANAGEMENT SYSTEM
Specific Application: Cash Management
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,600

GENASYS CORP.
FOENIX (HP-3000 FEDERAL FINANCIAL)
Specific Application: Government Finanicial Accounting, General Ledger, Accounts Payable, Accounts Receivable, Travel
Specific Industry: Government
System Requirements: HP 3000: MPE
Memory Required: 1.0M bytes
Source Language: Cobol, SPL
Purchase Terms: Purchase (license)
Price: $87,500
Number Installed to Date: 2
Date First Installed: October 1981
(See Vendor Profile Page V-50)

GENERAL COMPUTER SERVICES CORP.
1040
Specific Application: Individual Tax Returns
Specific Industry: Not Industry Sensitive
System Requirements: Point Four: MTOS
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 30
Date First Installed: 1975
(See Vendor Profile Page V-51)

GENERAL COMPUTER SERVICES CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Digital Systems Galaxy: OS; Victor 9000: MS-DOS, IBM PC: PC-DOS
Memory Required: 7.0K bytes
Source Language: ALC, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 15
Date First Installed: 1981

GENERAL COMPUTER SERVICES CORP.
GENERAL LEDGER & FINANCIAL REPORTING SYSTEM
Specific Application: General Ledger and Financial Reporting System
Specific Industry: Not Industry Sensitive
System Requirements: Digital Systems Galaxy: OS; Victor 9000: MS-DOS, IBM PC: PC-DOS
Memory Required: 15.0K bytes
Source Language: ALC, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 50
Date First Installed: 1979

GENERAL COMPUTER SERVICES CORP.
INVOICING & ACCOUNTS RECEIVABLE
Specific Application: Invoicing and Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Digital Systems Galaxy: OS; Victor 9000: MS-DOS, IBM PC: PC-DOS
Memory Required: 20.0K bytes
Source Language: ACL, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 40
Date First Installed: 1979

GENERATED SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM: EDX; IBM Series/1: RPS, Wang: VS
Source Language: Cobol, Assembler
Source Code Available: Yes
Date First Installed: 1971
(See Vendor Profile Page V-51)

GENERATED SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM: EDX; IBM Series/1: RPS; Wang: VS
Source Language: Cobol, Assembler
Source Code Available: Yes
Date First Installed: 1971

GENERATED SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM: EDX; IBM Series/1: RPS; Wang: VS
Source Language: Cobol, Assembler
Source Code Available: Yes
Date First Installed: 1971

GENERATED SYSTEMS, INC.
LAWN CARE ACCOUNTING SYSTEM
Specific Application: Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM: EDX; IBM Series/1: RPS, Wang: VS
Source Language: Cobol, Assembler
Date First Installed: 1981

GENERATED SYSTEMS, INC.
PARKING TICKET ACCOUNTING SYSTEM
Specific Application: Accounting
Specific Industry: Government, Other
System Requirements: IBM: EDX; Wang: VS, IBM Series/1: RPS
Source Language: Cobol, Assembler
Source Code Available: Yes
Date First Installed: 1983

GILBERT COMMONWEALTH, INC.
CUE PROJECT MANAGEMENT SYSTEM
Additional Product Classification: Graphics, Report Generator
Specific Application: Accounts Payable, Planning, Scheduling, General Ledger, Graphics Report Writer, DBMS, Purchase Estimating
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE, Prime: Primos, DEC VAX: VMS
Memory Required: 2.0M bytes
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 60
Date First Installed: Dec. 1978
(See Vendor Profile Page V-51)

GLENN A. BARBER AND ASSOCIATES
NBSI PACKAGE
Additional Product Classification: Payroll/Personnel
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Order Entry, Inventory Control, Sales Analysis, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RT-11; Wang: TSX Plus: RSTS/E: VS
Memory Required: 64.0K bytes
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-51)

GLOBAL HEALTH SYSTEM, INC.
PATIENT MANAGEMENT SYSTEM (PMS)
Specific Application: Medical Management Information System
System Requirements: DEC: RSX-11, VAX: Mumps; IBM PC: Mumps
Source Language: Mumps
Purchase Terms: Purchase (License), Lease
Price: $20,000 to $100,000
Number Installed to Date: 30
Date First Installed: 1978
(See Vendor Profile Page V-51)

GLOBAL HEALTH SYSTEM, INC.
GLOBAL HEALTH SYSTEM PATIENT MANAGEMENT SYSTEM FOR HOSPITALS
Specific Application: Order Entry, Results Reporting, Registration, Admission, Discharge
System Requirements: DEC: RSX-11, VAX: Mumps, IBM PC: Mumps
Source Language: Mumps
Purchase Terms: Purchase (License), Lease
Number Installed to Date: 2
Date First Installed: 1981

GLOBAL SOFTWARE, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS/OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30 to $50,000
Number Installed to Date: 200+
Date First Installed: 1978
(See Vendor Profile Page V-52)

GSD SYSTEMS INTERNATIONAL, INC.
ADVANCED FIXED ASSET ACCOUNTING
Specific Application: Fixed Asset Depreciation and Tax Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/38
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $14,400
Number Installed to Date: 40
Date First Installed: May 1981
(See Vendor Profile Page V-52)

GOODE BUSINESS SYSTEMS, INC.
GENERAL FINANCIAL
Additional Product Classification: Payroll/Personnel
Specific Application: Accounting, Payroll, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Dec/at: Basic
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1977
(See Vendor Profile Page V-52)

GREAT DIVIDE SOFTWARE
EASY
Specific Application: General Ledger, Check Printing
Specific Industry: Not Industry Sensitive
System Requirements: Apple III: CP/M, NEC DOS, IBM
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,095
(See Vendor Profile Page V-52)

GREAT DIVIDE SOFTWARE
G/L PLUS
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: CP/M, Apple III
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $495

GREAT DIVIDE SOFTWARE
SERVICE MANAGER
Specific Application: Inventory and Service Management
Specific Industry: Not Industry Sensitive
System Requirements: NEC; IBM CP/M; Apple II: APPLE-DOS
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,895

[illegible] SYSTEMS, INC.
ASAP — ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: BTI 8000: VRM, BTI 5000: Multiuser
Memory Required: 6.4M bytes
Source Language: Extended Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 80
Date First Installed: June 1978
(See Vendor Profile Page V-52)

GRW SYSTEMS, INC.
ASAP — ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: BTI 8000: VRM, BTI 5000: Multiuser
Memory Required: 6.4M bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 80
Date First Installed: June 1978

GRW SYSTEMS, INC.
ASAP — GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: BTI 8000: VRM, BTI 5000
Memory Required: 6.4M bytes
Source Language: Extended Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 100
Date First Installed: June 1978

GRW SYSTEMS, INC.
ASAP — INVOICES
Specific Application: Automated Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: BTI 8000: VRM, BTI 5000: Multiuser
Memory Required: 6.4M bytes
Source Language: Extended Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 35
Date First Installed: July 1980

GRW SYSTEMS, INC.
FIXED ASSET ACCOUNTING
Specific Application: Fixed Asset Accounting
Specific Industry: Not Industry Sensitive
System Requirements: BTI 8000: VRM, BTI 5000: Multiuser
Memory Required: 6.4M bytes
Source Language: Basic Extended
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 30
Date First Installed: September 1981

G.S.S. COMPUTER SALES, INC.
LOAN TRACKING SYSTEM
Additional Product Classification: Banking, Sort/Merge, WP/Text Editing, Report Generator, Data/File Management
Specific Application: Loan Tracking, Market Analyst, General Ledger, Accounts Payable, Accounts Receivable, WP
Specific Industry: Banking/Financial
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Purchase Terms: Purchase (license); Lease
Price: $12,500
Number Installed to Date: 5
Date First Installed: October 1982
(See Vendor Profile Page V-53)

GTS COMPUTER SYSTEMS, INC.
ROUTE
Additional Product Classification: Payroll/Personnel
Specific Application: Payroll, Payables, Receivables, General Ledger, Data Capture, Sales Analysis and Inventory
Specific Industry: Wholesale/Distribution
System Requirements: HP 3000: MPE IV
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $24,400
Date First Installed: February 1979
(See Vendor Profile Page V-53)

GULL RESOURCE MANAGEMENT SYSTEM
MRO (MANUFACTURING MANAGEMENT AND CONTROL)
Additional Product Classification: Payroll/Personnel
Specific Application: Inventory Progress Payment
Specific Industry: Engineering
System Requirements: Prime: Primos
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $500,000
Number Installed to Date: 150
(See Vendor Profile Page V-53)

H & A COMPUTER SYSTEMS
TIME/1
Additional Product Classification: Management
Specific Application: Legal Office Account and Management
Specific Industry: Legal
System Requirements: IBM Series/1: EDX
Memory Required: 10.0K bytes
Source Language: PXS
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 5
Date First Installed: 1982
(See Vendor Profile Page V-53)

HAMLIN, WILLIAMS, & ASSOCIATES, INC.
COUNTRY CLUB BILLING
Specific Application: Member Billing, Accounts Receivable
Specific Industry: Country Club
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 7
Date First Installed: June 1981
(See Vendor Profile Page V-53)

HAMLIN, WILLIAMS, & ASSOCIATES, INC.
FLORIST'S ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable for Retail Florist With Wire Service Affiliations
Specific Industry: Retail
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: September 1982

HARRIS DATA SERVICE
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP
Memory Required: 32.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 75
Date First Installed: October 1978
(See Vendor Profile Page V-53)

HARRIS DATA SERVICE
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38: CL
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000 to $3,500
Number Installed to Date: 50
Date First Installed: October 1978

HARRIS DATA SERVICE
SYSTEM/34/36 ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP; System/38: CL
Memory Required: 32.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 100
Date First Installed: October 1978

HARRIS DATA SERVICE
SYSTEM/34/36 GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM: SSP
Memory Required: 32.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $5,500
Number Installed to Date: 100
Date First Installed: October 1978

HARTRO COMPUTER SYSTEMS, INC.
INTEGRATED CONTRACTOR SERVICE SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Service Industry Operation Management
Specific Industry: Service Organization
System Requirements: Centurion: CPU 6.
Memory Required: 128.0K bytes
Source Language: CPL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000 to $15,000
Number Installed to Date: 16
Date First Installed: July 1981
(See Vendor Profile Page V-53)

HARVEST COMPUTER, INC.
CREATE MANAGEMENT SYSTEM
Specific Application: Accounting Package for Institution Departmental Use, Tracks Multiple Funds
Specific Industry: Medical, Education
System Requirements: DEC PDP-11: Unix
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 6
Date First Installed: October 1980
(See Vendor Profile Page V-53)

HARVEST CORP.
RETAIL MERCHANDISING SYSTEM
Specific Application: Handles Cash Registers, Processes Daily Reports, Discounts
Specific Industry: Retail
System Requirements: IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000 to $15,000
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-53)

HCE COMPUTER CONSULTANTS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 96.0K bytes
Source Language: Cobol 74
Source Code Available: Yes

Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 5
Date First Installed: January 1981
(See Vendor Profile Page V-54)

NCE COMPUTER CONSULTANTS
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 96.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 5
Date First Installed: January 1981

NCE COMPUTER CONSULTANTS
GENERAL ACCOUNTING
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 96.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 5
Date First Installed: January 1981

NCE COMPUTER CONSULTANTS
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 96.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 5
Date First Installed: January 1981

N & E COMPUTRONICS, INC.
VERSA LEDGER II
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS; PC-DOS, Apple II, IIE, II+ APPLE-DOS
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 10,000
Date First Installed: August 1982
(See Vendor Profile Page V-54)

N & E COMPUTRONICS, INC.
VERSA RECEIVABLES
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS, PC-DOS; Apple II, IIE, II+ APPLE-DOS
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 6,000
Date First Installed: July 1982

NEINECK ASSOCIATES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36: SSP
Memory Required: 64.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 70
Date First Installed: 1978
(See Vendor Profile Page V-54)

NEINECK ASSOCIATES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36: SSP
Memory Required: 64.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 70
Date First Installed: 1978

NEINECK ASSOCIATES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36: SSP
Memory Required: 64.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 70
Date First Installed: 1978

NEINECK ASSOCIATES, INC.
ORDER ENTRY/BILLING
Specific Application: Order Entry, Billing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36 SSP
Memory Required: 64.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 70
Date First Installed: 1978

NEURISTEEA CORP.
FINANCIAL REPORTING AND GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll, Financial Statements, Budgeting
Specific Industry: Manufacturing
System Requirements: Prime 2250, 250-850 Primos
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 4
Date First Installed: October 1982
(See Vendor Profile Page V-54)

NEURISTEEA CORP.
LEGAL TIME AND BILLING SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Time and Billing Accounts Receivable, General Ledger, Accounts Payable, Payroll, Conflict of Interest, Docketing, Calendar Control
Specific Industry: Legal
System Requirements: Prime 2250, 250, 850 Primos
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Share
Number Installed to Date: 31
Date First Installed: February 1978

NEWITT ASSOCIATES
NEWITT ASSOCIATES PLAN ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Contribution Plan Participation, Record Keeping
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4341: MVS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Lease
Price: $100,000
Number Installed to Date: 75
Date First Installed: 1974
(See Vendor Profile Page V-54)

NIGGINS OFFICE PRODUCTS, INC.
INDEPENDENT TELEPHONE COMPANY SYSTEM
Additional Product Classification: Management
Specific Application: Subscriber Billing, Plant Accounting
Specific Industry: Telephone
System Requirements: Point 4 Mark V, Mark VII Iris, Point 4 Mark III Bits
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 2
Date First Installed: 1981
(See Vendor Profile Page V-54)

NIGGINS OFFICE PRODUCTS, INC.
SHCOOL FINANCIAL PACKAGE
Specific Application: General Ledger, Accounts Payable, Encumberances Purchase Order
Specific Industry: Not Industry Sensitive
System Requirements: Point 4 Mark V, Mark VII Iris, Point 4 Mark III Bits
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 5
Date First Installed: 1983

NSSS, INC.
NURSING HOME SYSTEM
Additional Product Classification: Insurance, Medical
Specific Application: Nursing Home
Specific Industry: Medical, Nursing Home
System Requirements: Wang 2200 Series
Memory Required: 64.0K bytes
Source Language: Wang Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $20 to $30,000
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-54)

NSSS, INC.
SYMPHONY/PERFORMANCE ARTS SYSTEM
Additional Product Classification: WP/Text Editing, Fund Raising
Specific Application: Fund Raising, Subscription, Ticketing, WP, General Ledger
Specific Industry: Performing Arts
System Requirements: Wang 2200 Series
Memory Required: 64.0K bytes
Source Language: Wang Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000 to $25,000
Number Installed to Date: 2
Date First Installed: 1982

HOLGUIN AND ASSOCIATES
ENGINEERING ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel, WP/Text Editing
Specific Application: Payroll, Job Costing, WP, Optional Accounts Payable, Accounts Receivable, General Ledger
Specific Industry: Engineering
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $9,500
Number Installed to Date: 6
Date First Installed: 1982
(See Vendor Profile Page V-55)

HONEYWELL, INC.
FMS GENERAL LEDGER (ON-LINE)
Specific Application: On-Line Chart-of-Account, Subaccount, Budget Updating and Display, Budget Balance Forward
Specific Industry: Banking/Financial
System Requirements: Honeywell DPS Gcos 8
Purchase Terms: Purchase (license)
Price: $3,320
(See Vendor Profile Page V-55)

HONEYWELL, INC.
FMS CASH FLOW MANAGEMENT SYSTEM
Specific Application: Planning, Control of Investment and Borrowing Programs
Specific Industry: Banking/Financial
System Requirements: Honeywell DPS Gcos 8
Purchase Terms: Purchase (license)
Price: $15,000

HONEYWELL, INC.
HCSS/DPS 8 ACCOUNTS PAYABLE
Specific Application: Captures Daily Payables, Information Input and

Retention for Periodic Processing and Reporting; Maintains Vendor Information
Specific Industry: Health Care
System Requirements: Honeywell DPS Gcos 8
Purchase Terms: Purchase (license)
Price: $5,500

[illegible], INC.
HCSS/DPS 8 GENERAL LEDGER/RESPONSIBILITY
Specific Application: Database for Cost Analysis, Budget Appraisal of Revenue and Expense Accounts, Asset and Liabilities
Specific Industry: Health Care
System Requirements: Honeywell DPS Gcos 8
Purchase Terms: Purchase (license)
Price: $9,000
Date First Installed: 1900

HONEYWELL, INC.
HCSS/DPS 8 PROPERTY LEDGER
Specific Application: Managing Physical Assets for Hospitals; Property Description, Location, Classifications Status, Life Expectancy, Method of Depreciation
Specific Industry: Health Care
System Requirements: Honeywell [illegible]
Purchase Terms: Purchase (license)
Price: $2,500

HOTEL INFORMATION SYSTEMS
BACK OFFICE
Specific Application: General Accounting for Hospitality Centers
Specific Industry: Hotel
System Requirements: IBM System/34, System/36, System/38, PC
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1979
(See Vendor Profile Page V-55)

[illegible]
ACCOUNTING
Specific Application: General Accounting and Shop Scheduling for Maintenance
Specific Industry: Wholesale/Distribution
System Requirements: DEC PDP-11 RSTS/E
Memory Required: 32.0K bytes
Source Language: Basic+
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-55)

[illegible]
GENERAL LEDGER
Specific Application: Accounts Payable, Accounts Receivable, General Ledger
Specific Industry: Not Industry [illegible]
System Requirements: DEC PDP-11 RSTS/E
Memory Required: 32.0K bytes
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)

HOUSTON TIRE SHARING
SUB DIVISION BILLING SYSTEM
Specific Application: General Billing System for Trash Collectors
Specific Industry: Sanitation Collector
System Requirements: DEC PDP-11 RSTS/E
Memory Required: 32.0K bytes
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)

H/R COMPUTER SYSTEMS & SOFTWARE
FUEL OIL
Specific Application: Accounting, Management
Specific Industry: Petroleum
System Requirements: Infotest: Joel, DEC PDP-8, PDP-11/23, MS-DOS, Q
Source Language: Hibol, Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 29
Date First Installed: 1978
(See Vendor Profile Page V-54)

H/R COMPUTER SYSTEMS & SOFTWARE
GENERAL ACCOUNTING
Specific Application: General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Infotest: Joel, DEC PDP-8, PDP-11/23; MS-DOS, Q
Source Language: Hibol, Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1978

ICAS COMPUTER SERVICES, INC.
ICAS INVENTORY
Additional Product Classification: Inventory
Specific Application: Inventory Control, POS, Invoicing
Specific Industry: Auto Parts
System Requirements: DEC PDP-8, Decmate 1
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $10,000 to $20,000
Number Installed to Date: 600
Date First Installed: 1977
(See Vendor Profile Page V-56)

ICCS CORP.
ICCS ENTERTAINMENT INDUSTRY
Specific Application: Production Cost and Residual Tracking
System Requirements: Wang VS
Memory Required: 256.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000 to $100,000
Number Installed to Date: 4
Date First Installed: October 1981
(See Vendor Profile Page V-56)

ICS SERVICES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 25
(See Vendor Profile Page V-56)

ICS SERVICES, INC.
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 25

ICS SERVICES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 25

I C SYSTEMS, INC.
IC DENTAL LAB
Specific Application: Operational and Financial Accounting
System Requirements: TI 300, 800; DX-10
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $45,000 to $85,000
Number Installed to Date: 8
Date First Installed: 1981
(See Vendor Profile Page V-56)

IBC CORP.
QB 2000
Specific Application: General Business, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry [illegible]
System Requirements: HP 3000: MPE
Source Language: RPG-II, SPL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 115
Date First Installed: 1977
(See Vendor Profile Page V-56)

IDEAL SYSTEMS INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Rural Electric
System Requirements: Burroughs B90, B900, B1900, CMS
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: November 1982

IDEAL SYSTEMS INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Rural Electric
System Requirements: Burroughs B90, B900, B1900, CMS
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: November 1982

I E H CORP.
PLAN-IT
Additional Product Classification: Financial Modeling Languages/DSS
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $1,500
Number Installed to Date: 5
Date First Installed: July 1981
(See Vendor Profile Page V-56)

IMI AFFILIATED SERVICES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Banking/Financial, Medical
System Requirements: IBM System/36
Source Language: CPT
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 25
Date First Installed: October 1981
(See Vendor Profile Page V-56)

IMI AFFILIATED SERVICES, INC.
DRG REPORTING
Specific Application: Clinical Administrative Accounting
Specific Industry: Banking/Financial, Medical
System Requirements: IBM System/36
Source Language: CPT
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $13,000
Number Installed to Date: 25
Date First Installed: October 1981

IMI AFFILIATED SERVICES, INC.
FIXED ASSET
Specific Application: Fixed Assets
Specific Industry: Banking/Financial, Medical
System Requirements: IBM System/36

Source Language: CPT
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 26
Date First Installed: October 1981

IHC AFFILIATED SERVICES, INC.
GENERAL LEDGER 1
Specific Application: General Ledger
Specific Industry: Banking/Financial, Medical
System Requirements: IBM System/38
Source Language: CPT
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 26
Date First Installed: October 1981

IHC AFFILIATED SERVICES, INC.
GENERAL LEDGER 2
Specific Application: General Ledger
Specific Industry: Banking/Financial, Medical
System Requirements: IBM System/38
Source Language: CPT
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 26
Date First Installed: October 1981

IHC AFFILIATED SERVICES, INC.
PATIENT ACCOUNTING, HISTORY AND ADMISSIONS
Additional Product Classification: Medical
Specific Application: Accounting
Specific Industry: Banking/Financial, Medical
System Requirements: IBM System/38
Source Language: CPT
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 26
Date First Installed: October 1981

IHC AFFILIATED SERVICES, INC.
SCHEDULING
Specific Application: Accounting, Administrative
Specific Industry: Banking/Financial, Medical
System Requirements: IBM System/38
Source Language: CPT
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 26
Date First Installed: September 1981

IH SYSTEMS, INC.
THASE 3
Specific Application: Back Office Accounting
System Requirements: Tandem: Pathway
Source Language: Cobol 74
Source Code Available: Yes
Number Installed to Date: 4
Date First Installed: January 1983
(See Vendor Profile Page V-56)

IMREX CO., INC.
FEDERAL STOCK NUMBER PROGRAM
Specific Application: Vendor Search, Product Look-up, RFQ Component Program
Specific Industry: Manufacturing, Government
System Requirements: IBM System/38
Source Language: RPG-III
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-56)

INFOCON CORP.
INTERACTIVE ACCOUNTS PAYABLE SYSTEM
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38 Model 3: Data Base
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $5,000
Number Installed to Date: 5
Date First Installed: September 1982
(See Vendor Profile Page V-57)

INFOCON CORP.
INTERACTIVE GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $5,000
Number Installed to Date: 6
Date First Installed: September 1982

INFOCON CORP.
INTERACTIVE OPEN ITEM ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38, Data Base
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $5,000
Number Installed to Date: 7
Date First Installed: 1983

INFO-DATA SERVICES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38 CPS
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 200
(See Vendor Profile Page V-57)

INFO-DATA SERVICES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 CPS, System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 200
Date First Installed: 1978

INFO-DATA SERVICES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 CPS, IBM System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Lease
Date First Installed: 1978
(See Vendor Profile Page V-57)

INFORMATICS GENERAL CORP.
ACCOUNTS RECEIVABLE
Specific Industry: Banking/Financial
System Requirements: IBM System/36, System/34, System/23; PC-XT PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: RPG-II, Basic, MS Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,100
(See VendorProfile Page V-57)

INFORMATICS GENERAL CORP.
AP - ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Banking/Financial
System Requirements: IBM System/36, System/34, System/23; PC-XT PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: RPG-II, Basic, MS Cobol

INFORMATICS GENERAL CORP.
DEPRECIATION - DE
Specific Industry: Banking/Financial, Real Estate
System Requirements: IBM System/36, System/34, System/23; PC-XT PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: RPG-II, Basic, MS Cobol
Purchase Terms: Purchase (license)
Price: $1,000

INFORMATICS GENERAL CORP.
DUE DATE MONITORING
Specific Industry: Banking/Financial
System Requirements: IBM System/36, System/34, System/23; PC-XT PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: RPG-II, Basic, MS Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750

INFORMATICS GENERAL CORP.
PAYROLL CHECKWRITING - PC
Specific Industry: Banking/Financial, Real Estate
System Requirements: IBM System/36, System/34, System/23; PC-XT PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: RPG-II, Basic, MS Cobol
Purchase Terms: Purchase (license)
Price: $2,000

INFORMATICS GENERAL CORP.
PRACTICE MANAGEMENT - PM
Specific Industry: Banking/Financial
System Requirements: IBM System/36, System/34, System/23; PC-XT PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: RPG-II, Basic, MS Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,300

INFORMATICS GENERAL CORP.
QUICK-LOOK TAX PLANNER
Specific Industry: Banking/Financial
System Requirements: IBM System/36, System/34, System/23; PC-XT PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: RPG-II, Basic, MS Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495

INFORMATICS GENERAL CORP.
RANDOM NUMBER GENERATOR
Specific Industry: Banking/Financial
System Requirements: IBM System/36, System/34, System/23; PC-XT PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: RPG-II, Basic, MS Cobol
Source Code Available: No
Purchase Terms: Purchase (license)

INFORMATICS GENERAL CORP.
SALES ANALYSIS - SA
Specific Industry: Banking/Financial
System Requirements: IBM System/36, System/34, System/23; PC-XT PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: RPG-II, Basic, MS Cobol

INFORMATICS GENERAL CORP.
SECURITY SYSTEM
Specific Industry: Banking/Financial, Real Estate
System Requirements: IBM System/36, System/34, System/23; PC-XT PC-DOS 2.0
Source Language: RPG-II, Basic, MS Cobol
Purchase Terms: Purchase (license)
Price: $1,000

INFORMATICS GENERAL CORP.
STAFF SCHEDULING
Specific Industry: Banking/Financial
System Requirements: IBM System/36, System/34, System/23; PC-XT PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: RPG-II, Basic, MD Cobol

Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,100

INFORMATICS GENERAL CORP.
SUBSIDIARY LEDGER (SL)
Specific Industry: Banking/Financial, Real Estate
System Requirements: IBM System/36, System/34, System/23, PC-XT· PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: RPG-II, Basic, MS Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200

INFORMATICS GENERAL CORP.
TAX 1040
Specific Industry: Banking/Financial, Real Estate
System Requirements: IBM System/36, System/34, System/23, PC-XT· PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: RPG-II, Basic, MS Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,400

INFORMATION AND SYSTEMS RESEARCH, INC.
MAMS
Additional Product Classification: Payroll/Personnel
Specific Application: Municipal Accounting Management
Specific Industry: Government
System Requirements: DEC PDP-11: RT-11, RSTS/E; DEC VAX: VMS
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 6
Date First Installed: June 1982
(See Vendor Profile Page V-57)

INFORMATION MANAGEMENT CONSULTANTS, INC.
SAM (SYSTEM FOR ASSET MANAGEMENT)
Specific Application: Fixed Assets Package, Tracks Assets and Depreciation
Specific Industry: Manufacturing, Retail
System Requirements: Wang VS: Vsos
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-57)

INFORMATION PROCESSING ARCHITECTS
RADIO COMMON CARRIER
Specific Application: Accounts Receivable Inventory of Devices Used by Pager and Mobile Terminals
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200: Basic II
Memory Required: 64.0K bytes
Source Language: Link
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: June 1981
(See Vendor Profile Page V-58)

INFORMATION STRUCTURE, INC.
INTEGRATED PUBLICATION SYSTEM
Specific Application: Integrated Publisher's Information System
Specific Industry: Publishing
System Requirements: DEC PDP-11/23: RSX-11M, DEC Professional 350: PRO/OS
Memory Required: 128.0K bytes
Source Language: Basic, PL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000
Date First Installed: January 1982
(See Vendor Profile Page V-58)

INFORMATION SYSTEMS ENGINEERING
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll, Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: DG· R·DOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 25
Date First Installed: March 1982
(See Vendor Profile Page V-58)

INFORMATION SYSTEMS OF AMERICA, INC.
FORETAX
Specific Application: State and Federal Tax Compliance and Planning
Specific Industry: Not Industry Sensitive
System Requirements: Amdahl 470/V6· OS, MVS, VSI; CDC Omega: OS, MVS, VSI; CDC Cyber: NOS, DEC 10· Tops 10
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 120
Date First Installed: 1973
(See Vendor Profile Page V-58)

INFORMATION SYSTEMS OF AMERICA, INC.
ISA/ACCOUNTING, BUDGET AND COST SYSTEM
Specific Application: General Ledger
Specific Industry: Insurance
System Requirements: IBM 360, 370, 3030 Series, Honeywell
Memory Required: 150.0K bytes
Source Language: Ansi Cobol, Assembler
Purchase Terms: Purchase (license)
Number Installed to Date: 260

INFORMATION SYSTEMS OF AMERICA, INC.
ISA/ACCOUNTS PAYABLE PORTFOLIO
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 3708, 4300 Series: OS, DOS/VS, VSE, HP3000· MPE IV, Prime: Primos, Univac 1100· OS/1100
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 400
Date First Installed: February 1971

INFORMATION SYSTEMS OF AMERICA, INC.
ISA/ACCOUNTS RECEIVABLE PORTFOLIO
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300· OS, DOS/VS, VSE, HP 3000· MPE IV; Prime 500 and up: Primos, Univac 1100: OS/1100
Source Language: Cobol
Purchase Terms: Purchase (license)
Number Installed to Date: 160
Date First Installed: October 1978

INFORMATION SYSTEMS OF AMERICA, INC.
ISA/BOND AND STOCK SYSTEM
Additional Product Classification: Banking
Specific Application: Investment Management
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM 360, 370· OS, OS/VS, IBM 360, 370, 3000 Series: DOS, DOS/VS
Memory Required: 100.0K bytes
Source Language: Ansi Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 163
Date First Installed: March 1971

INFORMATION SYSTEMS OF AMERICA, INC.
ISA/CASH DISBURSEMENT SYSTEM
Specific Application: Accounts Payable
Specific Industry: Insurance
System Requirements: IBM 360, 370, 3030.
Memory Required: 150.0K bytes
Source Language: Ansi Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: August 1976

INFORMATION SYSTEMS OF AMERICA, INC.
ISA/FIXED ASSETS PORTFOLIO
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300 Series: OS, DOS/VS, VSE; HP 3000· MPE IV, Prime: Primos, Sperry Univac 1100: OS/1100
Source Language: Cobol
Purchase Terms: Purchase (license)
Number Installed to Date: 230
Date First Installed: July 1971

INFORMATION SYSTEMS OF AMERICA, INC.
ISA/GENERAL LEDGER PORTFOLIO
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300 Series: OS, DOS/VS, VSE, HP 3000· MPE IV, Prime: Primos, Univac 1100· OS/1100
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 410
Date First Installed: June 1972

INFORMATION SYSTEMS OF AMERICA, INC.
ISA/ON-LINE SECURITIES CONTROL
Additional Product Classification: Banking
Specific Application: Securities and Investment Management
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM 360, 370, 4300 Series: OS/VS, DOS/VS
Memory Required: 750.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 87
Date First Installed: September 1975

INFORMATION TECHNOLOGY, INC.
FIXED ASSET ACCOUNTING SYSTEM
Specific Application: Inventory of Fixed Assets
Specific Industry: Banking/Financial
System Requirements: Burroughs B90, B900: CMS; Burroughs B1000; B90: CMS; Burroughs B1000
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,900
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-58)

INFORMATION TECHNOLOGY, INC.
PERSONAL ACCOUNTING SYSTEM (PAS)
Additional Product Classification: Banking
Specific Application: General Ledger, Accounting,
Specific Industry: Banking/Financial
System Requirements: Burroughs B90: CMS; Burroughs B1000
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,900
Number Installed to Date: 25
Date First Installed: 1982

INFORMATION UNLIMITED SOFTWARE, INC.
GENERAL LEDGER
Specific Application: General Ledger, Budgetary Accountng
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: Virtual Cobol, IBM PC· PC-DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $1,150
Number Installed to Date: 50
Date First Installed: 1977
(See Vendor Profile Page V-58)

INNOVATEK MICROSYSTEMS, INC.
TIME TRACK V2.1
Specific Application: Cost Accounting Job Records
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/05, LSI-11; RT-11
Memory Required: 26.0K bytes
Source Language: Macro-11
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $775
Date First Installed: 1982
(See Vendor Profile Page V-59)

INNOVATIVE COMPUTER APPLICATIONS, INC.
BILLING SYSTEM
Specific Application: Billing Anesthesiologists
Specific Industry: Medical
System Requirements: Honeywell Level 6: Model 200, Model 400
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: July 1982
(See Vendor Profile Page V-59)

INNOVATIVE COMPUTING CORP.
ITS ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Freight Carriers
System Requirements: IBM System/34, System/36, System/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1976
(See Vendor Profile Page V-59)

INNOVATIVE COMPUTING CORP.
ITS ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Freight Carriers
System Requirements: IBM System/34, System/36, System/38
Memory Required: 128 0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1976

INNOVATIVE COMPUTING CORP.
ITS BUDGET
Specific Application: Budgeting
Specific Industry: Freight Carriers
System Requirements: IBM System/34, IBM System/36, IBM System/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1976

INNOVATIVE COMPUTING CORP.
ITS DRIVERS LOG AUDIT
Specific Application: Auditing
Specific Industry: Freight Carriers
System Requirements: IBM System/34, System/36, System/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1976

INNOVATIVE COMPUTING CORP.
ITS FUEL TAX REPORTING
Specific Application: Fuel Tax Reporting
Specific Industry: Freight Carriers
System Requirements: IBM System/34, System/36, System/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1976

INNOVATIVE COMPUTING CORP.
ITS GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Freight Carriers
System Requirements: IBM System/34, System/36, System/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1976

INNOVATIVE DATA SYSTEMS OF LOUISANA, INC.
MARGINS
Specific Application: Utility Billing, General Accounting
System Requirements: Honeywell: Gcos
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 2
Date First Installed: January 1983
(See Vendor Profile Page V-59)

INNOVATIVE MANAGEMENT, INC.
GENERAL ACCOUNTING
Specific Application: General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: TI 990: DX-10
Memory Required: 265.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: September 1981
(See Vendor Profile Page V-59)

INNOVATIVE PROFESSIONAL SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Legal
System Requirements: Datapoint: CP/M; Televideo: DOS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: September 1979
(See Vendor Profile Page V-59)

INNOVATIVE PROFESSIONAL SYSTEMS, INC.
REAL ESTATE CLOSING
Specific Application: Documenting for Real Estate Closings
Specific Industry: Legal
System Requirements: Datapoint: CP/M; Televideo: DOS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: October 1979

INNOVATIVE PROFESSIONAL SYSTEMS, INC.
TRUST ACCOUNTING
Specific Application: Legal Record Accounting
Specific Industry: Legal
System Requirements: Datapoint: CP/M; Televideo: DOS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: October 1979

INTEGRAL BUSINESS COMPUTING, INC.
BUSINESS MANAGEMENT SYSTEM
Additional Product Classification: Inventory
Specific Application: Order Entry, Sales Analysis, Billing, Purchasing, Inventory Management
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: DG: AOS, Dmos
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1978
(See Vendor Profile Page V-59)

INTEGRAL BUSINESS COMPUTING, INC.
INTEGRATED ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: DG: AOS, Dmos
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1978

INTEGRATED BUSINESS METHODS, INC.
ACCIDENT/HEALTH BILLING AND RETRIEVAL
Specific Application: Billing and Retrieval of Group Insurance Administrators
Specific Industry: Insurance
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 2
Date First Installed: 1981
(See Vendor Profile Page V-59)

INTEGRATED MANAGEMENT SERVICES, INC.
INTERACTIVE COLLECTION SYSTEM
Specific Application: Collection of Delinquent Accounts Receivable
Specific Industry: Manufacturing, Retail, Banking/Financial, Medical
System Requirements: HP 3000: MPE IV-
Memory Required: 512.0K bytes
Source Language: Cobol, SPL
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease, Time-Sharing
Number Installed to Date: 1
Date First Installed: September 1982
(See Vendor Profile Page V-59)

INTEGRATED OFFICE SYSTEMS
CLUB MANAGEMENT SYSTEM (CMS)
Specific Application: Membership Maintenance, Accounts Receivable
System Requirements: Datapoint 1550,1800, DOS
Memory Required: 64.0K bytes
Source Language: Databus, Datashare
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 3
Date First Installed: January 1981
(See Vendor Profile Page V-60)

INTEL CORP.
TAPS
Specific Application: Transcation Processing
Specific Industry: Commercial
System Requirements: Intel 86/435: Imax, Intel 86/445
Memory Required: 1.0M bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: September 1982
(See Vendor Profile Page V-60)

INTERACTIVE COMPUTER SYSTEMS CORP.
EMPLOYEES RECEIVABLES AND TRAVEL EXPENSES
Specific Application: Travel Expense Control, Reimburses Employees, Reconciles Vendor Billing
Specific Industry: Not Industry Sensitive
System Requirements: IBM Mainframes, Wang VS VS/OS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 25
Date First Installed: September 1982
(See Vendor Profile Page V-60)

INTERACTIVE COMPUTER SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10; IBM: PC-DOS; Apple: CP/M; Onyx: Oasis

Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 25
Date First Installed: 1981
(See Vendor Profile Page V-60)

INTERACTIVE COMPUTER SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10; IBM: PC-DOS; Apple: CP/M; Onyx: Oasis
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 25
Date First Installed: 1981

INTERACTIVE COMPUTER SYSTEMS, INC.
FIXED ASSSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10; IBM: PC-DOS; Apple: CP/M; Onyx: Oasis
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 26
Date First Installed: 1981

INTERACTIVE COMPUTER SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10; IBM: PC-DOS, Apple: CP/M; Onyx: Oasis
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 26
Date First Installed: 1981

INTERACTIVE COMPUTING
NCBA FINANCIAL ACCOUNTING
Specific Application: General Accounting
Specific Industry: Manufacturing
System Requirements: DEC PDP: TSX. DEC VAX. RT-11, VMS
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $1,500
Number Installed to Date: 5
Date First Installed: 1981
(See Vendor Profile Page V-60)

INTERACTIVE MANAGEMENT SYSTEMS CORP.
ALERT
Additional Product Classification: Inventory
Specific Application: Rental Contract Calculation, Accounting, Inventory Control
System Requirements: DG: R-DOS, AOS

Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $10,000
Date First Installed: 1982
(See Vendor Profile Page V-60)

INTERACTIVE MANAGEMENT SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive, Manufacturing
System Requirements: DEC PDP-11: RSTS/E, DEC VAX: VMS
Source Language: Basic, Basic Plus II
Purchase Terms: Purchase (license); Rental; Lease, Time-Sharing
Date First Installed: September 1974
(See Vendor Profile Page V-60)

INTERACTIVE MANAGEMENT SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive, Manufacturing
System Requirements: DEC PDP-11: RSTS/E, DEC VAX: VMS
Source Language: Basic, Basic Plus II
Purchase Terms: Purchase (license); Rental; Lease, Time-Sharing
Date First Installed: September 1974

INTERACTIVE MANAGEMENT SYSTEMS, INC.
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive, Manufacturing
System Requirements: DEC PDP-11: RSTS/E, DEC VAX: VMS
Source Language: Basic, Basic Plus II
Purchase Terms: Purchase (license); Rental; Lease, Time-Sharing
Date First Installed: September 1974

INTERACTIVE MANAGEMENT SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive, Manufacturing
System Requirements: DEC PDP-11: RSTS/E, DEC VAX: VMS
Source Language: Basic, Basic Plus II
Purchase Terms: Purchase (license); Rental; Lease, Time-Sharing
Date First Installed: September 1974

INTERACTIVE MANAGEMENT SYSTEMS, INC.
PURCHASING
Specific Application: Purchasing
Specific Industry: Not Industry Sensitive, Manufacturing
System Requirements: DEC PDP-11: RSTS/E, DEC VAX: VMS
Source Language: Basic, Basic Plus II
Purchase Terms: Purchase (license); Rental; Lease, Time-Sharing
Date First Installed: 1974

INTERACTIVE SYSTEMS, INC.
SOFTWARE INTERNATIONAL
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC 10: Tops-10; DEC 20: Tops-20; DEC VAX: VMS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $29,000
Number Installed to Date: 100
Date First Installed: June 1978
(See Vendor Profile Page V-60)

INTERACTIVE SYSTEMS, INC.
SOFTWARE INTERNATIONAL
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: DEC 10: Tops-10; DEC 20: Tops-20; DEC VAX: VMS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $36,000
Number Installed to Date: 71
Date First Installed: July 1981

INTERACTIVE SYSTEMS, INC.
SOFTWARE INTERNATIONAL
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Manufacturing
System Requirements: DEC 10: Tops-10; DEC 20: Tops-20; DEC VAX: VMS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $51,000
Number Installed to Date: 150
Date First Installed: February 1978

INTERACTIVE SYSTEMS, INC.
SOFTWARE INTERNATIONAL
ACCOUNTS RECEIVABLE & REVLINE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC 10: Tops-10; DEC 20: Tops-20; DEC VAX: VMS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $48,000
Number Installed to Date: 5
Date First Installed: March 1983

INTERNATIONAL BUSINESS SERVICES, INC.
PUBLIC HOUSING MANAGEMENT DATA SYSTEM
Specific Application: Tenant Accounting, Inventory Management, Maintainence, Work Orders
System Requirements: Datapoint: DOS
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 40
Date First Installed: September 1980
(See Vendor Profile Page V-60)

INTERNATIONAL COMPUTING SYSTEMS
JOB COST PROGRAM
Specific Application: Job Cost Analysis
Specific Industry: Manufacturing, Engineering, Construction
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 3
Date First Installed: November 1982
(See Vendor Profile Page V-61)

INTERNATIONAL MANAGMENT SYSTEMS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP; System/38: CPF
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 150
Date First Installed: 1977
(See Vendor Profile Page V-61)

INTERNATIONAL MANAGMENT SYSTEMS
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPF
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 150
Date First Installed: 1977

INTERNATIONAL MANAGMENT SYSTEMS
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP; System/38: CPF
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 150

INTERNATIONAL MANAGMENT SYSTEMS
GENERAL LEDGER/FINANCIAL REPORTER
Specific Application: General Ledger, Financial Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP, System/38: CPF
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 150
Date First Installed: 1977

INTERNATIONAL PROGRAMMING LABORATORIES CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM

System/34, System/36
Memory Required: 30.0K bytes
Source Language: RPG-II, RPG-III
[illegible] Yes
Purchase Terms: Purchase (license)
Price: $3,500 to $5,000
[illegible] 300
Date First Installed: 1977
(See Vendor Profile Page V-61)

INTERNATIONAL PROGRAMMING LABORATORIES CORP.
[illegible]
Specific Application: Accounts [illegible]
Specific Industry: Not Industry [illegible]
System Requirements: IBM System/34, System/36
Memory Required: 30.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500 to $5,000
[illegible] 300
Date First Installed: 1977

INTERNATIONAL PROGRAMMING LABORATORIES CORP.
[illegible]
Specific Application: Fixed Assets, Equipment Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 30.0K bytes
Source Language: RPG-II, RPG-III
[illegible] Yes
Purchase Terms: Purchase (license)
Price: $6,000 to $10,000
[illegible] 200
[illegible] 1977

INTERNATIONAL PROGRAMMING LABORATORIES CORP.
FINANCIAL REPORTING
Specific Application: Financial Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 30.0K bytes
Source Language: RPG-II, RPG-III
[illegible] Yes
Purchase Terms: Purchase (license)
Price: $3,500 to $5,000
[illegible] 300

INTERNATIONAL PROGRAMMING LABORATORIES CORP.
GENERAL ACCOUNTING
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 30.0K bytes
Source Language: RPG-II, RPG-III
Purchase Terms: Purchase (license)
[illegible]
Number Installed to Date: 300

INTERNATIONAL PROGRAMMING LABORATORIES CORP.
INVENTORY MANAGEMENT
Specific Application: Inventory Control
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM System/34, System/36
Memory Required: 30.0K bytes
Source Language: RPG-II, RPG-III
[illegible] Yes
Purchase Terms: Purchase (license)
Price: $6,000 to $10,000
[illegible] 300
Date First Installed: 1977

INTERNATIONAL PROGRAMMING LABORATORIES CORP.
JOB COST ACCOUNTING
Specific Application: Job Cost Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 30 0K bytes
Source Language: RPG-II, RPG-III
[illegible] Yes
Purchase Terms: Purchase (license)
Price: $5,000 to $9,000
Number Installed to Date: 300
Date First Installed: 1977

INTERNATIONAL PROGRAMMING LABORATORIES CORP.
ORDER PROCESSING
Specific Application: Customer and Purchase Order Processing
Specific Industry: Not Industry [illegible]
System Requirements: IBM System/34, System/36
Memory Required: 30.0K bytes
Source Language: RPG-II, RPG-III
[illegible] Yes
Purchase Terms: Purchase (license)
Price: $6,000 to $10 000
Number Installed to Date: 300
Date First Installed: September 1977

INTERNATIONAL PROGRAMMING LABORATORIES CORP.
SALES ANALYSIS
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 30.0K bytes
Source Language: RPG-II, RPG-III
[illegible] Yes
Purchase Terms: Purchase (license)
Price: $2,000 to $3,500
[illegible] 200
Date First Installed: September 1977

INTRO-LOGIC, INC.
BUSINESS SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 48 0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000 to $8,000
Number Installed to Date: 4
Date First Installed: 1982
(See Vendor Profile Page V-61)

INVENTORY MANAGEMENT SYSTEMS, INC.
FOOD & DAIRY MANAGEMENT SYSTEM (FDMS)
Specific Application: Distribution, Billing for Dairies
Specific Industry: Wholesale/Distribution
System Requirements: HP 3000: MPE IV
Memory Required: 1.0M bytes
Source Language: Fortran IV
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30 000
Number Installed to Date: 2
Date First Installed: May 1981
(See Vendor Profile Page V-61)

INVESTORS IN DATA PROCESSING, INC.
CHECK RECONCILEMENT
Specific Application: Check Reconciliation
Specific Industry: Banking/Financial
System Requirements: CDC 92, TI 990/10
Memory Required: 256.0K bytes
Source Language: Basic
[illegible] Yes
Purchase Terms: Purchase (license)
[illegible]
Date First Installed: March 1983
(See Vendor Profile Page V-61)

I.P.S., INC.
CREDIT UNION ACCOUNTING
Specific Application: Credit Union Accounting
Specific Industry: Not Industry [illegible]
[illegible]
System/36
Source Language: RPG-III
[illegible] Yes
Purchase Terms: Purchase (license)
Price: $3[illegible]0
[illegible] 2
Date First Installed: May 1983
(See Vendor Profile Page V-61)

I.P.S., INC.
GENERAL ACCOUNTING
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Payroll, Job Cost, Fixed Assets, Check Reconciliation
Specific Industry: Not Industry [illegible]
System Requirements: IBM System/38
Source Language: RPG-III
[illegible] Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: May 1983

I.P.S., INC.
INTERACTIVE GENERAL ACCOUNTING SYSTEM
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Fixed Asset, Payroll, Financial
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,000
Number Installed to Date: 2
Date First Installed: May 1983

IPT (INFORMATION PROCESSING TECHNIQUES)
CLIMAX (COMPUTERIZED LEASE INFORMATION ACCOUNTING)
Additional Product Classification: Lease Management
Specific Application: Lease Information, Management, Accounting
System Requirements: DG
Memory Required: 64 0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $20,000 to $50,000
Date First Installed: 1981
(See Vendor Profile Page V-61)

IT, INC.
KOPS
Specific Application: User-Designed Business Forms Creation, Account [illegible]
Specific Industry: Not Industry [illegible]
System Requirements: HP 70, HP 80, HP 175, HP 40
Memory Required: 32 0K bytes
Source Language: Basic
Purchase Terms: Purchase (license); [illegible]
Price: $1 295
[illegible] 30
Date First Installed: 1980
(See Vendor Profile Page V-62)

JACOBSEN & ASSOCIATES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Manufacturing
System Requirements: DG Eclipse: AOS, AOS/VS
Memory Required: 256 0K bytes
Source Language: Cobol
[illegible] Yes
Purchase Terms: Purchase (license), [illegible]
Date First Installed: January 1982
(See Vendor Profile Page V-62)

JACOBSEN & ASSOCIATES, INC.
ACCOUNTS PAYABLE VS MRP RECEIPT RECONCILIATION
Specific Application: Accounts Payable, MRP Receipt Reconciliation
Specific Industry: Manufacturing
System Requirements: DG Eclipse: AOS, AOS/VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license), Rental, Lease
Date First Installed: January 1975

JACOBSEN & ASSOCIATES, INC.
FINANCIAL REPORT WRITER
Specific Application: Financial Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse: AOS, AOS/VS
Memory Required: 256.0K bytes
Source Language: Cobol
[illegible] Yes
Purchase Terms: Purchase (license); [illegible] Lease
[illegible] 25
Date First Installed: January 1982

TO SOFTWARE

JACOBSEN & ASSOCIATES, INC.
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse: AOS, AOS/VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 5
Date First Installed: January 1982

JACOBSEN & ASSOCIATES, INC.
ORDER ENTRY, INVOICING AND AGED ACCOUNTING
Specific Application: Order Entry, Invoicing, Aged Accounts Receivable
Specific Industry: Manufacturing
System Requirements: DG Eclipse: AOS, AOS/VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 5
Date First Installed: January 1982

JAMES L. SELLERS & ASSOCIATES
FINANCIAL MANAGEMENT ACCOUNTING SYSTEM
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Report Writer
Specific Industry: Manufacturing, Wholesale/Distribution, Construction
System Requirements: NCR I-8230, I-8250; Imos III; NCR I-9020: Imos V, NCR I-9040: IRX, NCR I-9300: ITX
Memory Required: 1.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000
Number Installed to Date: 200
Date First Installed: September 1980
(See Vendor Profile Page V-62)

JAMES L. SELLERS & ASSOCIATES
INTERACTIVE ACCOUNTS PAYABLE SYSTEM
Specific Application: Accounts Payable
Specific Industry: Manufacturing, Wholesale/Distribution, Construction
System Requirements: NCR I-8230: Imos III, Imos V; NCR I-9040: IRX; NCR I-9300: ITX
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 300
Date First Installed: September 1980

JAMES L. SELLERS & ASSOCIATES
INTERACTIVE ACCOUNTS RECEIVABLE SYSTEM
Specific Application: Accounts Receivable System
Specific Industry: Manufacturing, Wholesale/Distribution, Construction
System Requirements: NCR I-8230: Imos III, Imos V; NCR I-9040: IRX; NCR I-9300: ITX
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 200
Date First Installed: October 1980

JAMES L. SELLERS & ASSOCIATES
INTERACTIVE DEPRECIATION ACCOUNTING
Specific Application: Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: NCR I-8230: Imos III, Imos V; NCR I-9040: IRX, NCR I-9300: ITX
Memory Required: 1.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 50
Date First Installed: October 1980

JAMES L. SELLERS & ASSOCIATES
INTERACTIVE GENERAL LEDGER SYSTEM
Specific Application: General Ledger
Specific Industry: Manufacturing, Wholesale/Distribution, Construction
System Requirements: NCR I-8230: Imos III, Imos V; NCR I-9040: IRX, NCR I-9300: ITX
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 300
Date First Installed: October 1980

JAY LESLIE CORP.
ADVERTISING AGENCY: FINANCIAL & INVOICING
Specific Application: Invoicing System
Specific Industry: Banking/Financial
System Requirements: BTI
Memory Required: 128.0K bytes
Source Language: Cbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 20
Date First Installed: 1981
(See Vendor Profile Page V-62)

J. D. EDWARDS & CO.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Lease
Price: $3,500 to $5,000
Number Installed to Date: 150
Date First Installed: September 1978
(See Vendor Profile Page V-62)

J. D. EDWARDS & CO.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Lease
Price: $3,500 to $5,000
Number Installed to Date: 200
Date First Installed: 1977

J. D. EDWARDS & CO.
FINANCIAL REPORTING
Specific Application: Financial Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Lease
Price: $3,500 to $5,000
Number Installed to Date: 200
Date First Installed: 1977

J. D. EDWARDS & CO.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Lease
Price: $4,000 to $6,000
Number Installed to Date: 200
Date First Installed: 1974

J. D. EDWARDS & CO.
INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Lease
Price: $6,000 to $10,000
Number Installed to Date: 100
Date First Installed: 1978

J. D. EDWARDS & CO.
OIL & GAS
Specific Application: Oil and Gas Accounting
System Requirements: IBM System/34, System/36, System/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Lease
Price: $20,000
Number Installed to Date: 85
Date First Installed: 1978

JEFFERSON PILOT BROADCASTING, INC.
SYSTEM 80 BROADCAST MANAGEMENT SYSTEM
Specific Application: Sales Traffic, General Accounting, Program Management
Specific Industry: Radio TV
System Requirements: IBM System/34, System/36
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1978
(See Vendor Profile Page V-62)

JOHNSON SYSTEMS, INC.
DOS JOB ACCOUNTING REPORT SYSTEM (DOS JARS)
Specific Application: Comprehensive Accounting Billing, Cost Distribution, Performance Measurement
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS/VS, IBM 3000 Series, 4300 Series, DOS/VSE
Memory Required: 120 0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $4,000
(See Vendor Profile Page V-62)

JOHNSON SYSTEMS, INC.
OS JOB ACCOUNTING REPORT SYSTEM (OS JARS)
Specific Application: Comprehensive Accounting, Billing, Cost Distribution and Performance Measurement
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: VS1, IBM 3000 Series: VS2, IBM 4300 Series: SVS, MVS
Memory Required: 120 0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $12,500

JTS COMPUTER SERVICE, INC.
ACCOUNTS RECEIVABLE WITH TIME ANALYSIS
Specific Application: Accounts Receivable, Time Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP, Wang VS: VS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,500
Date First Installed: 1981
(See Vendor Profile Page V-63)

JTS COMPUTER SERVICE, INC.
PROFESSIONAL SERVICES PACKAGE
Specific Application: Accounts Receivable, Time Analysis, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP; Wang VS: VS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $16,500
Date First Installed: 1983

JTS COMPUTER SERVICE, INC.
PROFESSIONAL SERVICES/GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP; Wang VS: VS

Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Date First Installed: 1983

K-DATA CENTER, INC.
AUTO PARTS DEALER
Specific Application: General Accounting
Specific Industry: Wholesale/Distribution, Retail, Auto Parts
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
[illegible]
Number Installed to Date: 4
[illegible]
(See Vendor Profile Page V-63)

[illegible]
GAAP
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: ADDS Mentor Pick; Microdata: Pick; Ultimate: Pick
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible]
Date First Installed: August 1978
(See Vendor Profile Page V-63)

KDK ENTERPRISES, INC.
[illegible]
Specific Application: Accounts [illegible]
Specific Industry: Not Industry Sensitive
System Requirements: ADDS Mentor Pick; Microdata: Pick; Ultimate: Pick
Source Language: Databasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible]
Number Installed to Date: 40
Date First Installed: 1979

KDK ENTERPRISES, INC.
GAAP GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: ADDS Mentor Pick; Microdata: Pick; [illegible]
Source Language: Databasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 45
Date First Installed: 1978

KEE-SYSTEMS, INC.
DENPOP
Additional Product Classification: Office Management
Specific Application: Dental Office Management
Specific Industry: Dental
System Requirements: [illegible] 11: TSX; DEC VAX: VMS, RT-11
Memory Required: 256.0K bytes
[illegible]

Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-63)

KEE-SYSTEMS, INC.
VETPOP
Additional Product Classification: Office Management
Specific Application: Veterinarian Office Management
Specific Industry: Medical, Veterinarian
System Requirements: DEC PDP-11: TSX; DEC VAX. VMS, RT-11.
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983

KEY FINANCIAL SYSTEMS, INC.
TRUST MASTER
Specific Application: Trust Accounting System
Specific Industry: Not Industry [illegible]
System Requirements: DEC PDP-11: RSTS/E, DEC VAX. VMS
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: 1979
(See Vendor Profile Page V-63)

KEYSTONE DATA CONSULTANTS, INC.
[illegible] ACCOUNTING SYSTEMS
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Inventory
Specific Industry: Not Industry [illegible]
System Requirements: IBM Displaywriter; Omni 65 UCSD-P; NEC
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,400
Number Installed to Date: 25
Date First Installed: 1981
(See Vendor Profile Page V-64)

KEYSTONE DATA CONSULTANTS, INC.
[illegible] BUSINESS SYSTEM
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Inventory, Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-II: RSX
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed [illegible]
Date First Installed: [illegible]

KPC COMPUTER SYSTEMS
NOTES PAYABLE SYSTEM
Specific Application: Compensating Balances, Variable Fixed Rates; Accumulated Interest Paid and Accrued
Specific Industry: Not Industry Sensitive
System Requirements: [illegible] 9000 OS/3
Memory Required: 256.0K bytes
Source Language: Ansi Cobol 74
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 15
Date First Installed: June 1981
(See Vendor Profile Page V-64)

KIMBROUGH COMPUTER SALES, INC.
COUNTRY CLUB ACCOUNTING PACKAGES
Specific Application: Membership Accounting for Country Clubs
System Requirements: DEC PDP-11 TSX-11
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible]
Date First Installed: 1980
(See Vendor Profile Page V-64)

KIMBROUGH COMPUTER SALES, INC.
ROUTE ACCOUNTING PACKAGE
Specific Application: Accounting, Accounts Receivable, Home Services, Sales Analysis, Ordering
System Requirements: DEC VAX: VMS
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25 000
Date First Installed: 1983

KIM PETROLEUM COMPUTERS, INC.
KPC MODULAR COMPUTER BASED OIL AND GAS MANAGEMENT
Additional Product Classification: Payroll/Personnel, Manufacturing, Oil/Gas Exploration
Specific Application: Field Reporting, Limited Partnership Reporting, Land/Lease Management, Net Revenue Distribution, Reserve Estimating, Economics, Joint-Interest Billing
Specific Industry: Oil/Gas Exploration
System Requirements: IBM System/38, System/36, System/34: SSP; Burroughs B80, B90, B1900: CMS/MCP
Memory Required: 64.0K bytes
Source Language: 74 Cobol
Source Code Available: [illegible]
Purchase Terms: Purchase (license)
[illegible]
Number Installed to Date: 60
[illegible]
(See Vendor Profile Page V-64)

KIM PETROLEUM COMPUTERS, INC.
KPC [illegible] OIL AND GAS
GENERAL ACCOUNTING
Additional Product Classification: WP/Text Editing; Inventory
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Depreciation, Inventory Control, WP
Specific Industry: Not Industry Sensitive, Oil/Gas Exploration
System Requirements: IBM System/38 System/36, System/34: SSP; Burroughs B80, B90, B1900: [illegible]
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $14,000
Number Installed to Date: 80
Date First Installed: March 1978

KINNY COMPUTER SYSTEMS, INC.
INDUSTRY ORIENTED FUEL OIL DISTRIBUTOR PACKAGE
Specific Application: Accounts Receivable, Service Dispatch, Degree Day Scheduling
Specific Industry: Fuel Oil [illegible]
System Requirements: Prime: Primos
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 75
[illegible]
(See Vendor Profile Page V-64)

KITZMILLER SYSTEMS
ACCOUNTS PAYABLE
Specific Application: Accounts [illegible]
Specific Industry: Not Industry [illegible]
System Requirements: Televideo 802H: CP/M; IBM PC: PC-DOS; TI 990: Unix
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: [illegible]
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 10,000
Date First Installed: 1981
(See Vendor Profile Page V-64)

KITZMILLER SYSTEMS
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Televideo 802H: CP/M, IBM PC: PC-DOS; TI [illegible] Unix
Memory Required: 64.0K bytes
[illegible]
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 10,000
Date First Installed: 1981

KITZMILLER SYSTEMS
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Televideo 802H: CP/M, IBM PC: PC-DOS; TI [illegible] Unix
Memory Required: 64.0K bytes
[illegible]
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 10,000
Date First Installed: 1981

KITZMILLER SYSTEMS
ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: Televideo 802H: CP/M, IBM PC: PC-DOS; TI 990: Unix

Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: [illegible]
Number Installed to Date: 10,000
Date First Installed: 1981

KKI CORP.
ANSR-INTERACTIVE GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B80, B90, B900, B1900, CMS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $17,000
Number Installed to Date: 50
Date First Installed: January 1980
(See Vendor Profile Page V-64)

KLANE GILLMAN & SCHECHTER
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, SSP
Memory Required: 16.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 300
Date First Installed: 1972
(See Vendor Profile Page V-64)

KLANE GILLMAN & SCHECHTER
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, SSP
Memory Required: 16.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 300
Date First Installed: 1972

KLANE GILLMAN & SCHECHTER
FIXED ASSET
Specific Application: Fixed Asset
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, SSP
Memory Required: 16.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 300
Date First Installed: 1972

KLANE GILLMAN & SCHECHTER
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, SSP
Memory Required: 16.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 300
Date First Installed: 1972

KLANE GILLMAN & SCHECHTER
ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, SSP
Memory Required: 16.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 300
Date First Installed: 1972

KLEIN DIVERSIFIED ENTERPRISES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 256.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-64)

KLEIN DIVERSIFIED ENTERPRISES, INC.
ENGINEERING TIME AND PROJECT MANAGEMENT
Additional Product Classification: Report Generator
Specific Application: Time and Dispersion Report, Invoice, Report Generator, Accounts Receivable
Specific Industry: Engineering
System Requirements: Wang: VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1981

KLEIN DIVERSIFIED ENTERPRISES, INC.
GENERAL LEDGER FINANCIAL SYSTEM
Specific Application: Financial, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Wang: VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,500
Number Installed to Date: 3
Date First Installed: 1981

KLEIN DIVERSIFIED ENTERPRISES, INC.
LAW OFFICE TIME MANAGEMENT
Additional Product Classification: Report Generator
Specific Application: Time Reports, Invoice, Accounts Receivable
Specific Industry: Legal
System Requirements: Wang: VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $3,000
Number Installed to Date: 3
Date First Installed: 1981

KLEIN DIVERSIFIED ENTERPRISES, INC.
PROFESSIONAL TIME MANAGEMENT
Additional Product Classification: Report Generator
Specific Application: Accounts Receivable, Invoices, Time Reports for General Consultants
Specific Industry: Not Industry Sensitive
System Requirements: Wang: VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1981

KMP COMPUTER SERVICES, INC.
CABLESTAR
System Requirements: IBM PC; CP/M; TRS-80; MS-DOS; Televideo; DEC Rainbow
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $40,000
Number Installed to Date: 60
Date First Installed: April 1980
(See Vendor Profile Page V-64)

KNOXVILLE COMPUTER CENTER
CELLULAR TELEPHONE SYSTEM
Specific Application: Credit Authorization Billing
Specific Industry: Telephone
System Requirements: IBM PC
Memory Required: 128.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Rental, Lease
(See Vendor Profile Page V-64)

KNOXVILLE COMPUTER CENTER
RETAIL INFORMATION
Specific Application: Retail Information
Specific Industry: Retail
System Requirements: IBM 4310: DOS
Memory Required: 512.0K bytes
Source Language: Cobol
Purchase Terms: Rental
Date First Installed: September 1976

KSI COMPUTER SYSTEMS, INC.
SAMS
Specific Application: Financial Accounting and Inventory Management
Specific Industry: Wholesale/Distribution
System Requirements: Prime
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 3
Date First Installed: June 1982
(See Vendor Profile Page V-64)

KUSERMAN, INC.
KRONOS SYSTEM - ACCOUNTS RECEIVABLE VERSION 2
Specific Application: Law Firm Accounts Receivable
Specific Industry: Legal
System Requirements: DEC Decmate, Decmate II, WP-78, PDP-8: COS-310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $770
Number Installed to Date: 50
Date First Installed: October 1977
(See Vendor Profile Page V-64)

KUSERMAN, INC.
KRONOS SYSTEM - GENERAL LEDGER VERSION 2
Specific Application: Law Firm General Ledger
Specific Industry: Legal
System Requirements: DEC Decmate, Decmate II, WP-78, PDP-8: COS-310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $770
Number Installed to Date: 50
Date First Installed: October 1977

KUSERMAN, INC.
KRONOS SYSTEM - TIME & BILLING
Specific Application: Law Firm Time and Disbursement Recording, Client Billing
Specific Industry: Legal
System Requirements: DEC Decmate, Decmate II, WP-78, PDP-8: COS-310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $770
Number Installed to Date: 50
Date First Installed: October 1977

LA CROSSE COMPUTER SYSTEMS, INC.
EXCESS COPY BILLING
Specific Application: Billing
Specific Industry: Wholesale/Distribution
System Requirements: DG Nova 4/X, Eclipse S120, Eclipse S20, Eclipse S140: R-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-65)

LA CROSSE COMPUTER SYSTEMS, INC.
MACHINE DEALER
Specific Application: Order Entry Invoicing, Serial Number Tracking, Maintenance Billing, Dispatching
Specific Industry: Wholesale/Distribution
General Accounting

System Requirements: DG Nova 4/X, Eclipse S120, Eclipse S20, Eclipse S140 R-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Price: $4,000 to $17,000
Number Installed to Date: 2
Date First Installed: June 1982

LA CROSSE COMPUTER SYSTEMS, INC.
MAINTENANCE BILLING
Specific Application: Billing
Specific Industry: Wholesale/Distribution
System Requirements: DG Nova 4/X, Eclipse S120, Eclipse S20, Eclipse S140 R-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 2
Date First Installed: June 1982

LAN SYSTEMS, INC.
CARRIER-DEALER CONTROL
Specific Application: Carrier-Dealer Control
Specific Industry: Newspaper Publishing
System Requirements: Burroughs B90, B900, B1900 CMS/MCP
Memory Required: 384.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000
Number Installed to Date: 30
Date First Installed: 1981
(See Vendor Profile Page V-65)

LAN SYSTEMS, INC.
DISPLAY-CLASSIFIED ADVERTISING
Specific Application: Display/Classified Advertising
Specific Industry: Newspaper Publishing
System Requirements: Burroughs B90, B900, B1900 CMS/MCP
Memory Required: 384.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,000
Number Installed to Date: 10
Date First Installed: 1981

LAN SYSTEMS, INC.
MACS (MEDIA ACCTING AND CIRCULATION SYSTEM)
Additional Product Classification: Circulation
Specific Application: General Accounting, Subscriber Control, Carrier-Dealer Control, Classified Ads
Specific Industry: Newspaper Publishing
System Requirements: Burroughs B90, B900, B1900 CMS/MCP
Memory Required: 384.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 30

LAN SYSTEMS, INC.
OASIS
Additional Product Classification: Manufacturing
Specific Application: General Accounting, Inventory Control On-Line Order Entry Billing
Specific Industry: Wholesale/Distribution
System Requirements: Burroughs B90, B900, B1900 CMS/MCP
Memory Required: 384.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $17,000 to $29,000
Number Installed to Date: 110
Date First Installed: September 1975

LAN SYSTEMS, INC.
SUBSCRIBER CONTROL
Specific Application: Subscriber Control
Specific Industry: Newspaper Publishing
System Requirements: Burroughs B90, B900, B1900 CMS/MCP
Memory Required: 384.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 30
Date First Installed: 1977

LAWSON ASSOCIATES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B1900
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,000
Number Installed to Date: 100
Date First Installed: December 1979
(See Vendor Profile Page V-65)

LAWSON ASSOCIATES, INC.
ACCOUNTS PAYABLE SYSTEM
Additional Product Classification: Manufacturing
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: DOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $14,000
Number Installed to Date: 152
Date First Installed: December 1979

LAWSON ASSOCIATES, INC.
ACCOUNTS RECEIVABLE SYSTEM
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series: DOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $14,000
Number Installed to Date: 76
Date First Installed: December 1979

LAWSON ASSOCIATES, INC.
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B1900
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,000
Number Installed to Date: 50
Date First Installed: June 1981

LAWSON ASSOCIATES, INC.
GENERAL LEDGER AND REPORT WRITER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series, DOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $17,000
Number Installed to Date: 152
Date First Installed: November 1978

LAWSON ASSOCIATES, INC.
GENERAL LEDGER AND REPORT WRITER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B1900
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $11,500
Number Installed to Date: 150
Date First Installed: December 1979

LAWSON ASSOCIATES, INC.
S/38 ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,000
Number Installed to Date: 75
Date First Installed: October 1981

LAWSON ASSOCIATES, INC.
S/38 ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,000
Number Installed to Date: 50
Date First Installed: January 1982

LAWSON ASSOCIATES, INC.
S/38 FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,000
Number Installed to Date: 50
Date First Installed: January 1982

LAWSON ASSOCIATES, INC.
S/38 GENERAL LEDGER AND REPORT WRITER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $11,500
Number Installed to Date: 75
Date First Installed: October 1981

LAWSON ASSOCIATES, INC.
S/38 PURCHASE ORDER
Specific Application: Purchase Order
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 30
Date First Installed: June 1982

L D M, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RT-11, RSX-11M, DEC VAX: VMS, Burroughs B20 Btos, Burroughs B1000, B5900 MCP
Memory Required: 420.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Lease
Price: $15,000
Date First Installed: 1981
(See Vendor Profile Page V-65)

L D M, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RT-11, RSX-11M, DEC VAX: VMS, Burroughs B20 Btos, Burroughs B1000, B5900 MCP
Memory Required: 420.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Lease
Price: $12,000
Date First Installed: 1981

L D M, INC.
FACS (FINANCIAL ACCOUNTING SYSTEM)
Specific Application: General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RT-11, RSX-11M, DEC VAX: VMS, Burroughs B20 Btos, Burroughs B1000, B5900 MCP
Memory Required: 420.0K bytes
Source Language: Cobol
Purchase Terms: Lease
Price: $60,000
Date First Installed: 1981

L D M, INC.
FIXED ASSETS
Specific Application: Fixed Asset Management
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, RSX-11M; DEC VAX: VMS; Burroughs B20: Btos, Burroughs B1000, B5900: MCP
Memory Required: 420.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Lease
Price: $15,000
Date First Installed: 1981

L D M, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, RSX-11M; DEC VAX: VMS; Burroughs B20: Btos; Burroughs B1000, B5900: MCP
Memory Required: 420.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Lease
Price: $18,000
Date First Installed: 1981

L D M, INC.
VECHICLE AND FLEET MANAGEMENT
Specific Application: Transportation Accounting
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, RSX-11M, DEC VAX: VMS, Burroughs B20: Btos; Burroughs B1000, B5900: MCP
Memory Required: 360.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Lease
Price: $30,000
Date First Installed: 1981

LEARNED-MANN
MLS
Additional Product Classification: Program Generators/Aids, Applications Development Tools
Specific Application: Integrates IBM PC With GE Mark III Services for Accounting-Based Management Information Problem Solving
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; GE Time-Sharing
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 150
Date First Installed: July 1979
(See Vendor Profile Page V-65)

LEGAL DATA SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable, Check Writing
Specific Industry: Legal
System Requirements: IBM Series/1; DEC PDP-11; DG Eclipse, Nova
Memory Required: 256.0K bytes
Source Language: Mis
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 80
Date First Installed: 1973
(See Vendor Profile Page V-65)

LEGAL DATA SYSTEMS, INC.
CONFLICT OF INTEREST
Additional Product Classification: Legal
Specific Application: Conflict of Interest
System Requirements: IBM Series/1; DEC PDP-11; DG Eclipse, Nova
Memory Required: 256.0K bytes
Source Language: Mis
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 80
Date First Installed: 1973

LEGAL DATA SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Legal
System Requirements: IBM Series/1; DEC PDP-11; DG Eclipse, Nova
Source Language: Mis
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 80
Date First Installed: 1973

LEGAL DATA SYSTEMS, INC.
LAW OFFICE MANAGEMENT
Additional Product Classification: Legal
Specific Application: Law Office Management
Specific Industry: Legal
System Requirements: Plessey Micro 11/23: Mumps; IBM Series/1; DEC PDP-11, Professional 350
Memory Required: 256.0K bytes
Source Language: Mis, Mumps
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 80
Date First Installed: 1973

LEGAL DATA SYSTEMS, INC.
LEGAL DATA CLIENT ACCOUNTING SYSTEM
Specific Application: Time and Billing and Law Office Management
Specific Industry: Legal
System Requirements: Plessey Micro 11/23: Mumps, IBM Series/1; DEC PDP-11, Professional 350
Memory Required: 256.0K bytes
Source Language: Mumps
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 80
Date First Installed: 1973

LEGAL DATA SYSTEMS, INC.
TIME & BILLING
Specific Application: Case Organization, Billing
Specific Industry: Legal
System Requirements: Mis; DEC PDP-11, Professional 350; Plessey Micro 11/23: Mumps
Source Language: Mumps, Mis
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 80.
Date First Installed: September 1973

LEGAL INFORMATION SYSTEMS, INC.
LOMAS (LAW OFFICE MANAGEMENT SYSTEM)
Specific Application: Accounts Receivable, Time and Billing, General Ledger, Forms Generator
Specific Industry: Legal
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Alpha Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $9,000
Number Installed to Date: 30
Date First Installed: 1980
(See Vendor Profile Page V-65)

LEGIST AUTOMATION, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Four Phase System IV MFE
Source Language: Vision
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,150
Date First Installed: 1983
(See Vendor Profile Page V-65)

LEGIST AUTOMATION, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Four Phase System IV: MFE
Source Language: Vision
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,050
Date First Installed: 1982

LEGIST AUTOMATION, INC.
LEGIST
Specific Application: Law Office Scheduling and Billing
Specific Industry: Not Industry Sensitive, Legal
System Requirements: Four Phase System IV: MFE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: 1983

LEMANS GROUP
LEMANS LEASE MANAGEMENT SYSTEM
Specific Application: Lease Management System
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11: RX-11M, DEC VAX: VMS; IBM 4300 Series; Cics
Memory Required: 512.0K bytes
Source Language: Fortran, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $60,000 to $75,000
Number Installed to Date: 10
Date First Installed: June 1982
(See Vendor Profile Page V-65)

LIBERTY SOFTWARE SYSTEMS, INC.
FINANCIAL CONTROL SYSTEMS (FCS)
Specific Application: General Ledger, Accounts Receivable; Accounts Payable, Inventory Control, Payroll
Specific Industry: Agriculture
System Requirements: IBM System/23: STD
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,000
Number Installed to Date: 15
Date First Installed: December 1981
(See Vendor Profile Page V-66)

LIBRA PROGRAMMING, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
System Requirements: IBM 5110, 5120, System/23 Datamaster
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,450
Number Installed to Date: 1,000
Date First Installed: October 1977
(See Vendor Profile Page V-66)

LIBRA PROGRAMMING, INC.
GENERAL LEDGER AND CLIENT WRITE-UP
Specific Application: General Ledger, Client Write-Up
Specific Industry: Wholesale/Distribution, Real Estate, Construction, Nonprofit Organizations
System Requirements: IBM 5110, 5120, System/23 Datamaster
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,450
Number Installed to Date: 1,500
Date First Installed: January 1979

LIBRA PROGRAMMING, INC.
CLIENT LEDGER
Specific Application: Client Ledger
Specific Industry: Banking/Financial
System Requirements: IBM 5110, 5120, System/23 Datamaster
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,850
Number Installed to Date: 200
Date First Installed: March 1976

LIBRA PROGRAMMING, INC.
TIME ACCOUNTING
Specific Application: Accounts Receivable, Client Analysis
Specific Industry: Wholesale/Distribution, Real Estate, Construction, Nonprofit Organizations
System Requirements: IBM System/23, 5110
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,450
Number Installed to Date: 50
Date First Installed: October 1981

LINK SOFTWARE
ACCOUNTS PAYABLE
Specific Application: Accounts Payable

Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/23: DOS
Memory Required: 64.0K bytes
Source Language: RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 250
Date First Installed: 1981
(See Vendor Profile Page V-66)

LINK SOFTWARE
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/23: DOS
Memory Required: 64.0K bytes
Source Language: RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 50
Date First Installed: 1981

LINK SOFTWARE
BILLING
Specific Application: Billing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/23: DOS
Memory Required: 64.0K bytes
Source Language: RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 250
Date First Installed: 1981

LINK SOFTWARE
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/23: DOS
Memory Required: 64.0K bytes
Source Language: RPG-II, Basic
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 250
Date First Installed: 1981

LINK SOFTWARE
INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/23: DOS
Source Language: RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 250
Date First Installed: 1981

LINK SOFTWARE
MANAGEMENT ACCOUNTING SYSTEM
Specific Application: Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/23: DOS
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1981

LINTON SHAFER COMPUTER SERVICES, INC.
ACCOUNTS PAYABLE CHECKWRITING
Specific Application: Accounts Payable, Check Writing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP
Memory Required: 32.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,400
Date First Installed: 1976
(See Vendor Profile Page V-66)

LINTON SHAFER COMPUTER SERVICES, INC.
ACCOUNTS RECEIVABLE AND CLIENT BILLING
Specific Application: Accounts Receivable, Client Billing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: 1976

LINTON SHAFER COMPUTER SERVICES, INC.
AUTOMATED WORK PAPERS
Specific Application: Computerized Audit Workpaper System
Specific Industry: Accountants
System Requirements: IBM System/34: SSP; IBM PC-XT: PC-DOS; Compaq: DOS
Memory Required: 32.0K bytes
Source Language: RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495 to $1,200
Date First Installed: 1981

LINTON SHAFER COMPUTER SERVICES, INC.
CONTINUING PROFESSIONAL EDUCATION
Specific Application: Continuing Professional Education
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP
Memory Required: 32.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350
(See Vendor Profile Page V-66)

LINTON SHAFER COMPUTER SERVICES, INC.
FIXED ASSET ACCOUNTING AND CONTROL SYSTEM
Specific Application: Depreciation System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP
Memory Required: 32.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,900

LINTON SHAFER COMPUTER SERVICES, INC.
MANAGEMENT ALERT
Specific Application: Ratio Analysis of Financial Information
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP; IBM PC-XT: PC-DOS
Memory Required: 64.0K bytes
Source Language: RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $245 to $350
Date First Installed: 1983

LIOCS CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable Module
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC PDP-11 Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500.
(See Vendor Profile Page V-66)

LIOCS CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable Module
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC VAX Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $5,000

LIOCS CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC PDP-11 Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500

LIOCS CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable Module
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC VAX Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $5,000

LIOCS CORP.
BILLING
Specific Application: Billing Module
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC PDP-11 Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000

LIOCS CORP.
BILLING
Specific Application: Billing Module
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC VAX Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000 to $13,000

LIOCS CORP.
GENERAL LEDGER
Specific Application: General Ledger Module
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC PDP-11 Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000

LIOCS CORP.
GENERAL LEDGER
Specific Application: General Ledger Module
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC VAX Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $7,000

LIOCS CORP.
ORDER ENTRY
Specific Application: Order Entry Module
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC PDP-11 Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000

LIOCS CORP.
PERSPECTIVE 500
Additional Product Classification: Manufacturing
Specific Application: Accounts Payable, Accounts Receivable, Billing, Order Entry, Inventory Control, Bill of Materials, Sales Analysis, General Ledger
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC PDP-11
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)

LIOCS CORP.
PERSPECTIVE 700
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Inventory Control, Billing, Bill of Material, Sales Analysis, Purchase Order Control, Order Entry
Specific Industry: Manufacturing, Wholesale/Distribution, Business

System Requirements: DEC VAX Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)

LIOCS CORP.
PURCHASE ORDER CONTROL
Specific Application: Purchase Order Control
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC VAX Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000 to $13,000

LIOCS CORP.
SALES ANALYSIS
Specific Application: Sales Analysis
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC PDP-11 Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500

LIOCS CORP.
SALES ANALYSIS
Specific Application: Sales Analysis
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC VAX Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $5,000

L & M DATA SYSTEMS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DG MV10000, Nova, Eclipse: DOS, R-DOS, AOS
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: 1980
(See Vendor Profile Page V-66)

L & M DATA SYSTEMS
INVOICING
Specific Application: Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: DG Micro Nova, Nova, Eclipse: DOS, R-DOS, AOS
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: 1980

L & M DATA SYSTEMS
L & M'S GENERAL ACCOUNTING
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DG Micro Nova, Nova, Eclipse: DOS, R-DOS, AOS
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $7,500
Date First Installed: 1980

L & M DATA SYSTEMS
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DG Micro Nova, Nova, Eclipse: DOS, R-DOS, AOS
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: 1980

THE LOCKWOOD ASSOCIATION, INC.
AFCS (AUTOMATED FOOD CONTROL SYSTEM)
Additional Product Classification: Inventory
Specific Application: Financial, Accounting, Inventory
System Requirements: NCR: Imos
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 400
Date First Installed: 1976
(See Vendor Profile Page V-66)

THE LOCKWOOD ASSOCIATION, INC.
APDS (AUTOMATED PAPER DISTRIBUTOR)
Additional Product Classification: Inventory
Specific Application: Financial, Inventory, Accounting
Specific Industry: Wholesale/Distribution, Retail
System Requirements: NCR: Imos
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 400
Date First Installed: 1976

THE LOCKWOOD ASSOCIATION, INC.
AUTO PARTS SYSTEM
Additional Product Classification: Inventory
Specific Application: Financial, Inventory , Accounting
System Requirements: NCR: Imos
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 400
Date First Installed: 1976

THE LOCKWOOD ASSOCIATION, INC.
FINANCIAL MANAGEMENT
Additional Product Classification: Inventory
Specific Application: Financial, Inventory, Accounting
Specific Industry: Wholesale/Distribution, Retail
System Requirements: NCR: Imos
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 400
Date First Installed: 1976

THE LOCKWOOD ASSOCIATION, INC.
LHS (LUMBER HARDWARE SYSTEM)
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Inventory
Specific Industry: Wholesale/Distribution, Retail
System Requirements: NCR: Imos
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 400
Date First Installed: 1976

LOGICAL DESIGN CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B90, B900: CMS; Burroughs B1900
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1980
(See Vendor Profile Page V-66)

LOGICAL DESIGN CORP.
ACCOUNTS RECEIVABLE
Specific Application: Multicompany Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B90, B900: CMS; Burroughs B1900
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1980

LOGICAL DESIGN CORP.
FINANCIAL ACCOUNTING SYSTEM
Specific Application: Financial Accounting System
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B90, B900: CMS; Burroughs B1900
Memory Required: 384.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

LOGICAL DESIGN CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B90, B900: CMS; Burroughs B1900
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1980

LOGICAL DESIGN CORP.
ORDER ENTRY/INVOICING
Specific Application: Order Entry/Invoicing
Specific Industry: Manufacturing
System Requirements: Burroughs B90, B900: CMS; Burroughs B1900
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1980

LOGICAL DESIGN CORP.
PURCHASING
Specific Application: Purchasing
Specific Industry: Manufacturing
System Requirements: Burroughs B90, B900: CMS; Burroughs B1900
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1980

LOGISTIKOS, INC.
ACCOUNTS PAYABLE
Specific Application: Patient Refunds, Accounts Payable and Split Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: SSP
Memory Required: 2.0M bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $20,000
Number Installed to Date: 10
Date First Installed: February 1982
(See Vendor Profile Page V-67)

LOGISTIKOS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: SSP
Memory Required: 2.0M bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $25,000
Number Installed to Date: 5
Date First Installed: January 1983

LOGISTIKOS, INC.
MATERIALS MANAGEMENT
Specific Application: Multiple Inventory Vendor Analysis, Purchase Order Generation
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: SSP
Memory Required: 2.0M bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $25,000
Number Installed to Date: 5
Date First Installed: 1982

LOZEAUX SYSTEM, INC.
RETAIL FUEL DELIVERY
Specific Application: Automatic Delivery and Credit Control, Accounting
Specific Industry: Retail Fuel Industry
System Requirements: IBM System/32; IBM System/34; IBM System/38
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)

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Price: $12,000 to $75,000
Number Installed to Date: 60
Date First Installed: 1970
(See Vendor Profile Page V-67)

THE LORD CONSULTING CORP.
PINTRACK
Specific Application: Telephone Charge Management
Specific Industry: Not Industry Sensitive
System Requirements: Wang, VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: March 1981
(See Vendor Profile Page V-67)

LOUIS A. WRIGHT & ASSOCIATES, INC.
ASSET DEPRECIATION
Specific Application: Asset Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-67)

LOUIS A. WRIGHT & ASSOCIATES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 5
Date First Installed: 1981

LOUIS A. WRIGHT & ASSOCIATES, INC.
PURCHASE ORDER SYSTEM
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 3
Date First Installed: 1981

MADISON DATA SYSTEMS, INC.
BILL OF MATERIALS
Specific Industry: Manufacturing
System Requirements: DG ADS/VS, ADS, R-DOS, DOS
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 12
(See Vendor Profile Page V-67)

MAGNICOM SYSTEMS SYSTEMS, INC.
MARC/10 FOR ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable, Payroll
Specific Industry: Cable Industry
System Requirements: DEC VAX VMS
Memory Required: 2.0M bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license), Rental, Lease
Number Installed to Date: 4
Date First Installed: 1981
(See Vendor Profile Page V-67)

MANAGEMENT ADVISORY COMPUTER SYSTEMS
SCHOOL INFORMATION MANAGEMENT SYSTEM
Specific Application: Accounting and Student Services for Schools
Specific Industry: Education
System Requirements: IBM System/34
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: March 1983
(See Vendor Profile Page V-68)

MANAGEMENT COMPUTER SERVICE, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Source Language: Basic, Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 100
Date First Installed: 1972
(See Vendor Profile Page V-68)

MANAGEMENT COMPUTER SERVICE, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Source Language: Basic, Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 100
Date First Installed: 1972

MANAGEMENT COMPUTER SERVICE, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Source Language: Basic, Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 100
Date First Installed: 1972

MANAGEMENT COMPUTER SERVICE, INC.
QUOTE SYSTEM
Specific Application: Quotes Order Prices
Specific Industry: Printing
System Requirements: DEC PDP-11: RSTS/E
Source Language: Basic, Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 1
Date First Installed: 1981

MANAGEMENT COMPUTER SERVICES, INC.
FEDERAL HOUSING
Specific Application: Accounting, Tenant Accounting
Specific Industry: Government
System Requirements: DG CS5
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 6
Date First Installed: 1980

MANAGEMENT CONTROL SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Real Estate, Accounting
System Requirements: IBM PC, System/32, System/34, System/38
Source Language: RPG-II, Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200 to $6,200
Number Installed to Date: 205
Date First Installed: 1975
(See Vendor Profile Page V-68)

MANAGEMENT CONTROL SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Real Estate, Accounting
System Requirements: IBM PC, System/32, System/34, System/38
Source Language: RPG-II, Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200 to $6,200
Number Installed to Date: 205
Date First Installed: 1975

MANAGEMENT CONTROL SYSTEMS, INC.
DEPRECIATION
Specific Application: Depreciation Calculation
Specific Industry: Real Estate
System Requirements: IBM PC, System/32, System/34, System/38
Source Language: Cobol, Basic, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200 to $6,200
Number Installed to Date: 205
Date First Installed: 1975

MANAGEMENT CONTROL SYSTEMS, INC.
FINANCIAL REPORTER
Additional Product Classification: Report Generator
Specific Industry: Real Estate, CPA
System Requirements: IBM PC, System/38, System/32, System/34
Source Language: Basic, Cobol, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200 to $6,200
Number Installed to Date: 205
Date First Installed: 1975

MANAGEMENT CONTROL SYSTEMS, INC.
LOAN AMORTIZATION
Specific Industry: Real Estate, Accounting
System Requirements: IBM PC, System/32, System/34, System/38
Source Language: RPG-2, Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200 to $6,200
Number Installed to Date: 205
Date First Installed: 1975

MANAGEMENT CONTROL SYSTEMS, INC.
PRACTICE MANAGEMENT
Specific Industry: Real Estate, Accounting
System Requirements: IBM PC, System/32, System/34, System/38
Source Language: RPG-II, Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200 to $6,200
Number Installed to Date: 205
Date First Installed: 1975

MANAGEMENT CONTROL SYSTEMS, INC.
TAX 1040
Specific Application: Tax Return Form 1040
Specific Industry: Real Estate, Accounting
System Requirements: IBM PC, System/32, System/34, System/38
Source Language: RPG-II, Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200 to $6,200
Number Installed to Date: 205
Date First Installed: 1975

MANAGEMENT CONTROL SYSTEMS, INC.
TAX PLANNING
Specific Application: Tax Planning
Specific Industry: Real Estate, Accounting
System Requirements: IBM PC, System/32, System/34, System/38
Source Language: RPG-II, Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200 to $6,200
Number Installed to Date: 205
Date First Installed: 1975

MANAGEMENT INFORMATION SYSTEM GROUP, INC.
TENANT MANAGEMENT SYSTEM VERSION 2
Additional Product Classification: Property Management
Specific Application: Tenant Control, General Ledger, Accounts Receivable, Accounts Payable andPayroll
Specific Industry: Commercial
System Requirements: IBM

System/34; SSP; IBM System/36, System/38
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $14,500
Number Installed to Date: 5
Date First Installed: June 1981
(See Vendor Profile Page V-69)

MANAGEMENT SERVICES
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Government
System Requirements: Commodore 8032: DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 2
Date First Installed: July 1983
(See Vendor Profile Page V-69)

MANAGEMENT SERVICES
BUDGET DEVELOPMENT PACKAGE
Specific Application: Budget Development Package
Specific Industry: Government
System Requirements: Commodore 8032: DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: September 1983

MANAGEMENT SERVICES
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Government
System Requirements: Commodore 8032: DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 6
Date First Installed: September 1982

MANAGEMENT SERVICES
MUNICIPAL ASSESSING
Specific Application: Tax Billing.
Specific Industry: Government
System Requirements: Commodore 8032: DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 1
Date First Installed: July 1983

MANAGEMENT SERVICES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/70: RSTS/E
Source Language: Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,200 to $1,500

MANAGEMENT SERVICES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS
Source Language: Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,200 to $1,500
Number Installed to Date: 500

MANAGEMENT SERVICES, INC.
FINANCIAL REPORTING
Specific Application: Financial Reporting
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/70: RSTS/E
Source Language: Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,200 to $1,500
Number Installed to Date: 500

MANAGEMENT SERVICES, INC.
FIXED ASSET ACCOUNTING
Specific Application: Fixed Asset Accounting
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Source Language: Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,200 to $1,500
Number Installed to Date: 500

MANAGEMENT SERVICES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS
Source Language: Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,200 to $1,500
Number Installed to Date: 500

MANAGEMENT SERVICES, INC.
JOB COSTING
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: PDP-11/70: RSTS/E
Source Language: Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,200 to $1,500
Number Installed to Date: 500

MANAGEMENT SERVICES, INC.
SALES ANALYSIS
Specific Application: Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/70: RSTS/E
Source Language: Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,200 to $1,500
Number Installed to Date: 500

MANAGEMENT SYSTEMS, INC.
ACCOUNTING PACKAGE
Specific Application: Invoicing, Purchasing, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, Series/1, PC: Pick, DEC 1180: Pick
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500 to $50,000
Number Installed to Date: 30

MANAGEMENT SYSTEMS, INC.
ADVERTISING AGENCY
Additional Product Classification: Advertising
Specific Application: Copywriter, Media Planner, Void Processor, Billing, Invoicing
Specific Industry: Ad Agencies
System Requirements: DEC 1180: Pick, IBM 4300, PC, Series/1: Pick
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500 to $500,000
Number Installed to Date: 30

MANAGEMENT SYSTEMS, INC.
APPAREL MANUFACTURING
Additional Product Classification: Manufacturing
Specific Application: General Accounting, Order Entry, Sales Analysis, Invoice Control
Specific Industry: Manufacturing, Apparel
System Requirements: IBM 4300, PC, Series/2: Pick
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500 to $50,000
Number Installed to Date: 30

MANAGEMENT VISTAS, INC.
FOCUS FORECASTING SYSTEM
Specific Application: Manufacturer/Distributor Sales Forecast By Product
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM 4300, Series/2: Pick, DEC LSI-11; Microdata Reality: Pick
Source Language: RPL
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-68)

MANAGEMENT VISTAS, INC.
FOCUS FORECASTING SYSTEM
Specific Application: Product Sales Forecast
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM 4300, Series/1: Pick, DEC LSI-11; Microdata Reality
Source Language: RPL
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 1
Date First Installed: 1983

MANAMATION, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Prime 50 Series: Primos
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-68)

MANATRON, INC.
BUDGETARY ACCOUNTING
Specific Application: Budgetary Accounting
Specific Industry: Government
System Requirements: Burroughs B1000
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-68)

MANATRON, INC.
CHILD SUPPORT
Additional Product Classification: Payroll/Personnel
Specific Application: Tracks Child Support
Specific Industry: Government
System Requirements: Burroughs B1000
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)

MANATRON, INC.
TAX COLLECTING AND BILLING
Specific Application: Tax Collecting and Billing
Specific Industry: Government
System Requirements: Burroughs B1000
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)

MANATRON, INC.
UTILITY BILLING
Specific Application: Utility Billing
Specific Industry: Government
System Requirements: Burroughs B1000
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)

MANUFACTURING CONTROL SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease

TO SOFTWARE

Price: $900 to $4,600
Number Installed to Date: 3
Date First Installed: January 1982
(See Vendor Profile Page V-69)

MANUFACTURING CONTROL SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $900 to $4,600
Number Installed to Date: 3
Date First Installed: January 1982

MANUFACTURING CONTROL SYSTEMS, INC.
FIXED ASSET ACCOUNTING
Specific Application: Fixed Asset Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $900 to $4,600
Number Installed to Date: 3
Date First Installed: January 1982

MANUFACTURING CONTROL SYSTEMS, INC.
GENERAL LEDGER/FINANCIAL STATEMENT
Specific Application: General Ledger and Financial Statements
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $900 to $4,600
Number Installed to Date: 3
Date First Installed: January 1982

MANUFACTURING CONTROL SYSTEMS, INC.
JOC
Specific Application: Job Order Costing
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $900 to $4,600
Number Installed to Date: 3
Date First Installed: January 1982

MANUFACTURING CONTROL SYSTEMS, INC.
ORDER ENTRY INVOICING
Specific Application: Order Entry Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $900 to $4,600
Number Installed to Date: 3
Date First Installed: January 1982

MANUFACTURING CONTROL SYSTEMS, INC.
PURCHASING
Specific Application: Purchasing History
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license), Rental, Lease
Price: $900 to $4,600
Number Installed to Date: 3
Date First Installed: January 1982

MANUFACTURING CONTROL SYSTEMS, INC.
SALES ANALYSIS
Specific Application: Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS, IBM System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,800 to $3,900
Number Installed to Date: 200
Date First Installed: June 1982

MANUFACTURING CONTROL SYSTEMS, INC.
SALES COMMISSION/ACCOUNTING
Specific Application: Accounting for Sales Commission
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $900 to $4,600
Number Installed to Date: 3
Date First Installed: January 1982

MANUS SERVICES CORP.
MANUS OIL DEALER SYSTEM
Specific Application: Accounting and Credit
Specific Industry: Oil Dealers
System Requirements: DEC PDP-11 RSTS/E
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 8
Date First Installed: 1983
(See Vendor Profile Page V-69)

MANUS SERVICES CORP.
MES-PC
Specific Application: Purchasing Order
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500 to $5,000
Number Installed to Date: 257
Date First Installed: 1979

MARKETRON, INC.
ACT II RADIO TRAFFIC & ACCOUNTING SYSTEM
Specific Application: Traffic and Accounting for Radio
Specific Industry: Radio Broadcasting
System Requirements: Marketron
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 250
Date First Installed: 1970
(See Vendor Profile Page V-69)

MARKMAN & ASSOCIATES, INC.
MARKMAN 2000
Additional Product Classification: Manufacturing
Specific Application: Inventory Cash, Route Control, Accounts Receivable, Accounts Payable, General Ledger
Specific Industry: Textile
System Requirements: DG Eclipse S/140 MV/8000
Memory Required: 128.0K bytes
Source Language: Business Code
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $19,900 to $25,000
Number Installed to Date: 140
Date First Installed: June 1976
(See Vendor Profile Page V-69)

MARYLAND COMPUTER SERVICES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-69)

MARYLAND COMPUTER SERVICES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 12
Date First Installed: 1981

MARYLAND COMPUTER SERVICES, INC.
FIXED ASSETS SUB LEDGER
Specific Application: Fixed Assets for General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Source Language: HP Basic
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 2
Date First Installed: 1981

MARYLAND COMPUTER SERVICES, INC.
FORMS MANAGEMENT-ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Banking/Financial, Medical
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: 1983

MARYLAND COMPUTER SERVICES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 10
Date First Installed: 1981

MARYLAND COMPUTER SERVICES, INC.
INVESTMENT SUBLEDGER
Specific Application: Investment Subledger for General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $895
Number Installed to Date: 2
Date First Installed: 1982

MARYLAND COMPUTER SERVICES, INC.
PREPAID ACCRUED EXPENSE SUBLEDGER
Specific Application: Prepaid, Accrued, Expense Subledger for General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 1
Date First Installed: 1982

MAS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-8; PDP-11: CTS
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 75
Date First Installed: September 1978
(See Vendor Profile Page V-70)

MAS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11, PDP-8: CTS
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1976

MAS, INC.
ORDER ENTRY AND INVOICING
Specific Application: Order Entry and Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-8, PDP-11; CTS
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible] Installed to Date: 20
Date First Installed: 1979

MAYORAS & HITTLE, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 96.0K bytes
Source Language: RPG-I
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
[illegible] Installed to Date: 33
Date First Installed: 1980
(See Vendor Profile Page V-70)

MAYORAS & HITTLE, INC.
UTILITY BILLING
Specific Application: Multiservice Utility Billing
Specific Industry: Government
System Requirements: IBM System/34, IBM System/36
Memory Required: 128.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1982

MCCLURKIN COMPUTER CORP.
GMS (GAS MEASUREMENT SYSTEM)
Additional Product Classification: Gas Measurement
Specific Application: Calculation and Maintenance of Gas [illegible]
Specific Industry: Gas Industry
System Requirements: PE 3200 Series: OS/32
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: April 1983
(See Vendor Profile Page V-70)

MCCORMACK & DODGE CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS/MVS; Burroughs; HP 3000: MPE, Prime; Primos
Memory Required: 387.0K bytes
Source Language: Ansi Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $19,500 to $32,500
Number Installed to Date: 515
Date First Installed: September 1980
(See Vendor Profile Page V-70)

MCCORMACK & DODGE CORP.
AP;M
Additional Product Classification: DBMS
Specific Application: Accounts Payable With DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50,000
Date First Installed: 1983

MCCORMACK & DODGE CORP.
AR;M
Additional Product Classification: DBMS
Specific Application: Accounts Receivable With DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $70,000
Date First Installed: 1984

MCCORMACK & DODGE CORP.
FA;M
Additional Product Classification: DBMS
Specific Application: Fixed Assets With DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $[illegible]
Date First Installed: 1983

MCCORMACK & DODGE CORP.
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: Univac 1100; Burroughs, IBM 370: OS/MVS, DEC VAX: VMS
Memory Required: 373.0K bytes
Source Language: Ansi Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $19,500 to $40,000
Number Installed to Date: 530
Date First Installed: 1971

MCCORMACK & DODGE CORP.
G/L PLUS
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Prime 50 Series: Primos; IBM 370 and Up: OS/MVS, HP 3000: MPE; IBM System/34
Memory Required: 600.0K bytes
Source Language: Ansi Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $33,000 to $61,000
Number Installed to Date: 1,100
Date First Installed: 1978

MCCORMACK & DODGE CORP.
GL;M
Additional Product Classification: DBMS
Specific Application: General Ledger With DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $88,000
Date First Installed: 1983

MCCORMACK & DODGE CORP.
PO;M
Additional Product Classification: DBMS
Specific Application: Purchase Order With DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $[illegible]
Date First Installed: 1983

MCCORMACK & DODGE CORP.
PURCHASE ORDER
Specific Application: Purchase Order
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS/MVS, HP 3000: MPE
Memory Required: 392.0K bytes
Source Language: Ansi Cobol
Purchase Terms: Purchase (license)
Price: $30,000
Number Installed to Date: 130
Date First Installed: 1980

MCCORMICK & ASSOCIATES
GENERAL LEDGER/FINANCIAL STATEMENT BUDGETING
Specific Application: General Ledger Financial Maintenance and Budgeting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-70)

MCCORMICK & ASSOCIATES
INTERACTIVE ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

MCDATA
ELECTRONIC SALES REP
PACKAGE
Specific Application: On-Line Order Entry and Billing, Commission Control
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000 Series 3
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: January 1983
(See Vendor Profile Page V-71)

MCHUGH, FREEMAN & ASSOCIATES, INC.
VTG100 ACCOUNTING CALCULATOR
Specific Application: Accounting Calculator
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS, RSX, DEC VAX-11: VMS
Memory Required: 28.0K bytes
Source Language: Basic Plus II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $[illegible]
Number Installed to Date: 10
Date First Installed: September 1[illegible]
(See Vendor Profile Page V-71)

MCP
BACS - ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200: Basic II
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 25
Date First Installed: 1981
(See Vendor Profile Page V-71)

MCP
BACS - ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Specified
System Requirements: Wang 2200
Memory Required: 64.0K bytes
Source Language: Basic II
Source Code Available: Yes
Price: $1,500
Number Installed to Date: 25
Date First Installed: 1981

MCP
BACS - BASIC ACCOUNTING COMPUTER
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200: Basic II
Memory Required: 64.0K bytes
Source Language: Basic II
Source Code Available: Yes
Price: $6,000
Number Installed to Date: 25
Date First Installed: 1981

MCP
BACS - GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 64.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 25
Date First Installed: 1981

MCP
BACS - PAYROLL
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 64.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 25
Date First Installed: 1981

MDS, INC.
IBS GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Banking/Financial
System Requirements: Datapoint: DOS, BAS
Memory Required: 48.0K bytes
Source Language: Cobol, Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 28
Date First Installed: 1979
(See Vendor Profile Page V-71)

MDS, INC.
IBS INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Banking/Financial
System Requirements: Datapoint: DOS, BAS
Memory Required: 48.0K bytes
Source Language: Cobol, Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 6
Date First Installed: 1982

MDS, INC.
IBS INVESTMENT ACCOUNTING
Specific Application: Investment Accounting
Specific Industry: Banking/Financial
System Requirements: Datapoint: DOS, RMS
Memory Required: 48.0K bytes
Source Language: Cobol, Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Date First Installed: 1981

MDS, INC.
IBS PURCHASING
Specific Application: Purchasing
Specific Industry: Banking/Financial
System Requirements: Datapoint: DOS, RMS
Memory Required: 48.0K bytes
Source Language: Cobol, Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 3
Date First Installed: 1983

MEASUREMENT CONCEPTS CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Bos
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,000
Date First Installed: 1979
(See Vendor Profile Page V-71)

MEASUREMENT CONCEPTS CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Bos
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,000
Date First Installed: 1979

MEDIQUIP, INC.
BUSINESS CONTROL SYSTEM
Additional Product Classification: Payroll/Personnel, WP/Text Editing, Graphics
Specific Application: General Ledger, Inventory, Accounts Payable, Accounts Receivable, Graphics, WP, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM; Pick
Memory Required: 64.0K bytes
Source Language: RPL
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 75
Date First Installed: 1976
(See Vendor Profile Page V-71)

MEGA COMPUTER CORP.
MEGA COMPUTER MANAGEMENT SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Inventory, Payroll, Accounts Payable, Accounts Receivable, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Basic, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $30,000
Number Installed to Date: 700
Date First Installed: 1978
(See Vendor Profile Page V-71)

MEDALL SOFTWARE SYSTEMS
MANAGEMENT DENTIST
Additional Product Classification: Payroll/Personnel, Insurance, Data/File Management
Specific Application: Office Management for Dentists
Specific Industry: Medical, Dental
System Requirements: Plexus; Unix
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $8,000
Number Installed to Date: 6
Date First Installed: 1982
(See Vendor Profile Page V-72)

MENTOR SYSTEMS, INC.
LAW OFFICE MANAGEMENT ACCOUNTING
Specific Application: Time and Disbursement Management Billing, Accounts Receivable and Practice Management Reporting
Specific Industry: Legal
System Requirements: IBM System/23, Datamaster 5324
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 10
(See Vendor Profile Page V-72)

MENTOR SYSTEMS, INC.
PUBLIC BUDGETARY ACCOUNTING SYSTEM
Specific Application: Multifund Accounting
Specific Industry: Education, Government, Nonprofit Organizations
System Requirements: IBM System/23, Datamaster 5324
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 125
Date First Installed: May 1978

MENTOR SYSTEMS, INC.
PUBLIC UTILITY BILLING SYSTEM
Specific Application: Billing Collections, Accounting
Specific Industry: Government
System Requirements: IBM System/23; Datamaster 5324
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 65
Date First Installed: May 1978

MERGENTHALER/MYCRO-TEK
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs: CMS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 70
Date First Installed: 1977
(See Vendor Profile Page V-72)

MERGENTHALER/MYCRO-TEK
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs: CMS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 70
Date First Installed: 1977

MESON SERVICES CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 64.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 4
Date First Installed: 1981
(See Vendor Profile Page V-72)

MESON SERVICES CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 64.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 4
Date First Installed: 1981

MESON SERVICES CORP.
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 64.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $12,500
Number Installed to Date: 4
Date First Installed: 1981

MESON SERVICES CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 64.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 4
Date First Installed: 1981

MESON SERVICES CORP.
WORK PREPARATION LEASE SYSTEM
Specific Application: Nonproducing Lease Maintenance, Joint Interest Billing, Daily Runtime
Specific Industry: Oil and Gas Producer
System Requirements: IBM Series/1: EDX
Memory Required: 128.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000

Number Installed to Date: 2
Date First Installed: 1981

MESON SERVICES CORP.
OIL AND GAS SYSTEM
Specific Application: Accounting
Specific Industry: Oil and Gas Producer
System Requirements: IBM Series/1; EDX
Memory Required: 128.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 4
Date First Installed: 1981

MESON SERVICES CORP.
PRODUCING LEASE SYSTEM
Specific Application: Accounting, Billing and Taxation
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1; EDX
Memory Required: 128.0K bytes
Source Language: EDL
Source [illegible]
Purchase Terms: Purchase (license)
Price: $12,500
[illegible] **Installed to Date:** 4
Date First Installed: 1981

METROCOM, INC.
METROCOM ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Payroll, Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell
Memory Required: 50.0K bytes
Source Language: Fortran IV
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1975
(See Vendor Profile Page V-72)

METRO SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Oil and Gas
System Requirements: IBM System/36; Honeywell; Pertec; DEC VAX Series
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
[illegible] **2.0K**
[illegible] **Installed to Date:** 200
[illegible] **1978**
(See Vendor Profile Page V-72)

METRO SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
System Requirements: IBM; Honeywell; Pertec; DEC VAX Series
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $2,000
Number Installed to Date: 200
Date First Installed: September 1978

METRO SYSTEMS, INC.
APE-AUTHORIZATION FOR EXPENDITURE
Specific Application: Authorization for Expenditure
Specific Industry: Oil and Gas
System Requirements: Pertec; Honeywell; DEC VAX Series, IBM System/36
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license); [illegible] Lease
Price: [illegible] $2,000
[illegible] **Installed to Date:** 200
[illegible] **First Installed:** 1978

METRO SYSTEMS, INC.
ECONOMIC EVALUATION
Specific Application: Economic Evaluation
Specific Industry: Oil and Gas
System Requirements: Pertec; Honeywell; IBM System/36; DEC VAX Series
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $2,000
Number Installed to Date: 200
Date First Installed: September 1978

METRO SYSTEMS, INC.
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Oil and Gas
System Requirements: Pertec; Honeywell; IBM System/36; DEC [illegible]
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $2,000
Number Installed to Date: 200
Date First Installed: September [illegible]

METRO SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Oil and Gas
System Requirements: Honeywell; Pertec; IBM System/36; DEC VAX [illegible]
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $2,000
Number Installed to Date: 200
Date First Installed: 1978

METRO SYSTEMS, INC.
JOINT INTEREST BILLING
Specific Application: Joint Interest Billing
Specific Industry: Oil and Gas
System Requirements: IBM System/36; Honeywell; Pertec; DEC VAX Series
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $2,000
Number Installed to Date: 200
Date First Installed: 1978

METRO SYSTEMS, INC.
LAND MANAGEMENT SYSTEM
Specific Application: Land Management
Specific Industry: Oil and Gas
System Requirements: Pertec, Honeywell, IBM System/36, DEC [illegible]
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license); [illegible] Lease
Price: $2,000
Number Installed to Date: 200
Date First Installed: 1978

METRO SYSTEMS, INC.
LEASE OPERATING STATEMENT
Specific Application: Lease Operating Statement
Specific Industry: Oil and Gas
System Requirements: Pertec; Honeywell; IBM System/36; DEC VAX Series
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $2,000
[illegible] **Installed to Date:** 200
Date First Installed: 1978

METRO SYSTEMS, INC.
PRODUCTION AND SALES VERIFICATION
Specific Industry: Oil and Gas
System Requirements: Pertec, Honeywell, IBM System/36, DEC VAX Series
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $2,000
Number Installed to Date: 200
Date First Installed: 1978

METRO SYSTEMS, INC.
REVENUE DISTRIBUTION
Specific Application: Revenue [illegible]
Specific Industry: Oil and Gas
System Requirements: Pertec; Honeywell; IBM System/36; DEC VAX Series
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license); [illegible] Lease
Price: [illegible] $1,000
Number Installed to Date: 200
Date First Installed: [illegible] 1978

METRO SYSTEMS, INC.
[illegible] FOR IV COMPLIED ON IBM DAB ACCOUNTING
Specific Application: Accounting
Specific Industry: Oil and Gas
System Requirements: Honeywell; Pertec, IBM System/36, DEC VAX Series 128
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 200

METRO SYSTEMS, INC.
WINDFALL PROFIT TAX VERIFICATION
Specific Application: Windfall Profit [illegible]
Specific Industry: Oil and Gas
System Requirements: Pertec, Honeywell, IBM System/36, DEC VAX Series
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $2,000
Number Installed to Date: 200
Date First Installed: September 1978

MHA SOFTWARE SERVICES, INC.
BILLING A/R
Specific Application: Invoicing, Accounts Receivable, Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5280
Memory Required: 46.0K bytes
Source Language: RPG
Source Code Available: [illegible]
Purchase Terms: Purchase (license)
Price: $2,500
[illegible] **Installed to Date:** 5
Date First Installed: September [illegible]
(See Vendor Profile Page V-72)

MHA SOFTWARE SERVICES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5280
Memory Required: 64.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 200
Date First Installed: February 1981

MICRO ARCHITECT, INC.
INTEGRATED ACCOUNTING PACKAGE (IAP)
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll, Inventory
Specific Industry: Not Industry Sensitive
System Requirements: [illegible] TRS-DOS 2.1, Xerox, CP/M 80, Kaypro MS-DOS, IBM PC PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $999
Date First Installed: 1981
(See Vendor Profile Page V-73)

MICRO - BASE CORP.
BUREAU SUPPORT SYSTEM
Specific Application: Delivery of Support Payments
Specific Industry: Government
System Requirements: TI 990; DX-10 Dnos
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 2
Date First Installed: February 1981
(See Vendor Profile Page V-73)

MICRO - BASE CORP.
LIBRARY SYSTEM
Additional Product Classification: Inventory
Specific Application: Inventory, Accounting and Purchasing for Libraries
Specific Industry: Library
System Requirements: TI 990: DX-10, Dnos
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: February 1983

MICRO FIVE CORP.
FLEXICALC
Specific Application: Financial Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: Micro V Series 100: STAR-DOS
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 1,000
Date First Installed: 1976
(See Vendor Profile Page V-73)

MICRO MIKE'S, INC.
INTEGRATED ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Accounts Receivable and Payable, General Ledger, Payroll; Can Be Sold as Separate Stand Alone Modules
Specific Industry: Not Industry Sensitive
System Requirements: Zilog Z80: CP/M; Televideo: MP/M; North Star: [illegible] MICRO-DOS
Memory Required: 52.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 300
Date First Installed: 1981
(See Vendor Profile Page V-74)

MICROMETICS, INC.
CPA CLIENT WRITE-UP
Specific Application: Client Work-Up With Payroll and Asset Accounting
System Requirements: CP/M; MP/M 86, Unix, MP/M
Memory Required: 48.0K bytes
Source Language: Cbasic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,495
Number Installed to Date: 250
Date First Installed: July 1979
(See Vendor Profile Page V-74)

MICROMETICS, INC.
MULTI-COMPANY G/L
Specific Application: Multicompany General Ledger
System Requirements: Vector Graphics: CP/M, CP/M 86, some MP/M, MP/M 86; IBM: Unix; DEC: MS-DOS
Memory Required: 48.0K bytes
Source Language: Cbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 250
Date First Installed: July 1979

MICROTECH BUSINESS SYSTEMS, INC.
FACTS
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Inventory, Order Entry, Purchase Order, Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Iris: Bits
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,500
Number Installed to Date: 15
Date First Installed: January 1981
(See Vendor Profile Page V-75)

MICRO-TECH, INC.
CLIENT WRITE UP SYSTEM
Specific Application: Write-Up
Specific Industry: Banking/Financial
System Requirements: Altos 8600, 586: Unix; Altos 8000, 580: MP/M: Xenix
Memory Required: 64.0K bytes
Source Language: Business Basic, IMC Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 3
Date First Installed: March 1983
(See Vendor Profile Page V-75)

MID-AMERICA BUSINESS COMPUTERS, INC.
[illegible] SYSTEM)
Additional Product Classification: Manufacturing
Specific Application: General Ledger, Accounts Payable and Receivable, Inventory Control and Purchasing, Billing
Specific Industry: Wholesale/Distribution
System Requirements: DG CS/100, [illegible]/300, MV/4000, MV/8000
Memory Required: 128.0K bytes
Source Language: Interactive Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500 to $14,000
Number Installed to Date: 30
(See Vendor Profile Page V-75)

MID-AMERICAN CONTROL CORP.
PROMPT AUTO PARTS SYSTEM
Additional Product Classification: DBMS
Specific Application: Batch and On-Line Order Processing, Accounting
System Requirements: IBM Series 1: EDX
Memory Required: 64.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $14,000
Date First Installed: January 1980
(See Vendor Profile Page V-75)

MID-AMERICAN CONTROL CORP.
PROMPT BUSINESS SYSTEM (PBS)
Additional Product Classification: Report and Program Generators/Aids, Application Development Tools
Specific Application: Order Processing, General Ledger, Accounts Receivable, Accounts Payable, Purchasing
Specific Industry: Not Industry Sensitive, Wholesale/Distribution, Retail, Construction, Transportation, Mail Order
System Requirements: IBM Series/1: EDX
Memory Required: 64.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $14,000
Number Installed to Date: 100
Date First Installed: October 1978

MID-AMERICAN CONTROL CORP.
PUBLIC BUDGETING & ACCOUNTING (PBA)
Additional Product Classification: Payroll/Personnel, WP/Text Editing, DBMS, Program Generators/Aids, Application Development Tools
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Utility Billing, Word Processing
Specific Industry: Education, Government
System Requirements: IBM Series/1: EDX
Memory Required: 128.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 60
Date First Installed: 1977

MIDAS SYSTEMS CORP.
CPA PACKAGE
Specific Application: Payroll, Time, Billing, Taxes, General Ledger, Accounts Payable, and Receivable
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS; Datapoint: DOS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000 to $7,000
Number Installed to Date: 180
Date First Installed: 1975
(See Vendor Profile Page V-75)

MID-ATLANTIC DATA SYSTEMS
CATALOG SYSTEM
Specific Application: Charge Cards, Late Notices, Accounting, Labels/Invoices, Sale Analysis Reports
Specific Industry: Catalog Mail Order
System Requirements: Basic Four: Boss
Memory Required: 12.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 3
Date First Installed: 1982
(See Vendor Profile Page V-75)

MIDCO DATA SYSTEMS
INVENTORY SYSTEM
Additional Product Classification: Inventory
Specific Application: Serial Number Control, Accounting, Inventory
Specific Industry: Wholesale/Distribution, Retail
System Requirements: DEC PDP-11: RT-11
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000 to $10,000
Number Installed to Date: 1
Date First Installed: 1980
(See Vendor Profile Page V-75)

MIDCONTINENT DATA
DRL
Specific Application: Radio and TV Broadcast Billing System
Specific Industry: Broadcasting
System Requirements: IBM 4341: DOS/VSE; IBM System/36
Memory Required: 128.0K bytes
Source Language: RPG, DMS
Source Code Available: No
Price: $30,000
Date First Installed: September 1983
(See Vendor Profile Page V-75)

MIDCONTINENT DATA
MIDCONTINENT DATA WATTS RESALE SYSTEM
Specific Application: Detailed Billing System for Watts
Specific Industry: Broadcasting
System Requirements: IBM 4341: DOS/VSE; IBM System/36
Memory Required: 64.0K bytes
Source Language: RPG
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: July 1982

MIDFENN INDUSTRIES, INC.
GENERAL ACCOUNTING
Specific Application: Inventory Control, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs 1000: MS/2
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-75)

MIDWEST COMPUTER CENTER CO.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Xenix 68; IBM: Xenix; CP/M: Bell 81
Memory Required: 64.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 5,000
Date First Installed: September 1976
(See Vendor Profile Page V-75)

MINCOMP CORP.
LFS
Specific Application: Oil and Gas Accounting
System Requirements: Honeywell DPS 6

Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: April 1983
(See Vendor Profile Page V-75)

MINICOMP SYSTEMS, INC.
BEVERAGE
Additional Product Classification: Payroll/Personnel
Specific Application: Payroll Accounts Payable, Accounts Receivable, General Ledger, Purchasing, On-Line Inventory Control
Specific Industry: Beverage
System Requirements: Empex 4: Iris; Altos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1976
(See Vendor Profile Page V-75)

MINICOMP SYSTEMS, INC.
JOB COSTING
Additional Product Classification: Manufacturing, Job Costing
Specific Application: Job Costing, Purchasing, On-Line Inventory Control, Payroll, General Ledger, Accounts Receivable, Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Empex 4: Iris, Altos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1976

MINICOMP SYSTEMS, INC.
RETAIL/WHOLESALE
Additional Product Classification: POS
Specific Application: POS, General Ledger, Accounts Receivable, Accounts Payable, Payroll, Purchasing On-Line Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: Empex 4: Iris; Altos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1976

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11; DEC: RSTS/E; Wang VS: VAX-11; HP: MPE
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1,000
(See Vendor Profile Page V-76)

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RSTS/E, VAX-11; Wang VS: RT-11; HP: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1,000

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
BILL OF MATERIAL PROCESSOR
Specific Application: Bill of Material Processor
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RSTS/E, VAX-11; Wang VS; TI: DX-10
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 500

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
CUSTOMER ORDER PROCESSING
Specific Application: Customer Order Processing
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10; DEC: RSTS/E; Wang VS: VAX-11; HP: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 500

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
FIXED ASSETS AND DEPRECIATION
Specific Application: Fixed Assets and Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: RT-11; DEC: RSTS/E; Wang VS: VAX-11; HP: PME
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 500

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: RSTS/E; DEC: RT-11; Wang VS: VAX-11; HP: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1,000

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
ORDER ENTRY/BILLING
Specific Application: Order Entry Billing
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10; HP: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1,000

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
PROFESSIONAL TIME AND BILLING
Specific Application: Time and Billing
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RT-11: RSTS/E: VAX-11
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 500

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
PURCHASE ORDERING
Specific Application: Purchase Ordering
Specific Industry: Not Industry Sensitive
System Requirements: RT-11; DEC: RSTS/E, VAX-11; TI: DX-10
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100

THE MINICOMPUTER CO.
ANESTHESIOLOGY MANAGEMENT SYSTEM
Specific Application: Accounting, General Ledger, Payroll
Specific Industry: Medical
System Requirements: IBM System/23: SSP; IBM Datamaster; Microdata: Pick; ADDS
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1979
(See Vendor Profile Page V-76)

THE MINICOMPUTER CO.
HOSPITAL MANAGEMENT SYSTEM
Specific Application: Accounting, Payroll, General Ledger
System Requirements: Microdata: Prime: Prime; IBM System/23: ADDS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1979

THE MINICOMPUTER CO.
MEDICAL MANAGEMENT SYSTEM
Specific Application: Accounting, Payroll, General Ledger
Specific Industry: Medical
System Requirements: Honeywell Ultimate: Pick; IBM Datamaster; IBM System/23: SSP; ADDS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1979

THE MINICOMPUTER CO.
RADIOLOGY INFORMATION SYSTEM
Specific Application: Accounting, General Ledger, Payroll
Specific Industry: Medical
System Requirements: IBM System/23: SSP; ADDS: Pick; Microdata; Prime: Prime
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1979

THE MINICOMPUTER CO.
RADIOLOGY MANAGEMENT SYSTEM
Specific Application: Payroll, Accounting,General Ledger
Specific Industry: Medical
System Requirements: IBM System/23: SSP; Honeywell Ultimate: Pick; Microdata; Prime
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1979

THE MINICOMPUTER CO.
UNIVERSITY MANAGEMENT SYSTEM
Specific Application: Billing, Accounting
Specific Industry: University
System Requirements: IBM System/23: SSP; Microdata: Pick; Datamaster; Prime: Prime
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1979

MINI-COMPUTER SUPPORT GROUP, INC.
ACCOUNTS PAYABLE
Specific Application: Purchase Tracking and Reporting
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS, RMS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,350
Number Installed to Date: 75
Date First Installed: 1979
(See Vendor Profile Page V-76)

MINI-COMPUTER SUPPORT GROUP, INC.
ACCOUNTS RECEIVABLE
Specific Application: Open Item, Balance Forward, Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS, RMS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,100
Number Installed to Date: 75
Date First Installed: 1979

MINI-COMPUTER SUPPORT GROUP, INC.
FIXED ASSETS
Specific Application: Fixed Assets Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS, RSM
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes

Purchase Terms: Purchase (license)
Price: $1,100
Number Installed to Date: 75
Date First Installed: 1979

MINI-COMPUTER SUPPORT GROUP, INC.
GENERAL LEDGER
Specific Application: Profit Center, Corporate Financial Tracking and Reporting Application
Specific Industry: Not Industry Specific
System Requirements: Datapoint: DOS, RMS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,350
Number Installed to Date: 75
Date First Installed: 1979

MINI-COMPUTER SUPPORT GROUP, INC.
JOB COSTING/BOM (BILLING OF MATERIAL)
Specific Application: Job Tracking Reporting, Progressive Billing
Specific Industry: Not Industry Specific
System Requirements: Datapoint: DOS, RMS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,350
Number Installed to Date: 75
Date First Installed: 1979

MINI-COMPUTER SUPPORT GROUP, INC.
ORDER PROCESSING
Specific Application: Open Order Entry, Inventory Control and Billing Application
Specific Industry: Not Industry Specific
System Requirements: Datapoint: DOS, RMS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,100
Number Installed to Date: 75
Date First Installed: 1979

MINICOMPUTER ASSOCIATES, INC.
BMACS
Additional Product Classification: Retail
Specific Application: Inventory Control, Accounting, Point of Sale, Terminal Support, Purchase Order and Returns, Accounts Payable, Accounts Receivable
Specific Industry: Bookstores
System Requirements: DG: R-DOS, DOS, MP/OS, MP/AOS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000 to $40,000
Date First Installed: 1983
(See Vendor Profile Page V-76)

[illegible] DATA SYSTEMS
TOPIC SYSTEM
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Accounts Receivable, Accounts Payable, Bill Of Materials, Order Processing, Inventory Control
Specific Industry: Manufacturing
System Requirements: TI 990· DX-10
Memory Required: 256 0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $32,500
Number Installed to Date: 70
Date First Installed: 1976
(See Vendor Profile Page V-76)

MINIDATA SYSTEMS
MINUTEMAN
Specific Application: Time and Billing
Specific Industry: Accounting
System Requirements: Wang 2200: CP/M
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 40
Date First Installed: 1978
(See Vendor Profile Page V-76)

MINIDATA SYSTEMS
TASKMASTER
Specific Application: Work Control System
Specific Industry: Accounting
System Requirements: Wang 2200· CP/M
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 30
Date First Installed: 1980

MIS SOFTWARE CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/36· SSP; IBM System/38
Memory Required: 64.0K bytes
Source Language: RPG-II (System/36), RPG-III (System/38)
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $5,000
Number Installed to Date: 7
Date First Installed: January 1983
(See Vendor Profile Page V-76)

MIS SOFTWARE CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/36· SSP; IBM System/38
Memory Required: 64.0K bytes
Source Language: RPG-II (System/36), RPG-III(System/38)
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $5,000
Date First Installed: January 1983

MIS SOFTWARE CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/36: SSP; IBM System/38
Memory Required: 64 0K bytes
Source Language: RPG-II (System/36), RPG-III(System/38)
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $5,000
Number Installed to Date: 7
Date First Installed: January 1983

MIS SOFTWARE CORP.
ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Wholesale Distribution
System Requirements: IBM System/36· SSP; IBM System/38
Memory Required: 64 0K bytes
Source Language: RPG-II (System/36), RPG-III(System/38)
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $5,000
Number Installed to Date: 7
Date First Installed: January 1983

MITCHELL HUMPHREY & CO.
FMS - 80
Additional Product Classification: Financial Modeling Languages/DSS, Report Generator
Specific Application: General Ledger, Budgeting, Cost Accounting, Forecasting and Modeling, On-Line Account Inquiry, Report Writer
Specific Industry: Not Industry Specific
System Requirements: HP 3000· MPE IV
Memory Required: 512 0K bytes
Source Language: SPL·
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 15
Date First Installed: June 1981
(See Vendor Profile Page V-76)

MONARCH DATA CORP.
FACS (FINANCIAL ACCOUNTING AND CONTROL)
Additional Product Classification: Inventory
Specific Application: Order Processing, Invoicing, Inventory Management, Accounts Receivable, Accounts Payable, General Ledger
Specific Industry: Not Industry Specific
System Requirements: IPL System 4443 DOS/VS, DG Nova 3
Memory Required: 64.0K bytes
Source Language: Extended Basic·
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 50
Date First Installed: 1974
(See Vendor Profile Page V-77)

MONARCH DATA CORP.
MAIL ORDER SUBSCRIPTION FULFILLMENT
Specific Application: General Accounting,Tracking and Processing of Mail Orders
Specific Industry: Mail Orders
System Requirements: DG Nova 3
Memory Required: 64 0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 5
Date First Installed: 1981

MOORE COMPUTING SYSTEMS, INC.
CUSTOMER FOLLOW-UP
Specific Application: Generates Repeat Business and Report Generation
Specific Industry: Retail
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: November ,1982
(See Vendor Profile Page V-77)

MOORE DATA SYSTEMS, INC.
BUDGET PREPARATION
Specific Application: Budget Preparation
Specific Industry: Government
System Requirements: NCR Criterion: VRX
Memory Required: 1.0M bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50,000
Number Installed to Date: 50
Date First Installed: 1979
(See Vendor Profile Page V-77)

MOORE DATA SYSTEMS, INC.
CHECK RECONCILIATION
Specific Application: Check Reconciliation
Specific Industry: Not Industry Specific
System Requirements: NCR Criterion. VRX
Memory Required: 1.0M bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 30
Date First Installed: 1976

MOORE DATA SYSTEMS, INC.
FINANCIAL MANAGEMENT INFORMATION SYSTEM
Specific Application: Fund Accounting
Specific Industry: Government
System Requirements: NCR Criterion· VRX
Memory Required: 1.0M bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75,000 to $100,000
Date First Installed: September 1976

MORTGAGE CLOSING ASSOCIATES
CONSTRUCTION ACCOUNTING
Specific Application: Accounting and Check Writing
Specific Industry: Banking/Financial
System Requirements: DG
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
(See Vendor Profile Page V-77)

MORTGAGE CLOSING ASSOCIATES
FURNITURE & FIXTURE
Specific Application: Control of

Furniture Depreciation Schedule
Specific Industry: Not Industry Sensitive
System Requirements: DG
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease

MORTGAGE CLOSING ASSOCIATES
GENERAL LEDGER, PAYROLL, ACCOUNTS
Specific Application: General Ledger, Payroll, Accounts Payable
Specific Industry: Not Industry Sensitive, Banking/Financial
System Requirements: DG
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease

MORTGAGE CLOSING ASSOCIATES
LOAN POOLING
Specific Application: Disbursement of Loan Proceeds to Certificate Holders
Specific Industry: Banking/Financial
System Requirements: DG
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease

MORTGAGE CLOSING ASSOCIATES
LOAN PROCESSING
Specific Application: Real Estate Loan Application Processing, Document Preparation and Commitment Control
Specific Industry: Banking/Financial
System Requirements: DG
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease

MOUNTAIN SOFTWARE GROWERS, INC.
MSG OIL & GAS ACCOUNTING SYSTEM
Specific Application: Accounting
System Requirements: Honeywell Gcos
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $150
Date First Installed: 1983
(See Vendor Profile Page V-77)

MRP, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Prime 50 Series: Prime 2250; Prime 250
Memory Required: 1.0M bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978
(See Vendor Profile Page V-77)

MRP, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Prime 50 Series: Primos; Prime 2250; Prime 25
Memory Required: 1.0M bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

MRP, INC.
FINANCIAL PACKAGE
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Prime 50 Series: Primos; Prime 2250; Prime 250
Memory Required: 1.0M bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

MRP, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Prime 50 Series: Primos; Prime 2250; Prime 25
Memory Required: 1.0M bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

MRP, INC.
GOVERNMENT CONTRACT REPORTING
Specific Application: Provides Contract and Expense Analysis
Specific Industry: Government
System Requirements: Prime 50 Series: Primos; Prime 2250; Prime 25
Memory Required: 1.0M bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

MRP, INC.
LOT TRACEABILITY
Specific Application: Tracks Lot History
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Prime 50 Series: Primos; Prime 2250; Prime 250
Memory Required: 1.0M bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

MRP, INC.
MANFACT II
Additional Product Classification: Manufacturing
Specific Application: Contains Modules for Accounting Packages
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Prime 50 Series, Prime 2250, Prime 250: Primos
Memory Required: 1.0M bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000 to $125,000
Number Installed to Date: 85
Date First Installed: 1978

MRP, INC.
MANUFACTURING/PRODUCTION CONTROL
Specific Application: Accounting, Application Generator
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Prime 50 Series, Prime 2250, Prime 250: Primos
Memory Required: 1.0M bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

MRP, INC.
MARKETING PACKAGE
Specific Application: Sales Order, Order Entry, Customer History, Optional Model Configurator
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Prime 50 Series: Primos; Prime 2250; Prime 250
Memory Required: 1.0M bytes
Source Language: Info Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

MRP, INC.
PRO FORMA
Specific Application: Budgeting and Financial Modeling
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Prime 50 Series: Primos; Prime 2250; Prime 250
Memory Required: 1.0M bytes
Source Language: Info Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

MRP, INC.
PROCUREMENT
Specific Application: Handles Purchasing, Purchase Order Requirement
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Prime 50 Series, Prime 2250, Prime 25
Memory Required: 1.0M bytes
Source Language: Info Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: September 1978

M R SOFTWARE
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23, System/34, System/36, 5110
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200

M R SOFTWARE
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23, System/34, System/36, 5110
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200
Date First Installed: 1978

M R SOFTWARE
BILL OF MATERIAL
Specific Application: Bill of Material
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23, System/34, System/36, 5110
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200

M R SOFTWARE
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23, System/34, System/36, 5110
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200

M R SOFTWARE
TIME MANAGEMENT
Specific Application: Time Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23, System/34, System/36, 5110
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200

MBA, INC. (MANAGEMENT SCIENCE AMERICA)
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, Sperry 1100
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 483
(See Vendor Profile Page V-77)

MBA, INC. (MANAGEMENT SCIENCE AMERICA)
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, Sperry 1100
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2,432

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
ALLTAX
Additional Product Classification: Payroll/Personnel
Specific Application: Handles Tax for Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300 Series; Sperry 1100
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2,500

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
CAPITAL EXPENDITURE TRACKING
Specific Application: Tracking Large Investments
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300 Series: DOS/OS; Sperry 1100
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1983

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
FIXED ASSETS
Specific Application: Fixed Assets Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300 Series: DOS/OS; Sperry 1100
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 853

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
FOREIGN EXCHANGE
Specific Application: Foreign Exchange
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300 Series; Sperry 1100
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
GENERAL LEDGER/PIC
Specific Application: General Ledger Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300 Series: DOS/OS; Sperry 1100
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 1,258

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
MSA ACCOUNTS RECEIVABLE SYSTEM
Specific Application: Accounts Receivable
Specific Industry: Manufacturing, Banking/Financial, Medical, Insurance, Education, Government, Nonprofit Organizations
System Requirements: IBM 370, 3030 Series: DOS/OS: DOS/VS
Memory Required: 180.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 393
Date First Installed: 1975

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
MSA CAPITAL EXPENDITURE TRACKING
Specific Application: Tracking of Capital Projects
Specific Industry: Manufacturing, Banking/Financial, Medical, Insurance, Education, Government, Nonprofit Organizations
System Requirements: IBM 360, 370, 3000 Series, 4300 Series: OS
Memory Required: 250.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
MSA FIXED ASSETS ACCOUNTING SYSTEM
Specific Application: Control of Fixed Assets
Specific Industry: Manufacturing, Banking/Financial, Medical, Insurance, Education, Government, Nonprofit Organizations
System Requirements: IBM 360, 370, 4300 Series: OS, OS/VS; Honeywell 66/6000; Burroughs: MCP
Memory Required: 240.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 768
Date First Installed: 1976

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
MSA FOREIGN EXCHANGE SYSTEM
Specific Application: Foreign Currency Conversion System
Specific Industry: Manufacturing, Banking/Financial, Medical, Insurance, Education, Government, Nonprofit Organizations
System Requirements: IBM 360, 370, 3030 Series, 4300 Series: OS, DOS, OS/VS
Memory Required: 288.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
MSA GENERAL LEDGER SYSTEM
Specific Application: General Ledger
Specific Industry: Manufacturing, Banking/Financial, Medical, Insurance, Education, Government, Nonprofit Organizations
System Requirements: IBM 360, 370, 3000 Series, 4300 Series: OS; Honeywell 66/6000; Burroughs: MCP; Sperry 1100
Memory Required: 250.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1,454
Date First Installed: 1971

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
MSA INVENTORY & PURCHASING SYSTEM
Specific Application: Inventory Control
Specific Industry: Manufacturing, Banking/Financial, Medical, Insurance, Education, Government, Nonprofit Organizations
System Requirements: IBM 360, 370, 3000 Series, 4300 Series: OS; Honeywell 66/6000; Burroughs: MCP
Memory Required: 150.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1970

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
MSA ACCOUNTS PAYABLE & PURCHASE ORDER
Specific Application: Accounts Payable
Specific Industry: Manufacturing, Banking/Financial, Medical, Education, Government, Nonprofit Organizations
System Requirements: IBM 370, 3000 Series, 4300 Series: OS, DOS; Burroughs B2700 to B7700; Honeywell 66/6000
Memory Required: 85.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 674
Date First Installed: 1970

M & I SOFTWARE, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34; SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: 1981
(See Vendor Profile Page V-76)

M & I SOFTWARE, INC.
ACCOUNTS PAYABLE 2000
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38; CPS
Memory Required: 1.0M bytes
Source Language: CL, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Date First Installed: May 1982

M & I SOFTWARE, INC.
GENERAL LEDGER 2000
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38; CPS
Memory Required: 1.0M bytes
Source Language: CL, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Date First Installed: May 1982

MULTICEPT CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Boss
Memory Required: 64.0K bytes
Source Language: Micro Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1980
(See Vendor Profile Page V-78)

MULTICEPT CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Boss
Memory Required: 64.0K bytes
Source Language: Micro Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1982

MULTICEPT CORP.
FUEL DELIVERY
Specific Application: Generates Tickets for Fuel Delivery, Accounts Receivable
System Requirements: Boss
Memory Required: 64.0K bytes
Source Language: Micro Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,400
Date First Installed: 1980

MULTICEPT CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Boss
Memory Required: 64.0K bytes
Source Language: Micro Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1979

MULTICEPT CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Boss
Memory Required: 64.0K bytes
Source Language: Micro Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: September 1979

MULTI-SYSTEMS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: TI 990: DX-10; Prime: Primos; IBM: MVS

Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $3,000
Number Installed to Date: 33
Date First Installed: September 1979
(See Vendor Profile Page V-78)

MULTI-SYSTEMS
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: TI 990: DX-10; Prime: Primos, IBM: MVS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $3,000
Number Installed to Date: 33
Date First Installed: September 1979

MULTI-SYSTEMS
GENERAL ACCOUNTING PACKAGE
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TI 990: DX-10; Prime: Primos, IBM: MVS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $12,000
Number Installed to Date: 30
Date First Installed: September 1979

MULTI-SYSTEMS
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: TI 990: DX-10; Prime: Primos, IBM: MVS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $3,000
Number Installed to Date: 33
Date First Installed: 1979

MUNICIPAL MANAGEMENT ASSOCIATES, INC.
DELINQUENT TAX RECEIVABLE SYSTEM
Specific Application: Tax Receivable System
Specific Industry: Not Industry Sensitive
System Requirements: NCR 9020: IRX
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $15,000
Number Installed to Date: 10
Date First Installed: July 1981
(See Vendor Profile Page V-78)

MUNICIPAL MANAGEMENT ASSOCIATES, INC.
PROPERTY TAX BILLING AND RECEIVABLE SYSTEM
Specific Application: Tax Billing and Receivable
Specific Industry: Government
System Requirements: NCR 9020: IRX
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $12,000
Number Installed to Date: 3
Date First Installed: July 1981

MUNICIPAL MANAGEMENT ASSOCIATES, INC.
WATER/SEWERAGE BILLING AND RECEIVABLE SYSTEM
Specific Application: Billing and Receivable
System Requirements: NCR 9020: IRX
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $10,000
Number Installed to Date: 2
Date First Installed: January 1982

NATIONAL COMPUTER UTILITY
TIP-TOP
Specific Application: Charge Accounts for Retail Stores
Specific Industry: Retail
System Requirements: IBM 360 DOS; IBM 370: VM, IBM 4300 Series: DOS/VSE
Memory Required: 256.0K bytes
Source Language: Assembler, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-78)

NATIONAL DATA COMMUNICATIONS, INC.
HOSPITAL APPLICATIONS SYSTEM
Specific Application: Order Processing, Accounting
Specific Industry: Medical
System Requirements: Prime: Primos
Memory Required: 512.0K bytes
Source Language: SOL, Cobol74
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $5,000
Number Installed to Date: 16
Date First Installed: 1981
(See Vendor Profile Page V-78)

NATIONAL DATA SERVICES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs: MCP
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: January 1983
(See Vendor Profile Page V-78)

NATIONAL DATA SERVICES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs: MCP
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 6
Date First Installed: January 1983

NATIONAL DATA SERVICES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs: MCP
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 6
Date First Installed: January 1983

NATIONAL DATATEC, INC.
SYTESMITH/GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Vector Graphic: CP/M; Xerox: CP/M; TRS-80: CP/M; IBM PC: CP/M; Apple: CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $700
Date First Installed: January 1982
(See Vendor Profile Page V-78)

NATIONAL DATATEC, INC.
SYTESMITH/GENERAL LEDGER FOR CPAS
Specific Application: General Ledger
Specific Industry: Accountants
System Requirements: Vector Graphic: CP/M; Xerox: CP/M; TRS-80: CP/M; IBM PC: CP/M; Apple: CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 18
Date First Installed: January 1982

NATIONAL E-F-T, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 10
Date First Installed: 1981

NATIONAL E-F-T, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 10
Date First Installed: 1981

NATIONAL E-F-T, INC.
FIXED ASSETS ACCOUNTING SYSTEM
Specific Application: Fixed Assets Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: 1982

NATIONAL E-F-T, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000
Number Installed to Date: 10
Date First Installed: 1981

NATIONAL TIMESHARING & DATA SERVICES
BALANCE FORWARD ACCOUNTS RECEIVABLE
Specific Application: Balance Forward Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4341: OS
Memory Required: 150.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-79)

NATIONAL TIMESHARING & DATA SERVICES
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4341: OS
Memory Required: 150.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

NATIONAL TIMESHARING & DATA SERVICES
ITEMIZED ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive

System Requirements: IBM 4341; OS
Memory Required: 150.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

NATIONAL TIMESHARING & DATA SERVICES
ITEMIZED ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4341; OS
Memory Required: 150.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)

NATIONAL TIMESHARING & DATA SERVICES
NON-ITEMIZED ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4341; OS
Memory Required: 150.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

NCR CORP.
IFMS (INTERACTIVE FINANCIAL MANAGEMENT SYSTEM)
Specific Application: General Ledger, Expenditure and Revenue, Budgeting
Specific Industry: Education, Construction
System Requirements: NCR 9040, 9300: ITX; NCR 9020, 8200: Imos II, Imos V
Memory Required: 24.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: January 1978
(See Vendor Profile Page V-79)

NCR CORP.
SHARE
Additional Product Classification: Payroll/Personnel, Hotel Management
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll
Specific Industry: Hotel Management
System Requirements: NCR 9020: IRX, NCR 9300: ITX
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease

NCR CORP.
STARCON
Additional Product Classification: Payroll/Personnel, Retail Management Support
Specific Application: General Ledger, Accounts Payable and Receivable, Credit Authorization
Specific Industry: Retail
System Requirements: NCR 8400, 8500: VRX
Memory Required: 1.0K bytes
Source Language: Cobol 74, Neat III, Level II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Date First Installed: January 1980

NCR CORP.
STATUS-II (STANDARD ACCOUNTING SYSTEM)
Additional Product Classification: Payroll/Personnel
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Payroll
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: NCR 8200, 5400, 9020: Imos; NCR 9300: ITX
Memory Required: 256.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 150
Date First Installed: December 1980

NEAL NELSON & ASSOCIATES
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 8
Date First Installed: September 19[illegible]
(See Vendor Profile Page V-79)

NEAL NELSON & ASSOCIATES
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 8
Date First Installed: January 1983

NEAL NELSON & ASSOCIATES
INVOICING AND ACCOUNTS RECEIVABLE
Specific Application: Invoicing, Accounts Receivable, Partial Payments, Deposits and Adjustments
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 25.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 6
Date First Installed: November 1982

NEAL NELSON & ASSOCIATES
PURCHASE ORDER ACCOUNTING
Additional Product Classification: Manufacturing
Specific Application: Purchase Order Accounting
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500

NELSON DATA RESOURCES, INC.
LOCAL GOVERNMENT
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Fund Accounting, Accounts Payable, Payroll
Specific Industry: Government
System Requirements: IBM PC-XT; PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,900
Number Installed to Date: 1
Date First Installed: July 1983
(See Vendor Profile Page V-79)

NETWORK COMPUTING CORP.
CUSTOMER ORDER PROCESSING SYSTEM
Specific Application: Order Processing for Utilities, Connect and Disconnect Services
Specific Industry: Utility
System Requirements: IBM 370: MVS, DOS/VS
Memory Required: 1.0M bytes
Source Language: Assembler, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1971
(See Vendor Profile Page V-79)

NETWORK COMPUTING CORP.
FINANCE SYSTEM
Specific Application: Financial, General Ledger
Specific Industry: Utility
System Requirements: IBM 370: MVS, DOS/VS
Memory Required: 1.0M bytes
Source Language: Assembler, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1971

NETWORK COMPUTING CORP.
TRANSPORT ACCOUNTING SYSTEM
Specific Application: Vehicle Information System
Specific Industry: Utility
System Requirements: IBM 370: MVS, DOS/VS
Memory Required: 1.0M bytes
Source Language: Assembler, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1971

NETWORK COMPUTING CORP.
UTILITY BILLING AND COMMISSION INFORMATION
Specific Application: Utility Billing, Consumer Information
Specific Industry: Utility
System Requirements: IBM 370: MVS, DOS/VS
Memory Required: 1.0M bytes
Source Language: Assembler, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150,000
Number Installed to Date: 60
Date First Installed: 1971

NEW ENGLAND MANAGEMENT SERVICES
INVESTMENT COUNSELOR
Specific Application: Uses Outside Data Bases for Investment Counseling and Portfolio Management
Specific Industry: Banking/Financial
System Requirements: Wang 2200; Wang VS
Memory Required: 128.0K bytes
Source Language: Basic II, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: October 1982
(See Vendor Profile Page V-79)

NEW ENGLAND MANAGEMENT SERVICES
UNION MEMBERSHIP
Specific Application: Union Accounting
System Requirements: Wang 2200; Wang VS
Memory Required: 128.0K bytes
Source Language: Basic II, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1981

NEW ENGLAND SYSTEMS TECHNOLOGY
INSURANCE AGENCY SYSTEM
Additional Product Classification: Insurance, WP/Text Editing
Specific Application: Billing, Accounting, Word Processing
Specific Industry: Insurance
System Requirements: Infotecs CC2; OS-V6
Memory Required: 64.0K bytes
Source Language: Hibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 50
Date First Installed: July 1979
(See Vendor Profile Page V-79)

NEWPORT WEST DATA SERVICES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS, AOS, AOS/VS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1981
(See Vendor Profile Page V-79)

NEWPORT WEST DATA SERVICES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive

System Requirements: DG: R-DOS, AOS, AOS/VS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 4
Date First Installed: 1981

NEXUS COMPUTER SYSTEMS, INC.
TEXTILE MACHINERY
Specific Application: Accounting, Currency Conversion
Specific Industry: Textile
System Requirements: IBM System/34
Memory Required: 96.0K bytes
Source Language: Fortran
Source Code Available: $500
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 3
Date First Installed: July 1981
(See Vendor Profile Page V-80)

NIAKWA MANAGEMENT SERVICES
CHAMPION TAX
Specific Application: Tax Accounting
System Requirements: Wang 2200: Wang Basic II
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1980
(See Vendor Profile Page V-80)

NIAKWA MANAGEMENT SERVICES
CLIENT ACCOUNTING SYSTEM
Specific Application: Client Accounting
System Requirements: Wang 2200: Wang Basic II
Memory Required: 28.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1975

NIAKWA MANAGEMENT SERVICES
PRACTICE MANAGEMENT SYSTEM
Specific Application: Practice Management
System Requirements: Wang 2200: Wang Basic II
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

NIEDORF COMPUTER CORP.
COMET
Additional Product Classification: Manufacturing, WP/Text Editing
Specific Application: International Business
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Nixdorf 8870: Nros
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 6,000
Date First Installed: September 1978
(See Vendor Profile Page V-80)

NORDATA, INC.
THE DISTRIBUTION PLANNING & CONTROL
Additional Product Classification: Distribution
Specific Application: Order Processing, Inventory Control, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM System/34: SSP
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $29,500
Number Installed to Date: 2
Date First Installed: March 1981
(See Vendor Profile Page V-80)

NORTH AMERICAN COMPUTER CONSULTANTS
MEMBERSHIP MANAGEMENT SYSTEM FOR ASSOCIATION ADMINISTRATION
Additional Product Classification: Payroll/Personnel, WP/Text Editing
Specific Application: Associations Management
Specific Industry: Associations
System Requirements: TI 990: DX-10
Memory Required: 256.0K bytes.
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 8
Date First Installed: February 1981
(See Vendor Profile Page V-80)

NORTH COUNTY COMPUTER SERVICES
USER-11
Additional Product Classification: Payroll/Personnel
Specific Application: Accounting Payroll
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Education, Government, Transportation, Nonprofit Organizations
System Requirements: DEC RSX-11: RSTS/E, DEC VAX: VMS
Memory Required: 64.0K bytes
Source Language: Basic, Basic Plus II, VAX Basic, Macro
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 200
Date First Installed: September 1978
(See Vendor Profile Page V-80)

NORTHEAST DATA SYSTEMS DISTRIBUTE
Specific Application: Integrated Distribution System
Specific Industry: Wholesale/Distribution
System Requirements: Prime; Honeywell, ADDS Mentor Pick
Memory Required: 128.0K bytes
Source Language: Basic Extended
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $15,000 to $35,000
Number Installed to Date: 50
Date First Installed: 1976
(See Vendor Profile Page V-80)

NORTHEAST DATACOM, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Manufacturing, Banking/Financial
System Requirements: Wang 2200 MVP Speed
Memory Required: 28.0K bytes
Source Language: Basic II
Source Code Available: Yes
(See Vendor Profile Page V-80)

NORTHEAST DATACOM, INC.
FIXED ASSETS
Specific Application: Depreciation
Specific Industry: Manufacturing, Banking/Financial
System Requirements: Wang 2200 MVP Speed
Memory Required: 32.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)

NORTHEAST DATACOM, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Banking/Financial
System Requirements: Wang 2200 MVP Speed
Memory Required: 35.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)

NORTHEAST DATACOM, INC.
GENERAL LEDGER - FINANCIAL REPORT WRITER
Additional Product Classification: Report Generator
Specific Application: General Ledger, Report Writing
Specific Industry: Banking/Financial
System Requirements: Wang 2200 MVP Speed
Memory Required: 28.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)

NORTHEAST DATACOM, INC.
RECURRING ITEMS
Specific Application: General Ledger
Specific Industry: Manufacturing, Banking/Financial
System Requirements: Wang 2200 MVP Speed
Memory Required: 28.0K bytes
Source Language: Basic II

NORTHEAST DATACOM, INC.
SECURITIES
Additional Product Classification: Banking
Specific Application: Securities Accounting
Specific Industry: Banking/Financial
System Requirements: Wang 2200 MVP Speed
Memory Required: 28.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)

NORTHEASTERN DATA PROCESSING, INC.
1040 TAX RETURN SYSTEMS
Specific Application: Individual Tax Returns
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1980
(See Vendor Profile Page V-80)

NORTHEASTERN DATA PROCESSING, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic 2
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

NORTHEASTERN DATA PROCESSING, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic 2
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

NORTHEASTERN DATA PROCESSING, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic 2
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

NORTHEASTERN DATA PROCESSING, INC.
JOB COSTING
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic 2
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

NORTHEASTERN DATA PROCESSING, INC.
TIME MANAGEMENT
Specific Application: Time and Expense Management
Specific Industry: Not Industry Sensitive

System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic 2
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

NORTHERN NUMBERS, INC.
INTERACTIVE PRINTING SYSTEMS
Additional Product Classification: Graphics, Inventory
Specific Application: Order Entry, Accounts Payable, Accounts Receivable, Graphic Arts, Inventory, Production Control
Specific Industry: Not Industry Sensitive
System Requirements: NCR: Imos, ITX, IRX
Memory Required: 386.0K bytes
Source Language: Fist Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1975
(See Vendor Profile Page V-80)

NORWESCO COMPUTING, INC.
RICS
Specific Application: Refuse Accounting and Management
Specific Industry: Garbage
System Requirements: NEC Astra: Itos
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 1
Date First Installed: May 1983
(See Vendor Profile Page V-81)

NOUR SOFTWARE
MARK IV
Specific Application: Financial Planning
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-81)

NOVVA COMPUTER SYSTEMS, INC.
LEGAL INSIGHT
Specific Application: Time Management, Billing, Accounts Receivable, Accounts Payable, General Ledger, Conflict of Interest
Specific Industry: Legal
System Requirements: Prime: Primos
Memory Required: 1.0M bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-81)

ODYSSEY SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Manufacturing
System Requirements: Point 4: Iris; DG Nova; Litton: IOS; Nixdorf
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Number Installed to Date: 4
Date First Installed: 1981
(See Vendor Profile Page V-82)

ODYSSEY SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Manufacturing
System Requirements: Point 4: Iris; DG Nova; Litton: IOS; Nixdorf
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Number Installed to Date: 4
Date First Installed: 1981

ODYSSEY SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Manufacturing
System Requirements: Point 4: Iris; DG Nova; Litton: IOS; Nixdorf
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Number Installed to Date: 4
Date First Installed: 1981

OIL INDUSTRY COMPUTER SERVICES, INC.
ACCOUNTING PACKAGE
Specific Application: General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Oil and Gas
System Requirements: Datapoint: DOS
Source Language: Databus
Purchase Terms: Purchase (license); Lease
Price: $10 to $50,000
Date First Installed: 1977
(See Vendor Profile Page V-82)

OIL-TROMEX, LTD.
OIL & GAS ACCOUNTING PACKAGE
Specific Application: Revenue Distribution, Joint Billing, Accounts Payable, Accounts Receivable, General Ledger
Specific Industry: Oil, Gas
System Requirements: NCR 8400, 8500: VRX; IBM 4300: DOS, VOS, VSM
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $65,000
(See Vendor Profile Page V-82).

OIL-TROMEX, LTD.
OIL & GAS LEASE REC SYSTEM
Specific Application: Lease and Rental Management
Specific Industry: Oil and Gas
System Requirements: NCR 8400, 8500: VRX; IBM 3031: VOS, DOS, Vsam; IBM 3081: DOS
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 1
Date First Installed: March 1983

OMEGA SYSTEMS
WHOLESALE DISTRIBUTION AND FINANCIAL
Specific Application: Multiwarehouse Management, Order Entry, General Ledger
Specific Industry: Wholesale/Distribution
System Requirements: Prime: Primos; DEC VAX: VMS; IBM 4300: OS
Memory Required: 768.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $90,000
Number Installed to Date: 11
Date First Installed: October 1981
(See Vendor Profile Page V-82)

OMNI COMPUTER SERVICE
GENERAL ACCOUNTING PACKAGE
Additional Product Classification: Payroll/Personnel
Specific Application: Payroll, Accounts Payable, Accounts Receivable, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: Iris
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-82)

OMNI COMPUTER SERVICE
GOVERNMENT GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: Payroll, Accounts Payable, General Ledger, Purchase Orders
Specific Industry: Education, Government, Small School Systems
System Requirements: DG Nova: Iris
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000
Number Installed to Date: 5
Date First Installed: 1981

OMNITRONICS
CABLE TV BILLING SYSTEM
Specific Application: Billing, Accounts Receivable
Specific Industry: Cable TV
System Requirements: Basic Four: DOS; Rexon: DOS; Seiko: DOS
Memory Required: 10.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-82)

ONTRAK DATA SYSTEMS
TIME SENSITIVE DELIVERY SYSTEM
Specific Application: Order Processing, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 3
Date First Installed: June 1981
(See Vendor Profile Page V-82)

ONTRAK DATA SYSTEMS
WHOLESALE JEWELER SYSTEM
Specific Application: Order Entry, Inventory Control
Specific Industry: Wholesale/Distribution
System Requirements: TI: DX-10
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 2
Date First Installed: January 1982

OPTIMUM SYSTEMS, INC.
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Accounts Payable, Accounts Receivable, Payroll, General Ledger, Order Entry, Inventory
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP; IBM System/36
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500 to $3,000
Number Installed to Date: 50
Date First Installed: September 1978
(See Vendor Profile Page V-83)

ORL ASSOCIATES, INC.
ASAP
Specific Application: General Purpose Accounting Package for Small Businesses
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix, PDP-11
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 20
Date First Installed: June 1981
(See Vendor Profile Page V-83)

O-W'P DATA PROCESSING
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: STI 5000, STI 8000
Memory Required: 64.0K bytes
Source Language: Basic Extended, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 8
Date First Installed: January 1982
(See Vendor Profile Page V-83)

G-WP DATA PROCESSING
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: BTI 5000, BTI 8000: Unix
Memory Required: 64.0K bytes
Source Language: Basic Extended, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 8
Date First Installed: January 1982

G-WP DATA PROCESSING
COLLECTION PROCESSING
Specific Application: Collection Processing
Specific Industry: Banking/Financial, Credit Collection Agencies
System Requirements: BTI 5000, BTI 8000: Unix
Memory Required: 64.0K bytes
Source Language: Basic Extended, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 8
Date First Installed: January 1982

G-WP DATA PROCESSING
CREDIT REPORTING
Specific Application: Credit Reporting
Specific Industry: Credit Bureaus
System Requirements: BTI 5000, BTI 8000: Unix
Memory Required: 64.0K bytes
Source Language: Basic Extended, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Date First Installed: January 1982

G-WP DATA PROCESSING
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: BTI 5000, BTI 8000: Unix
Memory Required: 64.0K bytes
Source Language: Basic Extended, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,580
Date First Installed: January 1982

G-WP DATA PROCESSING
INVOICING
Specific Application: Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: BTI 5000, BTI 8000: Unix
Memory Required: 64.0K bytes
Source Language: Basic Extended, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 8
Date First Installed: January 1982

PAGE APPLIED TECHNOLOGY, INC.
KOMAND/BASIC
Specific Application: Job Accounting, Charge-Back
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4341: MVS, IBM 3030 Series: VS1, IBM 3080; IBM 370 and Compatible
Memory Required: 512.0K bytes
Source Language: Cobol, ALC
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $9,000
Number Installed to Date: 25
Date First Installed: 1981
(See Vendor Profile Page V-83)

PACIFIC AREA COMPUTER SERVICE, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE IV, MPE V
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $5,000
(See Vendor Profile Page V-83)

PACIFIC AREA COMPUTER SERVICE, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE IV, MPE V
Source Language: Basic
Purchase Terms: Purchase (license); Lease
Price: $5,000

PACIFIC AREA COMPUTER SERVICE, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE IV, MPE V
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $5,000

PACIFIC AREA COMPUTER SERVICE, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE IV, MPE V
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $5,000

PACIFIC BUSINESS SYSTEMS
ATTORNEY BILLING PACKAGE
Specific Application: Time Accounting, Trust Accounts, Contingency Billing
Specific Industry: Legal
System Requirements: Point 4: Iris; DG Nova
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-83)

PARA RESEARCH, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/38
Memory Required: 28.0K bytes
Source Language: RPG-II
Source Code Available: $400
Purchase Terms: Purchase (license); Rental; Lease
Price: $600 to $2,000
Number Installed to Date: 1,000
Date First Installed: 1982
(See Vendor Profile Page V-84)

PARA RESEARCH, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 18.0K bytes
Source Language: RPG-II
Source Code Available: $400
Purchase Terms: Purchase (license); Rental, Lease
Price: $600
Date First Installed: 1982

PARA RESEARCH, INC.
BILLING ACCOUNTING SYSTEM
Specific Application: Billing Accounting System
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM System/34
Memory Required: 28.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,000
Number Installed to Date: 700
Date First Installed: 1982

PARA RESEARCH, INC.
DISTRIBUTION PLUS
Additional Product Classification: Manufacturing
Specific Application: Accounting, Control, and Management Reporting
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/34
Memory Required: 46.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $8,500
Number Installed to Date: 10
Date First Installed: July 1983

PARA RESEARCH, INC.
FIXED ASSETS
Specific Application: Depreciation Scheduling
Specific Industry: Banking/Financial
System Requirements: IBM System/34, System/38
Memory Required: 22.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,000 to $2,000
Number Installed to Date: 1,000
Date First Installed: 1982

PARA RESEARCH, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/38
[illegible]
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,000 to $2,000
Number Installed to Date: 1,800
Date First Installed: January 1981

PARA RESEARCH, INC.
MAPICS A/P HISTORY AND INQUIRY SYSTEM
Specific Application: Accounts Payable History and Inquiry
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/38
Memory Required: 24.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $400
Number Installed to Date: 40
Date First Installed: January 1983

PARA RESEARCH, INC.
MAPICS A/R HISTORY AND INQUIRY SYSTEM
Specific Application: Accounts Receivable History and Inquiry
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/38
Memory Required: 28.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $400 to $750
Number Installed to Date: 40
Date First Installed: January 1983

PASS CORP.
PASS/GL PASS/AP PASS/AR ALL SYSTEM GROUP
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Order Entry, Payroll, WP, DBMS, Report Writer
Specific Industry: Not Industry Sensitive, Wholesale/Distribution, Banking/Financial, Leasing
System Requirements: [illegible] 11/23, -11/24, -11/34, -11/44: RSTS/E; VAX: VMS
Memory [illegible]
Source Language: Basic
Source Code Available: $2,000
Purchase Terms: Purchase (license); [illegible]
Price: $50,000
Number Installed to Date: 200
Date First Installed: January 1970
[illegible] *Page V-84)*

PASSWORD SYSTEMS, INC.
INTERACTIVE ACCOUNTING AND INVENTORY
Specific Application: Accounts Receivable, Accounts Payable, Billing, Inventory
Specific Industry: Wholesale/Distribution
System Requirements: DEC PDP-

11 Series, VAX, RSX-11M
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 15
Date First Installed: January 1982
(See Vendor Profile Page V-84)

P. B. INDUSTRIES, INC.
DISTRIBUTION II
Specific Application: Accounting
Specific Industry: Wholesale/Distribution
System Requirements: HP 250
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $18,900
Number Installed to Date: 4
Date First Installed: 1981
(See Vendor Profile Page V-84)

PBL ASSOCIATES
ACCOUNTS PAYABLE
Specific Application: Accounts Payable, Cash Dispersement
Specific Industry: Not Industry Sensitive
System Requirements: Tandem: Guardian
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $15,700
Number Installed to Date: 14
Date First Installed: August 1981
(See Vendor Profile Page V-84)

PBL ASSOCIATES
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable, Cash Receipts
Specific Industry: Not Industry Sensitive
System Requirements: Tandem: Guardian
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $16,700
Number Installed to Date: 9
Date First Installed: December 1981

PBL ASSOCIATES
FIXED ASSET
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: Tandem: Guardian
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $13,800
Number Installed to Date: 8
Date First Installed: April 1982

PBL ASSOCIATES
GENERAL LEDGER
Specific Application: General Ledger, Financial Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Tandem: Guardian
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $20,500
Number Installed to Date: 18
Date First Installed: August 1981

PBS COMPUTING, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Public Accountant
System Requirements: DEC PDP-11: RSX-11M, Prime: Primos; Plessey: RT-11
Memory Required: 64.0K bytes
Source Language: Fortran, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,200
Number Installed to Date: 75
Date First Installed: 1980
(See Vendor Profile Page V-84)

PBS COMPUTING, INC.
ASSET DEPRECIATION
Specific Application: Asset Depreciation
Specific Industry: Public Accounting
System Requirements: DEC PDP-11: RSX-11M; Prime: Primos; Plessey: RT-11
Memory Required: 64.0K bytes
Source Language: Fortran, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,000 to $8,000
Number Installed to Date: 150
Date First Installed: 1979

PBS COMPUTING, INC.
GENERAL LEDGER AND FINANCE REPORT SYSTEM
Specific Application: Client Write-Up
Specific Industry: Public Accountant
System Requirements: DEC PDP-11: RSX-11M; Prime: Primos; Plessey: RT-11
Memory Required: 64.0K bytes
Source Language: Fortran, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500 to $9,000
Number Installed to Date: 150
Date First Installed: 1979

PBS COMPUTING, INC.
LOAN AMORTIZATION
Specific Application: Loan Amortization Schedules
Specific Industry: Public Accountant
System Requirements: DEC PDP-11: RSX-11M; Prime: Primos; Plessey: RT-11
Memory Required: 64.0K bytes
Source Language: Fortran, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 150
Date First Installed: 1979

PBS COMPUTING, INC.
PROFESSIONAL TIME AND BILLING
Specific Application: Time and Billing
Specific Industry: Public Accountant
System Requirements: DEC PDP-11: RSX-11M; Prime: Primos; Plessey: RT-11.
Memory Required: 64.0K bytes
Source Language: Fortran, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,200
Number Installed to Date: 75

PBS COMPUTING, INC.
TAXLINE
Specific Application: Individual Income Tax Processing
Specific Industry: Public Accountant
System Requirements: DEC PDP-11: RSX-11M; Prime: Primos; Plessey: RT-11
Memory Required: 64.0K bytes
Source Language: Fortran, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 600
Date First Installed: 1969

PCC SYSTEMS
GENERAL ACCOUNTING
Additional Product Classification: Manufacturing
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: BOS
Source Language: Business Basic
Source Code Available: Yes
(See Vendor Profile Page V-84)

PCD SYSTEMS, INC.
ASSET
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: UCSD-P; Altos, IBM
Memory Required: 64.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $300 to $1,290
Date First Installed: 1980
(See Vendor Profile Page V-84)

PCP SYSTEMS, INC.
MELU ACCOUNTING SOFTWARE
Specific Application: Accounts Payable, Accounts Receivable, General Ledger Inventory Control, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM; DEC LSI-11: UCSD-P; TRS-80; Altos
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: 1982

PEAT MARWICK MITCHELL & CO.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint; Wang VS; DEC PDP-11
Source Language: Databus, Cobol, Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,500
Number Installed to Date: 10
Date First Installed: 1979

PEAT MARWICK MITCHELL & CO.
AIMS (AIRPORT INFORMATION MANAGEMENT SYSTEM)
Specific Application: Airport Accounting
Specific Industry: Transportation
System Requirements: DEC PDP-11
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1979

PEAT MARWICK MITCHELL & CO.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint; Wang VS, DEC PDP-11
Source Language: Databus, Cobol, Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $3,500
Number Installed to Date: 10
Date First Installed: 1979

PEAT MARWICK MITCHELL & CO.
GMIS (GOVERNMENT INFORMATION MANAGEMENT SYSTEM)
Specific Application: Municipal Accounting
Specific Industry: Government
System Requirements: DEC PDP-11
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1979

PEAT MARWICK MITCHELL & CO.
IRIS (INTEGRATED RETAIL INFORMATION SYSTEM)
Additional Product Classification: Payroll/Personnel
Specific Application: Point of Sale, Sales Analysis
Specific Industry: Banking/Financial
System Requirements: Datapoint
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $12,500
Number Installed to Date: 15
Date First Installed: 1979

PEAT MARWICK MITCHELL & CO.
ON-LINE FAMOUS
Specific Application: Municipal Accounting System
Specific Industry: Government
System Requirements: Wang VS
Source Language: Cobol

Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1979

PERCEPTION TECHNOLOGY CORP.
CASH BALANCE REPORTING
Specific Application: Cash Balance Reporting
Specific Industry: Not Industry Sensitive
System Requirements: DEC RSTS/E
Memory Required: 256.0K bytes
Source Language: Dibol, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $70,000 to $270,000
Number Installed to Date: 60
Date First Installed: April 1980
(See Vendor Profile Page V-85)

PERFORMANCE MANAGEMENT, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-85)

PERFORMANCE MANAGEMENT, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)

PERFORMANCE MANAGEMENT, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)

PERFORMANCE MANAGEMENT, INC.
OIL AND GAS ACCOUNTING
Specific Application: Accounting for Oil and Gas
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40

PERTAMA SYSTEMS
INTERACTIVE FINANCIAL & PAYROLL SCHOOL 3000
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Budgeting
Specific Industry: Education
System Requirements: HP 3000: MPE
Memory Required: 500.0K bytes
Source Language: Cobol, SPL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 15
Date First Installed: July 1981
(See Vendor Profile Page V-85)

PERTAMA SYSTEMS
MENU 3000
Additional Product Classification: Payroll/Personnel, Menu System
Specific Application: Menu System
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 500.0K bytes
Source Language: Cobol, SPL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 30
Date First Installed: November 1979

PETROLEUM DATA SYSTEMS, INC.
GAS AND OIL ACCOUNTING SYSTEM
Specific Application: Financial Reports, AFE Billing, Partner Accounting, Multibusiness Accounting
Specific Industry: Gas and Oil
System Requirements: IBM System/36, System/34; Wang VS90
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $28,000
(See Vendor Profile Page V-85)

PETROLEUM SOFTWARE SYSTEMS, INC.
IPAS/100 INTEGRATED PETROLEUM ACCOUNTING SYSTEM
Specific Application: Petroleum Accounting System
Specific Industry: Oil and Gas Exploratio
System Requirements: IBM 303, 370, 4300 Series: DOS, OS; DEC VAX, PDP; Honeywell
Memory Required: 512.0K bytes
Source Language: Cocol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $90,000 to $130,000
Number Installed to Date: 26
Date First Installed: 1978
(See Vendor Profile Page V-85)

PHILIPS GROUP INC.
COM TRACK
Specific Application: Job Costing, Estimations, Accounts Payable, Accounts Receivable, General Ledger, Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4PHI, CP/M
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 37
Date First Installed: 1979
(See Vendor Profile Page V-86)

PHOENIX ENGINEERING, INC.
DISTRIBUTION ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Inventory Control and Management, Payroll, Labor Distribution, Financial Reports, Accounts Payable, Accounts Receivable, General Ledger
Specific Industry: Wholesale/Distribution
System Requirements: DG: R-DOS, AOS
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000 to $40,000
Number Installed to Date: 2
Date First Installed: December 1982
(See Vendor Profile Page V-86)

PHOTON SOFTWARE
SOFTPAC
SPECIFIC INDUSTRY: Medical, Nursing Homes Small
System Requirements: Datapoint; IBM 370 Series
Memory Required: 180.0K bytes
Source Language: Databus, Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000 to $12,000
Number Installed to Date: 90
Date First Installed: 1977
(See Vendor Profile Page V-86)

PIONEER SOFTWARE, INC.
MAP/36 ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/36: CPF
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: May 1982
(See Vendor Profile Page V-86)

PIONEER SOFTWARE, INC.
MAP/36 ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/36: CPF
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: February 1983

PIONEER SOFTWARE, INC.
MAP/36 GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/36: CPF
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)

PIONEER SOFTWARE, INC.
MAP/36 PURCHASE ORDER
Specific Application: Requisitioning, Purchasing, Receiving
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/36: CPF
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: February 1983

PLEX DATA BASE SYSTEMS, INC.
INTERACTIVE A/P SYSTEM
FIN/250-VER7.0
Specific Application: General Ledger, Accounts Payable Accounts Receivable
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: HP 3000: Basic
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
(See Vendor Profile Page V-86)

PLYCOM SERVICES, INC.
ACCOUNTS PAYABLE SYSTEM
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS; VAX: VMS
Memory Required: 16.0K bytes
Source Language: VAX Basic, Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,300 to $7,500
Number Installed to Date: 100
Date First Installed: 1978
(See Vendor Profile Page V-86)

PLYCOM SERVICES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS; VAX VMS
Memory Required: 16.0K bytes
Source Language: Basic, Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,300 to $7,500
Number Installed to Date: 100
Date First Installed: 1978

PLYCOM SERVICES, INC.
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS; VAX: VMS
Memory Required: 16.0K bytes
Source Language: VAX Basic, Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,300 to $7,500
Number Installed to Date: 100
Date First Installed: 1978

PLYCOM SERVICES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive

System Requirements: DEC PDP-11: RSTS; VAX: VMS
Memory Required: 16.0K bytes
Source Language: VAX Basic, Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,300 to $7,500
Number Installed to Date: 100
Date First Installed: 1978

P.M.A. SYSTEMS
PROPERTY MANAGEMENT ACCOUNTING SYSTEM
Specific Application: Property Management, Tenant Receivables
System Requirements: Datapoint: DOS, BMS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: June 1975
(See Vendor Profile Page V-86)

PMI COMPUTER SERVICES CO.
INCOME TAX
Specific Application: Income Tax
Specific Industry: Government
System Requirements: DEC PDP-11: CTS-300, CTS-500, RSTS/E, RT-11
Source Language: Dibol
Purchase Terms: Purchase (license); Lease
Date First Installed: 1983
(See Vendor Profile Page V-86)

POLICY MANAGEMENT SYSTEMS CORP.
ACCOUNT RECONCILIATION SYSTEM
Additional Product Classification: Insurance
Specific Application: Billing, Reconciles Agent and Company Accounts
Specific Industry: Insurance
System Requirements: IBM 4300: OS, IBM 3000 Series: DOS; IBM: MVS/VSE
Source Language: Cobol, Assembler
(See Vendor Profile Page V-87)

POLICY MANAGEMENT SYSTEMS CORP.
FINANCIAL MANAGEMENT SYSTEM (FMS)
Additional Product Classification: Insurance
Specific Application: General Ledger, Budgeting, Financial Account Reports
Specific Industry: Insurance
System Requirements: IBM 4300: OS, IBM 3000 Series: DOS; IBM: MVS/VSE
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 60
Date First Installed: 1978

POLICY MANAGEMENT SYSTEMS CORP.
HARDWARE ACCOUNTING SYTEM (HAAS)
Specific Application: Billing Verification, Inventory, Straight Line Depreciation, Accrual Tracking
Specific Industry: Insurance
System Requirements: IBM 4300: OS; IBM 3000 Series: DOS; IBM: MVS/VSE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 2
Date First Installed: 1981

POLYSON ASSOCIATES, INC.
FMS
Additional Product Classification: Insurance
Specific Application: Financial Management, General Ledger, Budgeting, Cost, Delegation, Cash Disbursements
Specific Industry: Insurance
System Requirements: IBM System/370, 4300, 3000 Series: OS, DOS, VSC
Memory Required: 1.0M bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 60
Date First Installed: 1978
(See Vendor Profile Page V-87)

PRINTERS COMPUTER SYSTEMS
PRINTER MANAGEMENT SYSTEM
Specific Application: Production Control, Job Costing, Estimating
System Requirements: CP/M 80; CP/M 86, MS-DOS
Memory Required: 256.0K bytes
Source Language: M Basic
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 35
Date First Installed: May 1978
(See Vendor Profile Page V-87)

Additional information provided for by vendor
Estimating — Office and customer copy
Order entry — Office and work order
Job costing — Actual and estimated
Paper inventory
Customer file
Production reports by:
Employee
Cost centers
Operations

PROCOM, INC.
TOTAL ACCOUNTING
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Order Entry, Inventory Control, Payroll, Purchasing
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS, SUPER-DOS
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)

PROMATA, INC.
MJA (MULTI-JOURNAL ACCOUNTING)
Specific Application: General Ledger, Payroll, Accounts Receivable, Accounts Payable, Order Entry, Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Televideo: CP/M; DEC: RSTS/E, RT-11; IBM PC: PC-DOS, TI
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $600 to $2,000
Number Installed to Date: 200
Date First Installed: 1977
(See Vendor Profile Page V-88)

PRODUCT GROUP, INC.
NAP - 11
Specific Application: Interactive Program for Nielsen, Sami, Shipment and Similar Four-Dimensional Data
System Requirements: DEC PDP: RSX-11M
Memory Required: 64.0K bytes
Source Language: Basic Plus II, Macro II Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Date First Installed: January 1981
(See Vendor Profile Page V-88)

PRODUCTION SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 100
Date First Installed: March 1980
(See Vendor Profile Page V-88)

PRODUCTION SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 100
Date First Installed: 1980

PRODUCTION SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 100
Date First Installed: March 1980

PRODUCTION SYSTEMS, INC.
INVOICING
Specific Application: Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 100
Date First Installed: March 1980

PRODUCTION SYSTEMS, INC.
PURCHASING
Specific Application: Purchasing
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 100
Date First Installed: 1980

PRODUCTIVE SOFTWARE SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP; IBM System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,900
Number Installed to Date: 1
Date First Installed: June 1982
(See Vendor Profile Page V-88)

PRODUCTIVE SOFTWARE SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP, System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,900
Number Installed to Date: 1
Date First Installed: June 1982

PRODUCTIVE SOFTWARE SYSTEMS, INC.
COMMERCIAL COLLECTION PACKAGE
Specific Application: Maintains and Tracks Claims, Claim Forwarding
Specific Industry: Collection
System Requirements: IBM System/34: SSP; IBM System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: June 1982

PRODUCTIVE SOFTWARE SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP, IBM System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)

Price: $4,900
Number Installed to Date: 6
Date First Installed: June 1982

PRODUCT RESEARCH, INC.
SMDR SYSTEM
Specific Application: Data Processor, Station Message Detail Recording
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/70: RSX, RSTS/E
Memory Required: 350.0K bytes
Source Language: Fortran
Source Code Available: Nb
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 2
Date First Installed: July 1981
(See Vendor Profile Page V-88)

PROFESSIONAL BUSINESS COMPUTER SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive, Wholesale/Distribution, Accounting
System Requirements: TI 990: DX-10, Unix
Memory Required: 256.0K bytes
Source Language: Cobol, RPG
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-88)

PROFESSIONAL BUSINESS COMPUTER SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Wholesale/Distribution, Accounting
System Requirements: TI 990: DX-10, Unix
Memory Required: 256.0K bytes
Source Language: Cobol, RPG
Source Code Available: No
Purchase Terms: Purchase (license)

PROFESSIONAL BUSINESS COMPUTER SYSTEMS, INC.
CLIENT WRITE-UP
Additional Product Classification: Payroll/Personnel
Specific Application: Bookkeeping
Specific Industry: Wholesale/Distribution, Accounting
System Requirements: TI 990: DX-10, Unix
Memory Required: 256.0K bytes
Source Language: Cobol, RPG
Purchase Terms: Purchase (license)

PROFESSIONAL BUSINESS COMPUTER SYSTEMS, INC.
DEPRECIATION
Specific Application: Fixed Asset Accounting
Specific Industry: Wholesale/Distribution, Accounting
System Requirements: TI 990: DX-10, Unix
Memory Required: 256.0K bytes
Source Language: Cobol, RPG
Source Code Available: No
Purchase Terms: Purchase (license)

PROFESSIONAL BUSINESS COMPUTER SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Wholesale/Distribution, Accounting
System Requirements: TI 990: DX-10, Unix
Memory Required: 256.0K bytes
Source Language: Cobol, RPG
Source Code Available: No
Purchase Terms: Purchase (license)

PROFESSIONAL BUSINESS COMPUTER SYSTEMS, INC.
INVENTORY CONTROL
Additional Product Classification: Inventory
Specific Application: Order Entry, Inventory, Sales Analysis
Specific Industry: Wholesale/Distribution, Accounting
System Requirements: TI 990: DX-10, Unix
Memory Required: 256.0K bytes
Source Language: Cobol, RPG
Source Code Available: No
Purchase Terms: Purchase (license)

PROFESSIONAL BUSINESS COMPUTER SYSTEMS, INC.
JOB COST
Specific Application: Job Costing
Specific Industry: Wholesale/Distribution, Accounting
System Requirements: TI 990: DX-10, Unix
Memory Required: 256.0K bytes
Source Language: Cobol, RPG
Source Code Available: No
Purchase Terms: Purchase (license)

PROFESSIONAL BUSINESS COMPUTER SYSTEMS, INC.
TIME AND CHARGES FOR THE PROFESSIONAL
Specific Application: Billing and Time Keeping
Specific Industry: Wholesale/Distribution, Accounting
System Requirements: TI 990: DX-10, Unix
Memory Required: 256.0K bytes
Source Language: Cobol, RPG
Source Code Available: No
Purchase Terms: Purchase (license)

PROFESSIONAL COMPUTER SERVICES, INC.
DISTRIBUTION PACKAGE
Additional Product Classification: Distribution
Specific Application: Order Entry Inventory Control, Sales Analysis, Accounts Receivable, Purchasing, Accounts Payable, Payroll, General Ledger
Specific Industry: Wholesale/Distribution
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $27,350
Number Installed to Date: 50
Date First Installed: January 1982
(See Vendor Profile Page V-88)

PROFESSIONAL DATA PROCESSING
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPF
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-88)

PROFESSIONAL DATA PROCESSING
DEPRECIATION
Specific Application: Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPF
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: 1983

PROFESSIONAL DATA PROCESSING
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPF
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 1
Date First Installed: 1983

PROFESSIONAL DATA PROCESSING
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPF
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: 1983

PROFESSIONAL DATA SERVICES, INC.
BILLING
Specific Application: Total Utility Billings
Specific Industry: Utilities
System Requirements: Datapoint: DOS, RMS
Source Language: Dbase
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-88)

PROFESSIONAL INFORMATION MANAGEMENT
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova 4: Iris
Memory Required: 64.0K bytes
Source Language: Business Basic
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 50
(See Vendor Profile Page V-88)

PROFESSIONAL INFORMATION MANAGEMENT
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova 4: Iris
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 50

PROFESSIONAL INFORMATION MANAGEMENT
RECEIVABLES, ORDER ENTRY, SALES ANALYSIS
Additional Product Classification: Manufacturing
Specific Application: Receivables, Order Entry, Sales Analysis, Inventory Control
Specific Industry: Wholesale/Distribution, Retail
System Requirements: DG Nova 4: Iris
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 50

PROFESSIONAL INFORMATION MANAGEMENT
TIME ACCOUNTING
Specific Application: Keep Track of Time and Work of Employees
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova 4: Iris
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 50

PROFESSIONAL INFORMATION PLANNING CORP.
OM 250
Specific Application: Accounts Payable, Accounts Receivable, Order Entry, Sales Analysis, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Memory Required: 196.0K bytes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 12
(See Vendor Profile Page V-88)

PROFESSIONAL SYSTEMS CORP.
DISMAX
Additional Product Classification: Payroll/Personnel
Specific Application: General Accounting, Order Entry, Payroll
Specific Industry: Wholesale/Distribution.
System Requirements: Qantel-System 10, System 70, System 40, System 64· Best
Source Language: Extended Business
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $14,000 to $25,000
Number Installed to Date: 30
Date First Installed: 1980
(See Vendor Profile Page V-88)

PROFIT MANAGEMENT SYSTEMS, INC.
FIN-87
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll, Inventory
Specific Industry: Not Industry Sensitive
System Requirements: HP Series 80
Memory Required: 190.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,495
Number Installed to Date: 200
(See Vendor Profile Page V-88)

PROGRAMMING SERVICES & SUPPORT, INC.
PSS ACCOUNTS PAYABLE SYSTEM
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110, 5120, System/23; IBM System/34, System/32: SSP
Memory Required: 32.0K bytes
Source Language: Basic, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 18
Date First Installed: January 1982
(See Vendor Profile Page V-88)

PROGRAMMING SERVICES & SUPPORT, INC.
PSS ACCOUNTS RECEIVABLE SYSTEM
Specific Application: Accounts Receivable Processing
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110/5120; IBM System 23; IBM System 34: SSP; IBM System 36: SSP
Memory Required: 32.0K bytes
Source Language: Basic, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 7
Date First Installed: March 1981

PROGRAM SYSTEMS, INC.
THE 1040 PACKAGE
Additional Product Classification: Payroll/Personnel
Specific Application: Client Write-Up, Payroll, Depreciation, Time/Expense Billing
System Requirements: DG
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: February 1981
(See Vendor Profile Page V-89)

PROJECTS UNLIMITED, INC.
DISTRIBUTORS SOFTWARE
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Payroll, Order Entry, Inventory Control, Sales Analysis, Purchasing
Specific Industry: Wholesale/Distribution
System Requirements: DEC Professional 350: RT-11; PDP-11/23: VMS; PDP-11/24: CTS-300, VAX Series
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $22,000
Number Installed to Date: 7
Date First Installed: 1975
(See Vendor Profile Page V-89)

PROJECTS UNLIMITED, INC.
MANUFACTURING SOFTWARE
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Payroll, Order Entry, Inventory Control, Sales Analysis, Bill of Materials, Purchasing, Job Costing
Specific Industry: Manufacturing
System Requirements: DEC Professional 350: RT-11; PDP-11/23: VMS; PDP-11/24: CTS-300; VAX Series
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $27,000
Number Installed to Date: 6
Date First Installed: 1975

PROMPT BUSINESS INFORMATION SYSTEMS, INC.
OILMAN
Specific Application: Oil and Gas Lease Management, Accounting
Specific Industry: Oil and Gas
System Requirements: IBM Series/1: EDX
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $29,000
Date First Installed: 1981
(See Vendor Profile Page V-89)

PROMPT BUSINESS INFORMATION SYSTEMS, INC.
RETAIL/WHOLESALE DISTRIBUTION SYSTEM
Additional Product Classification: Retail
Specific Application: Retail Wholesale Distribution System
Specific Industry: Wholesale/Distribution, Retail
System Requirements: IBM Series/1: EDX
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Date First Installed: 1980

PROMPT BUSINESS INFORMATION SYSTEMS, INC.
WHOLESALE/RETAIL DISTRIBUTION
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Payroll, Accounts Payable, Accounts Receivable, General Ledger, Inventory Control, Billing, Purchasing
Specific Industry: Wholesale/Distribution, Retail
System Requirements: IBM Series/1: EDX
Memory Required: 96.0K bytes
Source Code Available: Yes
Purchase Terms: Lease
Price: $18,000
Number Installed to Date: 100
Date First Installed: 1979

PRO-TUM SHARE
DEPRECIATION
Specific Application: Multiple Client Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: Iris
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $585
Number Installed to Date: 8
Date First Installed: 1982
(See Vendor Profile Page V-89)

PRO-TUM SHARE
FREE FORMAT GENERAL LEDGER
Specific Application: Multiple Client General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Iris
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,495
Number Installed to Date: 50
Date First Installed: 1977

PSI ENERGY SOFTWARE, INC.
SYSTEM FOR PRODUCTION, EXPENSE AND CAPITAL
Specific Application: Production, Expense and Capital Scheduling
Specific Industry: Petroleum
System Requirements: IBM 3701; MVS/TSO; Sperry 1100; DEC VAX: VMS; Prime 2250: Primos
Memory Required: 2.0M bytes
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Purchase (license); Time-Sharing
Number Installed to Date: 6
Date First Installed: 1982
(See Vendor Profile Page V-89)

PYRAMID DATA, LTD.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-8: COS-310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-89)

PYRAMID DATA, LTD.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-8: COS-310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 200
Date First Installed: 1978

PYRAMID DATA, LTD.
COMPREHENSIVE FINANCIAL REPORTING
Specific Application: General Ledger, Client Accounting
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-8: COS-310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: No
Price: $2,500
Number Installed to Date: 600
Date First Installed: February 1975

PYRAMID DATA, LTD.
DEPRECIATION ASSET MANAGEMENT
Specific Application: CPA Bookkeeping
Specific Industry: Bookkeeping
System Requirements: DEC PDP-8: COS-310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 150
Date First Installed: 1982

PYRAMID DATA, LTD.
JOB COST ESTIMATING
Specific Application: Job Cost Estimating
Specific Industry: Manufacturing, Job Shops
System Requirements: DEC PDP-8: COS-310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 150
Date First Installed: 1980

PYRAMID DATA, LTD.
JOB COST GENERAL CONTRACTOR
Additional Product Classification: Manufacturing
Specific Application: Accounting, Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-8: COS-310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,800
Number Installed to Date: 50
Date First Installed: 1980

PYRAMID DATA, LTD.
PROPERTY MANAGEMENT
Specific Application: Accounting, Rental Billing for Property Management
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-8: COS-310
Memory Required: 32.0K bytes
Source Language: Dibol
Purchase Terms: Purchase (license)
Price: $3,300
Number Installed to Date: 50
Date First Installed: 1981

PYRAMID DATA, LTD.
RENTAL BILLING SYSTEM
Specific Application: Track Rents and Deposits, Produces Invoices
Specific Industry: Real Estate, Rental Property
System Requirements: DEC PDP-8: COS-310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 100
Date First Installed: 1981

QANTEL CORP.
FOOTWEAR RETAILER ACCOUNTING AND MERCHANDISING
Specific Application: Accounting, Merchandising
Specific Industry: Retail, Shoe Repairs
System Requirements: Qantel System 10, System 20, System 40, System 64: Best
Memory Required: 128.0K bytes
Source Language: QIC Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $9,000
Number Installed to Date: 90
Date First Installed: October 1981
(See Vendor Profile Page V-89)

Q METRICS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse: R-DOS, AOS; Altos 586: Unix; Onyx C8000: Unix; Zilog System 8000 Model 11: Unix
Memory Required: 64.0K bytes
Source Language: Cobol, RM Cobol, C
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $3,000
Number Installed to Date: 8
Date First Installed: January 1983
(See Vendor Profile Page V-90)

Q METRICS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse: R-DOS, AOS; Altos 586: Unix; Onyx C8000: Unix; Zilog System 8000 Model 11: Unix
Memory Required: 64.0K bytes
Source Language: Cobol, RM Cobol, C
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 6
Date First Installed: September 1982

Q METRICS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse: R-DOS, AOS; Altos 586: Unix; Onyx C8000: Unix; Zilog System 8000 Model 11: Unix
Memory Required: 64.0K bytes
Source Language: Cobol, RM Cobol, C
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $3,000
Number Installed to Date: 8
Date First Installed: January 1983

QUADRATRON SYSTEMS, INC.
PROFESSIONAL TIME AND BILL
Specific Application: Professional Time and Billing System
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix, Fortune; Altos
Memory Required: 128.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $995 to $2,000
Number Installed to Date: 1,000
Date First Installed: February 1983
(See Vendor Profile Page V-90)

QUEUE ASSOCIATES, INC.
ACCOUNTS PAYABLE/GENERAL LEDGER
Specific Application: Accounts Payable, Check Production, Balance Sheet
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $2,000
Number Installed to Date: 200
Date First Installed: September 1978
(See Vendor Profile Page V-90)

QUEUE ASSOCIATES, INC.
BILL OF MATERIALS PROCESSOR W/INVOICING
Additional Product Classification: Manufacturing
Specific Application: Bill of Materials, Inventory, Order Entry, Invoicing, Accounts Receivable, Sales Analysis
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $4,800
Number Installed to Date: 140
Date First Installed: September 1977

QUEUE SYSTEMS, INC.
Q-DAS
Specific Application: Process Control
Specific Industry: Nuclear Plants
System Requirements: Modcomp: MAX 4; DEC VAX: VMS; Gould/SEL: MPX 32
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $100,000
Number Installed to Date: 1
Date First Installed: June 1982
(See Vendor Profile Page V-90)

QUINTESSENCE COMPUTING, INC.
DISTRIBUTION ACCOUNTING SYSTEM
Specific Application: Distribution Accounting
Specific Industry: Wholesale/Distribution
System Requirements: DEC PDP-11: RT-11, RSTS, RSX, VAX: VMS
Memory Required: 56.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000 to $36,000
Number Installed to Date: 57
Date First Installed: June 1980
(See Vendor Profile Page V-90)

QUINTREX DATA SYSTEMS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Telephone
System Requirements: IBM Series/1
Memory Required: 96.0K bytes
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,600
Number Installed to Date: 30
Date First Installed: 1980
(See Vendor Profile Page V-91)

QUINTREX DATA SYSTEMS
CAPITAL CREDIT SYSTEMS
Specific Application: Capital Credit
Specific Industry: Telephone
System Requirements: IBM Series/1
Memory Required: 96.0K bytes
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,600
Number Installed to Date: 18
Date First Installed: 1980

QUINTREX DATA SYSTEMS
DETAILED TOLL BILLING SYSTEM
Specific Application: Toll Billing
Specific Industry: Telephone
System Requirements: IBM Series/1
Memory Required: 96.0K bytes
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,600
Number Installed to Date: 30
Date First Installed: 1980

QUINTREX DATA SYSTEMS
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Telephone
System Requirements: IBM Series/1
Memory Required: 96.0K bytes
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,600
Number Installed to Date: 30
Date First Installed: 1980

QUINTREX DATA SYSTEMS
MOBILE PHONE RATING SYSTEM
Specific Application: Mobile Phone Rating
Specific Industry: Telephone
System Requirements: IBM Series/1
Memory Required: 96.0K bytes
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,600
Number Installed to Date: 30
Date First Installed: 1980

QUINTREX DATA SYSTEMS
TELEPHONE INFORMATION BILLING SYSTEM
Specific Application: Telephone Information Billing
Specific Industry: Telephone
System Requirements: IBM Series/1
Memory Required: 96.0K bytes
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 30
Date First Installed: 1980

QUODATA
BILLS
Specific Application: Student Billing
Specific Industry: Education, Nonprofit Organizations
System Requirements: DEC PDP-11: RSTS/E
Memory Required: 256.0K bytes
Source Language: Basic Plus, Macro, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $8,250
Number Installed to Date: 45
Date First Installed: 1979
(See Vendor Profile Page V-91)

QUODATA
FRS
Specific Application: Financial Reporting, Budgeting, Cash Flow, Management Projections, Accounts Receivable
Specific Industry: Education, Nonprofit Organizations
System Requirements: DEC PDP-11: RSTS/E
Memory Required: 256.0K bytes
Source Language: Basic Plus, Macro, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $14,700
Number Installed to Date: 45
Date First Installed: 1975

QUODATA
FUND-AL
Specific Application: Alumni Development, Fund Raising
Specific Industry: Education, Nonprofit Organizations
System Requirements: DEC PDP-11: RSTS/E
Memory Required: 1.0M bytes
Source Language: Basic Plus, Macro, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $14,300 to $32,700
Number Installed to Date: 20
Date First Installed: 1981

RAI BUSINESS SYSTEMS, INC.
BARS BASIC ACCOUNTING AND REPORTING SYSTEM
Specific Application: Accounts Payable, Accounts Receivable, Payroll and General Ledger
Specific Industry: Not Industry Sensitive

System Requirements: Datapoint: DOS
Memory Required: 4.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,500
Number Installed to Date: 200
Date First Installed: 1974
(See Vendor Profile Page V-91)

R. A. KOTTMEIER & ASSOCIATES, INC.
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36: SSP
Memory Required: 64.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-91)

RAMAC COMPUTER CORP.
TIRE
Specific Application: Accounting
Specific Industry: Wholesale/Distribution
System Requirements: DOS; R-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 4
Date First Installed: 1982
(See Vendor Profile Page V-91)

RAPID DATA, INC.
A/P ACTIVE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS, RMS
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 20
Date First Installed: 1977
(See Vendor Profile Page V-91)

RAPID DATA, INC.
A/R ACTIVE
Specific Application: Accounts Receivable Interactive System
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS: RMS
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 20
Date First Installed: 1977

RAPID DATA, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS: RMS
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 20
Date First Installed: 1977

RAPID DATA, INC.
ORDER/ENTRY INVENTORY CONTROL
Specific Application: Order Entry, Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS: RMS
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 20
Date First Installed: 1977

RAXCO
RABBIT I
Specific Application: Resource Accounting, Charge-Back
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $4,000 to $6,000
(See Vendor Profile Page V-91)

RC NESS & ASSOCIATES
INVENTORY CONTROL & ORDER MANAGEMENT
Specific Application: Order Entry and Inventory Control
Specific Industry: Wholesale/Distribution
System Requirements: Burroughs: MCP
Memory Required: 384.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750,000
Number Installed to Date: 12
Date First Installed: August 1981
(See Vendor Profile Page V-91)

RC NESS & ASSOCIATES
LTL-FREIGHT PROCESSING SYSTEM
Specific Application: Freight Processing, Accounts Payable, Accounts Receivable
Specific Industry: Trucking
System Requirements: Burroughs B1000: MCP
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $24,000
Number Installed to Date: 1
Date First Installed: April 1982

REALTREE ASSOCIATES, INC.
ADMAN II
Specific Application: Handling Displaying, Billing, of Ads
System Requirements: DEC PDP-11: RSX-11M
Memory Required: 128.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $75,000
(See Vendor Profile Page V-91)

REAL TIME COMPUTER SPECIALIST, INC.
FOOD COST MANAGER
Specific Application: Food Inventory, Cost Control and Price Control
Specific Industry: Education
System Requirements: IBM Series/1: EDX
Memory Required: 128.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $550
Number Installed to Date: 2
Date First Installed: March 1982
(See Vendor Profile Page V-92)

REAL TIME COMPUTER SPECIALIST, INC.
UP FRONT
Specific Application: Accounts Receivables, Sales Analysis, Inventory Control, Point of Sale Processing
Specific Industry: Lumber Retailers
System Requirements: IBM Series/1: EDX
Memory Required: 128.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 2
Date First Installed: February 1982

REAL-TIME MANAGEMENT, INC.
INCENTIVE LABOR ACCOUNTING
Specific Application: Labor Cost Control
Specific Industry: Manufacturing
System Requirements: TI Business System 600: DX-10; TI 990 Series 436
Memory Required: 254.0K bytes
Source Language: Cobol, Tform
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: September 1973
(See Vendor Profile Page V-92)

RESOURCE DYNAMICS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: RMS-DOS
Memory Required: 256.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,450 to $1,250
Number Installed to Date: 5
Date First Installed: March 1982
(See Vendor Profile Page V-92)

RESOURCE DYNAMICS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: RMS-DOS
Memory Required: 256.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,250 to $2,450

Number Installed to Date: 5
Date First Installed: March 1982

RESOURCE DYNAMICS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: RMS-DOS
Memory Required: 256.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,450 to $1,250
Number Installed to Date: 5
Date First Installed: March 1982

RESOURCE DYNAMICS, INC.
INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: RMS-DOS
Memory Required: 256.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,450 to $1,250
Number Installed to Date: 5
Date First Installed: March 1982

RESOURCE DYNAMICS, INC.
UTILITY BILLING
Specific Application: Utility Billing
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: RMS-DOS
Memory Required: 256.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,450
Date First Installed: March 1982

RESOURCE SOFTWARE INTERNATIONAL, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 256.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,375
Date First Installed: September 1977
(See Vendor Profile Page V-93)

RESOURCE SOFTWARE INTERNATIONAL, INC.
ACCOUNTS PAYABLE/CHECK WRITING
Specific Application: Accounts Payable, Check Writing
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 256.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200
Date First Installed: 1979

RESOURCE SOFTWARE INTERNATIONAL, INC.
BILLING SYSTEM
Specific Application: Billing System
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 256.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800
Date First Installed: 1977

RESOURCE SOFTWARE INTERNATIONAL, INC.
FIXED ASSET DEPRECIATION
Specific Application: Fixed Asset Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 256.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,775
Date First Installed: 1979

RESOURCE SOFTWARE INTERNATIONAL, INC.
GENERAL LEDGER/SINGLE COMPANY
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Source Language: Databus
Memory Required: 128.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,300
Date First Installed: 1977

RESOURCE SOFTWARE INTERNATIONAL, INC.
ORDER WRITING SYSTEM
Specific Application: Order Writing
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,050
Date First Installed: 1977

RINGGOLD MANAGEMENT SYSTEMS, INC.
NONESUCH ACQUISITIONS CONTROL
Specific Application: Order, Receipt and Payment Control
System Requirements: Wang Series 2200; Wang VS, Wang Professional
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $15,000
Number Installed to Date: 1
Date First Installed: October 1982
(See Vendor Profile Page V-93)

RIZZO DATA SYSTEM, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 7
Date First Installed: February 1981
(See Vendor Profile Page V-93)

RIZZO DATA SYSTEM, INC.
FINISHED GOODS INVENTORY
Specific Application: Inventory, Lot Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 5
Date First Installed: February 1982

RIZZO DATA SYSTEM, INC.
ORDER ENTRY BILLING
Specific Application: Order Entry, Billing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 5
Date First Installed: February 1982

RIZZO DATA SYSTEM, INC.
RAW MATERIALS INVENTORY
Specific Application: Single Level Explosion Inventory
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 5
Date First Installed: February 1982

R. K. RIDALL & CO., INC.
MATERIAL REQUIREMENTS PLANNING
Specific Application: MRP
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS; VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: July 1983
(See Vendor Profile Page V-93)

R. K. RIDALL & CO., INC.
PURCHASING CONTROL SYSTEM
Specific Application: Order Processing
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS; VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: January 1983

R.G.C.I., INC.
CLASS LEASE ACCOUNTING SYSTEM
Specific Application: Billing, Sales Tax, Property Tax, Income Tax, Financial
Specific Industry: Leasing
System Requirements: DG
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50,000
Number Installed to Date: 99
(See Vendor Profile Page V-93)

ROK SOFTWARE, INC.
AUTO PARTS
Specific Application: Inventory Control, Accounts Receivable
Specific Industry: Retail
System Requirements: Burroughs: MCP
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $24,600
Number Installed to Date: 1
Date First Installed: January 1983
(See Vendor Profile Page V-93)

ROK SOFTWARE, INC.
WHOLESALE DISTRIBUTION
Specific Application: Accounts Receivable, Inventory Control
Specific Industry: Wholesale/Distribution
System Requirements: Burroughs: MCP
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $27,950
Number Installed to Date: 3
Date First Installed: October 1981

ROMAN BUSINESS SERVICES
ROMAN BUSINESS SYSTEMS - VERSION 2.0
Additional Product Classification: Inventory
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Order Entry, Purchasing, Inventory, Sales Analysis
Specific Industry: Wholesale/Distribution
System Requirements: Wang 2200: Basic 2
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 8
Date First Installed: April 1981
(See Vendor Profile Page V-93)

ROSS SYSTEMS, INC.
MAPS/GL (GENERAL LEDGER/FINANCIAL MODELING)
Specific Application: General Ledger, Accounting, Financial Management, Budget Planning
Specific Industry: Manufacturing, Retail, Research
System Requirements: DEC VAX: VMS
Memory Required: 2.0M bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $22,500 to $30,000
Date First Installed: June 1983
(See Vendor Profile Page V-94)

ROTELCOM DATA, INC.
MITTS (MANAGEMENT INFORMATION TELEPHONE)
Specific Application: Tracks Telephone Usage
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Memory Required: 256.0K bytes
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1980
(See Vendor Profile Page V-94)

ROTELCOM DATA, INC.
RESALE BILLING PACKAGE
Specific Application: Rating and Billing of Customer Calling
Specific Industry: Watts Reseller
System Requirements: DEC PDP-11: RSTS/E
Memory Required: 256.0K bytes
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1982

ROY H. DAILEY, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-94)

RSA PRODUCTS
DIRECT 3000 FINANCIAL ORDER PROCESSING
Additional Product Classification: Payroll/Personnel
Specific Application: Accounts Payable and Receivable, General Ledger, Sales Order Processing, Purchase Order Processing, Inventory Control, Personnel
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE IV
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 60
Date First Installed: January 1980
(See Vendor Profile Page V-94)

R. SHRIVER ASSOCIATES
A/P
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE 4

Memory Required: 256 0K bytes
Source Language: Cobol 2
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: 1979
(See Vendor Profile Page V-94)

R. SHRIVER ASSOCIATES
A/R
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE 4
Memory Required: 256 0K bytes
Source Language: Cobol 2
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: 1979

R. SHRIVER ASSOCIATES
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE 4
Memory Required: 256 0K bytes
Source Language: Cobol 2
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: June 1982

R. SHRIVER ASSOCIATES
PURCHASE ORDER
Specific Application: Order Acquisition, Receipt of Goods
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE 4
Memory Required: 256 0K bytes
Source Language: Cobol 2
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: January 1983

R. SHRIVER ASSOCIATES
SALES ORDER PROCESS
Specific Application: On-Line Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE 4
Memory Required: 256 0K bytes
Source Language: Cobol 2
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 20
Date First Installed: 1981

SAGE SYSTEMS
COMPUTER AUDIT RETRIEVAL SYSTEM
Specific Application: Audit Retrieval
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS, Burroughs: MCP; NCR Century: VRX, HP 3000: MPE
Memory Required: 128 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000 to $35,000
Number Installed to Date: 100
Date First Installed: 1982
(See Vendor Profile Page V-94)

SAID, INC.
SASSIE
Specific Application: Membership Maintenance, Accounts Receivable for Dues, Reports Generator
System Requirements: Jacquard J 100, J 500
Memory Required: 128 0K bytes
Source Language: Jacquard Super
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,900
Date First Installed: 1978
(See Vendor Profile Page V-94)

SAKOM ENTERPRISES, INC. ACCOUNTANTS & BOOKKEEPERS
AUTOMATED CLIENT SYSTEM (ABACAS)
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS, RMS
Source Language: Databus
Source Code Available: $2,500
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 5
Date First Installed: March 1982
(See Vendor Profile Page V-94)

SALINA OFFICE SERVICES CORP.
NURSING HOME FINANCIAL PACKAGE
Specific Application: Financial
Specific Industry: Medical, Nursing Homes
System Requirements: Burroughs B900, B90 CMS, B1900
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000 to $30,000
Number Installed to Date: 35
Date First Installed: 1978
(See Vendor Profile Page V-94)

SANTA BARBARA DATA CENTER
GENERAL ACCOUNTING PACKAGE
Specific Application: General Ledger, Accounts Payable, Payroll, Report Generator, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,400
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-94)

SANTA BARBARA DATA CENTER
LINPAC (DG)
Specific Application: Invoicing, Billing, Accounts Receivable, Production Sales, Reporting
Specific Industry: Textile
System Requirements: DG Nova 4, Nova 4X, Eclipse: R-DOS
Memory Required: 128 0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $22,000
Number Installed to Date: 15
Date First Installed: 1981

SANTA BARBARA DATA CENTER
LINPAC (IBM)
Specific Application: Invoicing, Billing, Accounts Receivable, Production Sales Reporting, Cost Reporting
Specific Industry: Textile
System Requirements: IBM 360, 4331 OS/VSE, 4341
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 130
Date First Installed: 1980

SANTA CRUZ COMPUTER BILLING
Specific Application: Time-Shared Accounting, Billing
Specific Industry: Not Industry Sensitive
System Requirements: PE; DEC VAX: Unix, DEC PDP-11
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 2
Date First Installed: April 1983
(See Vendor Profile Page V-95)

SATELLITE COMPUTING, INC.
BOSS/3000
Additional Product Classification: WP/Text Editing, Inventory
Specific Application: Inventory Control, Purchase Order Management
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $89,000
Number Installed to Date: 45
Date First Installed: 1978
(See Vendor Profile Page V-95)

SATELLITE COMPUTING, INC.
QUALITY MATERIAL ACCOUNTING & MANUFACTURING SYSTEM
Additional Product Classification: WP/Text Editing
Specific Application: Financial, WP
Specific Industry: Manufacturing
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $130,000
Number Installed to Date: 5
Date First Installed: 1981

SAYLOR THORNTON & CO.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1980
(See Vendor Profile Page V-95)

SBD COMPUTER SERVICES CORP.
ON-LINE ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Sperry 1100
Source Language: Mapper, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 2
Date First Installed: 1983
(See Vendor Profile Page V-95)

SBS COMPUTERS
GENERAL ACCOUNTING SYSTEM
Specific Application: General Accounting System
Specific Industry: Wholesale/Distribution, Retail
System Requirements: Alpha Micro; Televideo, IBM PC PC-DOS; TI 700 and 900 Series: CP/M
Source Language: Cobol
Purchase Terms: Purchase (license); Rental, Lease
Price: $650 to $6,500
Number Installed to Date: 500
Date First Installed: 1978
(See Vendor Profile Page V-95)

SCIENCE MANAGEMENT CORP.
THOROUGHBRED UNI-DOL
Specific Industry: Not Industry Sensitive
System Requirements: Univac System 3: OS
Source Language: Basic
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-95)

SCIENTIFIC PROCESS & RESEARCH
XTEN
Additional Product Classification: Management
Specific Application: Accounting, Revenue, Land Management
Specific Industry: Petroleum
System Requirements: IBM 4300 Series: OS; IBM 3000 Series: DOS
Memory Required: 96 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $120,000 to $150,000
Number Installed to Date: 50
Date First Installed: July 1979
(See Vendor Profile Page V-95)

SCOTT-HEALEY ASSOCIATES, INC.
EQUIPMENT DEALER PACKAGE (EDP)
Specific Application: Equipment Dealer Package
Specific Industry: Manufacturing, Wholesale/Distribution, Retail
System Requirements: Burroughs B900 CMS
Memory Required: 256.0K bytes
Source Language: Cobol, Assist
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $12,000 to $25,000

[illegible] Installed to Date: 2
Date First Installed: January 1983
(See Vendor Profile Page V-96)

SDI
ACCOUNTING
Specific Application: Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS
Source Language: Assembler
Purchase Terms: Purchase (license); Lease
(See Vendor Profile Page V-96)

SEATTLE TELECOM & DATA, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 100
Date First Installed: 1980
(See Vendor Profile Page V-96)

SEATTLE TELECOM & DATA, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 100
Date First Installed: 1980

SEATTLE TELECOM & DATA, INC.
CONTRACTORS JOB COST
Specific Application: Job Cost
System Requirements: TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 100
Date First Installed: 1980

SEATTLE TELECOM & DATA, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 100
Date First Installed: 1980

SEDATA SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable, Cash Forecast
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10
Memory Required: 256.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: 1980
(See Vendor Profile Page V-96)

SEDATA SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10
Memory Required: 256.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: 1980

SEDATA SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger, Consolidation of Budget, Fund Statements
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10
Memory Required: 256.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: 1980

SEDATA SYSTEMS, INC.
ORDER ENTRY AND BILLING
Specific Application: Order Entry and Billing
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10
Memory Required: 256.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: 1980

SEI CORP.
TRUSTAID
Specific Application: Securities, Management, Accounting
Specific Industry: Banking/Financial
System Requirements: IBM
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 70
Date First Installed: 1977
(See Vendor Profile Page V-96)

SEI CORP.
RELATIONSHIP BANKING SYSTEM
Specific Application: Cash Management
Specific Industry: Banking/Financial
System Requirements: Prime
Source Language: Fortran
Purchase Terms: Purchase (license); Lease
Date First Installed: 1980

SEI CORP.
TRUSTPAC
Specific Application: Trust Accounting, Management Information
Specific Industry: Banking/Financial
System Requirements: DG
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 35
Date First Installed: 1982

SEI CORP.
TRUST-AID
Specific Application: Trust Accounting, Management Information
Specific Industry: Banking/Financial
System Requirements: IBM, Prime: Primos
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 430
Date First Installed: 1972

SELLERS SOFTWARE SERVICES CO.
PENNY PINCHER
Specific Application: Billing System for Long Distance Resellers
Specific Industry: Long Distance Resale
System Requirements: Datapoint: DOS, Unix; NCR, RSM
Memory Required: 128.0K bytes
Source Language: Databus, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-96)

SELLERS SOFTWARE SERVICES CO.
THE BOTTOM LINE
Specific Application: Billing System for Radio Common Carriers
Specific Industry: Common Carriers
System Requirements: Datapoint: DOS, RMS
Memory Required: 128.0K bytes
Source Language: Databus, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $13,000
Number Installed to Date: 1
Date First Installed: 1981

SENTINEL COMPUTER CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Wholesale/Distribution
System Requirements: Sentinel 30, Sentinel 40, Sentinel 50, Sentinel 80: Dbos
Memory Required: 128.0K bytes
Source Language: DBL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500
Number Installed to Date: 200
Date First Installed: April 1981

SENTINEL COMPUTER CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Wholesale/Distribution
System Requirements: Sentinel 30, Sentinel 40, Sentinel 50, Sentinel 80: Dbos
Memory Required: 128.0K bytes
Source Language: DBL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500
Number Installed to Date: 200
Date First Installed: April 1981

SENTINEL COMPUTER CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Wholesale/Distribution
System Requirements: Sentinel 30, Sentinel 40, Sentinel 50, Sentinel 80: Dbos
Memory Required: 128.0K bytes
Source Language: DBL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,250
Number Installed to Date: 200
Date First Installed: April 1981

SENTINEL COMPUTER CORP.
ORDER ENTRY AND INVOICING
Specific Application: Order Entry Invoicing
Specific Industry: Wholesale/Distribution
System Requirements: Sentinel 30, Sentinel 40, Sentinel 50, Sentinel 80: Dbos
Memory Required: 128.0K bytes
Source Language: DBL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,500
Number Installed to Date: 200
Date First Installed: April 1981

SENTINEL COMPUTER CORP.
PURCHASING
Specific Application: Purchasing
Specific Industry: Wholesale/Distribution
System Requirements: Sentinel 30, Sentinel 40, Sentinel 50, Sentinel 80: Dbos
Memory Required: 128.0K bytes
Source Language: DBL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500
Number Installed to Date: 200
Date First Installed: April 1981

SENTINEL COMPUTER CORP.
RENTAL/DEMURRAGE & CYLINDER CONTROL
Specific Application: Rental/ Demurrage and Cylinder Control
Specific Industry: Wholesale/Distribution
System Requirements: Sentinel 30, Sentinel 40, Sentinel 50, Sentinel 80: Dbos
Memory Required: 128.0K bytes
Source Language: DBL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500
Number Installed to Date: 200
Date First Installed: April 1981

SENTINEL COMPUTER CORP.
SALES ANALYSIS
Specific Application: Sales Analysis
Specific Industry: Wholesale/Distribution

System Requirements: Sentinel 30, Sentinel 40, Sentinel 50; Sentinel 80: Dbos
Memory Required: 128.0K bytes
Source Language: DBL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,250
Number Installed to Date: 200
Date First Installed: April 1981

SHAKER COMPUTER & MANAGEMENT SERVICES, INC.
COMPUTERIZED MUNICIPAL ACCOUNTING SYSTEM
Specific Application: Municipal Accounting System
Specific Industry: Government
System Requirements: Prime: Primos
Memory Required: 1.0M bytes
Source Language: Fortran, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 20
Date First Installed: 1970
(See Vendor Profile Page V-97)

SHAKER COMPUTER & MANAGEMENT SERVICES, INC.
DEBTORS ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable for Debtors
Specific Industry: Not Industry Sensitive
System Requirements: Prime
Memory Required: 1.0M bytes
Source Language: Fortran, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 5
Date First Installed: 1978

SHAKER COMPUTER & MANAGEMENT SERVICES, INC.
PROFESSIONAL TIME ACCOUNTING
Specific Application: Time Accounting, Payroll, Billing
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Memory Required: 1.0M bytes
Source Language: Fortran, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1980

SHAKER COMPUTER & MANAGEMENT SERVICES, INC.
PROJECT MANAGEMENT INFORMATION SYSTEM
Specific Application: Accounting and Cost Control
Specific Industry: Engineering, Construction
System Requirements: Prime: Primos
Memory Required: 1.0M bytes
Source Language: Fortran, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 2
Date First Installed: 1982

SHARED BUSINESS SERVICES, INC.
MEGAMED-MEDICAL OFFICE MANAGEMENT SYSTEM
Specific Application: Accounts Receivable, Medical Records, Appointment Scheduling, Correspondence Insurance Processing, Hospital Census
Specific Industry: Medical, Insurance
System Requirements: GA Zebra: Pick; Microdata Sequel: Reality Pick; ADDS Mentor: Pick; IBM Series/1: Pick
Memory Required: 32.0K bytes
Source Language: Basic, Proc English
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000 to $15,000
Number Installed to Date: 30
Date First Installed: February 1982
(See Vendor Profile Page V-97)

SHASTA GENERAL SYSTEMS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Zentec: Zenix; Altos: Unix, Xerox: CP/M
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 100
Date First Installed: 1978
(See Vendor Profile Page V-97)

SHASTA GENERAL SYSTEMS
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Zentec: Zenix, Altos: Unix, Xerox: CP/M
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 100
Date First Installed: 1978

SHASTA GENERAL SYSTEMS
AUTOMATIC DEPRECIATION
Specific Application: Automatic Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: Zentec: Zenix; Altos: Unix; Xerox: CP/M
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 100
Date First Installed: 1980

SHASTA GENERAL SYSTEMS
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Zentec: Zenix; Altos: Unix; Xerox: CP/M
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Price: $595
Number Installed to Date: 100
Date First Installed: 1978

SHASTA GENERAL SYSTEMS
PROFESSIONAL TIME ACCOUNTING
Specific Application: Professional Time Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Zentec: Zenix, Altos: Unix, Xerox: CP/M
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,495
Number Installed to Date: 100
Date First Installed: 1981

SHASTA GENERAL SYSTEMS
THE CPA
Specific Application: CPA and Client Write-Up
Specific Industry: CPA
System Requirements: Zentec: Zenix; Altos: Unix; Xerox: CP/M
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,395
Number Installed to Date: 100
Date First Installed: 1980

SHASTA GENERAL SYSTEMS
THE MANUFACTURER
Specific Application: Manufacturers Accounting
Specific Industry: Manufacturing
System Requirements: Zentec: Zenix; Altos: Unix, Xerox: CP/M
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,195
Number Installed to Date: 100
Date First Installed: 1978

SHASTA GENERAL SYSTEMS
THE RETAILER
Specific Application: Accounting
Specific Industry: Retail
System Requirements: Zentec: Zenix; Altos: Unix; Xerox: CP/M
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,195
Number Installed to Date: 300
Date First Installed: 1978

SHASTA GENERAL SYSTEMS
THE WHOLESALER
Specific Application: Wholesale Accounting and Inventory
Specific Industry: Wholesale/Distribution
System Requirements: Zentec: Zenix; Altos: Unix; Xerox: CP/M
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,195
Number Installed to Date: 150
Date First Installed: 1978

SIGMA SERVICES, INC.
DENTAL OFFICE MANAGEMENT SYSTEM
Specific Application: Accounts Receivable, Accounts Payable
Specific Industry: Medical, Dental
System Requirements: Onyx: Oasis
Memory Required: 64.0K bytes
Source Language: Basic, Basic-Plus, Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $14,000
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-97)

SIGMA SYSTEMS, INC.
STUDENT ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Education
System Requirements: IBM: OS, DOS; DEC: Tops; HP 3000
Memory Required: 64.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1982
(See Vendor Profile Page V-97)

SIGMA SYSTEMS, INC.
STUDENT AID MANAGEMENT SYSTEM
Specific Application: Administration of Financial Aid
Specific Industry: Education
System Requirements: IBM: OS-DOS; DEC: Tops 20; HP 3000: Tops 10
Memory Required: 64.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1979

SILTON AMS, INC.
SILTON APPAREL MANAGEMENT SYSTEM
Specific Application: Order Processing, Invoicing
Specific Industry: Apparel
System Requirements: HP 3000: MPE 5
Memory Required: 512.0K bytes
Source Language: Cobol II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $25,000 to $45,000
Number Installed to Date: 125
Date First Installed: 1969

SKAMP COMPUTER SERVICES, INC.
NEWSPAPER MANAGEMENT SYSTEM
Specific Application: Circulation, On-Line Classified, Editing
System Requirements: TI 300, 800, IBM PC-XT
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $14,900 to $20,000
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-98)

SMITH, DENNIS & GAYLORD, INC.
AGRI-BUSINESS 250
Specific Application: Accounting, General Ledger, Fixed Assets

Specific Industry: Agricultural
System Requirements: HP 250
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $23,500
Number Installed to Date: 10
(See Vendor Profile Page V-98)

SMITH, DENNIS & GAYLORD, INC.
BILLING 3000
Specific Application: Invoicing
Specific Industry: Retail, Wholesale/Distribution, Nonprofit Organizations, Transportation
System Requirements: HP 3000: MPE, Omit
Memory Required: 512.0K bytes
Source Language: Image
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 5

SMITH, DENNIS & GAYLORD, INC.
BUSINESS 3000 ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Banking/Financial, Medical, Legal, Transportation, Nonprofit Organizations
System Requirements: HP 3000: MPE, Omit
Source Language: Image, SPL, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 40

SMITH, DENNIS & GAYLORD, INC.
BUSINESS 3000 ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Banking/Financial, Medical, Legal, Transportation, Nonprofit Organizations
System Requirements: HP 3000: MPE, Omit
Source Language: Image, SPL, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 40

SMITH, DENNIS & GAYLORD, INC.
BUSINESS 3000 GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Banking/Financial, Medical, Legal, Transportation
System Requirements: HP 3000: MPE, Omit
Source Language: Image, SPL, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $17,500
Number Installed to Date: 40

SMITH, DENNIS & GAYLORD, INC.
BUSINESS 3000 ORDER MANAGEMENT
Specific Application: Order Management
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Transportation
System Requirements: HP 3000: MPE, Omit; Tandem
Source Language: Image, SPL, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $32,000
Number Installed to Date: 15

SMITH, DENNIS & GAYLORD, INC.
BUSINESS 3000 PURCHASING INVENTORY
Additional Product Classification: Inventory
Specific Application: Purchasing and Inventory Control
Specific Industry: Wholesale/Distribution, Retail, Banking/Financial, Medical, Construction, Transportation, Nonprofit Organizations
System Requirements: HP 3000: MPE, Omit
Source Language: Image, SPL, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 10

SMITH, DENNIS & GAYLORD, INC.
COMMODITIES 250
Specific Application: Commodities Control
Specific Industry: Wholesale/Distribution, Commodities
System Requirements: HP 250
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 19

SMITH, DENNIS & GAYLORD, INC.
FINANCIAL REPORT WRITER WITH GRAPHICS
Specific Application: General Ledger, Report Generator
Specific Industry: Banking/Financial, Legal, Construction, Transportation, Nonprofit Organizations, Shipping Vessels
System Requirements: HP 3000: MPE, Omit
Source Language: Image, SPL, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 5
Date First Installed: 1980

SMITH, DENNIS & GAYLORD, INC.
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 50
Date First Installed: September 1979

SMITH, DENNIS & GAYLORD, INC.
PURCHASING
Specific Application: Purchasing
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 60
Date First Installed: 1979

SMYTH BUSINESS SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Retail
System Requirements: IBM 4300: VSE, DG: R-DOS
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $15,000 to $20,000
Date First Installed: 1977
(See Vendor Profile Page V-98)

SMYTH BUSINESS SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Retail
System Requirements: IBM 4300: VSE, DG: R-DOS
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $15,000 to $20,000
Date First Installed: 1977

SMYTH BUSINESS SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Retail
System Requirements: IBM 4300: VSE, DG: R-DOS
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $15,000 to $20,000
Date First Installed: 1977

SNOWBIRD CORP.
TIME SHARE ACCOUNTING
Specific Application: Accounting
Specific Industry: Resort
System Requirements: Basic 4: Boss
Memory Required: 12.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-98)

SOFT PRO SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
System Requirements: Wang/VS: VS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
(See Vendor Profile Page V-98)

SOFTWARE INTELLIGENCE LABORATORY, INC.
SIL ACCOUNTING SYSTEM
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, MVS, Cics
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: October 1982
(See Vendor Profile Page V-98)

SOFTWARE INTERNATIONAL CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370: DOS, DOS/VS, IBM 4300 Series: DOS/VSE, OS, OS/VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 850
Date First Installed: September 1972
(See Vendor Profile Page V-98)

SOFTWARE INTERNATIONAL CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370: DOS, DOS/VS, IBM 4300 Series: DOS/VSE; IBM System/34; Honeywell 6000 Series
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 300
Date First Installed: 1974

SOFTWARE INTERNATIONAL CORP.
FINANCIAL REPORTING & WORK ORDER MANAGEMENT
Specific Application: Work Order Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370: DOS, DOS/VS, OS, OS/VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: September 1978

SOFTWARE INTERNATIONAL CORP.
FIXED ASSET ACCOUNING
Specific Application: Fixed Asset Accounting
Specific Industry: Not Industry Sensitive

Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 250
Date First Installed: 1978

SOFTWARE INTERNATIONAL CORP.
G/L & FINANCIAL REPORTING
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3030, 4300 Series: DOS/VS: OS, OS/VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 4,000
Date First Installed: 1970

SOFTWARE MANAGEMENT SYSTEMS, INC.
CONSTRUCT
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Job Costing, Scheduling, Estimating, Equipment Management
Specific Industry: Construction, Project Management
System Requirements: Prime 2250, 250, 450, 750, 850
Source Language: Info Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 63
Date First Installed: February 1981
(See Vendor Profile Page V-98)

SOFTWARE PRODUCTS, INC.-MANAGEMENT & ACCOUNTING SYSTEM FOR TIMESHARING
Additional Product Classification: Report Generator, Security/Auditing, Inventory
Specific Application: Time-Shared Inventory Control, Commissions, Contract Sales, Management, Security, Electronic Mail, Management Reports, Statistics
Specific Industry: Time-Sharing
System Requirements: Honeywell DPS 6
Memory Required: 65.0K bytes
Source Language: Ansi Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: June 1982
(See Vendor Profile Page V-98)

SOFTWARE PRODUCTS INTERNATIONAL
LOGIASSET
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM Displaywriter; IBM PC; Altos Sage II; TRS-80/II
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 200
Date First Installed: July 1981
(See Vendor Profile Page V-100)

SOFTWARE & SYSTEMS DEVELOPMENT CO.
PAID-PAYMENT INQUIRY DISPLAY SYSTEM
Specific Application: Interface With Accounts Receivable System
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM 370: OS, DOS, MVS, IBM 4300
Memory Required: 60.0K bytes
Source Language: Cobol, Ccs/Macro
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,500
Number Installed to Date: 2
Date First Installed: January 1982
(See Vendor Profile Page V-100)

SOFTWARE SYSTEMS MARKETING, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DG: DOS, R-DOS, AOS
Memory Required: 20.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,000 to $5,000
Number Installed to Date: 5
Date First Installed: 1982
(See Vendor Profile Page V-100)

SOFTWARE SYSTEMS, INC.
IOMS
Additional Product Classification: Management
Specific Application: Accounting, Order Entry, Inventory
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: NCR: Imoe, IRX, ITX; TI 600, 800, 990: DX-10, MS-DOS,CP/M 86
Memory Required: 128.0K bytes
Source Language: Cobol, RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,000
Number Installed to Date: 40
Date First Installed: 1978
(See Vendor Profile Page V-100)

THE SOFTWARE WORKS, INC.
FINANCIAL REPORTING SYSTEM
Specific Application: General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Prime: ADDS
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 50
Date First Installed: November 1978
(See Vendor Profile Page V-100)

SOLUTION ASSOCIATES, INC.
ATTORNEY TIME ACCOUNTING SYSTEM
Specific Application: Time Billing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP; IBM System/36: SSP 36; IBM PC: PC-DOS
Memory Required: 24.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: 192
(See Vendor Profile Page V-101)

SOLUTION ASSOCIATES, INC.
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP; IBM System/36: SSP 36, IBM PC: PC-DOS
Memory Required: 24.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 8
Date First Installed: 1982

SOLUTION ASSOCIATES, INC.
INSURANCE ONLINE CLAIMS
Specific Application: Accounting for Insurance Claims
Specific Industry: Insurance
System Requirements: IBM System/34: SSP; IBM System/36: SSP; IBM PC: PC-DOS
Memory Required: 24.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 2
Date First Installed: 1983

SOLUTIONS ASSOCIATES, INC.
ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/34: SSP; IBM System/36: SSP; IBM PC: PC-DOS
Memory Required: 24.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 3
Date First Installed: 1983

THE SOLUTIONS GROUP, INC.
LEGAL BILLING
Specific Application: Time and Billing for Attorneys
Specific Industry: Legal
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: February 1982
(See Vendor Profile Page V-101)

SOLUTION SYSTEMS, INC.
EFACTS
Specific Application: Payroll, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Engineering
System Requirements: Prime 50 Series: Primos
Memory Required: 512.0K bytes
Source Language: Info
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-101)

SOS, INC.
LEGAL
Specific Application: Multioffice Legal System
Specific Industry: Legal
System Requirements: DG Mova: Iris, Point 4: Bits, Bytronix
Memory Required: 32.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-101)

SOURCE DATA SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1, PC; NCR 9020, 9300, NCR Tower 1632; NCR Decision Mate V
Source Language: Forth
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 4
Date First Installed: July 1981
(See Vendor Profile Page V-101)

SOURCE DATA SYSTEMS, INC.
FIXED ASSETS
Specific Application: Fixed Asset
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1, PC, NCR 9020, 9300; NCR Tower 1632, NCR Decision Mate V
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 4
Date First Installed: July 1981

SOURCE DATA SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1, PC; NCR 9020, 9300; NCR Tower 1632
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 4
Date First Installed: July 1981

SOURCE ONE DISTRIBUTOR MANAGEMENT
ROUTE ACCOUNTING SYSTEM
Specific Application: Financial Route Accounting
Specific Industry: Wholesale/Distribution, Beverage
System Requirements: Burroughs: CMS
Memory Required: 192.0K bytes
Source Language: Cobol, RPG
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $9,000
Number Installed to Date: 80
Date First Installed: 1977
(See Vendor Profile Page V-101)

SOUTHERN SOFTWARE
DOMIS
Specific Application: Dental
Specific Industry: Medical, Dental
System Requirements: DG: R-DOS, AOS
Memory Required: 128.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 3
Date First Installed: 1982
(See Vendor Profile Page V-101)

SOUTHWEST COMPUTER SERVICES
OIL & GAS ACCOUNTING SYSTEM
Specific Application: Accounting for Oil and Gas, Inventory
Specific Industry: Oil and Gas
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 15
Date First Installed: 1970
(See Vendor Profile Page V-101)

SPECTRUM SOFTWARE
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS 3.3, IBM: MS-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 300
Date First Installed: 1982
(See Vendor Profile Page V-102)

SPECTRUM SOFTWARE
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS 3.3, IBM: MS-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 300
Date First Installed: 1982
(See Vendor Profile Page V-102)

SPECTRUM SOFTWARE
MERCHANDISE ENHANCE MASTER
Specific Application: General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS 3.3, IBM: MS-DOS
Memory Required: 48.0K bytes
Source Language: Basic Compiler
Purchase Terms: Purchase (license)
Price: $75
Number Installed to Date: 300
Date First Installed: 1982
(See Vendor Profile Page V-102)

SPEEDATA, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 48.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 30
Date First Installed: 1978

SPEEDATA, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 48.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 30
Date First Installed: 1978

SPEEDATA, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 48.0K bytes
Source Language: Databus
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 30
Date First Installed: 1977

SPENCER SYSTEMS, INC.
HOUSING AUTHORITY
Specific Application: General Accounting
Specific Industry: Government
System Requirements: IBM System/34
Memory Required: 48.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Date First Installed: December 1982
(See Vendor Profile Page V-102)

SPRINGFIELD SOFTWARE CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200: Basic II
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 100
Date First Installed: 1977
(See Vendor Profile Page V-0b)

SPRINGFIELD SOFTWARE CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200: Basic II
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 100
Date First Installed: 1977
(See Vendor Profile Page V-102)

SPRINGFIELD SOFTWARE CORP.
BASIC ACCOUNTING SYSTEM
Specific Application: Payroll, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200: Basic II
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,980
Number Installed to Date: 100
Date First Installed: 1977

SPRINGFIELD SOFTWARE CORP.
EQUIPMENT MANAGEMENT SYSTEM
Specific Application: Equipment Rental, Contract Equipment, Income and Expense Report Accounting
Specific Industry: Construction, Equipment Rental
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 10
Date First Installed: 1982

SPRINGFIELD SOFTWARE CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200: Basic II
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase-(license)
Price: $495
Number Installed to Date: 100
Date First Installed: 1977

SPRINGFIELD SOFTWARE CORP.
NURSING HOME ACCOUNTING SYSTEM
Specific Application: Accounting, Patient Records Management
Specific Industry: Medical, Nursing Homes
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1983

STANDARD COMPUTER SYSTEMS
GOVERNMENTAL FUND ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: Fund Accounting, Incumbents and Budgeting Payroll
Specific Industry: Government
System Requirements: IBM DOS VSE
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 4
Date First Installed: 1982
(See Vendor Profile Page V-102)

STANDARD DATA CORP.
ASSOCIATION MANAGEMENT SYSTEM
Specific Application: Membership, Accounts Receivable, Accounts Payable, Budgeting, Book Inventory, Registration, Record Keeping
Specific Industry: Associations
System Requirements: IBM 4300: DOS, Prime: Primos
Memory Required: 512.0K bytes
Source Language: Cobol, BAL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: December 1985
(See Vendor Profile Page V-102)

STANDARD DATA CORP.
UNION MEMBERSHIP CONTROL SYSTEM
Specific Application: Dues Collections, Record Keeping
Specific Industry: Unions
System Requirements: IBM 4300: DOS, Prime 550: Primos
Memory Required: 512.0K bytes
Source Language: Cobol, BAL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: December 1979

STANDUN CONTROLS, INC. (S.C.I.)
BAS (BASIC ACCOUNTING SYS)
Specific Application: Accounting
Specific Industry: Medical, Dental
System Requirements: Commodore
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $599
Number Installed to Date: 1,000
Date First Installed: 1980
(See Vendor Profile Page V-102)

STANDUN CONTROLS, INC. (S.C.I.)
LTA (LEGAL TEXT ACCOUNTING)
Additional Product Classification: WP Text Editing
Specific Application: Word Processing, Accounting
Specific Industry: Legal
System Requirements: Commodore
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $599
Number Installed to Date: 1,000
Date First Installed: 1980

STAR SOFTWARE SYSTEMS, INC.
STAR SYSTEM 1 GENERAL ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Payroll
Specific Industry: Not Industry Sensitive

TO SOFTWARE

System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: January 1981
(See Vendor Profile Page V-103)

STAR SOFTWARE SYSTEMS, INC.
STAR SYSTEM 5 LEGAL BILLING SYSTEM
Specific Application: Legal Timekeeping and Billing
Specific Industry: Legal
System Requirements: Altos: CP/M; North Star; IBM PC; Toshiba
Memory Required: 64.0K bytes
Source Language: Mbasic
Purchase Terms: Purchase (license)
Price: $950
Number Installed to Date: 2,000
Date First Installed: June 1980

STEPHEN W. LEVY, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 32.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 60
Date First Installed: July 1979
(See Vendor Profile Page V-103)

STEPHEN W. LEVY, INC.
ACCOUNTS RECEIVABLE-OPEN ITEM OR BALANCE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 32.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 65
Date First Installed: August 1979

STEPHEN W. LEVY, INC.
CPA CLIENT WRITE-UP SYSTEM COMPUTER
Specific Application: General Ledger, Accounting
Specific Industry: Not Industry Sensitive
System Requirements: DOS
Memory Required: 32.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 45
Date First Installed: March 1979

STEPHEN W. LEVY, INC.
LOAN AMORTIZATION
Additional Product Classification: Banking, Loan Amortization
Specific Application: Loan Amortization
Specific Industry: Banking/Financial
System Requirements: Datapoint: DOS
Memory Required: 32.0K bytes
Source Language: Databus
Source Code Available: Yes
Price: $250
Number Installed to Date: 30
Date First Installed: September 1979

STEPHEN W. LEVY, INC.
ONE-STEP BILLING SYSTEM
Specific Application: One-Step Billing System
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 32.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 30
Date First Installed: September 1979

STEPHEN W. LEVY, INC.
PROPERTY MANAGEMENT RESIDENTIAL
Additional Product Classification: Property Management
Specific Application: Property Management
Specific Industry: Not Industry Sensitive
System Requirements: DOS
Memory Required: 32.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 10
Date First Installed: January 1981

STEWART SYSTEMS CORP.
STEWY
Additional Product Classification: Management
Specific Application: Financial Management Estimating, Production Management
Specific Industry: Graphic Arts
System Requirements: DG Eclipse: R-DOS
Memory Required: 128.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $12,000
Number Installed to Date: 400
Date First Installed: 1971
(See Vendor Profile Page V-103)

ST. JOSEPH SYSTEMS
ST JOSEPH TRUST ACCOUNTING SYSTEM
Specific Application: Trust Accounting
Specific Industry: Banking/Financial, Education, Nonprofit Organizations
System Requirements: IBM: DOS, OS; Burroughs; NCR; HP
Memory Required: 96.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1970
(See Vendor Profile Page V-103)

STOCKHOLDER SYSTEMS, INC.
AUTOMATED LEASE ACCOUNTING SYSTEM
Specific Application: Maintain Computerized Records for Operating and Finance Leases
Specific Industry: Leasing Companies
System Requirements: IBM 3000,4300: OS-DOS
Memory Required: 200.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000 to $97,000
Number Installed to Date: 80
Date First Installed: June 1977
(See Vendor Profile Page V-103)

STOCKHOLDER SYSTEMS, INC.
CORPORATE SHAREHOLDER SYSTEMS (CSS)
Additional Product Classification: Securities Transfer
Specific Application: Securities Transfer and Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3000: OS-DOS
Memory Required: 200.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $45,000 to $200,000
Number Installed to Date: 150
Date First Installed: September 1988

STOLTZ ENTERPRISES, INC.
FOOD PROCESSORS PRODUCT MANAGEMENT SYSTEM
Specific Application: Management System
Specific Industry: Food Processors
System Requirements: DG: R-DOS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1983
(See Vendor Profile Page V-103)

STRUCTURED BUSINESS SYSTEMS, INC.
IMPORTER MANAGEMENT
Additional Product Classification: Inventory
Specific Application: Order Entry, Purchasing, Receiving, Inventory Management, Sales Analysis and Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT: PC-DOS; IBM System/34: SSP; Prime 50 Series
Memory Required: 128.0K bytes
Source Language: Cbasic
Purchase Terms: Purchase (license); Lease
Date First Installed: October 1983
(See Vendor Profile Page V-104)

STRUCTURE SYSTEMS GROUP
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; PC-DOS; MPM/86; CP/M 86
Memory Required: 48.0K bytes
Source Language: CB80, CB86
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1,800
Date First Installed: 1977
(See Vendor Profile Page V-104)

STS SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: Micos; DG Eclipse: AOS/VS; DG MV/Series
Memory Required: 64.0K bytes
Source Language: Interactive Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000 to $55,000
Number Installed to Date: 50
Date First Installed: September 1979
(See Vendor Profile Page V-104)

STS SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: Micos; DG Eclipse: AOS/VS; DG MV/Series
Memory Required: 64.0K bytes
Source Language: Interactive Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000 to $25,000

STS SYSTEMS, INC.
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: Micos; DG Eclipse: AOS/VS; DG MV/Series
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $10,000
Number Installed to Date: 3
Date First Installed: 1982

STS SYSTEMS, INC.
GENERAL LEDGER/FINANCIAL REPORT GENERATOR
Additional Product Classification: Report Generator
Specific Application: General Ledger, Financial Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: Micos; DG Eclipse: AOS/VS; DG MV/Series
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000 to $21,000
Number Installed to Date: 60
Date First Installed: 1979

STS SYSTEMS, INC.
MINIFUEL
Additional Product Classification: Heating Oil
Specific Application: Home and Commercial Heating Oil
Specific Industry: Wholesale/Distribution
System Requirements: DG Nova: Micos; DG Eclipse: AOS/VS; DG MV/Series

Memory Required: 64.0K bytes
Source Language: Interactive Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $20,000 to $75,000
Number Installed to Date: 140
Date First Installed: 1975

STS SYSTEMS, INC.
STORE
Specific Application: Inventory Control, Sales-Reporting, Purchase Order Management
Specific Industry: Retail
System Requirements: DG Nova: Micos, DG Eclipse: AOS/VS; DG MV/Series
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000
Number Installed to Date: 35
Date First Installed: 1978

STS SYSTEMS, INC.
STS FINANCIAL REPORTING SYSTEM
Additional Product Classification: Report Generator
Specific Application: Financial Reporting, General Ledger, Accounts Payable and Receivable, Fixed Assets, Financial Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: Micos; DG Eclipse: AOS/VS; DG MV/Series
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)

STYRON & ASSOCIATES
COLLECTION BUREAU SYSTEM
Specific Application: Debt Records, Monthly Reports, Phone Contacts, Written Notices
Specific Industry: Collection Bureaus
System Requirements: Datapoint: DOS; HP 3000; IBM
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-104)

SUCCESS SYSTEMS, INC.
BROKERAGE PACKAGE
Specific Application: Order Processing, Statiscal Analysis
Specific Industry: Wholesale/Distribution, Food Brokerage
System Requirements: Qantel 64; Honeywell
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $20,000
Date First Installed: 1979
(See Vendor Profile Page V-104)

SUCCESS SYSTEMS, INC.
PC-PAC
Specific Application: Pest Control Accounting
Specific Industry: Pest Control
System Requirements: Qantel; Xerox 820
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 2
Date First Installed: 1982

SUN INFORMATION SERVICES CO.
FICOM-PROJECT INFORMATION COST MANAGEMENT SYSTEM
Specific Application: Accounting With Cost Management, Budgeting, Project Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: OS, IBM 3000
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $65,000
Number Installed to Date: 40
Date First Installed: 1979
(See Vendor Profile Page V-104)

SWICK COMPUTER SERVICES, INC.
AUTO PARTS STORE SYSTEM
Specific Application: Auto Parts Store Bookkeeping
Specific Industry: Wholesale/Distribution, Auto Parts
System Requirements: TI 990: DX-10
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $10,000 to $20,000
Number Installed to Date: 3
Date First Installed: January 1982
(See Vendor Profile Page V-104)

SYNCOM SYSTEMS, INC.
APPAREL PACKAGE
Specific Application: Manufacturing and Accounting for the Apparel Industry
System Requirements: ADOS Mentor Pick
Memory Required: 128.0K bytes
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
(See Vendor Profile Page V-105)

SYNON CORP.
SYNON LABOR MANAGEMENT SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Data Collection, Time and Attendance, Job Cost Accounting
Specific Industry: Not Industry Sensitive
System Requirements: DG: ICOS, AOS, R-DOS
Source Language: Cobol, Interactive Cobol
Purchase Terms: Purchase (license); Rental; Lease
(See Vendor Profile Page V-105)

SYNON CORP.
SYNON LOAN PREPARATION AND TRACKING
Additional Product Classification: Banking
Specific Application: General Ledger, Accounts Payable and Receivable, Sales Analysis, Business Planner
Specific Industry: Banking/Financial
System Requirements: DG: Icos, AOS, R-DOS
Source Language: Cobol, Interactive Cobol
Purchase Terms: Purchase (license); Rental; Lease

SYSCOM, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease

SYSCOM, INC.
FLOWER WHOLESALER IMPORT/EXPORT
Specific Application: Flower Import/Export
Specific Industry: Import/Export
System Requirements: IBM System/32, System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: January 1982

SYSCOM, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23, System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: January 1982
(See Vendor Profile Page V-105)

SYSCOM, INC.
GUARDIAN
Specific Application: Legal Time/Cost Accounting
Specific Industry: Legal
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1981

SYSCOM, INC.
ORDER ENTRY
Specific Application: Order Entry System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease

SYSCOM, INC.
RETAIL/WHOLESALE PAINT SUPPLY
Specific Application: Retail/Wholesale
Specific Industry: Paint Supply
System Requirements: IBM System/32
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: January 1982

SYS-SYN CORP.
INVESTMENT MANAGEMENT SUPPORT SYSTEM
Specific Application: Investments and Money Management
System Requirements: Wang 2200
Memory Required: 3.2M bytes
Source Language: Basic II
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 3
(See Vendor Profile Page V-105)

SYSTEC COMPUTER ASSOCIATES, INC.
ACCOUNTING PACKAGE
Additional Product Classification: Payroll/Personnel
Specific Application: Payroll, Accounts Payable, Accounts Receivable, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse: R-DOS, DG Nova
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 1
(See Vendor Profile Page V-105)

SYSTEC COMPUTER ASSOCIATES, INC.
DISTRIBUTION PACKAGE
Additional Product Classification: Manufacturing
Specific Application: Distribution,Order Processing, Billing,Inventory and Sales Analysis
Specific Industry: Wholesale/Distribution
System Requirements: DG Eclipse: R-DOS, DG Nova
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000 to $15,000
Number Installed to Date: 4
Date First Installed: 1981

SYSTEM AUTOMATION CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE, Convergent Technology
Memory Required: 256.0K bytes
Source Language: Cobol (HP), Pascal (Convergent Technology)
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Date First Installed: 1979
(See Vendor Profile Page V-105)

SYSTEM AUTOMATION CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive

System Requirements: HP 3000: MPE; Convergent Technology: Ctos
Memory Required: 256 0K bytes
Source Language: Cobol (HP), Pascal (Convergent Technology)
[illegible] Yes
Purchase Terms: Purchase (license); Time-Sharing
Date First Installed: 1979

SYSTEM AUTOMATION CORP.
FINANCIAL MANAGEMENT SYSTEM
Specific Application: Accounting for [illegible] and Manufacturing Modules
Specific Industry: Not Industry [illegible]
System Requirements: HP 3000: [illegible] MPE; Ctos
Memory Required: 384.0K bytes
Source Language: Cobol, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
[illegible] Installed to Date: 60
Date First Installed: 1977

SYSTEM AUTOMATION CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE; Convergent Technology: Ctos
[illegible] Required: 256.0K bytes
Source Language: Cobol (HP), Pascal (Convergent Technology)
[illegible] Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Date First Installed: 1979

SYSTEM AUTOMATION CORP.
ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE; Ctos
Memory Required: 256.0K bytes
Source Language: Cobol (HP), Pascal (Convergent Technology)
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Date First Installed: 1979

SYSTEM AUTOMATION CORP.
PURCHASE ORDER
Specific Application: Purchase Order
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE; Convergent Technology: Ctos
Memory Required: 256.0K bytes
Source Language: Cobol (HP), Pascal (Convergent Technology)
Source Code Available: Yes
Purchase Terms: Purchase (license); Time Shari
Date First Installed: September 1979

SYSTEMIC COMPUTER SERVICES
OIL MILL ACCOUNTING SYSTEM
Specific Application: Inventory, Invoicing
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 4
Date First Installed: September 1981
(See Vendor Profile Page V-105)

SYSTEMS ANALYSIS, INC.
BUILDER 3000
Additional Product Classification: Manufacturing
Specific Application: Inventory Control, Accounting, Financial Reporting
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50,000 to $60,000
Number Installed to Date: 16
Date First Installed: March 1981
(See Vendor Profile Page V-105)

SYSTEMS AND SOLUTIONS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro AM 1000, AM 1000E, AM 1072E, AM 1092E: Amos
Memory Required: 256.0K bytes
Source Language: Alpha Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 60
(See Vendor Profile Page V-105)

SYSTEMS AND SOLUTIONS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro AM 1000, AM 1000E, AM 1072E, AM 1092E: Amos
Memory Required: 256.0K bytes
Source Language: Alpha Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible] Installed to Date: 60

SYSTEMS AND SOLUTIONS, INC.
GAS FIRST PURCHASER PACKAGE
Specific Application: Gas Charting With Revenue Disbursements
System Requirements: Alpha Micro AM 1000, AM 1000E, AM 1072E, AM 1092E: Amos
Memory Required: 256.0K bytes
Source Language: Alpha Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1

SYSTEMS AND SOLUTIONS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro AM 1000, AM 1072E, AM 1000E, AM 1092E: Amos
Memory Required: 256.0K bytes
Source Language: Alpha Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50

SYSTEMS AND SOLUTIONS, INC.
MOTORCYCLE DEALERS PACKAGE
Specific Application: Inventory Control Accounting for Motorcycle Dealers
System Requirements: Alpha Micro AM 1000, AM 1000E, AM 1072E, AM 1092E: Amos
Memory Required: 256.0K bytes
Source Language: Alpha Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 5

SYSTEMS AND SOLUTIONS, INC.
OIL FIRST PURCHASER PACKAGE
Specific Application: Oil Charting With Revenue Disbursements
System Requirements: Alpha Micro AM 1000, AM 1000E, AM 1072E, AM 1092E: Amos
Memory Required: 256.0K bytes
Source Language: Alpha Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
[illegible] Installed to Date: 7

SYSTEMS AND SOLUTIONS, INC.
RANCH ACCOUNTING
Specific Application: Joint Venture Ranch Accounting
System Requirements: Alpha Micro AM 1000, AM 1000E, AM 1072E, AM 1092E: Amos
Source Language: Alpha Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
[illegible] Installed to Date: 3

SYSTEMS AND SOLUTIONS, INC.
RETAIL/WHOLESALE JEWELRY PACKAGE
Specific Application: Inventory Control Accounting for Jewelry Stores
Specific Industry: [illegible] Retail
System Requirements: Alpha Micro AM 1000, AM 1000E, AM 1072E, AM 1092E: Amos
Memory Required: 256.0K bytes
Source Language: Alpha Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2

SYSTEMS AND SOLUTIONS, INC.
WELL REVENUE ACCOUNTING
Specific Application: Revenue Accounting for Joint Venture Partners
System Requirements: Alpha Micro AM 1000, AM 1000E, AM 1072E, AM 1092E: Amos
Memory Required: 256.0K bytes
Source Language: Alpha Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 12

SYSTEMS BY GRABER, INC.
ACCOUNTING PACKAGE
Specific Application: General Accounting, Accounts Payable, Accounts Receivable, General Ledger
System Requirements: DEC PDP-11/44 RSTS/E, DEC PDP-11/34
Source Language: Dibol
[illegible] Available: No
Purchase Terms: Purchase (license); Lease
Price: $40,000 to $125,000
[illegible] Installed to Date: 30
Date First Installed: April 1978
(See Vendor Profile Page V-106)

SYSTEMS BY MICA, INC.
[illegible] DISTRIBUTORS WHOLESALE)
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: Order Entry, Inventory, Purchasing, Accounts Receivable, Accounts Payable, Payroll, and General Ledger
Specific Industry: [illegible]
System Requirements: DEC VAX-11/750, VAX-11/780: VMS; DEC PDP-11/44. RSTS/E
Source Language: Dibol
[illegible] Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $65,000
Number Installed to Date: 37
Date First Installed: September [illegible]
(See Vendor Profile Page V-106)

SYSTEMS DESIGN ASSOCIATES
LABOR UNION MANAGEMENT [illegible]
Specific Application: Management, Health and Welfare Pensions, Hiring
System Requirements: Basic Four: Boss; Sperry BC/7
Source Language: Basic, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 7
Date First Installed: 1977
(See Vendor Profile Page V-106)

SYSTEMS DESIGNS
FLEET [illegible] SYSTEM (FMS)
Specific Application: Accounting, Productivity Analysis of Vehicle, Fleet

Specific Industry:
Wholesale/Distribution, Retail, Medical, Construction, Government, Transportation
System Requirements: Pixel 100 AP 80, 80G; Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 1
Date First Installed: May 1983
(See Vendor Profile Page V-106)

SYSTEMS GROUP
BUSINESS EXPRESS
Specific Application: General Accounting, Order Entry, Inventory Control and Word Processing
Specific Industry:
Wholesale/Distribution
System Requirements: Burroughs 2900 Series; Express Line
Memory Required: 256.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 1,200
Date First Installed: February 1981
(See Vendor Profile Page V-106)

THE SYSTEMS HOUSE, INC.
THE MODULAR DISTRIBUTION SYSTEM
Additional Product Classification: Inventory
Specific Application: Order Entry, Accounts Receivable, Inventory Control and Sales Analysis
Specific Industry:
Wholesale/Distribution
System Requirements: IBM Series/1; Honeywell DPS 6; DEC LSI-11: Pick
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000
Number Installed to Date: 40
Date First Installed: 1978
(See Vendor Profile Page V-106)

SYSTEMS MANAGEMENT, INC.
BUSINESS CONTROL, PROGRAM/BCP
Specific Application: Financial, Sales Distribution
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: Pick; IBM Series 50, 4300; DEC LSI-11
Source Language: Cobol, RPL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 400
Date First Installed: September 1975
(See Vendor Profile Page V-106)

SYSTEMS MANAGEMENT, INC.
ROADS
Specific Application: General Accounting, Parts Inventory, Sales
Specific Industry:
Wholesale/Distribution
System Requirements: IBM Series/1: Pick; DEC LSI-11
Source Language: RPL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $34,000
Number Installed to Date: 40
Date First Installed: 1977
(See Vendor Profile Page V-106)

SYSTEMS MANAGEMENT, INC.
TREADS
Specific Application: General Accounting for Tire Dealers and Retreaders
System Requirements: IBM 4300: Pick; IBM SC 9000; DEC LSI-11; IBM Series/2
Source Language: RPL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 6
Date First Installed: 1981

SYSTEMS NORTHWEST, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
(See Vendor Profile Page V-108)

SYSTEMS NORTHWEST, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000

SYSTEMS NORTHWEST, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000

SYSTEM SPECIALISTS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Retail
System Requirements: IBM System/34
Memory Required: 128.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
(See Vendor Profile Page V-107)

SYSTEM SPECIALISTS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Retail
System Requirements: IBM System/34
Memory Required: 128.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $9,500

SYSTEM SPECIALISTS, INC.
GENERAL LEDGER
Specific Application: General Ledger With Budgeting, Forecasting and Cash Flow
Specific Industry: Retail
System Requirements: IBM System/34
Memory Required: 128.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $8,500

SYSTEM SPECIALISTS, INC.
PURCHASE ORDER
Specific Application: Purchase Order
Specific Industry: Retail
System Requirements: IBM System/34
Memory Required: 128.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000

SYSTEM SPECIALISTS, INC.
SALES ACCOUNTING
Specific Application: Sales Accounting
Specific Industry: Retail
System Requirements: IBM System/34
Memory Required: 128.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000

SYSTEMS RESEARCH AND DEVELOPMENT CORP.
ADAM
Specific Application: Automobile Dealer Service
System Requirements: Prime: CP/M
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $12,000
(See Vendor Profile Page V-107)

SYSTEMS SERVICES, INC.
LAPS
Specific Application: Loan Application Processing
Specific Industry: Education
System Requirements: HP 3000; DEC VAX-11/70, VAX-11/50, VAX-11/20
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Lease
Date First Installed: 1983
(See Vendor Profile Page V-107)

SYSTEMS SERVICES, INC.
STUDENT AID MANAGEMENT II
Additional Product Classification: Education
Specific Industry:
Wholesale/Distribution, Retail, Medical, Construction, Government, Transportation
System Requirements: Pixel 100 AP 80, 80G; Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: $3,000
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 1
Date First Installed: May 1983
(See Vendor Profile Page V-106)

SYSTEMS GROUP
BUSINESS EXPRESS
Specific Application: General Accounting, Order Entry, Inventory Control, Word Processing
Specific Industry:
Wholesale/Distribution
System Requirements: Burroughs 2900 Series, Express Line
Memory Required: 256.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 1,200
Date First Installed: February 1981
(See Vendor Profile Page V-106)

THE SYSTEMS HOUSE, INC.
THE MODULAR DISTRIBUTION SYSTEM
Specific Application: Order Entry, Accounts Receivable, Inventory Control, Distribution and Sales Analysis
Specific Industry:
Wholesale/Distribution
System Requirements: IBM Series/1; Honeywell DPS 6; DEC LSI-11: Pick
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000
Number Installed to Date: 40
Date First Installed: 1978
(See Vendor Profile Page V-106)

SYSTEMS MANAGEMENT, INC.
BUSINESS CONTROL, PROGRAM/BCP
Specific Application: Financial, Sales Distribution
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: Pick; IBM Series 50, 4300; DEC LSI-11
Source Language: Cobol, RPL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 400
Date First Installed: September 1975
(See Vendor Profile Page V-106)

SYSTEMS MANAGEMENT, INC.
ROADS
Specific Application: General Accounting, Parts Inventory and Sales
Specific Industry:
Wholesale/Distribution
System Requirements: IBM Series 1: Pick; DEC LSI-11
Source Language: RPL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $34,000
Number Installed to Date: 40
Date First Installed: September 1977
(See Vendor Profile Page V-106)

Remember to mention the Computerworld Buyer's Guide *when contacting vendors.*

COMPUTERWORLD BUYER'S GUIDE

SYSTEMS SPECIALISTS, INC.
MEMBERSHIP MANAGEMENT ACCOUNTING SYSTEM
Specific Application: Accounting of Members
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/32; IBM System/34; IBM System/36
Memory Required: 96.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000 to $50,000
Number Installed to Date: 10
Date First Installed: 1980

SYSTEMS SPECIALISTS, INC.
PMAS
Specific Application: Property Management Accounting
Specific Industry: Real Estate
System Requirements: IBM System/34; System/32; System/36
Memory Required: 96.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $22,000 to $50,000
Number Installed to Date: 70
Date First Installed: 1977

SYSTEMS SPECIALISTS, INC.
RELEASE ACCOUNTING PACKAGE
Specific Application: Accounting and Inventory Control for Automotive Industry
System Requirements: Basic Four
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000 to $60,000
Number Installed to Date: 20
Date First Installed: September 1977

SYSTEMS SPECIALISTS, INC.
RETAIL ACCOUNTING PACKAGE
Specific Application: Accounting for the Retail Industry
Specific Industry: Retail
System Requirements: Basic Four
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000 to $70,000
Number Installed to Date: 10
Date First Installed: September 1978

SYSTEMS SPECIALISTS, INC.
STANDARD COST MANUFACTURING SYSTEM
Specific Application: MRP, Accounting
Specific Industry: Manufacturing
System Requirements: Basic Four
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $45,000 to $115,000
Number Installed to Date: 8
Date First Installed: September 1977

SYSTEMS TECHNOLOGY AUTOMATED RESOURCES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DG: AOS, DOS, R-DOS
Memory Required: 64.0K bytes
Source Language: DG Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
(See Vendor Profile Page V-107)

SYSTEMS TECHNOLOGY AUTOMATED RESOURCES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable Package
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS, AOS, DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 100

SYSTEMS TECHNOLOGY AUTOMATED RESOURCES, INC.
ELECTRICAL CONTRACTOR
Specific Application: General Accounting, Estimating
Specific Industry: Engineering
System Requirements: DG: AOS, R-DOS, DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 100

System Requirements: IBM 4300; Prime; IBM SC 9000; DEC LSI-11; IBM Series/1
Source Language: RPL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 6
Date First Installed: 1981

SYSTEMS UNLIMITED, INC.
SUNPAC: SF FINANCIAL VERSION 2
Additional Product Classifications: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable, Personnel Files, Assets
Specific Industry: Education
System Requirements: DG CS Series: AOS, iogs; IBM System/34, System/38: SSP, SCP; Prime: Primos; NCR 2800, 9030
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000
Number Installed to Date: 6
Date First Installed: February 1981
(See Vendor Profile Page V-107)

SYSTRON CORP.
TRUE TRUST FUND ACCOUNTING SYSTEMS)
Specific Application: Pension, Health Care
Specific Industry: Multiemployer Trust
System Requirements: Datapoint: DOS/RMS
Memory Required: 128.0K bytes
Source Language: Databus, Cobol
Source Code Available: Yes

Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 35
Date First Installed: 1980
(See Vendor Profile Page V-107)

SYSTRONICS, INC.
ASOBILLS BILLING SYSTEM
Specific Application: Bill Generator
System Requirements: DG Eclipse: AOS, AOS/VS
Source Language: AOS Cobol
Purchase Terms: Purchase (license)
Price: $7,495
Number Installed to Date: 3
Date First Installed: January 1982
(See Vendor Profile Page V-107)

SYTEK, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC Decmate I, Decmate II: COS-310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
(See Vendor Profile Page V-107)

SYTEK, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC Decmate I, Decmate II: COS-310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500

SYTEK, INC.
AMORTIZATION SCHEDULE SYSTEM
Specific Application: Amortization Schedule
Specific Industry: Not Industry Sensitive
System Requirements: DEC Decmate I; Decmate II: COS-310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000

SYTEK, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC Decmate I, Decmate II: COS-310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500

SYTEK, INC.
JOB COSTING WITH PAYROLL
Additional Product Classification: Payroll/Personnel
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: DEC Decmate I, Decmate II: COS-310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500

TAD COMPUTER ASSOCIATES
FIXED ASSETS ACCOUNTING
Specific Application: Fixed Asset Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-107)

TAD COMPUTER ASSOCIATES
TIME AND BILLING
Specific Application: Time Entry, Accounting Analysis and Billing
Specific Industry: CPA Firms
System Requirements: Wang VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1983

TCI SOFTWARE
APARTMENT MANAGEMENT SYSTEM
Specific Application: Account Receivable, Accounting
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 1
Date First Installed: September 1982
(See Vendor Profile Page V-108)

TECHNALYSIS CORP.
CORPORATE REPORT SYSTEM (CRS)
Additional Product Classification: Corporate Accounting, Payroll, Personnel, Manufacturing, Distribution
Specific Application: Order Processing, Inventory Control, Purchasing and Receiving, Sales Analysis, Accounts Payable, Accounts Receivable, General Ledger, Payroll, Fixed Assets
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: HP 3000: MPE
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 3
Date First Installed: January 1981
(See Vendor Profile Page V-108)

TECHNICAL ANALYSIS CORP.
ACCOUNTS PAYABLE II
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS, AOS/VS, AOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 100
Date First Installed: 1979
(See Vendor Profile Page V-108)

TECHNICAL ANALYSIS CORP.
ACCOUNTS RECEIVABLE II
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS, AOS/VS, AOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 100
Date First Installed: 1979

TECHNICAL ANALYSIS CORP.
GENERAL LEDGER I
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS, AOS/VS, AOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 100
Date First Installed: 1979

TERMINAL DYNAMICS, INC.
ACCOUNTING SYSTEM
Specific Application: Accounts Receivable, Accounts Payable, Payroll, General Ledger, Fixed Assets, Inventory Control, Job Costing, Time, Billing
Specific Industry: Not Industry Sensitive
System Requirements: Wang OIS
Memory Required: 64.0K bytes
Source Language: Wang Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 6
Date First Installed: June 1981
(See Vendor Profile Page V-108)

TECHNOLOGY SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: North Star Horizon: N-DOS, North Star Advantage: CP/M
Memory Required: 64.0K bytes
Source Language: North Star Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: 1979
(See Vendor Profile Page V-109)

TECHNOLOGY SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: North Star Horizon: N-DOS, North Star Advantage: CP/M
Memory Required: 64.0K bytes
Source Language: North Star Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: 1979

TECHNOLOGY SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: North Star Horizon: N-DOS, North Star Advantage: CP/M
Memory Required: 64.0K bytes
Source Language: North Star Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: 1979

TECHNOLOGY SYSTEMS, INC.
PURCHASING
Specific Application: Purchasing
Specific Industry: Not Industry Sensitive
System Requirements: North Star Horizon: N-DOS, North Star Advantage: CP/M
Memory Required: 64.0K bytes
Source Language: North Star Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: 1979

TEIKOR SOFTWARE, INC.
INCOME TAX PREPARATION
Specific Application: Income Tax Return Preparation
System Requirements: Wang 2200 Series
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 70
Date First Installed: 1979
(See Vendor Profile Page V-109)

TELECOMP, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 50
Date First Installed: 1977
(See Vendor Profile Page V-109)

TELECOMP, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 50
Date First Installed: 1978

TELECOMP, INC.
AUTOMOTIVE AFTER MARKET SOFTWARE PACKAGE
Specific Application: Accounts Receivable, Point of Sale, Sales Analysis and Inventory
Specific Industry: Automotive
System Requirements: Unix
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,250
Number Installed to Date: 50
Date First Installed: 1977

TELECOMP, INC.
BUDGET
Specific Application: Budgeting
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 50
Date First Installed: 1977

TELECOMP, INC.
FINANCIAL STATEMENTS
Specific Application: Statements
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 30
Date First Installed: 1978

TELECOMP, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 30
Date First Installed: 1977

TELSIS SYSTEMS, INC.
BUDGET SYSTEM
Specific Application: Budget Development
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 5500, 5600 RMS
Memory Required: 48.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 4
Date First Installed: September 1981
(See Vendor Profile Page V-109)

TELSIS SYSTEMS, INC.
FIXED ASSETS
Specific Application: Fixed Asset Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 5500, 5600 RMS
Memory Required: 48.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 4
Date First Installed: December 1982

TEXAS PROCESSOR, INC.
RETAIL ACCOUNTING PACKAGE
Specific Application: General Ledger, Accounts Payable and Receivable, Billing
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/03: RT-11; PDP-11/23: RSTS
Memory Required: 64.0K bytes
Source Language: Fortran, Macro
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 30
Date First Installed: 1976
(See Vendor Profile Page V-109)

THARP SYSTEM CORP.
PATIENT ACCOUNTING AND BILLING SYSTEM
Specific Application: Patient Accounting and Billing System
Specific Industry: Medical, Hospital
System Requirements: Wang VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 5
Date First Installed: 1982
(See Vendor Profile Page V-109)

THE HUTCHINSON CO.
POINT OF SALE INVENTORY CONTROL VERSION 1
Specific Application: Point of Sale Inventory Control
Specific Industry: Retail
System Requirements: Cromemco: C-DOS, Cromix
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: May 1983
(See Vendor Profile Page V-109)

THETA BUSINESS SYSTEMS
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11, HP 1000, Wicat Systems
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: June 1980
(See Vendor Profile Page V-109)

THETA BUSINESS SYSTEMS
ACCOUNTS PAYABLE VERSION 1.0
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, RT-11/TSX+; HP 1000; Wicat Systems: MCS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995 to $2,500
Number Installed to Date: 100
Date First Installed: June 1980

THETA BUSINESS SYSTEMS
GENERAL LEDGER VERSION 1.0
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, RT-11/TSX+; HP 1000; Wicat Systems: MCS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995 to $2,500
Number Installed to Date: 150
Date First Installed: February 1980

THETA BUSINESS SYSTEMS
ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, RT-11/TSX+; HP 1000; Wicat Systems: MCS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995 to $2,500
Number Installed to Date: 25
Date First Installed: June 1981

THOMAS LAGUBAN & ASSOCIATES, INC.
BOAR (SALES ORDER ENTRY AND ACCOUNTS RECEIVABLE)
Additional Product Classification: Manufacturing, Distribution
Specific Application: Order Processing, Distribution and Accounts Receivable
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM 360; 370, 3000 Series, 4300 Series; DOS
Source Language: Cobol, RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 25
Date First Installed: 1977
(See Vendor Profile Page V-110)

THOUGHTWARE PUBLISHING CO., INC.
THE ACCOUNTANT
Specific Application: Integrated General Ledger, Accounts Receivable, Accounts Payable, Fixed Assets, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $550 to $2,500
Number Installed to Date: 5,000
Date First Installed: 1978
(See Vendor Profile Page V-110)

3M DATATRACK SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-110)

3M DATATRACK SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981

3M DATATRACK SYSTEMS, INC.
BROADCAST AND PRINT PRODUCTION DATATRACK
Specific Application: Billing and Payment Purchase Plans
Specific Industry: Broadcasting
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981

3M DATATRACK SYSTEMS, INC.
BROADCAST FORWARDING DATATRACK
Specific Application: Billing and Payment Purchase Plans
Specific Industry: Broadcast
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981

3M DATATRACK SYSTEMS, INC.
CLIENT PROFITABILITY
Specific Application: Client Profitability
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981

3M DATATRACK SYSTEMS, INC.
GENERAL LEDGER AND FINANCIAL ANALYSIS
Specific Application: General Ledger Capabilities, Financial Analysis
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981

3M DATATRACK SYSTEMS, INC.
MAGAZINES DATATRACK
Specific Application: Billing and Payment Purchase Plans
Specific Industry: Magazines
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981

3M DATATRACK SYSTEMS, INC.
NETWORK TELEVISION DATATRACK
Specific Application: Billing and Payment Purchase Plans
Specific Industry: Network Television
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981

3M DATATRACK SYSTEMS, INC.
NEWSPAPERS DATATRACK
Specific Application: Billing and Payment Purchase Plans
Specific Industry: Newspapers
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: September 1981

3M DATATRACK SYSTEMS, INC.
OUTDOOR DATATRACK
Specific Application: Billing and Payment Purchase Plans
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1984

3M DATATRACK SYSTEMS, INC.
SPOT RADIO DATATRACK
Specific Application: Billing and Payment Purchase Plans
Specific Industry: Spot Radio
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981

3M DATATRACK SYSTEMS, INC.
SPOT TELEVISION DATATRACK
Specific Application: Billing and Payment Purchase Plans
Specific Industry: Television
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981

3M DATATRACK SYSTEMS, INC.
YELLOW PAGES DATATRACK
Specific Application: Billing and Payment Purchase Plans
Specific Industry: Yellow Pages
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981

THUNDERBIRD AUTOMATION GROUP, INC.
THUNDERBIRD FINANCIAL MANAGEMENT SYSTEM
Specific Application: Bank Planning, Budgeting, Financial Accounting, Cost Accounting
Specific Industry: Banking/Financial
System Requirements: IBM PC-XT: PC-DOS; Victor 9000: MS-DOS; NCR Decision Mate, Tower: Unix
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-110)

THUNDERBIRD AUTOMATION GROUP, INC.
THUNDERBIRD FIXED ASSET SYSTEM
Additional Product Classification: Banking
Specific Application: Fixed Asset Management and Tracking
Specific Industry: Financial
System Requirements: IBM PC-XT: PC-DOS, Victor 9000: MS-DOS; NCR Decision Mate, Tower: Unix
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)

THUNDERBIRD AUTOMATION GROUP, INC.
THUNDERBIRD GENERAL LEDGER SYSTEM
Specific Application: General Ledger With Budgeting
Specific Industry: Banking/Financial
System Requirements: IBM PC-XT: PC-DOS; Victor 9000: MS-DOS; NCR Decision Mate, Tower: Unix; IBM Displaywriter: CP/M 86
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)

THUNDERBIRD AUTOMATION GROUP, INC.
THUNDERBIRD PROFITABILITY MANAGEMENT SYSTEM
Specific Application: Bank Pricing and Profitability Management
Specific Industry: Banking/Financial
System Requirements: IBM PC-XT: PC-DOS; Victor 9000: MS-DOS; NCR Decision Mate, Tower: Unix; IBM Displaywriter: CP/M 86
Memory Required: 64.0K bytes
Source Language: RM Cobol
Purchase Terms: Purchase (license)

THUNDERBIRD AUTOMATION GROUP, INC.
THUNDERBIRD ASSET/LIABILITY MANAGEMENT SYSTEM
Specific Application: Asset/Liability Tracking and Control
Specific Industry: Banking/Financial
System Requirements: IBM PC-XT: PC-DOS; Victor 9000: MS-DOS, NCR Decision Mate, Tower: Unix; TI: CP/M
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)

TIMBERLINE SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Construction
System Requirements: TI Business System DX-10
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Monthly Fee
Price: $3,100
Number Installed to Date: 416
Date First Installed: September 1981
(See Vendor Profile Page V-110)

TIMBERLINE SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Construction
System Requirements: TI Business System: DX-10
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Monthly Fee
Price: $5,100
Number Installed to Date: 453
Date First Installed: February 1980

TIMBERLINE SYSTEMS, INC.
JOB COSTING
Additional Product Classification: Job Costing
Specific Application: Job Costing
Specific Industry: Construction
System Requirements: TI Business System DX-10
Memory Required: 256.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Rental, Monthly Fee
Price: $4,900
Number Installed to Date: 310
Date First Installed: 1980

TIMBERLINE SYSTEMS, INC.
PROMT
Additional Product Classification: Property Management
Specific Industry: Property Management
System Requirements: TI Business System: DX-10
Memory Required: 256.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Rental; Monthly Fee
Price: $5,500
Number Installed to Date: 100
Date First Installed: April 1981

TIME SHARE COMPUTER SYSTEMS
EASE
Additional Product Classification: Payroll/Personnel
Specific Application: Order Management, Inventory Control, Payroll, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Pick
Memory Required: 64.0K bytes
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $19,000
Number Installed to Date: 40
Date First Installed: 1980
(See Vendor Profile Page V-110)

TIME SHARE COMPUTER SYSTEMS
EASE ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Pick
Memory Required: 64.0K bytes
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 40
Date First Installed: 1980

TIME SHARE COMPUTER SYSTEMS
EASE ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Pick
Memory Required: 64.0K bytes
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 40
Date First Installed: 1980

TIME SHARE COMPUTER SYSTEMS
EASE FOR THE APPAREL INDUSTRY
Additional Product Classification: Payroll/Personnel
Specific Application: Order Management, Inventory, Accounts Payable, Payroll, Accounts Receivable, and General Ledger
Specific Industry: Apparel
System Requirements: Pick
Memory Required: 64.0K bytes
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 2
Date First Installed: 1981

TIME SHARE COMPUTER SYSTEMS
EASE GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Pick
Memory Required: 64.0K bytes
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 40
Date First Installed: 1980

TIMESHARING CONSULTANTS
FIXED ASSETS
Specific Application: Fixed Assets

Specific Industry: Not Industry Sensitive
System Requirements: DEC System 20; Tops 20
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-110)

TIMESHARING SERVICES, INC.
FINANCIAL ACCOUNTING PACKAGE
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Fixed Assets, Payroll, Order Entry, Purchasing
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos, DEC; Honeywell; IBM: DOS
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 100
Date First Installed: November 1979
(See Vendor Profile Page V-110)

TRL DATA SERVICES, INC.
ACCOUNTING SYSTEMS PACKAGES (ASP)
Specific Application: Payroll, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 1550, 4600 Series, 8600 Series: DOS, Datapoint 8800 Series: RMS
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000 to $15,000
Number Installed to Date: 30
Date First Installed: January 1976
(See Vendor Profile Page V-111)

TOMORROW SYSTEMS, INC.
ACCOUNTS PAYABLE MANAGEMENT SYSTEM
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 DOS
Memory Required: 128.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-111)

TOMORROW SYSTEMS, INC.
FIXED ASSET ACCOUNTING
Specific Application: Depreciation of Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/38 DOS
Memory Required: 128.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 175
Date First Installed: September 1980

TOMORROW SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 DOS
Memory Required: 128.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 10
Date First Installed: 1982

TSM, INC.
CPA AND PUBLIC ACCOUNTING BUSINESS
Specific Application: Facilities, Daily Business Operations
Specific Industry: Banking/Financial
System Requirements: Wang 2200 Series: DOS
Memory Required: 32.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 204
Date First Installed: 1976
(See Vendor Profile Page V-111)

TOM, INC.
D-CALC TM
Specific Application: Electronic Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200 Series: DOS
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: May 1983

TOM, INC.
EZ-SPEED TM
Specific Application: Records File Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200 Series: DOS
Memory Required: 32.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: May 1983

TOM, INC.
RECORD MANAGEMENT SYSTEM
Specific Application: Report Generator for Nonprogrammers
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200 Series: DOS
Memory Required: 32.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 305
Date First Installed: 1978

TRAIL BLAZER SYSTEMS, INC.
EXPEDITER
Specific Application: Billing, Rating, Tracking, Accounts Receivable, Inter-Line Shipment and Equipment Control
Specific Industry: Transportation
System Requirements: BTI 5000, 8000; BTI
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Price: $30,000
Number Installed to Date: 15
Date First Installed: 1976
(See Vendor Profile Page V-111)

TREE SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS, IBM 4300: OS; IBM 3000 Series: MVS
Memory Required: 500.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: 1972
(See Vendor Profile Page V-111)

TREE SYSTEMS, INC.
MATERIALS MANAGEMENT SYSTEM
Additional Product Classification: Manufacturing
Specific Application: Materials Forecasting, Planned Requirements, Accounts Payable, Purchasing, Store Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS, IBM 4300: OS, IBM 3000 Series: MVS
Memory Required: 2.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: 1980

TRIDATA CORP.
PAYROLL AND PERSONNEL SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Purchase Order Control
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS, RMS; IBM PC, PC-XT; PC-DOS
Memory Required: 64.0K bytes
Source Language: Cobol, Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 15
Date First Installed: March 1982
(See Vendor Profile Page V-112)

TRIONICS, INC.
TIME-KEEPER
Specific Application: Time and Accounting
Specific Industry: Legal
System Requirements: TRS-80: TFS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 10
Date First Installed: February 1981
(See Vendor Profile Page V-112)

TS COMPUTERS
LEASE/RENTAL BASE MANAGEMENT
Specific Application: Accounts Receivable, Inventory Control, Billing
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: Iris, Point Four: Iris
Memory Required: 64.0K bytes
Source Language: Nova Assembler, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1976
(See Vendor Profile Page V-112)

TS COMPUTERS
SERVICE HISTORY, BILLING, ACCOUNTING PACKAGE
Specific Application: Repair and Maintenance History, Order Entry, Accounts Receivable, Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: Iris, Point Four: Iris
Memory Required: 64.0K bytes
Source Language: Nova Assembler, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1976

TS COMPUTERS
TRAVEL ACCOUNTING RESERVATION SYSTEM (TARS)
Specific Application: Accounting, Reporting, Ticketing, Airline Tours Interface
Specific Industry: Travel Agencies
System Requirements: DG Nova: Iris, Point Four: Iris
Source Language: Nova Assembler, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1981

TSC SYSTEMS, INC.
MUNICIPAL BILLING (T-MB V.1)
Specific Application: Utility Billing
Specific Industry: Government
System Requirements: DG: Bits
Memory Required: 128.0K bytes
Source Language: Bits Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 1
Date First Installed: March 1982
(See Vendor Profile Page V-112)

TSC SYSTEMS, INC.
PEST CONTROL BILLING (T-PCB V.1)
Specific Application: Pest Control Billing
Specific Industry: Home Service
System Requirements: DG Nova: Micos
Memory Required: 64.0K bytes
Source Language: Micos-Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000

Number Installed to Date: 1
Date First Installed: August 1981

TSI TECHNICAL SUPPORT, INC.
CICS ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS/VSE
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 22
Date First Installed: 1978
(See Vendor Profile Page V-112)

TSI TECHNICAL SUPPORT, INC.
ROUTE ACCOUNTING (TRACS)
Specific Application: Accounting
Specific Industry: Textile Rental
System Requirements: IBM: DOS/VSE; TI: DX-10; NCR: Imos
Memory Required: 192.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25,000 to $200,000
Number Installed to Date: 6
Date First Installed: 1979

TUDOR SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Wholesale/Distribution, Beverage
System Requirements: IBM System/32, System/34, System/36
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: 1981
(See Vendor Profile Page V-112)

TUDOR SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Wholesale/Distribution, Beverage
System Requirements: IBM System/32, System/34, System/36
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: 1981

TUDOR SYSTEMS, INC.
COMBINED ACCOUNTING PACKAGE
Specific Application: Accounts Payable, Account Receivable, Payroll, General Ledger
Specific Industry: Wholesale/Distribution, Beverage
System Requirements: IBM System/32, System/34, System/36
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Date First Installed: 1981

TUDOR SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Wholesale/Distribution, Beverag
System Requirements: IBM System/32, IBM System/34, IBM System/36
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: 1981

UDP, INC.
BILLING
Specific Application: Billing
Specific Industry: Telephone
System Requirements: Datapoint 4630: DOS, Burroughs B1800, B1900, CMS/MCP
Memory Required: 128.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 1
(See Vendor Profile Page V-112)

UDP, INC.
RATING
Specific Application: Rating
System Requirements: Datapoint 4630, 8630: DOS, Burroughs B1800, B1900: CMS/MCP
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

UNICORN SYSTEMS CO.
CAELUS MANAGEMENT
Specific Application: General Ledger, Accounts Payable and Accounts Receivable
Specific Industry: Manufacturing
System Requirements: Wang VS: VS/OS
Memory Required: 512.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000 to $70,000
Number Installed to Date: 4
Date First Installed: September 1981
(See Vendor Profile Page V-113)

UNIQ DIGITAL SYSTEMS, INC.
SPIDER II
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Integrated Closed-Loop Manufacturing
Specific Industry: Manufacturing
System Requirements: DEC VAX Series, Unix
Memory Required: 1.0M bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,400
Number Installed to Date: 3
Date First Installed: March 1983
(See Vendor Profile Page V-113)

UNIQ DIGITAL SYSTEMS, INC.
SPIDER II - ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Manufacturing
System Requirements: DEC VAX: Unix
Memory Required: 1.0M bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,400

Number Installed to Date: 3
Date First Installed: March 1983

UNIQ DIGITAL SYSTEMS, INC.
SPIDER II - ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Manufacturing
System Requirements: DEC VAX: Unix
Memory Required: 1.0M bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,400
Number Installed to Date: 3
Date First Installed: March 1983

UNIQ DIGITAL SYSTEMS, INC.
SPIDER II - GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Manufacturing
System Requirements: DEC VAX: Unix
Memory Required: 1.0M bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,400
Number Installed to Date: 3
Date First Installed: March 1983

UNIQUE COMPUTER CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000 to $7,000
Date First Installed: 1980
(See Vendor Profile Page V-113)

UNIQUE COMPUTER CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000 to $7,000
Date First Installed: 1980

UNIQUE COMPUTER CORP.
FIXED ASSETS & DEPRECIATION
Specific Application: Fixed Assets and Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,000
Date First Installed: 1980

UNIQUE COMPUTER CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: IBM
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000 to $7,000
Date First Installed: 1980

UNIQUE COMPUTER CORP.
JOB COSTING
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,000
Date First Installed: 1980

UNISOFT
FinanCial PAYroll
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Payroll and Business Modeling
Specific Industry: Not Industry Sensitive
System Requirements: IMS TUF
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-113)

UNISYSTEMS, INC.
ROUTE ACCOUNTING
Specific Application: Inventory Control, Route Make-Up
Specific Industry: Linen Supply, Uniform
System Requirements: DEC RSTS/E, NEC APC: CP/M: RT-11
Memory Required: 128.0K bytes
Source Language: Macro, Cobol, Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000 to $25,000
Number Installed to Date: 10
Date First Installed: December 1981
(See Vendor Profile Page V-113)

UNITED EDUCATION & SOFTWARE
CLASS
Specific Application: Billing, Reporting and Accounting for Student Loans

Specific Industry: Education
System Requirements: IBM System/34, System/36: SSP
Memory Required: 48.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $20,000
Number Installed to Date: 62
Date First Installed: 1981
(See Vendor Profile Page V-113)

UNITED EDUCATION & SOFTWARE
GSL
Specific Application: Government Loan Billing Program
Specific Industry: Education
System Requirements: IBM System/34, System/36: SSP
Memory Required: 48.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 1
Date First Installed: August 1982

UNITED INFORMATION SERVICES
ORDER SERVICES
Additional Product Classification: Inventory
Specific Application: Inventory Control Inventory Management, Sales Order Entry and Processing
Specific Industry: Not Industry Sensitive
System Requirements: CDC Cyber
Source Language: Cobol, Fortran, Snobol, Super Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-113)

UNITED SYSTEMS AND SOFTWARE, INC.
GAS AND OIL DISTRIBUTOR SYSTEM
Additional Product Classification: Manufacturing
Specific Application: Inventory, Accounts Receivable, General Ledger
Specific Industry: Gas and Oil Distribution
System Requirements: DEC PDP-11: RSTS
Memory Required: 256.0K bytes
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000
Number Installed to Date: 3
Date First Installed: April 1981
(See Vendor Profile Page V-113)

UNITRONIX CORP.
STATE WELFARE PACKAGE
Specific Application: Keeps Records of Welfare Recipients Full Accounting
Specific Industry: Government, State Welfare Departments
System Requirements: DEC PDP-11/23: RSTS; DEC-VAX: VMS
Memory Required: 256.0K bytes
Source Language: Basic Plus, Cbol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000 to $7,000
Number Installed to Date: 4
Date First Installed: 1983
(See Vendor Profile Page V-113)

UNIVERSAL COMPUTER SERVICE
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: HP 3000 MPE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: 1979
(See Vendor Profile Page V-113)

UNIVERSAL DESIGN SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs 1100; IBM 360
Memory Required: 256.0K bytes
Source Language: Basic, Cobol, Autocoder
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1970
(See Vendor Profile Page V-114)

UNIVERSAL DESIGN SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs 1100; IBM 360
Memory Required: 256.0K bytes
Source Language: Basic, Cobol, Autocoder
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1970

UNIVERSAL DESIGN SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs 1100; IBM 360
Memory Required: 256.0K bytes
Source Language: Cobol, Basic, Autocoder
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1970

UNIVERSAL SYSTEMS SERVICES, INC.
CASH MANAGER
Specific Application: Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/36, System/34
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 14
Date First Installed: March 1983
(See Vendor Profile Page V-114)

UNIVERSITY COMPUTING CO.
UCC (FAS) FIXED ASSET SYSTEM
Additional Product Classification: Property Management
Specific Application: Physical Asset Management, Property and Inventory Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3030 DOS/OS, IBM 4300
Memory Required: 200.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 300
Date First Installed: 1973
(See Vendor Profile Page V-114)

UNIVERSITY COMPUTING CO.
UCC ACCOUNTS PAYABLE SYSTEM WITH PURCHASING
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3030, 4300 DOS/OS; Burroughs DOS/OS
Memory Required: 200.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 85
Date First Installed: 1980

UNIVERSITY COMPUTING CO.
UCC FINANCIAL CONTROL SYSTEM (FCS)
Additional Product Classification: Financial Modeling Languages/DSS
Specific Application: General Ledger, Budgeting, Financial Modeling
Specific Industry: Not Industry Sensitive, Manufacturing, Wholesale/Distribution, Retail, Banking/Financial
System Requirements: IBM 360, 370, 3030: DOS/OS, Burroughs: DOS/OS
Memory Required: 350.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 400
Date First Installed: 1970

UP-TIME SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/23: TSX Cobol+; DEC VAX: VMS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Price: $3,500
Number Installed to Date: 8
Date First Installed: 1982
(See Vendor Profile Page V-114)

UP-TIME SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: TSX Cobol+; DEC VAX: VMS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 8
Date First Installed: 1982

UP-TIME SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: TSX Cobol+; DEC VAX: VMS
Memory Required: 64.0K bytes
Source-Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Price: $3,500
Number Installed to Date: 8
Date First Installed: 1982

UP-TIME SYSTEMS, INC.
JOINT INTEREST BILLING
Specific Application: Joint Interest Billing
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: TSX Cobol+, DEC VAX: VMS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Date First Installed: 1983

UP-TIME SYSTEMS, INC.
REVENUE DISTRIBUTION
Specific Application: Revenue Distribution to Each Partner According to Interest, Prints Checks, Audit Trail
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: TSX Cobol+, DEC VAX: VMS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 1
Date First Installed: January 1983

U.S. COMPUTERS, INC.
MICRON 300
Specific Application: Accounting
Specific Industry: Insurance
System Requirements: DEC PDP-11: TSX
Memory Required: 64.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 35
Date First Installed: 1974

U.S. TRADING DATA SERVICE, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DOS
Memory Required: 64.0K bytes
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license)

Number Installed to Date: 50
Date First Installed: 1974
(See Vendor Profile Page V-114)

U.S. TRONIC DATA SERVICE, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DOS
Memory Required: 64.0K bytes
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1974

U.S. TRONIC DATA SERVICE, INC.
GENERAL LEDGER FINSATE
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DOS
Memory Required: 64.0K bytes
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 150
Date First Installed: 1974

VALLEY DATA BASE, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 1.0M bytes
Source Language: Cobol 2
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Price: $3,500
Date First Installed: 1983
(See Vendor Profile Page V-114)

VALLEY DATA BASE, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 1.0M bytes
Source Language: Cobol 2
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Price: $3,500
Date First Installed: 1983

VALLEY DATA BASE, INC.
BUSINESS INTEGRATED DATA SYSTEM (BIDS)
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Business Management
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 1.0M bytes
Source Language: Cobol 2
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Price: $1,950
Date First Installed: 1983

VALLEY DATA BASE, INC.
FIXED ASSETS
Specific Application: Fixed Assets With Equipment Maintenance .
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 1.0M bytes
Source Language: Cobol 2
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Price: $2,000
Date First Installed: 1983

VALLEY DATA BASE, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 1.0M bytes
Source Language: Cobol 2
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Price: $2,500
Date First Installed: 1983

VALLEY DATA BASE, INC.
PURCHASE ORDER
Specific Application: Purchase Order
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 1.0M bytes
Source Language: Cobol 2
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Price: $2,500
Date First Installed: 1983

VALUE COMPUTING, INC.
COMPUT A CHARGE
Specific Application: Job Accounting and Billing
Specific Industry: Not Industry Sensitive
System Requirements: IBM: VS1; IBM. DOS; Honeywel: Gcos 66; Sperry: Exec 8
Memory Required: 600.0K bytes
Source Language: Cobol, BAL
Purchase Terms: Purchase (license)
Price: $10,000 to $31,500
Number Installed to Date: 1,000
Date First Installed: 1970
(See Vendor Profile Page V-114)

VALUE MANAGEMENT CONSULTANTS, INC.
ACCOUNT (GENERAL LEDGER, APPROPRIATIONS REV)
Specific Application: General Ledger
Specific Industry: Education, Government, Nonprofit Organizations
System Requirements: R-DOS; AOS/VS
Memory Required: 64.0K bytes
Source Language: Interactive Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
(See Vendor Profile Page V-114)

VAN ARMUM & ASSOCIATES, INC.
SOLUTION
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll, Inventory and Point of Sale
Specific Industry: Not Industry Sensitive
System Requirements: DG CS Series: R-DOS, DG Eclipse: AOS
Memory Required: 128.0K bytes
Source Language: Cobol, Interactive Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $9,000
Number Installed to Date: 5
Date First Installed: January 1982
(See Vendor Profile Page V-115)

VARTRON CORP.
GROCERY STORE CHARGE PACKAGE
Specific Application: Billing
Specific Industry: Grocery Stores
System Requirements: DEC PDP-11/23: RT-11
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: January 1983
(See Vendor Profile Page V-115)

VECTOR SYSTEMS CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4331: VM
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-115)

VECTOR SYSTEMS CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4331: VM
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

VECTOR SYSTEMS CORP.
BILLING
Specific Application: Billing
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4331: VM
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

VECTOR SYSTEMS CORP.
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Payroll and Billing, Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4331: VM
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

VECTOR SYSTEMS CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4331: VM
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

VISION DATA EQUIPMENT CORP.
AD RECEIVABLES
Specific Application: Advertising
Specific Industry: Advertising
System Requirements: DEC VAX: RSTS/E, RT-11
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Rental; Lease
Price: $15,000 to $40,000
Number Installed to Date: 70
Date First Installed: 1972
(See Vendor Profile Page V-115)

VISION DATA EQUIPMENT CORP.
CABLE TV SUBSCRIPTION
Additional Product Classification: WP/Text Editing
Specific Industry: Advertising
System Requirements: DEC VAX: RSTS/E, RT-11
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Rental; Lease
Price: $15,000 to $40,000
Number Installed to Date: 70
Date First Installed: 1972

VISION DATA EQUIPMENT CORP.
CARRIER DEALER BILLING SYSTEM
Additional Product Classification: WP/Text Editing, Advertising
Specific Industry: Advertising
Specific Application: Advertising
System Requirements: DEC VAX: RSTS/E, RT-11
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Rental; Lease
Price: $15,000 to $400,000
Number Installed to Date: 70
Date First Installed: 1972

VISION DATA EQUIPMENT CORP.
COMMERCIAL PRINTING
Additional Product Classification: WP/Text Editing
Specific Application: Advertising
Specific Industry: Advertising
System Requirements: DEC VAX: RSTS/E, RT-11
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Rental; Lease
Price: $15,000 to $40,000
Date First Installed: 1972

VISION DATA EQUIPMENT CORP.
NON-SUBSCRIBER/SUBSCRIBER BILLING
Additional Product Classification: WP/Text Editing
Specific Application: Advertising
Specific Industry: Advertising
System Requirements: DEC VAX: RSTS/E, TR-11
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Rental; Lease
Price: $15,000 to $400,000
Number Installed to Date: 70
Date First Installed: 1972

VISION DATA EQUIPMENT CORP.
RADIO TRAFFIC CONTROL
Additional Product Classification: WP/Text Editing
Specific Application: Advertising
Specific Industry: Advertising
System Requirements: DEC VAX: RSTS/E, RT-11
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Rental; Lease
Price: $15,000 to $40,000
Number Installed to Date: 70
Date First Installed: September 1972

VISTA SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos; DEC VAX: VMS; IBM: CMS-DOS
Source Language: Fortran 77, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 4
Date First Installed: 1982
(See Vendor Profile Page V-116)

VISTA SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos; DEC VAX: VMS, IBM: CMS-DOS
Source Language: Fortran, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 3
Date First Installed: 1982

VISTA SYSTEMS, INC.
BUDGETING
Specific Application: Budgeting
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos; DEC VAX: VMS; IBM: CMS-DOS
Source Language: Fortran, Fortran 77, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 3
Date First Installed: 1982

VISTA SYSTEMS, INC.
FINANCIAL MANAGEMENT SYSTEM
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Fixed Assets, Budgeting
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos, DEC VAX: VMS, IBM: CMS-DOS
Source Language: Fortran, Fortran 77, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 3
Date First Installed: 1982

VISTA SYSTEMS, INC.
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos; IBM: CMS-DOS, VMX
Source Language: Fortran, Fortran 77, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 3
Date First Installed: 1982

VISTA SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos; DEC VAX: VMS; IBM: CMS-DOS
Source Language: Fortran, Fortran 77, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 4
Date First Installed: 1982

VISTA SYSTEMS, INC.
MAINTENANCE & MATERIALS MANAGEMENT SYSTEM
Specific Application: Inventory Control, Purchasing, Vehicle or Fleet Management
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos, DEC VAX: VMS; IBM: CMS-DOS
Source Language: Fortran, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 2
Date First Installed: 1982

VISTA SYSTEMS, INC.
PURCHASING
Specific Application: Purchasing
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos, DEC VAX: VMS; IBM: CMS-DOS
Source Language: Fortran, Fortran 77, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 2
Date First Installed: 1982

VM SOFTWARE, INC.
VMACCOUNT
Specific Application: Accounting, On-Line Inquiry, Reporting, Invoicing, Budgeting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4331; IBM 4341
Memory Required: 512.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: December 1981
(See Vendor Profile Page V-116)

WALKER INTERACTIVE PRODUCTS, INC.
11/AP
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3030; SSP, VSE, IBM 360, 370; DOS, DOS/VS; Prime: Primos; HP3000; MVS
Source Language: Cobol
Purchase Terms: Purchase (license)
Number Installed to Date: 93
Date First Installed: 1977
(See Vendor Profile Page V-116)

WALKER INTERACTIVE PRODUCTS, INC.
11/ARC
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3030; SSX/VSE, Prime: Primos, IBM 360, 370; DOS, DOS/VS; HP 3000; MVS
Source Language: Cobol
Purchase Terms: Purchase (license)
Number Installed to Date: 85
Date First Installed: 1977

WALKER INTERACTIVE PRODUCTS, INC.
11/GL
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3030; SSX/VSE, IBM 360, 370; DOS, DOS/VS; Prime: Primos; HP 3000; MVS
Source Language: Cobol
Purchase Terms: Purchase (license)
Date First Installed: 1980

WALKER INTERACTIVE PRODUCTS, INC.
11/IM
Specific Application: Materials Management for Manufacturing
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3030; SSX/VSE; Prime: Primos; IBM 360, 370; DOS, DOS/VS; HP 3000; MVS
Source Language: Cobol
Purchase Terms: Purchase (license)
Number Installed to Date: 120
Date First Installed: 1977

WALKER INTERACTIVE PRODUCTS, INC.
11/PO
Specific Application: Purchase Orders
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3030; SSX/VSE, Prime: Primos, IBM 360, 370: DOS, DOS/VS; HP 3000: MVS
Source Language: Cobol
Purchase Terms: Purchase (license)
Number Installed to Date: 85
Date First Installed: 1977

WATSON, STEACH & CO.
COUNTRY CLUB ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Accounts Receivable, General Ledger, Payroll
Specific Industry: Country Clubs
System Requirements: IBM System/32; IBM System/34
Memory Required: 14.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 5
(See Vendor Profile Page V-116)

WCS COMPUTER SERVICES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: January 1985
(See Vendor Profile Page V-116)

WCS COMPUTER SERVICES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: January 1985

WCS COMPUTER SERVICES, INC.
BILL OF MATERIALS
Specific Application: Bill of Materials
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: January 1985

WCS COMPUTER SERVICES, INC.
FIXED ASSET ACCOUNTING
Specific Application: Fixed Asset Accounting
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Wang 2200

Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: January 1985

WCS COMPUTER SERVICES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: January 1985

WESTERN COMPUTING
GENERAL BUSINESS
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: Payroll, Order Entry, Inventory Control, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $21,000 to $66,000
Number Installed to Date: 8
Date First Installed: 1982
(See Vendor Profile Page V-116)

WESTERN NEW YORK COMPUTING
MEDICAL BILLING
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Medical, Radiologists
System Requirements: DG: MOS; Prime: Primos; Alpha Micro: Amos
Memory Required: 64.0K bytes
Source Language: Basic, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $5,000 to $20,000
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-116)

WESTERN NEW YORK COMPUTING
MEMBERSHIP APPLICATION
Additional Product Classification: Payroll/Personnel, Manufacturing, Sort/Merge, Data/File Management
Specific Application: File Applications for Club Membership, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DG: MOS; Prime: Primos, Alpha Micro: Amos
Memory Required: 64.0K bytes
Source Language: Basic, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $5,000 to $20,000
Number Installed to Date: 3
Date First Installed: 1981

WESTINGHOUSE LEARNING CORP.
FINANCIAL RESOURCE SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Financial Accounting, Accounts Receivable, Accounts Payable
Specific Industry: Education
System Requirements: IBM; DEC: OS, DOS
Memory Required: 8.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50,000
Number Installed to Date: 300
Date First Installed: 1968
(See Vendor Profile Page V-116)

WESTINGHOUSE LEARNING CORP.
STUDENT INFORMATION SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Admissions Office, Accounts Payable, Accounts Receivable, Financial Aid
Specific Industry: Education
System Requirements: IBM; DEC: OS, DOS
Memory Required: 8.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50,000
Number Installed to Date: 300
Date First Installed: 1968

WESTREND BUSINESS COMPUTERS
PRODENT
Additional Product Classification: Payroll/Personnel
Specific Application: Accounts Payable, Accounts Receivable, General Ledger
Specific Industry: Medical, Dental
System Requirements: MS-DOS; CP/M
Memory Required: 64.0K bytes
Source Language: Assembly, Pascal, C
Purchase Terms: Purchase (license)
Price: $1,995
Number Installed to Date: 100
Date First Installed: 1979
(See Vendor Profile Page V-116)

WHELAN ASSOCIATES, INC.
PROPERTY MANAGEMENT
Specific Application: Property Management, Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX, IBM System/23
Memory Required: 64.0K bytes
Source Language: EDL, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 35
Date First Installed: September 1980
(See Vendor Profile Page V-116)

WHITESIDE ASSOCIATES
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
System Requirements: IBM 360, 370, 4300 DOS OS, Burroughs
Memory Required: 256.0K bytes
Source Language: Cobol'34
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000
Number Installed to Date: 50
Date First Installed: 1972
(See Vendor Profile Page V-117)

WICHITA SOFTWARE CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,270
Number Installed to Date: 50
Date First Installed: 1981
(See Vendor Profile Page V-117)

WICHITA SOFTWARE CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,270
Number Installed to Date: 50
Date First Installed: 1981

WICHITA SOFTWARE CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,270
Number Installed to Date: 50
Date First Installed: 1981

WICHITA SOFTWARE CORP.
JOINT INTEREST BILLING
Specific Application: Joint Interest Billing
Specific Industry: Oil and Gas
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,270
Number Installed to Date: 50
Date First Installed: 1981

WICHITA SOFTWARE CORP.
LEASE MANAGEMENT
Specific Application: Lease Management
Specific Industry: Oil and Gas
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,270
Number Installed to Date: 50
Date First Installed: 1981

WICHITA SOFTWARE CORP.
OIL AND GAS 23
Specific Application: Accounting
Specific Industry: Oil and Gas
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,270
Number Installed to Date: 50
Date First Installed: 1981

WICHITA SOFTWARE CORP.
PROFESSIONAL BILLING
Specific Application: Billing
Specific Industry: Legal
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,270
Number Installed to Date: 50
Date First Installed: 1981

WICHITA SOFTWARE CORP.
REVENUE DISTRIBUTION
Specific Application: Revenue Distribution
Specific Industry: Oil and Gas
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,270
Number Installed to Date: 50
Date First Installed: 1981

WILLIAMS COMPUTER SERVICES, INC.
DISTRIBUTION SYSTEM
Specific Application: Accounting and Inventory Control
Specific Industry: Manufacturing
System Requirements: Honeywell; IBM PC, TI, Nortel
Memory Required: 65.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1977
(See Vendor Profile Page V-117)

WILLIAMS COMPUTER SERVICES, INC.
MANUFACTURING SYSTEM
Specific Application: Accounting and Inventory Control
Specific Industry: Manufacturing
System Requirements: Honeywell; IBM PC, TI; Nortel
Memory Required: 65.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1977

WILLIAMS COMPUTER SERVICES, INC.
PHARMACY SYSTEM
Specific Application: Accounting and Inventory Control
Specific Industry: Pharmacy

System Requirements: Honeywell; IBM PC; TI, Nortel
Memory Required: 65.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1977

WILLIAMS COMPUTER SERVICES, INC.
INSITE ACCOUNTING SYSTEM
Specific Application: Accounting and Inventory Control
Specific Industry: Wholesale/Distribution
System Requirements: Honeywell; IBM PC; TI; Nortel
Memory Required: 65.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1977

WILSON SYSTEMS GROUP
WORK AND PROCESS FINANCIAL CONTROL
Specific Application: Work and Process Financial Control
Specific Industry: Legal
System Requirements: DG: AOS, VM
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000
Number Installed to Date: 4
Date First Installed: 1982
(See Vendor Profile Page V-117)

WOLF DATA SERVICES, INC.
JOB COST AND BILLING SYSTEM
Specific Application: Job Costing and Control
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS/RMS; Prime 50 Series: Primos; DG: CS Series: [illegible]
Source Language: Cobol, Databus, Datashare
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 2
Date First Installed: November 1982
(See Vendor Profile Page V-117)

WOODBURY COMPUTER ASSOCIATES, INC.
WBS
Specific Application: Order Entry, Accounts Receivable, Accounts Payable, Sales Analysis, General Ledger, Bill of Materials, Inventory
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: DG: ICOS, R-DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $25,000
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-117)

WORLD-WIDE COMPUTER RESOURCES, LTD.
CONTRACTOR'S JOB COSTING
Specific Application: Job Costing
Specific Industry: Manufacturing, Construction
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 50
Date First Installed: 1982
(See Vendor Profile Page V-118)

ZELTNER ASSOCIATES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23; Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-118)

ZELTNER ASSOCIATES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23, Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1978

ZELTNER ASSOCIATES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23; Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1978

ZELTNER ASSOCIATES, INC.
JOB COSTING
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200; IBM System/23
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1978

ZELTNER ASSOCIATES, INC.
ZACCS
Specific Application: Financial and Equipment Totals of Laundry Companies
Specific Industry: Laundry Equipment
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: February 1982

ZIEGLER & CO., INC.
FRONT DESK SYSTEM
Specific Application: Payroll, Mortgage Loans, General Ledger, Accounts Receivable, Accounts Payable
Specific Industry: Real Estate; Resorts
System Requirements: IBM System/34, PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $7,500
Number Installed to Date: 8
Date First Installed: August 1981
(See Vendor Profile Page V-118)

ZIEGLER & CO., INC.
RESORT RESERVATION PACKAGE
Specific Application: Reservations and Front Desk Accounting
Specific Industry: Real Estate, Resorts
System Requirements: IBM System/34, PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 8
Date First Installed: August 1981

AARDVARK SOFTWARE, INC.
ESTATE TAX PLAN VERSION 2.0
Additional Product Classification: Banking, Insurance
Specific Application: Estate Tax Plan
Specific Industry: Banking/Financial, Legal
System Requirements: Apple II, IIE, III: UCSD-P; IBM PC: UCSD-P; Victor 9000: UCSD-P; CP/M
Memory Required: 64.0K bytes
Source Language: UCSD-P
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: May 1982
(See Vendor Profile Page V-1)

AARDVARK SOFTWARE, INC.
PROFESSIONAL TAX PLAN-VERSION 2.4
Specific Application: Federal Income Tax Planning
Specific Industry: Banking/Financial
System Requirements: Apple II, IIE, III: UCSD-P; IBM PC: UCSD-P; Victor 9000: UCSD-P
Memory Required: 64.0K bytes
Source Language: UCSD-P
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: July 1981
(See Vendor Profile Page V-00)

ABAX MANSELCO COMPUTER SYSTEMS
ABAX RENTAL MANAGEMENT SYSTEM
Specific Application: Inventory Control; Accounts Receivable
Specific Industry: Rental
System Requirements: DEC PDP: CTS 300, TSX
Memory Required: 148.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,500
Number Installed to Date: 6
Date First Installed: February 1982
(See Vendor Profile Page V-1)

AST ASSOCIATES
DATA TRANS
Specific Application: Automatic Telecommunication and Data Transfer at 300-Baud or 1200-Baud Rate
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 1,000
Date First Installed: September 1982
(See Vendor Profile Page V-1)

ABW CORP.
RL-1 ACCOUNTING PACKAGE
Additional Product Classification: DBMS
Specific Application: General Ledger, Accounts Payable, Accounts Recievable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS 1.1; IBM PC-XT: PC-DOS 2.0
Memory Required: 96.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: September 1983
(See Vendor Profile Page V-1)

ACCOUNTANTS COMPUTER CO. & TAX SYSTEMS, INC.
SUPER TAX
Specific Application: Tax Returns in Real-time Mode
Specific Industry: Accounting Firms, Tax
System Requirements: OFB: Tilco
Memory Required: 384.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: January 1983
(See Vendor Profile Page V-1)

ACCOUNTANTS MICRO SYSTEMS, INC.
DATAWRITE
Specific Application: General Ledger Client Write-up
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Real Estate, Education, Construction, Government, Transportation, Nonprofit Organizations, Scientific
System Requirements: CP/M, DOS
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,495
Number Installed to Date: 2,000
Date First Installed: January 1979
(See Vendor Profile Page V-1)

ACCOUNTANTS MICRO SYSTEMS, INC.
FIXED ASSETS
Specific Application: Assets
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Real Estate, Education, Construction, Government, Transportation, Nonprofit Organizations, Scientific
System Requirements: CP/M
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 2,000
Date First Installed: January 1979

ACCOUNTANTS MICRO SYSTEMS, INC.
OMEGABYTE PRACTICE MANAGEMENT
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Real Estate, Education, Construction, Government, Transportation, Nonprofit Organizations, Scientific
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,995
Number Installed to Date: 2,000
Date First Installed: January 1979

ACCOUNTANTS MICRO SYSTEMS, INC.
TAX MACHINE
Specific Application: Tax
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Real Estate, Education, Construction, Government, Transportation, Non-Profit Organizations, Scientific
System Requirements: CP/M
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 1,000
Date First Installed: January 1979

ACCOUNTING SYSTEMS
GENERAL ACCOUNTING PACKAGE
Specific Application: Order Entry, Inventory, Accounts Payable, Accounts Receivable, General Ledger, Payroll, Job Costing
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Datapoint 1500: DOS
Memory Required: 32.0K bytes
Source Language: Databus
Source Code Available: Yes
Price: $6,000
Number Installed to Date: 40
Date First Installed: 1976
(See Vendor Profile Page V-1)

ACORN DIGITAL
GENERAL ACCOUNTING
Specific Application: General Accounting
System Requirements: IBM System/23, 5110, 5120
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 85
Date First Installed: 1980
(See Vendor Profile Page V-2)

ACORN DIGITAL
MANUFACTURING ACCOUNTING
Specific Application: Manufacturing Accounting
Specific Industry: Manufacturing
System Requirements: IBM System/23, 5110, 5120
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 5
Date First Installed: February 1983

ACORN DIGITAL
PUBLIC ACCOUNTING SYSTEM
Specific Application: Accounting
Specific Industry: Accountants
System Requirements: IBM System/23, 5110, 5120
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Price: $2,500
Number Installed to Date: 35
Date First Installed: 1980

ACORN SOFTWARE PRODUCTS, INC.
CONTROLS
Specific Application: Invoice Information, Financial Management, Payroll, Trust Accounting, Health Plan Maintenance
Specific Industry: Government, Correctional Institutions
System Requirements: IBM System/34: SSP; IBM System/36; IBM System/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1982
(See Vendor Profile Page V-2)

ACORN SOFTWARE PRODUCTS, INC.
DETOX
Additional Product Classification: Payroll/Personnel
Specific Application: Census Billing, Accounts Receivable, Accounts Payable, General Ledger, Payroll
Specific Industry: Medical, Alcohol Dryout Centers
System Requirements: IBM System/34: SSP; IBM System/36; IBM System/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 2
Date First Installed: 1982

ACORN SOFTWARE PRODUCTS, INC.
LEGUMS
Specific Application: Case Information, Billing, General Accounting
Specific Industry: Legal
System Requirements: IBM System/36: SSP; IBM PC
Memory Required: 64.0K bytes
Source Language: Basic, RPG
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000 to $15,000
Date First Installed: July 1983

ACUMEN RESOURCE CORP.
PRINTERS BUSINESS SYSTEM VERSION 3.5
Specific Application: Order Entry, Job Tracking, Accounts Receivable
System Requirements: CP/M; MP/M
Memory Required: 48.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,495
(See Vendor Profile Page V-2)

ADVANCED INFORMATION MANAGEMENT
MUTUAL FUND ACCOUNTING
Specific Application: Mutual Fund Accounting
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM PC-XT
Memory Required: 128.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-3)

ADVENTURE INTERNATIONAL
MAXI CRAS
Specific Application: Check Register Accounting System

Specific Industry: Not Industry Sensitive
System Requirements: TRS 80: DOS, IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1[illegible]
Date First Installed: 1982
(See Vendor Profile Page V-3)

ALPHANETICS
BASIC INSTRUCTION COURSE
Additional Product Classification: Program Generators, Aids, Application Development Tools
Specific Application: Basic Language Instruction
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT: PC-DOS; Wang: MS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $39
Number Installed to Date: 3,000
Date First Installed: February 1983
(See Vendor Profile Page V-4)

AMERICAN BUSINESS SYSTEMS, INC.
BACS-ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC 5150: DOS; DEC Rainbow 100: CP/M, CP/M 86; Eagle IV: CP/M; Altos 586: Xenix, MP/M 86
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1982
(See Vendor Profile Page V-5)

AMERICAN BUSINESS SYSTEMS, INC.
BACS-ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC 5150: DOS; DEC Rainbow 100: CP/M, CP/M 86; Eagle IV: CP/M; Altos 586: Xenix, MP/M 86
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1982

AMERICAN BUSINESS SYSTEMS, INC.
BACS-BUSINESS ACCOUNTING CONTROL SYSTEM
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll, Order Entry, Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC 5150: DOS; DEC Rainbow 100: CP/M, CP/M 86; Eagle IV: CP/M; Altos 586: Xenix, MP/M 86
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1982

AMERICAN BUSINESS SYSTEMS, INC.
BACS-GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC 5150: DOS; DEC Rainbow 100: CP/M, CP/M 86; Eagle IV: CP/M; Altos 586: Xenix, MP/M 86
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1982

AMERICAN BUSINESS SYSTEMS, INC.
CLIENT ACCOUNTING SYSTEM
Specific Application: General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC 5150: DOS; DEC Rainbow 100: CP/M, CP/M 86; Eagle IV: CP/M; Altos 586: Xenix, MP/M 86
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1981

AMERICAN MICRO DYNAMICS, INC.
TRUST
Additional Product Classification: Banking
Specific Application: Portfolio Management, Trust Accounting
Specific Industry: Banking/Financial
System Requirements: IBM PC; PC-DOS; CP/M
Memory Required: 64.0K bytes
Source Language: Dbase II
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: July 1983
(See Vendor Profile Page V-5)

AMERICAN PHARMACY COMPUTER, INC.
APCI
Additional Product Classification: Pharmacy
Specific Application: Processing, Prescriptions, Third Party Claims, Price Updates, Inventory
Specific Industry: Pharmacies, Hospitals
Memory Required: 192.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: August 1983
(See Vendor Profile Page V-5)

AMERICAN PLANNING CORP.
3-DESS
Specific Application: Three Dimensional Electronic Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M; Northstar Advantage: Northstar Horizon
Source Language: APC Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-5)

ANALYTICAL DATA SYSTEMS, INC.
POINT OF SALE
Specific Application: Invoicing, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, CP/M 86, MP/M
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 20
Date First Installed: February 1981
(See Vendor Profile Page V-6)

ANALYTICAL DATA SYSTEMS, INC.
PURCHASE ORDER
Specific Application: Purchasing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; MP/M; CP/M 86
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $749
Number Installed to Date: 15
Date First Installed: May 1983

ANGELES COMPUTER, INC.
COMPUTROLLER
Specific Application: General Accounting
Specific Industry: Construction, Weatherization
System Requirements: Apple: CP/M; DEC, HP
Memory Required: 64.0K bytes
Source Language: Dbase
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 3
Date First Installed: February 1982
(See Vendor Profile Page V-6)

APPLIED ELECTRONICS CORP.
IBS (INTEGRATED BUSINESS SYSTEM)
Specific Application: General Ledger, Accounts Payable, Payroll, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,700
Number Installed to Date: 80
Date First Installed: January 1978
(See Vendor Profile Page V-6)

APPLIED MICROCOMPUTER TECHNOLOGY
LIBERATOR
Specific Application: Interactive Accounting System With Order Entry
Specific Industry: Wholesale/Distribution
Source Language: Basic
Source Code Available: Yes
Price: $7,500
Number Installed to Date: 150
Date First Installed: September 1979
(See Vendor Profile Page V-6)

APPLIED SOFTWARE TECHNOLOGY
CASH RECEIPT JOURNAL
Specific Application: Journal of Original Entries
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation, Non-Profit Organizations
System Requirements: IBM PC; Apple II, Apple III
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
(See Vendor Profile Page V-6)

APPLIED SOFTWARE TECHNOLOGY
EXPENSE JOURNAL
Specific Application: Expense Records
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation, Non-Profit Organizations
System Requirements: Apple II; Apple III; IBM PC
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40

APPLIED SOFTWARE TECHNOLOGY
INVOICING TEMPLATE
Specific Application: Invoicing
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation, Non-Profit Organizations
System Requirements: IBM PC; Apple II; Apple III
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50

APPLIED SOFTWARE TECHNOLOGY
LEGAL OFFICE MANAGER
Specific Application: Billing, Scheduling
Specific Industry: Legal
System Requirements: IBM PC; Apple II; Apple III
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $249
Date First Installed: March 1983

APPLIED SOFTWARE TECHNOLOGY
PURCHASING TEMPLATE
Specific Application: Purchase Order Management
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government,

Transportation, Nonprofit Organizations
System Requirements: IBM PC; Apple II, Apple III
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: March 1983

APPLIED SOLUTIONS, INC.
ACCOUNTS PAYABLE
Specific Application: General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36 SSP
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 3
Date First Installed: February 1983
(See Vendor Profile Page V-5)

APPLIED SOLUTIONS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Open Items Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36: SSP
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 4
Date First Installed: September 1981

APPLIED SOLUTIONS, INC.
GENERAL LEDGER
Specific Application: General Ledger, Financial Statements
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36 SSP
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 3
Date First Installed: February 1983

ARCHITECTURAL COMPUTER SOFTWARE
ARCHITECTS BUSINESS MANAGER
Specific Application: General Business
Specific Industry: Architects
System Requirements: Apple II; Apple III; IBM PC, IBM PC-XT
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000 to $2,500
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-6)

ARCHITECTURAL COMPUTER SOFTWARE
ENGINEER BUSINESS MANAGER
Specific Application: General Business
Specific Industry: Engineering
System Requirements: Apple II; Apple III, IBM PC, IBM PC-XT
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000 to $2,500
Number Installed to Date: 40
Date First Installed: 1981

ARGONAUT INFORMATION SYSTEM, INC.
A/S INVENTORY/ACCOUNTING SYSTEM
Specific Application: Inventory Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38; IBM 370; DEC VAX
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 75
Date First Installed: 1978
(See Vendor Profile Page V-6)

ARMOR SYSTEMS
X-CALIBUR
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Inventory, Working Process for Manufacturing
Specific Industry: Manufacturing
System Requirements: Seiko: CP/M; Vector Graphics: MP/M
Memory Required: 64.0K bytes
Source Language: Cbasic-80, Cbasic-86
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1,500
Date First Installed: 1978
(See Vendor Profile Page V-6)

ARRAYS, INC.
THE HOME ACCOUNTANT
Specific Application: Financial Management System
Specific Industry: Home, Hobby
System Requirements: IBM PC, PC-XT, Apple II, IIE; Atari 400, 800; TRS-80 Model III, 4
Memory Required: 64.0K bytes
Source Code Available: Yes
Price: $100
Number Installed to Date: 75,000
Date First Installed: December 1981
(See Vendor Profile Page V-6)

ARTISAN SOFTWARE TECHNOLOGY, INC.
LOAN BILLING SYSTEM
Specific Application: General Ledger, Interest Calculation, Delinquency Follow- Up
Specific Industry: Banking/Financial
System Requirements: ARos 8010, 8011, 8012, 8013, Oasis
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $2,500
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-6)

ARTISAN SOFTWARE TECHNOLOGY, INC.
ROUTE DELIVERY
Specific Application: Newspaper
Specific Industry: Not Industry Sensitive
System Requirements: ARos 8010, 8011, 8012, 8013; Oasis
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 1
Date First Installed: 1982

ASTEC, INC.
INVENTORY MASTER
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; IBM PC-XT: PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
(See Vendor Profile Page V-6)

ASTEC, INC.
LEDGER MASTER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, IBM PC-XT: PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 8,306

ASTEC, INC.
PAYABLES MASTER
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, IBM PC-XT: PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 8,306

ASTEC, INC.
RECEIVABLE MASTER
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, IBM PC-XT: PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 8,306

AUTOMATED BOOKKEEPING CORP.
GENERAL LEDGER
Specific Application: General Ledger, Financial Statements
Specific Industry: Accountants
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic, RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: February 1983
(See Vendor Profile Page V-10)

AUTOMATED BUSINESS CENTERS
BULLETIN 870
Specific Application: Administrative Package for Texas School Districts, Accounts Receivable, Accounts Payable, General Ledger
System Requirements: Southwest Technical Products: Unitex
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: January 1983
(See Vendor Profile Page V-10)

AUTOMATION MANAGEMENT, INC.
AMI ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Retail, Legal, Insurance, Construction, Government, Non-Profit Organizations
System Requirements: IBM PC-XT, IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 120
(See Vendor Profile Page V-11)

AUTOMATION MANAGEMENT, INC.
AMI AD AGENCY BILLING
Specific Application: Billing
Specific Industry: Ad Agencies
System Requirements: IBM PC-XT, IBM PC, PC-DOS 2.0
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,300
Number Installed to Date: 2

AUTOMATION MANAGEMENT, INC.
AMI CLIENT ACCOUNTING
Specific Application: Client Accounting
Specific Industry: CPA Firms
System Requirements: IBM PC-XT: PC-DOS 2.0, IBM PC: PC-DOS 1.1
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 3
Date First Installed: June 1983

AUTOMATION MANAGEMENT, INC.
AMI CLIENT BILLING AND INVOICING
Specific Application: Time Accounting, Invoicing
System Requirements: IBM PC-XT, IBM PC: PC-DOS 2.0
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $550
Number Installed to Date: 5
Date First Installed: July 1983

AUTOMATION MANAGEMENT, INC.
AMI CPA SYSTEM
Specific Application: Client Billing, Accounts Receivable, Client Write-Up
Specific Industry: Accounting

System Requirements: IBM PC-XT, IBM PC: PC-DOS 2.0
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,195

AUTOMATION MANAGEMENT, INC.
AMI GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT: PC-DOS 2.0; IBM PC: PC-DOS 1.1
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $675

AUTOMATION MANAGEMENT, INC.
AMI INVOICING
Specific Application: Invoicing
System Requirements: IBM PC-XT, IBM PC: PC-DOS 2.0
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 33
Date First Installed: July 1983

AUTOMATION MANAGEMENT, INC.
AMI LAW OFFICE ACCOUNTING
Specific Application: Accounts Receivable, General Ledger, Billing and Time Accounting
Specific Industry: Legal
System Requirements: IBM PC-XT: PC-DOS 2.0; IBM PC: PC-DOS 1.1
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,[illegible]

AUTOMATION MANAGEMENT, INC.
AMI RESTAURANT ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Inventory Control, General Ledger, Accounts Payable, Accounts Receivable, Payroll
Specific Industry: Restaurant
System Requirements: IBM PC-XT: PC-DOS 2.0; IBM PC: PC-DOS 1.1
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,195

AUTOMATION MANAGEMENT, INC.
AMI TIME ACCOUNTING
Specific Application: Client Billing
Specific Industry: Engineering, Legal
System Requirements: IBM PC-XT: PC-DOS 2.0, IBM PC: PC-DOS 1.1
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $375
Number Installed to Date: 15
Date First Installed: July 1983

AUTOMATION PROGRAMMING & SERVICES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Televideo: CP/M
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 2
Date First Installed: February 1983
(See Vendor Profile Page V-11)

AUTOMATION PROGRAMMING & SERVICES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Televideo: CP/M
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 2
Date First Installed: February 1983

AUTOMATION PROGRAMMING & SERVICES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Televideo: CP/M
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 2
Date First Installed: February 1983

AUTOMATION PROGRAMMING & SERVICES, INC.
SALES ANALYSIS
Specific Application: Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Televideo: CP/M
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: February 1983

BASIC BUSINESS SOFTWARE, INC.
AMORTIZATION/DEPRECIATION
Specific Application: Amortization and Depreciation Processing
Specific Industry: Not Industry Sensitive
System Requirements: ; IBM PC; Apple IIE; Apple III
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30
Date First Installed: 1979
(See Vendor Profile Page V-12)

BASIC BUSINESS SOFTWARE, INC.
FIXED ASSET DEPRECIATION
Specific Application: Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Memory Required: 86 0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195
Date First Installed: 1982

BASIC BUSINESS SOFTWARE, INC.
SOME COMMON BASIC PROGRAMS
Additional Product Classification: Statistics
Specific Application: Finance, Math, Statistics
Specific Industry: Not Industry Sensitive
System Requirements: ; IBM PC; Apple IIE, III
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35
Date First Installed: 1979

BASIS, INC.
CHIRO/D CHIROPRACTIC OFFICE MANAGEMENT
Specific Application: Accounting and Billing
Specific Industry: Chiropractic
System Requirements: CP/M; MP/M
Memory Required: 48.0K bytes
Source Language: Basic Compiler, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 80
Date First Installed: February 1981
(See Vendor Profile Page V-12)

BASIS, INC.
DENTAL80 DENTAL ACCOUNTING AND BILLING
System Requirements: MP/M; CP/M, TURBO-DOS
Memory Required: 48.0K bytes
Source Language: Basic Compiler, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 75
Date First Installed: January 1981

BEACON SYSTEMS
F.A.R.M.S.
Specific Application: Farm Ledger, Billing, Inventory and Accounts Receivable
Specific Industry: Agri-Business
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $[illegible] to $[illegible]
Number Installed to Date: 10
Date First Installed: December 1982
(See Vendor Profile Page V-12)

BEAR COMPUTERS, INC.
FARM ACCOUNTING CONTROL SYSTEM (FACS)
Specific Application: Accounting
Specific Industry: Farming
System Requirements: CP/M; CP/M-86
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: [illegible]
Date First Installed: September 1981
(See Vendor Profile Page V-12)

BENEFIT ANALYSIS, INC.
PENADMIN
Specific Application: Pension and Profit Sharing Administration and Record Keeping Package
Specific Industry: Banking/Financial, Legal, Insurance
System Requirements: IBM PC-XT: CP/M; Apple II, II+, IIE, III: MS-DOS; Wang OIS, Xerox 820, 860
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: September 1981
(See Vendor Profile Page V-12)

BEST PROGRAMS
PERSONAL COMPUTER/FIXED ASSET SYSTEM PC
Specific Application: Fixed Asset Management and Depreciation Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Advanced Basic, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $385
Date First Installed: May 1983
(See Vendor Profile Page V-12)

BEST PROGRAMS
PERSONAL COMPUTER/PERSONAL FINANCE PROGRAM
Specific Application: Financial Management and Controls
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Advanced Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $[illegible]

BEST PROGRAMS
PROFESSIONAL FINANCE PROGRAM (PFP) II
Specific Application: Financial Management and Controls
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 96.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $[illegible]
Date First Installed: June 1983

BILLINGS COMPUTER CORP.
BILLINGS ACCOUNTING SUPPORT PACKAGE
Specific Application: Accounting

Specific Industry: Not Industry Sensitive
System Requirements: Billings: Boss
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Date First Installed: 1982
(See Vendor Profile Page V-12)

BILLINGS COMPUTER CORP.
BILLINGS BOOKKEEPER ACCOUNTING PACKAGE
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Billings: Boss
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1982

BILLINGS COMPUTER CORP.
BILLINGS NETWORK ACCOUNTING SYSTEM
Specific Application: Network Accounts Receivable, Accounts Payable, General Ledger and Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Billings: Boss
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1982

BILLINGS COMPUTER CORP.
BILLINGS NETWORK ACCOUNTS PAYABLE
Specific Application: Network Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Billings: Boss
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: 1982

BILLINGS COMPUTER CORP.
BILLINGS NETWORK ACCOUNTS RECEIVABLE PACKAGE
Specific Application: Network Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Billings: Boss
Memory Required: 644.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: 1982

BILLINGS COMPUTER CORP.
BILLINGS NETWORK GENERAL LEDGER PACKAGE
Specific Application: Network General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Billings: Boss
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: 1982

BISS, INC.
EMPLOYEE CONTRIBUTION
Specific Application: Accounting and Reporting
Specific Industry: Banking/Financial
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 10
Date First Installed: 1982
(See Vendor Profile Page V-12)

BISS, INC.
FIXED ASSET ACCOUNTING
Specific Application: Fixed Asset Accounting
Specific Industry: Banking/Financial
System Requirements: CP/M
Memory Required: 264.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $895
Number Installed to Date: 50
Date First Installed: 1980

BISS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Banking/Financial
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,295
Number Installed to Date: 30
Date First Installed: 1981

BISS, INC.
STOCKHOLDER ACCOUNTING
Specific Application: Stockholder Accounting
Specific Industry: Banking/Financial
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,295
Number Installed to Date: 20
Date First Installed: 1981

BJERGMAN ENTERPRISES
AM-BIZ PACKAGE
Specific Application: Mailing List, Inventory, Order Entry, General Ledger, Monthly Report, Organization Charter, Telephone Timer
Specific Industry: Wholesale/Distribution
System Requirements: TRS 80: DOS; IBM PC: PC-DOS; TRS MC10; Timex 2000 Series
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 500
Date First Installed: March 1980
(See Vendor Profile Page V-12)

BUDGET COMPUTER SYSTEMS
1040 TAX PREPARER
Specific Application: Taxes
Specific Industry: Accounting
System Requirements: Altos; IBC; Onyx; Seiko
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 30
Date First Installed: January 1983
(See Vendor Profile Page V-14)

BUDGET COMPUTER SYSTEMS
AUTO SUPPLY POINT OF SALE
Specific Application: Inventory Control, Accounts Receivable With Counter Ticket Generation
Specific Industry: Retail
System Requirements: Altos; IBC; Onyx, Seiko
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 5
Date First Installed: September 1982

BUDGET COMPUTER SYSTEMS
CLIENT WRITE-UP
Specific Application: Financial Statements
Specific Industry: Accounting
System Requirements: Altos; IBC; Onyx; Seiko
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 50
Date First Installed: September 1979

BUDGET COMPUTER SYSTEMS
DENTAL OFFICE MANAGEMENT
Specific Application: Accounts Receivable, Billing, and Word Processing
Specific Industry: Dental
System Requirements: Altos; IBC; Onyx; Seiko
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 5
Date First Installed: November 1982

BUDGET COMPUTER SYSTEMS
OIL AND GAS JOINT INTEREST BILLING
Specific Application: Maintain Well-Drilling Expenses and Generates Participant Billing
Specific Industry: Petroleum Production
System Requirements: Altos; IBC; Onyx; Seiko
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: June 1982

BUSH CONSTRUCTION, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Retail
System Requirements: Televideo (Hard Disk): CP/M
Memory Required: 64.0K bytes
Source Language: Dbase
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: 1983
(See Vendor Profile Page V-14)

BUSH CONSTRUCTION, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Retail
System Requirements: Televideo: CP/M
Memory Required: 64.0K bytes
Source Language: Dbase
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: February 1983

BUSH CONSTRUCTION, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Retail
System Requirements: Televideo (Hard Disk): CP/M
Memory Required: 64.0K bytes
Source Language: Dbase
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750

BUSINESS AUTOMATION, INC.
MAINTAINANCE DISPATCHING SYSTEM
Additional Product Classification: Manufacturing, Dispatching
Specific Application: Costing and Scheduling, Dispatching
Specific Industry: Not Industry Sensitive
System Requirements: General Automation: Control; Microdata: Pick
Memory Required: 64.0K bytes
Source Language: Fortran, Basic
Source Code Available: $1,000
Purchase Terms: Purchase (license); Rental; Lease
Price: $10,000
Date First Installed: February 1982
(See Vendor Profile Page V-14)

BUSINESS COMPUTER SERVICE, INC.
AUTO
Additional Product Classification: Insurance, Inventory

Specific Application: Inventory, Finance/Insurance
Specific Industry: Auto Dealers
System Requirements: IBM PC; CP/M; PC-DOS
Memory Required: 64.0K bytes
Source Language: DBase, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,800
Number Installed to Date: 2
Date First Installed: June 1982
(See Vendor Profile Page V-14)

[illegible] DATA SERVICES, INC.
RDS - ACCOUNTING
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll, Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Televideo
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 60
Date First Installed: July 1982
(See Vendor Profile Page V-14)

BUSINESS SYSTEMS, INC.
UTILITY MANAGEMENT SYSTEM
Specific Application: Water, Utilities, Gas and Sanitation Accounting
Specific Industry: Utilities
System Requirements: DEC PDP-11/23: RSTS, DEC VAX: VMS
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 4
Date First Installed: October 1982
(See Vendor Profile Page V-15)

B.W.C. SYSTEMS
CAIR
Additional Product Classification: Insurance
Specific Application: Accounting
Specific Industry: Insurance
System Requirements: TRS-80: CP/M
Memory Required: 48.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 50
Date First Installed: March 1981
(See Vendor Profile Page V-15)

BYRON HOPKINS & ASSOCIATES, INC.
CHIROPRACTOR SYSTEM
Additional Product Classification: Insurance
Specific Application: Accounts Receivable, Insurance
Specific Industry: Chiropractors
System Requirements: Altos: CP/M; Northstar: MP/M, Televideo: Oasis
Memory Required: 64.0K bytes
Source Language: Basic, Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $3,000
Number Installed to Date: 1
Date First Installed: January 1982
(See Vendor Profile Page V-15)

BYRON HOPKINS & ASSOCIATES, INC.
PHARMACY SYSTEM
Specific Application: Labeling, Inventory
Specific Industry: Pharmacies
System Requirements: Altos: CP/M; Northstar: MP/M; Televideo: Oasis
Memory Required: 64.0K bytes
Source Language: Basic, Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $3,000
Number Installed to Date: 1
Date First Installed: January 1982

C.A.I.
OIL AND GAS ROUGHNECK SOFTWARE
Specific Application: Accounting
Specific Industry: Oil and Gas
System Requirements: CP/M; MP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 25
Date First Installed: February 1982
(See Vendor Profile Page V-15)

CALL COMPUTER, INC.
A/C
Specific Application: Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; CP/M
Memory Required: 128.0K bytes
Source Language: Microsoft Basic
Purchase Terms: Purchase (license)
Price: $99
Number Installed to Date: 4
Date First Installed: 1983
(See Vendor Profile Page V-16)

CCH COMPUTAX, INC.
THE PARTNER CLIENT ACCOUNTING SYSTEM
Specific Application: Client Accounting, Financial Statement Generation
System Requirements: Televideo: TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Microsoft Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 250
Date First Installed: June 1982
(See Vendor Profile Page V-17)

CCH COMPUTAX, INC.
THE PARTNER FIXED ASSET
Specific Application: Tax Accounting
System Requirements: Televideo: TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: August 1983

CCH COMPUTAX, INC.
THE PARTNER GENERAL LEDGER
Specific Application: General Ledger
System Requirements: Televideo: TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Microsoft Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,800
Number Installed to Date: 250
Date First Installed: June 1982

CCH COMPUTAX, INC.
THE PARTNER PROFESSIONAL TIME
Specific Application: Client Billing, Profitability
System Requirements: Televideo: TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 150
Date First Installed: December 1982

CCH COMPUTAX, INC.
THE PARTNER RJE TAX MODULE
Specific Application: Interface Module
System Requirements: Televideo: TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 130
Date First Installed: January 1983

CCH COMPUTAX, INC.
THE PARTNER AFTER-THE-FACT PAYROLL
Specific Application: Payroll, Payroll Reporting
System Requirements: Televideo: TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Microsoft Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 250
Date First Installed: February 1982

CETEC
CENTAUR
Additional Product Classification: Payroll/Personnel, Radio Traffic
Specific Application: Radio Station Management System
Specific Industry: Radio Stations
System Requirements: IBM System/23
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $21,900
Number Installed to Date: 10
Date First Installed: July 1983
(See Vendor Profile Page V-18)

C F P, INC. (COMPUTERIZED FISCAL PLANNING)
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Payroll, Inventory, Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: IBM Datamaster; IBM PC
Memory Required: 64.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,200
Number Installed to Date: 150
Date First Installed: 1979
(See Vendor Profile Page V-18)

CHAMPAIGN COMPUTER CO., INC.
ALPHA ACCOUNTING
Specific Application: Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 40
Date First Installed: 1977
(See Vendor Profile Page V-18)

CHAMPAIGN COMPUTER CO., INC.
JOB COSTING
Specific Application: Job Costing
Specific Industry: Manufacturing
System Requirements: Alpha Micro: Amos
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 1
Date First Installed: August 1983

CHAMP SYSTEMS, INC.
BALANCE FOWARD ACCOUNTS RECEIVABLE
Specific Application: Balance Forward Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: HP 83: HP Basic; HP 85; HP 86; HP 87
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1982
(See Vendor Profile Page V-18)

CHELSEA INTERNATIONAL CORP.
GENERAL LEDGER ACCOUNTING
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Inventory Control
Specific Industry: Government
System Requirements: IBM PC: CP/M; Exxon WP 560
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 5
Date First Installed: July 1983
(See Vendor Profile Page V-18)

CHUCK DULIN & ASSOCIATES, INC.
AUTOMOTIVE DEALER FINANCIAL SYSTEM
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: Vehicle Safety, Inventory, Payroll, Accounting, Data Communication
System Requirements: HP 8221
Memory Required: 8.0K bytes

Source Language: HP 2
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000 to $10,000
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-18)

CHUCK DULIN & ASSOCIATES, INC.
GENERAL LOAN AND INVESTMENT SYSTEM
Specific Application: Solves Loan and Investment Problems
Specific Industry: Banking/Financial, Real Estate
System Requirements: HP 41CV
Memory Required: 3.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $725
Number Installed to Date: 20
Date First Installed: 1983

CIA (COMPUTER INVESTMENT ADVICE, INC.)
AMBULANCE BILLING
Specific Application: Private and Medicare Billing
Specific Industry: Not Industry Sensitive
System Requirements: Altos: MP/M, CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 3
Date First Installed: 1983
(See Vendor Profile Page V-19)

CIMARRON CORP.
DENTAL ACCOUNTING SYSTEM
Specific Application: Dental Accounting
Specific Industry: Medical, Dental
System Requirements: Commodore 8032; Commodore 8096
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 1,000
Date First Installed: 1981
(See Vendor Profile Page V-19)

CIMARRON CORP.
INSTA-CHECK
Specific Application: Home Record Keeping
System Requirements: Commodore 64
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: September 1983

CIMARRON CORP.
LEGAL TIME ACCOUNTING
Specific Industry: Legal
System Requirements: Commodore 8032; Commodore 8096
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 500
Date First Installed: 1980

CISNETWORK CORP.
ASTEK
Specific Application: Asset, Liability, Management System
Specific Industry: Banking/Financial
System Requirements: IBM PC; PC-DOS
Memory Required: 128.0K bytes
Source Language: APL
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 4
Date First Installed: July 1983
(See Vendor Profile Page V-19)

CLARK & SLATER ASSOCIATES, INC.
ENTRAC
Specific Application: Energy Tracking and Cost Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Apple III; DOS
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: June 1983
(See Vendor Profile Page V-19)

THE CLEMENTS CO.
MONITOR
Specific Application: Project Management, Job Costing
Specific Industry: Engineering
System Requirements: IBM PC; CP/M 86
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $895
Number Installed to Date: 10
Date First Installed: January 1982
(See Vendor Profile Page V-19)

CMA, INC.
NURSING HOME PACKAGE
Additional Product Classification: Payroll/Personnel, WP/Text Editing, Inventory
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Payroll, Inventory, WP
Specific Industry: Nursing Homes
System Requirements: Cado
Memory Required: 64.0K bytes
Source Language: Cadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-19)

COBRASOFT, INC.
AGNCYMGT
Specific Application: Travel Agency
Specific Industry: Travel Agencies
System Requirements: TRS-80/4; IBM PC; Olivetti M20; Victor 9000
Memory Required: 12.0K bytes
Source Language: Basic, Cbasic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 40
(See Vendor Profile Page V-19)

COBRASOFT, INC.
BIZMGT
Specific Application: Business Management and Accounting
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/4; IBM PC, Olivetti M20; Victor 9000
Memory Required: 128.0K bytes
Source Language: Basic, Cbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1983

COBRASOFT, INC.
CONSTRMGT
Specific Application: Construction Management
Specific Industry: Banking/Financial, Contracting
System Requirements: IBM PC; Olivetti M20; Victor 9000
Memory Required: 128.0K bytes
Source Language: Basic, Cbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1983

COMMERCIAL BUSINESS SYSTEMS, INC.
GENERAL ACCOUNTING SYSTEM
Additional Product Classification: Manufacturing
Specific Application: General Accounting, Inventory
Specific Industry: Wholesale Distribution, Rental, Service Companies
System Requirements: Olivetti M20; Pcos
Memory Required: 180.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 50
Date First Installed: 1982
(See Vendor Profile Page V-20)

COMMERCIAL MICRO SYSTEMS, INC.
STEP ONE
Additional Product Classification: Inventory
Specific Application: Integrated Accounting System With Inventory, Invoicing, General Ledger, Accounts Payable, Accounts Receivable, Order Entry
System Requirements: Victor: MS-DOS; HP: CP/M; IBM: PC-DOS; Olivetti: Pcos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,750
Date First Installed: 1979
(See Vendor Profile Page V-21)

COMMERCIAL MICRO SYSTEMS, INC.
STEP ONE - ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Victor: MS-DOS, HP: CP/M; IBM: PC-DOS; Olivetti: Pcos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600
Date First Installed: September 1979

COMMERCIAL MICRO SYSTEMS, INC.
STEP ONE - GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Victor: MS-DOS, HP: CP/M, IBM: PC-DOS; Olivetti: Pcos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600
Date First Installed: September 1979

COMMERCIAL MICRO SYSTEMS, INC.
STEP ONE - INVOICING
Specific Application: Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: Victor: MS-DOS; HP: CP/M; IBM: PC-DOS, Olivetti: Pcos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600
Date First Installed: September 1979

COMMERCIAL MICRO SYSTEMS, INC.
STEP ONE - ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: Victor: MS-DOS, HP: CP/M; IBM: PC-DOS; Olivetti: Pcos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600
Date First Installed: September 1979

COMMUNITY CORP.
DISTRIBUTION QUOTATION SYSTEM
Specific Application: Sales Quotes
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $2,000
Number Installed to Date: 12
Date First Installed: December 1981
(See Vendor Profile Page V-21)

COMMONWEALTH SYSTEMS
FOOD BROKERAGE SYSTEM
Specific Application: Order Processing and Sales Analysis
System Requirements: NCR 8200 Series: Imos, IRX
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000
Date First Installed: 1977
(See Vendor Profile Page V-21)

COMPLETE BUSINESS SERVICES
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Northstar: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: January 1983
(See Vendor Profile Page V-21)

COMPLETE BUSINESS SERVICES
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Northstar: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: January 1983

COMPLETE BUSINESS SERVICES
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Northstar: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: January 1983

COMPREHENSIVE SYSTEMS, INC.
STARBOARD-MATE
Specific Application: Accounting
System Requirements: TI: MS-DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: June 1983
(See Vendor Profile Page V-21)

COSPU-SHARE, INC.
ACCOUNTS RECEIVABLE - AR-11-VERSION 3
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/23: RSTS/E; DEC VAX: VAX/VMS
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 100
Date First Installed: June 1979
(See Vendor Profile Page V-22)

COSPUSOL, INC.
LABORATORY SOFTWARE
Additional Product Classification: Manufacturing
Specific Application: Product Control and Accounts Receivable
Specific Industry: Accounting
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase,(license)
Price: $2,995
Number Installed to Date: 30
Date First Installed: June 1980
(See Vendor Profile Page V-22)

COMPUTAX SYSTEMS, INC.
THE PARTNER CLIENT ACCOUNTING
Specific Application: Client Accounting
Specific Industry: Accountants
System Requirements: Televideo TS806: TURBO-DOS; Televideo TS816
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,500
Date First Installed: 1982
(See Vendor Profile Page V-22)

COMPUTAX SYSTEMS, INC.
THE PARTNER FIXED ASSET SYSTEM
Specific Application: Fixed Asset
Specific Industry: Accountant
System Requirements: Televideo TS806: TURBO-DOS; Televideo TS816
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1982

COMPUTAX SYSTEMS, INC.
THE PARTNER MULTI TAX
Specific Application: Enhanced Tax Planning
Specific Industry: Accountants
System Requirements: Televideo TS806: TURBO-DOS; Televideo TS816
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Date First Installed: 1982

COMPUTAX SYSTEMS, INC.
THE PARTNER PROFESSIONAL TIME CHARGES/BILLING
Specific Application: Professional Time Charges and Billing
Specific Industry: Accountants
System Requirements: Televideo TS806: TURBO-DOS; Televideo TS816
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Price: $2,500
Date First Installed: 1982

COMPUTAX SYSTEMS, INC.
THE PARTNER RJE TAX MODULE
Specific Application: Remote Job Entry Tax Module
Specific Industry: Accountant
System Requirements: Televideo TS806: TURBO-DOS; Televideo TS816
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,895
Date First Installed: 1982

COMPUTAX SYSTEMS, INC.
THE PARTNER TAX PLANNING
Specific Application: Tax Planning
Specific Industry: Accountants
System Requirements: Televideo TS806: TURBO-DOS; Televideo TS816
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $900
Date First Installed: 1982

COMPUTAX SYSTEMS, INC.
THE PARTNER ON-LINE INTERACTIVE TAX MODULE
Specific Application: On-Line Interactive Tax Module
Specific Industry: Accountants
System Requirements: Televideo TS806: TURBO-DOS; Televideo TS816
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Date First Installed: 1982

COMPUTECH GROUP, INC.
SOLOMON SERIES ACCOUNTING
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Payroll, Fixed Asset Management, Inventory, Order Entry, Job Costing, Purchasing
Specific Industry: Not Industry Sensitive, Engineering, Wholesale/Distribution, Retail, Construction
System Requirements: IBM PC: PC-DOS, IBM PC-XT: PC-DOS; DEC RAINBOW: CP/M 86
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 2,500
Date First Installed: February 1984
(See Vendor Profile Page V-22)

COMPUTER BUSINESS SYSTEMS
DCMS-DRY CLEANING MANAGEMENT SYSTEM
Specific Application: Dry Cleaning Management
Specific Industry: Dry Cleaning
System Requirements: Televideo: CP/M; Burroughs B800; TRS-80/II
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 4
Date First Installed: 1982

COMPUTER BUSINESS SYSTEMS
DMDS-DEBT MANAGEMENT DISPOSITION SYSTEM
Specific Application: Debt Management Disposition System
Specific Industry: Not Industry Sensitive
System Requirements: Televideo: CP/M; Burroughs B800; TRS-80/II
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 2
Date First Installed: January 1982

COMPUTER CONSULTANTS
TRS-POS
Additional Product Classification: Payroll/Personnel, Point of Sale
Specific Application: POS, Accounts Payable, Accounts Receivable, General Ledger, Inventory, Invoicing, Mailing List, Payroll
Specific Industry: Retail
System Requirements: TRS-80/4: TRS-DOS, L-DOS
Memory Required: 48.0K bytes
Source Language: Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,550
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-23)

COMPUTERIZED LIFE INSURANCE COMPUTATIONS
IRA
Specific Application: Figures Contributions, Inflation and Interest Rates
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM PC; TRS Model 2, Model 12, Model 16: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $95
(See Vendor Profile Page V-24)

COMPUTER LANGUAGE RESEARCH, INC.
MICROSOURCE PARAFILE AND PROFILE
Additional Product Classification: Data Entry System
Specific Application: Tax Preparation
Specific Industry: Tax
System Requirements: IBM: CP/M; Apple: CP/M; TRS: CP/M
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 200
Date First Installed: January 1983
(See Vendor Profile Page V-25)

COMPUTER LANGUAGE RESEARCH, INC.
MICROSOURCE/CHECKOUT WORK PAPERS
Specific Application: Tax Preparation

Specific Industry: Tax
System Requirements: IBM: CP/M; Apple: CP/M; TRS-80: CP/M
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 200
Date First Installed: January 1983

COMPUTER PRODUCTS INTERNATIONAL
FOOD-WARE
Specific Application: Accounting
Specific Industry: Restaurants
System Requirements: Apple: Applesoft
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $695
Number Installed to Date: 28
Date First Installed: 1981
(See Vendor Profile Page V-25)

COMPUTER SERVICES CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10; DEC: Dibol
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,000
Number Installed to Date: 300
Date First Installed: 1976
(See Vendor Profile Page V-26)

COMPUTER SERVICES CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10; DEC: Dibol
Memory Required: 10.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,000
Number Installed to Date: 300
Date First Installed: 1976

COMPUTER SERVICES CORP.
BUSINESS SYSTEM ACCOUNTING
Specific Application: General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10; DEC: Dibol
Memory Required: 10.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,000
Number Installed to Date: 300
Date First Installed: 1976

COMPUTER SERVICES CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10; DEC: Dibol
Memory Required: 10.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,000
Number Installed to Date: 300
Date First Installed: 1976

COMPUTER SERVICES, INC.
D/B MASTER LOCKBOX ACCOUNTING
Additional Product Classification: Banking
Specific Application: Lockbox Accounting
Specific Industry: Banking/Financial
System Requirements: Apple II, Apple II+, Apple IIE, Apple III: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: D/B Master
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 25
Date First Installed: September 1982
(See Vendor Profile Page V-28)

COMPUTER SERVICES, INC.
D/B MASTER STOCKHOLDER ACCOUNTING
Specific Application: Stockholder Accounting
Specific Industry: Banking/Financial
System Requirements: Apple II, Apple II+, Apple IIE, Apple III: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: D/B Master
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 25
Date First Installed: September 1982

COMPUTERS FOR BUSINESS, INC.
APARTMENT RECORD KEEPING SYSTEM
Specific Application: Resident Information Management, Including Customized Accounts Receivable
Specific Industry: Apartments
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: CB-80
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: April 1983
(See Vendor Profile Page V-29)

COMPUTERS FOR BUSINESS, INC.
CHURCH SYSTEMS
Specific Application: Member Record Keeping of Contributions and Census Information
Specific Industry: Churches
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: CB-80
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 7
Date First Installed: October 1981

COMPUTERS FOR YOU
REPTRAC
Specific Application: Track Sales Orders, Invoices, Commissions, Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Vector Graphics: CP/M; Altos
Memory Required: 64.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,995
Number Installed to Date: 6
Date First Installed: January 1982
(See Vendor Profile Page V-26)

COMPUTER SYSTEMS & SOLUTIONS, INC.
NEWSPAPER ACCOUNTING & CIRCULATION
Additional Product Classification: Circulation
Specific Application: Newspaper Accounting & Circulation
System Requirements: Northstar Horizon, Advantage: CP/M
Memory Required: 48.0K bytes
Source Language: CB-80
Source Code Available: No
Price: $3,000
Number Installed to Date: 3
Date First Installed: August 1981
(See Vendor Profile Page V-27)

COMPUTER SYSTEMS & SOLUTIONS, INC.
SUGAR BEET HARVESTING
Additional Product Classification: Payroll/Personnel
Specific Application: Internal Accounting and Payroll for Custom Harvesting
Specific Industry: Agriculture
System Requirements: Northstar Horizon, Advantage: CP/M
Memory Required: 48.0K bytes
Source Language: CB-80, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 2
Date First Installed: August 1982

COMPUTER SYSTEMS ASSOCIATES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 65
Date First Installed: 1980

COMPUTER SYSTEMS ASSOCIATES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 65
Date First Installed: 1980

COMPUTER SYSTEMS ASSOCIATES, INC.
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Inventory Billing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,000
Number Installed to Date: 65
Date First Installed: 1980

COMPUTER SYSTEMS ASSOCIATES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 65
Date First Installed: 1980

COMPUTER SYSTEMS ASSOCIATES, INC.
RETAIL CLOTHING SYSTEM
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: Inventory, Accounts Payable, Accounts Receivable, Payroll
Specific Industry: Retail
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1982

COMPUTER SYSTEMS DESIGN, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, TRS-80/II: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $485
Date First Installed: 1980
(See Vendor Profile Page V-27)

COMPUTER SYSTEMS DESIGN, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, TRS-80/II: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $485
Date First Installed: September 1980

COMPUTER SYSTEMS DESIGN, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; TRS-80/II: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $485
Date First Installed: 1980

COMPUTER SYSTEMS DESIGN, INC.
JOB COST
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; TRS-80/II: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $485
Date First Installed: 1980

COMPUTER SYSTEMS DESIGN, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; TRS-80/II: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $485
Date First Installed: 1980

COMPUTER SYSTEMS DESIGN, INC.
UTILITY BILLING
Specific Application: Post Card Billing
System Requirements: IBM PC: PC-DOS; TRS-80/II: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,495
Number Installed to Date: 10
Date First Installed: 1982

COMPUTER TERMINAL, LTD.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, IBM Datamaster; Ohio Scientific: OS 65U
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $499
Date First Installed: 1979
(See Vendor Profile Page V-28)

COMPUTER TERMINAL, LTD.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, IBM Datamaster; Ohio Scientific: OS 65U
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $499
Date First Installed: 1979

COMPUTER TERMINAL, LTD.
BILLING/INVOICING
Specific Application: Billing and Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, IBM Datamaster; Ohio Scientific: OS 65U
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $499
Date First Installed: 1979

COMPUTER TERMINAL, LTD.
COMPUTER BUSINESS SOFTWARE
Specific Application: Accounts Receivable, Accounts Payable, Payroll, Inventory, General Ledger, Billing, Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; IBM Datamaster; Ohio Scientific: OS 65U
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 1,000
Date First Installed: 1979

COMPUTER TERMINAL, LTD.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Ohio Scientific: OS 65U
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $499
Date First Installed: 1979

COMPUTER TERMINAL, LTD.
INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Datamaster; Ohio Scientific: OS 65U
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $499
Date First Installed: 1979

COMPUTER TERMINAL, LTD.
JOB COSTING
Specific Application: Accounting
System Requirements: IBM Datamaster; PC-DOS; IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)

COMPUTER TERMINAL, LTD.
TOBACCO AND CANDY
Specific Application: Accounting
System Requirements: IBM PC: PC-DOS, IBM Datamaster: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)

COMPUTER TERMINAL, LTD.
TRUCKING
Specific Application: Accounting
System Requirements: IBM Datamaster: PC-DOS; IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)

COMSHARE
MICROSHARE LUMP SUM SYSTEMS
Specific Application: Checking and Taxes
Specific Industry: Banking/Financial, Insurance, Consulting
System Requirements: IBM PC: PC-DOS, Apple II+, Apple IIE, Apple III: DOS 3.3, SOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: August 1981
(See Vendor Profile Page V-29)

CONCAP COMPUTING SYSTEMS
GENERAL ACCOUNTING
Specific Application: Accounting
Specific Industry: Accounting
System Requirements: Unix
Source Language: Basic, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 200
Date First Installed: 1966
(See Vendor Profile Page V-29)

CONCAP COMPUTING SYSTEMS
LAND SURVEYING
Specific Application: Accounting
Specific Industry: Land Surveying
System Requirements: Unix
Source Language: Basic, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 200
Date First Installed: 1966

CONCAP COMPUTING SYSTEMS
LIBRARY
Specific Application: Library Accounting
Specific Industry: Library
System Requirements: Unix
Source Language: Basic, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 200
Date First Installed: 1966

CONCAP COMPUTING SYSTEMS
MAPPING
Specific Application: Accounting
Specific Industry: Mapping
System Requirements: Unix
Source Language: Basic, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 200
Date First Installed: 1966

CONSTRUCTION DATA CONTROL, INC.
CONSTRUCTION MANAGEMENT INFORMATION SYSTEM
Specific Application: Job Costing, Estimating
Specific Industry: Insurance
System Requirements: CP/M; CP/M 86
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995 to $1,500
Number Installed to Date: 300
Date First Installed: 1979
(See Vendor Profile Page V-29)

CONTRACT SERVICES ASSOCIATES
CBOOK
Specific Application: Single Entry Bookkeeping
Specific Industry: Accounting Offices
System Requirements: TRS-80 Models I, II, III: TRS-DOS; IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $170
Date First Installed: 1978
(See Vendor Profile Page V-30)

CONWAY COMPUTER CONSULTANTS, INC.
MULTIUSER ACCOUNTING SYSTEM
Specific Application: Accounts Receivable, Accounts Payable, Payroll, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500 to $3,500
Number Installed to Date: 85
Date First Installed: September 1980
(See Vendor Profile Page V-30)

COOPERS & LYBRAND
BOOK AND TAX DEPRECIATION
Specific Application: Tax Preparation
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Source Language: Cobol
Source-Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
(See Vendor Profile Page V-31)

COOPERS & LYBRAND
DEFERRED CHARGES
Specific Application: Deferred Charges
Specific Industry: Not Industry Sensitive

System Requirements: CP/M; MP/M
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200

COOPERS & LYBRAND
ESTATE TAX PLAN
Specific Application: Estate Tax Preparation
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750

COOPERS & LYBRAND
COMPUTED INTEREST
Specific Application: Calculates the Present Value of the Note and Amortizes the Discount or Premium
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450

COOPERS & LYBRAND
MULTI-LEVEL FINANCING CALCULATIONS MORTGAGE
Specific Application: Determines Interest Principal, Loan Balances
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $375

COOPERS & LYBRAND
NET PRESENT VALUE PROGRAM
Specific Application: Calculates Net Present Value
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250

COOPERS & LYBRAND
PRE-AUDIT SOFTWARE
Specific Application: Trial Balance Worksheet, Adjusting Journal Entries, Fluctuation and Ratio Analysis and Financial Statements
System Requirements: CP/M; MP/M
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500

COOPERS & LYBRAND
PROFESSIONAL TAX PLAN
Specific Application: Tax Planning for Professionals
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350

COOPERS & LYBRAND
TAX TRACKING
Specific Application: Tax Preparation Information
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200

CORE, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110; IBM 5120, IBM Datamaster; IBM PC
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,000
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-31)

CORE, INC.
GENERAL ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110; IBM 5120, IBM System/23
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 30
Date First Installed: 1980

CORE, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110; IBM 5120, IBM Datamaster; IBM PC
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,000
Number Installed to Date: 200
Date First Installed: September 1978

CORE, INC.
SALES ANALYSIS
Specific Application: Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110; IBM 5120, IBM Datamaster; IBM PC
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,000
Number Installed to Date: 200
Date First Installed: September 1978

CORSTAR BUSINESS COMPUTING
DIBS 11
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: Includes Accounts Payable, Accounts Receivable, Payroll, General Ledger and Order Entry With Inventory
Specific Industry: Not Industry Sensitive, Wholesale/Distribution
System Requirements: DEC PDP-11: RSTS/E, DEC PDP-11/23, PDP-11/24 CTS-300
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 7
Date First Installed: 1982
(See Vendor Profile Page V-31)

COUNTRYSIDE DATA, INC.
AG - FINANCE
Specific Application: Cash Requirement Accounting With Analysis
System Requirements: Apple 2+: CP/M, IBM PC: CP/M; DEC Rainbow: CP/M
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 800
Date First Installed: June 1981
(See Vendor Profile Page V-31)

COUNTRYSIDE DATA, INC.
AG - MARKETS
Specific Application: Crop Charting
System Requirements: Apple II+: CP/M, IBM PC: CP/M; DEC Rainbow: CP/M
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350
Date First Installed: March 1982

COUNTRYSIDE DATA, INC.
AG - PAYROLL
Specific Application: Payroll
System Requirements: Apple II+: CP/M, IBM PC: CP/M; DEC Rainbow: CP/M
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350
Date First Installed: January 1983

COUNTRYSIDE DATA, INC.
AG - PLANNER
Specific Application: Budgeting
System Requirements: Apple II+: CP/M; IBM PC: CP/M; DEC Rainbow: CP/M
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Date First Installed: December 1981

CPAIDS
CORPORATE 1120-CTP
Specific Application: Tax Preparation
Specific Industry: Accounting
System Requirements: IBM PC: PC-DOS, CP/M 80, Vector Graphics: MP/M 80, MS-DOS, Apple II
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 200
Date First Installed: December 1981
(See Vendor Profile Page V-31)

CPAIDS
GENERAL LEDGER II
Additional Product Classification: Payroll/Personnel
Specific Application: Client Write-Up Payroll
System Requirements: IBM-PC: PC-DOS, Vector Graphics, CP/M 80
Memory Required: 48.0K bytes
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 900
Date First Installed: January 1979

CPAIDS
MASTER TAX PROGRAM-MTP
Specific Application: Tax Preparation
System Requirements: IBM PC: PC-DOS, TRS 80, Victor 9000
Memory Required: 48.0K bytes
Source Language: Mbasic, Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,695 to $1,995
Number Installed to Date: 1,000
Date First Installed: January 1978

CPAIDS
TAXPLANNER-TP
Specific Application: Tax Planner
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Vector Graphics, CP/M 80
Memory Required: 48.0K bytes
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 150
Date First Installed: September 1982

CREATIVE SOFTWARE SYSTEMS
ADVERTISING AGENCY ACCOUNTING
Specific Application: Billing, Accounting With Media Schedule
Specific Industry: Advertising
System Requirements: Micro V: Star-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,500
Number Installed to Date: 2
Date First Installed: February 1981
(See Vendor Profile Page V-32)

CREEKBILL SYSTEMS, LTD.
THE CREDITMINDER
Specific Application: Credit Control
Specific Industry: Wholesale/Distribution, Retail
System Requirements: TRS-DOS
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200
Date First Installed: March 1983
(See Vendor Profile Page V-32)

CTI LTD., INC.
ACTION/REPORT WRITER
Specific Application: Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPF
Memory Required: 512.0K bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-32)

C/U BUSINESS COMPUTERS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
(See Vendor Profile Page V-33)

C/U BUSINESS COMPUTERS
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000

C/U BUSINESS COMPUTERS
CLIENT TIMEKEEPING PROGRAM
Specific Application: Timekeeping for Professionals
Specific Industry: Medical, Legal
System Requirements: Alpha Micro: Amos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450

C/U BUSINESS COMPUTERS
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000

CUSTOM COMPUTER SPECIALISTS, INC.
SALES ORDER ENTRY
Additional Product Classification: Manufacturing
Specific Application: Sales Order Entry
Specific Industry: Manufacturing
System Requirements: Cromemco: Unix; TI Professional: MS-DOS; DEC Rainbow: CP/M 86/80
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-33)

CUSTOM COMPUTER SYSTEMS, INC.
JOB COST
Specific Application: Job Cost
Specific Industry: Wholesale/Distribution, Retail
System Requirements: Alpha Micro: Amos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Date First Installed: 1980

CYBERIA, INC.
BUSINESS MANAGER INVESTMENT ANALYSIS
Specific Application: Investment Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64: DOS 2.0; Epson HX210
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30
Date First Installed: November 1983
(See Vendor Profile Page V-34)

CYBERIA, INC.
BUSINESS MANAGER /BUSINESS STATISTICS
Specific Application: Business Statistics
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64: DOS 2.0; Epson HX 20
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30
Date First Installed: November 1983

CYBERIA, INC.
BUSINESS MANAGER-LOAN ANALYSIS VOLUME 2
Specific Application: Loan Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64: DOS 2.0; Epson HX20
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30
Date First Installed: November 1983

CYBERIA, INC.
FARM MANAGER VOLUME 1 GENERAL BUSINESS
Additional Product Classification: Farm Manager
Specific Application: General Business Loan Analysis
Specific Industry: Agriculture
System Requirements: Commodore 64: DOS 2.0
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30
Date First Installed: March 1983

CYBERNETICS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86, MS-DOS, Unix
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1981
(See Vendor Profile Page V-34)

CYBERNETICS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MS-DOS; Unix; RM-COS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1981

CYBERNETICS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MS-DOS; Unix; RM-COS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: September 1981

CYBERNETICS RESOURCE CORP.
CRCT-CYBERNETICS
ACCOUNTING
Specific Application: Client Write-Up, Time and Billing, Client History, Office Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,495
Number Installed to Date: 6
Date First Installed: March 1983
(See Vendor Profile Page V-34)

CYBERNETICS RESOURCE CORP.
PC CTLAW
Specific Application: Time and Accounting, Calendar, Docketing, and Office Management
Specific Industry: Legal
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,495
Number Installed to Date: 24
Date First Installed: January 1983

DAIS, INC.
DAIS ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Vector Graphics: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 25
Date First Installed: 1981
(See Vendor Profile Page V-34)

DAIS, INC.
DAIS ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Vector Graphics: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 25
Date First Installed: 1981

DAIS, INC.
DAIS GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Vector Graphics: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 25
Date First Installed: 1981

DALCOM INTERNATIONAL, INC.
ALPHA CLUB MANAGEMENT SYSTEM
Specific Application: Membership Bills, Inventory Control, Accounting
System Requirements: Alpha Micro 1000, 1042: Amos; Omron 8000 Series
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $3,000
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-34)

DAMAS [DATA MANAGEMENT SYSTEMS], INC.
FIRE MANAGEMENT SYSTEM
Specific Application: Management of Finances, Accounting Alarm Dispatch and Inspection
System Requirements: Point Four: Iris
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1982
(See Vendor Profile Page V-34)

DATACOUNT, INC.
GRAPHIC GENERAL LEDGER
Specific Application: General Ledger Reports

Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $299
Number Installed to Date: 300
Date First Installed: June 1982
(See Vendor Profile Page V-36)

DATA DEVELOPMENT, INC.
MBSI ACCOUNTING PACKAGE
Specific Application: Accounts Payable, Accounts Receivable, Payroll, Order Entry, Inventory Control
Specific Industry: Wholesale/Distribution
System Requirements: North Star Advantage, Horizon; CP/M, Unix
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $3,000
Date First Installed: 1980
(See Vendor Profile Page V-36)

DATA DEVELOPMENT, INC.
NORTHSTAR ACCPAC ACCOUNTING SYSTEM
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, Order Entry
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: North Star Advantage, Horizon; DOS
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: $2,500
Purchase Terms: Purchase (license)

DATA FINANCIAL SYSTEMS, INC.
FISCAL V
Specific Application: General Accounting Package
Specific Industry: Not Industry Sensitive
System Requirements: TeleVideo; CP/M; Point Four: iris
Memory Required: 64.0K bytes
Source Language: Adapt
Purchase Terms: Purchase (license)
Date First Installed: 1980
(See Vendor Profile Page V-36)

DATA - LINK SYSTEMS, INC.
DATA WELL
Specific Application: Production, Accounting
Specific Industry: Oil and Gas
System Requirements: Olivetti; Microtech
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 2
Date First Installed: 1983
(See Vendor Profile Page V-36)

DATA MANAGEMENT, INC.
CLIENT WRITE-UP
Specific Application: General Ledger
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,750
Date First Installed: 1980
(See Vendor Profile Page V-37)

DATAHOST, INC.
REAL ESTATE INVESTMENT PROGRAM
Specific Application: Forecasts Expenses and Income for Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE; Apple II+; Apple-DOS; IBM PC; PC-DOS
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $130
Date First Installed: 1981
(See Vendor Profile Page V-37)

DATA PROCESSING CONSULTANTS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM Datamaster 23; IBM 5710, IBM 5720
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,500
Date First Installed: 1980
(See Vendor Profile Page V-37)

DATA PROCESSING CONSULTANTS
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110; IBM 5120; IBM Datamaster 23
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,500
Date First Installed: 1980

DATA PROCESSING CONSULTANTS
JOB COST (CONTRACTOR)
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110; IBM 5120; IBM Datamaster 23
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,500
Date First Installed: 1980

DATA PROCESSING CONSULTANTS
ORDER ENTRY INVOICING
Specific Application: Order Entry Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110; IBM 5120; IBM Datamaster 23
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available:
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500
Date First Installed: 1980

DATA PROCESSING CONSULTANTS
PARTS INVENTORY BILLING AND ACCOUNTS RECEIVABLE
Specific Application: Inventory Billing and Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110; IBM 5120; IBM Datamaster 23
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $5,500
Date First Installed: 1980

DATA PROCESSING CONSULTANTS
PHARMACY
Specific Application: General Accounting
Specific Industry: Medical, Pharmacy
System Requirements: IBM 5110; IBM 5120; IBM Datamaster 23
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $6,000
Date First Installed: 1980

DATA PROCESSING CONSULTANTS
TERMITE/PEST CONTROL BILLING AND ROUTE CONTROL
Specific Application: Control Billing and Route Control
Specific Industry: Termite and Pest Control
System Requirements: IBM 5110; IBM 5120; IBM Datamaster 23
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,800
Date First Installed: 1980

DATA PROCESSING CONSULTING
PROPERTY AND CASUALTY INSURANCE AGENCY SYSTEM
Additional Product Classification: Marketing
Specific Application: Accounting, Marketing and Word Processing for Insurance Agents
Specific Industry: Insurance
System Requirements: Alpha Micro; Amos
Memory Required: 128.0K bytes
Source Language: Alpha Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 75
Date First Installed: 1978

DATA PROCESSING OF SELMA, INC.
AIR CHARTER SERVICE SYSTEM
Specific Application: Invoices and Billing, Flight and Load Manifest Report, Load and Balance to Satisfy FAA Requirements
Specific Industry: Air Charter Service
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $695
Number Installed to Date: 1
Date First Installed: November 1982
(See Vendor Profile Page V-36)

DATA PROCESSING SERVICES, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Source Language: RPG-III, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $3,500
Date First Installed: 1978
(See Vendor Profile Page V-36)

DATA PROCESSING SERVICES, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Source Language: RPG-III, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $3,000
Date First Installed: 1978

DATA PROCESSING SERVICES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Source Language: RPG-III, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $3,500
Date First Installed: 1978

DATA PRODUCTS MAINTENANCE CORP.
ACCOUNTS PAYABLE
Specific Application: Accounting Package With Aging and Check Writing
Specific Industry: Not Industry Sensitive
System Requirements: Ohio Scientific; OS 650
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $500
Number Installed to Date: 20
Date First Installed: September 1981
(See Vendor Profile Page V-36)

DATA PRODUCTS MAINTENANCE CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounting Package Aging and Statements

Specific Industry: Not Industry Sensitive
System Requirements: Ohio Scientific: OS 650
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $500
Number Installed to Date: 20
Date First Installed: 1981

DATA PRODUCTS MAINTENANCE CORP.
CASH DISPERSEMENT
Specific Application: Accounting Package With Check Writing
Specific Industry: Not Industry Sensitive
System Requirements: Ohio Scientific: OS 650
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $500
Number Installed to Date: 20
Date First Installed: 1981

DATA PRODUCTS MAINTENANCE CORP.
GENERAL LEDGER
Specific Application: Accounting, Balance Sheets, Profit and Loss
Specific Industry: Not Industry Sensitive
System Requirements: Ohio Scientific: OS 650
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $500
Number Installed to Date: 20
Date First Installed: 1981

DATA PRODUCTS MAINTENANCE CORP.
INVOICING
Specific Application: Reoccurring and Point of Sale
System Requirements: Ohio Scientific: OS 650
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $500
Number Installed to Date: 20
Date First Installed: 1981

DATA PROFESSIONAL, INC.
INSURANCE AGENCY MANAGEMENT SYSTEM
Specific Application: Accounts Receivable, Accounts Current, General Ledger, Direct Billing
Specific Industry: Insurance
System Requirements: IBM System/23: DOS; DG CS Series
Memory Required: 64.0K bytes
Source Language: RPG, Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000 to $20,000
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-38)

DATA SERVICE CENTER
CHURCH MEMBERSHIP
Specific Application: Church Membership Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Televideo: CP/M; Wang
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 2
Date First Installed: January 1983
(See Vendor Profile Page V-38)

DBIS (DESIGN AND BUILDERS OF INFORMATION SYSTEMS)
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Ohio Scientific
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 58
Date First Installed: 1979
(See Vendor Profile Page V-40)

DBIS (DESIGN AND BUILDERS OF INFORMATION SYSTEMS)
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Ohio Scientific
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $600
Number Installed to Date: 58
Date First Installed: 1979

DBIS (DESIGN AND BUILDERS OF INFORMATION SYSTEMS)
CABLE TV SYSTEM
Specific Application: Cable TV
Specific Industry: Cable TV
System Requirements: Ohio Scientific
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Date First Installed: 1981

D. B. SOFTWARE CO.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/III, DOS/Plus; TRS-80/4: L-DOS; IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: December 1978
(See Vendor Profile Page V-40)

D. B. SOFTWARE CO.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; TRS-80/III: DOS/Plus; TRS-80/4: L-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: December 1978

D. B. SOFTWARE CO.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; TRS-80/III, DOS-Plus; TRS-80/4: L-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: November 1978

D. B. SOFTWARE CO.
JOB COSTING
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; TRS-80/III: DOS/Plus; TRS-80/4: L-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Date First Installed: March 1981

D. B. SOFTWARE CO.
JOB COSTING ACCOUNTS PAYABLE
Specific Application: Job Costing Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; TRS-80/III: DOS/Plus; TRS-80/4: L-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Date First Installed: March 1981

D. B. SOFTWARE CO.
JOB COSTING PAYROLL
Additional Product Classification: Payroll/Personnel
Specific Application: Job Costing Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; R-S TRS-80/III: DOS/Plus; TRS-80/4: L-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250

D. B. SOFTWARE CO.
JOB COSTING ACCOUNTS RECEIVABLE
Specific Application: Job Costing Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; R-S TRS-80/III: DOS/Plus; TRS-80/4: L-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Date First Installed: April 1983

D. B. SOFTWARE CO.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/III: DOS/Plus; TRS-80/4: L-DOS; IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100

DEFINITIVE SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: UCSD-P; IBM PC-XT; Apple III; TI Professional
Source Language: UCSD-P
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600
(See Vendor Profile Page V-40)

DEFINITIVE SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
System Requirements: IBM PC: UCSD-P; IBM PC-XT; Apple III; TI Professional
Source Language: UCSD-P
Purchase Terms: Purchase (license)
Price: $1,200
Date First Installed: January 1982

DEFINITIVE SYSTEMS, INC.
SALES ORDER PROCESSING
Specific Application: Order Processing
Specific Industry: Retail
System Requirements: IBM PC: UCSD-P; IBM PC-XT; Apple III; TI Professional
Source Language: UCSD-P
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $723
Date First Installed: January,1982

DELOITTE HASKINS & SELLS
PLUSPLAN
Specific Application: Financial Modeling and Consolidations
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: January 1983
(See Vendor Profile Page V-40)

DELTA COMPUTER SYSTEMS, INC.
TRUCK BROKER ACCOUNTING
Specific Application: Billing

Equipment History, State and Federal Reporting
Specific Industry: Trucking
System Requirements: Cado: Kadol
Memory Required: 48.0K bytes
Source Language: Kadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,500
Number Installed to Date: 1
Date First Installed: June 1983

DEMICHELE SYSTEMS, INC.
STORE FRONT ENGINEERING AND ESTIMATING SYSTEM
Additional Product Classification: Manufacturing
Specific Application: Store Front Estimating
Specific Industry: Manufacturing, Engineering
System Requirements: IBM PC: PC-DOS, Cromemco: Cdos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $7,000 to $16,500
Number Installed to Date: 3
Date First Installed: 1982
(See Vendor Profile Page V-41)

DESIGN SYSTEMS, INC.
MICS 5.5
Additional Product Classification: Inventory
Specific Application: Inventory, Order Entry, Accounts Receivable
Specific Industry: Wholesale/Distribution
System Requirements: Altos: Oasis; ISC: Oasis; Onyx: Oasis
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 4
Date First Installed: April 1981

DIGITAL COLOR CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Cbasic, C, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $60
Number Installed to Date: 300
Date First Installed: 1979
(See Vendor Profile Page V-42)

DIGITAL COLOR CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Cbasic, C, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $60
Number Installed to Date: 300
Date First Installed: 1979

DIGITAL COLOR CORP.
CAD
Specific Application: Capital Assets and Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Cbasic, C, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $140
Number Installed to Date: 25
Date First Installed: 1982

DIGITAL COLOR CORP.
FINANCIAL ANALYSIS
Specific Application: Analysis of Profit and Loss
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Cbasic, C, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 150
Date First Installed: 1981

DIGITAL COLOR CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Cbasic, C, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $60
Number Installed to Date: 300
Date First Installed: 1979

DIGITAL COLOR CORP.
IPA
Additional Product Classification: Manufacturing
Specific Application: Inventory, Purchasing and Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Cbasic, C, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $60
Number Installed to Date: 10
Date First Installed: 1982

DIGITAL COLOR CORP.
NURSERY MANAGEMENT
Specific Application: Time for Plant Maturity, Genealogy, General Accounting
Specific Industry: Plant Nurseries
System Requirements: CP/M
Source Language: Cbasic, C, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 15
Date First Installed: 1982

DIGITAL COLOR CORP.
SED
Specific Application: Screen Editor
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Cbasic, C, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $95
Number Installed to Date: 200
Date First Installed: 1981

DIGITAL COLOR CORP.
STOCK
Specific Application: Stockmarket Portfolio Management
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Cbasic, C, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $120
Number Installed to Date: 25
Date First Installed: 1982

DIGITAN SYSTEMS, INC.
DIGITAN TUITION PACKAGE
Specific Application: Student Billing Accounts Receivable, Open Item and Balance Forward
Specific Industry: Education
System Requirements: Digitan Systems DE30: CP/M; Digitan Systems DE40
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: January 1982
(See Vendor Profile Page V-42)

DILITHIUM PRESS
32 VISICALC WORKSHEETS
Specific Application: Additional Spreadsheets to Use With Visicalc
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE: Apple DOS, IBM PC: PC-DOS
Source Language: Pascal
Source Code Available: $29
Purchase Terms: Purchase (license)
Price: $35
Number Installed to Date: 2,500
Date First Installed: February 1983
(See Vendor Profile Page V-42)

DISCOUNT SOFTWARE GROUP
ENHANCED OSBORNE
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic 2
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $299
(See Vendor Profile Page V-43)

DIVERSIFIED DATA SERVICES
RESORT RENTALS
Specific Application: Rental Management for Condo Owners, Monthly Billing, Statements to Owners With Monthly Checks
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/32, IBM System/34
Memory Required: 16.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,750
(See Vendor Profile Page V-43)

DURANGO SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Durango F 85: DX85M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $425
Number Installed to Date: 1,000
Date First Installed: 1979
(See Vendor Profile Page V-44)

DURANGO SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Durango F 85: DX85M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $425
Number Installed to Date: 1,000
Date First Installed: 1979

EAGLE COMPUTER SYSTEMS, INC.
ACCESSOR PROPERTY ACCOUNTING SYSTEM
Specific Industry: Government
System Requirements: Wang VS 2200
Memory Required: 24.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $9,000
Number Installed to Date: 4
Date First Installed: March 1980
(See Vendor Profile Page V-45)

EAGLE COMPUTER SYSTEMS, INC.
TAX ACCOUNTING SYSTEM
Specific Application: Tax Preparation
Specific Industry: Government
System Requirements: Wang VS 2200
Memory Required: 24.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $9,000
Date First Installed: March 1980

EAGLE SOFTWARE PUBLISHING, INC.
TAX DECISIONS
Specific Application: Tax Planning
System Requirements: IBM; DEC Rainbow 100; DEC Decmate 22
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $229
Date First Installed: February 1983
(See Vendor Profile Page V-45)

EASTERN COMPUTER SERVICES, INC.
DISTRIBUTION SYSTEM
Additional Product Classification: Distribution

Specific Application: Inventory Control, Inventory Analysis, Sales Control, Accounting, Billing
Specific Industry: Wholesale/Distribution
System Requirements: Seiko: Boss; Basic Four: Boss; DEC PDP-11: RSTS/E
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 1,500
Date First Installed: 1979
(See Vendor Profile Page V-45)

EASTERN COMPUTER SERVICES, INC.
GENERAL ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: Inventory, Purchase Order, Sales Order Processing, General Ledger Ledger, Accounts Payable, Accounts Receivable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Seiko: Boss; Basic Four: Boss
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 1,500
Date First Installed: 1975
(See Vendor Profile Page V-46)

E. F. HASKELL & ASSOCIATES, INC.
ASSOCIATION BILLING
Specific Application: Membership Billing, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $550 to $800
(See Vendor Profile Page V-45)

E. F. HASKELL & ASSOCIATES, INC.
AUDIT SYSTEM
Specific Application: Auditing
Specific Industry: Not Industry Sensitive, Accountants
System Requirements: CP/M
Memory Required: 56.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Lease
Price: $188
Date First Installed: August 1983

E. F. HASKELL & ASSOCIATES, INC.
AUDIT TM
Specific Application: Micro Computer Tools for Auditors
Specific Industry: Auditing
System Requirements: CP/M
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $187

E. F. HASKELL & ASSOCIATES, INC.
FIXED ASSET ACCOUNTING
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Fixed Asset Accounting
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 56.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Lease
Price: $600
Number Installed to Date: 400
Date First Installed: 1979

E. F. HASKELL & ASSOCIATES, INC.
FIXED ASSET ACCOUNTING SYSTEM
Specific Application: Depreciation Planning
Specific Industry: Not Industry Sensitive
System Requirements: North Star: CP/M
Memory Required: 48.0K bytes
Source Language: North Star Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $550 to $900

E. F. HASKELL & ASSOCIATES, INC.
JOB COST - CROP COST
Specific Application: Cost Accounting, Vendor Payment Accounts Receivable, Cost Estimation
Specific Industry: Construction, Agribusiness
System Requirements: CP/M; Mbasic
Memory Required: 56.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,050

E. F. HASKELL & ASSOCIATES, INC.
TAR II
Specific Application: Time and Billing
Specific Industry: Not Industry Sensitive, Accountants
System Requirements: CP/M
Memory Required: 56.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Lease
Price: $950
Date First Installed: 1983

E. F. HASKELL & ASSOCIATES, INC.
TKR III
Specific Application: Professional Time and Billing System
Specific Industry: Accounting
System Requirements: Northstar: CP/M
Memory Required: 56.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $1,300
Number Installed to Date: 500
Date First Installed: 1900

E. F. HASKELL & ASSOCIATES, INC.
TRKTM
Specific Application: Time Management, Accounts Receivable, Billing
System Requirements: CP/M
Memory Required: 56.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $950
Date First Installed: 1978

E. F. HASKELL & ASSOCIATES, INC.
UTILBILL
Additional Product Classification: Manufacturing
Specific Application: Public Utility Billing Receivable System
Specific Industry: Government
System Requirements: CP/M
Memory Required: 32.0K bytes
Source Language: Northstar Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $575 to $925

ELECTRONIC INFORMATION SYSTEM
EIS GENERAL ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Inventory, Payroll Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Ohio Scientific: OS 65U
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: 1978
(See Vendor Profile Page V-46)

ELECTRONIC INFORMATION SYSTEM
EIS ACCOUNTING
Specific Application: Accounts Payable, Accounts Receivable, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Ohio Scientific: OS 65U
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,200
Date First Installed: 1978

ELECTRONIC INFORMATION SYSTEM
EIS JOB COSTING
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: Ohio Scientific: OS 65U
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: 1978

ELECTRONIC INFORMATION SYSTEM
EIS ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: Ohio Scientific: OS 65U
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: 1978

ENERGY DATA SYSTEMS
ADAM (AUTOMATED DATA AND ACCOUNTING MANAGEMENT)
Additional Product Classification: Payroll/Personnel, WP/Text Editing
Specific Application: Back Office Accounting Functions, Sales and Management Reporting and Airline Reservations System Interface
System Requirements: UCSD-P
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 35
Date First Installed: 1980
(See Vendor Profile Page V-46)

ENERGY DATA SYSTEMS
GENERAL ACCOUNTING PACKAGES (GAPS)
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Payroll, Order Processing, Inventory Control
Specific Industry: Manufacturing
System Requirements: UCSD-P
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Number Installed to Date: 2
Date First Installed: 1983

EPIC COMPUTER PRODUCTS, INC.
SUPERVISE
Specific Application: WP, Data Processing, Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Episode: CP/M
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 2,000
Date First Installed: 1979
(See Vendor Profile Page V-47)

ETRESBY COMPUTER CO., INC.
ETRESBY PHARMACY SYSTEM
Specific Application: Prescription Labels, Billing, Accounting for Retail Pharmacies
Specific Industry: Medical, Pharmacy
System Requirements: Altos: CP/M; Northstar Advantage
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $5,000
Number Installed to Date: 24
Date First Installed: October 1982
(See Vendor Profile Page V-47)

EXECUTEC CORP.
FIXED ASSET ACCOUNTING
Additional Product Classification: Report Generator
Specific Application: Fixed Asset Accounting, Accounting Controls, Report Generation
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS, Wang PC; Victor 9000
Source Code Available: No
Purchase Terms: Purchase (license)

Price: $1,500
(See Vendor Profile Page V-47)

EXECUTEC CORP.
SAFE DEPOSIT ACCOUNTING
Specific Application: Accounting and Record Keeping for Safe Deposit Boxes
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS; Wang PC; Victor 9000
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500

EXECUTIVE DATA SYSTEMS, INC.
GENERAL LEDGER
Specific Application: Cost and Accounting System for Project-Oriented Organization
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M; MS-DOS; PC-DOS
Memory Required: 48.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 100
Date First Installed: 1980
(See Vendor Profile Page V-48)

EXECUTIVE DATA SYSTEMS, INC.
GENERAL LEDGER FOR GOVERNMENT
Specific Application: Accounting for Government Contract Operations
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M, MS-DOS, PC-DOS
Memory Required: 48.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 100
Date First Installed: 1980

EXECUTIVE DATA SYSTEMS, INC.
LEDGERMASTER
Specific Application: Client Write-Up System
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M; MS-DOS; PC-DOS
Memory Required: 48.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $950
Number Installed to Date: 100
Date First Installed: 1980

EXECUTIVE DATA SYSTEMS, INC.
PROSPECTOR
Additional Product Classification: Data/File Management
Specific Application: System to Help Salesmen Keep Track of Clients
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M; MS-DOS, PC-DOS
Memory Required: 48.0K bytes
Source Language: Cobol
Source Code Available: No
Price: $300
Number Installed to Date: 100
Date First Installed: 1980

EXECUTIVE OFFICE SYSTEMS
WATER UTILITY BILLING
Specific Application: Billing for Water Utilities
System Requirements: Oasis
Memory Required: 64.0K bytes
Source Language: Oasis Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $7,500
Number Installed to Date: 3
Date First Installed: September 1982
(See Vendor Profile Page V-48)

EXECUWARE
ECONOMIC ORDER QUANTITY (EOQ)
Specific Application: Determine Economic Order/Quantity
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, Apple II+; DOS, IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $93
Number Installed to Date: 150
Date First Installed: 1981
(See Vendor Profile Page V-48)

FALCOM SOFTWARE SYSTEMS
CPA CLIENT WRITE-UP
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: CB-80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,750
Number Installed to Date: 15
(See Vendor Profile Page V-48)

FALCOM SOFTWARE SYSTEMS
FINANCIAL PACKAGE
Specific Application: General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Memory Required: 48.0K bytes
Source Language: CB-80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 6
Date First Installed: October 1982

FALCOM SOFTWARE SYSTEMS
SALES LEADS MANAGEMENT
Specific Application: Develops and Tracks History of Potential Clients
Specific Industry: Wholesale/Distribution, Retail
System Requirements: MP/M; CP/M
Memory Required: 48.0K bytes
Source Language: CB-80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Date First Installed: January 1983

FARM BUSINESS SERVICES, INC.
TRANSACTION
Specific Application: Farm Accounting, Enterprise Analyses Integration with Production Modules, Financial
Specific Industry: Farm
System Requirements: IBM: MS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595 to $795
Number Installed to Date: 100
Date First Installed: December 1981
(See Vendor Profile Page V-48)

FARMPLAN COMPUTER SYSTEMS, INC.
2000 BOOKKEEPER
Specific Application: Double/Entry Accounting Cash or Accrual
Specific Industry: Small Business, Agriculture
System Requirements: Apple II+, Apple IIE: Apple-DOS; TI Professional: MS-DOS
Memory Required: 48.0K bytes
Source Language: Applesoft Basic, CP/M Basic
Source Code Available: No
Price: $395
Number Installed to Date: 1,200
Date First Installed: February 1981
(See Vendor Profile Page V-48)

FARMPLAN COMPUTER SYSTEMS, INC.
2200 LEAST COST RATIONING
Specific Application: Least Cost Feed Rationing
Specific Industry: Agricultural
System Requirements: Apple II+, Apple IIE. Apple-DOS; TI Professional: MS-DOS
Memory Required: 48.0K bytes
Source Language: Applesoft Basic, CP/M Basic
Source Code Available: No.
Price: $225
Number Installed to Date: 1,200
Date First Installed: February 1981

FARMPLAN COMPUTER SYSTEMS, INC.
3000 FINANCIAL PACKAGE (GENERAL LEDGER)
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable; Accounts Receivable, Inventory
Specific Industry: Education, Small Business
System Requirements: Apple IE, Apple II+: Apple-DOS; TI Professional: MS-DOS
Memory Required: 48.0K bytes
Source Language: Applesoft Basic, CP/M Basic
Source Code Available: No
Price: $1,200
Number Installed to Date: 1,200
Date First Installed: February 1981

FIFTH SYSTEMS & SOFTWARE, INC.
ORDER ENTRY SYSTEM FOR MANUFACTURERS
Additional Product Classification: Manufacturing
Specific Application: Order Entry, Accounts Receivable, Inventory Control, MRP, Purchase Order Management
Specific Industry: Manufacturing
System Requirements: IBC Cadet, Midi-Cadet: Oasis; Altos: Oasis; Onyx: Oasis
Memory Required: 256.0K bytes
Source Language: Oasis Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500 to $100
Number Installed to Date: 50
Date First Installed: 1979
(See Vendor Profile Page V-48)

FINANCIAL DECISION SYSTEMS, INC.
CHECKTAX
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Timesharing
(See Vendor Profile Page V-48)

FINANCIAL DECISION SYSTEMS, INC.
TAX CALENDAR
Specific Application: Tax Calendar for Monitoring Schedule Payments, Compliance Accounting and Taxes
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Timesharing
Price: $5,000 to $10,000
Date First Installed: 1981

FISHER BUSINESS SYSTEMS, INC.
CPA CLIENT WRITE-UP SYSTEM
Specific Application: Creation of Financial Statements and Other Reports
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, IBM PC-XT PC-DOS, TI Professional: MS-DOS; Zenith Z-100: Zdos
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 50
Date First Installed: February 1981
(See Vendor Profile Page V-49)

FISHER BUSINESS SYSTEMS, INC.
DENTAL PRACTICE MANAGEMENT
Additional Product Classification: Payroll/Personnel, Insurance
Specific Application: Billing, Insurance Form Preperation, General Ledger, Accounts Payable, Payroll, Patient Scheduling, Record Keeping and Practice Analysis
System Requirements: IBM PC, IBM PC-XT: PC-DOS, TI Professional: MS-DOS; Zenith Z-100: Zdos
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)

Price: $2,500
Number Installed to Date: 15
Date First Installed: February 1982

FISHER BUSINESS SYSTEMS, INC.
DISTRIBUTION MANAGEMENT SYSTEM
Additional Product Classification: Distribution
Specific Application: Sales and Purchase Order Processing, Inventory, Accounts Receivable, Sales Commission Tracking,
Specific Industry: Wholesale/Distribution
System Requirements: IBM PC, IBM PC-XT: PC-DOS; TI Professional: MS-DOS; Zenith Z-100: Zdos
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 40
Date First Installed: October 1980

FISHER BUSINESS SYSTEMS, INC.
INTERACTIVE ACCOUNTS PAYABLE SYSTEM
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, IBM PC-XT: PC-DOS; TI Professional: MS-DOS; Zenith Z-100: Zdos
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 65
Date First Installed: January 1981

FISHER BUSINESS SYSTEMS, INC.
INTERACTIVE ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, IBM PC-XT: PC-DOS; TI Professional: MS-DOS; Zenith Z-100: Zdos
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 50
Date First Installed: January 1982

FISHER BUSINESS SYSTEMS, INC.
INTERACTIVE GENERAL LEDGER SYSTEM
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC and IBM PC-XT: PC-DOS; TI Professional: MS-DOS; Zenith Z-100: Zdos
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 150
Date First Installed: June 1980

FISHER BUSINESS SYSTEMS, INC.
ORTHODONTIC PRACTICE MANAGEMENT SYSTEM
Additional Product Classification: Payroll/Personnel, Insurance
Specific Application: Billing, Accounts Receivable, Accounts Payable, General Ledger, Payroll, Record Keeping, and Patient Scheduling
System Requirements: IBM PC, IBM PC-XT: PC-DOS; TI Professional: MS-DOS; Zenith Z-100: Zdos
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 15
Date First Installed: June 1983

FLORIDA DATA PROCESSING, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: : CP/M
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 50
Date First Installed: June 1981
(See Vendor Profile Page V-49)

FLORIDA DATA PROCESSING, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 50
Date First Installed: June 1981

FLORIDA DATA PROCESSING, INC.
BILL OF MATERIALS
Specific Application: Bill of Materials
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 3
Date First Installed: June 1981

FLORIDA DATA PROCESSING, INC.
CBS-2100
Specific Application: Accounting and Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000: CP/M; Intertec: CP/M
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $9,500
Number Installed to Date: 50
Date First Installed: June 1978

FLORIDA DATA PROCESSING, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 50
Date First Installed: June 1981

FLORIDA DATA PROCESSING, INC.
INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 50
Date First Installed: June 1981

FLORIDA DATA PROCESSING, INC.
JOB COST
Specific Application: Job Cost
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 50
Date First Installed: June 1981

FLORIDA DATA PROCESSING, INC.
ORDER PROCESSING
Specific Application: Order Processing
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 15
Date First Installed: June 1981

FLORIDA DATA PROCESSING, INC.
PURCHASE ORDERING
Specific Application: Purchase Ordering
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 10
Date First Installed: June 1981

FOGLE COMPUTING CORP.
GENERAL LEDGER
Additional Product Classification: Report Generator
Specific Application: General Ledger, Accounts Payable and Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $380 to $1,200
Number Installed to Date: 20
Date First Installed: April 1982
(See Vendor Profile,Page V-49)

FRY, INC.
MUNICIPAL BILLING SYSTEM - MBS
Specific Application: Utility Billing
Specific Industry: Government
System Requirements: TRS-80, Model 12, Model 16: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,250
Number Installed to Date: 7
Date First Installed: January 1981
(See Vendor Profile Page V-50)

FUTURA SOFTWARE, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: TI
Memory Required: 32.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $149
(See Vendor Profile Page V-50)

FUTURA SOFTWARE, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
System Requirements: TI
Memory Required: 32.0K bytes
Source Language: Extended Basic,
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $149

FUTURA SOFTWARE, INC.
BILLING
Specific Application: Billing
Specific Industry: Not Industry Sensitive
System Requirements: TI
Memory Required: 32.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $149

FUTURA SOFTWARE, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: TI
Memory Required: 32.0K bytes
Source Language: Extended Basic
Source Code Available: Yes

Purchase Terms: Purchase (license)
Price: $149

FUTURA SOFTWARE, INC.
INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: TI
Memory Required: 32.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $149

GAYLORD BROS., INC.
SERIAL CONTROL SYSTEM
Specific Application: Check-In, Routing, Accounting, Claiming, Searching
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+; TRS-DOS, CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $2,500 to $5,000
(See Vendor Profile Page V-50)

[illegible]
FOOD PROCESSOR
Specific Application: General Ledger, Accounts Payable and Receivable, Billing, Inventory Control, Payroll
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 2
Date First Installed: August 1982
(See Vendor Profile Page V-50)

GENESIS COMPUTER SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Check Writer, Vouchers
Specific Industry: Nonprofit Organizations
System Requirements: Eagle: CP/M 2.2
Source Language: CB-80
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 25
Date First Installed: July 1981
(See Vendor Profile Page V-51)

GENESIS COMPUTER SYSTEMS, INC.
PURE ACCOUNTING SYSTEM
Specific Application: Single Entry Bookkeeping, Chart of Accounts, Budget
Specific Industry: Nonprofit Organizations
System Requirements: Eagle: CP/M 2.2
Source Language: CB-80
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 25
Date First Installed: July 1981

GENSIS, INC.
THE BOTTOM LINE
Additional Product Classification: Manufacturing
Specific Application: Inventory Control, Job Costing and Tracking, Productivity
Specific Industry: Manufacturing
System Requirements: Apple III: Apple DOS; Burroughs B20: Btos
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 10
Date First Installed: August 1981
(See Vendor Profile Page V-52)

GREAT PLAINS COMPUTER CO., INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: Flex, OS9, Gimix 6809: Uniflex; Southwest Technologies 6809: Uniflex; Tano 6809: Uniflex
Memory Required: 56.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 60
Date First Installed: June 1979
(See Vendor Profile Page V-52)

GREAT PLAINS COMPUTER CO., INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: Flex, OS9; Gimix 6809: Uniflex; Southwest Technologies 6809: Uniflex; Tano 6809: Uniflex
Memory Required: 56.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 140
Date First Installed: May 1979

GREAT PLAINS COMPUTER CO., INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: Flex, OS9; Gimix 6809: Uniflex; Tano 6809: Uniflex
Memory Required: 56.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 200
Date First Installed: March 1979

GROUNDSTAR SOFTWARE
FINANCIAL ANALYSIS
Additional Product Classification: Financial Modeling Languages, DSS
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: Oasis
Memory Required: 16.0K bytes
Source Language: Oasis Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 10
Date First Installed: January 1983
(See Vendor Profile Page V-52)

GROUNDSTAR SOFTWARE
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Oasis
Memory Required: 16.0K bytes
Source Language: Oasis Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 100
Date First Installed: April 1980

GROUNDSTAR SOFTWARE
WHOLESALE DISTRIBUTING AND ACCOUNTING
Specific Application: Sales, Inventory, Purchasing, General Ledger, Accounts Payable and Receivable, Payroll
Specific Industry: Wholesale/Distribution
System Requirements: Oasis
Memory Required: 16.0K bytes
Source Language: Oasis Basic
Source Code Available: $9,600
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 100
Date First Installed: April 1980

GT EVANS COMPUTER SYSTEMS, INC.
AD-TRAC
Additional Product Classification: Payroll/Personnel
Specific Application: Payroll, General Ledger, Accounts Payable and Receivable, Job Costing, Traffic Control, Media Billing
Specific Industry: Advertising
System Requirements: Wang 2200; Wang VS
Memory Required: 32.0K bytes
Source Language: Basic II, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $5 to $40
Number Installed to Date: 6
Date First Installed: March 1981
(See Vendor Profile Page V-53)

HAYDEN SOFTWARE
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Mbasic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $449
(See Vendor Profile Page V-53)

HAYDEN SOFTWARE
ACCOUNTS RECEIVABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Mbasic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 44

HAYDEN SOFTWARE
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Mbasic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $449

H & E COMPUTRONICS, INC.
BUSINESS PAC 100
Additional Product Classification: Management
Specific Application: Business Management
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS; IBM PC: PC-DOS; Apple II, IIE, II+: Apple Dos, CP/M
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 15,000
Date First Installed: 1979
(See Vendor Profile Page V-54)

H & E COMPUTRONICS, INC.
MAIL PAC II
Additional Product Classification: Mailing
Specific Application: Mailing List
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS; IBM PC: PC-DOS; Apple II, IIE, II+: Apple DOS, CP/M
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: September 1983

H & E COMPUTRONICS, INC.
MASTER PAC 100
Specific Application: Personal Finance
Specific Industry: Banking/Financial
System Requirements: TRS-80: TRS-DOS; IBM PC: PC-DOS; Apple II, IIE, II+: Apple DOS, CP/M
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 6,000
Date First Installed: 1979

H & E COMPUTRONICS, INC.
THE MARKET PAC
Specific Application: Stock Market Analysis
Specific Industry: Banking/Financial
System Requirements: TRS-80: TRS-DOS; IBM PC: PC-DOS; Apple II, IIE, II+: Apple DOS, CP/M
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 3,000
Date First Installed: December 1982

H & E COMPUTRONICS, INC.
VERSAPAYABLES
Specific Application: Accounts Payable
System Requirements: TRS-80: TRS-DOS; IBM PC: PC-DOS; Apple

II, IIE, II+. Apple DOS, CP/M
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 5,000
Date First Installed: July 1982

HENECK ASSOCIATES, INC.
ACCOUNTING FOR THE INTERIOR DESIGNER
Specific Application: Job Tracking
Specific Industry: Interior Design
System Requirements: IBM PC; PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 6
Date First Installed: June 1983
(See Vendor Profile Page V-54)

HERITAGE COMPUTING CORP.
JEWEL ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; TI Professional; MS-DOS, TRS-80
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
(See Vendor Profile Page V-54)

HERITAGE COMPUTING CORP.
JEWEL CLIENT WRITEUP
Specific Application: General Ledger, Modules, Fixed Assets, Payroll and Spreadsheet Interface
System Requirements: IBM PC; TI Professional; MS-DOS, TRS-80
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,550

HERITAGE COMPUTING CORP.
JEWEL FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; TI Professional, TRS-80
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500

HERITAGE COMPUTING CORP.
JEWEL GENERAL LEDGER FLEXIBLE BUDGETING
Specific Application: Flexible Budgeting Module
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; TI Professional; MS-DOS, TRS-80
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200

HERITAGE COMPUTING CORP.
JEWEL GENERAL LEDGER HISTORY
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; TI Professional: MS-DOS, TRS-80
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200

HERITAGE COMPUTING CORP.
JEWEL JOB COSTING
Additional Product Classification: Payroll/Personnel
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; TI Professional, TRS-80
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000

HERITAGE COMPUTING CORP.
JEWEL STANDARD GENERAL LEDGER
Specific Application: Standard General Ledger Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; TI Professional: MS-DOS, TRS-80
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750

HERITAGE COMPUTING CORP.
JEWEL G/L - DEPARTMENTALIZATION
Specific Application: Departmentalization Module
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; TI Professional: MS-DOS; TRS-80: TRSDOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200

HERITAGE COMPUTING CORP.
JEWEL A/R BILLING
Specific Application: Accounts Receivable, Billing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: MS-DOS, TI Professional: TRS-80: TRSDOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400

HOLLAND AUTOMATION U.S.A.
HAI-LINE ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Eagle II, III, IV: CP/M; Apple II, III
Memory Required: 64.0K bytes
Source Language: HAI Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 5,000
Date First Installed: 1977
(See Vendor Profile Page V-55)

HOLLAND AUTOMATION U.S.A.
HAI-LINE ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Eagle II, III, IV: CP/M; Apple II, III: MS-DOS
Memory Required: 64.0K bytes
Source Language: HAI Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 5,000
Date First Installed: 1977

HOLLAND AUTOMATION U.S.A.
HAI-LINE GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Eagle II, III, IV: CP/M; Apple II, III: MS-DOS
Memory Required: 64.0K bytes
Source Language: HAI Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 5,000
Date First Installed: 1977

HOLLAND AUTOMATION U.S.A.
HAI-LINE INVOICING
Specific Application: Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Eagle II, III, IV: CP/M; Apple II, III: MS-DOS
Memory Required: 64.0K bytes
Source Language: HAI Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 500
Date First Installed: 1979

HOLLAND AUTOMATION U.S.A.
HAI-LINE SALES ANALYSIS
Specific Application: Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Eagle II, III, IV: CP/M; Apple II, III. MS-DOS
Memory Required: 64.0K bytes
Source Language: HAI Basic
Source Code Available: No

HOLLAND AUTOMATION U.S.A.
HAI-LINE SALES ORDER PROCESSING
Specific Application: Sales Order Processing
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM PC: PC-DOS, Eagle II, III, IV: CP/M, Apple II, III: MS-DOS
Memory Required: 64.0K bytes
Source Language: HAI Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995
Date First Installed: 1983

HON COMPUTER SYSTEMS, INC.
ACCOUNTING
Specific Application: General Ledger, Accounts Payable and Receivable
Specific Industry: Banking/Financial
System Requirements: IBM PC; TRS-80
Source Language: Basic, Assembler
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-56)

HON COMPUTER SYSTEMS, INC.
AUTO DEALER PACKAGE
System Requirements: IBM PC; TRS-80
Source Language: Basic, Assembler
Purchase Terms: Purchase (license)

HOWARD W. SAMS & CO., INC.
FINANCIAL FACTS
Additional Product Classification: Banking
Specific Application: Banking, Real Estate, and Personal Finance Calculations
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE, II+, II: Apple DOS, IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Applesoft Basic, IBM Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $59
(See Vendor Profile Page V-56)

HOWARD W. SAMS & CO., INC.
FINANCIAL PLANNING
Additional Product Classification: Financial Modeling Languages, DSS
Specific Application: Financial Planning for Multiplan, Visicalc, and Supercalc
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE, II+: Apple DOS, IBM PC; TRS-80 Model I,III, TRS-DOS
Memory Required: 64.0K bytes
Source Language: No
Purchase Terms: Purchase (license)
Price: $69

HOWARD W. SAMS & CO., INC.
MONEY TOOL
Specific Application: Money Tracking Planning for Home or Small Businesses

Specific Industry: Not Industry Sensitive
System Requirements: Apple II+, IIE, II: Apple DOS; Franklin ACE 1000
Memory Required: 48.0K bytes
Source Language: Applesoft
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $59

IFDS (INTERNATIONAL FINANCIAL DATA SYSTEMS)
NOT-INTEGRATED PROGRAM
Specific Application: Asset Analysis, Investments, Amortization, Cash Flow
Specific Industry: Banking/Financial
System Requirements: IBM PC; Wang; Apple
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1979
(See Vendor Profile Page V-56)

INCOM SYSTEMS
GEM (GENERAL ECONOMIC MICROSYSTEM)
Specific Application: Accounting
Specific Industry: Manufacturing, Insurance
System Requirements: IBM PC: PC-DOS; CP/M
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $400
Date First Installed: 1982
(See Vendor Profile Page V-56)

INCOM SYSTEMS
PAM (PROPERTY ANALYSIS MICROSYSTEM)
Specific Application: Property Analysis
Specific Industry: Manufacturing, Insurance, Real Estate
System Requirements: IBM PC: PC-DOS; CP/M
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $600
Date First Installed: 1982

INFO-DESIGNS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable, Check Writing
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64, 8032, Super Pet
Memory Required: 32.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $80 to $395
Number Installed to Date: 15,000
Date First Installed: 1981
(See Vendor Profile Page V-57)

INFO-DESIGNS, INC.
ACCOUNT RECEIVABLE/INVOICES
Specific Application: Accounts Receivable, Invoices
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64, 8032, Super Pet
Memory Required: 32.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $80 to $395
Number Installed to Date: 15,000
Date First Installed: 1981

INFO-DESIGNS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64, 8032, Super Pet
Memory Required: 32.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $80 to $395
Number Installed to Date: 15,000
Date First Installed: 1981

INFO-DESIGNS, INC.
ORDER ENTRY POINT OF SALE
Specific Application: Order Entry Point of Sale
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64, 8032, Super Pet
Memory Required: 32.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $80 to $395
Number Installed to Date: 15,000
Date First Installed: 1981

INFORMATION AUTOMATION CORP.
APRIL
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 75
Date First Installed: August 1982
(See Vendor Profile Page V-57)

INFORMATION AUTOMATION CORP.
ARNIE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 75
Date First Installed: August 1982

INFORMATION AUTOMATION CORP.
GLENDA
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Price: $395
Number Installed to Date: 75
Date First Installed: August 1982

INFORMATION AUTOMATION CORP.
TRAVIS
Specific Application: Time and Expense Billing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 75
Date First Installed: August 1982

INFORMATION MANAGEMENT TECHNOLOGIES
QBS
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Order Entry, Inventory Control, Accounts Receivable and Payable, Purchasing, Payroll, General Ledger, Fixed Assets
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: DEC: Unix
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: Yes
Price: $600 to $4,000
Number Installed to Date: 75
Date First Installed: January 1983
(See Vendor Profile Page V-57)

INFORMATION SYSTEMS, INC.
DUE PROCESSOR
Specific Application: Legal Accounting Package
Specific Industry: Legal
System Requirements: TI Professional: MS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,400
Number Installed to Date: 40
Date First Installed: 1982
(See Vendor Profile Page V-58)

INFORMATION SYSTEMS, INC.
FUNERAL DIRECTOR'S PACKAGE
Specific Application: Accounting, Scheduling
Specific Industry: Funeral Homes
System Requirements: TI Professional: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1983

INNOSYS, INC.
MONEY MAESTRO
Additional Product Classification: Banking
Specific Application: Personal Bookkeeping Including Budgeting, Check Reconciliation, Payables and Receivables, and Check Printing
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; IBM PC: PC-DOS; Apple II: Apple DOS
Memory Required: 48.0K bytes
Source Language: Forth
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 5,000
Date First Installed: May 1981
(See Vendor Profile Page V-59)

INSOFT, INC.
INSOFT ACCOUNTING
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: Mbasic; Apple: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $365
Number Installed to Date: 700
Date First Installed: June 1981
(See Vendor Profile Page V-59)

INTER-DATA [illegible]
ACCOUNTING
Specific Application: Bookkeeping, Accounts Receivable and Payable in Spanish
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1983
(See Vendor Profile Page V-60)

INTERNATIONAL MARKETING CONSULTANTS, INC.
CLIC/EDUCATION ANALYSIS
Specific Application: Current Annual Savings Analysis
Specific Industry: Insurance
System Requirements: TRS-80/I; TRS-80/II
Source Language: Basic
Source Code Available: No
Price: $95
Number Installed to Date: 100
Date First Installed: 1978
(See Vendor Profile Page V-61)

INTERNATIONAL MICRO SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M, CP/M 86
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650
(See Vendor Profile Page V-61)

INTERNATIONAL MICRO SYSTEMS, INC.
BALANCE FORWARD ACCOUNT RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M, CP/M 86
Memory Required: 64.0K bytes
Source Language: Cbasic

Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650

INTERNATIONAL MICRO SYSTEMS, INC.
CASH RECEIPTS AND DISBURSEMENTS
Specific Application: Cash Receipts and Disbursements
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200

INTERNATIONAL MICRO SYSTEMS, INC.
DENTAL OFFICE MANAGEMENT
Specific Application: Dental Office Processing
Specific Industry: Medical, Dental
System Requirements: CP/M; MP/M; CP/M 86
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000

INTERNATIONAL MICRO SYSTEMS, INC.
FIXED ASSETS W/DEPRECIATION
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M; CP/M 86
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300

INTERNATIONAL MICRO SYSTEMS, INC.
FUND ACCOUNTING
Specific Application: Fund Accounting
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M; CP/M 86
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650

INTERNATIONAL MICRO SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 86; CP/M; MP/M
Memory Required: 128.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Price: $450

INTERNATIONAL MICRO SYSTEMS, INC.
GENERAL LEDGER II
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 86; CP/M; MP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Price: $650

INTERNATIONAL MICRO SYSTEMS, INC.
JOB ACCOUNTING
Specific Application: Job Accounting
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M; CP/M 86
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650

INTERNATIONAL MICRO SYSTEMS, INC.
OPEN ITEM ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: MP/M; CP/M; CP/M 86
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650

INTERNATIONAL MICRO SYSTEMS, INC.
WHOLESALE DISTRIBUTION SYSTEM
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Purchase Order, Inventory, Order Entry, Commissions, Sales Analysis, Back Order Management, Open Item
Specific Industry: Wholesale/Distribution, Retail
System Requirements: CP/M; MP/M; CP/M 86
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500

INTRO-LOGIC, INC.
BUSINESS SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Accounts Payable, Accounts Receivable, Payroll, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Memory Required: 48.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 12
Date First Installed: 1981
(See Vendor Profile Page V-61)

I.P. SHARP ASSOC., INC.
LESSOR LEASE EVALUATION FOR CANADIANS
Specific Application: Allows Canadian Lessors to Price Prospective Leasing Transactions
System Requirements: IBM; MVS; VSE
Source Language: APL
Purchase Terms: Purchase (license)
Number Installed to Date: 20
Date First Installed: 1981
(See Vendor Profile Page V-61)

JACK N. GOLQUITT, CPA
GENERAL LEDGER BOCS
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/4; TRS-80/I; TRS-80/II; TRS-80/III
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 75
Date First Installed: 1978
(See Vendor Profile Page V-62)

JE CHAPLIN ASSOCIATES, LTD.
MICRO BANKER DEMAND DEPOSIT ACCOUNTING
Specific Application: Investment Floors, Accounting
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS; IBM PC-XT: CP/M
Memory Required: 128.0K bytes
Source Language: Pascal, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 12
Date First Installed: 1982
(See Vendor Profile Page V-62)

JE CHAPLIN ASSOCIATES, LTD.
MICRO BANKER GENERAL LEDGER
Specific Application: Profit and Loss Statement, Balance Sheet, Subsidiary Reports
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS; IBM PC-XT: CP/M
Memory Required: 128.0K bytes
Source Language: Pascal, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 14
Date First Installed: 1982

JOSEKI COMPUTER CORP.
TIME AND EXPENSE BILLING SYSTEM (TEBS)
Specific Application: Time and Expense Billing System for Single Practice Consultants and Professionals
Specific Industry: Not Industry Sensitive
System Requirements: HP 87; HP-DOS; IBM PC; PC-DOS; HP 85; HP 86
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 350
Date First Installed: January 1982
(See Vendor Profile Page V-63)

J. P. SAWHNEY AND CO., INC.
FUND-IT VERSION 1.0
Additional Product Classification: Finance Plan
Specific Application: Education and Special Event Planning
Specific Industry: Banking/Financial, Insurance, Education, Home
System Requirements: IBM PC; PC-DOS; Osborne I, II; CP/M 2.2; Apple II+; Apple DOS 3.3
Memory Required: 48.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: June 1983
(See Vendor Profile Page V-63)

J. P. SAWHNEY AND CO., INC.
TAXMODE
Specific Application: Tax Planning After 1981
Specific Industry: Banking/Financial, Home
System Requirements: Apple II+; Apple DOS; Digital Research: CP/M; IBM 145-DOS
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 500
Date First Installed: November 1982

JS DATA SYSTEMS, INC.
COUNTRY CLUB MGMT SYSTEMS
Additional Product Classification: Payroll/Personnel
Specific Application: Membership Billing, Financial Application and Golf Handicapping
Specific Industry: Country Club
System Requirements: Altos: CP/M; TRS: MP/M
Memory Required: 48.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: December 1983
(See Vendor Profile Page V-63)

K-DATA CENTER, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 500
Date First Installed: 1979
(See Vendor Profile Page V-63)

K-DATA CENTER, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 305
Date First Installed: 1979

K-DATA CENTER, INC.
BILLING
Specific Application: Billing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23

Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 310
Date First Installed: 1979

K-DATA CENTER, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 365
Date First Installed: 1979

KEY MANAGEMENT, INC.
ACCOUNTS PAYABLE AP23
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23; IBM Datamaster
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 11
Date First Installed: December 1982
(See Vendor Profile Page V-64)

KEY MANAGEMENT, INC.
ACCOUNTS RECEIVABLE AR23
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23, IBM Datamaster
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 3
Date First Installed: December 1982

KEY MANAGEMENT, INC.
AOG FINANCE SYSTEM AOG
Specific Application: Fund Accounting, General Ledger, Accounts Payable
Specific Industry: Churches
System Requirements: IBM System/23 Datamaster
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 9
Date First Installed: December 1983

KEY MANAGEMENT, INC.
GENERAL LEDGER GL23
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23; IBM Datamaster
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 17
Date First Installed: December 1982

LASALLE COMPUTERS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS; Vector Graphics: CP/M; NCR Tower 1632: Unix; Digilog 1500: TURBO-DOS
Memory Required: 48.0K bytes
Source Language: CMD Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,900
Date First Installed: 1979
(See Vendor Profile Page V-65)

LASALLE COMPUTERS, INC.
CHECK RECONCILIATION
Specific Application: Check Reconciliation
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS; Vector Graphics: CP/M; NCR Tower 1632: Unix; Digilog 1500: TURBO-DOS
Source Language: CMD Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,700
Date First Installed: 1979

LASALLE COMPUTERS, INC.
RETAIL ACCOUNTS PAYABLE
Specific Application: Retail Accounts Payable
Specific Industry: Not Industry Sensitive, Retail
System Requirements: IBM PC; PC-DOS; Vector Graphics: CP/M; NCR Tower 1632: Unix; Digilog 1500: TURBO-DOS
Memory Required: 48.0K bytes
Source Language: CMD Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1979

LASALLE COMPUTERS, INC.
RETAIL GENERAL LEDGER
Specific Application: Retail General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS; Vector Graphics: CP/M; NCR Tower 1632: Unix; Digilog 1500: TURBO-DOS
Memory Required: 48.0K bytes
Source Language: CMD Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: 1979

LASALLE COMPUTERS, INC.
SERIES/3 RBS (RETAIL BUSINESS SYSTEM)
Specific Application: Retail Business General Accounting System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS; Vector Graphics: CP/M; NCR Tower 1632: Unix; Digilog 1500: TURBO-DOS
Memory Required: 48.0K bytes
Source Language: CMD Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 100
Date First Installed: 1978

LAWSON ASSOCIATES, INC.
GAS ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B20: Btos
Memory Required: 384.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
(See Vendor Profile Page V-65)

LAWSON ASSOCIATES, INC.
GAS ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B20: Btos
Memory Required: 384.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000

LAWSON ASSOCIATES, INC.
GAS FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B20: Btos
Memory Required: 384.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000

LAWSON ASSOCIATES, INC.
GAS GENERAL LEDGER AND REPORT WRITER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B20: Btos
Memory Required: 384.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000

LAWSON ASSOCIATES, INC.
GAS PURCHASE ORDER
Specific Application: Purchase Order
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B20: Btos
Memory Required: 384.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

LIBRA PROGRAMMING, INC.
ACCOUNTS RECEIVABLE - BALANCE FORWARD
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Lease
Price: $2,450
Number Installed to Date: 600
Date First Installed: July 1979
(See Vendor Profile Page V-66)

LIBRA PROGRAMMING, INC.
ACCOUNTS RECEIVABLE - OPEN ITEM
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Lease
Price: $2,450
Number Installed to Date: 1,000
Date First Installed: July 1979

LIBRA PROGRAMMING, INC.
BILLING
Specific Application: Billing/Invoicing
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Price: $2,450
Number Installed to Date: 400
Date First Installed: August 1980

LIBRA PROGRAMMING, INC.
BILLING/COSTING
Specific Application: Billing and Invoicing for Job Costing
Specific Industry: Manufacturing, Wholesale/Distribution, Construction
System Requirements: IBM System/23
Memory Required: 96.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Lease
Price: $2,900
Number Installed to Date: 150
Date First Installed: August 1981

LIBRA PROGRAMMING, INC.
SALES ANALYSIS
Specific Application: Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Lease
Price: $1,400
Number Installed to Date: 100
Date First Installed: June 1980

LINTON SHAPER COMPUTER SERVICES, INC.
GENERAL LEDGER/CLIENT WRITE-UP
Specific Application: General Ledger, Client Write-Up
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34; SSP; IBM System/32; IBM System/23; IBM 5110; IBM 5120
Memory Required: 64.0K bytes

Source Language: RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $3,800
Date First Installed: 1976
(See Vendor Profile Page V-66)

LINTON SHAFER COMPUTER SERVICES, INC.
PROFESSIONAL TIME MANAGEMENT
Specific Application: Professional Time Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP; IBM System/32; IBM System/23, 5110, 5120
Memory Required: 64.0K bytes
Source Language: RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $3,900
Date First Installed: 1976

LLOYDS ELECTRONICS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Kaypro II: CP/M; Kaypro IV; Kaypro X
Memory Required: 64.0K bytes
Source Language: Sbasic
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: August 1983
(See Vendor Profile Page V-66)

LLOYDS ELECTRONICS
ACCOUNTS RECEIVALBE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Kaypro II: CP/M; Kaypro IV; Kaypro X
Memory Required: 64.0K bytes
Source Language: Sbasic
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: July 1983

LLOYDS ELECTRONICS
FARM MANAGEMENT SYSTEMS
Specific Application: Farm Accounting and Enterprise Management
System Requirements: Kaypro II: CP/M; Kaypro IV; Kaypro X
Memory Required: 64.0K bytes
Source Language: Sbasic
Purchase Terms: Purchase (license)
Price: $500
Date First Installed: April 1983

LLOYDS ELECTRONICS
GENERAL LEDGER
Specific Application: Retail General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Kaypro II: CP/M; Kaypro IV; Kaypro X
Memory Required: 64.0K bytes
Source Language: Sbasic
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: July 1983

L & M DATA SYSTEMS
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DG Micro Nova: DOS, Rdos, AOS; DG Nova: Rdos, AOS, DOS; DG Eclipse: AOS, DOS, Rdos
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: September 1980
(See Vendor Profile Page V-66)

LOGICAL MINICOMPUTERS OF ERIE, INC.
AUTOMOTIVE DISTRIBUTOR SYSTEM
Specific Application: General Accounting, Inventory, Order Entry for Auto Parts Distribution
System Requirements: Point Four: Iris, Digidyne
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1979
(See Vendor Profile Page V-66)

LOGICAL MINICOMPUTERS OF ERIE, INC.
COUPON PROCESSING SYSTEM
Specific Application: General Accounting for Coupon Clearinghouses
System Requirements: Point Four: Iris, Digidyne
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1979

LOGICAL MINICOMPUTERS OF ERIE, INC.
GLOWS
Specific Application: Write-Up, Audit, Time Management System
System Requirements: Point Four: Iris, Digidyne
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1979

LOGICAL MINICOMPUTERS OF ERIE, INC.
QUIK DIRECT STORE DELIVERY
Specific Application: Vendor Delivery, Price Verification, General Accounting
Specific Industry: Retail
System Requirements: Point Four: Iris; Digidyne
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1979

LOGICAL MINICOMPUTERS OF ERIE, INC.
SOCIAL SERVICE SYSTEM
Specific Application: Accounting for Social Service Agencies
System Requirements: Point Four: Iris
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1979

LOGICAL MINICOMPUTERS OF ERIE, INC.
TANNERY SYSTEM
Specific Application: General Business
System Requirements: Point Four: Iris, Digidyne
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1979

L.T.C. SYSTEMS
LONG TERM CARE FACILITY
Additional Product Classification: Medical
Specific Application: Accounts Receivable, Utility Analysis, Patient Orders
Specific Industry: Medical, Nursing Home
System Requirements: Vector Graphics: CP/M, CP/M 86; Molecular Computer: CP/M, CPM 86; IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Dbase II
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $3,000
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-67)

LULLA APPLIED SYSTEMS
LAS/FICS; LA MANAGEMENT SYSTEM FOR FINANCIAL INSTITUTIONS
Additional Product Classification: Report Generator
Specific Application: General Ledger, Budgeting, Report Writer
Specific Industry: Banking/Financial
System Requirements: Burroughs B20: Btos, Convergent Technologies: Ctos
Memory Required: 384.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: April 1983
(See Vendor Profile Page V-67)

MANAGEMENT ADVISORY COMPUTER SYSTEMS
SCHOOL INFORMATION MANAGEMENT SYSTEM FOR MICROS
Additional Product Classification: Student Services
Specific Application: Complete Accounting and Student Services for Schools
Specific Industry: Education
System Requirements: TRS-80 Model 16: Unix
Source Language: C, Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 3
Date First Installed: June 1983
(See Vendor Profile Page V-68)

MANAGEMENT CYBERNETICS
MCI MICRO 2
Additional Product Classification: Insurance
Specific Application: Accounting Management System for Property and Casual, Independent Insurance Agencies
Specific Industry: Insurance
System Requirements: TRS-80/II, TRS-80/III, TRS-80/4, Model 12, Model 16: TRS-DOS
Memory Required: 48.0K bytes
Source Language: Basic, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 100
Date First Installed: January 1980
(See Vendor Profile Page V-68)

MANAGEMENT CYBERNETICS
MCI SUPERMICRO
Additional Product Classification: Insurance
Specific Application: Accounting Management System for Property and Casual, Independent Insurance Agencies
Specific Industry: Insurance
System Requirements: Oasis
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 1
Date First Installed: March 1983

MANATRON, INC.
BUDGETARY ACCOUNTING
Specific Application: Budgetary Accounting
Specific Industry: Government
System Requirements: Burroughs B20: Btos
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-68)

MANATRON, INC.
CHILD SUPPORT
Additional Product Classification: Payroll/Personnal
Specific Application: Track Child Support
Specific Industry: Government
System Requirements: Burroughs B20: Btos
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)

MANATRON, INC.
TAX COLLECTION AND BILLING
Specific Application: Tax Collection and Billing
Specific Industry: Government
System Requirements: Burroughs B20: Btos
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)

MANATRON, INC.
UTILITY BILLING
Specific Application: Utility Billing
Specific Industry: Government
System Requirements: Burroughs B20: Btos
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)

MARMEN COMPUTING, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE: CP/M, MS-DOS; IBM PC: CP/M, PC-DOS

Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 10
Date First Installed: April 1983
(See Vendor Profile Page V-69)

[illegible] COMPUTING, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE: CP/M, MS-DOS; IBM PC: CP/M, PC-DOS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 10
Date First Installed: April 1983

MARBEN COMPUTING, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE: CP/M, MS-DOS; IBM PC: CP/M, PC-DOS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 10
Date First Installed: April 1983

MASTERWORKS SOFTWARE, INC.
SMALL BUSINESS AIDE
Specific Application: Accounts Payable and Receivable, General Ledger, Payroll, Fixed Assets, Inventory
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Retail, Banking/Financial
System Requirements: IBM PC; Apple II+; Apple IIE
Source Language: Basic
Source Code Available: Yes
Price: $375
Number Installed to Date: 50
Date First Installed: January 1983
(See Vendor Profile Page V-70)

MATIC DATA SYSTEMS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Altos: Oasis; ISC: Oasis; Onyx: Oasis; Vector Graphics: CP/M
Memory Required: 64.0K bytes
Source Language: Basic, Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 500
Date First Installed: 1979
(See Vendor Profile Page V-70)

MATIC DATA SYSTEMS
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Altos: Oasis; ISC: Oasis; Onyx: Oasis
Memory Required: 64.0K bytes
Source Language: Osas Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: 1979

MATIC DATA SYSTEMS
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Altos: Oasis; ISC: Oasis; Onyx: Oasis; Vector Graphics
Source Language: Oasis Basic; Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 500
Date First Installed: 1979

MCM ENTERPRISES
PEACHTREE SERIES 8 ACCOUNTING
Specific Application: General Ledger, Accounts Receivable and Payable, Payroll, Inventory and Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco: Cromix
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Date First Installed: July 1982
(See Vendor Profile Page V-71)

MCM ENTERPRISES
PEACHTREE SERIES 8 ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco: Cromix
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: July 1982

MCM ENTERPRISES
PEACHTREE SERIES 8 ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco: Cromix
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: July 1982

MCM ENTERPRISES
PEACHTREE SERIES 8 GENERAL LEDGER
Additional Product Classification: Accounting
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco: Cromix
Memory Required: 128.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: July 1982

MCM ENTERPRISES
PEACHTREE SERIES 8 INVENTORY
Additional Product Classification: Manufacturing
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco: Cromix
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: July 1982

MCM ENTERPRISES
PEACHTREE SERIES 8 SALES INVOICING
Specific Application: Sales Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco: Cromix
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: July 1982

MDM SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,195
Number Installed to Date: 30
Date First Installed: 1979

MDM SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,195
Number Installed to Date: 30
Date First Installed: 1979

MDM SYSTEMS, INC.
COMPLETE ACCOUNTING
Specific Application: Complete Accounting System
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,780
Number Installed to Date: 30
Date First Installed: 1978

MDM SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,195
Number Installed to Date: 30
Date First Installed: 1979

MDS ASSOCIATES
MYTE MYTE PURCHASE ORDER PROCESSING
Specific Application: Enter, Track and Receive Purchase or Production Orders
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS; Victor MS-DOS; Advantage Computer: CP/M; DCC: CP/M
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: October 1983
(See Vendor Profile Page V-72)

MDS ASSOCIATES
MYTE MYTE GENERAL LEDGER & FINANCIAL
Specific Application: Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Victor MS-DOS; Advantage Computer: CP/M; DCC: CP/M
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: June 1983

MDS ASSOCIATES
MYTE MYTE PROTIME
Specific Application: Time and Billing System for Professionals
System Requirements: IBM PC: PC-DOS; Victor MS-DOS; Advantage Computer: CP/M; DCC
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: September 1983

MDS ASSOCIATES
MYTE MYTE ACCOUNTS PAYABLE
Specific Application: Cash Managements, Analyze Distributions
Specific Industry: Not Industry Sensitive, Retail
System Requirements: IBM PC: PC-DOS, Victor MS-DOS, Molecular Computer: CP/M; DCC: CP/M
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: June 1983

MDS ASSOCIATES
MYTE MYTE ACCOUNTS RECEIVABLE
Specific Application: Post Invoices and Receipts, Print Customer Statements, Receivables
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Victor: MS-DOS; Molecular: CP/M; DCC: CP/M
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: June 1983

MDS ASSOCIATES
MYTE MYTE ONE WRITE ACCOUNTING PACKAGE
Specific Application: Accounts Payable and Receivable, General Ledger, Write Checks, Send Customer Statements, Financials
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Victor MS-DOS, Molecular Computer: CP/M; DCC: CP/M
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 4
Date First Installed: June 1983

MICRO ARCHITECT, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; TRS-80/II, Models 12, 16; CP/M
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1980
(See Vendor Profile Page V-73)

MICRO ARCHITECT, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II; TRS-80 Model 12, IBM PC: CP/M
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $129 to $248
Date First Installed: 1980

MICRO ARCHITECT, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II, TRS-80 Model 16, IBM PC CP/M
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $129 to $248
Date First Installed: 1980

MICRO ASSOCIATES, INC.
MICA/AP - ACCOUNTS PAYABLE SYSTEM
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, PC-DOS, TRS-80 Model 12, 16: CP/M; Olivetti M-20: Pcos
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 52
Date First Installed: April 1983
(See Vendor Profile Page V-73)

MICRO ASSOCIATES, INC.
MICA/AR - ACCOUNTS RECEIVABLE SYSTEM
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, TRS-80 Model 12, 16: CP/M; Olivetti M20 Pcos
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 152
Date First Installed: November 1982

MICRO ASSOCIATES, INC.
MICA/GL - GENERAL LEDGER SYSTEM
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; TRS-80 Model 12, 16: CP/M; Olivetti M20 Pcos
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $129 to $248
Number Installed to Date: 105
Date First Installed: May 1982

MICRO ASSOCIATES, INC.
MICA/IC - INVENTORY CONTROL SYSTEM
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: IBM-PC: PC-DOS, TRS-80 Model 12, 16: CP/M, Olivetti M20: Pcos
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $395
Date First Installed: February 1983

MICROBASE SOFTWARE, INC.
MICROBASE SOFTWARE AD AGENCY SYSTEM
Specific Application: Production Billing, Media Billing, Accounts Receivable, Profit Reporting, Time History
Specific Industry: Advertising Agencies
System Requirements: IBM PC-XT, PC PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595 to $3,375
Date First Installed: February 1983
(See Vendor Profile Page V-73)

MICRO BUSINESS APPLICATIONS, INC.
ACCOUNTING APPLICATION DBASE
Specific Application: Data Base Files Interface
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M 86, Televideo 800, 1600: Concurrent CP/M, DEC Rainbow: MS-DOS, Epson QX10: MP/M
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 4,000
Date First Installed: May 1983
(See Vendor Profile Page V-73)

MICRO BUSINESS APPLICATIONS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; CP/M 86, MS-DOS
Memory Required: 42.0K bytes
Source Language: Microsoft Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Date First Installed: 1980

MICRO BUSINESS APPLICATIONS, INC.
ACCOUNTS PAYABLE WITH CHECK WRITING
Specific Application: Multiple Expense Account Distributions for Each Invoice, Prints Checks
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M 86, Televideo 800, 1600: Concurrent CP/M, DEC Rainbow: MS-DOS, Epson QX10: MP/M
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 4,000
Date First Installed: March 1981

MICRO BUSINESS APPLICATIONS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; CP/M 86, MS-DOS
Memory Required: 42.0K bytes
Source Language: Microsoft Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Date First Installed: 1980

MICRO BUSINESS APPLICATIONS, INC.
FIXED ASSET ACCOUNTING
Specific Application: Fixed Assets Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; CP/M 86, Televideo 800, 1600: Concurrent CP/M; DEC Rainbow: MS-DOS, Epson QX10: MP/M
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 4,000
Date First Installed: March 1981

MICRO BUSINESS APPLICATIONS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; CP/M 86; MS-DOS
Memory Required: 47.0K bytes
Source Language: Microsoft Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Date First Installed: September 1980

MICRO BUSINESS APPLICATIONS, INC.
GENERAL LEDGER WITH FINANCIAL REPORT WRITER
Specific Application: General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; CP/M 86, Televideo 800, 1600: Concurrent CP/M, DEC Rainbow: MS-DOS, Epson QX10: MP/M
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 4,000
Date First Installed: March 1981

MICRO BUSINESS APPLICATIONS, INC.
GENERAL LEDGER/SUPERCALC TM INTERFACE
Specific Application: General

Ledger Accounts; Financial Spreadsheet Interface
Specific Industry: Not Industry Sensitive
System Requirements: Televideo 800, 1600 CP/M 86 Concurrent CP/M, DEC Rainbow MS/DOS; Epson QX10 MP/M
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 4,000
Date First Installed: May 1982

MICRO BUSINESS APPLICATIONS, INC.
INVENTORY CONTROL WITH INVOICING
Specific Application: Inventory Control With Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT: CP/M 86, Televideo 80, 1600 Concurrent CP/M, DEC Rainbow: MS-DOS; Epson QX10: MP/M
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 4,000
Date First Installed: March 1981

MICRO BUSINESS APPLICATIONS, INC.
[illegible] ACCOUNTANT
Specific Application: Includes General Ledger, Accounts Receivable and Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT: CP/M 86; DEC Rainbow Concurrent CP/M; NEC APC: MS-DOS; Epson QX-10: MP/M
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,495
Number Installed to Date: 4,000
Date First Installed: March 1981

MICRO BUSINESS APPLICATIONS, INC.
MULTI-COMPANY OPTION
Specific Application: Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M 86, Televideo 80, 1600: Concurrent CP/M; DEC Rainbow: MS-DOS; Epson QX-10: MP/M
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 4,000
Date First Installed: March 1981

MICRO BUSINESS APPLICATIONS, INC.
MULTI-STATE LOCAL PAYROLL WITH CHECK WRITING
Specific Application: Payroll With Check Writing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M 86, Televideo 80, 1600: Concurrent CP/M; DEC Rainbow: MS-DOS, Epson QX-10: MP/M
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 4,000
Date First Installed: March 1981

MICRO BUSINESS APPLICATIONS, INC.
PROFESSIONAL TIME ACCOUNTING
Specific Application: Professional Time Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT: CP/M 86, Televideo 80, 1600 Concurrent CP/M; DEC Rainbow: MS-DOS; Epson QX-10: MP/M
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 4,000
Date First Installed: March 1981

MICRO BUSINESS APPLICATIONS, INC.
PURCHASE ORDER AND REQUISITIONS
Specific Application: Purchase Order and Requisitions
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M 86, Televideo 80, 1600; Concurrent CP/M; DEC Rainbow: MS-DOS, Epson QX-10: MP/M
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 4,000
Date First Installed: August 1982

MICRO BUSINESS SOFTWARE
REALWORLD ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MS-DOS, RT-11
Memory Required: 64.0K bytes
Source Language: RM Cobol, Micro Focus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 8,000
Date First Installed: October 1981
(See Vendor Profile Page V-73)

MICRO BUSINESS SOFTWARE
REALWORLD ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M, MS-DOS, RT-11
Memory Required: 64.0K bytes
Source Language: RM Cobol, Micro Focus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 12,000
Date First Installed: October 1981

MICRO BUSINESS SOFTWARE
REALWORLD GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MS-DOS, Unix; RT-11
Memory Required: 64.0K bytes
Source Language: RM Cobol, Micro Focus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 18,000.
Date First Installed: October 1981
(See Vendor Profile Page V-73)

MICRO BUSINESS SOFTWARE
REALWORLD - ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: MP/M
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 40,000.
Date First Installed: 1980

MICRO BUSINESS SOFTWARE
REALWORLD - GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RT-11
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 40,000
Date First Installed: 1980

MICRO BUSINESS SOFTWARE
REALWORLD - INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: PC-DOS
Memory Required: 64.0K bytes
Source Language: Micro Focus, Level II Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 4,000
Date First Installed: 1980

MICRO BUSINESS SOFTWARE
REALWORLD - ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: MP/M
Memory Required: 64.0K bytes
Source Language: Micro Focus, Level II Cobol
Source Code Available: Yes
Price: $650
Number Installed to Date: 40,000
Date First Installed: 1980

MICRO BUSINESS SOFTWARE
REALWORLD - PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Cmos
Memory Required: 64.0K bytes
Source Language: Micro Focus, Level II Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 40,000
Date First Installed: 1980

MICRO BUSINESS SOFTWARE
REALWORLD - SALES ANALYSIS
Specific Application: Analyze Sales
Specific Industry: Not Industry Sensitive
System Requirements: : MP/M 86
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 40,000
Date First Installed: 1980

MICRO BUSINESS SOFTWARE
REALWORLD ORDER ENTRY/BILLING
Specific Application: Order Entry, Billing
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M 86, Oasis
Memory Required: 64.0K bytes
Source Language: RM Cobol, Micro Focus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 4,000
Date First Installed: September 1981

MICRO BUSINESS SYSTEMS, INC. (MI)
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Banking/Financial
System Requirements: Altos: CP/M; Televideo: MP/M TRS-80
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 75
Date First Installed: 1981
(See Vendor Profile Page V-73)

MICRO BUSINESS SYSTEMS, INC. (MI)
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Banking/Financial
System Requirements: Altos: CP/M; Televideo: MP/M TRS-80
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 75
Date First Installed: 1981

MICRO BUSINESS SYSTEMS, INC. (MI)
CLIENT WRITE-UP SYSTEM.
Specific Application: General Ledger and Payroll System
Specific Industry: Banking/Financial
System Requirements: Altos: CP/M; Televideo: MP/M TRS-80
Memory Required: 64.0K bytes

Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 75
Date First Installed: 1981

MICRO BUSINESS SYSTEMS, INC. (IN)
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Banking/Financial
System Requirements: Altos: CP/M; Televideo: MP/M; TRS-80
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 75
Date First Installed: 1981

MICRO BUSINESS SYSTEMS, INC. (IN)
JOB COST SERIES
Specific Application: Job Cost System, General Ledger, Accounts Receivable, Accounts Payable, Contractor Payroll
Specific Industry: Banking/Financial
System Requirements: Altos: CP/M; Televideo: MP/M; TRS-80
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,335
Number Installed to Date: 75
Date First Installed: 1981

Additional information provided for by vendor

Integrated job cost, general ledger, payroll, accounts receivable and payable. Multiple company option. Floppy and hard disk versions. User definable chart of accts, cost accts, tax tables, aging and billing terms, union deductions and contributions. Generation of certified payroll, invoices, statements, checks, 941 data and W-2 forms. Tracks profitability of departments. Projects profits and losses by job.

MICRO BUSINESS SYSTEMS, INC. (IN)
JOB COST SYSTEM
Specific Application: Accounting Job Cost System
Specific Industry: Banking/Financial
System Requirements: Altos: CP/M; Televideo: MP/M; TRS-80
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 75
Date First Installed: 1981

MICRO BUSINESS SYSTEMS, INC. (LA)
PERFORMANCE THEORIES ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos 5.0, 1.1
Memory Required: 32.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 35
Date First Installed: January 1979

MICRO BUSINESS SYSTEMS, INC. (LA)
PERFORMANCE THEORIES ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos 5.0, 1.1
Memory Required: 32.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 35
Date First Installed: January 1979

MICRO BUSINESS SYSTEMS, INC. (LA)
PERFORMANCE THEORIES GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos 5.0, 1.1
Memory Required: 32.0K bytes
Source Language: Basic Compiler
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 35
Date First Installed: January 1979

MICRO COMPUTER SYSTEMS, INC.
CHURCH INFORMATION MANAGEMENT
Specific Application: Church Businesses, Including Receipt Tracking, Class Attendence, WP
System Requirements: TRS-80: TRS-DOS, CP/M; IBM PC-XT: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $3,740
Number Installed to Date: 1
Date First Installed: January 1983
(See Vendor Profile Page V-73)

MICRO COMPUTER SYSTEMS, INC.
WELL INFORMATION MANAGEMENT
Specific Application: Joint Interest, Revenue Distribution Needs of Independent Operators
System Requirements: TRS-80: TRS-DOS, CP/M; IBM PC-XT: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 40
Date First Installed: July 1979

MICROCOMPUTER CONSULTANTS
INCOME
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Integrated Business Management
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86; MP/M; MP/M 86; MS-DOS; PC-DOS
Memory Required: 64.0K bytes
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600 to $3,600
Date First Installed: 1977
(See Vendor Profile Page V-73)

MICRO DATA BUSINESS FORMS & SYSTEMS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $499
Date First Installed: 1980
(See Vendor Profile Page V-73)

MICRO DATA BUSINESS FORMS & SYSTEMS
ACCOUNTS RECEIVABLE SYSTEM
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $499
Date First Installed: 1980
(See Vendor Profile Page V-73)

MICRO DATA BUSINESS FORMS & SYSTEMS
AMBULANCE MEDICAL BILLING SYS
Specific Application: Accounts Receivable Program for Emergency Services
Specific Industry: Medical, Emergency Services
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $499
Date First Installed: 1980

MICRO DATA BUSINESS FORMS & SYSTEMS
CONTRACT BILLING SYSTEM
Specific Application: Accounts Receivable for Contract Billers
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Cbasic
Purchase Terms: Purchase (license)
Price: $499
Date First Installed: 1980

MICRO DATA BUSINESS FORMS & SYSTEMS
GENERAL LEDGER SYSTEM
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $499
Date First Installed: 1980

MICRO DATA BUSINESS FORMS & SYSTEMS
MEMBERSHIP BILLING SYSTEM
Specific Application: Billing for Membership Organizations
Specific Industry: Organizations
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $599
Date First Installed: 1980

MICRO DATA BUSINESS FORMS & SYSTEMS
ORDER ENTRY/ACCOUNTS RECEIVABLE SYSTEM
Specific Application: Order Entry Accounts Receivable
Specific Industry: Retail
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $599
Date First Installed: 1980

MICRO DATA BUSINESS FORMS & SYSTEMS
UTILITY BILLING SYSTEM
Specific Application: Utility Billing
Specific Industry: Utilities
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $599
Date First Installed: 1980

MICRODATA SOFTWARE DEVELOPMENT CO.
ADMAX
Specific Application: Advertising Agency Package
Specific Industry: Advertising
System Requirements: Micro Data: Reality
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 8
Date First Installed: 1981
(See Vendor Profile Page V-73)

MICRODATA SOFTWARE DEVELOPMENT CO.
RESULTS
Specific Application: Financial Distribution and Fund Management
Specific Industry: Not Industry Sensitive
System Requirements: Micro Data: Reality
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1980

MICRO INSTRUCTIONAL, INC.
ACCOUNTS PAYABLE TEMPLATE
Specific Application: Accounts Payable

Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40
Date First Installed: September 1982
(See Vendor Profile Page V-73)

MICRO INSTRUCTIONAL, INC.
ACCOUNTS RECEIVABLE TEMPLATE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40
Date First Installed: September 1982

MICRO INSTRUCTIONAL, INC.
CASH DISBURSEMENT JOURNAL TEMPLATE
Specific Application: Cash Disbursement Journal
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40
Date First Installed: September 1982

MICRO INSTRUCTIONAL, INC.
CASH RECEIVING JOURNAL TEMPLATE
Specific Application: Cash Receiving Journal
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40
Date First Installed: September 1982

MICRO INSTRUCTIONAL, INC.
DEPRECIATION TEMPLATE
Specific Application: Depreciation Template
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40
Date First Installed: September 1982

MICRO LAB
THE INVOICE FACTORY
Specific Application: Invoice Production, Accounts Reporting
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE: DOS 3.3
Memory Required: 48.0K bytes
Source Language: Applesoft Basic
Purchase Terms: Purchase (license)
Price: $200
(See Vendor Profile Page V-74)

MICRO LAB
VISIBLEND
Specific Application: Merges Vaicalc Files
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE: DOS 3.3
Memory Required: 48.0K bytes
Source Language: Applesoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
(See Vendor Profile Page V-74)

MICRO LAB
VISIFACTORY
Specific Application: Interface Program
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE: DOS 3.3
Memory Required: 48.0K bytes
Source Language: Applesoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $75

MICROLINE
TAASS II
Specific Application: Water Utility Billing and Accounts Receivable
System Requirements: Xerox: CP/M; Eagle, Televideo
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 25
Date First Installed: August 1983
(See Vendor Profile Page V-74)

MICRO MAIN CONSULTANTS
ACCOUNTING BUSINESS-PRO
Specific Application: Multiledger, Multicompany Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Altos: MP/M; Dynabyte: CP/M, IBM PC-XT: PC-DOS, Televideo: CP/M
Memory Required: 64.0K bytes
Source Language: Basic, Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $1,695
(See Vendor Profile Page V-74)

MICRO MED, INC.
DOM - DENTAL OFFICE MANAGEMENT
Specific Application: Dental Office Billing
System Requirements: IBM Datamaster
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-74)

MICRO MED, INC.
GENERAL LEDGER/ACCOUNTS PAYABLE
Specific Application: Small Business Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM Datamaster
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 6
Date First Installed: 1981

MICRO-TECH, INC.
VIDEO TAPE RENTAL CONTROL SYSTEM
Specific Application: Control of Video Tape Libraries and Memberships
Specific Industry: Retail
System Requirements: Altos: MP/M II
Memory Required: 120.0K bytes
Source Language: PL/1 80, Access Manager, Display Manager
Source Code Available: $1,500
Purchase Terms: Purchase (license)
Number Installed to Date: 1,500
Date First Installed: September 1981
(See Vendor Profile Page V-75)

MIDWEST COMPUTER CENTER CO.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Xerox 80; DEC Rainbow: CP/M; IBM PC
Memory Required: 64.0K bytes
Source Language: Fortran 4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 1,080
Date First Installed: 1978
(See Vendor Profile Page V-75)

MIDWEST COMPUTER CENTER CO.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Xerox 80; DEC Rainbow: CP/M; IBM PC
Memory Required: 64.0K bytes
Source Language: Fortran 4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,195
Number Installed to Date: 3,000
Date First Installed: 1978

MIDWEST COMPUTER CENTER CO.
JOB BUDGETING/ESTIMATING
Specific Application: Performs Job Budgeting and Estimating
Specific Industry: Not Industry Sensitive
System Requirements: Xerox 80; DEC Rainbow: CP/M; IBM PC
Memory Required: 64.0K bytes
Source Language: Fortran 4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 1,000
Date First Installed: 1979

MIDWEST COMPUTER CENTER CO.
JOB COSTING
Additional Product Classification: Manufacturing
Specific Application: Job Costing
Specific Industry: Manufacturing, Construction
System Requirements: Xerox 80; DEC Rainbow: CP/M; IBM PC
Memory Required: 64.0K bytes
Source Language: Fortran 4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 3,000
Date First Installed: 1977

MIDWEST COMPUTER CENTER CO.
TIME RECORDING AND MANAGEMENT SYSTEM
Specific Application: Accumulates Time and Prints Billing Statements
Specific Industry: Banking/Financial, Legal, Construction
System Requirements: Xerox 80; DEC Rainbow: CP/M; IBM PC
Memory Required: 64.0K bytes
Source Language: Fortran 4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,495
Number Installed to Date: 100
Date First Installed: January 1982

MIDWEST COMPUTER SALES
PROPRIETARY PACKAGE
Specific Application: Utility Billing
System Requirements: NEC APC: CP/M; Wang Professional: MS-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: July 1983
(See Vendor Profile Page V-75)

MIKRON DATA SYSTEMS, INC.
BUSINESS ACCOUNTING SYSTEM
Specific Application: Payroll, Inventory Control, Order Control, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Wholesale/Distribution
System Requirements: DG Nova: R-DOS, DG Eclipse: DOS, IBC: Superdos
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,500
Number Installed to Date: 200
Date First Installed: 1977
(See Vendor Profile Page V-75)

MODERN COMPUTER SYSTEMS, INC.
MCS ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Altos; TI Professional
Source Language: RM Basic
Purchase Terms: Purchase (license)
Price: $1,000 to $1,200
Number Installed to Date: 15,000
Date First Installed: January 1983
(See Vendor Profile Page V-75)

MODERN COMPUTER SYSTEMS, INC.
MCS ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Altos; TI Professional
Source Language: RM Cobol
Memory Required: 64.0K bytes
Source Language: Fortran 4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 3,000
Date First Installed: 1977

Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000 to $1,200
Number Installed to Date: 1,500
Date First Installed: January 1983

MODERN COMPUTER SYSTEMS, INC.
MCS GENERAL LEDGER REPORTER
Specific Application: General Ledger, Financial Report
Specific Industry: Not Industry Sensitive
System Requirements: Altos; TI PC Professional
Source Language: RM Cobol
Number Installed to Date: 1,500
Date First Installed: January 1983

MODERN COMPUTER SYSTEMS, INC.
MCS PURCHASE ORDER
Specific Application: Purchasing System
Specific Industry: Not Industry Sensitive
System Requirements: Altos; TI Professional
Source Language: RM Basic
Purchase Terms: Purchase (license)
Price: $1,000 to $1,200
Number Installed to Date: 1,500
Date First Installed: January 1983

MODERN MICROCOMPUTERS
CMS CLIENT WRITE-UP
Specific Application: Client Write-Up, General Ledger
Specific Industry: Accounting
System Requirements: Northstar Advantage: CP/M
Memory Required: 56.0K bytes
Source Language: Cbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: February 1979
(See Vendor Profile Page V-76)

MONROE SYSTEMS FOR BUSINESS
MONROE BUSINESS MANAGEMENT SERIES II SALES ANALYSIS
Specific Application: Sales Analysis
Specific Industry: Wholesale/Distribution
System Requirements: Monroe OC 8800 Series: CP/M 80
Memory Required: 128.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: August 1983
(See Vendor Profile Page V-77)

MONROE SYSTEMS FOR BUSINESS
MONROE BUSINESS MANAGEMENT SERIES I A/P
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Monroe OC 8820 Series
Memory Required: 128.0K bytes
Source Language: Monroe Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $595
Date First Installed: September 1982

MONROE SYSTEMS FOR BUSINESS
MONROE BUSINESS MANAGEMENT SERIES I-INVOICING
Specific Application: Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: Monroe OC 8800 Series: MS10
Memory Required: 128.0K bytes
Source Language: Monroe Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $195

MONROE SYSTEMS FOR BUSINESS
MONROE BUSINESS MANAGEMENT SERIES I-ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Monroe OS 8820: MS10; Monroe 8810; Monroe 8826
Memory Required: 64.0K bytes
Source Language: Monroe Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $595
Number Installed to Date: 500
Date First Installed: March 1982

MONROE SYSTEMS FOR BUSINESS
MONROE BUSINESS MANAGEMENT SERIES I - G/L
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Monroe OC 8800: MS10
Memory Required: 128.0K bytes
Source Language: Monroe Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $595
Date First Installed: December 1982

MONROE SYSTEMS FOR BUSINESS
MONROE BUSINESS MANAGEMENT SERIES II- G/L
Specific Application: General Ledger
Specific Industry: Wholesale/Distribution
System Requirements: Monroe OC 8800 Series: CP/M 80
Memory Required: 128.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: August 1983

MONROE SYSTEMS FOR BUSINESS
MONROE BUSINESS MANAGEMENT SERIES II ORDER ENTRY/BILLING
Specific Application: Order Entry/Billing
Specific Industry: Wholesale/Distribution
System Requirements: Monroe OC 8800: CP/M 80
Memory Required: 128.0K bytes
Source Language: RM Cobol
Source Code Available: No
Price: $995
Date First Installed: August 1983

MONROE SYSTEMS FOR BUSINESS
MONROE BUSINESS MANAGEMENT SERIES II A/P
Specific Application: Accounts Payable
Specific Industry: Wholesale/Distribution
System Requirements: Monroe OC 8800 Series: CP/M 80
Memory Required: 128.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $695
Date First Installed: August 1983

MONROE SYSTEMS FOR BUSINESS
MONROE BUSINESS MANAGEMENT SERIES II A/R
Specific Application: Accounts Receivable
Specific Industry: Wholesale/Distribution
System Requirements: Monroe OC 8800 Series: CP/M 80
Memory Required: 128.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $695
Date First Installed: August 1983

MONTEZUMA MICRO CHECKWRITER
Specific Application: Check Writer
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: M Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $99
Number Installed to Date: 100
Date First Installed: January 1980
(See Vendor Profile Page V-77)

MOORE COMPUTING SYSTEMS, INC.
BALANCE FORWARD ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 7
Date First Installed: February 1982
(See Vendor Profile Page V-77)

MOORE COMPUTING SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800
Date First Installed: February 1982

MOORE COMPUTING SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $950
Number Installed to Date: 10
Date First Installed: February 1982

MORLAN SOFTWARE
GENERAL LEDGER
Specific Application: General Ledger, Financial Reports and Budgets
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II: DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 5
Date First Installed: October 1982
(See Vendor Profile Page V-77)

MORLAN SOFTWARE
GENERAL LEDGER WITH CHECK RECONCILIATION
Additional Product Classification: Accounting
Specific Application: Deposits, Checking Account Information Statements
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II: DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 5
Date First Installed: April 1983

MORTGAGE CLOSING ASSOCIATES
LOAN SERVICING
Specific Application: Processing of Real Estate Loan Collection, Investor Remittance and Escrow Check Disbursement
Specific Industry: Banking/Financial
System Requirements: DG
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
(See Vendor Profile Page V-77)

NATIONAL COMPUTER UTILITY
TVC
Specific Application: Traffic Violation Control
Specific Industry: Government, Municipalities
System Requirements: IBM 360: DOS; IBM 370 VM; IBM 4300 Series: DOS/VSE
Memory Required: 256.0K bytes
Source Language: Assembler, Cobol
Source Code Available: Yes

Purchase Terms: Purchase (license); [illegible]
(See Vendor Profile Page V-78)

NATIONAL DATATEC, INC.
BYTESMITH/ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Vector Graphic: CP/M; Xerox: CP/M; TRS-80: CP/M; IBM PC: CP/M; Apple: CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license); [illegible]
Price: $600
Number Installed to Date: 10
Date First Installed: January 1982
(See Vendor Profile Page V-78)

NATIONAL DATATEC, INC.
BYTESMITH/TIME ACCOUNTING
Specific Application: Time Accounting
Specific Industry: Construction, Architects
System Requirements: Vector Graphic: CP/M; Xerox: CP/M; TRS-80: CP/M; IBM PC: CP/M; Apple: CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license); [illegible]
Price: $300
Number Installed to Date: 3
Date First Installed: January 1983

NATIONAL REAL ESTATE EXCHANGES, INC.
SPS 3000 ACCOUNTS PAYABLE
Specific Application: Multicompany Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC Decmate: CTS-310
Memory Required: 64.0K bytes
Source Language: Cbol
(See Vendor Profile Page V-79)

NEPENTHE PROGRAMS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: DOS+; TRS-80/III, Trs-80/4
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Lease
Price: $150
Date First Installed: 1980
(See Vendor Profile Page V-79)

NEPENTHE PROGRAMS
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: DOS+; TRS-80/III, Trs-80/4
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Lease

Price: $150
Date First Installed: 1980

NEPENTHE PROGRAMS
FOOD SERVICE COST ESTIMATING
Specific Application: Estimates Cost of Menus
Specific Industry: Not Industry Sensitive, Food Services
System Requirements: TRS-80/I: DOS+; TRS-80/III, Trs-80/4
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Lease
Price: $89
Date First Installed: 1980

NEPENTHE PROGRAMS
MINIBIZ BOOKKEEPING SYSTEM
Specific Application: Hybrid General Ledger Accounting
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: DOS+; TRS-80/III, Trs-80/4
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Lease
Price: $150
Date First Installed: 1981

NEPENTHE PROGRAMS
ORDER ENTRY AND INVENTORY
Specific Application: Order Entry Inventory Catalogue Interface
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: DOS+; TRS-80/III, Trs-80/4
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Lease
Price: $150
Date First Installed: 1981

NEPENTHE PROGRAMS
PROJECT COST CONTROL
Specific Application: Tracks Project Cost to Budget
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: DOS+; TRS-80/III, Trs-80/4
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Lease
Price: $89
Date First Installed: 1981

NEPENTHE PROGRAMS
TIPS ALLOCATION
Specific Application: Allocates Tips Hourly or By Sales
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: DOS+; TRS-80/III, Trs-80/4
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Lease
Price: $89
Date First Installed: 1983

N. F. SYSTEMS, LTD.
STOCK PORTFOLIO
Specific Application: Stock Portfolio Program
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: MS-DOS, Compaq
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $39
Number Installed to Date: 50
Date First Installed: September 1982
(See Vendor Profile Page V-80)

NORTH COUNTY COMPUTER SERVICES
USERBASE
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: Payroll, Inventory, General Ledger, Accounts Payable and Receivable
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Retail, Education, Government, Transportation, Nonprofit Organizations
System Requirements: [illegible]
Memory Required: 45.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: [illegible] 1982
(See Vendor Profile Page V-80)

NORTHERN DATA SYSTEMS OF MAINE, INC.
FUEL OIL DEALERS PACKAGE
Specific Application: Fuel Oil Accounting
Specific Industry: Fuel Oil
System Requirements: Cadol
Memory Required: 4.0K bytes
Source Language: Cadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 60
Date First Installed: September 1979
(See Vendor Profile Page V-80)

NORTHERN DATA SYSTEMS OF MAINE, INC.
LUMBER DISTRIBUTION SYSTEM
Specific Application: Gasoline Distribution System
System Requirements: Cado System
Memory Required: 4.0K bytes
Source Language: Cadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 12
Date First Installed: September 1982

NORTHERN DATA SYSTEMS OF MAINE, INC.
MUNICIPAL ACCOUNTING
Specific Application: Municipal Accounting
Specific Industry: Government
System Requirements: Cado Systems
Memory Required: 4.0K bytes
Source Language: Cadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 100
Date First Installed: 1979

NORTHERN DATA SYSTEMS OF MAINE, INC.
RETAIL STORES PACKAGE
Specific Application: Sales Accounting
Specific Industry: Retail
System Requirements: Cado Systems
Memory Required: 4.0K bytes
Source Language: Cadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 10
Date First Installed: 1981

NORTHERN DATA SYSTEMS OF MAINE, INC.
SCHOOL ADMINISTRATIVE ACCOUNTING
Additional Product Classification: Education
Specific Application: Class Attendence, Bus Schedule, Administration, Accounting
Specific Industry: Education
System Requirements: Cado Systems
Memory Required: 4.0K bytes
Source Language: Cadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 75
Date First Installed: 1979

NORTHERN DATA SYSTEMS OF MAINE, INC.
UTILITY BILLING
Specific Application: Utility Billing
Specific Industry: Government
System Requirements: Cado Systems
Memory Required: 4.0K bytes
Source Language: Cadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 40
Date First Installed: 1979

NORTHERN DATA SYSTEMS OF MAINE, INC.
WHOLESALE FOOD DISTRIBUTORS
Specific Application: Wholesale Food Distribution
Specific Industry: Wholesale/Distribution
System Requirements: Cado System
Memory Required: 4.0K bytes
Source Language: Cadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 12
Date First Installed: 1981

NORTHERN DATA SYSTEMS, INC.
REI CONTRACTOR ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Job Costing, Accounts Payable, Payroll, General Ledger, Inventory, Purchase Orders
Specific Industry: Not Industry Sensitive
System Requirements: Data Tiger Cadol; Cado Calling
Memory Required: 48.0K bytes
Source Language: Cado Basic
Source Code Available: Yes

Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: May 1978
(See Vendor Profile Page V-80)

NORTHERN DATA SYSTEMS, INC.
NDS DISTRIBUTOR SYSTEM
Specific Application: Accounts Receivable, Order Entry, Purchase Order,, Inventory and Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Cado Tiger: Cadot; Cado Cat Series
Memory Required: 48.0K bytes
Source Language: Cado Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 75
Date First Installed: August 1978

NORTHERN DATA SYSTEMS, INC.
NDS FINANCIAL ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: General Accounting, Payroll, General Ledger, Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Cado Tiger: Cadot; Cado Cat Series
Memory Required: 48.0K bytes
Source Language: Cado Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: May 1978

NORTHERN DATA SYSTEMS, INC.
NDS FUND RAISING
Specific Application: Gift Processing, Pledge Monitoring Correspondence, History Inquiry, Reporting By Donor
Specific Industry: Not Industry Sensitive
System Requirements: Cado Tiger: Cadot; Cado Catine: Cadot
Memory Required: 48.0K bytes
Source Language: Cado Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: December 1981

NORTHERN DATA SYSTEMS, INC.
NDS GOVERNMENT ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Appropriation Control, General Ledger, Payroll, Tax Billing, Utility Billing
Specific Industry: Government
System Requirements: Cado Tiger: Cadot; Cado Cat Series; Cadot
Memory Required: 48.0K bytes
Source Language: Cado Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)

NORTHERN DATA SYSTEMS, INC.
NDS PROFESSIONAL TIME & BILLING
Specific Application: Billing and Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Cado Tiger: Cadol; Cado Cat Series
Memory Required: 48.0K bytes
Source Language: Cado Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 6
Date First Installed: May 1981

NORTHWESTERN CONSULTING GROUP, INC.
ACCOUNTS PAYABLE IN SPANISH
Specific Application: Accounts Payable In Spanish
Specific Industry: Wholesale/Distribution, Construction, Accounting
System Requirements: IBM Datamaster DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $3,000
Number Installed to Date: 100
Date First Installed: December 1981
(See Vendor Profile Page V-81)

NORTHWESTERN CONSULTING GROUP, INC.
ACCOUNTS RECEIVABLE IN SPANISH
Specific Application: Accounts Receivable In Spanish
Specific Industry: Wholesale/Distribution, Construction, Accounting
System Requirements: IBM Datamaster DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $3,000
Number Installed to Date: 100
Date First Installed: December 1981

NORTHWESTERN CONSULTING GROUP, INC.
BILLING IN SPANISH
Specific Application: Billing in Spanish
Specific Industry: Wholesale/Distribution, Construction, Accounting
System Requirements: IBM Datamaster
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $3,000
Number Installed to Date: 100

NORTHWESTERN CONSULTING GROUP, INC.
GENERAL LEDGER IN SPANISH
Specific Application: General Ledger In Spanish
Specific Industry: Wholesale/Distribution, Construction, Accounting
System Requirements: IBM Datamaster DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $3,000
Date First Installed: December 1981

NORTHWESTERN CONSULTING GROUP, INC.
SALES ANALYSIS IN SPANISH
Specific Application: Sales Analysis In Spanish
Specific Industry: Wholesale/Distribution, Construction, Accounting
System Requirements: IBM Datamaster DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $3,000
Number Installed to Date: 100
Date First Installed: December 1981

O'HANLON COMPUTER SYSTEMS, INC.
THE SENSIBLE SOLUTION BOOKKEEPER
Specific Application: General Ledger, Accounts Receivable, Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; PC-DOS, MOST; MP/M
Memory Required: 48.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
(See Vendor Profile Page V-82)

O'HANLON COMPUTER SYSTEMS, INC.
THE SENSIBLE SOLUTION BOOKKEEPER PLUS
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: MP/M; CP/M; Most
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595

O'HANLON COMPUTER SYSTEMS, INC.
THE SENSIBLE SOLUTION MANAGEMENT
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Payroll, Order Entry, Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; DPC/OS, Most; MP/M
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $695

O'HANLON COMPUTER SYSTEMS, INC.
SENSIBLE SOLUTION BOOKKEEPER
Specific Application: General Ledger, Accounts Receivable, Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M, TURBO-DOS, MS-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495

Number Installed to Date: 250
Date First Installed: February 1983

O'HANLON COMPUTER SYSTEMS, INC.
SENSIBLE SOLUTION BUSINESS MANAGEMENT
Specific Application: General Ledger, Accounts Receivable, Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M; TURBO-DOS; MS-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $895
Number Installed to Date: 12
Date First Installed: June 1983

OMEGA DESIGN
MICROCHECK
Specific Application: Checkwriter, General Ledger, Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: Televideo 803: CP/M; IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: CB-80, CB-86
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 300
Date First Installed: December 1982
(See Vendor Profile Page V-82)

OMEGA MICROWARE, INC.
TAX TEMPLATES
Specific Application: Tax Scheduling
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Apple II: Apple-DOS; TRS-80: TRS-DOS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25
Date First Installed: 1983
(See Vendor Profile Page V-82)

OMNI SOFTWARE SYSTEMS, INC.
1040 TAX PREPARATION
Specific Application: Federal & State Tax Preparation
System Requirements: IBM PC: PC-DOS, North Star Horizon: DOS; North Star Advantage: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 400
Date First Installed: December 1979
(See Vendor Profile Page V-82)

OMNI SOFTWARE SYSTEMS, INC.
ACCOUNT ANALYSIS
Specific Application: Analysis of Sales, Receipts and Disbursements
System Requirements: IBM PC: PC-DOS, North Star Horizon: DOS; North Star Advantage: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 300
Date First Installed: July 1981

OMNI SOFTWARE SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, North Star Horizon: DOS; North Star Advantage: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 100
Date First Installed: September 1982

OMNI SOFTWARE SYSTEMS, INC.
AMORTIZATION SCHEDULE
Specific Application: Amortization Schedule
Specific Industry: Banking/Financial, Legal, Real Estate
System Requirements: IBM PC; PC-DOS, North Star Horizon: DOS; North Star Advantage: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 500
Date First Installed: August 1981

OMNI SOFTWARE SYSTEMS, INC.
CLIENT INFORMATION SYSTEM
Specific Application: General Ledger System
System Requirements: IBM PC; PC-DOS, North Star Horizon: DOS; North Star Advantage: DOS
Memory Required: 48.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $695
Number Installed to Date: 500
Date First Installed: September 1981

OMNI SOFTWARE SYSTEMS, INC.
CLIENT WRITE UP SYTEM
Specific Application: Client Write Up
System Requirements: IBM PC; PC-DOS, North Star Horizon: DOS; North Star Advantage: DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $695
Number Installed to Date: 400
Date First Installed: September 1981

OMNI SOFTWARE SYSTEMS, INC.
COMPLETE INTERACTIVE ACCOUNTING SYSTEM
Specific Application: Accounting System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS; North Star Horizon: DOS; North Star Advantage: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 250
Date First Installed: August 1981

OMNI SOFTWARE SYSTEMS, INC.
FIXED ASSET ACCOUNTING VERSION 5
Specific Application: Fixed Asset Accounting and Depreciation Schedule
System Requirements: IBM PC; PC-DOS, North Star Horizon: DOS; North Star Advantage: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 350
Date First Installed: January 1980

OMNI SOFTWARE SYSTEMS, INC.
FORM #1099 GENERATOR
Specific Application: Tax Preparation
Specific Industry: Legal
System Requirements: IBM PC; PC-DOS, North Star Horizon: DOS; North Star Advantage: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 450
Date First Installed: March 1981

OMNI SOFTWARE SYSTEMS, INC.
INCOME TAX PLANNER
Specific Application: Tax Planning
System Requirements: IBM PC; PC-DOS, North Star Horizon: DOS; North Star Advantage: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 400
Date First Installed: August 1981

OMNI SOFTWARE SYSTEMS, INC.
INVOICER PLUS
Specific Application: Invoice Preparation
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, North Star Horizon: DOS; North Star Advantage: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 300
Date First Installed: July 1981

OMNI SOFTWARE SYSTEMS, INC.
PERSONAL FINANCIAL SYSTEM
Specific Application: Personal Financial System
Specific Industry: Retail, Nonprofit Organizations
System Requirements: IBM PC; PC-DOS, North Star Horizon: DOS; North Star Advantage: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 300
Date First Installed: September 1981

OMNI SOFTWARE SYSTEMS, INC.
PREVENTATIVE MAINTENANCE SYSTEM
Specific Application: Asset Maintenance Schedule
Specific Industry: Manufacturing, Engineering, Construction, Transportation
System Requirements: IBM PC; PC-DOS; North Star Horizon: DOS; North Star Advantage: DOS
Memory Required: 48.0K bytes.
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 150
Date First Installed: June 1981

OMNI SOFTWARE SYSTEMS, INC.
THE ACCOUNTANT
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, North Star Horizon: DOS; North Star Advantage: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 200
Date First Installed: April 1981

OMNI SOFTWARE SYSTEMS, INC.
THE STOCK MANAGER
Specific Application: Stock Portfolio Management
Specific Industry: Legal, Insurance, Real Estate
System Requirements: IBM PC; PC-DOS, North Star Horizon: DOS; North Star Advantage
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 500
Date First Installed: February 1980

OMNI SOFTWARE SYSTEMS, INC.
TIME KEEPER - TIME & BILLING
Specific Application: Accounts Receivable
Specific Industry: Legal
System Requirements: IBM PC; PC-DOS, North Star Horizon: DOS; North Star Advantage: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $895
Number Installed to Date: 500
Date First Installed: July 1980

OMNI SOFTWARE SYSTEMS, INC.
TRUST ACCOUNTING
Specific Application: Trust Accounting
Specific Industry: Banking/Financial, Legal, Real Estate
System Requirements: IBM PC; PC-DOS, North Star Horizon: DOS; North Star Advantage: DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 200
Date First Installed: August 1982

OMNI 360 CORP.
FARM STORE ACCOUNTING AND RETAIL MANAGEMENT
Specific Application: Accounts Receivable and Payable, General Ledger, Inventory Control
System Requirements: IBM PC; PC-DOS; IBM PC-XT; PC-DOS
Memory Required: 128.0K bytes.
Source Language: Basic
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 12
Date First Installed: September 1982
(See Vendor Profile Page V-82)

OMNI 360 CORP.
GRAIN RECORDS ACCOUNTING AND INVENTORY
Additional Product Classification: Manufacturing
Specific Application: Accounting
System Requirements: IBM PC; PC-DOS; IBM PC-XT; PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 12
Date First Installed: September 1982

OPEN END SYSTEM
GENERAL ACCOUNTING
Specific Application: Accounts Payable and Receivable, Inventory, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Atari; Apple: APPLE-DOS; Alpha Micro, HP
Source Language: Basic, Assembler, Cobol, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: September 1976
(See Vendor Profile Page V-83)

OPEN SYSTEMS, INC.
THE SOFTWARE FITNESS PROGRAM ACCOUNTS
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M, MS-DOS; TURBO-DOS; Unix
Memory Required: 64.0K bytes
Source Language: Business Basic, RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40,000
Date First Installed: January 1978
(See Vendor Profile Page V-83)

OPEN SYSTEMS, INC.
THE SOFTWARE FITNESS PROGRAM GENERAL LEDGER
Specific Application: General Ledger

Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M86, M; MP/M 86; MS-DOS; TURBO-DOS, Oasis
Memory Required: 64.0K bytes
Source Language: Business Basic, RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40,000
Date First Installed: January 1978

OPEN SYSTEMS, INC.
THE SOFTWARE FITNESS PROGRAM INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Business Basic, RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40,000
Date First Installed: January 1978

OPEN SYSTEMS, INC.
THE SOFTWARE FITNESS PROGRAM JOB COST
Specific Application: Job Cost
Specific Industry: Not Industry Sensitive
System Requirements: MP/M; PC-DOS, Oasis, Unix
Memory Required: 64.0K bytes
Source Language: Business Basic, RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40,000
Date First Installed: January 1978

OPEN SYSTEMS, INC.
THE SOFTWARE FITNESS PROGRAM ORDER PROCESSING
Specific Application: Order Processing
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 86; MS-DOS; Unix; Oasis
Memory Required: 64.0K bytes
Source Language: Business Basic, RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40,000
Date First Installed: January 1978

OPEN SYSTEMS, INC.
THE SOFTWARE FITNESS PROGRAM A/R
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M86, MS-DOS; PC-DOS; TURBO-DOS, Unix
Memory Required: 64.0K bytes
Source Language: Business Basic; RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40,000
Date First Installed: January 1978

O. R., INC.
FINANCIAL WORKSHOP
Specific Application: Financial Reporting, General Ledger
Specific Industry: Rehabilitation
System Requirements: Corvus Concept WS I, Concept WS II
Memory Required: 16.0K bytes
Source Language: BAL, RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,200
Number Installed to Date: 10
Date First Installed: 1982
(See Vendor Profile Page V-83)

O. R., INC.
SERVICE ANALYSIS PACK
Specific Application: Service Analysis
Specific Industry: Rehabilitation
System Requirements: Corvus Concept I; Concept II
Memory Required: 16.0K bytes
Source Language: BAL, RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,700
Number Installed to Date: 10
Date First Installed: July 1982

PACIFIC BENCHMARK SYSTEMS, INC.
MEMBERSHIP BILLING SYSTEM
Specific Application: Billing, Mailing
Specific Industry: Memberships
System Requirements: Cado 2020 Series; Cado Cat; Cado Tiger
Memory Required: 48.0K bytes
Source Language: Cadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 4
Date First Installed: July 1982
(See Vendor Profile Page V-83)

PACIFIC BENCHMARK SYSTEMS, INC.
PRINTERS JOB COST
Specific Application: Maintains Cost Center Information for the Printing Industry
Specific Industry: Not Industry Sensitive, Printing
System Requirements: Cado 2020 Series; Cado Cat; Cado Tiger
Memory Required: 48.0K bytes
Source Language: Cadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 1
Date First Installed: 1982

PACIFIC COMPUTER
AUTOMATED SELF STORAGE MANAGEMENT SYSTEM
Specific Application: Tracks Tenants and Accounts Receivable
Specific Industry: Storage Companies
System Requirements: IBM, DEC; TURBO-DOS; DG: CP/M; Prime: MP/M
Memory Required: 48.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 2
Date First Installed: March 1983
(See Vendor Profile Page V-84)

PARKER COMPUTER SYSTEMS
RURAL WATER BILLING SYSTEM
Specific Application: Accounts Receivable
Specific Industry: Utilities
System Requirements: IBM PC; PC-DOS; CP/M
Memory Required: 128.0K bytes
Source Language: CP/M, PC-DOS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 10
Date First Installed: August 1981
(See Vendor Profile Page V-83)

PEACHTREE SOFTWARE
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
Memory Required: 50.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
(See Vendor Profile Page V-85)

PEACHTREE SOFTWARE
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
Memory Required: 50.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750

PEACHTREE SOFTWARE
GENERAL LEDGER
Specific Application: General Ledger Accounting
Specific Industry: Not Industry Sensitive
Memory Required: 50.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750

PEACHTREE SOFTWARE
PEACHPAK/4
Specific Application: Accounts Receivable, Accounts Payable, General Ledger
Specific Industry: Not Industry Sensitive
Memory Required: 48.0K bytes
Source Language: PC Basic, Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395

PEACHTREE SOFTWARE
SALES INVOICING
Specific Application: Sales Invoicing
Specific Industry: Not Industry Sensitive
Memory Required: 50.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750

PERICOMP CORP.
ACCOUNTING
Additional Product Classification: Manufacturing
Specific Industry: Not Industry Sensitive, Manufacturing, Retail
System Requirements: Z80 Micros; CP/M
Memory Required: 48.0K bytes
Source Language: Assembler, Dbase II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 50
Date First Installed: May 1980
(See Vendor Profile Page V-85)

PETTED MICRO SYSTEMS
LEGAL TIME ACCOUNTING
Specific Application: Accounts Payable and Receivable
Specific Industry: Legal
System Requirements: Commodore 8032; OS
Memory Required: 32.0K bytes
Source Language: Basic, Assembly-
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195 to $995
Date First Installed: 1979
(See Vendor Profile Page V-85)

PHOENIX SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
System Requirements: Cado
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1979

PHOENIX SYSTEMS, INC.
FIXED ASSETS
Specific Application: Fixed Assets
System Requirements: Cado
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1979
(See Vendor Profile Page V-86)

PHOENIX SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
System Requirements: Cado
Memory Required: 16.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 100
Date First Installed: 1979

PLENARY SYSTEMS, INC.
PASS
Specific Application: Client Write-Up System for Accountants
Specific Industry: Accountants
System Requirements: IBM PC; PC-DOS, TI Professional
Memory Required: 128.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195 to $2,000
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-86)

PLENARY SYSTEMS, INC.
PASS
Specific Application: Client Write-Up Including General Ledger, Accounts Receivable, Asset Management, Spreadsheet
Specific Industry: Accountants
System Requirements: IBM PC; PC-DOS, TI Professional
Memory Required: 128.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195 to $2,000

Number Installed to Date: 100
Date First Installed: 1981

PLEMARY SYSTEMS, INC.
PROFESSIONAL ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Accountants
System Requirements: IBM PC: PC-DOS, TI Professional
Memory Required: 128.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195 to $2,000
Number Installed to Date: 50
Date First Installed: 1983

PLEMARY SYSTEMS, INC.
TAX I
Specific Application: Tax Preparation
Specific Industry: Accountants
System Requirements: IBM PC: PC-DOS, TI Professional
Memory Required: 128.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195 to $2,000
Number Installed to Date: 50
Date First Installed: 1982

PLEMARY SYSTEMS, INC.
TAX II
Specific Application: 1040 Package
Specific Industry: Accountants
System Requirements: IBM PC: PC-DOS, TI Professional
Memory Required: 128.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195 to $2,000
Number Installed to Date: 50
Date First Installed: September 1979

PLEMARY SYSTEMS, INC.
TIME AND BILLING
Specific Application: Time and Billing
Specific Industry: Accountants
System Requirements: IBM PC: PC-DOS, TI Professional
Memory Required: 128.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195 to $2,000
Number Installed to Date: 400
Date First Installed: September 1979

POLICY DEVELOPMENT CORP.
MAGAZINE BILLING AND RENEWAL
Specific Application: Analyzes Probability of Renewal Efforts and Collection Efforts
Specific Industry: Magazine Publisher
System Requirements: IBM PC: PC-DOS; DEC Rainbow; CP/M 80; CP/M 86
Memory Required: 128.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 45
Date First Installed: 1983
(See Vendor Profile Page V-87)

POTTERS PROGRAMS
DEPRECIATION SCHEDULE
Specific Application: Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: North Star
Memory Required: 32.0K bytes
Source Language: Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30
Date First Installed: 1978
(See Vendor Profile Page V-87)

POTTERS PROGRAMS
TIME MANAGEMENT SYSTEM
Specific Application: Time Management
Specific Industry: Not Industry Sensitive
System Requirements: North Star
Memory Required: 32.0K bytes
Source Language: Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30
Date First Installed: 1978

PRINTERS SOFTWARE, INC.
ESTIMATE/80
Specific Application: Estimates Projected Time and Costs
Specific Industry: Printing
System Requirements: TRS-80/II, Model 12; TRS-80 Model 16; CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 1,500
Date First Installed: 1979
(See Vendor Profile Page V-87)

PRINTERS SOFTWARE, INC.
JOB CONTROL/80
Specific Application: Controls Labor and Material Costs
Specific Industry: Printing
System Requirements: TRS-80/II, Model 12; TRS-80 Model 16; CP/M 2.2
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 1,000
Date First Installed: April 1980

PROCOMP INTERNATIONAL
GENERAL ACCOUNTING.
Additional Product Classification: Data/File Management
Specific Application: Accounts Payable and Receivable, General Ledger, Payroll, Inventory, Database File Manager
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE: APPLE-DOS, IBM PC: PC-DOS; Source Language: Applesoft, Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3,500
Date First Installed: 1979
(See Vendor Profile Page V-87)

PROCOMP INTERNATIONAL
JOB COSTING SYSTEM
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE, III: APPLE-DOS; IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Applesoft, Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

PROFESSIONAL BUSINESS SYSTEMS, INC.
SCRIBE
Specific Application: Church Management, Membership, Financial
Specific Industry: Church
System Requirements: Durango F85: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 2
Date First Installed: October 1981
(See Vendor Profile Page V-88)

PROFESSIONAL DATA SERVICES
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM Micro
Source Language: Micro
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: April 1982
(See Vendor Profile Page V-88)

PROFESSIONAL SOFTWARE INNOVATIONS, INC.
AMORTIZATION PROGRAM
Specific Application: Amortization Program
Specific Industry: Not Industry Sensitive
System Requirements: CPT 8000; CPT 8100, CPT 8525
Source Language: PL/1, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1983
(See Vendor Profile Page V-89)

PROFESSIONAL SOFTWARE INNOVATIONS, INC.
TRUST ACCOUNTING SYSTEM
Specific Application: Money Management
Specific Industry: Not Industry Sensitive
System Requirements: CPT 8000; CPT 8100, CPT 8525
Source Language: Assembler, PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500 to $7,500
Number Installed to Date: 75

PROFESSIONAL SOFTWARE INNOVATIONS, INC.
ULTRA BUDGET ADMINISTRATOR
Specific Application: Budgeting
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80; Xerox 820
Source Language: Assembler, PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000 to $200
Date First Installed: 1983

PROFESSIONAL SOFTWARE INNOVATIONS, INC.
ULTRA PROFESSIONAL TIME BILLING SYSTEM
Specific Application: Billing
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80; Xerox 820
Source Language: Assembler, PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500 to $2,000
Number Installed to Date: 250
Date First Installed: February 1982

PROFIT MANAGEMENT SYSTEMS, INC.
FORECAM
Specific Application: Cash Flow Analysis Project
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 86; MS/DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: September 1983
(See Vendor Profile Page V-88)

PROMETHEAN SYSTEMS, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000: MS-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $895
Number Installed to Date: 40
Date First Installed: 1982
(See Vendor Profile Page V-89)

PROMETHEAN SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000: MS-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $895
Number Installed to Date: 40
Date First Installed: September 1982

PROMETHEAN SYSTEMS, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000: MS-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $895
Number Installed to Date: 40
Date First Installed: 1982

PROSOFT
TALLYMASTER - TRS-80
Specific Application: Financial Management
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: TRS-DOS: NEW-DOS; LNW-80; Lobo Max-80
Memory Required: 48.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $80
[illegible]
Date First Installed: February 1983
(See Vendor Profile Page V-89)

PYRAMID DATA LTD.
AMORTIZATION SCHEDULE PREPARE
Specific Application: Preparation of Amortization Schedules
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, PC-XT: PC-DOS; Compaq: MS-DOS; Otrona: MS-DOS
Source Language: Mbasic
Purchase Terms: Purchase (license)
Price: $4,995
Date First Installed: March 1983

PYRAMID DATA LTD.
INVOICE PREPARE
Specific Application: Invoice Preparation
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, PC-XT, PC-DOS; Compaq: MS-DOS; Otrona: MS-DOS
Source Language: Mbasic
Purchase Terms: Purchase (license)
Price: $5,995
Date First Installed: March 1983

QCS CORP.
QCS ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Altos: CP/M, Xenix, Quasar 300: MP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $900
[illegible] 10
Date First Installed: July 1981
(See Vendor Profile Page V-89)

QCS CORP.
QCS ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Altos: CP/M, Xenix, Quasar 300: MP/M
Memory Required: 64.0K bytes
Source Language: Lbasic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $90
Number Installed to Date: 10
Date First Installed: July 1981

QCS CORP.
QCS GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Altos: CP/M, Xenix, Quasar 300: MP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $900
Number Installed to Date: 10
Date First Installed: July 1981

QCS CORP.
QCS JOB COSTING
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: Altos: CP/M, Xenix; Quasar 300: MP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $900
Number Installed to Date: 10
Date First Installed: July 1981

QCS CORP.
QCS JOB ESTIMATING
Specific Application: Job Estimating
Specific Industry: Not Industry Sensitive
System Requirements: Altos: CP/M, Xenix; Quasar 300: MP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $900
Number Installed to Date: 10
Date First Installed: July 1981

QCS CORP.
QCS JOB QUOTING
Specific Application: Job Quoting
Specific Industry: Not Industry Sensitive
System Requirements: Altos: CP/M, Xenix; Quasar 300: MP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $900
Number Installed to Date: 10
Date First Installed: July 1981

QCS CORP.
QCS ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: Altos: CP/M, Xenix; Quasar 300: MP/M
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $900
Number Installed to Date: 4
Date First Installed: April 1982

QCS CORP.
QCS ORDER SCHEDULING
Specific Application: Job Scheduling
Specific Industry: Not Industry Sensitive
System Requirements: Altos: CP/M, Xenix; Quasar 300: MP/M
Memory Required: 96.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $900
Number Installed to Date: 4
Date First Installed: April 1982

QCS CORP.
QCS SALES ACCOUNT
Specific Application: Sales and Commission Reports
Specific Industry: Sales
System Requirements: Altos: CP/M, Xenix; Quasar 300: MP/M
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $900
[illegible] 4
Date First Installed: 1982

QUEST, INC.
QUEST ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: General Ledger, Accounts Payable and Receivable, Order Entry, Inventory Control, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Molecular Computer; North Star
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995 to $6,000
Number Installed to Date: 50
Date First Installed: September 1982
(See Vendor Profile Page V-90)

QUEST, INC.
QUEST BOOKKEEPER I
Specific Application: General Ledger, Accounts Receivable and Payable
Specific Industry: Not Industry Sensitive
System Requirements: Morrow Designs MD3: CP/M; IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Mbasic
Purchase Terms: Purchase (license)
Price: $795
[illegible] 300
Date First Installed: May 1983

QUEST, INC.
QUEST BOOKKEEPER II
Specific Application: Accounts Payable and Receivable, General Ledger, Invoicing Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Morrow Designs MD3: CP/M; IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Mbasic
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 24
Date First Installed: July 1983

QUICK-TAX, LTD.
CORPORATE TAX RETURNS
Specific Application: Corporate Tax Returns
Specific Industry: Banking/Financial, Accounting
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-90)

QUICK-TAX, LTD.
GENERAL LEDGER-CLIENT WRITE UP
Specific Application: General Ledger With Client Write-Up
Specific Industry: Banking/Financial, Accounting
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 3,000
Date First Installed: 1976

QUICK-TAX, LTD.
PARTNERSHIP TAX RETURNS
Specific Application: Partnership Tax Returns
Specific Industry: Banking/Financial, Accounting
System Requirements: CP/M
Source Language: Basic
Source Code Available: No
Date First Installed: 1983

QUICK-TAX, LTD.
PROFESSIONAL TAX PKG
Specific Application: Tax Preparation
Specific Industry: Banking/Financial, Accounting
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,350
Number Installed to Date: 1,600
Date First Installed: 1977

QUICK-TAX, LTD.
TIME AND BILLING SYSTEM
Specific Application: Time and Billing System
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
[illegible]

RAISH ENTERPRISES, INC.
JOB COSTING
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: DOS: CP/M; TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Cbasic
Purchase Terms: Purchase (license)
Date First Installed: 1982
(See Vendor Profile Page V-91)

RAXIS INTERNATIONAL, INC.
BOOKWORKER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: DOS

Memory Required: 96.0K bytes
Source Language: Extended Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 200
Date First Installed: May 1979

RAXIS INTERNATIONAL, INC.
PROSPECT MANAGER
Specific Application: Prospect Manager
Specific Industry: Not Industry Sensitive, Real Estate
System Requirements: Apple II: DOS
Memory Required: 96.0K bytes
Source Language: Extended Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1983

RAXIS INTERNATIONAL, INC.
SERVICE MANAGER
Specific Application: Service - Manager
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 96.0K bytes
Source Language: Extended Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1983

REALTY SOFTWARE CO.
CONSTRUCTION COST/PROFIT ANALYS
Specific Application: Construction Cost/Profit Analysis
Specific Industry: Banking/Financial
System Requirements: Apple II, IIE, III: APPLE-DOS 2.2; IBM PC: PC-DOS; CP/M: CP/M; TRS-80/I, TRS-80/III: TRS-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: February 1979
(See Vendor Profile Page V-92)

REALTY SOFTWARE CO.
TAX DEFFERED EXCHANGE
Specific Application: Property Tax Analysis
Specific Industry: Banking/Financial, Real Estate
System Requirements: Apple II, IIE, III: APPLE-DOS 2.2; IBM PC: PC-DOS; CP/M: CP/M; TRS-80/I, TRS-80/III: TRS-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: February 1979

R & E BUSINESS SYSTEMS, INC.
GEN ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel, Inventory
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Payroll, Inventory, Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; IBM PC: PC-DOS; Victor
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000 to $5,000
Number Installed to Date: 50
Date First Installed: 1977
(See Vendor Profile Page V-92)

R & E BUSINESS SYSTEMS, INC.
ROYALTY ACCOUNTING
Specific Application: Royalty Accounting
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; IBM PC: PC-DOS, Victor: MS-DOS
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 4
Date First Installed: March 1982

RECORDATA WEST, INC.
CLIENT ACCOUNTING SYSTEM
Specific Application: Client Accounting
System Requirements: Basic Four: IBM
Memory Required: 1.5M bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Date First Installed: 1973
(See Vendor Profile Page V-92)

RECORDATA WEST, INC.
LAWS-LEGAL ACCOUNTING WRITE SYSTEM
Specific Application: Time and Billing
Specific Industry: Legal
System Requirements: Basic Four: IBM
Memory Required: 1.5M bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000
Date First Installed: 1977

RED WING BUSINESS SYSTEMS, INC.
RED WING ASSET MANAGEMENT SYSTEM
Specific Application: Asset Management Depreciation Schedules
Specific Industry: Agricultural
System Requirements: Apple II, IIE: Applesoft; IBM RC: PC-DOS; TRS-80/III: TRS-DOS; TI Professional: MS-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 350
Date First Installed: August 1982
(See Vendor Profile Page V-92)

RED WING BUSINESS SYSTEMS, INC.
RED WING GENERAL LEDGER SYSTEM
Specific Application: General Ledger
Specific Industry: Agricultural
System Requirements: Apple II, IIE: Applesoft; IBM PC: PC-DOS; TRS-80/III, TRS-80/III: TRS-DOS; TI Professional: MS-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 600
Date First Installed: January 1982

REVEAL SOFTWARE, INC.
REVEAL PORTFOLIO AND CLIENT MANAGEMENT SYSTEM
Additional Product Classification: Banking
Specific Application: Portfolio and Client Management
Specific Industry: Banking/Financial
System Requirements: IBM PC: UCSD-P; Apple II, Apple III
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,250 to $1,550
Number Installed to Date: 200
Date First Installed: February 1982
(See Vendor Profile Page V-93)

RICHARD W. KRUEGER CPA
MANUFACTURING ACCOUNTING SYSTEM -
Additional Product Classification: Manufacturing
Specific Application: Inventory Control, Bill of Material, Accounts Receivable, Consigned Inventory
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Corvus Concept; Apple II+, IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: $6,000
Purchase Terms: Purchase (license)
Number Installed to Date: 11
Date First Installed: March 1981
(See Vendor Profile Page V-93)

RIZZO DATA SYSTEM, INC.
LOAN AMORTIZATION SCHEDULING FOR TRS/80
Specific Application: Loan Amortization Scheduling
Specific Industry: Banking/Financial
System Requirements: TRS-80/I, Model 12, Model 16
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $28
Number Installed to Date: 200
Date First Installed: December 1978
(See Vendor Profile Page V-93)

RMH ENTERPRISES
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Osborne 1; Osborne Executive; CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Purchase Terms: Purchase (license)
Price: $128
Number Installed to Date: 50
Date First Installed: June 1981
(See Vendor Profile Page V-94)

RMH ENTERPRISES
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Osborne 1: CP/M; Osborne Executive
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: $38
Purchase Terms: Purchase (license)
Price: $128
Number Installed to Date: 100
Date First Installed: June 1981

RMH ENTERPRISES
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Osborne 1: CP/M; Osborne Executive
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: $38
Purchase Terms: Purchase (license)
Price: $128
Number Installed to Date: 150
Date First Installed: June 1981

RMH ENTERPRISES
PAYROLL WITH COST ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: Payroll With Cost Accounting and Job Cost
Specific Industry: Not Industry Sensitive
System Requirements: Osborne 1: CP/M; Osborne Executive
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: $38
Purchase Terms: Purchase (license)
Price: $148
Number Installed to Date: 20
Date First Installed: September 1981

SAGE SYSTEMS
SAGE AUDITOR WORKSTATION
Specific Application: Interactive Auditor Productivity Tool for Financial Auditor With no DP Experience
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 256.0K bytes
Source Language: APS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 5
Date First Installed: 1983
(See Vendor Profile Page V-94)

SBD COMPUTER SERVICES CORP.
INDEPENDENT AGENT INSURANCE PAC
Additional Product Classification: WP/Text Editing
Specific Application: Accounts Payable, Accounts Receivable, General Ledger, WP, Labels, Letters
Specific Industry: Insurance
System Requirements: IBM PC; TI Professional
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1983
(See Vendor Profile Page V-95)

SCIENCE MANAGEMENT CORP.
THOROUGHBRED ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: 16-Bit Microcomputers
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595
(See Vendor Profile Page V-95)

SCIENCE MANAGEMENT CORP.
THOROUGHBRED ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: 16-Bit Microcomputers
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595

SCIENCE MANAGEMENT CORP.
THOROUGHBRED FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: 16-Bit Microcomputers
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595

SCIENCE MANAGEMENT CORP.
THOROUGHBRED GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: 16-Bit Microcomputers
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595

SCIENCE MANAGEMENT CORP.
THOROUGHBRED ORDER PROCESSING
Specific Application: Order Processing
Specific Industry: Not Industry Sensitive
System Requirements: 16-Bit Microcomputers
Source Code Available: Yes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $595

SCIENCE MANAGEMENT CORP.
THOROUGHBRED PURCHASE ORDER
Specific Application: Purchase Order
Specific Industry: Not Industry Sensitive
System Requirements: 16-Bit Microcomputers
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $395

SIERRA NATIONAL CORP.
S-BASE-RETAIL MERCHANT INVENTORY
Specific Application: Inventory Control for Retail Business
Specific Industry: Retail
System Requirements: Sierra 3000, 4000: CP/M, MP/M
Memory Required: 48.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 60
Date First Installed: January 1981
(See Vendor Profile Page V-97)

SIERRA NATIONAL CORP.
S-BASE-FOOD SERVICE
Specific Application: Sales Menu Explosion Inventory and Purchasing
Specific Industry: Restaurants
System Requirements: Sierra 3000, 4000: CP/M, MP/M
Memory Required: 48.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 50
Date First Installed: October 1982

SILICON VALLEY SYSTEMS, INC.
THE FINAL ANALYSIS
Specific Application: Process Cost Accounting
Specific Industry: Manufacturing
System Requirements: Apple II, II+, IIE; APPLE-DOS 3.3
Memory Required: 64.0K bytes
Source Language: UCSD-P
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $275
Number Installed to Date: 10,000
Date First Installed: December 1982
(See Vendor Profile Page V-97)

SMALL BUSINESS SYSTEMS GROUP, INC.
ACCOUNTMASTER 8/16TM
Additional Product Classification: Payroll/Personnel
Specific Application: Accounts Receivable and Payable, General Ledger, Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; IBM PC-XT: PC-DOS; TRS-80: CP/M; MP/M
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 25,000
Date First Installed: September 1979
(See Vendor Profile Page V-96)

SMART, INC.
SMART NET
Specific Application: Merchandising Accounting for Smaller Retailers
Specific Industry: Retail
System Requirements: IBM PC-XT: PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: Database
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 4
Date First Installed: 1983
(See Vendor Profile Page V-96)

SMC SOFTWARE SYSTEMS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Wholesale/Distribution
System Requirements: DEC PDP-11: RSTS/E; Altos: Xenix; Zilog: Zeus
Memory Required: 38.0K bytes
Source Language: SMC Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595
Date First Installed: 1972
(See Vendor Profile Page V-96)

SMC SOFTWARE SYSTEMS
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Wholesale/Distribution
System Requirements: DEC PDP-11: RSTS/E
Memory Required: 38.0K bytes
Source Language: SMC Basic
Purchase Terms: Purchase (license)
Price: $595
Date First Installed: 1972

SMC SOFTWARE SYSTEMS
FIXED ASSETS
Specific Application: Fixed Assets
Specific Industry: Wholesale/Distribution
System Requirements: DEC PDP-11: RSTS/E; Altos: Xenix; Zilog: Zeus
Memory Required: 38.0K bytes
Source Language: SMC Basic
Purchase Terms: Purchase (license)
Price: $595
Date First Installed: 1972

SMC SOFTWARE SYSTEMS
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Wholesale/Distribution
System Requirements: DEC PDP-11: RSTS/E; Altos: Xenix; Zilog: Zeus
Memory Required: 38.0K bytes
Source Language: SMC Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Date First Installed: 1972

SMC SOFTWARE SYSTEMS
PURCHASE ORDER
Specific Application: Purchase Order
Specific Industry: Wholesale/Distribution
System Requirements: DEC PDP-11: RSTS/E; Altos: Xenix; Zilog: Zeus
Memory Required: 38.0K bytes
Source Language: SMC Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Date First Installed: 1972

SMITH ANDERSON CORP.
REMITTANCE CONTROL
Specific Application: Remittance Control System
Specific Industry: Government
System Requirements: MCR 2SS8: MRX
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-96)

SOFTLINK CORP.
PRACTICAL ACCOUNTANT
Additional Product Classification: Payroll/Personnel, Report Generator
Specific Application: Payroll, Report Generator, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 150
Date First Installed: June 1983
(See Vendor Profile Page V-96)

SOFTSYNC, INC.
THE PERSONAL ACCOUNTANT
Specific Application: Accounting Program
Specific Industry: Banking/Financial
System Requirements: Commodore 64
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50 to $95
(See Vendor Profile Page V-96)

SOFTWARE CORP.
ACCOUNTING SERIES
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll, Inventory, Mail List, Check Writer and Job Estimate
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 8000 Commodity DOS; Commodore 9000: Commodore DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 25
Date First Installed: 1981
(See Vendor Profile Page V-96)

SOFTWARE CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 9000: Commodore DOS; Commodore 8000: Commodore DOS
Memory Required: 32.0K bytes
Source Language: Basic

Source Code Available: No
Purchase Terms: Purchase (license)
Price: $220
Number Installed to Date: 200
Date First Installed: 1980

SOFTWARE CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 8000: Commodore DOS; Commodore 9000: Commodore DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $220
Number Installed to Date: 200
Date First Installed: 1980

SOFTWARE CORP.
CHECKWRITER
Specific Application: Checkwriter
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 8000: Commodore DOS; Commodore 9000: Commodore DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $80
Number Installed to Date: 150
Date First Installed: 1979

SOFTWARE CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 8000: Commodore DOS; Commodore 9000: Commodore DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $280
Date First Installed: September 1983

SOFTWARE CORP.
JOB ESTIMATE AND JOB COST
Specific Application: Job Estimate and Job Cost
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 8000: Commodore DOS; Commodore 9000: Commodore DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $80
Number Installed to Date: 80
Date First Installed: 1981

SOFTWARE CORP.
LEGAL ACCOUNTING
Specific Application: A Legal Accounting Package
Specific Industry: Legal
System Requirements: Commodore 8000: Commodore DOS; Apple II, II+, IIE: APPLE-DOS; Apple III: APPLE-DOS; Commodore 8000: Commodore DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 40
Date First Installed: July 1979

SOFTWARE DYNAMICS
COUNT/UP
Specific Application: Double Entry Accounting System, Accounts Receivable, Accounts Payable, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: PSITech GT Series, TRS-80; Motorola: S-DOS
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,725
Number Installed to Date: 50
Date First Installed: 1980
(See Vendor Profile Page V-99)

THE SOFTWARE GROUP
WHOLESALE NURSERY ORDER ENTRY INVENTORY
Additional Product Classification: Inventory
Specific Application: Sales Order Processing and Inventory Control
Specific Industry: Wholesale/Distribution, Nursery
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic 2, CB-80
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 2
Date First Installed: September 1981
(See Vendor Profile Page V-99)

SOFTWARE PROGRAMMERS, INC.
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM Datamaster
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $6,000
Number Installed to Date: 100
Date First Installed: June 1982
(See Vendor Profile Page V-100)

SOFTWARE PROGRAMMERS, INC.
JOB COST
Specific Application: Job Cost
Specific Industry: Manufacturing
System Requirements: IBM Datamaster
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 15
Date First Installed: September 1982

SOFTWARE RESOURCES, INC.
MICRO-MASTER PROFESSIONAL PORTFOLIO
Specific Application: Portfolio Accounting
Specific Industry: Not Industry Sensitive, Banking/Financial
System Requirements: IBM PC: UCSD-P, IBM PC-XT: UCSD-P
Memory Required: 128.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 15
Date First Installed: September 1982
(See Vendor Profile Page V-100)

SOFTWARE TECHNOLOGY FOR COMPUTERS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS 3.3; IBM PC: PC-DOS 1.1
Memory Required: 48.0K bytes
Source Language: Assembly, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $275
Date First Installed: 1980
(See Vendor Profile Page V-100)

SOFTWARE TECHNOLOGY FOR COMPUTERS
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS 3.3; IBM PC: PC-DOS 1.1
Memory Required: 48.0K bytes
Source Language: Assembly, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1983

SOFTWARE TECHNOLOGY FOR COMPUTERS
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS 3.3; IBM PC: PC-DOS 1.1
Memory Required: 48.0K bytes
Source Language: Assembly, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1982

SOFTWARE TECHNOLOGY FOR COMPUTERS
MEDIA SCHEDULING
Specific Application: Media Scheduling
Specific Industry: Retail
System Requirements: Apple: APPLE-DOS 3.3; IBM PC: PC-DOS 1.1
Memory Required: 48.0K bytes
Source Language: Assembly, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Date First Installed: 1980

SOFTWARE TECHNOLOGY FOR COMPUTERS
PROFESSIONAL TIME AND BILLING
Specific Application: Professional Time and Billing
Specific Industry: Legal
System Requirements: Apple: APPLE-DOS 3.3; IBM PC: PC-DOS 1.1
Memory Required: 48.0K bytes
Source Language: Assembly, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Date First Installed: September 1980

SOFTWARE TECHNOLOGY, INC.
GENERAL LEDGER SYSTEM
Specific Application: General Ledger
Specific Industry: Legal, Accountants
System Requirements: CP/M; MS-DOS
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 60
Date First Installed: 1981
(See Vendor Profile Page V-100)

SOFTWARE TECHNOLOGY, INC.
TABS
Specific Application: Time Accounting and Billing System
Specific Industry: Legal, Accountants
System Requirements: : CP/M; MS-DOS; MP/M
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 500
Date First Installed: 1979

SOFTWARE TECHNOLOGY, INC.
TRUST ACCOUNTING SYSTEM
Specific Application: Trust Accounting
Specific Industry: Legal, Accountants
System Requirements: CP/M; MS-DOS
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 200
Date First Installed: 1982

SOLID SOFTWARE
SOLIDBILLING
Specific Application: Standard Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; MS-DOS
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Price: $495
Number Installed to Date: 360
Date First Installed: February 1982
(See Vendor Profile Page V-100)

SOLID SOFTWARE
SOLIDLEDGER
Specific Application: Standard General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; MS-DOS
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 350
Date First Installed: February 1982

SOLID SOFTWARE
SOLIDORDER
Additional Product Classification: Manufacturing
Specific Application: Sales Order Entry With Accounts Receivable, Inventory
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: CP/M 80; MS-DOS
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 175
Date First Installed: February 1982

SOLID SOFTWARE
SOLIDPAYABLES
Specific Application: Standard Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; MS-DOS
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 495
Date First Installed: February 1982

SORCIM CORP.
SUPERCALC
Specific Application: Electronic Worksheet
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86, PC-DOS; MS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Date First Installed: 1981
(See Vendor Profile Page V-101)

SORCIM CORP.
SUPERCHART
Additional Product Classification: Graphics
Specific Application: Graphics
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 2.2; CP/M 86, PC-DOS, MS-DOS
Memory Required: 80.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983

SORCIM CORP.
SUPERCALC 2
Specific Application: Electronic Worksheet
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86, PC-DOS; MS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: 1983

SOUTHERN SOLUTIONS
BUSINESSWARE
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll, Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: February 1983
(See Vendor Profile Page V-101)

SOUTHERN SOLUTIONS
CHURCH RECORD SYSTEM
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll
Specific Industry: Church
System Requirements: Commodore 8000 Series, Commodore B Series
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: September 1983

SOUTHERN SOLUTIONS
OIL ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll, Inventory
Specific Industry: Oil and Gas
System Requirements: Commodore 8000 Series; Commodore B Series
Purchase Terms: Purchase (license)
Date First Installed: September 1983

SOUTHERN SOLUTIONS
SYSTEM III ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll,
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 8000 Series; Commodore B Series
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: June 1981

SOUTHERN SOLUTIONS
SYSTEMS IV ACCOUNTING SYSTEM
Additional Product Classification: Payroll/Personnel, Manufacturing
Specific Application: Inventory, Job Cost, General Ledger, Accounts Payable and Receivable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 8000 Series, Commodore B Series
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750 to $4,500
Date First Installed: April 1983

SOUTH WEST SYSTEMS
ACCOUNTS PAYABLE
Specific Application: Accounts Payable With Check Writing
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: DOS; TRS-80/III: DOS+; TRS-80/4
Memory Required: 48.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: January 1980
(See Vendor Profile Page V-101)

SOUTH WEST SYSTEMS
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable General Billing
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: DOS, TRS-80/III: DOS+; TRS-80/4
Memory Required: 48.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: January 1980

SOUTH WEST SYSTEMS
MINISZ BOOKKEEPING SYSTEM
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: DOS+
Memory Required: 48.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: January 1980

SOUTH WEST SYSTEMS
PROJECT COST CONTROL
Specific Application: Financial Control
Specific Industry: Manufacturing, Engineering, Construction, Government
System Requirements: TRS-80/I: DOS+
Memory Required: 48.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $70
Date First Installed: January 1982

SPARKING CITY SOFTWARE CO.
TAVERN AUDIT PROGRAM SYSTEM
Specific Application: Audits Purchases and Sales
Specific Industry: Hospitality
System Requirements: Apple II; IBM PC; UCSD-P
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-101)

SPRINGWATER SOFTWARE, INC.
ACCOUNTING SYSTEM
Specific Application: General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 256.0K bytes
Source Language: APL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: August 1983
(See Vendor Profile Page V-102)

STANDARD SOFTWARE SYSTEM, INC.
ATTORNEY BILLING
Specific Application: Attorney Billing With Cost Accounting
Specific Industry: Legal
System Requirements: Victor 9000; IBM PC; Xerox 820; Televideo
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1982
(See Vendor Profile Page V-102)

STANDARD SOFTWARE SYSTEM, INC.
CASH DISBURSEMENTS
Specific Application: Cash Disbursements
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000; IBM PC; Xerox 820; Televideo
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1983

STANDARD SOFTWARE SYSTEM, INC.
CASH RECEIPTS
Specific Application: Cash Receipts
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000; IBM PC; Xerox 820; Televideo
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1983

STANDARD SOFTWARE SYSTEM, INC.
ELKS CLUBS PACKAGE
Specific Application: Club Management
Specific Industry: Clubs
System Requirements: Victor 9000; IBM PC; Xerox 820; Televideo
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1982

STANDARD SOFTWARE SYSTEM, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000; IBM PC; Xerox 820; Televideo
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1982

STARBURST COMPUTER GROUP, INC.
QUERY
Additional Product Classification: Manufacturing
Specific Application: Inventory, Accounts Receivable
Specific Industry: Quarry Stone Companies
System Requirements: Micropro Starburst. CP/M
Memory Required: 64.0K bytes
Source Language: CB-80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $475
Number Installed to Date: 2
Date First Installed: January 1983
(See Vendor Profile Page V-102)

STARBURST COMPUTER GROUP, INC.
STGL STARBURST GENERAL LEDGER
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Micropro Starburst: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $475
Number Installed to Date: 9
Date First Installed: January 1983

STATE OF THE ART, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Apple III; Apple II; IBM PC
Memory Required: 64.0K bytes
Source Language: UCSD-P
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $340
Date First Installed: July 1982
(See Vendor Profile Page V-103)

STATE OF THE ART, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple III; IBM PC
Memory Required: 64.0K bytes
Source Language: UCSD-P
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $340
Date First Installed: July 1982

STATE OF THE ART, INC.
BUDGETING & FINANCIAL REPORTING
Specific Application: Budgeting and Financial Reporting
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple III; IBM PC
Memory Required: 64.0K bytes
Source Language: UCSD-P
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $340
Date First Installed: July 1982

STATE OF THE ART, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple III; IBM PC
Memory Required: 64.0K bytes
Source Language: UCSD-P
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $340
Date First Installed: July 1982

STATE OF THE ART, INC.
PROFESSIONAL TIME & BILLING
Specific Application: Professional Time and Billing
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple III; IBM PC
Memory Required: 64.0K bytes
Source Language: UCSD-P
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $340
Date First Installed: July 1982

STATE OF THE ART, INC.
SALES INVOICING
Specific Application: Sales Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple III, IBM PC
Memory Required: 64.0K bytes
Source Language: UCSD-P
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $340
Date First Installed: July 1982

STERLING DATA APPLICATIONS, INC. (SDA)
EMERGENCY SERVICES & MINOR WORK OPERATIONS
Specific Application: Tracking Facilities Management Report Writing
Specific Industry: University
System Requirements: IBM PC: CP/M
Memory Required: 48.0K bytes
Source Language: Basic, DBase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: July 1983
(See Vendor Profile Page V-103)

ST. JOSEPH DATA SERVICE, INC.
MONTHLY MANAGEMENT ACCOUNTING PROGRAM
Specific Application: Cash Flow, Journals, Budget
System Requirements: IBM PC, PC-XT, PC-DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Lease
Price: $3,000
Number Installed to Date: 100
Date First Installed: January 1973
(See Vendor Profile Page V-103)

STOLZBERG RESEARCH ASSOCIATES, INC.
DISTRIBUTOR
Specific Application: General Accounting for Distribution Industry
Specific Industry: Wholesale/Distribution
System Requirements: IBM PC: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-103)

STOLZBERG RESEARCH ASSOCIATES, INC.
PRIVATE SCHOOL ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Education
System Requirements: IBM PC: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 5

STORED INFORMATION SYSTEMS
HOTSHOT
Specific Application: Billing, Management
Specific Industry: Hotel
System Requirements: Northstar Advantage: CP/M, Victor 900; Osborne 1. MS-DOS
Memory Required: 6.0K bytes
Source Language: Dbase II
Source Code Available: $200
Purchase Terms: Purchase (license)
Price: $2,300
Date First Installed: 1983.
(See Vendor Profile Page V-103)

STORED INFORMATION SYSTEMS
MRP + TWO
Specific Application: Modules for Specific Industries
Specific Industry: Manufacturing, Wholesale/Distribution, Custom Job Shop
System Requirements: North Star Advantage: CP/M; Victor 9000: MS-DOS: Osborne 1
Memory Required: 40.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 4
Date First Installed: April 1982

STREETER COMPUTER DEVELOPMENT, INC.
RESTAURANT ACCOUNTS RECEIVABLE
Specific Application: Restaurant Accounts Receivable
Specific Industry: Restaurant
System Requirements: IBM System/23: DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 15
Date First Installed: June 1982
(See Vendor Profile Page V-104)

STREETER COMPUTER DEVELOPMENT, INC.
RESTAURANT GENERAL LEDGER
Specific Application: Restaurant General Ledger
Specific Industry: Restaurant
System Requirements: IBM System/23: DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000 to $1,500
Number Installed to Date: 15
Date First Installed: June 1982

STRUCTURE SYSTEMS GROUP
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86, MP/M, MP/M 86
Memory Required: 48.0K bytes
Source Language: CB-80, CB-86
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1,500
Date First Installed: 1978
(See Vendor Profile Page V-104)

STRUCTURE SYSTEMS GROUP
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M, CP/M 86, MP/M 86
Memory Required: 48.0K bytes
Source Language: CB-80, CP-86
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1,500
Date First Installed: 1978

SYSCOM, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23; IBM System/34
Source Language: RPG II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: January 1982
(See Vendor Profile Page V-105)

SYSCOM, INC.
CPA (CLIENT WRITE-UP)
Specific Application: Client Write-Up
Specific Industry: Accounting
System Requirements: IBM System/23
Source Language: RPG II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: January 1982

SYSTEMS FOR CASH MANAGEMENT
CASH MANAGER SYSTEM
Specific Application: Cash Management
Specific Industry: Government
System Requirements: IBM PC: DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)

Number Installed to Date: 6
Date First Installed: May 1981
(See Vendor Profile Page V-105)

SYSTEM SOLUTIONS, INC.
RENAISSANCE ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM; HP; Vector Graphic
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $950
Date First Installed: October 1983
(See Vendor Profile Page V-106)

SYSTEM SOLUTIONS, INC.
RENAISSANCE ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: IBM; HP; Vector Graphic
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $950

SYSTEM SOLUTIONS, INC.
RENAISSANCE ENTREPRENEUR
Specific Application: General Ledger System
Specific Industry: Not Industry Sensitive
System Requirements: IBM; HP; Vector Graphic
Memory Required: 56.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 3
Date First Installed: April 1983

SYSTEMS PLUS, INC.
ACCOUNTING PLUS
Specific Application: Sale Order Entry, Purchase Order, Inventory, General Ledger, Accounts Payable and Receivable, Payroll, POS
Specific Industry: Wholesale/Distribution, Retail
System Requirements: : CP/M: MP/M; IBM PC: PC-DOS
Memory Required: 56.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 5,000
Date First Installed: March 1980
(See Vendor Profile Page V-107)

SYSTEMS PLUS, INC.
ACCOUNTING PLUS PC
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll, Sales Order Entry, Purchase Orders, Inventory, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; IBM PC-XT: PC-DOS; DOS 2.0
Memory Required: 96.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1983

SYSTEMS PLUS, INC.
ACCOUNTING PLUS SUPER/E
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll, Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE: APPLE-DOS
Source Language: Applesoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: March 1983

TANDY CORP.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80 Model 16: Xenix
Memory Required: 256.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $599
Date First Installed: 1983
(See Vendor Profile Page V-108)

TANDY CORP.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80 Model 16: Xenix
Memory Required: 256.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $599
Date First Installed: 1983

TANDY CORP.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80 Model 16: Xenix
Memory Required: 256.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $599
Date First Installed: 1983

TCS SOFTWARE, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Intel Microprocessor 8086: MS-DOS; Intel Microprocessor 8080: CP/M
Memory Required: 86.0K bytes
Source Language: Microsoft Basic
Purchase Terms: Purchase (license)
Number Installed to Date: 600
Date First Installed: August 1981
(See Vendor Profile Page V-108)

TCS SOFTWARE, INC.
TCM TOTAL SALES
Specific Application: Sales Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: Intel Microprocessor 8086: MS-DOS; Intel Microprocessor 8080
Memory Required: 145.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: September 1983

TCS SOFTWARE, INC.
TCS TOTAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Intel Microprocessor 8086: CP/M; Intel Microprocessor 8080: MS/DOS
Memory Required: 85.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1,000
Date First Installed: September 1981

TCS SOFTWARE, INC.
TCS TOTAL RECEIVABLES
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Intel Microprocessor 8086: MS/DOS; Intel Microprocessor 8080: CP/M
Memory Required: 85.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1,000
Date First Installed: August 1981

TECHNICAL DATA SYSTEMS, INC.
LAWTOMATION
Specific Application: Billing, Accounting, Court Calendar, Statute of Limitations
Specific Industry: Legal
System Requirements: Xerox 820; Vector Graphics 420: CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 70
Date First Installed: 1979
(See Vendor Profile Page V-109)

TEXAS INSTRUMENTS, INC.
BUSINESS AIDS LIBRARY CASH MANAGEMENT
Specific Application: Cash Management
Specific Industry: Not Industry Sensitive
System Requirements: TI DS990/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
(See Vendor Profile Page V-109)

TEXAS INSTRUMENTS, INC.
BUSINESS AIDS LIBRARY - LEASE/PURCHASE
Specific Application: Lease/Purchase Decisions
Specific Industry: Not Industry Sensitive
System Requirements: TI DS990/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20

TEXAS INSTRUMENTS, INC.
PERSONAL FINANCIAL AIDS
Specific Application: Financial Guidance
Specific Industry: Not Industry Sensitive
System Requirements: TI DS990/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $14

TEXAS INSTRUMENTS, INC.
TI-COUNT ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: TI DS990/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100

TEXAS INSTRUMENTS, INC.
TI-COUNT ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: TI DS990/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100

TEXAS INSTRUMENTS, INC.
TI-COUNT GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: TI DS990/4
Purchase Terms: Purchase (license)
Price: $100

TEXAS-SOFTWARE, INC.
OIL AND GAS REVENUE SYSTEM
Specific Application: Revenue Distribution, Windfall Profit Tax Reporting, General Accounting
Specific Industry: Oil and Gas
System Requirements: IBM PC: CP/M; Victor 9000: MS-DOS
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 2
Date First Installed: July 1983
(See Vendor Profile Page V-109)

THE HUTCHISON CO.
ALASKA SYSTEMS JOURNAL VERSION 1.
Specific Application: Check Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco: Cdos, Cromix
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license); Lease
Price: $195
Date First Installed: 1980
(See Vendor Profile Page V-109)

THE HUTCHISON CO.
T/H/C CB
Specific Application: Professional Client Billing for Time Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco: Cromix

Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 3
Date First Installed: 1900

THE HUTCHINSON CO.
T/H/C JOURNAL
Specific Application: Journalizing
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco: Cromix
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 20
Date First Installed: 1900

THE HUTCHINSON CO.
T/H/C JOURNAL VERSION 2.01
Specific Application: Journalizing Program
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco: Cdos, Cromix
Memory Required: 64.0K bytes
Source Language: Structured Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 20
Date First Installed: November 1981

THERMEDICS CORP.
MEDICUS
Additional Product Classification: WP/Text Editing, Medical
Specific Application: Keep Track of Patient's History, Billing, Analysis
Specific Industry: Medical, Veterinary
System Requirements: DDI: MCS
Memory Required: 512.0K bytes
Source Language: RM Cobol
Purchase Terms: Purchase (license)
Price: $4,000
Date First Installed: September 1983
(See Vendor Profile Page V-109)

THOUGHTWARE PUBLISHING CO., INC.
BOOKKEEPING
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll, Fixed Assets
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $175 to $500
Number Installed to Date: 5,000
Date First Installed: 1980
(See Vendor Profile Page V-110)

THOUGHTWARE PUBLISHING CO., INC.
BOOKEEPING II
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll, Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450 to $1,500
Number Installed to Date: 2,000
Date First Installed: 1981

THOUGHTWARE PUBLISHING CO., INC.
LI'L CHIEF
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300,
Number Installed to Date: 100
Date First Installed: September 1982

THOUGHTWARE PUBLISHING CO., INC.
SUPER CHIEF PLUS
Specific Application: Multiuser Version of Super Chief With Password Security
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M; TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Mbasic
Purchase Terms: Purchase (license)
Price: $1,000 to $4,700
Number Installed to Date: 50
Date First Installed: September 1982

THRESHOLD SOFTWARE
COSAC
Specific Application: Cost Accounting
Specific Industry: Engineering, Construction
System Requirements: HP 86
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 26
Date First Installed: January 1982
(See Vendor Profile Page V-110)

TIME ACCOUNTANTS
TIME ACCOUNTANT
Specific Application: Time and Expense Billing and Analysis System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS 1.1, IBM PC-XT: PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: Interpretive Basic, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 300
Date First Installed: September 1983
(See Vendor Profile Page V-110)

TIME COMPUTER CORP.
TIME MULTIPLE COMPANY ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Altos: Oasis; IBC: Oasis
Source Language: Oasis Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
(See Vendor Profile Page V-110)

TINY SYSTEMS, INC.
MICRO LEDGER ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Memory Required: 56.0K-bytes
Source Language: Cbasic
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 1,000
Date First Installed: September 1977
(See Vendor Profile Page V-110)

TINY SYSTEMS, INC.
MICRO LEDGER ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Memory Required: 56.0K bytes
Source Language: Cbasic
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 1,000
Date First Installed: September 1977

TINY SYSTEMS, INC.
MICRO LEDGER PAYROLL
Additional Product Classification: Payroll/Personnel
Specific Application: Payroll Checks
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Memory Required: 56.0K bytes
Source Language: Cbasic
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 1,000
Date First Installed: September 1977

TINY SYSTEMS, INC.
MICRO LEDGER/GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Memory Required: 56.0K bytes
Source Language: Cbasic
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 1,000
Date First Installed: September 1977

TIPPIE ASSOCIATES, INC.
QUICK-QUOTE
Additional Product Classification: Manufacturing
Specific Application: Cost Estimating Package
Specific Industry: Manufacturing, Engineering
System Requirements: IBM PC: Pascal
Memory Required: 64.0K bytes
Source Language: Pascal, Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license), Lease
Price: $7,000 to $12,000
Number Installed to Date: 2
(See Vendor Profile Page V-110)

TOM MUELLER & ASSOCIATES
LAB MANAGER
Additional Product Classification: Payroll/Personnel, Manufacturing, WP/Text Editing, DBMS, Data/File Management
Specific Industry: Dental Laboratory
System Requirements: DOS+
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 3
Date First Installed: January 1982
(See Vendor Profile Page V-111)

TOTAL SYSTEMS, INC.
FARMING SUPPLY PACKAGE
Specific Application: Farm Supply Distribution
Specific Industry: Wholesale/Distribution, Retail
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: March 1983
(See Vendor Profile Page V-111)

TOTAL SYSTEMS, INC.
RESTAURANT EQUIPMENT REPAIR COMPUTER
Specific Application: Management of Restaurant Repair
Specific Industry: Restaurant
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: November 1983

TRANSACTION DATA SYSTEMS, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Medical, Nursing Homes
System Requirements: IBM PC: PC-DOS
Memory Required: 192.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1980
(See Vendor Profile Page V-111)

TRANSPORTATION DATA EXCHANGE (TDE)
FULL TRUCKLOAD BILLING
Specific Application: Full Truckload Billing
Specific Industry: Trucking
System Requirements: Datapoint: DOS
Memory Required: 64.0K bytes
Source Language: Databus

Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: October 1981
(See Vendor Profile Page V-111)

TRIBASE APPLICATIONS TECHNOLOGY, INC.
BILLING/ACCOUNTS RECEIVABLE
Specific Application: Billing, Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II: DOS, CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-112)

TRIBASE APPLICATIONS TECHNOLOGY, INC.
TIME ACCOUNTING SYSTEM - TAS
Specific Application: Time Accounting
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II: CP/M, DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 2
Date First Installed: 1982

TRISTAR
COLLECT
Specific Application: Tracking Debtors and Payments to Principals
Specific Industry: Collection Agency
System Requirements: Victor 9000: CP/M, Victor 9000: CP/M 86
Memory Required: 10.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 100
Date First Installed: 1981
(See Vendor Profile Page V-112)

TRISTAR
MANUFACTURER'S REP
Specific Application: Tracking Commissions and Sales of Products By Territory
Specific Industry: Manufacturing
System Requirements: Victor 9000: CP/M 86
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 20
Date First Installed: January 1982

TRISTAR
SHOE STORE
Specific Application: Inventory Control, Cash Register Interactive and Accounts Receivable
Specific Industry: Shoe Stores
System Requirements: Victor 9000: CP/M 86; Xerox: CP/M
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 200
Date First Installed: 1980

TURNKEY BUSINESS SYSTEMS
PROFITMAKER ACCT SOFTWARE
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Receivable and Payable, Payroll With Cost Accounting
System Requirements: Kaypro: CP/M
Memory Required: 48.0K bytes
Source Language: CB-80 Basic, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $148
Number Installed to Date: 20
Date First Installed: May 1982
(See Vendor Profile Page V-112)

TURN-KEY DISTRIBUTION SYSTEMS, INC.
BIZ-PAK
Specific Application: General Accounting
Specific Industry: Wholesale/Distribution, Beverage Industry
System Requirements: DEC PDP-11: CTS-300, DEC PDP-11: CTS-500
Memory Required: 1.0M bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 50
Date First Installed: June 1982
(See Vendor Profile Page V-112)

TURN-KEY DISTRIBUTION SYSTEMS, INC.
DEZ-PAK
Specific Application: Billing-Accounting
Specific Industry: Wholesale/Distribution, Beverage Industry
System Requirements: DEC PDP-11: CTS-300; DEC PDP-11: CTS-500; DEC VAX: VMS
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 70
Date First Installed: June 1975

TURNKEY MINI COMPUTER SYSTEMS, INC.
ACCOUNTS RECEIVABLE, INVENTORY INFORMATION
Specific Application: Accounts Receivable
System Requirements: Apple II: Pascal
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 1
Date First Installed: November 1981
(See Vendor Profile Page V-112)

TURNKEY MINI COMPUTER SYSTEMS, INC.
PEST CONTROL ACCOUNTS RECEIVABLE INFORMATION
Specific Application: Accounts Receivable
System Requirements: Apple II: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: Applesoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 1
Date First Installed: 1981

TURNKEY MINI COMPUTER SYSTEMS, INC.
POOL SERVICE ACCOUNTS RECEIVABLE SB INFORMATION
Specific Application: Accounts Receivable
System Requirements: Apple II: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: Applesoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 5
Date First Installed: October 1981

TURNKEY MINI COMPUTER SYSTEMS, INC.
REFUSE
Specific Application: Accounts Receivable
System Requirements: Apple II: Pascal
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 2
Date First Installed: 1981

UNIVAIR INTERNATIONAL
UNIVAIR ACCOUNTS PAYABLE
Specific Application: General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M; Vector Graphics: PC-DOS; Televideo
Memory Required: 48.0K bytes
Source Language: Cbasic 2, Cbasic 86
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 100
Date First Installed: September 1980
(See Vendor Profile Page V-113)

UNIVAIR INTERNATIONAL
UNIVAIR ACCOUNTS RECEIVABLE
Specific Application: General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M; Vector Graphics: PC-DOS; Televideo
Memory Required: 48.0K bytes
Source Language: Cbasic 2, Cbasic 86
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 100
Date First Installed: September 1980

UNIVAIR INTERNATIONAL
UNIVAIR GENERAL LEDGER ACCOUNTING
Specific Application: General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M; Vector Graphics: MS-DOS; Victor 1000: PC-DOS, TVI
Memory Required: 48.0K bytes
Source Language: Cbasic 2, Cbasic 86
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 1,000
Date First Installed: September 1980

UNIVAIR INTERNATIONAL
UNIVAIR INSURANCE AGENCY MANAGEMENT
Additional Product Classification: Insurance
Specific Application: Accounts Payable, General Insurance
Specific Industry: Insurance
System Requirements: IBM PC: CP/M; Vector Graphics: MS-DOS; Victor 1000: PC-DOS; TVI
Memory Required: 48.0K bytes
Source Language: Cbasic 2, Cbasic 86
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,150
Number Installed to Date: 1,200
Date First Installed: January 1980

UNIVAIR INTERNATIONAL
UNIVAIR LEGAL TIME ACCOUNTING
Specific Application: Time Billing
Specific Industry: Legal
System Requirements: IBM PC: CP/M; Vector Graphics: MS-DOS; Victor 1000: PC-DOS; Televideo
Memory Required: 48.0K bytes
Source Language: Cbasic 2, Cbasic 86
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $950
Number Installed to Date: 600
Date First Installed: September 1980

UNIVAIR INTERNATIONAL
UNIVAIR SUPER LEDGER ACCOUNTING
Specific Application: General Ledger & Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M; Vector Graphics: MS-DOS; Victor 1000: PC-DOS; Televideo
Memory Required: 48.0K bytes
Source Language: Cbasic 2, Cbasic 86
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 400
Date First Installed: September 1980

UNIVERSAL BUSINESS AUTOMATION SYSTEMS, INC.
ACCOUNTS PAYABLE SYSTEM
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: MP/M, Altos: CP/M
Memory Required: 56.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595 to $745

Number Installed to Date: 30
Date First Installed: June 1982
(See Vendor Profile Page V-113)

UNIVERSAL BUSINESS AUTOMATION, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Altos: CP/M; IBM PC: MP/M
Memory Required: 56.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595 to $745
Number Installed to Date: 50
Date First Installed: September 1981

UNIVERSAL BUSINESS AUTOMATION, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Altos: MP/M; IBM PC: CP/M
Memory Required: 56.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595 to $745
Number Installed to Date: 15
Date First Installed: January 1983

UNIVERSAL BUSINESS AUTOMATION, INC.
SALES ORDER INVOICE SYSTEM
Additional Product Classification: Sales Invoicing
Specific Application: Sales Invoicing
Specific Industry: Wholesale/Distribution
System Requirements: Altos: CP/M; IBM PC: MP/M
Memory Required: 56.0K bytes
Source Language: Basic
Source Code Available: No.
Purchase Terms: Purchase (license)
Price: $595 to $745
Number Installed to Date: 50
Date First Installed: September 1981

UNIVERSAL DATA RESEARCH, INC.
INTEGRATED ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Unitex; TRS-80, Flex
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 500
Date First Installed: 1979
(See Vendor Profile Page V-113)

UNIVERSAL DATA RESEARCH, INC.
INTEGRATED ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80; Unitex; Flex
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 500
Date First Installed: 1979

USER FRIENDLY SOFTWARE
CUTE-CLIENT WRITE UP SYSTEM
Specific Application: Client Write-Up
Specific Industry: Accountants
System Requirements: Altos: CP/M, MP/M; DEC Rainbow 100: CP/M, MP/M, North Star: CP/M, MP/M
Memory Required: 48.0K bytes
Source Language: PL/1-80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,995
Number Installed to Date: 50
Date First Installed: June 1982
(See Vendor Profile Page V-114)

VANDATA
VANDATA BUSINESS SOFTWARE PACKAGE
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: CP/M: Cdos
Memory Required: 48.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 5,000
Date First Installed: May 1981
(See Vendor Profile Page V-115)

VENTURA COUNTY COMPUTER CENTER
DENTAL OFFICE MANAGEMENT SYSTEM
Additional Product Classification: Medical
Specific Application: Accounts Receivable, Treatment History, Insurance Billing, Union Billing, Medicare and Medicaid Forms Generator
Specific Industry: Medical, Dental
System Requirements: Alpha Micro: Amos
Memory Required: 128.0K bytes
Source Language: Alpha Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 100
Date First Installed: 1981
(See Vendor Profile Page V-115)

VENTURA COUNTY COMPUTER CENTER
MAIL ORDER ENTRY PACKAGE
Specific Application: Mail Order Processing, Creates Shipping Documents, Complete Audit Hall Inventory Control
Specific Industry: Retail
System Requirements: Alpha Micro: Amos
Memory Required: 128.0K bytes
Source Language: Alpha Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 1
Date First Installed: 1983

VERTICAL SOFTWARE, INC.
FACS
Specific Application: Farm Accounting Control System
Specific Industry: Agribusiness
System Requirements: Apple II, II+, IIE: APPLE-DOS; IBM PC-XT: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $525
Number Installed to Date: 100
Date First Installed: 1981
(See Vendor Profile Page V-115)

Additional information provided for by vendor

FACS farm accounting control system offers single entry; cash-based, 300 user-defined chart of accounts and unlimited enterprising: $525. Commtrac commodities charting program offers manual or automatic updating, RSI, moving averages, trend lines, Basis, ½ and ⅔-speed resistance and objectives retracements: $200. FACS and Commtrac are IBM- and Apple-compatible. Vertical Software, Inc. Peoria, IL (309) 688-2377.

VETROL DATA SYSTEMS, INC.
APPAREL
Additional Product Classification: Inventory
Specific Application: Inventory, Accounts Payable, Accounts Receivable
Specific Industry: Retail
System Requirements: Onyx: Oasis
Memory Required: 64.0K bytes
Source Language: Oasis Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000 to $6,000
Date First Installed: 1980
(See Vendor Profile Page V-115)

VETROL DATA SYSTEMS, INC.
GBA (GENERAL BUSINESS ACCOUNTING)
Additional Product Classification: Inventory
Specific Application: Inventory, Accounts Payable, Accounts Receivable
Specific Industry: Retail
System Requirements: Onyx: Oasis
Memory Required: 64.0K bytes
Source Language: Oasis Basic
Purchase Terms: Purchase (license)
Price: $5,000 to $6,000
Date First Installed: 1980

WAREHOUSE SOFTWARE
AUGMENTED TCS ACCOUNTING PACKAGE
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: PC-DOS: CP/M 80
Memory Required: 48.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-116)

WESTWARE SOFTWARE, INC.
2 POINT SYSTEM
Additional Product Classification: Payroll/Personnel, Manufacturing, DBMS
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll, Data Base System
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 3,000
Date First Installed: 1980
(See Vendor Profile Page V-116)

WESTWARE SOFTWARE, INC.
PERFORMANCE SERIES
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; IBM PC-XT
Memory Required: 256.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495 to $595
Number Installed to Date: 3,000
Date First Installed: 1980

WILMARK, INC.
ACCOUNTS PAYABLE
Specific Application: Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B20: Btos; Convergent Technologies AWS, Convergent Technologies NWS
Memory Required: 384.0K bytes
Source Language: Adept
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-117)

WILMARK, INC.
ACCOUNTS RECEIVABLE
Specific Application: Accounts Receivable
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B20: Btos, Convergent Technologies AWS; Convergent Technologies NWS
Memory Required: 384.0K bytes
Source Language: Adept
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 200
Date First Installed: 1978

WILMARK, INC.
FIXED ASSET MANAGEMENT & DEPRECIATION
Specific Application: Fixed Asset

Management and Depreciation
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B20: Btos; Convergent Technologies AWS; Convergent Technologies IWS
Memory Required: 384.0K bytes
Source Language: Adept
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 200
Date First Installed: 1978

WILMARK, INC.
GENERAL LEDGER AND FINANCIAL STATEMENT
Specific Application: General Ledger and Financial Statement
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B20: Btos; Convergent Technologies AWS, Convergent Technologies IWS
Memory Required: 384.0K bytes
Source Language: Adept
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 200
Date First Installed: 1978

WILMARK, INC.
ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B20: Btos, Convergent Technologies AWS; Convergent Technologies IWS
Memory Required: 384.0K bytes
Source Language: Adept
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 200
Date First Installed: 1978

WILMARK, INC.
PURCHASE ORDER
Specific Application: Purchase Order
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B20: Btos; Convergent Technologies AWS; Convergent Technologies IWS
Memory Required: 384.0K bytes
Source Language: Adept
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 200
Date First Installed: 1978

WINNER'S CIRCLE
LEGAL II
Specific Application: Legal Time Accounting Package
Specific Industry: Legal
System Requirements: Apple IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: June 1983
(See Vendor Profile Page V-117)

WISCONSIN MICROWAVE
AG/PAC
Specific Application: Financial Management
Specific Industry: Agribusiness
System Requirements: Apple II Series: UCSD-P, IBM PC
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 100
Date First Installed: 1982
(See Vendor Profile Page V-117)

TBM COMPUTER SERVICES CORP.
GENERAL ACCOUNTING
Additional Product Classification: Payroll/Personnel
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll, Order Entry, Invoicing
Specific Industry: Not Industry Sensitive
System Requirements: Xerox 510, 515 CP/M
Memory Required: 32.0K bytes
Source Language: DACL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000 to $8,000
Number Installed to Date: 80
Date First Installed: 1980
(See Vendor Profile Page V-118)

A/C	$2,500	A-12
A/P	$5,000	A-12
A/P	NA	A-89
A/P ACTIVE	$2,000	A-88
A/R	NA	A-90
A/R ACTIVE	$2,000	A-88
A/S ACCOUNTS PAYABLE	NA	A-10
A/S ACCOUNTS RECEIVABLE	NA	A-10
A/S GENERAL LEDGER/BUDGETING	NA	A-10
A/S PURCHASE ORDER PROCESSING	NA	A-10
ABLE - GENERAL LEDGER/MGMT REPORTING	$6,000	A-49
ACCIDENT/HEALTH BILLING AND RETRIEVAL	NA	A-55
ACCOUNT PAYABLE SYSTEM	NA	A-30
ACCOUNT RECEIVABLE HISTORY	$500	A-36
ACCOUNT RECONCILIATION SYSTEM	NA	A-84
ACCOUNTING	NA	A-15
ACCOUNTING	$10,000 to $86,000	A-27
ACCOUNTING	$3,600	A-49
ACCOUNTING	NA	A-91
ACCOUNTING FOR VAX	$10,000	A-32
ACCOUNTING PACKAGE	$3,500 to $50,000	A-87
ACCOUNTING PACKAGE	$10 to $50,000	A-90
ACCOUNTING PACKAGE	$8,600	A-97
ACCOUNTING PACKAGE	$40,000 to $125,000	A-98
ACCOUNTING SYSTEM	$1,200	A-101
ACCOUNTS PAYABLE	$8,000	A-1
ACCOUNTS PAYABLE	NA	A-1
ACCOUNTS PAYABLE	NA	A-3
ACCOUNTS PAYABLE	$8,250	A-4
ACCOUNTS PAYABLE	NA	A-5
ACCOUNTS PAYABLE	NA	A-5
ACCOUNTS PAYABLE	NA	A-6
ACCOUNTS PAYABLE	$7,500	A-8
ACCOUNTS PAYABLE	$1,000	A-8
ACCOUNTS PAYABLE	$2,600	A-14
ACCOUNTS PAYABLE	$395	A-15
ACCOUNTS PAYABLE	$800	A-16
ACCOUNTS PAYABLE	$750	A-17
ACCOUNTS PAYABLE	$3,000	A-18
ACCOUNTS PAYABLE	NA	A-19
ACCOUNTS PAYABLE	NA	A-21
ACCOUNTS PAYABLE	$2,400	A-22
ACCOUNTS PAYABLE	NA	A-24
ACCOUNTS PAYABLE	$1,500	A-27
ACCOUNTS PAYABLE	$2,000	A-31
ACCOUNTS PAYABLE	$3,000	A-31
ACCOUNTS PAYABLE	$2,000	A-32
ACCOUNTS PAYABLE	NA	A-33
ACCOUNTS PAYABLE	NA	A-33
ACCOUNTS PAYABLE	NA	A-33
ACCOUNTS PAYABLE	$2,500	A-33
ACCOUNTS PAYABLE	$2,850	A-34
ACCOUNTS PAYABLE	$695 to $1,950	A-35
ACCOUNTS PAYABLE	$1,500	A-35
ACCOUNTS PAYABLE	$4,500	A-36
ACCOUNTS PAYABLE	$350	A-36
ACCOUNTS PAYABLE	$1,500	A-36
ACCOUNTS PAYABLE	NA	A-36
ACCOUNTS PAYABLE	$5,000	A-38
ACCOUNTS PAYABLE	$2,100	A-38
ACCOUNTS PAYABLE	NA	A-38
ACCOUNTS PAYABLE	$8,000	A-39
ACCOUNTS PAYABLE	$1,150	A-39
ACCOUNTS PAYABLE	$2,000	A-39
ACCOUNTS PAYABLE	NA	A-40
ACCOUNTS PAYABLE	$2,500	A-41
ACCOUNTS PAYABLE	$2,500	A-41
ACCOUNTS PAYABLE	$295	A-43
ACCOUNTS PAYABLE	$2,000	A-43
ACCOUNTS PAYABLE	$4,500	A-43
ACCOUNTS PAYABLE	$3,000	A-44
ACCOUNTS PAYABLE	$10,000	A-47
ACCOUNTS PAYABLE	$3,000	A-48
ACCOUNTS PAYABLE	NA	A-48
ACCOUNTS PAYABLE	$850 to $1,500	A-48
ACCOUNTS PAYABLE	NA	A-49
ACCOUNTS PAYABLE	NA	A-49
ACCOUNTS PAYABLE	$30,000 to $50,000	A-49
ACCOUNTS PAYABLE	$2,000	A-50
ACCOUNTS PAYABLE	$400	A-51
ACCOUNTS PAYABLE	NA	A-52
ACCOUNTS PAYABLE	$12,000	A-52
ACCOUNTS PAYABLE	NA	A-53
ACCOUNTS PAYABLE	NA	A-56
ACCOUNTS PAYABLE	NA	A-56
ACCOUNTS PAYABLE	$3,500 to $5,000	A-56
ACCOUNTS PAYABLE	NA	A-57
ACCOUNTS PAYABLE	$3,500 to $5,000	A-58
ACCOUNTS PAYABLE	$650	A-59
ACCOUNTS PAYABLE	$3,000	A-60
ACCOUNTS PAYABLE	$9,000	A-61
ACCOUNTS PAYABLE	$15,000	A-61
ACCOUNTS PAYABLE	NA	A-62
ACCOUNTS PAYABLE	$2,450	A-62
ACCOUNTS PAYABLE	$1,500	A-62
ACCOUNTS PAYABLE	$1,500	A-63
ACCOUNTS PAYABLE	$3,000 to $5,000	A-63
ACCOUNTS PAYABLE	$1,500	A-64
ACCOUNTS PAYABLE	NA	A-64
ACCOUNTS PAYABLE	$20,000	A-64
ACCOUNTS PAYABLE	NA	A-65
ACCOUNTS PAYABLE	$200 to $6,200	A-66
ACCOUNTS PAYABLE	$1,250	A-67
ACCOUNTS PAYABLE	$1,200 to $1,500	A-67
ACCOUNTS PAYABLE	$900 to $4,600	A-67
ACCOUNTS PAYABLE	$2,500	A-68
ACCOUNTS PAYABLE	NA	A-68
ACCOUNTS PAYABLE	$3,000	A-69
ACCOUNTS PAYABLE	$19,500 to $32,500	A-69
ACCOUNTS PAYABLE	$1,000	A-70
ACCOUNTS PAYABLE	$2,500	A-70
ACCOUNTS PAYABLE	$5,000	A-70
ACCOUNTS PAYABLE	$2,000	A-71
ACCOUNTS PAYABLE	NA	A-73
ACCOUNTS PAYABLE	$1,350	A-73
ACCOUNTS PAYABLE	$3,000 to $5,000	A-74
ACCOUNTS PAYABLE	NA	A-75
ACCOUNTS PAYABLE	NA	A-75
ACCOUNTS PAYABLE	NA	A-75
ACCOUNTS PAYABLE	NA	A-75
ACCOUNTS PAYABLE	$5,000	A-75
ACCOUNTS PAYABLE	$1,000	A-76
ACCOUNTS PAYABLE	$3,000	A-76
ACCOUNTS PAYABLE	NA	A-77
ACCOUNTS PAYABLE	$5,000	A-77
ACCOUNTS PAYABLE	$2,500	A-78
ACCOUNTS PAYABLE	NA	A-78
ACCOUNTS PAYABLE	NA	A-79
ACCOUNTS PAYABLE	NA	A-79
ACCOUNTS PAYABLE	NA	A-80
ACCOUNTS PAYABLE	$2,000	A-80
ACCOUNTS PAYABLE	$5,000	A-81
ACCOUNTS PAYABLE	$600 to $2,000	A-81
ACCOUNTS PAYABLE	$15,700	A-82
ACCOUNTS PAYABLE	$2,500	A-82
ACCOUNTS PAYABLE	NA	A-83
ACCOUNTS PAYABLE	$1,500	A-84
ACCOUNTS PAYABLE	$4,900	A-84
ACCOUNTS PAYABLE	NA	A-85
ACCOUNTS PAYABLE	NA	A-85
ACCOUNTS PAYABLE	$1,000	A-86
ACCOUNTS PAYABLE	$3,000	A-87
ACCOUNTS PAYABLE	$2,600	A-87
ACCOUNTS PAYABLE	$2,450 to $1,250	A-88
ACCOUNTS PAYABLE	NA	A-89
ACCOUNTS PAYABLE	$795	A-91
ACCOUNTS PAYABLE	$2,000	A-91
ACCOUNTS PAYABLE	$2,500	A-91
ACCOUNTS PAYABLE	$595	A-92
ACCOUNTS PAYABLE	$15,000 to $20,000	A-93
ACCOUNTS PAYABLE	$1,000	A-93
ACCOUNTS PAYABLE	NA	A-93
ACCOUNTS PAYABLE	$1,000 to $5,000	A-94
ACCOUNTS PAYABLE	$7,500	A-94
ACCOUNTS PAYABLE	$1,200	A-95
ACCOUNTS PAYABLE	$495	A-96
ACCOUNTS PAYABLE	$500	A-96
ACCOUNTS PAYABLE	$20,000 to $55,000	A-96
ACCOUNTS PAYABLE	NA	A-97

ACCOUNTS PAYABLE	NA	A-98
ACCOUNTS PAYABLE	$5,000	A-99
ACCOUNTS PAYABLE	$3,000	A-99
ACCOUNTS PAYABLE	NA	A-100
ACCOUNTS PAYABLE	$500	A-101
ACCOUNTS PAYABLE	$400	A-101
ACCOUNTS PAYABLE	$1,800	A-101
ACCOUNTS PAYABLE	NA	A-102
ACCOUNTS PAYABLE	$3,100	A-103
ACCOUNTS PAYABLE	NA	A-104
ACCOUNTS PAYABLE	$2,500	A-105
ACCOUNTS PAYABLE	$2,000 to $7,000	A-105
ACCOUNTS PAYABLE	$2,500	A-106
ACCOUNTS PAYABLE	NA	A-106
ACCOUNTS PAYABLE	$3,500	A-106
ACCOUNTS PAYABLE	NA	A-107
ACCOUNTS PAYABLE	$3,500	A-107
ACCOUNTS PAYABLE	NA	A-107
ACCOUNTS PAYABLE	$4,000	A-108
ACCOUNTS PAYABLE	$1,000	A-108
ACCOUNTS PAYABLE	$1,270	A-109
ACCOUNTS PAYABLE	NA	A-110
ACCOUNTS PAYABLE ABS	$2,000	A-7
ACCOUNTS PAYABLE CHECKWRITING	$1,400	A-63
ACCOUNTS PAYABLE/GENERAL LEDGER	$2,800	A-87
ACCOUNTS PAYABLE HISTORY	$500	A-36
ACCOUNTS PAYABLE II	$2,500	A-101
ACCOUNTS PAYABLE MANAGEMENT SYSTEM	$1,200	A-104
ACCOUNTS PAYABLE SYSTEM	$3,600	A-7
ACCOUNTS PAYABLE SYSTEM	$5,000 to $15,000	A-27
ACCOUNTS PAYABLE SYSTEM	NA	A-40
ACCOUNTS PAYABLE SYSTEM	NA	A-45
ACCOUNTS PAYABLE SYSTEM	$14,000	A-81
ACCOUNTS PAYABLE SYSTEM	$1,300 to $7,500	A-83
ACCOUNTS PAYABLE SYSTEM-ABS	$2,000	A-7
ACCOUNTS PAYABLE-IAP 11-VERSION 3	$3,500	A-24
ACCOUNTS PAYABLE, CASH MANAGEMENT	NA	A-14
ACCOUNTS PAYABLE/CHECK WRITING	$1,200	A-88
ACCOUNTS PAYABLE/GENERAL LEDGER	$2,800	A-87
ACCOUNTS PAYABLE/PURCHASE CONTROL SYSTEM	$3,200	A-37
ACCOUNTS PAYABLE FOR THE S/34	$7,500	A-34
ACCOUNTS PAYABLE/36	$7,500	A-34
ACCOUNTS PAYABLE VERSION 1.0	$995 to $2,500	A-102
ACCOUNTS PAYABLE VS MRP RECEIPT RECONCIL	NA	A-57
ACCOUNTS PAYROLL	$4,000	A-19
ACCOUNTS RECEIVABLE	$5,000	A-1
ACCOUNTS RECEIVABLE	NA	A-4
ACCOUNTS RECEIVABLE	$8,250	A-4
ACCOUNTS RECEIVABLE	NA	A-5
ACCOUNTS RECEIVABLE	$3,000	A-6
ACCOUNTS RECEIVABLE	$7,500	A-6
ACCOUNTS RECEIVABLE	$1,000	A-8
ACCOUNTS RECEIVABLE	$2,400	A-14
ACCOUNTS RECEIVABLE	$395	A-15
ACCOUNTS RECEIVABLE	$800	A-16
ACCOUNTS RECEIVABLE	$750	A-17
ACCOUNTS RECEIVABLE	NA	A-19
ACCOUNTS RECEIVABLE	$4,000	A-19
ACCOUNTS RECEIVABLE	NA	A-20
ACCOUNTS RECEIVABLE	$2,500	A-23
ACCOUNTS RECEIVABLE	NA	A-24
ACCOUNTS RECEIVABLE	NA	A-26
ACCOUNTS RECEIVABLE	$1,500	A-27
ACCOUNTS RECEIVABLE	$2,000	A-31
ACCOUNTS RECEIVABLE	$5,000	A-31
ACCOUNTS RECEIVABLE	$2,000	A-32
ACCOUNTS RECEIVABLE	NA	A-33
ACCOUNTS RECEIVABLE	$2,500	A-33
ACCOUNTS RECEIVABLE	$2,850	A-34
ACCOUNTS RECEIVABLE	$1,500	A-35
ACCOUNTS RECEIVABLE	$695 to $1,950	A-35
ACCOUNTS RECEIVABLE	$1,500	A-36
ACCOUNTS RECEIVABLE	$4,500	A-36
ACCOUNTS RECEIVABLE	$350	A-36
ACCOUNTS RECEIVABLE	NA	A-37
ACCOUNTS RECEIVABLE	$7,500	A-38
ACCOUNTS RECEIVABLE	NA	A-38
ACCOUNTS RECEIVABLE	$8,000	A-38
ACCOUNTS RECEIVABLE	$2,000	A-38
ACCOUNTS RECEIVABLE	$1,150	A-39
ACCOUNTS RECEIVABLE	$2,000	A-39
ACCOUNTS RECEIVABLE	NA	A-40
ACCOUNTS RECEIVABLE	$2,000	A-40
ACCOUNTS RECEIVABLE	$2,500	A-40
ACCOUNTS RECEIVABLE	NA	A-40
ACCOUNTS RECEIVABLE	$3,000	A-41
ACCOUNTS RECEIVABLE	$2,500	A-41
ACCOUNTS RECEIVABLE	NA	A-42
ACCOUNTS RECEIVABLE	$295	A-43
ACCOUNTS RECEIVABLE	$2,000	A-43
ACCOUNTS RECEIVABLE	$5,000	A-44
ACCOUNTS RECEIVABLE	$10,000	A-47
ACCOUNTS RECEIVABLE	$3,000	A-48
ACCOUNTS RECEIVABLE	$850 to $1,500	A-48
ACCOUNTS RECEIVABLE	NA	A-49
ACCOUNTS RECEIVABLE	$3,000	A-50
ACCOUNTS RECEIVABLE	$2,000	A-51
ACCOUNTS RECEIVABLE	$400	A-51
ACCOUNTS RECEIVABLE	$5,000	A-52
ACCOUNTS RECEIVABLE	NA	A-52
ACCOUNTS RECEIVABLE	NA	A-52
ACCOUNTS RECEIVABLE	$1,100	A-53
ACCOUNTS RECEIVABLE	NA	A-56
ACCOUNTS RECEIVABLE	NA	A-56
ACCOUNTS RECEIVABLE	NA	A-56
ACCOUNTS RECEIVABLE	$3,500 to $5,000	A-57
ACCOUNTS RECEIVABLE	$3,500 to $5,000	A-58
ACCOUNTS RECEIVABLE	$650	A-58
ACCOUNTS RECEIVABLE	$3,000	A-60
ACCOUNTS RECEIVABLE	$2,500	A-60
ACCOUNTS RECEIVABLE	$12,000	A-61
ACCOUNTS RECEIVABLE	$5,150	A-62
ACCOUNTS RECEIVABLE	$1,500	A-63
ACCOUNTS RECEIVABLE	$3,000 to $5,000	A-63
ACCOUNTS RECEIVABLE	$1,500	A-63
ACCOUNTS RECEIVABLE	NA	A-64
ACCOUNTS RECEIVABLE	NA	A-66
ACCOUNTS RECEIVABLE	$200 to $6,200	A-66
ACCOUNTS RECEIVABLE	$1,200 to $1,500	A-67
ACCOUNTS RECEIVABLE	$900 to $4,600	A-68
ACCOUNTS RECEIVABLE	$2,500	A-68
ACCOUNTS RECEIVABLE	NA	A-68
ACCOUNTS RECEIVABLE	$1,000	A-70
ACCOUNTS RECEIVABLE	$5,000	A-70
ACCOUNTS RECEIVABLE	$2,000	A-71
ACCOUNTS RECEIVABLE	NA	A-73
ACCOUNTS RECEIVABLE	$1,100	A-73
ACCOUNTS RECEIVABLE	$3,000 to $5,000	A-74
ACCOUNTS RECEIVABLE	NA	A-75
ACCOUNTS RECEIVABLE	NA	A-75
ACCOUNTS RECEIVABLE	NA	A-75
ACCOUNTS RECEIVABLE	$1,000	A-76
ACCOUNTS RECEIVABLE	$3,000	A-77
ACCOUNTS RECEIVABLE	NA	A-77
ACCOUNTS RECEIVABLE	$5,000	A-77
ACCOUNTS RECEIVABLE	NA	A-78
ACCOUNTS RECEIVABLE	NA	A-78
ACCOUNTS RECEIVABLE	NA	A-80
ACCOUNTS RECEIVABLE	$2,000	A-81
ACCOUNTS RECEIVABLE	$5,000	A-81
ACCOUNTS RECEIVABLE	$600	A-81
ACCOUNTS RECEIVABLE	$16,700	A-82
ACCOUNTS RECEIVABLE	$4,200	A-82
ACCOUNTS RECEIVABLE	$2,500	A-82
ACCOUNTS RECEIVABLE	NA	A-83
ACCOUNTS RECEIVABLE	$1,300 to $7,500	A-83
ACCOUNTS RECEIVABLE	$1,500	A-86
ACCOUNTS RECEIVABLE	NA	A-86
ACCOUNTS RECEIVABLE	$4,900	A-86
ACCOUNTS RECEIVABLE	$1,500	A-86
ACCOUNTS RECEIVABLE	$1,000	A-86
ACCOUNTS RECEIVABLE	NA	A-87
ACCOUNTS RECEIVABLE	$2,450 to $1,250	A-88
ACCOUNTS RECEIVABLE	$1,375	A-88
ACCOUNTS RECEIVABLE	$2,500	A-88
ACCOUNTS RECEIVABLE	$795	A-91
ACCOUNTS RECEIVABLE	$2,000	A-91
ACCOUNTS RECEIVABLE	$2,500	A-91

ACCOUNTS RECEIVABLE	$595	A-92
ACCOUNTS RECEIVABLE	$15,000 to $20,000	A-93
ACCOUNTS RECEIVABLE	NA	A-93
ACCOUNTS RECEIVABLE	$150	A-95
ACCOUNTS RECEIVABLE	$1,200	A-95
ACCOUNTS RECEIVABLE	$495	A-95
ACCOUNTS RECEIVABLE	$5,000 to $25,000	A-96
ACCOUNTS RECEIVABLE	NA	A-97
ACCOUNTS RECEIVABLE	NA	A-97
ACCOUNTS RECEIVABLE	NA	A-98
ACCOUNTS RECEIVABLE	$2,000	A-99
ACCOUNTS RECEIVABLE	$9,500	A-99
ACCOUNTS RECEIVABLE	NA	A-100
ACCOUNTS RECEIVABLE	$500	A-101
ACCOUNTS RECEIVABLE	$400	A-101
ACCOUNTS RECEIVABLE	$1,800	A-101
ACCOUNTS RECEIVABLE	NA	A-102
ACCOUNTS RECEIVABLE	NA	A-102
ACCOUNTS RECEIVABLE	$2,500	A-105
ACCOUNTS RECEIVABLE	$2,000 to $7,000	A-105
ACCOUNTS RECEIVABLE	NA	A-106
ACCOUNTS RECEIVABLE	$3,500	A-106
ACCOUNTS RECEIVABLE	NA	A-107
ACCOUNTS RECEIVABLE	$3,500	A-107
ACCOUNTS RECEIVABLE	NA	A-107
ACCOUNTS RECEIVABLE	$4,000	A-108
ACCOUNTS RECEIVABLE	$1,000	A-108
ACCOUNTS RECEIVABLE	$30,000	A-109
ACCOUNTS RECEIVABLE	$1,270	A-109
ACCOUNTS RECEIVABLE	NA	A-110
ACCOUNTS RECEIVABLE II	$2,500	A-101
ACCOUNTS RECEIVABLE-OPEN ITEM OR BALANCE	$500	A-96
ACCOUNTS RECEIVABLE FOR THE S/34	$1,000	A34-
ACCOUNTS RECEIVABLE SYSTEM	NA	A-16
ACCOUNTS RECEIVABLE SYSTEM	NA	A-45
ACCOUNTS RECEIVABLE SYSTEM	$14,000	A-61
ACCOUNTS RECEIVABLE WITH TIME ANALYSIS	$10,500	A-59
ACCOUNTS RECEIVALBE AND CLIENT BILLING	$750	A-63
ACCOUNTS RECEIVABLE ABS	$2,000	A-7
ACCOUNTING SYSTEMS PACKAGES	$12,000 to $15,000	A-104
ACCOUNTANTS CLIENT WRITE-UP	$5,000	A-30
ACCOUNTING 1000	NA	A-45
ACCOUNTS PAYABLE 2000	$15,000	A-78
ACCRU-ACCOUNT CHARGING FOR RESOURCES	$1,500	A-6
ACCTS & BKKPRS AUTOMATED CLIENT ABACAS	$1,500	A-90
ACS ON-LINE SYSTEM 34	$5,000	A-7
ACS ON-LINE SYSTEM 36	$5,000	A-7
ACS ON-LINE SYSTEM 38	$5,000	A-7
ACT II RADIO TRAFFIC & ACCOUNTING SYSTEM	NA	A-99
ACTION S/36 ACCOUNTS PAYABLE	$7,500	A-34
ACTION S/36 FIXED ASSETS	$3,000	A-34
ACTION S/36 GENERAL LEDGER	$10,000	A-34
AD RECEIVABLES	$15,000 to $40,000	A-107
ADAM	$12,000	A-99
ADMAN II	$75,000	A-99
ADMS	$5,500	A-23
ADPACK	$50,000	A-23
ADVANCED FIXED ASSET ACCOUNTING	$14,400	A-49
ADVERTISING AGENCY	$3,500 to $500,000	A-67
ADVERTISING AGENCY SOFTWARE	$18,500	A-37
ADVERTISING AGENCY:FINANCIAL & INVOICING	NA	A-58
AEPACK	$50,000	A-23
AFCS (AUTOMATED FOOD CONTROL SYSTEM)	NA	A-44
AFE-AUTHORIZATION FOR EXPENDITURE	$2,000	A-71
AGFAB-AGRICULTURE FABRICATION MANAGEMENT	NA	A-18
AGLAND FEED-FORMULA BREAKOUTS	$3,000	A-3
AGLAND FERTILIZER	NA	A-3
AGLAND GRAIN ACCOUNTING	$7,500	A-3
AGLAND G/L AND FINANCIAL PKG	$7,500	A-3
AGRI-BUSINESS 250	$23,500	A-62
AGRICULTURAL ACCOUNTS PAYABLE	$800	A-16
AGRICULTURE ACCOUNTS RECEIVABLE	$4,200	A-16
AGRICULTURE GENERAL LEDGER	$4,700	A-16
AGRICULTURE PAYROLL	$16,800	A-16
AGRICULTURE BROKERAGE/JACKET ACCOUNTING	NA	A-16
AGRICULTURE EQUIPMENT USE/COST	$2,800	A-16
AIM	NA	A-42
AIM-GS	$750	A-8
AIMS	$17,500 to $35,000	A-12
AIRPORT INFORMATION MANAGEMENT SYSTEM	NA	A-62
ALCIE	$1,300	A-19
ALERT	$10,000	A-98
ALLTAX	NA	A-78
ALPHA ACCOUNT	$1,500 to $8,000	A-47
ALPHA TAX	$1,200	A-47
AMBULANCE BILLING AND COLLECTION	$1,000	A-15
AMI NOTES RECEIVABLE	$450	A-12
AMOCO JOBBER MGMT SYSTEM JMS	NA	A-42
AMORTIZATION SCHEDULE SYSTEM	$1,000	A-101
AMP-ASSOCIATION MANAGEMENT PACKAGE	$10,000	A-61
ANESTHESIOLOGY MGMT SYSTEM	NA	A-73
ANSR-INTERACTIVE GENERAL ACCOUNTING	$17,000	A-69
AP	$4,000	A-18
AP - ACCOUNTS PAYABLE	NA	A-53
AP;M	$50,000	A-67
AP/3000	$6,000	A-21
APARTMENT MANAGEMENT SYSTEM	$3,000	A-101
APDS (AUTOMATED PAPER DIST.)	NA	A-94
APPAREL MANUFACTURING	$2,500 to $50,000	A-67
APPAREL PKG	$20,000	A-67
APPAREL WHOLESALE/RETAIL STORE	$20,000 to $30,000	A-23
APPLIANCE DEALERS/BUYING COOPERATIVES	$10,000	A-45
APPLIANCE INDUSTRY SYSTEM	NA	A-46
APPRAISAL DISTRICT	NA	A-32
APRO MANAGEMENT PACKAGE	NA	A-19
AR;M	$70,000	A-69
AR/3000	$6,000	A-21
ARCHITECTURAL ENGINEERING MASTER AEMAS	NA	A-36
ARR GENERAL LEDGER	$2,000	A-4
ARR STATEMENT GENERATOR	$500	A-4
ART OPEN ITEM ACCOUNTS RECEIVABLE	$89	A-17
ASAP	$2,000	A-99
ASAP - ACCOUNTS PAYABLE	$3,000	A-99
ASAP - ACCOUNTS RECEIVABLE	$3,000	A-99
ASAP - GENERAL LEDGER	$4,000	A-99
ASAP - INVOICER	$2,500	A-99
ASCHILLS BILLING SYSTEM	$7,495	A-101
ASSESSMENT AND TAXATION	NA	A-39
ASSET	$300 to $1,290	A-62
ASSET DEPRECIATION	$7,000 to $8,000	A-62
ASSET DERPRECIATION	$2,000	A-68
ASSET LIABILITY HEDGE	NA	A-39
ASSETS	$20,000	A-39
ASSOCIATION BILLING	NA	A-68
ASSOCIATION MANAGEMENT SYSTEM	NA	A-68
ASSOCIATION MEMBERSHIP ACCOUNTING	NA	A-6
ATTORNEY AND ACCOUNTANT TIME ACCOUNTING	$3,000	A-30
ATTORNEY BILLING PACKAGE	$7,500	A-61
ATTORNEY TIME ACCOUNTING SYSTEM	$2,500	A-84
AUDITAPE 2	$2,500 to $8,000	A-42
AUTO PARTS DEALER	$9,000	A-99
AUTO PARTS DISTRIBUTION SYSTEM	$35,000	A-39
AUTO PARTS STORE SYSTEM	$10,000 to $20,000	A-67
AUTO PARTS SYSTEM	NA	A-84
AUTO PARTS	$24,000	A-99
AUTOLEASE BATCH SYSTEM	$75,000	A-12
AUTOMATED LEASE ACCOUNTING SYSTEM	$40,000	A-68
AUTOMATED PURCHSE ORDER	$1,500	A-44
AUTOMATED WORK PAPERS	$495 to $1,200	A-63
AUTOMATIC DEPRECIATION	$395	A-61
AUTOMOBILE DEALERSHIP ACCOUNTING	NA	A-63
[illegible]	[illegible]	A-102
AUTOMOTIVE CLUB MGMT	$15,000	A-19
AUTOMATED BILLING&COLLECTION	$20,000	A-30
AUTOMOBILE DEALER F&I SYSTEM	$1,500 to $2,000	A-17
AVANTI - INTEGRATED ACCOUNTING SYSTEM	$5,000	A-3
AVIATION CHARTER CONTROL	$1,900 to $4,700	A-14
B AND L INFORMATION SYSTEM-BLIS	NA	A-18
BACK OFFICE	NA	A-62
BACS - ACCOUNTS PAYABLE	$1,500	A-69
BACS - ACCOUNTS RECEIVABLE	$1,500	A-69
BACS - BASIC ACCOUNTING COMPUTER	$5,000	A-69
BACS - GENERAL LEDGER	$1,500	A-70
BACS - PAYROLL	$1,500	A-70
BALANCE FORWARD ACCOUNTS RECEIVABLE	$800	A-16
BALANCE FORWARD ACCTS RECEIVABLE	NA	A-77
BANK RECONCILIATION	$1,000	A-18
[illegible]	$1,990	A-66

BASIC ACCOUNTING AND REPORTING SYSTEM	$6,500	A-87
BCS SYSTEMS	$2,250 to $4,730	A-17
BETA ACCOUNTS RECEIVABLE	$2,450	A-24
BETA ASSET DEPRECIATION	$750	A-24
BETA BANK RECONCILIATION	$620	A-24
BETA CLIENT ACCOUNTING	$7,950	A-24
BETA LOAN AMORTIZATION	$350	A-24
BETA RANDOM NUMBER GENERATOR	$150	A-24
BETA TAX PLANNING	$1,125	A-24
BETA PROFESSIONAL TIME, CHARGE AND BILLING	$2,450	A-24
BETA 1040 TAX	$4,225	A-24
BEVERAGE	NA	A-73
BEVERAGE MANAGEMENT SYSTEM	$9,000	A-33
BRISTOL'S INTEGRATED ACCOUNTING	NA	A-16
BRCARSA	NA	A-27
BILL OF MATERIAL	NA	A-75
BILL OF MATERIAL PROCESSOR	NA	A-73
BILL OF MATERIALS	$3,500	A-15
BILL OF MATERIALS	NA	A-96
BILL OF MATERIALS	$1,000	A-108
BILL OF MATERIALS PROCESSOR W/INVOICING	$4,800	A-87
BILLING	$1,500	A-29
BILLING	$2,000	A-43
BILLING	$1,500	A-63
BILLING	$3,000	A-63
BILLING	$7,000 to $13,000	A-63
BILLING	NA	A-85
BILLING	$750	A-90
BILLING	NA	A-106
BILLING	NA	A-107
BILLING ACCOUNTING SYSTEM	$1,000	A-81
BILLING SYSTEM	NA	A-55
BILLING SYSTEM	$800	A-89
BILLING A/R	$2,500	A-71
BILLING 3000	$12,000	A-83
BILLS	$8,250	A-87
BILLS & CREDIT	NA	A-10
BIMOS	$10,000 to $40,000	A-74
BISINESS	$800	A-16
BLIS	NA	A-15
BOOKKEEPER	NA	A-39
[illegible]	$695	A-3
BOS ACCOUNTS PAYABLE	$550	A-15
BOS ACCOUNTS RECEIVABLE	$500	A-15
BOS GENERAL LEDGER	$550	A-15
BOS INVENTORY CONTROL	$550	A-15
BOS INVOICING	$300	A-15
BOSS (BACK OFFICE SUPPORT SYSTEM)	NA	A-35
[illegible]	$89,000	A-90
BRISTOLS INTEGRATED ACCOUNTING SYSTEM	$800	A-16
BROADCAST AND PRINT PRODUCTION DATATRACK	NA	A-102
BROADCAST BUSINESS COMPUTER SYSTEM	NA	A-35
BROADCAST FORWARDING DATATRACK	NA	A-102
BROKERAGE PACKAGE	$20,000	A-87
BSI COTTON ACCOUNTING SYSTEM	$3,500	A-16
BTCPP	$75,000	A-12
BTMS	$50,000	A-29
BUDGET	$1,800	A-102
BUDGET	$6,000	A-47
BUDGET DEVELOPMENT PACKAGE	NA	A-87
BUDGET PREPARATION	NA	A-1
BUDGET PREPARATION	$1,900	A-43
BUDGET PREPARATION	$50,000	A-74
BUDGET SYSTEM	$2,000	A-102
BUDGETARY ACCOUNTING	NA	A-87
BUDGETING	$4,000	A-106
BUDGETARY CONTROL SYSTEM	NA	A-44
BUILDER 3000	$50,000 to $80,000	A-90
BUREAU SUPPORT SYSTEM	NA	A-71
BUS	$6,000	A-37
BUSINESS ACCOUNTING SYSTEM	NA	A-16
BUSINESS ANALYST	$195	A-15
BUSINESS CONTROL SYSTEM	NA	A-70
BUSINESS EXPRESS	$6,000	A-89
BUSINESS LICENSE	NA	A-4
BUSINESS MANAGEMENT SYSTEM	NA	A-85
BUSINESS SYSTEM	$5,000 to $6,000	A-87
BUSINESS INTEGRATED DATA SYSTEM	$1,950	A-107
BUSINESS CONTROL, PROGRAM/BCP	$1,000	A-89
BUSINESS CONTROL PROGRAMS	NA	A-40
BUSINESS 3000 ACCOUNTS PAYABLE	$15,000	A-83
BUSINESS 3000 ACCOUNTS RECEIVABLE	$10,000	A-83
BUSINESS 3000 GENERAL LEDGER	$17,500	A-83
BUSINESS 3000 ORDER MANAGEMENT	$32,000	A-83
BUSINESS 3000 PURCHASING INVENTORY	$15,000	A-83
BYTESMITH/GENERAL LEDGER	$700	A-77
BYTESMITH/GENERAL LEDGER FOR CPA'S	$1,200	A-77
CA-ACCOUNTS PAYABLE	$27 to $30	A-25
CA-ACCOUNTS RECEIVABLE	$27 to $30	A-25
CA-ASSET MANAGEMENT	$28 to $39	A-25
CA-FINANCIAL MGMT A/R	$27,000	A-25
CA-FINANCIAL MGMT A/P	$27,000	A-25
CA-FINANCIAL MGMT FIXED ASSETS	$27,000	A-25
CA-FINANCIAL MGMT G/L	$15,000 to $48,000	A-25
CA-FINANCIAL MODELING/ORDER TABULATION	$35,000	A-25
CA-FINANCIAL PLANNER	$25,000 to $35,000	A-25
CA-GASPER	NA	A-25
CA-GENERAL LEDGER	$48 to $52	A-25
CABLE TV BILLING SYSTEM	$10,000	A-80
CABLE TV MGMNT SYSTEM	$20,000	A-18
CABLE TV SUBSCRIPTION	$15,000 to $40,000	A-107
CABLESTAR	$40,000	A-80
CABS	$6,500	A-35
CAELUS MANAGEMENT	$10,000 to $70,000	A-106
CAI A/P+	$15,000	A-18
CAI F/A	$12,500	A-18
CAI G/L PLUS	$1,500	A-18
CALENDAR	$8,000	A-17
CAMPUS FINANCIAL MANAGEMENT	NA	A-7
CAPALAW	NA	A-18
CAPITAL CREDIT SYSTEMS	$1,600	A-87
CAPITAL EXPENDITURE TRACKING	NA	A-70
CAPITAL PROJECT ACCOUNTING	NA	A-6
CARPET RETAIL	$15,000	A-30
CARRIER DEALER BILLING	$15,000 to $400,000	A-107
CARRIER-DEALER CONTROL	$8,000	A-81
CAS/IV ACCOUNTS PAYABLE	$17,500	A-30
CAS/IV FINANCIAL MANAGEMENT SYSTEM	$15,000	A-30
CAS/IV GENERAL LEDGER	NA	A-30
CAS/IV PURCHASE ORDERS/INVENTORY	$17,500	A-30
CAS IV/FIXED ASSETS	NA	A-30
CASEWARE GENERAL ACCOUNTING	$2,600	A-19
CASH BALANCE REPORTING	$70,000 to $270,000	A-83
CASH DISBURSEMENT	NA	A-31
CASH MANAGEMENT SYSTEM	$1,600	A-48
CASH MANAGER	$1,800	A-106
CASH REGISTER	NA	A-4
CASH/CREDIT MGMT SUPPORT (CCMSS)	NA	A-23
CASH DISBURSEMENT PROGRAM-VER.1	$800	A-4
CATALOG SYSTEM	$25,000	A-72
CCAS SW FOR OIL PRODUCERS/OPERATORS	NA	A-18
CCC STANDARD ACCOUNTING	NA	A-30
CCS LAW-BILL	NA	A-35
CELLULAR TELEPHONE SYSTEM	NA	A-90
CEMENTARY MANAGEMENT	$35,000	A-23
CETA ALLOWANCE & PARTICIPANT TRACKING	$500	A-40
CH/ACCOUNTS PAYABLE	$12,000	A-21
CHAMPION TAX	NA	A-79
CHECK RECONCILEMENT	NA	A-67
CHECK RECONCILIATION	NA	A-1
CHECK RECONCILIATION	$20,000	A-74
CHECK RECONCILIATION SYSTEM	$500	A-11
CHECK WATCHER	$120,000	A-30
CHECKOUT	$750	A-6
CHECK-RECON-CR-VERSION 1	$500	A-4
CHILD SUPPORT	NA	A-67
CHURCH MANAGEMENT	$495	A-15
[illegible]	NA	A-27
[illegible]	$595	A-3
CHURCH PACKAGE	$2,400	A-16
CICS ACCOUNTS RECEIVABLE	$25,000	A-106
CJ/ACCOUNTS RECEIVABLE	$12,000	A-31
CLAIMS SYSTEMS	$4,750	A-3
CLASS	$20,000	A-106
CLASS LEASE ACCOUNTING SYSTEM	$50,000	A-89
CLIENT ACCOUNT	$5,000 to $10,000	A-12
CLIENT ACCOUNTING	NA	A-7
CLIENT ACCOUNTING SYSTEM	NA	A-79

CLIENT PROFITABILITY ... NA ... A-162
CLIENT PROGRAMMED ACCOUNTING ... NA ... A-43
CLIENT WRITE UP ... NA ... A-5
CLIENT WRITE UP ... NA ... A-81
CLIMAX ... $20,000 to $50,000 ... A-37
CLINET CHARGE ... $8,000 ... A-17
CLUB MANAGEMENT SYSTEM ... NA ... A-7
CLUB MANAGEMENT SYSTEM (CMS) ... $4,000 ... A-56
CMC ACCOUNTS PAYABLE ... $1,100 ... A-81
CMC FIXED ASSET SYSTEM ... $700 ... A-20
CMI PROFIT ... $5,000 to $80,000 ... A-28
CMS ... NA ... A-43
CMS LEGAL MANAGEMENT SYSTEM ... NA ... A-35
COLLECTION AGENCY SYS ... $11,500 ... A-81
COLLECTION BUREAU SYSTEM ... NA ... A-97
COLLECTION PROCESSING ... $2,500 ... A-81
COLLEGE & UNIVERSITY FINANCIAL SYSTEM ... NA ... A-9
COLPAK ... $25,000 ... A-4
COM TRACK ... $3,500 ... A-83
COMBINED ACCOUNTING PACKAGE ... $7,500 ... A-105
COMET ... NA ... A-79
COMMERCIAL COLLECTION PACKAGE ... NA ... A-94
COMMERCIAL PRINTER BID SYS ... $600 ... A-36
COMMERCIAL PRINTING ... $15,000 to $40,000 ... A-107
COMMERCIAL PROPERTY MANAGEMENT ... NA ... A-31
COMMISSION REPORTING ... $1,500 ... A-40
COMMODITIES 250 ... $15,000 ... A-83
COMPLETE CREDIT UNION SYSTEMS ... $60,000 ... A-44
COMPLETE OIL MARKETER'S PERPETUAL ... $5,000 ... A-8
COMPREHENSIVE FINANCIAL REPORTING ... $2,500 ... A-96
COMPU NET ... $150,000 ... A-12
COMPU SYSTEM II ... NA ... A-27
COMPUT A CHARGE ... $10,000 to $31,500 ... A-107
COMPUTER-ASSISTED MANAGEMENT SYSTEM ... NA ... A-23
COMPUTER AUDIT RETRIEVAL ... $12,000 ... A-90
COMPUTERIZED ACCOUNTING SYSTEM ... $12,000 ... A-37
COMPUTERIZED MUNICIPAL ACCTG SY ... NA ... A-92
COMPUTOLL ... NA ... A-1
CONDOMINIUM PROPERTY MANAGEMENT ... $2,000 to $6,000 ... A-31
CONFLICT OF INTEREST ... NA ... A-62
CONSCO ACCOUNTING INFORMATION SYSTEM ... NA ... A-39
CONSCO CONSOLIDATION SYSTEM ... NA ... A-31
CONSTRUCT ... NA ... A-94
CONSTRUCTION ACCOUNTING ... NA ... A-74
CONSTRUCTION BUDGETARY ... NA ... A-48
CONSTRUCTION LOAN CONTROL ... NA ... A-30
CONSTRUCTION MONITORING ... $15,000 ... A-44
CONTINUING PROFESSIONAL EDUCATION ... $350 ... A-63
CONTRACTOR BILLING ... NA ... A-1
CONTRACTORS JOB COST ... $995 ... A-81
CONTRACTOR'S JOB COSTING ... $1,500 ... A-119
CONVENIENCE STORE DIRECT DELIVERY ... NA ... A-7
CORPORATE FINANCIAL SYSTEM ... NA ... A-8
CORPORATE SHAREHOLDER SYSTEMS ... $45,000 ... A-96
CORPORATE TRUST ACCOUNTING MGMT SYSTEM ... NA ... A-39
CORPORATE SUPPORT SYSTEM (CSS) ... $80,000 ... A-101
CORPTAX-AMS ... $10,000 to $15,000 ... A-48
COST & PRODUCTION SYSTEM ... NA ... A-46
COST-ACUMEN ... $995 ... A-25
COST ACCOUNTING/JOB COSTING ... $7,500 ... A-6
COUNTRY CLUB ACCOUNTING PACKAGES ... $5,000 ... A-89
COUNTRY CLUB ACCOUNTING SYSTEM ... NA ... A-109
COUNTRY CLUB BILLING ... $2,500 ... A-89
COUNTRY TAX BILLING ... $4,500 ... A-4
CPA ... NA ... A-72
CPA - CLIENT ACCOUNTING ... $2,000 ... A-4
CPA-11 ... $3,500 to $5,000 ... A-49
CPA AND PUBLIC ACCOUNTING BUSINESS ... NA ... A-104
CPA CLIENT WRITE UP SYSTEM ... $4,100 ... A-38
CPA COMPREHENSIVE FINANCIAL REPORTING ... $4,500 ... A-11
CPA CLIENT WRITE-UP ... $1,495 ... A-72
CPA CLIENT WRITE-UP SYSTEM COMPUTER ... $1,250 ... A-96
CPA PACKAGE ... $2,000 to $7,000 ... A-72
CPA SYSTEM ... NA ... A-77
CPA TIME ACCOUNTING ... $7,500 ... A-32
CPAS ACCOUNTS PAYABLE SYSTEM ... $250 to $4,000 ... A-25
CPAS ACCOUNTS RECEIVABLE SYSTEM ... $2,500 to $4,000 ... A-25
CPAS FIXED ASSETS AND DEPRECIATED ... $2,100 ... A-36
CPAS GENERAL LEDGER FINANCIAL ... $2,500 to $5,000 ... A-36
CPAS ORDER PROCESSING SYSTEM ... $2,500 to $9,000 ... A-25
CR/3000 ... $3,500 ... A-21
CREDIT REPORTING ... $4,000 ... A-91
CREDIT UNION ... NA ... A-34
CREDIT UNION ... $5,950 ... A-62
CREDIT UNION ACCOUNTING ... $35,000 ... A-57
CREDIT UNION MANAGEMENT ... $6,000 to $15,000 ... A-42
CREDIT UNION (CUROLS) ... $10,000 to $25,000 ... A-26
CSCO FIXED ASSET ACCOUNTING ... $7,000 ... A-39
CSCO MANUFACTURING JOB COST SYSTEM ... $50,000 ... A-39
CSCO TAX APPRAISAL ADMIN SYSTEM ... NA ... A-39
CSI ACCOUNTS PAYABLE ... $1,500 ... A-33
CSI BUSINESS SYSTEM ... $2,000 ... A-33
CSI GENERAL LEDGER ... $2,000 ... A-33
CTC PROVIDER SOFTWARE SYSTEM ... NA ... A-1
CUE PROJECT MANAGEMENT SYSTEM ... NA ... A-69
CULLINET FINANCIAL SYSTEM/GL ... $100,000 ... A-34
CUSTOM HOUSE BROKER SYSTEM ... NA ... A-7
CUSTOMER ORDER PROCESSING ... NA ... A-73
CUSTOMER ORDER PROCESSING SYSTEM ... NA ... A-78
CUSTOMER FOLLOW-UP ... $2,500 ... A-74
D-CALC TM ... NA ... A-104
DAS (DENTAL ACCOUNTING SYSTEM) ... $599 ... A-95
DATA-COM ACCOUNTS PAYABLE ... $2,500 ... A-37
DATA-COM ACCOUNTS RECEIVABLE ... $2,000 ... A-37
DATA-COM GENERAL LEDGER ... $2,000 ... A-37
DATASTAT ACCOUNTS PAYABLE ... $1,500 ... A-39
DATASTAT ACCOUNTS RECEIVABLE ... $1,500 ... A-39
DATASTAT GENERAL LEDGER ... $1,500 ... A-39
DCM ACCOUNTS RECEIVABLE ... $1,500 ... A-39
DCM GENERAL LEDGER ... $1,500 ... A-39
DDA/GENERAL LEDGER ... NA ... A-23
DEBT MANAGEMENT ... $2,000 ... A-36
DEBTORS ACCOUNTS RECEIVABLE ... NA ... A-82
DELINQUENT TAX RECEIVABLE SYSTEM ... $15,000 ... A-77
DELTA PUBLIC ACCOUNTING SYSTEM ... $2,000 ... A-42
DENPOP ... NA ... A-69
DENTAL OFFICE MANAGEMENT SYS ... $14,000 ... A-82
DENTAL-MEDICAL ... NA ... A-26
DEPRECIATION ... $200 to $6,200 ... A-66
DEPRECIATION ... NA ... A-85
DEPRECIATION ... $3,000 ... A-85
DEPRECIATION ... $595 ... A-85
DEPRECIATION-DE ... $1,000 ... A-53
DEPRECIATION/AMORTIZATION SCHEDULES ... $1,000 ... A-47
DEPRECIATION ASSET MANAGEMENT ... $600 ... A-85
DETAILED TOLL BILLING SYSTEM ... $3,600 ... A-87
DIGITAL INTEGRATED BUSINESS SYSTEM ... $16,000 ... A-11
DIRECT 3000 ... $10,000 ... A-49
DIRECT 3000 FINANCIAL ORDER PROCESSING ... NA ... A-89
DISMAX ... [illegible] ... A-85
DISPLAY-CLASSIFIED ADVERTISING ... $9,000 ... A-82
DISTRIBUTE ... [illegible] ... A-78
DISTRIBUTION ACCOUNTING SYSTEM ... [illegible] ... A-53
[illegible] ... [illegible] ... A-87
DISTRIBUTION CONTROL SYSTEM ... NA ... A-46
DISTRIBUTION II ... $18,900 ... A-82
DISTRIBUTION INFORMATION SYSTEM ... $24,000 ... A-35
DISTRIBUTION MANAGEMENT SYSTEM I ... $40,000 ... A-33
DISTRIBUTION PACKAGE ... NA ... A-10
DISTRIBUTION PACKAGE ... $27,350 ... A-85
DISTRIBUTION PACKAGE ... [illegible] ... A-87
DISTRIBUTION PLUS ... $8,500 ... A-81
DISTRIBUTION SYSTEM ... $3,000 ... A-39
DISTRIBUTION SYSTEM ... NA ... A-100
DISTRIBUTORS SOFTWARE ... $22,000 ... A-88
DISTRIBUTION MANAGEMENT & CONTROL ... $13,500 ... A-6
DMCS ... NA ... A-38
DMBS ... $25,000 ... A-41
DOHNSCO/D ... $8,000 to $10,000 ... A-47
DOMS ... $12,000 ... A-88
DOS JOB ACCOUNTING REPORT SYSTEM ... $4,000 ... A-88
DEPRECIATION - DE ... $1,000 ... A-53
DPS ACCOUNTING ... $8,000 to $24,000 ... A-44
DPS TELEPHONE SYSTEM ... $20,000 ... A-44
DRG REPORTING ... $10,000 ... A-53
DRL ... $30,000 ... A-72
DUE DATE MONITORING ... $750 ... A-53
DYNALOGIC CONSTITUENT SYSTEM ... $2,000 ... A-44

DYNALOGIC PROPERTY MANAGEMENT SYSTEM	$50,000	A-44
DYNALOGIC SCHOOL DISTRICT ACCOUNTING	$10,000	A-44
EASE	$19,000	A-103
EASE ACCOUNTS PAYABLE	N/A	A-103
EASE ACCOUNTS RECEIVABLE	N/A	A-03
EASE FOR THE APPAREL INDUSTRY	N/A	A-103
EASE GENERAL LEDGER	N/A	A-103
EASY	$1,095	A-49
EASY CASH AUTOMATED CASH APPLICATION	$14,000	A-6
EASYPOST INSURANCE AGENCY MANAGEMENT	$3,600	A-3
ECONOMIC EVALUATION	$2,000	A-71
EFACTS	N/A	A-94
ELECTRICAL CONTRACTOR	N/A	A-100
ELECTRICAL PLUMBING AND SUPPLY	$10,000	A-45
ELECTRONIC SALES REP PACKAGE	N/A	A-69
ELECTRIC AND/OR WATER/SEWER BILLING	N/A	A-1
EMBASSY INST LIBRARY FOR TAX PLANNING	N/A	A-45
EMPLOYEES RECEIVABLES & TRAVEL EXPENSES	$35,000	A-55
EMS BILLING	N/A	A-1
ENERGY MODULE	N/A	A-28
ENGINEERING ACCOUNTING SYSTEM	$9,500	A-51
ENGINEERING AND TIME ACCOUNTING	$2,000	A-39
ENGINEERING TIME AND PROJECT MANAGEMENT	N/A	A-60
EQUIPMENT MANAGEMENT SYSTEM	$5,000	A-95
EQUIPMENT & FIXED ASSETS	$6,000 to $10,000	A-57
EQUIPMENT DEALER PACKAGE	$12,000 to $25,000	A-90
ETI-ACCOUNTING	N/A	A-39
EXCALIBUR	$50,000 to $150,000	A-46
EXCESS COPY BILLING	$2,500	A-60
EXCISE TAX BILLING & COLLECTIONS	N/A	A-2
EXPEDITER	$30,000	A-104
EXPENSE ACCOUNTING	$3,000	A-19
EZCASH	$4,500	A-1
EZPAY	$4,500	A-1
EZ-SPEED TM	N/A	A-104
F&I BUSINESS SYSTEM	$2,500	A-6
FA;M	$50,000	A-69
FACS-FINANCIAL ACCOUNTING AND CONTROL	N/A	A-74
FACS-FINANCIAL ACCOUNTING SYSTEM	$60,000	A-61
FACTS	$10,500	A-72
FACTS V	N/A	A-45
FAP/3000	$6,000	A-21
FEDERAL HOUSING	N/A	A-66
FEDERAL PLANNING	N/A	A-48
FEDERAL STOCK NUMBER PROGRAM	N/A	A-53
FGL/3000	$6,000	A-21
FIAS	$3,500	A-34
FILM NEGATIVE LIBRARY	$2,000	A-44
FIN-PAC/38 ACCOUNTS PAYABLE	N/A	A-11
FIN-PAC/38 ACCOUNTS RECEIVABLE	N/A	A-11
FIN-PAC II ACCOUNTS PAYABLE	N/A	A-11
FIN-PAC II ACCOUNTS RECEIVABLE	N/A	A-11
FIN-PAC II GENERAL LEDGER	N/A	A-11
FIN-87	$2,495	A-96
FINANCE SYSTEM	N/A	A-78
FINANCIAL ACCOUNTING PACKAGE	N/A	A-104
FINANCIAL ACCOUNTING SYSTEM	$29,000	A-22
FINANCIAL ACCOUNTING SYSTEM	N/A	A-84
FINANCIAL COMMAND	$80,000	A-42
FINANCIAL CONTROL SYSTEMS	$7,000	A-62
FINANCIAL FUND ACCOUNTING	N/A	A-29
FINANCIAL INFORMATION PROCESSING SYSTEM	$2,500	A-28
FINANCIAL MANAGEMENT	$5,000	A-30
FINANCIAL MANAGEMENT	N/A	A-84
FINANCIAL MANAGEMENT ACCOUNTING SYSTEM	$7,000	A-58
FINANCIAL MANAGEMENT INFORMATION	$75,000	A-74
FINANCIAL MANAGEMENT SYSTEM	$8,400	A-23
FINANCIAL MANAGEMENT SYSTEM	$6 to $18,000	A-47
FINANCIAL MANAGEMENT SYSTEM	N/A	A-84
FINANCIAL MANAGEMENT SYSTEM	N/A	A-98
FINANCIAL MANAGEMENT SYSTEM	$20,000	A-109
FINANCIAL MANAGEMENT SYSTEM (FMS)	$10,000	A-8
FINANCIAL MODELING SYSTEM	$2,950	A-31
FINANCIAL PACKAGE	N/A	A-18
FINANCIAL PACKAGE	N/A	A-75
FINANCIAL PACKAGE	$8,000	A-105
FINANCIAL REPORT WRITER	N/A	A-57
FINANCIAL REPORT WRITER WITH GRAPHICS	$5,000	A-83
FINANCIAL REPORTER	$300 to $6,200	A-96
FINANCIAL REPORTING	$3,500 to $5,000	A-50
FINANCIAL REPORTING	$3,500 to $5,000	A-57
FINANCIAL REPORTING	$1,200 to $1,500	A-67
FINANCIAL REPORTING AND GENERAL ACCOUNTING	N/A	A-51
FINANCIAL REPORTING/GENERAL LEDGER	$2,800	A-14
FINANCIAL REPORTING SYSTEM	$12,000	A-94
FINANCIAL RESOURCE SYSTEM	$50,000	A-108
FINANCIAL STATEMENTS	N/A	A-40
FINANCIAL STATEMENTS	$1,200	A-102
FINANCIAL SYSTEM IN HISPANIC	$23,000	A-22
FINANCIAL REPORTING & WORK ORDER MANAGEMENT	N/A	A-93
FINISHED GOODS INVENTORY	$3,000	A-89
FIRST FUND RAISING INFO RETRE/VAL	N/A	A-15
FIS	N/A	A-28
FIXED ASSET	$5,000	A-53
FIXED ASSET	$3,000	A-80
FIXED ASSET	$13,800	A-82
FIXED ASSET ACCOUNTING	$17,000	A-37
FIXED ASSET ACCOUNTING	$2,200	A-40
FIXED ASSET ACCOUNTING	$3,000	A-50
FIXED ASSET ACCOUNTING	$1,200 to $1,500	A-67
FIXED ASSET ACCOUNTING	$900 to $4,600	A-88
FIXED ASSET ACCOUNTING	$1,200	A-104
FIXED ASSET ACCOUNTING	$1,000	A-108
FIXED ASSET ACCOUNTING/CONTROL SYSTEM	$1,900	A-53
FIXED ASSET ACCOUNTING SYSTEM	$3,900	A-54
FIXED ASSET DEPRECIATION	$2,775	A-69
FIXED ASSET DEPRECIATION SYSTEM	$995	A-31
FIXED ASSET MANAGEMENT	$800	A-16
FIXED ASSETS	N/A	A-4
FIXED ASSETS	N/A	A-42
FIXED ASSETS	$2,000	A-48
FIXED ASSETS	$2,000 to $3,500	A-50
FIXED ASSETS	$5,000	A-52
FIXED ASSETS	N/A	A-56
FIXED ASSETS	N/A	A-58
FIXED ASSETS	N/A	A-58
FIXED ASSETS	N/A	A-58
FIXED ASSETS	$9,000	A-61
FIXED ASSETS	$15,000	A-62
FIXED ASSETS	$19,500 to $40,000	A-69
FIXED ASSETS	$2,000	A-71
FIXED ASSETS	$1,100	A-73
FIXED ASSETS	N/A	A-76
FIXED ASSETS	N/A	A-79
FIXED ASSETS	$1,000 to $2,000	A-81
FIXED ASSETS	$1,300 to $7,500	A-83
FIXED ASSETS	$3,000	A-89
FIXED ASSETS	$15,000	A-93
FIXED ASSETS	$2,500	A-94
FIXED ASSETS	$5,000	A-94
FIXED ASSETS	$3,000 to $10,000	A-96
FIXED ASSETS	$2,000	A-102
FIXED ASSETS	N/A	A-103
FIXED ASSETS	$2,000	A-107
FIXED ASSETS	$4,000	A-109
FIXED ASSETS ACCOUNTING	N/A	A-101
FIXED ASSETS ACCOUNTING SYSTEM	$5,000	A-77
FIXED ASSETS ACRS SYSTEM	$2,100	A-39
FIXED ASSETS AND DEPRECIATION	N/A	A-73
FIXED ASSETS DEPRECIATION	$1,000	A-4
FIXED ASSETS INVENTORY	N/A	A-2
FIXED ASSETS SUB LEDGER	$795	A-66
FIXED ASSETS & DEPRECIATION	$7,000	A-104
FIXED ASSETS ACCOUNTING & DEPRECIATION	$3,250	A-26
FIXED ASSET MANAGEMENT SYSTEM-ON-LINE	$1,000	A-48
FIXED ASSETS FOR S/34 REPORTS	$5,000	A-34
FLEET MANAGEMENT SYSTEM FMS	$3,000	A-66
FLEXICALC	$1,200	A-72
FLOATING PRIME INTEREST RATE SYS	N/A	A-34
FLORIST PACKAGE	N/A	A-8
FLORIST'S ACCOUNTS RECEIVABLE	$2,500	A-50
FLOWER WHOLESALER-IMPORT/EXPORT	N/A	A-97
FMS	N/A	A-94
FMS - 90	N/A	A-74
FMS GENERAL LEDGER (ONLINE)	$3,320	A-51
FMS HONEYWELL CASH FLOW MANAGEMENT	$15,000	A-51
FOCIS	$10,000 to $25,000	A-23
FOCUS FORECASTING SYSTEM	N/A	A-67

FOENIX (HP-3000 FEDERAL FINANCIAL)	$87,500	A-49
FOOD BROKERAGE SYSTEM	$15,000	A-28
FOOD COST MANAGER	$850	A-88
FOOD PROCESSORS PRODUCT MANAGEMENT	NA	A-86
FOOD SERVICE PROGRAM	$2,500	A-43
FOOD STAMP PROCESSING	NA	A-2
FOOD & DAIRY MGMT SYSTEM	$30,000	A-57
FOOD DISTRIBUTOR'S PACKAGE	$10,000	A-45
FOOTWEAR RETAILER ACCTG/MERCHANDISING	$9,000	A-97
FOREIGN EXCHANGE	NA	A-78
FORETAX	NA	A-54
FORMS MANUFACTURING INVOICING SYSTEM	NA	A-28
FORMS PRINTING PACKAGE	NA	A-27
FORMS MANAGEMENT-ORDER ENTRY	$5,000	A-88
FREE FORMAT GENERAL LEDGER	$2,495	A-96
FREIGHT RECEIVABLES	NA	A-20
FREIGHT RECEIVABLES	NA	A-20
FRM (FINANCIAL RESOURCE MANAGEMENT)	$30,000	A-48
FRONT DESK SYSTEM	$1,500 to $7,500	A-110
FRS	$14,700	A-97
FRWACT	$70,000	A-35
FUEL DELIVERY	$2,400	A-76
FUEL OIL	NA	A-52
FUEL OIL JOB	NA	A-27
FUEL PAK	$13,000	A-41
FUND ACCOUNTING	$4,500	A-43
FUND-AL	$14,300 to $32,700	A-97
FUND ONE (VERSION 3.0)	NA	A-18
FUNDTRACK	NA	A-91
FURNITURE RENTAL INVENTORY SYSTEM	$12,500	A-21
FURNITURE & FIXTURE	NA	A-74
G.A.N.I	NA	A-14
G/L & FINANCIAL REPORTING	NA	A-94
G/L FOR S/34 REPORTS & SYSTEM CAPABILITIES	$10,000	A-34
G/L PLUS	$33,000 to $61,000	A-69
G.R.A.I.N.S.	$10,000	A-14
GAAP	NA	A-59
GAAP ACCOUNTS PAYABLE	$3,500	A-59
GAAP GENERAL LEDGER	$3,500	A-59
GAMBIT	$7,500	A-30
GAS/OIL WELL MANAGEMENT SYSTEM	$8,000	A-30
GAS AND OIL ACCOUNTING SYSTEM	$28,000	A-63
GAS AND OIL DISTRIBUTERS SYSTEM	$7,000	A-106
GAS FIRST PURCHASER	NA	A-98
GAS STATION CREDIT BILLING/ACCOUNTS	$3,000	A-27
GB 3000	NA	A-62
GENERAL ACCOUNTING	NA	A-1
GENERAL ACCOUNTING	NA	A-3
GENERAL ACCOUNTING	NA	A-6
GENERAL ACCOUNTING	$15,000	A-6
GENERAL ACCOUNTING	NA	A-7
GENERAL ACCOUNTING	$3,000	A-12
GENERAL ACCOUNTING	$1,500 to $2,500	A-17
GENERAL ACCOUNTING	$4,000	A-17
GENERAL ACCOUNTING	$1,400	A-20
GENERAL ACCOUNTING	$3,500	A-22
GENERAL ACCOUNTING	$4,000	A-22
GENERAL ACCOUNTING	$1,000	A-26
GENERAL ACCOUNTING	$6,000	A-31
GENERAL ACCOUNTING	$6,000	A-31
GENERAL ACCOUNTING	$10,000	A-32
GENERAL ACCOUNTING	$1,500 to $15,000	A-32
GENERAL ACCOUNTING	$15,500	A-34
GENERAL ACCOUNTING	$10,000	A-37
GENERAL ACCOUNTING	$5,000	A-37
GENERAL ACCOUNTING	NA	A-38
GENERAL ACCOUNTING	$2,000 to $10,000	A-38
GENERAL ACCOUNTING	$1,600 to $12,500	A-48
GENERAL ACCOUNTING	$7,500	A-51
GENERAL ACCOUNTING	NA	A-52
GENERAL ACCOUNTING	$2,500	A-54
GENERAL ACCOUNTING	NA	A-55
GENERAL ACCOUNTING	$4,000 to $6,000	A-57
GENERAL ACCOUNTING	NA	A-57
GENERAL ACCOUNTING	$12,500	A-70
GENERAL ACCOUNTING	NA	A-72
GENERAL ACCOUNTING	$2,500 to $3,000	A-89
GENERAL ACCOUNTING	NA	A-92
GENERAL ACCOUNTING	NA	A-107
GENERAL ACCOUNTING PACKAGE	$12,000	A-77
GENERAL ACCOUNTING PACKAGE	$8,000	A-86
GENERAL ACCOUNTING PACKAGE	$5,400	A-89
GENERAL ACCOUNTING SYSTEM	$10,000	A-22
GENERAL ACCOUNTING SYSTEM	$15,000	A-23
GENERAL ACCOUNTING SYSTEM	NA	A-57
GENERAL ACCOUNTING SYSTEM	$16,000	A-58
GENERAL ACCOUNTING SYSTEM	$850 to $6,500	A-90
GENERAL AVIATION	NA	A-42
GENERAL BUSINESS	$21,000 to $66,000	A-109
GENERAL BUSINESS PACKAGE	NA	A-36
GENERAL BUSINESS SYSTEM	$3,000 to $5,000	A-43
GENERAL BUSINESS SYSTEMS	$5,000	A-15
GENERAL FINANCIAL	NA	A-49
GENERAL LEDGER	$10,000	A-1
GENERAL LEDGER	$78	A-2
GENERAL LEDGER	NA	A-4
GENERAL LEDGER	NA	A-5
GENERAL LEDGER	NA	A-5
GENERAL LEDGER	$7,500	A-7
GENERAL LEDGER	$3,600	A-7
GENERAL LEDGER	$3,500	A-7
GENERAL LEDGER	$1,000	A-8
GENERAL LEDGER	$1,000	A-16
GENERAL LEDGER	NA	A-14
GENERAL LEDGER	$750	A-17
GENERAL LEDGER	$3,000	A-18
GENERAL LEDGER	NA	A-19
GENERAL LEDGER	$4,000	A-19
GENERAL LEDGER	NA	A-21
GENERAL LEDGER	NA	A-21
GENERAL LEDGER	$3,000	A-22
GENERAL LEDGER	NA	A-25
GENERAL LEDGER	$1,800	A-27
GENERAL LEDGER	$1,800	A-30
GENERAL LEDGER	$1,500	A-30
GENERAL LEDGER	$2,000	A-31
GENERAL LEDGER	$7,000	A-31
GENERAL LEDGER	$2,000	A-32
GENERAL LEDGER	NA	A-33
GENERAL LEDGER	NA	A-33
GENERAL LEDGER	2,000	A-33
GENERAL LEDGER	$2,500	A-33
GENERAL LEDGER	$2,850	A-34
GENERAL LEDGER	$895 to $1,950	A-35
GENERAL LEDGER	NA	A-36
GENERAL LEDGER	$350	A-36
GENERAL LEDGER	NA	A-37
GENERAL LEDGER	NA	A-37
GENERAL LEDGER	$1,000	A-38
GENERAL LEDGER	NA	A-38
GENERAL LEDGER	$2,500	A-38
GENERAL LEDGER	$2,000	A-38
GENERAL LEDGER	NA	A-40
GENERAL LEDGER	NA	A-41
GENERAL LEDGER	$2,500	A-41
GENERAL LEDGER	$25,000	A-41
GENERAL LEDGER	$2,500	A-42
GENERAL LEDGER	NA	A-42
GENERAL LEDGER	$295	A-43
GENERAL LEDGER	$2,000	A-43
GENERAL LEDGER	$18,000	A-47
GENERAL LEDGER	$3,500	A-48
GENERAL LEDGER	NA	A-49
GENERAL LEDGER	$2,000	A-51
GENERAL LEDGER	$400	A-51
GENERAL LEDGER	NA	A-52
GENERAL LEDGER	$5,000	A-52
GENERAL LEDGER	NA	A-52
GENERAL LEDGER	NA	A-53
GENERAL LEDGER	$1,150	A-54
GENERAL LEDGER	NA	A-55
GENERAL LEDGER	NA	A-56
GENERAL LEDGER	NA	A-56
GENERAL LEDGER	$4,000 to $6,000	A-58
GENERAL LEDGER	$850	A-59
GENERAL LEDGER	$3,000	A-60
GENERAL LEDGER	$18,000	A-62
GENERAL LEDGER	NA	A-62

GENERAL LEDGER	$1,050	A-82
GENERAL LEDGER	$1,500	A-83
GENERAL LEDGER	$3,000 to $7,500	A-83
GENERAL LEDGER	$2,000	A-83
GENERAL LEDGER	N/A	A-84
GENERAL LEDGER	$25,000	A-84
GENERAL LEDGER	$3,000	A-86
GENERAL LEDGER	N/A	A-86
GENERAL LEDGER	$1,250	A-87
GENERAL LEDGER	$1,200 to $1,500	A-87
GENERAL LEDGER	N/A	A-87
GENERAL LEDGER	$2,500	A-88
GENERAL LEDGER	$1,500	A-70
GENERAL LEDGER	$5,000	A-70
GENERAL LEDGER	$2,000	A-71
GENERAL LEDGER	$1,000	A-71
GENERAL LEDGER	$795	A-72
GENERAL LEDGER	N/A	A-73
GENERAL LEDGER	$1,350	A-74
GENERAL LEDGER	$3,000 to $5,000	A-74
GENERAL LEDGER	N/A	A-75
GENERAL LEDGER	N/A	A-75
GENERAL LEDGER	$1,000	A-76
GENERAL LEDGER	$3,000	A-77
GENERAL LEDGER	N/A	A-77
GENERAL LEDGER	$8,000	A-77
GENERAL LEDGER	N/A	A-77
GENERAL LEDGER	$2,500	A-78
GENERAL LEDGER	N/A	A-79
GENERAL LEDGER	N/A	A-79
GENERAL LEDGER	N/A	A-80
GENERAL LEDGER	$2,500	A-81
GENERAL LEDGER	$5,000	A-81
GENERAL LEDGER	$1,000 to $2,000	A-81
GENERAL LEDGER	$20,500	A-82
GENERAL LEDGER	$3,500	A-82
GENERAL LEDGER	N/A	A-83
GENERAL LEDGER	$1,300 to $7,500	A-83
GENERAL LEDGER	$1,500	A-84
GENERAL LEDGER	$4,900	A-84
GENERAL LEDGER	N/A	A-85
GENERAL LEDGER	$1,500	A-85
GENERAL LEDGER	N/A	A-85
GENERAL LEDGER	$3,000	A-87
GENERAL LEDGER	$2,600	A-87
GENERAL LEDGER	$2,000	A-88
GENERAL LEDGER	$2,450 to $1,250	A-88
GENERAL LEDGER	N/A	A-90
GENERAL LEDGER	N/A	A-90
GENERAL LEDGER	$795	A-91
GENERAL LEDGER	$2,000	A-91
GENERAL LEDGER	$1,250	A-91
GENERAL LEDGER	$595	A-92
GENERAL LEDGER	$15,000 to $20,000	A-93
GENERAL LEDGER	$7,500	A-94
GENERAL LEDGER	$150	A-95
GENERAL LEDGER	$1,000	A-95
GENERAL LEDGER	$495	A-95
GENERAL LEDGER	N/A	A-96
GENERAL LEDGER	N/A	A-97
GENERAL LEDGER	N/A	A-98
GENERAL LEDGER	N/A	A-98
GENERAL LEDGER	$3,000	A-99
GENERAL LEDGER	$6,500	A-99
GENERAL LEDGER	$500	A-101
GENERAL LEDGER	$400	A-101
GENERAL LEDGER	$1,800	A-102
GENERAL LEDGER	$5,100	A-103
GENERAL LEDGER	$1,200	A-104
GENERAL LEDGER	$2,500	A-105
GENERAL LEDGER	$2,000 to $7,000	A-106
GENERAL LEDGER	N/A	A-106
GENERAL LEDGER	$3,500	A-106
GENERAL LEDGER	$2,500	A-107
GENERAL LEDGER	N/A	A-107
GENERAL LEDGER	$10,000	A-108
GENERAL LEDGER	$1,000	A-109
GENERAL LEDGER	$1,270	A-109
GENERAL LEDGER	N/A	A-110

GENERAL LEDGER AND FINANCIAL ACCOUNTING	N/A	A-2
GENERAL LEDGER AND FINANCIAL ANALYSIS	N/A	A-102
GENERAL LEDGER AND REPORT WRITER	$11,500	A-81
GENERAL LEDGER AND REPORT WRITER	$17,000	A-81
GENERAL LEDGER FINANCIAL SYSTEM	$5,500	A-80
GENERAL LEDGER FINSATE	N/A	A-107
GENERAL LEDGER I	$2,500	A-101
GENERAL LEDGER SYSTEM	$800	A-16
GENERAL LEDGER SYSTEM	N/A	A-30
GENERAL LEDGER SYSTEM	N/A	A-45
GENERAL LEDGER W/FINANCIAL REPORT WRITER	N/A	A-79
GENERAL MUNICIPAL ACCOUNTS RECEIVABLE	N/A	A-2
GENERALIZED BOOKKEEPING SYSTEM	$7,600	A-17
GENERAL LEDGER - CMC	$4,500	A-27
GENERAL LEDGER/FINANCIAL MANAGEMENT	$8,500	A-4
GENERAL LEDGER & FINANCIAL REPORTING SYSTEM	N/A	A-49
GENERAL LEDGER & FINANCIAL STATEMENT	$485	A-3
GENERAL LEDGER - FINANCIAL REPORT W	N/A	A-79
GENERAL LEDGER ACCTG/FINANCIAL REPORTING	$5,100	A-47
GENERAL LEDGER, PAYROLL, ACCOUNTS	N/A	A-75
GENERAL LEDGER/ACCOUNTS PAYABLE	$1,000	A-35
GENERAL LEDGER/BUDGETARY CONTROL	N/A	A-15
GENERAL LEDGER/FIC	N/A	A-78
GENERAL LEDGER/FINANCIAL REPORT GENERATOR	$4,000	A-96
GENERAL LEDGER/FINANCIAL REPORTER	N/A	A-56
GENERAL LEDGER/FINANCIAL STATEMENT	$900 to $4,600	A-68
GENERAL LEDGER/FINANCIAL BUDGETING	N/A	A-69
GENERAL LEDGER (G/L) VERSION 1	$995 to $2,500	A-102
GENERAL LEDGER/GENERAL ACCOUNTING	$395	A-15
GENERAL LEDGER-GL-11-VERSION 4	$3,500	A-24
GENERAL LEDGER/SINGLE COMPANY	$1,300	A-89
GENERAL LEDGER 1	$15,000	A-53
GENERAL LEDGER 2	$5,000	A-53
GENERAL LEDGER 2000	$12,000	A-78
GIAPPAR	N/A	A-27
GIMS (GOVERNMENT INFO MANAGEMENT SYSTEM)	N/A	A-52
GL/M	$88,000	A-69
GL 3000	N/A	A-12
GL/3000	$6,000	A-21
GL FINANCIAL INFO	$8,500 to $35,000	A-48
GL PLUS	$495	A-49
GLAMRS	$9,500	A-18
GMS (GAS MEASUREMENT SYSTEM)	N/A	A-69
GOVERNMENT ACCOUNT SYSTEM	N/A	A-40
GOVERNMENT APPLICATION	N/A	A-26
GOVERNMENT CONTRACT REPORTING	N/A	A-75
GOVERNMENT GENERAL ACCOUNTING	$8,000	A-80
GOVERNMENTAL ACCOUNTING	$1,500	A-29
GOVERNMENTAL FINANCIAL SYSTEM	N/A	A-19
GOVERNMENTAL FUND ACCOUNTING	N/A	A-96
GRANT MANAGEMENT	N/A	A-2
GRANTS MANAGEMENT SYSTEM	N/A	A-50
GRIPES GEN LEDGER RECEIVABLES INVENTORY	$2,400	A-30
GROCERY STORE CHARGE PACKAGE	N/A	A-107
GSL	$20,000	A-108
GUARDIAN	N/A	A-97
HARDWARE ACCOUNTING SYTEM (HAS)	N/A	A-54
HARDWARE/SOFTWARE MANAGEMENT SYSTEM	N/A	A-26
HCSS/DPS 8 ACCOUNTS PAYABLE	$5,500	A-51
HCSS/DPS 8 GENERAL LEDGER/BUDGETARY	$2,000	A-52
HCSS/DPS 8 PROPERTY LEDGER	$2,500	A-52
HEALTH CLUB	N/A	A-21
HELU ACCOUNTING SOFTWARE	$498	A-52
HELU ACCOUNTING SYSTEMS	$2,400	A-53
HEWITT ASSOCIATES PLAN ACCOUNTING	$100,000	A-90
HIGHWAY COSTING SYSTEM	$9,995	A-19
HOME OWNERS RATING	$500	A-18
HORSE TRAINING MANAGEMENT SYSTEM	$5,500	A-96
HOSPITAL APPLICATIONS SYSTEM	$8,000	A-77
HOSPITAL MANAGEMENT SYSTEM	N/A	A-73
HOTEL	$2,500 to $6,000	A-28
HOTEL ROOTS MANAGEMENT	N/A	A-31
HOUSING AUTHORITY	$20,000	A-95
HP/PACK	$60,000	A-33
IBA	$25,000	A-4
IMS (INTERACTIVE BUSINESS MANAGEMENT)	N/A	A-47
IBOM	$2,500	A-41
IBS GENERAL LEDGER	$6,000	A-70
IBS INVENTORY CONTROL	$6,000	A-70

IBS INVESTMENT ACCOUNTING	$15,000	A-70
IBS PURCHASING	$6,000	A-70
IC DENTAL LAB	$45,000 to $85,000	A-52
ICAS	$15,000 to $30,000	A-42
ICAS INVENTORY	$10,000 to $20,000	A-52
ICCS ENTERTAINMENT INDUSTRY	$40,000 to $100,000	A-52
IDMS	$9,000	A-94
IDW 5	$65,000	A-96
IFMS	NA	A-78
IMPLEMENTATION	NA	A-25
IMPORTER MANAGEMENT	NA	A-96
INCENTIVE LABOR ACCOUNTING	NA	A-96
INCOME TAX	$8,000	A-17
INCOME TAX	NA	A-94
INDEPENDENT INSURANCE AGENCY	$5,000	A-27
INDEPENDENT TELEPHONE CO. SYSTEM	$12,000	A-51
INDUSTRIAL PACKAGE	$8,000	A-41
INDUSTRY FUEL OIL DISTRIBUTOR	$20,000	A-59
INSURANCE AGENCY SYSTEM	$3,000	A-78
INSURANCE ON-LINE CLAIMS	$2,500	A-74
INTEGRATED ACCOUNTING	NA	A-55
INTEGRATED ACCOUNTING PACKAGE	NA	A-22
INTEGRATED ACCOUNTING SYSTEM	$995	A-72
INTEGRATED CHECK RECONCILIATION SYSTEM	$600	A-11
INTEGRATED CONTRACTOR SERVICE SYSTEM	$5,000	A-50
INTEGRATED JOB COSTING SYSTEM VERSION 3	$4,000	A-11
INTEGRATED FIXED ASSETS & DEPRECIATION	$1,000	A-11
INTEGRATED ACCOUNTING PACKAGE-IAP	$999	A-71
INTEGRATED ON-LINE O/E AND INVOICE	$4,000	A-11
INTERACTIVE ACCOUNTING AND INVENTORY	NA	A-81
INTERACTIVE ACCOUNTS PAYABLE	$2,500	A-40
INTERACTIVE ACCOUNTS PAYABLE	NA	A-89
INTERACTIVE ACCOUNTS PAYABLE SYSTEM	$1,200	A-4
INTERACTIVE ACCOUNTS PAYABLE SYSTEM	$5,000	A-53
INTERACTIVE ACCOUNTS PAYABLE SYSTEM	$2,000	A-58
INTERACTIVE ACCOUNTS RECEIVABLE	$1,000	A-14
INTERACTIVE ACCOUNTS RECEIVABLE SYSTEM	$3,000	A-58
INTERACTIVE COLLECTION SYSTEM	NA	A-55
INTERACTIVE COMPUTER SYSTEMS A/P	NA	A-55
INTERACTIVE COMPUTER SYSTEMS A/R	NA	A-55
INTERACTIVE COMPUTER SYSTEMS FIXED ASSETS	NA	A-55
INTERACTIVE COMPUTER SYSTEMS G/L	NA	A-55
INTERACTIVE DEPRECIATION ACCOUNTING	$3,000	A-59
INTERACTIVE FIXED ASSETS MANAGEMENT	$2,200	A-36
INTERACTIVE GENERAL ACCOUNTING SYSTEM	$2,000	A-57
INTERACTIVE GENERAL LEDGER	$1,000	A-15
INTERACTIVE GENERAL LEDGER	$5,000	A-53
INTERACTIVE GENERAL LEDGER ACCTG	$300	A-20
INTERACTIVE GENERAL LEDGER AND ACCOUNTS	$3,600	A-36
INTERACTIVE GENERAL LEDGER SYSTEM	$2,000	A-58
INTERACTIVE INVENTORY	$3,000	A-40
INTERACTIVE OPEN ITEM A/R	$5,000	A-53
INTERACTIVE ORDER ENTRY	$5,500	A-40
INTERACTIVE PRINTING SYSTEMS	NA	A-90
INTEREST ACCRUALS	NA	A-10
INTERGRATED PUBLICATION SYSTEM	$30,000	A-84
INTERACTIVE GENERAL LEDGER & FINANCIAL	$2,500	A-40
INTERACTIVE FINANCIAL PAYROLL 3000	$25,000	A-63
INTERACTIVE ORDER ENTRY/INVENTORY	$7,500	A-36
INTERACTIVE A/P FIN/250	NA	A-53
INTERACTIVE A/R AND CREDIT MANAGEMENT	$85,000	A-27
INTERACTIVE MAP/3000 PACKAGE	NA	A-7
INV	$1,100	A-34
INVENTORY	$485	A-3
INVENTORY	$4,000	A-19
INVENTORY	NA	A-21
INVENTORY	$11,000	A-35
INVENTORY	$6,000 to $10,000	A-58
INVENTORY	$1,500	A-63
INVENTORY	$2,450 to $1,250	A-89
INVENTORY CONTROL	NA	A3
INVENTORY CONTROL	$395	A15
INVENTORY CONTROL	NA	A-85
INVENTORY MANAGEMENT	$6,000 to $10,000	A-57
INVENTORY STATUS SYSTEM	NA	A-46
INVENTORY SYSTEM	$5,000 to $10,000	A-72
INVENTORY CONTROL & ORDER MGMT	$750,000	A-96
INVESTMENT COUNSELOR	NA	A-78
INVESTMENT MANAGEMENT	NA	A-2
INVESTMENT MANAGEMENT SUPPORT SYSTEM	$20,000	A-57
INVESTMENT SUBLEDGER	$895	A-89
INVOICING	$485	A-3
INVOICING	NA	A-3
INVOICING	$1,000	A-8
INVOICING	NA	A-8
INVOICING	$1,500	A-94
INVOICING	$1,500	A-81
INVOICING	$1,250	A-94
INVOICING AND ACCOUNTS RECEIVABLE	$2,500	A-49
INVOICE/AR	NA	A-43
IPAS/100	$92,000 to $130,000	A-63
IRIS	$12,500	A-82
ISA/ACCOUNTING, BUDGET AND COST SYSTEM	NA	A-54
ISA/ACCOUNTS PAYABLE PORTFOLIO	NA	A-54
ISA/ACCOUNTS RECEIVABLE PORTFOLIO	NA	A-54
ISA/BOND AND STOCK SYSTEM	NA	A-54
ISA-CASH DISBURSEMENT SYSTEM	NA	A-54
ISA/FIXED ASSETS PORTFOLIO	NA	A-54
ISA/GENERAL LEDGER-PORTFOLIO	NA	A-54
ISA/ON-LINE SECURITIES CONTROL	NA	A-54
ITEMIZED ACCOUNTS PAYABLE	NA	A-77
ITEMIZED ACCOUNTS RECEIVABLE	NA	A-78
ITS ACCOUNTS PAYABLE	NA	A-55
ITS ACCOUNTS RECEIVABLE	NA	A-55
ITS BUDGET	NA	A-55
ITS DRIVERS LOGS AUDIT	NA	A-55
ITS FUEL TAX REPORTING	NA	A-55
ITS GENERAL LEDGER	NA	A-55
JC/ADVANCED GENERAL LEDGER	$18,000	A-21
JDE ELEGANT SOFTWARE	NA	A-1
JEWELRY	$2,500	A-11
JOB COST	NA	A-55
JOB COST ACCOUNTING	NA	A-8
JOB COST ACCOUNTING	$5,000 to $9,000	A-57
JOB COST AND BILLING SYSTEM	NA	A-110
JOB COST ESTIMATING	$1,000	A-56
JOB COST GENERAL CONTRACTOR	$5,900	A-56
JOB COST MANAGEMENT	NA	A-7
JOB COST PROGRAM	$2,500	A-56
JOB COST SYSTEM	$750	A-12
JOB COST SYSTEM	NA	A-37
JOB COSTING	$595	A-15
JOB COSTING	$1,200 to $1,500	A-57
JOB COSTING	NA	A-73
JOB COSTING	NA	A-79
JOB COSTING	$4,900	A-100
JOB COSTING	$7,000	A-105
JOB COSTING	NA	A-110
JOB COSTING WITH PAYROLL	$2,500	A-101
JOB COST & REPORT SYSTEM	NA	A-46
JOB COSTING/BOM	$1,350	A-74
JOB COST FOR S/34	$7,500	A-34
JOB COST CONTROL FOR S/36 REPORTS	$7,500	A-34
JOB SHOP CONTROL SYSTEM	$6,500 to $11,000	A-41
JOC	$900 to $4,600	A-88
JOINT INTEREST ACCOUNT SYSTEM FOR OIL	NA	A-36
JOINT INTEREST BILLING	$2,000	A-71
JOINT INTEREST BILLING	$3,500	A-100
JOINT INTEREST BILLING	$1,270	A-109
JOINT VENTURE ACCOUNTING SYS	NA	A-88
KDC MODULAR OIL AND GAS MGMT	$50,000	A-59
KEYWORD INFORMATION MANAGER	$4,000 to $5,000	A-16
KMART ROUTING GUIDE	NA	A-88
KOMAND/BASIC	$9,000	A-91
KOPS	$1,295	A-57
KOPS KEY ONES PROCESSING SYSTEM	$1,500	A-34
KPC MODULAR OIL AND GAS GENERAL ACCOUNTING	$14,000	A-59
KRONOS SYSTEM ACCOUNTS RECEIVABLE	$770	A-88
KRONOS SYSTEM GENERAL LEDGER	$770	A-88
KRONOS SYSTEM TIME & BILLING	$975	A-89
L & M'S GENERAL ACCOUNTING	$1,500 to $7,500	A-84
LAB 1000	NA	A-45
LABOR EMPLOYEE ADMINISTRATION PROGRAM	NA	A-43
LABOR UNION MANAGEMENT SYSTEM	NA	A-88
LAMP	$5,000	A-10
LAND DEVELOPMENT INDUSTRY	$2,500 to $6,000	A-58
LAND MANAGEMENT SYSTEM	$2,000	A-71
LANDFILL BILLING	NA	A-2

LAPS	N/A	A-99
LARGE BUSINESS SYSTEMS	N/A	A-8
LAW 1000	N/A	A-45
LAW FIRM MANAGEMENT SYSTEM	$22,000	A-10
LAW OFFICE AUTOMATIONS	$1,500 to $9,000	A-28
LAW OFFICE MANAGEMENT	N/A	A-62
LAW OFFICE MANAGEMENT ACCOUNTING	$1,500	A-70
LAW OFFICE TIME MANAGEMENT SYSTEM	N/A	A-90
LAW OFFICE MANAGEMENT SYSTEM	$15,000	A-1
LEADER IN ACCOUNTING/MEDICAL PRACTICES	$5,000	A-10
LEASE MANAGEMENT	$1,270	A-109
LEASE OPERATING STATEMENT	$2,000	A-71
LEASE/RENTAL BASE MANAGEMENT	N/A	A-104
LEGA	$2,000	A-33
LEGAL	N/A	A-94
LEGAL ACCOUNTING PACK	$360	A-14
LEGAL BILLING	$5,000	A-94
LEGAL DATA CLIENT ACCOUNTING SYSTEM	N/A	A-62
LEGAL INSIGHT	$25,000	A-90
LEGAL MANAGEMENT SYSTEM	$3,250	A-4
LEGAL TIME ACCOUNTING	$10,000 to $20,000	A-21
LEGAL TIME AND BILLING SYSTEM	N/A	A-51
LEGALMASTER	$2,950	A-29
LEGAL TIME ACCOUNTING SYSTEM	N/A	A-45
LEGIST	$1,500	A-62
[illegible] LEASE MGMT SYSTEM	$60,000 to $75,000	A-62
LHS (LUMBER HARDWARE SYSTEM)	N/A	A-64
[illegible] SYSTEM	N/A	A-72
LIL-SHEEP	$300	A-40
LINPAC	N/A	A-90
LINPAC	$22,000	A-90
LOAN AMORTIZATION	$200 to $6,200	A-68
LOAN AMORTIZATION	$500	A-82
LOAN AMORTIZATION	$250	A-96
LOAN POOLING	N/A	A-75
LOAN PROCESSING	N/A	A-75
LOAN TRACKING SYSTEM	$12,500	A-50
LOCAL GOVERNMENT	$9,900	A-78
LOCAL GOVERNMENT FINANCIAL SYSTEM	N/A	A-6
LOCAL SERVICE BILLING	N/A	A-5
LOGIASSET	$1,290	A-94
LOMAS	$9,000	A-62
LOT TRACEABILITY	N/A	A-75
LTA	$599	A-95
LTL FREIGHT PROCESSING SYSTEM	$24,000	A-98
LUMBER/BUILDING MATERIALS MANAGEMENT	$35,000	A-29
MACHINE DEALER	$4,000 to $17,000	A-60
MACS MEDIA ACCTG/CIRCULATION SYSTEM	$25,000	A-61
MAGAZINES DATATRUCK	N/A	A-103
MAIL ORDER DISTRIBUTORS PKG	$10,000	A-45
MAIL ORDER SUBSCRIPTION FULFILLMENT	N/A	A-74
[illegible] DISTRIBUTION MANAGEMENT	N/A	A-74
MAINTENANCE BILLING	$7,500	A-61
[illegible] & MATERIALS MANAGEMENT	$25,000	A-108
MAMS	$6,000	A-54
[illegible] ACCOUNTING SYSTEM	N/A	A-63
[illegible] ALERT	$245 to $350	A-63
MANAGEMENT DENTIST	$8,000	A-70
MANAGEMENT INVESTMENT ACCOUNTING SYSTEM	$2,250	A-46
MANAGEMENT & ACCOUNTING SYSTEM	N/A	A-94
MANFACT II	$40,000 to $125,000	A-75
MANMAN/AP	$20,000	A-11
[illegible] V A	$13,000	A-11
MANMAN/GL	$20,000	A-12
MANMAN/OMAR	$40,000	A-12
MANMAN/OMAR PLUS	$67,000	A-12
MANMAN/PLANMAN	$1,500	A-12
MANMAN/SERVICEMAN	$27,000	A-12
MANMAN/SERVICEMAN PLUS	$55,000	A-12
[illegible] SOFTWARE	$27,000	A-96
MANUFACTURING SYSTEM	N/A	A-108
[illegible] THOUGHTWARE SYSTEMS	$45,000	A-45
[illegible] PRODUCTION CONTROL	N/A	A-75
MANUS OIL DEALER SYSTEM	$20,000	A-68
[illegible] ACCOUNTS RECEIVABLE	N/A	A-83
[illegible] ACCOUNTS PAYABLE	N/A	A-83
MAP/36 GENERAL LEDGER	N/A	A-83
MAP/36 PURCHASE ORDER	N/A	A-83
MAPICS A/R HISTORY AND INQUIRY SYSTEM	$400 to $750	A-81
MAPS	N/A	A-20
MAPS/GL	$22,500	A-89
MARC 5 - ACCOUNTS PAYABLE	N/A	A-24
MARC 5 -RDA SERVICES	N/A	A-24
MARC 9 - ACCOUNTS RECEIVABLE	N/A	A-24
MARC/10 FOR ACCOUNTING	N/A	A-66
MARGINS	N/A	A-55
MARK IV	N/A	A-30
MARKET MASTER	$5,000	A-14
MARKETING PACKAGE	N/A	A-75
MARKMAN 2000	$19,900 to $25,000	A-68
MAS-MULTIPLE ASSET SYSTEM	N/A	A-3
MASS	$20,000	A-41
MATERIAL REQUIREMENTS PLANNING	N/A	A-88
MATERIALS MANAGEMENT	$25,000	A-84
MATERIALS MANAGEMENT SYSTEM	N/A	A-104
MAXILEDGER	$350	A-24
MBS-PO	$2,500 to $5,000	A-68
MCBA - ACCOUNTS PAYABLE	$2,000	A-32
MCBA - ACCOUNTS RECEIVABLE	$2,000	A-33
MCBA - BILL OF MATERIALS	$2,000	A-32
MCBA - FIXED ASSETS	$2,000	A-32
MCBA - GENERAL LEDGER	$2,000	A-32
MCBA - ORDER PROCESSING	$2,000	A-32
MCBA - PURCHASE ORDER	$2,000	A-32
MED-COMM RX	$5,000	A-44
MED 1000	N/A	A-45
MEDICAL BILLING	$5,000 to $20,000	A-109
MEDICAL MANAGEMENT SYSTEM	N/A	A-73
MEDIQUEST	N/A	A-42
MEGA COMPUTER MANAGEMENT SYSTEM	$5,000	A-70
MEGAMED-MEDICAL OFFICE MANAGEMENT	$4,000	A-62
MEMBERSHIP ACCOUNTING	$1,600	A-29
MEMBERSHIP APPLICATION	$5,000 to $20,000	A-109
MEMBERSHIP MANAGEMENT ACCOUNTING	$30,000	A-109
MEMBERSHIP MGMT FOR ASSOCIATIONS	$20,000	A-72
MENU 3000	$3,000	A-83
MERCHANDISE MANAGEMENT SYSTEM	$30,000	A-27
METROCOM ACCOUNTING SYSTEM	N/A	A-71
MICRO FLOWER	$4,995	A-29
MICROLAWPACK	$1,000	A-23
MICROLEDGER	$350	A-24
MICROPAY	$350	A-24
MICROREC	$350	A-24
MICRON 300	$4,500	A-109
MIDCONTINENT DATA WATTS REBALE SYSTEM	N/A	A-72
MINI OPTIMATIC	$25,000	A-36
MINI-MICRO OPTIMATIC	$15,000	A-35
MINI-MIZ	$15,000 to $95,000	A-12
MINIFUEL	$20,000 to $75,000	A-88
MINUTEMAN	$3,500	A-74
MITTS	N/A	A-89
MJA MULTI-JOURNAL ACCOUNTING	$600 to $2,000	A-84
MLS	N/A	A-62
MMC MFG MANAGEMENT/CONTROL	$500,000	A-80
MOBILE PHONE RATING SYSTEM	$2,600	A-97
MODMIS	$4,000	A-8
MOMS	$40,000	A-36
MONEY AUTHORIZATION SYSTEM MAS	$50,000	A-36
MORSALES	$10,000	A-32
MOTOR VEHICLE DEALER SYSTEM	N/A	A-97
MOTORCYCLE DEALERS PACKAGE	N/A	A-66
MSA ACCOUNTS RECEIVABLE SYSTEM	N/A	A-76
MSA CAPITAL EXPENDITURE TRACKING	N/A	A-76
MSA FIXED ASSETS ACCOUNTING SYSTEM	N/A	A-76
MSA FOREIGN EXCHANGE SYSTEM	N/A	A-76
MSA GENERAL LEDGER SYSTEM	N/A	A-76
MSA INVENTORY & PURCHASING	N/A	A-76
MSA ACCOUNTS PAYABLE & PURCHASE ORDER	N/A	A-76
MSG OIL & GAS ACCTG SYSTEM	$150	A-75
MULTI LEVEL MARKET PROGRAM	$10,000	A-32
MULTI-CO SUPPORT FOR DMAS I	$750	A-36
MULTI-COMPANY G/L	$995	A-72
MULTI-LEVEL MARKETING	N/A	A-47
MUNACC	$12,000	A-47
MUNICIPAL	$15,000	A-27
MUNICIPAL ACCOUNTING PACKAGE	$25,000	A-6
MUNICIPAL ASSESING	$2,000	A-67
MUNICIPAL BILLING	$8,000	A-104

MUSEUM MANAGEMENT AND OPERATIONS	$15,000	A-13
NAP - 11	$25,000	A-84
NBSI PACKAGE	N/A	A-67
NCBA FINANCIAL ACCOUNTING	$1,500	A-56
NETWORK TELEVISION DATATRACK	N/A	A-103
NEWSPAPER ACCOUNTS RECEIVABLE	$750	A-17
NEWSPAPER CIRCULATION PACKAGE	$10,000	A-17
NEWSPAPER MANAGEMENT SYS	$14,900 to $20,000	A-62
NEWSPAPERS DATATRACK	N/A	A-103
NONITEMIZED ACCOUNTS PAYABLE	N/A	A-78
NONPRODUCING LEASE SYSTEM	$15,000	A-70
NONSUBSCRIBER/SUBSCRIBER BILLING	$15,000	A-108
NONESUCH ACQUISITIONS CONTROL	$15,000	A-69
NOTES PAYABLE SYSTEM	N/A	A-59
NURSING HOME ACCOUNTING SYSTEM	N/A	A-95
NURSING HOME FINANCIAL	$10,000 to $30,000	A-90
NURSING HOME SYSTEM	$10,000	A-20
NURSING HOME SYSTEM	$20 to $30,000	A-51
OASIS	$17,000 to $29,000	A-11
OIL & GAS	$39,000	A-58
OIL & GAS ACCTG	[illegible]	A-80
OIL AND GAS ACCTG	N/A	A-82
OIL & GAS ACCOUNTING SYSTEM	N/A	A-11
OIL & GAS ACCOUNTING SYSTEM	$52,000	A-37
OIL & GAS ACCOUNTING SYSTEM	$19,500	A-108
OIL AND GAS INCOME DISTRIBUTION	N/A	A-5
OIL AND GAS INFORMATION SYSTEM	N/A	A-6
OIL & GAS LEASE	N/A	A-80
OIL AND GAS SYSTEM	$35,000	A-71
OIL AND GAS SYSTEM II	N/A	A-32
OIL AND GAS 23	$1,270	A-108
OIL FIRST PURCHASER	N/A	A-96
OIL MILL ACCOUNTING SYSTEM	$4,500	A-96
OILMAN	$28,000	A-99
OM 250	N/A	A-85
ON-LINE ACCOUNTS RECEIVABLE SYSTEM	N/A	A-19
ON-LINE FAMOUS	N/A	A-62
ON-LINE OIL & GAS ACCOUNTING SYSTEM	$150	A-25
ON LINE ACCOUNTS RECEIVABLE	N/A	A-80
ONLINE COLLECTION AGENCY SYSTEM	$15,000	A-1
ONLINE LEASE MANAGEMENT SYSTEM	$15,000	A-12
ONLINE SUBSCRIPTION FULFILLMENT	$10,000	A-1
[illegible]	$500	A-96
OPEN ITEM ACCOUNTS RECEIVABLE	$5,000	A-38
[illegible]	$40,000	A-35
ORDER ENTRY	$4,000	A-20
ORDER ENTRY	$2,500	A-39
ORDER ENTRY	N/A	A-47
ORDER ENTRY	$2,000	A-43
ORDER ENTRY	$650	A-58
ORDER ENTRY	$3,000	A-80
ORDER ENTRY	$3,000	A-53
ORDER ENTRY	$3,000 to $5,000	A-74
ORDER ENTRY	$2,500	A-94
ORDER ENTRY	N/A	A-97
ORDER ENTRY	N/A	A-98
ORDER ENTRY	$995 to $2,500	A-100
ORDER ENTRY AND BILLING	$2,000	A-41
ORDER ENTRY AND INVOICING	N/A	A-89
ORDER ENTRY AND INVOICING	$2,500	A-91
ORDER ENTRY BILLING	$800	A-18
ORDER ENTRY BILLING	N/A	A-39
ORDER ENTRY BILLING	$3,000	A-88
ORDER ENTRY SYSTEM	N/A	A-47
ORDER MANAGEMENT AND BILLING	$4,000	A-16
ORDER PROCESSING	$25,000 to $200,000	A-28
ORDER PROCESSING	$6,000 to $10,000	A-87
ORDER PROCESSING	$1,100	A-74
ORDER SERVICES	N/A	A-106
ORDER WRITING SYSTEM	$1,050	A-29
ORDER ENTRY, INVOICING AND AGED ACCOUNTING	N/A	A-52
ORDER ENTRY/BILLING	$800	A-21
ORDER ENTRY/BILLING	N/A	A-72
ORDER/ENTRY INVENTORY CONTROL	$2,000	A-69
ORDER ENTRY/INVOICING	N/A	A-64
ORDER ENTRY W/SPLIT BILLING	$1,650	A-36
OS JOB ACCOUNTING REPORT SYSTEM	$12,500	A-59
OUTDOOR DATATRACK	N/A	A-103
OVERHEAD EXPENSE ALLOCATION/REALLOCATION	$35,000	A-21
PACKER/SHIPPER BILLING	$18,100	A-15
PAID-PATIENT INCOME DISPLAY SYSTEM	$8,500	A-94
PARKING TICKET ACCOUNTING SYSTEM	N/A	A-99
PARTS MANAGEMENT AND INVOICING	$400	A-6
PAS-PORTFOLIO ACCTION SYST	$15,000	A-31
PASS/GL, PASS/AP, PASS/AR	$50,000	A-81
PATIENT ACCOUNTING AND BILLING SYSTEM	N/A	A-102
PATIENT ACCT, HISTORY AND ADMISSIONS	$42,500	A-53
PATIENT MANAGEMENT SYSTEM	$20,000 to $100,000	A-49
PAYABLES	$495	A-3
PAYROLL	$485	A-3
PAYROLL	$395	A-15
PAYROLL	$4,000	A-28
PAYROLL	$2,000	A-42
PAYROLL	$295	A-43
PAYROLL	$1,500	A-64
PAYROLL	$1,500	A-76
PAYROLL	$5,000	A-81
PAYROLL	$2,500	A-83
PAYROLL AND PERSONNEL SYSTEM	$7,000	A-104
PAYROLL CHECKWRITING	$2,000	A-52
PAYROLL FOR S/34 REPORTS	$7,500	A-84
PC-PAC	$7,500	A-87
PENNY PINCHER	$50,000	A-91
PENSION 70 SYSTEM	$29,000	A-33
PERSONAL FINANCE MASTER	$75	A-96
PERSONAL LEDGER SYSTEM	$130	A-28
PERSONAL ACCOUNTING SYSTEM	$3,900	A-54
PERSPECTIVE 500	N/A	A-63
PERSPECTIVE 700	N/A	A-63
PEST CONTROL BILLING	$6,000	A-104
PETROLEUM ACCOUNTING PACKAGE	$10,000 to $40,000	A-44
PHARMACY CONTROL	$795	A-17
PHARMACY SYSTEM	N/A	A-109
PHNTRACK	$3,000	A-66
PICOM	$60,000	A-87
PLAN-IT	$1,500	A-52
PLUMBING SUPPLY OF SALE	$7,500	A-27
PMAS	$27,000 to $53,000	A-100
PO	$650	A-34
PO;M	$45,000	A-60
POBAS	N/A	A-11
POINT OF SALE MANUAL ACCOUNTING SYSTEM	$20,000	A-26
POINT OF SALE INVENTORY CONTROL	N/A	A-102
POLICE MANAGEMENT	N/A	A-98
PRACTICE MANAGEMENT	$200 to $6,200	A-66
PRACTICE MANAGEMENT	$2,500	A-53
PRACTICE MANAGEMENT SYSTEM	N/A	A-79
PREPAID ACCRUED EXPENSE SUBLEDGER	$795	A-60
PRINTER MANAGEMENT SYSTEM	$3,500	A-84
PRISM-OPTICAL LABORATORY	N/A	A-26
PRIVATE MEMBERSHIP CLUB	$695	A-3
PRO FORMA	N/A	A-75
PROCUREMENT	N/A	A-33
PROPENT	$1,995	A-100
PRODUCING LEASE SYSTEM	$12,500	A-71
PRODUCTION AND SALES VERIFICATION	$2,000	A-71
PROFESSIONAL BILLING	$1,270	A-109
PROFESSIONAL SERVICES PACKAGE	$16,500	A-58
PROFESSIONAL TIME ACCOUNTING	$800	A-16
PROFESSIONAL TIME ACCOUNTING	N/A	A-92
PROFESSIONAL TIME ACCOUNTING	$1,495	A-92
PROFESSIONAL TIME AND BILL	$395 to $2,000	A-87
PROFESSIONAL TIME AND BILLING	N/A	A-7
PROFESSIONAL TIME AND BILLING	$2,800	A-29
PROFESSIONAL TIME AND BILLING	N/A	A-73
PROFESSIONAL TIME AND BILLING	$4,200	A-82
PROFESSIONAL TIME MANAGEMENT	N/A	A-69
PROFESSIONAL TIME-BILLING	N/A	A-49
PROFESSIONAL SERVICES/GENERAL LEDGER	$6,000	A-59
PROGRAM BUDGETING SYSTEM	$3,000	A-10
PROJECT CONTROL SYSTEMS	N/A	A-12
PROJECT COSTS	N/A	A-36
PROJECT MANAGEMENT INFORMATION SYSTEM	N/A	A-62
PROJECT MANAGEMENT SYSTEM	$4,000	A-30
PROJECT/ENCUMBERED ACCOUNTING	$3,000	A-41
PROMPT AUTO PARTS SYSTEM	$14,000	A-72
PROMPT BUSINESS SYSTEM PBS	$14,000	A-72
PROMPT BUSINESS SYSTEMS	$6,000	A-31

PROMT	$5,500	A-103
PROPAS (PROPERTY ACCOUNTING SYS	N/A	A-11
PROPERTY MANAGEMENT	$3,300	A-86
PROPERTY MANAGEMENT	$6,000	A-109
PROPERTY MANAGEMENT RESIDENTIAL	$1,250	A-86
PROPERTY MANAGEMENT SYSTEM	$800	A-17
PROPERTY MANAGEMENT SYSTEM	$8,500	A-44
PROPERTY MANAGER SYSTEM	$300	A-38
PROPERTY MGMT ACCOUNTING SYSTEM	N/A	A-84
PROPERTY TAX ACCOUNTING	N/A	A-46
PROPERTY TAX ASSESSMENTS AND BILLING	N/A	A-15
PROPERTY TAX BILLING AND RECEIVABLE	$12,000	A-77
PSS ACCOUNTS PAYABLE SYS	$1,500	A-86
PSS ACCOUNTS RECEIVABLE SYSTEM	$1,500	A-86
PTM (PROJECT TIME MANAGEMENT)	$6,000	A-4
PUBLIC BUDGETARY ACCOUNTING SYSTEM	$4,500	A-70
PUBLIC HOUSING MANAGEMENT	N/A	A-58
PUBLIC UTILITY BILLING SYSTEM	$4,000	A-70
PUBLIC BUDGETING & ACCOUNTING	N/A	A-72
PURCHASE ORDER	$30,000	A-69
PURCHASE ORDER	N/A	A-90
PURCHASE ORDER	N/A	A-98
PURCHASE ORDER	$5,000	A-99
PURCHASE ORDER	$2,500	A-107
PURCHASE ORDER ACCOUNTING	$2,500	A-78
PURCHASE ORDER CONTROL	$7,000 to $13,000	A-64
PURCHASE ORDER ENTRY	$8,500	A-47
PURCHASE ORDER MANAGEMENT	N/A	A-33
PURCHASE ORDER SYSTEM	N/A	A-17
PURCHASE ORDER SYSTEM	$2,500	A-86
PURCHASE ORDERING	N/A	A-73
PURCHASE ORDERS	N/A	A-2
PURCHASE ORDERS	N/A	A-41
PURCHASING	$4,000	A-20
PURCHASING	N/A	A-56
PURCHASING	N/A	A-64
PURCHASING	$900 to $4,600	A-68
PURCHASING	$1,000	A-84
PURCHASING	$2,500	A-91
PURCHASING	$15,000	A-93
PURCHASING	$400	A-101
PURCHASING	$4,000	A-106
PURCHASING CONTROL SYSTEM	N/A	A-89
PURCHASING SYSTEM FOR DMAS I	$900	A-36
PURCHASING & FIXED ASSETS	N/A	A-2
PURCHASE ORDER-PREPARATION	N/A	A-2
Q-DAS	$100,000	A-97
QUALITY MATERIAL ACCTG/MPG	$130,000	A-90
QUICK LOOK TAX PLANNER	$495	A-53
QUOTE SYSTEM	N/A	A-66
RABBIT I	$4,000 to $6,000	A-68
RACKETBALL/CLUB SYSTEM	$15,000	A-23
RACKJOBBER	N/A	A-47
RADIO COMMON CARRIER	N/A	A-54
RADIO STATION MANAGEMENT	$6,300	A-42
RADIO STATION SYSTEM	$12,000 to $80,000	A-46
RADIO TRAFFIC CONTROL	$15,000 to $40,000	A-108
RADIOLOGY INFORMATION SYSTEM	N/A	A-73
RADIOLOGY MANAGEMENT SYSTEM	N/A	A-73
RANCH ACCOUNTING	N/A	A-98
RANDOM NUMBER GENERATOR	N/A	A-53
RATING	N/A	A-105
RAT. MATERIALS INVENTORY	$3,000	A-89
REACT	$65,000 to $135,000	A-42
REAL ESTATE CLOSING	N/A	A-55
REAL ESTATE PROCESSING	N/A	A-29
RECAP	$65,000 to $135,000	A-42
RECEIVABLES	$485	A-3
RECEIVABLES, ORDER ENTRY, SALES ANALYSIS	N/A	A-95
RECORD MANAGEMENT SYSTEM	N/A	A-104
RECURRING ITEMS	N/A	A-79
REGISTER INVOICING	N/A	A-43
RELATIONSHIP BANKING SYSTEM	N/A	A-91
RELEASE ACCOUNTING PACKAGE	$30,000 to $60,000	A-100
RENTAL BILLING SYSTEM	$1,000	A-87
RENTAL PROPERTY MANAGEMENT	$2,000	A-31
RENTAL/DEMURRAGE & CYLINDER CONTROL	$2,500	A-91
RESALE BILLING PACKAGE	N/A	A-89
RESIDENTIAL COMMERICAL CONTRACT SYSTEM	$995	A-3
RESIDENTIAL LOAN INVENTORY CONTROL	N/A	A-26
RESORT RESERVATION PACKAGE	$5,000	A-110
RESPONSIBILITIES REPORTING SYSTEM	N/A	A-11
RESTAURANT MANAGEMENT SYSTEM	$2,500	A-48
RETAIL ACCOUNTING PACKAGE	$40,000 to $70,000	A-100
RETAIL ACCOUNTING PACKAGE	$7,500	A-102
RETAIL CARPET INVENTORY	N/A	A-26
RETAIL CARPET STORES SYSTEM	$10,000 to $15,000	A-14
RETAIL CLOTHING	N/A	A-36
RETAIL CLOTHING	N/A	A-84
RETAIL CLOTHING SYSTEM	$24,000	A-18
RETAIL FLORIST	$895	A-3
RETAIL FUEL DELIVERY	$12,000 to $75,000	A-84
RETAIL INFORMATION	N/A	A-60
RETAIL MERCHANDISING SYSTEM	$10,000 to $15,000	A-50
RETAIL POINT-OF-SALE SYSTEM	$26,000	A-48
RETAIL/WHOLESALE	N/A	A-73
RETAIL/WHOLESALE DISTRIBUTION SYSTEM	$20,000	A-96
RETAIL/WHOLESALE JEWELRY	N/A	A-96
RETAIL/WHOLESALE PAINT SUPPLY	N/A	A-97
RETAINAGE FOR S/34 REPORTS & CAPABILITIES	N/A	A-34
REV 8302 G/L+	$1,500	A-32
REVENUE DISTRIBUTION	$2,000	A-71
REVENUE DISTRIBUTION	$3,500	A-106
REVENUE DISTRIBUTION	$1,270	A-109
REVENUE SYSTEM	$1,000	A-10
RICS	$7,500	A-99
ROADS	$30,000	A-99
ROMAN BUSINESS SYSTEMS	$1,500	A-99
ROUTE	$24,400	A-50
ROUTE ACCOUNTING	$10,000 to $25,000	A-106
ROUTE ACCOUNTING PACKAGE	$25,000	A-59
ROUTE ACCOUNTING SYSTEM	$4,200	A-37
ROUTE ACCOUNTING SYSTEM	$9,000	A-94
ROUTE ACCOUNTING SYSTEM	N/A	A-110
ROUTE BILLING CONTROL	N/A	A-5
ROUTE ACCOUNTING (TRACS)	$25,000	A-106
RPS-PLUS	$8,500	A-35
S/38 ACCOUNTS PAYABLE	$9,000	A-61
S/38 ACCOUNTS RECEIVABLE	$9,000	A-61
S/38 FIXED ASSETS	$9,000	A-61
S/38 GENERAL LEDGER AND REPORT WRITER	$11,500	A-61
S/38 PURCHASE ORDER	$10,000	A-61
SALES ACCOUNTING	$5,000	A-99
SALES ANALYSIS	$2,000	A-32
SALES ANALYSIS	$2,000	A-48
SALES ANALYSIS	$2,000 to $3,500	A-57
SALES ANALYSIS	$3,000 to $5,000	A-84
SALES ANALYSIS	$1,500	A-84
SALES ANALYSIS	$1,200 to $1,500	A-87
SALES ANALYSIS	$2,800 to $3,900	A-88
SALES ANALYSIS	$1,250	A-91
SALES LEAD SYSTEM	$795	A-31
SALES ORDER PROCESS	N/A	A-90
SALES ANALYSIS - SA	N/A	A-53
SALES COMMISSION/ACCOUNTING	$900 to $4,600	A-68
SALES ORDER PROCESSING/INVOICING	N/A	A-11
SAM (ASSET MANAGEMENT)	$5,000	A-64
SAMS	N/A	A-60
SASSIE	$3,900	A-90
SCHEDULING	$10,000	A-53
SCHOOL DISTRICT ACCOUNTING	$10,000	A-44
SCHOOL FINANCE SYSTEM	$10,000	A-19
SCHOOL FUND ACCOUNTING AND PAYROLL	$17,500	A-39
SCHOOL GRADING AND ACCOUNTING	N/A	A-5
SCHOOL INFORMATION MANAGEMENT SYSTEM	N/A	A-60
SCHOOL MANAGEMENT SYSTEM	$35,000	A-41
SCHOOL MANAGEMENT SYSTEM II	$20,000	A-42
SCHOOL DISTRICT ACCOUNTING - PURCHASE	$5,000	A-44
SCHOOL DISTRICT ACCOUNTING - A/P	$5,000	A-44
SCHOOL DISTRICT ACCOUNTING - CENTRAL	$5,000	A-44
SCHOOL DISTRICT ACCOUNTING - G/L	$5,000	A-44
SCHOOL DISTRICT ACCOUNTING - A/R	$5,000	A-44
SECOND TIME JOB SHOP MANAGEMENT	$12,000	A-22
SECOND TIME ORDER ENTRY	$895	A-22
SECOND TIME - G/L	$895	A-22
SECOND TIME - A/R	$895	A-22
SECURITIES	N/A	A-79
SECURITY SYSTEM	$1,000	A-53

SERVICE HISTORY BILLING	N/A	A-104
SERVICE MANAGER	$1,695	A-50
SERVICE ORDERS	N/A	A-5
SEWERAGE BILLING	$500	A-10
SFC-DATA COLLECTION	$5,000	A-20
SHARE	N/A	A-78
SHARP	N/A	A-33
SCHOOL FINANCIAL PACKAGE	$5,000	A-51
SHORT TERM INVESTMENT MANAGEMENT	N/A	A-21
SIL ACCOUNTING SYSTEM	N/A	A-93
SILTON APPAREL MANAGEMENT SYSTEM	$25,000	A-92
SMALL AIRLINES	$2,500 to $6,000	A-26
SMALL BUSINESS ACCOUNTING/FINANCIAL	$4,500	A-47
SMARTS	$9,500	A-29
SMDR SYSTEM	$5,000	A-85
SMS (SUPPLY MANAGEMENT)	$7,500 to $14,000	A-72
SOAR (SALES ORDER ENTRY AND A/R)	N/A	A-102
SOCIAL SERVICES INFORMATION MANAGEMENT	$5,000	A-15
SOFTPAC	$5,000 to $10,000	A-83
SOFTWARE INTERNATIONAL ACCOUNTS PAYABLE	$29,000	A-56
SOFTWARE INTERNATIONAL FIXED ASSETS	$38,000	A-58
SOFTWARE INTERNATIONAL GENERAL LEDGER	$51,000	A-56
SOFTWARE INTERNATIONAL A/R & REVLINE	$48,000	A-56
SOFTWARE 1040	$2,600	A-47
SOGAS IV	N/A	A-71
SOLUTION	$1,600 to $9,000	A-107
SOP (SERVICE ORDER PROCESSING)	$75,000	A-12
SOS	$5,500 to $9,500	A-36
SPECS	$7,000	A-11
SPIDER II	$85,000	A-105
SPIDER II - ACCOUNTS PAYABLE	$4,400	A-105
SPIDER II - ACCOUNTS RECEIVABLE	$4,400	A-105
SPIDER II - FIXED ASSETS/DEPRECIATION	$4,400	A-105
SPIDER II - GENERAL LEDGER	$4,400	A-105
SPORTING GOODS/CLOTHING STORE	$8,000	A-39
SPOT RADIO DATATRACK	N/A	A-103
SPOT TELEVISION DATATRACK	N/A	A-103
ST JOSEPH TRUST ACCOUNTING SYSTEM	N/A	A-96
STAFF SCHEDULING	$3,100	A-53
STANDARD ACCOUNTING	$1,500	A-39
STANDARD COST MANUFACTURING	$45,000	A-100
STAR SYSTEM 1 GENERAL ACCOUNTING	$400	A-95
STAR SYTEM 5 LEGAL BILLING SYSTEM	$950	A-96
STARCOM	N/A	A-78
STATE WELFARE PACKAGE	$6,000 to $7,000	A-106
STATIC DATA & GENERAL ACCOUNTING	N/A	A-10
STATUS-III STANDARD ACCOUNTING SYSTEM	N/A	A-78
STEWY	$12,000	A-96
STORE	$30,000	A-97
STS FINANCIAL REPORTING SYSTEM	N/A	A-97
STUDENT ACCOUNTS RECEIVABLE	N/A	A-2
STUDENT ACCOUNTS RECEIVABLE	N/A	A-92
STUDENT AID MANAGEMENT II	N/A	A-99
STUDENT INFORMATION SYSTEM	$50,000	A-109
STUDENT/PARENT LOAN MANAGEMENT	$250,000	A-47
STUDENT AID MANAGEMENT	N/A	A-92
SUB DIVISION BILLING SYSTEM	N/A	A-52
SUBSCRIBER CONTROL	$4,000	A-81
SUBSIDIARY LEDGER	$1,200	A-54
SUNPAC: SF FINANCIAL	$9,000	A-100
SYMPHONY/PERF ARTS SYSTEM	$16,000 to $25,000	A-51
SYNON LABOR MANAGEMENT SYSTEM	N/A	A-97
SYNON LOAN PREPARATION AND TRACKING	N/A	A-97
SYSTEM FOR DISTRIBUTION	$20,000	A-33
SYSTEM FOR PRODUCTION, EXPENSE, AND CAPITAL	N/A	A-96
SYSTEM 34 ACCOUNTS PAYABLE	$3,000	A-6
SYSTEM 34/36 ACCOUNTS PAYABLE	$4,000	A-50
SYSTEM 34 GENERAL LEDGER FINANCIAL	$3,000	A-6
SYSTEM 34/36 GENERAL LEDGER	$3,000 to $5,500	A-50
SYSTEM 90 BROADCAST MANAGEMENT SYSTEM	N/A	A-56
TABS	$15,000	A-29
TAMRS	$25,000	A-6
TAPS	N/A	A-56
TASKMASTER	$1,500	A-74
TAX 1040	$3,400	A-54
TAX 1040	$200 to $6,200	A-96
TAX ACCOUNTANT SYSTEM	N/A	A-46
TAX APPEAL	N/A	A-2
TAX ASSESSMENT	$3,000	A-10
TAX COLLECTING AND BILLING	N/A	A-67
TAX COLLECTIONS	N/A	A-2
TAX LISTING & BILLING	N/A	A-2
TAX MAP DIGITIZING	N/A	A-2
TAX PLANNING	$200 to $6,200	A-99
TAXLINE	$1,000	A-62
TBAR	N/A	A-19
TCB-11	$1,200 to $2,500	A-48
TEIKOR 1040 TAX PACKAGE	N/A	A-101
TELEPHONE CALL ACCOUNTING	N/A	A-31
TELEPHONE INFORMATION AND BILLING SYSTEM	$5,000	A-87
TEMP	N/A	A-33
TENANT MANAGEMENT SYSTEM	$14,500	A-96
TEXTILE MACHINERY	$15,000	A-79
THASE 3	N/A	A-53
THE 1040 PACKAGE	N/A	A-86
THE ACCOUNTANT	$550 to $2,500	A-102
THE AUTOMATIVE BOND SYSTEM: TABS	N/A	A-6
THE BIG ACCOUNTING SYSTEM	$2,800 to $3,800	A-39
THE BIG ACCOUNTS RECEIVABLE SYSTEM	$2,250	A-39
THE BIG EQUIPMENT SALES RENTAL	$3,800	A-39
THE BOTTOM LINE	$13,000	A-91
THE BROADCAST SYSTEM	$35 to $50,000	A-26
THE CPA	$1,395	A-92
THE CRESSBILLER	$1,200 to $102	A-33
THE DISTRIBUTION PLANNING & CONTROL	$29,500	A-79
THE FOX	$16,000	A-39
THE MANUFACTURER	$1,195	A-92
THE MODULAR DISTRIBUTION SYSTEM	$7,000	A-99
THE MSA ACCOUNTS PAYABLE & PURCHASE ORDER	N/A	A-76
THE PARTNER TAX PLANNING	$900	A-19
THE PARTS HANDLER	$20,000	A-26
THE RETAILER	$1,195	A-92
THE STAR SYSTEM	$20,000	A-14
THE SALES-USE TAX SYSTEM	N/A	A-14
THE TA BUSINESS SYSTEM	$1,500	A-59
THE WHOLESALER	$1,195	A-92
THESIS-HIGHER EDUCATION	N/A	A-26
THOROUGHBRED UNI-DOL	N/A	A-99
THUNDERBIRD ASSET/LIABILITY MANAGEMENT	N/A	A-103
THUNDERBIRD FINANCIAL MANAGEMENT	N/A	A-103
THUNDERBIRD FIXED ASSET	N/A	A-103
THUNDERBIRD GENERAL LEDGER	N/A	A-103
THUNDERBIRD PROFITABILITY MANAGEMENT	N/A	A-103
TIBS	$5,000	A-20
TIME ACCOUNTING	$395	A-15
TIME ACCOUNTING	$2,450	A-62
TIME ACCOUNTING	N/A	A-85
TIME AND BILLING	N/A	A-101
TIME AND CHARGE II FOR THE PROFESSIONAL	N/A	A-85
TIME AND EXPENSE MANAGEMENT SYSTEM	$2,200	A-47
TIME COST ANALYSIS	$495	A-43
TIME MANAGEMENT	N/A	A-75
TIME MANAGEMENT	N/A	A-79
TIME SENSITIVE DELIVERY SYSTEM	$3,500	A-99
TIME SHARE ACCOUNTING	N/A	A-43
TIME & BILLING	N/A	A-62
TIME-KEEPER	$1,000	A-104
TIME ACCOUNTING SYSTEM	N/A	A-45
TIME/1	$15,000	A-58
TIME TRACK	$775	A-53
TIME 1000	N/A	A-45
TIP-TOP	N/A	A-77
TIRE	N/A	A-88
TOLL BILLING	N/A	A-6
TOPIC SYSTEM	$32,500	A-74
TOPS DISTRIBUTION SYSTEM	$4,995	A-6
TOTAL ACCOUNTING	N/A	A-94
TOTAL AGRI-BUSINESS COMPUTER,TOLL TACT	N/A	A-36
TOTAL-100, TOTAL-135, TOTAL 200	$16,000 to $65,000	A-43
TOTAL APPLICATION FOR BUILDING	$15,000	A-23
TRANSACTION SYSTEM	N/A	A-36
TRANSPORT ACCOUNTING SYSTEM	N/A	A-76
TRAVEL ACCOUNTING RESERVATION SYSTEM	N/A	A-104
TREADS	$1,000	A-99
TROUBLE TICKETS	N/A	A-6
TRUST ACCOUNTING	N/A	A-85
TRUST ACCOUNTING FEE SYSTEM	N/A	A-21
TRUST MASTER	N/A	A-99

TRUSTPAC	N/A	A-91
TRUST-AID	N/A	A-91
TUMS-TELEPHONE USAGE MANAGEMENT SYSTEM	N/A	A-1
UCC FIXED ASSET SYSTEM	N/A	A-106
UCC A/P SYSTEM W/PURCHASING	N/A	A-106
UCC FINANCIAL CONTROL SYSTEM	N/A	A-106
UNION ACCOUNTING MEMBERSHIP SYSTEM	$5,500	A-1
UNION MEMBERSHIP	N/A	A-78
UNION MEMBERSHIP CONTROL SYSTEM	N/A	A-95
UNIVERSITY MANAGEMENT SYSTEM	N/A	A-73
UP FRONT	$10,000	A-88
USER HOSTED EDIT ROUNTINE	$24,600	A-29
USER-11	N/A	A-79
UTILITY BILLING	N/A	A-4
UTILITY BILLING	N/A	A-28
UTILITY BILLING	N/A	A-29
UTILITY BILLING	$4,500	A-43
UTILITY BILLING	N/A	A-87
UTILITY BILLING	N/A	A-89
UTILITY BILLING/CONSUMER INFORMATION	$150,000	A-78
UTILITY BILLING SYSTEM	N/A	A-46
UTILITY BILLING & MANAGEMENT SYSTEM	$6,500	A-23
UTILTIY BILLING	$2,450	A-88
VECHICLE & FLEET MANAGEMENT	$30,000	A-62
VEHICLE OIL & GAS RECORDS	$2,000	A-19
VERSA LEDGER II	$150	A-51
VERSA RECEIVABLES	$100	A-51
VET	$6,000	A-31
VETERINARIAN MANAGEMENT SYSTEM	$8,500	A-46
VETPOP	N/A	A-59
VIDEO TAPE APPLICATIONS SYSTEM	$1,500	A-1
VMACCOUNT	N/A	A-108
VMRS PARTS INVENTORY CONTROL	$5,000	A-29
VTG100 ACCOUNTING CALCULATOR	$350	A-89
WANG SYMPHONY	N/A	A-8
WAREHOUSING SYSTEM	$14,000	A-17
WATER BILLING	$500	A-10
WATER/SEWER BILLING & COLLECTION	N/A	A-2
WATER/SEWERAGE BILLING/RECEIVABLE	$10,000	A-77
WBS	$25,000	A-110
WELDING SUPPLY SYSTEM-WSS	$12,500	A-14
WELL REVENUE ACCOUNTING	N/A	A-88
WHOLESALE DISTRIBUTION	N/A	A-22
WHOLESALE DISTRIBUTION AND FINANCIAL	$90,000	A-80
WHOLESALE DISTRIBUTION SYSTEM	N/A	A-7
WHOLESALE DISTRIBUTION	$25,950	A-89
WHOLESALE DRUG DISTRIBUTION	$30,000	A-22
WHOLESALE FABRIC DISTRIBUTION RECEIVABLE	$6,500	A-28
WHOLESALE GLASS DISTRIBUTION	$30,000	A-22
WHOLESALE JEWELER SYSTEM	$4,000	A-80
WHOLESALE LUMBER INVOICING AND INVENTORY	N/A	A-28
WHOLESALE/RETAIL DISTRIBUTION	$18,000	A-86
WHOLESALE/RETAIL DISTRIBUTION SYSTEM	$42,000	A-29
WHOLESALE/RETAIL SYS	$12,000	A-17
WINFALL PROFIT TAX VERFICATION	$2,000	A-71
WOODWORKING INDUSTRIES MFG PACKAGE	N/A	A-37
WORDPAL WORD PROCESSOR TIMEKEEPING BILLING	$495	A-23
WORK AND PROCESS FINANCIAL CONTROL S	$30,000	A-110
WORK ORDER ACCOUNTING	N/A	A-6
WORKHORSE GENERAL ACCOUNTING PACKAGE	$3,500	A-94
WORKSHOP REPORTING SYSTEM	$5,000	A-42
XTEN	$120,000 to $150,000	A-90
YELLOW PAGES DATATRACK	N/A	A-103
ZACCS	N/A	A-110
ZAP	$7,000	A-46
ZAR	$7,000	A-46
ZAS	$7,000	A-46
ZGL	$7,000	A-46
ZTX	$15,000	A-46

ABAX RENTAL MANAGEMENT SYSTEM	$9,500	A-111
ACCESSOR PROPERTY ACCOUNTING SYSTEM	$9,000	A-125
A/C	$99	A-116
ACCOUNT ANALYSIS	$100	A-142
ACCOUNTING	N/A	A-130
ACCOUNTING	N/A	A-131
ACCOUNTING	$595	A-144
ACCOUNTING APPLICATION DBASE	$100	A-136
ACCOUNTING PLUS	$595	A-152
ACCOUNTING PLUS PC	$495	A-152
ACCOUNTING SERIES	$1,080	A-148
ACCOUNTING SYSTEM	N/A	A-150
ACCOUNTS PAYABLE	$2,500	A-113
ACCOUNTS PAYABLE	$1,500	A-114
ACCOUNTS PAYABLE	$750	A-115
ACCOUNTS PAYABLE	$400	A-118
ACCOUNTS PAYABLE	$2,000	A-119
ACCOUNTS PAYABLE	$1,500	A-119
ACCOUNTS PAYABLE	$495	A-119
ACCOUNTS PAYABLE	$499	A-120
ACCOUNTS PAYABLE	$1,000 to $200	A-121
ACCOUNTS PAYABLE	$1,000	A-122
ACCOUNTS PAYABLE	$1,000	A-122
ACCOUNTS PAYABLE	$1,500	A-123
ACCOUNTS PAYABLE	$3,500	A-123
ACCOUNTS PAYABLE	$500	A-123
ACCOUNTS PAYABLE	$800	A-124
ACCOUNTS PAYABLE	$100	A-124
ACCOUNTS PAYABLE	$60	A-125
ACCOUNTS PAYABLE	$425	A-125
ACCOUNTS PAYABLE	$500	A-126
ACCOUNTS PAYABLE	$149	A-126
ACCOUNTS PAYABLE	N/A	A-126
ACCOUNTS PAYABLE	N/A	A-129
ACCOUNTS PAYABLE	$449	A-129
ACCOUNTS PAYABLE	$60 to $395	A-131
ACCOUNTS PAYABLE	$650	A-131
ACCOUNTS PAYABLE	$2,000	A-132
ACCOUNTS PAYABLE	$200	A-134
ACCOUNTS PAYABLE	$800	A-134
ACCOUNTS PAYABLE	$2,000	A-135
ACCOUNTS PAYABLE	$1,195	A-135
ACCOUNTS PAYABLE	N/A	A-136
ACCOUNTS PAYABLE	$595	A-136
ACCOUNTS PAYABLE	$795	A-137
ACCOUNTS PAYABLE	$499	A-138
ACCOUNTS PAYABLE	$795	A-138
ACCOUNTS PAYABLE	$150	A-141
ACCOUNTS PAYABLE	$750	A-144
ACCOUNTS PAYABLE	N/A	A-144
ACCOUNTS PAYABLE	N/A	A-145
ACCOUNTS PAYABLE	$895	A-145
ACCOUNTS PAYABLE	$128	A-147
ACCOUNTS PAYABLE	$595	A-148
ACCOUNTS PAYABLE	$220	A-148
ACCOUNTS PAYABLE	$275	A-149
ACCOUNTS PAYABLE	$150	A-150
ACCOUNTS PAYABLE	$340	A-151
ACCOUNTS PAYABLE	$1,500	A-151
ACCOUNTS PAYABLE	N/A	A-151
ACCOUNTS PAYABLE	$599	A-152
ACCOUNTS PAYABLE	N/A	A-152
ACCOUNTS PAYABLE	$795	A-155
ACCOUNTS PAYABLE IN SPANISH	$1,500 to $3,000	A-142
ACCOUNTS PAYABLE SYSTEM	$595 to $745	A-154
ACCOUNTS PAYABLE TEMPLATE	$40	A-138
ACCOUNTS PAYABLE WITH CHECKWRITING	$595	A-139
ACCOUNTS RECEIVABLE	$2,500	A-113
ACCOUNTS RECEIVABLE	$1,500	A-114
ACCOUNTS RECEIVABLE	$750	A-115
ACCOUNTS RECEIVABLE	$300	A-118
ACCOUNTS RECEIVABLE	$3,500	A-118
ACCOUNTS RECEIVABLE	$2,000	A-119
ACCOUNTS RECEIVABLE	$1,500	A-119
ACCOUNTS RECEIVABLE	$495	A-119
ACCOUNTS RECEIVABLE	$499	A-120
ACCOUNTS RECEIVABLE	$1,000	A-122
ACCOUNTS RECEIVABLE	$1,000	A-122
ACCOUNTS RECEIVABLE	$3,000	A-123
ACCOUNTS RECEIVABLE	$500	A-123
ACCOUNTS RECEIVABLE	$800	A-124
ACCOUNTS RECEIVABLE	$800	A-124
ACCOUNTS RECEIVABLE	$100	A-124
ACCOUNTS RECEIVABLE	$60	A-125
ACCOUNTS RECEIVABLE	$425	A-125
ACCOUNTS RECEIVABLE	$500	A-126
ACCOUNTS RECEIVABLE	$149	A-126
ACCOUNTS RECEIVABLE	$295	A-129
ACCOUNTS RECEIVABLE	N/A	A-129
ACCOUNTS RECEIVABLE	$2,000	A-132
ACCOUNTS RECEIVABLE	$1,900	A-133
ACCOUNTS RECEIVABLE	$200	A-134
ACCOUNTS RECEIVABLE	$600	A-135
ACCOUNTS RECEIVABLE	$2,000	A-135
ACCOUNTS RECEIVABLE	$1,195	A-135
ACCOUNTS RECEIVABLE	$129 to $248	A-136
ACCOUNTS RECEIVABLE	$595	A-136
ACCOUNTS RECEIVABLE	$795	A-137
ACCOUNTS RECEIVABLE	$1,195	A-139
ACCOUNTS RECEIVABLE	$150	A-141
ACCOUNTS RECEIVABLE	$300	A-143
ACCOUNTS RECEIVABLE	$750	A-144
ACCOUNTS RECEIVABLE	$895	A-148
ACCOUNTS RECEIVABLE	$128	A-147
ACCOUNTS RECEIVABLE	$595	A-148
ACCOUNTS RECEIVABLE	$220	A-149
ACCOUNTS RECEIVABLE	$495	A-149
ACCOUNTS RECEIVABLE	$150	A-150
ACCOUNTS RECEIVABLE	$340	A-151
ACCOUNTS RECEIVABLE	$1,500	A-151
ACCOUNTS RECEIVABLE	$599	A-152
ACCOUNTS RECEIVABLE	N/A	A-153
ACCOUNTS RECEIVABLE	$595 to $745	A-155
ACCOUNTS RECEIVABLE	$795	A-155
ACCOUNTS RECEIVABLE - BALANCE FORWARD	$2,450	A-133
ACCOUNTS RECEIVABLE IN SPANISH	$1,500 to $3,000	A-142
ACCOUNTS RECEIVABLE INVENTORY	$1,500	A-154
ACCOUNTS RECEIVABLE - OPEN ITEM	$2,450	A-133
ACCOUNTS RECEIVABLE SYSTEM	$499	A-130
ACCOUNTS RECEIVABLE TEMPLATE	$40	A-138
ACCOUNTS RECEIVABLE WITH INVOICING	$595	A-136
ACCOUNTING BUSINESS-PRO	$1,895	A-130
ACCOUNTING PLUS SUPER/E	$400	A-152
ACCOUNT RECEIVABLE/INVOICES	$60 to $395	A-131
ACCOUNTS RECEIVABLE CP/M	$2,000	A-135
ACCOUNTMASTER 8/16TM	$450	A-140
ACCOUNTS PAYABLE AP23	$800	A-133
ACCOUNTS RECEIVABLE AR23	$800	A-133
ACTION/REPORT WRITER	$5,000	A-122
AD-TRAC	$5 to $40	A-129
ADAM	N/A	A-128
ADMAX	N/A	A-138
ADVERTISING AGENCY ACCOUNTING	$5,500	A-121
AG - FINANCE	$750	A-121
AG - MARKETS	$350	A-121
AG - PAYROLL	$350	A-121
AG - PLANNER	$450	A-121
AG/PAC	$1,500	A-158
AGINCYMGT	N/A	A-117
AIR CHARTER SERVICE SYSTEM	$895	A-122
ALASKA SYSTEMS JOURNAL	$195	A-152
ALPHA ACCOUNTING	$1,500	A-116
ALPHA CLUB MANAGEMENT	$5,000	A-122
AM-BIZ PACK	$100	A-118
AMBULANCE BILLING	$4,000	A-117
AMBULANCE MEDICAL BILLING	$499	A-139
AMI ACCOUNTS PAYABLE	$450	A-113
AMI AD AGENCY BILLING	$1,300	A-113
AMI CLIENT ACCOUNTING	$750	A-113
AMI CLIENT BILLING AND INVOICING	$550	A-113
AMI CPA SYSTEM	$2,195	A-113
AMI GENERAL LEDGER	$675	A-114
AMI INVOICING	$450	A-114
AMI LAW OFFICE ACCOUNTING	$1,995	A-114
AMI RESTAURANT ACCOUNTING SYSTEM	$2,195	A-114
AMI TIME ACCOUNTING	$375	A-114
AMORTIZATION/DEPRECIATION	$30	A-114
AMORTIZATION PROGRAM	N/A	A-145

AMORTIZATION SCHEDULE	$40	A-143
AMORTIZATION SCHEDULE PREPARE	$4,995	A-146
AOG FINANCE SYSTEM	$5,000	A-133
APARTMENT RECORDKEEPING SYSTEM	N/A	A-119
APC I	N/A	A-112
APPAREL	$5,000 to $6,000	A-156
ARCHITECTS BUSINESS MANAGER	$2,000 to $2,500	A-113
ARNIE	$495	A-131
A/S INVENTORY/ACCOUNTING	N/A	A-113
ASSOCIATION BILLING	$550 to $600	A-126
ASTEX	N/A	A-117
ATTORNEY BILLING	N/A	A-150
AUDIT SYSTEM	$188	A-126
AUDIT TM	$187	A-126
AUGMENTED TCS ACCOUNTING	N/A	A-155
AUTO	$2,800	A-115
AUTO DEALER PACKAGE	N/A	A-130
AUTO SUPPLY POINT OF SALE	$2,500	A-115
AUTOMATED SELF-STORAGE MANAGEMENT	$1,500	A-144
AUTOMOTIVE DEALER FINANCIAL	$1,000 to $10,000	A-116
AUTOMOTIVE DISTRIBUTOR SYSTEM	N/A	A-134
BACS-ACCOUNTS PAYABLE	N/A	A-112
BACS-ACCOUNTS RECEIVABLE	N/A	A-112
BACS-BUS ACCOUNTING CONTROL SYSTEM	N/A	A-112
BACS-GENERAL LEDGER	N/A	A-112
BALANCE FOWARD ACCOUNTS RECEIVABLE	N/A	A-116
BALANCE FORWARD ACCOUNT RECEIVABLE	$660	A-131
BALANCE FORWARD ACCOUNTS RECEIVABLE	$750	A-140
BASIC INSTRUCTION COURSE IC	$39	A-111
BDS - ACCOUNTING	$750	A-116
BILL OF MATERIALS	$2,000	A-128
BILLING	$149	A-128
BILLING	$2,000	A-132
BILLING	$2,450	A-133
BILLING IN SPANISH	$1,500 to $3,000	A-142
[illegible] ACCOUNTING SUPPORT	$500	A-114
[illegible] BOOKKEEPER ACCOUNTING	$1,000	A-115
[illegible] NETWORK ACCOUNTING	$1,000	A-115
BILLINGS NETWORK ACCOUNTS	$300	A-115
BILLINGS NETWORK ACCOUNTS RECEIVABLE	$300	A-115
BILLINGS NETWORK GENERAL LEDGER	$300	A-115
[illegible] NETWORK PATROLL	$300	A-115
BILLING/ACCOUNTS RECEIVABLE	$600	A-154
BILLING/COSTING	$2,660	A-133
BILLING/INVOICING	$499	A-120
BIZ-PAK	$25,000	A-154
BIZMGT	N/A	A-117
BOOK AND TAX DEPRECIATION	$450	A-120
BOOKEEPING	$175 to $500	A-153
BOOKEEPING II	$450 to $1,500	A-153
BOOKWORKER	$995	A-146
BUDGETARY ACCOUNTING	N/A	A-134
BUDGETING & FINANCIAL REPORTING	$340	A-151
BULLETIN 670	$1,500	A-113
BUSINESS ACCOUNTING SYSTEM	$10,500	A-139
BUSINESS AIDS LIBRARY CASH MANAGEMENT	$40	A-152
BUSINESS MANAGER INVESTMENT ANALYSIS	$30	A-122
BUSINESS SYSTEM	$3,000	A-132
BUSINESS SYSTEM ACCOUNTING	$2,000	A-119
BUSINESSWARE	$100	A-150
BUSINESS AIDS LIBRARY LEASE/PURCHASE	$70	A-152
[illegible] STATISTICS	$30	A-122
BUSINESS MANAGER/LOAN ANALYSIS	$30	A-122
BUSINESS PAC 100	$100	A-129
BYTESMITH/ACCOUNTS RECEIVABLE	$600	A-141
BYTESMITH/TIME ACCOUNTING	$300	A-141
CABLE TV SYSTEM	$4,000	A-124
CAD	$140	A-125
CAIR	$3,500	A-116
CASH DISBURSEMENT JOURNAL TEMPLATE	$40	A-139
CASH DISBURSEMENTS	N/A	A-150
CASH DISPERSEMENT	$500	A-124
CASH MANAGER SYSTEM	N/A	A-151
CASH RECEIPT JOURNAL	$40	A-112
CASH RECEIPTS	N/A	A-150
CASH RECEIPTS AND DISBURSEMENTS	$200	A-132
CASH RECEIVING JOURNAL TEMPLATE	$40	A-139
CBOOK	$170	A-129
CBS-2100	$9,500	A-128

CENTAUR	$21,900	A-116
CHECK RECONCILIATION	$1,700	A-133
CHECKTAX	NA	A-127
CHECKWRITER	$99	A-140
CHECKWRITER	$80	A-149
CHILD SUPPORT	N/A	A-135
CHIROPRACTOR SYSTEM	$3,000	A-118
CHIRO80 CHIROPRACTIC OFFICE MANAGEMENT	N/A	A-114
CHURCH INFORMATION MANAGEMENT	$3,740	A-138
CHURCH MEMBERSHIP	$3,500	A-124
CHURCH RECORD SYSTEM	N/A	A-150
CHURCH SYSTEMS	N/A	A-119
CLIC/EDUCATION ANALYSIS	$95	A-131
CLIENT ACCOUNTING SYSTEM	N/A	A-112
CLIENT ACCOUNTING SYSTEM	$4,500	A-147
CLIENT INFORMATION SYSTEM	$695	A-143
CLIENT TIMEKEEPING PROGRAM	$450	A-122
CLIENT WRITE UP SYSTEM	$695	A-143
CLIENT WRITE-UP	$4,500	A-115
CLIENT WRITE-UP	$3,750	A-123
CLIENT WRITE-UP SYSTEM	$795	A-137
COLLECT	$4,000	A-154
COMPLETE ACCOUNTING	$4,780	A-135
COMPLETE INTERACTIVE ACCOUNTING	$500	A-143
COMPUTED INTEREST	$450	A-121
COMPUTER BUSINESS SOFTWARE	$3,000	A-120
COMPUTROLLER	$2,500	A-112
CONSTRMGT	NA	A-117
CONSTRUCTION COST/PROFIT ANALYS	$50	A-147
CONSTRUCTION MANAGEMENT INFORMATION	$995	A-120
CONTRACT BILLING SYSTEM	$499	A-138
CONTROLS	NA	A-111
CORPORATE TAX RETURNS	NA	A-148
CORPORATE 1120-CTP	$500	A-121
COSAC	$495	A-153
COUNTRY CLUB MANAGEMENT	NA	A-132
COUNT/UP	$1,725	A-140
COUPON PROCESSING SYSTEM	NA	A-134
CPA CLIENT WRITE-UP	$1,750	A-127
CPA CLIENT WRITE-UP	$2,000	A-127
CPA CLIENT WRITE-UP	NA	A-140
CPA CLIENT WRITE-UP	NA	A-151
CUTE - CLIENT WRITE-UP	$1,995	A-155
CYACT (CYBERNATICS ACCOUNTING)	$1,495	A-122
D/B MASTER LOCK BOX ACCOUNTING	$150	A-119
D/B MASTER STOCKHOLDER ACCOUNTING	$150	A-119
DAIS ACCOUNTS PAYABLE	$750	A-122
DAIS ACCOUNTS RECEIVABLE	$750	A-122
DAIS GENERAL LEDGER	$750	A-122
DATA WELL	$1,800	A-123
DATAWRITE	$3,495	A-111
DCMS	$1,500	A-118
DEFERRED CHARGES	$200	A-150
DENTAL ACCOUNTING SYSTEM	$595	A-117
DENTAL OFFICE MANAGEMENT	$2,000	A-135
DENTAL OFFICE MANAGEMENT SYSTEM	$5,000	A-155
DENTAL OFFICE MANAGEMENT	$1,500	A-116
DENTAL PRACTICE MGMT	$2,500	A-127
DENTAL80	NA	A-114
DEPRECIATION SCHEDULE	$30	A-145
DEPRECIATION TEMPLATE	$40	A-139
DETOX	$35,000	A-111
DEZ-PAK	$40,000	A-154
DIBS 11	NA	A-121
DIGITAN TUITION PACKAGE	$2,000	A-125
DISTRIBUTION MANAGEMENT SYSTEM	$2,500	A-128
[illegible]	[illegible]	A-117
DISTRIBUTION SYSTEM	$4,000	A-126
DISTRIBUTOR	NA	A-151
DMDS	$3,500	A-118
DOM	$8,000	A-139
DPS 33MC ACCOUNTS PAYABLE	NA	A-141
DUE PROCESSOR	$2,400	A-131
EIS GENERAL ACCOUNTING SYSTEM	$5,000	A-126
EIS ACCOUNTING	$2,200	A-126
EIS JOB COSTING	$1,500	A-126
EIS ORDER ENTRY	$1,500	A-126
ELKS CLUBS PACKAGE	NA	A-150
EMERGENCY SERVICES/MINOR WORK OPERATION	NA	A-151

EMPLOYEE CONTRIBUTION	$595	A-115
ENGINEER BUSINESS MANAGER	$2,000 to $2,500	A-113
ENHANCED OSBORNE	$299	A-126
ENTRAC	NA	A-117
EOQ	$93	A-127
ESTATE TAX PLAN	$750	A-121
ESTATE TAX PLAN V. 5.0	$750	A-111
ESTIMATE/80	$4,000	A-145
ETREBY PHARMACY SYSTEM	$5,000	A-128
EXPENSE JOURNAL	$40	A-112
F.A.R.M.S.	$10,000	A-114
FACS	$525	A-155
FARM MANAGEMENT SYSTEMS	$500	A-134
FARM STORE ACCOUNTING/RETAIL MANAGEMENT	NA	A-143
FARM ACCOUNTING CONTROL SYS (FACS)	NA	A-114
FARM MANAGER GENERAL BUSINESS	$50	A-122
FARMING SUPPLY PACKAGE	NA	A-153
FASS	$195 to $2,000	A-144
FINANCIAL ANALYSIS	$40	A-125
FINANCIAL ANALYSIS	$1,000	A-129
FINANCIAL FACTS	$59	A-130
FINANCIAL PACKAGE	$2,500	A-127
FINANCIAL PLANNING	$69	A-130
FINANCIAL WORKSHOP	$5,200	A-144
FIRE MANAGEMENT SYSTEM	NA	A-122
FISCAL V	NA	A-123
FIXED ASSET ACCOUNTING	$895	A-115
FIXED ASSET ACCOUNTING	$600	A-126
FIXED ASSET ACCOUNTING	$1,500	A-126
FIXED ASSET ACCOUNTING	$395	A-136
FIXED ASSET ACCOUNTING SYSTEM	$550 to $900	A-120
FIXED ASSET DEPRECIATION	$195	A-114
FIXED ASSETS	NA	A-144
FIXED ASSETS	$595	A-148
FIXED ASSET MANAGEMENT & DEPRECIATION	$750	A-155
FIXED ASSETS W/DEPRECIATION	$300	A-132
FIXED ASSET ACCOUNTING	$200	A-143
FOOD BROKERAGE SYSTEM	$8,000	A-118
FOOD PROCESSOR	$15,000	A-129
FOOD SERVICE COST ESTIMATING	$89	A-141
FOOD-WARE	$695	A-119
FORECASH	NA	A-145
FORM #1099 GENERATOR	$150	A-143
FUEL OIL DEALERS PACKAGE	$3,500	A-141
FULL TRACK/GAS BILLING	NA	A-153
FUND ACCOUNTING	$850	A-132
FUND ACCOUNTING SYSTEM	NA	A-129
FUND-IT VERSION	NA	A-132
FUNERAL DIRECTOR'S PACKAGE	NA	A-131
COMPUTED INTEREST	$450	A-120
GAPS-GENERAL ACCOUNTING PACKAGES	NA	A-126
GAS ACCOUNTS PAYABLE	$2,000	A-133
GAS ACCOUNTS RECEIVABLE	$2,000	A-133
GAS FIXED ASSETS	$2,000	A-133
GAS GENERAL LEDGER AND REPORT WRITER	$2,000	A-133
GAS PURCHASE ORDER	NA	A-133
GASOLINE DISTRIBUTORS SYSTEM	$5,000	A-141
GBA (GENERAL BUSINESS ACCOUNTING)	$5,000	A-156
GBS	$900 to $4,000	A-131
GEM	$400	A-131
GENERAL ACCOUNTING	NA	A-120
GENERAL ACCOUNTING	$3,000	A-111
GENERAL ACCOUNTING	$8,700	A-116
GENERAL ACCOUNTING	$9,000	A-119
GENERAL ACCOUNTING	$4,500	A-129
GENERAL ACCOUNTING	NA	A-143
GENERAL ACCOUNTING	NA	A-145
GENERAL ACCOUNTING	$1,500 to $4,000	A-149
GENERAL ACCOUNTING	$2,000 to $5,000	A-156
GENERAL ACCOUNTING PACKAGE	$6,000	A-111
GENERAL ACCOUNTING PACKAGE	NA	A-126
GENERAL ACCOUNTING SYSTEM	NA	A-117
GENERAL ACCOUNTING SYSTEM	$795	A-121
GENERAL ACCOUNTING SYSTEM	$4,000	A-126
GENERAL ACCOUNTING SYSTEM	$1,000 to $5,000	A-147
GENERAL LEDGER	$3,500	A-113
GENERAL LEDGER	NA	A-113
GENERAL LEDGER	$1,500	A-114
GENERAL LEDGER	$1,295	A-115
GENERAL LEDGER	$750	A-115
GENERAL LEDGER	$300	A-116
GENERAL LEDGER	$2,000	A-119
GENERAL LEDGER	$1,500	A-119
GENERAL LEDGER	$485	A-120
GENERAL LEDGER	$499	A-120
GENERAL LEDGER	$1,000	A-121
GENERAL LEDGER	$1,000	A-122
GENERAL LEDGER	$1,000	A-122
GENERAL LEDGER	$1,500	A-123
GENERAL LEDGER	$3,500	A-123
GENERAL LEDGER	$500	A-124
GENERAL LEDGER	$100	A-124
GENERAL LEDGER	$1,200	A-124
GENERAL LEDGER	$60	A-125
GENERAL LEDGER	$750	A-127
GENERAL LEDGER	$500	A-128
GENERAL LEDGER	$360 to $1,200	A-128
GENERAL LEDGER	$149	A-128
GENERAL LEDGER	$295	A-129
GENERAL LEDGER	$449	A-129
GENERAL LEDGER	$80 to $395	A-131
GENERAL LEDGER	$450	A-132
GENERAL LEDGER	$2,000	A-133
GENERAL LEDGER	$200	A-134
GENERAL LEDGER	$1,500	A-134
GENERAL LEDGER	$600	A-135
GENERAL LEDGER	$2,000	A-135
GENERAL LEDGER	$1,195	A-135
GENERAL LEDGER	$129 to $349	A-136
GENERAL LEDGER	$595	A-136
GENERAL LEDGER	$795	A-136
GENERAL LEDGER	$900	A-140
GENERAL LEDGER	$199	A-140
GENERAL LEDGER	$750	A-144
GENERAL LEDGER	NA	A-144
GENERAL LEDGER	$895	A-145
GENERAL LEDGER	$128	A-147
GENERAL LEDGER	$595	A-148
GENERAL LEDGER	$280	A-148
GENERAL LEDGER	$495	A-148
GENERAL LEDGER	NA	A-150
GENERAL LEDGER	$340	A-151
GENERAL LEDGER	$599	A-152
GENERAL LEDGER	$595 to $745	A-155
GENERAL LEDGER ACCOUNTING	$500	A-116
GENERAL LEDGER AND FINANCIAL STATEMENT	$795	A-150
GENERAL LEDGER BOCS	$395	A-132
GENERAL LEDGER FOR GOVERNMENT	$750	A-127
GENERAL LEDGER II	$750	A-121
GENERAL LEDGER II	$850	A-132
GENERAL LEDGER IN SPANISH	$1,500 to $1,700	A-142
GENERAL LEDGER SYSTEM	$499	A-136
GENERAL LEDGER SYSTEM	$500	A-140
GENERAL LEDGER WITH CHECK RECONCILIATION	$249	A-140
GENERAL LEDGER WITH REPORT WRITER	$595	A-136
GENERAL LEDGER/ACCOUNTS PAYABLE	$2,000	A-136
GENERAL LEDGER-CLIENT WRITE UP	$1,250	A-140
GENERAL LEDGER/CLIENT WRITE-UP	$1,500	A-133
GENERAL LEDGER GL23	$800	A-133
GENERAL LEDGER/SUPERCALC TM INTERFACE	$100	A-136
GENERAL LOAN AND INVESTMENT SYSTEM	$225	A-117
GLENDA	$395	A-131
GLOWS	NA	A-134
GRAIN RECORDS ACCOUNTING AND INVENTORY	NA	A-143
GRAPHIC GENERAL LEDGER	$250	A-122
HAI-LINE ACCOUNTS PAYABLE	$495	A-139
HAI-LINE ACCOUNTS RECEIVABLE	$495	A-139
HAI-LINE GENERAL LEDGER	$495	A-139
HAI-LINE INVOICING	$395	A-139
HAI-LINE SALES ANALYSIS	$495	A-139
HAI-LINE SALES ORDER PROCESSING	$995	A-139
HOTSHOT	$1,500	A-151
IBS INTEGRATED BUSINESS SYSTEM	$2,700	A-112
INCOME	$800 to $3,600	A-136
INCOME TAX PLANNER	$200	A-143
INDEPENDENT AGENT INSURANCE PAC	NA	A-147
INSOFT ACCOUNTING	$395	A-131
INSTA-CHECK	$100	A-117

INSURANCE AGENCY MANAGEMENT	$10,000	A-124
INTEGRATED ACCOUNTS PAYABLE	N/A	A-155
INTEGRATED ACCOUNTS RECEIVEABLE	N/A	A-153
INTERACTIVE ACCOUNTS PAYABLE SYSTEM	$600	A-128
INTERACTIVE ACCOUNTS RECEIVABLE	$600	A-128
INTERACTIVE GENERAL LEDGER SYSTEM	$600	A-128
INTERGRATED ACCOUNTS RECEIVABLE	N/A	A-153
INVENTORY	$499	A-120
INVENTORY	$500	A-129
INVENTORY	$149	A-127
INVENTORY CONTROL WITH INVOICING	$595	A-137
INVENTORY MASTER	$495	A-113
INVOICE PREPARE	$5,995	A-148
INVOICER PLUS	$150	A-143
INVOICING	$500	A-124
INVOICING TEMPLATE	$50	A-112
IPA	$60	A-125
IRA	$95	A-116
JEWEL ACCOUNTS PAYABLE	$500	A-130
JEWEL CLIENT WRITEUP	$1,550	A-130
JEWEL FIXED ASSETS	$500	A-130
JEWEL G/L - DEPARTMENTALIZATION	$200	A-130
JEWEL G/L FLEXIBLE BUDGETING	$200	A-130
JEWEL GENERAL LEDGER HISTORY	$200	A-130
JEWEL GENERAL LEDGER BUDGETING	$200	A-130
JEWEL JOB COSTING	$1,000	A-130
JEWEL STANDARD GENERAL LEDGER	$750	A-130
JEWEL A/R BILLING	$400	A-130
JOB ACCOUNTING	$650	A-122
JOB BUDGETING/ESTIMATING	$795	A-120
JOB COST	$485	A-120
JOB COST	$6,000	A-122
JOB COST	$500	A-130
JOB COST	$5,000	A-140
JOB COST SERIES	$3,335	A-130
JOB COST SYSTEM	$795	A-130
JOB COSTING	$5,000	A-116
JOB COSTING	N/A	A-130
JOB COSTING	$250	A-134
JOB COSTING	$795	A-139
JOB COSTING	N/A	A-146
JOB COSTING ACCOUNTS PAYABLE	$250	A-134
JOB COSTING PAYROLL	$250	A-134
JOB COSTING SYSTEM	N/A	A-145
JOB COSTING - A/R	$250	A-134
JOB COST (CONTRACTOR)	$1,500	A-123
JOB COST - CROP CAST	$1,050	A-139
JOB CONTROL/80	$5,000	A-140
JOB ESTIMATE AND JOB COST	$80	A-142
LAB MANAGER	$1,500	A-122
LABORATORY SOFTWARE	$2,995	A-118
LAND SURVEYING	N/A	A-120
LAS/FICS	N/A	A-134
LAWS	$7,000	A-147
LAWTOMATION	$4,500	A-152
LEDGER MASTER	$495	A-113
LEDGERMASTER	$950	A-127
LEGAL ACCOUNTING	$800	A-149
LEGAL II	$400	A-156
LEGAL OFFICE MANAGER	$249	A-112
LEGAL TIME ACCOUNTING	$650	A-117
LEGAL TIME ACCOUNTING	$195 to $995	A-144
LEQUIS	$5,000 to $15,000	A-111
LESSOR LEASE EVALUATION/CANADIANS	N/A	A-132
LIBERATOR	$1,200	A-112
LIBRARY	N/A	A-120
LI'L CHIEF	$300	A-153
LOAN AMORTIZATION SCHEDULING	$29	A-147
LOAN BILLING SYSTEM	$2,500	A-113
LOAN SERVICING	N/A	A-140
LONG TERM CARE FACILITY	$3,000	A-134
MAGAZINE BILLING AND RENEWAL	N/A	A-145
MAIL ORDER ENTRY PACKAGE	$3,000	A-156
MAIL PAC II	$100	A-129
MAINTAINANCE DISPATCHING SYSTEM	$10,000	A-110
MANUFACTURING ACCOUNTING	$3,000	A-111
MANUFACTURING ACCOUNTING SYSTEM	N/A	A-147
MAPPING	N/A	A-128
MARKETMAN'S ERP	$3,000	A-154
MASTER TAX PROGRAM	$1,895 to $1,995	A-121
MASTER PAC 100	$100	A-129
MAXI CRAS	$100	A-111
MBA TM ACCOUNTANT	$1,495	A-137
MBSI ACCOUNTING PACKAGE	$3,000	A-123
MCI MICRO 2	$3,500	A-134
MCI SUPERMICRO	$5,000	A-134
MCS ACCOUNTS PAYABLE	$1,000 to $1,200	A-139
MCS ACCOUNTS RECEIVABLE	$1,000 to $1,200	A-139
MCS GENERAL LEDGER REPORTER	N/A	A-140
MCS PURCHASE ORDER	$1,000 to $1,200	A-140
MEDIA SCHEDULING	$500	A-149
MEDICUS	$4,000	A-153
MEMBERSHIP BILLING SYSTEM	$599	A-139
MEMBERSHIP BILLING SYSTEM	$2,500	A-154
MICA/AP	$395	A-128
MICA/AR	$395	A-128
MICA/GL	$395	A-136
MICA/IC	$395	A-136
MICRO BANKER DEMAND DEPOSIT ACCOUNTING	$3,500	A-122
MICRO BANKER GENERAL LEDGER	$5,000	A-122
MICRO LEDGER ACCOUNTS PAYABLE	$750	A-153
MICRO LEDGER ACCOUNTS RECEIVABLE	$750	A-153
MICRO LEDGER PAYROLL	$750	A-153
MICROBASE SOFTWARE AD AGENCY	$595	A-139
MICROCHECK	$350	A-142
MICROSHARE LUMP SUM SYSTEMS	N/A	A-129
MICROSOURCE PARAFILE AND PROFILE	$750	A-118
MICROSOURCE/CHECKOUT WORK PAPERS	$750	A-118
MICRO LEDGER/GENERAL LEDGER	$750	A-153
MICRO-MASTER PROFESSIONAL PORTFOLIO	$3,000	A-149
MICS 5.5	$2,500	A-126
MINIBIZ BOOKKEEPING SYSTEM	$150	A-141
MINIBIZ BOOKKEEPING SYSTEM	$150	A-150
MONEY MAESTRO	$125	A-131
MONEY TOOL	$59	A-130
MONITOR	$695	A-117
MONROE BUS MGMT SERIES I A/R & SALES ANALYSIS	$395	A-140
MONROE BUSINESS MGMT SERIES I A/P	$595	A-140
MONROE BUSINESS MGMT SERIES I INVOICING	$195	A-140
MONROE BUSINESS MGMT SERIES I - A/R	$595	A-140
MONROE BUSINESS MGMT SERIES I- G/L	$595	A-140
MONROE BUSINESS MGMT SERIES II- G/L	N/A	A-140
MONROE BUSINESS MGMT SERIES II DEVELOPING	$995	A-140
MONROE BUSINESS MGMT SERIES II A/P	$695	A-140
MONROE BUSINESS MGMT SERIES II A/R	$695	A-140
MONTHLY MANAGEMENT ACCOUNTING	$3,000	A-151
MRP+TWO	N/A	A-151
MTYE MYTE PURCHASE ORDER PROCESSING	N/A	A-135
MULTICOMPANY OPTION	$250	A-137
MULTILEVEL FINANCING CALCULATION SOFTWARE	$175	A-121
MULTISTATE/LOCAL PAYROLL/CHECK WRITING	$595	A-137
MULTIUSER ACCOUNTING SYSTEM	$2,000 to $8,000	A-128
MUNICIPAL ACCOUNTING	$8,000	A-141
MUNICIPAL BILLING SYSTEM	$2,250	A-138
MUTUAL FUND ACCOUNTING	N/A	A-111
MYTE MYTE ACCOUNTS PAYABLE	N/A	A-128
MYTE MYTE ACCOUNTS RECEIVABLE	N/A	A-128
MYTE MYTE G/L & FINANCIAL	N/A	A-128
MYTE MYTE ONE WRITE ACCOUNTING	N/A	A-130
MYTE MYTE PROTIME	N/A	A-129
MYTE MYTE PURCHASE ORDER PROCESSING	N/A	A-135
NDS CONTRACTOR ACCOUNTING SYSTEM	N/A	A-141
NDS DISTRIBUTION SYSTEM	N/A	A-142
NDS FINANCIAL ACCOUNTING SYST	N/A	A-143
NDS FUND RAISING	N/A	A-142
NDS GOVERNMENT ACCOUNTING SYSTEM	N/A	A-142
NDS PROFESSIONAL TIME & BILLING	N/A	A-142
NET PRESENT VALUE PROGRAM	$250	A-121
NEWSPAPER ACCOUNTING & CIRCULATION	$3,000	A-118
NORTHSTAR ACCPAC ACCOUNTING	N/A	A-123
NOT-INTEGRATED PROGRAM	N/A	A-121
NURSERY MANAGEMENT	$1,200	A-128
NURSING HOME PACKAGE	$5,000	A-117
OIL ACCOUNTING SYSTEM	N/A	A-150
OIL AND GAS JOINT INTEREST BILLING	$2,500	A-115
OIL AND GAS REVENUE SYSTEM	$1,500	A-152
OIL AND GAS RESEARCH SOFTWARE	$8,000	A-116
OMEGABYTE PRACTICE MANAGEMENT	$1,995	A-111

OPEN ITEM ACCOUNTS RECEIVABLE	$650	..	A-132
ORDER ENTRY	$795	..	A-158
ORDER ENTRY AND INVENTORY	$150	..	A-141
ORDER ENTRY INVOICING	$2,500	..	A-123
ORDER ENTRY POINT OF SALE	$80 to $395	..	A-131
ORDER ENTRY SYSTEM FOR MANUFACTURERS	$3,500	..	A-127
ORDER PROCESSING	$1,000	..	A-128
ORDER ENTRY/ACCOUNTS RECEIVABLE SYSTEM	$599	..	A-136
ORTHODONTIC PRACTICE MANAGEMENT	$4,000	..	A-128
PERFORMANCE SERIES	$495 to $595	..	A-155
PAM	$600	..	A-131
PARTNERSHIP TAX RETURNS	NA	..	A-148
PARTS INVENTORY BILLING AND A/R	$5,500	..	A-123
PASS	$195 to $2,000	..	A-144
PAYABLES MASTER	$495	..	A-113
PAYROLL	$485	..	A-120
PAYROLL	$100	..	A-124
PAYROLL	$950	..	A-149
PAYROLL WITH COST ACCOUNTING	$148	..	A-147
PC CYLAW	$1,495	..	A-122
PEACHPAK/4	$395	..	A-144
PEACHTREE SERIES 8 ACCOUNTING	$4,500	..	A-135
PEACHTREE SERIES 8 A/P	$750	..	A-135
PEACHTREE SERIES 8 A/R	$750	..	A-135
PEACHTREE SERIES 8 G/L	$750	..	A-135
PEACHTREE SERIES 8 INVENTORY	$750	..	A-135
PEACHTREE SERIES 8 INVOICING	$750	..	A-135
PENADMIN	NA	..	A-114
PERFORMANCE THEORIES A/P	$595	..	A-139
PERFORMANCE THEORIES A/R	$595	..	A-139
PERFORMANCE THEORIES G/L	$595	..	A-139
PERSONAL FINANCIAL AIDS	$14	..	A-152
PERSONAL FINANCIAL SYSTEM	$125	..	A-143
PERSONAL COMPUTER/FIXED ASSET	$395	..	A-114
PERSONAL COMPUTER/PERSONAL FINANCE	$95	..	A-114
PEST CONTROL A/R	$800	..	A-154
PHARMACY	$6,000	..	A-123
PHARMACY SYSTEM	$3,000	..	A-118
PLUSPLAN	$1,500	..	A-134
POINT OF SALE	$250	..	A-112
POOL SERVICE ACCOUNTS RECEIVABLE 38 INFO	$800	..	A-154
PRACTICAL ACCOUNTANT	NA	..	A-148
PRE-AUDIT SOFTWARE	$1,500	..	A-121
PREVENTATIVE MAINTENANCE SYSTEM	$250	..	A-143
PRINTERS JOB COST	$1,500	..	A-144
PRINTERS BUSINESS SYSTEM	$2,495	..	A-111
PRIVATE SCHOOL ACCOUNTS RECEIVABLE	NA	..	A-151
PROFESSIONAL ACCOUNTS PAYABLE	$195 to $2,000	..	A-145
PROFESSIONAL TAX PKG	$1,350	..	A-148
PROFESSIONAL TAX PLAN	$350	..	A-121
PROFESSIONAL TIME ACCOUNTING	$495	..	A-137
PROFESSIONAL TIME AND BILLING	$395	..	A-149
PROFESSIONAL TIME & BILLING	$340	..	A-151
PROFESSIONAL TIME MANAGEMENT	$1,500 to $3,900	..	A-134
PROFESSIONAL FINANCE PROGRAM-PFP II	$245	..	A-114
PROFESSIONAL TAX PLAN-VERSION 2.4	NA	..	A-111
PROFITMAKER ACCOUNTING	$149	..	A-154
PROJECT COST CONTROL	$89	..	A-141
PROJECT COST CONTROL	$70	..	A-150
PROPERTY/CASUALTY INSURANCE AGENCY	NA	..	A-123
PROPRIETARY PACKAGE	$2,500	..	A-139
PROSPECT MANAGER	$495	..	A-147
PROSPECTOR	$300	..	A-127
PUBLIC ACCOUNTING SYSTEM	$2,500	..	A-111
PURCHASE ORDER	$749	..	A-112
PURCHASE ORDER	$595	..	A-148
PURCHASE ORDER	$795	..	A-158
PURCHASE ORDER AND REQUISITIONS	$395	..	A-137
PURCHASE ORDERING	$1,000	..	A-128
PURCHASING TEMPLATE	$50	..	A-112
QCS ACCOUNTS PAYABLE	$900	..	A-146
QCS ACCOUNTS RECEIVABLE	$90	..	A-146
QCS GENERAL LEDGER	$900	..	A-146
QCS JOB COSTING	$900	..	A-146
QCS JOB ESTIMATING	$900	..	A-146
QCS JOB QUOTING	$900	..	A-146
QCS ORDER ENTRY	$900	..	A-146
QCS ORDER SCHEDULING	$900	..	A-146
QCS SALES ACCOUNT	$900	..	A-146
QUERY	$475	..	A-151
QUEST ACCOUNTING SYSTEM	$995 to $6,000	..	A-146
QUEST BOOKKEEPER I	$795	..	A-146
QUEST BOOKKEEPER II	$995	..	A-146
QUICK-QUOTE	$7,000 to $12,000	..	A-153
QUIL DIRECT STORE DELIVERY	NA	..	A-134
REAL ESTATE INVESTMENT PROGRAM	$130	..	A-123
REALWORLD ACCOUNTS PAYABLE	$650	..	A-137
REALWORLD ACCOUNTS RECEIVABLE	$650	..	A-137
REALWORLD GENERAL LEDGER	$650	..	A-137
REALWORLD ORDER ENTRY	$650	..	A-137
REALWORLD ORDER ENTRY/BILLING	$650	..	A-137
REALWORLD PAYROLL	$650	..	A-137
REALWORLD SALES ANALYSIS	$650	..	A-137
RECEIVABLE MASTER	$495	..	A-113
RED WING ASSET MANAGEMENT	$250	..	A-147
RED WING GENERAL LEDGER	$500	..	A-147
REFUSE	$1,500	..	A-154
REMITTANCE CONTROL	$2,500	..	A-148
RENAISSANCE ACCOUNTS PAYABLE	$950	..	A-152
RENAISSANCE ACCOUNTS RECEIVABLE	$950	..	A-152
RENAISSANCE ENTREPRENEUR	$995	..	A-152
REPTRAC	$1,995	..	A-119
RESORT RENTALS	$2,750	..	A-125
RESTAURANT ACCOUNTS RECEIVABLE	NA	..	A-151
RESTAURANT EQUIPMENT REPAIR	NA	..	A-153
RESTAURANT GENERAL LEDGER	$1,000 to $1,500	..	A-151
RESULTS	NA	..	A-138
RETAIL ACCOUNTS PAYABLE	NA	..	A-133
RETAIL POINT OF SALE SYSTEM	NA	..	A-119
RETAIL GENERAL LEDGER	$2,000	..	A-139
RETAIL STORES PACKAGE	$6,000	..	A-141
REVEAL PORTFOLIO/CLIENT MANAGEMENT	$1,250	..	A-147
RL-1 ACCOUNTING PACKAGE	$295	..	A-111
ROUTE DELIVER	NA	..	A-113
ROYALTY ACCOUNTING	$750	..	A-147
RURAL WATER BILLING SYSTEM	$1,250	..	A-144
S-BASE - RETAIL MERCHANT INVENTORY	$1,500	..	A-149
S-BASE - FOOD SERVICE	$1,500	..	A-149
SAFE DEPOSIT ACCOUNTING	$1,500	..	A-127
SAGE AUDITORS WORKSTATION	$5,000	..	A-147
SALES ANALYSIS	$1,000	..	A-121
SALES ANALYSIS	$1,400	..	A-133
SALES ANALYSIS	$1,500	..	A-114
SALES ANALYSIS IN SPANISH	$1,500 to $3,000	..	A-142
SALES INVOICING	$750	..	A-144
SALES INVOICING	$340	..	A-151
SALES LEADS MANAGEMENT	$395	..	A-137
SALES ORDER ENTRY	$2,500	..	A-122
SALES ORDER INVOICE SYSTEM	$595 to $745	..	A-158
SALES ORDER PROCESSING	$900	..	A-124
SCHOOL ADMINISTRATIVE ACCOUNTING	$4,500	..	A-141
SCHOOL INFORMATION MANAGEMENT	NA	..	A-134
SCRIBE	$1,500	..	A-148
SED	$95	..	A-128
SENSIBLE SOLUTION BOOKKEEPER	$495	..	A-142
SENSIBLE SOLUTION BUSINESS MANAGEMENT	$995	..	A-142
SERIAL CONTROL SYSTEM	$2,500 to $5,000	..	A-129
SERIES/3 RBS-RETAIL BUSINESS SYSTEM	$8,000	..	A-133
SERVICE ANALYSIS PACK	$2,700	..	A-144
SERVICE MANAGER	$495	..	A-147
SHOE STORE	$3,500	..	A-154
SMALL BUSINESS AIDE	$975	..	A-135
SMART NET	$5,000	..	A-148
SOCIAL SERVICE SYSTEM	NA	..	A-134
SOLIDBILLING	$495	..	A-149
SOLIDLEDGER	$495	..	A-150
SOLIDORDER	NA	..	A-150
SOLIDPAYABLES	$495	..	A-150
SOLOMON SERIES ACCOUNTING	$595	..	A-118
SOME COMMON BASIC PROGRAMS	$35	..	A-114
STARBOARD-MATE	NA	..	A-118
STEP ONE	$2,750	..	A-117
STEP ONE - ACCOUNTS PAYABLE	$800	..	A-117
STEP ONE - ACCOUNTS RECEIVABLE	$800	..	A-117
STEP ONE - GENERAL LEDGER	$800	..	A-117
STEP ONE - INVOICING	$800	..	A-117
STEP ONE - ORDER ENTRY	$800	..	A-117
STGL STARBURST GENERAL LEDGER	$475	..	A-151

STOCK	$120	A-125
STOCK PORTFOLIO	$39	A-141
STOCKHOLDER ACCOUNTING	$1,295	A-115
STORE FRONT ENGINEERING/ESTIMATING	$7,000	A-125
SUGAR BEET HARVESTING	$795	A-119
SUPER CHIEF PLUS	$1,000 to $4,700	A-153
SUPER TAX	NA	A-111
SUPERCALC	$195	A-150
SUPERCHART	NA	A-150
SUPERVISE	$150	A-126
SUPERCALC 2	$295	A-150
SYSTEM III ACCOUNTING SYSTEM	$1,500	A-150
SYSTEMS IV ACCOUNTING SYSTEM	$750 to $4,500	A-150
T/H/C CB	$995	A-152
T/H/C JOURNAL	$295	A-153
T/H/C JOURNAL VERSION 2.01	$195	A-153
TAABS II	$1,500	A-139
TABS	$1,250	A-149
TALLYMASTER - TRS-80	$80	A-146
TANNERY SYSTEM	NA	A-134
TAR II	$950	A-126
TAVERN AUDIT PROGRAM SYSTEM	NA	A-150
TAX ACCOUNTING SYSTEM	$9,000	A-125
TAX CALENDAR	$5,000 to $10,000	A-127
TAX COLLECTION AND BILLING	NA	A-134
TAX DECISIONS	$229	A-125
TAX DEFFERED EXCHANGE	$50	A-147
TAX I	$195 to $2,000	A-145
TAX II	$195 to $2,000	A-145
TAX MACHINE	$995	A-111
TAX TEMPLATES	$89	A-142
TAX TRACKING	$1,200	A-121
TAXMODE	$250	A-132
TAXPLANNER-TP	$300	A-121
TCM TOTAL SALES	NA	A-152
TCS - TOTAL LEDGER	NA	A-152
TCS - TOTAL RECEIVABLES	NA	A-152
TERMITE	$4,800	A-123
THE ACCOUNTANT	$200	A-143
THE BOTTOM LINE	$5,000	A-129
THE CREDITMINDER	$1,200	A-121
THE FINAL ANALYSIS	$275	A-148
THE HOME ACCOUNTANT	$100	A-113
THE INVOICE FACTORY	$200	A-139
THE MARKET PAC	$100	A-129
THE PARTNER CLIENT ACCOUNTING	$4,500	A-116
THE PARTNER CLIENT ACCOUNTING SYSTEM	$4,500	A-116
THE PARTNER FIXED ASSET	$1,000	A-116
THE PARTNER FIXED ASSET SYSTEM	$1,000	A-116
THE PARTNER GENERAL LEDGER	$3,800	A-116
THE PARTNER MULTI TAX	$500	A-116
THE PARTNER PROFESSIONAL TIME	$2,500	A-116
THE PARTNER TIME CHARGES/BILLING	$2,500	A-116
THE PARTNER RJE TAX MODULE	$2,695	A-116
THE PARTNER RJE TAX MODULE	$2,695	A-116
THE PARTNER TAX PLANNING	$900	A-116
THE PERSONAL ACCOUNTANT	$30 to $35	A-148
THE PARTNER ON-LINE INTERACTIVE TAX	$500	A-116
THE SENSIBLE SOLUTION BOOKKEEPER	$495	A-142
THE SENSIBLE SOLUTION BOOKKEEPER PLUS	$595	A-142
THE SENSIBLE SOLUTION MANAGEMENT	$895	A-142
THE SOFTWARE FITNESS PROGRAM ACCOUNTS	NA	A-143
THE SOFTWARE FITNESS PROGRAM A/R	NA	A-144
THE SOFTWARE FITNESS PROGRAM G/L	NA	A-143
THE SOFTWARE FITNESS PROGRAM INVENTORY	NA	A-144
THE SOFTWARE FITNESS PROGRAM JOB COST	NA	A-144
THE SOFTWARE FITNESS PROGRAM O/P	NA	A-144
THE STOCK MANAGER	$150	A-143
THOROUGHBRED ACCOUNTS PAYABLE	$595	A-148
THOROUGHBRED ACCOUNTS RECEIVABLE	$595	A-148
THOROUGHBRED FIXED ASSETS	$595	A-148
THOROUGHBRED ORDER PROCESSING	$595	A-148
THOROUGHBRED PURCHASE ORDER	$395	A-148
TI-COUNT ACCOUNTS PAYABLE	$100	A-152
TI-COUNT ACCOUNTS RECEIVABLE	$100	A-152
TI-COUNT GENERAL LEDGER	$100	A-152
TIME ACCOUNTANT	$395	A-153
TIME AND EXPENSE BILLING SYSTEM	NA	A-132
TIME AND BILLING	$195 to $2,000	A-145
TIME AND BILLING SYSTEM	NA	A-146
TIME MANAGEMENT SYSTEM	$30	A-145
TIME MULTIPLE COMPANY ACCOUNTING	NA	A-153
TIME RECORDING AND MANAGEMENT SYSTEM	$2,495	A-139
TIME ACCOUNTING SYSTEM	$600	A-154
TIME KEEPER TIME & BILLING	$895	A-143
TIPS ALLOCATION	$89	A-141
TKR III	$1,300	A-126
TOBACCO AND CANDY	NA	A-120
TRANSACTION	$595 to $795	A-127
TRAVIS	$895	A-131
TRKTM	$950	A-126
TRS-POS	$4,550	A-118
TRUCK BROKER ACCOUNTING SYSTEM	$8,500	A-124
TRUCKING	NA	A-120
TRUST	NA	A-112
TRUST ACCOUNTING	$400	A-143
TRUST ACCOUNTING SYSTEM	$1,500 to $2,000	A-145
TRUST ACCOUNTING SYSTEM	$400	A-149
TVC	NA	A-140
ULTRA BUDGET ADMINISTRATOR	$15,000	A-145
ULTRA PROFESSIONAL TIME BILLING	$1,500	A-145
UNIVAIR ACCOUNTS PAYABLE	$500	A-154
UNIVAIR ACCOUNTS RECEIVABLE	$500	A-154
UNIVAIR GENERAL LEDGER ACCOUNTING	$500	A-154
UNIVAIR INSURANCE AGENCY MANAGEMENT	$1,150	A-154
UNIVAIR LEGAL TIME ACCOUNTING	$950	A-154
UNIVAIR SUPER LEDGER ACCOUNTING	$650	A-154
USERBASE	NA	A-141
UTILIBILL	$875 to $925	A-126
UTILITY BILLING	$1,495	A-120
UTILITY BILLING	NA	A-134
UTILITY BILLING	$2,500	A-141
UTILITY BILLING SYSTEM	$899	A-139
UTILITY MGMT SYSTEM	$4,000	A-118
VANDATA BUSINESS SOFTWARE PACKAGE	$295	A-155
VERSAPAYABLES	$100	A-129
VIDEO TAPE RENTAL CONTROL SYSTEM	NA	A-139
VISIBLEND	$50	A-139
VISIFACTORY	$75	A-139
WATER UTILITY BILLING	$7,500	A-127
WELL INFORMATION MANAGEMENT	$7,500	A-139
WHOLESALE DISTRIBUTION SYSTEM	$2,500	A-132
WHOLESALE FOOD DISTRIBUTORS	$3,500	A-141
WHOLESALE NURSERY ORDER ENTRY INVENTORY	$1,500	A-149
WHOLESALE DISTRIBUTING & ACCOUNTING	$6,000	A-129
X-CALIBUR	NA	A-113

Are you ready for MADIC?

1. Your company recognizes that the efficient flow of information is as crucial to your success as any other management function.

2. As your business becomes more complex, you find yourself using "patchwork" programs or "workaround" solutions to get the information you need. Even so, you'd like more visibility, more control.

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3. MADIC is used in manufacturing and distribution companies large or small, startup or established—discrete assembly, process, repetitive, or job shop operations.

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ABACUS DATA SYSTEMS, INC
EZBOMP
Specific Application: Inventory, Bill-of-Materials Processing
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (License)
Price: $1,200
(See Vendor Profile Page V-1)

ABACUS DATA SYSTEMS, INC
EZSTOCK
Specific Application: Inventory Management
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (License)
Price: $4,800

ABACUS DATA SYSTEMS, INC
EZTAG
Specific Application: Physical Inventory Management
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (License)
Price: $1,800

Additional information provided for by vendor.

EXSTOCK, an on-line, menu-driven, multiwarehouse inventory system, includes P.O. control to process inventory receipts, issues, returns and transfers.

EZBOMP (Bill-of-material processor) offers on-line, multilevel product structure management and inquiry.

EZTAG is a stand-alone module to interface with any inventory systems (such as MM3000, MACPAC, MAS-II) for year-end physical inventory applications.

ABC MANAGEMENT SYSTEMS, INC.
ABC/EQUIPMENT HISTORY
Specific Application: Equipment History Records
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Medical, Real Estate, Education, Construction, Government, Transportation, Scientific
System Requirements: IBM: Cics; HP, DEC VAX VMS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $11,000
Number Installed to Date: 10
Date First Installed: March 1982
(See Vendor Profile Page V-1)

ABC MANAGEMENT SYSTEMS, INC.
ABC/WORK ORDERS
Specific Application: Work Order Management
Specific Industry: Manufacturing, Construction, Government, Transportation
System Requirements: IBM: Cics, DOS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $22,000
Number Installed to Date: 15
Date First Installed: January 1982

ABC MANAGEMENT SYSTEMS, INC.
ABC INVENTORY
Specific Application: Inventory
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM: Cics; HP, DEC VAX: VMS; DEC PDP-11: RSTS/E
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $11,000
Number Installed to Date: 15
Date First Installed: March 1982

ACCESS TWO, INC.
CAMM (COMPUTER AIDED MANUFACTURER MANAGEMENT)
Additional Product Classification: Accounting, Payroll/Personnel
Specific Application: Manufacturing Management
Specific Industry: Manufacturing
System Requirements: DEC PDP-11 CTS300, DEC VAX VMS
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $50,000
Number Installed to Date: 10
Date First Installed: May 1982
(See Vendor Profile Page V-1)

ADVANCED AUTOMATION CONCEPTS,INC.
PARTS CAROUSEL CONTROLLER
Specific Application: Selects Parts in Sequential Order From Bill of Material
Specific Industry: Manufacturing, Construction
System Requirements: Motorola 6809: OS/9
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $5,000
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-2)

ADVANCED MANAGEMENT RESEARCH, INC.
PLANT FLOOR/23
Specific Application: Plant Floor Job Tracking and Control
Specific Industry: Manufacturing
System Requirements: IBM System/23: SSP
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $5,000
Date First Installed: June 1983

AGS MANAGEMENT SYSTEMS, INC.
PC 70 (PROJECT CONTROL 70)
Additional Product Classification: Banking, Insurance, Project Management
Specific Application: Managing and Monitoring Multiple Projects in Unlimited or Limited Resource Environment
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation, Non-Profit Organizations, Scientific, DP Departments
System Requirements: IBM: DOS, OS, VS, HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $42,000
Number Installed to Date: 850
Date First Installed: September 1975
(See Vendor Profile Page V-3)

AIMS, INC.
IIC
Specific Application: Industrial Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: HP: MPE; PE OS/32, Reliance
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $15,000
(See Vendor Profile Page V-4)

AIMS, INC.
MRP
Specific Application: MRP
Specific Industry: Manufacturing
System Requirements: HP: MPE; PE OS/32 Reliance
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $50,000

AMERICAN COMPUTER TECHNOLOGIES, INC.
MAN
Specific Application: Manufacturing, Job Costing, Job Estimating, Labor Routing
Specific Industry: Manufacturing
System Requirements: TI 300, 600, 800 DX-10
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 150
Date First Installed: September 1978
(See Vendor Profile Page V-5)

AMERICAN SOFTWARE, INC.
BILL OF MATERIAL
Specific Application: Bill of Material Processing
Source Language: Ansi Cobol
Source Code Available: No
(See Vendor Profile Page V-5)

AMERICAN SOFTWARE, INC.
CAPACITY PLANNING
Specific Application: Production Control
Specific Industry: Not Industry Sensitive
Source Language: Ansi Cobol

AMERICAN SOFTWARE, INC.
CUSTOMER ORDER PROCESSING
Specific Application: Order Entry and Status
Specific Industry: Not Industry Sensitive
Source Language: Ansi Cobol

AMERICAN SOFTWARE, INC.
DISTRIBUTION REQUIREMENTS PLANNING
Specific Application: Distribution Requirements Planning
Specific Industry: Not Industry Sensitive
Source Language: Ansi Cobol

AMERICAN SOFTWARE, INC.
INVENTORY ALLOCATION
Specific Application: Inventory Control and Allocation
Specific Industry: Not Industry Sensitive
Source Language: Ansi Cobol

AMERICAN SOFTWARE, INC.
INVENTORY CONTROLLER
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
Source Language: Ansi Cobol

AMERICAN SOFTWARE, INC.
MASTER SCHEDULING
Specific Application: Production Planning and Master Scheduling
Specific Industry: Not Industry Sensitive
Source Language: Ansi Cobol

AMERICAN SOFTWARE, INC.
MATERIAL REQUIREMENTS PLANNING
Specific Application: Material Requirements Planning
Specific Industry: Not Industry Sensitive
Source Language: Ansi Cobol

AMERICAN SOFTWARE, INC.
PROCUREMENT MATCHING
Specific Application: Procurement Matching
Specific Industry: Not Industry Sensitive
Source Language: Ansi Cobol

AMERICAN SOFTWARE, INC.
PRODUCTION ACTIVITY CONTROL
Specific Application: Provides Inventory Quantities and Current Manufacturing Order Status Information
Specific Industry: Not Industry Sensitive
Source Language: Cobol
Purchase Terms: Purchase (license)

AMERICAN SOFTWARE, INC.
PURCHASING & MATERIALS MANAGEMENT
Specific Application: Purchase Order Processing and Materials Control
Specific Industry: Not Industry Sensitive
Source Language: Ansi Cobol

ASSOCIATED, INC.
MANUFACTURING MANAGEMENT AND CONTROL
Specific Application: MRP, SFC
Specific Industry: Manufacturing
System Requirements: Prime; Microdata; GA; Honeywell
Source Language: Basic, English
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $31,500 to $39,500
Number Installed to Date: 100
(See Vendor Profile Page V-6)

APEX DATA GROUP
ORDER ENTRY/INVENTORY CONTROL
Specific Application: Order Entry/ Inventory Control
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Prime 2250, 250, 550, 850; Primos
Memory Required: 500.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 500
Date First Installed: May 1979
(See Vendor Profile Page V-6)

APPLIED DIGITAL COMMUNICATIONS, INC.
MANUFACTURING SYSTEM
Specific Application: Order Dynamics Driven Manufacturing, Job Shop Floor Control
Specific Industry: Manufacturing, Job Shop Manufacturinge
System Requirements: DG: R-DOS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $40,000
Number Installed to Date: 30
Date First Installed: 1980
(See Vendor Profile Page V-6)

APPLIED DIGITAL COMMUNICATIONS, INC.
SHOP ORDER CONTROL
Specific Application: Shop Order Control
Specific Industry: Manufacturing
System Requirements: DG Eclipse; R-DOS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1978

APRO SYSTEMS, INC.
PLANT INFORMATION PIECEWORK PAYROLL
Additional Product Classification: Psyroll/Personnel, Accounting
Specific Application: Apparel Plant Production Control Using Machine Readable Tickets
Specific Industry: Retail
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1982
(See Vendor Profile Page V-8)

ARTHUR ANDERSEN & CO.
DISTRIBUTION CONTROL SYSTEM
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM System/34
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 30
Date First Installed: 1977
(See Vendor Profile Page V-9)

ARTHUR ANDERSEN & CO.
MAC-PAC/34
Specific Application: Manufacturing Planning and Control Package
Specific Industry: Manufacturing
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 14
Date First Installed: 1982

ARTHUR ANDERSEN & CO.
MAC-PAC COBOL
Specific Application: Manufacturing Planning and Control Package
System Requirements: IBM 4300 and Larger; HP 3000; MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 90
Date First Installed: 1978

ARTHUR ANDERSEN & CO.
MAC-PAC S/G
Specific Application: Manufacturing Planning and Controlling
Specific Industry: Manufacturing
System Requirements: IBM System 3, System/34
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 160
Date First Installed: 1975

ASA, INC.
ASA MANUFACTURING
Specific Application: Job Costing Labor and Material Reporting, Bill of Materials, Purchase Order Tracking, Manufacturing Order Control
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11; GTS-300; DEC VAX: VMS, RSTS/E
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $17,500
Number Installed to Date: 8
Date First Installed: June 1982
(See Vendor Profile Page V-9)

ASK COMPUTER SYSTEMS, INC.
MANMAN/MFG
Specific Industry: Manufacturing
System Requirements: HP 3000; Images; DEC VAX: VMS
Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $80,000
Number Installed to Date: 300
(See Vendor Profile Page V-9)

A. S. THOMAS, INC.
ADVANCED FLEXIBLE MFG SYSTEM-AFMS
Specific Application: System Software for Controlling A Flexible Manufacturing System
Specific Industry: Manufacturing
System Requirements: DEC VAX-11/750, VAX-11/780 VMS, DEC PDP-11/44, PDP-11/24: RSX-11M
Memory Required: 1.0M bytes
Source Language: Fortran 77
Source Code Available: Yes
Purchase Terms: Purchase (licensis)
Number Installed to Date: 1
Date First Installed: June 1982
(See Vendor Profile Page V-9)

A. S. THOMAS, INC.
INTERACTIVE NUMERICAL CONTROL AND GRAPH
Additional Product Classification: Graphics
Specific Application: Tape Preparation and Graphics
Specific Industry: Manufacturing, Engineering
System Requirements: DEC PDP-11: RSX-11; DEC VAX: VMS
Source Language: Fortran
Purchase Terms: Purchase (license)
Date First Installed: 1972

AUTOMATED INFORMATION, INC.
ICAMS
Specific Application: Order Entry, Inventory Control Sales Analysis, Accounts Receivable
Specific Industry: Wholesale/Distribution
System Requirements: DEC PDP-11 RSTS/E, DEC VAX: VMS
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: Yes
Number Installed to Date: 4
Date First Installed: March 1982
(See Vendor Profile Page V-10)

AVIATION MANAGEMENT SYSTEMS, INC.
AVIATION SHOP CONTROL
Specific Application: Controls Parts and Labor Hours, Daily Work and Process, Reconciliation, Immediate Work Order Status, Automatic Flat Rate Control, Employee Incenove
Specific Industry: Aviation
System Requirements: DG: Icos, R-DOS, AOS, AOS/VS
Memory Required: 64.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $3,700 to $8,400
Number Installed to Date: 1
Date First Installed: July 1982
(See Vendor Profile Page V-11)

BAKER DATA, INC.
MANUFACTURING MATERIAL MANAGEMENT
Specific Application: Manufacturing Material Management
Specific Industry: Manufacturing
System Requirements: DEC PDP-11/23, 11/70; RT-11, RSTS/E, VM
Memory Required: 256.0K bytes
Source Language: DEC Dibol II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 60
Date First Installed: 1974
(See Vendor Profile Page V-11)

BENSON C. STONE & ASSOCIATES
GAINES
Specific Application: General Adaptive Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Unix; IBM; Honeywell, DEC PDP-11, VAX
Memory Required: 96.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $45,000 to $350,000
Number Installed to Date: 30
Date First Installed: April 1978
(See Vendor Profile Page V-12)

BILLINGS COMPUTER CORP.
BOOKKEEPING SALES INVENTORY
Specific Application: Sales Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Billings 50: BOS; Billings 6000: TURBO-DOS, Oasis
Memory Required: 56.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: June 1982
(See Vendor Profile Page V-12)

BOEING COMPUTER SERVICES CO.
MAINTENANCE AND MATERIALS MANAGEMENT SYSTEM (MAMS)
Specific Application: Plant and Equipment Maintenance
Specific Industry: Manufacturing, Transportation
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: HP Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978
(See Vendor Profile Page V-13)

BOEING COMPUTER SERVICES CO.
PRODUCTION MANAGEMENT SYSTEM (PMS)
Specific Application: Manufacturing Planning and Control
Specific Industry: Manufacturing
System Requirements: HP 3000: MPE
Source Language: HP Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1977

BONNER & MOORE COMPUTING CO.
COMPREHENSIVE ON-LINE MAINTENANCE PLANNING SYSTEM
Additional Product Classification: Maintenance

Specific Application: Maintenance, Planning and Scheduling, Inventory Control, Purchasing, Employee Time Accounting, Asset Control
Specific Industry: Manufacturing, Engineering, Construction, Process
System Requirements: IBM 8100 Series, IBM 4300, 3000 Series: OS, DOS, MVS, DG Eclipse AOS
Source Language: Cobol, CLC, Idea
[illegible]
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 31
Date First Installed: January 1979
(See Vendor Profile Page V-13)

BRUCE PAYNE CONSULTANTS, INC.
PRODUCTIVITY PERFORMANCE REPORT
Additional Product Classification: Banking, Insurance
Specific Application: Measure Productivity/Performance
Specific Industry: Manufacturing, Banking/Financial, Insurance
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 100
Date First Installed: 1971
(See Vendor Profile Page V-13)

BUSINESS SOFTWARE, INC.
FURNITURE MANUFACTURING SYSTEM
Specific Application: Inventories, Shipping, Routing, Place Work Order, Processing
Specific Industry: Manufacturing
System Requirements: Burroughs B90 CMS, Burroughs B300 CMS; Burroughs B900 CMS, Burroughs B1900: CMS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $16,000
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-15)

BUSINESS SYSTEMS ASSOCIATES
GLS MAPS
Specific Application: Map and Ship Floor Inventory, Purchase Orders
Specific Industry: Manufacturing
System Requirements: IBM System/4300 DOS/VSE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $45,000
Number Installed to Date: 60
Date First Installed: June 1974
(See Vendor Profile Page V-15)

CAE SYSTEMS, INC.
THE CAE 2000
Specific Application: Electronic Circuit Design
Specific Industry: Manufacturing, Engineering
System Requirements: Unix
Source Language: C
Source Code Available: No
Price: $39,000 to $100,000
Date First Installed: April 1983
(See Vendor Profile Page V-15)

CANNON COMPUTER CO., INC.
MANUFACTURING/MATERIAL CONTROL SYSTEM
Specific Application: MRP, Production/Inventory Control
Specific Industry: Manufacturing
System Requirements: IBM 370: DOS/VSE, IBM 4300; IBM 3300 Series
Memory Required: 1.0M bytes
Source Language: Ansi Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $297,000
Number Installed to Date: 150
Date First Installed: April 1969
(See Vendor Profile Page V-16)

CANNON COMPUTER CO., INC.
MCS
Specific Application: Manufacturing Package
Specific Industry: Manufacturing
System Requirements: IBM: DOS, OS MS
Memory Required: 256.0K bytes
Source Language: Cobol
[illegible]
Purchase Terms: Purchase (license)
Price: $50,000 to $300,000
[illegible]
Date First Installed: 1969

CARPENTER COMPUTER SERVICES
FOOD MANUFACTURERS PROCESSING SYSTEM
Specific Application: Processes Coupon Invoice Payment
Specific Industry: Food Manufacturing
System Requirements: TI 990: DX-10, Dnos
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: September 1981
(See Vendor Profile Page V-16)

CHAIN STORE SYSTEMS, LTD.
ON LINE WAREHOUSE MANAGEMENT SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Inventory Management, Labor Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS, IBM 4300: OS
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 27
Date First Installed: 1976
(See Vendor Profile Page V-16)

CHEM-AL, INC.
INDUSTRIAL ENGINEERING
Specific Application: Part Analysis, Critical Path Methods, Equation Curve Fittings, Engineering Problem Solving Applications
Specific Industry: Manufacturing, Engineering
System Requirements: TRS-80/I, 80/II, Model 12, Model 16: Basic
Memory Required: 64.0K bytes
Source Language: Basic, TRS Basic
Purchase Terms: Purchase (license)
Price: $799
Number Installed to Date: 50
Date First Installed: January 1982
(See Vendor Profile Page V-16)

CHRIS SCHAEFER & CO.
CSCO INVENTORY CONTROL SYSTEM
Specific Application: Warehouse Inventory, Finished Goods, Raw Materials, Electronic Cardex System
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes.
Purchase Terms: Purchase (license)
Date First Installed: 1982
(See Vendor Profile Page V-18)

CHRIS SCHAEFER & CO.
CSCO
WHOLESALES/DISTRIBUTERS
Additional Product Classification: Accounting, Payroll/Personnel
Specific Application: Warehouse Inventory Control, Physical Inventory, Sales Anaysis Report Generator, Accounting
Specific Industry: Wholesale/Distribution
System Requirements: HP 3000: MPE
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $60,000
Number Installed to Date: 2
Date First Installed: 1981

CHRISTENSEN COMPUTER CO., INC.
CCC REAL INFORMATION MANAGEMENT SYSTEM (RIMS)
Additional Product Classification: Inventory
Specific Application: Inventory Control, Quoting and Invoicing
Specific Industry: Tire and Wheel
System Requirements: Alpha Micro 1042; 1082: Amos; Alpha Micro 1000
Memory Required: 60.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Date First Installed: 1982
(See Vendor Profile Page V-18)

CIMS GROUP, INC.
INCITE
Specific Application: Corrugated Industry Cost Estimating
Specific Industry: Manufacturing
System Requirements: IBM 4300 Series, HP 3000, DG Eclipse
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: Yes

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"Before even talking to the salesman spend some time with The Software Catalog."* (July 4, 1983)

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[illegible]

Purchase Terms: Purchase (license); Lease
Price: $40,000 to $400,000
Number Installed to Date: 65
(See Vendor Profile Page V-19)

CINCOM SYSTEMS, INC.
MRPS
Specific Application: Inventory Control, Shop Floor Control, MRP
Specific Industry: Manufacturing
System Requirements: IBM, DOS, Edos, OS, MVS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-19)

COM-CODE ASSOCIATES
DP 11/23
Specific Application: Designed for Drafting or Architectural Engineering
Specific Industry: Manufacturing
System Requirements: HP Series 200 Intel
Memory Required: 756.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 60
Date First Installed: June 1981
(See Vendor Profile Page V-20)

COMMERCIAL COMPUTER SYSTEMS
SECOND TIME INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: RSTS/E, CTS 300, CP/M, CP/M 86, MS-DOS
Memory Required: 128.0K bytes
Source Language: Dibol
Purchase Terms: Purchase (license)
Price: $895
Number Installed to Date: 100
Date First Installed: 1978
(See Vendor Profile Page V-20)

COMMERCIAL SYSTEMS CORP.
INVENTORY/ORDER ENTRY
Specific Application: Inventory and Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: DG: AOS/ DOS; ACS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 30
Date First Installed: 1978

COMP ACT DATA SYSTEMS, INC.
FACS
Specific Application: VS/MVS Environment Inventory
Specific Industry: Not Industry Sensitive
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 10
(See Vendor Profile Page V-21)

COMPTECH
DCPOST
Specific Application: Point of Sale Communication and Polling
Specific Industry: Retail, Food Service
System Requirements: DEC 11/23+ RSX, DEC VAX 750 VSM, IBM 360 DOS, IBM 370 MVS
Memory Required: 256.0K bytes
Source Language: Cobol, Macro 11
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $18,000 to $25,000
Number Installed to Date: 3
(See Vendor Profile Page V-22)

COMPUMAX, INC.
BILL OF MATERIALS
Specific Application: Inventory Controls, Requirement Planning, Bill of Materials
Specific Industry: Manufacturing
System Requirements: Xerox 820, CP/M 80, Zenith-Heath Z89 Microsoft Basic, Apple II: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Microsoft Basic, Basic A
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 500
Date First Installed: 1981
(See Vendor Profile Page V-22)

COMPUMAX, INC.
MICRON V
Specific Application: Data Entry, Inventory Transactions, Job Cost, File, List, Economic Order
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, CP/M, Xerox 820 MS-DOS; NEC PC-8000; Micropolis 16
Memory Required: 48.0K bytes
Source Language: Microsoft Basic, Basic A
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 500
Date First Installed: 1981

COMPUMAX, INC.
ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Manufacturing
System Requirements: IBM PC: CP/M, Xerox 820 MS-DOS, NEC PC-8000, Micropolis 16
Memory Required: 48.0K bytes
Source Language: Microsoft Basic, Basic A
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 500
Date First Installed: 1981

COMPUTE-IT
JOBSTEP PIECE PRICE ESTIMATOR
Specific Application: Production Control
Specific Industry: Not Industry Sensitive
System Requirements: HP: DOS; IBM PC: PC-DOS; Commodore: DOS, TRS-80: DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 125
Date First Installed: 1981
(See Vendor Profile Page V-22)

COMPUTER ASSOCIATES
CA-DISTRIBUTION MANAGEMENT SOFTWARE/INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: DG: MVT, IBM 300 DOS, IBM 4300 OS, MVS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $27,000
Number Installed to Date: 400
Date First Installed: September 1978
(See Vendor Profile Page V-23)

COMPUTER ASSOCIATES
CA-DISTRIBUTION MANAGEMENT SOFTWARE/JOB COSTING
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: DG: MVT; IBM 300 Series: DOS, IBM 4300: OS, MVS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000
Number Installed to Date: 400
Date First Installed: 1978

COMPUTER ASSOCIATES
CA-INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Manufacturing, Wholesale/Distribution, Cross Industry
System Requirements: IBM 360, 370: DOS/VS, OS/VS1; DG Eclipse MV1: AOS, VM/CMS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $32 to $35
Date First Installed: April 1983

COMPUTER ASSOCIATES
CA-JOB COST
Specific Application: On-Line Collection of Direct Labor Hours, On-Line Inquiry of Job and Task Activity
Specific Industry: Manufacturing, Wholesale/Distribution, Retail
System Requirements: IBM 360, 370, 4300 Series: DOS/VS; DG Eclipse MV1: MVS, VM/CMS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $18 to $20
Date First Installed: April 1983

COMPUTER ASSOCIATES
CA-ORDER PROCESSING
Specific Application: Order Processing
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM: DOS/VS, OS/VS1, DG Eclipse MV1: VM/CMS, AOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $32 to $35
Date First Installed: April 1983

COMPUTER ASSOCIATES
CA-PURCHASING
Specific Application: Purchase Order Vendor Information
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM 360, DOS/VS, OS/VS1, DG Eclipse, MVS: VM/CMS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $18 to $20
Date First Installed: April 1983

COMPUTER COMMUNICATIONS SPECIALISTS, INC.
SHOPFLOOR DATA COLLECTION-PASS/1000
Specific Application: Data Collection
Specific Industry: Manufacturing
System Requirements: IBM Series/ 1000 EDX
Memory Required: 128.0K bytes
Source Language: EDL, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: TBD
(See Vendor Profile Page V-23)

COMPUTER COVENANT CORP.
INEQUITIVE MANUFACTURING SYSTEM
Specific Application: Management Control
Specific Industry: Manufacturing
System Requirements: DEC PDP-11: RSX-11, DEC VAX: VMS
Memory Required: 100.0K bytes
Source Language: Tibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 40
Date First Installed: 1978
(See Vendor Profile Page V-23)

COMPUTER DATA ACCESS, INC.
TOPS THREE
Specific Application: Parts Control, Inventory Control
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: DG: DOS, AOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 40
Date First Installed: 1969
(See Vendor Profile Page V-24)

COMPUTER INFORMATION ENTERPRISES
TIME AND ATTENDANCE
Additional Product Classification: Data/File Management
Specific Application: Manufacturing Data Collection
Specific Industry: Not Industry Sensitive
System Requirements: IBM EDX
Memory Required: 22.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Lease

Price: $1,000
Date First Installed: June 1983
(See Vendor Profile Page V-24)

COMPUTER INFORMATION ENTERPRISES
WAREHOUSE LOCATION SYSTEM
Specific Application: Inventory, Order Entry, Stock Forecasting
Specific Industry: Warehouses
System Requirements: IBM· EDX
Memory Required: 22.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible] 1981

COMPUTER OPERATIONS, INC.
[illegible]
Specific Application: Math Package With Screen Graphics for the Generation of Points
Specific Industry: Machine Tool
System Requirements: NCR· CP/M
Memory Required: 64.0K bytes
Source Language: Basic Compiler
[illegible]
Purchase Terms: Purchase (license)
Price: $15,500
[illegible] 100
Date First Installed: 1981
(See Vendor Profile Page V-25)

COMPUTER RESOURCES & TECHNOLOGY, IN.
[illegible]
Specific Application: Inventory, MRP, Costing, Labor, Routing, Bill of [illegible]
Specific Industry: Manufacturing
System Requirements: IBM System/36, System/34
Memory Required: 64.0K bytes
Source Language: RPG-II
[illegible]
Purchase Terms: Purchase (license)
[illegible]
Date First Installed: January 1984
(See Vendor Profile Page V-25)

COMPUTER STRATEGIES, INC.
AUTOMOTIVE [illegible] PROCESSING
Specific Application: Order Entry, Shipping and Billing of Telecommunicated Order's
Specific Industry: Manufacturing
System Requirements: IBM 4300 Series Pick, Honeywell Ultimate; Microdata
Memory Required: 64.0K bytes
Source Language: Real-Time
[illegible]
Purchase Terms: Purchase (license); Lease
Price: $15,000
Number Installed to Date: 10
Date First Installed: January 1983
(See Vendor Profile Page V-27)

[illegible], INC.
REPETITIVE MANUFACTURING SYSTEM
Specific Application: Shop Floor Control
[illegible]
System Requirements: IBM 4300 Series; Pick; Honeywell Ultimate; Microdata
Memory Required: 64.0K bytes
Source Language: Real-Time
[illegible]
Purchase Terms: Purchase (license)
[illegible]
Number Installed to Date: 10
Date First Installed: August 1983

COMPUTER SYSTEMS ARCHITECTS
TOTAL MANUFACTURING SYSTEM
Specific Application: General Ledger, Accounts Payable, Payroll, Job Cost, Purchase Order, MRP
Specific Industry: Manufacturing
System Requirements: TI· DX-10
Memory Required: 256 0K bytes
Source Language: Cobol
Source Code Available: $25,000
Purchase Terms: Purchase (license)
Price: $25,000
[illegible]
Date First Installed: December 1982
(See Vendor Profile Page V-27)

COMPUTER TALK, INC.
INTERACTIVE WIRE WRAP SYSTEM
Specific Application: Allows Rapid Input, Checking and Wire Wrap Interconnection of [illegible]
Specific Industry: Engineering
System Requirements: Computer Talk 400: TOS
Memory Required: 3.0K bytes
Source Language: Tas
[illegible]
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: October 1973
(See Vendor Profile Page V-27)

COMPUTER TALK, INC.
INTERACTIVE GRAPHIC DESIGN & STENCIL
Additional Product Classification: Graphics
Specific Application: Designs, Cuts Stencils, and Graphic Materials
System Requirements: Computer Talk 400· TOS
Source Language: Tas
[illegible]
Purchase Terms: Purchase (license)
[illegible]
Date First Installed: May 1972

COMPUTER TECHNOLOGY INC.
MCS II
Specific Application: Manufacturing System
Specific Industry: Manufacturing
System Requirements: Wang VS: VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible]
Number Installed to Date: 45
Date First Installed: February 1982
(See Vendor Profile Page V-27)

COMTEC, INC.
MCS-MANUFACTURING
Additional Product Classification: DBMS
Specific Application: Manufacturing Control
Specific Industry: Manufacturing
System Requirements: Honeywell Level 6 Ultimate: Pick, Prime Information, Pick, DEC LSI-II: Pick; Microdata Reality: Pick
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 4
Date First Installed: January 1981
(See Vendor Profile Page V-29)

CONDOR CORP.
COLT 80 TYPESETTING SYSTEM
Specific Application: Typesetting System
Specific Industry: Printing
System Requirements: Honeywell DPS 6 Size 400
Memory Required: 256.0K bytes
Source Language: Cobol
[illegible]
Purchase Terms: Purchase (license); Lease
Price: $25,000
Number Installed to Date: 50
Date First Installed: 1968
(See Vendor Profile Page V-29)

CONSTRUCTION INFORMATION SYSTEM
CONSTRUCT
Additional Product Classification: Accounting
Specific Application: Project Management Scheduling, Inventory, Job Cost, General Accounting
System Requirements: IBM: OS; Prime: Primos, Altos· Unix
Source Language: Basic
[illegible]
Purchase Terms: Purchase (license)
[illegible]
Date First Installed: January 1978
(See Vendor Profile Page V-30)

COOPERS & LYBRAND
INVENTORY
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
[illegible]
370 DOS/OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible]
(See Vendor Profile Page V-31)

CORRUGATED SERVICES CORP.
ASC - MI
Specific Application: Manufacturing
Specific Industry: Manufacturing
System Requirements: Wang 2200; Wang VS
Memory Required: 32.0K bytes
Source Language: Basic, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
[illegible]
Number Installed to Date: 15
[illegible]
(See Vendor Profile Page V-31)

CORRUGATED SERVICES CORP.
FC - 1000
Specific Application: Comprehensive Folding Carton Manufacturing
Specific Industry: Manufacturing
System Requirements: Wang 2200; Wang VS
Memory Required: 32.0K bytes
Source Language: Basic, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $25,000
Number Installed to Date: 15
Date First Installed: April 1981

CORRUGATED SERVICES CORP.
INFLOOR
Specific Industry: Manufacturing, Corrugated Box
System Requirements: Wang 2200; Wang VS
Memory Required: 32.0K bytes
Source Language: Basic, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $25,000
Number Installed to Date: 15
Date First Installed: April 1981

CORTEX CORP.
CORTEX APPLICATION FACTORY
Specific Application: Application Generator
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: DMS
Memory Required: 2.0M bytes
Source Language: Proprietary
[illegible]
Purchase Terms: Purchase (license); Rental
Price: $15,000
[illegible]
Date First Installed: September 1983
(See Vendor Profile Page V-31)

CORTEX CORP.
THE CORTEX APPLICATION BUILDER
Additional Product Classification: Management Information System
Specific Industry: Not Industry Sensitive, Legal
System Requirements: DEC PDP-11· RSX-11M, DEC VAX· DMS
Source Language: Proprietary
[illegible]
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 75
Date First Installed: 1976

CPSI
INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Altos 580: Unix, NCR 9050· Xenix, Columbia MPC, Imos, IBM PC-XT, CP/M 86
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 60
Date First Installed: September 1979
(See Vendor Profile Page V-31)

CROSSRO, INC.
VENDING MACHINE
Specific Application: Inventory and Route Control
System Requirements: DG: R-DOS, MOS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000 to $20,000
Number Installed to Date: 5
[illegible]
(See Vendor Profile Page V-32)

CULLINET SOFTWARE, INC.
CULLINET MANUFACTURING SYSTEM (CMS)
Specific Application: Planning, Production, Operating Control
Specific Industry: Manufacturing
System Requirements: IBM 360, 370, 3000 Series
Source Language: ADS/On-Line
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $80,000
Number Installed to Date: 12
Date First Installed: 1982
(See Vendor Profile Page V-33)

CULVERIN CORP.
GAGING
Specific Application: Production Quality Control
Specific Industry: Manufacturing
System Requirements: DEC PDP-11 RSX, VMS
Memory Required: 1.0K bytes
Source Language: Fortran, Macro
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: April 1983
(See Vendor Profile Page V-33)

CULVERIN CORP.
PMS
Specific Application: Real-Time Production Control
Specific Industry: Manufacturing
System Requirements: DEC PDP-11: RSX, DEC VAX: VMS
Memory Required: 1.0K bytes
Source Language: Fortran, Macro
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: March 1982

CUSTOMATION, INC.
CLASS (COMPUTERIZED LOGISTICS AND SERVICES)
Specific Application: Discrete Inventory Control, Call Avoidance, Tallied-Base Tracking and Billing System
Specific Industry: Manufacturing
System Requirements: Datapoint: DOS, RMS
Memory Required: 64.0K bytes
Source Language: Databus, Datashare
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Date First Installed: July 1982
(See Vendor Profile Page V-33)

CUSTOM COMPUTING, INC.
INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS, RMS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $695 to $9,950
Number Installed to Date: 200
Date First Installed: 1976
(See Vendor Profile Page V-33)

DAKOTA PROGRAMS OF BISMARCK
WHOLESALE/DISTRIBUTION
Specific Application: Inventory, General Distribution, Accounts Receivable
Specific Industry: Wholesale/Distribution
System Requirements: NCR 8200: Imos, NCR 9020: Imos III, NCR 9040, 9050: Imos V, NCR 9300: IRX
Memory Required: 16.0K bytes
Source Language: Ansi Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-33)

DALT & WOLCOTT, INC.
MATERIAL AVAILABILITY SHORTAGE SYSTEM
Specific Application: Helps Managers Increase Coordination Between Raw Material,Supplies and Manufacturing Requirements
Specific Industry: Manufacturing
System Requirements: IBM System/34, System/36
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 15
Date First Installed: January 1982
(See Vendor Profile Page V-34)

DATA AMLAS, LTD.
FEASE SERIES SOFTWARE
Specific Application: Accounts Receivable, Purchase Order, General Ledger, Payroll, Inventory
Specific Industry: Education
System Requirements: DEC TURBO-DOS; IBM PC: PC-DOS: CP/M
Memory Required: 64.0K bytes
Source Language: MS Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $4,000
Number Installed to Date: 50
Date First Installed: September 1981
(See Vendor Profile Page V-34)

DATA ASSOCIATES, INC.
INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE 4
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 1
Date First Installed: January 1981
(See Vendor Profile Page V-35)

DATA DEVELOPMENT, INC.
EDS ACCOUNTING MANUFACTURING SYSTEM
Specific Application: General Accounting Package
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: DG: DOS, R-DOS
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: September 1975
(See Vendor Profile Page V-36)

DATAFORMATION, INC.
CONSTRUCTION MANAGEMENT SYSTEM
Additional Product Classification: Accounting
Specific Application: Inventory Control, Invoicing, Purchase Orders, Accounting, Back Order
System Requirements: IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 1
Date First Installed: October 1981
(See Vendor Profile Page V-36)

DATA-MAX
FOOD MANUFACTURING/DISTRIBUTION SYSTEM
Additional Product Classification: Accounting, Payroll/Personnel
Specific Application: Sales Orders, Inventory, Shipping, Accounting, Manufacturing, Distribution
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Wang VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: June 1985
(See Vendor Profile Page V-37)

DATA SYSTEMS FOR INDUSTRY
QED/3000 MANUFACTURING MANAGEMENT SYSTEM
Specific Application: Sales Order, Materials, Production, Cost and Financial Management
Specific Industry: Manufacturing
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: September 1978
(See Vendor Profile Page V-38)

DATA SYSTEMS OF BATON ROUGE
THE BIG INVENTORY CONTROL SYSTEM
Specific Application: Inventory Control
Specific Industry: Wholesale/Distribution
System Requirements: DG: DOS, R-DOS, AOS
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,850
(See Vendor Profile Page V-38)

DATA SYSTEMS OF BATON ROUGE
THE BIG MANUFACTURING PLANNING
Specific Application: Inventory Control, Order Entry
Specific Industry: Manufacturing
System Requirements: DG: AOS, AOS/VS
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,800

DATA 3 SYSTEMS, INC.
MRP II 34/36
Specific Application: MRP II
Specific Industry: Manufacturing
System Requirements: IBM System/36, System/36, System/34
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $70,000 to $90,000
Number Installed to Date: 57
Date First Installed: March 1980
(See Vendor Profile Page V-39)

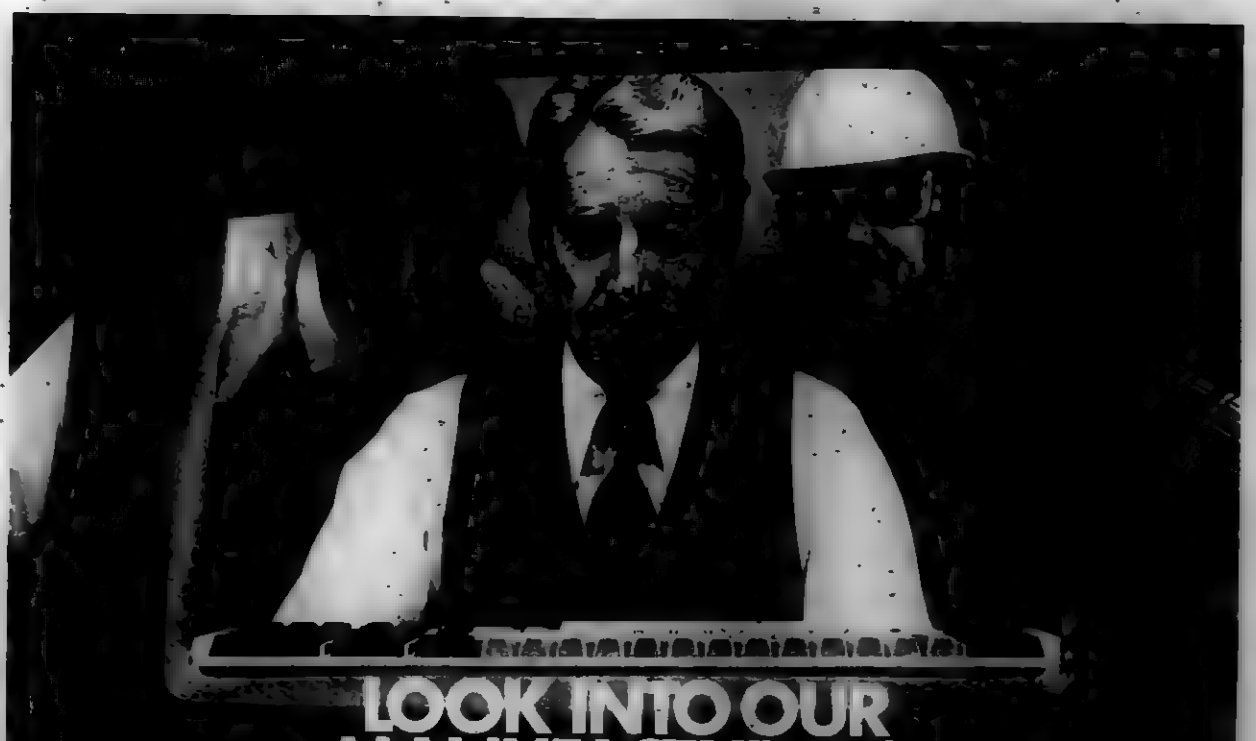
DATATRAC CORP.
DATATRAC MANUFACTURING PRODUCTION CONTROL SYSTEM
Specific Application: MRP Package
Specific Industry: Manufacturing
System Requirements: DEC PDP-11: TSX +
Memory Required: 128.0K bytes
Source Language: Dibol, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $1,000
Number Installed to Date: 3
Date First Installed: January 1983
(See Vendor Profile Page V-39)

DATAVISION
MANUFACTURING SYSTEM
Specific Industry: Manufacturing
System Requirements: DEC
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1975
(See Vendor Profile Page V-39)

DATAVISION
ORDER ENTRY CONTROL
Specific Application: Order Entry Control
Specific Industry: Not Industry Sensitive
System Requirements: DEC
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1975

DATAX, INC.
MANUFACTURING CONTROLS SYSTEM
Specific Application: Manufacturing
Specific Industry: Engineering, Food, Consumer
System Requirements: IBM System 3/15D: DOS; IBM System/34; IBM System/36, IBM System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Date First Installed: 1978
(See Vendor Profile Page V-39)

DATUM CONSULTANTS, INC.
MANUFACTURING CONTROL SYSTEM (MCS) Version 4
Specific Application: Bill of Material, Inventory Control, On Order, Cost Control, Routing, Work-in-Process Requirements, Capacity Planning, Input, Output
Specific Industry: Manufacturing



LOOK INTO OUR MANUFACTURING CONTROL SOFTWARE.

YOU WILL FIND OVER 700 INSTALLATIONS ALREADY BENEFITING FROM IT.

Benefiting through reduced inventory costs, increased productivity and improved customer service.

MAS-Manufacturing, the closed loop Manufacturing Resource Planning System from Martin Marietta Data Systems, has been delivering key benefits like this to hundreds of companies around the world for over a decade.

YOU WILL FIND A FLEXIBLE SOFTWARE SYSTEM AND HARDWARE INDEPENDENCE.

MAS-Manufacturing is the fully integrated on-line Manufacturing Control System with the built-in flexibility to be used in a wide variety of manufacturing companies—both large and small. And since our system is made up of integrated modules, your company can implement them as your business or budget dictates. Without the overhead of installing functions not required.

MAS-Manufacturing delivers results by synchronizing the six most critical elements of your company's manufacturing operation:

- ☐ Master Production Scheduling
- ☐ Inventory Control
- ☐ Manufacturing or Shop Floor Control
- ☐ Purchasing
- ☐ Cost Control
- ☐ Engineering Control

And we're flexible when it comes to providing you with the hardware option that meets your requirements. MAS-Manufacturing operates on *a wide variety of computer systems* from IBM mainframes and 4300 series computers (including the 4321/SSX) to Hewlett-Packard 3000's and DEC VAX minicomputers. For use on your machine or we'll supply the hardware too.

You can even use MAS through our Remote Computing Service, avoiding any hardware investment or commitment. And, because of the hardware versatility of MAS-Manufacturing, the system can easily be brought in-house in the future.

MARTIN MARIETTA

YOU WILL FIND UNBEATABLE SUPPORT, TRAINING, AND DOCUMENTATION.

As with every Martin Marietta product, you and your company can rely on us for full support. Our manufacturing and data processing specialists are always ready to assist you throughout each step of the planning, installation and implementation.

You will also find us ready to address your needs for software customization and user training. We can provide you with full maintenance services—including a special Customer Service Hotline.

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YOU WILL DISCOVER A GROWING MAS FAMILY OF PRODUCTS.

We recognize that there is more to a manufacturing company than manufacturing control. To meet your company's complete needs, we offer a growing family of MAS products including:

- ☐ MAS-Manufacturing
- ☐ MAS-Personnel
- ☐ MAS-Payroll
- ☐ MAS-Project Management
- ☐ MAS-Decision Support

Not to mention the 100-plus software packages offered on our remote computing services network.

We plan to continue our efforts as your total information services company by adding even more quality products to our growing MAS family.

YOU WILL REALIZE THAT RESULTS ARE ONLY A COUPON AWAY.

Whatever your manufacturing control or information services requirements, we have a system which can give you tangible, bottom line benefits. Fill out the coupon and mail it—we'll send you complete details on how Martin Marietta Data Systems products can start paying off for your company right away. Or, better yet, call us toll-free at (800) 638-7080. In Maryland, (800) 492-7170.

I'D LIKE A CLOSER LOOK.

Send me more information on MAS-Manufacturing software. Also include details on:

☐ MAS-Personnel ☐ MAS-Project Management
☐ MAS-Payroll ☐ MAS-Decision Support

Name

Title

Company

Address

City State

Zip Phone

MARTIN MARIETTA DATA SYSTEMS ©
Marketing Services, CW-P
6303 Ivy Lane
Greenbelt, Maryland 20770

System Requirements: Microdata Sequel: Reality, Microdata Reality: Reality; Honeywell Ultimate: Pick, IBM Series/1: Pick
Memory Required: 32.0K bytes
Source Language: RPL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $10
Number Installed to Date: 75
Date First Installed: June 1978
(See Vendor Profile Page V-39)

DAVID COOK ASSOCIATES
PHAX
Additional Product Classification: Accounting, DBMS, Report Generator
Specific Application: Production History Activities
Specific Industry: Oil and Gas
System Requirements: DEC VAX: RSTS/E, DEC 20
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-39)

DEALERS MANAGEMENT SERVICES
INVENTORY
Specific Application: Inventory
Specific Industry: Energy
System Requirements: Wang VS: VS, Wang PC: VS; Wang 2200: VS
Memory Required: 32.0K bytes
Source Language: Basic II, Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 40
Date First Installed: September 1981
(See Vendor Profile Page V-40)

DEBUGGK COMPUTER SERVICES,INC.
PRO III DMS (WHOLESALE SOFTWARE)
Additional Product Classification: Distribution
Specific Application: Comprehensive, Integrated, Distribution Software
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Prime: IBM Series/1, 4300: Pick; Honeywell: Ultimate, Microdata: Reality
Memory Required: 256.0K bytes
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: December 1978
(See Vendor Profile Page V-40)

DECISION SYSTEMS, INC.
INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 250
Date First Installed: 1983

DECISION SYSTEMS, INC.
SALES ORDER AND PURCHASING
Specific Application: Sales Order and Purchasing
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 250
Date First Installed: 1983

DENNEN COMPUTER SYSTEMS, INC.
MANUFACTURING
Specific Application: Bill of Materials, Manufacturing Order Entry, Planning, Component Usage
Specific Industry: Manufacturing
System Requirements: IBM 4300: DOS, Univac: OS
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: November 1982
(See Vendor Profile Page V-41)

DESIGN DATA SYSTEMS CORP.
CCC-TEK
Specific Application: Produces Numerically Controlled Tapes to Run Numerically Controlled Blades
System Requirements: HP 9836C; HP 9845C
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $9,500
Number Installed to Date: 3
Date First Installed: October 1982
(See Vendor Profile Page V-41)

DICKERMAN ASSOCIATES, INC.
MANUFACTURERS ACCOUNTING AND CONTROL SYSTEM
Additional Product Classification: Accounting
Specific Application: MRP, Inventory Control, General Accounting; Cost Accounting
Specific Industry: Manufacturing
System Requirements: Wang 2200: Wang
Memory Required: 64.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
(See Vendor Profile Page V-41)

DIGITAL EQUIPMENT CORP.
FDCM (FACTORY DATA COLLECTION AND MANAGEMENT)
Specific Application: Shop Floor Control, Inventory Control, Labor Scheduling, Data Collection
Specific Industry: Manufacturing
System Requirements: DEC PDP-11: RSX
Purchase Terms: Purchase (license)
Price: $42,000
(See Vendor Profile Page V-42)

ENTECH ENGINEERING, INC.
ORDER PROCESSING AND INVENTORY CONTROL SYSTEM
Specific Application: Order Processing and Inventory Control
Specific Industry: Manufacturing, Wholesale/Distribution, Retail
System Requirements: Datapoint 1560: DOS/Datashare, Datapoint 4630: DOS/Datashare
Memory Required: 96.0K bytes
Source Language: Databus
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: June 1982
(See Vendor Profile Page V-46)

ENTECH ENGINEERING, INC.
SHOP BILLING AND WEIGHT EXTENSION SYSTEM
Additional Product Classification: Accounting
Specific Application: Extension and Sorting of Structural Steel Material, Inventory and Order Processing Control
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Construction, Steel Fabricators
System Requirements: Datapoint 1560: DOS/Datashare, Datapoint 4630: DOS/Datashare
Memory Required: 96.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: June 1981

ERNST & WHINNEY
THE PLANNER SYSTEM FOR STATISTICS
Specific Application: Statistical Forecasting for Marketing and Production Planning
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM System/38: CPF; IBM System/34: SSP, IBM System/36: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II, RPG-III, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500 to $10,000
Date First Installed: June 1981
(See Vendor Profile Page V-47)

EXCALIBUR DATA SYSTEMS, INC.
INTEGRATED MANUFACTURING CONTROL SYSTEM
Specific Application: Raw Materials to Finished Products, Sales Analysis and Forecast
Specific Industry: Manufacturing
System Requirements: IBM System/34, System/36: SSP
Memory Required: 64.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: September 1980
(See Vendor Profile Page V-47)

THE FASBE GROUP
INVENTORY
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DEC 10: Tops 10; DEC 20: Tops 20
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 40
Date First Installed: February 1979
(See Vendor Profile Page V-00)

FOCUS SYSTEMS MANAGEMENT GROUP, INC.
MANAGEMENT SYSTEM
Specific Application: Inventory Management, Forecasting, Purchasing
Specific Industry: Manufacturing
System Requirements: Honeywell DPS6: Cisco
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Date First Installed: September 1977
(See Vendor Profile Page V-48)

FOCO COMPUTER SYSTEMS, INC.
FOCO WHOLESALE DISTRIBUTOR
Additional Product Classification: Accounting, Payroll/Personnel
Specific Application: Integrated Food Wholesale Distribution, Purchasing Reports
Specific Industry: Wholesale/Distribution
System Requirements: DEC-PDP-11: RSTS/E, CTS 300; IBM System/34, IBM System/36
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $20,100
Number Installed to Date: 60
Date First Installed: 1980
(See Vendor Profile Page V-49)

FORMATION, INC.
FORMAN
Specific Application: Third Generation MRP II System
Specific Industry: Manufacturing
System Requirements: IBM 370: VM, IBM 4300: VM, Formation F4000: VM
Memory Required: 1.0M bytes
Source Language: BPL (PL1)
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $45,000 to $100,000
Number Installed to Date: 8
Date First Installed: 1981
(See Vendor Profile Page V-49)

GARFIELD GROUP & [illegible]
[illegible], INC.
COMPREHENSIVE BUSINESS ACCOUNTING SYSTEM
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Payroll, Job Cost, Inventory, Billing
Specific Industry: Manufacturing, Wholesale/Distribution, Transportation
System Requirements: IBM 5110/5120: Basic; IBM System/23: Basic, IBM System/36
Memory Required: 32.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: September 1979
(See Vendor Profile Page V-50)

GBI DATA SYSTEMS
TRACDOWN-PROJECT TRACKING & PRODUCTVTY REPORT
Specific Application: Order/Job Entry, Project Tracking, Productivity Reporting, Pricing, Billing and General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $5,000
Date First Installed: May 1983
(See Vendor Profile Page V-50)

GENERAL ELECTRIC
CASPA
Specific Application: Numerical Control Machine Tape for Sculpture Surfaces
Specific Industry: Manufacturing
System Requirements: DEC VAX: VMS; IBM: MVS
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-51)

GENERAL ELECTRIC
IPS
Specific Application: Integrated Planning, MRP, Order Entry and Master Scheduling
Specific Industry: Manufacturing
System Requirements: DEC VAX: VMS
Memory Required: 2.0M bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1983

GENERAL ELECTRIC
MCMM
Specific Application: Center and Cell Shop Floor Control
Specific Industry: Manufacturing,
System Requirements: Honeywell 6: Gcos, DEC VAX-11: VMS
Memory Required: 250.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1982

GENERAL ELECTRIC
INFORMATION
MMS MPG
Specific Application: Manufacturing
Specific Industry: Manufacturing
System Requirements: IBM 4341: MVS, CMS: VM, GEISCO Remote Computer
Memory Required: 2.0M bytes
Source Language: Mms
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-51)

GIZZLIMBER ASSOCIATES, INC.
AUTOMOTIVE SUPPLIER MANUFACTURING SYSTEM
Specific Application: Repetitive Manufacturing From Customer Communications Thru MRP, Inventory and Shipping
Specific Industry: Manufacturing
System Requirements: TI Business System 300: DX-10
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: April 1983
(See Vendor Profile Page V-51)

GILMORE RESEARCH, INC.
MANUFACTURING MANAGEMENT SYSTEM
Additional Product Classification: Accounting
Specific Application: General Accounting and Manufacturing Applications
Specific Industry: Manufacturing
System Requirements: Wang 2200: VS; Wang VS
Memory Required: 30.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $13,000 to $35,000
Number Installed to Date: 146
Date First Installed: November 1976
(See Vendor Profile Page V-51)

GMD SYSTEMS INTERNATIONAL, INC.
CUSTOMER ORDER SERVICING
Additional Product Classification: Distribution
Specific Application: Order Entry Invoicing and Order Control
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM System/34, IBM System/38
Memory Required: 64.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,500
(See Vendor Profile Page V-52)

GMD SYSTEMS INTERNATIONAL, INC.
MAPICS ENCHANCEMENTS
Additional Product Classification: Accounting
Specific Application: Enhancements to Various Applications of IBM Mapics
Specific Industry: Manufacturing, Engineering
System Requirements: IBM System/34; IBM System/38
Source Language: RRG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)

GMD SYSTEMS INTERNATIONAL, INC.
PROCESS INDUSTRY ENCHANCEMENTS FOR MAPIC
Additional Product Classification: Accounting
Specific Application: Bills/Materials of Formulas, Costing, Inventory, MRP
Specific Industry: Manufacturing, Process
System Requirements: IBM System/34; IBM System/38
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,800
Number Installed to Date: 88
Date First Installed: September 1982

GMD SYSTEMS INTERNATIONAL, INC.
PURCHASE ORDER RELEASE & CONTROL
Specific Application: Purchasing and Procurement Materials Control for Mapics
Specific Industry: Manufacturing
System Requirements: IBM System/34, IBM System/38
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,800
Number Installed to Date: 58
Date First Installed: September 1982

GMD SYSTEMS INTERNATIONAL, INC.
STOCK LOCATION & LOT MANAGEMENT FOR MAPIC
Additional Product Classification: Accounting
Specific Application: Batch Lot Control and Location Management
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM System/34; IBM System/38
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 50
Date First Installed: September 1981

GMP SYSTEMS, INC.
MAN-FACT II
Specific Application: Does Manufacturing and Financial Processes
Specific Industry: Wholesale/Distribution, Banking/Financial
System Requirements: Prime: Primos
Memory Required: 1.0M bytes
Source Language: Ell, Info Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $30,000 to $125,000
Number Installed to Date: 85
Date First Installed: 1978
(See Vendor Profile Page V-52)

GOOSE [illegible] SYSTEMS, INC.
MANUFACTURING
Specific Application: Order Entry and Bill of Material
Specific Industry: Not Industry Sensitive
System Requirements: Quantal: Basic
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1977
(See Vendor Profile Page V-52)

GRAFTEK, INC.
NUMERICAL CONTROL
Specific Application: Creates Numerically Controlled Tool Paths
Specific Industry: Engineering
System Requirements: Gould Concept 32: MPX
Memory Required: 1.0M bytes
Source Language: Fortran, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-52)

GRW SYSTEMS, INC.
TRACK II - PCB JOB TRACKING
Specific Application: Printed Circuit Board Job Tracking
Specific Industry: Manufacturing
System Requirements: BTI 8000: Wang: BTI 8000: Multus
Memory Required: 6.4M bytes
Source Language: Extended Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: October 1979
(See Vendor Profile Page V-52)

HAVERLY SYSTEMS, INC.
FINANCIAL MODELING
Additional Product Classification: Banking, Report Generator, Compilers, Assemblers
Specific Application: Financial Modeling Operations of Blending Distribution
Specific Industry: Manufacturing, Engineering, Retail, Education, Government, Transportation, Scientific
System Requirements: IBM 370, 4300, 3000: OS, DOS, MVS, C; Sperry 1100: Fmps; Prime; DG Eclipse: AOS
Memory Required: 256.0K bytes
Source Language: BAL, Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $30,000
Number Installed to Date: 200
Date First Installed: February 1977
(See Vendor Profile Page V-53)

H. S. SOFTWARE & CO., INC.
MOST
Specific Application: Work Measurement and Standards Setting
Specific Industry: Manufacturing
System Requirements: DEC PDP-11: RSTS/E, DEC VAX: VMS
Memory Required: 28.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 40
Date First Installed: January 1978
(See Vendor Profile Page V-53)

HEURISTIC DATA SYSTEMS, INC.
IMPACT
Additional Product Classification: Accounting
Specific Application: Management Production and Accounting System
Specific Industry: Manufacturing
System Requirements: PT Sort
9E: OS/32
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50,000
Number Installed to Date: 1
Date First Installed: January 1983
(See Vendor Profile Page V-54)

HOLSUM AND ASSOCIATES
CRITICAL PATH SCHEDULING
Specific Application: Allows the User to Control Large Numbers of

Activities Associated With Complicated Projects
Specific Industry: Manufacturing
System Requirements: Wang 2200
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: 1982
(See Vendor Profile Page V-55)

HOLLANDER ASSOCIATES
TOPS/SCHEDULE
Additional Product Classification: System Resource Management
Specific Application: Project Control/Scheduling
Specific Industry: Manufacturing, Engineering, Construction
Memory Required: 100.0K bytes
Source Language: Fortran IV
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $40,000
(See Vendor Profile Page V-55)

HONEYWELL, INC.
HMS CAPACITY REQUIREMENTS PLANNING
Specific Application: Provides Capacity Requirements Planning and Shop FLoor, Control Work Center Loading, Shop Order Priority Sequencing and Maintenance
Specific Industry: Manufacturing
System Requirements: Honeywell DPS: Gcos 8
Purchase Terms: Purchase (license)
Price: $23,000
(See Vendor Profile Page V-55)

HONEYWELL, INC.
HMS MANUFACTURING DATA CONTROL
Specific Application: Establishes and Maintains Product Structures and Production Process Definitions
Specific Industry: Manufacturing
System Requirements: Honeywell DPS: Gcos 8
Purchase Terms: Purchase (license)
Price: $28,750

HONEYWELL, INC.
HMS MASTER PRODUCTION SCHEDULING
Specific Application: Establish A Master Schedule That Determines Production Range and Material Required to Meet Business Objectives
Specific Industry: Manufacturing
System Requirements: Honeywell DPS: Gcos 8
Purchase Terms: Purchase (license)
Price: $23,000

HONEYWELL, INC.
HMS MATERIAL REQUIREMENTS PLANNING
Specific Application: Provides Material Requirements Planning of Component Material Items
Specific Industry: Manufacturing
System Requirements: Honeywell DPS: Gcos 8
Purchase Terms: Purchase (license)
Price: $23,000

HOUSTON ENGINEERING RESEARCH CORP.
AUTOMATED PRODUCTION REPORTING SYSTEM
Specific Application: Finishing and Shipping System for Paper Mill
Specific Industry: Papermill
System Requirements: DEC PDP-11 RSX
Memory Required: 128.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000 to $50,000
Number Installed to Date: 15
Date First Installed: 1974
(See Vendor Profile Page V-55)

IDEAL SYSTEMS, INC.
WORK ORDERS
Specific Application: Work Orders
Specific Industry: Rural Electric Companies
System Requirements: Burroughs B90, B900 CMS, Burroughs B1900
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: November 1982
(See Vendor Profile Page V-56)

IIT RESEARCH INSTITUTE
CALB (COMPUTER AIDED ASSEMBLY LINE BALANCE)
Specific Application: Distributes Work Evenly on Assembly Lines
Specific Industry: Manufacturing
Memory Required: 200.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 50
Date First Installed: 1969
(See Vendor Profile Page V-56)

IIT RESEARCH INSTITUTE
SIMULATION PACKAGE
Specific Application: Includes A Geoeral Assembly Line Simulator, Manufacturing Simulator and Flexible Integrated Simulator
Specific Industry: Manufacturing
Memory Required: 200.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 40
Date First Installed: 1971

INDUSTRIAL NETWORK SYSTEMS
ELECTRONICS MRO PURCHASING
SPECIFIC INDUSTRY: Manufacturing, Medical
System Requirements: DEC PDP-11/70: RSTS/E
Source Language: Dibol, Basic
Number Installed to Date: 180
Date First Installed: 1980
(See Vendor Profile Page V-57)

INFORMATICS GENERAL CORP.
PRODUCTION IV
Specific Application: Closed Loop MRP System
Specific Industry: Manufacturing
System Requirements: IBM 360/370: DOS/VSE, IBM 4300 Series: OS/VS2(SVS), IBM 330 Series: OS/VS2 (MVS)
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $129,000
Number Installed to Date: 50
Date First Installed: June 1974
(See Vendor Profile Page V-57)

INFORMATION MANAGEMENT CONSULTANTS, INC.
INVENTORY CONTROL SYSTEM
Specific Application: Maintains and Tracks Inventory Items
Specific Industry: Manufacturing
System Requirements: Wang VS: Vsos
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-57)

INFORMATION MANAGEMENT SOFTWARE SPECIALISTS, INC.
DISTRIBUTION SOLUTIONS
Specific Application: Order Management, Price Promotion, Warehouse Pooling
System Requirements: IBM 4300 Series: OS, DOS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $83,900
Number Installed to Date: 20
Date First Installed: 1981
(See Vendor Profile Page V-57)

INFORMATION PROCESSING ARCHITECTS
RCC SYSTEMS, RADIO COMMON CARRIER SYSTEM
Specific Application: Includes Pager Inventory Control, Mobile Pager, General Repayment Charge Billing
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200 Series
Memory Required: 64.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-58)

INFO-TRONIC SYSTEMS, INC.
TIN MAN
Specific Application: Inventory Management
System Requirements: HP 3000: MPE
Memory Required: 768.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 12
Date First Installed: 1981
(See Vendor Profile Page V-59)

INTEGRATED MATERIAL CONTROL, INC.
MANUFACTURING MATERIAL TRACKING SYSTEM
Specific Application: Provides Work in Process Tracking on A Real-Time Basis
Specific Industry: Manufacturing
System Requirements: DG: RTE A.1, HP: DOS, Micros: PC-DOS
Memory Required: 128.0K bytes
Source Language: Fortran 77, C
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-60)

INTERACTIVE COMPUTER SYSTEMS, INC.
MANUFACTURING WORK ORDER SYSTEM
Additional Product Classification: Accounting
Specific Application: Manufacturing, Job Costing
Specific Industry: Manufacturing
System Requirements: TI: DX-10; IBM: PC-DOS; Apple: CP/M; Onyx: Oasis
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 26
Date First Installed: 1981
(See Vendor Profile Page V-60)

INTERACTIVE INFORMATION SYSTEMS, INC.
IMCS (INTERACTIVE MANAGEMENT CONTROL SYSTEM)
Specific Application: Manufacturing Solutions
Specific Industry: Manufacturing
System Requirements: DEC PDP-11 VMS, DEC VAX RSTS
Source Language: Native Basic, Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 60
Date First Installed: 1977
(See Vendor Profile Page V-60)

INTERACTIVE MANAGEMENT SYSTEMS, INC.
CAPACITY REQUIREMENTS PLANNING
Specific Application: Capacity Planning
Specific Industry: Not Industry Sensitive, Manufacturing
System Requirements: DEC PDP-11, RSTS/E, DEC VAX VMS
Source Language: Basic, Basic Plus II
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1974

INTERACTIVE MANAGEMENT SYSTEMS, INC.
MATERIALS REQUIREMENTS PLANNING
Specific Application: Materials Planning
Specific Industry: Manufacturing
System Requirements: DEC PDP-11 RSTS/E, DEC VAX VMS
Source Language: Basic, Basic Plus II
Purchase Terms: Purchase (license); Rental; Lease, Time-Sharing
Date First Installed: 1974

INTERNATIONAL PROGRAMMING LABORATORIES CORP.
JOB SHOP CONTROL SYSTEM
Specific Application: Job Costing for Job Shop Manufacturing
Specific Industry: Manufacturing
System Requirements: IBM System/23, System/34
Source Language: Basic, RPG

Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,500 to $11,000
Number Installed to Date: 150
Date First Installed: 1977
(See Vendor Profile Page V-61)

INTERNATIONAL PROGRAMMING LABORATORIES CORP.
MANUFACTURING RESOURCE PLANNING II
Specific Application: MRP
System Requirements: IBM System/34, System/36
Source Language: RPG-II, RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1980
(See Vendor Profile Page V-61)

INTERTEC
MAP/3000
Additional Product Classification: Accounting
Specific Application: Integrated Accounting and Manufacturing
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $57,000
Number Installed to Date: 80
Date First Installed: October 1979
(See Vendor Profile Page V-61)

INTRO-LOGIC, INC.
BACK TO BASICS
Specific Application: Manufacturing System
Specific Industry: Manufacturing
System Requirements: IBM System/34, System/36
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000 to $7,000
Number Installed to Date: 20
Date First Installed: 1981
(See Vendor Profile Page V-61)

INTRO-LOGIC, INC.
MANUFACTURING II (SYSTEMS 34/36)
Specific Application: Order Entry, Inventory Control, Purchasing, MRP, Shipping, Receiving
Specific Industry: Wholesale/Distribution, Retail
System Requirements: IBM System/34, IBM System/36
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000 to $25,000
Number Installed to Date: 2
Date First Installed: 1983

JACOBSEN & ASSOCIATES, INC.
CAPACITY REQUIREMENTS PLANNING
Specific Application: Capacity Requirements Planning
Specific Industry: Manufacturing
System Requirements: Data General Eclipse: AOS, AOS/VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
(See Vendor Profile Page V-62)

JACOBSEN & ASSOCIATES, INC.
NET MATERIAL STATUS
Specific Application: Physical Inventory Support (MRP)
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: DG Eclipse: AOS, AOS/VS
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 55
Date First Installed: September 1971

JACOBSEN & ASSOCIATES, INC.
OPERATION ROUTING SHEETS
Specific Application: Engineering Documentation, Configuration Control and Materials Resources Planning
Specific Industry: Manufacturing, Engineering
System Requirements: DG Eclipse: AOS, AOS/VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 55
Date First Installed: January 1983

JACOBSEN & ASSOCIATES, INC.
PRODUCT COST BUILDUP
Specific Application: Product Cost Buildup
Specific Industry: Manufacturing
System Requirements: DG Eclipse: AOS, AOS/VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 55
Date First Installed: January 1971

JACOBSEN & ASSOCIATES, INC.
SHOP FLOOR CONTROL
Specific Application: Shop Floor Control
Specific Industry: Manufacturing
System Requirements: DG Eclipse: AOS, AOS/VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1983

JACOBSEN & ASSOCIATES, INC.
SHOP LOADING
Specific Application: Shop Loading
Specific Industry: Manufacturing
System Requirements: DG Eclipse: AOS, AOS/VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1983

J. D. EDWARDS & CO.
JOB COST
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Lease
Price: $5,000 to $9,000
Number Installed to Date: 40
Date First Installed: 1980
(See Vendor Profile Page V-62)

JERVIS B. WEBB CO.
MICRO-AIM
Specific Application: A Stock Locator for Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: DEC
Memory Required: 128.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 3
Date First Installed: July 1982
(See Vendor Profile Page V-62)

KEILTRONIX
COLOR MATCHING AND CONTROL
Specific Application: Color Matching and Control
Specific Industry: Manufacturing
System Requirements: DEC: RSX-11M
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000 to $25,000
Number Installed to Date: 30
Date First Installed: 1980
(See Vendor Profile Page V-63)

KEILTRONIX
DRUG ROOM CONTROL LIQUIDS
Specific Application: Drug Room Control Liquids
Specific Industry: Manufacturing
System Requirements: DEC: RSX-11M
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000 to $25,000
Number Installed to Date: 10
Date First Installed: 1982

KEILTRONIX
DRUG ROOM CONTROL POWDERS
Specific Application: Drug Room Control Powders
Specific Industry: Manufacturing
System Requirements: DEC: RSX-11M
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000 to $25,000
Date First Installed: 1982

KEILTRONIX
DYE & CHEMICAL INVENTORY CONTROL
Specific Application: Dye and Chemical Inventory Control
Specific Industry: Manufacturing
System Requirements: DEC: RSX-11M
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000 to $25,000
Number Installed to Date: 30
Date First Installed: 1977

KEILTRONIX
DYE PROCESS MANAGEMENT
Specific Application: Total Dye House Control
Specific Industry: Manufacturing
System Requirements: DEC: RSX-11M
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000 to $25,000
Number Installed to Date: 50
Date First Installed: 1977

KEILTRONIX
ENERGY MANAGEMENT
Specific Application: Energy Management
Specific Industry: Manufacturing
System Requirements: DEC: RSX-11M
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000 to $25,000
Number Installed to Date: 5
Date First Installed: 1982

KENT COMPUTER CORP.
BUSINESS INVENTORY CONTROL SYSTEM
Specific Application: Inventory Control
Specific Industry: Retail
System Requirements: CP/M; Zenith Z100
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 5
Date First Installed: May 1983
(See Vendor Profile Page V-63)

KEYNOTE SYSTEMS, INC.
MANUFACTURING MANAGEMENT CONTROL SYSTEM
Specific Application: Engineering, Sales Order Processing, Inventory Planning, Working Process, Cost Control and Purchasing
Specific Industry: Manufacturing
System Requirements: DOS: Micro Data Reality: Pick, Micro Data Sequal: Pick, IBM: OS
Memory Required: 125.0K bytes
Source Language: Cobol, Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $31,500 to $40,000
Number Installed to Date: 5
Date First Installed: 1983
(See Vendor Profile Page V-64)

KEY SYSTEMS, INC.
PROFITKEY MANUFACTURING CONTROL SYSTEM
Specific Application: MRP
Specific Industry: Manufacturing
System Requirements: DEC PDP-11/23: RSX-11+; Televideo 806, 816: TURBO-DOS, IBM PC: CP/M 86, Micromation Mariner: MP/M

Memory Required: 56.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 111
Date First Installed: September 1980
(See Vendor Profile Page V-64)

LAH SYSTEMS, INC.
ON-LINE ORDER ENTRY AND INVENTORY CONTROL
Specific Application: Order Entry and Inventory Control
Specific Industry: Wholesale/Distribution
System Requirements: Burroughs B90, B900, B1900: CMS/MCP
Memory Required: 384.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $16,500
Number Installed to Date: 110
Date First Installed: 1975
(See Vendor Profile Page V-66)

LAH SYSTEMS, INC.
ON-LINE PURCHASE ORDERS
Specific Application: Purchasing
Specific Industry: Wholesale/Distribution
System Requirements: Burroughs B90, B900, B1900: CMS/MCP
Memory Required: 384.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: 1982

LIOCS CORP.
BILL OF MATERIAL
Specific Application: Bill of Material Module
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC PDP-11 Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
(See Vendor Profile Page V-66)

LIOCS CORP.
BILL OF MATERIAL
Specific Application: Bill of Material Module
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC VAX Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $5,000

LIOCS CORP.
INVENTORY CONTROL
Specific Application: Inventory Control Module
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC PDP-11 Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500

LIOCS CORP.
INVENTORY CONTROL
Specific Application: Inventory Control Module
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC VAX Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to-$5,000

LIOCS CORP.
ORDER ENTRY
Specific Application: Order Entry Module
Specific Industry: Manufacturing, Wholesale/Distribution, Business
System Requirements: DEC VAX Series
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000 to $13,000

LOGICAL DESIGN CORP.
BILL OF MATERIALS
Additional Product Classification: Accounting
Specific Application: Bill of Materials
Specific Industry: Manufacturing
System Requirements: Burroughs B90, B900, B1900: CMS/Native
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1979
(See Vendor Profile Page V-66)

LOGICAL DESIGN CORP.
CAPACITY REQUIREMENTS PLANNING
Specific Application: Production Control
Specific Industry: Manufacturing
System Requirements: Burroughs B90, B900, B900: CMS; Burroughs B1900: CMS/Native
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1979

LOGICAL DESIGN CORP.
INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive, Manufacturing
System Requirements: Burroughs B90, B900: CMS; Burroughs 1900: CMS/Native
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1979

LOGICAL DESIGN CORP.
LABOR EFFICIENCY
Specific Application: Production Control
Specific Industry: Manufacturing
System Requirements: Burroughs B90, B900: CMS; Burroughs B1900: CMS/Native
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1979

LOGICAL DESIGN CORP.
MANUFACTURING MANAGEMENT SYSTEM
Specific Application: Manufacturing Management
Specific Industry: Manufacturing
System Requirements: Burroughs B90, B900: CMS; Burroughs B1900: CMS Native
Memory Required: 384.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

LOGICAL DESIGN CORP.
MATERIAL REQUIREMENTS PLANNING
Specific Application: Production Schedule, Projects Raw Materials and Component Parts Needed
Specific Industry: Manufacturing
System Requirements: Burroughs B90, B900: CMS; Burroughs B1900: CMS/Native
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1979

LOGICAL DESIGN CORP.
PRODUCTION SCHEDULING
Specific Application: Finished Goods Production Requirements Reports
Specific Industry: Manufacturing
System Requirements: Burroughs B90, B900: CMS; Burroughs B1900: CMS/Native
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1979

LOGICAL DESIGN CORP.
RELEASE PROCESSING
Specific Application: Handles Blanket Purchase Orders to Manufacturer and Authorized Suppliers
Specific Industry: Manufacturing
System Requirements: Burroughs B90, B900; CMS; Burroughs B1900: CMS/Native
Memory Required: 384.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1979

LOGICAL DESIGN CORP.
SHIPPING
Specific Application: Maintains Customer and Vendor Shipments
Specific Industry: Manufacturing
System Requirements: Burroughs B90, B900: CMS; Burroughs B1900: CMS/Native
Memory Required: 1.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1979

LOGICAL DESIGN CORP.
WORK IN PROCESS
Specific Application: Maintains and Reports On the Job Progress
Specific Industry: Manufacturing
System Requirements: Burroughs B90, B900: CMS, Burroughs B1900: CMS/Native
Memory Required: 1.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1979

LOGICON, INC.
MAINTENANCE DISPATCH
Specific Application: Maintenance Dispatch
Specific Industry: Manufacturing
System Requirements: DEC PDP-11 Series: RSX-11M, RSX-11
Memory Required: 512.0K bytes
Source Language: Assembly, Macro, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000 to $20,000
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-67)

LOGICON, INC.
PLANNED MAINTENANCE
Specific Application: Planned Maintenance
Specific Industry: Manufacturing
System Requirements: DEC PDP-11 Series: RSX-11M, RSX-11
Memory Required: 512.0K bytes
Source Language: Assembly, Macro, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000 to $20,000
Number Installed to Date: 1
Date First Installed: 1983

LOGICON, INC.
PRODUCTION MONITORING
Specific Application: Production Monitoring
Specific Industry: Manufacturing
System Requirements: DEC PDP-11 Series: RSX-11M, RSX-11
Memory Required: 512.0K bytes
Source Language: Assembly, Macro, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000 to $20,000
Number Installed to Date: 9
Date First Installed: 1982

LOUIS A. WRIGHT & ASSOCIATES, INC.
AMPS
Additional Product Classification: Accounting, Payroll/Personnel
Specific Application: Purchase Order System, Release Accounting, Accounts Receivable, Accounts Payable, Inventory Control, Invoicing, Production Control, General Ledger, Payroll and Labor Reporting, Shipping Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34; IBM System/38
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000
Date First Installed: 1981
(See Vendor Profile Page V-67)

LOUIS A. WRIGHT & ASSOCIATES, INC.
INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34; IBM System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000
Number Installed to Date: 3
Date First Installed: 1981

LOUIS A. WRIGHT & ASSOCIATES, INC.
PRODUCTION CONTROL
Specific Application: Production Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000
Number Installed to Date: 3
Date First Installed: 1981

MADIC CORP.
MADIC CORPORATE INFORMATION SYSTEM
Specific Application: Manufacturing, MRP, Inventory, Cost Accounting, Marketing
Specific Industry: Manufacturing
System Requirements: Prime: Pick; ADDS, Honeywell
Source Language: Info Basic
Purchase Terms: Purchase (license); Lease
Price: $105,000
Number Installed to Date: 60
Date First Installed: September 1978
(See Vendor Profile Page V-67)

Additional information provided for by vendor

MADIC system modules include system, inventory, bill of material, configuration control, work-in-process, purchasing, accounts payable, quality assurance, marketing, accounts receivable, field service, MRP, capacity planning, cost accounting, payroll, general ledger, plant maintenance, project control, corporate planning and personnel.

MADISON DATA SYSTEMS, INC.
EXTENDED WORK ORDER STATUS
Specific Application: Extended Work Order Status
Specific Industry: Manufacturing
System Requirements: DG: AOS, AOS/VS, R-DOS, DOS
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 12
(See Vendor Profile Page V-67)

MADISON DATA SYSTEMS, INC.
MASTER PRODUCTION SCHEDULING MPS
Specific Application: Master Production Scheduling
Specific Industry: Manufacturing
System Requirements: DG: AOS, AOS/VS, R-DOS, DOS
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 12

MADISON DATA SYSTEMS, INC.
MRP
Specific Application: MRP
Specific Industry: Manufacturing
System Requirements: DG: AOS, AOS/VS, R-DOS, DOS
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 12

MADISON DATA SYSTEMS, INC.
PURCHASING
Specific Application: Purchasing
Specific Industry: Wholesale/Distribution
System Requirements: DG: AOS, AOS/VS, DOS, R-DOS
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 12

MADISON DATA SYSTEMS, INC.
ROUTING
Specific Application: Routing
Specific Industry: Manufacturing
System Requirements: DG: AOS, AOS/VS, R-DOS, DOS
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 12

MANAGEMENT COMPUTER SERVICE, INC.
EVENT REGISTRATION
Specific Application: Information About Displays, Prints Tickets and Badges, General Registration
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Source Language: Basic, Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-68)

MANAGEMENT COMPUTER SERVICE, INC.
EVENT REGISTRATION
Specific Application: Information About Displays, Prints Tickets and Badges, General Registration
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Source Language: Basic, Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-68)

MANAGEMENT COMPUTER SERVICE, INC.
SERVICE SYSTEM
Specific Application: Inventory Control, Tracks Time Out on Job
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Source Language: Basic, Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 3
Date First Installed: 1982

MANAGEMENT SCIENCE, INC.
UNICAM-DBMS (UNIVERSAL COMPUTER AIDED MANAGEMENT SYSTEM)
Additional Product Classification: DBMS
Specific Application: Work Measurement and Time Study
Specific Industry: Manufacturing, Engineering
System Requirements: TI
Memory Required: 256.0K bytes
Source Language: Cobol 74, Fortran 78
Source Code Available: No
Purchase Terms: Purchase (license); Lease
(See Vendor Profile Page V-68)

MANAGEMENT SCIENCE, INC.
UNIVATION SYSTEMS
Specific Industry: Manufacturing, Engineering
System Requirements: DG: OS, DOS; Burroughs B6700, B6800
Memory Required: 100.0K bytes
Source Language: Cobol 74, Fortran IV
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 200
Date First Installed: September 1968

MANAGEMENT SERVICES, INC.
MANUFACTURER'S REP SYSTEM
Specific Application: Manufacturer's Representatives
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/70: RSTS/E
Source Language: Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,200 to $1,500
Number Installed to Date: 500
(See Vendor Profile Page V-68)

MANAGEMENT SYSTEMS, INC.
ELECTRICAL DISTRIBUTOR
Specific Application: Electrical Distributor, Complete Billing
Specific Industry: Wholesale/Distribution
System Requirements: IBM 4300: Pick, IBM Series/1: Pick; IBM PC: Pick, DEC PDP-11/60: Pick
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500 to $50,000
Number Installed to Date: 30
(See Vendor Profile Page V-68)

MANAGEMENT SYSTEMS, INC.
FABRIC ASSEMBLY PACKAGE
Specific Application: Fabric Assembly Package
Specific Industry: Manufacturing
System Requirements: IBM 4300, PC, Series/1: Pick; DEC PDP-11/60: Pick
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500 to $50,000
Number Installed to Date: 30

MANAGEMENT SYSTEMS, INC.
FORMULA MANUFACTURING PACKAGE
Specific Application: Manufacturing Package for Flow Products, Food, Oil, Chemicals
Specific Industry: Manufacturing
System Requirements: IBM 4300, PC, Series/1: Pick; DEC PDP-11/60: Pick
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500 to $50,000
Number Installed to Date: 30

MANAGEMENT VISTAS, INC.
AUTOMOTIVE RELEASE CONTROL SYSTEM
Specific Application: Used By Auto Dealers to Receive Orders and Shipments
Specific Industry: Auto Dealer
System Requirements: IBM Series/1, 4300: Pick, DEC LSI-11: Pick; Micro Data Reality: Pick
Source Language: RPL
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 4
Date First Installed: April 1983
(See Vendor Profile Page V-68)

MANAGEMENT VISTAS, INC.
MANUFACTURE JOB QUOTATION SYSTEM
Additional Product Classification: Accounting
Specific Application: Manufacting Cost Estimates
Specific Industry: Manufacturing
System Requirements: IBM 4300, PC, Series/1: Pick, DEC LSI-11: Pick; Micro Data Reality: Pick
Source Language: RPL
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 3
Date First Installed: May 1983

MANAGEMENT VISTAS, INC.
PROJECT MANAGEMENT SYSTEM
Specific Application: Used to Schedule and Track Progress of Projects
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, IBM Series/2: Pick, DEC LSI-11: Pick, Micro Data Reality: Pick
Source Language: RPL
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 12
Date First Installed: February 1981

MANHATTAN SYSTEMS, INC.
ORDER PROCESSING
Specific Application: Order Processing, Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX-11/23: RT-11
Memory Required: 64.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 1
Date First Installed: September 1981
(See Vendor Profile Page V-68)

MANUFACTURING CONTROL SYSTEMS, INC.
INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $900 to $4,600
Number Installed to Date: 3
Date First Installed: January 1982
(See Vendor Profile Page V-69)

MANUFACTURING CONTROL SYSTEMS, INC.
PACS
Specific Application: Planning and Control System
Specific Industry: Manufacturing
System Requirements: Wang VS; IBM System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $47,000
Date First Installed: 1983

MANUFACTURING DATA SYSTEMS, INC.
COMPACT II SERIES 300
Specific Application: Programming for Numerically Controlled Machines
Specific Industry: Metal Working
System Requirements: DG Nova; OS/VS, DEC PDP-11; IBM: VM/CMS; OS/VS II
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000 to $80,000
Date First Installed: 1978
(See Vendor Profile Page V-68)

MANUFACTURING DATA SYSTEMS, INC.
COMPACT II SERIES 400
Specific Application: Apparel Programing Numerically Controlled Machines
Specific Industry: Metal
System Requirements: DEC PDP-11, IBM: VM/CMS; DG Nova, Eclipse: OS/VM: OS/VM2
Memory Required: 64.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $30,000 to $100,000
Date First Installed: June 1974

MANUFACTURING DATA SYSTEMS, INC.
NC GRAPHICS SERIES 400
Specific Application: Programming for Numerically Controlled Machine Tools
Specific Industry: Metal
System Requirements: IBM: VM/CMS; DG Nova, Eclipse: OS/VM; DEC PDP-11: OS/VM2
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50,000 to $120,000
Date First Installed: March 1982

MANUFACTURING SOLUTIONS & SYSTEMS, INC.
PURCHASING SYSTEM FORMAL
Specific Application: MRP
Specific Industry: Manufacturing
System Requirements: IBM System/34 DOS
Memory Required: 16.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 3
Date First Installed: April 1982
(See Vendor Profile Page V-69)

MANUFACTURING SYSTEMS, INC. OF MILWAUKEE
MRP PLUS
Additional Product Classification: Accounting
Specific Application: MRP, Accounting and Financial
Specific Industry: Manufacturing
System Requirements: Wang VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $48,000
Number Installed to Date: 3
Date First Installed: June 1981
(See Vendor Profile Page V-69)

MARTIN MARIETTA DATA SYSTEMS
MAS - COST CONTROL MODULE
Specific Application: Cost Control
Specific Industry: Manufacturing, Engineering, Government, Transportation, Scientific
System Requirements: IBM 3030 Series, 4300: DL/1; DEC VAX: VMS; HP 3000: MPE
Main Memory Required: 512.0K Bytes
Source Language: Cobol
Purchase Terms: Purchase (License)
Number Installed to Date: 750
Date First Installed: July 1972
(See Vendor Profile Page V-00)

MARTIN MARIETTA DATA SYSTEMS
MAS - MASTER PRODUCTION SCHEDULING
Specific Application: Master Production Scheduling
Specific Industry: Manufacturing, Engineering, Government, Transportation, Scientific
System Requirements: IBM 3030 Series, 4300: DL/1; DEC VAX: VMS; HP 3000: MPE
Main Memory Required: 512.0K Bytes
Source Language: Cobol
Purchase Terms: Purchase (License)
Number Installed to Date: 750
Date First Installed: July 1972

MARTIN MARIETTA DATA SYSTEMS
MAS - PURCHASING MODULE
Specific Application: Purchasing
Specific Industry: Manufacturing, Engineering, Government, Transportation, Scientific
System Requirements: IBM 3030 Series, 4300: DL/1; DEC VAX: VMS; HP 3000: MPE
Main Memory Required: 512.0K Bytes
Source Language: Cobol
Purchase Terms: Purchase (License)
Number Installed to Date: 750
Date First Installed: July 1972

MARTIN MARIETTA DATA SYSTEMS
MAS - SHOP FLOOR CONTROL MODULE
Specific Application: Shop Floor Control
Specific Industry: Manufacturing, Engineering, Government, Transportation, Scientific
System Requirements: IBM 3030 Series, 4300: DL/1; DEC VAX: VMS; HP 3000: MPE
Main Memory Required: 512.0K Bytes
Source Language: Cobol
Purchase Terms: Purchase (License)
Number Installed to Date: 750
Date First Installed: July 1972

MARTIN MARIETTA DATA SYSTEMS
MAS - MANUFACTURING CONTROL SYSTEM (INVENTORY CONTROL)
Specific Application: Inventory Control
Specific Industry: Manufacturing, Engineering, Government, Transportation, Scientific
System Requirements: IBM 3030 Series, 4300: DL/1; DEC VAX: VMS; HP 3000: MPE
Main Memory Required: 512.0K Bytes
Source Language: Cobol
Purchase Terms: Purchase (License)
Number Installed to Date: 750
Date First Installed: July 1972

MARTIN MARIETTA DATA SYSTEMS
MAS - MANUFACTURING CONTROL SYSTEM
Specific Application: Master Production Scheduling, Inventory, Shop Floor, Purchasing, Cost and Engineering Control
Specific Industry: Manufacturing, Engineering, Government, Transportation, Scientific
System Requirements: IBM 3030 Series, 4300: DL/1; DEC VAX: VMS; HP 3000: MPE
Main Memory Required: 512.0K Bytes
Source Language: Cobol
Purchase Terms: Purchase (License)
Price: $40,000 to $250,000
Number Installed to Date: 112
Date First Installed: July 1972

MARTIN MARIETTA DATA SYSTEMS
MAS - MANUFACTURING CONTROL SYSTEM (ENGINEERING CONTROL)
Specific Application: Engineering Control
Specific Industry: Manufacturing, Engineering, Government, Transportation, Scientific
System Requirements: IBM 3030 Series, 4300: DL/1; DEC VAX: VMS; HP 3000: MPE
Main Memory Required: 512.0K Bytes
Source Language: Cobol
Purchase Terms: Purchase (License)
Number Installed to Date: 750
Date First Installed: July 1972

MARYLAND COMPUTER SERVICES, INC.
FORMS MANAGEMENT-INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Banking/Financial, Medical
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,000
Number Installed to Date: 2
Date First Installed: September 1981
(See Vendor Profile Page V-69)

MARYLAND COMPUTER SERVICES, INC.
SEATING & TICKETING PACKAGE
Specific Application: Reservation Ticketing
Specific Industry: Function Facilities
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1982

MAS, INC.
ORDER ENTRY AND INVENTORY CONTROL
Specific Application: Order Entry and Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-8, PDP-11; CTS
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1979
(See Vendor Profile Page V-69)

MASSOGLIA AND ASSOCIATES, INC.
JOB HISTORY ANALYSIS
Specific Application: Elapse Time By Job, Tracks Simulation Area Assignments
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
(See Vendor Profile Page V-70)

MASTERS SOFTWARE CO.
MASTER CONTROL
Additional Product Classification: Accounting
Specific Application: Comprehensive Project and Accounting Control
Specific Industry: Manufacturing, Construction
System Requirements: CP/M, CP/M 86, Unix; MS-DOS; PC-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 6
Date First Installed: September 1982
(See Vendor Profile Page V-70)

MCCRACKEN COMPUTER, INC.
MCCRACKEN INSURANCE MANAGEMENT SYSTEM
Additional Product Classification: Insurance Report Generator
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Claims Reporting, Diary System, Profiling, Life Tracking, Production Reporting
Specific Industry: Insurance
System Requirements: IBMSystem/34, System/36, System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $23,850
Number Installed to Date: 120
Date First Installed: 1977
(See Vendor Profile Page V-71)

MCDONNELL DOUGLAS AUTOMATION CO.
CUSTOMER ON-LINE ORDER PROCESSING (CO-OP)
Specific Application: Distribution: Order Processing, Inventory Control, Purchasing, Warehouse Control, Accounts Receivable
Specific Industry: Wholesale/Distribution
System Requirements: IBM 4300 Series, 3000 Series, 370/15: IMS/VS1.2; IBM 370/158: Cics-OS/VS/DL1, Cics-DOS/VS/DL1
Memory Required: 8.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $110,000 to $275,000
Number Installed to Date: 29
Date First Installed: 1976
(See Vendor Profile Page V-71)

MDS ASSOCIATES
MYTE MYTE FORECASTING/SCHEDULING MODULE
Specific Application: Consolidated End Product Forecast and Schedule Based on Actual Orders or Salesman Forecasts
Specific Industry: Not Industry Sensitive, Manufacturing
System Requirements: IBM PC: PC-DOS, Victor: MS-DOS; Molecular Computer: CP/M, DCC: CP/M
Memory Required: 64.0K bytes
Source Language: RM Cobol
Purchase Terms: Purchase (license)
Date First Installed: June 1983
(See Vendor Profile Page V-71)

MICRO-BASE CORP.
CRITICAL PATH MGMT
Additional Product Classification: Graphics
Specific Application: Critical Path Management, Scheduling, Graphics
System Requirements: TI 990: DX-10, Dnos
Memory Required: 128.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1983
(See Vendor Profile Page V-73)

MICRO MANUFACTURING SYSTEMS
MCS-3 MANUFACTURING CONTROL SYSTEM
Specific Application: Integrated Inventory Control and MRP. Can Be Purchased as a Total System or on a Modular Basis
Specific Industry: Not Industry Sensitive
System Requirements: TRS: CP/M; Altos: TRS-DOS; Ithaca: Oasis; IBM: Unix
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 115
Date First Installed: January 1983
(See Vendor Profile Page V-74)

MIDEC, INC.
MIDEC INTEGRATED MANUFACTURING SYSTEM
Specific Application: Integrative Manufacturing System including Order Entry, Scheduling and Shop Floor Control
Specific Industry: Manufacturing
System Requirements: Tandem: Guardian
Memory Required: 112.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $125,000
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-75)

MIDEC, INC.
MIDEC TIME AND BILLING PACKAGE
Additional Product Classification: Accounting
Specific Application: Keeps Track of Cost Sheets, Time Billing
Specific Industry: Banking/Financial, Legal
System Requirements: Tandem: Guardian
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Date First Installed: 1979

MILTON ALLEN & ASSOCIATES, INC.
MANUFACTURER MANAGEMENT SYSTEM (MMS)
Specific Application: Integrated Manufacturing Management
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: HP 3000: MPE
Memory Required: 532.0K bytes
Source Language: Cobol 68
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Number Installed to Date: 30
Date First Installed: 1968
(See Vendor Profile Page V-75)

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
BASE MATERIAL REQUIREMENTS PLANNING
Specific Application: Base Material Requirements Planning
Specific Industry: Manufacturing
System Requirements: DEC: RT-11, RSTS/E
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
(See Vendor Profile Page V-75)

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
SHOP FLOOR CONTROL
Specific Application: Shop Floor Control
Specific Industry: Manufacturing
System Requirements: DEC VAX-11: RT-11, RSTS/E
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
JOB COSTING
Specific Application: Job Costing
Specific Industry: Manufacturing
System Requirements: DEC VAX-11 RT-11, RSTS/E
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date:

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
LABOR PERFORMANCE
Specific Application: Labor Performance
Specific Industry: Manufacturing
System Requirements: DEC VAX-11: RT-11, RSTS/E
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
STANDARD PRODUCT COSTING
Specific Application: Product Costing
Specific Industry: Manufacturing
System Requirements: DEC VAX-11 RT-11, RSTS/E
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
STANDARD PRODUCT ROUTING
Specific Application: Standard Product Routing
Specific Industry: Manufacturing
System Requirements: DEC VAX-11: RT-11, RSTS/E
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100

MMS INTERNATIONAL, INC.
FLEXIBLE MANUFACTURING CONTROL SYSTEM
Specific Application: Monitors Total Manufacturing of Plant From Conveyor to Work Station
Specific Industry: Manufacturing
System Requirements: DEC VAX: VMS; PLC Monarchy: Motorola 6800; HP 1000
Memory Required: 512.0K bytes
Source Language: Assembler, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-76)

MMS INTERNATIONAL, INC.
PARTS HANDLING SYSTEM
Specific Application: Inventory, Scheduling
Specific Industry: Manufacturing
System Requirements: DEC VAX: VMS, PLC Monarchy: Motorola 6800; HP 1000
Memory Required: 512.0K bytes
Source Language: Assembler, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1978

MSS SOFTWARE CORP.
INVENTORY MANAGEMENT
Specific Application: Inventory Management
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/36, SSP; IBM System/38
Memory Required: 64.0K bytes
Source Language: RPG-II (System/36), RPG-III (System/38)
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $5,000
Number Installed to Date: 7
Date First Installed: January 1983
(See Vendor Profile Page V-76)

MORROW COMPUTER, INC.
MAINSTAY
Specific Application: Maintenance Management System
Specific Industry: Manufacturing
System Requirements: DEC PDP-11/44, Sperry V77-80: Vortex
Source Language: Fortran, Total
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-77)

MPI SYSTEMS
INVENTORY MANAGEMENT SYSTEM
Specific Application: Inventory Management
Specific Industry: Not Industry Sensitive
System Requirements: TI 990: DX-10
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1982
(See Vendor Profile Page V-77)

MPI SYSTEMS
ORDER ENTRY
Additional Product Classification: Accounting
Specific Application: Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: TI 990: DX-10
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1982

MPI SYSTEMS
PURCHASE ORDER
Specific Application: Purchase Order
Specific Industry: Not Industry Sensitive
System Requirements: TI 990: DX-10
Source Language: Cobol
Source Code Available: Yes

Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1982

[illegible], INC.
PACS (PLANNING AND CONTROL SYSTEM)
Specific Application: Closed Loop Manufacturing Control
Specific Industry: Manufacturing
System Requirements: Wang VS; IBM System/36
Memory Required: 384.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $57,000 to $69,000
Number Installed to Date: 200
Date First Installed: 1968
(See Vendor Profile Page V-77)

M R SOFTWARE
INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23, System/34, System/36, [illegible]
Source Language: [illegible]
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200
(See Vendor Profile Page V-77)

M R SOFTWARE
JOB COSTING
Specific Application: Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23, System/34, System/36, 5110
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
INVENTORY AND PURCHASING SYSTEM
Specific Application: Inventory and Purchasing System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360; IBM 370, 4300XS, Sperry 1100
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 221
(See Vendor Profile Page V-77)

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
MRP-2
Specific Application: Manufacturing Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360; IBM 370; IBM 4300 Series; Sperry 1100
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 110

MSA, INC.(MANAGEMENT SCIENCE AMERICA)
MSA MANUFACTURING SYSTEM
Specific Application: Manufacturing (MRP)
Specific Industry: Manufacturing
System Requirements: IBM 370, 3000 Series, 4300 Series; DOS/VS
Memory Required: 500.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 106
Date First Installed: 1977

NATIONAL C-P-T, INC.
MAINTENANCE/1
Specific Application: Vehicle or Plant Equipment Maintenance
Specific Industry: Manufacturing, Banking/Financial
System Requirements: IBM Series/1
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-78)

NCA CORP.
MAXCIM
Specific Application: Manufacturing Accounting , MRP
Specific Industry: Manufacturing
System Requirements: DEC PDP: VMS, DEC VAX: RSTS
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100,000
Number Installed to Date: 300
Date First Installed: 1976
(See Vendor Profile Page V-79)

NCR CORP.
IMCS-II INTERACTIVE MANUFACTURING CONTROL SYSTEM
Specific Application: MRP Inventory Control
Specific Industry: Manufacturing
System Requirements: NCR 9300 SRS Systems: ITX; NCR 9300: Imos 5, TRX
Memory Required: 81.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); [illegible]
Number Installed to Date: 800
Date First Installed: January 1979
(See Vendor Profile Page V-79)

NCR CORP.
MISSION
Specific Application: MRP Inventory Control, Capacity Planning
Specific Industry: Manufacturing, Community Banks
System Requirements: NCR V8500, [illegible] VRX
Memory Required: 2.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); [illegible]
Number Installed to Date: 65
Date First Installed: May 1978

NEAL NELSON & ASSOCIATES
INVENTORY CONTROL
Specific Application: Inventory Control Integrated With Both Order and Purchase Order Processing
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
(See Vendor Profile Page V-79)

NEAL NELSON & ASSOCIATES
JOB COSTING
Specific Application: Job Costing, History of Materials, Labor Usage
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 2
Date First Installed: May 1983

NEAL NELSON & ASSOCIATES
ORDER PROCESSING
Specific Application: Order Processing With Partial Shipments and Back Orders
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500

NEW ENGLAND MANAGEMENT SERVICES
JOB SHOP MANUFACTURING
Specific Application: Shop Floor Control, Inventory Control, Material Requirements Planning
Specific Industry: Manufacturing
System Requirements: Wang 2200; Want VS
Memory Required: 128.0K bytes
Source Language: Basic II, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 4
Date First Installed: 1981
(See Vendor Profile Page V-79)

NEW ENGLAND MANAGEMENT SERVICES
PROCESS MANUFACTURING
Specific Application: Discrete Manufacturing
Specific Industry: Manufacturing
System Requirements: Wang 2200; Want VS
Memory Required: 128.0K bytes
Source Language: Basic II, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1982

NOESIS COMPUTING CO.
ORDER TRACK
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: HP: MPE
Source Language: Power House
Purchase Terms: Purchase (license)
Price: $10,000
Date First Installed: 1982
(See Vendor Profile Page V-80)

NUCLEAR DATA, INC.
ENVIRONMENTAL ANALYSIS PACKAGE
Specific Application: Environmental Analysis
System Requirements: DEC PDP, [illegible]
Memory Required: 64.0K bytes
Source Language: Fortran IV
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1982
(See Vendor Profile Page V-81)

NUCLEAR DATA, INC.
IBM DATA REDUCTION PACKAGE
Specific Application: Sodium Iodine Data Reduction Package
System Requirements: DEC PDP, VAX: Midas
Memory Required: 64.0K bytes
Source Language: Fortran IV
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: September 1978

NUCLEAR DATA, INC.
NEUTRON ACTIVATION ANALYSIS PACKAGE
Specific Application: Neutron Activation Analysis
System Requirements: DEC PDP, VAX: Midas
Memory Required: 64.0K bytes
Source Language: Fortran IV
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: September 1978

NUCLEAR DATA, INC.
NUCLIDE IDENTIFICATION PACKAGE
Specific Application: Identify and Quantify Nuclides Found in An Unknown Sample
System Requirements: DEC PDP, VAX: Midas
Memory Required: 64.0K bytes
Source Language: Fortran IV
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: September 1977

NUCLEAR DATA, INC.
X-RAY IDENTIFICATION PACKAGE
Specific Application: X-Ray Identification
System Requirements: DEC VAX, PDP: Midas
Memory Required: 64.0K bytes
Source Language: Fortran IV
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1980

OCTAL, INC.
APPLICON ADS/360 TO/FROM CALMA GDS II
Additional Product Classification: Graphics, CAD/CAM
Specific Application: Database Conversion
Specific Industry: Electronics
System Requirements: DEC PDP-11/34; RSX-11M
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 3
Date First Installed: February 1982
(See Vendor Profile Page V-81)

OCTAL, INC.
APPLICON APPLE 680 TO/FROM COMPUTERVISION
Additional Product Classification: Graphics, CAD/CAM
Specific Application: Database Conversion
Specific Industry: Electronics
System Requirements: DEC VAX: Unix, VMS
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $12,000
Date First Installed: July 1983

OCTAL, INC.
APPLICON APPLE 680 TO/FROM CALMA GDS-2
Additional Product Classification: Graphics, CAD/CAM
Specific Application: Database Conversion
Specific Industry: Electronics
System Requirements: DEC VAX: VMS, Unix
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 15
Date First Installed: September 1981

OCTAL, INC.
APPLICON APPLE 680 TO FROM CALTECH I
Additional Product Classification: Graphics, CAD/CAM
Specific Application: Database Conversion
Specific Industry: Electronics
System Requirements: DEC VAX: VMS, Unix
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 3
Date First Installed: January 1983

OCTAL, INC.
CALMA GDS II STREAM TO/FROM CALTECH I
Additional Product Classification: Graphics, CAD/CAM
Specific Application: Database Conversion
Specific Industry: Electronics
System Requirements: DEC VAX: VMS, Unix
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 3
Date First Installed: January 1983

OCTAL, INC.
CALMA GDS I LI TO/FROM APPLICON
Additional Product Classification: Graphics, CAD/CAM
Specific Application: Database Conversion
Specific Industry: Electronics
System Requirements: DEC PDP-11/34: RSX-11M; DEC VAX: VMS, Unix
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,600
Number Installed to Date: 5
Date First Installed: January 1981

ODYSSEY SYSTEMS, INC.
BILL OF MATERIALS
Specific Application: Bill of Materials
Specific Industry: Manufacturing
System Requirements: EDS Point Four; DG Nova; Litton; Nixdorf
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-82)

ODYSSEY SYSTEMS, INC.
INVENTORY
Specific Application: Inventory
System Requirements: DG Nova; EDS Point Four: IRIS; Nixdorf: NOS; Litton: IOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1982

ODYSSEY SYSTEMS, INC.
LABOR DISTRIBUTION
Specific Application: Labor Distribution
Specific Industry: Manufacturing
System Requirements: DG Nova; Nixdorf: NOX; Litton: IOS; EDS Point Four: Iris
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1982

ODYSSEY SYSTEMS, INC.
MACHINE TRACKING
Specific Application: Machine Tracking
Specific Industry: Manufacturing
System Requirements: DG Nova; Nixdorf: NOX; Litton: IOS; EDS Point Four: Iris
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1982

ODYSSEY SYSTEMS, INC.
MANUFACTURING CONTROL
Specific Application: Manufacturing Control
Specific Industry: Manufacturing
System Requirements: DG Nova; Litton: Iris; Nixdorf: NOS; EDS Point Four: IOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1982

ODYSSEY SYSTEMS, INC.
ORDER ENTYRY
Additional Product Classification: Order Entry
Specific Application: Order Entry System
Specific Industry: Manufacturing, Retail
System Requirements: DG Nova; Litton: Iris; Nixdorf: NOS; EDS Point Four: IOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1982

ODYSSEY SYSTEMS, INC.
PURCHASING
Specific Application: Purchasing
Specific Industry: Manufacturing, Retail
System Requirements: DG Nova; Litton: Iris; Nixdorf; EDS Point Four: IOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1982

ODYSSEY SYSTEMS, INC.
SHOP FLOOR MANAGEMENT
Specific Application: Shop Floor Management
Specific Industry: Manufacturing
System Requirements: DG Nova; Litton: Iris, EDS Point Four: IOS; Nixdorf: NOX
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1982

OIR (ORGANIZATION FOR INDUSTRIAL RESEARCH, INC.)
MULTICAPP COMPUTER ASSISTED PROCESS PLANNING
Specific Application: Automated Process Planning Classification and Coding
Specific Industry: Manufacturing, Government
Memory Required: 512.0K bytes
Source Language: Fortran, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 60
Date First Installed: 1973
(See Vendor Profile Page V-82)

OIR (ORGANIZATION FOR INDUSTRIAL RESEARCH, INC.)
MULTIGROUP GROUP TECHNOLOGY ANALYSIS/MILTI
Specific Application: Group Technology Analysis/ Classification, Coding for Design, Manufacturing, Standardization, Resource Management, Plant Layout
Specific Industry: Manufacturing
Memory Required: 5.1M bytes
Source Language: Fortran, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 40
Date First Installed: 1973

OMEGA COMPUTER CONSULTANTS, INC.
INVENTORY MANAGEMENT SYSTEM
Specific Application: Handles Customer Orders, Inventory and Sales Analysis
Specific Industry: Manufacturing
System Requirements: TI 9900: DX-10
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 100
Date First Installed: February 1980
(See Vendor Profile Page V-82)

G-WP DATA PROCESSING
FORMULATION
Specific Application: Process Manufacturing
Specific Industry: Manufacturing
System Requirements: BTI 5000, 8000 Unix
Memory Required: 64.0K bytes
Source Language: Extended Basic, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 8
Date First Installed: January 1982
(See Vendor Profile Page V-83)

G-WP DATA PROCESSING
INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: BTI 5000, 8000: Unix
Memory Required: 64.0K bytes
Source Language: Extended Basic, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 8
Date First Installed: January 1982

G-WP DATA PROCESSING
PRODUCTION CONTROL
Specific Application: Production Control
Specific Industry: Not Industry Sensitive
System Requirements: BTI 5000, 8000 Unix
Memory Required: 64.0K bytes
Source Language: Extended Basic, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 8
Date First Installed: January 1982

PARA RESEARCH, INC.
INVENTORY ACCOUNTING SYSTEM
Specific Application: Inventory Accounting System
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM System/34
Memory Required: 18.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,000
Number Installed to Date: 400
Date First Installed: 1982
(See Vendor Profile Page V-84)

PARA RESEARCH, INC.
MAPICS PURCHASING APPLICATION SYSTEM
Specific Application: Purchase Order Processing
Specific Industry: Manufacturing
System Requirements: IBM System/34
Source Language: RPG-II
Source Code Available: Yes

Purchase Terms: Purchase (license); Rental; Lease
Price: $1,500
Number Installed to Date: 50
Date First Installed: January 1983

PARA RESEARCH, INC.
MAPICS SHIPPED ORDER HISTORY INQUIRY SYSTEM
Specific Application: Shipped Order History Inquiry
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/38
Memory Required: 28.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $400 to $750
Number Installed to Date: 30
Date First Installed: January 1983

PARK AVENUE DATA SERVICES, INC.
TRUE LIFO SYSTEM
Specific Application: Last-In First-Out Inventory
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34; SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1981
(See Vendor Profile Page V-84)

PATTERN SYSTEMS OF N.J.
CUTTING PLANNER
Specific Application: Quoting, Planning, Scheduling of Rectangular Parts From A Sheet Inventory
Specific Industry: Manufacturing, Engineering, Construction
System Requirements: IBM PC; PC-DOS, Televideo 800 Series: CP/M; HP 3000: Prime
Memory Required: 64.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: January 1975
(See Vendor Profile Page V-84)

PCR, INC.
RMS/34
Additional Product Classification: Accounting
Specific Application: Financial, Distribution, Manufacturing Application
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM System/34; SSP
Memory Required: 36.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 400
Date First Installed: 1979
(See Vendor Profile Page V-84)

PCR, INC.
RMS/38
Additional Product Classification: Accounting
Specific Application: Financial, Distribution Manufacturing
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM System/38; CPS
Memory Required: 1.0M bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1982

PEAT MARWICK MITCHELL & CO.
ENGINEERING
Specific Application: Engineering
Specific Industry: Manufacturing
System Requirements: Datapoint
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000
Number Installed to Date: 10
Date First Installed: 1979
(See Vendor Profile Page V-85)

PEAT MARWICK MITCHELL & CO.
INVENTORY
Specific Application: Inventory
Specific Industry: Manufacturing
System Requirements: Datapoint
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 10
Date First Installed: 1979

PEAT MARWICK MITCHELL & CO.
MRP
Specific Application: MRP
Specific Industry: Manufacturing
System Requirements: Datapoint
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 10
Date First Installed: 1979

PEAT MARWICK MITCHELL & CO.
ORDER ENTRY INVENTORY SALES ANALYSIS
Specific Application: Order Entry Inventory Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11; Wang VS; Datapoint
Source Language: Dibol, Cobol, Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,500
Number Installed to Date: 10
Date First Installed: 1979

PEAT MARWICK MITCHELL & CO.
ORDER PROCESSOR ALLOCATION
Specific Application: Data Processor Allocation
Specific Industry: Manufacturing
System Requirements: Datapoint
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 10
Date First Installed: 1979

PEAT MARWICK MITCHELL & CO.
PURCHASE ORDER
Specific Application: Purchase Order
Specific Industry: Manufacturing
System Requirements: Datapoint
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 10
Date First Installed: 1979

PEAT MARWICK MITCHELL & CO.
SHOP FLOOR CONTROL
Specific Application: Shop Floor Control
Specific Industry: Manufacturing
System Requirements: Datapoint
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1979

PEAT MARWICK MITCHELL & CO.
WORK AND PROCESS
Specific Application: Work and Process
Specific Industry: Manufacturing
System Requirements: Datapoint
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 10
Date First Installed: 1979

PLAYERS COMPUTER, INC.
MAP 3000
Additional Product Classification: Accounting
Specific Application: Manufacturing, Distribution and Financial Software
Specific Industry: Manufacturing
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $83,000
Number Installed to Date: 15
Date First Installed: 1981
(See Vendor Profile Page V-86)

PLAYERS COMPUTER, INC.
PC1/PLUS
Additional Product Classification: Accounting
Specific Application: Manufacturing, Distribution and Financial Software
Specific Industry: Manufacturing
System Requirements: HP 250
Memory Required: 512.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000 to $25,000
Number Installed to Date: 10
Date First Installed: 1981

PLEX DATA BASE SYSTEMS, INC.
MANUFACTURING MPG/250 VERSION 7.0
Specific Application: Manufacturing, Purchasing
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: HP 250: Basic
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,250
Number Installed to Date: 25
(See Vendor Profile Page V-86)

PLEX DATA BASE SYSTEMS, INC.
ORDER MANAGEMENT-OM/250 VERS 7.0
Specific Application: Order Management, Inventory Control, Sales Analysis
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: HP 250: Basic
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,750
Number Installed to Date: 100

PMS SYSTEMS CORP.
SMART/CMS
Specific Application: Calibration of Assets, Management
Specific Industry: Not Industry Sensitive
System Requirements: Sperry 1100: VM/370; HP 3000: MPE; IBM 4341, 4083: DOS/VSE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 24
Date First Installed: September 1981
(See Vendor Profile Page V-86)

PMS SYSTEMS CORP.
SMART/MMS
Specific Application: Calibration of Assets, Management
Specific Industry: Not Industry Sensitive
System Requirements: Sperry 1100: VM/370; HP 3000: MPE; IBM 4341, 4083: DOS/VSE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 24
Date First Installed: 1981

PMS SYSTEMS CORP.
SMART/PMS
Specific Application: Property Management
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE; Sperry 1100: OS/VS; IBM 4341 to 4083: DOS/VSE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 24
Date First Installed: 1981

PMS SYSTEMS CORP.
SMART/SIMS
Specific Application: Inventory Management
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE; IBM 4341, 4083: DOS/VSE; Sperry 1100: OS/VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 24
Date First Installed: 1982

POLYSON ASSOCIATES, INC.
HAS
Specific Application: Hardware Accounting, Invoice Recording
Specific Industry: DP Companies
System Requirements: IBM System/370, 4300, 3000 Series: OS, DOS, VSC
Memory Required: 1.0M bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 10
Date First Installed: 1982
(See Vendor Profile Page V-87)

PORTER DATA SYSTEMS, INC.
STATISTICAL PROCESS CONTROL
Specific Application: Process Control
Specific Industry: Manufacturing
System Requirements: HP 200 Series: 9816S
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000 to $3,000
Number Installed to Date: 8
Date First Installed: April 1983
(See Vendor Profile Page V-87)

PRECISION NESTING SYSTEMS, INC.
NEST ONE
Specific Application: Nesting
Specific Industry: Manufacturing
Memory Required: 32.0K bytes
Source Language: Fortran IV
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 50
Date First Installed: 1980
(See Vendor Profile Page V-87)

PRECISION NESTING SYSTEMS, INC.
NESTING
Specific Application: Program Arranges Shapes
Specific Industry: Manufacturing
System Requirements: Fortran
Memory Required: 32.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000
Number Installed to Date: 50
Date First Installed: 1976

PRECISION NESTING SYSTEMS, INC.
SIMPART
Specific Application: Language for Two Dimensional Shape
Specific Industry: Manufacturing
Memory Required: 32.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 3
Date First Installed: 1981

PRIME COMPUTER, INC.
EDMS (ELECTRONIC DESIGN MANAGEMENT SYSTEM)
Specific Application: Electronic Computer-Aided Design
Specific Industry: Manufacturing, Engineering
System Requirements: Prime: Primos
Memory Required: 2.0M bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: September 1981
(See Vendor Profile Page V-87)

PROCESS CORP.
ENERGY MANAGEMENT SYSTEM
Specific Application: Energy Management Data Base Control
Specific Industry: Steel
System Requirements: DEC: RSX-11M, DG
Memory Required: 128.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: September 1976
(See Vendor Profile Page V-87)

PROCOM, INC.
MANUFACTURING SYSTEM
Additional Product Classification: Accounting
Specific Application: Manufacturing System
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS; Bluebird: Super-DOS
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-87)

PRODUCTION SYSTEMS, INC.
BILL OF MATERIALS
Specific Application: Bill of Materials
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 100
Date First Installed: March 1980
(See Vendor Profile Page V-88)

PRODUCTION SYSTEMS, INC.
INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 100
Date First Installed: September 1980

PRODUCTIVE SOFTWARE SYSTEMS, INC.
RETAIL MANAGEMENT SYSTEM
Specific Application: Sales Analysis, Profitability, Inventory Turnover, Mark-Downs
Specific Industry: Retail
System Requirements: IBM System/34: SSP; IBM System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 4
Date First Installed: April 1983
(See Vendor Profile Page V-88)

PROFESSIONAL COMPUTER RESOURCES
RMS/38 MANUFACTURING
Specific Application: Master Scheduling, MRP, Product Structure, Control and Costing, Capacity Requirements Planning
Specific Industry: Manufacturing
System Requirements: IBM System/38
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000
(See Vendor Profile Page V-88)

PROFESSIONAL DATA SERVICES, INC.
ORDER ENTRY SYSTEM
Additional Product Classification: Accounting
Specific Application: Inventory Control, Accounts Receivable
Specific Industry: Manufacturing
System Requirements: Datapoint: DOS, RMS
Source Language: Data Base
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-88)

PROFESSIONAL INFORMATION PLANNING CORP.
MANUFACTURING CONTROL 250
Specific Application: MRP
Specific Industry: Manufacturing
System Requirements: HP 250
Memory Required: 196.0K bytes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 3
Date First Installed: April 1982
(See Vendor Profile Page V-88)

PROFESSIONAL INFORMATION PLANNING CORP.
UPTIME
Specific Application: Spare Parts and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 196.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 1
Date First Installed: 1982

PROFFESSIONAL SOFTWARE SOLUTIONS, INC.
PRINTERS DEVIL
Specific Application: Order Writing and Invoice Package
Specific Industry: Printer Industry
System Requirements: IBM System/23
Source Language: Basic
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: March 1983
(See Vendor Profile Page V-88)

PROGRAMMING SERVICES & SUPPORT, INC.
PSS FEED INDUSTRY SICARSA SYSTEM
Specific Application: Inventory Control, Order Entry, Invoicing, Sales Analysis
System Requirements: IBM 5110, 5120, System/23, System/34, System/36: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 1
Date First Installed: October 1982
(See Vendor Profile Page V-88)

PROGRAMMING SERVICES & SUPPORT, INC.
PSS PRODUCTION COSTING SYSTEM
Specific Application: Production Costing
Specific Industry: Manufacturing
System Requirements: IBM 5110, 5120, System/23, System/34, System/36, SSP
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 2
Date First Installed: April 1983

PYRAMID DATA LTD.
INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-8: COS 310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 100
Date First Installed: 1980
(See Vendor Profile Page V-89)

QANTEL CORP.
QANTEL MANUFACTURING JOB SHOP
Specific Application: Short or Long Run Custom Products
Specific Industry: Manufacturing
System Requirements: Qantel System 10, System 20, System 40, System 64: Best
Memory Required: 160.0K bytes
Source Language: QIC Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $9,500 to $35,000
Number Installed to Date: 100
Date First Installed: 1980
(See Vendor Profile Page V-89)

QANTEL CORP.
QANTEL MANUFACTURING PROJECT MANAGEMENT
Specific Application: Manufacturing Project Management
Specific Industry: Manufacturing
System Requirements: Qantel System 10, System 20, System 40, System 64: Best
Memory Required: 160.0K bytes
Source Language: QIC Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $25,000 to $100,000
Number Installed to Date: 10
Date First Installed: 1983

QANTEL CORP.
QANTEL MANUFACTURING RESOURCE PLANNING
Specific Application: Forecast

Planning and Scheduling With Management, Financial Controls
Specific Industry: Manufacturing
System Requirements: Qantel System 10, System 20, System 40, System 64· Best
Memory Required: 160.0K bytes
Source Language: QIC Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $9,500 to $75,000
Number Installed to Date: 200
Date First Installed: 1978

QANTEL CORP.
QANTEL MANUFACTURING TO REQUIREMENTS
Specific Application: Build to Order Manufacturers
Specific Industry: Manufacturing
System Requirements: Qantel System 10, System 20, System 40, System 64· Best
Memory Required: 160.0K bytes
Source Language: QIC Basic
Purchase Terms: Purchase (license); Lease
Price: $9,500 to $35,000
Number Installed to Date: 100
Date First Installed: 1980

QUEUE ASSOCIATES, INC.
FIFO INVENTORY
Specific Application: Provides Detailed First-In First-Out Inventory Control Showing Trends
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $2,495
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-90)

[illegible] DATA SYSTEMS
INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Telephone
System Requirements: IBM Series/1
Memory Required: 96.0K bytes
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,600
Number Installed to Date: 30
Date First Installed: 1980
(See Vendor Profile Page V-91)

[illegible] & STRONG SYSTEMS PRODUCTS, INC.
[illegible] AND INVENTORY OPTIMIZATION SYSTEM
Specific Application: MRP II
Specific Industry: Manufacturing, Engineering, Government, Aerospace
System Requirements: IBM 360, 370, 3000 Series: OS, DOS, MVS; DEC VAX-11/780 VMS
Memory Required: 2.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $50,000
Number Installed to Date: 40
Date First Installed: 1981
(See Vendor Profile Page V-91)

RESOURCE SOFTWARE INTERNATIONAL, INC.
INVENTORY CONTROL SYSTEM
Specific Application: Inventory Control
Specific Industry: Manufacturing
System Requirements: Datapoint: DOS
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $775
Date First Installed: 1975
(See Vendor Profile Page V-93)

RESOURCE SOFTWARE INTERNATIONAL, INC.
INVENTORY SYSTEM
Specific Application: Inventory. System
Specific Industry: Manufacturing
System Requirements: Datapoint: DOS
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $950
Date First Installed: September 1977
(See Vendor Profile Page V-93)

RQTI SYSTEMS SOFTWARE
MM-1 MATERIAL MANAGEMENT SYSTEM
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: DEC PRO-350: P/OS, DEC PDP-11: RSX-11M
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $21,000
Number Installed to Date: 20
Date First Installed: 1981
(See Vendor Profile Page V-93)

R. K. RIDALL & CO., INC.
BILL OF MATERIAL
Specific Application: Multilevel Bill of Material
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: VS
Memory Required: 256.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: January 1983
(See Vendor Profile Page V-93)

R. K. RIDALL & CO., INC.
MASTER SCHEDULE
Specific Application: Manufacturing Management
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: January 1983

RSD, INC. (RESOURCES FOR SOFTWARE DEVELOPMENT)
PROMAN
Specific Application: Integrated Manufacturing, Financials, Sales Order Entry, Production Management
Specific Industry: Manufacturing
System Requirements: GA· Pick; Altos; Honeywell Ultimate
Memory Required: 2.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $99
Number Installed to Date: 3
Date First Installed: July 1983
(See Vendor Profile Page V-94)

R&E, INC. (ROCKY SMITH ENTERPRISES)
MCMM
Specific Application: Manufacturing Control Materials Management, Improve Efficiency on Shop Floors
Specific Industry: Manufacturing
System Requirements: DEC VAX: VMS
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 2
Date First Installed: January 1983
(See Vendor Profile Page V-94)

SCRIBE DATA SYSTEMS, INC.
MERCHANDISE FULFILLMENT SYSTEM
Additional Product Classification: Insurance
Specific Application: Order Processing, Inventory, Distribution
System Requirements: DEC PDP-11: RSX-11
Memory Required: 1.0M bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $50,000
Number Installed to Date: 1
Date First Installed: May 1983
(See Vendor Profile Page V-96)

SELLERS SOFTWARE SERVICES CO.
MAINTENANCE MANAGEMENT SYSTEM
Specific Application: Inventory Control, Maintenance Control
Specific Industry: Manufacturing
System Requirements: Datapoint: DOS, PMS
Memory Required: 128.0K bytes
Source Language: Databus, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-96)

SIGMA TECH, INC.
OPCOR
Specific Application: Optimum Planning and Control of Resources Modeling
Specific Industry: Manufacturing
System Requirements: IBM PC: PC-DOS; IBM Mainframes
Memory Required: 128.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease; Time-Sharing
Number Installed to Date: 7
Date First Installed: 1983
(See Vendor Profile Page V-97)

SIGMA TECH, INC.
STRIP
Specific Application: Minimize Scrap Losses When Slitting Metal
Specific Industry: Metals
System Requirements: IBM Series/1, RPS, IBM 4300· CMS/OS
Memory Required: 44.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease; Time-Sharing
Number Installed to Date: 2
Date First Installed: 1981

SIGNET LTD.
MERLIN
Additional Product Classification: Accounting, Payroll/Personnel
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Financials, Bill of Materials, Payroll,Order Entry, Work In Process, Sales Analysis, Purchasing, Inventory Management
Specific Industry: Manufacturing
System Requirements: DG. AOS/VS
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 12
Date First Installed: 1981
(See Vendor Profile Page V-97)

SILTON ASSS, INC.
SILTON IBM SYSTEM/36 APPAREL PACKAGE
Specific Application: Complete Apparel Information
Specific Industry: Apparel
System Requirements: IBM System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $75,000
Number Installed to Date: 3
Date First Installed: 1983
(See Vendor Profile Page V-97)

SMYTH BUSINESS SYSTEMS, INC.
INVENTORY AND SALES
Specific Application: Inventory and Sales
Specific Industry: Retail
System Requirements: IBM 4300: VSE, DG· R-DOS
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $15,000 to $20,000
Date First Installed: 1977
(See Vendor Profile Page V-98)

SOFT PRO SYSTEMS, INC.
BILL OF MATERIAL/LABOR & [illegible]
Specific Application: Material Planning, Tool Cost
Specific Industry: Not Industry Sensitive
System Requirements: Wang/VS: VS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
(See Vendor Profile Page V-98)

SOFTWARE DEVELOPMENT & MAINTENANCE, INC.
SDM/EAGLE COMPUTER OPTIMIZING SYSTEM
Specific Application: A Computerized Pattern Optimizing and Cutting System for Sheet Stock
Specific Industry: Manufacturing
System Requirements: DEC PDP-11; RT-11
Source Language: Fortran, Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-99)

SOFTWARE DEVELOPMENT & MAINTENANCE, INC.
SDM/MDCS MANUFACTURING AND DISTRIBUTION
Specific Application: Designed for Manufacturing and Distribution Operations
Specific Industry: Manufacturing
System Requirements: DEC PDP-11; RT-11, TSX, DEC VAX: VMS, RSTS/E
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 2,000

SOFTWARE REVIEW CORP.
DISTRIBUTION CONTROL SYSTEM
Additional Product Classification: Accounting
Specific Application: Distribution Control System
Specific Industry: Wholesale/Distribution, Retail
System Requirements: IBM System/34, System/36, System/38; 85*
Memory Required: 96.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $17,100
Number Installed to Date: 4
Date First Installed: 1982
(See Vendor Profile Page V-100)

SOLUTION DATA, INC.
SMMS
Specific Application: MRP, Inventory Management, General Ledger, Accounts Receivable, Accounts Payable, Sales Order Entry
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Altos 586, 8600; Xenix
Memory Required: 512.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $9,000
(See Vendor Profile Page V-101)

SOLUTION SYSTEMS, INC.
TMG
Specific Application: Thermal Analysis Program
Specific Industry: Engineering
System Requirements: Prime 50 Series; Primos
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 5
Date First Installed: 1982
(See Vendor Profile Page V-101)

SOS, INC.
JOB SHOP
Specific Application: History of Jobs By Operation and Man, Constant Job Average
Specific Industry: Manufacturing
System Requirements: DG Nova; Iris Bits
Memory Required: 32.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-101)

SOURCE DATA SYSTEMS, INC.
MATERIALS MANAGEMENT
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1, PC, NCR 9020, 9300, Tower 1632, Decision Mate V
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 4
Date First Installed: July 1981
(See Vendor Profile Page V-101)

SOURCE DATA SYSTEMS, INC.
PREVENTATIVE MAINTENANCE
Specific Application: Prevention Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1, PC, NCR 9020, 9300, Tower 1632, Decision Mate V
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 4
Date First Installed: July 1981

SPRINGFIELD SOFTWARE CORP.
INVENTORY CONTROL
Specific Application: Provides Standard Inventory Control, Handles Multilocation and Inventory Size Items
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-102)

SPRINGFIELD SOFTWARE CORP.
JOB COST CONTROL
Specific Application: Produces Numerous Job Cost Control Reports
Specific Industry: Commercial Printers
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: 1975

SPRINGFIELD SOFTWARE CORP.
OPEN ORDERS MANAGEMENT
Specific Application: Provides Order Entry, Open Order Status Reports, Release of Orders Invoicing Operations, Production Scheduling Reports
Specific Industry: Manufacturing, Clothing
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 6
Date First Installed: 1981

STAFF COMPUTER TECHNOLOGY CORP.
PRO
Specific Application: Process Control
Specific Industry: Manufacturing
System Requirements: DEC LSI-11
Memory Required: 24.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 500
Date First Installed: 1976
(See Vendor Profile Page V-102)

START SYSTEMS
FASHION INDUSTRY PACKAGE
Specific Application: Fashion Industry: Order Entry, Production, Inventory, Sales Analysis, Letter of Credit
Specific Industry: Wholesale/Distribution
System Requirements: Wang VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Rental
Price: $21,000
Number Installed to Date: 2
Date First Installed: June 1982
(See Vendor Profile Page V-103)

STRUCTURAL MEASUREMENT SYSTEMS
FORCED RESPONSE SIMULATION
Additional Product Classification: Engineering
Specific Application: Vibration/ Structural Analysis Predicts Response to Real Forces
Specific Industry: Manufacturing, Engineering, Transportation
System Requirements: HP Desktop; HP Mini, DEC
Memory Required: 128.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000 to $4,000
Number Installed to Date: 200
Date First Installed: 1980
(See Vendor Profile Page V-104)

STRUCTURAL MEASUREMENT SYSTEMS
MODEL ANALYSIS
Additional Product Classification: Engineering
Specific Application: Vibration/ Structural Analysis Determines Dynamic Characteristics
Specific Industry: Manufacturing, Engineering, Transportation, Scientific
System Requirements: HP Desktop, HP Mini, DEC
Memory Required: 128.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $8,500 to $18,500
Number Installed to Date: 200
Date First Installed: 1980

STRUCTURAL MEASUREMENT SYSTEMS
PARAMETER ESTIMATION PACKAGE
Additional Product Classification: Engineering
Specific Application: Vibration/ Structural Analysis
Specific Industry: Manufacturing, Engineering, Transportation
System Requirements: HP Desktop; HP Mini, DEC
Memory Required: 128.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,500
Number Installed to Date: 200
Date First Installed: 1980

STRUCTURAL MEASUREMENT SYSTEMS
STRUCTURAL DYNAMICS MODIFICATION
Additional Product Classification: Engineering
Specific Application: Vibration/ Structural Analysis; Predicts Mass Differences
Specific Industry: Manufacturing, Engineering, Transportation
System Requirements: HP Desktop; HP Mini, DEC
Memory Required: 128.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000 to $13,000
Number Installed to Date: 200
Date First Installed: 1980

STSC, INC.
CMCS COMPREHENSIVE MANUFACTURING CONTROL SYSTEM
Specific Application: Integrated On-Line Manufacturing, Inventory Planning and Control System
Specific Industry: Manufacturing
System Requirements: IBM 370/4330 VM/CMS
Memory Required: 2.0M bytes
Source Language: APL
Purchase Terms: Purchase (license)
Price: $50,000 to $275,000
Number Installed to Date: 20
Date First Installed: 1981
(See Vendor Profile Page V-104)

SYNON CORP.
SYNON DISTRIBUTOR AUTOMATED CONTROL
Additional Product Classification: Accounting
Specific Application: Bill of Materials, Work Order, Inventory Management, Purchasing, Accounts Receivable, Sales Analysis, Customer Order Entry
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM; Wang; AOS, R-DOS

TO SOFTWARE.

Memory Required: 64.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Rental; Lease
(See Vendor Profile Page V-105)

SYSCOM, INC.
JEWELRY INDUSTRY/MANUFACTURING
Specific Application: Jewelry Manufacturing
System Requirements: IBM System/32
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
(See Vendor Profile Page V-105)

SYSTEM AUTOMATION CORP.
INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE; Convergent Technologies
Memory Required: 256.0K bytes
Source Language: Cobol (HP), Pascal (Convergent Technologies)
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Date First Installed: 1979
(See Vendor Profile Page V-105)

SYSTEM AUTOMATION CORP.
MATERIAL REQUIREMENTS PLANNING PASCAL
Specific Application: Material Requirements Planning
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE, Convergent Technologies
Memory Required: 256.0K bytes
Source Language: Cobol (HP), Pascal (Convergent Technologies)
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Date First Installed: 1979

SYSTEM AUTOMATION CORP.
WORK ORDER CONTROL
Specific Application: Work Order Control
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE, Convergent Technologies
Memory Required: 256.0K bytes
Source Language: Cobol (HP), Pascal (Convergent Technologies)
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Date First Installed: 1979

SYSTEMS MANAGEMENT, INC.
MANUFACTURING CONTROL/SHOP FLOOR
Specific Application: Material Control/Shop Floor
Specific Industry: Manufacturing
System Requirements: IBM Series/1: Pick; IBM Series 50, 4300; DEC LSI-11
Source Language: Cobol, RPL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 250
(See Vendor Profile Page V-106)

SYSTEMS RESEARCH AND DEVELOPMENT CORP.
A-76 PROCUREMENT MANAGEMENT SYSTEM
Specific Application: In-House and Contract Work
Specific Industry: Government
System Requirements: Prime: CP/M
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $25,000
(See Vendor Profile Page V-107)

SYSTRAN CORP.
PID LOOP CONTROL
Specific Application: Process Control
Specific Industry: Manufacturing
System Requirements: Analog Devices
Memory Required: 125.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: March 1983
(See Vendor Profile Page V-107)

TAD COMPUTER ASSOCIATES
MULTIPLE WAREHOUSE INVENTORY AND ORDER ENTRY
Specific Application: Multiple Warehouse Inventory, Order Entry
Specific Industry: Wholesale/Distribution
System Requirements: Wang VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-107)

TEC COMPUTER SYSTEMS, INC.
TEC ACCOUNTING SYSTEM
Specific Application: General Accounting, Manufacturing
Specific Industry: Manufacturing
System Requirements: DEC PDP-11: RT-11; DEC VAX: VMS, RSTS
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 60
Date First Installed: 1978
(See Vendor Profile Page V-108)

TECHNICAL RESOURCES, INC.
MANUFACTURING CONTROL SYSTEM
Specific Application: Inventory Control, Order Entry, MRP, Job Cost, Bill Of Materials, Scheduling
Specific Industry: Manufacturing
System Requirements: DEC: RSTS/E
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 3
Date First Installed: 1983
(See Vendor Profile Page V-108)

TECHNOLOGY SYSTEMS, INC.
INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: North Star Horizon: Ndos, North Star Advantage: CP/M
Memory Required: 64.0K bytes
Source Language: North Star Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: 1979
(See Vendor Profile Page V-108)

TECHWARE COMPUTING CO.
COMPUTER AIDED MANUFACTURING TECHNICAL (CAM/TECH)
Additional Product Classification: Graphics
Specific Application: Programming and Parts Design
Specific Industry: Manufacturing, Engineering
System Requirements: DEC 1144, 1123+, 1123, 1103, Micro PDP-11: RT-11, RSX-11
Memory Required: 64.0K bytes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: May 1979
(See Vendor Profile Page V-109)

TELECOMP, INC.
DISTRIBUTORS INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Wholesale/Distribution
System Requirements: Unix
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,400
Number Installed to Date: 50
Date First Installed: 1977
(See Vendor Profile Page V-109)

TELECOMP, INC.
DISTRIBUTOR ORDER ENTRY & INVOICING
Specific Application: Distributor Order Entry and Invoicing
Specific Industry: Wholesale/Distribution
System Requirements: Unix
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,600
Number Installed to Date: 50
Date First Installed: 1977

TELECOMP, INC.
LABOR DISTRIBUTION
Specific Application: Labor Distribution
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,400
Number Installed to Date: 2
Date First Installed: 1982

THOMAS-LAGUBAN & ASSOCIATES, INC.
E-PICS (PRODUCTION INFORMATION CONTROL SYSTEM)
Specific Application: Information and Control System, Sales Order, Accounts Receivable, Accounts Payable, Purchase Orders, MRP, General Ledger, Central Information File
Specific Industry: Manufacturing
System Requirements: IBM 360, 370, 3000 Series: DOS
Source Language: Cobol, RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 35
Date First Installed: 1974
(See Vendor Profile Page V-110)

TIME SHARE COMPUTER SYSTEMS
EASE ORDER MANAGEMENT SYSTEM
Specific Application: Order Management
Specific Industry: Not Industry Sensitive
System Requirements: Pick
Memory Required: 64.0K bytes
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 40
Date First Installed: 1980
(See Vendor Profile Page V-110)

TRANS MICRO SYSTEM, INC.
MFG/1000
Specific Application: Integrated Manufacturing Information With MRP
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000: Rtse 6VM
Memory Required: 64.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $30,000 to $45,000
Number Installed to Date: 3
Date First Installed: August 1982
(See Vendor Profile Page V-111)

TRES SYSTEMS, INC.
MATERIALS FORECASTING/PLANNED REQUIREMENTS
Specific Application: Materials Forecasting, Planned Requirements
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3000 Series: DOS; IBM 370: OS; IBM 4300: MVS
Memory Required: 500.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: 1972
(See Vendor Profile Page V-112)

TRES SYSTEMS, INC.
PURCHASING
Specific Application: Purchasing
Specific Industry: Not Industry Sensitive
System Requirements: : IBM 370: OS; IBM 4300: DOS; IBM 3000 Series: MVS
Memory Required: 500.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: 1972

TRES SYSTEMS, INC.
STORES CONTROL
Specific Application: Stores Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: MVS, IBM 4300: OS; IBM 3000 Series: DOS
Memory Required: 500.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: 1972

TSC SYSTEMS, INC.
JEWELRY MANUFACTURING - JEWEL-250 REV1
Specific Application: Trace Orders and Precious Metals in Jewelry Manufacturing
Specific Industry: Manufacturing
System Requirements: HP 250
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Date First Installed: May 1981
(See Vendor Profile Page V-112)

UNIQ DIGITAL SYSTEMS, INC.
SPIDER II - BASED MRP
Specific Application: Based MRP
Specific Industry: Manufacturing
System Requirements: DEC VAX: Unix
Memory Required: 1.0M bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,550
Number Installed to Date: 3
Date First Installed: March 1983
(See Vendor Profile Page V-113)

UNIQ DIGITAL SYSTEMS, INC.
SPIDER II - BILL OF MATERIALS
Specific Application: Bill of Materials Processor
Specific Industry: Manufacturing
System Requirements: DEC VAX: Unix
Memory Required: 1.0M bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,900
Number Installed to Date: 3
Date First Installed: March 1983

UNIQ DIGITAL SYSTEMS, INC.
SPIDER II - CUSTOMER ORDER PROCESSING
Specific Application: Customer Order Processing
Specific Industry: Manufacturing
System Requirements: DEC VAX: Unix
Memory Required: 1.0M bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,900
Number Installed to Date: 3
Date First Installed: March 1983

UNIQ DIGITAL SYSTEMS, INC.
SPIDER II - INVENTORY MANAGEMENT
Specific Application: Inventory Management
Specific Industry: Manufacturing
System Requirements: DEC VAX: Unix
Memory Required: 1.0M bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,900
Number Installed to Date: 3
Date First Installed: March 1983

UNIQ DIGITAL SYSTEMS, INC.
SPIDER II - PURCHASE ORDER & RECEIVING
Specific Application: Purchase Order and Receiving
Specific Industry: Manufacturing
System Requirements: DEC VAX: Unix
Memory Required: 1.0M bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,900
Number Installed to Date: 3
Date First Installed: March 1983

UNIQ DIGITAL SYSTEMS, INC.
SPIDER II - SHOP FLOOR CONTROL
Specific Application: Shop Floor Control
Specific Industry: Manufacturing
System Requirements: DEC VAX: Unix
Memory Required: 1.0M bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,600
Number Installed to Date: 3
Date First Installed: March 1983

UNIQ DIGITAL SYSTEMS, INC.
SPIDER II - STANDARD PRODUCT COSTING
Specific Application: Standard Product Costing
Specific Industry: Manufacturing
System Requirements: DEC VAX: Unix
Memory Required: 1.0M bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,250
Number Installed to Date: 3
Date First Installed: March 1983

UNIQ DIGITAL SYSTEMS, INC.
SPIDER II - STANDARD PRODUCT COSTING
Specific Application: Standard Product Costing
Specific Industry: Manufacturing
System Requirements: DEC VAX: Unix
Memory Required: 1.0M bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,550
Number Installed to Date: 3
Date First Installed: March 1983

UNIQUE COMPUTER CORP.
BASE MATERIAL REQUIREMENT PLANNING
Specific Application: Determines What Levels of Raw Materials Are Needed for Particular Process
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,000
Date First Installed: 1982
(See Vendor Profile Page V-113)

UNIQUE COMPUTER CORP.
BILL OF MATERIALS PROCESSOR
Specific Application: Bill of Materials Processor
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000 to $7,000
Date First Installed: 1980

UNIQUE COMPUTER CORP.
SHOP FLOOR CONTROL
Specific Application: Shop Floor Control
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,000
Date First Installed: 1982

UNIQUE COMPUTER CORP.
STANDARD PRODUCT ROUTING
Specific Application: Creates and Maintains Data Describing Operations
Specific Industry: Manufacturing
System Requirements: DEC VAX: Unix
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000 to $7,000
Date First Installed: 1980

UNITED INFORMATION SERVICES
CBAS
Specific Application: Solutions to Many Management and Tracking Problems Of Circuit-Pack Inventory Control
System Requirements: CDC Cyber; IBM
Source Language: Fortran, Super Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
(See Vendor Profile Page V-113)

UP-TIME SYSTEMS, INC.
PROJECT CONTROL
Specific Application: Project Control
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: TSX COBOL+; DEC VAX: VMS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,950
Number Installed to Date: 8
Date First Installed: 1982
(See Vendor Profile Page V-114)

VALLEY COMPUTER ASSOCIATES, INC.
PRODUCTION COSTING
Additional Product Classification: Accounting
Specific Application: Production Costing
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: DEC PDP-11: RT-11; DEC VAX: VMS
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,400
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-114)

VALLEY DATA BASE, INC.
INVENTORY CONTROL
Specific Application: Inventory Control, Order Entry
System Requirements: HP 3000: MPE
Memory Required: 1.0M bytes
Source Language: Cobol 2
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Price: $3,000
Date First Installed: 1981
(See Vendor Profile Page V-114)

VIRGINIA TEK, INC.
OPTIMIZER 30
Additional Product Classification: Accounting
Specific Application: General Ledger, Product Control
Specific Industry: Pary Board Companies
Memory Required: 128.0K bytes
Source Language: Assembly, Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50,000
Date First Installed: 1980
(See Vendor Profile Page V-115)

VISTA SYSTEMS, INC.
INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: 16 Bit Unix based S.W. Prime Prime, IBM DOS; DOS: DEC VAX: VMS
Source Language: Fortran, Fortran 77, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-115)

WALLACE COMPUTER SERVICES, INC.
PRINTWARE
Specific Application: Creates

Shipping Labels By Answering Questions In English, Menu Driven
Specific Industry: Manufacturing
System Requirements: IBM System/34, System/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 250
Date First Installed: 1981
(See Vendor Profile Page V-116)

WALLACE COMPUTER SERVICES, INC.
VIDEO PRINTWARE
Specific Application: Draws Lines
Specific Industry: Manufacturing
System Requirements: DEC PDP-11; DEC VAX; VMS
Memory Required: 128.0K bytes
Source Language: Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1981

WCS COMPUTER SERVICES, INC.
INVENTORY
Specific Application: Inventory
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: January 1965
(See Vendor Profile Page V-116)

WCS COMPUTER SERVICES, INC.
MATERIALS MANAGEMENT
Specific Application: Materials Management
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: January 1965

WCS COMPUTER SERVICES, INC.
ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: January 1965

COMPUTING
SMALL MANUFACTURE
Additional Product Classification: Accounting, Payroll/Personnel
Specific Application: General Ledger, Accounts Payable, Accounts Receivable, Inventory
Specific Industry: Manufacturing
System Requirements: DG: MIS; Prime: Primos; Alpha Micro: Amos
Memory Required: 64.0K bytes
Source Language: Basic, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $5,000 to $20,000
Number Installed to Date: 5
Date First Installed: 1981
(See Vendor Profile Page V-116)

WHALEN COMPUTER SERVICES
BUSINESS SYSTEMS FOR NEWSPAPER INDUSTRY
Additional Product Classification: Accounting, Payroll/Personnel
Specific Application: Circulation, Classified Billing, Payroll, General Ledger, Advertising Manifest, Accounts Receivable
Specific Industry: Newspaper Industry
System Requirements: Datapoint: DQS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1980
(See Vendor Profile Page V-116)

WINSTON T. MCCLEERY CONSULTANTS
EMICS
Specific Application: Work Order Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B1000
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $95,000
Number Installed to Date: 1
Date First Installed: August 1983
(See Vendor Profile Page V-117)

XIDEX CORP.
PIOS - DLI VERSION
Specific Application: Manufacturing Application Software
Specific Industry: Manufacturing
System Requirements: IBM 370, 4300 Series, 3000 Series: MVS, DOS/VSE
Memory Required: 500.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: August 1983
(See Vendor Profile Page V-118)

AMERICAN SYSTEMS, INC.
STAMP-ACT
Specific Application: Integrated Programs for Metal Stamping Companies
Specific Industry: Manufacturing
System Requirements: Wang VS
Memory Required: 256.0K bytes
Source Language: VS Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1981
(See Vendor Profile Page V-5)

APPLIED TECHNOLOGY
CLP
Specific Application: Process Control
Specific Industry: Manufacturing
System Requirements: IBM Series/1; EDX
Memory Required: 128.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: 1980
(See Vendor Profile Page V-6)

ARTHUR ANDERSEN & CO.
MAC-PAC PC
Specific Application: Sales and Production Planning
Specific Industry: Manufacturing
System Requirements: IBM PC; PC-DOS
Memory Required: 320.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Lease
Date First Installed: 1983
(See Vendor Profile Page V-9)

ARTWORX
MAIL LIST
Specific Application: Mail List
Specific Industry: Not Industry Sensitive
System Requirements: Northstar; Apple; Atari
Memory Required: 32.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
(See Vendor Profile Page V-9)

ASSOCIATED BUSINESS SYSTEMS, INC.
SWINE MANAGEMENT
Specific Application: Hog, Bacon and Sausage Management
Specific Industry: Agribusiness
System Requirements: IMS; CP/M; TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Dbase II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,900
Number Installed to Date: 2
Date First Installed: April 1983
(See Vendor Profile Page V-9)

ASSOCIATED BUSINESS SYSTEMS, INC.
WASTE MANAGEMENT
Specific Application: Waste Management
Specific Industry: Garbage Collection
System Requirements: IMS; CP/M; TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Dbase II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,900
Number Installed to Date: 2
Date First Installed: October 1982

AUTOMATION MANAGEMENT, INC.
AMI JOB COST MANUFACTURING JOB SHOP
Additional Product Classification: Accounting
Specific Application: Job Cost
Specific Industry: Manufacturing
System Requirements: IBM PC-XT: PC-DOS 2.0; IBM PC: PC-DOS 2.0 or 1.0
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,100
Number Installed to Date: 3
(See Vendor Profile Page V-11)

AUTOMATION MANAGEMENT, INC.
AMI MANUFACTURING PACKAGE
Additional Product Classification: Accounting, Payroll/Personnel
Specific Application: General Ledger, Inventory Control, Job Cost, Accounts Payable and Receivable, Billing and Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT: PC-DOS 2.0; IBM PC: PC-DOS 1.1
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,900

AUTOMATED PROGRAMMING & SERVICES, INC.
ORDER ENTRY AND INVENTORY
Specific Application: Order Entry and Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Televideo; CP/M
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 2
Date First Installed: February 1983
(See Vendor Profile Page V-11)

BILLINGS COMPUTER CORP.
BILLINGS INVENTORY MANAGEMENT SYSTEM
Specific Application: Inventory Control
Specific Industry: Manufacturing
System Requirements: Billings: Boss
Memory Required: 64.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: 1981
(See Vendor Profile Page V-12)

BILLINGS COMPUTER CORP.
BILLINGS NETWORK INVENTORY MANAGEMENT
Specific Application: Inventory Control
Specific Industry: Manufacturing
System Requirements: Billings: Boss
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,900
Number Installed to Date: 8
Date First Installed: April 1981
(See Vendor Profile Page V-15)

CIMLINC, INC.
CIM CD
Specific Application: Three-Dimensional Sculptured Surface Modeling
Specific Industry: Manufacturing
System Requirements: DMA Vaxstar Unix
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 11
Date First Installed: December 1982
(See Vendor Profile Page V-15)

CHASE DATA SYSTEMS
NUDEAL
Specific Application: Inventory Management
Specific Industry: Numismatics
System Requirements: Altos; Zilog Z-80; Oasis
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 2
Date First Installed: January 1982
(See Vendor Profile Page V-16)

CHASE DATA SYSTEMS
PRINT-TRACK
Specific Application: Job Costing and Tracking
Specific Industry: Printing
System Requirements: Altos; Zilog Z-80; Oasis
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 2
Date First Installed: January 1982

COMMERCIAL MICRO SYSTEMS, INC.
STEP ONE - INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Victor; MS-DOS; HP; CP/M; IBM; PC-DOS; Osborne
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600
Date First Installed: 1979
(See Vendor Profile Page V-21)

COMPLETE BUSINESS SERVICES
INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Northstar; DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: January 1983
(See Vendor Profile Page V-21)

COMPUTER OPERATIONS, INC.
QUICK PATH
Specific Application: Part Geometry and Path Generation of Posted Part Programs
Specific Industry: Machine Tool
System Requirements: Televideo 806; CP/M
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75,000
Number Installed to Date: 3
Date First Installed: February 1982
(See Vendor Profile Page V-25)

COMPUTER OPTIONS, INC.
AUTOMATED COSTING & ESTIMATING-ACE-4
Specific Application: Job Costing and Estimating
Specific Industry: Manufacturing, Medical
System Requirements: Altos ACS8000; Oasis, Onyx C8001; Oasis, IBC Cadet, Entegn. Oasis
Memory Required: 256.0K bytes
Source Language: Oasis Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $9,800
Number Installed to Date: 30
Date First Installed: March 1980
(See Vendor Profile Page V-25)

COMPUTER SERVICES CORP.
BILL OF MATERIALS PROCESSING
Specific Application: Bill-of-Material Processing
Specific Industry: Not Industry Sensitive
System Requirements: TI; DX-10; DEC; Dibol
Memory Required: 10.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $3,000

Number Installed to Date: 300
Date First Installed: 1978
(See Vendor Profile Page V-26)

CORE, INC.
BILL/MATERIALS
Specific Application: Bill and [illegible]
Specific Industry: Not Industry [illegible]
System Requirements: IBM 5110, 5120, Datamaster, PC
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); [illegible] Lease
Price: $1,000
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-31)

CORE, INC.
INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry [illegible]
System Requirements: IBM 5110, Datamaster
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,000
Number Installed to Date: 200
Date First Installed: 1978

CREATIVE SOFTWARE SYSTEMS
APPAREL MANUFACTURING SYSTEM
Additional Product Classification: Accounting
Specific Application: Order Entry, Inventory Control and Accounting
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Micro Five: Stardos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,500
Number Installed to Date: 2
Date First Installed: March 1982
(See Vendor Profile Page V-32)

CREATIVE SOFTWARE SYSTEMS
MANUFACTURING INVENTORY CONTROL
Specific Application: Manufacturing Inventory Control With Purchasing
Specific Industry: Manufacturing
System Requirements: Micro Five: Stardos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 4
Date First Installed: 1983

CULVERIN COMP.
PQC-PACK
Additional Product Classification: Statistics
Specific Application: Implementation of Statistical Quality Control Techniques
Specific Industry: Manufacturing
System Requirements: IBM PC: PC-DOS: Apple II, II+, IIE, III: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $375
Number Installed to Date: 100
Date First Installed: January 1983
(See Vendor Profile Page V-33)

CUSTOM COMPUTER SPECIALISTS, INC.
BILL OF MATERIALS
Specific Application: Bill-of-Materials, Material Requirements Planning
Specific Industry: Manufacturing
System Requirements: Cromemco: Unix; TI Professional: MS-DOS, DEC Rainbow: CP/M 86, CP/M 80
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-33)

CUSTOM COMPUTER SPECIALISTS, INC.
INVENTORY
Specific Application: Monthly and Yearly Usage Reports
Specific Industry: Manufacturing
System Requirements: Cromemco: Unix; TI Professional: MS-DOS; DEC Rainbow: CP/M 86, CP/M 80
Memory Required: 128.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 6
Date First Installed: 1981

DATA — MAX
MANUFACTURING SYSTEM
Specific Application: Manufacturing
Specific Industry: Manufacturing
System Requirements: Datapoint: DOS; Wang VS: RMS
Memory Required: 64.0K bytes
Source Language: Databus, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-37)

DATA PROCESSING CONSULTANTS
INVENTORY CONTROL AND SALES ANALYSIS
Additional Product Classification: Accounting
Specific Application: Inventory Control and Sales Analysis
Specific Industry: Not Industry [illegible]
System Requirements: IBM Datamaster, 5110, 5120
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); [illegible] Lease
Price: $1,500
Date First Installed: 1980
(See Vendor Profile Page V-37)

DATA PROCESSING CONSULTANTS
MANUFACTURING INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Manufacturing
System Requirements: IBM 5110, 5120
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,500
Date First Installed: 1980

DBS (DESIGN AND BUILDERS OF INFORMATION SYSTEMS) INVENTORY INVOICING
Specific Application: Inventory Invoicing
Specific Industry: Not Industry [illegible]
System Requirements: Ohio Scientific
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 47
Date First Installed: 1979
(See Vendor Profile Page V-40)

DEMICHELE SYSTEMS, INC.
PRODUCTION CONTROL AND OPTIMIZATION
Specific Application: Cost Optimization, Pricing Reports on Production Stages and Control of Numerically Controlled Machinery
Specific Industry: Manufacturing, Engineering
System Requirements: IBM PC: PC-DOS, Cromemco: Cdos
Memory Required: 64.0K bytes
Source Language: Basic, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $16,000 to $25,000
Number Installed to Date: 45
Date First Installed: September 1977
(See Vendor Profile Page V-41)

DURANGO SYSTEMS, INC.
SALES ANALYSIS
Additional Product Classification: Accounting
Specific Application: Invoicing, Inventory Control and Sales Analysis
Specific Industry: Not Industry [illegible]
System Requirements: Durango F-[illegible] DX/DSM
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $425
Number Installed to Date: 1,000
Date First Installed: 1979
(See Vendor Profile Page V-44)

EASTERN COMPUTER SERVICES, INC.
MANUFACTURING SYSTEM
Additional Product Classification: Accounting
Specific Application: Financial and Manufacturing, Planning/ Engineering, Sales Inventory
Specific Industry: Manufacturing
System Requirements: Selkd: Boss; Basic A. Boss; DEC PDP-11: RSTS/E
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 500
Date First Installed: 1979
(See Vendor Profile Page V-45)

ESP COMPUTER RESOURCES, INC.
WHOLESALE/DISTRIBUTION PACKAGE
Specific Application: Inventory Control
Specific Industry: Wholesale/Distribution
System Requirements: Apple II: APPLE-DOS
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $160 to $190
Number Installed to Date: 1
Date First Installed: February 1983
(See Vendor Profile Page V-47)

FISHER CLOSED SYSTEMS, INC.
MANUFACTURING MGMT SYSTEM
Specific Application: Inventory Management, Sales Order Entry, Purchase Order, Processing, Inventory Accounts Receivable, Sales Commission Tracking
Specific Industry: Manufacturing
System Requirements: IBM PC, PC-XT: PC-DOS, TI Professional Computer: MS-DOS, Zenith Z-100: [illegible]
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 40
Date First Installed: March 1981
(See Vendor Profile Page V-49)

FORESIGHT, INC.
MCS-MANUFACTURING CONTROL SYSTEMS
Specific Application: Financial and Production Control
Specific Industry: Manufacturing
System Requirements: Datapoint: [illegible] DOS
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1980
(See Vendor Profile Page V-49)

GAYLORD BROS., INC.
TELEMARC III
Specific Application: Processing and Production of Catalogues, Cards, Labels
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-50)

GENERAL DIGITAL INDUSTRIES, INC.
NC MASTER
Specific Applications: NC Tape Preparation for Sheet Metal Manufacturers
System Requirements: DEC: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000

Number Installed to Date: 2
Date First Installed: January 1982
(See Vendor Profile Page V-51)

GORDON BLACK ASSOCIATES, INC.
VEHICLE MAINTENANCE SYSTEM
Specific Application: Fleet Operations and Maintenance Cost Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 1
Date First Installed: November 1982
(See Vendor Profile Page V-52)

HAYDEN SOFTWARE
INVENTORY
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Basic Compiler
Source Code Available: no
Purchase Terms: Purchase (license)
Price: $449
(See Vendor Profile Page V-53)

H. B. MAYNARD & CO., INC.
METALMATS
Specific Application: Generates Time Standards, Process Sheets, Parts Cost Estimates
Specific Industry: Manufacturing
System Requirements: TRS-80
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $5,000
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-53)

HELMSMAN SYSTEMS, INC.
H-BOMM VERSION 2.0
Specific Application: Bill-of-Materials Manager
Specific Industry: Manufacturing
System Requirements: Intel; Zilog; Motorola
Memory Required: 48.0K bytes
Source Language: Rational Fortran, Fortran, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,495
(See Vendor Profile Page V-54)

HELMSMAN SYSTEMS, INC.
H-BUY VERSION 2.0
Specific Application: Purchasing and Receiving
Specific Industry: Manufacturing
System Requirements: Intel; Zilog; Motorola
Memory Required: 48.0K bytes
Source Language: Rational Fortran, Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,495

HELMSMAN SYSTEMS, INC.
H-MRP
Specific Application: MRP on Line Transaction-Driven Net Change, Includes H-Bomm, H-Buy, H-Store, H-Make, and H-Plan
Specific Industry: Manufacturing
System Requirements: IBM PC; CP/M; Onyx 8002: Unix; MS-DOS
Memory Required: 54.0K bytes
Source Language: Rational Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,995
Number Installed to Date: 12
Date First Installed: March 1983

HELMSMAN SYSTEMS, INC.
H-MRP VERSION 2.0
Specific Application: MRP
Specific Industry: Manufacturing
System Requirements: Intel 8085, 8086; Zilog Z80, Z8000; Motorola 68000
Memory Required: 48.0K bytes
Source Language: Fortran, Rational Fortran, Assembly
Purchase Terms: Purchase (license)
Price: $9,995

HELMSMAN SYSTEMS, INC.
H-PLAN VERSION 2.0
Specific Application: Work-in-Process Management
Specific Industry: Manufacturing
System Requirements: Intel; Zilog; Motorola
Memory Required: 48.0K bytes
Source Language: Fortran, Rational Fortran, Assembly
Purchase Terms: Purchase (license)
Price: $2,495

HELMSMAN SYSTEMS, INC.
H-PLAN VERSION 2.0
Specific Application: Master Schedule, Planner Control, and MRP
Specific Industry: Manufacturing
System Requirements: Intel; Zilog; Motorola
Memory Required: 48.0K bytes
Source Language: Fortran, Rational Fortran, Assembly
Purchase Terms: Purchase (license)
Price: $3,495

HELMSMAN SYSTEMS, INC.
H-STORE VERSION 2.0
Specific Application: Inventory Management and Stores
Specific Industry: Manufacturing
System Requirements: Intel; Zilog; Motorola
Memory Required: 48.0K bytes
Source Language: Fortran, Rational Fortran, Assembly
Purchase Terms: Purchase (license)
Price: $3,495

HERITAGE COMPUTING CORP.
BILL OF MATERIALS
Specific Application: Manufacturing Bill-of-Material
Specific Industry: Manufacturing
System Requirements: IBM PC; TI Professional, TRS-80
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
(See Vendor Profile Page V-54)

HOLLAND AUTOMATION U.S.A.
HAI-LINE MANUFACTURING
Specific Application: Manufacturing
Specific Industry: Manufacturing
System Requirements: IBM PC; PC-DOS; Eagle II, III, IV; CP/M; Apple II, II+; MS-DOS
Memory Required: 64.0K bytes
Source Language: HAI-Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 30
Date First Installed: 1981
(See Vendor Profile Page V-56)

INDATA CORP.
MEMSYS (MEMORY SYSTEM ONE)
Specific Application: Parts Accounting, Label Printing
Specific Industry: Manufacturing
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $7,500
Date First Installed: August 1982
(See Vendor Profile Page V-57)

INDATA CORP.
TRANSYS (TRANSACTIONS SYSTEM)
Specific Application: Full Ticket Printing for Shipping and Receivables Departments
Specific Industry: Manufacturing
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Machine
Purchase Terms: Purchase (license); Rental, Lease
Price: $7,500

INFO-DESIGNS, INC.
INVENTORY MANAGEMENT
Specific Application: Inventory Management
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64, Super PET, 8032
Memory Required: 32.0K bytes
Source Language: Basic Compiler
Purchase Terms: Purchase (license)
Price: $5,000 to $10,000
Number Installed to Date: 15,000
Date First Installed: 1981
(See Vendor Profile Page V-57)

INTERNATIONAL MICRO SYSTEMS, INC.
MANUFACTURING INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Manufacturing
System Requirements: CP/M; MP/M; CP/M 86
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
(See Vendor Profile Page V-61)

INTRO-LOGIC, INC.
MANUFACTURING I
Specific Application: Order Entry, Inventory Control, Purchasing, Receiving, Bill of Materials
Specific Industry: Wholesale/Distribution, Retail
System Requirements: CP/M; MP/M
Memory Required: 48.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-61)

INTRO-LOGIC, INC.
MANUFACTURING II
Specific Application: Order Entry, Inventory Control, Purchasing, MRP, Shipping, Receiving
Specific Industry: Wholesale/Distribution, Retail
System Requirements: CP/M; MP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 6
Date First Installed: 1981

INTRO-LOGIC, INC.
WHOLESALE RETAIL DISTRIBUTION SYSTEM
Specific Application: Order Entry, Invoicing, Inventory Control, Purchase, Receiving, Accounts Receivable
Specific Industry: Wholesale/Distribution, Retail
System Requirements: CP/M, MP/M
Memory Required: 48.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 10
Date First Installed: 1981

K-BATA CENTER, INC.
INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 126
Date First Installed: 1979
(See Vendor Profile Page V-63)

KENWOOD DATA ASSOCIATES, INC.
INQUIRY TRACKING SYSTEM (ITS)
Additional Product Classification: Banking, Insurance, Government
Specific Application: Management Control of Correspondence and Telephone Inquiries
Specific Industry: Retail, Medical, Legal, Insurance
System Requirements: Zilog Z80; CP/M; IBM PC; MS-DOS
Memory Required: 56.0K bytes
Source Language: Cbasic, Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 3
Date First Installed: December 1982
(See Vendor Profile Page V-63)

LASALLE COMPUTING, INC.
MANUFACTURING (BILL OF MATERIALS)
Specific Application: Bill of Materials

Specific Industry: Manufacturing
System Requirements: IBM PC: PC-DOS; Digilog 1500: TURBO-DOS, NCR Tower 1632: Unix, Vector Graphic: CP/M
Memory Required: 48.0K bytes
Source Language: CMD Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 4
Date First Installed: 1981
(See Vendor Profile Page V-65)

LASALLE COMPUTING, INC.
MANUFACTURING/INVENTORY
Specific Application: Inventory
Specific Industry: Manufacturing
System Requirements: IBM PC CP/M, Digilog 1500: TURBO-DOS; NCR Tower 1632: Unix; Vector Graphic: DOS
Memory Required: 48.0K bytes
Source Language: CMD Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 4
Date First Installed: 1981

LASALLE COMPUTING, INC.
MANUFACTURING/INVOICING
Specific Application: Invoicing
Specific Industry: Manufacturing
System Requirements: IBM PC: PC-DOS, Digilog 1500: TURBO-DOS; NCR Tower 1632: Unix; Vector Graphic: CP/M
Memory Required: 48.0K bytes
Source Language: CMD Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 4
Date First Installed: 1981

LASALLE COMPUTING, INC.
MANUFACTURING/JOB COSTING
Specific Application: Job Costing
Specific Industry: Manufacturing
System Requirements: IBM PC: PC-DOS, Digilog 1500: TURBO-DOS; NCR Tower 1632: Unix; Vector Graphic: CP/M
Memory Required: 48.0K bytes.
Source Language: CMD Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $900
Number Installed to Date: 4
Date First Installed: 1981

LASALLE COMPUTING, INC.
MANUFACTURING/LABOR EFFICIENCY
Specific Application: Labor Efficiency
Specific Industry: Manufacturing
System Requirements: IBM PC: PC-DOS, Digilog 1500: TURBO-DOS; NCR Tower 1632: Unix; Vector Graphic: CP/M
Memory Required: 48.0K bytes
Source Language: CMD Basic
Source Code Available: Yes
Price: $900
Number Installed to Date: 4
Date First Installed: 1981

LASALLE COMPUTING, INC.
MANUFACTURING/ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Manufacturing
System Requirements: IBM PC: PC-DOS, Digilog 1500: TURBO-DOS; NCR Tower 1632: Unix, Vector Graphic: CP/M
Memory Required: 48.0K bytes
Source Language: CMD Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,400
Number Installed to Date: 4
Date First Installed: 1981

LASALLE COMPUTING, INC.
MANUFACTURING/SHOP LOADING
Specific Application: Shop Loading
Specific Industry: Manufacturing
System Requirements: IBM PC: PC-DOS; Digilog 1500: TURBO-DOS, NCR Tower 1632: Unix, Vector Graphic: CP/M
Memory Required: 48.0K bytes
Source Language: CMD Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,450
Number Installed to Date: 4
Date First Installed: 1981

LASALLE COMPUTING, INC.
MANUFACTURING/WORK IN PROCESS (WIP)
Specific Application: Work in Process
Specific Industry: Manufacturing
System Requirements: IBM PC: PC-DOS; Digilog 1500: TURBO-DOS, NCR Tower 1632: Unix, Vector Graphic: CP/M
Memory Required: 48.0K bytes
Source Language: CMD Basic
Source Code Available: Yes
Price: $1,250
Number Installed to Date: 4
Date First Installed: 1981

LASALLE COMPUTING, INC.
MRP (MANUFACTURERS RESOURCE PLANNING)
Specific Application: MRP
Specific Industry: Manufacturing
System Requirements: IBM PC: CP/M; Digilog 1500: TURBO-DOS, NCR Tower 1632: Unix; Vector Graphic: CP/M
Memory Required: 48.0K bytes
Source Language: CMD Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 4
Date First Installed: 1981

L & M DATA SYSTEMS
BILLS OF MATERIALS PROCESSING
Specific Application: Full Parts Explosion System
Specific Industry: Manufacturing
System Requirements: DG Micro Nova, Nova, Eclipse; AOS, AOS, RDOS
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 5
Date First Installed: 1982
(See Vendor Profile Page V-66)

LOGICAL DESIGN CORP.
QUALITY ASSURANCE
STATISTICAL PROCESS CONTROL
Specific Application: QA Statistical Process Control
Specific Industry: Manufacturing
System Requirements: Burroughs B20; Unix
Memory Required: 384.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-66)

LOGICAL MINICOMPUTERS OF ERIE, INC.
ADDUPLAST
Additional Product Classification: Accounting
Specific Application: General Accounting, Materials Forecasting for Plastic Injection Molders
Specific Industry: Manufacturing
System Requirements: Point Four: Iris; Digidyne
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June, 1979
(See Vendor Profile Page V-66)

LOGICAL MINICOMPUTERS OF ERIE, INC.
TOOL SHOP SYSTEM
Additional Product Classification: Accounting
Specific Application: Job Costing, General Accounting for Tool Shops
Specific Industry: Manufacturing
System Requirements: Point Four: Iris, Digidyne
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1979

LOGISTICON, INC.
DISPATCHER
Specific Application: Inventory Control
Specific Industry: Manufacturing
System Requirements: Xerox
Memory Required: 500.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: April 1983
(See Vendor Profile Page V-67)

LOGISTICS DATA SYSTEMS, INC.
PATHMAN-TRUCK ROUTING PROGRAM
Specific Application: Truck Routing (Primarily for the Food Industry)
Specific Industry: Wholesale/Distribution
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Advanced Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Date First Installed: September 1983
(See Vendor Profile Page V-67)

LOGISTICS DATA SYSTEMS, INC.
SPACEMAN-SPACE MANAGEMENT
Specific Application: Shelf Space Management (For the Food Industry)
Specific Industry: Retail
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Advanced Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 35
Date First Installed: February 1982

LOWELL SYSTEMS
LABELTRONIC-1000
Specific Application: Inventory, Shipping
Specific Industry: Not Industry Sensitive
System Requirements: Direct 1000: CP/M; IBM PC: MP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1982
(See Vendor Profile Page V-67)

LOWELL SYSTEMS
LABELTRONIC 2000
Specific Application: Inventory-Oriented Billing
Specific Industry: Not Industry Sensitive
System Requirements: Altos: MP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1982

MATIC DATA SYSTEMS
INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: Altos: Oasis; IBC: Oasis; Onyx; Vector Graphic VIP: CP/M
Memory Required: 64.0K bytes
Source Language: Oasis Basic, Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 80
Date First Installed: 1979
(See Vendor Profile Page V-70)

MATIC DATA SYSTEMS
JOB COSTING FOR PRINTERS
Additional Product Classification: Accounting
Specific Application: Job Cost and Profits Calculation
Specific Industry: Print Shops
System Requirements: Vector Graphic VIP: CP/M
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 20
Date First Installed: August 1982

MATIC DATA SYSTEMS
JOB ESTIMATING FOR PRINTERS
Specific Application: Job Estimating
Specific Industry: Print Shops
System Requirements: Vector Graphic VIP: CP/M; Epson America HX20
Memory Required: 64.0K bytes
Source Language: Microsoft Basic Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000

[illegible] Installed to Date: 50
Date First Installed: September 1981

MCCULLOUGH & ASSOCIATES
MPAC MANUFACTURING PLANNING
Specific Application: Inventory and Production Control, MRP, Order Entry, Purchasing, Receiving, Bill-of Materials
Specific Industry: Manufacturing
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Alpha Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 75
Date First Installed: May 1979
(See Vendor Profile Page V-71)

MDM SYSTEMS, INC.
AUTOMOTIVE INDUSTRY SUPPLIER
Specific Application: Telecommunications With Auto Companies and Pricing Letters
Specific Industry: Manufacturing
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
[illegible]
Purchase Terms: Purchase (license)
Price: $1,195
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-71)

MDM SYSTEMS, INC.
BILL OF MATERIALS
Specific Application: Bill of Materials
Specific Industry: Manufacturing
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
[illegible]
Purchase Terms: Purchase (license)
Price: $1,195
Number Installed to Date: 5
Date First Installed: 1982

MDM SYSTEMS, INC.
EFFICIENCY REPORTING
Specific Application: Manufacturing Efficiency Analysis
Specific Industry: Manufacturing
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,195
[illegible]
Date First Installed: [illegible]

MDM SYSTEMS, INC.
MANUFACTURING INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Manufacturing
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,995
Number Installed to Date: 5
Date First Installed: 1982

MDM SYSTEMS, INC.
MANUFACTURING RESOURCES PLANNING
Specific Application: Manufacturing Resources Planning
Specific Industry: Manufacturing
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,195
[illegible]
Date First Installed: [illegible]

MDM SYSTEMS, INC.
MANUFACTURING SYSTEM
Specific Application: Manufacturing
Specific Industry: Manufacturing
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,955
[illegible]
Date First Installed: 1982

MDM SYSTEMS, INC.
ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Manufacturing
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
[illegible]
Purchase Terms: Purchase (license)
Price: $1,495
[illegible]
Date First Installed: 1982

MDM SYSTEMS, INC.
PURCHASING AND RECEIVING
Specific Application: Purchasing and Receiving
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,495
[illegible]
Date First Installed: 1982

MDM SYSTEMS, INC.
QUOTATION
Specific Application: Quotations for Jobs
Specific Industry: Manufacturing
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,195
Number Installed to Date: 1
Date First Installed: 1982

MDM SYSTEMS, INC.
SHOP FLOOR CONTROL
Specific Application: Shop Floor Control
Specific Industry: Manufacturing
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,995
Number Installed to Date: 2
Date First Installed: 1982

MDS ASSOCIATES
MYTE MYTE INVENTORY CONTROL
Specific Application: Inventory Control and Stock Status Reporting for Manufacturers, Distributors
Specific Industry: Not Industry Sensitive, Manufacturing
System Requirements: IBM PC: PC-DOS, Victor: MS-DOS; Molecular Computer: CP/M; DCC: CP/M
Memory Required: 64.0K bytes
[illegible]
Source Code Available: No
Purchase Terms: Purchase (license)
[illegible]
(See Vendor Profile Page V-71)

MDS ASSOCIATES
MYTE MYTE MANPOWER PLANNING MODULE
Specific Application: Determine Manpower by Work Center by Time Period [illegible]
Module
Specific Industry: Not Industry Sensitive, Manufacturing
System Requirements: IBM PC: PC-DOS; Victor: MS-DOS; Molecular Computer: CP/M; DCC: CP/M
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: October 1983

MDS ASSOCIATES
MYTE MYTE MATERIAL REQUIREMENTS PLANNING
[illegible]
Raw Material Requirements by Time Period
Specific Industry: Manufacturing
[illegible]
DOS; Victor: MS-DOS, Molecular Computer: CP/M; DCC: CP/M
Memory Required: 64.0K bytes
[illegible]
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: January 1983

MDS ASSOCIATES
MYTE MYTE PRODUCTION COSTING MODULE
Specific Application: Production [illegible]
Completed
Specific Industry: Manufacturing
System Requirements: IBM PC: PC-DOS, Victor: MS-DOS; Molecular Computer: CP/M; DCC: CP/M
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: October 1983

MDS ASSOCIATES
MYTE MYTE STANDARD COST MODULE
Specific Application: Manufacturing Data Base Module, Bill-of-Materials Processing, Operations Real-Time Generator, Where-Used, "What If" Projections, Cost Control
Specific Industry: Not Industry Sensitive, Manufacturing, Construction
System Requirements: [illegible] PC: PC-DOS, Victor: MS-DOS; Molecular Computer: CP/M, DCC: CP/M
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 7
Date First Installed: May 1982

MICROCOMPUTER CONSULTANTS
INMASS
Specific Application: Integrated Manufacturing
Specific Industry: Manufacturing
System Requirements: CP/M; CP/M 86, MP/M, MP/M 86; MS-DOS, PC-DOS
Memory Required: 64.0K bytes
[illegible]
Source Code Available: No
Purchase Terms: Purchase (license)
[illegible]
[illegible]
(See Vendor Profile Page V-73)

MIDWEST COMPUTER CENTER CO.
BOMP/NET REQUIREMENTS
Additional Product Classification: [illegible]
Specific Application: Subassembly and Material Lists Production
Specific Industry: Manufacturing
System Requirements: Xerox 80; DEC Rainbow: CP/M; IBM PC
Memory Required: 64.0K bytes
Source Language: Fortran 4 Micro
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995
[illegible]
Date First Installed: 1980
(See Vendor Profile Page V-75)

MODERN COMPUTER SYSTEMS INC.
MCS INVENTORY
Specific Application: Inventory [illegible]
Specific Industry: Not Industry Sensitive
System Requirements: TI Professional Computer, Altos
Source Language: RM Basic C
[illegible]
Purchase Terms: Purchase (license)
Price: $1,300 to $1,500
[illegible]
Date First Installed: January 1983
(See Vendor Profile Page V-76)

MUNNIX CONTROL SYSTEMS, INC.
A PROGRAMMABLE MOTORING SYSTEM
Specific Application: Monitors Alarms, Displays Industrial Processing Statistics
Specific Industry: Mining, Power/Sewer
System Requirements: Intel: RMX 80
Memory Required: 64.0K bytes
Source Language: PLM
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1982
(See Vendor Profile Page V-78)

[illegible]
SYTESMITH/INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive

System Requirements: Vector Graphic: CP/M; Xerox: CP/M; Tandy: CP/M; IBM PC: CP/M; Apple: CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $600
Number Installed to Date: 2
Date First Installed: January 1983
(See Vendor Profile Page V-78)

NATIONAL DATATEC, INC.
BYTESMITH/JOB COSTING
Specific Application: Job Costings
Specific Industry: Construction, Architects
System Requirements: Vector Graphic: CP/M; XEROX: CP/M; Tandy: CP/M; IBM PC: CP/M; Apple: CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,700
Number Installed to Date: 3
Date First Installed: January 1983

NEPENTHE PROGRAMS
MANUFACTURING COST ESTIMATING
Specific Application: Estimates Cost of Manufacturing
Specific Industry: Manufacturing
System Requirements: TRS-80/I: DOS Plus; TRS-80/III, TRS-80 Model 4
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Lease
Price: $8,995
Date First Installed: September 1980
(See Vendor Profile Page V-79)

NORTHERN DATA SYSTEMS OF MAINE, INC.
PUBLIC WAREHOUSER PACKAGE
Specific Application: Warehousing
Specific Industry: Wholesale/Distribution
System Requirements: Cado
Memory Required: 4.0K bytes
Source Language: Cadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 12
Date First Installed: 1982
(See Vendor Profile Page V-80)

NORTHLAND INFORMATION SYSTEMS CORP.
FSD6
Additional Product Classification: Accounting
Specific Application: Inventory, Accounts Receivable, POS Invoicing, Sales Analysis
Specific Industry: Farm Supply
System Requirements: Altos: Oasis; TI Professional Computer: MP/M 86; IBM PC: PC-DOS; Xenix
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500 to $4,500
Number Installed to Date: 4
Date First Installed: 1981
(See Vendor Profile Page V-81)

NOVA TAPE, INC.
NOVA TAPE
Specific Application: Tape Preparation for Numerically Controlled Machines
Specific Industry: Manufacturing, Numerically Controlled Equipment
System Requirements: Apple; IBM PC
Memory Required: 48.0K bytes
Source Language: Basic, Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 100
Date First Installed: 1981
(See Vendor Profile Page V-81)

OLYMPIC SYSTEMS, INC.
MANUFACTURING CONTROL SYSTEM
Specific Application: MRP
Specific Industry: Manufacturing
System Requirements: CP/M 80; MP/M 80; CP/M 86; MP/M 86
Memory Required: 64.0K bytes
Source Language: Cbasic, Microsoft Basic, DEC Basic Plus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000
Date First Installed: April 1982
(See Vendor Profile Page V-82)

OPEN SYSTEMS, INC.
SOFTWARE FITNESS PROGRAM
Specific Application: Accounts Payable and Receivable, General Ledger, Payroll, Sales Order
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M; PC-DOS, Oasis; Xenix
Memory Required: 64.0K bytes
Source Language: Business Basic, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 45,000
Date First Installed: 1976
(See Vendor Profile Page V-83)

O.R., INC.
COMPLETE WORKSHOP PACKAGE
Additional Product Classification: Payroll/Personnel
Specific Application: Job Costing, Payroll
Specific Industry: Rehabilitation
System Requirements: Concept 2, Concept 3
Memory Required: 16.0K bytes
Source Language: BAL, RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,900
Number Installed to Date: 10
Date First Installed: July 1982
(See Vendor Profile Page V-83)

PACIFIC BENCHMARK SYSTEMS, INC.
APPAREL MANUFACTURING SYSTEM
Specific Application: Clothing Manufacturing
Specific Industry: Manufacturing, Apparel
System Requirements: Cado 2020 Series, CAT, Tiger
Memory Required: 48.0K bytes
Source Language: Cadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 3
Date First Installed: 1983
(See Vendor Profile Page V-83)

PACIFIC BENCHMARK SYSTEMS, INC.
BILL OF MATERIALS
Specific Application: Bill of Materials
Specific Industry: Manufacturing
System Requirements: Cado 2020 Series, CAT, Tiger
Memory Required: 48.0K bytes
Source Language: Cadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 2
Date First Installed: 1982

PHANTOS RESEARCH
COMPLETE BUSINESS SYSTEM
Additional Product Classification: Accounting
Specific Application: Accounts Receivable and Payable, Inventory Control, Sales Order Processing
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000: MS-DOS
Memory Required: 128.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $2,500
Number Installed to Date: 5
Date First Installed: February 1983
(See Vendor Profile Page V-85)

PRISM COMPUTER SYSTEMS
PARTS
Additional Product Classification: Accounting
Specific Application: Inventory, Order Entry, Point of Sale
Specific Industry: Auto Parts
System Requirements: CP/M; MP/M 80; MP/M 86
Memory Required: 80.0K bytes
Source Code Available: $2,000
Purchase Terms: Purchase (license)
Price: $1,700
Number Installed to Date: 20
Date First Installed: January 1982
(See Vendor Profile Page V-87)

SALTON AMS, INC.
SALTON IBM PC APPAREL RETAILER
Specific Application: Apparel Information
Specific Industry: Apparel
System Requirements: IBM PC: PC-DOS 1.1
Memory Required: 512.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $6,000
Number Installed to Date: 13
Date First Installed: 1982
(See Vendor Profile Page V-88)

SOFTWARE CORP.
BEAMS
Specific Application: Stress and Deflection Computations on Beams
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 8000, 9000: Commodore DOS; Apple II, II+, IIE, III: APPLE-DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $115
Number Installed to Date: 125
Date First Installed: 1979
(See Vendor Profile Page V-89)

SOFTWARE CORP.
BOLT CIRCLES
Specific Application: Computes X, Y Coordinates for any Number of Equally Spaced Points on a Circle
Specific Industry: Engineering, Machine Shops
System Requirements: Commodore 8000, 9000: Commodore DOS; Apple II, II+, IIE, III: APPLE-DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $65
Number Installed to Date: 100
Date First Installed: 1979

SOFTWARE CORP.
INVENTORY
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 8000, 9000: Commodore DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $55
Number Installed to Date: 200
Date First Installed: 1979

SOFTWARE CORP.
SPUR GEARS
Specific Application: Routines for Standard Straight Spur Gears
Specific Industry: Engineering, Machine Shops
System Requirements: Commodore 8000, 9000: Commodore DOS; Apple II, II+, IIE, III: APPLE-DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $55
Number Installed to Date: 40
Date First Installed: 1979

SOFTWARE CORP.
TRIG/CIRCLE VINCENT
Specific Application: Tangents, Trigonometric Calculations; Menu-Driven With User Prompts
Specific Industry: Engineering, Machine Shops
System Requirements: Commodore 8000, 9000: Commodore DOS; Apple II, II+, IIE, III: APPLE-DOS
Memory Required: 32.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $115
Number Installed to Date: 125
Date First Installed: 1979

SOUTH WEST SYSTEMS
COST ESTIMATING FOR MANUFACTURERS
Specific Application: Cost Estimating
Specific Industry: Manufacturing, Engineering
System Requirements: TRS-80/I: DOS Plus

Memory Required: 48.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $90
Date First Installed: January 1980
(See Vendor Profile Page V-102)

SOUTH WEST SYSTEMS
ORDER ENTRY & INVOICING
Specific Application: Order Entry, Inventory, Invoicing
Specific Industry: Manufacturing, Wholesale/Distribution, Retail
System Requirements: TRS-80/I: DOS Plus
Memory Required: 48.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: January 1982

STARDATA CORP.
FOREMAN
Specific Application: Job Shop Manufacturing
Specific Industry: Manufacturing
System Requirements: Zilog; Unix
Memory Required: 512.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000 to $15,000
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-103)

STARDATA CORP.
MANUFACTURING PACKAGE
Additional Product Classification: Accounting
Specific Application: Bill of Material and General Accounting (Optional)
Specific Industry: Manufacturing
System Requirements: Zilog; Unix
Memory Required: 512.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000 to $20,000
Number Installed to Date: 8
Date First Installed: 1981

STATE OF THE ART, INC.
INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple III; IBM PC
Memory Required: 64.0K bytes
Source Language: UCSD-P
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $340
Date First Installed: July 1982
(See Vendor Profile Page V-103)

STOLZBERG RESEARCH ASSOCIATES, INC.
MANUFACTURING INVENTORY MANAGEMENT SYSTEM
Specific Application: Manufacturing Inventory Management
Specific Industry: Manufacturing
System Requirements: IBM PC: CP/M, IBM PC-XT
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: $25,000
Purchase Terms: Purchase (license); Lease
Price: $1,460
Number Installed to Date: 60
Date First Installed: March 1980
(See Vendor Profile Page V-104)

STORED INFORMATION SYSTEMS
FINANCIAL INDICATORS
Specific Application: Custom Options, Job Tickets, Incentive System, Engineering Design, Computer Numerical Control Program Aid, Cost Control
Specific Industry: Manufacturing, Wholesale/Distribution, Custom Job Shop
System Requirements: North Star Advantage: CP/M; Victor 900; Osborne 1, MS-DOS
Memory Required: 6.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 4
Date First Installed: April 1982
(See Vendor Profile Page V-104)

SYSTEM APPLICATION ENGINEERING, INC.
DATA ACQUISITION INFORMATION SYSTEM
Specific Application: Process-Signal Monitoring
Specific Industry: Manufacturing, Engineering, Scientific
System Requirements: Analog Devices Macsym: MP/M 86
Memory Required: 384.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 1
Date First Installed: July 1983
(See Vendor Profile Page V-106)

SYSTEM APPLICATION ENGINEERING, INC.
DATA ACQUISITION & INFORMATION SYSTEM-DAIS V 1.0
Specific Application: Real-Time Data Acquisition
Specific Industry: Manufacturing, Engineering
System Requirements: Analog Devices. MP/M 86
Source Language: Macbasic 3
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 1
Date First Installed: August 1983

TANDY CORP.
INVENTORY CONTROL SYSTEM (ICS)
Specific Application: Inventory Control, Purchase Order, Reports
Specific Industry: Manufacturing, Wholesale/Distribution, Retail
System Requirements: TRS-80/II, TRS-80 Model 12, TRS-80 Model 16: TRS-DOS
Purchase Terms: Purchase (license)
Price: $299 to $399
Date First Installed: 1900
(See Vendor Profile Page V-109)

TANDY CORP.
ORDER ENTRY/INVENTORY CONTROL
Specific Application: Single-Pass Invoicing and Two-Pass Open Order Entry, Separate Billing
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80 Model 16: Xenix
Memory Required: 256.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $599
Date First Installed: 1983

TANDY CORP.
SALES ANALYSIS
Additional Product Classification: Sales Analysis
Specific Application: Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80 Model 16: Xenix
Memory Required: 256.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $399
Date First Installed: 1983

TCS SOFTWARE, INC.
TCS TOTAL INVENTORY
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8086: CP/M, Intel 8080 MS-DOS
Memory Required: 8.5M bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1,000
Date First Installed: August 1981
(See Vendor Profile Page V-109)

TCS SOFTWARE, INC.
TCS TOTAL MATERIALS
Specific Application: Bill of Materials, Inventory
Specific Industry: Manufacturing
System Requirements: Intel 8086: CP/M, Intel 8080 MS-DOS
Memory Required: 145.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: September 1983

TEXAS INSTRUMENTS, INC.
BUSINESS AIDS LIBRARY — INVENTORY MANAGEMENT
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: TI 99/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $70
(See Vendor Profile Page V-110)

TEXAS INSTRUMENTS, INC.
BUSINESS AIDS LIBRARY — INVOICE MANAGEMENT
Specific Application: Invoice Management
Specific Industry: Not Industry Sensitive
System Requirements: TI 99/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $70

TIME COMPUTER CORP.
TIME MANUFACTURERS REPRESENTIVE PACKAGE
Specific Industry: Manufacturers Representatives
System Requirements: Oasis
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
(See Vendor Profile Page V-111)

TIPNIS ASSOCIATES, INC.
CAMPLOT
Additional Product Classification: Engineering
Specific Application: CAM Engineering, Single-Spindle Automatic Cams
Specific Industry: Manufacturing, Engineering
System Requirements: Apple II+: Pascal, Apple IIE, IBM PC
Memory Required: 64.0K bytes
Source Language: Pascal, Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license); Lease.
Price: $900 to $6,000
Number Installed to Date: 38
Date First Installed: September 1981
(See Vendor Profile Page V-111)

TIPNIS ASSOCIATES, INC.
CEST
Specific Application: Economic Analyst Process Alternation
Specific Industry: Manufacturing, Engineering
System Requirements: Apple II+: Pascal; Apple IIE, IBM PC
Memory Required: 64.0K bytes
Source Language: Pascal, Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license), Lease
Price: $7,000 to $1,200
Number Installed to Date: 4
Date First Installed: January 1982

TIPNIS ASSOCIATES, INC.
COESEARCH
Specific Application: Inventory Search Package
Specific Industry: Manufacturing, Engineering
System Requirements: Apple II+: Pascal, Apple IIE, IBM PC
Memory Required: 64.0K bytes
Source Language: Pascal, Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $900 to $12,000
Number Installed to Date: 38
Date First Installed: September 1981

TIPNIS ASSOCIATES, INC.
ESTIMATION PROGRAMS
Additional Product Classification: Accounting
Specific Application: Job Shop Estimation, Process Planning, Shop Scheduling
Specific Industry: Manufacturing, Job Shops
System Requirements: Apple II+: Pascal; Apple IIE, IBM PC
Memory Required: 64.0K bytes
Source Language: Pascal, Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $900
Number Installed to Date: 38
Date First Installed: 1981

TIPPIE ASSOCIATES, INC.
SHOPSIM
Specific Application: Job Shop Scheduling
Specific Industry: Manufacturing, Engineering
System Requirements: Apple II+: Pascal; Apple IIE, IBM PC
Memory Required: 64.0K bytes
Source Language: Pascal, Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $900 to $12,000
Number Installed to Date: 36
Date First Installed: September 1981

TRAC LINE SOFTWARE, INC.
M-TRAC
Specific Application: Inventory Control
Specific Industry: Manufacturing
System Requirements: Altos: Oasis; Onyx, Dynabyte, IBC
Memory Required: 64.0K bytes
Source Language: Oasis Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,900
Number Installed to Date: 150
Date First Installed: 1980
(See Vendor Profile Page V-111)

TRAC LINE SOFTWARE, INC.
PERT (PROJECT EVALUATION REVIEW T)
Specific Application: Job Scheduling
Specific Industry: Manufacturing
System Requirements: Altos: Oasis; Onyx, IBC; Dynabyte
Memory Required: 64.0K bytes
Source Language: Oasis Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,100
Number Installed to Date: 50
Date First Installed: 1982

TRANS MICRO SYSTEM, INC.
PROPITEXT
Specific Application: Manufacturing Information System for Job Shops, [illegible]
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; Unix; MS-DOS
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $30,000
Number Installed to Date: 15
Date First Installed: August 1982
(See Vendor Profile Page V-111)

TSI — DIGITAL SYSTEMS, INC.
LAYOUT
Specific Application: Numerically Controlled Machine Tool Programming
Specific Industry: Manufacturing
System Requirements: TRS-80/II: [illegible]
Memory Required: 64.0K bytes
Source Language: Assembly, Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,600
Number Installed to Date: 75
Date First Installed: 1980
(See Vendor Profile Page V-112)

UNITED COMPUTERS INTERNATIONAL
NC TAPE PROGRAMMING SYSTEM
Specific Application: Numerically Controlled Mill Machines
Specific Industry: Manufacturing
System Requirements: IBM PC CP/M
Memory Required: 48.0K bytes
Source Language: Fortran, PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 100
Date First Installed: January 1980
(See Vendor Profile Page V-114)

UNIVAIR INTERNATIONAL
UNIVAIR ON LINE ORDER ENTRY
Additional Product Classification: POS
Specific Application: Inventory Control, POS
Specific Industry: Manufacturing
System Requirements: IBM PC: CP/M; Vector Graphics: MS-DOS; Victor 1000: PC-DOS, Televideo
Memory Required: 48.0K bytes.
Source Language: Cbasic 2, C Basic 86
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 600
Date First Installed: 1980
(See Vendor Profile Page V-115)

UNIVERSAL BUSINESS AUTOMATION, INC.
INVENTORY MANAGEMENT SYSTEM
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: Altos: CP/M; IBM PC: MP/M
Memory Required: 56.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595 to $745
Number Installed to Date: 50
Date First Installed: 1981
(See Vendor Profile Page V-115)

VISICORP
VISISCHEDULE
Specific Application: Project Scheduling and Job Costing
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III; APPLE-DOS, IBM PC: PC-DOS; Commodore, Atari 800
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: 1900
(See Vendor Profile Page V-117)

WALLACE COMPUTER SERVICES, INC.
BASIC PRINTWARE
Specific Application: Bar-Coding
Specific Industry: Manufacturing
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1981
(See Vendor Profile Page V-117)

WILMARK, INC.
INVENTORY CONTROL
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B20; Convergent Technologies AWS. Btos; Convergent Technologies: AWI
Memory Required: 384.0K bytes
Source Language: Adept
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-117)

BANKING

ADVANCED COMPUTER SYSTEMS,INC.
ALPS (ADVANCED LOAN PROCESSING SYSTEM)
Specific Application: Larger Bank Commercial Loans
Specific Industry: Banking/Financial
System Requirements: NCR: Idps, NCR: Imos, NCR: IRX, NCR: ITX
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: January 1982
(See Vendor Profile Page V-3)

ADVANCED COMPUTER SYSTEMS,INC.
ASSET/LIABILITY MANAGEMENT SYSTEM
SPECIFIC INDUSTRY: Banking/Financial
System Requirements: NCR: Idps, NCR: Imos; NCR: IRX, NCR: ITX
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 165
Date First Installed: January 1983

ADVANCED COMPUTER SYSTEMS,INC.
BANKER 80
Specific Application: Full Service Banking System
Specific Industry: Banking/Financial
System Requirements: NCR: Idps; NCR: Imos, NCR: IRX, NCR: ITX
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 750
Date First Installed: 1978

ALEXANDER PROGRAMMING CORP.
BON
Specific Application: Bonds Structuring
Specific Industry: Banking/Financial
System Requirements: Prime 400, Prime 750 Primos
Source Language: Fortran
Purchase Terms: Time-Sharing
(See Vendor Profile Page V-4)

ALEXANDER PROGRAMMING CORP.
MORTGAGE (MOR)
Specific Application: Mortgage Accounting
Specific Industry: Banking/Financial
System Requirements: Prime 400, Prime 750 Primos
Source Language: Fortran
Purchase Terms: Time-Sharing

ALEXANDER PROGRAMMING CORP.
REFUND
Specific Application: Refunding Existing Bond Issues
Specific Industry: Banking/Financial
System Requirements: Prime 400, Prime 750 Primos
Source Language: Fortran
Purchase Terms: Time-Sharing

AMERICAN AUTOMATED
AMERICAN AUTOMATED MORTGAGE LENDING
Specific Application: Mortgage Banking, Data Processing
Specific Industry: Banking/Financial
System Requirements: Burroughs 2900, 3900, 4900 MCP
Memory Required: 155 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1966
(See Vendor Profile Page V-5)

AMERICAN AUTOMATED
CONSTRUCTION LOAN
Specific Application: Accounting for Construction
Specific Industry: Banking/Financial
System Requirements: Burroughs 2900, 3900, 4900 MCP
Memory Required: 155 0K bytes
Source Language: Cobol
Source Code Available: Yes

AMERICAN AUTOMATED
INVENTORY CONTROL/WAREHOUSING
Specific Application: Tracks Mortgage Loans and Provides Loan Production Management Reports
Specific Industry: Banking/Financial
System Requirements: Burroughs 2900, 3900, 4900 MCP
Memory Required: 155 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1966

AMERICAN AUTOMATED
LOAN CLOSING
Specific Application: Provides Loan Documents - Calculations and Disclosures
Specific Industry: Banking/Financial
System Requirements: Burroughs 2900, 3900, 4900 MCP
Memory Required: 155.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1968

AMERICAN AUTOMATED
MORTGAGE LOAN SERVICING
Specific Application: Provides Investor Accounting
Specific Industry: Banking/Financial
System Requirements: Burroughs 2900, 3900, 4900 MCP
Memory Required: 155 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1968

ANACOMP, INC.
BANKSERV CHARGE CARD SYSTEM
Specific Application: Charge Card Processing
Specific Industry: Retail, Banking/Financial, Transportation
System Requirements: IBM 370, 4300, 3000 DOS, OS
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 55
Date First Installed: June 1967
(See Vendor Profile Page V-6)

ANACOMP, INC.
BANKSERV COLLECTION MANAGEMENT SYSTEM
Specific Application: Collection Management
Specific Industry: Retail, Banking,Financial
System Requirements: IBM 370, 4300, 3000 DOS OS
Source Language: Command Level C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 25
Date First Installed: June 1982

ANACOMP, INC.
BANKSERV INSTALLMENT LOAN SYSTEM
Specific Application: Installment Loan Processing
Specific Industry: Banking/Financial
System Requirements: IBM 370, 4300, 3000 DOS OS
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 130
Date First Installed: June 1970

A. O. SMITH DATA SYSTEMS
TYME/SWITCH II
Specific Application: EFT
Specific Industry: Banking/Financial
(See Vendor Profile Page V-6)

APPLIED ADVANCED MANAGEMENT RESEARCH, INC.
FISCAL-CPA
Specific Application: Critical Path Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Prime; Micro Data; Honeywell Ultimate Pick
Source Language: Data Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6 500
Number Installed to Date: 6
Date First Installed: February 1983
(See Vendor Profile Page V-7)

APPLIED COMMUNICATIONS, INC.
BASE24-ATM
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Retail Electronic Funds Transfer (EFT)
Specific Industry: Banking/Financial
System Requirements: Tandem
Purchase Terms: Purchase (license)
Number Installed to Date: 20
Date First Installed: June 1982
(See Vendor Profile Page V-7)

ARBAT SYSTEMS LTD.
ARBAT SERIES 700 INTERNATIONAL BANKING SYSTEM
Specific Application: Modules for International Banking
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11, DEC VAX VMS
Memory Required: 512'0K bytes
Source Language: Arms Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1972
(See Vendor Profile Page V-8)

ARBAT SYSTEMS LTD.
ARBAT SERIES 700 SWIST PACKAGE
Specific Application: Swist
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11, DEC VAX VMS
Memory Required: 512 0K bytes
Source Language: Arms Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 60
Date First Installed: 1979

ARBAT SYSTEMS LTD.
BANKING, SWIST LINK
Specific Application: Banking/Swist Link
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11, DEC VAX VMS
Memory Required: 512.0K bytes
Source Language: Arms Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1972

ARBAT SYSTEMS LTD.
CENTRAL BANK RETURNS
Specific Application: Central Bank Returns
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11, DEC VAX VMS
Memory Required: 512 0K bytes
Source Language: Arms Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1972

ARBAT SYSTEMS LTD.
COMMERCIAL LOANS TRANSACTION PROCESSING
Specific Application: Commercial Loans, Transaction Processing
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11, DEC VAX VMS
Memory Required: 512 0K bytes
Source Language: Arms Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1972

ARBAT SYSTEMS LTD.
DEMAND DEPOSIT ACCOUNTING
Specific Application: Demand Deposit Accounting
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11, DEC VAX, VMS
Memory Required: 512.0K bytes
Source Language: Arms Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1972

ARBAT SYSTEMS LTD.
EUROBONDS
Specific Application: Eurobonds
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11, DEC VAX VMS
Memory Required: 512 0K bytes
Source Language: Arms Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1972

ARBAT SYSTEMS LTD.
FINANCIAL FUTURES TRADING
Specific Application: Financial Futures Trading
Specific Industry: Banking/Financial

System Requirements: DEC PDP-11; DEC VAX VMS
Memory Required: 512.0K bytes
Source Language: Aims Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1972

ARBAT SYSTEMS LTD.
FOREIGN EXCHANGE TRANSACTION PROCESSING
Specific Application: Foreign Exchange Transaction Processing
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11; DEC VAX VMS
Memory Required: 512.0K bytes
Source Language: Aims Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1972

ARBAT SYSTEMS LTD.
FOREIGN NOTES & COINS
Specific Application: Foreign Notes and Coins
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11; DEC VAX VMS
Memory Required: 512.0K bytes
Source Language: Aims Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 108
Date First Installed: 1972

ARBAT SYSTEMS LTD.
FOREIGN EXCHANGE & SWAP PROFITABILITY
Specific Application: Foreign Exchange and Swap Profitability
System Requirements: DEC PDP-11; DEC VAX VMS
Memory Required: 512.0K bytes
Source Language: Aims Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1972

ARBAT SYSTEMS LTD.
FX/LND HEDGING
Specific Application: FX/LND Hedging
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11; DEC VAX VMS
Memory Required: 512.0K bytes
Source Language: Aims Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1972

ARBAT SYSTEMS LTD.
INVESTMENT MANAGEMENT SYSTEM
Specific Application: Investment Management System
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11; DEC VAX VMS
Memory Required: 512.0K bytes
Source Language: Aims Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1972

ARBAT SYSTEMS LTD.
LOANS & DEPOSITS TRANSACTION PROCESSING
Specific Application: Loans and Deposits Transaction Processing
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11; DEC VAX VMS
Memory Required: 512.0K bytes
Source Language: Aims Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1972

ARBAT SYSTEMS LTD.
MULTI BRANCH ACCOUNTING
Specific Application: Multibranch Accounting
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11; DEC VAX VMS
Memory Required: 512.0K bytes
Source Language: Aims Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1972

ARBAT SYSTEMS LTD.
RETAIL FOREIGN DRAFTS
Specific Application: Retail Foreign Drafts
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11; DEC VAX VMS
Memory Required: 512.0K bytes
Source Language: Aims Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1972

ARBAT SYSTEMS LTD.
TRADING DISPLAYS
Specific Application: Trading Displays
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11, DEC VAX VMS
Memory Required: 512.0K bytes
Source Language: Aims Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1972

ARGO DATA RESOURCE CORP.
AD 4700
Specific Application: Finance, Communication, Branch Automation Control
Specific Industry: Banking/Financial
System Requirements: IBM 4700; BSE
Memory Required: 110.0K bytes
Source Language: FCL, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $230,000
Number Installed to Date: 4
Date First Installed: 1983
(See Vendor Profile Page V-6)

ARGO DATA RESOURCE CORP.
CARD HOLDER MANAGEMENT CONTROL SYSTEM
Specific Application: IBM Mainframe Debit Card
Specific Industry: Banking/Financial
System Requirements: IBM System/370; MDS, BSE
Memory Required: 40.0K bytes
Source Language: ALC, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $45,000
Number Installed to Date: 4
Date First Installed: 1982

ARGO DATA RESOURCE CORP.
FINANCIAL SERVICE DELIVERY SYSTEM II (FSDSII)
Specific Application: IBM Host Mainframe Automatic Teller Machine Alteration
Specific Industry: Banking/Financial
System Requirements: IBM SYSTEM/370 MPS, BSE
Memory Required: 40.0K bytes
Source Language: ALC, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50,000
Number Installed to Date: 1
Date First Installed: 1983

ARGO DATA RESOURCE CORP.
FINANCIAL SERVICE DELIVERY SYSTEM I (FSDSI)
Specific Application: ATM Switch Interface
Specific Industry: Banking/Financial
System Requirements: IBM System/370 MDS, BSE
Memory Required: 40.0K bytes
Source Language: ALC, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $90,000
Number Installed to Date: 10
Date First Installed: 1982

ARGO DATA RESOURCE CORP.
FINANCIAL SERVICE DELIVERY SYS 1
Specific Application: Point Teller Automation System
Specific Industry: Banking/Financial
System Requirements: IBM System/370 MDS, BSE
Memory Required: 40.0K bytes
Source Language: ALC, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 1
Date First Installed: 1982

ARKANSAS SYSTEMS, INC.
ASI ON-LINE BANKING ENVIRONMENT
Specific Application: Automated Banking
Specific Industry: Banking/Financial
System Requirements: IBM System/34; SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: December 1982
(See Vendor Profile Page V-9)

ARKANSAS SYSTEMS, INC.
ATM SWITCH INTERFACE
Specific Application: Switch Interface
Specific Industry: Banking/Financial
System Requirements: IBM System/34 SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $11,000
Number Installed to Date: 5
Date First Installed: 1981

ARKANSAS SYSTEMS, INC.
ATM OFFLINE CONVERTER
Specific Application: ATM Interface
Specific Industry: Banking/Financial
System Requirements: IBM System/34 SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 2
Date First Installed: 1981

ARKANSAS SYSTEMS, INC.
AUTOMATED TELLER MACHINE MANAGEMENT
Specific Application: Automated Teller Machine Management
Specific Industry: Banking/Financial
System Requirements: IBM System/34 SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $11,000
Number Installed to Date: 1
Date First Installed: 1982

ARKANSAS SYSTEMS, INC.
BANK CUSTOMER INFORMATION SYSTEM
Specific Application: Banking
Specific Industry: Banking/Financial
System Requirements: IBM System/34 SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $11,000
Number Installed to Date: 11
Date First Installed: 1981

ARKANSAS SYSTEMS, INC.
TELLER TERMINAL MANAGEMENT
Specific Application: Bank Teller Terminal Management
Specific Industry: Banking/Financial
System Requirements: IBM System/34 SSP
Memory Required: 64.0K bytes
Source Language: RPG-II

ATLANTIC DATA SERVICES, INC.
MERRIMACK BANKING SYSTEM
Specific Application: Controlling
Specific Industry: Banking
System Requirements: IBM System/4300 DOS/VSE, IBM System/4300 OS/VS
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-10)

AUTOMATED FINANCIAL SYSTEMS, INC.
TOTAL LOAN INFORMATION SYSTEM
Specific Application: Loan Information
Specific Industry: Banking/Financial
System Requirements: IBM System/370, 4000, 3000, DOS, OS, MVS, Burroughs
Memory Required: 150.0K bytes
Source Language: Cobol
Source Code Available: Yes

Purchase Terms: Purchase (license)
Number Installed to Date: 90
(See Vendor Profile Page V-10)

ATA ASSOCIATES, INC.
MORTGAGE MANAGEMENT HANDLING SYSTEM
Specific Application: Mortgage Processing From Application to Servicing
Specific Industry: Banking/Financial
System Requirements: NEC Astra: Ittos
Memory Required: 384 0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: October 1982
(See Vendor Profile Page V-11)

BANKMATIC SYSTEMS, INC.
THE BANKMATIC SYSTEM
Specific Application: Back Office Processing
Specific Industry: Banking/Financial
System Requirements: DG: R-DOS, AOS
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $65,000
Number Installed to Date: 45
Date First Installed: January 1980
(See Vendor Profile Page V-11)

BOB WHITE COMPUTING & SOFTWARE, INC.
COMMERCIAL LOAN
Specific Application: Commercial Loans
Specific Industry: Banking/Financial
System Requirements: IBM 370: DOS, IBM 4300: OS, IBM 3000
Memory Required: 1.0M bytes
Source Language: BAL, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $24,000 to $28,000
Number Installed to Date: 30
Date First Installed: 1972
(See Vendor Profile Page V-13)

BOB WHITE COMPUTING & SOFTWARE, INC.
DEMAND/DEPOSIT ACCOUNTING
Specific Application: Demand Deposit
Specific Industry: Banking/Financial
System Requirements: IBM 370: DOS, IBM 4300: OS, IBM 3000
Memory Required: 1.0M bytes
Source Language: BAL, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $36,000 to $45,000
Date First Installed: 1974

BOB WHITE COMPUTING & SOFTWARE, INC.
ON-LINE BANKING SYSTEM
Specific Application: Banking
Specific Industry: Banking/Financial
System Requirements: IBM 370: DOS, IBM 4300: OS, IBM 3000
Memory Required: 1.0M bytes
Source Language: BAL, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 35
Date First Installed: 1977

BOB WHITE COMPUTING & SOFTWARE, INC.
ON-LINE CIF
Specific Application: Customer Information File
Specific Industry: Banking/Financial
System Requirements: IBM 3000 Series
Source Language: BAL, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $65
Number Installed to Date: 45
Date First Installed: September 1974

BOB WHITE COMPUTING & SOFTWARE, INC.
SAFE DEPOSIT ADMINISTRATION
Specific Application: Safe Deposit Administration
Specific Industry: Banking/Financial
System Requirements: IBM 370: DOS, IBM 4300: OS, IBM 3000
Memory Required: 1.0M bytes
Source Language: BAL, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $19,000 to $23,000
Number Installed to Date: 3
Date First Installed: 1981

BOB WHITE COMPUTING & SOFTWARE, INC.
SLANG III
Specific Application: EDP Audit Report Writer
Specific Industry: Banking/Financial
System Requirements: IBM 370: DOS, IBM 4300: OS, IBM 3000
Memory Required: 1.0M bytes
Source Language: BAL, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $5,500
Number Installed to Date: 40
Date First Installed: 1973

DATALLACTICS CORP.
NEXUS
Specific Application: Relationship Banking, Combined Statements, Funds Transfer, On-Line Access
Specific Industry: Banking/Financial
System Requirements: IBM 3000, 4300: OS/VS, Amdahl V7 or V8: MVS, NAS: VM
Source Language: Vsam Cobol, OS Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-17)

DATALLACTICS CORP.
PERF4
Specific Application: Investment Performance Analysis
Specific Industry: Banking/Financial
System Requirements: IBM 4300 Series: OS
Memory Required: 2.0M bytes
Source Language: Ansi Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1983

DATALLACTICS CORP.
PERF5
Specific Application: Investment Performance Analysis
Specific Industry: Banking/Financial
System Requirements: IBM: Burroughs
Memory Required: 50 0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 15
Date First Installed: 1982
(See Vendor Profile Page V-18)

CITIZENS AUTOMATED SYSTEMS
CANTON SYSTEM 1000
Specific Application: Savings and Loan Account Access
Specific Industry: Banking/Financial
System Requirements: IBM 4300: DOS/VSE, IBM 370: Cics
Memory Required: 512 0K bytes
Source Language: Ansi Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $170,000
Date First Installed: November 1982
(See Vendor Profile Page V-19)

CITIZENS AUTOMATED SYSTEMS
IMPACTS
Specific Application: Scheduling, Loan Tracking, Document Preparation
Specific Industry: Banking/Financial
System Requirements: IBM: DOS, OS
Memory Required: 256.0K bytes
Source Language: Ansi Cobol, Basic
Source Code Available: No
Purchase Terms: Purchase (license)

COMPLEX SYSTEM, INC.
BASIC-TO-BASIC REIMBURSEMENTS
Specific Application: Reimbursement
Specific Industry: Banking/Financial
System Requirements: IBM System/34: SSP; IBM System/38
Source Language: RPG, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
(See Vendor Profile Page V-22)

COMPLEX SYSTEM, INC.
BANKERS ACCEPTANCE
Specific Application: Bankers Acceptance
Specific Industry: Banking/Financial
System Requirements: IBM System/34: SSP; IBM System/38
Source Language: RPG, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease

COMPLEX SYSTEM, INC.
COLLEC
Specific Application: International Collections
System Requirements: IBM System/34: SSP; IBM System/38
Source Language: RPG, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 10

COMPLEX SYSTEM, INC.
COMMERCIAL LOANS
Specific Application: Commercial Loans
Specific Industry: Banking/Financial
System Requirements: IBM System/34: SSP; IBM System/38
Source Language: RPG, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease

COMPLEX SYSTEM, INC.
FORTRESS
Specific Application: Foreign Exchange, Treasury
System Requirements: IBM System/34: SSP; IBM System/38
Source Language: RPG, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease

COMPLEX SYSTEM, INC.
FUNDS TRANSFER & CONTROL
Specific Application: Funds Transfer and Control
Specific Industry: Banking/Financial
System Requirements: IBM Series/1: RPS
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease

COMPLEX SYSTEM, INC.
OFFSHORE BANKING
Specific Application: Offshore Banking
Specific Industry: Banking/Financial
System Requirements: IBM System/34: SSP; IBM System/38
Source Language: RPG, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease

COMPUTER DEVELOPMENT SERVICES, INC.
MINICHECK
Additional Product Classification: Sort/Merge, Data/File Management, Adjustments Balancing, Job Entry
Specific Industry: Banking/Financial
System Requirements: IBM PC
Memory Required: 256.0K bytes
Source Language: Basic, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $89,000
Date First Installed: 1983
(See Vendor Profile Page V-24)

COMPUTER MARKETING CORP.
FLEX/34
Specific Application: Credit Union Data Processing
Specific Industry: Banking/Financial
System Requirements: IBM System/34: SSP; IBM System/38: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75,000
Number Installed to Date: 3
Date First Installed: June 1981

COMPUTER SHARING CORP. SERVICES
CREDIT UNION TURNKEY SYSTEM
Specific Application: Teller Service, Printing Checks and Receipts
Specific Industry: Banking/Financial
System Requirements: TI 60, 30, 60: DX-10
Memory Required: 256.0K bytes
Source Language: Cobol

Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1975
(See Vendor Profile Page V-26)

COMPUTER SOFTWARE SPECIALISTS, INC.
LOAN PROCESSOR
Specific Application: Mortage and Loan Closing
Specific Industry: Banking/Financial
System Requirements: Wang 2200; Wang Basic
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
[illegible] 1975
(See Vendor Profile Page V-26)

COMPUTER USAGE CO.
FUNDS TRANSFER, FUNDS CONTROL
Specific Application: Bank Accounting
Specific Industry: Banking/Financial
System Requirements: Qantel; DEC PDP-11 · RSX-11M; Tandem: Guardian
Memory Required: 64.0K bytes
Source Language: Cobol, Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125,000 to $250,000
[illegible]
Date First Installed: 1974
(See Vendor Profile Page V-26)

COMPUTER USAGE CO.
IBM INTERACTION (BANKING)
Specific Application: Letters of Credit, Acceptance, Collection and Reimbursement
Specific Industry: Banking/Financial
System Requirements: IBM 4300; DOS, VSE
Memory Required: 2.0M bytes
Source Language: Cobol, IBM Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible]
[illegible]

COMPUTROL, INC.
BASE
Specific Application: Audit Software
Specific Industry: Banking/Financial
System Requirements: IBM; Burroughs, NCR
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $16,000
[illegible]
(See Vendor Profile Page V-28)

COMPUTROL, INC.
CREDIT COLLECTION SYSTEM
Specific Industry: Banking/Financial
System Requirements: IBM, NCR; Burroughs
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
[illegible]

COMPUTROL, INC.
INVESTMENT DEPOSIT SYSTEM
Specific Application: Investment Deposit
Specific Industry: Banking/Financial
System Requirements: IBM, NCR
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 4

COMPUTROL, INC.
KITING DETECTION
Specific Application: Kiting Detection
Specific Industry: Banking/Financial
System Requirements: IBM, NCR, Burroughs
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 30
(See Vendor Profile Page V-28)

COMPUTROL, INC.
LOAN MANAGEMENT SYSTEM
Specific Application: Loan Management
Specific Industry: Banking/Financial
System Requirements: IBM, NCR; Burroughs
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 4

COMSHARE
EMPLOYEE BENEFIT SYSTEM (EBS)
Specific Application: Trust Recordkeeping
Specific Industry: Banking/Financial
System Requirements: IBM System/360: DOS, OS
Memory Required: 356.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1973
(See Vendor Profile Page V-29)

COMSHARE
PAYSOP/TRASOP II
Specific Application: Recordkeeping for Payroll Based on Tax Reduction and Stock Ownership
Specific Industry: Not Industry Specific
System Requirements: IBM System/360: DOS, OS
Memory Required: 356.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1977

COMSHARE
PENSIONPAY SYSTEM
Specific Application: Benefit Payment
Specific Industry: Banking/Financial
System Requirements: IBM 360/40: DOS, OS
Memory Required: 356.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1973

COMTECTRA SYSTEMS, INC.
FIRST RATE LOAN
Specific Application: Lock-In Rate for Loan or Future Market
Specific Industry: Banking/Financial
System Requirements: Burroughs B7800; IBM, Data Media
Source Language: PL1, Cobol, Basic, Fortran
Purchase Terms: Purchase (license)

COMTECTRA SYSTEMS, INC.
LOAN CONTROL SYSTEM
Specific Application: Provides Statistics for Mortgage Loan Officers
Specific Industry: Banking/Financial
System Requirements: Burroughs B7800
Source Language: Cobol, PL/1, Fortran
Purchase Terms: Lease
(See Vendor Profile Page V-29)

COMTECTRA SYSTEMS, INC.
LOAN ORIGIN TRACKING SYSTEM
Specific Application: Monitors Cash Flow, Prepares Closing Documents
Specific Industry: Banking/Financial
System Requirements: IBM Series/ 2, Data Media; Evolution
Source Language: Basic
Purchase Terms: Purchase (license)

COMTECTRA SYSTEMS, INC.
MORTGAGE INDEX
Additional Product Classification: Report Generator
Specific Application: Data Base on Central Marketplace
Specific Industry: Banking/Financial
System Requirements: Burroughs B7850
Source Language: Cobol, Fortran, PL/1
Purchase Terms: Lease

COMTECTRA SYSTEMS, INC.
PORTFOLIO SYSTEM
Specific Application: Portfolio Management
Specific Industry: Banking/Financial
System Requirements: Burroughs B7800
Source Language: Cobol, PL/1, Fortran
Purchase Terms: Lease

COMTECTRA SYSTEMS, INC.
SCHEDULED AMORTIZATION
Specific Application: Tracks Amortizations, Schedules Land Write-Offs
Specific Industry: Banking/Financial
System Requirements: IBM Series/ 1; Data Media, Evolution
Source Language: Basic
Purchase Terms: Purchase (license)

CONCORD COMPUTING
FINANCIAL SWITCH
Specific Application: Allows In-Store Banking Functions to Take Place In A Shared Banking Environment
Specific Industry: Retail, Banking/Financial
System Requirements: Tandem: Guardian
Source Language: TAL, Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100,000
[illegible]
Date First Installed: May 1983
(See Vendor Profile Page V-29)

CONVEY COMPANIES, INC.
CREDIT APPLICATION AND TRACKING VER. 1
Specific Application: Loan Application Processing and Tracking
System Requirements: IBM 370; DOS/VS, [illegible]
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
[illegible]
(See Vendor Profile Page V-30)

CONVEY COMPANIES, INC.
LOAN CLOSING & TRACKING SYSTEM IMPACTS
Specific Application: Loan Closing, & Tracking
Specific Industry: Banking/Financial
System Requirements: IBM 370, 4300 Series, 3030 Series: DOS, OS
Memory Required: 128.0K bytes
Source Language: AL, Cobol
Source Code Available: [illegible]
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 4
Date First Installed: September 1982

CORPORATE DATA SYSTEMS
BANK ASSET LIABILITY MANAGEMENT SYSTEM
Specific Application: Banking
Specific Industry: Not Industry Sensitive
System Requirements: IBM Micro; [illegible] PC
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
[illegible]
(See Vendor Profile Page V-31)

CORPORATE DATA SYSTEMS
DEPOSIT 80
Specific Application: Integrated Banking Deposit
Specific Industry: Banking/Financial
System Requirements: IBM 4300; DOS, OS
Source Language: Cobol, Data [illegible]
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

CYBERNETICS
LOAN TRACK
Specific Application: Mortgage Loan Servicing for State Agencies Giving Low-Income Loans
Specific Industry: Government
System Requirements: IBM 370; DOS, OS, MVS. IBM PC PC-DOS, Burroughs B20 Mini, HP 3000
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $30,000
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-34)

CYTEL, INC.
DISTRIBUTION CONTROL SYSTEM)
Specific Application: Common Stock Computation Proof of Underwriting
Specific Industry: Banking/Financial
System Requirements: IBM 370; MVT· MVS
Memory Required: 600.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $120,000
[illegible]
(See Vendor Profile Page V-34)

DATA CARD CORP.
DOCUMENT IMAGE
Specific Application: Banking
Specific Industry: Banking, Financial
System Requirements: DG Nova 4C
Memory Required: 64.0K bytes
Source Language: Assembly
Purchase Terms: Lease
Number Installed to Date: 15
Date First Installed: March 1982
(See Vendor Profile Page V-35)

DATA INFORMATION SYSTEMS CORP.
ON-LINE GENERAL LEDGER-NCR'S
Specific Application: On-Line General Ledger
Specific Industry: Banking/Financial
System Requirements: NCR 8400, [illegible] Series: VRX
Memory Required: 200.0K bytes
Source Language: Nest/3
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 15
Date First Installed: April 1982
(See Vendor Profile Page V-36)

DATA SYSTEMS CONSULTANTS, INC.
BANK ACCOUNT RECONCILIATION
Specific Application: Bank Account Reconciliation
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: Virtual Cobol, IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $825
Number Installed to Date: 50
Date First Installed: 1977
(See Vendor Profile Page V-38)

DELOITTE HASKINS & SELLS
ALAMO
Specific Application: Asset Liability Analysis
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS, IBM 4300, 3083: DOS/VSE
Memory Required: 128.0K bytes
Source Language: DSS/F, ffps
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000 to $30,000
Number Installed to Date: 24
Date First Installed: July 1982
(See Vendor Profile Page V-40)

DESIGN SYSTEMS, INC.
CREDIT UNION
Specific Application: Credit Union Share Accounting
Specific Industry: Banking/Financial
System Requirements: IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); [illegible] Lease
Price: $3,000
Date First Installed: January 1981
(See Vendor Profile Page V-41)

DIEBOLD, INC.
DOTS (DIEBOLD ON-LINE TERMINAL)
Specific Application: ATM Network Management
Specific Industry: Banking/Financial
System Requirements: IBM 370: OS, DOS, MVS
Memory Required: 30.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 25
Date First Installed: March 1981
(See Vendor Profile Page V-41)

DIRECTIONS, INC.
VECTOR I
Additional Product Classification: Check Processing
Specific Application: Item Processng Analysis and Reporting
Specific Industry: Banking/Financial
System Requirements: DOS, OS, MVS
Memory Required: 70.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $36,000
Number Installed to Date: 60
Date First Installed: 1976
(See Vendor Profile Page V-43)

DIRECTIONS, INC.
VECTOR II
Additional Product Classification: Check Processing
Specific Application: User Controlled Table Generator
Specific Industry: Banking/Financial
System Requirements: IBM 4300 Series, DOS, IBM System/360: OS, IBM System/370: MVS; IBM 3380 Series
Memory Required: 100.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $24,000
Number Installed to Date: 40
Date First Installed: 1977

DIRECTIONS, INC.
VECTOR III
Additional Product Classification: Check Processing
Specific Application: Bulk Filing On-Line Find/Sort Support
Specific Industry: Banking/Financial
System Requirements: IBM 4300 Series: DOS, IBM System/360: OS; IBM System/370: MVS, IBM 3380
Memory Required: 100.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $32,000
Number Installed to Date: 80
Date First Installed: September 1978

DIRECTIONS, INC.
VECTOR V
Additional Product Classification: Check Processing
Specific Application: On-Line Automated Return/Exception Item Processing
Specific Industry: Banking/Financial
System Requirements: IBM 4300 Series, IBM System/360: OS, IBM System/370: MVS; IBM 3380 Series
Memory Required: 100.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 8
Date First Installed: 1982

DISK, INC.
DISC ACCOUNTING RECONCILIATION PACKAGE (ARP)
Specific Application: Reconciling of Checking Accounts for Commercial Banks
Specific Industry: Banking/Financial
System Requirements: IBM 4300, 3000: OS, DOS, IBM 370
Memory Required: 150.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 400
Date First Installed: 1979
(See Vendor Profile Page V-43)

DISK, INC.
DISC COMBINED INTEREST REPORTING SYSTEM (IRS)
Specific Application: Combines Year-End Information Required By the IRS
System Requirements: IBM 360, 370: OS, DOS; Burroughs
Memory Required: 150.0K bytes
Source Language: Cobol, ALC
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 150
Date First Installed: 1973

DISK, INC.
DISC RETIREMENT REPORTING SYSTEM (RRS)
Specific Application: Automates Processing, Customer and Back-Office Reporting, Distribution Functions
Specific Industry: Banking/Financial
System Requirements: IBM 370, 4300: OS, DOS; Burroughs; NCR
Memory Required: 150.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 150
Date First Installed: 1978

DISK, INC.
DISC CASH DISBURSEMENT FLOAT MANAGEMENT SYSTEM (DFMS)
Specific Application: Tracks Time for Check Clearance
Specific Industry: Banking/Financial
System Requirements: IBM 4300, 3000, 370: OS, DOS; Burroughs; NCR
Memory Required: 150.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000

DISK, INC.
DISC FEDERAL RESERVE/CORRESPONDENT
System Requirements: IBM 370, 4300: OS, DOS, Burroughs
Memory Required: 120.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 11
Date First Installed: 1981

DP PROGRAMMING CO.
CONSUMER LOAN PACKAGE
Additional Product Classification: Accounting
Specific Application: Consumer Loan Package
Specific Industry: Banking/Financial
System Requirements: IBM
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 1
Date First Installed: April 1983
(See Vendor Profile Page V-43)

DYATRON, INC.
MORTGAGE LOAN SYSTEM
Specific Application: Mortgage Loan Servicing
Specific Industry: Banking/Financial
System Requirements: IBM: OS/DOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $170,000
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-44)

DYATRON, INC.
PRO-TRUST INFORMATION SYSTEM
Specific Application: Provides Trust Accounting and Information Services for Financial Institutions
Specific Industry: Banking/Financial
System Requirements: IBM: OS/DOS
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $110,000 to $275,000
Date First Installed: 1975

DYNALOGIC
DYNALOGIC SAVINGS & LOAN SYSTEM
Specific Application: Savings and Loan
Specific Industry: Banking/Financial, Nonprofit Organizations
System Requirements: Wang VS: VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 1
Date First Installed: November 1982
(See Vendor Profile Page V-44)

DYNALOGIC, INC.
SAVINGS & LOAN SYSTEM
Specific Application: Savings and Loan
Specific Industry: Banking/Financial
System Requirements: Wang VS: DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000

EFT COMPUTER SYSTEMS, INC.
AUTOMATED COLLECTIONS SYSTEM
Specific Application: Automates Collection Process
Specific Industry: Banking/Financial
System Requirements: NCR 9040, 9050, 9300; IBM System/34; System/36, System/38
Memory Required: 128.0K bytes

Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: [illegible]
(See Vendor Profile Page V-45)

EFT COMPUTER SYSTEMS, INC.
CUSTOMER LOOK-UP (EFT-CLUE)
Specific Application: NYC Clearing House Customer ID Numbers
Specific Industry: Banking/Financial
System Requirements: IBM PC-XT, IBM System/34; IBM 4300; NCR 9040, 9050, 9300
Memory Required: 64.0K bytes
Source Language: Ansi Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $15
Number Installed to Date: 6
Date First Installed: May 1982

ELECTRONIC DATA SYSTEMS CORP.
COLLECTOR
Specific Application: Manages Collector System of Accounts, Obtains Credit Reports
Specific Industry: Banking/Financial
System Requirements: IBM
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-46)

ELECTRONIC DATA SYSTEMS CORP.
CREDIT BILLING SYSTEM
Additional Product Classification: Accounting
Specific Application: Maintenance of Accounts Receivable Master File, Management Reports, Monthly Statements
Specific Industry: Banking/Financial
System Requirements: IBM
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1980

EMPLOYEE COMMUNICATION SERVICES
IRAK RETIREMENT ACCOUNTING SYSTEMS
Additional Product Classification: Languages, Compilers/Assemblers
Specific Application: Tax Sheltered Savings Plan
Specific Industry: Banking/Financial
System Requirements: IBM 4331; DOS/VSE; Honeywell 6; Wicat; MOS
Memory Required: 256.0K bytes
Source Language: RM-Cobol, Cobol
Source Code Available: [illegible]
Purchase Terms: Lease
Price: $30,000
Number Installed to Date: 3
Date First Installed: July 1982
(See Vendor Profile Page V-46)

FINANCIAL SOFTWARE OF AMERICA, INC.
CUSTOMER SYSTEM
Specific Application: Storage, Maintenance and Inquiry of Customer Name and Address, Accounting Cross Reference
Specific Industry: Banking/Financial
System Requirements: IBM 370; IBM 4300; DOS/VSE, OS, IBM 3030; VS, MVS, Vsam, IBM 3080; Cics
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 15
Date First Installed: 1982
(See Vendor Profile Page V-48)

FINANCIAL SOFTWARE OF AMERICA, INC.
DEPOSIT SYSTEM
Specific Application: Processing Capabilities, Cash Management Accounting
Specific Industry: Banking/Financial
System Requirements: IBM 370; IBM 4300 DOS/VSE, OS, IBM 3030 Series, VS, MVS, Vsam, IBM 3080 Series, Ocs
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 75
Date First Installed: 1979

FINANCIAL SOFTWARE OF AMERICA, INC.
ON-LINE RETURNED & EXCEPTION ITEM SYSTEM
Specific Industry: Banking/Financial
System Requirements: IBM 370; IBM 4300 DOS, VSE, OS, IBM 3030 Series, VS, MVS, Vsam, IBM 3080 Series, Cics
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 12
Date First Installed: 1982

FINANCIAL SOFTWARE OF AMERICA, INC.
PROFITABILITY SYSTEM
Specific Application: Provides Service Charge Analysis, Customer Profitability/Loss Management Reporting
Specific Industry: Banking/Financial
System Requirements: IBM 3030 Series; VS, MVS, Vsam, IBM 3080 Series; Cics
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 25
Date First Installed: 1981

FINANCIAL SOFTWARE OF AMERICA, INC.
PROOF OF DEPOSIT PLUS
Specific Application: On-Line Capture and Transit Processing
Specific Industry: Banking/Financial
System Requirements: IBM 370; IBM 4300 DOS/VSE,OS, IBM 3030; VS, MVS, Vsam, IBM 3080; Cics
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 60
Date First Installed: 1977

FINANCIAL SOFTWARE OF AMERICA, INC.
TIME INVESTMENT SYSTEM
Specific Application: Provides Processing Capability for Certificates of Deposit, Money Market Certificates and O/D Certificates
Specific Industry: Banking/Financial
System Requirements: IBM 370; IBM 4300 DOS/VSE OS, IBM 3030 Series VS, MVS, Vsam, IBM 3080 Series Cics
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1983

FINANCIAL TECHNOLOGY, INC.
COMMERCIAL LOAN PORTFOLIO MANAGEMENT
Specific Application: Commercial Loan Portfolio Management
Specific Industry: Banking/Financial
System Requirements: Burroughs B1000 MCP, NCR Criterion
Memory Required: 40.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,500 to $35,000
Number Installed to Date: 50
Date First Installed: 1979
(See Vendor Profile Page V-49)

FINANCIAL TECHNOLOGY, INC.
FIXED ASSET MGMT
Specific Application: Fixed Asset Management
Specific Industry: Banking/Financial
System Requirements: Burroughs B1000 MCP, NCR Criterion
Memory Required: 40.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,500 to $35,000
Number Installed to Date: 50
Date First Installed: 1981

FRANKEL ENGINEERING LABORTORIES, INC.
CREDIT UNION MANAGEMENT
Specific Application: Credit Union Transaction-Processing
Specific Industry: Banking/Financial
System Requirements: HP 3000, MPE
Memory Required: 512.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-50)

GREAT SYSTEM SOFTWARE FINANCIAL PARTNER
Specific Application: General Business
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license), Rental, Lease
Price: $349
(See Vendor Profile Page V-52)

HOGAN SYSTEMS
ONLINE DELIVERY SYSTEM
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Real Time Transaction Controller
Specific Industry: Banking/Financial
System Requirements: IBM DOS/OS
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 14
Date First Installed: August 1982
(See Vendor Profile Page V-55)

HOGAN SYSTEMS
PLASTIC CARD SYSTEM
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Banking System/Card Processing
Specific Industry: Banking/Financial
System Requirements: IBM DOS/OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

HOGAN SYSTEMS
TIME DEPOSITS SYSTEM
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Demand and Time Deposits
Specific Industry: Banking/Financial
System Requirements: IBM DOS/OS
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: November 1979

HOGAN SYSTEMS
INSTALLMENT LOANS SYSTEM
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Loan Processing
Specific Industry: Banking/Financial
System Requirements: IBM DOS/OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 20
Date First Installed: July 1982

HOGAN SYSTEMS
TRUST SYSTEM
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Customer Information, Product Pricing
Specific Industry: Banking/Financial
System Requirements: IBM DOS/OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 41
Date First Installed: April 1981

HOGAN SYSTEMS
UMBRELLA SYSTEM
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Industry: Banking/Financial
System Requirements: IBM DOS/OS
Source Language: Assembler, Cobol

Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 65
Date First Installed: November 1979

HOUSTON TIME SHARING [illegible]
Specific Application: Syndicating and Billing, Bidding
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11; RSTS/E
Memory Required: 32.0K bytes
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-55)

[illegible] SYSTEMS, INC.
CIRS (CENTRALIZED INVESTMENT RESEARCH SYSTEM)
Specific Application: Provides Financial History, Current and Previous Estimating and Recommendations, Price History
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-57)

INDEX SYSTEMS, INC.
INTERNATIONAL BANKING SYSTEM
Specific Application: Multicurrency Accounting, On-Line Account Posting, Automatic Cyclical Statements and Translation
Specific Industry: Banking/Financial, [illegible]
System Requirements: IBM: VMS; DEC VAX: VAX Basic; DEC 11/70: RSX-11M+
Purchase Terms: Purchase (license)

INDEX SYSTEMS, INC.
[illegible] PERFORMANCE ANALYZER AND COMPARATIVE
Specific Application: Comprehensive Performance Measurement
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM
Purchase Terms: Purchase (license)

INFORMATION CONCEPTS, INC.
[illegible] TRUST FUND ACCOUNTING SYSTEM
Specific Application: Trust Fund Management
Specific Industry: Labor Trust Fund
System Requirements: DEC VAX: [illegible]
Memory Required: 1.0M bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: [illegible]
(See Vendor Profile Page V-55)

INFORMATION PROCESSING CORP.
PLASTIC CARD CONTROL MANAGEMENT
Specific Application: Plastic Card Control Management
Specific Industry: Banking/Financial
System Requirements: IBM: DOS; Tandem
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 50
Date First Installed: 1981
(See Vendor Profile Page V-58)

INFORMATION PROCESSING CORP.
SWITCH NETWORK
Specific Application: Switch Network
Specific Industry: Banking/Financial
System Requirements: Tandem
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150,000
Number Installed to Date: 4
Date First Installed: 1982

INFORMATION PROCESSING CORP.
UNIVERSAL ATM SYSTEM
Specific Application: Automatic Teller Machines
Specific Industry: Banking/Financial
System Requirements: IBM DOS/OS, Tandem
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $60,000
Number Installed to Date: 75
Date First Installed: 1972

INFORMATION SYSTEMS, INC.
PORTFOLIO MANAGEMENT PACKAGE
Specific Application: Keeps Track of Client Portfolios
Specific Industry: Banking/Financial
System Requirements: TI: DX 10
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,450
Number Installed to Date: [illegible]
Date First Installed: 1982
(See Vendor Profile Page V-58)

INFORMATION TECHNOLOGY, INC.
ATM SYSTEM
Specific Application: Allows Bank to be Involved in An Outside or Inside ATM Network
Specific Industry: Banking/Financial
System Requirements: Burroughs B90; Burroughs B900: CMS, Burroughs B1000: Native
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 50
Date First Installed: 1981
(See Vendor Profile Page V-58)

INFORMATION TECHNOLOGY, INC.
BDS SYSTEM
Specific Application: Demand Deposit Accounting, Certificates of Deposit, Loan Allocating, General Ledger, Savings
Specific Industry: Banking/Financial
System Requirements: Burroughs B90: CMS, Burroughs B900; Burroughs B1000
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35,000 to $95,000
Number Installed to Date: 275
Date First Installed: 1978

INFORMATION TECHNOLOGY, INC.
CHECK RECONCILIATION SYSTEM
Specific Application: Provides Capability for Check Reconciliation
Specific Industry: Banking/Financial
System Requirements: Burroughs B90, Burroughs B900: CMS; Burroughs B1000: Native
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,900
Number Installed to Date: 3
Date First Installed: 1983

INFORMATION TECHNOLOGY, INC.
TELLER TERMINALS SYSTEM
Specific Application: Performs Teller Functions
Specific Industry: Banking/Financial
System Requirements: Burroughs B90, B900: CMS; Burroughs B1000: Native
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,900
Number Installed to Date: 50
Date First Installed: 1981

[illegible], INC.
VIDEOBANKING SYSTEM
Specific Application: Marketing and Promotion
Specific Industry: Banking/Financial
System Requirements: CP/M; PC-DOS
Memory Required: 64.0K bytes
Source Language: Forth
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $13,000
Number Installed to Date: 4
Date First Installed: May 1983
(See Vendor Profile Page V-59)

INNOVATIVE SYSTEMS, INC.
BANK GEO
Additional Product Classification: Insurance
Specific Application: Banking/Insurance Package
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM [illegible] OS/VSI; IBM 370: DOS/VS; IBM 308X: MVS, IBM 433X
Memory Required: 200.0K bytes
Source Language: Cobol, [illegible] Assembler
Purchase Terms: Purchase (license)
Date First Installed: [illegible]
(See Vendor Profile Page V-59)

INNOVATIVE SYSTEMS, INC.
BANK MERGE
Additional Product Classification: Insurance
Specific Application: Banking/Insurance Package
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM 360: OS/VSI; IBM 370: DOS/VS; IBM 308X: MVS, IBM 433X
Memory Required: 200.0K bytes
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1978

INNOVATIVE SYSTEMS, INC.
BANK ZIP
Additional Product Classification: Insurance
Specific Application: Banking/Insurance Package
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM 360: OS/VSI, IBM 370: DOS/VS; IBM 308X: MVS, IBM 433X
Memory Required: 200.0K bytes
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983

INNOVATIVE SYSTEMS, INC.
BANKCASE
Additional Product Classification: [illegible]
Specific Application: Banking/Insurance Package
Specific Industry: Banking/Financial, [illegible]
System Requirements: IBM 360: OS/VSI, IBM 370: DOS/VS; IBM 308X: MVS, IBM 433X
Memory Required: 200.0K bytes
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 7
Date First Installed: 1982

INNOVATIVE SYSTEMS, INC.
BANKMARKET
Additional Product Classification: [illegible]
Specific Application: Banking/Insurance Package
Specific Industry: Banking/Financial, [illegible]
System Requirements: IBM 360: OS/VSI, IBM 370: DOS/VS; IBM 3080: MVS, IBM 433X
Memory Required: 200.0K bytes
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1982

INNOVATIVE SYSTEMS, INC.
BANKMATCH
Additional Product Classification: Insurance
Specific Application: Banking/Insurance Package
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM 360: OS/VSI, IBM 370: DOS/VS; IBM 3080: MVS, IBM 4330
Memory Required: 200.0K bytes
Source Language: Cobol, [illegible]
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1976

INNOVATIVE SYSTEMS, INC.
BANKSCRUB/ANALIZER
Additional Product Classification: Insurance
Specific Application: Banking/Insurance

Specific Industry: Banking/Financial, Insurance
System Requirements: IBM 360: OS/VSI, IBM 370: DOS/VS; IBM 3080: MVS, IBM 4330
Memory Required: 200.0K bytes
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 6
Date First Installed: 1983

INNOVATIVE SYSTEMS, INC.
BANKSCRUB/CONVERSION
Additional Product Classification: Insurance
Specific Application: Banking/Insurance Package
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM 360: OS/VSI, IBM 370: DOS/VS; IBM 3080: MVS, IBM 4330
Memory Required: 200.0K bytes
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 300
Date First Installed: 1976

INNOVATIVE SYSTEMS, INC.
BATCH CIF
Additional Product Classification: Insurance
Specific Application: Banking/Insurance Package
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM 360: OS/VSI, IBM 370: DOS/VS; IBM 3080: MVS, IBM 4330
Memory Required: 200.0K bytes
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1982

INNOVATIVE SYSTEMS, INC.
COMPMATCH
Additional Product Classification: Insurance
Specific Application: Banking/Insurance
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM 360: OS/VSI, IBM 370: DOS/VS; IBM 3080: MVS, IBM 4330
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1982

INNOVATIVE SYSTEMS, INC.
MARKETING INFORMATION SYSTEM
Additional Product Classification: Insurance
Specific Application: Banking/Insurance Package
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM 360: OS/VSI, IBM 370: DOS/VS; IBM 3080: MVS, IBM 4330
Memory Required: 200.0K bytes
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: 1983

INSURANCE SALES SYSTEMS
PROPOSAL HR-10
Additional Product Classification: Insurance
Specific Application: Insurance and Banking
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM: CP/M, Columbia, Televideo, Altos
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1979
(See Vendor Profile Page V-59)

INTERACTIVE COMPUTER SYSTEMS, INC.
ASSET/LIABILITY MANAGEMENT SYSTEM
Specific Application: Forecasting, Differentiates Between Assets and Liabilities
Specific Industry: Banking/Financial
System Requirements: TI: DX-10; IBM: PC-DOS; Apple: CP/M; Onyx; Oasis
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 56
Date First Installed: 1981
(See Vendor Profile Page V-60)

INTERACTIVE COMPUTER SYSTEMS, INC.
LOAN PROFITABILITY ANALYSIS
Specific Application: Evaluates Bank Loan Portfolios
Specific Industry: Banking/Financial
System Requirements: TI: DX-10; IBM: PC-DOS, Apple: CP/M; Onyx: Oasis
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 28
Date First Installed: 1981

INVESTORS IN DATA PROCESSING, INC.
PEPS (COMMERCIAL BANKS)
Specific Application: Proof Items Processed By Banks
Specific Industry: Banking/Financial
System Requirements: CDC 92; TI 990/10
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 8
Date First Installed: March 1983
(See Vendor Profile Page V-61)

INVESTORS IN DATA PROCESSING, INC.
PEPS (SAVINGS AND LOANS)
Specific Application: Savings and Loans Out Clearing, Capture and Cash Letter
Specific Industry: Banking/Financial
System Requirements: CDC 92, TI 99
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: March 1983

I.P.S., INC.
INTERACTIVE CREDIT UNION SYSTEM
Specific Application: Credit Union Management and Operation
Specific Industry: Banking/Financial
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Price: $25,000
Number Installed to Date: 2
Date First Installed: June 1982
(See Vendor Profile Page V-61)

JACK HENRY & ASSOCIATES, INC.
CIF 34
Specific Application: Customer Information File, Deposit Accounts, Loan Accounts, General Ledger, Budgeting, Bond Accounting, Safe Deposit, Stockholders Audit
Specific Industry: Banking/Financial
System Requirements: IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $24,000 to $49,000
Number Installed to Date: 210
Date First Installed: March 1977
(See Vendor Profile Page V-62)

J. R. KIRWAN & CO.
PORTFOLIO MANAGEMENT SYSTEM
Specific Application: Portfolio Management, Securities and Stocks
System Requirements: Sperry BC 7
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license), Rental, Lease
Price: $75,000
Number Installed to Date: 7
Date First Installed: September 1981
(See Vendor Profile Page V-63)

KASENT CORP.
ON LINE BANKING SYSTEM
Specific Application: On-Line Banking
Specific Industry: Banking/Financial
System Requirements: Stratus: VOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150 000
Date First Installed: September 1982
(See Vendor Profile Page V-63)

KEYSTONE COMPUTER ASSOCIATES, INC.
BANK CONTROL SYSTEM
Specific Application: Money Market, Foreign Exchange, Swift Chips
Specific Industry: Banking/Financial
System Requirements: IBM CICS: DOS/VS, GA 4
Source Language: Cobol, Telon
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: September 1975
(See Vendor Profile Page V-64)

KINBROUGH COMPUTER SALES, INC.
EXECUTIVE LINE OF CREDIT PACKAGE
Specific Application: Accounts Receivable, Accounts Payable
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11: TSX-11
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Date First Installed: 1981
(See Vendor Profile Page V-64)

KINBROUGH COMPUTER SALES, INC.
LOANCALC
Additional Product Classification: Accounting
Specific Application: Loan Calculations for Consumer and Commercial Loans, Prepares Loan Documents, User Definable Forms
Specific Industry: Banking/Financial
System Requirements: DEC Rainbow, IBM PC: PC-DOS; Apple II: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 15
Date First Installed: February 1982

LOGICAL SYSTEMS
BANKING
Specific Application: Turn Key Banking, Demand Deposit, Checking, Automatic Teller, General Ledger
Specific Industry: Banking/Financial
System Requirements: DEC, POS, RSTS, RSX
Memory Required: 128.0K bytes
Source Language: Basic, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $6,000
Date First Installed: 1982
(See Vendor Profile Page V-66)

MAGNUM COMMUNICATIONS, LTD.
CREDIGRANT
Specific Application: New Account Application Processing
Specific Industry: Retail, Banking/Financial
System Requirements: IBM Mainframe Cics
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-67)

MANAGEMENT COMPUTING CONSULTANTS
BANK 90
Specific Application: On-Line Tellers, Loan Accounting, Time Deposit Accounting, General Ledger
Specific Industry: Banking/Financial
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: RPG-II, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)

Price: $4,500
Number Installed to Date: 45
(See Vendor Profile Page V-68)

MANOF COMMUNICATIONS SYSTEMS, INC.
MANOF BANKING SYSTEM MBS
Specific Application: Money Transfer, Networks Gateway
Specific Industry: Banking/Financial
System Requirements: IBM Series/1 EDX
Memory Required: 256 0K bytes
Source Language: EDL, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $50 000 to $75,000
Number Installed to Date: 7
Date First Installed: September 1981
(See Vendor Profile Page V-69)

MARKETING DECISIONS, INC.
SALES DEVELOPMENT AND TRACKING SYSTEM
Additional Product Classification: Insurance, WP/Text Editing, Sort/Merge
Specific Application: New Accounts, Cross Selling, Acquiring New Deposits
Specific Industry: Banking/Financial
System Requirements: Wang OIS, VS, WPS, P, DOS, VS-DOS
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000 to $12,000
Number Installed to Date: 3
Date First Installed: March 1983
(See Vendor Profile Page V-68)

MCDONNELL DOUGLAS AUTOMATION CO.
MCAUTO MATERIAL MANAGEMENT
Additional Product Classification: Insurance
Specific Application: Inventory Control, Warehousing, Purchasing
Specific Industry: Banking/Financial, [illegible]
System Requirements: IBM 3000, 370/158 IMS/VS1.2
Memory Required: 8.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Mcauto CPT
Price: $225 000
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-71)

MODERN COMPUTER SYSTEMS, INC.
MBS BANKING SOFTWARE - AUDIT CONFIRMATION
Specific Application: Audit Confirmation
Specific Industry: Banking/Financial
System Requirements: TI Business Systems
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $1,000 to $3,500
Number Installed to Date: 250
Date First Installed: 1976
(See Vendor Profile Page V-76)

MODERN COMPUTER SYSTEMS, INC.
MBS BANKING SOFTWARE - CD
Specific Application: Cash Deposits
Specific Industry: Banking/Financial
System Requirements: TI Business Systems
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000 to $3,500
Number Installed to Date: 250
Date First Installed: 1976

MODERN COMPUTER SYSTEMS, INC.
MBS BANKING SOFTWARE - CHECKING
Specific Application: Checking Accounts
Specific Industry: Banking/Financial
System Requirements: TI Business Systems
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000 to $3,500
Number Installed to Date: 250
Date First Installed: 1976

MODERN COMPUTER SYSTEMS, INC.
MBS BANKING SOFTWARE - GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Banking/Financial
System Requirements: TI Business Systems
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000 to $3,500
Number Installed to Date: 250
Date First Installed: 1976

MODERN COMPUTER SYSTEMS, INC.
MBS BANKING SOFTWARE - LOANS
Specific Application: Loans
Specific Industry: Banking/Financial
System Requirements: TI Business Systems
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000 to $3,500
Number Installed to Date: 250
Date First Installed: September 1976

MODERN COMPUTER SYSTEMS, INC.
MBS BANKING SOFTWARE - SAVINGS
Specific Application: Savings Accounts
Specific Industry: Banking/Financial
System Requirements: TI Business Systems
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000 to $3,500
Number Installed to Date: 250
Date First Installed: September 1976

MODERN COMPUTER SYSTEMS, INC.
MBS BANKING SOFTWARE-CIF
Specific Application: Central Information File, Banking
Specific Industry: Banking/Financial
System Requirements: TI Business Systems
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000 to $3,500
Number Installed to Date: 250
Date First Installed: September 1976

MODULAR INFORMATION SYSTEMS, INC.
MISER
Specific Application: In-House Thrift Processing
Specific Industry: Banking/Financial
System Requirements: Burroughs B1000, B5000 MCP
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100,000 to $260,000
Number Installed to Date: 53
Date First Installed: September 1978
(See Vendor Profile Page V-77)

MORTGAGE SYSTEMS & SERVICES
LOAN DOCUMENT PREPARATION
Specific Application: Mortgage Loan Document Preparation
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11/23 RSTS/E
Memory Required: 256 0K bytes
Source Language: Basic Plus, Basic Plus II
Source Code Available: Yes
Purchase Terms: Purchase (license); [illegible]
Price: $8,650
Number Installed to Date: 49
Date First Installed: February 1978
(See Vendor Profile Page V-77)

NATIONAL E-F-T, INC.
LOANS/1
Specific Application: Installment Loan Portfolio Management
Specific Industry: Banking/Financial
System Requirements: IBM Series/1
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-78)

NATIONAL E-F-T, INC.
LOANS/43
Specific Application: Installment Loan Management
Specific Industry: Manufacturing, Banking/Financial
System Requirements: IBM 4300 Series
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 1
Date First Installed: 1983

NATIONAL E-F-T, INC.
TELLE-ORDER
Specific Application: Remote Order Entry
Specific Industry: Banking/Financial
System Requirements: IBM Series/1
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000
Number Installed to Date: 4
Date First Installed: 1982

NCR CORP.
CIF - CENTRAL INFORMATION FILE
Specific Industry: Banking/Financial
System Requirements: NCR 8500, 8500 VRX
Memory Required: 1.0K bytes
Source Language: Neat/3
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: January 1986
(See Vendor Profile Page V-79)

NCR CORP.
CLASS-COMPUTERIZED LOAN AND SAVING SYSTEM
Specific Application: Financial Account Processing
Specific Industry: Savings and Loan
System Requirements: NCR 8500, 8600 VRX
Memory Required: 1.0K bytes
Source Language: Neat/3
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: January 1970

NCR CORP.
[illegible]
Specific Application: General Ledger, In-House Account Processing
Specific Industry: Banking/Financial, Community Banks
System Requirements: NCR 9020; Imos III, Imos; NCR 9300, 9050: ITX, IRX
Memory Required: 128.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 600
Date First Installed: May 1979

NCR CORP.
IBS (INTERACTIVE [illegible] SYSTEM)
Additional Product Classification: International Wholesale Banking
Specific Application: General Ledger, Current Accounts, Customer Liabilities, Bank Borrowings, Foreign Exchange, and Letters of Credit
Specific Industry: Banking/Financial, Foreign Banks
System Requirements: NCR 9020, 5400, 9020: Imos, NCR 9300, 9050: ITX
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: January 1978

NELSON DATA RESOURCES, INC.
LOAN CLOSING
Specific Application: Mortgage and Broker Loan Closings
Specific Industry: Banking/Financial
System Requirements: IBM PC-XT; PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 2
Date First Installed: June 1983
(See Vendor Profile Page V-79)

NETWORK CONCEPTS, INC.
STOCKAID
Specific Application: On-Line Data Base for Security Option, Pricing Information
Specific Industry: Banking/Financial
System Requirements: Tandem: Guardian
Memory Required: 20.0K bytes
Source Language: TAL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: January 1983
(See Vendor Profile Page V-79)

NIXDORF COMPUTER CORP.
MORTGAGE MANAGEMENT SYSTEM
Specific Application: Document Preparation, Loan Tracking, Reporting
Specific Industry: Banking/Financial
System Requirements: Nixdorf 8870: Nros
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,800
Number Installed to Date: 150
Date First Installed: 1977
(See Vendor Profile Page V-80)

NMF, INC.
U SYSTEM 6
Specific Application: Personal Trust Accounting and Reporting
Specific Industry: Banking/Financial
System Requirements: IBM 370; DOS, IBM 4300 Series: DOS; IBM 3300 Series: DOS; DS
Source Language: Cobol, Macro Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-80)

NORTHEAST DATACOM, INC.
DOCUMENT PREPARATION
Specific Application: Forms Generation
Specific Industry: Banking/Financial
System Requirements: Wang 2200
Memory Required: 28.0K bytes
Source Language: Basic II
Source Code Available: Yes
(See Vendor Profile Page V-80)

NORTHEAST DATACOM, INC.
LOAN ORIGINATION
Specific Application: Loans, Mortgages
Specific Industry: Banking/Financial
System Requirements: Wang 2200
Memory Required: 28.0K bytes
Source Language: Basic II
Source Code Available: Yes

NORTHEAST DATACOM, INC.
TELLER EMULATION
Specific Application: Teller Terminal Emulation
Specific Industry: Banking/Financial
System Requirements: Wang 2200 MVP
Memory Required: 28.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)

NORTHEAST DATACOM, INC.
UNIFIER - ONLINE BANKING PACKAGE
Specific Application: Savings, Mortgage Loans, CIS, Generalized Report Utility
Specific Industry: Banking/Financial
System Requirements: Burroughs
Memory Required: 1.0M bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)

NU-COMP SYSTEMS, INC.
DOCUTEL ATM INTERFACE
Specific Application: ATM Interface
Specific Industry: Banking/Financial
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: February 1982
(See Vendor Profile Page V-81)

NU-COMP SYSTEMS, INC.
PROOF AND TRANSIT
Specific Application: Proof and Transit
Specific Industry: Banking/Financial
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 30
Date First Installed: 1980
(See Vendor Profile Page V-81)

OLYMPIA DATA SYSTEMS, INC.
DATACLOSE
Specific Application: Mortgage Loan Documentation Preparation Including Calculations
Specific Industry: Banking/Financial, Legal, Real Estate
System Requirements: Datapoint 1500, Datapoint ARC: DOS
Memory Required: 64.0K bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 125
Date First Installed: 1975
(See Vendor Profile Page V-82)

OLYMPIA DATA SYSTEMS, INC.
TITLE-WRITE
Specific Application: Performs Title Policy Preparation
Specific Industry: Banking/Financial, Legal, Real Estate
System Requirements: Datapoint 1500: DOS; Datapoint ARC
Memory Required: 64.0K bytes
Source Language: Datatbus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 110
Date First Installed: 1975

OMEGA COMPUTER CONSULTANTS, INC.
COLLECTION AGENCY SYSTEM
Specific Application: Operation of Collection Agencies
Specific Industry: Banking/Financial
System Requirements: TI 9900: DX-10, Prime Minicomputers: Primos
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000 to $10,000
Date First Installed: 1982
(See Vendor Profile Page V-82)

ON-LINE FINANCIAL SERVICES, INC.
FINANCIAL SOFTWARE SYSTEM
Specific Application: Savings, Loans, General Ledger, NOW Accounts, Customer Information
Specific Industry: Banking/Financial
System Requirements: Burroughs B6800, B6900, B7900: MCP
Memory Required: 3.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $250,000
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-82)

PACESETTER SYSTEMS, INC.
PACER ATI (ACCUMULATED TRANSFER JOURNAL)
Specific Application: Accumulated Transaction Journal, Display Balances
Specific Industry: Banking/Financial
System Requirements: IBM 370, IBM 4300: OS; IBM 3030: DOS; IBM 3080
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 60
Date First Installed: 1976
(See Vendor Profile Page V-83)

PACESETTER SYSTEMS, INC.
PACER/CDS (COMBINED DEPOSIT SYSTEM)
Specific Application: Package for Deposit System in Banks
Specific Industry: Banking/Financial
System Requirements: IBM 370; IBM 4300: DS; IBM 3030: DOS; IBM 3080
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 4
Date First Installed: 1982

PACESETTER SYSTEMS, INC.
PACER/CIF (CUSTOMER INFORMATION File)
Specific Application: Allows to Send Customer Reports
Specific Industry: Banking/Financial
System Requirements: IBM 370; IBM 4300: OS; IBM 3030: DOS; IBM 3080
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: December 1983

PACESETTER SYSTEMS, INC.
PACER-IRS (INTEREST REPORTING SYSTEM)
Specific Application: Interest Reporting Withholding
Specific Industry: Banking/Financial
System Requirements: IBM 370; IBM 4300: OS; IBM 3030: DOS; IBM 3080
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 30
Date First Installed: 1983

PETER T. BARRY & CO.
DISTRIBUTED INTERNATIONAL BANK ACCOUNT & COMMUNICATIONS SYSTEM
Specific Application: International Bank Lending, Payments, Dealing, Foreign Exchange, General Ledger, Communications, Credit Management
Specific Industry: Banking/Financial
System Requirements: Tandem Non Stop II, Guardian
Source Language: Anal Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-85)

POLYGON ASSOCIATES, INC.
SMS
Additional Product Classification: Insurance
Specific Application: Securities Management, Stocks and Bonds
Specific Industry: Insurance
System Requirements: IBM 370, 4300, 3600 Series: OS, DOS
Memory Required: 1.0M bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 40
Date First Installed: 1978
(See Vendor Profile Page V-87)

PRODUCTIVE SOFTWARE SYSTEMS, INC.
INSTALLMENT LENDING
Specific Application: Amortizes Loans, Maintains Repayment Late Charges and Collections, Handles Prepayment of Loans
Specific Industry: Banking/Financial
System Requirements: IBM System/34: SSP, IBM System/36
Memory Required: 96.0K bytes
Source Language: RPG-II, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-88)

Q METRICS, INC.
FOREIGN EXCHANGE SYSTEM-FOX
Specific Application: Foreign Exchange Trading
Specific Industry: Banking/Financial
System Requirements: Apollo 660; Unix, Onyx C8000: Unix; Zilog 11: Unix
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $25,000
Date First Installed: September 1983
(See Vendor Profile Page V-90)

R.G.C.I., INC.
VIP
Specific Application: Creative Loan Accounting Package
Specific Industry: Banking/Financial

System Requirements: DG
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-93)

THE SADDLEBROOK CORP.
FINANCIAL PLANNING & CONTROL SYSTEM
Specific Application: Financial Management
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11; RSTS/E
Memory Required: 256.0K bytes
Source Language: Macro Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 268
Date First Installed: 1974
(See Vendor Profile Page V-94)

THE SADDLEBROOK CORP.
SYSTEM M
Specific Application: Flexible Data Base Loan Processing for Mortgage and Consumer Loan Origination
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11; RSTS/E
Memory Required: 256.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 36
Date First Installed: April 1982

SEI CORP.
TRANSFER
Specific Application: Domestic and International Money Transfer
Specific Industry: Banking/Financial
System Requirements: IBM; DEC
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 25
(See Vendor Profile Page V-96)

SERCON CORP.
SERCON HOME BANKING - HOME BANKING
Specific Application: Provides the Ability to Bank Via Personal Computers
Specific Industry: Banking/Financial
System Requirements: IBM 370, 4340, 3030; DOS/VS; IBM PC; DOS/PC
Memory Required: 60.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Lease
Price: $60,000 to $80,000
(See Vendor Profile Page V-96)

SHAW SYSTEMS ASSOCIATES, INC.
CALCURATE
Specific Application: Financial Calculator
Specific Industry: Banking/Financial
System Requirements: IBM 370, 3000 Series: DOS/OS, IBM 4300: MVS
Memory Required: 130.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000
Number Installed to Date: 4
Date First Installed: 1982
(See Vendor Profile Page V-97)

SHAW SYSTEMS ASSOCIATES, INC.
CL/70
Specific Application: Commercial Loan and Collateral Processing
Specific Industry: Banking/Financial
System Requirements: IBM 370: DOS/OS, IBM 3000: MVS, IBM 4300
Memory Required: 130.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $45,000 to $83 000
Number Installed to Date: 53
Date First Installed: 1970

SHAW SYSTEMS ASSOCIATES, INC.
DOCUPREP
Specific Application: Data Capture and Document Preparation
Specific Industry: Banking/Financial
System Requirements: IBM 370, 3000 Series. DOS/OS; IBM 4300 Series. MVS
Memory Required: 130.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 3
Date First Installed: 1982

SHAW SYSTEMS ASSOCIATES, INC.
IBS
Specific Application: International Banking Multicurrency Accounting, Foreign Exchange, European Currency, Money Transfer, Collections, Credit
Specific Industry: Banking/Financial
System Requirements: IBM 370, 3000; DOS/OS; IBM 4300 Series: MVS
Memory Required: 130.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35,000 to $140,000
Number Installed to Date: 1
Date First Installed: 1981

SOFT PRO SYSTEMS, INC.
BANKING FORMS & SUPPLIES CONTROL
Specific Application: Inventory/Purchase Control, Warehouse Management, Cost Center Tracking
System Requirements: Wang/VS; HP 3000
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $45,000
(See Vendor Profile Page V-98)

SOFTWARE CLEARING HOUSE
ACCOUNT RECONCILIATION BY COMPUTER
Specific Application: Reconciles Multiple Checking Accounts Within Multiple Customers or Departments
Specific Industry: Banking/Financial
System Requirements: NCR Century Criterion, 8 Series: VRX
Memory Required: 40.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $4,000
Number Installed to Date: 15
(See Vendor Profile Page V-99)

SOFTWARE CONCEPTS, INC.
SAFE BOX ACCOUNTING (SBA)
Additional Product Classification: Accounting
Specific Application: Automated On-Line Inquiry and Tracking for Safe Deposit Box Accounting
Specific Industry: Banking/Financial
System Requirements: IBM: DOS, OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: 1981
(See Vendor Profile Page V-99)

SOFTWARE CONCEPTS, INC.
THE CONTROL MACHINE (TCM)
Specific Application: Automated Check Clearing and Departmental Balancing for Proof and Transit
Specific Industry: Banking/Financial
System Requirements: IBM: OS, DOS
Source Language: Cobol, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: 1977

SOFTWARE DEVELOPMENT & MAINTENANCE, INC.
OCM24/24 HOUR SUPPORT
Specific Application: Maintains Twenty-Four Hour Balance File For Automatic Teller
Specific Industry: Banking/Financial
System Requirements: Formation F4000: DOS/OS
Memory Required: 12.0K bytes
Source Language: Assembler, Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 11
Date First Installed: 1981
(See Vendor Profile Page V-99)

SOFTWARE DEVELOPMENT & MAINTENANCE, INC.
OCM24/CMS ATM ON-LINE CARDHOLDER MANAGEMENT SYSTEM
Specific Application: Designed for Automatic Teller Machines
Specific Industry: Banking/Financial
System Requirements: Formation F4000: DOS/OS
Memory Required: 150.0K bytes
Source Language: Assembler, CLC, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 10
Date First Installed: 1981

SOFTWARE DEVELOPMENT & MAINTENANCE, INC.
OCM24/SNF SHARED NETWORK FACILITY
Specific Application: Increases the Scope of An Institution's Existing ATM Network
Specific Industry: Banking/Financial
System Requirements: Formation F4000: DOS/OS
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 1
Date First Installed: 1982

SOFTWARE DEVELOPMENT & MAINTENANCE, INC.
OCM24/TCS ATM TRANSACTION CONTROL SYSTEM
Specific Application: Designed for Automatic Teller Machines
Specific Industry: Banking/Financial
System Requirements: Formation F4000: DOS/OS
Memory Required: 64.0K bytes
Source Language: CLC, Assembler, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 40
Date First Installed: 1975

SOFTWARE DEVELOPMENT & MAINTENANCE, INC.
OCM24/X.25/IBM-CICS/S REFERENCE
Specific Application: Designed for Automatic Teller Systems Without a Central Information File
Specific Industry: Banking/Financial
System Requirements: Formation F4000: DOS/OS
Memory Required: 16.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 5
Date First Installed: 1982

SOFTWARE DEVELOPMENT CORP.
DAGAR (THE LOAN ARRANGER)
Specific Application: Calculates Loans, Closing Adjustment Values and Amortization Schedules
Specific Industry: Banking/Financial, Real Estate, Car Dealers
System Requirements: CP/M; MP/M
Memory Required: 32.0K bytes
Source Language: Cbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $299
Date First Installed: 1/82
(See Vendor Profile Page V-99)

SOFTWARE MODULE MARKETING, INC.
IBM TRACS TELEPROCESSING REMOTE APPLICATION
Additional Product Classification: Communications/TP Monitors
Specific Application: Teleprocessing Application
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3030, 4300 Series: OS/MVT, MVS
Memory Required: 35.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $5,500 to $8,000
Number Installed to Date: 50
Date First Installed: May 1981
(See Vendor Profile Page V-99)

SOFTWARE SERVICES OF AMERICA, INC.
PROTA (ATM RETAIL BANKING DELIVERY SYSTEM)
Specific Application: ATM

Transaction Processing and Control
Specific Industry: Banking/Financial
System Requirements: IBM 3033: DOS/VSE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-100)

SOFTWARE SERVICES OF AMERICA, INC.
RBDS-CIF (RETAIL BANKING DELIVERY SYSTEM)
Specific Application: Customer Information File
Specific Industry: Banking/Financial
System Requirements: IBM 3033: OS, DOS/VSE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase [illegible]

SOFTWARE SERVICES OF AMERICA, INC.
RBDS (TELLER RETAIL BANKING DELIVERY)
Specific Application: Online Delivery of Teller, Platform and Backroom Transaction Processing
Specific Industry: Banking/Financial
System Requirements: IBM 3033: DOS/VSE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

SOFTWARE SERVICES OF AMERICA, INC.
RBDS 34/4700 (RETAIL BANKING DELIVERY)
Specific Application: Controller - Based Teller Applications
Specific Industry: Banking/Financial
System Requirements: IBM 3033: DOS/VSE
Source Language: Cobol, FCL
Source Code Available: Yes
Purchase Terms: Purchase (license)

SOUTH TRUST DATA SERVICES
INDY BANKING SYSTEM
Specific Application: Comprehensive Banking
Specific Industry: Banking/Financial
System Requirements: IBM System/34, IBM System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $32,500
Number Installed to Date: 30
Date First Installed: 1973
(See Vendor Profile Page V-161)

STOCKHOLDER SYSTEMS, INC.
PAPERLESS ENTRY PROCESSING SYSTEM
Specific Application: Interface Electronic Funds Transfer
Specific Industry: Banking/Financial
System Requirements: IBM 4300, 3000 Series: OS/DOS
Memory Required: 200.0K bytes
Source Language: Ansi Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,500 or $40,500
Number Installed to Date: 350
Date First Installed: September 1981
(See Vendor Profile Page V-103)

STOCKHOLDER SYSTEMS, INC.
PEP TELEPHONE TELLER (PTT)
Specific Application: Telephone Bill Paying, Funds Transfer, Video Banking
Specific Industry: Banking/Financial
System Requirements: IBM 3000, 4300 Series: OS/DOS
Memory Required: 250.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50,000 to $100,000
Number Installed to Date: 35
Date First Installed: May 1977

STSC, INC.
FUND STAR INFORMATION SYSTEM
Specific Application: Investment Analysis
Specific Industry: Banking/Financial
System Requirements: IBM 370/4330 VM/CMS, MVS
Source Language: APL
Source Code Available: No
Purchase Terms: Purchase (license); Time-Sharing
Date First Installed: 1982
(See Vendor Profile Page V-104)

SYMBOLICS FINANCIAL SYSTEMS, INC.
MLCS-INVENTORY LENDING SYSTEM
Specific Application: Mortgage Lending Management From Origination Documentation, Commitment Control and Loan Servicing
Specific Industry: Banking/Financial
System Requirements: IBM System/34, IBM System/36, HP 3000, IBM Series/1, MS/DOS, IBM PC
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 100
Date First Installed: February 1978
(See Vendor Profile Page V-104)

SYRACUSE DATA BASE
LEASE BILLING-DEPRECIATION PACKAGE
Specific Application: Lease Billing, Depreciation
Specific Industry: Banking/Financial
System Requirements: Televideo: CP/M, Altos MP/M
Memory Required: 1.0M bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1982
(See Vendor Profile Page V-105)

SYSCOM, INC.
MORTGAGE SERVICE SYSTEM
Specific Application: Mortgage Service
Specific Industry: Banking/Financial
System Requirements: IBM System/34, System/36
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: January 1982
(See Vendor Profile Page V-105)

SYSCOM, INC.
PREMIUM FINANCING
Specific Application: Premium Financing Package
Specific Industry: Banking/Financial
System Requirements: IBM System/34, System/36
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: January 1982

SYSCOM, INC.
SECOND MORTGAGE SYSTEM
Specific Application: Second Mortgage
Specific Industry: Banking/Financial
System Requirements: IBM System/34, System/36
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: January 1982

SYSTEMATICS, INC.
ASSET LIABILITY MANAGEMENT
Specific Application: Asset Liability Management
Specific Industry: Banking/Financial
System Requirements: IBM 4300 Series: DOS/VSE, MVS, IBM 3000: MVS
Memory Required: 300.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
(See Vendor Profile Page V-105)

SYSTEMATICS, INC.
CUSTOMER INFORMATION SYSTEM
Specific Application: Customer Information
Specific Industry: Banking/Financial
System Requirements: IBM 4300 Series: DOS/VSE, MVS; IBM 3000: MVS
Memory Required: 2.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Number Installed to Date: 2
Date First Installed: 1983

SYSTEMATICS, INC.
CUSTOMER REFERENCE FILE
Specific Application: ATM Support
Specific Industry: Banking/Financial
System Requirements: IBM 4300 Series: DOS/VSE, MVS; IBM 3000: MVS
Memory Required: 300.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Number Installed to Date: 2
Date First Installed: 1983

SYSTEMATICS, INC.
FAMILY OF FINANCIAL SYSTEM
Specific Application: Standardized, Comprehensive Set of Applications For the Financial Industry
Specific Industry: Banking/Financial
System Requirements: IBM 4300 Series: DOS/VSE, MVS; IBM 3000: MVS
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Number Installed to Date: 500
Date First Installed: 1970

SYSTEMATICS, INC.
FINANCIAL MANAGEMENT SYSTEM
Specific Application: Financial Management
Specific Industry: Banking/Financial
System Requirements: IBM 4300 Series: DOS/VSE, MVS; IBM 3000: MVS
Memory Required: 300.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Number Installed to Date: 45
Date First Installed: 1974

SYSTEMATICS, INC.
IMPACS (DEMAND DEPOSIT)
Specific Application: Demand Deposit
Specific Industry: Banking/Financial
System Requirements: IBM 4300, IBM 3000 Series: DOS/VSE, MVS
Memory Required: 300.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Number Installed to Date: 54
Date First Installed: 1977

SYSTEMATICS, INC.
INSTALLMENT CREDIT
Specific Application: Installment Loans
Specific Industry: Banking/Financial
System Requirements: IBM 4300 Series: DOS/VSE, MVS; IBM 3000: MVS
Memory Required: 300.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Number Installed to Date: 45
Date First Installed: September 1979

SYSTEMATICS, INC.
PROFITABILITY ANALYSIS
Specific Application: Profitability Analysis
Specific Industry: Banking/Financial
System Requirements: IBM 4300 Series: DOS/VSE, MVS
Memory Required: 300.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Date First Installed: 1983

SYSTEMATICS, INC.
PROJECT CONTROL
Specific Application: Project Control
Specific Industry: Banking/Financial
System Requirements: IBM 4300 Series: DOS/VSE, MVS; IBM 3000 Series: MVS
Memory Required: 300.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing

SYSTEMATICS, INC.
REAL ESTATE LOANS
Specific Application: Real Estate Loans
Specific Industry: Banking/Financial

System Requirements: IBM 4300 Series: DOS/VSE, MVS; IBM 3000: MVS
Memory Required: 300.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 7
Date First Installed: 1982

SYSTEMATICS, INC.
SAVINGS/TIME DEPOSIT
Specific Application: Savings, Time Deposit
Specific Industry: Banking/Financial
System Requirements: IBM 4300 Series: DOS/VSE, MVS; IBM 3000: MVS
Memory Required: 300.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Time-Sharing
Number Installed to Date: 50
Date First Installed: 1981

SYSTEMS MARKETING CONSULTANTS, INC.
QUOTEMATE
Additional Product Classification: Insurance
Specific Application: Stock Quotes
Specific Industry: Banking/Financial
System Requirements: Stratus/32: VOS
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $115,000
Number Installed to Date: 3
Date First Installed: January 1983
(See Vendor Profile Page V-106)

SYSTEMS NORTHWEST, INC.
CREDIT UNION PACKAGE
Specific Application: Banking Transactions
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11: RSTS
Memory Required: 128.0K bytes
Source Language: Basic Plus, Basic Plus II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,000
Number Installed to Date: 1
(See Vendor Profile Page V-108)

SYSTEMS NORTHWEST, INC.
SPM
Specific Application: Data Management Tool, Multiple Updates
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11: RSTS
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000

SYTEK, INC.
SECURITY PORTFOLIO SYSTEM
Specific Application: Investment Portfolio
Specific Industry: Banking/Financial
System Requirements: DEC Decmate I: COS-310; DEC Decmate II
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
(See Vendor Profile Page V-107)

THE SLIMS CORP.
CONSTRUCTION LOAN SYSTEM (CLS
Specific Application: Construction (Commercial) Loan Accounting
Specific Industry: Banking/Financial
System Requirements: Burroughs B90 Series: CMS, Burroughs B1000 Series
Source Language: Ansi Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $19,500 to $34,500
Number Installed to Date: 1
Date First Installed: May 1983
(See Vendor Profile Page V-109)

THE SLIMS CORP.
LOAN TRACKING/DOCUMENT PREPARATION SYSTEM
Specific Application: Mortgage or General Loan Processing, Document Preparation
Specific Industry: Banking/Financial
System Requirements: Burroughs B90, B900, B1000: CMS
Source Language: Ansi Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $24,500 to $39,500
Date First Installed: September 1983

THUNDERBIRD AUTOMATION GROUP, INC.
THUNDERBIRD SAFE DEPOSIT MANAGEMENT SYSTEM
Specific Application: Safe Deposit Management
Specific Industry: Banking/Financial
System Requirements: IBM PC-XT: PC-DOS, NCR Decisionmate; TI: CP/M 80; Victor 9000: CP/M 86
Memory Required: 64.0K bytes
Source Language: Dbase II
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-110)

TIMBERLINE SYSTEMS, INC.
LOAN AMORTIZATION
Specific Application: Loan Amortization
Specific Industry: Not Industry Sensitive, Construction, Property Management
System Requirements: TI: DX-10
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $500
Number Installed to Date: 136
Date First Installed: September 1981
(See Vendor Profile Page V-110)

TNL DATA SERVICES, INC.
AUTOMATED TELLER STATION
Specific Application: Allows Bank to Integrate Bookkeeping and Brokerage Functions Through Single Entry Stations
Specific Industry: Banking/Financial
System Requirements: Datapoint: DOS, RM$
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $6,000 to $8,000
(See Vendor Profile Page V-111)

TNL DATA SERVICES, INC.
CUSTODIAN CONTROL
Additional Product Classification: Securities
Specific Application: Monitors Vaults to Control Securities Movement
Specific Industry: Banking/Financial
System Requirements: Datapoint: DOS, RMS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $15,000 to $20,000
Number Installed to Date: 1
Date First Installed: 1982

TRADESTREET RESEARCH
BANK FINANCIAL MODELS
Specific Application: Monthly and Annual Financial Models
Specific Industry: Banking/Financial
System Requirements: IBM PC-XT: PC-DOS, IBM 4300 Series: MVS; IBM 3000 Series: OS
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Rental
Date First Installed: September 1980
(See Vendor Profile Page V-111)

TRADESTREET RESEARCH
COMMERCIAL LOAN OFFICINE
Specific Application: Commercial Loan Package
Specific Industry: Banking/Financial
System Requirements: IBM PC-XT: PC-DOS 1.1, IBM 4300 Series: MVS, OS, IBM 3000 Series: DOS
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Rental
Date First Installed: November 1982

TRADESTREET RESEARCH
FINANCIAL FITNESS
Specific Application: Provides Financial Modeling and Budget Services
Specific Industry: Banking/Financial
System Requirements: IBM PC-XT; PC-DOS, IBM 4300 Series: MVS; IBM 3000 Series: OS
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Rental
Date First Installed: March 1982

UNITED INFORMATION SERVICES
BDS
Specific Application: Determines Maturity and Coupon Schedules for New Security Issues
System Requirements: DEC System/10
Source Language: Cobol, Fortran, PL1, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-113)

UNITEK COMPUTER SERVICES, INC.
ACCLAIM
Specific Application: Process Share Drafts, Payroll, Credit Disability, Interest Refunds, Student Loans
Specific Industry: Banking/Financial, Credit Union
System Requirements: Century 200: Century
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000
Date First Installed: September 1976
(See Vendor Profile Page V-113)

UNITEK COMPUTER SERVICES, INC.
WANG CREDIT UNION PACKAGE
Specific Application: Process Share Drafts, Payroll Deduction, Credit Disability
Specific Industry: Banking/Financial, Credit Unions
System Requirements: Wang 2200: OS
Memory Required: 20.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300 000
Number Installed to Date: 2
Date First Installed: 1982

UNIVERSITY COMPUTING CO.
UCC 3/DASD MANAGEMENT SYSTEM
Additional Product Classification: System Resource Management
Specific Application: Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: VSI, MVS
Memory Required: 64.0K bytes
Source Language: PL/I
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $17,000
Number Installed to Date: 400
Date First Installed: April 1976
(See Vendor Profile Page V-114)

UNIVERSITY COMPUTING CO.
VOS ASSET CARD MANAGEMENT (ACM)
Specific Application: Automated Teller Machine Software
Specific Industry: Banking/Financial
System Requirements: IBM 360, 370: DOS, OS, VS
Source Language: Cobol; Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: November 1975

UNIVERSITY COMPUTING CO.
UCC COMMERCIAL LOAN SYSTEM (CLS)
Specific Application: Commercial Loan Processing
Specific Industry: Banking/Financial
System Requirements: IBM 360, 370: DOS, OS, VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10

UNIVERSITY COMPUTING CO.
UCC CUSTOMER MANAGEMENT INFORMATION
Specific Application: Customer Data Base, Customer Profitability, Customer Marketing Analysis
Specific Industry: Banking/Financial
System Requirements: IBM 360, 370, 4300 Series, 30: DOS, OS, VS
Source Language: Cobol, ALC

Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: March 1970

UNIVERSITY COMPUTING CO.
UCC CONSUMER TRANSACTION SYSTEM (CTS)
Specific Application: Automated Teller Machine Software
Specific Industry: Banking/Financial
System Requirements: IBM 360, 370 OS, DOS, VS
Source Language: Assembler, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: November 1976

UNIVERSITY COMPUTING CO.
UCC INSTALLMENT LOAN SYSTEM (ILS)
Specific Application: Installment Loan Processing
Specific Industry: Banking/Financial
System Requirements: IBM 360, 370 DOS, OS, VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: March 1971

UNIVERSITY COMPUTING CO.
UCC PAPERLESS ITEM PROCESSING (PIPS)
Specific Application: Electronic Funds Transfer, Corporate Cash Management and Automated Clearinghouse Processing
Specific Industry: Banking/Financial
System Requirements: IBM System 4,360, 370, 3000 OS/DOS; Burroughs MCP
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: September 1974

UNIVERSITY COMPUTING CO.
UCC SUPER MICRO
Specific Application: Check Processing
Specific Industry: Banking/Financial
System Requirements: IBM System 3,360, 370, 4300 DOS, OS VS
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 140
Date First Installed: September 1983

VALLEY DATA BASE, INC.
COLLECTION AGENCY PACKAGE
Specific Application: Keeps Track of Clients and Billing, Payroll, and Accounting
Specific Industry: Banking/Financial, Collection Agencies
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol 2
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 1
Date First Installed: September 1982
(See Vendor Profile Page V-114)

WISMER ASSOCIATES, INC.
CASHMAX
Specific Application: Investment Management, Debt Management for Short And Long Term Investments, Portfolio and Cash Flow Forecasting
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Memory Required: 512.0K bytes
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Date First Installed: 1975
(See Vendor Profile Page V-117)

WISMER ASSOCIATES, INC.
MONEYMAX
Specific Application: Investment Management for Short and Long Term Investment Portfolio, Cash Flow Management
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Memory Required: 512.0K bytes
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Date First Installed: 1975

WISMER ASSOCIATES, INC.
PENSIONMAX
Specific Application: Investment Management, Debt Management for Short and Long Term Investment Portfolios, Cash Flow Management
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Memory Required: 512.0K bytes
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Date First Installed: 1976

WISMER ASSOCIATES, INC.
TRADERMAX
Specific Application: Investment Management, Debt Management for Short and Long Term Investment Portfolios, Cash Flow Management
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Memory Required: 512.0K bytes
Source Language: Fortran 77
Purchase Terms: Purchase (license); Rental
Date First Installed: 1977

YARDLEY GROUP, INC.
YARDLEY BULLION SYSTEM
Specific Application: Integrated System for Trading of Precious Metals
Specific Industry: Not Industry Sensitive, Banking/Financial, Insurance
System Requirements: DEC VAX: VMS, IBM 3000, 4300: VM, MVS, CMS
Memory Required: 1.0M bytes
Source Language: APL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $125,000
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-118)

YARDLEY GROUP, INC.
YARDLEY FUTURE SYSTEM II
Specific Application: Back Office System for Businesses That Use Future Market
Specific Industry: Banking/Financial, Insurance
System Requirements: DEC VAX: VMS
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $40,000
Number Installed to Date: 10
Date First Installed: December 1983

YARDLEY GROUP, INC.
YARDLEY INTEGRATED METALS
Specific Application: Commercial and Precious Metals for Trading, Tracking, Inventory and Accounting
System Requirements: IBM: MVS, VM, CMS, DEC VAX: VMS, Prime; Burroughs
Memory Required: 1.0M bytes
Source Language: APL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Date First Installed: December 1983

ABT ASSOCIATES
IRA ASSESSOR
Specific Application: Gives Customers A Preliminary Look at IRA Accounts
Specific Industry: Banking/Financial
System Requirements: Apple II+: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35
Number Installed to Date: 500
Date First Installed: July 1982
(See Vendor Profile Page V-1)

ABT ASSOCIATES
RETIREMENT PLANNER
Specific Application: Retirement Planner
Specific Industry: Banking and Financial
System Requirements: Apple II+: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $85
Number Installed to Date: 500
Date First Installed: July 1982

ADVANCED INFORMATION MANAGEMENT
MORTGAGE SYSTEM
Specific Application: Mortgage System
Specific Industry: Banking/Financial
System Requirements: IBM PC-XT
Memory Required: 128.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-3)

ADVANCED INFORMATION MANAGEMENT
SHAREHOLDER RECORD KEEPING SYSTEM
Specific Application: Shareholder Record Keeping
Specific Industry: Banking/Financial
System Requirements: IBM PC-XT
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

ADVANCED INFORMATION SYSTEMS, INC.
BANK FINANCE MANAGEMENT
Specific Application: Installment Lending Package
Specific Industry: Banking/Financial
System Requirements: MS-DOS: CP/M 86
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $1,500
Number Installed to Date: 100
Date First Installed: July 1979
(See Vendor Profile Page V-3)

ALLIED INFORMATION SYSTEMS
ADTRAN
Specific Application: Automates Transactions for Back-Office, Loans, New Accounts
Specific Industry: Banking/Financial
System Requirements: B-R Aladdin 30: Unix
Memory Required: 512.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: October 1983
(See Vendor Profile Page V-4)

ALLIED INFORMATION SYSTEMS
BANKTRAN
Specific Application: Automation of Telex Functions
Specific Industry: Banking/Financial
System Requirements: B-R Aladdin 30: Unix
Memory Required: 512.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: August 1983

ALLIED INFORMATION SYSTEMS
PORTFOLIO MANAGEMENT SYSTEM
Specific Application: Portfolio Management
Specific Industry: Brokers
System Requirements: B-R Aladdin 40: Unix
Memory Required: 512.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: September 1983

ALLIED INFORMATION SYSTEMS
STOCK QUOTE
Specific Application: Stock Quote
Specific Industry: Brokers
System Requirements: B-R Aladdin 40: Unix
Memory Required: 512.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: September 1983

AMERICAN MICRO DYNAMICS, INC.
PASS
Specific Application: Pension Administration
Specific Industry: Not Industry Specific
System Requirements: IBM PC: PC-DOS, CP/M
Memory Required: 64.0K bytes
Source Language: C Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: January 1980
(See Vendor Profile Page V-5)

AMPERSAND CORP.
BRANCHBANK VERSION 3.0
Specific Application: Marketing of Financial Services
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS, IBM PC-XT
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: NO
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 50
Date First Installed: December 1981
(See Vendor Profile Page V-5)

AURORA SYSTEMS, INC.
CREDIT BUREAU ACCESS SYSTEM
Specific Industry: Not Industry Sensitive, Banking/Financial
System Requirements: Apple II
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 25
Date First Installed: November 1981
(See Vendor Profile Page V-10)

AURORA SYSTEMS, INC.
MONEY CENTER ACCOUNTING SYSTEM
Specific Industry: Banking/Financial
System Requirements: Apple II; Apple III; IBM PC
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 40
Date First Installed: July 1982

AURORA SYSTEMS, INC.
RB-3
Specific Application: Database of Bank Services and Products
Specific Industry: Banking/Financial
System Requirements: Apple III; IBM PC
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,995
Number Installed to Date: 75
Date First Installed: February 1983

AURORA SYSTEMS, INC.
SAFE DEPOSIT BILLING SYSTEM
Specific Application: Safety Deposit
Specific Industry: Banking/Financial
System Requirements: Apple II; IBM PC
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 200
Date First Installed: January 1982

AURORA SYSTEMS, INC.
THE CREDIT MANAGER
Specific Application: Credit Management System
Specific Industry: Banking/Financial
System Requirements: IBM PC
Memory Required: 256.0K bytes
Source Language: Lotus 1-2-3 Advanced
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 35
Date First Installed: November 1981

BISS, INC.
ASSET LIABILITY INFO SYSTEM
Specific Application: Asset Liability
Specific Industry: Banking/Financial
System Requirements: CP/M
Memory Required: 264.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,595
Number Installed to Date: 8
Date First Installed: 1983
(See Vendor Profile Page V-12)

BISS, INC.
BANK LIQUIDITY ANALYSIS
Specific Application: Bank Liquidity Analysis
Specific Industry: Banking/Financial
System Requirements: CP/M
Memory Required: 264.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 10
Date First Installed: 1981

BISS, INC.
LOAN LOSS CONTROL
Specific Application: Loan Loss Control
Specific Industry: Banking/Financial
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 30
Date First Installed: 1982

BISS, INC.
LOAN PRICING ANALYSIS
Specific Application: Loan Pricing Analysis
Specific Industry: Banking/Financial
System Requirements: CP/M
Memory Required: 264.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 35
Date First Installed: 1981

BISS, INC.
LOAN CALCULATION & FORMS PRINTING
Specific Application: Loan Calculation, Forms Processing
Specific Industry: Banking/Financial
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,295
Number Installed to Date: 10
Date First Installed: 1982

BISS, INC.
SAFE DEPOSIT
Specific Industry: Banking/Financial
System Requirements: CP/M
Memory Required: 264.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,095
Number Installed to Date: 50
Date First Installed: 1980

BROWN, SANDERS & ASSOCIATES
FEDERAL ESTATE TAX PLANNING (FED-ESTAS)
Specific Application: Estate Tax Planning
Specific Industry: Banking/Financial, Legal
System Requirements: Apple II: APPLE-DOS; IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $1,500
Number Installed to Date: 7
Date First Installed: September 1981
(See Vendor Profile Page V-13)

BROWN, SANDERS & ASSOCIATES
TRUST UNBUNDLED FEE SYSTEM (TUFS)
Specific Application: Trust Account Billing
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $12,500
Number Installed to Date: 2
Date First Installed: April 1983

COMM BASIC ASSOCIATES
COMMODITY SYS PROGRAMS
Specific Application: Summarizes Commodity Price Actions
Specific Industry: Not Industry Sensitive
System Requirements: Vector Graphic: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $395 to $695
Number Installed to Date: 100
Date First Installed: January 1978
(See Vendor Profile Page V-20)

COMPLEX SYSTEM, INC.
TELKEY
Specific Application: Telex Key Testing
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS
Source Language: RPG, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
(See Vendor Profile Page V-21)

COMPUTER AIDED DECISIONS, INC.
CREDIT SPREADING
Specific Application: Analysis of Corporate Income and Balance Sheets for Bank Credit Department
Specific Industry: Banking/Financial
System Requirements: Apple II: APPLE-DOS; IBM PC: PC-DOS; TRS-80 Model 12
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 2
Date First Installed: October 1981
(See Vendor Profile Page V-22)

COMPUTER AIDED DECISIONS, INC.
PORTFOLIO VALUATION SYSTEM (PVS)
Additional Product Classification: Brokerages, Money Management
Specific Application: Investment Portfolio Appraisals
Specific Industry: Banking/Financial
System Requirements: Apple II: APPLE-DOS; IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,100 to $2,500
Number Installed to Date: 5
Date First Installed: February 1982

COMPUTERIZED LIFE INSURANCE COMPUTATIONS
ANNUITY PROPOSAL
Specific Application: Statistical Generation of Monthly Income With Varied Tax Values
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM PC: PC-DOS; TRS-80/II, TRS-80 Model 12, TRS-80 Model 16: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $95
(See Vendor Profile Page V-24)

COMPUTERIZED LIFE INSURANCE COMPUTATIONS
CLIC SOFTWARE
Additional Product Classification: Insurance
Specific Application: Financial Planning
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM PC; TRS-80/II, TRS-80 Model 12, TRS-80 Model 16: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 4
Date First Installed: 1983

COMPUTERIZED LIFE INSURANCE COMPUTATIONS
EDUCATION ANALYSIS
Additional Product Classification: Insurance
Specific Application: Home Interest and Savings Calculations
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM PC; TRS-80/II; TRS-80 Model 16: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $95

COMPUTERIZED LIFE INSURANCE COMPUTATIONS
MISC RETIREMENT ANALYSIS
Additional Product Classification: Insurance
Specific Application: Retirement, State Tax and Social Security Analysis
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM PC; TRS-80/II, TRS-80 Model 12, TRS-80 Model 16: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $225

COMPUTER HOOK
TELEBROKER
Specific Application: Portfolio and Accounting Support
System Requirements: Apple III, IBM PC-XT, IBM PC UCSD-P
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,495
Date First Installed: December 1982
(See Vendor Profile Page V-25)

COMPUTER HOOK
TELEMINDER
Specific Application: Provides Access to the Dow Jones New Retrieval Service
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE, Apple II, Apple III, IBM PC; UCSD-P
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: May 1982

COMPUTER SERVICES CORP.
FOREIGN CURRENCY PROCESSING
Specific Application: Foreign Currency Processing
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10; DEC: Dibol
Memory Required: 10.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,000
Number Installed to Date: 300
Date First Installed: 1976
(See Vendor Profile Page V-26)

COMPUTER SERVICES, INC.
D/B MASTER CHARED OFF LOANS
Specific Application: Installment of Loans
Specific Industry: Banking/Financial
System Requirements: Apple III, Apple II, Apple II+, Apple IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: D/B Master
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 25
Date First Installed: September 1982
(See Vendor Profile Page V-26)

COMPUTER SYSTEMS & SOLUTIONS, INC.
AGRICULTURE BANK LOAN TRACKING
Additional Product Classification: Payroll/Personnel, Accounting
Specific Application: For Lending Institutions Dealing Agricultural Loans
Specific Industry: Banking/Financial
System Requirements: Apple II, Sirius Horizon, North Star Advantage: CP/M
Memory Required: 48.0K bytes
Source Language: CB-80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 1
Date First Installed: December 1982
(See Vendor Profile Page V-27)

COSSHARE
ADMINISTRATIVE REPORTING/INVESTMENT REVIEW
Specific Application: Customer Reporting and Investment, Review of Accounting Records and Tax Preparation
Specific Industry: Banking/Financial, Legal
System Requirements: Apple III: APPLE-DOS 3.3
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: April 1982
(See Vendor Profile Page V-29)

COSSHARE
MICROSHARE ESOP SYSTEM
Additional Product Classification: Insurance
Specific Application: Cash, Share Unit Cross Accounts
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM PC: PC-DOS, Apple II+, Apple IIE, Apple III: APPLE-DOS 3.3, SOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 20
Date First Installed: June 1981

COSSHARE
MICROSHARE PROFIT SHARING SYSTEM
Additional Product Classification: Insurance
Specific Application: Profit Sharing, Money Purchase, Pension, Savings
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM PC: PC-DOS; Apple II+, Apple IIE, Apple III: APPLE-DOS 3.3, SOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 80
Date First Installed: March 1981

COSSHARE
MICROSHARE WILLS/NEW BUSINESS SYSTEM
Specific Application: Record Keeping and Processing
Specific Industry: Banking/Financial, Legal
System Requirements: IBM PC: PC-DOS, Apple II+, Apple IIE, Apple III: APPLE-DOS 3.3, SOS
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: September 1981

COSTECTRA SYSTEMS, INC.
BASS BOND ANALYSIS SPREAD SYSTEMS
Specific Application: Investment Service Buyer/Client Trade
Specific Industry: Banking/Financial
System Requirements: IBM PC; Data Media Corp.
Source Language: Basic
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-28)

COSTECTRA SYSTEMS, INC.
BROKER RECONCILIATION HEDGE
Specific Application: Integration With all Hedge Systems, Track Brokers' Monthly and Quarterly Reports
Specific Industry: Banking/Financial

System Requirements: IBM; Data Media; Evolution
Source Language: Cobol, PL/1, Fortran
Purchase Terms: Purchase (license)

CONTECTRA SYSTEMS, INC.
MICRO COMPUTER
Specific Application: Daily Prices of Stock/Commodities
Specific Industry: Banking/Financial
System Requirements: IBM
Source Language: Basic
Purchase Terms: Purchase (license)

CONTECTRA SYSTEMS, INC.
PEARPORT MANAGEMENT
Specific Application: Stock Brokers Portfolio Record File
Specific Industry: Banking/Financial
System Requirements: IBM
Source Language: Basic
Purchase Terms: Purchase (license)

CONTRACT SERVICES ASSOCIATES
LOANCOMP
Specific Application: Loan Computation
Specific Industry: Banking/Financial
System Requirements: TRS-80/I, TRS-80/II, TRS-80/III: TRS-DOS; IBM PC PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $70
Date First Installed: 1974
(See Vendor Profile Page V-30)

C/U BUSINESS COMPUTERS
BANK BALANCE PROGRAM
Specific Application: Company Bank Balance Program
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: AMOS
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $450
(See Vendor Profile Page V-33)

CULVERIN CORP.
ATM-PLUS
Specific Application: ATM Control System
Specific Industry: Retail, Banking/Financial
System Requirements: NCR Automated 5080, Automated 1770, Automated 1780, Automated 1773: FBS III
Memory Required: 256.0K bytes
Source Language: Intel 8080 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 500
Date First Installed: March 1981
(See Vendor Profile Page V-33)

CULVERIN CORP.
ATM-PLUS 3624E
Specific Application: Emulates the IBM 3624 for NCR ATM System
Specific Industry: Retail, Banking/Financial
System Requirements: NCR Automated 5080, Automated 1770, Automated 1780, Automated 1773: FBS III
Memory Required: 256.0K bytes
Source Language: Intel 8080 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,450
Number Installed to Date: 50
Date First Installed: December 1981

CULVERIN CORP.
DOCUPRE!
Specific Application: Teller Automation of Accounts Area
Specific Industry: Banking/Financial
System Requirements: NCR 3251 FBS III
Memory Required: 60.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 9
Date First Installed: 1982

CULVERIN CORP.
TELLERVATION
Specific Application: Supplies Control and On-Line Interface for NCR Teller Terminals
Specific Industry: Banking/Financial
System Requirements: NCR 3251 Microprocessor: FBS III; NCR 2261 Teller Terminal
Memory Required: 256.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 300
Date First Installed: 1978

DATA BUSINESS VISION, INC.
ASSET LIABILITY INTEREST SENSITIVITY MANAGEMENT SYSTEM
Specific Application: Banking
Specific Industry: Banking/Financial
System Requirements: Convergent Technologies: Ctos, NCR Workstation: Ctos; Burroughs B20: Vtos
Memory Required: 320.0K bytes
Source Language: Basic, Fortran
Purchase Terms: Purchase (license)
Price: $2,500
(See Vendor Profile Page V-35)

EMITECH CORP.
CREDIT UNION FINANCIAL PACKAGE
Specific Industry: Banking/Financial
System Requirements: Alpha Microsystem
Memory Required: 32.0K bytes
Source Language: Alpha Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,500
Number Installed to Date: 2
Date First Installed: 1981
(See Vendor Profile Page V-42)

ELECTRONIC INFORMATION SYSTEM
EIS INVESTOR SYSTEM
Specific Application: Investment Aid for Investors and Financial Counselors
Specific Industry: Banking/Financial
System Requirements: OSI: OS85U
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: 1980
(See Vendor Profile Page V-46)

EXECUTEC CORP.
ASSET/LIABILITY MANAGEMENT
Specific Application: Interest Rate Analysis System
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS, Wang Professional Computer; Victor 9000
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
(See Vendor Profile Page V-47)

EXECUTEC CORP.
INVESTMENT ANALYSIS
Specific Application: Investment Analysis, Customer Relations
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS; Wang Professional Computer; Victor 9000
Source Code Available: No
Price: $500

EXECUTIVE DATA SYSTEMS, INC.
DEPRECIATION/AMORTIZATION MANAGEMENT SYSTEM
Specific Application: Loan Scheduling
Specific Industry: Banking/Financial
System Requirements: CP/M, MP/M, MS-DOS, PC-DOS
Memory Required: 48.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 125
Date First Installed: 1980
(See Vendor Profile Page V-48)

EXECUWARE
FAP-FIN ANALYSIS PKG
Specific Application: Planning Tool, Lease vs. Buy Analysis, Loan/Lease Amortization
Specific Industry: Banking/Financial
System Requirements: Apple II, Apple II+: DOS, IBM PC: PC-DOS
Memory Required: 64M bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $93
Number Installed to Date: 250
Date First Installed: 1982
(See Vendor Profile Page V-48)

FARM BUSINESS SERVICES, INC.
MARKET WINDOW
Specific Application: Automatic Commodity and Stock Charting Program
Specific Industry: Not Industry Sensitive
System Requirements: TRS: MS-DOS, IBM PC: CP/M, Compact
Memory Required: 64 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995 to $1,295
Date First Installed: April 1983
(See Vendor Profile Page V-49)

FINANCIAL SYSTEMS, INC.
AGRICULTURAL CREDIT ANALYSIS
Specific Industry: Banking/Financial
System Requirements: Apple II, Apple III: DOS, MS-DOS
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 750
Date First Installed: 1982
(See Vendor Profile Page V-48)

FINANCIAL SYSTEMS, INC.
ASSET LIABILITY MANAGEMENT
Additional Product Classification: Accounting
Specific Industry: Banking/Financial
System Requirements: Apple II, DOS, MS-DOS
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,995
Date First Installed: 1982

FINANCIAL SYSTEMS, INC.
COMMERCIAL CREDIT ANALYSIS
Specific Application: Commercial Credit Analysis
Specific Industry: Banking/Financial
System Requirements: Apple II, Apple III: DOS, MS-DOS
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 700
Date First Installed: 1982

FINANCIAL SYSTEMS, INC.
INTEREST ACCRUALS
Additional Product Classification: Accounting
Specific Application: Interest Accrual,System
System Requirements: Apple II, Apple III DOS, MS-DOS
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 700
Date First Installed: 1982

FINANCIAL SYSTEMS, INC.
IRA PROPOSAL DISCLOSURE
Specific Application: IRA Proposal Disclosure
Specific Industry: Banking/Financial
System Requirements: Apple II, Apple III. DOS, MS-DOS
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 750
Date First Installed: 1982

FINANCIAL SYSTEMS, INC.
LOAN DOCUMENTATION PROGRAM
Additional Product Classification: Accounting
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,495
Date First Installed: 1983

FINANCIAL TECHNOLOGY, INC.
FINANCIAL PLANNING & ASSET LIABILITY MANAGEMENT
Specific Application: Financial Planning, Assets Liability
Specific Industry: Banking/Financial
System Requirements: IBM PC; Commodore; Apple II, Apple III

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THE INTERNATIONAL SOFTWARE DATABASE

Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 60
Date First Installed: 1982
(See Vendor Profile Page V-49)

HELLISMAN SYSTEMS, INC.
H-CHAMP +II V2.0
Additional Product Classification: Data/File Management
Specific Application: Archive and Text File Formatting Utilities
Specific Industry: Not Industry Sensitive
System Requirements: Intel; Zilog; Motorola
Memory Required: 48.0K bytes
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $149
Number Installed to Date: 4
Date First Installed: May 1983
(See Vendor Profile Page V-54)

HON COMPUTER SYSTEMS, INC.
CREDIT UNION PACKAGE
Specific Application: Credit Union Package
Specific Industry: Banking/Financial
System Requirements: IBM PC; TRS-80
Source Language: Basic, Assembler
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-55)

HON COMPUTER SYSTEMS, INC.
FINANCIAL INSURANCE SYSTEM
Specific Application: Financial Insurance
Specific Industry: Banking/Financial
System Requirements: IBM PC; TRS-80
Source Language: Basic, Assembler
Purchase Terms: Purchase (license)

IFSS (INTERNATIONAL FINANCIAL DATA SYSTEMS)
SUPPORTING SCHEDULES
Specific Application: Checking/ Saving Accounts Inventory, Depreciation and Historical Investment Trading
Specific Industry: Banking/Financial
System Requirements: IBM PC; Wang; Apple
Purchase Terms: Purchase (license)
Date First Installed: 1978
(See Vendor Profile Page V-56)

INSURANCE SALES SYSTEMS
FINANCIAL GOAL PROPOSAL
Additional Product Classification: Insurance
Specific Application: Financial
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM: CP/M
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Purchase Terms: Purchase (license)
Date First Installed: 1979
(See Vendor Profile Page V-59)

INSURANCE SALES SYSTEMS
LOAN AMORTIZATION & DEPRECIATION
Additional Product Classification: Insurance
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM: CP/M; Columbia; Televideo Systems; Altos
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1979

INSURANCE SALES SYSTEMS
MORTAGE EXCELLERATION PROPOSAL
Additional Product Classification: Insurance
Specific Application: Mortage Management
Specific Industry: Banking/Financial
System Requirements: IBM: CP/M; Columbia; Televideo Systems; Altos
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1979

INSURANCE SALES SYSTEMS
TOTAL NEATS ANALYSIS
Additional Product Classification: Insurance
Specific Application: Total Neats Analysis
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM: CP/M; Columbia; Televideo Systems; Altos
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1979

JE CHAPLIN ASSOCIATES, LTD.
MICRO BANKER AUDITING
Specific Application: Controls Transactions
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS, IBM PC-XT: CP/M
Memory Required: 128.0K bytes
Source Language: Pascal, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-62)

JE CHAPLIN ASSOCIATES, LTD.
MICRO BANKER COLLECTIONS
Specific Application: Checks Outstanding Debts, Collects Funds at Maturity
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS, IBM PC-XT: CP/M
Memory Required: 128.0K bytes
Source Language: Pascal, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 2
Date First Installed: 1982

JE CHAPLIN ASSOCIATES, LTD.
MICRO BANKER COMMERCIAL LOAN
Specific Application: Commercial Loan Needs
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS, IBM PC-XT: CP/M
Memory Required: 128.0K bytes
Source Language: Pascal, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 3
Date First Installed: 1982

JE CHAPLIN ASSOCIATES, LTD.
MICRO BANKER FOREIGN EXCHANGE
Specific Application: Converts Currency, Foreign Exchange Needs
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS, IBM PC-XT: CP/M
Memory Required: 128.0K bytes
Source Language: Pascal, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 10
Date First Installed: 1982

JE CHAPLIN ASSOCIATES, LTD.
MICRO BANKER LETTERS OF CREDIT
Specific Application: Credit Letters
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS, IBM PC-XT: CP/M
Memory Required: 128.0K bytes
Source Language: Pascal, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 2
Date First Installed: 1982

JE CHAPLIN ASSOCIATES, LTD.
MICRO BANKER MONEY MARKET
Specific Application: Money Market Needs
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS, IBM PC-XT: CP/M
Memory Required: 128.0K bytes
Source Language: Pascal, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 10
Date First Installed: 1982

JE CHAPLIN ASSOCIATES, LTD.
MICRO BANKER TIME DEPOSIT
Specific Application: Calculates Investments Over Time
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS; IBM PC-XT: CP/M
Source Language: Pascal, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 5
Date First Installed: 1982

KPC COMPUTER SYSTEMS
MICRO COMPUTER BASED-INTERACTIVITY INSTALLMENT
Specific Application: Handles System Interests, Precomputes Insurances, Tracks Collection Action Taken, Produces Loan Documents, Delinquency Reports and Receipts
Specific Industry: Banking/Financial
System Requirements: ISC: Oasis; Altos 8000-10
Memory Required: 256.0K bytes
Source Language: Oasis Basic
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 15
Date First Installed: June 1983
(See Vendor Profile Page V-64)

MICROBANKER COMPUTER, INC.
IEMS-INTEGRATED FINANCIAL MANAGEMENT
Specific Application: Budget Accounting, General Ledger, Investment Accounting, Accounts Payable, Financial Modeling
Specific Industry: Banking/Financial
System Requirements: IBM System/34; SSP; IBM System/36
Memory Required: 128.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 21
Date First Installed: September, 1977
(See Vendor Profile Page V-71)

MLB SYSTEMS INC.
REVEAL PORTFOLIO AND CLIENT MANAGEMENT
Specific Application: Automatic Account Executives
Specific Industry: Banking/Financial
System Requirements: Apple; IBM PC; Victor 20
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200
Date First Installed: 1982
(See Vendor Profile Page V-76)

MONROE SYSTEMS FOR BUSINESS
INSTALLMENT LOAN TRANSACTION SYSTEM I
Specific Application: Installment Loan Calculation
Specific Industry: Banking/Financial
System Requirements: Monroe OC 5400 Series; MS 2
Memory Required: 128.0K bytes
Source Language: Monroe Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $2,750
Date First Installed: March 1983
(See Vendor Profile Page V-77)

MONROE SYSTEMS FOR BUSINESS
SYSTEMATIC ANALYSIS & FINANCIAL EVALUATION
Specific Application: Commercial Credit Review
System Requirements: Monroe OC 5400 Series; MS10
Memory Required: 64.0K bytes
Source Language: Monroe Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: May 1983

NALA ASSOCIATES
ATM SECURITY ACCESS CONTROL
Specific Application: Security for ATM Control Networking
Specific Industry: Banking/Financial
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $10,000 to $30,000
Date First Installed: January 1983
(See Vendor Profile Page V-78)

NATIONAL DATATEC, INC.
BYTESMITH/ESCROW
Specific Application: Escrow Department Processing
Specific Industry: Banking/Financial
System Requirements: Vector Graphic, Xerox, TRS, IBM PC, Apple: CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $600
Number Installed to Date: 3
Date First Installed: January 1982
(See Vendor Profile Page V-78)

NISUS CORP.
CREDIT UNION MANAGER
Specific Application: Credit Union Manager
Specific Industry: Banking/Financial, Credit Manager
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,500
Date First Installed: November 1981
(See Vendor Profile Page V-80)

POWERSOFT, INC.
REAL ESTATE ANALYSIS AND OTHER FINANCIAL
Specific Application: Amortization Depreciation, 20 Financial Programs
Specific Industry: Banking/Financial, Real Estate
System Requirements: IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $99
(See Vendor Profile Page V-87)

RAPIDATA
Division of National Data Corp.
COMMUNITY BANK WORK STATION
Specific Application: Banking
Specific Industry: Banking/Financial
System Requirements: IBM PC; North Star Advantage
Memory Required: 64.0K bytes
Source Language: Dbase II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 1
Date First Installed: July 1983
(See Vendor Profile Page V-78)

REALTY SOFTWARE CO.
APR LOAN ANALYSIS
Specific Application: Loan Analysis
Specific Industry: Banking/Financial, Real Estate
System Requirements: Apple II, IIE, III: DOS 2 2, IBM PC: PC-DOS; TRS-80/I, TRS-80/III: TRS-DOS, CP/M
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: February 1978
(See Vendor Profile Page V-92)

REALTY SOFTWARE CO.
LOAN AMORTIZATION
Specific Application: Loan Amortization
Specific Industry: Banking/Financial, Real Estate
System Requirements: Apple II, IIE, III: DOS 2.2, IBM PC, PC-DOS, TRS-80/I, TRS-80/III: TRS-DOS, CP/M
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: February 1978

REMOTE COMPUTING CORP.
PEAR PORTFOLIO SYSTEM
Specific Application: Tracks Stocks, Interest Cost, Bills, Dividends
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS; Apple
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 600
Date First Installed: 1981
(See Vendor Profile Page V-92)

RESPONSE, INC.
AMORTIZATION & DEPRECIATION
Specific Industry: Banking/Financial
System Requirements: IBM PC, PC-XT: DOS 2.0
Memory Required: 128.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 30
Date First Installed: 1983
(See Vendor Profile Page V-93)

RESPONSE, INC.
CERTIFICATES OF DEPOSIT
Specific Application: Deposit Certificates
Specific Industry: Banking/Financial
System Requirements: IBM PC, PC-XT DOS 2.0
Memory Required: 128.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 30
Date First Installed: 1983

RESPONSE, INC.
IRA'S
Specific Application: IRA Projections
Specific Industry: Banking/Financial
System Requirements: IBM PC, PC-XT DOS 2.0
Memory Required: 128.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1983

RESPONSE, INC.
MASTER LIBRARY SELECTOR
Specific Application: Needed for Other Response Software Modules
Specific Industry: Banking/Financial
System Requirements: IBM PC, PC-XT: DOS 2.0
Memory Required: 128.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,350
Number Installed to Date: 40
Date First Installed: 1983

RESPONSE, INC.
MONEY MANAGEMENT
Specific Application: Money Management
Specific Industry: Banking/Financial
System Requirements: IBM PC, PC-XT DOS 2.0
Memory Required: 128.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 30
Date First Installed: 1983

RESPONSE, INC.
MORTGAGE LOANS
Specific Application: Mortgage Loans
Specific Industry: Banking/Financial
System Requirements: IBM PC, PC-XT, DOS 2.0
Memory Required: 128.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 30
Date First Installed: 1983

RESPONSE, INC.
PC/BANKER
Specific Application: Selling Aid for Bank Services, IRAs, Mortgage Loans, Personal Financial Statements
Specific Industry: Banking/Financial
System Requirements: IBM PC, PC-XT, DOS 2.0
Memory Required: 128.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,650
Number Installed to Date: 40
Date First Installed: March 1983

RESPONSE, INC.
PC BANKER CEO MODULE
Specific Application: Financial Forecasting, Account Evaluation, Customer Service
Specific Industry: Banking/Financial
System Requirements: IBM PC, PC-XT DOS 2.0
Memory Required: 192.0K bytes
Source Language: Basember
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 30
Date First Installed: May 1983

RESPONSE, INC.
PERSONAL FINACIAL STATEMENTS
Specific Application: Personal Financial Statements
Specific Industry: Banking/Financial
System Requirements: IBM PC, PC-XT: DOS 2.0
Memory Required: 128.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 30
Date First Installed: 1983

SHAW SYSTEMS ASSOCIATES, INC.
PASS
Specific Application: Profit Allocation Share System
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS
Memory Required: 130.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $475
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-97)

SPARKING CITY SOFTWARE CO.
ASSET LIABILITY MANAGEMENT SYSTEM
Specific Application: Tracks Interest Income and Expense
Specific Industry: Banking/Financial
System Requirements: Apple II: UCSD-P; IBM PC
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 3
(See Vendor Profile Page V-102)

SUMMIT INFORMATION SYSTEMS CORP.
ATM MARKET TRACKING SYSTEM
Specific Application: ATM Market Tracking System
Specific Industry: Banking/Financial
System Requirements: HP 100 Series: CP/M, IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: March 1981
(See Vendor Profile Page V-105)

SUMMIT INFORMATION SYSTEMS CORP.
COST OF FUNDS ANALYSIS
Specific Application: Funds Analysis Cost
Specific Industry: Banking/Financial
System Requirements: HP 100 Series: CP/M, IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: March 1981

SUMMIT INFORMATION SYSTEMS CORP.
INVESTMENT PORTFOLIO ANALYSIS
Specific Application: Investment Portfolio Analysis
Specific Industry: Banking/Financial
System Requirements: HP 100 Series: CP/M, IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: March 1981

SUMMIT INFORMATION SYSTEMS CORP.
LOAN PORTFOLIO ANALYSIS
Specific Application: Loan Portfolio Analysis
Specific Industry: Banking/Financial
System Requirements: HP 100 Series: CP/M, IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic

Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: March 1981

SUMMIT INFORMATION SYSTEMS CORP.
MONEY MARKET PROGRAM SYSTEM
Specific Application: Money Market Program System
Specific Industry: Banking/Financial
System Requirements: HP 100 Series: CP/M, IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: March 1981

SUMMIT INFORMATION SYSTEMS CORP.
MONEY MARKET TRACKING SYSTEM
Specific Application: Money Market Tracking System
Specific Industry: Banking/Financial
System Requirements: HP 100 Series: CP/M, IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: March 1981

SUMMIT INFORMATION SYSTEMS CORP.
SAFETY DEPOSIT TRACKING SYSTEM
Specific Application: Safety Deposit Tracking System
Specific Industry: Banking/Financial
System Requirements: HP 100 Series: CP/M, IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: March 1981

SUMMIT INFORMATION SYSTEMS CORP.
STATEMENT OF FINANCIAL CONDITION
Specific Application: Statement of Financial Condition
Specific Industry: Banking/Financial
System Requirements: HP 100 Series: CP/M, IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: March 1981

SUMMIT INFORMATION SYSTEMS CORP.
STATEMENT OF INCOME & EXPENSE
Specific Application: Income and Expense Statement
Specific Industry: Banking/Financial
System Requirements: HP 100 Series: CP/M, IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: March 1981

SUNBELT COMPUTER SERVICES, INC.
BCMS BANKERS CREDIT MANAGEMENT
Specific Application: Credit Analysis
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS
Memory Required: 192.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 1
Date First Installed: July 1983
(See Vendor Profile Page V-105)

TAB BOOKS, INC.
CHECKBOOK ANALYZER
Specific Application: Personal Financial Management
Specific Industry: Wholesale/Distribution, Retail
System Requirements: Apple II, IIE: APPLE-DOS 3.3; IBM PC: PC-DOS 1.1
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,495
Date First Installed: January 1983
(See Vendor Profile Page V-106)

VIDEO COMPUTER CENTER
BROKERAGE PACKAGE
Specific Application: Custom Brokerage House
Specific Industry: Banking/Financial
System Requirements: IBM: Ldos; TRS-80: DOS
Memory Required: 48.0K bytes
Source Language: Basic, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000
Date First Installed: 1983
(See Vendor Profile Page V-117)

WATNIK & CO.
WATNIK EQUILIBRIUM TIME MODEL 2
Specific Application: Investment Logic Checker
System Requirements: IBM PC: PC-DOS 2.0
Memory Required: 320.0K bytes
Source Language: Load Module
Source Code Available: No
Purchase Terms: Rental; Lease
Number Installed to Date: 21
Date First Installed: 1983
(See Vendor Profile Page V-117)

WARNER ASSOCIATES, INC.
MICRO CASH MANAGEMENT
Specific Application: Cash Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, IBM PC-XT
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Date First Installed: 1983
(See Vendor Profile Page V-119)

INSURANCE

ADMINISTRATIVE DATA CORP.
SYSTEM 6 BROKERAGE ACCOUNTING
Specific Application: Insurance Agency and Brokerage Firm Management
Specific Industry: Insurance
System Requirements: IBM System/34, System/36, System/38
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 42
Date First Installed: 1971
(See Vendor Profile Page V-2)

ADMINISTRATIVE DATA CORP.
SYSTEM 6 BROKERAGE OA
Specific Application: Office Automation
Specific Industry: Insurance
System Requirements: IBM System/34, System/36, System/38
Memory Required: 96.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 1
Date First Installed: 1983

ADVANCED BUSINESS SYSTEMS, INC.
EASYVIEW (PROSPECTING SYSTEM)
Specific Application: Monitors Sales Prospects Sales
Specific Industry: Legal, Insurance
System Requirements: PC-DOS, Unix, MS-DOS, CP/M 86, TRS-80/I: TRS-DOS
Memory Required: 64.0K bytes
Source Language: RM Cobol
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 75
Date First Installed: January 1983
(See Vendor Profile Page V-2)

ADVANCED SYSTEMS APPLICATIONS
ADCTS
Specific Application: Elegibility
Specific Industry: Insurance
System Requirements: IBM: Cics
Memory Required: 2.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1982
(See Vendor Profile Page V-3)

ADVANCED SYSTEMS APPLICATIONS
BLUE CAPS
Specific Application: Blue Cross Claims Processing
Specific Industry: Insurance
System Requirements: IBM: Cics
Memory Required: 2.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

ADVANCED SYSTEMS APPLICATIONS
CAPSULE
Specific Application: Management, Cost Containment, Reporting
Specific Industry: Insurance
System Requirements: IBM: Cics
Memory Required: 294.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: 1983

AGENCY DATA GUIDANCE, INC.
INDEPENDENT INSURANCE AGENTS EDGE
Specific Application: Rating, Bookkeeping, WP
Specific Industry: Insurance
System Requirements: DG: DOS
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license), Rental, Lease
Price: $7,500
Date First Installed: March 1982
(See Vendor Profile Page V-3)

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
ACCIDENT AND HEALTH SALES AND QUOTING SYSTEM
Specific Application: Quoting
Specific Industry: Medical, Group, Life
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-5)

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
CHECK HISTORY
Specific Application: Check History
Specific Industry: Insurance
System Requirements: DEC, Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
COMMERCIAL AUTO RATE QUOTING
Specific Application: Competitive Rate Quoting
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license),

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
EXPENSE HISTORY
Specific Application: Expense History
Specific Industry: Insurance
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
INSULATION SYSTEM
Specific Application: Insulation
Specific Industry: Insurance
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
MEDICAL PRACTICE MANAGEMENT SYSTEM
Specific Application: Medical Practice Management
Specific Industry: Medical, Insurance
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
PERSONAL AUTO RATE QUOTING
Specific Application: Competitive Rate Quoting
Specific Industry: Insurance
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
PRODUCTION HISTORY
Specific Application: Production History
Specific Industry: Insurance
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
WELL COSTING
Specific Application: Well Costing
Specific Industry: Insurance
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)

ANISTICS, INC.
ANALYTICAL ARIS
Specific Application: Risk Management
Specific Industry: Insurance
System Requirements: DEC 20: Tops 20, IBM PC: PC-DOS
Source Language: Fortran
Source Code Available: No
Purchase Terms: Time-Sharing
Date First Installed: 1978
(See Vendor Profile Page V-6)

ANISTICS, INC.
ARIS CLAIMS
Specific Application: Risk Management Information
Specific Industry: Insurance
System Requirements: DEC 20: Tops 20
Memory Required: 256.0K bytes
Source Language: Cobol, Fortran, Macro
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Date First Installed: 1978

BUSINESS COMPUTER SYSTEMS CORP.
ADVANCE
Specific Application: Rates and Writes Homeowner Insurance Policies
Specific Industry: Insurance
System Requirements: IBM: DOS/VSE; Honeywell
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 14
Date First Installed: 1973
(See Vendor Profile Page V-14)

BUSINESS COMPUTER SYSTEMS CORP.
CABLE
Specific Application: Customer Billing
Specific Industry: Insurance
System Requirements: IBM: DOS/VSE, Honeywell: OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 20
Date First Installed: 1973

BUSINESS COMPUTER SYSTEMS CORP.
CARS
Specific Application: Rates and Writes Private Passenger Auto Policies
Specific Industry: Insurance
System Requirements: IBM: DOS/VSE; Honeywell: OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 6
Date First Installed: 1971

BUSINESS COMPUTER SYSTEMS CORP.
OSAR
Specific Application: Automobile Policies
Specific Industry: Insurance
System Requirements: IBM: DOS/VSE, Honeywell: OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 10
Date First Installed: 1976

BUSINESS COMPUTER SYSTEMS CORP.
PN
Specific Application: Premium Note Financing
Specific Industry: Insurance
System Requirements: IBM: DOS/VSE, Honeywell: VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 18
Date First Installed: 1970

CAPSCO SOFTWARE INTERNATIONAL
CAP-12
Specific Application: Insurance Administration System
Specific Industry: Insurance
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $175,000
Number Installed to Date: 40
Date First Installed: June 1974
(See Vendor Profile Page V-16)

CAPSCO SOFTWARE INTERNATIONAL
CAPS-INVEST
Specific Application: Investment
Specific Industry: Insurance
System Requirements: IBM; Burroughs; CP/M
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: [illegible]
Date First Installed: 1982

CHUBB & SON, INC.
FLEXSTAT
Specific Application: Annual Statements, Bureau Reporting, Premium and Loss Reports, Experience Reports
Specific Industry: Retail, Insurance
System Requirements: IBM 3081; MVS, IBM 3033
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license), Lease
Price: $75,000
Number Installed to Date: [illegible]
Date First Installed: 1971
(See Vendor Profile Page V-18)

COMPUTECH CORP.
GROUP RATING & SALES PROPOSAL (GR & SP)
Specific Application: Group Insurance Rating, Sales Proposal
Specific Industry: Insurance
System Requirements: IBM 3030 Series, 370, 360; OS/VS
Memory Required: 500.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: December 1982
(See Vendor Profile Page V-22)

COMPUTER ENTERPRISES, LTD.
INSURANCE SCALE
Specific Application: Record Keeping
Specific Industry: Insurance
System Requirements: Tandy; Victor 9000, Zenith; CP/M, XDS
Source Language: Basic
Purchase Terms: Lease
Price: $695
Date First Installed: December 1982
(See Vendor Profile Page V-24)

COMPUTER INCOME PLANNING CORP.
UNIVERSAL LIFE ADMINISTRATION SYSTEM
Specific Application: Life Insurance Administration
Specific Industry: Insurance
System Requirements: [illegible]
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: [illegible]
Number Installed to Date: 1
Date First Installed: April 1983
(See Vendor Profile Page V-24)

COMPUTER INCOME PLANNING CORP.
UNIVERSAL LIFE ILLUSTRATION SYSTEM
Specific Application: Life Insurance Illustration
Specific Industry: Insurance
System Requirements: IBM MVS; IBM PC; PC-DOS; Apple APPLE-DOS
Source Language: Fortran, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $12,000 to $35,000
Number Installed to Date: 25
Date First Installed: October 1981
(See Vendor Profile Page V-24)

COMPUTER MANAGEMENT SERVICES, INC.
CMS (CLAIMS MANAGEMENT SYSTEM)
Specific Application: Medical and Dental Claims Processing and Adjudication
Specific Industry: Insurance
System Requirements: IBM; Prime; Primos
Source Language: Cobol
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 1
Date First Installed: 1976
(See Vendor Profile Page V-25)

COMPUTERS & BUSINESS SYSTEMS, INC.
INSURANCE FINANCIAL MANAGEMENT SYSTEM
Additional Product Description
Accounting
Specific Application: Insurance Management
Specific Industry: Not Industry Sensitive, Insurance
System Requirements: DG Eclipse; AOS, AOS/VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: August 1981
(See Vendor Profile Page V-25)

COMPUTER SERVICE CO.
INSURANCE BILLING AND CLAIMS PROCESSING
Specific Application: Billing, Claims Processing, Rate Tables
Specific Industry: Insurance
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-26)

CORE WEST, INC.
INSURANCE
Specific Application: Insurance Package
Specific Industry: Insurance
System Requirements: IBM System/34, System/36, System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: [illegible]
Date First Installed: 1979
(See Vendor Profile Page V-32)

CSA/CRT
INSURANCE ADJUSTMENT PACKAGE
Specific Application: Insurance Claims Settlement, Integrated With the General Accounting System
Specific Industry: Insurance
System Requirements: Point Four; Ins
Memory Required: 64.0K bytes
Source Language: Ins Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,500
Date First Installed: 1982
(See Vendor Profile Page V-32)

CYBERTEK COMPUTER PRODUCTS, INC.
CYPROS/AP AGENCY SYSTEMS
Specific Application: Maintains Name File, Generates Correspondence, Electronic Mail
Specific Industry: Insurance
System Requirements: IBM 360, 370, 3000 Series; DOS, OS
Source Language: Assembler, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-34)

CYBERTEK COMPUTER PRODUCTS, INC.
CYPROS/AP AGENT'S ON-LINE SYSTEM
Specific Application: Provides Complete Structured Agent or Agency Data Base and On-Line Transactions to Update and Display Agent/Agency Information
Specific Industry: Insurance
System Requirements: IBM 360, 370, 3000, 4300; DOS/OS
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)

CYBERTEK COMPUTER PRODUCTS, INC.
CYPROS/AP APPLICATION EXECUTIVE
Specific Application: Interface, Between Teleprocessing Monitor and User Application Subsystems
Specific Industry: Insurance
System Requirements: IBM 360, 370, 3000 Series; DOS, OS
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)

CYBERTEK COMPUTER PRODUCTS, INC.
CYPROS/AP AUTOMATED ISSUE
Specific Application: Automates Procedures of Policy Issue From Original Data Collection Through Creation of In-Force Record
Specific Industry: Insurance
System Requirements: IBM 360, 370, 3000, 4300 Series; DOS; OS
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)

CYBERTEK COMPUTER PRODUCTS, INC.
CYPROS/AP POLICY ADMINISTRATION SYSTEM
Specific Application: Provides On-Line Inquiry and Maintenance of the In-Force Police File
Specific Industry: Insurance
System Requirements: IBM 360, 370, 3000 Series; DOS; OS
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)

CYBERTEK COMPUTER PRODUCTS, INC.
CYPROS/AP STATUTORY REPORTING
Specific Application: Provides Data for Preparing State Exhibits
Specific Industry: Insurance
System Requirements: IBM 360, 370, 3000 Series
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)

CYBERTEK COMPUTER PRODUCTS, INC.
CYPROS/AP UNIVERSAL LIFE
Specific Application: Process and Issue Universal Life Insurance Policies
Specific Industry: Insurance
System Requirements: IBM 360, 370, 4300; DOS
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)

DATA ACTION ENTERPRISES
LIFE BUSINESS EVALUATION
Specific Application: Business Evaluation
Specific Industry: Insurance
System Requirements: DEC, Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: [illegible]
(See Vendor Profile Page V-34)

DATA ACCESS ENTERPRISES
LIFE CORPORATE FEASIBILITY
Specific Application: Life Insurance Corporate Feasibility
Specific Industry: Insurance
System Requirements: DEC, Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: [illegible]

DATA ACCESS ENTERPRISES
LIFE IRA ILLUSTRATION
Specific Application: IRA
Specific Industry: Insurance
System Requirements: DEC, Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500

DATA ACCESS ENTERPRISES
LIFE POLICY AUDIT
Specific Application: Policy Audit
Specific Industry: Insurance
System Requirements: DEC; Zenith
Source Language: Dibol
Purchase Terms: Purchase (license)
Price: $500

DATA ACCESS ENTERPRISES
LIFE PROSPECT CLIENT INVENTORY
Specific Application: Client Inventory
Specific Industry: Insurance
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500

DATA ACCESS ENTERPRISES
VARIABLE DEPOSIT ANNUITY
Specific Application: Deposits
Specific Industry: Insurance
System Requirements: DEC, Zenith
Source Language: Dbol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500

DATA BASIC, INC.
INSURANCE AGENT SYSTEM
Specific Application: Policy Tracking System for Independent Insurance Agents
Specific Industry: Insurance
System Requirements: Victor 9000: CP/M, Apple: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 23
Date First Installed: April 1983
(See Vendor Profile Page V-35)

DATAMARK CORP.
INSURANCE PREMIUM FINANCING SYSTEM
Specific Application: Independent Finance Companies
Specific Industry: Not Industry Sensitive
System Requirements: DG: AOS, R-DOS
Memory Required: 128.0K bytes
Source Language: Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $6,000
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-37)

DATCO, INC.
LIL LIFE INSURANCE LEVERAGING
Specific Application: Leverage Existing Policy By Buying Additional Insurance
Specific Industry: Insurance
System Requirements: North Star CP/M
Memory Required: 48.0K bytes
Source Language: PL/I
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 4
Date First Installed: 1983
(See Vendor Profile Page V-38)

DECISION RESEARCH CORP.
INSURANCE AGENCY ACCOUNTING SYSTEM
Specific Application: Insurance Agency Accounting
Specific Industry: Insurance
System Requirements: HP 3000: MPE
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: April 1983
(See Vendor Profile Page V-40)

DENNEN COMPUTER SYSTEMS, INC.
CARRIER DETAILED CLAIM INFORMATION SYSTEM
Specific Application: Identifies Errors and Simplifies Corrections
Specific Industry: Insurance
System Requirements: IBM DOS, DEC VAX OS
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1982
(See Vendor Profile Page V-41)

DENNEN COMPUTER SYSTEMS, INC.
ON LINE WORKERS COMPENSATION
Specific Application: Automates Policy Issue and Statistical Reporting, Provides Timely Premium Billing
Specific Industry: Insurance
System Requirements: IBM DOS, DEC VAX OS
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1982

DYER, WELLS & ASSOCIATES, INC.
DWA MEDICODES
Specific Application: Cross-Reference of Surgical Procedure Codes
Specific Industry: Medical, Insurance, Government
System Requirements: IBM 4300, 370, 3030 Series, OS, DOS, Wang, VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 1
Date First Installed: July 1983
(See Vendor Profile Page V-44)

DYER, WELLS & ASSOCIATES, INC.
GRID-GROUP INTEGRATED DATE SYSTEM
Specific Application: Billing, Collections, Renewal and Proposal Writing
Specific Industry: Insurance
System Requirements: IBM 370, 4300, 3030 DOS, OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: October 1982

DYX CORP.
SALES PROPOSAL
Specific Application: Produce Insurance Sales Proposals
Specific Industry: Insurance
System Requirements: IBM PC: PC-DOS, IBM Mainframes: OS/DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: June 1981
(See Vendor Profile Page V-44)

DYX CORP.
VLN-VARIABLE LIFE SYSTEM
Specific Application: Process Variable Life Insurance
Specific Industry: Insurance
System Requirements: IBM Mainframes: OS/DOS, VSI, MVS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: January 1984

EDUCATIONAL METHODS, INC.
STATISTICAL TRACKING & REPORTING
Specific Application: Collateral Protection Monitoring
Specific Industry: Insurance
System Requirements: IBM: OS/DOS, Prime: Primos
Memory Required: 500.0K bytes
Source Language: Ans Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1910
(See Vendor Profile Page V-45)

ELECTRONIC DATA SYSTEMS CORP.
PROPERTY AND CASUALTY
Specific Application: Processes Property and Casualty Insurance
Specific Industry: Insurance
System Requirements: IBM 370: Cics
Memory Required: 4.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: August 1981
(See Vendor Profile Page V-46)

ELECTRONIC DATA SYSTEMS CORP.
UNIVERSAL LIFE
Specific Application: Life Insurance Package
Specific Industry: Insurance
System Requirements: IBM 4300: Cics, IBM 370
Memory Required: 4.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: 1981

ERISCO INC.
CLAIMFACTS: MEDICAL, DENTAL, AND DISABILITY
Specific Application: Health Benefits Processing
Specific Industry: Insurance
System Requirements: IBM: DOS/VS, OS/VS2 (MVS), DOS/VSE
Memory Required: 700.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 11
Date First Installed: 1980
(See Vendor Profile Page V-47)

FINANCIAL DATA PLANNING CORP.
AGENCY PARTNER
Specific Application: Illustration for Micros
Specific Industry: Insurance
System Requirements: HP 3000: MPE 5, HP 125; IBM PC: PC-DOS; DEC Rainbow
Memory Required: 128.0K bytes
Source Language: Microsoft Basic, HP Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease; Time-Sharing
Price: $25,000
(See Vendor Profile Page V-48)

FINANCIAL DATA PLANNING CORP.
FDP83
Specific Application: Advanced Underwriting, Sales Illustration
Specific Industry: Insurance
System Requirements: HP 3000: MPE 5, HP 125; IBM PC: PC-DOS; DEC Rainbow
Memory Required: 128.0K bytes
Source Language: Microsoft Basic, HP Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease, Time-Sharing
Number Installed to Date: 2,900
Date First Installed: 1972
(See Vendor Profile Page V-48)

FINANCIAL DATA PLANNING CORP.
FDP III
Specific Application: Pension Proposal and Administrative System for Life Insurance Groups
Specific Industry: Insurance
System Requirements: HP 125; HP 3000 MPE 5, IBM PC: PC-DOS; DEC Rainbow
Memory Required: 128.0K bytes
Source Language: Microsoft Basic, HP Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease; Time-Sharing
Number Installed to Date: 1,500
Date First Installed: 1970

FINANCIAL DATA PLANNING CORP.
MAAS
Specific Application: Multiple Account Allocation, Contribution Pension
Specific Industry: Insurance
System Requirements: HP 3000: MPE 5; HP 125, IBM PC, PC-DOS; DEC Rainbow
Memory Required: 128.0K bytes
Source Language: Microsoft Basic, HP Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease, Time-Sharing
Number Installed to Date: 3
Date First Installed: 1983

FINANCIAL DATA PLANNING CORP.
LILIS
Specific Application: Universal Life/Home Office Administration
Specific Industry: Insurance
System Requirements: HP 3000: MPE 5; HP 125, IBM PC; PC-DOS; DEC Rainbow
Memory Required: 128.0K bytes
Source Language: Microsoft Basic, HP Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease, Time-Sharing
Number Installed to Date: 1
Date First Installed: 1981

FRY COMPUTER CONSULTANTS, INC.
INSURANCE PREMIUM FINANCING SYSTEM
Specific Application: General Ledger, Accounts Payable and Receivable, Cycle Billing

Specific Industry: Banking/Financial
System Requirements: Qantel 200/300, Honeywell DPS 6
Memory Required: 128.0K bytes
Source Language: Qantel QIC Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 2
Date First Installed: September 1982
(See Vendor Profile Page V-50)

GENERAL DATA SYSTEM, LTD.
VIN/SCAN
Specific Application: Validation of Vehicle Identification Number and Automatic Assignment of Rating Symbols
Specific Industry: Insurance
System Requirements: IBM 360 370, 3000, 430: DOS; IBM PC: PC-DOS, OS/MVS
Memory Required: 300.0K bytes
Source Language: Ansi Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease; Transactions
Date First Installed: April 1983
(See Vendor Profile Page V-51)

HERITAGE COMPUTER CORP.
AIMS MR AUTOMATED INSURANCE
SPECIFIC INDUSTRY: Insurance
System Requirements: IBM 370, 4300, 3000 DOS/VSE, Sperry System 80: OS/3, OS/VS
Memory Required: 512.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease, Processing
Date First Installed: September 1979
(See Vendor Profile Page V-54)

HERITAGE COMPUTER CORP.
AIMS/CL AUTOMATED INSURANCE COMMERCIAL LINES
Specific Application: Insurance Management
Specific Industry: Insurance
System Requirements: IBM 370, 4300, 3000 Series: DOS/VSE; Sperry System 80: OS/3, OS/VS
Memory Required: 512.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $65,000
Number Installed to Date: 10

HERITAGE COMPUTER CORP.
AIMS/CM AUTOMATED. INSURANCE
SPECIFIC INDUSTRY: Insurance
System Requirements: IBM 370, 4300, 3000 Series: DOS/VSE; Sperry System 80: OS/3, OS/VS
Memory Required: 512.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease, Processing
Price: $50,000
Date First Installed: July 1978

HERITAGE COMPUTER CORP.
CAMS CASH APPLICATION MANAGEMENT
Specific Application: Cash Application Management
Specific Industry: Insurance
System Requirements: IBM 370, 4300, 3000: DOS/VSE, Sperry System 80: OS/3, OS/VS
Memory Required: 512.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 3
Date First Installed: March 1982

HOPPER ASSOCIATES.
CLAIMS PROCESSING SYSTEM
Specific Application: Process Health Insurance Claims
Specific Industry: Insurance
System Requirements: HP3000: MPE; IBM PC: PC-DOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
(See Vendor Profile Page V-55)

INCEPTS, INC.
PROGRAM STRETCHER
Specific Application: Solves Register Problems for Assembler Language Programs
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: 1982
(See Vendor Profile Page V-56)

INFORMATICS GENERAL CORP.
GROUP - COMM
Specific Application: Administrative System for Group Insurance Operation
Specific Industry: Insurance
System Requirements: IBM Mainframe: OS/DOS
Memory Required: 350.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 7
Date First Installed: March 1982
(See Vendor Profile Page V-57)

INFORMATICS GENERAL CORP.
LIFE - COMM
Specific Application: Insurance Administration
Specific Industry: Insurance
System Requirements: IBM Mainframes: OS, DOS, Cics
Memory Required: 1.5M bytes
Source Language: Assembler, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 70

INFORMATICS GENERAL CORP.
MORTGAGE LOAN SYSTEM
Specific Application: Process or Service Mortgage Loans
Specific Industry: Insurance
System Requirements: IBM Mainframe. OS,DOS,MVS/VM
Memory Required: 256.0K bytes
Source Language: Assembler, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40

INFORMATICS GENERAL CORP.
STOCK AND BOND SYSTEM
Specific Application: Security Investing
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM Mainframes. OS, DOS, Cics
Memory Required: 300.0K bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 95

INFORMATICS GENERAL CORP.
THE EXAMINER
Specific Application: Group and Individual Claims Processing
Specific Industry: Insurance
System Requirements: IBM Mainframes. OS, DOS, Cics
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 17
Date First Installed: July 1983

INFORMATION RESOURCES, INC.
PI/CHECK WRITER
Specific Application: Writes Checks for Claims Processing
Specific Industry: Insurance
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 3
Date First Installed: 1983
(See Vendor Profile Page V-58)

INSURANCE DATA COMPUTER SERVICE, INC.
CASH NEEDS ANALYSIS
Specific Application: Analysis of Financial Poertion of Family With Death of A Working Spouse
Specific Industry: Banking/Financial, Insurance
System Requirements: Apple II
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
(See Vendor Profile Page V-59)

INSURANCE DATA COMPUTER SERVICE, INC.
COMPARATIVE POLICY ANALYSIS
Specific Application: Compares Benefits of Existing Insurance Portfolio With A Proposed Policy
Specific Industry: Banking/Financial, Insurance
System Requirements: Apple II
Memory Required: 48.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Number Installed to Date: 1

INSURANCE DATA COMPUTER SERVICE, INC.
EMERGENCY MEDICAL INFORMATION CARD
Specific Application: Identification Cards
Specific Industry: Banking/Financial, Insurance
System Requirements: Apple II
Memory Required: 64 0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1

INSURANCE DATA COMPUTER SERVICE, INC.
GROUP INSURANCE INFORMATION CARD
Specific Application: Identification Cards
Specific Industry: Insurance
System Requirements: Apple II
Memory Required: 64 0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25
Number Installed to Date: 1

INSURANCE DATA COMPUTER SERVICE, INC.
PERSONAL NEEDS ANALYSIS
Specific Application: Tool for Analyzing Financial Standing In the Event of A Death or Retirement
Specific Industry: Banking/Financial, Insurance
System Requirements: Apple II; IBM PC
Memory Required: 64 0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)

INSURANCE DATA COMPUTER SERVICE, INC.
STATE LIQUIDITY ANALYSIS
Specific Application: Analizes Cash Demands With A Death of A Spouse
Specific Industry: Banking/Financial, Insurance
System Requirements: Apple II
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Number Installed to Date: 1

INTEGRATED BUSINESS METHODS, INC.
INSURANCE BILLING SYSTEM
Additional Product Classification: Accounting
Specific Application: Premium Billing
Specific Industry: Insurance
System Requirements: HP: MPE IV
Memory Required: 256 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); On-Line Service
Price: $40,000
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-60)

INTEGRATED BUSINESS METHODS, INC.
INSURANCE MARKETING SYSTEM
Specific Application: Marketing
Specific Industry: Insurance
System Requirements: HP: MPE IV
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); On-Line Service
Price: $15,000
Number Installed to Date: 1
Date First Installed: 1982

ISI SYSTEMS, INC.
ASSIGNED RISK PROCESSING SYSTEM
Specific Application: Data Base Rating, Endorsement Processing, Billing, Collection, Statistical Reporting, On-Line Inquiry, All Involuntary or Assigned Risk Policies
Specific Industry: Insurance
System Requirements: IBM 3081
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Rental; Lease
Number Installed to Date: 50
Date First Installed: 1974
(See Vendor Profile Page V-61)

ISI SYSTEMS, INC.
MASSACHUSETTS AUTOMOBILE PROCESSING SYSTEM
Specific Application: Data Base, Rating, Endorsement Processing, Billing, Collection Statistical Reporting, On-Line Inquiry
Specific Industry: Insurance, Property and Casualty
System Requirements: IBM 3081: VS
Memory Required: 1.0M bytes
Source Language: Cobol
Purchase Terms: Rental, Lease
Number Installed to Date: 50
Date First Installed: 1969

LIOCS CORP.
PERSPECTIVE AGENCY SYSTEM
Specific Application: Insurance Agency Management System
Specific Industry: Insurance
System Requirements: DEC VAX Series
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000 to $10,000
(See Vendor Profile Page V-66)

LOGIC APPLICATIONS CORP.
GRAD DBL
Specific Application: Administers New York DBL
Specific Industry: Insurance
System Requirements: IBM OS, DOS
Memory Required: 150.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $50,000
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-67)

LOGIC APPLICATIONS CORP.
GRAD I
Specific Application: Group Insurance Administrations
Specific Industry: Insurance
System Requirements: Prime Series 50: Primos, IBM OS, DOS
Memory Required: 150.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $60,000 to $125,000
Date First Installed: 1977

MATRIX SYSTEMS & SERVICES, INC.
CHALLENGER FOR INSURANCE AGENTS
Specific Application: Insurance Management Word Processing
Specific Industry: Insurance
System Requirements: Datapoint: Datashare
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000 to $9,000
Number Installed to Date: 100
Date First Installed: January 1979
(See Vendor Profile Page V-70)

MULTI-SYSTEMS
INSURE
Specific Application: Self Insurer Fund Management
Specific Industry: Insurance
System Requirements: TI 990: DX-10, Prime: Primos, IBM MVS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $18,000
Number Installed to Date: 4
Date First Installed: March 1983
(See Vendor Profile Page V-78)

NETWORK DATA PROCESSING CORP.
FLEXIBLE DEFERRED ANNUITY
Specific Application: Life and Health Insurance Administration
Specific Industry: Insurance
System Requirements: IBM: DOS; DG: AOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-79)

NETWORK DATA PROCESSING CORP.
GAAP VALUATION
Specific Application: Life and Health Insurance Administration
Specific Industry: Insurance
System Requirements: IBM: DOS; DG: AOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

NETWORK DATA PROCESSING CORP.
LA-3
Specific Application: Life and Health Insurance Administration
Specific Industry: Insurance
System Requirements: IBM: DOS; DG: AOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

NETWORK DATA PROCESSING CORP.
UNIVERSAL LIFE ADMINISTRATION
Specific Application: Life and Health Insurance Administration
Specific Industry: Insurance
System Requirements: IBM: DOS; DG: AOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

NETWORK DATA PROCESSING CORP.
UNIVERSAL LIFE ISSUE
Specific Application: Life and Health Insurance Administration
Specific Industry: Insurance
System Requirements: IBM: DOS; DG: AOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

NETWORK DATA PROCESSING CORP.
UNIVERSAL LIFE ISSUE
Specific Application: Life and Health Administration
Specific Industry: Insurance
System Requirements: Apple II, III; IBM PC
Source Language: Basic
Purchase Terms: Purchase (license)

NEWPORT WEST DATA SERVICES, INC
INSURANCE RATING SYSTEM
Specific Application: Insurance Rating
Specific Industry: Insurance
System Requirements: DG: R-DOS, AOS, AOS/VS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-79)

PALLM, INC.
INTERACTIVE NEW BUSINESS
Specific Application: Home Office New Business and Policy Issue for Life, Health and Annuity Products
Specific Industry: Insurance
System Requirements: IBM 370, 4300 Series, 3000 Series: MVS, DOS/VSE
Memory Required: 500.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: September 1982
(See Vendor Profile Page V-84)

PALLM, INC.
PACKAGED AUTOMATED LIABILITY MANAGEMENT
Specific Application: Home Office Administration, Policies, Claims, Financial
Specific Industry: Insurance
System Requirements: IBM 4300 Series, 3000 Series, 360,: DOS/OS; Wang VS
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $325,000
Number Installed to Date: 1
Date First Installed: 1981

PALLM, INC.
PACKAGED AUTOMATED LIFE/LIABILITY MANAGEMENT
Specific Application: Home Office Administration for Life, Health, Annuities and Universal Life Products
Specific Industry: Insurance
System Requirements: IBM 370, 4300 Series, 3000 Series: MVS, DOS/VSE, DG MV6000 to MV10000 AOS
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1974

PALLM, INC.
PALLM UNIVERSAL LIFE
Specific Application: Administration Processing System for Single Fund Universal Life and Annuity Insurance Products
Specific Industry: Insurance
System Requirements: IBM: DOS, OS, MVS
Memory Required: 64.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 15
Date First Installed: 1982

PALLM, INC.
PALLM-LIFE
Specific Application: Home Office Administration, Life Health Annuity and Life Health Insurance Products
Specific Industry: Insurance
System Requirements: IBM: DOS, OS, MVS
Memory Required: 64.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 60
Date First Installed: 1975

PALLM, INC.
PALLM-VARIABLE UNIVERSAL LIFE
Specific Application: Administration System for Single or Multifund and Equity-Linked Insurance Products
Specific Industry: Insurance
System Requirements: IBM: DOS, OS, MVS
Memory Required: 64.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1983

PALLM, INC.
VARIABLE UNIVERSAL LIFE SYSTEM
Specific Application: Issue and Administration of Universal Life I and II
Specific Industry: Insurance
System Requirements: IBM 370, 4300 Series, 3000 Series: MVX, DOS/VSE
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: January 1982

PARK SOFTWARE
ON-LINE CLAIMS PROCESSING SYSTEM (CPS)
Specific Application: Interactive Claims Adjustment
Specific Industry: Insurance
System Requirements: DEC VAX: VMS
Memory Required: 1.0M bytes
Source Language: VAX-11 Cobol, VAX-11 FMS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150,000
Number Installed to Date: 1
Date First Installed: December 1983
(See Vendor Profile Page V-84)

PARK SOFTWARE
PRESCRIPTION DRUG CLAIMS SYSTEM (PCS VERSION 2.1)
Specific Application: Prescription Drug Claims Processing
Specific Industry: Insurance
System Requirements: DEC PDP: RSTS/E
Source Language: DEC Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: March 1981

POLICY MANAGEMENT SYSTEMS CORP.
AGENCY COMPANY ACCESS (ACA)
Specific Application: Information Reformator, Translates Information Flow Between Computer System and the Insurance Agency Network
Specific Industry: Insurance
System Requirements: IBM 4300: OS, IBM 3000 Series: DOS; IBM 168: MVS: VSE
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 25
Date First Installed: 1983
(See Vendor Profile Page V-87)

POLICY MANAGEMENT SYSTEMS CORP.
BASIC PROCESSING SYSTEM (BPS)
Specific Application: On-Line Data Capture, Editing of Premium and Cost Information, Claims Handling, Policy Level Reinsurance and Reporting
Specific Industry: Insurance
System Requirements: IBM 4321: SSX, IBM 4331
Memory Required: 1.0M bytes
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 7
Date First Installed: 1982

POLICY MANAGEMENT SYSTEMS CORP.
INSURANCE MANAGEMENT INFORMATION SYSTEM I
Specific Application: Management of Data Base, Report Generation
Specific Industry: Insurance
System Requirements: IBM 4300: OS, IBM 3000 Series: DOS; IBM 168: MVS/VSE
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 110
Date First Installed: 1978

POLICY MANAGEMENT SYSTEMS CORP.
POLICY MANAGEMENT SYSTEM (PMS VERSION 6)
Additional Product Classification: Sort/Merge, Report Generator, Data/File Management, Data Dictionary, Program Generators/Aids, Application Development Tools
Specific Application: Policy Processing, Billing, Renewals, Reporting
Specific Industry: Insurance
System Requirements: IBM: MVS, DOS
Source Language: Assembler, Cobol
Source Code Available: Yes
Number Installed to Date: 305
Date First Installed: 1973

POLICY MANAGEMENT SYSTEMS CORP.
POLICY MANAGEMENT SYSTEM (PMS)
Specific Application: Organization and Maintenance
Specific Industry: Insurance
System Requirements: IBM 4300: OS, IBM 3000 Series: MVS; IBM 168, DOS/VSE
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 322
Date First Installed: October 1974

POLICY MANAGEMENT SYSTEMS CORP.
SECURITIES MANAGEMENT SYSTEM (SMS)
Specific Application: Securities Management
Specific Industry: Insurance
System Requirements: IBM 4300: OS, IBM 3000 Series: DOS; IBM 168, VSE, MVS
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 35
Date First Installed: 1978

POLYGON ASSOCIATES, INC.
ACA
Specific Application: Interface for Insurance Company and Agents
Specific Industry: Insurance
System Requirements: IBM 370, 4300, 3000 Series: OS, DOS, VSC
Memory Required: 1.0M bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 15
Date First Installed: 1983
(See Vendor Profile Page V-87)

POLYGON ASSOCIATES, INC.
ARS
Specific Application: Accounts Reconciliation System, Billing
Specific Industry: Insurance
System Requirements: IBM 370, 4300, 3000 Series: OS, DOS, VSC
Memory Required: 1.0M bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 110
Date First Installed: 1977

POLYGON ASSOCIATES, INC.
IMS
Specific Application: Insurance Management Information, Report Generator
Specific Industry: Insurance
System Requirements: IBM 370, 4300, 3000 Series: OS, DOS, VSC
Memory Required: 1.0M bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 150
Date First Installed: 1977

POLYGON ASSOCIATES, INC.
PMS
Specific Application: Policy Management, Policy Issuance, Policy and Claims IMS
Specific Industry: Insurance
System Requirements: IBM 370, 4300, 3000 Series: DOS, OS
Memory Required: 1.0M bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 300
Date First Installed: 1974

PROGRAMMING SERVICES & SUPPORT, INC.
PSS POLICY INFORMATION SYSTEM
Specific Application: Insurance Company Policy Billing and Reporting
Specific Industry: Insurance
System Requirements: IBM 5110/5120, System/23; IBM System/34, System/36 SSP
Memory Required: 32.0K bytes
Source Language: Basic, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 4
Date First Installed: January 1981
(See Vendor Profile Page V-86)

PROGRAM SYSTEMS, INC.
RESERVE/GUP CALCULATIONS
Specific Application: Reserve/GUP Calculations for Credit Life/Disability Policies
Specific Industry: Insurance
System Requirements: DG
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-89)

RICHARD M. WALSH ASSOCIATES
WALSH INSURANCE PACKAGE
Specific Application: Independent Insurance Agent
Specific Industry: Insurance
System Requirements: DEC PDP-11: RT-11, RSTS/E
Memory Required: 128.0K bytes
Source Language: Basic, Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: 1979
(See Vendor Profile Page V-93)

SATELLITE SOFTWARE INTERNATIONAL (SSI)
WORKPERFECT
Specific Application: Word Processing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1983
(See Vendor Profile Page V-95)

SCORPION SYSTEMS, INC.
THE PROSPECTOR
Specific Application: Prospecting, Survey Taking
Specific Industry: Insurance, Real Estate, Nonprofit Organizations, Consumer Sales
System Requirements: Apple IIE: APPLE-DOS, CP/M, IBM PC: PC-DOS; Victor 9000
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $700 to $4,000
Number Installed to Date: 15
Date First Installed: June 1982
(See Vendor Profile Page V-95)

SIGMA SOFTWARE, INC.
ADVANCED UNDERWRITING
Specific Application: Single Life Deferred Compensation, Cost-per-Dollar Insurance Comparison, Executive Bonus, Vanishing Premium
Specific Industry: Insurance
System Requirements: Wang 2200 Series, Wang PC, IBM PC: PC-DOS
Memory Required: 28.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,100
Number Installed to Date: 400
Date First Installed: 1978
(See Vendor Profile Page V-97)

SIGMA SOFTWARE, INC.
EXPANDED ESTATE PLANNING
Specific Application: Expanded Estate Planning
Specific Industry: Insurance
System Requirements: Wang 2200
Memory Required: 28.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 150
Date First Installed: 1979

SIGMA SOFTWARE, INC.
MULTI LIFE DEFERRED COMPENSATION
Specific Application: Multiple Life Insurance Deferred Compensation
Specific Industry: Insurance
System Requirements: Wang 2200 Series
Memory Required: 28.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 20
Date First Installed: 1982

STRATEGIC DATA SYSTEMS
CASUALTY INSURANCE PROCESSING SYSTEM
Specific Application: Policy and Loss Administration, Accounting Management Bureau and State Reporting
Specific Industry: Insurance
System Requirements: Wang VS
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license), Lease
Price: $100 to $200
Number Installed to Date: 3
Date First Installed: February 1983
(See Vendor Profile Page V-104)

STSC, INC.
POLICY PLUS
Specific Application: Decision Support Tool for Analysis of Large Policy Data Bases
Specific Industry: Insurance
System Requirements: IBM 370/4330; VM/CMS
Memory Required: 500.0K bytes
Source Language: APL
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 18
Date First Installed: October 1982
(See Vendor Profile Page V-104)

SYSCOM, INC.
MOTOR VEHICLE INSURANCE
Specific Application: Motor Vehicle Insurance
Specific Industry: Insurance
System Requirements: IBM System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: January 1982
(See Vendor Profile Page V-105)

SYSTEM AUTOMATION CORP.
INSURANCE
Specific Application: Insurance
Specific Industry: Automobile Club
System Requirements: HP 3000; MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Number Installed to Date: 1
Date First Installed: October 1983
(See Vendor Profile Page V-105)

SYSTEMS ASSURANCE CORP.
CASUALTY INSURER BUSINESS INFORMATION SYSTEM
Specific Application: Property/ Casualty Policy Writing and Administration
Specific Industry: Insurance
System Requirements: Wang VS45; IBM System/34; DEC VAX
Memory Required: 256 0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 18
Date First Installed: July 1981
(See Vendor Profile Page V-105)

TCA, INC.
CLIENT/CONTRACT ADMINISTRATIVE SYSTEM
Specific Application: Client Commission Administration
Specific Industry: Insurance
System Requirements: IBM 370; Arch, IBM PC; PC-DOS
Memory Required: 190.0K bytes
Source Language: Cobol, Assembler, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 45
(See Vendor Profile Page V-108)

TCC, INC.
CONTINUUM LIFE AGENCY SUPPORT SYSTEM
Specific Application: Agents Management Tools
Specific Industry: Insurance
System Requirements: IBM 370; Arch, IBM PC, PC-DOS
Memory Required: 190 0K bytes
Source Language: Cobol, Assembler, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 45

TCC, INC.
CONTINUUM SYSTEMS
Specific Application: Home/Office Policy Administrator
Specific Industry: Insurance
System Requirements: IBM 370 Arch, IBM PC: PC-DOS
Memory Required: 190.0K bytes
Source Language: Cobol, Assembler, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 100

TCI SOFTWARE
PROPERTY AND CASUALTY SYSTEM
Specific Application: Billing, Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 1
Date First Installed: July 1981
(See Vendor Profile Page V-106)

TRADESTREET RESEARCH
LIFE INSURANCE FINANCIAL MODEL
Specific Application: Financial Model
Specific Industry: Insurance
System Requirements: IBM PC-XT: PC-DOS; IBM 4300 Series: MVS; IBM 3000 Series: OS
Memory Required: 128 0K bytes
Source Code Available: No
Purchase Terms: Rental
Date First Installed: July 1980
(See Vendor Profile Page V-111)

ULTIMATE INTERAQUITAIN, INC.
TACS
Specific Application: On-Line Claims and Payments
Specific Industry: Insurance
System Requirements: Ultimate Series: Ultimate
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75,000
Number Installed to Date: 5
Date First Installed: July 1981
(See Vendor Profile Page V-112)

VANTAGE COMPUTER SYSTEMS
UNIVERSAL LIFE ADMINISTRATION SYSTEM
Specific Application: Universal Life, Flexible Premium, Annuities Single Premium and Deferred Annuities Administration
Specific Industry: Insurance
System Requirements: IBM: Cics, OS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $5,000
Number Installed to Date: 8
Date First Installed: October 1981
(See Vendor Profile Page V-115)

VANTAGE COMPUTER SYSTEMS
VANTAGE ONE
Specific Application: Nontraditional Life Insurance Policy Processing
Specific Industry: Insurance
System Requirements: IBM: Cics, OS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 21
Date First Installed: November 1982

THE WHEATLEY GROUP LTD.
WHEATLEY INSURANCE SYSTEMS (WINS)
Specific Application: Policy Management, Claims Processing, Premium Accounting
Specific Industry: Insurance
System Requirements: IBM System/38
Memory Required: 2 0M bytes
Source Language: Cobol, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150,000
Date First Installed: August 1982
(See Vendor Profile Page V-117)

AGENCY COMPUTER SYSTEMS, INC.
AUTO RATING PACKAGE.
Specific Application: Property, Casualty, Rating
Specific Industry: Insurance
System Requirements: TRS-80: TRS-DOS, IBM PC-XT· PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 130
Date First Installed: 1978
(See Vendor Profile Page V-3)

AGENCY COMPUTER SYSTEMS, INC.
FIND-IT
Specific Application: Property, Casualty Market Search for Unusual Coverages
Specific Industry: Insurance
System Requirements: TRS-80: TRS-DOS, IBM PC-XT· PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 10
Date First Installed: 1982

AGENCY COMPUTER SYSTEMS, INC.
HOME OWNER RATING PACKAGE
Specific Application: Property, Casualty Rating
Specific Industry: Insurance
System Requirements: TRS-80: TRS-DOS, IBM PC-XT· PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 50
Date First Installed: 1980

AGENCY COMPUTER SYSTEMS, INC.
RESIDENTIAL COST ESTIMATOR PACKAGE
Specific Application: Calculates Replacement Values for Residential Dwellings
Specific Industry: Insurance
System Requirements: TRS-80: TRS-DOS, IBM PC-XT· PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 70
Date First Installed: 1981

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
INSURANCE AGENCY AUTOMATED ACCOUNTING
Additional Product Classification: Accounting
Specific Application: Monthly Customer Statements and Reports, Accounts Receivable and Payable, General Ledger, Premium and Commission Statistics
Specific Industry: Insurance
System Requirements: DEC Rainbow· CP/M, Decmate II· CP/M 86, Zenith Z90· CP/M, Muse: OSM
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: September 1977
(See Vendor Profile Page V-5)

AMERICAN MICRO DYNAMICS, INC.
SYSTEM 1000
Specific Application: Insurance Agent Management
Specific Industry: Education
System Requirements: IBM PC· PC-DOS, CP/M
Memory Required: 64.0K bytes
Source Language: Dbase-II
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: March 1982
(See Vendor Profile Page V-5)

ANISTICS, INC.
PERSONAL AGIS
Specific Application: Risk Management
Specific Industry: Insurance
System Requirements: IBM PC· PC-DOS
Memory Required: 256.0K bytes
Purchase Terms: Purchase (license)
Date First Installed: April 1983
(See Vendor Profile Page V-6)

AQS, INC.
AQS INSURANCE RATING SOFTWARE
Specific Application: Insurance Rating
Specific Industry: Insurance
System Requirements: Wang 2200 LVP· Basic 2, IBM PC-XT· PC-DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: February 1981
(See Vendor Profile Page V-8)

AQS, INC.
COMMERCIAL AND PERSONAL INSURANCE
Specific Application: Insurance Property Casualty Rating System
Specific Industry: Insurance
System Requirements: Wang 2200 LDT, IBM PC-XT
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 35
Date First Installed: September 1980

ARTISAN SOFTWARE TECHNOLOGY, INC.
PERFORMANCE PACKAGE
Additional Product Classification: Accounting
Specific Application: General Ledger, Report Generation Rates
Specific Industry: Insurance
System Requirements: Altos 8010, 8011, 8012, 8013 Oasis
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $2,500
Number Installed to Date: 2,500
Date First Installed: 1982
(See Vendor Profile Page V-9)

AUSTIN MICRO SYSTEMS, INC.
AUSTIN MICRO SYSTEM
Specific Application: Policy Management and Storage System
System Requirements: IBM PC, TI· CP/M 2.2
Source Language: Fortran
Purchase Terms: Lease
Number Installed to Date: 275
Date First Installed: 1978
(See Vendor Profile Page V-10)

BENEFIT ANALYSIS, INC.
FAMILY ASSET DISTRIBUTION PLAN
Specific Application: Estate Planning
Specific Industry: Banking/Financial, Legal, Insurance, CPA
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $500
Date First Installed: June 1982
(See Vendor Profile Page V-12)

BENEFIT ANALYSIS, INC.
FAMILY INCOME CONTINUATION PLAN
Specific Application: Life Insurance Sales Support, Needs Analysis
Specific Industry: Banking/Financial, Legal, Construction, CPA
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $300
Date First Installed: June 1982

BENEFIT ANALYSIS, INC.
FAMILY WEALTH & PRESERVATION OPTION
Specific Application: Shows Impact of Life Insurance in an Irrevocable Trust
Specific Industry: Banking/Financial, Legal, Construction, CPA
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $200
Date First Installed: June 1982

BENEFIT ANALYSIS, INC.
PENPRO
Specific Application: Qualified Pension, Profit-Sharing
Specific Industry: Banking/Financial, Legal, Construction, CPA
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $500
Date First Installed: June 1982

BREMER ASSOCIATES, INC.
AUTO FINANCE & INSURANCE
Specific Application: Auto Finance and Insurance
System Requirements: TRS-80: TRS-DOS, IBM PC· PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 95
Date First Installed: 1983
(See Vendor Profile Page V-13)

B.W.C. SYSTEMS
AUTO RATING
Specific Application: Quotes Auto Insurance Rates
Specific Industry: Insurance
System Requirements: TRS-80: CP/M
Memory Required: 48.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 120
Date First Installed: January 1979
(See Vendor Profile Page V-15)

BYRON HOPKINS & ASSOCIATES, INC.
DENTAL SYSTEM
Specific Application: Insurance
Specific Industry: Dental
System Requirements: Altos: CP/M; Northstar· MP/M, Televideo: Oasis; CDM
Memory Required: 64.0K bytes
Source Language: Basic, Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $3,000
Number Installed to Date: 1
Date First Installed: January 1982
(See Vendor Profile Page V-15)

COMPUTERIZED LIFE INSURANCE COMPUTATIONS AGENCY MANAGER
Specific Application: Program Analysis of Client and Agent Records Sales, Commissions and Advances
Specific Industry: Banking/Financial, Insurance
System Requirements: TRS-80/II, TRS-80 Model 12, TRS-80 Model 16: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $295
(See Vendor Profile Page V-24)

COMPUTERIZED LIFE INSURANCE COMPUTATIONS GOVERNMENT BENEFITS ANALYSIS
Specific Application: Benefits Analysis for Active Servicemen, Social Security
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM PC; TRS-80/II, TRS-80 Model 12, TRS-80 Model 16 TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $225

COMPUTERIZED LIFE INSURANCE COMPUTATIONS LIFE INSURANCE COMPARISON AND REPLACEMENT
Specific Application: Life Insurance Proposal Package, Details Existing and Proposed Plans, Compliance and Sales Forms
Specific Industry: Banking/Financial, Insurance

System Requirements: IBM PC; TRS-80/II, TRS-80 Model 12, TRS-80 Model 16: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $995

COMPUTERIZED LIFE INSURANCE COMPUTATIONS
LIFE INSURANCE PROPOSAL
Specific Application: Personnel Fact Sheet for Premium, Retirement and Death Benefits, Rider and Payment Methods
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM PC; TRS-80/II, TRS-80 Model 12, TRS-80 Model 16: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $225

COMPUTERIZED LIFE INSURANCE COMPUTATIONS
RATEBOOK MAKER
Specific Application: Fact Sheets for Premiums, Rate Proposals
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM PC; TRS-80/II, TRS-80 Model 12, TRS-80 Model 16: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $225

CONWAY COMPUTER CONSULTANTS, INC.
CLAIMS ADMISSION & MGMT.
Specific Application: Claims Admission & Management
Specific Industry: Insurance
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000 to $50,000
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-30)

DGM-COM SYSTEMS, INC.
AESOPS
Specific Application: Automation of Insurance Office Functions
Specific Industry: Insurance
System Requirements: Alpha Micro: Amos
Memory Required: 64.0K bytes
Source Language: Alpha Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $7,500
Number Installed to Date: 1
Date First Installed: November 1982
(See Vendor Profile Page V-42)

DURANGO SYSTEMS, INC.
BOECKH PROPERTY APRAISALS
Specific Application: Residential and Commercial Property Appraisal
Specific Industry: Insurance
System Requirements: Durango F-85: DX85M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,450
Number Installed to Date: 50
Date First Installed: 1982
(See Vendor Profile Page V-44)

DURANGO SYSTEMS, INC.
STAR 64 INSURANCE AGENCY MANAGEMENT
Specific Application: Forms Preparation, Prospecting, Billing, Company and Client Receivables, Accounts Payable, General Ledger
Specific Industry: Insurance
System Requirements: Durango F-85: DX85M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,965
Number Installed to Date: 300
Date First Installed: 1981

INFORMATICS GENERAL CORP.
THE TOP PRODUCER
Specific Application: Field Force Insurance
Specific Industry: Insurance
System Requirements: IBM PC: UCSD-P
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 70
Date First Installed: October 1982
(See Vendor Profile Page V-57)

INSURANCE SALES SYSTEMS
PROPOSAL IRA
Specific Application: IRA Accounting
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM: CP/M; Columbia; Televideo, Altos
Memory Required: 64.0K bytes
Source Language: Compiler Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1978
(See Vendor Profile Page V-59)

INTERNATIONAL MARKETING CONSULTANTS, INC.
CLIC/ANNUITY PROPOSAL
Specific Application: Taxed Deferred Investment Value vs. Currently Taxed Investment Value
Specific Industry: Insurance
System Requirements: TRS-80/I, TRS-80/II
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $95
Number Installed to Date: 100
Date First Installed: 1978
(See Vendor Profile Page V-61)

INTERNATIONAL MARKETING CONSULTANTS, INC.
CLIC/GOVERNMENT BENEFIT ANALYSIS
Specific Application: Current and Retirement Military Benefits Analysis
Specific Industry: Insurance
System Requirements: TRS-80/I, TRS-80/II
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $235
Number Installed to Date: 100
Date First Installed: 1978

INTERNATIONAL MARKETING CONSULTANTS, INC.
CLIC/INSURANCE COMPARISON & REPLACEMENT
Additional Product Classification: Report Generator
Specific Application: Compares Existing Insurance With Proposed Insurance Program
Specific Industry: Insurance
System Requirements: TRS-80/I, TRS-80/II
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 100
Date First Installed: 1978

INTERNATIONAL MARKETING CONSULTANTS, INC.
CLIC/IRA ANALYSIS
Specific Application: Tax-Deferred IRA Benefits Analysis
Specific Industry: Insurance
System Requirements: TRS-80/I, TRS-80/II
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $95
Number Installed to Date: 100
Date First Installed: 1978

INTERNATIONAL MARKETING CONSULTANTS, INC.
CLIC/LIFE INSURANCE PROPOSAL
Specific Application: Life Insurance Program Illustration for Clients
Specific Industry: Insurance
System Requirements: TRS-80/I, TRS-80/II
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $235
Number Installed to Date: 100
Date First Installed: 1978

INTERNATIONAL MARKETING CONSULTANTS, INC.
CLIC/MORTGAGE ANALYSIS
Specific Application: Client Aid for Purchasing Principle of Mortgage
Specific Industry: Insurance
System Requirements: TRS-80/I, TRS-80/II
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $95
Number Installed to Date: 100
Date First Installed: 1978

INTERNATIONAL MARKETING CONSULTANTS, INC.
CLIC/NEED/RETIREMENT ANALYSIS
Specific Application: Illustrates Financial Need in Event of Spouse's Death
Specific Industry: Insurance
System Requirements: TRS-80/I, TRS-80/II
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $235
Number Installed to Date: 100
Date First Installed: 1978

INTERNATIONAL MARKETING CONSULTANTS, INC.
CLIC/RATE BOOK MAKER
Specific Application: Creation of Customized Life Insurance Rate Books
Specific Industry: Insurance
System Requirements: TRS-80/I, TRS-80/II
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $235
Number Installed to Date: 100
Date First Installed: 1978

INTERNATIONAL MICRO SYSTEMS, INC.
INSURANCE AGENCY MANAGEMENT
Specific Application: Insurance Agency Processing
Specific Industry: Insurance
System Requirements: CP/M; MP/M, CP/M 86
Memory Required: 64.0K bytes
Source Language: C Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
(See Vendor Profile Page V-61)

ISI SYSTEMS, INC.
ACC-U-RATE
Specific Application: Develops Premiums
Specific Industry: Insurance
System Requirements: Apple II: APPLE-DOS, IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic, Pascal
Purchase Terms: Lease
Date First Installed: 1979
(See Vendor Profile Page V-61)

LASALLE COMPUTING, INC.
INSURANCE NOTIFICATION/CANCELLATION
Specific Application: Automobile Casualty Notification Late Payment
Specific Industry: Insurance
System Requirements: Vector Graphic: CP/M; Digilog 150: TURBO-DOS, NCR Tower 1632: Unix; IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: CMD Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1981
(See Vendor Profile Page V-65)

LOLA APPLIED SYSTEMS
LAS/AIMS: LAS AGENCY INFORMATION & MANAGEMENT SYSTEM
Additional Product Classification: Accounting
Specific Application: Integrated Policy Progression, Billing, Accounts Payable and Receivable, Accounts Current Management, General Ledger, Agency Sales Analysis and Marketing
Specific Industry: Insurance
System Requirements: Burroughs B20 Series. Btos. Convergent Technologies. Ctos
Memory Required: 384.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: April 1983
(See Vendor Profile Page V-67)

MDS ASSOCIATES
MYTE MYTE AUTOMOBILE RATING PACKAGE
Specific Application: Policy Quotation

Specific Industry: Insurance
System Requirements: IBM PC: PC-DOS, Victor: MS-DOS; Molecular: CP/M; DCC: CP/M
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
[illegible] Installed to Date: 2
Date First Installed: August 1983
(See Vendor Profile Page V-71)

[illegible] DATA SYSTEMS
FORMS & SYSTEMS
[illegible] ASSIST SYSTEM
Specific Application: Policy Management System
Specific Industry: Insurance
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: C Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $[illegible]
Date First Installed: 1980
(See Vendor Profile Page V-73)

NETWORK DATA PROCESSING CORP.
COST DISCLOSURE
Specific Application: Life and Health Insurance Administration
Specific Industry: Insurance
System Requirements: Apple II, Apple III; IBM PC
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-79)

NETWORK DATA PROCESSING CORP.
FINANCIAL [illegible] ANALYSIS
Specific Application: Life and Health [illegible]
Specific Industry: Insurance
System Requirements: Apple II, Apple III; IBM PC
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)

NETWORK DATA PROCESSING CORP.
REGULAR LIFE PROPOSAL
Specific Application: Life and Health Insurance Administration
Specific Industry: Insurance
System Requirements: Apple II, Apple III; IBM PC
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)

[illegible] DATA SYSTEMS OF MAINE, INC.
INDEPENDENT INSURANCE AGENCY PACKAGE
Specific Application: Insurance
Specific Industry: Insurance
System Requirements: Cado Systems
Memory Required: 4.0K bytes
Source Language: Cadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $[illegible]
Number Installed to Date: [illegible]
Date First Installed: 1982
(See Vendor Profile Page V-80)

POLICY MANAGEMENT SYSTEMS CORP.
INSURANCE WORK STATION (IWS)
Specific Application: Claim Handling, WP, Form Generation, Ad Hoc Report Writing, Cross-Reference Checking
Specific Industry: Insurance
System Requirements: IBM: MS-DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Lease
Date First Installed: January 1984
(See Vendor Profile Page V-81)

POLTRON ASSOCIATES, INC.
IWS
Specific Application: Insurance Company Interface With Mainframe
Specific Industry: Insurance
Memory Required: 1.0M bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Lease
Date First Installed: 1[illegible]
(See Vendor Profile Page V-87)

POLYSYSTEMS, INC.
COMPACT
Specific Application: Insurance Actuaries
Specific Industry: Insurance
System Requirements: IBM PC; Victor 9000
Memory Required: 256.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-87)

REDWOOD COMPUTER SERVICE CENTER
[illegible] CLAIMS MANAGEMENT SYSTEM
Specific Application: Payment, Control and Full Reporting of Health Insurance
Specific Industry: Insurance
System Requirements: HP3000: [illegible]
Source Code Available: Yes
Purchase Terms: Purchase (license); [illegible]
Price: $50,000
Number Installed to Date: 2
Date First Installed: July 1982
(See Vendor Profile Page V-92)

RENAISSANCE GROUP, LTD.
CLAIMS SYSTEM
Specific Application: Interactive Claims Processing, Actuary Analysis of Claim Reserve and Expense
Specific Industry: Insurance
System Requirements: IBM PC; Intel
Memory Required: 64.0K bytes
Source Language: C, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-93)

S.B.C. SYSTEMS CO.
401 K SYSTEM
Additional Product Classification: Accounting
Specific Application: Insurance/Accounting
Specific Industry: Insurance
System Requirements: Teletech: MICRO-DOS; Northstar: MICRO-DOS; IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic -
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 1
Date First Installed: October 1983
(See Vendor Profile Page V-95)

S.B.C. SYSTEMS CO.
PORTABLE EMPLOYEE BENEFIT ENROLLMENT SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Employee Benefits Enrollment
System Requirements: IBM PC: CP/M, PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: September 1983

SENSIBLE SOFTWARE, INC.
REPORT CARD
Additional Product Classification: Education
Specific Application: Report, Grades Keeper
Specific Industry: Not Industry [illegible]
System Requirements: Apple: Apple DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $60
Number Installed to Date: 250
Date First Installed: [illegible]
(See Vendor Profile Page V-97)

UNION INFORMATION SERVICE, INC.
PENSION FUND ADMINISTRATION SYSTEM
Additional Product Classification: Payroll/Personnel
Specific Application: Benefits Definition Analysis
Specific Industry: Not Industry [illegible]
System Requirements: Convergent Technologies: Cios; Burroughs B20
Memory Required: 256.0K bytes
Source Language: Pascal, Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $9,000
Number Installed to Date: 10
Date First Installed: January 1981
(See Vendor Profile Page V-114)

VIDEO COMPUTER CENTER
INSURANCE PACKAGE
Specific Application: Auto Rating
Specific Industry: Insurance
System Requirements: IBM: PC-DOS; TRS-80: Cdos
Memory Required: 48.0K bytes
Source Language: Basic, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $7,[illegible]
Number Installed to Date: 12
Date First Installed: [illegible]
(See Vendor Profile Page V-117)

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Manufacturing

A-76 PROCUREMENT MANAGEMENT SYSTEM	$25,000	B-22
ABC/EQUIPMENT HISTORY	$11,000	B-1
ABC/WORK ORDERS	$22,000	B-1
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AFMS	NA	B-2
AMPS	$43,000	B-13
APPLICON AGS-990 TO/FROM CALMA GDS II	$12,000	B-16
APPLICON APPLE TO/FROM COMPUTERVISION	$12,000	B-17
APPLICON APPLE TO/FROM CALMA GDS-2	$12,000	B-17
APPLICON APPLE TO/FROM CALTECH I	$15,000	B-17
ASA MANUFACTURING	$17,500	B-2
ASC - MI	$25,000	B-6
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AUTOMOTIVE RELEASE CONTROL SYSTEM	NA	B-13
AUTOMOTIVE RELEASE PROCESSING	$15,000	B-5
AUTOMOTIVE SUPPLIER MFG SYSTEM	NA	B-9
AVIATION SHOP CONTROL	$3,700 to $9,400	B-2
BACK TO BASICS	$5,000 to $7,000	B-11
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BASE MATERIAL REQUIREMENTS PLANNING	NA	B-23
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BILL OF MATERIAL	$1,500	B-12
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BILL OF MATERIALS PROCESSOR	$2,000 to $7,000	B-23
BILL OF MATERIAL/LABOR & MODEL SIMULATION	$4,000	B-39
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BUSINESS INVENTORY CONTROL SYSTEM	$200	B-11
BUSINESS SYSTEMS FOR NEWSPAPER INDUSTRY	NA	B-24
CA DISTRIBUTION MGMT SOFTWARE/INV CTRL	$27,000	B-4
CA DISTRIBUTION MGMT SOFTWARE/JOB COSTING	$8,000	B-4
CA INVENTORY CONTROL	$32 to $35	B-4
CA JOB COST	$18 to $20	B-4
CA ORDER PROCESSING	$32 to $35	B-4
CA PURCHASING	$18 to $20	B-4
THE CAE 2000	$39,000 to $100,000	B-3
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CALMA GDS II STREAM TO/FROM CALTECH I	$10,000	B-17
CALMA GDS1 LU TO/FROM APPLICON	$2,600	B-17
CAMM (CAM MANAGEMENT)	$50,000	B-1
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CAPACITY REQUIREMENTS PLANNING	NA	B-10
CAPACITY REQUIREMENTS PLANNING	NA	B-11
CAPACITY REQUIREMENTS PLANNING	NA	B-12
CASPA	NA	B-9
CCC RIMS	$10,000	B-3
CLASS	$15,000	B-6
CMCS	$50,000 to $275,000	B-21
COLOR MATCHING AND CONTROL	$10,000 to $25,000	B-11
COLT 80 TYPESETTING SYSTEM	$25,000	B-8
COMPACT 4 SERIES 300	$15,000 to $80,000	B-14
COMPACT 8 SERIES 400	$30,000 to $100,000	B-14
COMPREHENSIVE BUSINESS ACCOUNTING	NA	B-6
COMPREHENSIVE ON-LINE MAINT PLANNING	NA	B-2
CONSTRUCT	$10,000	B-5
CONSTRUCTION MANAGEMENT SYSTEM	$10,000	B-6
THE CORTEX APPLICATION BUILDER	NA	B-5
CORTEX APPLICATION FACTORY	$15,000	B-5
CRITICAL PATH MGMT	NA	B-15
CRITICAL PATH SCHEDULING	$5,000	B-9
CSAS	NA	B-22
CSCO INVENTORY CONTROL SYSTEM	NA	B-3
CSCO WHOLESALES/DISTRIBUTERS	$60,000	B-3
CULLINER MANUFACTURING SYS-CMS	$60,000	B-9
CUSTOMER ORDER PROCESSING	NA	B-1
CUSTOMER ORDER SERVICING	$5,000	B-9
CUSTOMER ON-LINE ORDER PROCESSING	$110,000	B-15
CUTTING PLANNER	NA	B-16
DATASTAT MFG PRODUCTION CONTROL	$3,000	B-6
DCPOST	$18,000 to $25,000	B-4
DISTRIBUTION CONTROL SYSTEM	NA	B-2
DISTRIBUTION CONTROL SYSTEM	$17,100	B-21
DISTRIBUTION REQUIREMENTS PLANNING	NA	B-1
DISTRIBUTION SOLUTIONS	$83,900	B-10
DISTRIBUTORS INVENTORY CONTROL	$2,400	B-22
DISTRIBUTOR ORDER ENTRY & INVOICING	$2,600	B-22
DP 11636	$7,500	B-4
DRUG ROOM CONTROL LIQUIDS	$10,000 to $25,000	B-11
DRUG ROOM CONTROL POWDERS	$10,000 to $25,000	B-11
DYE & CHEMICAL INVENTORY CONTROL	$10,000 to $25,000	B-11
DYE PROCESS MANAGEMENT	$10,000 to $25,000	B-11
E-PICS	NA	B-22
EASE ORDER MANAGEMENT SYSTEM	NA	B-22
EDMS	NA	B-10
EDS ACCOUNTING, MFG SYSTEM	NA	B-6
ELECTRICAL DISTRIBUTOR	$3,500 to $50,000	B-13
ELECTRONICS MRO PURCHASING	NA	B-10
EMICS	$95,000	B-24
ENERGY MANAGEMENT	$10,000 to $25,000	B-11
ENERGY MANAGEMENT SYSTEM	NA	B-15
ENGINEERING	$8,000	B-10
ENVIRONMENTAL ANALYSIS PACKAGE	$1,000	B-10
EVENT REGISTRATION	NA	B-13
EXTENDED WORK ORDER STATUS	NA	B-13
EZBOMP	$1,200	B-1
EZSTOCK	$4,800	B-1
EZTAG	$1,800	B-1
FABRIC ASSEMBLY PACKAGE	$3,500 to $50,000	B-13
FACS	$4,500	B-4
FASHION INDUSTRY PKG	$21,000	B-21
FBASE SERIES SOFTWARE	$4,500	B-6
FC - 1600	$25,000	B-6
FDCM	$42,000	B-8
FIFO INVENTORY	$2,400	B-20
FINANCIAL MODELING	$30,000	B-9
FLEXIBLE MANUFACTURING CONTROL SYSTEM	NA	B-15
FOOD MANUFACTURERS PROCESSING SYSTEM	NA	B-3
FOOD WHOLESALE DISTRIBUTOR	$20,100	B-6
FOOD MFG/DISTRIBUTION SYS	NA	B-6
FORCED RESPONSE SIMULATION	$3,000 to $4,000	B-21
FORMAN	$45,000 to $100,000	B-8
FORMS MANAGEMENT-INVENTORY CONTROL	$7,000	B-14
FORMULA MANUFACTURING PACKAGE	$3,500 to $50,000	B-13
FORMULATION	$2,000	B-17
FURNITURE MFG SYS	$16,000	B-3
GAGING	NA	B-6
GAINES	$10,000 to $250,000	B-2
GLS MAPS	$45,000	B-3
HAS	NA	B-19
HMS CAPACITY REQUIREMENTS PLANNING	$23,000	B-18
HMS MANUFACTURING DATA CONTROL	$28,750	B-18
HMS MASTER PRODUCTION SCHEDULING	$23,000	B-18
HMS MATERIAL REQUIREMENTS PLANNING	$23,000	B-18
ICAMS	NA	B-2
IC	$15,000	B-1
IMCS-II INTERACTIVE MFG CONTROL SYSTEM	NA	B-15
IMCS (INTERACTIVE MFG CONTROL SYSTEM)	NA	B-10
IMPACT	$50,000	B-9
INCITE	$40,000 to $400,000	B-3
INDUSTRIAL ENGINEERING	$799	B-3
INEQUITIVE MFG SYSTEM	$20,000	B-4
INFLOOR	$25,000	B-5
INTEGRATED MFG CONTROL SYSTEM	NA	B-8
INTERACTIVE NUMERICAL CONTROL AND GRAPH	NA	B-2
INTERACTIVE WIRE WRAP SYSTEM	$5,000	B-6
INTERACTIVE GRAPHIC DESIGN & STENCIL	$58,000	B-8
INVENTORY	$6,000	B-5

INVENTORY	$2,000	B-5
INVENTORY	$2,500	B-8
INVENTORY	$3,000	B-8
INVENTORY	$12,000	B-8
INVENTORY	NA	B-17
INVENTORY	$2,500	B-17
INVENTORY	$6,000	B-18
INVENTORY	$1,000	B-24
INVENTORY ACCOUNTING SYSTEM	$1,000	B-17
INVENTORY ALLOCATION	NA	B-1
INVENTORY AND PURCHASING SYSTEM	NA	B-16
INVENTORY AND SALES	$15,000 to $20,000	B-20
INVENTORY CONTROL	$695 to $1,950	B-6
INVENTORY CONTROL	$4,500	B-6
INVENTORY CONTROL	$1,500	B-12
INVENTORY CONTROL	$3,000 to $5,000	B-12
INVENTORY CONTROL	NA	B-12
INVENTORY CONTROL	$8,000	B-12
INVENTORY CONTROL	$900 to $4,600	B-14
INVENTORY CONTROL	NA	B-16
INVENTORY CONTROL	$2,500	B-16
INVENTORY CONTROL	$1,000	B-19
INVENTORY CONTROL	$750	B-19
INVENTORY CONTROL	$1,600	B-20
INVENTORY CONTROL	$1,000	B-21
INVENTORY CONTROL	NA	B-22
INVENTORY CONTROL	$400	B-22
INVENTORY CONTROL	$3,000	B-23
INVENTORY CONTROL	$12,000	B-23
INVENTORY CONTROL SYSTEM	$5,000	B-16
INVENTORY CONTROL SYSTEM	$775	B-20
INVENTORY CONTROLLER	NA	B-1
INVENTORY MANAGEMENT	$3,000 to $5,000	B-15
INVENTORY MANAGEMENT SYSTEM	NA	B-15
INVENTORY MANAGEMENT SYSTEM	$10,000	B-17
INVENTORY SYSTEM	$950	B-20
INVENTORY/ORDER ENTRY	$5,400	B-4
IPS	NA	B-9
JEWELRY MANUFACTURING	$10,000	B-23
JEWELRY INDUSTRY/MFG	NA	B-22
JOB COST	$5,000 to $9,000	B-11
JOB COST CONTROL	$1,000	B-21
JOB COSTING	NA	B-15
JOB COSTING	NA	B-16
JOB COSTING	$2,500	B-16
JOB HISTORY ANALYSIS	$200	B-14
JOB SHOP	NA	B-21
JOB SHOP CONTROL SYSTEM	$6,500 to $11,000	B-10
JOB SHOP MANUFACTURING	NA	B-16
JOBSTER PIECE PRICE ESTIMATOR	$1,500	B-4
LABOR DISTRIBUTION	NA	B-17
LABOR DISTRIBUTION	$2,400	B-22
LABOR EFFICIENCY	NA	B-12
LABOR PERFORMANCE	NA	B-15
MAC-PAC/3B	NA	B-2
MAC-PAC COBOL	NA	B-2
MAC-PAC RPG	NA	B-2
MACHINE TRACKING	NA	B-17
MADIC CORPORATE INFORMATION SYSTEM	$105,000	B-13
MAINSTAY	NA	B-15
MAINTENANCE DISPATCH	$10,000 to $20,000	B-12
MAINTENANCE MANAGEMENT SYSTEM	$7,500	B-20
MAINTENANCE AND MATERIALS MGMT	NA	B-2
MAINTENANCE/1	$25,000	B-16
MAN	NA	B-1
MANAGEMENT SYSTEM	$25,000	B-8
MAN-FACT II	$125,000 to $30,000	B-9
MANMAN/MFG	$80,000	B-2
MANUFACTURE JOB QUOTATION SYSTEM	NA	B-13
MANUFACTURE REP SYSTEM	$1,200 to $1,500	B-13
MANUFACTURER MANAGEMENT SYSTEM MMS	NA	B-15
MANUFACTURERS ACCOUNTING AND CONTROL	NA	B-8
MANUFACTURERS MANAGEMENT SYSTEM	NA	B-12
MANUFACTURING	$15,000	B-6
MANUFACTURING	NA	B-8
MANUFACTURING	NA	B-8
MANUFACTURING CONTROL	NA	B-17
MANUFACTURING CONTROL 250	NA	B-19
MANUFACTURING CONTROL SYSTEM	$25,000	B-22
MANUFACTURING CONTROLS SYSTEM	NA	B-6
MANUFACTURING MANAGEMENT AND CONTROL	$31,500	B-2
MANUFACTURING MANAGEMENT CONTROL	$31,500	B-11
MANUFACTURING MANAGEMENT SYSTEM	$13,000	B-9
MANUFACTURING MATERIAL MGMT	NA	B-2
MANUFACTURING MATERIAL TRACKING SYSTEM	NA	B-10
MANUFACTURING RESOURCE PLANNING II	NA	B-11
MANUFACTURING SYSTEM	$40,000	B-2
MANUFACTURING SYSTEM	NA	B-6
MANUFACTURING SYSTEM	NA	B-18
MANUFACTURING WORK ORDER SYSTEM	NA	B-10
MANUFACTURING/MATERIAL CONTROL SYSTEM	$297,000	B-2
MANUFACTURING-MFG 250	$5,250	B-18
MANUFACTURING CONTROL/SHOP FLOOR	$2,000	B-22
MANUFACTURING II (SYS 34/36)	$20,000 to $25,000	B-11
MAP 3000	$83,000	B-16
MAP/3000	$57,000	B-11
MAPICS ENCHANCEMENTS	NA	B-9
MAPICS PURCHASING APPLICATION SYSTEM	$1,500	B-17
MAPICS SHIPPED ORDER HISTORY INQUIRY	$400	B-18
MAS	$NA	B-14
MAS COST CONTROL MODULE	NA	B-14
MAS (ENGINEERING CONTROL)	$NA	B-14
MAS (INVENTORY CONTROL)	$40,000	B-14
MAS MANUFACTURING CONTROL SYSTEM	$NA	B-14
MAS MASTER PRODUCTION SCHEDULING	NA	B-14
MAS PURCHASING MODULE	NA	B-14
MAS SHOP FLOOR CONTROL MODULE	NA	B-14
MASTER CONTROL	$5,000	B-14
MASTER PRODUCTION SCHEDULING	NA	B-13
MASTER SCHEDULE	NA	B-20
MASTER SCHEDULING	NA	B-1
MATERIAL AVAILABILITY SHORTAGE SYSTEM	$500	B-6
MATERIAL REQUIREMENTS PLANNING	NA	B-1
MATERIAL REQUIREMENTS PLANNING	NA	B-10
MATERIAL REQUIREMENTS PLANNING	NA	B-12
MATERIAL REQUIREMENTS PLANNING PASCAL	NA	B-22
MATERIALS MANAGEMENT	$7,500	B-21
MATERIALS MANAGEMENT	$1,000	B-24
MATERIALS FORECASTING/PLANNED REQUIREMENTS	NA	B-22
MAXCIM	$100,000	B-19
MCCRACKEN INSURANCE MANAGEMENT	$23,850	B-15
MCMM	NA	B-9
MCMM	NA	B-20
MCS	$50,000 to $300,000	B-3
MCS-MANUFACTURING	$25,000	B-6
MCS-3 MANUFACTURING CONTROL SYSTEM	NA	B-15
MCS II	$35,000	B-6
MERCHANDISE FULFILLMENT SYSTEM	$50,000	B-20
MERLIN	NA	B-20
MFG/1000	$35,000 to $45,000	B-22
MICROIN V	$350	B-4
MICRO-AIM	$20,000	B-11
MIDEC INTEGRATED MANUFACTURING SYSTEM	$125,000	B-15
MIDEC TIME AND BILLING PACKAGE	$12,000	B-15
MMS MFG	NA	B-9
MISSION	NA	B-18
MM-1 MATERIAL MGMT SYSTEM	$21,000	B-20
MODEL ANALYSIS	$6,500 to $18,800	B-21
MOST	NA	B-6
MRP	$50,000	B-1
MRP	NA	B-13
MRP	$5,000	B-13
MRP-2	NA	B-16
MRP PLUS	$48,000	B-11
MRPS	NA	B-4
MRPS 34/36	$70,000 to $90,000	B-6
MSA MANUFACTURING SYSTEM	NA	B-16
MULTICAPP PROCESS PLANNING	NA	B-17
MULTIGROUP GROUP TECHNOLOGY ANALYSIS	NA	B-17
MULTIPLE INVENTORY/ORDER ENTRY	NA	B-22
MYTE MYTE FORECASTING/SCHEDULING MODULE	NA	B-15
NAI DATA REDUCTION PACKAGE	$1,000	B-18
NC GRAPHICS SERIES 400	$50,000 to $120,000	B-18
NEST ONE	$10,000	B-19
NESTING	$30,000	B-19
NET MATERIAL STATUS	NA	B-11

NEUTRON ACTIVATION ANALYSIS	$2,000	B-16
NUCLIDE IDENTIFICATION	$2,000	B-16
NUMERICAL CONTROL	N/A	B-9
ON-LINE ORDER ENTRY/INVENTORY CONTROL	$16,500	B-12
ON-LINE PURCHASE ORDERS	$3,000	B-12
ON LINE WAREHOUSE MANAGEMENT	N/A	B-3
OPCON	N/A	B-20
OPEN ORDERS MANAGEMENT	$1,500	B-21
OPERATION ROUTING SHEETS	N/A	B-13
OPTIMIZER 30	$50,000	B-23
ORDER ENTRY	$350	B-4
ORDER ENTRY	$7,000 to $13,000	B-12
ORDER ENTRY	N/A	B-14
ORDER ENTRY	N/A	B-11
ORDER ENTRY	N/A	B-17
ORDER ENTRY	$1,000	B-24
ORDER ENTRY CONTROL	N/A	B-6
ORDER ENTRY/INVENTORY CONTROL	$7,500	B-2
ORDER ENTRY INVENTORY SALES ANALYSIS	$5,500	B-18
ORDER ENTRY SYSTEM	N/A	B-11
ORDER PROCESSING	N/A	B-13
ORDER PROCESSING	$2,500	B-18
ORDER PROCESSING/INVENTORY CONTROL	N/A	B-6
ORDER PROCESSOR ALLOCATION	[illegible]	B-18
ORDER TRACK	$10,000	B-16
ORDER MANAGEMENT-OM/250	$3,750	B-18
PACS	$47,000	B-14
PACS, PLANNING AND CONTROL SYSTEM	$57,000	B-16
PARAMETER ESTIMATION PACKAGE	$5,500	B-21
PARTS CAROUSEL CONTROLLER	$5,000	B-1
PARTS HANDLING SYSTEM	N/A	B-15
PC1/PLUS	$10,000 to $25,000	B-18
PC 70	$42,000	B-1
PHAX	N/A	B-8
PID LOOP CONTROL	N/A	B-22
PIOS - DLI VERSION	N/A	B-24
PLANNED MAINTENANCE	$10,000 to $20,000	B-12
THE PLANNER SYSTEM FOR STATISTICS	$7,500	B-8
PLANT INFORMATION PIECEWORK PAYROLL	N/A	B-2
PLANT FLOOR/23	$5,000	B-1
PMS	N/A	B-6
PREVENTATIVE MAINTENANCE	$7,500	B-21
PRINTERS DEVL	N/A	B-19
PRINTWARE	N/A	B-23
PRO	$5,000	B-21
PRO III DMS (WHOLESALE SOFTWARE)	N/A	B-8
PROCESS INDUSTRY ENCHANCEMENTS (MAPICS)	$8,800	B-9
PROCESS MANUFACTURING	N/A	B-16
PROCUREMENT MATCHING	N/A	B-1
PRODUCT COST BUILDUP	N/A	B-11
PRODUCTION ACTIVITY CONTROL	N/A	B-1
PRODUCTION/INVENTORY OPTIMIZATION	$35,000	B-20
PRODUCTION CONTROL	$8,000	B-13
PRODUCTION CONTROL	$2,500	B-17
PRODUCTION COSTING	$2,400	B-23
PRODUCTION IV	$129,000	B-10
PRODUCTION MONITORING	$10,000 to $20,000	B-12
PRODUCTION SCHEDULING	N/A	B-12
PRODUCTIVITY PERFORMANCE REPORT	$25,000	B-3
PRODUCTION MANAGEMENT SYSTEM	N/A	B-2
PROFITKEY MANUFACTURING CONTROL SYSTEM	N/A	B-11
PROJECT CONTROL	$2,500	B-23
PROJECT MANAGEMENT SYSTEM	N/A	B-18
PSB FEED INDUSTRY SCARS4 SYSTEM	$4,500	B-19
PCS PRODUCTION COSTING SYSTEM	$1,500	B-11
PURCHASE ORDER	N/A	B-11
PURCHASE ORDER	$4,000	B-18
PURCHASING	N/A	B-13
PURCHASING	N/A	B-17
PURCHASING	N/A	B-22
PURCHASING SYSTEM FORMAL	$5,000	B-14
PURCHASING & MATERIALS MANAGEMENT	N/A	B-2
QANTEL MANUFACTURING JOB SHOP	$9,500 to $35,000	B-19
QANTEL MANUFACTURING PROJECT MANAGEMENT	$25,000	B-19
QANTEL MANUFACTURING RESOURCE PLANNING	$9,500	B-19
QANTEL MANUFACTURING TO REQUIREMENTS	$9,500	B-20
QCK-TSK	$9,500	B-8
QED/3000 MANUFACTURING MGMT	N/A	B-6
RDC SYSTEMS, RADIO COMMON CARRIER	N/A	B-10
RELEASE PROCESSING	N/A	B-12
REPETITIVE MANUFACTURING SYSTEM	$20,000	B-5
RETAIL MANAGEMENT SYSTEM	N/A	B-19
RMS/34	N/A	B-18
RMS/38	N/A	B-18
RMS/38 MANUFACTURING	$40,000	B-19
ROUTING	N/A	B-13
SDM EAGLE COMPUTER OPTIMIZING SYSTEM	$25,000	B-21
SDM INDUS MANUFACTURING AND DISTRIBUTION	$2,500	B-21
SEATING & TICKETING PACKAGE	N/A	B-14
SECOND TIME INVENTORY CONTROL	$895	B-4
SERVICE SYSTEM	N/A	B-13
SHIPPING	N/A	B-12
SHOP BILLING AND WEIGHT EXTENSION SYSTEM	N/A	B-6
SHOP FLOOR CONTROL	N/A	B-11
SHOP FLOOR CONTROL	N/A	B-16
SHOP FLOOR CONTROL	$7,000	B-23
SHOP FLOOR MGMT	N/A	B-17
SHOP LOADING	N/A	B-11
SHOP ORDER CONTROL	N/A	B-2
SHOPFLOOR DATA COLLECTION-PASS/1000	N/A	B-4
SILTON IBM SYSTEM/36 APPAREL PACKAGE	$25,000	B-20
SIMPART	$15,000	B-18
SIMULATION PACKAGE	$15,000	B-13
SMALL MANUFACTURE	$5,000 to $20,000	B-24
SMART/CMS	N/A	B-18
SMART/MMS	N/A	B-18
SMART/PMS	N/A	B-18
SMART/SIMS	N/A	B-18
SIMMS	$3,000 to $5,000	B-21
SPIDER II BASED MRP	$4,550	B-23
SPIDER II BILL OF MATERIALS	$4,900	B-23
SPIDER II CUSTOMER ORDER PROCESSING	$4,900	B-23
SPIDER II INVENTORY MANAGEMENT	$4,900	B-23
SPIDER II JOB COSTING	$4,550	B-23
SPIDER II PURCHASE ORDER & RECEIVING	$4,900	B-23
SPIDER II SHOP FLOOR CONTROL	$5,850	B-23
SPIDER II STANDARD	$4,850	B-23
SPIDER II STANDARD PRODUCT COSTING	$4,550	B-23
STANDARD PRODUCT COSTING	N/A	B-15
STANDARD PRODUCT ROUTING	N/A	B-15
STANDARD PRODUCT ROUTING	$2,000 to $7,000	B-24
STATISTICAL PROCESS CONTROL	$1,000 to $3,000	B-19
STOCK LOCATION/LOT MANAGEMENT (MAPICS)	$2,500	B-9
STORES CONTROL	N/A	B-23
STRIP	N/A	B-20
STRUCTURAL DYNAMICS MODIFICATION	$10,000	B-21
SYRON DISTRIBUTION AUTOMATED CONTROL	N/A	B-21
TEC ACCOUNTING SYSTEM	N/A	B-22
TIME AND ATTENDANCE	$1,000	B-4
TIN MAN	N/A	B-10
TMG	N/A	B-21
TOPS THREE	N/A	B-4
TOPS/SCHEDULE	$42,000	B-19
TOTAL MANUFACTURING SYSTEM	$25,000	B-5
TRACDOWN	$5,000	B-8
TRACK II - PCB JOB TRACKING	N/A	B-9
TRIG POINT	$15,500	B-6
TRUE LIFO SYSTEM	N/A	B-16
UNICAM-DBMS	N/A	B-13
UNIVATION SYSTEMS	N/A	B-13
UPTIME	N/A	B-18
VENDING MACHINE	$10,000 to $20,000	B-5
VIDEO PRINTWARE	N/A	B-24
WAREHOUSE LOCATION SYSTEM	N/A	B-5
WHOLESALE/DISTRIBUTION	$3,000	B-6
WORK AND PROCESS	$4,000	B-16
WORK IN PROCESS	N/A	B-12
WORK ORDER CONTROL	N/A	B-22
WORK ORDERS	N/A	B-10
X-RAY IDENTIFICATION PACKAGE	$1,000	B-16

Banking

ACCOUNT RECONCILIATION BY COMPUTER	$4,000	B-44
ACULFAS	$30,000	B-46
AD 4700	$250,000	B-35
ALAMO	$5,000 to $30,000	B-38
ALPS	N/A	B-34
AMER AUTOMATED MORTGAGE LENDING	N/A	B-34
ARBAT SERIES 700 INT'L BANKING	N/A	B-34
ARBAT SERIES 700 SWIST	N/A	B-34
ASI ON-LINE BANKING ENVIRONMENT	$12 to $20	B-35
ASI SWITCH INTERFACE	$11,000	B-35
ASSET LIABILITY MANAGEMENT	N/A	B-45
ASSET/LIABILITY MANAGEMENT SYSTEM	N/A	B-34
ASSET/LIABILITY MANAGEMENT SYSTEM	N/A	B-41
ATM OFFLINE CONVERTER	$1,500	B-35
ATM SYSTEM	$4,000	B-40
AUTOMATED COLLECTIONS SYSTEM	N/A	B-38
AUTOMATED TELLER MACHINE MANAGEMENT	$11,000	B-35
AUTOMATED TELLER STATION	$6,000 to $8,000	B-46
BANK ACCOUNT RECONCILIATION	$825	B-38
BANK ASSET LIABLE MANAGEMENT SYSTEM	N/A	B-37
BANK CONTROL SYSTEM	N/A	B-41
BANK FINANCIAL MODELS	N/A	B-46
BANK QEO	N/A	B-40
BANK MERGE	N/A	B-40
BANK ZIP	N/A	B-40
BANK-CUSTOMER INFORMATION SYSTEM	$11,000	B-28
BANK-TO-BANK REIMBURSEMENTS	N/A	B-36
BANK 90	$4,500	B-41
BANKERS ACCEPTANCE	N/A	B-36
BANKER 80	N/A	B-34
BANKHOUSE	N/A	B-43
BANKING	$60,000	B-41
BANKING FORMS & SUPPLIES CONTROL	$45,000	B-44
BANKING/SWIST LINK	N/A	B-34
BANKMARKET	N/A	B-40
BANKMATCH	N/A	B-40
THE BANKMATIC SYSTEM	$65,000	B-36
BANKON HOME BANKER	$60,000	B-44
BANKSERV CHARGE CARD SYSTEM	N/A	B-34
BANKSERV COLLECTION MANAGEMENT	N/A	B-34
BANKSERV INSTALLMENT LOAN	N/A	B-34
BANKSCRUB/ANALYZER	N/A	B-40
BANKSCRUB/CONVERSION	N/A	B-41
BASE	$16,000	B-37
BASE24-ATM	N/A	B-34
BATCH CIF	N/A	B-41
BDS	N/A	B-46
BDS SYSTEM	$35,000 to $95,000	B-40
BON	N/A	B-34
CALCURATE	$8,000	B-44
CANTON SYSTEM 1990	$170,000	B-36
CARS HQ DATA MANAGEMENT CONTROL	$45,000	B-35
CASHMAX	N/A	B-47
CENTRAL BANK RETURNS	N/A	B-34
CHECK RECONCILIATION SYSTEM	$2,900	B-40
CHECPAC	N/A	B-38
CIF - CENTRAL INFORMATION FILE	N/A	B-42
CIF 24	$24,000 to $49,000	B-41
CIRS (CENTRALIZED INVESTMENT RESEARCH)	N/A	B-40
CL/70	$45,000 to $83,000	B-44
CLASS	N/A	B-42
COLLEC	N/A	B-38
COLLECTION AGENCY PACKAGE	$7,500	B-47
COLLECTION AGENCY SYSTEM	$5,000 to $10,000	B-43
COLLECTOR	N/A	B-39
COMMERCIAL LOAN	$24,000 to $28,000	B-36
COMMERICAL LOAN OFFICERS	N/A	B-40
COMMERCIAL LOAN PORTFOLIO MANAGEMENT	$5,000	B-39
COMMERCIAL LOANS	N/A	B-38
COMMERCIAL LOANS TRANSACTION PROCESSING	N/A	B-34
COMMUNITY BANKER 80	N/A	B-43
CONSTRUCTION LOAN	N/A	B-34
CONSTRUCTION LOAN SYSTEM	$19,500 to $34,500	B-46
CONSUMER LOAN PACKAGE	$5,000	B-38
THE CONTROL MACHINE	N/A	B-44
CORPMATCH	N/A	B-41
COSTODIAN CONTROL	$15,000 to $20,000	B-46
CREDIGRANT	N/A	B-41
CREDIT APPLICATION AND TRACKING	$35,000	B-37
CREDIT BILLING SYSTEM	N/A	B-39
CREDIT COLLECTION SYSTEM	N/A	B-37
CREDIT UNION	$3,000	B-34
CREDIT UNION MANAGEMENT	$10,000	B-39
CREDIT UNION PACKAGE	$9,000	B-46
CREDIT UNION TURNKEY SYSTEM	N/A	B-38
CUSTOMER INFORMATION SYSTEM	N/A	B-45
CUSTOMER REFERENCE FILE	N/A	B-38
CUSTOMER SYSTEM	N/A	B-39
DAGAR (THE LOAN ARRANGER)	$299	B-44
DATACLOSE	N/A	B-43
DEMAND DEPOSIT ACCOUNTING	N/A	B-34
DEMAND/DEPOSIT ACCOUNTING	$36,000 to $45,000	B-39
DEPOSIT SYSTEM	N/A	B-39
DEPOSIT 80	N/A	B-37
DISC ACCT RECONCILIATION	N/A	B-38
DISC COMBINED INTEREST REPORTING	$35,000	B-34
DISC RETIREMENT REPORTING	$25,000	B-39
DISC CASH DISPERSMENT FLOAT MGMT	$8,000	B-38
DISC FEDERAL RESERVE/CORRESPONDENT	$25,000	B-39
DISTRIBUTED INT'L BANK/COMMUNICATIONS	N/A	B-43
DOCUMENT IMAGE	N/A	B-39
DOCUMENT PREPARATION	N/A	B-43
DOCUPREP	$35,000	B-44
DOCUTEL ATM INTERFACE	N/A	B-43
DOTS (DIEBOLD ON-LINE TERMINAL)	$25,000	B-39
DYNALOGIC SAVINGS & LOAN SYSTEM	$5,000	B-38
EMPLOYEE BENEFIT SYSTEM (EBS)	N/A	B-37
EUROBONDS	N/A	B-34
EXECUTIVE LINE OF CREDIT PACKAGE	$4,000	B-41
FAMILY OF FINANCIAL SYSTEM	N/A	B-46
FEPS (COMMERCIAL BANKS)	N/A	B-41
FINANÁCIAL SOFTWARE SYSTEM	$250,000	B-43
FINANCIAL FITNESS	N/A	B-46
FINANCIAL MANAGEMENT SYSTEM	N/A	B-45
FINANCIAL PARTNER	$349	B-39
FINANCIAL PLANNING & CONTROL SYSTEM	N/A	B-44
FINANCIAL SERVICE DELIVERY I	$60,000	B-35
FINANCIAL SERVICE DELIVERY II	$55,000	B-35
FINANCIAL SERVICE DELIVERY III	$62,000	B-35
FINANCIAL SWITCH	$100,000	B-37
FISCAL-CPA	$6,500	B-34
FIXED ASSET	$8,500 to $35,000	B-39
FIXED RATE LOAN	N/A	B-37
FLEX/34	$25,000	B-36
FOREIGN EXCHANGE TRANSACTION PROCESSING	N/A	B-35
FOREIGN NOTES & COINS	N/A	B-35
FOREIGN EXCHANGE & SWAP PROFITABILITY	N/A	B-35
FOREIGN EXCHANGE SYSTEM	$25,000	B-43
FORTRESS	N/A	B-36
FUND STAR INFORMATION SYSTEM	N/A	B-45
FUNDS TRANSFER & CONTROL	N/A	B-36
FUNDS TRANSFER, FUNDS CONTROL	$125,000 to $250,000	B-37
FX/LND HEDGING	N/A	B-35
IBM INTERNATION BANKING	N/A	B-37
IBS	$95,000 to $140,000	B-44
IMPACTS	N/A	B-36
IMPACS (DEMAND DEPOSIT)	N/A	B-45
INDY BANKING SYSTEM	$32,500	B-45
INSTALLMENT CREDIT	N/A	B-45
INSTALLMENT LENDING	N/A	B-43
INTERACTIVE CREDIT UNION SYSTEM	$35,000	B-41
INTERACTIVE INT'L BANKING SYSTEM	N/A	B-42

INTERNATIONAL BANKING SYSTEM	NA	B-40
INVENTORY CONTROL/WAREHOUSING	NA	B-34
INVESTMENT DEPOSIT SYSTEM	NA	B-37
INVESTMENT MANAGEMENT SYSTEM	NA	B-38
IRAK RETIREMENT ACCOUNTING SYSTEMS	$90,000	B-38
KITING DETECTION	$1,200	B-37
LEASE BILLING-DEPRECIATION	NA	B-40
LOAN AMORTIZATION	$500	B-40
LOAN CLOSING	NA	B-34
LOAN CLOSING	$2,500	B-42
LOAN CONTROL SYSTEM	NA	B-37
LOAN DOCUMENT PREPARATION	$8,650	B-42
LOAN MANAGEMENT SYSTEM	NA	B-37
LOAN ORIGIN TRACKING SYSTEM	NA	B-37
LOAN ORIGINATION	NA	B-43
LOAN PROCESSOR	NA	B-37
LOAN PROFITABILITY ANALYSIS	NA	B-41
LOAN TRACK	$30,000	B-37
LOAN CLOSING & TRACKING SYSTEM	$35,000	B-37
LOAN TRACKING/DOCUMENT PREPARATION	$24,500	B-46
LOANCALC	$1,500	B-41
LOANS & DEPOSITS TRANSACTION PROCESSING	NA	B-35
LOANS/1	$2,500	B-42
LOANS/43	$35,000	B-42
MANOF BANKING SYSTEM MBS	$50,000 to $75,000	B-42
MARKETING INFORMATIN SYSTEM	NA	B-41
MBS BANKING - AUDIT CONFIRMATION	$1,000	B-42
MBS BANKING - CD	$1,000	B-42
MBS BANKING - CHECKING	$1,000	B-42
MBS BANKING - GENERAL LEDGER	$1,000	B-42
MBS BANKING - LOANS	$1,000	B-42
MBS BANKING - SAVINGS	$1,000	B-42
MBS BANKING - CIF	$1,000	B-42
MCAUTO MATERIAL MANAGEMENT	$225,000	B-42
MERRIMACK BANKING SYSTEM	NA	B-35
MINICHECK	$89,000	B-36
MISER	$100,000 to $260,000	B-42
MLCS-MORTGAGE LENDING SYSTEM	NA	B-40
MONEYMAX	NA	B-47
MORTGAGE INDEX	NA	B-37
MORTGAGE LOAN SERVICING	NA	B-34
MORTGAGE LOAN SYSTEM	$170,000	B-38
MORTGAGE MANAGEMENT HANDLING SYSTEM	NA	B-34
MORTGAGE MANAGEMENT SYSTEM	$4,800	B-43
MORTGAGE SERVICE SYSTEM	NA	B-41
MORTGAGE-MOR	NA	B-34
MULTI BRANCH ACCOUNTING	NA	B-35
MUNICIPAL BONDS	NA	B-40
NEXUS	NA	B-36
OCM24/24 HOUR SUPPORT	$5,000	B-44
OCM24/CMS ATM ON-LINE CARDHOLDER	$35,000	A44-
OCM24/SNF SHARED NETWORK FACILITY	$10,000	B-44
OCM24/TCS ATM TRANSACTION CONTROL	$35,000	B-44
OCM24/X-REF MINI-CROSS REFERENCE	$5,000	B-44
OFFSHORE BANKING	NA	B-36
ON-LINE BANKING SYSTEM	NA	B-36
ON-LINE BANKING SYSTEM	$150,000	B-41
ON-LINE CIF	$65	B-36
ON-LINE GENERAL LEDGER-NCR'S	$1,800	B-36
ON-LINE RETURNED & EXCEPTION ITEM	NA	B-39
ONLINE DELIVERY SYSTEM	NA	B-39
PACE	NA	B-40
PACER/ATM	NA	B-43
PACER/CB	NA	B-43
PACER/CIF	NA	B-43
PACER/IRS	NA	B-43
PAYROLL/TAX ENTRY PROCESSING	$4,500	B-40
PAYSOP/TRASOP II	NA	B-37
PENSIONMAX	NA	B-47
PENSIONPAY SYSTEM	NA	B-37
PEP TELEPHONE TELLER	$50,000 to $100,000	B-45
PEPS (SAVINGS AND LOANS)	NA	B-41
PERF4	NA	B-36
PLASTIC CARD CONTROL MANAGEMENT	$40,000	B-40
PLASTIC CARD SYSTEM	NA	B-39
PORTFOLIO MANAGEMENT PACKAGE	$1,450	B-40
PORTFOLIO MANAGEMENT SYSTEM	$75,000	B-41
PORTFOLIO SYSTEMS	NA	B-37
PREMIUM FINANCING	NA	B-45
PRO-TRUST INFORMATION	$110,000 to $275,000	B-38
PROFITABILITY ANALYSIS	NA	B-40
PROFITABILITY SYSTEM	NA	B-39
PROJECT CONTROL	NA	B-45
PROOF AND TRANSIT	$3,000	B-43
PROOF OF DEPOSIT PLUS	NA	B-39
THE PROPHET SYSTEM	NA	B-39
PROPOSAL HR-16	NA	B-41
QUOTEMARK	$115,000	B-46
RBDS-ATM RETAIL BANKING	NA	B-44
RBDS-CIF RETAIL BANKING	NA	B-45
RBDS -TELLER RETAIL BANKING	NA	B-45
RBDS 36/4700 RETAIL BANKING	NA	B-45
REAL ESTATE LOANS	NA	B-45
REFUND	NA	B-34
RETAIL FOREIGN DRAFTS	NA	B-35
SAFE BOX ACCOUNTING SBA	NA	B-44
SAFE DEPOSIT ADMINISTRATION	$19,000 to $23,000	B-39
SALES DEVELOPMENT AND TRACKING	$7,000	B-42
SAVINGS & LOAN SYSTEM	$5,000	B-38
SAVINGS TIME DEPOSIT	NA	B-46
SCHEDULED AMORTIZATION	NA	B-37
SECOND MORGAGE SYSTEM	NA	B-45
SECURITY PORTFOLIO SYSTEM	$500	B-46
SLANG III	$3,500	B-39
SMM TRADE TELEPROCESSING REMOTE	$3,500	B-44
SMS	NA	B-43
SPM	$7,000	B-46
STOCKBIR	NA	B-43
SWITCH NETWORK	$150,000	B-40
SYSTEM M	NA	B-44
TELLER EMULATION	NA	B-43
TELLER TERMINAL MANAGEMENT	NA	B-35
TELLER TERMINALS SYSTEM	$3,900	B-40
TELLE-ORDER	$30,000	B-42
TRANSFERRED SAFE DEPOSIT MANAGEMENT	NA	B-46
TRUST INVESTMENT SYSTEM	NA	B-39
TITLE-WRITE	NA	B-42
TOTAL LOAN INFORMATION SYSTEM SYSTEM	NA	B-35
TRADERMAX	NA	B-47
TRADING SIMPLIFIE	NA	B-35
TRANSFER	NA	B-44
TYME/SWITCH II	NA	B-34
U SYSTEM II	NA	B-43
UCC 2/24HR MANAGEMENT SYSTEM	$17,000	B-46
UCC ASSET CARD MANAGEMENT ACM	NA	B-46
UCC COMMERCIAL LOAN SYSTEM -CLS	NA	B-46
UCC CURRENT MANAGEMENT INFORMATION	NA	B-46
UCC CONSUMER TRANSACTION SYSTEM-CTS	NA	B-47
UCC INSTALLMENT LOAN SYSTEM - ILS	NA	B-47
UCC PAPERLESS ITEM PROCESSING-PPS	NA	B-47
UCC SUPER MICRO	NA	B-47
UDC UNIVERSITIES INSTALLATION	$120,000	B-37
UNIVERSAL SYSTEM	NA	B-38
UNIVISION - ONLINE BANKING PACKAGE	NA	B-43
UNION TRUST FUND ACCOUNTING SYSTEM	NA	B-40
UNIVERSAL ATM SYSTEM	$60,000	B-40
VECTOR I	$18,500	B-38
VECTOR II	$24,000	B-38
VECTOR III	$32,000	B-38
VECTOR V	$40,000	B-38
VIDEOBANKING SYSTEM	$13,000	B-40
VIP	$60,000	B-43
WANG CREDIT UNION PACKAGE	$300,000	B-46
YARDLEY BULLION SYSTEM	$125,000	B-47
YARDLEY FUTURE SYSTEM II	$40,000	B-47
YARDLEY INTERBANK METALS	NA	B-47

Insurance

ACA	N/A	B-61
ACCESS	N/A	B-56
ACCIDENT AND HEALTH SALES/QUOTING	N/A	B-58
ADVANCED UNDERWRITING	$2,100	B-61
AGENCY PARTNER	$25,000	B-58
AGENCY COMPANY ACCESS (ACA)	N/A	B-61
AIMS/MR	N/A	B-59
AIMS/CL	$65,000	B-59
AIMS/CM	$50,000	B-59
ANALYTICAL ARIS	N/A	B-58
ARIS CLAIMS	N/A	B-58
ARS	N/A	B-61
ASSIGNED RISK PROCESSING SYSTEM	N/A	B-60
AWARDS	N/A	B-58
BASIC PROCESSING SYSTEM	N/A	B-61
BLUE CAPS	N/A	B-58
CABILS	N/A	B-58
CAMS	N/A	B-59
CAP-12	$125,000	B-58
CAPS-INVEST	$20,000	B-57
CAPSULE	N/A	B-58
CARRIER DETAILED CLAIM INFORMATION SYSTEM	N/A	B-58
CARS	N/A	B-58
CASH NEEDS ANALYSIS	N/A	B-59
CASUALTY INSURANCE PROCESSING	$100 to $200	A61-
CASUALTY INSURERS BUSINESS INFORMATION	N/A	B-62
CHALLENGER FOR INSURANCE AGENTS	$6,000	B-60
CHECK HISTORY	N/A	B-58
CLAIMS PROCESSING SYSTEM	N/A	B-59
CLAIMFACTS	N/A	B-58
CLIENT/CONTRACT ADMINISTRATIVE SYSTEM	N/A	B-62
CMS-CLAIMS MANAGEMENT SYSTEM	N/A	B-57
COMMERCIAL AUTO RATE QUOTING	N/A	B-58
COMPARATIVE POLICY ANALYSIS	N/A	B-59
CONTINEUM LIFE AGENCY SUPPORT SYSTEM	N/A	B-62
CONTINUUM SYSTEMS	N/A	B-62
CYPROS/AP ADMINISTRATIVE SYSTEM	N/A	B-57
CYPROS/AP AGENTS ON-LINE SYSTEM	N/A	B-57
CYPROS/AP APPLICATION EXECUTIVE	N/A	B-57
CYPROS/AP AUTO ISSUE	N/A	B-57
CYPROS/AP POLICY ADMINISTRATION	N/A	B-57
CYPROS/AP STATUTORY REPORTING	N/A	B-57
CYRPROS/AP UNIVERSAL LIFE	N/A	B-57
DW&A/MEDICODES	N/A	B-58
EASYVIEW PROSPECTING SYSTEM	$295	B-58
EMERGENCY MEDICAL INFO CARD	N/A	B-59
EXPANDED ESTATE PLANNING	$4,000	B-61
EXPENSE HISTORY	N/A	B-58
FDP83	N/A	B-58
FDP III	N/A	B-58
FLEXIBLE DEFERRED ANNUITY	N/A	B-60
FLEXSTAT	$75,000	B-57
GAAP VALUATION	N/A	B-60
GRAD DBL	$50,000	B-60
GRAD I	$50,000 to $125,000	B-60
GRID-GROUP INTERGATED DATE SYSTEM	N/A	B-59
GROUP INSURANCE INFO CARD	$25	B-59
GROUP - COMM	N/A	B-59
GROUP RATING & SALES PROPOSAL	N/A	B-57
ILA-3	N/A	B-60
IMS	N/A	B-61
INDEPENDENT INSURANCE AGENTS EDGE	$7,500	B-58
INSULATION SYSTEM	N/A	B-58
INSURANCE	$10,000	B-57
INSURANCE	N/A	B-62
INSURANCE ADJUSTMENT PACKAGE	$12,500	B-57
INSURANCE AGENCY ACCOUNTING	N/A	B-58
INSURANCE AGENT SYSTEM	$250	B-59
INSURANCE BILLING/CLAIMS PROCESSING	$7,500	B-57
INSURANCE BILLING SYSTEM	$40,000	B-59
INSURANCE FINANCIAL MANAGEMENT	N/A	B-57
INSURANCE MANAGEMENT INFO SYSTEM I	N/A	B-61
INSURANCE MARKETING SYSTEM	$15,000	B-59
INSURANCE MODULE	$695	B-57
INSURANCE PREMIUM FINANCING SYSTEM	$6,000	B-59
INSURANCE PREMIUM FINANCING SYSTEM	$10,000	B-59
INSURANCE RATING SYSTEM	N/A	B-60
INSURE	$18,000	B-60
INTERACTIVE NEW BUSINESS	N/A	B-60
IRI/CHECK WRITER	$2,500	B-59
LIFE BUSINESS EVALUATION	$500	B-57
LIFE CORPORATE FEASIBILITY	$500	B-57
LIFE INSURANCE FINANCIAL MODEL	N/A	B-62
LIFE IRA ILLUSTRATION	$500	B-57
LIFE POLICY AUDIT	$500	B-57
LIFE PROSPECT CLIENT INVENTORY	$500	B-57
LIFE - COMM	N/A	B-59
LIL LIFE INSURANCE LEVERGING	$1,500	B-58
MAAS	N/A	B-59
MASSACHUSETTS AUTOMOBILE PROCESSING SYSTEM	N/A	B-60
MEDICAL PRACTICE MANAGEMENT SYSTEM	N/A	B-58
MORTGAGE LOAN SYSTEM	N/A	B-59
MOTOR VEHICLE INSURANCE	N/A	B-62
MULTI LIFE DEFERRED COMPENSATION	N/A	B-61
ON-LINE CLAIMS PROCESSING	$150,000	B-60
ON LINE WORKERS COMPENSATION	N/A	B-58
OSAR	N/A	B-58
PACKAGED LIABILITY MANAGEMENT	$225,000	B-60
PACKAGED LIFE/LIABILITY MANAGEMENT	N/A	B-60
PALLM UNIVERSAL LIFE	N/A	B-60
PALLM-LIFE	N/A	B-60
PALLM-VARIABLE UNIVERSAL LIFE	N/A	B-60
PERSONAL AUTO RATE QUOTING	N/A	B-58
PERSONAL NEEDS ANALYSIS	N/A	B-59
PERSPECTIVE AGENCY SYSTEM	$5,000 to $10,000	B-60
PMS	N/A	B-61
PN+	N/A	B-58
POLICY PLUS	N/A	B-62
POLICY MANAGEMENT SYSTEM	N/A	B-61
POLICY MANAGEMENT SYSTEM (PMS)	N/A	B-61
PRESCRIPTION DRUG CLAIMS SYSTEM	N/A	B-61
PRODUCTION HISTORY	N/A	B-58
PROGRAM STRETCHER	$2,500	B-59
PROPERTY AND CASUALTY	N/A	B-58
PROPERTY AND CASUALTY SYSTEM	$3,000	B-62
PSS POLICY INFORMATION SYS	$5,000	B-61
RESERVE/GUP CALCULATIONS	$1,000	B-61
SALES PROPOSAL	N/A	B-58
SECURITIES MANAGEMENT SYSTEM	N/A	B-61
STATE LIQUIDITY ANALYSIS	N/A	B-59
STATISTICAL TRACKING & REPORTING	N/A	B-58
STOCK AND BOND SYSTEM	N/A	B-59
SYSTEM & BROKERAGE ACCOUNTING	$12,000	B-58
SYSTEM & BROKERAGE OA	$1,000	B-58
TACS	$75,000	B-62
THE EXAMINER	N/A	B-58
THE PROSPECTOR	$700 to $4,000	B-61
ULIS	N/A	B-58
UNIVERSAL LIFE	N/A	B-58
UNIVERSAL LIFE ADMINISTRATION	$125,000	B-57
UNIVERSAL LIFE ADMINISTRATION	N/A	B-60
UNIVERSAL LIFE ADMINISTRATION	$3,000 to $5,000	B-62
UNIVERSAL LIFE ILLUSTRATION	$12,000 to $35,000	B-57
UNIVERSAL LIFE ISSUE	N/A	B-60
VANTAGE ONE	N/A	B-62
VARIABLE DEPOSIT ANNUITY	$1,500	B-58
VARIABLE UNIVERSAL LIFE SYSTEM	N/A	B-60
VIN/SCAN	N/A	B-59
VLN-VARIABLE LIFE SYSTEM	N/A	B-58
WALSH IKNSURANCE PACKAGE	N/A	B-61
WELL COSTING	N/A	B-58
WHEATLEY INSURANCE SYSTEMS	$150,000	B-62
WORKPERFECT	$495	B-61

Manufacturing

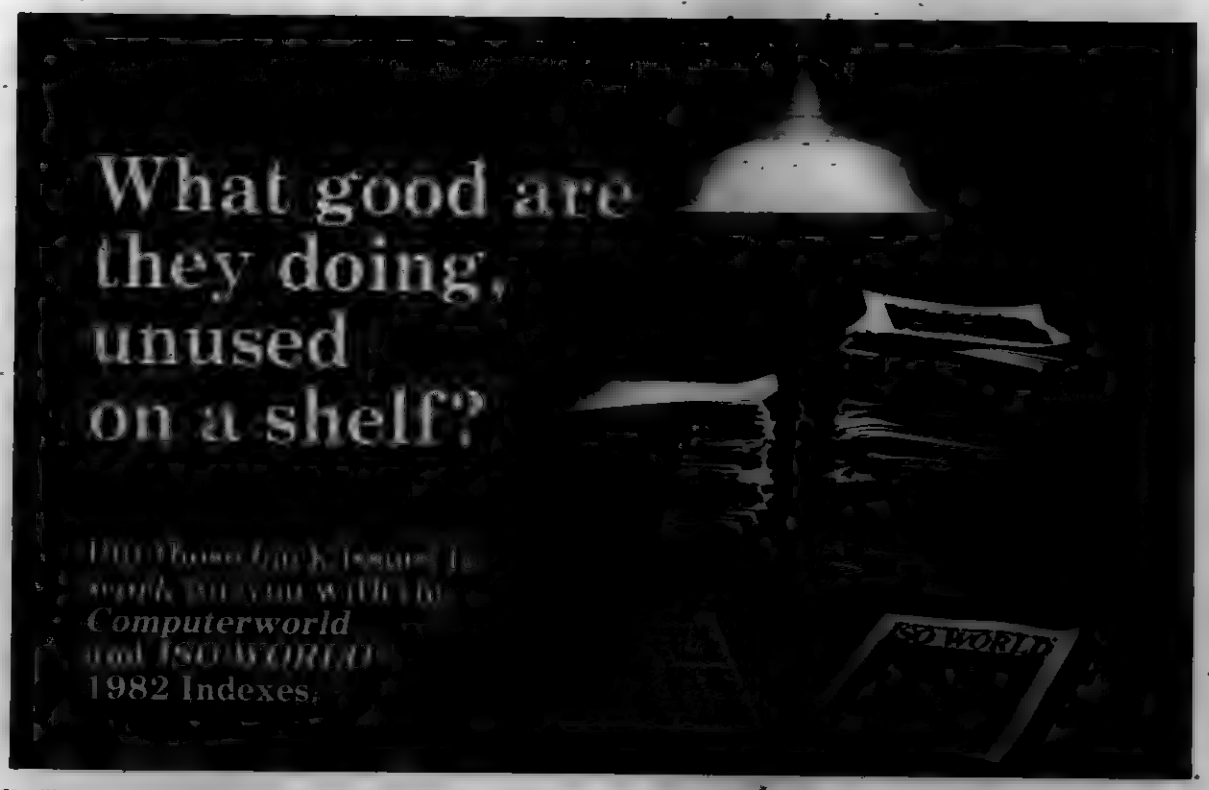
A PROGRAMMABLE MOTORING SYSTEM	N/A	B-29
ACCUPLAST	N/A	B-28
AMI JOB COST MANUFACTURING JOB SHOP	$1,100	B-25
AMI MANUFACTURING PKG	$2,995	B-25
APPAREL MANUFACTURING SYSTEM	$7,500	B-30
APPAREL MANUFACTURING SYSTEM	$6,500	B-26
AUTOMOTIVE INDUSTRY SUPPLIER	$1,195	B-29
AUTOMATED COSTING & ESTIMATING	$9,800	B-25
BASIC PRINTWARE	N/A	B-32
BEAMS	$115	B-30
BILL OF MATERIALS	$2,500	B-26
BILL OF MATERIALS	$1,195	B-29
BILL OF MATERIALS	$4,000	B-30
BILL OF MATERIALS PROCESSING	$2,000	B-25
BILLINGS INVENTORY MANAGEMENT SYSTEM	$300	B-25
BILLINGS NETWORK INVENTORY MANAGEMENT	$300	B-25
BILL/MATERIALS	$1,000	B-28
BILLS OF MATERIALS PROCESSING	$2,000	B-28
BOLT CIRCLES	$65	B-30
BOMP/NET REQUIREMENTS	$995	B-29
BUSINESS AIDS LIBRARY INVENTORY MANAGEMENT	$70	B-31
BUSINESS AIDS LIBRARY INVOICE MANAGEMENT	$70	B-31
BYTESMITH/IVENTORY	$600	B-29
BYTESMITH/JOB COSTING	$2,700	B-30
CAMPLOT	$900 to $6,000	B-31
CEST	$7,000 to $1,200	B-31
CIM CD	N/A	B-25
CLP	$5,600	B-25
COESEARCH	$900 to $12,000	B-31
COMPLETE BUSINESS SYSTEM	$2,500	B-30
COMPLETE WORKSHOP PACKAGE	$6,900	B-30
COST ESTIMATING FOR MANUFACTURERS	$90	B-30
DATA ACQUISITION INFORMATION SYSTEM	$35,000	B-31
DATA ACQUISITION/INFORMATION	$35,000	B-31
DISPATCHER	N/A	B-28
EFFICIENCY REPORTING	$1,195	B-29
ESTIMATION PROGRAMS	$900	B-31
FINNANCIAL INDICATORS	$300	B-31
FITS	$25,000	B-25
FOREMAN	$5,000 to $15,000	B-31
FQC-PACK	$375	B-26
FSDS	$2,500 to $4,500	B-30
H-BOMM	$1,495	B-27
H-BUY	$2,495	B-27
H-MRP	$9,995	B-27
H-MRP VERSION 2.0	$9,995	B-27
H-PLAN VERSION 2.0	$3,495	B-27
H-PLAN	$2,495	B-27
H-STORE	$3,495	B-27
HAI-LINE MANUFACTURING	$495	B-27
INMASS	$600 to $3,600	B-29
INQUIRY TRACKING SYSTEM	$3,000	B-27
INVENTORY	$750	B-25
INVENTORY	$300	B-26
INVENTORY	$1,000	B-26
INVENTORY	$2,500	B-26
INVENTORY	$449	B-27
INVENTORY	$2,000	B-27
INVENTORY	$80	B-30
INVENTORY CONTROL	$2,000	B-28
INVENTORY CONTROL	$340	B-31
INVENTORY CONTROL	$795	B-32
INVENTORY CONTROL AND SALES ANALYSIS	$1,500	B-28
INVENTORY INVOICING	$1,000	B-26
INVENTORY MANAGEMENT	$80 to $395	B-27
INVENTORY MANAGEMENT SYSTEM	$595 to $745	B-32
INVENTORY CONTROL SYSTEM	$299 to $399	B-31
JEWEL MFG BILL OF MATERIALS	$750	B-27
JOB COSTING FOR PRINTERS	$2,000	B-28
JOB ESTIMATING FOR PRINTERS	$2,000	B-28
LABELTRONIC-1000	N/A	B-28
LABELTRONIC 2000	N/A	B-28
LAYOUT	$3,600	B-32
M-TRAC	$5,900	B-32
MAC-PAC PC	N/A	B-25
MAIL LIST	$40	B-25
MANUFACTURING CONTROL	$6,000	B-30
MANUFACTURING COST ESTIMATING	$6,995	B-30
MANUFACTURING I	$4,500	B-27
MANUFACTURING II	$6,000	B-27
MANUFACTURING INVENTORY CONTROL	$5,000	B-26
MANUFACTURING INVENTORY CONTROL	$2,500	B-26
MANUFACTURING INVENTORY CONTROL	$2,500	B-27
MANUFACTURING INVENTORY CONTROL	$1,995	B-28
MANUFACTURING INVENTORY MANAGEMENT	$1,400	B-31
MANUFACTURING MANAGEMENT	$2,500	B-26
MANUFACTURING PACKAGE	$5,000 to $20,000	B-31
MANUFACTURING RESOURCES PLANNING	$1,195	B-29
MANUFACTURING SYSTEM	N/A	B-26
MANUFACTURING SYSTEM	$4,000	B-26
MANUFACTURING SYSTEM	$12,955	B-29
MANUFACTURING/BOM BILL OF MATERIALS	$1,800	B-27
MANUFACTURING/INVENTORY	$1,200	B-26
MANUFACTURING/INVOICING	$1,500	B-26
MANUFACTURING/JOB COSTING	$900	B-28
MANUFACTURING/LABOR EFFICIENCY	$900	B-28
MANUFACTURING/ORDER ENTRY	$1,400	B-26
MANUFACTURING/SHOP LOADING	$1,450	B-28
MANUFACTURING/WORK IN PROCESS	$1,250	B-28
MCS MANUFACTURING CONTROL	N/A	B-26
MCS INVENTORY	$1,000 to $1,200	B-29
MEMSYS	$7,500	B-27
METALMATS	$30,000	B-27
MPAC MANUFACTURING PLANNING	N/A	B-29
MRP MANUFACTURERS RESOURCE PLANNING	N/A	B-26
MYTE MYTE INVENTORY CONTROL	N/A	B-29
MYTE MYTE MANPOWER PLANNING MODULE	N/A	B-29
MYTE MYTE MATERIAL REQUIREMENTS PLANNING	N/A	B-29
MYTE MYTE PRODUCTION COSTING MODULE	N/A	B-29
MYTE MYTE STANDARD COST MODULE	N/A	B-29
NC MASTER	$5,000	B-26
NC TAPE PROGRAMMING SYSTEM	$1,500	B-32
NOVA TAPE	$3,500	B-30
NUDEAL	$1,000	B-25
ORDER ENTRY	$1,495	B-29
ORDER ENTRY AND SHIPPING	$1,500	B-25
ORDER ENTRY & INVOICING	$150	B-31
ORDER ENTRY/INVENTORY CONTROL	$599	B-31
PARTS	$1,700	B-30
PATHMAN-TRUCK ROUTING PROGRAM	$4,500	B-29
PERT	$1,100	B-32
PRINT-TRACK	$1,500	B-25
PRODUCTION CONTROL/OPTIMIZATION	$16,000	B-30
PROFITKEY	$5,000 to $30,000	B-32
PUBLIC WAREHOUSER PACKAGE	$4,000	B-30
PURCHASING AND RECEIVING	$1,495	B-29
QA STATISTICAL PROCESS CONTROL	N/A	B-29
QUICK PATH	$29,500	B-25
QUOTATION	$1,195	B-29
SALES ANALYSIS	$425	B-26
SALES ANALYSIS	$399	B-31
SHOP FLOOR CONTROL	$1,995	B-29
SHOPSIM	$900 to $12,000	B-32
SILTON APPAREL RETAILER	$6,000	B-30
SOFTWARE FITNESS PROGRAM	N/A	B-30
SPACEMAN-SPACE MANAGEMENT	$4,500	B-30
SPUR GEARS	$55	B-30
STAMP-ACT	N/A	B-25
STEP ONE - INVENTORY	$600	B-25
SWINE MANAGEMENT	$4,900	B-26
TCS TOTAL INVENTORY	N/A	B-31
TCS TOTAL MATERIALS	N/A	B-31
TELEMARC III	N/A	B-30
TIME MANUFACTURERS REP	N/A	B-31

TO SOFTWARE

TOOL SHOP SYSTEM	N/A	B-28
TRANSYS	$7,500	B-27
TRIG/CIRCLE TANGENT	$115	B-30
UNIVAIR ON LINE ORDER ENTRY	$750	B-31
VEHICLE MAINTAINENCE SYSTEM	$3,000	B-27
VISISCHEDULE	$300	B-32
WASTE MANAGEMENT	$4,900	B-25
WHOLESALE RETAIL DISTRIBUTION	$4,500	B-27
WHOLESALE/DISTRIBUTION PACKAGE	$160 to $190	B-28

Banking

ADMINISTRATIVE REPORTING/INVESTMENT REVIEW	N/A	B-48
ADTRAN	N/A	B-48
AGRICULTURAL CREDIT ANALYSIS	[illegible]	B-50
AGRICULTURE BANK LOAN TRACKING	$1,250	B-49
AMORTIZATION & DEPRECIATION	$200	B-53
ANNUITY PROPOSAL	[illegible]	B-49
[illegible] LOAN ANALYSIS	$50	B-53
ASSET LIABILITY INFORMATION	$1,595	B-48
ASSET LIABILITY INTEREST SENSITIVITY	$2,500	B-50
ASSET/LIABILITY MANAGEMENT	$100	B-50
ASSET LIABILITY MANAGEMENT	$1,995	B-50
ASSET LIABILITY MANAGEMENT	$1,500	B-53
ATM-PLUS	N/A	B-50
ATM-PLUS DRIVE	$2,450	B-50
ATM MARKET TRACKING SYSTEM	N/A	B-53
ATM SECURITY ACCESS CONTROL	$10,000 to $30,000	B-52
BANK BALANCE PROGRAM	$450	B-50
BANK FINANCE MANAGEMENT	$1,500	B-48
BANK LIQUIDITY ANALYSIS	$495	B-48
BANKTRAN	N/A	B-48
BASS BOND ANALYSIS SPREAD	N/A	B-48
BOND BANKERS CREDIT MANAGEMENT	$4,000	B-54
BRANCHBANKER V 5.0	$1,250	B-48
BROKER RECONCILIATION HEDGE	N/A	B-49
BROKERAGE PACKAGE	$7,000	B-54
BYTESMITH/ESCROW	$600	B-53
CERTIFICATES OF DEPOSIT	$400	B-53
CHECKBOOK ANALYZER	$3,495	B-54
CLIC SOFTWARE	N/A	B-49
COMMERCIAL CREDIT ANALYSIS	$300	B-50
COMMODITY SYSTEMS PROGRAMS	$395 to $695	B-49
COMMUNITY BANK WORK STATION	$2,000	B-53
COST OF FUNDS ANALYSIS	N/A	B-53
CREDIT BUREAU ACCESS SYSTEM	$250	B-48
THE CREDIT MANAGER	$995	B-48
CREDIT SPREADING	$1,200	B-49
CREDIT UNION FINANCIAL PACKAGE	$8,500	B-50
CREDIT UNION MANAGER	$6,500	B-53
CREDIT UNION PACKAGE	N/A	B-52
D/B MASTER CHARGE OFF LOANS	$150	B-49
DEPRECIATION/AMORTIZATION MANAGEMENT	$100	B-50
DOCUPREP	$500	B-50
EDUCATION ANALYSIS	$95	B-49
EIS INVENTORY SYSTEM	$1,500	B-50
FAP-FIN ANALYSIS PKG	$93	B-50
FEDERAL ESTATE TAX PLANNING	$1,500	B-48
FINANCIAL GOAL PROPOSAL	N/A	B-52
FINANCIAL INSURANCE SYSTEM	N/A	B-52
FINANCIAL PLANNING/ASSET LIABILITY	$5,000	B-50
FOREIGN CURRENCY PROCESSING	$2,000	B-49
H-CHAMP + 8	$149	B-52
IEMS	N/A	B-52
INSTALLMENT LOAN TRANSACTION SYSTEM I	$2,750	B-52
INTEREST ACCRUALS	$300	B-50
INVESTMENT ANALYSIS	$500	B-50
INVESTMENT PORTFOLIO ANALYSIS	N/A	B-53
IRA'S	N/A	B-53
IRA ASSESSOR	$35	B-48
IRS PROPOSAL DISCLOSURE	$300	B-50
LOAN AMORTIZATION	N/A	B-53
LOAN DOCUMENTATION PROGRAM	$2,495	B-50
LOAN LOSS CONTROL	$995	B-49
LOAN PORTFOLIO ANALYSIS	N/A	B-53
LOAN PRICING ANALYSIS	$750	B-49
LOAN AMORTIZATION & DEPRECIATION	N/A	B-52
LOAN CALCULATION & FORMS PRINTING	$1,295	B-49
LOANCOMP	$70	B-50
MARKET WINDOW	$995 to $1,295	B-50
MASTER LIBRARY SELECTOR	$1,350	B-53
MICRO BANKER AUDITING	N/A	B-52
MICRO BANKER COLLECTIONS	$3,000	B-52
MICRO BANKER COMMERCIAL LOAN	$3,000	B-52
MICRO BANKER FOREIGN EXCHANGE	$4,000	B-52
MICRO BANKER LETTERS OF CREDIT	$3,500	B-52
MICRO BANKER MONEY-MARKET	$4,000	B-52
MICRO BANKER TIME DEPOSIT	$3,500	B-52
MICRO CASH MANAGEMENT	N/A	B-54
MICROCOMPUTER	N/A	B-50
MICROCOMPUTER INTERACTIVITY INSTALLMENT	N/A	B-52
MICROSHARE ESOP SYSTEM	N/A	B-49
MICROSHARE PROFIT SHARING	N/A	B-49
MICROSHARE WILLS/NEW BUSINESS	N/A	B-49
MONEY CENTER ACCOUNTING SYSTEM	$3,000	B-48
MONEY MANAGEMENT	$400	B-53
MONEY MARKET PROGRAM SYSTEM	N/A	B-54
MONEY MARKET TRACKING SYSTEM	N/A	B-54
MORTAGE EXCELLERATION PROPOSAL	N/A	B-52
MORTGAGE LOANS	$400	B-53
MORTGAGE SYSTEM	N/A	B-48
NEED RETIREMENT ANALYSIS	$225	B-48
PASS	N/A	B-48
PASS	$475	B-53
PC/BANKER	$3,650	B-53
PC BANKER CED MODULE	$750	B-53
PEAR PORTFOLIO SYSTEM	$600	B-53
PEAPORT MANAGEMENT	N/A	B-53
PERSONAL FINACIAL STATEMENTS	$400	B-53
PORTFOLIO MGMT SYSTEM	N/A	B-48
PORTFOLIO VALUATION SYSTEM	$1,100 to $2,500	B-49
RB-3	$1,995	B-48
REAL ESTATE ANALYSIS/OTHER FINANCIAL	$99	B-53
RETIREMENT PLANNER	$85	B-48
REVEAL PORTFOLIO AND CLIENT MANAGEMENT	N/A	B-52
SAFE DEPOSIT	$1,095	B-49
SAFE DEPOSIT BILLING SYSTEM	$995	B-49
SAFETY DEPOSIT TRACKING SYSTEM	N/A	B-54
SHAREHOLDER RECORDKEEPING	N/A	B-49
STATEMENT OF FINANCIAL CONDITION	N/A	B-54
STATEMENT OF INCOME & EXPENSE	N/A	B-54
STOCK GRATE	N/A	B-49
SUPPORTING SCHEDULES	N/A	B-52
SYSTEMATIC ANALYSIS/FINANCIAL EVALUATION	N/A	B-52
TELEBROKER	$1,495	B-49
TELEMINDER	$295	B-49
TELKEY	N/A	B-49
TELLERVATION	N/A	B-50
TOTAL NEATS ANALYSIS	N/A	B-52
TRUST [illegible] FEE SYSTEM	$12,500	B-49
WATNR EQUILIBRIUM TIME MODEL 2	N/A	B-54



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Take a look at just a few of the hundreds of entries listed in the *Computerworld* and *ISO WORLD* Indexes:

Index	Heading	# Entries
CW	Local Area Nets	70
CW	Microcomputers	81
CW	Graphics Systems	[illegible]
CW	Accounting Systems	101
CW	Disk Equipment	126
[illegible]O	Dealers/Distributors	64
[illegible]O	IBM-PC	84
ISO	Floppy Disks	51
ISO	Modems	[illegible]
ISO	Retail Stores	53

And that's a sample of just this year. We also have Indexes for *Computerworld* that go all the way back to 1976 and Indexes for CBN back to the first — (Nov. 1978-Dec. 1979)

If you don't have all the back issues of *Computerworld* and *ISO WORLD* that you need to get the articles you want, you can order back copies for the entire year on 35mm microfilm from University Microfilm, Int., Periodical Entry Dept., 300 North Zeeb Road, Ann Arbor, MI 48106 — at very reasonable rates. Or you can simply take advantage of their reprint service for individual articles.

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INSURANCE PACKAGE	$7,000	B-65
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INSURANCE WORK STATION (IWS)	N/A	B-65
IWS	N/A	B-65
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LIFE INSURANCE COMPARISON AND REPLACEMENT	$995	B-63
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PENPRO	$500	B-63
PENSION FUND ADMINISTRATION SYSTEM	$9,000	B-65
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RESIDENTIAL COST ESTIMATOR PACKAGE	$150	B-63
STAR 64 INSURANCE AGENCY MGMT	$3,965	B-64
SYSTEM 1000	N/A	B-63
THE TOP PRODUCER	N/A	B-64
401 K SYSTEM	$15,000	B-65

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InSci's Payroll/Personnel System answers that need with superior technical features and unbeatable benefits for the user.

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Our state-of-the-art payroll/personnel database system currently is integrated directly into three popular database management environments, including IMS/DL-1 and IDMS. It was designed to take full advantage of each specific database structure, eliminating clumsy, resource-draining interface programs that need to be coded and maintained. Our native programs are easy to install, tailor, maintain and support.

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Superior Technical Features Ensure the Most Proficient System Available

There are many outstanding features of the InSci system. Here are just a few:

- *Modularized design for easy maintenance*
  The system was designed from the top down, and is highly modularized, providing maximum flexibility. A single module or subroutine supports each specific function in the system, such as security or check printing. All processing is transaction driven.
- *User-exit routines*
  There are several strategic areas in the system defined to allow user-exit subroutines. These enable you to add your own program without changing the base system code. They can be used, for example, during Employee Record Maintenance or Payroll Calculation Processing, to override the standard system routine. They're coded as separately compiled and linked modules and are defined to the system via a special directory.
- *Source code*
  InSci, unlike many other software firms, gives *you* the source code, which allows you to go right into the system and alter it, if necessary.
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  Technical staff and the user can select the most efficient operating mode for each processing task. Urgent changes, such as payscale changes, can be processed in real time, final mode, so they become effective immediately. Preliminary processing mode allows for simulating situations, such as a payroll run, without affecting the database.

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Call Christine Hanavan at (201)-391-1600 for more information or write to her at the address below.

InSci

Information Science Incorporated

ACPI LTD.
AUTOMATED TIME, ATTENDANCE, AND PAYROLL/PERSONNEL SYSTEM
Specific Application: Payroll/Personnel/Attendance
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38; SSP
Source Language: RPG-II, RPG-III
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: [illegible]
Number Installed to Date: 20
Date First Installed: [illegible]
(See Vendor Profile Page V-2)

AIMS-INC.
PS
Specific Application: Industrial Payroll System
Specific Industry: Not Industry [illegible]
System Requirements: HP; MPE; [illegible]
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $25,000
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-4)

ALAN R. ROSEN, INC.
ARR PERSONNEL AGENCY
Specific Application: Personnel Agency Management
Specific Industry: Employment Personnel
System Requirements: IBM System/34; SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-4)

ALR SYSTEMS & SOFTWARE INC.
GENERAL ACCOUNTING PACKAGE GENPAK
Specific Application: Accounts Payable, Payroll, Fixed Assets, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS, 25, 45, 50; VS/OS
Memory Required: 256.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 20
Date First Installed: June 1981
(See Vendor Profile Page V-4)

AMCOR COMPUTER CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11; RSTS/E
Memory Required: 62.0K bytes
Source Language: Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $8,250
Number Installed to Date: 50
(See Vendor Profile Page V-4)

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
PAYROLL
Specific Application: Payroll With Standard Gross to Net Calculations
Specific Industry: Not Industry Sensitive
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-5)

AMERICAN [illegible] & PROFESSIONAL COMPUTER STORE, INC.
TEMPORARY HELP BILLING AND PAYROLL
Specific Application: Time Card Printing
Specific Industry: Engineering, Temporary Help
System Requirements: DEC; Zenith
Source Language: Dibol
Source Code Available: Yes

AMERICAN COMPUTER & ELECTRONICS CORP.
PAYROLL
Specific Application: [illegible]
System Requirements: TI 990 [illegible]
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1976
(See Vendor Profile Page V-5)

AMERICAN RESOURCE SYSTEMS
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry [illegible]
System Requirements: IBM System/34, System/36; SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: [illegible]
Date First Installed: 1976
(See Vendor Profile Page V-5)

ANALYSIS RESEARCH AND COMPUTATION, INC.
NETB
Additional Product Classification: Manufacturing
Specific Application: Manufacturing Payroll/Personnel
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3330, 4340 Series, Sperry 1100
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $11,200
Number Installed to Date: 35
Date First [illegible]
(See Vendor Profile Page V-5)

APEX DATA GROUP
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Prime 2250, [illegible]
Memory Required: 500.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $7,500
Number Installed to Date: 500
Date First Installed: May 1979
(See Vendor Profile Page V-6)

APPLIED [illegible] SYSTEMS, INC.
MANUFACTURING PAYROLL
Specific Application: Payroll Including Piecework and Incentive Payments
Specific Industry: Manufacturing
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: [illegible]
Number Installed to Date: 2
Date First Installed: 1981
(See Vendor Profile Page V-7)

APPLIED BUSINESS SYSTEMS
PAYROLL/PERSONNEL-ABS
Specific Application: Payroll,Personnel
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova, Eclipse; R-DOS
Memory Required: 64.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: [illegible]
Price: [illegible]
Date First Installed: August 1978
(See Vendor Profile Page V-7)

APPLIED DATA CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Wholesale/Distribution
System Requirements: DG: R-[illegible]
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1980
(See Vendor Profile Page V-7)

APPLIED SOLUTIONS, INC.
PAYROLL
Additional Product Classification: Accounting
Specific Application: General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36:SSP
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 1
Date First Installed: May 1983
(See Vendor Profile Page V-8)

APPLIED SYSTEMS, INC.
PAYROLL
Specific Application: Automatic Payroll With Twelve Different Deductions
Specific Industry: Education, Government
System Requirements: North Star Horizon; DEC PDP-8; OS; DEC Decmate I, Decmate II
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 50
Date First Installed: 1976
(See Vendor Profile Page V-8)

ARGONAUT INFORMATION SYSTEM, INC.
PAYROLL SYSTEM
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38, 370; HP 3000; DEC VAX
Memory Required: 64.0K bytes
Source Language: [illegible]
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 500
Date First Installed: 1978
(See Vendor Profile Page V-8)

ARIES INFORMATION SYSTEMS, INC.
PREPAS PERSONNEL/PAYROLL GOVERNMENT SYSTEM
Specific Application: Resource Management Including Payroll and [illegible]
Governmental Entities
Specific Industry: Education
System Requirements: HP 2000; MPE; TI 990: DX-10; Honeywell PDS 6, 7, 8: Gcos 4; IBM 4300 Series, 370: DOS/VSE, OS
Memory Required: 96.0K bytes
Source Language: [illegible]
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: July 1974
(See Vendor Profile Page V-9)

ASK COMPUTER SYSTEMS, INC.
MANMAN/PAYROLL
Specific Application: Payroll Processing
Specific Industry: Manufacturing
System Requirements: HP 3000: Images, DEC VAX: VMS
Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $24,000
Number Installed to Date: 20
Date First Installed: 1983
(See Vendor Profile Page V-9)

[illegible] DATA, INC.
PAYROLL SYSTEM
Specific Application: [illegible]
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/23, PDP-11/70: RT-11, RSTS/E: VM
Memory Required: 256.0K bytes
Source Language: DEC Dibol II
Purchase Terms: Purchase (license)
Number Installed to Date: 60
Date First Installed: December 1975
(See Vendor Profile Page V-11)

BANCROFT COMPUTER SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive

System Requirements: IBM System/3, System/34, System/36, System/38
Memory Required: 20.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,900
Number Installed to Date: 300
Date First Installed: 1975
(See Vendor Profile Page V-11)

BANCROFT COMPUTER SYSTEMS, INC.
PAYROLL MANAGEMENT SYSTEM
Specific Application: Payroll Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3, System/34, System/36, System/38
Memory Required: 20.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Price: $3,500
Number Installed to Date: 100
Date First Installed: 1980

BRISTOL INFORMATION SYSTEMS, INC.
PAYROLL SYSTEM
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Vector Graphics: CP/M; Datapoint: DOS, MS-DOS
Memory Required: 64.0K bytes
Source Language: Databus, [illegible]
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 200
Date First Installed: 1972
(See Vendor Profile Page V-13)

BUSINESS COMPUTER CENTER
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Compiled Micro
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 100
(See Vendor Profile Page V-14)

CALIFORNIA COMPUTER TIMESHARING
PAYROLL
Specific Application: Payroll Duties Including Back Pay, Vacation Pay, Calculates all Checks on Daily, Weekly, Monthly or Yearly Basis
Specific Industry: Not Industry Sensitive
System Requirements: IBT
Memory Required: 64.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $8,000
Number Installed to Date: 40
Date First Installed: 1981
(See Vendor Profile Page V-15)

CAMPCO, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200; Wang VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
(See Vendor Profile Page V-16)

CAPE DATA, INC.
AFFIRM PAYROOL/PERSONNEL
Specific Application: Integrated Payroll and Personnel System for Government and Education
Specific Industry: Education, Government
System Requirements: HP 3000: MPE
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 8
Date First Installed: January 1981
(See Vendor Profile Page V-16)

CBASCO
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license); Lease
(See Vendor Profile Page V-17)

CCSI
GOVERNMENTAL PAYROLL
Specific Application: Payroll
Specific Industry: Government
System Requirements: IBM System/34, System/36
Memory Required: 42.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 25
Date First Installed: January 1983
(See Vendor Profile Page V-17)

C. D. SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell Level 6: DPS-400
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 65
Date First Installed: 1978
(See Vendor Profile Page V-17)

CHILSON'S MANAGEMENT CONTROLS, INC.
CMC PAYROLL SYSTEM
Specific Application: Payroll System
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 1550: DOS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $950
Date First Installed: January 1978
(See Vendor Profile Page V-18)

CHRIS SCHAEFER & CO.
CSCO ORDER ENTRY & INVOICING SYSTEM
Specific Application: Addresses Finished Goods, Sales Order Processing and Order Shipments
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-18)

CIRCUIT RESEARCH CORP.
HUMAN RESOURCES MANAGEMENT SYSTEM
Specific Application: Personnel Administration, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Memory Required: 512.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20,000 to $30,000
Number Installed to Date: 5
Date First Installed: 1982
(See Vendor Profile Page V-19)

CMC ASSOCIATES, INC.
FPR/3000
Specific Application: Multicompany Payroll With Labor Distribution
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 35
Date First Installed: September 1977
(See Vendor Profile Page V-19)

CMC ASSOCIATES, INC.
PR/3000
Specific Application: Multicompany Payroll With Labor Distribution
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 36
Date First Installed: 1977

C. M. COMPUTER, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS; IBM: SUPER-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-19)

COLLIER - JACKSON, INC.
CJ/PAYROLL
Specific Application: Payroll Processing and Reporting
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000; DEC VAX: VMS
Memory Required: 32.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 162
Date First Installed: 1977
(See Vendor Profile Page V-20)

COLLIER - JACKSON, INC.
CJ/PERSONNEL
Specific Application: Personnel Reporting
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 32.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 7
Date First Installed: 1982

COLLINGWOOD SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/32, System/34, System/36, System 38
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 250
Date First Installed: 1974
(See Vendor Profile Page V-20)

COMMERCIAL COMPUTER SYSTEMS
SECONDTIME-PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, CTS 300: CP/M; CP/M 86, MS-DOS
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $895
Number Installed to Date: 100
Date First Installed: 1979
(See Vendor Profile Page V-20)

COMMERCIAL SYSTEMS CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS, AOS, A-DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 30
Date First Installed: 1978
(See Vendor Profile Page V-20)

COM-PRO SPECIALISTS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Manufacturing
System Requirements: IBM 4300, 3000 Series: DOS, OS/MVS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-22)

COMSHARE
PROFILES/3000
Additional Product Classification: Human Resource Management
Specific Application: Personnel Recordkeeping System for Transaction Updating, Standard Reporting, Ad Hoc Inquiry
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: Cobol, Image
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 22
Date First Installed: September 1981
(See Vendor Profile Page V-00)

COMPUMAX, INC.
MICROPERS
Specific Application: Payroll/ Personnel
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M, Xerox 820: MS-DOS; NEC PC-8000; Micropolis 16
Memory Required: 48.0K bytes
Source Language: Microsoft Basic, Basic A
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 500
Date First Installed: 1981
(See Vendor Profile Page V-22)

COMPU-SHARE, INC.
PAYROLL - PY-11 VERSION 3.0
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/23: RSTS/E; DEC VAX: VMS/VMS
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,900
Number Installed to Date: 100
Date First Installed: June 1979
(See Vendor Profile Page V-22)

COMPUTAC, INC.
MARC 6 - PAYROLL
Specific Application: Payroll
Specific Industry: Publishing
System Requirements: Wang VS: DOS
Memory Required: 250.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 45
Date First Installed: January 1980
(See Vendor Profile Page V-22)

COMPUTAX SYSTEMS, INC.
BETA PAYROLL CHECKWRITING
Specific Application: Payroll Checkwriting
System Requirements: Burroughs B90, B900, B1900
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,150
Date First Installed: September 1979
(See Vendor Profile Page V-22)

COMPUTER COMPUTING CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370/UNK
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Rental
Number Installed to Date: 200
Date First Installed: September 1974
(See Vendor Profile Page V-22)

COMPUTER ACCOUNTING SYSTEMS, INC.
CPAS PAYROLL SYSTEM
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 16.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500 to $5,000
Number Installed to Date: 100
Date First Installed: 1972
(See Vendor Profile Page V-22)

COMPUTER APPLICATIONS SYSTEMS, INC. (CASI)
TIME & ATTENDANCE SYSTEM SOFTWARE (TASS /1)
Specific Application: Computer Electronic Time Cards
System Requirements: IBM System/1: EDX
Memory Required: 128.0K bytes
Source Language: EDL
Source Code Available: NO
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 15
Date First Installed: 1982
(See Vendor Profile Page V-23)

COMPUTER ASSOCIATES
CA-ADMINISTRATION MANAGEMENT SOFTWARE/PERSONNEL MANAGEMENT
Specific Application: Personnel Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: MVT, IBM 300 Series: DOS; DG: OS, MVS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $27,000
Number Installed to Date: 400
Date First Installed: 1978
(See Vendor Profile Page V-23)

COMPUTER ASSOCIATES
CA-PERSONNEL MANAGEMENT
Specific Application: Personnel/ Payroll
Specific Industry: General Business
System Requirements: IBM: DOS/VS, OS/VS1/MVS; DG Eclipse: AOS; MV8000, MV6000, MV400: VS/DOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: April 1983

COMPUTER INCOME PLANNING CORP.
STEP
Specific Application: Pension Design for 4RA and Others, Profit Sharing, Defined Benefit Plans
Specific Industry: Banking/Financial, Legal, Insurance
System Requirements: IBM: MVS
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $35,000 to $150,000
Number Installed to Date: 50
(See Vendor Profile Page V-24)

COMPUTER INFORMATION ENTERPRISES
CORPORATE HUMAN RESOURCES
Specific Application: Salary Review, Job Classification
Specific Industry: Not Industry Sensitive
System Requirements: IBM, EDX
Memory Required: 22.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1982
(See Vendor Profile Page V-24)

COMPUTER INFORMATION SYSTEMS
RESUME MANAGEMENT SYSTEM
Additional Product Classification: Resume Management
Specific Application: Resume Management, Personnel
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 512.0K bytes
Source Language: VAX Basic
Purchase Terms: Purchase (license)
Price: $2,000 to $3,000
Date First Installed: 1982
(See Vendor Profile Page V-24)

COMPUTERIZED PLANNING SYSTEM, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Basic Four: BBM
Source Language: Business Basic, Basic Four
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 10
Date First Installed: 1983
(See Vendor Profile Page V-24)

COMPUTER SEARCH INTERNATIONAL CORP.
THE CAREER NETWORK
Specific Application: Data Base Search and Retrieval System for Human Resource Management
System Requirements: Prime: Primos
Source Language: Fortran
Source Code Available: No
Purchase Terms: Lease
Date First Installed: 1981
(See Vendor Profile Page V-25)

CONTECTRA SYSTEMS, INC.
PERSONNEL MANAGEMENT SYSTEM
Specific Application: Employee Record File
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/ 1; Evalution; Data Media
Source Language: Basic
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-29)

COMDATA, INC.
PASSRYTE
Specific Application: Personnel
Specific Industry: Not Industry Sensitive
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $49,000
Number Installed to Date: 120
Date First Installed: 1980
(See Vendor Profile Page V-29)

COMDATA, INC.
PAYRYTE
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM: Clos
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $49,000
Number Installed to Date: 100
Date First Installed: 1969

CONESTOGA DATA SERVICES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38: CCP
Memory Required: 48.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-29)

CONSOLIDATED COMPUTER SERVICES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 450
Date First Installed: 1975
(See Vendor Profile Page V-29)

COOPERS & LYBRAND
PAYROLL
Specific Application: Payroll

TO SOFTWARE

Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370; DOS/OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
(See Vendor Profile Page V-31)

CORRUGATED SERVICES CORP.
MOBA - PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200; Wang VS
Memory Required: 32.0K bytes
Source Language: Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,000
Number Installed to Date: 15
Date First Installed: April 1981
(See Vendor Profile Page V-31)

CORTES CORP.
HUMAN RESOURCE MANAGEMENT SYSTEM
Specific Application: Personnel, Payroll Interface, Job Application, Job Tracking
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RSX-11M DEC VAX DMS
Source Language: Proprietary
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 8
Date First Installed: November 1980
(See Vendor Profile Page V-31)

CPSI
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Altos ACS 580; Unix, NCR 9050; Xenix, Columbia MPC, Imos; IBM PC-XT; CP/M 86
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 60
Date First Installed: 1979
(See Vendor Profile Page V-31)

CREATIVE DATA SYSTEMS, INC.
PAYROLL
Specific Application: Payroll System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 35
Date First Installed: June 1978
(See Vendor Profile Page V-32)

CROWN SOFTWARE SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1978
(See Vendor Profile Page V-32)

CRS WEST, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: 1970
(See Vendor Profile Page V-32)

CSA/CRT
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Point Four Iris
Memory Required: 64.0K bytes
Source Language: Iris Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,850
Date First Installed: September 1978
(See Vendor Profile Page V-32)

C/U BUSINESS COMPUTERS
TIME TRACKING
Specific Application: Tracking Sales Time
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro, Amos
Memory Required: 40.0K bytes
Source Language: Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 4
Date First Installed: January 1982
(See Vendor Profile Page V-33)

CUSTOM BUSINESS SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200; VP/MVP
Memory Required: 32.0K bytes
Source Language: Wang Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 80
Date First Installed: January 1983
(See Vendor Profile Page V-33)

CUSTOM COMPUTING, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint; DOS, RMS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $695 to $1,950
Number Installed to Date: 200
Date First Installed: 1976
(See Vendor Profile Page V-33)

CYBORG SYSTEMS, INC.
CYBORG ON-LINE PAYROLL/PERSONNEL
Specific Application: Payroll/ Personnel
System Requirements: IBM System/38, DS, DOS, DEC System 10, System 20, VAX; Tops 10, 30 and Up; Burroughs, HP 3000
Memory Required: 150.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $45,000 to $95,000
Number Installed to Date: 300
Date First Installed: September 1974
(See Vendor Profile Page V-34)

DARCOR
INTERACTIVE PAYROLL SYSTEM
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, 5340
Memory Required: 48.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,800
Number Installed to Date: 51
Date First Installed: September 1978
(See Vendor Profile Page V-34)

DATA ASSOCIATES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000; MPE 4
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 1
Date First Installed: July 1983
(See Vendor Profile Page V-35)

DATA CENTER MANAGEMENT, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11; RSTS/E
Memory Required: 16.0K bytes
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 30
Date First Installed: 1977
(See Vendor Profile Page V-35)

DATA COMMUNICATIONS CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Banking/Financial, Manufacturing
System Requirements: DG Eclipse; R-DOS, DG S140
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 125
Date First Installed: 1981
(See Vendor Profile Page V-35)

DATA COMMUNICATIONS CORP.
PERSONNEL
Specific Application: Personnel
Specific Industry: Banking/Financial, Broadcasting
System Requirements: DG Eclipse; R-DOS, DG S140
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 125
Date First Installed: 1981

DATA-COM SYSTEMS & SERVICES, INC.
DATE-COM PAYROLL
Specific Application: Multifirm/ Company Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 8
Date First Installed: October 1980
(See Vendor Profile Page V-35)

DATACON OF ST. HELENS, INC.
PAYMASTER
Specific Application: Full Feature Payroll System
Specific Industry: Not Industry Sensitive
System Requirements: HP3000; MPE
Memory Required: 500.0K bytes
Source Language: Cobol, RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-35)

DATA GENERAL CORP.
GENAP SOFTWARE FINANCIAL SERIES PAYROLL
Specific Application: Company Data Maintenance and Inquiry, Labor Reporting, Employee Data Maintenance and Inquiry, Payroll Cycle Processing, Special Processes
Specific Industry: Not Industry Sensitive
System Requirements: DG
Memory Required: 20.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-36)

DATAMERICA CORP.
DATAMERICA PAYDAY PAYROLL
Specific Application: Payroll Management
Specific Industry: Banking/Financial
System Requirements: Imos; IRX; NCR ITX, Idps
Memory Required: 80.0K bytes
Source Language: Ansi Cobol 4
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,850

Date First Installed: October 1979
(See Vendor Profile Page V-37)

DATA PROCESSING CORP. OF DELAWARE VALLEY
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Lease
Date First Installed: 1969
(See Vendor Profile Page V-38)

DATA PRODUCTS MAINTENANCE CORP.
CALIFORNIA PAYROLL
Additional Product Classification: Accounting
Specific Application: Integrated Accounting Package, Writing Checks, Payroll, Taxes
Specific Industry: Not Industry Sensitive
System Requirements: Ohio Scientific OS 530
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $500
Number Installed to Date: 20
Date First Installed: 1981
(See Vendor Profile Page V-38)

DATAREX COMPUTER SYSTEMS
PAYROLL SYSTEM
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3, System/32; System/34
Memory Required: 32.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $3,500
(See Vendor Profile Page V-38)

DATA SYSTEMS CONSULTANTS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: Virtual Cobol, IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $825
Number Installed to Date: 50
Date First Installed: 1977
(See Vendor Profile Page V-38)

DATATEX SYSTEMS, INC.
PAYROLL
Additional Product Classification: Accounting
Specific Application: Prints Payroll Checks, Deduction Reports, Year to Date Registers, Status Reports, Payroll Register
Specific Industry: Not Industry Sensitive
System Requirements: NCR 101: B8; NCR 8200: Imos; Burroughs B1800
Source Language: Nest/3, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 50
Date First Installed: 1973
(See Vendor Profile Page V-39)

DATATRAC CORP.
DATASTAT PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11; TSX+
Memory Required: 64.0K bytes
Source Language: Dibol, Cobol
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 40
Date First Installed: 1977
(See Vendor Profile Page V-39)

DATA TRAIN, INC.
ETI-PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DOS; CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-39)

DATAX, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Engineering, Retail, Construction
System Requirements: IBM System/34, System 36; DOS, IBM System/36, IBM System 3/15D
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1978
(See Vendor Profile Page V-39)

DATEX, INC.
INTERACTIVE PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
(See Vendor Profile Page V-39)

DA-TRONICS
PAYROLL AND COST
Specific Application: Payroll and Cost: Handles Multiple State and Taxes and Union Locals
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: Datashare
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $1,300
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-39)

DAVID GROTH & ASSOCIATES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 3/UNIX: OCL, IBM System/34: OCL; IBM System/32: OCL, IBM System/36: OCL
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1977
(See Vendor Profile Page V-39)

DEALERS MANAGEMENT SERVICES
PAYROLL
Specific Application: Payroll
Specific Industry: Energy
System Requirements: Wang VS: VS; Wang PC: VS; Wang 2200: VS
Memory Required: 32.0K bytes
Source Language: Basic II, Cobol
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 43
Date First Installed: August 1981
(See Vendor Profile Page V-40)

DEFARO SOFTWARE SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 16.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 3
Date First Installed: March 1982
(See Vendor Profile Page V-40)

DENNEN COMPUTER SYSTEMS, INC.
LABOR DISTRIBUTION
Additional Product Classification: WP/Text Editing, Data/File Management
Specific Application: File Maintenance, Distribution, Editing and Balancing, Payroll, Attendance Report
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS; DEC VAX: OS
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: January 1983
(See Vendor Profile Page V-41)

D. F. MCNAMARA CO.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3: DOS
Memory Required: 32.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Rental
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-41)

DMIT-ALL SYSTEMS CORP.
PAYROLL SYSTEM
Specific Application: Daily Payroll, Pensions, W2, Insurance
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/34: CTS-300
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 2
Date First Installed: January 1981
(See Vendor Profile Page V-42)

DIVERSIFIED ELECTRONICS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11, DEC VAX: VMS
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 30
Date First Installed: 1976
(See Vendor Profile Page V-43)

DLM SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Government
System Requirements: IBM System/34, System/36: SSP
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,800
Number Installed to Date: 11
Date First Installed: July 1980
(See Vendor Profile Page V-43)

D. P. ASSOCIATES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TRW Fujitsu Unos
Memory Required: 48.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 2
Date First Installed: January 1982
(See Vendor Profile Page V-43)

DYNALOGIC, INC.
DYNALOGIC CONSTRUCTION JOB COSTING
Specific Application: Integrated Payroll, Accounts Payable, General Ledger and Job Costing for Work In Progress
Specific Industry: Engineering Construction
System Requirements: Wang V: VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
(See Vendor Profile Page V-44)

DYNALOGIC, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: DOS
Memory Required: 128.0K bytes

Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

DYNAMIC CONTROL CORP.
PAYROLL/ PERSONNEL
Additional Product Classification: DBMS
Specific Application: Payroll/Personnel
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/36
Memory Required: 2.0M bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license), Rental; Lease
Price: $20,000
Date First Installed: 1982
(See Vendor Profile Page V-44)

EDP OF AMERICA, INC.
ED PAYROLL
Specific Application: Payroll, Personnel
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: Pick, ADDS Mentor: Pick; Microdata Reality: Reality; GA Zebra: Pick
Memory Required: 128.0K bytes
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000 to $12,000
Number Installed to Date: 2
Date First Installed: September 1982
(See Vendor Profile Page V-46)

EFFICIENT COMPUTING CO.
PAYROLL 1000
Specific Application: Payroll
Specific Industry: Not Industry Sensitive, Wholesale/Distribution, Medical, Legal
System Requirements: HP 1000: RTE 6, RTE IVB, RTE A
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-46)

ENTECH ENGINEERING, INC.
PAYROLL SYSTEM
Specific Application: Payroll
System Requirements: Datapoint 1560 4630 DOS/Datashare
Memory Required: 96.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: June 1982
(See Vendor Profile Page V-46)

EPICOM, INC.
EPR
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Multa
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,000
Number Installed to Date: 45
Date First Installed: September 1978
(See Vendor Profile Page V-47).

EQUINE MANAGEMENT SYSTEMS
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, DEC Micro PDP-11
Memory Required: 256 0K bytes
Source Language: Basic Plus II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 80
Date First Installed: 1979
(See Vendor Profile Page V-47)

EXCALIBUR DATA SYSTEMS, INC.
SALESMAN COMMISSION SYSTEM
Additional Product Classification: Accounting
Specific Application: IBM Majics Compatible Salesman Commission System
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/34, System/36 SSP
Memory Required: 64.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1980
(See Vendor Profile Page V-47)

EXECU-FLOW SYSTEMS, INC.
HOME HEALTH CARE SYSTEM
Additional Product Classification: Accounting
Specific Application: Employee Payroll, Patient Billing
Specific Industry: Medical, Home Health Care
System Requirements: Cado: Cado
Memory Required: 32.0K bytes
Source Language: Cadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,500
Number Installed to Date: 3
Date First Installed: August 1982
(See Vendor Profile Page V-47)

FIGGIE SYSTEMS-MANAGEMENT GROUP, INC.
PAYROLL SYSTEM
Specific Application: Payroll System With Multicompany Capabilities
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell DPS 6 Gcos
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: 1977
(See Vendor Profile Page V-48)

FINANCIAL FORECAST, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System38
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 450
Date First Installed: 1975
(See Vendor Profile Page V-48)

FRANKLEN COMPUTER SYSTEMS
PAYROLL
Specific Application: Multicompany Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, CTS-300
Memory Required: 64 0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $850 to $1,500
Number Installed to Date: 25
Date First Installed: 1981
(See Vendor Profile Page V-50)

GENERATED SYSTEMS, INC.
PAYMASTER
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: OS; Sperry: DOS, IBM: EDX, Wang: VS
Source Language: Cobol, Assembler
Source Code Available: Yes
Date First Installed: 1971
(See Vendor Profile Page V-51)

GENESYS SOFTWARE SYSTEMS, INC.
GENESYS BENEFITS MANAGEMENT
Specific Application: Deferred Benefits Administration
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: OS-DOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 430
Date First Installed: 1975
(See Vendor Profile Page V-51)

GENESYS SOFTWARE SYSTEMS, INC.
GENESYS HRMS
Specific Application: Human-Resource Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: OS-DOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 400
Date First Installed: 1975

GENESYS SOFTWARE SYSTEMS, INC.
GENESYS PAYROLL ACCOUNTING
Specific Application: Payroll Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: OS-DOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 400
Date First Installed: 1972

GENESYS SOFTWARE SYSTEMS, INC.
GENESYS PERSONNEL ADMINISTRATOR
Specific Application: Personnel
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: OS-DOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 400
Date First Installed: 1974

GRIS SYSTEMS, INC.
ASAP - PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: BTI 8000: VRM, BTI 5000, Multus
Memory Required: 6.4M bytes
Source Language: Extended Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 50
Date First Installed: July 1979
(See Vendor Profile Page V-52)

HARRIS DATA SERVICE
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM Ssytem/34, System/36, System/38: SSP
Source Language: RPG-II, RPG-III (System/38)
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $5,000
Number Installed to Date: 125
Date First Installed: October 1978
(See Vendor Profile Page V-53)

HCE COMPUTER CONSULTANTS
PAYROLL
Specific Application: Payroll Including Restaurant Accounting for Tips
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 96 0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 5
Date First Installed: January 1981
(See Vendor Profile Page V-54)

HEWITT ASSOCIATES
HEWITT AMERICAN SOCIAL SECURITY ESTIMATOR
Specific Application: Social Security Benefit Calculation
Specific Industry: Not Industry Sensitive
System Requirements: IBM
Memory Required: 90.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); DEC Rental

Number Installed to Date: 35
(See Vendor Profile Page V-54)

IBM
INTERACTIVE PERSONNEL SYSTEM
Specific Application: Personnel Administration and Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS/VS, IBM 3030 Series: DOS/VSE, IBM 4300: Cics/DOS/VS
Memory Required: 240 OK bytes
Source Language: PL/1, Assembler
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-56)

IDEAL SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Rural Electric
System Requirements: Burroughs B90, B900: GMS, Burroughs B1900
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: November 1982
(See Vendor Profile Page V-56)

INC AFFILIATED SERVICES, INC.
PAYROLL/PERSONNEL TIME AND ATTENDANCE
Specific Application: Payroll/ Personnel
Specific Industry: Banking/Financial
System Requirements: IBM System/38
Source Language: CPT
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 26
Date First Installed: October 1981
(See Vendor Profile Page V-56)

INFOCON CORP.
INTER ACTIVE PAYROLL
Specific Application: Payroll
System Requirements: IBM System/38, All Models
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $5,000
Date First Installed: 1983
(See Vendor Profile Page V-57)

INFORMATION MANAGEMENT CONSULTANTS, INC.
RECRUITMENT TRACKING SYSTEM
Specific Application: Employee Tracking
System Requirements: Wang VS
Memory Required: 128.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: 1981
(See Vendor Profile Page V-57)

INFORMATION SCIENCE, INC.

INSCI HUMAN RESOURCE SYSTEM
Specific Application: Personnel Record Keeping Systems
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series
Memory Required: 600.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $46,000 to $145,000
Number Installed to Date: 1,000
Date First Installed: 1965
(See Vendor Profile Page V-58)

INFORMATION SCIENCE, INC.
INSCI PAYROLL SYSTEM
Specific Application: Multicompany Multipay Group System
Specific Industry: Not Industry [redacted]
System Requirements: IBM 370: OS, IBM 4300 Series: DOS, IBM 3000 Series: OS, DOS-OS
Memory Required: 600 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $45,000 to $120,000
Number Installed to Date: 800

INFORMATION SCIENCE, INC.
INSCI PAYROLL/PERSONNEL REPORT WRITER
Additional Product Classification: Report Generator
Specific Application: Integrated Payroll/Personnel System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370P: OS, IBM 4300 Series: DOS, IBM 3000 Series: OS; IBM Equivalent MF: DOS OS
Memory Required: 600.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75,000 to $230,000
Number Installed to Date: 800

Additional Information provided for by vendor

InSci's payroll/personnel and pension administration systems are technically and functionally the most advanced in the industry. The company started the human resource systems industry in 1965 and over the past few years has added a series of state-of-the-art products, including the systems for IDMS, IMS/IDL and ADABAS.

INFORMATION SPECIALISTS, INC.
AUTOMOTIVE RELEASE SYSTEM
Additional Product Classification: Manufacturing
Specific Application: Automotive Release System
System Requirements: DG Nova: R-DOS, AOS, AOS/VS
Memory Required: 512.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $12,500
Date First Installed: June 1982
(See Vendor Profile Page V-58)

INFORMATION SYSTEMS, INC.
PAY 99C
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TI 990: DX-10
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,950
Number Installed to Date: 30
Date First Installed: 1980

INNOVATIVE COMPUTING CORP.
ITS PAYROLL
Specific Application: Payroll,
Specific Industry: Freight Carriers
System Requirements: IBM System/34, System/36, System/38
Memory Required: 128 0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1976
(See Vendor Profile Page V-59)

INSURANCE DATA COMPUTER SERVICE, INC.
BENICOM
Specific Application: Employee Benefit Communications Tool,
Specific Industry: Banking/Financial, Insurance
System Requirements: Apple II
Memory Required: 64 0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
(See Vendor Profile Page V-59)

INTEGRAL SYSTEMS, INC. (ISI)
THE PAYROLL/PERSONNEL SYSTEM
Specific Application: Personnel Management, Position Tracking Data Security
[redacted]
Resources
[redacted]
System 36; HP 3000
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 390
Date First Installed: 1972
(See Vendor Profile Page V-59)

INTERACTIVE COMPUTER SYSTEMS, INC.
INTERACTIVE COMPUTER SYSTEM- PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10; IBM: PC-DOS; Apple: CP/M; Onyx: Oasis
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 26
Date First Installed: 1981
(See Vendor Profile Page V-60)

INTERACTIVE SYSTEMS, INC.
SOFTWARE INTERNATIONAL PAYROLL/PERSONNEL
Specific Application: Payroll/ Personnel
Specific Industry: Not Industry Sensitive
System Requirements: DEC System 10: Tops-10, System 20: Tops-20; DEC VAX: VMS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $38,000
Number Installed to Date: 50
Date First Installed: January 1981

INTERNATIONAL PROGRAMMING LABORATORIES CORP.
PAYROLL / PERSONNEL
Specific Application: Payroll and Personnel
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 30.0K bytes
Source Language: RPG-II, RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000 to $10,000
Number Installed to Date: 800
Date First Installed: 1977
(See Vendor Profile Page V-61)

IS&R SYSTEMS, INC.
PDS/1
Specific Application: Personnel Data or Functional Personnel Management
Specific Industry: Human Resource
System Requirements: IBM Series/ 1: EDX
Source Language: EPL
Purchase Terms: Lease
Number Installed to Date: 2
Date First Installed: 1981
(See Vendor Profile Page V-61)

JACOBSEN & ASSOCIATES, INC.
GENERAL LEDGER
Specific Application: General Ledger
Specific Industry: Manufacturing
System Requirements: DG Eclipse: AOS, AOS/VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 20
Date First Installed: January 1982
(See Vendor Profile Page V-62)

JACOBSEN & ASSOCIATES, INC.
PAYROLL LABOR DISTRIBUTION
Specific Application: Payroll Labor Distribution
Specific Industry: Manufacturing
System Requirements: DG Eclipse: [redacted]
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 20
Date First Installed: January 1982

JAMES J. BAGSHAW & CO.
THE MODULAR PENSION SYSTEM
Specific Application: Design and Administration of Pension Plans
Specific Industry: Insurance
System Requirements: Wang 2200
Purchase Terms: Lease
Number Installed to Date: 50
Date First Installed: December 1973
(See Vendor Profile Page V-62)

5:31 PM
Mon.-Fri.
TRAIN NO. 58

Our clients heard about us through the grapevine.

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Sales and support offices located throughout North America.

JAMES L. SELLERS & ASSOCIATES
INTERACTIVE PAYROLL SYSTEM FMAS
Specific Application: Payroll
Specific Industry: Manufacturing, Wholesale/Distribution, Construction
System Requirements: NCR I-8230 Imos III, NCR I-9020 Imos V, NCR I-9040 IRX; NCR I-9300; ITX
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 300
Date First Installed: December 1981
(See Vendor Profile Page V-62)

J. D. EDWARDS & CO.
PAYROLL PERSONNEL
Specific Application: Payroll Personnel
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, Saytem/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Lease
Price: $6,000 to $10,000
Number Installed to Date: 75
Date First Installed: 1979
(See Vendor Profile Page V-62)

KDK ENTERPRISES, INC.
GAAP PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: ADDS Mentor Pick, Honeywell Ultmate: Pick
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Date First Installed: July 1983
(See Vendor Profile Page V-63)

KEYES MANAGEMENT SYSTEMS, INC.
KEYES APPAREL MANAGEMENT SYSTEM
Additional Product Classification: Manufacturing, Accounting
Specific Application: Piecework, Ticketing, Payroll, Inventory, Scheduling, Shipping and Invoicing
Specific Industry: Manufacturing
System Requirements: Victor Graphics: CP/M; DEC Rainbow
Memory Required: 128.0K bytes
Source Language: CB-80
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: October 1983
(See Vendor Profile Page V-64)

KPG COMPUTER SYSTEMS
PAYROLL SYSTEM
Specific Application: Reports 9000 Divisions, Tracks Salary Adjustments, Employee Training, Intercompany Transfer, Accumulates Personnel Sick and Vacation Time
Specific Industry: Not Industry Sensitive
System Requirements: Sperry 9030; OS3
Memory Required: 256.0K bytes
Source Language: Ansi 74 Cobol
Source Code Available: Yes
Purchase Terms: Lease
Date First Installed: June 1981
(See Vendor Profile Page V-64)

KITZMILLER SYSTEMS
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Televideo 802H CP/M, IBM PC PC-DOS, TI 990 Unix
Memory Required: 64.0K bytes
Source Language: RM-Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 10,000
Date First Installed: 1981
(See Vendor Profile Page V-64)

KLANE GELLMAN & SCHECHTER
PAYROLL
Additional Product Classification: Accounting
Specific Application: Payroll Software
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34; SSP
Memory Required: 16.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,900
Number Installed to Date: 300
Date First Installed: 1972
(See Vendor Profile Page V-64)

LA CROSSE COMPUTER SYSTEMS, INC.
CLIENT PAYROLL SYSTEM
Specific Application: Piece Rate,Payroll, Monitors Productivity
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova 4X, Eclipse S20; R-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 2
Date First Installed: 1983
(See Vendor Profile Page V-65)

LAWSON ASSOCIATES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B1900
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 50
Date First Installed: January 1982
(See Vendor Profile Page V-65)

LAWSON ASSOCIATES, INC.
PERSONNEL ADMINISTRATION
Specific Application: Personnel Administration
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300, 3000 Series: OS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 2
Date First Installed: April 1983

LAWSON ASSOCIATES, INC.
S/36 PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 50
Date First Installed: January 1982

LAWSON ASSOCIATES, INC.
S/38 PERSONNEL ADMINISTRATION
Specific Application: Personnel Administration
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 8
Date First Installed: May 1983

LIBRA PROGRAMMING, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110, 5120, System/23
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,450
Number Installed to Date: 900
Date First Installed: October 1976
(See Vendor Profile Page V-66)

LINK SOFTWARE
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/23; DOS
Memory Required: 64.0K bytes
Source Language: RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 250
Date First Installed: 1981
(See Vendor Profile Page V-66)

LINTON SHAPER COMPUTER SERVICES, INC.
PAYROLL CHECKWRITING
Specific Application: Payroll Checkwriting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 32.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,800
Date First Installed: 1978
(See Vendor Profile Page V-66)

LOGICAL DESIGN CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs 90, B900; CMS; Burroughs 1900 CMS/Native
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1979
(See Vendor Profile Page V-66)

LOUIS A. WRIGHT & ASSOCIATES, INC.
PAYROLL AND LABOR REPORTING
Specific Application: Payroll and Labor Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/38
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 70
Date First Installed: 1979
(See Vendor Profile Page V-67)

MACHINE PAYROLL ACCOUNTING SERVICE
PAYROLL/PERSONNEL
Specific Application: On-Line Payroll and Personnel
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX-11/780; VMS
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $20,000
Date First Installed: November 1978
(See Vendor Profile Page V-67)

MAGNUSON SYSTEMS SYSTEMS, INC.
BAT 1700 FOR ACCOUNTING
Specific Application: General Ledger, Payroll, Fixed Asset Accounting, Performance Reporting, Accounts Payable
Specific Industry: Broadcasting
System Requirements: Datapoint: DOS
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 75
Date First Installed: 1975
(See Vendor Profile Page V-67)

MANAGEMENT COMPUTER SERVICE, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11; RSTS/E
Source Language: Basic, Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 100
Date First Installed: 1978
(See Vendor Profile Page V-68)

MANAGEMENT CONTROL SYSTEMS, INC.
PAYROLL/CHECK WRITING
Specific Application: Payroll With Check Writing

Specific Industry: Real Estate, Accounting
System Requirements: IBM PC, System/32, IBM System/34, IBM System/38
Source Language: RPG-II, Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200 to $6,200
Number Installed to Date: 205
Date First Installed: 1975
(See Vendor Profile Page V-68)

MANAGEMENT SERVICES
PERSONNEL PAYROLL
Specific Application: Payroll and Personnel
Specific Industry: Government
System Requirements: Commodore 8032: DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 2
Date First Installed: June 1983
(See Vendor Profile Page V-68)

MANAGEMENT SERVICES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS
Source Language: Basic Plus
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,200 to $1,500
Number Installed to Date: 500
(See Vendor Profile Page V-68)

MANAGEMENT SERVICES, INC.
PERSONNEL
Specific Application: Personnel
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/70: RSTS/E
Source Language: Basic Plus
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,200 to $1,500
Number Installed to Date: 500

MANAGEMENT SYSTEMS, INC.
OFFICE TEMPORARY
Specific Application: High Speed Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, Series/1, PC: Pick; DEC PDP-11/60: Pick
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500 to $50,000
Number Installed to Date: 30
(See Vendor Profile Page V-69)

MANAGEMENT SYSTEMS, INC.
SECURITY GUARD SYSTEM
Additional Product Classification: Accounting
Specific Application: Tracks Guards, Projects, Billing
Specific Industry: Security
System Requirements: IBM 4300, PC, Series/1 Pick, DEC 1180 PickMemory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500 to $50,000
Number Installed to Date: 30

MANATRON, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Government
System Requirements: Burroughs B1000
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-68)

MARYLAND COMPUTER SERVICES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 15
Date First Installed: 1983
(See Vendor Profile Page V-69)

MAS, INC.
CLIENT WRITE UP
Additional Product Classification: Accounting
Specific Application: After the Fact Payroll Reporting, General Ledger
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-8, PDP-11: CTS
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 75
Date First Installed: September 1976
(See Vendor Profile Page V-70)

MAS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-8, PDP-11: CTS
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1976

MAYORAS & HEFTLE, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM System/36
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 33
Date First Installed: 1980
(See Vendor Profile Page V-70)

MCCORMACK & DODGE CORP.
HR;M
Additional Product Classification: DBMS
Specific Application: Human Resources Payroll and Personnel With DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100,000
(See Vendor Profile Page V-70)

MCCORMACK & DODGE CORP.
HR;M/PAYROLL
Additional Product Classification: DBMS
Specific Application: Payroll Application With DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $74,000

MCCORMACK & DODGE CORP.
HR;M/PERSONNEL
Additional Product Classification: DBMS
Specific Application: Personnel Application With DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $80,000
Date First Installed: 1983

MCCORMACK & DODGE CORP.
HUMAN RESOURCE MANAGEMENT
Specific Application: Human Resource Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS/MVS
Memory Required: 800.0K bytes
Source Language: Ansi Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 105
Date First Installed: 1982

MCCORMACK & DODGE CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS/MVS
Memory Required: 800.0K bytes
Source Language: Ansi Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $32,500 to $49,500
Number Installed to Date: 105
Date First Installed: 1982

MCCORMACK & DODGE CORP.
PERSONNEL
Specific Application: Personnel
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS/MVS
Memory Required: 800.0K bytes
Source Language: Ansi Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $32,500 to $49,500
Number Installed to Date: 105
Date First Installed: 1982

MCCORMICK & ASSOC.
INTERACTIVE PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/36
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-70)

MCRAE INDUSTRIES, INC.
WPS I AND II
Specific Application: Piecework Payroll Application With Inventory Control
System Requirements: IBM System/34: SSP
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $13,000
Date First Installed: 1980
(See Vendor Profile Page V-71)

MCRAE INDUSTRIES, INC.
WPS III
Specific Application: Piecework Payroll Application With Inventory Control
System Requirements: IBM System/34: SSP
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: 1980

MCRAE INDUSTRIES, INC.
WPS I, II, AND III
Specific Application: Piecework Payroll Application With Inventory Control
System Requirements: IBM System/34: SSP
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $16,000
Date First Installed: 1980

MDS, INC.
MS PERSONNEL
Specific Application: Personnel
Specific Industry: Banking/Financial
System Requirements: Datapoint: DOS, RMS
Memory Required: 48.0K bytes
Source Language: Cobol, Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000

[illegible] Installed to Date: 3
Date First Installed: 1982
(See Vendor Profile Page V-71)

MEASUREMENT CONCEPTS CORP.
PAYROLL
Specific Application: Payroll, Personnel
Specific Industry: Not Industry Sensitive
System Requirements: BOS
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,500
Date First Installed: 1979
(See Vendor Profile Page V-71)

[illegible] SYSTEMS, INC.
PUBLIC PAYROLL/PERSONNEL SYSTEM
Specific Application: Payroll
Specific Industry: Education, Government, Nonprofit Organizations
System Requirements: IBM System 23, Datamaster 5324, 5124
Source Language: Basic
[illegible] Code Available: Yes
Purchase Terms: Purchase (license)
[illegible]
[illegible] Installed to Date: 124
Date First Installed: May 1978
(See Vendor Profile Page V-72)

MERGENTHALER/MYCRO-TEK
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs: CMS
Source Language: Cobol
[illegible] Code Available: No
Purchase Terms: Purchase (license)
[illegible]
[illegible] Installed to Date: 70
[illegible]: 1977
(See Vendor Profile Page V-72)

MESON SERVICES CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 64.0K bytes
Source Language: EDL
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 4
[illegible]
(See Vendor Profile Page V-72)

META SOFTWARE
PAYROLL/PERSONNEL
Specific Application: Payroll/ Personnel Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $5,000 to $8,000
Number Installed to Date: 1
Date First Installed: July 1983
(See Vendor Profile Page V-72)

METRO SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Oil and Gas
System Requirements: Pertec; Honeywell, IBM System/36; DEC VAX Series
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $2,000
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-72)

MIDWEST COMPUTER CENTER CO.
PAYROLL
Specific Application: National Tax Table Support and Federal Forms, Union Information, Workman's Compensation
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Fortran 4, Macro
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,195
Number Installed to Date: 3,000
Date First Installed: 1977
(See Vendor Profile Page V-75)

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
CLIENT WRITE UP
Specific Application: Client Write-Up
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX-11: RT-11, RSTS/E
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible]
(See Vendor Profile Page V-75)

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: RT-11; DEC VAX: RT-11, RSTS/E; Wang VS, HP: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1,000
Date First Installed: [illegible]

MINI-COMPUTER SUPPORT GROUP, INC.
PAYROLL
Specific Application: A Complete Hourly and Salaries Application
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS RMS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,350
Number Installed to Date: 75
Date First Installed: 1979
(See Vendor Profile Page V-76)

MINI-COMPUTER SUPPORT GROUP, INC.
PERSONNEL
Specific Application: Client Generated Personnel Information Tracking, Application
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS, RMS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,100
Number Installed to Date: 75
Date First Installed: 1979

MPI SYSTEMS
PAYROLL
Specific Application: General Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TI 990: DX-10
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1982
(See Vendor Profile Page V-77)

MRP, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Prime 50 Series: Primos; Prime 2250, Prime 250
Memory Required: 1.0M bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978
(See Vendor Profile Page V-77)

MRP, INC.
PERSONNEL
Specific Application: Personnel
Specific Industry: Manufacturing, Wholesale/Distribution
[illegible] Prime 50 Series: Primos; Prime 2250; Prime 256
Memory Required: 1.0M bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
ALLTAX TAXING SYSTEM
Specific Application: Payroll Taxing
Specific Industry: Manufacturing, Banking/Finance, Medical, Insurance, Education, Government, Nonprofit Organizations
Memory Required: 32.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible]
(See Vendor Profile Page V-78)

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
INTERNATIONAL PAYROLL
Specific Application: International Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360; IBM 370; IBM 4300XS; Sperry 1100
[illegible]
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
MSA PAYROLL SYSTEM
Specific Application: Payroll
Specific Industry: Manufacturing, Banking/Financial, Medical, Insurance, Education, Government, Nonprofit Organizations
[illegible] 360, 370; OS; Burroughs; Honeywell 66/6000; Sperry 1100
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1,361
Date First Installed: 1970

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
MSA PERSONNEL MANAGEMENT & REPORTING
[illegible] Human Resource Management
Specific Industry: Manufacturing, Banking/Financial, Medical, Insurance, Education, Government, Nonprofit Organizations
System Requirements: IBM 360/370, 3030 Series: OS; Burroughs; Honeywell 66/6000
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible]
Date First Installed: September 1975

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
[illegible] 360, 370, 4300 Series; Sperry 1100
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1,127

MSA, INC. (MANAGEMENT SCIENCE AMERICA)
PERSONNEL MANAGEMENT REPORTING SYSTEM
Specific Application: Personnel Reporting Management System
Specific Industry: Not Industry [illegible]
System Requirements: IBM 360, 370, 4300XS; Sperry 1100
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 633

M S I SOFTWARE, INC.
ADMINISTRATIVE SUPPORT MODULE
Specific Application: Record Keeping, Inquiry Reports
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPS; IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: CL, RPG-III, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: July 1982
(See Vendor Profile Page V-78)

M S I SOFTWARE, INC.
ATTENDANCE PROCESSING
Specific Application: Tracks Employee Attendance
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPS; IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: CL, RPG-III, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: July 1982

M S I SOFTWARE, INC.
EEO & OSHA REPORTING
Specific Application: Equal Employment Opportunity and OSHA Reporting,
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPS, IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: CL, RPG-III, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: July 1982

M S I SOFTWARE, INC.
PERSONNEL 2000
Specific Application: Human Resources Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPS; IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: CL, RPG-III, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,500 to $20,000
Date First Installed: July 1982

M S I SOFTWARE, INC.
REPORT WRITER
Additional Product Classification: Report Generator
Specific Application: Allows Users to Define and Use Custom Reports
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPS, IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: CL, RPG-III, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: July 1982

M S I SOFTWARE, INC.
SALARY ADMINISTRATION
Specific Application: Salaries and Budget Administration and Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPS; IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: CL, RPG-III, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: July 1982

MULTI-SYSTEMS
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TI 990: DX-10, Prime: Primos, IBM: MVS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license), Rental, Lease
Price: $3,000
Number Installed to Date: 33
Date First Installed: 1979
(See Vendor Profile Page V-78)

NATIONAL DATA PROCESSING CORP.
GENERAL PAYROLL SYSTEM
Specific Application: General Management, Office Sales, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B1000; MCP
Memory Required: 256.0K bytes
Source Language: Cobol 68
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 1
Date First Installed: September 1981
(See Vendor Profile Page V-78)

NATIONAL DATA SERVICES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs; MCP
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 6
Date First Installed: January 1983
(See Vendor Profile Page V-78).

NATIONAL FSI, INC.
EMPLOYEE BENEFIT ADMINISTRATION SYSTEM
Specific Application: Employee Benefit Record Keeping
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200 VS Series: Wang; Wang 2200-MVP, LVP
Memory Required: 256.0K bytes
Source Language: Anal Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license), Rental, Lease
Price: $22,000 to $123,000
Number Installed to Date: 100
Date First Installed: 1920
(See Vendor Profile Page V-79)

NATIONAL FSI, INC.
PARTICIPANT ACCOUNTING SYSTEM (PAS)
Specific Application: Shareholder Record Keeping
Specific Industry: Banking/Financial, Insurance
System Requirements: Wang VS Series: VS
Memory Required: 256.0K bytes
Source Language: Anal Cobol
Source Code Available: Yes
Purchase Terms: Lease
Price: $50,000 to $150,000
Number Installed to Date: 1
Date First Installed: 1981

NATIONAL INFORMATION SYSTEMS, INC.
PRES
Specific Application: Human Resource Management
Specific Industry: Not Industry Sensitive
System Requirements: DEC 10: Tops 10; DEC 20: Tops 20
Source Language: Accent
Purchase Terms: Purchase (license)
Price: $15,000 to $40,000
Number Installed to Date: 2
Date First Installed: 1981
(See Vendor Profile Page V-79)

NATIONAL TIMESHARING & DATA SERVICES
COMPUPAY
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4341 OS
Memory Required: 150.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-79)

NEAL NELSON & ASSOCIATES
PAYROLL
Specific Application: Payroll With Automatic Calculation of Taxes and Standard Deductions
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 2
Date First Installed: July 1983
(See Vendor Profile Page V-79)

NETWORK COMPUTING CORP.
PERSONNEL AND PAYROLL SYSTEM
Specific Application: Maintains Information on Personnel and Payroll
Specific Industry: Utility
System Requirements: IBM 370: MVS: DOS/VS
Memory Required: 1.0M bytes
Source Language: Assembler, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1971
(See Vendor Profile Page V-79)

NEWPORT WEST DATA SERVICES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS, AOS, AOS/VS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 4
Date First Installed: 1981
(See Vendor Profile Page V-80)

NORTHEAST DATACOM, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200 MVP Speed
Memory Required: 28.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-80)

NORTHEASTERN DATA PROCESSING, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: September 1978
(See Vendor Profile Page V-80)

NU-COMP SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Banking/Financial
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 30
Date First Installed: 1981
(See Vendor Profile Page V-81)

OCCIDENTAL COMPUTER SYSTEMS, INC.
SUPERPAY PAYROLL SYSTEM
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300, 3000 Series
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $980
Number Installed to Date: 100
Date First Installed: 1972
(See Vendor Profile Page V-81)

OCCIDENTAL COMPUTER SYSTEMS, INC.
SUPER-PAY-PAYROLL PERSONNEL SYSTEM
Additional Product Classification: WP/Text Editing
Specific Application: Mail List Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, OS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $980
Number Installed to Date: 100
Date First Installed: January 1970

ODYSSEY SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Manufacturing

System Requirements: EDS Point Four; DG Nova: Iris; Litton: IOS; Nixdorf: NOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1981
(See Vendor Profile Page V-82)

OMEGA SYSTEMS
MULTI EMPLOYER TRUST SYSTEM
Specific Application: Comprehensive Administration of Health, Legal and Pension Funds in A Multiemployer Trust Environment
Specific Industry: Retail, Construction, Multiemployer Trust
System Requirements: Prime 50 Series: Primos
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75,000
Number Installed to Date: 1
Date First Installed: December 1982
(See Vendor Profile Page V-82)

ORGANIZATION CHANGE CORP.
HUMAN RESOURCES MANAGEMENT SYSTEM
Specific Application: Personnel/ Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3030, 4300 Series: OS-DOS; DEC VAX 705, TI 80
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 10
Date First Installed: June 1982
(See Vendor Profile Page V-83)

[illegible] DATA PROCESSING
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: BTI 5000, 8000
Memory Required: 64.0K bytes
Source Language: Extended Basic, C
Purchase Terms: Purchase (license)
Price: $3,250
Number Installed to Date: 8
Date First Installed: January 1982
(See Vendor Profile Page V-83)

[illegible] DATA SYSTEMS
COMMUNITY ACTION AGENCY/FUND ACCOUNTING SYSTEM
Specific Application: Fund Accounting, General Ledger, Payroll, Accounts Payable
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: CTS 300, RT-11
Memory Required: 256.0K bytes
Source Language: Dibol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000 to $150,000
Date First Installed: 1979
(See Vendor Profile Page V-84)

PARAGON DATA SYSTEMS
FIRE-FOUNDARY MANAGEMENT INFORMATION SYSTEM
Specific Application: Comprehensive Cost Accounting
System Requirements: DEC PDP-11: CTS 300, RT-11
Memory Required: 256.0K bytes
Source Language: Dibol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Date First Installed: 1979

PARA RESEARCH, INC.
MAPICS PAYROLL AND EMPLOYEE HISTORY SYSTEM
Specific Application: Payroll and Employee History System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/38
Memory Required: 20.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $400 to $750
Number Installed to Date: 30
Date First Installed: January 1983
(See Vendor Profile Page V-84)

PARA RESEARCH, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/38
Memory Required: 30.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,000 to $2,000
Number Installed to Date: 1,200
Date First Installed: 1982

PARK AVENUE DATA SERVICES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive, Small Business
System Requirements: IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-84)

PARK SOFTWARE
PROFIT SHARING SYSTEM (PSS)
Specific Application: Profit Sharing Plan Administration
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 500.0K bytes
Source Language: VAX-11 Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 2
Date First Installed: February 1983
(See Vendor Profile Page V-84)

PBS COMPUTING, INC.
PAYROLL CHECK WRITING
Specific Application: Payroll Check Writing
Specific Industry: Public Accounting
System Requirements: DEC PDP-11. RSX-11M; Prime: Primos; Plessey: RT-11
Memory Required: 64.0K bytes
Source Language: Fortran, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,650
Number Installed to Date: 150
Date First Installed: September 1975
(See Vendor Profile Page V-84)

PERFORMANCE MANAGEMENT, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: RPG
Purchase Terms: Purchase (license)
Date First Installed: 1979
(See Vendor Profile Page V-85)

PERSONNEL DATA SYSTEMS, INC.
PASS/ACCU-PAY
Specific Application: Personnel Reporting and Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3000 Series. DOS; IBM 430. Series: OS; HP 3000: MPE
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $39,000 to $160,000
Number Installed to Date: 300
Date First Installed: June 1971
(See Vendor Profile Page V-85)

PLEX DATA BASE SYSTEMS, INC.
PLEX PAYROLL - PAYROLL 250 VERSION 7
Specific Application: Payroll/ Personnel
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: HP 250: Basic
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,850
Number Installed to Date: 4
(See Vendor Profile Page V-86)

PLYCOM SERVICES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS, VMS
Memory Required: 16.0K bytes
Source Language: VAX Basic, Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,300 to $7,500
Number Installed to Date: 100
Date First Installed: 1978
(See Vendor Profile Page V-86)

PLYCOM SERVICES, INC.
TIME ANALYSIS SYSTEM
Specific Application: Measures Productivity of Employee
Specific Industry: Not Industry Sensitive,
System Requirements: DEC PDP-11: RSTS; DEC VAX: VMS
Memory Required: 16.0K bytes
Source Language: VAX Basic, Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,300 to $7,500
Number Installed to Date: 100
Date First Installed: 1978

POWERSOFT, INC.
SUPER CHECK BOOK 3-PLUS
Additional Product Classification: Accounting
Specific Application: Check Registration and Check Writer, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Applesoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $119
(See Vendor Profile Page V-87)

PRODUCTION SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 100
Date First Installed: March 1982
(See Vendor Profile Page V-88)

PRODUCTIVE SOFTWARE SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP; IBM System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Price: $4,000
Number Installed to Date: 6
Date First Installed: June 1982
(See Vendor Profile Page V-88)

PROFESSIONAL BUSINESS COMPUTER SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive, Wholesale/Distribution, Accounting
System Requirements: TI 990: DX-10: Unix
Memory Required: 256.0K bytes
Source Language: Cobol, RPG
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-88)

PROFESSIONAL INFORMATION MANAGEMENT
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova 4: Iris
Memory Required: 64.0K bytes
Source Language: Business Basic

Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 50
(See Vendor Profile Page V-86)

PROGRAMMING SERVICES & SUPPORT, INC.
PSS ATF PAYROLL SYSTEM
Specific Application: Payroll Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110, 5120, System/23, System/34, System/36 SSP
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 4
Date First Installed: April 1981
(See Vendor Profile Page V-86)

PROGRAMMING SERVICES & SUPPORT, INC.
PSS PAYROLL SYSTEM
Specific Application: Payroll Processing and Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110, 5120, System/23, System/34, System/36 SSP
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 11
Date First Installed: January 1982

PYRAMID DATA LTD.
PAYROLL CHECK WRITING
Specific Application: Payroll Check Writing
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-8; COS 310
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-89)

QUEUE ASSOCIATES, INC.
PAYROLL/LABOR
Specific Application: Payroll With Labor Distribution, All State Taxes, Earnings Record, 941, W2 Reports
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $1,800
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-90)

QUEUE ASSOCIATES, INC.
PIECEWORK PAYROLL
Specific Application: Will Pay Employees Based on Piecework as Well as Salaries and Hourly Employees
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $2,800
Number Installed to Date: 4
Date First Installed: 1982

QUINTREX DATA SYSTEMS
PAYROLL
Specific Application: Payroll
Specific Industry: Telephone
System Requirements: IBM Series/1
Memory Required: 96.0K bytes
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,600
Number Installed to Date: 30
Date First Installed: 1980
(See Vendor Profile Page V-90)

RAPID DATA, INC.
PAYROLL ACTIVE
Specific Application: Payroll - Interactive System
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS, RMS
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 20
Date First Installed: 1977
(See Vendor Profile Page V-91)

RESOURCE DYNAMICS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: RMS, DOS
Memory Required: 256.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,450 to $1,250
Number Installed to Date: 5
Date First Installed: March 1982
(See Vendor Profile Page V-92)

RESOURCE SOFTWARE INTERNATIONAL, INC.
EEO RETRIEVAL SYSTEM EQUAL EMPLOYMENT OPPORTUNITY
Additional Product Classification: Data/File Management
Specific Application: Aids Compliance With the Governmental Laws and Guidelines Covering Equal Employment Opportunity
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $725
Date First Installed: 1981
(See Vendor Profile Page V-93)

RESOURCE SOFTWARE INTERNATIONAL, INC.
PAY-PER
Specific Application: A Complete Payroll and Personnel System
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,700
Date First Installed: 1979

REZZO DATA SYSTEM, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 10
(See Vendor Profile Page V-93)

R. J. SELZER CO., INC.
LIBRARY SELECTION MODULE
Specific Application: Automates the Schedules of Optional Reports
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS; MDS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 40
Date First Installed: 1981
(See Vendor Profile Page V-93)

R. J. SELZER CO., INC.
PAYROLL PREPARATION SYSTEM
Specific Application: Contains Select/Merge, Scheduler and Library Selection Modules
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, MDS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 40
Date First Installed: 1981

R. J. SELZER CO., INC.
SCHEDULER MODULE
Specific Application: Control Clearing Code and Creates the Control for Production
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS; MDS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 40
Date First Installed: 1977

R. J. SELZER CO., INC.
SELECT/MERGE MODULE
Specific Application: Creates Active Master File for Products
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, MDS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 40
Date First Installed: September 1975

R. SHRIVER ASSOCIATES
PERSONNEL
Specific Application: Independent Data Base Oriented With Personnel System; Maintains Substantial Employee Data, Produces Most Government Reports
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3000; MPE 4
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 15
Date First Installed: January 1981
(See Vendor Profile Page V-94)

SAYLER THORSTENSON & CO.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 40
Date First Installed: 1980
(See Vendor Profile Page V-95)

SEATTLE TELECOM & DATA, INC.
CONTRACTORS PAYROLL
Specific Application: Payroll
System Requirements: TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 100
Date First Installed: 1980
(See Vendor Profile Page V-96)

SEATTLE TELECOM & DATA, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 100
Date First Installed: 1980

SENTINEL COMPUTER CORP.
PAYROLL/PERSONNEL
Specific Application: Payroll/ Personnel
Specific Industry: Wholesale/Distribution
System Requirements: Sentinel Computer Sentinel-30, Sentinel-40; Dbox: Sentinel-50; Sentinel-80
Memory Required: 128.0K bytes

Source Language: DBL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500
Number Installed to Date: 200
Date First Installed: April 1981
(See Vendor Profile Page V-96)

[illegible] DATA SERVICES, INC.
PERSONNEL ASSESSMENT SELECTION SYSTEM
Specific Application: Applicant and Job Selection, Client and Referral Processing
Specific Industry: Employment Agency
System Requirements: Datapoint: DOS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000 to $7,500
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-96)

SHAKER COMPUTER & MANAGEMENT SERVICES, INC.
CONTRACTOR COMPUTERIZED PAYROLL, A/R & JOB COST
Additional Product Classification: Accounting
Specific Application: Payroll, Accounts Receivable, Accounts Payable, General Ledger, Job Costing
Specific Industry: Construction
System Requirements: Prime: Primos
Memory Required: 1.0M bytes
Source Language: Fortran, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 100
Date First Installed: September 1986
(See Vendor Profile Page V-97)

SHASTA GENERAL SYSTEMS
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Zantec: Xenix, Altos: Unix; Xerox: CP/M
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 100
Date First Installed: September 1978
(See Vendor Profile Page V-97)

SINTEK
SINTEK'S SUSOP
Specific Application: Management Training
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: M-DOS, VS, MVS; Honeywell Level 6; DEC PDP-11/34
Memory Required: 64.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: March 1978
(See Vendor Profile Page V-97)

SMITH, DENNIS & GAYLORD, INC.
BUSINESS 3000 PAYROLL PERSONNEL
Specific Application: Payroll and Personnel
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE, Omit
Source Language: Image, SPL, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $17,500
Number Installed to Date: 10
(See Vendor Profile Page V-98)

SOFTWARE BROKERS INTERNATIONAL, INC.
MULTI COMPANY PAYROLL
Specific Application: Multicompany, Multistate Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,900
Number Installed to Date: 11
Date First Installed: September 1981
(See Vendor Profile Page V-99)

SOFTWARE INTERNATIONAL CORP.
PAYROLL/PERSONNEL
Specific Application: Payroll/ Personnel
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360/370: DOS, IBM 4300 Series: DOS/VSE; IBM System/3, System/34, System/38: OS; Sperry 9030, 1040: DOS/VSE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 150
Date First Installed: 1979
(See Vendor Profile Page V-99)

SOFTWARE SYSTEMS MARKETING, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DG: DOS, R-DOS, AOS
Memory Required: 20.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,000 to $5,000
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-100)

SOURCE DATA SYSTEMS, INC.
PAYROLL/PERSONNEL
Specific Application: Payroll/ Personnel
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series 1, PC: NCR 9020, 9300; NCR Tower 1632; NCR Decision Mate V
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 4
Date First Installed: July 1981
(See Vendor Profile Page V-101)

SPEEDATA, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 48.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 30
Date First Installed: 1977
(See Vendor Profile Page V-102)

SPRINGFIELD SOFTWARE CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200: Basic II
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 100
Date First Installed: 1977
(See Vendor Profile Page V-102)

STANDARD DATA CORP.
PENSION AND WELFARE FUND MANAGEMENT SYSTEM
Specific Application: Claims Processing,Pension Disbursement, Annuities, Remissions Processing, Financial Record Keeping
Specific Industry: Pension and Welfare Funds
System Requirements: IBM 4300 Series: DOS; Prime: Primos
Memory Required: 512.0K bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: March 1983
(See Vendor Profile Page V-102)

STEPHEN W. LEVY, INC.
PAYROLL-PRESENTLY CALIFORNIA
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 32.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 70
Date First Installed: October 1979
(See Vendor Profile Page V-103)

SYNERGY SOFTWARE, INC.
PERSONNEL HUMAN RESOURCES SYSTEM
Specific Application: Personnel, Human Resources
Specific Industry: Not Industry Sensitive
System Requirements: Wang [illegible]
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $5,000
Date First Installed: November 1983
(See Vendor Profile Page V-105)

SYSCOM, INC.
PAYROLL
Specific Application: Payroll Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23, System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: January 1982
(See Vendor Profile Page V-105)

SYSTEM APPLICATION ENGINEERING, INC.
SAFETY & HYGIENE INFORMATION SYSTEM-SHIRA
Specific Application: Employee Safety, Exposure, Training Monitor and Report
Specific Industry: Manufacturing, Construction, Government
System Requirements: HP 1000: RTE
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $80,000
Number Installed to Date: 1
Date First Installed: April 1981
(See Vendor Profile Page V-105)

SYSTEM AUTOMATION CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: HP3000: MPE; Convergent Technologies: [illegible]
Memory Required: 256.0K bytes
Source Language: Cobol, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license); Time Sharing
Date First Installed: 1979
(See Vendor Profile Page V-106)

SYSTEMS ANALYSIS, INC.
PERSONNEL 125
Specific Application: Matches Jobs and Candidates
System Requirements: HP 125: CP/M
Source Language: D Base II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $6,000
Number Installed to Date: 6
Date First Installed: July 1982
(See Vendor Profile Page V-106)

SYSTEMS AND SOLUTIONS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro AM 1000, AM AM 1072E; AM 1092E; Amos
Memory Required: 256.0K bytes
Source Language: Alpha Basic, Assembler

Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 60
(See Vendor Profile Page V-105)

SYSTEMS & COMPUTER TECHNOLOGY CORP. (SCT)
HRIS-GOVERNMENT
Specific Application: Human Resource Information System
Specific Industry: Government
System Requirements: IBM 370, 4300, 3030, 3081 Series: DOS/VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150,000
Number Installed to Date: 7
Date First Installed: June 1982
(See Vendor Profile Page V-105)

SYSTEMS NORTHWEST, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
(See Vendor Profile Page V-106)

SYSTEM SPECIALISTS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Retail
System Requirements: IBM System/34
Memory Required: 128.0K bytes
Source Language: RPG-II
Purchase Terms: Purchase (license)
Price: $3,000
(See Vendor Profile Page V-106)

TAD COMPUTER ASSOCIATES
RETIREMENT FUNDS MANAGEMENT
Specific Application: Retirement Funds Management
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: January 1983
(See Vendor Profile Page V-107)

TECHNICAL ANALYSIS CORP.
PAYROLL II
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS; AOS/VS, DOS, AOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 100
Date First Installed: 1979
(See Vendor Profile Page V-108)

TECHNOLOGY SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: North Star Horizon: N-DOS; North Star Advantage: CP/M
Memory Required: 64.0K bytes
Source Language: North Star Basic
Purchase Terms: Purchase (license)
Price: $900
Date First Installed: 1979
(See Vendor Profile Page V-108)

TELECOMP, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,400
Number Installed to Date: 30
Date First Installed: 1977
(See Vendor Profile Page V-108)

TESSERACT CORP.
BENEFIT PLAN ADMINISTRATION
Specific Application: Provides Enrollment and Plan Maintenance of Medical, Dental, Life, Disability and Deferred Compatible Plans
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: OS-DOS
Memory Required: 70.0K bytes
Source Language: Assembler, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $70,000 to $134,000
Date First Installed: 1900
(See Vendor Profile Page V-109)

TESSERACT CORP.
PERSONNEL MANAGEMENT SYSTEM
Specific Application: Humin Resources
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Memory Required: 70.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $13,700
Number Installed to Date: 30
Date First Installed: 1975

THETA BUSINESS SYSTEMS
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11; HP 1000; Wicat
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
(See Vendor Profile Page V-109)

3M DATATRACK SYSTEMS, INC.
PARYOLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: HP
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-110)

3M DATATRACK SYSTEMS, INC.
PAYROLL BUDGETING
Specific Application: Payroll Budgeting
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: HP
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981

3M DATATRACK SYSTEMS, INC.
PERSONNEL
Specific Application: Personnel
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: HP
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981

TIDEWATER CONSULTANTS, INC.
FLEX-PAY
Specific Application: General Payroll System
Specific Industry: Not Industry Sensitive
Memory Required: 40.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 2
Date First Installed: November 1982
(See Vendor Profile Page V-110)

TIDEWATER CONSULTANTS, INC.
SUPERPAY
Specific Application: On-Line Data Entry System for Genesis Payroll System Limited Inquiry Capability
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/70: RSTS/E
Memory Required: 31.0K bytes
Source Language: Basic Plus II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: January 1983

TIDELINE SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive, Construction
System Requirements: TI Business Systems: DX-10
Memory Required: 256.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Rental
Price: $4,200
Number Installed to Date: 346
Date First Installed: February 1980
(See Vendor Profile Page V-110)

TIME SHARE COMPUTER SYSTEMS
EASE PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Pick
Memory Required: 64.0K bytes
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 40
Date First Installed: 1980
(See Vendor Profile Page V-110)

TOMORROW SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 DOS
Memory Required: 128.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-111)

TRES SYSTEMS, INC.
BENEFITS/ERISA
Specific Application: Calculation of Actual Coverage and Deduction Amounts for Health and Welfare Plans, Benefits and Retirement Administration
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS, IBM 4300 Series; OS: IBM 303X. VM
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 27
Date First Installed: 1978
(See Vendor Profile Page V-112)

TRES SYSTEMS, INC.
EIS/BASE PAYROLL SYSTEM
Specific Application: Payroll, Check Reconciliation, Labor Distribution, U.S. Tax System, Optional Real Time Update in 1984
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS; IBM 4300 Series: OS; IBM 303X: VM
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1970

TRES SYSTEMS, INC.
EMPLOYEE INFORMATION SYSTEM P/R & PERSONNEL
Specific Application: Employee Information System Payroll and Personnel
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS; IBM 4300 Series: OS; IBM 303X: VM
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 38
Date First Installed: 1970

TRES SYSTEMS, INC.
SAFETY AND HEALTH (TSCA, MSHA, OSHA)
Specific Application: Safety and Health

Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS; IBM 4300 Series: DOS; IBM 3030 Series: VM
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 9
Date First Installed: 1983

TRIDATA CORP.
RESTAURANT PAYROLL AND PERSONNEL
Specific Application: Payroll/ Personnel
System Requirements: Datapoint: DOS, RMS, IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Cobol, Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 15
Date First Installed: March 1982
(See Vendor Profile Page V-112)

TRI TECHNICAL SUPPORT, INC.
CICS PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS/VSE
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 6
Date First Installed: January 1979
(See Vendor Profile Page V-112)

TUDOR SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Wholesale/Distribution, Beverage
System Requirements: IBM System/32, System/34, System/36: SSP
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: September 1981
(See Vendor Profile Page V-112)

UNIS DIGITAL SYSTEMS, INC.
SPIDER II - PAYROLL
Specific Application: Payroll
Specific Industry: Manufacturing
System Requirements: DEC VAX: Unix
Memory Required: 1.0M bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,400
Number Installed to Date: 3
Date First Installed: March 1983
(See Vendor Profile Page V-113)

UNISOR COMPUTER CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix
Memory Required: 256.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000 to $7,000
Date First Installed: September 1980
(See Vendor Profile Page V-113)

UNIVERSAL COMPUTER SERVICE
PAYROLL
Specific Application: Payroll
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $4,500
Number Installed to Date: 2
(See Vendor Profile Page V-113)

UNIVERSAL DESIGN SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360; Burroughs 1100
Memory Required: 256.0K bytes
Source Language: Basic, Cobol, Autocoder
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: September 1970
(See Vendor Profile Page V-114)

UP-TIME SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 Series: TSX Cobol+; VAX-11 Series: VMS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 8
Date First Installed: 1982
(See Vendor Profile Page V-114)

VALLEY DATA BASE, INC.
AGRICULTURAL PAYROLL PACKAGE
Specific Application: Agricultural Accounting, Multiple Earnings and Deductions, Multiple Check Capability
Specific Industry: Agriculture
System Requirements: HP 3000: MPE
Memory Required: 1.0M bytes
Source Language: Cobol 2
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 3
Date First Installed: November 1982
(See Vendor Profile Page V-114)

VALLEY DATA BASE, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 1.0M bytes
Source Language: Cobol 2
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Price: $2,500
Date First Installed: 1983

VALUE MANAGEMENT CONSULTANTS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Education, Government, Nonprofit Organizations
System Requirements: R-DOS, AOS/VS
Memory Required: 64.0K bytes
Source Language: Interactive Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
(See Vendor Profile Page V-114)

VALUE MANAGEMENT CONSULTANTS, INC.
PERSONNEL MANAGEMENT SYSTEM (PMS)
Specific Application: Personnel Management System
Specific Industry: Education
System Requirements: R-DOS, AOS/VS
Memory Required: 64.0K bytes
Source Language: Interactive Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease

VANTAGE COMPUTER SYSTEMS
FLEXIBLE PREMIUM RETIREMENT
Additional Product Classification: Insurance
Specific Application: Processes Flexible Premium Retirement Annuities
Specific Industry: Insurance
System Requirements: IBM: Cics, OS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 83
Date First Installed: 1978
(See Vendor Profile Page V-115)

VECTOR SYSTEMS CORP.
PAYROLL
Specific Application: Payroll/ Personnel
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4331: VM
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-115)

VISTA SYSTEMS, INC.
PAYROLL, PERSONNEL AND LABOR DISTRIBUTION
Specific Application: Personnel, Time Keeping and Payroll, Safety Training and Claims
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos; IBM: CMS-DOS; DEC VAX: VMS
Source Language: Fortran, Fortran 77, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-116)

VISTA SYSTEMS, INC.
PERSONNEL
Specific Application: Personnel
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos; DEC VAX: VMS; IBM: CMS-DOS
Source Language: Fortran, Fortran 77, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 2
Date First Installed: 1982

VISTA SYSTEMS, INC.
SAFETY TRAINING AND CLAIMS
Specific Application: Safety Training and Claims
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos; IBM: CMS-DOS; DEC VAX: VMS
Source Language: Fortran, Fortran 77, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 2
Date First Installed: 1982

VISTA SYSTEMS, INC.
TIME KEEPING AND PAYROLL
Specific Application: Time Keeping and Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos; DEC VAX: VMS; IBM: CMS-DOS
Source Language: Fortran, Fortran 77, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 2
Date First Installed: 1982

WCS COMPUTER SERVICES, INC.
EMPLOYMENT HISTORY
Specific Application: Employment History
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: January 1985
(See Vendor Profile Page V-116)

WCS COMPUTER SERVICES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50

Date First Installed: January 1965

[redacted]
CORP.
HUMAN RESOURCE SYSTEM
Additional Product Classification: Data/File Management
Specific Application: Payroll, Personnel, Management of Central [redacted]
Specific Industry: Education
System Requirements: IBM; OS, DEC
Memory Required: 8.0M bytes
Source Language: Cobol
[redacted]
Purchase Terms: Purchase (license)
[redacted]
[redacted]
[redacted]
(See Vendor Profile Page V-116)

[redacted]
CORP.
PAYROLL/PERSONNEL FOR NON-PROFIT
Specific Application: Payroll, General Ledger, Accounts Payable, Accounts Receivable, Personnel Management
Specific Industry: Education
System Requirements: IBM; OS; DEC DOS
Memory Required: 8.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1968

WICHITA SOFTWARE CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,270
Number Installed to Date: 50
Date First Installed: 1981
(See Vendor Profile Page V-117)

ZELTNER ASSOCIATES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200; IBM System 23
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 70
Date First Installed: 1978
(See Vendor Profile Page V-118)

ACE SOFTWARE, INC.
CABLE TV SYSTEM
Additional Product Classification: Accounting
Specific Application: Payroll, Subscriber Billing, General Ledger, Accounts Payable
Specific Industry: Communication
System Requirements: NCR; IBM PC
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000 to $10,000
Number Installed to Date: 3
Date First Installed: 1979
(See Vendor Profile Page V-2)

ACE SOFTWARE, INC.
SCHOOL PACKAGE
Additional Product Classification: Accounting
Specific Application: Personnel, Budgeting, Payroll Accounting for Schools
Specific Industry: Education
System Requirements: NCR; HP
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500 to $24,000
Number Installed to Date: 10
Date First Installed: 1979

ACORN SOFTWARE-PRODUCTS, INC.
BENEFITS
Specific Application: Benefits Plan Management, Union Dues, Member Assessment, Eligibility
Specific Industry: Union Labels
System Requirements: IBM System/34; SSP; IBM System/38
Memory Required: 128.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25,000 to $100,000
Date First Installed: September 1978
(See Vendor Profile Page V-2)

AMERICAN BUSINESS SYSTEMS, INC.
BACS-PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS; DEC Rainbow 100; CP/M, CP/M 86; Eagle IV; CP/M; Altos 586; Xerox; HP/M 86
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1980
(See Vendor Profile Page V-5)

ASTEC, INC.
PAYMASTER
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 1,000
Date First Installed: 1980
(See Vendor Profile Page V-9)

AUTOMATED BOOKKEEPING CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive, Accountants
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic, RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: February 1983
(See Vendor Profile Page V-10)

AUTOMATION MANAGEMENT, INC.
AMI PAYROLL
Specific Application: Payroll
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Retail, Legal, Insurance, Real Estate, Construction, Government, Restaurants, Unions
System Requirements: IBM PC-XT: PC-DOS 2.0; IBM PC MS-DOS 1.1
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 10
Date First Installed: May 1983
(See Vendor Profile Page V-11)

AUTOMATION PROGRAMMING & SERVICES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Televideo; CP/M
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 2
Date First Installed: February 1983
(See Vendor Profile Page V-11)

BILLINGS COMPUTER CORP.
BILLINGS BOOKKEEPER PAYROLL PACKAGE
Specific Application: Payroll Accounting
Specific Industry: Not Industry Sensitive
System Requirements: Billings: Boss
Memory Required: 64.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: 1982
(See Vendor Profile Page V-12)

BUSH COMPUTATION, INC.
PAYROLL
Specific Application: Deductions, Hard Disk Payroll
Specific Industry: Retail
System Requirements: Televideo Hard Disk CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: 1983
(See Vendor Profile Page V-14)

COMPLETE BUSINESS SERVICES
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Northstar DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: January 1983
(See Vendor Profile Page V-21)

COMPUTAX SYSTEMS, INC.
THE PARTNER PAYROLL CHECKWRITER SYSTEM
Specific Application: Payroll Checkwriting
Specific Industry: Accountants
System Requirements: Televideo TS806: TURBO-DOS; Televideo TS816
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,250
Date First Installed: 1982
(See Vendor Profile Page V-22)

COMPUTAX SYSTEMS, INC.
THE PARTNER AFTER-THE-FACT PAYROLL
Specific Application: Payroll
Specific Industry: Accountants
System Requirements: Televideo TS806: TURBO-DOS; Televideo TS816
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1982
(See Vendor Profile Page V-22)

COMPUTER PRODUCTS INTERNATIONAL
PAY-MATE
Specific Application: General Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Apple: Applesoft, CP/M; Commodore
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $375
Number Installed to Date: 7,000
Date First Installed: 1978
(See Vendor Profile Page V-23)

COMPUTER SERVICES CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10; DEC: Dmcs
Memory Required: 10.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,000
Number Installed to Date: 300
Date First Installed: 1976
(See Vendor Profile Page V-26)

COMPUTER SYSTEMS ASSOCIATES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23 Datamaster
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 65
Date First Installed: 1980
(See Vendor Profile Page V-27)

COMPUTER TERMINAL, LTD.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, IBM Datamaster; Ohio Scientific OS-65U
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $499
Date First Installed: 1979
(See Vendor Profile Page V-28)

CORE, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110, 5120, Datamaster, PC
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
(See Vendor Profile Page V-31)

C/U BUSINESS COMPUTERS
PAYROLL PROGRAM
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro Amps
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
(See Vendor Profile Page V-33)

CYBERNETICS INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MS-DOS; Unix; PMDOS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1981
(See Vendor Profile Page V-34)

DATA BASIC, INC.
PAYROLL PAC
Specific Application: National Payroll, Tax
Specific Industry: Not Industry Sensitive
System Requirements: Xerox 9000; CP/M; Apple: MS-DOS
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 150
Date First Installed: 1981
(See Vendor Profile Page V-35)

DATAMENTION
RECORDS MANAGER
Additional Product Classification: Data/File Management
Specific Application: Personnel Data Base
Specific Industry: Not Industry Sensitive
System Requirements: MS-DOS
Memory Required: 192.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $499
Number Installed to Date: 15,000
Date First Installed: October 1981
(See Vendor Profile Page V-37)

DATA PROCESSING SERVICES, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/36, System/34, System/38
Source Language: RPG-III, RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $4,500
Date First Installed: 1978
(See Vendor Profile Page V-38)

DATA PRODUCTS MAINTENANCE CORP.
NATIONAL PAYROLL
Additional Product Classification: Accounting
Specific Application: Integrated Check-Writing, Payroll, Tax
Specific Industry: Not Industry Sensitive
System Requirements: Ohio Scientific: OS-65U
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $500
Number Installed to Date: 20
Date First Installed: 1981
(See Vendor Profile Page V-38)

DATA SYSTEMS
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TI 99: Extended Basic
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 10
Date First Installed: May 1983
(See Vendor Profile Page V-39)

DBS (DESIGN AND BUILDERS OF INFORMATION SYSTEMS)
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Ohio Scientific
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 51
Date First Installed: 1979
(See Vendor Profile Page V-40)

D.B. SOFTWARE CO.
PAYROLL PLUS
Specific Application: Union Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/III: DOS+; TRS-80/4: Ldos; IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Date First Installed: October 1982
(See Vendor Profile Page V-40)

DIGITAL DOLOR CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Cbasic, C, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $60
Number Installed to Date: 300
Date First Installed: 1979
(See Vendor Profile Page V-42)

DIVERSIFIED DATA SERVICES
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/32, System/34
Memory Required: 32.0K bytes
Source Code Available: Yes
Number Installed to Date: 10
(See Vendor Profile Page V-43)

DUO SOFT CORP.
PARTICIPATIVE MANAGEMENT SKILLS
Specific Application: Computer Based Training
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+; IBM PC, Tandy
Memory Required: 48.0K bytes
Source Language: UCSD-P
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $249
Date First Installed: April 1983
(See Vendor Profile Page V-44)

DURANGO SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Durango F-85 DX85M
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $425
Number Installed to Date: 81
Date First Installed: 1979
(See Vendor Profile Page V-44)

E. F. HASKELL & ASSOCIATES, INC.
PAYROLL CHECKWRITER SUBSYSTEM
Specific Application: Payroll Check Writer
Specific Industry: CPA
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Northstar Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100 to $750
(See Vendor Profile Page V-45)

ELECTRONIC INFORMATION SYSTEM
EIS PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Ohio Scientific: OS-65U
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,100
Date First Installed: 1978
(See Vendor Profile Page V-46)

FINSERV COMPUTER CORP.
STOCK OPTION SYSTEM I
Specific Application: Stock-Option Holders Record
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Date First Installed: November 1983
(See Vendor Profile Page V-49)

FISHER BUSINESS SYSTEMS, INC.
INTERACTIVE PAYROLL SYSTEM
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, PC-XT PC-DOS, TI Professional: MS-DOS, Zenith Z-100: Zdos
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 200
Date First Installed: August 1979
(See Vendor Profile Page V-48)

FLORIDA DATA PROCESSING, INC.
DIECEWORK PAYROLL
Additional Product Classification: Manufacturing, WP/Text Editing
Specific Application: Payroll for Apparel Manufacturers
Specific Industry: Manufacturing
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 5
Date First Installed: June 1981
(See Vendor Profile Page V-49)

FLORIDA DATA PROCESSING, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 50
Date First Installed: June 1981

FUTURA SOFTWARE, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TI
Memory Required: 32.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $149
(See Vendor Profile Page V-50)

HAYDEN SOFTWARE
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: CP/M, CP/M 86
Source Language: Microsoft Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $449
(See Vendor Profile Page V-53)

H & E COMPUTRONICS, INC.
VERSAPAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS, IBM PC PC-DOS; Apple II, IIE, II+ Apple DOS; CP/M
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 6,000
Date First Installed: July 1982
(See Vendor Profile Page V-54)

HERITAGE COMPUTING CORP.
JEWEL PAYROLL W/LABOR DISTRIBUTION
Specific Application: Payroll With Labor Distribution
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; TI Professional: MS-DOS, TRS-80
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
(See Vendor Profile Page V-54)

INFO-SESSIONS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64, Commodore 8032, Superpet
Memory Required: 32.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $80 to $395
Number Installed to Date: 15,000
Date First Installed: 1981
(See Vendor Profile Page V-57)

INFORMATION AUTOMATION CORP.
PETER
Specific Application: Payroll

Specific Industry: Not Industry Sensitive
System Requirements: IBM PC MS-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 150
Date First Installed: August 1982
(See Vendor Profile Page V-57)

INTERNATIONAL MICRO SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: MP/M; CP/M, CP/M 86
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650
(See Vendor Profile Page V-61)

INTERNATIONAL MICRO SYSTEMS, INC.
PAYROLL W/LABOR DISTRIBUTION
Specific Application: Payroll
Specific Industry: Not Industry
[illegible]
System Requirements: CP/M; MP/M, CP/M 86
Memory Required: 64.0K bytes
Source Language: Cbasic
[illegible]
Purchase Terms: Purchase (license)
Price: $850

JACK M. COLQUITT, CPA
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, TRS-80/II, TRS-80/III, TRS-80/4
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195
[illegible]
Date First Installed: January 1983
(See Vendor Profile Page V-62)

LABELLE COMPUTING, INC.
PERSONNEL INQUIRY
Specific Application: Inquiry, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Vector Graphic: CP/M; Digilog: TURBO-DOS, NCR Tower 1632: Unix, IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: CMD Basic
Purchase Terms: Purchase (license)
[illegible]
Date First Installed: 1982
(See Vendor Profile Page V-65)

LABELLE COMPUTING, INC.
RETAIL PAYROLL
Specific Application: Retail Payroll
Specific Industry: Not Industry
[illegible], Retail
System Requirements: Vector Graphic: CP/M; Digilog: TURBO-DOS; NCR Tower 1632: Unix, IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: CMD Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,400
Date First Installed: 1979

LAWSON ASSOCIATES, INC.
GAS PERSONNEL
Specific Application: Personnel
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B20: Btos
Memory Required: 384.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
(See Vendor Profile Page V-65)

LLOYDS ELECTRONICS
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Kaypro II CP/M; Kaypro 4, Kaypro 10
Memory Required: 64.0K bytes
Source Language: S Basic
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: August 1983
(See Vendor Profile Page V-66)

M/A-COM SIGMA DATA, INC.
LOCATOR
Specific Application: Personnel Locator and Mail Forwarding
Specific Industry: Not Industry [illegible]
System Requirements: Zilog
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1978
(See Vendor Profile Page V-67)

MANATRON, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Government
System Requirements: Burroughs [illegible]
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-68)

MATIC DATA SYSTEMS
CPA PAYROLL
Specific Application: Payroll
Specific Industry: CPA Firms
System Requirements: Altos: Oasis; IBC: Oasis; Onyx: Oasis; Vector Graphic: CP/M
Memory Required: 64.0K bytes
Source Language: Oasis Basic, Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 20
Date First Installed: 1982
(See Vendor Profile Page V-70)

MATIC DATA SYSTEMS
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Altos: Oasis; IBC: Oasis; Onyx: Oasis; Vector Graphic: CP/M
Memory Required: 64.0K bytes
Source Language: Oasis Basic; Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 100
Date First Installed: 1979

MCM ENTERPRISES
PEACHTREE SERIES II PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco: Cromix
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: July 1982
(See Vendor Profile Page V-71)

MDM SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,195
Number Installed to Date: 30
Date First Installed: 1979
(See Vendor Profile Page V-71)

MICRO ARCHITECT, INC.
PAYROLL SYSTEM
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II, TRS-80 Model 12, IBM PC: CP/M
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $129 to $248
Date First Installed: [illegible]
(See Vendor Profile Page V-73)

MICRO ASSOCIATES, INC.
MICA/PR
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, TRS-80 Model 12 and Model 16: CP/M, Olivetti M-20: Pcos
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible]
Number Installed to Date: [illegible]
Date First Installed: June 1982
(See Vendor Profile Page V-73)

MICRO BUSINESS APPLICATIONS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; [illegible]
Memory Required: 42.0K bytes
Source Language: Microsoft Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
[illegible]
Date First Installed: September 1980
(See Vendor Profile Page V-73)

MICRO BUSINESS SOFTWARE
REALWORLD PAYROLL
Specific Application: Payroll, Parameter Setting
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 86; MP/M 86; RT-11, Oasis
Memory Required: 64.0K bytes
Source Language: RM Cobol, Micro Focus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $550
Number Installed to Date: 4,000
Date First Installed: October 1981
(See Vendor Profile Page V-73)

MICRO BUSINESS SYSTEMS, INC.
CONTRACTOR PAYROLL SYSTEM
Specific Application: Payroll
Specific Industry: Banking/Financial
System Requirements: Altos: CP/M; Televideo: MP/M, Tandy
Memory Required: 64.0K bytes
Source Language: M Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 75
Date First Installed: 1981
(See Vendor Profile Page V-73)

MICRO BUSINESS SYSTEMS, INC.
PERFORMANCE TRENDS PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos 1.1 or 5.0
Memory Required: 32.0K bytes
Source Language: Basic Compiler
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: [illegible]
Date First Installed: January 1979

MICRO BUSINESS SYSTEMS, INC.
TEMPORARY PERSONNEL PAYROLL BILLING
Specific Application: Payroll, Billing
Specific Industry: Temporary [illegible]
System Requirements: Compupro: CP/M 80; Morrow MD2/3: CP/M 86; MP/M II
Memory Required: 56.0K bytes
Source Language: Cbasic 2
Purchase Terms: Purchase (license)
Price: $2,500 to $3,500
Number Installed to Date: 6

MICRO DATA BUSINESS FORMS & SYSTEMS
PAYROLL SYSTEM
Specific Application: Payroll
Specific Industry: Not Industry [illegible]
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: [illegible]
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: [illegible]
Date First Installed: 1980
(See Vendor Profile Page V-73)

MICRO DATA BUSINESS FORMS & SYSTEMS
RESTAURANT PAYROLL
Specific Application: Payroll

Specific Industry: Hospitality
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: C Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $499
Date First Installed: 1982

MICRO INSTRUCTIONAL, INC.
PAYROLL TEMPLATE
Specific Application: Payroll Template
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40
Date First Installed: September 1982
(See Vendor Profile Page V-73)

MODERN COMPUTER SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Altos; TI Professional
Source Language: RM Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000 to $1,200
Number Installed to Date: 1,500
Date First Installed: January 1983
(See Vendor Profile Page V-76)

MONROE SYSTEMS FOR BUSINESS
MONROE BUSINESS MANAGEMENT SERIES II PAYROLL
Specific Application: Payroll
Specific Industry: Wholesale/Distribution
System Requirements: Monroe OC 8600 Series CP/M 80
Memory Required: 128.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $695
Date First Installed: August 1983
(See Vendor Profile Page V-77)

NATIONAL BATATEL, INC.
BYTESMITH/PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Vector Graphic: CP/M; Xerox: CP/M; TRS-80: CP/M; IBM PC: CP/M, Apple: , CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $600
Number Installed in Town: 5
Date First Installed: January 1982
(See Vendor Profile Page V-78)

NORTHWESTERN CONSULTING GROUP, INC.
PAYROLL IN SPANISH
Specific Application: Payroll Prompted in Spanish
Specific Industry: Wholesale/Distribution, Construction, CPA
System Requirements: IBM PC/XT; DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $3,000
Number Installed to Date: 100
Date First Installed: December 1981
(See Vendor Profile Page V-81)

OMNI SOFTWARE SYSTEMS, INC.
AFTER-THE-FACT PAYROLL
Specific Application: Passive Payroll System
System Requirements: IBM PC: MS-DOS; North Star Horizon, Advantage: NS-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 200
Date First Installed: September 1980
(See Vendor Profile Page V-87)

OMNI SOFTWARE SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: MS-DOS, North Star Horizon, Advantage: NS-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 300
Date First Installed: April 1980

OPEN SYSTEMS, INC.
THE SOFTWARE FITNESS PROGRAM PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: MP/M 86; CP/M 86; Oasis, Unix
Memory Required: 64.0K bytes
Source Language: Business Basic, RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 45,000
Date First Installed: January 1978
(See Vendor Profile Page V-83)

O.R., INC.
RELIEF PAYROLL
Specific Application: Payroll
Specific Industry: Rehabilitation
System Requirements: Concept 2; Concept 3
Memory Required: 16.0K bytes
Source Language: BAL, RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 15
Date First Installed: July 1982
(See Vendor Profile Page V-83)

PEACHTREE SOFTWARE
PEACHPAY PAYROLL SYSTEM
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
Memory Required: 50.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
(See Vendor Profile Page V-85)

PERSONNEL MANAGEMENT, INC.
AAPLANNER I AVAILABILITY & UTILIZATION WORKSHEETS
Specific Application: Preparation of Affirmative Action Plans
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Visicalc
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $135
Date First Installed: March 1983
(See Vendor Profile Page V-85)

PERSONNEL MANAGEMENT, INC.
AAPLANNER II-INTEGRATED AVAILABILITY & UTILITY SYSTEM
Specific Application: Preparation of Affirmative Action Plans
Specific Industry: Not Industry Sensitive
Memory Required: 128.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Date First Installed: March 1983

PROMISE SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
System Requirements: Cado
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 100
Date First Installed: 1979
(See Vendor Profile Page V-86)

PUBLISHED SYSTEMS, INC.
PAYROLL CHECK WRITING
Specific Application: Payroll Check Writing
Specific Industry: Accountants
System Requirements: IBM PC: MS-DOS, TI Professional
Memory Required: 128.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795 to $2,300
Number Installed to Date: 300
Date First Installed: 1977
(See Vendor Profile Page V-86)

POTTERS PROGRAMS
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: North Star: DOS
Memory Required: 32.0K bytes
Source Language: Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $60
(See Vendor Profile Page V-87)

PROMETHEAN SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000: MS-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $895
Number Installed to Date: 45
Date First Installed: 1982
(See Vendor Profile Page V-89)

PYRAMID DATA LTD.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, PC-XT; PC-DOS, Compaq: MS-DOS; Columbia: MS-DOS
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,995
Date First Installed: March 1985
(See Vendor Profile Page V-89)

QCS CORP.
QCS PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Altos: CP/M, Xenix, Quasar QDP-300: MP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $850
Number Installed to Date: 10
Date First Installed: July 1981
(See Vendor Profile Page V-89)

QUANTAM, LTD.
AFTER THE FACT PAYROLL
Specific Application: Payroll
Specific Industry: Banking/Financial, CPA
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 3,000
Date First Installed: 1977
(See Vendor Profile Page V-90)

R. HUBBARD DESIGN GROUP
PAYAPP
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 125
Date First Installed: August 1980
(See Vendor Profile Page V-93)

SALES PRODUCTIVITY SYSTEMS, INC.
THE PERSONNEL SYSTEM - TPS
Specific Application: Human Resource Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC/XT; PC-DOS, Altos 586, 8000 MP/M II, Altos 586, 8600: Unix
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)

Date First Installed: March 1983
(See Vendor Profile Page V-94)

S.A.C. SYSTEMS, CO.
VOLUNTARY LIFE INSURANCE
Specific Application: Salary Reduction Profit-Sharing
Specific Industry: Insurance
System Requirements: Teletech: DOS, North Star: DOS, IBM PC: MS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 1
Date First Installed: September 1983
(See Vendor Profile Page V-95)

SCIENCE MANAGEMENT CORP.
[illegible] PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: 16-Bit Microcomputer
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: [illegible]
(See Vendor Profile Page V-95)

SMC SOFTWARE SYSTEMS
PAYROLL
Specific Application: Payroll
Specific Industry: Wholesale/Distribution
System Requirements: DEC PDP-11· RSTS/E, Altos. Xenix, Zilog: Zeus
Memory Required: 38.0K bytes
Source Language: SMC Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Date First Installed: September 1982
(See Vendor Profile Page V-98)

SOFTWARE CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 8000, 9000 Commodore DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30
Number Installed to Date: 200
Date First Installed: 1979
(See Vendor Profile Page V-99)

SOFTWARE TECHNOLOGY FOR COMPUTERS
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS 3.3; IBM PC: PC-DOS 1.1
Memory Required: 48.0K bytes
Source Language: Assembly, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $275
Date First Installed: 1980
(See Vendor Profile Page V-100)

SOLID SOFTWARE
SOLIDPAY
Specific Application: Standard Payroll
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80, MS-DOS
Memory Required: 64 0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 350
Date First Installed: February 1982
(See Vendor Profile Page V-100)

SOLID SOFTWARE
SOLIDSEARCH
Specific Application: Personnel Agency Search System, Job Order, Client Data Base, Maintenance
Specific Industry: Personnel
System Requirements: CP/M 80: MS-DOS
Memory Required: 64 0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $895
Number Installed to Date: 100
Date First Installed: February 1982

SOUTH WEST SYSTEMS
FULL SERVICE PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/1· DOS +
Memory Required: 48 0K bytes
Source Language: Mbasic
Source Code Available: $75
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: January 1981
(See Vendor Profile Page V-101)

SPRINGWATER SOFTWARE, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 256.0K bytes
Source Language: APL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: July 1983
(See Vendor Profile Page V-102)

STANDARD SOFTWARE SYSTEMS, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000; IBM PC, Xerox 820; Televideo
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: [illegible]
Date First Installed: 1982
(See Vendor Profile Page V-102)

STATE OF THE ART, INC.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III; IBM PC
Memory Required: 64.0K bytes
Source Language: UCSD-P
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $340
Date First Installed: July 1982
(See Vendor Profile Page V-103)

STREETER COMPUTER DEVELOPMENT, INC.
RESTAURANT PAYROLL WITH TIP INCOME ACCOUNTING
Specific Application: Restaurant Payroll, Tip Income Accounting
Specific Industry: Restaurant
System Requirements: IBM System/23: DOS
Memory Required: 64 0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,850
Number Installed to Date: 15
Date First Installed: June 1982
(See Vendor Profile Page V-104)

STRUCTURE SYSTEMS GROUP
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M, CP/M 86, MP/M 86
Memory Required: 48.0K bytes
Source Language: CB80, CB86
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1,000
Date First Installed: 1978
(See Vendor Profile Page V-104)

TARDY CORP.
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80 Model 16. Xenix
Memory Required: 256.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $699
Date First Installed: 1983
(See Vendor Profile Page V-106)

TCS SOFTWARE, INC.
TCS TOTAL PAYABLE
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Microprocessor with CP/M; MS-DOS
Memory Required: 85.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200
Date First Installed: August 1981
(See Vendor Profile Page V-108)

THOUGHTWARE PUBLISHING CO., INC.
SUPER CHIEF
Specific Application: Integrated General Ledger, Accounts Payable and Recievable, Fixed Assets, Payroll
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $700 to $3,200
Number Installed to Date: 200
Date First Installed: September 1981
(See Vendor Profile Page V-110)

UNIVERSAL BUSINESS AUTOMATION, INC.
PAYROLL SYSTEM
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Altos: MP/M, IBM PC: CP/M
Memory Required: 56.0K bytes
Spurce Language: Basic
Purchase Terms: Purchase (license)
Price: $595 to $745
Number Installed to Date: 10
Date First Installed: January 1983
(See Vendor Profile Page V-113)

[illegible]
PAYROLL
Specific Application: Payroll
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B20: Btos; Convergent Technologies AWS Turbo, IWS-110
Memory Required: 384 0K bytes
Source Language: Adept
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 200
Date First Installed: 1983
(See Vendor Profile Page V-117)

XECAL, INC.
TRACK
Additional Product Classification: Data/File Management
Specific Application: Personnel Agency Client File
Specific Industry: Not Industry Sensitive
System Requirements: Partec PCC-2000 Unix
Memory Required: 64.0K bytes
Source Language: Basic-Unix
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 1
Date First Installed: June 1982
(See Vendor Profile Page V-118)

WP/TEXT EDITING

ACCUSOFT, INC.
ZWORD
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38; CP/M
Memory Required: 96.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 200
Date First Installed: 1980
(See Vendor Profile Page V-2)

ADMINISTRATIVE DATA CORP.
POWER WRITER
Specific Application: Spelling, WP, Report Writing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 6
Date First Installed: 1983
(See Vendor Profile Page V-2)

ADVANCED MANAGEMENT RESEARCH, INC.
ASSOCIATIONS II
Additional Product Classification: Associations
Specific Application: Membership and Mailing System for Associations
Specific Industry: Nonprofit Organizations, Memberships
System Requirements: IBM System/23; BSP
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $4,000
Date First Installed: July 1983
(See Vendor Profile Page V-3)

AFCAD SYSTEMS, INC.
AFCAD WORD PROCESSING SYSTEM
Specific Application: Word Processing
Specific Industry: Not Industry Sensitive
System Requirements: Prime; Primos
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000 to $13,000
Number Installed to Date: 200
Date First Installed: 1975
(See Vendor Profile Page V-3)

ALPHA SYSTEMS LTD.
FOURUP - CHESHIRE LABELS
Specific Application: Creating Multicolumns of Labels From Single Column
Specific Industry: Not Industry Sensitive
System Requirements: Jacquard
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1979
(See Vendor Profile Page V-4)

AMERICAN FRANKLIN CO.
AUTOMATED LETTER PREPARATION SYSTEM
Specific Application: Letter Writing In Volume
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300, 300 Series: OS-DOS
Memory Required: 100.0K bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $12,750
Number Installed to Date: 50
Date First Installed: September 1973
(See Vendor Profile Page V-5)

AMERICAN RESOURCE SYSTEMS
WORD PROCESSOR
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: 1980
(See Vendor Profile Page V-5)

ANDROMEDA SYSTEMS, INC.
DPS-DOCUMENT PROCESSING SYSTEM
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11: RT-11
Source Language: Fortran, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 70
Date First Installed: September 1981
(See Vendor Profile Page V-6)

A. P. COMPUTER PRODUCTS
DOCU-WRITER II VERSION 1
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64, VIC 20: Basic
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-6)

APEX DATA GROUP
WORD PROCESSING
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Prime 2250, 250, 550, 850: Primos
Memory Required: 500.0K bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $10,000
Number Installed to Date: 500
Date First Installed: May 1979
(See Vendor Profile Page V-6)

APPLIED DATA RESEARCH, INC.
ADR/ETZ - RELEASE 1.5
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000, 4300 Series: OS, DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $18,200 to $23,600
Number Installed to Date: 375
Date First Installed: 1975
(See Vendor Profile Page V-7)

ART SCI., INC.
MAGIC MAILER
Specific Application: Mail Merge List
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $70
Date First Installed: January 1982
(See Vendor Profile Page V-9)

ART SCI., INC.
MAGIC WINDOW II
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: December 1982

ATEX INTERNATIONAL, INC.
ONEWRITER VIDEO TEXT EDITOR
Specific Application: Full Screen Video Text Editor
Specific Industry: Not Industry Sensitive
System Requirements: TRS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $95
Date First Installed: November 1982
(See Vendor Profile Page V-10)

AVERSCO CO.
AMORS - ASSURANCE MANAGEMENT ORGANIZED
Additional Product Classification: DBMS, Security/Auditing
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Financial Modeling, WP, Policy Maintenance
Specific Industry: Insurance
System Requirements: Microdata Reality: Pick; Honeywell Ultimate: Pick, IBM Series/1: Pick; Microdata
Source Code Available: Yes
Memory Required: 9.6M bytes
Source Language: Basic, RPL
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $19,500
Number Installed to Date: 30
Date First Installed: January 1977
(See Vendor Profile Page V-11)

BATTELLE SOFTWARE PRODUCTS
BASIF
Specific Application: Textual Retrieval Information Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series, 4341; Wang VS; DEC VAX: VMS, CDC Cyber 6000
Source Language: Fortran, Machine
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $26,600 to $38,000
Number Installed to Date: 140
Date First Installed: 1973
(See Vendor Profile Page V-12)

B I BOYLE ASSOCIATES, INC.
BAMTEXT: WORD PROCESSING DOCUMENT COMPOSITION
Specific Application: Document Composition
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 and 4300: DOS/VSE
Memory Required: 120.0K bytes
Source Language: Assembler, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,900
Number Installed to Date: 35
Date First Installed: May 1982
(See Vendor Profile Page V-12)

BOS NATIONAL, INC.
BOS AUTOWRITER
Specific Application: WP
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Micro Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $550
Number Installed to Date: 3,000
Date First Installed: 1978
(See Vendor Profile Page V-13)

BOWNE INFORMATION SYSTEMS, INC.
KEY SEARCH
Specific Application: Building and Searching Data Base
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS, DOS
Memory Required: 256.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $45,000
Number Installed to Date: 6
Date First Installed: 1979
(See Vendor Profile Page V-13)

BOWNE INFORMATION SYSTEMS, INC.
TEXT/ONE
Specific Application: Text Editing, Document Production
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370: OS, DOS
Memory Required: 256.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $45,000

Number Installed to Date: 15
Date First Installed: 1975

BUSINESS COMPUTER DESIGN, INC.
WORD-MINT
Specific Application: Mail System, WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 14.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $1,500
Number Installed to Date: 125
Date First Installed: January 1983
(See Vendor Profile Page V-14)

CALIFORNIA SYSTEMS ASSOCIATES
POWER WP
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RSX
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,495
Number Installed to Date: 1,200
Date First Installed: 1978
(See Vendor Profile Page V-16)

CALIFORNIA SYSTEMS ASSOCIATES
WORD WRIGHT
Additional Product Classification: DBMS
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RSX-11, DEC: VMS
Source Language: Dibol, Macro
Purchase Terms: Purchase (license)
Price: $2,395
Number Installed to Date: 200
Date First Installed: 1979

CENTURY ANALYSIS, INC.
WORD/S
Specific Application: Intelligent Terminal Base WP System Designed for NCR Mainframes
Specific Industry: Not Industry Sensitive
System Requirements: NCR: VRX, B/3
Source Language: Cobol, Neat/3
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 50
Date First Installed: 1979
(See Vendor Profile Page V-17)

COMPAC SYSTEMS, INC.
3*16 WORD PROCESSOR
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: Bluebird: SUPER-DOS; DG: DOS, R-DOS, AOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750 to $1,150
Date First Installed: June 1980
(See Vendor Profile Page V-21)

COMPAC SYSTEMS, INC.
SP SPELL
Specific Application: Stand Alone Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: Bluebird: SUPER-DOS; DG: DGS, R-DOS, AOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: 1981

COMPLETE COMPUTER SYSTEMS
CREATE WORD PROCESSING
Specific Application: Produces Form Letter With Variable Imbedded Text
Specific Industry: Not Industry Sensitive
System Requirements: DG: Desktop; DOS; Data General Nova: R-DOS, DG Eclipse: AOS
Memory Required: 64.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,200
Number Installed to Date: 50
Date First Installed: July 1978
(See Vendor Profile Page V-22)

COMPU-DRAW
MULTED
Specific Application: Multiple-File Text Editing
Specific Industry: Not Industry Sensitive
System Requirements: Osborne: CP/M; XEROX-820: CP/M; KAYPRO-II: CP/M
Memory Required: 48.0K bytes
Source Language: Written: PL/I
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: February 1983
(See Vendor Profile Page V-22)

COMPUTER BUSINESS SYSTEMS, INC.
NIXDORF WORD PROCESSING SOFTWARE
Specific Application: WP/Text Editor
Specific Industry: Not Industry Sensitive
System Requirements: Nixdorf 600
Source Language: Cobol Editor
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 75
Date First Installed: 1980
(See Vendor Profile Page V-23)

COMPUTER CONSULTANTS & SERVICE CENTER
TESS/3000 TEXT EDITING SUB-SYSTEM
Specific Application: Full Screen Editing for HP 3000
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: SPL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,450
Number Installed to Date: 20
Date First Installed: March 1982
(See Vendor Profile Page V-23)

COMPUTER COMP. OF AMERICA
TEXT/204
Specific Application: On-Line Document Storage, Retrieval, and Update System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: 360, 370, 4300 Series: OS, DOS/VSE
Memory Required: 350.0K bytes
Source Language: User Language
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $25,000
Number Installed to Date: 3
Date First Installed: 1983
(See Vendor Profile Page V-23)

COMPUTER INFORMATION ENTERPRISES
WORD PROCESSING
Specific Application: WP, NoLimitations, Text Editor, Spelling Dictionary, Mass Mailer, Paragraph Insertion
Specific Industry: Not Industry Sensitive
System Requirements: IBM: EDX
Memory Required: 22.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: 1979
(See Vendor Profile Page V-24)

COMPUTERIZED PLANNING SYSTEM, INC.
WORD PROCESSING
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Basic Four: BBM
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 10
Date First Installed: 1983
(See Vendor Profile Page V-24)

COMPUTER PROGRAMMING, INC. (CPI)
CORCS-COMPUTERIZED ON LINE REPORT
Specific Application: Transfers Spooled 3275 to WP for Wang OIS
Specific Industry: Not Industry Sensitive
System Requirements: Wang OIS: DOS
Memory Required: 64.0K bytes
Source Language: OIS Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $97,500
Number Installed to Date: 10
Date First Installed: September 1982
(See Vendor Profile Page V-25)

COMPUTE-R-SYSTEMS
CRSWORD
Specific Application: WP
Specific Industry: Legal
System Requirements: DEC PDP8: OS/78
Memory Required: 256.0K bytes
Source Language: Macro
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $12,000
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-27)

COMPUTER SYSTEMS TECHNOLOGY, INC.
WORD PROCESSING
Specific Application: WP
Specific Industry: Government
System Requirements: DG: R-DOS, AOS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license).
Number Installed to Date: 40
Date First Installed: 1976
(See Vendor Profile Page V-27)

COMPUTER TECHNOLOGY INC.
AUTODOC
Specific Application: Text Editing and Documentation Control
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: VS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V 27)

COMPU-TOWN, INC.
CT*OS SPELLING CORRECTOR VERSION 1.1
Specific Application: Spelling Corrector for Word Processing Systems
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, RSX: RT-11, TSX, DEC VAX: VAX/VMS; DEC Professional 350: P/OS
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 350
Date First Installed: November 1981
(See Vendor Profile Page V-28)

COMPU-TOWN, INC.
CT*OS UTILITIES PACKAGE VERSION 1.1
Specific Application: List File Sorter, Index Print, Index Restore and Lost Document Recovery
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 Series: RSTS/E, RSX; DEC VAX Series: VAX/VMS
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 25
Date First Installed: March 1983

COMPU-TOWN, INC.
CT*OS WORD PROCESSING VERSION 4.3
Specific Application: WP and List Processing

Specific Industry: Not Industry Sensitive
System Requirements: DEC Professional 300: P/OS; D C PDP-11: RSTS, RSX, TSX: RT-11; DEC VAX: VAX/VMS
Memory Required: 64.0K bytes
Source Language: Macro-II
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1980

COMPUVIEW PRODUCTS
VEDIT - FULLSCREEN TEXT EDITOR
Specific Application: Program Development and WP Text Editor
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, Displaywriter: MS-DOS, CP/M 86; TRS-80/II: CP/M 80; Apple II, IIE: CP/M 80
Memory Required: 20.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 8,000
Date First Installed: November 1978
(See Vendor Profile Page V-29)

CONTEL INFORMATION SYSTEMS
LEX-ELEVEN
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, RT-11, VMS
Source Language: Fortran, Macro 11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $850 to $7,500
Number Installed to Date: 1,000
(See Vendor Profile Page V-30)

CONTEL INFORMATION SYSTEMS
SATURN-WP
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, RT-11: Unix
Source Language: Fortran, Macro 11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $499 to $5,000

CORPORATE COMPUTER SYSTEMS, INC.
TFORM REV 3.10
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Text Formatter
System Requirements: HP 1000
Memory Required: 18.0K bytes
Source Language: Fortran, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 40
Date First Installed: June 1981
(See Vendor Profile Page V-31)

CORPORATE COMPUTER SYSTEMS, INC.
THE HANDLE WRITER REV 1.5
Specific Application: WP
System Requirements: HP 1000
Source Language: Assembly, Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 3
Date First Installed: June 1983

CSC BUSINESS SYSTEMS, INC.
MTEXT WORD PROCESSING
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Pertec 2000, 3000: MTX, Microfive 1000: SMC
Memory Required: 256.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 15
Date First Installed: January 1982
(See Vendor Profile Page V-32)

CYCARE SYSTEMS, INC.
WORD PROCESSING
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell DPS 6, Gcos 400; Wang 2200
Memory Required: 64.0K bytes
Source Language: Basic (Wang), Cobol (Honeywell)
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 150
Date First Installed: 1980
(See Vendor Profile Page V-34)

CYEX SYSTEMS CORP.
CY GLOBAL WORD PROCESSING
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: WP, Program Development and Report Management
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10, Dnos
Memory Required: 192.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 50
Date First Installed: November 1982
(See Vendor Profile Page V-34)

DAMFORD CORP.
FULL SCREEN EDITOR
Specific Application: Program Text Editor
Specific Industry: Engineering
System Requirements: Apollo: Aegis
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 30
Date First Installed: 1982
(See Vendor Profile Page V-34)

DAMFORD CORP.
MUSE
Specific Application: WP
Specific Industry: Engineering
System Requirements: Apollo: Aegis
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 30
Date First Installed: 1983

DATA BASIC, INC.
DATA MERGE
Specific Application: WP Interface to the Data Base
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000: CP/M; IBM PC: PC-DOS; Apple
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 200
Date First Installed: February 1982
(See Vendor Profile Page V-35)

DATA CONSULTANTS, INC.
INSCRIBE
Specific Application: Word Processor With Text Editing
Specific Industry: Not Industry Sensitive
System Requirements: DG: DOS, R-DOS, AOS, AOS/VS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 4
Date First Installed: 1983
(See Vendor Profile Page V-35)

DATALOGICS, INC.
DATALOGICS 6300 SYSTEM
Specific Application: Prepare Text for High Speed Photo Typesetters or Xerox 9700
Specific Industry: Publishing
System Requirements: DEC PDP-11/44, PDP-11/45, PDP-11/70, VAX-11/780 Executext
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250,000
Number Installed to Date: 35
Date First Installed: September 1970
(See Vendor Profile Page V-36)

DATAMED RESEARCH, INC.
THE INCREDIBLE TEXT PRINTER
Specific Application: WP; Text Processing; Report Writing
Specific Industry: Not Industry Sensitive
System Requirements: Sage II, Sage IV: UCSD-P
Memory Required: 60.0K bytes
Source Language: UCSD-Pascal
Source Code Available: $5,000
Purchase Terms: Purchase (license)
Price: $249
Number Installed to Date: 150
Date First Installed: September 1981
(See Vendor Profile Page V-37)

DATAPOINT CORP.
INTEGRATED ELECTRONIC OFFICE SYSTEM (IEOS)
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 8800, 8200: RMS; Datapoint 3800, 8600: RMS-DOS
Memory Required: 52.0K bytes
Source Code Available: No
Price: $1,500
(See Vendor Profile Page V-37)

DATA PROCESSING DESIGN
WAFE FOR RSTS/E
Specific Application: Text File and Program Editor
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Memory Required: 160.0K bytes
Source Language: Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 50
Date First Installed: June 1981
(See Vendor Profile Page V-38)

DATA PROCESSING DESIGN
WORD-11 FOR RSTS/E, RSX, VAX/VMS
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 Series: RSTS/E, RSX-11M; DEC PDP-11/7 Series: VMS
Memory Required: 160.0K bytes
Source Language: Macro-11, Macro-32, Basic Plus
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $3,500 to $9,500
Number Installed to Date: 1,400
Date First Installed: September 1977

DATAVISION
WORD PROCESSING
Specific Application: WP/Text Editing
Specific Industry: Not Industry Sensitive
System Requirements: DEC
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1975
(See Vendor Profile Page V-39)

DAWN COMPUTER CORP.
TASK MASTER QTEXT
Additional Product Classification: Graphics, Sort/Merge
Specific Application: WP, Information Management, Line Drawing, Typesetting, Sorting
Specific Industry: Not Industry Sensitive
System Requirements: RT-11; DEC: RSX-11: TSX+: RSX-11M
Memory Required: 64.0K bytes
Source Language: Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 500
Date First Installed: 1976
(See Vendor Profile Page V-40)

DDIS (DESIGN AND BUILDING OF INFORMATION SYSTEMS)
WORD PROCESSING
Specific Application: WP
Specific Industry: Not Industry Sensitive

System Requirements: OS 64U; TURBO-DOS; CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
(See Vendor Profile Page V-40)

[illegible] DATA SYSTEMS, INC.
WORD PROCESSING SYSTEM
MULTIWORD
Specific Application: Word/Text Processing
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS/VS, OS/VS; HP: MPE-IV; IBM Series/1: EDX
Memory Required: 25.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: February 1979
(See Vendor Profile Page V-40)

DESIGNERS SOFTWARE
PALANTIR WORD PROCESSOR
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MS-DOS
Memory Required: 56.0K bytes
Source Language: C, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 20,004
Date First Installed: January 1982
(See Vendor Profile Page V-41)

DHI COMPUTING SERVICE
WORD PROCESSOR
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: [illegible] DOS/VS; IBM 370: DOS/VS
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: August 1983
(See Vendor Profile Page V-41)

DYER, WELLS & ASSOCIATES, INC.
DW&A/ADAS-AUTOMATED DOCUMENT
Additional Product Classification: Insurance
Specific Application: Automated Document Assembly
Specific Industry: Insurance
System Requirements: Wang: VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 3
Date First Installed: October 1982
(See Vendor Profile Page V-44)

EDC SYSTEMS
LEX-11
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DEC Professional: POS, DEC Rainbow: RT-11; DEC: RSX-II, Unix
Purchase Terms: Purchase (license); Lease
Date First Installed: 1980
(See Vendor Profile Page V-45)

ERISCO, INC.
IMPLEFACTS
Specific Application: Defined Contribution Record Keeping
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 370: OS/VS2 (MVS), OS/VSI, DOS/VS, DOS/VSE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 400
Date First Installed: October 1972
(See Vendor Profile Page V-47)

FERNWEAR CORP.
WP, GRAPHICS PACKAGE
Additional Product Classification: Graphics
Specific Application: Word Processor, Graphics
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000: [illegible]
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750 to $2,500
Number Installed to Date: 40
Date First Installed: November 1982
(See Vendor Profile Page V-48)

[illegible] SOFTWARE, INC.
WP34
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/36, System/34, IBM System/38; SSP
Memory Required: 38.0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,890 to $3,500
Number Installed to Date: [illegible]
Date First Installed: 1978
(See Vendor Profile Page V-46)

GLENN A. BARBER AND ASSOCIATES
CT OS
Specific Application: WP/Editing, List Processing
Specific Industry: Not Industry Sensitive
System Requirements: DEC: VMS: RSTS/E: TSX+: RT-11
Memory Required: 31.0K bytes
Source Language: Macro-11
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-51)

GLENN A. BARBER AND ASSOCIATES
FASTEXT
Specific Application: Text Editor
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RT-11: RSX-11M; DEC VAX: VMS: FASTEXT
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)

GOULD, INC.
DOCUMENT PROCESSOR
Specific Application: Large Document Processing
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Memory Required: [illegible]
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $17,850
(See Vendor Profile Page V-52)

GOULD, INC.
OFFICE AUTOMATOR
Specific Application: Electronic Mail, Teleconferencing, Office Automation
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Memory Required: 500.0K bytes
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $8,000

GOULD, INC.
WORD PROCESSOR
Specific Application: Word Processing
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Memory Required: 500.0K bytes
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $11,000

GREG SINGER & ASSOCIATES
ZWORD
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38; SSP
Memory Required: 96.0K bytes
Source Language: RPG-II
Purchase Terms: Purchase (license)
Price: $3,500
(See Vendor Profile Page V-53)

HORNS COMPUTER SERVICES
OLE
Specific Application: Letter Writing System
Specific Industry: Not Industry Sensitive
System Requirements: IBM-4300: DOS; IBM 370: Cics
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-55)

HUGH CORT COMPUTER
WORD WRIGHT
Specific Application: Word Processor
Specific Industry: [illegible]
Sensitive
System Requirements: HP200: OS250
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 6
Date First Installed: June 1982
(See Vendor Profile Page V-55)

HUMAN SERVICES COMPUTING, INC.
SCRIBE
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: DEC; DG; IBM Series/1
Source Language: Mixte
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1977
(See Vendor Profile Page V-55)

H & W COMPUTER SYSTEMS, INC.
ELECTRONIC MAIL UNDER CICS (SYSM)
Additional Product Classification: Electronic Mail
Specific Application: Electronic Mail
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS/OS
Memory Required: 40.0K bytes
Source Language: Cobol, BAL
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $8,500
Number Installed to Date: 30
Date First Installed: December 1982
(See Vendor Profile Page V-55)

THE INFORMATION ORGANIZATION CORP.
HIGH SPEED PRINTER INTERFACE TO WANG VS/WP
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive, Legal
System Requirements: Wang VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 2
Date First Installed: May 1982
(See Vendor Profile Page V-56)

THE INFORMATION ORGANIZATION CORP.
IBM DISPLAYWRITER INTERFACE TO WANG VS/WP
Specific Application: Word Processor
Specific Industry: Legal
System Requirements: Wang VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 2
Date First Installed: August 1982

INTERACTIVE SYSTEMS, INC.
DIGITEXT - WORD PROCESSING SYSTEM
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS; DEC PDP-11: RSX-11

Source Language: Micro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000 to $7,000
Number Installed to Date: 150
Date First Installed: March 1982
(See Vendor Profile Page V-60)

IPT (INFORMATION PROCESSING TECHNIQUES)
TIPS WORD PROCESSING
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DG: Unix; DEC PDP-11, VAX: VMS
Memory Required: 64.0K bytes
Source Language: C, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $695
Number Installed to Date: 500
Date First Installed: 1980
(See Vendor Profile Page V-61)

IPT (INFORMATION PROCESSING TECHNIQUES)
ZIP - SCREEN EDITOR
Specific Application: Programmers Text Editor
Specific Industry: Not Industry Sensitive
System Requirements: DG: AOS, AOS/VS, R-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 10
Date First Installed: 1981

KENT COMPUTER CORP.
DISPLAYSTAR
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Osborne Executive: CP/M; Zenith X100
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125
Date First Installed: June 1983
(See Vendor Profile Page V-63)

KINSV COMPUTER SYSTEMS, INC.
AFCAD WORD PROCESSING SYSTEM
Specific Application: Text Editing and Formatting, Electronic Mail, Office Automation
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $8,000
Number Installed to Date: 100
Date First Installed: 1977
(See Vendor Profile Page V-64)

LARC COMPUTING, INC.
LARC EDITOR
Specific Application: Program Development and WP
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: SPL
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1976
(See Vendor Profile Page V-65)

LEIGHT AUTOMATION, INC., READER
Specific Application: Spelling Checker, Readability Calculator
Specific Industry: Not Industry Sensitive
System Requirements: Four-Phase: MFE
Memory Required: 54.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $900
Number Installed to Date: 35
Date First Installed: 1982
(See Vendor Profile Page V-65)

LELAND COMPUTER SERVICES, INC.
WORD PROCESSING SYSTEM
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM System/36: SSP
Memory Required: 92.0K bytes
Source Language: RPG-II (System/34), RPG-III (System/36)
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250 to $3,500
Number Installed to Date: 120
(See Vendor Profile Page V-65)

L. W. JAMES & ASSOCIATES
WORD WISE 2
Specific Application: WP With Spelling Check and Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845, HP9816, HP9826, HP9836
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 116
Date First Installed: 1981

L. W. JAMES & ASSOCIATES
WORDWISE
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845, HP 9816, HP 9826, HP 9836
Memory Required: 187.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 125
Date First Installed: 1981

MANAGEMENT COMPUTER SERVICE, INC.
LIST MANAGEMENT
Specific Application: List Information, Produces Labels, General Listing
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Source Language: Basic, Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 10
Date First Installed: 1982
(See Vendor Profile Page V-66)

MANAGEMENT INFORMATION SYSTEMS CORP.
SUPER TYPE
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro; Amos
Source Language: Alpha Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $900
Number Installed to Date: 6
Date First Installed: October 1982
(See Vendor Profile Page V-66)

MANAGEMENT SERVICES, INC.
WORD PROCESSOR
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/70: RSTS/E
Source Language: Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,200
Number Installed to Date: 500
(See Vendor Profile Page V-66)

MANATRON, INC.
BALLOT TABULATIONS
Specific Application: Ballot Tabulations
Specific Industry: Government
System Requirements: Burroughs B1000
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-66)

MANATRON, INC.
WRITE ONE
Specific Application: Word Processor
Specific Industry: Government
System Requirements: Burroughs B1000
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)

MANUFACTURING CONTROL SYSTEMS, INC.
WORD PROCESSOR
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $950 to $4,800
Number Installed to Date: 3
Date First Installed: January 1982
(See Vendor Profile Page V-66)

MARC SOFTWARE INTERNATIONAL
MUSE
Specific Application: Scientific Typing, WP, Foreign Language
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Prime: Primos; DEC VAX Series: VMS, Apollo Domain
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595 to $12,500
Number Installed to Date: 400
Date First Installed: 1980
(See Vendor Profile Page V-66)

MARYLAND COMPUTER SERVICES, INC.
MAILING LIST
Specific Application: Mailing List
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-66)

MARYLAND COMPUTER SERVICES, INC.
SPELLING CHECKER
Specific Application: Spelling Correction
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 3
Date First Installed: 1983

MARYLAND COMPUTER SERVICES, INC.
WORD PROCESSOR
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Source Language: HP Basic
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 113
Date First Installed: 1981

MAS, INC.
WORD PROCESSOR
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-8, PDP-11: CTS
Memory Required: 64.0K bytes
Source Language: Cbasi
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1976
(See Vendor Profile Page V-68)

MEMOTECH CORP.
MEMOTEX
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
Memory Required: 16.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
(See Vendor Profile Page V-72)

MICRO FIVE CORP.
FLEXITEX
Specific Application: WP

Specific Industry: Not Industry Sensitive
System Requirements: Micro V Series/10: Star-DOS
Memory Required: 10.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 1,500
Date First Installed: 1978
(See Vendor Profile Page V-73)

MICRO FIVE CORP.
WORD CONCEPT ONE
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Micro V Series/10: SMC Basic
Memory Required: 10.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 50
Date First Installed: 1982

THE MICROPERIPHERAL CORP.
TSMART
Specific Application: Telecommunications
Specific Industry: Not Industry Sensitive
System Requirements: Atari 800
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,995
Date First Installed: 1981
(See Vendor Profile Page V-74)

THE MICROPERIPHERAL CORP.
TYPER-A
Specific Application: Editing, Loading, Printing, Saving, and Displaying
Specific Industry: Not Industry Sensitive
System Requirements: Atari 400, 800
Memory Required: 16.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,995
Date First Installed: 1981

MICROPROCESSOR LABORATORIES, INC.
HANDLE/SPELL
Specific Application: 80,000 Word Spelling Checker Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: Unix; HP 3000 RTE
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 80
Date First Installed: November 1982
(See Vendor Profile Page V-74)

MICROPROCESSOR LABORATORIES, INC.
HANDLE/WRITER
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: Unix; HP 3000 RTE
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $565 to $2,500
Date First Installed: November 1982

MICROTECH BUSINESS SYSTEMS, INC.
STARWRITER WORD PROCESSING SYSTEM
Specific Application: WP, Full Dictionary, Mathematical Capabilities Within The Document Spreadsheet Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Iris: Bits
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 1,000
Date First Installed: January 1981
(See Vendor Profile Page V-75)

MIDDENI INDUSTRIES, INC.
WORDPOWER
Specific Application: WP and World Management
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B1800
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 4
Date First Installed: 1982
(See Vendor Profile Page V-75)

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
MAILING LIST
Specific Application: Mailing List
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS; HP MPE, TI: DX-10
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 500
(See Vendor Profile Page V-76)

MINI-COMPUTER SYSTEMS, INC.
OMS
Specific Application: List Processing, Electronic Filing, Calendar, Scheduling, WP
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse: Micos, DG Eclipse MV, AOS/VS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: $2,500
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 6
Date First Installed: 1982
(See Vendor Profile Page V-76)

MINICOMPUTER SYSTEMS, INC.
PROFESSIONAL'S PORTFOLIO MANAGEMENT SYSTEM
Additional Product Classification: DBMS
Specific Application: Accounting and Control of Client Portfolio, Analytic Tool for Buy/Sell Decisions, Debt/Equity Securities, Options, Treasury Reporting
Specific Industry: Stock Broker Investment
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Database
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 2
Date First Installed: August 1982

MODERN COMPUTER SYSTEMS, INC.
R SYSTEMS WORD PROCESSOR
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: TI Business Systems
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000 to $3,500
Number Installed to Date: 250
Date First Installed: 1976
(See Vendor Profile Page V-76)

M R SOFTWARE
MAILING
Specific Application: Mailing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23, System/34, System/36, IBM 5110
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200
(See Vendor Profile Page V-77)

M R SOFTWARE
WORD PROCESSOR
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23, System/34, System/36, IBM 5110
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200

NATIONAL INFORMATION SYSTEMS, INC.
MUSE
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DEC System 10: Tops 10, System 20: Tops 20, PDP-11, VAX: RSX-11M, VMS; Harris; Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $7,300 to $12,500
Number Installed to Date: 100
Date First Installed: 1980
(See Vendor Profile Page V-79)

NCR CORP.
WORD-WISE
SPECIFIC INDUSTRY: Manufacturing, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation, Nonprofit Organizations
System Requirements: NCR 9300: ITX
Memory Required: 1.0M bytes
Source Language: Cobol 74
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: January 1983
(See Vendor Profile Page V-79)

NIAKWA MANAGEMENT SERVICES
STATISTICAL WORD PROCESSING
Specific Application: Statistical WP
System Requirements: Wang 2200: Wang Basic II
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-80)

NORTHEAST DATACOM, INC.
DATA 3500 WORD PROCESSING
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Wang I200 MVP Speed
Memory Required: 28.0K bytes
Source Language: Basic II
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-80)

NORTHEAST DATACOM, INC.
RECORD MANAGEMENT SYSTEM (RMS)
Specific Application: Word Processing, Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200 MVP Speed
Memory Required: 28.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)

NORTHERN TELECOM, INC.
OMNIWORD
Specific Application: WP/Text Editor
Specific Industry: Not Industry Sensitive
System Requirements: Northern Telecom 503
Memory Required: 256.0K bytes
Purchase Terms: Purchase (license)
Price: $650 to $1,895
Number Installed to Date: 300
Date First Installed: 1981
(See Vendor Profile Page V-81)

OAK SOFTWARE
OAK SOFTWARE'S WORD PROCESSING SYSTEM
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Memory Required: 34.0K bytes
Source Language: RPG
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 150
Date First Installed: May 1980
(See Vendor Profile Page V-81)

OPTION 1
UNIVERSAL WORD PROCESSOR
Specific Application: WP

Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 15.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 100
Date First Installed: February 1981
(See Vendor Profile Page V-83)

OPTIONS 1
WORD/3
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110, 5120; Basic 2
Memory Required: 32.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 150
Date First Installed: April 1980

PARA RESEARCH, INC.
EASY TEXT
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/38
Memory Required: 40.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $750 to $1,500
Date First Installed: January 1981
(See Vendor Profile Page V-84)

PARA RESEARCH, INC.
PARATEXT
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/38
Memory Required: 28.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,000 to $1,500
Number Installed to Date: 2,500
Date First Installed: June 1980

PBS COMPUTING, INC.
WORD AND LIST PROCESSING
Specific Application: Word and List Processing
Specific Industry: Accounting
System Requirements: DEC PDP-11; RSX-11M
Memory Required: 64.0K bytes
Source Language: Fortran, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 200
Date First Installed: 1980
(See Vendor Profile Page V-84)

PCD SYSTEMS, INC.
ADVANCED SYSTEMS EDITOR
Specific Application: Advanced System Oriented Text Editor for UCSD-P System
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11; TRS, Altos
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: 1980
(See Vendor Profile Page V-84)

PCD SYSTEMS, INC.
CPR TEXT FORMATTER
Specific Application: Post Text Processing Under UCSD-P System
Specific Industry: Not Industry Sensitive
System Requirements: IBM; DEC LSI-11: UCSD-P; Altos
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Date First Installed: 1980

PCD SYSTEMS, INC.
FINAL COPY
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: TRS:-UCSD-P;IBM: Runtime; Altos
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $890
Date First Installed: 1980

PCR, INC.
WORDPOWER
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 34; DSP
Memory Required: 36.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2,500
Date First Installed: 1980
(See Vendor Profile Page V-84)

PHOENIX SOFTWARE ASSOCIATES LTD.
PMATE
Specific Application: Text Editor
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; PC-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 2,500
Date First Installed: 1981
(See Vendor Profile Page V-86)

POINT FOUR DATA CORP.
STYLIST
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova; Iris
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
(See Vendor Profile Page V-86)

POINT FOUR DATA CORP.
TYPIST
Specific Application: Word Processing
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova; Iris
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: 1982
(See Vendor Profile Page V-86)

PROFESSIONAL SOFTWARE, INC.
WORD +PC
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT: PC-DOS
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Date First Installed: 1982
(See Vendor Profile Page V-88)

PROFESSIONAL SOFTWARE, INC.
WORD PRO 1+
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Commodore
Memory Required: 8.0K bytes
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,995

PROFESSIONAL SOFTWARE, INC.
WORD PRO 2+
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Commodore
Memory Required: 16.0K bytes
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $198
Date First Installed: 1982

PROFESSIONAL SOFTWARE, INC.
WORD PRO 3+
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Commodore
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: January 1981

PROFESSIONAL SOFTWARE, INC.
WORD PRO 3+/64
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: Commodore
Memory Required: 64.0K bytes
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,995
Date First Installed: December 1982

PROFESSIONAL SOFTWARE, INC.
WORD PRO 4+
Specific Application: Word Processing
Specific Industry: Not Industry Sensitive
System Requirements: Commodore
Memory Required: 32.0K bytes
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Date First Installed: 1979

PROFESSIONAL SOFTWARE, INC.
WORD PRO 5+
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Commodore
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: January 1982

PROFESSIONAL SOFTWARE, INC.
WORD PRO 6+
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Commodore SuperPET
Memory Required: 96.0K bytes
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)

QANTEL CORP.
WORD PROCESSING
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Qantel System 10, 20, 40, 64: Best
Memory Required: 8.0K bytes
Source Language: QIC Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: 1977
(See Vendor Profile Page V-90)

QUADRATRON SYSTEMS, INC.
Q-ZWP
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix; Fortune; Altos
Memory Required: 128.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $395 to $2,000
Number Installed to Date: 1,000
Date First Installed: August 1983
(See Vendor Profile Page V-0-)

QUINTREX DATA SYSTEMS
WORD ORDER SYSTEM
Specific Application: Word Order SYS
Specific Industry: Telephone
System Requirements: IBM Series/1
Memory Required: 96.0K bytes
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,600
Number Installed to Date: 30
Date First Installed: 1980
(See Vendor Profile Page V-91)

RAI BUSINESS SYSTEMS, INC.
WORD PROCESSING
Specific Application: WP

Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 4.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $950
Date First Installed: 1983
(See Vendor Profile Page V-91)

NATIONAL DATA SYSTEMS
SCRED SCREEN EDITOR
Specific Application: Text Editoring
Specific Industry: Not Industry Sensitive
System Requirements: DG: AOS, AOS/VS
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $950 to $1,200
Number Installed to Date: 30
Date First Installed: November 1981
(See Vendor Profile Page V-91)

RHINTEK, INC.
RED SCREEN EDITOR - RHINTEK SCREEN
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DG: DOS, R-DOS, AOS
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 50
Date First Installed: 1977
(See Vendor Profile Page V-93)

R SYSTEMS, INC.
R WORD
Additional Product Classification: DBMS
Specific Application: Basic WP
Specific Industry: Not Industry Sensitive
System Requirements: TI 990: DX-10; TI Business System 200: Dnos; TI 300: CDS 990
Memory Required: 28.0K bytes
Source Language: Assembly
Source Code Available: No
Price: $695
Number Installed to Date: 2,500
Date First Installed: 1977
(See Vendor Profile Page V-94)

RMF CORP.
IMPRS WORD PROCESSING SYSTEM
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RSTS/E; DEC: RT-11, RSX-11, VMS, Ias
Memory Required: 28.0K bytes
Source Language: Imprs
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-94)

S.A.S. OFFICE SOFTWARE
WP 5110 5120 VIRTUAL WP
Specific Application: WP File Editing
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110; IBM 5120
Memory Required: 32.0K bytes
Source Language: Micro Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,750
Number Installed to Date: 800
Date First Installed: August 1978
(See Vendor Profile Page V-94)

SATELLITE SOFTWARE INTERNATIONAL (SSI)
WORKPERFECT SPELLER
Specific Application: 30,000 Words Plus Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $95
Date First Installed: 1983
(See Vendor Profile Page V-95)

SATURN SYSTEMS, INC.
DP SATURN
Specific Application: Word Processor and List
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Memory Required: 39.0K bytes
Source Language: Macro-11
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 1,200
Date First Installed: 1978
(See Vendor Profile Page V-95)

SBDATA SYSTEMS, INC.
WORD PROCESSING
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10
Memory Required: 256.0K bytes
Source Language: Cobol, RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,195
Date First Installed: 1980
(See Vendor Profile Page V-96)

SHIRLEY SOFTWARE SYSTEMS
DIRECT ED
Specific Application: Text Editing, Data Editing, WP
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Memory Required: 250.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $4,000
Number Installed to Date: 5
Date First Installed: February 1983
(See Vendor Profile Page V-97)

SIGMA SOFTWARE, INC.
MULTI MATE
Specific Application: Word Processor
Specific Industry: Insurance
System Requirements: Wang PC; IBM PC: PC-DOS
Memory Required: 28.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1983
(See Vendor Profile Page V-97)

SIGMA SOFTWARE, INC.
STENO-POOL WORD PROCESSING CLIENT FILE
Additional Product Classification: Data/File Management
Specific Application: Steno-Pool WP, Client File and List
Specific Industry: Insurance
System Requirements: Wang 2200
Source Code Available: Yes
Memory Required: 28.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 400
Date First Installed: 1978

SOFTWARE CLEARING HOUSE
MULTIWORD
Specific Application: WP Text Editing
Specific Industry: Not Industry Sensitive
System Requirements: NCR I and V Series Imos IRX
Memory Required: 20.0K bytes
Source Language: Cobol 74
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $1,500 to $2,500
Number Installed to Date: 73
(See Vendor Profile Page V-99)

SOFTWARE DYNAMICS
SEDIT
Specific Application: Full Screen Editor for Large Files
Specific Industry: Not Industry Sensitive
System Requirements: PalTech GT Series; TRS, Motorola: Sdos
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $115
Number Installed to Date: 200
Date First Installed: 1984
(See Vendor Profile Page V-99)

SOFTWARE SEARCH GROUP
BLACK BOOK
Additional Product Classification: Data/File Management
Specific Application: Name and Address File Management With Cross Indexing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, CP/M
Memory Required: 128.0K bytes
Source Language: MS Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $99
Number Installed to Date: 10
Date First Installed: April 1983
(See Vendor Profile Page V-100)

SPECTRAPHYSICS
LASERSCRIPT
Additional Product Classification: Typesetting
Specific Application: Text Processing, Printing, Typesetting
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX-11/780, VAX-11/750, VAX-11/730: VMS
Memory Required: 128.0K bytes
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 1
Date First Installed: June 1983
(See Vendor Profile Page V-102)

SPECTRAPHYSICS
SUPERSCRIPT I
Specific Application: Text Processing With Mathematical Equations
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX-11/780, VAX-11/750, VAX-11/730: VMS
Memory Required: 128.0K bytes
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 20
Date First Installed: November 1981

SPECTRAPHYSICS
SUPERSCRIPT - II
Additional Product Classification: Graphics
Specific Application: Text/WP Requring Equations and Graphics
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX-11/780, VAX-11/750, VAX-11/730: VMS
Memory Required: 128.0K bytes
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 2
Date First Installed: June 1983

STANDARD CONTROLS, INC. (S.C.I.)
WORDCRAFT A/TRA
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Commodore
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $599
Date First Installed: 1980
(See Vendor Profile Page V-102)

STRATUS COMPUTER
WORD PROCESSING SYSTEM
Specific Application: WP With Spelling Verification
Specific Industry: Not Industry Sensitive
System Requirements: Stratus 32, Stratus VOS
Source Language: PL/1
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: February 1982
(See Vendor Profile Page V-104)

SYSTEMS OF THE FUTURE, INC.
DM/250 DISTRIBUTION MANAGEMENT
Specific Application: Order Entry, Inventory Control, Purchase Order Control, Accounts Receivable, Sales Analysis, Accounts Payable, General Ledger

Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: HP 250: OS 250
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3 to $5,000
Number Installed to Date: 10
Date First Installed: February 1982
(See Vendor Profile Page V-106)

TAFT CONSULTING, INC.
QUESTER
Specific Application: Text Searching System
Specific Industry: Not Industry Sensitive
System Requirements: Tandem NSI, NSII: Guardian
Source Language: TAL
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-108)

TECHNICAL ANALYSIS CORP.
WPS II
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: DG: DOS, AOS/VS, R-DOS, AOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 100
Date First Installed: 1979
(See Vendor Profile Page V-108)

TECHNICON DATA SYSTEMS CORP.
TECHNICON MEDICAL INFORMATION SYSTEM -
Specific Application: Medical Text Processing and Results, Charting
Specific Industry: Medical, Hospital
System Requirements: IBM 4341: VS
Memory Required: 3.0M bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 40
Date First Installed: 1971
(See Vendor Profile Page V-108)

TERRA GRAPHICS
XEDIT
Specific Application: Text Editing
Specific Industry: Not Industry Sensitive
System Requirements: Primos
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,750
Date First Installed: August 1981
(See Vendor Profile Page V-109)

MAINFRAME WORD PROCESSING WITH QWIK-DRAFT III

- Any typist can easily learn to use it.
- No knowledge of programming techniques required.
- Free-style original text entry.
- Corrections in formatted display.
- Training, installation and manuals included.
- Uses your existing IBM 3270-type network and IBM 370 or plug compatible mainframe.

Top Down Systems

Software From
OFFICE EXPRESS, INC.
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Rockville, Maryland 20850
(301) 251-9400

TICOM SYSTEMS, INC.
TICOM OFFICE MANAGEMENT SYSTEM
Specific Application: Versatile WP Forms, Data Entry, Communications
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; DEC Rainbow: UCSD-P; NEC APC; TI
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $885
Date First Installed: 1982
(See Vendor Profile Page V-110)

TIME COMPUTER CORP.
SPELLBINDER WORD PROCESSOR
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Oasis: CP/M
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-110)

TOM (THE OFFICE MANAGER, INC.)
D.A.T.A 2000 WORD PROCESSING SYSTEM
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200 Series: DOS
Memory Required: 32.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1,250
Date First Installed: September 1978
(See Vendor Profile Page V-111)

TOP DOWN SYSTEMS
QWICK-MAIL
Additional Product Classification: Electronic Mailing
Specific Application: Document and Message Electronic Mail Packages
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CP/M, DOS, VS, MVS
Memory Required: 256.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license); Rental; Lease
Price: $9,375
Number Installed to Date: 25
Date First Installed: 1983
(See Vendor Profile Page V-111)

UNILOGIC, LTD.
SCRIBE
Specific Application: Text Formatting
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Tops 10, Tops 20; Prime: Primos; Apollo: Aegis; IBM: VM/CMS
Memory Required: 1.0M bytes
Source Language: Bliss, PL/1, C
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $4,000 to $50,000
Number Installed to Date: 250
Date First Installed: September 1979
(See Vendor Profile Page V-113)

UNIVERSITY COMPUTING SERVICES CORP.
TEXT
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs 5900, 6000, 7000: MCP
Source Language: Algol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 2
Date First Installed: January 1983
(See Vendor Profile Page V-114)

WESTERN COMPUTER SYSTEMS, INC.
WESTERN RETAILER BOOKSELLER SYSTEM
Additional Product Classification: Accounting
Specific Application: Inventory Control, General Ledger, Accounts Payable, Accounts Receivable
Specific Industry: Retail
System Requirements: Alpha Micro: Amos
Memory Required: 128.0K bytes
Source Language: Alpha Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $10,000
Number Installed to Date: 3
Date First Installed: October 1982
(See Vendor Profile Page V-116)

WICAT SYSTEMS, INC.
WORD PROCESSING
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Wicat: Unix, MCS
Memory Required: 512.0K bytes
Source Language: Fortran II, Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300 to $1,500
Number Installed to Date: 5,000
Date First Installed: 1981
(See Vendor Profile Page V-117)

XIDAK, INC.
MAINEDIT
Specific Application: Portable Display-Oriented Text Editor
Specific Industry: Engineering
System Requirements: IBM 370, 4300, 3000 Series: VM/CMS; DEC VAX, System 10, 20: VMS; Apollo: Unix
Memory Required: 512.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $880 to $7,000
Number Installed to Date: 100
Date First Installed: 1981
(See Vendor Profile Page V-118)

ADVANCED INFORMATION MANAGEMENT
CORRESPONDENCE SYSTEM
Specific Application: Information Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-3)

THE ALTERNATE SOURCE
EDM
Specific Application: Programmable Text Editing
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: MULTI-DOS, TRS-80/M, 80/4: TRS-DOS, DOS Plus
Memory Required: 48.0K bytes
Source Language: Z80
Purchase Terms: Purchase (license)
Price: $149
Number Installed to Date: 100
Date First Installed: March 1983
(See Vendor Profile Page V-4)

ARTISAN SOFTWARE TECHNOLOGY, INC.
CONSUMER OPINION FIRM ETATISTX
Specific Application: Automatic Questionnaire Generator
Specific Industry: Not Industry Sensitive
System Requirements: Altos 8010, 8011, 8012, 8013: Cass
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $2,500
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-9)

ASPEN SOFTWARE
GRAMMATIK
Specific Application: Style and Typographical Check
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, TRS-80: CP/M
Memory Required: 120.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $75
Number Installed to Date: 1,000
Date First Installed: 1981
(See Vendor Profile Page V-9)

BASIC BUSINESS SOFTWARE, INC.
SCREEN
Specific Application: Text Editor
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Memory Required: 96.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75
Date First Installed: 1983
(See Vendor Profile Page V-12)

BILLINGS COMPUTER CORP.
BILLINGS WORD MATTER MAIL
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Billings: Boss
Memory Required: 64.0K bytes
Source Language: Macro Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
(See Vendor Profile Page V-12)

BUSINESS MANAGEMENT SYSTEMS, INC.
WP
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 128.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 4
Date First Installed: 1981
(See Vendor Profile Page V-14)

CALIFORNIA SOFTWARE PRODUCTS, INC.
THEODORE/FORMAT.
Specific Application: Screen Text Editor Format
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell DPS 6: Gcos 6
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 200
Date First Installed: December 1980
(See Vendor Profile Page V-15)

C.S SOFTWARE, INC.
THE LETTER WRITER
Specific Application: Text Processor
Specific Industry: Not Industry Sensitive
System Requirements: Atari: DOS
Memory Required: 24.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $19
Date First Installed: 1980
(See Vendor Profile Page V-17)

CHANG LABS
MEMOPLAN
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M, DEC Rainbow: MS-DOS
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 200
Date First Installed: April 1983
(See Vendor Profile Page V-18)

CIMARRON CORP.
WORDCRAFT ULTRA
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64: CP/M
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Date First Installed: 1980
(See Vendor Profile Page V-19)

COMMUNICATIONS PROFESSIONALS
TEXT-MASTER
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: OhioScientific Key: OS 65U
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 100
Date First Installed: 1981
(See Vendor Profile Page V-21)

COMPUTER SERVICES CORP.
WORD PROCESSING
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10, DS2: Dedi
Memory Required: 10.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,000
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-26)

CONTEXT MANAGEMENT SYSTEMS
THE CONTEXT MBA
Specific Application: MBA Integrates Most Managerial Functions Into A Single Software Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, PC-XT,HP 200
Memory Required: 256.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $695 to $795
Date First Installed: July 1982
(See Vendor Profile Page V-30)

CONTRACT SERVICES ASSOCIATES
FORMLET
Specific Application: WP for Preparing Form Letters
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/II: TRS-DOS, IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1976
(See Vendor Profile Page V-30)

CONTRACT SERVICES ASSOCIATES
TYP/PRT
Specific Application: Permits Printer to Be Used as A Typewriter
Specific Industry: Businesses
System Requirements: TRS-80/I, 80/II, 80/III: TRS-DOS, IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $18
Date First Installed: 1974

CORNUCOPIA SOFTWARE
ELECTRIC WEBSTER SPELLING
DISCOUNT
Specific Application: WP Spelling Checker
Specific Industry: Not Industry Sensitive
System Requirements: TRS: C-DOS, CP/M
Memory Required: 48.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $90
Number Installed to Date: 12,000
Date First Installed: March 1982
(See Vendor Profile Page V-31)

DATAMOST, INC.
WRITE-ON
Specific Application: A Low Cost WP System for General Use
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III: APPLE-DOS, IBM PC: PC-DOS
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $100
Date First Installed: 1981
(See Vendor Profile Page V-37)

DIGITAL COLOR CORP.
WORD PROCESSING SYSTEM
Specific Application: Text Editor, Spelling, Formatted Printing, Letter Writing
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Cbasic, C, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 200
Date First Installed: 1981
(See Vendor Profile Page V-42)

DIGITAL SYSTEMS CORP.
GALAXY WORD PROCESSING
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Altos: MP/M II
Memory Required: 10.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: March 1981
(See Vendor Profile Page V-42)

DSPLS III
QUICK BROWN FOX
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64: VIC 20
Source Language: Machine
Source Code Available: No

Purchase Terms: Purchase (license)
Price: $65
Date First Installed: November 1982
(See Vendor Profile Page V-43)

DURANGO SYSTEMS, INC.
STAR TEXT
Specific Application: WP With Optional Publication and Artistic Form
Specific Industry: Not Industry Sensitive
System Requirements: Durango [illegible]
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $[illegible]
Number Installed to Date: 2,000
Date First Installed: 1980
(See Vendor Profile Page V-44)

ELLIS COMPUTING
NEVADA EDIT
Specific Application: Full Screen Editor Designed for Writing Computer Programs
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8080: CP/M; Intel 8085, Zilog Z80
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30
Number Installed to Date: 4,000
Date First Installed: 1981
(See Vendor Profile Page V-46)

FEROX MICROSYSTEMS, INC.
WORD EXEC
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1982
(See Vendor Profile Page V-48)

FUTURA SOFTWARE, INC.
[illegible]
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: TI
Memory Required: 32.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $149
(See Vendor Profile Page V-50)

GAYLORD BROS., INC.
SUPER TEXT 40/80
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $175
(See Vendor Profile Page V-50)

G. B. ASSOCIATES
THE WORD MACHINE
Specific Application: Word Processing
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/III: TRS-DOS, CP/M
Memory Required: 48.0K bytes
Source Language: Basic Compiler,Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $37
Number Installed to Date: 100
Date First Installed: June 1980
(See Vendor Profile Page V-50)

GREAT PLAINS COMPUTER CO., INC.
ETYLOGRAPH II
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: TRS Flex, OS9, Gimix 6809 Flex, Uniflex; Tano 6809: Flex, Uniflex Southwest Technical S/09: Flex, Uniflex
Memory Required: 56.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 1,200
Date First Installed: June 1980
(See Vendor Profile Page V-52)

HAYDEN SOFTWARE
PIE SPELLER
Specific Application: Checks Spelling on all Documents
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Source Language: Mbasic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $99
(See Vendor Profile Page V-53)

HAYDEN SOFTWARE
PIE WRITER
Specific Application: Personal Information Environment Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: Apple II
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $149

HAYDEN SOFTWARE
PIE WRITER
Specific Application: Personal Information Environment Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $199

HORNE COMPUTER SERVICES
HCS-AS; AGENCY SERVICE
Specific Application: Sorting, Letter Writing, Reporting, Rating From Policies Extracted From Home Office
Specific Industry: Insurance
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 12
Date First Installed: September 1983
(See Vendor Profile Page V-55)

HOWARD W. SAMS & CO., INC.
CLEAN SLATE
Specific Application: Page Oriented Word Processor That Shows Howthe Document Will Look Before It Is Printed
System Requirements: TRS-80/4,80/1
Memory Required: 32.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $79
(See Vendor Profile Page V-55)

HOWARD W. SAMS & CO., INC.
PEN-PAL
Specific Application: Word Processor With Flexible Storage and Editorial Capacity
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+,IIE, II: APPLE-DOS, Franklin ACE 1000
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $59

INFORMATION UNLIMITED SOFTWARE, INC.
EASY WRITER II
Specific Application: Advanced Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-DOS, DEC Micro PDP: MS-DOS, TI Professional: MS-DOS
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $350
Date First Installed: 1977
(See Vendor Profile Page V-58)

INFOSOFT SYSTEMS, INC.
WP EASY WORD PROCESSOR
Specific Application: WP
Specific Industry: Not Industry Sensitive
Memory Required: 3.2M bytes
Source Language: 8080 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: January 1978
(See Vendor Profile Page V-58)

LEADING EDGE PRODUCTS, INC.
LEADING EDGE WORD PROCESSING
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-65)

LEXISOFT, INC.
SPELLBINDER
Specific Application: Word Processing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Altos Oasis; Victor 9000: MS-DOS, CP/M 86
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1978
(See Vendor Profile Page V-66)

LIFETREE SOFTWARE, INC.
VOLKSWRITER TM
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Eagle 1600: MS-DOS; COMPAQ MS-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 10,000
Date First Installed: January 1982
(See Vendor Profile Page V-66)

MANETRON, INC.
BALLOT TABULATION
Specific Application: Ballot Tabulation
Specific Industry: Government
System Requirements: Burroughs [illegible]
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-68)

MANETRON, INC.
WRITE ONE
Specific Application: WP
Specific Industry: Government
System Requirements: Burroughs B20 Btos
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)

METASOFT CORP.
[illegible]
Specific Application: Sophisticated WP Aimed At High Production Offices
Specific Industry: Not Industry Sensitive
System Requirements: North Star: CP/M; IBM PC: PC-DOS, Apple IIE: [illegible]
Memory Required: 96.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 10,000
Date First Installed: July 1980
(See Vendor Profile Page V-72)

MICRO ARCHITECT, INC.
WORD PROCESSOR
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80 Model 12, Model 16: CP/M, IBM PC: CP/M
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $58
Date First Installed: 1980
(See Vendor Profile Page V-73)

MICRODATA SOFTWARE DEVELOPMENT CO.
WORDMATE
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Microdata: Pick
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible] **Installed to Date:** 200
Date First Installed: January 1982
(See Vendor Profile Page V-73)

MICRON, INC.
WORD
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 12
Date First Installed: 1981
(See Vendor Profile Page V-74)

MICROPRO INTERNATIONAL CORP.
TOTAL PAC
Specific Application: Package Includes Wordstar, Mailmerge, Spellstar and Star Index
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $695
Date First Installed: 1983

MICROPRO INTERNATIONAL CORP.
WORDSTAR
Specific Application: Powerful Word Processor With Full Data Compatibility
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MS-DOS
Memory Required: 80.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
[illegible] **Installed to Date:** 400,000
Date First Installed: 1979
(See Vendor Profile Page V-74)

MICROSOFT
MICROSOFT MOUSE
Specific Application: Moves the Cursor on Screen and Points to Specific Information
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-74)

MILLER MICROCOMPUTER SERVICE
FORTHWRITE
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; Compaq; TRS 80/II, 80/4
Memory Required: 64.0K bytes
Source Language: MMS Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $175 to $500
Number Installed to Date: 200
Date First Installed: March 1982
(See Vendor Profile Page V-75)

MOHAWK DATA SCIENCES CORP.
WORD 21
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: MDS Series 21: OS/2; MDS 2110: OS/10
Memory Required: 128.0K bytes
Source Language: Mobol/Z80
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $1,200
Date First Installed: November 1981
(See Vendor Profile Page V-77)

MONROE SYSTEMS FOR BUSINESS
MONROE SUPERMERGE
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Monroe OC 8800 Series: CP/M 80
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $150
Number Installed to Date: 500
Date First Installed: June 1982
(See Vendor Profile Page V-77)

MONROE SYSTEMS FOR BUSINESS
MONROE SUPERWORD
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Monroe: CP/M 80
Memory Required: 64.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license); Lease
Price: [illegible]
Number Installed to Date: 1,000
Date First Installed: June 1982

MONROE SYSTEMS FOR BUSINESS
MONROE SUPERWORD / SUPERMERGE
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Monroe OC 8800 Series: CP/M 80
Memory Required: 64.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license); Lease
Price: $675

MUSE SOFTWARE
ADDRESS BOOK
Specific Application: Mailing List, Stores Up to 700 Names and Addresses, May Be Hooked Up to the Phone
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+: APPLE-DOS 3.2, Apple IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $49
(See Vendor Profile Page V-78)

MUSE SOFTWARE
FORM LETTER MODULE
Specific Application: Super Text and Home Office, Customizes Letters and Prints Them
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+: APPLE-DOS 3.2, Apple IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100

MUSE SOFTWARE
SUPER-TEXT HOME OFFICE
Specific Application: Office Word-Processor With 40, 50, 60 or 70 Column
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+: APPLE-DOS 3.2, Apple IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $99
Number Installed to Date: 5,000
Date First Installed: February 1982

MUSE SOFTWARE
SUPER-TEXT PROFESSIONAL
Specific Application: 40, 80 Column Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+: APPLE-DOS 3.2; Apple IIE: APPLE-DOS 3.3, IBM PC: PC-DOS 1.1
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $99
Number Installed to Date: 7,000
Date First Installed: February 1983

NEW ERA TECHNOLOGIES, INC.
MIST +
Specific Application: Sophisticated Microcomputer Information Support Tool
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Memory Required: 56.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: May 1983
(See Vendor Profile Page V-79)

OASIS SYSTEMS
PUNCTUATION
Specific Application: Corrects Punctuation Errors
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; APPLE, CP/M, Victor 9000
Memory Required: 164.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $125
[illegible] **Installed to Date:** 800
Date First Installed: February 1983
(See Vendor Profile Page V-81)

OASIS SYSTEMS
WORD
Specific Application: Spelling Error Identification
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M, Apple, Victor 9000
Memory Required: 164.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75
Number Installed to Date: 3,000
Date First Installed: 1981

OASIS SYSTEMS
WORD PLUS
Specific Application: Identify and Correct Spelling Errors
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M, Apple, Victor 9000
Memory Required: 164.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 3,000
Date First Installed: 1982

THE ORTHOCODE CORP.
[illegible]
Specific Application: Table of Contents
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M; Altos: MP/M, NS-DOS, MS-DOS, Dynabyte: MS-DOS
[illegible] **Memory Required:** 48.0K bytes
Source Language: Forth
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $ 95
[illegible] **Installed to Date:** 50,000
Date First Installed: November 1980
(See Vendor Profile Page V-83)

THE ORTHOCODE CORP.
ENUMERATOR
Specific Application: Line Numbering
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M, Altos: MP/M, NS-DOS, MS-DOS, Dynabyte: MS-DOS
Source Language: Forth
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $60
Number Installed to Date: 3,000
Date First Installed: February 1982

THE ORTHOCODE CORP.
LAWMATE
Specific Application: WP
Specific Industry: Legal
System Requirements: IBM PC: CP/M, Altos: MP/M, NS-DOS, MS-DOS, Dynabyte: MS-DOS
Memory Required: 48.0K bytes
Source Language: Forth
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495

Number Installed to Date: 100
Date First Installed: December 1982

PEACHTREE SOFTWARE
PEACHTEXT WORD PROCESSOR
Specific Application: WP
Specific Industry: Not Industry Sensitive
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
(See Vendor Profile Page V-85)

PEACHTREE SOFTWARE
PEACHTREE GRAPHICS LANGUAGE PACKAGE
Additional Product Classification: Financial Modeling Languages, DSS, Program Generators/Aids, Application Development Tools, Languages
Specific Application: Programming Language List, Spelling Proofreader, Thesaurus and Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, IBM PC-XT; PC-DOS; Compaq; TI-Professional
Memory Required: 48.0K bytes
Source Language: Assembler, Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395

PEACHTREE SOFTWARE
SPELLING PROOFREADER
Specific Application: Proofreader for WP of Text-Edited Documents
Specific Industry: Medical, Legal
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150

PERFECT SOFTWARE, INC.
PERFECT FILER
Specific Application: Mail, Merge, List, Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-DOS; Digital: MS-DOS; Apple: CP/M
Memory Required: 64.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $595
Date First Installed: 1981
(See Vendor Profile Page V-86)

PERFECT SOFTWARE, INC.
PERFECT SPELLER
Specific Application: Word Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: IBM: PC-DOS, Digital: MS-DOS; Apple: CP/M
Memory Required: 64.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: 1981

PERFECT SOFTWARE, INC.
PERFECT WRITER
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: IBM: PC-DOS; Digital: MS-DOS; Apple: CP/M
Memory Required: 64.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1981

PETTED MICRO SYSTEMS
WORD PRO
Specific Application: WP/Text Editor
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 8032; OS
Memory Required: 32.0K bytes
Source Language: Basic, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Date First Installed: 1979
(See Vendor Profile Page V-85)

PHOENIX SYSTEMS, INC.
WORD PROCESSOR
Specific Application: WP
System Requirements: Cado
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 100
Date First Installed: 1979
(See Vendor Profile Page V-86)

PROFESSIONAL SOFTWARE
[illegible], INC.
ULTRA FORMS PROCESSING SYSTEM
Specific Application: Print Information on Preprinted Forms
Specific Industry: Not Industry Sensitive
System Requirements: CPT 8000; CPT 8100; CPT 8525
Source Language: Assembler, PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000 to $3,000
Number Installed to Date: 100
(See Vendor Profile Page V-88)

PROSOFT
NEESCRIPT 7.0
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: TRS-DOS; LNW-80: NEW-DOS; [illegible]
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 6,000
Date First Installed: June 1980
(See Vendor Profile Page V-89)

PYRAMID DATA LTD.
NUMBER CRUNCHER
Specific Application: Handles Text Editing, Information Management Applications Generator or Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, IBM PC-XT: PC-DOS; Columbia: COS 310; DEC Decmate: COS 310
Memory Required: 128.0K bytes
Source Language: Dibol, Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 200
Date First Installed: February 1983
(See Vendor Profile Page V-89)

PYRAMID SERVICE CORP.
WORD PROCESSING
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5120
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: [illegible]
Number Installed to Date: 30
Date First Installed: 1981
(See Vendor Profile Page V-89)

Q-TYPE CORP.
QTYPE 200
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Pertec
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 1,000
(See Vendor Profile Page V-90)

QUANTUM INFORMATION SYSTEMS
SPELL-PROOF
Specific Application: Spelling Checker
Specific Industry: Not Industry Sensitive
System Requirements: Oasis
Memory Required: 8.0K bytes
Source Language: Z80 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 200
Date First Installed: December 1981
(See Vendor Profile Page V-90)

QUARK, INC.
WORD JUGGLER IIE 2.5
Specific Application: WP
System Requirements: Apple III: APPLE-DOS; Apple IIE: APPLE-DOS
Memory Required: 128.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $129 to $295
Number Installed to Date: 6,000
Date First Installed: 1981
(See Vendor Profile Page V-90)

RACET COMPUTERS, LTD.
ELECTRIC PENCIL
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: MEC PC-8001, 8801, Racet Nacdos
Memory Required: 32.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $99
Number Installed to Date: 1,400
Date First Installed: 1982
(See Vendor Profile Page V-91)

RAISIN ENTERPRISES, INC.
QUICKEY
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: DOS; CP/M; TURBO-DOS
Memory Required: 54.0K bytes
Source Language: Cbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 400
Date First Installed: 1982
(See Vendor Profile Page V-91)

REALTY SOFTWARE CO.
PROPERTY MANAGEMENT SYSTEM (PMS)
Additional Product Classification: Graphics
Specific Application: Property Management
System Requirements: Apple II, IIE, III: APPLE-DOS, IBM PC: PC-DOS: CP/M; TRS-80/I, 80/III: TRS-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Date First Installed: February 1978
(See Vendor Profile Page V-92)

R. L. ROUTHETT & ASSOCIATES, INC.
[illegible] WORD PROCESSOR
Specific Application: WP, Budgeting, Portfolio, Calendar
System Requirements: IBM: CP/M 86
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 10
Date First Installed: September 1983
(See Vendor Profile Page V-93)

SELECT INFORMATION SYSTEMS, INC.
[illegible] WORD PROCESSING
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: IBM: PC-DOS, Xerox: CP/M, Altos: CP/M 86
Memory Required: 64.0K bytes
Source Language: Assembler, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 30,000
Date First Installed: 1981
(See Vendor Profile Page V-96)

SIERRA ON-LINE
DICTIONARY
Specific Application: Computerized Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+, IIE, APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2,500
Date First Installed: December 1981
(See Vendor Profile Page V-97)

SIERRA ON-LINE
SCREENWRITER II
Specific Application: WP
Specific Industry: Not Industry Sensitive

System Requirements: Apple II+; APPLE-DOS, Apple IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 16,000
Date First Installed: June 1982

SILICON VALLEY SYSTEMS, INC.
WORD HANDLER II
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, III: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $60
Number Installed to Date: 100,000
Date First Installed: January 1981
(See Vendor Profile Page V-97)

SMARTEK COMPUTER PRODUCTS, INC.
COPY ART II
Specific Application: WP, Graphics, Mailing List, Mail Merge
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/III: TRS-DOS
Memory Required: 48.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 2,100
Date First Installed: July 1982
(See Vendor Profile Page V-98)

SOFTWARE CORP.
DOCUMENT WRITER
Specific Application: Document Writer
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 8000, 9000: Commodore DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $240
Date First Installed: 1983
(See Vendor Profile Page V-99)

SOFTWARE CORP.
LETTER WRITER
Specific Application: Letter Writer
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 8000, 9000: Commodore DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $240
Date First Installed: 1983

SOFTWARE DYNAMICS
EDIT
Specific Application: General Purpose Text Editor
Specific Industry: Not Industry Sensitive
System Requirements: PsiTech GT Series, TRS, Motorola: S-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $115
Number Installed to Date: 1,000
Date First Installed: 1978
(See Vendor Profile Page V-99)

SOFTWARE DYNAMICS
TYPE
Specific Application: Document Text Processing and WP
Specific Industry: Not Industry Sensitive
System Requirements: PsiTech GT Series, TRS, Motorola: S-DOS
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $140
Number Installed to Date: 150
Date First Installed: 1982

SOFTWARE PUBLISHING CORP.
WORD PROCESSING
Specific Application: WP
Specific Industry: Not Industry Sensitive,
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125 to $175
Number Installed to Date: 15,000
Date First Installed: June 1983
(See Vendor Profile Page V-100)

SOFTWARE TOOLWORKS
PIE 1.5
Additional Product Classification: Graphics
Specific Application: Full Screen Editor
Specific Industry: Not Industry Sensitive
System Requirements: Heath/Zenith: CP/M
Memory Required: 32.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30
Number Installed to Date: 4,000
(See Vendor Profile Page V-100)

SOFTWARE TOOLWORKS
SPELL 2.0
Specific Application: Word Proofreader
Specific Industry: Not Industry Sensitive
System Requirements: Heath/Zenith: CP/M; Osborne: CP/M; Kaypro: CP/M
Memory Required: 21.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 2,100
Date First Installed: 1980

SOFTWARE TOOLWORKS
TEXT 4.0
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Multiple Text Formatter
Specific Industry: Not Industry Sensitive
System Requirements: Heath/Zenith: CP/M; Osborne: CP/M; Kaypro: CP/M
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 2,000
Date First Installed: 1980

SOLUTION TECHNOLOGY, INC.
COMPARE II
Specific Application: Differential Text Antalyzer
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86, MS-DOS
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $145
Date First Installed: July 1983
(See Vendor Profile Page V-101)

SOLUTION TECHNOLOGY, INC.
STARMATE
Specific Application: Document Indexing and Finisher for Wordstar
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86; MS-DOS
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Date First Installed: July 1983

SORCIM CORP.
SUPER SPELLGUARD
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: CP/M, CP/M 86, PC-DOS, MS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Date First Installed: 1980
(See Vendor Profile Page V-101)

SORCIM CORP.
SUPERWRITER
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86, PC-DOS, MS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: 1982

SOUTHWESTERN DATA SYSTEMS, INC.
THE CORRESPONDENT
Specific Application: Text Editing Program, WP
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE: APPLE-DOS, Apple II+
Memory Required: 48.0K bytes
Source Language: Assembly, Applesoft
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $95
(See Vendor Profile Page V-101)

SOUTH WEST SYSTEMS
DOCU-WRITER WORD PROCESSOR
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/II: TRS-DOS Plus
Memory Required: 48.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40
Date First Installed: January 1980
(See Vendor Profile Page V-101)

STATE OF THE ART, INC.
WORD PROCESSING
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple III, IBM PC
Memory Required: 64.0K bytes
Source Language: USCP-Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $340
Date First Installed: July 1982
(See Vendor Profile Page V-103)

STRUCTURE SYSTEMS GROUP
WORD RIGHT
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: PC-DOS; IBM: CP/M; Other 8A, 16/32 OS
Memory Required: 52.0K bytes
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1984
(See Vendor Profile Page V-104)

SUPERSOFT, INC.
CORRECTOR
Specific Application: Spelling Correction
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
(See Vendor Profile Page V-104)

SUPERSOFT, INC.
DISK EDIT
Additional Product Classification: Banking, Program Generators/Aids, Application Development Tools
Specific Application: Text Editing;Provides the Raw Information on Disk in Both Hex and Ascii
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86;PC-DOS
Source Language: C
Purchase Terms: Purchase (license)
Price: $100

SUPERSOFT, INC.
STAR EDIT
Additional Product Classification:

Program Generators/Aids, Application Development Tools
Specific Application: Screen Editor Suitable for Any Text Processing Task Including Program Writing and WP
Specific Industry: Not Industry
System Requirements: CP/M, CP/M [illegible], MS-DOS
Memory Required: 32.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $225

SYNTACTICS CORP.
CRYSTALWRITER
Specific Application: Word Processing
Specific Industry: Not Industry
System Requirements: Unix; Xenix
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: [illegible]
Date First Installed: June 1983
(See Vendor Profile Page V-105)

TCS SOFTWARE, INC.
TCS Q/WORD
Specific Application: Word Processor
Specific Industry: Not Industry
System Requirements: Microprocessor 8080; MS-DOS; [illegible]
Memory Required: 85.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: September 1983
(See Vendor Profile Page V-106)

TECHNICAL DATA SYSTEMS, INC.
ASSOCIATION MEMBERSHIP SYSTEM
Specific Application: Keeps Track of Membership, Activities, Status, Contributions, Schedules, Performs Mass Mailing and Accounting
System Requirements: IBM PC; Vector Graphics 420; Xerox 820: CP/M
Memory Required: 64.0K bytes
Source Language: Cbois
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
(See Vendor Profile Page V-108)

TEC, INC.
CLIENT WRITE-UP
Specific Application: Does Write-UpWork for Accountants
Specific Industry: Accounting
System Requirements: [illegible]
Model 12, Model 16: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,[illegible]
Purchase Upgraded to Date: Yes
Date First Installed: November 1981
(See Vendor Profile Page V-109)

THRESHOLD SOFTWARE
WRITE/IDEA
Specific Application: Word Processor
Specific Industry: Not Industry Sensitive
System Requirements: HP 85, HP 86
Memory Required: 64.0K bytes
Source Language: Basic, Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $225
Date First Installed: October 1982
(See Vendor Profile Page V-110)

TRANSPORTATION DATA EXCHANGE (TDE)
WORD PROCESSING
Specific Application: WP
System Requirements: Datapoint: DOS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: 1982
(See Vendor Profile Page V-112)

VISICORP
VISISPELL
Specific Application: WP
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III: APPLE-DOS, IBM PC PC-DOS, Commodore; Atari 800
Purchase Terms: Purchase (license)
Price: $225
(See Vendor Profile Page V-115)

VISICORP
VISIWORD
Specific Application: WP
Specific Industry: Not Industry
System Requirements: Apple II, III: APPLE-DOS, IBM PC: PC-DOS; Commodore; Atari 800
Purchase Terms: Purchase (license)
Price: $375

VOLUTION SYSTEMS
ASE (ADVANCE SYSTEM EDITOR)
Specific Application: Text Editor
Specific Industry: Not Industry
System Requirements: IBM: PC-DOS, Apple; Native; Sage
Memory Required: 164.0K bytes
Source Code Available: Yes
Date First Installed: October 1983
(See Vendor Profile Page V-116)

XYBION CORP.
WORDGRAPHICS
Additional Product Classifications: Graphics
Specific Application: Integrated Editor Making Texture View Graphs and Tables
Specific Industry: Not Industry Sensitive
System Requirements: Ramtek 6214: CP/M, HP 9836
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $1,[illegible]
Date First Installed: 1981
(See Vendor Profile Page V-118)

OTHER

ABACUS CORP.
FASHION MERCHANDISER SYSTEM
Additional Product Classification: Retailing
Specific Application: Black Book
Specific Industry: Retail
System Requirements: IBM 370: OS, DOS
Memory Required: 256.0K bytes
Source Language: Ansi Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 1
Date First Installed: 1979
(See Vendor Profile Page V-1)

ABACUS CORP.
PROFIT SYSTEM
Additional Product Classification: Retailing
Specific Application: Retail Staple Stock System
Specific Industry: Retail
System Requirements: IBM 370: OS, DOS
Memory Required: 256.0K bytes
Source Language: Ansi Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 3
Date First Installed: 1971

ABACUS CORP.
RETAIL SALES ANALYSIS SYSTEM
Additional Product Classification: Retailing
Specific Application: Sales Analysis With Some Levels of Receipts and Sales to Date
Specific Industry: Retail
System Requirements: IBM 370: OS, DOS
Memory Required: 256.0K bytes
Source Language: Ansi Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 10
Date First Installed: 1967

ADS MANAGEMENT SYSTEMS, INC.
PAC I
Additional Product Classification: Project Management
Specific Application: Small Project Management, Research and Development
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E; DEC VAX 11: VMS; DEC 20: Tops 20; HP 3000: MPE
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $20,000
Number Installed to Date: 30
(See Vendor Profile Page V-3)

ADS MANAGEMENT SYSTEMS, INC.
PAC II
Additional Product Classification: Project Management
Specific Application: Project, Research Management In A Multiproject Environment
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs: MCP; DEC VAX: VMS, DEC 10: Tops 10; DEC 20: Tops 20
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $42,000
Number Installed to Date: 850

AGS MANAGEMENT SYSTEMS, INC.
PC/70
Additional Product Classification: Project Management
Specific Application: Planning and Monitoring, Project Research Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS/OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $42,000
Number Installed to Date: 850

AGS MANAGEMENT SYSTEMS, INC.
PC/70 ESTIMATOR
Additional Product Classification: System Development
Specific Application: Systems Development Management and Estimating
Specific Industry: Not Industry Sensitive, DP Departments
System Requirements: IBM: OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $39,500
Number Installed to Date: 375
Date First Installed: 1979

ASCOR COMPUTER CORP.
BUSINESS CONTROL SYSTEM
Additional Product Classification: Distribution Management
Specific Application: Distribution, Order Processing, Sales Analysis, Inventory Control Management
Specific Industry: Wholesale/Distribution
System Requirements: DEC PDP-11: RSTS/E, DEC VAX 11/750, VAX 11/780· VMS
Memory Required: 62.0K bytes
Source Language: Basic Plus II; Basic
Purchase Terms: Purchase (license); Lease
Price: $12,000 to $26,000
Number Installed to Date: 60
(See Vendor Profile Page V-4)

AMERICAN COMPUTER TECHNOLOGIES, INC.
SALES PROSPECTING & MANAGEMENT
Additional Product Classification: Marketing
Specific Application: Marketing System
Specific Industry: Not Industry Sensitive
System Requirements: TI 300, 800, 800; DS-10
Memory Required: 128.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license); Lease
Date First Installed: 1980
(See Vendor Profile Page V-5)

APPLIED BUSINESS SYSTEMS
PURCHASE-MASTER
Additional Product Classification: Purchasing
Specific Application: Requisition and Purchasing Management Control
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: R-DOS; DG Eclipse
Memory Required: 64.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 12
Date First Installed: June 1981
(See Vendor Profile Page V-7)

APPLIED DATA RESEARCH, INC.
ADR/EMAIL - RELEASE 1.0
Additional Product Classification: Electronic Mail
Specific Application: Electronic Mail
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series, 4300 Series: OS, DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $16,000 to $25,500
Date First Installed: 1982
(See Vendor Profile Page V-7)

APPLIED DATA RESEARCH, INC.
ADR/EMAIL - RELEASE 1.0
Additional Product Classification: Electronic Mail
Specific Application: Electronic Mail
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series, 4300 Series: OS, DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $16,000 to $25,500
Date First Installed: 1982

APPLIED DIGITAL COMMUNICATIONS, INC.
DISTRIBUTION SYSTEM
Additional Product Classification: Distribution
Specific Application: Order Processing and Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: CRT; Robot
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 30
Date First Installed: 1976
(See Vendor Profile Page V-8)

BOEING COMPUTER SERVICES CO.
DP8400
Additional Product Classification: Program Generators/Aids, Application Development Tools, Operating Systems, Engineering
Specific Application: Engineering Modeling and Graphics Display
Specific Industry: Engineering
System Requirements: DEC PDP-11/23; DEC VAX-11/730, VAX-11/750
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 3
(See Vendor Profile Page V-13)

BUNKER RAMO ELECTRONIC SYSTEMS
BR1800 OFFICE AUTOMATION SYSTEM
Additional Product Classification: Local Area Network
Specific Application: Fully Integrated Office System, WP, Electronic Mail, Graphics, Calendar, Library, Forms
Specific Industry: Federal Government
System Requirements: PDP-11: Unix; VAX 11; Motorola 6800
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 11
Date First Installed: 1982
(See Vendor Profile Page V-14)

CAMBEX CORPORATION
SYSTEMS, INC.
CONTROL
Additional Product Classification: Distribution
Specific Application: Distribution Management
Specific Industry: Wholesale/Distribution
System Requirements: IBM 4331: DOS, IBM: OS
Memory Required: 2.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300,000
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-16)

CAP INFORMATION SYSTEMS
REAL TIME
Additional Product Classification: Real Time System
Specific Application: Real Time Multiprocessors
Specific Industry: Not Industry Sensitive, Engineering, Government, Scientific
System Requirements: DEC PDP-11: RSX-11; VAX-11: VMS; IBM Series/1: EDX; Intel iRMX
Memory Required: 32.0K bytes
Source Language: Fortran, Macro-11, C, Coral
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000
Number Installed to Date: 4
Date First Installed: January 1982
(See Vendor Profile Page V-16)

CDS COMPUTING
T-BATCH
Additional Product Classification: Data Entry
Specific Application: Data Entry
Specific Industry: Not Industry Sensitive
System Requirements: Tandem
Source Language: Cobol, TAL
Purchase Terms: Purchase (license); Lease

Price: $15,000
Number Installed to Date: 12
Date First Installed: December 1981
(See Vendor Profile Page V-17)

Additional information provided for by vendor

T-Batch

Data entry package runs on DEC VAX, Tandem Computer, Inc. and all CP/M-based systems.

Includes all standard features of data entry such as quick user-written formats, productivity reports and status reports.

Output to disk or tape.

For sale or lease.

Pricing on request.

CHELSEA INTERNATIONAL CORP.
COST SCHEDULE REPORT SYSTEM
Additional Product Classification: Project Management
Specific Application: Cost and Work Break-Down Status Reporting
Specific Industry: Government Contractors
System Requirements: IBM System/370: MVS
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Date First Installed: 1980
(See Vendor Profile Page V-18)

CHILDOFF'S MANAGEMENT CONTROLS, INC.
CMC UNPROCESSED EGG SYSTEM
Specific Application: Receives Unprocessed Eggs, Generates Receipts
System Requirements: Datapoint 1550 DOS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $400
Number Installed to Date: 2
Date First Installed: January 1982
(See Vendor Profile Page V-18)

COMMERCIAL SOFTWARE, INC.

CADETS
Additional Product Classification: Telephone Management
Specific Application: Telephone Usage and Cost Accounting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370, 4300, 3000 Series: OS
Memory Required: 180.0K bytes
Source Language: Cobol
Source Code Available: Yes
Number Installed to Date: 40
(See Vendor Profile Page V-21)

COMMERCIAL SOFTWARE, INC.
TEMS
Additional Product Classification: Accounting, Telephone Management
Specific Application: Telephone Equipment Managment, Order Processing, Equipment Management Reports
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-RSX-11, DEC VAX VMS
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $55,000
Number Installed to Date: 5
Date First Installed: 1981

COMPUTER ASSOCIATES
CA - SCHEDULER
Additional Product Classification: Scheduler
Specific Application: Scheduler
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: MVT, IBM 300 Series, 370: OS, MVS
Memory Required: 256.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 300
Date First Installed: 1978
(See Vendor Profile Page V-23)

COMPUTER ASSOCIATES
CA-DISTRIBUTION MANAGEMENT SOFTWARE/ORDER PROCESS
Additional Product Classification: Order Processing
Specific Application: Order Processing
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: MVT, IBM 300 Series: DOS; DG: OS, MVS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $27,000
Number Installed to Date: 400
Date First Installed: 1978

COMPUTER ASSOCIATES
CA-DISTRIBUTION MANAGEMENT SOFTWARE/PURCHASING
Additional Product Classification: Purchasing
Specific Application: Purchasing
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: MVT; 300 Series: DOS; DG: OS, MVS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000
Number Installed to Date: 400
Date First Installed: 1978

COMPUTER ASSOCIATES, INC.
CAPS
Additional Product Classification: Retail
Specific Application: Retail Pharmacy
Specific Industry: Retail
System Requirements: DEC PDP-

A Return on your Investment

11: CTS-300, CTS-500
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $5,000
Number Installed to Date: 20
Date First Installed: 1981

COMPUTER CORP. OF AMERICA

COMET/204
Additional Product Classification: Electronic Mail
Specific Application: Electronic Mail
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300 Series: OS, DOS/VSE
Memory Required: 350.0K bytes
Source Language: User Language
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $90,000
Number Installed to Date: 75
Date First Installed: 1981
(See Vendor Profile Page V-23)

COMPUTER INFORMATION SYSTEMS

ADVERTISING AND COMMUNICATION SYSTEM
Additional Product Classification: Advertising
Specific Application: Advertising and Communication
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 512.0K bytes
Source Language: VAX Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30,000 to $90,000
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-24)

COMPUTER INPUT CORP.

JURY SELECTION & MANAGEMENT
Additional Product Classification: Government
Specific Application: Jury Selection System
Specific Industry: Government
Memory Required: 156.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $42,000
Number Installed to Date: 123
Date First Installed: 1977
(See Vendor Profile Page V-24)

COMPUTER POWER

MORTGAGE SERVICING PACKAGE (MSP)
Additional Product Classification: Mortgage Accounting
Specific Application: Mortgage Management, New Loan Collections, Escrow, Secondary Market Reporting, Management Reports, Payoff
Specific Industry: Banking/Financial, Mortgage Servicing
System Requirements: IBM 370, 4300, 4341: DOS/VSE, OS/VS1
Memory Required: 1.0M bytes
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Lease, License
Number Installed to Date: 132
Date First Installed: 1967
(See Vendor Profile Page V-25)

COMPUTER TALK, INC.

ELECTRONIC MAIL
Additional Product Classification: Electronic Mail
Specific Application: Receives and Transmits Electronic Mail
Specific Industry: Not Industry Sensitive
System Requirements: Computer Talk 400: Tos
Memory Required: 2.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 3
Date First Installed: May 1983
(See Vendor Profile Page V-27)

COMSHARE

PROFILES/3000
Additional Product Classification: Human Resource Management
Specific Application: Personnel Record Keeping System for Transaction Updating, Standard Reporting, Ad Hoc Inquiry
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: Cobol, Image
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,500
Number Installed to Date: 22
Date First Installed: August 1981
(See Vendor Profile Page V-29)

COMTECTRA SYSTEMS, INC.

WALL STREET WIZARD
Additional Product Classification: Financial
Specific Application: Martin Data Base Analysis, News Service
Specific Industry: Banking/Financial
System Requirements: IBM, Burroughs B7800
Source Language: Basic, Cobol, Fortran, PL/1
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-29)

CONSOLIDATED COMPUTER SERVICES, INC.

WDS
Additional Product Classification: Wholesale Distribution
Specific Application: Wholesale Distribution System Including Order Processing, Accounts Receivable, Inventory Control and Analysis
Specific Industry: Wholesale/Distribution
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000
Number Installed to Date: 500
Date First Installed: March 1975
(See Vendor Profile Page V-29)

CORPORATE SERVICES INTERNATIONAL

TELEMAIL
Additional Product Classification: Electronic Mail
Specific Application: Electronic Mail System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: VM, IBM 370: VM
Memory Required: 1.0M bytes
Source Language: APL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $3,000
Date First Installed: 1982
(See Vendor Profile Page V-31)

CYTROL, INC.

CYX-MB ELECTRONIC MAILBOX
Additional Product Classification: Electronic Mail
Specific Application: Provides Electronic Mail Services
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/24-70: RSX-11M; DEC VAX: VMS
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 10
Date First Installed: May 1983
(See Vendor Profile Page V-34)

DATAIR

PTAX
Additional Product Classification: Pension
Specific Application: Pension Trust Administration
Specific Industry: Banking/Financial, Insurance, Pension Consultants
System Requirements: IBM System 360: CP/M; IBM System 370: DOS; IBM System 360/22: DOS/VS. IBM System 370/125: OS
Memory Required: 256.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $120,000
(See Vendor Profile Page V-36)

DEFARO SOFTWARE SYSTEMS, INC.

SMS 1
Additional Product Classification: Education
Specific Application: Educational Management System for Private Schools
Specific Industry: Education
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $35,000
Number Installed to Date: 1
Date First Installed: July 1982
(See Vendor Profile Page V-40)

DEFARO SOFTWARE SYSTEMS, INC.

SMS 2
Additional Product Classification: Education
Specific Application: Educational Management System for Public Schools
Specific Industry: Education
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $1
Number Installed to Date: 1
Date First Installed: January 1981

DESIGN SYSTEMS, INC. (NJ)

DSI MAILING LIST
Additional Product Classification: Marketing
Specific Application: Mailing List
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 2
Date First Installed: January 1982
(See Vendor Profile Page V-41)

DUN & BRADSTREET COMPUTING SERVICES

KEY/MASTER
Additional Product Classification: Data Entry
Specific Application: On-Line Data Entry System for Cics
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 370, System 360: DOS, OS, VS
Memory Required: 130.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20,000 to $40,000
Number Installed to Date: 1,000
Date First Installed: 1974
(See Vendor Profile Page V-44)

EDP MANAGEMENT, INC.

REVIEW
Additional Product Classification: Report Writer
Specific Application: Report Writer, Increases Productivity, Training
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $10,000
Date First Installed: June 1972
(See Vendor Profile Page V-45)

ENTERPRISE TECHNOLOGY CORP.

GENERALIZED REPORTING SYSTEM (GRS)
Additional Product Classification: Report Writer
Specific Application: User-Friendly Report Writer; Can Be Used By Programmers and Nonprogrammers
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/70; DEC VAX: VMS
Memory Required: 64.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,500 to $5,500

Number Installed to Date: 100
Date First Installed: September 1981
(See Vendor Profile Page V-47)

FOGIE SYSTEMS MANAGEMENT GROUP, INC.
DISTRIBUTION SYSTEM
Additional Product Classification: Distribution System
Specific Application: Inventory Management, Order Entry, Invoicing, Sales Analysis, Purchasing
Specific Industry: Wholesale/Distribution
System Requirements: Honeywell DPS6 Geos
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Date First Installed: 1977
(See Vendor Profile Page V-48)

GENERAL ELECTRIC INFORMATION
DISPATCH 3000 SYSTEM
Additional Product Classification: Distribution
Specific Application: Order Entry, Inventory Control, Purchasing, Accounts Receivable, Accounts Payable, Fixed Asset Accounting, General Ledger, Commission Reporting, Sales Analysis, Direct Customer Order Processing, Electronic Mail
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM 4331 and Larger OS, DOS
Memory Required: 2.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $150,000 to $425,000
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-51)

GENERAL ELECTRIC INFORMATION
THE QUIK-COMM SYSTEM
Additional Product Classification: Electronic Mail
Specific Application: Electronic Mail Transmission
Specific Industry: Manufacturing, Wholesale/Distribution, Banking/Financial, Legal, Insurance, Government, Transportation, Nonprofit Organizations
Source Code Available: No
Purchase Terms: RCS Basis
Number Installed to Date: 450
Date First Installed: April 1981

GLENN A. BARBER AND ASSOCIATES
DI HANDLER
Additional Product Classification: Printer Utility
Specific Application: Handles Daisy Wheel Quality Printers
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RT-11, RSX-11, TSX Plus, RSTS/E
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
(See Vendor Profile Page V-51)

GLENN A. BARBER AND ASSOCIATES
DZ HANDLER
Additional Product Classification: Printer Utility
Specific Application: Line Printing on A DZ Line
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RT-11, RSX-11, TSX Plus, RSTS/E
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000

GLENN A. BARBER AND ASSOCIATES
ETS
Additional Product Classification: Terminal Utility
Specific Application: Vertical Line Capability
Specific Industry: Not Industry Sensitive
System Requirements: Wang: VS
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)

GOULD, INC.
VECTOR PROCESSOR COMMON MEMORY SW
Additional Product Classification: Vector Processing
Specific Application: Seismic, Image Processing FFT
Specific Industry: Engineering, Scientific
System Requirements: Concept/32 CPU and C: MPX-32
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
(See Vendor Profile Page V-52)

HCE COMPUTER CONSULTANTS
INTERACTIVE LIBRARY PROCESSING SYSTEM
Additional Product Classification: Library Management
Specific Application: Performs Circulation Acquisition Budget Analysis, Text Services, Patron History
Specific Industry: Government, Municipal Libraries
System Requirements: IBM System/36: IRX; NCR: VRX; IBM System/34
Memory Required: 1.0M bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: April 1982
(See Vendor Profile Page V-54)

HERBERT FRIEDMAN & ASSOCIATES, INC.
CRISP
Additional Product Classification: Manufacturing, Order Entry
Specific Application: Integrated Distribution/Manufacturing: Control/Financial Control
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: IBM System/38, CPF
Memory Required: 2.0M bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: September 1981
(See Vendor Profile Page V-54)

Additional information provided for by vendor

Crisp is fully on-line, written in RPG-III and native to the IBM System/38. We custom it to client specifications prior to delivery. All modules are completely integrated. All facets of manufacturing and distribution are covered as well as the cost and financial accounting for those operations. On-site consulting is provided. Price includes DDS, source and object.

HERMENET, INC.
COMNET-5 V2.1 ELECTRONIC MAIL SYSTEM
Additional Product Classification: Electronic Mail
Specific Application: Multiuser Networked Electronic Mail and File Transfer
Specific Industry: Not Industry Sensitive
System Requirements: Molecular Computer Supermicro: NS-DOS; OSM Zeus: Muse
Memory Required: 58.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 720
Date First Installed: July 1982
(See Vendor Profile Page V-54)

H & M SYSTEMS SOFTWARE, INC.
KEYFAST-ON-SITE DATA ENTRY SYSTEM
Additional Product Classification: Data Entry
Specific Application: Data Entry
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370-4300 Series. DOS, OS; IBM 4300 Series
Memory Required: 128.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license); Lease
Price: $15,400 to $22,000
Number Installed to Date: 520
Date First Installed: June 1981
(See Vendor Profile Page V-54)

THE HOWER GROUP
FAST
Additional Product Classification: Tax Collection
Specific Application: On-Line Appraisal Assessment, Tax Collection
Specific Industry: Government, State
System Requirements: IBM 4300 Series: DOS/VSE, Prime: Primos;IBM PC-XT: OS/M, VS Burroughs 1800 Series. OS/VS
Memory Required: 256.0K bytes
Source Language: Cobol, Basic, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 50
Date First Installed: 1981
(See Vendor Profile Page V-55)

INFORMATICS GENERAL CORP.
AMORTIZATION (AM)
Additional Product Classification: Property Management
Specific Industry: Banking/Financial, Real Estate
System Requirements: IBM System/36, System/34, System/23, IBM PC-XT DOS 2.0
Memory Required: 128.0K bytes
Source Language: RPG-II, Basic, MS Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200 to $400
(See Vendor Profile Page V-57)

INFORMATICS GENERAL CORP.
CIMS (CORPORATE INVESTMENT MANAGEMENT SECURITY)
Additional Product Classification: Financial
Specific Application: Security Investments (Stock and Bond)
Specific Industry: Banking/Financial, Insurance
System Requirements: IBM Mainframes. OS/DOS/Cics
Memory Required: 300.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 38
Date First Installed: November 1983

INFORMATICS GENERAL CORP.
FINANCIAL REPORTING (FR)
Additional Product Classification: Property Management
Specific Industry: Banking/Financial, Real Estate
System Requirements: IBM System/36, System/34, System/23; IBM PC-XT .DOS 2.0
Memory Required: 64.0K bytes
Source Language: RPG-II, Basic, MS Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,900

INTERPROCESS SYSTEMS, INC.
MAIL EXCHANGE OPTION FOR AFM/AP
Additional Product Classification: Electronic Mail
Specific Application: Electronic Mail Facility
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: MVS, TSO, VS
Memory Required: 10.0K bytes
Source Language: Basic Assembler, APL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $3,500
Number Installed to Date: 10
Date First Installed: September 1982
(See Vendor Profile Page V-61)

LAURITS R. CHRISTENSEN ASSOCIATES, INC.
ECONOMETRIC PROGRAMMING LANGUAGE (EPL)
Additional Product Classification: Econometrics
Specific Application: Econometric Modeling, Time Series Analysis
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse: AOS, AOS/VS
Memory Required: 512.0K bytes
Source Language: Fortran 77
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,500
Number Installed to Date: 3
Date First Installed: September 1981
(See Vendor Profile Page V-85)

MARKETING & SALES SOFTWARE, INC.
ACTIONS
Additional Product Classification: Market and Sales
Specific Application: Managing, Recording, Scheduling, Producing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 3
Date First Installed: April 1983
(See Vendor Profile Page V-69)

MASSTOR SYSTEMS CORP.
MASSNET
Additional Product Classification: Network System
Specific Application: High Speed Computer to Computer Network - Contact Company for Specific Network Capabilities
Specific Industry: Not Industry Sensitive
System Requirements: Sperry 1100 Series, IBM 370 Series; DEC VAX, PDP, CDC
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 150
Date First Installed: September 1978
(See Vendor Profile Page V-70)

MCDONNELL DOUGLAS AUTOMATION CO.
MANAGEMENT SCHEDULING AND LEVELING SYSTEM
Additional Product Classification: Scheduling
Specific Application: Scheduling and Resource Analysis
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX-11/730: VAX, VAX-11/750, VAX-11/780, VAX-11/782: VAX/VMS
Memory Required: 400.0K bytes
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 370
Date First Installed: September 1969
(See Vendor Profile Page V-71)

MCDONNELL DOUGLAS AUTOMATION CO.
LINE ITEM STATUS SYSTEM
Additional Product Classification: Item Tracking and Scheduling
Specific Application: Material and Equipment Control Drawing,Tracking
Specific Industry: Manufacturing, Engineering, Construction
System Requirements: IBM 3033 OS/MVS, CDC Cyber 170 Series, DEC PDP-11, VAX-11/780: VMS
Memory Required: 350.0K bytes
Source Language: Ansi Cobol
Source Code Available: No
Purchase Terms: Purchase (license), Lease
Price: $75,000
Number Installed to Date: 50

MCDONNELL DOUGLAS AUTOMATION CO.
MCAUTO FREIGHT BILL AUDIT
Additional Product Classification: Transportation
Specific Application: Freight Bill Audit and Reporting
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Transportation
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: January 1982

MCDONNELL DOUGLAS AUTOMATION CO.
MCAUTO FREIGHT RATING AND ROUTING
Additional Product Classification: Transportation
Specific Application: Freight Rating and Routing
Specific Industry: Manufacturing, Wholesale/Distribution, Transportation
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 20
Date First Installed: April 1982

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
SALES HISTORY
Additional Product Classification: Sales
Specific Application: Sales History
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: MPE, HP
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 500
(See Vendor Profile Page V-75)

MCGS, INC.
USER MAIL
Additional Product Classification: Electronic Mail
Specific Application: Electronic Message System, Correspondence Management, Appointment Calendar
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RSTS/E
Source Language: Basic Plus II
Price: $2,680
Number Installed to Date: 50
Date First Installed: April 1982
(See Vendor Profile Page V-79)

NCR CORP.
IRMS-INTERACTIVE RETAIL MANAGEMENT SYSTEM
Additional Product Classification: Retail Inventory
Specific Application: General Ledger, Credit Authorization for Accounts Receivable, Class Level Inventory and Sales Analysis
Specific Industry: Retail
System Requirements: NCR I Series: Imos; NCR 8200 Series: IRX, NCR 9000 Series: ITX; NCR 9300 Series
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: January 1977
(See Vendor Profile Page V-79)

NCR CORP.
NCR-ADCOM ADVANCED COMMUNICATIONS
Additional Product Classification: Communications for Retail
Specific Application: Provide Scheduling Services, Two-Way File Transmission
Specific Industry: Retail
System Requirements: NCR 8020: Imos V
Memory Required: 384.0K bytes
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: May 1983

NORTHERN TELECOM, INC.
OMNIMAIL
Additional Product Classification: Electronic Messenger
Specific Application: Electronic Messenger Display Phone
Specific Industry: Not Industry Sensitive
System Requirements: Northern Telecom 585: 4.1 Omni Task: Northern Telecom SBI
Memory Required: 512.0K bytes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1983
(See Vendor Profile Page V-81)

PLEX DATA BASE SYSTEMS, INC.
INNER OFFICE ELECTRONIC MAIL SYSTEM
Additional Product Classification: Electronic Mail
Specific Application: Memo Maintenance Communication
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: HP: Basic
Memory Required: 56.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 3
(See Vendor Profile Page V-80)

POLICE DATA SYSTEMS LAW ENFORCEMENT AUTOMATED DATA SYSTEM
Additional Product Classification: Law Enforcement
Specific Application: Police Records Management, Crime Analysis, Computer-Aided Dispatch
Specific Industry: Government
System Requirements: DEC PDP-11/24: RSTS/E; DEC VAX-730, VAX-750
Memory Required: 512.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000 to $100,000
Number Installed to Date: 6
Date First Installed: July 1981
(See Vendor Profile Page V-86)

SAS INSTITUTE, INC.
SAS/OR
Additional Product Classification: Scheduling
Specific Application: Operating Research Product, Scheduling
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, VM/CMS, SXS, DEC VAX: VMS, DG: Eclipse MV Series; Prime 50 Series: Primos
Memory Required: 512.0K bytes
Source Language: IBM Assembler, Fortran, PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,800
(See Vendor Profile Page V-95)

SIGMA SOFTWARE, INC.
LIFE SUPPORT
Additional Product Classification: Sales
Specific Application: Sales Illustration Package for the Life Insurance Industry
Specific Industry: Insurance
System Requirements: Wang 2200 Series; Wang PC; IBM PC: PC-DOS
Memory Required: 28.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 500
Date First Installed: 1977
(See Vendor Profile Page V-87)

SPIRE SOFTWARE, INC.
PENSION
Additional Product Classification: Pension
Specific Application: Corporate and Keogh Plan, Defined Benefits and Defined Contribution
Specific Industry: Insurance, Life Insurance
System Requirements: Wang 2200 Series, Wang PC; IBM PC: PC-DOS
Memory Required: 32.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 125
Date First Installed: 1980

THE SOLUTIONS GROUP, INC.
THE STUDENT SOLUTION
Additional Product Classification: Education Administration
Specific Application: A Complete Student Information Management System
Specific Industry: Education
System Requirements: CP/M; IBM PC: PC-DOS; DEC III
Memory Required: 64.0K bytes
Source Language: D Base II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: 1983
(See Vendor Profile Page V-101)

SPSS, INC.
SCSS
Additional Product Classification: Statistics
Specific Application: Conversational Statistical System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300 Series. CMS, MVS, OS; DEC System/10, System/20 Tops VMS, Burroughs (Large and Small); Prime 400
Memory Required: 150.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1977
(See Vendor Profile Page V-102)

SPSS, INC.
SPSS DATA ANALYSIS SYSTEM
Additional Product Classification: Report Generator, Data/File Management, Statistics
Specific Application: Report Writer, Data and File Handling, Cross Tabulation, Multiple Regressidn
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RSX-11, RT-11
Memory Required: 150.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1986

SPSS, INC.
SPSS/11
Additional Product Classification: Report Generator, Data/File Management, Statistics
Specific Application: Report Writer, Data and File Handling, Cross Tabulations, Multiple Regression
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RSTS/E, RSX, RT-11
Memory Required: 56.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1976

SPSS, INC.
SPSSX
Additional Product Classification: Statistics
Specific Application: Information Analysis, Statistics, File Handling
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CMS/OS, DEC VAX VMS, DEC System/20: Tops 20
Memory Required: 1.0M bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: April 1983

STANDARD COMPUTER SYSTEMS
VOTER REGISTRATION SYSTEM
Additional Product Classification: Voter Registration
Specific Application: Voter Registration System
Specific Industry: Government
System Requirements: IBM: DOS/VSE
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 4
Date First Installed: 1983
(See Vendor Profile Page V-102)

SYSTEMS & COMPUTER TECHNOLOGY CORP. (SCT)
ISIS
Additional Product Classification: Admissions
Specific Application: Complete Package for Admissions Registration, Financial Aid
Specific Industry: Education
System Requirements: IBM 370, 3030, 3033, 4300 DOS/VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150,000
Date First Installed: December 1979
(See Vendor Profile Page V-106)

SYSTEMS UNLIMITED, INC.
SUNPAC: SR-STUDENT RECORDS
Additional Product Classification: Administration
Specific Application: Class Scheduling, Grade Reporting and Attendance, Accounting
Specific Industry: Education
System Requirements: DG CS: AOS, Icos, IBM System/34, System/38 SSP, SCP, Prime: Primos, NCR 8200, 9030 Imos III
Source Language: Ansi Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,000
Date First Installed: February 1982
(See Vendor Profile Page V-107)

3M DATATRACK SYSTEMS INC.
SALES SUMMARY DATATRACK
Specific Application: Sales Summary
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: HP
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-110)

TOP DOWN SYSTEMS
QWICK-MAIL
Additional Product Classification: Electronic Mailing
Specific Application: Document and Message Electronic Mail Packages
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CP/M, DOS, VS, MVS
Memory Required: 256.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license); Rental, Lease
Price: $9,375
Number Installed to Date: 25
Date First Installed: 1983
(See Vendor Profile Page V-111)

UNITED EDUCATION & SOFTWARE
ADMINS
Additional Product Classification: Management
Specific Application: Complete Student Management, Includes Grading, Class Setup, Attendance, Accounts Payable, Payroll, General Ledger, Profitability
Specific Industry: Education
Memory Required: 48.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $15,000
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-113)

UNIVERSITY COMPUTING CO.
UCC 2 DOS UNDER OS (DUO)
Additional Product Classification: Conversion Aids
Specific Application: DOS to OS Transition Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVT, MVS, VSI
Source Language: ALC
Purchase Terms: Purchase (license); Rental, Lease
Price: $42,000
Number Installed to Date: 1,000
Date First Installed: 1970
(See Vendor Profile Page V-114)

UNIVERSITY COMPUTING CO.
UCC 7/AUTOMATED PRODUCTION CONTROL
Additional Product Classification: Schedules
Specific Application: Schedules
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVT,VS7, MVS
Memory Required: 220.0K bytes
Source Language: ALC
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease, 36 Month Installments
Price: $55,000
Number Installed to Date: 400
Date First Installed: November 1977

UNIVERSITY COMPUTING CO.
UCC 8 MANAGEMENT SUPPORT SYSTEM
Additional Product Classification: Data Center Management
Specific Application: Management Support System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: VS7,MVS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease, 36 Month Installments
Price: $40,500
Number Installed to Date: 30
Date First Installed: 1980

UNIVERSITY COMPUTING CO.
UCC 9 RT HARDWARE RELIABILITY SYSTEM
Additional Product Classification: Data Center Management
Specific Application: Hardware Reliability
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, MVT, MVS, VS7
Memory Required: 512.0K bytes
Source Language: PL/1
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease, 12 Month Installments
Price: $16,500
Number Installed to Date: 700
Date First Installed: September 1976

UNIVERSITY COMPUTING CO.
UCC 20 OS JCL GENERATOR
Additional Product Classification: Conversion Aids
Specific Application: OS JCL Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370 DOS, VSI, MVS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease, UCC 20
Price: $10,500
Date First Installed: 1981

UNIVERSITY COMPUTING SERVICES CORP.
MAIL
Additional Product Classification: Electronic Mail
Specific Application: Electric Mail
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs 5900 MCP, Burroughs 6000 MCP; Burroughs 7000 MCP
Source Language: Algol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 3
Date First Installed: July 1982

ALPHANETICS
BUSINESS PROGRAMS PAC 1
Additional Product Classification: Business
Specific Application: 15 Business Programs including Loans, Assets and Depreciation, Cash Flow and Analysis
System Requirements: IBM PC: PC-DOS; IBM PC-XT: PC-DOS 2.0
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 2,000
Date First Installed: 1982
(See Vendor Profile Page V-4)

BILLINGS COMPUTER CORP.
BILLINGS POSTMASTER PACK
Additional Product Classification: Electronic Mail
Specific Application: Billings Data Center Electronic Mail Installation
Specific Industry: Not Industry Sensitive
System Requirements: Billings: Boss
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: 1982
(See Vendor Profile Page V-12)

BILLINGS COMPUTER CORP.
BILLINGS ELECTRONIC MAIL (E-MAIL)
Additional Product Classification: Electronic Mail
Specific Application: Electronic Mail
Specific Industry: Not Industry Sensitive
System Requirements: Billings: Boss
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: 1982

BUSINESS PLANNING SYSTEMS, INC.
PLAN 80
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86; MS-DOS
Memory Required: 128.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 3,000
Date First Installed: October 1980
(See Vendor Profile Page V-14)

COMPUTER RESOURCES, INC.
STUDENT MASTER FILE
Additional Product Classification: Administration
Specific Application: Generalized Student Data Base System
Specific Industry: Education
System Requirements: TRS-80; Apple II
Memory Required: 28.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 150
Date First Installed: May 1982
(See Vendor Profile Page V-25)

COMPUTONE SYSTEMS, INC.
FINANCIAL PLANNING AND INSURANCE POLICY
Additional Product Classification: Financial Planning
Specific Application: Estate Planning, Business Evaluation, Financial Needs Analysis, Client Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 8,000
Date First Installed: 1970
(See Vendor Profile Page V-28)

COMSHARE
APPLICANT TRACKING
Additional Product Classification: Human Resource Management
Specific Application: Record Keeping, Standard Ad Hoc Reporting, Letter Generation, Data Extraction
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT: CP/M 86
Memory Required: 256.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: June 1983
(See Vendor Profile Page V-29)

CYBERNETICS, INC.
ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 86, MS-DOS, Unix: RM/COS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1981
(See Vendor Profile Page V-34)

CYBERNETICS, INC.
SALES ANALYSIS
Additional Product Classification: Sales
Specific Application: Sales Analysis
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 86; MS-DOS, Unix: RM/COS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1981

FOGLE COMPUTING CORP.
INVENTORY
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $600 to $1,200
Number Installed to Date: 25
Date First Installed: July 1982
(See Vendor Profile Page V-49)

FOGLE COMPUTING CORP.
P-COM
Specific Application: Electronic Mail
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $325
Number Installed to Date: 9
Date First Installed: May 1983

H & E COMPUTRONICS, INC.
VERSAINVENTORY
Additional Product Classification: Inventory
Specific Application: Inventory
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS, IBM PC: PC-DOS, Apple II, IIE, II+: APPLE-DOS, CP/M
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 6,000
Date First Installed: July 1982
(See Vendor Profile Page V-54)

MEMOTECH CORP.
DIRECT SALES MANAGER
Additional Product Classification: Sales
Specific Application: Menu Screens for Order Entry, Invoice Printing, Media Analysis, Inventory and Additional Programs
System Requirements: IBM PC: PC-DOS, CP/M, MP/M
Memory Required: 400.0K bytes
Source Language: D-Base
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 3
Date First Installed: November 1982
(See Vendor Profile Page V-72)

MICRO COMPUTER SYSTEMS
QUICK & EASY QUOTATION AND ANALYSIS
Additional Product Classification: Sales Quotation
Specific Application: Sales Quotation
System Requirements: Vector Graphics: CP/M, IBM PC: CP/M; Discovery: CP/M
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: January 1981
(See Vendor Profile Page V-73)

MICRO CORP.
INTELLITERM
Additional Product Classification: Communications
Specific Application: Micro and Mainframe Programs Communications
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/III: L-DOS; IBM PC-XT: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 300
Date First Installed: 1980
(See Vendor Profile Page V-73)

MICRO COURSEWARE CORP.
BLUE CHIP 1: INTRODUCTION TO MICRO APPLICATIONS
Specific Application: Development of Microcomputer Literacy for Business Professionals
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, PC-XT
Main Memory Required: 64.0K Bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (License)
Price: $95
Date First Installed: November 1983

MICRO COURSEWARE CORP.
444 Geary Blvd.
San Francisco, CA 94118
(415) 751-5223

MICROSOFT
MICROSOFT MULTI-TOOL
INSIGHT EXPERT SYSTEM
Additional Product Classification: Management
Specific Application: Management
System Requirements: Apple II: MS-DOS, Apple IIE, Apple III
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-74)

MOHAWK DATA SCIENCES CORP.
WORLD WIDE INTEGRATED COMMUNICATION
Specific Application: Electronic Mail
Specific Industry: Not Industry Sensitive
System Requirements: MDS Series 21: OS/2; MDS 2110: OS/10
Memory Required: 128.0K bytes
Source Code Available: Yes
Purchase Terms: Rental
Date First Installed: April 1981
(See Vendor Profile Page V-77)

PEACHTREE SOFTWARE
INFORMATION ACCESS
Specific Application: Data Exchange
Specific Industry: Not Industry Sensitive
Memory Required: 56.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $375
(See Vendor Profile Page V-85)

PEACHTREE SOFTWARE
INVENTORY MANAGEMENT
Specific Application: Inventory Control

Specific Industry: Not Industry Sensitive
Memory Required: 50.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750

PEACHTREE SOFTWARE
JOB COST SYSTEM
Specific Application: Job Cost Tracker
Specific Industry: Not Industry Sensitive
Memory Required: 50.0K bytes
Source Language: Mbasic
Purchase Terms: Purchase (license)
Price: $750

PEACHTREE SOFTWARE
LIST MANAGER
Specific Application: Data Base, List Manager
Specific Industry: Not Industry Sensitive
Memory Required: 48.0K bytes
Source Language: Mbasic
Purchase Terms: Purchase (license)
Price: $250

QUE CORP.
SUPERCALC SUPERPANELS
Specific Application: Runs Under Supercalc: Cash Flow Management, Financial Statement Presentation, Financial Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $80
Date First Installed: February 1983
(See Vendor Profile Page V-90)

QUE CORP.
VISICALC MODELS FOR BUSINESS
Specific Application: Runs Under Visicalc: Cash Flow Management, Financial Statement Presentation
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III, TRS-80/II, TRS-80 Model 4, IBM PC
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $80
Date First Installed: February 1983

REDDING GROUP, INC.
GRAFTALK — VERSION 2.15
Specific Application: Business Graphics Package, Text Editor, Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; PC-DOS, MS-DOS, CP/M 86
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Date First Installed: 1981
(See Vendor Profile Page V-92)

SALES PRODUCTIVITY SYSTEMS, INC.
SALES AND MARKETING MANAGEMENT INFORMATION SYSTEM (SAMMIS)
Specific Application: Sales, Marketing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT, PC-DOS 2.2, Altos 580, 8000, MP/M, Altos 586, 8600 Unix
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: June 1982
(See Vendor Profile Page V-94)

SATURN SYSTEMS, INC.
32K RAMBOARD MOVEDOS
Additional Product Classification: Program Application
Specific Application: Moves Disk Operating System into 32K-Byte Saturn RAM Board
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE APPLE-DOS
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: January 1982
(See Vendor Profile Page V-95)

SATURN SYSTEMS, INC.
64/128 RAM BOARD PRELUDO-DISK
Specific Application: Allows 64/128 Saturn RAM Board to be Used as a Disk Drive Under APPLE-DOS
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE Apple DOS 3.3
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 11,000
Date First Installed: January 1982

SATURN SYSTEMS, INC.
64/128 RAM BOARD RAMDEXPAND
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+, IIE, II: APPLE-DOS
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 11,000
Date First Installed: January 1982

SATURN SYSTEMS, INC.
CP/M PSEUDO-DISK
Specific Application: Allows Saturn RAM Card to be Used as A Disk Drive
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE, CP/M
Memory Required: 48.0K bytes
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 11,000
Date First Installed: January 1982

SATURN SYSTEMS, INC.
NEPTUNE PASCAL PSEUDO-DISK
Specific Application: Allows Neptune RAM Card to be Used as a Disk Drive
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE: Pascal
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: January 1982

SOFTWARE CONNECTIONS
LAN MAIL MONITOR
Specific Application: Electronic Mail
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; Apple II, IIE
Memory Required: 192.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 300
Date First Installed: 1983
(See Vendor Profile Page V-99)

SOFTWARE CONNECTIONS
LAN TIMEKEEPER
Specific Application: Time Management, Electronic Calendar, Scheduler
Specific Industry: Not Industry Sensitive
System Requirements: Apple II
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: August 1983

SOFTWARE TECHNOLOGY FOR COMPUTERS
ORDER ENTRY
Specific Application: Order Entry
Specific Industry: Not Industry Sensitive, Retail
System Requirements: Apple: APPLE-DOS 3.3; IBM PC: PC-DOS 1.1
Memory Required: 48.0K bytes
Source Language: Assembly, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $695
Date First Installed: 1983
(See Vendor Profile Page V-100)

Payroll/Personnel

ADMINISTRATIVE SUPPORT MODULE	N/A	C-12
AFSUM PAYROOL/PERSONNEL	N/A	C-2
AGRICULTURAL PAYROLL PACKAGE	$2,500	C-18
ALLTAX TAXING SYSTEM	N/A	C-12
APIR PERSONNEL AGENCY	N/A	C-1
ASAP - PAYROLL	$4,000	C-6
ATTENDANCE PROCESSING	N/A	C-13
AUTOMOTIVE RELEASE SYSTEM	$12,500	C-7
AUTOMATED T/A, P/R, PERSONNEL	$20,000	C-1
BAT 1700 FOR ACCOUNTING	N/A	C-10
BENEFIT PLAN ADMINISTRATION	$70,000 to $134,000	C-17
BENEFITS/ERISA	N/A	C-17
BENICOM	N/A	C-7
BETA PAYROLL CHECKWRITING	$2,150	C-3
BUSINESS 3000 PAYROLL PERSONNEL	$17,500	C-16
CA-ADMINISTRATION/PERSONNEL	$27,000	C-3
CA-PERSONNEL MANAGEMENT	$17 to $20	C-3
CALIFORNIA PAYROLL	$500	C-5
CICS PAYROLL	$25,000	C-18
CJ/PAYROLL	$15,000	C-2
CJ/PERSONNEL	$24,000	C-2
CLIENT PAYROLL SYSTEM	$4,000	C-10
CLIENT WRITE UP	N/A	C-11
CLIENT WRITE UP	N/A	C-12
CMC PAYROLL SYSTEM	$950	C-2
COMPUPAY	N/A	C-13
COMMUNITY ACTION AGENCY/FUND ACCOUNTING	$5,000	C-14
CONTRACTORS PAYROLL	$995	C-15
CONTRACTOR PAYROLL, A/R & JOB COSTING	N/A	C-16
CORPORATE HUMAN RESOURCES	N/A	C-3
CPAS PAYROLL SYSTEM	$2,500 to $5,000	C-3
CSCO ORDER ENTRY & INVOICING SYS	$6,000	C-2
DATAMERICA PAYDAY PAYROLL	$1,850	C-4
DATASTAT PAYROLL	$1,500	C-5
DATE-COM PAYROLL	$2,500	C-4
DYNALOGIC CONSTRUCTION JOB COSTING	$20,000	C-5
EASE PAYROLL	N/A	C-17
ED PAYROLL	$5,000 to $12,000	C-6
EEO & OSHA REPORTING	N/A	C-13
EEO RETRIEVAL SYSTEM	$725	C-15
EIS/BASE PAYROLL SYSTEM	N/A	C-17
EMPLOYEE BENEFIT ADMINISTRATION SYSTEM	$20,000	C-13
EMPLOYMENT HISTORY	$1,000	C-18
EMPLOYEE INFORMATION SYSTEM P/R & PERSONNEL	N/A	C-17
ETI-PAYROLL	N/A	C-5
FLEX-PAY	$1,500	C-17
FLEXIBLE PREMIUM RETIREMENT	N/A	C-14
FMS-FOUNDARY MGMT INFORMATION SYSTEM	$10,000	C-14
FPR/3000	$6,000	C-2
GAAP PAYROLL	$4,000	C-10
GENAP PAYROLL	N/A	C-4
GENERAL ACCOUNTING PACKAGE GENPAK	$10,000	C-1
GENERAL LEDGER	N/A	C-7
GENERAL PAYROLL SYSTEM	$10,000	C-13
GENESYS BENEFITS MANAGEMENT	N/A	C-6
GENESYS HRMS	N/A	C-6
GENESYS PAYROLL ACCOUNTING	N/A	C-6
GENESYS PERSONNEL ADMINISTRATOR	N/A	C-6
GOVERNMENTAL PAYROLL	$4,500	C-2
HEWITT ASSOC SOCIAL SECURITY ESTIMATOR	N/A	C-6
HOME HEALTH CARE SYSTEM	$3,500	C-6
HR;M	$100,000	C-11
HR;M/PAYROLL	$74,000	C-11
HR;M/PERSONNEL	$60,000	C-11
HRIS-GORVERNMENT	$150,000	C-17
HUMAN RESOURCE MANAGEMENT	N/A	C-11
HUMAN RESOURCE MANAGEMENT SYSTEM	N/A	C-4
HUMAN RESOURCE SYSTEM	$50,000	C-19
HUMAN RESOURCE MANAGEMENT SYSTEM	$20,000	C-2
HUMAN RESOURCES MANAGEMENT SYSTEM	$40,000	C-17
IBS PERSONNEL	$6,000	C-11
INSCI HUMAN RESOURCE SYSTEM	$46,000 to $145,000	C-7
INSCI PAYROLL SYSTEM	$45,000 to $120,000	C-7
INSCI PAYROLL/PERSONNEL REPORT WRITER	$75,000	C-7
INTER ACTIVE PAYROLL	$5,000	C-7
INTERACTIVE CPTR SYS- PAYROLL	N/A	C-7
INTERACTIVE PAYROLL	$3,500	C-5
INTERACTIVE PAYROLL	N/A	C-11
INTERACTIVE PAYROLL SYSTEM	$2,800	C-4
INTERACTIVE PAYROLL SYSTEM FMAS	$3,000	C-10
INTERACTIVE PERSONNEL SYSTEM	N/A	C-7
INTERNATIONAL PAYROLL	N/A	C-12
IPS	$25,000	C-1
ITS PAYROLL	N/A	C-7
KEYES APPAREL MFG SYSTEM	$5,000	C-10
LABOR DISTRIBUTION	N/A	C-5
LIBRARY SELECTION MODULE	$6,000	C-15
MANMAN/PAYROLL	$24,000	C-1
MANUFACTURING PAYROLL	N/A	C-1
MAPICS PAYROLL AND EMPLOYEE HISTORY	$400	C-14
MARC 6 - PAYROLL	N/A	C-3
MCBA - PAYROLL	$2,000	C-4
MICROPERS	$350	C-3
MSA PAYROLL SYSTEM	N/A	C-12
MSA PERSONNEL MANAGEMENT & REPORTING	N/A	C-12
MULTI COMPANY PAYROLL	$3,900	C-16
MULTI EMPLOYER TRUST SYSTEM	$75,000	C-14
NETB	$11,200	C-1
OFFICE TEMPORARY	$3,500 to $50,000	C-11
PARTICIPANT ACCOUNTING SYSTEM	$50,000	C-13
PASS/ACCU-PAY	$39,000 to $160,000	C-14
PASSRYTE	$49,000	C-8
PAY-PER	$2,700	C-15
PAY 990	$2,950	C-7
PAYMASTER	$5,000	C-4
PAYMASTER	N/A	C-6
PAYROLL	$8,250	C-1
PAYROLL	N/A	C-1
PAYROLL	N/A	C-1
PAYROLL	$3,000	C-1
PAYROLL	$7,500	C-1
PAYROLL	$1,000	C-1
PAYROLL	$3,500	C-1
PAYROLL	$3,000	C-1
PAYROLL	$1,900	C-1
PAYROLL	$750	C-2
PAYROLL	$6,000	C-2
PAYROLL	$3,000	C-2
PAYROLL	N/A	C-2
PAYROLL	$4,000	C-2
PAYROLL	N/A	C-2
PAYROLL	N/A	C-3
PAYROLL	$3,500	C-2
PAYROLL	$15,000	C-3
PAYROLL	N/A	C-3
PAYROLL	$1,800	C-3
PAYROLL	$1,500	C-3
PAYROLL	$2,000	C-3
PAYROLL	$2,000	C-3
PAYROLL	$2,000	C-4
PAYROLL	N/A	C-4
PAYROLL	N/A	C-4
PAYROLL	$2,500	C-4
PAYROLL	$2,850	C-4
PAYROLL	$1,000	C-4
PAYROLL	$895 to $1,950	C-4
PAYROLL	$4,500	C-4
PAYROLL	$1,500	C-4
PAYROLL	N/A	C-4
PAYROLL	N/A	C-5
PAYROLL	$825	C-5
PAYROLL	$2,000	C-5

PAYROLL	NA	C-5
PAYROLL	NA	C-5
PAYROLL	$2,500	C-5
PAYROLL	[illegible]	C-5
PAYROLL	NA	C-5
PAYROLL	$2,000	C-5
PAYROLL	[illegible]	C-5
PAYROLL	$2,500	C-5
PAYROLL	NA	C-6
PAYROLL	$1,500	C-6
PAYROLL	$3,000	C-6
PAYROLL	$850 to $1,500	C-6
PAYROLL	$3,000 to $5,000	C-6
PAYROLL	$2,500	C-6
PAYROLL	NA	C-7
PAYROLL	$650	C-10
PAYROLL	$3,000	C-10
PAYROLL	$15,000	C-10
PAYROLL	$2,450	C-10
PAYROLL	$1,500	C-10
PAYROLL	NA	C-10
PAYROLL	NA	C-10
PAYROLL	$1,200 to $1,500	C-11
PAYROLL	NA	C-11
PAYROLL	$2,500	C-11
PAYROLL	NA	C-11
PAYROLL	$3,000	C-11
PAYROLL	$32,500 to $49,500	C-11
PAYROLL	$1,500	C-12
PAYROLL	$3,500	C-12
PAYROLL	$2,500	C-12
PAYROLL	$2,000	C-13
PAYROLL	$1,195	C-12
PAYROLL	NA	C-12
PAYROLL	$1,350	C-12
PAYROLL	NA	C-12
PAYROLL	NA	C-12
PAYROLL	NA	C-12
PAYROLL	$3,000	C-13
PAYROLL	NA	[illegible]
PAYROLL	$2,500	C-13
PAYROLL	NA	C-13
PAYROLL	NA	C-13
PAYROLL	NA	C-13
PAYROLL	$3,000	C-13
PAYROLL	NA	C-13
PAYROLL	$3,250	C-14
PAYROLL	$1,080 to $2,000	[illegible]
PAYROLL	NA	C-14
PAYROLL	NA	C-14
PAYROLL	$1,300 to $7,500	C-14
PAYROLL	$2,000	C-14
PAYROLL	$4,900	C-14
PAYROLL	NA	C-14
PAYROLL	NA	C-14
PAYROLL	NA	C-14
PAYROLL	$2,600	[illegible]
PAYROLL	$2,450 to $1,250	[illegible]
PAYROLL	$2,560	[illegible]
PAYROLL	NA	[illegible]
PAYROLL	$795	[illegible]
PAYROLL	$595	C-16
PAYROLL	$1,000 to $5,000	[illegible]
PAYROLL	$1,000	C-16
PAYROLL	$495	C-16
PAYROLL	NA	C-16
PAYROLL	NA	[illegible]
PAYROLL	NA	[illegible]
PAYROLL	$5,000	C-17
PAYROLL	$3,000	C-17
PAYROLL	$900	C-17
PAYROLL	$2,400	C-17
PAYROLL	NA	C-17
PAYROLL	NA	C-17
PAYROLL	$4,200	C-17
PAYROLL	$1,200	C-17
PAYROLL	$2,500	C-18
PAYROLL	$2,000 to $7,000	C-18
PAYROLL	$4,500	[illegible]
[illegible]	NA	C-18

[illegible]	$3,500	C-18
[illegible]	$2,500	C-18
[illegible]	NA	C-18
[illegible]	NA	C-18
PAYROLL	$1,000	C-18
PAYROLL	$1,270	C-18
PAYROLL	NA	C-19
PAYROLL ACTIVE	$2,000	C-15
PAYROLL AND COST	$5,000	[illegible]
PAYROLL AND LABOR REPORTING	$3,000	C-19
PAYROLL BUDGETING	NA	C-17
PAYROLL CHECK WRITING	$1,650	C-14
PAYROLL CHECK WRITING	$1,000	C-15
PAYROLL CHECKWRITING	$1,800	C-19
PAYROLL/CHECK WRITING	$200 to $6,200	C-19
PAYROLL II	$2,500	C-17
PAYROLL/LABOR	$1,800	C-15
PAYROLL LABOR DISTRIBUTION	NA	C-7
PAYROLL MANAGEMENT SYSTEM	$3,500	C-2
PAYROLL PERSONNEL	$6,000 to $10,000	[illegible]
PAYROLL/PERSONNEL	$20,000	C-6
PAYROLL/PERSONNEL	$6,000 to $10,000	C-7
PAYROLL/PERSONNEL	$20,000	[illegible]
PAYROLL/PERSONNEL	$5,000 to $8,000	C-11
PAYROLL/PERSONNEL	$2,500	C-15
PAYROLL/PERSONNEL	NA	C-16
PAYROLL/PERSONNEL	$10,000	[illegible]
PAYROLL/PERSONNEL-ABS	$2,000	C-1
PAYROLL/PERSONNEL FOR NONPROFIT	NA	C-19
PAYROLL PERSONNEL LABOR DISTRIBUTION	$20,000	C-16
PAYROLL/PERSONNEL TIME AND ATTENDANCE	$25,000	C-7
PAYROLL PREPARATION SYSTEM	$12,000	C-15
PAYROLL --- PRESENTLY CALIFORNIA	$500	C-16
PAYROLL SYSTEM	NA	C-1
PAYROLL SYSTEM	NA	C-1
PAYROLL SYSTEM	$800	C-2
PAYROLL SYSTEM	$3,500	C-5
PAYROLL SYSTEM	$15,000	C-5
PAYROLL SYSTEM	NA	C-6
PAYROLL SYSTEM	$5,000	C-6
PAYROLL SYSTEM	NA	C-16
PAYROLL --- PY-11 V3.6	$3,500	C-3
PAYROLL 1099	NA	C-6
PAYRYTE	$49,000	C-3
PDS/1	NA	C-7
PENSION AND WELFARE FUND MANAGEMENT	NA	C-16
PERSONEL MANAGEMENT SYSTEM	$13,700	C-17
PERSONNEL	NA	C-4
PERSONNEL	$1,200 to $1,500	C-11
PERSONNEL	$1,100	C-12
PERSONNEL	NA	C-12
PERSONNEL	NA	C-12
PERSONNEL	NA	C-16
PERSONNEL	NA	C-17
PERSONNEL	$15,000	C-18
PERSONNEL ADMINISTRATION	$20,000	C-16
PERSONNEL AND PAYROLL SYSTEM	NA	C-13
PERSONNEL ASSESSMENT SELECTION SYSTEM	[illegible]	C-19
PERSONNEL HUMAN RESOURCES SYSTEM	$5,000	C-16
PERSONNEL MANAGEMENT REPORTING SYSTEM	NA	C-12
PERSONNEL MANAGEMENT SYSTEM	NA	C-17
PERSONNEL PAYROLL	$1,250	C-15
PERSONNEL MANAGEMENT SYSTEM (PMS)	NA	C-19
PERSONNEL 125	$3,000 to $6,000	C-16
PERSONNEL 2000	$6,000 to $20,000	C-13
PIECEWORK PAYROLL	$2,800	C-15
PLEX PAYROLL - PAYROLL 250 VERSION 7	$1,950	C-14
PR/3000	$6,000	C-2
PROFILES/3000	[illegible]	C-3
PREPAS PERSONNEL/PAYROLL GOVT SYSTEM	NA	C-1
PRES	$15,000 to $40,000	C-13
PROFIT SHARING SYSTEM - PSS	$5,000	C-14
PSS ATF PAYROLL SYSTEM	$400	C-15
PSS PAYROLL SYSTEM	$1,500	C-15
PUBLIC PAYROLL/PERSONNEL SYST	$1,750	C-12
RECRUITMENT TRACKING SYSTEM	$3,000	C-7
REPORT WRITER	NA	C-13
RESTAURANT PAYROLL AND PERSONNEL	$1,000	C-19
RESUME MANAGEMENT SYSTEM	[illegible] $3,000	C-3

RETIREMENT FUNDS MANAGEMENT	N/A	C-17
S/38 PAYROLL	$15,000	C-10
S/38 PERSONNEL ADMINISTRATION	$15,000	C-10
SAFETY TRAINING AND CLAIMS	$4,000	C-18
SAFETY & HYGIENE INFO SYSTEM-SHISA	$80,000	C-18
SAFETY AND HEALTH (TSCA, MSHA, OSHA)	N/A	C-17
SALARY ADMINISTRATION	N/A	C-13
SALESMAN COMMISSION SYSTEM	N/A	C-6
SCHEDULER MODULE	$4,000	C-15
SECONDTIME-PAYROLL	$895	C-2
SECURITY GUARD SYSTEM	$3,500 to $50,000	C-11
SELECT/MERGE MODULE	$2,000	C-15
SIMTEK'S BUSOP	N/A	C-16
SOFTWARE INT'L PAYROLL/PERSONNEL	$38,000	C-7
SPIDER II - PAYROLL	$4,400	C-18
STEP	$35,000 to $150,000	C-3
SUPERPAY	N/A	C-17
SUPERPAY PAYROLL SYSTEM	$960	C-13
SUPERPAY PAYROLL PERSONNEL	$960	C-13
SUPER CHECK BOOK 3-PLUS	$119	C-14
TEMPORARY HELP BILLING AND PAYROLL	N/A	C-1
THE CAREER NETWORK	N/A	C-3
THE MODULAR PENSION SYSTEM	N/A	C-7
THE PAYROLL/PERSONNEL	N/A	C-7
TIME ANALYSIS SYSTEM	$1,300 to $7,500	C-14
TIME KEEPING AND PAYROLL	$4,000	C-18
TIME TRACKING	$350	C-4
TIME & ATTENDANCE SYSTEM	$20,000	C-3
WIPS I AND II	$13,000	C-11
WIPS III	$2,500	C-11
WIPS I, II, AND III	$16,000	C-11
ZPR	$7,000	C-6

WP/Text Editing

ADR/ETZ - RELEASE 1.5	$18,200 to $23,600	C-26
ADVANCED SYSTEMS EDITOR	$150	C-32
AFCAD WORD PROCESSING SYSTEM	$5,000 to $13,000	C-26
AFCAD WORD PROCESSING SYSTEM	$8,000	C-30
AMORS - ASSURANCE MGMT ORGANIZED	$19,500	C-26
ASSOCIATIONS/23	$4,000	C-26
AUTODOC	$4,000	C-27
AUTOMATED LETTER PREPARATION SYSTEM	$12,750	C-26
BALLOT TABULATIONS	N/A	C-30
BASIF	$26,600 to $38,000	C-26
BIMTEXT- WORD PROCESSING DOCUMENT C	$2,600	C-26
BLACK BOOK	$99	C-33
BOS AUTOWRITER	$550	C-26
CORCS-COMPUTERIZED ON LINE REPORT C	$97,500	C-27
CPR TEXT FORMATTER	$195	C-32
CREATE WORD PROCESSING	$4,000	C-27
CRSWORD	$12,000	C-27
CT*OS SPELLING CORRECTOR VERSION 1.1	$500	C-27
CT*OS UTILITIES PACKAGE VERSION 1.1	$500	C-27
CT*OS WORD PROCESSING VERSION 1.3	N/A	C-27
CT OS	N/A	C-29
CY GLOBAL WORD PROCESSING	$1,500	C-28
D.A.T.A. 3500 WORD PROCESSING SYSTEM	N/A	C-34
DATA MERGE	$150	C-28
DATA 3500 WORD PROCESSING	N/A	C-31
DATALOGICS 5000 SYSTEM	$250,000	C-28
DISCTEXT - WORD PROCESSING SYSTEM	$1,000 to $7,000	C-29
DIRECT ED	$4,000	C-33
DISPLAYSTAR	$125	C-30
DISTRIBUTION MANAGEMENT	$3 to $5,000	C-33
DOCU-WRITER II VERSION 1	N/A	C-26
DOCUMENT PROCESSOR	$17,850	C-29
DP SATURN	N/A	C-33
DPS-DOCUMENT PROCESSING SYSTEM	$400	C-26
DWELL EDAS-AUTOMATED DOCUMENT	N/A	C-29
EASY TEXT	$750 to $1,500	C-32
ELECTRONIC MAIL UNDER CICS	$8,500	C-29
FASTEXT	N/A	C-29
FINAL COPY	$890	C-32
FLEXITEX	$1,000	C-30
FOURUP - CHESHIRE LABELS	$100	C-26
FULL SCREEN EDITOR	$1,500	C-28
HANDLE/SPELL	$125	C-31
HANDLE/WRITER	$585 to $2,500	C-31
THE HANDLE WRITER REV 1.3	$2,500	C-28
PRINTER INTERFACE TO WANG VS/WP	$3,500	C-29
DISPLA PRINTER INTERFACE TO WANG VS/WP	$4,000	C-29
IMPLEFACTS	N/A	C-29
IMPRS WORD PROCESSING SYSTEM	$1,500	C-33
THE INCREDIBLE TEXT PRINTER	$249	C-26
INSCRIBE	$3,500	C-28
INTEGRATED ELECTRONIC OFFICE SYSTEM	$1,500	C-29
KEY SEARCH	$45,000	C-26
LARC EDITOR	N/A	C-30
LASERSCRIPT	$30,000	C-33
LEX-ELEVEN	$850 to $7,500	C-26
LEX-11	N/A	C-29
LIST MANAGEMENT	N/A	C-30
MAGIC MAILER	$70	C-26
MAGIC WINDOW II	$150	C-26
MAILING	N/A	C-31
MAILING LIST	$1,500	C-30
MAILING LIST	N/A	C-31
MAINEDIT	$880 to $7,000	C-34
MEMOTEX	$5,000	C-30
MTEXT WORD PROCESSING	$750	C-29
MULTED	$59	C-27
MULTI MATE	$450	C-33
MULTIWORD	$1,500 to $2,500	C-33
MUSE	$7,500	C-26
MUSE	$595 to $12,500	C-30
MUSE	$7,300 to $12,500	C-31
NEDCWF WORD PROCESSING SOFTWARE	$3,000	C-27
OAK SOFTWARE'S WORD PROCESSING	$2,500	C-31
OFFICE AUTOMATOR	$2,500	C-29
OLE	N/A	C-29
OMNIWORD	$650 to $1,895	C-31
OMNIWRITER VIDEO TEXT EDITOR	$99	C-26
OMS	$2,500	C-31
PALANTIR WORD PROCESSOR	$450	C-29
PARATEXT	$1,000 to $1,500	C-32
PMATE	$250	C-32
POWER WP	$1,495	C-27
POWER WRITER	$1,250	C-26
PROFESSIONAL'S PORTFOLIO MANAGEMENT	$2,500	C-31
Q-ONE	$595 to $3,000	C-32
QUESTER	N/A	C-34
R SYSTEMS WORD PROCESSOR	$1,000 to $3,500	C-31
R WORD	$695	C-33
READER	$900	C-30
RECORD MANAGEMENT SYSTEM (RMS)	N/A	C-31
RED SCREEN EDITOR	$1,195	C-33
SATURN WP	$489 to $5,000	C-26
SCREEN-SCREEN EDITOR	$950 to $1,200	C-33
SCRIBE	N/A	C-29
SCRIBE	$4,000 to $50,000	C-34
SEDIT	$115	C-33
SP SPELL	$295	C-27
SPELLBINDER WORD PROCESSOR	N/A	C-34
SPELLING CHECKER	$450	C-30
STARWRITER WORD PROCESSING SYSTEM	$3,500	C-31
STATISTICAL WORD PROCESSING	N/A	C-31
STENO-POOL WP CLIENT FILE	$3,900	C-33
STYLIST	$2,000	C-32

SUPER TYPE	$800	C-30
SUPERSCRIPT I	$4,000	C-33
SUPERSCRIPT II	$6,000	C-33
TASK MASTER Q'TEXT	N/A	C-28
TECHNICON MEDICAL INFORMATION SYSTEM	N/A	C-34
TESS/3000 TEXT EDITING SUB-SYSTEM	$2,400	C-27
TEXT	$5,000	C-34
TEXT/ONE	$40,000	C-26
TEXT/204	$30,000	C-27
TFORM REV 3.10	$4,000	C-28
3"10 WORD PROCESSOR	$750 to $1,150	C-27
TICOM OFFICE MANAGEMENT SYSTEM	$985	C-34
TIPS WORD PROCESSING	$695	C-30
TSMART	$7,995	C-31
TYPER-A	$1,995	C-31
TYPIST	$2,000	C-32
UNIVERSAL WORD PROCESSOR	$4,500	C-31
VEDIT - FULLSCREEN TEXT EDITOR	$150	C-28
WAFE FOR RSTS/E	$995	C-28
WESTERN RETAILER BOOKSELLER	$10,000	C-34
WORD AND LIST PROCESSING	$4,000	C-32
WORD CONCEPT ONE	$495	C-31
WORD ORDER SYSTEM	$2,600	C-32
WORD PROCESSING	$10,000	C-27
WORD PROCESSING	$1,500	C-27
WORD PROCESSING	$600	C-27
WORD PROCESSING	N/A	C-27
WORD PROCESSING	N/A	C-28
WORD PROCESSING	N/A	C-28
WORD PROCESSING	$400	C-28
WORD PROCESSING	N/A	C-32
WORD PROCESSING	$950	C-32
WORD PROCESSING	$2,000	C-33
WORD PROCESSING	$300 to $1,500	C-34
WORD PROCESSING SYSTEM	$250 to $3,500	C-30
WORD PROCESSING SYSTEM	$3,600	C-33
WORD PROCESSING SYSTEM MULTIWORD	N/A	C-29
WORD PROCESSOR	$1,500	C-26
WORD PROCESSOR	N/A	C-28
WORD PROCESSOR	$11,000	C-29
WORD PROCESSOR	$1,200	C-30
WORD PROCESSOR	$900 to $4,600	C-30
WORD PROCESSOR	$2,500	C-30
WORD PROCESSOR	N/A	C-30
WORD PROCESSOR	N/A	C-31
WORD WRIGHT	$2,395	C-27
WORD WRIGHT	$750	C-28
WORD-MINT	$1,500	C-27
WORD +PC	$395	C-32
WORD PRO 1+	$4,995	C-32
WORD PRO 2+	$195	C-32
WORD PRO 3+	$295	C-32
WORD PRO 3+ /64	$8,995	C-32
WORD PRO 4+	$450	C-32
WORD PRO 5+	$450	C-32
WORD PRO 6+	N/A	C-32
WORDWISE	$195	C-30
WORD-WISE	N/A	C-31
WORDWISE 2	$495	C-30
WORD/3	$1,000	C-32
WORD/5	$7,500	C-32
WORD-11 RSTS/E, RSX, VAX/UNIS	$3,500 to $9,500	C-28
WORDCRAFT A/TRA	$599	C-33
WORDPOWER	$3,500	C-31
WORDPOWER	N/A	C-32
WORKPERFECT SPELLER	$95	C-33
WP, GRAPHICS PACKAGE	$750 to $2,500	C-29
WP34	$1,890 to $3,500	C-29
WP 5110 5120 VIRTUAL	$1,750	C-33
WPS II	$2,000	C-34
WRITE ONE	N/A	C-30
XEDIT	$1,750	C-34
ZIP - SCREEN EDITOR	$1,200	C-30
ZWORD	$3,600	C-26
ZWORD	$3,500	C-29

Other Applications

ACTIONS	$1,500	C-46
ADMINS	$15,000	C-47
ADR/EMAIL - RELEASE 1.0	$16,000 to $25,500	C-42
ADVERTISING COMMUNICATION SYSTEM	$30,000	C-44
AMORTIZATION - AM	$200 to $400	C-42
BUSINESS CONTROL SYSTEM	$12 to $26,000	C-43
BR1600 OFFICE AUTOMATION SYS	N/A	C-42
CA SCHEDULER	N/A	C-43
CA DISTRIBUTION/ORDER PROCESSING	$27,000	C-43
CA DISTRIBUTION MANAGEMENT/PURCHASING	$8,000	C-43
CAPS	$5,000	C-43
CIMS	N/A	C-45
COMET/204	$30,000	C-44
CADETS	N/A	C-43
CMC UNPROCESSED EGG SYSTEM	$400	C-43
COMNET-8 V2.1 ELECTRONIC MAIL SYSTEM	$395	C-45
CONTROL	$300,000	C-42
COST SCHEDULE REPORT SYSTEM	N/A	C-43
CRISP	N/A	C-41
CYX-MB ELECTRONIC MAILBOX	$2,000	C-44
DI HANDLER	$25,000	C-41
DISPATCH 3000 SYSTEM	$150,000 to $425,000	C-45
DISTRIBUTION SYSTEM	$40,000	C-42
DISTRIBUTION SYSTEM	$25,000	C-45
DP6400	N/A	C-42
DZ HANDLER	$25,000	C-41
ECONOMETRIC PROGRAMMING LANGUAGE	$5,500	C-46
ELECTRONIC MAIL	$3,000	C-44
ETS	N/A	C-45
FASHION MERCHANDISER SYSTEM	$20,000	C-42
FAST	N/A	C-45
FINANCIAL REPORTING - FR	$3,000	C-45
GENERALIZED REPORTING	$4,800	C-44
INNER OFFICE ELECTRONIC MAIL SYSTEM	$1,200	C-40
INTERACTIVE LIBRARY PROCESSING SYSTEM	N/A	C-45
IRMS-INTERACTIVE RETAIL MANAGEMENT SYS	N/A	C-46
ISIS	$150,000	C-47
JURY SELECTION & MANAGEMENT	$20,000	C-44
KEYFAST	$15,000	C-45
KEY/MASTER	$75,000	C-44
LAW ENFORCEMENT AUTOMATED DATA ENTRY	$40,000	C-46
LIFE SUPPORT	N/A	C-46
LINE ITEM STATUS SYSTEM	$75,000	C-46
MAIL	$5,000	C-47
MAIL EXCHANGE OPTION FOR AFM/AP	$3,500	C-45
MANAGEMENT SCHEDULING AND CONTROL SYSTEM	N/A	C-46
MASSNET	N/A	C-46
MCAUTO FREIGHT BILL AUDIT	N/A	C-46
MCAUTO FREIGHT RATING AND ROUTING	N/A	C-46
MORTGAGE SERVICING PACKAGE (MSP)	N/A	C-44
NCR-ADCOM ADVANCED COMMUNICATIONS	N/A	C-46
OMNIMAIL	$5,000	C-46
PAC I	$20,000	C-42
PAC II	$42,000	C-42
PC/70	$42,000	C-42
PENSION	$20,000	C-46
PROFILES/3000	$25,500	C-44
PTAX	$120,000	C-44
PROFIT SYSTEM	$15,000	C-42
PURCHASE-MASTER	$3,000	C-42
QWIK - COMM	N/A	C-45
QWICK-MAIL	$9,375	C-47

REAL TIME	$8,000	C-42
RETAIL SALES ANALYSIS SYSTEM	$2,500	C-42
REVIEW	$19,000	C-44
SALES HISTORY	N/A	C-46
SALES SUMMARY DATATRACK	N/A	C-47
SAS/OR	$3,000	C-46
SALES PROSPECTING/MANAGEMENT	N/A	C-42
SCSS	N/A	C-47
SDM/70 ESTIMATOR	$39,500	C-42
SMS 1	$35,000	C-44
SMS 2	$20,000	C-44
SPSS DATA ANALYSIS SYSTEM	N/A	C-47
SPSS/11	N/A	C-47
SPSSX	N/A	C-47
THE STUDENT SOLUTION	$5,000	C-46
SUNPAC:SR	$9,000	C-47
T-BATCH	$15,000	C-42
TELEMAIL	$3,000	C-44
TEMS	$55,000	C-43
UCC 2 DOS UNDER OS (DUO)	$42,000	C-47
UCC 7/AUTOMATED PRODUCTION CONTROL	$55,000	C-47
UCC 8 MANAGEMENT SUPPORT SYSTEM	$40,500	C-47
UCC 9 RT HARDWARE RELIABILITY SYSTEM	$16,500	C-47
UCC 20 OS JCL GENERATOR	$10,500	C-47
USER MAIL	$2,880	C-46
VECTOR PROCESSOR COMMON MEMORY SW	$10,000	C-45
VOTER REGISTRATION SYSTEM	N/A	C-47
WALL STREET WIZARD	N/A	C-44
WDS	$7,000	C-44

Payroll/Personnel

AAPLANNER I AVAILABILITY/UTILIZATION	$135	C-23
AAPLANNER-II INTEGRATED AVAILABILITY/UTILITY	$885	C-23
AFTER THE FACT PAYROLL	$450	C-23
AFTER-THE-FACT PAYROLL	$250	C-23
AMI PAYROLL	$450	C-20
BACS-PAYROLL	NA	C-20
BENEFITS	$25,000 to $100,000	C-20
BILLINGS BOOKKEEPER PAYROLL PACKAGE	$300	C-23
BYTESMITH/PAYROLL	$600	C-23
CABLE TV SYSTEM	$2,000 to $10,000	C-20
CONTRACTOR PAYROLL SYSTEM	$795	C-20
CPA PAYROLL	$2,000	C-22
EIS PAYROLL	$1,100	C-21
FULL SERVICE PAYROLL	$150	C-24
GAS PERSONNEL*	$2,000	C-22
INTERACTIVE PAYROLL SYSTEM	$600	C-21
JEWEL PAYROLL W/LABOR DISTRIBUTION	$500	C-21
LOCATOR	NA	C-22
MICA/PR	$395	C-22
MONROE SERIES 8 PAYROLL	$695	C-23
NATIONAL PAYROLL	$500	C-21
PARTICIPATIVE MANAGEMENT SKILLS	$249	C-21
THE PARTNER AFTER-THE-FACT PAYROLL	$1,000	C-20
THE PARTNER PAYROLL CHECKWRITING	$1,250	C-20
PAY-WARE	$375	C-20
PAYAPP	$400	C-21
PAYMASTER	$495	C-20
PAYROLL	NA	C-20
PAYROLL	$1,500	C-20
PAYROLL	$750	C-20
PAYROLL	$400	C-20
PAYROLL	$2,000	C-20
PAYROLL	$1,500	C-20
PAYROLL	$499	C-20
PAYROLL	NA	C-20
PAYROLL	$1,000	C-20
PAYROLL	$4,500	C-21
PAYROLL	$50	C-21
PAYROLL	$800	C-21
PAYROLL	$60	C-21
PAYROLL	NA	C-21
PAYROLL	$425	C-21
PAYROLL	$500	C-21
PAYROLL	$149	C-21
PAYROLL	$400	C-21
PAYROLL	$80 to $395	C-21
PAYROLL	$650	C-22
PAYROLL	$195	C-22
PAYROLL	$200	C-22
PAYROLL	NA	C-22
PAYROLL	$2,000	C-22
PAYROLL	$1,195	C-22
PAYROLL	$595	C-22
PAYROLL	$1,000 to $1,200	C-23
PAYROLL	$250	C-23
PAYROLL	NA	C-23
PAYROLL	$60	C-23
PAYROLL	$895	C-23
PAYROLL	$7,995	C-23
PAYROLL	$595	C-24
PAYROLL	$220	C-24
PAYROLL	$275	C-24
PAYROLL	NA	C-24
PAYROLL	NA	C-24
PAYROLL	$340	C-24
PAYROLL	NA	C-24
PAYROLL	$699	C-24
PAYROLL	$795	C-24
PAYROLL CHECK WRITING	$195 to $2,000	C-23
PAYROLL CHECKWRITER SUBSYSTEM	$100 to $750	C-21
PAYROLL IN BPASIC	$1,500 to $3,000	C-23
PAYROLL PAC	$350	C-20
PAYROLL PLUS	$250	C-21
PAYROLL PROGRAM	$1,000	C-20
PAYROLL SYSTEM	$129 to $248	C-22
PAYROLL SYSTEM	$499	C-22
PAYROLL SYSTEM	$595 to $745	C-24
PAYROLL TEMPLATE	$40	C-23
PAYROLL W/LABOR DISTRIBUTION	$850	C-21
PEACHPAY PAYROLL SYSTEM	$750	C-22
PEACHTREE SERIES 8 PAYROLL	$750	C-21
PERSONNEL PAYROLL THE [illegible] PAYROLL	$595	C-22
PERSONNEL INQUIRY	$1,350	C-22
THE PERSONNEL SYSTEM	NA	C-41
PETER	$495	C-41
PIECEWORK PAYROLL	$1,000	C-21
QCS PAYROLL	$900	C-23
REALWORLD PAYROLL	$650	C-22
RECORDS MANAGER	$499	C-21
RESTAURANT PAYROLL	$499	C-22
RESTAURANT PAYROLL/TIP INCOME ACCOUNTING	$1,850	C-24
RETAIL PAYROLL	$1,450	C-22
SCHOOL PACKAGE	$1,500	C-20
THE SOFTWARE FITNESS PROGRAM PAYROLL	NA	C-41
SOLIDPAY	$495	C-24
SOLIDSEARCH	$895	C-24
STAFF PAYROLL	$2,000	C-23
STOCK OPTION SYSTEM I	$25,000	C-21
SUPER CHIEF	$700 to $3,200	C-24
TCS TOTAL PAYABLE	NA	C-24
TEMPORARY PERSONNEL PAYROLL BILLING	$2,500	C-22
THOROUGHBRED PAYROLL	$595	C-24
TRACK	$2,500	C-24
VERSAPAYROLL	$100	C-21
VOLUNTARY LIFE INSURANCE	[illegible]	C-24

WP/Text Editing

ADDRESS BOOK	$49	C-37
ADVANCE SYSTEM EDITOR	NA	C-40
ASSOCIATION MEMBERSHIP SYSTEM	$500	C-40
BALLOT TABULATION	NA	C-38
BENCHMARK SYSTEMS	$500	C-38
BILLINGS WORD MASTER PACK	$300	C-35
CLEAN SLATE	$79	C-38
CLIENT WRITE-UP	$1,200	C-40
COMPARE II	$745	C-39
[illegible]	[illegible]	C-36
COPY ART II	$150	C-38
CORRECTOR	$250	C-39
CORRESPONDENCE SYSTEM	NA	C-36
THE CORRESPONDENT	$50	C-39
CRYSTAL WRITER	$800	C-40
DICTIONARY	NA	C-39
DISK EDIT	$100	C-39
DOCUMENT WRITER	$240	C-39

DOCUMENT WRITER	$240	C-39
DOCUMATE - PLUS	$165	C-37
DOCU-WRITER! WORD PROCESSOR	$40	C-39
EASY WRITER II	$350	C-36
EDIT	$115	C-39
EDM	$149	C-35
ELECTRIC PENCIL	$99	C-39
ELECTRIC WEBSTER SPELLING CHECKER	$90	C-35
ENUMERATOR	$80	C-37
FORMLET	$50	C-35
FORM LETTER MODULE	$100	C-37
FORTHWRITE	$175 to $500	C-37
GALAXY WORD PROCESSING	$1,000	C-35
GRAMMATIK	$75	C-35
HCS-4S, AGENCY SERVICE	N/A	C-36
LAWMATE	$495	C-37
LEADING EDGE WORD PROCESSING	N/A	C-36
LETTER WRITER	$240	C-39
MEMOPLAN	$195	C-35
MICROSOFT MOUSE	N/A	C-37
MIST+	N/A	C-37
MONROE SUPERMERGE	$150	C-37
MONROE SUPERWORD	$525	C-37
MONROE SUPERWORD / SUPERMERGE	$675	C-37
NEESCRIPT 7.0	$125	C-38
NEVADA EDIT	$30	C-36
NUMBER CRUNCHER	$395	C-38
PEACHTEXT WORD PROCESSOR	$250	C-38
PEACHTREE GRAPHICS LANGUAGE PACKAGE	$395	C-38
PEN-PAL	$59	C-36
PERFECT FILER	$595	C-38
PERFECT SPELLER	$295	C-38
PERFECT WRITER	$495	C-38
PIE 1.5	$30	C-39
PIE SPELLER	$99	C-38
PIE WRITER	$199	C-36
PIE WRITER	$149	C-38
PROPERTY MANAGEMENT SYSTEM	$450	C-38
PUNCTUATION	$125	C-37
QTYPE 200	$300	C-38
QUICK BROWN FOX	$65	C-35
QUICKEY	N/A	C-38
SCREEN	$75	C-35
SCREENWRITER II	N/A	C-38
SELECT WORD PROCESSING	$495	C-38
SILVER SOFT	$399	C-38
SPELLBINDER	$495	C-38
SPELLING PROOFREADER	$150	C-38
SPELL-PROOF	$800	C-38
SPELL 2.0	$50	C-39
STAR EDIT	$225	C-39
STAR TEXT	$495	C-36
STARMATE	$145	C-39
STYLOGRAPH II	$195	C-36
SUPER SPELLGUARD	$195	C-39
SUPERWRITER	$295	C-39
SUPER-TEXT HOME OFFICE	$99	C-37
SUPER-TEXT PROFESSIONAL	$99	C-37
SUPER TEXT 40/80	$175	C-36
TCS Q/WORD	N/A	C-40
TEXT-MASTER	$300	C-36
TEXT 4.0	$40	C-39
THE CONTEXT MBA	$695 to $795	C-36
THE LETTER WRITER	$19	C-35
THEODORE/FORMAT	$3,500	C-35
TOTAL PAC	$895	C-37
TYP/PRT	$18	C-35
TYPE	$140	C-39
ULTRA FORMS PROCESSING SYSTEM	$2,000 to $3,000	C-39
VISISPELL	$225	C-40
VISIWORD	$375	C-40
VOLKSWRITER 3®	$195	C-36
WORD	N/A	C-37
WORD	$75	C-37
WORDCRAFT ULTRA	$450	C-35
WORD EXEC	$495	C-36
WORDGRAPHICS	$1,995	C-40
WORD HANDLER II	$60	C-39
WORD JUGGLER IIE 2.5	$229 to $295	C-39
THE WORD MACHINE	$37	C-36
WORDMATE	N/A	C-37
WORD PLUS	$150	C-37
WORD PRO	$195	C-38
WORD PROCESSING	$2,000	C-35
WORD PROCESSING	$149	C-36
WORD PROCESSING	$2,000	C-39
WORD PROCESSING	$50	C-39
WORD PROCESSING	$125 to $175	C-39
WORD PROCESSING	$340	C-39
WORD PROCESSING	N/A	C-40
WORD PROCESSING SYSTEM	$260	C-35
WORD PROCESSOR	$58	C-36
WORD RIGHT	$495	C-39
WORDSTAR	$495	C-37
WORD 21	$1,200	C-37
WP	$1,000	C-35
WP DAISY WORD PROCESSOR	N/A	C-36
WRITE-ON	$130	C-35
WRITE ONE	N/A	C-36
WRITE/IDEA	$225	C-40

Other Applications

APPLICANT TRACKING	$2,000	C-40
BILLINGS ELECTRONIC MAIL (E-MAIL)	$300	C-40
BILLINGS POSTMASTER PACK	$300	C-40
BLUE CHIP 1	$95	C-40
BUSINESS PROGRAMS PAC 1	$40	C-40
CP/M PSEUDO-DISK	N/A	C-40
DIRECT SALES MANAGER	$2,000	C-40
FINANCIAL PLANNING AND INSURANCE POLICY	$500	C-40
GRAFTALK - VERSION 2.16	$450	C-40
INFORMATION ACCESS	$375	C-40
INTELLITERM	$150	C-40
INVENTORY	$800 to $1,200	C-40
INVENTORY MANAGEMENT	$750	C-40
JOB COST SYSTEM	$750	C-40
LAN MAIL MONITOR	$1,200	C-40
LAN TIMEKEEPER	$750	C-40
LIST MANAGER	$250	C-40
MICROSOFT MULTI-TOOL BUDGET EXPERT SYSTEM	N/A	C-40
NEPTUNE CP/M PSEUDO-DISK	N/A	C-40
ORDER ENTRY	$695	C-40
ORDER ENTRY	$1,000	C-40
P-COM	$325	C-40
PLAN 80	$495	C-40
Q AND A SALES QUOTATION AND ANALYSIS	$2,000	C-40
STUDENT MASTER FILE	$350	C-40
SALES ANALYSIS	$1,000	C-40
SALES & MKTG MGMT INFO SYS-SAMMIS	N/A	C-40
64/128 RAM BOARD PSEUDO-DISK	N/A	C-40
64/128 RAM BOARD RAMEXPAND	N/A	C-40
SUPERCALC SUPERMODELS	$60	C-40
32K RAM MOVEDOS	N/A	C-40
VERSAINVENTORY	$100	C-40
VISICALC MODELS FOR BUSINESS	$30	C-40
VISI TREND/PLOT	$300	C-40
WORLD WIDE INTEGRATED COMMUNICATION	N/A	C-40

See COBOL.

Dick is a COBOL programmer. Dick is bored. Harried. Dick struggles with trace and debugging routines. Nonexistent documentation. Mainframe logjams. So Dick is four months behind schedule. And users are upset about turnaround times. They yell and make Dick upset. They make Dick's boss upset. Nobody is very happy.

See COBOL Run.

Jane is a happy COBOL programmer. She uses ANIMATOR.™ It's a Visual Programming™ aid for Micro Focus LEVEL II COBOL.™ It runs on a micro. It makes child's play of mainframe test and maintenance chores.

With ANIMATOR Jane sees a picture of the program explaining itself. In live action. In real time. In COBOL source code. ANIMATOR tracks the program's exact execution path. Including subroutine branches.

Jane can have the program run fast. Or slow. Or stop. With one key. This makes it easy to spot problems. Insert fixes. Set breakpoints. Instantly.

Jane's programs sometimes win awards. Yet she always meets schedules. Jane's boss likes this about Jane. Because he doesn't like users to yell at him.

Run, COBOL, Run.

This DP manager got a bonus. Because he doubled productivity. Cleared backlogs. Cut costs. Boosted morale. Produced terrific applications. Quickly. Put control and prestige back into the central DP function. And nobody yells at him anymore. All thanks to ANIMATOR.

See ANIMATOR now.

Let Micro Focus put your DP shop on the fast track.

ANIMATOR runs with Micro Focus LEVEL II COBOL for compatibility with ANSI '74 High Level COBOL implementations. A mainframe-micro communications link is recommended for downloading mainframe programs.

For detailed information or a demo, contact:

MICRO FOCUS

2465 East Bayshore Road • Suite 400
Palo Alto, CA 94303
(415) 856-4161

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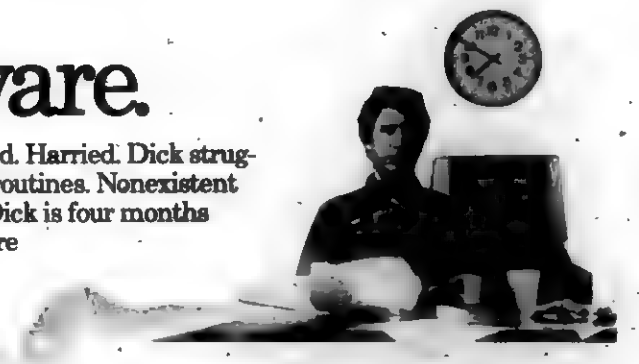
See Software.



Dick is a programmer. Dick is bored. Harried. Dick struggles with trace chores. Debugging routines. Nonexistent documentation. Hidden bugs. So Dick is four months behind schedule. And customers are upset when bugs slip through. They yell and make Dick upset. They make Dick's boss upset. Nobody is very happy.

See Software Run.

Jane is a happy programmer. She uses ANIMATOR™. It's a visual programming aid for Micro Focus COBOL. It runs on a micro. It makes child's play of test and debugging tasks.

With ANIMATOR Jane sees a picture of the program explaining itself. In real time. In COBOL source code. ANIMATOR tracks the program's exact execution path. Including subroutine branches. Jane can have the program run fast. Or slow. Or stop. With one key. This makes it easy to spot problems. Insert fixes. Set breakpoints. Instantly.

Jane's programs are best sellers. They're delivered on time. With no hidden bugs. Jane's boss likes this about Jane. Because he doesn't like customers to yell at him.

Run, Software, Run.

This software vendor just went public. Because he doubled productivity. Eliminated bugs. Cut costs. Produced terrific applications. Beat the competition to market. And customers don't yell at him anymore. All thanks to ANIMATOR.

See ANIMATOR now.

Let ANIMATOR help you do better work. And speed your applications to market. For detailed information or a demo, contact:

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A. B. DICK CO.
A B DICK CO. CP/M RELEASE 2
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: A.B. Dick: CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: January 1982
(See Vendor Profile Page V-1)

ALCYON, INC.
REGULUS VERSION 4.0
Specific Application: Multitasking, Multiuser Unix-Compatible Real-Time Operating System
Specific Industry: Not Industry Sensitive
System Requirements: Motorola 68000
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 500
Date First Installed: May 1982
(See Vendor Profile Page V-4)

AMDAHL CORP.
UNIVERSAL TIME SHARING SYSTEM
Specific Application: Software Development
Specific Industry: Not Industry Sensitive
System Requirements: Amdahl 470, 580: VM/370; IBM 370: VM/SP
Source Language: C, Assembler
Source Code Available: Yes
(See Vendor Profile Page V-4)

ATON INTERNATIONAL, INC.
HARD DISK OPTION FOR ATON CP/M 8/12 MEG
Specific Application: Environment For Application Programs
Specific Industry: Not Industry Sensitive
System Requirements: TRS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $80
Number Installed to Date: 500
Date First Installed: April 1982
(See Vendor Profile Page V-10)

BILLINGS COMPUTER CORP.
BOS
Specific Application: Operating System, Compiler and Program Utilities
Specific Industry: Not Industry Sensitive
System Requirements: Billings 500: BOS, Billings 6000
Memory Required: 56.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: 1979
(See Vendor Profile Page V-12)

BOS NATIONAL, INC.
BUSINESS OPERATING SYSTEM (BOS - V)
Specific Application: Single or Multiuser, Fully Transportable Operating System for Mini and Micro Computers
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11, IBM Series/1; TI 9900, DG Enterprise
Memory Required: 64.0K bytes
Source Language: Micro/Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 3,000
Date First Installed: 1978
(See Vendor Profile Page V-13)

COLLECTION DATA SYSTEM, INC.
COLLECTION AGENCY
Specific Application: New Debtor Setup, Master Index, Trust Accounting Management Reports
Specific Industry: Manufacturing, Legal
System Requirements: TI 990/1 Series 300, 600, 800
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: No.
Purchase Terms: Purchase (license)
Price: $10,000 to $90,000
Number Installed to Date: 130
Date First Installed: 1970
(See Vendor Profile Page V-20)

COMPUTER PROJECTS, INC.
ELECTRONIC MAIL
Specific Application: Electronic Mail Box, Receives Messages, Memory for Message Electronic Mailbox
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell
Memory Required: 65.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 45
Date First Installed: 1976
(See Vendor Profile Page V-25)

COMPUTER PROJECTS, INC.
MESSAGE SWITCHING
Specific Application: Communication Switch to Interface With Any Equipment
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell
Memory Required: 65.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 45
Date First Installed: 1976

CONTEL INFORMATION SYSTEMS
STAR -ELEVEN
Additional Product Classification: Performance Measurement, System Resource Management, Communications/TP Monitors
Specific Application: Local Area Network
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, RT-11, VMS
Source Language: Fortran, Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 150
Date First Installed: September 1980
(See Vendor Profile Page V-30)

CONTEL INFORMATION SYSTEMS
TSX-PLUS
Additional Product Classification: Performance Measurement, System Resource Management
Specific Application: Multiuser Operating System for RT-11
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11
Source Language: Fortran, Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 500

CONTEL INFORMATION SYSTEMS
VRT
Specific Application: Virtual RT-11 Emulator
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Source Language: Macro-11, Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,750
Number Installed to Date: 75
Date First Installed: 1983

DATAPOINT CORP.
DISK OPERATING SYSTEM (DOS)
Specific Application: General Purpose Operating System With Local Area Networking Via Arcnet Network
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 8600, 6000, 5500, 3800: DOS
Memory Required: 48.0K bytes
Source Code Available: No
Date First Installed: September 1972
(See Vendor Profile Page V-37)

DATAPOINT CORP.
RESOURCE MANAGEMENT SYSTEM (RMS)
Additional Product Classification: Data/File Mariagement, Sort/Merge
Specific Application: Multipurpose, Multitasking Operating System With Local Area Networking Via Arcnet
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 8800, 8600, 6000, 3800: RMS
Memory Required: 60.0K bytes
Source Language: Assembler
Source Code Available: No,
Purchase Terms: Purchase (license)
Price: $1,500

DIGITAL EQUIPMENT CORP.
RSTS/E
Specific Application: Multiuser, Time-Sharing, Resource-Sharing General Purpdes Operating System
System Requirements: DEC PDP-11: RSTS/E
Purchase Terms: Purchase (license)
Price: $600 to $11,000
(See Vendor Profile Page V-42)

DIGITAL EQUIPMENT CORP.
RSX-11M
Specific Application: Multiuser, Multiprogramming, Real-Time Operating System for Many Applications Including Communications
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11, RSX-11, DEC VAX-11
Purchase Terms: Purchase (license)
Price: $800 to $11,500

DIGITAL EQUIPMENT CORP.
RT-11
Specific Application: Disk-Based, Single User Real-Time Operating System, Interactive Program Development of On-LineApplication
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, DEC VAX-11
Purchase Terms: Purchase (license)
Price: $800 to $4,000

DIGITAL INTERFACE SYSTEMS, INC.
TXMAP
Specific Application: Operating System for TI Single Board Computers
Specific Industry: Not Industry Sensitive
System Requirements: TI
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-42)

DIGITAL INTERFACE SYSTEMS, INC.
TXTM
Specific Application: Operating System for TI Single Board Computers
Specific Industry: Not Industry Sensitive
System Requirements: TI
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 10
Date First Installed: 1981

DUQUESNE SYSTEMS
QUICK-FETCH
Specific Application: Reduces Program Fetch Input and Output
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: MVS, IBM 3030: VSI, IBM 3081
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $9,000
Number Installed to Date: 20
Date First Installed: May 1983
(See Vendor Profile Page V-44)

DUQUESNE SYSTEMS
SCON
Specific Application: Single Console for Multisystem
Specific Industry: Not Industry Sensitive

System Requirements: IBM 370: MVS, IBM 3030 Series; IBM 3080 Series
Source Language: Basic Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $7,000
Number Installed to Date: 175
Date First Installed: September 1981

DUQUESNE SYSTEMS
STAM
Specific Application: Sharing Disks and Tape Drives
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: MVS, IBM 3030: VSI; IBM 308X
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $10,000
Number Installed to Date: 300
Date First Installed: September 1979

EMPIRICAL RESEARCH GROUP
68 K FORTH
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: Digital Research: CP/M, ERG 68000
Memory Required: 68.0K bytes
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 400
Date First Installed: 1981
(See Vendor Profile Page V-46)

ENERTEC, INC.
MICRO CONCURRENT PASCAL
Additional Product Description: Languages, Compilers, Assemblers
Specific Application: Microprocessor Development
Specific Industry: Manufacturing, Engineering, Scientific
System Requirements: DEC PDP-11: RSX-11M, RT-11, DEC VAX: VMS, IBM 370: CMS; DG Nova Series, Eclipse MV Series: AOS, R-DOS
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 103
Date First Installed: January 1980
(See Vendor Profile Page V-46)

EPICOR, INC.
ZSH
Specific Application: User-Friendly Shell
Specific Industry: Not Industry Sensitive
System Requirements: Zilog-Based Systems: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,500
Number Installed to Date: 5
Date First Installed: September 1982
(See Vendor Profile Page V-47)

G & G ENGINEERING
CONCURRENT CP/M 8-16
Specific Application: Allows User to Simultaneously Monitor 8- and 16-Bit CP/M Programs
Specific Industry: Not Industry Sensitive
System Requirements: Compupro S100: CP/M
Memory Required: 192.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 10
Date First Installed: June 1983
(See Vendor Profile Page V-51)

G & G ENGINEERING
CP/M 68K
Specific Application: Software Development on IEEE 696/S100 Standard System With Motorola 68000
Specific Industry: Software Development
System Requirements: Compupro S100: CP/M
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 40
Date First Installed: May 1983

G & G ENGINEERING
MP/M 8-16
Specific Application: Allows Simultaneous Use of 8 and 16 Bit CP/M Program on IEEE 696/S100
Specific Industry: Not Industry Sensitive
System Requirements: Compupro S100: MP/M
Memory Required: 192.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 100
Date First Installed: February 1982

GOULD, INC.
MAPPED PROGRAMMING EXECUTIVE
Specific Application: Real-Time, High-Performance Applications
Specific Industry: Engineering, Scientific
System Requirements: Gould Concept/32, 32 Series
Memory Required: 256.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
(See Vendor Profile Page V-52)

GOULD, INC.
UTX, UNIVERSAL TIMESHARING EXECUTIVE
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: UTX
Source Code Available: No
Purchase Terms: Purchase (license)

HONEYWELL, INC.
GCOS 8® EXEC
Specific Application: Nucleus of Base & Subsystem to Control & System and Create or Restore A File System
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell DPS; Gcos 8
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-55)

HUNTER & READY, INC.
VRTX/80
Specific Application: Real-Time Operating System for Embedded Microprocessor Applications
Specific Industry: Not Industry Sensitive
System Requirements: Z80 Zilog
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,400
Number Installed to Date: 150
Date First Installed: 1982
(See Vendor Profile Page V-55)

HUNTER & READY, INC.
VRTX/86
Specific Application: Real Time Operating System for Microprocessor Applications
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8086
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,400
Number Installed to Date: 150
Date First Installed: 1982

HUNTER & READY, INC.
VRTX/8002
Specific Application: Real-Time Operating System for Embedded Microprocessor Applications
Specific Industry: Not Industry Sensitive
System Requirements: Zilog Z8002
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,400
Number Installed to Date: 150
Date First Installed: 1982

HUNTER & READY, INC.
VRTX/68000
Specific Application: Real-Time Operating System for Embedded Microprocessor Applications
Specific Industry: Not Industry Sensitive
System Requirements: Motorola 68000
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,400
Number Installed to Date: 150
Date First Installed: 1982

IBM
DOS/VSE
Specific Application: Operating System for the 4300 Processor
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300
Memory Required: 92.0K bytes

INFORMATION PROCESSING, INC.
BLISS/COBOL-MULTIUSER OPERATING SYSTEM
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: Bliss/Cobol; Point 4 Mark 3, 5, 8: Bliss/Cobol, Bytronix B Series: Bliss/Cobol; Digidyne: Bliss/Cobol
Memory Required: 6.4M bytes
Source Language: DG Nova
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 1,700
Date First Installed: July 1974
(See Vendor Profile Page V-58)

INFORMATION SYSTEMS CONSULTANTS, INC.
XEIS/XEISO
Specific Application: Hardware Diagnostic
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell Level 6: Gcos
Memory Required: 512.0K bytes
Source Language: Gmap
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $3,550
Number Installed to Date: 40
Date First Installed: 1980
(See Vendor Profile Page V-58)

INNOVATEK MICROSYSTEMS, INC.
MATP STAND-ALONE TERMINAL INTERFACE
Specific Application: Real-Time Operating Program for Dedicated Systems
Specific Industry: Manufacturing, Process Control
System Requirements: DEC PDP-11; DEC Falcon SBC; DEC Micro PDP-11
Memory Required: 4.0K bytes
Source Language: Macro
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $ CALL
Date First Installed: 1981
(See Vendor Profile Page V-59)

IPT (INFORMATION PROCESSING TECHNIQUES) MIRAGE
Specific Application: CP/M Capability on DG Minicomputers
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: R-DOS; DG Eclipse: DOS, AOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,295
Number Installed to Date: 30
(See Vendor Profile Page V-61)

IPT (INFORMATION PROCESSING TECHNIQUES) UNIX OPERATING SYSTEM FOR DG
Specific Application: Unix Operating System for DG 16-Bit Eclipses
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: No

Purchase Terms: Purchase (license)
Price: $10,000
Date First Installed: 1983

J&H SOFTWARE CONSULTANTS, INC.
C EXECUTIVE
Specific Application: Monitor for On-Line Real-Time and Distributed Processing Systems
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Medical, Government, Scientific
System Requirements: DEC; Intel 8080, 8085, 8086; Motorola 68000; North Star
Memory Required: 60.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: February 1981
(See Vendor Profile Page V-62)

LANTECH SYSTEMS
UNET
Specific Application: Multitasking and Networking With and Industry Standard Accounts Payable System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $[illegible]
Number Installed to Date: 7,000
Date First Installed: May 1983
(See Vendor Profile Page V-65)

MARCO 4, INC.
CICS AIDS
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 3030, 4300 Series: DOS/VSE
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Price: $100
Number Installed to Date: 25
Date First Installed: April 1983
(See Vendor Profile Page V-69)

MARCO 4, INC.
CICSPRINT
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 3030, 4300 Series: DOS, VSE
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Price: $185
Number Installed to Date: 300
Date First Installed: December 1981

MARCO 4, INC.
LOGOUT MULTLOG
Specific Application: Console Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 3030, 4300 Series: DOS/VSE, DOS/VSE
Memory Required: 10.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Price: $125
Number Installed to Date: 1,000
Date First Installed: September 1976

MARK WILLIAMS CO.
C COMPILERS MWC/86
Specific Application: C Compiler MWC/86
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX; DEC PDP-11
Source Language: C
Source Code Available: Yes
Price: $500 to $6,000
Date First Installed: September 1981
(See Vendor Profile Page V-69)

MARK WILLIAMS CO.
COHERENT TM OPERATING SYSTEM
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX; DEC VAX: VMS
Source Language: C Code
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500 to $1,500
Date First Installed: September 1980

MICROBOL, INC.
MICROBOL
Additional Product Classification: Languages, Accounting, WP/Text Editing
Specific Application: Integrated Operating System and Programming Language, Also Has General Accounting Applications
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11, IBM PC; Intel 8086, 8088; CP/M
Memory Required: 256.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 250
Date First Installed: September 1978
(See Vendor Profile Page V-73)

MICRO MARKETING, INC.
MDZ OS
Specific Application: Multiuser, Multiprocessor Operating System That Provides as Many as 16 Users With Dedicated Z80 Processors
Specific Industry: Not Industry Sensitive
System Requirements: MDZ
Memory Required: 64.0K bytes
Source Language: Z80 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 100
Date First Installed: May 1982
(See Vendor Profile Page V-74)

MICROSYSTEMS, INC.
RTOS-80
Specific Application: Priority Driven Multitasking System With Optional Serial and Disk Input and Output
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8080, Zilog Z80
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,750
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-75)

MINI-COMPUTER SYSTEMS, INC.
MICOS
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse Series: Micos; DG Eclipse MV Series: AOS/VS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 2,000
Date First Installed: November 1975
(See Vendor Profile Page V-76)

M R C SYSTEMS
RTX 01
Specific Application: Real-Time Executive
Specific Industry: Not Industry Sensitive
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
(See Vendor Profile Page V-77)

M R C SYSTEMS
SOFTBLOX EXPRESS
Specific Application: Multitasking Executive, Includes MRC Bug Utility
Specific Industry: Not Industry Sensitive
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $550

NCR CORP.
EXECUTIVE-VRX-RELEASE 9
Specific Application: Operating System for NCR Mainframes
Specific Industry: Not Industry Sensitive
System Requirements: NCR V-8500, V-8400, V-8300, V-8
Memory Required: 380.0K bytes
Source Language: NCR
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 7,000
Date First Installed: March 1978

NCR CORP.
INTERACTIVE VIRTUAL SYSTEMS IVS-RELEASE 1
Specific Application: Interactive Extension for V-8x OS
Specific Industry: Not Industry Sensitive
System Requirements: NCR V-8500, V-8400, V-8300, V-8
Memory Required: 200.0K bytes
Source Language: NCR
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: June 1982

NCR CORP.
ITS INTERACTIVE TRANSACTION EXECUTIVE
Specific Industry: Manufacturing, Wholesale Distribution, Retail, Banking, Finance, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation, Nonprofit Organizations
System Requirements: NCR 9300; ITX
Memory Required: 1.0M bytes
Source Language: NCR
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Date First Installed: January 1983

NCR CORP.
UNIX
Specific Industry: Not Industry Sensitive
System Requirements: NCR Tower; Unix
Memory Required: 512.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: April 1983

NIXDORF COMPUTER CORP.
DIPOS/ASSEMBLER
Additional Product Classification: Languages
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: Nixdorf 8860
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Rental
Number Installed to Date: 10,000
(See Vendor Profile Page V-80)

NIXDORF COMPUTER CORP.
NIDOS/UBE
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: Nixdorf 8890 VSE
Memory Required: 320.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: [illegible]
Date First Installed: September 1981

NIXDORF COMPUTER SOFTWARE CO.
EDOS/VS
Specific Application: Replacement Operating System
Specific Industry: Not Industry Sensitive
System Requirements: Edos: IBM: DOS, DOS/VS, DOS/VSE
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $[illegible]
Date First Installed: January 1976
(See Vendor Profile Page V-80)

NIXDORF COMPUTER SOFTWARE CO.
EDOS/VSE
Specific Application: Replacement Operating System
Specific Industry: Not Industry Sensitive
System Requirements: Edos: IBM: DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $20,000
Date First Installed: April 1983

NIXDORF COMPUTER SOFTWARE CO.
EXTENDED OPERATOR CONSOLE SYSTEM
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: Edos, DOS
Source Language: Assembler
Purchase Terms: Purchase (license); Lease
Price: $2,750
Date First Installed: 1980

NIXDORF COMPUTER SOFTWARE CO.
EXTENDED PROCEEDURE LANGUAGE (EPROC)
Specific Application: Extended Procedure Language
Specific Industry: Not Industry Sensitive
System Requirements: IBM: Edos, DOS
Source Language: Assembler
Purchase Terms: Purchase (license); Lease
Price: $8,000
Date First Installed: March 1982

NORTHEAST DATACOM, INC.
SPEED
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200 MVP: Speed
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-80)

PANATRO, INC.
PANA/BASIC
Additional Product Classification: Languages, Compilers/Assemblers, Interpreter
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
Memory Required: 48.0K bytes
Source Language: Basic, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $500 to $50,000
Number Installed to Date: 5,000
Date First Installed: 1977
(See Vendor Profile Page V-84)

PARAGON DATA SYSTEMS
AD/OS-APPLICATION DEVELOPMENT OS
Specific Application: Package of Tools and Utility Programs Used to Develop, Upgrade CTS-300 Applications
System Requirements: DEC PDP-11: CTS 300, RT-11
Memory Required: 256.0K bytes
Source Language: Dibol, Assembler
Source Code Available: Yes
Price: $1,000 to $3,000
Date First Installed: 1980
(See Vendor Profile Page V-84)

PCS SYSTEMS, INC.
RUNTIME SYSTEMS
Specific Application: Allows Applications Programs to Run On Other Computers
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11, TRS; IBM, Altos
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150 to $200
Number Installed to Date: 100,000
Date First Installed: 1980
(See Vendor Profile Page V-84)

PCS SYSTEMS, INC.
THE UCSD P-SYSTEM
Specific Application: Complete Operating and Development System
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11; TRS, IBM, Altos
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350 to $850
Number Installed to Date: 200,000
Date First Installed: 1978

POINT FOUR DATA CORP.
IRIS
Specific Application: Interactive Operating System
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova Tape: Iris
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,400
Number Installed to Date: 18,000
(See Vendor Profile Page V-86)

PRIME COMPUTER, INC.
PRIMOS
SPECIFIC INDUSTRY: Not Industry Sensitive
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Price: $12,500 to $25,000
Date First Installed: 1973
(See Vendor Profile Page V-87)

RTOS/REAL-TIME COMPUTER SCIENCE CORP.
PC/IRMX VERSION 1.0
Specific Application: Multiprogramming, Multiuser
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; IBM PC-XT
Memory Required: 128.0K bytes
Source Language: Object
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,250
Number Installed to Date: 5
Date First Installed: April 1983
(See Vendor Profile Page V-94)

RYAN-MCFARLAND CORP.
RM/COS
Specific Application: Commercial Operating System for Microcomputers, Optimized for Development and Execution of Cobol Programs
Specific Industry: Not Industry Sensitive
System Requirements: TI 990; Motorola 68000
Memory Required: 128.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 50,000
Date First Installed: 1979
(See Vendor Profile Page V-94)

S & H COMPUTER SYSTEMS, INC.
TSX
Specific Application: Multiuser, Multitasking Operating System Addressing Up to 64K Bytes
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11
Memory Required: 64.0K bytes
Source Language: Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,275
Number Installed to Date: 20,000
Date First Installed: 1976
(See Vendor Profile Page V-97)

S & H COMPUTER SYSTEM, INC.
TSX-PLUS
Specific Application: Multitasking Multiuser Operating System Offering RT-11 XM Environment
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11
Memory Required: 128.0K bytes
Source Language: Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 4,000
Date First Installed: September 1980

SOFTECH MICROSYSTEMS, INC.
UCSD P-SYSTEM, VERSIONS IV.0, IV.1
Additional Product Classification: Languages, Compilers/Assemblers
Specific Application: System Software for Micro/Minicomputer Systems
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP 11: UCSD-P
Memory Required: 48.0K bytes
Source Language: UCSD-Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: 1979
(See Vendor Profile Page V-98)

SOFTWARE TRIANGLE
EDOS/MT
Specific Application: Multiuser Version of S-DOS for Two to Seven Users
Specific Industry: Not Industry Sensitive
System Requirements: PalTech GT Series; TRS, Motorola: S-DOS
Memory Required: 128.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 100
Date First Installed: 1980
(See Vendor Profile Page V-99)

SOFTWARE MODULE MARKETING, INC.
QUICK TUBE
Specific Application: Performance Enhancement
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370,3030, 4300 Series, PC: MVT, VS, MVS
Memory Required: 2.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 120
Date First Installed: February 1978
(See Vendor Profile Page V-99)

SOFTWARE MODULE MARKETING, INC.
SUPERCONSOLE
Additional Product Classification: System Resource Management
Specific Application: Provides Single Console Image for Multiple System Environment
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3030, 4300, PC: MVS
Memory Required: 10.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $7,000
Number Installed to Date: 20

SOFTWARE PURSUITS, INC.
DOS/MVT/VSE OPERATING SYSTEM
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: IBM Mainframes: DOS/VSE
Source Language: ALC
Source Code Available: No
Purchase Terms: Rental
Number Installed to Date: 200
Date First Installed: 1974
(See Vendor Profile Page V-100)

SOFTWARE PURSUITS, INC.
DOS/MVT/VSE OPERATING SYSTEM
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: IBM Mainframes: DOS/VSE
Memory Required: 1.0M bytes
Source Language: ALC
Source Code Available: No
Purchase Terms: Rental
Number Installed to Date: 200
Date First Installed: 1974

SOFTWARE SYSTEMS, INC.
5280 JOB STREAM SUPERVISOR (JSS)
Specific Application: Offers Procedure Language and Menu Capability for IBM 5280
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5280 SCP
Memory Required: 48.0K bytes
Source Language: 5280 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $580
Number Installed to Date: 360
Date First Installed: October 1980
(See Vendor Profile Page V-100)

2 Trillion

Last night we backed up two trillion (yes, that's 12 zeroes) characters of data, and checked our work.

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We bring files back alive, the way they should be—readable, usable—which some "cut-rate" backup systems *don't* do. We verify the data before moving it to tape. That's why 75% of the Fortune 100 companies trust their vital data to VMBACKUP

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☐ **VMTAPE/CMS:** Tape management featuring drive management, SL tape support, security, and audit file
☐ **VMLIB:** A source library control system offering compression, **COPY/INCLUDE** cross reference, and management of the development process
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SOURCE DATA SYSTEMS, INC.
SDL
Additional Product Classification: Data Base Management Systems, Report Generator, Data/File Management Program Generators/Aids, Application Development Tools
Specific Application: Operating System, Utilities, Data Base Management System, Report Writer/Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1, PC, NCR 9020, 9300, NCR Tower 1632, NCR Decision Mate V
Source Language: Forth
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1978
(See Vendor Profile Page V-101)

SPECTRAL ASSOCIATES
FLEX +V. 2.0
Specific Application: Disk Operating System
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $89
Number Installed to Date: 200
Date First Installed: June 1982
(See Vendor Profile Page V-101)

SYSTEMS SOFTWARE INTERNATIONAL, INC.
GLAB
Specific Application: Operating System and On-Line Tape Display Utility
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: MVS, IBM 4300: MVS
Memory Required: 20.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $1,200 to $2,000
Number Installed to Date: 75
(See Vendor Profile Page V-107)

SYSTEMS SOFTWARE INTERNATIONAL, INC.
XSERV
Specific Application: Operation System, Dataset Cross Reference Program
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: MVS, IBM 4300: MVS
Memory Required: 300.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 150
Date First Installed: 1981

TARBELL ELECTRONICS
CACHE BIOS CP/M 2.2
Specific Application: Speeds Up CP/M
Specific Industry: Not Industry Sensitive
System Requirements: Empire Series: CP/M, Rebel Series: CP/M
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: 1982
(See Vendor Profile Page V-108)

TARBELL ELECTRONICS
CACHE XIOS MP/M 2
Specific Application: Speeds Up MP/M
Specific Industry: Not Industry Sensitive
System Requirements: Empire Series: MP/M, Rebel Series: MP/M
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1982

TECHNE SOFTWARE
CACHE/Q
Specific Application: Disk Buffering Enhancement
Specific Industry: Not Industry Sensitive
System Requirements: IBM-PC-DOS, CP/M
Source Language: Basic, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $225
Number Installed to Date: 5,000
Date First Installed: June 1982
(See Vendor Profile Page V-108)

TECHNICO, INC.
MOS OPERATING SYSTEM
Specific Application: Multiuser Industrial Control Operating System
Specific Industry: Education, Scientific, Industrial Control
System Requirements: TI 9900
Memory Required: 4.0K bytes
Source Language: 9900 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 300
Date First Installed: 1980
(See Vendor Profile Page V-108)

TECHNICO, INC.
ROS OPERATING SYSTEM
Specific Application: Single User Industrial Control Operating System
Specific Industry: Education, Scientific, Industrial Control
System Requirements: TI 9900
Memory Required: 4.0K bytes
Source Language: 9900 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 2,000
Date First Installed: 1978

TECHNICO, INC.
TMOS
Specific Application: Multiuser Industrial Control Operating System That Supports Hard Disk and Tape Backup
Specific Industry: Education, Scientific, Industrial Control
System Requirements: TI 9900
Memory Required: 4.0K bytes
Source Language: 9900 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 100
Date First Installed: 1981

UNIQUE COMPUTER CORP.
BERKELY 4.1 UNIX
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 10
Date First Installed: 1982
(See Vendor Profile Page V-108)

UNIQUE COMPUTER CORP.
UNIX SYSTEM III
Specific Application: Time-Sharing Operating System
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11, VAX
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000 to $20,000
Number Installed to Date: 100
Date First Installed: 1981

UNIQUE COMPUTER CORP.
UNIX SYSTEM V
Specific Application: Time-SharingOperating System
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 5
Date First Installed: 1983

VENTUR COM, INC.
VENIX II
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11/23, DEC PDP-11, DEC Professional
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,400
Number Installed to Date: 400
Date First Installed: April 1981
(See Vendor Profile Page V-115)

VISTA COMPUTER, INC.
VSM - VISTA STANDARD MUMPS
Additional Product Classification: Languages
Specific Application: Disk Based Time-Sharing System
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse: AOS, VSM, DG Eclipse MV: AOS/VS, DG Nova: VSM
Memory Required: 64.0K bytes
Source Language: Mumps
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $10,000 to $30,000
Number Installed to Date: 35
Date First Installed: January 1980
(See Vendor Profile Page V-115)

WILD HARE COMPUTER SYSTEMS, INC.
TBS (TIMESHARING SYSTEM)
Specific Application: Multiuser, Multilingual Capabilities Up to 26 Users
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: R-DOS; DG Eclipse: Iods, Infos
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,900
Number Installed to Date: 500
Date First Installed: 1977
(See Vendor Profile Page V-117)

THE WOLLONGONG GROUP, INC.
CUSTOM TRAINING
Specific Application: Training Required By Client
Specific Industry: Not Industry Sensitive
System Requirements: DEC 11/730: VMS, DEC 11/750: Unix; DEC 11/780, DEC 11/782
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1980
(See Vendor Profile Page V-117)

THE WOLLONGONG GROUP, INC.
ELNICE
Specific Application: VMS User Wishing to Have Complete Unix Environment With VMS
Specific Industry: Not Industry Sensitive
System Requirements: DEC 11/730: VMS, DEC 11/750; DEC 11/780, DEC 11/782
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,250 to $30,500
Number Installed to Date: 100
Date First Installed: August 1981

VAX track to hardware freedom.

You know about the many portable programming benefits of UNIX™. You're also keenly aware of your company's extensive investment in VMS software. Now you can take advantage of both and be hardware independent, too. Because now there's EUNICE.

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EUNICE provides a machine transparent medium that allows your programmers the freedom to operate in any one of three environments: VMS, UNIX, or integrated VMS/UNIX. They can switch modes at any time, depending on application. And through EUNICE, they can also take advantage of a wealth of available UNIX-based software.

EUNICE comes with the full Berkeley 4.1 BSD UNIX environment which includes the high level languages of C, FORTRAN 77, LISP, Pascal, and Franz LISP. You also get standard UNIX networking software. Plus, Source Code Control System — a powerful facility that provides a completely controlled program development and documentation environment.

▲ We keep you on track.

Wollongong is a full-service organization dedicated to the advancement of UNIX. As such, we're quickly becoming recognized as *The UNIX Authority*. We sell more UNIX-based software to the 32-bit minicomputer market than anyone else. And back it with the widest range of support services available.

Services like personalized client consultation; system-level design; fast, efficient installation; on-site training and full documentation. We also provide a wide variety of options to enhance the efficiency of your VMS/UNIX system. Options like RM/COBOL, a high-level implementation of the ANSI 74 COBOL standard for efficient execution of COBOL business applications. Or IP/TCP, the new Department of Defense protocol that allows two or more host computers to communicate within a predefined environment.

▲ Over 300 VAX sites already free!

They know the fastest track to independence lies with EUNICE. Because they've joined the growing list of satisfied Wollongong customers. To find out how you can enjoy hardware freedom, mail the coupon today, or call our toll-free number: 800-USA-UNIX. In California, call: 800-962-UNIX.

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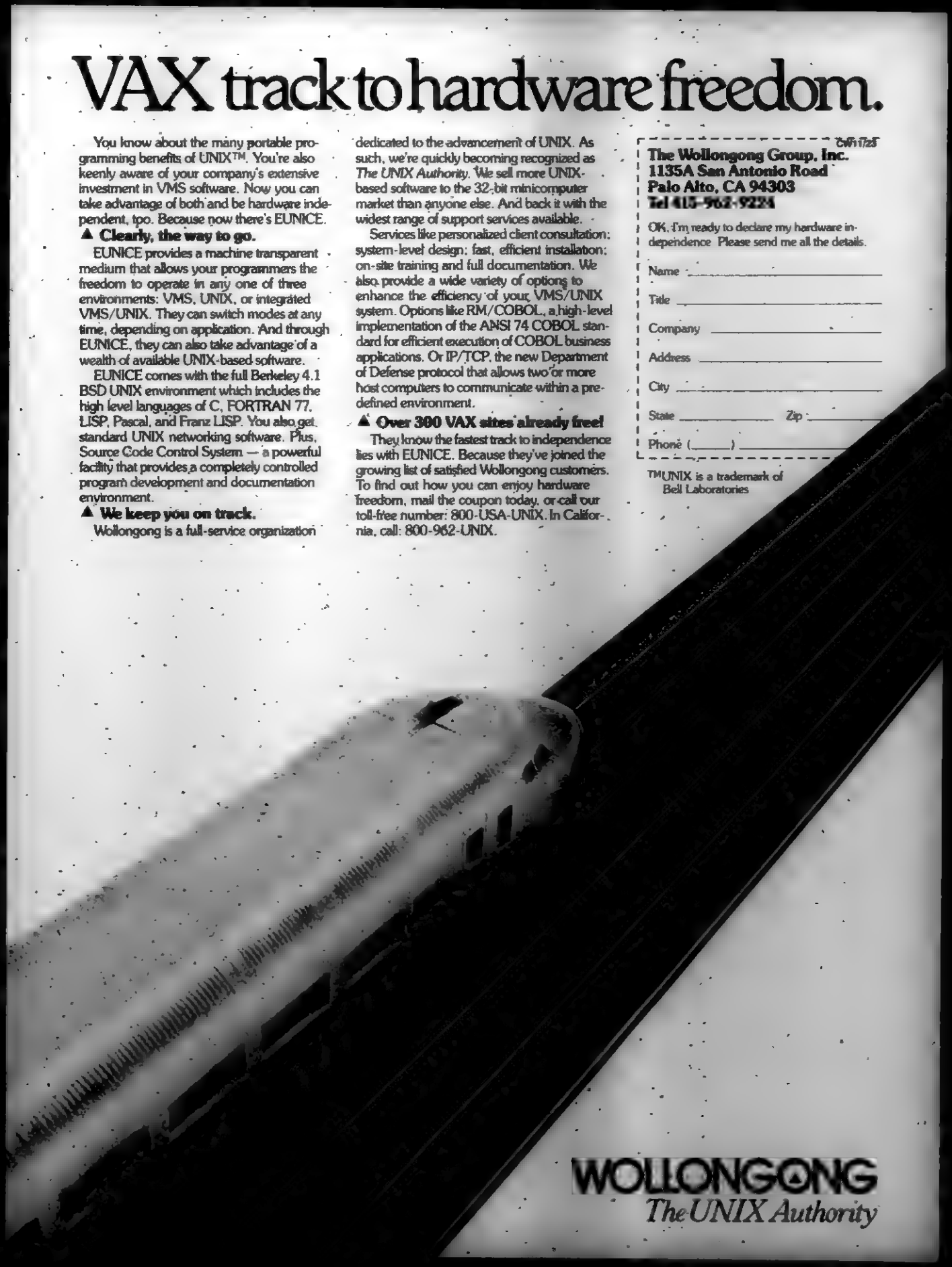

WOLLONGONG
The UNIX Authority

ANALOGIC CORP.
[illegible]
Specific Application: Provides Multiple Windows
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 8,200
(See Vendor Profile Page V-6)

APPLIED DATA CORP.
CP/M FOR THE TRS-80
Specific Application: Converts TRS-80 to CP/M
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: CP/M
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 2,000
Date First Installed: September 1978
(See Vendor Profile Page V-7)

ATON INTERNATIONAL, INC.
ATON CP/M 3.1
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/III, Model 12, Model 16
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200 to $350
Number Installed to Date: 500
Date First Installed: May 1982
(See Vendor Profile Page V-10)

ATON INTERNATIONAL, INC.
[illegible]
OPTION FOR ATON CP/M
Specific Application: Operating System
System Requirements: TRS-80
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 500
Date First Installed: May 1982

BILLINGS COMPUTER CORP.
BILLINGS OASIS PACK
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: Billings
Memory Required: 64.0K bytes
Purchase Terms: Purchase (license)
Price: $300
(See Vendor Profile Page V-12)

BILLINGS COMPUTER CORP.
BILLINGS TURBO-DOS OPERATING SYSTEM
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: Billings
Memory Required: 64.0K bytes
Purchase Terms: Purchase (license)
Price: $450

CHARLES RIVER DATA SYSTEMS, INC.
UNOS
Specific Application: Unix-Type Operating System
Specific Industry: Not Industry Sensitive
Memory Required: 256.0K bytes
Source Language: C56
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: 1981
(See Vendor Profile Page V-18)

DATA TECHNOLOGY INDUSTRIES
SUPERBRAIN OPERATING SYSTEM
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: Associate
Price: $125
(See Vendor Profile Page V-38)

DIGITAL RESEARCH, INC.
CONCURRENT CP/M-86
Specific Application: Files Management, Date and Time Stamps, Real-Time Operating System
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 128.0K bytes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-42)

DIGITAL RESEARCH, INC.
CP/M-68K
Specific Application: Support 64K Bytes to 16M Bytes of RAM, C Language, Cross-Development Tool
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Purchase Terms: Purchase (license)

DRAFTEK
DE-BIO
Specific Application: IBM DOS Modification w/Increased Disk Storage
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: DOS
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: September 1982
(See Vendor Profile Page V-43)

ENSIGN SOFTWARE
ELECTRONIC DESK
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 96.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $70
Number Installed to Date: 2,000
Date First Installed: September 1983
(See Vendor Profile Page V-46)

HEMENWAY CORP.
MSP/Z8000
Specific Application: Real-Time Multi-Tasking
Specific Industry: OEM
System Requirements: Zilog Z8000
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 100
Date First Installed: 1981
(See Vendor Profile Page V-54)

HEMENWAY CORP.
MSP/6800
Specific Application: Real-Time Multi-Tasking
Specific Industry: OEM
System Requirements: Motorola 6800
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 100
Date First Installed: 1981

HEMENWAY CORP.
OS ENGINE
Specific Application: Operating System
Specific Industry: OEM
System Requirements: Motorola 6800: MSP; Zilog Z8000
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 40
Date First Installed: 1981

HOLLAND AUTOMATION U.S.A.
HAI*BAS RUN TIME
Specific Application: Two Utilities
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Eagle II, III, IV: CP/M; Apple II, III: MS-DOS
Memory Required: 64.0K bytes
Source Language: HAI*Basic, Intel 8080 Assembler, 8086 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 3,200
Date First Installed: September 1978
(See Vendor Profile Page V-55)

INDUSTRIAL PROGRAMMING, INC.
MTOS-68
Specific Application: General Control
Specific Industry: Control Application
System Requirements: Motorola 6800, 6801, 6802
Memory Required: 3.0K bytes
Source Language: Assembler
Source Code Available: Yes
(See Vendor Profile Page V-57)

INDUSTRIAL PROGRAMMING, INC.
MTOS-68K
Specific Application: General Control
Specific Industry: Control Application
System Requirements: Motorola 68000, 68K, 68k
Memory Required: 3.0K bytes
Source Language: Assembler
Source Code Available: Yes

INDUSTRIAL PROGRAMMING, INC.
MTOS-80
Specific Application: General Control
Specific Industry: Control Application
System Requirements: Intel 8080, 8085, 8086
Memory Required: 3.0K bytes
Source Language: Assembler
Source Code Available: Yes

INDUSTRIAL PROGRAMMING, INC.
MTOS-80MP
Specific Application: General Control
Specific Industry: Control Application
System Requirements: Intel 8080, 8085, 8086
Memory Required: 3.0K bytes
Source Language: Assembler
Source Code Available: Yes

INDUSTRIAL PROGRAMMING, INC.
MTOS-86
Specific Application: General Control
Specific Industry: Control Application
System Requirements: Intel 8086, 8088
Memory Required: 3.0K bytes
Source Language: Assembler
Source Code Available: Yes

INFOSOFT SYSTEMS, INC.
INFOSOFT OPERATING SYSTEM (I/OS - V)
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
Memory Required: 3.2M bytes
Source Language: Intel 8080 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $225
Number Installed to Date: 100,000
Date First Installed: July 1977
(See Vendor Profile Page V-58)

INFOSOFT SYSTEMS, INC.
INFOSOFT MULTIUSER OPERATING SYSTEM
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
Memory Required: 128.0K bytes
Source Language: Intel 8086 Assembler, Infosoft C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: January 1981

A unique company dedicated to the development and enhancement of UNIX® software and support regardless of host hardware! This was the concept pioneered by The Wollongong Group in 1980. The year it introduced the 32-bit UNIX-based operating system for the Perkin-Elmer [redacted]

The world's first UNIX utility company.

Since then, we have continued to develop and market a wide spectrum of UNIX software for 32-bit minicomputers. We have also gained an enviable clientele from the ranks of the 'Fortune 1000.' In fact, we have now extended the UNIX utility concept through distribution channels to worldwide markets.

Today, Wollongong software products not only operate under UNIX, but also under DEC's VMS and our proprietary EUNICE which provides a transparent link between UNIX and VMS on the same host computer.

System-level packages

These run under VMS or EUNICE for VAX users, or UNIX for PE 3200 users.

IP/TCP Internet Protocol Transmission Control Protocol is the newly adopted Department of Defense standard which provides a set of cooperative processes allowing two or more host computers to communicate.

R/M COBOL is a high-level implementation of the ANSI 74 COBOL standard, designed for efficient development and execution of COBOL business applications. Features include GSA certified COBOL, Level-2 relative and indexed file [redacted]

Full Screen Editor supports advanced programming and text processing requirements, concurrent file editing, and formatting.

Development products

EUNICE A comprehensive suite of software which provides VAX users with the unique ability to merge their native VMS [redacted] UNIX commands and

[illegible]
UNI-OS
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
Memory Required: 32.0K bytes
Source Language: Intel 8080 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: December 1982

MICROMETICS DESIGN CORP.
MSMOI MICROMETICS STANDARD MUMPS
[illegible] Product Classification: Languages
Specific Application: Conversational Applications Development
Specific Industry: Not Industry Sensitive
System Requirements: Four Phase; Southwest Technical; Apple
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $695
Number Installed to Date: 300
Date First Installed: November 1981
(See Vendor Profile Page V-74)

MICRO-SYSTEMS SOFTWARE, INC.
DOS +
Specific Application: Disk Operating System
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I; [illegible]
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 30,000
Date First Installed: [illegible]
(See Vendor Profile Page V-75)

MICRO-SYSTEMS SOFTWARE, INC.
DOS +4
Specific Application: Disk Operating System
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/IV
Source Language: [illegible]
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: July 1983

[illegible] DATA SCIENCES CORP.
PERSONAL COMPUTING 21
[illegible] Application: CP/M
Operating System for Multistation Systems
Specific Industry: Not Industry Sensitive
System Requirements: MDS Series 21: OS/2; MDS 2110: OS/10
Memory Required: 128.0K bytes
Source Language: Mobol/Z80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200
Date First Installed: July 1983
(See Vendor Profile Page V-77)

MOSTEK CORP.
M/OS-80 OPERATING SYSTEM
Specific Application: Operating System for Master Bus Boards and Systems
Specific Industry: Engineering
System Requirements: Mostek Master Matrix: M/OS-80
Memory Required: 64.0K bytes
Source Language: C, Zilog Z80 Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 1,000
Date First Installed: November 1981
(See Vendor Profile Page V-77)

MOSTEK CORP.
UNIX SYSTEM III
Specific Application: Unix System III Operating System
Specific Industry: Engineering
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: C, Motorola 68000 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)

MUSYS CORP.
TURBO-DOS VERSION 1.22
Specific Application: CP/M and MP/M Compatible Multiuser, Multiprocessor Operating System
Specific Industry: Not Industry Sensitive
System Requirements: TURBO-DOS
Memory Required: 64.0K bytes
Source Language: CDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 2,000
Date First Installed: March 1981
(See Vendor Profile Page V-78)

NCR CORP.
CP/M CONTROL PROGRAM FOR MICROCOMPUTERS
Specific Industry: Not Industry Sensitive
System Requirements: NCR Decision Mate V: CP/M
Memory Required: 64.0K bytes
Source Language: Assembler Code
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: February 1983
(See Vendor Profile Page V-79)

NCR CORP.
MS-DOS — MICROSOFT DISK OPERATING SYSTEM
SPECIFIC INDUSTRY: Not Industry Sensitive
System Requirements: NCR Decision V: MS-DOS
Memory Required: 64.0K bytes
Source Language: Assembler Code
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: February 1983

[illegible] SYSTEMS, INC.
[illegible]
Specific Application: Shared Access to Virtual Disks for Local-Area Network
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS, Apple III: CP/M; IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 500
Date First Installed: 1981
(See Vendor Profile Page V-79)

NESTAR SYSTEMS, INC.
PRINT SERVER
Specific Application: Spooled Printing Simulating Virtual Printers for Local-Area Network Users
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: Pascal, Apple III: SOS; IBM PC: PC-DOS; CP/M
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 500
Date First Installed: 1981

OMIKRON ASSOCIATES
MAPPER 1/48K
Specific Application: CP/M for the TRS-80/I
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: CP/M
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 3,500
Date First Installed: 1978
(See Vendor Profile Page V-82)

OMIKRON ASSOCIATES
MAPPER 3/48K
Specific Application: CP/M for the TRS-80/III
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 3,500
Date First Installed: 1978

OMIKRON ASSOCIATES
MAPPER 3/64K
Specific Application: CP/M for the TRS-80/III
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 3,500
Date First Installed: 1978

PMD, INC.
OPTIBASIC
Specific Application: Industrial Process Control
Specific Industry: Manufacturing
System Requirements: Zilog Z80; Zycom 160+; PHC Optimizer
Memory Required: [illegible] bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: 1981
(See Vendor Profile Page V-85)

PHOENIX SOFTWARE ASSOCIATES, LTD.
MPDOS
Specific Application: CP/M-Compatible Multiprocessor Operating System
Specific Industry: OEM
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: December 1982
(See Vendor Profile Page V-86)

PROFILES & TROUT
FAT CP/M 2 OPERATING SYSTEM
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II
Memory Required: 32.0K bytes
Source Language: Assembly, [illegible]
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 7,000
Date First Installed: February 1980
(See Vendor Profile Page V-86)

RACET COMPUTERS, LTD.
HARD/SOFT DISK SYSTEM (HSDS) [illegible]
Specific Application: Second Source Hard Disk Drives
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, TRS-80/II, TRS-80 Model 12
Memory Required: 64.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $400 to $500
Number Installed to Date: 500
Date First Installed: 1979
(See Vendor Profile Page V-91)

RACET COMPUTERS, LTD.
RACET NECDOS - VERSION 2.X
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: NEC PC-8001, 8801
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $175 to $275
Number Installed to Date: 8,000
Date First Installed: 1981

SCIENCE MANAGEMENT CORP.
THOROUGHBRED MULTIUSER BASIC OPERATING SYSTEM
Specific Application: Multiuser Operating System
Specific Industry: Not Industry Sensitive
System Requirements: 16-Bit Micro
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595
(See Vendor Profile Page V-93)

SENSIBLE SOFTWARE, INC.
DOS PLUS
Specific Application: Enhanced Apple Disk Operating System

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Specific Industry: Not Industry Sensitive
System Requirements: Apple APPLE-DOS
Memory Required: 48 0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25
Number Installed to Date: 1 000
Date First Installed: February 1981
(See Vendor Profile Page V 36)

SOFTWARE DYNAMICS
DOLOMATE
Additional Product Classification: WP/Text Editing Data/File Management, Sort/Merge, Program Generators/Aids/Applications Development Tools, Compilers/Assemblers
Specific Application: Professional Tool Package for Tandy Computers, Includes Compiler, Assembler Editor and Utility Programs
Specific Industry: Not Industry-Sensitive
System Requirements: Tandy TRS-80
Memory Required: 16 0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 30
Date First Installed: 1983
(See Vendor Profile Page V-99)

SOFTWARE DYNAMICS
MDOSSIM
Specific Application: Simulates Motorola M-DOS Under S-DOS
Specific Industry: Not Industry Sensitive
System Requirements: Psitech GT Series, TRS-80, Motorola. S-DOS
Memory Required: 64 0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $127
Number Installed to Date: 100
Date First Installed: 1980

SOFTWARE DYNAMICS
S-DOS
Specific Application: Single-User DOS for Motorola 6800, 6809
Specific Industry: Not Industry Sensitive
System Requirements: Psitech GT Series, Smoke Signal Broadcasting, TRS, Motorola
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible]
Number Installed to Date: 600
Date First Installed: 1978

SOFTWARE DYNAMICS
S-DOS/ES
Specific Application: Extended S-DOS With A 64K-Byte User Space
Specific Industry: Not Industry Sensitive
System Requirements: Psitech GT Series, Smoke Signal Broadcasting, TRS, Motorola
Memory Required: 128 0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $115
[illegible]

Date First Installed: 1983

SOFTWARE TOOLWORKS
INTRO TO BASIC PROGRAMMING
Additional Product Classification: Languages Tutorial
Specific Application: Basic Language Programming Introduction
System Requirements: Heath,Zenith CP M
Memory Required: 48 0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 954
Date First Installed: 1980
(See Vendor Profile Page V-100)

TECHNICAL SYSTEMS CONSULTANTS, INC.
UNIFLEX DISK OPERATING SYSTEM
Specific Application: Modeled After the Unix Operating Systems
Specific Industry: Not Industry Sensitive
System Requirements: Motorola 6809, 6800
Memory Required: 256 0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2 500
Date First Installed: 1980
(See Vendor Profile Page V-108)

TICOM SYSTEMS INC.
UCSD P-SYSTEM
Specific Application: Software Development and Application Execution
Specific Industry: Not Industry Sensitive
System Requirements: TI UCSD-P, NEC APC, DEC Rainbow
Memory Required: 64 0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $120 to $825
(See Vendor Profile Page V-110)

U-MICROCOMPUTERS, INC.
MEMORY MANAGEMENT
Specific Application: Moves DOS Onto the RAM Card
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE, II+, APPLE-DOS
Purchase Terms: Purchase (license)
Price: $39
(See Vendor Profile Page V-112)

[illegible]
UNIPLUS
Specific Application: System 3 and System 5 Unix
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256 0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 500
Date First Installed: January 1982
(See Vendor Profile Page V-113)

VENTURA COM, INC.
VENIX 86
Specific Application: Operating System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC PC-XT
Memory Required: 192 0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $775
Number Installed to Date: 1,000
Date First Installed: June 1983
(See Vendor Profile Page V-115)

VERITAS TECHNOLOGY, INC.
CP/M 86
Specific Application: Tandy
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80, Model 12, Model 16, CP/M 86
Memory Required: 64 0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $225
Date First Installed: 1983
(See Vendor Profile Page V-115)

VISICORP
VISION
Specific Application: Integrated Software and Operating Environment With Open-Ended System, Machine Independent
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; Honeywell, Wang, TI
Source Language: C
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-115)

WILD HARE COMPUTER SYSTEMS, INC.
COBOL INTERPRETER
Specific Application: DG CS/Cobol Interpreter for Hair Brain
Specific Industry: Not Industry Sensitive
System Requirements: Hare Brain Workstation: MCS
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
[illegible]
Date First Installed: June 1983
(See Vendor Profile Page V-117)

WILD HARE COMPUTER SYSTEMS, INC.
RDOS/SIMULATOR
Specific Application: Emulates DG Nova 4/X and RDOS Environment on Hare Brain
Specific Industry: Not Industry Sensitive
System Requirements: Hare Brain: MCS
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1 500
[illegible]
Date First Installed: June 1983

LANGUAGES

ADPAC CORP.
ADPAC
Specific Application: Language for IBM Mainframes
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS
Source Language: Adpac
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $28,000
Number Installed to Date: 80
Date First Installed: 1963
(See Vendor Profile Page V-2)

ANATEC, INC. (ANACONDA ADVANCED TECHNOLOGY)
CMAP
Specific Application: Process Control
Specific Industry: Chemical
System Requirements: DEC PDP-11 RSX-11M
Memory Required: 128.0K bytes
Source Language: Crisp, Fortran, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 200
Date First Installed: December 1974
(See Vendor Profile Page V-6)

ANDREW RUBEL & ASSOCIATES,INC.
DIGITAL COMMAND LANGUAGE
Specific Application: Command Language
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RSX 3.2
Source Language: Fortran
Source Code Available: $2,500
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 400
Date First Installed: December 1980
(See Vendor Profile Page V-6)

ATON INTERNATIONAL, INC.
BASIC SUBROGATE FOR ATON CP/M
Specific Application: Interface Allowing Basic Interpreter Supplied BY Radio Shack to Operate Under CP/M
Specific Industry: Not Industry Sensitive
System Requirements: Radio Shack
Memory Required: 64 0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $99
Date First Installed: October 1981
(See Vendor Profile Page V-10)

ATON INTERNATIONAL, INC.
I-TO-Z ASSEMBLY LANGUAGE TRANSLATOR
Specific Application: Translates Intel 8080 to Zilog Z-80 Assembly Mnemonics
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $49
Date First Installed: November 1982

ATON INTERNATIONAL, INC.
Z-TO-I ASSEMBLY LANGUAGE TRANSLATOR
Specific Application: Translates Zilog Z-80 to Intel 8080 Assembly Mnemonics
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 8.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $49
Date First Installed: November 1982

CENTURY ANALYSIS, INC.
INTEL/6
Specific Application: Interpretive Language
Specific Industry: Not Industry Sensitive
System Requirements: NCR: VRX, B/3
Memory Required: 200.0K bytes
Source Language: Cobol, Neat/3
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $10,900
Number Installed to Date: 90
Date First Installed: April 1982
(See Vendor Profile Page V-17)

THE CODE WORKS
D/C
Specific Application: Language
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 52.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,500
(See Vendor Profile Page V-19)

COMPUCON
COMPUCON CONTROL LANGUAGE (CCL)
Specific Application: Data Acquistion Energy Management Industrial Control
Specific Industry: Process Control
Source Language: Source Assembly, Not Distributed
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-22)

THE COMPUTER SPECTRUM LTD.
SPEED II
Specific Application: Fourth Generation Language
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS
Memory Required: 256.0K bytes
Source Language: Object Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: 1983
(See Vendor Profile Page V-28)

CONTROL-C SOFTWARE, INC.
BASIC INTERPRETER LEVEL 2
Additional Product Classification: Basic Interpreter
Specific Application: Runs Programs Written In Basic Four's Level II Basic
System Requirements: IBM PC: PC-DOS, CP/M 86, MP/M 86
Source Language: C, Assembler
Price: $500
Number Installed to Date: 5,000
(See Vendor Profile Page V-30)

CONTROL-C SOFTWARE, INC.
BASIC INTERPRETER LEVEL 2 FOR 6800
Specific Application: Runs Programs Written In Basic Four's Level II Basic
Specific Industry: Not Industry Sensitive
System Requirements: Altos 8000: CP/M 80, MP/M 80
Memory Required: 64.0K bytes
Source Language: C, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 5,000
Date First Installed: December 1981

CONTROL DATA CORP.
SIMSCRIPT
Specific Application: Developed for String Manipulation, Compilation Techniques, Machine Simulation
Specific Industry: Not Industry Sensitive
System Requirements: CDC Cyber 170
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-30)

CORPORATE COMPUTER SYSTEMS, INC.
COBOL/1000 REV. 1.1
Specific Application: Implementation of the Ansi X3.23
Specific Industry: Not Industry Sensitive, Scientific
System Requirements: HP 1000
Memory Required: 28.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 19
Date First Installed: December 1981
(See Vendor Profile Page V-31)

CPS BUSINESS SYSTEMS, INC.
SYSTEM 80/SERVE - INFORMATION & RETRIEVAL
Specific Application: Provides Ease of Programming for the Lay Person
Specific Industry: Not Industry Sensitive
System Requirements: TI
Memory Required: 356.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 15
Date First Installed: September 1982
(See Vendor Profile Page V-31)

DANFORD CORP.
DCL
Specific Application: Danford Command Language That Emulates VAX: VMS ECC, Language
System Requirements: Apollo: Aegis
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 2
Date First Installed: 1983
(See Vendor Profile Page V-34)

DATAPOINT CORP.
BASIC
Specific Application: General Purpose Data Processing Language
Specific Industry: Manufacturing
System Requirements: Datapoint 8600, 6600, 3800, 1800 DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $1,500
(See Vendor Profile Page V-37)

DATAPOINT CORP.
CHAIN
Specific Application: Batch and Interactive Management of Job Control
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 1800, 8600 6600 3800 RMS-DOS
Source Language: Assembler

DATAPOINT CORP.
DATABUS (DATAPOINT BUSINESS LANGUAGE)
Specific Application: Transaction Processing, Intelligent Data Entry and General DP
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 8800, 8600, 8220, 6600, 3800: RMS-DOS; Datapoint 1560 DOS
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $1,500

DATAPOINT CORP.
DATASHARE
Specific Application: Communications Software
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 8800, 8600, 6600, 3500 RMS-DOS
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $1,500

DATAPOINT CORP.
FORTRAN
Specific Application: Industry Standard DP Language for Science.
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 8600, 6600, 3500, 1560 DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $1,500

DATAPOINT CORP.
RPG - REPORT PROGRAM GENERATOR
Additional Product Classification: Compilers/Assemblers
Specific Application: DP Language for Development of Batch-Oriented Applications
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 8600, 6600, 6600, 3800 RMS-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $1,500

DEWAR INFORMATION SYSTEMS CORP.
SPITBOL
Specific Application: String Language Processor
Specific Industry: General Business
System Requirements: DEC VAX:

Unix; DEC PDP: RSX; IBM System/360, 370
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-41)

DIGITAL EQUIPMENT CORP.
BASIC-11/RT-11
Specific Application: Conversational Programming Language Using English-Like Statements
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: CTS-300; DEC VAX-11: RT-11
Purchase Terms: Purchase (license)
Price: $590 to $1,500
(See Vendor Profile Page V-42)

DIGITAL EQUIPMENT CORP.
COBOL-81
Specific Application: High Level Language for Business DP
Specific Industry: Business
System Requirements: DEC PDP-11: RSTS/E; DEC VAX-11: RSX-11
Purchase Terms: Purchase (license)
Price: $3,600 to $6,750

DIGITAL EQUIPMENT CORP.
CORAL-66
Specific Application: Replaces Assembly Level Programming In Modern Industrial, Commercial Applications
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX-11; DEC VAX-11
Purchase Terms: Purchase (license)
Price: $4,050 to $5,100
Date First Installed: 1900

DIGITAL EQUIPMENT CORP.
DIBOL-11/DECFORM
Specific Application: High Level Language for Commercial Applications Programming
Specific Industry: Commercial
System Requirements: DEC PDP-11: RSTS/E; DEC VAX-11
Purchase Terms: Purchase (license)
Price: $5,200 to $8,600

DIGITAL EQUIPMENT CORP.
PDP-11 BASIC PLUS 2 V2
Specific Application: Handles Big Applications, Supports Structured Programming, User Friendly
System Requirements: DEC PDP-11: RSTS/E, RSX; DEC VAX-11: VMS
Purchase Terms: Purchase (license)
Price: $3,850 to $5,850

DIGITAL EQUIPMENT CORP.
PDP-11 FORTRAN IV V2.6
Specific Application: Expanded Former Ansi Fortran, X3.9-1966
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: CTS-300, RSX, DEC VAX-11: RSTS/E, RT-11
Purchase Terms: Purchase (license)
Price: $900 to $4,300

DISC
DBL (DATA BUSINESS LANGUAGE)
Specific Application: Language
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, TSX, TSX1, DEC VAX: RSTS, RSX-11M, VMS, DOS
Memory Required: 64.0K bytes
Source Language: DBL
Purchase Terms: Purchase (license)
Price: $945
Number Installed to Date: 1,800
Date First Installed: 1978
(See Vendor Profile Page V-43)

ELLIS COMPUTING
NEVADA FORTRAN
Specific Application: Fortran Version
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8080, 8085, Zilog Z80
Memory Required: 48.0K bytes
Purchase Terms: Purchase (license)
Price: $30
Number Installed to Date: 6,000
(See Vendor Profile Page V-46)

FIRST SYSTEMS CORP.
C
Specific Application: Intel Compatible Cross Development of 8086 Software on Mainframes
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, IBM: CMS: Unix
Source Language: C
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-49)

FIRST SYSTEMS CORP.
FS ASM86
Specific Application: Intel Compatible Cross Development of 8086 Software on Mainframes
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix, IBM: CMS, VMS
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 27
Date First Installed: February 1982

FIRST SYSTEMS CORP.
FS FORTRAN 86
Specific Application: Intel Compatible Cross Development of 8086 Software on Mainframes
System Requirements: DEC VAX: VMS, IBM: CMS, Unix
Source Language: Pascal
Date First Installed: June 1983

FIRST SYSTEMS CORP.
FS PASCAL 86
Specific Application: Intel Compatible Cross Development of 8086 Software on Mainframes
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, IBM: CMS: Unix
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 35
Date First Installed: June 1981

FIRST SYSTEMS CORP.
PLM/86
Specific Application: Intel Compatible Cross Development of 8086 Software on Mainframes
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, IBM: CMS, Unix
Source Language: C
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: 1983

GAMMA TECHNOLOGY, INC.
PASCAL COMPILER AOS AND AOS/VS RELEASE I & II
Specific Application: Pascal Compiler
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse: AOS, DG Eclipse MV Series: AOS/VS
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000 to $2,000
Number Installed to Date: 50
Date First Installed: 1979
(See Vendor Profile Page V-50)

GOULD, INC.
ICSC-ADA TRANSLATER
Specific Application: ADA Training
Specific Industry: Government, Military
System Requirements: Concept/32: UTX
Memory Required: 1.0M bytes
Source Language: C
Purchase Terms: Purchase (license); Rental
Price: $10,000
(See Vendor Profile Page V-52)

GOULD, INC.
LNS-PASCAL TRANSLATOR
Specific Application: Language Translator
Specific Industry: Engineering, Scientific
System Requirements: Concept/32: UTX
Memory Required: 1.0M bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $6,000

GRAFTEK, INC.
AGILE
Specific Application: Algorithmic Graphics Interface Language
System Requirements: Gould Concept 32: MPX
Memory Required: 1.0M bytes
Source Language: Fortran, Basic
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1982
(See Vendor Profile Page V-52)

HONEYWELL, INC.
TBS BASIC LANGUAGE
Specific Application: Can Create and Execute Programs Written in Basic
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell DPS Book II
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-55)

IBM
SCI (SPD II
Specific Application: Language
Specific Industry: Not Industry Sensitive
System Requirements: DOS; DOS/VS
Memory Required: 14.0K bytes
Purchase Terms: Purchase (license)
Price: $2,900
(See Vendor Profile Page V-56)

INNOVATIVE MANAGEMENT, INC.
INMAN TO COBOL TRANSLATOR
Specific Application: Language Translator From DEC
Specific Industry: Not Industry Sensitive
System Requirements: TI 990
Memory Required: 256.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Date First Installed: 1981
(See Vendor Profile Page V-59)

MATHEMATICA PRODUCTS GROUP
RELATE
Specific Application: Relational Language
Specific Industry: Not Industry Sensitive
System Requirements: IBM
Source Language: Assembler
Purchase Terms: Purchase (license); Rental; Lease
Price: $7,000 to $14,000
Number Installed to Date: 150
Date First Installed: 1981
(See Vendor Profile Page V-70)

MIPS SOFTWARE DEVELOPMENT, INC.
APL-A PROGRAM LANGUAGE
Specific Application: Programming
Specific Industry: Not Industry Sensitive
System Requirements: Prime Model 50 Primos
Purchase Terms: Purchase (license); Lease
Price: $14,000
Number Installed to Date: 10
(See Vendor Profile Page V-76)

NATIONAL INFORMATION SYSTEMS, INC.
MAXBASIC
Specific Application: Extended High Performance Basic
Specific Industry: Not Industry Sensitive
System Requirements: DEC 10: Tops 10; DEC 20: Tops 20
Source Language: Macro
Purchase Terms: Purchase (license)
Price: $12,000 to $75,000
Number Installed to Date: 30
Date First Installed: 1977
(See Vendor Profile Page V-79)

NIXDORF COMPUTER CORP.
COBOL
Specific Application: Programming Language
Specific Industry: Not Industry Sensitive
System Requirements: Nixdorf 8860 Dipos
Memory Required: 512.0K bytes
Source Language: Assembler
Purchase Terms: Rental
Number Installed to Date: 7,000
(See Vendor Profile Page V-80)

PCD SYSTEMS, INC.
CROSS ASSEMBLERS
Additional Product Classification: Utility

Specific Application: Converts Assembly Language Code Cross Assembler
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11, TRS, IBM, Altos
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $375
Date First Installed: 1980
(See Vendor Profile Page V-84)

PCD SYSTEMS, INC.
LISP INTERPRETER
Specific Application: Artificial Intelligence Language
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11, TRS, IBM, Altos
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 300
Date First Installed: 1980

PRIME COMPUTER, INC.
BASIC/M
SPECIFIC INDUSTRY: Not Industry
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000 to $5,000
Date First Installed: 1980
(See Vendor Profile Page V-87)

PRIME COMPUTER, INC.
C
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Price: $7,500
Date First Installed: 1983

PRIME COMPUTER, INC.
COBOL 74
Specific Application: Procedural Language for Commercial Business Data Processing
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Purchase Terms: Purchase (license); Monthly License
Date First Installed: September 1977

PRIME COMPUTER, INC.
FORTRAN 66
Additional Product Classification: Compilers/Assemblers
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Purchase Terms: Purchase (license)

PRIME COMPUTER, INC.
FORTRAN 77
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Purchase Terms: Purchase (license); Monthly License
Date First Installed: 1979

PRIME COMPUTER, INC.
PASCAL
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Purchase Terms: Purchase (license); Monthly License
Price: $7,500

PRIME COMPUTER, INC.
PL/1 SUBSET G
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Purchase Terms: Purchase (license); Monthly License
Price: $1,500 to $7,500
Date First Installed: 1981

PRIME COMPUTER, INC.
RPG-II
Specific Application: Commercial Business Data Processing
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Purchase Terms: Purchase (license); Monthly License
Date First Installed: 1977

PRIME COMPUTER, INC.
SOURCE LEVEL DEBUGGER
Specific Application: Procedural Language for Commercial Business Data Processing
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Purchase Terms: Purchase (license); Monthly License
Price: $6,400
Date First Installed: 1981

PRITSKER & ASSOCIATES, INC.
SLAM II
Specific Application: Simulation Language for Alternative Modeling. Supports the Development and Analysis of Systems
Specific Industry: Not Industry Specified
Memory Required: 175.0K bytes
Source Language: Fortran IV
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 400
Date First Installed: January 1979
(See Vendor Profile Page V-87)

PROPRIETARY SOFTWARE SYSTEMS
DUAL DYNAMIC UNIVERSAL LANGUAGE
Specific Application: CrossAssembly, Macro Assembly Source Conversion And Link Editing
Specific Industry: Government, Aerospace
System Requirements: IBM; DEC: VMS, Sperry; Control Data
Memory Required: 400.0K bytes
Source Language: Dual
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000
Number Installed to Date: 70
Date First Installed: September 1969
(See Vendor Profile Page V-89)

PROPRIETARY SOFTWARE SYSTEMS
DYNAMIC UNIVERSAL ASSEMBLY LANGUAGE
Additional Product Classification: Compilers/Assemblers
Specific Application: Language
Specific Industry: Not Industry Sensitive
Memory Required: 500.0K bytes
Source Language: Tilt
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 45
Date First Installed: September 1969

RADIX II, INC.
EXTENDED C COMPILER: C-PLUS
Additional Product Classification: Communications/TP Monitors
Specific Application: System Software, Compiler, Real-Time
Specific Industry: Not Industry Sensitive
System Requirements: PE 32-Bit: OS/32MT; IBM Series/1 EDX
Memory Required: 64.0K bytes
Source Language: R
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,500
Date First Installed: January 1983
(See Vendor Profile Page V-91)

RADIX II, INC.
MACHINE INDEPENDENT PROGRAMMING LANGUAGE
Additional Product Classification: Compilers/Assemblers
Specific Application: System Software, Compiler, Real-Time, Applications
Specific Industry: Not Industry Sensitive
System Requirements: PE 32-Bit: OS/32MT, IBM Series/1 EDX
Memory Required: 64.0K bytes
Source Language: R
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,500
Date First Installed: January 1982

RADIX II, INC.
N-BASIC: MULTI-USER BASIC INTERPRETER
Additional Product Classification: Compilers/Assemblers
Specific Application: Basic Interpreter
Specific Industry: Not Industry Sensitive
System Requirements: PE 32-Bit: OS/32MT, IBM Series/1 EDX
Memory Required: 64.0K bytes
Source Language: R
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,500
Date First Installed: January 1982

SCSI CORP.
JOB CONTROL LANGUAGE
Specific Application: Job Control Language
Specific Industry: Not Industry Sensitive
System Requirements: Tandem T16 1, 2; Guardian
Source Language: TAL
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 8
Date First Installed: September 1981
(See Vendor Profile Page V-95)

SENTINEL COMPUTER CORP.
BASIC
Specific Application: Basic Language
Specific Industry: Wholesale/Distribution
System Requirements: Sentinel 30; Sentinel 40: Dbos; Sentinel 50; Sentinel 80
Memory Required: 128.0K bytes
Source Language: DBL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,000
Number Installed to Date: 200
Date First Installed: April 1981
(See Vendor Profile Page V-96)

SENTINEL COMPUTER CORP.
COBOL
Specific Application: Cobol Language
Specific Industry: Wholesale/Distribution
System Requirements: Sentinel 30; Sentinel 40: Dbos, Sentinel 50; Sentinel 80
Memory Required: 128.0K bytes
Source Language: DBL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500
Number Installed to Date: 200
Date First Installed: April 1981

S & H COMPUTER SYSTEM, INC.
COBOL PLUS
Specific Application: Ansi 74 Standard Cobol With Powerful Screen Handling Extensions
Specific Industry: Not Industry Specified
System Requirements: DEC PDP-11: RT-11
Memory Required: 32.0K bytes
Source Language: Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,300
Number Installed to Date: 500
Date First Installed: 1980
(See Vendor Profile Page V-97)

SIMULATIONS SERVICES
CSSL-IV
Specific Application: Continuous System Simulation Language
Specific Industry: Engineering, Scientific
System Requirements: DEC: Tops 10, 20, IBM: VMS; CDC: NOS; MSOS, Cmm
Memory Required: 32.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $12,500
Number Installed to Date: 400
Date First Installed: September 1981
(See Vendor Profile Page V-98)

SOFTWARE SYSTEMS
SMC THOROUGHBRED TM BASIC
Specific Application: Programming Language
Specific Industry: Cross Industry
System Requirements: Unix
Memory Required: 80.0K bytes
Source Code Available: Yes
Number Installed to Date: 1,600
Date First Installed: 1980
(See Vendor Profile Page V-100)

SOFTWARE TOOLS
UNALTER THE LANGUAGE CONVERSION
Specific Application: Language Conversion Processor
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DOS/OS
Memory Required: 128.0K bytes
Source Language: Cobol, BAL
Purchase Terms: Lease
Price: $1,750
Number Installed to Date: 2
Date First Installed: September 1[illegible]
(See Vendor Profile Page V-100)

SPEAKEASY COMPUTING CORP.
SPEAKEASY
Specific Application: Multipurpose Package
Specific Industry: Engineering, Banking/Financial, Education, Government, Scientific
System Requirements: IBM [illegible] 370; 3000 Series: MVS, OS/VSO, VM, DEC VAX 11/70 Series. VMS
Memory Required: 200.0K bytes
Source Language: Fortran, Assembler
Purchase Terms: Lease
Price: $6,500
Number Installed to Date: 175
Date First Installed: January 1978
(See Vendor Profile Page V-101)

SYSTEMS RESEARCH CORP.
COBOL CROSS REFERENCE
Specific Application: Cross Reference Report
Specific Industry: Not Industry Sensitive
System Requirements: PE 3200: OS/32, PE 8/32; PE 7/32
Source Language: Assembler, Cobol
Purchase Terms: Purchase (license)
Price: $2,000 to $3,000
Number Installed to Date: 5
Date First Installed: 1982
(See Vendor Profile Page V-107)

SYSTEMS RESEARCH CORP.
COBOL OPTIMIZER
Specific Application: Improves Run Time
Specific Industry: Not Industry Sensitive
System Requirements: PE 3200: OS/32, PE 8/32, PE 7/32
Source Language: Assembler
Purchase Terms: Purchase (license); Lease
Price: $4,250 to $5,000
Number Installed to Date: 5
Date First Installed: 1982

TECHNICO, INC.
[illegible] AND [illegible] LANGUAGE
Specific Application: Computer Aided Instruction: Allows An Instructor to Generate Testof Drill Segments By Typing In Text
Specific Industry: Education
System Requirements: TI; Commodore, IBM PC
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20 to $2,000
Number Installed to Date: 100
Date First Installed: 1981
(See Vendor Profile Page V-108)

TECHNICO, INC.
BASIC
Specific Application: Extended Basic Similar to the Basic on DEC Series, 10 and Honeywell 6600
Specific Industry: Education, Scientific, Industrial Control
System Requirements: TI 9900
Memory Required: 32.0K bytes
Source Language: 9900 Assembler
Source Code Available: Yes
Price: $[illegible]
Number Installed to Date: 400
Date First Installed: 1981

TECHNICO, INC.
C-COMPILER
Additional Product Classification: Compilers/Assemblers
Specific Application: Extended Version of C Compiles Native 9900 Code
Specific Industry: Education, Scientific, Industrial Control
System Requirements: TI 9900
Memory Required: 48.0K bytes
Source Language: 9900 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 50
Date First Installed: April 1983

TECHNICO, INC.
FORTRAN
Specific Application: Real Standard 4 Level 9
Specific Industry: Education, Scientific, Industrial Control
System Requirements: TI 9900
Memory Required: 32.0K bytes
Source Language: 9900 Assembler
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 150
Date First Installed: 1979

TINY C ASSOCIATES
TINY C INTERPRETER
Additional Product Classification: Interpreter
Specific Application: Interprets Tiny C Language
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: CP/M; Apple: APPLE-DOS; TRS-80
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 2,000
Date First Installed: April 1978
(See Vendor Profile Page V-110)

VAN ARMURE & ASSOCIATES, INC.
SP/SCREEN
Specific Application: Screen Section for DG SP/Pascal
Specific Industry: Not Industry Sensitive
System Requirements: MP AOS; Data General: AOS, AOS/VS
Source Language: Pascal, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 5
Date First Installed: October 1[illegible]
(See Vendor Profile Page V-115)

[illegible], LTD.
C [PASCAL] NATIVE COMPILER AND CROSS COMPILER
Additional Product Classification: Compilers/Assemblers
Specific Application: Software Support and Enhancement
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Government
System Requirements: VERSA-DOS, CP/M 80, DEC VAX 730, 750: Unix, DEC PDP-11, LSI/11: RT-11, RSTS/E
Source Language: C, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $550
Number Installed to Date: 2,000
Date First Installed: March 1978
(See Vendor Profile Page V-117)

WHEAT SYSTEMS, INC.
APL
Specific Application: Language
Specific Industry: Not Industry Sensitive
System Requirements: Wicat: Unix, MCS
Memory Required: 512.0K bytes
Source Language: APL
Purchase Terms: Purchase (license)
Price: $300 to $1,500
Number Installed to Date: 1,000
Date First Installed: 1981
(See Vendor Profile Page V-117)

WHEAT SYSTEMS, INC.
ASSEMBLER
Specific Application: Language
Specific Industry: Not Industry Sensitive
System Requirements: Wicat: Unix, MCS
Memory Required: 512.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $300 to $1,500
Number Installed to Date: 5,000
Date First Installed: 1981

WHEAT SYSTEMS, INC.
C
Specific Application: Language
Specific Industry: Not Industry Sensitive
System Requirements: Wicat: Unix, MCS
Memory Required: 512.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $300 to $1,500
Number Installed to Date: 5,000
Date First Installed: 1981

WHEAT SYSTEMS, INC.
COBOL
Specific Application: Language
Specific Industry: Not Industry Sensitive
System Requirements: Wicat Systems: Unix, MCS
Memory Required: 512.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $300 to $15,000
Number Installed to Date: 1,000
Date First Installed: 1981

WICAT SYSTEMS, INC.
FORTRAN 77
Specific Application: Language
Specific Industry: Not Industry Sensitive
System Requirements: Wicat: Unix,MCS
Memory Required: 512.0K bytes
Source Language: Fortran 77
Purchase Terms: Purchase (license)
Price: $300 to $15,000
Number Installed to Date: [illegible]
Date First Installed: 1981

WICAT SYSTEMS, INC.
MICRO COBOL II
Specific Application: Language
Specific Industry: Not Industry Sensitive
System Requirements: Wicat: Unix, MCS
Memory Required: 512.0K bytes
Source Language: Micro Cobol II
Purchase Terms: Purchase (license)
Price: $300 to $1,500
Number Installed to Date: 3,500
Date First Installed: 1981

WICAT SYSTEMS, INC.
PASCAL
Specific Application: Language
Specific Industry: Not Industry Sensitive
System Requirements: Wicat: Unix, MCS
Memory Required: 512.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $300 to $1,500
Number Installed to Date: 5,000
Date First Installed: 1981

THE WOLLONGONG GROUP, INC.
4.1 BSD
Specific Application: Application Development Research
Specific Industry: Not Industry Sensitive
System Requirements: DEC 11/730: VMS, DEC 11/750; DEC [illegible]
Source Language: C
Purchase Terms: Purchase (license)
Price: $[illegible]
Number Installed to Date: 30
Date First Installed: 1980
(See Vendor Profile Page V-117)

THE WOLLONGONG GROUP, INC.
R/M COBOL
Specific Application: Provides High Level Program, Cobol Language Environment
Specific Industry: Banking/Financial
System Requirements: DEC 11/730: VMS, DEC 11/750: Unix; DEC 11/780; DEC 11/[illegible]
Memory Required: [illegible]
Source Language: C
Purchase Terms: Purchase (license)
Price: $5,000 to $8,500
Number Installed to Date: 5
Date First Installed: February 1983

A.B. DICK CO.
A B DICK COMPANY MICROSOFT BASIC RELEASE
Specific Application: Programming
Specific Industry: Not Industry Sensitive, Engineering
System Requirements: A.B. Dick Magna Write, Magna III, Magna SL: CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $450
Date First Installed: September 1982
(See Vendor Profile Page V-1)

THE ALTERNATE SOURCE
ALTERNATE FORTH
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: MULTI-DOS; TRS-80/III: DOS/80; TRS-80/4: TRS-DOS, DOS/Plus
Memory Required: 32.0K bytes
Source Language: Z80
(See Vendor Profile Page V-4)

AMERICAN PLANNING CORP.
APC BASIC
Specific Application: Program Language
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M; North Star Advantage, Horizon
Source Language: APC Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-5)

APPLIED ANALYTICS, INC.
MICRO SPEED II+
Specific Application: High Speed Mathematical Computation
Specific Industry: Engineering, Scientific
System Requirements: Apple
Memory Required: 48.0K bytes
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $645
Date First Installed: December 1981
(See Vendor Profile Page V-7)

APPLIED ANALYTICS, INC.
MICRO SPEED II
Specific Application: High-Speed Mathematical Computation
Specific Industry: Engineering, Scientific
System Requirements: Apple: DOS
Memory Required: 48.0K bytes
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 400
Date First Installed: February 1981

APPLIED ANALYTICS, INC.
MICRO SPEED PC
Specific Application: High-Speed Mathematical Computation
Specific Industry: Engineering, Scientific
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595

COMAGRAPH
PASCAL MT +
Specific Application: Allows Pascal Programs to Run Under Cromix
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco Cromix
Memory Required: 128.0K bytes
Source Language: Pascal, Z80 Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $95 to $100
Number Installed to Date: 50
Date First Installed: 1981
(See Vendor Profile Page V-20)

COMPUTER CO.
APL - 68000 MICROCOMPUTER PROCESSOR
Specific Application: APL Interpreter for 16/32-Bit Microcomputers
Specific Industry: Not Industry Sensitive
System Requirements: Altos ACS 68000
Purchase Terms: Purchase (license)
Number Installed to Date: 500
Date First Installed: February 1981
(See Vendor Profile Page V-23)

COMPUTER CONCEPTS CORP.
CCC-BASIC II
Additional Product Classification: Compilers/Assemblers
Specific Application: Language and Operating System
Specific Industry: Not Industry Sensitive
Memory Required: 256.0K bytes
Source Language: 68000 Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
(See Vendor Profile Page V-23)

DIGITAL RESEARCH, INC.
PASCAL/MT +
Specific Application: ISO Standard Pascal Extended
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Pascal
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-42)

DIGITAL RESEARCH INC.
PL/I
Specific Application: Block Structures of Algol, String Handling Decimal Arithmetic of Cobol, Numerical Structures for Fortran
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: PL/I
Purchase Terms: Purchase (license)

ELLIS COMPUTING
NEVADA COBOL
Specific Application: Full-Screen Editor Designed for Writing Programs
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8080, 8085; Zilog Z80
Memory Required: 32.0K bytes
Purchase Terms: Purchase (license)
Price: $$$
Number Installed to Date: 10,000
Date First Installed: 1979
(See Vendor Profile Page V-46)

ELLIS COMPUTING
NEVADA PILOT
Specific Application: Pilot Language Version
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8080, 8085; Zilog Z80
Memory Required: 32.0K bytes
Source Code Available: No
Price: $$0
Number Installed to Date: 4,000
Date First Installed: 1980

GNOSIS, INC.
P-LISP - VERSION 3.1.2
Specific Application: Lisp Interpreter
Specific Industry: Education
System Requirements: Apple II
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 800
Date First Installed: June 1982
(See Vendor Profile Page V-52)

HAYDEN SOFTWARE
ORCA/M
Specific Application: Object Resource Code Assembler
Specific Industry: Not Industry Sensitive
System Requirements: Apple II
Memory Required: 64.0K bytes
Source Language: Mbasic Compiler
Source Code Available: no
Purchase Terms: Purchase (license)
Price: $99
(See Vendor Profile Page V-53)

HEMENWAY CORP.
HEMENWAY/FORTH
Specific Application: Subset of Forth 79 That Runs as a Task Under MSP
Specific Industry: OEMS
System Requirements: Motorola 6800: MSP
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 40
Date First Installed: 1982
(See Vendor Profile Page V-54)

KRELL SOFTWARE CORP.
KRELL LOGO FOR THE APPLE II
Specific Application: Introductory Computer Language
Specific Industry: Education
System Requirements: Apple II
Memory Required: 64.0K bytes
Purchase Terms: Purchase (license)
Price: $8,995
Number Installed to Date: 6,000
Date First Installed: January 1982
(See Vendor Profile Page V-64)

LABORATORY MICROSYSTEMS
FORTH LANGUAGE PROGRAM
Specific Application: Forth Language Program
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M, IBM 8088C: MP/M; IBM 8086: MS-DOS; PC-DOS
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 3,000
Date First Installed: 1981
(See Vendor Profile Page V-64)

LIFEBOAT ASSOCIATES
LATTICE C COMPILER
Specific Application: Programming Language
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Tecmar: MS-DOS; Victor 9000: CP/M 86; SB 86
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 1,000
Date First Installed: April 1982
(See Vendor Profile Page V-66)

LOGO COMPUTER SYSTEMS, INC.
APPLE LOGO
Specific Application: Program Language
Specific Industry: Education
System Requirements: Apple
Memory Required: 64.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: March 1981
(See Vendor Profile Page V-67)

LOGO COMPUTER SYSTEMS, INC.
ATARI - LOGO
Specific Application: Program Languages
Specific Industry: Education
System Requirements: Atari 1200 XL, 800, 400
Memory Required: 16.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: August 1983

LOGO COMPUTER SYSTEMS, INC.
FRENCH EDITION APPLE LOGO
Specific Application: Program Languages
Specific Industry: Education
System Requirements: Apple
Memory Required: 64.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: August 1983

LOGO COMPUTER SYSTEMS, INC.
IBM LOGO
Specific Application: Program Languages
Specific Industry: Education
System Requirements: IBM PC
Memory Required: 128.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: October 1983

LOGO COMPUTER SYSTEMS, INC.
PRO-LOGO
Specific Application: DEC Professional 300 Series Program Language

Specific Industry: Education
System Requirements: DEC Professional 300
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983

MARTIAN TECHNOLOGIES
[illegible]
Specific Application: FIG Forth With With Array, Matrix, String and Floating-Point Operators
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 1.4; CP/M 2.2
Memory Required: 5.0K bytes
Source Language: Forth
[illegible]
Purchase Terms: Purchase (license)
[illegible]
(See Vendor Profile Page V-69)

MARTIAN TECHNOLOGIES
[illegible]
Specific Application: FIG Forth With Array, Matrix, String and Floating-Point Operators
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 1.4; CP/M 2.2
Memory Required: 24.0K bytes
Source Language: Forth
[illegible]
Purchase Terms: Purchase (license)
[illegible]

MBP
MBP COBOL
Specific Application: Language
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Intel 8088/86: CP/M 86; Oasis 16, IMRX
Memory Required: 128.0K bytes
Source Language: CDL II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 100
[illegible]
(See Vendor Profile Page V-70)

MICRODATA SOFTWARE DEVELOPMENT CO.
ALL
Specific Application: Application Language Liberator
Specific Industry: Not Industry Sensitive
System Requirements: Microdata: Pick
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible]
(See Vendor Profile Page V-73)

MICRO FOCUS, INC.
CIS COBOL
Specific Application: Low Intermediate Certified Cobol Compiler
Specific Industry: Not Industry Sensitive
System Requirements: DEC: Unix; IBM PC: PC-DOS; Victor 900: CP/M 86
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease; Royalty
Price: $650
[illegible]
(See Vendor Profile Page V-73)

MICRO FOCUS, INC.
LEVEL II COBOL
Specific Application: High Level Ansi-Certified Cobol Compiler
Specific Industry: Not Industry Sensitive
System Requirements: DEC: Unix; IBM PC: PC-DOS; Victor 900: CP/M 86
Source Language: Cobol
[illegible]
Purchase Terms: Purchase (license)
Price: $1,600
Date First Installed: May 1982

MICRO FOCUS, INC.
PERSONNEL COBOL
Specific Application: High-Level Cobol Program Environment
Specific Industry: Not Industry Sensitive
System Requirements: DEC: Unix; IBM PC: PC-DOS; Victor: CP/M 86
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400

MICRO LAB
LINKING LOADER AND LANGUAGE PLUS
Additional Product Classification: Compilers/Assemblers
Specific Application: Programming Aids
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE: DOS 3.3
Memory Required: 48.0K bytes
Source Language: Applesoft Basic
[illegible]
Purchase Terms: Purchase (license)
Price: $150
(See Vendor Profile Page V-74)

MICRO MIKE'S, INC.
BAZIC
Specific Application: High-Speed Zilog Z80 Basic Interpeter, BCD Math, North Star Basic-Compatible
[illegible]
System Requirements: Televideo: CP/M; North Star: MP/M; Altos: DOS; Zilog Z80: DOS
Source Language: Z80 Assembler
Purchase Terms: Purchase (license)
Price: $150
[illegible]
Date First Installed: 1980
(See Vendor Profile Page V-74)

MICRONETICS DESIGN CORP.
MSM MICRONETICS STANDARD MUMPS
Specific Application: Conversational Development
Specific Industry: Not Industry Sensitive
System Requirements: Tandy: TRS-DOS, Unix; IBM PC: PC-DOS; NCR Tower
Memory Required: 128.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: May 1983
(See Vendor Profile Page V-74)

MICROSPARC, INC.
MACROSOFT
Specific Application: Basic Program Writing, Compiler Into 6502 Machine Language
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+, IIE: DOS
Memory Required: 64.0K bytes
Source Language: Applesoft, 6502 Machine
[illegible]
Purchase Terms: Purchase (license)
[illegible]
Date First Installed: January 1982
(See Vendor Profile Page V-74)

MILLER MICROCOMPUTER SERVICES
MMS FORTH V2.2
Additional Product Classification: [illegible]
Specific Application: Debugging, Hardware Access Environment
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, XT; Compaq; TRS-80/III, TRS-80/4
Source Language: MMS Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $129
[illegible]
Date First Installed: May 1979
(See Vendor Profile Page V-75)

O'HANLON COMPUTER SYSTEMS
THE SENSIBLE SOLUTION-FULL LANGUAGE
Specific Application: Required for Making Changes in Sensible Solution Modules
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; DPC/OS, MOST, MP/M
Memory Required: 48.0K bytes
Source Language: Sensible Solution
Purchase Terms: Purchase (license)
Price: $695
(See Vendor Profile Page V-82)

O'HANLON COMPUTER SYSTEMS
THE SENSIBLE SOLUTION - LANGUAGE-RUN TIME VERSION
Specific Application: Run-Time Version of the Sensible Solution
[illegible]
System Requirements: CP/M; [illegible]
Source Language: Sensible Solution
Purchase Terms: Purchase (license)
Price: $395

OPTIMIZED SYSTEMS SOFTWARE, INC.
ACTION
Specific Application: Language
Specific Industry: Not Industry Sensitive
System Requirements: Apple; Atari; Commodore
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: September 1983
[illegible] V-83)

OPTIMIZED SYSTEMS SOFTWARE, INC.
BASIC A+
Specific Application: Language
Specific Industry: Not Industry Sensitive
System Requirements: Apple: OS/A+; Atari: OS/A+; Commodore: OS/A+
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $80
Number Installed to Date: 6,000
Date First Installed: March 1981

PEGASUS SOFTWARE
FBASIC
Specific Application: Language System Development
Specific Industry: Not Industry Sensitive
System Requirements: Ohio Scientific
Memory Required: 48.0K bytes
Source Language: Fbasic
Source Code Available: No
Purchase Terms: Purchase (license)
[illegible]
(See Vendor Profile Page V-85)

PFLTSKER & ASSOCIATES, INC.
MICRONET
Specific Application: Alternative Modeling Simulation Language
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE, II+ CP/M, IBM PC: CP/M
[illegible]
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: June 1983
(See Vendor Profile Page V-87)

RACET COMPUTERS, LTD.
ADVANCED PROGRAMMING BASIC
Specific Application: Basic Extension for Advanced Programmers
Specific Industry: Not Industry Sensitive
System Requirements: NEC OC-8001, 8801, Racet NEC-DOS
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $80
Number Installed to Date: 100
Date First Installed: 1982
(See Vendor Profile Page V-91)

RACET COMPUTERS, LTD.
INFINITE BASIC
Specific Application: Extend Basic
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, TRS-80/III: TRS-DOS
Memory Required: 16.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $80
Number Installed to Date: 1,000
Date First Installed: 1980

RACET COMPUTERS, LTD.
INFINITE BUSINESS
Specific Application: Extend Basic

Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, TRS-80/III: TRS-DOS
Memory Required: 16.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30
Number Installed to Date: 250
Date First Installed: 1982

RACET COMPUTERS, LTD.
RACET ENHANCED BASIC (REBAS)
Specific Application: Basic
Specific Industry: Not Industry
System Requirements: TRS-80/II, Model 12, Model 16: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $99
Number Installed to Date: 50
Date First Installed: 1983

THE SOFT WAREHOUSE
THE MUMATH/MUSIMP SYMBOLIC
Specific Application: Symbolic Math Calculator and Programming Language
Specific Industry: Engineering,
System Requirements: IBM PC: PC-DOS, Apple II, II+: Apple DOS, TRS-80/I, TRS-80/III: TRS-DOS, CP/M
Memory Required: 48.0K bytes
Source Language: Mumath Written, Musimp Written
Purchase Terms: Purchase (license)
Price: $300 to $250
Date First Installed: September 1979
(See Vendor Profile Page V-99)

SOFTWARE TOOLWORKS
C/80 2.0
Compilers/Assemblers
Specific Application: C Structures
Specific Industry: Not Industry Sensitive
System Requirements: Heath/Zenith: CP/M; Osborne: CP/M, Kaypro: CP/M
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 1,860
Date First Installed: September 1980
(See Vendor Profile Page V-100)

SOFTWARE TOOLWORKS
LISP/80
Specific Application: Artificial Language
Specific Industry: Not Industry Sensitive
System Requirements: Heath/Zenith: CP/M; Osborne: CP/M; Kaypro: CP/M
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 1,018

SOFTWARE TOOLWORKS
RATFOR
Specific Application: Structured Program Features
Specific Industry: Not Industry Sensitive
System Requirements: Heath/Zenith: CP/M; Osborne: CP/M; Kaypro: CP/M
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 560
Date First Installed: 1980

STSC, INC.
APL*PLUS/PC SYSTEM
Specific Application: Eltended APL for the IBM PC
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Date First Installed: 1983
(See Vendor Profile Page V-104)

SUNBELT COMPUTER SYSTEMS
DATABUS COMPILER - SUNDOS®
Additional Product Classification: Compilers/Assemblers
Specific Application: Compiler, Program Execution of Datapoint Databus Programs on a Micro
Specific Industry: Not Industry Sensitive
System Requirements: MS-DOS
Memory Required: 256.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 5
Date First Installed: June 1983
(See Vendor Profile Page V-104)

SUNBELT COMPUTER SYSTEMS
DATABUS COMPILER SUNDOS®
Additional Product Classification: Compilers/Assemblers
Specific Application: Compiler, Program Execution of Datapoint Databus Programs on a Micro
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 86
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 1
Date First Installed: June 1983

SUNBELT COMPUTER SYSTEMS
DATABUS COMPILER SUNDOS® VERSION 2
Additional Product Classification: Compilers/Assemblers
Specific Application: Move and Run Datapoint Databus Programs on a Micro
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 50

SUPERSOFT, INC.
BASIC COMPILER
Additional Product Classification: Compilers/Assemblers
Specific Application: Superset of Standard Basic Compatible With Microsoft Basic Interpreter
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 86
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300 to $500
(See Vendor Profile Page V-104)

SUPERSOFT, INC.
FORTH
Specific Application: Language
Specific Industry: Engineering, Scientific, Technical Industries
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Forth
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200

SUPERSOFT, INC.
LISP
Specific Application: Lisp Language, Lisp Interpreter
Specific Industry: Engineering, Scientific, Technical Industries
System Requirements: CP/M; TRS-DOS, CP/M 86
Memory Required: 16.0K bytes
Source Language: Lisp
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $75 to $200

SUPERSOFT, INC.
TINY PASCAL
Additional Product Classification: Compilers/Assemblers
Specific Application: Subset of Standard Pascal, Substitute for Assembly Programming
Specific Industry: Engineering, Scientific, Technical Industries
System Requirements: CP/M; TRS-DOS, CP/M 86
Memory Required: 36.0K bytes
Source Language: Tiny Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50

TAMARACK SOFTWARE, INC.
VANILLA PILOT (VP)
Specific Application: Pilot Programing
Specific Industry: Retail, Education
System Requirements: Commodore 64, VIC 20, PET 4032, CBM 8032
Memory Required: 32.0K bytes
Source Language: Machine Code
Source Code Available: No
Price: $30
Date First Installed: December 1982
(See Vendor Profile Page V-108)

TANDY CORP.
COBOL DEVELOPMENT SYSTEM
Specific Application: High-Level Implementation of Ansi-74 Cobol
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80 Model 16: Xenix, TRS-DOS; TRS-80/II, Model 12: TRS-DOS
Memory Required: 256.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $699
Date First Installed: 1983
(See Vendor Profile Page V-108)

TANDY CORP.
EDITOR/ASSEMBLER, SERIES I
Specific Application: Machine Language Programming
Specific Industry: Not Industry
System Requirements: TRS-80/II, Model 12, Model 16: TRS-DOS
Purchase Terms: Purchase (license)
Price: $50

TECHNICAL SYSTEMS CONSULTANTS, INC.
UNIFLEX BASIC
Specific Application: Basic Interpreter
Specific Industry: Not Industry Sensitive
System Requirements: Motorola AL809: Uniflex, Motorola 6800: Unix
Memory Required: 35.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150 to $500
Number Installed to Date: 700
Date First Installed: 1981
(See Vendor Profile Page V-108)

TECHNICAL SYSTEMS CONSULTANTS, INC.
UNIFLEX COBOL
Level One and Level Two Features
Specific Industry: Not Industry
System Requirements: Motorola
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)

TECHNICAL SYSTEMS
UNIFLEX PASCAL
System Requirements: Motorola 6809: Uniflex, Motorola 6800: Unix
Memory Required: 35.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 400
Date First Installed: 1981

TECHNICAL SYSTEMS CONSULTANTS, INC.
UNIFLEX FORTRAN 77
77 Subset
Specific Industry: Not Industry Sensitive
System Requirements: Motorola 6809; Motorola 6800: Uniflex, Unix
Memory Required: 35.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)

TEXAS INSTRUMENTS, INC.
EXTENDED BASIC

Specific Industry: Not Industry Sensitive
System Requirements: TI 99/4
Purchase Terms: Purchase (license)
Price: $100
(See Vendor Profile Page V-109)

TEXAS INSTRUMENTS, INC.
TI - PILOT
Specific Application: Computer Assisted Instruction
Specific Industry: Not Industry Sensitive
System Requirements: TI 99/4
Purchase Terms: Purchase (license)
Price: $80

U-MICROCOMPUTERS, INC.
STRUCTURED BASIC
Specific Application: Basic Interpreter
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE, II+: APPLE-DOS
Purchase Terms: Purchase (license)
Price: $130
(See Vendor Profile Page V-112)

UNICOM
TERRAPIN LOGO
Specific Application: Terrapin Logo Language
Specific Industry: Education
System Requirements: Apple II, IIE
Source Language: Base
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $240
Date First Installed: 1983
(See Vendor Profile Page V-113)

UNISOFT SYSTEM CORP.
ADA
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 2
Date First Installed: March 1983
(See Vendor Profile Page V-113)

UNISOFT SYSTEM CORP.
ASM68
Specific Application: 68000-Cross Assembler
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: June 1982

UNISOFT SYSTEM CORP.
BASIC +
Specific Application: Basic++ Compatible Interpreter
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400

UNISOFT SYSTEM CORP.
BASIC FOUR
Specific Application: Basic Four Interpreter
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $385

UNISOFT SYSTEM CORP.
COBOL
Specific Application: Cobol .
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,250

UNISOFT SYSTEM CORP.
FORTAN - 77
Specific Application: Scientific Programming
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $800

VALPAR INTERNATIONAL
VALFORTH 1.1 AND VALFORTH UTILITIES
Specific Application: FIG-Forth-Based Programming Language
Specific Industry: Not Industry Sensitive
System Requirements: Atari 400/800
Memory Required: 24.0K bytes
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,995
Number Installed to Date: 5,000
Date First Installed: 1982
(See Vendor Profile Page V-114)

VOLITION SYSTEMS
MODULAR-2
Specific Application: Creates High Level Language
Specific Industry: Not Industry Sensitive
System Requirements: IBM: PC-DOS, TI Native; Apple: Sage Technologies
Memory Required: 164.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: October 1980
(See Vendor Profile Page V-116)

WILD HARE COMPUTER SYSTEMS, INC.
FORTRAN 4 AND 5 TO FORTRAN 77 TRANSLATOR
Specific Application: Translates DG Fortran 4 and 5 to Fortran-77
Specific Industry: Not Industry Sensitive .
System Requirements: Hare Brain-Work Station: MCS
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 4
Date First Installed: June 1983
(See Vendor Profile Page V-117)

COMPILERS/ASSEMBLERS

ADVANCED COMPUTER TECHNIQUES
ACT ANSI COBOL
Specific Application: Full Level 2 Ansi Cobol Compiler
Specific Industry: Computer Manufacturing/OEM
System Requirements: IBM Mainframes: Unix; Honeywell Level 6
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-3)

ADVANCED COMPUTER TECHNIQUES
ACT FORTRAN 77
Specific Application: Fortran Compiler
Specific Industry: Computer Manufacturing/OEM
System Requirements: IBM Mainframes: Unix, Honeywell Level 6
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license); Royalty A
Date First Installed: 1980

ADVANCED COMPUTER TECHNIQUES
ACT PASCAL
Specific Application: Pascal Compiler
Specific Industry: Computer Manufacturing/OEM
System Requirements: IBM Mainframes; Honeywell Level 6: Unix
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $79,000
Number Installed to Date: 2,000
Date First Installed: 1980

ALCYON, INC.
C68
Specific Application: C-Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Motorola 68000: Regulus; DEC VAX: VMS; DEC PDP-11: Unix
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $950
Number Installed to Date: 250
Date First Installed: January 1981
(See Vendor Profile Page V-4)

ALLEN M. ASHLEY
COMSTAR
Specific Application: Compiler for North Star Basic
Specific Industry: Not Industry Sensitive
System Requirements: North Star Horizon: NS-DOS
Memory Required: 12.0K bytes
Source Language: 8080 Assembly
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 200
Date First Installed: 1980
(See Vendor Profile Page V-4)

ALLEN M. ASHLEY
PDS-PROGRAM DEVELOPMENT SYSTEM
Specific Application: Assembly Language Development System
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 16.0K bytes
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $99
Number Installed to Date: 2,000

ALLEN M. ASHLEY
SOURCE MODULES
Specific Application: Assembly Language Software Development Utilities
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 500
Date First Installed: September 1977

ALLEN M. ASHLEY
STAR*TRAC
Specific Application: Debug Monitor for North Star Basic
Specific Industry: Not Industry Sensitive
System Requirements: North Star: NS-DOS
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $49
Date First Installed: September 1980

ALLEN M. ASHLEY
SYSTEM-CP4
Specific Application: CP/M Cross Assembler for the National COP400 Series Microprocessors
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 15.0K bytes
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 100
Date First Installed: 1981

ALLEN M. ASHLEY
SYSTEM-TMS7
Specific Application: Cross Assembler for the Texas Instruments TMS7000 Series Microprossors
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 15.0K bytes
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 150
Date First Installed: 1982

ALLEN M. ASHLEY
SYSTEM Z8
Specific Application: CP/M Cross Assembler for the Z8 Microprocessor
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 15.0K bytes
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 500
Date First Installed: 1980

ALLEN M. ASHLEY
SYSTEM-18
Specific Application: CP/M Cross Assembler for the RCA 1802/4/6 Microprocessors
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 15.0K bytes
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 200
Date First Installed: 1980

ALLEN M. ASHLEY
SYSTEM-20
Specific Application: CP/M Cross Assembler for the AMI S2000 Series Micr. Oprocessors
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 15.0K bytes
Source Language: 8080 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 100
Date First Installed: 1980

ALLEN M. ASHLEY
SYSTEM-48
Specific Application: CP/M Cross Assembler for the Intel 8048 Microprocessor
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 15.0K bytes
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 200
Date First Installed: 1981

ALLEN M. ASHLEY
SYSTEM-51
Specific Application: CP/M Cross Assembler for the Intel 8051 Microprocessor
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 15.0K bytes
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1981

ALLEN M. ASHLEY
SYSTEM-70
Specific Application: CP/M Cross Assembler for the National 70-Series Microprocessors
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 15.0K bytes
Source Language: 8080 Assembly
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 100
Date First Installed: 1982

ALLEN M. ASHLEY
SYSTEM-75
Specific Application: CP/M Cross Assembler for the NEC 7500 Series Microprocessors
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: 1983

ALLEN M. ASHLEY
SYSTEM-99
Specific Application: CP/M Cross Assembler for the TI TMS9900 Series Microprocessors
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 15.0K bytes
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: 1982

ALLEN M. ASHLEY
SYSTEM-320
Specific Application: CP/M Cross Assembler for the TI TMS32010 Microprocessor
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 15.0K bytes
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: 1983

ALLEN M. ASHLEY
SYSTEM-3870
Specific Application: CP/M Cross Assembler for the Fairchild/Mostek F8/3. 870
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 15.0K bytes
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 100
Date First Installed: 1981

ALLEN M. ASHLEY
XRMAK-Z8
Specific Application: CP/M-80 Relocating Cross Assembler for the Zilog Z8 Microprocessor
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Date First Installed: 1983

ALLEN M. ASHLEY
Z-COM
Specific Application: Compiler for Basic
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 12.0K bytes
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 200
Date First Installed: February 1983

ALLEN M. ASHLEY
ZRMAK-F8
Specific Application: CP/M-80

Relocating Cross Assembler for the Fairchild/Mostek F8/3870 Microprocessors
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 16.0K bytes
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Date First Installed: 1983

ALLEN M. ASHLEY
ZRMAK-18
Specific Application: CP/M-80 Relocating Cross Assembler for the RCA 180, 2/4/6 Microprocessor
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: 8080 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Date First Installed: 1983

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
SOFTBOL I COMPILER
Specific Application: A Run Time System Which Includes the Necessary Utilities and Sorts
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-8: CP/M 2.2; DEC PDP-11
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-5)

APPLIED INFORMATION SYSTEMS, INC.
AIS-PL/1, PDP-11 PL/1 COMPILER-VERSION 2.
Specific Application: Programming Languages/Compilers
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP: RSX, RSTS/E, DEC VAX: VMS, DEC Professional 300: P/OS
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,200
Number Installed to Date: 100
Date First Installed: September 1978
(See Vendor Profile Page V-6)

AVOCET SYSTEMS, INC.
XASM68K CROSS ASSEMBLER FOR 68000
Specific Application: A Cross Assembler for the Motorola 68000
Specific Industry: Manufacturing, Engineering
System Requirements: CP/M 80
Memory Required: 16.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-11)

AVOCET SYSTEMS, INC.
XASM75 CROSS ASSEMBLER FOR NEC 7500
Specific Application: A Cross Assembler for the NEC 75000
Specific Industry: Manufacturing, Engineering
System Requirements: CP/M 80
Memory Required: 16.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Date First Installed: 1980

AVOCET SYSTEMS, INC.
XASM/F8 CROSS ASSEMBLER FOR F8/3870
Specific Application: Cross Assembler for the F8/3870
Specific Industry: Manufacturing, Engineering
System Requirements: CP/M 80
Memory Required: 16.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: 1980

BILLINGS COMPUTER CORP.
B-BASIC
Specific Application: Basic Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Billings 500: BOS; Billings: TURBO-DOS; Oasis
Memory Required: 56.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: April 1981
(See Vendor Profile Page V-12)

BILLINGS COMPUTER CORP.
COBOL
Specific Application: Cobol Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Billings 500: BOS; Billings 6000: TURBO-DOS: Oasis
Memory Required: 56.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: April 1981

BILLINGS COMPUTER CORP.
FORTRAN
Specific Application: Computer
Specific Industry: Not Industry Sensitive
System Requirements: Billings 500: BOS; Billings 6000: TURBO/DOS: Oasis
Memory Required: 56.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: April 1981

BILLINGS COMPUTER CORP.
MACRO ASSEMBLER
Specific Application: Macro Assembler Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Billings 500: BOS, Billings 6000: TURBO-DOS: Oasis
Memory Required: 56.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: April 1981

CALIFORNIA SOFTWARE PRODUCTS, INC.
CSPI P
Specific Application: Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell: Gcos 6; Gould: MPX
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,500
Number Installed to Date: 500
Date First Installed: 1979
(See Vendor Profile Page V-16)

COMPUTER TALK, INC.
MAS MICRO ASSEMBLER
Specific Application: Assembles Any Micro Code, Firmware Computer Format
Specific Industry: Engineering
System Requirements: Computer Talk 400: Tos
Memory Required: 3.0K bytes
Source Language: Tas
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Date First Installed: May 1974
(See Vendor Profile Page V-27)

CONTEL INFORMATION SYSTEMS
COBOL-PLUS
Specific Application: Real-Time High Performance Languages Compiler/Assembler
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, RT-11, Unix
Source Language: Fortran, Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
(See Vendor Profile Page V-30)

CORPORATE COMPUTER SYSTEMS, INC.
HP/C COMPILER REV 1.0
Specific Application: High Level Language
System Requirements: HP 1000
Memory Required: 27.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 129
Date First Installed: November 1982
(See Vendor Profile Page V-31)

DACOR COMPUTER SYSTEMS, INC.
DACOR EXTENDED BASIC COMPILER
Specific Application: Compiler
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse: R-DOS, AOS, AOS/VS
Memory Required: 64.0K bytes
Purchase Terms: Purchase (license)
Price: $6,400
Number Installed to Date: 30
Date First Installed: October 1982
(See Vendor Profile Page V-34)

DATABILITY SOFTWARE SYSTEMS, INC.
BASCOM BASIC COMPILER
Specific Application: Basic Compiler
Specific Industry: Not Industry Sensitive
System Requirements: DEC System 20: Tops 20; DEC System 10: Tops 10
Source Language: Macro
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 112
Date First Installed: January 1977
(See Vendor Profile Page V-35)

DATAPOINT CORP.
COBOL-COMMON BUSINESS ORIENTAL LANGUAGE
Specific Application: General Purpose Language
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 5500: RMS; Datapoint 8600, 6600, 3600: RMS/DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
(See Vendor Profile Page V-37)

DIGITAL RESEARCH, INC.
LEVEL II COBOL
Specific Application: Mainframe Level Compiler for Ansi Cobol 74
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-42)

DYLAKOR
DYL-270
Specific Application: Self-Contained Compile-to-Go System Offering Extended Utility Functions and Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, DOS/VS, OS, OS/MVS
Memory Required: 99.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1981
(See Vendor Profile Page V-44)

DYNAMIC SOLUTIONS, INC.
UCSD P-SYSTEM TM VERSION 4.1
Specific Application: Operating System Compiler and Utilities
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Source Language: Pascal, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: 1983
(See Vendor Profile Page V-44)

ESP MANAGEMENT, INC.
SOURCE
Specific Application: Maintains Program With Re-Compiling
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,500

Date First Installed: June 1972
(See Vendor Profile Page V-45)

FIRST SYSTEMS CORP.
FS DEBUG
Specific Application: Intel-Compatible Cross Development of 8086 Software on Mainframes
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, IBM: CMS, Unix
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 15
Date First Installed: March 1982
(See Vendor Profile Page V-49)

FIRST SYSTEMS CORP.
FS LINK AND FS LOC
Specific Application: Intel-Compatible Cross Development of 8086 Software on Mainframes
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS; IBM: CMS: Unix
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000
Number Installed to Date: 35
Date First Installed: January 1982

GENERAL RESEARCH CORP.
IFTRAN
Specific Application: Structured Program for Fortran
Specific Industry: Not Industry Sensitive
System Requirements: DEC: OS/DOS; CDC: VAX/VMS; IBM 4300, 3030 Series: Gcos
Memory Required: 18.0K bytes
Source Language: V Iftran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $187,500
Number Installed to Date: 120
Date First Installed: 1972
(See Vendor Profile Page V-51)

GENERAL RESEARCH CORP.
V-IFTRAN
Specific Application: Verifiable Program for Fortran
Specific Industry: Not Industry Sensitive
System Requirements: DEC: OS/DOS; Honeywell: VAX/RMS; IBM: Gcos; CDC: Exec
Memory Required: 22.0K bytes
Source Language: V Iftran
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 60
Date First Installed: September 1975

GENTRY, INC.
REX-EASYV+
Specific Application: Interface for Simplifying HP V+
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE IV
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 100
Date First Installed: January 1981
(See Vendor Profile Page V-51)

GOULD, INC.
BASIC
Specific Application: Language
Specific Industry: Education
System Requirements: Concept/32: MPX-32
Memory Required: 186.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
(See Vendor Profile Page V-52)

GOULD, INC.
COBOL
Specific Application: Language
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000

GOULD, INC.
FORTRAN 77+
Specific Application: Language
Specific Industry: Engineering, Scientific
System Requirements: Concept/32: MPX-32
Memory Required: 60.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000

GOULD, INC.
FORTRAN 77/X32
Specific Application: Compilers/Assemblers
Specific Industry: Engineering, Scientific
System Requirements: Concept 32/67, MPX-32; Concept 32/87: MPX-32
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,800

GOULD, INC.
PASCAL
Specific Application: Language
Specific Industry: Engineering, Scientific
System Requirements: Concept/32: MPX-32
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000

HONEYWELL, INC.
TSS FORTRAN-77 OPTION
Specific Application: Ability to Compile and Execute Fortran 77 Programs in TSS Environment
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell DPS: Gcos 8
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-55)

INFORMATICS GENERAL CORP.
MARK V
Specific Application: Nonprocedure Language Compiler for Developing Applications
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: OS; IBM 370: DOS
Source Language: Assembler
Source Code Available: No
(See Vendor Profile Page V-57)

INFOSOFT SYSTEMS, INC.
INFOSOFT STRUCTURED ASSEMBLER
Specific Application: Assembly Program
Memory Required: 3.2M bytes
Source Language: 8080 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: July 1977
(See Vendor Profile Page V-58)

IPT (INFORMATION PROCESSING TECHNIQUES)
'C' COMPILER
Specific Application: C Compiler for DG
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: AOS; DG Eclipse MV Series: R-DOS, AOS, AOS/VS
Memory Required: 64.0K bytes
Source Language: C Language
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 30
(See Vendor Profile Page V-61)

IPT (INFORMATION PROCESSING TECHNIQUES)
EXTENDED BASIC COMPILER
Specific Application: Extended Basic Compiler
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse: DOS; DG Eclipse MV Series: AOS, AOS/VS
Source Language: Extended Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,200
Number Installed to Date: 10
Date First Installed: 1983

LANTECH SYSTEMS
C CROSS COMPILER
Specific Application: Allows Software to Be Written on Larger System for Use on IBM PC, Specific Industry: Software Developer
System Requirements: DEC VAX: VMS, Unix, RTE; DEC PDP: Unix/32U; Plexus: Unix; IBM: Unix, MS-DOS
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,750
Number Installed to Date: 150
Date First Installed: 1983
(See Vendor Profile Page V-65)

LANTECH SYSTEMS
LANTECH BASIC COMPILER
Specific Application: Allows Programming in Basic
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, Unix, RTE; DEC PDP: Unix/32V, VMS; Plexus: Unix; IBM: Unix, MS-DOS
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $149
Date First Installed: July 1983

LEXICO ENTERPRISES, INC.
ATLAS-86 ATLAS LANGUAGE COMPILER
Specific Application: Compilation of Atlas Test Procedures
System Requirements: HP 1000 Series E, F: RTE; HP A700, A900
Memory Required: 256.0K bytes
Source Language: Source Code isSystem Delivered, Executable
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $45,000
Number Installed to Date: 5
Date First Installed: 1981
(See Vendor Profile Page V-65)

LEXICO ENTERPRISES, INC.
ATLAS-80 ATLAS LANGUAGE COMPILA-
Specific Application: Compilation of Atlas Test Procedures
System Requirements: Configured Computer: Most
Memory Required: 128.0K bytes
Source Language: PL/1
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 2
Date First Installed: 1982

MARK WILLIAMS CO.
CPM/86 COMPILER
Specific Application: CPM/86 Compiler, Runs Under Coherent Operating System
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX, DEC VAX: VMS
Source Language: C Code
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500 to $6,000
Date First Installed: 1983
(See Vendor Profile Page V-69)

MARK WILLIAMS CO.
MSDOS COMPILER
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX; DEC VAX: VMS
Source Language: C Code
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500 to $6,000
Date First Installed: 1983

MARK WILLIAMS CO.
XY BASIC TM INTERPRETER AND COMPILER
Specific Application: Basic Interpreter and Compiler
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX, DEC VAX: VMS
Source Language: C Code
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500 to $550
Date First Installed: 1979

MASSACHUSETTS COMPUTER ASSOCIATES, INC.
COMPILERWRITER'S WORK BENCH
Specific Application: Compiler Generation Tools
Specific Industry: Computer Manufacturing
Source Language: Pascal, C

Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 15
Date First Installed: 1982
(See Vendor Profile Page V-70)

MICROSYSTEMS, INC.
PROFORTH
Specific Application: Produces Code for TH79 Compatible 8085 and Z-80 Versions Available
Specific Industry: Not Industry Sensitive
System Requirements: Tektronics 8002: DOS; Tektronics 8550: DOS50
Memory Required: 1.0K bytes
Source Language: Forth
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,250
Number Installed to Date: 10
Date First Installed: 1982
(See Vendor Profile Page V-75)

MISOSYS
CON 80 Z
Specific Application: Translates From 80 Assembler Code to Z Code
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/III: DOS
Memory Required: 48.0K bytes
Source Language: Z80 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 1,000
(See Vendor Profile Page V-76)

MISOSYS
CON Z CP/M
Specific Application: Translates From CP/M Files
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/III: DOS
Memory Required: 48.0K bytes
Source Language: Z80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 1,000

MISOSYS
EBAS 4
Specific Application: Macro Assembler for L-DOS 5.1 Model I and 3
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/III: DOS
Memory Required: 48.0K bytes
Source Language: Z80 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 1,000

MISOSYS
LC
Specific Application: C Language Compiler
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/III: DOS
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 1,000

MISOSYS
PRO-CREATE
Specific Application: Macro Assembler for L-DOS 6D
Specific Industry: Not Industry Sensitive
System Requirements: DOS
Memory Required: 64.0K bytes
Source Language: Z80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 1,000

MOSTEK CORP.
ASM-6800 STRUCTURED MACRO CROSS ASSEMBLER
Specific Application: Assembler for the Motorola 68000 to Run on DEC VAX or PDP-11 Computer
Specific Industry: Engineering
System Requirements: DEC PDP-11: RSX-11; DEC VAX-11/780: VMS
Memory Required: 64.0K bytes
Source Language: Pascal 2
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 2
Date First Installed: November 1982
(See Vendor Profile Page V-77)

MOSTEK CORP.
ASM-68200 STRUCTURE MACRO CROSS ASSEMBLER
Specific Application: Cross Assembler for Motorola 68200 to RUN on DEC VAX or PDP-11
Specific Industry: Engineering
System Requirements: DEC PDP-11: RSX-11M; DEC VAX
Memory Required: 64.0K bytes
Source Language: Pascal 2
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: July 1983

NCR CORP.
VRX COBOL
Specific Application: Ansi Cobol Compiler
Specific Industry: Not Industry Sensitive
System Requirements: NCR V8400, V8500, V8600- VRX
Memory Required: 300.0K bytes
Source Language: NCR
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1,000
Date First Installed: September 1978
(See Vendor Profile Page V-79)

NIXDORF COMPUTER CORP.
NCOBOL
Additional Product Classification: Languages
Specific Application: Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Nixdorf 8890: Nidos/VSE
Memory Required: 100.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: September 1981
(See Vendor Profile Page V-80)

NVNATEC, INC.
UNIWARE
Additional Product Classification: Program Generators/Aids/Application Development Tools
Specific Application: Cross Assembler Package, Linker
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,100
Number Installed to Date: 30
Date First Installed: January 1981
(See Vendor Profile Page V-81)

OASYS CORP.
CROSS ASSEMBLER
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Develop Program on PDP-11 and VAX, Execute on Motorola 68000
Specific Industry: Engineering, Software House
System Requirements: DEC VAX: Unix; DEC PDP-11: RSX-11: VMS
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 150
Date First Installed: January 1982
(See Vendor Profile Page V-81)

OREGON SOFTWARE, INC.
CROSS COMPILER DEVELOPMENT SYSTEM
Specific Application: Development System, Generates Object Files
Specific Industry: Manufacturing, Engineering, Medical, Education, Government, Scientific, Software Development
System Requirements: DEC VAX: VMS, DEC PDP-11: RSX
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000 to $9,500
Number Installed to Date: 15
Date First Installed: September 1983
(See Vendor Profile Page V-83)

OREGON SOFTWARE, INC.
PASCAL 1
Specific Application: Single Pass Compiler for Pascal Produces Assembly Code
Specific Industry: Manufacturing, Engineering, Medical, Education, Government, Scientific, Software Development
System Requirements: RSX-11; DEC PDP-11: RSTS/E: RT-11
Memory Required: 44.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,795 to $2,390
Number Installed to Date: 3,000
Date First Installed: August 1975

OREGON SOFTWARE, INC.
PASCAL 2
Specific Application: Multipass Compiler for Pascal: Produces Relocatable Binary Object Code or Standard Assembler Code
Specific Industry: Manufacturing, Engineering, Medical, Education, Government, Scientific, Software Development
System Requirements: DEC PDP-11: RSTS/E, RT-11; Motorola: VERSA-DOS
Memory Required: 56.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500 to $5,000
Number Installed to Date: 300
Date First Installed: May 1981

OREGON SOFTWARE, INC.
PASCAL-2 CONCURRENT PROGRAMMING PACKAGE
Specific Application: Series of Options for Pascal 2 Compiler Allows Concurrent Programming in Standard Pascal
Specific Industry: Manufacturing, Engineering, Medical, Education, Government, Scientific, Software Development
System Requirements: DEC VAX: VMS; DEC PDP-11: RSX; VERSA-DOS
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 15
Date First Installed: January 1983

PCD SYSTEMS, INC.
BASIC COMPILER
Specific Application: Basic Language
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11; TRS; IBM; Altos
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $225
Number Installed to Date: 200,000
Date First Installed: 1978
(See Vendor Profile Page V-84)

PCD SYSTEMS, INC.
DISASSEMBLER PACKAGE
Specific Application: Disassembles Z80, 65OZ, 68000 Microporocessor
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11; IBM; TRS, Altos
Memory Required: 80.0K bytes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1980

PCD SYSTEMS, INC.
FORTRAN 77 COMPILER
Specific Application: Fortran Language
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11; TRS; IBM
Memory Required: 64.0K bytes
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 200,000
Date First Installed: 1978

PCD SYSTEMS, INC.
PASCAL COMPILER
Specific Application: Pascal Language Compiler

Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11; TRS, IBM, Altos
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $375
Number Installed to Date: 200,000
Date First Installed: 1978

PROCESSOR INNOVATIONS
XI 320 MACRO ASSEMBLER
Specific Application: Assembler
Specific Industry: Research and Development
System Requirements: Intellec: XI
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: December 1982
(See Vendor Profile Page V-87)

PROCESSOR INNOVATIONS
XI 7000 MACRO ASSEMBLER
Specific Application: Assembler
Specific Industry: Research and Development
System Requirements: Intellec: XI
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: December 1982

PROCESSOR INNOVATIONS
XI 99000 MACRO ASSEMBLER
Specific Application: Assembler
Specific Industry: Research and Development
System Requirements: Intellec: XI
Memory Required: 64.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: December 1982

RATIONAL DATA SYSTEMS
PASCAL COMPILER INTERPERTER
SPECIFIC INDUSTRY: Not Industry Sensitive, Scientific
System Requirements: DG Nova: AOS, AOS/VS, R-DOS
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $4,000
Number Installed to Date: 75
Date First Installed: April 1983
(See Vendor Profile Page V-91)

REALTIME SOFTWARE SYSTEMS, INC.
Z-80X ABSULTE CROSS ASSEMBLER
Specific Application: Absolute Cross Over Assembler
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300; DEC PDP-11
Memory Required: 65.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1980
(See Vendor Profile Page V-92)

RHINTEK, INC.
RHINTEK PASCAL COMPILER
Specific Application: Compiler
Specific Industry: Not Industry Sensitive
System Requirements: DG: DOS, R-DOS, AOS
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $3,500
Number Installed to Date: 50
Date First Installed: 1977
(See Vendor Profile Page V-93)

RYAN-McFARLAND CORP.
RM/COBOL
Additional Product Classification: Languages
Specific Application: Ansi Cobol 74 Compiler
Specific Industry: Not Industry Sensitive
System Requirements: NCR Tower: Xenix; IBM PC: PC-DOS; TRS: MS-DOS, CP/M
Memory Required: 64.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750 to $1,250
Number Installed to Date: 150,000
Date First Installed: 1976
(See Vendor Profile Page V-94)

SANTA CRUZ COMPUTER
6800 DEVELOPMENT PACKAGE
Specific Application: Allows A Unix System to Cross Develop Software for A Motorola 6800
Specific Industry: Not Industry Sensitive
System Requirements: Perkin Elmer; DEC PDP-11: Unix; DEC VAX
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 1
Date First Installed: January 1983
(See Vendor Profile Page V-95)

SOFTWARE TOOLS
M2C LANGUAGE CONVERSION PROCESSOR
Specific Application: Language Conversion Processor
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DOS/OS
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,150
Number Installed to Date: 1
Date First Installed: June 1981
(See Vendor Profile Page V-100)

STRATUS COMPUTER
BASIC COMPILER
Specific Application: Basic Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Stratus 32: Stratus VOS
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: September 1981
(See Vendor Profile Page V-104)

STRATUS COMPUTER
COBOL COMPILER
Specific Application: Ansi Cobol 74 Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Stratus 32: Stratus VOS
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $12,000
Date First Installed: November 1981

STRATUS COMPUTER
FORTRAN 77 COMPILER
Specific Application: Ansi Fortran 78 Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Stratus 32: Stratus VOS
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $8,000
Date First Installed: July 1982

STRATUS COMPUTER
PASCAL COMPILER
Specific Application: Pascal Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Stratus 32: Stratus VOS
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000
Date First Installed: July 1982

STRATUS COMPUTER
PL/1
Specific Application: Ansi PL/1 Subset G Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Stratus 32: Stratus VOS
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000
Date First Installed: November 1981

SYSTEM & SOFTWARE, INC.
C CROSS COMPILER
Specific Application: Compiles User C Programs into Native Code for the Target Processors
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX-11M, DEC VAX-11
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,950 to $7,150
Number Installed to Date: 50
Date First Installed: September 1980
(See Vendor Profile Page V-108)

SYSTEM & SOFTWARE, INC.
PASCAL CROSS COMPILER
Specific Application: Pascal Cross Compiler ISO-Compatible With Extentions to Allow Modularity and Seperate Compilation
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX-11M; DEC VAX: VMS 11, Unix
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,150 to $6,400
Number Installed to Date: 50
Date First Installed: September 1980

SYSTEM & SOFTWARE, INC.
REX-A80
Specific Application: Relocatable Cross Assembler for Microprocessor System Development
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP: RSX-11M; DEC VAX: VMS; DEC LSI: Unix
Source Language: Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,750
Number Installed to Date: 50
Date First Installed: September 1980

SYSTEM & SOFTWARE, INC.
REX-8MA/186
Specific Application: Structure Macro Assembler Package for Intel Microprocessors
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX-11M; DEC VAX-11: VMS; DEC LSI-11: Unix
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: July 1983

TECHNICO, INC.
EDITOR ASSEMBLER LINKING LOADER
Specific Application: Editor Assembler Linking Loader for Assembly Language Program of the TI 9900
Specific Industry: Education, Scientific, Industrial Control
System Requirements: TI 9900
Memory Required: 8.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 500
Date First Installed: 1978
(See Vendor Profile Page V-109)

TELESOFT
ADA COMPILER
Specific Application: Ada Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Unix; DEC VMS, IBM 370 DOS; IBM PC: CMS
Source Language: ADA
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1981
(See Vendor Profile Page V-109)

TELESOFT
TELESOFT ADA COMPILER
Specific Application: Ada Compiler
Specific Industry: Not Industry Sensitive, Government
System Requirements: IBM 370; DEC VAX, IBM PC
Source Language: Ada
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000

Number Installed to Date: 360
Date First Installed: August 1981

TRANSLATION SYSTEMS, INC.
C
Specific Application: Produces Optimized Machine Code
Specific Industry: Not Industry Sensitive
System Requirements: Wang; DEC; Prime
Memory Required: 200.0K bytes
Source Language: PL/1
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-111)

TRANSLATION SYSTEMS, INC.
FORTRAN 77
Specific Application: Produces Optimized Machine Code
Specific Industry: Not Industry Sensitive
System Requirements: Wang; DEC; Prime
Memory Required: 200.0K bytes
Source Language: PL/1
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

TRANSLATION SYSTEMS, INC.
PASCAL
Specific Application: Produces Optimized Machine Code
Specific Industry: Not Industry Sensitive
System Requirements: Wang; DEC; Prime
Memory Required: 200.0K bytes
Source Language: PL/1
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

TRANSLATION SYSTEMS, INC.
PL/1 SUBSET G
Specific Application: Produces Optimized Machine Code
Specific Industry: Not Industry Sensitive
System Requirements: Wang; DEC; Prime
Memory Required: 200.0K bytes
Source Language: PL/1
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 20,000
Date First Installed: 1974

VANDATA
C CROSS COMPILER
Specific Application: Cross Compiler for C Language
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11, VMS, DEC VAX, RSX-11M, Unix
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,200 to $3,800
Number Installed to Date: 80
Date First Installed: June 1981
(See Vendor Profile Page V-115)

WINTEK CORP.
6800/01/05/09 CROSS-LINKER
Specific Application: Microcomputer Software Development
Specific Industry: Engineering
System Requirements: 16 Bit or Larger Machine With Fortran
Memory Required: 52.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 100
Date First Installed: 1975
(See Vendor Profile Page V-117)

WINTEK CORP.
6800/6801 MACRO CROSS ASSEMBLER
Specific Application: Microcomputer Software Development
Specific Industry: Engineering
System Requirements: 16 Bit or Larger Machine With Fortran
Memory Required: 52.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 100

WINTEK CORP.
6800 PL/W HIGH LEVEL LANGUAGE COMPILER
Specific Application: Microcomputer Software Development
Specific Industry: Engineering
System Requirements: 16 Bit or Larger Machine With Fortran
Memory Required: 42.0K bytes
Source Language: Ansi Fortran IV
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,400
Number Installed to Date: 74
Date First Installed: 1975

WINTEK CORP.
6800 SIMULATOR
Specific Application: Microcomputer Software Development
Specific Industry: Engineering
System Requirements: 16 Bit Larger Machine With Fortran
Memory Required: 52.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 50
Date First Installed: 1975

WINTEK CORP.
6801 SIMULATOR
Specific Application: Microcomputer Software Development
Specific Industry: Engineering
System Requirements: 16 Bit or Larger Machine With Fortran
Memory Required: 52.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 50
Date First Installed: 1975

WINTEK CORP.
6805 MACRO CROSS ASSEMBLER
Specific Application: Microcomputer Software Development
Specific Industry: Engineering
System Requirements: 16 Bit or Larger Machine With Fortran
Memory Required: 52.0K bytes
Source Language: Ansi Fortran IV
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 10

XIDAK, INC.
MAINSALE
Specific Application: Compiler for Mainsale Language
Specific Industry: Engineering
System Requirements: IBM 370, 4300, 3000 Series; VM/CMS; DEC VAX-10, VAX-20, VMS; DEC System 10: Tops 10; Apollo: Unix
Memory Required: 512 0K bytes
Source Language: Mainsale
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,770 to $22,050
Number Installed to Date: 100
Date First Installed: 1980
(See Vendor Profile Page V-118)

THE ALTERNATE SOURCE
ALE
Specific Application: Assembly Language Editor and Assembler
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: MULTI-DOS; TRS-80/III: DOS/80; TRS-80/4: TRS-DOS; DOS+
Memory Required: 48.0K bytes
Source Language: Z80
Purchase Terms: Purchase (license)
Price: $49
Number Installed to Date: 200
Date First Installed: March 1983
(See Vendor Profile Page V-4)

THE ALTERNATE SOURCE
NEW BASIC
Specific Application: Addition of Commands to Existing Basic Language
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: MULTI-DOS; TRS-80/III: DOS/80; TRS-80/4: TRS-DOS, DOS+
Memory Required: 32.0K bytes
Source Language: Z80
Purchase Terms: Purchase (license)
Price: $39
Number Installed to Date: 12
Date First Installed: June 1983

AVOCET SYSTEMS, INC.
XASM05 CROSS ASSEMBLER FOR 6805
Specific Application: Cross Assembler for the Motorola 6805
Specific Industry: Manufacturing, Engineering
System Requirements: CP/M 80
Memory Required: 16.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Date First Installed: 1980
(See Vendor Profile Page V-11)

AVOCET SYSTEMS, INC.
XASM09 CROSS ASSEMBLER FOR 6809
Specific Application: Cross Assembler for the Motorola 6809
Specific Industry: Manufacturing, Engineering
System Requirements: CP/M 80
Memory Required: 16.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: 1980

AVOCET SYSTEMS, INC.
XASM18 CROSS ASSEMBLER FOR THE 1802
Specific Application: Cross Assembler for the 1802
Specific Industry: Manufacturing, Engineering
System Requirements: CP/M 80
Source Language: Machine
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: 1980

AVOCET SYSTEMS, INC.
XASM29 CROSS ASSEMBLER FOR THE Z80
Specific Application: Cross Assembler for the Z80
Specific Industry: Manufacturing, Engineering
System Requirements: CP/M 80
Memory Required: 16.0K bytes
Source Language: Machine
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: 1980

AVOCET SYSTEMS, INC.
XASM48 CROSS ASSEMBLER FOR THE 8048/8041
Specific Application: Cross Assembler for the Intel 8048/41
Specific Industry: Manufacturing, Engineering
System Requirements: CP/M 80
Memory Required: 16.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: 1980

AVOCET SYSTEMS, INC.
XASM51 CROSS ASSEMBLER FOR THE 8051
Specific Application: Cross Assembler for the Intel 8051
Specific Industry: Manufacturing, Engineering
System Requirements: CP/M 80
Memory Required: 16.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: 1980

AVOCET SYSTEMS, INC.
XASM65 CROSS ASSEMBLER FOR THE 6502
Specific Application: Cross Assembler for the 6502
Specific Industry: Manufacturing, Engineering
System Requirements: CP/M 80
Memory Required: 16.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: 1980

AVOCET SYSTEMS, INC.
XASM6800 CROSS ASSEMBLER FOR THE 6800/6801
Specific Application: Cross Assembler for the Motorola 6800/6801
Specific Industry: Manufacturing, Engineering
System Requirements: CP/M 80
Memory Required: 16.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: 1980

AVOCET SYSTEMS, INC.
XASM400 CROSS ASSEMBLER FOR COP400
Specific Application: Cross Assembler for the COP400
Specific Industry: Manufacturing, Engineering
System Requirements: CP/M 80
Memory Required: 16.0K bytes
Source Language: Machine
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: 1980

CIMARRON CORP.
INSTA-SPEED
Specific Application: Compiler.
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: June 1983
(See Vendor Profile Page V-19)

COMMONWEALTH SYSTEMS
DECOMPILER
Specific Application: Turns Cadol Object Programs Into Source Programs
Specific Industry: Not Industry Sensitive
System Requirements: Cado
Source Language: Cadol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 10
Date First Installed: September 1982
(See Vendor Profile Page V-21)

COMPUTER INNOVATIONS, INC.
CI-C86 C COMPILER
Specific Application: C Compiler
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 86; MS-DOS
Memory Required: 96.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 2,000
Date First Installed: September 1981
(See Vendor Profile Page V-24)

DIGITAL RESEARCH, INC.
CBASIC
Specific Application: Decimal Arithmetic, Expanded File Processing, String Processing, Assembly Code Interface
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8080: CP/M, Intel 8055
Memory Required: 24.0K bytes
Source Language: C Basic
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-42)

DIGITAL RESEARCH, INC.
CIS COBOL
Specific Application: Compiler for Ansi '74 Micro Cobol
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Purchase Terms: Purchase (license)

ECOSOFT, INC.
ECO-C
Specific Application: C Compiler
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350
Date First Installed: September 1978
(See Vendor Profile Page V-45)

EMPIRICAL RESEARCH GROUP
68K BASIC COMPILER
Specific Application: Basic Compiler, Alpha Basic Compatible
Specific Industry: Not Industry Sensitive
System Requirements: Unix 3; Uniplus, Motorola 68000-Based; CP/M; Mirage
Memory Required: 68.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 25
Date First Installed: 1983
(See Vendor Profile Page V-46)

GALFO SYSTEMS
INTEGER BASIC COMPILER
Specific Application: Integer Basic Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Apple
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 175
Date First Installed: 1981
(See Vendor Profile Page V-50)

GAYLORD BROS., INC.
BASIC COMPILER
Specific Application: Basic Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Apple,II+
Memory Required: 48.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $395
(See Vendor Profile Page V-50)

HAYDEN SOFTWARE
COMPILER PLUS
Specific Application: Running Code Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Apple II
Memory Required: 64.0K bytes
Source Language: Mbasic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
(See Vendor Profile Page V-53)

HEMENWAY CORP.
HEMENWAY/BASIC INTERPRETER
Specific Application: Full-Function Basic Interpreter for Motorola 6800; 8-Bit Basic Programs Compatible
Specific Industry: OEM
System Requirements: Motorola 6800
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000
Number Installed to Date: 100
Date First Installed: 1981
(See Vendor Profile Page V-54)

HOLLAND AUTOMATION U.S.A.
HAI"BAS BASIC COMPILER
Specific Application: Interpreter, Compiler and Programming Utilities
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-

DOS; Eagle II, III, IV: CP/M; Apple II, III MS-DOS
Memory Required: 64.0K bytes
Source Language: HAI'Basic, Intel 8080 Assembler, Intel 8086 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 1,000
Date First Installed: 1976
(See Vendor Profile Page V-55)

INFOSOFT SYSTEMS, INC.
INFOSOFT C COMPILER
System Requirements: Compiler
Memory Required: 4.8M bytes
Source Language: Infosoft C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1981
(See Vendor Profile Page V-58)

INFOSOFT SYSTEMS, INC.
INFOSOFT C COMPILER - MICROSOFT REL FORM
Specific Application: Compiler
Specific Industry: Not Industry Sensitive
Memory Required: 4.8M bytes
Source Language: Infosoft C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: August 1982

INTER-CARE SYSTEMS, INC.
DATAPLUS
Specific Application: Compiler/Interpreter
Specific Industry: Not Industry Sensitive
System Requirements: Digitex: Oasis; Datapoint: Datashare
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 100
Date First Installed: 1976
(See Vendor Profile Page V-60)

INTERNATIONAL ELECTRONIC MACHINERY, INC.
IEM FORTRAN 77
Specific Application: Allows Programmers to Use Another Language
Specific Industry: Not Industry Sensitive
System Requirements: HP Series 200 Pascal
Source Language: Pascal, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 25
Date First Installed: May 1983
(See Vendor Profile Page V-61)

ITHACA INTERSYSTEMS
PASCAL/Z
Specific Industry: Manufacturing, Engineering, Banking/Financial, Education, Government, Scientific
System Requirements: CP/M; MP/M
Memory Required: 256.0K bytes
Source Language: Pascal
Source Code Available: $5,000
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 3,000
Date First Installed: November 1979
(See Vendor Profile Page V-61)

JOHNSON-LAIRD, INC.
BIFCON
Specific Application: File Conversion — Business Basic and Data Files into Ascii
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M; TURBO-DOS
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: April 1983
(See Vendor Profile Page V-62)

MANX SOFTWARE SYSTEMS

AZTEC C
Specific Application: Compiler
Specific Industry: Programmers
System Requirements: IBM PC; Apple; Televideo; North Star
Source Language: C
Source Code Available: $15,000
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 4,000
Date First Installed: 1981
(See Vendor Profile Page V-69)

MANX SOFTWARE SYSTEMS
AZTEC C86
Specific Application: Compiler
Specific Industry: Programmer
System Requirements: IBM PC; Apple, Televideo; North Star
Source Language: C
Source Code Available: $15,000
Purchase Terms: Purchase (license)
Price: $249
Number Installed to Date: 4,000
Date First Installed: April 1983

Additional Information provided for by vendor

Aztec compilers are the most complete implementation of Bell Laboratories' Unix Version 7 C available for microcomputers. Aztec C is portable. C code can be freely moved between Unix and microcomputer systems. Aztec C includes relocating assembler, linkage editor, library utility, debugging aid and overlay support. Aztec C, the choice of professional programmers.

MICRO DATA BASE SYSTEMS, INC.
C 1 YER 1.10
Additional Product Classification: Manufacturing
Specific Application: Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Zilog Z80: CP/M; Intel 8080/8085: MP/M; TRS-DOS
Memory Required: 40.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $575
Date First Installed: 1981
(See Vendor Profile Page V-73)

MICRON, INC.
SMART TERM II
Specific Application: Smart Terminal Emulation for Micros
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly.
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 0
Date First Installed: 1982
(See Vendor Profile Page V-74)

MICROPRODUCTS
MDS-MICROPRODUCTS 6502 DEVELOPMENT SYSTEM
Specific Application: Editor/Assembler, Disassembler, Debugger
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE; Apple II+; APPLE-DOS; Franklin Ace
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $9.995
Number Installed to Date: 9,000
Date First Installed: June 1980
(See Vendor Profile Page V-74)

MICROPRODUCTS
MICROPRODUCTS DISASSEMBLER
Specific Application: Disassembler
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE; DOS, Franklin
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,995
Number Installed to Date: 6,000
Date First Installed: September 1979

MICROPRODUCTS
MICROPRODUCTS EDITOR/ASSEMBLER
Specific Application: Editor/Assembler
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE, II+; APPLE-DOS; Franklin
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,995
Number Installed to Date: 6,000
Date First Installed: September 1979

MICROSOFT
MICROSOFT APPLESOFT COMPILER
Specific Application: Compile and Run Large Programs, Minimize Code Expansion
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE, II+, II
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-74)

MICROSOFT
MICROSOFT BASIC COMPILER
Specific Application: Increase Program Execution Speed
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: MS-DOS; Apple IIE: CP/M 80
Memory Required: 44.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)

MICROSOFT
MICROSOFT BUSINESS BASIC COMPILER
Specific Application: Microsoft Basic Language Compiler
Specific Industry: Not Industry Sensitive
System Requirements: MS-DOS
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)

MICROSOFT
MICROSOFT C COMPILER
Specific Application: C Compiler
Specific Industry: Not Industry Sensitive
System Requirements: MS-DOS
Memory Required: 128.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)

MICROSOFT
MICROSOFT COBOL COMPILER
Specific Application: Cobol Transfer From Mainframes and Minis to Micros
System Requirements: Apple II: MS-DOS; Apple IIE: CP/M 80
Memory Required: 44.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)

MICROSOFT
MICROSOFT FORTRAN COMPILER
Specific Application: Meets ANS 1978 Ansi Standard, IEEE Standard Floating Point Arithmetic
Specific Industry: Not Industry Sensitive
System Requirements: MS-DOS
Memory Required: 160.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)

MICROSOFT
MICROSOFT PASCAL COMPILER
Specific Application: Reduce Code Development Effort, Address Types, Constants, Function of Arrays and Record Types, Super Arrays, Controls Flow Features
Specific Industry: Not Industry Sensitive
System Requirements: MS-DOS
Memory Required: 160.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)

MICROSOFT
MICROSOFT FORTRAN — 80 COMPILER
Specific Application: Program Generation, Library of Suroutines
System Requirements: Apple II: CP/M 80; Apple IIE
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)

MICROSPARC, INC.
THE ASSEMBLER
Specific Application: Translation of

6502 Assembly Language Source File Into Machine Language
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+, IIE: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: Applesoft, 6502 Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $70
Number Installed to Date: 500
Date First Installed: January 1983
(See Vendor Profile Page V-74)

MIDWEST MICRO-TEK, INC.
UP CROSS ASSEMBLERS MS-DOS
Specific Application: Engineering Uniprocessor Development
Specific Industry: Engineering
System Requirements: PM PC MS-DOS
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 100
Date First Installed: December 1982
(See Vendor Profile Page V-75)

MIDWEST MICRO-TEK, INC.
UP CROSS ASSEMBLERS CP/M 80
Specific Application: Engineering Uniprocessor Development
Specific Industry: Engineering
System Requirements: CP/M 80
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 450
Date First Installed: June 1978

MIDWEST MICRO-TEK, INC.
UP CROSS ASSEMBLERS CP/M 86
Specific Application: Engineering Uniprocessor Development
Specific Industry: Engineering
System Requirements: CP/M 86
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: No
Price: $300
Number Installed to Date: 200
Date First Installed: December 1982

MOHAWK DATA SCIENCES CORP.
COBOL
Additional Product Classification: Languages
Specific Application: Cobol Compiler/Runtime
Specific Industry: Not Industry Sensitive
System Requirements: PDP-11 Series 21: OS/2; MDS 2110: OS/10
Memory Required: 96.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $2,500
Date First Installed: March 1981
(See Vendor Profile Page V-77)

MOHAWK DATA SCIENCES CORP.
MOHAWK BUSINESS ORIENTED LANGUAGE
Additional Product Classification: Languages
Specific Application: Programming Language/Compiler
Specific Industry: Not Industry Sensitive
System Requirements: MDS Series 21: OS/2, MDS 2110: OS/10
Memory Required: 96.0K bytes
Source Language: Mobol/Z80
Source Code Available: No

MOSTEK CORP.
CRASM-70-CROSS ASSEMBLER FOR 3870
Specific Application: Cross Assembler for 3870
Specific Industry: Engineering
System Requirements: Mostek Matrix System: M/OS-80
Memory Required: 64.0K bytes
Source Language: Fortran-66
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 5
Date First Installed: October 1982
(See Vendor Profile Page V-77)

MOSTEK CORP.
MICROSOFT M80/L80, BASIC-80,
Specific Application: 700 Assembler, Basic, Interpreter, Fortran
Specific Industry: Engineering
System Requirements: Mostek Matrix System: M/OS-80; Mostek Bus System: M/OS-80; CP/M
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 150
Date First Installed: June 1982

M-R C SYSTEMS
AS6802 ASSEMBLER
Specific Application: Produces Motorola 6801 Object Code on Standard Motorola M6800 Microprocessor
Specific Industry: Not Industry Sensitive
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
(See Vendor Profile Page V-77)

MUMFORD MICRO SYSTEMS
8748 CROSS ASSEMBLER
Specific Application: Cross Assembler for TRS-80
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-78)

MUMFORD MICRO SYSTEMS
INSTANT ASSEMBLER
Additional Product Classification: Debugging
Specific Application: Machine Language Assembler and Debugger
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $39
Date First Installed: 1981

OPTIMIZED SYSTEMS SOFTWARE, INC.
C/85
Specific Application: C Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Apple; Commdore
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $80
Number Installed to Date: 500
Date First Installed: November 1982
(See Vendor Profile Page V-83)

OPTIMIZED SYSTEMS SOFTWARE, INC.
MAC/65
Specific Application: Macro Assembler
Specific Industry: Not Industry Sensitive
System Requirements: Apple; Atari; Commodore
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $80
Number Installed to Date: 3,000
Date First Installed: November 1982

PH-ASSOCIATES, INC.
TMS 320 C
Specific Application: Assembler for TI 320 IC
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: CP/M; Tektronix 8560: TURBO-DOS
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: June 1983
(See Vendor Profile Page V-86)

PHOENIX SOFTWARE ASSOCIATES, LTD.
PASM
Specific Application: Assembler
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 500
Date First Installed: 1979
(See Vendor Profile Page V-86)

R.S.B. SOFTWARE PRODUCTS
AQNAS
Specific Application: Meta Assembler, Assemblers Coding
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $170
Date First Installed: 1977
(See Vendor Profile Page V-91)

SINUTEK COMPUTER PRODUCTS, INC.
Z-BASIC
Specific Application: Basic Compiler
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: MULTI-DOS, TRS-80/III
Memory Required: 48.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $99
Number Installed to Date: 5,000
Date First Installed: January 1982
(See Vendor Profile Page V-96)

SOFTSYNC, INC.
ASSEMBLER
Specific Application: Assembler
System Requirements: Timex-Sinclair TS 2000
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-96)

SOFTSYNC, INC.
MONITOR DISASSEMBLER
Specific Application: Disassembler
System Requirements: Timex-Sinclair TS 2000
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20

SOFTWARE DYNAMICS
ASM
Specific Application: Motorola 6800 or 6809 Assembler
Specific Industry: Not Industry Sensitive
System Requirements: Palsch GT Series: TRS-80; Motorola: S-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $260
Number Installed to Date: 1,000
Date First Installed: September 1978
(See Vendor Profile Page V-99)

SOFTWARE DYNAMICS
SDOS BASIC COMPILER
Specific Application: Extended Business Basic Compiler, Internal File, Capability
Specific Industry: Not Industry Sensitive
System Requirements: Palsch GT Series: TRS-80; Motorola: S-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $242
Date First Installed: 1978

SOFTWARE TOOLWORKS
UVMAC
Specific Application: Macro Assemblers for Zilog Z80 and Intel 8080 Codes
Specific Industry: Not Industry Sensitive
System Requirements: Heath/Zenith: CP/M; Osborne: CP/M; Kaypro: CP/M
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30
Number Installed to Date: 1,319
Date First Installed: 1980
(See Vendor Profile Page V-100)

SORCIM CORP.
ACT SERIES
Specific Application: Program Translator
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M; C-DOS
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $175
Date First Installed: 1979
(See Vendor Profile Page V-101)

SORCIM CORP.
PASCAL/ M
Specific Application: Pascal Implementation
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 2.2
Memory Required: 56.0K bytes
Source Language: Pascal, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Date First Installed: 1977

SORCIM CORP.
PASCAL/M - 86
Specific Application: ISO Implementation
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 86; MP/M 86
Memory Required: 80.0K bytes
Source Language: Pascal, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1980

SORCIM CORP.
TRANS - 86
Specific Application: Translator
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 2.2
Memory Required: 48.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $175
Date First Installed: 1980

STANDARD SOFTWARE SYSTEM, INC.
DLOCK
Specific Application: Allows Multiusers in Dbase II
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000; IBM PC; Xerox 820; Televideo
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1983
(See Vendor Profile Page V-102)

STELLATION TWO, INC.
THE ASSEMBLER DEVELOPMENT SYSTEM (ADS)
Specific Application: Development Tool
Specific Industry: Scientific, Programming
System Requirements: Apple II, IIE; [illegible]
Memory Required: 48.0K bytes
Source Language: 6809 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $325
Number Installed to Date: 500
Date First Installed: October 1984
(See Vendor Profile Page V-103)

SUPERSOFT, INC.
C COMPILER
Specific Application: Two-Pass Compiler Supports for Version 7 Unix, C
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 86, CP/M; PC-DOS
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
(See Vendor Profile Page V-104)

SUPERSOFT, INC.
FORTRAN
Specific Application: Fortran IV
Specific Industry: Engineering, Scientific, Technical Industries
System Requirements: MS-DOS; CP/M; CP/M 86; PC-DOS
Memory Required: 32.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $425

SUPERSOFT, INC.
SUPERSOFT ADA
Specific Application: Native Code, Fully Recursive, Multipass
Specific Industry: Engineering, Scientific, Technical
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: ADA
Source Code Available: No
Price: $300 to $350

TECHNICAL SYSTEMS CONSULTANTS, INC.
UNIFLEX RELOCATING ASSEMBLER
Specific Application: Relocating Assembler/Loader Under Uniflex
Specific Industry: Not Industry Sensitive
System Requirements: Motorola 6809, Motorola 6800: Uniflex; Motorola 6800: Unix
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 300
Date First Installed: 1981
(See Vendor Profile Page V-106)

TEXAS INSTRUMENTS, INC.
EDITOR/ASSEMBLER
Specific Application: Assembler
Specific Industry: Not Industry Sensitive
System Requirements: TI 99/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
(See Vendor Profile Page V-109)

TEXAS INSTRUMENTS, INC.
UCSD PASCAL COMPILER
Specific Application: Compiler
Specific Industry: Not Industry Sensitive
System Requirements: TI 99/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125

TEXAS INSTRUMENTS, INC.
UCSD P-SYSTEM ASSEMBLER/LINKER
Specific Application: Assembler
Specific Industry: Not Industry Sensitive
System Requirements: TI 99/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100

TINY C. ASSOCIATES
TINY C COMPILER
Specific Application: Compiler for Tiny C Language
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Tiny C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 300
Date First Installed: September 1980
(See Vendor Profile Page V-110)

UNISOFT SYSTEM CORP.
PACSAL
Specific Application: Pascal Compiler
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
(See Vendor Profile Page V-113)

PERFORMANCE MEASUREMENT

ADVANCED INFORMATION MANAGEMENT
AIM/CI ANALYZER
Specific Application: Measures Efficiency of Vsam Files
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370; IBM 4300 Series, IBM 3000 Series: DOS, OS/VS
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-3)

AMALGAMATED SOFTWARE OF NORTH AMERICA, INC.
ACCELER 8
Specific Application: Performance Measurement
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 64.0K bytes
Source Language: Basic/Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $3,200
Number Installed to Date: 4
Date First Installed: June 1983
(See Vendor Profile Page V-4)

AMDAHL CORP.
CMS XL
Specific Application: Performance Improvement
Specific Industry: Not Industry Sensitive
System Requirements: Amdahl 470, K80: VM/SP; IBM System/370: VM/SP
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Rental; Lease
(See Vendor Profile Page V-4)

APPLIED DATA RESEARCH, INC.
ADR/LOOK-RELEASE 8.2
Specific Application: Performance Measurement
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series, 4300 Series: OS, DOS, DOS/VS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $10,900 to $29,500
(See Vendor Profile Page V-8)

AURELIAN CORP.
TASP
Specific Application: Transparent Activity Sampling
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000 RTE
Memory Required: 14.0K bytes
Source Language: Fortran IV, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 10
Date First Installed: June 1982
(See Vendor Profile Page V-10)

AUTOMATION DESIGN, INC.
WATCHER-PC
Specific Application: Records Response Time on Transactions of IBM 3270 Where the IBM PC Is Used as A 3278
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Source Code Available: Yes
Purchase Terms: Lease
Price: $5,000
(See Vendor Profile Page V-11)

BGS SYSTEMS, INC.
BEST/1 - MVS
Additional Product Classification: Sysytem Resource Management, Performance
Specific Application: What-If Modeling Under MVS Operating System for Capacity Planning Performance and System Design
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 3030, 370: MVS
Memory Required: 800.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 400
Date First Installed: 1979
(See Vendor Profile Page V-12)

BGS SYSTEMS, INC.
BEST/1 - SNA
Additional Product Classification: System Resource Management
Specific Application: Modeling for SNA Networks for Capacity Planning, Performance and System Design
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 3030, 370: SNA
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: September 1983

BGS SYSTEMS, INC.
CAPTURE - MVS
Additional Product Classification: Sysytem Resource Management
Specific Application: Monitors, Analyzes MVS Operating Systems Performance
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 3030, 370: MVS
Purchase Terms: Lease
Number Installed to Date: 300
Date First Installed: 1980

BGS SYSTEMS, INC.
CAPTURE - VM
Additional Product Classification: System Resource Management
Specific Application: Monitors, Analyzes and Fine-Tunes MVS Operating Systems Performance
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 3030, 370: VM
Purchase Terms: Lease
Number Installed to Date: 20
Date First Installed: 1982

BGS SYSTEMS, INC.
CRYSTAL
Additional Product Classification: System Resource Management
Specific Application: Predicts Performance of New Applications
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 3030, 370: MVS; VM
Memory Required: 1.4M bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1981

BGS SYSTEMS, INC.
INFO/BASE
Additional Product Classification: System Resource Management
Specific Application: Comprehensive Capacity Management Data Base System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3030, 370, 4300: MVS, VM
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 5
Date First Installed: September 1983

BMS COMPUTER, INC.
CIMS - CICS/VS TRANSACTION ACCOUNTING
Additional Product Classification: System Resource Management
Specific Application: Chargeback for Users of IBM Cics/VS Product
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, 370, 4300 Series: VSE, VSI, MVS
Memory Required: 120.0K bytes
Source Language: Ansi Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,000
Number Installed to Date: 25
Date First Installed: September 1981
(See Vendor Profile Page V-13)

BMS COMPUTER, INC.
CIMS VM/CMS SESSION A
Additional Product Classification: System Resource Management
Specific Application: Computer Center Billing and Charge Back for IBM VM/C, MS Users
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, 370, 4300 Series: VM/CMS, VS1, MVS
Memory Required: 150.0K bytes
Source Language: Ansi Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,000
Number Installed to Date: 25
Date First Installed: 1981

BMS COMPUTER, INC.
CIMS-COMPUTER INSTALLATION MANAGEMENT SYSTEM
Additional Product Classification: System Resource Management
Specific Application: Computer Center Charge-Back System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, 370, 4300: DOS/VSE
Memory Required: 100.0K bytes
Source Language: Ansi Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $5,000
Number Installed to Date: 300
Date First Installed: 1974

CANDLE CORP.
DEXAN
Specific Application: MVS Performance Measurement
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3700 Series. MVS/SE, IBM 330: MVS/XA 1.1; IBM 4300 Series
Memory Required: 300.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license).
Number Installed to Date: 500
Date First Installed: 1982
(See Vendor Profile Page V-16)

CANDLE CORP.
DEXAN/IMS
Specific Application: Cics Performance Measurement
System Requirements: IBM 370: MVS 1.1; IBM 3300 Series: 1.16; IBM 4300 Series: 1.2
Memory Required: 200.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983

CANDLE CORP.
EPILOG/MVS
Specific Application: ARA Performance Monitor Works for Response Times and Analyzes the Problems
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370
Memory Required: 250.0K bytes
Source Language: Assembler
Source Code Available: Yes
Date First Installed: 1983

CANDLE CORP.
EPILOG
Specific Application: Manages Hard Reports, TSO and Batch Turn Around
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370; IBM 3300, IBM 4300 Series
Memory Required: 300.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Number Installed to Date: 175
Date First Installed: 1981

CANDLE CORP.
OMEGAMON
Specific Application: A Real-Time Display Monitor Used to Determine System Statistics, Learning Dynamics, MVS
Specific Industry: Not Industry Sensitive
System Requirements: MVS/SE; IBM 3700: MVS; IBM 330: Non/SE; IBM 4300 Series: SE
Memory Required: 300.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1977

CANDLE CORP.
OMEGAMON/CICS
Specific Application: Finds Causes of Degenerated Response Time
Specific Industry: Not Industry Sensitive
System Requirements: IBM: Cics, DOS/VS
Memory Required: 300.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 450
Date First Installed: 1980

CANDLE CORP.
OMEGAMON/IMS
Specific Application: Monitors Cics Response Time
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3700: MVS; IBM 3300 Series, IBM 4300 Series
Memory Required: 200.0K bytes
Source Language: Assembler
Source Code Available: No
Date First Installed: 1983

CANDLE CORP.
RTA/CICS
Specific Application: Window Into IMS Detects IMS Availability and Problems
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370; IBM 3300, 4300 Series
Memory Required: 150.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1981

CHEMSHARE CORP.
MONITOR
Specific Application: System Performance Monitor
Specific Industry: Not Industry Sensitive
System Requirements: Prime 50: Primos
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: 1982
(See Vendor Profile Page V-18)

COMMERCIAL PROGRAMMING SERVICES, INC. (CPS)
PERF/TIME
Specific Application: System Performance Measurement
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series
Memory Required: 128.0K bytes
Source Language: Fortran, BAL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,995
Number Installed to Date: 1
Date First Installed: May 1983
(See Vendor Profile Page V-21)

COMPUTER ASSOCIATES
CA-JASPER-PPA
Specific Application: Program Performance Analyzer; Interfaces to Other Jasper Products
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 380, 4300 Series DOS/VS
Memory Required: 128.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 30
(See Vendor Profile Page V-23)

COMPUTER ASSOCIATES
CA-JASPER/CICS
Specific Application: Performance Measurement
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 380, 4300 Series, 300 Series: DOS/VS: OS/VS1/MVS
Memory Required: 128.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $5,500 to $8,500
Number Installed to Date: 250
Date First Installed: 1981

COMPUTER ASSOCIATES
CA-JASPER/IMS
Specific Application: Performance Monitor for IMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 380, 4300 Series, 300 Series: OS/VS1/MVS
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 125
Date First Installed: 1979

COMPUTER ASSOCIATES
CA-JASPER/JA
Specific Application: Job Accounting and Billing System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 380, 4300 Series, 300 Series: DOS/VS, OS/VS1/MVS
Memory Required: 256.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $6,000 to $8,500
Number Installed to Date: 1,520
Date First Installed: 1979

COMPUTER TECHNOLOGY INC.
JSC-JOB SCHEDULING AND CONTROL
Specific Application: Schedules, Tracks and Controls Job to Various Work Centers and Back
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000 to $20,000
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-27)

COMPUTING CAPABILITIES CORP.
RADAR
Specific Application: System Performance Measurement
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: SPL
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $3,500
Number Installed to Date: 1
Date First Installed: May 1983
(See Vendor Profile Page V-28)

COOPERS & LYBRAND
SMF ANALYZER
Specific Application: Systems Management Facility Gathers Information For Accounting and System Performance Purposes
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, MVS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
(See Vendor Profile Page V-31)

DIVERSIFIED SOFTWARE SYSTEMS, INC.
SYSTEM ANALYZER RELEASE 10 FLOWCHARTER
Specific Application: Analyze OS (VS) Job and System Streams
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, 370: OS,OS/VSE; Amdahl VS, V6, V7 OS,OS/VSE; IBM 4300 Series, 3000 Series
Memory Required: 512.0K bytes
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $6,995
Number Installed to Date: 20
Date First Installed: September 1982
(See Vendor Profile Page V-43)

DUQUESNE SYSTEMS
QCM/JAB
Specific Application: Job Accounting Reporting System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: MVS, IBM 3030 Series: VSI; IBM 308X
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Rental
Number Installed to Date: 200
Date First Installed: July 1971
(See Vendor Profile Page V-44)

DUQUESNE SYSTEMS
QCM/SPI
Specific Application: Reporting Facility
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: MVS, IBM 3030 Series: VSI; IBM 308X
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $6,000
Number Installed to Date: 250
Date First Installed: June 1971

DUQUESNE SYSTEMS
QCM/SPM
Specific Application: On-Line Reporting System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: MVS, IBM 3030 Series: VSI; IBM 308
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $6,000
Number Installed to Date: 200
Date First Installed: July 1971

DUQUESNE SYSTEMS
QCM PERFORMANCE DATA BASE
Specific Application: Reporting and Archiving Procedures
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: MVS, IBM 3030 Series: VSI, IBM 3060 Series
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $6,000
Number Installed to Date: 18
Date First Installed: February 1983

DUQUESNE SYSTEMS
QCM PERFORMANCE MONITOR
Specific Application: Useful for Timing and Planning
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: MVS, IBM 3030 Series: VSI; IBM 3060 Series
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $14,000
Number Installed to Date: 250
Date First Installed: November 1971

FIRESIGN COMPUTER CO.
RESPONSE TIME/1
Specific Application: Measures Response Time By Terminal, By Program and By Time of Day
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1, EDX
Memory Required: 20.0K bytes
Source Language: EDL, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $965
Date First Installed: March 1983
(See Vendor Profile Page V-49)

GEMAC, INC.
SRF VERSION 2 SYSTEM REPORTING
Specific Application: Software Performance Monitor
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 Series, RSX-11M; DEC PDP-11 Series, RSX-11M+
Memory Required: 16.0K bytes
Source Language: Assembler, Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $3,995 to $4,495

Number Installed to Date: 400
Date First Installed: July 1979
(See Vendor Profile Page V-50)

GOAL SYSTEMS INTERNATIONAL, INC.
EXPLORESTROBE/P
Specific Application: Extends System Capabilities
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS/VS, IBM 4300: DOS/VSE, IBM 3080: OS
Memory Required: 80.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 5,500
Date First Installed: 1978
(See Vendor Profile Page V-52)

H & A COMPUTER SYSTEMS
SERIES 1 PERFORMANCE ANALYZER
Specific Application: Performance Analyzer
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 6.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 25
Date First Installed: 1982
(See Vendor Profile Page V-53)

HARRIS CORP.
VISTA
Specific Application: VOS Integral Source Tracking and Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Harris 600, 700, 800: VOS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: August 1983
(See Vendor Profile Page V-53)

INFORMATION RESEARCH ASSOCIATES, INC.
COMPUTER ANALYSIS AND DESIGN SYSTEM
Specific Application: Computer Performance Analysis
Specific Industry: Not Industry Sensitive
Memory Required: 500.0K bytes
Source Language: Ansi Fortran 66
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $6,000
Number Installed to Date: 28
Date First Installed: September 1977
(See Vendor Profile Page V-58)

INFORMATION RESEARCH ASSOCIATES, INC.
PAWS - VERSION 2.0
Specific Application: Computer Performance Analysis
Specific Industry: Not Industry Sensitive
Source Language: Ansi Fortran 66
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $16,500
Number Installed to Date: 26
Date First Installed: July 1981

INSTITUTE OF MODERN PROCEDURES
BUDGET FOR VS
Specific Application: Captures Job Statistics on Wang VS
Specific Industry: Not Industry Sensitive
System Requirements: Wang: VS
Memory Required: 128.0K bytes
Source Language: Cobol, Assembler
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 30
Date First Installed: 1979
(See Vendor Profile Page V-59)

JOHNSON SYSTEMS, INC.
JARS
Specific Application: Capacity Planning, Managing Day to Day Operations and Charge Back
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS,OS
Memory Required: 256.0K bytes
Source Language: Assembler, Cobol
Source Code Available: No
Purchase Terms: Purchase (license), Rental, Lease
Price: $6,000 to $12,500
Number Installed to Date: 3,500
Date First Installed: 1971
(See Vendor Profile Page V-62)

JOHNSON SYSTEMS, INC.
UMAX
Specific Application: Capacity Planning, Managing Day to Day Operations and Charge Back for the Cics Operating System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, OS
Source Language: Assembler, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $4,000 to $6,000
Number Installed to Date: 1,500
Date First Installed: 1976

MARGO 4, INC.
SYSTEM ACCOUNTING
Specific Application: Performance Measurement
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3030, 4300: DOS/VSE
Memory Required: 14.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 250
Date First Installed: June 1979
(See Vendor Profile Page V-69)

MIS INTERNATIONAL, INC.
AUTOMATED LASER VISION INSPECTION SYSTEM
Specific Application: Communication Between Robot and Computer for Automated Laser Vision
Specific Industry: Not Industry Sensitive, Manufacturing
System Requirements: DEC VAX: VMS, PLC Monarchy; Motorola 6800, HP 1000
Memory Required: 512.0K bytes
Source Language: Assembler, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license), Lease
Date First Installed: 1980
(See Vendor Profile Page V-76)

MIS INTERNATIONAL, INC.
AUTOMATED PRODUCTION REPORTING SYSTEM
Specific Application: Monitor Assembly Units, Production Reporting
Specific Industry: Manufacturing
System Requirements: DEC VAX: VMS, PLC Monarchy; Motorola 6800, HP 1000
Memory Required: 512.0K bytes
Source Language: Assembler, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license), Lease
Date First Installed: 1977

MORINO ASSOCIATES, INC.
MVS INTEGRATED CONTROL SYSTEM (MICS)
Specific Application: Integrated Data Base Providing Access to Performance, Capacity Planning, Accounting, and Other MVS Management Information
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS
Source Language: Sas
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 100
Date First Installed: October 1980
(See Vendor Profile Page V-77)

MORINO ASSOCIATES, INC.
TSO/SCAN
Specific Application: Performance Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS
Memory Required: 22.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $16,700
Number Installed to Date: 500
Date First Installed: 1978

NATIONAL ADVANCED SYSTEMS
DISCERN/VM
Specific Application: Performance Measurement
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: VM
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $7,400
Number Installed to Date: 30
Date First Installed: 1980
(See Vendor Profile Page V-78)

NORTHWEST DIGITAL SOFTWARE
RPM
Specific Application: RSTS/E Performance Monitor
System Requirements: DEC PDP-11: RSTS/E
Memory Required: 120.0K bytes
Source Language: Macro-11
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 12
Date First Installed: January 1983
(See Vendor Profile Page V-81)

ORBIS CORP.
SYSTEM PERFORMANCE MONITOR
Specific Application: Displays Software Tasks Running In the System
Specific Industry: Engineering, Scientific
System Requirements: Gould Concept 32: MPX 32
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $8,000
Number Installed to Date: 200
Date First Installed: November 1979
(See Vendor Profile Page V-83)

PERFORMANCE SYSTEMS, INC.
SCERT II
Specific Application: CPE Performance Measurement and Evaluation
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS, MVS
Memory Required: 200.0K bytes
Source Language: Cobol, ALC
Source Code Available: No
Purchase Terms: Purchase (license), Lease
Number Installed to Date: 500
Date First Installed: 1982
(See Vendor Profile Page V-85)

POTOMAC SOFTWARE LABS
DASZL
Specific Application: Tool for IBM (MVS) 370 Functions
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: MVS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $8,000
Number Installed to Date: 3
Date First Installed: November 1981
(See Vendor Profile Page V-87)

PROGRAMART
STROBE/CodeCheck
PERFORMANCE MEASUREMENT
Specific Application: Performance Measurement of Applications
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS/VS, DOS/VSE
Memory Required: 512.0K bytes
Source Language: Assembler, Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $9,500
Number Installed to Date: 90
Date First Installed: January 1973
(See Vendor Profile Page V-89)

RAXCO
RABBIT 2
Specific Application: Performance Analysis Package
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $4,000 to $6,000
Date First Installed: 1900
(See Vendor Profile Page V-91)

REMOTE DATA SYSTEMS, INC.
NETSTAR/270
Specific Application: Remote Network Performance Monitoring Systems
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series OS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,335
Number Installed to Date: 5
Date First Installed: January 1981
(See Vendor Profile Page V-92)

SOFTOOL CORP.
FORTRAN TRACING INSTRUMENTERS
Specific Application: Software Management Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS; DG Eclipse MV: AOS/VS; Gould Series 32: MPX, IBM 330, 370, 3030, 4300 Series
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $7,000
Number Installed to Date: 700
Date First Installed: September 1980
(See Vendor Profile Page V-96)

SOFTWARE CLEARING HOUSE
PAXS
Specific Application: Performance and Trend Analysis System
Specific Industry: Not Industry Sensitive
System Requirements: NCR 8455, 8500 Series VRX
Source Language: VRX Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $1,500
Number Installed to Date: 97
(See Vendor Profile Page V-99)

SYSTEMS APPLICATIONS
PERFORM
Specific Application: Computer Performance Evaluation Package
Specific Industry: Not Industry Sensitive
System Requirements: Prime 50: Primos, Prime 400, Prime 500
Source Language: Fortran
Source Code Available: No.
Purchase Terms: Purchase (license); Lease
Price: $1,950
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-105)

SYSTEMS RESEARCH CORP.
PEPE
Specific Application: Perkin Elmer Performance Evaluation
Specific Industry: Not Industry Sensitive
System Requirements: PE 3200: OS/32; PE 7/32, PE 8/32
Source Language: Fortran, Pascal, Assembler, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $2,500 to $10,000
Number Installed to Date: 22
Date First Installed: September 1982
(See Vendor Profile Page V-107)

SYSTEMS SOFTWARE, INC.
FEP
Specific Application: Front End Processor
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX; DG. AOS, A-DOS
Source Language: EDL, Assembler, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 12
Date First Installed: 1978
(See Vendor Profile Page V-107)

SYSTEMS SOFTWARE, INC.
SSPL
Specific Application: System Software for Pipe Line and Data Base Monitor
Specific Industry: Utility
System Requirements: IBM Series/1: EDX, DG AOS
Source Language: EDL, Fortran, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75,000
Number Installed to Date: 4
Date First Installed: 1978

SYSTEMS SOFTWARE, INC.
SSPM
Specific Application: System Software Power Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX; DG. AOS, A-DOS
Source Language: EDL, Assembler, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75,000
Number Installed to Date: 6
Date First Installed: 1978

SYSTEMS SOFTWARE, INC.
SSTA
Specific Application: System Software Terminal Automation
Specific Industry: Utilities
System Requirements: IBM Series/1: EPX, DG AOS, A-DOS
Source Language: EDL, Fortran, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 20
Date First Installed: 1980

TAGG ASSOCIATES, INC.
ALARM-HARDWARE RELIABILITY MEASUREMENT SYSTEM
Specific Application: Performance Measurement
Specific Industry: Not Industry Sensitive
System Requirements: IBM
Memory Required: 256.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $14,000
Number Installed to Date: 00
Date First Installed: September 1977
(See Vendor Profile Page V-108)

TAGG ASSOCIATES, INC.
BIO-BLOCK SIZE INVESTIGATOR
Specific Application: Performance Measurement
Specific Industry: Not Industry Sensitive
System Requirements: IBM
Memory Required: 256.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,950
Number Installed to Date: 20
Date First Installed: 1982

TELCO RESEARCH CORP.
BILLING INVENTORY COMMUNICATIONS SYSTEM
Additional Product Classification: Communications/TP Monitors
Specific Application: General Cost Allocations Facility Inventory
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS/MVS, DEC PDP VM, CMS
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $15,000
Date First Installed: 1982
(See Vendor Profile Page V-109)

TRISYS, INC.
RAMSES
Specific Application: Resource Accounting Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38. CPS
Memory Required: 750.0K bytes
Source Language: RPG
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 5
Date First Installed: May 1983
(See Vendor Profile Page V-112)

UNIVERSAL SOFTWARE, INC.
CAMS
Specific Application: Cics Accounting, Billing, Performance Monitoring
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series; DOS/VS; IBM 3300 Series; DOS VS, DOS/VSE
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $3,190
Number Installed to Date: 50
(See Vendor Profile Page V-114)

UNIVERSAL SOFTWARE, INC.
INSIGHT
Specific Application: System Performance Monitor
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: DOS/VS; IBM 3300: DOS/VSE; IBM 3700
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $2,900
Number Installed to Date: 50

UNIVERSAL SOFTWARE, INC.
VM/ACCOUNTING
Specific Application: VM Accounting, Billing, Performance Monitoring
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: DOS/VS; IBM 3300: DOS/VSE, IBM 3700
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Date First Installed: July 1983

VALLEY COMPUTING, INC.
SMT (SYSTEM MANAGEMENT TOOL)
Specific Application: Job Performance Monitor
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360 System/370 OS/VS1
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $7,500 to $9,000
Number Installed to Date: 40
Date First Installed: September 1978
(See Vendor Profile Page V-114)

XIDAK, INC.
MAINPM
Specific Application: Performance Monitor for Mansale Programs
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: VM/CMS; DEC System 10, 20, VAX: VMS; Apollo: Unix
Memory Required: 512.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $880 to $7,000
Number Installed to Date: 100
(See Vendor Profile Page V-118)

AUTOMATION DESIGN, INC.
LOADER-PC
Specific Application: Uses IBM PC to Test Ccs and IMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Source Code Available: Yes
Purchase Terms: Lease
(See Vendor Profile Page V-11)

DILITHIUM PRESS
HOW TO USE SUPERCALC
Specific Application: Financial Spreadsheets to Use With Supercalc
Specific Industry: Not Industry Sensitive
System Requirements: Compupro: CP/M; IBM PC: MS-DOS; Osborne: CP/M, PC-DOS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 250
Date First Installed: October 1982
(See Vendor Profile Page V-42)

STRUCTURED SOFTWARE SYSTEMS, INC.
PERFORMANCE MONITOR
Specific Application: Tool to Monitor the Performance of An Executing Basic Program
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845
Source Language: Assembly
Source Code Available: No
Price: $325
Date First Installed: 1981
(See Vendor Profile Page V-104)

SUPERSOFT, INC.
DIAGNOSTICS II
Specific Application: System Maintenance Routines for Mainte
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86; MS-DOS
Memory Required: 32.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125
(See Vendor Profile Page V-104)

SUPERSOFT, INC.
SYSTEM CHECKER
Specific Application: Diagnostic Program
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86; MS-DOS
Memory Required: 32.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $75

SYSTEM RESOURCE MANAGEMENT

APL CONSULTING SERVICES, INC.
[illegible] BACKUP/RESTORE UTILITIES DSC50
Specific Application: System Resource Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 8
Date First Installed: December 1982
(See Vendor Profile Page V-7)

AUTOVATIVE COMPUTER EXTENSIONS, INC.
ACX PM PRINTER MANAGER FOR VM/SP
Specific Application: Controls and Manages Small Printers
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370; IBM 3000 Series; IBM 4300 Series
Source Language: Pascal, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: April 1983
(See Vendor Profile Page V-11)

AXIOS PRODUCTS, INC.
ASYNCHRONOUS PROGRAM FETCH (FETCH)
Specific Application: Cics Productivity Aid: Increases Throughput, Decreases Response Time
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: Cics, OS/VS
Memory Required: 10.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 20
Date First Installed: October 1982
(See Vendor Profile Page V-11)

B I MOYLE ASSOCIATES, INC.
[illegible]-DOS/VSE CICS SYSTEM STA
Specific Application: Cics Problem Determination
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 and 4300: DOS/VSE
Memory Required: 60.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,400
Number Installed to Date: 35
Date First Installed: April 1982
(See Vendor Profile Page V-12)

B I MOYLE ASSOCIATES, INC.
BIM SPOOL-DOS/VSE TERMINAL PRINTER SPOOLER
Specific Application: Remote Job Printing on Terminal Printer
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 and 4300: DOS/VSE
Memory Required: 10.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $4,000
Number Installed to Date: 400
Date First Installed: March 1979

B I MOYLE ASSOCIATES, INC.
BIMCMPRS-CICS 3270 DATA COMPR
Specific Application: Terminal Performance Improvement
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 and 4300: DOS/VSE
Memory Required: 10.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,600
Number Installed to Date: 50
Date First Installed: March 1983

B I MOYLE ASSOCIATES, INC.
BIMDISQQ-CONSOLE HARD COPY FILE DISPLAY
Specific Application: Console Display for Operators and Programmers
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 and 4300: DOS/VSE
Memory Required: 20.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $680
Number Installed to Date: 100
Date First Installed: June 1980

B I MOYLE ASSOCIATES, INC.
BIMMONTR-DOS/VSE SYSTEM STATUS PERFORMANCE
Specific Application: Operating System Control and Performance Measurement
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370; DOS/VSE; IBM 4300
Memory Required: 20.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,080
Number Installed to Date: 100
Date First Installed: June 1980

B I MOYLE ASSOCIATES, INC.
BIMP3270-CICS DOS/VSE CRT VER 1.1
Specific Application: CRT Screen Printing
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 and 4300: DOS/VSE
Memory Required: 10.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $800
Number Installed to Date: 25
Date First Installed: March 1983

B I MOYLE ASSOCIATES, INC.
BIMSPOOM-DOS/VSE ON LINE TO BATCH P
Specific Application: Report Creation From On-Line Program
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 and 4300: DOS/VSE
Memory Required: 4.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $920
Number Installed to Date: 100
Date First Installed: August 1981

B I MOYLE ASSOCIATES, INC.
BIMSNAP-DOS/VSE CICS SYSM VER 1.0
Specific Application: Terminal Management on Line Testing Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 and 4300: DOS/VSE
Memory Required: 10.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,600
Number Installed to Date: 10
Date First Installed: March 1983

CAMBRIDGE SYSTEMS GROUP
AUTOMATIVE DATA CENTER I
Specific Application: Job Scheduling, Routine Schedules and Monitoring
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3081 MVS; IBM 370; IBM 3000
Source Language: ALC
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $42,000
Number Installed to Date: 30
Date First Installed: 1981
(See Vendor Profile Page V-16)

C. G. A. COMPUTER ASSOCIATES, INC.
QCO
Specific Application: Allows Selected Message Streams From Different Systems to Be Blended and Unified
Specific Industry: Not Industry Sensitive
System Requirements: MVS; IBM PC: OS, SVS, OS/VSI
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 200
Date First Installed: 1980
(See Vendor Profile Page V-18)

C. G. A. COMPUTER ASSOCIATES, INC.
MSM
Specific Application: Allows Multiple System Users to Access Disk Devices Across all Systems
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: MVS: OS, SVS, OS/VSI
Source Language: Assembly
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 350
Date First Installed: 1979

C. G. A. COMPUTER ASSOCIATES, INC.
PAC/MASTER
Specific Application: Monitors and Controls Usage of Storage Devices
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: OS, MVS, SVS
Memory Required: 256.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $11,500
Number Installed to Date: 175
Date First Installed: 1978

C. G. A. COMPUTER ASSOCIATES, INC.
SUPER IMS
Specific Application: Works in Multisystems to Protect Data Integrity and Eliminate Resolve Lockouts
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: MVS, OS, SVS, DOS/VSI
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 450
Date First Installed: 1978

COMPUTER ASSOCIATES
CA-SCHEDULER
Additional Product Classification: Job Scheduling
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 380, 4300 Series, 300: DOS/VS, OS/VS1/MVS
Memory Required: 256.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $8,500 to $14,500
Number Installed to Date: 100
Date First Installed: 1978
(See Vendor Profile Page V-23)

COMPUTER INFORMATION SYSTEMS
RESOURCE ACCOUNTING AND CHARGEBACK SYSTEM
Specific Application: Computer Resource Accounting and Chargeback System
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX-VMS
Memory Required: 512.0K bytes
Source Language: VAX Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000 to $5,000
Date First Installed: 1982
(See Vendor Profile Page V-24)

COMPUTER INFORMATION SYSTEMS
VMSACTSYS
Specific Application: Resource Accounting, Comprehensive Invoicing and Budget Subsystem
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX-11/730, VAX-11/750, VAX-11/780, VAX-11/782
Memory Required: 256.0K bytes
Source Language: VAX Basic

Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,995
Date First Installed: June 1982

COMPUTER SYSTEM ARCHITECTS, INC.
STROBE
Specific Industry: Not Industry Sensitive
System Requirements: Programart: MVS, VSI, VSE
Source Language: Assembler, Cobol
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 100
Date First Installed: 1972
(See Vendor Profile Page V-27)

CONTEL INFORMATION SYSTEMS
SHARE-ELEVEN
Additional Product Classification: Operating Systems, Performance Measurement
Specific Application: Multiuser Monitor for RT-11
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11, RT-11
Source Language: Fortran, Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 200
Date First Installed: 1979
(See Vendor Profile Page V-31)

CORODALE, INC.
JCL/MANAGER
Specific Application: Job Stream Execution Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300, 3000 DOS/VS
Memory Required: 156.0K bytes
Source Language: IBM Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,000
Number Installed to Date: 550
Date First Installed: June 1978
(See Vendor Profile Page V-31)

CORODALE, INC.
SPACE/MANAGER
Specific Application: Disk Space Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300, 3000 DOS/VS
Memory Required: 156.0K bytes
Source Language: IBM Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $8,500
Number Installed to Date: 650
Date First Installed: November 1978

CORODALE, INC.
SYSTEM/MANAGER
Specific Application: Operations Resource Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300, 3000: DOS/VS
Memory Required: 156.0K bytes
Source Language: IBM Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $8,500 to $28,000
Number Installed to Date: 650
Date First Installed: November 1978

CORODALE, INC.
SYSTEM/SCHEDULER
Specific Application: Job Definition, Scheduling and Submission
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300, 3000 DOS/VS, DOS/VSE
Memory Required: 64.0K bytes
Source Language: IBM Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $6,500
Number Installed to Date: 10
Date First Installed: June 1983

CORODALE, INC.
TAPE/MANAGER
Specific Application: Tape File,Volume, Vault Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 3000 DOS/VS
Memory Required: 156.0K bytes
Source Language: IBM Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $7,500
Number Installed to Date: 580
Date First Installed: October 1979

DABSCO, INC.
JOBS - MENU-DRIVEN SYSTEMS
Specific Application: Menu-Driven JCL and System Management for Cics
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300 DOS/VS
Memory Required: 4.0K bytes
Source Language: Cics Common Level
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $3,400
Number Installed to Date: 75
Date First Installed: February 1982
(See Vendor Profile Page V-34)

DATA MANS CORP.
NMF [NETWORK MANAGEMENT FACILITY]
Specific Application: Management Tool for Operators of Large Data-Communication Networks
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell DPS8. Gcos
Memory Required: 30.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $7,500
Date First Installed: June 1982
(See Vendor Profile Page V-36)

DUQUESNE SYSTEMS
SDSI
Specific Application: Shared Device Management Tool
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: MVS; IBM 3030 Series: VSI; IBM 3080 Series
Source Language: BAL
Purchase Terms: Purchase (license); Rental
Price: $13,000
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-44)

ENTERPRISE TECHNOLOGY CORP.
DISC UTILITY PROBASE
Specific Application: Disk Space Utilization and Storage Allocation
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP: RSTS/E
Memory Required: 32.0K bytes
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 60
Date First Installed: May 1980
(See Vendor Profile Page V-46)

ENTERPRISE TECHNOLOGY CORP.
DUMPER
Specific Application: Disk to Tape Back Up and Restore
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP: RSTS/E
Memory Required: 32.0K bytes
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $625
Number Installed to Date: 120
Date First Installed: October 1979

ESI
JOB FLOW
Specific Application: Automatic Computer Resource Management
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B1700, B190, B700, B490 MCP
Memory Required: 40.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 95
Date First Installed: March, 1981
(See Vendor Profile Page V-47)

ESI
VIRTUAL/MS
Specific Application: Virtual Memory Simulation
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B2700, B490 MCP
Memory Required: 67.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 10
Date First Installed: August 1982

FORMULA CONSULTANTS INC.
FIXED STORAGE MANAGEMENT-FSM 110
Specific Application: Disk Space Management
Specific Industry: Not Industry Sensitive
System Requirements: Sperry 1100 OS-1100
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $8,000
Number Installed to Date: 6
Date First Installed: February 1981
(See Vendor Profile Page V-49)

GEJAC, INC.
ARSAP VERSION 3 RESOURCE MANAGEMENT SYSTEM
Specific Application: Resource Management Chargeback
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX-11 Series: VMS, DEC PDP-11 Series: RSX-11M, RSX-11M+, RSTS/E
Memory Required: 16.0K bytes
Source Language: Assembly, Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,995 to $11,995
Number Installed to Date: 600
Date First Installed: August 1978
(See Vendor Profile Page V-50)

GOAL SYSTEMS INTERNATIONAL, INC.
FAQSSTROKEXP
Specific Application: Extends the Range of System Capabilities
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS/VS, IBM 4300 DOS/VSE, IBM 3080 OS
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 1,000
Date First Installed: 1977
(See Vendor Profile Page V-52)

GOAL SYSTEMS INTERNATIONAL, INC.
JCLMANSTROKEXP
Specific Application: Extends the Range of System Capabilities
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, IBM 4300 DOS/VSE, IBM 3080 OS
Memory Required: 32.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 5,500
Date First Installed: 1981

GWILT CONSULTING CO.
JOB ACCOUNT MANAGER (JAM) LEVEL 1
Specific Application: Resource Measurment and Billing
Specific Industry: Not Industry Sensitive
System Requirements: Tandem NS. Tandem NS II Guardian
Source Language: TAL
Purchase Terms: Purchase (license)
Price: $10,000

Number Installed to Date: 2
Date First Installed: June 1982
(See Vendor Profile Page V-53)

MANSCO DATA PROCESSING, INC.
007
Specific Application: Encryption of Data
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS
Memory Required: 4.0K bytes
Source Language: Assembler
Source Code Available: Yes
(See Vendor Profile Page V-53)

I E R CORP.
USAGE/3000
Specific Application: Job Control, Monitor Resource Use, Cost
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 14
Date First Installed: August 1982
(See Vendor Profile Page V-56)

INFORMATICS GENERAL CORP.
MARK IV
Specific Application: General Data Processing, Management Systems
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: OS, IBM 370: DOS
Source Language: Assembler
Purchase Terms: Purchase (license)
Number Installed to Date: 1,800
Date First Installed: 1984
(See Vendor Profile Page V-57)

MAINS SERVICES CORP.
DISK WIZARD
Specific Application: RSTS Disk Optimizer
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $95
Date First Installed: 1981
(See Vendor Profile Page V-69)

MARTIN AND STEARN, INC.
DASH-DYNAMIC AUXILLARY STORAGE
Specific Application: Historical Data Base
Specific Industry: Government
System Requirements: VAX-11/750: VMS
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
(See Vendor Profile Page V-60)

MARYLAND COMPUTER SERVICES, INC.
EXECUTIVE TASK MANAGER
Specific Application: Systems Monitor
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 12
Date First Installed: 1983
(See Vendor Profile Page V-69)

MASSOGLIA AND ASSOCIATES, INC.
TERMINAL SIGN-ON UTILITY
Specific Application: Sign-on Terminals From System Console
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
(See Vendor Profile Page V-70)

MCHUGH, FREEMAN & ASSOCIATES, INC.
SOURCE/FILE CROSS REFERENCE PACKAGE
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Produces Cross Reference Listings of Source Codes Maintained on System
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS, RSX
Memory Required: 28.0K bytes
Source Language: Basic Plus II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 27
Date First Installed: 1981
(See Vendor Profile Page V-71)

MDC SYSTEMS CORP.
DCAS/3000 DATA CENTER ACCT SYS 3000
Specific Application: Data Center Accounting and Resource Management
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE IV
Memory Required: 256.0K bytes
Source Language: Cobol II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 3
Date First Installed: December 1982
(See Vendor Profile Page V-71)

MICRO BUSINESS SYSTEMS, INC.
COPYR 2.01 SYSTEM COPY UTILITY
Specific Application: Intersystem Copying of Ascii or Hex Files
Specific Industry: Not Industry Sensitive
System Requirements: Morrow MD 1723: CP/M 80; Compupro: CP/M 84; HP 3000: MPE IV
Memory Required: 64.0K bytes
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: June 1983
(See Vendor Profile Page V-73)

MULTIPLICATIONS, INC.
PROTOCOL
Specific Application: Project Management Application
Specific Industry: Engineering, Construction
System Requirements: IBM 4300: DOS/VS, IBM 3000 Series: OSM/VS: DOS/MVT
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $190,000
Number Installed to Date: 2
Date First Installed: May 1982
(See Vendor Profile Page V-78)

NEAL NELSON & ASSOCIATES
COMMERCIAL SPOOLING SYSTEM
Specific Application: Assigns Forms Numbers, Establishes
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 8
Date First Installed: August 1982
(See Vendor Profile Page V-79)

NIXDORF COMPUTER CORP.
CAS
Specific Application: Maintains Control of Releases and Variations Within A Network, Allows Software to Be Developed Centrally
Specific Industry: Not Industry Sensitive
System Requirements: Nixdorf 8860: Dipos
Memory Required: 512.0K bytes
Source Language: Assembler
Purchase Terms: Rental
Number Installed to Date: 2,000
Date First Installed: 1900
(See Vendor Profile Page V-80)

PACE APPLIED TECHNOLOGY, INC.
KOMAND/CICS
Specific Application: Cics Transaction Charging Based on Resource Consumption and/or Fixed Rates
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series: OS/MVS; IBM 308X: OS/VSI
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500
Date First Installed: 1979
(See Vendor Profile Page V-83)

PACE APPLIED TECHNOLOGY, INC.
KOMAND/DAMS
Specific Application: Records Space Utilization and Charges for Usage At the Track Hour Level
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series: OS/MVS, IMB 3080 Series: OS/VSI
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $9,000
Date First Installed: 1975

PACE APPLIED TECHNOLOGY, INC.
KOMAND/DAS (DATA CENTER)
Specific Application: Enhances SMF Data, Job and TSO Costing, Resource Utilization Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series: OS/MVS; IBM 3080 Series: OS/VSI
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $16,000
Date First Installed: 1970

PACE APPLIED TECHNOLOGY, INC.
KOMAND/ICI
Specific Application: IMS Transaction Charging Based on Resource Consumption and/or Fixed Rates
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series: OS/MVS, IBM 3080 Series: OS/VSI
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500
Date First Installed: 1980

PACE APPLIED TECHNOLOGY, INC.
KOMAND/OBB (ONLINE BUDGET MANAGEMENT)
Specific Application: Updates Expenses At Termination and Provides On-Line File Maintenance With Inquiry Support
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series: MVS/SE2, IBM 3080: MVS/SP
Source Language: Assembler, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $4,000
Date First Installed: 1983

PACE APPLIED TECHNOLOGY, INC.
KOMAND/OLC (ON LINE COSTING)
Specific Application: Computes and Displays Step/Job Charges
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series: MVS; IBM 3080 Series: MVS/SP
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $3,000
Date First Installed: 1981

PACE APPLIED TECHNOLOGY, INC.
KOMAND/OBB (ONLINE BILLING SYSTEM)
Specific Application: Terms/Data Center Billing, Periodic/Year-To-Date

It took us five years to develop the best disk/tape manager.

It will take you ten minutes to prove it.

That's all the time it takes to have our System Manager demonstration tape up and running.

For a free obligation trial, simply call 617-426-8780.

Or write us at Corodale Incorporated, 211 Congress Street, Boston Massachusetts 02110.

Financial Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series, OS/MVS, IBM 3080 Series OS/VSI
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license), Rental, Lease
Price: $6 000
Date First Installed: 1973

PACE APPLIED TECHNOLOGY, INC.
[illegible]/VMCI
Specific Application: VM Charging, Including CMS and Batch
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series OS/MVS, IBM 3080 OS/VSI
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license), Rental, Lease
Price: $2,500
Date First Installed: 1980

PARA RESEARCH, INC.
CLOCK DATA SYSTEM
Specific Application: Job Scheduling
Specific Industry: Manufacturing
System Requirements: IBM System/34, System/38
Memory Required: 2.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $250 to $500
Number Installed to Date: 300
Date First Installed: April 1981
(See Vendor Profile Page V-84)

PCD SYSTEMS, INC.
CORVUS HARD-DISK DRIVERS
Specific Application: Runs Corvus Hard Disk on Micro
Specific Industry: Not Industry Sensitive
System Requirements: TRS, Apple
Memory Required: 64 0K bytes
Purchase Terms: Purchase (license)
[illegible]
Date First Installed: 1980
(See Vendor Profile Page V-84)

PROGRAMART
DISCLOSE - DATA SET SURVEY SYSTEM
Specific Application: Storage Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series, 430: OS/VS, VS1, MVS
Memory Required: 128.0K bytes
Source Language: Assembler, [illegible]
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 30
Date First Installed: February 1974
(See Vendor Profile Page V-88)

[illegible] ENTERPRISES, INC.
[illegible] PROCESSOR FOR TSX
Specific Application: Batch [illegible]
Specific Industry: Not Industry Sensitive
System Requirements: TSX
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 6
Date First Installed: February 1983
(See Vendor Profile Page V-95)

SCM CORP.
PCL-PROCESS CONTROL LANGUAGE
Specific Application: Process Scheduling
Specific Industry: Not Industry Sensitive
System Requirements: Tandem T16 Guardian
Source Language: TAL
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-95)

SIGNAL TECHNOLOGY, INC.
EZLOG VERSION 1.5
Specific Application: A VAX/VMS Login Enhancement Which Allows True 3 Level Computer Usage Reporting By Account, Project, and User
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX VMS
Memory Required: 512 0K bytes
Source Language: Fortran, Macro
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1 000 to $2,200
Number Installed to Date: 75
Date First Installed: February 1981
(See Vendor Profile Page V-97)

SIGNAL TECHNOLOGY, INC.
PROCESS ACCOUNTING & CHARGEBACK SYSTEM
Specific Application: VAX/VMS User Billing and System Utilization Monitoring
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX VMS
Memory Required: 512.0K bytes
Source Language: Fortran, Macro
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500 to $4,900
Number Installed [illegible]
Date First Installed: February 1979

SOFTWARE CLEARING HOUSE
CATALIST
Specific Application: VRX Catalog Job Manager
Specific Industry: Not Industry Sensitive
System Requirements: NCR V Series VRX
Source Language: VRX Cobol
Source Code Available: No
Purchase Terms: Purchase (license), [illegible]
Price: $2,000
Number Installed to Date: 57
(See Vendor Profile Page V-99)

SOFTWARE CLEARING HOUSE [illegible]
Specific Application: VRX Job Accounting System
Specific Industry: Not Industry [illegible]
System Requirements: NCR 8455, 8500 Series VRX
Source Language: VRX Cobol
Source Code Available: No
Purchase Terms: Purchase (license), [illegible]
Price: $1,500
Number Installed to Date: 154

SOFTWARE CLEARING HOUSE PROGRESS
Specific Application: Project Personnel Accounting System
Specific Industry: Not Industry Sensitive
System Requirements: NCR VRX Series B3, B4, VRX
Source Language: VRX or B Series
Source Code Available: Nd
Purchase Terms: Purchase (license), Rental
Price: $1 500
Number Installed to Date: 39

SOFTWARE CLEARING HOUSE
SURCHARGE
Specific Application: VRX Accounting and Chargeback System
Specific Industry: Not Industry Sensitive
System Requirements: NCR VRX Series VRX
Source Language: VRX Cobol
Source Code Available: No
Purchase Terms: Purchase (license), Rental
Price: $2,000
Number Installed to Date: 50

SOFTWARE CONCEPTS, INC.
COMPUTER SCHEDULING AND REPORTING (CSAR)
Specific Application: Fully Automates Production Work-Load Scheduling, Provides Tools For Organization, Production Control, and Future Planning
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, Burroughs OS
Source Language: Cobol, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: September 1975
(See Vendor Profile Page V-99)

SOFTWARE MODULE MARKETING, INC.
[illegible] SYSTEM
Specific Application: Storage Device Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3030 4300 Series, PC MVT, MVS, SP, VSI, SVS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $12,000 to $32 500
Number Installed to Date: 500
Date First Installed: 1977
(See Vendor Profile Page V-99)

SOFTWARE MODULE MARKETING, INC.
[illegible] SCHEDULING PROCESSOR
Specific Application: Job Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, VS
Memory Required: 30.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $12,000
Number Installed to Date: 6
Date First Installed: November 1981

SOFTWARE MODULE MARKETING, INC.
PMO (PROGRAM MANAGEMENT OPITMIZER)
Specific Application: System Performance Enhancement
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3030 4300 Series MVS/VS1
Memory Required: 2 0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Rental, Lease
Price: $5 000
Number Installed to Date: 140
Date First Installed: July 1981

SOFTWARE MODULE MARKETING, INC.
SOS! (SHARED DATA SET INTEGRITY)
Specific Application: System Resource Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3030, 4300 Series, PC VS1, MVS
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental Lease
Price: $12,000
Number Installed to Date: 250
Date First Installed: 1978

SOFTWARE MODULE MARKETING, INC.
[illegible] ALLOCATION MANAGEMENT)
Specific Application: System Resource Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3030, 4300 Series, PC VS1, MVS
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $10,000
Number Installed to Date: 130
[illegible]

STSC, INC.
[illegible] MANAGER'S TOOLS
Specific Application: Includes Tools to Help the Information Center Manager Allocate, Evaluate and Optimize Computer Resources
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, [illegible]
Source Language: APL, Assembler [illegible]
Purchase Terms: Purchase (license)
[illegible]
Date First Installed: 1982
(See Vendor Profile Page V-104)

Introducing.
Software for the operations manager.

The automated
DOS/VS(E)

C

It's Corodale's new
System Scheduler. A better
way to log, schedule and
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System Scheduler supple-
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Boston, Massachusetts
02110

SYSTEMS AND SOLUTIONS, INC.
REMIND
Specific Application: Background Task for System Maintenance, Scheduling and Inter-Job Communication
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro AM 1000, AM 1000 E, AM 1072E, AM 1092E: Amos
Memory Required: 256.0K bytes
Source Language: Alpha Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
[illegible] **Installed to Date:** 3
(See Vendor Profile Page V-105)

TELCO RESEARCH CORP.
GENERAL COST ALLOCATION (GCA)
Additional Product Classification: Communications/TP Monitors
Specific Application: Allocates Telecommunications Costs to Users
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation
System Requirements: IBM (OS/MVS, VM/CMS; Honeywell; DEC PDP: RSX-11M
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); From: $36,500
Date First Installed: April 1981
(See Vendor Profile Page V-109)

TELCO RESEARCH CORP.
[illegible] TRACKING
Specific Application: Collects Trouble Reports in Service or [illegible]
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $13,200

TOWER SYSTEMS, INC.
D-FAST VSE
Specific Application: Disk Dataset Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM S370, 4300 Series, 3000 Series: DOS/VSE: DOS/VS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 1,060
Date First Installed: 1973
(See Vendor Profile Page V-111)

TOWER SYSTEMS, INC.
EPIC/VSE
Specific Application: Dataset Management and Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM S370, 4300 Series, 3000 Series: DOS VSE, DOS/VS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 50
Date First Installed: 1983

TOWER SYSTEMS, INC.
T-FAST/MSE
Specific Application: Tape Dataset Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM S370, 4300 Series, 3000 Series: DOS/VSE, DOS/VS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 1,000
Date First Installed: 1973

TOWER SYSTEMS, INC.
TD-FAST/VSE
Specific Application: Tape/Disk Dataset Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM S370, 4300 Series, 3000 Series: DOS/VSE, DOS/VS
Source Language: Assembler
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 600
Date First Installed: 1981

[illegible], INC.
CONTROL LANGUAGE ANALYSIS MODULE
Specific Application: to Document Job Procedures and Outline Job [illegible]
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38 CPS
Memory Required: 750.0K bytes
Source Language: RPG
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
[illegible] **Installed to Date:** 15
Date First Installed: January 1983
(See Vendor Profile Page V-112)

U-MICROCOMPUTERS, INC.
APPLE SOFT RELOCATER
Specific Application: Moves [illegible] Above Hires Graphics to Run A Bigger Program
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE, II Plus: APPLE-DOS
Purchase Terms: Purchase (license)
Price: $19
(See Vendor Profile Page V-112)

UNITED INFORMATION SERVICES
AIMS
Specific Application: Project Scheduling Control
Specific Industry: Telecommunications
System Requirements: CDC Cyber; IBM
Source Language: Fortran, Super Basic, Cobol, Snobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
(See Vendor Profile Page V-113)

UNIVERSAL SOFTWARE, INC.
JAZ
Specific Application: Job Accounting System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: DOS/VS; IBM 3300: DOS/VSE; IBM 3700
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
[illegible] **Installed to Date:** 75
(See Vendor Profile Page V-114)

UNIVERSITY COMPUTING CO.
UCC 6/PDS SPACE MANAGEMENT SYSTEM
Specific Application: Manage Portion Data Sets
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVT; VSI
Source Language: ALC
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease, 36Month Installments
Price: $7,750
Number Installed to Date: 200
Date First Installed: September 1975
(See Vendor Profile Page V-114)

UNIVERSITY COMPUTING SERVICES CORP.
RMTP
Specific Application: Printing At Various Terminals or [illegible]
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs 5900, 6000, 7000; MCP
Source Language: Algol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
[illegible] **Installed to Date:** 3
Date First Installed: January 1982

VALUE COMPUTING, INC.
DATA CENTER MANAGEMENT SYSTEM (DCMS)
Specific Application: Production Control and Scheduling
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 and Up: MVS; Sperry 1100 VS9: Exec; Honeywell: Gcos
Memory Required: 100.0K bytes
Source Language: Assembly, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $39,000
Number Installed to Date: 275
Date First Installed: September 1971
(See Vendor Profile Page V-114)

VM SOFTWARE, INC.
VMDEFER
Specific Application: Scheduling, Executes CMS Subset Commands
System Requirements: IBM 4331: VM; IBM
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 25
(See Vendor Profile Page V-116)

VM SOFTWARE, INC.
VMTAPE/VSE
Specific Application: Integrated VSE and VM Tape Drive, Tape Volume, Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4XX VM
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 150

MICRO BUSINESS SYSTEMS, INC.
MENU MODE 2.01
Specific Application: Control Running Application Programs
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; CP/M 86; MP/M 86
Memory Required: 56.0K bytes
Source Language: PL/1 80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $75
Number Installed to Date: 14
Date First Installed: June 1981
(See Vendor Profile Page V-73)

MICRO DIGITAL ASSOCIATES, INC.
E.86
Specific Application: Real-Time Multitasking Executive
Specific Industry: Industrial Customer Terminal Equipment OEM
Memory Required: 14.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 6
Date First Installed: September 1981
(See Vendor Profile Page V-73)

MOSTEK CORP.
MOSGEN SYSTEM GENERATION PROGRAM
Specific Application: System Generation Utility for M/OS-80
Specific Industry: Engineering
System Requirements: Mostek M/OS-80
Memory Required: 64.0K bytes
Source Language: D, Z80 Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $695
Number Installed to Date: 60
Date First Installed: March 1982
(See Vendor Profile Page V-77)

OMEGA MICROWARE, INC.
THE MANAGER
Specific Application: Allows DOS to Be Loaded Onto A 16K RAM Card to Provide More Memory Usage
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: 6502 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $34
Number Installed to Date: 2,000
Date First Installed: 1982
(See Vendor Profile Page V-82)

PEGASUS SOFTWARE
A/65
Specific Application: Systems Development
Specific Industry: Not Industry Sensitive
System Requirements: DRI Scientific
Memory Required: 48.0K bytes
Source Language: Fbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $75
(See Vendor Profile Page V-86)

QUANTUM INFORMATION SYSTEMS
SCHEDULE
Specific Application: Twenty Four Hour Job Scheduling Utility
Specific Industry: Not Industry Sensitive
System Requirements: Cuss
Memory Required: 8.0K bytes
Source Language: Z80 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 150
Date First Installed: December 1980
(See Vendor Profile Page V-90)

RADIX COMPUTERS, LTD.
COMMAND PROCESSOR - COMPROC
Specific Application: Command Processing
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, TRS-80/III, TRS-DOS
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30
Number Installed to Date: 2,000
Date First Installed: 1980
(See Vendor Profile Page V-91)

SCHUCHARDT SOFTWARE SYSTEMS, INC.
INTEPERT
Specific Application: Resource Allocation, Critical Path
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 128.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195
Date First Installed: September 1983
(See Vendor Profile Page V-95)

TOTAL SYSTEMS, INC.
MUFBAR-MULTI-FLOPPIE BACK UP AND RESTORE
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; CP/M 86; MS-DOS
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 100
Date First Installed: February 1982
(See Vendor Profile Page V-111)

U-MICROCOMPUTERS, INC.
VERSA AM DISC
Specific Application: Allows Use of A RAM Board as a Disk
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, Apple II+, Apple IIE: APPLE-DOS
Purchase Terms: Purchase (license)
Price: $59
(See Vendor Profile Page V-113)

U-MICROCOMPUTERS, INC.
VERSA VISICALC EXPAND
Specific Application: Allows User to Expand Memory and Use an 80 Column Board
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, Apple IIE, Apple II+: APPLE-DOS
Purchase Terms: Purchase (license)
Price: $89

VISICORP
VISITERM
Additional Product Classifications: Communications and TP Monitors
Specific Application: Terminal Emulation
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III: APPLE-DOS; IBM PC: PC-DOS; Commodore; Atari 800
Purchase Terms: Purchase (license)
Price: $100
(See Vendor Profile Page V-115)

LIBRARY MANAGEMENT

AURELIAN CORP.
SLIP
Specific Application: Software Library Indexing
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000: RTE IV B
Memory Required: 12.0K bytes
Source Language: Fortran IV, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 12
Date First Installed: December 1981
(See Vendor Profile Page V-10)

B I MOYLE ASSOCIATES, INC.
BIMSERV-DOS/VSE LIBRARY DISPLAY
Specific Application: Library Directory and Data Display
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 370, 4300 Series: DOS/VS, DOS/VSE
Memory Required: 40.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,800
Number Installed to Date: 50
Date First Installed: June 1981
(See Vendor Profile Page V-12)

BUSINESS INFORMATION SYSTEMS
TCI
Additional Product Classification: Interface
Specific Application: Interface Between Teleprocessor and Data Systems
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DOS; IBM 370: OS
Memory Required: 16.0K bytes
Source Language: Assembler, Cobol, PL/1
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: May 1981
(See Vendor Profile Page V-14)

BUSINESS INFORMATION SYSTEMS
TDLI
Additional Product Classification: Interface
Specific Application: Interface Between Application DMLI System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DOS; IBM 370: OS
Memory Required: 16.0K bytes
Source Language: Assembler, Cobol, PL/1
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: January 1983

COMPUTER ASSOCIATES
CA-DYNAM
Specific Application: Provides Device Independent Disk Management Catalog, Management and Shared Disk Support, Includes Dynam/D, Dynam/T and Dynam/FI
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 360, 4300 Series, 3000 Series: DOS/VS, VM/CMS
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 700
Date First Installed: 1981
(See Vendor Profile Page V-23)

COMPUTER ASSOCIATES
CA-DYNAM/D
Specific Application: Provides Facilities for Disk Space Management, Catalog Management
Specific Industry: Not Industry Sensitive
System Requirements: DOS/VS, and IBM Plug Compatible: VM, CMS
Memory Required: 300.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 2,100
Date First Installed: 1977

COMPUTER ASSOCIATES
CA-DYNAM/FI
Specific Application: File Independent Facility; Allows Files to Be Used Across Different Storage Media
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 360, 4300 Series, 303: DOS/VS
Memory Required: 300.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 700
Date First Installed: 1979

COMPUTER ASSOCIATES
CA-DYNAM/T
Specific Application: Tape Library Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 303: DOS/VS: VM/CMS
Memory Required: 300.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 2,700
Date First Installed: September 1978

COMPUTER ASSOCIATES
CA-TLMS
Specific Application: Library Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 360, 4300 Series, 303: OS/VS1: MVS
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease

COMPUTER CONCEPTS, INC.
DOSSIER BROWSE
Specific Application: Library Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 DOS/VSE; IBM PC
Memory Required: 128.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,750
Number Installed to Date: 20
Date First Installed: December 1982
(See Vendor Profile Page V-23)

COMPUTER SYSTEMS INTERNATIONAL, LTD.
MYLAR
Specific Application: Magnetic Tape Library System
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B700, B900, 4000 Series
Memory Required: 8.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 3
Date First Installed: 1983
(See Vendor Profile Page V-27)

COMPUTERWARE SOFTWARE UNLIMITED
WARAN THE ON LINE LIBRARIAN
Specific Application: Improves Programmer Productivity BY 70% and Offers Positive Protection for Source Programs
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 Series; IBM 4300 Series; DOS/VS
Memory Required: 192.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $9,000
Number Installed to Date: 110
Date First Installed: September 1979
(See Vendor Profile Page V-29)

DATADOM OF ST. HELENS, INC.
SKIPPER
Specific Application: On Time Library for Applications Written in Cobol
Specific Industry: Not Industry Sensitive
System Requirements: HP3000: MPE
Memory Required: 500.0K bytes
Source Language: SPL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,900
Number Installed to Date: 80
Date First Installed: September 1979
(See Vendor Profile Page V-35)

DATAWAVE, INC.
TEXT COMPARATOR
Additional Product Classification: Comparison System
Specific Application: Compares Program Source and Entire Program Library
Specific Industry: CCP Applications
System Requirements: IBM 370: OS/VSI, MVS
Source Language: Assembler
(See Vendor Profile Page V-38)

ESI
LIONL
Specific Application: Automatic Tape Library Management
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B2500, B4900, B6700, B700 Series: MCP
Memory Required: 70.0K bytes
Source Language: Cobol, DC Algol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 70
Date First Installed: March 1980
(See Vendor Profile Page V-47)

FORMULA CONSULTANTS INC.
STAR-1100 SYSTEM FOR IBM ADMINISTRATION REPORTING
Additional Product Classification: System Resource Management
Specific Application: Tape Library Management
Specific Industry: Not Industry Sensitive
System Requirements: Sperry 1100: OS 1100
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $15,000
Number Installed to Date: 60
Date First Installed: December 1980
(See Vendor Profile Page V-49)

GENERAL ELECTRIC INFORMATION
FORTRAN SUBROUTINE LIBRARY
Specific Application: 156 Callable Routines In Fortran
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 100.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: September 1982
(See Vendor Profile Page V-51)

GOAL SYSTEMS INTERNATIONAL, INC.
FLEESTROKEXP
Specific Application: Extends the Range of System Capabilities
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS/VS; IBM 4300 DOS/VSE; IBM 3080: OS
Memory Required: 80.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 1,500
Date First Installed: 1975
(See Vendor Profile Page V-53)

GOAL SYSTEMS INTERNATIONAL, INC.
PDSMAINSTROKEXP
Specific Application: Extends the Range of System Capabilities
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370:

DOS/VS; IBM 4300: DOS/VSE; IBM 3080: OS
Memory Required: 80.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 5,500
Date First Installed: 1982

MAVERLY SYSTEMS, INC.
SDD (SELF GENERATING DICTIONARY LANGUAGE AID)
Additional Product Classification: Data Dictionary
Specific Application: Data Management Support Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370; IBM 4300: DOS, OS, VSE; IBM 3000 Series: DOS, OS, VSE
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $14,500 to $18,500
Number Installed to Date: 10
Date First Installed: June 1981
(See Vendor Profile Page V-53)

MSL, INC.
MSL LIBRARY
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 2,000
Date First Installed: July 1971
(See Vendor Profile Page V-56)

INFORMATION SYSTEMS CONSULTANTS, INC.
MRS
Additional Product Classification: Report Generator
Specific Application: Program Librarian Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell Level 66: Gcos
Memory Required: 4.8M bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $2,500
Number Installed to Date: 5
Date First Installed: 1983
(See Vendor Profile Page V-58)

INFORMATION SYSTEMS CONSULTANTS, INC.
SOLOMAN
Specific Application: Library Management
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell Level 66: Gcos
Memory Required: 29.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $9,000
Number Installed to Date: 15
Date First Installed: 1981

KNOXVILLE COMPUTER CENTER
VM LIBRARY
Specific Application: Library Management System for VM Operating System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4341 DOS
Memory Required: 1.0M bytes
Source Language: Assembler
Purchase Terms: Rental
Date First Installed: November 1981
(See Vendor Profile Page V-64)

MARCO 4, INC.
VSAM-TUNE
Specific Application: Enhances Vsam Performance
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3030, 4300 Series: DOS/VSE
Memory Required: 16.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 250
Date First Installed: June 1981
(See Vendor Profile Page V-69)

MAZZOGLIA AND ASSOCIATES, INC.
CONSOLIDATED LIBRARY DIRECTORY LISTING
Specific Application: Generate and Combines Library Listing, Flags Duplicate Number
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3
Source Language: RPG-II, Cobol, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
(See Vendor Profile Page V-70)

MCHUGH, FREEMAN & ASSOCIATES, INC.
STANDARD SUBROUTINE LIBRARY
Specific Application: Provides A Set of Callable Routines That Can Be Used for Program Development
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS, RSX, DEC VAX-11: VMS
Source Language: Macro 11, Basic Plus II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 16
Date First Installed: 1981
(See Vendor Profile Page V-71)

MSDSYS
MLIB
Specific Application: Microsoft Code/Librarian for Microsoft Compatible Files
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/1, 80/III. DOS and 3 DOS
Memory Required: 48.0K bytes
Source Language: Z80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 1,000
(See Vendor Profile Page V-76)

PANSOPHIC SYSTEMS, INC.
PANEXEC
Specific Application: Librarians
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: VMS, IBM 370: DOS/VSE, IBM 3030 Series: OS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $20,000 to $30,000
Number Installed to Date: 400
Date First Installed: September 1977
(See Vendor Profile Page V-84)

PANSOPHIC SYSTEMS, INC.
PANVALET
Specific Application: Librarian
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370: OS, DOS, DOS/VS, IBM 3030: CMS, VM, IBM 4300 Series
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $6,000 to $15,000
Number Installed to Date: 4,580
Date First Installed: 1970

PRO-LOG CORP.
PLUS SOFTWARE LIBRARY
Specific Application: Pre-Written Software Routines
Specific Industry: Not Industry Sensitive
Memory Required: 16.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 200
Date First Installed: 1981
(See Vendor Profile Page V-89)

SOFTWARE CLEARING HOUSE
NAVIGATOR
Specific Application: Tape Librarian Operations Control System
Specific Industry: Not Industry Sensitive
System Requirements: NCR Century 8400, B Series. VRX
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $3,500
Number Installed to Date: 10
(See Vendor Profile Page V-99)

TRISYS, INC.
OBJECT DIRECTORY INVESTIGATOR
Specific Application: Cataloging Actual System Objects
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPS
Memory Required: 750.0K bytes
Source Language: RPG
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $675
Number Installed to Date: 40
Date First Installed: June 1982
(See Vendor Profile Page V-112)

TRISYS, INC.
VTOC
Specific Application: Volume Table of Contents
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPS
Memory Required: 750.0K bytes
Source Language: RPG
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $225
Number Installed to Date: 50
Date First Installed: January 1982

VALUE COMPUTING, INC.
VALU-LIB
Specific Application: Tape Library Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, 370, 3000, 4300
Memory Required: 100.0K bytes
Source Language: Cobol, BAL
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $17,000
Number Installed to Date: 200
Date First Installed: February 1973
(See Vendor Profile Page V-114)

ATOM INTERNATIONAL, INC.
XDT-Z-80 DEBUGGER
Additional Product Classification: Debugging Aid
Specific Application: Interactive Debugging for Zilog Z80 Programs Under CP/M
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 8.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $49
Date First Installed: January 1983
(See Vendor Profile Page V-10)

COLOR TERMINALS INTERNATIONAL, INC.
ARTIS TM
Additional Product Classification: Graphics
Specific Application: Charts, Graphs, Plots Organization Charts
Specific Industry: Not Industry Sensitive
System Requirements: Cdos; Florida Computer; CP/M
Memory Required: 64.0K bytes
Source Language: Forth, Assembler, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: June 1983
(See Vendor Profile Page V-20)

COMPUTER LANGUAGE RESEARCH, INC.
MICROSOURCE/MARATHON LINK
Specific Application: Dumb-Terminal Emulator Package for Micros
Specific Industry: Tax Industry
System Requirements: IBM: CP/M; Apple: CP/M; Tandy: CP/M
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $199
Number Installed to Date: 150
Date First Installed: January 1983
(See Vendor Profile Page V-25)

[illegible], INC.
THE INFORMATION CENTRE - IC - VERSION 3
Additional Product Classification: WP/Text Editing, DBMS, Report Generator, Data/File Management
Specific Application: General-Purpose Office Automation
Specific Industry: Not Industry Sensitive
System Requirements: Morrow Decision One CP/M
Memory Required: 128.0K bytes
Source Language: Z80 Assembler, Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $[illegible],000
Number Installed to Date: 20
Date First Installed: November 1980
(See Vendor Profile Page V-65)

MOSTEK CORP.
MODLIB-SOFTWARE MODULAR LIBRARY
Specific Application: Software I/O Modules for Mostek Bus Boards
Specific Industry: Engineering
System Requirements: Mostek Matrix: MOS-80
Memory Required: 64.0K bytes
Source Language: Z80 Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 20
Date First Installed: 1983
(See Vendor Profile Page V-77)

SOFTWARE ARCHITECTS, INC.
DISKETTE LIBRARY MANAGEMENT SYSTEM
Specific Application: Cataloguing System for Disk and File
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30
Date First Installed: 1981
(See Vendor Profile Page V-99)

SOFTWARE SYSTEMS CONSULTANTS, INC.
IBM BASIC DATA EXCHANGE
Additional Product Classification: Translator
Specific Application: Read/Write IBM 3741 Formatted Diskettes on Alpha Micro Systems
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 25
Date First Installed: 1981
(See Vendor Profile Page V-100)

SOUTHERN COMPUTER SYSTEMS, INC.
FPP
Specific Application: Floating-Point Processor Arithmetic
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; Isis
Memory Required: 3.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250 to $2,500
Number Installed to Date: 400
Date First Installed: 1978
(See Vendor Profile Page V-101)

SOUTHERN COMPUTER SYSTEMS, INC.
TRIG-PAC
Specific Application: Trigonometry, Logarithms
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 3.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250 to $2,500
Number Installed to Date: 175
Date First Installed: 1979

SYSTEM SOLUTIONS, INC.
RENAISSANCE LIBRARIAN
Specific Application: Management of Common Cobol Code
Specific Industry: Not Industry Sensitive
System Requirements: Vector Graphics; IBM; HP
Memory Required: 56.0K bytes
Source Language: Cobol
Source Code Available: No
Price: $400
Number Installed to Date: 2
Date First Installed: April 1983
(See Vendor Profile Page V-106)

COMMUNICATIONS

A. B. DICK CO.
A. B. DICK HASP
Specific Application: Data Communications
Specific Industry: Not Industry Sensitive
System Requirements: A.B. Dick Magna Writer, Magna III, Magna SL CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $418
Date First Installed: March 1983
(See Vendor Profile Page V-1)

A. B. DICK CO.
A. B. DICK MAGNA SOFTWARE
Specific Application: Data Communication
Specific Industry: Not Industry Sensitive
System Requirements: A. B. Dick Magna Writer, Magna III, Magna SL CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: March 1983

A. B. DICK CO.
A. B. DICK BIS 3270TM
Specific Application: Data Communications
Specific Industry: Not Industry Sensitive
System Requirements: A. B. Dick Magna Writer, Magna III, Magna SL CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: March 1983

A. B. DICK CO.
A. B. DICK BIS 3780TM
Specific Application: Data Communications 2780/3780
Specific Industry: Not Industry Sensitive
System Requirements: A. B. Dick Magna Writer, Magna III, Magna SL CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: March 1983

ACC
X.25 NETWORK CONTROL PROGRAM
Specific Application: Access to X.25 Public Packet Switched Network
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs MCP V3.2
Source Language: Algol
Source Code Available: Yes
Purchase Terms: Rental
Price: $1,000
Number Installed to Date: 6
Date First Installed: December 1977
(See Vendor Profile Page V-1)

ACCESS TELECOMMUNICATIONS
ACCESS 34/36/38
Specific Application: Provides Asynchronous Communication
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Source Language: RPG-III, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: November 1981
(See Vendor Profile Page V-1)

ADVANCED COMPUTER TECHNIQUES
ACT NETWORK PROCESSOR
Specific Application: Comprehensive Communications Controller
Specific Industry: Communication
System Requirements: Honeywell DPS 6, Honeywell Level 6
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-3)

ADVANCED INFORMATION MANAGEMENT
AM/FILE CONVERSION SYSTEM
Specific Application: Menu-Driven Aid to Converting From One Machine to Another
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, IBM 3000, 4300 Series
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license), Rental, Lease
Date First Installed: 1982
(See Vendor Profile Page V-4)

ADVANCED SYSTEMS CONCEPTS, INC.
REMOTE PRINTER SUPPORT
Specific Application: Transports Queues and Spools Report to Other Remote Systems Via Decnet
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 1.0M bytes
Source Language: Macro
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 1
Date First Installed: June 1983
(See Vendor Profile Page V-3)

ALTERED PRODUCTS, INC.
ALTERED PRODUCTS SHADOW II
Specific Application: Full Function Teleprompter Monitor
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3000 Series, 4300 Series: DOS/VSE, OS, VS
Memory Required: 100.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $26,000
Number Installed to Date: 7,400
Date First Installed: September 1975
(See Vendor Profile Page V-4)

AMERICAN COMPUTER & ELECTRONICS CORP.
HP 3000
Specific Application: Communications Link Between TI and HP
Specific Industry: Not Industry Sensitive
Memory Required: 25.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: 1981
(See Vendor Profile Page V-5)

APPLIED CYBERNETICS, INC.
FREEFORM 3000
Specific Application: Communications Interface for HP Terminals Only
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000-MPE
Source Language: SPL
Source Code Available: No
Number Installed to Date: 34
Date First Installed: 1977
(See Vendor Profile Page V-7)

APPLIED CYBERNETICS, INC.
TERMINAL/3000
Specific Application: Communications Interface Between HP 3000 and Non-HP Terminals
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000 MPE
Source Language: SPL
Purchase Terms: Purchase (license), Lease
Price: $2,500
Number Installed to Date: 34
Date First Installed: 1977

APPLIED DATA RESEARCH, INC.
ADR/DATACOM/DC - RELEASE 4
Specific Application: TP Monitor
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series 370, 3000 OS DOS
Source Language: Assembler
Purchase Terms: Purchase (license), Rental, Lease
Price: $13,600 to $51,500
(See Vendor Profile Page V-7)

APPLIED INFORMATION SYSTEMS, INC.
COMMUNICATION SYSTEM VERSION 2.0
Specific Application: Communications
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 Series, VAX-11 Series, Professional 300
Memory Required: 3.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,400
Number Installed to Date: 15
Date First Installed: 1974
(See Vendor Profile Page V-8)

ATON INTERNATIONAL, INC.
MICROMOTE 3278 EMULATOR
Specific Application: Allows Micro- or Minicomputer to Emulate IBM 2780 or 3780 Remote Batch Terminals
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 24.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Date First Installed: November 1982
(See Vendor Profile Page V-10)

ATON INTERNATIONAL, INC.
MICROMOTE 3278 EMULATON
Specific Application: Emulates IBM 3275 Interactive Data Terminal Using Bisynchronous Protocol
Specific Industry: Not Industry Sensitive
System Requirements: Unix: CP/M
Memory Required: 24.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Date First Installed: November 1982

BASIC BUSINESS CONTROL SYSTEM, INC.
ELECTRONIC SCALE POLLING SYSTEM
Specific Application: Sends and Retrieves Data to and From Multiple Electronic Scales
Specific Industry: Retail
System Requirements: IBM Series/1 EDX, IBM DOS
Memory Required: 128.0K bytes
Source Language: EDL, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: May 1983
(See Vendor Profile Page V-12)

BASIC BUSINESS CONTROL SYSTEM, INC.
ELECTRONIC TIME CLOCK POLLING SYSTEM
Specific Application: Sends and Retreves Data to and From Intelligent Stand-Alone Electronic Time Clock
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1 EDX
Memory Required: 128.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: May 1983

BASS BREED ASSOCIATES, INC.
TIMS
Specific Application: Connecting Intel Development Stations to Minicomputers For Shared Use
System Requirements: HP 1000: RTE6, DEC PDP RSX-11M
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 1
Date First Installed: October 1981
(See Vendor Profile Page V-12)

BILLINGS COMPUTER CORP.
WESTLAW
Specific Application: Interface to

West Publishing Co. Law Library
Specific Industry: Not Industry Sensitive
System Requirements: Billings 500: BOS, Billings 6000: TURBO-DOS, Data
Memory Required: 56.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: November 1981
(See Vendor Profile Page V-00)

BOSSECAZE, MCLEROY & HARRISON
VIRTEX
Specific Application: Communications
Specific Industry: Not Industry Sensitive
System Requirements: NCR 8500, 8600, NCR 8600
Memory Required: 1.0M bytes
Source Language: Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $8,500
Number Installed to Date: 145
Date First Installed: May 1979
(See Vendor Profile Page V-13)

CAP INFORMATION SYSTEMS
TRANSIT INFORMATION TRANSFER SERVICES
Specific Application: Communication Between Computers Connected By Racal-Milgo's Planet
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX-11M; DEC VAX: VMS
Memory Required: 50.0K bytes
Source Language: C, Assembler
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-16)

CARNEY ASSOCIATES, INC.
MSI/TELXON RECEIVE
Specific Application: Receive Data From Hand-Held Entry Devices to Computer
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 64.0K bytes
Source Language: EDX, Series/1
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 4
(See Vendor Profile Page V-16)

CENTURY ANALYSIS, INC.
BOSS-3
Specific Application: Transaction Processor Data-Entry Monitor and On-Line Program Development System for NCR Mainframes
Specific Industry: Not Industry Sensitive
System Requirements: NCR: VRX, B/3
Memory Required: 256.0K bytes
Source Language: Cobol, Neat/3
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 500
Date First Installed: 1977
(See Vendor Profile Page V-17)

CINCOM SYSTEMS, INC.
ENVIRON/1
Specific Application: On-Line Teleprocessing Communication Monitor
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, E-DOS, OS, MVS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $59,400
(See Vendor Profile Page V-19)

CLYDE DIGITAL SYSTEMS
DATACHIT SESSION DOCUMENTOR COMMUNICATION
Additional Product Classification: System Resource Management
Specific Application: Session Documentor
Specific Industry: Wholesale/Distribution, Retail, Banking/Financial, Education, Construction, Nonprofit Organizations
System Requirements: DEC VAX: RSTS/E, VMS
Memory Required: 56.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 100
Date First Installed: November 1980
(See Vendor Profile Page V-19)

CODE CORP.
TELECOMUNICATIONS
Specific Application: Communicates With Service Bureau for Inquiry and Input
Specific Industry: Banking/Financial
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 18
(See Vendor Profile Page V-19)

COMM PRO ASSOCIATES
NAS (NETWORK ACCESS SYSTEM)
Specific Application: X.25 Support 3705
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3705: VS, IBM 4705: MVS, VM, MVT
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 200
Date First Installed: 1977
(See Vendor Profile Page V-21)

COMM PRO ASSOCIATES
PP04
Specific Application: Terminal Switching Plus PP03 Features
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3705: VS, IBM 4705: MVS, VM, MVT
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 75
Date First Installed: 1983

COMM PRO ASSOCIATES
VLSW (VIRTUAL LINE SWITCH)
Specific Application: Switch Between EP and NPP (PP01-PP04 Integrated)
System Requirements: IBM 3705: VS, IBM 4705: MVS, VM, MVT
Memory Required: 256.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Lease
Date First Installed: September 1977

COMPION CORP.
ACCESS
Specific Application: Network Communications Package That Provides Network Protocol for Interconnecting Computers
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 25
Date First Installed: 1982
(See Vendor Profile Page V-21)

COMPU-DRAW
COMCOM
Specific Application: Computer Communication and Terminal Emulation
Specific Industry: Not Industry Sensitive
System Requirements: Osborne: CP/M; Kaypro-II: CP/M; Xerox 820: CP/M
Memory Required: 12.0K bytes
Source Language: Assembly (Written), Object (Delivered)
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $95
Date First Installed: February 1982
(See Vendor Profile Page V-22)

COMPU-DRAW
CPMCPM
Specific Application: File Transfer Between Computers
Specific Industry: Not Industry Sensitive
System Requirements: Osborne: CP/M; Xerox 820: CP/M; Kaypro-II: CP/M
Memory Required: 8.0K bytes
Source Language: Assembly (Written), Object (Delivered)
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $65
Date First Installed: March 1982

COMP-U-STAFF, INC.
SSWIP
Specific Application: Bank Switch Interface, Processor Interface, IBM Based Machine With NCR Electronic Funds Transfer Switch
Specific Industry: Banking/Financial
System Requirements: IBM 4300: DOS, IBM 3030 Series: OS, IBM 3080 Series: MVS
Memory Required: 512.0K bytes
Source Language: Assembler, Macro
Source Code Available: No
Purchase Terms: Purchase, Lease
Price: $40,000
Number Installed to Date: 4
Date First Installed: September 1982
(See Vendor Profile Page V-22)

COMPUTAX SYSTEMS, INC.
BETA DATA COMM HANDLER
Specific Application: Data Communications
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B90: CMS, B900, B1900
Memory Required: 256.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: 1979
(See Vendor Profile Page V-22)

COMPUTER CORNER
CCS COMMUNICATIONS CONTROL SYSTEM
Specific Application: Asynchronous Data Communications File Transfer, Terminal Simulation
Specific Industry: Not Industry Sensitive
System Requirements: Osborne 1: CP/M 2.2
Source Language: 8080 Assembly
Purchase Terms: Purchase (license)
Price: $79
Date First Installed: July 1983
(See Vendor Profile Page V-23)

COMPUTER INFORMATION ENTERPRISES
C-F-NETWORK
Specific Application: Install IBM Series/1 Using Communication Facilities
Specific Industry: Not Industry Sensitive
System Requirements: IBM: EDX
Memory Required: 22.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-24)

COMPUTER INFORMATION ENTERPRISES
CREDIT AUTHORIZATION INTERFACE
Specific Application: Protocol Conversion to Interface With Non IBM Sale, Control Into IBM Cics Credit Host Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM: EDX
Memory Required: 22.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: November 1982

COMPUTER INFORMATION ENTERPRISES
SWITCH NETWORK SUPPORT
Specific Application: Central Support for IBM Series/1 and PC Display Managers
Specific Industry: Not Industry Sensitive
System Requirements: IBM: EDX
Memory Required: 22.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Date First Installed: 1981

COMPUTER INFORMATION ENTERPRISES
TELEPHONE PBX SYSTEM
Specific Application: Charging PBX Department Costing and Usage

Specific Industry: Not Industry Sensitive
System Requirements: IBM; EDX
Memory Required: 22.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1982

COMPUTERWARE SOFTWARE UNLIMITED
HAROLD TP MONITOR
Specific Application: Generalized TP Monitor
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 Series; DOS; IBM 4300 Series; DOS/VS, DOS/VSE
Memory Required: 100.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $3,000
Number Installed to Date: 40
Date First Installed: June 1980
(See Vendor Profile Page V-26)

COMPUTIME, INC.
POINT OF SALES COMMUNICATIONS MANAGEMENT
Specific Application: Performs Two-Way Communications Operations Between, POS Devices and IBM Mainframes
Specific Industry: Retail
System Requirements: IBM DOS
Memory Required: 256.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000
Number Installed to Date: 1
Date First Installed: August 1981
(See Vendor Profile Page V-26)

COMPUWARE CORP.
CICS-AID
Specific Application: Provide English Language Diagnostics for CICS
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series; MVS, DOS/VS, DOS, VSI
Memory Required: 40.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $8 to $8,000
Number Installed to Date: 10
Date First Installed: May 1983
(See Vendor Profile Page V-26)

CULLINET SOFTWARE, INC.
INTEGRATED DATABASE MANAGEMENT SYSTEM-DATA
Specific Application: Integrated System of Teleprocessing Functions
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series, 430
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $50,000
Number Installed to Date: 328
Date First Installed: June 1978
(See Vendor Profile Page V-33)

CULLINET SOFTWARE, INC.
UNIVERSAL COMMUNICATIONS FACILITY
Specific Application: Communications
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series, 430
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $40,000
Number Installed to Date: 301
Date First Installed: January 1981

C & W MICROTEL LTD.
IMX 300
Specific Application: Store and Forward Message Switching (Conversion)
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/34; Scams
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50,000
Number Installed to Date: 48
Date First Installed: 1970
(See Vendor Profile Page V-33)

CYTROL, INC.
CTS-DC DATA COMMUNICATIONS MONITOR
Specific Application: Data Communications Management
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/24, PDP-11/70; RSX-11M; DEC VAX: VMS
Source Language: Assembler, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $20,000 to $30,000
Number Installed to Date: 20
Date First Installed: August 1978
(See Vendor Profile Page V-34)

CYTROL, INC.
CTX-RT/DECNET REACH THROUGH
Specific Application: Connect DEC-CYX Systems Via Decnet
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 10
Date First Installed: May 1983
(See Vendor Profile Page V-34)

CYTROL, INC.
CTX-RTIBM REACH THROUGH
Specific Application: Connect DEC/CYX Systems and IBM Systems
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP; RSX-11M; DEC VAX: VMS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,600 to $7,000
Number Installed to Date: 20

DAMFORD CORP.
TECTRONICS TERMINAL EMULATION
Specific Application: Terminal Emulator
Specific Industry: Engineering
System Requirements: Apollo: Aegis
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 2
Date First Installed: 1983
(See Vendor Profile Page V-34)

DATA INDEX, INC.
ZIX - TERMINAL CONTROL SYSTEM
Specific Application: Manages Terminal and Memory Space
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 128.0K bytes
Source Language: EDL, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 3
Date First Installed: April 1983
(See Vendor Profile Page V-36)

THE DATELEX CO., INC.
PASSPORTS SYSTEM
Specific Application: Communication System Between Micros and Mainframes
Specific Industry: Fortune 1000
System Requirements: IBM PC: UCSD-P; HP 125; DEC Rainbow
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 1,000
Date First Installed: 1981
(See Vendor Profile Page V-36)

DATAMARK SYSTEMS, INC.
LOCAL HIGH-SPEED DATA LINK
Specific Application: Local Area Network
Specific Industry: Not Industry Sensitive
System Requirements: GA-16, 1600 DT, 1600 XT; Control
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,000 to $5,000
Number Installed to Date: 28
Date First Installed: February 1981
(See Vendor Profile Page V-37)

DATAPOINT CORP.
ANS
Specific Application: Local Area Network Sector Server Software
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 6600, 6800, 3600; DOS
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 5,000
(See Vendor Profile Page V-37)

DATAPOINT CORP.
CHANNEL PRODUCTS DC10, CHSOUR, MLCI
Specific Application: Direct Attachment to IBM Compatible Byte Multiplex or Channel for Information Transfer To and From IBM to PCM Host
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 6600 DOS
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500

DATA SYSTEMS OF BATON ROUGE
BLAST
Specific Application: Computer to Computer Communication Software Package
Specific Industry: Not Industry Sensitive
System Requirements: DG; Apple II; CP/M, IBM PC; MS-DOS, DEC VAX: VMS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250 to $1,395
Number Installed to Date: 200
Date First Installed: 1980
(See Vendor Profile Page V-39)

DEFARO SOFTWARE SYSTEMS, INC.
AUTOMATIC NETWORKING OPTION
Specific Application: Automatic Networking
Specific Industry: Retail
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: August 1982
(See Vendor Profile Page V-40)

DILKS CO., INC.
DEC DV11 SYNCHRONOUS COMMUNICATIONS HANDLER
Specific Application: Full Polling Capability With Priority Output Scheme
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11, DEC VAX: VMS
Memory Required: 12.0K bytes
Source Language: Fortran 77, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 1
Date First Installed: October 1982
(See Vendor Profile Page V-42)

DIVERSIFIED CORP.
SINGLE BIT HEXADECIMAL SYSTEM
Specific Application: Programmable Controller System Software
Specific Industry: Not Industry Sensitive

System Requirements: Divelbiss
Memory Required: 2.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: [illegible]
Number Installed to Date: 1,000
Date First Installed: June 1982
(See Vendor Profile Page V-43)

DATA GROUP
NDMS NETWORK DESIGN AND MANAGEMENT SYSTEM
Specific Application: Design Management Reporting and Optimization of Multistage, Multipoint Data Communications Networks
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series, 430: MVS, TSO, CMS; DEC 730, 750, 780, VAX: VMS; Amdahl 470, 5880
Memory Required: 160.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Lease; Time-[illegible]
Price: $8,500
Date First Installed: January 1977
(See Vendor Profile Page V-43)

DATA GROUP
NETWORKER
Specific Application: Design of Data Communications Networks
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series, 4300 Series: MVS, TSO, CMS; DEC VAX-11/750, VAX-11/780: VMS; Amdahl
Memory Required: 300.0K bytes
Source Language: Fortran, Cobol
Source Code Available: No
Purchase Terms: Lease; Time-Sharing
Price: $10,000 to $50,000
Number Installed to Date: 3
Date First Installed: November 1983

DYNAMIC MICROPROCESSOR ASSOCIATION
ASCOM
Specific Application: Asynchronous Communication
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86; MS-DOS, PC-DOS
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $115
Number Installed to Date: 3,000
Date First Installed: January 1979
(See Vendor Profile Page V-44)

EFT COMPUTER SYSTEMS, INC.
MESSAGE-SWITCHING AND CONTROL SYSTEM
Specific Application: Message Switching and Control System
Specific Industry: Banking/Financial
System Requirements: NCR 9040, [illegible]
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-46)

ESCA CORP.
FAIL OVER PACKAGE
Specific Application: Redundant CPU'S Networking Package
Specific Industry: Engineering, Scientific
System Requirements: DEC VAX 750: VMS; DEC VAX-11/780, VAX-11/782
Source Language: Fortran, Macro
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50,000
Number Installed to Date: 5
Date First Installed: 1983
(See Vendor Profile Page V-47)

EVANS GRIFFITHS AND HART, INC.
COLINK
Specific Application: Links Two RSTS/E Systems
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP: RSTS/E
Memory Required: 96.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,250
Date First Installed: 1979
(See Vendor Profile Page V-47)

EVANS GRIFFITHS AND HART, INC.
DEALUP
Specific Application: Link for RSTS/E System to A Remote Computer Using An Asynchronous Terminal Line
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Memory Required: 96.0K bytes
Source Language: Basic
Source Code Available: No
Price: $1,700
Number Installed to Date: 59
Date First Installed: 1979

EVANS GRIFFITHS AND HART, INC.
TAM
Specific Application: Transaction Processing Front End for the PDP-11
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E Version: RSX-11M Version: VMS Version 3 A
Memory Required: 96.0K bytes
Source Language: Basic, Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 93
Date First Installed: 1976

EVERGREEN CONSULTING, INC.
QUICK-TUBE
Specific Application: TSO
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS/MVS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Rental; Lease
Price: $650
Number Installed to Date: 123
Date First Installed: May 1978
(See Vendor Profile Page V-47)

GAMMA TECHNOLOGY, INC.
GAMMA TECHNOLOGY WORKSTATIONS
Specific Application: Protocol Emulation 1 Hasp 2-X780, 3UT200, 4UN1004
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse: AOS/VS; DG Eclipse MV Series: Rtos; DG Nova: R-DOS
Memory Required: 32.0K bytes
Source Language: Assembly, Fortran V
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000 to $4,000
Number Installed to Date: 425
Date First Installed: 1976
(See Vendor Profile Page V-50)

GEJAC, INC.
HASP VERSION 3
Specific Application: Communications
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX 11: VMS; DEC PDP-11: RSX; DEC PDP-11: Ias, RT-11
Memory Required: 16.0K bytes
Source Language: Assembler, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $3,500 to $6,500
Number Installed to Date: 500
Date First Installed: January 1978
(See Vendor Profile Page V-50)

GENERAL ELECTRIC INFORMATION
TSI2.0
Specific Application: Communication Software
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 100.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Date First Installed: September 1983
(See Vendor Profile Page V-51)

GEORGE W. HALLAHAN & CO., INC.
XCHANGE-11
Specific Application: Microcomputer Communication and Networking
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, DEC VAX: RSX-11M
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $99,500
Number Installed to Date: 28
Date First Installed: May 1982
(See Vendor Profile Page V-51)

G & G ENGINEERING
MODEM 8-16
Specific Application: Telecommunication Language for MP/86 System and for Concurrent CP/M 8-16
Specific Industry: Not Industry Sensitive
System Requirements: Compupro S100: CP/M, MP/M
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 85
Date First Installed: January 1983
(See Vendor Profile Page V-51)

GLENN A. BARBER AND ASSOCIATES
TSX-NET
Specific Application: Networking
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RT-11; TSX Plus: RSX 11; VAX
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-51)

GOULD, INC.
HASP REMOTE WORKSTATION
Specific Application: Remote Job Entry
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Memory Required: 400.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
(See Vendor Profile Page V-52)

GRANADA SYSTEMS DESIGN, INC.
INTERFACE
Specific Application: Host Able to Communicate With Multiple Other Hosts
Specific Industry: Not Industry Sensitive, Banking/Financial
System Requirements: IBM Series/1: EDX
Memory Required: 96.0K bytes
Source Language: EDL
Source Code Available: Yes
Price: $12,500 to $25,000
Number Installed to Date: 6
Date First Installed: July 1981
(See Vendor Profile Page V-52)

GRANADA SYSTEMS DESIGN, INC.
TELDEAR
Specific Application: Telephone Data Entry and Audio Response, Touch-Tone, Order Entry, Pay-By-Phone Sales Order Entry
Specific Industry: Not Industry Sensitive, Wholesale/Distribution, Banking/Financial
System Requirements: IBM Series/1: EDX; IBM System/36: SSP; IBM System/38: SSP
Memory Required: 96.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,500
Number Installed to Date: 6
Date First Installed: June 1981

GUILD, INC.
THE GUILD CATALYST
Specific Application: Totally Portable Across Hardware, Enables Networking Between Micros, Minis and Mainframes
Specific Industry: Not Industry Sensitive

System Requirements: Motorola 68000: Catalyst; Zilog 8000: Catalyst; DEC: Catalyst; Unix 1100: Catalyst
Memory Required: 64.0K bytes
Source Language: Extended Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250,000
Number Installed to Date: 5
Date First Installed: March 1982
(See Vendor Profile Page V-53)

H & A COMPUTER SYSTEMS
RSS-REMOTE SERIES 1 SERVICES
Specific Application: Remote Operation and Service
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 8.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 10
Date First Installed: 1982
(See Vendor Profile Page V-53)

HARRIS CORP.
RJE HOST
Specific Application: Remote Job Entry
Specific Industry: Not Industry Sensitive
System Requirements: Harris 600, 700, 800: VOS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,800
(See Vendor Profile Page V-53)

HARRIS CORP.
RJE TERMINAL EMULATION
Specific Application: Terminal Emulation.
Specific Industry: Not Industry Sensitive
System Requirements: Harris 600, 700, 800: VOS

HORNS COMPUTER SERVICES
RPSS-REMOTE PRINTER SPOOLING
Specific Application: Remote Printer Spooling System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: DOS, IBM 370: Cics
Source Language: Assembler
Purchase Terms: Lease
Number Installed to Date: 12
Date First Installed: 1981
(See Vendor Profile Page V-55)

HOUSTON ENGINEERING RESEARCH CORP.
TDC 2000 DRIVER
Specific Application: Communication Driver Between DEC PDP-11 and Honeywell 2000
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX
Memory Required: 128.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 3
Date First Installed: 1978
(See Vendor Profile Page V-55)

HUNTER & READY, INC.
C INTERFACE LIBRARY (HP)
Specific Application: Interfaces Programs Written In HPC to VRTX8002
Specific Industry: Not Industry Sensitive
System Requirements: Zilog Z8002
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 100
Date First Installed: 1982
(See Vendor Profile Page V-55)

HUNTER & READY, INC.
C INTERFACE LIBRARY (WHITE SMITH)
Specific Application: Interfaces Programs Written IN White Smiths C, to VRTX 8002
Specific Industry: Not Industry Sensitive
System Requirements: Zilog Z8002
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 100
Date First Installed: 1982

HUNTER & READY, INC.
C INTERFACE LIBRARY (ALCYON)
Specific Application: Interface Programs Written In Alcyon C to VRTX 68000
Specific Industry: Not Industry Sensitive
System Requirements: Motorola 68000
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 100
Date First Installed: 1982

HUNTER & READY, INC.
C INTERFACE LIBRARY (HP)
Specific Application: Interfaces Programs Written In Hewlett Packard C to VRTX 68000
Specific Industry: Not Industry Sensitive
System Requirements: Motorola 68000
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 100
Date First Installed: 1982

HUNTER & READY, INC.
C INTERFACE LIBRARY (HP)
Specific Application: Interfaces Programs Written In HP C to VRTX 86
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8086
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 100
Date First Installed: 1982

HUNTER & READY, INC.
C INTERFACE LIBRARY (MOTOROLA)
Specific Application: Interfaces Programs Written In Motorola C to VRTX 68000
Specific Industry: Not Industry Sensitive
System Requirements: Motorola 68000
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 100
Date First Installed: 1982

HUNTER & READY, INC.
C INTERFACE LIBRARY (MIT)
Specific Application: Interfaces Programs Written IN MIT C to VRTX 86
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8086
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 100
Date First Installed: 1982

HUNTER & READY, INC.
C INTERFACE LIBRARY (WHITE SMITHS)
Specific Application: Interfaces Programs Written In White Smiths C, to VRTX 68000
Specific Industry: Not Industry Sensitive
System Requirements: Motorola 68000
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 100
Date First Installed: 1982

HUNTER & READY, INC.
PASCAL INTERFACE LIBRARY (HP)
Specific Application: Interfaces Programs Written In HP Pascal to, VRTX 68000
Specific Industry: Not Industry Sensitive
System Requirements: Motorola 68000
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 100
Date First Installed: 1982

HUNTER & READY, INC.
PASCAL INTERFACE LIBRARY (HP)
Specific Application: Interfaces Programs Written IN HP Pascal to VRTX 86
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8086
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 100
Date First Installed: 1982

HUNTER & READY, INC.
PASCAL INTERFACE-LIBRARY (HP)
Specific Application: Interfaces Programs Written IN HP Pascal to VRTX 8002
Specific Industry: Not Industry Sensitive
System Requirements: Zilog Z8002
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 100
Date First Installed: 1982

HUNTER & READY, INC.
PL/M INTERFACE LIBRARY
Specific Application: Interfaces Programs Written In PL/M to VRTX 86
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8086
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 100
Date First Installed: 1982

INDUSTRIAL COMPUTER CORP.
DOCMP 1000
Specific Application: Provides DEC to HP 1000 Communication
Specific Industry: Not Industry Sensitive
System Requirements: HP1000
Memory Required: 64.0K bytes
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 5
Date First Installed: January 1983
(See Vendor Profile Page V-57)

INFOMEDIA CORP.
JENNY
Specific Application: Electronic Mail Package
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: SPL
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-57)

INFORMATION MANAGEMENT TECHNOLOGIES
DEDICOM
Specific Application: Communication Message Switching Program
Specific Industry: Not Industry Sensitive
System Requirements: DG: Unix; TI; Perkin Elmer
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000 to $40,000
Number Installed to Date: 20
Date First Installed: September 1982
(See Vendor Profile Page V-57)

THE INFORMATION ORGANIZATION CORP.
WANG VS TO HIGH SPEED PRINTER
Additional Product Classification: Speed Printer
Specific Application: Sends Wang WP to High Speed Printer
Specific Industry: Not Industry Sensitive

System Requirements: Wang VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 2
Date First Installed: August 1982
(See Vendor Profile Page V-58)

THE INFORMATION ORGANIZATION CORP.
WANG VS TO IBM DISPLAY WRITER
Additional Product Classification: Display Writer
Specific Application: Telecommunication Interface Package to Translate Wang WP to IBM Display Writer and IBM to Wang
System Requirements: Wang VS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 2
Date First Installed: May 1982

INFOSERVICES, INC.
INFOCOM//INFOHOST ANSWER-DB
Additional Product Classification: Library Management, Report Generation
Specific Application: Communications From Micros to Prime and Micro to Micro
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MS-DOS
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Date First Installed: 1981

INNOVATEK MICROSYSTEMS, INC.
COMMUNICATION LINK
Specific Application: High Speed Communications to Remote Systems
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11, LSI-11; RT-11
Memory Required: 12.0K bytes
Source Language: Macro
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $775
Date First Installed: 1978
(See Vendor Profile Page V-59)

INTERNETRICS
TALK
Specific Application: Communications Link Between Minicomputers and Mainframes
Specific Industry: Not Industry Sensitive
System Requirements: Intel
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
(See Vendor Profile Page V-60)

KEYSTONE DATA
[illegible] YANTE, INC.
FILE TRANSMISSION PACKAGE
Specific Application: Transmits [illegible] From One Machine to Another
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11; RSX
Memory Required: 128.0K bytes
Source Language: Macro-11
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 6
Date First Installed: 1982
(See Vendor Profile Page V-64)

LEIGHT AUTOMATION, INC.
LT 200
Specific Application: Terminal Emulator
Specific Industry: Not Industry Sensitive
System Requirements: Four Phase 4; MFE
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 3
Date First Installed: 1982
(See Vendor Profile Page V-65)

LINE SYSTEMS
DATALINK
Specific Application: Communicates With Other Data Bases
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE, III: P System, IBM PC-XT: P System
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: August 1983
(See Vendor Profile Page V-65)

LOGICA, INC.
FASTRAN
Specific Application: Bank Cable Room and Funds Transfer Automation Software
Specific Industry: Banking/Financial, International
System Requirements: DEC PDP-11; RSX; Tandem
Memory Required: 1.0M bytes
Source Language: Macro, C
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $100,000
Number Installed to Date: 20
Date First Installed: 1979
(See Vendor Profile Page V-66)

LOGICA, INC.
FASTRX
Specific Application: Transaction Processing and Message Switching Applications
Specific Industry: Banking/Financial, International
System Requirements: DEC PDP-11; RSX; Tandem
Memory Required: 1.0M bytes
Source Language: Macro, C
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $75,000
Number Installed to Date: 25
Date First Installed: 1979

LOGICA, INC.
FASTWIRE
Specific Application: Bank Cable Room and Funds Transfer Automation Software
Specific Industry: Banking/Financial, International
System Requirements: DEC PDP-11; RSX
Memory Required: 1.0M bytes
Source Language: Macro, C
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $100,000
Number Installed to Date: 3
Date First Installed: 1982

MATHEMATICA PRODUCTS GROUP
ATLAS
Specific Application: Data Communications Monitor
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS/VSE
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $20,000
Number Installed to Date: 40
Date First Installed: 1982
(See Vendor Profile Page V-70)

MCCORMACK & DODGE CORP.
PCIM
Specific Application: Personal Computer Link From Micro to Mainframe
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Date First Installed: 1983
(See Vendor Profile Page V-70)

MCDONNELL DOUGLAS AUTOMATION CO.
MCAUTO SYSTEM 1
Specific Application: Manage A Distributed Environment Between A Local Minicomputer Dedicated to An Engineering Project and A Backup Mainframe
Specific Industry: Manufacturing, Engineering, Construction, Government, Transportation
System Requirements: DEC: VMS
Memory Required: 1.0K bytes
Purchase Terms: Purchase (license); Lease
Date First Installed: February 1983
(See Vendor Profile Page V-71)

MEGAWEST SYSTEMS, INC.
MEGA NET
Specific Application: Communications Between Hardware
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC I; ADDS Mentor: Pick, Micro Data
Memory Required: 64.0K bytes
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,300
Number Installed to Date: 40
Date First Installed: 1980
(See Vendor Profile Page V-72)

MICRO-INTEGRATION, INC.
BIS 3780 VERSION 5.0
Specific Application: IBM 2780 3780 Emulator Communications Remote Job Entry
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86, MS-DOS, PC-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $695
Number Installed to Date: 2,000
Date First Installed: September 1979
(See Vendor Profile Page V-74)

MICRO-INTEGRATION, INC.
COAXSYS TM
Specific Application: IBM 3270 Coaxial Interface Hardware and Software
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86, MS-DOS; PC-DOS
Memory Required: 64.0K bytes
Source Language: Pascal, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,195

MICRO-INTEGRATION, INC.
MICRO-SNA/3770 VERSION 1.0
Specific Application: IBM 3270 Terminal Emulator, Communications
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86, MS-DOS, PC-DOS
Memory Required: 64.0K bytes
Source Language: Assembler, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $695

MICRO-INTEGRATION, INC.
MICRO-SNA3770
Specific Application: IBM 3770 Terminal Emulator, Communications, Remote Job Entry
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86, MS-DOS, PC-DOS
Memory Required: 64.0K bytes
Source Language: Assembler, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $695

MICROSTUF, INC.
CROSSTALK XVI
Specific Application: Integrated Help System Emulates Several Terminals, Supports Most Auto-Dial Modems Capable of Automated File Transmission
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: MS-DOS, Victor 9000; Eagle 1600; Compact Corona
Memory Required: 96.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
(See Vendor Profile Page V-74)

MOHAWK DATA SCIENCES CORP.
EM 3741
Specific Application: Communications
Specific Industry: Not Industry Sensitive
System Requirements: MDS Series 21· OS/2
Source Language: Mobol/Z80
Source Code Available: No
(See Vendor Profile Page V-77)

MOHAWK DATA SCIENCES CORP.
EM 3275
Specific Application: Communications
Specific Industry: Not Industry Sensitive
System Requirements: MDS Series 21· SO/2
Source Language: Mobol/Z80
Source Code Available: No

MOHAWK DATA SCIENCES CORP.
MASP/WS
Specific Application: Communications
Specific Industry: Not Industry Sensitive
System Requirements: MDS Series 21· OS/2
Memory Required: 9.6M bytes
Source Language: Mobol/Z80
[illegible] **Code Available:** No
Purchase Terms: Purchase (license)

MOHAWK DATA SCIENCES CORP.
REMOTE COPY
Specific Application: Communications
Specific Industry: Not Industry Sensitive
System Requirements: MSD Series 21· OS/2
Source Language: Mobol/Z80
Source Code Available: No

NATIONAL D-A-T, INC.
LINK/1
Specific Application: Communications Support
Specific Industry: Manufacturing, Banking/Financial
System Requirements: IBM Series/1
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
[illegible] **Installed to Date:** 2
Date First Installed: 1982
(See Vendor Profile Page V-78)

NCR CORP.
NCR [illegible] TRAN-7000 EL
Specific Application: Entry Level Transaction Processing Monitor
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation, Nonprofit Organizations, Scientific
System Requirements: NCR V-7900, V-8000· VRX
Memory Required: 1.0K bytes
Source Language: Cobol, Neat/VS
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 6
Date First Installed: October 1982
(See Vendor Profile Page V-79)

NESTAR SYSTEMS, INC.
3270 CLUSTER EMULATOR SERVER
Specific Application: Provides An Emulated IBM 3274 Model 5/C Bisynchronous Mode
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: Pascal, IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: July 1983
(See Vendor Profile Page V-79)

NIXDORF COMPUTER CORP.
3270 BSYNC EMULATOR
Specific Application: Interactive Communication Between 8860 and Host
Specific Industry: Not Industry [illegible]
System Requirements: Nixdorf 8860· Dipos
Memory Required: 512.0K bytes
Source Language: Assembler
Purchase Terms: Rental
[illegible] **Installed to Date:** 5,000
(See Vendor Profile Page V-80)

NIXDORF COMPUTER CORP.
3270 SNA EMULATOR
Specific Application: Interactive Communication Between 8860 and Host
Specific Industry: Not Industry [illegible]
System Requirements: Nixdorf 8860· Dipos
Memory Required: 512.0K bytes
Source Language: Assembler
Purchase Terms: Rental
[illegible] **Installed to Date:** 1,800

NIXDORF COMPUTER CORP.
3770 SNA EMULATOR
Specific Application: Interactive Communications Between 8860 and Host
Specific Industry: Not Industry [illegible]
System Requirements: Nixdorf 8860· Dipos
Memory Required: 512.0K bytes
Source Language: Assembler
Purchase Terms: Rental
[illegible] **Installed to Date:** 2,000

NORTHEAST DATACOM, INC.
TELECOMMUNICATIONS
Specific Application: Telecommunications
Specific Industry: Not Industry [illegible]
System Requirements: Wang 2200 MVP: Speed
Memory Required: 28.0K bytes
Source Language: Basic II
[illegible] **Code Available:** Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-81)

N.P.R.I.
DATII
Specific Application: Automation of Facilities Doing Telemarketing
Specific Industry: Not Industry Sensitive, Banking/Financial, Insurance, Subscriptions
System Requirements: DEC PDP-11· RSX-11M+, DEC VAX· VMS
Memory Required: 132.0K bytes
Source Language: Fortran 77, Macro
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $12,000 to $100,000
[illegible] **Installed to Date:** 7
Date First Installed: April 1982
(See Vendor Profile Page V-81)

ORION SOFTWARE, INC.
NETPRO/370
Specific Application: Connects IBM System/34-36-38 With Telex/Gnisco and IBM PC
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34· SSP; IBM System/36, System/38· CFP
Memory Required: 96.0K bytes
Source Language: RPG-II, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $3,200 to $10,000
[illegible] **Installed to Date:** 120
Date First Installed: January 1982
(See Vendor Profile Page V-83)

PACESETTER SYSTEMS, INC.
PACER/HPS-HOST PROCESSING SYSTEM
Specific Application: Allows Bank to Communicate With IBM System/370
Specific Industry: Banking/Financial
System Requirements: IBM System/370; IBM 4300 Series: OS; IBM 3030 Series: DOS; IBM 3080 Series
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 1
Date First Installed: 1980
(See Vendor Profile Page V-83)

PACIFIC SOFTWARE MANUFACTURING CO.
X.DOT:PAD
Specific Application: Interface From Asynchronous Terminals to A Packet Switching Network
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX; Motorola 68000; Zilog Z8000
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $49,000
Date First Installed: 1983
(See Vendor Profile Page V-84)

PRIME COMPUTER, INC.
DPTX - INTERCONNECT FACILITY FOR IBM 3270
Specific Application: Communications Control and Facilitation
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Price: $7,500
Number Installed to Date: 1,000
Date First Installed: 1979
(See Vendor Profile Page V-87)

PRIME COMPUTER, INC.
EM 200 UT-EMULATION FOR CONTROL DATA UT 200
Specific Application: Emulation and Communication
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Price: $3,750
Date First Installed: 1979

PRIME COMPUTER, INC.
EM 1004 - EMULATION FOR UNIVAC 1004
Specific Application: Emulation and Communication
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
[illegible] **Code Available:** No
Purchase Terms: Purchase (license); Monthly License
Price: $3,750
Date First Installed: 1979

PRIME COMPUTER, INC.
EM 7020 - EMULATION FOR ICL 7020
Specific Application: Emulation and Communication
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Price: $3,750
Date First Installed: 1980

PRIME COMPUTER, INC.
EM GRTS - EMULATION FOR HONEYWELL GPTS
Specific Application: Emulation and Communication
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Price: $4,500
Date First Installed: 1979

PRIME COMPUTER, INC.
EM [illegible] - EMULATION FOR ICL XSM
Specific Application: Emulation and Communication
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
[illegible]
Date First Installed: 1982

[illegible] COMPUTER, INC.
[illegible] - EMULATION FOR IBM HASP II
Specific Application: Emulation - Communication

Specific Industry: Not Industry Sensitive
System Requirements: Prime Primos
Source Code Available: No
Purchase Terms: Purchase (license), Monthly Licens
Price: $5,250
Date First Installed: 1979

PRIME COMPUTER, INC.
EMIEO - EMULATION FOR IBM 2780/3780
Specific Application: Communications - Emulation
Specific Industry: Not Industry Sensitive
System Requirements: Prime Primos
Source Code Available: No
Purchase Terms: Purchase (license), Monthly License
Price: $4,500
Date First Installed: 1979

PRIME COMPUTER, INC.
FILE TRANSFER SERVICE
Additional Product Classification: System Resource Management
Specific Application: Network File Transfer Facility
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Price: $2 000
Date First Installed: 1981

PRIME COMPUTER, INC.
PACKET NETWORK INTERFACE
Specific Application: Communications Control and Facilitation
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Price: $2,500
Date First Installed: 1979

PRIME COMPUTER, INC.
PRIMENET - NETWORKING FACILITY
Specific Application: Communications Control and Facilitation - DDP Environment
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Price: $7,200
Number Installed to Date: 1,000
Date First Installed: 1979

PROGRAM RESOURCES, INC.
WANG DEC LINK
Specific Application: Allows VT100 to Emulate VAX
Specific Industry: Not Industry Sensitive
System Requirements: Wang VT 100
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995

Number Installed to Date: 3
Date First Installed: 1983
(See Vendor Profile Page V-88)

QUADSTAR CORP.
AUDIO RESPONSE SYSTEM
Specific Application: Home Bill Payment, Teller Assisted Functions Via Telephone
Specific Industry: Retail Banking/Financial
System Requirements: IBM Series/1 EDX
Memory Required: 512 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75,000
Number Installed to Date: 2
Date First Installed: 1981
(See Vendor Profile Page V-90)

QUADSTAR CORP.
AUTOMATED COLLECTION SYSTEM
Specific Application: Automated Credit Card System and Installment Loan Collection Activities
Specific Industry: Retail, Banking/Financial
System Requirements: IBM Series/1 EDX
Memory Required: 512 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $75,000
Number Installed to Date: 3
Date First Installed: 1981

QUADSTAR CORP.
HOME BANKING SYSTEM
Specific Application: Personal Home Banking
Specific Industry: Retail, Banking/Financial
System Requirements: IBM Series/1 EDX
Memory Required: 512 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $50,000
Number Installed to Date: 1
Date First Installed: 1983

QUADSTAR CORP.
SUPERNET
Specific Application: Terminal Network Management
Specific Industry: Retail, Banking/Financial
System Requirements: IBM Series/1 EDX
Memory Required: 512 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $200,000
Number Installed to Date: 20
Date First Installed: 1979

RADIX II, INC.
EDL-R
Additional Product Classification: Languages
Specific Application: Use IBM Software on Non-IBM Machine
Specific Industry: Not Industry Sensitive
System Requirements: , PE 32 Bit: OS/32MT, HP 1000, HP2000: HP OS

Memory Required: 64 0K bytes
Source Language: R
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,500
Date First Installed: January 1983
(See Vendor Profile Page V-91)

REAL-TIME MANAGEMENT INC.
REMOTE 990
Specific Application: Allows TI 990S and Business Systems to Participate IN Burroughs Pole Network
Specific Industry: Not Industry Sensitive
System Requirements: TI System/300, 600, 800 DX-10, IT 990/4-36
Memory Required: 192 0K bytes
Source Language: TI Assembly, Cobol, Tiform
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,500
Date First Installed: 1978
(See Vendor Profile Page V-92)

RGTI SYSTEMS SOFTWARE
SCREENSHARE-11 TERMINAL MONITOR FACILITY
Specific Application: Terminal Monitoring for Remote Support, Demonstrations, Troubleshooting, Supervision, and Security
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RSX, DEC VAX, VMS
Source Language: Macro
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 30
Date First Installed: 1981
(See Vendor Profile Page V-93)

ROTELCOM DATA, INC.
SATURN-SPECIAL SERVICES AND TRUNK UTILIZATION
Specific Application: Tracks Circuits and Trunk Utilization
Specific Industry: Telephone Industry
System Requirements: DEC VAX-11/780 VMS
Memory Required: 2.0M bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-94)

RUF CORP.
IMPRS COMMUNICATIONS SOFTWARE
Specific Application: Communications
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RSTS/E, RT-11, RSX-11, VMS, las
Memory Required: 28.0K bytes
Source Language: Macro-11
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 7
Date First Installed: 1981
(See Vendor Profile Page V-94)

SCIENTIFIC SYSTEMS SERVICES, INC.
FORTRAN
Specific Application: Interface Communications With Aydin 5215 Display Generator
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000, 4600, A700 RTE 6, RTE A1, Modcomp Classic Max, DEC PDP-11, RSX-11M, PE OS/32
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,700
Number Installed to Date: 25
Date First Installed: June 1982
(See Vendor Profile Page V-95)

SMART, INC.
SERIES/1 POLLER & CREDIT AUTHORIZATION SYSTEM
Specific Application: Communication Between POS and Mainframe, Performs Credit Authorization Functions
Specific Industry: Retail
System Requirements: IBM Series/1
Memory Required: 64 0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000 to $80,000
Date First Installed: October 1983
(See Vendor Profile Page V-98)

SOFTWARE AG OF NORTH AMERICA, INC.
COM-PLETE
Specific Application: Teleprocessing System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370: MVS, IBM 4300 Series Series OS-VS1, IBM 3000 Series Series: DOS/VSE
Memory Required: 512.0K bytes
Source Language: Assembler
(See Vendor Profile Page V-99)

SOFTWARE CLEARING HOUSE
VIMOS
Specific Application: Allows Applications to Run Under VIMOS
Specific Industry: Not Industry Sensitive
System Requirements: NCR V Series VRX
Memory Required: 41.0K bytes
Source Language: VRX Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $3,500
Number Installed to Date: 147
(See Vendor Profile Page V-96)

SOFTWARE CLEARING HOUSE
VRTEX
Specific Application: Utility VRX Teleprocessing Monitor, Includes Features Required to Develop New Systems From Scratch Under VRX
Specific Industry: Not Industry Sensitive
System Requirements: NCR V Series VRX
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $7,000 to $17,000
Number Installed to Date: 147

SOFTWARE DEVELOPMENT CORP.
DAGAR DTS-3
Specific Application: Terminal Mon

From One CP/M to Another
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: CB-80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: February 1982
(See Vendor Profile Page V-99)

SOFTWARE DYNAMICS
SDNET
Specific Application: Shared Resources Microcomputer Network Software
Specific Industry: Not Industry Sensitive
System Requirements: PalTech GT Series, TRS, Motorola
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 25
Date First Installed: 1982

SOFTWARE MANAGEMENT SYSTEMS, INC.
MICROTALK
Specific Application: Interface IBM PC or Victor 9000 to Prime Computers
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, Victor 9000: MS DOS; Prime: Primos
Memory Required: 128.0K bytes
Source Language: Info Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 2
Date First Installed: July 1983
(See Vendor Profile Page V-99)

SOFTWARE SYSTEMS, INC.
3361 MODEL 11 WORK STATION EMULATOR
Specific Application: Enables IBM 5280 System to Operate On-Line to IBM System/34, /36, /38
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5280: DCP
Memory Required: 64.0K bytes
Source Language: 5280 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 150
Date First Installed: February 1982
(See Vendor Profile Page V-100)

SOFTWARE SYSTEMS, INC.
SYSTEM 34, 36, 38 DISKETTE TRANSFER
Specific Application: File Transfer Station From IBM System/34, 36, 38 to IBM 5280
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Source Language: Assembler, RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350 to $750
Number Installed to Date: 50
Date First Installed: February 1982

SPARTACUS COMPUTERS, INC.
KNET
Specific Application: Networking
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4331: VM
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-101)

START SYSTEMS
AUTOPASS 3270TM
Specific Application: Communicatons Interface Between Wang VS and IBM 3270 Host Processor, Interfaces With CMS, TSO, Cics, IMS
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS
Memory Required: 256.0K bytes
Source Language: Object Language, Procedure Language
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000 to $80,000
Number Installed to Date: 2
Date First Installed: January 1982
(See Vendor Profile Page V-103)

STRATUS COMPUTER
3277 EMULATOR FACILITY
Specific Application: Facilities to Connect Stratus Computer to IBM Mainframe Using Bisynchronous Protocol
Specific Industry: Not Industry Sensitive
System Requirements: Status 132: Status VOS
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: June 1982
(See Vendor Profile Page V-104)

STRATUS COMPUTER
3278 TERMINAL SUPPORT
Specific Application: Connects IBM 3270 Terminal to A Stratus Computer
Specific Industry: Not Industry Sensitive
System Requirements: Status 32: Stratus VOS
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Date First Installed: June 1982

STRATUS COMPUTER
3780 REMOTE JOB ENTRY
Specific Application: 2780/3780/Hasp Communications to Host Computers
Specific Industry: Not Industry Sensitive
System Requirements: Stratus VOS
Source Language: PL/1
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: March 1982

SYSTEM A SOFTWARE, INC.
NEXUS
Specific Application: Ties PDP-11 or VAX Together With the Other on Intel MDS or MDS Under CP/M
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: Isis II, DEC VAX: CP/M
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 100
Date First Installed: September 1978
(See Vendor Profile Page V-106)

THE SYSTEMS CENTER
NETWORK ACCESS SERVICES-SERIES/1
Specific Application: Allows Series/1 EDX Programs to Communication Upstream With SNA Host Processor
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1 EDX
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: October 1982
(See Vendor Profile Page V-106)

THE SYSTEMS CENTER, INC.
NETWORK DATAMOVER
Specific Application: Manages the Transfer of Information Between Computers: Mainframe to Mainframe, Mainframe to Series/1, Mainframe to Intel
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, PC-DOS, Apple Lisa APPLE-DOS, IBM System/370: MVS; IBM Series/1
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: August 1983

SYSTEMS RESOURCES CORP.
SRI 3278
Specific Application: Protocol Converter for the 3278
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, IBM 3033, IBM 3081
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Date First Installed: 1982
(See Vendor Profile Page V-107)

SYSTEMS STRATEGIES, INC.
2780/3780 EMULATOR
Specific Application: Provides 2780/3780 Batch to IBM Mainframes
Specific Industry: Not Industry Sensitive
Source Language: C Code
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $47,000
Number Installed to Date: 5
(See Vendor Profile Page V-107)

SYSTEMS STRATEGIES, INC.
3270 SDC EMULATOR
Specific Application: Emulator 3270 SDC Device on IBM Mainframe
Specific Industry: Not Industry Sensitive
Source Language: C Code
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $85,000
Number Installed to Date: 1

SYSTEMS STRATEGIES, INC.
3270 SNA EMULATOR
Specific Application: Emulator 3270 Cluster Controller to IBM Mainframe
Specific Industry: Not Industry Sensitive
Source Language: C Code
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $13,000
Number Installed to Date: 5
Date First Installed: September 1978

SYSTEMS STRATEGIES, INC.
X25 INTERFACE
Specific Application: Colt X25 Standard Communication Interface
Specific Industry: Not Industry Sensitive
Source Language: C Code
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $90,000
Number Installed to Date: 2

TAFT CONSULTING, INC.
TERRALINK
Specific Application: An Interface Between A Tandem and the Western Union on Easy Link
Specific Industry: Not Industry Sensitive
System Requirements: Tandem NS I, NS II Guardian
Source Language: TAL
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: 1983
(See Vendor Profile Page V-108)

TECHNICO, INC.
SERIAL FILE TRANSFER PROGRAM
Specific Application: Allows the User to Upload and Download From A Host Computer
Specific Industry: Education, Scientific, Industrial Control
System Requirements: TI 9900
Memory Required: 4.0K bytes
Source Language: 9900 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 50
Date First Installed: 1982
(See Vendor Profile Page V-108)

TEKELEC, INC.
CHAMELEON BISYNC
Additional Product Classification: Performance Measurement
Specific Application: Protocol Modeling
Specific Industry: Manufacturing, Engineering, Banking/Financial, Government
System Requirements: Chameleon
Source Language: Proprietary
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 55
Date First Installed: December 1982
(See Vendor Profile Page V-109)

TEKELEC, INC.
FRAMEM (FRAME LEVEL EMULATOR)
Additional Product Classification: Performance Measurement

Specific Application: Protocol Modeling for Development and Test Purposes
Specific Industry: Manufacturing, Engineering, Banking/Financial, Government, Network Support
System Requirements: Chameleon
Source Language: Proprietary
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,000
Number Installed to Date: 55
Date First Installed: April 1982

TEKELEC, INC.
SIMP/L (SIMULATOR INTERACTIVE MULTI-PROTOCOL)
Specific Application: Protocol Modeling for Development and List
Specific Industry: Manufacturing, Engineering, Banking/Financial, Government, Network Support/ Development
Source Language: Proprietary
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 55
Date First Installed: December 1982

TEKELEC, INC.
SITREX-PLUS
Specific Application: X.25 Protocol Modeling
Specific Industry: Manufacturing, Engineering, Banking/Financial, Government, X.25 Network Support
Source Language: Proprietary
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 300
Date First Installed: March 1980

TELCO RESEARCH CORP.
MULTI-NODE TANDEM OPTYMIZER (MTO)
Specific Application: Design and Optimize Multiple Location Switched Networks
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation
System Requirements: IBM OS/MOS, VM/CMS; DEC 10, DEC 20; VAX: VMS; DG Eclipse MV 8000
Memory Required: 100.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 35
Date First Installed: 1978
(See Vendor Profile Page V-109)

TELCO RESEARCH CORP.
THE ACD OPTYMIZER
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation
System Requirements: IBM: OS/MVS; DEC 10: VM/CMS; PDP-11; Z-80
Source Language: Fortran, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $27,500
Date First Installed: 1978

TELCO RESEARCH CORP.
THE OPTYMIZER PLUS
Specific Application: Network Optimization
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation
System Requirements: IBM: OS/MVS, VM/CMS; DEC VAX, PDP: VMS; Honeywell; Amdahl
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $28,600
Date First Installed: 1978

TOP DOWN SYSTEMS
INTF 3270
Specific Application: Software Interface for Terminal Monitor to Another Systems Monitor
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CP/M, DOS, VS, MVS
Memory Required: 256.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license); Rental; Lease
Price: $8,125
Number Installed to Date: 25
Date First Installed: 1982
(See Vendor Profile Page V-111)

TRANSACTION DATA SYSTEMS, INC.
STAT-MUX SUPPORT FACILITY
Specific Application: Provides A Software Statistical Interface to Remote Multiplexors
Specific Industry: Not Industry Sensitive
System Requirements: PE 3200: OS-32
Memory Required: 500.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 2
Date First Installed: 1981
(See Vendor Profile Page V-111)

UNIQUE AUTOMATION PRODUCTS
RJE REMOTE JOB ENTRY SOFTWARE
Specific Application: Telecommunications
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX, RT-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,850 to $2,250
Number Installed to Date: 100
Date First Installed: January 1978
(See Vendor Profile Page V-113)

UNIQUE AUTOMATION PRODUCTS
UAP-LINK
Specific Application: Files Transfers Through Standard Telecommunications
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: Most; IBM PC: PC-DOS; DEC Micros: CMS; IBM 370: TSO
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250 to $1,500
Number Installed to Date: 50
Date First Installed: July 1982
(See Vendor Profile Page V-113)

UNIQUE AUTOMATION PRODUCTS
UAP-LINK FILE TRANSFER SOFTWARE
Specific Application: Telecommunications File Transfer
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11; DEC VAX: VMS, IBM PC: PC-DOS; IBM Mainframe: TSO
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 40
Date First Installed: June 1982

VAN AMBURG & ASSOCIATES, INC.
TAC SOFT
Specific Application: User-Defined Technical Assistance Center Support, Package Supports Maintenance of CO and PBX Switching Equipment
Specific Industry: Telephone
System Requirements: DG Eclipse: AOS
Memory Required: 760.0K bytes
Source Language: SP/Pascal, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-115)

WINTERNALTER, INC.
NS3270 AND NS3780 2780
Specific Application: Micro to Mainframe Communication Programs (Emulation)
Specific Industry: Not Industry Sensitive
Memory Required: 56.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-117)

ABT ASSOCIATES
DATA TRANS
Specific Application: Automatic Telecommunication and Data Transfer Runs at 300 Baud or 1200 Baud Rate
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+; APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 1,000
Date First Installed: September 1982
(See Vendor Profile Page V-1)

ADVANCED MICRO TECHNIQUES
INTELLIGENT TERMINAL - VERSION 1
Additional Product Classification: Asynchronous Communications Package
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 500
Date First Installed: June 1981
(See Vendor Profile Page V-3)

ADVANCED MICRO TECHNIQUES
MICROTELEX - VERSION 1.02
Specific Application: Converts CP/M Into Telex/TWX
Specific Industry: Not Industry Sensitive
System Requirements: MP/M; CP/M
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 7,600
Date First Installed: 1982

ADVANCED SOFTWARE PRODUCTS, INC.
3101 EMULATOR
Specific Application: Emulates 3101 Terminal
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Memory Required: 128.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 100
Date First Installed: 1982
(See Vendor Profile Page V-3)

ADVANCED SYSTEMS CONCEPTS, INC.
PRISM PROFESSIONAL INTER SYSTEM
Specific Application: Emulates IBM 3276 With 3278 Model 2 Display Station
Specific Industry: Not Industry Sensitive
System Requirements: DEC Professional 300 P/OS
Memory Required: 512.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 120
Date First Installed: June 1983

THE ALTERNATE SOURCE
TCOM
Specific Application: Tape-Based Communication, Full Up Loading and Down Loading
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/III: DOS/80; TRS-80/4: TRS-DOS, DOS+, MULTI-DOS
Source Language: Z80
Purchase Terms: Purchase (license)
Price: $29
Number Installed to Date: 50
Date First Installed: October 1982
(See Vendor Profile Page 4)

THE ALTERNATE SOURCE
TRAKCESS
Specific Application: Access Floppy Disk Controller, Perform Track I/O
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: MULTI-DOS; TRS-80/III: DOS/80; TRS-80/4: TRS-DOS, DOS+
Source Language: Basic, Z80
Purchase Terms: Purchase (license)
Price: $29
Number Installed to Date: 500
Date First Installed: November 1982

THE ALTERNATE SOURCE
TRS-80 COMMUNICATION
Specific Application: Allows TRS-80 to Talk to Micros and Mainframes
System Requirements: TRS-80/I: MULTI-DOS; TRS-80/III: DOS/80; TRS/80/4: TRS-DOS, DOS+
Memory Required: 32.0K bytes
Source Language: Z80
Purchase Terms: Purchase (license)
Price: $39
Number Installed to Date: 1,000
Date First Installed: February 1980

ASHTON, INC.
ELECTRONIC MESSAGE SYSTEM
Specific Application: Simulates Electronic Mail Center and Remote Data Base
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Apple III: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 10
Date First Installed: February 1983
(See Vendor Profile Page V-6)

AUTOMATED MESSAGE CENTERS
COMM-HANDLER
Specific Application: Remote Communication With Other Computers
Specific Industry: Not Industry Sensitive
System Requirements: Southwest Technical: Uniflex
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 25
Date First Installed: 1982
(See Vendor Profile Page V-10)

AUTOMATED PROFESSIONAL SYSTEMS
APSTOCK
Specific Application: Manage Client Information and Clients Portfolios, Makes Effective Use of Disk Space
Specific Industry: Banking/Financial, Brokerage
System Requirements: CP/M 80; Intel 8080: CP/M 86; Intel 8086: MS-DOS, PC-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-10)

AUTOMATED PROFESSIONAL SYSTEMS
APSTRAN
Specific Application: Transfers Data Between Incompatible File Formats
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; Intel 8080: CP/M 86; Intel 8086: MS-DOS; PC-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: September 1983

AUTOMATION DESIGN, INC.
THINKER-PC
Specific Application: Uses IBM PC to Interface With On-Line Intelligent Terminals
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Source Code Available: Yes
Purchase Terms: Lease
(See Vendor Profile Page V-11)

COMPUTER TOOLBOX, INC.
INTELLICOM
Specific Application: Terminal Emulator Communication Program
Specific Industry: Not Industry Sensitive
System Requirements: DEC VT-100: CP/M; IBM PC, XT: PC-DOS; North Star Advantage: CP/M
Memory Required: 56.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50 to $250
Date First Installed: September 1982
(See Vendor Profile Page V-26)

COMPUTER TOOLBOX, INC.
INTELLICOM VER 1.5
INTELLIGENT COMMUNICATIONS
Specific Application: Communications and Terminal Emulation With Data Capture and Transmission Capabilities
Specific Industry: Not Industry Sensitive
System Requirements: DEC VT-100: CP/M, North Star Advantage: CP/M; IBM PC: PC-DOS
Memory Required: 56.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $49
Number Installed to Date: 200
Date First Installed: September 1982

THE COMPUTOLL GROUP LTD.
XTENDED CDR
Specific Application: Allocate and Control Telephone Usage Costs
System Requirements: Vector Graphics: CP/M
Memory Required: 64.0K bytes
Source Language: Basic Compiler, Basic
Source Code Available: No
Purchase Terms: Purchase (license), Lease
Price: $25,000
Number Installed to Date: 15
Date First Installed: July 1982
(See Vendor Profile Page V-26)

CORPUSVIEW PRODUCTS
MODEM-86
TELECOMMUNICATIONS UTILITY
Specific Application: Networking of Microcomputer Mainframe Access
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, Displaywriter: CP/M-86, PC-DOS
Memory Required: 24.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $89
Number Installed to Date: 60
Date First Installed: October 1982
(See Vendor Profile Page V-26)

DATALEX CO.
PASSPORT-MICRO-TO HOST COMPUTER
Specific Application: Communications
Specific Industry: Not Industry Sensitive
System Requirements: IBM; HP 200: UCSD-P; TI Professional: PC-DOS; CP/M 86
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: May 1983
(See Vendor Profile Page V-36)

DATA TECHNOLOGY INDUSTRIES
CONTE
Specific Application: Communications
Specific Industry: Not Industry Sensitive
System Requirements: Associate
Purchase Terms: Purchase (license); Lease
Price: $175
(See Vendor Profile Page V-36)

D.E.M.
SOFTWARE HANDLER
Specific Application: Reads Data Out of Cash Register, Creates File on IBM
Specific Industry: Retail
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $99

Number Installed to Date: 50
Date First Installed: March 1983
(See Vendor Profile Page V-41)

[illegible] MICRO PRODUCTS, INC.
DISK TRANSFER
Specific Application: Utility Program to Transfer OSI CP/M Format Disk to Standard CP/M IBM 3740 Format
Specific Industry: Not Industry Sensitive
System Requirements: D and N 80; Ohio Scientific: CPM 2.2
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: January 1983
(See Vendor Profile Page V-43)

DON'T ASK COMPUTER SOFTWARE
TELETAPI
Specific Application: Telecommunications Package
Specific Industry: Not Industry Sensitive
System Requirements: Alan; DOS
Memory Required: 32.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Date First Installed: January 1983
(See Vendor Profile Page V-43)

DUXBURY SYSTEMS, INC.
METERED UTILITY MONITORING SYSTEM
Specific Application: Communications
Specific Industry: Not Industry Sensitive
System Requirements: North Star Horizon: DOS, North Star Advantage: DOS
Memory Required: 36.0K bytes
Source Language: North Star Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $175
Number Installed to Date: 5
Date First Installed: January 1982
(See Vendor Profile Page V-44)

FALCON SOFTWARE SYSTEMS
BACKUP
Specific Application: Backs Up Disk to Floppy Transport
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Memory Required: 48.0K bytes
Source Language: CB-80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $85
Number Installed to Date: 10
(See Vendor Profile Page V-48)

FALLON & ASSOCIATES, INC.
STANDARD & CUSTOM MICROBASED COMPUTER SUPPLY
Specific Application: SNA, X25 DCE, X25 DTE, 3270/3780 BSC, Async, X-3, Async VIP 7700, 3270 Emulation Processor
Specific Industry: Telecommunications
Source Language: Pascal, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200
Date First Installed: May 1981
(See Vendor Profile Page V-46)

FERGE MICROSYSTEMS, INC.
LOGON
Specific Application: Allows Storage of Configurations and Phone Numbers
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: UCSD-P, MS-DOS; Apple II: APPLE-DOS
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 500
(See Vendor Profile Page V-48)

FORMULA CONSULTANTS, INC.
SUPER-SYNCHRONOUS UTS PROTOCOL
Specific Application: Sperry Terminal Emulation
Specific Industry: Not Industry Sensitive
System Requirements: Xerox 860: CP/M
Memory Required: 48.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $900
Number Installed to Date: 10
Date First Installed: June 1982
(See Vendor Profile Page V-49)

GAYLORD BROS., INC.
DIAL-UP INQUIRY
Specific Application: One or More Dial-Up Ports to Exist on the GS-1000, GS-2000
Specific Industry: Library
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $5,000
(See Vendor Profile Page V-50)

GAYLORD BROS., INC.
GS-500 MICRO COMPUTER NETWORK SYSTEM
Specific Application: On-Line and Stand Alone Processing with GS-100 Features
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)

GAYLORD BROS., INC.
OCLC INTERFACE
Specific Application: Direct Transfer of An Edited Marc II Record on the OCLC
Specific Industry: Library
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $5,000

GAYLORD BROS., INC.
VISI TERM
Specific Application: Enables Apple II to Communicate With Other Computers
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $100

GENASYS CORP.
TELIOS
Specific Application: Asynchronous Telecommunications Handler for IBM PC
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS 2.0
Memory Required: 96.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 30
(See Vendor Profile Page V-50)

GENERAL DIGITAL INDUSTRIES, INC.
COMPAT/200
Specific Application: User 200 Workstation Emulator for Communication With CDC Cyber Systems
Specific Industry: Not Industry Sensitive
System Requirements: DEC: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 10
Date First Installed: January 1982
(See Vendor Profile Page V-51)

GUNN ENTERPRISES, INC.
CUSTOM CROS I/O DRIVERS
Specific Application: Supports Nonstandard Terminals On Cromemco
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco: C-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 300
Date First Installed: 1977
(See Vendor Profile Page V-53)

GUNN ENTERPRISES, INC.
MODEM COMMUNICATIONS FOR COMMUNICATIONS
Specific Application: Allows Transfer of Programs to and From Cromix
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco: Cromix
Memory Required: 128.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 40
Date First Installed: 1982

HENSON SYSTEMS, INC.
CRTX
Specific Application: Communications
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Columbia MPC
Memory Required: 42.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 400
Date First Installed: 1981
(See Vendor Profile Page V-54)

HENSON SYSTEMS, INC.
CRTXE
Specific Application: Communications With Terminal Emulation
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Columbia MPC
Memory Required: 42.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 200
Date First Installed: 1981

HENSON SYSTEMS, INC.
REMOTE
Specific Application: Allows User to Remotely Execute A CP/M System
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 50
Date First Installed: 1981

HOUSTON COMPUTER SERVICES, INC.
OCTACOMN/940
Specific Application: Intelligent Front End I/O Processor to Interface RS-232 Terminals Asyncronously
Specific Industry: Not Industry Sensitive
System Requirements: TI DS990: DX-10, Dnos; TI Professional: PC-DOS
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,750
Number Installed to Date: 180
Date First Installed: October 1981
(See Vendor Profile Page V-55)

HOUSTON U. LAMB & CO., INC.
HELLO CENTRAL!
Specific Application: Allows the User Computer to Talk to Other Computers Over Telephone Lines
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE; Apple II+; Apple II: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50
(See Vendor Profile Page V-55)

IAS CORP.
GENTERM
Specific Application: Comprehensive Asynchronous Communications Package
Specific Industry: Not Industry Sensitive

System Requirements: Apple II: APPLE-DOS; CP/M; IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: CP/M Fortran, Microsoft Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $79
Number Installed to Date: 1,000
Date First Installed: June 1983
(See Vendor Profile Page V-56)

IE SYSTEMS, INC.
ACCULINK
Specific Application: Protocol Emulation
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CP/M; Zarox 820: MS-DOS; NEC: PC-DOS; TRS
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $245
Number Installed to Date: 1,000
Date First Installed: August 1979
(See Vendor Profile Page V-56)

IE SYSTEMS, INC.
BIS - 3270
Specific Application: Protocol Emulation
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CP/M; Zarox 820: MS-DOS; NEC: PC-DOS; TRS
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $695
Number Installed to Date: 1,000
Date First Installed: November 1980

IE SYSTEMS, INC.
BIS - 3780
Specific Application: Protocol Emulation
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CP/M; Zarox: MS-DOS; NEC: PC-DOS; TRS
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $695
Number Installed to Date: 1,000
Date First Installed: January 1979

IE SYSTEMS, INC.
BIS-HASP
Specific Application: Protocol Emulation
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CP/M; Zarox 820: MS-DOS; NEC: PC-DOS; TRS
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 1,000
Date First Installed: May 1982

IE SYSTEMS, INC.
BIS-3270 VERSION 4.0
Specific Application: 3270 Emulation Software for Microcomputers
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86, MS-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $695
Number Installed to Date: 600
Date First Installed: November 1980

INFOSOFT SYSTEMS, INC.
INFOSOFT NETWORK SYSTEM - MULTI/NET
Additional Product Classification: Networking
Specific Industry: Not Industry Sensitive
Memory Required: 32.0K bytes
Source Language: Intel 8080 Assembler, Infosoft C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: September 1982
(See Vendor Profile Page V-58)

INFOSOFT SYSTEMS, INC.
INTELLIGENT TERMINAL (COMMUNICATION SYSTEM)
Specific Application: Communications
Specific Industry: Not Industry Sensitive
Memory Required: 3.2M bytes
Source Language: Intel 8080 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: August 1976

INTEGRATED DESIGN ENGINEERING, INC.
NCR COMM
Specific Application: Data Communications
Specific Industry: Not Industry Sensitive
System Requirements: NCR Decision Mate V, CP/M; MS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: August 1983
(See Vendor Profile Page V-59)

INTERNATIONAL DIGITAL ELECTRONICS ASSOCIATES
COMMUNICATION
Specific Application: Telex, Twix, Special Protocol
Specific Industry: Communications
System Requirements: Intel: BTX; Bitelex
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 100
Date First Installed: 1982
(See Vendor Profile Page V-61)

KEYBROOK BUSINESS SYSTEMS, INC.
KEYBROOK FILESERVER
Specific Application: Networking System for CP/M Micro Computers
Specific Industry: Not Industry Sensitive
System Requirements: Xerox 820; Sanyo: CP/M; Altos
Source Language: Z80 Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,700
Number Installed to Date: 50
Date First Installed: 1982
(See Vendor Profile Page V-63)

LINDBERGH SYSTEMS
OMNITERM
Specific Application: Smart Terminal Software With File Transfer
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, TRS-80/II, TRS-80/III: TRS-DOS; TRS-80 Model 12: TRS-DOS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $95 to $175
Number Installed to Date: 1,000
Date First Installed: January 1980
(See Vendor Profile Page V-66)

NCR ENTERPRISES
PROCALL
Specific Application: Communicates With Electronic Bulletin Boards, Large Computers, Between Cromemco Systems (Multiple and Single Users), Environments, Christianson Protocol or Program Transfers
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco C10: C-DOS; Cromemco S100: Cromix
Memory Required: 64.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $350 to $200
Number Installed to Date: 150
Date First Installed: December 1982
(See Vendor Profile Page V-71)

MICRO-INTEGRATION, INC.
BIS-HASP VERSION 1.1
Specific Application: Heap Multileaving Workstation Communications
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86, MS-DOS; PC-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 50
Date First Installed: 1981
(See Vendor Profile Page V-74)

MICRO-INTEGRATION, INC.
BIS 3270 VERSION 4.0
Specific Application: IBM 3270 Terminal Emulator Communications
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86, MS-DOS, PC-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $695
Number Installed to Date: 2,000
Date First Installed: November 1980

MICRO/MAGIC SYSTEMS, INC.
BI-SYNC
Specific Application: Remote Job Entry
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000
Memory Required: 128.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1983

MICRON, INC.
COMM LINE
Specific Application: Monitors Communication Between Computers
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: 1983
(See Vendor Profile Page V-74)

MICRON, INC.
SMART TERM I
Specific Application: Makes Mini Look Like Intelligent Terminal
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200
Date First Installed: 1979

MICROSPARC, INC.
TELETEXT
Specific Application: General Purpose Data Communications Package
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+, IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Applesoft, 6502 Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $80
Number Installed to Date: 100
Date First Installed: June 1982
(See Vendor Profile Page V-74)

MICROSTUF, INC.
REMOTE
Specific Application: Remote Console Program Allows Contact With User's Microcomputer
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Televideo: CP/M; Eagle; North Star
Source Language: Assembly
Source Code Available: No
Price: $150
(See Vendor Profile Page V-74)

MICROSTUF, INC.
TRANSPORTER
Specific Application: Automated Data Communications Program Designed for Unattended Information Exchange
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: MS-DOS
Memory Required: 96.0K bytes

Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295

MICRO-SYSTEMS SOFTWARE, INC.
BBS-80
Specific Application: Bulletin Board System That Hooks Up to Microcomputers via Telephone
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I; TRS-80/III
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $80
Date First Installed: 1981
(See Vendor Profile Page V-75)

MICRO-SYSTEMS SOFTWARE, INC.
MICROTERM
Specific Application: Enables Microcomputer to Hook Up to Mainframes
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80; IBM PC; Apple II; Apple IIE
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $80
Date First Installed: 1982

MICRO-SYSTEMS SOFTWARE, INC.
QUADROMACK
Specific Application: Communication System That Ties Four TRS-80/I, III or IV to One Hard Disk
System Requirements: TRS-80/I; TRS-80/III; TRS-80/IV
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $900 to $1,000
Date First Installed: August 1983

MONROE SYSTEMS FOR BUSINESS
ASCOM +
Specific Application: Asynchronous Communicabons Utility
Specific Industry: Not Industry Sensitive
System Requirements: Monroe OC 8800 Series: CP/M 80
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $175
Date First Installed: 1981
(See Vendor Profile Page V-77)

MONROE SYSTEMS FOR BUSINESS
MONROE BIS - 3780
Specific Application: Synchronous 2780/3780 Emulation
Specific Industry: Not Industry Sensitive
System Requirements: Monroe OC 8800 Series: CP/M 80
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $750
Date First Installed: 1981

MONROE SYSTEMS FOR BUSINESS
MONROE BIS- 3270
Specific Application: Synchronous Communications
Specific Industry: Not Industry Sensitive
System Requirements: Monroe OC 8800 Series: CP/M 80
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $750
Date First Installed: 1981

MONROE SYSTEMS FOR BUSINESS
MONROE TTY EMULATOR
Specific Application: Asynchronous Communications Utility
Specific Industry: Not Industry Sensitive
System Requirements: Monroe OC 8800 Series: MS-10; Monroe EC 8500; MS-10
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $95
Date First Installed: 1981

MONROE SYSTEMS FOR BUSINESS
MONROE BIS -HASP
Specific Application: Multileaving Workstation Emulation
Specific Industry: Not Industry Sensitive
System Requirements: Monroe OC 8800 Series: CP/M 80
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $795
Date First Installed: 1981

MONROE SYSTEMS FOR BUSINESS
MONROE 3270 SNA/SDLC
Specific Application: SNA 3270 Display Emulation
Specific Industry: Not Industry Sensitive
System Requirements: Monroe OC 8800 Series: MS-10
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $995
Date First Installed: 1981

MUNFORD MICRO SYSTEMS
DEMON
Specific Application: Monitor and Debugger
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: DOS
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $29
Date First Installed: 1983
(See Vendor Profile Page V-78)

MUNFORD MICRO SYSTEMS
TELCOM II
Specific Application: Advanced Telecommunication
System Requirements: TRS-80: DOS
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $69
Date First Installed: 1982

MUNFORD MICRO SYSTEMS
TELCOM I
Specific Application: Telecommunications
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: DOS
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35
Date First Installed: 1980

NESTAR SYSTEMS, INC.
3278 EMULATOR
Specific Application: Emulates IBM 3278 Model II for Personal Computer on the Same Local Network as IBM 3278 Emulator
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: Pascal; Apple III: APPLE-SOS; IBM PC: PC-DOS; CP/M
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: July 1983
(See Vendor Profile Page V-79)

NESTAR SYSTEMS, INC.
3773 EMULATOR SERVER
Specific Application: Remote Job Entry
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: November 1983

NESTAR SYSTEMS, INC.
FILE TRANSFER SERVER
Specific Application: Provides Batch Transfer of Files
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: Pascal; Apple III: APPLE-SOS; IBM PC: PC-DOS; CP/M
Memory Required: 64.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 500
Date First Installed: 1981

NEW GENERATION SYSTEMS, INC.
AMCALL
Specific Application: Communication
Specific Industry: Not Industry Sensitive
System Requirements: Compupro: CP/M
Memory Required: 64.0K bytes
Source Language: C, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: January 1982
(See Vendor Profile Page V-79)

N. P. SYSTEMS, LTD.
HOST COMM
Specific Application: Host Communications Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Compaq
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 200
Date First Installed: September 1983
(See Vendor Profile Page V-80)

PATHWAY DESIGN, INC.
PATHWAY/BSC
Specific Application: Communications, IBM 3270/3770 Emulation
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Date First Installed: September 1983
(See Vendor Profile Page V-84)

PATHWAY DESIGN, INC.
PATHWAY/SNA
Specific Application: 3773/3270 Emulator
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Date First Installed: September 1983

PEACHTREE SOFTWARE
TELECOMMUNICATIONS
Specific Application: Data Communications
Specific Industry: Not Industry Sensitive
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
(See Vendor Profile Page V-85)

PICKLES & TROUT
LYNC 3.0 COMMUNICATIONS SOFTWARE
Additional Product Classification: System Resource Management
Specific Application: Communications Software
Specific Industry: Not Industry Sensitive

System Requirements: CP/M 2
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $85
Date First Installed: January 1983
(See Vendor Profile Page V-86)

PLANNING DATA SYSTEMS - TERM
Specific Application: Communications Between Micros and Mainframes
System Requirements: Televideo: CP/M, Vector Graphics. CP/M
Memory Required: 48.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1982
(See Vendor Profile Page V-86)

QUALITY SOFTWARE, INC. - QS CALL
Specific Application: Data Transfer Via Telecommunications
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT: PC-DOS; Altos 8000-2: CP/M; IBM PC: PC-DOS 2.0
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Date First Installed: January 1982
(See Vendor Profile Page V-90)

QUALITY SOFTWARE, INC. - QS SAM
Specific Application: Utility for Transferring Text From Microcomputers to AM Typesetters
System Requirements: IBM PC-XT: PC-DOS 2.0; Altos 8000: CP/M; IBM PC: PC-DOS 2.0
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $795
Date First Installed: January 1982

RACET COMPUTERS, LTD. - MAGIC MAIL
Specific Application: Mail Communications
Specific Industry: Not Industry Sensitive
System Requirements: NEC PC 8001, 8801 Racet NEC-DOS
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 25
Date First Installed: 1983
(See Vendor Profile Page V-91)

RCS (ROZSA COMPUTER SYSTEMS), INC. - SUPER COM
Specific Application: Communications Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; CP/M
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $19,500
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-91)

REDDING GROUP, INC. - ALPACA PLUS
Specific Application: Micro to Micro Network Communications System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M
Memory Required: 48.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
(See Vendor Profile Page V-92)

REDDING GROUP, INC. - ALPACA-PLUS - VERSION 2.56
Specific Application: Micro to Micro Communications
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Date First Installed: 1980

REDDING GROUP, INC. - ASYNCH
Specific Application: Asynchronized Communicator
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M
Memory Required: 48.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100

REDDING GROUP, INC. - ASYNCH - VERSION 3.01
Specific Application: Asynchronous Communications
Specific Industry: Not Industry Sensitive
System Requirements: 8 or 16 Bit Micros: CP/M
Memory Required: 48.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1979

REDDING GROUP, INC. - LYNX
Specific Application: Overlay Linker
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M
Memory Required: 48.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250 to $150

REDDING GROUP, INC. - MICRO E COM
Specific Application: Bisynchronized Electronic Mail
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M
Memory Required: 48.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)

REDDING GROUP, INC. - MICRO X.25
Specific Application: Protocol for Communication
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; IBM PC
Memory Required: 48.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)

REDDING GROUP, INC. - SYNCH 2780/3780
Specific Application: Bisynchronized IBM Micro to Mainframe Protocol Emulator
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M
Memory Required: 48.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500

REDDING GROUP, INC. - SYNCH 2780/3780 - VERSION 2.52
Specific Application: Bisynchronous Communications Package
Specific Industry: Not Industry Sensitive
System Requirements: 8 or 16 Bit Micros: CP/M
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Date First Installed: April 1979

REDDING GROUP, INC. - SYNCH 3270
Specific Application: IBM 3270 Protocol Emulator
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M
Memory Required: 48.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750

REDDING GROUP, INC. - SYNCH 3270 - VERSION 1.3
Specific Application: Bisynchronous Communications
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750

REMOTE COMPUTERS CORP. - DIAL DATA
Specific Application: Interfaces Micro With Mainframe
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS; Apple
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $190
Number Installed to Date: 1,000
Date First Installed: 1981
(See Vendor Profile Page V-92)

RTCS/REAL-TIME COMPUTER SCIENCE CORP. - PC/ENET VERSION 1.0
Specific Application: Ethernet
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Memory Required: 128.0K bytes
Source Language: Object, PL/M
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,700
Number Installed to Date: 3
Date First Installed: March 1983
(See Vendor Profile Page V-94)

SENSIBLE SOFTWARE, INC. - TELE-PORTER
Specific Application: Communication Package for Transferring Files and Diskettes Between Apple Computers
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $80
Number Installed to Date: 100
Date First Installed: July 1983
(See Vendor Profile Page V-96)

SIECOR, INC. - TELECOMM
Specific Application: Allows Mobile Terminals to Interface With State or National Computers
Specific Industry: Not Industry Sensitive
System Requirements: DG; HP; Durango
Memory Required: 256.0K bytes
Source Language: Assembler, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-97)

SMITH EDUCATIONAL ENGINEERING SERVICES, INC. - ICOMM
Specific Application: Emulates Over Twelve Terminals to Allow Access to Mainframes, Minicomputers and Personal Computers
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 1,000
Date First Installed: February 1982
(See Vendor Profile Page V-98)

THE SOFTWARE STORE - SOFTCOM - TELECOMMUNICATIONS UTILITY
Specific Application: Telecommunications Utility for Smart Terminal and File Transfer
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 32.0K bytes
Source Language: Machine

Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 2,000
Date First Installed: 1980
(See Vendor Profile Page V-100)

SOUTHERN COMPUTER SYSTEMS, INC.
ISIS-CP/M
Specific Application: Data Transfer Between Operating Systems
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 16.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 1,000
Date First Installed: 1979
(See Vendor Profile Page V-101)

SOUTHWESTERN DATA SYSTEMS, INC.
ASCII EXPRESS II
Specific Application: Basic Communications
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35
Date First Installed: 1900
(See Vendor Profile Page V-101)

SOUTHWESTERN DATA SYSTEMS, INC.
ASCII EXPRESS THE PROFESSIONAL
Specific Application: APPLE-DOS Communications File Transfer
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $130
Date First Installed: 1900

SOUTHWESTERN DATA SYSTEMS, INC.
ONLINE
Specific Application: Private Access Dial-Up System for Apple Computers Equipped With a Hayes Micromodem II
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $90
Date First Installed: 1900

SOUTHWESTERN DATA SYSTEMS, INC.
P-TERM THE PROFESSIONAL
Specific Application: Communications Package for Pascal
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: UCSD-P
Memory Required: 48.0K bytes
Source Language: Assembly, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $130
Date First Installed: 1900

SOUTHWESTERN DATA SYSTEMS, INC.
Z-TERM
Specific Application: Terminal Package for Apple Computers With Microsoft Z-80 Soft Card
System Requirements: Apple II, II+, IIE: Apple CP/M
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1900

SOUTHWESTERN DATA SYSTEMS, INC.
Z-TERM THE PROFESSIONAL
Specific Application: Communications Package for Apple Computers With Microsoft Z-80 Soft Card
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE: Apple CP/M; Apple II+
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: 1900

SSM MICROCOMPUTER PRODUCTS, INC.
TRANSEND I
Specific Application: Communications
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, Apple IIE: APPLE-DOS
Source Language: Assembly, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $69
Number Installed to Date: 1,000
Date First Installed: 1981
(See Vendor Profile Page V-102)

SSM MICROCOMPUTER PRODUCTS, INC.
TRANSEND II
Specific Application: Send and Receive Messages, Verify File Transfers
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple IIE: APPLE-DOS
Source Language: Assembly, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $149
Number Installed to Date: 1,000
Date First Installed: 1981

SSM MICROCOMPUTER PRODUCTS, INC.
TRANSEND III
Specific Application: Electronic Mail
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, Apple IIE: APPLE-DOS
Source Language: Assembly, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $275
Number Installed to Date: 1,000
Date First Installed: 1983

SSM MICROCOMPUTER PRODUCTS, INC.
TRANSEND PC
Specific Application: Electronic Mail
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $189
Date First Installed: August 1983

SUPERSOFT, INC.
TERM II
Specific Application: Allows CP/M Computer to Communicate With Other Terminals and Computers
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 32.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
(See Vendor Profile Page V-104)

THE SYSTEMS CENTER, INC.
NETWORK ACCESS SERVICES CORVUS G
Specific Application: Allows Corvus Omninet Microprocessor Programs to Communicate With IBM SNA Processors
Specific Industry: Not Industry Sensitive
System Requirements: Corvus Concept: Coos; IBM PC: PC-DOS; Apple Lisa: Lisa
Memory Required: 512.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: September 1983
(See Vendor Profile Page V-00)

THE SYSTEMS CENTER, INC.
SNA ON MICRO COMPUTERS
Specific Application: Supports Full IBM SNA Data Communications
Specific Industry: Not Industry Sensitive
Memory Required: 100.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: May 1983
(See Vendor Profile Page V-108)

TEKELEC, INC.
CHAMELEON ASYNC
Specific Application: Stop-Start Protocol Simulator
Specific Industry: Not Industry Sensitive
System Requirements: Sesqua Chameleon Data Communications
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 30
Date First Installed: 1983
(See Vendor Profile Page V-109)

TEKELEC, INC.
CHAMELEON BASIC
Specific Application: Simulator of Byte Protocol
Specific Industry: Not Industry Sensitive
System Requirements: Sesqua Chameleon Data Communications
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 30
Date First Installed: 1983

TEKELEC, INC.
FRANEM
Specific Application: HDLC/SDLC Protocol Simulator
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 42
Date First Installed: 1982

TEKELEC, INC.
SNP/L
Specific Application: SNA Protocol Simulator
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 35
Date First Installed: 1983

TEKELEC, INC.
SITREX
Specific Application: X.25 Network and Subscriber Simulator
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 226
Date First Installed: 1981

TELCO RESEARCH CORP.
TRC DATA RECORDER/POLLER
Specific Application: Data Capture for Call Detail
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; IBM PC-XT
Memory Required: 256.0K bytes
Purchase Terms: Purchase (license)
Price: $12,500 to $14,500
(See Vendor Profile Page V-109)

TELEPHONE SOFTWARE CONNECTION, INC.
PHONE SECRETARY II
Specific Application: Logs Calls with Name, Place and Time
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Applesoft W6502
Source Code Available: No
Purchase Terms: Purchase (license)

Price: $45
(See Vendor Profile Page V-108)

TELEPHONE SOFTWARE CONNECTION, INC.
TELEPHONE TRANSFER II
Specific Application: Sends All APPLE-DOS 3.3 File Types Over the Phone to Another Apple Computer
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Applesoft W6502
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $80

TELEPHONE SOFTWARE CONNECTION, INC.
TERMINAL PROGRAM
Specific Application: Intelligent Terminal Program with 16K Capture Buffer
Specific Industry: Not Industry Sensitive.
System Requirements: Apple II, II+, IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Applesoft W6502
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40

TEXAS INSTRUMENTS, INC.
TERMINAL EMULATOR II
Specific Application: Terminal Emulation
Specific Industry: Not Industry Sensitive
System Requirements: TI DS990/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
(See Vendor Profile Page V-109)

TICOM SYSTEMS, INC.
REMCOM
Specific Application: Comprehensive Asynchronous Communications Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; DEC Rainbow; UCSD-P; NEC APC; TI
Memory Required: 64.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $95
Date First Installed: 1981
(See Vendor Profile Page V-110)

TRW CORP.
PTWX
Specific Application: Telex II (TWX) Terminal Software
Specific Industry: Not Industry Sensitive
System Requirements: Commodore Pet, CBM
Memory Required: 8.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $99
Date First Installed: 1980
(See Vendor Profile Page V-111)

TRW CORP.
XPTERM
Specific Application: Smart Terminal Software
Specific Industry: Not Industry Sensitive
System Requirements: Commodore PET, CBM
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $49 to $59
Date First Installed: 1980

UNISOFT SYSTEM CORP.
S-NET
Specific Application: Networking
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 156.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 10
Date First Installed: March 1983
(See Vendor Profile Page V-113)

USMA COMPUTER CO.
COMMUNICATIONS PACKAGE
Specific Application: Asynchronous Communications With An IBM PC and Hayes Smart Modem
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 3
Date First Installed: January 1983
(See Vendor Profile Page V-114)

USMA COMPUTER CO.
IBM PC COM
Specific Application: Communication With Time-Sharing Firms and Data Bases
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 5
Date First Installed: January 1983

VISICORP
VISIANSWER
Specific Application: Communications
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Purchase Terms: Purchase (license)
Date First Installed: 1900
(See Vendor Profile Page V-115)

WILD HARE COMPUTER SYSTEMS, INC.
HARE/NET
Specific Application: Local Area Network Software
Specific Industry: Not Industry Sensitive
System Requirements: Hare Brain Work Station: MCS
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 4
Date First Installed: June 1983
(See Vendor Profile Page V-117)

AGS MANAGEMENT SYSTEMS, INC.
ISP
Additional Product Classification: Methodologies
Specific Application: Information Planning Methodology Which Enables An Organization to Use Its Own Personnel to Access Long-Range Strategic Planning Local-Area Network
Specific Industry: Not Industry Sensitive
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $25,500
Number Installed to Date: 15
(See Vendor Profile Page V-3)

AGS MANAGEMENT SYSTEMS, INC.
SDM/STRUCTURE
Additional Product Classification: Methodologies
Specific Application: A State of the Art Methodology Containing Structure Analysis Design and Programming Techniques, Languages
Specific Industry: Not Industry Sensitive
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $39,500
Number Installed to Date: 25

AGS MANAGEMENT SYSTEMS, INC.
SDM/70
Additional Product Classification: Methodologies
Specific Application: Systematic Approach for Designing, Enhancing, Maintaining Systems
Specific Industry: Not Industry Sensitive
System Requirements: IBM DOS/OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $39,500
Number Installed to Date: 400

AMDAHL CORP.
MVS/SP ASSIST (MVS/SPA)
Additional Product Classification: Enhancement
Specific Application: Improve Performance
Specific Industry: Not Industry Sensitive
System Requirements: Amdahl 470, 580: MVS/SP; IBM System/370: MVS/SP
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Rental; Lease
(See Vendor Profile Page V-4)

AMDAHL CORP.
SESSION
Additional Product Classification: Operating System Extension
Specific Industry: Not Industry Sensitive
System Requirements: Amdahl 470, 580: VM/SP; IBM 4300 Series, 3030, 3080 Series: VM/SP
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Yearly or Monthly License
Price: $500 to $5,000
Date First Installed: 1983

AMDAHL CORP.
VM/PERFORMANCE ENHANCEMENT
Additional Product Classification: Enhancement
Specific Application: Performance Improvement
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 4300, 3030 Series: VM/SP; Amdahl 470, 580: MVS/SP
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Rental; Lease

AMDAHL CORP.
VM SOFTWARE ASSIST
Additional Product Classification: Enhancement
Specific Application: Improve VM Performance
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: VM/SP; Amdahl 470, 580: VM/SP
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Rental; Lease

THE CAMBRIDGE SYSTEMS GROUP
ADC2 (AUTOMATED DATA CENTER SYSTEM)
Additional Product Classification: Job Scheduler
Specific Application: Job Scheduling, Monitor, Job History and Performance Data Base
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370, 3000
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $42,000
Number Installed to Date: 50
Date First Installed: April 1980
(See Vendor Profile Page V-16)

THE CAMBRIDGE SYSTEMS GROUP
ASM2 (AUTOMATED SPACE MANAGEMENT SYSTEM)
Additional Product Classification: Dasd Management
Specific Application: Dasd Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370, 3000
Source Language: Assembler
Purchase Terms: Purchase (license); Rental; Lease
Price: $15,500
Number Installed to Date: 575
Date First Installed: June 1974

COMPUTER ASSOCIATES
CA-DRIVER
Additional Product Classification: Job Scheduling
Specific Application: Job Management System With Programmable Language Capability
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 360, 300 Series, 300 Series: DOS/VS, OS/VS1/MVS
Memory Required: 64.0K bytes
Source Language: BAL
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 485
Date First Installed: 1979
(See Vendor Profile Page V-23)

CORPORATE COMPUTER SYSTEMS, INC.
TIME
Additional Product Classification: Time Management
Specific Application: Time Management
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000
Memory Required: 7.0K bytes
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: September 1983
(See Vendor Profile Page V-31)

CORPORATE COMPUTER SYSTEMS, INC.
UTEP -1
Specific Application: Communications Link
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000: IVB
Memory Required: 28.0K bytes
Source Language: C, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Date First Installed: 1983

CYTROL, INC.
CYX-DD OVERLAP SEEK DISK DRIVER
Specific Application: Overlap Seek Disk Driver
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/24, PDP-11/70: RSX-11M
Source Language: Assembler, Cobol
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 60
Date First Installed: August 1978
(See Vendor Profile Page V-34)

CYTROL, INC.
CYX-DV DV11 MULTIPLEXOR DRIVER
Specific Application: DV11 Multiplexor Driver
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/24, PDP-11/70: RSX-11M; DEC VAX: VMS
Source Language: Assembler, Cobol
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 30
Date First Installed: August 1978

DIVERSIFIED MICROSYSTEMS
MP/M 8080
Additional Product Classification: OS Emulator
Specific Application: Emulation for the CP/M 3.0 Operating System
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAC; HP 3000
Memory Required: 256.0K bytes
Source Language: Macro Assembly, SPL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,045
Date First Installed: July 1983
(See Vendor Profile Page V-43)

DIVERSIFIED MICROSYSTEMS
MPU-8080
Additional Product Classification: OS Emulator
Specific Application: Emulation for the CP/M 2.2 Operating System
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX; HP 3000
Memory Required: 256.0K bytes
Source Language: Macro Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $845
Number Installed to Date: 4
Date First Installed: 1983

H & W COMPUTER SYSTEMS, INC.
CICS 320X TRANSMISSION OPTIMIZER
Additional Product Classification: Performance Enhancement
Specific Application: Improve 3200 Series Terminal Response Time
Specific Industry: Not Industry Sensitive
System Requirements: IBM DOS/VS
Memory Required: 25.0K bytes
Source Language: BAL
Purchase Terms: Purchase (license); Lease
Price: $1,500
Number Installed to Date: 450
Date First Installed: January 1980
(See Vendor Profile Page V-55)

INDUSTRIAL COMPUTER CORP.
TIME 1000
Additional Product Classification: Time Clock
Specific Application: On-Board Time of Day Clock for HP 1000
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000
Memory Required: 8.0K bytes
Source Language: Fortran, Assembler
Purchase Terms: Purchase (license)
Price: $900
Number Installed to Date: 15
Date First Installed: 1983
(See Vendor Profile Page V-57)

INTERTEC
ESP/3000
Additional Product Classification: Terminal Handler
Specific Application: Used to Make Building and Processor Easier for Programmer
Specific Industry: Not Industry Sensitive
System Requirements: HP3000: MPE
Source Language: Assembler (SPL)

Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 200
Date First Installed: February 1978
(See Vendor Profile Page V-61)

JOHNSON SYSTEMS, INC.
APEX
Additional Product Classification: Production Control
Specific Application: Production Control System to Control Manual and Machine Events Through the Production Process
Specific Industry: Not Industry Sensitive
System Requirements: IBM: VSI, MVS
Source Language: Assembler, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $32,000
Number Installed to Date: 100
Date First Installed: 1980
(See Vendor Profile Page V-62)

L. W. JAMES & ASSOCIATES
FORTRAN TO BASIC SYNTAX TRANSLATOR
Additional Product Classification: Translator
Specific Application: Converts Fortran to Basic
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845
Memory Required: 187.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 5
Date First Installed: 1981
(See Vendor Profile Page V-67)

MHT SERVICES, INC.
MHTRAN-1 DOS TO OS ASSEMBLER TRANSLATOR
Additional Product Classification: Conversion Aid
Specific Application: DOS to OS Conversion
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: OS, MVS, VSI
Memory Required: 100.0K bytes
Source Language: Assembler, Object
Purchase Terms: Purchase (license)
Price: $2,400 to $9,900
Date First Installed: September 1982
(See Vendor Profile Page V-72)

MITCHELL & GAUTHIER ASSOCIATES, INC.
ACSL ADVANCED CONTINOUS STIMULATION MODE
Additional Product Classification: Stimulation Mode
Specific Application: Soft Stimulation Mode
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E; IBM: TSO, CMS; DEC VAX: VMS
Purchase Terms: Lease
Number Installed to Date: 200
Date First Installed: 1975
(See Vendor Profile Page V-76)

NETWORK CONCEPTS, INC.
MTE (MULTI TASKING EXECUTIVE)
Additional Product Classification: Operating System Enhancement
Specific Application: Supports Multithreaded Processes Written in TAL
Specific Industry: Not Industry Sensitive
System Requirements: Tandem: Guardian
Source Language: TAL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: September 1982
(See Vendor Profile Page V-79)

NIXDORF COMPUTER SOFTWARE CO.
SIM 14
Additional Product Classification: Simulation
Specific Application: 1400 Simulator
Specific Industry: Not Industry Sensitive
System Requirements: IBM: S-DOS, DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $10,000
Date First Installed: September 1977
(See Vendor Profile Page V-80)

PRIME COMPUTER, INC.
ESCAPE/34
Additional Product Classification: IBM System/34 RPG-II Migration
Specific Application: Migration Package
Specific Industry: Not Industry Sensitive
System Requirements: Prime 50 Series: Primos
Memory Required: 512.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $12,500
Date First Installed: April 1983
(See Vendor Profile Page V-87)

PUGH - ROBERTS ASSOCIATES, INC.
PLOTTER PACKAGE
Additional Product Classification: Plotter Interface
Specific Application: Interfaces HP 47OA Plotter
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS, TSO, CMS
Purchase Terms: Purchase (license); Time-Sharing
Price: $2,000
Number Installed to Date: 6
Date First Installed: 1982
(See Vendor Profile Page V-88)

SPECTRO PRODUCTS
LABORATORY MANAGEMENT
Additional Product Classification: Lab Management
Specific Application: Data Management Laboratory
Specific Industry: Scientific
System Requirements: DEC PDP-11/23 Plus: RSX-11M; DEC PDP-11: RSX-11M
Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Number Installed to Date: 14
Date First Installed: 1981
(See Vendor Profile Page V-102)

UNIVERSITY COMPUTING CO.
UCC 7 BASIC AUTOMATED PRODUCTION CONTROL SYSTEM
Additional Product Classification: Schedulers
Specific Application: Schedulers
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 360: MVT; IBM System 370: VS7, MVS
Memory Required: 220.0K bytes
Source Language: ACC
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $36,500
Date First Installed: January 1983
(See Vendor Profile Page V-114)

UNIVERSITY COMPUTING CO.
UCC 10 DATA DICTIONARY MANAGER
Specific Application: Data Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 360: MVT; IBM System 370: VS7, MVS
Memory Required: 102.0K bytes
Source Language: Cobol, ALC
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease, 36 Month Installments
Price: $25,500
Number Installed to Date: 300
Date First Installed: 1973

Microcomputer Section

DATA TECHNOLOGY INDUSTRIES
PPK KEYLOADER
Additional Product Classification: System Support
Specific Application: Loading Function Keys
Specific Industry: Not Industry Sensitive
Purchase Terms: Purchase (license)
Price: $99
(See Vendor Profile Page V-38)

JOHNSON-LAIRD, INC.
SI-2
Additional Product Classification: Language Interpreter
Specific Application: Basic Interpreter
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M, MP/M, TURBO-DOS
Memory Required: 48.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Number Installed to Date: 1,000
Date First Installed: 1981
(See Vendor Profile Page V-92)

MICROPRODUCTS
MICROPRODUCTS APPLEBUG
Additional Product Classification: Debugger
Specific Application: Debugger
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE, II+; Franklin
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,995
Number Installed to Date: 6,000
Date First Installed: June 1979
(See Vendor Profile Page V-74)

MICROSOFT
MICROSOFT BASIC INTERPRETER
Additional Product Classification: Interpreter
Specific Application: Write, Edit, Debug Your Program
Specific Industry: Not Industry Sensitive
System Requirements: MS-DOS, CP/M 80
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-74)

MICROSPEED, INC.
LEXICOM
Additional Product Classification: File Conversion
Specific Application: Utility for Converting Word Processing Files
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE: DOS
Memory Required: 48.0K bytes
Source Language: Applesoft, 6502 Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: June 1982
(See Vendor Profile Page V-74)

PERSOFT, INC.
THE SMART TERM
Additional Product Classification: Emulator
Specific Application: Terminal Emulator That Emulates: DEC VT 100, 101, 102, 125 and DG Dasher 10, 200
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 96.0K-bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 2,000
Date First Installed: 1982
(See Vendor Profile Page V-85)

WEEKLY'S CIRCLE
DISK ENCRYPTION SYSTEM
Additional Product Classification: Encryption
Specific Application: Loads 6000 Bits Per, Second Copy Protection
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Binary Code
Purchase Terms: Purchase (license)
Price: $60
Date First Installed: March 1982
(See Vendor Profile Page V-117)

Operating Systems

A B DICK COMPANY CP/M RELEASE 2	$300	D-1
AD/OS-APPLICATION DEVELOPMENT OS	$1,000 to $3,000	D-4
BERKELY 4.1 UNIX	$20,000	D-6
BLISS/COBOL-MULTIUSER	$750	D-2
BOS	$300	D-1
BUSINESS OPERATING SYSTEM (BOS V)	$400	D-1
C COMPILERS MWC/86	$500 to $6,000	D-3
C EXECUTIVE	$300	D-3
CACHE BIOS CP/M 2.2	$50	D-6
CACHE XIOS MP/M 2	$100	D-6
CACHE/Q	$225	D-6
CICS AIDS	$100	D-3
CICSPRINT	$185	D-3
COHERENT TM OPERATING SYSTEM	$500 to $1,500	D-3
COLLECTION AGENCY	$10,000 to $90,000	D-1
CONCURRENT CP/M 6-16	$1,000	D-2
CP/M 68K	$395	D-2
CUSTOM TRAINING	NA	D-6
DIPOS/ASSEMBLER	NA	D-3
DISK OPERATING SYSTEM (DOS)	NA	D-1
DOS/VSE	NA	D-2
DOS/MVT/VSE OPERATING SYSTEM	NA	D-4
EDOS/VS	$19,200	D-3
EDOS/VSE	$20,000	D-3
ELECTRONIC MAIL	NA	D-1
EUNICE	$5,250 to $30,500	D-6
EXECUTIVE-VRX-RELEASE 8	NA	D-3
EXTENDED OPERATOR CONSOLE SYSTEM	$2,750	D-4
EXTENDED PROCEDURE LANGUAGE	$8,000	D-4
FLEX +V. 2.0	$69	D-6
FORTH (68K)	$395	D-2
GCOS 60 EXEC	NA	D-2
HARD DISK OPTION FOR ATON CP/M 8/12	$80	D-1
INTERACTIVE VIRTUAL SYSTEMS IVS-RELEASE 1	NA	D-3
IRIS	$5,400	D-4
ITX-INTERACTIVE TRANSCTION EXECUTIVE	NA	D-3
LOGOUT MULTILOG	$125	D-3
MAPPED PROGRAMMING EXECUTIVE	$3,500	D-2
MDZ/OS	$800	D-3
MESSAGE SWITCHING	NA	D-1
MICOS	$6,000	D-3
MICRO CONCURRENT PASCAL	NA	D-2
MICROBOL	$1,500	D-3
MIRAGE	$3,295	D-2
MOS OPERATING SYSTEM	$350	D-6
MP/M 8-16	$1,000	D-2
NIDOS/UBE	NA	D-3
PANA/BASIC	$500 to $50,000	D-4
PC/IRMX VERSION 1.0	$2,250	D-4
PRIMOS	$12,500 to $25,000	D-4
QLAB	$1,200 to $2,000	D-6
QUICK TUBE	NA	D-4
QUICK-FETCH	$9,000	D-1
REGULUS VERSION 4.0	$2,000	D-1
RESOURCE MANAGMENT SYSTEM	$1,500	D-1
RM/COS	$1,250	D-4
RSTS/E	$800 to $11,000	D-1
RSX-11M	$800 to $11,500	D-1
RT-11	$800 to $4,000	D-1
RTOS-80	$1,750	D-3
RTX 01	$450	D-3
RUNTIME SYSTEMS	$150 to $200	D-4
SATT: STAND-ALONE TERMINAL INTERFACE	$425	D-2
SCON	$7,000	D-1
SCS OPERATING SYSTEM	$125	D-6
SDL	NA	D-6
SDOS/MT	$805	D-4
SOFTBLOX EXPRESS	$550	D-3
SPEED	NA	D-4
STAM	$10,000	D-2
STAR -ELEVEN	$4,000	D-1
SUPERCONSOLE	$7,000	D-4
TMOS	$450	D-6
TSS (TIMESHARING SYSTEM)	$5,900	D-6
TSX	$1,275	D-4
TSX-PLUS	$2,000	D-1
TSX-PLUS	$2,000	D-4
TXIMAP	$1,000	D-1
TXTM	$1,500	D-1
THE UCSD-P SYSTEM	$350 to $850	D-4
UCSD-P SYSTEM, V. IV, I	$50	D-4
UNET	$99	D-3
UNIVERSAL TIME SHARING SYSTEM	NA	D-1
UNIX	NA	D-3
UNIX OPERATING SYSTEM FOR DG	$10,000	D-2
UNIX SYSTEM III	$4,000 to $20,000	D-6
UNIX SYSTEM V	$20,000	D-6
UTX, UNIVERSAL TIMESHARING EXECUTIVE	NA	D-2
VENIX II	$2,400	D-6
VRT	$1,750	D-1
VRTX/80	$3,400	D-2
VRTX/86	$3,400	D-2
VRTX/8002	$3,400	D-2
VRTX/68000	$3,400	D-2
VSM (VISTA STANDARD MUMPS)	$10,000 to $30,000	D-6
XETS/XEIBO	$3,550	D-2
XSERV	$3,000	D-6
ZSH	$15,000	D-2
$280 JOB STREAM SUPERVISOR	$560	D-4

Languages

ADPAC	$28,000	D-14
AGILE	NA	D-15
APL	$300 to $1,500	D-17
APL-A PROGRAM LANGUAGE	$14,500	D-15
ASSEMBLER	$300 to $1,500	D-17
AUTHORING AND DRILL LANGUAGE	$20 to $2,000	D-17
BASIC	$1,500	D-14
BASIC	$1,000	D-15
BASIC	$199	D-17
BASIC SURROGATE FOR ATON CP/M	$99	D-14
BASIC/VM	$1,000 to $5,000	D-16
BASIC INTERPRETER LEVEL 2	$500	D-14
BASIC INTERPRETER LEVEL 2 FOR 8086	$400	D-14
BASIC-11/RT-11	$300 to $1,500	D-15
BSD (4.1)	$9,950	D-17
C	NA	D-15
C	$7,500	D-16
C	$300 to $15,000	D-17
C-COMPILER	$450	D-17
C (PASCAL) NATIVE AND CROSS COMPILER	$550	D-17
CHAIN	NA	D-14
COBOL	NA	D-15
COBOL	$2,500	D-16
COBOL	$300 to $15,000	D-17
COBOL CROSS REFERENCE	$2,000 to $3,000	D-17
COBOL OPTIMIZER	$4,000 to $5,000	D-17
COBOL-PLUS	$2,000	D-15
COBOL 74	NA	D-15

COBOL-61	$3,600 to $6,750	D-15
COBOL/1000 REV 1.1	$5,000	D-14
COMPUCON CONTROL LANGUAGE (CCL)	N/A	D-14
CORAL-66	$4,050 to $5,100	D-15
CRISP	N/A	D-14
CROSS ASSEMBLERS	$375	D-15
CSSL-IV	$12,500	D-16
DATABUS DATAPOINT BUSINESS LANGUAGE	$1,500	D-14
DATASHARE	$1,500	D-14
DBL (DATA BUSINESS LANGUAGE)	$940	D-15
DCL	$1,000	D-14
DIBOL TO COBOL TRANSLATOR	N/A	D-15
DIBOL-11/DECFORM	$5,200 to $8,600	D-15
DIGITAL COMMAND LANGUAGE	$750	D-14
DOS RPG-II	$2,800	D-16
DUAL DYNAMIC UNIVERSAL LANGUAGE	$30,000	D-16
DYNAMIC UNIVERSAL ASSEMBLY LANGAUAGE	N/A	D-16
EXTENDED C COMPILER: C-PLUS	$2,500	D-16
FORTRAN	$1,500	D-14
FORTRAN	$450	D-17
FORTRAN 66	N/A	D-16
FORTRAN 77	N/A	D-16
FORTRAN 77	$300 to $15,000	D-17
FS ASM86	$2,000	D-15
FS FORTRAN 86	N/A	D-15
FS PASCAL 86	$10,000	D-15
I-TO-Z ASSEMBLY LANGUAGE TRANSLATOR	$49	D-14
IC9C-ADA TRANSLATER	$10,000	D-15
INTEL/9	$10,900	D-14
LISP INTERPRETER	$100	D-16
LNS-PASCAL TRANSLATOR	$6,000	D-15
[illegible]	[illegible]	D-16
MAXBASIC	$12,000 to $15,500	D-16
MICRO COBOL II	$300 to $1,500	D-17
NEVADA FORTRAN	$30	D-16
PASCAL	$7,500	D-16
PASCAL	$300 to $1,500	D-17
PASCAL COMPILERS (AOS & AOS/VS)	$2,000	D-16
PDP-11 BASIC-PLUS-2 V2	$3,850 to $5,650	D-16
PDP-11 FORTRAN IV V2.6	$800 to $4,000	D-15
PL/1 SUBSET G	$1,500 to $7,500	D-16
PLM/86	N/A	D-15
Q/C	$9,500	D-14
R-BASIC: MULTI-USER BASIC INTERPRETER	$1,500	D-16
R/M COBOL	$5,000 to $8,500	D-17
RELATE	$7,000 to $14,000	D-16
RPG - REPORT PROGRAM GENERATOR	$1,500	D-16
RPG II	N/A	D-16
SLAM II	N/A	D-15
SMC THOROUGHBRED TM BASIC	N/A	D-17
SNOBOL	N/A	D-14
SOURCE LEVEL DEBUGGER	$6,400	D-16
SP/SCREEN	$2,500	D-17
SPEAKEASY	$6,500	D-17
SPEED II	$5,000	D-14
SPITBOL	N/A	D-16
SYSTEM INFOPRIVE - INFORMATION & RETRIEVAL	N/A	D-14
TINY C INTERPRETER	$100	D-17
TSS BASIC LANGUAGE	N/A	D-16
UNALTER THE LANGUAGE CONVERSION	$1,750	D-17
Z-TO-I ASSEMBLY LANGUAGE TRANSLATOR	$49	D-14

Compilers/Assemblers

ACT ANSI COBOL	N/A	D-23
ACT FORTRAN 77	N/A	D-23
ACT PASCAL	$79,000	D-23
ADA COMPILER	N/A	D-27
AIS PL/1, PDP-11, PL/1 COMPILER	$5,200	D-24
ASM-6800 MACRO CROSS ASSEMBLER	$3,000	D-26
ASM-68200 MACRO CROSS ASSEMBLER	$3,000	D-26
ATLAS-80 ATLAS LANGUAGE COMPILER	$42,000	D-25
ATLAS-80 ATLAS LANGUAGE COMPILER	$40,000	D-25
B-BASIC	$300	D-24
BASCOM BASIC COMPILER	$5,000	D-24
BASIC	$2,500	D-25
BASIC COMPILER	$225	D-26
BASIC COMPILER	$5,000	D-27
C	N/A	D-26
C COMPILER	$3,500	D-25
C CROSS COMPILER	$1,750	D-25
C CROSS COMPILER	$3,950 to $7,150	D-27
C CROSS COMPILER	$3,200 to $3,800	D-26
COBOL	$300	D-24
COBOL	$6,000	D-25
COBOL COMPILER	$12,000	D-27
COBOL-COMMON BUSINESS ORIENTAL LANGUAGE	$1,500	D-24
COBOL-PLUS	$2,000	D-24
COMPILERWRITER'S WORK BENCH	N/A	D-25
COMSTAR	$400	D-23
CON 80 Z	$40	D-26
CON Z CP/M	$40	D-26
CPM/86 COMPILER	$600 to $6,000	D-25
CROSS ASSEMBLER	$3,000	D-26
CROSS COMPILER DEVELOPMENT SYSTEM	$7,000 to $9,500	D-26
CSPI P	$6,500	D-24
C86	$950	D-23
DACOR EXTENDED BASIC COMPILER	$6,400	D-24
DISASSEMBLERS PACKAGE	$100	D-26
DYL-270	N/A	D-24
EBAS 4	$100	D-26
EDITOR ASSEMBLER LINKING LOADER	$250	D-27
EXTENDED BASIC COMPILER	$4,200	D-26
FORTRAN	$300	D-24
FORTRAN 77	N/A	D-26
FORTRAN 77+	$4,000	D-24
FORTRAN 77 COMPILER	$350	D-26
FORTRAN 77 COMPILER	$8,000	D-27
FORTRAN 77/X32	$5,800	D-26
FS DEBUG	$5,000	D-25
FS LINK AND FS LOC	$7,000	D-25
HP/C COMPILER REV 1.5	$4,000	D-24
IFTRAN	$187,500	D-26
INFOSOFT STRUCTURED ASSEMBLER	N/A	D-23
LANTECH BASIC COMPILER	$149	D-25
LC	$150	D-26
LEVEL II COBOL	N/A	D-24
MBC LANGUAGE CONVERSION PROCESSOR	$1,150	D-27
MACRO ASSEMBLER	$300	D-24
MAINSAIL	$2,770 to $22,050	D-26
MARK V	N/A	D-25
MAS MICRO ASSEMBLER	$4,500	D-24
MBDOS COMPILER	$500 to $6,000	D-26
MCOBOL	N/A	D-26
PASCAL	$5,800	D-25
PASCAL	N/A	D-26
PASCAL COMPILER	$375	D-
PASCAL COMPILER	$6,000	D-27
PASCAL COMPILER INTERPERTER	$3,000 to $4,000	D-27
PASCAL CROSS COMPILER	$4,150 to $6,400	D-27
PASCAL 1	$1,795 to $2,060	D-26
PASCAL 2	$3,500 to $5,000	D-26
PASCAL-2 CONCURRENT PROGRAMMING	$2,000	D-26
PDS-PROGRAM DEVELOPMENT SYSTEM	$99	D-23
PL/I	$6,000	D-27
PL/1 SUBSET G	N/A	D-26
PRO-CREATE	$100	D-25
PROFORTH	$2,250	D-25
REX-A86	$2,750	D-27
REX-EASYV+	$1,500	D-26
REX-SMA/186	N/A	D-27
RMHTEK PASCAL COMPILER	$3,000 to $3,500	D-27
RM/COBOL	$750 to $1,250	D-27
SOFTBOL I COMPILER	N/A	D-24
SOURCE	$1,500	D-24
SOURCE MODULES	$100	D-23
STAR*TRAC	$49	D-23
SYSTEM-CP4	$150	D-23

SYSTEM-TM57	$150	D-23
SYSTEM Z8	$150	D-23
SYSTEM-18	$150	D-23
SYSTEM-20	$150	D-23
SYSTEM-48	$150	D-23
SYSTEM-51	N/A	D-23
SYSTEM-70	$150	D-23
SYSTEM-75	$150	D-23
SYSTEM-90	$150	D-23
SYSTEM-220	$150	D-23
SYSTEM-3870	$150	D-23
TELESOFT ADA COMPILER	$3,000	D-27
TSS FORTRAN-77 OPTION	N/A	D-25
UCSD-P SYSTEM TM VERSION 4.1	$1,500	D-24
25V-IFTRAN	N/A	D-25
VRX COBOL	N/A	D-28
[illegible] CROSS ASSEMBLER FOR 68000	N/A	D-24
[illegible]75 CROSS ASSEMBLER FOR HEC 7500	$500	D-24

XASMF8 CROSS ASSEMBLER FOR F8/3870	$200	D-24
XI 320 MACRO ASSEMBLER	$1,000	D-27
XI 7000 MACRO ASSEMBLER	$1,000	D-27
XI 99000 MACRO ASSEMBLER	$1,000	D-27
XRMAK-Z8	$250	D-23
XY BASIC TM INTERPRETER/COMPILER	$500 to $550	D-25
Z-COM	$200	D-23
Z-80X ABSOLUTE CROSS ASSEMBLER	N/A	D-27
ZRMAK-F8	$250	D-23
ZRMAK-18	$250	D-23
6800/01/05/09 CROSS-LINKER	$400	D-28
6800 DEVELOPMENT PKG	$5,000	D-27
6800/6801 MARCO CROSS ASSEMBLER	$1,000	D-28
6800 PL/W HIGH LEVEL LANGUAGE COMPILER	$1,400	D-28
6800 SIMULATOR	$800	D-28
6801 SIMULATOR	$800	D-28
6805 MACRO CROSS ASSEMBLER	$1,000	D-28

Performance Measurement

ACCELER 8	$3,200	D-34
ADR/LOOK-RELEASE 6.2	$10,900 to $29,500	D-34
AIM/CI ANALYZER	N/A	D-34
ALARM-HARDWARE RELIABILITY MEASUREMENT	$14,000	D-37
AUTOMATED LASER VISION INSPECTION	N/A	D-35
AUTOMATED PRODUCTION REPORTING SYSTEM	N/A	D-36
BEST/1 - MVS	N/A	D-34
BEST/1 - SNA	N/A	D-34
BILLING INVENTORY COMMUNICATIONS SYSTEM	$19,800	D-37
BIO-BLOCK SIZE INVESTIGATOR	$1,950	D-37
BUDGET FOR VS	$3,500	D-36
CA-JASPER-PPA	N/A	D-35
CA-JASPER/CICS	$5,500 to $8,500	D-28
CA-JASPER/IMS	N/A	D-35
CA-JASPER/JES	$6,000 to $8,500	D-28
CAMS	$3,100	D-27
CAPTURE - MVS	N/A	D-34
CAPTURE - VM	N/A	D-34
CIMS - CICS/VS TRANSACTION ACCOUNTING	$2,000	D-34
CIMS VM/CMS SESSION A	$2,000	D-34
CIMS-COMPUTER INSTALLATION MANAGEMENT	$5,000	D-34
CIMS/XL	N/A	D-34
COMPUTER ANALYSIS AND DESIGN SYSTEM	$6,000	D-36
CRYSTAL	N/A	D-34
DASZL	$8,000	D-36
[illegible]	N/A	D-34
DEXAN/IMS	N/A	D-34
DISCERN/VM	$7,400	D-36
EPILOG/MVS	N/A	D-34
ESRA/CICS	N/A	D-34
EXPLORESTROKEEXP	N/A	D-28
FEP	$15,000	D-37
FORTRAN TRACING INSTRUMENTERS	$7,000	D-37
INFO/BASE	N/A	D-34
INSIGHT	$2,900	D-37
JARS	$6,000 to $12,500	D-34
JSC-JOB SCHEDULING AND CONTROL	$10,000 to $20,000	D-35
MARPM	$880 to $7,000	D-37
MONITOR	$2,500	D-35

MVS INTEGRATED CONTROL (MICS)	$29,800	D-37
NETSTAR/270	$5,335	D-36
OMEGAMON	N/A	D-34
OMEGAMON/CICS	N/A	D-35
OMEGAMON/IMS	N/A	D-35
PAWS - VERSION 2.0	$16,500	D-36
PAXS	$1,500	D-37
PEPE	$2,500 to $10,000	D-37
PERF/TIME	$6,995	D-35
PERFORM	$1,950	D-37
QCM/JAB	N/A	D-35
QCM/SPI	$6,000	D-34
QCM/SPM	$6,000	D-34
QCM PERFORMANCE DATA BASE	$6,000	D-35
QCM PERFORMANCE MONITOR	$14,000	D-35
RABBIT 2	$4,000 to $6,000	D-37
RADAR	$3,500	D-28
RAMSES	$750	D-37
RESPONSE TIME/1	$985	D-28
RPM	$3,500	D-28
RTA/CICS	N/A	D-35
SCERT II	N/A	D-28
SERIES 1 PERFORMANCE ANALYZER	$3,500	D-36
SMF ANALYZER	$4,000	D-28
SMT (SYSTEM MANAGEMENT TOOL)	$4,500	D-37
SRF VERSION 2 SYSTEM REPORTING	$3,995 to $4,495	D-35
SSPL	$75,000	D-37
SSPM	$75,000	D-37
SSTA	$25,000	D-37
STROBE-PROGRAM PERFORMANCE MEASUREMENT	$9,500	D-28
SYSTEM ACCOUNTING	N/A	D-36
SYSTEM PERFORMANCE MONITOR	$8,000	D-28
SYSTEM ANALYZER RELEASE 10 FLOWCHARTER	$6,995	D-35
TASP	$1,200	D-34
TSO/MON	$16,700	D-36
UMAX	$4,000 to $6,000	D-36
VISTA	N/A	D-36
VM/ACCOUNTING	N/A	D-37
WATCHER-PC	$5,000	D-34

System Resource Management

ACX PM PRINTER MANAGER FOR VM/SP	N/A	D-40
AIMS	N/A	D-40
APPLE SOFT RELOCATER	$19	D-48
ARSAP RESOURCE MANAGEMENT SYSTEM	$2,995	D-41
ASYNCHRONOUS PROGRAM FETCH (FETCH)	N/A	D-48
AUTOMATIVE DATA CENTER 2	$42,000	D-40
BATCH PROCESSOR FOR TSX	$300	D-44
BIM-ODIS-DOS/VSE CICS SYSTEM STA	$2,480	D-40
BIM SPOOL-DOS/VSE TERMINAL PRINTER SPOOLER	$4,000	D-40

BIMCMPRS-CICS 3270 DATA COMPR	$1,600	D-40
BIMDSLOG-CONSOLE HARD COPY FILE DISPL	$880	D-40
BIMMONTR-DOS/VSE SYSTEM STATUS PER	$1,080	D-40
BIMP3270-CICS DOS/VSE CRT VER 1.1	$800	D-40
BIMSPOON-DOS/VSE ON LINE TO BATCH P	$920	D-40
BIMSWAP-DOS/VSE CICS BTAM VER 1.0	$1,600	D-40
CA-SCHEDULER	$9,500 to $36,000	D-40
CAS	N/A	D-42
CATALIST	$2,000	D-44

CLOCK DATA SYSTEM	$250 to $500	D-44
COMMERCIAL SPOOLING SYSTEM	$2,500	D-42
COMPUTER SCHEDULING AND REPORTING	NA	D-44
CONTROL LANGUAGE ANALYSIS MODULE	$750	D-46
COPYR 2.01 SYSTEM COPY UTILITY	NA	D-42
CORVUS HARD-DISK DRIVERS	$200	D-44
D-FAST VSE	NA	D-46
DASH-DYNAMIC AUXILLARY STORAGE	NA	D-42
DATA CENTER MANAGEMENT SYSTEM	$39,000	D-46
DCAS/3000 DATA CENTER ACCT SYS/3000	$4,000	D-42
DISCLOSE	$1,800	D-44
DISH BUILDER	$995	D-42
DISK UTILITY PACKAGE	$350	D-41
DMS/OS DASD MANAGEMENT SYSTEM	$12,000 to $32,500	D-44
DUMPER	$825	D-41
EPIC/VSE	NA	D-46
ESP/DJC EXECUTION SCHEDULING PROCESSOR	$12,000	D-44
EXECUTIVE TASK MANAGER	$125	D-42
EZLOG VERSION 1.5	$1,000 to $2,200	D-44
FAQSSTROKEXP	NA	D-41
FIXED STORAGE MANAGEMENT-FSM 110	$8,000	D-41
GCD	NA	D-40
GENERAL COST ALLOCATION (GCA)	$28,500	D-46
INFORMATION CENTER PLUS MANAGER'S TOOLS	$25,000	D-44
JAXS	$1,500	D-44
JAZ	NA	D-46
JCL/MANAGER	$2,000	D-41
JCLMANSTROKEXP	NA	D-41
JOB ACCOUNT MANAGER LEVEL 1	$10,000	D-41
JOB FLOW	NA	D-41
JOBS MENU-DRIVEN SYSTEMS	$5,400	D-41
KOMAND/CCI	$2,500	D-42
KOMAND/DAMS	$9,000	D-42
KOMAND/DAS	$16,000	D-42
KOMAND/ICI	$2,500	D-42
KOMAND/OSM	$4,000	D-42
KOMAND/OLC	$3,000	D-42
KOMAND/RBS	$6,000	D-42
KOMAND/VSCI	$2,500	D-44
MARK IV	NA	D-42
MSM	NA	D-46
NMF (NETWORK MANAGEMENT FACILITY)	$7,500	D-41
PAC/MASTER	$11,500	D-46
PCL (PROCESS CONTROL LANGUAGE)	NA	D-44
PMO (PROGRAM MANAGEMENT OPTIMIZER)	$5,000	D-44
PROBLEM TRACKING	$13,200	D-46
PROCESS ACCOUNTING & CHARGEBACK	$2,500	D-44
PROGRESS	$1,500	D-44
PROTOCOL	$190,000	D-42
REMIND	NA	D-46
RESOURCE ACCOUNTING AND CHARGEBACK	$3,000	D-46
RMTP	$2,000	D-46
SDSI	$12,000	D-41
SDSI (SHARED DATA SET INTEGRITY)	$12,000	D-44
SERIES 1 BACKUP/RESTORE UTILITIES DSC50	$450	D-46
SHARE-ELEVEN	$1,000	D-41
SOURCE/FILE CROSS REFERENCE PACKAGE	$450	D-42
SPACE/MANAGER	$8,500	D-41
STAM (SHARED TAPE ALLOCATION MANAGEMENT)	$10,000	D-44
STROBE	NA	D-41
SUPER MSI	NA	D-46
SURCHARGE	$2,000	D-44
SYSTEM/MANAGER	$8,500 to $28,000	D-41
SYSTEM/SCHEDULER	$9,500	D-41
T-FAST/USE	NA	D-46
TAPE/MANAGER	$7,500	D-41
TD-FAST/VSE	NA	D-46
TERMINAL SIGN-ON UTILITY	$100	D-42
UCC 8/PDS SPACE MANAGEMENT SYSTEM	$7,750	D-46
USAGE/3000	$250	D-42
VIRTUAL/MS	NA	D-41
VMDEFER	NA	D-46
VMSACTSYS	$2,995	D-46
VMTAPE/VSE	NA	D-46
007	NA	D-42

Library Management

8MASERV DOS/VSE LIBRARY DISPLAY	$1,600	D-49
CA-DYNAM	NA	D-49
CA-DYNAM/D	NA	D-49
CA-DYNAM/FI	NA	D-49
CA-DYNAM/T	NA	D-49
CA-TLMS	NA	D-49
CONSOLIDATED LIBRARY DIRECTORY LISTING	$100	D-50
DOSSIER BROWSE	$2,750	D-49
FLEESTROKEXP	NA	D-49
FORTRAN SUBROUTINE LIBRARY	$495	D-49
IMSL LIBRARY	NA	D-49
LIONL	NA	D-49
MARIAN THE ON-LINE LIBRARIAN	$9,000	D-49
MLIB	$40	D-50
NRS	$2,500	D-50
NAVIGATOR	$3,500	D-50
OBJECT DIRECTORY INVESTIGATOR	$875	D-50
PANEXEC	$20,000 to $30,000	D-50
PANVALET	$6,000 to $15,000	D-50
PDSMANSTROKEXP	NA	D-49
PLUS SOFTWARE LIBRARY	$150	D-50
REELS	$4,500	D-49
SELF-GENERATING DICTIONARY LANGUAGE AID	$14,500	D-50
SKIPPER	$1,900	D-49
SLIP	$295	D-49
SOLOMAN	$9,000	D-50
STANDARD SUBROUTINE LIBRARY	$1,000	D-50
STAR-1100 SYSTEM FOR TAPE REPORTING	$15,000	D-49
TCI	NA	D-49
TIDLI	NA	D-49
TEXT COMPARATOR	NA	D-49
VALU-LIB	$17,000	D-50
VM LIBRARY	NA	D-50
VSAM-TUNE	NA	D-50
VTOC	$225	D-50

Communications/TP Monitors

A B DICK COMPANY HASP	$416	D-53
A B DICK COMPANY MAGNA SOFTWARE	$300	D-53
A B DICK COMPANY BIS 3270TM	$400	D-53
A B DICK COMPANY BIS 378STM	$400	D-53
ACCESS	$15,000	D-54
ACCESS 34/36/38	NA	D-53
THE ACD OPTYMIZER	$27,500	D-52
ACT NETWORK PROCESSOR	NA	D-53
ADR/DATACOM/DC - RELEASE 4	$13,600 to $51,500	D-53
AIM/FILE CONVERSION SYSTEM	NA	D-53
ALTERGO PRODUCTS SHADOW II	$26,000	D-53
ARC	$1,500	D-55
ASCOM	$175	D-50
ATLAS	$28,000	D-50
AUDIO RESPONSE SYSTEM	$75,000	D-50
AUTOMATED COLLECTION SYSTEM	$75,000	D-50

AUTOMATIC NETWORKING OPTION	$5,000	D-85
AUTOPASS 3270TM	$15,000 to $80,000	D-61
BETA DATA COMM HANDLER	$1,500	D-54
BIS 3780 VERSION 5.0	$695	D-58
BLAST	$250 to $1,395	D-55
BOSS-3	$12,000	D-54
BSC 3741	NA	D-59
BSWP	$40,000	D-54
C-F-NETWORK	NA	D-54
C INTERFACE LIBRARY (HP)	$450	D-57
C INTERFACE LIBRARY (WHITESMITHS)	$450	D-57
C INTERFACE LIBRARY (ALCYON)	$450	D-57
C INTERFACE LIBRARY (HP)	$450	D-57
C INTERFACE LIBRARY (HP)	$450	D-57
C INTERFACE LIBRARY (MT)	$450	D-57
C INTERFACE LIBRARY (MT)	$450	D-57
C INTERFACE LIBRARY (WHITESMITHS)	$450	D-57
CATCHIT SESSION DOCUMENTOR COMMUNICATION	$600	D-54
CATS	$12,000 to $100,000	D-55
CCS COMMUNICATIONS CONTROL SYST	$79	D-54
CHAMELEON BISYNC	$1,000	D-61
CHANNEL PRODUCTS DC10, CHOUR, MLCI	$1,500	D-55
CICS-AID	$6 to $8,000	D-55
COAXXSYS TM	$1,195	D-58
COLINK	$1,250	D-58
COM-PLETE	NA	D-60
COMCOM	$95	D-54
COMMUNICATION LINK	$775	D-58
[illegible] SYSTEM-VERSION 2.0	$4,400	D-53
CPMCP/M	$65	D-54
CREDIT AUTHORIZATION INTERFACE	NA	D-54
CROSSTALK XVI	$195	D-58
CYX-DC DATA COMMUNICATIONS MONITOR	$20,000	D-58
CYX-RT/DECNET REACH THROUGH	$5,000	D-58
CYX-RT/IBM REACH THROUGH	$4,600 to $7,000	D-55
DAGAR DTS-3	$250	D-60
DATALINK	NA	D-58
DOCMP 1000	$2,500	D-57
DEALUP	$1,700	D-58
DEC DV11 SYNCHRONOUS COMMUNICATIONS HANDLER	NA	D-55
DEDICOM	$20,000 to $40,000	D-57
DPTX - INTERCONNECT FACILITY FOR IBM 3270	$7,500	D-58
EDL-R	$2,500	D-60
ELECTRONIC SCALE POLLING SYSTEM	NA	D-53
ELECTRONIC TIME CLOCK POLLING SYSTEM	NA	D-53
EM 200 UT-EMULATION FOR CDC UT 200	$3,750	D-59
EM 1004 - EMULATION FOR SPERRY 1004	$3,750	D-59
EM 3275	NA	D-53
EM 7020 - EMULATION FOR ICL 7020	$3,750	D-59
EM GRTS - EMULATION FOR HONEYWELL GRTS	$4,500	D-59
EM XBM - EMULATION FOR ICL XBM	$3,750	D-59
EMHASP - EMULATION FOR IBM HASP II	$5,250	D-53
EMX80 - EMULATION FOR IBM 2780/3780	$4,500	D-60
ENVIRON/1	$59,400	D-54
FAIL OVER PACKAGE	$50,000	D-59
FASTRAN	$100,000	D-55
FASTRX	$[illegible],000	D-54
FASTWIRE	$100,000	D-59
FILE TRANSFER SERVICE	$2,000	D-60
FILE TRANSMISSION PACKAGE	$1,200	D-59
FORTRAN	$1,700	D-60
FRAMEM (FRAME LEVEL EMULATOR)	$1,000	D-61
FREEFORM/3000	NA	D-53
GAMMA TECHNOLOGY WORKSTATIONS	$3,000 to $4,000	D-56
THE GUILD CATALYST	$250,000	D-56
HAROLD TP MONITOR	$3,000	D-53
HASP REMOTE WORKSTATION	$3,000	D-53
HASP VERSION 3	$3,500 to $5,500	D-53
HASP 990	$5,000	D-53
HOME BANKING SYSTEM	$50,000	D-60
[illegible] COMMUNICATIONS SOFTWARE	$2,000	D-60
IMX 300	$50,000	D-60
INFOCOMM/INFOHOST ANSWER-OS	$3,500	D-58
INTEGRATED DBMS	$50,000	D-53
INTERFACE	$12,000 to $25,000	D-56
INTF 3270	$8,125	D-62
JENNY	NA	D-57
KNET	$15,000	D-61
LINK/1	$20,000	D-59
LOCAL HIGH SPEED DATA LINK	$2,000 to $5,000	D-55
MASP/WS	NA	D-59
MCAUTO SYSTEM 1	NA	D-58
MEGA NET	$2,000	D-58
MESSAGE-SWITCHING AND CONTROL SYSTEM	NA	D-56
MICROTALK	$300	D-61
MICRO/REMOTE 2780/3780 EMULATOR	$25,000	D-53
MICRO/REMOTE 3270 EMULATOR	$25,000	D-53
MICRO-SNA/3270 VERSION 1.0	$695	D-59
MICRO-SNA3770	$695	D-59
MINIHOST	$200,000	D-60
MODEM 8-16	$295	D-56
MSI/TELXON RECEIVE	$3,000	D-54
MULTI-NODE TANDEM OPTYMIZER (MTO)	NA	D-62
NAS (NETWORK ACCESS SYSTEM)	NA	D-54
NCR-DMS/TRAN-PRO EL	NA	D-59
NDMS NETWORK DESIGN AND MANAGEMENT SYSTEM	$6,500	D-56
NETWORK DATAMOVER	NA	D-61
NETWORK ORION	$3,200 to $10,000	D-59
NETWORKER	$10,000 to $50,000	D-56
NETWORK ACCESS SERVICES-SERIES1	NA	D-61
NEXUS	$420	D-61
NS3270 AND NS3780 2780	NA	D-62
THE OPTYMIZER PLUS	$28,600	D-62
PACER/HPS-HOST PROCESSING SYSTEM	NA	D-59
PACKET NETWORK INTERFACE	$2,500	D-60
PASCAL INTERFACE LIBRARY (HP)	$450	D-57
PASCAL INTERFACE LIBRARY (HP)	$450	D-57
PASCAL INTERFACE LIBRARY (HP)	$450	D-57
PASSPORTS SYSTEM	$500	D-55
PC;M	$10,000	D-59
PL/M INTERFACE LIBRARY	$450	D-57
POINT OF SALES COMMUNICATIONS MANAGEMENT	$30,000	D-55
PP04	NA	D-54
PRIMENET - NETWORKING FACILITY	$7,500	D-60
QUICK-TUBE	$650	D-58
REMOTE COPY	NA	D-59
REMOTE PRINTER SUPPORT	$1,500	D-53
REMOTE 990	$12,500	D-60
RJE-REMOTE JOB ENTRY	$3,000	D-61
RJE HOST	$2,600	D-57
RJE REMOTE JOB ENTRY SOFTWARE	$1,850 to $2,250	D-53
RJE TERMINAL EMULATION	NA	D-57
RPSS-REMOTE PRINTER SPOOLING	NA	D-57
RSS-REMOTE SERIES 1 SERVICES	$3,500	D-57
SATURN-SPECIAL SERVICES AND TRUNK UT	NA	D-60
SCREENSHARE-11 TERMINAL MONITOR FACILITY	$1,250	D-60
SDNET	$150	D-61
SERIAL FILE TRANSFER PROGRAM	$100	D-61
SERIES 1 POLLER & CREDIT AUTHORIZATION	$20,000	D-60
SIM 3278	$6,500	D-61
SINGLE BIT HEXADECIMAL SYSTEM	$250	D-55
SITREX-PLUS	$1,000	D-62
STAT-MUX SUPPORT FACILITY	$5,000	D-62
SWITCH NETWORK SUPPORT	$20,000	D-54
SYSTEM 34, 36, 38 EMULATOR TRANSFER	$350 to $750	D-61
TAC SOFT	NA	D-62
TALK	$500	D-59
TAM	$6,000	D-56
TDC 2000 DRIVER	$4,500	D-57
TECTRONICS TERMINAL EMULATOR	$1,500	D-55
TELDEAR	$12,500	D-59
TELECOMMUNICATIONS	NA	D-59
TELECOMMUNICATIONS	$2,500	D-61
TELEPHONE PBX SYSTEM	NA	D-51
TERMINAL/3000	$2,500	D-63
TERRALINK	$5,000	D-61
TRANSIT INFORMATION TRANSFER SERVICES	NA	D-54
TS/2.0	$250	D-56
TSX-NET	NA	D-58
UAP-LINK	$250 to $1,500	D-62
UAP-LINK FILE TRANSFER SOFTWARE	$250	D-62
UNIVERSAL COMMUNICATIONS FACILITY	$40,000	D-55
UT 200	$10,000	D-59
VIMOS	$9,500	D-60
VIRTEX	$9,500	D-54
VIRTEX	$7,000 to $17,000	D-60
[illegible]	NA	D-54
VMOS	$15,000	D-53

WANG DEC LINK	$395	D-60
WANG VS TO HIGH SPEED PRINTER	$4,000	D-57
WANG VS TO IBM DISPLAY WRITER	$4,000	D-58
WESTLAW	$300	D-53
X.DOT:PAD	$40,000	D-58
X25 INTERFACE	$90,000	D-61
X.25 NETWORK CONTROL PROGRAM	$1,000	D-53
XCHANGE-11	$99,500	D-56
ZIX - TERMINAL CONTROL SYSTEM	$5,000	D-55
2780/3780 EMULATOR	$47,000	D-61
3270 BISYNC EMULATOR	N/A	D-59
3270 BSC EMULATOR	$85,000	D-61
3270 CLUSTER EMULATOR SERVER	$3,000	D-59
3270 EMULATOR FACILITY	$5,000	D-61
3270 SNA EMULATOR	N/A	D-61
3270 SNA EMULATOR	$13,000	D-59
3270 TERMINAL SUPPORT	$4,000	D-61
3770 SNA EMULATOR	N/A	D-59
5251 MODEL 12 WORK STATION EMULATOR	$500	D-61

Systems Software — Other

ACSL ADVANCED CONTINOUS STIMULATION MODE	N/A	D-71
ADC2 AUTOMATED DATA CENTER SYSTEM	$42,000	D-70
APEX	$32,000	D-71
ASM2-AUTOMATED SPACE MANAGEMENT SYSTEM	$19,500	D-70
CA-DRIVER	N/A	D-70
CICS 32XX TRANSMISSION OPTIMIZER	$2,500	D-70
CYX-DD OVERLAP SEEK DISK DRIVER	$2,000	D-70
CYX-DV DV11 MULTIPLEXOR DRIVER	$3,000	D-70
ESCAPE/34	$12,500	D-71
ESP/3000	$1,000	D-70
FORTRAN TO BASIC SYNTAX TRANSLATOR	$495	D-71
ISP	$25,500	D-70
LABORATORY MANAGEMENT	N/A	D-71
MHTRAN-1 DOS TO OS ASSEMBLER TRANSLATOR	$2,400	D-71
MP/M 8080	$1,045	D-70
MPU-8080	$845	D-70
MTE MULTI TASKING EXECUTIVE	N/A	D-71
MVS/SP ASSIST (MVS/SPA)	N/A	D-70
PLOTTER PACKAGE	$2,000	D-71
SDM/STRUCTURE	$39,500	D-70
SDM/70	$39,500	D-70
SESSION	$500 to $5,000	D-70
SIM 14	$10,000	D-71
TIME	$900	D-70
TIME 1000	$900	D-70
UCC 7 BASIC AUTOMATED PRODUCTION CONTROL	$36,500	D-71
UCC 10 DATA DICTIONARY MANAGER	$25,500	D-71
UTEP -1	$4,000	D-70
VM/PERFORMANCE ENHANCEMENT	N/A	D-70
VM SOFTWARE ASSIST	N/A	D-70

Operating Systems

ATON CP/M 2.2	$200 to $350	D-8
BILLINGS OASIS PACK	$300	D-8
BILLINGS TURBODOS OPERATING SYSTEM	$450	D-8
COBOL INTERPRETER	$1,500	D-12
COLORMATE	$495	D-12
CONCURRENT CP/M-86	N/A	D-8
CP/M 86	$225	D-12
CP/M-68K	N/A	D-8
CP/M CONTROL PROGRAM FOR MICROCOMPUTERS	N/A	D-10
CP/M FOR THE TRS 80	$200	D-8
DE-BIO	$57	D-8
DOS +	$150	D-10
DOS +4	$150	D-10
DOS PLUS	$25	D-10
ELECTRONIC DISK	$70	D-8
FILE SERVER	N/A	D-10
HAI-BAS RUN TIME	N/A	D-8
HARD/SOFT DISK SYSTEM (HSDS V.6)	$400	D-10
INFOSOFT OPERATING SYSTEM (I/OS V)	$225	D-8
INFOSOFT MULTI-USER OPERATING SYSTEM	N/A	D-8
INSIGHT	$300	D-8
INTRO TO BASIC PROGRAMMING	N/A	D-12
M/OS-80 OPERATING SYSTEM	$325	D-10
MAPPER 1/48K	$200	D-10
MAPPER 3/48K	$200	D-10
MAPPER 3/64K	$200	D-10
MDOSSIM	$127	D-12
MEMORY BANK SWITCHING OPTION FOR ATON CP/M	$60	D-8
MEMORY MANAGEMENT	$39	D-12
MPDOS	N/A	D-10
MS DOS-MICROSOFT DISK OPERATING SYSTEM	N/A	D-10
MSMOS MICRONETICS STANDARD MUMPS	$695	D-10
MSP/Z8000	$20,000	D-8
MSP/6800	$20,000	D-8
MTOS-68	N/A	D-8
MTOS-68K	N/A	D-8
MTOS-69	N/A	D-8
MTOS-80	N/A	D-8
MTOS-80MP	N/A	D-8
MTOS-86	N/A	D-8
OPTIBASIC	$2,500	D-10
OS/ENGINE	$10,000	D-8
P&T CP/M 2 OPERATING SYSTEM	$200	D-10
PERSONAL COMPUTING 21	$1,200	D-10
PRINT SERVER	$500	D-10
RACET MECDOS - VERSION 2.2	$175 to $275	D-10
RDOS/SIMULATOR	$1,500	D-12
SDOS	$265	D-12
SDOS/ES	$115	D-12
SUPERDRAW OPERATING SYSTEM	$125	D-8
THOROUGHBRED MULTIUSER BASIC OS	$595	D-10
TURBO-DOS VERSION 1.22	$750	D-10
UCSD-P SYSTEM	$120 to $825	D-12
UNI-OS	$300	D-10
UNIFLEX DISK OPERATING SYSTEM	N/A	D-12
UNIPLUS +	N/A	D-12
UNIX SYSTEM III	N/A	D-10
UNOS	$3,000	D-8
VENIX 86	$775	D-12
VISION	N/A	D-12

Languages

A B DICK COMPANY MICROSOFT BASIC RELEASE	$450	D-18
ACTION	N/A	D-18
ADA	$3,500	D-21
ADVANCED PROGRAMMING BASIC	$80	D-19
ALL	N/A	D-19
ALTERNATE FORTH	N/A	D-18
APC BASIC	N/A	D-18
APL - 68000 MICROCOMPUTER PROCESSOR	N/A	D-18
APL PLUS/PC SYSTEM	$595	D-20
APPLE LOGO	N/A	D-18
ASM68	$200	D-21
ATARI - LOGO	N/A	D-18
BASIC +	$400	D-21
BASIC A+	$80	D-19
BASIC COMPILER	$300 to $500	D-20
BASIC FOUR	$395	D-21
BAZIC	$150	D-18
C/80 2.0	$50	D-20
CCC-BASIC II	N/A	D-18
CIS COBOL	$850	D-18
COBOL	$1,250	D-21
COBOL DEVELOPMENT SYSTEM	$899	D-20
DATABUS COMPILER SUNDS86	$495	D-20
DATABUS COMPILER SUNDS86	$495	D-20
DATABUS COMPILER SUNDS80 V2	$495	D-20
EDITOR/ASSEMBLER SERIES I	$50	D-20
EXTENDED BASIC	$100	D-20
FBASIC	$150	D-18
FORTAN - 77	$600	D-21
FORTH	$200	D-20
FORTH LANGUAGE PROGRAM	$500	D-18
FORTRAN 4/5 TO FORTRAN 77 TRANSLATOR	$2,500	D-21
FRENCH EDITION APPLE LOGO	N/A	D-18
HEMENWAY/FORTH	$15,000	D-18
IBM LOGO	N/A	D-18
INFINITE BUSINESS	$30	D-19
KRELL LOGO FOR THE APPLE II	$8,995	D-18
LATTICE C COMPILER	$500	D-18
LEVEL II COBOL	$1,600	D-19
LINKING LOADER AND LANGUAGE PLUS	$150	D-19
LISP	$75 to $200	D-20
LISP/80	$40	D-20
MACROSOFT	$100	D-19
MBP COBOL	$500	D-19
MICRO SPEED II +	$645	D-18
MICRO SPEED II	$495	D-18
MICRO SPEED PC	$595	D-18
MICRONET	N/A	D-19
MMS FORTH V2.2	$129	D-19
MODULAR-2	N/A	D-21
MSM MICRONETICS STANDARD MUMPS	N/A	D-18
MUMATH/MUSIMP SYMBOLIC	$300 to $250	D-20
NEVADA COBOL	$30	D-18
NEVADO PILOT	$30	D-18
ORCA/M	$99	D-18
P-LISP	N/A	D-18
PASCAL MT +	$95	D-18
PASCAL/MT +	N/A	D-19
PERSONNEL COBOL	$400	D-19
PL/I	N/A	D-18
PRO-LOGO	N/A	D-18
RACET ENHANCE BASIC -REBAS	$99	D-20
RATFOR	$40	D-20
SENSIBLE SOLUTION FULL LANGUAGE	$695	D-19
SENSIBLE SOLUTION LANGUAGE RUN TIME	$395	D-18
STRUCTURED BASIC	$139	D-21
TERRAPIN LOGO	$240	D-21
TI - PILOT	$80	D-21
TIMN ROMABLE FORTH	$200	D-19
TIMN FORTH RELEASE 3.1	$100	D-19

TINY PASCAL	$85	D-30
UNIFLEX BASIC	$150 to $500	D-29
UNIFLEX COBOL	N/A	D-30
UNIFLEX PASCAL	N/A	D-30
UNIFLEX FORTRAN 77	N/A	D-29
VALFORTH 1.1 AND VALFORTH UTILITIES	$5,995	D-21
VANILLA PILOT (VP)	$30	D-30

Compilers/Assemblers

'ACT SERIES	$175	D-32
AQNAS	$170	D-31
ALE	$49	D-29
AS6802 ASSEMBLER	$300	D-31
ASM	$260	D-31
ASSEMBLER	N/A	D-31
AZTEC C	$199	D-30
AZTEC C86	$249	D-30
BASIC COMPILER	$395	D-29
BIFCON	N/A	D-30
C 1 VER 1.10	$575	D-30
C/65	$80	D-31
C COMPILER	$500	D-32
CBASIC	N/A	D-29
CI-C86 C COMPILER	$395	D-29
CIS COBOL	N/A	D-29
COBOL	$2,500	D-31
COMPILER PLUS	$99	D-29
CRASM-70-CROSS ASSEMBLER FOR 3870	$295	D-31
DATAPLUS	$250	D-30
DECOMPILER	$200	D-29
DLOCK	N/A	D-32
ECO-C	$350	D-29
EDITOR/ASSEMBLER	$50	D-32
FORTRAN	$425	D-32
HAI-BAS BASIC COMPILER	$295	D-30
HEMENWAY/BASIC INTERPRETER	$30,000	D-30
IEM FORTRAN 77	$1,200	D-30
INFOSOFT C COMPILER	N/A	D-29
INFOSOFT C COMPILER - MICROSOFT REL FORM	N/A	D-29
INSTANT ASSEMBLER	$39	D-31
INSTA-SPEED	N/A	D-29
[illegible] BASIC COMPILER	$150	D-31
MAC/65	$80	D-30
MDS MICROPRODUCTS 6502 DEVELOPMENT	$9,995	D-30
MICROPRODUCTS DISASSEMBLER	$2,995	D-30
MICROPRODUCTS EDITOR/ASSEMBLER	$2,995	D-30
MICROSOFT APPLESOFT COMPILER	N/A	D-30
MICROSOFT BASIC COMPILER	N/A	D-30
MICROSOFT BUSINESS BASIC COMPILER	N/A	D-30
MICROSOFT C COMPILER	N/A	D-30
MICROSOFT COBOL COMPILER	N/A	D-30
MICROSOFT FORTRAN COMPILER	N/A	D-30
MICROSOFT PASCAL COMPILER	N/A	D-30
MICROSOFT FORTRAN - 80 COMPILER	N/A	D-30
MICROSOFT M80/L80, BASIC-80,	N/A	D-31
[illegible] BUSINESS ORIENTED LANGUAGE	N/A	D-31
MONITOR DISASSEMBLER	$20	D-31
NEW BASIC	$39	D-29
PACSAL	$500	D-32
PASCAL/ M	$395	D-32
PASCAL/M - 86	$495	D-32
PASCAL/Z	$450	D-30
PASM	$200	D-31
[illegible] BASIC COMPILER	$242	D-31
SMART TERM II	$250	D-30
SUPERSOFT ADA	$300 to $350	D-32
THE [illegible]	$70	D-30
THE ASSEMBLER DEVELOPMENT SYSTEM	$325	D-32
TINY C COMPILER	$250	D-32
TMS 320 C	N/A	D-31
TRANS - 86	$175	D-32
UCSD PASCAL COMPILER	$125	D-32
UCSD P-SYSTEM ASSEMBLER/LINKER	$100	D-32
UNIFLEX RELOCATING ASSEMBLER	N/A	D-32
UP CROSS ASSEMBLERS MS/DOS	$300	D-31
UP CROSS ASSEMBLERS CP/M 80	$200	D-31
UP CROSS ASSEMBLERS CP/M 86	$300	D-31
UVMAC	$30	D-31
XASM05 CROSS ASSEMBLER FOR 6805	$200	D-29
XASM09 CROSS ASSEMBLER FOR 6809	$200	D-29
XASM18 CROSS ASSEMBLER FOR THE 1802	$200	D-29
[illegible] CROSS ASSEMBLER FOR THE Z80	$200	D-29
[illegible] CROSS ASSEMBLER FOR THE 8048/8041	$200	D-29
[illegible] CROSS ASSEMBLER FOR THE 8051	$200	D-29
XASM65 CROSS ASSEMBLER FOR THE 6502	$200	D-29
XASM68 CROSS ASSEMBLER FOR THE 6800/6801	$200	D-29
XASM400 CROSS ASSEMBLER FOR COP400	$200	D-29
Z-BASIC	$99	D-31
68K BASIC COMPILER	$150	D-29
8748 CROSS ASSEMBLER	N/A	D-31

Communications/TP Monitors

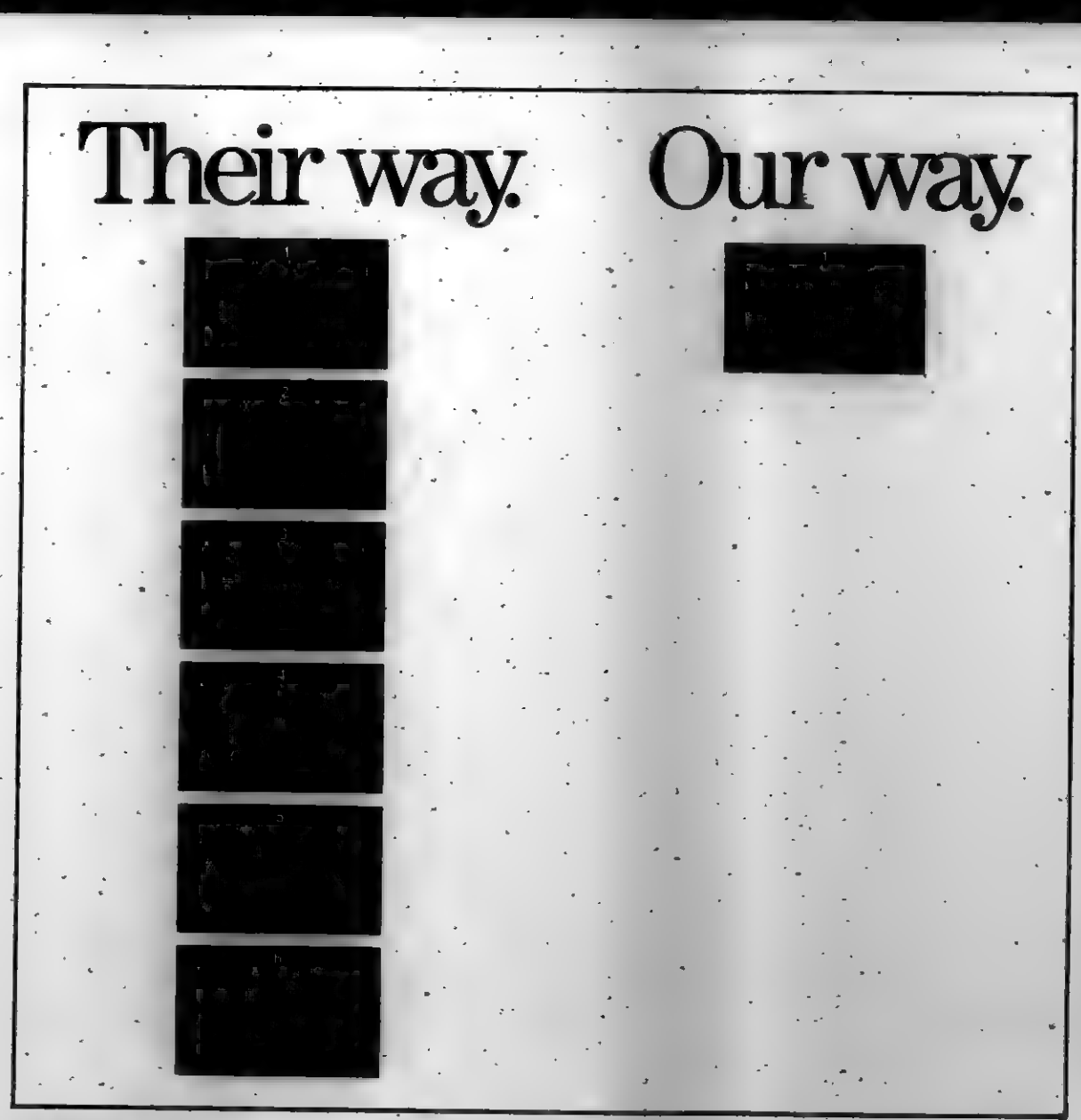
ACCULINK	$245	D-66
ALPACA PLUS	$500	D-67
[illegible] PLUS V 2.0A	$500	D-67
AMCALL	$150	D-66
APSTOCK	N/A	D-63
APSTRAN	N/A	D-63
ASCII EXPRESS II	$35	D-65
ASCII EXPRESS PROFESSIONAL	$130	D-66
ASCOM +	$175	D-66
ASYNCH	$100	D-67
ASYNC - VERSION 3.01	$100	D-67
B-NET	$400	D-69
BACKUP	$35	D-64
BBS-80	$80	D-66
BI-SYNC	$495	D-65
BIS - 3270	$695	D-65
BIS - 3780	$695	D-65
BIS-HASP	$995	D-65
BIS-HASP VERSION 1.1	$995	D-65
BIS 3270 VERSION 4.0	$695	D-65
BIS-3270 VERSION 4.0	$695	D-65
CHAMELEON ASYNC	$1,000	D-66
CHAMELEON BASIC	$1,000	D-66
COMM LINE	$300	D-65
COMM-HANDLER	$295	D-63
COMMUNICATION	$1,500	D-66
COMMUNICATIONS PACKAGE	$200	D-66
COMPAT/280	$3,000	D-64
CONTE	$175	D-63
CRTX	$100	D-64
CRTXE	$250	D-64
CUSTOM CDOS I/O DRIVERS	$195	D-64
DATA TRANS	$100	D-63
DEMON	$29	D-66
DIAL DATA	$100	D-67
DIAL-UP INQUIRY >	$5,000	D-64
DISK TRANSFER	$100	D-64
ELECTRONIC MESSAGE SYSTEM	$495	D-63
FILE TRANSFER SERVER	$2,000	D-66
FRANEM	$1,000	D-66
GENTERM	$79	D-64
GS-500 MICRO NETWORK SYSTEM	N/A	D-64

[illegible]/NET	$2,000	D-61
HELLO CENTRAL!	$99	D-64
HOST COMM	$120	D-66
IBM PC COM	$200	D-69
ICOMM	$150	D-67
INFOSOFT NETWORK SYSTEM - MULTI/NET	N/A	D-65
INTELLICOM	$50 to $250	D-63
INTELLIGENT TERMINAL - VERSION 1	$150	D-61
INTELLIGENT TERMINAL (COMMUNICATION SYSTEM)	N/A	D-61
INTELLICOM INTELLIGENT COMMUNICATIONS	$49	D-63
ISIS-CP/M	$250	D-68
KEYBROOK FILESERVER	$2,700	D-65
LOGON	$150	D-64
LYNC 3.0 COMMUNICATIONS SOFTWARE	$85	D-66
LYNX	$250 to $150	D-67
MAGIC MAIL	$150	D-67
METERED UTILITY MONITORING SYSTEM	$175	D-64
MICRO E COM	N/A	D-67
MICROTERM	$80	D-66
MICROTELEX V 1.02	$150	D-63
MICRO X.25	N/A	D-67
MODEM COMMUNICATIONS	$595	D-64
MODEM-86 TELECOMMUNICATIONS UTILITY	$89	D-63
MONROE BIS-HASP	$795	D-66
MONROE BIS-3780	$750	D-66
MONROE BIS-3270	$750	D-66
[illegible] TTY EMULATOR	$95	D-68
MONROE 3270 SNA/SDLC	$995	D-66
NCR COMM	$400	D-65
NETWORK ACCESS SERVICES	N/A	D-68
OCLC INTERFACE	$5,000	D-64
OCTACOMM/940	$2,750	D-64
OMNITERM	$95 to $175	D-65
ONLINE	$90	D-68
P-TERM THE PROFESSIONAL	$130	D-68
PASSPORT-MICRO-TO HOST COMPUTER	N/A	D-63
PATHWAY/BSC	$595	D-66
PATHWAY/SNA	$595	D-66
PC/ENET VERSION 1.0	$1,700	D-67
PHONE SECRETARY II	$45	D-68
PRISM PROFESSIONAL SYSTEM	$595	D-62
PROCALL	$350 to $200	D-65
PTWX	$99	D-69
QS CALL	$195	D-67
QS SAM	$795	D-67
QUADROMACK	$900 to $1,000	D-66
REMCOM	$95	D-61
REMOTE	$80	D-64
REMOTE	$150	D-65
SIMP/L	$1,000	D-66
SITREX	$2,000	D-66
SMART TERM I	N/A	D-63
SNA ON MICRO COMPUTERS	N/A	D-66
SOFTCOM TELECOMMUNICATIONS UTILITY	$150	D-67
SOFTWARE HANDLER	$99	D-63
STANDARD & CUSTOM SUPPLY	N/A	D-64
SUPER COM	$19,500	D-67
SUPER-SYNCHRONOUS UTS PROTOCOL	$900	D-64
SYNCH 2780/3780	$500	D-67
SYNCH 2780/3780 V 2.02	$500	D-67
SYNCH 3270	$750	D-67
SYNCH 3270 V 1.3	$750	D-67
TCOM	$79	D-63
TELCOM II	$69	D-66
TELE-PORTER	$80	D-67
TELECOM I	$39	D-66
TELECOMM	N/A	D-66
TELECOMMUNICATIONS	$150	D-67
TELEPHONE TRANSFER II	$80	D-69
TELETARI	$40	D-64
TELETEXT	$80	D-65
TELIOS	N/A	D-62
TERM	N/A	D-67
TERM II	$200	D-66
TERMINAL EMULATOR II	$50	D-69
TERMINAL PROGRAM	$40	D-69
THINKER-PC	N/A	D-63
TRAKCESS	$29	D-63
TRANSEND I	$89	D-66
TRANSEND II	$149	D-66
TRANSEND III	$275	D-66
TRANSEND PC	$169	D-66
TRANSPORTER	$295	D-65
TRC DATA RECORDER/POLLER	$12,500 to $14,500	D-66
TRS-80 COMMUNICATION	$39	D-63
VISI TERM	$100	D-64
VISIANSWER	N/A	D-66
XPTERM	$49 to $59	D-69
XTENDED CDR	$25,000	D-63
Z-TERM	$100	D-66
Z-TERM THE PROFESSIONAL	$150	D-66
3101 EMULATOR	$300	D-63
3276 EMULATOR	$200	D-66
3773 EMULATOR SERVER	$2,000	D-66

Other Systems Software

(Includes Performance Measurement, System Resource Management And Library Management)

ARTIS TM	$8,000	D-51
A/65	$75	D-47
BI-2	N/A	D-71
COMMAND PROCESSOR - COMPROC	$30	D-47
DIAGNOSTICS II	$125	D-38
DISK ENCRYPTION SYSTEM	$60	D-71
DISKETTE LIBRARY MANAGEMENT	$30	D-51
E-86	N/A	D-47
FPP	$250 to $2,500	D-51
IBM BASIC DATA EXCHANGE	$295	D-51
THE INFORMATION CENTER	$5,000	D-51
INTEPERT	$195	D-47
HOW TO USE SUPERCALC	$40	D-38
LEXICOM	$50	D-71
LOADER-PC	N/A	D-38
THE MANAGER	$34	D-47
MENU MODE 2.01	$75	D-47
MICROPRODUCTS APPLEBUG	N/A	D-71
MICROSOFT BASIC INTERPRETER	N/A	D-71
MICROSOURCE/MARATHON LINK	$100	D-51
[illegible]-SOFTWARE MODULE LIBRARY	$295	D-51
[illegible] SYSTEM DISKETTE PROTECTION PROGRAM	$60	D-47
[illegible]-FLOPPY BACK UP AND RESTORE	$150	D-47
PERFORMANCE MONITOR	$60	D-38
PFK KEYLOADER	$89	D-71
RENAISSANCE LIBRARIAN	$600	D-51
SCHEDULE	$150	D-47
THE SMART TERM	$125	D-71
SYSTEM CHECKER	$75	D-38
TRIG-PAC	$250 to $2,500	D-51
VERSA AM DISC	$89	D-47
VERSA VISICALC EXPAND	$89	D-47
VISITERM	$100	D-47
XDT-Z-80 DEBUGGER	$49	D-51



IDMS/R Automatic System Facility.

One database management system provides an Automatic System Facility for system development: IDMS/R.

Fourth generation languages, though excellent productivity tools, only address part of the system development task – namely, steps three and four as shown above. IDMS/R with Automatic System Facility, however, automates all of the steps necessary to develop systems. All you do is specify the data.

The Automatic System Facility dynamically builds the system.

It defines the database; creates screen formats; develops the applications; links the definition, screen and application together, then documents the system.

One DBMS using a powerful system development facility does it all. And does it all automatically. IDMS/R.

For more information or a demonstration on this unique facility, call 617-329-7700. To attend a seminar refer to the following page for a complete schedule.

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Cullinet Software Seminars

Every week Cullinet conducts seminars on integrated software solutions. Topics include a range of software products for successful information systems: IDMS/R, the high performance relational DBMS, Manufacturing and Financial Applications, Integrated Personal Computer Software, and Decision Support Systems for top management.

You can attend these seminars free of charge. Simply check the list below for the date and location most convenient to you. Then call Harry Merkin at (617) 329-7700 to make a reservation for yourself and your associates.

Battle Creek, MI	Dec. 7	Miami, FL	Dec. 2	Ottawa, ONT	Nov. 24
Boise, ID	Dec. 6	Minneapolis, MN	Nov. 29	Providence, R.I.	Dec. 6
Brattleboro, VT	Dec. 9	Mobile, AL	Dec. 1	Quebec City, PQ	Nov. 30
Chicago/ Bloomingdale, IL	Dec. 8	Montreal, PQ (ENG)	Dec. 7	St. Louis, MO	Nov. 30
Columbia, SC	Dec. 7	Montreal, PQ (FR)	Dec. 6	Tallahassee, FL	Dec. 1
Dearborn, MI	Dec. 6	New Orleans, LA	Dec. 15	*Tampa, FL	Nov. 29
Fort Lauderdale, FL	Dec. 1	New York/ Long Island, NY	Dec. 6	Toronto, ONT	Dec. 15
Kansas City, MO	Dec. 14	New York/Rye, NY	Dec. 6	*Valley Forge, PA	Dec. 1
Los Angeles, CA	Dec. 7	New York, NY	Dec. 7	*Vancouver, BC	Nov. 30
Macon, GA	Dec. 15	Omaha, NE	Dec. 15	Wausau, WI	Dec. 13
*Meadowlands, NJ	Nov. 30			Wichita, KS	Dec. 1
				Winnipeg, MAN	Nov. 29

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*indicates seminars that include concurrent sessions on Cullinet's manufacturing and financial application software.

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A. B. DICK CO.
A B DICK ELECTRONIC FILE SYSTEM
Specific Application: Data Base Manager for Very Small Data Base Application
Specific Industry: Not Industry Sensitive
System Requirements: AB Dick Magna III, Magna Writer, Magna SL: CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: June 1982
(See Vendor Profile Page V-1)

ABW CORP.
RL-1 RELATIONAL DATABASE MANAGEMENT
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: DOS 1.1; IBM PC-XT: DOS 2.0
Memory Required: 96.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 119
Date First Installed: April 1983.
(See Vendor Profile Page V-1)

ADPAC CORP.
DESIGN
Specific Application: Computer Assistance for Normalization
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS
Source Language: Adpac
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 3
Date First Installed: November 1982
(See Vendor Profile Page V-2)

ADVANCED DATA MANAGEMENT
DRS
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MOS, TSO, VM/CMS, DEC VAX: VMS
Memory Required: 64.0K bytes
Source Language: Macro Assembler, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 209
Date First Installed: September 1980
(See Vendor Profile Page V-3)

AERONAUTICAL RESEARCH ASSOCIATION OF PRINCETON
DATA BASE MANAGEMENT SYSTEM DRS
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX-11/780, VAX-11/750, VAX-11/730: VMS; DEC PDP-11 Series: RSX, Ias; IBM 3000 Series, 4300 Series: DMS, TSO
Source Language: Assembler, Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease, Time-Sharing
Price: $15,000 to $52,000
Number Installed to Date: 250
(See Vendor Profile Page V-3)

AGS MANAGEMENT SYSTEMS, INC.
PAC III
Specific Application: Designed for Most Complex Multitask Projects, Heavy Construction, Engineering, and Manufacturing
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS/OS; IBM System/38; DEC VAX: VMS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $46,000
Number Installed to Date: 40
(See Vendor Profile Page V-3)

AIMS PLUS CORP.
AIMS + VERSION III
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Integrated Application Generator, DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2700
Memory Required: 28.0K bytes
Source Language: Wang Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,995
Number Installed to Date: 1,000
Date First Installed: November 1978
(See Vendor Profile Page V-4)

AIMS PLUS CORP.
ARMS
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Integrated Application Generator and File Manager
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 16.0K bytes
Source Language: Wang Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,995
Date First Installed: October 1983

AMCOR COMPUTER CORP.
AMBASE DATA BASE MANAGEMENT SYSTEM
Additional Product Classification: Report Generator, Program Generators/Aids, Application Development Tools
Specific Application: Application Development, Data Base Management, Report Generation
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, DEC VAX-11/750: VMS; DEC VAX-11/780: VMS
Memory Required: 256.0K bytes
Source Language: Basic Plus II, Basic
Price: $29,000
Number Installed to Date: 125
(See Vendor Profile Page V-4)

AMERICAN BUSINESS & PROFESSIONAL COMPUTER STORE, INC.
INSURANCE POLICY INFORMATION DATA BASE
Additional Product Classification: Insurance
Specific Application: Complete Policy Details for Auto Homeowners and Most Commercial Lines Except for Packaged Policies
Specific Industry: Insurance
System Requirements: Zenith
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-5)

AMPORT AIED ASSOCIATES
DNA-4
Specific Application: Process Control, Data Collection
Specific Industry: Manufacturing
System Requirements: DEC PDP: Unix, DEC VAX, Prime, HP 3000
Memory Required: 128.0K bytes
Source Language: DNA-4
Purchase Terms: Purchase (license); Rental
Price: $11,000
Number Installed to Date: 50
Date First Installed: January 1976
(See Vendor Profile Page V-5)

ANACOMP, INC.
PURCHASING DECISION SUPPORT
Specific Application: DBMS, Requisitions, Purchase Orders
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, VS1, MVS
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $9,000
Date First Installed: 1983
(See Vendor Profile Page V-5)

ANACOMP, INC.
PURCHASING DECISION SUPPORT/ QUOTATION
Specific Application: Quotation and Contract
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, VS1, MVS
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50,000
Date First Installed: 1983

ANACOMP, INC.
PURCHASING DECISION SUPPORT/ RECEIVING
Specific Application: Receiving and Inspection
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, VS1, MVS
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 3
Date First Installed: 1983

ANACOMP, INC.
PURCHASING DECISION SUPPORT/INVENTORY
Additional Product Classification: Inventory
Specific Application: Inventory Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, VS1, MVS
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50,000
Number Installed to Date: 3
Date First Installed: 1983

ANACOMP, INC.
PURCHASING DECISION SUPPORT/INVOICE
Specific Application: Invoice Processing
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, VS1, MVS
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 3
Date First Installed: 1983

THE ANALYTIC SCIENCES CORP.
LODESTAR
Specific Application: Manage, Edit, Validate, Analyze
Specific Industry: Electric Utility
System Requirements: IBM 4300: MVS, OS/VS
Memory Required: 512.0K bytes
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25,000 to $100,000
Number Installed to Date: 13
Date First Installed: September 1980
(See Vendor Profile Page V-6)

ANISTICS, INC.
CUSTOM ARS
Specific Application: General Purpose Data Based Management Service
Specific Industry: Not Industry Sensitive
System Requirements: DEC 20: Tops 20
Memory Required: 256.0K bytes
Source Language: Fortran, Macro
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $100,000
Date First Installed: 1979
(See Vendor Profile Page V-6)

APPLICATIONS SOFTWARE CORP.
ORIGIN
Additional Product Classification: Data Dictionary
Specific Application: File Maintenance, Report Program, On-Line Update Program, Menu and User Help Text Generation
Specific Industry: Not Industry Sensitive
System Requirements: MAI/Basic Four Boss
Memory Required: 8.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: January 1983
(See Vendor Profile Page V-7)

Large Systems DBMS

APPLIED DATA RESEARCH, INC.
ADR/D-NET-RELEASE 1.1
Specific Application: Distributed Data Processing
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series, 4300 Series; OS, DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $29,100 to $35,700
Date First Installed: 1983
(See Vendor Profile Page V-7)

APPLIED DATA RESEARCH, INC.
ADR/DATACOM/DB
Specific Application: Relational Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 370, 3000 Series OS, DOS
Source Language: Assembler
Purchase Terms: Purchase (license); Rental; Lease
Price: $59,600 to $73,000

APPLIED MICROCOMPUTER TECHNOLOGY
THE CREATOR
Specific Application: Program Generating DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Altos; Oasis; Onyx; IBM PC
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 200
Date First Installed: June 1981
(See Vendor Profile Page V-8)

ASK COMPUTER SYSTEMS, INC.
MANMAN/QUIZ
Specific Application: Report Writer
Specific Industry: Manufacturing
System Requirements: HP 3000 Images; DEC VAX: VMS
Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $9,000
Date First Installed: 1981
(See Vendor Profile Page V-9)

AUTOMATED SKILL, INC.
SUPERENGLISH II
Specific Application: End User Data Base
Specific Industry: Not Industry Sensitive
System Requirements: DG: AOS, AOS/VS
Memory Required: 128.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000 to $25,000
Number Installed to Date: 100
Date First Installed: 1977
(See Vendor Profile Page V-10)

BAIRFIELD CONSULTING, INC.
DMS
Specific Application: DBMS Application Development Tool
Specific Industry: Not Industry Sensitive
Memory Required: 80.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 4
Date First Installed: August 1982
(See Vendor Profile Page V-11)

BOEING COMPUTER SERVICES CO.
BCS RIM - RELATIONAL INFORMATION MANAGEMENT
Additional Product Classification: Report Generator, Query Languages
Specific Application: Information Management
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, IBM 3030, 3080, 4300 Series: VM/CMS; CDC Cyber: NOS; Cray: COS
Source Language: Fortran
Source Code Available: Yes
Price: $7,500
Number Installed to Date: 45
Date First Installed: January 1983
(See Vendor Profile Page V-13)

BPI SYSTEMS, INC.
INFORMATION MANAGEMENT SYSTEM
Specific Industry: Not Industry Sensitive
System Requirements: PC-DOS, CP/M, MS-DOS, APPLE-SOS
Memory Required: 64.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-13)

BRITTON LEE
IDM SYSTEM - UNIX
Specific Application: Relational Database Management
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 Series: Unix; DEC VAX-11 Series: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $30,000
Number Installed to Date: 20
Date First Installed: September 1981
(See Vendor Profile Page V-13)

BRITTON LEE
IDM SYSTEM - VM/CMS
Specific Application: Relational Database Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series: VM/CMS
Memory Required: 1.0M bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $95,000
Number Installed to Date: 3
Date First Installed: June 1983

BRITTON LEE
IDM SYSTEM - VMS
Specific Application: Relational Database Management
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX-11 Series: VMS
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $60,000
Number Installed to Date: 30
Date First Installed: June 1982

CALCULON CORP.
CALCON
Additional Product Classification: Report Generator
Specific Application: General Purpose Project Management Control System With Fully Integrated Data Entry, DBMS, and Report Generation Facilities
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS; Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $11,700
Number Installed to Date: 6
Date First Installed: March 1983
(See Vendor Profile Page V-15)

CALIFORNIA SOFTWARE PRODUCTS, INC.
MAXXIMUM
Specific Application: DBMS
Specific Industry: Engineering
System Requirements: Gould SEL: PX; IBM 4300 VM/CMS
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1977
(See Vendor Profile Page V-15)

CALL COMPUTER, INC.
MAIN MANAGER
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CPM
Memory Required: 128.0K bytes
Source Language: Micro Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 1,000
Date First Installed: January 1972
(See Vendor Profile Page V-16)

THE CAMBRIDGE SYSTEMS GROUP
AUTOMATED SPACE MANAGEMENT SYSTEM 2
Specific Application: Automated Disk Base Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 VSI; IBM 3030 Series: SVS; IBM 4300 Series: MVS
Source Language: ALC
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $19,500
Number Installed to Date: 100
Date First Installed: 1984
(See Vendor Profile Page V-16)

CENTURY ANALYSIS, INC.
PLUS/4
Specific Application: A Relational Database for Use With NCR Mainframes
Specific Industry: Not Industry Sensitve
System Requirements: NCR: VRX: B/3
Memory Required: 128.0K bytes
Source Language: Cobol, Nest/3
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $11,000
Number Installed to Date: 175
Date First Installed: 1979
(See Vendor Profile Page V-17)

CINCOM SYSTEMS, INC.
MINI TOTAL DBMS
Specific Application: Realtime DBMS
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, HP Level 6; IBM System/34; Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-19)

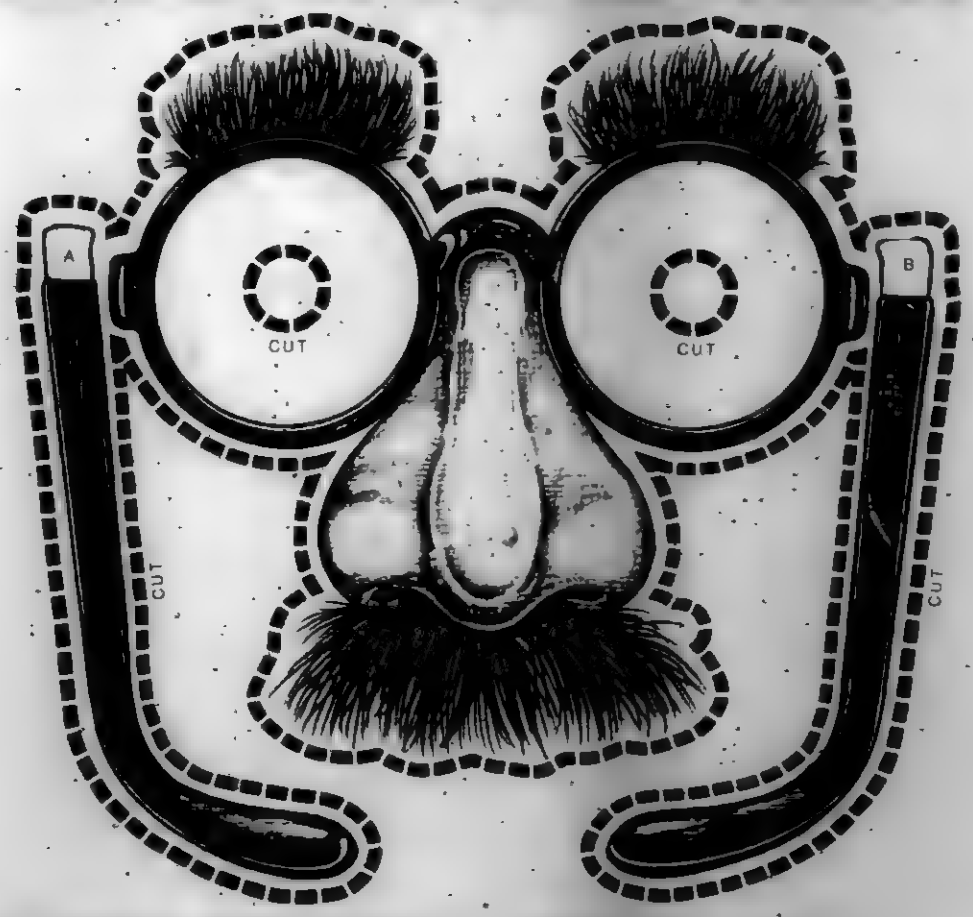
CINCOM SYSTEMS, INC.
TIS
Specific Application: DBMS (Reactional)
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, E-DOS, OS, MVS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)

CINCOM SYSTEMS, INC.
TOTAL DATA BASE MANAGEMENT PROGRAM
Specific Application: Realtime DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, DOS/VS, OS, MVS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $44,000

COMARK (FIRST RESEARCH)
MARKET RESEARCH
Specific Application: Data Collection
System Requirements: Oasis
Memory Required: 64.0K bytes
Source Language: Cbool
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 5
Date First Installed: 1981
(See Vendor Profile Page V-19)

COSE CORP.
COSE-ONE
Additional Product Classification: Banking
Specific Application: Data Base Management System for Processing Mortgages and Loans
Specific Industry: Banking/Financial
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)

WHAT TO WEAR TO WORK IF YOU BUY THE WRONG DBMS INSTEAD OF OUR MODEL 204.



Picking the best, most productive DBMS for an OS, DOS or CMS environment requires the use of all your faculties. Because many DBMSs never live up to their promises. And sooner or later those deficiencies are bound to catch up with you. Leaving you looking for something to hide behind.

Computer Corporation of America doesn't have to put on an act to convince you. Our MODEL 204 DBMS is the only commercial DBMS ever designed from scratch for online systems. Every other DBMS was converted from batch. And that means new applications come up faster with MODEL 204. In fact, 5 to 50 times faster. And your applications and databases are much easier to maintain.

What about performance? If you end up with a DBMS that can barely carry a few million records and a dozen or so users, you won't be able to mask the fact forever. Especially if someone finds out that MODEL 204 can handle up to 513 billion records and 999 concurrent updates.

Now the advantages of MODEL 204 are available for the DOS/VS(E) and native CMS environments. Without sacrificing either performance or productivity.

In the DOS world, MODEL 204 is the only DBMS with a direct teleprocessing interface. Which saves the resources and productivity costs of a terminal monitor.

Our native CMS implementation outperforms other DBMSs because it utilizes its own I/O routines without modification to either VM or CMS.

Finally, two other things that no other DBMS can say. MODEL 204 received the highest overall rating in a recent *Datapro* survey, 3.5.[1] And it's the fastest growing system for IBM mainframes from an independent vendor.[2]

Now faced with these facts wouldn't you look silly buying anything but MODEL 204 DBMS?

MORE ON MODEL 204 DBMS.

CWG 11/23 G

☐ Make a presentation. ☐ Let's put MODEL 204 in and benchmark.
☐ Send me a brochure. ☐ Send me info on free DBMS seminars.
Operating Environment: ☐ OS ☐ DOS ☐ CMS

NAME _____ TITLE _____
COMPANY _____
ADDRESS _____
CITY _____
STATE _____ ZIP _____
TELEPHONE _____

Computer Corporation of America
Four Cambridge Center, Cambridge, MA 02142 (617) 492-8860

1 Datapro "User Ratings of Proprietary Software COMPLETE" November 1982 2 Computerworld December 20, 1982

Other Offices: New York, Houston, Dallas, Los Angeles, San Francisco, Chicago, Philadelphia, Atlanta, Washington, D.C., Morristown, NJ Representatives: Canada, U.K., Europe, Australia, Japan, Saudi Arabia.

Large Systems DBMS

Number Installed to Date: 60
Date First Installed: 1976
(See Vendor Profile Page V-19)

COMMERCIAL SYSTEMS CORP.
BUSINESS LICENSE SYSTEM
Specific Application: Calculates and Prints for Business Assignments to Certain Geographical Areas
System Requirements: DG: R-DOS, AOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 30
Date First Installed: 1981
(See Vendor Profile Page V-21)

COMMERCIAL SYSTEMS CORP.
VOTER REGISTRATION SYSTEM
Specific Application: Registration for all Voters, Voter Lists By Precinct
System Requirements: DG: R-DOS, AOS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 30
Date First Installed: 1981

COMPLETE COMPUTER SYSTEMS
CREATE
Additional Product Classification: Data/File Management, WP/Text Editing, Report Generator
Specific Application: Report Writer, Word Processing, System Generator, File Management, DBMS
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS, DOS, AOS
Memory Required: 64.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $21,000
Number Installed to Date: 50
Date First Installed: 1976
(See Vendor Profile Page V-22)

COMPU-DRAW
DSPACK
Specific Application: Information Management
Specific Industry: Not Industry Sensitive
System Requirements: Osborne: CP/M; Xerox 820: CP/M; Kaypro II: CP/M
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195
Date First Installed: May 1982
(See Vendor Profile Page V-22)

COMPUTER ASSOCIATES
CA-RELATIONAL DATABASE SYSTEM
Specific Application: Relational Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: MVT; IBM 360 Series: DOS, OS, MVS
Memory Required: 500.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 7
Date First Installed: 1983
(See Vendor Profile Page V-23)

COMPUTER CORP. OF AMERICA
MODEL 204
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series: OS, DOS, IBM 3300: CMS
Memory Required: 500.0K bytes
Source Language: 360 Instruction
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $99,000 to $235,000
Number Installed to Date: 250
Date First Installed: 1967
(See Vendor Profile Page V-23)

COMPUTER CORP. OF AMERICA
MODEL 204 DATABASE MANAGEMENT SYSTEM
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300 Series: OS: DOS/VSE
Memory Required: 350 0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $155,000 to $235,000
Number Installed to Date: 175
Date First Installed: 1971

COMPUTER TECHNIQUES, INC.
DUEO-IV
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: DBMS and Application Development Tool
Specific Industry: Not Industry Sensitive
System Requirements: Prime 50 Series: Primos: Midos: Midos+
Memory Required: 64 0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license); Rental
Date First Installed: 1974
(See Vendor Profile Page V-27)

COMPUTER TIME SHARE
DATA STORAGE AND RETRIEVAL SYSTEM
Specific Application: DRIVE
Specific Industry: Not Industry Sensitive
System Requirements: DG: Iris: Microtec Bits
Memory Required: 64.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 6
Date First Installed: June 1983
(See Vendor Profile Page V-28)

DENTEL INFORMATION SYSTEMS
RT FILE
Additional Product Classification: Report Generator, Data/File Management, Data Dictionary, Query Languages, Security/Auditing
Specific Application: Relational DBMS
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, RT-11
Source Language: Fortran, Macro-11
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $9,500
Number Installed to Date: 350
Date First Installed: 1983
(See Vendor Profile Page V-30)

CONTINENTAL SOFTWARE, INC.
LIFETRACE
Additional Product Classification: Insurance, Report Generator
Specific Application: DBMS, Cases, Retrieval, Letter Writing, Report Generator
Specific Industry: Insurance
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795
Date First Installed: 1982
(See Vendor Profile Page V-30)

CORDATUM
SAMANTHA
Specific Application: Textual Database Management and Composition System
Specific Industry: Publishing
System Requirements: IBM 4300 Series; OS
Memory Required: 100.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50,000
Number Installed to Date: 35
Date First Installed: 1978
(See Vendor Profile Page V-31)

CORPORATE COMPUTER SYSTEMS, INC.
ASK REV C01.83
Specific Application: Data Base Inquiry and Reporting
System Requirements: HP 1000; HP 3000
Memory Required: 28.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 24
Date First Installed: May 1982
(See Vendor Profile Page V-31)

CREATIVE APPLICATIONS, INC.
DBM
Specific Application: APL Data Base Management System Made of APL Language
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; IBM 5120; TI BUS: APL
Memory Required: 64.0K bytes
Source Language: APL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200 to $3,000
Number Installed to Date: 50
Date First Installed: 1979
(See Vendor Profile Page V-31)

CSI (COMPUTER RESOURCES, INC.)
RELATE TM/3000
Additional Product Classification: Graphics, Report Generator
Specific Application: Relational DBMS With Colorgraphics and Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 256.0K bytes
Source Language: SPL
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $9,950 to $18,500
Number Installed to Date: 30
Date First Installed: November 1980
(See Vendor Profile Page V-32)

CULLINET SOFTWARE, INC.
DISTRIBUTED DATABASE SYSTEM (DDS)
Specific Application: Distributed DBMS Network
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series, 430 Series
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $30,000
Number Installed to Date: 59
Date First Installed: March 1980
(See Vendor Profile Page V-33)

CULLINET SOFTWARE, INC.
INTEGRATED DATABASE MANAGEMENT SYSTEM
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series, 430 Series
Memory Required: 600 0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $50,000
Number Installed to Date: 1,175
Date First Installed: May 1973

CYTROL, INC.
CYT-DB DATA BASE MANAGER
Specific Application: Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/24, 11/70: RSX-11M; DEC VAX: VMS
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $17,000 to $25,000
Number Installed to Date: 30
Date First Installed: August 1976
(See Vendor Profile Page V-34)

CYTRON, INC.
CYX-TRANSACTION PROCESSING SYSTEM
Additional Product Classification: Communications TP Monitors
Specific Application: Provides Data Communications Management and Data Base Management for DEC PDP-11 and VAX-Based Systems
Specific Industry: Not Industry Sensitive

System Requirements: DEC PDP-11: RSX-11M, DEC VAX: VMS
Memory Required: 144.0K bytes
Source Language: Assembler, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $30,000 to $45,000
Number Installed to Date: 30

DATABASE SYSTEMS CORP.
FACTS
Additional Product Classification: Query Languages
Specific Application: Define, Create Files, Generate Reports, Data Entry
Specific Industry: Not Industry Sensitive
System Requirements: Prime 250-II, 850 Primos
Memory Required: 125.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: September 1979
(See Vendor Profile Page V-35)

DATABASE SYSTEMS CORP.
FAST
Additional Product Classification: Query Languages
Specific Application: Multikey, Multiuser Isam File Management System, Midas Compatible, 199
Specific Industry: Not Industry Sensitive
System Requirements: Prime 250-II, 250 Primos
Memory Required: 125.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: September 1979

DATA BASIC, INC.
FILE PAC
Specific Application: Low End User-Oriented Direct or File Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: Xerox 8000, MS-DOS; IBM PC: CP/M; Apple
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 50
Date First Installed: 1980
(See Vendor Profile Page V-35)

DATA BASIC, INC.
SYSTEM PAC
Specific Application: Upgrade of File Pac to Include A Screen Design System for Data Update and Other Utilities
Specific Industry: Not Industry Sensitive
System Requirements: Xerox 8000, CP/M; IBM PC: PC-DOS; Apple
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 200
Date First Installed: 1979

DATABILITY SOFTWARE SYSTEMS, INC.
CONTROL 10/20
Additional Product Classification: Report Generator, Program Generators/Aids, Application Development Tools
Specific Application: Information Management System
Specific Industry: Not Industry Sensitive
System Requirements: DEC System 20/20, 20/40: Tops 20; DEC System 10: Tops 10
Source Language: Bescom
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 77
Date First Installed: July 1979
(See Vendor Profile Page V-35)

DATA CENTER CORP.
HIERARCHICAL DATA BASE MANAGEMENT SYSTEM
Specific Application: Integrated Information Management System
Specific Industry: Not Industry Sensitive
System Requirements: DG: DOS; IBM PC-XT: PC-DOS, R-DOS, AOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 100
Date First Installed: 1977
(See Vendor Profile Page V-35)

DATAMARK SYSTEMS, INC.
REMOTE DATA BASE
Additional Product Classification: Communications TP Monitors
Specific Application: Remote Data Base
Specific Industry: Not Industry Sensitive
System Requirements: GA-16, 1600DT, 1600XT: Control
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500 to $7,000
Number Installed to Date: 25
Date First Installed: February 1981
(See Vendor Profile Page V-37)

DATA TRAIN, INC.
BOOKKEEPER II
Additional Product Classification: Accounting
Specific Application: Bookkeeping DBMS
Specific Industry: Not Industry Sensitive
System Requirements: DOS: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-39)

DAVID COOK ASSOCIATES
DATA TABLES
Specific Application: DBMS
Specific Industry: Oil and Gas
System Requirements: DEC VAX: RSTS, DEC 70
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 3
Date First Installed: 1982
(See Vendor Profile Page V-39)

DBMS DESIGN AND BUILDERS OF INFORMATION SYSTEMS
ITOMAM BASE III
Specific Application: Storage Back-Up System
Specific Industry: Not Industry Sensitive
System Requirements: OS-80U, TURBO-DOS, CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $395
(See Vendor Profile Page V-40)

DIGITAL ANALYSIS CORP.
UNIFY
Specific Application: DBMS
System Requirements: PE 3200 Series, Gould/SEL Concept 32: Unix; Charles River Universe; Cromemco 68000
Memory Required: 256.0K bytes
Source Language: RM Cobol, Fortran, Pascal, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500 to $20,000
Number Installed to Date: 1,000
Date First Installed: 1982
(See Vendor Profile Page V-42)

DIGITECH, INC.
DATA BASE MANAGEMENT SYSTEM
Specific Application: Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: Plus, CP/M
Memory Required: 56.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 12
Date First Installed: October 1982
(See Vendor Profile Page V-42)

DISCOPHILE SYSTEMS, INC.
OUTPUT
Specific Application: General Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: DEC: CP/M; DG
Memory Required: 128.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500 to $25,000
Date First Installed: 1971
(See Vendor Profile Page V-43)

DIVERSIFIED PROGRAMMING, INC.
IDOL (INTERACTIVE DEFINITION ORIENTED LANGUAGE)
Specific Application: Data Base/File Management
Specific Industry: Wholesale/Distribution
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $995
(See Vendor Profile Page V-43)

DJR ASSOCIATES, INC.
FMS
Additional Product Classification: Report Generator, Program Generators/Aids, Application Development Tools, Languages,Compilers, Assemblers
Specific Application: DBMS, Report Generator, Applications Development Languages
Specific Industry: Not Industry Sensitive
System Requirements: CP/M, DOS, Unix
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 1,000
Date First Installed: October 1978
(See Vendor Profile Page V-43)

DUN & BRADSTREET COMPUTING SERVICES
NOMAD 2
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: VM/CMS, VM/SP/HO
Memory Required: 4.0M bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $135,000
Number Installed to Date: 80
Date First Installed: 1982
(See Vendor Profile Page V-44)

DUN & BRADSTREET COMPUTING SERVICES
DATA ANALYZER
Specific Application: Information Retrieval and Analysis Systems
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 370, System 360 DOS, VS, MVS
Memory Required: 120.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $14,000
Date First Installed: 1971

EFFICIENT COMPUTERS CO.
DATA BASE 1000
Specific Application: DBMS
Specific Industry: Not Industry Sensitive, Wholesale/Distribution, Medical, Legal
System Requirements: HP 1000, RTE 6, RTE IVB, RTE A
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-45)

ELSIT USA, INC.
IKON
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 36.0K bytes
Source Language: Assembler
Source Code Available: Yes

Large Systems DBMS

Purchase Terms: Purchase (license)
Price: $30K
Date First Installed: August 1983
(See Vendor Profile Page V-46)

EPICORE, INC.
ZIN
Specific Application: Organize Company Data
Specific Industry: Not Industry Sensitive
System Requirements: Zilog, Unix, Zeus
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $11,000
Number Installed to Date: 5
Date First Installed: 1982
(See Vendor Profile Page V-47)

ESCA CORP.
HABITAT
Specific Application: Real Time DBMS
Specific Industry: Engineering, Scientific
System Requirements: DEC VAX-11/750: VMS; DEC VAX-11/780, VAX-11/782
Source Language: Fortran, Macro
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $70,000 to $100,000
Number Installed to Date: 30
Date First Installed: 1981
(See Vendor Profile Page V-47)

EVALUATION AND PLANNING SYSTEMS
FCSHIERARCHY
Specific Application: Hierarchical Data Base
Specific Industry: Not Industry Sensitive
System Requirements: IBM: TSO: CMS: Cics
Memory Required: 256.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 3,000
Date First Installed: 1973
(See Vendor Profile Page V-47)

EVALUATION AND PLANNING SYSTEMS
FCSNDS
Specific Application: Relational Data Base System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: TSO, CMS, Cics
Memory Required: 256.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,000
Number Installed to Date: 3,000
Date First Installed: 1973

FITZ SYSTEMS, INC.
DBA 34/36
Specific Application: DBMS That Creates Up to 10 Alternate Access Paths for Existing Files for Use in RPG-II Programs, Query and Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36: SSP
Memory Required: 25.0K bytes
Source Language: RPG-II, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $4,300
Number Installed to Date: 12
Date First Installed: March 1980
(See Vendor Profile Page V-49)

FORMATION, INC.
TRANSACTION MANAGEMENT SYSTEM TMS
Specific Application: Application Software Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: VM/370; IBM 4300: VM/370; Formation 4000: VM/370
Memory Required: 1.0M bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 6
Date First Installed: January 1982
(See Vendor Profile Page V-49)

FORTEX SYSTEMS CORP.
ORACLE
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300; IBM 370
Memory Required: 1.0M bytes
Source Language: C Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000 to $40,000
Number Installed to Date: 5
Date First Installed: December 1982
(See Vendor Profile Page V-49)

GENERAL RESEARCH CORP.
PRIS
Specific Application: Problem Report Information System
Specific Industry: Not Industry Sensitive
System Requirements: DEC: OS-DOS; Honeywell: VAX/VMS; Univ: Goos; CDC: Exec
Memory Required: 15.0K bytes
Source Language: V-ltran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $59,500
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-51)

GENTRY, INC.
PAL DATA BUILDER
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE IV
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Date First Installed: September 1983
(See Vendor Profile Page V-51)

GOLDATA COMPUTER SERVICES, INC.
GOLDATABASE
Specific Application: DBMS for A Novice User
Specific Industry: Fortune 1000
System Requirements: Apple: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $29,500
Date First Installed: May 1983
(See Vendor Profile Page V-52)

GOULD, INC.
GARDEN-INTERACTIVE DATA MANIPULATION LANGUAGE
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,800
(See Vendor Profile Page V-52)

GOULD, INC.
KERNEL - DATA DESCRIPTION AND MANIPULATION
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Memory Required: 750.0K bytes
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $19,400

GOULD, INC.
SEED DATA BASE SOFTWARE PACKAGE
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Memory Required: 750.0K bytes
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $49,500

GOULD, INC.
TOTAL - DATA BASE MANAGEMENT SYSTEM
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Source Language: Cobol, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $18,000

GRAFTER, INC.
REMIS
Specific Application: Relational DBMS Ties CAD/CAM to Production Scheduling and Accounting
Specific Industry: Engineering
System Requirements: Gould Concept/32: MPX
Memory Required: 1.0M bytes
Source Language: Fortran, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 5
Date First Installed: 1983
(See Vendor Profile Page V-52)

GRW SYSTEMS, INC.
MARS (MULTIPLE ACCESS RETRIEVAL)
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: BTI 8000: VRM; BTI 5000: Mutus
Memory Required: 6.4M bytes
Source Language: Extended Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 75
Date First Installed: January 1978
(See Vendor Profile Page V-52)

GRW SYSTEMS, INC.
MARS-MULTIPLE ACCESS RETRIEVAL
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: BTI 8000: VRM; BTI 5000: Mutus
Memory Required: 6.4M bytes
Source Language: Extended Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 150
Date First Installed: January 1977

HBR SYSTEMS, INC.
NOAH
Specific Application: Combination of Software and Hardware to Run DBMS Tools
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 88; 80: RMS; Datapoint 86; Onyx 8000: Unix
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: September 1982
(See Vendor Profile Page V-54)

HUMAN SOFT
DB PLUS
Specific Application: Compresses and Decompresses Transform File Structure, Sorts
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III; IBM PC: PC-DOS; North Star: CP/M, MS-DOS
Memory Required: 128.0K bytes
Source Language: C Code
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-55)

INFO DATA SYSTEMS, INC.
INQUIRE
Specific Application: Information Resource Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370: MDS, IBM System/3000: OS; IBM 4300 Series: VM
Memory Required: 375.0K bytes
Source Language: PL/1, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $50,000 to $195,000

Number Installed to Date: 300
Date First Installed: 1969
(See Vendor Profile Page V-57)

INFORMATICS GENERAL CORP.
INQUIRY IV-TMS
Specific Application: On-Line Data Retrieval and Display Systems
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: OS, IBM 370: DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 275
Date First Installed: 1978
(See Vendor Profile Page V-57)

INFORMATION BUILDERS, INC.
FOCUS
Specific Application: DBMS Applications
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series, 370, 3000 Series: VM/CMS, MVS; Amdahl: VM/CMS, MVS
Source Language: Fortran, BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $66,000
Number Installed to Date: 785
Date First Installed: May 1975
(See Vendor Profile Page V-57)

INFORMATION PROCESSING ARCHITECTS
THE LINK SYSTEM
Specific Application: Constructs A Virtual Data Base Machine
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200: Basic II
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 2
Date First Installed: June 1981
(See Vendor Profile Page V-58)

INFORMICS, INC.
TEXT PROCESSING SERVICE TPS
Specific Application: Data Base Management for Text Files
Specific Industry: Publishing Libraries
System Requirements: DEC 10: Tops 10
Memory Required: 2.3M bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-58)

INTELLIGENETICS
KEE (KNOWLEDGE ENGINEERING ENVIRONMENT)
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: DEC System 10, System 20 Series: Top 10, 20; XDS 1100 Series: VMS; Symbolic: Unix
Memory Required: 1.0M bytes
Source Language: Lisp
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 5
Date First Installed: July 1983
(See Vendor Profile Page V-60)

INTERNATIONAL MARKET RESOURCES, INC.
STATUS SALES INFORMATION SYSTEM
Specific Application: Designed to Provide A Sales Office With Combination Word Processor, DP and Automatic Calendar to Assist In Managing A Sales Territory
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX +300: VMS
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $1,500
Number Installed to Date: 4
Date First Installed: 1982
(See Vendor Profile Page V-61)

INVENTORY SYSTEMS, INC.
DOSE PHARMACY SYSTEM
Specific Application: DBMS, Drug Distribution
System Requirements: IBM Series/1: EDX
Source Language: EDL Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1977
(See Vendor Profile Page V-61)

IPT (INFORMATION PROCESSING TECHNIQUES)
SUPER ENGLISH IX
Specific Application: Data Base Management and Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: DG: RDOS: AOS
Memory Required: 64.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $9,000
Number Installed to Date: 100
Date First Installed: 1981
(See Vendor Profile Page V-61)

ISE-USA
MDBS III DMS
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Unix; CP/M; MP/M; TRS-DOS, MS-DOS
Source Language: Assembly, C
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: December 1982
(See Vendor Profile Page V-61)

ISE-USA
MDBS III DDL/DMS: STANDARD
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Zilog Z80: CP/M, MP/M; Intel 8080/8085: Unix: TRS-DOS: MS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly, C
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: December 1982

LAZAROV SOFTWARE SYSTEMS, INC.
OFFICE MULE DBM LANGUAGE
Additional Product Classification: Report Generator, Data/File Management, Data Dictionary, Query Languages, Security/Auditing
Specific Application: All Business Applications
Specific Industry: Not Industry Sensitive
System Requirements: Microdata: (Pick) Reality; GA: Pick
Memory Required: 128.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 2
Date First Installed: August 1983
(See Vendor Profile Page V-65)

LOGICA, INC.
BACK UP AND RECOVERY
Specific Application: Before and After Image Logging
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3000 Series: MVS; Gcos 3; Prime 50 Series: Primos; DG Nova: AOS/VS
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 150
Date First Installed: 1979
(See Vendor Profile Page V-66)

LOGICA, INC.
BASIC SYSTEM
Specific Application: Includes the Nucleus Language Interface
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3000 Series: MVS, Honeywell DPS 8: Gcos; Prime 50 Series: Primos: AOS/VS
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 150
Date First Installed: 1979

LOGICA, INC.
MULTI USER CONCURRENCY CONTROL
Specific Application: Predicate Locking to Record Level
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3000 Series: MVS; Honeywell DPS 8: Gcos, Prime 50 Series: Primos; DG Nova: AOS/VS
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 150
Date First Installed: 1979

LOGICA, INC.
RAPIDE
Specific Application: Rapid Interactive Development Environment
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3000 Series: MVS, Honeywell DPS 8: Gcos; Prime 50 Series: Primos; DG Nova: AOS/VS
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 150
Date First Installed: 1979

LOGICA, INC.
RAPPORT
Specific Application: Relational DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3000 Series: MVS, Honeywell DPS8; Prime 50 Series: Primos; DG Nova: AOS/VS
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $12,500 to $61,000
Number Installed to Date: 150
Date First Installed: October 1979

LOGICAL SYSTEMS
ACCESS
Specific Application: Data Base Management and Program Generator
Specific Industry: Consumer Electronics
System Requirements: DEC: POS, RSTS/E: VMS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $9,800
Date First Installed: 1978
(See Vendor Profile Page V-66)

MANUFACTURING CONTROL SYSTEMS, INC.
SPEED
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $900 to $4,600
Number Installed to Date: 3
Date First Installed: January 1982
(See Vendor Profile Page V-66)

MARITIME DATA NETWORK, LTD.
MARITIME DATA NETWORK MARDATA
Specific Application: On-Line Information Database
Specific Industry: Government, Transportation
Source Code Available: No
Price: $1,000 to $4,000
Number Installed to Date: 400
Date First Installed: 1976
(See Vendor Profile Page V-66)

MARYLAND COMPUTER SERVICES, INC.
DATA BASE MAINTENANCE
Specific Application: Allows for A

Large Systems DBMS

Change Without Adding or Deleting Main
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 15
Date First Installed: 1982
(See Vendor Profile Page V-89)

MATHEMATICA PRODUCTS GROUP
RAMIS II
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $40,000 to $80,000
Number Installed to Date: 1,000
Date First Installed: 1977
(See Vendor Profile Page V-70)

MCCORMACK & DODGE CORP.
CP-IM
Additional Product Classification: Project Analysis
Specific Application: Capital Project Analysis Application With DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $22,000
(See Vendor Profile Page V-70)

METRITEK, INC.
SMART VENDOR II
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX, DOS
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-72)

MICRO ARCHITECT, INC.
INTEGRATED OFFICE AUTOMATION SYSTEM
Additional Product Classification: WP/Text Editing
Specific Application: Data Base Manager, Word Processing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT: PC-DOS: CP/M 80; TRS-80/II: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $998
Date First Installed: 1981
(See Vendor Profile Page V-73)

MICRO DATA BASE SYSTEMS, INC.
KNOWLEDGE MANAGER (KNOWLEDGEMAN)
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Utilities Program
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8086/8088: PC-DOS, MS-DOS, CP/M, CP/M 86
Memory Required: 192.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Date First Installed: June 1983
(See Vendor Profile Page V-73)

MICRO DATA BASE SYSTEMS, INC.
MDBS-EDA (EDUCATIONAL AID)
Specific Industry: Education
System Requirements: Zilog Z-80: CP/M; Intel 8080, 8085, 8086, 8088: MP/M 86; PDP-11: Unix, Xenix, MP/M
Memory Required: 64.0K bytes
Source Language: Assembly C
Purchase Terms: Purchase (license)
Date First Installed: January 1983

MICRO FIVE CORP.
UPDATE
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: Micro V Series/10: STAR-DOS
Memory Required: 10.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 1,500
Date First Installed: 1978
(See Vendor Profile Page V-73)

MRP SYSTEMS
INFOTRIVE
Additional Product Classification: Report Generator
Specific Application: DBMS and Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: DG: Iris; Point 4
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,400
Date First Installed: September 1977
(See Vendor Profile Page V-77)

NCR CORP.
ITX-DBS INTERACTIVE TRANSACTION DATABASE
SPECIFIC INDUSTRY: Manufacturing, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation, Nonprofit Organizations
System Requirements: NCR 8300: ITX
Memory Required: 1.0M bytes
Source Language: NCR
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: January 1983
(See Vendor Profile Page V-79)

NCR CORP.
NCR-DMS/LOGICAL VIEW
Specific Application: Data Manager
Specific Industry: Not Industry Sensitive
System Requirements: NCR V-8500, 8000 Series: VRX
Memory Required: 1.0K bytes
Source Language: Cobol 74
Source Code Available: No
Purchase Terms: Rental
Number Installed to Date: 5
Date First Installed: October 1982

ORACLE CORP.
ORACLE
Specific Application: Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM: VM/CMS, DG Eclipse Series: AOS, AOS/VS; DEC PDP-11, VAX: VMS, Unix, RSX, Fortune 32, 16: Unix
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $600 to $96,000
Number Installed to Date: 300
Date First Installed: 1979
(See Vendor Profile Page V-83)

O-W/P DATA PROCESSING
LIMS
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: BTI 5000: Unix
Memory Required: 64.0K bytes
Source Language: Extended Basic, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 7
Date First Installed: January 1982
(See Vendor Profile Page V-83)

PACIFIC SOFTWARE MANUFACTURING CO.
SEQUITUR
Additional Product Classification: WP/Text Editing
Specific Application: Relational DBMS With Integrated Word Processing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; DEC VAX: Unix; Zilog
Memory Required: 9.0K bytes
Purchase Terms: Purchase (license)
Price: $795 to $12,000
Number Installed to Date: 200
Date First Installed: 1981
(See Vendor Profile Page V-84)

PCD SYSTEMS, INC.
LOGIQUEST
Specific Application: Relational Data Base Using Virtual Memory
Specific Industry: Not Industry Sensitive
System Requirements: IBM; TRS, P System; DEC LSI-11: Runtime; Altos
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $550
Date First Installed: 1981
(See Vendor Profile Page V-84)

PCD SYSTEMS, INC.
PC BASE
Specific Application: Relational Data Base Uses Procedure Files
Specific Industry: Not Industry Sensitive
System Requirements: IBM; TRS, P System, Altos: Runtime
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $245
Date First Installed: 1980

PEREGRINE SYSTEMS, INC.
PNMS - II
Specific Application: Problem Change and Configuration Management
System Requirements: IBM PC: CP/M, IBM 3000 Series: Unix: MS-DOS
Memory Required: 64.0K bytes
Source Language: C, Unix, PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-85)

PHASE ONE SYSTEMS, INC.
CONTROL
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: Oasis; TRS-80
Memory Required: 64.0K bytes
Source Language: Assembly, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 30,000
Date First Installed: 1978
(See Vendor Profile Page V-85)

POSSE CO.
DMS-PLUS
Specific Application: Data Base Management System
Specific Industry: Education
System Requirements: DEC VAX: VMS, DEC PDP-11
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $14,000 to $17,500
Number Installed to Date: 150
Date First Installed: 1977
(See Vendor Profile Page V-86)

PRIME COMPUTER, INC.
DBMS - DATABASE MANAGEMENT SYSTEM
Specific Application: Database Management
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Date First Installed: 1978
(See Vendor Profile Page V-87)

PRIME COMPUTER, INC.
DBMS - QUERY
Additional Product Classification: Data/File Management, Query Languages
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Purchase Terms: Purchase (license); Monthly License

Price: $10,000
Date First Installed: 1981

PRIME COMPUTER, INC.
PRIME INFORMATION
Additional Product Classification: Report Generator, Data Dictionary, Query Languages
Specific Application: Any Business Environment
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Price: $25,000
Date First Installed: September 1978

PROFESSIONAL SOFTWARE INNOVATIONS, INC.
DATA BASE MANAGER
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: CPT 8100, 8000, 8525
Source Language: Assembler, PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-86)

PROFESSIONAL SOFTWARE, INC.
ADMINISTRATOR
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Commodore
Source Language: Machine Code
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,995
Date First Installed: September 1981

PROFESSIONAL SOFTWARE, INC.
INFO PRO
Specific Application: Midlevel Data Base Manager
Specific Industry: Not Industry Sensitive
System Requirements: Commodore
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: July 1982

PROJECT SYSTEMS CONSULTANTS
ARTEMIS PROJECT COMPACTION UTILITY (PPACK)
Additional Product Classification: Data/File Management
Specific Application: Automatically Handles Steps to Copy Artemis Project and Data to File, Reconstitute With Maximum DataCompaction
Specific Industry: Project Management
System Requirements: Meter: Artemis
Source Language: Artemis
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,500
Date First Installed: 1981
(See Vendor Profile Page V-89)

PROJECT SYSTEMS CONSULTANTS
ARTEMIS PROJECT DOCUMENTATION UTILITY
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Automated Comprehensive and Standardized Method for Documentation of Artemis Applications
Specific Industry: Project Management
System Requirements: Meter: Artemis
Source Language: Artemis
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $4,500
Date First Installed: 1980

PROMPT BUSINESS INFORMATION SYSTEMS, INC.
PROMPT DATA BASE FACILITIES
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1:EDX
Memory Required: 64.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Date First Installed: 1979
(See Vendor Profile Page V-89)

QUANTUM SYSTEMS, INC.
MICROVISORY
Specific Application: Supervisory Control and Data Acquisition
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RSX-11M
Memory Required: 256.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,500
Date First Installed: 1980
(See Vendor Profile Page V-90)

QUODATA
QDMS
Specific Application: Data Base Management
Specific Industry: Education, Nonprofit Organizations
System Requirements: DEC PDP-11: RSTS/E, DEC VAX: VMS
Memory Required: 1.0M bytes
Source Language: Basic Plus, Macro, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $19,500
Number Installed to Date: 100
Date First Installed: 1976
(See Vendor Profile Page V-91)

RAI BUSINESS SYSTEMS, INC.
HORIZON
Specific Application: General Report Writer for Nontechnical Users
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 4.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 100
Date First Installed: 1979
(See Vendor Profile Page V-91)

RANDALL RUSTIN
XQL
Specific Application: Relational Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: DOS, DEC VAX: Unv, Sage.
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: May 1983
(See Vendor Profile Page V-91)

REAL DECISIONS CORP.
DARTMASTER
Specific Application: Interactive Query, Screening and Viable Format Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370; IBM 4300, DEC, Prime
Memory Required: 1.0M bytes
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000
Date First Installed: 1982
(See Vendor Profile Page V-92)

REAL DECISIONS CORP.
DARTPAC
Specific Application: Entry-Level Retrieval and Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300; DEC, Prime; IBM 370
Memory Required: 1.0M bytes
Source Language: Assembler, Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000
Date First Installed: 1982

RELATIONAL TECHNOLOGY, INC.
INGRES-RELATION DATABASE MANAGEMENT SYSTEM
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, Motorola 6800 Unix
Memory Required: 1.0M bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35,000 to $9,500
Date First Installed: 1973
(See Vendor Profile Page V-92)

SAGE DATA, INC.
THE SAGE SYSTEM
Additional Product Classification: Graphics, Report Generator
Specific Application: Integrated DBMS With Other Utilities That Interface Mainframes to Personal Computers
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3400; IBM 4341: CMS
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1980
(See Vendor Profile Page V-94)

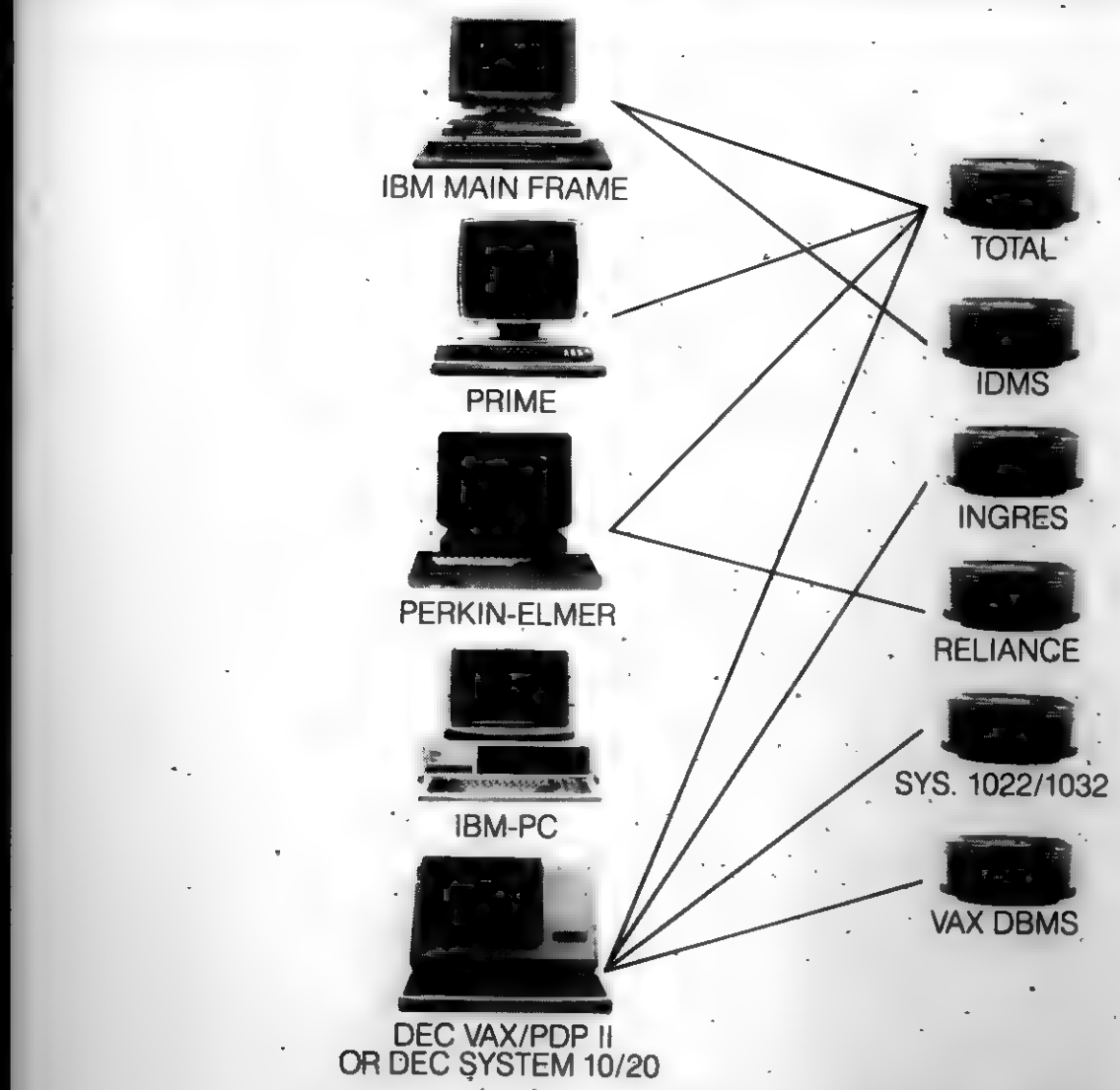
SAS INSTITUTE, INC.
SAS
Specific Application: Statistical Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS; DEC VAX: VMS, DG MX Series: VM/CMS, Prime 50 Series: Primos
Memory Required: 512.0K bytes
Source Language: IBM Assembler, Fortran, PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,500
(See Vendor Profile Page V-95)

SAS INSTITUTE, INC.
SAS/IMS-DL/1
Specific Application: Interface to IBM IM DL/1 Type Data Base
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, VM/CMS, SXS; DG: Eclipse MV Series; DEC VAX: VMS; Prime 50 Series: Primos
Memory Required: 512.0K bytes
Source Language: IBM Assembler, Fortran, PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000

SAUER COMPUTER SYSTEMS
THE SAUER LIBRARY
Specific Application: DBMS and Integrated Accounting Packages
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E; IBM CS9000: Ceos, Ohio Scientific: OS 65U
Source Language: Basic
Purchase Terms: Purchase (license); Rental
Price: $6,000
Number Installed to Date: 200
Date First Installed: September 1974
(See Vendor Profile Page V-95)

SEED SOFTWARE
SEED DATA BASE MANAGEMENT SYSTEM
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: DEC 20: CMS, DEC PDP-11: Tops 10; DEC VAX: VMS; IBM 3000 PC: PC-DOS
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $50,000
Number Installed to Date: 130
Date First Installed: February 1977
(See Vendor Profile Page V-96)

SENTINEL COMPUTER CORP.
DBOS
Specific Application: Data Base Operating System
Specific Industry: Wholesale/Distribution
System Requirements: Sentinel-30; Sentinel-40: Dbos; Sentinel-50; Sentinel-80



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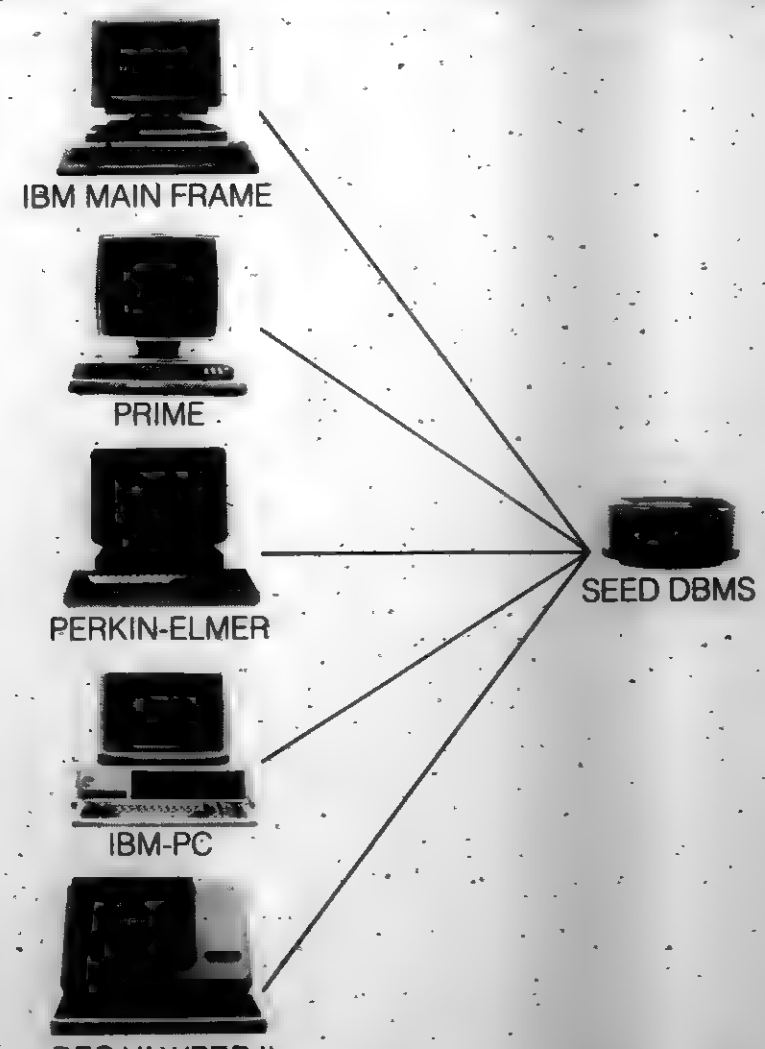

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Computer_____ Oper. Sys._____

UNITED INFORMATION SERVICES, INC.

SEED SOFTWARE, 2300 Walnut Street, Suite 734, Philadelphia, PA 19103

Large Systems DBMS

Memory Required: 128.0K bytes
Source Language: DBL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $3,850
Number Installed to Date: 200
Date First Installed: April 1981
(See Vendor Profile Page V-96)

SIGNAL TECHNOLOGY, INC.
OMNIBASE 1.0
Specific Application: Data Base Management System, VAX/VMS Software Interface, Britton-Lee
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, Britton-Lee IDM 500
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000 to $30,000
Number Installed to Date: 10
Date First Installed: June 1982
(See Vendor Profile Page V-97)

SIGNAL TECHNOLOGY, INC.
SMARTFORM - VERSION 1.5
Additional Product Classification: Data/File Management, Query Languages
Specific Application: A Data Management Productivity Tool Which Allows Forms Design Plus Data Entry, Retrieval, Editing And Deletion Without Programming
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 512.0K bytes
Source Language: Basic V2
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500 to $4,200
Date First Installed: February 1983

SIR, INC.
SIR/SSMS
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS; DEC: VM/CMS; Univ: VMS
Source Language: Sirtran
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1977
(See Vendor Profile Page V-98)

SOFTWARE BASIX, INC.
D BASE II USER GUIDE
Additional Product Classification: Education
Specific Application: Dbase II Instructional Package
Specific Industry: Not Industry Sensitive
System Requirements: CP/M: IBM PC: PC-DOS; Xerox 820: CP/M
Memory Required: 128.0K bytes
Source Language: 8080 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $29
Number Installed to Date: 30,000
(See Vendor Profile Page V-99)

SOFTWARE AG OF NORTH AMERICA, INC.
ADABAS
Specific Application: General Purpose Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 370: MVS; IBM 4300 Series. OS/VSI, IBM 3000 Series: DOS/VS, DOS/VSE
Memory Required: 384.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $106,000
Number Installed to Date: 1,000
Date First Installed: April 1971
(See Vendor Profile Page V-99)

SOFTWARE CRAFTSMEN, INC.
DB1 VERSION 1.4
Additional Product Classification: Data Dictionary, Program Generators/Aids, Application Development Tools
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370/138: MVS, OS/MVT, DOS/VS, VM/CMS
Memory Required: 240.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $100
Number Installed to Date: 33
Date First Installed: 1976
(See Vendor Profile Page V-99)

SOFTWARE HOUSE
SYSTEM 1022
Specific Application: Relational DBMS for DEC 10 and DEC 20
Specific Industry: Not Industry Sensitive
System Requirements: DEC 10: Tops 10; DEC 20: Tops 20
Source Language: Macro-10
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $22,500
Number Installed to Date: 250
Date First Installed: 1974
(See Vendor Profile Page V-99)

SOFTWARE HOUSE
SYSTEM 1032
Specific Application: Relational DBMS for the DEC VAX
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Source Language: VAX Macro
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 15
Date First Installed: 1982

SOFTWARE PRODUCTS INTERNATIONAL
LOGIQUEST III
Additional Product Classification: Accounting, Financial Modeling Languages/DSS
Specific Application: Relational Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM Displaywriter; IBM PC; TRS 80
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $550
Number Installed to Date: 1,500
Date First Installed: December 1980
(See Vendor Profile Page V-100)

SOFTWARE SYSTEMS
THOROUGHBRED IDOL
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Unix; Z8000 Chip
Memory Required: 20.0K bytes
Source Language: SMC Thoughbred
Source Code Available: Yes
Number Installed to Date: 1,600
Date First Installed: 1977
(See Vendor Profile Page V-100)

SOFTWARE SYSTEMS MARKETING, INC.
SOFTWARE MACHINE
Specific Application: Relational Database Application Generator
Specific Industry: Not Industry Sensitive
System Requirements: DG: DOS, R-DOS, AOS
Memory Required: 20.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $5,000 to $25,000
Number Installed to Date: 4
Date First Installed: 1982
(See Vendor Profile Page V-100)

STATISTICAL GRAPHICS CORP.
STAT GRAPHICS
Additional Product Classification: Graphics
Specific Application: Interactive Data Analysis, Statistical Graphics, DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: MVS/TSO; IBM 370: Vspc; IBM 4300: VM
Source Language: APL
Source Code Available: No
Purchase Terms: Purphase (license)
Price: $3,800
Number Installed to Date: 15
Date First Installed: February 1982
(See Vendor Profile Page V-103)

STORED INFORMATION SYSTEMS
SIS - TWO SINGLE LEVEL
Specific Application: Single Level Database
Specific Industry: Manufacturing, Wholesale/Distribution, Custom Job Shop
System Requirements: North Star Advantage: CP/M; Victor 900; Osborne 1: MS-DOS
Memory Required: 40.0K bytes
Source Language: Dbase II
Source Code Available: $200
Purchase Terms: Purchase (license)
Price: $90,000
Number Installed to Date: 4
Date First Installed: April 1982
(See Vendor Profile Page V-103)

STSC, INC.
EMMA DATA MANAGEMENT UTILITIES
Specific Application: Data Management and Reporting System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370/4330: VM/CMS, MVS
Source Language: APL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20,000
Date First Installed: 1900
(See Vendor Profile Page V-104)

SUN INFORMATION SERVICES CO.
SUNINFO
Specific Application: Relational Database, Record Keeping Tracking and Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: DS; IBM 3000 Series
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 2
Date First Installed: 1983
(See Vendor Profile Page V-104)

SYNERCOM TECHNOLOGY, INC.
SYNERMAP
Additional Product Classification: Graphics
Specific Application: Graphics and DBMS for Automated Mapping
Specific Industry: Automated Mapping
System Requirements: DEC VAX: VMS
Memory Required: 1.5M bytes
Source Language: Fortran IV
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 25
Date First Installed: 1979
(See Vendor Profile Page V-105)

SYSTEM AUTOMATION CORP.
PANNET
Additional Product Classification: Report Generator
Specific Application: Generates Reports and Processes Data
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B20; Convergent Technology: Ctos; IBM Mainframe
Memory Required: 384.0K bytes
Source Language: Cobol, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1973
(See Vendor Profile Page V-105)

SYSTEMS AND SOLUTIONS, INC.
DATA BASE MANAGER
Specific Application: Supervisory Job That Handles File Input and Output and Manages Records
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro AM 1000, AM 1000E, AM 1072E, AM 1092E. Amos
Memory Required: 256.0K bytes
Source Language: Alpha Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 10
(See Vendor Profile Page V-105)

SYSTEMS NORTHWEST, INC.
FPM
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RSTS
Memory Required: 128.0K bytes
Source Language: Basic Plus II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
(See Vendor Profile Page V-106)

SYTEK, INC.
RECORD MANAGEMENT SYSTEM
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: DEC Decmate I; COS-310; DEC Decmate II
Memory Required: 32.0K bytes
Source Language: Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $800
(See Vendor Profile Page V-107)

TASCON CORP.
DDCA
Specific Application: DBMS Multiuser
Specific Industry: Not Industry Sensitive
System Requirements: Zilog Z-80: CP/M, Intel 8080: TURBO-DOS; Intel 8085
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 2,500
Date First Installed: 1976
(See Vendor Profile Page V-108)

3CI
INFOCEN
Specific Application: Relational DBMS
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG MV Series: AOS/VS; Unix
Memory Required: 1.0M bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $29,000 to $54,000
(See Vendor Profile Page V-110)

TOP DOWN SYSTEMS
ASPENSEARCH V
Specific Application: Document Database Storage Search and Retrieval System for Large Collection of Documents
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CP/M, DOS, VS, MVS
Memory Required: 256.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license); Rental; Lease
Price: $18,125
Number Installed to Date: 60
Date First Installed: September 1976
(See Vendor Profile Page V-111)

TRISTAR
THE WHOLESALER
Additional Product Classification: Accounting
Specific Application: Inventory Control, Price Leveling Accounts Receivable, and Data Base Management
Specific Industry: Wholesale/Distribution
System Requirements: NCR
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: September 1975
(See Vendor Profile Page V-112)

UNIQ DIGITAL SYSTEMS, INC.
UNIBASE
Specific Application: Uses A High Speed Relational Processor or Networking Up to 64 Computers
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX Series: Unix
Memory Required: 1.0M-bytes
Source Language: C
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: January 1983
(See Vendor Profile Page V-113)

UNIQUE COMPUTER CORP.
UNIFED DATA BASE MANAGEMENT SYSTEM
Additional Product Classification: Report Generator
Specific Application: Relational Data Base System Report Writer; Generates Data Entry Screen
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix; DEC PDP-11
Memory Required: 256.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 15
Date First Installed: 1983
(See Vendor Profile Page V-113)

UNITED INFORMATION SERVICES
INFORM
Specific Application: Information Management Package That Provides An Efficient Method for Data Entry Retrieval, Verification, Modification and Reporting
System Requirements: CDC Cyber; IBM
Source Language: Cobol, Fortran, Super Basic, Snobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

UNITED INFORMATION SERVICES
OASES
Specific Application: Securities Data Base System Which Provides Current Historical, Financial and Descriptive Information
System Requirements: DEC System 10P
Source Language: Cobol, Fortran, PL/1, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)

UNITED INFORMATION SERVICES
OLIVER
Specific Application: Conversational Data Base System Data Definition Manipulation, Information Storage, Retrieval, Report Generation
Specific Industry: Not Industry Sensitive
System Requirements: DEC System 10
Source Language: Cobol, Fortran, Basic, PL/1
Source Code Available: Yes
Purchase Terms: Purchase (license)

SIMPLY PUT...

Decision Support Systems (DSS) Database Management Systems (DBMS) Human Resource Managment Systems (HRMS) Information Systems User Developed Systems. Information Centers. A lot of technical terms for what should be a simple concept. **Putting the power of the computer in the hands of the decision maker as well as the computer programmer.**

Times and technology have changed to make this possible. Now powerful 32-bit systems are available at a fraction of mainframe costs and the software solution is finally available.

3CI's **InFoCen™** can be classified by a lot of technical terms. Simply put, it allows decision makers to begin **using** the computer instead of **learning** to computerese. Through software tools like a relational DBMS, color graphics, forms, reports, statistics, messages and user definesble command prompts, applications are limited only by an individual's imagination.

3CI

Imagine what **InFoCen™** can do for you. Call us toll free at **1-800-525-3001.**

UNITED TELECOM COMPUTER GROUP
SEED DATA BASE MANAGEMENT SYSTEM
Additional Product Classification: Graphics, Report Generator, Data/File Management, Data Dictionary, Query Languages
Specific Application: Process Control, Bills of Materials, Engineering, and Drawing
Specific Industry: Not Industry Sensitive
System Requirements: IBM
Source Language: Cobol, Fortran, Basic, PL/1
Source Code Available: Yes
Purchase Terms: Purchase (license)

UNITED INFORMATION SERVICES
SEED
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: CDC Cyber; IBM
Source Language: Cobol, Fortran, Super Basic, Snobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

UNIVERSAL MEMORY, INC.
BASE/1
Specific Application: Large Scale Data Base Management System With Text Handling Capabilities
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS/MVS, IBM: DOS/VSE, Honeywell Multics; IBM: VM/CMS, CICS/VS, MVS/VSE
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: 1980
(See Vendor Profile Page V-114)

VALUATION SYSTEMS CO., INC.
DATA STORAGE AND RETRIEVAL
Specific Application: Data Management System
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 28.0K bytes
Source Language: Basic
Memory Required: 50.0K bytes
Source Language: Fortran, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 120
Date First Installed: January 1977
(See Vendor Profile Page V-115)

Purchase Terms: Purchase (license)
Price: $2,750
Number Installed to Date: 45
Date First Installed: March 1979
(See Vendor Profile Page V-114)

VAN AMBURG & ASSOCIATES, INC.
SP INFOS
Specific Application: Complete interface for DG SP/Pascal
Specific Industry: Not Industry Sensitive
System Requirements: DG AOS, AOS/VS
Source Language: Pascal, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 6
Date First Installed: September 1982
(See Vendor Profile Page V-115)

WICAT SYSTEMS, INC.
[illegible]
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Wicat: Unix, MCS
Memory Required: 512.0K bytes
Source Language: Assembler, Fortran II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300 to $1,500
Number Installed to Date: 5,000
Date First Installed: 1981
(See Vendor Profile Page V-117)

WINSTON T. MCCLEERY CONSULTANTS
ELITE
Specific Application: Application Resource Management
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs 1000
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $15,000
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-117)

ZATKO CORP.
SMALL
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Data Base Management and Applications [illegible]
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RT-11, RSX-11M
Source Language: Fortran, Assembler
Source Code Available: [illegible]
Purchase Terms: Purchase (license)
Price: $1,800 to $3,500
Number Installed to Date: 150
Date First Installed: January 1978
(See Vendor Profile Page V-118)

Microcomputer DBMS Section

AIMS PLUS, CORP.
MICRO AIMS
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Integrated Application Generator and File Manager
Specific Industry: Not Industry Sensitive
System Requirements: Wang PC MS-DOS
Memory Required: 64.0K bytes
Source Language: MS Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: October 1983
(See Vendor Profile Page V-4)

AMERICAN PLANNING CORP.
MANAGEMENT INFORMATION SYSTEMS BUILDER
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC CP/M, North Star Advantage, Horizon
Source Language: APC Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-5)

AMERICAN SYSTEMS, INC.
SURVIVOR PAC
Additional Product Classification: Accounting, WP/Text Editing
Specific Application: General Ledger, Accounts Payable and Receivable, Payroll, WP, DBMS
Specific Industry: Insurance
System Requirements: MP/M (80 or 86); Televideo: Most, CP/M 80, CP/M 86
Memory Required: 64.0K bytes
Source Language: Cbasic II, CB-80
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $10,000
Number Installed to Date: 100
(See Vendor Profile Page V-5)

APL COMPUTERS, INC.
APL MASTERDATA
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Wicat Systems: MCS
Memory Required: 10.0K bytes
Source Language: APL, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 1
Date First Installed: May 1983
(See Vendor Profile Page V-6)

APPLIED SOFTWARE TECHNOLOGY
PASCAL INTERFACE
Specific Application: Post Language Interface
Specific Industry: Not Industry Sensitive
System Requirements: UCSD P-System: IBM PC; Apple II; Apple III
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $245
Number Installed to Date: 300
Date First Installed: March 1982
(See Vendor Profile Page V-8)

APPLIED SOFTWARE TECHNOLOGY
QBASE
Specific Application: Personal Data File
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation, Nonprofit Organizations
System Requirements: IBM PC; Apple II
Memory Required: 128.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $189
Number Installed to Date: 3,000
Date First Installed: March 1983

APPLIED SOFTWARE TECHNOLOGY
VERSA FORM
Specific Application: Business Form Processor
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation, Nonprofit Organizations
System Requirements: IBM PC; Apple II; Apple III
Memory Required: 128.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $389 to $495
Number Installed to Date: 10,000
Date First Installed: [illegible]

ART SCI., INC.
MAGIC MEMORY
Specific Application: Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+; Apple IIE
Memory Required: 48.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: June 1983
(See Vendor Profile Page V-9)

BILLINGS COMPUTER CORP.
BILLINGS DATABASE MANAGER PACK
Specific Application: Database Management
Specific Industry: Not Industry Sensitive
System Requirements: Billings: Boss
Memory Required: 64.0K bytes
Purchase Terms: Purchase (license)
Price: $500
Date First Installed: 1981
(See Vendor Profile Page V-12)

BOEING COMPUTER SERVICES CO.
THE BOEING INTELLIGENT TERMINAL
Additional Product Classification: Graphics, Sort/Merge, Report Generator, Operating Systems, Languages
Specific Application: Integrated Management Information System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, PC-XT; DEC PDP-11/3, PDP-11/23; Wang PC; HP/25
Memory Required: 64.0K bytes
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 300
Date First Installed: June 1979
(See Vendor Profile Page V-13)

CAPTRON, INC.
JET DATA BASE MANAGEMENT SYSTEM
Specific Application: DBMS for Disk Based Systems
Specific Industry: Not Industry [illegible]
System Requirements: BTI 5000; [illegible]
Memory Required: 59.0K bytes
Source Language: Basic Compiler
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-16)

C-S SOFTWARE, INC.
[illegible] DATA BASE
Specific Application: Small Data [illegible]
Specific Industry: Not Industry [illegible]
System Requirements: Atari
Memory Required: 16.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $14
Date First Installed: 1981
(See Vendor Profile Page V-17)

CIA (COMPUTER INVESTMENT [illegible])
DBMS-A
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Altos: MP/M, CP/M
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Purchase Terms: Purchase (license)
Price: $295
[illegible]
Date First Installed: 1981
(See Vendor Profile Page V-18)

CIA (COMPUTER INVESTMENT ADVICE, INC.)
DBMS-B
Specific Application: Customer Can Set Up Own Files (Add, Delete and Monitor)
System Requirements: Altos: MP/M, CP/M
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 20
Date First Installed: 1981

CIA (COMPUTER INVESTMENT ADVICE, INC.)
DBMS-C
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Altos: MP/M, CP/M

Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 20
Date First Installed: 1981

CORPU-DRAW
DBPACK-II
Specific Application: Comprehensive Data Base
[illegible]
Specific Industry: Not Industry [illegible]
System Requirements: Osborne: CP/M; Xerox 820: CP/M; Kaypro-II: CP/M
Memory Required: 48.0K bytes
Purchase Terms: Purchase (license)
[illegible]
Date First Installed: August 1983
(See Vendor Profile Page V-22)

COMPUTER AIDED DECISIONS, INC.
DATABASE
Additional Product Classification: Sort/Merge, Report Generator, Data/File Management
Specific Application: Data Base Management System and Report Generator
Specific Industry: Not Industry [illegible]
System Requirements: Apple II: APPLE-DOS, IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 10
[illegible]
(See Vendor Profile Page V-23)

CONCENTRIC DATA SYSTEMS, INC.
VIP
Specific Application: Information Management Data Base for IBM PC
Specific Industry: Not Industry [illegible]
[illegible] IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Proprietary
Purchase Terms: Purchase (license)
Date First Installed: December 1983
(See Vendor Profile Page V-29)

CONTINENTAL SOFTWARE, INC.
DATAWRITE
Specific Application: DBMS, Prospect Letter Writing, Miscellaneous Forms, Inquiry, Functions
[illegible] IBM PC: CP/M 80; TRS-80/8 MS DOS; Apple; Exec
Memory Required: 64.0K bytes
Source Language: MBasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
[illegible]
(See Vendor Profile Page V-30)

CONTINENTAL SOFTWARE, INC.
FAT (PROSPECT ACTION & TRACKING)
Specific Application: Life Insurance Prospecting, Selective Retrieval, Letter Writing
Specific Industry: Insurance
System Requirements: IBM PC: CP/M 80, DEC, Televideo, Apple
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: 1982

CORDATUM
AUTHOR
Specific Application: Interactive Video Instructional System for Training Purposes
Specific Industry: Not Industry Sensitive
System Requirements: DEC: Unix; IBM PC
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 42
Date First Installed: October 1983
(See Vendor Profile Page V-31)

DATA ACCESS CORP.
DATAFLEX
Specific Application: Relational DBMS, Applications Development System
Specific Industry: Not Industry [illegible]
System Requirements: Wang: TURBO-DOS; DEC: CP/M; IBM PC: PC-DOS
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750 to $1,250
[illegible]
Date First Installed: November 1981
(See Vendor Profile Page V-34)

DATA MANAGEMENT SYSTEMS, INC.
DCDS-RELATIONAL DATABASE MANAGEMENT
Specific Application: Database Management System
Specific Industry: Not Industry Sensitive
System Requirements: Motorola 6800 CP/M Xenix
Memory Required: 128.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $495
[illegible]
Date First Installed: February 1983
(See Vendor Profile Page V-37)

DATA RESEARCH ASSOCIATES, INC.
MARC DATABASE MANAGER
Specific Application: Stores, Encodes and Communicates Bibliographic Information In Machine Readable Form
Specific Industry: Library
System Requirements: DEC
Source Language: Basic, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1977
(See Vendor Profile Page V-38)

DBMS (DESIGN AND BUILDERS OF INFORMATION SYSTEMS) MD DATA BASE SYSTEM
Specific Application: Data Base System
Specific Industry: Not Industry Sensitive
System Requirements: Ohio [illegible]
Memory Required: 48.0K bytes
Source Language: Basic
[illegible]
Purchase Terms: Purchase (license)
Price: $400
[illegible] 85
Date First Installed: 1978
(See Vendor Profile Page V-40)

EAGLE COMPUTER SYSTEMS, INC.
CLERK RECORD INDEXING SYSTEM
Specific Application: Single Entry into Multiple County Government Indices
Specific Industry: Government
System Requirements: Wang VS 2000
Memory Required: 24.0K bytes
Source Language: Basic, Speed
[illegible]
Purchase Terms: Purchase (license); Rental, Lease
Price: $6,000
Number Installed to Date: 4
Date First Installed: March 1983
(See Vendor Profile Page V-45)

EAGLE ENTERPRISES
CITATION
[illegible]
Reference Information Journal, [illegible]
Key Word Index
Specific Industry: Not Industry [illegible]
System Requirements: CP/M; IBM PC: PC-DOS
Memory Required: 56.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $185
[illegible]
Date First Installed: July 1982
(See Vendor Profile Page V-45)

EDUCOM
OMS (OFFICE MANAGEMENT SYSTEM)
Specific Application: Office Management System
Specific Industry: Engineering
System Requirements: Alpha Micro: AMOS/L
Memory Required: 30.0K bytes
[illegible]
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible]
Number Installed to Date: 3
Date First Installed: 1982
(See Vendor Profile Page V-45)

ESP COMPUTER [illegible], INC.
DATA KEYPER
Specific Application: Data Base Management System
[illegible] Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $99 to $149
Number Installed to Date: 50
Date First Installed: January 1981
(See Vendor Profile Page V-47)

EXECUWARE
[illegible]
Specific Application: Client Information Storage and Retrieval System
Specific Industry: Not Industry Sensitive
System Requirements: Apple II Plus; Apple II: APPLE-DOS; IBM PC: [illegible]
Memory Required: 48.0K bytes
Source Language: Basic
[illegible]
Purchase Terms: Purchase (license)
Price: $93
[illegible]
Date First Installed: 1982
(See Vendor Profile Page V-48)

EXECUWARE
NEXT STEP
Specific Application: DBMS With Built-In Electronic Programming
Specific Industry: Not Industry Sensitive
[illegible]
Plus, Apple II: APPLE-DOS; IBM PC-XT: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: April 1983

GRYPHONE SYSTEMS
PASF
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Apple II: CP/M 86, Apple III: [illegible]
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
[illegible]
1980
(See Vendor Profile Page V-52)

HAYDEN SOFTWARE
STATMANAGER
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $249
(See Vendor Profile Page V-53)

HOUGHTON MIFFLIN CORP.
GUIDANCE INFORMATION SYSTEM
[illegible]
Occupations, Colleges, Graduate [illegible] Services
Specific Industry: Education
System Requirements: Apple II; IBM PC-XT: PC-DOS
Source Language: Pascal
Source Code Available: No
Purchase Terms: Lease
Price: $3,100
Number Installed to Date: 4,000
Date First Installed: 1982
(See Vendor Profile Page V-55)

INCOM SYSTEMS
PHAST (5 MODULES)
Specific Application: DBMS
Specific Industry: Manufacturing,

Microcomputer DBMS

Specific Industry: Manufacturing, Insurance, Real Estate
System Requirements: IBM PC: PC-DOS; CP/M
Memory Required: 128.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,000
Date First Installed: 1984
(See Vendor Profile Page V-58)

INFO - PROS
INFO - GEN
Specific Application: Database Manager
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $245
Date First Installed: February 1983
(See Vendor Profile Page V-57)

INFORMATION BUILDERS, INC.
PC/FOCUS
Specific Application: DBMS and Information Control System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; TI Professional: MS-DOS
Memory Required: 256.0K bytes
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: May 1983
(See Vendor Profile Page V-57)

INNOVATIVE SOFTWARE
TBI (TOTAL INFORMATION MANAGEMENT)
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, PC-DOS, Victor 9000/M
Memory Required: 128.0K bytes
Source Language: Mbasic Compiler, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: January 1981
(See Vendor Profile Page V-59)

INSOFT, INC.
DATA DESIGN
Specific Application: Database Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Memory Required: 128.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $225
Number Installed to Date: 2,000
Date First Installed: March 1983
(See Vendor Profile Page V-59)

INSURANCE SALES SYSTEMS
MASTERFILE
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CP/M; Columbia; Televideo; Altos
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1979
(See Vendor Profile Page V-59)

INSURANCE SALES SYSTEMS
POLICY INFORMATION FILES
Specific Application: Electronic File Policy Information
Specific Industry: Insurance
System Requirements: CP/M; Columbia; Televideo; Altos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $475
Number Installed to Date: 450
Date First Installed: 1979

I.P. SHARP ASSOCIATES, INC.
FASTNET PROJECT PLANNING
Specific Application: Project Planning and Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS; VSE
Source Language: APL
Purchase Terms: Purchase (license)
Price: $50,000
Number Installed to Date: 15
(See Vendor Profile Page V-61)

I.P. SHARP ASSOCIATES, INC.
MAGICSTORE TIME SERIES DATA BASE
Specific Application: Create, Maintain, and Report Time Series Data From A Private or Shared Data Base
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS; VSE
Source Language: APL
Purchase Terms: Purchase (license)
Number Installed to Date: 70
Date First Installed: 1980

LASALLE COMPUTING, INC.
SERIES/3 DBMS
Additional Product Classification: Graphics, Sort/Merge, Data/File Management
Specific Application: DBMS-Graphics, Sort/Merge, Data File Management
Specific Industry: Not Industry Sensitive
System Requirements: Vector Graphics; CP/M; Digilog 1500; TURBO-DOS; NCR Tower 1632; Unix; IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: CMD Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 100
Date First Installed: 1978
(See Vendor Profile Page V-65)

LEARNING TOOLS, INC.
APS-ADMINISTRATIVE PLANNING SYSTEM
Specific Application: DBMS, Tracks Students or Clients
Specific Industry: Education, Government
System Requirements: Apple II; Apple IIE; IBM PC: PC-DOS; IBM PC-XT
Source Language: IPC, CMS
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $1,195
Number Installed to Date: 5
Date First Installed: 1983
(See Vendor Profile Page V-65)

LEARNING TOOLS, INC.
CPM CURRICULUM MANAGEMENT SYSTEM
Specific Industry: Education, Government
System Requirements: IBM PC: PC-DOS; IBM PC-XT; Apple II; Apple IIE
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $295
Number Installed to Date: 100
Date First Installed: 1982

LEARNING TOOLS, INC.
PS-INDIVIDUALIZED PLANNING SYSTEM
Specific Application: DBMS, Creates Own User-Defined File
Specific Industry: Education, Government
System Requirements: Apple II; Apple IIE; IBM PC; IBM PC-XT
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $495
Number Installed to Date: 100
Date First Installed: 1982

MAG SOFTWARE, INC.
MAG/BASE I
Specific Application: Data Base Management, List-Oriented Applications
Specific Industry: Not Industry Sensitive
System Requirements: CP/M/80; MS-DOS/ PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 4,000
Date First Installed: September 1978
(See Vendor Profile Page V-67)

MAG SOFTWARE, INC.
MAG/BASE II
Additional Product Classification: Report Generator
Specific Application: DBMS, List Oriented Application
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; MS-DOS, PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 4,000
Date First Installed: September 1978

MAG SOFTWARE, INC.
MAG/BASE III
Additional Product Classification: Report Generator
Specific Application: DBMS, List Oriented Application, Relative Report Writer Program Aid
Specific Industry: Not Industry Sensitive
System Requirements: PC-DOS; MS-DOS; CP/M 86
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $700
Number Installed to Date: 4,000
Date First Installed: 1978

MANATRON, INC.
DATA MANAGER
Specific Application: DBMS
Specific Industry: Government
System Requirements: Burroughs B20; Btos
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-68)

MDS ASSOCIATES
BYTE BYTE COMPARATIVE SALES REPORT WRITER
Specific Application: Sales History, Also Reports By Product, Customer, Territory, and Compares Year to Year, Month to Month
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Victor: MS-DOS; Molecular Computer: CP/M; DCC: CP/M
Memory Required: 64.0K bytes
Source Language: RM Cobol
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: April 1983
(See Vendor Profile Page V-71)

MICRO-AP, INC.
SELECTOR V, VERSION II DATA BASE
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86, MP/M 86, MS-DOS
Memory Required: 52.0K bytes
Purchase Terms: Purchase (license)
Price: $900
Number Installed to Date: 5,000
Date First Installed: June 1978
(See Vendor Profile Page V-73)

MICRO ARCHITECT, INC.
DATA BASE MANAGER
Specific Application: Data Base Manager
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, TRS-80/II, TRS-80/16, IBM PC; CP/M
Source Language: Microsoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50 to $250
Number Installed to Date: 1,000
Date First Installed: September 1980
(See Vendor Profile Page V-73)

MICRO CORP.
DATA MASTER
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: TRS 80; I-DOS
Memory Required: 48.0K bytes
Source Language: Basic, Pascal

Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 700
Date First Installed: 1980
(See Vendor Profile Page V-73)

MICRO DATA BASE SYSTEMS, INC.
MDBS III
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M; CP/M 86; MP/M 86; TURBO-DOS; Unix
Memory Required: 64.0K bytes
Source Language: C, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200 to $20,000
Number Installed to Date: 5,000
Date First Installed: September 1978
(See Vendor Profile Page V-73)

MICRO DATA BASE SYSTEMS, INC.
MDBST VERSION 1.10
Additional Product Classification: Report Generator, Query Languages, Program Generators/Aids, Application Development Tools
Specific Application: Systems Software
Specific Industry: Not Industry Sensitive
System Requirements: Z-80: CP/M; Intel 8080: CP/M
Memory Required: 64.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Date First Installed: 1979
(See Vendor Profile Page V-73)

MICRO LAB
DATA FACTORY 5.0
Additional Product Classification: Sort/Merge, Report Generator, Data/File Management
Specific Application: Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: Apple II and IIE: APPLE DOS 3.3
Memory Required: 48.0K bytes
Source Language: Applesoft Basic
Purchase Terms: Purchase (license)
Price: $300
(See Vendor Profile Page V-74)

MICRO LAB
THE MINI FACTORY
Specific Application: Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: Apple II and IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Applesoft Basic
Purchase Terms: Purchase (license)
Price: $150

MICROLINE
DMS III
Specific Application: Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: Xerox: CP/M; Eagle; Televideo
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $950
Number Installed to Date: 5
Date First Installed: February 1983
(See Vendor Profile Page V-74)

MICRO/MACRO SYSTEMS, INC.
DATA ACE
Specific Application: Relational DBMS With Data Manipulation, Screen Edit, Data Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: Wang 200 MS-DOS
Memory Required: 128.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Date First Installed: 1982
(See Vendor Profile Page V-74)

MICROPRO INTERNATIONAL CORP.
INFORSTAR
Specific Application: Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MC-DOS
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1981
(See Vendor Profile Page V-74)

MICRORIM
R:BASE, FORTRAN
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: CP/M 80, IBM PC-XT: PC-DOS, Victor 900, Burroughs B20, Otrs
Memory Required: 52.0K bytes
Source Language: Pascal, Assembly
Purchase Terms: Purchase (license)
Price: $595 to $795
Number Installed to Date: 4,000
Date First Installed: August 1982
(See Vendor Profile Page V-74)

MICROSYSTEMS, INC.
INFOSCOPE
Specific Application: Enter Information, Manipulate, Reorder and Examine in Any of Several Formats
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Victor 9000, Eagle 1600; Columbia
Memory Required: 128.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $225
(See Vendor Profile Page V-74)

MONROE SYSTEMS FOR BUSINESS
MONROE CONDOR
Specific Application: Database Management
Specific Industry: Not Industry Sensitive
System Requirements: Monroe 20

8800 Series: CP/M 80
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license); Lease
Price: $295 to $850
Number Installed to Date: 100
Date First Installed: March 1983
(See Vendor Profile Page V-77)

MULTI-SOFT
MULTI-TRIVE
Specific Application: DBMS Software
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple IIE
Memory Required: 64.0K bytes
Source Language: Basic, Assembler
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 100
Date First Installed: March 1983
(See Vendor Profile Page V-78)

UVT MICROCOMPUTER SYSTEM, INC.
CYBER FILE
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: DBMS and Application Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M, Fortune, DEC PDP
Memory Required: 64.0K bytes
Source Language: Forth
Purchase Terms: Purchase (license)
Price: $1,100
Date First Installed: July 1983
(See Vendor Profile Page V-78)

NCCS, INC.
USERBASE
Specific Application: Comprehensive, Multiuser Database Management System/M for Oasis
Specific Industry: Not Industry Sensitive
System Requirements: Oasis
Memory Required: 64.0K bytes
Source Language: C
Price: $1,495
Number Installed to Date: 100
Date First Installed: October 1982
(See Vendor Profile Page V-78)

NEW ERA TECHNOLOGIES, INC.
MIST MICRO COMPUTER INFORMATION SUPPORT TOOL
Additional Product Classification: WP/Text Editing
Specific Application: Word Processing, DBMS, Remote Use, Powerful Telecommunications
Specific Industry: Not Industry Sensitive
System Requirements: Vector Graphic: CP/M, Kaypro II
Memory Required: 56.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: July 1982
(See Vendor Profile Page V-78)

O'HANLON COMPUTER SYSTEMS, INC.
SENSIBLE SOLUTION DB/PROCEDURAL PROGRAMMING
Additional Product Classification: Language
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M, TURBO-DOS, MS-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $695
Number Installed to Date: 500
Date First Installed: November 1982
(See Vendor Profile Page V-82)

OLYMPIA COMPUTING CO.
CAT:MAN
Specific Application: Produces Program Management Information-Required By Federal and State Education Authorities
Specific Industry: Education
System Requirements: Apple II: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Applesoft Basic
Source Code Available: Yes
Price: $600
Number Installed to Date: 4
Date First Installed: August 1982
(See Vendor Profile Page V-82)

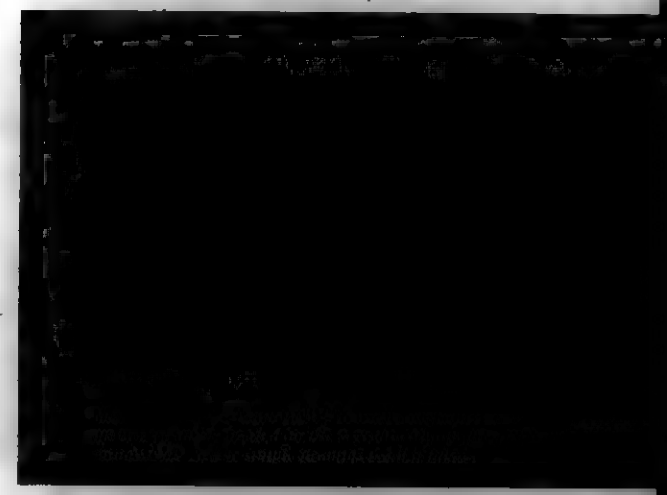
PETTED MICRO SYSTEMS
INFO PRO
Specific Application: Data Base Management System
System Requirements: Commodore 8032, 700
Memory Required: 32.0K bytes
Source Language: Basic, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195 to $350
Date First Installed: 1979
(See Vendor Profile Page V-85)

QUALITY COMPUTER PRODUCTS
SYSTEM 1
Specific Application: Data Retrieval for Library or Professional Use
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 52.0K bytes
Source Language: Pascal
Source Code Available: Yes
(See Vendor Profile Page V-90)

QUIC-N-EASI PRODUCTS, INC.
Q-PRO 4
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Professional Data Base Manager and Application Development Tool
Specific Industry: Not Industry Sensitive
System Requirements: Z80 SIG: CP/M; IBM PC: PC-DOS, Must MS-DOS
Memory Required: 48.0K bytes
Source Language: C, Assembler
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 1,600
Date First Installed: July 1981
(See Vendor Profile Page V-90)

QUIC-N-EASI PRODUCTS, INC.
QUIC-N-EASI, AG
Specific Application: First Time User Data Base Manager
Specific Industry: Not Industry Sensitive

IF YOU'RE CONSIDERING CONSIDER



As a knowledgeable personal computer user, you know that there's a world of difference between first generation software products and second. (Think of VisiCalc™ and Lotus 1-2-3,™ for example.)

It's the difference between setting standards. And then raising them.

INTRODUCING R:BASE,™ FROM MICRORIM.™

R:base is the new generation of relational database software. With a combination of capacity, speed and transportability that today's more powerful PC applications need. (Check out the comparisons.)

Not only that, R:base is much simpler to use and learn. So your applications are up in days, instead of weeks. And anyone—computer literate or not—can enter and view data, and generate reports. Just what you would expect from a second generation product.

MANAGING A DATABASE. CONVENIENTLY.

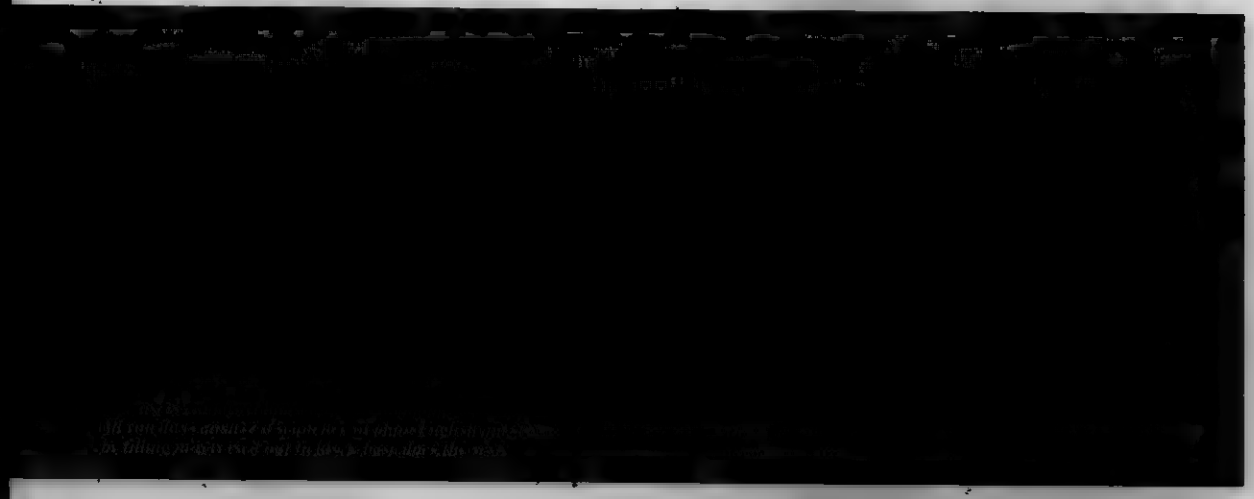
With R:base, it's simple. A series of prompts guides you every step of the way. Which means you don't have to be a programmer to create data entry or report forms just like the ones you're used to using.

As you become more proficient, you'll create shortcuts by customizing menus of stored commands. And print reports as simple or complex as you like at the touch of a key. With R:base, prompted, ad-hoc queries and customized report formatting become the reality that first generation products could only promise!

R:base is also very forgiving. It's very hard to make a mistake. That's because commands are simple English expressions—like SELECT, PROJECT, WITH, WHERE, FROM, etc. Dates and dollar amounts are written normally: 11/16/83;

dBASE II is a trademark of Ashton-Tate. VisiCalc is a trademark of VisiCorp. 1-2-3 is a trademark of Lotus. MultiPlan and MS-DOS are trademarks of MicroSoft. CTOS is a trademark of Convergent Technologies. Unix is a trademark of Bell Labs.

PURCHASING dBASE II, THIS FIRST.



$500.00. And, because data entry verification rules are defined up front, you just can't put any "garbage in"—even if you try!

What's more, R:base allows you to sort and select data on up to ten different criteria, perform totals, and then display the results—all with a single, powerful command (see screens).

QUESTIONS? ASK FOR HELP.

The R:base HELP feature provides detailed information that describes every command and process required for complete mastery of the database. (As does our plain-English documentation.) For example, if you're not sure what SELECT does, simply key in HELP SELECT and R:base will tell you what the command does, how it works, even the proper syntax. This way you don't have to keep referring back to the user manual—it's all right there in front of you.

R:base + MULTIPLAN™ = POWER²

Unlike first generation microdatabases offering the "amazing" capacity of one file and some 60,000 records, R:base literally blows the lid off database size. You may never create an application using forty files with 100 billion records. But with R:base, you can.

Now imagine being able to tap all that power in conjunction with one of the most popular spreadsheet programs on the market today: MultiPlan. R:base is fully compatible with MultiPlan, so you can zip back and forth between programs without cumbersome file manipulation.

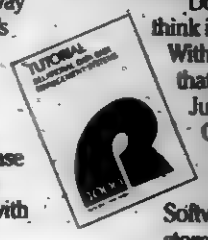
THE R:base PRODUCT FAMILY.

R:base™ 4000 is a single-user relational database (MS-DOS™ version is list $495). R:base™ 6000 is a multi-user version, available early 1984. In addition to MS-DOS, both packages will also be available in CTOS,™ with UNIX™ to follow.

The optional extended ReportWriter™ provides enhanced reporting and calculating capabilities (MS-DOS version is list $150). Program Interface™ is a set of subroutines which allows direct database access from PASCAL or FORTRAN programs (MS-DOS Version is list $395).

And what happens if you've already got dBASE II? Not to worry. It's easy to transfer your files to R:base.

FULL DEMO PACKET, $9.95.



Does all this sound too good to be true? If you think it does, let us prove to you that R:base is for real. With a comprehensive tutorial and demo diskette that will give you convincing hands-on experience. Just call our order desk at (800) 227-6703 (in California, 800-632-7979) and have your VISA or MasterCard number handy.

Better yet, hurry over to your nearest Software retailer or participating ComputerLand® store for an eye-opening demonstration.

MICRORIM
Relational Information Management
Microrim, Inc.
1750 112th N.E.
Bellevue, WA 98004

System Requirements: CP/M, TURBO-DOS, Most, NS-DOS
Memory Required: 48.0K bytes
Source Language: C, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 500
Date First Installed: September 1982

RAXIS INTERNATIONAL, INC.
CONTRACTOR TYPER
Specific Application: Tracks, Sales Prospects, Closing Retail Instalments, DBMS, Document Generation
System Requirements: Apple II: APPLE-DOS
Memory Required: 96.0K bytes
Source Language: Extended Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,995
Date First Installed: August 1982
(See Vendor Profile Page V-91)

RAXIS INTERNATIONAL, INC.
INFOWORKER
Specific Application: DBMS, Information Management System With Mailing Capabilities
System Requirements: Apple II, APPLE-DOS
Memory Required: 96.0K bytes
Source Language: Extended Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: December 1982

S.B.C. SYSTEMS, CO.
SELF FUNDING HEALTH CARE FINANCING
Additional Product Classification: Insurance, Banking
Specific Application: Performs the Administration of Self-Funded Health Insurance
System Requirements: MICRO-DOS, North Star: MICRO-DOS; IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 1
Date First Installed: May 1983
(See Vendor Profile Page V-95)

SCHUCHARDT SOFTWARE SYSTEMS, INC.
INTEBASE
Specific Application: Relational Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Assembly
Source Code Available: Yes
Price: $495
Date First Installed: 1983
(See Vendor Profile Page V-96)

SENSIBLE SOFTWARE, INC.
BOOKENDS
Specific Application: Reference Management System: Tracks Books, Manuals, Journals, Generates Bibliographies, Footnotes
Specific Industry: Not Industry Sensitive
System Requirements: APPLE, APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 200
Date First Installed: May 1983
(See Vendor Profile Page V-96)

SENSIBLE SOFTWARE, INC.
MULTI-DISK CATALOGUE III
Specific Application: Data Base, Keep Track of Diskette Collection
Specific Industry: Not Industry Sensitive
System Requirements: APPLE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25
Number Installed to Date: 3,000
Date First Installed: March 1980

SIERRA ON-LINE
GENERAL MANAGER
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+, II: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 4,200
Date First Installed: November 1981
(See Vendor Profile Page V-97)

SMC SOFTWARE SYSTEMS
IDOL
Specific Application: Data Base Management
Specific Industry: Wholesale/Distribution
System Requirements: DEC PDP-11: RSTS/E; Altos: Xenix; Zilog: Zeus
Memory Required: 38.0K bytes
Source Language: SMC Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Date First Installed: 1972
(See Vendor Profile Page V-98)

SOFTWARE CONNECTIONS
DBMS FOR LOCAL AREA NETWORKS
Specific Application: DBMS for Local Area Networks
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; Corvis Omni Network; Novel Network
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,850
Date First Installed: August 1983
(See Vendor Profile Page V-99)

SOFTWARE CORP.
DETECTIVE
Specific Application: Personnel or Company Data Base With Unlimited Search Capability Including A Half-Page Remark Field
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 8000, 9000: Commodore-DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $320
Number Installed to Date: 0
Date First Installed: 1982
(See Vendor Profile Page V-99)

SOFTWARE CORP.
INQUIRY
Specific Application: Personnel or Company Data Base With Unlimited Search Capability
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 9000, 8000: Commodore DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 1
Date First Installed: 1982

THE SOFTWARE STORE
INFO-80 APPLICATION DEVELOPMENT SYSTEM
Additional Product Classification: Sort/Merge, Report Generator, Data/File Management, Program Generators/Aids, Application Development Tools
Specific Application: Data Base Applications Development System
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 1,000
Date First Installed: October 1980
(See Vendor Profile Page V-100)

SOFTWARE TECHNOLOGY FOR COMPUTERS
IFD
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS; IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Assembly, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: 1979
(See Vendor Profile Page V-100)

SORCIM CORP.
SUPER DATA + FILE MANAGER
Specific Application: File and Records Management
Specific Industry: Not Industry Sensitive
System Requirements: CP/M II 2; CP/M 86; PC-DOS; MS-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-101)

STONEWARE, INC.
ADVANCED DATABASE MASTER
Specific Application: Database Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; IBM PC-XT
Memory Required: 48.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 30,000
Date First Installed: 1979
(See Vendor Profile Page V-103)

STONEWARE, INC.
DB MASTER
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; Apple II, II+, IIE
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $229 to $595
Number Installed to Date: 30,000
Date First Installed: September 1980

STONEWARE, INC.
DB MASTER VERSION 3
Specific Application: Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: Applesoft, Apple II Plus; Apple IIE
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $229
Number Installed to Date: 30,000
Date First Installed: September 1979

STONEWARE, INC.
DB MASTER VERSION 4
Specific Application: Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: Applesoft; Apple II+, IIE
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 30,000
Date First Installed: 1979

STONEWARE, INC.
SPECIAL ADDITION DB MASTER
Specific Application: DB Master for Hard Disk
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: Applesoft
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 30,000
Date First Installed: 1979

STONEWARE, INC.
STAT PAC
Specific Application: Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: Applesoft

Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $129
Number Installed to Date: 30,000
Date First Installed: September 1979

STORED INFORMATION SYSTEMS
MRP +TWO MULTI LEVEL DATABASE
Specific Application: Data Base Management System
Specific Industry: Manufacturing, Wholesale/Distribution, Custom Job Shop
System Requirements: North Star Advantage: CP/M; Victor 900; Osborne 1 MS-DOS
Memory Required: 40.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 4
Date First Installed: April 1982
(See Vendor Profile Page V-103)

STORED INFORMATION SYSTEMS
MRP +TWO ON-LINE SALES ORDER DATA
Specific Application: Data Base Management System
Specific Industry: Manufacturing, Wholesale/Distribution, Custom Job Shop
System Requirements: North Star Advantage. CP/M, Victor 900; Osborne 1 MS-DOS
Memory Required: 44.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 4
Date First Installed: April 1982

STORED INFORMATION SYSTEMS
MRP +TWO ONLINE INVENTORY CONTROL
Specific Application: Data Base Management System
Specific Industry: Manufacturing, Wholesale/Distribution, Custom Job Shop
System Requirements: North Star Advantage: CP/M, Victor 900; Osborne 1: MS-DOS
Memory Required: 24.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 4
Date First Installed: April 1982

STORED INFORMATION SYSTEMS
MRP +TWO ONLINE PROCUREMENT DATABASE
Specific Application: Data Base Management System
Specific Industry: Manufacturing, Wholesale/Distribution, Custom Job Shop
System Requirements: North Star Advantage: CP/M; Victor 900; Osborne 1: MS-DOS
Memory Required: 24.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 4
Date First Installed: April 1982

STORED INFORMATION SYSTEMS
MRP +TWO PROCUREMENT DATABASE
Specific Application: Database Management System
Specific Industry: Manufacturing, Wholesale/Distribution, Custom Job Shop
System Requirements: North Star Advantage: CP/M, Victor 900; Osborne 1: MS-DOS
Memory Required: 20.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 4
Date First Installed: April 1982

STORED INFORMATION SYSTEMS
MRP +TWO INVENTORY CONTROL DATA BASE
Specific Application: Database Management System
Specific Industry: Manufacturing, Wholesale/Distribution, Custom Job Shop
System Requirements: North Star Advantage: CP/M, Victor 900; Osborne 1 MS-DOS
Memory Required: 20.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 4
Date First Installed: April 1982

STORED INFORMATION SYSTEMS
MRP+TWO/ENGINEERING DATA BASE SYSTEM
Specific Application: Data Base Management
Specific Industry: Engineering
System Requirements: CP/M; Victor 900; Osborne 1: MS-DOS
Memory Required: 20.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 4
Date First Installed: April 1982

STORED INFORMATION SYSTEMS
MRP+TWO/SALES ORDER DATA BASE SYSTEM
Specific Application: Data Base Management System
Specific Industry: Manufacturing, Wholesale/Distribution, Custom Job Shop
System Requirements: CP/M; Victor 900; Osborne 1: MS-DOS
Memory Required: 40.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 4
Date First Installed: April 1982

STORED INFORMATION SYSTEMS
MRP+TWO PRODUCT CONTROL DATABASE SYSTEM
Specific Application: Data Base Management System
Specific Industry: Manufacturing, Wholesale/Distribution, Custom Job Shop
System Requirements: North Star Advantage: CP/M; Victor 900; Osborne 1. MS-DOS
Memory Required: 30.0K bytes
Source Language: Dbase II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 4
Date First Installed: April 1982

STRUCTURE SYSTEMS GROUP
ANALYST
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: PC-DOS: MP/M CP/M
Memory Required: 48.0K bytes
Source Language: CB80, CB86
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 1,000
Date First Installed: 1979
(See Vendor Profile Page V-104)

SUMMIT INFORMATION SYSTEMS CORP.
DATA BASE MARKET TRACKING SYSTEM
Additional Product Classification: Banking
Specific Application: Data Base Market Tracking System
Specific Industry: Banking/Financial
System Requirements: HP 100 Series. CP/M, IBM PC PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: March 1981
(See Vendor Profile Page V-104)

SUPERSOFT, INC.
ENCODE/DECODE II
Specific Application: Lockout System for DBMS
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1979
(See Vendor Profile Page V-104)

SUPERSOFT, INC.
PERSONAL DATA BASE
Specific Application: Personal Data Base Management System
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125

SURVEY TEHNOLOGY CORP
DATA ANALYST
Additional Product Classification: Security/Auditing
Specific Application: Data Base Analysis With Data Security
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: UCSD-P; Altos
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100 to $1,000
Number Installed to Date: 1,000
Date First Installed: June 1983
(See Vendor Profile Page V-104)

SURVEY TEHNOLOGY CORP.
SURVEY ANALYST
Specific Application: Process Market and Political Research Data
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: UCSD-P. Altos 8000
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 6
Date First Installed: October 1982

TAB BOOKS, INC.
C-BIMS: CASSETTE BASED INFORMATION
Specific Application: Tape Based Data Base Manager
Specific Industry: Wholesale/Distribution, Retail,
System Requirements: VIC 20; Commodore 64, Pet
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,495
Date First Installed: July 1983
(See Vendor Profile Page V-107)

TRAC LINE SOFTWARE, INC.
DATA TRAC
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: Altos: Oasis; Onyx; Dynabyte, IBC
Source Language: Oasis Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 100
Date First Installed: 1980
(See Vendor Profile Page V-111)

TURN-KEY DISTRIBUTION SYSTEMS, INC.
HUMAN RESOURCES
Specific Application: DBMS for Human Resources Personnel
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: CTS-300; DEC PDP-11: CTS-500
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 7
Date First Installed: November 1982
(See Vendor Profile Page V-112)

TYMSHARE
PC - FOCUS
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; DEC Rainbow
Source Language: Pascal

Microcomputer DBMS

Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-112)

UNIVERSAL DATA RESEARCH, INC.
DATA BASE MANAGEMENT SYSTEM DBM VE
Specific Application: Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: Unifiex; TRS-80: Flex, TRS-DOS
Memory Required: 48 0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1979
(See Vendor Profile Page V-114)

UYSON COMPUTER SYSTEMS, INC.
OPTIMUM DATA MANAGEMENT SYSTEM
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: DBMS — Including User-Defined Files and Screen Forms, Multiuser,Process-Keyed Direct Data Access and Process-Keyed Length Data Storage Capabilities
Specific Industry: Not Industry Sensitive
System Requirements: OSM: CP/M; Televideo: CP/M; Molecular Computer: CP/M 86, IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: CB 80, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 5,000
Date First Installed: February 1982
(See Vendor Profile Page V-114)

WALMAR COMPUTERS
QF' UTILITY
Specific Application: Augment Quick Files
Specific Industry: Not Industry Sensitive
System Requirements: Apple III; Apple IIE
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: July 1983
(See Vendor Profile Page V-116)

WILLIAMS, INC.
DBMS
Specific Application: DBMS and Nonprocedural Business Applications
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B20; Btos; Convergent Technologies: AWS, IWS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-117)

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A B DICK ELECTRONIC FILE SYSTEM	N/A	E-1
ACCESS	$9,800	E-7
ADABAS	$106,000	E-12
ADMINISTRATOR	$8,995	E-8
ADR/D-MET-RELEASE 1.1	$29,100 to $35,700	E-2
ADR/DATACOM/DB	$59,600 to $73,000	E-2
AIMS + VERSION III	$4,995	E-1
AMBASE DATA BASE MANAGEMENT SYSTEM	$29,000	E-1
ARMS	$1,995	E-1
ARTEMIS PROJECT COMPACTION UTILITY	$1,500	E-8
ARTEMIS PROJECT DOCUMENTATION UTILITY	$4,500	E-8
ASK REV C01.83	$8,000	E-4
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BASIC SYSTEM	N/A	E-7
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BUSINESS LICENSE SYSTEM	$3,500	E-4
CA-RELATIONAL DATABASE SYSTEM	N/A	E-4
CALCON	$11,700	E-2
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CONTROL	N/A	E-8
CONTROL 10/30	$15,000	E-5
CP/M	$22,000	E-8
CREATE	$21,000	E-4
THE CREATOR	$750	E-2
CUSTOM ARIS	$100,000	E-1
CYX-DB DATA BASE MANAGER	$17,000 to $25,000	E-4
CYX-TRANSACTION PROCESSING SYSTEM	$33,000	E-4
DARTMASTER	$15,000	E-8
DARTPAC	$15,000	E-8
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DATA STORAGE AND RETRIEVAL	$2,750	E-13
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DBASE II USER GUIDE	$29	E-12
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DBPACK	$195	E-4
DB PLUS	N/A	E-8
DDCA	$795	E-13
DESIGN	$15,000	E-1
DISTRIBUTED DATABASE SYSTEM	$30,000	E-4
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DMS-PLUS	$14,000 to $17,500	E-8
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IDM SYSTEM - VM/CMS	$95,000	E-2
IDM SYSTEM - VMS	$80,000	E-2
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INFOCEN	$29,000	E-13
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INQUIRE	$50,000 to $195,000	E-9
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INTEGRATED DBMS	$35,000	E-4
INTEGRATED OA SYSTEM	$995	E-9
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KERNEL DATA DESCRIPTION/MANIPULATION	$19,400	E-8
KNOWLEDGE ENGINEERING ENVIRONMENT	$20,000	E-7
KNOWLEDGE MANAGER	$4,0	E-8
LIFETRACK	$795	E-4
LIMS	$10,000	E-8
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LODESTAR	$25,000 to $[illegible],500	E-1
LOGIQUEST	$550	E-8
LOGIQUEST III	$550	E-12
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MRP + TWO SINGLE-LEVEL	$90,000	E-12
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NCR-DMS/LOGICAL VIEW	N/A	E-8
NOAH	N/A	E-8
NOMAD 2	$135,000	E-5
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OFFICE MULE DBM LANGUAGE	$7,500	E-7
OLIVER	N/A	E-13
OMNIBASE 1.0	$15,000 to $30	E-12
ORACLE	$5,000 to $40,000	E-6
ORACLE	$600 to $96,000	E-9
ORIGIN	N/A	E-1
OUTPUT	$2,500 to $25,000	E-5
PAC III	$46,000	E-1
PAL DATA BUILDER	$3,500	E-6
PD BASE	$245	E-8
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PRIME INFORMATION	$25,000	E-9
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PURCHASING DECISION SUPPORT/ QUOTATION	$50,000	E-1
PURCHASING DECISION SUPPORT/ RECEIVING	$20,000	E-1
PURCHASING DECISION SUPPORT/INVENTORY	$50,000	E-1
PURCHASING DECISION SUPPORT/INVOICE	$40,000	E-1
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RECORD MANAGEMENT SYSTEM	$800	E-13
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STATUS SALES INFORMATION SYSTEM	$1 500	E-7
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SUPERENGLISH II	$5,000 to $25,000	E-2
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MICRO AIMS	$495	E-14
MICRORIM, FORTRAN	$595 to $795	E-17
THE MINI FACTORY	$150	E-17
MIST MICRO COMPUTER INFORMATION SUPPORT	N/A	E-17
MONROE CONDOR	$295 to $650	E-17
MRP + TWO MULTI LEVEL DATABASE	$1,000	E-21
MRP + TWO ON-LINE SALES ORDER DATA	N/A	E-21
MRP + TWO ONLINE INVENTORY CONTROL	N/A	E-21
MRP + TWO ONLINE PROCUREMENT DATABASE	N/A	E-21
MRP + TWO PROCUREMENT DATABASE	$600	E-21
MRP & TWO INVENTORY CONTROL DATA BASE	$600	E-21
MRP + TWO/ENGINEERING DATA BASE SYSTEM	$300	E-21
MRP + TWO/SALES ORDER DATA BASE SYSTEM	N/A	E-21
MRP + TWO PRODUCT CONTROL DATABASE SYSTEM	$300	E-21
MULTI-DISK CATALOGUE III	$25	E-20
MULTI-TRIVE	$150	E-17
MYTE MYTE COMPARATIVE SALES REPORT WRITER	N/A	E-16
NEXT STEP	$295	E-15
OMS- OFFICE MANAGEMENT SYSTEM	$600 to $3,000	E-15
PASCAL INTERFACE	$245	E-14
PASF	$200	E-15
PAT (PROSPECT ACTION & TRACKING)	$295	E-15
PC - FOCUS	N/A	E-21
PC/FOCUS	$2,600	E-16
PERSONAL DATA BASE	$125	E-21
PHAST (5 MODULES)	$2,000	E-15
POLICY INFORMATION FILES	$475	E-18
Q-PRO 4	$395	E-17
QBASE	$189	E-14
QF UTILITY	N/A	E-22
QUIC-N-EASI AG	$295	E-17
SELECTOR V, VERSION II DATA BASE	$900	E-16
SELF FUNDING HEALTH CARE FINANCING	$15,000	E-20
SENSIBLE SOLUTION DB	$695	E-17
SERIES/3 DBMS	$1,200	E-18
SPECIAL ADDITION DB MASTER	$499	E-20
STAT PAC	$129	E-20
STATMANAGER	$249	E-15
SUPER DATA - FILE MANAGER	N/A	E-20
SURVEY ANALYST	$3,500	E-21
SURVIVOR PAC	$10,000	E-14
SYSTEM 1	N/A	E-17
TAILORED READING	$950	E-21
TIM (TOTAL INFO MGMT)	$495	E-16
USERBASE	$1,495	E-17
VERSA FORM	$389 to $495	E-14
VIP	N/A	E-15

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- Takes a businesslike approach to the design and implementation of information systems
- Results in better designed, functional systems in less time

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- Audits the path of test data at the conditional statement level
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- Addresses the problems of abends which occur during testing by intercepting abnormal conditions
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ADL DATA SYSTEMS, INC.
MENU/E
Specific Application: Application Development
Specific Industry: Not Industry Sensitive
System Requirements: DEC RSTS/E
Memory Required: 10.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 30
Date First Installed: January 1980
(See Vendor Profile Page V-2)

ADMINS, INC.
ADMINS/V32
Additional Product Classification: Graphics, Sort/Merge, Report Generator, Data/File Management, Data Dictionary
Specific Application: Variety of Business Applications
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX VMS Unix
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $5,000 to $100,000
Number Installed to Date: 150
Date First Installed: 1975
(See Vendor Profile Page V-2)

AEPAC CORP.
DIAGNAPHERS FOR DATA PROCESSING
Specific Application: Helps Document Operator Standards
Specific Industry: Not Industry Sensitive
System Requirements: IBM OS
Source Language: Adpac
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $9,500
Number Installed to Date: 11
Date First Installed: December 1982
(See Vendor Profile Page V-2)

ADVANCED COMPUTER CONCEPTS, INC.
APDL (ADVANCED PROGRAM DESIGN)
Specific Application: Software Development Tool
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11, VAX-11; RT-11, RSX-11M
Memory Required: 32.0K bytes
Source Language: PASCAL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 10
Date First Installed: January 1983
(See Vendor Profile Page V-2)

ADVANCED COMPUTER CONCEPTS, INC.
ISAP INTERACTIVE SCHEMATIC AND ASSEMBLY PACKAGE
Specific Application: Interactive Wirelist Debug and Preparation Tool
Specific Industry: Engineering
System Requirements: DEC VAX-11 VMS
Memory Required: 250.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 2
Date First Installed: March 1983

ADVANCED SOFTWARE PRODUCTS, INC.
VIRTUAL COBOL
Additional Product Classification: Languages
Specific Application: Language Application Environment
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC IBM Display Terminal, IBM Series/1, IBM 370
Memory Required: 128.0K bytes
Source Language: Assembler, Virtual Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000 to $5,000
Date First Installed: 1978
(See Vendor Profile Page V-3)

AIB / APPLIED INFORMATION DEVELOPMENT, INC.
TESTING MANAGEMENT HANDBOOK (TMH)
Specific Application: Software Testing
Specific Industry: Not Industry Sensitive
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 10
Date First Installed: July 1982
(See Vendor Profile Page V-3)

AIMS PLUS, CORP.
AIMS + PLUS
Specific Application: User-Friendly, Menu Driven Application Generator
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200, Wang PC MS-DOS; IBM PC PC-DOS
Memory Required: 24.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 1,000
Date First Installed: October 1978
(See Vendor Profile Page V-4)

ALLEN & ASSOCIATES, LTD.
AUTOMATIC INFORMATION MANAGEMENT SYSTEM
Specific Application: Application Generator
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 1,000
Date First Installed: January 1978
(See Vendor Profile Page V-4)

ALTERSO PRODUCTS, INC.
ICPG COMMUNICATIONS PROGRAM GENERATION
Specific Application: Generates Cics Applications
Specific Industry: Not Industry Sensitive
System Requirements: IBM
Memory Required: 25.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $27,000
Number Installed to Date: 400
Date First Installed: 1977
(See Vendor Profile Page V-4)

ANALYST INTERNATIONAL CORP.
CORVET
Specific Application: Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM 43, 41: DOS, IBM 30, 31: M-DOS; DG Eclipse MV 4000
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $95,000
Date First Installed: July 1983
(See Vendor Profile Page V-6)

ANDREW RUSSEL & ASSOCIATES, INC.
COMMAND LINE EDITOR
Specific Application: Edits Command Line
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX VMS
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,050
Number Installed to Date: 200
Date First Installed: December 1981
(See Vendor Profile Page V-6)

APPLICATION DEVELOPMENT SERVICES
DOCU/MANAGER DM400
Specific Application: Programming Aids
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 200
Date First Installed: 1980
(See Vendor Profile Page V-7)

APPLICATIONS PROGRAMMING
LOGICCHAIN
Specific Application: Decrease the Effort Needed to Maintain and Understand Cobol Programs
Specific Industry: Not Industry Sensitive
Memory Required: 82.0K bytes
Source Language: Cobol
Purchase Terms: Lease
Date First Installed: 1967
(See Vendor Profile Page V-7)

APPLIED ADVANCED MANAGEMENT RESEARCH, INC.
APPLICATIONS GENERATOR-AG
Additional Product Classification: Languages
Specific Application: Incorporates tPG, Easy Save Documentor, Menus and Reporter
Specific Industry: Not Industry Sensitive
System Requirements: Prime; Microdata, Honeywell Ultimate: Pick; GA
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000
Number Installed to Date: 3
Date First Installed: December 1982
(See Vendor Profile Page V-7)

APPLIED ADVANCED MANAGEMENT RESEARCH, INC.
DOCUMENTOR
Specific Application: Documents Full System With Cross Referencing Data
Specific Industry: Not Industry Sensitive
System Requirements: Prime; Microdata, Honeywell Ultimate: Pick; GA
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 6
Date First Installed: November 1982

APPLIED ADVANCED MANAGEMENT RESEARCH, INC.
EASYSAVE
Specific Application: A Shortcut to File Save or System Back-Up
Specific Industry: Not Industry Sensitive
System Requirements: Prime, Microdata, Honeywell Ultimate: Pick; GA
Source Language: Data Basic
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 1
Date First Installed: December 1982

APPLIED ADVANCED MANAGEMENT RESEARCH, INC.
IPG
Specific Application: Input Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: Prime; Microdata, Honeywell Ultimate: Pick; GA
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 5
Date First Installed: December 1982

APPLIED CYBERNETICS, INC.
ADEPT 3000
Specific Application: Online Program Generator On-Line Data Entry Programs
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $1,500
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-7)

APPLIED DATA RESEARCH, INC.
ADR/AUTOFLOW II RELEASE 8
Specific Application: System Development

Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series, 4300 Series: OS, DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license), Rental, Lease
Price: $7,800 to $7,300
Date First Installed: 1975
(See Vendor Profile Page V-7)

APPLIED DATA RESEARCH, INC.
ADR/COBOL
Specific Application: Cobol
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series, 4300 Series: OS, DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $8,800 to $10,500
Date First Installed: 1970

APPLIED DATA RESEARCH, INC.
ADR/DL
Specific Application: High Level Cobol Extension
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series, 4300 Series: OS, DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $25,500 to $31,300
Date First Installed: 1981

APPLIED DATA RESEARCH, INC.
ADR/IDEAL - RELEASE 1.0
Specific Application: Interactive Application Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series, 4300 Series: OS, DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $50,000 to $75,000
Date First Installed: 1983

APPLIED DATA RESEARCH, INC.
ADR/ROSCOE-RELEASE 5.2
Specific Application: On-Line Program Delvelopment
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series, 4300 Series: OS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $40,000 to $47,300
Date First Installed: 1970

APPLIED DATA RESEARCH, INC.
ADR/VOLLIE-RELEASE 3.2
Specific Application: On-Line Program Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series, 4300 Series: DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license), Rental, Lease
Price: $18,700 to $24,400

APPLIED INFORMATION SYSTEMS, INC.
EASY ENTRY FORMS MANAGEMENT AND DATA ENTRY
Specific Application: Data Entry
Specific Industry: Not Industry Sensitive
System Requirements: RSX, RSTS/E, DEC VAX-11 Series: VMS, DEC Professional 300: P/OS
Memory Required: 60.0K bytes
Source Language: PL/1
Purchase Terms: Purchase (license)
Price: $4,400
Number Installed to Date: 50
Date First Installed: August 1980
(See Vendor Profile Page V-8)

APPLIED SOFTWARE, INC.
FULL-SCREEN EDIT PLUS-FSE
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM
Memory Required: 100.0K bytes
Source Language: 370 Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 50
Date First Installed: June 1982
(See Vendor Profile Page V-8)

APPLIED SOFTWARE, INC.
TSO SUPERSET UTILITIES
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS: TSO
Memory Required: 100.0K bytes
Source Language: 370 Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 200
Date First Installed: June 1980

ARKANSAS SYSTEMS, INC.
ASI CROSS REFERENCE SYSTEM
Specific Application: Programming Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: RPG-11
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 2,
Date First Installed: 1983
(See Vendor Profile Page V-9)

ARKANSAS SYSTEMS, INC.
USER LIBRARY ANALYSIS (ULA)
Specific Application: Library Analysis,
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $95
Date First Installed: September 1984

ARKANSAS SYSTEMS, INC.
WORK STATION UTILITY (WSU) PROGRAM G
Specific Application: Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $345
Date First Installed: August 1982

ARRAY COMPUTER, INC.
EXCHECK
Specific Application: Cobol Cross-Reference and Directory Facility. Catalogues, Debugging and Testing Information
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: DOS, OS; IBM 3000, IBM 350 Series
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,900
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-9)

ARRAY COMPUTER, INC.
FOCUS
Specific Application: Conversion JCL and Cobol From DOS and OS Provide Documentation
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: DOS, OS, IBM 3000, IBM 350 Series
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $15,800
Number Installed to Date: 150
Date First Installed: 1973

ARMSTRONG'S SYSTEMS HOUSE, INC.
KEYPR
Specific Application: Program Development, Maintenance and Configuration Management
Specific Industry: Not Industry Sensitive
System Requirements: Prime 50 Series: Primos
Memory Required: 10.0K bytes
Source Code Available: No
Purchase Terms: Rental
Date First Installed: September 1981
(See Vendor Profile Page V-9)

A + SOFTWARE, INC.
AUTOMATIC DOCUMENTATION FACILITY
Specific Application: Application Development, Automated Documentation
Specific Industry: Not Industry. Sensitive
Source Language: Assembler, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $6,500
Number Installed to Date: 7
Date First Installed: June 1981
(See Vendor Profile Page V-9)

A + SOFTWARE, INC.
IMS DOCUMENTATION SYSTEM
Specific Application: Automated IMS Documentaton Generator
Specific Industry: Not Industry Sensitive
Source Language: Assembler, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $14,700
Number Installed to Date: 7
Date First Installed: June 1981

A + SOFTWARE, INC.
JCL MANAGEMENT SYSTEM
Specific Application: Application Development
Specific Industry: Not Industry Sensitive
Source Language: Assembler, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $6,500
Number Installed to Date: 7
Date First Installed: June 1981

A + SOFTWARE, INC.
RESOURCE MANAGEMENT (AND AUDIT) SYSTEM
Specific Application: Application Development and Documentation
Specific Industry: Not Industry Sensitive
Source Language: Assembler, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $6,500
Number Installed to Date: 7
Date First Installed: June 1981

ATLANTIC MANAGEMENT SYSTEMS, INC.
ISP-INFORMATION SYSTEM PLANNING
Specific Application: Long Range Planning System
Specific Industry: Not Industry Sensitive
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 10
Date First Installed: 1983
(See Vendor Profile Page V-10)

ATLANTIC MANAGEMENT SYSTEMS, INC.
PAC I
Specific Application: A Program Management System for the Smaller Environment
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos, DEC PDP: RSTS/E, HP 3000: MPE, DEC 20: DMS 3.0
Source Language: Fortran
Purchase Terms: Purchase (license); Lease
Date First Installed: 1975

ATLANTIC MANAGEMENT SYSTEMS, INC.
SDM/70
Specific Application: System Development Method Planning Tool
Specific Industry: Not Industry Sensitive
Purchase Terms: Purchase (license); Lease

Date First Installed: 1978

ATLANTIC MANAGEMENT SYSTEMS, INC.
STRUCTURED SDM/70
Specific Application: Works With [illegible]
Specific Industry: Not Industry Sensitive
Date First Installed: 1983

BANCROFT COMPUTER SYSTEMS, INC.
FILE MAINTENANCE PROGRAM GENERATOR
Specific Application: File Maintenance Program Generator
Specific Industry: Not Industry [illegible]
System Requirements: IBM System/3, System/34, System/36, System/38
Memory Required: 20.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 500
Date First Installed: 1980
(See Vendor Profile Page V-11)

BANCROFT COMPUTER SYSTEMS, INC.
SYSTEM DOCUMENTATION AND ANALYSIS
Specific Application: System Documentation and Analysis Aid
Specific Industry: Not Industry [illegible]
System Requirements: IBM System/3, System/34, System/36, System/38
Memory Required: 20.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 350
Date First Installed: 1980

BILLINGS COMPUTER CORP.
ASIST
Specific Application: Program Tool for Developing Screens and Forms
Specific Industry: Not Industry Sensitive
System Requirements: Billings 500: BOS; Billings 6000: TURBO-DOS: Oasis
Memory Required: 56.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: 1982
(See Vendor Profile Page V-12)

BILLINGS COMPUTER CORP.
COMPUTAMATIC TERMINAL
Specific Application: Emulates A Smart Terminal
Specific Industry: Not Industry Sensitive
System Requirements: Billings 500: BOS, Billings 6000: TURBO-DOS: Oasis
Memory Required: 56.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $500
Date First Installed: November 1981

B I MOYLE ASSOCIATES, INC.
BIM-OMNI-FULL SCREEN EDITOR - V
Specific Application: Program Editing System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 and 4300: DOS/VSE
Memory Required: 200.0K bytes
Source Language: PL/1, Assembler
Source Code Available: No
Purchase Terms: Purchase (license), Rental, Lease
Price: $9,500
Date First Installed: February 1983
(See Vendor Profile Page V-13)

BLACKHAWK DATA CORP.
HAWKEYE
Specific Application: Cobol Standardizer
Specific Industry: Not Industry Sensitive
System Requirements: IBM, Burroughs; Honeywell, DEC
Memory Required: 50.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $3,000 to $5,000
Number Installed to Date: 85
Date First Installed: 1974
(See Vendor Profile Page V-12)

BOEING COMPUTER SERVICES CO.
EASYS
Additional Product Classification: Operating Systems
Specific Application: Simulation
Specific Industry: Engineering
System Requirements: CDC: NOS/BE, DEC VAX-11/780: VMS; IBM 370, 3000 Series: TSO; Cray 1S: COS
Memory Required: 120.0K bytes
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 4
Date First Installed: September 1981
(See Vendor Profile Page V-13)

BUSINESS COMPUTER DESIGN, INC.
DOCU-MINT
Specific Application: Flowcharting, File Layouts, Menus
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 14.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Lease
Price: $850
Number Installed to Date: 1,400
Date First Installed: September 1979
(See Vendor Profile Page V-14)

BUSINESS CONTROLS CORP.
SBS
Specific Application: Software Development
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E; DEC VAX Series; DEC 20: VMS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000 to $35,000
Number Installed to Date: 30
Date First Installed: 1981
(See Vendor Profile Page V-14)

BUSINESS INFORMATION SYSTEMS
SCREENS MADE EASY (SME)
Specific Application: Free Form Interactive Screen Design Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300, 303: DOS, OS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $6,000
Number Installed to Date: 2
Date First Installed: April 1983
(See Vendor Profile Page V-14)

BUSINESS SYSTEMS RESOURCES, INC.
FAST
Specific Application: Application Development Tool, Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX Series: VAX VMS; DG Eclipse MV Series: AOS/VS
Memory Required: 2.0M bytes
Source Language: PL/2, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: November 1981
(See Vendor Profile Page V-15)

BYTEL
COGEN
Specific Application: Cobol Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: Unix: MP/M
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $950 to $7,500
Number Installed to Date: 800
Date First Installed: March 1981
(See Vendor Profile Page V-15)

BYTEL
MENUPRO
Specific Application: Cobol Menu Processor
Specific Industry: Not Industry Sensitive
System Requirements: Unix; CP/M; MP/M
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 150
Date First Installed: March 1981

CALIFORNIA COMPUTER TIMESHARING
AIM
Specific Application: Programs Program Training, Enhance Program Productivity
Specific Industry: Not Industry Sensitive
System Requirements: 8K
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $5,000
Number Installed to Date: 5
Date First Installed: 1982
(See Vendor Profile Page V-15)

CALIFORNIA SOFTWARE PRODUCTS, INC.
CALIFORNIA 10 PAK
Specific Application: Professional Programming Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Source Language: Pascal
Source Code Available: NO
Purchase Terms: Purchase (license)
Price: $100
(See Vendor Profile Page V-15)

CAP INFORMATION SYSTEMS
MICROADE
Specific Application: Universal Microprocessor Program Development System
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP Series, VAX Series: RT-11, RSX-11
Memory Required: 30.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 70
Date First Installed: September 1977
(See Vendor Profile Page V-16)

CARLETON CORP.
AUDITEC
Additional Product Classification: Report Generator, Security/Auditing
Specific Application: Report Generator Program Generator, EDP Auditing., Financial Auditing
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Memory Required: 350.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 70
Date First Installed: January 1981
(See Vendor Profile Page V-16)

CENTURY ANALYSIS, INC.
IMPACT-8
Specific Application: Fourth Generation Interactive Program, Development System for NCR Mainframe
Specific Industry: Not Industry Sensitive
System Requirements: NCR 8/3
Memory Required: 256.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $29,500
Number Installed to Date: 60
Date First Installed: April 1982
(See Vendor Profile Page V-17)

CENTURY ASSOCIATES
CA-PAT ONLINE PROGRAM DEVELOPMENT
Specific Application: On-Line Program Tool for NCR Users
Specific Industry: Banking/Financial
System Requirements: NCR, IBM
Memory Required: 64.0K bytes
Source Language: Nest/3
Purchase Terms: Purchase (license); Rental

Price: $9,500
Number Installed to Date: 55
Date First Installed: September 1977
(See Vendor Profile Page V-17)

G. G. A. COMPUTER ASSOCIATES, INC.
DCD II
Specific Application: Automatic Cobol Documentation and Analysis
Specific Industry: Not Industry Sensitive
System Requirements: DOS/VS; IBM PC DOS/VSE, Sperry 1100 Series: OS, OS/VSI
Memory Required: 128.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 425
Date First Installed: 1974
(See Vendor Profile Page V-18)

CHAPMAN & ASSOCIATES
DYNAMIC DATASET ALLOCATOR
Specific Application: Provide Flexible Batch Program
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370 OS
Memory Required: 1.0K bytes
Source Language: IBM/370 BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $500
(See Vendor Profile Page V-18)

CHAPMAN & ASSOCIATES
KEYWORD SCANNER
Specific Application: Provide Keyword-Based Free Format Input Capability
Specific Industry: Not Industry Sensitive
System Requirements: OS
Memory Required: 10.0K bytes
Source Language: IBM/370 BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $500

CHAPMAN & ASSOCIATES
REPORT ASSISTS
Specific Application: Report and File Managment Services
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370: OS
Memory Required: 1.0K bytes
Source Language: IBM/370 BAL
Purchase Terms: Purchase (license); Rental
Price: $200

CHAPMAN & ASSOCIATES
THE MESSAGE MANAGER
Specific Application: Provide Variable Length/Text Message Creation
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370 OS
Memory Required: 2.0K bytes
Source Language: IBM/370 BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $600

CHILSON'S MANAGEMENT CONTROLS, INC.
CMC COBOL CONVERTER
Specific Application: Converts Databus Code to RM Cobol
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 1550 DOS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $4,000
Number Installed to Date: 1
Date First Installed: October 1982
(See Vendor Profile Page V-18)

CHILSON'S MANAGEMENT CONTROLS, INC.
CMC DATA SHARE EDIT PROGRAM
Specific Application: File Record Viewing, Format Error Search
Specific Industry: DP Department
System Requirements: Datapoint 1550 DOS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $800

CHILSON'S MANAGEMENT CONTROLS, INC.
CMC FLOW CHART GENERATOR
Specific Application: Points Flow Charts From Databus
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 1550 DOS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $950
Number Installed to Date: 1
Date First Installed: October 1982

CINCOM SYSTEMS, INC.
LMS-2
Specific Application: Interactive On-Line Productivity Development Maintenance and Operation Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM DOS, E-DOS, OS, MVS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-19)

CINCOM SYSTEMS, INC.
MANTIS
Specific Application: Productivity Tool Utilizing Fourth Generation Computing
Specific Industry: Not Industry Sensitive
System Requirements: IBM, DOS, E-DOS, OS, MVS
Source Language: Cobol
Purchase Terms: Purchase (license)

CITIZENS AUTOMATED SYSTEMS
THE STANDARD
Specific Application: Program Generation
Specific Industry: Banking/Financial
System Requirements: IBM: DOS, OS
Memory Required: 256.0K bytes
Source Language: Ansi Cobol, Basic
Source Code Available: No.
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-19)

CLYDE DIGITAL SYSTEMS
DOC SESSION DOCUMENTOR AND TERMINAL EXPANDER
Specific Application: Session Documentor and Terminal Expander
Specific Industry: Accounting/Auditing, Retail, Banking/Financial, Education, Construction, Nonprofit Organizations
System Requirements: DEC PDP-11/44, PDP-11/70 RSTS/E
Memory Required: 56.0K bytes
Source Language: Basic; Basic Plus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $900
Number Installed to Date: 100
Date First Installed: Unknown
(See Vendor Profile Page V-19)

COSSGROUP
TEXT TRANSLATOR GENERATOR PROGRAM
Specific Application: Table-Driven Code Translator
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, TSX+, RSX, DEC VAX
Memory Required: 64.0K bytes
Source Language: Macro
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 2
Date First Installed: December 1981
(See Vendor Profile Page V-20)

COMMERCIAL DATA CORP.
COMMUNICATIONS DEVELOPMENT TOOLS
Additional Product Classification: Communications/TP Monitors
Specific Application: Tool to Design and Develop On-Line Appications
Specific Industry: Not Industry Sensitive
System Requirements: NCR 8455: VRX
Memory Required: 150.0K bytes
Source Language: VRX Cobol, VRX Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $13,000
Number Installed to Date: 2
(See Vendor Profile Page V-20)

COMMERCIAL PROGRAMMING SERVICES, INC. (CPS)
"DOKTOR AUTOMATIC COBOL PROGRAM DOCUMENTOR"
Specific Application: Cobol Program Documentation Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series, 3000 Series; Honeywell DPS6, DPS8
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,995
Number Installed to Date: 20
Date First Installed: January 1981
(See Vendor Profile Page V-21)

COMP ACT DATA SYSTEMS, INC.
ACES (APPLICATION CICS ENVIRONMENT SYSTEM)
Specific Application: Automated method for Creating BMS Map Layouts and Cics Command-Level Cobol Source Programs
Specific Industry: Not Industry Sensitive
System Requirements: DOS; VS/VSE, OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,500
Number Installed to Date: 20
(See Vendor Profile Page V-21)

COMP ACT DATA SYSTEMS, INC.
BMS (SIMPLIFIED MAPPING SUPPORT)
Specific Application: Creating BMS Map Layouts and Their Macros for Cics Programs
Specific Industry: Not Industry Sensitive
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 30

COMP-PRO CORP.
COM/GEN
Additional Product Classification: Data Dictionary
Specific Application: A Relational Dictionary Program Generator System That Increases Programmer Productivity in Application Development
Specific Industry: Computer
System Requirements: Base; Two Level to 64bit 68mb
Memory Required: 16.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $795 to $1,595
Number Installed to Date: 43
Date First Installed: 1981
(See Vendor Profile Page V-21)

CORPU-DRAW
BASXREF
Specific Application: Cross-References Basic Programs
Specific Industry: Not Industry Sensitive
System Requirements: Osborne-01: CP/M, Xerox 820: CP/M; Kaypro-II: CP/M
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $39
Date First Installed: April 1981
(See Vendor Profile Page V-22)

COMPUTER ASSOCIATES
CA-EZTEST CICS
Additional Product Classification: Productivity Tools
Specific Application: On-Line Debugging Facility Designed for the Cics/VS Environment
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370,

380, 4300 Series: DOS/VS, OS/VS1, VM/CMS, MVS
Memory Required: 30.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $12,500 to $17,500
Number Installed to Date: 60
Date First Installed: 1982
(See Vendor Profile Page V-23)

COMPUTER ASSOCIATES
CA-OPTIMIZER
Additional Product Classification: Productivity Tool
Specific Application: Productivity Tool
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 380, 4300 Series: DOS/VS, OS/VS1, MVS
Memory Required: 160.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $15,000 to $32,500
Number Installed to Date: 1,500
Date First Installed: 1970

COMPUTER ASSOCIATES
CA-VTERM
Specific Application: Programming And Systems Development Aids
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 380, 4300 Series: VM/CMS
Memory Required: 8.0K bytes
Source Language: BAL
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 40
Date First Installed: 1981

COMPUTER CONCEPTS, INC.
DOSSIER
Additional Product Classification: Security/Auditing
Specific Application: Documentation, Standards, Auditing
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300: DOS, DOS/VS, DOS/VSE
Memory Required: 80.0K bytes
Source Language: Assembler (BAL)
Purchase Terms: Purchase (license); Rental, Lease
Price: $8,850
Number Installed to Date: 1,000
Date First Installed: December 1974
(See Vendor Profile Page V-23)

COMPUTER CONCEPTS, INC.
INSPECTOR ON CALL
Specific Application: Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS
Memory Required: 10.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 1
Date First Installed: 1983

COMPUTER INFORMATION SYSTEMS
CIS SYSTEM LIBRARY
Specific Application: Software Development
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 512.0K bytes
Source Language: VAX Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,800 to $12,000
Date First Installed: 1981
(See Vendor Profile Page V-24)

COMPUTER INFORMATION SYSTEMS
G SYSTEM
Specific Application: Programming and Development Tool
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 512.0K bytes
Source Language: VAX Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $8,000 to $20,000
Number Installed to Date: 8
Date First Installed: 1981

COMPUTER RESOURCES INTL.
FILE MANAGEMENT SYSTEM - FMS
Additional Product Classification: Data/File Management, Data Dictionary, Report Generator
Specific Application: Application Development Tool
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell DPS/6/ Good
Memory Required: 80.0K bytes
Source Language: Cobol A
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,995
Number Installed to Date: 4
Date First Installed: March 1983
(See Vendor Profile Page V-25)

COMPUTER SYSTEMS INTERNATIONAL, LTD.
HELP-HAWAII EDIT AND LIBRARY SYSTEM
Specific Application: Programming Aid
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs 2000, 3000, 4000 Series: MCP/VI, MCP/IX
Memory Required: 50.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $11,000
Number Installed to Date: 40
Date First Installed: 1977
(See Vendor Profile Page V-27)

COMPUTER SYSTEMS RESEARCH, INC.
THE BUG BYTER
Specific Application: Systems and Application Debugger for Assembler Language
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370: MVS, VM
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $9,500
Number Installed to Date: 30
Date First Installed: 1979
(See Vendor Profile Page V-27)

COMPUTER TECHNOLOGY, INC.
SOFTWARE REVISION TRACKING: SRT
Specific Application: Tracks Revisions in Source Code
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 6
Date First Installed: June 1982
(See Vendor Profile Page V-27)

COMPUTIME, INC.
PRINT UTILITY
Specific Application: Retrieves Spooled Data From List Query and Routes To Any Cics Printer
Specific Industry: Not Industry Sensitive
System Requirements: IBM: Cics
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $1,000
Number Installed to Date: 5
Date First Installed: June 1981
(See Vendor Profile Page V-28)

COMPUTIME, INC.
TABLE ACCESS METHOD
Specific Application: Efficient Table Management Module for Use in Application Programs
Specific Industry: Not Industry Sensitive
System Requirements: IBM: Cics, DOS
Memory Required: 64.0K bytes
Source Language: Assembler, Cobol
Source Code Available: Yes
Purchase Terms: Lease
Price: $500
Number Installed to Date: 3
Date First Installed: June 1981

COMPUWARE CORP.
COBOL-AID
Additional Product Classification: Languages, Compilers/Assemblers
Specific Application: Provides Source Level Debugging Capability for Cobol
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series 3000 Series: VSI, DOS/VS, MVS, DOS
Memory Required: 18.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $5,000 to $7,000
Number Installed to Date: 110
Date First Installed: January 1983
(See Vendor Profile Page V-28)

CONSUMER SYSTEMS SERVICES GROUP, INC.
DATABASIC UTILITY SYSTEM
Specific Application: DL1/IMS Test Data Base Creation
Specific Industry: Not Industry Sensitive
System Requirements: IBM Mainframes: OS, DOS, MVS
Memory Required: 768.0K bytes
Source Language: Cobol, PL/1
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $13,500 to $23,500
Number Installed to Date: 50
Date First Installed: August 1980
(See Vendor Profile Page V-30)

CONSUMER SYSTEMS SERVICES GROUP, INC.
JCL/FLOW DOCUMENTATION SYSTEM
Specific Application: Application System Documentation Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM Mainframe: OS, DOS
Memory Required: 256.0K bytes
Source Language: Cobol, BAL
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $7,500
Number Installed to Date: 70
Date First Installed: June 1979
(See Vendor Profile Page V-30)

CONSUMER SYSTEMS SERVICES GROUP, INC.
TEST/IMS
Specific Application: BTS Alternative for Testing IMS Applications
Specific Industry: Not Industry Sensitive
System Requirements: IBM Mainframes: MVS, VSI
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $10,000
Number Installed to Date: 50
Date First Installed: February 1981

CONTEL INFORMATION SYSTEMS
MIND-MODULAR INTERACTIVE NETWORK
Specific Application: Interactive Design and Analysis Tool for Developing or Managing Central Data Communications Network
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, System/370, 3030 Series: CMS/TSO; DEC 20: Tops 20
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 100
Date First Installed: 1976
(See Vendor Profile Page V-30)

CONTEL INFORMATION SYSTEMS
WATSAN-PLUS
Specific Application: Design and Optimization of Single-Site PBX Communications Network
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360,

System/370, 3030 Series: CMS/TSO; DEC 20: Tops 20
Memory Required: 150.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 15
Date First Installed: March 1982
(See Vendor Profile Page V-30)

CONVERSION SYSTEMS
ADLI (AMIGOS-DL1 INTERFACE)
Specific Application: ADLI Allows Amigos Files to Be Converted to Either Vsam or DL1 Files Without Affecting the Application Programs
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS,/IBM 360: DOS; IBM 4300; IBM 3030 Series
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 2
Date First Installed: January 1983
(See Vendor Profile Page V-30)

COSVEY COMPANIES, INC.
ON-LINE NO CODE APPLICATION GENERATOR
Specific Application: Application Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3030 Series: DOS, OS
Memory Required: 128.0K bytes
Source Language: AL, Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $85,000
Number Installed to Date: 2
Date First Installed: January 1983
(See Vendor Profile Page V-30)

COOPERS & LYBRAND
AUDIT PAK II
Specific Application: Preprocessor That Generates A Cobol or RPGProgram From A Problem Description
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3 Model 10: SCP; IBM System/3 Model 12: SC 1, IBM System/3 Model 15: SC 2; IBM System/34
Memory Required: 13.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
(See Vendor Profile Page V-31)

COOPERS & LYBRAND
CORE IMAGE COMPARE PROGRAM
Specific Application: Compares the Object Module to the Load Module of The Same Computer Program
System Requirements: IBM 360, 370; DOS/OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500

CORPORATE COMPUTER SYSTEMS, INC.
AUD-F REV 1.0
Specific Application: Testing Fortran-Based Software
System Requirements: HP 1000
Memory Required: 36.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 6
Date First Installed: March 1983
(See Vendor Profile Page V-31)

CORPORATE COMPUTER SYSTEMS, INC.
PDVR 23 REV 1.1
Specific Application: Pseudo Disk Driver
System Requirements: HP 1000
Memory Required: 500.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 7
Date First Installed: November 1982

CORPORATE COMPUTER SYSTEMS, INC.
REV 1.0 TASP TRANSPARENT ACTIVITY
Specific Application: Produces Reports of Computer System Activity
System Requirements: HP 3000
Memory Required: 15.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 10
Date First Installed: 1981

CORPORATE COMPUTER SYSTEMS, INC.
SCREEN/1000 REV 2.2
Specific Application: Format System to Increase Productivity
System Requirements: HP 1000
Memory Required: 27.0K bytes.
Source Language: C, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 65
Date First Installed: January 1982

CORPORATE COMPUTER SYSTEMS, INC.
SHARE/1000 REV 2301
Specific Application: Creates Multiuser Environment
System Requirements: HP 1000
Memory Required: 27.0K bytes
Source Language: Fortran, C, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 1
Date First Installed: June 1983

CORPORATE COMPUTER SYSTEMS, INC.
SPELL/1000 REV 2.1
Specific Application: Checks Spelling of Documents
System Requirements: HP 1000
Memory Required: 27.0K bytes
Source Language: Fortran, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (License)
Price: $1,000
Date First Installed: August 1981

CORPORATE COMPUTER SYSTEMS, INC.
TERMINAL MANAGER REV 5301
Specific Application: Provides Terminal Data Entry and Control
System Requirements: HP 1000
Memory Required: 27.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,800
Number Installed to Date: 1
Date First Installed: April 1983

CORPORATE COMPUTER SYSTEMS, INC.
WAT WORK IN PROCESS REV 5301
Additional Product Classification: Time Accounting
Specific Application: Comprehensive Time Accounting System
Specific Industry: Business
System Requirements: HP 1000
Memory Required: 27.0K bytes
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 2
Date First Installed: April 1982

CORPORATE SERVICES INTERNATIONAL
SOFTWARE MACHINE
Specific Application: Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: Televideo: CP/M; IBM PC: CP/M; IBM 4300: VM
Memory Required: 64.0K bytes
Source Language: APL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,000 to $5,000
Date First Installed: 1981
(See Vendor Profile Page V-31)

CORT DATA
INDEX PLUS
Specific Application: Programming Aid
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE IV
Source Language: Cobol SPL
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $10,500
Number Installed to Date: 3
Date First Installed: April 1983
(See Vendor Profile Page V-31)

CORTEX CORP.
CORTEX APPLICATION ACCELERATOR
Specific Application: Code Optimizer
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP: RSX-11M, DEC VAX: DMS
Source Language: Proprietary
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $15,000
Number Installed to Date: 7
Date First Installed: June 1982
(See Vendor Profile Page V-31)

CORTEX CORP.
THE CORTEX APPLICATION TRIO (CORTEX)
Specific Application: Application Development
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX Series. VMS
Memory Required: 1.0K bytes
Source Language: Macro
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $19,500 to $49,500
Date First Installed: July 1983

CULLINET SOFTWARE, INC.
APPLICATION DEVELOPMENT SYSTEM/BATCH
Specific Application: Application Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, System/370, 3000 Series, 430 Series
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 70
Date First Installed: December 1980
(See Vendor Profile Page V-33)

CULLINET SOFTWARE, INC.
APPLICATION DEVELOPMENT SYSTEM/ONLINE
Specific Application: Application Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 434
Date First Installed: August 1981

CULLINET SOFTWARE, INC.
INTERACT
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, System/370, 3000 Series, 430 Series
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $30,000
Number Installed to Date: 132
Date First Installed: June 1975

CULLINET SOFTWARE, INC.
ONLINE QUERY - OLQ
Specific Application: Conversational Language
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, System/370, 3000 Series, 430 Series
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30,000
Number Installed to Date: 754
Date First Installed: January 1979

CYTROL, INC.
CYX-ER ERROR REPORTING FUNCTIONS
Specific Application: Provides Centralized Program Error Reporting for DEC/CYX

Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/24, 11/70: RSX-11M; DEC VAX: VMS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,300 to $2,000
Number Installed to Date: 10
Date First Installed: May 1983
(See Vendor Profile Page V-34)

DATABASE DESIGN CORP.
DATA DESIGNER RELEASE 2.5
Specific Application: Logical Data Base Design
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, System/370, 3300, 430 Series: OS; DEC VAX-750, VAX-11/78: VMS, OS/VS1, OS/VS
Memory Required: 700.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $35,000
Number Installed to Date: 75
Date First Installed: December 1979
(See Vendor Profile Page V-35)

DATABASE SYSTEMS CORP.
ESCAPE 34
Specific Application: Migration Conversion, IBM 34 Converted to Prime Accepts OCL, RPG-II Source Code, Supports Workstation Devices
Specific Industry: Not Industry Sensitive
System Requirements: Prime 50: Primos
Memory Required: 125.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000
Date First Installed: March 1983
(See Vendor Profile Page V-35)

DATA BASIC, INC.
ADVANCED SYSTEM PAC
Specific Application: An Extension of the System Pac Adds A Fourth Generation Application Development System Which Includes Full Relational Database Capability
Specific Industry: Not Industry Sensitive
System Requirements: Victor 9000: CP/M; IBM PC: Apple: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $695
Number Installed to Date: 500
Date First Installed: 1983
(See Vendor Profile Page V-35)

DATA BRAIN, INC.
DBI-2
Specific Application: Uses the Atlantic Research 40A, 4800 Analyzers to Test Various Protocols By Sperry
Specific Industry: Not Industry Sensitive
System Requirements: Atlantic Research
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595 to $2,000
Number Installed to Date: 110
Date First Installed: August 1982
(See Vendor Profile Page V-35)

DATA BRAIN, INC.
DBI-3
Specific Application: Uses the Atlantic Research 40A, 4600 Analyzers to Test Various Protocols BY IBM
Specific Industry: Not Industry Sensitive
System Requirements: Atlantic Research
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595 to $2,000
Number Installed to Date: 100
Date First Installed: August 1982

DATA BRAIN, INC.
DBI-3
Specific Application: Uses the Atlantic Research 40, 4600 Analyzers to Test Various Protocols By DEC
Specific Industry: Not Industry Sensitive
System Requirements: Atlantic Research
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595 to $2,000
Number Installed to Date: 100
Date First Installed: August 1982

DATA DIRECTIONS
COBBLER
Specific Application: Cobol Program Generator for Wang VS Equipment
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $9,500
Number Installed to Date: 5
Date First Installed: June 1980
(See Vendor Profile Page V-36)

DATA DIRECTIONS
PROJECT
Specific Application: Procedure Library Cross Reference for IBM OS, VS, MVS Environments
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS: VS, MVS
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 35
Date First Installed: 1977

DATA INDEX, INC.
PROC/MACH 1
Specific Application: Procedure Processor
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 128.0K bytes
Source Language: EDX, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $850
Number Installed to Date: 6
Date First Installed: January 1983
(See Vendor Profile Page V-36)

DATAMED RESEARCH, INC.
MINIAC APPLICATIONS GENERATOR
Specific Application: Programming System for Creating Verticle Market Business Applications
System Requirements: Sage II or IV: UCSD-P
Memory Required: 64.0K bytes
Source Language: UCSD-Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-37)

DATAWAVE, INC.
ASSEMBLER TO COBOL
Specific Application: Converts Languages to Cobol
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, OS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1971
(See Vendor Profile Page V-39)

DATAWAVE, INC.
AUDOCODER TO COBOL
Specific Application: Converts Languages to Cobol
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, OS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1971

DATAWAVE, INC.
COBOL TO COBOL
Specific Application: Converts Languages to Cobol
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1971

DATAWAVE, INC.
DOS/ALC TO OS/ALC
Specific Application: Converts Languages to Cobol
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, OS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1971

DATAWAVE, INC.
EASYCODER TO COBOL
Specific Application: Converts Language to Cobol
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, OS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1971

DATAWAVE, INC.
PL/1 TO COBOL
Specific Application: Converts Languages to Cobol
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, OS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1971

DATAWAVE, INC.
RPG TO COBOL
Specific Application: Converts Languages to Cobol
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, OS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1971

DATAWAVE, INC.
RPG TO PL/1
Specific Application: Converts Languages
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS,OS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1971

DAVID S. BLACK & ASSOCIATES, INC.
COBOL PROGRAM GENERATOR
Additional Product Classification: Graphics, Sort/Merge, Report Generator, Data/File Management, Data Dictionary
Specific Application: Data Screen, Generates Reports, Sort/Merge, Graphics
Specific Industry: Not Industry Sensitive
System Requirements: Prime; Sperry; DEC 20
Memory Required: 60.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 150
Date First Installed: 1979
(See Vendor Profile Page V-39)

DAVIDSON SOFTWARE SYSTEMS
SOURCE/PROCEDURE CONTROL SYSTEM
Specific Application: Source/Procedure Control System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: System/34 DOS, HP: CP/M; Televideo: CP/M: Unix

Memory Required: 64.0K bytes
Source Language: RPG-II, Basic
[illegible]
Purchase Terms: Purchase (license); Lease
Price: $300
Number Installed to Date: 50
Date First Installed: 1980
(See Vendor Profile Page V-39)

DELOITTE HASKINS & SELLS
UPARS
Specific Application: Generate Comprehensive Financial Planning, Accounting and Reports Systems
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, [illegible]
Memory Required: 256.0K bytes
Source Language: Fortran, IBM Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $80,000 to $100,000
Number Installed to Date: 2
Date First Installed: [illegible]
(See Vendor Profile Page V-40)

DELPHI DATA SYSTEMS, INC.
HIBOL APPLICATION DEVELOPMENT
Specific Application: Program Code Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM
Memory Required: 55.0K bytes
[illegible]
Purchase Terms: Purchase (license); Lease
[illegible]
Date First Installed: [illegible]
1982
(See Vendor Profile Page V-40)

[illegible] SYSTEMS, INC.
PATHH
Specific Application: Automatic Documentation
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
[illegible]
Purchase Terms: Purchase (license)
Price: [illegible]
[illegible]
Date First Installed: January 1982
(See Vendor Profile Page V-41)

DESKTOP SOFTWARE CORP.
THE NPL INFORMATION MANAGEMENT SYSTEM
Additional Product Classification: Payroll/Personnel, Manufacturing, Banking, Insurance, DBMS
Specific Application: A Nonprocedural Language Used as An Information Management System
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE 64; UCSD-P; Apple III 256, UCSD-P; IBM PC 256; PC-DOS; IBM PC 128; UCSD-P
Memory Required: 64.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $950
Number Installed to Date: 160
Date First Installed: February 1981
(See Vendor Profile Page V-41)

DEVA SYSTEMS SOFTWARE, INC.
[illegible]
Specific Application: Utility Program Converts DOS/VSP Cics Library Members to VM/CMS Files
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370: VM 370; IBM 4300 [illegible]
Memory Required: 384.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 3
Date First Installed: April 1981
(See Vendor Profile Page V-41)

DIGITAL SOLUTIONS, INC.
FMS (FORTRAN UTILITY SYSTEM)
Specific Application: Programming Aid for Debugging, Timing and Testing Fortran Code During Execution
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, System/370, 3000, 4000 Series: OS, CMS, Sperry 1100 Series: Exec 8, CDC Cyber 6000, 7000 Series: NOS, BE, Kron; Cray: CDS
Source Language: Portran
[illegible]
Purchase Terms: Purchase (license); [illegible]
Price: $4,000 to $21,000
Number Installed to Date: 130
Date First Installed: 1970
(See Vendor Profile Page V-42)

DISC
SCS/RCS
Specific Application: Screen and Report Control
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, TSX, TSX1; DEC VAX: RSTS, RSX-11M, VMS, POS
Memory Required: 64.0K bytes
Source Language: DBL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 40
Date First Installed: 1978
(See Vendor Profile Page V-43)

DIVERSIFIED SOFTWARE SYSTEMS, INC.
DOCU/TEXT-200 RELEASE 4.0
Specific Application: Automated Documentation System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 DS/VS
Memory Required: 512.0K bytes
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $15,000
Number Installed to Date: 75
Date First Installed: February 1980
(See Vendor Profile Page V-43)

DUN & BRADSTREET COMPUTING SERVICES
FACETS
Specific Application: Logical Data Base Design
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360: DOS, IBM System/370: OS, VS; Sperry 1100: Exec 8; Honeywell: Gcos
Memory Required: 360.0K bytes
Source Language: Cobol
[illegible]
Purchase Terms: Purchase (license)
Price: $1,500
[illegible]
Date First Installed: 1983
(See Vendor Profile Page V-44)

DUQUESNE SYSTEMS
PMO
[illegible]
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370: MVS, IBM 3030 Series: [illegible]
Source Language: BAL
[illegible]
Purchase Terms: Purchase (license); [illegible]
Price: [illegible]
Number Installed to Date: 300
[illegible]
(See Vendor Profile Page V-44)

DYER, WELLS & ASSOCIATES, INC.
DW&A/STEPSAVER
Specific Application: Cics Application Development Tool and Program Generator
Specific Industry: Not Industry [illegible]
System Requirements: IBM 4300 Series, System/370, 3030 Series: OS, DOS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 4
Date First Installed: January 1983
(See Vendor Profile Page V-44)

DYNAMIC MICROPROCESSOR ASSOCIATES
FORMULA II
Specific Application: Applications Generator
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 86; [illegible]
Memory Required: 64.0K bytes
Source Language: C
Price: $695
Number Installed to Date: 2,000
Date First Installed: January 1979
(See Vendor Profile Page V-44)

DYNAX RESOURCES, INC.
SUPERZAP/38
Specific Application: Programmer's Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38 CPS
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 40
Date First Installed: March 1982
(See Vendor Profile Page V-44)

EDP MANAGEMENT, INC.
ISAM GENERATOR
Specific Application: Allows Index File Access and Maintenance
Specific Industry: Not Industry [illegible]
System Requirements: Burroughs
Source Language: Cobol
[illegible]
Purchase Terms: Purchase (license); [illegible]
Price: $4,000
[illegible]
(See Vendor Profile Page V-45)

EDP MANAGEMENT, INC.
LOOKUP
Specific Application: Reduces Development Time, File Conversions, Correction Extraction Program
[illegible]
System Requirements: Burroughs
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
[illegible]
Date First Installed: June 1972

EDP MANAGEMENT, INC.
PRINT-FILE COMPARE
Specific Application: Compares [illegible] Conversion
[illegible]
System Requirements: Burroughs
Source Language: Cobol
[illegible]
Purchase Terms: Purchase (license); Rental, Lease
Price: $6,000
Date First Installed: June 1972

EDP MANAGEMENT, INC.
QUICK
Specific Application: Generates Test Data
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $4,000
Date First Installed: June 1972

EDP MANAGEMENT, INC.
REFORMAT
Specific Application: Increases Cobol Productivity, Enables Programmer To Write Shorthand [illegible] of Cobol
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs; IBM
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease

EDP MANAGEMENT, INC.
REPORT WRITER SIMULATOR
Specific Application: Generates Source Statements
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease

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Price: $4,000
Date First Installed: June 1972

EFFICIENT COMPUTING CO.
ENTRY 1000
Specific Application: Screen Generator
Specific Industry: Not Industry Sensitive, Wholesale/Distribution, Medical, Legal
System Requirements: HP 1000 RTE 6· RTE IVB RTE A
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-45)

ELECTRONIC DATA SYSTEMS CORP.
APPLICATION
Specific Application: Application Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, OS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000 to $20,000
Number Installed to Date: 12
Date First Installed: January 1983
(See Vendor Profile Page V-46)

ELECTRONIC DATA SYSTEMS CORP.
STANTAST
Specific Application: Data Compressions, Decompression, Scrambling, Encryption, Formatting And Manipulation
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVT, VS1, MVS, DOS/VSE
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: 1980

ELECTRONIC DATA SYSTEMS CORP.
WARPOUT
Specific Application: Easy-to-Use Utility Language That Increases Programmer Productivity
Specific Industry: Not Industry Sensitive

ESI
MODEL/MS
Specific Application: Program and Database Testing Aid
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B1700-B490 MCP
Memory Required: 54.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 10
Date First Installed: August 1982
(See Vendor Profile Page V-47)

ESI
PRO
Specific Application: On-Line Systems Development Tool
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B2700 B490 MCP/VI
Memory Required: 20.0K bytes
Source Language: Cobol Assembler
Source Code Available: No
Purchase Terms: Purchase (license), Lease
Number Installed to Date: 140
Date First Installed: May 1974

ESI
PROXY
Specific Application: On-Line Application Program Generation System
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B1700, B190, B2700 B490 B5700, B790 MCP
Memory Required: 38.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license), Lease
Number Installed to Date: 40
Date First Installed: August 1981

EXECUCOM SYSTEM CORP.
IFPS OPTIMUM
Specific Application: Expands User Analytical Capabilities
Specific Industry: Not Industry Sensitive
System Requirements: DEC 10, DEC 20, DEC VAX VMS
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license), Lease
Price: $2,500
Date First Installed: 1981
(See Vendor Profile Page V-47)

FORTH, INC.
POLYFORTH II
Specific Application: Programming Tool
Specific Industry: Scientific
System Requirements: DEC PDP-11: Forth OS; Intel 8080 Forth OS, IBM PC: Forth OS, Apple: Forth OS
Memory Required: 32.0K bytes
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $300 to $3,200
Number Installed to Date: 900
Date First Installed: 1979
(See Vendor Profile Page V-49)

FOUNDATION COMPUTER SYSTEMS
ANY
Specific Application: Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 1.0M bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: November 1983
(See Vendor Profile Page V-49)

GARY BERGMAN ASSOCIATES, INC.
ADVANCED DEBUGGING SYSTEM
Specific Application: Interactive Debugging of IBM Cics Applications
Specific Industry: Not Industry Sensitive
System Requirements: IBM Mainframe OS/VS, DOS/VS, VSE MVS
Memory Required: 50.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license), Rental
Price: $19,900 to $24,900
Number Installed to Date: 400
Date First Installed: May 1974
(See Vendor Profile Page V-50)

GEJAC, INC.
SAL 11 VERSION 3 STRUCTURED ASSEMBLY
Specific Application: Programmer Productivity Aid
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 Series RT-11, RSX-11M, RSX-11M +
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license), Rental, Lease
Price: $1,295 to $1,595
Number Installed to Date: 200
Date First Installed: March 1977
(See Vendor Profile Page V-50)

GENASYS CORP.
PATHFINDER
Specific Application: Cobol Programming Productivity Tool (Autotrace)
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 32.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 4
Date First Installed: June 1981
(See Vendor Profile Page V-50)

GENERAL ELECTRIC INFORMATION
MIMS
Additional Product Classification: DBMS
Specific Application: Tool for the Development of ApplicationSystems
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4341: MVS, VM/CMS; Geisco Remote Computer
Memory Required: 2.0M bytes
Source Code Available: No
Number Installed to Date: 100
Date First Installed: 1973
(See Vendor Profile Page V-51)

GENERAL ELECTRIC INFORMATION
MIMS ADF APPLICATION DEVELOPMENT FACILITY
Specific Application: Improve Programmer Productivity
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4341: MVS, MV/CMS; Geisco Remote Computer
Memory Required: 2.0M bytes
Source Language: Mims
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

GENERAL RESEARCH CORP.
RXVP 80
Specific Application: Verification and Validation System for Fortran
Specific Industry: Not Industry Sensitive
System Requirements: DEC OS-DOS; IBM VAX/VMS, Honeywell Gcos, CDC Exec
Memory Required: 65.0K bytes
Source Language: V-lftran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000
Date First Installed: 1979
(See Vendor Profile Page V-51)

GENERATED SYSTEMS, INC.
DATARYTE
Specific Application: Data Validation
Specific Industry: Not Industry Sensitive
System Requirements: IBM, EDX, Wang VS, IBM Series/1· RPS
Source Language: Cobol, Assembler
Source Code Available: Yes
Date First Installed: September 1971
(See Vendor Profile Page V-51)

GENTRY, INC.
PAL DATA MANAGER
Specific Application: Designs Screens
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000· MPE/IV
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Date First Installed: January 1983
(See Vendor Profile Page V-51)

GENTRY, INC.
REX-II
Specific Application: Programmer's Utility
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE/IV
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,000
Number Installed to Date: 100
Date First Installed: January 1980

GEOGRAPHIC SYSTEMS, INC.
GEOBUILD
Specific Application: Designs Geographic Territories
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, CMS/TSO
Memory Required: 1.0M bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,500
Number Installed to Date: 12
Date First Installed: October 1981
(See Vendor Profile Page V-51)

GEOGRAPHIC SYSTEMS, INC.
GEOSET
Specific Application: Allows Design to Assist Manager to Decide on Territories and Realignment
System Requirements: IBM: OS, CMS/TSO

Memory Required: 1.0M bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license), Rental, Lease
Price: $7,500
Number Installed to Date: 15
Date First Installed: October 1981
(See Vendor Profile Page V-51)

GOLDBERG ASSOCIATES
CRJE-EX
Specific Application: Assist in Program Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370 VS1
Memory Required: 400.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license), Rental, Lease
Date First Installed: September 1978
(See Vendor Profile Page V-52)

GOULD, INC.
AUDITOR
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
System Requirements: Concept/32
Memory Required: 120.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,000
(See Vendor Profile Page V-52)

GOULD, INC.
FORTRAN FORMATTER
Specific Application: Development Aid
Specific Industry: Engineering, Scientific
Memory Required: 64.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500

GOULD, INC.
INTERFACE DOCUMENTER
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Memory Required: 100.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,000

GOULD, INC.
LIBRARY OF PREPROCESSORS
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $8,500

GOULD, INC.
MEMORY MANAGERS LIBRARY
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Memory Required: 7.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $8,500

GOULD, INC.
OPTIMIZING INSTRUMENTER
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32 MPX-32
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,000

GOULD, INC.
PRODUCTIVITY LIBRARY
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $12,500

GOULD, INC.
SPROUT - FILE CONVERTER
Specific Application: File Conversion
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,900

GOULD, INC.
STRUCTURIZER
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Memory Required: 140.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $8,500

GOULD, INC.
SYMBOLIC DEBUGGER
Specific Application: Programming Aid
Specific Industry: Engineering
System Requirements: Concept/32: MPX-32
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500

GOULD, INC.
TESTING INSTRUMENTER
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,000

GOULD, INC.
TRACING INSTRUMENTER
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,000

GOULD, INC.
VISTA - SCREEN FORMATTER AND EDITOR
Specific Application: Programming Aid
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX-32
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $9,700

GREG DINGER & ASSOCIATES
SEARCH 34
Specific Application: Search and Recovery
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP; IBM System/36: SSP
Memory Required: 18.0K bytes
Source Language: RPG-II
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 30
(See Vendor Profile Page V-52)

GROUP OPERATIONS, INC.
SCAN/370
Specific Application: Documentation and Analysis Tool for Cobol
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS/VS, DOS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease Plan
Number Installed to Date: 60
Date First Installed: October 1978
(See Vendor Profile Page V-52)

H & A COMPUTER SYSTEMS, EXM
Specific Application: EDX Management Utilities
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 10.0K bytes
Source Language: EDL
Source Code Available: No
Price: $365
Date First Installed: 1983
(See Vendor Profile Page V-53)

H & A COMPUTER SYSTEMS PXS
Specific Application: Application Development System
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 12.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,250 to $4,700
Number Installed to Date: 1,000
Date First Installed: 1977

HARRIS CORP.
VBUG
Specific Application: VOS Symbolic Debugger
Specific Industry: Not Industry Sensitive
System Requirements: Harris 600, 700, 800 VOS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: September 1983
(See Vendor Profile Page V-53)

HAWKEYE INFORMATION SYSTEMS
DATA BASE/36
Specific Application: Standardizes Field Names in RPG Programs
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 20.0K bytes
Source Language: RPG
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,400
Number Installed to Date: 250
Date First Installed: 1979
(See Vendor Profile Page V-54)

HIGHER ORDER SOFTWARE, INC.
USE.IT
Specific Application: Tool to Design and Implement Functional Specifications
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX-11/730, VAX-11/750; VMS
Memory Required: 128.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 30
Date First Installed: 1982
(See Vendor Profile Page V-54)

HSES, INC.
PROGRAMMERS UTILITY
Specific Application: Utility Programming
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200 Series
Memory Required: 64.0K bytes
Source Language: Wang Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-54)

H & M SYSTEMS SOFTWARE, INC.
MFAST - CICS [illegible] MAP GENERATOR
Specific Application: Cics [illegible]

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Map and Mapset Generation
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS; IBM 4300 Series: DOS; IBM 3000 Series
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (licensing)
Price: $6,250 to $7,950
Number Installed to Date: 250
Date First Installed: December 1979
(See Vendor Profile Page V-54)

HOWARD W. SAMS & CO., INC.
PROGRAMMER
Specific Application: A User-Friendly Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+, II: APPLE-DOS, Franklin ACE 1000: CP/M; IBM PC
Memory Required: 64.0K bytes
Source Language: Machine Code, Applesoft, Gbasic, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $199
(See Vendor Profile Page V-55)

H & W COMPUTER SYSTEMS, INC.
CICS SPOOL DISPLAY/PRINT (CPMI)
Specific Application: Spool Display/Print
Specific Industry: Not Industry Sensitive
System Requirements: IBM: VS1, MVS
Memory Required: 75.0K bytes
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $5,880
Number Installed to Date: 350
Date First Installed: January 1979
(See Vendor Profile Page V-55)

H & W COMPUTER SYSTEMS, INC.
ONLINE PROGRAM DEVELOPMENT
Specific Application: PDS Editor, Spool Display Print
Specific Industry: Not Industry Sensitive
System Requirements: IBM: VS1: MVS
Memory Required: 75.0K bytes
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $8,500
Number Installed to Date: 250
Date First Installed: January 1979

ICS SERVICES, INC.
VICS
Specific Application: Development Aid Saves 60% of Programming Time
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 25
(See Vendor Profile Page V-56)

INDUSTRIAL COMPUTER CORP.
TERMINAL MANAGER
Specific Application: Development of Industrial Applications
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,900
Date First Installed: November 1980
(See Vendor Profile Page V-57)

INFORMATICS GENERAL CORP.
PRODUCTIVITY PLUS
Specific Application: Speeds Up Processing
Specific Industry: Banking/Financial, Real Estate
System Requirements: IBM System/36, System/23: DOS 2.0
Source Language: RPG-II, Basic, MS Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
(See Vendor Profile Page V-57)

INFORMATICS GENERAL CORP.
TRANS - IV
Specific Application: Application Development System for Developing On-Line Applications Cics/VS
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360; OS; IBM 370: DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 185
Date First Installed: 1980

INFORMATION AND SYSTEMS RESEARCH, INC.
RIMS/MPG
Specific Application: Complete Application Generator
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP; DEC VAX
Memory Required: 64.0K bytes
Source Language: Dibol, DBL, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,750 to $15,000
Number Installed to Date: 435
Date First Installed: January 1980
(See Vendor Profile Page V-57)

INFORMATION AND SYSTEMS RESEARCH, INC.
RIMS/MPG-PLUS
Specific Application: Application Program and Source Code Generating System
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, RSTS/E, RSX-11M; DEC VAX: VMS
Source Language: Cobol, Dibol, DBL, Cobol Plus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,750
Number Installed to Date: 450
Date First Installed: June 1983
(See Vendor Profile Page V-57)

INFORMATION CONCEPTS, INC.
CICS DUMP DISPLAY FACILITY
Specific Application: Instant Cics Dump Display and Hardcopy
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: MVS, IBM 3000 Series: VS1; IBM 360, VS1, IBM 370
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 27
Date First Installed: 1981
(See Vendor Profile Page V-57)

INFORMATION CONCEPTS, INC.
CICS QUEUE COMMAND
Specific Application: Display JES II Reports, Check Job Status, Submit Jobs From Cics
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: MVS, IBM 3000 Series: 4MB 360, IBM 370
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 5
Date First Installed: 1982

INFORMATION CONCEPTS, INC.
IMS DATA BASE SUPPORT FACILITY
Specific Application: Maintenance Tool for Building, Displaying, and Modifying Data Base
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: MVS, IBM 3000 Series: VS1; IBM 360, IBM 370
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,500
Number Installed to Date: 8
Date First Installed: 1981

INFORMATION CONCEPTS, INC.
IMS TERMINAL OPTIMIZER
Specific Application: Improves On-Line Response and Print Speed, Expands Network Capacity
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: MVS V51, IBM 3000 Series: IBM 360, IBM 370
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,500
Number Installed to Date: 2
Date First Installed: 1982

INFORMATION SYSTEMS, INC.
GIFTKLEAN
Specific Application: Utility That Puts Fragmented Files Together
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: June 1981
(See Vendor Profile Page V-58)

INFORMATION SYSTEMS, INC.
INTERACTIVE COBOL PROGRAM GENERATOR
Specific Application: Generates Cobol Code for Programming
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,450
Date First Installed: 1981

INFORMATION SYSTEMS, INC.
QUICKSCAN
Specific Application: Reduces Cobol Compiles By Half
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1981

INFORMATION SYSTEMS, INC.
TPDDSR-MUX
Specific Application: Same Functions as TI TPDDSR Except Works With EI, A or Axis 7 Channel MUX
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: September 1981

INNOVATEK MICROSYSTEMS, INC.
IMI EPROMMER
Specific Application: Eprom Programming
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, DEC LSI-11: RT-11
Memory Required: 13.0K bytes
Source Language: Macro
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350
Date First Installed: 1982
(See Vendor Profile Page V-59)

INNOVATEK MICROSYSTEMS, INC.
IMI SYSTEM INTEGRATOR
Specific Application: Microcomputer Development System
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11,-DEC LSI-11: RT-11
Memory Required: 22.0K bytes
Source Language: Macro
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,650
Date First Installed: September 1979

INTERACTIVE MANAGEMENT SYSTEMS, INC.
SOFTWARE CONTROL
Specific Application: Software Control
Specific Industry: Not Industry Sensitive, Manufacturing
System Requirements: DEC PDP-11: RSTS/E, DEC VAX: VMS
Source Language: Basic, Basic Plus II
Purchase Terms: Purchase (license); Rental; Lease, Time-Sharing
Date First Installed: 1974
(See Vendor Profile Page V-60)

INTERACTIVE SOFTWARE SYSTEMS, INC.
ADT-32
Specific Application: Applications Development Tool
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 1.0M bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $12,000
Number Installed to Date: 10
Date First Installed: January 1981
(See Vendor Profile Page V-60)

INTERACTIVE SYSTEMS, INC.
ISG-INTERACTIVE SYSTEM GENERATOR
Specific Application: Systems Generator
Specific Industry: Not Industry Sensitive
System Requirements: DEC 10: Tops-10; DEC 20: Tops-20; VAX: VMS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 5
Date First Installed: August 1982
(See Vendor Profile Page V-60)

INTERACTIVE SYSTEMS, INC.
SCOPE-FORMS MANAGEMENT UTILITY
Specific Application: Programming Aid-Screen Formatter
Specific Industry: Not Industry Sensitive
System Requirements: DEC 10: Tops-10; DEC 20: Tops-20; VAX: VMS
Source Language: Bliss
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,500
Number Installed to Date: 200
Date First Installed: January 1978

INTERACTIVE TECHNOLOGY, INC.
RDM (RESPONSIVE DATA MANAGER)
Specific Application: Application Development
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, RSX, RSTS/E
Memory Required: 64.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $2,495
Number Installed to Date: 150
Date First Installed: 1979
(See Vendor Profile Page V-60)

INTERMETRICS
ADASYNCH
Specific Application: ADA Language Syntax Checker
Specific Industry: Not Industry Sensitive
Source Language: Pascal
Source Code Available: $500
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-60)

INTERMETRICS
INTERC
Specific Application: C Language Software Development Tools
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: Unix; DEC VAX: VMS, RSX
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,995

INTERMETRICS
INTERPAS
Specific Application: Pascal Language Software Development Tools
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: Unix; DEC VAX: VMS, RMX
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,995

INTERPROCESS SYSTEMS, INC.
INPUT STACK PROCESSOR ISP
Specific Application: Auxiliary Processor for Manipulating APL Input
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series; MVS/TSO, VM/CMS
Memory Required: 40.0K bytes
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $3,300
Date First Installed: 1983

INTERPROCESS SYSTEMS, INC.
OUTPUT STACK PROCESSOR OSP
Specific Application: Auxiliary Processor for Capturing APL Output
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series; MVS/TSO, VM/CMS
Memory Required: 40.0K bytes
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $3,300
Number Installed to Date: 4
Date First Installed: 1982

IPT (INFORMATION PROCESSING TECHNIQUES)
TRACER FORTRAN DEBUGGER
Specific Application: Program Debugger for Fortran Programs, Fortran Programmers Development Aid
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RSX, Ias, DG: AOS, AOS/VS, R-DOS
Memory Required: 64.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,950
Number Installed to Date: 100
Date First Installed: 1975
(See Vendor Profile Page V-61)

JAX SOFTWARE DEVELOPMENT CORP.
CODEN
Specific Application: Generates Cobol Application Program
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs
Memory Required: 60.0K bytes
Source Language: Algol, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $40,000
Number Installed to Date: 24
Date First Installed: 1981
(See Vendor Profile Page V-62)

JEM ASSOCIATES
PROGRAM DEVELOPMENT ENVIRONMENT
Specific Application: Program Development Tool Which Automates Support Of Object and Copy Libraries Through Additional Session Manager Menus
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: 1981
(See Vendor Profile Page V-62)

JYACC, INC.
AIDE
Specific Application: An Integrated Set of Program Development Utilities for TI 990 Computers
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10
Source Language: Assembly, SCI
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 3
Date First Installed: September 1981
(See Vendor Profile Page V-63)

KENNEDY ASSOCIATES, INC.
FIRES
Specific Application: Generates Ad-Hoc Reports and Tables on Any File
Specific Industry: Not Industry Sensitive
System Requirements: Sperry 1100: Executive; DEC 10: Unix
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $15,950
Number Installed to Date: 200
Date First Installed: 1976
(See Vendor Profile Page V-63)

KOS & ASSOCIATES, INC.
KISS - (KEEP IT SIMPLE & STANDARDIZED)
Specific Application: Application Program Development (Cobol)
Specific Industry: Not Industry Sensitive
System Requirements: Any System With Cobol
Memory Required: 20.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: January 1982
(See Vendor Profile Page V-64)

KOS & ASSOCIATES, INC.
KOPE-COBOL ONLINE PROGRAMMING ENVIRONMENT
Specific Application: Cobol Application Program Development
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Memory Required: 140.0K bytes
Source Language: Cobol, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $15,000
Number Installed to Date: 2
Date First Installed: February 1982

LANGUAGE RESOURCES, INC.
KOST COMMUNICATION UTILITY FOR DEC VAX
Additional Product Classification: Compilers/Assemblers
Specific Application: Microprocessor Software Development
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Date First Installed: 1981
(See Vendor Profile Page V-65)

LANGUAGE RESOURCES, INC.
KOST COMMUNICATION UTILITY FOR IBM
Additional Product Classification: Compilers/Assemblers
Specific Application: Microprocessor Software Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CMS
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)

LANGUAGE RESOURCES, INC.
VM
Additional Product Classification: Compilers/Assemblers
Specific Application: Microprocessor Software Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: VM: CMS

Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,500
Number Installed to Date: 120
Date First Installed: 1982

LANGUAGE RESOURCES, INC.
XDS-68 FOR VAX/VMS
Additional Product Classification: Compilers/Assemblers
Specific Application: Microprocessor Software Development
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,500
Number Installed to Date: 120
Date First Installed: 1982

LANGUAGE RESOURCES, INC.
XDS-68 FOR IBM/VM-CMS
Additional Product Classification: Compilers/Assemblers
Specific Application: Microprocessor Software Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CMS
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,500
Number Installed to Date: 120
Date First Installed: 1981

LANGUAGE RESOURCES, INC.
XDS-68 FOR VAX/VMS
Additional Product Classification: Compilers/Assemblers
Specific Application: Microprocessor Software Development
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,500
Number Installed to Date: 120
Date First Installed: 1981

LEXICO ENTERPRISES, INC.
MODEL 2000 DPG/LINK -DIGITAL PROGRAM G
Specific Application: Assists in Generation of Test Patterns for Circuit Test Systems
System Requirements: HP 1000 With HP-IB I
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000
Date First Installed: 1980
(See Vendor Profile Page V-66)

LINTEX, INC.
SYSTEM/34 TO SYSTEM/36 CONVERSION AID
Specific Application: Conversion
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,200
Number Installed to Date: 3
Date First Installed: April 1982
(See Vendor Profile Page V-66)

LOGICA, INC.
ADDITIONAL LANGUAGE INTERFACE
Specific Application: Additional Language Interface
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3000 Series: MVS; Honeywell DPS 8: Gcos, Prime 50 Series: Primos; DG Nova: AOS/VS
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 150
Date First Installed: 1979
(See Vendor Profile Page V-66)

LOGICA, INC.
RASQL
Specific Application: SQL Alternative Interface to Rapids
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3000 Series: MVS; Honeywell DPS8: Gcos, Prime 50 Series: Primos; DG Nova: AOS/VS
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 150
Date First Installed: 1979

LOGISTIKOS, INC.
THE MENU FACILITY
Specific Application: Menu Facility for Production and Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38, SSP
Memory Required: 1.0M bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: July 1983
(See Vendor Profile Page V-67)

L. W. JAMES & ASSOCIATES
TEXT EDITOR FOR BASIC PROGRAM
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845, HP 9816, HP 9826, HP 9836
Memory Required: 167.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 35
Date First Installed: 1981
(See Vendor Profile Page V-67)

MANAGEMENT AND COMPUTER SERVICES, INC.
COPYMACS
Specific Application: Lists Record Counts
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, System/370: OS, OS/VS1, OS/VS 2
Memory Required: 40.0K bytes
Purchase Terms: Purchase (license); Lease
Price: $2,000
Number Installed to Date: 100
Date First Installed: 1979
(See Vendor Profile Page V-68)

MANAGEMENT AND COMPUTER SERVICES, INC.
CROSSMACS
Specific Application: OS Cross Reference for Cobol Programmers
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, System/370: OS, VM/CMS, OS/VS1, OS/VS2
Memory Required: 40.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Lease
Price: $2,000
Number Installed to Date: 40
Date First Installed: 1975

MANAGEMENT AND COMPUTER SERVICES, INC.
DATAMACS
Specific Application: Test Data Generator for Cobol Programs
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360 370: Gcos; Honeywell Series 600: VM/CMS; Burroughs Mainframe: MCP; Sperry 9000, 1100 MOS
Memory Required: 350.0K bytes
Source Language: Fortran, Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $14,000 to $20,000
Number Installed to Date: 1,100
Date First Installed: 1969

MANAGEMENT AND COMPUTER SERVICES, INC.
JCLMACS
Specific Application: Cross Referencing Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, System/370: OS, OS/VSI, OS/VS2
Purchase Terms: Purchase (license); Lease
Price: $3,500
Number Installed to Date: 100
Date First Installed: 1977

MANAGEMENT AND COMPUTER SERVICES, INC.
PROMACS
Specific Application: Utility Program Enchancement, Maintains Systems, Creates Reports, Development of New Systems
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, System/370: DOS, OS, VM/CMS, OS/VSI
Memory Required: 750.0K bytes
Source Language: Cobol, Assembler
Purchase Terms: Purchase (license); Lease
Price: $15,000 to $17,000
Number Installed to Date: 60
Date First Installed: 1979

MANAGEMENT AND COMPUTER SERVICES, INC.
SYSTEMACS
Specific Application: Phased Life Cycle Methodology for Design and Implementation of Business Information System
Specific Industry: Not Industry Sensitive
Purchase Terms: Purchase (license); Lease
Price: $22,500
Number Installed to Date: 75
Date First Installed: 1977

MANAGEMENT AND COMPUTER SERVICES, INC.
TRACMACS
Specific Application: To Help System Designers and Programmers Audit the Quality of Software Testing
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, System/370: DOS: OS, MCP: OS/VS
Memory Required: 40.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Lease
Price: $15,000 to $20,000
Number Installed to Date: 15
Date First Installed: April 1981

MANUS SERVICES CORP.
RESPOND
Specific Application: Online Monitor and Tuning Aid
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Source Language: Basic Plus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,250
Number Installed to Date: 50
Date First Installed: 1982
(See Vendor Profile Page V-69)

MARK/OPS, INC.
PROGRAMERS TOOL
Specific Application: Programming Aid
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RSTS
Memory Required: 128.0K bytes
Source Language: Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1983
(See Vendor Profile Page V-69)

MASSACHUSETTS COMPUTER ASSOCIATES, INC.
FORTRAN OUTPUT EXPEDITER
Specific Application: Optimizes Formatted Output in IBM OS Environments
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS/OS
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 100
Date First Installed: September 1976
(See Vendor Profile Page V-70)

MASSOGLIA AND ASSOCIATES, INC.
CRT-VTOS DISPLAY
Specific Application: Display VTOSFrom Any Terminal
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
(See Vendor Profile Page V-70)

MASSOGLIA AND ASSOCIATES, INC.
FILE DISPLAY/UPDATE
Specific Application: Display or Update Any File From Any WD
Specific Industry: Not Industry
System Requirements: IBM System/34
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100

MASSOGLIA AND ASSOCIATES, INC.
ONLINE SOURCE ENTRY & DOCUMENTATION SYSTEM
Specific Application: Maintain Source, Procedures, and Documentation In Disk File
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495

MASSOGLIA AND ASSOCIATES, INC.
PROCEDURE EXPLODER
Specific Application: Exploded Listing of Nested Procedure, Each Nested Level Is Indented
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100

MASSOGLIA AND ASSOCIATES, INC.
PROCEDURE/FILE CROSS REFERENCE
Specific Application: Condensed Alphabetic Procedure List Option
Specific Industry: Not Industry Sensitive
System/34, IBM System/3
Purchase Terms: Purchase (license)
Price: $100

MASSOGLIA AND
QCOPY UTLITIES
Specific Application: Submit Jobs to Reader Queue From Terminal, Review Reports From Printer Queue, From Terminal
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3
Source Language: RPG-II, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100

MASSOGLIA AND ASSOCIATES, INC.
RPG II CROSS REFERENCE
Specific Application: Cross Reference of Variable Names, Tables and Labels Used
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100

MASSOGLIA AND ASSOCIATES, INC.
SOURCE/FILE CROSS REFERENCE
Specific Application: Cross References Files and Programs Giving Access Method
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3; IBM System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100

MASSOGLIA AND ASSOCIATES, INC.
SYSTEM STATUS AND HISTORY DISPLAY
Specific Application: Display System Status and User From AnyTerminal
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200

MATHEMATICA PRODUCTS GROUP
FSM
Specific Application: Screen Formatter
Specific Industry: Not Industry Sensitive
System Requirements: IBM
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $6,000 to $12,000
Number Installed to Date: 100
Date First Installed: 1980
(See Vendor Profile Page V-70)

M. BRYCE & ASSOCIATES, INC.
PROJECT MANAGEMENT COMMAND
Specific Application: Project Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3030,*4300 Series: OS, VS, MVS; Honeywell Level 66: Gcos; DEC VAX, HP 300: MPE IV
Memory Required: 128.0K bytes
Source Language: Ansi Cobol
Source Code Available: no
Purchase Terms: Purchase (license); Lease
Price: $30,000
Date First Installed: August 1983
(See Vendor Profile Page V-70)

MCDONNELL DOUGLAS AUTOMATION CO.
DICS SCREEN DESIGN AID
Specific Application: BMS Screen Generator
Specific Industry: Not Industry Sensitive
Source Language: Cobol, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $13,500
Number Installed to Date: 2
Date First Installed: February 1982
(See Vendor Profile Page V-71)

MCDONNELL DOUGLAS AUTOMATION CO.
MS SCREEN DESIGN AID SDA
Specific Application: MFS Screen Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3030, 3081, 3083 Series: MVS
Source Language: Cobol, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 70
Date First Installed: October 1976

MENTOR GRAPHICS CORP.
IDEA 100/1200
Specific Application: Logic Design Analysis and Simulator, Timing Verification, Design File Interface, Document Preparation
System Requirements: Apollo DN 300: Aegis, Apollo DN 420
Memory Required: 1.0M bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20,000 to $40,000
Number Installed to Date: 100
Date First Installed: November 1982
(See Vendor Profile Page V-72)

MENTOR GRAPHICS CORP.
IDEA 1100/1300
Specific Application: Logic Design and Analysis, Design File, Interface, Netlister, Document Preparation
System Requirements: Apollo DN 300: Aegis, Apollo DN 420
Memory Required: 1.0M bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000 to $28,000
Number Installed to Date: 100
Date First Installed: November 1982

MENTOR GRAPHICS CORP.
IDEA 1400
Specific Application: Document Preparation and Project Communications Software for Electronic Designers and Project Managers
System Requirements: Apollo DN 300: Aegis
Memory Required: 1.0M bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $6,000 to $15,000
Number Installed to Date: 100
Date First Installed: November 1982

MENTOR GRAPHICS CORP.
MENTOR SPICE -MSPICE
Specific Application: Interactive Analysis Tool for Analog Circuitry
System Requirements: Apollo Aegis
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000 to $10,000
Date First Installed: September 1981

MICROMAX COMPUTER INTELLIGENCE, INC.
DOCS
Specific Application: Screen On-Line Design System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, OS
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $4,000
Date First Installed: July 1983
(See Vendor Profile Page V-74)

MISOSYS
XDE 01
Specific Application: Four Utility Programs
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/III TRS-DOS
Memory Required: 48.0K bytes
Source Language: Z80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 1,000
(See Vendor Profile Page V-76)

MISOSYS
PRO-GENY
Specific Application: Four Utility Programs
Specific Industry: Not Industry Sensitive
System Requirements: DOS
Memory Required: 64.0K bytes
Source Language: Z80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 1,000

M R C SYSTEMS
COMPAC I
Specific Application: Control Routine Package, Sas Monitor Display, Reset
Specific Industry: Not Industry Sensitive
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
(See Vendor Profile Page V-77)

MSP, INC.
TESTMANAGER
Specific Application: Program Structure Testing and Test Data Generation
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DO-DOS, IBM 370
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 200

Date First Installed: 1971
(See Vendor Profile Page V-78)

MULTIPLICATIONS, INC.
ACCOLADE
Specific Application: Cics Application Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: DOS/VS, IBM 3000 Series: OSM/VS: DOS/MVT
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30,000
Number Installed to Date: 60
Date First Installed: May 1982
(See Vendor Profile Page V-78)

NATIONAL ADVANCED SYSTEMS
EXTEND
Specific Application: Extend Facilities Simulator
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370: MVS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license), Rental, Lease
Price: $5,000
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-78)

NATIONAL INFORMATION SYSTEMS, INC.
DPL
Specific Application: Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: DEC 10: Tops 10; DEC 20: Tops 20
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $39,000 to $62,000
Number Installed to Date: 150
Date First Installed: 1974
(See Vendor Profile Page V-79)

NCCS, INC.
USER-II
Additional Product Classification: DBMS
Specific Application: Optimizes Productivity In Developing Application
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RSTS/E: VMB
Source Language: Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $14,500 to $22,000
Number Installed to Date: 250
Date First Installed: 1978
(See Vendor Profile Page V-79)

NCR CORP.
INTERACTIVE DEBUG SYSTEM
IDS-RELEASE 1
Specific Application: Source Code Debugging Tool
Specific Industry: Not Industry Sensitive
System Requirements: NCR V-8500, VRX; NCR V-8600 VRX, VRX
Memory Required: 64.0K bytes
Source Language: NCRL
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: June 1982
(See Vendor Profile Page V-79)

NCR CORP.
IVS TEXT EDITORS RELEASE 1
Specific Application: Source Code Preparation Aid
Specific Industry: Not Industry Sensitive
System Requirements: NCR V-8500 VRX, NCR V-8400 Series: VRX, NCR V-8600 VRX
Memory Required: 30.0K bytes
Source Language: NCRL
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: June 1982

NEAL NELSON & ASSOCIATES
INDEXED ACCESS METHOD
Specific Application: Indexed Accessing Method, Suits the Requirements Of Programming for Commercial Applications
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 8
Date First Installed: August 1982
(See Vendor Profile Page V-79)

NEAL NELSON & ASSOCIATES
SUPPORT FUNCTIONS
Specific Application: Set of Support Functions Useful In Formatting Printed Output and Video Display Screen
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 8
Date First Installed: August 1982

NELSON DATA RESOURCES, INC.
PC DOCS
Specific Application: Screen Design Aid Programmer and Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT, PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 40
Date First Installed: August 1982
(See Vendor Profile Page V-79)

NETWORK CONCEPTS, INC.
CONTROL
Specific Application: Configuration Control
Specific Industry: Not Industry Sensitive
System Requirements: Tandem: Guardian
Source Language: TAL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,500
Number Installed to Date: 20
Date First Installed: July 1981
(See Vendor Profile Page V-79)

NEW ENGLAND SYSTEMS TECHNOLOGY
EZ-PROG APPLICATION GENERATOR
Specific Application: Application Generation
Specific Industry: Not Industry Sensitive
System Requirements: DG Micro DOS, DG Nova: R-DOS, DG Eclipse AOS
Memory Required: 64.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,400
Number Installed to Date: 5
Date First Installed: March 1981
(See Vendor Profile Page V-79)

NEXAID COMPUTER SYSTEMS, INC.
NEXAID
Specific Application: Programmer Productivity Aid, Screen and Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 96.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 8
Date First Installed: January 1981
(See Vendor Profile Page V-80)

NIXDORF COMPUTER CORP.
DIALIS
Specific Application: Cobol Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: Nixdorf 8860: Dipos
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Rental
Number Installed to Date: 2,000+
(See Vendor Profile Page V-80)

NIXDORF COMPUTER CORP.
PWS/VSE
Specific Application: Program Development Tool and Time-Sharing System
Specific Industry: Not Industry Sensitive
System Requirements: Nixdorf 8890: Nidos/VSE
Memory Required: 1.0M bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 6
Date First Installed: October 1982

NIXDORF COMPUTER SOFTWARE CO.
PWS/VSE ADVANCED FUNCTIONS
Specific Application: Interactive Program Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM: E-DOS, DOS
Source Language: Assembler
Purchase Terms: Purchase (license), Lease
Price: $9,500
Date First Installed: April 1982

NOBLE PRODUCTION AND RECORDING, INC.
INTERACTIVE VIDEO
Additional Product Classification: Payroll/Personnel, Manufacturing, WP/Text Editing, Graphics, Report Generator
Specific Application: Provides A Video Version of Software Products
Specific Industry: Not Industry Sensitive
System Requirements: Interactive: Port 232
Purchase Terms: Purchase (license), Lease
Price: $1,500
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-80)

NORTH AMERICAN TECHNOLOGY, INC.
CONTEMPORY APPLICATIONS OF OPTICAL BAR CODE
Specific Application: Software to Read and Write Bar Code
Specific Industry: Not Industry Sensitive
System Requirements: UCSD-P
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 80
Date First Installed: 1981
(See Vendor Profile Page V-80)

ON-LINE BUSINESS SYSTEMS
WILBUR
Specific Application: Text Editing, On-Line Program Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS, OS VSI
Memory Required: 512.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license), Rental, Lease
Number Installed to Date: 125
(See Vendor Profile Page V-82)

ON-LINE SOFTWARE INTERNATIONAL
INTERTEST RELEASE 2.3
Specific Application: Cics Programmer Productivity Tool for Testing and Debugging
Specific Industry: Not Industry Sensitive
System Requirements: IBM Compatible
Memory Required: 60.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license), Rental, Lease
Price: $24,000
Number Installed to Date: 1,200
Date First Installed: June 1977

OPCODE, INC.
HISTORIAN PLUS SOFTWARE CONTROL
Additional Product Classification: Library Management

Specific Application: Source Library Maintenance
Specific Industry: Not Industry Sensitive
Source Language: Fortran
Source Code Available: No
Price: $6,750
Number Installed to Date: 200
Date First Installed: March 1977
(See Vendor Profile Page V-82)

ORBIS CORP.
FORMS MANAGEMENT
Specific Application: Builds Forms on Screens, Allows Data Update
Specific Industry: Engineering, Scientific
System Requirements: Gould SEL Concept 32· MPX 32
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 150
Date First Installed: September 1979
(See Vendor Profile Page V-83)

ORSOFT SOFTWARE, INC.
SOURCE TOOLS
Specific Application: Application Development Tool Source Code Manages The Development and Maintenance of Software Project
Specific Industry: Manufacturing, Engineering, Medical, Education, Government, Scientific, OEM
System Requirements: DEC VAX: VMS, DEC PDP-11: RSX
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,600 to $4,020
Number Installed to Date: 25
(See Vendor Profile Page V-83)

OSTED DIALOGUE, INC.
ANALECT - VERSION 10.4
Additional Product Classification: Graphics, Sort/Merge, Report Generator, Data/File Management, Data Dictionary
Specific Application: Analysis, Forecasting, Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: IBM 30, 43: CMS, Prime· Primos
Source Language: Fortran, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $10,000 to $125,000
Number Installed to Date: 30
Date First Installed: July 1975
(See Vendor Profile Page V-83)

OXFORD SOFTWARE CORP. LTD.
Specific Application: Cics and IMS Application Development Tools
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370· 4300 Series· DOS· DS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $24,000 to $60,000
Number Installed to Date: 1,500
Date First Installed: September 1976
(See Vendor Profile Page V-83)

PACIFIC SOFTWARE MANUFACTURING CO.
C-LANGUAGE PROGRAMMER INTERFACE
Specific Application: Development Tool Kit and Run Time
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix, IBM PC: PC-DOS
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-84)

PACIFIC SOFTWARE MANUFACTURING CO.
X.DOT:X.25
Additional Product Classification: Communications/TP Monitors
Specific Application: C Language Source Code Technology Transfer Product
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX; Motorola 68000; Zilog Z8000
Memory Required: 64 0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000
Number Installed to Date: 10
Date First Installed: 1981

PACIFIC SOFTWARE MANUFACTURING CO.
X.DOT FOR UNIX
Additional Product Classification: Communications/TP Monitors
Specific Application: Interface From Unix to Packet Switching, Supports Remote Log In, Call Out, File Transfer, Mail
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX; Morotoria 68000, Zilog Z8000
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40,000
Date First Installed: 1983

PANSOPHIC SYSTEMS, INC.
MS/CX
Specific Application: System Development Tool for Cics
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3030 Series. DOS/VSE; IBM 370/115 and Up: Cics/VS
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $29,000 to $35,000
Number Installed to Date: 100
Date First Installed: 1979
(See Vendor Profile Page V-84)

PANSOPHIC SYSTEMS, INC.
O-W-L
Additional Product Classification: Library Management
Specific Application: Librarian, Application Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM: VS: DOS/VS
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $20,000
Number Installed to Date: 3,500
Date First Installed: 1978

PANSOPHIC SYSTEMS, INC.
PRO/GRAMMAR
Additional Product Classification: Data/File Management
Specific Application: Application Development System, Information Retrieval and Data Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, System/370: DOS; IBM 4300 Series: OS, IBM 3030 Series
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $25,000 to $35,000
Number Installed to Date: 100
Date First Installed: 1980

PARA RESEARCH, INC.
DOCUMENTOR DATA SYSTEM
Specific Application: Automated Documentation
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 22.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $900
Number Installed to Date: 500
Date First Installed: July 1981
(See Vendor Profile Page V-84)

PCD SYSTEMS, INC.
IMP
Specific Application: Instant Mathematical Programming Generator Writes Pascal to Solve Linear and Nonlinear Equations
Specific Industry: Not Industry Sensitive
System Requirements: IBM; DEC LSI-11: P System; Altos
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Date First Installed: 1980
(See Vendor Profile Page V-84)

PENNINGTON SYSTEMS, INC.
SCRNIO/11 (SCREEN FORM I/O)
Specific Application: Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX-11M/M+, Ias; DEC VAX-11: VMS
Memory Required: 1.1M bytes
Source Language: Macro-11, Assembler, VAX-Micro
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500 to $5,000
Number Installed to Date: 80
Date First Installed: August 1979
(See Vendor Profile Page V-85)

PETROLEUM SOFTWARE SYSTEMS, INC.
PROGRESS ADS
Additional Product Classification: Data/File Management
Specific Application: ICS Application Development System File Handling, Data Collection
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS DOS
Memory Required: 512.0K bytes
Source Language: Native Mode
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $17,000 to $23,000
Number Installed to Date: 12
Date First Installed: 1982
(See Vendor Profile Page V-85)

PHOENIX SOFTWARE ASSOCIATES LTD.
PLINK II
Specific Application: Linkage Editor
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64 0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 1,000
Date First Installed: 1978
(See Vendor Profile Page V-86)

PHOENIX SYSTEMS, INC.
SYSTEM - 80
Specific Application: Cobol Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: TI; Honeywel; DG
Memory Required: 64.0K bytes
Source Language: RM Cobol
Purchase Terms: Purchase (license); Rental
Price: $995
Number Installed to Date: 1,100
Date First Installed: May 1980
(See Vendor Profile Page V-86)

PHOTON SOFTWARE
ELF
Specific Application: Test Logic and Physical Design of Computer
Specific Industry: Not Industry Sensitive
System Requirements: Apple; IBM 370; IBM 4300; Wang
Memory Required: 64.0K bytes
Source Language: Cobol, Fortran, PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 10
Date First Installed: 1982
(See Vendor Profile Page V-86)

PHOTON SOFTWARE
SDS
Specific Application: Programming Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370,4300; Wang; Apple
Memory Required: 64.0K bytes
Source Language: Cobol, Fortran, PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25,000
Date First Installed: 1978

PRIME COMPUTER, INC.
EMACS - REAL TIME DISPLAY EDITOR
Specific Application: Real Time

Display Editor
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Price: $4,000
Date First Installed: 1982
(See Vendor Profile Page V-87)

PROCESSOR INNOVATIONS
XI CORE CROSS DEVELOPMENT PACKAGE
Specific Application: Development Tools
Specific Industry: Research and Development
System Requirements: Intellec: XI
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,900
Number Installed to Date: 150
Date First Installed: December 1982
(See Vendor Profile Page V-87)

PROFESSIONAL SOFTWARE, INC.
POWER
Specific Application: Program Utility Kit
Specific Industry: Not Industry Sensitive
System Requirements: Commodore
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,500
(See Vendor Profile Page V-88)

PROGRAMMING AIDS, INC.
CHECK-OUT
Specific Application: Cobol Programs
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B5900, B790 MCP
Memory Required: 144.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-88)

PROGRESSIVE SOFTWARE, INC.
PROGRAMMER'S AID
Specific Application: Applications DEV System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, DOS, 4300 Series OS, DOS
Memory Required: 44.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $17,000 to $23,000
Number Installed to Date: 8
Date First Installed: June 1981
(See Vendor Profile Page V-89)

PRO-LOG CORP.
ABL 1
Specific Application: Software Development Tool and Micro Controller
Specific Industry: Not Industry Sensitive
Memory Required: 16.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000 to $6,000
Number Installed to Date: 50
Date First Installed: January 1983
(See Vendor Profile Page V-89)

PRO-LOG CORP.
MP-4-5-8
Specific Application: Software Debugging Tool
Specific Industry: Not Industry Sensitive
Memory Required: 16.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100 to $200
Number Installed to Date: 100
Date First Installed: 1978

PRO-LOG CORP.
MPM 1.0
Specific Application: Menu Directory
Specific Industry: Not Industry Sensitive
Memory Required: 16.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100 to $750
Number Installed to Date: 5
Date First Installed: 1982

PRO-LOG CORP.
PS1B, PS3B
Specific Application: Software Development and Debugging Tool
Specific Industry: Not Industry Sensitive
Memory Required: 16.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Date First Installed: 1978

QUAD CORP.
AVID
Specific Application: Checks Cobol Programs for Adherence to Company Standards
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1982
(See Vendor Profile Page V-90)

QUAD CORP.
LOGICAL FILE COMPARE
Specific Application: Compares Data Files in Testing
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Date First Installed: 1978

QUANTUM SYSTEMS, INC.
QDI
Specific Application: Write Programs
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11M
Memory Required: 256.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 5
Date First Installed: 1981
(See Vendor Profile Page V-90)

QUELO
A68K
Additional Product Classification: Compilers/Assemblers
Specific Application: Motorola 68000 Cross Assembler
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; CP/M 68K, IBM PC
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: January 1983
(See Vendor Profile Page V-90)

QUELO
BLX
Specific Application: Basic Language Extension
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $95
Date First Installed: November 1981

REALTIME SOFTWARE SYSTEMS, INC.
NUBAG
Specific Application: Introduction Command for New Users for Apollo, Teaching Tool
Specific Industry: Not Industry Sensitive
System Requirements: Apollo
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-92)

REALTIME SOFTWARE SYSTEMS, INC.
WHODO
Specific Application: Program Identity and Aid
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11; Apollo: Aegis
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

REM ASSOCIATES
COMPILE/PLUS
Additional Product Classification: Documentation
Specific Application: Program Level Documentation Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, IBM System/36
Memory Required: 32.0K bytes
Source Language: RPG-II, Assembler
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 300
Date First Installed: August 1981
(See Vendor Profile Page V-92)

REM ASSOCIATES
HEALTH CENTER INFORMATION SYSTEM
Additional Product Classification: Accounting
Specific Application: Physicians Office Management System Maintenance Utility
Specific Industry: Not Industry Sensitive.
System Requirements: Burroughs MCP; IBM 36
Memory Required: 384.0K bytes
Source Language: Cobol Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30,000
Number Installed to Date: 3
Date First Installed: April 1983

REM ASSOCIATES
REMDOC
Additional Product Classification: Documentation
Specific Application: System/34 Level Documentation Software
Specific Industry: Not Industry Sensitive
System Requirements: IBMSystem/34, IBM System/36
Memory Required: 32.0K bytes
Source Language: RPG-II, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 300
Date First Installed: December 1981

REMOTE BUSINESS SERVICES, INC.
RBS BUILD PROGRAM BUILDERS FOR MINI'S
Specific Application: Aid to Standard Programming Techniques
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RSTS/E
Memory Required: 128.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 40
Date First Installed: March 1975
(See Vendor Profile Page V-92)

RENBECK CORP.
ADDERS PROGRAM MAPPING
Specific Application: Cics Program Mapping
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series DOS/VS; OS VS MFT, MVT DOS/VSE, MVS
Memory Required: 48.0K bytes
Source Language: Object Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000 to $5,000
Number Installed to Date: 10
Date First Installed: August 1981
(See Vendor Profile Page V-92)

RENBECK CORP.
GUEST
Specific Application: Programming Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360,

370, 4300 Series, 300 Series: DOS/VS, OS/VS, MFT, MVT, MVS, DOS/VSE
Memory Required: 200.0K bytes
Source Language: Object Code
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $22,500 to $27,500
Number Installed to Date: 10
Date First Installed: February 1983

RGTI SYSTEMS SOFTWARE
XBT-DD DEVICE DRIVER
Additional Product Classification: Communications/TP Monitors
Specific Application: IBM/RSX Communications
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11, RSX
Source Language: Macro
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,700
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-93)

RGTI SYSTEMS SOFTWARE
PDV/DC - FORMS SERVER
Additional Product Classification: System Resource Management, Screen Management
Specific Application: Screen Management for Transaction Processing Applications Using DEC FMS-11
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RSX, DEC VAX VMS
Source Language: C, Macro
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,000
Date First Installed: 1983

RGTI SYSTEMS SOFTWARE
RFX-11 VERSION II (FILE TRANSFER UTILITY)
Additional Product Classification: Communications/TP Monitors
Specific Application: File Transfer and Virtual Terminal Utility
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RSX, RT, DEC VAX VMS
Memory Required: 5.0K bytes
Source Language: Mac o
Source Code Available Yes
Purchase Terms: Purchase (license)
Price: $675
Number Installed to Date: 300
Date First Installed: 1980

RIZZO DATA SYSTEMS, INC.
DISPRINT
Specific Application: Allows Interactive Program Modification
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 5
Date First Installed: September 1982
(See Vendor Profile Page V-93)

SAFE SOFTWARE SYSTEMS, INC.
JCLSAFE
Specific Application: Designed to Eliminate JCL Errors and Automatically Flow Chart and Cross Reference Data Sets and Programs
Specific Industry: Not Industry Sensitive
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,500
Number Installed to Date: 40
Date First Installed: 1978
(See Vendor Profile Page V-94)

SAGE SYSTEMS
ADVANCED PROGRAMMING SYSTEM - APS
Specific Application: Powerful Productivity Support System Engineered to Leverage Senior Technical Talent Skills
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370; IBM 4300 Series: OS/MVS, IBM 3000 Series
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 22
Date First Installed: 1981
(See Vendor Profile Page V-94)

SCHMIDT ASSOCIATES
FORMS
Specific Application: Transaction Processing System
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix
Memory Required: 512.0K bytes
Source Language: C Code
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: June 1983
(See Vendor Profile Page V-95)

SCHMIDT ASSOCIATES
MENUS
Specific Application: Menu Processor
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix
Memory Required: 1.0M bytes
Source Language: C-Code
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10,000
Date First Installed: September 1979

SCIENCE MANAGEMENT CORP.
THOROUGHBRED IDOL
Specific Application: Program Developmental Tool
Specific Industry: Not Industry Sensitive
System Requirements: 16-Bit Micros
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
(See Vendor Profile Page V-95)

SDA PRODUCTS, INC.
CL/1
Specific Application: Source Code Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4341: OS, DOS; IBM 3033, Sperry: Honeywell
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $5,000
Number Installed to Date: 150
Date First Installed: 1981
(See Vendor Profile Page V-96)

SDA PRODUCTS, INC.
COBOL RX
Specific Application: Source Code Processor
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4341: OS, DOS; IBM 3033, Honeywell; Sperry
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $7,500
Number Installed to Date: 150
Date First Installed: 1982

SGM
SCADA SOFTWARE PRODUCTS RCS7
Specific Application: Supervisory Control and Data Acquisition
Specific Industry: Industrial Automation
System Requirements: DEC PDP-11 Series: RSX-11M, DEC VAX Series: VMS, Modcomp Classic: MAX IV; DG Eclipse MV Series: AOS/VS, RT-32
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000 to $50,000
Number Installed to Date: 30
Date First Installed: April 1980
(See Vendor Profile Page V-96)

SHARED BUSINESS SERVICES, INC.
SBS STRUCTURED SOLUTION GENERATOR
Specific Application: Total Application Development
Specific Industry: Not Industry Sensitive
System Requirements: GA Zebra: Pick; Microdata Sequal Reality Pick; ADDS Mentor: Pick, IBM Series/1, PC
Memory Required: 32.0K bytes
Source Language: Basic, English, Info Access
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 5
Date First Installed: January 1983
(See Vendor Profile Page V-97)

SIR, INC.
SIR/NET
Specific Application: Upper Level Language Interface
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS; DEC: VM/CMS; Univ: VMS
Source Language: Sirtran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Date First Installed: 1982
(See Vendor Profile Page V-98)

SOFTOOL CORP.
COBOL DOCUMENTER A
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV: AOS/VS; Gould SEL Series 32: MPX; IBM System/330, 370, 3030 Series, 430 Series: VM/CMS, MVS, TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $7,000
Number Installed to Date: 750
Date First Installed: August 1980
(See Vendor Profile Page V-98)

SOFTOOL CORP.
COBOL INTERFACE DOCUMENTER
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV: AOS/VS, Gould SEL Series 32: MPX, IBM System/330, 370, 3030, 430: VM/CMS, MVS, TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $7,000
Number Installed to Date: 750
Date First Installed: 1981

SOFTOOL CORP.
COBOL LIBRARY OF PREPROCESSORS
Specific Application: Software Management Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV: AOS/VS, Gould SEL Series 32: MPX, IBM System/330, 370, 3030, 430 Series: VM/CMS, MVS, TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $4,500
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
COBOL OPTIMIZATION INSTRUMENTERS
Additional Product Classification: Performance Measurement
Specific Application: Software Management Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV: AOS/VS; Gould SEL Series 32: MPX, IBM System/330, 370, 3030, 430 Series: VM/CMS, MVS, TSO

Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $7,000
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
COBOL STRUCTURIZER
Specific Application: Software Management Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV: AOS/VS; Gould SEL Series 32: MPX; Honeywell 6000 Level: VM/CMS, MVS/TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $8,500
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
COBOL TESTING INSTRUMENTERS
Additional Product Classification: Performance Measurement
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV AOS/VS; Gould SEL Series 32: MPX; IBM System/330, 370, 3030, 430 Series: VM/CMS, MVS/TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $7,000
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
COBOL TRACING INSTRUMENTERS
Additional Product Classification: Performance Measurement
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS; DG Eclipse MV: AOS/VS; Gould SEL Series 32: MPX, IBM System/330, 370, 3030,430 Series
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $7,000
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
FORLTRAN STRUCTURED LANGUAGE
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV: AOS/VS, Gould SEL Series 32: MPX; IBM System/330, 370, 3030, 430 Series: VM/CMS, MVS/TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $20,000
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
FORTRAN AUDITOR
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS; DG Eclipse MV: AOS/VS; Gould SEL Series 32: MPX; IBM System/330, 370, 3030, 430: VM/CMS, MVS/TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $16,000
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
FORTRAN DOCUMENTER A
Specific Application: Software Management Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV; Gould SEL Series 32: MPX; IBM System/330, 370, 3030, 430 Series: VM/CMS, VMS/TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $7,000
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
FORTRAN INTERFACE DOCUMENTER
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS; DG Eclipse MV: AOS, VS; Gould SEL Series 32: MPX, IBM System/330, 370, 3030, 430 Series: VM/CMS, MVS/TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $7,000
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
FORTRAN LIBRARY OF PREPROCESSORS
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS; DG Eclipse MV: AOS, VS; Gould SEL Series 32: MPX, IBM System/330, 370, 3030, 430 Series: VM/CMS, MVS/TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $4,500
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
FORTRAN MEMORY MANAGERS LIBRARY
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV: AOS, VS; Gould SEL Series 32: MPX; IBM System/330, 370, 3030, 430 Series: VM/CMS, MVS/TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $8,500
Number Installed to Date: 750
Date First Installed: 1980

SOFTOOL CORP.
FORTRAN OPTIMIZATION INSTRUMENT
Additional Product Classification: Performance Measurement
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV: AOS, VS; Gould SEL Series 32: MPX; IBM System/330, 370, 3030, 430 Series: VM/CMS
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $7,000
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
FORTRAN PRODUCTIVITY LIBRARY
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV: AOS, VS; Gould SEL Series 32: MPX; IBM System/330, 370, 3030, 430 Series: VM/CMS, MVS/TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $12,500
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
FORTRAN STRUCTURIZER
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV: AOS, VS; Gould SEL Series 32: MPX; IBM System/330, 370, 3030, 430 Series: VM/CMS, MVS/TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $8,500
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
FORTRAN TESTING INSTRUMENTERS
Additional Product Classification: Performance Measurement
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS; DG Eclipse MV AOS/VS, Gould SEL Series 32 MPX, IBM System/330, 370, 3030, 430 Series: Unix
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $7,000
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
FORTRAN X/Y TRANSPORTATION PACKAGE
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV AOS, VS; Gould SEL Series 32: MPX; IBM System/330, 370, 3030, 430 VM/CMS, MVS/TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
SOFTOOL COBOL PROGRAMMING ENVIRONMENT
Additional Product Classification: Performance Measurement
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV AOS, VS; Gould SEL Series 32: MPX, IBM System/330, 370, 3030, 430: VM/CMS, MVS/TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $33,500
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
SOFTOOL FORTRAN PROGRAMMING ENVIRONMENT
Additional Product Classification: Performance Measurement
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV: AOS, VS, Gould SEL Series 32: MPX; IBM

System/330, 370, 3030, 430: VM/CMS, MVS/TSO
Source Language: Fortran
Purchase Terms: Purchase (license); Lease
Price: $60,000
Number Installed to Date: 750
Date First Installed: August 1980

SOFTOOL CORP.
SOFTOOL TUTORIALS LIBRARY
Specific Application: Software Management, Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclispe MV: AOS, VS; Gould SEL Series 32: MPX, IBM System/330, 370, 3030, 430: VM/CMS, MVS/TSO
Source Language: Fortran
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 750
Date First Installed: August 1980

SOFTRON, INC.
CADAT-COMPUTER AIDED DESIGN AND TEST
Specific Application: Digital Logic Simulator
Specific Industry: Electonic
System Requirements: Unix
Memory Required: 1.0M bytes
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $75,000
Number Installed to Date: 10
Date First Installed: January 1983
(See Vendor Profile Page V-98)

SOFTWARE AG OF NORTH AMERICA, INC.
NATURAL
Specific Application: Fourth Generation Application System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370: MVS, IBM 4300 Series Series: OS-VS1; IBM 3000 Series Series: DOS/VS, DOS/VSE
Source Language: Assembler
Purchase Terms: Purchase (license); Lease
Price: $40,000
Number Installed to Date: 1,000
Date First Installed: 1979
(See Vendor Profile Page V-99)

SOFTWARE CLEARING HOUSE
APPLICATION SCREEN PAINTER (ASP)
Specific Application: Virtax Programmer Can Type Image of Designed Screen Format At Terminal, Reducing Coding Lines
Specific Industry: Not Industry Sensitive
System Requirements: NCR V Series: VRX
Memory Required: 40.0K bytes
Source Language: VRX Cobol
Purchase Terms: Purchase (license); Rental
Price: $2,200
Number Installed to Date: 43
(See Vendor Profile Page V-99)

SOFTWARE CLEARING HOUSE
COBOL 74 CODE GENERATOR (COGEN) RELEASE 8
Specific Application: Through Simple Steps Cogen Produces Standardized Bug-Free Cobol 74 Sourceprograms for Standard Business Applications
Specific Industry: Not Industry Sensitive
System Requirements: NCR 8200, 8400, 8500: Imos; DEC VAX: VMS, RT-11
Source Language: Cobol 74

SOFTWARE CLEARING HOUSE
DAVE
Specific Application: Data Entry System Which Supports the Familiar Functions of A Keypunch
Specific Industry: Not Industry Sensitive
System Requirements: NCR V: VRX
Source Language: Cobol 74
Purchase Terms: Purchase (license); Rental
Price: $3,200 to $4,950
Number Installed to Date: 42

SOFTWARE CLEARING HOUSE
DOCUTEXT
Specific Application: Documentation Text Formatting
Specific Industry: Not Industry Sensitive
System Requirements: NCR Century Criterion, B Series: VRX
Memory Required: 25.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $1,250
Number Installed to Date: 10

SOFTWARE CLEARING HOUSE
EASY MENU
Specific Application: Menu Processing System for Easy Custom Tailored Menus (Replacement for the NCR Menu Processor)
Specific Industry: Not Industry Sensitive
System Requirements: NCR 8200, 9000 Series: Imos, IRX
Memory Required: 17.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Rental
Price: $1,500 to $2,000
Number Installed to Date: 15

SOFTWARE CLEARING HOUSE
INTER/PRO
Specific Application: Interpretive Language, Interactive Programming Utility
Specific Industry: Not Industry Sensitive
System Requirements: NCR 8455, 8500 Series: VRX
Purchase Terms: Purchase (license); Rental
Price: $3,200
Number Installed to Date: 5

SOFTWARE CLEARING HOUSE
JCL WRITER
Specific Application: JCL Code Generator, Self-Modifying, Keeps Up With File Moves and Changes
Specific Industry: Not Industry Sensitive
System Requirements: NCR I Series: Imos, IRX
Memory Required: 25.0K bytes
Purchase Terms: Purchase (license); Rental
Price: $1,050
Date First Installed: July 1983

SOFTWARE CLEARING HOUSE
SCREEN-TEK
Specific Application: Screen Generator
Specific Industry: Not Industry Sensitive
System Requirements: NCR 8455, 8500 Series: VRX
Purchase Terms: Purchase (license); Rental
Price: $3,500
Number Installed to Date: 10

SOFTWARE CLEARING HOUSE
TOPICS
Specific Application: On-Line Program Development System Replacement
Specific Industry: Not Industry Sensitive
System Requirements: NCR Century 8455, B3, B4: VRX
Memory Required: 120.9K bytes
Purchase Terms: Purchase (license); Rental
Price: $2,500
Number Installed to Date: 207

SOFTWARE CLEARING HOUSE
UTILITY PROGRAM GENERATOR (UPG) I
Specific Application: Utility Shorthand Language for Report Writing
Specific Industry: Not Industry Sensitive
System Requirements: NCR Century, Criterion, B Series: VRX
Memory Required: 48.0K bytes
Purchase Terms: Purchase (license); Rental
Price: $2,975
Number Installed to Date: 682

SOFTWARE MANAGEMENT SYSTEMS, INC.
ESCAPE
Specific Application: Programming Aid
Specific Industry: Not Industry Sensitive
System Requirements: Prime 2250, 250, 450, 750, 850
Source Language: Info Basic
Purchase Terms: Purchase (license); Lease
Price: $10,000
Number Installed to Date: 15
Date First Installed: November 1981
(See Vendor Profile Page V-99)

SOFTWARE MODULE MARKETING, INC.
COMPAREX
Specific Application: File Comparison Utility
Specific Industry: Not Industry Sensitive
System Requirements: DOS/VS, MVS, VSE, OS
Memory Required: All 2K bytes
Source Language: Assembler
Purchase Terms: Purchase (license); Rental, Lease
Price: $4,000 to $8,000
Number Installed to Date: 18
Date First Installed: 1982
(See Vendor Profile Page V-99)

SOFTWARE TECHNOLOGY
CICI PRINT FACILITY
Specific Application: Menu-Driven Index Reports, With Individual Page Print, Screen Displays, Multiple Copies and Destinations, On-Line and Multiple-Task Spooling, Batch Spooling
Specific Industry: Not Industry Sensitive
System Requirements: MVS
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (License)
Date First Installed: 1982

SOFTWARE TECHNOLOGY
P.O. Box 1110
Poulsbo, WA 98370
(206) 842-1011
Major Market: Cics Shops With MVS, DOS
Target Industries: Not Industry Sensitive
Target Applications: On-Line Spooling With Batch Interface
Net Sales: $500,000 (1982)
Contacts:
Head of Software: Steve Oak
Head of Engineering: Tom Butler
Head of Marketing: Allen Schmitt
Geographic Coverage: International
Number of Employees: 8

SOFTWARE TOOLS
CALL COPY CROSS REFERENCE LISTING
Specific Application: Programming
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360
Memory Required: 128.0K bytes
Source Language: Cobol
Purchase Terms: Lease
Price: $550
Date First Installed: June 1982
(See Vendor Profile Page V-100)

SOFTWARE '70
ISAM 70
Specific Application: Programming Aid
Specific Industry: Not Industry Sensitive
Source Language: Fortran IV
Source Code Available: Yes
Purchase Terms: Lease
Price: $99
Number Installed to Date: 400
Date First Installed: 1973
(See Vendor Profile Page V-100)

SOFTWARE '70
SORT80
Specific Application: Disk, Tape Support for Fortran IV
Specific Industry: Not Industry Sensitive
Source Language: Fortran IV
Source Code Available: Yes
Purchase Terms: Lease
Price: $99
Number Installed to Date: 400

SOFTWARE '70
STRING 70
Specific Application: Character String Package for Fortran IV Users
Specific Industry: Not Industry Sensitive
Source Language: Fortran IV
Purchase Terms: Lease

Price: $99
Number Installed to Date: 300
Date First Installed: 1975

SOFTWORKS, INC.
VSAM-ASSIST
Specific Application: Back-Up and Restore Vsam Data Set and Catalog
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $4,950
Number Installed to Date: 500
Date First Installed: 1978
(See Vendor Profile Page V-100)

SOFTWORKS, INC.
VSAM COBOL I-O LOGIC ERROR DETECTION
Specific Application: Prints Data in the Syslog Describing Input/Output Error for Vsam
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS
Memory Required: 512.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license); Lease
Price: $3,000
Number Installed to Date: 10
Date First Installed: 1981

SOS, INC.
DQ KEY
Specific Application: Restores Keys in Files
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: Iris; Point 4: Bit; Bytronics
Memory Required: 32.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1982
(See Vendor Profile Page V-101)

SOS, INC.
RWD
Specific Application: Addresses Any Location or File
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: Iris, Point 4: Bits, Bytronics
Memory Required: 32.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1982

SOS, INC.
UNPROTECT
Specific Application: Recovers A Protected Program
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: Iris, Point 4: Bits; Bytronics
Memory Required: 32.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1981

STARDATA CORP.
ASTRA/GEN
Specific Application: Developing Cobol Programs
Specific Industry: Not Industry Sensitive
System Requirements: NEC Astra 250, NEC Astra 270
Memory Required: 128.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Rental, Lease
Price: $5,000
Number Installed to Date: 25
Date First Installed: 1982
(See Vendor Profile Page V-102)

STAR PLAN DATA PROCESSING, INC.
MP2
Additional Product Classification: Preprocessor
Specific Application: Macro Language Utility, Preprocessor .
Specific Industry: OEM, Software Development
System Requirements: DEC PDP-11 Series: RSTS; DEC VAX-11 Series: VMS
Memory Required: 64.0K bytes
Source Language: Basic, Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $850
Number Installed to Date: 3
Date First Installed: March 1983
(See Vendor Profile Page V-102)

START SYSTEMS
AIDESET-ADVANCES INTERACTIVE DEVELOPMENT ENVIRONMENT
Specific Application: Programmer Software Development Aids
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS
Memory Required: 256.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 3
Date First Installed: January 1982
(See Vendor Profile Page V-103)

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A VSAM—COBOL I-O Logic Error Display utility that frees application programmers from the time-consuming searching and guess work involved in dealing with I-O logic errors by allowing the quick determination of the causes of those errors. For all OS/VS systems.

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STRATUS COMPUTER
FINANCIAL TICKER
Specific Application: Interface to High Speed Securities Ticker Services
Specific Industry: Banking/Financial
System Requirements: Stratus 32: Stratus VOS
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: February 1983
(See Vendor Profile Page V-104)

STRATUS COMPUTER
FORMS MANAGEMENT SYSTEM (FMS)
Specific Application: Interactive Screen Forms Creation and Run Time Management
Specific Industry: Not Industry Sensitive
System Requirements: Stratus 32: Status VOS
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Date First Installed: July 1982

STRATUS COMPUTER
TRANSACTION PROCESSING FACILITY (TPS)
Specific Application: System Tool for Developing Interactive Transaction, Processing Applications
Specific Industry: Not Industry Sensitive
System Requirements: Stratus 32: Stratus VOS
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $12,500
Date First Installed: June 1982

STSC, INC.
APL PLUS/1200 SERIES OF SYSTEM S/W PRODUCTS
Specific Application: APL Enhancements, Shared File System, Data Management Utilities, Programmer Tools and Utilities
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4330 VM/SP, CMS/SP
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $60,000
Number Installed to Date: 35
Date First Installed: 1978
(See Vendor Profile Page V-104)

STSC, INC.
APL PLUS/1140 SYSTEM
Specific Application: Includes STSC'S Proprietary Enhancements to IBM'S VS/APL Implemented in the VM/SP Area CMS/SP Environments
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4330; VM/SP, CMS/SP
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $70,000
Number Installed to Date: 40
Date First Installed: 1981

STSC, INC.
APL PLUS/1280 SYSTEM
Specific Application: Includes STSC'S Proprietary Enhancements to IBM'S VS/APL Implemented in the MVS/TSP Environment
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3080 Series: VM/SP; IBM 370, 145, 4341, 3030 Series
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $70,000
Number Installed to Date: 40
Date First Installed: 1982

SUBJECT WILLS & CO.
FAST PROGRAMMING
Specific Application: Complete Program Generator System
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS, RMS
Memory Required: 128.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 4
Date First Installed: November 1981
(See Vendor Profile Page V-104)

SUN INFORMATION SERVICES CO.
FASTFORM
Specific Application: CRT Screen Generator Operates on Either TSO or CMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, IBM 3000 Series: OS
Memory Required: 512.0K bytes
Source Language: Assembler
Sealer: Project Management and Tracking
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS, IBM 4300, IBM 3000 Series
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $110,000 to $140,000
Number Installed to Date: 50
Date First Installed: 1974
(See Vendor Profile Page V-104)

SYNCSORT, INC.
STDOC
Specific Application: Cobol Documentation Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3030 Series: SVS; 3080 Series: VS/1; IBM 4300 Series: MVS
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-105)

SYSTEMATICS, INC.
FINANCIAL INFORMATION ACCESS SYSTEM
Specific Application: On-Line Support for all Other Systematics, Inc. Programs
Specific Industry: Banking/Financial
System Requirements: IBM 4300 Series: DOS/VSE, MVS; IBM 3000 Series: MVS
Memory Required: 2.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Time-Sharing
Number Installed to Date: 30
Date First Installed: 1982
(See Vendor Profile Page V-105)

SYSTEMS & APPLIED SCIENCES CORP.
METEOROLOGICAL SATELLITE PACKAGE
Specific Application: Main Package in Meteorological Satellite Package Makes Other Packages Run
Specific Industry: Scientific
System Requirements: DEC VAX; DG
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
(See Vendor Profile Page V-105)

SYSTEMS INTEGRATION, INC.
CODE GENERATOR
Specific Application: Automatic Applications Program
Specific Industry: Not Industry Sensitive
System Requirements: OS; IBM Series/1; DEC PDP-11
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-106)

SYSTEM & SOFTWARE, INC.
MART
Specific Application: Simplifies Interactions Between Application Programs and Arithmetic Devices
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8080, 8085; Zilog Z80
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 100
Date First Installed: September 1979
(See Vendor Profile Page V-106)

SYSTEMS RESOURCES CORP.
TABLE BASE
Specific Application: Table Handling Package for IBM Mainframe.
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: OS, DOS, IBM 370; IBM 3080 Series
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25,000
Date First Installed: 1981
(See Vendor Profile Page V-107)

SYSTEMS TECHNOLOGY ASSOCIATES RESOURCES, INC.
GENERAL UTILITY PACKAGE
Specific Application: General Utility Package For Over 100 Utilities
Specific Industry: Not Industry Sensitive
System Requirements: DU ADS, DOS, R-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 100
(See Vendor Profile Page V-107)

TASCOM CORP.
K BASIC
Specific Application: Microsoft Mbasic, Index and Indirect Access
Specific Industry: Not Industry Sensitive
System Requirements: Zilog Z80: CP/M, TURBO-DOS; Intel 8080: TURBO-DOS, CPM; Intel 8085: CP/M, TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $120,005
Date First Installed: 1975
(See Vendor Profile Page V-108)

TECHNOLOGY CONSULTING CORP.
SUPER BUG
Specific Application: VM/CMS Debugging System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: VM/CMS
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 10
Date First Installed: 1982
(See Vendor Profile Page V-108)

TELESOFT
TELESOFT PROGRAMMING SUPPORT
Specific Application: Development System to Do Work In Ada
Specific Industry: Not Industry Sensitive
System Requirements: Unix; DEC: VMS, IBM 370: DOS; IBM PC: CMS
Source Language: Ada
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1981
(See Vendor Profile Page V-109)

THE SATELLITE CO., INC.
TOOL KIT SYSTEM
Specific Application: Builds Software
Specific Industry: Fortune 1000
System Requirements: IBM PC DOS/PC-IX; HP 100 RMX; Pertron
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1981
(See Vendor Profile Page V-109)

THE LORD CONSULTING CORP.
SI FRONT END
Specific Application: Ada Front End to Software International Financial Reporting System to Make Ease to Use
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: VS
Memory Required: 128.0K bytes
Source Language: Cobol, Wang
Source Code Available: Yes

Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 10
Date First Installed: June 1981
(See Vendor Profile Page V-109)

THE SYSTEMS CENTER
NETWORK DATAMOVER-MVS
Additional Product Classification: Graphics
Specific Application: Distribute Data, Program Text Graphic Between Mainframes, Mini- and Microcomputers
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3000 Series: MVS; IBM 4300 Series
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Date First Installed: July 1983
(See Vendor Profile Page V-109)

THETA BUSINESS SYSTEMS
PASCAL DEVELOPMENT SYSTEM
Specific Application: Pascal Development System
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11; HP-1000; Wicat Systems
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995 to $2,500
Number Installed to Date: 200
Date First Installed: August 1979
(See Vendor Profile Page V-109)

THORNE DATA, INC.
RECFLOW
Specific Application: Draws Record Layout of Cobol Programs
Specific Industry: Not Industry Sensitive
System Requirements: OS; IBM 4340; IBM 3330
Memory Required: 256.0K bytes
Source Language: Cobol, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 8
Date First Installed: January 1978
(See Vendor Profile Page V-110)

TOMMY, INC.
DATA BASE - PLUS
Additional Product Classification: DBMS, Report Generator, Query Languages
Specific Application: Family of Application Development Tools Including DBMS, Screen/Print Handler, Query, Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, IBM System 34· SSP; IBM Series/1: EDX, CPS; IBM: Cics
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 500
Date First Installed: 1978
(See Vendor Profile Page V-111)

TOM (THE OFFICE MANAGER, INC.)
SPEED II APPLICATIONS GENERATOR UTILITY
Specific Application: Reduces Application Development Time At all Stages
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: DOS
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 70
Date First Installed: July 1982
(See Vendor Profile Page V-111)

TOM (THE OFFICE MANAGER, INC.)
SPEED TM I APPLICATION GENERATOR UTILITY
Specific Application: Reduces Time for Application Design, Programming, Debugging
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200 Series: DOS
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2,500

TONE SOFTWARE CORP.

ISP-INTERSYSTEM SPOOL PROCESSOR
Additional Product Classification: Spooling Packages
Specific Application: Permits Transfer of Spooled Input add Output Data Between Multiple VS1 and or MVS CPU
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: IBM VS1, MVS, IBM 3030; IBM 4300
Memory Required: 70.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1976
(See Vendor Profile Page V-111)

TONE SOFTWARE CORP.
PROCMAN
Additional Product Classification: Performance Tools
Specific Application: C List Compiler
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: IBM/VS1 and MVS; IBM 3030; IBM 4300
Memory Required: 50.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 50
Date First Installed: September 1982

TONE SOFTWARE CORP.
TSPRINT
Additional Product Classification: Spooling Packages
Specific Application: Attached Printer Support Package
System Requirements: IBM 370: IBM VS1, MVS, IBM 3030; IBM 4300
Memory Required: 30.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 15
Date First Installed: March 1983

TONE SOFTWARE CORP.
FSO
Specific Application: Display of Input and Output, Dataset Manipulation, System Programmer Aids
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: IBM VS1, MVS, IBM 3030; IBM 4300
Memory Required: 36.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 200
Date First Installed: April 1978
(See Vendor Profile Page V-111)

TONE SOFTWARE CORP.
TONE 3
Specific Application: Time-Sharing, Program Development System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: IBM VS1, IBM 3030, IBM 4300
Memory Required: 512.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 350
Date First Installed: 1975

TONE SOFTWARE CORP.
TONE 4
Specific Application: Time-Sharing, Program Development System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: IBM MVS, IBM 4300, 3030
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 50
Date First Installed: 1979

Additional information provided for by vendor

Programmer and data center productivity tools. TONE3 — TSE for IBM VS1; PROCMAN — the TSO CLIST compiler; TSPRINT — spool to 328X printer support; ISP — shared spool for VS1/MVS; FSO — full screen utility for Cics, Roscoe, TSO; TONE4 — Enhanced TSO for MVS. Systems software for the IBM VS1 and MVS user. Worldwide sales and support.

TRISYS, INC.
SDM AIDS
Specific Application: Documentation of RPG
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38· CPS
Memory Required: 750.0K bytes
Source Language: RPG
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 30
Date First Installed: January 1982
(See Vendor Profile Page V-112)

UNITED INFORMATION SERVICES
TAS
Specific Application: Inputs Dynafax Data From A Terminal In Free Field Format and Posts Process Output Results
Specific Industry: Engineering
System Requirements: CDC Cyber; IBM
Source Language: Fortran, Super Basic, Cobol, Snobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-113)

USERVENTURES
CDB
Specific Application: Interactive Source Level Debugger for Unix and Unix-Like Systems
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix; National 16032; Z8000
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 25
Date First Installed: January 1983
(See Vendor Profile Page V-113)

UNIVERSAL SYSTEMS SERVICES, INC.
DOC-USS/34
Specific Application: Programmers Documentation Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 34· SSP
Memory Required: 32.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $440
Number Installed to Date: 40
Date First Installed: April 1982
(See Vendor Profile Page V-114)

UNIVERSAL SYSTEMS SERVICES, INC.
DOS-USS/38
Specific Application: Programmers Documentation Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Memory Required: 32.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $580
Number Installed to Date: 30
Date First Installed: July 1982

USER SYSTEMS, INC.
COBOL LANGUAGE ANALYZER AND SOURCE SYSTEM
Specific Application: Cleans Up Old Cobol Programs, Formats, Renumbers, Cross References
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS, DOS
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000 to $12,000
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-114)

VERTEX CORP.
AIMS PLUS
Specific Application: Application Generator
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200
Memory Required: 28.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000 to $7,000
Number Installed to Date: 1,000
(See Vendor Profile Page V-115)

VIRTUAL SYSTEMS SOFTWARE, INC.
CICS CIC
Specific Application: Cics Interactive Cobol Symbolic Debugging System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS, VS1, VSE
Memory Required: 25.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license); Rental
Price: $15,000
(See Vendor Profile Page V-115)

VIRTUAL SYSTEMS SOFTWARE, INC.
ILLUSION
Specific Application: Cics Printer Terminal and Batch Distribution Report System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS, VS1, VSE
Memory Required: 15.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $19,000
Number Installed to Date: 100
Date First Installed: 1981

WHITESMITHS, LTD.
IDRIS
Specific Application: Software Support
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Government
System Requirements: VERSA-DOS; CP/M 80, CP/M 86; DEC PDP-11, VAX/750; MS-DOS
Source Language: C, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $550
Date First Installed: March 1981
(See Vendor Profile Page V-117)

ZIDAK, INC.
MAINDEBUG
Specific Application: Source Level Debugger for Mainsale Programs
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: VM/CMS; DEC VAX System 10, 20: VMS; Apollo: Unix
Memory Required: 512.0K bytes
Purchase Terms: Purchase (license)
Price: $880 to $7,000
Number Installed to Date: 100
Date First Installed: 1981
(See Vendor Profile Page V-118)

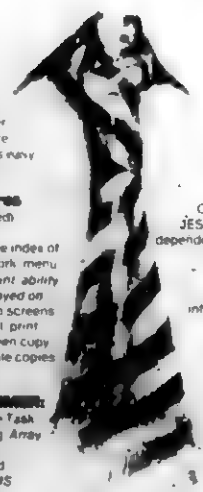
CICS PRINT FACILITY

CPF fine unites more sminds' Release 3.0 is more user friendly and more efficient than the previous release. Print online or batch reports anywhere within your CICS network with greater efficiency than ever before possible. CPF makes it as easy as loosening your tie!

Standard CPF features
(new functions highlighted)

FOR THE USER: Active index of all reports, security network menu driven, individual page print ability to affect all reports displayed on index with one entry, help screens, report display on terminal, print interrupt and restart, screen copy, message sending, multiple copies, multiple destinations.

FOR THE PROGRAMMER: Online Spooling, Multiple Task Spooling, Batch Spooling, Array Mode, Predefined Report, Automatic ENQUEUE and DEQUEUE, Enhanced BMS Support, Direct Spooling.



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CPF operates under MVS with JES 2 or JES 3, and is not release dependent upon CICS. CPF will work with BTAM, VTAM or TCAM.

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Microcomputer Section

ADVENTURE INTERNATIONAL
DISKEY
Specific Industry: Not Industry Sensitive
System Requirements: Atari 400: DOS 2.0; Atari 800: DOS 2.0
Memory Required: 32.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: 1983
(See Vendor Profile Page V-3)

ADVENTURE INTERNATIONAL
THE DISASSEMBLER
Specific Application: Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: Atari 400: DOS 2.0; Atari 800: DOS 2.0
Memory Required: 32.0K bytes
Source Language: Machine
Price: $50
Date First Installed: 1983

THE ALTERNATE SOURCE
SPEAK!
Specific Application: Adds Speech to TRS-80 Programs
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: MULTI-DOS, TRS-80/III: DOS/80; TRS-80/4: TRS-DOS, DOS+
Memory Required: 48.0K bytes
Source Language: Z80
Purchase Terms: Purchase (license)
Price: $39
Number Installed to Date: 200
Date First Installed: December 1981
(See Vendor Profile Page V-4)

THE ALTERNATE SOURCE
STOPPER
Specific Application: Good Programming Utility to Assist With Debugging
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: MULTI-DOS, TRS-80/III: DOS/80; TRS-80/4: TRS-DOS, DOS+
Memory Required: 32.0K bytes
Source Language: Z80
Price: $20
Date First Installed: June 1981

THE ALTERNATE SOURCE
TASMON ALTERNATE SOURCE MONITOR
Specific Application: Debugging for Machine Language Programs
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I: MULTI-DOS, TRS-80/III: DOS/80; TRS-80/4: TRS-DOS, DOS+
Memory Required: 16.0K bytes
Source Language: Z80
Purchase Terms: Purchase (license)
Price: $29
Number Installed to Date: 1,500
Date First Installed: January 1980

AMERICAN SYSTEMS, INC.
WARNER DIAGRAM PLOTTER
Specific Application: Diagram Plotter
Specific Industry: Not Industry Sensitive
System Requirements: DEC: COS
Memory Required: 16.0K bytes
Source Language: Dibol
Purchase Terms: Purchase (license)
Price: $550
Date First Installed: June 1981
(See Vendor Profile Page V-5)

AMHERST SYSTEMS, INC.
NEWDRAW
Specific Application: CAE for Digital Logic Design and Schematic Entry
Specific Industry: Engineering
System Requirements: Lisp
Memory Required: 1.0M bytes
Source Language: Lisp
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Date First Installed: June 1982
(See Vendor Profile Page V-5)

ANSWER CORP.
DISC UTILITY
Specific Application: Disk Utility, Screen Editor, Replaces, Deletes and Compacts Disks
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE; Apple II, APPLE-DOS 3.2; Apple II+; Franklin
Memory Required: 32.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $6,000 to $90,000
Date First Installed: September, 1982
(See Vendor Profile Page V-6)

APL COMPUTERS, INC.
APL COMCALL
Specific Application: Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: Wicat: MCS
Memory Required: 10.0K bytes
Source Language: APL, Assembler
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: February 1982
(See Vendor Profile Page V-6)

APL COMPUTERS, INC.
APL FOOSCREEN
Specific Application: Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: Wicat: MCS
Memory Required: 10.0K bytes
Source Language: APL, Assembler
Purchase Terms: Purchase (license)
Price: $225
Number Installed to Date: 15
Date First Installed: June 1982

ASHTON-TATE
DBASE II
Specific Application: Data Base Management, Programming Language

Specific Industry: Not Industry Sensitive
System Requirements: CP/M: CP/M 86, IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $700
Date First Installed: 1980
(See Vendor Profile Page V-9)

AUTOMATION MANAGEMENT, INC.
AMI MASTER MENU INTERFACE
Specific Application: Creates Main Menus for Running AMI Software on Hard Disks
System Requirements: IBM PC-XT: PC-DOS 2.0; IBM PC: PC-DOS 2.0
Memory Required: 64.0K bytes
Source Language: Basic Compiled
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $49
(See Vendor Profile Page V-11)

CAPRO, INC.
PRO-IV SOFTWARE
Specific Application: Application Development Facility
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Corona: MS-DOS; Compaq: CPM 86; Columbia. CP/M
Memory Required: 40.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: June 1982
(See Vendor Profile Page V-16)

CAVM SYSTEMS, INC.
GHOST WRITER
Specific Application: Prompted English Language Authoring System, Training Programs
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple II+; Apple IIE
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 60
Date First Installed: April 1982
(See Vendor Profile Page V-17)

C E SOFTWARE, INC.
THE CREATER
Specific Application: Character Set Editor, Computer Caligraphy
Specific Industry: Not Industry Sensitive
System Requirements: Atari: DOS
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $14
Date First Installed: 1983
(See Vendor Profile Page V-17)

COMMONWEALTH SYSTEMS
INDEX FILES
Specific Application: Series of Subroutines for Creating and Maintaining Files Indexed on Apple Pascal System
Specific Industry: Not Industry Sensitive
System Requirements: Apple
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-21)

COMPRESS
EN BASIC - AUTHORING SYSTEM
Specific Application: Authoring Basic Programs
Specific Industry: Education
System Requirements: Apple 3.3
Memory Required: 48.0K bytes
Source Language: Applesoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: May 1983
(See Vendor Profile Page V-21)

COMPUTER CONTROL SYSTEMS, INC.
AUTOSORT/86M
Specific Application: Programmer's Tool
System Requirements: MS-DOS; PC-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 1,000
Date First Installed: August 1982
(See Vendor Profile Page V-23)

COMPUTER SERVICES
INSPECT
Specific Application: Allows the User to Look at and Modify Individual Bytes or Records on the Diskette
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $75
Date First Installed: November 1982
(See Vendor Profile Page V-26)

COMPUTERS FOR YOU
DTC
Specific Application: Converts Dbase II to Vector Graphics Mail List or Visa Versa
Specific Industry: Not Industry Sensitive
System Requirements: Vector Graphics. CP/M
Memory Required: 64.0K bytes
Source Language: Dbase II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 10
Date First Installed: June 1982
(See Vendor Profile Page V-26)

COMPUTER SIGHT
APEX OPERATING SYSTEM
Specific Application: Makes Computer Run Faster and More Efficiently
Specific Industry: Not Industry Sensitive
System Requirements: Apple: Apex
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 2,000
Date First Installed: 1980
(See Vendor Profile Page V-26)

COMPUTER STATIONS, INC.
MACRO-SCED
Specific Application: Screen Editing Program
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Machine Language
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $49
Number Installed to Date: 500
Date First Installed: June 1980
(See Vendor Profile Page V-26)

COMPUTER SYSTEMS RESEARCH, INC.
CSR TRAINER 3000 SYSTEM
Specific Application: Instructional Development Delivery System for the IBM PC
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $998
Number Installed to Date: 50
Date First Installed: June 1982
(See Vendor Profile Page V-27)

COMPUTER TERMINAL LTD.
GENERATOR
Specific Application: Productivity Tool, Menus, Reports for Programmer and End User
System Requirements: IBM PC: PC-DOS, IBM Datamaster: MS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-28)

COMPUTING SERVICES
CBIDATA
Specific Application: Application Development Tool
Specific Industry: Not Industry Sensitive
System Requirements: Computer Superbrain: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $395
(See Vendor Profile Page V-28)

COMPUTING SERVICES
CISIMS
Specific Application: Application Development Tool
Specific Industry: Not Industry Sensitive
System Requirements: Computer Superbrain: CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $1,495

CREATIVE SOLUTIONS, INC.
MULTI-FORTH, CUSTOM-PROMPT, PORTA-PROCESS
Additional Product Classification: Operating Systems, Languages, Compilers/Assemblers
Specific Application: Process Control, Real-Time Data
Specific Industry: Engineering, Wholesale/Distribution, Government, Scientific
System Requirements: HP Series 200; Motorola VME/10, Bunker Ramo 68000, Omnibyte OBK-1
Memory Required: 64.0K bytes
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 75
Date First Installed: January 1981
(See Vendor Profile Page V-32)

CYBERNETICS, INC.
CRT
Specific Application: Cobol Reprogramming Tool
Specific Industry: Not Industry Sensitive
System Requirements: CP/M CP/M-86, MS-DOS, Unix. RM/COS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $950
Number Installed to Date: 200
Date First Installed: December 1981
(See Vendor Profile Page V-34)

DASH DATA SYSTEMS, INC.
FAST WRITER
Specific Application: Speeds Program Generation
Specific Industry: Not Industry Sensitive
System Requirements: Tandem; Honeywell, HP
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 25
Date First Installed: 1982
(See Vendor Profile Page V-34)

DATA FINANCIAL SYSTEMS, INC.
ADAPT (APPLICATION & DESIGN PROGRAMMING TECH.)
Specific Application: To Increase Programming Productowty By 90 Percent
Specific Industry: Not Industry Sensitive
System Requirements: Televideo CP/M, Point Four Iris
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1975
(See Vendor Profile Page V-36)

THE DATELEX CO., INC.
BUBBLE SYSTEM
Specific Application: Allows PC-DOS to Run on UCSD-P System
Specific Industry: Fortune 100
System Requirements: IBM PC. UCSD-P; HP 125, DEC Rainbow
Memory Required: 128.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 1,000
Date First Installed: 1981
(See Vendor Profile Page V-37)

DATAMENTION
PROJECT MANAGER
Specific Application: Project Management Tool
Specific Industry: Not Industry Sensitive
System Requirements: MS-DOS
Memory Required: 192.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $499
Number Installed to Date: 15,000
Date First Installed: June 1981
(See Vendor Profile Page V-37)

DATA-BX, INC.
CONTROL CENTER
Specific Application: Makes Environment More User-Friendly
Specific Industry: Computer Dealers, OEM
System Requirements: CP/M 86, TurboDOS
Memory Required: 16.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $95
Date First Installed: 1982
(See Vendor Profile Page V-38)

DATA TECHNOLOGY INDUSTRIES
TEACHER
Specific Application: Teaches Associate Operating System
Specific Industry: Not Industry Sensitive
System Requirements: Associate
Purchase Terms: Purchase (license)
Price: $100
(See Vendor Profile Page V-38)

DB/DC SOFTWARE ASSOCIATES,INC.
ULTIMENU FOR BASIC
Specific Application: Provides Simple, Economical and Foolproof Access To Your Entire Basic Software Library
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Memory Required: 48.0K bytes
Source Language: IBM Basic
Purchase Terms: Purchase (license)
Price: $19
(See Vendor Profile Page V-40)

DB/DC SOFTWARE ASSOCIATES, [illegible]
ULTIMENU FOR DOS
Specific Application: Simplifies DOS, Runs Any Program, Command, Batch File, Easy to Customize
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 48.0K bytes
Purchase Terms: Purchase (license)
Number Installed to Date: 25

DIGITAL RESEARCH, INC.
DIGITAL RESEARCH C
Specific Application: Multiple Memory Model and Chaining Support. Supports C Language
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8086: CP/M; Intel 8088
Memory Required: 112.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-42)

DIGITAL RESEARCH, INC.
DISPLAY MANAGER
Specific Application: Design Displays and A Library of Subroutines to Place Displays on the Screen
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Purchase Terms: Purchase (license)

DIGITAL RESEARCH, INC.
MAC AND RMAC
Specific Application: Write Routines Once and Then References the Instructions With Just One Statement
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Assembly
Purchase Terms: Purchase (license)

DIGITAL RESEARCH, INC.
SID
Specific Application: Controls Step-by-Step Execution of A Program to Allow Location of Logic Errors
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Purchase Terms: Purchase (license)

DIGITAL RESEARCH, INC.
XLT86
Specific Application: Moving 8-Bit 8080 Assembler Programs to the 16-Bit 8086 Processor
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Assembly
Purchase Terms: Purchase (license)

DYNATECH MICROSOFTWARE, INC.
CODEWRITER
Specific Application: Program Design Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Apple IIE, II+: APPLE-DOS; Victor 9000: DOS; Commodore 64: DOS
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $340
Number Installed to Date: 5,000
Date First Installed: April 1983
(See Vendor Profile Page V-44)

EDUCALITOR, INC.
ADVOCAITE
Specific Application: Authoring System to Write Custom Courseware
Specific Industry: Not Industry Sensitive
System Requirements: Apple; TI
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 25
Date First Installed: 1981
(See Vendor Profile Page V-45)

EDUCATOR, INC.
CAI PLUS
Specific Application: Authoring System to Write Custom Courseware
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Memory Required: 256.0K bytes
Source Language: APL Plus
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 10
Date First Installed: July 1983

ELECTRONIC INFORMATION SYSTEM
EIS BASIC CROSS REFERENCE PROGRAM
Specific Application: Cross References
Specific Industry: Not Industry Sensitive
System Requirements: OSI, OS65U
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: 1978
(See Vendor Profile Page V-46)

EMPIRICAL RESEARCH GROUP
VED 68K SCREEN EDITOR
Specific Application: Full Screen-Oriented Screen Editor
Specific Industry: Not Industry Sensitive
System Requirements: 68K Forth: Unix, CPM
Memory Required: 68.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195 to $395
Number Installed to Date: 150
Date First Installed: 1982
(See Vendor Profile Page V-46)

ENSIGN SOFTWARE
CROSS REFERENCE
Specific Application: Programming Tool
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: PC Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 800
Date First Installed: June 1982
(See Vendor Profile Page V-46)

ENSIGN SOFTWARE
FASTSORT
Specific Application: Programming Development Tool
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Machine
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 300
Date First Installed: September 1982

ENSIGN SOFTWARE
ISAM ROUTINES-INDEXED SEQUENTIAL ACCESS
Specific Application: Programming Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: PC Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75
Number Installed to Date: 1,000
Date First Installed: June 1982

EXECUTEC CORP.
EXECU/BUSTM
Specific Application: Data Integration, Displays Presentation, User Interface, User Insolation From Operating System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Victor 9000: CP/M 86; Wang PC: Unix
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
(See Vendor Profile Page V-47)

FOGLE COMPUTING CORP.
SCREEN DESIGN FACILITY (SDF)
Specific Application: Custom Screen Designing and Data Entry Subroutines
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: PC-DOS (Basic)
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease, Visa, Mastercard
Price: $150
Number Installed to Date: 800
Date First Installed: February 1982
(See Vendor Profile Page V-49)

FOX AND GELLER, INC.
DATE
Specific Application: Formats, Debugs and Modifies Programs
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; IBM PC: PC-DOS; Victor 9000: MS-DOS
Memory Required: 48.0K bytes
Source Language: PL/1, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $99
(See Vendor Profile Page V-50)

FOX AND GELLER, INC.
QUICK - CODE
Specific Application: Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; IBM PC: PC-DOS, Victor 9000: MS-DOS
Memory Required: 48.0K bytes
Source Language: PL/1, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195

FOX AND GELLER, INC.
QUICK - SCREEN
Specific Application: Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: PL/1
Purchase Terms: Purchase (license)
Price: $149

GAYLORD BROS., INC.
APPLE PILOT
Specific Application: Support Development of Courseware for CAI
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Pilot, Basic
Purchase Terms: Purchase (license)
Price: $100
(See Vendor Profile Page V-50)

GREAT PLAINS COMPUTER CO., INC.
6809 CROSSBAK
Specific Application: Software Development Tool
Specific Industry: Not Industry Sensitive
System Requirements: Tano 6809; Flex 6809; Gimix 6809 Flex 6809; Southwest Tech 6809; Flex 6809
Memory Required: 56.0K bytes
Source Language: 6809 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $120
Number Installed to Date: 50
Date First Installed: March 1979
(See Vendor Profile Page V-52)

GREAT PLAINS COMPUTER CO., INC.
6809 RELOCATABLE MACRO-ASSEMBLER
Specific Application: Programming Utility for 6809
Specific Industry: Not Industry Sensitive
System Requirements: Tano 6809; Flex 6800/6809, Southwest Technology 6809; Flex 6800/6809; Gimix 6809 Flex 6800/6809
Memory Required: 56.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $120
Number Installed to Date: 100
Date First Installed: May 1979

HELMSMAN SYSTEMS, INC.
H-CHAMP
Specific Application: A Command Applications Environment That Provides Essential Utility Software Tools
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, Onyx 8002: Unix; CP/M
Memory Required: 48.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $695
Date First Installed: November 1982
(See Vendor Profile Page V-54)

HELMSMAN SYSTEMS, INC.
H-CHAMP + M - VERSION 2.0
Specific Application: Procedures and Batch Processing
Specific Industry: Not Industry Sensitive
System Requirements: Intel; Zilog; Motorola
Memory Required: 48.0K bytes
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $149
Number Installed to Date: 4
Date First Installed: May 1983

HENDERSON INDUSTRIES
ROPE (ROBOT PROGRAMMING LANGUAGE)
Specific Application: Programming By Use of A Color Graphics Terminal To Develop the Next Task That the Robot Will Perform
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8086: CP/M, Intel 8087
Source Language: PL/M
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,500
Date First Installed: November 1983
(See Vendor Profile Page V-54)

HOWARD W. SAMS & CO., INC.
APPLE-AIDS
Specific Application: Allows User to Perform Numerous Disk Operations Not Normally Available From Standard DOS
Specific Industry: Not Industry Sensitive
System Requirements: Apple III, Apple II+, II: APPLE-DOS; Franklin Ace
Memory Required: 48.0K bytes
Source Language: Assembly, Applesoft
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
(See Vendor Profile Page V-55)

ICONIX CORP.
MANAGEMENT SUPPORT SYSTEM-(MSS)
Additional Product Classification: Graphics, Sort/Merge, Report Generator, Data/File Management, Data Dictionary
Specific Application: Improves Access to Ad Analysis, Simulation of Information Plus Color Graphics
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 512.0K bytes
Source Language: Basic
Source Code Available: No
Price: $1,000
Date First Installed: January 1983
(See Vendor Profile Page V-56)

INFOSOFT SYSTEMS, INC.
I.SAL, ASSEMBLY TOOLS
Specific Application: Programming Aid
Specific Industry: Not Industry Sensitive
Memory Required: 3.2M bytes
Source Language: 8086 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1981
(See Vendor Profile Page V-58)

INTERACTIVE TECHNOLOGY, INC.
ISAM (HIERARCHIC DATA MANAGER)
Specific Application: Application Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 120
Date First Installed: January 1983
(See Vendor Profile Page V-60)

INTRGL CORP.
INTRO C
Specific Application: Program Development
Specific Industry: Engineering
System Requirements: Intel 8086
Microprocessor: Unix, OA9, Flex
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $375 to $1,500
Number Installed to Date: 300
Date First Installed: February 1982
(See Vendor Profile Page V-61)

J.P. GRASP ASSOCIATES, INC.
WSDOC APL SYSTEM DOCUMENTATION & DEBUGGING AIDS
Specific Application: Programmer's Tool Summarizing all Aspects of A Workspace Environment, Debugging Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM; APL V/E
Source Language: APL
Purchase Terms: Purchase (license)
Date First Installed: 1974
(See Vendor Profile Page V-61)

JOSEKI COMPUTER CORP.
MENU'D
Specific Application: Writes Source Code for Basic Language Screen Menus
Specific Industry: Not Industry Sensitive
System Requirements: HP Series 80 HP-DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: May 1983
(See Vendor Profile Page V-63)

JOSEKI COMPUTER CORP.
PACK'R
Specific Application: Compresses HP Basic Program
Specific Industry: Not Industry Sensitive
System Requirements: HP; HP-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: September 1982

JOSEKI COMPUTER CORP.
PICK-N-PACK
Specific Application: Compresses IBM Basic Program
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: August 1981

J. VELKATIS, CONSULTANTS
TAB TALK
Specific Application: User Assistant
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; DEC PC-DOS, CP/M 86, CP/M, CP/M 80
Memory Required: 32.0K bytes
Purchase Terms: Purchase (license)
Date First Installed: October 1982
(See Vendor Profile Page V-63)

LEARNED TOOLS, INC.
SOFT DOC
Specific Application: On-Line Documentation on Help System
Specific Industry: Not Industry Sensitive
System Requirements: Hyperion: PC-DOS, IBM PC, PC-XT; Sage
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $395
(See Vendor Profile Page V-65)

LIFEBOAT ASSOCIATES
C-FOOD SMORGASBORD
Specific Application: Collection of Useful C Routines
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, TEC MAP, MS-DOS, Victor 9000, CP/M 86, SB 86
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: 1982
(See Vendor Profile Page V-66)

MANAGEMENT AND COMPUTER SERVICES, INC.
ESTIMACS
Specific Application: Development of Estimates for Mainframes, Software, Systems Project
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS; Apple
Source Code Available: No
Purchase Terms: Purchase (lease); Lease
Price: $25,000
Number Installed to Date: 50
Date First Installed: 1981
(See Vendor Profile Page V-68)

MARTIAN TECHNOLOGIES
FORTH APPLICATION MODULES
Specific Application: Indexed Forth Screen Listing
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 1.4, CP/M 2.2
Source Language: Forth
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $60
(See Vendor Profile Page V-69)

MEGATECH CORP.
Z80 ASSEMBLER
Specific Application: Allows User to Write Programs in Assembly Language
System Requirements: Timex/Sinclair
Memory Required: 16.0K bytes

Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: May 1983
(See Vendor Profile Page V-72)

MICRO BUSINESS APPLICATIONS, INC.
BAPES CALC INTERFACE
Specific Application: Monthly and Yearly Statements Passed to Supercalc
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; CP/M 86; MS-DOS
Memory Required: 42.0K bytes
Source Language: Microsoft Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1980
(See Vendor Profile Page V-73)

MICRO CORP.
ELECTRONIC DISK UTILITY
Specific Application: Electronic Disk Utility
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: MS-DOS
Memory Required: 64.0K bytes
Source Language: MS Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 100
Date First Installed: April 1983
(See Vendor Profile Page V-73)

MICRO CORP.
UNBASIC PROGRAM
Specific Application: Programming Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: MS-DOS
Memory Required: 18.0K bytes
Source Language: MS Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75
Number Installed to Date: 200
Date First Installed: January 1982

MICRO DATA BASE SYSTEMS, INC.
SCREEN MASTER
Specific Application: Screen Management
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MS-DOS; Unix; CP/M 86
Memory Required: 64.0K bytes
Source Language: C, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $700 to $1,900
Number Installed to Date: 100
Date First Installed: 1982
(See Vendor Profile Page V-73)

MICRO FOCUS, INC.
ANIMATER
Specific Application: Interacts With Source Code Debugger
Specific Industry: Not Industry Sensitive
System Requirements: DEC: Unix; IBM PC: PC-DOS; Victor 900: CP/M 86
Memory Required: 64.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $800
Date First Installed: May 1982
(See Vendor Profile Page V-73)

MICRO FOCUS, INC.
FORMS 2
Specific Application: Screen Source Code Generation
Specific Industry: Not Industry Sensitive
System Requirements: DEC: Unix; IBM PC: PC-DOS; Victor 900: CP/M 86
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: 1980

MICRON, INC.
A-LIST
Specific Application: Listing Utility
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1982
(See Vendor Profile Page V-74)

MICRON, INC.
COMPARE
Specific Application: File Comparing Utility
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1981

MICRON, INC.
FILES
Specific Application: Extended Directory Utility
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1983

MICRON, INC.
LCREF
Specific Application: Line Cross Reference Utility
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1981

MICRON, INC.
LOG
Specific Application: Job Logging Utility
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1983

MICRON, INC.
MENU
Specific Application: Menu Utility
Specific Industry: Not Industry Sensitive
System Requirements: TRS 80: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1981

MICRON, INC.
VCREF
Specific Application: Variable Cross Reference Utility
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1981

MICROPRODUCTS
FREQOUT
Specific Application: Spectrum Fourier Transform and Graphics Oscilloscope Program For Data Acquisition and Distribution
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE, II+; APPLE-DOS, Franklin
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,995
Number Installed to Date: 250
Date First Installed: 1981
(See Vendor Profile Page V-74)

MICROPRODUCTS
CHIPS
Specific Application: Prints and Truth Tables for Over 100 TTL and Cmos Chips
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE, II+; Franklin
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,995
Number Installed to Date: 1,200
Date First Installed: February 1982

MICROSOFT
MICROSOFT ALDS SYSTEM
Specific Application: Programs In Three Assembly Languages, Transfer 6502
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE; Apple II
Memory Required: 44.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-74)

MICROSOFT
MICROSOFT MACRO ASSEMBLER PACKAGE
Specific Application: Program In Either Z80 or 8080, Increase Efficiency
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)

MICROSOFT
MICROSOFT PREMIUM SOFTCARD IIE PACKAGE
Specific Application: Run CP/M-80 on Apple IIE, Double Your Apple's Memory to 128K
System Requirements: Apple IIE
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)

MICROSOFT
MICROSOFT RAMCARD MEMORY BOARD FOR APPLE II
Specific Application: Run Large Applications or Custom Program In Any Microsoft Language
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)

MICROSOFT
MICROSOFT SYSTEM CARD PACKAGE
Additional Product Classification: System Card
Specific Application: Access A Variety of Peripheral Devices Through PC, Modem, Computers, Printers
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)

MICROSOFT
MICROSOFT MULISP/MUSTAR
Specific Application: Common Use of Memory Space, Complete Implementation of the Lisp System
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; CP/M 80; Apple IIE; MS-DOS
Memory Required: 32.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)

MICROSPARC, INC.
AMP
Specific Application: Increases the Usable Program Space In Your Apple II By Providing An Extra 10,000 Bytes of Directly Accessible Memory
Specific Industry: Not Industry Sensitive,
System Requirements: Apple II+, IIE: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: Applesoft, 6502 Machine
Source Code Available: No

Purchase Terms: Purchase (license)
Price: $30
Number Installed to Date: 500
Date First Installed: June 1982
(See Vendor Profile Page V-74)

MICROSPARC, INC.
AMPERSOFT
Specific Application: Provides Extensions to Applesoft Basic and DOS While Offering Extra Program Space
Specific Industry: Not Industry [illegible]
System Requirements: Apple II+, IIE: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: Applesoft, 6502 Machine
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 1,000
Date First Installed: January 1982

MICROSPARC, INC.
DIRECTORY MASTER
Specific Application: A Utility Which Allows You to Format and Customize the Screen Display Which Appears When the Catalog Command Is Used
Specific Industry: Not Industry [illegible]
System Requirements: Apple II+, IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Applesoft, 6502 Machine
Source Code Available: [illegible]
Purchase Terms: Purchase (license)
Price: [illegible]
Number Installed to Date: 500
Date First Installed: January 1982

MICROSPARC, INC.
[illegible] (ADDITIONAL APPLESOFT LINE EDITOR)
Specific Application: Utility Designed to Facilitate all Phases of Program Development and Editing
Specific Industry: Not Industry [illegible]
System Requirements: Apple II+, IIE: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: Applesoft, 6502 Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 500
Date First Installed: June 1982

MICROSPARC, INC.
[illegible]
Specific Application: A Utility for Detecting and Spotlighting Errors in Programs Entered From Magazines or Books
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+/IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: 6502 Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30
Number Installed to Date: [illegible]
Date First Installed: January 1982

MICROSPARC, INC.
PROOF
Specific Application: to Assist Users of Visicalc (TM) in Retrieving and Printing the Formulas and Variables Used in Creating Models and Tables
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+/IIE: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: Applesoft, 6502 Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 500
Date First Installed: January 1983

[illegible] DATA SCIENCES CORP.
C-CODE 21
Specific Application: Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: MDS Series 21: OS/2; MDS 2110: OS/10
Memory Required: 128.0K bytes
Source Language: Mobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: [illegible]
Date First Installed: May 1983
(See Vendor Profile Page V-77)

M R C SYSTEMS
COMPAK 2
Specific Application: TID Control
Specific Industry: Not Industry Sensitive
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $550
(See Vendor Profile Page V-77)

M R C SYSTEMS
SOFTBLOCK [illegible]
Specific Application: 6801 Chip Interface,Port Selection, Clock Rates
Specific Industry: Not Industry Sensitive
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: [illegible]

MUSE SOFTWARE
APPLE'S EDUCHEK
Specific Application: Teacher's Aid: Helps Set up Custom Programs
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+, APPLE-DOS 3.2; Apple IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Purchase Terms: Purchase (license)
Price: $100
(See Vendor Profile Page V-78)

MUSE SOFTWARE
ELEMENTARY MATH
Specific Application: [illegible]
Program for Elementary Math
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+: APPLE-DOS 3.2, Apple IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes.
Purchase Terms: Purchase (license)
Price: $40
(See Vendor Profile Page V-78)

NEW GENERATION SYSTEMS, INC.
MICROSHELL
Specific Application: Unix-Like Utility for CP/M
Specific Industry: Not Industry Sensitive
System Requirements: Compupro: CP/M
Memory Required: 64.0K bytes
Source Language: C, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: [illegible]
Date First Installed: January 1982
(See Vendor Profile Page V-79)

NEW GENERATION SYSTEMS, INC.
MICROTOOLS
Specific Application: Unix-Like Utility for CP/M
Specific Industry: Not Industry Sensitive
System Requirements: Compupro: CP/M
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: July 1982

NEW GENERATION SYSTEMS, INC.
TV SET
Specific Application: Set Up for Televideo Terminals
Specific Industry: Not Industry Sensitive
System Requirements: Compupro: CP/M
Memory Required: 64.0K bytes
Source Language: C, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: [illegible]
Date First Installed: October 1982
(See Vendor Profile Page V-00)

N. F. SYSTEMS, LTD.
CROSS REFERENCE
Additional Product Classification: Data/File Management
Specific Applications Area: [illegible]
Reference of A Basic Program
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $34
Number Installed to Date: 50
Date First Installed: September 1982
(See Vendor Profile Page V-80)

N. F. SYSTEMS, LTD.
SCREEN MASTER
Special Appearance: [illegible]
Development Program
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Compaq
Memory Required: 64.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Number Installed to Date: 75
Date First Installed: September 1982

N. F. SYSTEMS, LTD.
SORT 80
Additional Product Classification: Sort/Merge
Specific Application: Sort Subroutine
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Compaq
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $34
Number Installed to Date: 100
Date First Installed: September 1982

N. F. SYSTEMS, LTD.
TEXT MASTER
Additional Product Classification: WP/Text Editing
Specific Application: Document Formatter
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: MS-DOS, Compaq
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $99
Number Installed to Date: 25
Date First Installed: September 1982

OMIKRON ASSOCIATES
[illegible] DENSITY SUPPORT PACKAGE
Specific Application: Allows the TRS-80/I to Operate Double Density in CP/M
Specific Industry: Not Industry [illegible]
System Requirements: TRS-80: CP/M
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $49
Number Installed to Date: 200
Date First Installed: January 1983
(See Vendor Profile Page V-82)

OSBRC CORP.
SCREEN MACHINE
Specific Application: Programmer's Tool That Facilitates Screen Management and Text Manipulations
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $49
Date First Installed: 1983
(See Vendor Profile Page V-82)

PHOENIX SOFTWARE ASSOCIATES LTD.
DBUG
Specific Application: Debugger
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 500
Date First Installed: 1979
(See Vendor Profile Page V-83)

PHOENIX SOFTWARE ASSOCIATES LTD.
PLINK 86
Specific Application: Linkage Editor
Specific Industry: Not Industry Sensitive
System Requirements: MS-DOS; CP/M 86
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 40
Date First Installed: June 1983
(See Vendor Profile Page V-00)

POTTERS PROGRAMS
DIRECTORY UTILITIES
Specific Application: Utilities for Program Generation
Specific Industry: Not Industry Sensitive
System Requirements: North Star: NS-DOS
Memory Required: 32.0K bytes
Source Language: Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75
Date First Installed: 1978
(See Vendor Profile Page V-87)

POTTERS PROGRAMS
NORTH STAR TO CBASIC
Specific Application: File Translator
Specific Industry: Not Industry Sensitive
System Requirements: North Star: NS-DOS
Memory Required: 32.0K bytes
Source Language: Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $60

POTTERS PROGRAMS
PRETTY PRINTER
Specific Application: Print of Programs Generator
Specific Industry: Not Industry Sensitive
System Requirements: North Star: NS-DOS
Memory Required: 32.0K bytes
Source Language: Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20
Date First Installed: 1978

QED INFORMATION SERVICES, INC.
DABAK
Specific Application: Describe Output Interactively to Micro Then Produce Cobol Code
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+, Apple IIE: APPLE-DOS; IBM 370: Cics; IBM PC, PC-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license); Lease
Price: $65,000
Number Installed to Date: 12
Date First Installed: 1981
(See Vendor Profile Page V-90)

QUANTUM SOFTWARE SYSTEMS, INC.
QUANTUM SYSTEM
Specific Application: Development System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; Columbia; Compaq; Eagle
Memory Required: 96.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Date First Installed: April 1982
(See Vendor Profile Page V-90)

RACET COMPUTERS, LTD.
EXTEND DEVELOPMENT PACKAGE
Specific Application: Assembly Language Programming Aid
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II, TRS-80/I, Model 12, : TRS-DOS 2.0
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 400
Date First Installed: 1981
(See Vendor Profile Page V-91)

RACET COMPUTERS, LTD.
RACET DEBUG
Specific Application: Machine Language Program Development
Specific Industry: Not Industry Sensitive
System Requirements: NEG PC-8001, 8801: Racet NEC-DOS
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10
Number Installed to Date: 150
Date First Installed: 1982

REDDING GROUP, INC.
LYNX - VERSION 2.62
Specific Application: Overlay Linker
Specific Industry: Not Industry Sensitive
System Requirements: Intel; Zilog
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Date First Installed: 1981
(See Vendor Profile Page V-92)

RELATIONAL SYSTEMS INTERNATIONAL, INC.
PEARL 80
Specific Application: Program Generation in Cbasic
Specific Industry: Not Industry Sensitive
System Reqdirements: CP/M
Memory Required: 56.0K bytes
Source Language: Cbasic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: September 1980
(See Vendor Profile Page V-92)

RESOURCE SOFTWARE INTERNATIONAL, INC.
COMPUTER AIDED INSTRUCTION
Specific Application: Math, Arithmetic, Vocabulary
Specific Industry: Education
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $34
(See Vendor Profile Page V-93)

RESPONSE, INC.
PC/COYER
Specific Application: Screen Generator, Master File Maintenance, Program Generator
System Requirements: IBM PC and PC XT: PC-DOS 2.0
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 30
Date First Installed: June 1983
(See Vendor Profile Page V-93)

RIZZO DATA SYSTEMS, INC.
LISTER FOR II, 12, 16
Specific Application: List Basic Programs
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II, Model 12, Model 16
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $28
Number Installed to Date: 30
(See Vendor Profile Page V-93)

ROCLAN SOFTWARE
AIDE
Specific Application: Programming Aid
Specific Industry: Program Development
System Requirements: Atari 400, 800, 1200XL
Memory Required: 32.0K bytes
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $29
(See Vendor Profile Page V-93)

ROKLAN SOFTWARE
AUTOGRAMMER
Specific Application: Games
System Requirements: CP/M; TRS-80
Memory Required: 8.5M bytes
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $399

RTCS/REAL-TIME COMPUTER SCIENCE CORP.
RTCS/UDI VERSION 4.0
Additional Product Classification: Operating Systems
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; MS-DOS
Memory Required: 192.0K bytes
Source Language: PL/M
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 250
Date First Installed: July 1982
(See Vendor Profile Page V-94)

SATURN SYSTEMS, INC.
32K RAM BOARD PSEUDO-DISK
Specific Application: Allows 32K Saturn RAM Board to Be Used as A Disc Drive Under APPLE-DOS 3.3
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE, APPLE-DOS 3.3; Apple II+
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: January 1982
(See Vendor Profile Page V-95)

SATURN SYSTEMS, INC.
32K RAM BOARD-RAMEXPAND
Specific Application: Allows Storage of Parts of Programs
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE: APPLE-DOS 3.3; Apple II+; Apple II
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: January 1982

SATURN SYSTEMS, INC.
64/128 RAM-BOARD MOVE DOS
Additional Product Classification: Programming Application
Specific Application: Moves Electric 64/128 Saturn RAM Board for More Memory Frees Up to 10K of User Space
System Requirements: Apple II: APPLE-DOS 3.3; Apple IIE; Apple II+
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 11,000
Date First Installed: January 1982

SATURN SYSTEMS, INC.
EMBER
Specific Application: Extends Program Capacity for Apple Through Use of Neptune or Saturn RAM Card
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+: APPLE-DOS 3.3; Apple IIE
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 75
Date First Installed: June 1983
(See Vendor Profile Page V-95)

SCHUCHARDT SOFTWARE SYSTEMS, INC.
INTEVATE
Specific Application: Applications Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195
Date First Installed: September 1983
(See Vendor Profile Page V-95)

SEA DATA CORP.
STRPAK
Specific Application: Program Development
Specific Industry: Not Industry Sensitive
System Requirements: MP/M; MS-DOS; CP/M; Morrow Design; CP/M

Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $225
Date First Installed: January 1982
(See Vendor Profile Page V-96)

SENSIBLE SOFTWARE, INC.
APLUS
Specific Application: Software Tools for Developing Applesoft Basic Programs
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 600
Date First Installed: June 1982
(See Vendor Profile Page V-96)

SENSIBLE SOFTWARE, INC.
APPLEGUARD
Specific Application: Protect Software Programs Against Duplication
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 300
Date First Installed: January 1981

SENSIBLE SOFTWARE, INC.
APPLESOFT BASIC ENHANCEMENT
Specific Application: Structured Basic Enhancement for Applesoft
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 2,000
Date First Installed: June 1979

SENSIBLE SOFTWARE, INC.
BUILD USING
Specific Application: Print Using Routine for Applesoft Basic
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30
Number Installed to Date: 600
Date First Installed: October 1982

SENSIBLE SOFTWARE, INC.
EDIT-SOFT
Specific Application: Line Editor for Writing and Revising Applesoft Programs
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 400
Date First Installed: April 1982

SENSIBLE SOFTWARE, INC.
THE BUG
Specific Application: Debugging Aid for Assembly Programs
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 600
Date First Installed: November 1981

SIERRA ON-LINE
EPF IV - EXTENDED PROGRAMMING FACILITY
Specific Application: Computer Programming
Specific Industry: Programming
System Requirements: Apple II+; Apple IIE
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 900
Date First Installed: December 1982
(See Vendor Profile Page V-97)

SOFTSYNC, INC.
MACHINE CODE TEST TOOL
Specific Application: Utility Program
System Requirements: Timex Sinclair 1000; Timex Sinclair ZX81
Memory Required: 16.0K bytes
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20
Date First Installed: March 1983
(See Vendor Profile Page V-98)

SOFTSYNC, INC.
PROGAMMERS TOOL KIT 16K
Specific Application: Programmer's Aid
System Requirements: Timex Sinclair 1000, Timex Sinclair ZX81
Memory Required: 16.0K bytes
Source Language: Machine Code
Purchase Terms: Purchase (license)
Price: $15
Date First Installed: October 1982

SOFTSYNC, INC.
PROGRAMMERS TOOLKIT
Specific Application: Programming Aid
System Requirements: Commodore 64; Timex Sinclair 2000
Memory Required: 48.0K bytes
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25
Date First Installed: April 1983

SOFTWARE BUILDING BLOCKS, INC.
SBB PASCAL
Additional Product Classification: Compilers, Assemblers
Specific Application: Allows Software to Be Written in Pascal
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350
Date First Installed: August 1983
(See Vendor Profile Page V-99)

SOFTWARE CONNECTIONS
LAN DATA CORE
Specific Application: Allows Custom Modification of Relational DBMS for Systems Integration
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,950
Number Installed to Date: 100
Date First Installed: 1983
(See Vendor Profile Page V-99)

SOFTWARE DYNAMICS
IDS
Specific Application: 6800 Assembly Language Interpretive Debugging Tool
Specific Industry: Not Industry Sensitive
System Requirements: PSITech GT Series
Memory Required: 3.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $80
Number Installed to Date: 250
Date First Installed: 1978
(See Vendor Profile Page V-99)

THE SOFT WAREHOUSE
THE MULISP/MUSTAR ARTIFICIAL INTELLIGENCE
Additional Product Classification: Languages
Specific Application: Lisp Language Interpreter With Editor for Artificial Intelligence Programming
Specific Industry: Engineering, Education and Scientific
System Requirements: IBM PC: PC-DOS, Apple II; II+: CP/M, APPLE-DOS CP/M
Memory Required: 32.0K bytes
Source Language: Mulisp Written, Mustar Written
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 1,000
Date First Installed: September 1979
(See Vendor Profile Page V-99)

THE SOFTWARE STORE
PROGRAM MAP BASIC CROSS REFERENCE UTILITY
Specific Application: Microsoft Basic Cross Reference Utility
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 2,000
Date First Installed: June 1978
(See Vendor Profile Page V-100)

SOFTWARE TECHNOLOGY FOR COMPUTERS
THE CREATOR
Specific Application: Software Generator
Specific Industry: Legal, Education, Accounting
System Requirements: Apple: APPLE-DOS 3.3; IBM PC: PC-DOS 1.1
Memory Required: 48.0K bytes
Source Language: Assembly, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: 1982
(See Vendor Profile Page V-100)

SOFTWARE TOOLWORKS
CATALOG SYSTEM & UTILITIES
Specific Application: Track Files
Specific Industry: Not Industry Sensitive
System Requirements: Heath; Zenith: H-DOS
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25
Number Installed to Date: 600
Date First Installed: 1980
(See Vendor Profile Page V-100)

SOFTWARE TOOLWORKS
REACH
Additional Product Classification: Communications, TP Monitors
Specific Application: Time-Sharing Transfer Files
Specific Industry: Not Industry Sensitive
Memory Required: 48.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $20
Number Installed to Date: 2,654
Date First Installed: 1980

SORCIM CORP.
SUPER DATA INTERCHANGE
Specific Application: Conversion Program
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 2.2; CP/M 86, PC-DOS MS-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: 1982
(See Vendor Profile Page V-101)

SOUTHERN COMPUTER SYSTEMS, INC.
RAID
Specific Application: Assembly Language Debugger
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; Isis
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250 to $745
Number Installed to Date: 500
Date First Installed: 1979
(See Vendor Profile Page V-101)

STATCOM CORP.
CRT FORM (APPLE PASCAL)
Additional Product Classification: Data/File Management, Languages
Specific Application: Program

Generator for Vertical Market Application, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, APPLE-Pascal
Memory Required: 64.0K bytes
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: October 1981
(See Vendor Profile Page V-103)

STATCOM CORP.
CRT FORM (CBASIC) CP/M 80
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Application, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: February 1982

STATCOM CORP.
CRT FORM (DIGITAL RESEARCH C) CP/M 86
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Application, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, DEC Rainbow CP/M 86
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: June 1983

STATCOM CORP.
CRT FORM (DIGITAL RESEARCH C) MS-DOS
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Application, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, DEC Rainbow
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: February 1982

STATCOM CORP.
CRT FORM (FORTRAN) MS-DOS
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Application, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, DEC Rainbow
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: July 1983

STATCOM CORP.
CRT FORM-(MICROSOFT BASIC) MS-DOS
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Application, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, DEC Rainbow
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: July 1983

STATCOM CORP.
CRT FORM-(MS PASCAL) MS/DOS
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Application, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, DEC Rainbow
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: July 1983

STATCOM CORP.
CRT FORM (MBASIC) CP/M 80
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Applications Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: February 1982

STATCOM CORP.
CRT FORM (MICROSOFT FORTRAN) MS-DOS
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Applications, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, DEC Rainbow
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: July 1983

STATCOM CORP.
CRT FORM-(MICROSOFT BASIC) MS-DOS
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Application, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, DEC Rainbow
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: July 1983

STATCOM CORP.
CRT FORM-(PASCAL MT+)
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Application, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: February 1982

STATCOM CORP.
CRT FORM (PASCAL MT+) CP/M 86
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Application, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; DEC Rainbow: CP/M 86
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: June 1983

STATCOM CORP.
CRT FORM-(PASCAL MT+) MS/DOS
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Application, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, DEC Rainbow
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: July 1983

STATCOM CORP.
CRT FORM (PASCAL MT+) CP/M 86
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Application, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; DEC Rainbow: CP/M 86
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: June 1983

STATCOM CORP.
CRT FORM-(SUPERSOFT C) MS-DOS
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Application, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: February 1982

STATCOM CORP.
CRT FORM (SUPERSOFT C) MS-DOS
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Application, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, DEC Rainbow: CP/M 86
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: June 1983

STATCOM CORP.
CRT FORM-(UCSD IV)
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Application, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: UCSD-P IV
Memory Required: 64.0K bytes
Source Language: Assembler, Pascal
Price: $400
Number Installed to Date: 1,000
Date First Installed: 1981

STATCOM CORP.
CRTFORM
Additional Product Classification: Data/File Management, Languages
Specific Application: Application Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC Rainbow; MS-DOS; IBM PC; CP/M

Memory Required: 64.0K bytes
Source Language: Assembly, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: May 1981

STATCOM CORP.
CRTFORM-(LATTICE C) MS/DOS
Additional Product Classification: Data/File Management, Languages
Specific Application: Program Generator for Vertical Market Applications, Design Implementation and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS; DEC Rainbow
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,000
Date First Installed: July 1983

STRUCTURED SOFTWARE SYSTEMS, INC.
COMMENT STRIPPER (STRIP)
Specific Application: Provides A New Keyboard Command to Remove Comments From A Basic Program In Memory
Specific Industry: Not Industry Sensitive
System Requirements: HP 9835; HP 9845
Memory Required: 2.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,100
Number Installed to Date: 120
(See Vendor Profile Page V-104)

STRUCTURED SOFTWARE SYSTEMS, INC.
DUMP ALPHA
Specific Application: Binary Program That Provides A New Basic Statement, Which Facilitates Copying the CRT Printout Area To A Hard Copy Printer
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845
Memory Required: 2.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 150
Date First Installed: 1981
(See Vendor Profile Page V-104)

STRUCTURED SOFTWARE SYSTEMS, INC.
FIND
Specific Application: A Binary Program That Provides A Keyboard Command to Search for Program Resident Indentifiers and Literal Strings
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845
Memory Required: 3.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 75
Date First Installed: 1981

STRUCTURED SOFTWARE SYSTEMS, INC.
LIF UTILITY
Specific Application: Converts/Transfers Data Files to LIF Format Files
Specific Industry: Not Industry Sensitive
Memory Required: 23.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 50
Date First Installed: March 1982

STRUCTURED SOFTWARE SYSTEMS, INC.
LOAD SUB
Specific Application: Provides Three Basic Keywords to Facilitate Program Overlaying
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845
Memory Required: 2.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $550
Number Installed to Date: 50

STRUCTURED SOFTWARE SYSTEMS, INC.
MEMORY MAPPER BINARY PROGRAM
Specific Application: Software Development Tool Which Helps Programmers Write Basic Programs
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845 B/C
Memory Required: 3.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 150
Date First Installed: 1980

STRUCTURED SOFTWARE SYSTEMS, INC.
SCRUB
Specific Application: Binary Program Provides A Keyboard Command to Remove Unused Entries From the Basic Program Symbol Table
Specific Industry: Not Industry Sensitive
System Requirements: HP 9835; HP 9845
Memory Required: 2.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 100
Date First Installed: 1981

STRUCTURED SOFTWARE SYSTEMS, INC.
SEARCH AND REPLACE
Specific Application: Enhance Editing Capability By Providing A Keyboard Command to Change Indentifier Names and Literal Strings
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845
Memory Required: 3.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 100
Date First Installed: 1981

STRUCTURED SOFTWARE SYSTEMS, INC.
TOOL KIT
Specific Application: Aids In Program Development, Optimization, and Documentation
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 300
Date First Installed: 1982

STRUCTURED SOFTWARE SYSTEMS, INC.
XREF
Specific Application: Tool for Programmers That Will Reduce Debugging Time on Large Programs That Are Written In Basic
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845
Memory Required: 3.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $325
Number Installed to Date: 100
Date First Installed: 1981

STRUCTURE SYSTEMS GROUP
MAGIC WORKSHEET
Specific Application: Electronic Worksheet
Specific Industry: Not Industry Sensitive
System Requirements: PC-DOS; MP/M, CP/M
Memory Required: 48.0K bytes
Source Language: Forth
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: 1982
(See Vendor Profile Page V-104)

STSC, INC.
APL PLUS/80 SYSTEM
Specific Application: Application Development System
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II; TRS-DOS
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: 1982
(See Vendor Profile Page V-104)

SUPERSOFT, INC.
UTILITIES I
Specific Application: Collection of General Purpose Routines To Speed Program and System Development
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 24.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $60
(See Vendor Profile Page V-104)

SUPERSOFT, INC.
UTILITIES II
Specific Application: Collection of General Purpose Routines To Speed Program and System Development
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 32.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $60

SYSTEM SOLUTIONS, INC.
RENAISSANCE EDITOR
Specific Application: Creation and Modification of Cobol Source Code
Specific Industry: Not Industry Sensitive
System Requirements: IBM; HP; Vector Graphics
Memory Required: 56.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: 1983
(See Vendor Profile Page V-108)

SYSTEM SOLUTIONS, INC.
RENAISSANCE FORMS
Specific Application: Creates CRT Screen Layouts for Interactive Programs
Specific Industry: Not Industry Sensitive
System Requirements: IBM; HP; Vector Graphics
Memory Required: 56.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 24
Date First Installed: February 1982

SYSTEM SOLUTIONS, INC.
RENAISSANCE PROGRAMMER
Additional Product Classification: Data/File Management
Specific Application: Generate Cobol Data Entry, File Maintenance and Inquiry Programs
Specific Industry: Not Industry Sensitive
System Requirements: IBM; HP; Vector Graphics
Memory Required: 56.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1983

TAB BOOKS, INC.
THE DISASSEMBLER TM
Specific Application: Nonlabeling Disassembler Including ROM Basic and I/O Version
Specific Industry: Wholesale/Distribution, Retail, Utility
System Requirements: Timex Sinclair 2000
Memory Required: 48.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,495
Date First Installed: 1983
(See Vendor Profile Page V-107)

TANDY CORP.
BASIC INTERPRETER
Specific Application: Allows Development of Applications In Basic Language
System Requirements: TRS-80 Model 16; Xenix
Memory Required: 256.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $250
Date First Installed: 1983
(See Vendor Profile Page V-106)

TANDY CORP.
TRS-XENIX DEVELOPMENT SYSTEM
Specific Application: Allows Development of Multiuser Software
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80 Model 16; Xenix
Memory Required: 256.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: 1983

TEXAS INSTRUMENTS, INC.
COURSE DESIGNER AUTHORING SYSTEM
Specific Application: Creates Interactive Video Lessons
Specific Industry: Not Industry Sensitive
System Requirements: TI DS990/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
(See Vendor Profile Page V-108)

TEXAS INSTRUMENTS, INC.
MINI-MEMORY
Specific Application: Extended Memory Plus Program Utilities
Specific Industry: Not Industry Sensitive
System Requirements: TI DS990/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100

TEXAS INSTRUMENTS, INC.
PROGRAMMING AIDS III
Specific Application: Programming Aids
Specific Industry: Not Industry Sensitive
System Requirements: TI DS990/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30

TEXAS INSTRUMENTS, INC.
PROGRAMMING AIDS I
Specific Application: Programming Aids
Specific Industry: Not Industry Sensitive
System Requirements: TI DS990/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10 to $15

TEXAS INSTRUMENTS, INC.
PROGRAMMING AIDS II
Specific Application: Programming Aids
Specific Industry: Not Industry Sensitive
System Requirements: TI DS990/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25

TEXAS INSTRUMENTS, INC.
UCSD-P SYSTEM
EDITOR/FILER/UTILITIES
Specific Application: Editor, Filer and Utilities
Specific Industry: Not Industry Sensitive
System Requirements: TI DS990/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $75

T/MAKER CO.
T/MAKER III
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; CP/M 86
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $275
Number Installed to Date: 7,000
Date First Installed: January 1980
(See Vendor Profile Page V-110)

UNICOM
NETWORK MANAGERS TOOL KIT
Specific Application: Helps Run Network
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple IIE
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
(See Vendor Profile Page V-113)

UNIDATA
UNISYN
Specific Application: Allows Users to Easily Develop Any Type of Application
Specific Industry: Not Industry Sensitive
System Requirements: DEC Rainbow 100: Unisyn; IBM PC: Unisyn, Apple: Unisyn
Memory Required: 320.0K bytes
Source Language: Unisyn
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $39
Number Installed to Date: 50
Date First Installed: August 1982
(See Vendor Profile Page V-113)

U.S. SOFTWARE CORP.
IEEE FLOATING POINT LIBRARIES
Specific Application: IEEE Floating Point Library
Specific Industry: Manufacturing, Engineering, Medical, Government, Scientific
Memory Required: 4.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750 to $1,250
Number Installed to Date: 120
Date First Installed: May 1980
(See Vendor Profile Page V-114)

U.S. SOFTWARE CORP.
MULTI-TASKING KERNEL (MTK)
Additional Product Classification: Operating Systems
Specific Application: Operating System Kernel Scheduler
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Medical, Government, Transportation, Scientific
Memory Required: 1.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 150
Date First Installed: December 1981

VERSA COMPUTING
AJE
Specific Application: Advanced Extended BASIC
Specific Industry: Not Industry Sensitive
System Requirements: Apple II
Memory Required: 48.0K bytes
Source Language: Machine Code
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $60
(See Vendor Profile Page V-115)

WHITESMITHS, LTD.
SOFTWARE TOOLKIT
Specific Application: Software Enhancement
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 3
Date First Installed: May 1983
(See Vendor Profile Page V-117)

DATA DICTIONARIES

APPLIED DATA RESEARCH, INC.
ADR/DATADICTIONARY - RELEASE 2
Specific Application: Data Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series 370, 3000 Series: OS DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $28,100 to $32,600
Date First Installed: 1978
(See Vendor Profile Page V-7)

CASH MANAGEMENT SYSTEMS, INC.
INTERACTIVE DATA DICTIONARY
Specific Application: Data Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 370: OS, DOS
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 3
Date First Installed: September 1982
(See Vendor Profile Page V-16)

CINCOM SYSTEMS, INC.
DCS
Specific Application: On-Line Data Dictionary With Data Entry
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, Edos, OS, MVS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-18)

COMPUTER CORP. OF AMERICA
DICTIONARY/294
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300 Series: OS, DOS/VSE
Memory Required: 350.0K bytes
Source Language: Assembler
(See Vendor Profile Page V-23)

CULLINET SOFTWARE, INC.
INFORMATION DIRECTORY
Specific Application: Data Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series, 4300 Series
Memory Required: 250.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 30
Date First Installed: January 1981
(See Vendor Profile Page V-33)

CULLINET SOFTWARE, INC.
INTEGRATED DATA DICTIONARY-IDD
Specific Application: Data Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series, 4300 Series
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 945
Date First Installed: February 1977

DUN & BRADSTREET COMPUTING SERVICES
DATA CATALOG II
Specific Application: Free Standing Data Procedures Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: Sperry 1100; IBM 360: DOS; IBM 370: OS/VS; Honeywell: Gcos
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $13,500
Date First Installed: September 1977
(See Vendor Profile Page V-44)

DYSERV, INC.
VTOC
Specific Application: Prints Volume Table of Contents Within Each Disk Pack in a Directory Listing Form
Specific Industry: Engineering
System Requirements: IBM System/3-15: SSP
Memory Required: 22.0K bytes
Source Language: RPG-II, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 5
Date First Installed: 1982
(See Vendor Profile Page V-44)

ESI
DATAPULSE
Specific Application: Data Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B1700 to B1900, B2700, B4900, B5700 to B7900: MCP
Memory Required: 65.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 7
Date First Installed: December 1982
(See Vendor Profile Page V-47)

GENASYS CORP.
SARA/SARAPC
Specific Application: Data Element Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE; IBM 3030 Series, 4300 Series: OS/TSO; IBM PC: DOS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $11,800
Number Installed to Date: 6
Date First Installed: June 1981
(See Vendor Profile Page V-50)

GENTRY, INC.
PAL DATA CONTROLLER
Specific Application: Data Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE IV
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 50
Date First Installed: May 1982
(See Vendor Profile Page V-51)

H. B. MAYNARD & CO., INC.
MOST COMPUTER SYSTEM
Specific Application: Work Measurement and Calculations
Specific Industry: Manufacturing
System Requirements: DEC PDP-11; DEC VAX: VMS
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $35,000 to $75,000
Number Installed to Date: 45
Date First Installed: 1978
(See Vendor Profile Page V-53)

LEGLER SYSTEMS CO.
EDXREF CROSS REFERENCE DICTIONARY
Specific Application: Prints Sorted Cross Reference Listing of EDL Source Code
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 14.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $95
Number Installed to Date: 60
Date First Installed: January 1978
(See Vendor Profile Page V-65)

MASSTOR SYSTEMS CORP.
MASSNET DATA EXCHANGE (MDX)
Specific Application: Utility With Network File Transfer and Remote Job Entry
Specific Industry: Not Industry Sensitive
System Requirements: Sperry 1100 Series; IBM 370 Series; DEC VAX, PDP; CDC
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 150
Date First Installed: 1978
(See Vendor Profile Page V-70)

M. BRYCE & ASSOCIATES, INC.
PRIDE ASDM (AUTOMATED SYSTEMS DESIGN)
Additional Product Classification: Program Generators/Aids/Applications Development Tools
Specific Application: Information Systems Design and Development
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3030 Series, 4300 Series: OS/DOS, VSE/MVS; Honeywell Level 66,: Gcos, Decsystem 10, 20: Tops 10; HP 3000: MPE IV
Memory Required: 128.0K bytes
Source Language: Ansi Cobol 74
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $80,000
Number Installed to Date: 1,200
Date First Installed: April 1971
(See Vendor Profile Page V-70)

MSP, INC.
DATAMANAGER
Specific Application: Data Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: OS/DOS; IBM 370
Memory Required: 300.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 1,000
Date First Installed: 1971
(See Vendor Profile Page V-78)

MSP, INC.
DESIGN MANAGER
Specific Application: Dictionary-Driven Modeling and Logic Data Base Design
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: OS/DOS, IBM 370
Memory Required: 300.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1983

MSP, INC.
PROJECT MANAGER
Specific Application: Program Resource Manager and Budgetary Control System
Specific Industry: Not Industry Sensitive
Memory Required: 55.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $8,000
Number Installed to Date: 75
Date First Installed: 1972

MSP INC.
SOURCEMANAGER
Specific Application: On-Line Dictionary-Driven Application Development System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: OS/DOS; IBM 370
Memory Required: 300.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: 1983

NCR CORP.
NCR-DMS/DIRECTORY
Specific Application: Resource Directory/Data Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: NCR V-8500, V-8000 Series: VRX
Memory Required: 1.0K bytes
Source Language: Cobol 74
Source Code Available: No
Purchase Terms: Rental
Number Installed to Date: 6
Date First Installed: October 1982
(See Vendor Profile Page V-79)

PROFFESSIONAL SOFTWARE SOLUTIONS, INC.
LEGAL RESEARCH
Specific Application: Data Dictionary for Managing Legal Reference Systems
Specific Industry: Legal
System Requirements: IBM System 23
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: May 1983
(See Vendor Profile Page V-88)

Microcomputer Section

DECISION MICROSYSTEMS, INC.
PANDAMONIA COMPANION
Specific Application: Fully Documented Machine for the Pandamonia Dictionary
Specific Industry: Education
System Requirements: Apple II, II+, IIE, TRS-80
Memory Required: 48.0K bytes
Source Language: Assembly, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30
(See Vendor Profile Page V-40)

GREAT PLAINS COMPUTER CO., INC.
SPELLING CHECKER
Specific Application: Spelling Complement for Word Processing
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80 Flex, OS9, Gimix 6809: Flex, Uniflex; Tano 6809: Flex, Uniflex, Southwest Technologies 6809: Flex, Uniflex
Memory Required: 56.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 500
Date First Installed: July 1981
(See Vendor Profile Page V-52)

DATA/FILE MANAGEMENT

ADVANCED SYSTEMS CONCEPTS, INC.
INTACT INTEGRATED APPLICATION CONTROL
Specific Application: Terminal File and Management
Specific Industry: Not Industry Sensitive, Banking/Financial
System Requirements: DEC VAX VMS; DEC PDP, Professional 300
Memory Required: 512.0K bytes
Source Language: Fortran, Fortran Cobol
Source Code Available: $50,000
Purchase Terms: Purchase (license)
Price: $3,000 to $15,000
Date First Installed: December 1981
(See Vendor Profile Page V-3)

AIS (APPLIED INFORMATION DEVELOPMENT, INC.)
JCL WTR - THE SYSOUT RETRIEVAL
Specific Application: Retrieval and Storage of JCL Sysout Listings
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3000 Series, System 370/158: MVS TSO/SPE; AMS 470/V6,V7,V8; NAS AS/7000, 8000, 9000
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 12
Date First Installed: December 1982
(See Vendor Profile Page V-4)

THE ALTERNATE SOURCE
ISAR
Specific Application: Information Storage and Retrieval, Create, Store and Edit Random Access Data Files
Specific Industry: Not Industry Sensitive
Memory Required: 32.0K bytes
Source Language: Basic, Z80
Purchase Terms: Purchase (license)
Price: $39
Number Installed to Date: 1,000
Date First Installed: November 1979
(See Vendor Profile Page V-4)

APPLICATIONS SOFTWARE, INC.

ASI-ST
Specific Application: Report Writing and Data Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360/370, 4000 Series, 3000 Series: OS-DOS
Memory Required: 130.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $20,000 to $40,000
Number Installed to Date: 300
Date First Installed: 1971
(See Vendor Profile Page V-7)

APPLIED DATA RESEARCH, INC.
ADR/DATAENTRY-RELEASE 2.4
Specific Application: Data Collection and Validation
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series, 4300 Series: OS, DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $12,700 to $10,300
Date First Installed: 1971
(See Vendor Profile Page V-7)

APPLIED SYSTEMS, INC.
ATTENDANCE REPORTING
Specific Application: Handles Attendance and Student Datafiles for up to 5000 Students
Specific Industry: Education
System Requirements: Decmate 1 and 2, DEC PDP-8: OS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 50
Date First Installed: 1976
(See Vendor Profile Page V-8)

APPLIED SYSTEMS, INC.
PAYROLL TO PBS CROSSOVER
Specific Application: Assigns Payroll to Appropriate PBS Accounts
Specific Industry: Education, Government
System Requirements: North Star Horizon; DEC PDP-8: OS; Decmate 1 and 2
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: 1978

AQUIDNECK DATA CORP.
SEND/RECEIVE
Additional Product Classification: Accounting
Specific Application: File Transfer System, General Accounting
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 100.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 3
Date First Installed: April 1983
(See Vendor Profile Page V-9)

AQUIDNECK DATA CORP.
TRANSFER/ACCEPT
Additional Product Classification: Accounting
Specific Application: Accounting/WP Document Transfer
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 100.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 3
Date First Installed: May 1983

AQUIDNECK DATA CORP.
VOX
Specific Application: Information Transfer Between Software Packages, Allows Loading of Data File Into Spreadsheet and Word Processing Packages
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 100.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,400
Date First Installed: 1971
(See Vendor Profile Page V-9)

ARTIFICIAL INTELLIGENCE CORP.
INTELLECT
Specific Application: Allows Expression of Retrieval Needs in Plain English
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: VM; Honeywell
Source Language: PL/1
Purchase Terms: Purchase (license)
Price: $49,500 to $89,500
Number Installed to Date: 150
Date First Installed: June 1979
(See Vendor Profile Page V-9)

AUTOMATED RESOURCES GROUP, INC.
SPS 3000
Specific Application: Subscription Fulfillment Solutions
Specific Industry: Publishing
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $18,000
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-10)

BIBLIOGRAPHIC RETRIEVAL SERVICES
BRS-SEARCH (MAIN FRAME VERSION)
Specific Application: Full Text Free Text Storage and Retrieval for Textext Data Base, BRS On-Line Services
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS/MVS
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $60,000
Number Installed to Date: 10
Date First Installed: January 1981
(See Vendor Profile Page V-12)

BIBLIOGRAPHIC RETRIEVAL SERVICES
BRS-SEARCH (IBM-MICRO VERSION)
Specific Application: Full Text Storage and Retrieval for Textext Data Bases
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000 to $30,000
Number Installed to Date: 5
Date First Installed: September 1982

CALIFORNIA SOFTWARE, INC.
NETMAN
Specific Application: Data Center and Data Communications Manager
System Requirements: DOS, VSE, MVS, VM, VS1
Price:
Number Installed to Date: 80
Date First Installed: 1980

CALIFORNIA SOFTWARE, INC.
1460 Fourth St.
Santa Monica, CA 90401
(213) 451-5693
Target Industries: General Business
Contact: Marketing Department
Geographic Coverage: National

CAPRICORN COMPUTING
ACCESS
Specific Industry: Not Industry Sensitive
System Requirements: NCR 8400, 8500 Series VRX
Source Language: Nest/VS
Source Code Available: No
Price: $1,500
Number Installed to Date: 20
Date First Installed: September, 1981
(See Vendor Profile Page V-16)

CAPRICORN COMPUTING
DSPOOLER
Specific Application: Printer Spool File Selective Print/Copy Utility
Specific Industry: Not Industry Sensitive
System Requirements: NCR 8400, 8500 Series VRX
Memory Required: 64.0K bytes
Source Language: Nest/VS
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $1,750

Number Installed to Date: 9

CAPRICORN COMPUTING
MAGIC
Specific Application: Disk/Tape File Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: NCR Century 200, 300, 8400, 8500 Series; NCS, VRX
Memory Required: 64.0K bytes
Source Language: Neat/3, Neat/VS
Purchase Terms: Purchase (license); Rental
Price: $2,200
Date First Installed: July 1982

CARDELL SYSTEMS, INC.
CAPS 500
Specific Application: Retrieve Information From Cash Register
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Date First Installed: 1981
(See Vendor Profile Page V-17)

CCSI
MASTER NAME INDEX
Specific Application: File Management
Specific Industry: Government
System Requirements: IBM PC; MS-DOS; IBM System/34; IBM System/36
Memory Required: 24.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: July 1983
(See Vendor Profile Page V-17)

CDS COMPUTING

CDS 2000
Specific Application: Circulation Fulfillment Data Base
Specific Industry: Trade Publishing
System Requirements: Tandem
Memory Required: 500.0K bytes
Source Language: TAL, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 2
Date First Installed: August 1982
(See Vendor Profile Page V-17)

Additional information provided for by vendor

CDS 2000

On-line interactive circulation fulfillment for trade publications. Complete systems include security, company data base, one subscriber for multiply subscriptions, BPA, ITMT, integrated reader service, list rental, paid and full presort mail system. In 16- to 600-terminal systems.

CHUSS & SON, INC.
MC
Specific Application: Compares Source Codes From Two Different Programs, Highlights Additions, Deletions and Changes
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, MVS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-18)

COMPROG, INC.
KSAM 1000 KEYED SEQUENTIAL ACCESS
Specific Application: File Access of Keyed Records
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000: RTE IV
Memory Required: 20.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 20
Date First Installed: February 1981
(See Vendor Profile Page V-22)

COMPU-DRAW
FILER-FILE MANAGEMENT PROGRAM
Specific Application: Archiving, Cataloging and Compressing Files
Specific Industry: Not Industry Sensitive
System Requirements: Osborne: CP/M; Xerox 820: CP/M; Kaypro-II: CP/M
Memory Required: 56.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $49
Number Installed to Date: 200
Date First Installed: December 1983
(See Vendor Profile Page V-22)

COMPU-DRAW
UNERA
Specific Application: Recovers Erased Files
Specific Industry: Not Industry Sensitive
System Requirements: Osborne: CP/M; Xerox 820: CP/M; Kaypro-II: CP/M
Memory Required: 16.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $29
Date First Installed: June 1983

COMPUTER ASSOCIATES
CA-[illegible]
Specific Application: Relational Database Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 580, 4300 Series, 3000 Series: DOS/VS, OS/VS1/MVS, VM/CMS; Unix
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $65,000 to $102,000
(See Vendor Profile Page V-23)

COMPUTER CONSULTING SERVICES
ROUTE DISTRIBUTION SYSTEMS
Additional Product Classification: Accounting
Specific Application: Inventory, Accounts Payable, Accounts Receivable, General Ledger, Automatic Routes
Specific Industry: Water Bottle Industry
System Requirements: Centurion: CPU6
Memory Required: 128.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1981
(See Vendor Profile Page V-23)

COMPUTER CONTROL SYSTEMS, INC.
FABS II (FAST ACCESS B-TREE SYSTEM)
Additional Product Classification: Program Generators/Aids/Applications Development Tools
Specific Application: Programmers Tools Utilities
System Requirements: CP/M; MP/M
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 1,000
Date First Installed: August 1981
(See Vendor Profile Page V-23)

COMPUTER HOUSE
COPIER MACHINE DEALERS
Additional Product Classification: Accounting
Specific Application: Balance Forward, COD and Double Alert, Service Call, Rental, Maintenance and Meter Charge Billing, Accounts Receivable
Specific Industry: Copier Machine Dealers
Source Language: Hibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 4
Date First Installed: 1982
(See Vendor Profile Page V-24)

COMPUTER HOUSE
LEGAL TIME & BILLING
Additional Product Classification: Accounting, WP/Text Editing
Specific Application: Client Management, WP/Text Editing, Attorney Analysis, Bill Management, Trust in Escrow
Specific Industry: Legal
Source Language: Hibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 5
Date First Installed: 1982

COMPUTER HOUSE
PROFESSIONAL TIME AND BILLING
Additional Product Classification: Accounting, WP/Text Editing
Specific Application: Client Management, WP/Text Editing, Bill Management
Specific Industry: Not Industry Sensitive
Source Language: Hibol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 10
Date First Installed: September 1982

COMPUTER INFORMATION ENTERPRISES
RETAIL PRICE CHANGE
Specific Application: Automated Price Change
Specific Industry: Retail
System Requirements: IBM: EDX
Memory Required: 22.0K bytes
Source Language: EDL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1983
(See Vendor Profile Page V-24)

COMPUTER INFORMATION SYSTEMS
CUSTOMER SUPPORT SYSTEM
Specific Application: Records Management of Customer Support Calls
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 512.0K bytes
Source Language: VAX Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000 to $3,000
Date First Installed: September 1981
(See Vendor Profile Page V-24)

COMPUTER MEDIA, INC.
ICS 1000
Specific Application: Generic Package for Data Acquisition and Control
Specific Industry: Manufacturing
System Requirements: HP 1000A Series; RTE; HP 200 Series
Memory Required: 250.0K bytes
Source Language: Fortran 77
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: March 1983
(See Vendor Profile Page V-25)

COMPUTER SOLUTIONS, INC.
LOCK AND KEY DIRECTORY
Specific Application: Maintains Lock-Cut and Angle Information
Specific Industry: Lock Smith
System Requirements: NEC Astros
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 1
Date First Installed: June 1982
(See Vendor Profile Page V-26)

COMPUTER WORKSHOP
COBOLCRAFT REDIFILE
Specific Application: Data Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 128.0K bytes
Source Language: RM Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 150
Date First Installed: 1981
(See Vendor Profile Page V-26)

ASI/INQUIRY

The only game in town!

ASI/INQUIRY

That's right. ASI/INQUIRY is the *only fully interactive* query language that supports the above environments. Thus, it's much more powerful than so called "4th generation" languages. Isn't it about time you were dealt in! For details, contact Applications Software, Inc.

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Breaking the programming bottleneck™

(See listing on opposite page.)

ADAPSO

COMPUTIME, INC.
FILE UTILITY
Specific Application: Provides Inquiry and Maintenance Capabilities for any File Accessible Through Cics
Specific Industry: Not Industry Sensitive
System Requirements: IBM: Cics
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $1,500
Number Installed to Date: 5
Date First Installed: August 1981
(See Vendor Profile Page V-28)

COMPUTING CAPABILITIES CORP.
INSIGHT II
Specific Application: On-Line Transaction Processor
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: SPL
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $7,500
Number Installed to Date: 150
Date First Installed: July 1980
(See Vendor Profile Page V-28)

COMPUTING CAPABILITIES CORP.
INSIGHT II/L
Specific Application: On-Line Transaction Processor
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: SPL
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $2,800
Number Installed to Date: 5
Date First Installed: January 1983

COMPUTRON TECHNOLOGIES CORP.
LISTER 2000
Specific Application: Enhanced Version of the Lister. Integrates WP Files With Data Base Files
System Requirements: Wang VS: VS/OS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 8
Date First Installed: August 1982
(See Vendor Profile Page V-28)

COMPUWARE CORP.
FILE-AID
Specific Application: File Manipulation and Expansion of the SPF Environment
Specific Industry: Not Industry Sensitive
System Requirements: IBM Mainframes OS/MVS
Memory Required: 60.0K bytes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 150
Date First Installed: February 1975
(See Vendor Profile Page V-28)

CONTECTRA SYSTEMS, INC.
SCAM THRIFT INDUSTRY ANALYSIS
Specific Application: Data Base for Federal Home and Loan
Specific Industry: Banking/Financial
System Requirements: Burroughs B7800
Source Language: Cobol, PL/1, Fortran
Purchase Terms: Lease
(See Vendor Profile Page V-29)

THE CONDOR CORP.
CONDOR MULTIKEY SEARCH SYSTEM
Specific Application: High-Speed Search Technique
Specific Industry: Not Industry Sensitive
System Requirements: Intel: CP/M; Moorce: MP/M; Honeywell: MS-DOS, IBM PC: PC-DOS
Memory Required: 256.0K bytes.
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 210
Date First Installed: June 1971
(See Vendor Profile Page V-29)

CON TEL DATA SERVICES CORP.
CENTRALIZED TICKET INVESTIGATING PACKAGE
Additional Product Classification: Sort/Merge
Specific Application: Ticket Investigating Package
Specific Industry: Telephone
System Requirements: IBM System/38
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1981
(See Vendor Profile Page V-30)

CON TEL DATA SERVICES CORP.
CDS'S DISTRIBUTED CUSTOMER RECORD INFORMATION
Specific Application: Customer Record Information System
Specific Industry: Telephone
System Requirements: Honeywell MOD600, DPS-6
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100,000
Date First Installed: 1981

CON TEL DATA SERVICES CORP.
HE MAC NETWORK MANAGEMENT ADMINISTRATION CENTER
Specific Application: Centralize Maintenance for Stored Program Control, Switching Interface With Digital Switches
Specific Industry: Telephone
System Requirements: Honeywell MOD600, DPS-6
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1981

CONTEL INFORMATION SYSTEMS
DISKS -ELEVEN
Specific Application: Virtual Disk Handler for RT-11
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11
Source Language: Fortran, Macro 11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 300
Date First Installed: 1980
(See Vendor Profile Page V-30)

CONTEL INFORMATION SYSTEMS
RECORD-ELEVEN
Specific Application: Record Locking System for Multiuser RT-11/TSX +
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, DEC VAX: VMS, RT-11, Unix
Source Language: Fortran, Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 300
Date First Installed: 1980

CONTEL INFORMATION SYSTEMS
TRACE-ELEVEN
Specific Application: Literate On-Line Debugger for RT-11
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11
Source Language: Fortran, Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 120
Date First Installed: 1980

CORODALE, INC.
VSAM/CALC
Specific Application: Vsam File Optimization
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300, 3000, PCMs: DOS/VS, DOS/MVT/VSE, DOS/VSE, EDOS/VSE
Memory Required: 12.0K bytes
Source Language: IBM Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $1,000
Number Installed to Date: 200
Date First Installed: December 1980
(See Vendor Profile Page V-31)

CORODALE, INC.
VSAM/DISPLAY
Specific Application: On-Line Vsam Cluster Information
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300, 3000, PCMs: DOS/VS, DOS/MVT/VSE, DOS/VSE, EDOS/VSE
Memory Required: 12.0K bytes
Source Language: IBM Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $1,500
Number Installed to Date: 80
Date First Installed: January 1983

CORODALE, INC.
VSAM/LIST
Specific Application: Vsam File and Volume Information
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300, 3000, PCMs: DOS/VS, DOS/MVT/VSE, DOS/VSE, EDOS/VSE
Memory Required: 12.0K bytes
Source Language: IBM Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $1,500
Number Installed to Date: 250
Date First Installed: February 1981

CORPORATE COMPUTER SYSTEMS, INC.
DELTA.DOC REV 1.0
Specific Application: Data Management
System Requirements: HP 1000
Memory Required: 28.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $950
Number Installed to Date: 20
Date First Installed: August 1981
(See Vendor Profile Page V-31)

CORPORATE COMPUTER SYSTEMS, INC.
REV 1.0 SOURCESOURCE CONTROL SYSTEM 10
Specific Application: Source File Management
System Requirements: HP 1000
Memory Required: 28.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 60
Date First Installed: June 1981

CREATIVE DATA SYSTEMS, INC.
CDM-CIRC
Specific Application: Circulation Management System
Specific Industry: Newspaper
System Requirements: IBM System/34, System/36, System/38
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 60
Date First Installed: June 1979
(See Vendor Profile Page V-32)

C-S COMPUTER SYSTEMS, INC.
C-S Extract
Specific Application: File Compare Utility
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, OS, MVS
Memory Required: 64.0K bytes.
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $1,500
Number Installed to Date: 150
Date First Installed: 1975
(See Vendor Profile Page V-32)

C/U BUSINESS COMPUTERS NOTES
Specific Application: Organizing User Defined Note Files
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 40.0K bytes
Source Language: Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 15
Date First Installed: June 1981
(See Vendor Profile Page V-33)

CUFF'S PLANNING AND MODELS LTD.
CUFF'S -86
Specific Application: Hierarchical Data Base Consolidations, Multidimensional Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CMS; DEC System 20, 10: Tops 20, 10; DEC VAX: VMS, Unix
Memory Required: 512.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35,000
Date First Installed: July 1983
(See Vendor Profile Page V-33)

CUSTOM PROGRAMMING GROUP, INC.
FRED (FUND RAISING AND EXPANSION MANAGEMENT)
Additional Product Classification: Query Languages
Specific Application: Maintaining Lists of Donors and Accounts
System Requirements: Four Phase: MFE
Memory Required: 96.0K bytes
Source Language: Cobol 74
Source Code Available: No
Purchase Terms: Lease
Price: $6,000
Number Installed to Date: 2
Date First Installed: February 1982
(See Vendor Profile Page V-33)

CUSTOM PROGRAMMING GROUP, INC.
SAM (SYSTEM FOR ARCHIVAL MANAGEMENT)
Specific Application: Works With Four Phase WP Software, Providing Document Management
Specific Industry: Not Industry Sensitive
System Requirements: Four Phase: MFE
Memory Required: 96.0K bytes
Source Language: Cobol 74
Source Code Available: No
Purchase Terms: Lease
Price: $2,500
Number Installed to Date: 1
Date First Installed: February 1983

CYTROL, INC.
CYX-FM FILE MAINTENANCE
Specific Application: Maintains Data Files
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/24, 11/70: RSX-11M; DEC VAX: VMS
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 10
Date First Installed: May 1983
(See Vendor Profile Page V-34)

CYTROL, INC.
CYX-TF TEXT FILING FUNCTIONS
Specific Application: Provides Text Filing Functions
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP: 11/24, 11/70: RSX-11M; DEC VAX: VMS
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,300
Number Installed to Date: 1
Date First Installed: May 1983

DATA DIRECTIONS
THE PUBS MANAGER
Additional Product Classification: Graphics
Specific Application: Text and Graphics Document Control System, Technical Publications
Specific Industry: Banking/Financial, Government
System Requirements: Wang VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $45,000 to $65,000
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-36)

THE DATELEX CO., INC.
ENTRY POINT SYSTEM
Specific Application: Data Entry
Specific Industry: Fortune 1000
System Requirements: IBM PC: UCSD-P; HP 125, DEC Rainbow
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1,000
Date First Installed: 1981
(See Vendor Profile Page V-36)

DATAMARK SYSTEMS, INC.
DATAMARK FILE MANAGEMENT SYSTEM
Specific Application: Provides Unix Type File Structures With Options
Specific Industry: Not Industry Sensitive
System Requirements: GA 16: Control, 1600 DT: Control; 1600 XT: Control
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1983
(See Vendor Profile Page V-37)

DATAMARK SYSTEMS, INC.
IBM CHANNEL CONTROL UNIT EMULATOR
Additional Product Classification: Program Generators/Aids, Applications Development Tools, Communications/TP Monitors
Specific Application: Front End Networking, Satellite Communications
Specific Industry: Not Industry Sensitive
System Requirements: GA 16: Control; 1600DT: Control; 1600 XT: Control
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $5,000
Number Installed to Date: 50
Date First Installed: 1977

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DATAPHASE SYSTEMS, INC.
ALIS
Specific Application: Integrated Library System
Specific Industry: Library
System Requirements: DG; Tandem
Source Language: Mumps
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 60
Date First Installed: 1976
(See Vendor Profile Page V-37)

DATA PROCESSING CORP. OF DELAWARE VALLEY
CUSTOMER MAILING LIST
Specific Application: Customer Mailing List File Management
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Lease
Date First Installed: September 1969
(See Vendor Profile Page V-38)

DATASCAN AMERICA, INC.
ENTER/SCAN
Additional Product Classification: Query Languages
Specific Application: Screen Creation, Data Entry and Processing System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series, 3000 Series, 370: Cics, IBM System/34, IBM System/36: CP/M; IBM PC: PC-DOS; Datapoint 1500: DOS
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 3,000
Date First Installed: June 1978
(See Vendor Profile Page V-38)

DATA-TEK
JOB MANAGER PROGRAMMER
Specific Application: Manages the Stream of Batch Jobs Into IBM Mainframes
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 1
Date First Installed: September 1981
(See Vendor Profile Page V-38)

DATAVISION
COUNTRY CLUB
Specific Application: Keep Data File on Members
Specific Industry: Country Clubs
System Requirements: DEC
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1975
(See Vendor Profile Page V-39)

DATCO, INC.
BARTER
Additional Product Classification: Accounting
Specific Application: Monitor Bills for Customer In-Grade Transactions
Specific Industry: Not Industry Sensitive
System Requirements: North Star: CP/M
Memory Required: 48.0K bytes
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 2
Date First Installed: 1983
(See Vendor Profile Page V-39)

DAVIDSON SOFTWARE SYSTEMS
HISTORY FILE ANALYSIS
Specific Application: History File Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 DOS. Unix; HP: CP/M; Televideo CP/M
Memory Required: 64.0K bytes
Source Language: RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $200
Number Installed to Date: 50
Date First Installed: 1980
(See Vendor Profile Page V-39)

DAVIS CONSULTANTS, INC.
ESP EMPLOYEE SCHEDULE PACKAGE
Specific Application: Provides A Service for Employee Schedule Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/33, System/34, System/23, System/36 SSP
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,300
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-39)

DAWN COMPUTER CORP.
TASK MASTER Q'UERY
Specific Application: Data Base for Taskmaster and Q'Text
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RT-11 RSX-11, TSX +
Memory Required: 64.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 500
Date First Installed: 1976
(See Vendor Profile Page V-40)

DECISION SYSTEMS, INC.
CREAM
Specific Application: Menu Handling
Specific Industry: Restaurant
System Requirements: Unix
Memory Required: 64.0K bytes
Source Language: RM Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: 1983
(See Vendor Profile Page V-40)

DEFARO SOFTWARE SYSTEMS, INC.
DOC 3
Specific Application: Full Screen Text Management and Computer-Aided Instruction
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/34, System/36
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 3
Date First Installed: August 1982
(See Vendor Profile Page V-40)

DEKA SYSTEMS SOFTWARE, INC.
SCANPRT
Specific Application: Review/Print School Files
Specific Industry: Education
System Requirements: IBM 370: VM370; IBM 4300 Series, IBM 3270
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 8
Date First Installed: February 1983
(See Vendor Profile Page V-41)

DIGITAL ELECTRONIC SERVICES
STREAMER UTILITY
Specific Application: Copies Disk to Tape
Specific Industry: Not Industry Sensitive
System Requirements: TI 990: DX-10, Dnos
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 25
Date First Installed: November 1982
(See Vendor Profile Page V-42)

DIGITAL EQUIPMENT CORP.
FMS-11 (FORMS MANAGEMENT SYSTEM)
Specific Application: Builds Interactive Screen-Oriented Data Entry Capabilities Into Applications Programs
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX, RSTS/E, VAX-11: VMS
Purchase Terms: Purchase (license)
Price: $1,240 to $3,310
Date First Installed: 1900
(See Vendor Profile Page V-42)

DIGITAL EQUIPMENT CORP.
SORT-II
Specific Application: All-Purpose Data Sorting Utility for Files Formed by RMS-11
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX, RSTS/E; VAX-11: VMS
Purchase Terms: Purchase (license)
Price: $410 to $1,190
Date First Installed: 1900

DUN & BRADSTREET COMPUTING SERVICES
DOCUMASTER
Specific Application: Text Storage and Retrieval System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS, OS, VS
Memory Required: 90.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $37,200
Date First Installed: 1980
(See Vendor Profile Page V-42)

EDP MANAGEMENT, INC.
LIBFIX
Specific Application: Maintains A Library File
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $500
Date First Installed: June 1972
(See Vendor Profile Page V-45)

EDP MANAGEMENT, INC.
LOOKAT
Specific Application: Finds Differences in Two Versions of Same File
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs
Source Language: Cobol
Purchase Terms: Purchase (license); Rental, Lease
Price: $4,000 to $6,000
Date First Installed: June 1972

EFT COMPUTER SYSTEMS, INC.
CUSTOMER ACCOUNT PROFITABILITY SYSTEM
Additional Product Classification: Financial Modeling Languages/DSS
Specific Application: Customer Profitability
Specific Industry: Banking/Financial
System Requirements: NCR 9040, 9050, 9300, IBM System/34, System/36, System/38
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: March 1983
(See Vendor Profile Page V-45)

EK-RMS ENTERPRISES, INC.
DATA ROUTINES
Specific Application: Data Routines
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP
Memory Required: 48.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1979
(See Vendor Profile Page V-45)

ESI
BASTE
Specific Application: Database System for Compression and Storage of All Files
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B2700, B490 MCP
Memory Required: 29.0K bytes
Source Language: BPL
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 35
Date First Installed: March 1982
(See Vendor Profile Page V-47)

ESP COMPUTER RESOURCES, INC.
DATAKEYPER (DK-300)
Specific Application: Information Management
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Applesoft
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: July 1981
(See Vendor Profile Page V-47)

EVANS GRIFFITHS AND HART, INC.
SELECT
Specific Application: Record Extraction Utility
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP: RSTS/E
Memory Required: 96.0K bytes
Source Language: Basic, Macro
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 195
Date First Installed: 1978
(See Vendor Profile Page V-47)

EVANS GRIFFITHS AND HART, INC.
SELECT
Specific Application: Record Extraction Utility for VAX/VMS
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Date First Installed: 1982

EVANS GRIFFITHS AND HART, INC.
VSORT
Specific Application: Multi-Key Sort for the DEC VAX-11 Under VMS
Specific Industry: Not Industry Sensitive

Utility Software

System Requirements: DEC VAX-11
Source Language: Extended Basic, Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 6
Date First Installed: 1982

FINANCIAL SOFTWARE OF AMERICA, INC.
COMMON FILE SYSTEM
Specific Application: Allows the Storage, Addition and Maintenance of All Common Information to All Application Systems
Specific Industry: Banking/Financial
System Requirements: IBM 370, 4300: DOS/VSE, OS; IBM 303X: VS, MVS, Vsam, IBM 308X: Cics
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 150
Date First Installed: September 1977
(See Vendor Profile Page V-48)

FORMS MANAGEMENT, INC.
PER TROL RECORDS MANAGEMENT
Specific Application: Record Management
Specific Industry: Not Industry Sensitive
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
(See Vendor Profile Page V-49)

FORMS MANAGEMENT, INC.
PER TROL SUPPLIES MANAGEMENT
Specific Application: Office Supplies Management
Specific Industry: Not Industry Sensitive
System Requirements: [illegible] AS
Memory Required: 256.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Rental; Lease

GENERAL ELECTRIC INFORMATION SERVICES CO.
PC HISAM 2.1
Additional Product Classification: Program Generators/Aids, Applications Development Tools
Specific Application: Data Base Access Method, Process Data Files That Are Logically Organized
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 100.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $325
Date First Installed: May 1983
(See Vendor Profile Page V-51)

GENERAL RESEARCH CORP.
PORTUP
Specific Application: Portable Source Code and Configuration Control
Specific Industry: Not Industry Sensitive
System Requirements: DEC: OS/DOS
Memory Required: 30.0K bytes
Source Language: V-ftran
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1980
(See Vendor Profile Page V-51)

GENERIC SYSTEMS, INC.
DRD (DOCTOR DISK)
Additional Product Classification: Security/Auditing, Library Management
Specific Application: Disk Utility, Back-Up Data File Library
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DOS, IBM 370/UNK: DOS/VS, IBM 4300. DOS/VSE, E-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500
Number Installed to Date: 500
Date First Installed: January 1974
(See Vendor Profile Page V-51)

HENTRY, INC.
PAL DATA DIRECTOR
Specific Application: Menu Processor
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE IV
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: August 1983
(See Vendor Profile Page V-51)

GEOGRAPHIC SYSTEMS, INC.
GEOFILE
Specific Application: Mapping Files in Standard Environment
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, CMS/TSO
Memory Required: 1.0M bytes
Source Language: Fortran
Purchase Terms: Purchase (license); Rental; Lease
Price: $500 to $20,000
Number Installed to Date: 12
Date First Installed: October 1981
(See Vendor Profile Page V-51)

HARRIS CORP.
VISP
Specific Application: Indexed Sequential File Package
Specific Industry: Not Industry Sensitive
System Requirements: Harris 600, 700, 800; VOS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15,000
(See Vendor Profile Page V-53)

HARTH SYSTEMS, INC.
HSA (KEYWORD INDEX SEARCH SYSTEM)
Additional Product Classification: Report Generator
Specific Application: Librarying and Filing of Data
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-53)

HAWKEYE INFORMATION SYSTEMS
PATHFINDER/38
Specific Application: Documentation and Cross Reference for the System/38
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPF
Memory Required: 300.0K bytes
Source Language: RPG
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,450
Number Installed to Date: 30
Date First Installed: May 1982
(See Vendor Profile Page V-53)

HDR SYSTEMS, INC.
HDR DATA BASE UTILITIES
Specific Application: Menu-Driven Program Providing the Services for Data Base Back-Up, Recovery and Conversion
Specific Industry: Not Industry Sensitive
System Requirements: Onyx 8002: Unix, Datapoint 80, 86: RMS,
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: Two
(See Vendor Profile Page V-54)

HOUSTON COMPUTER SERVICES, INC.
OCTACOMM/LINK
Specific Application: File Transfer
Specific Industry: Not Industry Sensitive
System Requirements: TI Professional: MS-DOS; TI 990: DX-10, Dnos
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
(See Vendor Profile Page V-55)

H & W COMPUTER SYSTEMS, INC.
ITEMARC FILE VERIFICATION
ALLOCATION FOR CICS
Specific Application: Dynamic File Verification and Allocation for Cics
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS
Memory Required: 30.0K bytes
Source Language: BAL
Purchase Terms: Purchase (license); Lease
Price: $4,500
Number Installed to Date: 15
Date First Installed: April 1983
(See Vendor Profile Page V-55)

INFORMATION DESIGN, INC.
IDC
Specific Application: LC Data

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Conversion of Mark Data Into Library Card Catalog
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 25
Date First Installed: 1979
(See Vendor Profile Page V-57)

INFORMATION DESIGN, INC.
CARD SET
Specific Application: LC Data Conversion of Mark Data Into Library Card Catalog
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 25
Date First Installed: 1979

INFORMATION MANAGEMENT CONSULTANTS, INC.
KIRS (KEYBOARD RETRIEVAL INFORMATION SYSTEM)
Additional Product Classification: Library Cataloging
Specific Application: Library Services Cataloging Document Indexing (12 Separate Data Bases
Specific Industry: Library
System Requirements: Wang VS: VS/OS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,500
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-57)

INFORMATION SYSTEMS DESIGN, INC.
ALPHALIST
Additional Product Classification: Report Generator
Specific Application: File System Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell Level 66: Gcos
Source Language: Gmap, Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $5,950
Number Installed to Date: 13
Date First Installed: 1982
(See Vendor Profile Page V-58)

INFORMATION SYSTEMS OF AMERICA, INC.
ISA/EXTRACTO
Specific Application: General Purpose Data Management Tool
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series,: DOS, OS, VS, VS/E; Sperry 9060: VS9
Memory Required: 40.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Date First Installed: June 1974
(See Vendor Profile Page V-58)

INFORMATION SYSTEMS OF AMERICA, INC.
ISA/ON LINE ALPHA SYSTEM (OAS)
Specific Application: Name File Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series,: DOS, OS, VS, VS/E; Sperry 9060: VS9
Memory Required: 150.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 90
Date First Installed: July 1971

INTERACTIVE SYSTEMS, INC.
MRU (MESSAGE ROUTING UTILITY)
Specific Application: Message Routing Utility
Specific Industry: Not Industry Sensitive
System Requirements: DEC System 10: Tops 10; DEC System 20: Tops 20; DEC VAX: VMS
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 25
Date First Installed: December 1981
(See Vendor Profile Page V-60)

INTERPROCESS SYSTEMS, INC.
AFM/AP-A FILE MANAGEMENT SYSTEM
Specific Application: File Management System for APL
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series. MVS, TSO
Memory Required: 512.0K bytes
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $14,500
Number Installed to Date: 85
Date First Installed: 1977
(See Vendor Profile Page V-61)

INTERPROCESS SYSTEMS, INC.
INTERACTIVE LINK OPTION FOR AFM/AR
Specific Application: Interface Between Non-APL Programs and the APL-Based AFM/ AP File Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: MVS, TSO
Memory Required: 6.0K bytes
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $1,750
Number Installed to Date: 15
Date First Installed: 1982

INTERPROCESS SYSTEMS, INC.
KEYED ACCESS OPTION FOR AFM/AP
Specific Application: Extension to the AFM File System; Allows Access of APL Data By Key
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: MVS, TSO
Memory Required: 40.0K bytes
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Price: $3,500
Number Installed to Date: 20
Date First Installed: 1981

ISSCO GRAPHICS
TELLAPLAN
Specific Application: Comprehensive Project Planning, Scheduling and Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS/VS; DEC VAX: VMS; Burroughs: MCP
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,200 to $12,500
(See Vendor Profile Page V-61)

JEM ASSOCIATES
AUTOPOLL/1
Specific Application: POS Data Collection for Mixed Vendor Networks Custom Reformating Communications for Most Host Protocols
Specific Industry: Retail
System Requirements: EDX
Memory Required: 128.0K bytes
Source Language: EDL, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $12,500
Number Installed to Date: 10
Date First Installed: 1978
(See Vendor Profile Page V-62)

JOHNSON SYSTEMS, INC.
DOS JARS-VM INTERFACE OPTION
Additional Product Classification: Translator
Specific Application: Translates VM Accounting Records Into the Summary File Format for Input to DOS Jars
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS/VS; IBM 4300 Series: DOS/VSE; IBM 4300 Series
Memory Required: 120.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,000
(See Vendor Profile Page V-63)

JOHNSON SYSTEMS, INC.
DOS JARS-VM/CCF INTERFACE OPTION
Additional Product Classification: Translator
Specific Application: Translates ICCF Accounting Records Into the Summary File Format for Input to DOS Jars
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS/VS; IBM 3000 Series: DOS/VSE; IBM 4300 Series
Memory Required: 120.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,000

JOHNSON SYSTEMS, INC.
OS JARS - MVS/VS INTERFACE OPTION
Additional Product Classification: Translates
Specific Application: Enables OS Jars Users to Report on IMS/VS Utilities
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370; VS1; IBM 3000 Series: VS2; IBM 4300 Series: SVS, MVS
Memory Required: 120.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $3,000

JOHNSON SYSTEMS INC.
OS JARS - TSO INTERFACE OPTION
Additional Product Classification: Translates
Specific Application: Enables OS Jars Users to Process TSO Accounting and Utilization Data
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370; VS1; IBM 3000 Series: VS2; IBM 4300 Series: SVS, MVS
Memory Required: 120.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $3,000
Date First Installed: 1980

JOHNSON SYSTEMS, INC.
OS JARS - VM INTERFACE OPTION
Additional Product Classification: Translates
Specific Application: Translates VM Accounting Records Into the Summary Files Format for Input to OS Jars
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370; VS1; IBM 3000 Series: VS2; IBM 4300 Series: SVS, MVS
Memory Required: 120.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,000

J P SEDLAK ASSOCIATES, INC.
DATA POOL
Specific Application: Data Entry, File Management, Distributed Data Processing
Specific Industry: Insurance
System Requirements: IBM Series 1: CPS; IBM 4300: OS/VS1
Memory Required: 192.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10 to $20,000
(See Vendor Profile Page V-63)

KIMBRO DATA, INC.
POS INTERFACE
Specific Application: Reads Data From A Data Terminal System In the Computer
Specific Industry: Retail
System Requirements: Burroughs B20: Btos; Ellingr Dose
Memory Required: 64.0K bytes
Source Language: Cobol, Machine, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)

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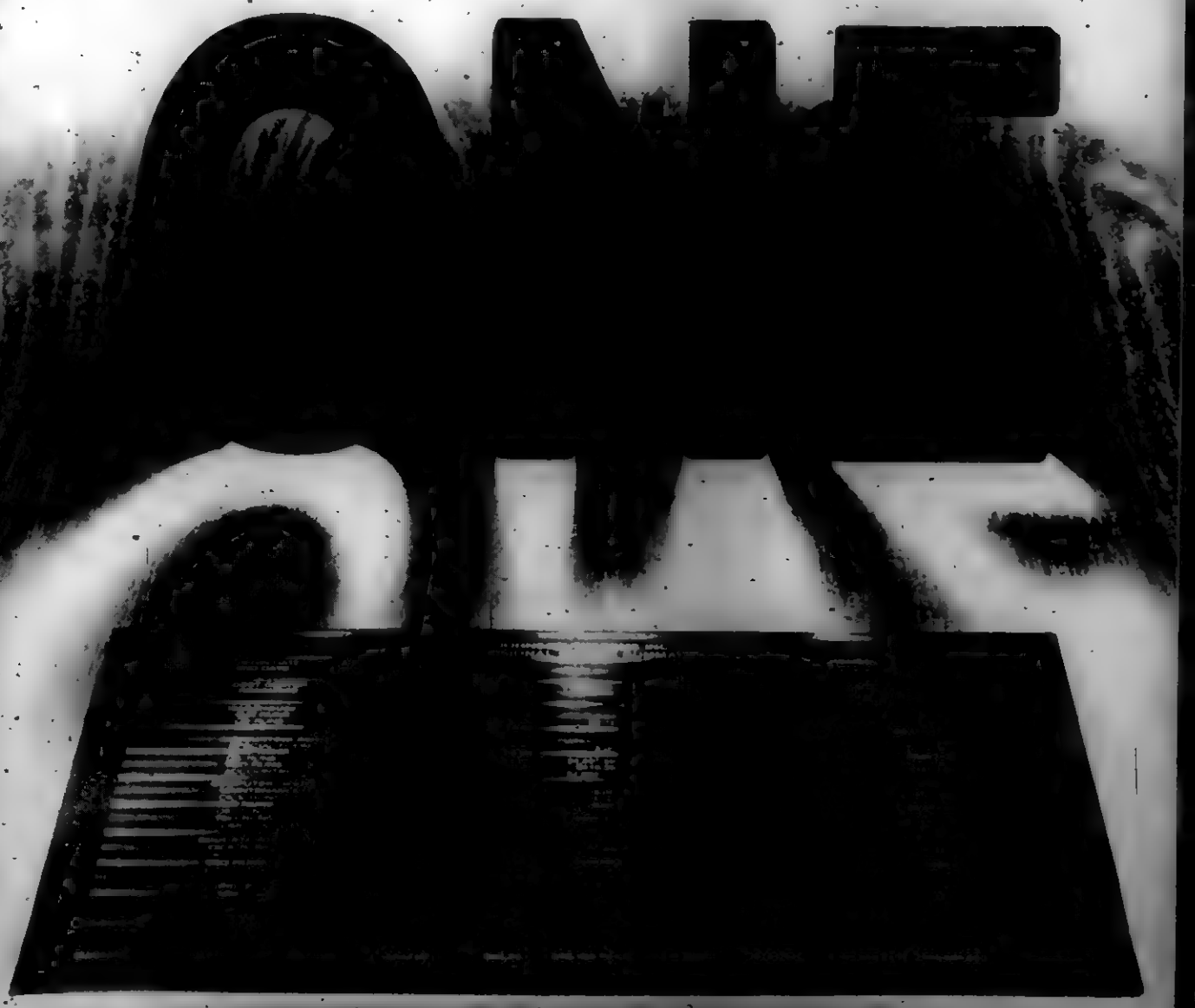

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Price: $750
Number Installed to Date: 1
Date First Installed: December 1982
(See Vendor Profile Page V-64)

LACHMAN ASSOCIATES, INC.
REMO TT
Specific Application: File Transfer System
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, RSX Plus
Memory Required: 56.0K bytes
Source Language: Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $375 to $700
Date First Installed: 1980
(See Vendor Profile Page V-65)

LEARNED-MANN
ASTALK
Additional Product Classification: Communications/TP Monitors
Specific Application: Communications and File Building
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; GE Time-Sharing System
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 100
Date First Installed: August 1982
(See Vendor Profile Page V-65)

LINK SYSTEMS
DATAFAX
Specific Application: File Management
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE, III, IBM PC-XT
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195 to $295
Date First Installed: January 1982
(See Vendor Profile Page V-66)

MANAGEMENT CONTROL SYSTEMS, INC.
DUE DATE MONITORING
Specific Application: Due Date Monitoring
Specific Industry: Accounting
System Requirements: IBM PC, System/32, System/34, System/38
Source Language: Cobol, RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200 to $6,200
Number Installed to Date: 205
Date First Installed: 1975
(See Vendor Profile Page V-66)

MANAGEMENT CONTROL SYSTEMS, INC.
STAFF SCHEDULING
Specific Application: Staff Scheduling
Specific Industry: Real Estate, CPA
System Requirements: IBM PC, System/32, System/34, System/38
Source Language: RPG-II, Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200 to $6,200
Number Installed to Date: 205
Date First Installed: 1975

MANAGEMENT SYSTEMS, INC.
WARRANTY SYSTEM
Specific Application: Tracks Warranties Given Out
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: Pick, IBM PC: Pick, IBM Series/2: Pick, DEC PDP-11/60: Pick
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500 to $50,000
Number Installed to Date: 30
(See Vendor Profile Page V-68)

MARYLAND COMPUTER SERVICES, INC.
FILE MODIFICATION
Specific Application: Changes Status of A File
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 5
Date First Installed: 1982
(See Vendor Profile Page V-69)

MASSOGLIA AND ASSOCIATES, INC.
LIST FILE UTILITY
Specific Application: Condensed File List With Selection By Record or Search Mask
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
(See Vendor Profile Page V-70)

MASSTOR SYSTEMS CORP.
SHARED VSS (SHARED VIRTUAL STORAGE SYSTEM)
Specific Application: Attaches to Masnet High Capacity File Management System
Specific Industry: Not Industry Sensitive
System Requirements: Sperry 1100 Series; IBM 370 Series; DEC VAX, PDP; CDC
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 150
Date First Installed: September 1978
(See Vendor Profile Page V-70)

MATHEMATICA PRODUCTS GROUP
DES
Specific Application: Data Entry
Specific Industry: Not Industry Sensitive
System Requirements: IBM; DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $5,000 to $8,000
Number Installed to Date: 100
Date First Installed: 1980

MATHES & ASSOCIATES, INC.
MICROLINK
Specific Application: Transmits Files Between A Microcomputer and NCR Mainframes, Has A Terminal Emulation Module
Specific Industry: Not Industry Sensitive
System Requirements: NCR: CP/M, MS-DOS
Memory Required: 48.0K bytes
Source Language: C, Nest/3, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: August 1983
(See Vendor Profile Page V-70)

MCDONNELL DOUGLAS AUTOMATION CO.
CICS DATA ENTRY/DATA SEPARATION SYSTEM
Specific Application: Organized Collection, Storage and Separation of Data, Creating Data Files Suitables for Batch Processing
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3000 Series, 4300 Series; DOS/OS
Source Language: Cobol and Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $13,000
Number Installed to Date: 2
Date First Installed: June 1982
(See Vendor Profile Page V-71)

MCDONNELL DOUGLAS AUTOMATION CO.
MESSAGE DISTRIBUTION & COLLECTION SYSTEM (MDCS)
Specific Application: INS/VS Distribution Collection System via User-Defined Message
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3000 Series, 4341; OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $28,000

MEASUREMENT CONCEPTS CORP.
FUEL DELIVERY SYSTEM
Specific Application: Provides Management Services to Fuel Dealers
Specific Industry: Fuel Dealers
System Requirements: BOS
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,400
Date First Installed: 1979
(See Vendor Profile Page V-71)

MEGASOFT COMPUTERS
STORAGE MANAGER
Specific Application: Complete Business Management
Specific Industry: Storage
System Requirements: CP/M
Memory Required: 512.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $10,000 to $15,000
Number Installed to Date: 35
Date First Installed: November 1982
(See Vendor Profile Page V-72)

METROCOM, INC.
STAPACA
Additional Product Classification: Statistics
Specific Application: Statistical Analysis Data Management
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell
Memory Required: 50.0K bytes
Source Language: Fortran IV
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1977
(See Vendor Profile Page V-72)

MINICOMPUTER ASSOCIATES, INC.
MARKETING MANAGEMENT SYSTEM
Additional Product Classification: Report Generator
Specific Application: Marketing File Management and Report Generator
Specific Industry: Marketing Organizations
System Requirements: DG: R-DOS; Gcos, MP/OS; MP/AOS
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000 to $3,000
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-76)

MISOSYS
PDS
Specific Application: Portion Data Set Utility
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, III; TRS-DOS
Memory Required: 48.0K bytes
Source Language: Z80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 1,000
(See Vendor Profile Page V-76)

MISOSYS
PRO-PADS
Specific Application: Professional Portion Data Set Utility
Specific Industry: Not Industry Sensitive
System Requirements: DOS/80
Memory Required: 64.0K bytes
Source Language: Z80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 1,000

MOUNTAIN SOFTWARE GROWERS, INC.
EQUAL
Additional Product Classification: Program Generators, Program Aids and Applications Development Tools, Maintenance
Specific Application: Application Development and File Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell: Gcos; HP: MPE; Prime: Primos
Source Language: Cobol

Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 140
Date First Installed: 1977
(See Vendor Profile Page V-77)

NATIONWIDE DATA DIALOG
LOCK/II
Specific Application: Security Superstructure Built Around on RSTS Password
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Source Language: Basic, Macro/ Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 80
Date First Installed: 1978
(See Vendor Profile Page V-78)

NATIONWIDE DATA DIALOG
SAFE/II
Specific Application: Access Programs From A Menu
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Source Language: Basic, Macro/ Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 80
Date First Installed: 1978

NCR CORP.
INGRES
Specific Industry: Not Industry Sensitive
System Requirements: NCR Tower: Unix
Memory Required: 512.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: April 1983
(See Vendor Profile Page V-79)

NEAL NELSON & ASSOCIATES
MENU SYSTEM
Specific Application: Prompt Menu System
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 6
Date First Installed: August 1982
(See Vendor Profile Page V-79)

NICHOLS & CO., INC.
N8500
Specific Application: Project Managmeot
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS; HP 3000: MPE; Burroughs: DMS II, CMS
Memory Required: 170.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $28,000
Number Installed to Date: 300
Date First Installed: 1977
(See Vendor Profile Page V-80)

NIXDORF COMPUTER CORP.
MHF/JTP/FTP
Additional Product Classification: Communications/TP Monitors
Specific Application: Allow Flexible Configuration of Terminals and Processors
Specific Industry: Not Industry Sensitive
System Requirements: Nixdorf 8890: VSE, IBM 370, 4300, 3000 Series
Memory Required: 100.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 6
Date First Installed: January 1983
(See Vendor Profile Page V-80)

NIXDORF COMPUTER CORP.
NDB/NDO/NDQ
Additional Product Classification: Data Dictionary, Query Languages
Specific Application: DBMS, Data Dictionary and Data Query Language
Specific Industry: Not Industry Sensitive
System Requirements: Nixdorf 8890: VSE
Memory Required: 300.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 20
Date First Installed: January 1982

NOESIS COMPUTING CO.
MEETING TRAK
Specific Application: Meeting Management
Specific Industry: Not Industry Sensitive
System Requirements: HP: MPE
Source Language: Powerhouse
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-80)

NOESIS COMPUTING CO.
PEOPLE TRAK
Specific Application: Membership Subscription Management
Specific Industry: Publishers
System Requirements: HP: MPE
Source Language: Power House
Purchase Terms: Purchase (license)
Price: $7,000
Number Installed to Date: 2
Date First Installed: 1982

NOVVA COMPUTER SYSTEMS, INC.
DOCUMENT INSIGHT
Specific Application: Document Storage and Retrieval
Specific Industry: Not Industry Sensitive
System Requirements: Prime Information
Memory Required: 1.0M bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 7
Date First Installed: 1981
(See Vendor Profile Page V-81)

NURSERI-CORP, INC.
E-Z-DEX
Specific Application: File Management System for Fortran Users on DG Computers
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS; DOS; AOS
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 45
Date First Installed: February 1979
(See Vendor Profile Page V-81)

OLAMIC SYSTEMS CORP.
DEMAND #2
Additional Product Classification: Screen Formatter
Specific Application: Data Entry
Specific Industry: Not Industry Sensitive
System Requirements: Decsystem 10: Tops 10; Decsystem 20: Tops 20
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $12,000 to $19,500
Number Installed to Date: 35
Date First Installed: June 1979
(See Vendor Profile Page V-82)

ON-LINE BUSINESS SYSTEMS
OBS-FTP
Specific Application: File Transfer Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS, OS/VS!
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $4,000
Number Installed to Date: 1
Date First Installed: July 1983
(See Vendor Profile Page V-82)

ORBIS CORP.
UTL
Specific Application: Utilities
Specific Industry: Engineering, Scientific
System Requirements: Gould Concept 32: MPX 32
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $3,000
Number Installed to Date: 150
Date First Installed: November 1979
(See Vendor Profile Page V-83)

PANSOPHIC SYSTEMS, INC.
EASYTRIEVE
Additional Product Classification: Report Generator
Specific Application: Information Retrieval/Data Management, Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300; Siemens BS1000: DOS
Memory Required: 72.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 3,500
Date First Installed: September 1973
(See Vendor Profile Page V-84)

PARA RESEARCH, INC.
MAILING LIST
Specific Application: List Processing and Management System to Maintain Customer Lists
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 32.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $750
Number Installed to Date: 20
Date First Installed: July 1983
(See Vendor Profile Page V-84)

PARA RESEARCH, INC.
MAPICS CUSTOMER INQUIRY SYSTEM
Specific Application: Display Information on Current Receivables, Open Orders, Sales History and Ship-to Addresses, Customer Information
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $750
Number Installed to Date: 20
Date First Installed: June 1983

PCR, INC.
FILE MASTER
Specific Application: Software Development File Maintenance Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 36.0K bytes
Source Language: RPG-II, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 200
Date First Installed: 1982
(See Vendor Profile Page V-84)

PETROLEUM INFORMATION CORP.
BASE MAP MODULE
Specific Application: Generates Township Information
Specific Industry: Engineering, Petroleum
System Requirements: DEC PDP-11/23: RSX-11M; DEC VAX-11/750, VAX-11/730: VMS; IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,500
Number Installed to Date: 30
Date First Installed: 1971
(See Vendor Profile Page V-86)

PETROLEUM INFORMATION CORP.
UTILITIES MODULES
Specific Application: Plotting and Data File Manipulation
Specific Industry: Petroleum Industry

Price: $6,500
Number Installed to Date: 30
Date First Installed: 1971

PIONEER SOFTWARE, INC.
FILE REFERENCE UTILITY
Specific Application: Displays File References
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CPF
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-86)

PREDICTION SYSTEMS, INC.
GSA
Specific Application: Governs Stochastic Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: VM/[illegible]
Source Language: Gobol, Fortran
Source Code Available: No
Purchase Terms: Rental
Date First Installed: 1979
(See Vendor Profile Page V-87)

PRIME COMPUTER, INC.
FORMS (FORMS ONLINE RESOURCE MANAGEMENT SYSTEM)
Additional Product Classification: Program Generators/Aids, Applications Development Tools
Specific Application: Form Definition
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Date First Installed: 1981
(See Vendor Profile Page V-87)

PRIME COMPUTER, INC.
[illegible] (MULTIPLE INDEX DATA ACCESS SYSTEM)
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Price: $5,500
Date First Installed: 1982

PRIME COMPUTER, INC.
PRIME POWER+
Additional Product Classification: Query Languages
Specific Industry: Not Industry Sensitive
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Price: $12,500
Date First Installed: September 1980

QUIKNE SYSTEMS, INC.
TRIM
Specific Application: Training Records Management System
Specific Industry: Nuclear Power Plants
System Requirements: Modcomp: MAX 4; DEC VAX: VMS, Gould: MPX 32
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 1
Date First Installed: July 1983
(See Vendor Profile Page V-90)

QUINTREX DATA SYSTEMS
CONTINUING PROPERTY RECORDS SYSTEM
Specific Application: Property Records
Specific Industry: Telephone
System Requirements: IBM Series/1
Memory Required: 96.0K bytes
Source Language: Forth
Source Code Available: Yes
Price: $1,600
Number Installed to Date: 30
Date First Installed: 1980
(See Vendor Profile Page V-91)

REAL DECISIONS CORP.
DART (DATA ACCESS & REPORTING TECHNIQUE)
Specific Application: Accessing Standard & Poor's Compustat Files and Other Public Financial Data Bases
Specific Industry: Banking/Financial, Insurance, Investment Groups
System Requirements: DEC System 20: Tops 20; IBM 360, 370 and Up: VM/CMS; Prime: Primos
Memory Required: 1.5M bytes
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $40,000.
Date First Installed: February 1980
(See Vendor Profile Page V-92)

REAL-TIME MANAGEMENT, INC.
REAL-TIME PROCESSING AND REPORTING
Specific Application: Collects Data From Factories and Offices to Update Files on Realtime
Specific Industry: Manufacturing, Medical, Security
System Requirements: TI 800, 800: DX-10; TI 990
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-92)

REDSHAW, INC.
REDSHAW COMPREHENSIVE [illegible] AGENCY SYSTEM
Specific Application: File Retrieval, WP, Accounting, Marketing, Expense
Specific Industry: Real Estate
System Requirements: Wang 2200
Memory Required: 8.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1,800
Date First Installed: June 1975
(See Vendor Profile Page V-92)

RELATIONAL DATABASE SYSTEMS, INC.
INFORMIXTM
Additional Product Classification: Query Languages
Specific Application: Database Management System
Specific Industry: Not Industry Sensitive
System Requirements: Altos 586: Unix; DEC PDP, VAX, IBM PC: PC-DOS, Xenix
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800 to $1,600
Number Installed to Date: 1,500
Date First Installed: February 1981
(See Vendor Profile Page V-92)

RELATIONAL DATABASE SYSTEMS, INC.
PERFORM
Additional Product Classification: Query Languages
Specific Application: Data Base Management System
Specific Industry: Not Industry Sensitive
System Requirements: Altos 586: Unix, DEC PDP, VAX; IBM PC: PC-DOS, Xenix
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800 to $1,600
Number Installed to Date: 1,500
Date First Installed: [illegible] 1982

REMOTE DATA SYSTEMS, INC.
DISK LOGGING SUPPORT SYSTEM (DLSS)
Specific Application: Enhances Environ 1 Disk Logging Facility
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series, 4300 Series: OS/Environ 1
Memory Required: 24.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,500
Number Installed to Date: 3
Date First Installed: September 1981
(See Vendor Profile Page V-92)

RGTI SYSTEMS SOFTWARE
SLIM/1
Additional Product Classification: Sysytem Resource Management, Data Compression
Specific Application: Data Compression
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX, DEC VAX: VMS, DEC Professional 350: P/OS, RSTS
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $900
Number Installed to Date: 10
Date First Installed: 1982
(See Vendor Profile Page V-93)

RMS DATA SERVICES, INC.
VEND-11
Specific Application: Comprehensive Vending Management
Specific Industry: Vending Machines
System Requirements: DEC RDP-4: RSTS/E
Memory Required: 128.0K bytes
Source Language: Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 2
Date First Installed: November 1981
(See Vendor Profile Page V-93)

SANTA CRUZ COMPUTER
PNET
Specific Application: Unix-to-Unix File Transfer Program With Error Control
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX; PE; National Semi 1: Unix; Intel 8086
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 5
Date First Installed: March 1983
(See Vendor Profile Page V-95)

SAXTER
UNION OFFICE AUTOMATION
Additional Product Classification: Payroll/Personnel, Insurance, WP/Text Editing, Sort/Merge, Report Generator
Specific Application: Office Automation for Local Unions
Specific Industry: Unions
System Requirements: Fortune: Unix
Memory Required: 256.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $30,000
Number Installed to Date: 2
Date First Installed: July 1983
(See Vendor Profile Page V-95)

SCIENTIFIC & BUSINESS SYSTEMS, INC.
COMPRESS
Specific Application: Tape and Disk File Management
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell: [illegible]
Memory Required: 64.0K bytes
Source Language: Fortran, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $3,000
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-95)

SCIENTIFIC & BUSINESS SYSTEMS, INC.
ILCON
Specific Application: File Reduction, Reduce Fragmentation, Sorts
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell Level 6: Gcos, Honeywell DPS 8
Memory Required: 64.0K bytes
Source Language: Fortran, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $8,000
Number Installed to Date: 50
Date First Installed: 1978

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- WHAT EQUIPMENT DO YOU HAVE EXPERIENCE WITH &/OR ACCESS TO &/OR PLAN TO BUY?

☐ MAINFRAME ☐ MINI ☐ MICRO ☐ DESIGN/R&D

BRAND NAME(S): ☐ IBM ☐ XEROX ☐ APPLE ☐ TI

☐ COMMODORE ☐ RADIO SHACK ☐ ATARI ☐ OSBORNE

☐ TIMEX/SINCLAIR ☐ NORTH STAR ☐ HEWLETT PACKARD

☐ OTHER _____

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☐ DATA PROCESSING ☐ BUSINESS APPLICATIONS ☐ GRAPHICS

☐ LEGAL ☐ VOICE ☐ MEDICAL ☐ APPLIANCE (HOME) CONTROL

☐ ROBOTICS ☐ GAMES ☐ MUSIC ☐ R&D ☐ OTHER _____

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SCM CORP.
DSU
Additional Product Classification: Query Languages
Specific Application: Allows Nontechnical Users to Build, Maintain and Use a Relational Data Base
Specific Industry: Not Industry Sensitive
System Requirements: Tandem T16, Models 1 and 2: Guardian
Source Language: TAL
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-95)

SCM CORP.
IOFILE
Specific Application: Monitor and Control Disk Files
Specific Industry: Not Industry Sensitive
System Requirements: Tandem T16, Models 1 and 2: Guardian
Source Language: TAL
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1983

SCM CORP.
FLIST
Specific Application: Selective File Display and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: Tandem T16: Guardian
Source Language: TAL
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: February 1983

SCRIBE DATA SYSTEMS, INC.
SCRIBE 11
Specific Application: Subscription Fulfillment
Specific Industry: Publishing
System Requirements: DEC PDP-11, VAX-11 RSX-11
Memory Required: 1.0M bytes
Source Language: Assembler
Purchase Terms: Purchase (license); Lease
Price: $50,000
Number Installed to Date: 30
Date First Installed: 1978
(See Vendor Profile Page V-98)

SEISMOGRAPH SERVICE CORP.
SEISMAP
Additional Product Classification: Report Generator
Specific Application: Seismic Processing, Process Data Looking for Hydrocarbon Deposit
System Requirements: DEC VAX: VMS
Memory Required: 2.0M bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $150,000
Number Installed to Date: 65
Date First Installed: December 1980
(See Vendor Profile Page V-96)

SIR, INC.
SIR/FORMS
Specific Application: Screen-Oriented Data Entry
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DEC: VM/CMS, Sperry: VMS
Source Language: Sirtran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 600
Date First Installed: 1980
(See Vendor Profile Page V-96)

SMALL SYSTEMS SOFTWARE, INC.
DTS POLLING
Specific Application: DTS 540 Cash Register Poling and Updating
Specific Industry: Supermarket
System Requirements: IBM Series/1: EDX
Memory Required: 128.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-98)

SOFTOOL CORP.
CHANGE AND CONFIGURATION CONTROL
Additional Product Classification: Program Generators/Aids, Application Development Tools, Library Management
Specific Application: Software Management Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV: AOS, AOS/VS, Gould SEL Series 32: MPX, IBM 3300 Series, 370, 3030 Series, 4300 Series: VM/CMS, MVS, TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Lease
Price: $50,000
Date First Installed: January 1983
(See Vendor Profile Page V-99)

SOFTOOL CORP.
CHANGE CONTROL (CCTM)
Additional Product Classification: Program Generators/Aids/Applications Development Tools, Library Management
Specific Application: Software Management Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS; DG Eclipse MV: AOS, AOS/VS; Gould SEL Series 32: MPX, IBM 3300 Series, 370, 3030 Series, 4300 Series: VM/CMS, MVS, TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $72,000
Date First Installed: January 1983

SOFTOOL CORP.
SOFTOOL
Additional Product Classification: Program Generators/Aids/Applications Development Tools, Performance Measurement, Library Management
Specific Application: Software Management Development and Maintenance
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DG Eclipse MV: AOS, AOS/VS; Gould SEL Series 32: MPX, IBM 3300 Series, 370, 3030 Series, 4300 Series: VM/CMS, MVS, TSO
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $1,500
Number Installed to Date: 750
Date First Installed: August 1980

SOFTWARE CLEARING HOUSE
ACCESS
Specific Application: NCR VRX Operating System Spool File Access Management System
Specific Industry: Not Industry Sensitive
System Requirements: NCR V-8455, 8500 Series: VRX
Source Language: Neat VS
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $1,500
Number Installed to Date: 15
(See Vendor Profile Page V-99)

SOFTWARE CLEARING HOUSE
DIREX
Specific Application: Directory Reporting and Maintenance System
Specific Industry: Not Industry Sensitive
System Requirements: NCR Century, Criterion: VRX
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $1,500
Number Installed to Date: 18

SOFTWARE CLEARING HOUSE
REORG
Specific Application: Disk Compression, Squeezes Out Interfile Dead
Specific Industry: Not Industry Sensitive
System Requirements: NCR Century, Criterion: VRX
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $2,000
Number Installed to Date: 27

SOFTWARE CLEARING HOUSE
SPOOLEASE
Specific Application: Allows Easy On-Line Access to any Spool File, Can Print Selected Page of Spooled Listings
Specific Industry: Not Industry Sensitive
System Requirements: NCR 8200, 9000 Series: Imos, IRX
Memory Required: 13.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $450
Number Installed to Date: 1
Date First Installed: June 1982

SOFTWARE NORTH
SEND/REC
Specific Application: Performs File Transfers From One DG Machine to Another
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS, AOS
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $95
Number Installed to Date: 6
Date First Installed: October 1982
(See Vendor Profile Page V-99)

SOFTWARE NORTH
SOFTWARE NORTH ARCHIVAL SYSTEM-SNARC
Specific Application: Prepares and Keeps Complete Records of File Locations on Back-Up and Archive Tape
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS, AOS
Memory Required: 64.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 2
Date First Installed: 1983

SOFTWARE SEARCH GROUP
DATA PLAZE
Specific Application: Cross Indexing
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 25
Date First Installed: March 1983
(See Vendor Profile Page V-100)

SOFTWIDER, INC.
VSAM SPACE MANAGER
Specific Application: Allows Specification of A Logical Pool of Volume When Defining Vsam Datasets
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $4,000 to $7,500
Number Installed to Date: 15
Date First Installed: 1983
(See Vendor Profile Page V-100)

SOFTWORKS, INC.
VSAM-QUICK-INDEX
Specific Application: Alternates Second Under Vsam
Specific Industry: Not Industry Sensitive
System Requirements: IBM OS, IBM DOS
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,600 to $3,000
Number Installed to Date: 30
Date First Installed: 1980

SOLUTION ASSOCIATES, INC.
ADMINISTRATION CONTROL SYSTEM
Specific Application: Filing and [illegible]
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP; IBM System/36 SSP; IBM PC. PC-DOS
Memory Required: 24.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: [illegible]
(See Vendor Profile Page V-101)

SOUTHWEST COMPUTER SERVICES
LEASE RECORDS SYSTEM
Specific Application: Lease Records System
Specific Industry: Oil and Gas
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,500
Number Installed to Date: 15
Date First Installed: 1970
(See Vendor Profile Page V-101)

SPSS, INC.
SPSS/PRO
Specific Application: Menu System to Invoke Application System With Lists, Creates, Edits, Displays Print Files
Specific Industry: Not Industry Sensitive
System Requirements: DEC Professional 350
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: September 1983
(See Vendor Profile Page V-102)

S.S.R. CORP.
OMNIFILE
Specific Application: File Manager
System Requirements: IBM PC; PC-DOS, DEC Rainbow: DOS; Victor 9000: DOS; Wang Professional: DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $375
Date First Installed: August 1983
(See Vendor Profile Page V-102)

STATCOM CORP.
INFOMANAGER
Additional Product Classification: [illegible]
Specific Application: Data Storage and Retrieval
Specific Industry: Not Industry Sensitive, Government, Transportation, Nonprofit Organizations
System Requirements: DEC Rainbow: MS-DOS, IBM PC: CP/M 80, CP/M 86
Source Language: Assembly, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: December 1982
(See Vendor Profile Page V-103)

STEELE DATA PROCESSING, INC.
BOWLING MANAGEMENT SYSTEM
Specific Application: Replaces the Secretary
Specific Industry: Bowling
System Requirements: Datapoint: DOS
Memory Required: 64.0K bytes
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 2
Date First Installed: October 1981
(See Vendor Profile Page V-103)

SYSTEMS AND SOLUTIONS, INC.
CARDIF
Specific Application: Computerized Card File System
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro AM 1000, AM 1000E, AM 1072E, AM 1092E; Amos
Memory Required: 256.0K bytes
Source Language: Alpha Basic, [illegible]
Source Code Available: [illegible]
Purchase Terms: Purchase (license)
Number Installed to Date: 8
(See Vendor Profile Page V-105)

THE SYSTEMS CENTER
NETWORK DATAMOVER-SERIES/1
Specific Application: Loads Data File, Texts, Between Itself and Its Corresponding NDM-MVS
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: DOS
Memory Required: 90.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: October 1983
(See Vendor Profile Page V-106)

SYSTEMS DESIGN & DEVELOPMENT CORP.
[illegible] LINK INTERFACE
Specific Application: Data Entry System for Military Standard
Specific Industry: Government
System Requirements: Wang VS80
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $35,000
Number Installed to Date: 5
Date First Installed: 1982
(See Vendor Profile Page V-106)

SYSTEM & SOFTWARE, INC.
FSI-FILE SYSTEM INTERFACE
Specific Application: Modular Run-Time Support Package That Provides File Functions for RSX 11-Based Systems
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300 to $1,750
Number Installed to Date: 100
Date First Installed: September 1979
(See Vendor Profile Page V-108)

SYSTEMS RESOURCES CORP.
REPORT DISTRIBUTOR
Specific Application: Mark IV Special Function for Report Handling
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300; OS, DOS, MVS; IBM 370; IBM 3080
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 50
Date First Installed: [illegible]
(See Vendor Profile Page V-107)

SYSTEMS SOFTWARE TECHNOLOGY CORP.
SSTM
Specific Application: Disk to Disk Copy and Compression Program
Specific Industry: Not Industry Sensitive
System Requirements: Harris: [illegible]
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 7
Date First Installed: May 1983
(See Vendor Profile Page V-107)

TCI SOFTWARE
MAIL TRACK
Specific Application: List Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $95
Number Installed to Date: 300
Date First Installed: March 1983
(See Vendor Profile Page V-108)

TECHNICAL ANALYSIS CORP.
RMA INTERFACE SOFTWARE
Specific Application: Allows You to Talk From Dos Host Through 3274, 3276 Comm to IBM PC
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,195
Number Installed to Date: 1,000
Date First Installed: 1982
(See Vendor Profile Page V-109)

TECHNICAL ANALYSIS CORP.
Q DUMP/Q LOAD
Specific Application: Dumping and Loading Files From One Source of Media To Another
System Requirements: DG: DOS, R-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 100
Date First Installed: 1979
(See Vendor Profile Page V-109)

TECHNOLOGY SYSTEMS, INC.
NAME AND ADDRESS
Specific Application: Name and Address
Specific Industry: Not Industry Sensitive
System Requirements: North Star Horizon: NS-DOS; North Star Advantage: CP/M
Memory Required: 64.0K bytes
Source Language: North Star Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: 1979
(See Vendor Profile Page V-108)

TICOM SYSTEMS, INC.
FINAL FORM
Specific Application: Interactive Form Design and Data Entry Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; DEC Rainbow: UCSD-P; NEC APC; TI
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: 1983
(See Vendor Profile Page V-110)

TRANSACTION DATA SYSTEMS, INC.
FILE TRANSFER FACILITY
Specific Application: Transfer Disk Files From Processor to Processor Across Communications Lines
Specific Industry: Not Industry Sensitive
System Requirements: PE 3200: OS 32
Memory Required: 500.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: November 1982
(See Vendor Profile Page V-111)

TSI INTERNATIONAL
AUDIT ANALYZER
Specific Application: Data Analyzer, Complete Reporting System, EDP Audition Analyes, Manipulates Information
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300 DOS/VS
Memory Required: 12.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $14,000
Number Installed to Date: 900
Date First Installed: 1971
(See Vendor Profile Page V-112)

TSI INTERNATIONAL
DATA CATALOGUE 2
Specific Application: Free Standing, Indexed Data Dictionary Provides A Powerful Array of Data Management Functions In Easy-To-Use Form
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell Gcos; IBM 360, 370: OS, DOS, VS; Sperry 1100
Memory Required: 256.0K bytes

Source Language: Cobol, PL/1, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $13,500
Number Installed to Date: 300
Date First Installed: 1978

TSI INTERNATIONAL
DOCU/MASTER
Specific Application: Document Storage and Retrieval Providing Immediate On-Line Access to Vital Business Documents
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 360, 370· DOS
Memory Required: 90.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 75
Date First Installed: 1980

TSI INTERNATIONAL
FACETS
Specific Application: Logic Data Base Designed System That Uses New Approach to Normalizing Data, Achieving Results, Normal Form
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 360, 370· DOS
Memory Required: 380.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 28
Date First Installed: 1983

TSI INTERNATIONAL
KEY/MASTER
Additional Product Classification: Data Entry
Specific Application: Complete Entry, Editing, Verification and Reform, Keyed Data to User Specifications for System With Up to 900 Terminals
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300· DOS, Cics
Memory Required: 130.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $23,500
Number Installed to Date: 800
Date First Installed: 1967

TSI INTERNATIONAL
THE DATA ANALYZER
Specific Application: Information Retrieval, Analysis and Presentation for Business, Research and Data Processing
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300· DOS/VS
Memory Required: 120.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $14,000
Number Installed to Date: 900
Date First Installed: 1971

TUDOR SYSTEMS, INC.
DIMAS 2
Additional Product Classification: Order Processing
Specific Application: Data Collection and Sales Analysis for the Beer Industry
Specific Industry: Wholesale/Distribution, Beer
System Requirements: IBM System/32; IBM System/34
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $22,500
Number Installed to Date: 190
Date First Installed: 1970
(See Vendor Profile Page V-112)

UNITED INFORMATION SERVICES
IFM
Specific Application: Manages and Manipulates Fixed or Free Field Data Files
Specific Industry: Not Industry Sensitive
System Requirements: CDC Cyber; IBM
Source Language: Cobol, Fortran, Super Basic, Snobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-113)

UNITEK COMPUTER SERVICES, INC.
DATAMOD UTILITIES
Specific Application: General Purpose Filing
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 2
Date First Installed: October 1982
(See Vendor Profile Page V-113)

UNIVERSAL SOFTWARE, INC.
ADAS
Specific Application: Disk Space Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: DOS/VS; IBM 3300: DOS/VSE, IBM 3700
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $6,525
Number Installed to Date: 200
(See Vendor Profile Page V-114)

UNIVERSAL SOFTWARE, INC.
PSAM
Specific Application: Data/File Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: DOS/VS; IBM 3300: DOS/VSE; IBM 3700
Source Language: Assembler
Purchase Terms: Purchase (license); Rental
Price: $12,325
Number Installed to Date: 150
(See Vendor Profile Page V-114)

UNIVERSITY COMPUTING SERVICES CORP.
QUERY
Specific Application: Indexing Search
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs 5900, 6000, 7000: MCP
Source Language: Algol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 3
Date First Installed: July 1982
(See Vendor Profile Page V-114)

VALUE COMPUTING, INC.
SMF EXPRESS 1.03
Specific Application: Data Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370, 4300 Series, 3000 Series: VS1/MVS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 33
Date First Installed: July 1981
(See Vendor Profile Page V-114)

VERMONT INFORMATION PROCESSING, INC.
VIP BEVERAGE SYSTEM
Additional Product Classification: Inventory
Specific Application: Inventory Data File on Product Route Control
Specific Industry: Wholesale/Distribution
System Requirements: IBM System/32, IBM PC: PC-DOS; IBM System/34· CPF, SSP
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $21,000
Date First Installed: September 1970
(See Vendor Profile Page V-115)

VIKING SOFTWARE SERVICES, INC.
VDM-VIKING DATA MANAGER
Specific Application: On-Line Data Entry, Retrieval, Search of Multi Keyed Isam Files
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 40.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 10
Date First Installed: April 1983
(See Vendor Profile Page V-115)

VM SOFTWARE, INC.
VMLIB
Specific Application: Centralized File Management of CMS Filer and Management of the Development Process
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4331
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 45
(See Vendor Profile Page V-116)

VM SOFTWARE, INC.
VMTAPE
Specific Application: Comprehensive Tape Drive and Tape Volume Management, Maintains A Tape Management Catalog, Audit File
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4431: VM; IBM
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 150

WICAT SYSTEMS, INC.
ULTRA CA/C
Specific Application: Data/File Management
Specific Industry: Not Industry Sensitive
System Requirements: Wicat: Unix: MCS
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300 to $1,500
Number Installed to Date: 5,000
Date First Installed: 1981
(See Vendor Profile Page V-117)

XCOMSOFT CORP.
TELEFILE
Specific Application: File Transfer
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series, IBM 370: MVS; IBM 3030, 3080 Series
Memory Required: 200.0K bytes
Source Language: BAL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,500
(See Vendor Profile Page V-118)

ZIA CORP.
RIFLE
Specific Application: Transfers Files Through Modem to System
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/24: RT-11
Source Language: Macro
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,250
Number Installed to Date: 20
Date First Installed: January 1981
(See Vendor Profile Page V-118)

ZIA CORP.
VIRTUAL TERMINAL (VT)
Specific Application: Virtual Connection, Transfers Information as If On Home Computer
System Requirements: DEC PDP-11/23: RT-11, TSX+
Memory Required: 8.0K bytes
Source Language: Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 25
Date First Installed: January 1982

ADVANCED MICRO TECHNIQUES
MICROLIB-VERSION 1.42
Additional Product Classification: File Management
Specific Application: Disk File Librarian Package
Specific Industry: Not Industry Sensitive
System Requirements: MP/M; CP/M
Memory Required: 48.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 7,350
Date First Installed: 1982
(See Vendor Profile Page V-3)

AMERICAN MICRO DYNAMICS, INC.
CLIENT
Specific Application: Data Base for Handling Individuals
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS; CP/M
Memory Required: 64.0K bytes
Source Language: Dbase II
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: March 1983
(See Vendor Profile Page V-5)

ANALYTICAL DATA SYSTEMS, INC.
B-TREE RECOVERER UTILITY
Specific Application: File Recoverer Utility
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, CP/M, MP/M 86
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 6
Date First Installed: January 1983
(See Vendor Profile Page V-6)

BASIC BUSINESS SOFTWARE, INC.
IBM BASIC UTILITIES
Specific Application: Cross Reference, Editing Program Utilities, Basic Subroutines
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $95
Date First Installed: 1982
(See Vendor Profile Page V-12)

BILLINGS COMPUTER CORP.
BILLINGS STANDARD PACK
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Introduce User to Computer Plus Diskette Duplication Capabilities
Specific Industry: Not Industry Sensitive
System Requirements: BOS
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
(See Vendor Profile Page V-12)

C E SOFTWARE, INC.
CCA DATA MANAGEMENT SYSTEM
Specific Application: File Management Program
Specific Industry: Not Industry Sensitive
System Requirements: Atari: DOS; Apple: APPLE-DOS, CP/M
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $99 to $225
Date First Installed: 1980
(See Vendor Profile Page V-17)

CLASS [COOPERATIVE LIBRARY AGENCY FOR SYSTEMS & SERVICES]
GOLDEN RETRIEVER
Specific Application: Data Base File Management
Specific Industry: Not-Industry Sensitive
System Requirements: TRS-80/II, Models 12, 16; TRS-DOS; IBM PC, PC-XT; PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 1,000
Date First Installed: 1982
(See Vendor Profile Page V-18)

COMPUTER CONTROL SYSTEMS, INC.
FABS/PC (FAST ACCESS B-TREE)
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Programmers Tools, Utilities
System Requirements: PC-DOS, MS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 100
Date First Installed: March 1982
(See Vendor Profile Page V-23)

COMPUTER CONTROL SYSTEMS, INC.
FABS/86C (FAST ACCESS B-TREE)
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Programmers Tools, Utilities
System Requirements: CP/M 86
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 100
Date First Installed: May 1982

COMPUTER CONTROL SYSTEMS, INC.
FABS/86M (FAST ACCESS B-TREES)
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Programmers Tools, Utilities
Specific Industry: Not Industry Sensitive
System Requirements: MS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 100
Date First Installed: May 1982
(See Vendor Profile Page V-24)

COMPUTER OPERATIONS, INC.
DMS
Specific Application: Generation of Part Programs and File Manipulation
Specific Industry: Machine Tool
System Requirements: NCR: CP/M, CP/M 86
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $12,500
Number Installed to Date: 100
Date First Installed: September 1980
(See Vendor Profile Page V-25)

COMPUTER OPERATIONS, INC.
SOS
Specific Application: Generation of Part Programs, Editing And File Manipulation
Specific Industry: Machine Tool
System Requirements: Televideo 800 System: CP/M
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $29,500
Number Installed to Date: 3
Date First Installed: December 1982

COMPUTER WORKSHOP
FANTASTIC FILER
Specific Application: Comprehensive File Management System for the Novice
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $69
Number Installed to Date: 100
Date First Installed: 1983
(See Vendor Profile Page V-26)

CONTECTRA SYSTEMS, INC.
DIAL DATA
Specific Application: Micro Access to Merlin Data Base
Specific Industry: Banking/Financial
System Requirements: IBM
Source Language: Basic
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-29)

CYBERNA, INC.
EDUCATION TUTORIAL VOLUME 3
Specific Application: Data Storage and File Handling
Specific Industry: Education
System Requirements: DOS 2.0
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25
Date First Installed: November 1983
(See Vendor Profile Page V-34)

CYBERNETICS RESOURCE CORP.
CYPRO
Specific Application: Time and Billing, Calendar, Client History, Office Management
Specific Industry: Not Industry-Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,495
Number Installed to Date: 2
Date First Installed: March 1983
(See Vendor Profile Page V-34)

DATA ACCESS CORP.
DATABANK
Specific Application: Data Manager, File Handling Routine and List Manager
Specific Industry: Not Industry Sensitive
System Requirements: Osborne; CP/M, Apple; CP/M; IBM PC; MS-DOS
Memory Required: 64.0K bytes
Source Language: Mbasic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250 to $350
Number Installed to Date: 1,000
Date First Installed: 1979
(See Vendor Profile Page V-35)

DATA CONTROL, INC.
GAME ROOM RECORD KEEPING SYSTEM
Specific Application: Keeps Track of Receipts, Machine Usage of Many Machines
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: CB-80
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: February 1984
(See Vendor Profile Page V-36)

DATA CONTROL, INC.
MEMBERSHIP RECORD KEEPING SYSTEM
Specific Application: Designed to Keep Membership Inventory for Professional Associations
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: CB-80
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: November 1983

DATAMENTION
TASK MANAGER
Specific Application: Daily Calendar
Specific Industry: Not Industry Sensitive
System Requirements: MS-DOS
Memory Required: 192.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $499
Number Installed to Date: 15,000
Date First Installed: October 1981
(See Vendor Profile Page V-37)

DATA RESEARCH ASSOCIATES, INC.
INFORMATION AND REFERRAL
Specific Application: Input and Storage of Data in Micro-Like Format.

Large Amounts of Data
System Requirements: DEC
Source Language: Basic, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1977
(See Vendor Profile Page V-36)

DATA RESEARCH ASSOCIATES, INC.
NEWSPAPER INDEXING PACKAGE
Specific Application: Organize and Keep Newspaper Information Up-to-Date
Specific Industry: Library
System Requirements: DEC
Source Language: Basic, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1977

DIGITAL RESEARCH, INC.
ACCESS MANAGER
Specific Application: File Access to Data Records, B-Tree Index Structure, Multiuser Support
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-42)

DILITHIUM PRESS
MICROBOOK: DATABASE MANAGEMENT
Specific Application: Database Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Apple II, IIE: APPLE-DOS: Pascal
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 1,500
Date First Installed: March 1983
(See Vendor Profile Page V-42)

ECOSOFT, INC.
A(RCHIVIST)
Specific Application: File Utility
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: 1978
(See Vendor Profile Page V-45)

ECOSOFT, INC.
I(INTERCHANGE)
Specific Application: File Utility
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $75
Date First Installed: 1978

ESSENTIAL SOFTWARE CORP.
BASIC DATA
Specific Application: Basic Data
Specific Industry: Education
System Requirements: Apple II: APPLE-DOS 3.3; Apple II+: APPLE-DOS 3.3; Apple IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: August 1983
(See Vendor Profile Page V-47)

EXECUTEC CORP.
EXECU/LINK TM
Specific Application: A Full 3780 RJE Emulator Package for Data Transfer
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, DOS/VSE
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350
(See Vendor Profile Page V-47)

FYI, INC.
SUPERFILE
Specific Application: Electronic File Cabinet for Word Processor
Specific Industry: Researchers and Writers
System Requirements: CP/M 80: MS-DOS
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Date First Installed: March 1982
(See Vendor Profile Page V-50)

GAYLORD BROS., INC.
ADDRESS BOOK MAILING LIST
Specific Application: Storing Names, Addresses and Telephone Numbers, Sort File
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $50
(See Vendor Profile Page V-50)

GAYLORD BROS., INC.
DATA REPORTER
Additional Product Classification: Report Generator
Specific Application: Data Management, Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $220

GAYLORD BROS., INC.
DB MASTER
Specific Application: Data Base System, Keeps Track of Personal and Business-Related Information
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $229

GAYLORD BROS., INC.
DB MASTER - UTILITY PAK #1
Specific Application: Add, Delete, Move, Modify or Rename Fields Without Reentry of Data
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $99

GAYLORD BROS., INC.
DB MASTER-UTILITY PAK #2
Additional Product Classification: Sort/Merge, Report Generator
Specific Application: Data Base Master With Global Editor, Global Delete
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $99

GAYLORD BROS., INC.
GS-100 CIRCULATION CONTROL SYSTEM
Additional Product Classification: Sort/Merge, Report Generator
Specific Application: Circulation Control System
Specific Industry: Legal
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic

GAYLORD BROS., INC.
GS-1000 STAND ALONE CIRCULATION SYSTEM
Additional Product Classification: Report Generator
Specific Application: Handles Issues, Returns, Interlibrary Loan, Overdue Notices, Reports
Specific Industry: Library
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)

GAYLORD BROS., INC.
GS-2000 DISTRIBUTED
Additional Product Classification: Report Generator
Specific Application: Reports, Clerical Services
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)

GAYLORD BROS., INC.
LIST HANDLER
Specific Application: Combines Names and Address File With Word Handler
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $60

GAYLORD BROS., INC.
PFS (PERSONAL FILING SYSTEM): FILE
Specific Application: Database: Filing, Recording Retrieval and Summarization of Collected Information
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $125

GAYLORD BROS., INC.
PORTFOLIO EVALUATOR
Specific Application: Storage, Modification and Update of Stock Portfolio
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $50

GAYLORD BROS., INC.
SEARCH KEY ACCESS
Specific Application: On-Line Access to Library Item Holdings By Author, Title, Card Number
Specific Industry: Library
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)

GAYLORD BROS., INC.
TIME MANAGER
Specific Application: Keeps Track of Time and Personnel Data
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $150

GAYLORD BROS., INC.
VISI FILE
Additional Product Classification: Sort/Merge
Specific Application: Filing System: Search, Sort, Retrieve, and Calculate all Types of Data
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $250

G. A. ASSOCIATES
CUSTOMIZED APPLICATION & UTILITY SYSTEM
Additional Product Classification: Sort/Merge
Specific Application: Sales/Marketing Management, Customer Control
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: March 1983
(See Vendor Profile Page V-50)

GEORGE GOOBI & ASSOCIATES, INC.
HELPWARE
Specific Application: Editing, Directory for File Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS 1.1
Memory Requirements: 64.0K bytes

Source Language: Object
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 100
Date First Installed: March 1983
(See Vendor Profile Page V-51)

GREAT PLAINS COMPUTER CO., INC.
INFOMAG - DBMS
Specific Application: Specifies New Data Bases With Search and Sort Capability
Specific Industry: Not Industry Sensitive
System Requirements: TRS: Flex, OS, Gimix 6809: Flex, Uniflex, Southwest Tech 6809: Flex, Uniflex; Tano 6809: Flex, Uniflex
Memory Required: 56.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 50
Date First Installed: August 1981
(See Vendor Profile Page V-52)

GRYPHONE SYSTEMS
FAS-FILE
Specific Application: Card File Data Base
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS; Sage II; IBM PC: PC-DOS
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $145
Date First Installed: 1983
(See Vendor Profile Page V-53)

HELMSMAN SYSTEMS, INC.
H-CHAMP CORE VERSION 2.0
Additional Product Classification: Security/Auditing, Program Generators/Aids, Application Development Tools
Specific Application: Applications Environment, Housekeeping, Access and Security, Menu, Mail, Shell Directory and File Manipulation
Specific Industry: Not Industry Sensitive
System Requirements: Intel; Zilog; Motorola
Memory Required: 48.0K bytes
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 4
Date First Installed: May 1983
(See Vendor Profile Page V-54)

HOLLAND AUTOMATION U.S.A.
HAI-LINE FILEKEEPER
Additional Product Classification: Report Generator
Specific Application: File Management and Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Eagle II, III, IV: CP/M; Apple II, III: MS-DOS
Memory Required: 64.0K bytes
Source Language: HAI-Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 5,000
Date First Installed: 1977
(See Vendor Profile Page V-55)

HOWARD W. SAMS & CO., INC.
INSTANT RECALL
Specific Application: Allows User to Create, Change, Edit and Save Screens of Information and Save In Memory Or On A Disk
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE, II+
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $59
(See Vendor Profile Page V-55)

IBS, INC.
SOFTWARE SELECTOR
Specific Application: to Provide A Searchable Index for IBM PC Software
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $95
(See Vendor Profile Page V-56)

INNOVATIVE SOFTWARE
FAST FACTS
Specific Application: Personal Filing System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Mbasic Compiler, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Date First Installed: July 1983
(See Vendor Profile Page V-58)

I.P. SHARP ASSOCIATES, INC.
ACT PAK ACTUAL PACKAGE
Additional Product Classification: Graphics
Specific Application: Linear Representation of the Standardized Interational Actuarial Notation
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS, VSE
Source Language: APL
Purchase Terms: Purchase (license)
Number Installed to Date: 50
(See Vendor Profile Page V-61)

I.P. SHARP ASSOCIATES, INC.
NABRA INFORMATION MANAGEMENT SYSTEM
Additional Product Classification: Sort/Merge
Specific Application: Data Entry and Updating, File Search and Sort
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS, VSE
Source Language: APL
Purchase Terms: Purchase (license)
Number Installed to Date: 110
Date First Installed: 1979

I.P. SHARP ASSOCIATES, INC.
MAGIC DATA ANALYSIS & REPORTING
Additional Product Classification: Report Generator, Graphics
Specific Application: Retrieve, Manipulate and Plot Data
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS, VSE
Source Language: APL
Purchase Terms: Purchase (license)
Number Installed to Date: 700
Date First Installed: 1973

I.P. SHARP ASSOCIATES, INC.
STARS CASE MANAGEMENT MODELS
Additional Product Classification: Financial Modeling Languages/DSS
Specific Application: Facilitates the Creation and Storage of Multiple Sets of Input Assumptions for A Model
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS,VSE
Source Language: APL
Purchase Terms: Purchase (license)
Number Installed to Date: 35
Date First Installed: 1978

KERN PUBLICATIONS
DATA ACQUISITION SYSTEM
Specific Application: Data Acquisition and Processing
Specific Industry: Education, Scientific
System Requirements: IBM PC: PC-DOS 1.1, IBM PC-XT: PC-DOS 2.0; Apple II: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Applesoft Basic, IBM Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $85 to $150
Date First Installed: June 1983
(See Vendor Profile Page V-63)

LOGICAL MICROCOMPUTERS OF ERIE, INC.
COUNTY GOVERNMENT SYSTEM
Additional Product Classification: Accounting
Specific Application: Domestic Relations, Voter Registration, Tax Billing, and Assessment for County Government
Specific Industry: Government
System Requirements: Point 4; Iris; Digidyne
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1979
(See Vendor Profile Page V-66)

MICRO BUSINESS APPLICATIONS, INC.
DWP
Specific Application: Internal File Is Output to A Word Processor or A Data Processor
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80, CP/M 86, MS-DOS
Memory Required: 42.0K bytes
Source Language: Microsoft Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1980
(See Vendor Profile Page V-73)

MICRO BUSINESS APPLICATIONS, INC.
MULTI COMPANY
Specific Application: Multiple Sets of Data for Use of Companies
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80, CP/M 86, MS-DOS
Memory Required: 42.0K bytes
Source Language: Microsoft Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1980

MICRO CORP.
WORD STAR PATCHER
Specific Application: Data File Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: MS-DOS
Source Language: MS Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 500
Date First Installed: June 1982
(See Vendor Profile Page V-73)

MICRO LAB
DATA FACTORY
Specific Application: Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: Olivetti M20
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
(See Vendor Profile Page V-74)

MICRO LAB
DATA FACTORY IBM
Specific Application: Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: IBM Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300

MICRO LAB
DATA MANAGER II
Specific Application: Data Base Management
Specific Industry: Not Industry Sensitive
System Requirements: Apple III: APPLE-SOS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500

MICROGL, INC.
DOPLUS
Specific Application: Job Control Utility
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS

Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 12
Date First Installed: 1981
(See Vendor Profile Page V-74)

MILLER MICROCOMPUTER SERVICE
DATAHANDLER
Specific Application: Data File Management With Reporting Capabilities
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC and PC-XT; Compaq; TRS-80/4, 80/4I
Memory Required: 64.0K bytes
Source Language: MMS Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $59
Number Installed to Date: 1,000
Date First Installed: September 1979
(See Vendor Profile Page V-75)

MOHAWK DATA SCIENCES CORP.
EXTENDED DATA ENTRY (EDE)
Specific Application: Customized Data Entry
Specific Industry: Not Industry Sensitive
System Requirements: MDS Series 21: OS/2; MDS 2110: OS/10
Memory Required: 96.0K bytes
Source Language: Mobol
Source Code Available: No
Date First Installed: January 1981
(See Vendor Profile Page V-77)

MOHAWK DATA SCIENCES CORP.
FIND 21
Specific Application: Electronic Filing, Cross Reference and Retrieval
Specific Industry: Not Industry Sensitive
System Requirements: MDS Series 21: OS/2, MDS 2110: OS/10
Memory Required: 128.0K bytes
Source Language: Mobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Date First Installed: April 1983

NATIONAL DATA COMMUNICATIONS, INC.
OUTPATIENT REGISTRATION SCHEDULING
Specific Application: Outpatient Registration and Appointment Scheduling
Specific Industry: Medical
System Requirements: Prime:Primos
Memory Required: 512.0K bytes
Source Language: SOL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-78)

N. F. SYSTEMS, LTD.
COMPARE MASTER
Additional Product Classification: Sort/Merge
Specific Application: Compares Two Files (Data, Program or Text)
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Compaq
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $34
Number Installed to Date: 50
Date First Installed: September 1982
(See Vendor Profile Page V-80)

N. F. SYSTEMS, LTD.
FILE MANAGER
Specific Application: File Management Program
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Compaq
Memory Required: 96.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 75
Date First Installed: September 1982

OCTO LIMITED
DIRECTORY MANAGEMENT
Specific Application: Directory Management
Specific Industry: Publishing
System Requirements: Datapoint: DOS
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-81)

OMEGA MICROWARE, INC.
COPYWRITER
Specific Application: Copies A Program Onto Different Disks
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $99
Date First Installed: 1983
(See Vendor Profile Page V-82)

OMEGA MICROWARE, INC.
THE INSPECTOR
Specific Application: Searches Memory and Disk for Review or Alteration of Data
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: 6502 Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,995
Number Installed to Date: 4
Date First Installed: 1981

OMEGA MICROWARE, INC.
THE WATSON
Specific Application: Assists the Instructor in Maintaining the Integrity of the Data
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: 6502 Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,995
Number Installed to Date: 2,000
Date First Installed: 1982

OMEGA MICROWARE, INC.
THE CONSOLIDATOR
Additional Product Classification: Financial Modeling Languages/DSS
Specific Application: Visicalc Utility That Allows Manipulating Totals Of Seperate Files Without Reentering On A Seperate Template
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $49
Number Installed to Date: 3,000
Date First Installed: 1982

OMEGA MICROWARE, INC.
TRANSPORTER
Specific Application: Stores the Visicalc on the Coone Starfire Hard Drive
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $49
Date First Installed: 1983

PERMISSION SOFTWARE
REAL TIME OBSERVATION-DATA COLLECTION
Specific Application: Data Collection for Research Purposes
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35
Date First Installed: 1983
(See Vendor Profile Page V-85)

POTTERS PROGRAMS
CROSS REFERENCE PROGRAM
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Cross Reference
Specific Industry: Not Industry Sensitive
System Requirements: North Star
Memory Required: 32.0K bytes
Source Language: Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25
(See Vendor Profile Page V-87)

POTTERS PROGRAMS
DISK CATALOG SYSTEM
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Catalog System of Programs
Specific Industry: Not Industry Sensitive
System Requirements: North Star
Memory Required: 32.0K bytes
Source Language: Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25
Date First Installed: 1978

POTTERS PROGRAMS
DISK DUMP
Specific Application: Allows User to Dump Any North Star Compatible Disks
Specific Industry: Not Industry Sensitive
System Requirements: North Star
Source Language: Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20
Date First Installed: 1978

QEI, INC.
QUINCAN UNIVERSAL INTELLIGENT CONTROL SYSTEM
Additional Product Classification: Operating Systems
Specific Application: Supervisory Control and Data Acquisition
Specific Industry: Utilities
System Requirements: Motorola 6800 Micro
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $35,000
Number Installed to Date: 50
Date First Installed: 1977
(See Vendor Profile Page V-90)

QUANTUM INFORMATION SYSTEMS
EXCHANGE
Specific Application: Oasis IBM 3740 Diskette Based Data Exchange Utility
Specific Industry: Not Industry Sensitive
System Requirements: Oasis
Memory Required: 8.0K bytes
Source Language: Z80 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 150
Date First Installed: July 1981
(See Vendor Profile Page V-92)

QUANTUM INFORMATION SYSTEMS
QCOPY
Specific Application: Copy Utility
Specific Industry: Not Industry Sensitive
System Requirements: Oasis
Memory Required: 8.0K bytes
Source Language: Z80 Assembler
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 150
Date First Installed: December 1982

QUANTUM INFORMATION SYSTEMS
REORG
Specific Application: File Reorganization Utility
Specific Industry: Not Industry Sensitive

System Requirements: Oasis
Memory Required: 8.0K bytes
Source Language: Z80 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 300
Date First Installed: April 1982

QUANTUM INFORMATION SYSTEMS
SQUEEZE
Specific Application: Directory Reorganization and Disk Compression Utility
Specific Industry: Not Industry Sensitive
System Requirements: Oasis
Memory Required: 8.0K bytes
Source Language: Z80 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 300
Date First Installed: May 1982

RACET COMPUTERS, LTD.
KEYED FILE SYSTEM-80-KFS-80
Specific Application: Art Entry Facility B-Tree Structure
Specific Industry: Not Industry Sensitive
System Requirements: NEC PC-8001, 8801: Racet NEC-DOS; TRS-80/I, 80/II, 80/III: TRS-DOS
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 2,000
Date First Installed: 1981
(See Vendor Profile Page V-91)

RACET COMPUTERS, LTD.
RENCORE, & PRELUDE
Specific Application: Renumbering
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/III: TRS-DOS
Memory Required: 16.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35
Number Installed to Date: 5,000
Date First Installed: 1978

RACET COMPUTERS, LTD.
SUPERZAP - SZAP
Specific Application: File Recovery System
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/III: Model I/II: TRS-DOS 4.X
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 300
Date First Installed: 1983

REALIA, INC.
SPACEMAKER
Specific Application: Compresses Executable Files for IBM PC. Fits More On A Disk and Makes Programs to Run Faster
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $75
Number Installed to Date: 20
Date First Installed: January 1983
(See Vendor Profile Page V-92)

REALIA, INC.
TERMULATOR
Specific Application: Emulates DEC VT100 and VT52 Terminals, File Transfer Capability, File Transmittal and Reception
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: MS-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $95
Number Installed to Date: 20
Date First Installed: January 1983

RELATIONAL DATABASE SYSTEMS, INC.
C-ISAM/M
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: File Access Programmers Tool
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; Unix, DEC PDP; DOS; Altos 586; HEMOC Zeus
Memory Required: 24.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 5,000
Date First Installed: November 1981
(See Vendor Profile Page V-92)

SENSIBLE SOFTWARE, INC.
DISK ORGANIZER
Specific Application: Organizing Directory on Apple Diskettes
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30
Number Installed to Date: 1,500
Date First Installed: March 1981
(See Vendor Profile Page V-99)

SENSIBLE SOFTWARE, INC.
DISK RECOVERY
Specific Application: Recovering Data on Diskettes
System Requirements: Apple: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $30
Number Installed to Date: 2,300
Date First Installed: March 1981

SENSIBLE SOFTWARE, INC.
SUPER DISK COPY
Specific Application: Program for Copying Files and Diskettes
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35
Number Installed to Date: 5,000
Date First Installed: June 1979

SILICON VALLEY SYSTEMS, INC.
LIST HANDLER
Specific Application: Mail Merge Data Base
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, III: APPLE-DOS 3.3; Apple Compatible: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 50,000
Date First Installed: June 1982
(See Vendor Profile Page V-97)

SOFTWARE DYNAMICS
SMP
Specific Application: Binary Maintenance Program Used to Inspect and Update Files Without Application
Specific Industry: Not Industry Sensitive
System Requirements: PalTech GT Series, TRS Compatible 3-DOS
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Price: $45
Number Installed to Date: 150
Date First Installed: 1981
(See Vendor Profile Page V-99)

SOFTWARE PUBLISHING CORP.
PFS: FILE
Specific Application: Personal Filing System
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE, III: APPLE-DOS; IBM PC: PC-DOS; TI Professional: MS-DOS
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125 to $175
Number Installed to Date: 200,000
Date First Installed: 1981
(See Vendor Profile Page V-100)

THE SOFTWARE STORE
DISK FIX, DISK EDITOR & FILE RECOVERY SYSTEM
Specific Application: Disk Editor and File Recovery Utility for CP/M
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Machine Code
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 1,000
Date First Installed: December 1979
(See Vendor Profile Page V-100)

SOFTWARE TOOLWORKS
AUTODIFF
Specific Application: Document and Progress Sources Files
Specific Industry: Not Industry Sensitive
System Requirements: Osborne CP/M; Kaypro: CP/M
Memory Required: 48.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $30
Number Installed to Date: 240
Date First Installed: 1982
(See Vendor Profile Page V-100)

SOFTWARE TOOLWORKS
PACK & CRYPT
Specific Application: Protect Sensitive Files
Specific Industry: Not Industry Sensitive
System Requirements: Heath/Zenith: CP/M, Osborne: CP/M; Kaypro: CP/M
Memory Required: 48.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $25
Number Installed to Date: 787
Date First Installed: 1981

SOFTWARE TOOLWORKS
SUPER ZAP
Specific Application: Full System Interactive Disk Patcher
Specific Industry: Not Industry Sensitive
System Requirements: Heath/Zenith: CP/M, Osborne: CP/M; Kaypro: CP/M
Memory Required: 48.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $25
Number Installed to Date: 1,000
Date First Installed: 1980

SOFTWRIGHTS, INC.
HELPWARE
Specific Application: Professional Disk File Management With Powerful Single Key Stroke Text Editing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Columbia Data: MS-DOS; Compaq, Corona
Memory Required: 96.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 40
Date First Installed: 1982
(See Vendor Profile Page V-100)

SOUTHWESTERN DATA SYSTEMS, INC.
DISK LIBRARY
Specific Application: Creates, Maintains Cross-Referenced Index of Disk Based Programs and Files
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE, Apple 3 Disk
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
(See Vendor Profile Page V-101)

STATCOM CORP.
INFOMANAGER - (INSOCS)
Additional Product Classification: DBMS, Report Generator

Specific Application: File Management Storage and Retrieval
Specific Industry: Not Industry Sensitive
System Requirements: DEC Rainbow; IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: December 1982
(See Vendor Profile Page V-103)

STATCOM CORP.
INFOMANAGER (CP/M 86 W/DBASE INTERFACE)
Additional Product Classification: DBMS, Report Generator
Specific Application: File Management,Storage and Retrieval With Dbase II Interface
Specific Industry: Not Industry Sensitive
System Requirements: DEC Rainbow: CP/M 86; IBM PC
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: December 1982

STATCOM CORP.
INFOMANAGER (CP/M 86)
Additional Product Classification: DBMS, Report Generator
Specific Application: File Management Storage and Retrieval
Specific Industry: Not Industry Sensitive
System Requirements: DEC Rainbow: CP/M 86; IBM PC
Memory Required: 128.0K bytes
Source Language: Assembler, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: December 1982

STATCOM CORP.
INFOMANAGER (MSDOS W/ DBASE INTERFACE)
Additional Product Classification: DBMS, Report Generator
Specific Application: File Management Storage and Retrieval, With Dbase II Interface
Specific Industry: Not Industry Sensitive
System Requirements: DEC Rainbow: MS-DOS; IBM PC
Memory Required: 128.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: December 1982

STERLING DATA APPLICATIONS, INC. (SDA)
VEHICLE SCHEDULING & MAINTENANCE PROGRAM
Specific Application: Maintenance History and Vehicle Schedule
Specific Industry: Trucking
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: August 1983
(See Vendor Profile Page V-103)

SUPERSOFT, INC.
INVESTMENT TAXPAC
Specific Application: Maintains A Complete Catalog of Information on Investment and Tax Records
Specific Industry: Banking/Financial
System Requirements: IBM PC PC-DOS
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
(See Vendor Profile Page V-104)

SUPERSOFT, INC.
TFS-TEXT FORMATTING SYSTEM
Specific Application: Text Formatter Allows User to Create A Text File With Embedded Commands
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 24.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $85

THE SYSTEMS CENTER
NETWORK DATAMOVER-MICRO
Specific Application: Distributes Bulk Information Between Itself and Other Micro NDM Support Processors
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 8.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: March 1984
(See Vendor Profile Page V-106)

TASCON CORP.
KISS
Specific Application: File Management System
Specific Industry: Not Industry Sensitive
System Requirements: Zilog Z-80: CP/M; Intel 8086: TURBO-DOS; Intel 8086
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 15,000
Date First Installed: September 1976
(See Vendor Profile Page V-108)

THRESHOLD SOFTWARE
FILE/IDEA
Specific Application: File Management System
Specific Industry: Not Industry Sensitive
System Requirements: HP 86
Memory Required: 64.0K bytes
Source Language: Basic, Machine Code
Source Code Available: No
Price: $225
Date First Installed: July 1983
(See Vendor Profile Page V-110)

TIME COMPUTER CORP.
SYZ
Specific Application: Reorganize and Resize Oasis Indexed and Data Files
Specific Industry: Not Industry Sensitive
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-110)

TIME COMPUTER CORP.
TIME LIST/MANAGER (TLM)
Specific Application: File Handling System
Specific Industry: Not Industry Sensitive
System Requirements: Altos: Oasis; IBM
Source Language: Oasis Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease

TYMSHARE
NPL
Specific Application: Nonprocedural Language
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; DEC Rainbow
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-112)

UNICORN SYSTEMS CO.
DISK MAP/PC
Specific Application: Recovered Erased Disk Files
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Forth
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $59
Date First Installed: September 1982
(See Vendor Profile Page V-113)

USER FRIENDLY SOFTWARE
IT LIST MANAGEMENT SYSTEM
Specific Application: Sorting, Selecting, Instant Look-Up by Name, Company or Number
Specific Industry: Not Industry Sensitive
System Requirements: Altos; CP/M, MP/M; DEC Rainbow 100: CP/M, MP/M; North Star: CP/M, MP/M
Memory Required: 48.0K bytes
Source Language: PL/1-80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 50
Date First Installed: 1981
(See Vendor Profile Page V-114)

VISICORP
VISIFILE
Specific Application: Electronic Filing
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III: APPLE-DOS; IBM PC: PC-DOS; Commodore; Atari 800
Purchase Terms: Purchase (license)
Price: $250 to $300
(See Vendor Profile Page V-115)

FINANCIAL MODELING/DSS

ABC MANAGEMENT SYSTEMS, INC.
ABC ANALYST
Specific Application: Financial Modeling and Analysis
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Banking/Financial, Medical, Insurance, Real Estate, Education, Construction, Government, Transportation
System Requirements: IBM: TSO; DEC: VMS
Memory Required: 150 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75,000
Number Installed to Date: 50
Date First Installed: January 1980

ABC MANAGEMENT SYSTEMS, INC.
ABC FINANCIAL PLANNING AND MODELING SYSTEM
Specific Application: Financial Planning and Modeling
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Banking/Financial, Medical, Insurance, Real Estate, Education, Construction, Government, Transportation
System Requirements: IBM: CMS, DEC: RMS
Memory Required: 150 0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25 000
Number Installed to Date: 100
Date First Installed: January 1974

A. B. DICK CO.
SUPERCALC TM
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: A.B. Dick Magna Writer Magna III, Magna SE, CP/M
Memory Required: 64 0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: March 1983
(See Vendor Profile Page V-1)

ABW CORP.
ELF SPREADSHEET
Specific Application: Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, XT, PC-DOS
Memory Required: 96 0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125
Date First Installed: March 1984
(See Vendor Profile Page V-1)

ADCOM TECHNOLOGY, INC.
SUPERCOMP
Additional Product Classification: Financial Modeling
Specific Application: Electronic Spreadsheet Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: DG: AOS
Memory Required: 64 0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 1,000
Date First Installed: June 1981
(See Vendor Profile Page V-1)

ACCESS TECHNOLOGY, INC.
SUPERCOMP 20
Specific Application: Electronic Spreadsheet, Financial Modeling, Decision Support
Specific Industry: Not Industry Sensitive
System Requirements: DEC: VMS, RSTS/E, Prime: Primos, Onyx: Unix, Plexus: TSX+
Memory Required: 64 0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 1,000
Date First Installed: January 1982

ALAN R. ROSEN, INC.
ARR PLANNER
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, SSP
Memory Required: 48 0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
(See Vendor Profile Page V-4)

AMERICAN BUSINESS SYSTEMS, INC.
FINANCIAL MODELING SYSTEM
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, DEC Rainbow 100: CP/M, CP/M 86, Eagle IV: CP/M, Altos 586: Xenix, MP/M 86
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1980
(See Vendor Profile Page V-5)

AMERICAN SOFTWARE, INC.
SALES FORECASTER
Specific Application: Forecasting
Source Language: Ansi Cobol
(See Vendor Profile Page V-5)

ANALYSIS RESEARCH AND COMPUTATION, INC.
CONCISE
Specific Application: Modeling Language
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3300, 3030, 4300 Series, Sperry 1100
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $12 000
Number Installed to Date: 1
Date First Installed: January 1982
(See Vendor Profile Page V-6)

APL COMPUTERS, INC.
APL INVEST
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: APL 6800: MCS, Wicat
Memory Required: 30.0K bytes
Source Language: APL
Purchase Terms: Purchase (license)
Price: $225
Number Installed to Date: 3
Date First Installed: June 1981
(See Vendor Profile Page V-6)

APPLIED ADVANCED MANAGEMENT RESEARCH, INC.
FISCAL
Additional Product Classification: DBMS, Graphics, Report Generator
Specific Application: Financial Modeling and Planning, DBMS, Reporting, Graphics Forcasting, Econometrics
Specific Industry: Not Industry Sensitive
System Requirements: Prime, Ultimate; Microdata: Pick, GA
Source Language: Data Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 25
Date First Installed: February 1982
(See Vendor Profile Page V-7)

APPLIED ADVANCED MANAGEMENT RESEARCH, INC.
FISCAL PLUS
Additional Product Classification: DBMS, Graphics, Report Generator
Specific Application: Fiscal With Statistical Analysis, Industrial Forcasting, Operations Research
Specific Industry: Not Industry Sensitive
System Requirements: Prime; Ultimate, Microata: Pick, GA
Source Language: Data Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 4
Date First Installed: March 1983

APPLIED ADVANCED MANAGEMENT RESEARCH, INC.
FISCAL SIMPLE
Additional Product Classification: Banking, DBMS, Graphics, Report Generator
Specific Application: Financial Modeling and Planning, DBMS, Report, Graphics Forecasting and Econometrics
Specific Industry: Not Industry Sensitive
System Requirements: Prime; Ultimate, Microdata: Pick, GA
Source Language: Data Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 10
Date First Installed: June 1982

APPLIED DATA RESEARCH, INC.
ADR EMPIRE - VERSION 5.5
Specific Application: Decision Support
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series, 4300 Series; DEC
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $48,000
(See Vendor Profile Page V-7)

ATON INTERNATIONAL, INC.
VISICALC SURROGATE FOR ATON CP/M
Specific Application: Interface, Which Allows Radio Shack Visicalc (26-45, 11) to be Operated Under Aton CP/M
Specific Industry: Not Industry Sensitive
System Requirements: Radio Shack
Memory Required: 64 0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: October 1982
(See Vendor Profile Page V-10)

AUTOMATIC FORECASTING SYSTEMS, INC.
PACK SYSTEM
Specific Application: Forecasting Modeling and Control
Specific Industry: Not Industry Sensitive
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
Number Installed to Date: 1,300
Date First Installed: 1977
(See Vendor Profile Page V-10)

BGS SYSTEMS, INC.
BEST/1 - VM
Specific Application: "What-If" Modeling Under VM for Capacity Planning Performance and System Design
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3030 Series, System 370 VM
Memory Required: 1.0M bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1982
(See Vendor Profile Page V-12)

BILLINGS COMPUTER CORP.
B-CALC
Specific Application: Electronic Spread Sheet
Specific Industry: Not Industry Sensitive
System Requirements: Billings 500: BOS, Billings 6000: TURBO-DOS, Unix
Memory Required: 56.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Date First Installed: January 1983
(See Vendor Profile Page V-12)

CALIFORNIA SYSTEMS ASSOCIATES
POWER CALC
Specific Application: Financial Modeling and Forecast
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP: RSX-11, RSTS/E, VAX: VMS
Source Language: Assembly
Source Code Available: No

Purchase Terms: Purchase (license)
Price: $1,495
Number Installed to Date: 1,200
Date First Installed: 1978
(See Vendor Profile Page V-18)

CALIFORNIA SYSTEMS ASSOCIATES
[illegible]
Specific Application: MCBA File
Specific Industry: Not Industry [illegible]
System Requirements: DEC PDP: RSX-11, RSTS/E, VAX: VMS
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,495
Number Installed to Date: 1,200
Date First Installed: 1978

CODE CORP.
SPREAD SHEET
Specific Application: Spreadsheet
Specific Industry: Banking/Financial
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
[illegible]
[illegible]
(See Vendor Profile Page V-18)

COMPAC SYSTEMS, INC.
SMOOTH SPREADING
Specific Application: Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: Bluebird: SUPER-DOS; DG: DOS, R-DOS, AOS
Memory Required: 64.0K bytes
Source Language: Business Basic, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $395
Date First Installed: August 1983
(See Vendor Profile Page V-21)

COMPROG, INC.
MATH 1000
Specific Application: Interactive Business and Scientific Modeling
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000: RTE IV
Memory Required: 50.0K bytes
Source Language: Assembler
[illegible] No
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 250
Date First Installed: September 1981
(See Vendor Profile Page V-22)

COMPUTAX SYSTEMS, INC.
CALCU-PLAN
Additional Product Classification: Electronic Worksheet
Specific Application: Electronic Worksheet
Specific Industry: Accountants
System Requirements: Burroughs B90, B900, B1900; CMS
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $850
Date First Installed: July 1983
(See Vendor Profile Page V-22)

COMPUTER CONSULTANTS & SERVICE CENTER
J ENPLAN/3000
Specific Application: Financial Modeling and Spreadsheet
Specific Industry: Not Industry [illegible]
System Requirements: HP 3000: MPE, IBM Mainframes: TSO, CMS; Data[illegible]: CMS
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 10
Date First Installed: 1982
(See Vendor Profile Page V-23)

COMPUTER DATA CORP.
CDC-FINANCIAL (COMPUTER DATA INFOSYS)
Additional Product Classification: Accounting
Specific Application: General Ledger, Accounts Receivable, Accounts Payable, Financial Modeling, Forecasting, Fixed Assets
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000; DEC VAX-11
Memory Required: 512.0K bytes
Source Language: Cobol II
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 50
Date First Installed: 1979
(See Vendor Profile Page V-24)

COMPUTER RESOURCES & TECHNOLOGY, INC.
FINANCIAL MODELING
Specific Application: Financial Modeling and Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38, System/34
Memory Required: 32.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
[illegible]
Date First Installed: June 1982
(See Vendor Profile Page V-25)

COMPUTER TIME SHARE
MASTERCALC VERSION 2
Specific Application: Electronic Spreadsheet, Financial Bitronics
Specific Industry: Not Industry [illegible]
System Requirements: DG: Iris; Microtec: Iris, Bits
Memory Required: 64.0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 150
Date First Installed: November 1982
(See Vendor Profile Page V-26)

CORESHARE
SYSTEM W
Specific Application: Decision Support
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; IBM 4300 Series, 3000 Series: VM/CMS, MVS/TSO; VM/CMS; IBM System 370
Memory Required: 2.5M bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
[illegible]
Date First Installed: January 1983
(See Vendor Profile Page V-29)

COSTECTRA SYSTEMS, INC.
[illegible]
Specific Application: Spreadsheet
[illegible]
Specific Industry: Banking/Financial
System Requirements: IBM Series/1; Evolution; Datamedia
Source Language: Basic
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-29)

COSTECTRA SYSTEMS, INC.
MERLIN
Specific Application: Financial Forecasting Data Base for Historical Data
Specific Industry: Banking/Financial
System Requirements: Burroughs B7800
Source Language: PL/1, Cobol, Fortran
Purchase Terms: Lease

COSTECTRA SYSTEMS, INC.
SOP FINANCIAL PLANNING
Specific Application: Financial Planning Forecasting
Specific Industry: Banking/Financial
System Requirements: Burroughs B7800
Source Language: Cobol, Fortran
Purchase Terms: Lease

CONSOLIDATED COMPUTER SERVICES, INC.
FINANCIAL MODELING SYSTEM
Specific Application: Spreadsheet
Specific Industry: Not Industry Sensitive
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 2
Date First Installed: 1983
(See Vendor Profile Page V-29)

CONTEL INFORMATION SYSTEMS
ESTURN-CALC
Specific Application: Spreadsheet Calculator
Specific Industry: Not Industry Sensitive
System Requirements: DEC-PDP-11 RSTS/E, RT-11, Unix
Source Language: Fortran, Macro 11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $489 to $1,956
(See Vendor Profile Page V-30)

CORPORATE COMPUTER SYSTEMS, INC.
ABLE (A BUSINESS LANGUAGE V.8302)
Specific Application: Financial Modeling
Specific Industry: Banking/Financial
System Requirements: [illegible]
Memory Required: 40.0K bytes
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
[illegible]
Date First Installed: November 1982
(See Vendor Profile Page V-31)

CORPORATE DATA SCIENCES, INC.
PLAN -IT
Specific Application: Modeling/ Planning Tool
Specific Industry: Not Industry Sensitive
System Requirements: Durango: HP 3000
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
[illegible]
Number Installed to Date: 40
Date First Installed: June 1980
(See Vendor Profile Page V-31)

CORT DATA
PROTABS TIME AND BILLING SYSTEM
Specific Application: Financial Modeling
Specific Industry: Legal, CPA
System Requirements: HP 3000: MPE IV
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $20,000
Number Installed to Date: 1
Date First Installed: November 1982
(See Vendor Profile Page V-31)

[illegible]
MDLR VERSION 3.1
Specific Application: Financial Modeling
Specific Industry: Manufacturing, Engineering, Banking/Financial, [illegible]
System Requirements: Prime Information: Pick, Honeywell Ultimate, ADDS Mentor; Microdata
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500 to $5,000
Number Installed to Date: 3
Date First Installed: [illegible]
(See Vendor Profile Page V-32)

CUSTOM COMPUTATION, INC.
GRAPH-PAC
Specific Application: Forecasting and Graphics
Specific Industry: Not Industry Sensitive
[illegible]
Memory Required: 32.0K bytes
Source Language: EDL
Source Code Available: $2,000
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 5
[illegible]
(See Vendor Profile Page V-33)

[illegible]
DBLEDGER
Specific Application: Spreadsheet Program
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200: Basic 2, Wang VS: VS
Memory Required: 64.0K bytes

Source Language: Basic, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: June 1982
(See Vendor Profile Page V-35)

DATAPOINT CORP.
MULTIPLAN
Specific Application: Comprehensive Spreadsheet Simulator
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 6800, 8600, 3800, 6600: RMS, RMS-DOS
Memory Required: 98.0K bytes
Source Code Available: Yes
(See Vendor Profile Page V-37)

DATA-TEK
PERFORMA
Specific Application: Financial Modeling Language
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $17,000
Date First Installed: October 1982
(See Vendor Profile Page V-36)

DECISIONS DEVELOPMENT, INC.
PROFORMA
Additional Product Classification: Program Generators/Aids/Applications Development Tools, Languages, Banking, Graphics, Report Generator
Specific Application: Financial Modeling
Specific Industry: Banking/Financial, Real Estate, Construction, Government
System Requirements: Decsystem 10; IBM 4300 Series; Honeywell 6000
Source Language: Fortran, Assembler
Purchase Terms: Purchase (license); Rental, Lease
Price: $50,000
Date First Installed: January 1986
(See Vendor Profile Page V-40)

DEFARO SOFTWARE SYSTEMS, INC.
DSS I
Additional Product Classification: DBMS
Specific Application: Decision Support
Specific Industry: Wholesale/Distribution, Retail
System Requirements: IBM System/34, System/36
Memory Required: 96.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Price: $8,000
Number Installed to Date: 1
Date First Installed: November 1982
(See Vendor Profile Page V-40)

DESKTOP FINANCIAL SOLUTIONS, INC.
DESKTOP/FINANCIAL PLANNING SYSTEM
Specific Application: Financial Planning, Budgeting, Cash Flow Forecasting, Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: Wang OIS: VS, IBM PC, PC-DOS, Wang Personal Computer
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750 to $7,500
Number Installed to Date: 15
Date First Installed: October 1982
(See Vendor Profile Page V-41)

DIDSING ASSOCIATES CORP.
HOTEL/MOTEL INDUSTRY SIMULATOR
Specific Application: Economic Analysis of Property Value, Projects Room, Occupancy, Real Estate, Investment Analysis
Specific Industry: Hotel/Motel
System Requirements: IBM: DOS/VS, OS/MVS
Memory Required: 128.0K bytes
Source Language: PL/1
Purchase Terms: Purchase (license)
Price: $12,000 to $15,000
Number Installed to Date: 30
Date First Installed: 1976
(See Vendor Profile Page V-41)

DYNO, INC.
DYNO BATCH REPORT PROGRAMS
Additional Product Classification: Inventory
Specific Application: Forecasting and Simulation, Inventory Management, Purchase Orders, Printing, Selective List
Specific Industry: Not Industry Sensitive
Source Language: Cobol
(See Vendor Profile Page V-42)

DYNO, INC.
DYNO DICE 6PO SYSTEM
Additional Product Classification: Accounting, Inventory
Specific Application: Data Base, Invoicing Purchase Orders, Forecasting and Inventory
Specific Industry: Manufacturing, Wholesale/Distribution, Retail
System Requirements: IBM System 360/370
Source Language: Cobol
Source Code Available: $25,000
Purchase Terms: Purchase (license); Rental, Lease
Price: $25,000
Number Installed to Date: 11
Date First Installed: June 1983

ENERGY MANAGEMENT ASSOCIATES, INC.
PROSCREEN II
Specific Application: Utility Financial Planning System
System Requirements: IBM: MVS; Prime: Primos, CMS, OS
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 20
Date First Installed: 1982
(See Vendor Profile Page V-46)

ENGINEERED DESIGN CONCEPTS, INC.
EDC FINANCIAL MODELING
Specific Application: Color Business Graphics, Statistical Analysis, Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS Series
Source Language: Cobol, RPG, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $4,950
Number Installed to Date: 15
Date First Installed: January 1983
(See Vendor Profile Page V-46)

ENGINEERED DESIGN CONCEPTS, INC.
EDC GRAPHICS IMAPCT
Additional Product Classification: Graphics
Specific Application: Color Business Graphics, Statistical Analysis, Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS Series
Memory Required: 1.0K bytes
Source Language: Cobol, RPG, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $9,950
Number Installed to Date: 30
Date First Installed: December 1982

ENGINEERED DESIGN CONCEPTS, INC.
EDC STATISTICAL ANALYSIS
Additional Product Classification: Graphics
Specific Application: Color Business Graphics, Statistical Analysis, Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS Series
Source Language: Cobol, RPG, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $3,930
Number Installed to Date: 15
Date First Installed: January 1983

EXECUCOM SYSTEM CORP.
IFPS DATASPAN
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $10,000
Number Installed to Date: 225
Date First Installed: 1981
(See Vendor Profile Page V-00)

EXECUCOM SYSTEM CORP.
IFPS SENTRY
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 101
Date First Installed: 1981

EXECUCOM SYSTEM CORP.
INTERACTIVE FINANCIAL PLANNING SYSTEM I
Specific Application: Financial Modeling
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Banking/Financial, Insurance, Real Estate, Education, Construction, Government, Transportation, Nonprofit Organizations
System Requirements: CDC; Decsystem 10, 20, VAX; Harris; Prime; VM
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $81,000
Number Installed to Date: 936
Date First Installed: January 1976
(See Vendor Profile Page V-47)

EXECUTIVE TECHNOLOGY DATA SYSTEMS (ETDS)
FINPLAN FINANCIAL PLANNING AND MODELING
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38, System/36, System/34, System/23: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II, RPG-III, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,450
Number Installed to Date: 300
Date First Installed: July 1980
(See Vendor Profile Page V-48)

FEROX MICROSYSTEMS, INC.
FEROX MODELER
Specific Application: Comprehensive Decision Support and Financial Modeling
Specific Industry: Not Industry Sensitive, Banking/Financial
System Requirements: HP 3000: MPE, DEC VAX: VMS
Source Language: Pascal
Purchase Terms: Purchase (license)
Date First Installed: 1982
(See Vendor Profile Page V-48)

FINANCIAL DECISION SYSTEMS, INC.
CORPTAX
Specific Application: Comprehensive Corporate Tax Compliance, Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3000 Series, 9700
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Timesharing
Price: $35,000 to $45,000
Number Installed to Date: 170
Date First Installed: 1975
(See Vendor Profile Page V-48)

FINANCIAL FORECAST, INC.
FINANCIAL MODEL
Specific Application: Financial

Modeling System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36, System/38
Source Language: RPG-II, RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 450
Date First Installed: 1975
(See Vendor Profile Page V-49)

FINANCIAL SOFTWARE, INC.
FINANCIAL FORECASTING
Specific Application: Financial Forecasting Package
Specific Industry: Legal, Real Estate
System Requirements: IBM: DOS; IBM System/34 SSP
Memory Required: 36.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $900
Number Installed to Date: 200
Date First Installed: 1976
(See Vendor Profile Page V-46)

FUSION PRODUCTS INTERNATIONAL
FUSION 3/34
Specific Application: Financial Modeling
System Requirements: IBM System/34 SSP
Memory Required: 34.0K bytes
Source Language: RPG
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 200
Date First Installed: December 1981
(See Vendor Profile Page V-50)

FUSION PRODUCTS INTERNATIONAL
FUSION 3138
Additional Product Classification: Graphics
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Memory Required: 100.0K bytes
Source Language: RPG-III
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 76
Date First Installed: October 1982

GENERAL RESEARCH CORP.
FLOWCALC
Specific Application: Electronic Spreadsheet for DEC VAX
Specific Industry: Not Industry Sensitive
System Requirements: DEC; IBM; Sperry
Memory Required: 512.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Number Installed to Date: 75
Date First Installed: 1982
(See Vendor Profile Page V-51)

GEOGRAPHIC SYSTEMS, INC.
GEOMAP
Specific Application: Decision Support
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, CMS/TSO
Memory Required: 1.0M bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $25,000
Number Installed to Date: 15
Date First Installed: September 1981
(See Vendor Profile Page V-51)

H & A COMPUTER SYSTEMS
CALC/1
Additional Product Classification: Security/Auditing
Specific Application: Electronic Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 32.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 20
Date First Installed: 1982
(See Vendor Profile Page V-53)

IPDS (INTERNATIONAL FINANCIAL DATA SYSTEMS)
FINANCIAL PLANNER
Specific Application: Taxes, Complete Financial Planner
Specific Industry: Banking/Financial
System Requirements: IBM PC; Wang; Apple
Purchase Terms: Purchase (license)
Date First Installed: 1979
(See Vendor Profile Page V-56)

INNEX CO., INC.
EXECUTIVE DECISION SUPPORT SYSTEM
Specific Application: Analysis of Sales, Marketing, Budget Predictions, Financials, Bar Graph, Screen Formatting
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38
Source Language: RPG-III
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-56)

INFORMATION SYSTEMS OF AMERICA, INC.
FORESIGHT
Specific Application: Financial Management and Planning System
Specific Industry: Not Industry Sensitive
System Requirements: Amdahl 470/V6: DOS, MVS, VS1; Burroughs B6700, B7700: MCP; CDC Omega: OS, MVS, VS1; CDC 6600 Cyber: NOS
Source Language: Fortran Assembl
Purchase Terms: Purchase (license); Time Sharing
Number Installed to Date: 1,000
Date First Installed: June 1970
(See Vendor Profile Page V-58)

IPT (INFORMATION PROCESSING TECHNIQUES)
SUPER COMP ELECTRONIC SPREADSHEET
Specific Application: Electronic Spreadsheet for Financial Modeling and Planning
Specific Industry: Not Industry Sensitive
System Requirements: DG
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 1,500
Date First Installed: 1981
(See Vendor Profile Page V-61)

IPT (INFORMATION PROCESSING TECHNIQUES)
SUPERCOMP 20 - ELECTRONIC SPREADSHEET
Specific Application: Financial Modeling and Planning, Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: DG MV Series; AOS/VS, DEC PDP-11, VAX: RT-11, VMS, DEC Professional 350: TSK+, RSTS/E, Prime: Primos
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 1,000
Date First Installed: 1982

J. GLASER & CO., INC.
SCIENTIFIC INVENTORY MANAGEMENT
Additional Product Classification: Inventory Control
Specific Application: Inventory Control Using Math Optimization
Specific Industry: Wholesale/Distribution, Retail
System Requirements: Dental: Basi
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
(See Vendor Profile Page V-62)

LEGIST AUTOMATION, INC.
MS/CS
Specific Application: MSE Security Logging Accounting and Control
Specific Industry: Not Industry Sensitive
System Requirements: Four Phase 4: MFE
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 10
Date First Installed: 1982
(See Vendor Profile Page V-65)

LEGIST AUTOMATION, INC.
THEN-IF
Specific Application: Spreadsheet Modeling
Specific Industry: Not Industry Sensitive
System Requirements: Four Phase 4: MFE
Memory Required: 84.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $2,400
Number Installed to Date: 40
Date First Installed: 1982

LLOYD BUSH AND ASSOCIATES
MODEL - FINANCIAL PLANNING, MODELING
Specific Application: Financial Modeling, Distributed Decision Support
Specific Industry: Not Industry Sensitive
Memory Required: 128.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $9,000
Number Installed to Date: 110
Date First Installed: 1980
(See Vendor Profile Page V-66)

LUPPER & LOWE, INC.
SPREAD FINANCIAL MODELING LANG
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS; HP 3000: MPE, IBM PC: PC-DOS
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-67)

MANAGEMENT COMPUTER SERVICE, INC.
ECHO CAL
Specific Application: Electronic Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11, RSTS/E
Source Language: Basic, Basic 6+
Source Code Available: No
Purchase Terms: Purchase (lease); Rental, Lease
Number Installed to Date: 25
Date First Installed: 1982
(See Vendor Profile Page V-68)

MANAGEMENT CONTROL SYSTEMS, INC.
INVESTMENT MODELING
Specific Application: Investment Modeling
Specific Industry: Real Estate, CPA
System Requirements: IBM PC, System/32, System/34, System/38
Source Language: RPG-2, Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200 to $6,200
Number Installed to Date: 205
Date First Installed: 1975
(See Vendor Profile Page V-68)

MANAGEMENT DECISIONS SYSTEMS, INC.
EXPRESS
Specific Industry: Not Industry Sensitive
System Requirements: IBM: VM/CMS, Prime: Primos, IBM 3270
Memory Required: 1.0M bytes
Source Language: AED
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 300
Date First Installed: 1973
(See Vendor Profile Page V-69)

MANUFACTURING CONTROL SYSTEMS, INC.
FORECASTING
Specific Application: Forecasting Future Trends
Specific Industry: Not Industry Sensitive

System Requirements: Wang VS; IBM System/38
Source Language: RPG-2
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $2,800 to $3,900
Number Installed to Date: 200
Date First Installed: June 1982
(See Vendor Profile Page V-69)

MARYLAND COMPUTER SERVICES, INC.
CRYSTAL
Specific Application: Electronic Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 3
Date First Installed: 1983
(See Vendor Profile Page V-69)

MASSOGLIA AND ASSOCIATES, INC.
STAT/34
Specific Application: Statistical Analysis Program
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 96.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
(See Vendor Profile Page V-70)

MASS SYSTEMS CO., INC.
FINANCIAL DESK CALCULATOR
Specific Application: Financial Calculations
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34; SSP; IBM System/38; CPF
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 150
Date First Installed: June 1981
(See Vendor Profile Page V-70)

MCCLINTOCK CORP.
ENERGY CONSUMPTION, SYSTEM SIMULATION
Specific Application: Energy Consumption, System Simulation and Economic Analysis
Specific Industry: Engineering
System Requirements: CP/M; CP/M 86; MS-DOS; PC-DOS
Memory Required: 64.0K bytes
Source Language: Compiled Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 25
Date First Installed: December 1982
(See Vendor Profile Page V-70)

MERRILL-HALL BOOK CO.
INVESTPAK
Specific Application: Investment Problem Solver, Bond Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+; VM/CMS, TRS-80/I, III, IBM, VM/CMS, DEC VAX-11/780 VMS
Memory Required: 32.0K bytes
Purchase Terms: Purchase (license)
Price: $200
(See Vendor Profile Page V-71)

MDCR, INC.
DECISION SUPPORT SYSTEM
Specific Application: Comprehensive Decision Support System for the Financial and Marketing Community
Specific Industry: Not Industry Sensitive
System Requirements: IBM MVS, VM/CMS, IBM PC, XT, PC-DOS, Victor 9000 CP/M
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-71)

MDS, INC.
EE FINANCIAL FORECASTING AND MODELLING
Specific Application: Financial Forecasting and Modeling
Specific Industry: Banking/Financial
System Requirements: Datapoint: DOS, RMS
Memory Required: 48.0K bytes
Source Language: Cobol, Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 200.
Date First Installed: 1977
(See Vendor Profile Page V-71)

MECHANICAL TECHNOLOGY, INC.
AID
Specific Application: Financial Package, Quality Control
Specific Industry: Not Industry Sensitive
System Requirements: HP; DEC PDP-11/23 RSX
Memory Required: 64.0K bytes
Source Language: Basic, Fortran
Source Code Available: Yes
Purchase Terms: Lease
Price: $500 to $5,000
Number Installed to Date: 300
Date First Installed: 1974
(See Vendor Profile Page V-71)

MEDIA BUREAU INTERNATIONAL
MEDIA BUREAU INTERNATIONAL
Specific Application: Buy Advertising Time in Different Media, Post Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 96.0K bytes
Source Language: RPG
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 150
Date First Installed: 1972
(See Vendor Profile Page V-71)

THE MEGA GROUP, INC.
MEGA SPACE
Specific Application: Statistical Analysis and Forecasting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series, 3000 Series; VM/CMS
Memory Required: 1.5M bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $25,000
Number Installed to Date: 150
Date First Installed: 1976
(See Vendor Profile Page V-72)

THE MEGA GROUP, INC.
MEGCALL
Specific Application: Electric Spreadsheet for Mainframes
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series, 3000 Series: DOS VM/CMS
Memory Required: 1.5M bytes
Source Language: PL/2
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $15,000 to $19,000
Number Installed to Date: 40
Date First Installed: May 1983

METROCOM, INC.
FINMOD
Specific Application: Financial Spreadsheet Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell
Memory Required: 50.0K bytes
Source Language: Fortran IV
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978
(See Vendor Profile Page V-72)

MICRO MAINFRAME, INC.
DSS/A
Specific Application: Statistical and Analitcal Review of Data
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: UCSD-P; IBM PC, UCSD-P
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1982
(See Vendor Profile Page V-74)

MICROPROCESSOR ENTERPRISES, INC.
HANDLE/CALC
Specific Application: Fully Integrated Electronic Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: Unix; HP 3000 RTE
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Date First Installed: 1983
(See Vendor Profile Page V-74)

MSA (MANAGEMENT SCIENCE AMERICA), INC.
FORECASTING MODELING
Specific Application: Forecasting Modeling
Specific Industry: Not Industry Sensitive
System Requirements: IBM MF; 370, 4300 Series: DOS/OS; Sperry 1100

Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 102
(See Vendor Profile Page V-77)

MSA (MANAGEMENT SCIENCE AMERICA), INC.
MSA FORECASTING & MODELING SYSTEM
Specific Application: Financial Modeling
Specific Industry: Manufacturing, Banking/Financial, Medical, Insurance, Education, Government, Nonprofit Organizations
System Requirements: IBM 360/370, 3030 Series: SSX, OS; Burroughs: MCP
Memory Required: 350.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 192
Date First Installed: 1979

NATIONAL INFORMATION SYSTEMS, INC.
ACCENT R VERSION 7.30
Specific Application: Decision Support System and Strategic Planning
Specific Industry: Not Industry Sensitive
System Requirements: Decsystem 10; Tops 10; Decsystem 20: Tops 20
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $40,000 to $52,000
Number Installed to Date: 35
Date First Installed: 1980
(See Vendor Profile Page V-79)

NATIONAL INFORMATION SYSTEMS, INC.
NYPLAN
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: Decsystem 10, 20: Tops 10, Tops 20; VAX, DEC PDP-11: VMS, RSTS/E; TI DS990 Model 4-20 (DX10)
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $3,500 to $15,500
Number Installed to Date: 150
Date First Installed: 1975

NCR CORP.
MULTIPLAN
Additional Product Classification: Financial
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: NCR Tower: Unix
Memory Required: 512.0K bytes
Source Language: C
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: April 1983
(See Vendor Profile Page V-79)

NEAL NELSON & ASSOCIATES
SALES ANALYSIS
Specific Application: Sales Analysis

by Orders Booked and Invoices Sent
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 6
Date First Installed: November 1982
(See Vendor Profile Page V-79)

HAKWA MANAGEMENT SERVICES
2200 SPREADSHEET
Specific Application: Spreadsheet
System Requirements: Wang 2200; Wang Basic II
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1980
(See Vendor Profile Page V-80)

HYPLAN
FINANCIAL MODELLING SYSTEM
Specific Application: Financial Modeling System
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, RSX, RSTS; VAX: VMS; TI
Memory Required: 64.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $1,500 to $3,500
Number Installed to Date: 200
Date First Installed: January 1981
(See Vendor Profile Page V-81)

OSI, INC.
COSMO (COMM SYSTEM MODELING)
Specific Application: Flex Modeling for Most Communications Systems (Analog and Digital)
Specific Industry: Communications
System Requirements: IBM 3030 Series, HP 1000; DEC VAX
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 3
Date First Installed: June 1982
(See Vendor Profile Page V-83)

OXFORD SOFTWARE CORP.
MAXICALC
Specific Application: Electronic Spreadsheet for Cics
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370, 4300 Series. DOS, OS
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $12,000 to $15,000
Number Installed to Date: 400
Date First Installed: 1983
(See Vendor Profile Page V-83)

PARA RESEARCH, INC.
EASY CALC
Specific Application: Spreadsheet Analysis and Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, System/36
Memory Required: 36.0K bytes
Source Language: RPG-II
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: 1982
(See Vendor Profile Page V-84)

PARA RESEARCH, INC.
PARACALC
Specific Application: Financial Modeling
Specific Industry: Banking/Financial
System Requirements: IBM System/34, System/36
Memory Required: 36.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,000
Number Installed to Date: 2,800
Date First Installed: August 1981

PARA RESEARCH, INC.
STRATEGIC RATIO
Specific Application: Financial Ratios
Specific Industry: Banking/Financial
System Requirements: IBM System/34
Memory Required: 28.0K bytes
Source Language: RPG-II
Purchase Terms: Purchase (license); Rental; Lease
Price: $350
Number Installed to Date: 50
Date First Installed: July 1983

PARK SOFTWARE
OP RETAIL PLANNER
Specific Application: Cash Flow, Inventory Forecasting
System Requirements: DEC VAX
Source Language: VAX-11 Basic
Source Code Available: $25,000
Purchase Terms: Purchase (license); Rental; Lease
Price: $15,000
Number Installed to Date: 25
Date First Installed: April 1983
(See Vendor Profile Page V-84)

PBL ASSOCIATES
PERSPECTIVE
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: Tandem Guardian
Source Language: Cobol
Purchase Terms: Purchase (license); Rental; Lease
Price: $25,000
Number Installed to Date: 10
Date First Installed: September 1982
(See Vendor Profile Page V-84)

PBS COMPUTING, INC.
SATURNCALC
Specific Application: Electronic Spreadsheet Generator
Specific Industry: Public Accountant
System Requirements: DEC PDP-11: RSX-11M
Memory Required: 64.0K bytes
Source Language: Fortran, Basic
Purchase Terms: Purchase (license)
Price: $1,200
Date First Installed: 1982
(See Vendor Profile Page V-84)

PCD SYSTEMS, INC.
LOGICALC
Specific Application: Financial Modeling and Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: IBM; DEC LSI-11: UCSD-P; Tandy: Runtime; Altos
Memory Required: 64.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $98 to $190
Date First Installed: 1981
(See Vendor Profile Page V-84)

PCD SYSTEMS, INC.
MILESTONE
Specific Application: Project Management Application, Combining Pert and Critical Path Method Techniques
Specific Industry: Not Industry Sensitive
System Requirements: IBM; DEC LSI-11: UCSD-P; Tandy, Altos
Memory Required: 64.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: 1980

PCD SYSTEMS, INC.
NUTRI-CALC
Specific Application: Modelrig
Specific Industry: Medical, Education
System Requirements: IBM; Apple; Tandy: Runtime, Altos
Memory Required: 64.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $129
Number Installed to Date: 1000
Date First Installed: 1980

PCD SYSTEMS, INC.
PROCALC
Specific Application: Advanced Version of Logicalc
Specific Industry: Not Industry Sensitive
System Requirements: IBM; DEC LSI-11: UCSD-P; Tandy: Runtime; Altos
Memory Required: 64.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $350
Date First Installed: 1981

PDR, INC.
EASY PLAN
Specific Application: Financial Planning and Modeling
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34; SSP
Memory Required: 36.0K bytes
Source Language: RPG-II
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 1,000
Date First Installed: 1982
(See Vendor Profile Page V-84)

PHOTON SOFTWARE
EPSILON
Specific Application: Decision Support, Basic Estimations
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300; Wang; Apple
Memory Required: 64.0K bytes
Source Language: Cobol, Fortran, PL/1
Purchase Terms: Purchase (license)
Price: $3,500
Date First Installed: 1983
(See Vendor Profile Page V-86)

POLICY DEVELOPMENT CORP.
ENTRY POINT OPTIMIZER
Specific Application: Calculates the Most Cost Effective Magazine Distribution Method
Specific Industry: Magazine Publisher
System Requirements: DEC VAX-11/780: VMS
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 35
Date First Installed: 1981
(See Vendor Profile Page V-87)

POLICY DEVELOPMENT CORP.
PDC PUBLISHING MODEL
Specific Application: Circulation and Financial Forecasting
Specific Industry: Magazine Publisher
System Requirements: DEC VAX-11/780: VMS
Memory Required: 128.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 150
Date First Installed: 1974

POLICY DEVELOPMENT CORP.
PROMOTION EVALUATION MODEL
Specific Application: Forecast the Future Profitability/Return on Investment From Magazine Promotions
Specific Industry: Magazine Publisher
System Requirements: DEC VAX-11/780: VMS
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 75
Date First Installed: 1975

PREDICTION SYSTEMS, INC.
GSM
Specific Application: General Stochastic Modeling
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370
Source Language: Cobol, Fortran
Purchase Terms: Rental
Date First Installed: 1979
(See Vendor Profile Page V-87)

PSI ENERGY SOFTWARE, INC.
ENGINEERING LIBRARY
Specific Application: Solve Complex Engineering Studies
Specific Industry: Petroleum
System Requirements: Prime 2250; Primos; Prime 850
Memory Required: 2.0M bytes
Source Language: Fortran 77
Purchase Terms: Purchase (license); Time-Sharing
Date First Installed: 1976
(See Vendor Profile Page V-88)

PSI ENERGY SOFTWARE, INC.
PROFITABILITY OF OIL AND GAS OPPORTUNITIES
Specific Application: Economic Model for Oil and Gas Properties

Specific Industry: Petroleum
System Requirements: IBM 370: MVS/TSO; Sperry 1100; DEC VAX; Prime 2250· Primos
Memory Required: 2.0M bytes
Source Language: Fortran 77
Purchase Terms: Purchase (license); Time-Sharing
Date First Installed: 1973

PUGH - ROBERTS ASSOCIATES, INC.
DOCUMENTOR
Specific Application: Provides Formatted and Cross-Referenced Listing of Models
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS, TSO, CMS, DEC VAX: VMS; Honeywell: Gcos, Prime 750: Primos
Source Language: Fortran
Purchase Terms: Purchase (license); Time-Sharing
Price: $2,500
Date First Installed: 1980
(See Vendor Profile Page V-89)

PUGH - ROBERTS ASSOCIATES, INC.
DYNAMIC MODELS-DYNAMO
Specific Application: Simulation of Models of Closed-Loop Feedback Systems
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS, TSO, CMS; DEC VAX: VMS; Honeywell: Gcos; Prime 750· Primos
Source Language: AED, Fortran, Pascal
Source Code Available: $245
Purchase Terms: Purchase (license); Time-Sharing
Price: $3,000 to $12,000
Number Installed to Date: 1,000

QANTEL CORP.
QIC PLAN
Specific Application: Financial Forecasting Package
Specific Industry: Not Industry Sensitive
System Requirements: Qantel System 10, System 20, System 30, System 40· Best
Memory Required: 16.0K bytes
Source Language: QIC Basic
Purchase Terms: Purchase (license); Lease
Price: $990
Date First Installed: 1978
(See Vendor Profile Page V-89)

R&I BUSINESS SYSTEMS, INC.
FINANCIAL MODELING
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint: DOS
Memory Required: 4.0K bytes
Source Language: Databus
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 100
Date First Installed: 1976
(See Vendor Profile Page V-91)

SAN DIEGO SOFTWARE
CALL ELECTRONIC SPREADSHEET
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110, 5120
Memory Required: 32.0K bytes
Source Language: Micro Code
Purchase Terms: Purchase (license)
Price: $830
Date First Installed: December 1982
(See Vendor Profile Page V-94)

SATURN SYSTEMS, INC.
SATURN-CALC
Specific Application: Electronic Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Memory Required: 36.0K bytes
Source Language: Macro 11
Purchase Terms: Lease
Number Installed to Date: 800
Date First Installed: 1982
(See Vendor Profile Page V-95)

SIMPLAN SYSTEMS, INC.
SIMPLAN VERSION 1.10
Specific Application: Financial Modeling, Corporate Planning
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300 Series, 3030 Series: MFT; Prime 2250 450+. Primos
Memory Required: 320.0K bytes
Source Language: PL/1
Source Code Available: $10,000
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 90
Date First Installed: February 1974
(See Vendor Profile Page V-97)

SMITH, DENNIS & GAYLORD, INC.
BUSINESS 360 FINANCIAL PLANNING
Specific Application: Financial Modeling
Specific Industry: Wholesale/Distribution, Retail, Banking/Financial, Legal, Construction, Transportation, Nonprofit Organizations
System Requirements: HP 3000: MPE, Omit
Source Language: Image, SPL, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $12,500
Number Installed to Date: 5
(See Vendor Profile Page V-96)

SOFT PRO SYSTEMS, INC.
PHIMOD/COBOL (V.1.61, 2.01, 3.01)
Specific Application: Financial Modeling, Analysis and Forecasting
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $500 to $1,450
Number Installed to Date: 50
Date First Installed: 1982
(See Vendor Profile Page V-98)

SOFTWARE INTERNATIONAL CORP.
FORECASTING, MODELING & REPORTING
Specific Application: Forecasting, Modeling and Reporting
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360/370, 3030, 4300 Series: DOS/VS: OS, OS/VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1982
(See Vendor Profile Page V-99)

SOFTWARE PRODUCTS INTERNATIONAL
LOGICALC
Additional Product Classification: Accounting
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: IBM Displaywriter, PC; Altos Sage II; TRS-80/II
Memory Required: 128.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $190
Number Installed to Date: 2,500
Date First Installed: February 1981
(See Vendor Profile Page V-100)

SOFTWARE PRODUCTS INTERNATIONAL
PROCALC
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: IBM Displaywriter, PC; Altos Sage II; TRS-80/II
Memory Required: 64.0K bytes
Source Language: Pascal

SPSS, INC.
EIA
Specific Application: Interactive Data Analysis and Forecasting System
Specific Industry: Not Industry Sensitive
System Requirements: DG: AOS, R-DOS; Decsystem 10: Tops 10; IBM: MVS, OS; Honeywell: Gcos, CP6
Memory Required: 150.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1972
(See Vendor Profile Page V-102)

STANDARD RESEARCH, INC.
MEGA CHE
Specific Application: Financial Modeling System
Specific Industry: Not Industry Sensitive
Memory Required: 40.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $3,000 to $15,000
Number Installed to Date: 50
Date First Installed: 1982
(See Vendor Profile Page V-102)

STOCHOS, INC.
DSS AID DECISION AID SYSTEM V.1
Specific Application: DSS
Specific Industry: Not Industry Sensitive
System Requirements: HP 250, HP 9835, HP 98; IBM PC: CP/M 86; Intertec: CP/M 80, CMC International: CP/M 80/86
Memory Required: 64.0K bytes
Source Language: Basic, CB80, CB86
Purchase Terms: Purchase (license)
Price: $995
Number Installed to Date: 5
Date First Installed: March 1982
(See Vendor Profile Page V-103)

STRATEGIC PLANNING ASSOCIATES, INC.
FORECAST
Specific Application: Planning, Modeling and Goal Seeking
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CMS, TSO; Prime: Primos, HP 3000: MPE
Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 20
Date First Installed: 1981
(See Vendor Profile Page V-104)

STRATEGIC PLANNING ASSOCIATES, INC.
PROFILE
Specific Application: Planning Tool for Corporate Strategic Planners
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CMS TSO; Prime: Primos, HP 3000· MPE
Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $65,000
Number Installed to Date: 50
Date First Installed: 1980

SUNRISE DATA SYSTEMS
SUNPLAN
Specific Application: Spreadsheet Application
Specific Industry: Banking/Financial
System Requirements: HP 250: OS 250
Memory Required: 256.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-104)

THE SYSTEMS SPECIALISTS
ECONOMIC MODELING SYSTEM EMS
Specific Application: Modeling
System Requirements: IBM System/34, System/36
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 10
Date First Installed: January 1982
(See Vendor Profile Page V-106)

TRANSNATIONAL GAS SYSTEMS, INC.
OGAS (OIL AND GAS ACCOUNTING SYSTEMS)
Additional Product Classification: Accounting, WP/Text Editing, Payroll/Personnel
Specific Application: Accounts Receivable, Accounts Payable, General Ledger, Billing, Revenue

Distribution, Lease Records, WP, Payroll, Spreadsheet
Specific Industry: Oil, Gas
System Requirements: DEC PDP-11/23, PDP-11/24; RSTS/E, VAX-11
Memory Required: 256 0K bytes
Source Language: DEC Dibol
[illegible] $50,000
[illegible] Lease
Price: $50,000
[illegible] 1977
(See Vendor Profile Page V-106)

TOWER SYSTEMS, INC.
OMNICALC
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: OS/VS1, MVS, DOS/VSE, OS/VS2
Source Language: Cobol
Purchase Terms: Purchase (license); Lease
[illegible] 250
(See Vendor Profile Page V-111)

TUDOR SYSTEMS, INC.
MARKET-SHARE PROGRAM
Specific Application: Allows Customer to Take Inventory to Calculate Estimate of Market Share
Specific Industry: Wholesale/Distribution; Beverage
System Requirements: TI 990; IBM System/32, System/36
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: 1982
(See Vendor Profile Page V-112)

UNIQ DIGITAL SYSTEMS, INC.
UNICALC
Specific Application: Three-Dimensional Financial Modeling and Spreadsheet Calculator
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix
Memory Required: 1.0M bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 12
Date First Installed: January 1983
(See Vendor Profile Page V-113)

UNIQUE COMPUTER CORP.
UNICALC
Specific Application: Three-Dimensional Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: Unix, DEC VAX
Memory Required: 256.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: 1983
(See Vendor Profile Page V-113)

UNITED INFORMATION SERVICES
FORESIGHT
Specific Application: Financial Modeling Program That Prepares Financial, Analysis and Mgmt Reports
System Requirements: CDC Cyber; IBM: System/8; Decsystem 10
Source Language: Fortran, Cobol, Basic, PL/1
[illegible] Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-113)

UNITED INFORMATION SERVICES
SAS
Specific Application: Statistical Analysis System Used to Analyze and Forecast Time Series Data
Source Language: Ansi Cobol, DS Fortran, DS Basic, PL/1, Optimizer
Source Code Available: Yes
Purchase Terms: Purchase (license)

UNITED INFORMATION SERVICES
TCS
Specific Application: Asset, Debt and Bank Relationship Management, Cash Forecasting
Specific Industry: Banking/Financial
System Requirements: DEC Decsystem 10
Source Language: Cobol, Fortran, Basic, PL/1
Source Code Available: Yes
Purchase Terms: Purchase (license)

VALUATION SYSTEMS CO., INC.
FINANCIAL ANALYSIS SYSTEM
Specific Application: Loan, Present Value, Income and Expense Analysis
Specific Industry: Banking/Financial, Real Estate
System Requirements: Wang VS: VS/OS, Wang 2200: CP/M
Memory Required: 28.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400 to $5,000
Number Installed to Date: 61
Date First Installed: March 1979
(See Vendor Profile Page V-114)

VIA COMPUTER, INC.
PROPHIT II (TIME SHARING)
Additional Product Classification: Report Generator
Specific Application: Financial Modeling, Goal-Seeking Ratios
Specific Industry: Not Industry Sensitive
System Requirements: CDC
Source Language: Basic, PL/1
Purchase Terms: Purchase (license)
Number Installed to Date: 4,000
Date First Installed: 1983
(See Vendor Profile Page V-115)

WCS COMPUTER SERVICES, INC.
SPREADSHEET
Specific Application: Spreadsheet
Specific Industry: Manufacturing, Wholesale/Distribution
System Requirements: Wang 2200
Memory Required: 32.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
(See Vendor Profile Page V-116)

WESTMORELAND SYSTEMS, INC.
CALC/34 VERSION 4
Specific Application: Flexible Financial Modeling
System Requirements: IBM System/34
Memory Required: 32.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2 [illegible]
Number Installed to Date: 400
Date First Installed: January 1981
(See Vendor Profile Page V-116)

WHY SYSTEMS, INC.
DIGICALC V1.2
Specific Application: Electronic Spreadsheet/Financial Management
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 Series. RSTS/E, DEC VAX Series. VMS, Professional 350 Series
Memory Required: 300 0K bytes
Source Language: Basic +2, Macro, VAX Basic
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 375
Date First Installed: 1981
(See Vendor Profile Page V-117)

WICAT SYSTEMS, INC.
RSTE
Specific Application: Financial Model
Specific Industry: Not Industry Sensitive
System Requirements: Wicat: Unix, MCS
Memory Required: 512.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $300 to $1,500
Number Installed to Date: 5,000
Date First Installed: 1981
(See Vendor Profile Page V-117)

WORTH, AUGER & ASSOCIATES, INC.
PLAN MASTR
Specific Application: Financial Planning
Specific Industry: Not Industry Sensitive
System Requirements: Basic Four [illegible]
Memory Required: 16.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500 to $3,500
Number Installed to Date: 100
Date First Installed: December 1980
(See Vendor Profile Page V-118)

WORTH, AUGER & ASSOCIATES, INC.
ROWS & COLUMNS
Specific Application: Electronic Spreadsheet in Business Basic
Specific Industry: Not Industry Sensitive
System Requirements: Basic Four 510 Boss, BBM, Point 4 Iris
Memory Required: 16.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $695
Number Installed to Date: 50

SIMPLAN

THE DATA DRIVEN DECISION SUPPORT SYSTEM

All the analysis in the world will not help make a better decision unless it is based on complete, up to date information; data is the key to Decision Support. And SIMPLAN is the data driven Decision Support System.

For more information about SIMPLAN contact:

SIMPLAN SYSTEMS, INC.
300 Eastowne Drive
Chapel Hill, NC 27514
(919) 493-2495

ABACUS ASSOCIATES
VIZ-A-COM
Additional Product Classification: Report Generator, Data/File Management
Specific Application: Provides Consolidations for Visicalc
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Apple III: APPLE-SOS; Apple II, IIE: APPLE-DOS; TRS-DOS
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100 to $140
Number Installed to Date: 1,000
Date First Installed: August 1982
(See Vendor Profile Page V-1)

ABACUS ASSOCIATES
VIZ-A-MERGE (A MERGE SYSTEM)
Specific Application: Financial Modeling, Reporting System for A Spreadsheet Data Base
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Apple II, II+, IIE: APPLE-DOS; TRS-80/I, 80/II, 80/III,80/4: TRS-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100 to $140
Number Installed to Date: 18
Date First Installed: June 1983

THE ALTERNATE SOURCE
VISICALC FORMULA PRINTER
Specific Application: Display Visicalc Spreadsheets in Report Form
Specific Industry: Not Industry Sensitive
System Requirements: S TRS-80/I, 80/III
Purchase Terms: Purchase (license)
Price: $39
Number Installed to Date: 200
Date First Installed: November 1982
(See Vendor Profile Page V-00)

ANALOGICS, INC.
FORECASTER
Specific Application: Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: Alpha Micro: Amos
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 50
Date First Installed: January 1982
(See Vendor Profile Page V-6)

ANDERSON-BELL
ABSTAT
Additional Product Classification: Statistical
Specific Application: Interactive Statistical Package
Specific Industry: Not Industry Sensitive
System Requirements: DEC VT 180: CP/M 80; APPLE: CP/M 86; IBM PC: DOS, Victor: MS-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 1,000
Date First Installed: September 1981
(See Vendor Profile Page V-8)

ASHTON-TATE
BOTTOM LINE STRATEGIST
Specific Application: Financial Modeling
Specific Industry: Manufacturing, Wholesale/Distribution, Retail, Banking/Financial
System Requirements: CP/M: CP/M 86, IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: 1982
(See Vendor Profile Page V-9)

BASIC BUSINESS SOFTWARE, INC.
FINANCE CALCULATOR
Specific Application: Finance Calculator
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; Apple IIE, II, III
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $30
Date First Installed: 1979
(See Vendor Profile Page V-12)

BSG CORP.
STRATEGIC PLANNER
Specific Application: Financial Modeling Package With Built-In Amortization and Depreciation Schedules
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M 86; Apple II: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: 249$ to 295$
Number Installed to Date: 40
Date First Installed: 1980
(See Vendor Profile Page V-14)

CHANG LABS
CONSOLIDATION MODULE
Specific Application: Performs Mathematical Operations, Reconsolidation of Files
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CPM, PC-DOS
Memory Required: 64.0K bytes
Source Language: C Basic
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: April 1982
(See Vendor Profile Page V-18)

CHANG LABS
MICROPLAN
Specific Application: Large Scale Budgeting, Financial, Planning, Discount, Cash Flow, Depreciation Scheduling
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CPM, PC-DOS
Memory Required: 64.0K bytes
Source Language: C Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: April 1981

CHANG LABS
PROFIT PLAN
Specific Application: Budgeting, Financial Forecasting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M: PC-DOS
Memory Required: 64.0K bytes
Source Language: C Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 50,000
Date First Installed: December 1981

COMPUTER SYSTEMS RESEARCH, INC.
CSR SURVIVAL TRAINING FOR VISICALC
Specific Application: Computer Audio Based Instructions for Using Visicalc on the IBM PC
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 1
Date First Installed: January 1982
(See Vendor Profile Page V-27)

COMPU TRAC
COMPU TRAC V 4.0
Specific Application: Technical Analysis of Market Trends
Specific Industry: Stock and Commodities
System Requirements: Apple II+, IIE: APPLE-DOS; IBM PC: PC-DOS; Franklin ACE 1000: DOS
Memory Required: 64.0K bytes
Source Language: Basic, Prime, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 2,500
Date First Installed: June 1979
(See Vendor Profile Page V-29)

CONSHARE
TARGET APPLICATIONS LIBRARY
Specific Application: Decision Support for Library
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M; DEC Rainbow 100: CP/M
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $125
(See Vendor Profile Page V-29)

CONSHARE
TARGET FINANCIAL MODELING
Specific Application: Spreadsheet Plus Financial Modeling Decision Support System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M, DEC Rainbow 100: CP/M
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $325
Number Installed to Date: 1,500
Date First Installed: June 1982

CONSHARE
TARGET MAKE MAKER
Specific Application: DSS Service for 35MM Color Slides, Overheads, Charts, Graphs
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $175
Number Installed to Date: 1,000
Date First Installed: February 1982

CONSHARE
TARGET PLANNER/CALC
Specific Application: Spreadsheet Decision Support
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II; CP/M; Apple II, III: M; DEC VT100: CP/M
Memory Required: 56.0K bytes
Source Language: C
Source Code Available: No
Price: $99
Number Installed to Date: 10,000
Date First Installed: April 1982

CONSHARE
TARGET PLOT
Specific Application: Business Graphics DDS for Plotting Line, Bar and Scatter Graphs and Charts
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $75
Date First Installed: 1979

CONSHARE
TARGET TASK
Specific Application: Project Scheduling, and Management Decision Support
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M; DEC Rainbow 100: CP/M
Memory Required: 56.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $329
Number Installed to Date: 1,400
Date First Installed: November 1981

CONTECTRA SYSTEMS, INC.
PEAR TECHNICAL ANALYSIS
Additional Product Classification: Graphics
Specific Application: Graphic Modeling, Simulated Trade Models
Specific Industry: Banking/Financial
System Requirements: IBM
Source Language: Basic
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-29)

CONTROL DATA LITERAMA
RETURN ON INVESTMENT (ROI)
Specific Application: Gives

Tangible Evidence of Investment Future
Specific Industry: Not Industry Sensitive
System Requirements: CP/M, MP/M
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $375
(See Vendor Profile Page V-31)

CUBICOMP CORP.
CS-1 GRAPHICS SYSTEM
Specific Application: General Purpose Solid Modeling
Specific Industry: Manufacturing, Engineering, Medical, Education, Scientific
System Requirements: IBM PC, PC-XT
Memory Required: 3.2M bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-32)

DATAMENTION
REPORT MANAGER
Specific Application: Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: MS-DOS
Memory Required: 192.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $ [illegible]
Number Installed to Date: 15,000
Date First Installed: October 1981
(See Vendor Profile Page V-37)

DATA PROCESSING CONSULTANTS
DATA COUNT 23 SPREADSHEET PROGRAM
Specific Application: Spreadsheet Program
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110; IBM 5120, Datamaster 23
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental Lease
Price: $1,275
Date First Installed: 1983
(See Vendor Profile Page V-37)

DBMS, INC.
PRACTICALE PLUS
Additional Product Classification: Accounting, Payroll/Personnel, Graphics, Sort/Merge
Specific Application: Alphanumeric Sort, Spreadsheet, Graphics, Search
Specific Industry: Not Industry Sensitive
System Requirements: Commodore VIC 20
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50 to $55
Number Installed to Date: 10,000
Date First Installed: 1983
(See Vendor Profile Page V-40)

DBMS, INC.
PRACTICALE 20
Additional Product Classification: Accounting, Payroll/Personnel, Graphics, Sort/Merge
Specific Application: Alphanumeric Sort, Spreadsheet, Graphic
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64; Commodore VIC 20
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20 to $45
Number Installed to Date: 10,000
Date First Installed: 1983

DBMS, INC.
PRACTICALE 64
Additional Product Classification: Accounting, Payroll/Personnel, Graphics, Sort/Merge
Specific Application: Alphanumeric Sort, Graphic, Spreadsheet, Search
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64, Commodore VIC 20
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50 to $55
Number Installed to Date: 10,000
Date First Installed: 1983
(See Vendor Profile Page V-40)

DECISION SUPPORT SERVICES, INC.
MICRO DSS ANALYSIS
Additional Product Classification: Graphics, Sort/Merge, Report Generator
Specific Application: Sort/Merge, Statistical Analysis, Group Analysis Ad Hoc Relationship Between Data
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+; IBM PC
Memory Required: 256.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Date First Installed: 1982
(See Vendor Profile Page V-40)

DECISION SUPPORT SERVICES, INC.
MICRO DSS FINANCIAL
Additional Product Classification: Graphics, Sort/Merge, Report Generator
Specific Application: Financial Planning, Color Graphics, Report Generator, Sort/Merge
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III; IBM PC
Memory Required: 256.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $ [illegible] to $ [illegible]
Date First Installed: 1982

DLH SYSTEMS, INC.
DATACALC/23
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: IBM Datamaster
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,275
Number Installed to Date: 89
Date First Installed: September 1982
(See Vendor Profile Page V-43)

DUO SOFT CORP.
BUSINESS PLANNER
Specific Application: True Financial Modeling, Accounting Statements, Financial Ratios, Graphs, Tables
Specific Industry: Not Industry Sensitive
System Requirements: Apple II,III; IBM PC
Memory Required: 64.0K bytes
Source Language: UCSD-Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 1,000
Date First Installed: November 1982
(See Vendor Profile Page V-44)

DUO SOFT CORP.
BUSINESS PLANNER
DEMONSTRATION
Specific Application: Flip Chart Binder, Features, Benefit Charts, Keystroke Demonstration Charts
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple III; IBM PC
Memory Required: 64.0K bytes
Source Language: UCSD-Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $75
Date First Installed: March 1983

EAGLE SOFTWARE PUBLISHING, INC.
MONEY DECISION
Specific Application: Financial Planning
System Requirements: IBM; Apple; DEC, Victor
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $199 to $299
Number Installed to Date: 8,000
Date First Installed: March 1982
(See Vendor Profile Page V-45)

EXECUCOM SYSTEM CORP.
IFPS PERSONAL
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; MS-DOS
Memory Required: 256.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: 1983
(See Vendor Profile Page V-47)

EXECUTEC CORP.
EXECU/MODEL TM
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: A Powerful and Flexible Tool for Analysis, Planning, and Financial Modeling
Specific Industry: Not Industry Sensitive
System Requirements: [illegible] DOS, Wang PC MS-DOS, Victor 9000
Purchase Terms: Purchase (license)
Price: $200

FARMPLAN COMPUTER SYSTEMS, INC.
3230 FARMCALC
Specific Application: Series Of Microcomputer Program Models Designed to Run on Visicalc
Specific Industry: Agricultural
System Requirements: Apple II+, IIE, APPLE-DOS, TI Professional: MS-DOS
Memory Required: 48.0K bytes
Source Language: Applesoft Basic, CP/M Basic
Source Code Available: No
Price: $295
Number Installed to Date: 1,000
Date First Installed: February 1981
(See Vendor Profile Page V-48)

FEROX MICROSYSTEMS, INC.
ENCORE
Specific Application: Comprehensive Decision Support and Financial Modeling System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; UCSD-P System, PC-DOS
Memory Required: 256.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,850
Number Installed to Date: 1,000
(See Vendor Profile Page V-48)

FINANCIAL SYSTEMS, INC.
FINANCIAL CALCULATOR
Additional Product Classification: Banking
Specific Application: Financial Modeling
Specific Industry: Banking, Financial
System Requirements: Apple II, III: APPLE-DOS
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $ [illegible]
Number Installed to Date: 150
Date First Installed: 1982
(See Vendor Profile Page V-48)

FISHER BUSINESS SYSTEMS, INC.
FINANCIAL PLANNING SYSTEM
Specific Application: Financial Planning, Investment Analysis, Tax Modeling
Specific Industry: Banking/Financial
System Requirements: IBM PC, PC-XT; PC-DOS, TI PC; PC-DOS, Zenith Z100 Z-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 50
Date First Installed: February 1982
(See Vendor Profile Page V-49)

GAYLORD BROS., INC.
DESKTOP/PLAN
Specific Application: Financial Planning and Budgeting
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+; APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $250
(See Vendor Profile Page V-50)

GAYLORD BROS., INC.
VISI CALC
Specific Application: Electronic Work Sheet
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $250

GAYLORD BROS., INC.
VISI SCHEDULE
Additional Product Classification: Report Generator, Data/File Management
Specific Application: Project Planner, Cost Allocated Resource Distribution
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $300

HERITAGE COMPUTING CORP.
JEWEL SPREADSHEET INTERFACE
Specific Application: Spreadsheet Interface for Visicalc Lotus 1, 2, 3
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; TI Professional: MS-DOS, TRS 80
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $175
(See Vendor Profile Page V-54)

I.P. SHARP ASSOCIATES, INC.
EASY ECONOMETRIC ANALYSIS
Specific Application: Simple Models, Econometric Analysis
System Requirements: IBM; VMS; PDP
Source Language: APL
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: 1980
(See Vendor Profile Page V-61)

LOTUS DEVELOPMENT CORP.
1-2-3 (RELEASE 1A) INTEGRATED SPREADSHEET
Additional Product Classification: DBMS, Graphics
Specific Application: Spreadsheet, Information Management and Graphics for Managers And Professionals
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS, IBM PC-XT: PC-DOS; Wang; NEC
Memory Required: 192.0K bytes
Source Language: Assembly
Price: $495
(See Vendor Profile Page V-67)

MANATRON, INC.
MULTI PLAN
Specific Application: MultiplanSpreadsheet
Specific Industry: Government
System Requirements: Burroughs B20 Btos
Source Language: Basic
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-68)

MCGRAW-HILL BOOK CO.
MICRO TSP
Specific Application: Regression Forecasting and Tools for Developing Statistical Relationships Among Data
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+: APPLE-DOS 3.3, IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Applesoft Basic
Purchase Terms: Purchase (license)
Price: $295 to $395
(See Vendor Profile Page V-71)

MEMOTECH CORP.
MEMOCALS
Additional Product Classification: Accounting
Specific Application: Spreadsheet
System Requirements: Timex/Sinclair
Memory Required: 16.0K bytes
Source Language: Assemby
Source Code Available: Yes
Price: $5,000
(See Vendor Profile Page V-72)

MICROPRO INTERNATIONAL CORP.
PLANSTAR
Specific Application: High-End Financial Modeling System
Specific Industry: Not Industry Sensitive
System Requirements: CP/M, MS-DOS
Memory Required: 128.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $695
Date First Installed: 1983
(See Vendor Profile Page V-74)

MARKET COMPUTER CENTER CO.
FINANCIAL ANALYSIS
Additional Product Classification: Accounting
Specific Application: Performs Budgeting, Prior Year Analysis, Fixed Asset Management, Solves Financial Problems
Specific Industry: Not Industry Sensitive
System Requirements: Xerox 80; DEC Rainbow: CP/M, IBM PC
Memory Required: 64.0K bytes
Source Language: Fortran 4, Macro
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 1,000
Date First Installed: September 1978
(See Vendor Profile Page V-75)

MOHAWK DATA SCIENCES CORP.
PLAN 21
Specific Application: Electronic Spreadsheet Program
Specific Industry: Not Industry Sensitive
System Requirements: MDS Series 21: OS/2, MDS 2110: OS/10
Memory Required: 96.0K bytes
Source Language: Mobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Date First Installed: May 1983
(See Vendor Profile Page V-77)

MONROE SYSTEMS FOR BUSINESS
MONROE SUPERCALC / SUPERSHEET
Specific Application: Electronic Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: Monroe OC 8800 Series: MS10; Monroe EC 8800: MS10
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $245
Number Installed to Date: 1,750
Date First Installed: January 1982
(See Vendor Profile Page V-77)

OCTO LIMITED
FINANCIAL AND CIRCULATION MODELING
Specific Application: Financial and Circulation Modeling
Specific Industry: Publishing
System Requirements: Datapoint: DOS
Source Language: Databus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-81)

OMEGA MICROWARE, INC.
SUPER EXPANDER PLUS
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Gives Added Commands to the Standard Visicalc
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $125
Date First Installed: 1983
(See Vendor Profile Page V-82)

OMEGA MICROWARE, INC.
SUPER EXPANDER 40 COLUMNS
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Visicalc Pre-Boot Program That Combines With Ramex to Expand the Visicalc Memory
System Requirements: Apple II: APPLE-DOS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $54
Date First Installed: 1981

OMEGA MICROWARE, INC.
SUPER EXPADER 80 COLUMN
Additional Product Classification: Program Generators/Aids, ApplicationDevelopment Tools
Specific Application: Visicalc Pre-Boot Program That Combines With Ramex to Expand the Visicalc Memory
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $99
Date First Installed: 1982

OMEGA MICROWARE, INC.
THE INVESTOR'S TOOLKIT
Specific Application: Makes In-Depth Analysis of A Portfolio as Well as Predictions Into the Future and Equity Market
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS, IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Applesoft Basic
Purchase Terms: Purchase (license)
Price: $80 to $700
Date First Installed: 1982

OMNIA SOFTWARE SYSTEMS, INC.
ELECTRONIC WORKSHEET
Specific Application: Spreadsheet Program
System Requirements: IBM PC: PC-DOS, North Star Horizon, Advantage: NS-DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 350
Date First Installed: October 1981
(See Vendor Profile Page V-82)

PEACHTREE SOFTWARE
PEACHCALC ELECTRONIC SPREADSHEET
Specific Application: Electronic Spreadsheet
Specific Industry: Not Industry Sensitive
Memory Required: 48.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $150
(See Vendor Profile Page V-85)

PERFECT SOFTWARE, INC.
PERFECT CALC
Specific Application: Spreadsheet Application
Specific Industry: Not Industry Sensitive
System Requirements: IBM: PC-DOS, DEC: MS-DOS, Apple
Memory Required: 64.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: 1981
(See Vendor Profile Page V-85)

PETTED MICRO SYSTEMS
MS-CALC
Specific Application: Electronic Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 8032: OS
Memory Required: 32.0K bytes
Source Language: Basic, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150 to $250
(See Vendor Profile Page V-85)

PHOENIX SYSTEMS, INC.
BUSY PLAN
Additional Product Classification: Graphics
Specific Application: Forecasting and Graphing

System Requirements: Cado
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1979
(See Vendor Profile Page V-86)

POLICY DEVELOPMENT CORP.
MAGAZINE CIRCULATION HISTORY
Specific Application: Captures and Analyzes Key Statistics
Specific Industry: Magazine Publisher
System Requirements: IBM PC; PC-DOS, DEC Rainbow: CP/M 86
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 35
Date First Installed: 1983
(See Vendor Profile Page V-87)

PROSOFT
TELLMASTER - IBM PC
Specific Application: Financial Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $130
Number Installed to Date: 200
Date First Installed: February 1983
(See Vendor Profile Page V-89)

QUANTITATIVE SOFTWARE MANAGEMENT, INC.
SLIM
Specific Application: Software Life Cycle Management Decision Support System; Plans Software Development Projects for Managers
Specific Industry: Not Industry Sensitive
System Requirements: HP 80 Series, IBM PC; MS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Lease
Price: $25,000
Number Installed to Date: 60
Date First Installed: 1977
(See Vendor Profile Page V-90)

RACET COMPUTERS, LTD.
ELECTRIC SPREADSHEET
Specific Application: Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: NEC PC-8001; Racet NEC-DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $75
Number Installed to Date: 100
Date First Installed: 1982
(See Vendor Profile Page V-91)

SATURN SYSTEMS, INC.
VC-EXPAND
Specific Application: Expanded Spreadsheet For Visicalc
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+; APPLE-DOS 3.3, Apple II
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $89
Number Installed to Date: 1,000
Date First Installed: January 1982
(See Vendor Profile Page V-95)

SATURN SYSTEMS, INC.
VC-EXPAND/IIE
Specific Application: Expands Spreadsheet for Visicalc
System Requirements: Apple IIE: APPLE-DOS 3.3
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $89
Number Installed to Date: 200
Date First Installed: May 1983

SATURN SYSTEMS, INC.
VC-EXPAND/80
Specific Application: Expands Spreadsheet for Visicalc
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS 3.3, Apple IIE
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $89
Number Installed to Date: 1,000
Date First Installed: July 1982

SATURN SYSTEMS, INC.
VC/80
Specific Application: Spreadsheet for Visicalc
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS 3.3; Apple II+; Apple IIE
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $49
Number Installed to Date: 300
Date First Installed: July 1982

SCHUCHARDT SOFTWARE SYSTEMS, INC.
INTERCALL
Specific Application: Three Dimensional Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 128.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: September 1983
(See Vendor Profile Page V-93)

SHAFFER & SHAFFER APPLIED RESEARCH & DEVELOPMENT
VISICALC PROGRAMMING
Specific Application: Illustrated, Step-By-Step Exercise to Build Visicalc Model
Specific Industry: Not Industry Sensitive
System Requirements: Apple 2E: APPLE-DOS; IBM PC; Atari 1200; TRS-80/III
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,999
Number Installed to Date: 500
Date First Installed: October 1982
(See Vendor Profile Page V-97)

SIMPLE SOFT, INC.
QUIKCALC DEPRECIATION ANALYZER
Specific Application: Financial Modeling
Specific Industry: Banking/Financial, Legal, Real Estate
System Requirements: IBM PC; Apple II, IIE, III; Xerox 820; Osborne, Kaypro
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-97)

SIMPLE SOFT, INC.
QUIKCALC LOAN ANALYZER
Additional Product Classification: Banking
Specific Application: Financial Modeling
Specific Industry: Banking/Financial, Legal, Real Estate
System Requirements: IBM -PC; Apple II, IIE, III, Xerox 820: CP/M
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100 to $130
Date First Installed: April 1982

SOFTWARE ARTS, INC.
TK SOLVER
Specific Application: Equation Solver
Specific Industry: Engineering, Education, Construction, Scientific
System Requirements: IBM PC: PC-DOS, DEC 350; DEC Rainbow: CP/M 86; Wang PC: MS-DOS
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $299
(See Vendor Profile Page V-98)

SOFTWARE ARTS, INC.
TK SOLVERPACKS
Specific Application: Equation Solver Packages
Specific Industry: Engineering
System Requirements: IBM PC: PC-DOS, DEC 350, DEC Rainbow: CP/M 86, Wang PC: MS-DOS
Purchase Terms: Purchase (license)
Price: $100

SOFTWARE CORP.
STATISTICAL REPORT PROGRAM
Specific Application: Statistical Spreadsheet Program
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 8000: Commodore DOS; Commodore 9000: Commodore DOS
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $220
Number Installed to Date: 30
Date First Installed: 1980
(See Vendor Profile Page V-99)

SOFTWARE TOOLWORKS
ZENCALC 3.0
Specific Application: File-Featured Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: Heath/Zenith: CP/M
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 570
Date First Installed: September 1980
(See Vendor Profile Page V-100)

SOMA INTERNATIONAL, INC.
INSIGHT
Specific Application: Financial Modeling
Specific Industry: Banking/Financial
System Requirements: Alpha Micro: Amos
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500 to $600
Number Installed to Date: 150
Date First Installed: January 1982
(See Vendor Profile Page V-101)

SPREADWATER SOFTWARE, INC.
FORECASTING
Specific Application: Forecasting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 256.0K bytes
Source Language: APL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: July 1983
(See Vendor Profile Page V-102)

STSC, INC.
APL PLUS/PC FINANCIAL AND STATISTICAL LIBRARY
Additional Product Classification: Financial Analysis
Specific Application: Financial Modeling, Management Consulting and Application Building
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 256.0K bytes
Source Language: APL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $275
Number Installed to Date: 25
Date First Installed: January 1983
(See Vendor Profile Page V-104)

SUNSET INFORMATION SYSTEMS CORP.
FORECAST
Specific Application: Forecasting for Financial Institutions
Specific Industry: Banking/Financial
System Requirements: HP 100 Series; CP/M, IBM PC: MS-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: March 1981
(See Vendor Profile Page V-104)

SUMMIT INFORMATION SYSTEMS CORP.
SPREAD ANALYSIS
Specific Application: Spread Analysis
Specific Industry: Banking/Financial
System Requirements: HP 100 Series: CP/M; IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: March 1981

SUPERSOFT, INC.
SCRATCHPAD
Specific Application: Spreadsheet, Business Planning, Financial Modeling, and Decision Making
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; PC-DOS; MS-DOS; CP/M 86
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
(See Vendor Profile Page V-104)

SUPERSOFT, INC.
THE OPTIMIZER
Specific Application: Business Decision Aid
Specific Industry: Banking/Financial
System Requirements: APPLE-DOS; CP/M; Podos
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350
(See Vendor Profile Page V-104)

SYSTEMS PLUS, INC.
THE WEDGE
Specific Application: Financial Modeling
Specific Industry: Not Industry Sensitive
Memory Required: 48.0K bytes
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $199
Date First Installed: March 1982
(See Vendor Profile Page V-107)

TANDY CORP.
ENHANCED MODEL III VISICALC
Specific Application: Electronic Worksheet
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/III
Purchase Terms: Purchase (license)
Price: $199
(See Vendor Profile Page V-108)

TANDY CORP.
MULTI-PLAN
Specific Application: Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80 Model 16; Xenix
Memory Required: 256.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $349
Date First Installed: 1983

TEXAS SOFTWARE, INC.
OIL AND GAS FINANCIAL MODEL PECON
Specific Application: Financial Planning, Prospect Variation
Specific Industry: Oil and Gas
System Requirements: IBM PC: PC-DOS; Victor 9000: CP/M; TI Professional
Memory Required: 128.0K bytes
Source Language: C Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 5
Date First Installed: July 1983
(See Vendor Profile Page V-109)

TYMSHARE
PROCALC
Specific Application: Information Analysis Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: DEC Rainbow
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: 1983
(See Vendor Profile Page V-112)

UNISOFT SYSTEM CORP.
ULTRACALC
Specific Application: Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
(See Vendor Profile Page V-113)

UNISOFT SYSTEM CORP.
VIEWCOMP
Specific Application: Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400

UNIVERSITY COMPUTING CO.
UCC MBA
Additional Product Classification: Payroll/Personnel, Banking, WP/Text Editing, Entertainment (Games), Graphics
Specific Application: Financial Modeling, WP, Graphics, Data Communications
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; HP 9816
Memory Required: 256.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $900
Number Installed to Date: 2,000
Date First Installed: August 1982
(See Vendor Profile Page V-114)

UNIVERSITY COMPUTING CO.
UCC MBA-MICROCOMPUTER SOFTWARE
Specific Application: Spreadsheet Modeling, Graphics, Word Processing, Data Base, Forms Generation
Specific Industry: Manufacturing
System Requirements: IBM PC; HP 9816
Memory Required: 256.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2,000

VIA COMPUTER, INC.
MICRO PROPHIT
Additional Product Classification: Report Generator
Specific Application: Financial Modeling, Ratio Reports
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Memory Required: 192.0K bytes
Source Language: IBM Basic
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 10
Date First Installed: 1983
(See Vendor Profile Page V-115)

VISICORP
DESKTOP PLAN
Specific Application: Financial Planning
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III: APPLE-DOS; IBM PC: PC-DOS
Purchase Terms: Purchase (license)
Price: $250 to $300
(See Vendor Profile Page V-115)

VISICORP
VISICALC
Specific Application: Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III: APPLE-DOS, Commodore 2001; IBM PC: PC-DOS; Atari 800
Purchase Terms: Purchase (license)
Price: $250
(See Vendor Profile Page V-116)

VISICORP
VISICALC ADVANCE VERSION
Specific Application: Spreadsheet Financial Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III: APPLE-DOS, IBM PC: PC-DOS; Commodore; Atari
Purchase Terms: Purchase (license)
Price: $400

VISICORP
VISICALC BUSINESS FORECASTING MODEL
Specific Application: Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III: APPLE-DOS; IBM PC: PC-DOS; Commodore; Atari 800
Purchase Terms: Purchase (license)
Price: $100

VISICORP
VISICALC IV
Specific Application: Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III: APPLE-DOS; IBM PC: PC-DOS; Commodore; Atari 800
Purchase Terms: Purchase (license)
Price: $250

VISICORP
VISILINK
Additional Product Classification: Communications/TP Monitors
Specific Application: Business Information Planning for Visicalc
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III: APPLE-DOS; IBM PC: PC-DOS; Commodore; Atari 800
Purchase Terms: Purchase (license)
Price: $250

GRAPHICS

AB ASSOCIATES, INC.
INTERACTIVE GRAPHICS SPICE
Specific Application: Electronic Circuit Analysis
Specific Industry: Engineering, Education
System Requirements: DEC VAX: Unix, VMS, Prime: Primos
Memory Required: 500.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $19,500
Number Installed to Date: 400
Date First Installed: July 1979
(See Vendor Profile Page V-1)

AB ASSOCIATES, INC.
SUPER-SCEPTRE
Specific Application: Electrical, Mechanical, Control, System Analysis Program
Specific Industry: Engineering, Education
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $24,900
Number Installed to Date: 400
Date First Installed: 1975

ABW CORP.
[illegible] GRAPHICS PROCESSOR
Specific Application: Graphics Processor
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: DOS 1.1, IBM PC-XT: DOS 2.0
Memory Required: 96.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Date First Installed: March 1984
(See Vendor Profile Page V-1)

ARDENT & FUSSEL & ASSOCIATES, INC.
BLOX GRAPHICS BUILDER
Specific Application: Creates Graphics Application
Specific Industry: Not Industry Sensitive
System Requirements: VAX: VMS
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: July 1982
(See Vendor Profile Page V-6)

APPLICATION SOFTWARE CORP.
[illegible] GRAPHICS PACKAGE
Specific Application: Vertical and Horizontal Bar Charts, Line Graphs, Pie Charts, Statistical Scatter Charts
Specific Industry: Not Industry Sensitive
System Requirements: MAI/Basic 4: [illegible]
Memory Required: 8.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 100
Date First Installed: 1981
(See Vendor Profile Page V-7)

APPLIED ADVANCED MANAGEMENT RESEARCH, INC.
SUPERPLOT
Specific Application: Graphics
Specific Industry: Not Industry Sensitive
System Requirements: Prime, Micro Data; Honeywell Ultimate: Pick, GA
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,495
Number Installed to Date: 30
Date First Installed: November 1982
(See Vendor Profile Page V-7)

ASK COMPUTER SYSTEMS, INC.
MANMAN/GRAFMAN
Specific Application: Business Graphics
Specific Industry: Manufacturing
System Requirements: HP 3000: Images, DEC VAX VMS
Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 20
Date First Installed: 1981
(See Vendor Profile Page V-9)

ATHENA SYSTEMS, INC.
GRAFMAKER/TK VERSION 1.0
Specific Application: Support Graphics Development for DEC Professional 350
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX 750, 780: VMS, DEC PDP-11: RSX-11
Memory Required: 256.0K bytes
Source Language: Fortran 66/77
Source Code Available: No
Purchase Terms: Purchase (license); OEM Agreement
Price: $12,500
Number Installed to Date: 1
Date First Installed: January 1983
(See Vendor Profile Page V-10)

AUTOMATED GRAPHICS TECHNOLOGY, INC.
VIP GRAPHICS
Additional Product Classification: Graphics
Specific Application: Business Graphics
Specific Industry: Not Industry Sensitive
System Requirements: HP 86: Basic
Memory Required: 196.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Number Installed to Date: 40
Date First Installed: August 1982
(See Vendor Profile Page V-10)

AYDIN CORP.
AYGRAF/CORE
Specific Application: Sophisticated Two Dimensional Graphics
Specific Industry: Not Industry Sensitive
System Requirements: DEC: VMS; DEC VAX RSX-11/M
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 300
Date First Installed: 1979
(See Vendor Profile Page V-11)

AYDIN CORP.
SEISGRAF
Specific Application: Seismic Data and Contour Interpretation
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: VMS, RSX-11/M
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: 1983
(See Vendor Profile Page V-11)

AZTEC, INC.
AZ CHART
Specific Application: Automatic Management Information Charts and Graphs With Predefined Formats, Also Wordchart Capabilities
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000: RTE, DEC VAX, IBM
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7,000
Number Installed to Date: 12
Date First Installed: January 1988
(See Vendor Profile Page V-11)

AZTEC, INC.
AZCORE
Specific Application: Graphic and Imaging Application Development Software
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000: RTE, DEC VAX, IBM
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 169
Date First Installed: August 1979

AZTEC, INC.
SLIDE GRAPHIC II
Specific Application: Comprehensive Business Computer Color Graphics Software Package, User Friendly, Slide Making Application
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000: RTE, DEC VAX; IBM
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000
Number Installed to Date: 169
Date First Installed: August 1979

AZTEC, INC.
WORD CHART
Specific Application: Text Only Visuals, Automatic Text Generating, Graphic Slide Making, Up to 1500 Fonts
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000: RTE; DEC VAX, IBM
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 60
Date First Installed: June 1981

BANCROFT COMPUTER SYSTEMS, INC.
LINE GRAPH PRINTING SYSTEM
Specific Application: Line Graph Printing System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3; System/34; System/36; System/38
Memory Required: 20.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 65
Date First Installed: 1975
(See Vendor Profile Page V-11)

BELL & MURPHY & ASSOCIATES, INC.
CENTON LOG
Specific Application: Digitizes Multiple Curves Simultaneously, Logorithmic
System Requirements: Wang 2200
Memory Required: 28.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Lease
Date First Installed: 1973
(See Vendor Profile Page V-12)

BELL & MURPHY & ASSOCIATES, INC.
CENTON - SYN
Specific Application: Digitizes Logs
System Requirements: Wang 2200
Memory Required: 28.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Lease
Date First Installed: 1973

CADRE CORP.
CADRE GRAPHICS
Specific Application: Designed to Be A User Graphics Package for Development Applications
Specific Industry: Manufacturing
System Requirements: DEC: RSX-11; Modular Computer
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1983
(See Vendor Profile Page V-16)

CALMA
CAD-CAM
Specific Application: CAD/CAM
Specific Industry: Not Industry Sensitive
System Requirements: DEC: DEC
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: April 1973
(See Vendor Profile Page V-16)

CDS COMPUTING
COLOR SELECT
Specific Industry: Not Industry Sensitive
System Requirements: Tandem
Memory Required: 500.0K bytes
Source Language: TAL and Cobol
Source Code Available: No
Price: $7,500 to $9,000
(See Vendor Profile Page V-17)

CERNITAS COMPUTER SERVICES, INC.
CCS - PLOT
Specific Application: Uses Dot Matrix Printer Like A Plotter, Converts Computer Data Into Graphics, Erases Lines and Shaded Areas

Specific Industry: Not Industry Sensitive
System Requirements: IBM: ISDX; DEC PDP-11: RSTS/E, DG: DOS
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500 to $1,900
Number Installed to Date: 1,000
Date First Installed: 1978
(See Vendor Profile Page V-17)

COMPUTER LANGUAGE RESEARCH, INC.
SPRINTER SOFTWARE
Specific Application: Word Processing Text, Forms, Graphics
Specific Industry: Insurance
System Requirements: IBM 4341: MVS
Memory Required: 950.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $42,000
Number Installed to Date: 13
Date First Installed: 1981
(See Vendor Profile Page V-25)

COMPUTER TALK, INC.
INTERACTIVE DIGITIZING
Specific Application: Digitize, Edit, Store Digitized Highway and Map Data
Specific Industry: Engineering
System Requirements: Computer Talk 400: Tos
Memory Required: 3.0K bytes
Source Language: Tas
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $28,000
Date First Installed: October 1975
(See Vendor Profile Page V-27)

COMTECTRA SYSTEMS, INC.
MERLIN GRAPHICS
Specific Application: Graphics on Data Market Movements
Specific Industry: Banking/Financial
System Requirements: Burroughs B7800
Source Language: PL/1, Cobol, Fortran
Purchase Terms: Lease
(See Vendor Profile Page V-29)

CONTRACT SOFWARE SERVICES
VT100 SPECIAL GRAPHICS LIBRARY
Specific Application: Set of Graphic Features for VT100's
Specific Industry: Not Industry Sensitive
System Requirements: ; DEC PDP-11: RT-11: RSTS/E: RSX-11
Memory Required: 64.0K bytes
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 5
Date First Installed: September 1982
(See Vendor Profile Page V-30)

CORPORATE COMPUTER SYSTEMS, INC.
EGRAF REV 8305
Specific Application: Graph Drawing
System Requirements: HP 1000
Memory Required: 14.0K bytes
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,850
Number Installed to Date: 4
Date First Installed: 1982
(See Vendor Profile Page V-31)

CORPORATE COMPUTER SYSTEMS, INC.
PLOTC REV 8208
Specific Application: High Impact Graphic Presentation
System Requirements: HP 1000
Memory Required: 14.0K bytes
Source Language: Assembly, Fortran
Purchase Terms: Purchase (license)
Price: $1,850
Number Installed to Date: 4
Date First Installed: 1982

CORPORATE COMPUTER SYSTEMS, INC.
TPLOT REV 8308
Specific Application: Set of Graphics Support Subroutines
System Requirements: HP 1000: MPE
Memory Required: 14.0K bytes
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $850
Number Installed to Date: 4
Date First Installed: 1982

CORTEX CORP.
CORTEX EXECUTIVE DATA DISPLAY SYSTEM
Specific Application: Business Graphics
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX Series: VMS
Memory Required: 1.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000 to $7,000
Number Installed to Date: 12
Date First Installed: 1982
(See Vendor Profile Page V-31)

C TEK SOFTWARE, INC.
STAR PLOT 1.0
Specific Application: Graphics
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell Ultimate; ADDS Mentor: Pick; Microdata; IBM Series/1, Model 4331
Memory Required: 128.0K bytes
Source Language: Basic, Pick Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 1
Date First Installed: May 1983
(See Vendor Profile Page V-32)

CUBICOMP CORP.
CS - 5
Specific Application: Advanced Three Dimensional Solid Colored Modeling Graphics for Design and Development Work Animation
Specific Industry: Not Industry Sensitive
Memory Required: 320.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: July 1983
(See Vendor Profile Page V-32)

DATA BUSINESS VISION, INC.
THE GRAPHIC DECISION SUPPORT SYSTEM
Specific Application: Business Graphics
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS, Burroughs B20: Btos, Altos 856: Unix, NCR Worksaver: Ctos
Memory Required: 320.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000 to $35,000
Date First Installed: June 1982
(See Vendor Profile Page V-35)

DATAPOINT CORP.
COLOR BUSINESS GRAPHICS (CBG)
Specific Application: Prints Interactive Generation, Production and Display of Graphics and Presentation Visuals
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 6600, 8600: DOS
Memory Required: 128.0K bytes
Source Language: Systems Develop
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
(See Vendor Profile Page V-37)

DATA PROCESSING DESIGN
IB GRAPH FOR RSTS/E V1.0
Specific Application: Business Graphics
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Memory Required: 256.0K bytes
Source Language: Macro-11, Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $5,500 to $7,500
Number Installed to Date: 12
Date First Installed: April 1983
(See Vendor Profile Page V-38)

DATASCAN AMERICA, INC.
GRAPH/SCAN
Specific Application: Graphics Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3000 Series, 370: Cics, IBM System 34, 38: CP/M; IBM PC: PC-DOS; Datapoint 1560: DOS
Purchase Terms: Purchase (license)
Number Installed to Date: 300
Date First Installed: August 1982
(See Vendor Profile Page V-38)

DAVID COOK ASSOCIATES
GRID
Specific Application: Graphics Information Display
Specific Industry: Oil and Gas
System Requirements: DEC VAX: RSTS/E, DEC 20
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1983
(See Vendor Profile Page V-39)

DIGITAL INTERFACE SYSTEMS, INC.
PLAT 21
Specific Application: Plotting Graphics Software
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10
Memory Required: 256.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-42)

DYNAMIC GRAPHICS, INC.
SURFACE DISPLAY LIBRARY (SDL)
Specific Application: Library of Fortran Subrouting to Draw Contour Maps
Specific Industry: Engineering, Construction
System Requirements: VMS: Primos: MVS
Memory Required: 32.0K bytes
Source Language: Ansi Fortran IV
Purchase Terms: Purchase (license); Lease
Price: $17,500
Number Installed to Date: 100
Date First Installed: 1975
(See Vendor Profile Page V-44)

EBERT CORP., INC.
ONLINE INTERACTIVE LAZOR VIDEO DISPLAY SYSTEM
Specific Application: On-Line Interactive Laser Video Display System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series, Cics; DEC PDP-11; Univ; DEC VAX
Source Language: Cobol, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000 to $50,000
Number Installed to Date: 3
Date First Installed: 1981
(See Vendor Profile Page V-45)

ENGINEERING MECHANICS RESEARCH CORP.
DISPLAY DIGIT
Specific Application: Structural Analysis Design
Specific Industry: Manufacturing, Engineering, Transportation, Nuclear/Aerospace
System Requirements: DEC VAX; Prime: Primos, IBM: VM/CMS; Burroughs: MCP 3.3
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $15,000 to $20,000
Number Installed to Date: 140
Date First Installed: 1974
(See Vendor Profile Page V-46)

ENGINEERING MECHANICS RESEARCH CORP.
INTERFACE BETWEEN MOVIE BYU AND NIS
Additional Product Classification: Program Generators/Aids, Applications Development Tools
Specific Application: Interactive

Specific Industry: Not Industry Sensitive, Manufacturing, Engineering, Transportation, Nuclear Aerospace
System Requirements: VAX; IBM: VM/CMS; Prime: Primos; Burroughs: [illegible]
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $3,000 to $5,000
Number Installed to Date: 10

ENVIRONMENTAL SYSTEM RESEARCH INS. (ESRI)
CRID-CRIDTOPO
Additional Product Classification: Geographic Information
Specific Application: Management Modeling of Geographic Data
Specific Industry: Engineering, Real Estate, Education, Government, Transportation, Nonprofit Organizations, Scientific, Environment
System Requirements: Prime: Primos, DEC VAX: VMS; DG: AOS; IBM: VM/CMS
Memory Required: 500.0K bytes
Source Language: Fortran 66
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: June 1982
(See Vendor Profile Page V-47)

[illegible] SYSTEMS
FCSEPS
Specific Application: Color Graphics Modeling Language With Statistical Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IBM: TSO, CMS, Cics
Memory Required: 256.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); [illegible] Lease
Price: $3,000
Number Installed to Date: 3,000
Date First Installed: September 1973
(See Vendor Profile Page V-47)

EXECUCOM SYSTEM CORP.
IFPS/GRAPHICS
Additional Product Classification: Financial Modeling Languages/DSS
Specific Industry: Not Industry Sensitive
Source Language: Fortran, Assembler
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 56
Date First Installed: 1982
(See Vendor Profile Page V-47)

FINGRAPH CORP.
FINGRAPH
Specific Application: Decision Support Graphics
Specific Industry: Not Industry Sensitive, Banking/Financial
System Requirements: DEC System 20: Tops 20; DEC VAX: VMS; DEC PDP-11: Tops 10; DEC PRO 350: POS
Source Language: Fortran, Dibol
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1982
(See Vendor Profile Page V-49)

FUSION PRODUCTS INTERNATIONAL
QUERY AND REPORT PROCESSOR
Additional Product Classification: Sort/Merge, Report Generator, Data Dictionary, Query Languages
Specific Application: Query and Report Processor
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 38
Memory Required: 100.0K bytes
Source Language: RPG-III
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 26
Date First Installed: January 1983
(See Vendor Profile Page V-50)

GENERAL ELECTRIC
AUTOMATIC PLATE LAYOUT SYSTEM
Specific Application: Optimizes Placement of Patterns on Plate Metal Stock for Frame Cutters
Specific Industry: Manufacturing
System Requirements: Calma
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 6
Date First Installed: 1981
(See Vendor Profile Page V-51)

GEOGRAPHIX, INC.
GRAPHIX-11
Specific Application: Business Graphics
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11; DEC LSI-11: RSX-11M
Memory Required: 64.0K bytes
Source Language: Fortran IV
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,095
Number Installed to Date: 12
Date First Installed: February 1982
(See Vendor Profile Page V-51)

GOULD, INC.
PLOT-10 TCS - TERMINAL CONTROL SYSTEM
Specific Application: Two Dimensional Graphics, CAD/CAM
Specific Industry: Engineering, Scientific
System Requirements: Concept/32: MPX-32
Memory Required: 48.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,500
(See Vendor Profile Page V-52)

GOULD, INC.
TEMPLATE
Specific Application: Three Dimensional Graphics
Specific Industry: Engineering, Scientific
System Requirements: Concept/32: MPX-32
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $27,500

GRAPHIC COMMUNICATIONS, INC.
GRAPHWRITER
Specific Application: Business Graphics for Presentation
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; DEC Rainbow 100; NEC APC
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 400
Date First Installed: March 1983
(See Vendor Profile Page V-52)

Additional information provided for by vendor

GRAPHWRITER is a business graphics package designed to produce formal presentations on microcomputers. High-quality output, wide range of chart types, flexibility to create custom graphs and is easy to use. Includes pie, bar, line, word, Gantt, organizational, flow, pie-bar, line-table and bubble charts. Hard copy from plotters or 35mm slide systems.

GRAPHIC INFORMATION SYSTEM TECHNOLOGY
GSDL
Specific Application: Architectural Graphics
Specific Industry: Education
System Requirements: IBM: TSO/CPS; Prime: Primos; DEC: VMS; AMX: Unix
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20,000 to $35,000
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-52)

HOLGUIN AND ASSOCIATES
CEADES-CADD
Additional Product Classification: CAD
Specific Application: Computer-Aided Design and Graphics Package
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000: RTE
Memory Required: 512.0K bytes
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $22,500 to $55,500
Number Installed to Date: 170
Date First Installed: 1979
(See Vendor Profile Page V-55)

INFORMATION AND SYSTEMS RESEARCH, INC.
RMS/GRAF
Specific Application: Graphics Generating System
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, RSTS/E, RSX-11M; DEC VAX
Source Language: Cobol, Dibol, EXAL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 450
Date First Installed: April 1982
(See Vendor Profile Page V-57)

INFORMATION CONCEPTS, INC.
VTAM PRINT SUPPORT
Specific Application: Printer, RJE Report Devices Supporting Local and Remote Hard Copy Needs
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300; VSE; IBM 3000 Series; IBM 360; IBM 370
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 308
Date First Installed: 1978
(See Vendor Profile Page V-57)

INFORMATION SYSTEMS OF AMERICA, INC.
FOREGRAPH
Specific Application: Multicolor Graphics
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360; 370: OS, MVS, VSI, IBM 3030 Series: OS, MVS, VSI, DEC VAX-11/780: VAX/VMS; Prime 400-750: Primos
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 10
Date First Installed: June 1981
(See Vendor Profile Page V-58)

INFORMATION SYSTEMS, INC.
BUSINESS GRAPHICS
Specific Application: Allows User-Set Graphics to Run on A TI Computer
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $950
Date First Installed: 1982
(See Vendor Profile Page V-58)

INFORMATION SYSTEMS, INC.
GRAPHICS TOOL KIT
Specific Application: Source for Plotting Subroutines and Utilities
Specific Industry: Not Industry Sensitive
System Requirements: TI: DX-10
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $950
Date First Installed: 1982

INTERACTIVE GRAPHICS SYSTEMS, INC.
DATA [illegible] ANALYSIS METHOD)
Specific Application: Graphics
Specific Industry: Scientific
System Requirements: DEC VAX: VMS; DEC PDP-11: RSX
Memory Required: 8.0K bytes

Source Language: Macro, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,400 to $13,000
Number Installed to Date: 30
Date First Installed: 1976
(See Vendor Profile Page V-60)

INTERACTIVE GRAPHICS SYSTEMS, INC.
GDL (GRAPHICS DISPLAY LIBRARY)
Specific Application: Graphics
Specific Industry: Scientific
System Requirements: DEC VAX; DEC PDP-11: RSX
Memory Required: 8.0K bytes
Source Language: Macro, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,400 to $13,000
Number Installed to Date: 33
Date First Installed: 1976

INTERACTIVE GRAPHICS SYSTEMS, INC.
IGOR (INTERACTIVE GRAPHICS OPERATING
Specific Application: Graphics
Specific Industry: Scientific
System Requirements: DEC VAX: RSX, DEC PDP-11
Memory Required: 8.0K bytes
Source Language: Macro, Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,400 to $13,000
Number Installed to Date: 24
Date First Installed: 1976

IPT (INFORMATION PROCESSING TECHNIQUES)
EXHIBIT BUSINESS GRAPHICS
Specific Application: Business Graphics
Specific Industry: Not Industry Sensitive
System Requirements: DG: Mapped R-DOS, DEC VAX VMS, AOS, Unix
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200
Date First Installed: 1981
(See Vendor Profile Page V-61)

ISE-USA
TOPS or AAS
Specific Application: CAM
Specific Industry: Not Industry Sensitive
System Requirements: CP/M, MP/M, TRS-DOS, Unix, MS-DOS
Memory Required: 48.0K bytes
Source Language: Assembly, C
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: January 1983
(See Vendor Profile Page V-61)

ISSCO GRAPHICS
CIRCUIT
Specific Application: Circuit Design
Prompt User for Data
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CMS; DEC VAX: VMS; Burroughs: OS/VS
Source Language: Fortran
Purchase Terms: Purchase (license); Lease
Price: $1,400 to $5,300
Date First Installed: 1982
(See Vendor Profile Page V-61)

ISSCO GRAPHICS
DISSPLAY
Specific Application: High Quality Presentation Graphics
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CMS; DEC VAX: VMS, Burroughs: OS/VS
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $9,500 to $57,600
Number Installed to Date: 700
Date First Installed: 1970

ISSCO GRAPHICS
TELLAGRAF
Specific Application: Graphics Presentation Application Program, Runs On English Commands
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CMS; DEC VAX: VMS, Burroughs: OS/VS
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $9,500 to $67,600
Number Installed to Date: 700
Date First Installed: September 1978

ISSCO GRAPHICS
THE DATA CONNECTION
Specific Application: Easy Access of Data for Manipulation for Graphics Presentations
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CMS; DEC VAX: VMS, Burroughs: OS/VS
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $7,500 to $22,500
Date First Installed: 1982

JOHNSON SYSTEMS, INC.
GOLD
Specific Application: Graphics On-Line Display of Cics Activity.
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS/VS; IBM 3000 Series: DOS/VSE; IBM 4300 Series: VS1: MVS
Memory Required: 40.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $2,000 to $4,000
Date First Installed: 1980
(See Vendor Profile Page V-63)

LACHMAN ASSOCIATES, INC.
ZETAVU
Specific Application: Computer Graphics
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4341: VM/CMS, DEC PDP-11: RT-11, PSX-Plus; CDC Cyber 175: NOS
Memory Required: 56.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: June 1982
(See Vendor Profile Page V-65)

LOGICON, INC.
LOGNET DISPLAY GENERATOR-LDG
Additional Product Classification: Report Generator
Specific Application: Report Generator of Graphics
Specific Industry: Manufacturing
System Requirements: DEC PDP-11 Series: RSX-11M, RSX-11
Memory Required: 512.0K bytes
Source Language: Assembly, Macro, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 10
Date First Installed: 1982
(See Vendor Profile Page V-67)

LUNDY ELECTRONICS & SYSTEMS, INC.
ULTRA GRAFICS II CAD SOFTWARE SUBROUTINE
Specific Application: Computer Graphics Design
Specific Industry: Manufacturing, Engineering, Education, Construction, Government, Scientific
System Requirements: DEC PDP-II: RSX-11M, DEC VAX: VMS
Memory Required: 32.0K bytes
Source Language: Fortran
Source Code Available: Yes
(See Vendor Profile Page V-67)

L. W. JAMES & ASSOCIATES
SERIES 200 UTILITIES PACKAGE
Specific Application: Plotting Data, Disk Packing, Calendar
Specific Industry: Not Industry Sensitive
System Requirements: HP 9816; HP 9826, HP 9836
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $95
Number Installed to Date: 28
Date First Installed: 1981
(See Vendor Profile Page V-67)

MAI CDC SIGMA DATA, INC.
DATAGRAF
Specific Application: Graphics Package
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3030 Series: CMS
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: September 1978
(See Vendor Profile Page V-67)

MARC SOFTWARE INTERNATIONAL
MENTAT
Specific Application: Interactive Graphics, Finite Element, Pre- and Post Processing
Specific Industry: Engineering
System Requirements: IBM 370; Cyber 175
Memory Required: 100.0K bytes
Source Language: Fortran
Source Code Available: Yes
Price: $20,000
Number Installed to Date: 30
Date First Installed: September 1978
(See Vendor Profile Page V-69)

MATHEMATICA PRODUCTS GROUP
PLOT
Specific Application: Business Graphics
Specific Industry: Not Industry Sensitive
System Requirements: IBM
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $5,000 to $10,000
Number Installed to Date: 100
Date First Installed: 1979
(See Vendor Profile Page V-70)

MCDONNELL DOUGLAS AUTOMATION CO.
BUILDING DESIGN SYSTEM BDS
Specific Application: Architectural Design, Three Dimensional Modeling Data Base for Scheduling Quantity Takeoffs, Interference Checking and Project Coordination
Specific Industry: Construction, Architecture
System Requirements: Prime 2250, 250, 550 7 Primos, DEC VAX 730 7X 780 VMS
Memory Required: 1.0M bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $171,500
Number Installed to Date: 2
Date First Installed: December 1982
(See Vendor Profile Page V-71)

MCDONNELL DOUGLAS AUTOMATION CO.
GENERAL DRAFTING SYSTEM GDS
Specific Application: Architectural Engineering Drafting and Facilities Management
Specific Industry: Engineering, Construction, Facilities Management
System Requirements: Prime 2250, 250, 550 Primos, DEC VAX-11/730, 750, 780, VMS
Memory Required: 1.0M bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $136,500
Number Installed to Date: 30
Date First Installed: September 1981

MCDONNELL DOUGLAS AUTOMATION CO.
STRADIS/DRAW
Specific Application: System Development Tool
Specific Industry: Not Industry Sensitive
System Requirements: Tektronix 4113, Tektronix 4632; IBM 3278, 3279
Memory Required: 500.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license); Rental
Price: $50,000
Number Installed to Date: 18
Date First Installed: August 1982

MCDONNELL DOUGLAS AUTOMATION CO.
TURNER MCAUTO ACTIVITY PLOTTING
Specific Application: Graphic

Display of Network Diagrams or BarCharts
Specific Industry: Manufacturing, Engineering, Banking/Financial, Legal, Education, Construction, Government, Transportation, Utilities
System Requirements: IBM 360, 3083, 4300 Series: MVS, VM/CMS; VAX-11/730, 780: VMS
Memory Required: 700.0K bytes
Source Language: Cobol, Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 35
Date First Installed: July 1979

MENTOR GRAPHICS CORP.
MENTOR CADSYS
Specific Application: Auto Place, Auto Route and Interactive Graphic Software for Gate Array Physical Design
System Requirements: Apollo DN 600, Aegis
Memory Required: 1.0M bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: September 1983
(See Vendor Profile Page V-72)

METHEUS CORP.
AXIA
Specific Application: Computer Graphics Applications
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP, VAX: RT-11, RSX, VMS
Memory Required: 64.0K bytes
Source Language: Fortran 66, Fortran 77
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: April 1982
(See Vendor Profile Page V-72)

MICROPROCESSOR LABORATORIES, INC.
HANDLE GRAPHICS
Specific Application: Business Graphics Package That Inserts Graphics Directly Into Text
Specific Industry: Not Industry Sensitive
System Requirements: Unix; HP 3000: RTE
Memory Required: 128.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $260
Date First Installed: 1983
(See Vendor Profile Page V-74)

MINCOMP CORP.
MAGIC
Specific Application: Contour Plotter
System Requirements: Perkin Elmer 320: OS 32
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $12,000
Number Installed to Date: 6
Date First Installed: January 1983
(See Vendor Profile Page V-75)

MINCOMP CORP.
SYNPLOT
Specific Application: Synthetic Seismograph Generation and Plotting
System Requirements: PE OS 32
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $12,000
Number Installed to Date: 6
Date First Installed: January 1983

MINICRON SBC CORP.
GRAPHICS BUSINESS REPORTER
Specific Application: Transfers Data Base to Bar Charts and Graphs
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: OCL
Memory Required: 22.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Date First Installed: 1981
(See Vendor Profile Page V-75)

MISOSYS
GRASP
Specific Application: Graphics Supports MX 80 Series
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/II, 80/III, DOS
Memory Required: 48.0K bytes
Source Language: Z80 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 1,000
(See Vendor Profile Page V-76)

MISOSYS
Z GRAPH
Specific Application: Graphics Editor
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/II: DOS
Memory Required: 48.0K bytes
Source Language: Z80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 1,000

NATIONAL DATA CORP.
GRAPHICS 10/10
Specific Application: Graphics Package
Specific Industry: Not Industry Sensitive
System Requirements: DEC System 10: Tops 10; DEC System 20: Tops 20
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-76)

NPS AUTOMATION SERVICES
CADD SERVICES
Specific Application: Computerized Design and Drafting
Specific Industry: Engineering
System Requirements: DEC PDP-11/23; Sperry V70 Series: Vortex
Memory Required: 64.0K bytes
Source Language: Fortran, RT-11
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 50
Date First Installed: January 1978
(See Vendor Profile Page V-81)

ORBIS CORP.
INTEGRAPHIX
Specific Application: Real Time Scientific and Engineering Graphics
Specific Industry: Engineering, Scientific
System Requirements: IBM; Gould SEL Concept 32: Unix C; DEC
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $12,000
Number Installed to Date: 200
Date First Installed: November 1979
(See Vendor Profile Page V-83)

PAFEC ENGINEERING CONSULTANTS, INC.
BOXER
Specific Application: Three Dimensional Solids Modeler
Specific Industry: Engineering, Drafting
System Requirements: DEC VAX-11/M30, 1750: VMS, Prime 50 Series. Primos, Apollo; DG Eclipse MV Series: AOS
Memory Required: 1.0M bytes
Source Language: Ansi Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20,000 to $30,000
Number Installed to Date: 15
Date First Installed: January 1982
(See Vendor Profile Page V-84)

PAFEC ENGINEERING CONSULTANTS, INC.
DOGS-DESIGN ORIENTED GRAPHICS
Specific Application: Two Dimensional Drafting Design Package for Engineers and Architects
Specific Industry: Drafting
System Requirements: DEC VAX-11/730, 1750, 1780: VMS;Prime 50 Series: Primos; DG Eclipse MV Series AOS
Memory Required: 1.0M bytes
Source Language: Ansi Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20,000 to $30,000
Number Installed to Date: 80
Date First Installed: September 1972

PAFEC ENGINEERING CONSULTANTS, INC.
PAFEC
Specific Application: Three Dimensional Finite Element Program Used and Analysis
Specific Industry: Engineering, Drafting
System Requirements: DEC VAX-11/730, 11/7. VMS, Prime 50 Series: Primos; Apollo; Aegis; DG Eclipse MV Series: AOS
Memory Required: 1.0M bytes
Source Language: Ansi Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 220
Date First Installed: September 1973

PAFEC ENGINEERING CONSULTANTS, INC.
PIGS (PAFEC INTERACTIVE GRAPHICS)
Additional Product Classification: CAD
Specific Application: Extensive Interactive Graphics, Processing or Use With Pafec
Specific Industry: Engineering, Drafting
System Requirements: DEC VAX-11/730. VMS; Prime 50 Series: Primos; Apollo: Aegis, DG Eclipse MV Series: AOS
Memory Required: 1.0M bytes
Source Language: Ansi Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10,000
Number Installed to Date: 175
Date First Installed: 1975

PARA RESEARCH, INC.
PARASPLIT MANAGEMENT SYSTEM
Specific Application: Financial and Statistical Bar Graphs
Specific Industry: Banking/Financial
System Requirements: IBM System/34
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $350
Number Installed to Date: 300
Date First Installed: January 1982
(See Vendor Profile Page V-84)

PETROLEUM INFORMATION CORP.
DIGITIZING MODULES
Specific Application: Log Digitizing and Seismographic Data Digitizing
Specific Industry: Petroleum
System Requirements: DEC PDP-11/23: RSX-11M, DEC VAX-11/750: VMS, DEC VAX-11/730: VMS, IBM PC DOS
Memory Required: 128.0K bytes
Source Language: Fortran, Macro Assembler, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,500
Number Installed to Date: 30
Date First Installed: 1982
(See Vendor Profile Page V-85)

PETROLEUM INFORMATION CORP.
GEOPHYSICAL MODULE
Specific Application: Generates Synthetic Siesmographs and Tracers
Specific Industry: Petroleum
System Requirements: DEC PDP-11/23: RSX-11M, DEC VAX-11/750: VMS, DEC VAX 11/730; VMS; IBM PC DOS
Memory Required: 128.0K bytes
Source Language: Fortran, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,500
Number Installed to Date: 5
Date First Installed: 1981

PETROLEUM INFORMATION CORP.
LOG ANALYSIS MODULE
Specific Application: Log Analysis
Specific Industry: Petroleum
System Requirements: DEC PDP-

11/23; RSX-11M; DEC VAX-11/750; VMS, DEC VAX-11/730; VMS, IBM PC DOS
Memory Required: 128.0K bytes
Source Language: Fortran, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,500
Number Installed to Date: 30
Date First Installed: 1979

PMX, INC.
XL INC
Specific Application: Part Programming System
Specific Industry: Manufacturing
System Requirements: IBM PC; IBM PC-XT
Memory Required: 128.0K bytes
Source Language: EXL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,500
Number Installed to Date: 30
Date First Installed: 1980
(See Vendor Profile Page V-86)

PRECISION VISUALS, INC.
CONTOURING
Specific Application: Contouring
Specific Industry: Geophysical
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $9,000 to $24,000
Number Installed to Date: 500
Date First Installed: 1979
(See Vendor Profile Page V-87)

PRECISION VISUALS, INC.
DI3000
Specific Application: System Integration for A Wide Variety of Applications
Specific Industry: Not Industry Sensitive
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $9,000 to $24,000
Number Installed to Date: 500
Date First Installed: 1979

PRECISION VISUALS, INC.
GRAFMAKER
Specific Application: Business Graphics, Fortran Callable
Specific Industry: Not Industry Sensitive
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $9,000 to $24,000
Number Installed to Date: 500
Date First Installed: 1979

PRECISION VISUALS, INC.
GRAFMASTER
Specific Application: User-Friendly Interactive Business Package
Specific Industry: Not Industry Sensitive
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $9,000 to $24,000
Number Installed to Date: 500
Date First Installed: 1979

PRECISION VISUALS, INC.
METAFILE
Specific Application: Picture Saving Device
Specific Industry: Not Industry Sensitive
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $9,000 to $24,000
Number Installed to Date: 500
Date First Installed: 1979

PRIME COMPUTER, INC.
MEDUSA - COMPUTER AIDED DESIGN
Additional Product Classification: CAD/CAM
Specific Application: CAD, Two and Three Dimensional
Specific Industry: Engineering, Construction
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); MO Licens
Date First Installed: 1981
(See Vendor Profile Page V-87)

PRIME COMPUTER, INC.
PDGS -PRODUCT DESIGN GRAPHICS SYSTEM
Specific Application: Graphics
Specific Industry: Manufacturing, Engineering, CAD
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Price: $95,000
Date First Installed: 1981

PRIME COMPUTER, INC.
PDMS - PLANT DESIGN MANAGEMENT SYSTEM
Specific Application: Design
Specific Industry: Engineering
System Requirements: Prime: Primos
Source Code Available: No
Purchase Terms: Purchase (license); Monthly License
Price: $200,000
Date First Installed: 1978

QUANTUM SYSTEMS, INC.
TGM
Specific Application: Training Package, Charts of Parameters on Color CRT'S
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RSX-11M
Memory Required: 256.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 4
Date First Installed: 1981
(See Vendor Profile Page V-90)

RACAL-REDAC, INC.
COMPUTER AIDED PCB ELECTRONIC ENGINEERING
Specific Application: Interactive Graphics
Specific Industry: Manufacturing, Engineering, Government
System Requirements: DEC PDP-11/24; RT-11; DEC VAX-11/750; VMS; HP 2649A, DEC PDP-11/34; RT-11
Memory Required: 256.0K bytes
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 250
Date First Installed: 1984
(See Vendor Profile Page V-91)

RACAL-REDAC, INC.
PCB DESIGN
Specific Application: Aids in the Design of PCB Boards
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11; RT-11
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 175
Date First Installed: 1982

RACAL-REDAC, INC.
SYSTEM 600 SOFTWARE
Specific Application: PCB Layout, PCB Aids, Schematics, Data Base and Documentation, High Performance Design Aids
System Requirements: DEC PDP-11/750, 11/780 VMS
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983

RADIAN CORP.
CPS 1/GRAPHICS
Specific Application: Geological Data Analyses
Specific Industry: Oil
System Requirements: Prime: Primos, IBM MVS, CDC
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000 to $100,000
Number Installed to Date: 104
Date First Installed: 1982
(See Vendor Profile Page V-91)

RESEARCH ENGINEERS, INC.
STAARPL
Specific Application: Graphics Display for the Staad III
Specific Industry: Engineering
System Requirements: DEC VAX: VMS, Prime Primos; Pixel: Unix
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1980
(See Vendor Profile Page V-92)

RIMITEK, INC.
RIMITEK PLOT PACKAGE
Specific Application: Graphics Charting
System Requirements: DEC PDP-11, VAX: RSTS/E; DG: R-DOS, AOS
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: 1977
(See Vendor Profile Page V-93)

SAS INSTITUTE, INC.
SAS - GRAPH
Specific Application: Color Graphics
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, VM/CMS, SXS, DEC VAX: VMS, DG: Eclipse MV Series; Prime 50 Series; Primos
Memory Required: 512.0K bytes
Source Language: IBM Assembler, Fortran, PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
(See Vendor Profile Page V-95)

SATURN SYSTEMS, INC.
SATURN GRAPH
Specific Application: Graphics Package
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RSTS/E, DEC VAX
Source Language: Macro-11, Saturn Calc
Source Code Available: No
Purchase Terms: Lease
Date First Installed: 1983
(See Vendor Profile Page V-95)

SCIENTIFIC SYSTEMS SERVICES, INC.
CGS-COLOR GRAPHICS SYSTEM
Specific Application: User-Oriented Color Graphics System
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000, A600, A700 RTE 6, RTE A.1, Modcomp Classic MAX, DEC PDP-11 RSX-11M, PE OS/32
Memory Required: 128.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $19,500
Number Installed to Date: 35
Date First Installed: March 1984
(See Vendor Profile Page V-95)

SELANAR CORP.
PLOT-I
Specific Application: Fortran Callable Subroutine for Graphics
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RT-11, RSX-11M VMS
Memory Required: 16.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 250
Date First Installed: 1978
(See Vendor Profile Page V-96)

SPARACINO ASSOCIATES, INC.
PLOT UTILITY
Specific Application: Plotting Utility for Udraw Program
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845, HP Series 200
Memory Required: 187.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 100
Date First Installed: February 1982
(See Vendor Profile Page V-101)

SPARACINO ASSOCIATES, INC.
UDRAW
Specific Application: Graphics Program

Specific Industry: Not Industry Sensitive
System Requirements: HP 9345, HP Series 200
Memory Required: 187.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 100
Date First Installed: February 1982

SPARKOMO ASSOCIATES, INC.
EX CHART UTILITY
Specific Application: Utility That Creates X4 Charts
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845; HP Series 200
Memory Required: 187.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 100
Date First Installed: February 1982

SPSS, INC.
SPSS GRAPHIC OPTION
Specific Application: Business Graphics System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: CMS, OS, DEC PDP-11: RSTS, RXS; DEC VAX: VMS; DEC System/20: Tops 20
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1981
(See Vendor Profile Page V-102)

STANDARD RESEARCH, INC.
CHAR-GRAPH
Specific Application: Graphics
Specific Industry: Not Industry Sensitive
Memory Required: 40.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000 to $15,000
Number Installed to Date: 50
Date First Installed: 1981
(See Vendor Profile Page V-102)

SUN INFORMATION SERVICES CO.
PI-GRAPH
Specific Application: Line Graph, Bar Graphs, Line Curve, Pie Charts
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, DEC IBM 3000 Series
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $30,000
Number Installed to Date: 5
Date First Installed: 1981
(See Vendor Profile Page V-104)

SYNERCOM TECHNOLOGY, INC.
CAP/IN
Additional Product Classification: Cartographics
Specific Application: Cartographic and Photogrammetric Input System.
Specific Industry: Automated Mapping
System Requirements: DEC VAX VMS
Memory Required: 1.5M bytes
Source Language: Fortran IV
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1973
(See Vendor Profile Page V-105)

SYNERCOM TECHNOLOGY, INC.
CARTRAN
Additional Product Classification: Scientific
Specific Application: Geographic Coordinate Conversion
Specific Industry: Automated Mapping
System Requirements: DEC VAX VMS
Memory Required: 1.5M bytes
Source Language: Fortran IV
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1973

SYNERCOM TECHNOLOGY, INC.
COGO-I
Additional Product Classification: Scientific
Specific Application: Enchanced Coordinate Geometry Applications
Specific Industry: Automated Mapping
System Requirements: DEC VAX: VMS
Memory Required: 1.5M bytes
Source Language: Fortran IV
Purchase Terms: Purchase (license)
Date First Installed: 1973

SYNERCOM TECHNOLOGY, INC.
THEMATIC MAPPING
Additional Product Classification: Mapping
Specific Application: Automated Mapping for Natural Industries.
Specific Industry: Natural Resources
System Requirements: DEC VAX: VMS
Memory Required: 1.5M bytes
Source Language: Fortran IV
Purchase Terms: Purchase (license)
Date First Installed: 1973

SYSTEMS & APPLIED SCIENCES CORP.
LANDSAT RAW DATA TO PICTURE FORMAT
Additional Product Classification: Scientific
Specific Application: Raw Data to Picture Format
Specific Industry: Scientific
System Requirements: DEC VAX; DG
Source Language: Fortran, Assembly
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: June 1981
(See Vendor Profile Page V-105)

SYSTEMS & APPLIED SCIENCES CORP.
METEOROLOGICAL SATELITE PACKAGE GRID & MAP
Additional Product Classification: Scientific
Specific Application: Grid and Map Implantation
Specific Industry: Scientific
System Requirements: DEC VAX; DG
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease

SYSTEMS & APPLIED SCIENCES CORP.
METEOROLOGICAL SATELLITE-IMAGE ANIMATION
Additional Product Classification: Scientific
Specific Application: Image Animation
Specific Industry: Scientific
System Requirements: DEC VAX; DG
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease

SYSTEMS & APPLIED SCIENCES CORP.
METEOROLOGICAL SATELLITE-SNOW MAPPING
Additional Product Classification: Scientific
Specific Application: Snow Mapping
Specific Industry: Scientific
System Requirements: DEC VAX; DG
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease

SYSTEMS APPLICATIONS
FIA PLOT
Specific Application: Business Graphics, Scientific (Contouring) Graphics, Mapping
Specific Industry: Not Industry Sensitive
System Requirements: Prime 50 Series: Primos; Prime 4000; Prime 400
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,500 to $6,500
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-105)

SYSTEMS APPLICATIONS
INFO-VERSAGRAPH
Specific Application: 128 Standard Forms
Specific Industry: Not Industry Sensitive
System Requirements: Prime 50; Prime 400, Prime 500
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $7,200
Date First Installed: September 1981

TARBELL ELECTRONICS
TARBELL CPM DATA BASE SYSTEM
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 44.0K bytes
Source Language: Z-80 Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 200
Date First Installed: November 1982
(See Vendor Profile Page V-108)

TIMBERLINE SYSTEMS, INC.
GRAPHICS
Specific Application: Graphics
Specific Industry: Not Industry Sensitive
System Requirements: TI Business System S: DX-10
Memory Required: 256.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Rental, Monthly Installments
Price: $2,500
Number Installed to Date: 20
Date First Installed: 1981
(See Vendor Profile Page V-110)

UNITED INFORMATION SERVICES
CALCOMP FUNCTIONAL SOFTWARE
Specific Application: Plotting for Business Applications, Fitting Curves To A Set of Data Points, Bar Graphs
System Requirements: CDC Cyber; IBM
Source Language: Fortran, Super - Basic, Cobol, Snobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-113)

UNITED INFORMATION SERVICES
GDS
Specific Application: Versatile, Integrated Graph Design and Production System
Specific Industry: Not Industry Sensitive
System Requirements: DEC System 10
Source Language: Cobol, Fortran, Basic, PL/1
Source Code Available: Yes
Purchase Terms: Purchase (license)

UNITED INFORMATION SERVICES
PLOTREQ
Specific Application: Utility Routine That Submits Plot Requests to the Plotting Devices
Specific Industry: Engineering
System Requirements: CDC Cyber; IBM
Source Language: Fortran, Super Basic, Cobol, Snobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

UNITED INFORMATION SERVICES
UNIDRAW
Specific Application: Graphics System Includes Set of Subroutine Libraries Containing Calcomp Cell-Compatible Plot Subroutines
Specific Industry: Engineering
System Requirements: CDC Cyber; IBM; Cray
Source Language: Fortran, Cobol, Super Basic, Snobol
Source Code Available: Yes
Purchase Terms: Purchase (license)

UNITED INFORMATION SERVICES
UNIGRAF
Specific Application: Generates

Line, Bar, and Pie Charts From A Variety of Data Sources
Specific Industry: Not Industry Sensitive
System Requirements: CDC Cyber; IBM
Source Language: Fortran, Cobol, Super Basic, Symbol
Source Code Available: Yes
Purchase Terms: Purchase (license)

VIDEX, INC.
APPLE WRITER II PRE-BOOT
Specific Application: Display Apple Writer II In 80 Columns In Both Upper and Lower Case
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple IIE
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $79
(See Vendor Profile Page V-115)

VIDEX, INC.
V CALC 80 PRE-BOOT
Specific Application: Display V CALC 80 In 80 Columns with Both Upper and Lower Case
Specific Industry: Not Industry Sensitive
System Requirements: Apple II
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $49

VIDEX, INC.
V CALC 80 PRE-BOOT WITH MEMORY EXPANSION
Specific Application: Expand Memory Card; Expanded Area for V Calc
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple IIE
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $89

VIRGINIA TESC, INC.
AUTOROUT 20
Specific Application: Generates Programs of Numeric Control for Checking the Outline of the Print Board
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20,000 to $25,000
Date First Installed: 1981
(See Vendor Profile Page V-115)

XIPHIAS
VG SHOW
Specific Application: Data Tablet Event Handler
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11/23: UCSD-P; NEC APC: UCSD-P; IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-116)

XIPHIAS
VG SKETCH
Specific Application: Paint and Drafting Program
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11/23: UCSD-P; NEC APC: UCSD-P; IBM PC: MS-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $695 to $10,000
Number Installed to Date: 200
Date First Installed: September 1981

XIPHIAS
VG TYPE
Specific Application: Font Design
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11/23: UCSD-P; NEC APC: UCSD-P; IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295 to $2,500
Number Installed to Date: 200
Date First Installed: September 1981

XYBION CORP.
XXGRAF
Specific Application: Collection of Fortran Subroutines for Scientific And Engineering Graphics
System Requirements: DEC PDP-11; DEC VAX; Prime; HP 3000
Memory Required: 128.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $12,500
Date First Installed: 1981
(See Vendor Profile Page V-116)

ADVENTURE INTERNATIONAL
SAGE SCOTT ADAMS GRAPHICS EDITOR
Specific Application: Graphics Editor
System Requirements: Atari 400: DOS 2.0; Atari 800: DOS 2.0
Memory Required: 48.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: June 1983
(See Vendor Profile Page V-3)

AMERICAN VIDEO RESOURCES, INC.
MICROART
Specific Application: Graphics
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Applesoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $[illegible],500
Number Installed to Date: 2,000
Date First Installed: 1981
(See Vendor Profile Page V-5)

ANIMATION GRAPHICS, INC.
AGIL PART PROGRAM
Specific Application: Creates Computer Graphics and Illustrations
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple IIE
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35
Number Installed to Date: 200
Date First Installed: May 1983
(See Vendor Profile Page V-6)

ANIMATION GRAPHICS, INC.
AGIL SUPER SLIDE SHOW
Specific Application: Display Graphic Illustrations
Specific Industry: Not Industry Sensitive
System Requirements: Apple II and IIE
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $29
Date First Installed: June 1983

APL COMPUTERS, INC.
APL GRAPHICS
Specific Application: Graphics
Specific Industry: Not Industry Sensitive
System Requirements: Wicat: MCS
Memory Required: 10.0K bytes
Source Language: APL, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $225
Number Installed to Date: 10
Date First Installed: June 1982
(See Vendor Profile Page V-7)

ARDIS APPLIED ELECTROMAGNETICS, INC.
PRESENTATION GRAPHICS
Specific Application: Business Graphics
Specific Industry: Not Industry Sensitive
System Requirements: HP 300: MPE: Chromatics 7900: Iris: Unix
Memory Required: 512.0K bytes
Source Language: Fortran 77
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,500
Date First Installed: May 1980
(See Vendor Profile Page V-8)

ARRIGONI COMPUTER GRAPHICS
TOUCH 'N DRAW II ARCHITECTURAL
Additional Product Classification: Report Generator, Architecture
Specific Application: Building Design, Construction Drawings, Bill of Materials, Cost Estimates
Specific Industry: Construction, Architecture
System Requirements: Unix
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $73,000
(See Vendor Profile Page V-9)

ARRIGONI COMPUTER GRAPHICS
TOUCH 'N DRAW II, INTERIOR DESIGN
Additional Product Classification: Report Generator, Interior Design
Specific Application: Presentation, Installation Drawings, Bill of Materials, Cost Estimates
Specific Industry: Interior Designers
System Requirements: Unix
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $73,000

AUTODESK, INC.
AUTOCOD
Specific Application: Design System for Plotting
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS 1.1; Victory 9000: CPM/86; Zenith 100
Memory Required: 128.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 500
Date First Installed: 1982
(See Vendor Profile Page V-10)

AUTOMATED PROFESSIONAL SYSTEMS
APSGRAPH
Specific Application: Menu Driven Graphics Package Spreadsheet Editor
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80; Intel: CP/M 86, MS-DOS, PC-DOS
Memory Required: 128.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $500
Date First Installed: September 1983
(See Vendor Profile Page V-10)

AYDIN CORP.
STANDARD INSTRUCTION SET
Specific Application: Standard Two Dimensional Graphics
Specific Industry: Not Industry Sensitive
System Requirements: DEC: VMS: RSX-11/M
Source Language: 8086 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 400
Date First Installed: 1978
(See Vendor Profile Page V-11)

AZTEC, INC.
PC CORE
Specific Application: Graphic and Imaging Application Pie Charts, Area Charts, Bar Charts, High Resolution Text Visuals
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 256.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995
Date First Installed: 1983
(See Vendor Profile Page V-11)

BASIC BUSINESS SOFTWARE, INC.
PLOT
Specific Application: Plotting Program
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; Apple II E; Apple III
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75
Date First Installed: 1979
(See Vendor Profile Page V-12)

BELL & MURPHY & ASSOCIATES, INC.
CENTOM
Specific Application: Mapping With Digitizing, Well and Seismic Information
System Requirements: Wang 2200
Memory Required: 30.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 20
Date First Installed: 1979
(See Vendor Profile Page V-12)

BUSINESS & PROFESSIONAL SOFTWARE, INC.
APPLE BUSINESS GRAPHICS
Specific Application: Bar, Pies, Lines, Scattergraphs
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple III
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $175
(See Vendor Profile Page V-15)

BUSINESS & PROFESSIONAL SOFTWARE, INC.
BPS BUSINESS GRAPHICS
Specific Application: Graphics
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350
Date First Installed: February 1983

Additional information provided for by vendor

A complete color business graphics package for the IBM PC and PC-XT. The program automatically extracts data from Lotus Development Corp.'s 1-2-3, Datapoint Corp.'s Multiplan, Visicorp's Visicalc and other programs. BPS Business Graphics draws pie, bar and line charts on more than 70 plotters and printers. Sets chart, axis and floating labels and legends. Creates standard formats for reuse with new data.

BUSINESS & PROFESSIONAL SOFTWARE, INC.
PIX - PRINTER/PLOTTER INSTALLATION KIT
Specific Application: Allows Apple Business Graphics to Interface With Over 50 Printers and Plotters
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple III
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150

BUSINESS & PROFESSIONAL SOFTWARE, INC.
SCREEN DIRECTOR
Specific Application: Graphics
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple III
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150

BUSINESS & PROFESSIONAL SOFTWARE, INC.
TARGET IMAGE MAKER
Specific Application: Creates 35MM Shades and Overheads From Apple Business Graphics
Specific Industry: Not Industry Sensitive
System Requirements: Apple II
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $175

CHANG LABS
GRAPHPLAN
Specific Application: Integrated Business Graphics Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M; North Star Advantage: NS-DOS
Memory Required: 64.0K bytes
Source Language: C Basic
Source Code Available: No
Purchase Terms: Purchase (license)

Price: $395
(See Vendor Profile Page V-18)

COMMERCIAL SOFTWARE SYSTEMS
HP-85 BUSINESS GRAPHICS
Specific Application: Business Graphics
Specific Industry: Not Industry Sensitive
System Requirements: HP-85
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 15
Date First Installed: January 1981
(See Vendor Profile Page V-21)

COMPUTER STATIONS, INC.
COMBINED ENHANCED GRAPHICS SOFTWARE
Specific Application: Graphic Dome Program
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+, IIE: DOS
Memory Required: 48.0K bytes
Source Language: Machine Language
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $34
Number Installed to Date: 1,000
Date First Installed: June 1979
(See Vendor Profile Page V-26)

COMPUTER STATIONS, INC.
GRAPHIC WRITER
Specific Application: Utility Program for WP
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Machine Language
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $54
Number Installed to Date: 1,000
Date First Installed: February 1981

COMPUTER STATIONS, INC.
ULTRA HI-RES
Specific Application: Plotting Program
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $49
Number Installed to Date: 750
Date First Installed: March 1980

COSESS CORP.
PICTOGRAPH
Specific Application: Special Symbols, Fonts, Foreign Characters
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $395
Number Installed to Date: 5
Date First Installed: April 1983
(See Vendor Profile Page V-29)

CONTRACT SOFTWARE SERVICES
GEOGRAPHIC CONTOUR MAPPING SYSTEM
Additional Product Classification: Geographic
Specific Application: Produces Contours of Graphic Land
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Supersoft Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-39)

DECISION RESOURCES
CHART-MASTER
Specific Application: Business Graphics Program
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; IBM PC, PC-XT; Apple
Memory Required: 64.0K bytes
Source Language: C-Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $375
Date First Installed: 1981
(See Vendor Profile Page V-40)

DESKTOP COMPUTER SOFTWARE, INC.
GRAPH'N'CALC
Additional Product Classification: Financial Modeling Languages/DSS
Specific Application: Business Graphics and Forecasting System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Apple II: APPLE-DOS, Apple III
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $199
Number Installed to Date: 1,500
Date First Installed: November 1982
(See Vendor Profile Page V-41)

DIGITAL RESEARCH, INC.
DR GRAPH
Specific Application: Graphics
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-42)

DON'T ASK COMPUTER SOFTWARE
PM ANIMATOR
Additional Product Classification: Demonstration
Specific Application: Player Missile Graphics Package, Demonstration and Tutorial
Specific Industry: Education
System Requirements: Atari: DOS
Memory Required: 32.0K bytes
Source Language: Basic, Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35
Date First Installed: June 1983
(See Vendor Profile Page V-43)

ELECTRONIC LAB INDUSTRIES
NOTE PRO BRIDGE
Specific Application: Puts Music into Programs
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64: 6502
Source Language: Basic, Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $24
Date First Installed: May 1983
(See Vendor Profile Page V-46)

ELECTRONIC LAB INDUSTRIES
NOTE PRO I
Specific Application: Music Editor and Generator
Specific Industry: Not Industry Sensitive
System Requirements: Commodore64: 6502
Source Language: Basic, Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $24
Date First Installed: May 1983

ELECTRONIC LAB INDUSTRIES
NOTE PRO II
Specific Application: Music Editor and Generator
Specific Industry: Not Industry Sensitive
System Requirements: Commodore 64: 6502
Source Language: Basic, Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $46
Date First Installed: May 1983

ELECTRONIC LAB INDUSTRIES
PLOT-A-LOT
Specific Application: High Res Screen Editor
Specific Industry: Not Industry Sensitive
System Requirements: Commador 64: 6502
Source Language: Basic, Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $14
Date First Installed: May 1983

ELECTRONIC LAB INDUSTRIES
THE STAFF
Specific Application: Music Editor and Generator
Specific Industry: Not Industry Sensitive
System Requirements: Commodore VIC 20: 6502
Source Language: Basic, Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $14
Date First Installed: September 1982

EXECUTEC CORP.
EXECU/PLOT TM
Specific Application: A Business Graphics Product for the Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: August 1983
(See Vendor Profile Page V-47)

FEROX MICROSYSTEMS, INC.
GRAPHPOWER
Additional Product Classification: General Business
Specific Application: Screen and Plotter Business Graphic and Presentation Package
Specific Industry: Not Industry Sensitive, Banking/Financial
System Requirements: IBM PC: UCSD-P System, PC-DOS
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 500
Date First Installed: 1981
(See Vendor Profile Page V-48)

FOX AND GELLER, INC.
D GRAPH
Specific Application: Generates Graphs From User Data Files or DBMS II Data Files
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; IBM PC: PC-DOS, Victor 9000: MS-DOS
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
(See Vendor Profile Page V-50)

GAYLORD BROS., INC.
PLANETARY GUIDE
Additional Product Classification: Education
Specific Application: Graphics Identify Members of the Solar System, Phases of the Moon and Planetary Movement
Specific Industry: Education
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $30
(See Vendor Profile Page V-50)

GAYLORD BROS., INC.
VISI PLOT
Specific Application: Produce Graphs and Charts
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Purchase Terms: Purchase (license)
Price: $200

HERCOM SYSTEMS, INC.
EMUPLOT III
Additional Product Classification: Communications/TP Monitors
Specific Application: Three Dimensional Graphics Package
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80
Memory Required: 56.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 20
Date First Installed: 1982
(See Vendor Profile Page V-54)

ICONICA, INC.
SPACEMAN
Specific Application: Space Planning Facilities Management
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $20,000 to $30,000
Number Installed to Date: 8
Date First Installed: November 1981
(See Vendor Profile Page V-56)

ICONIX CORP.
AUTOGRAF WORKSTATION
Specific Application: Charts, Text Diagrams, Maps, General Purpose Tools
Specific Industry: Not Industry Sensitive
System Requirements: Chromatic CS 1000
Memory Required: 32.0K bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 70
Date First Installed: January 1981
(See Vendor Profile Page V-56)

ICONIX CORP.
HIGH PERFORMANCE GRAPHICS OUTPUT
Specific Application: ProScan Publication Quality Output From Autograph Work Station
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 15
Date First Installed: March 1983

INFOGRAPHICS, INC.
DESIGN CHOICE
Specific Application: Graphics Package
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
(See Vendor Profile Page V-57)

INFOGRAPHICS, INC.
DESIGN CONSTRUCTION
Specific Application: Graphics Package
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495

INFOGRAPHICS, INC.
DESIGN FREE FORM
Specific Application: Graphics Package
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495

INNOVATIVE SOFTWARE
FAST GRAPHS
Specific Application: Business Graphics
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; DEC; Wang
Memory Required: 128.0K bytes
Source Language: Mbasic Compiler, C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 5,000
Date First Installed: January 1983
(See Vendor Profile Page V-59)

I.P. SHARP ASSOCIATES, INC.
QUICK DRAW PRODUCTION GRAPHICS PACKAGE
Specific Application: Line Plot, Bar Charts, Pie Charts, and High/Low Close Plots
Specific Industry: Not Industry Sensitive
System Requirements: HP: MVS, VSE
Source Language: APL
Purchase Terms: Purchase (license)
Number Installed to Date: 60
(See Vendor Profile Page V-61)

I.P. SHARP ASSOCIATES, INC.
SAGA GRAPHICS
Specific Application: Provides Tools for Drawing Lines, Shading Areas and Printing Text
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS, VSE
Source Language: APL
Purchase Terms: Purchase (license)
Number Installed to Date: 205
Date First Installed: 1981

I.P. SHARP ASSOCIATES, INC.
SUPERPLOT BUSINESS GRAPHICS
Specific Application: Produce Plots on A Wide Variety of Plotting Devices, and Terminals With Control Color, Shading, Size and Shape
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS, VSE
Source Language: APL
Purchase Terms: Purchase (license)
Number Installed to Date: 190
Date First Installed: 1977

KERN PUBLICATIONS
DATA PLOTTING SOFTWARE
Specific Application: Data Plotting and Processing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS 1.1; IBM PC-XT: APPLE-DOS 2.0; Apple II: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: IBM Basic, Applesoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $48
Number Installed to Date: 4,000
Date First Installed: September 1982
(See Vendor Profile Page V-63)

KERN PUBLICATIONS
GRAPHICS
Specific Application: Graphics Teaching Aid
Specific Industry: Not Industry Sensitive, Education
System Requirements: IBM PC: PC-DOS 1:1; IBM PC-XT: APPLE-DOS 2.0
Memory Required: 64.0K bytes
Source Language: IBM Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: June 1983

LABORATORY TECHNOLOGIES CORP.
EPLOT
Specific Application: Scientific Graphic Plotting
Specific Industry: Not Industry Sensitive
System Requirements: Labtech 70: Imsai 80
Memory Required: 384.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license).
Number Installed to Date: 30
Date First Installed: September 1980
(See Vendor Profile Page V-65)

LOGO COMPUTER SYSTEMS, INC.
SPRITE LOGO
Additional Product Classification: Languages
Specific Application: Graphics
Specific Industry: Education
System Requirements: Apple II
Memory Required: 64.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: September 1983
(See Vendor Profile Page V-67)

MCGRAW-HILL BOOK CO.
TYPES GRAPHICS
Specific Application: Graphics Instant Vision Instant Revision
Specific Industry: Not Industry Sensitive
System Requirements: Apple II +; IBM PC
Memory Required: 128.0K bytes
Purchase Terms: Purchase (license)
Price: $295 to $395
(See Vendor Profile Page V-71)

MEDIA CYBERNETICS, INC.
HALO
Specific Application: Text Box or Graphics Functions
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Source Language: Fortran, Basic, C, APL+
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: January 1983
(See Vendor Profile Page V-71)

MEMOTECH CORP.
HIGH RESOLUTION GRAPHICS HRG
Specific Application: Over 30 Subroutines for Graphics Will Program At the Dot, Line, Character or Page Level
Specific Industry: Not Industry Sensitive
System Requirements: Timex/Sinclair
Memory Required: 16.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: May 1983
(See Vendor Profile Page V-72)

METASOFT CORP.
BENCHMARK GRAPHICS
Specific Application: Draws PieCharts, Diagrams Document With 27,000 Words In the Dictionary
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; CP/M; North Star: NS-DOS; Apple IIE: APPLE-DOS
Memory Required: 96.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2,500
Date First Installed: July 1982
(See Vendor Profile Page V-72)

MICRO CONTROL SYSTEMS, INC.
ADVANCED SPACE GRAPH-SPACE TABLET
Additional Product Classification: CAD
Specific Application: Enhanced Version of Space Graph, Space Tablet, Auto Dimension Angle and Distance
Specific Industry: Manufacturing, Engineering, Medical, Education, Construction, Scientific
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Assembler, Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,695
Number Installed to Date: 150
Date First Installed: April 1983
(See Vendor Profile Page V-73)

MICRO CONTROL SYSTEMS, INC.
SLIDE
Specific Application: Presentation Graphics Flow Chart
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Price: $95
Number Installed to Date: 350
Date First Installed: August 1981

MICRO CONTROL SYSTEMS, INC.
SLIDEPRO
Specific Application: Allows the Making of Overhead Projection Slides
Specific Industry: Manufacturing, Engineering, Medical, Education, Construction, Nonprofit Organizations
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes

Source Language: Assembler, Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $95
Date First Installed: July 1982

MICRO CONTROL SYSTEMS, INC.
SPACE GRAPHICS
Specific Application: Computer AidDigitizer
Specific Industry: Not Industry Sensitive, Engineering, Education
System Requirements: Cannon; IBM PC: PC-DOS, Apple II+: APPLE-DOS 3.3; Victor 9000
Memory Required: 64.0K bytes
Source Language: Basic Compiler
[illegible]
Purchase Terms: Purchase (license)
[illegible]
Number Installed to Date: 800
Date First Installed: August 1981

MICRO CONTROL SYSTEMS, INC.
SPACE GRAPHICS ADVANCED
Additional Product Classification: Report Generator, CAD
Specific Application: Advanced Computer Aid Digitizer
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: [illegible]
Memory Required: 128.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,695
Date First Installed: August 1981

MICRO CONTROL SYSTEMS, INC.
SPACE GRAPH/SPACE TABLET W/ HI-RESOLUTION
Additional Product Classification: CAD
Specific Application: Conceptual Three DimensionalCAD-Scale, Rotate and Move Object In Three [illegible]
Specific Industry: Manufacturing, Engineering, Medical, Education, [illegible]
System Requirements: IBM PC: PC-DOS; Apple II, IIE: APPLE-DOS
Memory Required: 64.0K bytes
Source Language: Assembler, Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $795
Number Installed to Date: 700
Date First Installed: February 1982

MICRO CONTROL SYSTEMS, INC.
SPACE GRAPH/SPACE TABLET-WITH HI-RESOLUTION
Additional Product Classification: CAD
Specific Application: Enhanced Version of Advanced Space Graph, Improved Speed and Accuracy
Specific Industry: Manufacturing, Engineering, Medical, Education, Scientific
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Assembler, Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,495

MODULAR DATA SYSTEMS, INC.
ADACS
Specific Application: Advanced Distributed Aquisition and Control System
Specific Industry: Engineering
System Requirements: DEC: RSX-11M: Mas IV; Gould Concept 32: MPX
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000 to $175,000
Number Installed to Date: 6
Date First Installed: October 1981
(See Vendor Profile Page V-77)

MORGAN-FAIRFIELD GRAPHICS
[illegible] ILLUSTRATION SYSTEM
Specific Application: Digital Illustration for Video Slides, Presentation Graphics
Specific Industry: Not Industry Sensitive
System Requirements: Florida Computer: CP/M
Memory Required: 640.0K bytes
Source Language: Pascal MT+
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $11,200
Number Installed to Date: 1
Date First Installed: December 1981
(See Vendor Profile Page V-77)

MORGAN-FAIRFIELD GRAPHICS
MICROMAP II COMPUTER ASSISTED CARTOGRAPHY
Specific Application: Data Driven Maps and Graphs
Specific Industry: Real Estate, Education, Construction, Government, Transportation, Nonprofit Organizations
System Requirements: Apple II, II+, IIE APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Applesoft Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $650
Number Installed to Date: 80
Date First Installed: 1979

MUSE SOFTWARE
DATA-PLOT
Specific Application: [illegible]
Program, Creates Charts and Prints Outs
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+: APPLE-DOS 3.2; Apple IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $60
(See Vendor Profile Page V-78)

MUSE SOFTWARE
KNOW YOUR APPLE
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Graphics and Music to Learn Use of the Apple II+
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+: APPLE-DOS
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35

MUSE SOFTWARE
KNOW YOUR APPLE IIE
Additional Product Classification: Program Generators/Aids, Application-Development Tools
Specific Application: Graphics and Music to Learn Use of the Apple IIE
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25

MUSE SOFTWARE
U-DRAW II
Specific Application: Draws Floor Plans on Computer
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+: APPLE-DOS 3.2; Apple IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40

[illegible] INC.
BYTESMITH/SET-EPSON
Specific Application: Graphics
Specific Industry: Not Industry Sensitive
System Requirements: Vector, Xerox: CP/M; TRS-80: CP/M, IBM PC: CP/M, Apple: CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: [illegible]
Number Installed to Date: 15
Date First Installed: March 1982
(See Vendor Profile Page V-78)

[illegible] INC.
BYTESMITH/SET-PRISM
Specific Application: Graphics
Specific Industry: Not Industry Sensitive
System Requirements: Vector, Xerox: CP/M; TRS-80: CP/M; IBM PC: CP/M, Apple: CP/M
Memory Required: 64.0K bytes
Source Language: Cbasic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $40
Number Installed to Date: 15
Date First Installed: March 1982

PEACHTREE SOFTWARE
ACCESS PAK
Additional Product Classification: Languages
Specific Application: Interactive Interpretive Programming Language
Specific Industry: Not Industry Sensitive
System Requirements: Compaq; IBM PC: PC-DOS, TI Professional
Memory Required: 128.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $525
(See Vendor Profile Page V-85)

PLANNING DATA SYSTEMS
MULTMAP I
Specific Application: Mapping System for Generation of Thermic [illegible]
Specific Industry: Not Industry [illegible]
System Requirements: Televideo: CP/M; Vector Graphics: CP/M
Memory Required: 48.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $2,000
Date First Installed: 1982
(See Vendor Profile Page V-85)

PROGRESSIVE PROGRAMMING
GRAPHICS AID
Specific Application: Deletes Print Ad or Peek Poke Location
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/III
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $10
Date First Installed: 1980
(See Vendor Profile Page V-86)

PRO SYSTEMS
PRO/GRAPH
Specific Application: Graph Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Advanced Basic
Purchase Terms: Purchase (license)
Price: $70
(See Vendor Profile Page V-86)

REALTIME SOFTWARE SYSTEMS, INC.
BIO FEEDBACK GRAPHICS
Specific Application: Graphics, Observes Bodily Functions
Specific Industry: Not Industry Sensitive
System Requirements: TRS: TRS-DOS
Memory Required: 65.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: February 1983
(See Vendor Profile Page V-92)

REDDING GROUP, INC.
GRAF LIB
Specific Application: Library of [illegible]
Specific Industry: Writing Custom Graphics
System Requirements: IBM PC: CP/M
Memory Required: [illegible]
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $400
(See Vendor Profile Page V-92)

REDDING GROUP, INC.
GRAF TALK
Specific Application: Graphs Data File

Specific Industry: Business
System Requirements: IBM PC: CP/M
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $450

[illegible] GROUP, INC.
GRAPLIB - VERSION 5.02
Specific Application: Collection of Graphics Subroutines
Specific Industry: Not Industry [illegible]
System Requirements: CP/M 80: MP/M
Memory Required: 48.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $400
Date First Installed: 1978

REMOTE COMPUTING CORP.
PEAK TECHNICAL ANALYSIS
Specific Application: Graphics
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS, Apple
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $600
Number Installed to Date: 200
Date First Installed: 1982
(See Vendor Profile Page V-92)

ROKLAN SOFTWARE
THE LECTRIC WINDOW
Specific Application: Graphics
Specific Industry: Manufacturing, Engineering, Insurance, Scientific
System Requirements: TRS-80/I, 80/II
Memory Required: 48.0K bytes
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25
(See Vendor Profile Page V-93)

SEA DATA CORP.
PLOTPAK
Specific Industry: Not Industry Sensitive
System Requirements: CP/M: MP/M
Source Language: Fortran 80
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $365
Number Installed to Date: 25
Date First Installed: January 1982
(See Vendor Profile Page V-96)

SELANAR CORP.
SQPLOT
Specific Application: Graphics
Specific Industry: Not Industry Sensitive
System Requirements: DEC VT180 Series, CP/M,
Memory Required: 8.0K bytes
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 150
Date First Installed: 1980
(See Vendor Profile Page V-95)

SILVA SYSTEMS, INC.
GL/M
Specific Application: Produce Graphics From Daisywheel Printers
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC CP/M 80
Memory Required: 64.0K bytes
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 10
Date First Installed: April 1983
(See Vendor Profile Page V-96)

SENSIBLE SOFTWARE, INC.
GRAPHICS DEPARTMENT
Specific Application: Generation of Pie, Bar, Line Scatter, Charts, Lettering, Editing Tools for Pictures
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 20
Date First Installed: July 1983
(See Vendor Profile Page V-96)

SENSIBLE SOFTWARE, INC.
IMAGE PRINTER II
Specific Application: Printing High-Resolution Pictures on Printers
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 1,100
Date First Installed: October 1981

SIERRA ON-LINE
THE ARTIST
Specific Industry: Graph Development
System Requirements: Apple II+, IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1,700
Date First Installed: October 1982
(See Vendor Profile Page V-97)

SOFTECH, INC.
GRAPHICS KIT 15X
Specific Industry: Not Industry Sensitive
System Requirements: Timex-Sinclair 1000; Timex-Sinclair ZX81
Memory Required: 16.0K bytes
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15
Date First Installed: October 1982
(See Vendor Profile Page V-98)

SOFTWARE ARTS, INC.
TK SOLVER PACK/FINANCIAL MANAGEMENT
Specific Application: General Financial Activities
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Wang PC: MS-DOS; DEC 350: PL-DOS, DEC Rainbow: CP/M 86
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1983
(See Vendor Profile Page V-99)

SOFTWARE CLEARING HOUSE
GRAPHSTATION
Specific Application: Integrated System for Business Graphics
Specific Industry: Not Industry Sensitive
System Requirements: NCR I, V Series: Imos, IRX, VRX
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $13,900
Date First Installed: July 1983
(See Vendor Profile Page V-99)

SOFTWARE PUBLISHING CORP.
PFS: WRITE
Specific Application: Bar, Line and Pie Graphs for Business Applications
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE, III: APPLE-DOS, IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125 to $175
Number Installed to Date: 30,000
Date First Installed: 1981
(See Vendor Profile Page V-100)

SOFTWARE TECHNOLOGY FOR COMPUTERS
THE COLORING BOARD
Specific Application: Creating Graphics
Specific Industry: Education
System Requirements: Apple: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Assembly, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $60
Date First Installed: 1978
(See Vendor Profile Page V-100)

SOFTWARE TOOLWORKS
ED-A-SKETCH
Specific Application: Full Screen Graphics Editor
Specific Industry: Not Industry Sensitive
System Requirements: Heath/Zenith: CP/M
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30
Number Installed to Date: 2,000
Date First Installed: September 1982
(See Vendor Profile Page V-100)

SPECTRA VIDEO
BUSINESS GRAPHICS
Specific Application: Small Business Graphics
Specific Industry: Not Industry Sensitive
System Requirements: Spectra Video 318; Spectra Video 328
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25
Date First Installed: June 1983
(See Vendor Profile Page V-102)

SSM MICROCOMPUTER PRODUCTS, INC.
GRAPH-IT
Specific Application: Graphics Dump Program
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE: APPLE-DOS
Source Language: Basic, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 1,000
Date First Installed: 1983
(See Vendor Profile Page V-102)

STATISTICAL GRAPHICS CORP.
STAT GRAPHICS PC
Specific Application: Interactive Data Analysis Statistical Graphics DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Source Language: APL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $475
Number Installed to Date: 15
Date First Installed: March 1983
(See Vendor Profile Page V-103)

[illegible], INC.
STATS GRAPH
Additional Product Classification: Statistical
Specific Application: Performs Statistical Analysis on User Data and Provides Graphic Formats For Displaying Data
Specific Industry: Banking/Financial
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
(See Vendor Profile Page V-104)

TELOS COMPUTING, INC.
TELEGRAPHY
Specific Application: Graphics Interface for DBMS
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple IIE, IBM PC
Memory Required: 64.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $500
Date First Installed: December 1983
(See Vendor Profile Page V-109)

TEXAS INSTRUMENTS, INC.
GRAPHING PACK
Specific Application: Graphics Package
Specific Industry: Not Industry Sensitive
System Requirements: TI 99/4
Purchase Terms: Purchase (license)
Price: $10 to $20
(See Vendor Profile Page V-106)

TEXAS INSTRUMENTS, INC.
VIDEO GRAPHS
Specific Application: Graphics Program

Specific Industry: Not Industry Sensitive
System Requirements: TI 99/4
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20

TICOM SYSTEMS, INC.
UCSD-P SYSTEM GRAPHICS EXTENSION
Specific Application: Implementation Allows the Program to Use the Graphics Industry's Siggrath Core Standard Protocol
Specific Industry: Not Industry Sensitive
System Requirements: NEC APC: UCSD-P; DEC Rainbow
Memory Required: 64.0K bytes
Source Language: Pascal, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Date First Installed: 1983
(See Vendor Profile Page V-116)

TIPNIS ASSOCIATES, INC.
GRAPHIC LETS
Specific Application: Graphics
Specific Industry: Manufacturing, Engineering
System Requirements: Apple II+: Pascal; Apple IIE, IBM PC
Memory Required: 4.0K bytes
Source Language: Pascal, Basic
Source Code Available: No
Purchase Terms: Purchase (license); [redacted]
Price: $600 to $12,000
Number Installed to Date: 38
Date First Installed: September 1981
(See Vendor Profile Page V-116)

TRANS MICRO SYSTEMS, INC.
CE/1000
Specific Application: Comprehensive Civil Engineering System for Plotting Subdivisions Map Plans and Profiles
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000: Rtse 6VM
Memory Required: 64.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000 to $20,000
Number Installed to Date: 3
Date First Installed: August 1982
(See Vendor Profile Page V-111)

T & W SYSTEMS

CADAPPLE
Specific Application: Computer-Aided Drafting
Specific Industry: Engineering, Construction
System Requirements: Apple II+: UCSD-P, Apple IIE
Memory Required: 64.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $1,995
Number Installed to Date: 300
Date First Installed: May 1982
(See Vendor Profile Page V-112)

T & W SYSTEMS
TSQUARE
Specific Application: Computer-Aided Drafting
Specific Industry: Engineering, Construction
System Requirements: Terak: UCSD-P
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,495
Number Installed to Date: 80
Date First Installed: June 1981

T & W SYSTEMS
VERSACAD
Specific Application: Computer-Aided Drafting
Specific Industry: Engineering, Construction
System Requirements: IBM PC: UCSD-P
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,995
Date First Installed: July 1983

Additional Information provided for by vendor

CADAPPLE/VERSACAD are general-purpose drafting software packages for Apple II and IBM PC computers. CADAPPLE/VERSACAD are especially suited for architectural, mechanical and electrical drafting as well as for teaching CAD in industry or in vocational education. The software uses dynamic graphics and is easy to use and easy to learn.

VERSA COMPUTING
EXPANSION PAC I
Specific Application: Realtime Shape Tables 350 Predefined Shapes
Specific Industry: Not Industry Sensitive
System Requirements:
Memory Required: 48.0K bytes
Source Language: Basic, Machine Code
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 39
(See Vendor Profile Page V-115)

VERSA COMPUTING
EXPANSION PAC-II
Specific Application: 10 Extra Commands to Versa Writer
Specific Industry: Not Industry Sensitive
System Requirements: Apple II
Memory Required: 48.0K bytes
Source Language: Basic, Machine Code
Source Code Available: Yes
Price: $30

VERSA COMPUTING
VERSA WRITER
Specific Application: Complete Graphic Package
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple II+
Memory Required: 48.0K bytes
Source Language: Basic, Machine Code
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $190 to $299

VIA SYSTEMS, INC.
100 SERIES
Specific Application: Graphics Logic Design Mask Sizing Pattern Design
Specific Industry: Electronic
System Requirements: DEC PDP-11/23
Memory Required: 160.0K bytes
Source Language: C, DEC Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1982
(See Vendor Profile Page V-115)

VISICORP
VISIPLOT
Specific Application: Creates Charts and Graphics
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III: APPLE-DOS, IBM PC: PC-DOS; Commodore, Atari 800
Purchase Terms: Purchase (license)
Price: $200
(See Vendor Profile Page V-115)

VISICORP
VISITREND/PLOT
Specific Application: Business Graphics
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, III: APPLE-DOS, IBM PC: PC-DOS; Commodore, Atari 800
Purchase Terms: Purchase (license)
Price: $300

WILLEY CORP.
TRACE
Specific Application: Optical Design
Specific Industry: Optical
System Requirements: TRS-80: TRS-DOS, Apple II+: APPLE-DOS 2.3, IBM PC
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: [redacted]
Number Installed to Date: 100
Date First Installed: 1980
(See Vendor Profile Page V-117)

XIPHIAS
VIDEOGRAPH
Specific Application: Short Turn Around, Short Burst, Graphics System Includes Videograph Sketch, Type, Show
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11/23: UCSD-P; NEC APE: UCSD-P; IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000 to $20,000
Number Installed to Date: 200
Date First Installed: September 1981
(See Vendor Profile Page V-115)

XYBION CORP.
ARTGRAPHICS
Specific Application: Paint Type Program, Freehand Artistic Creation
Specific Industry: Not Industry Sensitive
System Requirements: Ramtek 6214: CP/M; FCG Beacon
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $1,995
Date First Installed: 1981
(See Vendor Profile Page V-118)

XYBION CORP.
CHARTGRAPHICS
Specific Application: Makes Line, Bar and Pie Charts
Specific Industry: Not Industry Sensitive
System Requirements: Ramtek 6214: CP/M, HP 9836, FCG Beacon
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: 1981

XYBION CORP.
VIEWER
Specific Application: Allows Slides Created to Be Shown in Electronic Slide Show Fashion
Specific Industry: Not Industry Sensitive
System Requirements: Ramtek 6214, HP 9836, FCG Beacon
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $995
Date First Installed: 1981

REPORT GENERATORS

ADDITIONAL RESOURCES, INC.
DATA PROCESSING SYSTEM (DPS)
Additional Product Classification: Report Generator, Data Dictionary, Query Languages, Program Generators/Aids, Application Development Tools
Specific Application: Complete Data Processing
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B1000, B2000, B4000, B5000, B7000; MCP
Memory Required: 350.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $40,000
Number Installed to Date: 30
Date First Installed: September 1980
(See Vendor Profile Page V-2)

ALEXANDER PROGRAMMING CORP.
REV
Specific Application: Report Generator
Specific Industry: Banking/Financial
System Requirements: Prime 750; 400 Primos
Source Language: Fortran
Source Code Available: No
Purchase Terms: Time-Sharing
(See Vendor Profile Page V-4)

AMCOR COMPUTER CORP.
AMWRITER-END USER NONTECHNICAL REPORT WRITER
Specific Application: Report Generation
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, DEC VAX-11/750, VAX 11/780; VMS
Memory Required: 256.0K bytes
Source Language: Basic Plus II, Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $2,500
Date First Installed: 1983
(See Vendor Profile Page V-4)

AMCOR COMPUTER CORP.
REPORT GENERATOR
Specific Application: Report Generation and Inquiry
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, DEC VAX-11/750, VAX 11/780; VMS
Memory Required: 256.0K bytes
Source Language: Basic Plus II, Basic
Purchase Terms: Purchase (license); Lease
Price: $3,500
Number Installed to Date: 150

APPLIED DATA RESEARCH, INC.
ADR/DATA REPORTER-RELEASE 2.6
Specific Application: Information Retrieval
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000 Series, 4300 Series; OS, DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $10,300 to $12,300
Date First Installed: 1976
(See Vendor Profile Page V-7)

APPLIED SYSTEMS, INC.
GRADE REPORTING
Specific Application: Prints Report Cards and School Reports
Specific Industry: Education
System Requirements: North Star Horizon; DEC PDP-8; Decmate 1 and 2
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-8)

ARGAT SYSTEMS LTD.
REPORT GENERATOR
Specific Application: Report Generator
Specific Industry: Banking/Financial
System Requirements: DEC PDP-11, DEC VAX; VMS
Memory Required: 512.0K bytes
Source Language: Aims Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1972
(See Vendor Profile Page V-8)

ARGONAUT INFORMATION SYSTEM, INC.
REPORT SYSTEM
Specific Application: Reports
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38, HP 3000, DEC VAX
Memory Required: 64.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: September 1976
(See Vendor Profile Page V-8)

AUTOMATED ANALYSIS
REPORTER
Specific Application: Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000; MPE
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $6,000
Date First Installed: September 1978
(See Vendor Profile Page V-10)

AZNEX, INC.
AZ-7
Specific Application: User-Friendly General-Purpose Report Writer and Inquiry
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell; Gcos; Harris; Vulcan/VOS, HP3000; MPE; DG; OS/AOS
Memory Required: 32.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $10,000 to $32,500
Number Installed to Date: 50
Date First Installed: 1971
(See Vendor Profile Page V-11)

BARFIELD CONSULTING, INC.
DMS REPORT GENERATOR
Specific Application: Report Generator
Specific Industry: Not Industry Sensitive
Memory Required: 60.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 2
Date First Installed: April 1983
(See Vendor Profile Page V-11)

BDS NATIONAL, INC.
ASSISTER REPORT WRITER + FOR IBM SERIES I
Additional Product Classification: Data/File Management
Specific Application: Report Writing, File Update, Create Files, Inquiry, Updating
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4952 Series/1, 4953 Series/1, 4955 Series/1, 4956 Series/1; EDX
Memory Required: 128.0K bytes
Source Language: EDL
Source Code Available: $1,000
Purchase Terms: Purchase (license); Rental
Price: $2,500
Number Installed to Date: 50
Date First Installed: September 1980
(See Vendor Profile Page V-13)

BDS NATIONAL, INC.
BDS AUTOCLERK
Additional Product Classification: Data/File Management, Program Generators/Aids/Appl. Development Tools
Specific Application: Allows Nonprogrammers to Create Special Reports And Data Files as Needed
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: Microcobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 2,000
Date First Installed: September 1978

CIBAR, INC.
WHAT-IF
Specific Application: Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,500
Number Installed to Date: 7
Date First Installed: November 1983
(See Vendor Profile Page V-19)

CINCOM SYSTEMS, INC.
SOCRATES
Specific Application: Batch Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370; E-DOS, OS, MVS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-19)

COMPUTER ASSOCIATES
CA-EARL
Specific Application: Report Program Language for the Nonprogrammers
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3600 Series; DOS/VS, OS/VS1/MVS, VM/CMS
Memory Required: 160.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 600
Date First Installed: 1974
(See Vendor Profile Page V-23)

COMPUTER SYSTEMS TECHNOLOGY, INC.
PROGRAM GENERATOR REPORT WRITER
Specific Application: Program Generator and Report Writer
Specific Industry: Government
System Requirements: DG; R-DOS; AOS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1978
(See Vendor Profile Page V-27)

COMPUTER WORKSHOP
MENU MANAGER
Additional Product Classification: Menu Manager
Specific Application: Cobol Report and Display Writer and Allows 600-Word Comment on Existing File
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 64.0K bytes
Source Language: RM Cobol
Purchase Terms: Purchase (license)
Price: $49
Number Installed to Date: 150
Date First Installed: 1982
(See Vendor Profile Page V-28)

COMPUTROL, INC.
REPORT IT
Specific Application: Report Writer
Specific Industry: Banking/Financial
System Requirements: IBM; NCR; Burroughs
Source Language: Cobol
Purchase Terms: Purchase (license)
Number Installed to Date: 20
(See Vendor Profile Page V-28)

CULLINET SOFTWARE, INC.
CULPRIT
Specific Application: Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series

Memory Required: 150.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $27,000
Number Installed to Date: 1,117
Date First Installed: 1969
(See Vendor Profile Page V-33)

CYBERNA, INC.
USERVISION
Specific Application: Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: Tandem 16: Guardian; TI 990: DX-10
Memory Required: 250.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-34)

CYTROL, INC.
CYX-RW REPORT WRITER
Specific Application: Provides Functions for Preparing Reports
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/24 up to 11/70: RSX-11M; DEC VAX: VMS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 10
Date First Installed: May 1983
(See Vendor Profile Page V-34)

DATA BASE MANAGEMENT, INC.
BASIC OFFICES SETTLEMENT SYSTEM II
Specific Application: Settlement Report Generator
Specific Industry: Legal, Real Estate
System Requirements: HP 250
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-35)

DATAMATIC, INC.
SCHOOL ACCOUNT APPLICATION
Specific Application: Federal Handbook 22, Accounts Payable, Accounts Receivable, Budget Report, Audit Trail
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell; Datapoint; Burroughs
Memory Required: 128.0K bytes
Source Language: Cobol 77
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 37
Date First Installed: 1973
(See Vendor Profile Page V-37)

DATASCAN AMERICA, INC.
REPORT/SCAN
Specific Application: Report Writing System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3000 Series, 370: Cics; IBM System/34, System/38: CFP; IBM PC: PC-DOS, Datapoint 1560: DOS
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 3,000
Date First Installed: June 1978
(See Vendor Profile Page V-38)

DATAVISION
CLIENT WRITE UP
Specific Application: Write-Up Client Documents
Specific Industry: Accountants
System Requirements: DEC
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1975
(See Vendor Profile Page V-39)

DATAVISION
REPORT WRITER
Additional Product Classification: Graphics
Specific Application: Generates Reports and Graphics
Specific Industry: Not Industry Sensitive
System Requirements: DEC
Memory Required: 64.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1975

DENNEN COMPUTER SYSTEMS, INC.
UNIT STATISTICAL PLAN MAGNETIC TAPE REPORT
Specific Application: Reduces Council Assessment by Presenting Statistical Data in Format Requested by NCCI
Specific Industry: Insurance
System Requirements: IBM: DOS, DEC VAX: OS
Memory Required: 512.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-41)

DIGITAL EQUIPMENT CORP.
DATATRIEVE - II
Additional Product Classification: Query Languages
Specific Application: Data Maintenance, Query Lang, Report-Writing System
Specific Industry: Government
System Requirements: DEC PDP-11: RSTS/E; DEC VAX-11: VMS
Purchase Terms: Purchase (license)
Price: $4,200
(See Vendor Profile Page V-42)

DTRO, INC.
DTRO MBS-MICRO INTERACTIVE REPORT
Specific Application: Builds Files and Allows Interactive User-Friendly Report Generation
Specific Industry: Not Industry Sensitive
System Requirements: IBM: TSO; DEC PDP: RSTS/E; HP 3000; Honeywell Level 6
Memory Required: 100.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 1
Date First Installed: 1982
(See Vendor Profile Page V-44)

DYLAKOR
DYL-350
Specific Application: Fixed-Form, Parameter-Driven Report Writer, Information Handling
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, SSX, OS, CMS
Memory Required: 54.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 1,000
Date First Installed: November 1972
(See Vendor Profile Page V-44)

DYLAKOR
DYL-280
Additional Product Classification: Sort/Merge
Specific Application: Free-Form English Report Writer, Data Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, SSX, OS, CMS
Memory Required: 120.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 1,900
Date First Installed: 1981

EFFICIENT COMPUTING CO.
REPORT 1000
Specific Application: Report Generator
Specific Industry: Wholesale/Distribution, Medical, Legal
System Requirements: HP 1000: RTE 6, RTE IVB, RTE V
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-45)

ELECTRONIC DATA SYSTEMS CORP.
SPLITTER
Specific Application: Controls and Simplifies Report Output
Specific Industry: Not Industry Sensitive
System Requirements: IBM: MVS, MVT
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: September 1980
(See Vendor Profile Page V-46)

ESI
IMPULSE
Specific Application: On-Line Report Generation
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B1700-B1900, B2700-B4900, B1700-B7900 MCP
Memory Required: 67.0K bytes
Source Language: Cobol
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 8
Date First Installed: December 1982
(See Vendor Profile Page V-47)

GENTRY, INC.
MCBA PAR
Specific Application: Report Writer
Specific Industry: Accountants Productivity Management
System Requirements: HP 3000: MPE IV
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: August 1983
(See Vendor Profile Page V-51)

GENTRY, INC.
MIS PAR
Specific Application: Report Writer
Specific Industry: Accountants Productivity Management
System Requirements: HP 3000: MPE IV
Source Language: B
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,000
Number Installed to Date: 3
Date First Installed: January 1983

GENTRY, INC.
PAL DATA REPORTER
Specific Application: End-User Tool for Report Writing
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE IV
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 50
Date First Installed: January 1982

GOULD, INC.
SLOCUM - REPORT WRITER
Specific Application: Report Generation
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32: MPX 32
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $9,700
(See Vendor Profile Page V-52)

HAUTE SYSTEMS, INC.
WP GEM (WORD PROCESSING GENERATOR)
Specific Application: Custom Word Processing Output Generator
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-53)

HDR SYSTEMS, INC.
SQL REPORT WRITER
Specific Application: Allows User to Query in SQL and Produces Reports Using Easy to Understand Report Writer Commands
Specific Industry: Not Industry Sensitive
System Requirements: Onyx 8002: Unix; Datapoint 88, 86: RMS
Memory Required: 64.0K bytes

Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: September 1982
(See Vendor Profile Page V-54)

INS ASSOCIATES, INC.
E-Z WRITER SYSTEM
Specific Application: Enables A User to Design Honeywell OWN Formats Without Use of A Program
Specific Industry: Not Industry Sensitive
System Requirements: DEC: CP/M, CTS-300, CTS-500, Unix
Memory Required: 64.0K bytes
Source Language: Dibol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: February 1980
(See Vendor Profile Page V-56)

INFORMATICS GENERAL CORP.
ANSWER - 2
Specific Application: Report Writer Providing Full Production Reporting Capability
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360; OS, IBM 370: DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1979
(See Vendor Profile Page V-57)

INFORMATICS GENERAL CORP.
REPORT WRITER
Specific Application: Report Writer
System Requirements: IBM 360: OS, IBM 370: DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 250
Date First Installed: 1979

INFORMATION AND SYSTEMS RESEARCH, INC.
VOILA!
Specific Application: Report Generating System
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11, RSTS/E, RSX-11M; DEC VAX: VMS
Source Language: Dibol, Cobol, C#L
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 450
Date First Installed: July 1983
(See Vendor Profile Page V-57)

INTERACTIVE SOFTWARE SYSTEMS, INC.
ISI REPORT GENERATOR
Specific Application: Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 1.0M bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 10
Date First Installed: January 1981
(See Vendor Profile Page V-60)

INTERPROCESS SYSTEMS, INC.
APLPRINT
Specific Application: High-Speed Print Facility for VS/APL
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: MVS, TSO, VM/CMS
Memory Required: 60.0K bytes
Source Language: BAL
Source Code Available: $440
Purchase Terms: Purchase (license); Rental
Price: $1,750
Number Installed to Date: 3
Date First Installed: 1982
(See Vendor Profile Page V-61)

INTERPROCESS SYSTEMS, INC.
ENCHANCED FORMAT FOR VS/APL
Specific Application: Formats APL Data Into Reports
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: MVS/TSO, MVS/VS
Memory Required: 8.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $3,300
Number Installed to Date: 40
Date First Installed: 1981

LOGICAL DESIGN CORP.
JOB COST
Specific Application: Reports on Goods Sold and Completed
Specific Industry: Manufacturing
System Requirements: Burroughs B90, B900, B1900: CMS, CMS/Native
Source Language: Cobol 74
Purchase Terms: Purchase (license)
Date First Installed: 1979
(See Vendor Profile Page V-66)

THE MANAGEMENT GROUP, INC.
IQ (INFO QUICK)
Specific Application: Cobol Program Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell DPS 8: Gcos 3; Honeywell Level 66: Gcos 8
Memory Required: 38.0K bytes
Source Language: Cobol-66, Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $22,500
Number Installed to Date: 40
Date First Installed: 1976
(See Vendor Profile Page V-68)

MASSOGLIA AND ASSOCIATES, INC.
CCF PRINT SPOOLER
Specific Application: Transmit Reports From Spool Queue to 3280 Series Terminal Printers
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/3
Source Language: RPG II, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
(See Vendor Profile Page V-70)

MATHIS & ASSOCIATES, INC.
QUEST
Additional Product Classification: Data Dictionary
Specific Application: English-Like Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: NCR: VRX
Memory Required: 64.0K bytes
Source Language: Cobol, Neat/3
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $3,475
Number Installed to Date: 175
Date First Installed: June 1981
(See Vendor Profile Page V-70)

MATHIS & ASSOCIATES, INC.
UPG
Additional Product Classification: Data/File Management, Program Generators/Aids/Applications Development Tools
Specific Application: Shorthand Load and GO Program Generator
Specific Industry: Not Industry Sensitive
System Requirements: NCR: VRX
Memory Required: 64.0K bytes
Source Language: Neat/3
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $4,975
Number Installed to Date: 600
Date First Installed: 1975

MCDONNELL DOUGLAS AUTOMATION CO.
MULTIPLE REPORT CREATION SYSTEM
Specific Application: Production Report Generator Against Large Files and Data Bases
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series 4300 Series: OS/VS VM/CM
Memory Required: 140.0K bytes
Source Language: Assembler, Machine
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 200
Date First Installed: June 1975
(See Vendor Profile Page V-71)

METRETEK, INC.
UTILITY SYSTEM
Additional Product Classification: Data/File Management
Specific Application: Data Conversion
System Requirements: IBM PC; IBM Series/1: EDX; Apple: APPLE-DOS
Source Language: EDL, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-72)

MINI-COMPUTER BUSINESS APPLICATIONS, INC.
REPORT WRITER
Specific Application: Writes Reports
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX-11: RT-11, RSTS/E
Source Language: Dibol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
(See Vendor Profile Page V-75)

MINIDATA SYSTEMS
SUPERITE
Specific Application: Client Write Up
Specific Industry: Accounting
System Requirements: Wang 2200; CP/M
Memory Required: 32.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,195
Number Installed to Date: 193
Date First Installed: 1979
(See Vendor Profile Page V-76)

MOHAWK DATA SCIENCES CORP.
REPORTER
Specific Application: Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: MDS Series 21: OS/2; MDS 2110: OS/10
Memory Required: 96.0K bytes
Source Language: Mobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $550
Date First Installed: September 1981
(See Vendor Profile Page V-77)

MRP SYSTEMS
INFORMAT
Specific Application: Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: DG: Mv; Point 4
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,200
Date First Installed: 1977
(See Vendor Profile Page V-77)

MULTIPLICATIONS, INC.
IMAGINE
Additional Product Classification: Query Languages
Specific Application: Query Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series; DOS/VS, IBM 3081 Series; DOS/VS, DOS/MVT
Source Language: Cobol, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $52,000
Number Installed to Date: 5
Date First Installed: September 1983
(See Vendor Profile Page V-78)

NATIONAL FEI, INC.
VUE
Additional Product Classification: Accounting, Graphics
Specific Application: Generates Reports for Scheduling, Costing and Resource Analysis, Generates Network Diagrams
Specific Industry: Engineering, Construction
System Requirements: DEC PDP-11: RT-11, RSTS/E, DEC VAX: VMS; HP 3000: MPE, Honeywell
Memory Required: 64.0K bytes
Source Language: Fortran 4
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $16,000
Number Installed to Date: 50
Date First Installed: 1978
(See Vendor Profile Page V-79)

NCR CORP.
PCD-PARAMETERS IN COBOL OUT
Specific Industry: Manufacturing, Aerospace, Distribution, Retail, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation, Nonprofit Organizations
System Requirements: NCR 9300: ITX
Memory Required: 1.0M bytes
Source Language: NCR
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Date First Installed: January 1983
(See Vendor Profile Page V-80)

NORTH AMERICAN COMPUTER CONSULTANTS
USERVISION
Specific Application: Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: Tandem 16: Guardian; TI 990: DX-10
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-80)

NORTHEAST DATACOM, INC.
REPORT GENERATOR
Specific Application: Report Generation
Specific Industry: Not Industry Sensitive
System Requirements: Wang 2200: Speed
Memory Required: 28.0K bytes
Source Language: Basic II
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-80)

OASYS CORP.
AIDE
Additional Product Classification: Data/File Management, Program Generators/Aids/Applications Development Tools, Languages
Specific Application: Application Development Environment of Integrated Tools Aimed at Commercial Applications
Specific Industry: System Houses
System Requirements: Motorola 68000; Intel-8086, IBM PC: PC-DOS, DEC VAX: VMS, Unix
Memory Required: 512.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license), Lease
Price: $600 to $10,000
Date First Installed: July 1982
(See Vendor Profile Page V-81)

OUTPUT REPORTING, INC.
OR - REPORTER/OR - DISPLAYER
Specific Application: Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP
Memory Required: 22.0K bytes
Source Language: RPG-II, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 250
Date First Installed: June 1980
(See Vendor Profile Page V-83)

PACE APPLIED TECHNOLOGY, INC.
KOMAND/DB (DATA INQUIRY SYSTEM)
Specific Application: Generalized and Statistical Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series: OS/MVS; IBM 3080 Series: OS/VS1
Source Language: Cobol, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $5,000
Date First Installed: 1973
(See Vendor Profile Page V-83)

PARA RESEARCH, INC.
EASY LIST
Specific Application: Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 36.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $600
Number Installed to Date: 70
Date First Installed: November 1982
(See Vendor Profile Page V-84)

PARK SOFTWARE
PIE
Additional Product Classification: Query Languages
Specific Application: Report Writer Query Program
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E; DEC VAX: VMS
Memory Required: 62.0K bytes
Source Language: Basic Plus 2
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500 to $4,000
Number Installed to Date: 70
Date First Installed: 1981
(See Vendor Profile Page V-84)

PCR, INC.
FACT FINDER
Specific Application: Information Retrieval Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP
Memory Required: 42.0K bytes
Source Language: RPG-II, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,995
Number Installed to Date: 390
Date First Installed: 1981
(See Vendor Profile Page V-84)

PETROLEUM INFORMATION CORP.
PETROLEUM
Specific Application: Mapping, Graphing, Digitizing Analysis
Specific Industry: Petroleum
System Requirements: IBM PC: PC-DOS, DEC VAX-11/750, VAX-11/730: VMS; PDP-11/23: RSX-11M
Memory Required: 512.0K bytes
Source Language: Basic, Fortran
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: 1975
(See Vendor Profile Page V-85)

QANTEL CORP.
REPORT GENERATOR
Specific Application: Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: Qantel System 10, System 20, System 40, System 64: Best
Memory Required: 8.0K bytes
Source Language: QIC Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Date First Installed: 1978
(See Vendor Profile Page V-89)

Q. E., INC.
QUERY
Additional Product Classification: Query Languages
Specific Application: Ad Hoc Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: Prime 2250: Primos
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $7,500
Number Installed to Date: 6
Date First Installed: 1983
(See Vendor Profile Page V-90)

QUANTUM SYSTEMS, INC.
QLX
Specific Application: Custom Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RSX-11M
Memory Required: 256.0K bytes
Purchase Terms: Purchase (license)
Price: $7,500
Date First Installed: 1983
(See Vendor Profile Page V-90)

RELATIONAL DATABASE SYSTEMS, INC.
ACETM
Additional Product Classification: Data/File Management
Specific Application: Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: Unix; DEC PDP: Xenix; Altos: DOS, Zeus
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $800 to $1,600
Number Installed to Date: 1,500
Date First Installed: February 1981
(See Vendor Profile Page V-92)

RENDECK CORP.
DATAMAN II
Specific Application: Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 4300 Series, 3000 Series: DOS/VSE, MVS, DOS/VS, OS/VS
Memory Required: 80.0K bytes
Source Language: Object Code
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $15,500 to $19,500
Number Installed to Date: 200
Date First Installed: January 1976
(See Vendor Profile Page V-92)

SMITH, DENNIS & GAYLORD, INC.
REPORT WRITER FOR GENERAL LEDGER
Additional Product Classification: Accounting
Specific Application: Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 512.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 60
Date First Installed: 1979
(See Vendor Profile Page V-96)

SMITH, DENNIS & GAYLORD, INC.
REX PAL
Additional Product Classification: Program Generators/Aids/Applications Development Tools
Specific Application: Report Generating
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Source Language: Basic, SPL, Image
Purchase Terms: Purchase (license)
Price: $9,000
Number Installed to Date: 2

SOURCE DATA SYSTEMS, INC.
FINANCIAL MANAGEMENT REPORTER
Specific Application: Financial Management Report Writer

Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1, PC; NCR 9020, 9300, Tower 1632, Decision Mate V
Source Language: Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 4
Date First Installed: July 1981
(See Vendor Profile Page V-101)

STSC, INC.
ADRS PLUS SYSTEM
Specific Application: Uses the Advanced Features of the APL Plus System to Improve Significantly the Performance of ADRS II
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370/4330: VM/CMS
Source Language: APL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $10,000
Date First Installed: 1982
(See Vendor Profile Page V-104)

SYSTEC COMPUTER ASSOCIATES, INC.
REPORT GENERATOR
Specific Application: Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse; DG Nova: R-DOS
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 1
Date First Installed: 1983
(See Vendor Profile Page V-105)

SYSTEM SUPPORT SOFTWARE, INC.
QUIKJOB-QUIKWRITE
Additional Product Classification: Data/File Management, Query Languages, Program Generators/Aids/Applications Development Tools
Specific Application: Language
Specific Industry: Not Industry Sensitive
System Requirements: IBM Mainframes: OS/3
Memory Required: 40.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $5,445
Number Installed to Date: 1,000
Date First Installed: October 1972
(See Vendor Profile Page V-108)

TRANS MICRO SYSTEM, INC.
ASK/3000
Specific Application: Image Data Base Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 64.0K bytes
Source Language: SPL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 400
Date First Installed: 1977
(See Vendor Profile Page V-111)

TRES SYSTEMS, INC.
REPORT WRITER
Specific Application: Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS, IBM 4300 Series: OS; IBM 3030 Series: MVS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 18
Date First Installed: 1983
(See Vendor Profile Page V-112)

UNITED INFORMATION SERVICES
COMMTRACK
Specific Application: Generates Reports, Analyzes Telephone Use and Related Costs
Specific Industry: Telecommunications
System Requirements: CDC Cyber; IBM
Source Language: Fortran, Super Basic, Cobol, Snobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-113)

Microcomputer Section

CISNETWORK CORP.
REPORT ON MICRO
Specific Application: Customized Report Writing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT: PC-DOS 2.0
Memory Required: 256.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-19)

COMPUTER SYSTEMS ASSOCIATES, INC.
PEANUT BROKER PACKAGE
Specific Application: Produces Federally Required Report for Peanut Brokers
Specific Industry: Peanut Brokers
System Requirements: IBM System/23
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-27)

DATA RESEARCH ASSOCIATES, INC.
LIBRARY FOR THE BLIND & PHYSICALLY HANDICAPED
Specific Application: Automate Selection, Circulation, Statistics, Generator, Report Writing and Other Data Processing Needs
Specific Industry: Library
System Requirements: DEC
Source Language: Basic, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1977
(See Vendor Profile Page V-38)

EXECUTEC CORP.
EXECU/REPORTER TM
Specific Application: A Functionally Complete System for Interactive Definition and Batch Preparation of Reports
Specific Industry: Not Industry Sensitive
System Requirements: Wang PC: PC-DOS; Victor 9000; IBM PC
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
(See Vendor Profile Page V-47)

FARM BUSINESS SERVICES, INC.
SOW AUDIT
Additional Product Classification: Inventory
Specific Application: Records Inventory Control
Specific Industry: Farm
System Requirements: IBM: PC-DOS; CP/M
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $395 to $695
Number Installed to Date: 100
Date First Installed: 1980
(See Vendor Profile Page V-46)

FOGLE COMPUTING CORP.
PROSPECTOR IV
Additional Product Classification: Sales
Specific Application: Letter Writing and Record Keeping
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: PC-DOS (Basic)
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $280
Number Installed to Date: 30
Date First Installed: March 1982
(See Vendor Profile Page V-49)

FOGLE COMPUTING CORP.
UNIVERSAL REPORT FACILITY URF
Additional Product Classification: Operating Systems
Specific Application: Nonspecific General Report Writing
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: PC-DOS (Basic)
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $150
Number Installed to Date: 50
Date First Installed: March 1982

FRIENDS SOFTWARE CORP.
FRIEND:THE REPORT GENERATOR
Specific Application: Generate Reports, Tables, Percentages, Listings And Tabulations from Dbase II
Specific Industry: Not Industry Sensitive
System Requirements: Zilog Z80, Intel 8080, Intel 8086, CP/M, PC-DOS, MP/M, MS-DOS
Memory Required: 48.0K bytes
Source Language: 8080, Pcode
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 400
Date First Installed: 1980
(See Vendor Profile Page V-50)

GAYLORD BROS., INC.
GS-500 ACQUISITION SYSTEM
Specific Application: Order Entry, Produce Purchase Orders, Automate Receiving Process, Print Claims
Specific Industry: Library
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $2,500
(See Vendor Profile Page V-50)

GAYLORD BROS., INC.
PFS REPORT
Additional Product Classification: Sort/Merge
Specific Application: Sorts and Summarizes Data Stored in PFS
Specific Industry: Not Industry Sensitive

System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $95 to $125

GAYLORD BROS., INC.
THE WORD HANDLER II
Specific Application: Produce Professional Reports and Documents
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48 0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $199

GULF EDUCATIONAL SYSTEMS, INC.
REPORT GENERATOR
Specific Application: Allows Designing and Customizing Reports on All Information In Data Base
Specific Industry: Education
Memory Required: 64 0K bytes
Source Language: Cobol
Source Code Available: $250
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,000
Number Installed to Date: 60
Date First Installed: 1982
(See Vendor Profile Page V-53)

HELDMAN SYSTEMS, INC.
H-CHAMP + IV - VERSION 2.0
Specific Application: Report Schedule and Print Report Formatting Utilities
Specific Industry: Not Industry Sensitive
System Requirements: Intel; Zilog; Various
Memory Required: 48.0K bytes
Source Language: Fortran, Rational Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $149
Number Installed to Date: 4
Date First Installed: May 1983
(See Vendor Profile Page V-54)

INFO-FIVE
INFO-REPORTER
Specific Application: Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64 0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125
Date First Installed: April 1983
(See Vendor Profile Page V-57)

L.P. SHARP ASSOC., INC.
STATE CHORE TABULATION ANALYSIS
Specific Application: Analyzing, Manipulation and Reporting Coded Data
Specific Industry: Not Industry Sensitive
System Requirements: IBM; MVS; VSE
Source Language: APL
Purchase Terms: Purchase (license)
Number Installed to Date: 25
Date First Installed: 1982
(See Vendor Profile Page V-61)

OPEN SYSTEMS, INC.
TEAM MANAGER
Specific Application: Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: CP/M, MP/M· PC-DOS, Oasis, Xenix
Memory Required: 64 0K bytes
Source Language: Business Basic, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: July 1983
(See Vendor Profile Page V-83)

OPEN SYSTEMS, INC.
THE SOFTWARE FITNESS PROGRAM THE TEAM
Specific Application: Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: CP/M, MS-DOS, PC-DOS, TURBO-DOS
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: June 1983

RELATIONAL SYSTEMS INTERNATIONAL, INC.
PERSONAL PEARL VER 1.06
Additional Product Classification: Data/File Management, Financial Modeling Languages/DSS, Program Generators, Aids, Application Development Tools
Specific Application: Management of Information In Relational Data Base and User Unique Software
Specific Industry: Not Industry Sensitive
System Requirements: CP/M: PC-DOS
Memory Required: 56 0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: September 1982
(See Vendor Profile Page V-82)

SOFTWARE PUBLISHING CORP.
PFS: REPORT
Specific Application: Produce Reports From PFS: File Adds
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE, III: APPLE-DOS, IBM PC· MS--DOS; TI Professional: MS-DOS
Memory Required: 128 0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125 to $175
Number Installed to Date: 100,000
Date First Installed: 1981
(See Vendor Profile Page V-100)

SOLUTIONS, INC.
VIS/BRIDGE/REPORT
Specific Application: Enhances Report Printing Capabilities of Visicalc
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, TRS-80/II, TRS-80/III, TRS-80 Model 12, TRS-80 Model 16: MS-DOS; Apple-II+, Apple III: APPLE-DOS; IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $79
Date First Installed: October 1982
(See Vendor Profile Page V-101)

STERLING DATA APPLICATIONS, INC. (SDAI)
VETERINARIAN INFORMATION SYSTEM
Specific Application: Handles Check In to Check Out With Special Reports and Vaccinations, Prints Receipts
Specific Industry: Veterinary
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: Dbase II, ADL
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 8
Date First Installed: May 1983
(See Vendor Profile Page V-103)

TRANS MICRO SYSTEM, INC.
ASK/1000
Specific Application: Image Data Base Report Generator
Specific Industry: Not Industry Sensitive
System Requirements: HP1000
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000
Number Installed to Date: 10
Date First Installed: November 1982
(See Vendor Profile Page V-111)

QUERY LANGUAGES

ALPHA SOFTWARE CORP.
DATABASE MANAGER II
Additional Product Classification: Sort/Merge, Report Generator, DBMS
Specific Application: Provides An Interface Between Visicalc 1-2-3 and Wordstar
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS 1.1, 2.0
Memory Required: 128.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 870
Date First Installed: April 1983
(See Vendor Profile Page V-4)

ALTERGO PRODUCTS, INC.
FQS FRIENDLY QUERY SYSTEM
Specific Application: On-Line Query Capability
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3000 Series, 4300; DOS/VSE, OS/VS
Memory Required: 25.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $11,500 to $15,000
Number Installed to Date: 100
Date First Installed: 1981
(See Vendor Profile Page V-4)

ASCOM COMPUTER CORP.
QUERY LANGUAGE
Specific Application: Productivity Tool for Query Language
System Requirements: DEC PDP-11; RSTS/E, DEC VAX-11/750: VMS, DEC VAX-11/780: VMS
Memory Required: 256.0K bytes
Source Language: Basic Plus II, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 150
(See Vendor Profile Page V-4)

APPLICATIONS SOFTWARE, INC.
ASI-INQUIRY
Specific Application: Interactive Query Language
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370; IMS/Cics, IBM 4300, 3000 Series: IMS/Cics
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $40,000
Number Installed to Date: 150
Date First Installed: 1974
(See Vendor Profile Page V-7)

APPLIED DATA RESEARCH, INC.
ADR DATAQUERY RELEASE 3.0
Specific Application: Interactive Relational Query System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370; 3000 Series, 4300 Series: OS; DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $14,600 to $17,900
Date First Installed: 1975
(See Vendor Profile Page V-7)

CENTURY ANALYSIS, INC.
LOOK/4
Specific Application: Interactive Query
Specific Industry: Not Industry Sensitive
System Requirements: NCR: VRX, B/3
Source Language: Cobol, Neat/3
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,500
Number Installed to Date: 175
Date First Installed: 1978
(See Vendor Profile Page V-17)

CINCOM SYSTEMS, INC.
MINI T-ASK
Specific Application: Query Language
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS; HP Level 6; IBM System/34; Prime
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-19)

CINCOM SYSTEMS, INC.
T-ASK
Specific Application: on Line Interactive Query System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, E-DOS, OS, MVS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)

COMPUTER HEADWARE
WHATS IT?
Specific Application: Interactive Query Retrieval
Specific Industry: Not Industry Sensitive
System Requirements: Various CP/M Compatible: CP/M; Apple: APPLE-DOS; North Star Horizon: NS-DOS, Alpha Micro: Alpha DOS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $150
Date First Installed: March 1978
(See Vendor Profile Page V-24)

CULLINET SOFTWARE, INC.
ONLINE ENGLISH - OLE
Specific Application: On-Line English Language
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series, 4300 Series
Memory Required: 800.0K bytes
Source Language: PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35,000
Number Installed to Date: 75
Date First Installed: September 1980
(See Vendor Profile Page V-33)

DATABASE SYSTEMS CORP.
ENTRY
Specific Application: Design Data Entry Applications, Create Screen Forms, Generating

Specific Industry: Not Industry Sensitive
System Requirements: Prime 750, 250, 550 Primos
Memory Required: 125.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1979
(See Vendor Profile Page V-35)

DATABASE SYSTEMS CORP.
TRANSACT
Specific Application: High Performance On-Line Design Transaction Processors, Paint Screen
Specific Industry: Not Industry Sensitive
System Requirements: Prime 850, 250; Primos
Memory Required: 125.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1979

FRITZ ASSOCIATES, INC.
THEMIS
Specific Application: Natural Language Query
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Memory Required: 1.0M bytes
Source Language: Interlist
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-50)

FUSION PRODUCTS INTERNATIONAL
FUSION-1 INFORMATION RETRIEVAL SYSTEM
Specific Application: Application Toll for IBM System/34
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, SSP
Memory Required: 34.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 291
Date First Installed: October 1981
(See Vendor Profile Page V-50)

HARD HAT SOFTWARE
WHATS IT?
Specific Application: Interactive Query Retrieval
Specific Industry: Not Industry Sensitive
System Requirements: Apple; North Star; Alpha Micro: CP/M
Source Language: Varies
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $245
Date First Installed: March 1978
(See Vendor Profile Page V-53)

HDR SYSTEMS, INC.
HDL TRANSLATOR
Specific Application: A Translator Which Allows the User to Do the Query, Update and Control, Authorization of the Data Base Admin

Specific Industry: Not Industry Sensitive
System Requirements: Onyx 8002: Unix, Data Point 88, 86: RMS
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: September 1982
(See Vendor Profile Page V-54)

H & M SYSTEMS SOFTWARE, INC.
CFAST - ONLINE INQUERY AND UPDATE SYSTEM
Specific Application: Cics Inquiry and Update
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: DOS, OS, IBM 4300: IBM 3000 Series
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $9,250
Number Installed to Date: 150
Date First Installed: January 1980
(See Vendor Profile Page V-54)

THE HUTCHINSON CO.
PARAGRAPH PATTERN MATCH - PPM
Specific Application: Word Processing/Inquiry
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco: Cromix
Memory Required: 4.0K bytes
Source Language: Z-80 Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 11
Date First Installed: March 1981
(See Vendor Profile Page V-111)

NCR CORP.
NCR-DMS/QUERY
Specific Application: Information Retrieval Query Language
Specific Industry: Not Industry Sensitive
System Requirements: NCR V-8500: VRX; NCR V-8000 Series: VRX
Memory Required: 1.0M bytes
Source Language: Cobol, Neat/VS
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 33
Date First Installed: September 1982
(See Vendor Profile Page V-78)

NCR CORP.
QUERY/I
SPECIFIC INDUSTRY: Manufacturing, Banking/Financial, Medical, Legal, Insurance, Real Estate, Education, Construction, Government, Transportation, Nonprofit Organizations
System Requirements: NCR 9300 Series Systems: ITX
Memory Required: 1.0M bytes
Source Language: NCRL
Source Code Available: No

Purchase Terms: Purchase (license); Rental, Lease
Date First Installed: January 1983

SCIENTIFIC & BUSINESS SYSTEMS, INC.
EASYWORK
Additional Product Classification: Report Generator
Specific Application: Report Writer and Cobol Generator, Interactive Query System
Specific Industry: Not Industry
System Requirements: Honeywell: Dbos
Memory Required: 64.0K bytes
Source Language: Fortran, Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $8,000 to $25,000
Number Installed to Date: 150
Date First Installed: 1971
(See Vendor Profile Page V-95)

SENTINEL COMPUTER CORP.
[illegible] REPORT WRITER
Specific Application: Query Report Writer
Specific Industry: Wholesale/Distribution
System Requirements: Sentinel 30; Sentinel 40: Dbos; Sentinel 50; [illegible]
Memory Required: 128.0K bytes
Source Language: DBL
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,000
Number Installed to Date: 200
Date First Installed: April 1981
(See Vendor Profile Page V-96)

SIR, INC.
SIR/SQL+
Specific Application: Relational Query Retrieval
Specific Industry: Not Industry
System Requirements: IBM: OS; DEC: VM/CMS, Univ: VMS
Source Language: Sirtran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $6,000
Date First Installed: 1983
(See Vendor Profile Page V-99)

TRANS MICRO SYSTEM, INC.
INTERPILER
Specific Application: Cobol Code Generator From Ask Query Report
Specific Industry: Not Industry
System Requirements: HP 3000: MPE
Memory Required: 64.0K bytes
Source Language: SPL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: [illegible]
Date First Installed: August 1983
(See Vendor Profile Page V-111

TRES SYSTEMS, INC.
IMS DATA COMMUNICATION
Additional Product Classification: DBMS
Specific Application: [illegible] Communication Inquiry and DataBase
Specific Industry: Not Industry
System Requirements: IBM 370: DOS, IBM 4300 Series: OS; IBM 3030 Series: VM
Source Language: Cics
Specific Industry: Not Industry
System Requirements: IBM 370: DOS; IBM 4300 Series: OS; IBM [illegible] VM
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1979
(See Vendor Profile Page V-112)

Microcomputer Section

GOULD, INC.
[illegible] QUERY LANGUAGE
Specific Application: Query Language
Specific Industry: Not Industry Sensitive
System Requirements: Concept/32; [illegible]
Source Language: Fortran, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $9,700
(See Vendor Profile Page V-52)

[illegible] SYSTEMS, INC.
JUST ASK
Specific Application: English Sentence Inquiry System
System Requirements: Cadd
Memory Required: 16.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 100
Date First Installed: 1983
(See Vendor Profile Page V-86)

TCS SOFTWARE, INC.
TCS SAMPLE
Specific Application: Report Query Processor
Specific Industry: Not Industry Sensitive
System Requirements: Intel 8080 MP/M; Intel 8086: MS-DOS
Memory Required: 8.5M bytes
Source Language: Microsoft Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 1,000
Date First Installed: August 1981
(See Vendor Profile Page V-106)

SECURITY/AUDITING

APPLIED REALTIME SYSTEMS, INC.
COMPUTERIZED LIMITED ACCESS SECURITY
Specific Application: Restrict Access and/or Record Time and Attendance Data
Specific Industry: Banking/Financial, Medical, Education, Government
System Requirements: IBM Series/1, IBM PC
Memory Required: 64 0K bytes
Source Language: EDL, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,500
Number Installed to Date: 80
Date First Installed: May 1978
(See Vendor Profile Page V-8)

APPLIED SOFTWARE, INC.
DATA ENCRYPTION FACILITY-DEF
Specific Application: Data Security
Specific Industry: Not Industry Sensitive
System Requirements: IBM, MVS
Memory Required: 100 0K bytes
Source Language: 370 Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 10
Date First Installed: September 1982
(See Vendor Profile Page V-8)

THE CAMBRIDGE SYSTEMS GROUP
ACCESS CONTROL FACILITY
SYSTEM Z DEVELOP
Specific Application: Controls Access to Computer
Specific Industry: Not Industry Sensitive
System Requirements: IBM 308X: MVS, IBM 370, VS, IBM 303X
Source Language: ALC
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $27,000
Number Installed to Date: 950
Date First Installed: 1978
(See Vendor Profile Page V-16)

THE CAMBRIDGE SYSTEMS GROUP
ACF2 ACCESS CONTROL FACILITY SYSTEM
Specific Application: Data Security
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370, 3000 OS/VS
Memory Required: 250.6K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $21,000 to $29,500
Number Installed to Date: 1,000
Date First Installed: May 1978

CONTENT ASSOCIATES
FOCUS TERMINAL SECURITY SYSTEM
Specific Application: Password Security System
Specific Industry: Banking/Financial
System Requirements: NCR B3 VRX
Memory Required: 20.0K bytes
Source Language: Neat/3
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 10
Date First Installed: February 1981
(See Vendor Profile Page V-17)

C. G. A. COMPUTER ASSOCIATES, INC.
TOP SECRET
Specific Application: Comprehensive and Flexible Security for MVS System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, MVS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 150
Date First Installed: September 1981
(See Vendor Profile Page V-18)

CHAPMAN & ASSOCIATES
SIGNED DATA
Specific Application: Secure Intercompany Communication
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Retail, Banking/Financial, Legal, Insurance, Construction, Government, Transportation, Nonprofit Organizations
System Requirements: IBM 370: MVS
Memory Required: 80.0K bytes
Source Language: 370 BAL, OS
Source Code Available: No
Purchase Terms: Purchase (license), Rental
Price: $50,000
(See Vendor Profile Page V-18)

CHAPMAN & ASSOCIATES
THE DES PACKAGE
Specific Application: Encryption
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370: OS, MVS
Memory Required: 50.0K bytes
Source Language: 370 BAL, OS
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $1,000

COMPUTER ASSOCIATES - CA-SENTINEL
Specific Application: Creation, Maintenance and Retrieval Of All Job Related Information
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 360, 4300 Series, 3000 Series DOS/VS
Memory Required: 256 0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Rental, Lease
(See Vendor Profile Page V-23)

COOPERS & LYBRAND
BAS (BANKING AUDIT SYSTEM)
Specific Application: Assist IN Auditing Commerical Banks
Specific Industry: Not Industry Sensitive, Banking/Financial
System Requirements: IBM 360, 370 DOS, OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $6,500
(See Vendor Profile Page V-31)

COOPERS & LYBRAND
SOURCE COMPARE PROGRAM
Specific Application: Can Be Used to Test Whether all Program Changes Were Properly Authorized
System Requirements: IBM 360, 370 DOS/OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000

CULLINET SOFTWARE, INC.
EDP-AUDITOR
Specific Application: Auditing
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000 Series, 4300 Series
Memory Required: 150 0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); [illegible]
Price: $20,000
Number Installed to Date: 677
Date First Installed: April 1972
(See Vendor Profile Page V-33)

CYTROL, INC.
CYT-SC SECURITY CONTROL FUNCTIONS
Specific Application: Provides Security Control Functions for DEC/CYX Systems
Specific Industry: Not Industry [illegible]
System Requirements: DEC PDP-11/24, PDP-11/70, RSX-11M; DEC VAX, VMS
Source Language: Cobol
Purchase Terms: Purchase (license)
Price: $2,500 to $4,000
Number Installed to Date: 10
Date First Installed: May 1983
(See Vendor Profile Page V-34)

DATA INFORMATION SYSTEMS CORP.
TAS-TOTAL AUDIT
Specific Application: Audit Software
Specific Industry: Not Industry Sensitive, Banking/Financial
System Requirements: NCR Criterion 8400 VRX, NCR B1, B3
Memory Required: 128.0K bytes
Source Language: NCR Neat/3
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5 000
Number Installed to Date: 20
(See Vendor Profile Page V-36)

DELTA SYSTEMS, INC.
DSI SECURITY
Specific Application: Security
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, SSP
Memory Required: 64 0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 5
Date First Installed: January 1982
(See Vendor Profile Page V-41)

DYLAKOR
DYL-AUDIT
Specific Application: Auditing and Information Retrieval Offers Stratified and Nonstratified Sampling Techniques
Specific Industry: Not Industry [illegible]
System Requirements: IBM: DOS, SSX, OS, CMS
Memory Required: 100 0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 150
Date First Installed: February 1979
(See Vendor Profile Page V-44)

EDP SECURITY, INC.
EDP DISASTER RECOVERY PLAN
Specific Application: EDP Disaster Recovery Plan
Specific Industry: Not Industry Sensitive
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 600
Date First Installed: December 1979
(See Vendor Profile Page V-45)

ELECTRONIC DATA SYSTEMS CORP.
EAC
Specific Application: Total Security Package That Provides Data Protection and Audit Ability
Specific Industry: Not Industry Sensitive
System Requirements: IBM: VSE; IBM VS1, IBM MVS
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: Sperry 1100 OS 1100
Source Language: Cobol, [illegible]
Source Code Available: Yes
Price: $10,000
Number Installed to Date: 5
Date First Installed: June 1981
(See Vendor Profile Page V-46)

THE FASBE GROUP
SECURITY SYSTEM
Specific Application: A Security System
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS, DEC 10, Tops 10; DEC 20: Tops 20
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,0[illegible]
Number Installed to Date: 40
Date First Installed: February 1979
(See Vendor Profile Page V-48)

GAMMA TECHNOLOGY, INC.
SECURE REV 3.00 (NBS DATA ENCRYPTION ALGORITHM)
Specific Application: Encrypt and Decrypt Files
Specific Industry: Not Industry [illegible]
System Requirements: DG Eclipse: AOS, R-DOS
Source Language: Assembly and Forth
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 4
Date First Installed: 1981
(See Vendor Profile Page V-50)

GENASYS CORP.
SENTRY/3000
Specific Application: Data and System Access Security

Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE
Memory Required: 5.0K bytes
Source Language: Cobol, SPL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $14,500
Number Installed to Date: 3
Date First Installed: June 1981
(See Vendor Profile Page V-50)

INDUSTRIAL SYSTEMS, INC.
SECURITY SYSTEM
Specific Application: Execute Card Entry Security
System Requirements: HP 1000: RTE
Memory Required: 256.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $42,500
Number Installed to Date: 1
(See Vendor Profile Page V-57)

INFORMATION MANAGEMENT CONSULTANTS, INC.
SYSTEM AUDITOR
Specific Application: Tracks Percentage of Computer Resources Being Utilized By Whom and When
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: Vsos
Memory Required: 128.0K bytes
Source Language: Cobol, Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 4
Date First Installed: 1983
(See Vendor Profile Page V-57)

L B 80, INC.
CHARGEX
Specific Application: Charge Back System
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs B1700, B930, 7900: MCP
Memory Required: 190.0K bytes
Source Language: Cobol
Purchase Terms: Lease
Price: $3,000
Date First Installed: 1978
(See Vendor Profile Page V-65)

LFL DATA PROCESSING CONSULTANTS, INC.
DCS SECURITY PACKAGE
Specific Application: Security Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DOS, OS; IBM 370; IBM 4300
Memory Required: 24.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 1
Date First Installed: 1981
(See Vendor Profile Page V-66)

LOGICA, INC.
DATA SECURITY
Specific Application: Data Security to Data Item Level
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 3000 Series: MVS; Honeywell DPS 8: Gcos, Prime 50 Series: Primos, DG Nova: AOS/VS
Memory Required: 512.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental
Number Installed to Date: 150
Date First Installed: 1979
(See Vendor Profile Page V-66)

MARYLAND COMPUTER SERVICES, INC.
PROGRAM SECURITY
Specific Application: Code Security Package
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 8
Date First Installed: 1982
(See Vendor Profile Page V-69)

MCHUGH, FREEMAN & ASSOCIATES, INC.
AUTOMATIC PASSWORD CHANGER
Specific Application: Automatic Password Changer
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS
Memory Required: 28.0K bytes
Source Language: Basic Plus II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 15
Date First Installed: 1982
(See Vendor Profile Page V-71)

MCHUGH, FREEMAN & ASSOCIATES, INC.
DATA ENCRYPTION PACKAGE
Specific Application: to Encrypt Source Files Data Files and Task Image Files
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11, RSTS RSX, DEC VAX: VMS
Memory Required: 28.0K bytes
Source Language: Basic Plus II, Macro-11
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 12
Date First Installed: September 1982

MCHUGH, FREEMAN & ASSOCIATES, INC.
KEYBOARD MONITOR
Specific Application: Computer Security
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS
Memory Required: 28.0K bytes
Source Language: Basic Plus II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 22
Date First Installed: September 1981

ON-LINE SOFTWARE INTERNATIONAL
GUARDIAN
Specific Application: Data Security for Cics
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3: Cics/VS
Memory Required: 20.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $20,000 to $27,500
Date First Installed: 1979
(See Vendor Profile Page V-82)

OXFORD SOFTWARE CORP.
COSS
Specific Application: Cics On-Line Security System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/370, 4300 Series: DOS, OS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $20,000
Number Installed to Date: 75
Date First Installed: 1982
(See Vendor Profile Page V-83)

PANSOPHIC SYSTEMS, INC.
PANAUDIT
Specific Application: Computer Auditing System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, DOS, IBM 3030 Series: OS; IBM 4300
Memory Required: 72.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $15,900 to $19,900
Number Installed to Date: 400
Date First Installed: 1975
(See Vendor Profile Page V-84)

PARA RESEARCH, INC.
TIME TRACKING
Specific Application: Records System History and Makes Records Available for Cost Analysis
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 14.0K bytes
Source Language: RPG-II
Purchase Terms: Purchase (license); Rental, Lease
Price: $300
(See Vendor Profile Page V-84)

PRIME FACTORS
DESCRIPT F4, CX, 88
Specific Application: DES
Specific Industry: Not Industry Sensitive
Memory Required: 25.0K bytes
Source Language: Assembler, Fortran, Cobol, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental, Lease
Price: $500 to $2,000
Number Installed to Date: 45
Date First Installed: May 1981
(See Vendor Profile Page V-87)

PRIME FACTORS
PETPHER
Specific Application: Generalized Data Encryption Using DES
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300 Series, 3000 Series 360: OS/MVS,VM; Wang VS: CP/M
Memory Required: 56.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 25
Date First Installed: May 1981

PRINCETON SOFTWARE CO.
DATA SECURITY FACILITY (DSF)
Specific Application: Data Security - General Purpose Encryption Utility
Specific Industry: Not Industry Sensitive
System Requirements: IBM Mainframes
Source Code Available: No
Purchase Terms: Lease
Price: $950
Number Installed to Date: 15
Date First Installed: March 1982
(See Vendor Profile Page V-87)

PRINCETON SOFTWARE CO.
SECURE/CMS
Specific Application: Data Security Through File Encrypt
Specific Industry: Not Industry Sensitive
System Requirements: IBM Mainframes, VM/CMS
Source Code Available: No
Purchase Terms: Lease
Price: $950
Number Installed to Date: 18
Date First Installed: June 1982

PROFIDEX CORP.
FILE GUARD VERSION 1.0
Specific Application: Computer Security
Specific Industry: Not Industry Sensitive
System Requirements: DG
Memory Required: 20.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995
Date First Installed: April 1983
(See Vendor Profile Page V-89)

S. S., INC.
SECURITY MANAGEMENT SYSTEM - SMS
Specific Application: On-Line Security and Batch for Prime Systems
Specific Industry: Not Industry Sensitive
System Requirements: Prime 2250: Primos
Memory Required: 256.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $1,500
Number Installed to Date: 7
Date First Installed: 1982
(See Vendor Profile Page V-90)

SQUAD CORP.
CHANGE AUDIT
Specific Application Comments:
Two Versions of Same Program

Specific Industry: Not Industry Sensitive
System Requirements: IBM; DOS, OS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Date First Installed: 1979
(See Vendor Profile Page V-90)

QUODATA
SECURE
Specific Application: Security Software
Specific Industry: Education, Nonprofit Organizations
System Requirements: DEC PDP-11; RSTS/E
Memory Required: 256.0K bytes
Source Language: Basic Plus, Macro, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 70
Date First Installed: 1975
(See Vendor Profile Page V-91)

SCHWITZER ENTERPRISES, INC.
MAIL SYSTEM FOR TSX
Specific Application: Electronic Mail, Checks Password Everytime You Log on
Specific Industry: Not Industry Sensitive
System Requirements: TSX
Source Language: Machine Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Number Installed to Date: 6
Date First Installed: February 1983
(See Vendor Profile Page V-95)

SOFTWARE CLEARING HOUSE
FRAME
Specific Application: VRX Menu Processing Security Control System for Virtex Users
Specific Industry: Not Industry Sensitive
System Requirements: NCR 8400 8500; VRX
Source Language: VRX Cobol 74
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $2,200
Number Installed to Date: 25
(See Vendor Profile Page V-99)

SOFTWARE DEVELOPMENT CORP.
DAGAR CIPHER
Specific Application: An Encription Package to Easily Encode and Decipher Any File for Security
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 32.0K bytes
Source Language: CB-80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $80
Date First Installed: 1982
(See Vendor Profile Page V-99)

SOFTWARE SOLUTIONS, INC.
SAFEGARD II
Specific Application: Data Encryption

Specific Industry: Not Industry Sensitive
System Requirements: IBM 360; IBM 370; Wang VF
Memory Required: 2.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 75
Date First Installed: 1972
(See Vendor Profile Page V-100)

SYSTEC COMPUTER ASSOCIATES, INC.
MENU GENERATOR & SECURITY CONTROL
Specific Application: Menu Generator and Security Control
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse; R-DOS, DG Nova
Memory Required: 128.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 10
Date First Installed: 1981
(See Vendor Profile Page V-105)

SYSTEMS APPLICATIONS
LOGIN
Specific Application: System Accounting Package for User on System
Specific Industry: Not Industry Sensitive
System Requirements: Prime 50; Primos, Prime 400, Prime 500
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,500
(See Vendor Profile Page V-105)

U.S. SOFTWARE CORP.
DATA SECURITY PACKAGE
CRYPTOPAC
Specific Application: Data Security
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; IBM PC; PC-DOS, DEC PDP; RT-11
Memory Required: 32.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75
Number Installed to Date: 25
Date First Installed: May 1983
(See Vendor Profile Page V-114)

BILLINGS COMPUTER CORP.
BILLINGS DATA CENTER PACK
Specific Application: Set Up Central Data Base
Specific Industry: Not Industry Sensitive
System Requirements: Billings
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $300
Date First Installed: 1982
(See Vendor Profile Page V-12)

COMPUTER SECURITY INTERNATIONAL,INC.
ATM SECURITY ACCESS CONTROL
Specific Application: Monitors ATM Utilization With Alert for Excess Withdrawals
Specific Industry: Banking/Financial
System Requirements: Xerox 820
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20 000 to $25 000
Date First Installed: January 1983
(See Vendor Profile Page V-26)

FISCHER-IMMS SYSTEMS CORP.
WATCHDOG
Specific Application: Security
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80 MS-DOS
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $299
(See Vendor Profile Page V-49)

GAYLORD BROS., INC.
SECURITY MODULE
Specific Application: Allows A Library to Limit the Available Functions of Any Terminal to the Library Staff
Specific Industry: Library
System Requirements: Apple II +
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $2 500
(See Vendor Profile Page V-50)

GUNN ENTERPRISES, INC.
ASKARI
Specific Application: Protection Programmer for Cromemco Structured Basic
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco Cromix
Memory Required: 128.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date:
Date First Installed: September
(See Vendor Profile Page V-53)

NEW GENERATION SYSTEMS, INC.
MICROCRYPT
Specific Application: Program, Data Encryption
Specific Industry: Not Industry Sensitive
System Requirements: Compupro CP/M
Memory Required: 64.0K bytes
Source Language: C, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $125
Date First Installed: October 1981
(See Vendor Profile Page V-79)

OMEGA MICROWARE, INC.
THE LOCKSMITH
Specific Application: Copies Protected Software, Checks Disk Drive, Changes Parameters of Disk, Verifies Data
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, APPLE-DOS
Memory Required: 48.0K bytes
Source Language: 8502 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $9,995
Number Installed to Date: 21.000
Date First Installed: 1981
(See Vendor Profile Page V-82)

SOUTHERN COMPUTER SYSTEMS, INC.
DATA-LOCK
Specific Application: Coding Password Into File
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 2.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $95
Date First Installed: May 1983
(See Vendor Profile Page V-101)

SOUTHERN COMPUTER SYSTEMS, INC.
RECOVER
Specific Application: Recovering Accidentally Erased Files
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 2.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $75
Number Installed to Date: 150
Date First Installed: 1981

STRUCTURED SOFTWARE SYSTEMS, INC.
SNICET
Specific Application: A Security System for the HP 86 and HP 87
Specific Industry: Not Industry Sensitive
System Requirements: HP 86, HP
Memory Required: 15.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1.500
Number Installed to Date: 16
Date First Installed: January 1983
(See Vendor Profile Page V-104)

STRUCTURED SOFTWARE SYSTEMS, INC.
NODUP
Specific Application: Protects Valuable Proprietary Software From Being Copied By Unauthorized Users
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845 B
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 40
Date First Installed: 1979

STRUCTURED SOFTWARE SYSTEMS, INC.
OEMSEC
Specific Application: Enciphers the Stored Version of A Proogram and Irreversibly Alters Its Structure
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845 B
Memory Required: 10.0K bytes
Source Language: Basic, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 40
Date First Installed: 1978

STRUCTURED SOFTWARE SYSTEMS, INC.
SECM
Specific Application: Protects Valuable Proprietary Software Against Unauthorized Duplication, Inspection or Modification
Specific Industry: Not Industry Sensitive
System Requirements: HP 9836, HP 9826
Memory Required: 15.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 30
Date First Installed: February 1983

STRUCTURED SOFTWARE SYSTEMS, INC.
MCRS
Specific Application: A Software Supplier Can Make Tapes Containing Basic Programs That Cannot Be Stored, Copied, Listed Or Edited
Specific Industry: Not Industry Sensitive
System Requirements: HP 85
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 25
Date First Installed: 1982

SORT/MERGE

THE ALTERNATE SOURCE
ATLERNATE SORT
SYSTEM REQUIREMENTS: DOS; TRS-80/4; TRS-DOS
Memory Required: 16.0K bytes
Source Language: Z80
Purchase Terms: Purchase (license)
Price: $19
Number Installed to Date: 500
Date First Installed: 1981
(See Vendor Profile Page V-4)

APPLIED REALTIME SYSTEMS, INC.
INDEXED ACCESS METHOD (IAM)
Additional Product Classification: Data/File Management
Specific Application: System Utility-Indexed Access Method
System Requirements: IBM Series/1: EDX
Memory Required: 7.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-8)

BELL & MURPHY & ASSOCIATES, INC.
CENTON - DDD
Specific Application: Merges Data Into Three Dimensional Presentation
System Requirements: Wang 2200
Memory Required: 28.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Lease
Date First Installed: 1975
(See Vendor Profile Page V-12)

COMPUTER ASSOCIATES
CA - SORT
Specific Application: Sort
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300; MVT, IBM 300 Series: DOS, MVS; IBM 370 OS
Memory Required: 256.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 1,000
Date First Installed: 1978
(See Vendor Profile Page V-23)

COMPUTER ASSOCIATES
CA-DART
Specific Application: Report Generator for Sorting Systems
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 360, 4300 Series: DOS/VS, OS/VS1/MVS
Memory Required: 19.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $6,000 to $7,500
Number Installed to Date: 50
Date First Installed: 1981

COMPUTER ASSOCIATES
CA-SORT
Specific Application: Sort Merge Utility
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 360, 4300 Series: DOS/VS and IBM Plug Compatible OS/VS1/MVS, VM/CMS
Memory Required: 30.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 5,000
Date First Installed: 1971

COMPUTER ASSOCIATES
CA-SORT/CMS
Specific Application: Provides OS Sort Capabilities Under CMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370,380, 4300 Series: DOS/VS, OS/VS1/MVS, VM/CMS
Memory Required: 30.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 400
Date First Installed: 1978

COMPUTER ASSOCIATES
DA-SRAM
Specific Application: Sort Reentrant Access Method Allows Multiple, Sorts to Be Processed Concurrently
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370,380, 4300 Series: DOS/VS, OS/VS1/MVS
Memory Required: 10.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $5,100 to $5,700
Number Installed to Date: 3,100
Date First Installed: September 1971

COMPUTER CONTROL SYSTEMS, INC.
AUTOSORT-C/CR (SORT MERGE SELECT)
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Programmers Tools Utilities
System Requirements: CP/M, MP/M
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 1,000
Date First Installed: May 1981
(See Vendor Profile Page V-23)

COMPUTER CONTROL SYSTEMS, INC.
AUTOSORT-M/MR (SORT MERGE SELECT)
Additional Product Classification: Program Generators/Aids/Appl. Development Tools
Specific Application: Programmers Tool. Utilities
System Requirements: CP/M, MP/M
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 1,000
Date First Installed: June 1981

CORPORATE COMPUTER SYSTEMS, INC.
SORT/1800 REV 1.8
Specific Application: General Purpose Sorting Tool
System Requirements: HP 1000
Memory Required: 1.0K bytes
Source Language: C, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $990
Number Installed to Date: 41
Date First Installed: February 1982
(See Vendor Profile Page V-31)

CORPORATE COMPUTER SYSTEMS, INC.
SORT PLUS REV 8304
Additional Product Classification: Program Generators/Aids,Application Development Tools
Specific Application: General Purpose Sort Package
System Requirements: HP 1000
Memory Required: 27.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $900
Number Installed to Date: 10
Date First Installed: 1981

ECOSOFT, INC.
SORT PLUS
Specific Application: Fast Sort for HP 1000 Multilingual
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000
Memory Required: 40.0K bytes
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $800
Number Installed to Date: 13
Date First Installed: October 1982
(See Vendor Profile Page V-45)

EVANS GRIFFITHS AND HART, INC.
FSORT3
Specific Application: Very Fast Sort for the PDP-11
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E
Memory Required: 96.0K bytes
Source Language: Basic, Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 500
Date First Installed: 1976
(See Vendor Profile Page V-47)

INCASE, INC.
SORT/MERGE
Specific Application: Sort/Merge
Specific Industry: Engineering, Scientific
System Requirements: Gould Concept/32
Memory Required: 20.0K bytes
Purchase Terms: Purchase (license)
Price: $2,500
(See Vendor Profile Page V-52)

INMARK
SORT ROUTINE
Specific Application: Sort Utility
Specific Industry: Not Industry Sensitive
System Requirements: PE: OS
Memory Required: 12.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-59)

METRETEK, INC.
SURVEY SYSTEM
Additional Product Classification: Report Generator, Data/File Management
Specific Application: Data Collection, Survey Analysis
System Requirements: IBM PC; IBM Series/1: DOS; Apple: EDX
Source Language: EDL, Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-72)

MICROMAX COMPUTER INTELLIGENCE, INC.
DATACOMP
Specific Application: Comparison Utility (File to File)
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, OS
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $6,000
Number Installed to Date: 5
Date First Installed: January 1983
(See Vendor Profile Page V-74)

MICROMAX COMPUTER INTELLIGENCE, INC.
VSAMCOMP
Specific Application: Comparison Utility
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, OS
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $3,000
Number Installed to Date: 6
Date First Installed: May 1982

OREGON SOFTWARE, INC.
SORT-1-PLUS
Specific Application: Sorting System
Specific Industry: Manufacturing, Engineering, Wholesale/Distribution, Banking/Finance, Medical, Education, Government, Scientific, Software Development
System Requirements: DEC VAX: VMS; DEC PDP-11: RSTS/E
Memory Required: 16.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 1,800
Date First Installed: 1979
(See Vendor Profile Page V-83)

PENNINGTON SYSTEMS, INC.
SPEEDSORT/11
Specific Application: Sort/Merge
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-

11; RSX-11M
Memory Required: 64.0K bytes
Source Language: Fortran, Macro
Source Code Available: No
Purchase Terms: Rental
Price: $400
Date First Installed: June 1978
(See Vendor Profile Page V-85)

QUALITY SYSTEMS DEVELOPMENT CORP.
RES-Q VERSION 2.11
Additional Product Classification: Report Generator, Data/File Management, Security/Auditing, Program Generators/Aids, Application Development Tools
Specific Application: Source Code Comparitor Library Maintenance Tool
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS, OS, VSE, MVS, HP 3000 MPE 3, MPE 4; Burroughs Medium 250: MCP; Sperry 1100: Exec 1100
Memory Required: 300.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 150
Date First Installed: 1977
(See Vendor Profile Page V-90)

RAI BUSINESS SYSTEMS, INC.
DATASHARE UTILITIES
Specific Application: Eliminates Rollouts, Including DBMS Plus Library, Sort Index Reformatter
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint; [illegible]
Memory Required: 4.0K bytes
Source Language: Databus
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $950
Number Installed to Date: 700
Date First Installed: 1981
(See Vendor Profile Page V-91)

SAPE SOFTWARE SYSTEMS, INC.
SSUMATCH
Specific Application: File Matching Utility
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS; Intel 8086: MVS; NAS: VS/1; Amdahl: DOS
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
Number Installed to Date: 40
Date First Installed: 1978
(See Vendor Profile Page V-94)

SATELLITE SOFTWARE INTERNATIONAL (SSI)
WORKPERFECT SORTER
Specific Application: Sorts Lists
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; PC-DOS
Memory Required: 128.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $145
Date First Installed: 1985
(See Vendor Profile Page V-96)

SAZTEC
FACS FACILITY EXCHANGE SERVICE
Additional Product Classification: Report Generator, Data/File Management, Operating Systems, Engineering
Specific Application: Cable Pair Utilization Analysis
Specific Industry: Engineering
System Requirements: DOS/OS
Memory Required: 50.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $50,000
Number Installed to Date: 1
Date First Installed: July 1983
(See Vendor Profile Page V-95)

S & H COMPUTER SYSTEMS, INC.
[illegible]
Specific Application: High Speed Efficient Disk-Sort, Powerful Select, Merge and Field Mapping Facilities
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11; RT-11
Memory Required: 20.0K bytes
Source Language: Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Number Installed to Date: 2,500
Date First Installed: 1976
(See Vendor Profile Page V-97)

SOFTWARE CLEARING HOUSE
MICREX
Specific Application: Micro Sorter Control System: Allows Multiple Extraction Criteria for Automatic Exception Pull
Specific Industry: Banking/Financial
System Requirements: NCR 151 and Up, B Series: VRX
Memory Required: 96.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $1,250
Number Installed to Date: 22
(See Vendor Profile Page V-99)

SOFTWARE CLEARING HOUSE
SORTEX
Specific Application: Micro Sort Package: Better Use of Available Pockets.
Specific Industry: Banking/Financial
System Requirements: NCR Century 151, B Series. VRX
Memory Required: 96.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $1,750
Number Installed to Date: 14

SOLUTIONS, INC.
VIS/BRIDGE/DJ
Specific Application: Gateway Information From Dow Jones News Retrieval, and Loads It Directly Into Visicalc Spreadsheet
Specific Industry: Banking/Financial
System Requirements: TRS-80/I, 80/II, 80/III, Models 12, 16: MS-DOS; Apple II+, IIe: APPLE-DOS; IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $295
Date First Installed: May 1983
(See Vendor Profile Page V-101)

SYNCSORT, INC.
SYNCSORT
Specific Application: Compatible Replacement for IBM Sort/Merge Products
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360: VM/SP; IBM System/370: MVT; IBM System/3030, 3080 Series: MFT, IBM System/4300: DOS/VS
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 9,000
Date First Installed: 1972
(See Vendor Profile Page V-105)

Microcomputer Section

ADVENTURE INTERNATIONAL
MAXI MANAGER
Specific Application: Sort/Merge, DBMS
Specific Industry: Not Industry Sensitive
System Requirements: DOS; TRS-80
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
(See Vendor Profile Page V-3)

[illegible] INTERNATIONAL
MAXI MANAGER UTILITY PACKAGE 1
Specific Application: Sort/Merge, DBMS
Specific Industry: Not Industry Sensitive
System Requirements: [illegible] DOS
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: 1982

BEAR COMPUTERS, INC.
FLEX-I-SORT
Specific Application: Fast Sort Utility
Specific Industry: Not Industry Sensitive
System Requirements: CP/M; MP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $179
Number Installed to Date: 100
Date First Installed: March 1982
(See Vendor Profile Page V-12)

COMPUTER CONTROL SYSTEMS, INC.
AUTOSORT/80C
Additional Product Classification: Program Generators/Aids, Application Development Tools
Specific Application: Programmers Tools, Utilities
System Requirements: CP/M; MP/M
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 100
Date First Installed: June 1982
(See Vendor Profile Page V-23)

COMTECTRA SYSTEMS, INC.
INSIGHT
Additional Product Classification: Report Generator, Data/File Management
Specific Application: Data Sort, Report Generators
Specific Industry: Banking/Financial
System Requirements: IBM; Data Media
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-29)

DATA RESEARCH ASSOCIATES, INC.
UNION LIST OF SERIES
Additional Product Classification: Data/File Management
Specific Application: Computerized Union List of Series, Allows Maintenance of Title
Specific Industry: Not Industry Sensitive
System Requirements: DEC
Source Language: Basic, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: 1977
(See Vendor Profile Page V-39)

DESIGN AND BUILDERS OF INFORMATION SYSTEMS
DIS MACHINE LANGUAGE SORT
Specific Application: Sort Routine
Specific Industry: Not Industry Sensitive
System Requirements: Ohio Scientific
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 85
Date First Installed: [illegible]
(See Vendor Profile Page V-40)

DIGITAL COLOR CORP.
[illegible] SOFTWARE
Specific Application: File Sort and Search, Binary Search and Sort, Sort & Tree
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Source Language: Cbasic, C, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1982
(See Vendor Profile Page V-42)

GAYLORD BROS., INC.
M/SORT
Specific Application: Sorting for Microcomputer, Load Sequential Files

Specific Industry: Not Industry Sensitive
System Requirements: Apple II +
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $195
(See Vendor Profile Page V-50)

GENASYS CORP.
FAST FORM
Additional Product Classification: Report Generator, Data/File Management, Query Languages
Specific Application: Screen Definition, Data Collection, File Building, Sort, Query
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC, PC-DOS
Memory Required: 128.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-51)

GREAT PLAINS COMPUTER [illegible], INC.
[illegible]
Specific Application: Complement WP Capabilities
Specific Industry: Not Industry Sensitive
System Requirements: TRS: Flex, OS9 Gimix 6809: Flex, Uniflex, Tano 6809: Flex, Uniflex; Southwest Tech 6809 Flex, Uniflex
Memory Required: 56.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 500
Date First Installed: April 1981
(See Vendor Profile Page V-52)

INFO - PROS
INFO-SORT
Specific Application: Utility Sort/Merge
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Basic, Assembler
Purchase Terms: Purchase (license)
Price: $95
Number Installed to Date: 200
Date First Installed: August 1982
(See Vendor Profile Page V-57)

[illegible] LAB
THE MERGER
Specific Application: Merges Files Between Two Programs
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Applesoft Basic
Purchase Terms: Purchase (license)
Price: $50
(See Vendor Profile Page V-74)

MICROPRO INTERNATIONAL CORP.
SUPERSORT
Specific Application: Data Merges and Selects Information From Up to 32 Files
Specific Industry: Not Industry Sensitive
System Requirements: CP/M: MS-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200 to $250
(See Vendor Profile Page V-74)

MICROSOFT
MICROSOFT SORT FACILITY
Specific Application: Sort Method, Binary Insertion Technique of Sorting, Sort/Merge
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE, Apple II
Memory Required: 44.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-74)

QUANTUM INFORMATION SYSTEMS
QSORT
Specific Application: Sort Utility
Specific Industry: Not Industry Sensitive
System Requirements: Oasis
Memory Required: 8.0K bytes
Source Language: Z80 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 300
Date First Installed: July 1981
(See Vendor Profile Page V-90)

QUANTUM SYSTEMS, INC.
SMARTCH
Specific Application: File Matching Utility
Specific Industry: Not Industry Sensitive
System Requirements: DEC: RSX-11M
Memory Required: 256.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 15
Date First Installed: 1981

RACET COMPUTERS, LTD.
DISK SORT/MERGE DSM
Specific Application: Disk Sort/Merge
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/II, 80/III: TRS-DOS
Memory Required: 16.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $90 to $150
Number Installed to Date: 5,000
Date First Installed: 1981
(See Vendor Profile Page V-91)

RACET COMPUTERS, LTD.
GENERALIZED SUBROUTINE FACILITY GSF
Specific Application: In-Memory Sort
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/II, 80/III: TRS-DOS
Memory Required: 16.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $30 to $50
Number Installed to Date: 10,000
Date First Installed: 1979

RACET COMPUTERS, LTD.
MULTI-KEY SORT- "MKS"
Specific Application: In-Memory Sort
Specific Industry: Not Industry Sensitive
System Requirements: NEC PC-8001, 8801 Racet NEC-DOS
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $60
Number Installed to Date: 200
Date First Installed: 1982

SOFTWARE DYNAMICS
SORT
Specific Industry: Not Industry Sensitive
System Requirements: PsiTech GT Series, TRS: Motorola: S-DOS
Memory Required: 64.0K bytes
Source Language: Basic Compiler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $92
Number Installed to Date: 50
Date First Installed: 1980
(See Vendor Profile Page V-99)

SOLUTIONS, INC.
VIS/BRIDGE/GL
Specific Application: Extracts Information From General Ledger and Loads It Directly Into Visicalc
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II: TRS-DOS
Memory Required: 48.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Date First Installed: December 1982
(See Vendor Profile Page V-101)

SOLUTIONS, INC.
VIS/BRIDGE/SORT
Specific Application: Adds Sorting Capability to Visicalc
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/II, 80/III, Models 12, 16, TRS-DOS, Apple 2+, 3: APPLE-DOS; IBM PC: PC-DOS
Memory Required: 48.0K bytes
Source Language: Basic, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $50
Date First Installed: January 1983

STONEWARE, INC.
UTILITY PACK 1
Additional Product Classification: Data/File Management
Specific Application: Restructures, Transfer of Records, Recovers Damaged Files, Reblocks for Extra Space
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; Apple II: Basic; Apple II+, Apple III
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $129
Number Installed to Date: 30,000
Date First Installed: 1981
(See Vendor Profile Page V-103)

STONEWARE, INC.
UTILITY PACK 2
Additional Product Classification: Data/File Management
Specific Application: Restructures, Transfer of Records, Recovers Damaged Files, Reblocks for Extra Space
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC; Apple II: Basic; Apple II+, Apple III
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $129
Number Installed to Date: 30,000
Date First Installed: 1981
(See Vendor Profile Page V-103)

STRUCTURE SYSTEMS GROUP
Q SORT
Specific Application: Sort Utility
Specific Industry: Not Industry Sensitive
System Requirements: PC-DOS, MP/M, CP/M
Memory Required: 48.0K bytes
Source Language: CB 80, CB 86
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 1,000
Date First Installed: 1977
(See Vendor Profile Page V-104)

TECHNICAL SYSTEMS CONSULTANTS, INC.
UNIFILE SORT/MERGE
Specific Application: Sort/Merge
Specific Industry: Not Industry Sensitive
System Requirements: Motorola 6809, Motorola 6800: Uniflex; Flex, Unix
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: 1981
(See Vendor Profile Page V-108)

OTHER

A. B. DICK CO.
BACKUP UTILITY
Additional Product Classification: Disk File Backup
Specific Application: Disk Backup Utility
Specific Industry: Not Industry Sensitive
System Requirements: AB Dick Magna III, Magna Writer, Magna SL: CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: June 1982
(See Vendor Profile Page V-1)

A. B. DICK CO.
CLEANUP UTILITY
Additional Product Classification: Multipurpose File
Specific Application: Multipurpose File Maintenance Utility
Specific Industry: Not Industry Sensitive
System Requirements: AB Dick Magna III, Magna SL, Magna Writer: CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: June 1982

A. B. DICK CO.
A B DICK COPY UTILITY
Specific Application: File Copy Utility
Specific Industry: Not Industry Sensitive
System Requirements: AB Dick Magna III, Magna Writer, Magna SL: CP/M
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: June 1982

A. B. DICK CO.
PRINT UTILITY
Additional Product Classification: Print Utility
Specific Application: Utility for Printing
Specific Industry: Not Industry Sensitive
System Requirements: AB Dick Magna Writer, Magna III, Magna SL: CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: June 1982

A. B. DICK CO.
SETUP UTILITY
Additional Product Classification: Multipurpose
Specific Application: A Utility to Modify Setups
Specific Industry: Not Industry Sensitive
System Requirements: AB Dick Magna III, Magna SL, Magna Writer: CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Date First Installed: June 1982

A. B. DICK CO.
CONVERT & CP/M III
Additional Product Classification: File Conversion
Specific Application: File Conversion
Specific Industry: Not Industry Sensitive
System Requirements: AB Dick Magna III, Magna Writer, Magna SL: CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: June 1982

A. B. DICK CO.
CP/M-LOOP PRINTER U
Specific Application: Output to Magna Loop Printer
Specific Industry: Not Industry Sensitive
System Requirements: AB Dick Magna Writer: CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: June 1983

ACCUSOFT, INC.
WILLTELL
Additional Product Classification: Telex Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP, IBM System/36: CP; IBM System/38
Memory Required: 3 0K bytes
Source Language: RPG-II, RPG-III
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 20
Date First Installed: 1982
(See Vendor Profile Page V-2)

AGS MANAGEMENT SYSTEMS, INC.
OFFICE PRO
Additional Product Classification: Office Automation
Specific Application: Modular Family On-Line Computer Application, Enhances Common Office Communications and Reference Functions, Electronic Directory
Specific Industry: Not Industry Sensitive
System Requirements: IBM: Cics
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $31,500
Number Installed to Date: 5
(See Vendor Profile Page V-3)

AMCOR COMPUTER CORP.
SCREEN GENERATOR
Additional Product Classification: Screen Generator
Specific Application: Productivity Tool for Screen Generation
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSTS/E, DEC VAX-11/750: VMS, DEC VAX-11/780: VMS
Memory Required: 256 0K bytes
Source Language: Basic Plus II, Basic
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $4,500

Number Installed to Date: 150
(See Vendor Profile Page V-4)

APPLIED ADVANCED MANAGEMENT RESEARCH, INC.
MENUS
Additional Product Classification: Menu
Specific Application: A Menu Generator That Defines and Runs Menus
Specific Industry: Not Industry Sensitive
System Requirements: Prime; Micro Data; Honeywell Ultimate: Pick; GA
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $750
Number Installed to Date: 7
Date First Installed: December 1982
(See Vendor Profile Page V-7)

APPLIED ADVANCED MANAGEMENT RESEARCH, INC.
REPORTER
Additional Product Classification: Enhancement
Specific Application: Designed to Enhance the Power of English
Specific Industry: Not Industry Sensitive
System Requirements: Prime; Micro Data; Honeywell Ultimate: Pick; GA
Source Language: Data Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 6
Date First Installed: November 1982

APPLIED BUSINESS SYSTEMS
DOC-MASTER
Additional Product Classification: Documentation Tools
Specific Application: Software Documentation Aids
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: R-DOS, DG Eclipse: R-DOS
Memory Required: 64 0K bytes
Source Language: Extended Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,000
Number Installed to Date: 5
Date First Installed: November 1981
(See Vendor Profile Page V-7)

APPLIED DATA RESEARCH, INC.
ADR/ASC-RELEASE 7.1
Additional Product Classification: Documentation
Specific Application: System Documentation
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000, 4300 Series. OS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $13,100
Date First Installed: 1978
(See Vendor Profile Page V-8)

ARKANSAS SYSTEMS, INC.
FILE TRANSMISSION UTILITY (FTU)
Additional Product Classification: Communications Aid
Specific Application: Communications Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 5
Date First Installed: 1981
(See Vendor Profile Page V-9)

ARKANSAS SYSTEMS, INC.
LIBRARY TRANSMISSION UTILITY (LTU)
Additional Product Classification: Communications Aid
Specific Application: Communications Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34. SSP
Memory Required: 64.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $190
Number Installed to Date: 5
Date First Installed: August 1982

ARTHUR ANDERSEN & CO.
METHOD/1
Specific Application: Information Systems Methodology
Specific Industry: Not Industry Sensitive
Source Code Available: Yes
Purchase Terms: Lease
Number Installed to Date: 200
Date First Installed: 1978
(See Vendor Profile Page V-9)

ATLANTIC MANAGEMENT SYSTEMS, INC.
ESTIMATOR
Additional Product Classification: Estimator
Specific Application: Estimating SDM/70
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, 370: OS, IBM System/3000: OS, IBM System/4300: OS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 55
Date First Installed: 1981
(See Vendor Profile Page V-10)

ATLANTIC MANAGEMENT SYSTEMS, INC.
PAC II
Additional Product Classification: Project Managements
Specific Application: Project Management & Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, 370: OS/DOS, DEC VAX: VMS, Honeywell 6600: GE/COS, Burroughs 6800: MCP
Source Language: Cobol
Purchase Terms: Purchase (license); Lease
Date First Installed: 1975

ATLANTIC MANAGEMENT SYSTEMS, INC.
PAC III
Additional Product Classification: Project Management
Specific Application: Project Management System: Controls Project Time and Cost
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, 370: OS/DOS, IBM System/4300: OS/DOS, DEC VAX: VMS, IBM System/300 Series: OS/DOS
Source Language: Cobol
[illegible]
Date First Installed: 1979

ATLANTIC MANAGEMENT SYSTEMS, INC.
PAC MACRO
Additional Product Classification: Program Management
Specific Application: Resource Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, 370; Prime 250: Primos; IBM System/38: CPS
Source Language: Ansi Cobol
[illegible]
Purchase Terms: Purchase (license); Lease
Date First Installed: 1979

ATLANTIC MANAGEMENT SYSTEMS, INC.
PC/70
Additional Product Classification: Program Management
Specific Application: Resource Management System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/360, 370: OS/DOS, IBM System/3000: OS/DOS, IBM System/4300, HP 3000: MPE
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 850
Date First Installed: 1976

AUD CYN ASSOCIATES, INC.
TELECOMMUNICATIONS CONTROL SYSTEM
Additional Product Classification: Sort/Merge, Data/File Management, Query Languages, Operating Systems, Telecommunications
Specific Application: Telephone Usage, Equipment Accountability and Cost, Distribution
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000: MPE; IBM 360, 370: OS
Memory Required: 250.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $4,000 to $15,000
Number Installed to Date: 8
Date First Installed: October 1982
(See Vendor Profile Page V-10)

AURELIAN CORP.
CLU
Additional Product Classification: List
Specific Application: Cartridge List Utility
Specific Industry: Not Industry Sensitive
System Requirements: HP 1000: RTE IV B
Memory Required: 23.0K bytes
Source Language: Fortran IV, [illegible]
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $89
Number Installed to Date: 1
Date First Installed: February 1982
(See Vendor Profile Page V-10)

A V P SYSTEMS, INC.
VERIFY-THE ZIP CODE VERIFICATION SYSTEM
Additional Product Classification: Verification
Specific Application: File Verification
Specific Industry: Not Industry Sensitive
Memory Required: 12.0K bytes
Source Language: Ansi Cobol
Source Code Available: Yes
Purchase Terms: Lease
Price: $1,900
Number Installed to Date: 15
Date First Installed: January 1983
(See Vendor Profile Page V-11)

AXIOS PRODUCTS, INC.
REMOTE ON-LINE PRINT EXECUTIVE SYSTEM(ROPES)
Additional Product Classification: Remote Print
Specific Application: Interfaces With all Applications
Specific Industry: Not Industry Sensitive
System Requirements: IBM SYS/370, 3000 Series: Cics
Memory Required: 12.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license); Rental, Lease
Price: $5,000 to $20,000
Number Installed to Date: 15
Date First Installed: May 1978
(See Vendor Profile Page V-11)

BRITZ SYSTEMS
DAYS - SCHEDULE SYSTEM FOR THE SYSTEM/34
Additional Product Classification: Management Aid
Specific Application: Maintain and Provide A Schedule of Events
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34 SSP
Memory Required: 14.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $99
Number Installed to Date: 50
Date First Installed: October 1982
(See Vendor Profile Page V-13)

BRITZ SYSTEMS
INDICATOR DOCUMENTATOR
DOCUMENTATION FOR RPG
Additional Product Classification: Documentation
Specific Application: RPG-II Indicator Documentation
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 12.0K bytes
Source Language: RPG-II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $99
Number Installed to Date: 20
Date First Installed: September 1982

BUSINESS COMPUTER DESIGN, INC.
MANAGE-MINT
Additional Product Classification: System Enhancement
Specific Application: Makes Job Runs 50% Faster, IBM Utilities Is 48% Faster, Enhances Disk and Memory Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34; IBM System/36
Memory Required: 14.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Lease
Price: $1,250
Number Installed to Date: 700
Date First Installed: September 1982
(See Vendor Profile Page V-14)

BUSINESS INFORMATION SYSTEMS
ADL I
Additional Product Classification: Interface
Specific Application: Interface for Amigos Application
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DOS, IBM 370: OS
Memory Required: 16.0K bytes
Source Language: Assembler, Cobol, PL/1
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Date First Installed: January 1980
(See Vendor Profile Page V-14)

BUSINESS INFORMATION SYSTEMS
SCREENS MADE EASY
Additional Product Classification: Productivity Aid
Specific Application: Assists Application Programmers With Development of IMS and Cics
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360: DOS, IBM 370: OS
Memory Required: 16.0K bytes
Source Language: Assembler, Cobol, PL/1
Source Code Available: No
Purchase Terms: [illegible] Lease
Date First Installed: January 1983

CALIFORNIA SOFTWARE PRODUCTS, INC.
[illegible] 34
Additional Product Classification: Conversion
Specific Application: Converts RPG Package 34 on Honeywell DP 56
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell: DP
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: December 1982
(See Vendor Profile Page V-15)

CARNEY ASSOCIATES, INC.
CAI - MENU PROCESSOR
Additional Product Classification: Menu Processor
Specific Application: Provides User/Program Interface Via Menus or Terminals
Specific Industry: Not Industry Sensitive
System Requirements: DG C/150: AOS, AOS/VS
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,250
Number Installed to Date: 2
Date First Installed: November 1981
(See Vendor Profile Page V-16)

CARNEY ASSOCIATES, INC.
CAI AOS/COBOL - ASSEMBLER
Additional Product Classification: Utility Subroutines
Specific Application: Subroutines to Perform Operating System Functions From Cobol
Specific Industry: Not Industry Sensitive
System Requirements: DG Eclipse: AOS
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: [illegible]
Number Installed to Date: 3
Date First Installed: November 1981

CENTURY ANALYSIS, INC.
FIRST/1
Additional Product Classification: Management Reporting
Specific Application: Management Reporting System That Operated W/CIS File
Specific Industry: Not Industry Sensitive
System Requirements: NCR: VRX, B/3
Memory Required: 80.0K bytes
Source Language: Cobol(See *Vendor Profile Page V-17*)

COMPAC SYSTEMS, INC.
WISEMAN
Additional Product Classification: Code Optimizer
Specific Application: Code Optimizer
Specific Industry: Not Industry Sensitive
System Requirements: DG: DOS, R-DOS, AOS
Memory Required: 64.0K bytes
Source Language: Business Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $995
Date First Installed: November 1982
(See Vendor Profile Page V-21)

COMP-SCI DATA SYSTEMS, INC.
CAMS
Additional Product Classification: Conversion
Specific Application: Conversion Analysis and Management System, DOS to MVS Conversion
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS

Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $22,500
Number Installed to Date: 60
(See Vendor Profile Page V-21)

COMP ACT DATA SYSTEMS, INC.
DTOC
Additional Product Classification: Converter
Specific Application: Converts DOS Cobol Source Code to OS Cobol Source Code
Specific Industry: Not Industry Sensitive
System Requirements: IBM System 360 OS, IBM System 370
Memory Required: 80.0K bytes
Source Language: Assembler, Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $5,800
Number Installed to Date: 60

COMPUTER ASSOCIATES
CA-DISC TAPE FILE
Additional Product Classification: Disk Tape File
Specific Application: Disk Manager
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: MVT, IBM 300 DOS, OS, MVS
Memory Required: 256.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 4,000
Date First Installed: 1978
(See Vendor Profile Page V-23)

COMPUTER ASSOCIATES
CA-JASPER
Additional Product Classification: Performance Measurement
Specific Application: Includes Jasper/JA, Jasper/RT, Jasper/Cics and Jaspe. R/PPA
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 380, 4300 300 Series: DOS/VS, OS/VS1/MVS
Memory Required: 256.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $14,500 to $30,000
Number Installed to Date: 110
Date First Installed: 1981

COMPUTER ASSOCIATES
CA-MASS-CASD
Additional Product Classification: Data Base
Specific Application: Data Migration Facility Includes OMS Monitor, On-Line Task Manager
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 380, 4300, 3000 Series: OS, DOS/VS
Memory Required: 128.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $7,000
Number Installed to Date: 45
Date First Installed: 1982

COMPUTER ASSOCIATES
CA-OPTIMIZER
Additional Product Classification: Optimizer
Specific Application: Optimizer
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300: MVT, IBM 300 Series: DOS, IBM 370 OS, MVS
Memory Required: 256.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 1,000
Date First Installed: 1978

COMPUTER ASSOCIATES
CA-QUICKTROL
Additional Product Classification: Project Management
Specific Application: Project Control Tracking System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 380, 4300 Series: DOS/VS, OS/VS1, MVS
Memory Required: 100.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $15,000 to $18,000
Number Installed to Date: 35
Date First Installed: 1981

COMPUTER ASSOCIATES
CA-RAPS
Additional Product Classification: Disk Tape File
Specific Application: Allows Access to Power VS Spool Files
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 380, 4300, 300 Series: DOS/VS
Memory Required: 20.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 700
Date First Installed: 1981

COMPUTER ASSOCIATES
CA-UCAMDU
Additional Product Classification: Disk Tape File
Specific Application: Selective Dataset Copy Utility
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 380, 4300, 300 Series: MVS, OS/VS1
Memory Required: 48.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $4,000
Number Installed to Date: 125
Date First Installed: 1972

COMPUTER ASSOCIATES
CA-VIEW
Additional Product Classification: Disk Tape File
Specific Application: Display and Management Facility for CMS Queue Files
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 380, 4300 Series: VM/CMS
Memory Required: 25.0K bytes
Source Language: BAL
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Number Installed to Date: 30
Date First Installed: 1981

COMPUTER SYSTEM ARCHITECTS, INC.
DISCLOSE
Additional Product Classification: Data Set Survey System
Specific Application: Disk Survey System
Specific Industry: Not Industry Sensitive
System Requirements: Programart NVS, VSI, VSE
Source Language: Assembler, Cobol
Purchase Terms: Purchase (license)
Price: $1,800
Number Installed to Date: 50
Date First Installed: 1974
(See Vendor Profile Page V-27)

CULLINET SOFTWARE, INC.
ESCAPE
Additional Product Classification: DBMS Migration Aid
Specific Application: DBMS
Specific Industry: Not Industry Sensitive
System Requirements: IBM 360, 370, 3000, 430 Series
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $25,000
Number Installed to Date: 39
Date First Installed: February 1981
(See Vendor Profile Page V-33)

DASD CORP.
COBOL TO COBOL TRANSLATOR
Additional Product Classification: Translator
Specific Application: Cobol Conversion Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS/MVS
Memory Required: 1.0M bytes
Source Language: PL/1
Purchase Terms: Lease
Price: $10,500
Number Installed to Date: 130
Date First Installed: 1978
(See Vendor Profile Page V-34)

DASD CORP.
FORTRAN TO FORTRAN TRANSLATOR
Additional Product Classification: Translator
Specific Application: Fortran Conversion Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM System: OS/MVS
Memory Required: 1.0M bytes
Source Language: PL/1
Purchase Terms: Lease
Price: $19,800
Number Installed to Date: 30
Date First Installed: 1980

DASD CORP.
NAT/S TO COBOL TRANSLATOR
Additional Product Classification: Translator
Specific Application: Nest/3 to Cobol Conversion Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM System: OS/MVS
Source Language: PL/1
Purchase Terms: Lease
Price: $17,400
Number Installed to Date: 35
Date First Installed: 1978

DASD CORP.
RPG-II TO COBOL TRANSLATOR
Additional Product Classification: Translator
Specific Application: RPG-II to Cobol Conversion Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS/MVS
Memory Required: 1.0M bytes
Source Language: PL/1
Purchase Terms: Lease
Price: $19,800
Number Installed to Date: 150
Date First Installed: 1974

DASD CORP.
SYSTEM/3 CCP TO CICS COBOL TRANSLATOR
Additional Product Classification: Translator
Specific Application: System/3 CCP to Cics Cobol Conversion Aid
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS/MVS
Memory Required: 1.0M bytes
Source Language: PL/1
Purchase Terms: Lease
Price: $24,800
Number Installed to Date: 21
Date First Installed: 1980

DASD CORP.
UNIVERSAL TCS TRANSLATOR
Additional Product Classification: Translator
Specific Application: A Conversion Aid
Specific Industry: Not Industry Sensitive
Memory Required: 1.0M bytes
Source Language: Cobol
Purchase Terms: Lease
Price: $10,000
Number Installed to Date: 4
Date First Installed: 1983

DATA BASE MANAGEMENT, INC.
DBMI LIST
Additional Product Classification: List
Specific Application: IMS Data Base List Utility
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300; IBM 370 OS IBM 4341
Source Language: ALC
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 30
Date First Installed: 1974
(See Vendor Profile Page V-35)

DATA BASE MANAGEMENT, INC.
DBMI LOAD
Specific Application: IMS Data Base Load Utility

Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300; IBM 370: OS, IBM 4341
Source Language: ALC
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 50
Date First Installed: 1974

DATACOM OF ST. HELENS, INC.
SPOOLER
Additional Product Classification: Spooler
Specific Application: Spool Remote Printers
Specific Industry: Not Industry Sensitive
System Requirements: HP 3000; MPE
Memory Required: 500.0K bytes
Source Language: SPL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,000
Number Installed to Date: 175
Date First Installed: March 1980
(See Vendor Profile Page V-35)

DATA IMAGE CORP.
UNI-DATE
Additional Product Classification: Date Subroutine
Specific Application: Calculates Date Span and Date Reformatting
Specific Industry: Not Industry Sensitive
System Requirements: Honeywell DPS Gcos
Memory Required: 2.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $500
Number Installed to Date: 6
Date First Installed: January 1982
(See Vendor Profile Page V-36)

DATANEX, INC.
HASP+
Additional Product Classification: Interconnect
Specific Application: Connect VAX or PDP-11 to A Wide Variety of Systems Using Bisynchronous Multileaving Line Protocols
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP: RSX, DEC VAX: VMS
Source Language: Fortran, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 300
Date First Installed: 1977
(See Vendor Profile Page V-37)

DATANEX, INC.
HASP-11
Additional Product Classification: Interconnect Tool
Specific Application: Connects PDP-11 to A Wide Variety of Systems Using, Bisynchronous Multileaving Line Protocols
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11; RT-11
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,500
Number Installed to Date: 100
Date First Installed: 1976

DATAPOINT CORP.
ELECTRONIC MAIL SYSTEMS (EMS)
Additional Product Classification: Electronic Mail
Specific Application: Serves as Network Controller for Both Local Area Network and Remote
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 8600: DOS; Datapoint 8600
Memory Required: 128.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,500
(See Vendor Profile Page V-37)

DATA PROCESSING DESIGN
SAVER FOR RSTS/E V2.7
Additional Product Classification: Backup
Specific Application: Disk to Tape Backup and Disk Option
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11; RSTS/E
Memory Required: 160.0K bytes
Source Language: Macro-11, Basic Plus
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $850
Number Installed to Date: 600
Date First Installed: June 1979
(See Vendor Profile Page V-38)

DAVIDSON SOFTWARE SYSTEMS
PROCEDURE UTILITIES
Additional Product Classification: Procedure Utility
Specific Application: Procedure Utilities
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34, DOS; HP: CP/M; TVI: CP/M: Unix
Memory Required: 64.0K bytes
Source Language: RPG-II, Basic
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $100
Number Installed to Date: 50
Date First Installed: September 1980
(See Vendor Profile Page V-39)

DYNAMIC MICROPROCESSOR ASSOC.
CP/M 86 TO MSDOS OPERATING SYSTEM CONVERTER
Additional Product Classification: Converter
Specific Application: Allows Programs Written for CP/M 86 to Execute Under MS-DOS
Specific Industry: Not Industry Sensitive
System Requirements: MSDOS, PCDOS
Memory Required: 16.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 150
Date First Installed: May 1983
(See Vendor Profile Page V-44)

DYNAMIC MICROPROCESSOR ASSOC.
EM80/86
Additional Product Classification: Emulator
Specific Application: Software Emulates Intel Like 8-Bit Software on the 8086 and 8088 Without Modification of User Program
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 86; MSDOS, 86 86, PCDOS
Memory Required: 16.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $95
Number Installed to Date: 3,000
Date First Installed: January 1980

DYNAMIC MICROPROCESSOR ASSOC.
8080/85 TO CP/M 86 OPERATING SYSTEM CONVERTER
Additional Product Classification: Converter
Specific Application: Allows Programs Written in MS-DOS to Execute Under CP/M 86
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 86
Memory Required: 16.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $95
Number Installed to Date: 150
Date First Installed: May 1983

EDP MANAGEMENT, INC.
DIANA
Additional Product Classification: Directory Analysis
Specific Application: Does A Thorough Directory Analysis
Specific Industry: Not Industry Sensitive
System Requirements: Burroughs
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Price: $1,500
Date First Installed: June 1972
(See Vendor Profile Page V-45)

EXECUCOM SYSTEM CORP.
IFPS SENTRY
Additional Product Classification: Data Entry
Specific Application: Data Entry Utility Package Which Facilitates Information Into IFPS File
Specific Industry: Not Industry Sensitive
System Requirements: DEC 10; DEC 20; DEC VAX
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $12,000
Date First Installed: 1981
(See Vendor Profile Page V-47)

EXECUCOM SYSTEM CORP.
IFPS - DATASPAN
Additional Product Classification: Reformat
Specific Application: Interactive File Information Program to Reformat as IFPS

Specific Industry: Not Industry Sensitive
System Requirements: DEC 10; DEC 20; DEC VAX VMS
Source Language: Fortran, Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $10,000
Date First Installed: 1981

GARY BERGMAN ASSOCIATES, INC.
ADS
Additional Product Classification: Debugging
Specific Application: Debugs Application Programs in A Cics Environment
Specific Industry: Not Industry Sensitive
System Requirements: IBM Compatible: DOS/VS, OS/VS
Memory Required: 40.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $19,000 to $24,900
Number Installed to Date: 250
Date First Installed: 1974
(See Vendor Profile Page V-50)

GEJAC, INC.
MEMORY DISK VERSION 1
Additional Product Classification: Device Handler
Specific Application: System Performance Enhancement
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 Series: RT-11, RSX-11M, RSX-11M+
Memory Required: 2.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $1,500
Number Installed to Date: 25
Date First Installed: July 1982
(See Vendor Profile Page V-50)

GENERATION SCIENCES, INC.
GAMMA
Additional Product Classification: Application Generator
Specific Application: Allows System Developer to Plan, Design, Program, Install and Document Any Application System
Specific Industry: Not Industry Sensitive
System Requirements: IBM, Burroughs
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Number Installed to Date: 25
Date First Installed: June 1982
(See Vendor Profile Page V-51)

GOAL SYSTEMS INTERNATIONAL, Inc.
FAVERSTROXEXP
Additional Product Classification: Backup Storage
Specific Application: Extends the Range of Capabilities of System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370:

DOS/VS; IBM 4300: DOS/VSE; IBM 3080: OS
Memory Required: 80.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 5,500
Date First Installed: 1978
(See Vendor Profile Page V-52)

GOAL SYSTEMS INTERNATIONAL, INC.
PHOENIX
Additional Product Classification: Computer-Based Training
Specific Application: Extends the Range of Capabilities on Your System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370; DOS/VSE; IBM 4300: DOS/VS; IBM 3080: OS
Memory Required: 80.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 5,500
Date First Installed: 1981

GREG DINNER & ASSOCIATES
WILLTELL
Additional Product Classification: Operating Systems, Insurance Report Generator, Insurance Performance Measurement, Management
Specific Application: Telex Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34: SSP; IBM System/36: SSP; IBM System/38: SSP
Source Language: RPG-II
Purchase Terms: Purchase (license)
Price: $5,500 to $7,000
(See Vendor Profile Page V-52)

HARRIS CORP.
SHARED DISK SOFTWARE
Additional Product Classification: Disk Utility
Specific Application: Users of Two Independent CPUS Can Access Same Disk Files
Specific Industry: Not Industry Sensitive
System Requirements: Harris 600, 700, 800 VCS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Date First Installed: April 1983
(See Vendor Profile Page V-53)

HARTE SYSTEMS, INC.
ADS - AUTOMATIC INFORMATION DISPLAY SYSTEM
Additional Product Classification: Documentation
Specific Application: On-Line Display of Documentation
Specific Industry: Not Industry Sensitive
System Requirements: Wang VS: VS
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,000
Number Installed to Date: 2
Date First Installed: 1982
(See Vendor Profile Page V-53)

HOLLAND SYSTEMS CORP.
STRATEGIC SYSTEMS PLANNING
Additional Product Classification: Information Resource
Specific Application: Database andInformation System Planning
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3000, 4300: OS/VS2, MVS
Memory Required: 100.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: August 1982
(See Vendor Profile Page V-55)

HOUSTON ENGINEERING RESEARCH CORP.
MACHINERY MONITORING SYSTEM
Specific Application: Machine Monitoring
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX
Memory Required: 128.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20,000 to $50,000
Number Installed to Date: 5
Date First Installed: 1978
(See Vendor Profile Page V-55)

HUMAN SERVICES COMPUTING, INC.
EPIC SYSTEM GENERATOR
Additional Product Classification: DB Handler
Specific Application: Time Dimensional Data Base Handler, Statistics
Specific Industry: Medical
System Requirements: DEC; DG; IBM (unspec.)
Source Language: MWS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1977
(See Vendor Profile Page V-55)

INCEPTS, INC.
INCOMPARE
Additional Product Classification: File Comparison
Specific Application: Compares Sequential Files
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, DOS
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $4,500
Date First Installed: 1981
(See Vendor Profile Page V-56)

INNOVATION DATA PROCESSING
FAST DUMP RESTORE V4.7
Additional Product Classification: Disk Management
Specific Application: Disk Management
Specific Industry: Not Industry Sensitive
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $4,500
Number Installed to Date: 5,000
Date First Installed: May 1972
(See Vendor Profile Page V-59)

INTERACTIVE SYSTEMS, INC.
KSU-KEYPUNCH SIMULATION UTILITY
Additional Product Classification: Keypunch Simulation
Specific Application: Keypunch Simulation Utility
Specific Industry: Not Industry Sensitive
System Requirements: DEC 10: Tops 10; DEC 20: toPS-20; VAX: VMS
Source Language: Bliss
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 12
Date First Installed: August 1982
(See Vendor Profile Page V-60)

INTERACTIVE SYSTEMS, INC.
SRU - SCREEN REPORT UTILITY
Additional Product Classification: Screen Report
Specific Application: Screen Report Utility
Specific Industry: Not Industry Sensitive
System Requirements: DEC 10: Tops-10; DEC 20: Tops-20; VAX: VMS
Source Language: Bliss
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 5
Date First Installed: October 1982

IPT (INFORMATION PROCESSING TECHNIQUES)
BLAST (BLOCKED ASYNCHRONOUS TRANSMISSION)
Additional Product Classification: Data Transfer Protocol
Specific Application: Data Transfer
Specific Industry: Not Industry Sensitive
System Requirements: DG: RDOS; VAX: VMS; IBM PC: PC-DOS; Apple: CP/M 2.2
Memory Required: 64.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 200
Date First Installed: 1982
(See Vendor Profile Page V-61)

IPT (INFORMATION PROCESSING TECHNIQUES)
WILD HARE MTSS (TIME SHARING SYSTEM)
Additional Product Classification: OS Enhancement
Specific Application: Time-Sharing System for BG Mapped R-DOS Operating System
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS
Memory Required: 128.0K bytes
Source Language: Assembler, Algol
Purchase Terms: Purchase (license)
Price: $5,900
Number Installed to Date: 400
Date First Installed: 1980

LEGIST AUTOMATION, INC.
MAPS
Additional Product Classification: Protocol Simulator
Specific Application: Multiline Asynchronous Protocol Simulator
Specific Industry: Not Industry Sensitive
System Requirements: Four Phase IV: DPE
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,900
Date First Installed: 1983
(See Vendor Profile Page V-65)

MARCON & ASSOCIATES, INC.
MARCON PROJECT ACCOUNTING CONTROL
Additional Product Classification: Project Management
Specific Application: Project Management Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, DOS: DOS-DS
Memory Required: 50.0K bytes
Source Language: Ansi Cobol 74
Source Code Available: Yes
Purchase Terms: Purchase (license); Lease
Price: $7,500 to $12,000
Number Installed to Date: 30
Date First Installed: January 1983
(See Vendor Profile Page V-69)

MARSH-4, INC.
DUMPMASTER/DUMPMASTER ONLINE
Additional Product Classification: Dump Utility
Specific Application: Dump Utility
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 3030, 4300 Series: DOS/VSE
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 400
Date First Installed: July 1979
(See Vendor Profile Page V-69)

MARYLAND COMPUTER SERVICES, INC.
MEDIA MANAGEMENT
Additional Product Classification: Disk Package Utility
Specific Application: Disk Utility
Specific Industry: Not Industry Sensitive
System Requirements: HP 250
Source Language: HP Basic
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 25
Date First Installed: 1982
(See Vendor Profile Page V-69)

MCDONNELL DOUGLAS AUTOMATION CO.
DIVERSIFIED ONLINE QUEUING
Specific Application: Cics Utility to Provide Queuing and Printing of Hard Copy Generated By An On-Line Application System
Specific Industry: Not Industry Sensitive
System Requirements: IBM 3080; 4300 Series: DOS/OS
Source Language: Cobol Cics
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $3,000
Number Installed to Date: 8

Date First Installed: January 1982
(See Vendor Profile Page V-71)

MCDONNELL DOUGLAS AUTOMATION CO.
STRADIS
Additional Product Classification: System Development
Specific Application: Systems Development Methodology
Specific Industry: Not Industry Sensitive
Purchase Terms: Purchase (license)
Price: $40,000
Number Installed to Date: 85
Date First Installed: July 1979

MICROTECH EXPORTS, INC.
REFORMATTER CONVERSION SOFTWARE DEC-CP/M
Additional Product Classification: Conversion System
Specific Application: Reads, Writes, and Transfers Bidirectionally Between DEC RT-11 and CP/M
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11/RT-11
Memory Required: 32.0K bytes
Source Language: C, Macro-11, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350
Number Installed to Date: 250.
Date First Installed: September 1982
(See Vendor Profile Page V-75)

MISOSYS
DSMBLR 3
Additional Product Classification: Disassembler
Specific Application: Disk Disassembler for L-DOS
Specific Industry: Not Industry Sensitive
System Requirements: TRS 80/I, 80/III: TRS-DOS
Memory Required: 48.0K bytes
Source Language: Z80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 1,000
(See Vendor Profile Page V-75)

MISOSYS
HELP
Specific Application: Help Package
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/III: TRS-DOS
Memory Required: 48.0K bytes
Source Language: Z80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $25
Number Installed to Date: 1,000

MISOSYS
PRO-DUCE
Specific Application: Disassembler for 3-DOS 60 and L-DOS 60
Specific Industry: Not Industry Sensitive
System Requirements: DOS
Memory Required: 64.0K bytes
Source Language: Z80 Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 1,000

MISOSYS
Z SHELL
Additional Product Classification: Preprocessor
Specific Application: Command Line Preprocessor, IO Direction, Multiple Command, On-Line
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/III: TRS-DOS
Memory Required: 48.0K bytes
Source Language: Z80
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 1,000

MOBIUS MANAGEMENT SYSTEMS, INC.
INFOPAC
Additional Product Classification: Output Management
Specific Application: Automated Distribution of Computer Generated Output
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4300, 370: DOS, VSE, OS
Memory Required: 1.0M bytes
Source Language: Cobol
Source Code Available: No
Purchase Terms: Purchase (license); Rental, Lease
Price: $12,500
Number Installed to Date: 10
Date First Installed: February 1983
(See Vendor Profile Page V-76)

M S I SOFTWARE, INC.
TIMER/38
Additional Product Classification: Job Scheduler
Specific Application: Automatic Job Scheduler, Job Execution System
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/38: CP/F
Memory Required: 1.0M bytes
Source Language: RPG-III
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $1,000
Date First Installed: August 1982
(See Vendor Profile Page V-75)

NCR CORP.
NCR-OMS/DATA ENTRY
Additional Product Classification: Data Entry
Specific Application: On-Line Data Entry
Specific Industry: Not Industry Sensitive
System Requirements: NCR V-8500: VRX; NCR V-8000 Series: VRX
Memory Required: 1.0K bytes
Source Language: Nest/VS
Purchase Terms: Rental
Number Installed to Date: 40
Date First Installed: April 1981
(See Vendor Profile Page V-79)

NEAL NELSON & ASSOCIATES
JOB QUEUE PROCESSOR
Additional Product Classification: Job Queue Processor
Specific Application: Job Queue Processor, Allows Deferred Processing of Batch Jobs
Specific Industry: Not Industry Sensitive
System Requirements: Unix
Memory Required: 256.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 8
Date First Installed: August 1982
(See Vendor Profile Page V-79)

NEXDOS COMPUTER SOFTWARE CO.
DATA ENTRY GENERATOR (DEG)
Additional Product Classification: Data Entry
Specific Application: Data Entry Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM: E-DOS, DOS
Source Language: Assembler
Purchase Terms: Purchase (license); Lease
Price: $9,500
Date First Installed: 1975
(See Vendor Profile Page V-80)

NUMERI-CORP, INC.
SUPERSCREEN
Additional Product Classification: Screen Generation
Specific Application: Screen Generation and Data Input Editor
Specific Industry: Not Industry Sensitive
System Requirements: DG: R-DOS, DOS, AOS
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $750 to $950
Number Installed to Date: 45
Date First Installed: February 1979
(See Vendor Profile Page V-81)

OLSEN SYSTEMS CORP.
ATTAIN
Additional Product Classification: Screen Formatter
Specific Application: Data Entry
Specific Industry: Not Industry Sensitive
System Requirements: DEC 10: Tops 10; DEC 20: Tops 20
Source Language: Assembler
Purchase Terms: Purchase (license); Rental; Lease
Price: $6,900 to $9,950
Number Installed to Date: 6
Date First Installed: March 1983
(See Vendor Profile Page V-82)

PARA RESEARCH, INC.
RESCUE DATA SYSTEM
Additional Product Classification: Rescue System
Specific Application: Allows User to Restart Any Procedure Where It Halted
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/34
Memory Required: 16.0K bytes
Source Language: RPG-II
Source Code Available: Yes
Purchase Terms: Purchase (license); Rental; Lease
Price: $250
(See Vendor Profile Page V-84)

PCD SYSTEMS, INC.
CP/M TO P-SYSTEM
Additional Product Classification: Conversion Aid
Specific Application: Conversion Package
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11; IBM; TRS; Altos
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1980
(See Vendor Profile Page V-84)

PCD SYSTEMS, INC.
CRTFORM
Additional Product Classification: Forms Generator
Specific Application: Program Forms Generator
Specific Industry: Not Industry Sensitive
System Requirements: IBM; DEC LSI-11; TRS, Altos
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $450
Date First Installed: 1980
(See Vendor Profile Page V-84)

PCD SYSTEMS, INC.
IBM 3741 TO P-SYSTEM
Additional Product Classification: Conversion Aid
Specific Application: Conversion Package
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11; IBM, TRS, Altos
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $285
Date First Installed: 1982

PCD SYSTEMS, INC.
PFAS-KEYED ISAM
Additional Product Classification: Utility
Specific Application: Develop Routines to Access Data By Keys
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11; TRS, IBM, Altos
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $225
Date First Installed: 1980

PCD SYSTEMS, INC.
TRS-DOS TO P-SYSTEM
Additional Product Classification: Conversion Aid
Specific Application: Conversion Package
Specific Industry: Not Industry Sensitive
System Requirements: DEC LSI-11; TRS, IBM; Altos
Memory Required: 64.0K bytes
Purchase Terms: Purchase (license)
Price: $100
Date First Installed: 1980

PENNINGTON SYSTEMS, INC.
COMPAX (PDD-11 TO VAX-11 ASSEMBLER
Additional Product Classification: Translator
Specific Application: Translator
Specific Industry: Not Industry Sensitive

System Requirements: DEC PDP-11: RSX-11M, DEC VAX-11: VMS
Memory Required: 64.0K bytes
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $7,500
Number Installed to Date: 15
Date First Installed: July 1981
(See Vendor Profile Page V-85)

PENNINGTON SYSTEMS, INC.
VIDEO/11 (VIDEO TERMINAL I/O)
Additional Product Classification: Terminal Support
Specific Application: System Terminal Support
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX-11M/M+, ias; DEC VAX-11: VMS
Memory Required: 5.0M bytes
Source Language: Macro-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,750
Number Installed to Date: 90
Date First Installed: August 1979

POINT FOUR DATA CORP.
FORCE
Additional Product Classification: Code Generator
Specific Application: Code Generator
Specific Industry: Not Industry Sensitive
System Requirements: DG Nova: Iris
Memory Required: 64.0K bytes
Source Language: Business Basic
Purchase Terms: Purchase (license)
Price: $3,000
(See Vendor Profile Page V-86)

QUADRATRON SYSTEMS, INC.
Q-FORM
Additional Product Classification: Form Generators
Specific Application: Form Generator and Manager
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix, Fortune; Altos
Memory Required: 128.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $795 to $1,300
Number Installed to Date: 1,200
Date First Installed: July 1983
(See Vendor Profile Page V-90)

QUADRATRON SYSTEMS, INC.
Q-MENU
Additional Product Classification: Menu Generator
Specific Application: Menu Generator and Manager
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix, Fortune, Altos
Memory Required: 128.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $795 to $1,700
Number Installed to Date: 1,000
Date First Installed: November 1982

QUADRATRON SYSTEMS, INC.
THE INTEGRATOR
Additional Product Classification: Integrator
Specific Application: Runs Programs Simultaneously
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: Unix; Fortune; Altos
Memory Required: 128.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $595 to $3,000
Number Installed to Date: 1,000
Date First Installed: April 1983

QUALITY SOFTWARE, INC.
OS PLUS
Additional Product Classification: Financial/Accounting
Specific Application: Small Business Accounting and Invoicing Needs
Specific Industry: Not Industry Sensitive
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350
Date First Installed: March 1982
(See Vendor Profile Page V-90)

QUALITY SYSTEMS DEVELOPMENT CORP.
UTILITY CONTROL PROGRAM
UCON
Additional Product Classification: On-Line Program Development
Specific Application: On-Line Program Development System
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS/OS; Amdahl
Memory Required: 300.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 30
Date First Installed: January 1976
(See Vendor Profile Page V-90)

RAXCO
RABBIT 5
Additional Product Classification: Back-Up
Specific Application: High Speed Disk to Tape Backup System for VMS
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX: VMS
Source Language: Fortran
Purchase Terms: Purchase (license)
Price: $5,000
Date First Installed: 1900
(See Vendor Profile Page V-91)

SAS INSTITUTE, INC.
SAS/ETS
Additional Product Classification: Electronic Time Series
Specific Application: Electronic Time Series
Specific Industry: Not Industry Sensitive
System Requirements: IBM: OS, VM/CMS; DEC VAX: VMS, DG: MV Series, Prime 50 Series: Primos
Memory Required: 512.0K bytes
Source Language: IBM Assembler, Fortran, PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,600
(See Vendor Profile Page V-95)

SAS INSTITUTE, INC.
SAS/SSP
Specific Application: Full Screen Product Editor
Specific Industry: Not Industry Sensitive
System Requirements: IBM; DEC VAX; DG
Source Language: IBM Assembler, Fortran, PL/1
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $3,000

SATELLITE SOFTWARE INTERNATIONAL [SSI]
P-EDIT
Additional Product Classification: Editor
Specific Application: Program Editor
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $95
Date First Installed: 1983
(See Vendor Profile Page V-95)

SATURN SYSTEMS, INC.
TITAN APPLICATION SOFTWARE
Additional Product Classification: General Utility
Specific Application: Set of Programs to Enhance the Utility of the Operating System
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Macro, Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Date First Installed: May 1983
(See Vendor Profile Page V-95)

SDI
DOX
Additional Product Classification: Spooling
Specific Application: Connect Spooling for Files
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease
(See Vendor Profile Page V-96)

SDI
EPAT
Additional Product Classification: Tape Management
Specific Application: Tape Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM, DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease

SDI
EPAT SVA
Additional Product Classification: Tape Management
Specific Application: RPM-Based Tape Management
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)

SDI
INSTANT FBA
Additional Product Classification: Disk Conversion
Specific Application: Disk Conversion
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Lease

SDI
RPM
Additional Product Classification: Spooling
Specific Application: Spooling
Specific Industry: Not Industry Sensitive
System Requirements: IBM: DOS
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)

S & W COMPUTER SYSTEM, INC.
INDAS
Additional Product Classification: Statistical Analysis
Specific Application: Statistical Analysis
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RT-11
Memory Not Classification: Interface Package
Specific Application: Interfaces One, Two or Three Trams to Dbase II
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS; Apple II +/IIe: APPLE-DOS; Xerox 280: CP/M; HP 125
Memory Required: 10.0K bytes
Source Language: C Code
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20
Number Installed to Date: 800
(See Vendor Profile Page V-95)

SOFTWARE CLEARING HOUSE
DSPOOLER
Additional Product Classification: Spoolers
Specific Application: VRX Spool File Utility Which Subdivides the File Into 9 Smaller Spool Files
Specific Industry: Not Industry Sensitive
System Requirements: NCR 8455, DEC 11/23, VAX
Source Language: Nest/VS
Source Code Available: No
Purchase Terms: Purchase (license); Rental
Price: $1,750
Number Installed to Date: 11
(See Vendor Profile Page V-99)

SOFTWARE CLEARING HOUSE
FLAW CHECK
Additional Product Classification:

Disk Utility
Specific Application: Analyzes Disk Packs for Flawed Areas and Prints Reports Detailing the Status of Each Packs Reliability
Specific Industry: Not Industry Sensitive
System Requirements: NCR Century Criterion: B Series: VRX
Memory Required: 16.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license);
Price: $500
Number Installed to Date: 39

SOFTWARE CLEARING HOUSE
[illegible]
Specific Application: Micro to Mainframe Interface Allowing File Transfers Between Micros and NCR B Series and VRX Mainframes
Specific Industry: Not Industry Sensitive
System Requirements: NCR N, V Series, B Series: VRX
Source Code Available: No
Purchase Terms: Purchase (license);
Date First Installed: August 1983

SOFTWARE CLEARING HOUSE
QUEST
Additional Product Classification: Report Writer
Specific Application: Dictionary Driven Report Writer
Specific Industry: Not Industry Sensitive
System Requirements: NCR B Series VRX
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license);
Price: $3,475
Number Installed to Date: 224

SOFTWARE ISLAND, INC.
[illegible]
Additional Product Classification: Menu
Specific Application: Interfaces Between CP/M and the Operator
Specific Industry: Not Industry Sensitive
System Requirements: Kaypro; Osborne; Televideo: CP/M
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $95
Number Installed to Date: [illegible]
Date First Installed: 1982
(See Vendor Profile Page V-99)

SOFTWARE ISLAND, INC.
[illegible]
Additional Product Classification: Misc
Specific Application: A Set of 13 Unix-Like Utilities Converted to Run on CP/M
Specific Industry: Not Industry Sensitive
System Requirements: Kaypro; Osborne, Televideo: CP/M
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
[illegible]
Number Installed to Date: 100
Date First Installed: 1980

SOFTWARE TECHNIQUES, INC.
DISKIT
Additional Product Classification: Disk Structuring
Specific Application: Structure DEC RSTS/E Disks and High-Speed Disk-Access
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RSTS/E
Source Language: Basic Plus II
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,350
Number Installed to Date: 300
Date First Installed: January 1981
(See Vendor Profile Page V-100)

SYNCSORT, INC.
SYBACK
Additional Product Classification: Backup
Specific Application: Back-Up and Restore Facility for VM Systems
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370; IBM 3030 Series, 3080 Series. Bsepp; IBM 4300 Series: Sepp
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
(See Vendor Profile Page V-105)

SYSTEMS APPLICATIONS
BMDP STATISTICAL SOFTWARE
Additional Product Classification: Library Statistical
Specific Application: Library of Different Statistical Applications
Specific Industry: Not Industry Sensitive
System Requirements: Prime 50 Series: Primos; Prime 400; Prime 500
Source Language: Fortran
Source Code Available: No
Purchase Terms: Lease
Price: $1,050 to $2,900
Number Installed to Date: 40
Date First Installed: December 1981
(See Vendor Profile Page V-105)

TARBELL ELECTRONICS
TARBELL BASIC
Additional Product Classification: Interpreter
Specific Application: Interpreter Basic
Specific Industry: Not Industry Sensitive
System Requirements: Empire Series: CP/M; Rebel Series: MP/M
Memory Required: 44.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $100
Number Installed to Date: 200
Date First Installed: 1979
(See Vendor Profile Page V-109)

TERMINALS UNLIMITED, INC.
NETSTAR
Additional Product Classification: Electronic Mail
Specific Application: Electronic Mail
Specific Industry: Not Industry Sensitive
System Requirements: Intertech; Dynabite CP/M
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 6
Date First Installed: December 1982
(See Vendor Profile Page V-112)

UNIQUE AUTOMATION PRODUCTS
EZ SHAR
Specific Application: Terminal Emulator for DEC Equipment
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11: RSX-11M,-TSX+, RT-11
Source Language: On Request
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500 to $750
Number Installed to Date: 75
Date First Installed: 1980
(See Vendor Profile Page V-113)

UNIQUE AUTOMATION PRODUCTS
RJE
Additional Product Classification: [illegible]
Specific Application: 2780 Emulator for DEC Equipment
Specific Industry: Not Industry Sensitive
System Requirements: DEC PDP-11 RSX-11M TSX+, RT-11
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,800 to $2,250
[illegible]
Date First Installed: 1980
(See Vendor Profile Page V-113)

UNIQUE COMPUTER CORP.
[illegible]
Additional Product Classification: Printer Spooler
Specific Application: Allows Multiple Prints, Cues, Variable Print Control
Specific Industry: Not Industry Sensitive
System Requirements: [illegible]
Memory Required: 128.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
[illegible]
Date First Installed: 1980
(See Vendor Profile Page V-113)

UTILITY SOFTWARE, INC.
TRANSACTION PROCESSING FACILITY
Additional Product Classification: Screen Processing
Specific Application: Provides Whole Screen Processing for Transactions
Specific Industry: Not Industry Sensitive
System Requirements: DEC 10: Tops 10, DEC 20: Tops 20
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $12,000
Number Installed to Date: 4
Date First Installed: 1981
(See Vendor Profile Page V-114)

VAN ARSDALE & ASSOCIATES, INC.
SP/TOOLKIT
Additional Product Classification: Collection of Utilities
Specific Application: Collection of Utilities including Call Translatorsfor SP Pascal
Specific Industry: Not Industry Sensitive
System Requirements: MP/AOS; DG AOS, AOS/VS
Source Language: Pascal, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)

Price: $1,500
Number Installed to Date: 6
Date First Installed: October 1982
(See Vendor Profile Page V-115)

VISUAL SYSTEMS CORP.
VISACAR MODULE 5.0 MICROFILM DATABASE
Additional Product Classification: Microfilm Database
Specific Application: Creation, Maintenance and High Volume Usage of Microfilm Data Bases on 16MM Blip-Encoded Roll Microfilm
Specific Industry: Not Industry Sensitive
System Requirements: Datapoint 1800: DOS; Datapoint 6600: DOS/RMS, Datapoint 8600: DOS/RMS, Datapoint 8800: RMS
Memory Required: 128.0K bytes
Source Language: DOS Datashare, RMS Datashare
Source Code Available: No
Purchase Terms: Purchase (license); Lease
Price: $10,000
Number Installed to Date: 15
Date First Installed: September 1982
(See Vendor Profile Page V-116)

VM SOFTWARE, INC.
VMARCHIVE
Additional Product Classification: Archive Storage
Specific Application: Archival Storage System for VM Environment Provides End User-Driven Copying and Storage
Specific Industry: Not Industry Sensitive
System Requirements: IBM 4331; IBM
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 430
(See Vendor Profile Page V-116)

VM SOFTWARE, INC.
VMBACKUP
Additional Product Classification: Backup and Restore
Specific Application: Provides Backup and Restore for the VM Environment
Specific Industry: Not Industry Sensitive
System Requirements: IMB 4331: VM, IBM
Memory Required: 512.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 450

THE WOLLONGONG GROUP, INC.
IP/TCP
Additional Product Classification: Networking Software
Specific Application: DOD Standard Network Protocol
Specific Industry: Not Industry Sensitive
System Requirements: DEC VAX-11/730, 11/750, 11/780, 11/782
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $15,000
Number Installed to Date: 8
Date First Installed: July 1983
(See Vendor Profile Page V-117)

WOLVERINE SOFTWARE CORP.
GPSS/H
Additional Product Classification: Simulation Language
Specific Application: Discrete Event Simulation
Specific Industry: Not Industry Sensitive
System Requirements: IBM 370, 4300 Series, 3000 Series: MVS, VS1, VM/CMS; DEC VAX: VMS, Unix
Memory Required: 500.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Lease
Number Installed to Date: 58
Date First Installed: November 1977
(See Vendor Profile Page V-117)

Microcomputer Section

ADDMASTER CORP.
DATA GENERATOR - DATAGEN
Additional Product Classification: Paper Tape Input and Output
Specific Application: Paper Tape Input and Output Communications
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Source Language: Forth
Purchase Terms: Purchase (license)
Price: $115
Number Installed to Date: 100
Date First Installed: 1982
(See Vendor Profile Page V-2)

ADVANCED MICRO TECHNOLOGIES
DPATCH - VERSION 2.00
Additional Product Classification: Disk Error Recovery
Specific Application: Disk Error Recovery
Specific Industry: Not Industry Sensitive
System Requirements: CP/M, MP/M
Memory Required: 48.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $195
Number Installed to Date: 1,500
Date First Installed: 1981
(See Vendor Profile Page V-3)

APPLIED I
TUTSIM-UNIVERSITY OF TWENTE SIMULATION
Additional Product Classification: CAD
Specific Application: Engineering Design
Specific Industry: Engineering
System Requirements: Apple II, IIE; IBM PC; CPM; DEC PDP-11: RT-11, RSX
Memory Required: 48.0K bytes
Source Language: Assembly, Fortran
Purchase Terms: Purchase (license)
Price: $500 to $4,000
Number Installed to Date: 100
Date First Installed: 1982
(See Vendor Profile Page V-8)

ASPEN SOFTWARE
RANDOM HOUSE PROOF PEAK
Additional Product Classification: Spell Checker
Specific Application: Checks Spelling
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: DOS; TRS-80: CP/M
Memory Required: 120.0K bytes
Source Language: Machine
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 1,000
Date First Installed: 1981
(See Vendor Profile Page V-9)

BASIC BUSINESS COMPUTERS, INC.
RANDOM NUMBER GENERATOR
Additional Product Classification: Generator
Specific Application: Random Generator, Samples for Auditing
Specific Industry: CPA, Bookkeepers
System Requirements: IBM PC: UCSD-P System; Altos, DEC; Molecular Computer
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-00)

BILLINGS COMPUTER CORP.
BILLINGS DIAGNOSTICS PACK
Additional Product Classification: Diagnostics
Specific Application: Diagnostics Software
Specific Industry: Not Industry Sensitive
System Requirements: Billings: Boss
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $500
Date First Installed: September 1981
(See Vendor Profile Page V-12)

BUSINESS MANAGEMENT SYSTEMS, INC.
BTAS/1
Additional Product Classification: Point Access Method
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 128.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Number Installed to Date: 6
Date First Installed: September 1982
(See Vendor Profile Page V-14)

BUSINESS MANAGEMENT SYSTEMS, INC.
MAIL
Additional Product Classification: Message System
Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 128.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 4
Date First Installed: 1981
(See Vendor Profile Page V-14)

BUSINESS MANAGEMENT SYSTEMS, INC.
TSS/1
Additional Product Classification: Terminal Security
Specific Application: Secure Specific Industry: Not Industry Sensitive
System Requirements: IBM Series/1: EDX
Memory Required: 128.0K bytes
Source Language: EDL
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 30
Date First Installed: 1981
(See Vendor Profile Page V-14)

CADLINC, INC.
CIM CAM
Additional Product Classification: Graphics
Specific Application: Interactive Graphics Used to Create Geometrics, Generate Machine Data for 2-to-2 1/4 Axis, Provide Manufacturing Documentation
System Requirements: CIM Station: Unix
Source Language: Fortran
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $35,000
Date First Installed: 1971
(See Vendor Profile Page V-15)

CALIFORNIA SOFTWARE PRODUCTS, INC.
BABY/34
Additional Product Classification: Conversion
Specific Application: IBM 34 to PC
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,500
Date First Installed: September 1983
(See Vendor Profile Page V-15)

CENTRAL POINT SOFTWARE, INC.
COPY II PLUS
Additional Product Classification: Back-Up Program
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $40
Number Installed to Date: 15,000
Date First Installed: June 1981
(See Vendor Profile Page V-17)

CENTRAL POINT SOFTWARE, INC.
COPY V PC
Additional Product Classification: Back-Up Program
Specific Application: Backup Programs
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 12,000
Date First Installed: January 1983

CENTRAL POINT SOFTWARE, INC.
THE FILER
Specific Application: Disk Utility System
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $20
Number Installed to Date: 50,000
Date First Installed: June 1982

COMPUTER ASSISTANCE, INC.
PASCO (PROJECT & SYSTEM CONTROL SYSTEM)
Additional Product Classification: Project Control
Specific Application: DP Project Control
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT: PC-DOS
Memory Required: 128.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $8,000
Number Installed to Date: 1
Date First Installed: June 1983
(See Vendor Profile Page V-23)

COMPUTER SERVICES, INC.
IRA MARKETER
Additional Product Classification: Marketing Tool
Specific Application: Marketing Tool for IRA-Account Demonstration
Specific Industry: Banking/Financial
System Requirements: Apple III: APPLE-DOS, IBM PC: PC-DOS
Memory Required: 96.0K bytes
Source Language: MS-DOS (IBM)
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,495
Number Installed to Date: 45
Date First Installed: July 1982
(See Vendor Profile Page V-26)

COMPUVIEW PRODUCTS - VDISK FORMATING UTILITY
Additional Product Classification: Format, Read, Write
Specific Application: Use IBM PC Production Machine for Diskette Production on 5 1/4 Inch Media
Specific Industry: Software Manufacturers
System Requirements: IBM PC: CP/M 86
Memory Required: 48.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 40
Date First Installed: November 1982
(See Vendor Profile Page V-28)

COMX CORP.
FASTRAK
Additional Product Classification: Printer Spooler
Specific Application: Printer Spooler and RAM Disk Emulator
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $99
Number Installed to Date: 3,000
Date First Installed: March 1983
(See Vendor Profile Page V-29)

CORE, INC.
DCP
Additional Product Classification: Disk Control
Specific Application: Hard Disk Control Utility
Specific Industry: Not Industry Sensitive
System Requirements: IBM 5110; IBM 5120; IBM Datamaster; IBM PC
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: No
Purchase Terms: Purchase (license); Rental; Lease
Number Installed to Date: 150
Date First Installed: 1982
(See Vendor Profile Page V-31)

DATALEX CO.
ENTRYPOINT - MICRO-BASED DATA ENTRY
Additional Product Classification: Off-Line Data Entry
Specific Application: Off-Line Data Entry
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC-XT: UCSD-P; HP 125, 200; TI Professional, 990; Sage, Nestar Plan/40
Memory Required: 128.0K bytes
Source Language: UCSD-P
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $1,450
Number Installed to Date: 100
Date First Installed: January 1982
(See Vendor Profile Page V-36)

DELTA COMPUTER SYSTEMS, INC.
APPLE/CADO TERMINAL EMULATION
Additional Product Classification: Emulation
Specific Application: Emulator
Specific Industry: Not Industry Sensitive
System Requirements: CADO: Kadol
Memory Required: 48.0K bytes
Source Language: Kadol
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $95.00
Number Installed to Date: 25
Date First Installed: November 1982
(See Vendor Profile Page V-40)

DESIGN SYSTEMS, INC.
IBMXCHG 2.5
Additional Product Classification: Data Conversion
Specific Application: Oasis to IBM Conversion
Specific Industry: Not Industry Sensitive
System Requirements: Altos: Oasis; TBC: Oasis; Onyx: Oasis; TRS-80/II: Oasis
Memory Required: 64.0K bytes
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $95
Number Installed to Date: 25
Date First Installed: April 1981
(See Vendor Profile Page V-41)

DOFT ASK COMPUTER SOFTWARE
SOFTWARE ARTHRITIC MINITEL RAM
Additional Product Classification: Speech Synthesizer
Specific Application: Software
Speech Synthesizer
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Atari: DOS
Memory Required: 32.0K bytes
Source Language: Machine
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $49 to $125
Date First Installed: August 1982
(See Vendor Profile Page V-43)

EFT COMPUTER SYSTEMS, INC.
MICROTAP
Additional Product Classification: Interface
Specific Application: Mainframe - Micro Interface
Specific Industry: Banking/Financial
System Requirements: IBM PC: PC-DOS, HOT Micro 80
Memory Required: 128.0K bytes
Source Language: Cobol
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 2
Date First Installed: 1983
(See Vendor Profile Page V-45)

EMPIRICAL RESEARCH GROUP
EM 80
Additional Product Classification: Emulator
Specific Application: Z80 Emulator
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 125
Date First Installed: 1981
(See Vendor Profile Page V-46)

FOREST SYSTEMS, CORP.
XCOPY
Additional Product Classification: Disk Back-Up Utility
Specific Application: Disk Back-Up Utility
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: CP/M
Memory Required: 1.0M bytes
Source Language: C Code
Purchase Terms: Purchase (license); Rental; Lease
Price: $100
Number Installed to Date: 300
Date First Installed: December 1982
(See Vendor Profile Page V-48)

GAYLORD BROS., INC.
OVERDUE WRITER
Additional Product Classification: Circulation
Specific Application: Circulation System
Specific Industry: Library
System Requirements: TRS-80/I, 80/II; Apple II+; CP/M
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-50)

GAYLORD BROS., INC.
VISI DEX
Additional Product Classification:

Time Management
Specific Application: Information and Time Management Program
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+
Memory Required: 48.0K bytes
Source Language: Basic
Purchase Terms: Purchase (license)
Price: $250

[illegible] SOFTWARE WORKS
AUTOMATIC SYSTEM
Specific Application: Automatic Executing of All Programs
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Basic, Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $200
Number Installed to Date: 100
Date First Installed: February 1982
(See Vendor Profile Page V-50)

[illegible] SYSTEMS
PHOSFORM
Additional Product Classification: Form Generator
Specific Application: Fill in the Form, Form Generator
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: APPLE-DOS, Apple III, MS-DOS
Source Language: Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 100
Date First Installed: February 1982
(See Vendor Profile Page V-52)

[illegible] ENTERPRISES, INC.
DS-3-CP/M EMULATION FOR CROMIX
Additional Product Classification: Enhancement
Specific Application: System Enhancement
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco: Cromix
Memory Required: 128.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $595
Number Installed to Date: 50
Date First Installed: 1982
(See Vendor Profile Page V-53)

[illegible] ENTERPRISES, INC.
CUSTOM CROMIX I/O AND UTILITIES
Specific Application: Allows Nonstandard Peripherals Under Cromix
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco
Memory Required: 128.0K bytes
Source Language: Assembly
Price: $450
Number Installed to Date: 60
Date First Installed: 1982

HOUSTON COMPUTER SERVICES, INC.
OCTACOMM/PC
Additional Product Classification: [illegible]
Specific Application: Allows TI Professional to Talk to TI 990
Specific Industry: Not Industry Sensitive
System Requirements: TI Professional: MS-DOS
Source Language: Assembler, Pascal
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 20
Date First Installed: April 1983
(See Vendor Profile Page V-55)

IMEX SYSTEMS, INC.
EPSON PRINTER INITIALIZATION PROGRAM
Additional Product Classification: Printer Initializer
Specific Application: Menu Driven Printer Setup Program
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80
Memory Required: 20.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $2,995
Number Installed to Date: 4
Date First Installed: May 1983
(See Vendor Profile Page V-56)

INTECTRA, INC.
EXSYS-EXPERT SYSTEM TUTORIAL (VERS 1)
Additional Product Classification: Artificial Intelligence
Specific Application: Expert Systems
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE, IBM PC
Memory Required: 48.0K bytes
Source Language: Lisp
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $495
Number Installed to Date: 20
Date First Installed: June 1982
(See Vendor Profile Page V-59)

JOHNSON-LAIRD, INC.
TIF
Additional Product Classification: Printer Utility
Specific Application: TI Formatter: Reads In A Word Star Document File And Prints It on the TI-810LQ Printer
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 80, CP/M+, MP/M
Source Language: BDS
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: 1983
(See Vendor Profile Page V-62)

LABORATORY TECHNOLOGIES CORP.
CROM
Additional Product Classification: Program
Specific Application: Instrument Designed to Be Used In Chromatography
Specific Industry: Scientific
System Requirements: Labtech 70: Irmx 86
Memory Required: 384.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Date First Installed: July 1983
(See Vendor Profile Page V-65)

LABORATORY TECHNOLOGIES CORP.
EFIT
Additional Product Classification: Statistics
Specific Application: Nonlinear Regression
Specific Industry: Scientific
System Requirements: Labtech 70: Irmx 86
Memory Required: 384.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 3
Date First Installed: 1980

LABORATORY TECHNOLOGIES CORP.
TAKE DATA
Additional Product Classification: Data Acquisition
Specific Application: General Purpose Analog Data Acquisition
Specific Industry: Scientific
System Requirements: Labtech 70: Irmx 86
Memory Required: 384.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 25
Date First Installed: 1982

LABORATORY TECHNOLOGIES CORP.
TNET
Additional Product Classification: Telecommunications
Specific Application: Terminal Networking Utility
Specific Industry: Not Industry Sensitive
System Requirements: Labtech 70: Irmx 86
Memory Required: 384.0K bytes
Source Language: Fortran
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 25
Date First Installed: 1982

MICRO MIXER, INC.
COPYALL
Additional Product Classification: Translator
Specific Application: Transfers Programs and Datafiles From North Star DOS Disk Format to North Star CP/M Disk Format
Specific Industry: Not Industry Sensitive
System Requirements: North Star Horizon 22
Memory Required: 48.0K bytes
Source Language: Z80
Source Code Available: No
Price: $75
Number Installed to Date: 500
Date First Installed: 1981
(See Vendor Profile Page V-74)

MICROPRO INTERNATIONAL CORP.
CALCSTAR
Additional Product Classification: Spreadsheet
Specific Application: Electronic Spreadsheet
Specific Industry: Not Industry Sensitive
System Requirements: CP/M, MS-DOS
Memory Required: 64.0K bytes
Source Language: Pascal
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Date First Installed: 1981
(See Vendor Profile Page V-74)

MICROPRO INTERNATIONAL CORP.
STARBURST
Additional Product Classification: Menu Making
Specific Application: Menu Making and Program Integrator
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 64.0K bytes
Source Language: C
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $195
Date First Installed: 1983

MICROSOFT
[illegible] MULTIPLAN
ELECTRONIC WORKSHEET
Additional Product Classification: Electronic Worksheet
Specific Application: Electronic Worksheet
Specific Industry: Not Industry Sensitive
System Requirements: Apple II: MS-DOS, Apple IIE, CP/M 80, Apple III
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-74)

MICROSOFT
[illegible] Cobb MBASIC
BOARD FOR IBM PC
Additional Product Classification: Support
Specific Application: Run Larger Programs on Your IBM Personal Computer Up to 50 Times Faster
Specific Industry: Not Industry Sensitive
System Requirements: IBM
Memory Required: 64.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)

MICROSOFT
MICROSOFT SOFTCARD PLUS SYSTEM
Additional Product Classification: Transfer
Specific Application: CP/M-80 on Your Apple, Access Thousands of Applications for CP/M-80
Specific Industry: Not Industry Sensitive
System Requirements: Apple II
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)

MICROSOFT
MICROSOFT SOFTCARD PREMIUM SYSTEM
Additional Product Classification: Support
Specific Application: Support A 60K CP/M-80 Operating System on the Apple II
Specific Industry: Not Industry Sensitive
System Requirements: Apple II
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)

MICROSOFT
MICROSOFT SOFTCARD SYSTEM
Additional Product Classification: Transfer
Specific Application: Apple to Runon CP/M-80
Specific Industry: Not Industry Sensitive
System Requirements: Apple II
Memory Required: 48.0K bytes
Source Code Available: No
Purchase Terms: Purchase (license)

MICROTECH EXPORTS, INC.
REFORMATTER CONVERSION SOFTWARE CP/M 86-IBM
Additional Product Classification: Conversion System
Specific Application: Reads, Writes and Transfers Bidirectionally Between CP/M 86 and IBM 3740
Specific Industry: Not Industry Sensitive
System Requirements: CP/M 86, MP/M 86
Memory Required: 96.0K bytes
Source Language: C, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $250
Number Installed to Date: 175
Date First Installed: March 1983
(See Vendor Profile Page V-75)

MICROTECH EXPORTS, INC.
REFORMATTER CONVERSION SOFTWARE CP/M-DEC
Additional Product Classification: Conversion System
Specific Application: Reads, Writes, and Transfers Bidirectionally Between CP/M and DEC RT-11
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 24.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $240
Number Installed to Date: 1,000
Date First Installed: 1980

MICROTECH EXPORTS, INC.
REFORMATTER CONVERSION SOFTWARE CP/M-IBM
Additional Product Classification: Conversion System
Specific Application: Reads, Writes, and Transfers Bidirectionally Between CP/M and IBM 3740
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 32.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $240
Date First Installed: 1978

MICROTECH EXPORTS, INC.
REFORMATTER CONVERSION SOFTWARE CROMIX-DEC
Additional Product Classification: Conversion
Specific Application: Reads, Writes and Transfers Bidirectionally Between Cromix and DEC RT-11
Specific Industry: Not Industry Sensitive
System Requirements: Cromemco: Cromix
Source Language: C, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Number Installed to Date: 100

MICROTECH EXPORTS, INC.
REFORMATTER CONVERSION SOFTWARE TRS-DEC
Additional Product Classification: Conversion System/W
Specific Application: Reads, Writes and Transfers Bidirectionally Between TRS and DEC RT-11
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, Model 12, 16
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $249
Number Installed to Date: 150
Date First Installed: 1982

MICROTECH EXPORTS, INC.
REFORMATTER CONVERSION SOFTWARE TRSDOS-CP/M
Additional Product Classification: Conversion System
Specific Application: Reads, Writes and Transfers Bidirectionally Between TRS-DOS and CP/M
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $249
Number Installed to Date: 500
Date First Installed: 1982

MICROTECH EXPORTS, INC.
REFORMATTER CONVERSION S/W MSDOS-IBM 3740
Additional Product Classification: Conversion System
Specific Application: Reads, Writes and Transfers Bidirectionally Between MS-DOS and IBM 3740
Specific Industry: Not Industry Sensitive
System Requirements: MS-DOS
Memory Required: 96.0K bytes
Source Language: C, Assembly
Source Code Available: No
Price: $350
Date First Installed: July 1983

MICROTECH EXPORTS, INC.
REFORMATTER CONVERSION S/W PCDOS-IBM 3740
Additional Product Classification: Conversion System
Specific Application: Reads, Writes and Transfers Bidirectionally Between PC-DOS and IBM 3740
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 96.0K bytes
Source Language: C, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $350
Date First Installed: July 1983

MUMFORD MICRO SYSTEMS
CLONC
Additional Product Classification: Tape Duplicator
Specific Application: Tape Duplicator
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $38
Date First Installed: 1979
(See Vendor Profile Page V-76)

MUMFORD MICRO SYSTEMS
DISK INDEX
Additional Product Classification: Menu
Specific Application: Disk Cataloging
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $29
Date First Installed: 1980

MUMFORD MICRO SYSTEMS
FFTASM
Additional Product Classification: Fourier Transform
Specific Application: Fast Fourier Transform
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80: TRS-DOS
Memory Required: 32.0K bytes
Source Language: Assembler
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $49
Date First Installed: 1981

MUSE SOFTWARE
VOICE
Additional Product Classification: Voice
Specific Application: Gives the Apple the Ability to Talk Individual Words. May Add Words
Specific Industry: Not Industry Sensitive
System Requirements: Apple II+: APPLE-DOS 3.2; Apple IIE: APPLE-DOS 3.3
Memory Required: 48.0K bytes
Purchase Terms: Purchase (license)
Price: $40
(See Vendor Profile Page V-78)

NEW GENERATION SYSTEMS, INC.
DISK MAKER
Additional Product Classification: Diskette Duplicator
Specific Application: Creates 5 Inch Disks for 7 Users Formats
Specific Industry: Not Industry Sensitive
System Requirements: Compupro: CP/M
Memory Required: 64.0K bytes
Source Language: C, Assembly
Purchase Terms: Purchase (license)
Price: $1,30
Date First Installed: 1983
(See Vendor Profile Page V-80)

PERMISSION SOFTWARE
SYSTEM
Additional Product Classification: Menu
Specific Application: Menu for Program Selection
Specific Industry: Not Industry Sensitive
System Requirements: Apple: APPLE DOS
Memory Required: 48.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $7
Date First Installed: 1983
(See Vendor Profile Page V-85)

PHOTON SOFTWARE
MEDIA MAGICIAN VERSION 2.0
Additional Product Classification: Disk Sector
Specific Application: Allows Direct Access Edit to Byte Level on Floppyor Hard Disk
Specific Industry: Software Houses
System Requirements: IBM PC: PC-DOS, IBM PC-XT: PC-DOS 2.0
Memory Required: 64.0K bytes
Source Language: C, Assembly 8086
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $48
Number Installed to Date: 200
Date First Installed: January 1983
(See Vendor Profile Page V-86)

PHOTON SOFTWARE
MATCHMAKER
Additional Product Classification: Interpreter
Specific Application: Interpreter of Command Text Processor for the Running on the IBM PC or Compatible
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 256.0K bytes
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 75
Date First Installed: July 1983

PHOTON SOFTWARE
MEDIA MAGICIAN
Additional Product Classification: Disk Editor
Specific Application: Full Disk Editor Runs on Any MS-DOS 2.0 System Operates on Hard or Floppy Disk
Specific Industry: Not Industry Sensitive
System Requirements: MS-DOS 2.0
Memory Required: 64.0K bytes
Source Language: C, Assembly
Source Code Available: No
Purchase Terms: Purchase (license)
Price: $69
Number Installed to Date: 50
Date First Installed: January 1983

POTTERS PROGRAMS
DISK REPAIR
Additional Product Classification: Program Recovery
Specific Application: Recovery of Crashed Programs
Specific Industry: Not Industry Sensitive
System Requirements: North Star: DOS
Memory Required: 32.0K bytes
Source Language: Basic, Assembler
Source Code Available: Yes

Purchase Terms: Purchase (license)
Price: $40
Date First Installed: 1978
(See Vendor Profile Page V-87)

POTTERS PROGRAMS
UNIVERSAL MENU
Additional Product Classification: Menu
Specific Application: Menu System
Specific Industry: Not Industry Sensitive
System Requirements: North Star
Memory Required: 32.0K bytes
Source Language: Basic, Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $15
Date First Installed: September 1978

PRISM SOFTWARE
COPY/1
Additional Product Classification: Duplicates Disks
Specific Application: Duplicates Disks
Specific Industry: Not Industry Sensitive
System Requirements: DSI:DOS
Source Language: Machine
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $20
Number Installed to Date: 50
Date First Installed: 1980
(See Vendor Profile Page V-87)

QUARK, INC.
CATALYST 1.0
Additional Product Classification: Interpreter
Specific Application: Hard Disk Boot for Apple III
System Requirements: Apple III: APPLE-DOS
Memory Required: 256.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $149
Number Installed to Date: 2,000
Date First Installed: 1981
(See Vendor Profile Page V-90)

QUARK, INC.
DISCOURSE 1.0
Additional Product Classification: Spooler
Specific Application: Software Spooler for Apple III
System Requirements: Apple III: APPLE-SOS
Memory Required: 256.0K bytes
Source Language: Assembler
Purchase Terms: Purchase (license)
Price: $125
Number Installed to Date: 2,000
Date First Installed: 1981

RACET COMPUTERS, LTD.
BASIC PROGRAM CROSS REFERENCE UTILITY
Specific Application: Cross Reference Utility
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II, Model 12, 16: TRS-DOS 2.0
Memory Required: 64.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $50
Number Installed to Date: 200
Date First Installed: 1981
(See Vendor Profile Page V-91)

RACET COMPUTERS, LTD.
BASIC LINK FACILITY -BLINK
Additional Product Classification: Basic Linker
Specific Application: Basic Link Facility
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/I, 80/II, 80/III: TRS-DOS
Memory Required: 16.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $30 to $40
Number Installed to Date: 1,000
Date First Installed: 1981

RACET COMPUTERS, LTD.
FAST BACKUP UTILITY FASTBACK VERSION 2
Additional Product Classification: Back-Up Utility
Specific Application: Back-Up Utility
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II, Model 12, 16: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $75
Number Installed to Date: 1,000
Date First Installed: 1982

RACET COMPUTERS, LTD.
SPEED-UP KIT VERSION 2.0 A & B
Additional Product Classification: Disk
Specific Application: Disk I/O Speed-Up
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II, Model 12, 16: TRS-DOS
Memory Required: 64.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $99
Number Installed to Date: 400
Date First Installed: 1983

RACET COMPUTERS, LTD.
UTILITY PACKAGE
Additional Product Classification: Disk
Specific Application: Recovers Blown Directory
Specific Industry: Not Industry Sensitive
System Requirements: TRS-80/II, Model 12, 16: TRS-DOS 2.0
Memory Required: 64.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $150
Number Installed to Date: 1,000
Date First Installed: September 1981

RAISIN ENTERPRISES, INC.
COLLECTION PACKAGE
Additional Product Classification: Data Collection
Specific Application: Data Collection System for Legal Documents
Specific Industry: Not Industry Sensitive, Legal
System Requirements: CP/M, DOS, TURBO-DOS
Memory Required: 64.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Date First Installed: 1982
(See Vendor Profile Page V-91)

REDDING GROUP, INC.
MICRO E.COM
Additional Product Classification: Mass Mailing
Specific Application: Mass Mailing
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Purchase Terms: Purchase (license)
(See Vendor Profile Page V-92)

SCHUCHARDT SOFTWARE SYSTEMS, INC.
INTEPLAN
Additional Product Classification: Time Management
Specific Application: Time Management and Recordkeeping
Specific Industry: Not Industry Sensitive
System Requirements: IBM PC: PC-DOS
Memory Required: 128.0K bytes
Source Language: Assembly
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $749
Date First Installed: September 1983
(See Vendor Profile Page V-95)

SCIENCE MANAGEMENT CORP.
THOROUGHBRED SMC BASIC
Additional Product Classification: Language Interpreter
Specific Application: Basic Language Interpreter
Specific Industry: Not Industry Sensitive
System Requirements: 16-Bit
Source Language: Basic
Price: $750
(See Vendor Profile Page V-95)

SMALL RECORDS ASSOCIATES, INC.
SMALL RECORD SYSTEM
Additional Product Classification: Emulator
Specific Industry: Not Industry Sensitive
System Requirements: Z-80 Obase: CP/M
Memory Required: 56.0K bytes
Source Language: CB 80
Source Code Available: Yes
Purchase Terms: Purchase (license)
Price: $295
Number Installed to Date: 50
Date First Installed: August 1981
(See Vendor Profile Page V-96)

SOFTWARE TOOLWORKS
SPOOL N' GO
Specific Application: Printer Spooler
Specific Industry: Not Industry Sensitive
System Requirements: CP/M
Memory Required: 48.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $30
Number Installed to Date: 500
Date First Installed: 1980
(See Vendor Profile Page V-100)

SOUTHWESTERN DATA SYSTEMS, INC.
ACE APPLESOFT COMMAND EDITOR
Additional Product Classification: Programming Utility
Specific Application: Speeds Up, Program Listing, Entry and Editing, Keyboard Micros, Hex/DEC Conversion
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $40
(See Vendor Profile Page V-101)

SOUTHWESTERN DATA SYSTEMS, INC.
AMPER-ARRAY
Additional Product Classification: Programming Utility
Specific Application: Routine Machine Library Disk, Search, Sort, Rename, Read, Write
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE: Apple II+: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $50

SOUTHWESTERN DATA SYSTEMS, INC.
AMPER-CHART
Additional Product Classification: Programming Utility
Specific Application: Creates Charts and Graphics
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $50

SOUTHWESTERN DATA SYSTEMS, INC.
AMPER-SAMPLER I
Additional Product Classification: Programming Utility
Specific Application: Routine Machine Library Disk of Machine Lang Routines to Enhance Applesoft and Basic
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $50

SOUTHWESTERN DATA SYSTEMS, INC.
AMPER-SCREEN
Additional Product Classification: Programming Utility
Specific Application: Library Disk Aids in Design and Implementation of Text Screens in Applesoft Basic
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $50

SOUTHWESTERN DATA SYSTEMS, INC.
APPLE-DOC
Additional Product Classification:

Programming Utility
Specific Application: Aids Analysis By Cross Referencing Variables, Line References, Constants
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly, Applesoft
Purchase Terms: Purchase (license)
Price: $40

SOUTHWESTERN DATA SYSTEMS, INC.
LIST MASTER
Additional Product Classification:
Programming Utility
Specific Application: Helps Applesoft Program Run Faster, Use Less Memory, Combines Lines, Names
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE. APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly, Applesoft
Purchase Terms: Purchase (license)
Price: $40

SOUTHWESTERN DATA SYSTEMS, INC.
MERLIN
Additional Product Classification:
Programming Utility
Specific Application: Micro-Assembler That Makes Assembly Language Programming Easy
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $65

SOUTHWESTERN DATA SYSTEMS, INC.
MUNCH A BUG
Specific Application: Assembly Language Debugging Tool
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE. APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $50

SOUTHWESTERN DATA SYSTEMS, INC.
PRINTOGRAPHER
Additional Product Classification:
Printing Utility
Specific Application: Printing Utility to Printout, Hires Screens on Any Graphic Printer
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, II+, IIE: APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $50

SOUTHWESTERN DATA SYSTEMS, INC.
SPEED STAR
Additional Product Classification:
Programming Utility
Specific Application: Applesoft Compiler Converts Programs to 6502 Machine Language
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE; Apple II+
Memory Required: 48.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $100

SOUTHWESTERN DATA SYSTEMS, INC.
THE ROUTINE MACHINE
Additional Product Classification:
Programming Utility
Specific Application: Allows Choice of Prewritten Machine Language Routines for Applesoft Programs
Specific Industry: Not Industry Sensitive
System Requirements: Apple II, IIE, II+ APPLE-DOS
Memory Required: 48.0K bytes
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $65

STELLATION TWO, INC.
INVISIBLE OPTIMIZER
Additional Product Classification:
Speed Enhancement
Specific Application: Processing and I/O Speed Enhancement
Specific Industry: Not Industry Sensitive
System Requirements: Apple IIE, Pascal CPM
Memory Required: 48.0K bytes
Source Language: CP/M, Pascal
Purchase Terms: Purchase (license)
Price: $449
Number Installed to Date: 50
(See Vendor Profile Page V-103)

STREETER COMPUTER DEVELOPMENT, INC.
SCREEN GENERATOR
Additional Product Classification:
Screen Generator
Specific Application: Generates Screen With Code Numbers
Specific Industry: Not Industry Sensitive
System Requirements: IBM System/23. DOS
Memory Required: 64.0K bytes
Source Language: Basic
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 15
Date First Installed: June 1982
(See Vendor Profile Page V-104)

STRUCTURED SOFTWARE SYSTEMS, INC.
COMMAND FILE/MEMORY MAGE STORAGE
Additional Product Classification:
Enhancement
Specific Application: Expands Your HP 9845 to Automatic Execution of Streams of Commands Without Human Intervention.
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $1,000
Number Installed to Date: 150
Date First Installed: 1982
(See Vendor Profile Page V-104)

STRUCTURED SOFTWARE SYSTEMS, INC.
MEMORY MASS STORAGE (MMS)
Additional Product Classification:
Storage
Specific Application: Provides the Ability to Use Part of the 9845 B/C Main Memory as A Mass Storage Device
Specific Industry: Not Industry Sensitive
System Requirements: HP 9845 B/C
Source Language: Assembly
Purchase Terms: Purchase (license)
Price: $550
Number Installed to Date: 25
Date First Installed: April 1982

SUN MICROSYSTEMS, INC.
SSUN ETHERNET
Additional Product Classification:
Network Interface
Specific Application:
TCP/IP/Ethernet Network Interface
Specific Industry: Manufacturing, Engineering, Scientific
System Requirements: Sun Workstation: Unix
Purchase Terms: Purchase (license)
Price: $1,800
(See Vendor Profile Page V-104)

SUPERSOFT, INC.
DISK DOCTOR
Additional Product Classification:
Recovery Aid
Specific Application: Automatically Recovers Crashed Diskette
Specific Industry: Not Industry Sensitive
System Requirements: CP/M, CP/M 86
Memory Required: 48.0K bytes
Source Language: C
Purchase Terms: Purchase (license)
Price: $100
(See Vendor Profile Page V-104)

TCS SOFTWARE, INC.
TCS TOTAL UTILITIES
Additional Product Classification:
DBMS Utility
Specific Application: Data Base Utility
Specific Industry: Not Industry Sensitive
System Requirements: Intel Microprocessor 8080 CPM; Intel Microprocessor 8088 MS-DOS
Memory Required: 8.2M bytes
Source Language: Microsoft Basic
Purchase Terms: Purchase (license)
Number Installed to Date: 500
Date First Installed: 1982
(See Vendor Profile Page V-108)

TECHNICAL SYSTEMS CONSULTANTS, INC.
UNIFLEX TEXT PROCESSOR
Additional Product Classification:
Text Processor
Specific Application: Text Processor Under Uniflex
Specific Industry: Not Industry Sensitive
System Requirements: Motorola 6809; Motorola 6800: Uniflex; Motorola 6800: Unix
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 1,200
Date First Installed: 1981
(See Vendor Profile Page V-108)

TECHNICAL SYSTEMS CONSULTANTS, INC.
UNIFLEX ENCHANCED PRINTER SPOOLER
Additional Product Classification:
Printer Spooler
Specific Application: Enhanced Printer Spooler
System Requirements: Motorola 6809; Motorola 6800: Uniflex; Motorola 6800: Unix
Source Language: Assembler
Source Code Available: Yes
Purchase Terms: Purchase (license)
Number Installed to Date: 200
Date First Installed: 1982

TELOS COMPUTING, INC.
TELOFACTS I
Additional Product Classification:
Survey Tool
Specific Application: Assists in Taking Surveys, Evaluates Responses and Constructs Reports
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple IIE; IBM PC
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $49
Number Installed to Date: 1,200
Date First Installed: March 1983
(See Vendor Profile Page V-109)

TELOS COMPUTING, INC.
TELOFACTS II
Additional Product Classification:
Survey Tool
Specific Application: A General Survey Tool With the Ability to Weigh Different Responses and Answer Questions About Unique Ranks
Specific Industry: Not Industry Sensitive
System Requirements: Apple II; Apple IIE; Apple Pascal; IBM PC
Memory Required: 48.0K bytes
Source Language: Pascal
Purchase Terms: Purchase (license)
Price: $199
Number Installed to Date: 200
Date First Installed: March 1983

TEXAS INSTRUMENTS, INC.
SPEECH EDITOR
Additional Product Classification:
Voice Synthesizer
Specific Application: Computer Generated Speech
Specific Industry: Not Industry Sensitive
System Requirements: TI 99/4
Purchase Terms: Purchase (license)
Price: $40
(See Vendor Profile Page V-109)

TEXAS INSTRUMENTS, INC.
TEXT-TO-SPEECH (ENGLISH)
Additional Product Classification:
Voice Synthesizer
Specific Application: Enables Computer to Speak
Specific Industry: Not Industry Sensitive
System Requirements: TI 99/4
Purchase Terms: Purchase (license)
Price: $30

Applications Development Systems

A68K	$300	F-21
ABL 1	$4,000 to $6,000	F-21
ACCOLADE	$39,000	F-19
ACES - APPLICATION CICS ENVIRONMENT SYSTEM	$8,500	F-5
ADASYNCH	N/A	F-16
ADDERS PROGRAM MAPPING	$3,000 to $5,000	F-21
ADDITIONAL LANGUAGE INTERFACE	N/A	F-17
ADEPT/3000	$6,500	F-2
ADLI (AMIGOS-DL1 INTERFACE)	N/A	F-7
ADMINS/V32	$5,000 to $100,000	F-2
ADR/AUTOFLOW II-RELEASE 6	$7,800 to $7,300	F-2
ADR/COBOL	$8,800 to $10,500	F-3
ADR/DL	$25,500 to $31,300	F-3
ADR/IDEAL - RELEASE 1.0	$50,000 to $75,000	F-3
ADR/ROSCOE-RELEASE 5.2	$40,000 to $47,300	F-3
ADR/VOLLIE-RELEASE 3.2	$18,700 to $24,400	F-3
ADT-32	$12,000	F-16
ADVANCED DEBUGGING SYSTEM	$19,900 to $24,900	F-12
ADVANCED SYSTEM PAC	$695	F-8
ADVANCED PROGRAMMING SYSTEM - APS	$10,000	F-22
AIDE	$2,000	F-16
AIDESET	$2,500	F-25
AIM	$5,000	F-4
AIMS PLUS	$5,000 to $7,000	F-20
AIMS +PLUS	$500	F-2
ANALECT -VERSION 10.4	$10,000 to $125,000	F-20
ANY	N/A	F-12
APDL (ADVANCED PROGRAM DESIGN)	$750	F-2
APL PLUS/1000 SYSTEM S/W PRODUCTS	$60,000	F-26
APL PLUS/1140 SYSTEM	$70,000	F-26
APL PLUS/1280 SYSTEM	$70,000	F-26
APPLICATION	$15,000 to $20,000	F-12
APPLICATIONS GENERATOR-AG	$7,000	F-2
APPLICATION SCREEN PAINTER	$2,200	F-24
APPLICATION DEVELOPMENT SYSTEM/BATCH	$20,000	F-7
APPLICATION DEVELOPMENT SYSTEM/ONLINE	$40,000	F-7
ASI CROSS REFERENCE SYSTEM	$195	F-3
ASIST	$300	F-4
ASSEMBLER TO COBOL	N/A	F-8
ASTRA.GEN	$5,000	F-25
AUD-F REV 1.0	$995	F-7
AUDIT PAK II	$6,000	F-7
AUDITEC	N/A	F-4
AUDITOR	$16,000	F-13
AUDOCODER TO COBOL	N/A	F-8
AUTOMATIC DOCUMENTATION FACILITY	$6,500	F-3
AUTOMATIC INFORMATION MGMT SYSTEM	$7,500	F-2
AVID	N/A	F-21
BASXREF	$39	F-5
BIM-OMNI-FULL SCREEN EDITOR - V	$9,500	F-4
BLX	$95	F-21
C-LANGUAGE PROGRAMMER INTERFACE	N/A	F-20
CA-EZTEST CICS	$12,500 to $17,500	F-5
CA-OPTIMIZER	$15,000 to $32,500	F-6
CA-VTERM	N/A	F-6
CADAT-COMPUTER AIDED DESIGN AND TEST	$75,000	F-24
CALIFORNIA 10 PAK	$100	F-4
CALL COPY CROSS REFERENCE LISTING	$550	F-24
CDB	N/A	F-27
CHECK-OUT	N/A	F-21
CICI PRINT FACILITY	N/A	F-34
CICS DB	$15,000	F-28
CICS DUMP DISPLAY FACILITY	$2,500	F-15
CICS QUEVE COMMAND	$2,500	F-15
CICS SCREEN DESIGN AID	$13,500	F-15
CICS SPOOL DISPLAY/PRINT	$5,880	F-15
CIS SYSTEM LIBRARY	$4,800 to $12,000	F-6
CL/1	$5,000	F-22
CMC COBOL CONVERTER	$4,000	F-5
CMC DATA SHARE EDIT PROGRAM	$800	F-5
CMC FLOW CHART GENERATOR	$950	F-5
COBBLER	$9,500	F-8
COBOL DOCUMENTER A	$7,000	F-22
COBOL INTERFACE DOCUMENTER	$7,000	F-22
COBOL LANGUAGE ANALYZER/SOURCE SYSTEM	$6,000	F-27
COBOL LIBRARY OF PREPROCESSORS	$4,500	F-22
COBOL OPTIMIZATION INSTRUMENTERS	$7,000	F-22
COBOL PROGRAM GENERATOR	N/A	F-8
COBOL RX	$7,500	F-22
COBOL STRUCTURIZER	$8,500	F-23
COBOL TESTING INSTRUMENTERS	$7,000	F-23
COBOL TO COBOL	N/A	F-8
COBOL TRACING INSTRUMENTERS	$7,000	F-23
COBOL-AID	$5,000 to $7,000	F-6
COBOL 74 CODE GENERATOR RELEASE 6	N/A	F-24
CODE GENERATOR	N/A	F-26
COGEN	$950 to $7,500	F-4
COGEN	$45,000	F-16
COM/GEN	$795 to $1,595	F-5
COMMAND LINE EDITOR	$1,050	F-2
COMMUNICATIONS DEVELOPMENT TOOLS	$13,000	F-5
COMPAREX	$4,000 to $8,000	F-24
COMPAK 1	$450	F-16
COMPILE/PLUS	$150	F-21
COMPUTAMATIC TERMINAL	$300	F-4
CONTEMPORY APPLICATIONS OF OPTICAL BAR CODE	$500	F-19
CONTROL	$10,500	F-16
COPYMACS	$2,000	F-17
CORE IMAGE COMPARE PROGRAM	$1,000	F-7
CORTEX APPLICATION ACCELERATOR	$15,000	F-7
CORVET	$95,000	F-2
CPG COMMUNICATIONS PROGRAM GENERATION	$27,000	F-2
CRJE-EX	N/A	F-13
CROSSMACS	$2,000	F-17
CRT-VTOS DISPLAY	$100	F-16
CYX-ER ERROR REPORTING FUNCTIONS	$1,300 to $2,000	F-7
DASYS	$3,200 to $4,950	F-24
DATA BASE - PLUS	N/A	F-27
DATA DESIGNER RELEASE 2.6	$35,000	F-6
DATA BASE/30	$1,400	F-13
DATABASIC UTILITY SYSTEM	$13,500 to $23,500	F-6
DATAMACS	$14,000 to $20,000	F-17
DATARYTE	N/A	F-12
DBI-2	$595 to $2,000	F-6
DBI-3	$595 to $2,000	F-6
DBI-3	$595 to $2,000	F-6
DCD II	N/A	F-6
DIAGRAPHERS FOR DATA PROCESSING	$9,500	F-2
DIALIS	N/A	F-16
DISPRINT	$250	F-22
DOC SESSION DOCUMENTOR/TERMINAL EXPANDER	$600	F-5
DOCU/MANAGER DM400	N/A	F-2
DOCU-MINT	$850	F-4
DOC-USS/34	$440	F-27
DOCU/TEXT-200 RELEASE 4.0	$28,500	F-9
DOCUMENTOR	$3,000	F-2
DOCUMENTOR DATA SYSTEM	$600	F-30
DOCUTEXT	$1,250	F-24
DO KEY	N/A	F-25
*DOKTOR AUTOMATIC COBOL PROGRAM	$6,995	F-5
DOS/ALC TO OS/ALC	N/A	F-8
DOS-USS/30	$560	F-27
DOSSIER	$3,650	F-6
DPL	$39,000 to $62,000	F-19
DW&A/STEPSAVER	N/A	F-8
DYNAMIC DATASET ALLOCATER	$500	F-5
EASY ENTRY FORMS MANAGEMENT/DATA ENTRY	$4,400	F-3
EASY MENU	$1,500 to $2,000	F-34
EASY5	N/A	F-4
EASYCODER TO COBOL	N/A	F-9
EASYSAVE	$500	F-2
EMACS - REAL TIME DISPLAY EDITOR	$4,000	F-30
ENTRY 1000	N/A	F-12
ESCAPE	$10,000	F-24

ESCAPE 24	$10,000	F-6
EXCHECK	$3,900	F-3
EXM	$995	F-13
EXTEND	$5,000	F-19
EZ-PROG APPLICATION GENERATOR	$2,400	F-19
FACETS	$1,500	F-6
FAST	NA	F-4
FAST PROGRAMMING	$5,000	F-20
FASTFORM	$11,000	F-20
FDV/CC - FORMS SERVER	$13,000	F-22
FILE MAINTENANCE PROGRAM GENERATOR	$500	F-4
FILE MANAGEMENT SYSTEM - FMS	$3,995	F-6
FILE DISPLAY/UPDATE	$100	F-18
FINANCIAL INFORMATION ACCESS SYSTEM	NA	F-20
FINANCIAL TICKER	$5,000	F-20
FIRES	$15,950	F-18
FOCUS	$15,000	F-3
FORMS	NA	F-22
FORMS MANAGEMENT	$3,000	F-20
FORMS MANAGEMENT SYSTEM (FMS)	$4,000	F-20
FORMULA II	$995	F-6
FORTRAN AUDITOR	$16,000	F-23
FORTRAN DOCUMENTER A	$7,000	F-23
FORTRAN FORMATTER	$3,500	F-23
FORTRAN INTERFACE DOCUMENTER	$7,000	F-23
FORTRAN LIBRARY OF PREPROCESSORS	$4,500	F-23
FORTRAN MEMORY MANAGERS LIBRARY	$8,500	F-23
FORTRAN OPTIMIZATION INSTRUMENT	$7,000	F-23
FORTRAN OUTPUT EXPEDITER	NA	F-17
FORTRAN PRODUCTIVITY LIBRARY	$12,500	F-23
FORTRAN STRUCTURED LANGUAGE	$20,000	F-23
FORTRAN STRUCTURIZER	$8,500	F-23
FORTRAN TESTING INSTRUMENTER	$7,000	F-23
FORTRAN X/Y TRANSPORTATION PACKAGE	NA	F-23
FSM	$6,000 to $12,000	F-18
FSO	NA	F-27
FULL-SCREEN EDIT PLUS-FSE	NA	F-3
FUR FORTRAN UTILITY SYSTEM	$4,000 to $21,000	F-6
G SYSTEM	$6,500 to $25,000	F-6
GENERAL UTILITY PACKAGE	NA	F-20
GEOBUILD	$1,500	F-13
GEOSET	$7,500	F-12
GIFTKLEAN	$495	F-15
GUEST	$22,500 to $27,500	F-21
HAWKEYE	$3,500 to $5,000	F-4
HEALTH CENTER INFORMATION SYSTEM	$30,000	F-21
HELP-HAWAII EDIT AND LIBRARY SYSTEM	$11,000	F-6
HIBOL APPLICATION DEVELOPMENT	NA	F-9
HISTORIAN PLUS SOFTEARE CONTROL S	$6,750	F-19
HOST COMMUNICATION UTILITY FOR DEC VAX	$500	F-16
HOST COMMUNICATION UTILITY FOR IBM	NA	F-16
ICCFCNVT	$1,500	F-6
IDEA 160/1200	$30,000 to $40,000	F-16
IDEA 1100/1300	$15,000 to $28,000	F-13
IDEA 1400	$8,000 to $15,000	F-11
IDMS	$550	F-20
IFPS OPTIMUM	$2,500	F-12
ILLUSION	$19,000	F-20
IM EPROMMER	$550	F-15
IM SYSTEM INTEGRATOR	$1,650	F-15
IMP	$250	F-20
IMPACT-4	$29,500	F-4
IMR DATA BASE SUPPORT FACILITY	$6,500	F-16
IMR DOCUMENTATION SYSTEM	$14,700	F-3
IMS SCREEN DESIGN AID SDA	$15,000	F-16
IMS TERMINAL OPTIMIZER	$6,500	F-15
INDEX PLUS	$10,500	F-7
INDEXED ACCESS METHOD	$2,500	F-19
INPUT STACK PROCESSOR ISP	$3,300	F-16
INSPECTION OF CALL	$6,500	F-6
INTERACT	$30,000	F-7
INTERACTIVE COBOL PROGRAM GENERATOR	$1,450	F-15
INTERACTIVE DEBUG SYSTEM IDS-RELEASE 1	NA	F-15
INTERACTIVE VIDEO	$1,500	F-15
INTERC	$4,995	F-11
INTERFACE DOCUMENTER	$7,000	F-13
INTERPAS	$4,995	F-16
INTER/PRO	$3,200	F-24
INTERTEST RELEASE 2.3	$24,000	F-19
IPG	$2,000	F-3
ISAM GENERATOR	$4,000	F-9
ISAM 70	$99	F-24
ISAP INTERACTIVE SCHEMATIC/ASSEMBLY	$4,000	F-3
ISG-INTERACTIVE SYSTEM GENERATOR	$5,000	F-19
ISP-INFORMATION SYSTEM PLANNING	NA	F-3
ISP-INTERSYSTEM SPOOL PROCESOR	NA	F-27
IVS TEXT EDITORS RELEASE 1	NA	F-19
JCL MANAGEMENT SYSTEM	$6,500	F-3
JCL WRITER	$1,050	F-24
JCLFLOW DOCUMENTATION SYSTEM	$7,500	F-6
JCLMACS	$3,500	F-17
JCLSAFE	$12,500	F-22
K BASIC	$120,005	F-28
KEYPR	NA	F-3
KEYWORD SCANNER	$500	F-6
KISS (KEEP IT SIMPLE & STANDARDIZE)	$100	F-24
KOPE-COBOL ONLINE PROGRAMMING ENVIORNMENT	$15,000	F-16
LIBRARY OF PREPROCESSORS	$4,500	F-13
LMS-2	NA	F-6
LOGICAL FILE COMPARE	$4,500	F-21
LOGICCHAIN	NA	F-3
LOOKUP	$12,500 to $3,000	F-9
MAINDEBUG	$660 to $7,000	F-28
MANTIS	NA	F-5
MART	$750	F-28
MEMORY MANAGERS LIBRARY	$1,250	F-13
MENTOR SPICE -MSPICE	$4,000 to $10,000	F-16
MENU/E	$395	F-3
MENUPRO	NA	F-4
MENUS	NA	F-22
METHODOLOGICAL MATALITY PACKAGE	NA	F-20
MFAST - COBOL MAP GENERATOR	$6,250 to $7,950	F-13
MICROADE	$10,000	F-4
MIMS	NA	F-12
MIMS ADF APPLICATION DEVELOPMENT FACILITY	NA	F-12
MIND-MODULAR INTERACTIVE NETWORK	NA	F-6
MIRAC APPLICATIONS GENERATOR	$450	F-9
MIS/OL	$28,000 to $35,000	F-20
MODEL/MS	NA	F-12
MODEL 3600 DFG/LINK -DIGITAL PROGRAM G	$10,000	F-17
MP2	$850	F-25
MP-4-8-9	$150 to $400	F-21
MPM 1.0	$150 to $750	F-21
MSP 01	$40	F-19
NATURAL	$40,000	F-24
NETWORK DATAMOVER-MVS	$10,000	F-27
NEXAID	$1,000	F-19
NUBAG	NA	F-21
O-W-L	$20,000	F-20
OLPDT ONLINE PROGRAM DEVELOPMENT	$9,500	F-4
ON-LINE NO CODE APPLICATION GENERATOR	$85,000	F-7
ONLINE LINE PROGRAM DEVELOPMENT	$8,500	F-11
ONLINE SOURCE ENTRY/DOCUMENTATION	$495	F-13
ONLINE QUERY - OLQ	$2,500	F-7
OPTIMIZING INSTRUMENTER	$7,000	F-13
OUTPUT STACK PROCESSOR OSP	$3,300	F-16
PAC 1	NA	F-3
PAL DATA MANAGER	$3,500	F-12
PASCAL DEVELOPMENT SYSTEM	$995 to $2,500	F-27
PATH34	$395	F-9
PATHFINDER	$4,000	F-12
PC COBER	$450	F-19
PDVR 33 REV 1.1	$1,800	F-7
PL-1 TO COBOL	NA	F-6
PLINK II	$350	F-20
PMC2 PROJECT MANAGEMENT COMMAND	$30,000	F-19
PMO	$6,000 to $12,500	F-9
POLYFORTH II	$300 to $3,200	F-12
POWER	$8,995	F-21
PRINT UTILITY	$1,000	F-6
PRINT-FILE COMPARE	$6,000	F-9
PRO	NA	F-12
PRO-GENY	$40	F-19
PRO/GRAMMAR	$25,000 to $35,000	F-20
PROC/MACH 1	$850	F-6
PROCEDURE EXPLODER	$100	F-19
PROCEDURE/FILE CROSS REFERENCE	$100	F-19
PROCMAN	NA	F-27

PRODUCTIVITY LIBRARY	$12,500	F-13
PRODUCTIVITY PLUS	$1,500	F-15
PROGRAM DEVELOPMENT ENVIRONMENT	$750	F-16
PROGRAMERS TOOL	N/A	F-17
PROGRAMMER	$199	F-15
PROGRAMMER UTILITY	$500	F-13
PROGRESS ADS	$17,000 to $23,000	F-20
PROGRESSIVE'S /ADS	$17,000 to $23,000	F-21
PROMACS	$15,000 to $18,000	F-18
PROXREF	$7,500	F-8
PROXY	N/A	F-12
PS1B, PS2B	$6,000	F-21
PWS/VSE	N/A	F-19
PWS/VSE ADVANCED FUNCTIONS	$9,500	F-19
PXS	$1,250 to $4,700	F-13
QCOPY UTILITIES	$100	F-18
QDI	$3,500	F-21
QUICK	$4,000	F-9
QUICKSCAN	$495	F-15
RASOL	N/A	F-17
RBS BUILD PROGRAM BUILDERS FOR MNU'S	$6,000	F-21
RCM (RESPONSIVE DATA MANAGER)	$2,495	F-16
RECFLOW	$3,000	F-27
REFORMAT	N/A	F-9
REMDOC	$600	F-21
REPORT ASSISTS	$200	F-5
REPORT WRITER SIMULATOR	$4,000	F-9
RESOURCE MANAGEMENT (AND AUDIT) SYSTEM	$6,500	F-3
RESPOND	$2,250	F-17
REV 1.0 TASP TRANSPARENT ACTIVITY	$1,200	F-7
REX-II	$7,000	F-12
RFX-11 VERSION II (FILE TRANSFER UTILITY)	$675	F-22
RMS/MPG	$5,750 to $15,000	F-15
RMS/MPG-PLUS	$5,750	F-15
RPG TO COBOL	N/A	F-8
RPG TO PL/1	N/A	F-8
RPGII CROSS REFERENCE	$100	F-18
RWD	N/A	F-25
RXVP 80	$15,000	F-12
SAL 11 VERSION 3 STRUCTURED ASSEMBLY	$1,295	F-12
SBS	$12,000 to $35,000	F-4
SCADA SOFTWARE PRODUCT: RCS7	$15,000 to $50,000	F-22
SCAN/370	N/A	F-13
SCOPE-FORMS MANAGEMENT UTILITY	$8,500	F-16
SCREENS MADE EASY SME	$6,000	F-4
SCREEN-TEX	$3,500	F-24
SCREEN/1000 REV 2.2	$1,800	F-7
SCRNIO/11	$3,500	F-20
SCS/RCS	$1,200	F-8
SDM/70	N/A	F-3
SDM AIDS	$500	F-27
SDP	$10,000	F-20
SDS	$25,000	F-20
SEARCH 34	$350	F-13
SHARE/1000 REV 2201	$1,500	F-7
SI FRONT END	$5,000	F-26
SIR/HOST	$4,000	F-22
SMS (SIMPLIFIED MAPPING SUPPORT)	$4,500	F-5
SODS	$4,000	F-16
SOFTOOL COBOL PROGRAMMING ENVIRONMENT	$33,500	F-23
SOFTOOL FORTRAN PROGRAMMING ENVIRONMENT	$20,000	F-23
SOFTOOL TUTORIALS LIBRARY	N/A	F-24
SOFTWARE CONTROL	N/A	F-16
SOFTWARE MACHINE	$2,000 to $25,000	F-7
SOFTWARE REVISION TELECOMM. SET	$200	F-6
SORT80	$99	F-24
SOURCE TOOLS	$3,600 to $4,020	F-20
SOURCE/FILE CROSS REFERENCE	$100	F-18
SOURCE/PROCEDURE CONTROL SYSTEM	$300	F-8
SPEED II APPLICATIONS GENERATOR UTILITY	N/A	F-27
SPEED TIP I APPLICATION GENERATOR UTILITY	N/A	F-27
SPELL/1000 REV 2.1	$1,000	F-7
SPROUT - FILE CONVERTER	$3,900	F-13
SQG STRUCTURED SOLUTION GENERATOR	$10,000	F-22
STANFAST	$3,000	F-12
STRING 70	$99	F-24
STRUCTURIZER	$8,500	F-13
STRUCTURED SDM/70	N/A	F-4
SUPER BUG	$5,000	F-26
SUPERZAP/36	$300	F-9
SUPPORT FUNCTIONS	$2,500	F-19
SYDOC	N/A	F-26
SYMBOLIC DEBUGGER	$2,500	F-13
SYSTEM - 80	$995	F-20
SYSTEM DOCUMENTATION AND ANALYSIS	$250	F-4
SYSTEM STATUS AND HISTORY DISPLAY	$200	F-18
SYSTEMACS	$22,500	F-17
SYSTEM/34 TO SYSTEM/36 CONVERSION AID	$1,200	F-17
TABEL BASE	$25,000	F-26
TABLE ACCESS METHOD	$500	F-6
TAS	N/A	F-27
TELESOFT PROGRAMMING SUPPORT	N/A	F-26
TERMINAL MANAGER	$3,800	F-15
TERMINAL MANAGER REV 8301	$3,800	F-7
TEST/IMS	$16,000	F-6
TESTING INSTRUMENTER	$7,000	F-13
TESTING MANAGEMENT HANDBOOK	$4,000	F-2
TESTMANAGER	N/A	F-18
TEXT EDITOR FOR BASIC PROGRAM	$195	F-17
TEXT TRANSLATOR GENERATOR PROGRAM	$1,000	F-5
TRACING INSTRUMENTER	$7,000	F-13
THE BUG BYTER	$9,500	F-8
THE CORTEX APPLICATION TRIO (CORTEX)	$495	F-7
THE MENU FACILITY	$495	F-17
THE MENU FACILITY	$495	F-17
THE MESSAGE MANAGER	$600	F-5
THE NPL INFORMATION MANAGEMENT SYSTEM	$950	F-9
THE STANDARD	N/A	F-5
THOROUGHBRED IDOL	$595	F-22
TONE 3	N/A	F-27
TONE 4	N/A	F-27
TOOL KIT SYSTEM	N/A	F-26
TOPICS	$2,500	F-24
TPDDSR-MUX	$750	F-15
TRACER FORTRAN DEBUGGER	$3,950	F-16
TRACING INSTRUMENTER	$7,000	F-13
TRACMACS	$15,000 to $20,000	F-17
TRANS - IV	N/A	F-15
TRANSACTION PROCESSING FACILITY	$12,000	F-26
TSO SUPERSET UTILITIES	N/A	F-3
TSPRINT	N/A	F-27
UFO	$24,000 to $60,000	F-20
UNPROTECT	N/A	F-25
UPARS	$80,000 to $100,000	F-9
USE.IT	$15,000	F-13
USER-II	$14,500 to $22,000	F-19
USER LIBRARY ANALYSIS	$95	F-3
UTILITY PROGRAM GENERATOR (UPG) I	$2,975	F-24
VBUG	N/A	F-13
VICS	$5,000	F-15
VIRTUAL COBOL	$1,000 to $5,000	F-2
VISTA - SCREEN FORMATTER AND EDITOR	$9,700	F-13
VM	$8,500	F-16
VSAM-ASSIT	$4,950	F-25
VSAM COBOL I-O LOGIC ERROR DETECTION	$3,000	F-25
W/P WORK IN PROCESS REV 8302	$7,500	F-7
WAAPDSUT	N/A	F-12
WATSAN-PLUS	N/A	F-6
WHODO	N/A	F-21
WILBUR	N/A	F-18
WORK STATION UTILITY GENERATOR	$345	F-3
X.DOT:X.25	$30,000	F-29
X.DOT FOR UNIX	$40,000	F-29
XDS-88 FOR VAX/VMS	$8,500	F-17
XI CORE CROSS DEVELOPMENT PACKAGE	$2,900	F-21
XOS-86 FOR IBM/VM-CMS	$8,500	F-17

Data Dictionaries

ADR/DATADICTIONARY-RELEASE 2	$28,100 to $32,600	F-40
DATA CATALOG II	$13,500	F-40
DATAMANAGER	NA	F-40
DATAPULSE	NA	F-40
DCS	NA	F-40
DESIGN MANAGER	NA	F-40
DICTIONARY/204	NA	F-40
EDXREF CROSS REFERENCE DICTIONARY	$95	F-40
INFORMATION DIRECTORY	NA	F-40
INTEGRATED DATA DICTIONARY-IDD	$35,000	F-40
INTERACTIVE DATA DICTIONARY	NA	F-40
LEGAL RESEARCH	NA	F-41
MASSNET DATA EXCHANGE- MDX	NA	F-40
MOST COMPUTER SYSTEM	$35,000 to $75,000	F-40
NCR-DMS/DIRECTORY	NA	F-40
PAL DATA CONTROLLER	$3,500	F-40
PRIDE-ASDM (AUTOMATED SYSTEMS DESIGN	$80,000	F-40
PROJECT MANAGER	$8,000	F-40
SARA/SARAPC	$11,800	F-40
SOURCEMANAGER	NA	F-40
VTOC	$7,500	F-40

Data/File Management

ACCESS	$1,500	F-43
ACCESS	$1,500	F-66
ACCUCHECK	$2,400	F-43
ADAS	$6,525	F-58
ADMINISTRATION CONTROL SYSTEM	$750	F-57
ADR/DATAENTRY-RELEASE 2.4	$12,700 to $10,300	F-43
AFM/AP-A FILE MANAGEMENT SYSTEM	$14,500	F-60
ALIS	NA	F-47
ALPHALIST	$3,550	F-50
ARBAT SERIES 700 INTERGRATION SYSTEM	NA	F-43
ASI-ST	$20,000 to $40,000	F-43
ASTALK	$295	F-52
ATTENDANCE REPORTING	$2,000	F-43
AUDIT ANALYZER	$14,000	F-57
AUTOPOLL/1	$12,500	F-50
BARTER	$1,000	F-48
BASE MAP MODULE	$6,500	F-53
BASYS	NA	F-48
BCS	$1,800	F-48
BMAS 2	$22,500	F-58
BOWLING MANAGEMENT SYSTEM	$5,000	F-57
BRS-SEARCH (MAINFRAME VERSION)	$60,000	F-43
BRS-SEARCH (MINI-MICRO VERSION)	$5,000	F-43
C-S COMP	$1,800	F-46
CA-UNIVERSE	$85,000 to $102,000	F-44
CAPS 500	$25,000	F-44
CARD SET	$1,800	F-50
CARDIT	NA	F-57
CDS 2000	NA	F-44
CENTRALIZED TICKET INVESTIGATING PACKAGE	NA	F-48
CHANGE AND CONFIGURATION CONTROL	$30,000	F-66
CICS DATA ENTRY/DATA SEPARATION SYSTEM	$13,000	F-52
COBOLCRAFT REDIFILE	$495	F-44
COM-CIRC	NA	F-46
COMMON FILE SYSTEM	NA	F-49
COMPRESS	$3,000	F-54
CONDOR MULTIKEY SEARCH SYSTEM	NA	F-46
CONTINUING PROPERTY RECORDS SYSTEM	$1,600	F-54
COPIER MACHINE DEALERS	$5,000	F-44
COUNTRY CLUB	NA	F-49
CREAM	$400	F-46
CS-COMP	$1,800	F-46
CUFF'S -66	$35,000	F-47
CUSTOMER ACCOUNT PROFITABILITY SYSTEM	NA	F-46
CUSTOMER MAILING LIST	NA	F-47
CUSTOMER SUPPORT SYSTEM	$2,000 to $3,000	F-44
CYX-PM FILE MAINENANCE	$4,000	F-47
CYX-TF TEXT FILING FUNCTIONS	$1,300	F-47
DART (DATA ACCESS & REPORTING TECHNIQUE	$40,000	F-54
DATA PLAZE	$100	F-66
DATA POOL	$10 to $20,000	F-50
DATA ROUTINES	NA	F-48
DATA CATALOGUE 2	$13,500	F-57
DATAFAX	$199 to $299	F-52
DATAKEYPER (DK-300)	NA	F-46
DATABASE FILE MANAGEMENT SYSTEM	NA	F-47
DATAMOD UTILITIES	$750	F-58
DBU	NA	F-66
THE DATA ANALYZER	$14,000	F-58
DELTA/LOGO REV 1.8	$995	F-46
DEMAND 92	$12,000 to $19,500	F-53
DERIS DISTRIBUTED CUSTOMER RECORD INFO	$100,000	F-46
DES	$5,000 to $8,000	F-52
DIREX	$1,500	F-66
DISK LOGGING SUPPORT SYSTEM	$10,500	F-54
DISKE -ELEVEN	$500	F-46
DOC 3	$2,000	F-46
DOCU/MASTER	NA	F-58
DOCULIBTM	$32,200	F-46
DOCUMENT INSIGHT	$15,000	F-52
DOS JARS-VM INTERFACE OPTION	$2,000	F-58
DOS JARS-VSE/ICCF INTERFACE OPTION	$2,000	F-58
DRD (DOCTOR DISK)	$2,900	F-46
DSPOOLER	$1,750	F-43
DTS POLING	NA	F-58
DUE DATE MONITORING	$200 to $6,200	F-52
DYNAMIC FILE VERITICATION ALLOCATION (CIS)	$4,500	F-49
E-Z-DEX	$750	F-53
EASYTRIEVE	NA	F-53
ENTER/SCAN	NA	F-47
ENTRY POINT SYSTEM	NA	F-47
EQUAL	NA	F-52
ESP EMPLOYEE SCHEDULE PACKAGE	$2,300	F-48
FABS II	$150	F-44
FACETS	$15,000	F-66
FILE MASTER	$1,500	F-53
FILE MODIFICATION	$495	F-52
FILE REFERENCE UTILITY	NA	F-54
FILE TRANSFER FACILITY	NA	F-57
FILE UTILITY	$1,500	F-46
FILE-AID	NA	F-46
FILER-FILE MANAGEMENT PROGRAM	$49	F-44
FINAL FORM	$295	F-57
FMS-11 (FORMS MANAGEMENT SYSTEM)	$1,240	F-48
FORMS ON-LINE RESOURCE MANAGEMENT	NA	F-54
FSI-FILE SYSTEM INTERFACE	$300 to $1,750	F-57
FUEL DELIVERY SYSTEM	$2,400	F-52
GEOFILE	$500 to $20,000	F-49
GSA	NA	F-54
HISTORY FILE ANALYSIS	$300	F-48
IBM CHANNEL CONTROL UNIT EMULATOR	$5,000	F-47
ICS 1000	NA	F-44
IFM	NA	F-60
ILCON	$8,000	F-54
INFOMANAGER	$400	F-57
INFORMIXTM	$300 to $1,600	F-54
INGRES	NA	F-53
INSIGHT II	$7,500	F-46

INSIGHT E-L	$2,800	F-46
INTACT INTEGRATED APPLICATION CONTROL	$3,000	F-43
INTELLECT	$49,500 to $69,500	F-43
INTERACTIVE LINK OPTION FOR APM/AR	$1,750	F-50
IRMA INTERFACE SOFTWARE	$1,195	F-57
ISA/EXTRACTO	N/A	F-50
ISA/ON LINE ALPHA SYSTEM (OAS)	N/A	F-50
ISAR	$39	F-43
JCL WTR - THE SYSOUT RETRIEVAL	$7,500	F-43
JOB MANAGER PROGRAMMER	$10,000	F-47
KEY/MASTER	$23,500	F-58
KEYED ACCESS OPTION FOR APM/AP	$3,500	F-50
KFILE	N/A	F-56
KISS - KEYWORD INDEX SEARCH SYSTEM	$3,000	F-49
KLIST	N/A	F-56
KRIS KEYBOARD RETRIEVAL INFORMATION SYSTEM	$5,000	F-50
KSAM 1000 KEYED SEQUENTIAL ACCESS	$1,500	F-44
LEASE RECORDS SYSTEM	$12,500	F-57
LEGAL TIME & BILLING	$3,000	F-44
LIBFIX	$500	F-48
LIST FILE UTILITY	$100	F-52
LISTER 2000	N/A	F-46
LOCK AND KEY DIRECTORY	$500	F-44
LOCK/II	$1,250	F-53
LOOKAT	$4,000 to $6,000	F-48
MAGIC	$2,200	F-44
MC	$750	F-44
MAIL TRACK	$65	F-57
MAILING LIST	$750	F-53
MAPICS CUSTOMER INQUIRY SYSTEM	$750	F-53
MARKETING MANAGEMENT SYSTEM	$1,000 to $3,000	F-52
MASTER NAME INDEX	$1,500	F-44
MEETING TRAK	$10,000	F-53
MENU SYSTEM	$2,500	F-53
MESSAGE DISTRIBUTION/COLLECTION SYSTEM	$28,000	F52-
MHF/JTP/FTP	N/A	F-53
MICROLINK	$2,500	F-52
MIDASPLUS	$5,500	F-54
MIL-STD-1398 LSAR INTERFACE	$35,000	F-57
MRU - MESSAGE ROUTING UTILITY	$3,000	F-50
N5500	$28,000	F-53
NAME AND ADDRESS	$400	F-57
NDB/NDD/NDQ	N/A	F-53
NE MAC NETWORK NIGHT ADMINISTRATION CENTER	N/A	F-46
NETMAN	N/A	F-43
NETWORK DATAMOVER-SERIES/1	N/A	F-57
NOTES	$250	F-47
OBS-FTP	$4,000	F-53
OCTACOMM/LINK	$1,000	F-49
OMNIFILE	$375	F-57
OS JARS-MCI/V3 INTERFACE OPTION	$3,000	F-50
OS JARS-TSO INTERFACE OPTION	$3,000	F-50
OS JARS-VM INTERFACE OPTION	$3,000	F-50
PAL DATA DIRECTOR	$2,000	F-49
PATHFINDER/36	$1,400	F-49
PATROLL TO PRB CROSSOVER	$1,000	F-43
PC HSAM 2.1	$325	F-49
PDS	$40	F-52
PEOPLE TRAK	$7,000	F-53
PER TROL RECORDS	N/A	F-49
PER TROL SUPPLIES	N/A	F-49
PERFORMTH	$800 to $1,600	F-54
PNET	$500	F-54
PORTUP	N/A	F-49
POS INTERFACE	$750	F-50
PRIME POWER+	$12,500	F-54
PRO-PADS	$40	F-52
PROFESSIONAL TIME AND BILLING	$3,000	F-44
PSAM	$12,325	F-58
THE PUBS MANAGER	$45,000 to $65,000	F-47
Q DUMP/Q LOAD	$750	F-57
QUERY	$5,000	F-58
REAL-TIME PROCESSING AND REPORTING	N/A	F-54
RECORD-ELEVEN	$250	F-48
REDSHAW COMPREHENSIVE INSURANCE AGENCY	N/A	F-54
REMO TT	$375 to $700	F-52
REORG	$2,000	F-56
REPORT DISTRIBUTOR	$10,000	F-57
RETAIL PRICE CHANGE	N/A	F-44
REV 1.9 SCONS	$5,000	F-48
RIFLE	$2,250	F-58
ROUTE DISTRIBUTION SYSTEMS	N/A	F-44
SAFE/II	N/A	F-53
SAM (SYSTEM FOR ARCHIVAL MANAGEMENT)	$2,500	F-47
SCAN THRIFT INDUSTRY ANALYSIS	N/A	F-48
SCANPRT	$3,000	F-48
SCRIBE 11	$50,000	F-56
SEISMAP	$150,000	F-56
SELECT	$1,500	F-48
SEND/REC	$95	F-56
SEND/RECEIVE	$3,000	F-43
SFS 3000	$18,000	F-43
SHARED VSS	N/A	F-52
SIR/FORMS	$6,000	F-56
SLIM/1	$900	F-54
SMF EXPRESS 1.03	$10,000	F-58
SOFTOOL	$80,000	F-56
SOFTWARE NORTH ARCHIVAL SYSTEM SNARC	$495	F-56
SORT-II	$410 to $1,190	F-48
SPOOLEASE	$450	F-56
SPSS/PRO	N/A	F-57
SQL DATA BASE UTILITIES	N/A	F-49
SST4	N/A	F-57
STAFF SCHEDULING	$200 to $6,200	F-52
STAPACA	N/A	F-52
STORAGE MANAGER	$10,000 to $15,000	F-52
STREAMER UTILITY	$250	F-48
TASK MASTER O'UREY	N/A	F-48
TELEFILE	$2,500	F-58
TELLAPLAN	$3,200 to $12,500	F-50
TRACE-ELEVEN	$250	F-48
TRANSFER/ACCEPT	$2,000	F-43
TRIM	$40,000	F-54
ULTRA CA/C	$300 to $1,500	F-58
UNERA	$29	F-44
UNION OFFICE AUTOMATION	$30,000	F-54
UTILITIES MODULES	$6,500	F-53
UTL	$3,000	F-53
VDM-VIKING DATA MANAGER	$2,500	F-58
VEND-11	$20,000	F-54
VIP BEVERAGE SYS	$21,000	F-58
VIRTUAL TERMINAL	$650	F-58
VISP	$15,000	F-49
VMLIB	N/A	F-56
VMTAPE	N/A	F-56
VOX	$2,000	F-43
VSAM SPACE MANAGER	$4,950 to $7,425	F-56
VSAM/CALC	$1,000	F-48
VSAM/DISPLAY	$1,500	F-48
VSAM/LIST	$1,500	F-48
VSAM-QUICK-INDEX	$2,600 to $3,000	F-56
VSELECT	$1,500	F-48
VSORT	$2,500	F-48
WARRANTY SYSTEM	$3,500 to $50,000	A-62

Financial Modeling/DSS

ABC ANALYST	$75,000	F-66
ABC FINANCIAL PLANNING AND MODELING SYS	$25,000	F-66
ABLE - A BUSINESS LANGUAGE REV 8302	$150	F-67
ACCENT R VERSION 7.30	$40,000 to $52,000	F-70
ADR/EMPIRE -VERSION 3.8	$48,000	F-66
AID	$500 to $5,000	F-70
APL INVEST	$225	F-66
ARR PLANNER	$1,500	F-66
B-CALC	$300	F-66
BEST/1 - VM	N/A	F-66
BUSINESS 3000 FINANCIAL PLANNING	$12,500	F-72
CALC/1	$1,500	F-66

CALC/34 VERSION 4	$2,500	F-73
CALCU-PLAN	$850	F-67
CALL ELECTRONIC SPREADSHEET	$830	F-72
CDIS-FINANCIAL (COMPUTER DATA INFOSYS)	NA	F-67
CIP RETAIL PLANNER	$15,000	F-71
CORPTAX	$35,000 to $45,000	F-68
COSMO-COMM SYS MODELING	$20,000	F-71
CRYSTAL	$1,560	F-70
DBLEDGER	NA	F-67
DEC AID DECISION AID SYSTEM VERSION 1	$995	F-71
DECISION SUPPORT SYSTEM	NA	F-70
DESKTOP/FINANCIAL PLANNING SYSTEM	$750 to $7,500	F-68
DIGICALC V 1.2	$4,000	F-73
DOCUMENTOR	$2,500	F-72
DSS/A	$495	F-70
DSS I	$8,000	F-68
DTRO BATCH REPORT PROGRAMS (DTRO)	NA	F-68
DTRO CICS INFO SYSTEM	$25,000	F-68
DYNAMIC MODELS-DYNAMO	$3,000 to $12,000	F-72
EASY CALC	$1	F-71
EASY PLAN	$795	F-71
ECHO CAL	NA	F-69
ECONOMIC MODELING SYSTEM (EMS	$8,000	F-72
EDC FINANCIAL MODELING	$4,950	F-68
EDC GRAPHICS IMPACT	$9,950	F-68
EDC STATISTICAL ANALYSIS	$3,930	F-68
ENERGY CONSUMPTION, SYSTEM SIMULATION	$995	F-70
ENGINEERING LIBRARY	NA	F-71
ENTRY POINT OPTIMIZER	NA	F-71
EPSILON	$3,500	F-71
EXECUTIVE DECISION SUPPORT SYSTEM	NA	F-69
EXPRESS	NA	F-69
FEROX MODELER	NA	F-69
FINANCIAL AID SYSTEM	NA	F-67
FINANCIAL ANALYSIS SYSTEM	$480 to $5,000	F-72
FINANCIAL DESK CALCULATOR	$250	F-70
FINANCIAL FORECASTING	$900	F-69
FINANCIAL MODEL	$5,000	F-68
FINANCIAL MODELING	$500	F-67
FINANCIAL MODELING	$1,500	F-72
FINANCIAL MODELING SYSTEM	NA	F-66
FINANCIAL MODELLING SYSTEM	$2,000	F-67
FINANCIAL MODELLING SYSTEM	$1,500 to $3,500	F-71
FINANCIAL PLANNER	NA	F-69
FINMOD	NA	F-70
FINPLAN FINANCIAL PLANNING AND MODELING	$1,450	F-68
FISCAL	$10,000	F-66
FISCAL PLUS	$15,000	F-68
FISCAL SIMPLE	$1,500	F-66
FLOWCALC	NA	F-69
FORECASTING, MODELING	NA	F-70
FORECAST	$10,000	F-72
FORECASTING	$2,800 to $3,900	F-67
FORECASTING, MODELING & REPORTING	NA	F-72
FORESIGHT	NA	F-69
FORESIGHT	NA	F-73
FUSION 3/34	$2,500	F-69
FUSION 3130	$4,500	F-69
GENESYS	$12,000	F-66
GEOMAP	$25,000	F-69
GRAPH-PAC	$2,000	F-67
GSM	NA	F-71
HANDLE/CALC	$320	F-70
HOTEL/MOTEL INDUSTRY SIMULATOR	$12,000 to $15,000	F-68
IBS FINANCIAL FORECASTING AND MODELING	$5,000	F-70
IDA	NA	F-72
IFPS DATASPAN	$10,000	F-68
IFPS SENTRY	$12,000	F-68
INTERACTIVE FINANCIAL PLANNING SYSTEM I	$64,000	F-68
INVESTMENT MODELING	$200 to $6,200	F-69
INVESTPAK	$200	F-70
J ENPLAN/3000	$3,000	F-67
LOGICALC	$95 to $190	F-71
LOGICALC	$190	F-72
MARKET-SHARE PROGRAM	$2,500	F-73
MASTERCALC VERSION 2	$800	F-67
MATH 1000	$450	F-67
MAXICALC	$12,000 to $15,000	F-71
MDLR VERSION 3.1	$1,500 to $5,000	F-67
MEDIA BUREAU INTERNATIONAL	NA	F-70
MEGA DSS	$3,000 to $15,000	F-72
MEGA SPACE	$25,000	F-70
MEGCALL	$15,000 to $19,000	F-70
MERLIN	NA	F-67
MILESTONE	$295	F-71
MODEL-FINANCIAL PLANNING, MODELING	$8,000	F-69
MS/CS	$3,000	F-69
MSA FORECASTING & MODELING SYSTEM	NA	F-70
MULTIPLAN	NA	F-69
MULTIPLAN	NA	F-70
NUTRI-CALC	$129	F-71
NYPLAN	$3,500 to $16,500	F-70
OGAS-OIL AND GAS ACCOUNTING SYSTEMS	$50,000	F-72
OMNICALC	NA	F-73
PACK SYSTEM	$400	F-66
PARACALC	$1,000	F-71
PDC PUBLISHING BOOK	NA	F-71
PERFORMA	$17,000	F-66
PERSPECTIVE	$25,000	F-71
PHIMOD/COBOL	$500	F-70
PLAN MASTR	$2,500 to $3,500	F-73
PLAN-IT	$1,000 to $5,000	F-67
POWER CALC	$1,495	F-66
POWER CALC PLUS	$1,495	F-67
PROCALC	$350	F-70
PROCALC	NA	F-72
PROFILE	$65,000	F-72
PROFITABILITY OF OIL AND GAS OPPORTUNITIES	NA	F-71
PROFORMA	$50,000	F-66
PROMOTION EVALUATION MODEL	NA	F-71
PROPHIT II (TIME SHARING)	NA	F-73
PROSCREEN II	NA	F-66
PROTABS TIME AND BILLING SYSTEM	$20,000	F-67
QIC PLAN	$990	F-72
RBTE	$300 to $1,500	F-73
RL-1 SPREADSHEET	$125	F-66
ROWS & COLUMNS	$695	F-73
SALES ANALYSIS	$2,500	F-70
SALES FORECASTING	NA	F-66
SAS	NA	F-73
SATURN-CALC	$489 to $1,956	F-67
SATURN-CALC	NA	F-72
SCIENTIFIC INVENTORY MANAGEMENT	NA	F-69
SIMPLAN VERSION 1.10	NA	F-72
SMOOTH SPREADING	$395	F-67
SOP FINANCIAL PLANNING	NA	F-67
SPREAD FINANCIAL MODELING LANGUAGE	NA	F-66
SPREAD SHEET	$2,000	F-67
SPREADSHEET	$1,000	F-73
STAT/34	$2,500	F-70
STRATEGIC RATIO	$350	F-71
SUNTAB	NA	F-72
SUPERCOMP	$750	F-66
SUPERCALC TM	$295	F-66
SUPERCOMP 20	$395	F-66
SUPER COMP ELECTRONIC SPREADSHEET	$395	F-66
SYSTEM W	NA	F-67
TCS	NA	F-73
THEN-IF	$2,400	F-69
UNICALC	$2,000	F-73
VERSACALC ENVIRONMENT FOR ATOM CPUS	$99	F-66

Graphics

APPLE WRITER II PRE-BOOT	$19	F-67
AUTOMATIC PLATE LAYOUT SYSTEM	NA	F-62
AUTOROUT 90	$20,000 to $35,000	F-67
AXIA	$2,000	F-64

AYGRAF/CORE	$2,500	F-80
AZ CHART	$7,000	F-80
AZCORE	$10,000	F-80
[illegible]	N/A	F-80
BOXER	$20,000 to $30,000	F-84
[illegible]	$950	F-82
CAD-CAM	N/A	F-80
CADD SERVICES	N/A	F-84
[illegible]	N/A	F-80
CALCOMP FUNCTIONAL SOFTWARE	N/A	F-86
CAP/IN	N/A	F-86
CARTRAN	N/A	F-86
CCS - PLOT	$1,500 to $1,900	F-80
[illegible]	$20,000 to $65,500	F-82
CENTON LOD	N/A	F-80
CENTON - SYN	N/A	F-80
CGS-COLOR GRAPHICS SYSTEM	$19,500	F-85
[illegible]	$3,000 to $15,000	F-86
COGO-I	N/A	F-88
COLOR SELECT	$7,500 to $9,000	F-80
COLOR BUSINESS GRAPHICS (CBG)	$1,500	F-81
COMPUTER AIDS FOR ELECTRONIC ENGINEERING	N/A	F-85
CONTOURING	$9,000 to $24,000	F-85
CORTEX EXECUTIVE DATA DISPLAY	$6,000	F-81
CPS 1/GRAPHICS	$25,000 to $100,000	F-85
CRID-CRIDTOPO	N/A	F-82
CS - 5	N/A	F-81
CUECHART	$1,800 to $5,300	F-83
DASTAGRAF	N/A	F-83
THE DATA CONNECTION	$7,500 to $22,500	F-83
DI3000	$9,000 to $24,000	F-85
[illegible]	$6,500	F-84
DISPLAY DIGIT	$15,000 to $20,000	F-81
DISSPLAY	$9,500 to $57,600	F-83
[illegible]	$20,000 to $30,000	F-84
EGRAF REV 8305	$1,850	F-81
[illegible]	$3,900	F-83
FCSEPS	$2,000	F-82
FIA PLOT	$5,500 to $6,500	F-86
FINGRAPH	N/A	F-82
FOREGRAPH	N/A	F-82
GAM (GRAPHICS ACCESS METHOD)	$4,400 to $13,000	F-82
GDL (GRAPHICS DISPLAY LIBRARY)	$4,400 to $13,000	F-83
GDS	N/A	F-86
[illegible]	$136,500	F-83
[illegible]	$6,500	F-84
GOLD	$2,000 to $4,000	F-83
GRAFMAKER	$9,000 to $24,000	F-85
GRAFMASTER	$9,000 to $24,000	F-85
[illegible]	$12,500	F-80
GRAPHICS	$2,500	F-86
GRAPHICS BUSINESS REPORTER	$395	F-84
[illegible] TOOL KIT	$950	F-82
GRAPHWRITER	$395	F-82
[illegible]	N/A	F-81
GRAPHICS 10/20	[illegible]	F-84
[illegible]	$1,095	F-82
GRASP	$50	F-84
GRID	N/A	F-81
GSDL	$20,000 to $35,000	F-82
HANDLE GRAPHICS	$260	F-84
IB GRAPH FOR RSTS/E V1.0	$5,500 to $7,500	F-81
IFPS/GRAPHICS	$15,000	F-82
IGOR (INTERACTIVE GRAPHICS OPERATING)	$4,400	F-83
INFO-VERSAGRAPH	$9,200	F-86
INTEGRAPHIX	$12,000	F-84
INTERACTIVE DIGITIZING	$28,000	F-81
INTERACTIVE GRAPHICS SPICE	$19,500	F-80
INTERFACE BETWEEN MOVIE BYU AND IRIS	$3,000	F-81

LANDSAT RAW DATA TO PICTURE FORMAT	N/A	F-86
LINE GRAPH PRINTING SYSTEM	$250	F-80
LOG ANALYSIS MODULE	$6,500	F-84
LOGINET DISPLAY GENERATOR- LDG	$10,000	F-83
MAGIC	$12,000	F-84
MANMAN/GRAFMAN	$3,000	F-80
MEDUSA - COMPUTER AIDED DESIGN	N/A	F-85
MENTAT	$20,000	F-83
MENTOR CADSYS	N/A	F-84
MERLIN GRAPHICS	N/A	F-81
METAFILE	$9,000 to $24,000	F-85
METEOROLOGICAL SATELITE GRID & MAP	N/A	F-86
METEOROLOGICAL SATELITE IMAGE ANIMATION	N/A	F-86
PAFEC	$35,000	F-84
PARAPLOT MANAGEMENT SYSTEM	$350	F-84
PCB DESIGN	N/A	F-85
PDGS (PRODUCT DESIGN GRAPHICS)	$95,000	F-85
PDMS (PLANT DESIGN MANAGEMENT)	$200,000	F-86
PI-GRAPH	$30,000	F-86
PIGS (PAFEC INTERACTIVE GRAPHICS)	$10,000	F-84
PL3DS-1	$3,000	F-86
PLAT 21	$1,500	F-81
PLOT	$5,000 to $10,000	F-83
PLOT UDRAW UTILITY	$250	F-86
PLOTC REV 6208	$1,850	F-81
PLOTREQ	N/A	F-86
PRINTER GRAPHICS PACKAGE	$2,500	F-80
QUERY AND REPORT PROCESSOR	$5,000	F-82
RIGHTER PLOT PACKAGE	$1,050	F-86
RIMS/GRAF	$1,250	F-83
RL-1 GRAPHICS PROCESSOR	N/A	F-80
SAS - GRAPH	$5,000	F-85
SATURN GRAPH	N/A	F-85
SEISGRAF	N/A	F-80
SERIES 200 UTILITIES PACKAGE	$95	F-83
SLIDE GRAPHIC II	$26,000	F-80
SPRINTER SOFTWARE	$42,000	F-81
SPSS GRAPHIC OPTION	N/A	F-85
STAADPL	N/A	F-85
STAR PLOT 1.0	$1,000	F-81
STRADS/DRAW	$50,000	F-83
SUPERPLOT	$1,495	F-80
SUPER-SCEPTRE	$24,900	F-80
SYSTEM 800 SOFTWARE	N/A	F-81
TARBELL CPM DATA BASE SYSTEM	$100	F-86
TDBS III ARS	N/A	F-83
TDX	$5,000	F-84
TELLAGRAF	$9,500 to $67,600	F-83
TEMPLATE	$27,500	F-82
THEMATIC MAPPING	N/A	F-86
TPLOT REV 6308	$850	F-81
TURNER MCAUTO ACTIVITY PLOTTING	N/A	F-83
UDRAW	$1,000	F-85
UNDRAW	N/A	F-86
UNGRAF	N/A	F-86
V CALC 80 PRE-BOOT	$49	F-87
V CALC 80 PRE-BOOT WITH MEMORY EXPANSION	$69	F-87
VG SHOW	$5,000	F-87
VG SKETCH	$695 to $10,000	F-87
VG TYPE	$295 to $2,500	F-87
VIP GRAPHICS	N/A	F-80
VT100 SPECIAL GRAPHICS LIBRARY	$295	F-81
VTAM PRINT SUPPORT	N/A	F-82
WORD CHART	$3,500	F-80
XL/NC	$6,500	F-85
XX CHART UTILITY	$500	F-86
XXGRAF	$12,500	F-87
Z GRAPH	$40	F-84
ZETAVU	$500	F-83

Report Generators

ACETIII	$800 to $1,600	F-86
ADR/DATA REPORTER-RELEASE 2.0	$10,300	F-85
ADRS PLUS SYSTEM	$10,000	F-89
ADT REPORT GENERATOR	$5,000	F-87

AIDE	$600 to $10,000	F-86
AMWRITER END USER NON-TECHNICAL RPT WRITER	$2,500	F-85
ANSWER - 2	N/A	F-87
APLPRINT	$1,750	F-87

ASK/3000	$6,000	F-99
ASSISTER REPORT WRITER + FOR IBM SERIES I	$2,500	F-95
AZ 7	$10,000 to $32,500	F-95
BASIC OFFICES SETTLEMENT SYSTEM B	$5,000	F-96
BLOOM - REPORT WRITER	$9,700	F-96
BOS AUTOCLERK	$550	F-95
CA-EARL	N/A	F-95
CCP PRINT SPOOLER	$495	F-97
CLIENT WRITE UP	N/A	F-96
COMMTRACK	N/A	F-99
CULPRIT	$27,000	F-95
CYX-RW REPORT WRITER	$6,000	F-96
DATAMAN II	$15,500 to $19,500	F-96
DATA PROCESSING SYSTEM (DPS)	$40,000	F-95
DATATRIEVE - II	$4,200	F-96
DMS REPORT GENERATOR	$2,000	F-95
DTRO MINI-MICRO INTERACTIVE REPORT	$4,000	F-96
DYL-280	N/A	F-96
DYL-280	N/A	F-96
E-Z WRITER SYSTEM	N/A	F-97
EASY LIST	$600	F-96
ENHANCED FORMAT FOR VSAPL	$3,300	F-97
FACT FINDER	$2,995	F-96
FINANCIAL MANAGEMENT REPORTER	$2,500	F-96
FIS	$3,000 to $4,000	F-96
GRADE REPORTING	$3,000	F-95
IMAGINE	$52,000	F-97
IMPULSE	N/A	F-96
INFORMAT	$1,000	F-97
[illegible]	$22,000	F-97
JOB COST	N/A	F-97
KOMAND/DIS (DATA INQ SYS)	$5,000	F-96
MCBA PAR	$5,000	F-96
MENU MANAGER	$49	F-95
MM PAR	$7,000	F-96
MULTIPLE REPORT CREATION SYSTEM	N/A	F-97
OR - REPORTER/OR - DISPLAYER	$4,500	F-96
PAL DATA REPORTER	$3,500	F-96
PETROLEUM	N/A	F-96
PICO-PARAMETERS IN COBOL OUT	N/A	F-96
PROGRAM GENERATOR REPORT WRITER	N/A	F-95
QLX	$7,500	F-96
QUERY	$7,500	F-96
QUEST	$3,475	F-97
QUIKJOB-QUIKWRITE	$5,445	F-96
REPORT GENERATOR	$3,500	F-95
REPORT GENERATOR	N/A	F-96
REPORT GENERATOR	N/A	F-96
REPORT GENERATOR	N/A	F-96
REPORT GENERATOR	$3,500	F-96
REPORT IT	N/A	F-95
REPORT SYSTEM	N/A	F-95
REPORT WRITER	N/A	F-96
REPORT WRITER	N/A	F-97
REPORT WRITER	N/A	F-97
REPORT WRITER	N/A	F-96
[illegible]	$5,000	F-96
REPORTER	$6,000	F-95
REPORTER	$550	F-97
REPORT/SCAN	N/A	F-95
[illegible]	N/A	F-96
REV	N/A	F-95
REX PAL	[illegible]	F-96
[illegible]	[illegible]	F-96
SOCRATES	N/A	F-95
SPLITTER	$5,000	F-96
[illegible]	N/A	F-96
SUPERITE	$3,750	F-97
UNIT STATISTICAL PLAN MAGNETIC TAPE REPORT	N/A	F-96
UPG	$4,975	F-97
USERVISION	N/A	F-96
USERVISION	N/A	F-96
UTILITY SYSTEM	N/A	F-97
VOILA!	$1,250	F-97
VUE	$16,000	F-96
WHAT-IF	$1,500	F-95
WP GENERATOR	$2,000	A-96

Query Languages

ADR/DATAQUERY-RELEASE 3.0	$14,600 to $17,900	F-102
ASI-INQUIRY	$60,000	F-102
CFAST - ONLINE INQUERY AND UPDATE SYSTEM	$9,250	F-102
DATABASE MANAGER II	$295	F-102
EASYWORK	$8,000 to $25,000	F-103
ENTRY	$100	F-102
FOS FRIENDLY QUERY SYSTEM	$11,500 to $15,000	F-102
FUSION-1 INFORMATION RETRIEVAL SYSTEM	$3,500	F-102
IMS DATA COMMUNICATION	N/A	F-103
INTERPILER	$2,850	F-103
LOOK/4	$5,500	F-102
MINI T-ASK	N/A	F-102
[illegible]	N/A	F-102
ONLINE ENGLISH - OLE	$55,000	F-102
PARAGRAPH PATTERN MATCH	$50	F-102
QUERY LANGUAGE	$3,500	F-102
QUERY REPORT WRITER	$1,000	F-102
QUERY/I	N/A	F-102
SIR/SQL +	$6,000	F-102
SQL TRANSLATOR	N/A	F-102
T-ASK	N/A	F-102
THEMIS	N/A	F-102
TRANSACT	N/A	F-102
WHATS IT?	[illegible]	F-102
[illegible]	[illegible]	A-102

Security/Auditing

ACCESS CONTROL FACILITY SYSTEM 2 DEVELOP	$27,000	F-105
ACF2 ACCESS CONTROL FACILITY SYSTEM	$21,000	F-105
AUTOMATIC PASSWORD CHANGER	$350	F-105
BAS (BANKING AUDIT SYSTEM)	$6,500	F-105
CA-SENTINEL	N/A	F-105
CHANGE AUDIT	$4,500	F-106
CHARGEX	$5,000	F-105
CICS SECURITY PACKAGE	$1,500	F-106
COMPUTERIZED LIMITED ACCESS SECURITY	$5,500	F-105
COSS	$20,000	F-106
CYX-SC SECURITY CONTROL FUNCTIONS	$2,500 to $4,000	F-105
DAGAR CIPHER	$80	F-107
DATA ENCRYPTION PACKAGE	$1,250	F-105
DATA SECURITY	N/A	F-105
DATA SECURITY PACKAGE CRYPTOPAC	[illegible]	F-107
[illegible]	N/A	F-105
[illegible]	$950	F-106
DESCRIPT F8, C8, B8	$500 to [illegible]	F-106
THE DES PACKAGE	$1,000	F-106
DSI SECURITY	$2,500	F-106
DYL-AUDIT	N/A	F-106
EDP-AUDITOR	$20,000	F-105
[illegible]	N/A	F-105
[illegible]	$995	F-106
[illegible]	$3,000	F-106
FRAME	$2,200	F-107
GUARDIAN	$20,000 to $27,500	F-106
KEYBOARD MONITOR	$500	F-106

LOGIN	$4,500	F-107
MAIL SYSTEM FOR TSX	$300	F-107
MENU GENERATOR & SECURITY CONTROL	$1,500	F-107
PANAUDIT	$15,900 to $19,900	F-108
PROGRAM SECURITY	$495	F-108
PSYPHER	N/A	F-106
SAC	$10,000 to $22,000	F-105
SAFEGARD II	$1,500	F-107
SECURE	$500	F-107
SECURITY SYSTEM	$42,500	F-105
SECURITY SYSTEM	$2,500	F-106
SECURITY MANAGEMENT SYSTEM - SMS	$1,500	F-106
SECURE/CMS	$950	F-106
SECURE REV 3.00(NBS DATA ENCRYPTION ALGORITHM	$500	F-105
SENTRY/3000	$14,500	F-105
SIGNED DATA	$50,000	F-105
SOURCE COMPARE PROGRAM	$1,000	F-105
SYSTEM AUDITOR	$2,500	F-106
TAS-TOTAL AUDIT	$5,000	F-105
TIME TRACKING	$300	F-106
TOP SECRET	N/A	A-105

Sort/Merge

ALTERNATE SORT	$19	F-110
AUTOSORT-C/CR (SORT MERGE SELECT)	$150	F-110
AUTOSORT-M/MR (SORT MERGE SELECT)	$150	F-110
CA - SORT	N/A	F-110
CA-DART	$6,000 to $7,500	F-110
CA-SORT	N/A	F-110
CA-SORT/CMS	N/A	F-110
CA-SRAM	$5,100 to $5,700	F-110
CENTON - DDD	N/A	F-110
DATACOMP	$6,000	F-110
DATASHARE UTILITIES	$950	F-111
FACS FACILITY EXCHANGE SERVICE	$50,000	F-111
FSORT3	$2,500	F-110
INDEXED ACCESS METHOD (IAM)	$1,250	F-110
MICREX	$1,250	F-111
RES-Q VERSION 2.11	$3,500	F-111
RTSORT	$450	F-111
SORT PLUS	$800	F-110
SORT ROUTINE	N/A	F-110
SORT/MERGE	$2,500	F-110
SORT-1-PLUS	$750	F-110
SORT/1000 REV 1.0	$995	F-110
SORT PLUS REV 03/04	$800	F-110
SORTEX	$1,750	F-111
SPEEDSORT/11	$800	F-110
SSUMATCH	$1,500	F-111
SURVEY SYSTEM	N/A	F-110
SYNCSORT	N/A	F-111
VIS/BRIDGE/DJ	$295	F-111
VSAMCOMP	$3,000	F-110
WORKPERFECT SORTER	$145	A-111

Other

A B DICK BACKUP UTILITY	N/A	F-114
A B DICK CLEANUP UTILITY	N/A	F-114
A B DICK COPY UTILITY	N/A	F-114
A B DICK SETUP UTILITY	N/A	F-114
A B DICK CONVERT & CP/M III	N/A	F-114
ADL I	N/A	F-115
ADR/ASC-RELEASE 7.1	$13,100	F-114
ADS	$19,000 to $24,900	F-117
AIDS - AUTOMATIC INFORMATION DISPLAY SYSTEM	$4,000	F-118
ATTAIN	$6,900 to $9,950	F-119
BLAST - BLOCKED ASYNCHRONOUS TRANSMISSION	$250	F-118
BMDP STATISTICAL SOFTWARE	$1,050 to $2,900	F-121
CA-DISC TAPE FILE	N/A	F-118
CA-JASPER	$14,500 to $30,000	F-118
CA-MANAGE-DASD	$7,000	F-118
CA-OPTIMIZER	N/A	F-116
CA-OUTCKTROL	$15,000 to $18,000	F-118
CA-RAPS	N/A	F-116
CA-UCANDU	$4,000	F-116
CA-VIEW	N/A	F-116
CAI - MENU PROCESSOR	$1,250	F-115
CAI ACS/COBOL - ASSEMBLER	$500	F-115
CAMS	$22,500	F-115
CLU	$89	F-116
COBOL TO COBOL TRANSLATOR	$10,500	F-116
COMPAX (PDD-11 TO VAX-11 ASSEMBLER	$7,500	F-119
CP/M 86 TO MSDOS OPERATING SYSTEM CONVERTER	N/A	F-117
CP/M TO P-SYSTEM	$100	F-119
CP/M LOOP PRINTER U	N/A	F-114
CRTFORM	$450	F-119
DATA ENTRY GENERATOR (DEG)	$9,500	F-119
DAYS - SCHEDULE SYS FOR THE SYSTEM/34	$99	F-115
DBMI LIST	N/A	F-116
DBMI LOAD	N/A	F-116
DIANA	$1,000	F-117
DISCLOSE	$1,800	F-116
DISKIT	$1,350	F-121
DIVERSIFIED ONLINE QUEUING	$3,000	F-118
DOC-MASTER	$5,000	F-114
DOX	N/A	F-120
DSMBLR 3	$40	F-119
DSPOOLER	$1,750	F-120
DTOC	$5,800	F-119
DUMPMASTER/DUMPMASTER ONLINE	N/A	F-118
ESTIMATOR	N/A	F-114
ELECTRONIC MAIL SYSTEMS (EMS)	$1,500	F-117
EMSG/86	$95	F-117
EPAT	N/A	F-120
EPAT SVA	N/A	F-120
EPIC SYSTEM GENERATOR	N/A	F-118
ESCAPE	$25,000	F-116
EZ SHAR	$590 to $750	F-121
FAST DUMP RESTORE V4.7	$4,500	F-118
FAVERSTROKEXP	N/A	F-117
FILE TRANSMISSION UTILITY (FTU)	$195	F-114
FIRST/1	$13,500	F-116
FLAW CHECK	$500	F-120
FORCE	$3,000	F-120
FORTRAN TO FORTRAN TRANSLATOR	$19,800	F-116
GAMMA	N/A	F-117
GPSS/H	N/A	F-122
HASP+	N/A	F-117
HASP-11	$3,500	F-117
HELP	$25	F-119
IBM 3741 TO P-SYSTEM	$285	F-119
IFPS SENTRY	$12,000	F-117
IFPS - DATASPAN	$10,000	F-117
INCOMPARE	$4,500	F-118
INDAS	$2,000 to $5,000	F-120
INDOC INDICATOR DOCUMENTATION FOR RPG	$99	F-116
INFOPAC	$12,500	F-119
INSTANT FBA	N/A	F-120
THE INTEGRATOR	$595 to $3,000	F-120
IP/TCP	$15,000	F-122
JOB QUEUE PROCESSOR	$2,500	F-119
KSU-KEYPUNCH SIMULATION UTILITY	$3,000	F-118
LIBRARY TRANSMISSION UTILITY (LTU)	$190	F-114
LINE PRINTER/SPOOLER	$500	F-121

MACHINERY MONITORING SYS	$20,000 to $50,000	F-118
MANAGE-MINT	$1,250	F-115
MAPS	$2,800	F-118
MARCON PROJECT ACCOUNTING CONTROL	$7,500	F-118
MEDIA MANAGEMENT	$250	F-118
MEMORY DISK VERSION 1	$1,500	F-117
MENUS	$750	F-114
METHOD/1	NA	F-114
MICROLINK	NA	F-121
MIMIX	$495	F-121
MIMIX TM - COMPATABILITY WITH CP/M	$495	F-121
MSDOS TO CP/M 86 OPERATING SYSTEM CONVERTER	$95	F-117
NAT/3 TO COBOL TRANSLATOR	$17,400	[illegible]
NCR-DMS/DATA ENTRY	NA	F-118
NETSTAR	$895	F-121
OFFICE PRO	$31,500	F-114
OS PLUS	$350	F-120
P-EDIT	$95	F-120
PAC II	NA	F-114
PAC III	NA	F-115
PAC MACRO	NA	F-115
PC/70	NA	F-115
PFAS-KEYED ISAM	$225	F-119
PHOENIX	NA	F-118
PRINT UTILITY	NA	F-114
PRO-DUCE	$40	F-119
PROCEDURE UTILITIES	$100	F-117
Q-FORM	$395 to $2,000	[illegible]
Q-MENU	$395 to $2,000	F-120
QUEST	$3,475	F-121
RABBIT S	$5,000	[illegible]
REFORMATTER CONVERSION SOFTWARE DEC-CP/M	$350	F-119
REMOTE ON-LINE PRINT EXECUTIVE	$8,000	F-115
REPORTER	$2,000	F-114
RESCUE DATA SYSTEM	$250	F-119
RJE	$1,800 to $2,250	F-121
RPG-II TO COBOL TRANSLATOR	$19,800	F-116
RPG PACKAGE 34	NA	F-115
RPM	NA	[illegible]
SAS/ETS	$3,600	F-120
SAS/SSP	$3,000	[illegible]
SAVER FOR RSTS/E V2.7	$850	F-117
SCREEN GENERATOR	$4,500	F-114
SCREENS MADE EASY	NA	F-115
SETUP UTILITY	NA	F-114
SHARED DISK SOFTWARE	$4,500	F-118
SOFTWARE OFF SITE - SOS	$200	F-121
SP/TOOLKIT	$1,500	F-121
SPOOLER	$2,000	F-117
SRU - SCREEN REPORT UTILITY	$3,000	F-118
STRADIS	$40,000	F-119
STRATEGIC SYSTEMS PLANNING	NA	F-118
SUPERSCREEN	$750 to $950	F-119
SURVEILLANCE	NA	F-121
SYBACK	NA	F-121
SYSTEM/3 CCP TO CISC COBOL TRANSLATOR	$24,800	F-116
TARBELL BASIC	$100	[illegible]
TELECOMMUNICATIONS CONTROL SYSTEM	$4,000	F-115
TIMER/38	$1,000	F-119
TITAN APPLICATION SOFTWARE	NA	F-120
TRANSACTION PROCESSING FACILITY	$12,000	F-121
TRS-DOS TO P-SYSTEM	$100	F-119
UNI-DATE	$500	F-117
UNIVERSAL FILE TRANSLATOR	$10,000	F-118
UTILITY CONTROL PROGRAM UCON	NA	[illegible]
VERAZIP-THE ZIP CODE VERIFICATION SYSTEM	$1,900	F-115
VIDEO/11 (VIDEO TERMINAL I/O)	$1,750	[illegible]
VISAGAR MODULE 5.0 MICROFILM DATABASE	$10,000	[illegible]
VMARCHIVE	NA	F-122
VMBACKUP	NA	[illegible]
WILD HARE MTBS	$5,900	F-118
WILLTELL	NA	F-114
WILLTELL	$5,500 to $7,000	F-118
WISEMAN	$995	F-115
YOUSABLE MENU	$95	F-121
YOUSABLE UTILITIES	$95	F-121
Z SHELL	$40	F-119

Applications Development Systems

A-LIST	$100	F-32
ADAPT	N/A	F-29
ADVOCAITE	$195	F-30
AIDE	$29	F-34
AMI MASTER MENU INTERFACE	$49	F-29
AMP	$30	F-32
AMPERSOFT	$50	F-33
ANIMATER	$800	F-32
APEX OPERATING SYSTEM	$185	F-29
APL COMCALL	$300	F-28
APL FOOSCREEN	$225	F-28
APL PLUS/80 SYSTEM	$295	F-37
APLUS	$40	F-35
APPILOT II EDU-DISK	$100	F-33
APPLE PILOT	$100	F-31
APPLEGUARD	$250	F-35
APPLESOFT BASIC ENHANCEMENT	$40	F-35
APPLE-AIDS	$49	F-31
AUTOGRAMMER	$399	F-34
AUTOSORT/RAM	$150	F-29
AXE	$69	F-38
BASIC INTERPRETER	$299	F-38
BUBBLE SYSTEM	$750	F-29
THE BUG	$500	F-35
BUILD USING	$30	F-35
C - FOOD SMORGASBORD	$150	F-31
CAI PLUS	$500	F-30
CATALOG SYSTEM & UTILITIES	$25	F-35
CHIPS	$4,995	F-32
CODE 21	$500	F-33
CODEWRITER	$340	F-30
COMMENT STRIPPER	$8,100	F-37
COMPARE	$100	F-32
COMPAK 2	$550	F-33
COMPUTER AIDED INSTRUCTION	$34	F-34
CONTROL CENTER	$99	F-30
COURSE DESIGNER AUTHORING SYSTEM	$200	F-38
THE CREATER	$14	F-29
THE CREATOR	$300	F-35
CROSS REFERENCE	$25	F-30
CROSS REFERENCE	$34	F-33
CRT	$950	F-29
CRT FORM (APPLE PASCAL)	$400	F-35
CRT FORM (CBASIC) CP/M 80	$400	F-36
CRT FORM (DIGITAL RESEARC C) CP/M 86	$400	F-36
CRT FORM (DIGITAL RESEARCH C) MS/DOS	$400	F-36
CRT FORM (FORTRAN 80) CP/M80	$400	F-36
CRT FORM (MBASIC) CP/M 80	$400	F-36
CRT FORM (MICROSOFT FORTRAN) MS/DOS	$400	F-36
CRT FORM-(MICROSOFT BASIC) MS/DOS	$400	F-36
CRT FORM-(MS PASCAL) MS/DOS	$400	F-36
CRT FORM (PASCAL MT+)	$400	F-36
CRT FORM (PASCAL MT+) CP/M 86	$400	F-36
CRT FORM-(PASCAL MT+) MS/DOS	$400	F-36
CRT FORM (PL/80) CP/M80	$400	F-36
CRT FORM (SUPERSOFT C) CP/M 86	$400	F-36
CRT FORM-(SUPERSOFT C) MS/DOS	$400	F-36
CRT FORM (UCSD IV)	$400	F-36
CRTFORM	$400	F-36
CRTFORM-(LATTICE C) MS/DOS	$400	F-37
CSIDATA	$395	F-29
CSIMMS	$1,495	F-29
CSR TRAINER 2000 SYSTEM	$998	F-29
DABAK	$85,000	F-34
DATIL	$99	F-30
DBASE II	$700	F-28
DBUG	$200	F-33
DIGITAL RESEARCH C	N/A	F-30
DIRECTORY MASTER	$30	F-33
DISC CHECKIT UTILITIES	$25	F-34
DISC UTILITY	$15	F-28
DISKEY	$50	F-28

DISPLAY MANAGER	N/A	F-30
THE DISASSEMBLER	$50	F-28
THE DISASSEMBLER TM	$1,495	F-37
DOUBLE DENSITY SUPPORT PKG	$49	F-33
DTC	$150	F-29
DUMP ALPHA	$200	F-37
EDIT-SOFT	$40	F-35
EIS BASIC CROSS REFERENCE PROGRAM	$50	F-30
ELECTRONIC DISC UTILITY	$50	F-32
ELEMENTARY MATH	$40	F-33
EMBER	$50	F-34
EN BASIC AUTHORING SYSTEM	$150	F-29
EPF IV	N/A	F-35
ESTIMACS	$25,000	F-31
EXECU/BUSTM	$450	F-30
EXTEND DEVELOPMENT PACKAGE	$125	F-34
FAST WRITER	$1,500	F-28
FASTSORT	N/A	F-30
FILES	$100	F-32
FIND	$350	F-37
FORMS 2	$200	F-32
FORTH APPLICATION MODULES	$60	F-31
FREQOUT	$4,995	F-32
GALE (GLOBAL APPLESOFT LINE EDITOR)	$50	F-33
GENERATOR	N/A	F-29
GHOST WRITER	$1,500	F-29
H-CHAMP	$695	F-31
H-CHAMP + M - VERSION 2.0	$149	F-31
I/SAL AUXILARY TOOLS	N/A	F-31
IDB	$80	F-35
IEEE FLOATING POINT LIBRARIES	$750 to $1,250	F-38
INDEX FILES	$200	F-29
INSPECT	$75	F-29
INTEVATE	$195	F-34
INTRO C	$375 to $1,500	F-31
ISAM ROUTINES-INDEXED SEQUENTIAL ACCESS	$70	F-30
KEY PERFECT	$30	F-33
LAN DATA CORE	$1,950	F-35
LCREF	$100	F-32
LIF UTILITY	$500	F-37
LISTER FOR II, 12, 16	$28	F-34
LOAD SUB	$550	F-37
LOG	$100	F-32
LYNX - VERSION 2.62	$250	F-34
MAC AND RMAC	N/A	F-30
MACHINE CODE TEST TOOL	$20	F-35
MACRO-SCED	$49	F-29
MAGIC WORKSHEET	$295	F-37
MANAGEMENT SUPPORT SYSTEM	$3,000	F-31
MEMORY MAPPER BINARY PROGRAM	$250	F-37
MENU	$100	F-32
MENU'D	N/A	F-31
MICROSHELL	$150	F-33
MICROSOFT ALDS SYSTEM	N/A	F-32
MICROSOFT MACRO ASSEMBLER PACKAGE	N/A	F-32
MICROSOFT PREMIUM SOFTCARD IIE PACKAGE	N/A	F-32
MICROSOFT RAMCARD MEMORY BOARD FOR APPLE II	N/A	F-32
MICROSOFT SYSTEM CARD PACKAGE	N/A	F-32
MICROSOFT MULISP/MUSTAR	N/A	F-32
MICROTOOLS	$150	F-33
MINI-MEMORY	$100	F-38
THE MULISP/MUSTAR ARTIFICIAL INTELLIGENCE	$250	F-35
MULTI-FORTH	N/A	F-29
MULTI-TASKING KERNEL MTK	$250	F-38
NETWORK MANAGERS TOOL KIT	N/A	F-38
NEWDRAW	$20,000	F-28
NORTH STAR TO CBASIC	$60	F-34
PACK'R	N/A	F-31
PC/COYER	$450	F-34
PEARL SD	$495	F-34
PICK-N-PACK	N/A	F-31
PLINK 86	$395	F-34

PRETTY PRINTER	$20	F-34
PRO-IV SOFTWARE	$5,000	F-29
PROGRAM MAP BASIC CROSS REFERENCE UTILITY	$150	F-35
PROGRAMMERS TOOLKIT	$25	F-35
PROGRAMMERS TOOL KIT 16K	$15	F-35
PROGRAMMING AIDS I	$10 to $15	F-38
PROGRAMMING AIDS II	$25	F-38
PROGRAMMING AIDS III	$20	F-38
PROJECT MANAGER	$499	F-30
PROOF	$50	F-33
QUANTUM SYSTEM	$650	F-34
QUICK - CODE	$295	F-30
QUICK - SCREEN	$149	F-30
RACET DEBUG	$18	F-34
RAID	$250 to $745	F-38
RDM 300	$995	F-31
REACH	$20	F-35
RENAISSANCE EDITOR	$300	F-37
RENAISSANCE FORMS	$400	F-37
RENAISSANCE PROGRAMMER	$1,000	F-37
ROPL-ROBOT PROGRAMMING LANGUAGE	$3,500	F-31
RTCS/UDI VERSION 4.0	$500	F-34
SBS-PASCAL	$[illegible]	F-33
SCREEN DESIGN FACILITY SDF	$150	F-30
SCREEN MACHINE	$49	F-33
SCREEN MASTER	$700 to $1,900	F-33
SCREEN MASTER	N/A	F-33
SCRUB	$125	F-37
SEARCH AND REPLACE	$350	F-37
SID	N/A	F-36
SOFT DOC	$395	F-31
SOFTBLOX MMC SUG TM	$75	F-33
SOFTWARE TOOLKIT	$200	F-36

SORT 80	$34	F-33
SPEAK!	$39	F-28
STOPPER	$20	F-29
STRPAK	$225	F-34
SUPER CALC INTERFACE	$100	F-62
SUPER DATA INTERCHANGE	$50	F-35
T/MAKER III	$275	F-30
TAB TALK	N/A	F-31
TASMON ALTERNATE SOURCE MONITOR	$29	F-29
TEACHER	$100	F-60
TEXT MASTER	$99	F-33
TOOL KIT	$1,500	F-37
TRS-XENIX DEVELOPMENT SYSTEM	$750	F-39
TV SET	$75	F-33
UCSD P-SYSTEM EDITOR/FILER/UTILITIES	$75	F-36
ULTIMENU FOR BASIC	$19	F-30
ULTIMENU FOR DOS	N/A	F-30
UNBASIC PROGRAM	$75	F-32
UNISYN	$39	F-28
UTILITIES I	$60	F-37
UTILITIES II	$60	F-37
VCREF	$100	F-32
VED 64K SCREEN EDITOR	$195 to $395	F-30
WARNIER DIAGRAM PLOTTER	$550	F-29
WSDOC APL SYS DOCUMENTATION/DEGUBBING	N/A	F-31
XLT86	N/A	F-36
XREF	$325	F-37
Z80 ASSEMBLER	$5,000	A-31
32K RAM BOARD PSEUDO-DISK	N/A	F-34
32K RAM BOARD-RAMEXPAND	N/A	F-34
64/128 RAM BOARD MOVE DOS	N/A	F-34
6809 CROSSBAK	$120	F-31
[illegible] RELOCATABLE [illegible] ASSEMBLER	$120	F-31

Data/File Management

ACCESS MANAGER	N/A	F-60
ACT PAK ACTUAL PACKAGE	N/A	F-61
ADDRESS BOOK MAILING LIST	$50	F-60
ARCHIVIST	$150	F-60
AUTODIFF	$30	F-63
B-TREE RECOVERER UTILITY	$100	F-59
BASIC DATA	$2,500	F-60
BILLINGS STANDARD PACK	$100	F-59
BMP	$46	F-63
C-ISAM/TM	$450	F-63
CCA DATA MANAGEMENT SYSTEM	$99 to $225	F-59
CLIENT	N/A	F-58
COMPARE MASTER	$34	F-62
THE CONSOLIDATOR	$49	F-62
COPYWRITER	$99	F-62
COUNTY GOVERNMENT SYSTEM	N/A	F-61
CROSS REFERENCE PROGRAM	$25	F-62
CUSTOMIZED APPLICATION & UTILITY SYSTEM	N/A	F-58
CYPRO	$145	F-59
DATA ACQUISITION SYSTEM	$85 to $150	F-61
DATA FACTORY	$500	F-61
DATA FACTORY IBM	$300	F-61
DATA MANAGER II	$500	F-61
DATA REPORTER	$220	F-58
DATABANK	$250 to $350	F-59
DATAHANDLER	$59	F-62
DB MASTER	$229	F-60
DB MASTER-UTILITY PAK #1	$99	F-60
DB MASTER-UTILITY PAK #2	$99	F-60
DIAL DATA	N/A	F-59
DISK MAP/PC	$59	F-64
DIRECTORY MANAGEMENT	N/A	F-62
DISK CATALOG SYSTEM	$20	F-62
DISK DUMP	$20	F-62
DISK LIBRARY	$50	F-63
DISK ORGANIZER	$30	F-63
DISK RECOVERY	$30	F-63
DISK REVISION EDITOR/FILE RECOVERY	$150	F-63
DMS	$12,500	F-59

DOPLUS	$100	F-61
DWP	$100	F-61
EDUCATION TUTORIAL VOLUME I	$25	F-59
EXCHANGE	$200	F-62
EXECU/LINK TM	$350	F-60
EXTENDED DATA ENTRY (EDE)	N/A	F-62
FABS/PC (FAST ACCESS B-TREE)	$150	F-59
FABS/86C (FAST ACCESS B-TREE)	$150	F-59
FABS/86 (FAST ACCESS B-TREE)	$150	F-59
FANTASTIC FILER	$69	F-59
FAS-FILE	$145	F-61
FAST FACTS	$195	F-61
FILE MANAGER	$125	F-61
FILE/IDEA	$225	F-64
FIND 21	$250	F-62
GAME ROOM RECORD KEEPING SYSTEM	N/A	F-59
GOLDEN RETRIEVER	$1,800	F-59
GS-100 CIRCULATION CONTROL SYSTEM	N/A	F-60
GS-1000 STAND-ALONE CIRCULATION SYSTEM	N/A	F-60
GS-2000 DISTRIBUTED	N/A	F-60
H-CHAMP CORE VERSION 2.0	$295	F-61
HAI-LINE FILEKEEPER	$195	F-61
HELPWARE	$195	F-60
HELPWARE	$185	F-63
I(INTERCHANGE)	$75	F-60
IBM BASIC UTILITIES	$85	F-59
INFOMANAGER-(MB-DOS)	$400	F-63
INFOMAG-DBMS	$295	F-61
INFOMANAGER (CP/M 86 W/DBASE INTERFACE)	$400	F-64
INFOMANAGER (CP/M 86)	$400	F-64
INFOMANAGER (MB-DOS W/DBASE INTERFACE)	$400	F-64
INFORMATION MANAGEMENT	N/A	F-59
THE INSPECTOR	$5,995	F-62
INSTANT RECALL	$59	F-61
INVESTMENT TAXPAC	$200	F-64
IT LIST MANAGEMENT SYSTEM	$495	F-64
KEYED FILE SYSTEM-86-KFS-86	$150	F-63
KISS	$225	F-64
LIST HANDLER	$80	F-60

LIST HANDLER	$50	F-63
MABRA INFORMATION MANAGEMENT SYSTEM	N/A	F-61
MAGIC DATA ANALYSIS & REPORTING	N/A	F-61
MEMBERSHIP RECORD KEEPING SYSTEM	N/A	F-59
MICROBOOK: DATABASE MANAGEMENT	$40	F-60
MICROLIB-VERSION 1.42	$295	F-59
MULTI COMPANY	$100	F-61
NETWORK DATAMOVER-MICRO	N/A	F-64
NEWSPAPER INDEXING PACKAGE	N/A	F-60
NPL	N/A	F-64
OUTPATIENT REGISTRATION SCHEDULING	N/A	F-62
PACK & CRYPT	$25	F-63
PFS: FILE	$125 to $175	F-63
PFS (PERSONAL FILING SYSTEM): FILE	$125	F-60
PORTFOLIO EVALUATOR	$50	F-60
QCOPY	$150	F-62
QUINDAR UNIVERSAL INTELLIGENT CONTROL	$25,000	F-62
REAL TIME OBSERVATION-DATA COLLECTION	$35	F-62
REMODEL & PRELOAD	$35	F-63
REORG	$150	F-62
SEARCH KEY ACCESS	N/A	F-60
SOFTWARE SELECTOR	$95	F-61
SOS	$29,500	F-59
SPACEMAKER	$75	F-63
SQUEEZE	$250	F-63
STARS CASE MANAGEMENT MODELS	N/A	F-61
SUPER DISK COPY	$35	F-63
SUPER ZAP	$25	F-63
SUPERFILE	$195	F-60
SUPERZAP	$100	F-63
SYZ	N/A	F-64
TASK MANAGER	$499	F-59
TERMULATOR	$95	F-63
TFS-TEXT FORMATTING SYSTEM	$85	F-64
TIME MANAGER	$150	F-60
TIME LIST/MANAGER (TLM)	N/A	F-64
TRANSPORTER	$49	F-62
VEHICLE SCHEDULING & MAINTENANCE PROGRAM	N/A	F-64
VISI FILE	$250	F-60
VISIFILE	$250 to $300	F-64
THE WATSON	$4,995	F-62
WORD STAR PATCHER	$50	F-61

Financial Modeling/DSS

ABSTAT	$395	F-74
APL PLUS/PC FINANCIAL AND STATISTICAL LIBRARY	$275	F-77
BOTTOM LINE STRATEGIST	$400	F-74
BUSINESS PLANNER	$295	F-75
BUSINESS PLANNER DEMONSTRATION	$75	F-75
BUSY PLAN	N/A	F-75
COMPU TRAC V 4.0	$1,800	F-74
CONSOLIDATION MODULE	$295	F-74
CS-5 GRAPHICS SYSTEM	N/A	F-75
CSR SURVIVAL TRAINING FOR VISICALC	$250	F-74
DATA COUNT 23 SPREAD SHEET PROGRAM	$1,275	F-75
DATACALC/23	$1,275	F-75
DESKTOP PLAN	$250 to $300	F-78
DESKTOP/PLAN	$250	F-75
EASY ECONOMETRIC ANALYSIS	N/A	F-75
ELECTRIC SPREADSHEET	$75	F-77
ELECTRONIC WORKSHEET	$125	F-75
ENCORE	$1,850	F-75
ENHANCED MODEL III VISICALC	$199	F-78
EXECU/MODEL TM	$200	F-75
FINANCE CALCULATOR	$30	F-74
FINANCIAL ANALYSIS	$495	F-78
FINANCIAL AND CIRCULATION MODELING	N/A	F-75
FINANCIAL CALCULATOR	$300	F-75
FINANCIAL PLANNING SYSTEM	$1,500	F-75
FORECAST	N/A	F-77
FORECASTER	$1,060	F-74
FORECASTING	N/A	F-77
IFPS PERSONAL	$3,000	F-75
INSIGHT	$500 to $600	F-77
INTERCALL	$295	F-77
JEWEL SPREADSHEET INTERFACE	$175	F-75
MAGAZINE CIRCULATION HISTORY	N/A	F-77
MEMOCALS	$5,000	F-75
MICRO DSS ANALYSIS	$495	F-75
MICRO DSS FINANCIAL	$795 to $995	75 F-75
MICRO PROPHIT	$3,000	F-78
MICRO TSP	$295 to $395	F-75
MICROPLAN	$495	F-74
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PEAR TECHNICAL ANALYSIS	N/A	F-74
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PLAN 21	$500	F-75
PLANSTAR	$695	F-75
PRACTICALE PLUS	$50 to $55	F-75
PRACTICALE 20	$20 to $45	F-75
PRACTICALE 64	$50 to $55	F-75
PROCALC	N/A	F-78
PROFIT PLAN	$195	F-74
QUIKCALC DEPRECIATION ANALYZER	N/A	F-77
QUIKCALC LOAN ANALYZER	$100 to $130	F-77
REPORT MANAGER	$399	F-75
RETURN ON INVESTMENT (ROI)	$375	F-74
SCRATCHPAD	$295	F-78
SLIM	$25,000	F-77
SPREAD-ANALYSIS	N/A	F-78
STATISTICAL REPORT PROGRAM	$220	F-77
STRATEGIC PLANNER	$496 to $995	F-74
SUPER EXPANDER PLUS	$125	F-75
SUPER EXPANDER 40 COLUMNS	$64	F-75
SUPER EXPADER 80 COLUMN	$99	F-75
TALLMASTER-IBM PC	$130	F-77
TARGET APPLICATIONS LIBRARY	$125	F-74
TARGET FINANCIAL MODELLING	$325	F-74
TARGET IMAGE MAKER	$175	F-74
TARGET PLANNERCALC	$99	F-74
TARGET PLOT	$75	F-74
TARGET TASK	$329	F-74
THE INVESTOR'S TOOLKIT	$80 to $700	F-75
THE OPTIMIZER	$200	F-78
THE WEDGE	$199	F-78
TK SOLVER	$299	F-77
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VISI CALC	$250	F-78
VISI SCHEDULE	$300	F-78
VISI-CALC	$195 to $395	F-78
VISICALC	$250	F-78
VISICALC ADVANCE VERSION	$400	F-78
VISICALC BUSINESS FORECASTING MODEL	$100	F-78
VISICALC FORMULA PRINTER	$39	F-74
VISICALC IV	$250	F-78
VISICALC PROGRAMMING	$5,999	F-77
VIZ-A--COM	$100 to $140	F-74
VIZ-A-MERGE (A MERGE SYSTEM)	$100 to $140	F-74
ZENCALC 3.0	$50	F-77
1-2-3 (RELEASE 1A) INTEGRATED SPREADSHEET	$495	F-75
3220 FARMCALC	$295	F-75

Graphics

ACCESS PAK	$525	F-91
ADACS	$25,000 to $175,000	F-91
ADVANCED SPACE GRAPH-SPACE TABLET	$1,695	F-90
AGIL PAINT PROGRAM	$35	F-88
AGIL SUPER SLIDE SHOW	$29	F-88
APL GRAPHICS	$225	F-88
APPLE BUSINESS GRAPHICS	$175	F-88
APSGRAPH	$300	F-88
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AUTOGRAF WORKSTATION	N/A	F-90
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BYTESMITH/SET-EPSON	$40	F-91
BYTESMITH/SET-PRISM	$40	F-91
CADAPPLE	$1,995	F-83
CE/1000	$5,000 to $20,000	F-83
CENTOM	N/A	F-88
CHARTGRAPHICS	N/A	F-83
CHART-MASTER	$375	F-88
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COMBINED ENCHANCED GRAPHICS SOFTWARE	$34	F-88
D GRAPH	$295	F-88
DATA PLOTTING SOFTWARE	$48	F-90
DATA-PLOT	$80	F-91
DESIGN CHOICE	$495	F-90
DESIGN CONSTRUCT	$495	F-90
DESIGN FREE FORM	$495	F-90
DR GRAPH	N/A	F-88
ED-A-SKETCH	$30	F-82
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EPLOT	N/A	F-90
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GEOGRAPHIC CONTOUR MAPPING SYSTEM	N/A	F-88
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GRAF LIB	$400	F-82
GRAF TALK	$450	F-91
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GRAPHICS	$50	F-90
GRAPHICS AID	$10	F-91
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GRAPHING PACK	$10 to $20	F-82
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GRAPHPOWER	$295	F-88
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GRAPH-IT	$50	F-82
GRAPHICS KIT 16K	$15	F-82
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HALO	$150	F-90
HIGH PERFORMANCE GRAPHICS OUTPUT	$2,500	F-90
[illegible]	$100	F-90
HP-85 BUSINESS GRAPHICS	$150	F-88
HYPER GRAPHICS	$295 to $395	F-90
IBIS ILLUSTRATION SYSTEM	$11,200	F-91
IMAGE PRINTER II	$50	F-82
KNOW YOUR APPLE	$35	F-91
KNOW YOUR APPLE 2E	$25	F-91
THE LECTRIC WINDOW	$29	F-82
MICROART	$15,900	F-88
MICROMAP II COMPUTER ASSISTED CARTOGRAPHY	$650	F-91
MULTIMAP I	$2,000	F-91
NOTE PRO BRIDGE	$24	F-88
NOTE PRO I	$24	F-88
NOTE PRO II	$46	F-88
PC CORE	$995	F-88
PEAR TECHNICAL ANALYSIS	$600	F-82
PFS: WRITE	$125 to $175	F-82
PICTOGRAPH	$395	F-88
PIK - PRINTER/PLOTTER INSTALLATION KIT	$150	F-88
PLANETARY GUIDE	$30	F-88
PLOT	$75	F-88
PLOT-A-LOT	$14	F-88
PLOTPAK	$365	F-82
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SAGA GRAPHICS	N/A	F-88
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SCREEN DIRECTOR	$150	F-88
SGPLOT	$450	F-82
SLIDE	$95	F-88
SLIDEPRO	$95	F-88
SPACE GRAPHICS	$795	F-91
SPACE GRAPHICS ADVANCED	$1,695	F-91
SPACEMAN	$20,000 to $30,000	F-88
SPACE GRAPH/SPACE TABLET W/ HI-RESOLUTION	$795	F-91
SPACE GRAPH/SPACE TABLET-WITH HI-RESOLUTION	$2,495	F91-
SPRITE LOGO	N/A	F-88
THE STAFF	$14	F-88
STANDARD INSTRUCTION SET	N/A	F-88
STAT GRAPHICS PC	$475	F-82
STATS-GRAPH	$200	F-82
SUPERPLOT BUSINESS GRAPHICS	N/A	F-88
TARGET IMAGE MAKER	$175	F-88
TELEGRAPHY	$500	F-82
TK SOLVER PACK/FINANCIAL MANAGEMENT	$100	F-82
TOUCH 'N DRAW II ARCHITECTURAL	$73,000	F-88
TOUCH 'N DRAW II, INTERIOR DESIGN	$73,000	F-88
TRACE	$250 to $1,000	F-83
TSQUARE	$4,495	F-83
U-DRAW II	[illegible]	F-91
UCSD P-SYSTEM GRAPHICS EXTENSION	[illegible]	F-83
ULTRA HI-RES	[illegible]	F-88
VERSACAD	$1,995	F-83
VESA WRITER	[illegible]	F-83
VIDEO GRAPHS	$20	F-82
VIDEOGRAPH	$1,000 to $20,000	F-83
VIEWER	$995	F-83
VISI PLOT	$200	F-88
VISIPLOT	$200	F-83
VISITREND/PLOT	$300	A-88
100 SERIES	N/A	F-88

Sort/Merge

AUTOSORT/86C	$150	F-111
BIS MACHINE LANGUAGE SORT	$125	F-111
DIGITAL COLOR UTILITIES SOFT-WARE	N/A	F-111
DISK SORT/MERGE DSM	$90 to $150	F-112
FAST FORM	N/A	F-112
FLEX+-SORT	$179	F-111

GENERALIZED SUBROUTINE FACILITY GSE	$30 to $50	F-112
INFO-SORT	$95	F-112
INSIGHT	N/A	F-111
M/SORT	$195	F-111
MAIL MERGE	$125	F-112
MAXI MANAGER	$150	F-111
MAXI MANAGER UTILITY PACKAGE 1	$50	F-111
THE MERGER	$50	F-112
MICROSOFT SORT FACILITY	N/A	F-112
MULTI-KEY SORT- 'MKS'	$60	F-112
Q SORT	$100	F-112
QISORT	$200	F-112
SORT	$92	F-112
SSUMATCH	$5,000	F-112
SUPERSORT	$200 to $250	F-112
UNIFLEX SORT/MERGE	N/A	F-112
UNION-LIST OF SERIES	N/A	F-111
UTILITY PACK 1	$129	F-112
UTILITY PACK 2	$129	F-112
VIS/BRIDGE/GL	$195	F-112
VIS/BRIDGE/SORT	$89	A-112

Other Utility Software
(Includes Data Dictionaries, Query Languages and Security/Auditing)

ACE APPLESOFT COMMAND EDITOR	$40	F-126
AMPER-ARRAY	$50	F-126
AMPER-CHART	$50	F-126
AMPER-SAMPLER I	$50	F-126
AMPER-SCREEN	$50	F-126
APPLE/CADO TERMINAL EMULATION	$65.000	F-123
APPLE-DOC	$40	F-126
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BILLINGS DIAGNOSTICS PACK	$500	F-122
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CD/S-CP/M SIMULATION FOR CROMIX	$595	F-124
CIM CAM	$35,000	F-123
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COLLECTION PACKAGE	NA	F-126
COMMAND FILE/MEMORY MASS STORAGE	$1,000	F-127
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COPY V PC	NA	F-122
COPY/1	$20	F-126
COPYALL	$75	F-124
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CUSTOM CRONET I/O AND UTILITIES	$595	F-124
DCP	NA	F-123
DATA GENERATOR - DG	$115	F-122
DATA-LOCK	$95	F-108
DISCOURSE 1.0	$125	F-126
DISK DOCTOR	$100	F-127
DISK INDEX	$29	F-125
DISK MAKER	$1,200	F-125
DISK REPAIR	$40	F-125
DPATCH	$195	F-122
DSEC87	$1,500	F-108
EPT	NA	F-124
ESI 80	$595	F-123
ENTRYPOINT	$1,450	F-123
EPSON PRINTER INITIALIZATION PROGRAM	$2,995	F-124
FAST BACKUP UTILITY FASTBACK	$75	F-126
FASTRAK	$99	F-123
FFTASM	$49	F-123
INFOSET QUERY LANGUAGE	$9,700	F-100
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IRA MARKETER	$1,495	F-123
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MEDIA MAGICIAN	$99	F-126
MEDIA MAGICIAN VERSION 2.0	$49	F-126
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MICROSOFT SOFTCARD SYSTEM	NA	F-124
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REFORMATTER CONVERSION CP/M-IBM	$249	F-123
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THE ROUTINE MACHINE	$65	F-127
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Corrections

CORRECTIONS TO THE COMPUTERWORLD BUYER'S GUIDE TO COMPUTER SYSTEMS
August 24, 1983

The address for FOUR-PHASE SYSTEMS, INC. was incorrect; the correct address is 10700 North De Anza Blvd., Cupertino, Ca. 95014 M/S 52 10A7. (408) 253 0900.

Honeywell, Inc.'s DPS 7 line of computers is a mainframe and should have been listed in the mainframe section of the guide.

CORRECTIONS TO THE COMPUTERWORLD BUYER'S GUIDE TO TERMINALS & PERIPHERALS
October 5, 1983

The ND2 and ND3 printers listed on page A-50 of the guide are offered by Siemens Corp. not World Storage Technology Ltd. The address of Siemens is 240 E. Palais Rd., Anaheim, California 92805 Tel. (714) 772-5001. The price of the ND2 is $310,000 and the price of the ND3 is $190,000

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Airlines Find Ways to Beat the Holiday Rush

By John Gallant
CW Staff

While other shops bend under year-
id pressures, DP departments in the
rline industry are using capacity plan-
ng and programming moratoriums to
se system strains brought on by in-
eased holiday travel.

"We hit peak usage of the system
om mid-November until after New
ar's Day. But when we do our capaci-
planning earlier in the year, we base
r requirements on getting through
st Christmas rush," explained Wayne
ndra, director of computer services
Delta Air Lines. "We try to have all
r critical-path processing systems in
place for this time of year."

Within the peak holiday period are so-called "spike" days, such as the Monday after Thanksgiving, when the number of updates, inquiries, inputs and other processing transactions is exceptionally high, said Fred Voth, manager of computer performance for Republic Airlines. "During this season and especially on spike days, we have to handle an increased amount of data access. But I can't recall having to add extra processing power or communications lines, because our capacity planning has been so good." Added William Lakeman, manager of applications programming at Eastern Airlines' Miami Computer Center, "We've worked all year to provide the capacity for this season."

Capacity planning for some air carriers involves sophisticated techniques. At American Airlines, DP management utilizes detailed fore-

(Continued on Page 10)

COMPUTERWORLD
THE WEEKLY NEWSPAPER FOR THE COMPUTER COMMUNITY
Second-class postage paid at Framingham, Mass. and additional mailing offices
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$1.50 a copy; $44/year | December 19, 1983 | Vol. XVII, No. 51

See You in '84

Next week's *Computerworld* will feature our annual look at the year ahead and the developing trends in the computer industry. Combining the issue dates of Dec. 26 and Jan. 2, "Forecast '84" will examine what corporations are budgeting for management information systems and services next year, take a fresh look at micro-to-mainframe links, examine what IBM has done in the first years of the '80s, discuss how Digital Equipment Corp. is going back to the basics and check out what's hot and what's not.

Computerworld will sport a fresh look when we resume normal weekly production on Jan. 9. That issue will contain all the news and features offered in every issue of *Computerworld*, but it will feature an updated format with an easy-to-read typeface, more indexes and expanded technical sections.

The Jan. 9 issue will also witness the debut of a new technical section called "Microcomputers." The new section — covering systems, software, storage, output devices, board-level devices and auxiliary equipment — will centralize in one place the expanding number of stories now found in *Computerworld* on the use of microcomputers within corporations.

Study Takes Exception To Belief That Firms Don't Control Micros

By Jim Bartimo
CW Staff

NEW YORK — Despite the popular belief that the growth of microcomputer usage within corporations has been chaotic and uncontrolled, most of corporate America is dealing with the microcomputer explosion through the use of micro-to-mainframe links and companywide guidelines.

That is the conclusion of a report commissioned by the National Association of Accountants and released at a press briefing here last week.

Conducted by Price Waterhouse & Co., "Managing Microcomputers: A Guide for Financial Policymakers" looks at 240 individuals in 100 companies of varying sizes and locations involved in retailing, manufacturing and service. Within these companies, three groups were surveyed — chief accounting officers, management information systems managers and internal auditors.

"We may have underestimated the ability of corporate America to handle this phenomenon," said Price Waterhouse partner Gerald Ward. "There has been a lot of gloom and doom."

Fifty-nine percent of the 100 companies indicated that their micros are communicating with other computers. Of that group, 71% said the micros communicate with a mainframe or minicomputer inside the company with varying degrees of access to corporate data bases. Another 52% of the companies with communicating micros claimed they use electronic mail, while 14% said they share peripheral equipment, inferring a growing spread of local-area networks.

Another surprise found in the study results was that corporations are controlling the spread and use of microcomputers — something that has not been the case in recent years. A whopping 81% of the 100 companies claimed to have a formal policy regarding the purchase of microcom-

(Continued on Page 6)

Amdahl Plans Alternative To IBM's MVS

By Paul Gillin
CW Staff

SUNNYVALE, Calif. — Amdahl Corp. will release an "alternative" operating system to IBM's MVS for IBM and Amdahl mainframes which Amdahl said will provide improved performance for high-volume transactions while occupying significantly less memory than MVS.

The operating system, which is code-named Project Aspen, is slated for release in late 1984 or early 1985. The system will coexist and communicate with MVS but will be geared toward separate applications involving high-volume transactions and program development.

"It is not a replacement for MVS," a vendor spokesman said.

The system can also run as the sole operating system on a CPU. However, the spokesman would not say

(Continued on Page 8)

Inside

"Can we talk?" both Digital Equipment Corp. and Dun & Bradstreet asked last week. **Page 2.**

• • •

The night before Christmas is less than a week away, and several vendors have already stuffed their systems stockings. Modular Computer Systems, Inc. plunged into the 32-bit systems market by introducing its first superminicomputer **(Page 4)**, Sperry Corp. added two more multiprocessors to its 1100/70 mainframe line **(Page 5)** and Burroughs Corp. unwrapped an entry-level desktop system that can communicate with its larger systems **(Page 6)**.

• • •

A license to steal is what computer matching and profiling may be giving "professional" criminals, two MIT researchers warn. **Page 6.**

• • •

AT&T Renames, Restructures Western Electric

By Phil Hirsch
CW Washington Bureau

Western Electric will be dissolved as a separate corporate entity and absorbed into the newly formed AT&T Technologies, Inc. as of Jan. 1.

The new corporation will be structured internally into four lines of business on that date. Each line of business will be headed by a marketing executive who controls manufacturing and product development. The main aim of the new organization is to make it more responsive to customer needs.

AT&T Technologies, Inc. will be one of three incorporated units operating under the umbrella of AT&T Technologies and will be headed by James E. Olson. The other two units are Bell Laboratories and AT&T Information Systems. Olson, the new chairman of AT&T Technologies, Inc., will also continue as vice-chairman of AT&T.

The heads of each of the three

(Continued on Page 9)

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Subscription rates: $50 per year in U.S., $75 per year in Canada, $100 per year all other countries. $2.50 a copy in U.S. Foreign subscriptions are sent via surface mail unless otherwise requested.

Postmaster: Send address changes to Computerworld, Circulation Dept., Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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Special requests should be addressed to Patricia M. Shannon, CW Communications, Inc., 375 Cochituate Rd., Framingham, MA 01701.

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Printed in the U.S.A. Send Form 3579 change of address to Computerworld Circulation Dept., Box 880, 375 Cochituate Road, Framingham, Mass. 01701

Voice Tech Makes Itself Heard

• DEC Adds Voice Synthesizer

By David Myers
CW New York Bureau

NEW YORK — It seemed only appropriate that Digital Equipment Corp. permitted its talking computer to introduce itself to reporters and analysts here last week.

The industry's second-largest computer maker unveiled a $4,000 voice-synthesis unit called Dectalk that DEC executives said can "read" text strings at 120 to 350 word/min in any of several different voices.

Available in large quantities in March, the device provides single-user remote access to a computer via telephone. User instructions are provided to Dectalk and the host computer by pressing numbers on a standard Touch-Tone telephone. The unit can acknowledge these instructions in one of several user-selected voices — ranging from a deep baritone to one with a feminine lilt — and provides the requested data over the telephone also via an electronically synthesized voice.

Dectalk was demonstrated here last week running on the desktop Decmate microcomputer. However, the voice unit is compatible with any type of computer from any vendor, said Julius Marcus, vice-president of business and office systems engineering. He added, however, that rigging up a compatible device would require software not covered by the unit's $4,000 price.

Two years in development, the voice unit acts almost solely as an output device. "It will output any text string — the same thing you output to a printer," explained Robert Hughes, group manager of business and office products marketing for the firm. As an input device, it is "limited to whatever a Touch-Tone dial can do."

DEC presently has no plans to expand the voice-synthesis unit into a multiuser device. Moreover, initial users will be required to write their own applications programs.

DEC readily admits there is presently no real application or target market for the voice-synthesis device. In fact, DEC is depending on end users to come up with applications for Dectalk. "We have to build a market for it. The market hasn't happened yet," said Bill Avery, terminals and workstations engineering manager for DEC.

Decmate, VAX Enhancements

DEC also used last week's press conference to unveil a number of software enhancements for its Decmate workstation. These include Decspell, a spelling correction program that costs $395; an enhanced word processing package for $995; and a graphics software option that costs $695. The graphics option will be available sometime within the next few months, while the other two packages will be shipped sometime in the spring.

DEC also brought out document preparation and document transfer programs for its high-end VAX superminicomputers, including a document output and preparation package for $7,000 and a document exchange communications package, called DECDX, costing $2,850. The former will be available this spring, the latter sometime this winter.

Finally, the company announced two new communications capabilities for its VAX machines: bisynchronous terminal support for linking IBM 3270 terminals to its VAX systems, selling for $3,000, and an external document exchange program, costing $5,000, for transfers between VAX and Wang Laboratories, Inc.'s Office Information Systems. These will be available this winter and in the spring of 1984, respectively.

DEC is headquartered in Maynard, Mass. 01754.

• Credit Data Now Available Via Dunsvoice

By Jim Bartimo
CW Staff

NEW YORK — Dun & Bradstreet Corp. has announced the implementation of voice technology in its information services. The computer-voice network, called Dunsvoice, will give Dun & Bradstreet Credit Services' customers local telephone access to information on about 5.3 million U.S. businesses.

The voice network will allow 60,000 customers in 79 cities nationwide to obtain business and credit information via a push-button telephone. A computer-directed voice responds to the customer, who then requests various data by pressing the buttons on his telephone.

Information available includes a summary index of payment habits and a business summary that includes sales, net worth, number of employees, condition and trend of the business, name of principal officer and year the business started, a Dun & Bradstreet spokesman said.

Included in the Dunsvoice service will be the ability to request hard-copy documents to be mailed out. Special or more detailed information can be requested by having the voice network transfer the user to a customer service representative.

The network cost several million dollars to develop over three years. It has been tested by 400 companies over a six-month period, a company spokesman said.

The initial cost of obtaining access to Dunsvoice is $1,760 for 100 units. A basic credit rating of a company will use a half unit, and the payment index for company and industry will use a quarter unit: Dun & Bradstreet is at 299 Park Ave., New York, N.Y. 10171.

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MAX IV Superset Also Announced

Supermini Marks Modcomp Reawakening

By Tom Henkel
CW Staff

FORT LAUDERDALE, Fla. — After two years of virtual dormancy, Modular Computer Systems, Inc. has, in the words of its president, "come out of the closet" with its first 32-bit superminicomputer.

Called the Classic 32/85, the unit is a real-time processor that can run both 32-bit and 16-bit applications, the latter reportedly without software modification or system degradation. Like other systems in the firm's line, the newest entry is designed principally for factory automation and scientific applications, a spokesman said.

In addition, the firm also announced MAX 32 Rev.A, a superset of the firm's 16-bit MAX IV operating system designed to support real-time processing for the 32/85. The 32-bit system can also operate under MAX IV, a spokesman claimed.

The Classic 32/85 boasts both 16- and 32-bit firmware instruction sets, which are said to allow users of the firm's 16-bit minicomputers to run their software on the 32-bit machine without modification. Current 16-bit program users do not have to recompile their applications to run them on the supermini; however, since recompilation offers the benefit of a larger address space, it can result in improved execution time, according to the firm's president and chief executive officer, Gabriel A. Rosca.

Due to architectural improvements, the Classic 32/85 reportedly offers twice the performance of the firm's high-end 16-bit processor, the Classic II/75, announced in 1982. The 32/85 is also compatible with Modcomp's line of board-level processors announced earlier this year: the Classic II/15 Modacs V, an intelligent process I/O system; the Modacs II, a data acquisition and control system; and the Model 4185-X disk subsystem [CW, Aug. 29].

Memory Modifications

The Classic 32/85 offers up to 64M bytes of multiported physical memory and 1G byte virtual memory. However, operating system modifications to accommodate virtual memory will not be made for at least a year, according to Prem Chawla, director of product marketing.

The system's CPU is composed of the memory management unit with a mapping processor, a four-way 64K-byte cache memory and an instruction set processor.

The Classic 32/85 can be configured with up to six central processors or I/O control units. A single-processor configuration offers an internal throughput roughly equivalent to two million instructions per second (Mips), while a four-processor configuration offers throughput roughly equivalent to 8 Mips, the vendor said.

Typically, a maximum of four central processors can be configured with up to two I/O control units. But for I/O-intensive applications, reportedly up to four I/O control units can be attached to two CPUs, the firm said.

All application software written on any Classic series processor can be transported to the 32/85 processor operating under MAX 32. In addition, the 32/85 uses the same I/O bus as the earlier 16-bit Classic systems; therefore, peripherals used on earlier systems can also function on the Classic 32/85, the vendor said.

A basic 32/85 configuration including a CPU, two I/O controllers, 2M bytes of main memory, the maintenance subsystem and console controller costs $148,500. Additional memory costs $12,000 in 2M-byte additions. A similarly configured processor with two CPUs, two I/O controllers and 6M bytes of main memory costs $295,000. The MAX 32 operating system can be licensed for $10,000, the vendor said.

Modcomp can be reached through P.O. Box 6099, 1650 W. McNab Road, Fort Lauderdale, Fla. 33310.

Market May Still Give A Tough Time to Modcomp

Analysis

By Bill Laberis
CW Staff

FORT LAUDERDALE, Fla. — The price and performance claims of Modular Computer Systems, Inc.'s new 32-bit supermini appear to make it an attractive factory floor addition, but other market forces will make it difficult for the company to regain its failing financial health.

For one thing, 32-bit capabilities ceased being a novelty years ago, and users now expect them. Thus, with its late entry into this market segment (see related story), Modcomp joins such major factory automation vendors as Digital Equipment Corp., Perkin-Elmer Corp. and Gould, Inc. that have offered 32-bit processors for factory automation for some time.

Also, Modcomp officials who were presenting the 32-bit Classic 32/85 last week may be overstating the vitality of factory automation demand in 1984. Modcomp is counting on a "major surge" in factory automation-related purchases in 1984 as the recovery spreads to the manufacturing sector of the economy. With this surge, Modcomp would like to add upward of 30 major accounts to its books in the year and is staffing up on the marketing side to do so, the company said.

Gradual Climb

However, instead of a surge in demand, what may be more likely is a gradual climb, mainly because factory automation is a relatively new concept, encompassing elements of both process control and traditional data processing. Getting professionals from both spheres to work together and to agree on anything will be a difficult task.

"I see a lot of pent-up demand in the factory automation area, but companies are still wrestling to define just what it is, let alone how much they are willing to risk on it," said Tony Friscia, who tracks factory automation for Framingham, Mass.-based International Data Corp. "Factory automation has a really great future, but it isn't going to happen all at once, or even a great deal in one year."

It is that bright future that has attracted major competitors to the factory arena, and it is this increased competition coupled with Modcomp's outdated 16-bit line that has made life so difficult for the company recently.

After earning $1.8 million on modest sales gains in 1982, Modcomp went into a tailspin, with the company posting losses of $1.4 million, $550,000 and $10.9 million in the first three quarters of 1983, respectively. Heavy losses are anticipated in the fourth quarter, while revenues for the year may end up at 1981 levels. Meanwhile, the company has axed 14% of its work force — mostly white-collar professionals [CW, Oct. 10] — in an effort to stem the flow of red ink.

"With the kind of competition out there, it is just not a comfortable market to be involved in now," Friscia said. "Modcomp has a solid product line, and the new machine looks like a good one. But it's tough to go against the likes of DEC in one of its stronger markets."

Friscia said third-party software companies are more inclined to write applications to run on machines of the bigger vendors, which also have the largest installed bases.

Modcomp claimed it has an installed base of more than 3,000 16-bit machines, and it is this market that is its primary target with the 32/85. One key feature of the 32/85, Modcomp said, is its ability to recompile applications written for 16-bit machines and run them in the 32-bit mode with no degradation, a feature it claimed to be unique in the real-time processing world.

But this feature may not have much applicability beyond Modcomp's own user base, Friscia commented.

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The redesign, *Computerworld's* first in seven years, is being carried out under the direction of Robert Lockwood, the nationally known newspaper designer whose credits include *The Christian Science Monitor, Chicago Sun Times, Allentown Morning Call, Philadelphia Bulletin, Dallas Morning News* and *Baltimore Sun*. He was the founder and first president of the Society of Newspaper Designers.

Sperry Adds Two Processors to 1100/70 Series

By Tom Henkel
CW Staff

BLUE BELL, Pa. — Sperry Corp. has added two high-end multiprocessor computer systems to its 1100/70 series of mainframes.

Called the 1100/73 and 1100/74, the units offer users the additional choices of a three- and four-CPU system, respectively. The enhancements bring to 19 the number of available uniprocessor, dual-processor and multiprocessor configurations in the 1100/70 line.

The 1100/73 and 1100/74 use the same 64-bit chip technology used in other 1100/70 series processors. In addition, the newly announced processors are compatible with other processors in the line.

All main memory for the 1100/73 and 1100/74 is contained in external storage cabinets. On previous 1100/70 mainframe systems, all memory is internal, with additional external memory optionally available.

The maximum main memory of the 1100/73 and 1100/74 is 8M words, or 32M bytes, with each external main storage unit containing a memory capacity from 1M to 4M words (4M to 16M bytes), the vendor said. Both the 1100/73 and 1100/74 use the 1100/OS operating system, which is compatible with other processors in the 1100 line. Components of the 1100/OS include system control software, Sperry's Mapper applications development package and most popular languages, a spokesman said.

The 1100/70 configurations include a Distributed Communications Processor (DCP): either the firm's DCP 40 (which supports up to 256 communications lines), the DCP 20 (which supports up to 48 lines) or the DCP 10 (which supports six lines). In addition, the DCP units offer network processing, including downline nodal processing and data concentration, the spokesman noted.

The 1100/73 and 1100/74 incorporate a disk controller that allows attachment of up to 16 Sperry 8470 and 8450 disk drives on a single or dual channel. The controller also allows attachment of up to four 8480 disk drives that can be intermixed with the 8470s or 8450s, the vendor said.

An 1100/73 CPU with 1M word of main memory costs $1,052,710. The unit leases for $26,625/mo on a five-year plan with a monthly maintenance fee of $6,450. The 1100/74 central processor with 1M word of main memory costs $1,322,180. The unit leases for $33,635/mo with a monthly $8,360 maintenance fee, according to the company.

Both systems are available immediately from Sperry through P.O. Box 500, Blue Bell, Pa. 19424.

DEC Gear Bound For Soviet Bloc Seized in UK

By Peter Bartolik
CW Staff

DORSET, England — Yet another consignment of Digital Equipment Corp. computer components has been seized just prior to alleged shipment to a Soviet bloc country.

Agents of the UK's Customs and Excise seized Dec. 11 a container truck loaded with six "pieces" of DEC equipment, reportedly valued at more than $750,000, as it was about to be placed on a ferry here in the port of Poole.

According to U.S. Customs spokeswoman Christine Frazer, "neither the U.S. manufacturer, Digital Equipment Corp., nor the UK firm [that imported the equipment into the UK] are involved in this."

Arrested when agents seized the equipment were Bryan Williamson, 51, president of the UK firm Datalac, and Christopher Carrigan, 40, an engineer with the company. An unnamed person who was driving the container truck was also detained. Williamson and Carrigan were reportedly arraigned Dec. 12 before a UK Magistrates Court on charges that they violated the 1981 British Export of Goods Control Order. They were reported held in lieu of bail.

Exactly what type of DEC equipment was uncovered in the seizure was not publicly identified. Customs' Frazer said she did not know whether the equipment was the same type that was reported seized recently in West Germany [CW, Nov. 21] and Sweden [CW, Nov. 28]. Those seizures involved a split shipment of a DEC VAX-11/782 dual-processor superminicomputer.

According to Frazer, Williamson "is the subject of a current U.S. Customs investigation, and the firm is on the U.S. Department of Commerce's denial list." The denial list contains the identities of individuals and companies who may not be granted export licenses for U.S. high-technology items.

The equipment was reportedly to be shipped to France, but allegedly would have been reshipped to Czechoslovakia. According to Frazer, Williamson had received British export licenses for two computers, but not for four additional components that were seized.

The U.S. Customs attache with the U.S. Embassy in London was involved in the investigation conducted by the UK's Customs and Excise department, Frazer said.

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Matching Assailed as Way to Catch Criminals

By Jake Kirchner
CW Washington Bureau

CAMBRIDGE, Mass. — Using computer matching and profiling to detect white-collar crimes — a method popular among bureaucratic and law enforcement agencies — may actually catch only less sophisticated violators while giving "professional" criminals "a license to steal," according to two MIT researchers.

Relying on computers to scan data files routinely or to build statistical profiles of criminals — both intended to alert authorities to possible indicators of criminal behavior — necessarily results in focusing on a limited number of variables, noted Dr. Gary T. Marx and Dr. Nancy Reichman in a soon-to-be-published paper on the subject.

Marx, a professor in the MIT Department of Urban Studies and Planning, and Reichman, recently awarded a doctorate by the same department, suggested that these indicators, although narrowly selected, "may be invested with far more predictive power than they warrant." This might detract attention from other variables and other types of crime they might indicate.

While these techniques can deter or discover some offenders, they also offer "almost guaranteed" success for criminals "who gain knowledge of the system and take action to neutralize it."

Their paper, which will appear in an upcoming issue of *American Behavioral Scientist*, concludes: "Cleary not all potential offenders can acquire the knowledge or have the skill sufficient to neutralize the system. However, over time, it seems likely that these systems will disproportionately net the marginal, amateur, occasional or opportunistic violator rather than those who are more systematic, repetitive, skilled or professional in their rules breaking."

Ironically, the paper added, those skilled persons "may be granted a kind of license to steal, even while headlines hail the effectiveness of control agents using new techniques."

According to Reichman, the paper is the first fruit of a larger research project examining the use of computers to ferret out white-collar crime. She told *Computerworld* that on the subject of computer matching and profiling, "our concern is that these techniques have been expanding with little empirical documentation on their costs, benefits or consequences."

The paper is meant to raise issues and does not come to any hard conclusions on this use of computers, she said, adding those conclusions cannot be reached until better case history and statistical data are available. Collecting that data may be the next step of their research, she said.

In their paper, the two researchers noted that use of computer matching is on the rise, with approximately 500 programs now in effect on the state and federal level. While the programs have successfully detected some crimes, they said, they also raise questions about errors and civil liberties violations.

Data errors, software errors and mistaken interpretation of the data used in matching programs can make them ineffective, according to the paper. They may also "transform the presumption of innocence into an assumption of guilt" and circumvent constitutional and legal protections for citizens, the researchers said.

The paper added that although the detailed data necessary for "sound policy recommendations" is not available, the computer techniques do raise a number of theoretical implications, including the possibility they will merely shift the types of crimes detected.

The two authors said these uses of computers are an indication of "an irreversible continuing historical process of more intensive and extensive social control."

Beyond that, they said, "powerful new discovery means may overload the system. Authorities may discover far more violations than they can prosecute or process. This overabundance can lead to the misuse of discretion and demoralization."

Runs in CMS Environment

Burroughs Unwraps B95 Desktop Micro

By Tom Henkel
CW Staff

DETROIT — Burroughs Corp. has announced the B95, an entry-level desktop computer system based on a proprietary microprocessor set that operates in the same software environment as a number of previous Burroughs computers.

The B95 functions under the firm's Computer Management System (CMS), the same operating environment as larger Burroughs processors including the B80, B800, B90, B900, B1900 and the CP 9500. CMS consists of the Master Control Program operating system, high-level language compilers and utilities and a number of business management application programs.

The B95 is targeted at budgetary accounting, inventory management, patient accounting, payroll and asset management applications, the vendor said.

The B95 consists of three basic units: a power supply unit, a processor and a data storage module. It is available with between 256K and 512K bytes of main memory and a maximum hard disk storage capacity of 28.8M bytes, the vendor said.

The processor module includes main memory, a disk controller and a data communications controller, Burroughs said. The storage module comes with a standard 9.6M bytes of formatted 5¼-in. hard disk storage, plus 700K bytes of floppy disk storage. Users have the option of substituting a 14.4M-byte hard disk drive for the 9.6M-byte drive for an additional $300. In addition, a second storage unit, offering only the 14.4M-byte hard disk storage, can be added to the B95 system to bring the total storage capacity to 28.8M bytes. The additional storage unit costs $5,095, a Burroughs spokesman said.

The B95 can be used as a standalone desktop system or as a satellite processor in a network with other Burroughs systems. The system can operate in a standard office environment, and most configurations are customer-installable.

In addition to the CMS operating system, the B95 is equipped with Superstart, a program that presents the operator with a series of menus that serves as a guide to using the system. The Superstart package, Master Control Program and assorted utilities are available for a one-time license fee of $2,850, Burroughs said.

A basic B95 configuration, consisting of 256K bytes of main memory, 9.6M bytes of hard disk storage, a 180- to 230 char./sec printer and a Burroughs ET 1100 workstation, costs $18,417.

There are two basic software maintenance plans for the system. A phone-in maintenance service costs $205/year, and an expanded maintenance service, which includes on-site maintenance if necessary, costs $410/year. A limited-time, or month-to-month, software rental plan costs $100/mo, a spokesman said from Burroughs headquarters in Detroit, Mich. 48232.

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Study Finds Micros Managed

(Continued from Page 1)

puters, while 74% have micro training programs, and 73% integrate microcomputer planning with all other computer planning, according to Ward.

Of the 100 companies, 23% have more than 100 micros, and 50% have between two and 25 micros, with the following overlapping applications breakdown: 47% used for stand-alone accounting; 36% for mailing lists; 80% for budget forecasting; 28% for cash management; 23% for time-sharing (terminal emulation); and 70% for word processing, Ward said.

He emphasized that this study differed from many others that have found corporations lacking in both advanced communications applications and in establishing microcomputer policies. Because the study found so much interest in hooking microcomputers together, Ward said "Micros are being used in a communications mode, and this needs to be addressed in the coming year."

The study will not be available for several months, but more information is available from the National Association of Accountants, 919 Third Ave., New York, N.Y. 10022.

Scrooge

What might have happened if old Ebenezer had been a sort user!

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Scene: The computer center of Scrooge & Marley, a busy counting-house. Enter Bob Cratchit, systems programmer and father of a large family.

Cratchit: Excuse me, sir. I was wondering if I might have December 25th off.

Scrooge: Bah, humbug, Cratchit! You know we have all those sorts to run by the end of the year. And nobody to run 'em but that green kid you hired. What's his name?

Cratchit: Tiny Tim, sir. (Bravely) He's my son and he says it's our sort program that's causing the trouble. He thinks we ought to try SyncSort—

Scrooge: Humbug, man! Our sort is made by the World's Leading Hardware Manufacturer. (Jams on his hat.) Now be here all the earlier on the 26th!

Scrooge takes a solitary meal at his local fast-food outlet and then retires to his gloomy bedchamber. Perhaps as a result of what he has eaten—a tacoburger washed down by a low-calorie soda—he experiences a harrowing nightmare.

He is visited not only by the ghost of his former partner, Jacob "Damn the Software" Marley, but also by the Ghosts of Data Processing Past, Present and Future.

Ghost of DP Present (as he shows Scrooge the Cratchit family gathered for their holiday meal): Yes, a happy family, but—alas—one over whom a cloud hangs. Poor Tiny Tim...

Scrooge: Is there no hope for the little chap, Spirit?

Ghost: No...unless Tiny Tim receives a new sort program, his operations are...doomed!

When Scrooge finally awakens from his ordeal, he is a greatly changed man. Happy to be alive, he springs from his bed, throws open his windows and calls to a blue-jeaned youth in the street below.

Scrooge: You there, boy! Do y'know the fine, big sort program that hangs in the shop down the street?

Boy: Crikey, sir, you must mean SyncSort.

Scrooge: I do indeed. Run and tell 'em to send it here at once! A half crown if it arrives in less than five minutes. (Chortling) I'll send it along to Tiny Tim. If that doesn't goose up his sorting, nothing will.

From that day to this, no man keeps the holidays better than Scrooge, and nobody sorts better either. To Tiny Tim, who has just received his MBA, Scrooge has been a second father.

And to his other employees, who now enjoy ten paid holidays a year, Scrooge is as good a man and as good a master as anyone in the good old world of data processing!

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Redundancy Prevented Serious Danger

Nasa Probing Failure of Shuttle Computers

By Peter Bartolik
CW Staff

HOUSTON — Redundancy paid off again for the National Aeronautics and Space Administration (Nasa) and its astronauts when two computers failed prior to and during the landing sequence of the space shuttle *Columbia* on Dec. 8.

No official cause for the failures has yet been determined, a Nasa spokeswoman said last week, but the sequence of events began at the same time that an automatic firing of jet thrusters in the nose of the craft rocked the vehicle with a force that Mission Commander John W. Young said was probably as great as anything ever experienced on a shuttle flight.

"It really hit the vehicle hard," Young reported here to Nasa's Mission Control after the incident, adding, "It was probably as high a magnitude type of thing as we have seen."

Simultaneously, the ship's No. 1 computer shut down and its task of handling the guidance and navigation systems was immediately taken over by the second of four redundant IBM Advanced System/4 Pi Model AP-101 computers. But five minutes later, following another thruster firing, the second computer also shut down, and Mission Control commanded the third computer to take over the vital guidance and navigation functions.

"Nothing has been proven," Nasa spokeswoman Lisa Malone said last week when asked if it had been determined that the thruster firings had definitely been linked to the computer failures. Engineers for Nasa, Rockwell International Corp. — the prime contractor for the shuttle project — and IBM will work jointly to attempt to pinpoint the cause, she added.

"IBM is conducting an extensive study to see what went wrong," according to Joseph Melitano, a spokesman with the company's space shuttle program. The units that failed were removed from *Columbia* and were to be flown for analysis to IBM's Owego, N.Y., facility where they were developed, he added.

The initial failures, however, were not the last of the problems for the mission. Flight controllers succeeded in restarting the second computer, but were unable to restart the first. Then, just as *Columbia* touched down almost seven hours behind the original schedule, the No. 2 computer again failed. (Nasa technicians also discovered last week that during the landing a small fire occurred when fuel leaked from an auxiliary power unit used to drive the ship's hydraulic system.) Another problem encountered earlier in the day was the failure of one of three inertial measuring units.

Redundancy and backup systems are terms that have come to be synonymous with the U.S. space program. "That's why the astronauts were not in any danger," according to Nasa's Malone.

According to IBM's Melitano, four computers are tied into a redundant system, and a fifth acts as a backup and is generally called into use only during "critical mission phases" such as ascent and descent. Any one computer can control and land the craft, he said, and each of the four main computers is also assigned to monitor specific functions during flight, such as navigation and guidance or reentry procedures. The redundant configuration incorporates a method for prioritizing functions, and each computer "votes" on the task at hand.

The recent shuttle mission, the ninth to date, set a number of firsts for the program: the largest crew, six men; the longest mission, 10 days; and the first use of Spacelab, a European Space Agency orbital research facility that was carried into orbit and returned to Earth in the shuttle's cargo bay and was also the heaviest payload.

Inquiry: Human Error Probable Cause For KAL Presence in Russian Airspace

By Patricia Keefe
CW Staff

MONTREAL — One of two human errors in operating computerized navigational equipment is the most probable explanation why a South Korean airliner strayed into Soviet airspace Sept. 1, according to a report under consideration by the 33-member governing body of the International Civil Aviation Organization (Icao) here.

The study discounts Soviet claims that Korean Airlines (KAL) Flight 007 was on a spy mission for the U.S. and charges the Soviets did not make "exhaustive efforts" to identify the airliner before shooting it down, killing all 269 people on board.

The report also rejected other theories about why the plane deviated from its normal course, including taking a shortcut to reserve fuel, a hijacking or navigational equipment failure.

The two theories strongly supported by the report hold that the plane strayed 300 miles off course because the crew either input incorrect coordinates for its Anchorage, Alaska, departure point into the inertial navigation computer system (INS) [CW, Dec. 5] or neglected to attach the automatic pilot to the INS. Under the latter theory, the automatic pilot would have kept operating on a constant heading rather than providing the successive heading changes computed by the INS.

The report concluded, "Each of these postulations assumed a considerable degree of lack of alertness and attentiveness on the part of the entire flight crew, but not to a degree that was unknown in civil aviation," an Icao spokesman confirmed

Also, the inquiry team found no evidence to support the Soviet supposition that the KAL airliner was on a spy mission, according to the spokesman. Although the Soviets claim the airliner delayed its takeoff for 40 minutes to coincide with the passage of U.S. satellites, the inquiry team's report refutes that charge.

The report states that KAL airliners customarily alter their flight plans to account for the "winds aloft," which vary daily. The KAL pilot did nothing out of the ordinary when he delayed his flight for 30 minutes to ensure that he would not reach Seoul, South Korea, before his scheduled arrival time, the spokesman said. "The flight plan is based on the winds aloft, which can alter flight time by as much as 40 to 50 minutes," he added, noting "this pattern [of behavior] was traced back over months."

Soviet and Czechoslovakian representatives of the Icao "have had some difficulties" with the 100-page document, as well as with a resolution recently passed by the governing body, the Icao spokesman said. Under that resolution, the governing body agreed to:

- Reiterate its resolution of Sept. 16, calling on all parties to the investigation to cooperate fully and furnish the Icao with all the information about the incident at their disposal as soon as possible.
- Refer the seven-member inquiry team's report to the Technical Air and Navigation Committee (Tanc) for review.
- Review Tanc's findings at its next session, which begins Jan. 23, reporting final conclusions in late March.
- No longer restrict the character of the council working paper.

Attached to the inquiry team's report is an 18- or 20-page preliminary report filed by the Soviets as a result of their own internal state investigation, the Icao spokesman said. "This statement makes it quite clear that the Russians considered the plane to be an intruder on an intelligence-gathering mission," he continued. Further, the preliminary report cites the airliner's sudden climb of 2,000 feet and its loss of speed, which the Soviets took to be an evasive action. Shortly after receiving permission from Japanese air controllers to climb 2,000 feet, KAL Flight 007 was shot down.

The inquiry team has concluded that the Soviets did not make exhaustive efforts, such as flying close to read the print or logo on the airliner's side; in order to identify the plane. The spokesman said that the Soviets claim to have attempted to communicate with the airliner's crew on a frequency different from the one used by the air controllers and so would not have overheard any conversation on the latter frequency.

The secretary general of the Icao, also a member of the inquiry team, personally visited the Soviet Union to request that state officials turn over a number of items thought to be in their possession, including video recordings and tape transcripts. Although Soviet officials have not yet turned over any of the requested evidence, they did say they would take the secretary general's request under consideration, the spokesman added.

Amdahl to Release Alternative to MVS

(Continued from Page 1)

whether Aspen will be compatible with other systems, data base management and applications software now supported by MVS.

Amdahl has said little about the project at this point other than to comment that Aspen will be designed to operate on any IBM 370 architecture machine. The spokesman said the principal attributes of Aspen are its "ease of use for operating staff and system programmers.

"I think the one word to describe it is simplicity," he said. "It does a lot of things that a systems programmer now has to concern himself with, such as data set allocation, which has to be done stringently by a systems programmer."

Early reports have described Aspen as being a "stripped-down" version of MVS, but the Amdahl spokesman bristled at that suggestion. "It was completely innovative from the start," he said. "Some of the control block interfaces are similar, but there was no attempt to emulate or duplicate MVS." He added that most of the essential performance features of MVS have been retained.

Aspen's price will "probably be 20% to 25% lower than MVS," according to Robert Fertig, president of Enterprise Information Systems, Inc., a research group based in Greenwich, Conn. However, the Amdahl spokesman said no price has been set.

In developing Aspen, Amdahl becomes one of the few software vendors ever to challenge IBM in the operating system realm. However, the spokesman said the company does not regard the four-year development effort as a risk.

"We feel there's kind of a vacuum out there for an operating system with a high-transaction orientation for development on a very-efficient basis," he said.

As Amdahl's first research and development project in the operating system category, Aspen signals a new thrust by Amdahl into systems software. The company already offers the Unix operating system on its 470 and 580 processors.

"We've done things in the productivity and compatibility areas before. That, plus this program, are indications that it's more important for us to get into software," the spokesman said.

Western Electric Gets New Name, New Structure

(Continued from Page 1)

units will report to Olson. This arrangement, he said, will "make it easier to set common policies.

"We decided to organize our resources by lines of business in the belief that customers will be served best by a fast-moving organization focused on specific markets," he explained last week at a New York/Washington, D.C., press teleconference. Integrating manufacturing and product development "will translate customer needs into products and systems in the fastest, most efficient way. The head of each business unit will now have control over all the resources necessary to be successful and will be accountable for the profitability of that business worldwide."

Olson added that AT&T regards its deregulated subsidiary as "another line of business," larger than any of the four derived from Western Electric. After repeating AT&T's oft-stated objection to the Federal Communications Commission's (FCC) Second Computer Inquiry Decision, which requires AT&T terminal equipment and computer-based online (enhanced) services to be marketed through a separate subsidiary, Olson indicated that after divestiture officially occurs Jan. 1, the company will argue the decision is no longer needed, since it is based on predivestiture conditions. If this campaign fails to change the FCC's mind, Olson said, Western Electric plants that currently manufacture products marketed by AT&T Information Systems will be transferred to that subsidiary.

AT&T Technologies, Inc. will consist of four marketing divisions devoted to network systems, consumer products, "technology systems" (components, electronic systems, computer systems and federal systems) and international sales. The head of each division will report to Donald Procknow, currently president of Western Electric. He is vice-chairman and chief operating officer of AT&T Technologies, Inc.

Procknow reports to Olson, along with Ian M. Ross, president of AT&T Bell Laboratories, and Charles Marshall, chairman of AT&T Information Systems.

AT&T Chairman Tells Why They Did It

NEW YORK — "We could have chosen to call this new enterprise the Western Electric Co. We chose instead to put all our resources and reputation behind the AT&T name."

In this way, Charles L. Brown, chairman of AT&T, explained and characterized the sweeping reorganization of his company while speaking before security analysts here last week.

AT&T essentially divided its business into two parts: the regulated Long Lines segment of the business, now called AT&T Communications; and AT&T Technologies, Inc., consisting of AT&T's unregulated entities (see related story) under the leadership of James E. Olson, AT&T vice-chairman.

Brown told the analysts that the reorganization is "a major step to shape the new AT&T into a company that is organized to make the most of the business opportunities now open to us in unregulated markets." AT&T Technologies "will assume the corporate charter of the Western Electric Co. The Western Electric name will not be retired. Rather, it will be displayed on AT&T's telephone products," Brown said.

"As for our market, we see it as nothing short of global," according to Brown. "The organization we are creating today will help greatly to break down any remaining barriers that might keep us from thinking of the business in global terms," he said.

Brown claimed that "commotion over divestiture" had distracted attention from the company's many product introductions this year, adding that internal demand for Western Electric's integrated circuits "increased threefold" over last year.

The reorganization notwithstanding, Brown warned analysts that "1984 will not be an easy year for us," labeling the next 12 months a "shape-up year" in which the company will seek to consolidate and organize its businesses. However, he promised analysts that the company would eventually produce a return on equity "higher than in predivestiture days."

Asked if AT&T had any plans to acquire smaller firms, Brown said, "While we have no inhibitions against it, we have no immediate plans we are ready to announce."

Articles on Apple, IBM Micros Indexed

SOUTHBURY, Conn. — BP Publications has announced a series of indexes to magazines that publish articles relating to business computing and personal computers from IBM and Apple Computer, Inc.

The bimonthly indexes, available now, reportedly cover 12 magazines with articles about Apple computers, 11 magazines for the IBM Personal Computer and 10 magazines with articles about business computers.

Subscriptions for 1984 are priced at $22 for "The Apple Index," $24 for "The IBM Personal Computer Index" and $28 for "The Business Computer Index." An annual cumulation of each index costs an additional $10.

Information is available from BP Publications, P.O. Box 617, Stiles Road, Southbury, Conn. 06488.

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Banks' Systems Ready for Holiday Season

By David Myers
CW New York Bureau

NEW YORK — With Christmas less than a week away, banks here are stockpiling clean, crisp bills for their customers to hand out as job-well-done tips to New York's legion of superintendents, doormen and parking-garage attendants.

But in other ways, banks in the Big Apple began preparations for the Christmas crush a long time ago.

"Our planning year is based on the Christmas rush. If we can get past Christmas, we can relax in January," said Alan Silberstein, senior vice-president of retail operations at Chemical Bank here.

For the banks' systems managers, this means new computer equipment has to be in place, tested and broken in well before Thanksgiving. The Christmas shopping season begins the day after America's fall feast and runs until the day of Christmas Eve, according to banking executives.

A spokesman for the Bank of New York said business does not slack off even then; what with January white sales and customers exchanging their Christmas gifts for something a little more suitable, the first month of the year is as busy a month as the last.

Business is particularly brisk in at least two areas: remittance processing and credit card transactions.

Remittance processing is up during December, according to William W. Shine, senior vice-president of operations and systems for Chase Manhattan Bank. Shine speculated that customers increase the number of payments on their charge card accounts in order to boost the amount of credit they have available to them for Christmas presents.

Credit Card Transactions

Credit card transactions are heavier in the 30 days between Thanksgiving and Christmas than at any other time during the year. These strain the banks' computer systems for both processing the sales tickets and authorizing the purchase to the merchant, according to Shine.

"Christmas purchases are in large measure made by plastic," Shine pointed out. The reason for this seems obvious: Christmas shoppers do not want to know how much they are spending until after the Christmas spirit has worn off.

In preparation for the heavy volume of charge account activity, the banks must purge their computer storage disks just prior to Thanksgiving. This gives them more room for the flood of shopping data to come.

But credit card purchases place the stiffest burden on banks' authorization setups. Banks that authorize credit card payments automatically have to make sure they have provided enough access routes into their computers' modems.

Banks that OK the transactions in a telephone conversation between a store clerk and a bank worker must hire additional personnel for the holidays.

In fact, the greatest strain on banks' resources during the Christmas trading period is not on their systems, but on their personnel.

"Our biggest problem in getting the work done is not the [shopping] rush, but the terrible imposition on [bank employees] who want to go out to shop for Christmas," Silberstein said.

Just like the hordes of last-minute Christmas shoppers, customer traffic in the bank branches is heaviest on the Friday before Christmas, Dec. 23 this year. So extra tellers are needed, and even bank executives are pressed into service. "Everyone does a day in the branches," Silberstein said.

Airlines' DP Shops Beat Christmas Rush

(Continued from Page 1)

casting models and a base of historical data to predict capacity peaks and equipment and personnel needs. A spokesman for American said the airline can anticipate activity volume almost on a daily basis as a result of that modeling.

At United Airlines, capacity planning is "pretty much a science," according to Michael Schwab, director of the Chicago Computer Center. "The increased demand doesn't affect us because we have plenty of capacity. We're extremely well positioned to respond to these peaks because of our ongoing planning, which incorporates a combination of modeling and projection methodologies and historical data on past capacity usage."

In most airline DP environments, reliance on capacity planning is coupled with a programming change freeze, or moratorium, intended to prevent costly system disruptions. At Trans World Airways, for example, "Our real-time reservation system is designed to handle the added volume during this season, but to be certain that we don't upset things, we institute a system freeze. We don't allow anything but emergency programming changes during that time," said Ted Celentino, director of systems and programming.

Republic's DP shop has a two-level moratorium policy. During that airline's restricted period, which extends from Thanksgiving until mid-December, programmers are told to avoid "non-error-correcting or non-revenue-producing changes," Voth said. During the stricter change freeze period from mid-December until Jan. 3, only critical or "emergency" changes are allowed.

"Even if you test a program extensively before you bring it into the production environment, you're going to experience some system degradation at first," said Delta's Condra. "Our mission is to provide good, uninterrupted service, and the freeze provides us with optimum response time and availability during this period."

For the airlines that do not impose a programming moratorium, planning is still the key to success. "We don't have a hard-and-fast blackout," said American Airlines spokesman Al Becker. "Our whole programming effort just can't grind to a halt. But our activities are carefully scheduled so that no major hardware or programming changes occur during peak usage times. It's simply a matter of tight management control."

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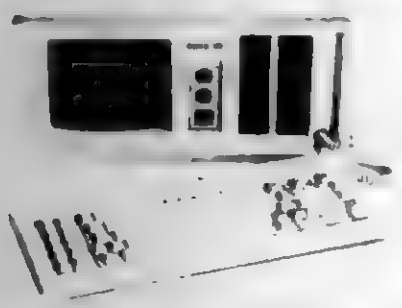

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U.S. Supreme Court Says No to Divestiture Review

WASHINGTON, D.C. — Unanimously and without comment, the U.S. Supreme Court refused this past week to review the AT&T divestiture plan which resulted from the settlement of the U.S. vs. AT&T antitrust suit.

The court's action removed what is probably the final barrier to implementation of the divestiture Jan. 1.

The appeal was filed by California and New York, which argued, among other things, that inside wiring and "station-handling costs" — the expenses of transporting a terminal to the customer's site, installing and testing it — should have been transferred to AT&T rather than left with the divested Bell operating companies. These expenses total about $2.3 billion, according to California's appeal.

Baxter Resigns as Head Of Antitrust Division

WASHINGTON, D.C. — Saying that he's "burned out" and eager to resume his teaching post at Stanford University, U.S. Assistant Attorney General William Baxter resigned effective last Friday as head of the Justice Department's Antitrust Division.

Succeeding Baxter is J. Paul McGrath, the chief of the Justice Department's Civil Division, who worked for AT&T as a private antitrust attorney.

Baxter, a firm believer in the idea that bigness in business is not necessarily bad, dropped the government's 13-year-old antitrust suit against IBM on Jan. 8, 1982, the same day he announced the settlement of the government's seven-year-old antitrust suit against AT&T. Although the latter action broke up the world's largest corporation, it was criticized as not going far enough, and U.S. Federal District Court Judge Harold Greene, who is presiding over the AT&T divestiture, forced the company last summer to accept additional restraints.

Baxter's resignation and McGrath's succession were announced at a press conference here, during which the new head of the Antitrust Division stressed the need to "avoid handicapping business" by penalizing economic efficiency in a competitive environment. Because of his past association with AT&T, McGrath said he would disqualify himself from matters involving the Bell System.

U.S. Attorney General William French Smith and Deputy Attorney General Edward C. Schmults have also disqualified themselves for the same reason.

Ellinghaus Announces Retirement From AT&T

NEW YORK — William M. Ellinghaus, who began his career 44 years ago as an installer for the Chesapeake and Potomac Telephone Co., announced last week that he is retiring as AT&T's president and chief operating officer.

No successor to Ellinghaus was named.

Long interested in the arts, Ellinghaus, 61, will become board chairman of New York City's Channel 13 (WNET). He also will devote much of his time to the National Arts Stabilization Fund, which provides financial support to artistic organizations.

FCC Chairman Defends Commission's Rulings

WASHINGTON, D.C. — "Universal service will not be impaired by recent FCC [Federal Communications Commission] decisions" despite "demagogic statements" to the contrary, according to FCC Chairman Mark Fowler.

The first part of that statement was contained in a letter Fowler wrote earlier this month to two Republican congressmen who had asked for the FCC's views on legislation approved by the House of Representatives a short time earlier. That legislation would require drastic revision of the access surcharge plan the commission unveiled a year ago.

State utilities regulators are ardent supporters of the legislation. Among the most ardent are Susan W. Leisner, a member of the Florida Public Service Commission, and Eric Schneidewind, chairman of the Michigan commission.

Fowler's remark about "demagogic statements" was made at an FCC meeting held a few days before he sent his letter. At that meeting, the FCC commissioners concluded that their recent decisions — particularly the controversial access surcharge — have not been responsible for higher local telephone rates. The FCC chairman said statements by Leisner and Schneidewind were examples of what he had in mind.

The FCC's conclusion that its decisions in recent years are not responsible for higher local phone rates rests on a four-month analysis of data the commission solicited from all the states.

One major finding of this analysis was that only about 40% of the rate increases being requested by the Bell operating companies and the four largest independent carriers this year are being granted. Moreover, two-thirds of the increases allegedly are linked to changed depreciation rules, inflation, higher wages and other factors not related to federal decisions.

Fowler, in his letter to the two Republican congressmen, alluded to this analysis in supporting his contention that the commission's decisions of the past few years have not put universal telephone service in jeopardy.

The letter was addressed to James T. Broyhill (R-N.C.) and Don Ritter (R-Pa.), members of the House Energy and Commerce committee.

The committee's telecommunications bill, H.R. 4295, along with a companion Senate measure, S. 1660, are likely to receive final consideration when Congress reconvenes.

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Bristol-Myers Exec Cites Problems

Companies Urged to Plan Technological Change

By Jeffry Beeler
CW West Coast Bureau

SAN FRANCISCO — Despite its great importance, technology planning is still such an infant business discipline that very few big organizations have had a chance to start practicing it, according to Bristol-Myers Co.'s Personnel Development Director Jan Margolis.

Failure to plan effectively for emerging information technologies has already cost some large corporations dearly, Margolis said last week at a conference sponsored by Boston-based *Data Training* magazine. To underscore her point, she cited the example of a very large New York bank that neglected to plan adequately for its purchases of word processing systems and finally wound up with 25 models from 10 vendors. Because of their inevitable incompatibilities, few, if any, of the competing products could communicate coherently with the bank's host processing system.

Speaking at the fourth annual Data Training Conference and Exposition, Margolis characterized the bank's systems' woes as the product of an organization that "was driven by vendor product strategies rather than by its own technology plans."

Failure to Standardize

In a second example of poor technology planning, Margolis related the case history of a major office products supplier whose failure to standardize its purchases of electronic mail systems resulted in the acquisition of 10 models, all incompatible. Such horror stories, she said, dramatize the dangers that can befall big companies, even high-tech vendors, when they "fail to think through their technology needs."

During her Dec. 13 keynote address, Margolis characterized information technology as playing an increasingly important role in shaping the big business world's products, services and operations. The use of that technology — and its possible long-term consequences — have to be carefully planned.

In particular, large organizations have to assess how the introduction of new information technology into their work places will affect their employees, who need to be effectively managed if the firms are to achieve their key objectives, Margolis said.

Although technological change within a large corporation can often prove beneficial, it also exacts at least a moderate human toll by:

- Adding to a position's intellectual content and thus increasing a jobholder's pressure and stress.
- Changing the ways employees interact socially while at work.
- Intensifying the need for lateral coordination across different corporate functions.
- Requiring workers to acquire new professional knowledge and skills continually as their jobs swiftly change.

Once companies commit themselves to adopting a new information technology, they need to educate their employees to cope with the resulting changes in their work. Ironically, Margolis said, at least some of that instruction can be significantly aided by computers — the same phenomenon that is forcing workers to adapt in the first place.

Unlike most of history's other major agents of technological change, "computers create enormous opportunity for individualized education on a mass scale," she said.

Instructors Told Timeliness as Crucial as Content In Training Data Base Development Teams

By Jeffry Beeler
CW West Coast Bureau

SAN FRANCISCO — Timing is as important as content in effectively training the diverse members of a data base development team, Douglas Stewart, an education advisor at Aetna Life & Casualty Co., said here last week.

In devising a sound data base instruction course, trainers have to do much more than just correctly identify the various topics that need to be covered.

They also have to know at precisely what point during a project development cycle each topic should be presented for the optimum results, Stewart said during a conference that was sponsored by *Data Training* magazine.

In addition, he said, data base trainers need to be cognizant of at least one other important fact: that the educational needs of each of a project team's four constituent groups — DPers, end users, general managers and data base administrators — differ widely and have to be defined accordingly.

For example, of the four major groups involved in creating a typical data base, only the data base administrators require instruction in access methods. The best time for the training is sometime during a project's design phase, Stewart said during the fourth annual Data Training Conference and Exposition.

On the other hand, data base administrators can be justifiably exempted from any education involving information or data modeling. But for the other three groups, he said, at least some teaching of modeling is indispensable. This training should be conducted in the project initiation phase for general management and in the specification/definition stage for end users and DPers.

In addition to covering access methods and information or data modeling, a well-conceived educational course for data base development should address topics such as performance tuning, data manipulation languages, data dictionary languages and physical design, according to Stewart. Environmental communications control and data base concepts, both generic and product-specific, should also be covered, he maintained.

Only in one of the recommended topic areas — generic data base concepts — do all four of a project team's member groups need the same kind of training at exactly the same time — during the initiation phase, Stewart said.

At one point or another during a development cycle, DPers should receive data base education in all the suggested topic areas, except access methodologies and data dictionary languages. End users, by contrast, should concentrate on learning about performance tuning, data manipulation languages, modeling and data base concepts, he said.

High-Level Aids Topic of Series

WAKEFIELD, Mass. — Digital Consulting Associates, Inc. has announced symposia focusing on new data base and fourth-generation language products.

Featuring 14 guest lecturers from various corporations, the series will be held in Los Angeles, March 6-9; Washington, D.C., April 24-27; Chicago, May 15-18; and New York, June 15-18.

The fee is $375 for the first day alone and $750 for the four-day conference.

Additional information can be obtained from Digital Consulting Associates, which is located at 339 Salem St., Wakefield, Mass. 01880.

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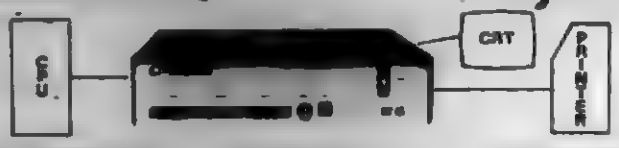

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Former Insurance Employee Jailed for Fraud

By James Connolly
CW Staff

TOLEDO, Ohio — A one-time Aetna Life & Casualty Co. worker has begun a six-month prison sentence for using a computer to issue more than $8,000 in phony dental insurance benefit checks to her relatives.

Ila R. Barringer, who received the sentence, her sister Hazel M. Wood and Wood's sons, John Morris and Clifford Morris, all of Toledo, pleaded guilty to a charge of single conspiracy to commit mail fraud in exchange for prosecutors dropping the balance of a 12-count indictment. Wood, also a former Aetna employee, and John Morris were placed on probation; Clifford Morris will be sentenced in January.

Barringer received a more severe sentence than her sister and nephew not only because she was judged more culpable, but because even after the $8,473 scam at Aetna was discovered, she engaged in a similar scheme with another employer, according to U.S. District Court Judge Donald J. Young.

Thomas Middleton, assistant claims manager of Aetna's Toledo office, said Wood and Barringer were customer relations representatives who were primarily involved in telephone contact with customers, but also had clearance to process claims through an IBM 3081 mainframe located at Aetna's headquarters in Hartford, Conn.

"What these two would do is process dummy claims under the Morrises' files and issue drafts to the Morrises, then blank out all of the data in the file so that if anybody looked, the file would seem empty," Middleton explained.

Middleton said that on at least 10 occasions between 1979 and 1981, the computer produced checks for the Morrises, whose names were in the computer's memory because they had once been covered by Aetna group policies in jobs they held briefly.

Assistant U.S. Attorney James Jensen reported that U.S. Postal Service inspectors were called in by Aetna when an internal audit indicated there were no claim files to justify the checks.

But by that time, in 1982, both women had left Aetna. Wood, a 10-year employee, was fired for altering and cashing a $1,600 check issued to Aetna; Barringer, a four-year employee, quit, according to Middleton.

Jensen commented, "The judge said that [Barringer] hadn't learned from the previous circumstance."

"Barringer went to another company, where she was in a position to issue claims and issued checks for $6,600. Even after she was interviewed in our case, she issued one other check. The judge said that although the check was small, the same elements underlie the case," he said.

Wood was not charged in the check case, and Barringer, who has been ordered to make restitution to Aetna, has not yet been charged in the $6,600 case involving an undisclosed company.

Barringer's attorney, Harland M. Britz, said she "admitted doing everything. There was no defense." He noted that he had objected to the "apparent disparity in sentences" between Barringer and her sister, who had similar computer access. He said Barringer became involved in the conspiracy at a time when her house was being foreclosed and she was being threatened with the shutoff of gas to her home.

Middleton noted that Aetna supported the prosecution as a deterrent to other schemes.

Aetna spokesman Thomas Collins declined to comment on the frequency of cases such as Barringer's or on the company's security measures. The company reportedly has been examining more closely cases where checks are made payable to the insured, rather than to vendors.

Collins also disputed the description of the case as a computer crime. "It's happened occasionally throughout the years, not only in insurance companies. It used to be done by hand, and now it's being done by computer.

"The frequency is probably less than it used to be because it is much more difficult to do it. There is a tremendous amount of checks and balances built into a computer system," he said.

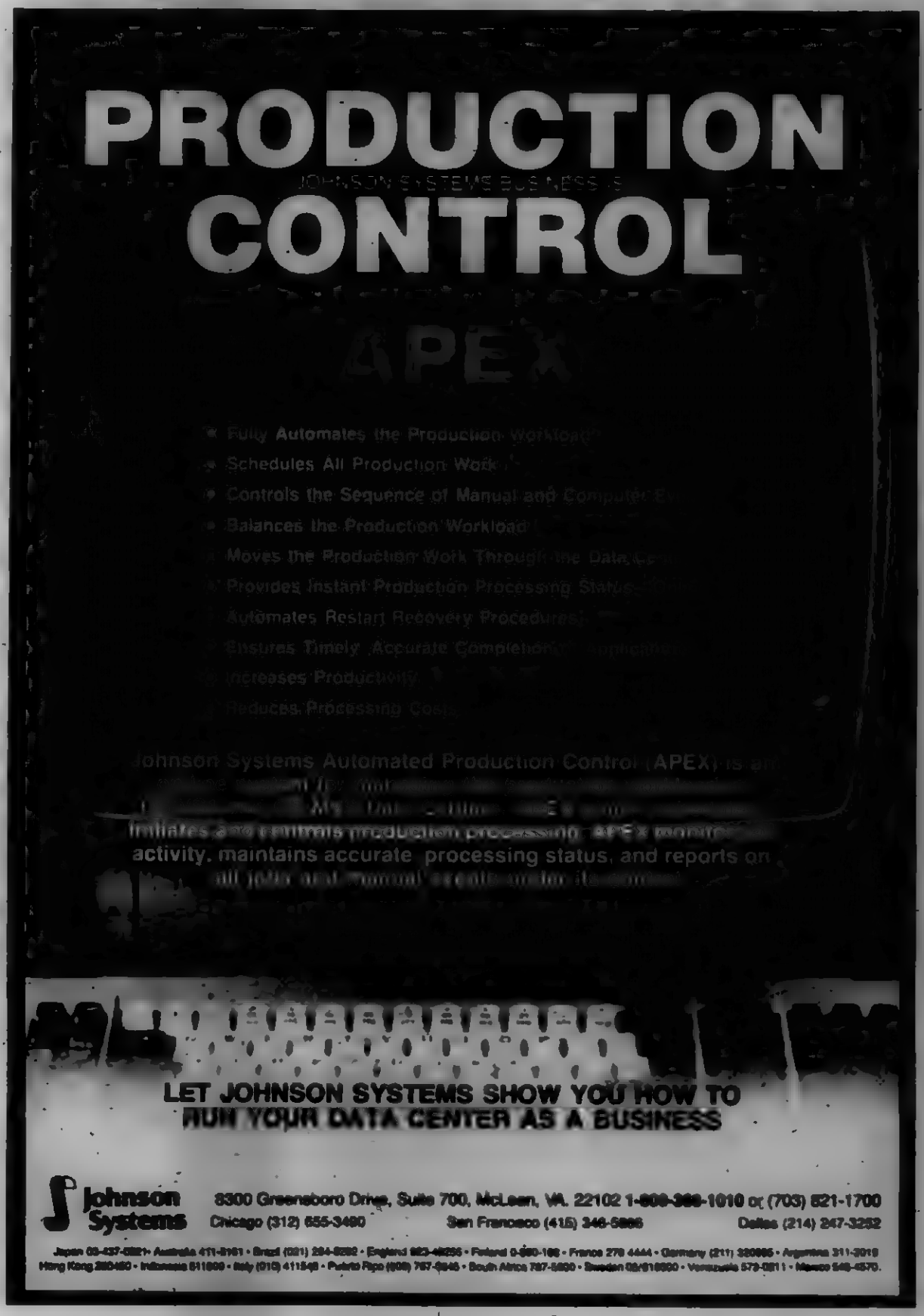
User Support Exec To Address Nestu

WELLESLEY, Mass. — The head of the U.S. subsidiary of a worldwide IBM System/34, 36 and 38 users support organization will address a meeting of the Northeast System/38 Users Group (Nestu, Inc.) at Wellesley College here Feb. 21.

Robin M. Retallick, appointed in February as president of Johnston, Brown and Associates, Inc., will speak at afternoon and evening sessions on "System/38 — Past, Present and Future" and "A System/38-Based Company MIS — the Five Most Common Mistakes."

Retallick spent 13 years with IBM, most recently as manager of product marketing for IBM Australia.

The cost of attending the meeting is $35 for members and $50 for non-members. Nestu is at 64 Temple St., Spencer, Mass. 01562.



Xerox Exec Hits Practices of Local Net Industry

By Robert Batt
CW West Coast Bureau

SAN DIEGO — The local-area network industry is riddled with immature business practices, a senior executive from Xerox Corp. said here last week.

Speaking at the Multiuser Systems and Local Networks Forum sponsored by Future Computing, Inc., John Shoch, vice-president of Xerox's Office Systems Division, said many products that are labeled "local networks" are in fact merely channel interfaces.

Moreover, Shoch maintained that the controversy between broadband and baseband techniques for the networking of data is irrelevant. He compared it to the struggle 100 years ago between ac and dc for prominence in the electrical industry.

"In the long run, whatever local network you choose doesn't make a difference," Shoch told an audience of data processing professionals. "The important question is, what problem are you trying to solve rather than what local network are you going to buy?"

Shoch said it is the application that defines the use of networks, and that will continue to influence how they are used in the future. He warned that those users and vendors who are not considering the use of higher level protocols and architectures face a very rocky road.

"If you think selecting your local network is your problem, you are mistaken. It is, in fact, only 1% of the problem. You need to understand all the other layers of the communications hierarchy to implement an effective solution," Shoch added.

The RS-232 Bottleneck

The application of local-area networks was also addressed at the conference by Robert Metcalfe, chairman of 3Com Corp. Metcalfe said it is important to break the RS-232 interface bottleneck which, he claimed, has been holding back progress in communications technology for several years.

As far as the use of local-area networks with microcomputers are concerned, Metcalfe sees the emphasis shifting from the sharing of peripherals to the ability to access information from mainframes and store it on a personal computer.

"The percentage of information kept in mainframes will plummet as more and more information becomes stored in local personal computer groups," he predicted.

Local networks, Metcalfe asserted, are moving into the domain of personal communication, particularly in the areas of electronic mail, voice and data-based messaging, distribution, filing, integration and processing of information.

True multiuser software will be the key determinant in the evolution of shared data bases, he added, and application software for local networking of personal computers will be at the frontier of this technology.

According to Allen Malinger, senior manager for local-area networks at Datapoint Corp., the key issue is the upper layer of software integration available to the end user.

"Users want to access any file on a universal basis and in a way that is transparent to him or her. Users do not need to know how the module works, but they do need to know how to interface at each level of the module," Malinger asserted.

Turning to the problems of the DP executive, Mark Warshaw, network product manager at Corvus Systems, Inc., said the management information systems manager will be closely concerned with network services as they continue to grow.

"The DP manager will be increasingly faced with the problem of how to coordinate information flow through the organization where that information flow is, in part, a model of the organization itself."

In this connection, Warshaw added, it will be necessary to connect local-area networks with corporate mainframes. "Just because personal computers are growing in number and power does not mean that there are going to be any less mainframes. Central processors will always have their uses," he concluded.

Local Nets Need Standards To Promote Growth, Forum Told

By Robert Batt
CW West Coast Bureau

SAN DIEGO — Official standards are urgently required if the growth in local-area networks is really to take off, data processing professionals who gathered here were told recently.

John Hemphill, a senior technology consultant at Future Computing, Inc., told the Multiuser Systems and Local Networks Forum that three types of standards in particular are needed:

- A layered hierarchical communications architecture to insulate operating systems from communications hardware and to permit the use of various data link protocols such as Datapoint Corp.'s Arcnet and Xerox Corp.'s Ethernet.
- A network-level communications protocol for remote access to shared resources that supports logical access to remote resources and a multivendor workstation environment.
- A standard application program/operating system interface, which supports functions to control and access shared remote resources and insulates applications from the network design.

Involve Multiple Vendors

"Multiple vendors have to be involved in the creation of a standard. If you make a proprietary system a standard, you scare off third-party manufacturers who are the ones needed to develop the software and add-on products," Hemphill told the forum, sponsored by Future Computing.

Among the requirements necessary to make a standard, he said, are published open hardware and software interfaces, independent suppliers of network operating system software and workstations and file servers that are open for independent development.

To be successful in this market, Hemphill stressed, a vendor must provide a complete local-area network product with availability of multiuser, local network application software.

Single-user versions of this software must also be available to allow migration to a local network environment, he added.

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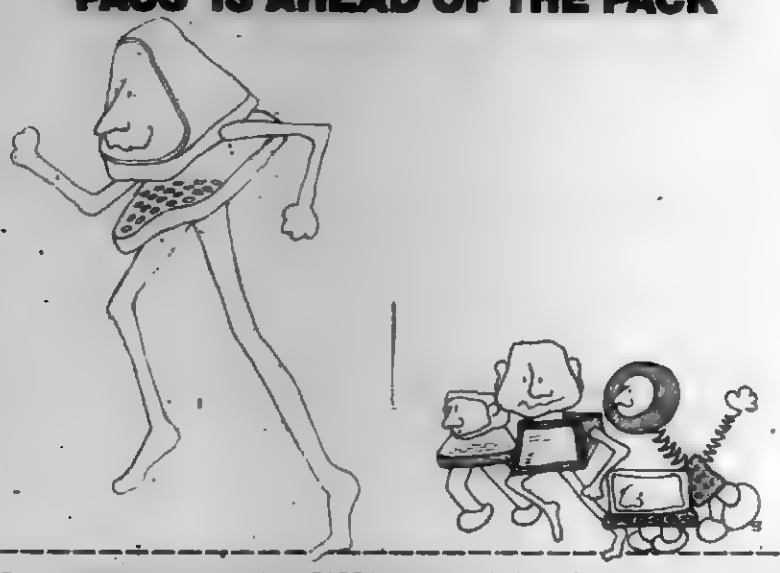

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Integration of Micros, Local Networks Heralded

By Robert Batt
CW West Coast Bureau

SAN DIEGO — The era in which personal computers will be integrated into viable local-area network systems has arrived, according to speakers at the Multiuser Systems and Local Networks Forum held here last week by Future Computing, Inc.

Chris Langewis, cofounder and senior vice-president of international business at Phase One Systems, Inc., said local-area networks will be a growing product in the future, but not at the expense of competing approaches such as multiuser systems.

"We are going to see a multitiered market in which local networks, multiuser systems and stand-alone computers must be able to coexist. Local networks will, therefore, need to combine the other factors that exist in the market," he told his audience.

In a session devoted to local network issues, Carl Travillion, director of product management at NCR Corp., said the objective of local networks is to establish a logical link to additional corporate information resources, including personal computers, host computers and other networks. "To exploit fully the market opportunities provided by local networks, manufacturers must design for, rather than adapt to, software which provides a path to common user objectives," he contended.

The two biggest problems in the industry today, according to Travillion, are I/O and peripheral integration. So far, personal computers have proved themselves pretty bad at I/O and I/O management, he asserted; as for peripheral integration, microcomputer users will demand the same level of peripheral support as users of host processors, regardless of whether it is in the form of disks, tapes, drives or optical printers.

The NCR executive outlined a number of criteria to which good local network systems must conform:

- A system that is aggressively priced against multiuser systems.
- One that provides a more total system in terms of performance and usability than competing technologies.
- A system that offers open-ended, nonproprietary support of industry requirements.
- A system aimed at the target market — that is, any business which uses multiple personal computers with complementary objectives.

Travillion stressed that local-area networks will need to provide a great deal of security for future applications, particularly with the advent of "work-at-home" programs which, he claimed, are just around the corner.

"Networks should be designed in a manner in which a novice can enter the network and operate it without damaging the integrity of the data. It should also be flexible enough to cater to the experienced user through the use of passwords," he added.

The issue of data integrity was also addressed by Darrell Miller, marketing manager of software systems at Digital Research, Inc. Miller said that data security capabilities are especially important in the Microsoft, Inc. MS-DOS and IBM PC-DOS environments.

Requirements for an operating system in a shared computing environment include concurrency and real-time capabilities; support for micros from different vendors; support for multiple network types and multiple operating system types running on the network; and resource and information-sharing capabilities, according to Miller. "The integrity of the information in both multiuser and local network environments is an issue that we as an industry need to come to grips with very quickly," he concluded.

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Nets Seen Dominating Multiuser System Tech

By Robert Batt
CW West Coast Bureau

SAN DIEGO — Local-area networks will become the dominant technology in the multiuser system environment, Egil Juliussen, chairman of Future Computing, Inc., told the Multiuser Systems and Local Networks Forum held here last week.

Local-area networks possess a key marketing advantage over current shared processor systems in that they are an aftermarket solution to sharing information for existing microcomputer users, according to Juliussen. "A local network only adds an incremental inventory value to the existing personal computer inventory. The channels that are selling personal computers can, therefore, add a local network for a relatively low investment," he explained. "It is much harder for these channels to add a shared processor system."

In addition, Juliussen told the Future Computing-sponsored forum that local networks possess several technical advantages over shared processors which seem likely to ensure their long-term success. A local network, he claimed, has a performance edge; is less vulnerable to single failures; can handle more users per system without a lot of degradation; and can accommodate local peripherals for individual users.

Furthermore, the new type of windowing available in local-area network software, which permits different types of data to be simultaneously displayed on a personal computer, cannot be performed on a shared processor system, Juliussen said.

Short-Term Phenomenon

While shared processor systems currently have a cost advantage over local networks, this is a short-term phenomenon, the market researcher asserted. The economies of scale for local networks are huge, and a considerable amount of good software for these networks will appear in the next two years, he noted.

Turning to some of the key issues facing the multiuser personal computer industry, Juliussen predicted that IBM will introduce a local network within the next 18 months. It will probably be an open architecture, he said.

In the area of marketing, a key element is how effectively computer stores will sell local networks. Juliussen estimated that the number of computer stores selling local-area networks will jump from its current level of 15% to between 35% and 50% over the next few years.

According to Juliussen, the market for local networks will be fueled by a dramatic increase in the number of office workers who use personal computers. He predicted this figure will rise from its 1983 level of 3.8 million micros (or 7% of the office work force in the U.S.) to 50 million (or 65% of the work force) by 1995.

Currently, he estimated, around $6 billion is being spent in the office personal computer market, only 4% of which is allocated to local networks compared with 82% for stand-alone personal computers and 14% for shared processor systems.

By 1988, he predicted, the ratio will be 70% stand-alone personal computers, 25% personal computers in a local network and only 5% shared processor systems.

The installed base for local-area networks, he added, will rise dramatically from its current level of around 15,000 to over 450,000 by 1988, overtaking shared processor systems, which are estimated to grow from 100,000 units to 400,000 units over the same period.

In the office personal computer market, Juliussen concluded, Hewlett-Packard Co. leads the pack by a long way, while in the office/home market, IBM is on top with estimated revenues of $1.5 billion, followed closely by Apple Computer, Inc. and Radio Shack, each with approximately $1.1 billion in revenues.

ITS '84 Slated For April 3-5

MONTREAL — Teleglobe Canada has announced that Toronto will be one of five sites for the International Teleconference Symposium (ITS '84), slated for April 3-5.

The symposium will be conducted concurrently at five international sites — Sydney, Australia, Tokyo, London, Philadelphia and Toronto — linked via the Intelsat communications satellite system. It will feature fully interactive teleconferenced sessions, according to Teleglobe spokesman Philip van Leeuwen.

Presentations and discussions will focus on developments in teleconferencing services, equipment and networks.

The symposium is being sponsored by Intelsat and its signatories in the host countries. Symposium fees are $495 (Canadian) with registration before Jan. 31 and $595 (Canadian) for registration after that date.

More information is available from the ITS '84 Symposium Coordinator, Teleglobe Canada, 17th Floor, Marketing Department, 680 Sherbrooke St. W., Montreal, Que., Canada H3A 2S4.

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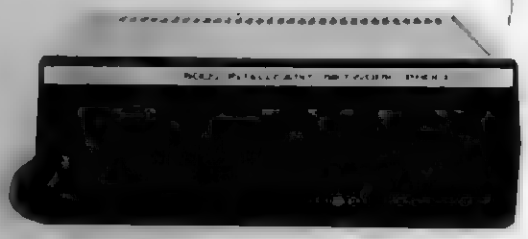

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Field Exercises Successful

Army Puts Electronic Dog Tags Through Paces

By John Gallant
CW Staff

FORT LEWIS, Wash. — The high-technology version of the military "dog tag" has performed like a trooper during exercises designed to test its capabilities in the field.

The 9th Infantry Division, also known as the High Technology Light Division, recently put the microchip version of the standard U.S. Army dog tag [CW, May 16] through its paces during field training exercises here.

During the exercises, code-named Lasermace, some 3,000 of the division's 16,000 troops were issued the so-called Personal Data Tags, which contain a 64K-bit electrically erasable programmable read-only memory chip that can be read by a portable computer.

The tag stores medical, personnel and financial data about a soldier. Similar in size to the older metal dog tags, the tags were used in Lasermace to transfer troop records across units, recall medical and emergency treatment information for "wounded" soldiers and to record "casualties," among other things, according to Maj. Robert Perceval, public affairs officer for the 9th Infantry Division.

Fed Into Terminal

In the field, data from the microchip dog tag could be fed into a portable computer terminal and relayed via a coded FM channel to headquarters, providing military authorities with information on troop strength and location.

The tags are only one component of the 9th Division's prototype High Technology Personnel System, which embraces a variety of technologically advanced products that officials hope will reduce paperwork and manpower requirements for the Army in the future.

The microchip dog tags will undergo more testing next month during a command post exercise code-named Caberbase. The high-tech military equipment and the modern-day maneuver and logistical concepts developed by the 9th Infantry Division are scheduled to be evaluated fully during a field training exercise named Laserstrike next August. If the Personal Data Tag continues to perform up to expectations, the Army hopes to issue them on a servicewide basis by early 1985.

At Fort Harrison in Indiana, officials recently received the first batch of the 1,600 Personal Data Tags the Army plans to test in peacetime applications here. "The information we put into these tags is pretty standard data about an individual that doesn't change very often. The computer can read it quickly and correctly when a soldier is transferred, and that saves a lot of paperwork and time," said Chris Occhialini, civilian systems manager for the data tag project.

"When we need to see some information about an individual, it will be available on a CRT screen rather than a paper record that has to be maintained and filed," he added.

According to Occhialini, the prototype electronic dog tags are "very expensive" at more than $100 each, but that cost is expected to drop to about $30 when the tags are purchased in large quantities.

Perceval's cost estimate was considerably lower — about $15 — for the dog tags used by the 9th Infantry Division.

If the computerized dog tags are adopted, the Army would need between 2 and 3 million of the tags for all its active, reserve and National Guard personnel, Occhialini estimated.

Occhialini said the Personal Data Tag will be worn in addition to the standard dog tag which, because it is more durable than the electronic version, would remain with a casualty for identification.

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Competitors, Users Decry Proposed AT&T Rates

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — AT&T's proposed rates for dial-up long-distance, Wats and private-line services were lambasted by the company's competitors and customers earlier this month.

In comments submitted to the Federal Communications Commission (FCC), the critics accused AT&T of reducing rates only for the services where it faces heavy competition and charged that the company has passed on only a portion of the savings it will reap from the FCC's access charge decision.

The new rates, which AT&T unveiled last October, are scheduled to go into effect April 3. Most of those who submitted comments said the FCC should impose interim rates on that date while investigating the objections to AT&T's proposal.

"The issue of most immediate concern to users," said the International Communications Association (ICA), a corporate communications users group, "is whether AT&T has flowed through to interstate ratepayers . . . the full amount of its savings resulting from implementation of the access charge plan." ICA contended that "approximately $2.1 billion more of AT&T's projected interstate revenue requirement could be subject to flow-through."

The association also questioned whether AT&T's regulated rate base has been properly valued.

The recent comments on AT&T's pending tariff represent the latest development in the battle over the FCC's access charge decision, under which the present method of reimbursing local telephone companies for the costs they incur in providing access to the long-distance network is to be revised drastically.

Long-distance users alone currently bear these costs through charges included in the bills they receive from their long-distance carriers. Under the new plan, part of the long-distance access expense will be billed directly to all local-exchange users, while long-distance users will continue to pay the balance through their carriers.

AT&T's pending long-distance (technically inter-Local Access and Transport Area [Lata]) tariff is the first one reflecting the latter portion of the new access charge. Also pending before the FCC is a set of tariffs filed by the Bell operating companies and several independent telephone companies that specify what they intend to charge both the long-distance carriers and local network subscribers for long-distance access. Users and other common carriers strongly oppose the Bell operating company tariffs as well as the AT&T filing.

Originally, the FCC access charge decision, together with the local telephone company and AT&T tariffs, were to become effective Jan. 1. But because of the voluminous tariff material filed by AT&T and the local carriers, the FCC ordered a delay.

During that interim period, present rates will continue, but revenues will be divvied up between AT&T and the local companies, according to a plan which they devised and which was accepted Dec. 1 by U.S. Federal District Court Judge Harold Greene, who is presiding over the divestiture of AT&T. A week after this ruling, Greene decided that customers who do not designate another inter-Lata carrier when they place a long-distance call will be routed automatically to AT&T. Since up to 90% of such calls are undesignated, the decision is worth billions of dollars to AT&T.

Wanted: Your Views On Communications Nets

Computerworld is looking for a few good stories on data communications networks. A Feb. 27 Special Report on the subject is now in the making, and contributions are welcome until Jan. 9.

Contributed stories can take two forms: non-product-specific tutorials covering a trend or direction in data communications networks, or case studies of specific users who have solved specific business problems with a certain type of data communications network.

These articles should be between four and six doubled-spaced typewritten pages in length. Authors are encouraged to include any camera-ready art or black-and-white photographs.

Authors should include with all submissions a very brief biography of themselves (name, title, company, city, state) and a telephone number at which they can be reached. Articles should be sent to Jim Bartimo, Senior Editor/Communications, *Computerworld*, Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

Calendar

Jan. 9-10, Houston — **Automated Base Mapping for Petroleum Applications: Managing Mega Information in the Coming Decade.** Contact: Tom Van Denover, Synercon, 10405 Corporated Drive, Sugar Land, Texas 77478.

Jan. 11-13, Chicago — **Office Automation and Integration.** Contact: Data-Tech Institute, 386 Franklin Ave., P.O. Box 569, Nutley, N.J. 07110. Also being held Jan. 18-20 in Baltimore and Jan. 25-27 in Stamford, Conn.

Jan. 11-13, Washington, D.C. — **Relational Data Bases.** Contact: Software Institute of America, 339 Salem St., Wakefield, Mass. 01880.

Jan. 11-13, Chicago — **Structured Analysis for Users.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

Jan. 11-13, Lakewood, Colo. — **Intermediate/Advanced Easytrieve.** Contact: The Seminar Broker, 3212 W. 133 Ave., Broomfield, Colo. 80020.

Jan. 12-13, Orlando, Fla. — **Networking Personal Computers.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held Jan. 16-17 in Rochester, N.Y., and Jan. 26-27 in Boston.

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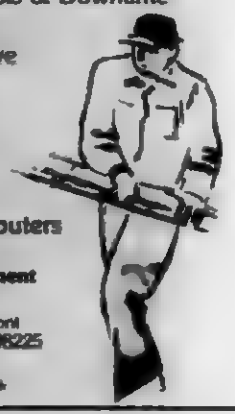

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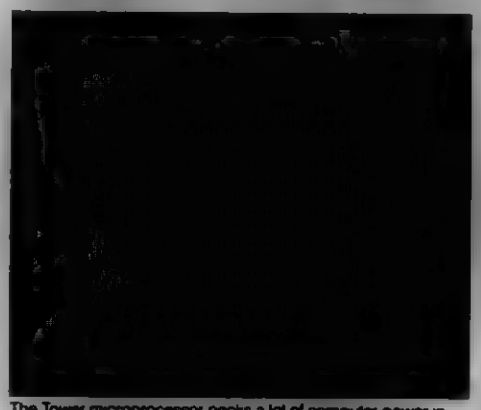

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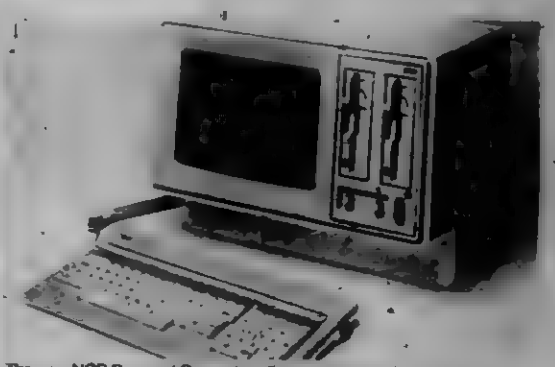

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International Report

FROM THE CW INTERNATIONAL NEWS NETWORK

AUSTRALIA

SYDNEY — Westpac Banking Corp. has announced plans to link up with three major retailers here to create a nationwide network of approximately 1,000 banking terminals. Westpac customers will be able to purchase goods and withdraw cash at Woolworth stores, BP service stations and Food Plus stores by directly debiting their Westpac bank accounts. Analysts here are calling the Westpac announcement an aggressive move in the competitive electronic funds transfer arena.

FRANCE

PARIS — Honeywell Bull-CII has entered the European microcomputer arena with three systems from Honeywell, Inc. — the Mini 6/10 (called the Micro 6/10 in the U.S.), the Mini 6/210 and the Mini 6/290. The first runs under Honeywell's Gcos-400, Digital Research, Inc.'s CP/M and Microsoft, Inc.'s MS-DOS operating systems. It can reportedly emulate the IBM 3270 terminal and offers 512K bytes of random-access memory.

Without printer, the price of a 6/10 configuration is approximately $6,000. The 6/210 and 6/290 are multiuser systems (four and 16 maximum workstations, respectively) based on Gcos. They are priced from $18,000 and $20,000, respectively.

PARIS — IBM France has announced that the Personal Computer XT/370 microcomputer product line is now available for French users. The micro is priced from $4,600.

PARIS — In a move to strengthen its public image, Texas Instruments, Inc. announced that it is "firmly grounded in the minicomputer, microcomputer and terminal marketplace," which represents more than $900 million in worldwide sales and $25 million in French revenues alone. The announcement was delivered at a recent press conference here in the wake of the company's decision to abandon the production of its TI 99/4 microcomputer product line. In France, TI plans to enhance the capabilities on its Professional Computer line with local-area networking and the ability to communicate with IBM configurations.

PARIS — The French software house Serli has introduced a three-dimensional computer-aided design software system based on Victor Technologies' 9000 microcomputer. Called Conception-3D, the product is said to be a true three-dimensional system suitable for architecture, mechanical design and engineering applications.

PARIS — A Frost & Sullivan report just released here indicates that IBM is applying increased pressure on manufacturers of plug-compatible mainframes here. The study said plug-compatible manufacturers must concentrate on market niches and provide better service than IBM in order to survive.

JAPAN

TOKYO — Sanyo Electric Co. will market its personal computer line in the U.S. next year, the company announced recently. The Sanyo Models MBC-550 and MBC-555 can reportedly run software written for the IBM Personal Computer and small business machines and are priced between $1,000 and $1,400.

TOKYO — During the first half of 1983, Hitachi Ltd. attained sales of $8.8 billion, up from $8.2 billion in the first half of 1982. The sales resulted in a net income for that period of $338 million.

SWITZERLAND

ZURICH — The Swiss postal, telephone and telegraph administration announced that it has selected ITT of the U.S. to supply its System 12 digital-switching system for its telephone network. Installation of the digital-switching system will begin in late 1986.

ENGLAND

NEWBURY — A survey of 163 IBM mainframe sites conducted by Xephon Technology Transfer Ltd. found that IBM rates poorly as a software supplier. Out of a field of 21 of the most widely used software suppliers, IBM finished 19th under "product quality" and ranked 20th for "value for money." Users, however, tend to buy IBM software more readily than independent software because of their fears about future compatibility, according to the survey.

WEST GERMANY

MUNICH — In a major joint research and development pact, France's Honeywell Bull-CII, England's ICL and West Germany's Siemens AG have officially announced the establishment of the European Computer Industry Research Center Gmbh here. The three partners plan to concentrate on information technology research, with special emphasis on artificial intelligence.

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Apple Loses Australian Fight Over Look-Alikes

By Peter Bartolik
CW Staff

Apple Computer, Inc. recently lost a round in its international legal battle against the marketing of "fake Apple" microcomputers when an Australian federal judge ruled that Apple II programs contained in read-only memory (ROM) are not protected by Australia's copyright law. Apple reportedly plans to appeal.

The Australian ruling is in direct contrast to a U.S. Court of Appeals ruling earlier this year that affirmed the copyrightability of operating systems and computer programs embedded in ROM [CW, Sept. 12]. That decision overturned a lower court decision which had denied Apple an injunction against Franklin Computer Corp.'s marketing of its ACE series of Apple-compatible computers.

U.S. trade organizations contacted by *Computerworld* last week reacted negatively to the Australian decision, but said they have not yet obtained copies of the ruling.

Oliver Smoot, spokesman for the Computer and Business Equipment Manufacturers Association, said the decision would probably not impact U.S. mainframe and minicomputer vendors who export to Australia and rely on specific contractual agreements and trade secret statutes for protection. But vendors of microcomputers and micro software, he added, have tended to rely on copyright protection and would certainly be concerned.

"There is a serious question about the advisability to market [U.S. products] in Australia," Smoot said. "Certainly they would not want to market something innovative down there until there is some clarification."

The Association of Data Processing Service Organizations, Inc., which filed a brief in support of Apple's U.S. case against Franklin, is "disappointed" by the Australian decision, according to general counsel Ronald J. Palenski. He said the ruling should be a matter of concern for U.S. vendors doing business in Australia, but he doubted it will affect judicial rulings in other countries or the U.S.

"Because the U.S. leads in technology, it also leads in confronting the property law issue," Palenski said. "We have had more court cases, more legislation on the issue, and other countries essentially look to the U.S. [for guidance]." Internationally, he said, "there is not disparity, but [rather] uncertainty" over how to deal with software protection.

The Australian case, filed by Apple Computer Australia Pty. Ltd., is reportedly one of about 30 cases that Apple Computer, Inc. is pressing in foreign countries. Apple's Australian subsidiary had claimed that Computer Edge Pty. Ltd., by marketing Taiwanese-manufactured Wombat microcomputers, was infringing upon copyright protection afforded Apple's Applesoft version of Basic and Autostart ROM, both embedded in ROM chips.

The ruling by Justice Bryan Beaumont in the Federal Court of Australia has sparked concern that the ruling could be applied to applications software because the judge said a program is intended only to assist the functioning of a mechanical device. According to Graham Greenleaf, president of the New South Wales Society for Computers and the Law, the judge in his decision did not acknowledge any difference between operating system software and applications software.

"There is some grounds to believe that he means it to cover all software," Greenleaf said.

Beaumont said the last amendment of Australia's copyright law, made in 1968 and reportedly modeled on a 1956 amendment to British law, did not extend copyright protection to computers, which he said was an indication the legislative intent was that such matters should be covered by other legislation. However, some Australian lawyers have argued that a British parliamentary commission, the Whitford Committee, reported in 1977 that, while no specific reference to computers was included in the British amendment of 1956, computer programs were covered by existing categories of literary work.

This story was prepared with the assistance of David Noble, news editor of Australasian Computerworld.

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EDITORIAL

Welcome to 1984

A recent national poll conducted by Louis Harris has turned up some surprisingly optimistic, yet cautious, observations on how the American public views computers and society.

First, the good news. After randomly interviewing more than 1,000 people — a small number of them corporate executives and legislative leaders — Harris found that computers may have finally overcome the stigma of being coldhearted invaders of privacy. In fact, 88% of those polled feel that computers and automation will actually improve the quality of their lives, despite the scenario presented by George Orwell some years ago when he fictionally peered into his future and our soon-to-be present.

However, a number of those people considered by Harris in its poll to be "nonleaders" — 68%, to be exact — also feel that while computers are their friends, they and, more accurately, the people who use them, cannot necessarily be trusted to preserve privacy and look out for the future of their children. They insist that to be trusted, computers must be tightly controlled and restricted.

However, more than 60% of the corporate and government "leaders" in the poll — people in Congress and school superintendents, for example — disagree with public opinion and are against tight restrictions on the use of computers.

This brings us to the question of who should be given the keys to the convertible on a freewheeling, Orwellian Saturday night: the American public, who wants to keep tabs on every movement, or government lawmakers and industry leaders, who would like to have as few stop signs and red lights as possible.

Certainly, the majority of those polled have a point. Without any restrictions or close scrutiny, computers and their users have the potential for putting a few dents in personal privacy and computer-based accuracy. This apparently was the case at the Illinois Department of Law Enforcement, where it was recently found that 59% of the department's 1.25 million computerized arrest files contained incomplete and, therefore, wrong data. Prosecutors and judges in that state use this data to file charges and make sentencing decisions.

The polled leaders also have a point. For instance, although the computer-based matching and data-swapping programs that have been conducted by federal welfare and other agencies sound unethical, the U.S. Welfare Department has used these techniques to uncover thousands of frauds and to ensure that benefits are given to the right people.

While computers have finally been elevated to the friendly and familiar likes of E.T. and Winnie the Pooh (at least according to Harris), the American public now has an even greater and tougher responsibility. It is not to keep an eye on the object at which everyone has been pointing, but rather to keep an eye on the people who are doing the pointing.

DATA PAST

Five Years Ago
Dec. 18, 1978

WASHINGTON, D.C. — Then-President Carter praised the computer matching techniques used by the Department of Health, Education and Welfare to detect fraud against the government.

Ten Years Ago
Dec. 19, 1973

WINNIPEG, Man. — A keypunch incentive bonus plan was developed here at Gambles Canada Ltd. to encourage employees to increase speed and reduce errors, while improving their earning power.

LETTERS

'What I Meant to Say'

In the article "Where's Cullinet Headed? A Frank Talk With John J. Cullinane" [CW, Dec. 5], I was quoted as saying that Cullinet Software, Inc. "bought [Micropro International Corp.'s] Wordstar." What I meant to say was that Cullinet "bought Finalword from Mark of the Unicorn, Inc."

John J. Cullinane
Chairman of the Board
Cullinet Software, Inc.
Westwood, Mass.

Two Distinct Systems

Robert P. Campbell's In Depth article "Locking Up the Mainframe" [CW, Oct. 10] was quite interesting. Users are becoming more aware of security issues and are placing an increased importance on their systems' ability to provide protection. More articles should be devoted to informing the user community of alternatives to protecting their information.

However, I am concerned that the article may be misleading. The specific reference to the Honeywell, Inc. Multics system is inaccurate. Campbell has confused the two separate and distinct systems offered by Honeywell: Multics and Gcos.

The specific evolution Campbell has identified was the adaptation of the Gcos operating system for the World Wide Military Command System. Software modifications and enhancements were made to Gcos both to enhance the security as well as to provide specific new functions as required by the government. Penetration may or may not have been completed as indicated by Campbell.

The Multics operating system did not evolve from Gcos in the manner described in the article. Multics was developed from an original design effort by a team from Bell Laboratories, General Electric Co. and MIT in the early 1960s. The hardware utilized for the early development effort was an offshoot of the same hardware used for the Gcos evolution; however, both operating systems were developed independently.

As Multics was developed, the need for hardware enforcement of the original security design goals required modifications to the hardware, and a new system came into existence. The hardware system, now designated DPS 8/70M, is significantly different from its distant cousin, DPS 8/70, on which Gcos will execute. Multics will not execute on the Gcos DPS 8/70 hardware.

Multics is currently being used at several government installations. The U.S. Air Force data services has used a tiger team to investigate the security of Multics. The team did penetrate Multics while investigating an early release of the operating system.

However, over a year of effort was required with a full listing of all operating system code available. As soon as the security breach was identified, the problem was corrected, and no further successful penetrations have been identified.

Both the U.S. and Canadian governments have designed systems utilizing Multics, on which classified information is being maintained. Their analyses and subsequent uses of Multics indicates an acceptance of the security protection offered by Multics.

No system is totally secure, given an infinite amount of time and resources. However, I am amazed that Multics is not given the recognition it deserves. Multics is a commercially available system and should not be overlooked by users who are seriously concerned about system security.

Robert J. Grimes
Senior Computer Consultant
RG Consulting
Phoenix, Ariz.

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65 Public Utility/Communication Systems/Transportation
70 Mining/Construction/Petroleum/Refining
75 Other User
Vendors
80 Manufacturer of Computers, Computer-related Systems or Peripherals
85 Computer Service Bureau/Software/Planning/Consulting
90 Computer/Peripheral Dealer/Distributor/Retailer
95 Other Vendor

2. OCCUPATION/FUNCTION (Circle One)
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12 VP/Assistant VP
13 Treasurer/Controller/Financial Officer
21 Director/Manager/Supervisor DP/MIS Services
22 Director/Manager of Operations/Planning/Administrative Services
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
35 OA/WP Director/Manager/Supervisor
38 Data Comm Network/Systems Mgmt
41 Engr/Scientific/R&D/Tech Mgmt
51 Mfg Sales Reps/Sales/Marketing Mgmt
60 Consulting Mgmt
70 Medical/Legal/Accounting Mgmt
80 Educator/Journalist/Librarian/Student
90 Other

3 COMPUTER INVOLVEMENT (Circle all that apply)
Types of equipment with which you are personally involved either as user, vendor or consultant
A. Mainframes/Superminis
B. Minicomputers/Small Business Computers
C. Microcomputers/Desktops
D. Communications Systems
E. Office Automation Systems

READER COMMENTARY/Richard Carter

'Twas the Week Before Christmas

'Twas the week before Christmas
And all thru Tech. Supp.
Not a phone bell was ringing,
Not a system was up.

My keyboard was silent
In a "NOT POLLING" state;
I had a blank screen
On my 3278.

The manuals were sitting
Straight up on the shelves
In hope they'd be stolen
By demented, old elves.

And I in my office,
My face in my hand,
Had just blown the system
With an "SPQ COMMAND."

The users were roaming
Outside near their bins,
Gazing thru windows
At the system within.

They saw thru the glass
What a programmer dreads:
The printers were ripping
Their output to shreds.

The console was blurred
By vague moving shapes
While tape drives digested
Some Master-File tapes.

Operations was frantic
And Systems was screaming:
"Our CE's at lunch,
(Or off somewhere dreaming)."

Then Management came
And learned of our fate
Once again caught
In a Downtime Stalemate.

"What can we do?"
One boss moaned in stress.
"I wish we had someone
To fix up this mess."

Then all of a sudden
From outside the door
We heard a great crash
And dived for the floor.

And then to our eyes
Appeared a great sled
And inside, an FE
(Who was dressed all in red).

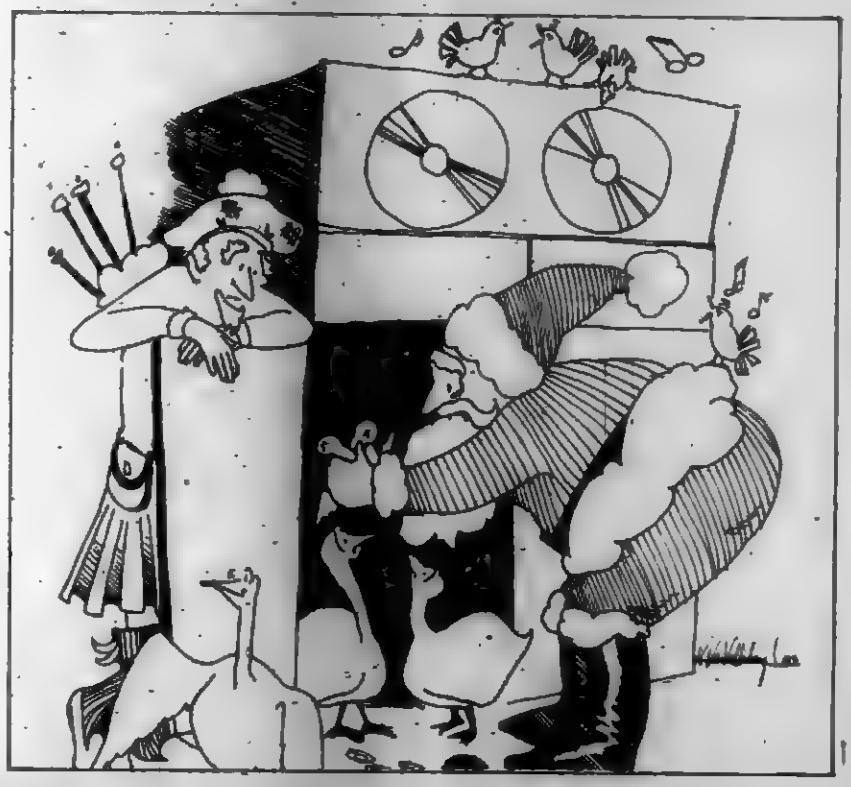
He was covered with ink
From his head to his toe
And commented loudly
"I wish it were snow!"

He was not very tall
And more chubby than thin;
His nose matched his clothes
And his face wore a grin.

He set right to work
Knowing just what to do
And he didn't stop once
Until he was through.

He pulled from the units
The strangest of things,
From four calling birds
To five golden rings.

He cast out the items,
Piece after piece,



And one of us fainted
When he pulled out six geese.

He said not a word
Except for some griping
'Cause he had to extract
Seven pipers piping.

He gave out a groan
And removed his black gloves,
Then reached right inside
And removed two squashed doves.

Debris filled the room
Right up to the doors
'Till he slammed shut the units
And said "It's all yours!!"

We looked at each other
And said "What the hell?"
Then pushed the blue button
That said "IPL."

We heard a few clicks,
A groan and a glupp,
And wouldn't you know,
The damn thing came up.

The FE just stood there
With a smile on his face.
As fix-it men go,
This guy was an ace.

He packed up his tools
And mounted his sleigh.
Stuck his thumb in his nose
And went on his way.

We watched as he flew
Off into the night
Until in the dark
He vanished from sight.

Yet we heard him exclaim
And it was sort of dim,
"Merry Christmas to all,
But don't call again."

Carter is employed in the engineering technical support department at Stone & Webster in Boston.

HUMAN CONNECTION/Jack Stone

IBM Micro Clones a la 'Cabbage Patch Kids'

The "Cabbage Patch Kids" phenomenon has much greater significance beyond that of merely being the latest rage for gristling the media mills at this time of the year. Indeed, Cabbage Patchism is a quasi-revolutionary product development strategy that finds application throughout human enterprise in the industrialized free world.

I presume that by now you are aware of the basal mechanism employed by Coleco Industries, Inc., the vendor: A gaggle of automatic randomizers makes certain that the various components and subassemblies of the kids' systems constitute, in fact, unique combinations.

In this way, the end recipient is made to feel that the ever-so-slightly modified kid clone is very specially his, a matter attested to by "adoption papers."

The doll industry generates, of course, a substantial hunk of our national wealth, and all of us should applaud the brilliance of Coleco in contributing to our economy in such an enlightened way.

Even more important to DPers is that Cabbage Patchism has the potential for generating unique IBM Personal Computer clones, which, though functionally equivalent to Big Blue's offerings, are tailored to the individual needs of users.

Personal Computer Mart

Just think of the impact these items would have on the personal computer marketplace:

- Buyers would no longer have to settle for the drab eggshell-colored plastic that encases much of the machinery around these days.

Instead, they could order accent panels outfitted with a variety of stripes, solids, herringbones, simulated woods or even Middle Eastern rug patterns.

Of course, swatches of material from the ancillary-furnishings of the computer room would have to be forwarded along with the order form to assure complementary matches, which should not be a terrible inhibitor for the purchasers who will go to great lengths to assure that the gestalt of the machine reflects their personalities and life-styles.

- Taking a lead from the newly announced talking cameras, the vendors could install a voice synthesizer unit to generate system messages in place of textual displays.

For example, the male users will be able to order voices tailored to their tastes — like those of Katherine Hepburn, Morgan Fairchild or Brooke Shields, depending on the generational time slot — and fantasize over cooing tones that softly note, "I'm your main menu. Make your choice, any choice."

And female counterparts will have heartthrobs such as Burt Reynolds or Clint Eastwood whisper that "storage on Drive C is exhausted."

- "Window" options will be available to allow for split-screen display not only of two to eight data files simultaneously, but also family-rated movies that the operator can enjoy while waiting for the interminably slow-speed sorts that are so common on personal computers.

Then, too, we can be certain that the independents will find ways to design boards for unused slots that will permit the display of X-rateds.

- There would be a total integrated electronic system alternative in which the computer is packaged along with a comprehensive array of stereo and video components.

Not only would these components be controlled through the computer keyboard, but the user who is really into dynamite experiences could process and record digital signals from the microframe on the stereo/video gear for subsequent playback.

Maybe I'm old hat because I'd bet that the results would not be much better than the rock 'n' roll stuff that clutters the airwaves today. But at any rate, the effects would be novel, even, perhaps, mind blasting.

I'm not altogether certain about the global practicality of Cabbage Patchism as a vehicle for customizing personal computers, but it seems to me that, given the spirit and imagination of American computer-driven entrepreneurs, Cabbage Patchism someday will be an important factor in our marketplace, let's hope less of a fad than the Cabbage Patch Kids.

For you and your family, a joyous holiday season and a prosperous new year.

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Financial Modeling: Look Before You Leap

By Len Bergstrom
Special to CW‡

The rapid growth of the financial modeling software market has presented buyers not only with a wealth of opportunities, but also a healthy dose of confusion. To make an intelligent choice, businesses must first define which features are important. In this first part of a two-part series, Len Bergstrom defines some of the criteria you should establish before investigating the alternatives.

At the beginning of the decision process, it is essential to establish your personal criteria first. Users are often overwhelmed by vendor claims or swayed by an emphasis on sophisticated features that they cannot use. No system is the best for all financial modeling requirements. By starting with an analysis of the needs of your company, you can screen out those vendors who are obviously overqualified and underqualified.

To establish individual criteria, create a profile of your company to delineate general and specific requirements in several key areas. This is often done by performing a user survey or, when possible, involving key end users in the actual decision making.

High on the list of important considerations are the company's personnel characteristics. Your company profile should specify departments involved and their degrees of participation. End users should be surveyed to determine their levels of programming proficiency and experience with programming and financial modeling languages. Finally, investigate the styles of operation — the types of models, levels of sophistication, degrees and frequency of change and ad hoc needs.

Determine the exact type of modeling and reporting capabilities required. Model characteristics such as size, number of accounts and time periods, level of detail and summation can be addressed. Review how different models communicate with each other for corporate planning, division planning and unit planning. Critical issues include the availability of financial, statistical, forecasting and user-defined functions and subroutines, as well as how the sys-

(Continued on Page 30)

Allows Integration of Methodologies

Nastec Introduces Tool for Case 2000

SOUTHFIELD, Mich. — Nastec Corp. has introduced the Lifecycle Manager, a software package that allows various conventional methodologies and design tools to be integrated on the company's Computer-Aided Software Engineering (Case) 2000 workstation.

Case 2000 is a desktop unit consisting of an Intel Corp. 8086 microprocessor with up to 1M byte of memory and a real-time multitasking operating system. The workstation offers host communications links with IBM mainframes via IBM 2780 or 3770 remote job entry and 3270 emulation capability.

Graphitext: Nastec Corp.'s design and documentation editor

The system includes limited word processing functions and a graphics package that allows flowcharts to be created and manipulated.

Lifecycle Manager operates in a clustered configuration of Case 2000 workstations to provide identification and selection of the steps required for project execution, estimation of resources and budget, assignment of individual work steps, generation of menus, execution of work steps and verification of their completion, on-line Help screens and quality reviews.

Lifecycle Manager is said to enable management to plan and control the life cycle methodology by enforcing performance standards, allowing con-

(Continued on Page 28)

Comshare Adds Filing, Window To 'System W'

ANN ARBOR, Mich. — Comshare, Inc. has announced filing and window capabilities for its System W decision support software.

Filepower reportedly brings data into System W applications from varied computerized format sources. It is said to increase productivity by accumulating incoming detail data to the level wanted for modeling purposes.

Window reportedly allows full-screen data entry, editing and viewing of any spreadsheet from a System W model data base.

System W is available for IBM VM/CMS and MVS/TSO operating systems. Prices for System W, including Window, range from $55,000 to $100,000. The price for the Filepower option is $5,000.

Comshare is located at 3001 S. State St., Ann Arbor, Mich. 48106.

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STAR

Price Increase Announced For Release 3.0 of 'Test/IMS'

DOWNERS GROVE, Ill. — Consumer Systems Services Group, Inc. has announced a price increase for Release 3.0 of its Test/IMS software testing tool for the native IMS environment.

Release 3.0 of Test/IMS, which the company said is scheduled for release during the first quarter of 1984, will be distributed to all current users at no cost. Through Jan. 31, Test/IMS will be priced at $16,000 for perpetual license. It will be priced at $21,000 after that date.

The package was designed as a testing tool that provides diagnostic information on IMS programs while testing within the native IMS environment. Facilities within the package reportedly provide users with a means of checking application program logic, IMS interfaces, teleprocessing activity and data base activity.

Enhancements offered with Release 3.0 include the ability to change dynamically (from a terminal) any Test/IMS diagnostic option, the ability to choose the type of dump desired, the capability to measure standard work-unit variances and the ability to save on-line output for printing.

Test/IMS is available from Consumer Systems, 1100 31st St., Downers Grove, Ill. 60515.

Time Deposit System Debuts

ALPHARETTA, Ga. — Optimum User Software Corp. (Opus) has announced the Time Deposit System which is said to give bank customer service personnel control over processing all types of deposits.

Designed for use in IBM's CICS-VS environment, the real-time system reportedly uses self-prompting screens enabling the terminal operator to process new accounts, deposits, redemptions and customer inquiries without referring to paper documents or making calculations. All transactions are immediately edited and posted when entered at branch or correspondent banks.

The vendor said that by defining a new investment instrument's "profile" to the system, each bank can react to changing regulations or competitive conditions. The system also offers book-entry processing, which reportedly eliminates the need to control and maintain legal documents for Certificates of Deposit. The package also features Internal Revenue Service withholding and Individual Retirement Account reporting, multibank processing and automatic general ledger entries.

The Time Deposit System is priced at $97,000 from Opus, 765 Rio Grande Drive, Alpharetta, Ga. 30201.

'Probe' Package Introduced For System/38

WHEELING, Ill. — Advanced Systems Concepts, Inc. has announced Probe, an interactive analysis and cross-referencing package for the IBM System/38.

According to the vendor, Probe uses object- and source-code-level analysis to provide cross-referencing information. The analysis is performed in a batch subsystem, and the information is provided on-line. The package reportedly is menu driven and will display job stream explosions. It shows all control transfers from one program to another and provides flowcharts.

The package is said to provide on-line data base information, including record layouts for externally described files and RPG and Cobol program described files. Probe does field analysis and can display program usage of field information for internally and externally described files, allowing users to determine which programs are using a specified field.

Reference field analysis and physical and logical file dependencies can be displayed through the package, and file "where used" displays and explosions are included.

Probe is available for a one-time license fee of $1,000 from Advanced Systems Concepts, 1084 Cornell, Wheeling, Ill. 60090.

Nastec Adds Tool For Case 2000

(Continued from Page 27)

sistent reviews of the different phases of the software process and providing facilities for financial measurement and control.

It enables in-house software development standards or commercial methodologies to be used for a structured approach to programming. Views of projects already completed and future tasks are available. Related materials, such as instruction, are part of the information provided.

The price of one workstation, including 384K bytes of memory, high-resolution monitor, operating system and foundation software, is $15,000. Lifecycle Manager has a one-time sales price of $26,000, which includes use on one existing workstation plus 40 hours of consultation and training. Additional workstation licenses range from $500 to $3,000 each.

Nastec is at 24681 Northwestern Highway, Southfield, Mich. 48075.

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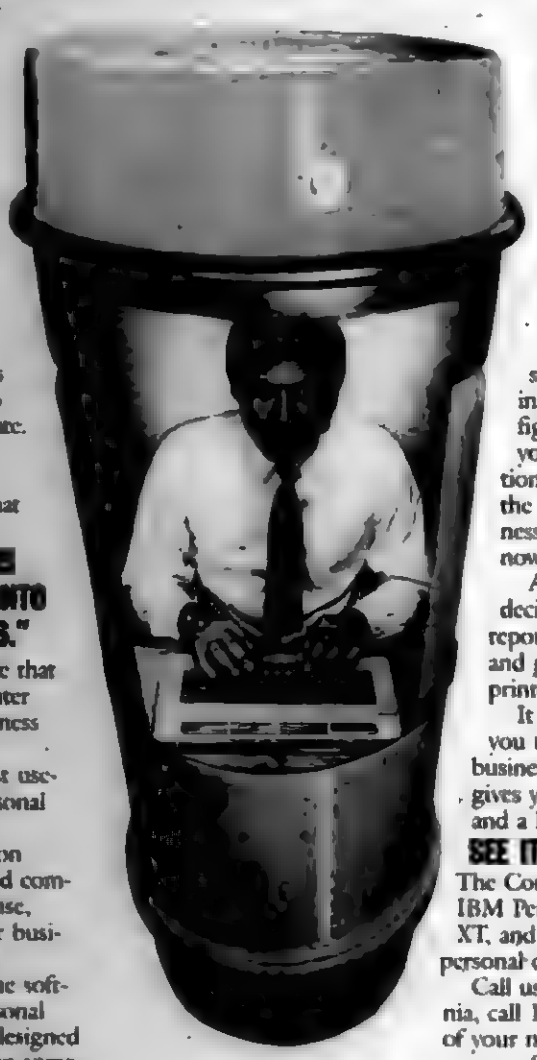

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ADR Introduces Graphics Support For Query System

PRINCETON, N.J. — Applied Data Research, Inc. (ADR) has introduced interactive color graphics support for its ADR/Dataquery relational query system.

According to the company, Dataquery's interactive graphics facility condenses data from a company data base into pictures.

Designed for use with IBM 3278 video, 3279 color video and 3287 hard-copy printers and IBM CICS using IBM Graphic Data Display Manager graphics, Dataquery reportedly allows a user to select report information from a menu and request a graph.

It was designed to produce six basic graph types, including bar charts, line graphs, pie charts, surface charts, scatter diagrams and histograms.

Other presentation options are said to include color selection, horizontal and vertical grid selections, chart headings, axis titles, movable key boxes and multiple charts per page.

The permanent-license price for the graphics option is $8,000 for IBM OS environments and $6,000 for DOS environments.

The permanent license for Dataquery is $18,800 for OS and $14,600 for DOS from ADR at CN-8, Rt. 206 and Orchard Road, Princeton, N.J. 08540.

Boeing Enhances Its RIM DBMS

VIENNA, Va.— Boeing Computer Services Co. (BCS) has announced that it has enhanced its BCS RIM data base management system (DBMS) offering to include a report writer and other additions including links to personal computers using Microrim software.

BCS RIM Version 6.0 reportedly lets the user utilize the report writer to organize and display data involving employee records, budgets, structural analysis and design and project management.

The report writer features layout directives for controlling output appearance, user-specified print breaks, multiple-relation reporting and alternate sort sequencing.

Offered for scientific and engineering applications, BCS RIM Version 6.0 reportedly allows data to be entered and edited on a micro and transmitted to a mainframe and lets portions of the data base be downloaded from a mainframe to a micro for local processing.

Available now, Version 6.0 is a Fortran-based product supported on operating systems that include Digital Equipment Corp.'s VMS, Control Data Corp.'s NOS, IBM's VM/CMS and Cray Research, Inc.'s COS.

The data base is priced at $7,500 and the report writer at $2,500.

More information is available from Boeing Computer Services, CV86, 7980 Gallows Court, Vienna, Va. 22180.

Choosing Financial Modeling Software

(Continued from Page 27)

tem handles complex computations, lead and lag periods, automatic reordering of equations and solution of simultaneous equations.

It is important to view several different aspects of reporting needs. The extent of periodic needs for reports must be evaluated in terms of degree of repetition, formal procedures, multiple usages and volumes. Consider whether custom and standard reports are available and whether the reports will be for presentation or information needs. Consider the origin, size, type, frequency and immediacy of ad hoc reports and graphs. Finally, the current approach to these modeling and reporting problems is critical.

Data management is assuming more and more importance. Does your company require access to external data bases? Are there any specialized requirements for market or geographic data? Financial modeling systems differ greatly in the way they communicate with external data bases.

Amount of Data

Also, the amount of corporate data varies substantially according to the number of items and historical periods, the types of data, the overall volume and significant digits. The frequency, source and means of capture and update operations have to be identified. Finally, size up the system's ability to transfer data and the characteristics of retrieval and reporting. Determine frequency of access, degree of screening, purposes of data and types of users.

Special needs also deserve some thought. Network locations can be identified for interaction of terminals, local dial access, sales and technical support coverage. International network needs, consolidations, currency exchange rates and common applications play a role. The presence of analysis capabilities can also be vital.

Documentation, training, hot line, application models and consulting availability should figure in your evaluation.

Lastly, review current service contracts for terms and conditions, amount of usage, types of applications and degree of satisfaction. The last question to be asked is where will the system be used? In-house computer facilities may be a significant factor in the decision process.

Bergstrom is a principal and vice-president of consulting services for Real Decisions Corp. in Stamford, Conn.

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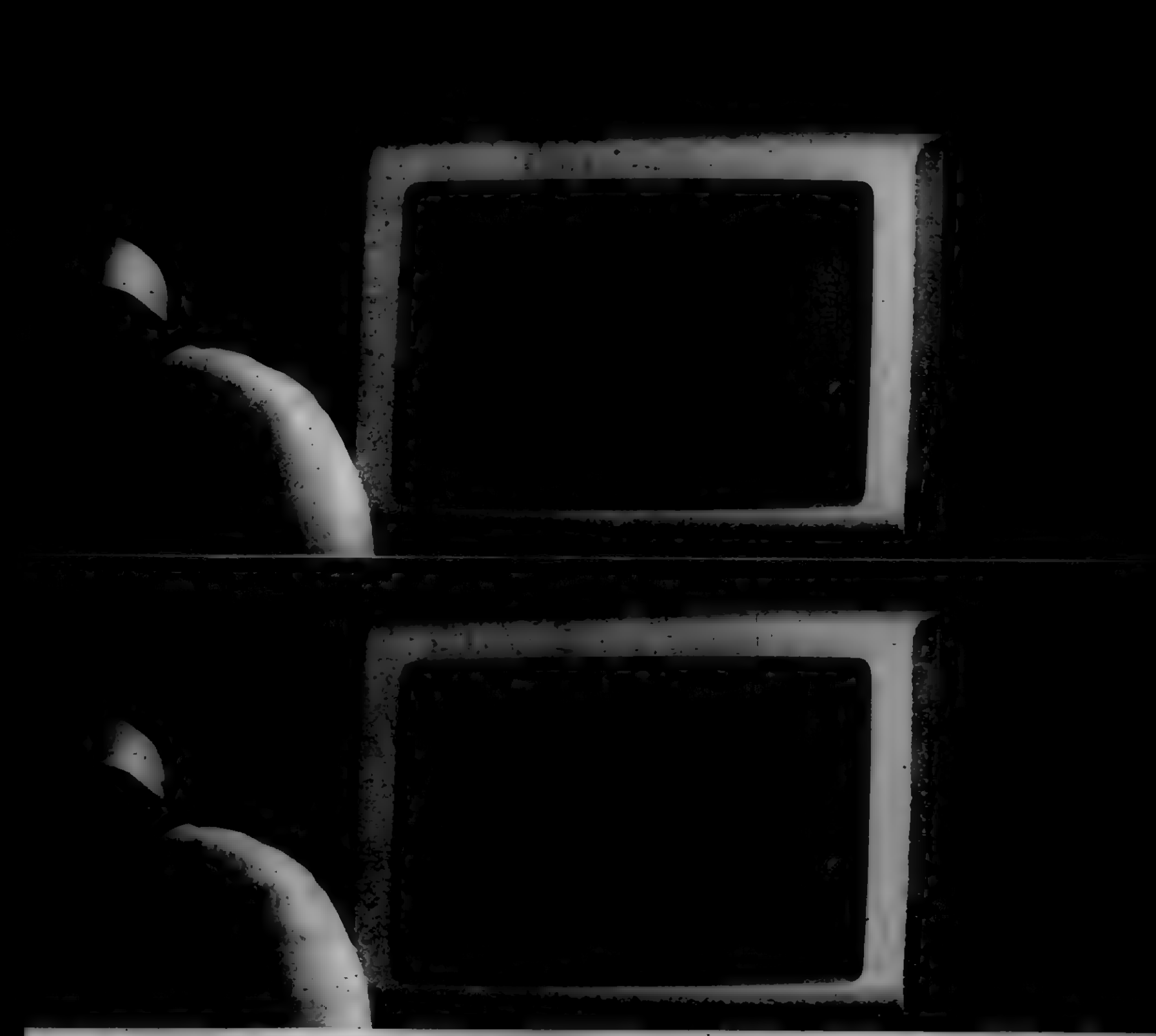

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On-Line Support System Out

DALLAS — Hogan Systems, Inc. has introduced an on-line customer support system that allows access with the firm's mainframe computers based here and with IBM Personal Computers at the customer's site.

The Hogan Interactive Telecommunication System (Hits) can reportedly be accessed from any location 24 hours a day. The customer can transmit batch, on-line and screen questions directly to Hogan's support center here by dialing the telephone number through his Personal Computer and using appropriate security methods for access. Hogan's customer support staff can transmit solutions immediately, the vendor said.

In most cases, the Hogan customer support representative can view the exact documentation the customer is viewing within three minutes. An electronic mail capability allows anyone using Hits to send messages to any other person within the net.

The information data base provides clients with access to an abridged version of Hogan's change control system, which keeps track of current updates, a spokesman said. It also contains installation information, examples, tips, product announcements, upcoming events and education class schedules.

The Hits system costs an annual fee of about 2.5% of the user's software investment, plus telecommunications connect charges.

More information is available from Hogan Systems at 5080 Spectrum Drive, Dallas, Texas 75248.

'Valu Lib' Update Released For IBM 4300s, Series/36

CHERRY HILL, N.J. — Value Computing, Inc. has announced Release 5.0 of Valu Lib, its tape library management system for IBM 4300 series and Series/36 mainframes. The new version reportedly includes additional options for cataloging data sets, more detailed movement and location facilities for tape volumes and enhanced security functions.

The system is said to allow users to delete data sets from the system catalog, maintaining consistency between Valu Lib and the catalog. Other features enable the user to check the catalog when scratching data sets, to extend retention of data sets found in the catalog and to create an auxiliary catalog.

The company reported that the tape movement facility has been expanded to enable users to assign bin or slot number to tape volumes and to flag bins as available for a new tape when a tape is moved.

Security capabilities reportedly have been expanded by having the system send a 44-char. data set name to the security system.

Valu Lib Release 5.0 is scheduled for release in the first quarter of 1984 at a purchase price of $20,000 or on a 12-mo lease at $1,834/mo.

Value Computing is located at 498 N. Kings Highway, Cherry Hill, N.J. 08034.

'MAD' Provides Documentation For HP 3000s

KELLER, Texas — Related Computer Technology, Inc. has introduced the Multilingual Automatic Documentor (MAD), a system that provides documentation of programs written in either Fortran, Cobol or Basic languages for users of Hewlett-Packard Co.'s HP 3000 computers.

MAD is menu driven and allows complete or partial documentation as required. The system delivers program listings and flowcharts along with a cross-referenced list of variables, the vendor said.

The price is $4,995 from Related Computer Technology, 154 S. Main St., Keller, Texas 76248.

Lucasfilm Unveils Logic Design System

SAN RAFAEL, Calif. — Lucasfilm Ltd., through its Computer Division, has announced the Cadroid software package, a logic design system that reportedly takes the designer from schematic entry through prototype board layout and wire list generation at the desktop.

Written in the 'C' programming language, the software runs under the Unix operating system on most Motorola, Inc. 68000-based microcomputers with bit-mapped displays and on the Digital Equipment Corp. VAX-11.

Prices start at $8,000 from Lucasfilm through P.O. Box 2009, San Rafael, Calif. 94912.

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A new 82-page book, "SYNAPSE TRANSACTION PROCESSING SYSTEM OVERVIEW", clearly illustrates how a systems designer can accelerate development of a high-performance, fault-tolerant, on line transaction-processing system.

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Simulation System Out for VAX-11

HOBOKEN, N.J. — Advanced Systems Concepts, Inc. has announced its Performance Simulation System (PSS), designed to record and replay terminal sessions for the Digital Equipment Corp. VAX-11 family of computers.

PSS reportedly assists with performance testing, application reliability and security by monitoring and playing back I/O of terminals using DEC's VMS terminal class driver.

Replay and editing of the input log reportedly allows large terminal and/or transaction loads to be performed while not requiring significant manpower and terminal resources.

Output of the simulated terminal session is captured during the replay, providing a mechanized means of verifying an applications reliability by comparing the original output log to the playback output log, a spokesman said.

The system is now available at a licensed price of $4,995 for the VAX-11/780, $3,495 for the VAX-11/750 and $1,995 for the VAX-11/730. Advanced Systems Concepts is located at 22 Hudson Place, Hoboken, N.J. 07030.

Tool Monitors System/38 Users

VANCOUVER, B.C. — Chakra Systems International has announced software that reportedly allows system operators to monitor and control terminals on the IBM System/38.

GO/38 allows the system operator, on interactive display, to see the user of every terminal and to know the menu and program the user is on and the time the program was entered.

The data reportedly can be recorded to a data base file for later analysis or can be used either to lock a user to a menu at the next return to the menu or to interrupt the job and force the user back to the menu.

GO/38 is now available in English and French. It leases for $700 per year. Chakra Systems International is located at 8465 Victoria Drive, Vancouver, B.C., Canada V5P4A8.

Firm Updates Pricing Scale For Ross/V

LEXINGTON, Mass. — Evans Griffiths & Hart, Inc. has introduced a new pricing scale for its Ross/V software package.

The vendor's Digital Equipment Corp. RSTS/E Operating System Simulator under IBM's VMS operating system is being newly offered at $7,700 for a DEC VAX-11/750 and at $5,500 for a VAX-11/730. The price will remain at $10,900 for a single-CPU VAX-11/780 license.

Written in VAX-11 Macro, Ross/V provides a way to develop RSTS/E applications on the VAX, a spokesman said. Ross/V supports a subset of RSTS/E monitor calls, standard RSTS/E features, the "hidden" RSX run-time system, resident libraries, job spawning and detached jobs.

The vendor is located at 55 Waltham St., Lexington, Mass. 02173.

Library System For Industry Targets HP 3000

SAN ANTONIO, Texas — Ernst & Whinney has announced its library of oil and gas industry financial and management information packages for use with Hewlett-Packard Co.'s HP 3000 processors.

The information in the library reportedly helps to identify profit improvement opportunities in producing operations, monitors actual results against capital and operating budgets and focuses on tax-saving opportunities.

The Oil and Gas Accounting and Information System package is said to help operators fulfill reporting requirements. The Nonoperator/Investor Accounting System provides income tax and Windfall Profit Tax information.

The Oil and Gas Accounting and Information System is priced between $45,000 and $90,000; the Land and Lease Management System is priced at $20,000; and the Winplan package has a $5,000 license fee. All include training. The Nonoperator/Investor Accounting System is available on a service bureau basis for $6,000 per 120 connect hours from Ernst & Whinney, 1900 Frost Bank Tower, 100 W. Houston St., San Antonio, Texas 78205.

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Financial Tool Gets Upgrade

SCHAUMBURG, Ill. — Outlook Software, Inc. has announced upgrades to its financial modeling package for the IBM System/38. The new version of Outlook/38 reportedly allows a maximum modeling size of 10,000 rows by 10,000 columns, automatically generated models, an unlimited number of models and an automatic model directory.

The software is also said to allow conditional consolidations and up to 1,000 different report formats for a single model, with the formats stored in a menu format.

The package costs $2,850, and a direct file access option costs $500 from Outlook Software, Suite 117, 1 Woodfield Lake, Schaumburg, Ill. 60195.

Graphics Aid From Cortex

'Edds' Added to Strategic Library

WELLESLEY, Mass. — Strategic Information and Cortex Corp. have announced that Cortex's Executive Data Display System (Edds) software has been integrated into Strategic Information's banking business library.

Cortex's Edds system is said to be a full-color presentation graphics package which runs on Digital Equipment Corp.'s VAX-11 system in the DEC VMS operating system environment. Edds will reportedly interface with Tabs, Strategic Information's bank financial statement modeling and forecasting system; its Tab-M asset liability management system; and Bankmaster, its financial management system.

Cortex's Edds package is said to feature 13 lettering styles, including gothic, script, roman and italic, for production of presentation-quality graphs, charts and text. The package reportedly transforms data entered either from a terminal or from standard data files for use in multicolor line plots, high-low-close plots, scatter diagrams, horizontal or vertical bar charts, pie charts and standard text.

Edds is priced at $6,000, according to the vendor. More information is available from Cortex at 55 William St., Wellesley, Mass. 02181.

DEC Offers Accounting System

MERRIMACK, N.H. — Digital Equipment Corp. has introduced the Digital Accounting System, an integrated system designed for small businesses. The system was designed specifically for use on the Decmate II small business computer utilizing a 10M-byte Winchester disk.

The general ledger accounting system handles up to 13 accounting periods or can be used with accounts receivable, inventory control, accounts payable or payroll. Posting of ledgers, financial statement preparation and book closings are integrated, a spokesman said.

Individual accounting modules cost $650, and the sales analysis module starts at $325 from DEC, Continental Blvd., Merrimack, N.H. 03054.

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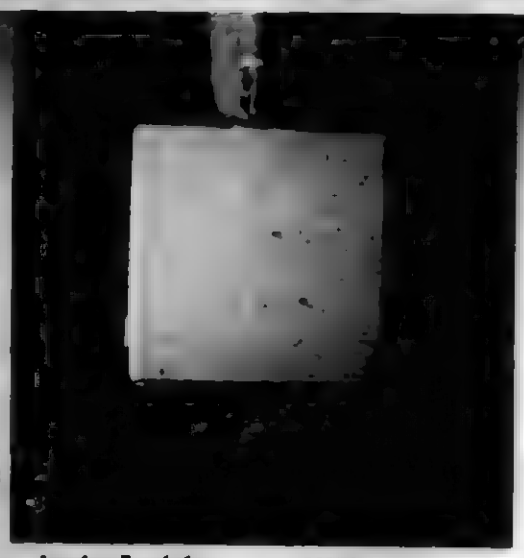

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Concurrent CP/M Receives Generic Version

LAS VEGAS — Digital Research, Inc. recently announced at Comdex/Fall '83 a generic version of its Concurrent CP/M operating system for products based on Intel Corp.'s 8086 and 8088 microprocessors. The generic version of Concurrent CP/M operates with the IBM Personal Computer and is equally suitable for single- and multiuser configurations, according to Digital Research.

The OEM version of Concurrent CP/M works with the software publisher's DR Soft/Net package. DR Soft/Net reportedly allows assorted models of CP/M-based personal computers to be tied together through any local networking scheme, including Xerox Corp.'s Ethernet and Datapoint Corp.'s Arcnet, the vendor said.

In other Comdex-related product moves, Digital Research announced a compiler technology that will reportedly permit existing application software to be transported between different vendors' microprocessors without extensive reprogramming. In its initial version, available in January, the technology will be available as a compiler for Fortran 77, Digital Research said.

The vendor also used Comdex to introduce a family of application software packages that purportedly allow a wide variety of 8- and 16-bit systems to create presentation graphics and emulate a graphics terminal. In addition, the software family includes a program that enables charts and graphs to be generated on the IBM Personal Computer.

The generic version of Concurrent CP/M and DR Soft/Net will be packaged together and will become available next March at OEM-negotiated prices. The three graphics packages range in price from $295 to $500, compared to $500 for the Fortran 77 compiler.

Digital Research is at 160 Central Ave., Pacific Grove, Calif. 93950.

Works With 370, 4300, 30 Series

IBM Unveils Change-Dispensing ATM

RYE BROOK, N.Y. — An automated teller machine (ATM) said to dispense exact change to the penny, cash paychecks and accept check deposits without deposit slips or envelopes was announced last week by IBM. The ATM cannot be left unattended as it is not physically secure.

The IBM 4730 Personal Banking Machine can dispense pennies, nickels, dimes and quarters and bills in five denominations. Designed for use in banks, stores and work locations, the unit also provides the usual ATM functions, including account transfers, payments, deposits and withdrawals.

In supermarkets and other stores, it can authorize personal checks for acceptance at checkout counters, an IBM spokesman said.

Users of the 4730 can cash payroll, Social Security and other third-party checks made out for uneven amounts. The user inserts a banking card, keys in a personal identification number and places the check directly into the check deposit slot.

The 4730 identifies the check by scanning its magnetic characters. The identification number and the amount of the check are entered through the keyboard and are transmitted to the bank's host computer where they are verified. If the request is authorized, the exact amount is dispensed in bills and coins.

When a currency cartridge becomes empty, the 4730 can dispense the correct amount of change using the next lowest denomination of bills and coins, an IBM spokesman said.

All personal ID numbers transmitted from the ATM to the host are encrypted. In addition, messages with sensitive data are tagged with a special code. When the 4730 receives authorization from the host, the terminal verifies that the code was not modified during transmission. Any tampering will change the code, and the terminal will not complete the transaction.

The IBM 4730 Personal Banking Machine can dispense bills and coins.

The ATM will be available in one- or two-console models and can be installed free-standing, in a teller/cashier counter or by a wall. The terminal has a 480-char.,

(Continued on Page 36)

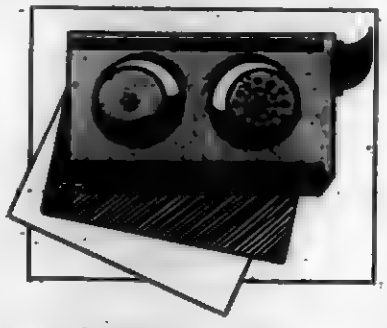
Modem Market Seen Fueled By Integration

Second in a Two-Part Series

By Jean-Pierre Cahier

Special to CW‡

Although certain studies indicated a possibility of a shrinking modem market at the end of the decade, the most recent predictions seem to unanimously agree on the sustained growth of the modem industry. The main argument is the anticipated explosive growth of distributed information processing and of new networking applications.



Another argument is of an economic and technological nature: Integration of an increasing number of modem functions into a single chip will decrease modem prices, which, while lowering manufacturers' per-unit profits, will attract many more new customers.

Single-circuit integration has already

(Continued on Page 38)

Teleray Adds Ansi X3.64 Unit To Smart Editing Terminal Line

MINNEAPOLIS — Teleray, Inc. has announced the addition of a new Ansi X3.64 terminal, the Model 7-DEC, to its smart editing line.

The dual-mode, multipage unit is 100% software-compatible with the Digital Equipment Corp. VT102 in one mode and the Teleray Model 10-compatible or user-definable (code-loadable) terminals in the other. Either of these resident control modes can be chosen from the keyboard.

With its extended Ansi code set, the Model 7-DEC performs all operating functions of the VT102 plus text editing, programmable function and block transmission operations, according to the company. It has two pages of display memory, either volatile or nonvolatile, which can be expanded to four pages. Its display memory can be reformatted by redefining logical line length and page length.

The 7-DEC's function and numeric pad keys total 32 keys, or 64 functions. They may all be redefined by the user to be compatible with DEC or any other system.

The list price is $1,370, with delivery within 30 days. More information is available from Teleray at 6425 Flying Cloud Drive, Eden Prairie, Minn. 55344.

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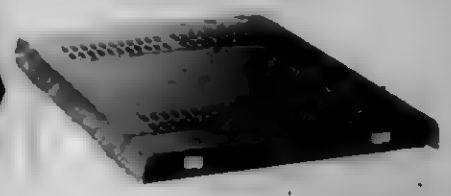

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Modular Private Branch Exchange Offered

SHELTON, Conn. — Tie/Communications, Inc. has introduced a digital modular private branch exchange (PBX) said to combine key telephone operations with the capacity of a medium-size PBX.

The Mercury PBX is reportedly targeted at the 200 to 2,000 extension market and is said to allow station users to access a range of features without using hook-switch flash. Mercury is also said to transmit voice and data simultaneously, thus eliminating separate data switches, duplicated wiring, dedicated data phones, modems and acoustic couplers.

For data transmission, the switch is said to be compatible with current protocols and can reportedly connect compatible equipment as an integral part of the data network.

Priced at $300 to $400 per line, the switch will be available in May 1984. Additional information can be obtained from Tie/Communications at 5 Research Drive, Shelton, Conn. 06484.

Performance Monitor System Out

CHERRY HILL, N.J. — Avant-Garde Computing, Inc. has announced an enhanced Net/Measure performance monitoring system for smaller networks.

Net/Measure is a stand-alone, central-site system said to be capable of monitoring up to 12 lines and 700 terminals. The system is said to enable operators and managers to see how every terminal on every line is performing at any given moment. Real-time and historical performance data is displayed on a full-screen CRT and can be generated as printed reports, according to a vendor spokesman.

Net/Measure is compatible with IBM's Binary Synchronous Communications and Synchronous Data Link Control. Priced at less than $18,000, Net/Measure is available from Avant-Garde at 2091 Springdale Road, Cherry Hill, N.J. 08003.

Teletex Begins U.S. Service To Germany

WALNUT CREEK, Calif. — Teletex, an international commercial message communications service, recently inaugurated its operations in the U.S. with a message sent to West Germany from the Siemens Medical Laboratories here.

Developed by Siemens AG in West Germany and initiated through Western Union, Inc., Teletex service uses terminals which combine text typing and processing with automatic memory communications. The service operates at a transmission speed of 2,400 bit/sec, according to the vendor.

Teletex service is provided by Western Union and is available between 25 U.S. cities and between those cities and West Germany. The cost of the service is 85 cents/single page domestically and $1.34/single page between the U.S. and West Germany, with each additional page costing 35 cents and 84 cents, respectively.

Further information about the Teletex service is available from Siemens Communications Systems, Inc. at 186 Wood Ave., Iselin, N.J. 08830.

IBM Offers ATM Said to Dispense Exact Change

(Continued from Page 35)

nonglare 9-in. diagonal display. An optional privacy filter limits the view to the person standing directly in front of the screen.

The 4730 can communicate directly with IBM 370, 30 series and 4300 processors using existing Vtam, Tcam and NCP programs. In addition, application programs running under CICS/VS or IMS/VS can be used. The terminal also can communicate with a host processor through the 4701 finance controller, the spokesman said.

Purchase price is $20,000 for the basic single-console model and $32,700 for the basic two-console model. The coin dispenser costs $2,830; the check deposit, $3,640; and the envelope deposit, $1,720. The customizing program has a one-time charge of $6,000 or a monthly charge of $500. The monitor program has a one-time charge of $20,000 or a monthly charge of $1,600.

The ATM will be available in the fourth quarter of 1984. More information is available from IBM, Information Systems Group, 900 King St., Rye Brook, N.Y. 10573.

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Page Entry Terminal Works Without Operator Support

SCHAUMBURG, Ill. — Motorola, Inc.'s Communications Sector has introduced a new compact, desktop, page entry terminal.

Designed specifically for entry of alphanumeric and other pages, the Motorola Page Entry Terminal eliminates the need for operator assistance, according to the vendor. The LCD of the Page Entry Terminal displays 40 characters at one time. Messages longer than 40 characters are marqueed across the display.

The terminal's other features include: built-in speaker and telephone handset, computer and electronic mail access, built-in modem and autodialer, built-in clock, ability to operate during power loss, plus optional accessories.

The Page Entry Terminal is priced at $1,105 from Motorola's Communication Sector at 1301 E. Algonquin Road, Schaumburg, Ill. 60196.

Hand-Held Unit Monitors, Tests Interconnects

CIRCLEVILLE, N.Y. — RVS Electronics, Inc. has introduced a hand-held tester designed to monitor and troubleshoot modem and data terminal interconnects.

The Model PK-10 Modem-Terminal Interface Tester is an RS-232 interface diagnostic instrument. It incorporates 24 dip switches and associated breakout pins and 10-bar graph LED display, with the option of power from a battery or from the RS-232 interface.

Other features include one ground socket for control signal simulation, one B-positive socket for control signal simulation, one permanently fixed male and female two-pin connector, four single patch cords and two double patch cords, according to a vendor spokesman.

The product is priced at $69, the spokesman said, with delivery requiring two to four weeks. More information is available from RVS Electronics through P.O. Box 87, Circleville, N.Y. 10919.

Firm Cuts Price, Enhances Line Of Transceiver

BROOKFIELD, Conn. — American Photonics, Inc. has announced a price reduction for its TR1000 Fiber Optic Transceiver, along with two new versions of the product.

The TR1000A, with a maximum transmission distance of four to five kilometers, costs $200. The TR1000B, with a transmission distance of two to three kilometers, costs $150, and the TR1000C, with a transmission distance of two to three kilometers, costs $75. The price reduction is effective immediately.

Additional information is available from American Photonics at 71 Commerce Road, Brookfield, Conn. 06804.

Add-In ROM Boosts Terminal's Speed

NORCROSS, Ga. — Intecolor Corp. has introduced an add-in programmable read-only memory that is said to double the speed of its E8001G color graphics terminal.

Called Fastware, the average rate at which E8001G processes information is increased from about 9,400 bit/sec to 19,200 bit/sec. The processing speed of graphics plot codes is increased by about 35%.

Fastware is priced at $300 from Intecolor at Intecolor Drive, 225 Technology Park, Norcross, Ga. 30092.

Innovator Line of Printers Gets Extended Capabilities

MIAMI — Innovative Electronics, Inc. has announced extended communications interface capability for the Innovator 300 line/min printer system.

According to the vendor, the Innovator 202-FC provides complete IBM 2780 and 3780 emulation facilities within its built-in printer and Ascii terminal port.

Features include space compression or expansion, processor interrupt reception, conversational mode, component selection and vertical format control, according to the vendor.

The printer uses heavy-duty chain technology to print fully formed characters at a nominally rated print speed of 300 line/min. Speeds over 400 line/min are achieved using the 48-char. set. Clear, fully formed uppercase and lowercase characters are generated on up to six copies, the vendor said.

Models offering 132-col. and 80-col. forms are available.

The 132-col. printer is priced at $5,495, with delivery from stock within 30 days. More information is available from Innovative Electronics at 4714 N.W. 165th St., Miami, Fla. 33014.

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Integration Seen Fueling Modem Mart Growth

(Continued from Page 35)
been achieved in a few cases for signal processors (modulation and demodulation). The modem, in the commonly accepted definition of the term, should not be viewed as just a device for conversion of analog and digital signals — which in fact may not even be performed — but rather as a device whose hierarchically layered functions will be successively integrated into a single circuit.

Single-Chip Modem

Dave Fisher of Arthur D. Little, Inc. claims that it is already possible to build a two-chip modem and expects a single-chip 9,600 bit/sec modem to enter the market in 1984.

On the low end of the market, integration will eliminate the separate-box modem. The possibility of building an advanced modem with just a couple of chips will bring new opportunities right away for microcomputer manufacturers such as Tandy Corp. or Apple Computer, Inc., which may choose to integrate these advanced modems into their systems rather than sell a separate modem "box."

In France the government-run Postal, Telephone and Telegraph Adminstration is not particularly interested in a significant increase in telecommunications traffic and even less interested in supplying cheaper communications equipment to small users.

This phenomenon is also visible in the case of French videotex, for which the companies named above will supply hundreds of thousands of modems. But videotex, with the possibility of interconnecting different computers and terminals via telephone network, can spur the demand for modems even higher if modem prices start to decrease below $150, as they have in the U.S.

One might consider the case of a nationwide American network, operating since last summer, serving users of videotex and Atari, Inc. game terminals. The network uses three Stratus Computer, Inc. computers, serves 300,000 users and may be expanded to serve up to 12 million users of Atari 2600 and compatible game systems.

The operating company, Control Video Corp. (CVC), expects to provide message switching and home banking, using the telephone network at 900 and 1,800 bit/sec. The main factor behind this successful operation — which in fact resembles in some ways some public-service telecommunications projects now under way in France — is the low cost of the project's "home" modems, which have 8K bytes of random-access memory for downloading programs and are priced at $60 from CVC.

However, no matter what dominates the market — videotex, video games, microcomputers or combined applications of microcomputers and telecommunications — the increased demand for modems is inevitable and should be accompanied by miniaturization, abandonment of the "separate box" concept and a decrease in prices.

This article originally appeared in Le Monde Informatique, Computerworld's *French affiliate, and appears here as part of the CW International News Network. Jean-Pierre Cahier is a senior writer at* Le Monde Informatique.

SNA/SDLC Option Out for Direct 1600

SANTA CLARA, Calif. — Direct, Inc., a designer and manufacturer of integrated personal business computers, has announced an extended Systems Network Architecture/Synchronous Data Link Control (SNA/SDLC) communications option said to allow its Series 1600 computers to communicate with IBM mainframes.

The SNA protocol allows the Series 1600 to communicate with IBM systems and other SNA networks that support applications on Hewlett-Packard Co., Digital Equipment Corp., and IBM computers.

The multilayered SNA protocol runs on Direct's 1625 and 1631 computers and is designed to emulate the IBM 3274 Model 51C communications controllers with a 3278 display.

The 1600 system supports the same screen formats as those supported by the IBM 3278 Model 2 display station. The Direct SNA supports Ebcdic line transmission and status line messages. The 1631 also provides 24 function keys for 3278 emulation.

Both products are priced at $990, with delivery in 90 days. More information is available from Direct at 4201 Burton Drive, Santa Clara, Calif. 95054.

Turbomux-2 Offers Compaction

PALO ALTO, Calif. — Chung Telecommunications has introduced a data compaction unit with a two-channel statistical multiplexer.

According to the vendor, the Turbomux-2 will support either two 1,200 bit/sec data streams or two 2,400 data streams over a single Bell 212A or compatible modem.

The Turbomux-2 offers error detection and retransmission features which, according to the vendor, ensure high-fidelity data transmission.

The Turbomux-2 is priced at $995. More information is available from Chung Telecommunications at 4046 Ben Lomond Drive, Palo Alto, Calif. 94306.

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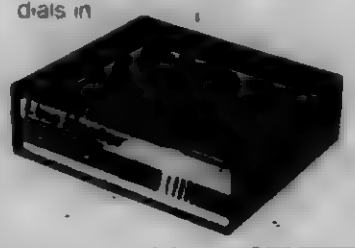

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Intertec Desktop Debuts, Compatible With IBM Micro

COLUMBIA, S.C. — Intertec has introduced Headstart, a desktop business microcomputer that features up to 1M byte of main memory, dual processors and both 8- and 16-bit program compatibility. The unit is compatible with IBM's Personal Computer.

Headstart is 15 in. wide, 11 in. high and less than a foot deep and weighs approximately 25 lb. The system has two housings: the CRT terminal enclosure, which houses the disk drive and processor/memory electronics, and a detachable keyboard. The system also includes a 3½-in. microfloppy disk drive and a random-access memory (RAM) disk, a disk emulation circuit, the vendor said.

The 1M-byte memory model is the VPU 1000. The VPU 512 comes with 500K bytes of memory, while the VPU 128 has 128K bytes. Both the VPU 1000 and the VPU 512 include a 3½-in. microfloppy disk drive, the vendor said.

Headstart reportedly permits a second disk drive to be emulated via the company's RAM disk feature. Up to 1M byte of user memory can be partitioned as emulated disk memory.

The two standard microprocessors are the Intel Corp. 8086, a 16-bit processor, and the Zilog, Inc. Z80A, an 8-bit processor. Two operating systems are offered as standard features: Microsoft, Inc.'s MS-DOS for 16-bit software and Digital Research, Inc.'s CP/M 80 for 8-bit packages, the vendor said.

According to a spokesman, Headstart is both a single and a multiuser microcomputer. Although it may be purchased as a single-user, stand-alone workstation, it can be expanded for use in a local-area network.

Up to 255 Headstart video processing units (VPU) can be linked together via the company's proprietary, high-speed coaxial interface. Users can start with a single VPU and later add users with the addition of a coaxial connection, the vendor said.

(Continued on Page 40)

Business Micro Said to Incorporate Development Tool For Non-DPers

SUNNYVALE, Calif. — Logical Business Machines, Inc. has introduced a business microcomputer that incorporates an application development tool that can reportedly be used by both programmers and nonprogrammers.

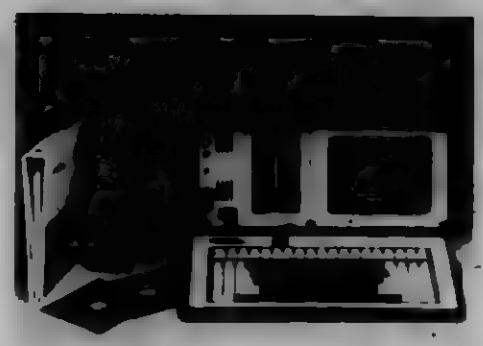
The Logical L-XT is a 16-bit system that includes the firm's Logical Natural Language. The system can be used for developing custom applications. In addition, the unit can be equipped with Microsoft, Inc.'s MS-DOS operating system. This gives the unit compatibility with IBM's Personal Computer software, the vendor said.

The computer also offers 192K bytes of random-access memory (RAM), a 10M-byte Winchester hard disk (upgradable to 60M bytes), a 320K-byte floppy disk and an amber CRT screen. Two IBM expansion slots are available to the user, and the system includes one parallel and two serial ports for attaching printers, modems and other peripherals, the vendor said.

According to the vendor, the Logical Natural Language allows users to produce data entry screens and reports as well as create and manipulate data files.

The language consists of "verbs," which are used to create and index files,

(Continued on Page 42)



Modular Micros, Inc.'s Zorba

Zorba Micro Line Gets Co-Processor, Hard Disk Version

FORT LAUDERDALE, Fla. — Modular Micros, Inc. has introduced a hard disk version of its Zorba series of portable computers. The firm also announced a co-processor for the series.

The Zorba Model 2000HD incorporates a 5¼-in., 10M-byte Winchester disk drive packaged with one 800K-byte flexible diskette drive. The unit features a a Zilog, Inc. Z80A microprocessor, 64K bytes of user memory, Digital Research, Inc.'s CP/M 2.2 operating system and a 9-in. green or amber video display. It is a self-contained unit weighing 25 lb, the vendor said.

(Continued on Page 42)

Power Stabilizer Saves Agency $174,000 in Hardware Costs

HARRISBURG, Pa. — A state agency here claims a 60Hz motor generator power stabilizer, which cost $64,000, saved $174,000 in the past year in hardware replacement costs and an estimated $500,000 in employee overtime.

According to Fred A. Weisman III, director of the Bureau of Technical Services at the Pennsylvania Department of Public Welfare, the department's Sperry Corp. 1100/84 mainframe uses 1,300 terminals connected to a telecommunications network in order to process more than 500,000 daily transactions throughout 64 counties.

The department's central computing facility had been using a 60Hz to 415Hz frequency converter from KW Control Systems, Inc. for some time. The frequency converter automatically conditioned power to the central processor, according to Weisman.

However, up until November 1982, the department did not use a power conditioner for its 60Hz peripherals, he added.

'Getting Out of Hand'

"Sometime in August 1982," Weisman said, "we became aware that the frequency of disk drive printed-circuit board failures and failures of head disk assemblies was getting out of hand. The system was being interrupted, and downtime was excessive. This was an intolerable situation."

Weisman formed a task force to study what could be done about peripheral downtime. The task force included the department's DP operations director, James Gray, and several representatives of Sperry's engineering group. The task force decided to evaluate how many times there was a system interruption and conduct a search to determine what was causing the problem.

The Sperry engineers brought in a power monitor in order to evaluate the power coming in from the utility company. Power was monitored for an eight-month period that extended from January 1982 to August 1982.

In that time, there were 20 printed-circuit board failures in Sperry 5056 and 5046 control units and 42 disk drive printed-circuit board failures in Sperry 8470 and 8450 drives. That was an average of eight print-

(Continued on Page 42)

Even though it is less than a week before Christmas, Symbolics, Inc. has unwrapped its Spartacus Computers, Inc. IBM-compatible mainframe a little early. Page 44.

Micad Touts Mix of CAD/CAE, Development

REDWOOD CITY, Calif. — Kontron Electronics has introduced a computer-aided design and engineering (CAD/CAE) workstation which can be integrated with a microcomputer development system.

Called Micad, the workstation is a hardware and software development system that allows engineers to design printed circuit boards and gate arrays, the vendor said.

Schematic input and hand-drawn layouts for printed-circuit boards and gate arrays are created using a digitizer. A graphics editor allows device interconnection, and a symbol library is also included, the vendor said.

According to the vendor, Micad bridges the gap between development and CAD/CAE systems by offering both capabilities in an integrated stand-alone system.

A Micad system consists of a Kontron KDS-980 development system which runs under Digital Research, Inc.'s CP/M operating system. Storage is provided by dual 5¼-in. floppy disks and a 10M-byte hard disk, the vendor said.

Two monitors come with the system: a 17-in. graphics monitor that has a resolution of 1,024 by 768 points and a 15-in. data monitor that displays 25 lines of 80 char./screen. Both monitors have adjustments for height and viewing angle.

Micad software allows direct digitizing and interactive cell layout of printed-circuit boards from two-sided to multilayer designs. Interface software enables the system to communicate to a more powerful CPU such as a Digital Equipment Corp. VAX-11/780 superminicomputer for memory and computer-intensive functions like simulation, plotting or design rule checking, the vendor said.

The 280 by 280 digitizer tablet has .025mm of resolution. Its cross-hair cursor offers parallax-free viewing, and its 16 control buttons allow one-handed operation. A graphics printer that allows high-resolution hard copies of the graphics screen and a pen plotter that produces large format check plots are optional.

The complete Micad system sells for $25,000. The KDS-980 Kontron workstation can be upgraded to Micad for $10,500 from Kontron Electronics, 639 Price Ave., Redwood City, Calif. 94063.

Processor Board Fits Nova Mini

DOBBS FERRY, N.Y. — Ardent Computer Products has announced the Supermap Processor Board, a 15- by 15-in., multifurictional printed-circuit board for users of Data General Corp.'s Nova minicomputers.

The product is compatible with the control and data switches of the Nova and can reside in either the CPU or I/O slots of the Nova chassis, the vendor said.

The processor consists of a 16-bit processor with 128K bytes of main memory. Memory is reportedly expandable to 256K bytes for use with the Nova instruction set.

The unit costs $3,500 from Ardent Computer Products, 145 Palisades St., Dobbs Ferry, N.Y. 10522.

Desktop Micro Introduced By Intertec

(Continued from Page 39)

Headstart also features a variety of user-oriented utilities including electronic mail, software file protection, individual user password generation, individual VPU logon/off and programmable user security features, the vendor said.

Two optional tabletop Data Storage Systems will be available for users who desire local-area network operation or enhanced data storage capability. Both feature the vendor's data networking system, which permits multiple VPUs to share common and/or restricted disk data bases.

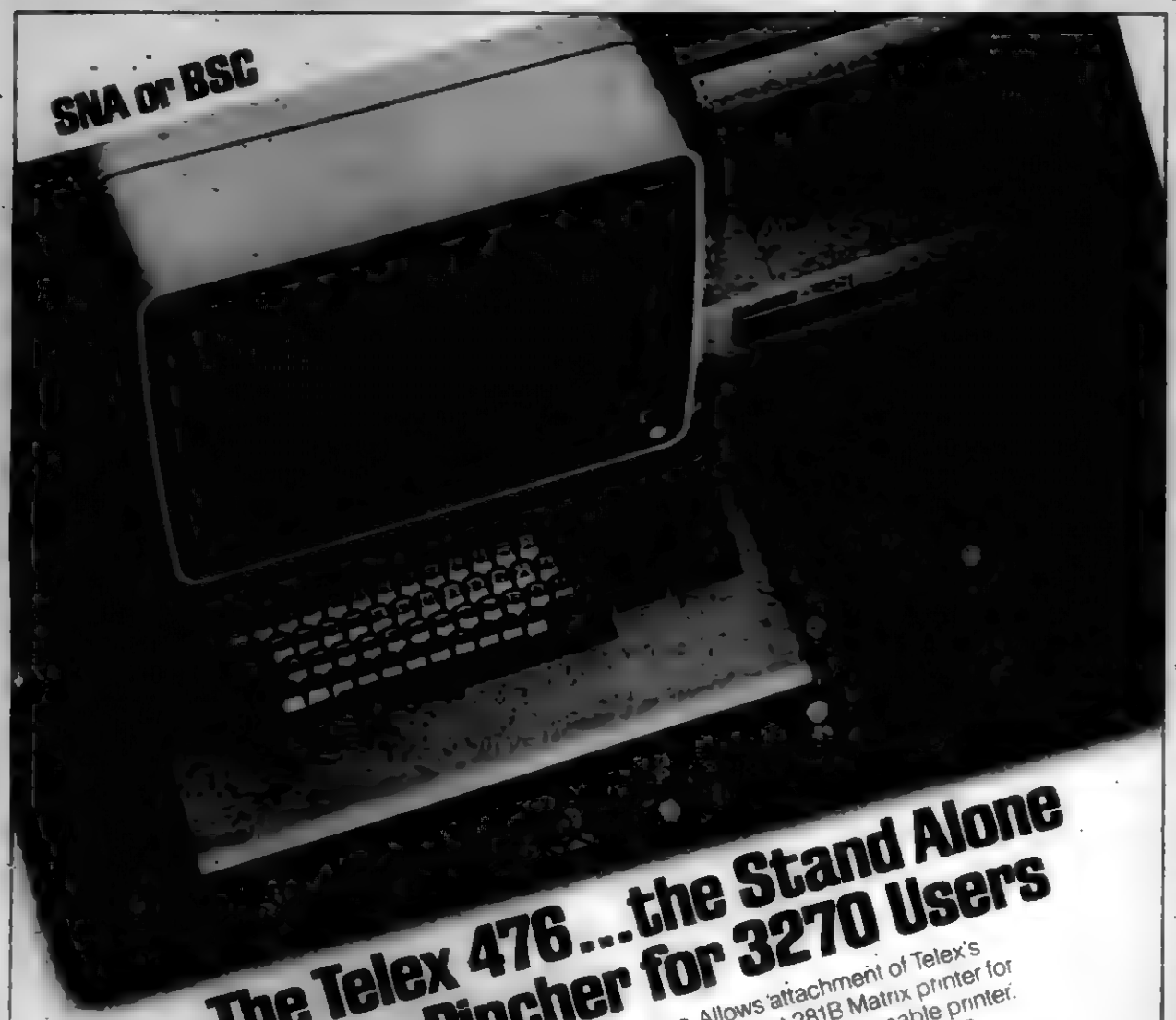
The DSS-10 utilizes a 5¼-in. Winchester disk drive that is upgradable to 20M bytes. Another model, the DSS-50, uses an 8-in. Winchester disk featuring 25M bytes of fixed storage and 25M bytes of removable data to ensure data base integrity. The DSS-50 can be expanded by adding up to three auxiliary 50M bytes for a total capacity of 200M bytes, the vendor said.

According to a spokesman, interfaces for Headstart include a coaxial communications interface, an external disk I/O interface, an expansion bus interface, an RS-449/RS-232 serial communications port and a Centronics Data Computer Corp.-compatible parallel printer port.

Headstart can be connected to a variety of different modems and printers, the vendor said, including a high-speed line printer and future expansions.

Headstart comes with a 12-in. nonglare screen with a green phosphor character display and costs from $1,795 for a VPU. A disk-based model with 500K bytes of memory is selling for less than $3,500, the vendor said.

More information is available from the vendor at 2300 Broad River Road, Columbia, S.C. 29210.



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Agency Cuts Downtime With Power Stabilizer

(Continued from Page 39)

ed-circuit board failures a month. In addition, there was an average of 2½ head disk assembly failures a month, Weisman recalled.

"The average monthly cost for printed-circuit card and [head disk assembly] hardware replacement alone was $14,500," Weisman explained.

"But far more serious was the havoc such fallout could cause in the field due to incorrect computation and other errors, lost processing time and overtime required every time our system would fail causing downtime," Weisman said.

Overtime alone was getting to be a major expenditure, according to Weisman.

"We actually documented the department's cost of overtime required by system downtime attributed directly to failures of 60Hz peripherals in September and October 1982 at $200,000. That was just for that two-month period," Weisman explained.

Cause of Downtime

The task force discovered the cause of the downtime to be periodic power surges and sags coming into the 60Hz power system from the utility.

At one point, power spikes were recorded at more than 100V on each input phase, Weisman recalled.

"At this point, the Sperry engineering group concurred that we go with a 300-kVac [KW Control Systems] Piller 60Hz motor generator power stabilizer," Weisman said.

The solution appears to have worked. In the year since the power stabilizer was installed, the department has had only two printed-circuit board failures and one head disk assembly failure, Weisman said.

"Based upon the average failure rates we were experiencing before we installed the power stabilizer, we could have expected a total of 96 failed printed-circuit boards and 31.2 [head disk assembly] failures during that same period without the power stabilizer, and of course, a commensurate amount of system downtime," Weisman added.

The power stabilizer paid for itself within six months, and Weisman estimated it has saved about $500,000 in overtime. "It is conceivable that we have realized substantial additional savings due to a reduction in processing errors," Weisman maintained.

'Imperative in Any System'

"My own conclusion," Weisman said, "is that conditioned power is imperative in any DP system and not just for the mainframe, but for all 60Hz peripherals as well.

"This is particularly true for any on-line system, such as ours, which operates through a large telecommunications terminal network. DP managers and facilities simply cannot take it for granted that the utility power coming into their system is going to be computer-grade power," Weisman said.

He suggested other DP managers conduct surveys similar to that conducted by the Department of Public Welfare.

Zorba Line Gets Hard Disk, Co-Processor

(Continued from Page 39)

The system offers bundled software from a variety of third-party suppliers, and the unit emulates more than 30 different disk formats including Xerox Corp.'s 820 and Digital Equipment Corp.'s VT-180, according to the vendor.

The 2000HD offers a full Ascii keyboard with 19 special function keys capable of up to 55 programmable functions, including a terminal communications capability with a host computer and a built-in power supply selector, suited for either 110V or 220V operations.

The initial product offering with 7-in. high-resolution CRT terminal, Z80A microprocessor, 64K bytes of user memory and two 400K-byte disk drives is priced at $1,595. The Zorba 2000, featuring a 9-in. amber or green screen, Z80A microprocessor, 64K bytes of user memory and either two 400K-byte disk drives or two 800K-byte disk drives costs $1,995 and $2,295, respectively.

In addition, the firm announced a co-processor for its Zorba 2000 series of portable computers.

The co-processor is a field-upgradable enhancement that features a 16-bit Intel Corp. 8088 microprocessor and 256K bytes of random-access memory. Digital Research, Inc.'s CP/M 86 and Microsoft, Inc.'s MS-DOS operating systems are supported by the Zorba co-processor, the vendor said.

According to a spokesman, the co-processor was designed for users who run large, complex programs. The extra memory and processing enhancements reportedly offer the user greater program sophistication with the convenience of portability.

The Zorba 2000 co-processor is a printed-circuit board that mounts inside the Zorba processor. For users who want to run Digital Research's CP/M 2.2 operating system, the co-processor can be used as a 256K-byte random-access memory drive, the vendor said.

The co-processor is scheduled for delivery starting in January 1984. The retail price is $795. More information is available from Modular Micros through P.O. Box 6099, Fort Lauderdale, Fla. 33310.

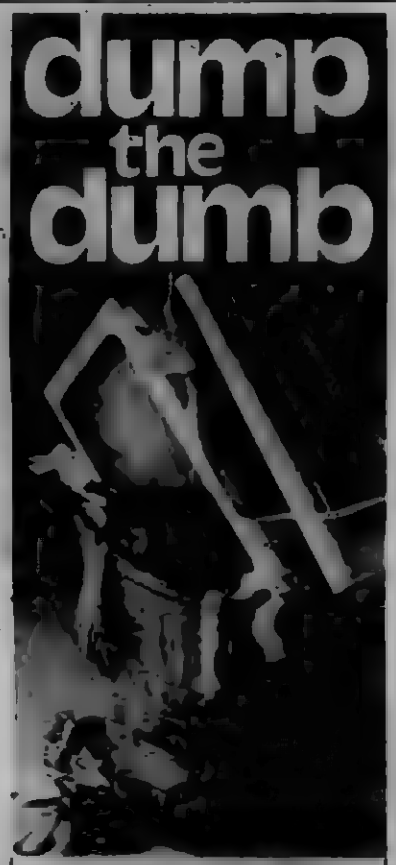
Business Micro Incorporates Application Tool

(Continued from Page 39)

manipulate data, enter prompts on the screen and accept entry data from the user; the "nouns" represent the user's data, the vendor said.

The L-XT system can be expanded with an additional 50M bytes of hard disk storage and 128K bytes of additional RAM. Other options include memory protection from power failure, streaming tape backup, clock and calendar and additional parallel and serial ports to accommodate printers, modems and other devices.

A typical system costs $5,985, which includes a monitor, word processing package, spreadsheet, real-time clock and power backup. More information is available from Logical Business Machines, 1294 Hammerwood Ave., Sunnyvale, Calif. 94086.



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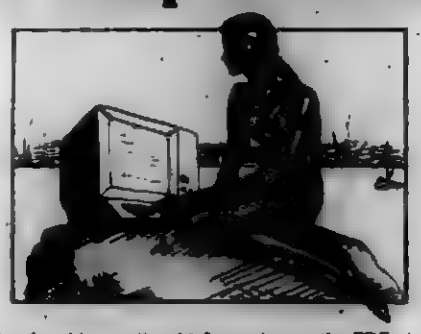

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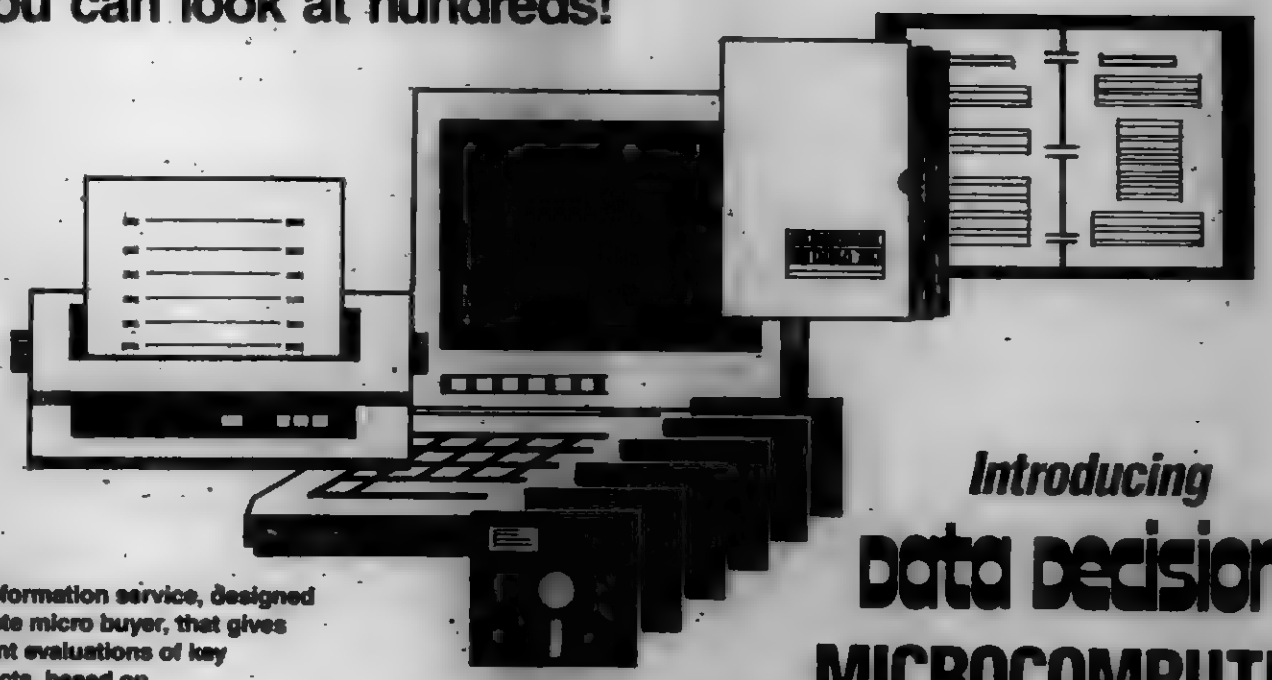

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First-User Installation Sees Spartacus K102 Running in Half Hour

CAMBRIDGE, Mass. — Installation technicians from Spartacus Computers, Inc. had good luck with the firm's first-user installation of its IBM-compatible mainframe. The technicians managed to have the system up and running in about 30 minutes.

Purchased by Symbolics, Inc., a computer research and development company, the Spartacus K102 processor is one component of the Spartacus System, a workstation-based system designed to offer distributed processing and IBM 370 compatibility to office users.

The Symbolics configuration includes the K102 distributed processor with 1M byte of main memory, 150M bytes of hard disk storage, a Xerox Corp. Ethernet local-area network control unit and Spartacus' Knet software package. Knet reportedly allows IBM and compatible processors to connect to the Ethernet local-area network and permits telephone connection to long-haul networks. Also included in the configuration are two IBM 3278-type terminals manufactured by Visual Technology, Inc., of Tewksbury, Mass., a Symbolics spokesman said.

"We looked at alternative systems but there were complexity and cost problems," according to James E. Kulp, manager of networks development for Symbolics. All the other solutions required two or three pieces of hardware, Kulp continued. The Spartacus product did it all in one step. This allowed Symbolics to use one piece of hardware and one standard interconnect (Ethernet) to tie directly to another standard interconnect (an IBM channel), Kulp explained.

Additional components of the Spartacus system include the Spartacus KOS virtual-machine operating system, video display terminals and the Knet networking subsystem, according to Spartacus.

Symbolics purchased the Spartacus system with the hope of extending the market for its Lisp-based computer system, the Symbolics Computer System, to users of IBM mainframes.

'Dance With IBM'

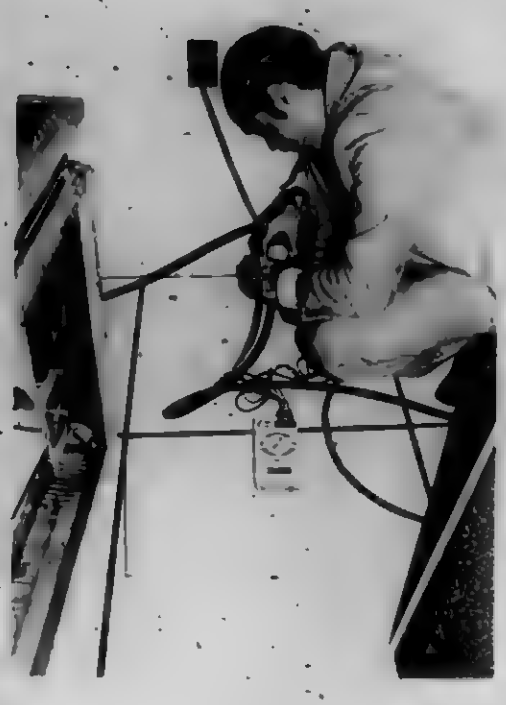
"As our original market, which was mostly research and academia, expands, we're running into more commercial customers and running into more IBM systems," Kulp said. "And if we want to reach that market we have to dance with IBM as we dance with other computer manufacturers.

"We chose the Spartacus system because it had two important things," Kulp said. "One, [it] had a direct Ethernet channel attachable controller and second, [it has] a software package with which you can communicate over Ethernet using a standard set of protocols."

A Spartacus spokesman noted that the Knet network offers users one integrated local and long-haul network for IBM's 370-architecture processors. The Knet is a datagram-based network designed to interconnect Spartacus K102 processors, 370-compatible processors and servers. This permits the sharing of peripheral devices from a variety of vendors. The network consists of Knet software and an Ethernet control unit.

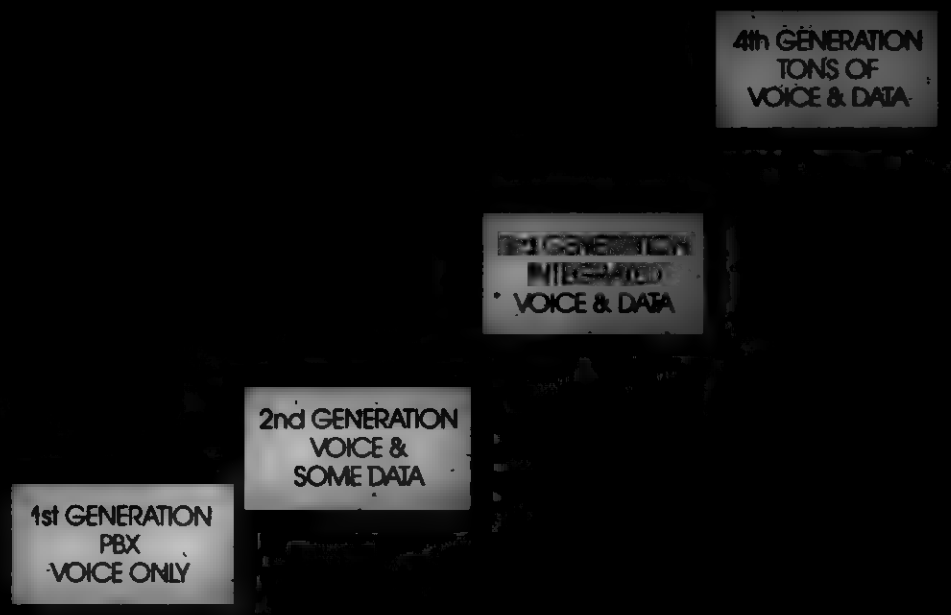
The network runs unmodified as a subsystem in a virtual machine under IBM's VM/370, VM/SP operating systems or under the Spartacus KOS operating system.

According to a spokesman, a typical Spartacus system costs between $65,000 and $122,000.



Photos and Text by Lynn Haber

James E. Kulp, Manager of Network Development for Symbolics, Inc., signs acceptance of delivery papers (top left); Benjamin Petterson, Senior Technical Support Specialist with Spartacus Computers, Inc., sets up one of the two 3278-type terminals (top right); Spartacus Systems Programmer David Foss plugs the K102 processor into 110 volt service (bottom left); and Spartacus Computers representatives waiting for the system to come up (from left to right, Benjamin Petterson, Patrick Lucci, James Burhnam, Michael D. Rivers and David Foss) (bottom right).



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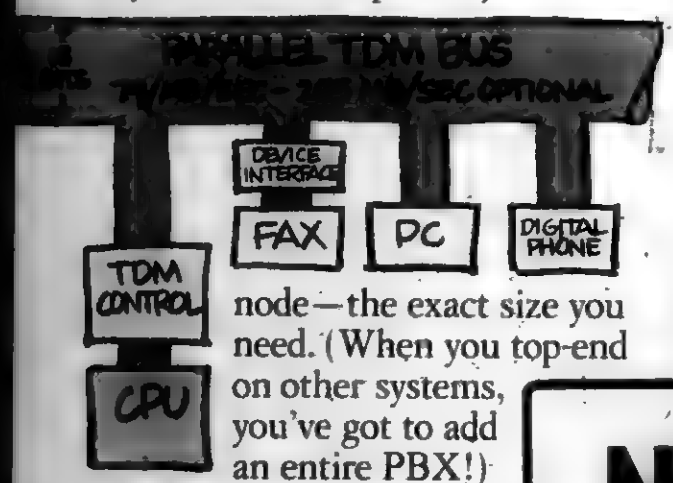

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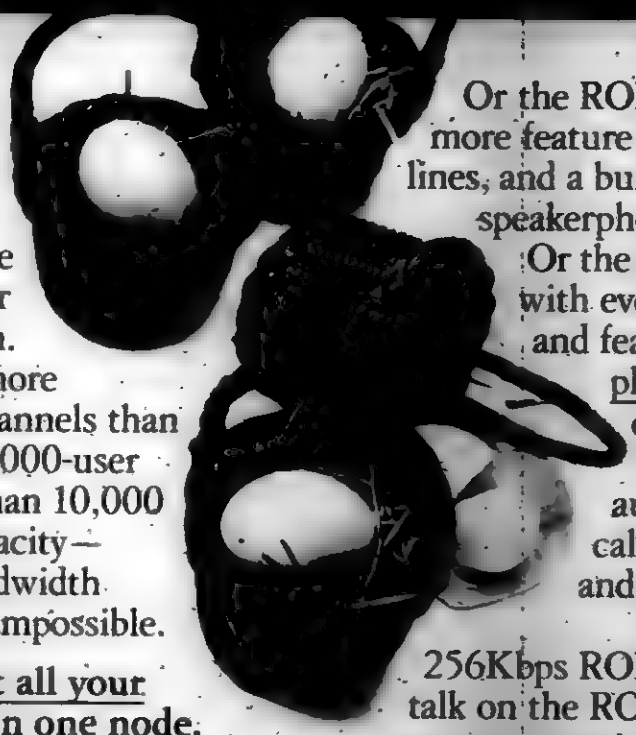

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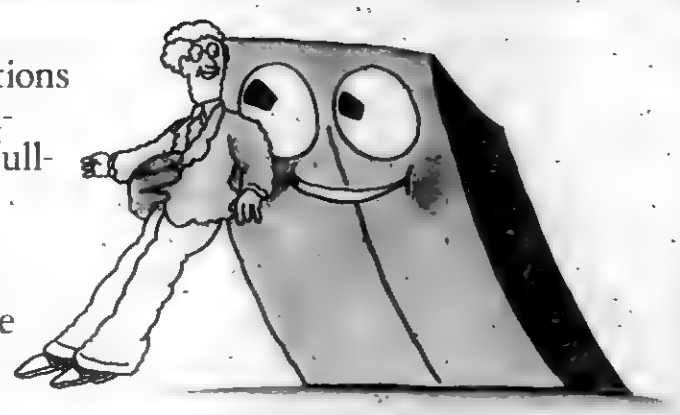

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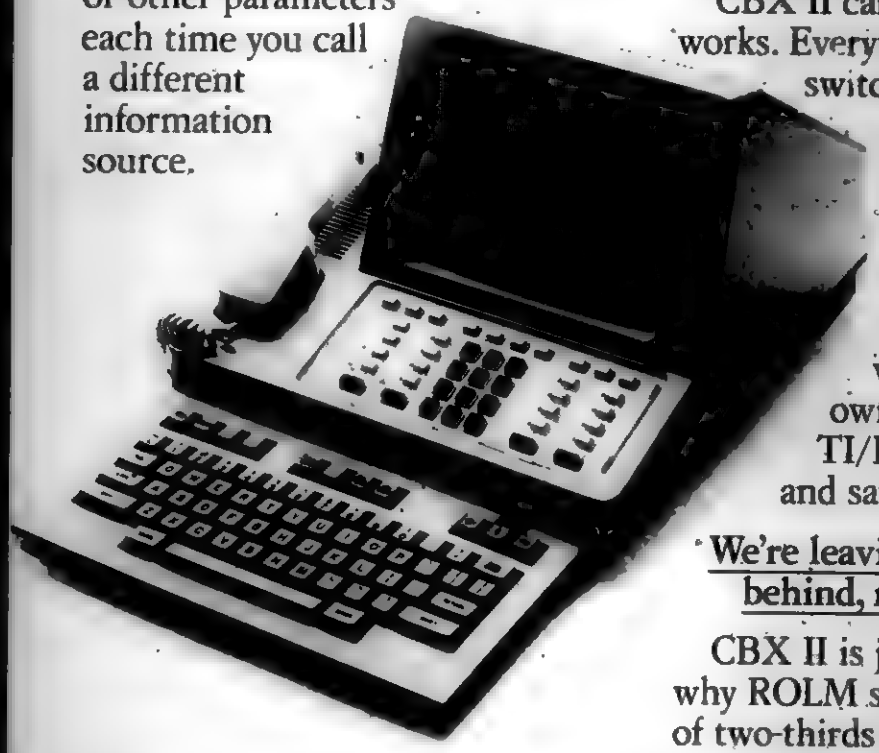

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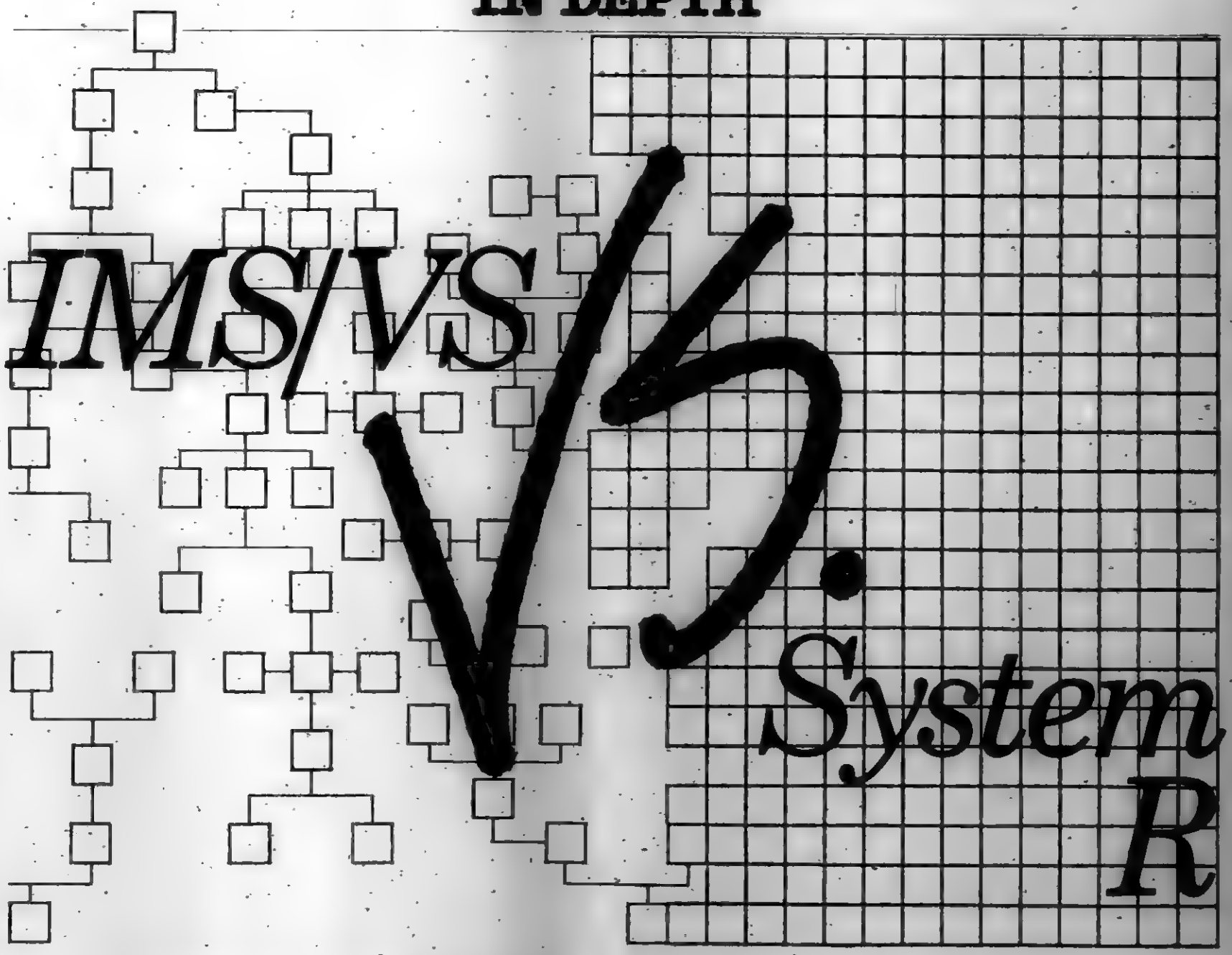


Comparing IBM's Hierarchical and Prototype DBMS

By Monica Ajmani Hickey

IBM continues to refine its prototype System R, a relational DBMS that promises more power and adaptability than the hierarchical IMS/VS.

Information Management System/Virtual Storage (IMS/VS) is the principal hierarchical data base management system (DBMS) provided by IBM for its 370, 30 series and 4300 systems. Advancing into the frontiers of relational theory, IBM is currently refining its prototype System R, heralding the first projected general-purpose relational DBMS. Following is a comparative analysis of IMS/VS and System R at this turning point in DBMS technology. The description of System R is based on published material in the *IBM Systems Journal* and other sources.

Physical Organization. In a hierarchical DBMS such as IMS/VS, a physical data base is an ordered data set. Within this data set are fixed all of the occurrences of one type of physical data base record. The physical data base record is built as a structure of data elements, identified as segments, which are systematically ordered in a series of hierarchical relationships.

A typical physical data base record will contain many segments. A segment is defined as a unit of access that contains one or more fields of data. A segment might contain such fields as employee name, organization number, job code and base pay.

The relationship built from a subordinated series of segments is known as a hierarchical structure and is analogous to the layering of a tree structure. It is commonly identified as the parent-child relationship. This method of structuring data follows an evolving process of subordination, requiring data base reorganization as the data elements are modified.

In elaborating on this IMS-unique parent-child relationship, it is important to emphasize the logical relationship between the segments as a hierarchy. The highest, or root,

segment is the definitive source of the remainder of the hierarchy. A conceptual relationship, from the root, links these subordinating segments, and the user can select other logical file organizations from them. These relationships are logical file organizations (unidirectional and bidirectional pointers) commonly identified as physical twin, logical twin, physical parent-child and logical parent-child.

The user will designate one or more sets of all segments in the physical record that will appear in the data base logical hierarchy. These are called "sensitive segments," and, as they are grouped into sets, they are then arranged into the specified logical hierarchical relationship.

It is apparent from the literature on System R that the user (data base designer) will not be required to possess in-depth knowledge of its physical structure. Most of it will be internal to the DBMS.

IMS/VS supports up to 255 fields per segment (record) and up to 1,000 fields per data base. Variable-length fields and segments are supported. The maximum length of a field is 255 characters and, for segments, there are 32,000 characters in most retrievals.

The physical organization of System R is governed by a subordinate data base manager known as the Research Storage System (RSS). In RSS, segments are the primary basis for data storage, and each segment is grouped into a collection of logical address spaces that are used to organize physical clustering. Although one segment can support several tables, all of a table's records must be confined to one segment.

The N-ary relation, the central data object in RSS, features a "time-varying" number of records. These N-ary relations are conveniently identified as tables. Tables are flexible to user changes without a data base reload. Another feature provided, as a means of addressing records, is an identification known as Tuple Identifier (TID). TID is used to identify all records in a table. The RSS Index is established to correspond a given table with specific values in related sort fields. The RSS Index thus performs an access for each view of a table. An index is compiled for each segment containing a table.

An important advantage of System R is the capacity to utilize the Research Storage Interface (RSI). RSI is an organizing navigational data manager built with System R to offer record-at-a-time operators on base tables. The RSI performs its function in a very dynamic environment. The RSI employs the RSS-created identifiers and data segments, tables, access paths and records. The RSI then uses its own working storage areas for its segments and access paths addressed as indexes and links.

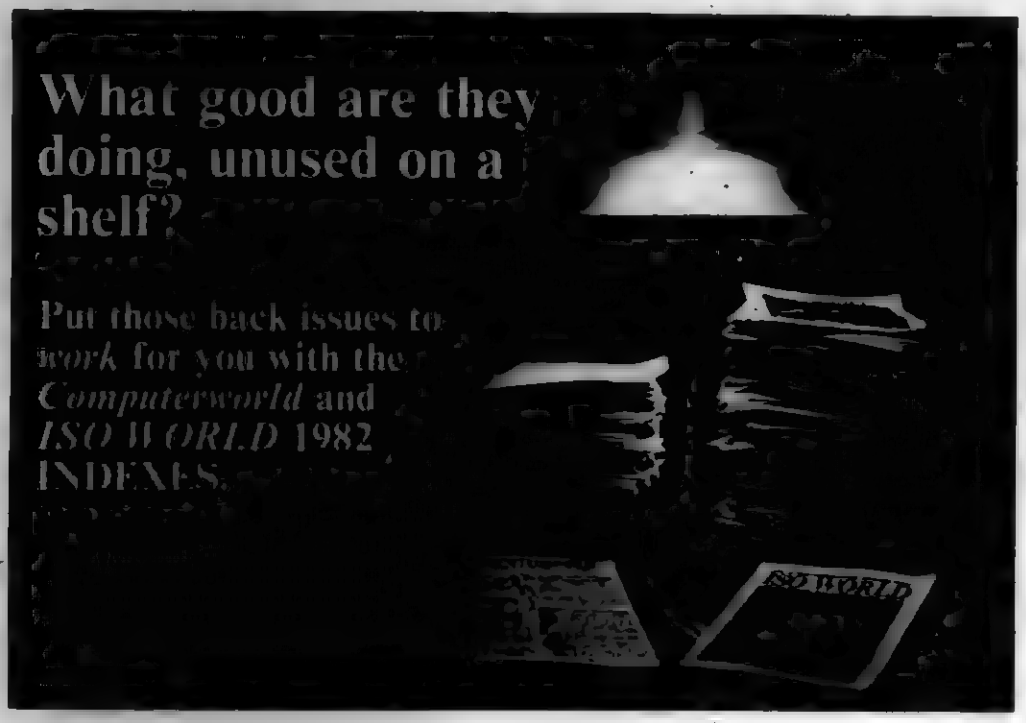
Finally, each segment of the RSS is stored in a sequence of pages on disk. Each page contains 4,069 bytes of disk space, which is allocated randomly. Each page then performs a transfer unit to virtual storage.

The fundamental difference between these two data structures, in physical organization, is that IMS/VS presents data in a hierarchy and System R presents data in a tabular, relational structure. Efficient utilization of space is sometimes easier when using the hierarchical structure. In System R, data must often be duplicated excessively.

Traditionally, data often forms a natural hierarchy. While working with the two structures, if required, the mapping of hierarchies to relations is not always simple to delineate. It is also apparent from the literature on System R that the user (data base designer) will not be required to possess in-depth knowledge of its physical structure. Most of it will be internal to the DBMS. Currently, the IMS/VS data base designer is sufficiently familiar with the physical structure to be able to develop efficient data bases.

Logical Organization

The logical organization of IMS/VS is integrally compatible with its physical organization. The logical



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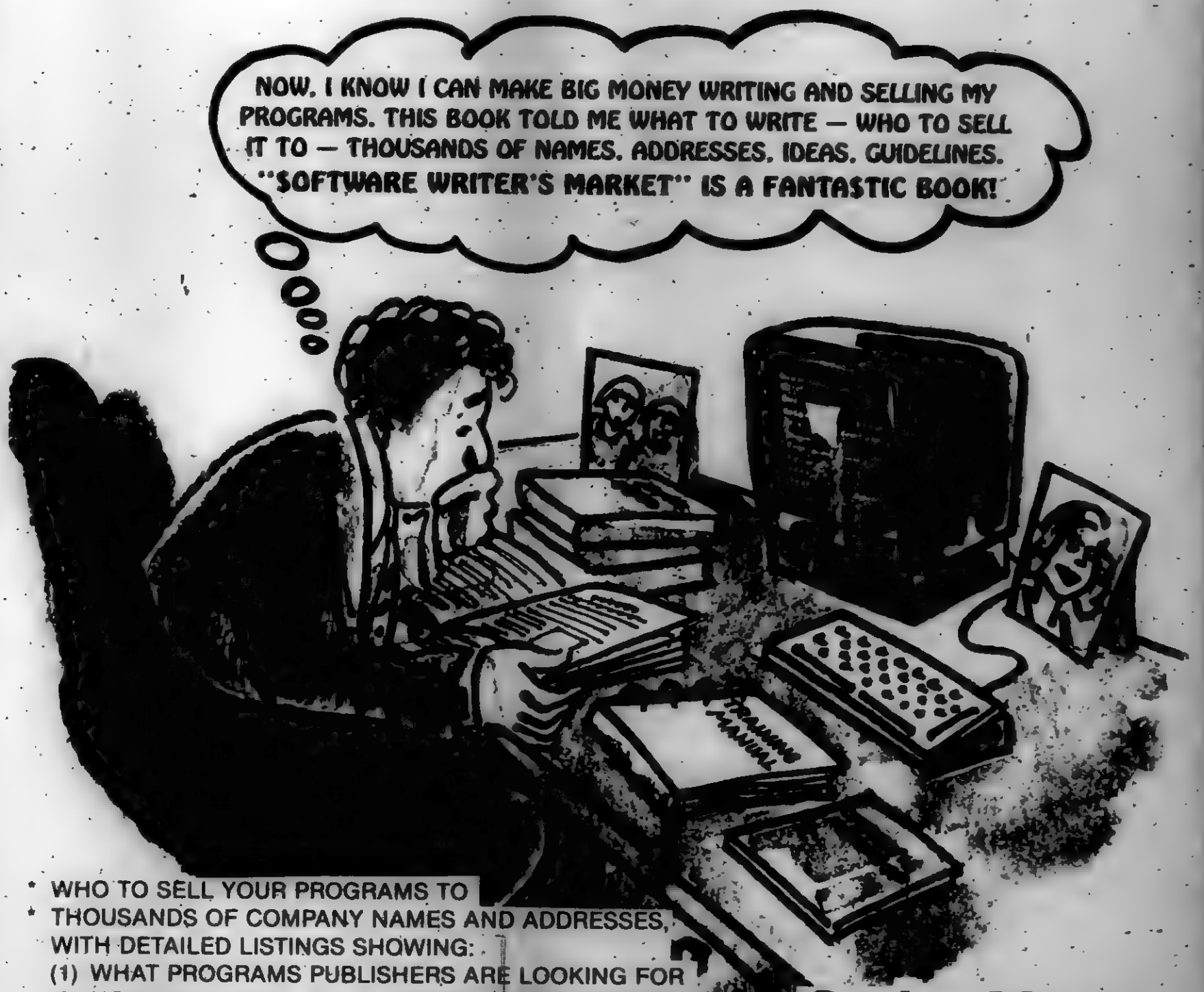

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data base is a series of records organized such that one record is one single-rooted tree of segments based on one tree-structure record type. In the design transformation from physical to logical record types, the physical record may be chosen as a pattern for construction. The segment type is identified, and its identifier may be changed to accommodate the logical structure. The segment type and its subordinating dependent segment structure types are omitted. Then a concatenation is assembled, building from logical parent to logical child. Antecedents and dependents of this logical parent can be linked as dependents of the complete concatenated segment.

The IMS/VS logical structure functions as a virtual data base and does not exist independently in storage. It is a two-dimensional system that requires logical data base segments to be drawn from the physical data base, as required, through the application program.

In System R, the logical organization is very powerful and adaptable. Physical structure is immediately transparent to the user. In fact, multilevel view-on-views are available to the user.

In addition, the underlying stored data may change in structure, leaving many user views unaffected. Since increased data independence is a major objective of enhanced data base design, the feature of multilevel view-on-views makes System R an especially attractive data structure. The System R internal data storage format is not an immediate user concern. User query response from the data base is shown in the form of a table, which may be stored as a view.

Further facilitating user control, System R enables users to specify only a limited view of a table, such as a row or column subset, so they are not required to browse through the entire table. This very flexible authorization mechanism also provides the option of locking specific columns as "read only."

A comparison of logical models reveals the substantial advantages of System R. System R's logical model affects how most users see data value: in a tabular view. This feature, obviously, will make the system very appealing to nonprogrammers. In addition, data base design is not the laborious and cumbersome process required for IMS/VS. System R's clean and simple tabular views can represent almost all expressions. The IMS model additionally requires an understanding of the use of pointers (virtual record types). In a very straightforward and logical hierarchical relationship, using the IMS model is a very systematic process. Organizing relationships and involving complex groupings of many-to-many links are facilitated by the relational model and, by comparison, very difficult to order by the IMS/VS model.

Access Paths

The comparison of each system's access path selection process further illuminates the contrast between IMS/VS and System R. The IMS/VS data structure makes use of physical pointers for the purpose of scanning records in hierarchic order and offers rapid access to segments within a record. The following access methods are provided: Hierarchic Sequential Access Method (Hsam); Hierarchic Indexed Sequential Access Method (Hisam); Hierarchic Indexed Direct Access Method (Hidam); and Hierarchic Direct Access Method (Hdam).

Each of these access methods possesses different storage and performance characteristics, and the user must, therefore, choose a method that closely fulfills the requirements of the data base being implemented. This selection is specified in the data base definition statements. Coding methods vary to support the access path required. Normally, one record at a time is accessed. Users' operations are based on predefined access paths in IMS/VS.

System R unburdens the user from defining access paths. The system has a built-in optimizer to determine access path selections. The optimizer functions by examining the properties contained in the query and the access paths defined for the table requested by the query. It then calculates a cost estimate for each access request by employing the following cost algorithm:

COST = PAGE FETCHES + W * (RSI CALLS)

To minimize the cost for each path, System R's specification is set up to reduce the total resource requirements for processing a query. The computed cost by the optimizer

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is a weighted measure of I/O performed and CPU used. The RSI calls are the anticipated total records retrieved from the RSS that will be used for a query.

System R catalogs the estimated costs and statistics gathered from several sources. The optimizer uses these statistics to determine cost estimates for the execution of statements, requesting different access paths, such as sorting, indexes and scanning. The least expensive access path is used automatically.

In System R, all access requests are based on field values in the tables. All access operations are executed on tables, resulting in the output appearing in a new table.

Data Base Definition

In IMS/VS, the Data Base Definition (DBD) is used for the individual data base to specify both the logical and physical data base definition. The physical data base is mapped into storage according to the specification defined in the DBD as Hsam, Hdam, Hisam or Hidam. The DBD also contains the name and size of the segments. In addition, the DBD specifies the relationship among segments in the data base and the relationship among segments with other data bases. Logical data bases are defined in the DBD from physical data bases that exist. A logical data base may be defined as a subschema of a physical data base, or it may be a subschema defined as a relationship from many physical data bases.

System R provides a revolving and simple data base definition procedure. Using Structured Query Language (SQL) statements, users can dynamically change access privileges assigned to various users. Users can also create or delete tables, create or delete indexes on tables, add columns to the established tables, initiate a new transaction or create or delete a view of data.

System R uses one universal language, SQL, for data base definition, user query, programmers and data access, thereby providing a powerful general-purpose language for interaction among data base developers. In comparison, different languages are used for data definition and data manipulation in the IMS language, Data Language/1 (DL/1). This causes complexity and miscommunication among various user groups.

SQL language statements are very powerful and flexible in data definition, which reduces programming and maintenance. Many different user views can be formatted at the same time, which, likewise, reduces data base maintenance requirements. IMS/VS DBD is a very complex language. It requires the definitions of many complex parameters and relationships, necessitating the creation of the data base administrator (DBA) position to support such extensive maintenance demands.

Language Support

The IMS/VS DL/1 is severely limited. Not a true programming language but an I/O language, it consists of DL/1 operations statements that direct programs to transfer data. Operations designated GET, INSERT, DELETE and REPLACE are DL/1 subroutines called by whatever programming language is used for application programming.

Looking at IMS/VS' data language in greater depth, we can see that it contains and supports some features that enhance its operations. The Program Communication Block (PCB) is the location of each program's view of where a part or all of a physical or logical data base is specified, otherwise known as the logical data structure.

The Program Specification Block is a collection of PCBs used by one application program.

IMS/VS operations are further refined by one other additional feature. The interface to the integrated data bases for both the application programmer and application user is simplified by the Product Development Communication and Control (PDCC).

Those portions of the application code that are common to multiple applications, such as input verification routines and segment layout, are eliminated from the application code, reducing programming and maintenance.

For IMS/VS language facilities to be most effective, one should be working within direct usage of predefined access paths in the data structure. Query logic quickly becomes more complex as indirect access paths are used. This limitation is often tedious for the user since predefined access paths may appear to

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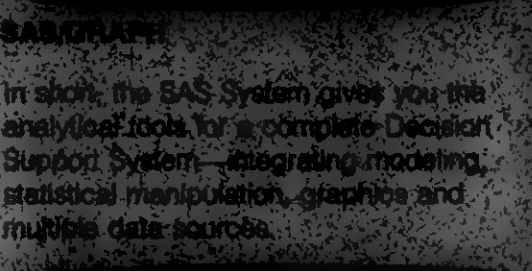

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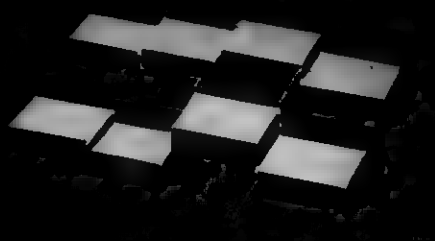

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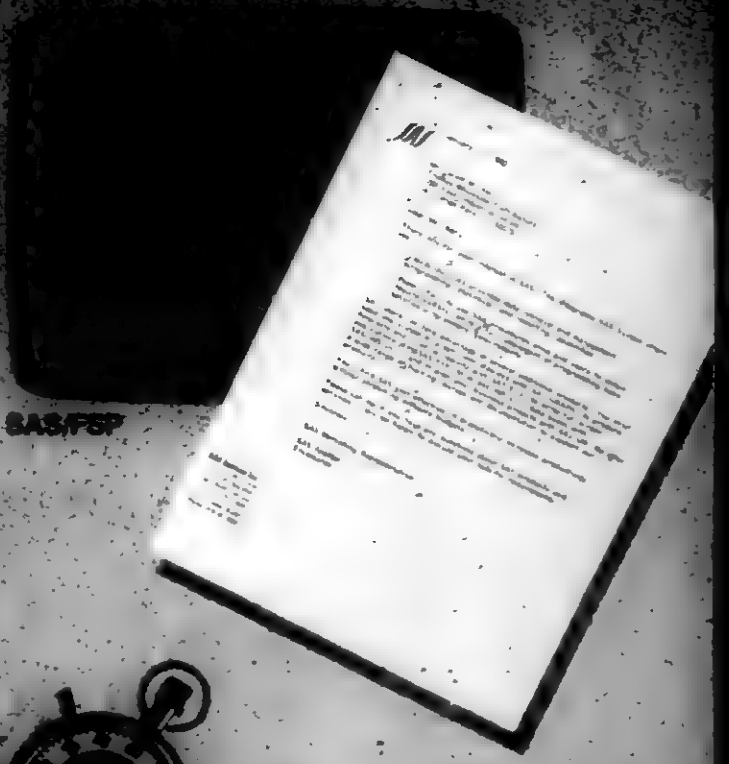

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be very complex and asymmetrical in layout.

By contrast, System R's data language, SQL, is entirely relational and algebraic in structure. Based on a relational data model, SQL can support definition, access and modification of multiple views of stored tables by providing specific select, project and join operations. SQL also manipulates sets of records. That is, it operates on tables as a whole. Also embedded within SQL are other set operations such as union, intersection and differences, which work on complete sets of records. In addition, there are special functions for summation, aggregation and ordering available in SQL.

Since System R employs a fully functional programming language through SQL, it is flexible in supporting the user's needs. Two types of query facilities are provided:

1. Queries that are executed only once, such as ad hoc queries and updates.

2. Canned query programs that are stored in a program library and have a high rate of execution.

SQL features include query, update, table definition and deletion, views or indexes and data base security. Following is an example of a SQL statement:

```
SELECT NAME
FROM PERSONNEL
WHERE OFFICE = SIOUX CITY
```

This statement presumes a personnel table containing the attributes NAME, OFFICE, JOB and SALARY.

SQL statements may be incorporated into a PL/I or Cobol program by prefixing each with a dollar sign ($). Following from this capacity, SQL statements embedded within a PL/I or Cobol program may contain host language variables, if the variable names are prefixed by a dollar sign. The PL/I or Cobol program gets the answer set from the SQL query by an open statement. This process binds the values of the host-language variables. A FETCH statement is then used repeatedly to get rows from the answer set inserted in the program variables.

The enhancements of SQL make it much more easily available to more users in more flexible applications than the I/O limitations of DL/1 can provide. The complexity of an IMS/VS DL/1 data base manipulation is caused by the multiplicity of concepts. Separate concepts are used when predefined paths of different types are required.

In SQL, however, additional programming logic is required when data must be accessed one record at a time. In some applications of this type, the DL/1 language is more efficient than SQL. Where explosion/implosion loops are required, such as for a bill of material, SQL requires several table operations, while DL/1 can process the same requirement with far fewer operations that build from its implicit hierarchical data structure. However, when operations involve set retrieval and updating, SQL makes them simple and straightforward.

Overall, SQL is a language designed to offer a symmetrical, simple, high-level interface for the query specifier, and it is generally more adaptable to many different applications than the rigid, heavily structured DL/1 lan-

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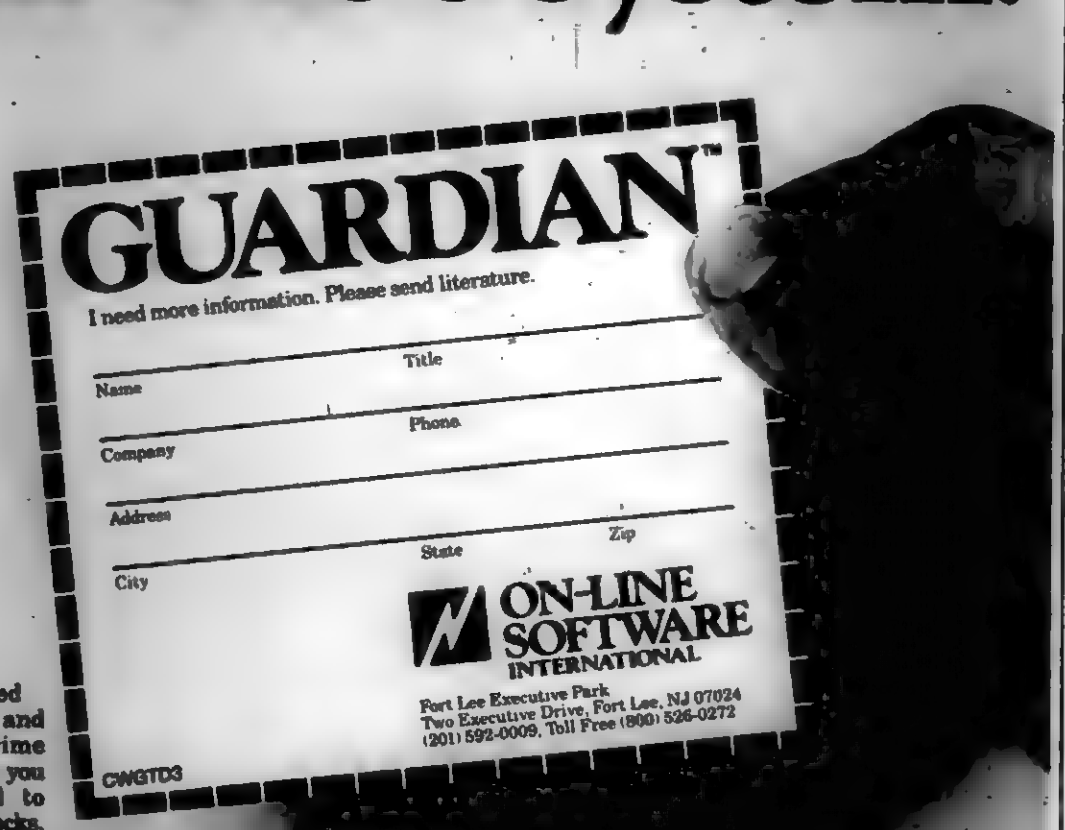

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Providing terminal support and transaction management, the dictionary captures relationships between subjects and provides system security and recovery. Dictionary data is organized by category, and the different categories include data base, segment, element, PCB, system, job, program, module, transaction, PSB and DDUSER.

The user can also define his own categories. More than 50 different menus can be accessed, and dictionary reports are available to view any hierarchy, a glossary or a variety of displays, as well as single subjects.

SQL, by itself, is a powerful data definition and data manipulation language. System R's data dictionary capability is built within its language structure and, unlike with IMS/VS, it is not a separate system. The description of the data base is stored, based on user-visible "system" tables that can be retrieved using SQL language statements. When a new table is created, new entries are incorporated in the system tables. Users, when creating tables, are encouraged to add English text that describes the "meanings" of the tables and their columns. Other users may later retrieve all tables with specific attributes, or they may browse through the descriptions of defined tables.

SQL, by itself, is a powerful data definition and data manipulation language. System R's data dictionary capability is built within its language structure and, unlike with IMS/VS, it is not a separate system.

Since IMS/VS is a commercial product, its data dictionary is much more comprehensive. IMS/VS users are given a complete catalog. With all the complex interrelationships of the IMS/VS features, its data dictionary is required to monitor all of the user categories. Though the System R catalog is much more informal, it does provide data cataloging features. However, it does not now include transaction management of security and recovery features.

Data Base Integrity

IMS/VS currently features comprehensive facilities for backup, recovery, restart and transaction management. Data base recovery is managed by the user through the periodic reproduction of copies of the user's data sets and by recording the data base changes in the system log. When there is a failure in a data set, the data set is restored by the latest backup copy and made current by applying the transactions from the change log.

Recording data base changes in the system log is a process of identifying two segment images: "before segment change" and "after segment change." Also included in the process are the program name, the date and time, the data base identity and the record being changed. To facilitate the recovery of each data set, the utility performs the following: loads the latest image copy, reads the system log in time-ascending order to absorb all changed log entries and applies the "after" image to replace canceled data. Two utilities are available in the data base: image copy and data base recovery.

IMS/VS has established important technological enhancements in data sharing: the synch point concept and fixed-server transaction processing to facilitate transaction processing. In IMS/VS, the requirement of data sharing is controlled through the segment instance. As programs are updating, the same segment types can run concurrently; thus segments are acquired and released as required to prevent interferences. One or more programs may be terminated abnormally to resolve deadlocks over data resources, and the use of the synch point recovery facilities can then restart the terminated programs.

System R can accommodate multiple users accessing data simultaneously, and it provides complete facilities for transaction backout and system recovery. Most recovery data is stored on disk, and a nondramatic restart process is transparent to the user. A transaction in the context of System R is defined as a unit of work that may use several SQL statements. Partially finished transactions are erased by the system, but once transactions are applied, they are no longer subject to backout.

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Concurrency is controlled through the transactions. Because of System R's unique locking protocol, concurrent access to a data item functions without disruption. The user has full control in defining the isolation of each transaction, if required. Querying and deadlock detection are monitored by the locking subsystem.

The RSS transaction recovery is set in motion by begin and end commands. This feature initiates "undo" of all changes made by the transaction, including record and index changes, and all creation of new tables and indexes. Supporting this function, time-ordered list log entries are maintained. All entries are concatenated to include both old and new values of the modified entities. Very rapid recovery is continually provided through frequent checkpoints to sustain consistent data values, indexes and tables.

To support multiple-user access, locking techniques must be invoked to maintain system synchronization. Physical locking is controlled by setting and holding locks on one or more pages during the execution of an RSI operation. Logical locking is controlled by setting the lock on specific entities, such as segments, tables or TIDs, and holding them until they are explicitly released or until a transaction ends. By varying the lock duration, pages can be locked both for physical and logical functions.

Various levels of data consistency identify for the user his margin of control. Level 1 "dirty data," which has been updated by a still running transaction, may be read but not updated by a subsequent transaction. Level 2 "clean data" means that the transaction that established the value is concluded, but there is no assurance that a next access will result in the identical value. Level 3 offers the logical equivalent of a single user. No one user accessing the system can know if other users are simultaneously accessing and updating the data base.

Again, proper locking techniques ensure that the system functions efficiently. Locks are requested dynamically during transaction wait time while a matrix of waiting users is checked. During this check, deadlock cycles are identified.

The oldest transactions are then obliterated by the system.

As a research program, System R provides both new ideas and experimental techniques. Its extensive transaction management facility can enhance future research applications. This system differs from IMS/VS in that its restart facilities are managed by the RSS rather than the main operating system. In addition, System R facilities, as an advancement, feature options that are streamlined and simplified, whereas IMS/VS installation personnel must acquire in-depth knowledge and take precautions to certify proper and smooth system operation.

Security Features

Both IMS/VS and System R have built-in processes to limit and adequately authorize data access. The IMS/VS system provides for the isolation of "sensitive" fields within "sensitive" segments. This "sensitive segment" feature protects physical data base growth. Through the program communication block, the processing options are specified. Types of segment operations allowed are identified in the "PROCOPT" entry. Entries can be limited to retrieval-only or insert, replace, delete or any combination thereof.

The System R user views offer a powerful authorization mechanism. One may limit table access to a row and column subset view for a single, cited user. In addition, identified columns of a view may be limited as "read only." Data base access authorization is established and, if required, perpetuated through the "grant" operation. Both systems have equivalently powerful authorization/authentication security-level features, including audit-trail facilities.

Data Independence

IMS/VS possesses only a limited system for data independence. Some operations do not always require recompilation of existing application programs, such as adding new segment types at certain points, adding new fields, selecting different pointer options and changing the division of a data base into data set groups.

A most positive enhancement of the relational DBMS, like System R, is the very highest level of data independence. A specific access path or the physical layout of data need not be stated as part of data access or update. For obvious reasons, the application programs are then much less complex than those of IMS/VS, and the data management system can operate efficiently to select the best

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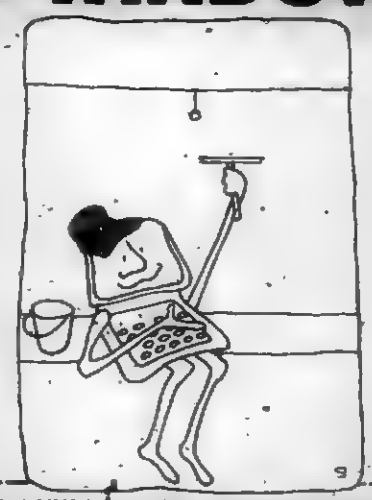

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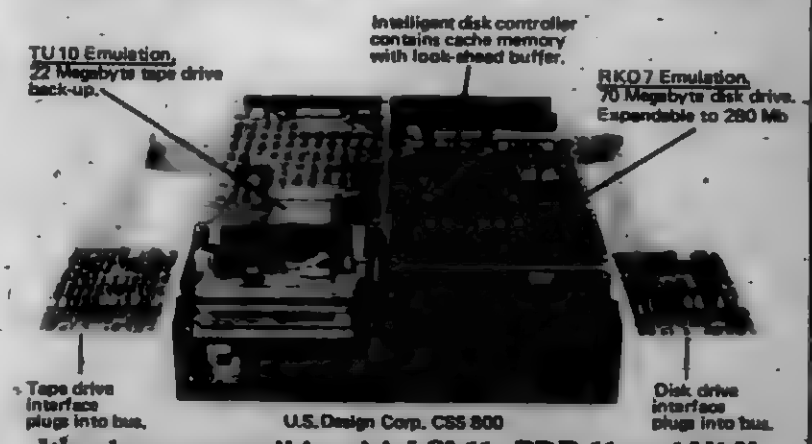

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strategy for program execution.

As discussed earlier, the System R optimizer determines the best strategy to minimize the cost of SQL statement execution. Cost is factored from estimates for CPU and I/O requirements. Storage is not a continuing user concern since the System R program remains in-function as the underlying storage structures evolve over time.

System R supports greater data independence. Users are explicitly aware of all fields. Tabular operations are not dependent on predefined access paths. And, of course, data structures are not defined and constrained by physical attributes, such as concatenated logical parent fields. However, large shared data bases that support several different applications may require specialized language constructs to function efficiently. One very obvious feature of IMS/VS is its reorganization requirement when new data elements are initiated.

User's Environment

The user environments of IMS/VS and System R are immediately contrastable. The explicitly defined access paths of IMS/VS guide the user through the system without extensive tabular operations. A weakness of System R is its inherent performance inefficiency in supporting user proficiency in a more flexible environment. Without user-defined access paths, systems operations are more costly. And the performance of the tabular operation may not be acceptable. Relational operations are, it should be noted, very powerful and easy to grasp and use. What is desired as the end result can be defined much more directly in relational operations, instead of rigidly and mechanically confining the user to defining the process for a desired result, which is the required burden of IMS/VS.

Some current enhancements in specialized hardware, such as associative processors or logic-per-track devices, could substantially streamline relational data base operations.

For users who are not proficient programmers, the tabular views of System R afford the most forgiving flexibility. But for the programmer, much more program structuring is required in System R than in the hierarchical asymmetrical languages of IMS/VS. Where set retrieval or update is required, the relational view can simplify programming.

The data base administrator is challenged by the same responsibilities in each system. Storage options must still be specified, operation procedure must still be maintained and overall performance must be monitored. System R simplifies the interfacing with external and internal definitions. Effective design, like normalization, is required of either system, but the clear, simple interface with the user allows good System R design to be much easier.

Other Facilities, Features

IMS/VS is associated with several utilities and aids. Only the major supporting components will be described in this section. The Data Base Definition Generation (DBD Gen) utility generates the control blocks for programs to process data from the data base which describe the various physical and logical data bases from the DBD statements. The Program Specification Block Generation statements describe the characteristics of data bases and terminals required by a particular application program. The System Log Analysis provides statistical reports on terminal operation and transaction type analysis.

Data Base Image Copy and Recovery utilities drive the "unload" and reconstruct the data base. Assistance in the generation of display and message formats for IBM CRTs is supplied by a number of utilities called Message Format Services. The Data Base is used to create a data base and to run batch application programs. The Application Development Facility aids in application programming.

The highly developed Data Communication feature contains programs to control the teleprocessing network. It schedules the appropriate application programs required by incoming messages and provides access to the IMS/VS data base. The Index Data Base features direct access to the physical data base by data values. In an index data base, the record type is contained in a single root segment type. The Data Entry Data Base is a sequential dependent data base for storing a large volume of off-line data to be processed later in batch.

Many of the utilities and aids of IMS/VS described above have become a standard part of other DBMS, based on their successful implementation in this system.

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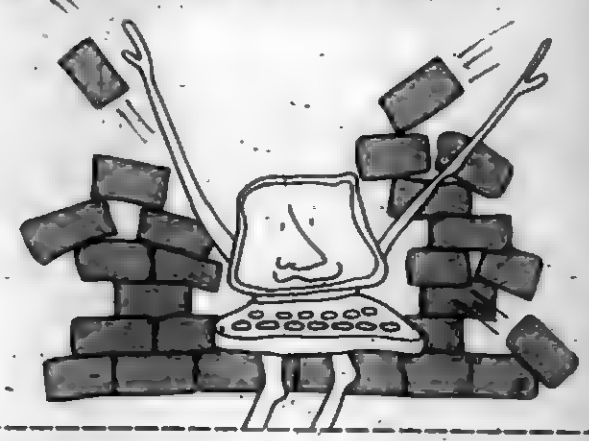

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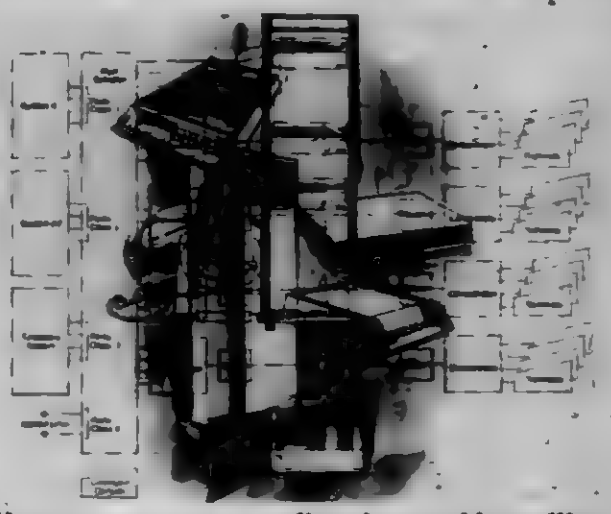

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required. System R is the product of work initiated in mathematical formalism, and it has a theoretical foundation. Its development supports its main objective: to provide a DBMS where relational requests may be easily implemented and optimized.

Since System R is an experimental DBMS, a few of its features are unique. It is driven by the Relational Data System (RDS). In RDS, host-language programs are precompiled and installed as "canned programs" by an innovative precompiler called Xprep. Activation of these canned programs is driven by XRDI, an execution system that also executes the SQL statements for ad hoc requests. Xprep, as part of its function, converts SQL statements in the program into a machine language, identified as the "access module." Replacement of these SQL statements is effected by host language calls to the access module.

In System R, the execution process for a canned program involves calls to the XRDI, which causes the access module to load for the program. The access module also interfaces with the RSS to effect operation on the data base.

A most attractive feature of System R is the User-Friendly Interface (UFI). The UFI mainly supports dialogue and display, providing guidance to ad hoc users. The UFI access module transfers control to the XRDI for SQL statement execution. The System R RSS possesses an automatic locking system which "traffic-signals" these simultaneous activities.

When commercially released, System R will be associated with several utilities that will support a production environment. Because it is still an experimental product, its current interfaces with other facilities are not a matter of demand or concern.

Performance Improvements

IBM will continue to optimize System R with hardware advancements in the areas of logical processing storage devices and central processing units with even greater artificial intelligence in data management. These improvements will substantially overcome the major problems in providing a higher performance rate.

Before we see the true System R, several interim products will be released as part of a slow migration to the relational DBMS. Most of these products will share data with IMS/VS.

As time lapses before we see the true System R, several interim products will be announced and released as part of a slow migration to the relational DBMS. Most of these products will share data with IMS/VS. IBM recently announced the release of Data Base 2 (DB2), which extends and facilitates a relational data model. In DB2, data operations are controlled and supported by SQL. The interface between IMS/VS and DB2 is accomplished by the Data Extract program. Data is extracted from the IMS/VS data sets and loaded into the DB2 data base from user query. In addition, DB2 is supported by the Query Management Facility, which simplifies application programming, enhances productivity and can be easily used by end users for data base query.

The release of ever-advancing interim relational data base products will protect customers from the sudden shock of new methodologies — not to mention the trauma of high costs, re-education and conversion. Time will allow for development of a truly superior relational DBMS.

IBM will market System R when it is shareable and compatible with IMS (hierarchical) applications. This does not mean that the systems will function on the same data sets. The problem with integrity and deadlock will be substantial.

The relational DBMS will control and support interfacing IMS installations until they become obsolete. The careers, concepts and dollars committed to IMS/VS should sustain it through this decade.

About the Author

Monica Ajmani Hickey is a data administrator at Lockheed Missile & Space Co. in Sunnyvale, Calif. She has 13 years' experience in data base administration and information management systems planning, design and development, both for government and private industry.

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Administrative, Clerical Staffs Targeted

OA Focus Said to Ignore Managers' Needs

By Jerry A. Klein
Special to CW‡

Attention focused on the data, word, voice and image processing and networking aspects of office automation has virtually ignored the needs of management. Almost all the hardware, software and services have been developed for use by administrative and clerical staffs.

Yet management executives, all the way to the chief operating officer, must still integrate data and make decisions. These people spend up to 75% of their time communicating at many levels within their organizations — with superiors, peers and subordinates, with off-site staff and with financial or research organizations inside and outside their own jurisdictions.

Much of that time is wasted because of inefficient communications capabilities and because many OA technologies and procedures are not tailored to the management task.

Lack of effective communications has produced so-called "telephone tag," which leads to a bloated "information float" causing delayed or incorrect decisions. Lack of proper technology has caused the abandonment of rigid, inappropriate OA that demanded unacceptable changes in management style.

Until the advent of OA technologies, the telephone was only a voice-to-ear link, a small percentage of the communications decision process. Now the new communications technologies of OA — based on personal computers and terminals linked with an emerging family of digital switches — promise to change dramatically the way business people communicate at every level.

'Office automation includes core data and word processing capabilities in the typical workstation that incorporate varying degrees of intelligence and memory, supported by peripherals and made powerful with software. It must also disseminate these results for managers. Advanced communications techniques must be integral to OA.'

OA is integrating voice, data, text, graphics, images and video, but these new tools have been presented in so many forms (with other new offerings to come) that buyers must become increasingly informed and selective if the right configuration is to be attained.

Dramatic End Results

The end results for individuals and organizations will be dramatic: Information will become available immediately; managers will be able to review and discuss plans and projections contained within the OA system with other offices within a plant or around the world as easily as if the individuals concerned were sitting in the same room; and access to individuals needed for project discussion will become almost instantaneous, no matter where they may be.

Office automation includes core data and word processing capabilities in the typical workstation that incorporate varying degrees of intelligence and memory, supported by peripherals and made powerful with software. It must also disseminate these results for people to use — especially managers. Therefore, advanced communications techniques must be integral to office automation.

Since no accepted definition exists for OA, with user goals varying from group to group based on the need for productivity as defined by that group, highly flexible characteristics and communications elements are vital.

Communications become harder and costlier with distance. The result is that managers who must control geographically dispersed activities and people — regional, national or international — face tough communications challenges complicated further by time zones and obsolete equipment.

An average of four telephone calls is needed to reach a staff member in another time zone, prompting the term "telephone tag." Traditional mail may be delayed hours or a few days (optimistic) to as long as a week (realistic). Even telegrams, intended to compress these delays albeit at high cost, are delayed by internal distribu-

(Continued on Page 54)

Wang Updates VS Mini, Micro, Plans Wang Office-Disoss Link

LOWELL, Mass. — Wang Laboratories, Inc. has announced several enhancements to both its Professional Computer and its VS minicomputer.

Wang also announced its intention to produce within one year an interface between Wang Office — Wang's network-based office automation package — and IBM's Distributed Office Support System (Disoss).

The interface will reportedly allow Wang systems running Wang Office to share information with IBM systems supported through Disoss. Information flow between Wang and IBM systems will reportedly be bidirectional.

Among the announcements for the Professional Computer were:

- The Wang Professional Computer Multistation, said to allow users to further integrate Wang Professional Computers with VS systems by enabling the Wang micro to use the VS multiple-window display facilities. The Multistation is said to provide capabilities such as simultaneous task support, data transfer between tasks, simultaneous views of multiple applications, virtual disk storage for Professional Computers, improved use of resources, consistent data between users and centralized backup. Available in March 1984, the Multistation is available for a license fee of $295.
- The addition of Microsoft, Inc.'s Windows to the Wang Professional Computer's MS-DOS operating system, said to allow Professional Computer systems to employ multiple-window display techniques and mechanical point devices in an operating environment that reportedly permits users to run multiple applications concurrently. Microsoft Windows will be available in the second quarter of 1984.

(Continued on Page 54)

Point 4 Introduces System Featuring WP, E-Mail

IRVINE, Calif. — Point 4 Data Corp. has introduced its Point 4 Electronic Office System, said to feature word processing, electronic mail and an electronic calendar.

The electronic mail capabilities reportedly provide a method for sending notes, memos, entire mailing lists and other documents to one or more individuals. The electronic calendar is reportedly configured to resemble an executive's day planner. The system requires Point 4's Iris operating system. Future enhancements to the system will include an electronic note pad and electronic files, a spokesman said.

Priced at $2,000, the system is available from Point 4 Data at 2569 McCabe Way, Irvine, Calif. 92714.

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OA Focus Ignores Needs of Management

(Continued from Page 53)

tion delays. These are the ingredients of the information float.

Obsolete data degrades management decisions and actions, made worse when "round trip" data must precede decisions. Improved communications are the key to addressing these intolerable delays.

In modern offices implementing OA via personal computers, a range of peripherals is emerging to address these high-priority needs. Black-box additions are finally giving way to intelligent and integrated systems based on new technology that fundamentally changes personal computer architecture.

There is a further choice for managers implementing new OA systems, depending on the size of the company, the availability of fully integrated systems already in place in some organizations or the presence of personal computers being used in stand-alone mode by individuals within the organization.

Regardless of the choice, communications delays can no longer be permitted to degrade the quality and timeliness of management decision and action. Improved communications remains the critical path to improving management efficiency.

What is needed is the desktop integration of voice and data. Desk-to-desk teleconferencing, either with interleaved voice and data on a single line or simultaneous voice and data on two lines, plus screen mail provides:

- The ability to send and receive electronic mail without interrupting the user's other activities.
- An intelligent electronic telephone with autodial directory, speed dial, hands-free speaker and speakerphone option.
- Automated data base access and terminal emulation.
- Single-button, user-programmable keys for the popular long-distance interconnect services.
- Communications management, in which the system automatically logs all telephone calls and electronic mail for time, data, ID and duration of incoming and outgoing calls.

The information float is collapsing as OA advances. This collapse is bringing the future management wave closer.

Not all managers have comprehended these momentous changes, but sooner or later they will make the discovery — to their advantage or disadvantage.

Klein is vice-president of marketing at Cygnet Technologies, Inc. of Sunnyvale, Calif., which markets executive workstations.

Wang Updates Micro, VS Mini, Plans Interface

(Continued from Page 53)

The mechanical mouse attachment will be sold for $215.

- Professional Computer Basic-2, a compatible version of Wang's 2200 Basic-2. Professional Computer Basic-2 is said to be a high-level programming language designed for interactive programming on the Wang micro. Professional Computer Basic-2 will be available in the second quarter of 1984 for $395.
- An Advanced Professional Computer Basic Compiler, said to complement the Basic Interpreter, which is included as standard software with the Wang Professional Computer. The Basic Compiler reportedly increases the level of development support available to users as well as the conversion of software written for other microcomputers to the Wang Professional Computer. Advanced Professional Computer Basic will be available in the second quarter of 1984 for $295.
- Digital Research, Inc.'s CP/M 80 Emulation Software, said to allow Wang Professional Computer users equipped with the Local Communications Option Card to access an optional operating system, programming languages and application programs. CP/M 80 Emulation Software is available immediately and priced at $240.

Announcements for the VS include:

- The VS Multistation, a software tool said to transform a VS terminal into a personalized workstation, enabling users to run several applications at the same time. VS Multistation reportedly operates in conjunction with the Professional Computer Multistation. Available in January 1984, the one-time license fee is $3,000.

The enhancements for the VS 25 and VS 45 minicomputers include a 9-track tape drive, a 76M-byte fixed disk drive and a two-port data communications controller, according to the vendor.

More information is available from Wang at One Industrial Ave., Lowell, Mass. 01851.

If you're buying communications products, something's coming to you this February that will make your job a lot easier.

The *Computerworld Buyer's Guide* to Communications.

Designed to give you a valuable, one-stop information source for communications vendors and products, this *Buyer's Guide* includes all the tools you need to make the right communications choice:

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This is the first *Computerworld Buyer's Guide to Communications*, and, if you're one of *Computerworld's* 114,000 subscribers in the U.S., you'll get it this February.

And if you're a vendor or marketer of communications products — hardware or software — be sure our readers know about you. Get your ad to us by January 6th. To reserve space in this issue of *Computerworld Buyer's Guides*, call one of the sales offices listed below or call Don Fagan, Vice President Sales/Marketing; Ed Marecki, National Sales Director, Kathy Doyle, Marketing Support Manager, or Kevin McPherson, Product Manager, at (617) 879-0700.

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MS-DOS Seen Key To Unlocking Compatibility

By Tim Caffrey
And Tom Wilmott
Special to CW‡

Second of two parts on the IBM Personal Computer and the markets it has spawned.

A key element of plug compatibility is the ability to incorporate the IBM Personal Computer's operating system, Microsoft, Inc.'s MS-DOS, on plug-compatible machines.

Microsoft is free to license the use of its operating system to vendors other than IBM and has done so with such machines as Eagle Computer, Inc.'s Eagle, Corona Data Systems, Inc.'s personal computers, Compaq Computer Corp.'s Compaq and others.

While the presence of MS-DOS on a machine is essential for plug-compatible manufacturers (PCM), it does not guarantee complete compatibility. Each version of MS-DOS that Microsoft ports to different computer models is customized to accommodate specific architectures.

Programmers eager to exploit the symbiotic potential of portable operating systems such as MS-DOS have two options. They can either use generic MS-DOS operands to design a program that will run equally well on an IBM machine or one of its plug-compatible competitors, or they can circumvent MS-DOS commands to achieve particular efficiencies.

Transportability Lost

An example of the latter is Lotus Development Corp.'s development of a version of 1-2-3 specifically for the Personal Computer. Lotus clearly benefited by producing a product designed for the unique design of the Personal Computer. What it gained in efficiency, however, it sacrificed in transportability.

As Microsoft continues to develop and refine the power of MS-DOS, applications developers will have more freedom to write programs for a larger audience, and the question of degrees of compatibility will become less problematic. As the market stands today, no (personal computer) machine can be a 100% IBM look-alike, simply because IBM has protected parts of its design by law. Potential PCMs can study publicly available designs, but they cannot legally duplicate them. An analagous situation would be to show the competitors an easy route and

(Continued on Page 60)

For Increased Efficiency

Further Honeywell Cuts Seen

By Robert Batt
CW West Coast Bureau

PHOENIX — The relentless pressure to improve price/performance capabilities will force Honeywell, Inc.'s Information Systems into further radical cost-cutting measures, according to one of its senior executives.

In a recent interview here, Deward Manzer, vice-president and general manager of Honeywell's Large Computer Products Division (LCPD), said further cutbacks in the division's work force cannot be ruled out.

"Competitive price/performance improvements mean that we are increasingly being forced to look for new ways to increase cost-effectiveness and organizational efficiency. This requires the elimination of overhead costs, and this is what the cutbacks in our staff have been related to," he explained.

In October, Manzer announced that LCPD, which designs, manufactures and manages Honeywell's large-scale DPS 8 and DPS 88 product lines, will reduce its work force by 13% — or 500 of its 3,800 employees — by year-end. This follows a similar cost-cutting campaign in 1982, during which the division laid off 1,800 people out of a total work force of 22,000.

Manzer said the division's strategy now is to become more efficient in the areas of research and development, manufacturing and marketing of its products, in response to competitive forces and in anticipation of stiffer competition to come, particularly from IBM.

This will be no easy task. The company, which has an installed base of 2,000 large systems users in 40 countries, recently announced a nearly 25% drop in earnings for the first nine months of the year to $139.3 million, compared with $184.9 million last year. Third-quarter results, however, showed a marked improvement totaling $58.4 million, a 33% rise over the same period in 1982, which the Honeywell executive attributed to the previous cost-cutting measures.

End-User Focus

"We are currently focusing our research and development efforts on the world of end-user application development and productivity tools. Our emphasis is on software tools that will help sell complete systems," Manzer added.

He affirmed that the recent cross-licensing deal with Japanese manufacturer NEC Corp. is a portend of things to come. Under the terms of the deal,

(Continued on Page 62)

Apple Forecast Shows Rough Weather Ahead

By Robert Batt
CW West Coast Bureau

GREENWICH, Conn. — The future for Apple Computer, Inc. is one fraught with dangers and difficulties that would overwhelm an ordinary company, according to a report just published by Enterprise Information Systems, Inc. (EIS).

The report, titled, "The Apple Report: A Comprehensive Analysis," stated, however, that the Cupertino, Calif.-based personal computer manufacturer is no ordinary firm, and it is too early to conclude that it will drift into obscurity.

Nevertheless, the report noted, the Apple organization contains major weaknesses which could slow its growth over the rest of this decade. "The most serious weakness is the capability of Apple to market and sell to the medium and large organizations. Currently neither the dealers nor Apple's direct sales force are particularly experienced or knowledgeable in the vagaries of this marketplace," it stated.

There are also weaknesses in Apple's current product line, the report asserted, including no current support for Microsoft, Inc.'s MS-DOS operating system, which, the report maintained, is evolving as an industry standard, and a lack of a low-priced home computer, a multiuser system and networking capability.

The company's Applenet product is currently intended

(Continued on Page 62)

Televideo Outlines Micro Strategy

'Because of the heavy demand for IBM Personal Computers and compatible machines, a demand the microcomputer industry isn't meeting because of a squeeze on manufacturing capacity, the widely heralded shakeout is still 12 months off, Dubridge said.'

By David Myers
CW New York Bureau

NEW YORK — With IBM gobbling up between 45% and 80% of the market for personal computers, Televideo Systems, Inc. would be happy for some share of the remainder, according to a company executive.

Richard Dubridge, vice-president and chief financial officer of the seven-year-old market leader in display terminals, reported to a gathering of securities analysts here earlier this month that Televideo shipped its first IBM-compatible 16-bit microcomputer earlier this month.

"We believe that in the 16-bit world, PC-DOS [the IBM operating system software] will be the standard you must adopt to succeed in the market. A manufacturer which designs a computer system with a proprietary operating system is living in the past," Dubridge declared.

Next month, shipments of the IBM-compatible portable machine, a product designed to go head-to-head with Compaq Computer Corp.'s 30-lb portable, will begin in volume, Dubridge told analysts.

After personal computers and portables, Televideo intends to attack four different markets:

- Video display terminals, where Dubridge said the Sunnyvale, Calif.-based company sees its major competition coming from Digital Equipment Corp., Lear Siegler, Inc. and Applied Digital Data Systems, Inc.
- Multiuser microcomputer systems, where Dubridge said Televideo passed Altos Computer Systems, Inc. as the market leader one year ago.
- Computer printers, where Dubridge said the leading rivals are Diablo Systems, Inc. and Qume Corp.
- A new product area Dubridge said Televideo is pioneering, which is called the "personal terminal."

"It will be a status symbol on an executive's desk," Dubridge said, explaining that the high-resolution terminal was designed to afford access to on-line data bases. As yet, the company has no competition in that market, according to Dubridge.

But the computer maker's chief financial officer insisted that Televideo saw its "biggest opportunity" in the market for equipment that is compatible with the IBM Personal Computer.

Dubridge said he glimpsed little in the way of IBM-compatible hardware at the Comdex/Fall '83 show in Las Vegas last month. Neither DEC nor Hewlett-Packard Co. has announced personal computers that are

(Continued on Page 56)

Sonecor Invades New England Telephone Area

BURLINGTON, Mass. — What is thought to be the first invasion by an independent operating company into the territory of a Bell operating company took place last week when Southern New England Telephone Co. opened an office here — in a New England Telephone region — for its Sonecor division.

After divestiture, New England Telephone will be combined with New York Telephone to form Nynex and will compete with Sonecor.

With the intent to offer value-added voice and data switches, Sonecor will market communications equipment from Codex Corp., GTE Corp., NEC American and NEC Information Systems, Northern Telecom, Inc., Wang Laboratories, Inc. and others. Sonecor's communications software and services such as maintenance will also be offered eventually, a spokesman said.

"Our customers can get as much or as little service as they want," said Alfred Van Sinderen, Sonecor's chief executive officer. "They don't have to pick and choose from a bewildering array of communications and data processing components. They don't have to worry about installation and maintenance unless they want to."

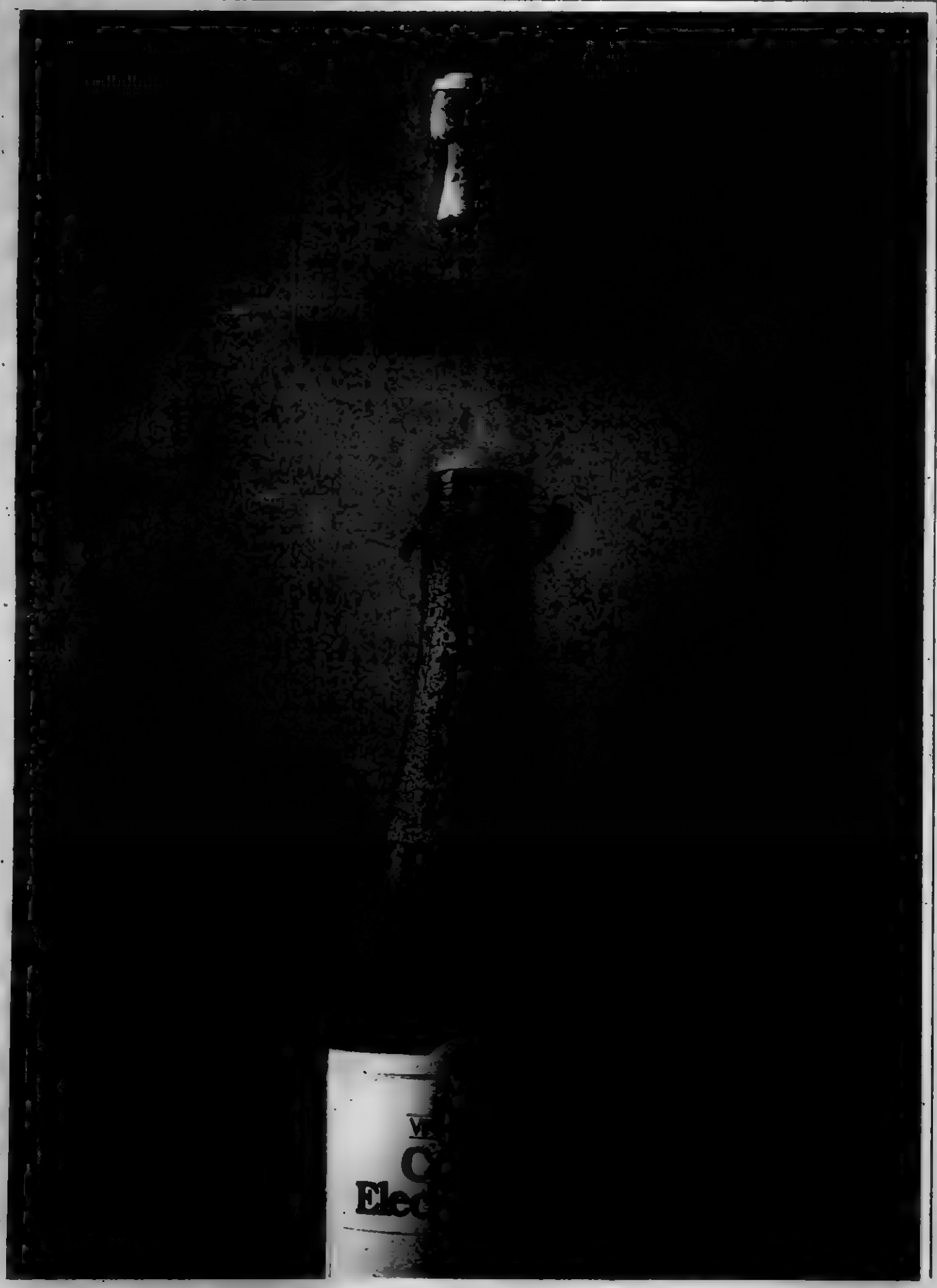
Premier among Sonecor's value-added systems is the Neax 2400 advanced private branch exchange (PBX), which is renamed the Sonecor System 2001 when marketed by Sonecor. The 2001 is designed to switch data and voice and serve as the hub of the automated office, the spokesman said.

Sales representatives present at the office opening identified the added software as the major advantage of the 2001 over the Neax.

Sonecor officials stressed Southern New England Telephone's long experience with voice lines, but were careful not to promise superior access to the local loop or long-distance lines.

"Our knowledge and depth of experience are our trump cards," said Warren W. Raynor, general manager of Sonecor Systems.

Stressing service, Sonecor's print advertising will state that "Boston hardly needs another manufacturer of communications equipment," Raynor said.



Televideo Outlines Strategy

(Continued from Page 55)

compatible with the IBM Personal Computer, he pointed out.

Dubridge estimated that IBM's eventual share of the personal computer market would wind up somewhere between its 45% piece of the video display terminal field and its 80% hold on the mainframe world. But that does not mean there is no room for competitors, he added.

"Compaq was successful not so much because [users] wanted portables but because they wanted something that was available and cheaper than the [IBM Personal Computer]," Dubridge said, referring to the Houston-based leader of the portable mart.

Because of the heavy demand for IBM Personal Computers and compatible machines, a demand the microcomputer industry is not meeting because of a squeeze on manufacturing capacity, the widely heralded shakeout is still 12 months off, Dubridge said.

"The industry is simply short of products. That means anybody with a decent product can sell it over the next 12 months. Dealers will take on several [IBM-compatible] vendors now and wait a year to see who the winners are," he said.

Because of product shortages, price competition will not heat up for at least a year, according to Dubridge. After that, a rival will have to undercut IBM by 15% to 20% to remain competitive, he said.

But compatibility does not mean a manufacturer has to turn out machines that look, smell and act exactly like the Personal Computer, Dubridge said.

To Prevent Severe Cash Crisis

Micro Makers, Sellers Told to Manage Strictly

By Robert Batt
CW West Coast Bureau

LAS VEGAS — Personal computer manufacturers and independent sales organizations must adopt rigorous management techniques if they are to avoid the severe cash crisis now facing several firms, attendees at the recent Comdex/Fall '83 exposition here were told.

Speaking at a session titled "Cash Crunch Management," William Gustin, partner in the Los Angeles-based accounting firm Nelson, Gustin, Brandlin & Cheatham, said it is important to draw up contingency measures to deal with setbacks such as a drop in sales.

"To avoid a cash crunch requires constant self-evaluation and identification of the telltale signs of an impending cash-flow crisis. It is important, for instance, to know the productivity of your assets and what resources it is taking to generate them," he asserted.

Firms faced with a severe cash crunch, he said, should resort to outside financing, look for higher profit margins and develop better information systems to speed collections, reduce inventory and keep overhead costs under control.

Companies that are in deep trouble should create a "survival budget," he suggested. They should examine every cost and all product prices and should aim for a 10% to 15% return on investment. This may require having access to daily and weekly, as well as the normal monthly, information about the company, he contended.

Also speaking at the session, Mark Singleton, president and chief executive officer of Complete Office Information Networks, a Norcross, Ga.-based manufacturer of financial software packages, emphasized cost cutting as the only way to improve profitability at a time of crisis.

"You cannot sell yourself out of a cash-flow problem. It only makes matters worse," he told his audience. "You need to focus on cash, not the profit-and-loss statement. If you concentrate on the bottom line, you will run out of cash long before you can improve profits."

Cutting costs, Singleton said, is typically a dirty business, because nobody likes to fire employees and make structural changes.

Organizational analysis lies at the heart of cost cutting, he claimed, and includes:

- The need to discover the number of people that managers can effectively manage.
- The setting up of proper reporting levels so the biggest spending departments report to senior management. "Surprisingly, this is often not the case in troubled organizations," he said.
- Streamlined management, in which the layers of authority within a company are minimized.

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MS-DOS: Its Role in Unlocking Compatibility

(Continued from Page 55)

then tell them they cannot take it.

The market does not sink or swim on the issue of plug compatibility alone, however. Users have begun to suspect the long-term financial viability of PCM vendors and have raised other questions of technical compatibility. For example, they wonder if linking the devices to local-area networks is worth the risk, when the potential cost savings is only a matter of a few hundred dollars.

'IBM will enjoy the benefits of continued market momentum. Based upon decision-making cycles in large organizations and upon the dynamics which we have described at length, we can anticipate continued penetration by the Personal Computer.'

Obviously, this risk is greater in large organizations where the management information systems planner senses that personal computers must quickly become a window on a larger distributed resources net. The unwillingness of consumers to risk losing the advantages of software and peripheral support by selecting non-IBM products is a key element.

Another look-alike strategy has been used by established vendors who enhance machines of their own design to emulate the Personal Computer. The rationale behind this approach is to allow potential users to take advantage of the existing base of IBM-oriented application packages, while also gaining compatibility and migration paths within the vendor's environment.

This strategy accepts as a base premise that the software, not the hardware, is the key to product success. Examples of this hybrid strategy are the Wang Laboratories, Inc. personal computer, which was originally designed to run MS-DOS, and the Digital Equipment Corp. Rainbow, which has recently been enhanced with the MS-DOS operating system.

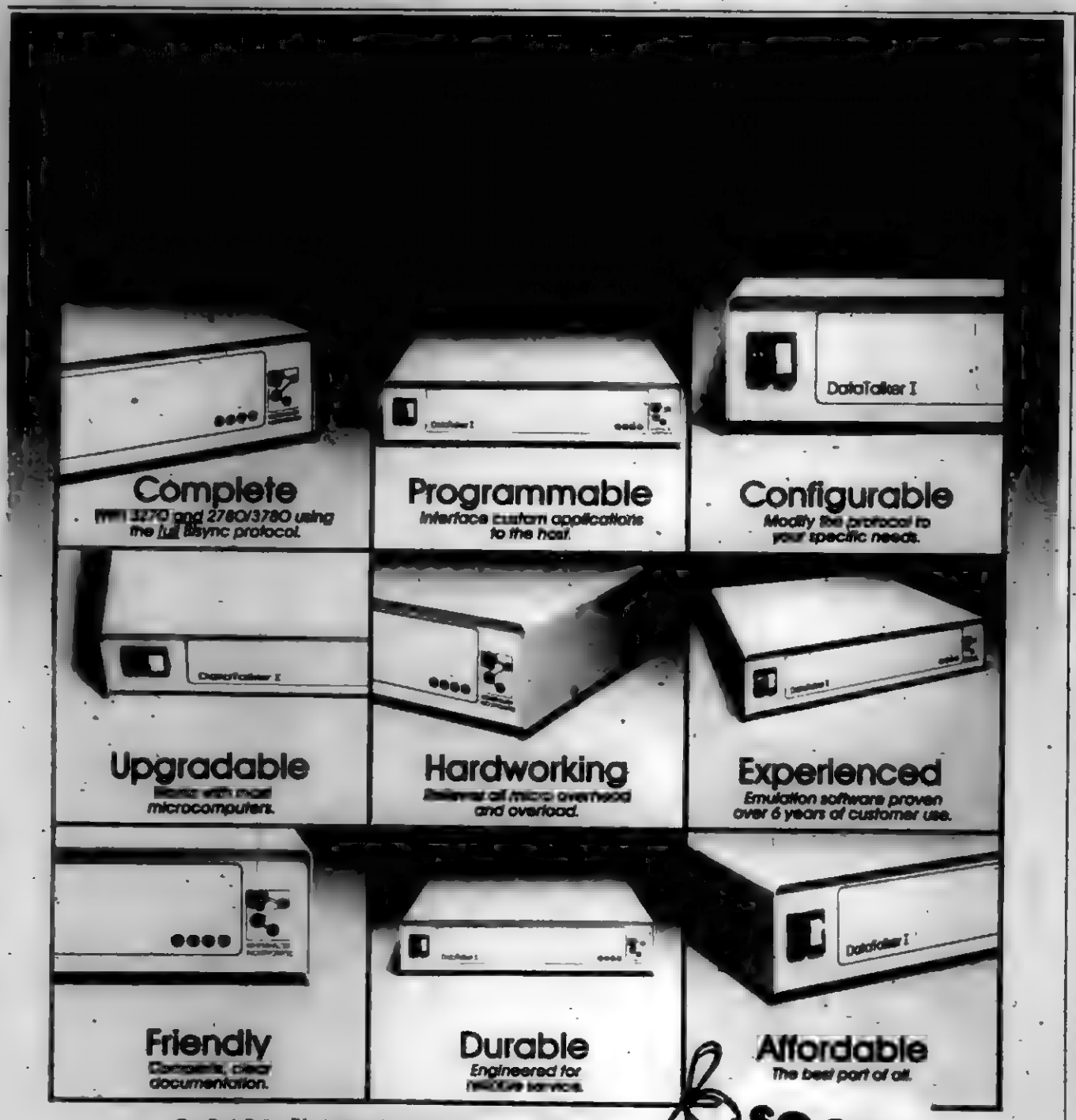
So what will be the course of future events in the microcomputer market? First of all, it seems apparent that IBM will enjoy the benefits of continued market momentum. Based upon decision-making cycles in large organizations and upon the dynamics that have been described at length, one can anticipate continued penetration by the Personal Computer.

IBM might introduce more powerful processors at a higher price after having established itself in the low-end markets.

What of future products from competing vendors or from IBM itself? Keep in mind that to date, with Commodore Business Machines, Inc. as a possible exception, no vendor has had a follow-up product as successful as its first. So given the fact that present dominance is no guarantee of future success, what will characterize the next microcomputer phenomenon? We propose that this product will be the next smashing success:

- A workstation based on the Motorola, Inc. 68000 microprocessor. The cost of producing such a device is quickly becoming justifiable.
- The workstation will run the Unix operating system. At this time it appears that no vendor's proprietary operating systems will dominate the multitasking, multiuser requirements of the future, except perhaps that from AT&T.
- The workstation will cost between $6,000 to $7,000 and will include a high-resolution, black-and-white CRT; 500K bytes of main memory; and 30M bytes of Winchester disk storage.
- Variations of the operating system will permit access to files and computing resources around the network. Communications capabilities will be critical to the success of the device.

Caffrey is market research analyst and Willmott is director of user programs at International Data Corp., Framingham, Mass.



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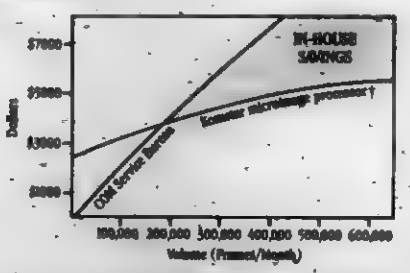

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Business Systems Markets Division
Dept. DP3625, Rochester, NY 14650

Apple's Reputation Could Save Its Skin: Report

(Continued from Page 55)
only as a link between several Apple computers and is not a serious contender in the corporate communications market, the report claimed.

According to EIS, fewer than 50 to 75 Applenets are in operation, and in this market, Apple will be overmatched by such companies as NCR Corp., Hewlett-Packard Co., Wang Laboratories, Inc., Digital Equipment Corp. and above all, IBM.

In the growing business market for microcomputers, compatibility with IBM host processors (and perhaps others such as DEC) will be a critical factor in ensuring success, the report argued.

Apple's newly announced strategy of targeting large organizations also requires a fundamental change in its dealer distribution system, and this will be no easy task, the report contended.

"Most Apple dealers have little interest in, or do not feel capable of marketing to medium and large businesses, particularly the Fortune 1,000 customer. They are not involved in the complexities of compatibility with existing corporate data processing and communications systems, nor are they familiar with selling to corporate DP executives, purchasing departments and others in the corporate hierarchy."

Thus, the report added, a critical problem facing Apple in upgrading its dealer outlets is to prevent the defection of dealers if it sets its requirements too high. "It is at least conceivable that Apple is making a timing error and that it is tightening the reins on its dealers at the time when it should be releasing them to ensure that they remain in the fold," EIS said.

Given these difficulties, EIS predicted that Apple's growth over the next five years will drop to 30% or even lower, compared with a growth rate of 915% in 1978 and 69% this year. This would result in company revenues totaling $3.15 billion in 1988, compared with about $1 billion today.

Despite the host of problems facing the company, the report noted a number of strengths which will contribute to Apple continuing as a viable competitor in the personal computer arena. These include a reputation for product quality, excellent name recognition and an installed base of over one million computer users.

"The Apple Report: A Comprehensive Analysis," costs $650 from EIS, Box 1154, Greenwich, Conn. 06836.

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Honeywell May Reduce Work Force

(Continued from Page 55)
NEC's S-1000 large-scale computer will be integrated with Honeywell's Gcos-8 operating system software in an attempt to meet performance requirements that are higher than those served by Honeywell's DPS 88 distributed processing system.

"Our strategy is to look for third-party relationships which improve the total span of our product offerings, including new software products, and which we cannot meet in a timely fashion through our own internal product development," the executive declared.

As an example of this policy, Manzer also cited a five-year agreement reached this fall with the Swedish telecommunications manufacturer, L. M. Ericsson Telephone Co., in which the U.S. manufacturer will purchase Ericsson's new MD-110 digital private automated branch exchange for resale in North America. The two companies also formed a jointly owned R&D company, Honeywell/Ericsson Development Co., to develop voice and data communications products.

In conclusion, the Honeywell executive stressed his company will continue as an independent mainframe supplier directing its focus at key areas such as transaction processing and data management facilities and attempting to gain dominance in specific market niches such as manufacturing processes.

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Price Pressures Seen Strapping Printer Makers

FRAMINGHAM, Mass. — Increasing price pressures are forcing printer manufacturers to tighten returns on investment in order to compete in a crowded marketplace, according to a recent report from International Data Corp. (IDC).

The report, titled "Distribution/Pricing Policies: Printer Products," said due to the increased popularity of personal computers in the U.S. in the past five years, the demand for low-end impact printers has dramatically increased. However, it added, the market is currently characterized by severe price pressures resulting from:

- An increased number of new competitors entering the market.
- A reduction in the price of printer components.
- A portfolio of new technologies that simplify the design of the printer.
- The U.S. vendor's adoption of Japanese mass production techniques.

"As a result of increasing price pressures, it is necessary, now more than ever, for manufacturers to analyze closely their return on investment in order to ensure cost effectiveness in every aspect of business," the report stated.

During the past year, IDC said, several vendors discontinued production of many printer models that were not cost effective and replaced them with updated versions instead of merely lowering prices on existing models.

"With advances in technology occurring almost daily and fierce competition in the marketplace, vendors have been forced to discontinue production of any printer that does not utilize the most up-to-date technologies," the report stated.

According to IDC, market pressures have also forced vendors to re-evaluate their channels of distribution. Manufacturers have either decreased their channels of distribution significantly by designating only a few exclusive distributors for their products, or they have sought to increase their channels in an effort to saturate the market with their printers.

Most manufacturers, regardless of which strategy they chose, have maintained a good size OEM base. The OEM business has enabled vendors to maintain a steady demand for their products by packaging a printer with each system the OEM sells, the report noted.

The report predicts that although shipments in the personal computer printer market will continue to grow through 1987, the growth will reach a high point next year for most types of dot matrix and full character printers, slow down during 1985 and 1986 and begin to stabilize during 1987.

During this period, the report added, growth will be greater for the higher speed dot matrix and full character printers than for the under 80 char./sec dot matrix printers, due to the decreasing prices of personal computers through 1987.

Turning to the fortunes of the popular daisywheel printer, IDC said it is now in the middle of a step-down process designed to appeal to the personal computer user market.

Although well on its way, the daisywheel will not become commonplace in this market until the price tag has been reduced to at least $1,500, the report maintained.

For new products with large potential markets, penetration pricing is the most appropriate strategy, the report continued. "This is because the existence of a large potential market is certain to attract large competitors soon after the new technology is introduced."

The intention is to attempt to sell the whole market at one price.

"If the product is only slightly distinctive, the best policy is penetration pricing at a price either at or slightly above those of competitive substitutes," the report stated.

More information on the report is available from IDC at 5 Speen St., Framingham, Mass. 01701.

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Semi Announces Plans For Operation in Japan

TOKYO — The Semiconductor Equipment and Materials Institute (Semi) recently announced plans to establish operations in Japan next year to provide a link between the Japanese semiconductor industry and institute members in the U.S. and Europe.

A Semi spokesman said the institute will seek greater input from Japanese vendors into the development of manufacturing specifications important to both American and Japanese companies. In part, Semi will work in Japan to increase automation of semiconductor processing.

Commenting on the Japanese link, James C. Morgan, president of Semi and of Applied Materials, Inc. of Santa Clara, Calif., said, "Everyone is aware of the major role of Japanese semiconductors in the world marketplace, but until recently most of the capital equipment they used came from U.S. vendors."

Spartacus Tabs Janzen

Carl M. Janzen

BEDFORD, Mass. — Carl M. Janzen, formerly Burroughs Corp. corporate vice-president and before that president of Nixdorf Computer Co., has been named president and chief operating officer for Spartacus Computers, Inc. in Bedford, Mass.

Janzen replaces George McQuilken, one of Spartacus' founders, as president. McQuilken will retain the positions of chairman of the board and chief executive officer.

Janzen began his computer career in sales in 1971 at IBM.

DPMA to Sponsor Seminar On Software Configuration

LOS ANGELES — The Education Foundation of the Data Processing Management Association (DPMA) will sponsor a seminar entitled "Software Configuration Management" in three U.S. cities in January.

The seminar will feature Rick Frederick, manager of software configuration management at Texas Instruments, Inc., who will show participants comprehensive methods for the formulation and implementation of both large and small software configuration management plans. Participants will also learn the tools and techniques necessary to automate configuration management functions.

The seminar will be held in Orlando, Fla., Jan. 23-24; in Boston Jan. 26-27; and in Washington, D.C., Jan. 30-31. DPMA can be reached at Department SCM, Suite 2000, 3420 Kashiwa St., Torrance, Calif. 90510.

Rockwell Joins MCC Consortium

AUSTIN, Texas — Microelectronics and Computer Technology Corp. (MCC), a research and development consortium based here, has announced that Rockwell International Corp. has become the 15th member of the organization.

Rockwell is a Pittsburgh, Pa.-based firm which manufactures a variety of products including electronics and automotive items. Rockwell also has heavy involvement in government aerospace projects. It is a major contractor in the National Aeronautics and Space Administration's space shuttle program.

Led by former head of the National Security Agency, retired Adm. Bobby Inman, the MCC consortium is conducting research in four basic areas: semiconductor packaging, software technology, very large-scale integration and computer-aided design and advanced computer architectures.

Other members of MCC include: Advanced Micro Devices, Inc.; Allied Corp.; Control Data Corp.; Digital Equipment Corp.; Harris Corp.; Honeywell, Inc.; Martin Marietta Corp.; Mostek, Inc.; Motorola, Inc.; NCR Corp.; National Semiconductor Corp.; and Sperry Corp.

MCC is located at Suite 200, Echelon Building No. 1, 9430 Research Blvd., Austin, Texas 78759.

Rand Family To Sell Stock To Group

SAN FRANCISCO — A management investment group at Rand Information Systems, Inc. has reached an agreement with family members who control the company for the purchase of 50% of its outstanding stock.

The management group was led by Dale Darnley, president and chief executive officer; Ronald Edwards Jr., senior vice-president treasurer and secretary; and Charles Romig, vice-president. The executives were joined by a group of outside investors.

Additional information concerning the transaction will be disclosed in the forthcoming filings with the U.S. Securities and Exchange Commission. Based here, Rand is a software and service company specializing in software conversions and in the development of advanced business systems.

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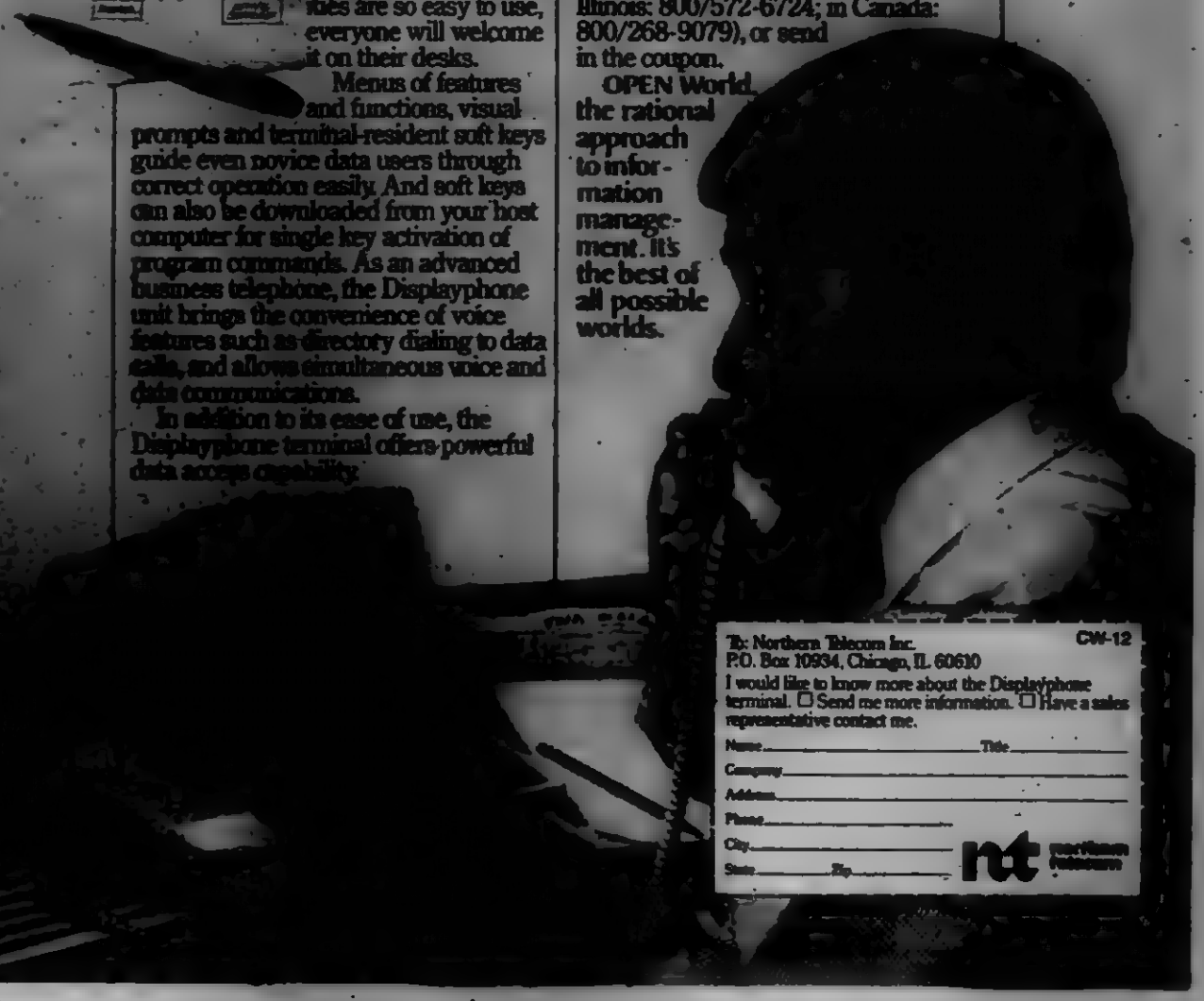

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- Conversion stories.
- Integrating micro with mainframe applications.
- Applications for manufacturing.

You'll get information on who should select packaged applications. You'll read about the impact of application generation tools on selecting packaged solutions. And you'll get pages of fact-filled ads for products to keep you up-to-date on just what's new. If you buy, choose or recommend applications software products — you won't want to miss this special report in *Computerworld's* January 30th issue.

And if you've got packaged software products our readers want to know about — then you need to get your ad to us by January 13 to be included in the Special Report. To reserve space in this issue, call Don Fagan, Vice President Sales/Marketing; Ed Marecki, National Sales Director, or Kathy Doyle, Marketing Support Manager at (617) 879-0700. Or, call one of the sales offices listed below:

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Sr. Systems Programmer: Minimum 3 years plus Univac 1100 systems experience.

A college degree is desired. Exceptional opportunity for professional growth in rapidly-expanding DP environment. Please send resume and salary history to:

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Responsibilities: Sell **Model 204** and other CCA systems in designated territories; track leads, identify and qualify prospects; develop sales strategies; monitor and report sales progress; close sales; perform account administration and follow-up.

Qualifications: 3-5 years' experience selling computer software systems; solid understanding of IBM environment and marketplace; DBMS experience desired.

Positions available in the following branch offices: Connecticut; New Jersey; Rochester; Pittsburgh; Washington, DC; Detroit; Houston; Los Angeles.

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Responsibilities: Pre- and post-sale support for **Model 204** DBMS within our Federal Systems Group; pre-sales presentations; analysis of user requirements, benchmarks, customer training and installation.

Qualifications: Solid experience in IBM systems/applications software with emphasis on operating systems, database and teleprocessing.

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Responsibilities: Sales and marketing support for **Model 204** international affiliates. Prepare and implement sales and marketing strategies; monitor and report sales progress; coordinate technical consultant support efforts and develop new affiliate relationships.

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Responsibilities: Develop test plans and procedures, create test tools, and assist the Development staff in testing new releases of the world's fastest growing DBMS.

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Qualifications: Management, course development and teaching experience, knowledge of instructional techniques and presentation skills, knowledge of IBM mainframe systems and DBMS experience preferred.

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Qualifications: Teaching experience; knowledge of IBM systems - JCL, programming languages - COBOL, PL/1, BAL, Fortran, DBMS, CICS, PP, Monitors experience desirable.

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Dec. 1980	88
Dec. 1981	148
Dec. 1982	227
Nov. 1983	316

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Programmer Analysts with a minimum of 3 years Assembler programming experience. Experience with CICS, DL1 or IMS DB/DC, I/O ACCESS Methods and Teleprocessing are additionally required.

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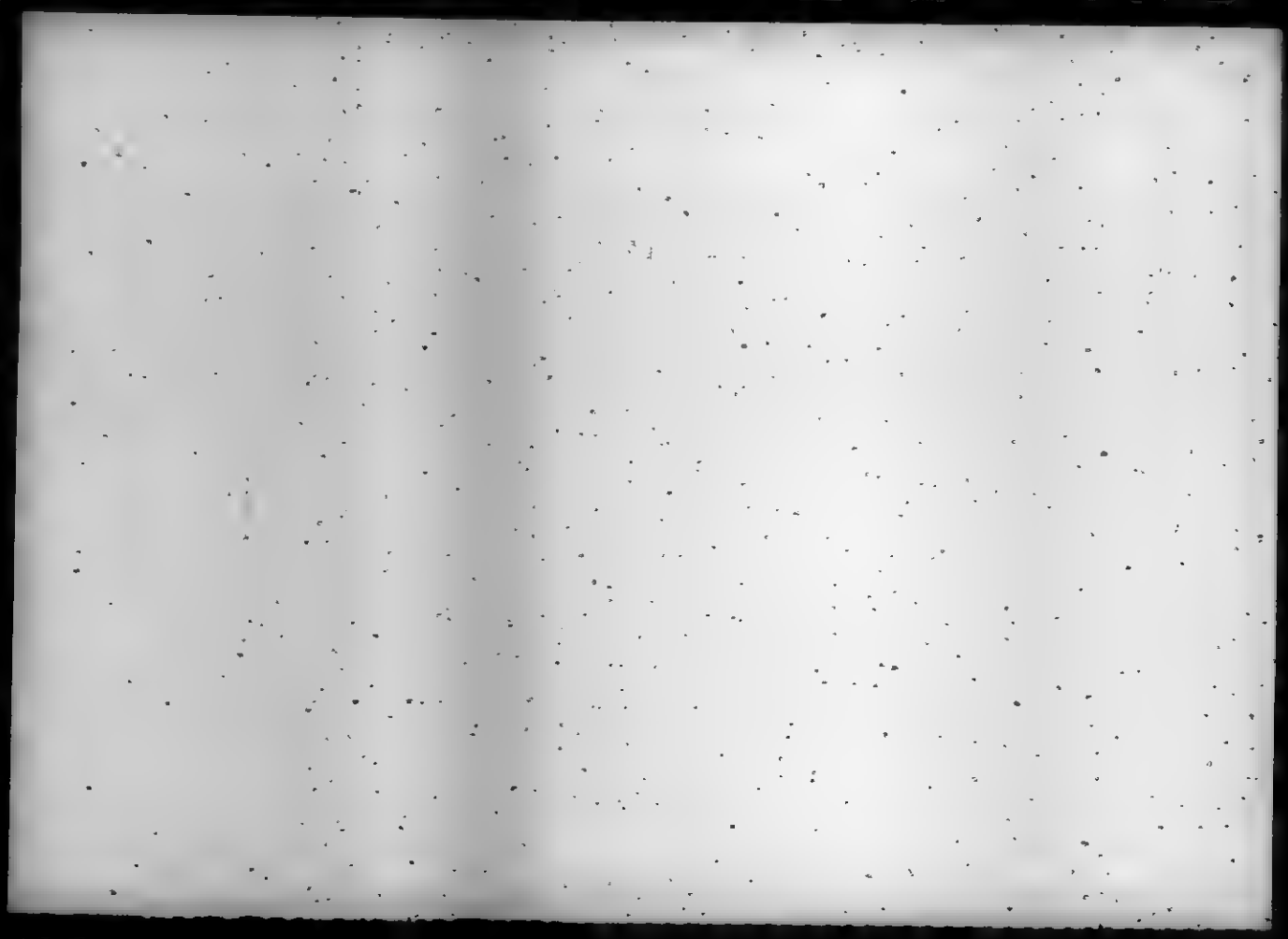

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Sr. Software Engineers: UNIX System Architect

You will be defining a version of SYSTEM V for NS16032 and NS32032. Two to five years' experience in UNIX kernel development is desired.

Sr. Software Engineers: UNIX Kernel Development

You will work on porting Berkeley 4.2bsd to NS16032 and NS32032 based microcomputer systems. Two to five years' experience in UNIX kernel development is desired.

Sr. Software Engineers: Networking

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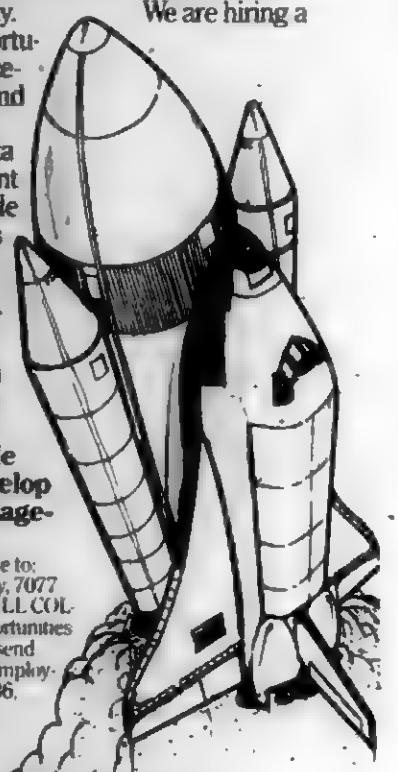

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You will work with users and Systems Analysts to define and design complex changes or additions to existing programs. Qualified candidates will have a Bachelors degree or equivalent and at least 4 years experience in analytical and design assignments. The environment is IBM 3033, OS/MVS, IMS, utilizing COBOL and CICS.

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This management individual will work with executive and middle management formulating project objectives, evaluating priorities, examining alternatives and guiding project plans aimed at the implementation of major business systems. Included is the responsibility for all steps of the phased development of new applications.

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Requires expertise in using structured analysis and design techniques to analyze, design, specify and test state of the art seismic systems for Sohio's aggressive exploration programs.

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Individuals should have above average skills in interpersonal relations, written and oral communication. Project management skills are also desirable.

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BS or MS degree in computer science, math or related field is required. Minimum 3 years' training and experience in the analysis, design, specification and testing of software systems under a structured environment is required.

Individuals should have above average skills in interpersonal relations, written and oral communications. Project management skills are desirable.

All positions require familiarity with FORTRAN '77. Experience with DEC (VAX-11/750 & VAX 11/780) and CRAY IS/X-MP systems is desirable. DEC assembler, DEC systems internals, data base management systems, graphics software and hardware experience is preferred.

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Develop new, and enhance existing, research systems implementing database management systems, computer graphics, vendors supplied software and intercomputer data transfer. Develop menu facilities for customized end-user interactive capabilities. Requires an advanced degree in a quantative discipline, preferably chemistry, with a combined undergraduate degree in chemistry and CS; proficiency in several programming languages such as FORTRAN and PL/1; knowledge of several database management systems.

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- 6-10 years experience - IBM software environment
- IBM Assembler
- OS-VS, MVS, DOS-VSE, VM
- CICS (BTAM, VTAM)
- Data Base (IMS, TOTAL, TIS, or IDMS)
- TSO

These systems consulting positions are available in: Boston; New York; Philadelphia; Washington, D.C.; Atlanta, Memphis; Cincinnati, Columbus, Chicago, St. Louis; Battle Creek, Michigan; Ogden, Utah; San Francisco, and Los Angeles.

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Professor Nicholas Negroponte
Director, Media Laboratory
Room NE43-255
Massachusetts Institute of Technology
545 Technology Square
Cambridge, Massachusetts 02139

The positions are in the discipline areas of:

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1. television engineering, digital video, telecommunication
2. computer animation, image processing, artificial intelligence
3. human/machine interface, experimental psychology
4. electronic imaging, display technology, 3-D
5. developmental psychology, social science computation
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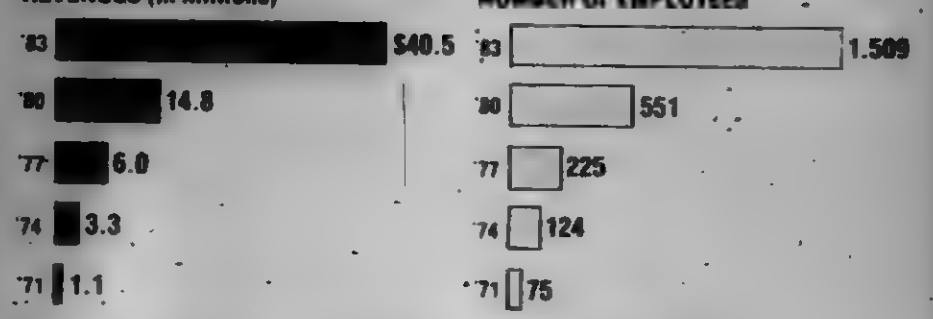

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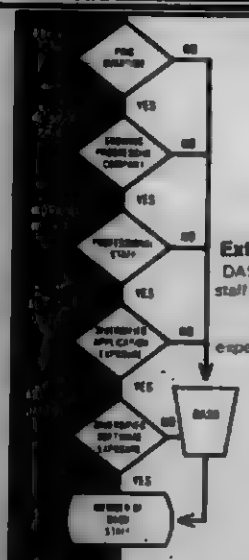

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EOE M/F/H

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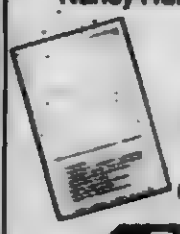

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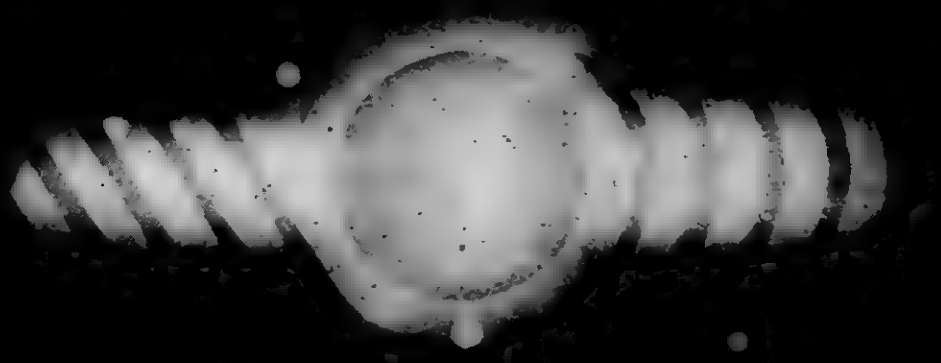

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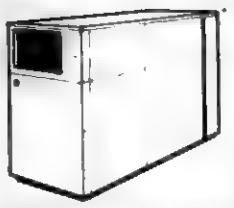

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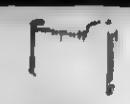

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The terms of the sale are a minimum down payment of 25% in either cash, certified or cashier's check at the time of sale with the balance due within 24 hours. Delivery shall take place upon receipt of the total purchase price. All goods are sold "as is." The undersigned reserves the right to reject any or all bids and to bid on and purchase any or all of these goods.

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Ad closing is every Friday, 6 working days prior to issue date.

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COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
375 Cochituate Road, Box 880, Framingham, MA 01701/(617) 879-0700

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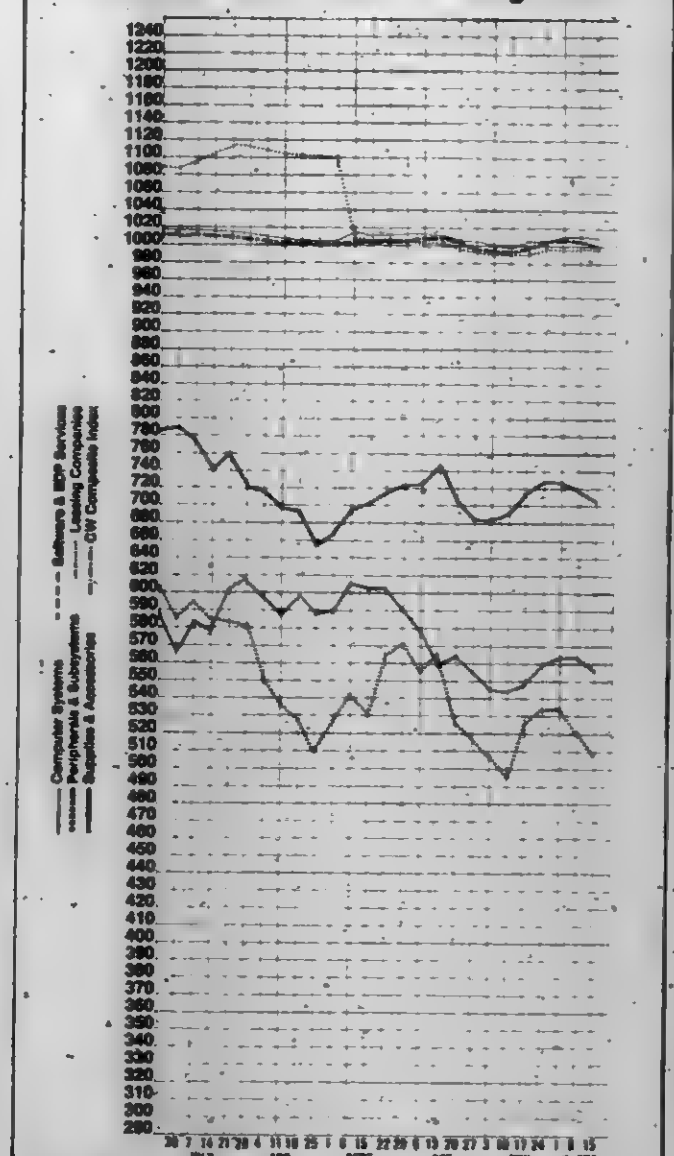

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Computerworld Stock Trading Summary

All statistics compiled and tabulated by TRADE QUOTES INC Cambridge Mass 02139

CLOSING PRICES WEDNESDAY, DECEMBER 14, 1983

	1982-83 RANGE	CLOSE DEC 14 1983	WEEK NET CHANGE	WEEK PCT CHANGE
COMPUTER SYSTEMS				
ALPHA MICROSYSTEMS	11- 24	14 3/8	-1 3/4	-10.6
ALTOS COMPUTER SYST	8- 28	8 1/2	- 1/4	-7.5
AMDAHL CORP	8- 30	18 1/8	+1 7/8	+10.6
APPLE COMPUTER INC	16- 63	23 3/8	+2 3/8	+11.3
AT&T	60- 70	63 7/8	- 3/8	-0.5
BURROUGHS CORP	28- 58	46	+ 1/4	+0.5
COMPUTER AUTOMATION	8- 17	8 1/4	- 1/4	-3.0
COMPUTER CONSOLES	8- 26	21 1/8	+ 1/8	+0.5
CONTROL DATA CORP	21- 62	44	-1 1/2	-3.2
CONVERGENT TECHNOL	18- 41	22 3/8	+ 1/4	+1.1
CRAY RESEARCH INC	20- 87	31 7/8	+1 1/8	+3.1
DATA GENERAL CORP	10- 41	32 3/4	-1	-3.0
DATAPOINT CORP	11- 36	13 1/2	- 3/4	-5.3
DIGITAL EQUIPMENT	82-132	88 1/8	-1 1/8	-1.6
GRID INC	8- 18	13 1/2	- 3/8	-2.7
ELECTRONIC ASSOC.	5- 18	8 3/8	0	0.0
FLOATING POINT SYST	18- 44	28 1/2	+1 1/4	+3.8
FONSORD	22- 67	33 3/4	-2	-5.9
GENERAL AUTOMATION	3- 15	11 5/8	-1	+7.8
GOULD INC	28- 44	30 5/8	- 3/8	-1.2
HARRIS CORP	20- 51	28 1/2	- 1/4	-0.6
HEWLETT-PACKARD CO	22- 48	46	-1 1/2	-3.8
HONEYWELL INC	80-137	134 3/8	-2 3/8	-1.7
IBM	97-134	129 7/8	+1 5/8	+1.3
IPL SYSTEMS INC	9- 14	9 1/4	-1 1/2	-40.8
M/A-COM INC	20- 35	20	-1 3/8	-6.4
MAGNUSON COMP SYSTS	1- 5	3/8	0	0.0
MANAGEMENT ASSIST	7- 18	10 1/2	- 1/8	-0.6
MATSUSHITA ELECTR(ADR)	42- 80	78 1/4	-3	-1.2
MODULAR COMPUTER SYS	8- 18	7 3/8	- 1/8	-1.6
NORAND DATA SCI	10- 18	15 3/8	+ 3/8	+2.5
MOTOROLA INC	82-148	134 1/8	+3 3/4	+4.1
NAT'L SEMICONDUCTOR	16- 60	19 3/4	-1 7/8	-10.6
NCR	38-136	127 1/4	-6 1/8	-4.8
PERKIN-ELMER	17- 37	27 3/8	+ 1/8	+0.4
PRIME COMPUTER INC	11- 30	17	+ 1/4	+1.4
SPERRY CORP	21- 47	46 3/4	+ 1/8	+0.2
TANDEM COMPUTERS INC	14- 46	34 1/8	-1 1/8	-3.1
TANDY CORP	20- 65	43	- 3/4	-1.7
TELEVIDEO SYSTEMS	16- 43	17 3/8	-1 1/8	-6.0
TELXON CORP	8- 18	11 1/2	-1 1/2	-11.5
TEXAS INSTRUMENTS	71-170	134 7/8	+1	+0.7
ULTIMATE CORP	8- 24	18 1/4	-1	-5.7
VECTOR GRAPHICS INC	3- 14	8	- 1/8	-11.1
WANG LABS "B"	13- 42	32 3/4	+ 3/4	+2.3
WANG LABS "C"	31- 42	32 1/2	+ 1/8	+0.3
XEROX CORP	39- 80	80	+1	+2.0
LEASING COMPANIES				
BOOTHE FINANCIAL CP	21- 38	33 3/4	+ 1/2	+1.5
COMDISCO INC	7- 43	18 1/2	- 1/2	-2.6
CONTINENTAL INFO SYS	3- 18	8 3/4	0	0.0
DPF INC	8- 15	13 5/8	+ 3/8	+2.8
U.S. LEASING	18-.67	38 1/4	+ 1/4	+0.6
COMPONENTS				
ADVANCED MICRO DEV	13- 36	32 1/4	+2 1/8	-6.1
ADV'D SEMICONDUCTOR	12- 35	33	-1 1/2	-4.3
ANALOG DEVICES INC	18- 42	36 3/8	-1 1/8	-2.7
ANALOGIC CORP	20- 27	19 3/4	-1 1/4	-5.9
APPLIED MAGNETICS CP	18- 37	25 7/8	+ 3/4	+2.9
TEKTRONIX	14- 38	34 5/8	-1 5/8	-4.4

EXCH: N=NEW YORK; A=AMERICAN; P=PACIFIC; B=BOSTON; I=NATIONAL; W=NEWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
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	1982-83 RANGE	CLOSE DEC 14 1983	WEEK NET CHANGE	WEEK PCT CHANGE
SOFTWARE & EDP SERVICES				
ADVANCED COMP TECH	1- 8	4	+ 3/4	+23.0
ADVANCED SYSTEMS INC	8- 22	18 3/4	-1	-4.8
ADS COMPUTERS INC	7- 32	28 1/2	-1 1/4	-4.2
AMERICAN SOFTWARE	18- 31	18	- 1/2	-2.5
ANACOMP INC	6- 27	8	-1 1/8	-12.3
ANALYSTS INT'L CORP	9- 20	12	+ 1/4	+2.1
APPLIED DATA RES.	8- 37	31 1/8	-1	-3.1
AQA COMPUTER SYSTEMS	8- 21	16 1/4	-1 1/4	-7.1
ASTRODYNE COMP IND	6- 7	2 1/2	0	0.0
AUTOMATIC DATA PROC	23- 64	35 1/2	- 3/8	-1.4
BSA COMPUTER ASSOC.	5- 17	8	- 3/4	-9.0
COMPUTER ASSOC INT'L	9- 38	28 1/2	+1 1/4	+4.6
COMPUTER HORIZONS	8- 20	12 1/4	+ 1/2	+4.2
COMPUTER NETWORK	4- 10	5 3/8	- 1/8	-1.8
COMPUTER SCIENCES	11- 23	18 1/4	- 3/8	-2.1
COMPUTER TASK GROUP	8- 22	16 1/4	- 3/8	-2.2
COMPUTER USAGE	2- 12	12	+2 1/4	+20.0
COMPUTONE SYSTEMS	8- 28	8 3/4	- 1/4	-2.8
CONSERV CORP	5- 20	9 3/4	- 1/4	-2.1
COMSHARE	7- 13	12 1/2	+1 3/8	+14.9
CULLINET SOFTWARE	12- 50	41	-1 1/8	-2.8
CYCARE SYSTEMS INC	9- 27	18 1/2	-1	-5.7
ELECTRONIC DATA SYST	10- 42	38	-1 1/4	-3.4
HODAN SYSTEM INC	10- 53	18	- 1/4	-1.2
GENERAL ELECTRIC CO	48- 58	56 1/2	-1 7/8	-2.2
GTE CORP	38- 68	42 3/4	+1	-2.3
INFORMATICS INC	10- 34	21	-5 1/2	-20.7
INFOTRON SYSTEMS COR	25- 42	38 1/4	+ 1/4	+0.6
KEANE ASSOCIATES	6- 18	8 1/2	- 1/4	-2.9
COMICON	6- 31	30 3/4	+ 1/8	+0.4
MCI COMMUNICATIONS	13- 34	14 7/8	- 3/4	-4.7
MDBT DCI AMER INC	8- 32	28	- 3/4	-2.6
MATHEMATICAL APP SYS	10- 32	10	- 1/2	-4.7
MICOM SYSTEMS INC	28- 50	42 1/2	+1	+2.4
MONROE-MERGER CP	8- 22	8	- 1/2	-5.8
NATIONAL DATA CORP	9- 28	26 7/8	- 1/4	-1.1
ON-LINE SOFTWARE INT	17- 37	18 1/2	-2	-8.7
PANSOPHIC SYSTEMS	8- 30	26 1/8	- 1/8	-0.6
PLANNING RESEARCH	8- 21	17 3/8	0	0.0
POLICY MGMT SYSTS CP	13- 38	33 1/2	+ 3/4	+2.6
PROGRAMMING & SYS	1- 8	4 3/4	- 3/8	-7.3
REYNOLDS & REYNOLD	13- 50	42 3/4	+2	+4.4
SCI CORP	13- 38	26 1/2	-1 3/4	-6.6
SHARED MEDICAL SYST	13- 49	32 1/2	-1 1/2	-4.4
SCIENTIFIC COMPUTERS	8- 16	11 1/4	+ 1/2	+4.8
SOFTWARE AG	9- 17	10 5/8	- 3/8	-3.5
SYNCHRONIC INC.	12- 30	25 3/8	- 1/8	-2.2
UMS CORP	9- 18	14 1/2	- 3/8	-2.5
WYLY CORP	7- 17	15	- 1/4	-2.2
PERIPHERALS & SUBSYSTEMS				
4th INTERNATIONAL	2- 7	3 3/4	- 1/8	-3.2
ANDERSON JACOBSON	6- 28	8 1/2	- 3/4	-7.3
AUTO-TROL TECHNOLOGY	8- 29	22 1/8	- 3/8	-1.8
DAMTEC INC	7- 30	13 1/4	0	0.0
DEC-IVE INT'L	4- 15	8	+1 1/8	+16.3
DELT.EXCHANGE & NEW	8- 30	24 7/8	- 1/8	-0.5
COMPEX CORP	3- 4	1 1/2	0	0.0
CENTRONICS DATA CORP	8- 28	19 1/2	- 7/8	-4.3
DIGI CORP	4- 12	10 1/8	0	0.0
EDMUNDSCIENCE	2- 29	11 1/8	+2 1/8	+23.8
COMPUTER DEVICES INC	1- 24	3/8	- 1/8	-10.8
COMPUTER TRANSCEIVED	4- 12	3 7/8	0	0.0
COMPUTERVISION CORP	15- 50	40 3/8	-2	-4.8
COMMAC CORP	10- 38	18 7/8	- 7/8	-4.4
DATAPRODUCTS CORP	10- 41	28 1/2	- 9/8	-3.8
DATARAM CORP	5- 15	14	- 1/4	-2.4
DATA SWITCH CORP	13- 41	25 1/2	-2 1/2	-8.9
DATUM INC	2- 17	8 1/8	- 3/8	-4.4
DECISION DATA COMPUT	3- 16	14 3/8	- 7/8	-5.8
DIGITEL-OLIVETTI	11- 30	11 3/8	- 3/4	-6.1
ELECTRONIC M A R	5- 11	7 7/8	- 1/4	-3.1
ENDATA, INC	11- 66	16 3/4	- 3/4	-4.3
EVANS & SUTHERLAND	16- 96	31 3/4	- 3/4	-2.3
GANDALF TECHNOLOGIES	8- 22	9 3/8	- 1/8	-1.3
GEN'L DATA COMM IND	6- 32	22	+ 1/2	+2.3
GREAT SOUTHWEST IND	1- 6	1	0	0.0
HAZELTINE CORP	7- 31	23 3/8	0	0.0
ICOT CORP	3- 16	3 3/8	- 1/2	-12.9
INFORMATION INTL INC	10- 22	13 1/4	- 0	0.0
INFORMATION SCIENCE	12- 17	15	0	0.0
INTEL CORP	11- 65	40 1/8	-1 1/8	-2.7
IPL SYSTEMS INC	9- 14	9 1/4	- 1/2	-5.0
LUNDY ELECTRONICS	7- 18	11 3/8	- 3/8	-3.1
MEGADATA CORP	8- 13	13	- 1/4	-1.8
MSI DATA CORP	18- 37	28 3/8	-1 3/8	-4.6
MANNA CORP	8- 28	23 3/8	+ 1/2	+2.1
NETWORK SYSTEMS CORP	8- 34	18 7/8	-2 1/8	-13.2
NO AMERICAN PHILIPS	49- 78	73 7/8	+ 3/4	+0.9
NORTHERN TELECOM LTD	22- 48	46 1/4	-2 5/8	-6.1
OMEX	3- 8	3 1/8	- 1/4	-8.0
PARADYNE CORP	14- 30	18	+ 1/8	+0.8
PENRIL CORP	7- 16	12	- 1/8	-1.0
PHOENIX AMERICAN INC	7- 17	12 1/8	+ 1/8	+1.0
PLESSEY (ADR)	28- 41	34 3/8	+ 1/8	+0.2
PRINTRONIX INC	23- 34	28 1/2	-2 1/8	-7.0
RANTEC CORP	8- 28	12	- 3/4	-5.8
RAYTHEON CO	42- 98	64 3/8	+ 1/2	+1.1
RECOGNITION EQUIP	4- 17	12 1/8	- 3/8	-3.0
ROLM CORP	40- 80	32	-1 7/8	-3.4
SANDERS ASSOCIATES	30-120	48 5/8	-5 1/8	-4.3
SCAN DATA	1- 3	3/8	0	0.0
SCAN-TRON CORP	12- 17	16 1/8	- 1/2	-2.9
SCIENTIFIC ATLANTA	19- 23	45 3/8	- 3/8	-0.8
STORAGE TECHNOLOGY	14- 23	14 1/8	- 3/8	-2.6
SYKES DATATRONICS	4- 27	4 1/4	- 1/8	-2.8
SYSTEMS & COMP TECH	24- 39	28 3/8	- 7/8	-2.9
T BAR INC	7- 17	8 1/8	- 1/2	-5.1
TAB PRODUCTS CO	8- 39	23 7/8	+1	+4.3
TANDON CORP	10- 28	18 1/2	+ 1/8	+0.2
TTC INC	9- 12	7 1/2	+1 1/8	+20.0
TEKTRONIX INC	34- 87	72 3/8	-1 3/8	-2.3
TELEX	5- 35	22 7/8	- 3/8	-1.6
TESDATA SYSTEMS CP	3- 19	8 1/2	-1	-8.5
TIMEPLEX INC	7- 29	24	+1 1/8	+4.9
VISUAL TECHNOLOGY	9- 28	13 1/4	-1 1/4	-8.6
SUPPLIES & ACCESSORIES				
AMERICAN BUS PRODS	11- 34	33 3/8	+ 7/8	+2.6
BARRY WRIGHT	13- 33	31 3/4	+ 1/8	+0.7
DUPLEX PRODUCTS INC	12- 26	25	- 1/2	-1.8
ENNIS BUS. FORMS	6- 28	24	- 1/2	-2.0
3M COMPANY	60- 90	88	- 3/8	-0.4
MOORE CORP LTD	26- 91	83 1/8	- 3/4	-1.7
STANDARD REGISTER	11- 34	31	-1 1/4	-3.8
WALLACE BUS FORMS	11- 33	31 1/4	- 1/2	-1.9

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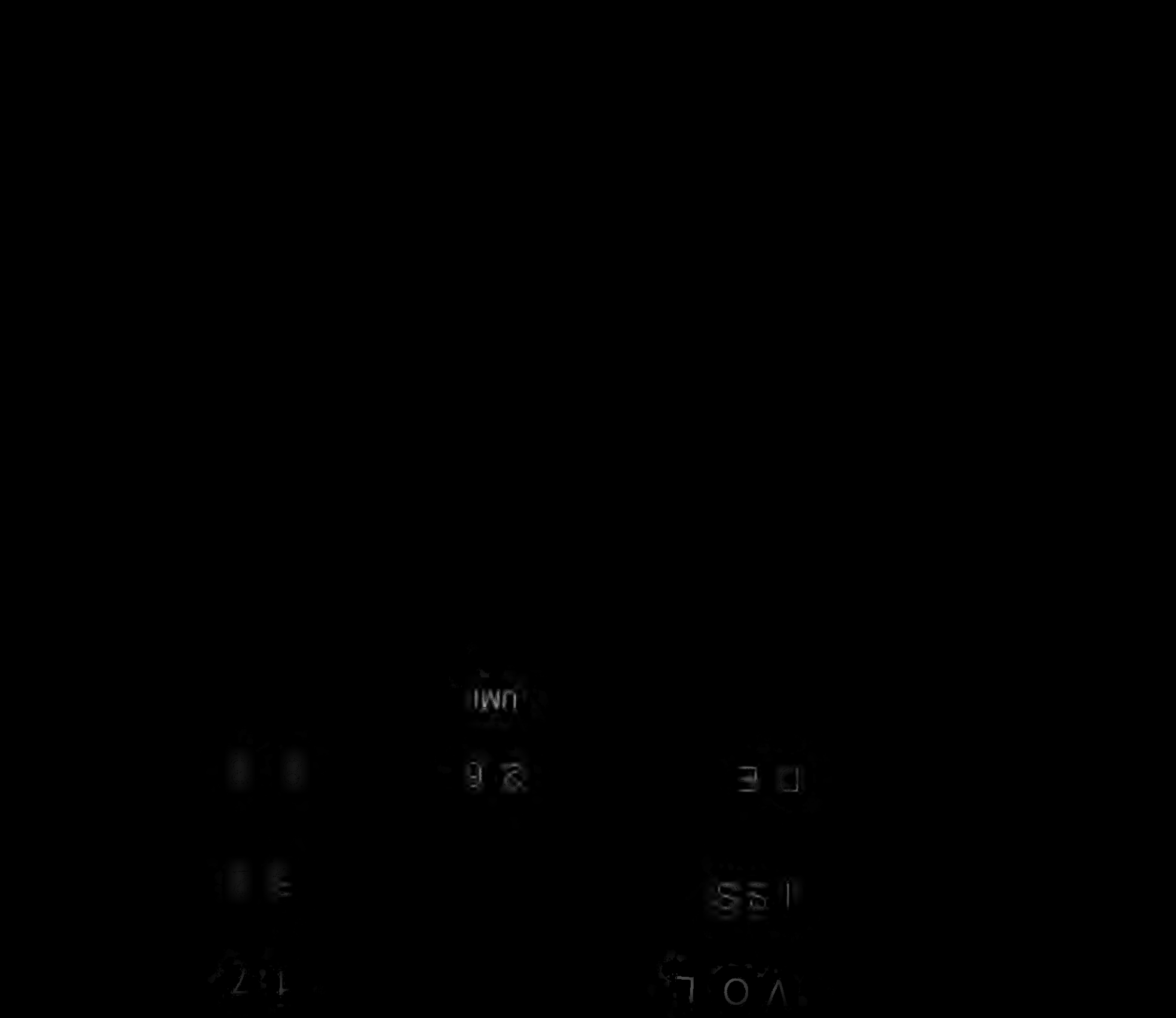

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COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper

Second-class postage paid at Framingham, Mass. and additional mailing offices © 1984 by CW Communications/Inc.

y; $44/year

December 26, 1983/January 2, 1984

Vol. XVII, No. 52/Vol. XVIII, No. 1

NEWSPAPER

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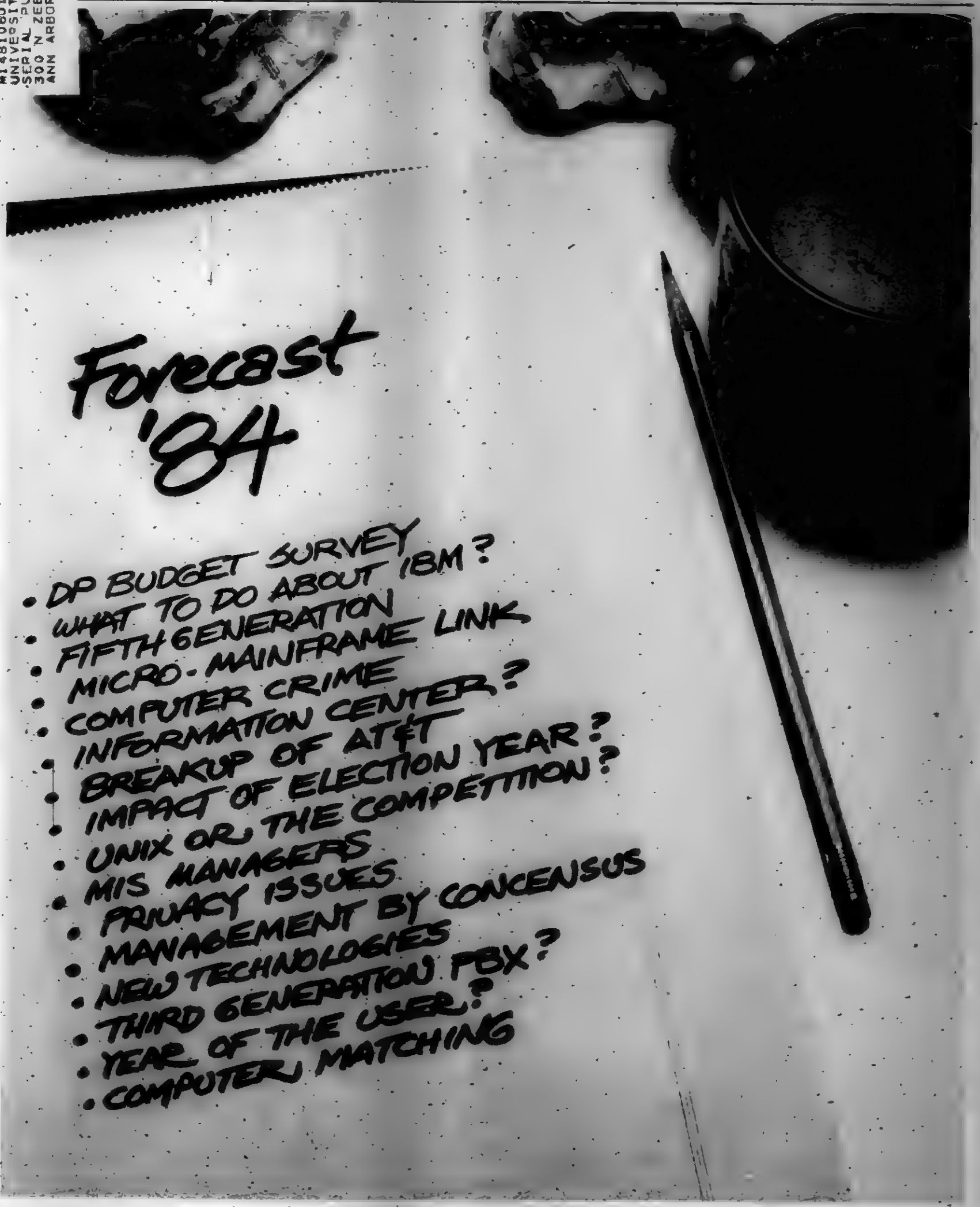

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Second-class postage paid at Framingham, Mass., and additional mailing offices. Computerworld (ISSN: 0010-4841) is published weekly, except January (5 issues), February (4 issues), March (5 issues), April (4 issues), May (5 issues), June (4 issues), July (5 issues), August (5 issues), September (4 issues), October (5 issues), November (4 issues), December (4 issues) and a single combined issue for the last week in December and the first week in January by CW Communications/Inc., Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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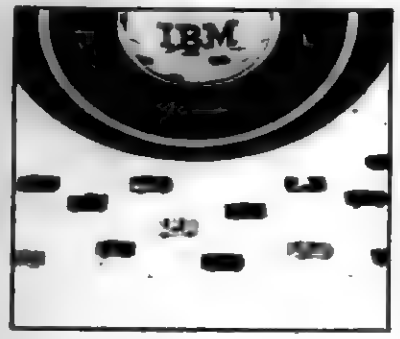

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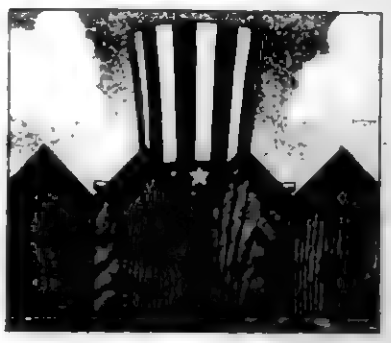

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Annual DP Budget Survey

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Picking Up the Check

By Peter Bartolik

It may be the fear of future inflation, or perhaps the tail end of the recession. But whatever the reason, DP budgets are increasing at a slower rate than over the past two years, even as DP centers take on increasing responsibilities, *Computerworld's* annual survey of DP managers has found.

While several of the 49 DP managers polled this year said they are appropriating money in anticipation of AT&T divestiture-related increases, for microcomputer purchases and for end-user training, budgets as a whole are not growing as fast as they did last year and the previous year.

The majority of respondents to the survey — 67% — said their budgets for 1984 will be up over the 1983 level, while 15 will experience level funding and one will work with a smaller budget. The increases will average 12.4%, compared to the 17% reported last year and the 20.3% reported the year prior to that.

The one manager who reported a reduction — a whopping 33% cut — said it is the result of a corporate reorganization.

The economic recovery being touted in Washington, D.C., has yet to show up in the spending plans of an overwhelming majority (83.6%) of the managers. A few even said they are still feeling the affects of the recession.

The fastest changing areas of the data processing world, microcomputers and communications, are creating wide divisions in the manner of dealing with procurement and administration, according to this year's survey. Twenty of the respondents reported that microcomputers are purchased out of DP budgets, while 20 others reported micros are purchased by end-user budgets (the remainder had no set

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Staff Writer Peter Bartolik coordinated the efforts of the Computerworld writers who conducted the survey upon which this story is based. Members of the survey team included staff writers John Gallant, Lynn Haber and Patricia Keefe and West Coast correspondent Robert Hall.

DP BUDGET SURVEY

policy); last year, 19 managers said end users paid for micros and only six said DP departments paid.

Perhaps reflecting the experimental aura surrounding micro implementation, Henry Goldback, DP manager of Follet Corp. in Chicago, said his company established a "micro study budget" and will purchase about 100 units this year from that budget.

End-user training, particularly with regard to micros, is a responsibility for 55% of the managers, but only half have a readily identifiable budget line item to fund that responsibility. "It's part of each programmer's job," Goldback noted, "but it is not budgeted."

Communications

Communications appears to be another area where both DP management and upper management are feeling their way. Almost half, 45%, reported they have some responsibility for corporate voice communications policy, ranging from giving advice to selecting the entire telecommunications system. An identical percentage also said they have set funds aside in anticipation of increases resulting from the divestiture of AT&T, but only four managers without some say over voice communication have made such a provision.

At Helene Curtis Industries, Inc. in Chicago, according to DP Director Edward Valliere, "We're very concerned [about the AT&T divestiture]. We're just waiting to see; we put aside $20,000." But James Durkee, vice-president of management information systems for Carson Pirie Scott & Co., also in Chicago, represents the other end of the scale: "We've been upgrading our own switches with purchased equipment. We're positioned to buy anyone's service."

According to the survey, communications will eat up an average of 10.8% of DP budgets in 1984, about the same as last year.

As in previous years, salaries continue to eat up the lion's share of the budget, but that share has dropped slightly from 46% to 43%.

The actual salary increases are lower than in previous years, averaging 5.7% across the board and only 8.8% in those departments which actually are increasing spending for salaries in 1984.

Last year, departments that increased personnel salaries experienced an average 17% increase over the previous year.

In a seemingly inconsistent reversal of last year's survey, 57% of the managers surveyed plan to hire additional personnel this year; last year, 56% planned not to hire. Positions being created are generally for programmers, analysts and support personnel, although one department expects to hire a data base management system administrator.

Members of this year's survey group said they have less trouble finding qualified DP personnel than last year's group; only 55% of the 1984 group said they have problems filling positions, compared to 82% last year.

Personnel turnover rates in 1983 were greater than last year's at 20% of the departments, smaller at 26.5% and the same at half of the departments covered in the survey; the 1983 survey had found sharply decreased turnover, which may indicate that DP personnel this year are more secure in their ability to find new employment in an eco-

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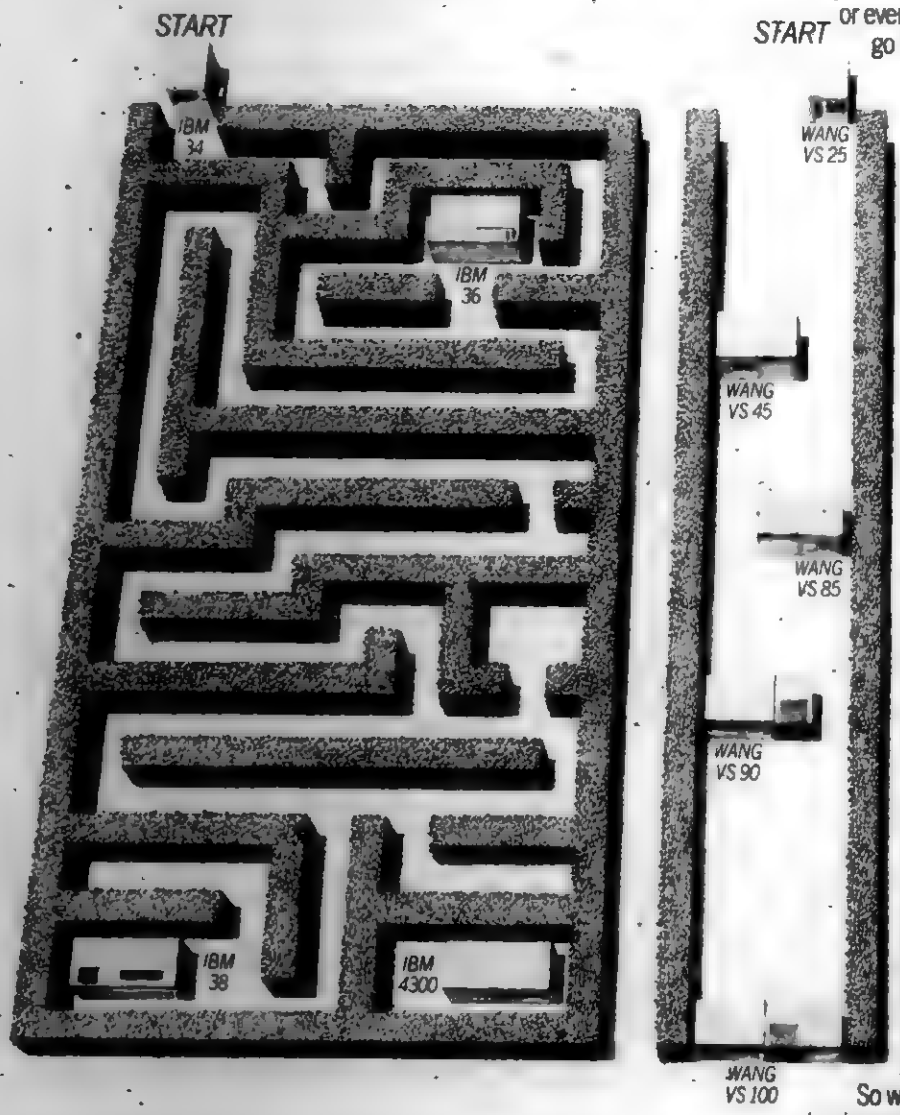

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DP BUDGET SURVEY

(Continued from Page 5)

nomic upturn.

Most managers, about 60%, won't hire personnel without formal DP training. But the majority of those who do hire novices find them to be effective personnel. "Given a little bit of time to learn, they become very effective," said David Sheppard, senior vice-president of DP services with the Boston Co., a financial services company in Massachusetts.

More than 65% of the managers have appropriated funds for training, and such funds average 2.53% of the total budget among the 25 managers who were able to pinpoint the figures.

In a slight dip from last year's 50:50 ratio, the managers reported their programmers spend an average of 45.3% on maintenance work and the rest on new development.

Programmers spend more than 50% of their time on maintenance at 20 of the 49 shops that were surveyed. Three managers reported they employ separate teams of programmers for maintenance and development; one of those said the programmers rotate between maintenance and development.

Vendors will be pleased with one aspect of the survey: 80% of the managers plan to purchase new software, and slightly more than 70% expect to buy additional hardware and peripherals.

Ten managers reported they will be purchasing various types of financial applications packages such as accounts receivable, general ledger and the like; seven will purchase data base management systems; five will be purchasing packages to run under IBM's MVS operating system; three will purchase fourth-generation software; and three will purchase applications generators. Only two managers expect to purchase micro-to-mainframe linkage packages.

IBM will be the big winner in the hardware area, with 10 IBM 3081s (nine at one shop alone), three 3083s, two 4300 series machines, three System/36s and one Series/1 on the managers' shopping lists. One shop plans to buy seven of Tandem Computers, Inc.'s Non-Stop II or TXP units; and several plan purchases of minicomputers and micros.

Purchase and lease of hardware, along with service and maintenance, will cost DP shops an average 19.7% of their budgets this year, down from last year's 32%. Mainframe costs will eat up the largest chunk, with 15 shops reporting the purchase and license fees at between 20% and 40% of their total budgets.

Software Costs Rising

Software costs, however, will chew up a far greater chunk of the 1984 budget than they did in 1983. Reflecting perhaps the large number of managers purchasing new packages this year, software costs will average about 19.6% of the total budget, compared with only 10% in 1983.

Overall, half of the managers said their greatest cost increase this year will be in the area of salaries; 28.5% said hardware and 22.5% indicated software will go up the most (some managers picked more than one area, accounting for the figures adding up to more than 100%).

'Seven managers said their greatest concern [in 1984] will be to reduce backlog, and another five said their concern is to improve efforts to make information available to the end user.'

Three managers said their greatest increase will be in the purchase of outside consulting services. Asked to list their concerns as department heads for this year, the managers listed a wide variety.

Seven managers said their greatest concern will be to reduce backlog, and another five said their concern is to improve efforts to make information available to the end user.

Six managers said they are most concerned with supporting corporate goals, and five said increasing productivity tops their list. Five managers mentioned personnel; four are concerned with micro proliferation and micro-to-mainframe communications.

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Management By Consensus

The MIS Chief's Balancing Act

By David Myers

The spread of microcomputers and word processors through the offices of Fortune 1,000 corporations has forced the management information systems (MIS) chief to walk a tightrope.

Beneath lies annihilation — the loss of power within the corporation, even the loss of a job. On the other side lie enhanced stature and leverage, a more important role within the corporation. Whether he makes it across is almost entirely up to him.

Office automation has sparked a trend within America's largest corporations toward computer decision making by consensus or committee. There is nothing radical in that. Corporations live and breathe by committee.

But in the past, it was always the MIS chief who decided how the corporation was going to automate its information processing functions. Suddenly the MIS director finds he can no longer act alone.

"When it comes to general planning, equipment selection, vendor selection and implementation strategies, it is no longer clear that the MIS director has carte blanche," according to Tom Willmott of International Data Corp., a Framingham, Mass.-based market research firm.

"MIS decisions were once restricted entirely to the data processing department. Administration department heads would choose things like PBX [private branch exchanges].

"Now the MIS director may be involved in office automation, but the president of the company has his finger in the pie, too. No longer is it 'MIS director, write a check,' " Willmott maintained.

Why has office automation sparked this trend? Probably because it got its start outside the data processing department, in the administrative offices of the corporation.

As Susan Roper, manager of office automation for Hughes Aircraft, put it, "More and more individuals are saying they want that tool." They aren't walking down the hall to the DP department for help, that is; they are demanding the resources for solving their own problems themselves.

What has resulted is a proliferation of microcomputers throughout many corporations. Rather than waiting for the MIS chief to get around to them, department heads are going out and buying machines for their personnel.

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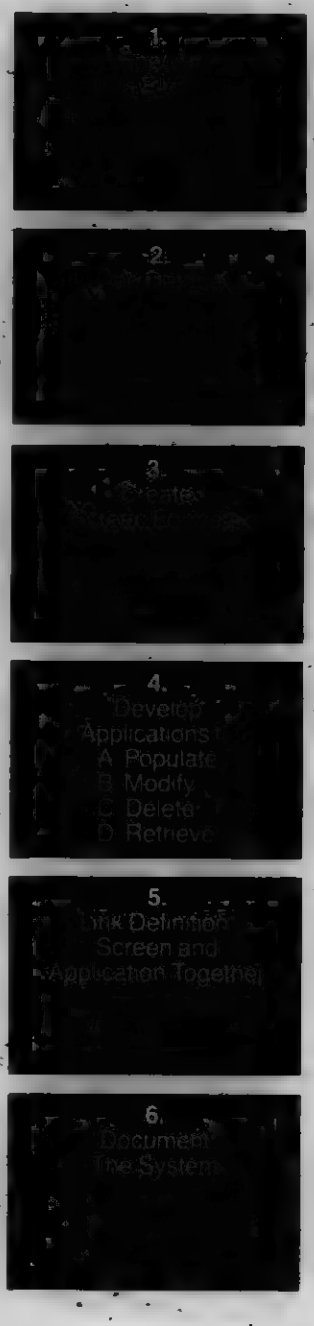
David Myers is Computerworld's correspondent in New York.

Their way.



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MANAGEMENT BY CONSENSUS

(Continued from Page 8)

Joseph E. Izzo of the JIA Management Group pointed out that in 1979 only 5% of the computers installed in U.S. companies were outside the control of the data processing department. This year the number is gauged at between 30% and 35%.

"When the [Apple Computer, Inc.] Apples came out, everybody wanted one. They became a sort of de facto standard. Now the same thing is happening with the IBM [Personal Computer]. We have to race just to keep up," said Jim Stockwell, manager of data processing at Teledyne, Inc.

> *"The MIS group is not a police force. I don't see it as our role to go out and see if [other departments] need the productivity gains they say they'll be able to achieve" with office automation.* — Raymond Priore, vice-president of systems and information processing at Consolidated Edison of New York.

Of course, as soon as one brand of computer is installed in one department and another brand in another department, the problem of incompatibility rears its ugly head.

In order to stave off incompatibility woes before they arise, many firms are beginning to appoint committees to draw up plans for corporationwide office automation.

The committees are not a welcome sight; no one in American business wants to serve on yet another committee; but they became necessary when it grew clear that DP departments did not have the power to enforce compatibility requirements.

"We have no centralized control. These people [in other departments] don't necessarily have to come to us" before springing for microcomputers, Roper said.

Indeed, a good many American firms are "highly decentralized," split up into "individual business units with their own business requirements," as Anthony Pizzelanti, vice-president for information systems at the Macmillan Publishing Co., pointed out.

Central Committee

In these firms, a central committee — often disguised under the gentler sobriquet "Office Automation Task Force" — is the only way to keep track of and have a semblance of control over what is happening in the various corporate departments.

The committee may include top-level executives. "I expect senior management to get more attuned to the process. It's inevitable anyway," Pizzelanti said.

The involvement of top-level execs is inevitable because office automation is something that interests them, whereas data processing seems alien, according to Teledyne's Stockwell.

What is more, top-level executive involvement is welcome to many MIS directors because it relieves them of the responsibility of judging other department heads' equipment requests.

'Not Police Force'

"The MIS group is not a police force. I don't see it as our role to go out and see if [other departments] need the productivity gains they say they'll be able to achieve" with office automation, noted Raymond Priore, vice-president of systems and information processing at Consolidated Edison of New York.

An Office Automation Task Force also prevents other departments from feeling as if strange machines, foreign procedures and unobtainable productivity goals have been foisted upon them.

"It's a way of ensuring that the right constituency gets involved in decision making," according to Raymond L. Boggs of the Venture Development Corp.

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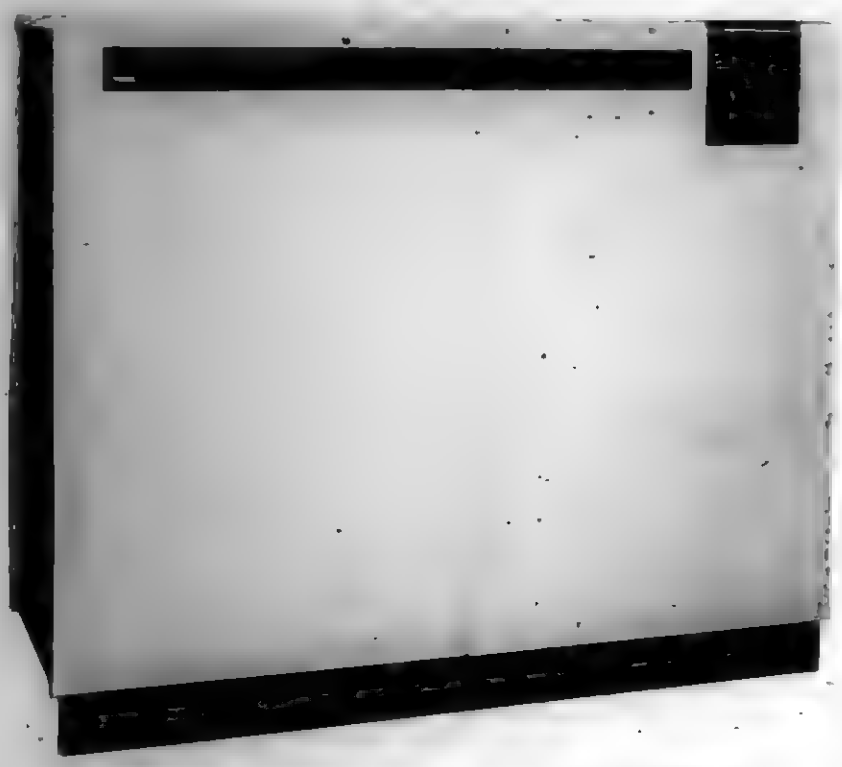

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MANAGEMENT BY CONSENSUS

Thus the task force is a sort of users group. And some firms, in fact, have set up a variety of small, in-house users groups rather than a single central committee and have decided to permit a controlled proliferation of small systems, as long as there is no overlap between departments with incompatible machinery.

In any case, the task force or users group method of decision making puts the burden of proof squarely upon the user for justifying his need for automated office equipment.

"It's the user's requirement, so he should be the one to have to justify it to the corporation. Not that I couldn't participate in the justification process. But I don't see that as my role," Priore contended.

Added Benefit

Placing the onus for justification upon the user has the additional benefit — from the MIS director's perspective — of awakening department managers to the cost and implementation difficulties that are involved in a new system.

As Roper pointed out, involving users in the acquisition process scales down their expectations and makes them more sensitive to everything that goes into choosing and starting up a system.

"If they are not involved in the acquisition process, they could end up wasting more time with a personal computer than they save," Roper said.

MIS Chief's Role

But what of the MIS chief's role in all these changes? Will the increased involvement of top-level execs in computers decrease his power within the corporation? Or will the involvement of users in computer acquisition increase their dependence on him and so enhance his standing in the firm?

"It all depends on the character of the MIS manager," Boggs said. "If he is really concerned with how the equipment is going to be used on a day-to-day basis, which means he must understand how business is conducted so the equipment won't have a disruptive effect, then he has a future.

"But if he is technologically driven — if he is insensitive to people's needs — he is vulnerable to being co-opted by the committee," Boggs added.

To survive the challenge of office automation, the MIS chief must become "far more of a businessman than he is now," JIA's Izzo agreed.

Izzo suggested that the MIS director should subscribe to *The Wall Street Journal* and *Business Week* and concern himself with the most pressing of business issues.

'Not Just Manager'

The encroachment of top-level management upon his traditional territory means the MIS chief must become "a leader, not just a manager," Izzo added.

While some MIS directors bemoan a weakening of their position as a result of growing "computer literacy" in the executive suites, others are viewing it as an opportunity to be seized.

As Roper pointed out, the MIS managers are the ones to provide training and guidance. As Teledyne's Stockwell explained, as long as there is a need for technical advice, there will always be a need for MIS directors. Those who fear a reduction of their power as executives learn more about computers have already had their power reduced, Izzo said.

"The more executives know, the more powerful he [the MIS chief] should be. That's where his greatest power will come about. As executives become [computer] literate, he has the chance to become a leader," Izzo said.

Perhaps the greatest challenge, however, will be not to the MIS director himself but to the data processing department as it is known today.

As more and more users become adept with office automation, they may begin to infiltrate the inner computer sanctums. And there may evolve a new organization within the American corporation — the Office of Computer Technology.

> *Will the increased involvement of top-level execs in computers decrease his power within the corporation? Or will the involvement of users in computer acquisition increase their dependence on him and so enhance his standing in the firm? "It all depends on the character of the MIS manager. If he is really concerned with how the equipment is going to be used on a day-to-day basis, then he has a future. But if he is technologically driven, he is vulnerable to being co-opted."*
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> — Raymond L. Boggs, Venture Development Corp.

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MIS Managers

Traditionally one of the most underbudgeted items in data processing, DP training needs have grown beyond the traditional technical courses offered to help departmental staff keep up with the latest hardware and software innovations. Today, because of the growing corporate reliance on the management information systems (MIS) function and the onslaught of end-user computing, a new dimension to training has been created — one that imbues everyone in the DP department, from the vice-president of information systems to the programmer, with a business orientation.

An understanding of business in general — and the specific company's business in particular — bodes well for DP professionals who can expect to broaden or lengthen their career paths by taking steps to become business-literate while working to help their end users become computer-literate.

In an attempt to determine the role of MIS in relation to the needs of the corporate world, Computerworld *recently interviewed five high-level MIS executives employed in industries that represent some of the largest users of information processing. The professionals interviewed included:*

- *From the retailing industry, Anthony M. Grybowski, manager, Systems & Data Processing, Federated Department Stores, Ohio. Grybowski holds a B.S. in accounting and an executive degree in business data processing.*
- *From the manufacturing and services sector, Donald J. Marino, director of Management Information Systems at Bendix Corp. in New York. Marino, who earned a B.S. in business administration, worked 10 to 12 years in product scheduling before spending the last 20 years in systems analysis and systems management.*
- *From the transportation industry, Robert Forstrom, vice-president of Information Systems for The Bekins Co. in California. He has a B.A. and a master's degree in chemical engineering. Forstrom began his DP career as a systems programming manager 20 years ago.*
- *From the diversified financial area, Edward Huntington, assistant vice-president/Equipment, Finance Data Center, Citicorp Industrial Credit in New York. Huntington, who concentrated in computer science in college, has been in DP for 22 years.*
- *From the commercial banking sector, H. Alfred Colby, senior vice-president of Information Services, John Hancock Mutual Life Insurance Co., Boston. He has a B.S. in economics and worked on systems analysis and managed projects in the user community before being promoted to his current position.*

Broadening the Perspective

By Patricia Keefe

Is it important for management information systems managers to broaden their perspectives and skills beyond the narrow technical realm of DP? If so, why?

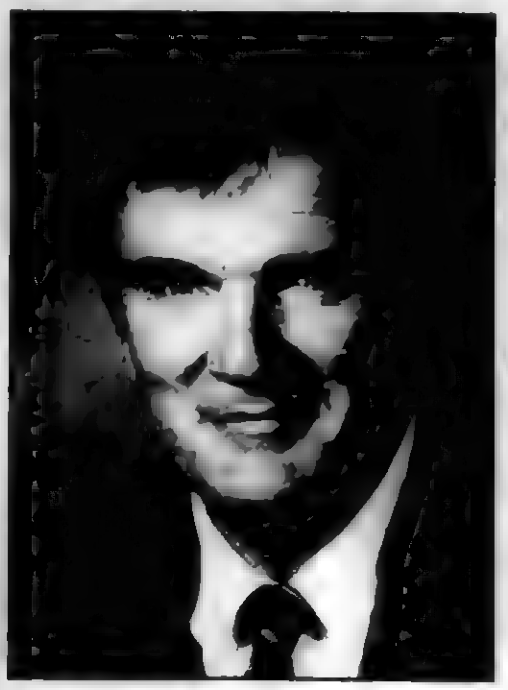
Grybowski: Absolutely. The MIS director has to respond to the business that the organization is in and the DP business. In order to do so, he must be involved in all aspects of the company, such as marketing and manufacturing, to get a feel for the business and to implement priorities with upper level management.

MIS executives need to be more aware of corporate goals so they can contribute a bit better to the bottom line. In other words, MIS directors should not operate in a vacuum.

Marino: There's no question that much of the black eye given MIS in the press — some of it well deserved — is created by the fact that [MIS has] taken technicians and made them managers instead of taking managers and teaching them technical abilities. All of my managers are business-oriented. At Bendix [Corp.], now Allied [Corp.], we have a kind of top-down, bottom-up structure where our strategies and

Patricia Keefe is a staff writer at Computerworld.

Anthony M. Grybowski



H. Alfred Colby

Donald J. Marino

objectives are business-oriented and need MIS support to make those objectives come true.

Forstrom: Yes, it is advantageous from the point of view of the [chief executive officer] and officers of the subsidiary. In their view, the MIS top executive should be a manager, and this would require him to have broader skills. As a participant in the strategic planning of the company . . . I am expected [not only] to contribute technical solutions to corporate problems, but [also to contribute] ideas from a business standpoint. Subsidiary presidents say I should know their businesses as well as they do in order to contribute technical solutions to the business problems that they have.

I have found that users do not understand how to apply technology to business, so they expect DP to understand their problems, such as in operations, marketing and business.

Huntington: Yes, the reason being that unless a DP or MIS manager has an idea of what's going on in the world around him, especially in application or user areas, he cannot really perform his job properly. He must be able to understand the needs of the user community.

Colby: It is important to have business skills in addition to having good managerial skills for my professional and technical people, especially at senior levels, where [they are] beginning to get much more involved in the business the company is in.

Does the need for an ability to look at the overall business picture apply to your technical staff as well as to you?

Grybowski: I believe it is essential that they get some background in accounting, marketing and psychology. When they get involved in applications, people can do a better job if they have an understanding of the users' requirements.

Marino: My own background is 20 years in DP and an additional 12 years in an operational production environment. Many of my supervisors, and especially my systems analysts, were brought in from user groups to be trained as MIS people.

We cross-pollinate. We have a program now that takes user analysts, teaches them DP and then sends them back to their respective departments to help us.

Forstrom: Partly yes and partly no. Some people need both, such as systems analysts and programmers. I have found that business programmers don't necessarily have to understand the implementation of what they do.

Huntington: I like my systems programmer management and operations management to know what is happening in the world outside hardware. If they approach applications with tunnel vision, they will not be as receptive to user needs and problems.

Colby: There is room for both technically [oriented] and business-oriented data processing staff. We need more than ever good technical people — next year we [in MIS] expect to experience growth of 15% to 20%. In some cases, there is no need for good technical people to be involved or to know about business plans. On the other hand, as we are called upon more and more to help end users, it becomes important to understand their business.

How are you handling business-oriented training for your technical staff members?

Grybowski: Our main way is to offer a tuition refund program and to encourage staff to attend evening classes. If they have a computer science degree, we recommend that they attend business classes, such as marketing or accounting. If they have a broad background in college, we try to expand them further, rotating them on different systems, such as marketing, manufacturing and accounting.

We use a combination of training methods. We do have manuals, which we supplement with on-the-job training. The quickest way to learn is probably to use manuals and team the person up with a more experienced staff member to get him accustomed to the particular job, then turn the job over to him and see how he does.

Marino: Since 1975 we have had an account with a company called Advanced Systems, Inc. in Chicago. We are a big user of its audiovisual devices. We started actually structuring the training program for systems analysis courses several years ago using its media. We put a lot of our systems analysts, programmers and technical people

(Continued on Page 14)

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The redesign, *Computerworld's* first in seven years, is being carried out under the direction of Robert Lockwood, the nationally known newspaper designer whose credits include *The Christian Science Monitor, Chicago Sun Times, Allentown Morning Call, Philadelphia Bulletin, Dallas Morning News* and *Baltimore Sun*. He was the founder and first president of the Society of Newspaper Designers.

MIS MANAGERS

(Continued from Page 13)
through those courses.

We have staff meetings weekly, where all the higher level technicians sit in and describe their weekly activities, and I describe what's going on in the business world.

At my level, in this division, I report directly to the vice-president and general manager on the staff level with the other directors of the various functions. In addition to conventional systems programming and computer operations, I have a software and education group with a supervisor of education whose basic responsibility is to control the education of the 70-some people who work for me.

We also support highly professional organizations, such as the Data Processing Management Association and [the American Federation of Information Processing Societies, Inc.]. This program allows [technical employees] to go back to college to finish degrees or further their education — and it does not have to be computer science — and the company pays for it.

Forstrom: We provide some on-the-job training and education. We get people to spend time with the business people as much as possible. We encourage people to take university-level business classes, such as MBA or advanced-degree courses. We also provide in-house, video-assisted training.

Huntington: We have almost daily meetings with the user community to discuss how we can change things. It's an open dialogue where they can discuss problems they have, or perceive to have, with the DP center and address them and bring them out in the open.

We are primarily an IBM shop, and we send staff to IBM schools. Also, two members of the staff attend school at night in the computer science field. We also send operations managers to various IBM seminars for an exchange of ideas, to see what's new in equipment.

Many user departments hold seminars, which we attend when time permits. Unfortunately, that's not too frequently.

Colby: We talk about it some, of course. There are a number of professional [insurance] organizations that provide courses, such as the Life Office Management Association [Loma] and Charter Life Underwriters. The company pays for the Loma courses, subsidizes the books and provides a bonus upon passing each of the nine exams in the series.

We also have some insurance-related courses run by the personnel department. And we have a regular education center with its own entry-level courses and a couple dozen higher level courses.

In a more important way, we rotate assignments. We have a couple dozen people out at the moment, rotated out in user areas. This includes systems and management people who typically work an assignment for one to two years. They are dedicated to systems analyis and specification development of the user department, for example. In return, we'll take users into our area. Some users are in management jobs, such as systems management and directors.

Is the growth of end-user computing a major force behind the move toward general business education for technical staff members?

Grybowski: In some companies, end-user computing may force it, but in our particular company, we've always been user-oriented, and we've always gone the extra mile for the user to keep him happy. Most of our end users are in the engineering and technical [research and development] areas. There is some demand to hint there will be more growth in [end-user computing].

Marino: We've got a whole program going whose sole purpose is to introduce computing to the world outside of MIS. And to do that, it's kind of an information management concept, however, it's not that formal. We have a huge network of 300 CRTs that we are making available to users, including a variety of software products and applications and about eight personal computers in a few strategic areas. We are trying to develop a strategy for personal computing. I really don't see a lot of impact here, because a lot of my MIS people are going for additional education anyway.

Forstrom: We have a need to work with and assist a broad range of users on everything from the information center idea to personal computer ideas. The staff is assigned to do that. To a degree, although I don't know if it has a significant impact, it has caused a few people to have to understand business. Generally, staff systems analysts understand it anyway.

Huntington: We are just embarking on an office automation project where we are placing micros on 75% of the desks in the division — that is just starting up. Only the first 25 computers have arrived, and they are being installed on a top-on-down basis. I suspect this will underline the need for a business orientation, although as of yet we are not feeling any impact.

Colby: End-user computing is growing in leaps and bounds here. We have an information center with a couple hundred users, and it's growing at 100% a year. We find we are being called upon more and more to support this, to provide training and advice. Strangely, it has not adversely impacted the traditional central operations.

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What's Hot! What's Not!

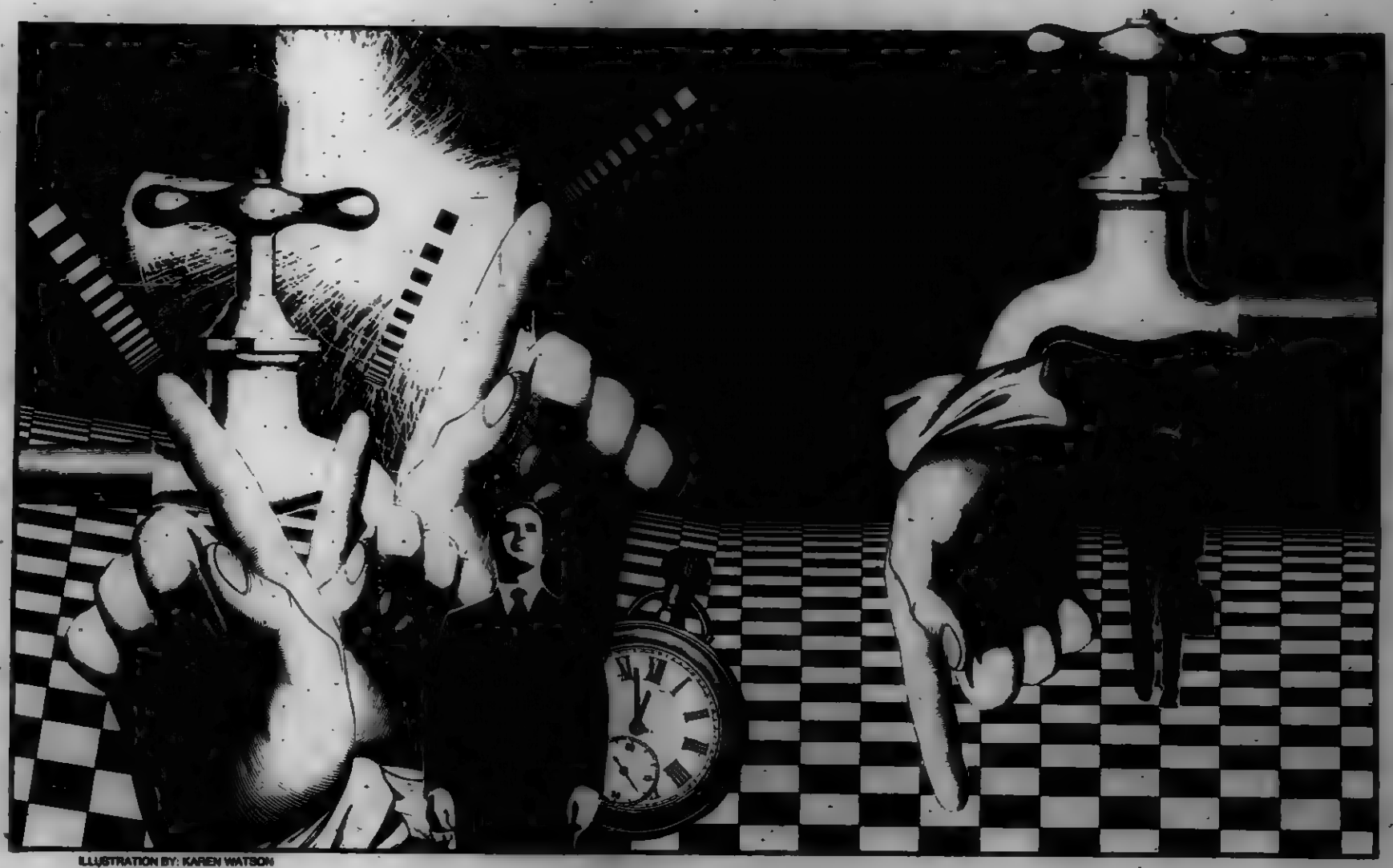

ILLUSTRATION BY: KAREN WATSON

By Jim Bartimo

Keeping track of the new products, technologies and buzzwords of the computer industry is as difficult as keeping track of the Top 40 hits in popular music — as soon as you get used to one, another one comes along to replace it.

In the ongoing effort to keep our readers up to date on new trends, *Computerworld* has compiled this list of upcoming and outgoing technologies as a guide for the confused. Readers are advised to use this list as but one source of information on an ever-changing industry.

What's Hot in Chip Technology

Digital Equipment Corp. last summer invested $26 million in Trilogy Ltd., a company promising to bring **wafer technology** to the computer industry [CW, Aug. 8]. Promising high reliability, wafer technology places all circuitry on a single 2½ sq-in. wafer instead of wiring hundreds of individual chips to boards. "We always talk about high tech, but this is an order of magnitude higher than high tech," according to David Dell, director of research services at the Diebold Group in New York.

Perhaps another few orders of magnitude higher than wafer technology is the **biochip** — the computer industry's attempt to turn living organisms into microchips. Some predictions call for a reduction in size by 500 times from current silicon chips, but others say the chips could be 80 years in the making.

Biochips are made from existing biosystems, such as large protein molecules, to produce electronic circuits and switches or by synthesizing an electron-trained molecule from scratch. Suspiciously close to reproducing the human brain, biochips would prove a boon because "the processing capacity of your brain is more dense than any chip," according to Kenneth Bosomworth, president of International Resource Development, Inc. (IRD), a Norwalk, Conn.-based market research firm.

What's Not Hot

If IBM, Bell Laboratories and Sperry Corp. say **Josephson junction circuits** are dead — they're dead. Research attempts to supercool circuits to reduce resistance and increase speed were dropped by all three organizations last year, short-circuiting British physicist

(Continued on Page 16)

Jim Bartimo is a senior editor/communications for Computerworld.

WHAT'S HOT AND WHAT'S NOT

(Continued from Page 15)

Brian Josephson's idea [CW, Nov. 14]. Silicon and gallium arsenide technologies are still best bets for the immediate future of processors.

What's Hot in Systems

There are 675 micro hardware products on the market today and 154 manufacturers, according to IRD. The **microcomputer** has hit the industry with a force strong enough to support some 100 microcomputer publications and employ countless third-party software developers. The question still weighing heavy on everyone's mind is: When will the micro market turn cold?

The IBM Personal Computer is hot.

What's Not Hot

DEC stock last autumn took a one-day plunge of 21 points, following in a more drastic manner the lead of other **minicomputer** makers such as Data General Corp., Prime Computer, Inc. and Datapoint Corp. While the minicomputer will be with us for some time, it will most likely be best utilized in specialized niches such as office automation and engineering — leaving distributed data processing in the hands of its smaller brother, the micro.

What's Hot in Displays

Whether it turns out to be electroluminescent, liquid crystal or plasma, **flat-panel displays** will account for 50% of the computer displays within three years, according to Bosomworth. Since the general shape of things in the computer industry is tending toward miniaturization, the compaction of the CRT's footprint would be a natural development.

The 5-in. display was hot in the days when Adam Osborne and his staff first showed it off. It's not hot anymore.

What's Not Hot

Adam Osborne will tell you — 5-in. display screens can be hazardous to your health. While his computer's peephole display screen wasn't the only reason his company filed for protection under the Chapter 11 bankruptcy statute [CW, Sept. 19], it didn't help.

What's Hot in Storage Technology

Boasting 4G bytes of storage and sometimes even more, one **optical disk storage** system can store the entire *Encyclopedia Britanica* if necessary. Optical disks grew out of the entertainment industry's marketing of movies to the home and, as a result, can store images as well as digital information.

While there are numerous applications for document storage already in place today, 1984 could well see a boom in erasable optical disks that are interchangeable with magnetic disk drives. "If there's a breakthrough in cost for erasable disks, they'll naturally take off," according to Hank Koehn, director of futures research for the Los Angeles-based Security Pacific Bank.

Vertical recording technology strives to stand magnetic bits of information on end instead of side by side on a disk as they are today. According to Diebold's Dell, this would have a compacting effect, leading to 4 billion bytes on one disk by 1985 and 15 billion bytes on a disk by 1990. "They wouldn't

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WHAT'S HOT AND WHAT'S NOT

look a hell of a lot different, but there would be 100 times the density [of information]," Dell said.

What's Not Hot

Last year at this time, microcomputer users were barraged with multiple sizes in disk drive offerings, and many wondered which one would end up being the standard. Now, it looks like the use of **8-in. disk drives** and **3½-in. disk drives** will not reach widespread use in the microcomputer market. With even advanced micros such as the Apple Computer, Inc. Lisa settling on 5-in. drives, the micro market has at least one standard by which to live.

What's Hot in Memory

"Nonvolatile" will be the name of the memory game next year, and the winner in the portable terminal and computer market will remain **Cmos**. Currently featured in notebook computers from Radio Shack, Epson America, Inc. and NEC Information Systems, Inc., Cmos allows internal memory to remain intact with a power source as small as four AA batteries. "The price is coming down and will continue to drop by 40% per year," Dell predicted of Cmos.

What's Not Hot

A clear parallel to Cmos is **magnetic bubble** memory, which utilizes no power source at all to maintain memory, but instead relies on magnetic bits to line up in rows after the power source is shut down. What's the problem with magnetic bubble? Its high price tag has not captured the support of many vendors, and a lack of vendor support has lead to a continued high price tag.

What's Hot in Software

"People in the home and in business don't have the time to fool around with software," Koehn said, so **windowing** capability and **integrated software packages** are among the hottest items in software.

Introduced by Xerox Corp. in its office automation workstation, the Star, windows allow the user to treat the computer screen like a desktop where various files can remain open simultaneously. Third-party software houses such as Visicorp have developed windowing for the IBM Personal Computer, and the Apple Macintosh (when introduced in January) is predicted to feature similar windowing to the company's Lisa.

Keeping the users' needs in mind, integrated software — such as that found in Lotus Development Corp.'s 1-2-3, Sperry Corp.'s Sperrylink office system and DEC's All-in-One software — allows users to transfer data, text and graphics easily from one file to another. If Comdex/Fall '83's 20 introductions of integrated packages is any indication, this type of software will remain popular throughout the next year [CW, Dec. 5].

What's Not Hot

With integrated software and powerful data processing available for under $10,000 with a microcomputer, hooking up a dumb terminal to a remote host in a **time-sharing** configuration has become less and less necessary. "The next five years will see an almost total disappearance of the raw computer utility concept," Ed Metz, senior vice-president at Input, Inc., told *Computerworld* last September.

What's Hot in Communications

Last year was the year of the **nonblocking private branch exchange** (PBX) telephone system, which promised the ability to switch data and voice with equal efficiency. Dubbed "the next-generation PBX," nonblocking architectures, such as those from Intecom, Inc., Ztel, Inc. and finally Rolm Corp., suggested that local-area networks could be best

(Continued on Page 18)

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WHAT'S HOT AND WHAT'S NOT

Visicorp's Vision is one of the hot windowing packages.

(Continued from Page 17)

achieved through existing telephone wiring.

Nonblocking "allows one port access to every other port," according to Edward Horrell, president of the Memphis, Tenn., consulting group, Mitchell & Horrell, Inc. "Now that data is on the line as well as voice, nonblocking is important because data can't tolerate the delays that voice can."

Industry pundit Dixon Doll, president of the DMW Group, Inc., predicted that "every vendor planning to offer voice and data switching will commit to nonblocking."

What's Not Hot

There is no shortage of reasons why **video teleconferencing** is not taking off as was once expected. While teleconferencing was predicted to cut travel expenditures by allowing video meetings to take place over data lines, the unfamiliarity of the technology seems to be too much of a hindrance.

"We have a lot to learn about how people interact," Koehn said. "People become controlled, and there's less friendly banter with videoconferencing. There's also a lot of nonverbal signaling going on [that isn't picked up through teleconferencing]."

What's Hot in Computer Crime

The movie *War Games* did more for the reputation of **computer hackers** than any teenage whiz kid could have in his best system-cracking days. The media jumped on almost every prosecution — including the 414s and the Wizard of Arpanet — with an unusual fervor [CW, Sept. 12]. Why the sudden interest in hackers? If these kids can crack these systems, perhaps computers are not so threatening to the public after all.

What's Not Hot

For the sixth year in a row, the U.S. Congress has failed to act on a **federal computer crime bill** that would make the misuse and abuse of computers a federal crime. While Rep. Bill Nelson (D-Fla.) vowed at the start of the congressional session to push through the controversial H.R. 1092, the bill never got any further than subcommittee hearings [CW, Nov. 28].

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Micros And the End User

A Passing Fancy?

By Jeffry Beeler

The sometimes sweet, sometimes stormy romance between big business and small computers is entering a new phase in its evolution—a development that confronts management information systems (MIS) directors with significant management and technological issues as they look ahead to 1984.

Only a few years ago, the question that dominated conversations among prospective buyers of commercial personal computers went as follows: Are microcomputers just a passing fancy, mesmerizing but hopelessly impractical playthings, or will they take their place alongside other business machines in large corporations and prove their mettle in serious, demanding applications?

Jeffry Beeler is a Computerworld *West Coast correspondent.*

Since then, the question has been answered with resounding finality. What began between big business and personal computers as a harmless flirtation and progressed into casual courtship has blossomed into a passionate love affair and is now hurtling inexorably toward engagement and a rendezvous at the altar. At the least, the pair is already openly cohabiting, as evidenced by the growing list of Fortune 1,000 companies where personal computers are invading work places by the hundreds and thousands.

But today, the focus of concern in the big business-personal computer relationship is beginning to shift to a second, perhaps even more urgent, question: Will the union work? More importantly, will the once-promising marriage ultimately prove a mismatch, leaving both sides permanently scarred and plunging them into discord?

The answers to the above questions may take years to fully reveal themselves, although some tantalizing clues have already begun to emerge and no doubt will continue to do so as 1984 progresses.

In the meantime, opinion on the subject remains sharply divided. Some industry observers — including Dr. Lew Glendenning, director of information systems research at San Jose, Calif.-based Strategic, Inc. — view the future of business microcomputing fairly optimistically. Citing the results of his own company's recent market research, Glendenning credits personal computers with already having cut large companies' costs, boosted worker efficiency and productivity and won "strong [user] support." He also cites fresh research findings to support the frequent vendor claim that

(Continued on Page 20)

(Continued from Page 19)

micros can make major inroads into the big business world's huge application backlogs — a serious problem that has defied solution for years.

Echoing Glendenning's optimism on the application backlog question is Connecticut Mutual Life Insurance Co. Vice-President Ted Stein, who bases his opinion on his own firm's recent experiences with 1,000 networked IBM Personal Computers. "Many of the programs that [corporate computing departments] have never gotten around to developing are small and personal and are the sort of thing that end users could frequently do themselves," he said.

"So if they have the right hardware and software tools at their disposal, users will be able to ease the application backlog because they know the subject matter in question much better than any programmer or systems analyst."

Not everyone, however, views the future relationship between large corporations and personal computers quite so rosily. One such skeptic is independent DP consultant Gopal Kapur, who foresees an impending information systems crisis unless big businesses speedily supplement their microcomputer acquisitions with significantly improved management techniques.

For years, Kapur said, most large user organizations have woefully neglected to impose strict standards and sound management procedures on their in-house software development operations. The unfortunate result has been programming projects that all too often exceed their budgets, miss their implementation deadlines and produce systems that either reek with errors or fail to work as expected.

Although the absence of standards and effective management has caused untold grief, the situation offers at least one minor consolation: Because most programs until recently were written exclusively on mainframes, with all their inherent inefficiencies, systems-related catastrophes could usually be counted on to develop at a reasonably sedate pace. But with the recent proliferation of micros, the speed with which applications or data can go seriously awry has been dangerously accelerated.

"It's a little like having a berserk person running around inside your organization," Kapur said. "If you give the person a baseball bat, he could hurt a lot of people. But think how much more harm would be done if you gave the same individual a machine gun." Thus, in the absence of careful control over software-development activities, personal computers threaten to aggravate greatly the very problems they were expressly designed to solve.

The mass importation of microcomputers into the big business arena may also stimulate another potentially harmful trend — an increased willingess by nontechnical end users to "decouple" themselves from their corporate MIS organizations, Kapur said. After years of abuse and neglect at the hands of their DPers, many users are increasingly looking to micros as their deliverance.

Another personal computer problem that will grow in importance during the coming year is the issue of end-user training, which many corporations thus far have sorely neglected, according to Microcomputer Managers Association founder James Haner. Snowed by a recent spate of television advertising campaigns, many computing novices have been misled into believing that they can learn to use their micros in a matter of minutes.

If the training issue is not addressed, commercial personal computers may receive "only about one hour of use per month rather than 10 hours every week," according to Aaron Goldberg, research manager for International Data Corp. of Framingham, Mass.

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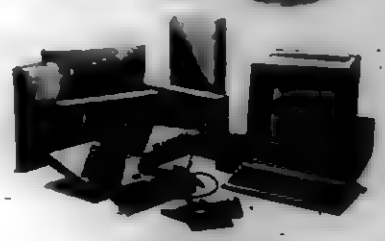

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	$ Amount	Total	13787.06	22071.22	20954.00	14210.25
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MICROS AND THE END USER

Will Apple Steal IBM's Micro Mart Thunder?

By Tom Henkel
CW Staff

IBM dominated the microcomputer market during 1983. And it will probably do the same in 1984.

In addition to major IBM announcements, such as the 3270 Personal Computer and the Personal Computer XT/370, the Personal Computer and Personal Computer XT were doing so well that IBM could not keep pace with the demand.

The situation spawned a host of vendors willing to manufacture anything that could be plugged into an IBM micro, including IBM-compatible disk drives, memory expansion boards, printers, plotters, tape drives and keyboards.

By all predictions, 1984 will bring much of the same. But Apple Computer, Inc. may try to steal IBM's thunder.

For Apple, 1984 may be a make-or-break year. While IBM has been wallowing in the success of its Personal Computer, sales of Apple's latest entry, the Lisa, have been less than impressive. Prospective buyers have shunned the Lisa, contending the machine is too expensive, is incompatible with current Apple systems and does not offer easy access to IBM mainframes.

According to Michael Killen, president of Strategic, Inc., a Santa Clara, Calif., market research firm, IBM's success — and Apple's lack of it — is a classic case of good product marketing over bad.

According to Killen, Apple made an incredible blunder when it announced the Lisa, a processor that originally cost about $10,000 (it now costs about $8,000). Current Apple users could not upgrade to the Lisa, and new users were hesitant to make a heavy investment in a machine that did not offer IBM compatibility, he explained.

"The Lisa is going to dangle out there," Killen said, comparing the processor to the earlier, somewhat ill-fated Xerox Corp. Star, an intelligent workstation that offers capabilities similar to the Lisa, including multiple windows and business graphics. The Star was announced in 1981 with a $16,000 price tag. So far, industry watchers agree, the Star has not been a successful product for many of the same reasons the Lisa has not been a hot seller.

Noting that many corporate micro users also use IBM mainframes, Killen said, "I can't see any IBM shop getting involved with another family of machines, like Lisa, when it can buy a carload of machines for the [Personal Computer]."

Apple is expected to ring in 1984 with a flurry of product announcements, including the much-touted Macintosh. Some industry watchers believe the early 1984 announcements are Apple's attempt to lash back at IBM.

The Macintosh, according to Ralph Wagner, president of Microsource Financial, Inc., a Watertown, Mass., computer dealer, will do everything the Lisa can do for around $3,000. Other industry watchers, such as Tod Corenson, a vice-president at Enion & Associates, a Cupertino, Calif., market research firm, feel the Macintosh will be the entry-level Lisa now missing from the Apple lineup.

In either case, the Macintosh appears to offer Apple stronger ammunition for landing corporate accounts. The question is whether the Macintosh will meet analysts' and users' expectations and whether Apple can successfully market the device to raise corporate eyebrows.

Lisa Enhancements

Apple is reportedly planning enhancements to the Lisa. Corenson said planned enhancements include: a rewrite of the Lisadraw graphics package that is said to be four times faster than the currently available version; a revision of Apple's Pascal compiler; and the availability of Xerox's Smalltalk operating environment on the Lisa. The addition of IBM compatibility, such as a linkup to IBM's Systems Network Architecture, would also improve Lisa's image among corporate accounts, Corenson noted.

Apple's Achilles' heel appears to be a lack of presence in Fortune 500 firms.

"We've had the best year ever in terms of volume with Apple," Wagner said. But he quickly noted many of those sales were to public schools and not corporations.

However, IBM has its problems, too. While IBM appears to have gained control over the largest corporate microcomputer accounts, "there is an absolute finite supply of products from IBM," Wagner said. Pointing to the almost weekly announcements of IBM-compatible microcomputers, Wagner said IBM's delivery problems tend to give competitors about a year to develop competing products.

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Micro-Mainframe Links

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Making the Connection

By Paul Gillin

The wait is almost over.

The micro-mainframe link — the great software buzzword of 1983 — is set to become a widespread reality in 1984. Rarely has a single software technology so captured the attention of the computer industry. And probably never before has a largely unavailable technology been the subject of so much anticipation and speculation.

The micro-mainframe link was the subject of dozens of product announcements in 1983 by companies that included four of the top five independent packaged software vendors and both of the leading makers of microcomputer spreadsheet packages. However, with most of the products not scheduled to be available until early 1984, the opportunity to evaluate the various approaches has not yet been realized.

The clamor for such products is not surprising. The 1982 installed base of 1.6 million microcomputers in corporate environments is expected to grow to more than 19 million by 1985, according to International Data Corp. (IDC), the Framingham, Mass.-based market research firm.

The user demand for access to business data has sent DP managers scurrying to find any way to tie micros into their corporate mainframes. International Resource Development, Inc. (IRD), located in Norwalk, Conn., predicts that users will spend more than $500 million on micro-mainframe communications in 1984 [CW, Dec. 5]. An IRD study found that nine out of 10 Fortune 500 companies surveyed were either implementing or seriously studying programs in this area.

So far, the demand for link products has outstripped the ability of most vendors to respond with technically sophisticated offerings. The links announced this year have taken nearly as many forms as the vendors offering them. And while many claims have been made, relatively few products have actually been delivered. Those that have been unveiled are only a first step in what observers believe will be a flood of very sophisticated links that will become available over the next few years.

The end result may be a shakeout

(Continued on Page 25)

Paul Gillin is senior editor/software for Computerworld.

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MICRO-MAINFRAME LINKS

(Continued from Page 23) in the market for micro-mainframe links that could severely affect those vendors whose technology does not offer significant added value over and above the early "vanilla" links, which were essentially terminal emulators.

But despite the problems that lurk down the road, those vendors who delivered links this year have found them enormously successful.

Management Science America, Inc. (MSA), which was the first mainframe software vendor to enter the market when it introduced its Peachlink in December 1982, attributes more than $5 million in combined mainframe and micro software sales directly to the link's introduction. McCormack & Dodge Corp., which began delivering its PC Link package in July, has chalked up more than $2 million in sales of its link alone.

"Many users are buying our product without even looking at it," commented Robert Weiler, McCormack & Dodge's vice-president of marketing. "They buy it because they like our company, and I'm sure the same applies to MSA."

Stamp of Approval

As in the personal computer market, it was IBM that legitimized the micro-mainframe link concept this year with its October announcement of the 3270-PC and the Personal Computer XT/370.

The 3270-PC, which is the more end-user-oriented of the two products, offers the ability to run concurrent applications from multiple mainframes in a terminal emulation mode using windowing techniques.

David Ferris, chairman of Ferrin Corp., a San Francisco-based personal computing support firm, called the IBM 3270-PC "numerically the much more important announcement. Large companies have been holding off on [IBM] 3270 purchases and getting terminal emulators instead. But a lot of them would prefer to wait and buy that emulation directly from IBM."

The two announcements "have echoes that will be with us for a long time," added Thomas O'Flaherty, a principal consultant with Input, Inc. in Saddle Brook, N.J.

In addition to establishing itself as a vendor of a full line of communicating hardware, IBM has set a bar over which all other competitors must leap, O'Flaherty said. "This will have vendors worried because they'll always be a couple of steps behind IBM," he stated.

For the moment, however, competitors are welcoming IBM's endorsement of the linkage concept. "IBM is telling us people will want to access mainframe data, so it can't help but improve the market," McCormack & Dodge's Weiler observed.

He believes the link market is beginning to resemble the packaged application software field of the late 1960s, when IBM's endorsement opened the door for independent vendors who provided improved functionality over the Big Blue offerings.

"The key for us," Weiler said, "is to stay ahead of IBM technically and to offer attention to the individual customer. That's what made the independents flourish in the first place."

Four Categories

Micro-mainframe connections currently fall into four general categories, according to "Communications Software: Forging the Micro-to-Mainframe Link" from IDC. These include:

- Dumb terminal or terminal emulation, allowing transfer and receipt of data in the host format.
- Data download, in which the data from the host becomes a file stored locally on the microcomputer.
- Information download, in which files are structured and formatted for a specific purpose.
- Active information extraction, in which software

(Continued on Page 26)

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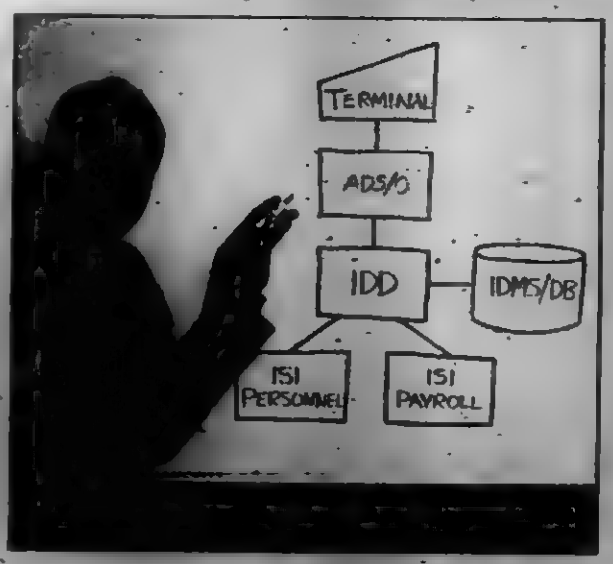

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MICRO-MAINFRAME LINKS

(Continued from Page 25)

on both host and microcomputer allow the user to select the desired data.

A host of terminal emulation and download products are now available for nearly every large system and most micros. But the major announcements of this year have fallen into the latter two categories, with each vendor offering its own unique capabilities.

MSA's Executive Peachpak II, for example, allows real-time downloading of multiple "mini data bases" on MSA mainframe applications directly into a format that can be run on several popular microcomputer packages.

Data Extraction

Visianswer-Answer/DB, a jointly announced product from Informatics General Corp. and Visicorp, allows the IBM Personal Computer to extract data from a variety of different data bases. Applied Data Research, Inc. (ADR) and Visicorp's Vision-based software integrates Visicorp applications with 10 ADR mainframe products including data base management, decision support, program development and office automation.

Computer Corp. of America's PC-204 offers a transparent user interface and automatic reformatting of mainframe files on the company's Model 204 DBMS to run on Lotus Development Corp.'s Lotus 1-2-3. McCormack & Dodge's Interactive PCLink allows real-time uploading of Personal Computer files to update the mainframe data base.

Cullinet Software, Inc.'s Personal Computer System features proprietary IBM Personal Computer software tied to an extracted data base on the mainframe, offering virtual mainframe storage, communication between microcomputers via the extracted data base and an indirect interface to other data base management systems.

These products give users a broad and diverse range of options from which to choose. Yet some significant shortcomings are already becoming apparent, observers say.

"The most glaring shortcoming is that they're not really out there," observed James B. Rothnie Jr., executive vice-president of Computer Corp. of America. "The shape of the market will be a lot different in 1984, after the users get some experience."

Satisfied With Less

O'Flaherty noted that despite vendor claims of technically elegant features, most users for the moment will be satisfied with far less. "Many people in DP are frightened of having users roam around in their on-line files, anyway," he said. "Right now the most important features are simple file transfers. We have to walk before we can run."

Mac Lewis, president of Systems Center, Inc. in Irving, Texas, pointed to the reliance of most links on terminal emulation as a fundamental weakness. "Most of the products are using the [Technical Analysis Corp.] Irma board, which allows the [personal computer] to plug via a coaxial cable into an [IBM] 3274 cluster controller," he said. "That limits the mainframe to having to deal with [IBM] 3270 data streams. All they can really transfer effectively is text-type information."

Lewis believes the next major innovation to come down the micro-mainframe pike will be a tie into IBM's Systems Network Architecture to allow loading of entire control blocks including binary data. Such a capability could overcome the problem posed by terminal emulation that requires data to be rekeyed or reformatted in order to fit

(Continued on Page 27)

Company	1982 Revenues ($M)	Type of Company	Primary Products
Management Science America, Inc.	100	Applications	Accounting, Human Resources, Manufacturing
Information Science Corp.	65	Applications/Program Design	Accounting, Insurance, Report Generation, Query, Program Design
Cullinet Software, Inc.	66	Data Base	DBMS, Program Design, Report Generation, Query, Getting into Applications
Applied Data Research	59	Data Base	Program Support, DBMS, DBS, Electronic Mail and Word Processing
University Computing Co.	52	Applications/ Data Management	Performance Measurement/System Management, Program Support, Data Management, Accounting, Bank, Manufacturing
McCormack & Dodge	36	Applications	Accounting, Human Resources
Visicorp	35	Analysis Tools	Analysis
Datapoint Systems	18	DBS	DBS
On-Line SW International	14	Program Design	Program Support; Program Design
Management Decision Systems, Inc.	5	DBS	DBS

IDC Chart

Independent Packaged Software Vendors Offering Micro-to-Mainframe Links

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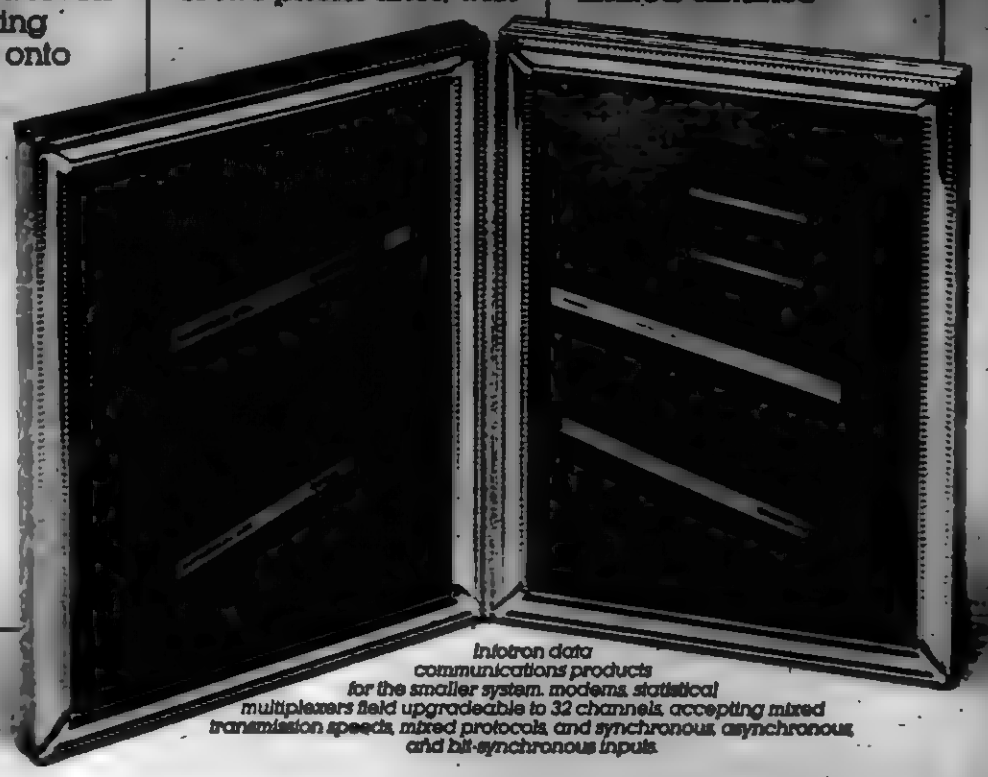

Infotron data communications products for the smaller system: modems, statistical multiplexers field upgradeable to 32 channels, accepting mixed transmission speeds, mixed protocols, and synchronous, asynchronous, and bit-synchronous inputs.

MICRO-MAINFRAME LINKS

(Continued from Page 26)

into the micro application. It could also allow applications to be exchanged between the micro and mainframe or other micros in object code without the need to recompile at either end, he said.

The IDC report points to the lack of a "universal" link as a potential future stumbling block. "There is no doubt that current announcements are attempts by vendors to preserve/extend/protect their current base of users," the report stated. "How long they will be able to hold out against the development of a truly universal link is open to speculation."

So far, the Informatics/Visicorp product is the only "intelligent" link that attempts to meet that criterion. However, it is limited by the requirement that it run under IBM's IMS/DC teleprocessing monitor. The IBM 3270-PC is also a first step toward providing a link to disparate kinds of data. "The world badly needs a way of addressing various kinds of mainframe organizations," Ferris said.

'Untapped Field'

The micro-mainframe market of the future may evolve into one dominated by IBM or several independents offering a horizontal link to various data bases. "There is an untapped field for generalized links," Rothnie said.

It will be complemented by many independents selling links that include intelligent features built around individual packages. "The vendors of applications software, in particular, will have a niche because they can make it very easy for the data base administrator or the user to get at their data," Ferris commented.

Right now, the most important factor is time. With most of the major new link products due to be available within the next three months, users are just preparing to get their feet wet. A look back next year may reveal a new crop of untapped needs and yet another swing in the software market.

Link Products Spur Predictions

As the software industry prepares for the first round of reactions from users of microcomputer-to-mainframe link products, observers are speculating about some of the new issues that may emerge.

"In areas in which a lot of sensitive information is involved, the physical security of diskettes in the office will be an issue," predicted James B. Rothnie Jr., executive vice-president of Computer Corp. of America. "On a terminal, users see information in a very ephemeral way. They're not used to worrying about these things."

Education and training will become critically important as users start exploring the uncharted territory of the corporate data base, according to Thomas O'Flaherty, a principal consultant at Input, Inc. in Saddle Brook, N.J. "Users now look at MIS [management information systems] through a keyhole, knowing very little about what goes on inside," he said. "It's a heavy burden on MIS people to open that up."

O'Flaherty also believes mainframe software will begin to be modified to take advantage of the distributed processing power available on micros. "New technologies will make on-line capabilities on the mainframe less important," he said. "We'll see the industry evolve from batch to on-line back to batch again."

More friendly applications will proliferate on microcomputers, with windowing becoming a hot item, predicted Betty Feezor, product manager of the Personal Computer Products Division at Management Science America, Inc. Also, "from a corporate perspective, people will be looking for really superior service from vendors."

Security will become an issue, particularly as dial-up access becomes more popular among users, Feezor said. Another concern is that users will want to download too much data at first, highlighting the need for good training from DP.

Local-area networks could be rejuvenated by the micro-mainframe link, noted Robert Weiler, vice-president of marketing at McCormack & Dodge Corp. "One of the hotter areas will be networking personal computers to each other without going through the mainframe," he forecast.

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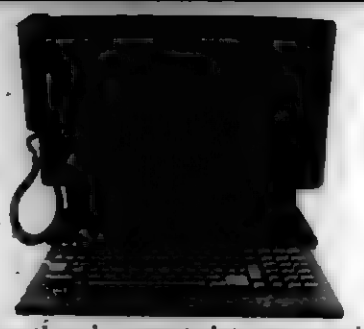

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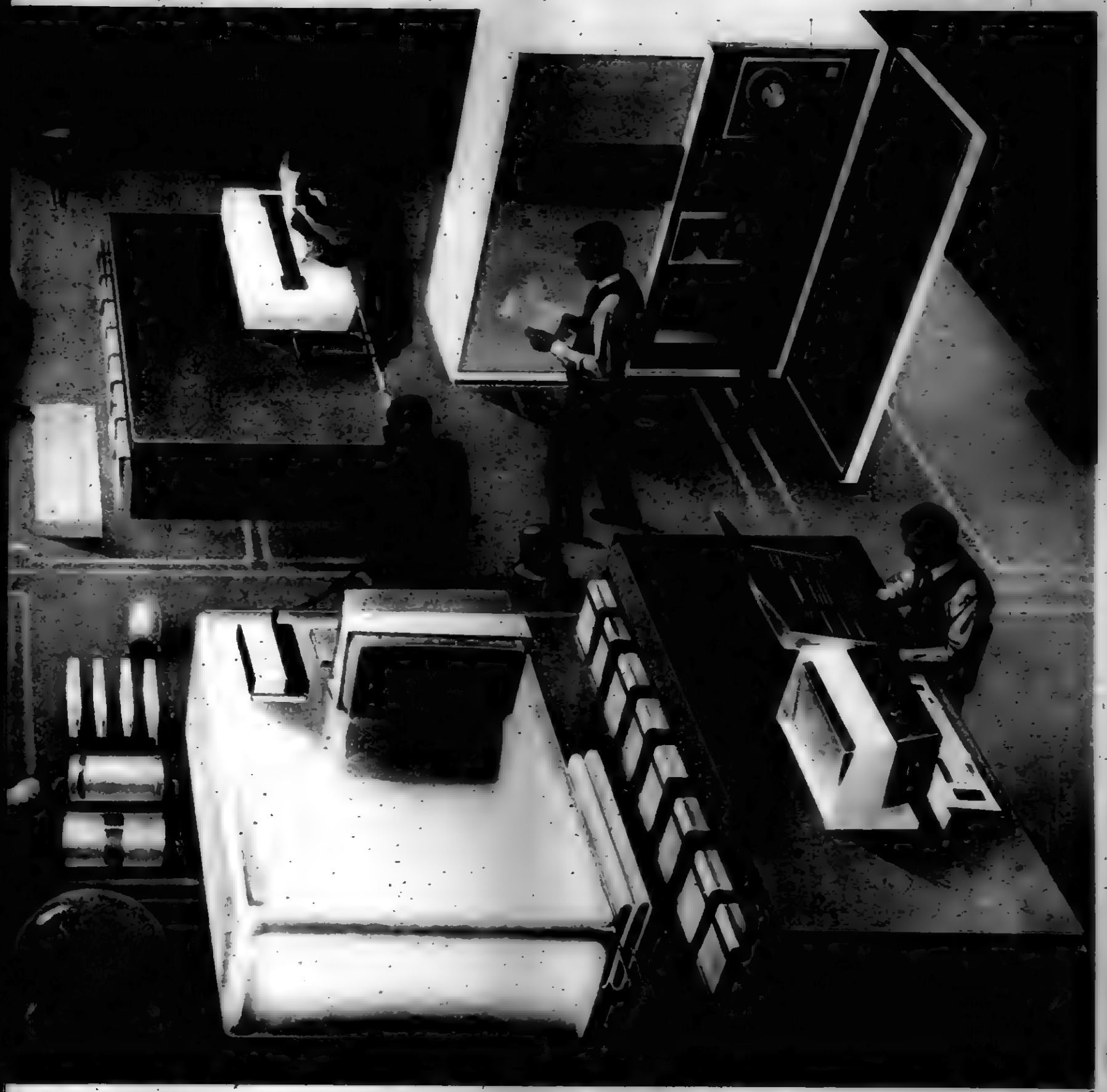

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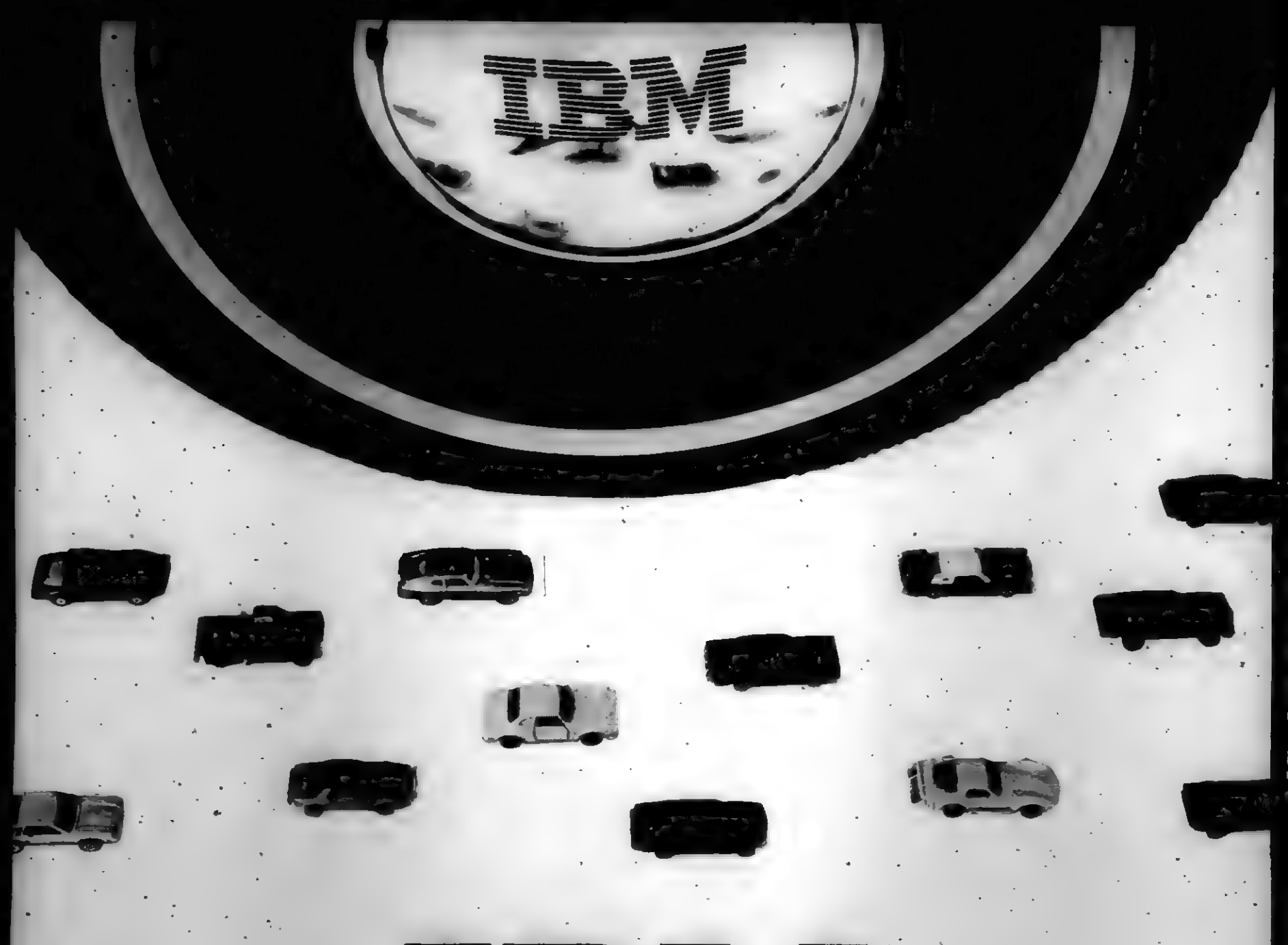

IBM

King of the Road

By Bill Laberis

Why, man, he doth bestride the narrow world like a colossus.
— Cassius in Shakespeare's
Julius Caesar

A personal computer was absent from both the product agenda and the minds of most key strategists at IBM in 1980. But the following year brought a personal computer announcement; a few machines were shipped by year's end. In 1982, 100,000 personal computers bearing the ubiquitous blue initials left IBM's shipping dock; in 1983, 600,000 machines.

Bill Laberis is senior editor/industry at Computerworld.

In 1984, IBM will own a majority share of an exploding market where 36 months ago it had no product. To do so, IBM unflinchingly shattered a time-honored tradition in allowing outsiders to provide major components and software for its personal computer.

The action sent deep tremors rippling throughout the personal computer market, burying some of IBM's competitors and driving most of the rest to the relative safety of various market niches. But it soon became apparent that, in the personal computer market as throughout every sector of the computer industry, there is no safety.

IBM is leaving no stone unturned in its inexorable quest to control every area where it competes and, thus, control its destiny. Its quick work of the personal computer business yielded positive proof of both its intent and its ability to do so.

What is truly mind-boggling is the magnitude of IBM's mastery over the most vibrant and strategically pivotal sector of the world economy. To put the company's No. 1 position in proper perspective, consider that IBM will earn more profit in 1983 — about $5 billion — than its closest U.S. competitor will realize in *total sales*.

IBM's maintenance revenues alone will be more than double the total sales of Digital Equipment Corp., which bills itself as the No. 2 computer company. In fact, IBM's revenues from a product it introduced just two years ago, the Personal Computer, are likely to exceed the total sales of its nearest competitor in 1984.

IBM Dominance

In short, no industrial company in history has approached the sheer dominance IBM has established over the markets in which it competes. No other company has wielded the power of IBM to legitimate such a broad range of products, methodologies and business practices. And few, if any, large companies have demonstrated IBM's uncanny ability to move so nimbly and quickly, completely revamping its organizational structure, manufacturing strategy and product mix, all since 1981.

"IBM will continue to play the wind in every arena of the market," said Michael Geran, IBM analyst with E.F. Hutton Corp. in New York. "They call the tune, and everyone else dances."

If it can be said that a mean and lean IBM put on the gloves in 1982, it follows that the company bloodied many noses in 1983 and will likely score major knockouts in the coming year. Companies that carefully chose markets where IBM maintained a low profile will find themselves fighting off Big Blue in their own backyards.

For example, with its 4300 series Glendale machines announced in September [CW, Sept. 19, 1983], IBM is targeting the scientific and engineering applications that heretofore had consumed so many high-end DEC and Data General Corp. superminis. According to Carl Amdahl, vice-chairman of Trilogy Ltd., "IBM is now able to provide a very cost-effective, high-performance machine that competes with off-the-shelf technology solutions found in today's superminis."

To complement this drive into the noncommercial market, IBM showed surprising versatility in announcing a significant OEM pact with Computervision Corp., the only company with greater computer-aided design and manufacturing revenues than IBM [CW, Aug. 15, 1983].

Equity Interest

Realizing it can't do it all alone, IBM is using others to spearhead thrusts into promising markets. It will use its equity interest (17%) in Rolm Corp. to ensure that it has an IBM-friendly private branch exchange to bring to the automated office. Its equity interest in Intel Corp., which has virtually paid for itself in terms of Intel's stock appreciation, ensures IBM a steady supply of Intel's coveted microprocessors. And an IBMer on the boards of both Rolm and Intel will ensure that at least a portion of the companies' development efforts will have a distinctive IBM flavor.

After several years as the defendant in a fruitless antitrust suit brought by the U.S. Justice Department, IBM has taken the offensive in the legal arena. Japan, Inc. will reel for some time to come following the punishment meted out to Hitachi Ltd. for its part in stealing IBM trade secrets.

Mitsubishi Electric Ltd. pleaded no contest in U.S. District Court to settle an industrial espionage case involving IBM software secrets. After being fined a paltry $10,000, Mitsubishi revealed the real damage suffered: It announced it would delay its entry into the Japanese IBM plug-compatible market for a "few" years.

And IBM has warned its biggest competitor in Japan, Fujitsu Ltd., about possible copyright infringement, reportedly buying and analyzing a Fujitsu mainframe to carefully scrutinize the machine for copyright violations.

"It's getting to be a mean, ugly world out there, and it doesn't look like it's going to be quite so much fun anymore," according to William F. Zachmann, vice-president of International Data Corp. in Framingham, Mass. "The junkyard dog is on the loose."

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IBM Plug-Compatible Mainframers Fading

They were the "Great White Hope" of the computer industry just a few years ago, carrying to users a promise of liberation from the company that held the keys to the 370 instruction set.

Buoyed by favorable user opinion and led by a cadre of former IBMers, IBM plug-compatible mainframe (PCM) and peripherals makers successfully chewed into IBM's market share on several fronts. Often they did so by offering superior technology at attractive prices.

Tracking the fortunes of the PCMs today is a fairly easy task, mainly because there are so few that are viable, at least without support from various Japanese partners.

Magnuson Computer Systems, Inc. is mired in Chapter 11 proceedings, having been all but buried by IBM's 4300 series. Cambex Corp. ended fiscal 1983 losing nearly $2 million on ever-shrinking sales. Storage Technology Corp. (STC) has laid off scores of workers to counter weighty quarterly losses and is a full 18 months behind IBM in getting its 3380-type disk drive to market. Memorex Corp. has turned to making Burroughs Corp.-compatible disk drives to cover for sagging IBM-compatible sales. National Advanced Systems, Inc. has gotten out of domestic manufacture of IBM-compatible mainframes altogether. Upstart IPL, Inc. has suffered three consecutive quarterly losses, with no particularly bright prospects in sight.

Only Amdahl Corp., which weathered a very poor year in 1982, has enjoyed any measure of success selling into the IBM world. But there are questions about Amdahl's ability to deliver Extended Architecture capabilities as planned — and about the long-term future of a company that is largely single-product in nature.

Even the Japanese PCMs are feeling IBM's ire, and in very costly ways, as IBM has aggressively and successfully pursued legal paths to prevent the Japanese from freely duplicating its operating software and modifying it for Far Eastern applications, as the Japanese had done for years.

No Concessions

"IBM will no longer concede anything to the PCMs," said Charles Greco, market analyst with International Data Corp. (IDC) in Framingham, Mass. "I'm not saying it's IBM's intent to bury every PCM. On the other hand, it won't bother them much if they do."

IBM is "behaving like they want 100% of every market they compete in," agreed Jack Hart, IBM analyst at IDC. "And instead of worrying about who's going to sue them, they're out suing the competition, like National Advanced Systems, over secrets theft. Things have changed."

In brief, IBM has gained a tremendous competitive advantage in recent years with a massive capital investment program that has made the company the quintessential low-cost, high-volume producer. Its participation in virtually every segment of the computer industry has enabled IBM to spread ever-increasing research and development costs across several product lines, lowering per-unit costs.

The PCMs — mainly single-product-line companies — cannot afford the initial capital expense needed to compete with IBM's production capabilities and don't have a range of products across which to distribute research and development costs.

In addition, IBM, with its early product support approach, has managed to withhold product specifications from its PCM competitors until it is nearly in the volume-shipment mode. This, coupled with changes IBM routinely makes during a product's life cycle, has

"IBM will no longer concede anything to the PCMs," said Charles Greco, market analyst with International Data Corp. in Framingham, Mass. "I'm not saying it's IBM's intent to bury every PCM. On the other hand, it won't bother them much if they do."

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put the PCMs on the losing end of a vicious cycle where:

- IBM announces and ships a product.
- The company gets a one-year-plus shipment jump on the PCMs.
- The PCMs announce their plug-compatible versions and initiate shipments, struggling to meet stated performance benchmarks within compressed development times.
- Responding to PCM me-too announcements, IBM slashes the price of its product, at this point having recovered most or all of its initial capital investment.
- The PCMs must follow suit, biting deeply into their profit margins.
- IBM announces the successor to its product, and the cycle starts anew.

"Clearly it is the IBM strategy to get out there in volume prior to the plug compatibles' ability to respond," said Carl Amdahl, vice-chairman of Trilogy Ltd., which hopes to leapfrog IBM technologically and ship a competitive high-end mainframe by 1985. "IBM has clearly come a long way regarding the way it will now compete with the PCMs."

Amdahl, who was Magnuson's technical chief during its brief heyday, said IBM is much more price-aggressive than it was a few years ago, giving customers significant price breaks when they purchase systems bundling IBM components exclusively.

IBM, Amdahl said, has also insulated itself from antitrust pressure by promoting itself as "the creator and defender of American high technology and the only company capable of defeating the Japanese in the high-tech wars." Finally, he said, IBM has now caught up with and surpassed the technical expertise of its PCM competitors and has greatly padded its technological hand by acquiring stakes in other leading-edge suppliers like Intel Corp. and Rolm Corp. Amdahl predicted more of the same in 1984.

Jesse Aweida, chairman of troubled STC, said IBM's newfound aggressiveness has impacted companies in areas where it is competing in earnest for the first time. "The PCMs are used to fighting IBM," Aweida said. "We're dealing largely with very sophisticated users at the high end, and they look for value. That's what keeps us alive."

Aweida, whose company also is hoping to leapfrog IBM technologically with an optical disk storage system, said it is not feasible for PCMs to compete against IBM across a wide range of products in both marketing and manufacturing. However, STC is making an effort to crack the mid-range systems market, where, Aweida said, IBM has no competition.

"It has gotten tougher to compete [with IBM], mostly because they've become so price aggressive," Aweida said. "This trend will continue into next year and beyond, because they have great ambitions.

"But remember, users don't want to be confined to one supplier, especially when the PCMs can offer cost-effective alternatives," he added. "I wish people would stop writing about the PCMs like we're dead."

IDC's Greco sees the situation differently. "In the long run, only the Japanese will be able to compete effectively with IBM, and they might have to abandon the 370 architecture altogether to do it," he said. "The PCMs in 1984 will be more against the wall than ever. IBM's just too big and too good, that's all."

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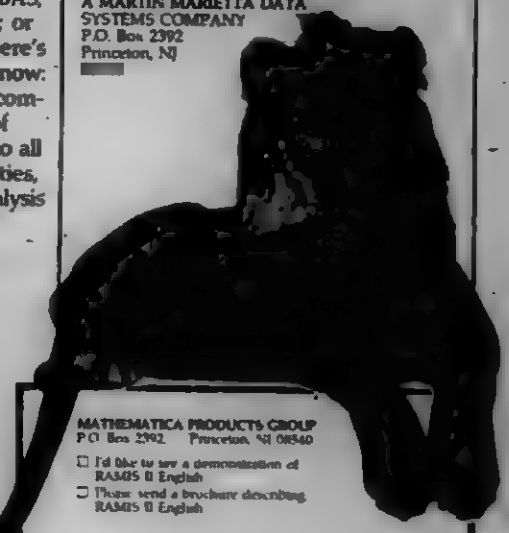

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IBM

What's Next in IBM's Product Strategy? Only

Second-guessing IBM's product and market strategies has become a tricky art in recent years.

Simply put, Big Blue has come to dominate so many sectors of the computer industry that its moves are dictated less by somewhat predictable external market forces and more by internal considerations of what is right for IBM. As one IBM watcher put it, "The worst thing for IBM's competitors is that IBM is no longer pressured into announcing anything. Almost without exception, the company does what it wants, when it wants, all in line with internal production schedules, capital requirements and the like.

"Guessing what they'll do is just that — guessing."

Nowhere was this independence more apparent in the past year than with IBM's November introduction of the PCjr, its low-end micro, which front-line analysts had picked for introduction at various times in March, mid-June, Sept. 15 and, finally, Nov. 1. IBM then defied virtually all predictions by announcing it would not actually sell the machine until well after the Christmas shopping rush.

Some Predictions

Notwithstanding a mind entirely its own, IBM is likely to make certain product and strategic announcements in concert with its stated intention to become a $100 billion company by 1990. What follows is a compendium of what IBM might have in store for 1984, based on interviews with several IBM watchers, including Jack Hart, long-time IBM employee and now an IBM analyst with International Data Corp. (IDC) in Framingham, Mass.; Charles Greco, who tracks IBM, and the lease market in particular, at IDC; Robert Fertig, president of Enterprise Information Systems in Greenwich, Conn.; and Robert Djurdjevic, editor of the Annex Computer Report.

Here are their predictions:

● ***A 3080 Series Successor.*** With the lofty code name "Sierra," IBM's 3080 replacement will be announced sometime in 1984, with analysts divided between a second- and fourth-quarter announcement. Initial shipments would begin six months after the announcement, volume shipments three to six months later.

The machine will offer sizable price/performance increases over the present high-end offerings, perhaps in the range of $200,000 per million instructions per second (Mips). Whether a clear migration path from the 3080 will be offered is questionable, with one source predicting an entirely new architecture followed by a "true" VM/XA announcement. A single processor in the 15- to 20-Mips range is expected, with 30-plus Mips in the dyadic mode.

IBM will likely delay the announcement as long as 3080 order backlogs remain healthy, which at present they are. The usual pre-announcement signals — price cuts in the 15% to 20% range for machines like the 3081 Model Group K and 3084 — will come two or three months before the Sierra announcement, perhaps on two separate occasions. Clearly, any gains in market share that IBM realizes with increased 3080 sales in anticipation of Sierra will come at the expense of Amdahl Corp.'s 5860 and the high-end machines of National Advanced Systems, Inc.

But if 3080 sales continue at present levels well into 1984, a Sierra announcement may not appear at all next year. As one analyst put it, "What's Sierra going to compete against? It will compete against IBM's 3080 series, that's what. They've got all the time in the world now."

● ***Mass Storage Devices.*** IBM's outrageously successful 3380 disk drive (more than 48,000 spindles shipped in 1983 with no viable competition) will be enhanced by a dual-density version offering about 1½ times the storage at less than 1½ times the price of the 3380. All signs point toward field upgradability of the 3380 to the dual-density model, while IBM will leave the door open to introducing a quad-density version, perhaps in 1985.

Analysts concede that IBM owns the mass storage market and that plug-compatible manufacturers such as Storage Technology Corp. (STC) and the Memorex Division of Burroughs Corp. are in for a rough ride in the disk drive arena in the coming years (see story on Page 34).

Analysts state with somewhat less conviction that IBM will also announce a successor to its 3420 tape drive, a replacement that has been rumored for a couple of years. IBM dropped the 3420's price 20% in August.

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IBM

IBM Knows for Sure

Hart Greco Fertig Djurdjevic

But there are some compelling reasons for IBM's not announcing a new tape drive, despite the fact that it would allow the company to recoup some of the tape market share it has lost to STC. One reason is that STC will not announce a new tape drive until after IBM does, because the STC version must be IBM-compatible to sell at all. By not announcing a 3420 successor, IBM essentially will deprive STC of revenues it would realize from quick sales of a competitive product, which STC is rumored to have waiting in the wings.

Nonetheless, the consensus is that a 3420 successor will arrive in the second half of 1984, and it will be an 18-track, data streaming version.

● ***On the Low End.*** Louder rumblings of a 32-bit, multiuser system announcement have been heard, with some analysts speculating that IBM will make a concession to market pressure and announce full Unix support with the machine, called "Popcorn" at times. IBM is not now a dominant force in the low-end (20 terminals or less) multiuser market, accounting for only about one system in 10 shipped, compared with two of three mainframes. With few unplowed fields remaining, IBM may well announce significant products here in 1984.

● ***Communications.*** Seeking to attack its heretofore biggest customer, AT&T, before the communications giant can get its bearings in the competitive world, IBM will heighten its communications interests in 1984.

A local-area network is inevitable, not unlike the proposed baseband token ring net IBM unveiled in Geneva in October [CW, Oct. 31]. AT&T has local-area network plans, too, but is keeping them more tightly wrapped.

IBM's local-area network will run initially on twisted pair media at speeds starting at 4M bit/sec, while combining the serial local-area network principle of a ring net with elements of a star configuration.

In concert with the aforementioned upgraded mass storage devices, IBM may enhance its 3880 controller to handle the new load requirements, perhaps including tape controlling capabilities if a 3420 successor is announced.

● ***Leasing.*** The byword for 1984 is, "Look out, third-party dealers, here comes the IBM Credit Corp., full steam ahead." Analysts believe that with a third financing partner — General Mills Corp. — in tow, IBM will offer such attractive lease rates that it will capture any deal it wants, leaving the third-party dealers fighting harder than ever to write attractive leasing deals.

Next year, IBM Credit Corp. will "handsomely compensate" IBM's sales representatives who steer lease customers to IBM Credit Corp. and not to third-party dealers, one source said. IBM Credit Corp.'s lease volume will reach $1 billion next year, making it the largest lessor by far. The implications for users in 1984 are generally more favorable lease rates across the board, with third-party lessors at times taking greater risks than usual.

● ***Business Strategy.*** Growing from $40 billion in sales to $100 billion in seven years will be a Herculean task, even for a company 10 times larger than its nearest competitor. One growth path IBM will continue to follow will lead it to stake more minority equity positions in established companies, as it has done with Rolm Corp. (19% ownership) and Intel Corp. (17%).

Analysts polled settled on two broad areas in which IBM may be active in 1984 in minority stakes, robotics and software. However, none would speculate on particular partnership candidates.

Organizationally, IBM went from having seven to 18 independent business units in 1983, a trend likely to continue next year as the company continues to reap the rewards of carefully planned decentralization as it deepens its penetration across a broad range of market segments.

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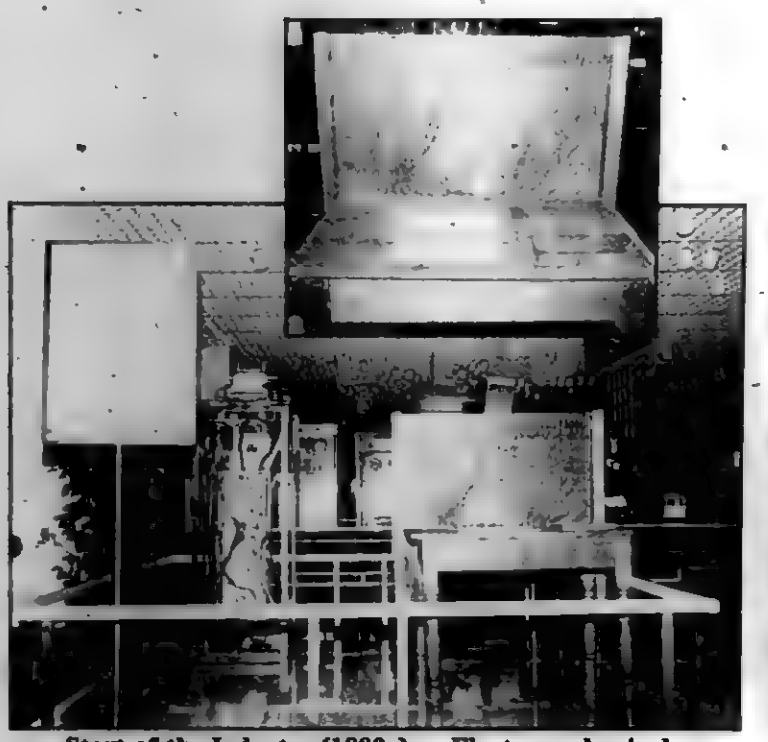
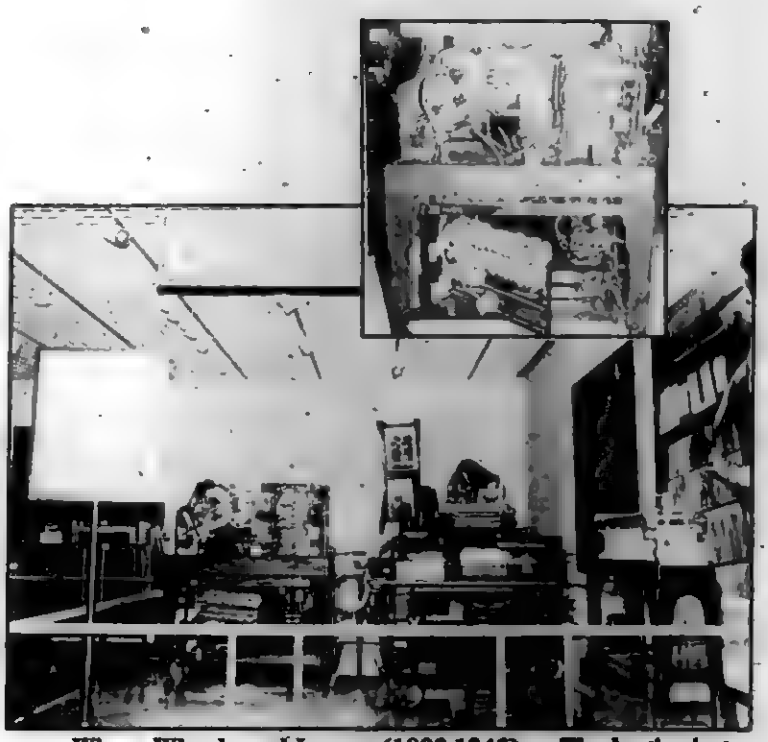
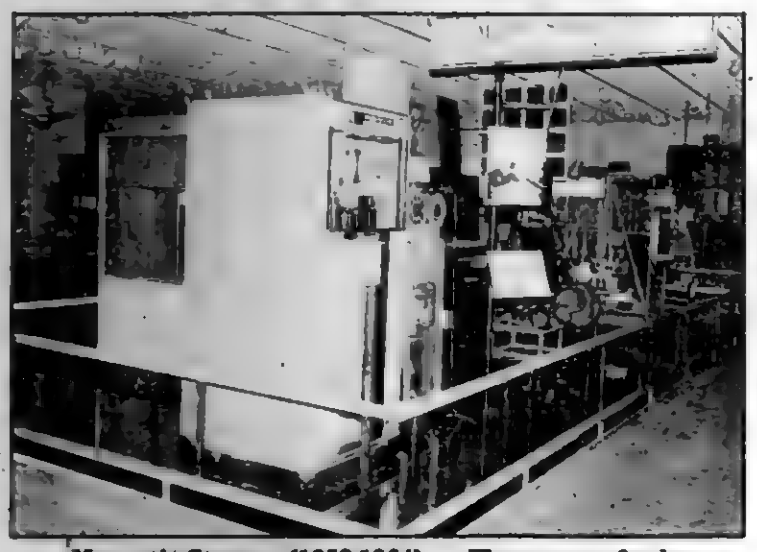


1 Start of the Industry (1880s) — Electromechanical machines were the heart of info processing through 1940s. (Insert) Punch card machine by Herman Hollerith.



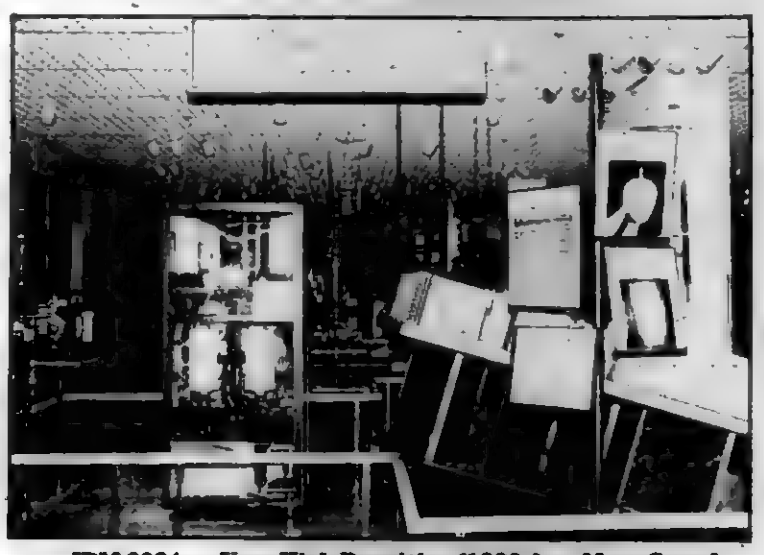
2 Wires, Wheels and Levers (1890-1946) — The beginning of modern data processing. (Inset) IBM 077, an early collator.



4 Magnetic Storage (1952-1964) — The answer for large-volume storage was the magnetic disk, enabling users to retrieve information directly, in less than a second.

5 Transistors (1957-1964) — Smaller, Faster, More Reliable. As a vacuum tube replacement, the transistor cut the time needed for electrical pulse circuits.

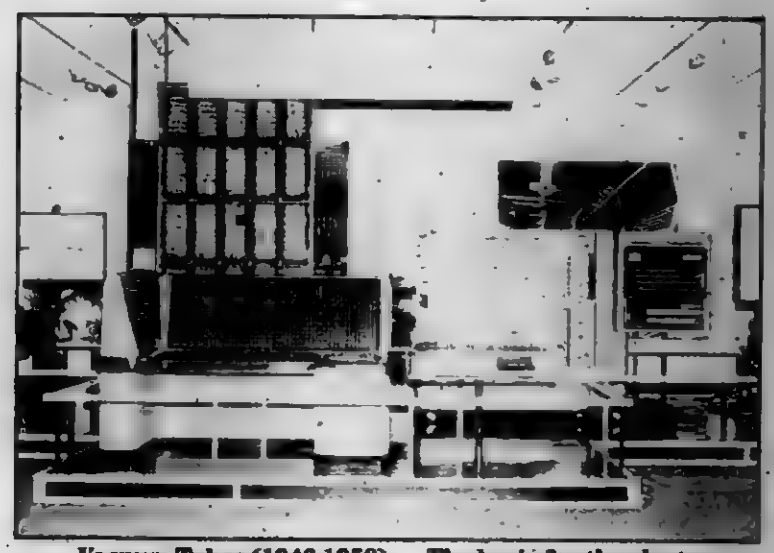
7 IBM 370 (1970s) — Faster Solutions to More Needs. The first computer with an entire main memory of monolithic technology.



8 IBM 3084 — Very High Densities (1980s) — More Speed, Function, Capacity, Reliability.

History of Computing

Photos by Lynn Haber
Text by David Myers



3 **Vacuum Tubes (1946-1958) — The basis for the electronic computer, permitting calculations several thousand times faster than electromechanical relays.**

6 **IBM 360 (1964) — The First Big "Family" of Computers. This system incorporated new solid logic technology.**

9 **Today — Higher Productivity, Lower Cost.**

The history of computing is in many ways the history of IBM. From the punched-card reader invented by Herman Hollerith for the census of 1890 to the newly unveiled PCjr home computer, IBM scientists and engineers have developed enough gadgetry for 10,000 patents.

A simple selection of these would make an impressive exhibit of computer technology — and that is what IBM created in a recent exhibit at its new Gallery of Science and Art on the ground floor of its world headquarters building in New York. (The IBM gallery, located at 590 Madison Ave., changes its exhibits regularly. The museum is open free to the public Tuesday through Friday from 11 a.m. to 6 p.m. and on Saturday from 10 a.m. to 5 p.m.)

Known to American business enthusiasts as the company of the Watsons, IBM might just as fairly be known as the company driven by hundreds upon hundreds of largely anonymous computer engineers. From modest beginnings as a maker of punched-card readers and time clocks, IBM became a computer vendor when the five-ton Harvard Mark I, a so-called Automatic Sequence Controlled Calculator, was installed at Harvard University in 1944.

Two years later, the first 100 production models of the company's 604, the first electronic calculator built around vacuum tubes instead of electromechanical relays, rolled off the lines in Endicott, N.Y.

In 1948, when the firm installed the huge Selective Sequence Electronic Calculator in its headquarters on Madison Ave., IBM determined for years to come how the world would picture computers: room-size monstrosities of blinking lights — with 12,500 tubes and 21,400 relays — that dwarfed their operators.

Since then, computer technology has progressed from vacuum tubes to magnetic-core arrays, invented by An Wang and F.W. Viehe and first introduced into widespread use in the early 1960s. Soon after came the transistor, invented at Bell Laboratories in 1947 and used by IBM in 1961 in its Stretch, a computer 75 times faster than previous vacuum-tube models, built out of 150,000 transistors.

In 1964, only four years after IBM had launched captive production of transistors, came solid-logic technology, capable of switching a current from on to off in 30 billionths of a second. Integrated-circuit technology made its debut in 1971 in the 370 line of mainframes, the first all-integrated-circuit machines delivered by IBM. Not coincidentally, the 370 also capped an effort begun with the company's 360 series to make all its equipment compatible — yet another concept that IBM pioneered.

Lynn Haber is a Computerworld staff writer and David Myers is Computerworld's New York correspondent.

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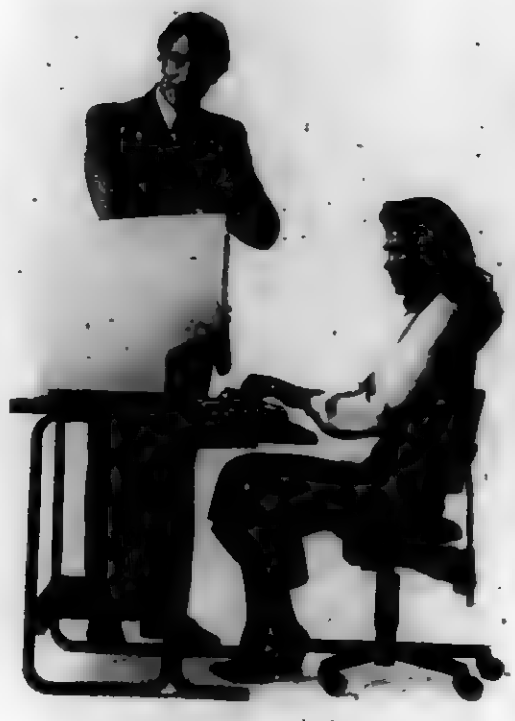

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Glossary:

ASCII (American Standard Code for Information Interchange). The language spoken by DEC, not by IBM (without PCI).
ASYNCHRONOUS Start-stop communications technique used by low-cost low speed ASCII terminals and Personal Computers.
CoaxFACE™ Exclusive PCI device provides RS232C interface to coax cables for attachment of ASCII terminals to PCI converters.
DEC Digital Equipment Corpora-

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tion. Used here as synonym for an ASCH host.
DECONVERTER (74D) Makes the IBM 3270 world ASCII-compatible.
FULL SCREEN The ability to modify an entire CRT screen of data without host interruption.
MODEMS Interface to allow digital devices to communicate over phone lines.
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PCI (Protocol Computers, Inc.) We make the non-IBM world IBM compatible. Now we make the IBM world non-IBM compatible, too.
SDLC (Synchronous Data Link Control). Line protocol for data communications between IBM systems and terminals.
SNA (System Network Architecture). IBM's approach to data communications networking.
SNA/SDLC IBM communications: non-compatible with DEC (ASCII) communications (without PCI).
SYNCHRONOUS High speed, high cost data communications technique.
PCI 74D Deconverter makes the IBM 3270 world ASCII compatible.

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3278/79 IBM's CRT and color CRT.*
3178 IBM low cost CRT.*
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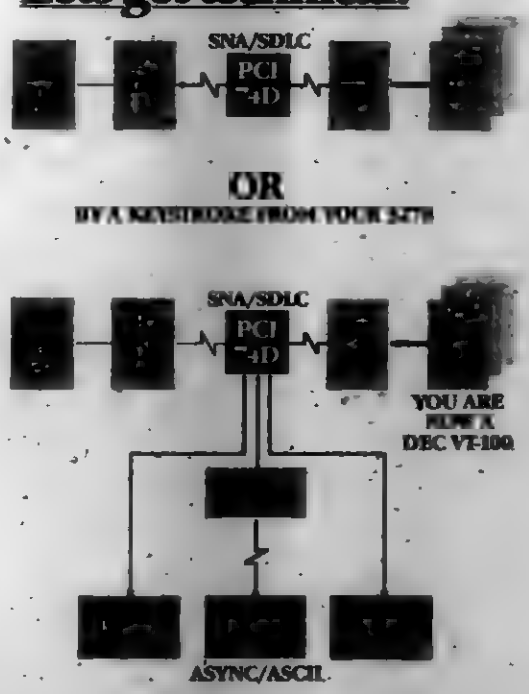

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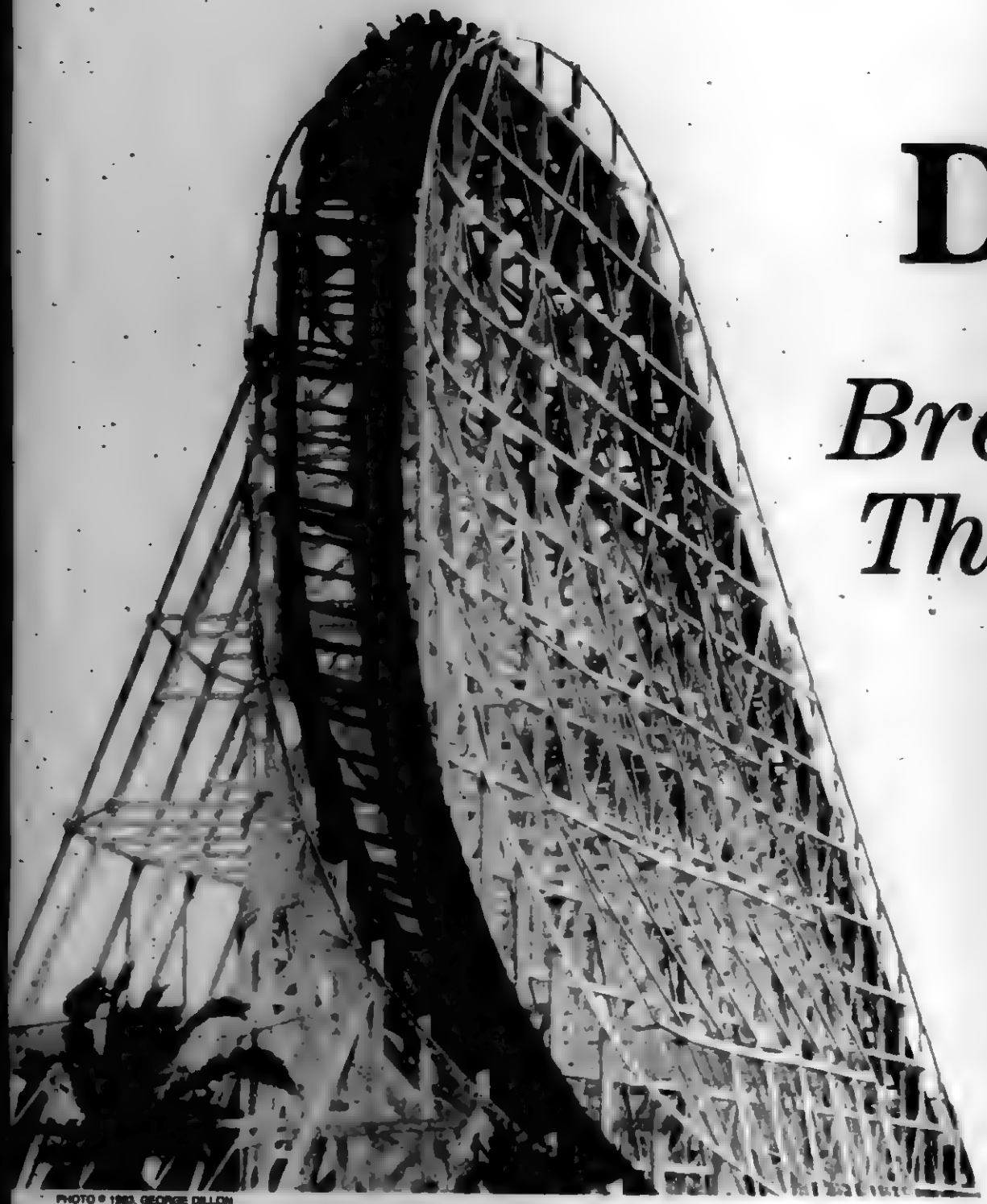

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DEC

Breaking The Fall

By Peter Bartolik

The arrows flew from all sides in 1983 while Digital Equipment Corp. circled the wagons and hunkered down in decidedly bad humor. During a year in which the company was expected by some to renew its vigor, key executives left, earnings dropped and upstart competitors brought out faster machines.

The company struck a defensive posture, maintaining that nothing was wrong. But despite its protestations, it's beginning to look like DEC may go back to the basics in 1984.

Many people believed that 1983 would be the watershed year during which DEC would hone neglected marketing skills and mount a full-fledged campaign on the potentially lucrative business and office automation markets. The year was a watershed one, but not for the anticipated reasons. DEC announced in late October that first-quarter earnings would be off sharply — following a 32% slide in fiscal 1983 — because of "administrative problems" in shipping microcomputers and delays in shipping computer disk drives for large machines. Following the bad news, the stock market chopped more than $30 off the per-share price of DEC stock before it began to edge slowly back up past the $70 level.

Financial analysts, many of whom had begun to back away from the stock, sounded betrayed, in light of DEC's previous forecasts, and quickly revised downward their estimates for the company's health in 1984. Stephen K. Smith, an analyst with Paine Webber Mitchell Hutchins and still a DEC booster, lowered his fiscal year 1984 earnings projection to between $3 and $4 per share, which would be the lowest level in many a year.

The finger pointing was fast and furious; some said the company was befuddled by the aggressive moves of IBM, others said that the company lacked solid marketing skills. Some even insinuated that the company's management was past its prime.

No Charlie Chaplin

Talking to DEC President Kenneth H. Olsen, who has no intention of appointing a successor, one would think that 1983's problems were merely a bump in the road, an inconvenience that was overplayed by the nervous Nellies on Wall Street and the bloodthirsty hounds of the press. "You see, people who make these comments don't understand what marketing is," Olsen said in a recent interview with *Computerworld*. "They expect marketing to be Charlie Chaplin on television. [But] marketing is identifying your product and identifying your customer and bringing the

Peter Bartolik is a staff writer at Computerworld.

DEC

two together, and with our kind of product, we're after commercial, industrial, scientific and educational markets.

"This [marketing] often is not completely noticeable by the ordinary people who aren't our customers. . . . We really haven't been too bad through the years, and people that consider us not a marketing company ought to look at the results; we're not doing too badly. I think that's the measure. The measure isn't whether your mother-in-law in Idaho recognizes the name of the company.

"So, yes, we plan to be aggressive, and yes, we should be more aggressive, but no, our goal isn't to be noticed by the financial people or the press."

But the people who make the decisions on buying business computers and word processing equipment may very well be the people whose eyes are riveted on the latest TV antics of IBM's Charlie Chaplin look-alike. And the question has been asked whether a company that touts its highly technical spec sheets can sell in the burgeoning office automation market.

Frederick G. Withington, an industry analyst with Arthur D. Little, Inc., believes that in 1984 we will see "a considerable amount of refocusing" from DEC. "They'll be going back to their basic market." He quickly added, however, "that [it] doesn't mean they're giving up on office automation or the personal computer, it just means they realize there is more potential in their traditional scientific and engineering market."

Olsen claims that in the recent past the company has not lost an office automation contract in bids against the industry leader, Wang Laboratories, Inc., and that DEC probably has more word processing workstations installed than anybody else. But much of that installed base is in the markets of science and engineering where DEC has traditionally dominated.

"When it comes to the white-collar office, we didn't concentrate on that 'til the last couple of years, but we haven't lost an order to the leader in that business, [not] a single new order for a couple of years," Olsen said. "People already using somebody else's equipment have a tendency to continue to do so, but for new orders we don't lose."

Aaron Goldberg, an industry analyst with International Data Corp., doesn't feel DEC is ready to give up on the white-collar market. However, he concluded, "The move into the commercial markets is taking DEC a lot longer than it anticipated."

Won't Overrun IBM

In the area of microcomputers, DEC is going to bide its time and wait for the market to rise to the company's level, according to Olsen. With the announcement late last year of the Microvax I, a VAX-11 superminicomputer on two micro boards, and the expected announcement later this year of the "VAX-on-a-chip," the company is developing sophisticated equipment for the sophisticated user who grows dissatisfied with the limits of lower end microcomputers.

"We're not going to overrun IBM [in the micro area]; we're not going to compete head-on with IBM," Olsen declared. "Our equipment didn't set out to get that broad market base, and so we're not going to go after that broad market they are. We're going after that segment which maybe learned about computers with the less expensive, more computer-oriented marchines [and now wants more power]."

But if DEC won't compete with IBM in the micro arena, that's not going to stop Big Blue from trying to claim a piece of the traditional DEC market. Olsen said he welcomes the challenge and is "flattered" by IBM's interest, but believes DEC offers unique services.

However, IBM's move into DEC territory has "already happened," according to Withington, who said that DEC is not fully prepared to wage war with IBM. "DEC needs better technology. [Its] electronics are not as modern as IBM's."

On the other hand, DEC is not entirely defenseless, Withington acknowledged. "In the eyes of a considerable number of users, DEC has superior software, better cost packages and ease of use, and perhaps the company is more responsive. And its greatest asset is the number of people who have written software for the VAX."

IDC's Goldberg also believes DEC is well-equipped to maintain its market, but he expressed concern about the "exodus" of top and mid-

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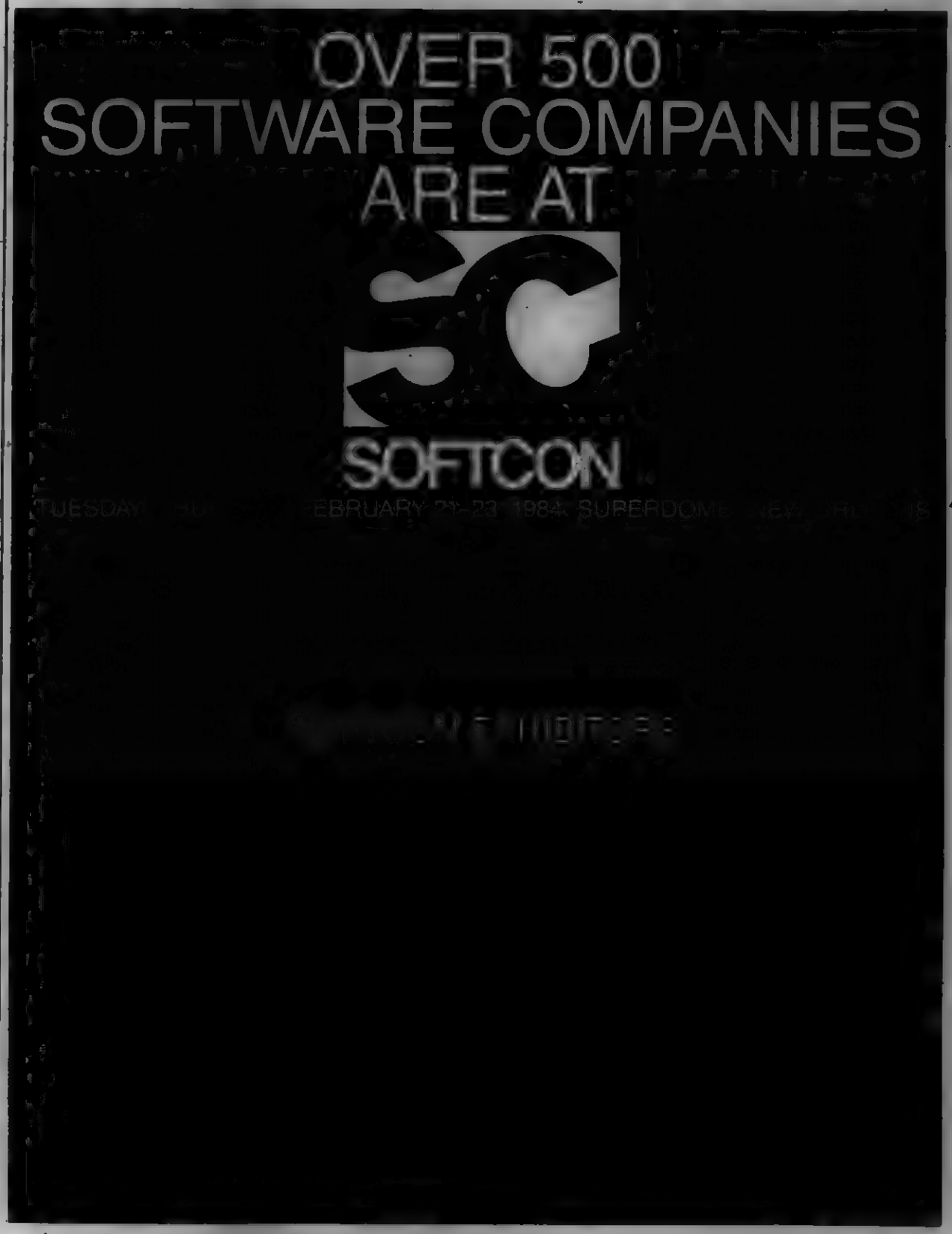

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die management personnel, particularly from "projects" under way at the company. Most notable of the departures was the midsummer resignation of C. Gordon Bell, formerly vice-president of engineering [CW, July 25].

Olsen practically bristles when he thinks of the published comments of unidentified former employees. "When the senior people left the company, I don't think any of them ever said bad things to the press. But some of the people who lost out at the more junior level don't know enough to keep their mouths shut, and the press often doesn't know enough . . . you [shouldn't] talk to people who either left angry or who didn't make it here, who failed here or were let go or . . . the press should be more sensitive."

If the company has more leaders than it can use, he added, that is a positive sign that shows DEC is doing well; some personnel, he added, were with the company for a long time and simply wanted a different type of position or change of pace.

The 'Late' VAX

Another topic that ruffles Olsen's feathers is the suggestion that the high-end replacement for the six-year-old VAX-11/780 is late in coming. "The VAX computer is a very sophisticated computer. Because of all the features and details, it is very difficult to make it very fast, so from the start there have always been people who make simpler, faster machines. . . . We don't compete on speed, we compete on throughput and convenience [and] ease of use and those features."

Olsen claims that the products "we've got coming" make his job the most exciting that it has ever been. But the industry experts aren't so sure.

An Almost Mythical Giant

MAYNARD, Mass. — Within the organization, Digital Equipment Corp. President Kenneth H. Olsen looms larger than life, an awe-inspiring mythical giant standing with one foot forward, gazing over the horizon. It's an image with which Olsen is apparently not uncomfortable.

During a recent interview with *Computerworld*, Olsen made it clear that DEC is his company, and in no way is he ready to turn the helm over to someone younger.

Asked if he had a team ready to take over when the time comes to go out fishing, Olsen replied: "Oh no, you never have a team ready, and I'm still too young to say we'll set a team up. . . . We have a number of bright people, [but] I'll probably never admit that they're ready to take over without me."

CW File Photo

Olsen at a Recent Meeting

On his actual role, Olsen said: "If anything, I fail at not being the forceful decision maker. . . . Where we've been successful, we've broken down the pieces where people have responsibility, set the goals and measured them. . . . Basically, strategy is encouraged by me or teased by me, but it's the responsibility of individuals."

"And so far as making the decisions, I take an active part in teasing, showing, educating, but . . . the decisions come automatically . . . it's making sure decisions get made, that's the job."

Departed Personnel

On departed personnel: "The people who have left us left for all kinds of reasons, and we would never make any comments about why. We would never say how many left because we encouraged them or how many left because . . . and most of them know enough to keep their mouths shut, too."

"Maybe the way to say it is, as friends and as colleagues for a long period of time, we miss them; but as part of the organization, it gives the opportunity for the bright, young people to move in and take these jobs."

On IBM's aggressive product strategy: "We have a head start there. We have the software, we have the machines, we have the products coming, so we feel flattered to have them show this interest."

(Asked if it isn't a problem to deal with the mystique behind the IBM name, Olsen replied, "Oh yeah, but it's a big market. We do those areas we feel we can offer something unique in.")

On the challenges of younger superminicomputer manufacturers: "When people say there's three or four machines out there faster, our answer is there always have been, so [speed] is not what made [the VAX-11] the standard of the industry. It's fast, but there is always something that goes a little faster. So we won't admit that we've lost any of that market; we've always had competition there and probably will for a long time. We don't offer the fastest, simplest machine."

Trauma With Micros

On the trauma in the micro market: "The trauma which we went through bears no relationship to the trauma that others went through. We made some administrative mistakes, we call them administrative, and that really had little to do with our personal computer plans."

"Our first year, we probably shipped more than IBM did its first year. We shipped approximately what we had planned. There were different types of plans, different types of numbers, so that statement is not always consistent, you see. And we accomplished very much what our original plans were, although at times we had more ambitious plans.

"But the problem of most personal computers, I would assume, is that most of them are in the same market; they do the same thing. We, from the start, have been after a different market and a different level of quality. . . . So we feel our approach just takes a little longer to catch on."

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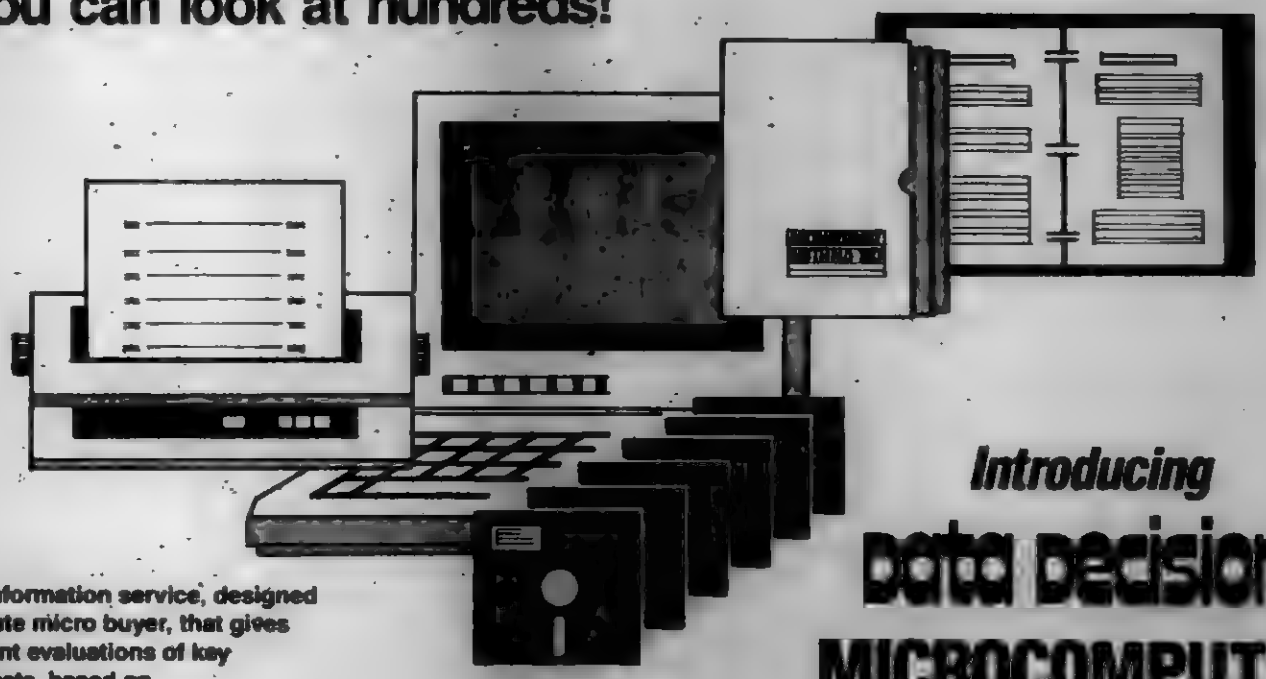

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The AT&T Divestiture

Hoping for the Right Numbers

By Phil Hirsch

Even though the Bell system will be broken up on Jan. 1, telecommunications users still do not have the answers to some important questions. Among other things, they don't know what message toll service, Wats and other heavily used communications services will cost after April 3.

That's the date on which the Federal Communications Commission's (FCC) new access charge plan may or may not go into operation, along with new rate tariffs filed by AT&T and the Bell operating companies last October. Congress strongly opposes the FCC access charge plan, and most corporate communications users strongly oppose the tariffs.

The access charge plan restructures the way local telephone companies will be reimbursed for the costs they incur in providing access to the long-distance telephone network. Historically, this reimbursement has been made through "settlements" paid by long-distance telephone carriers. Other common carriers have basically paid a similar Exchange Network Facilities for Interstate Access charge. Altogether, this "interstate contribution" amounts to about $6.5 billion annually.

Although tendered by carriers, the money actually comes out of their customers' pockets. That means it has been paid totally by long-distance communications users.

Since long-distance charges comprise a major part of most corporations' communications bills, business users are particularly eager to reduce their part of the interstate contribution. One reason that's difficult is because the contribution includes a hefty subsidy that enables local telephone companies to keep down the costs of their local services.

The political consequences of this point became clear when the FCC unveiled its access charge plan a year ago and was immediately assailed by Congress, consumer groups and state regulators. The plan imposes a monthly surcharge on all users of the local telephone network, including those who make no telephone calls at all. The surcharge is $2 per month for each residential subscriber's access line and up to $6 per month for each business access line.

According to an analysis made by the House of Representatives' telecommunications subcommittee, the residential surcharge would amount to $1.9 billion the first year the plan was in effect and $3.6 billion in the plan's sixth year. In other words, about 30% of the annual interstate contribution would be shifted the first year from long-distance users to local residential users, while in the sixth year, about

(Continued on Page 46)

Phil Hirsch is senior editor/communications at Computerworld.

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(Continued from Page 44)
55% of the total contribution would be shifted.

However, legislation now pending in both houses of Congress would bar the FCC from imposing surcharges on residential and single-line business users. If either bill is enacted, larger companies would supply a much bigger percentage of the interstate contribution than they would under the FCC plan.

The House bill (H.R. 4295) permanently bans residential and single-line business surcharges, while the Senate legislation (S. 1660) defers them for two years. The full House passed H.R. 4295 early last month; S. 1660 is scheduled for a final vote in the Senate late in January.

'Excellent Chance'

According to Herb Jasper, who probably spends more time tracking telecommunications developments on Capitol Hill than anyone else in Washington, D.C., there is an "excellent chance" the Senate will pass its bill. Jasper, executive vice-president of the American Council for Competitive Communications, an other common carriers' trade association, pointed out that the Senate bill is sponsored by a Republican — Bob Packwood (R-Ore.) — which gives it an edge in the present Republican-dominated Senate. Moreover, S. 1660 is less objectionable than the House bill to AT&T and bigger companies.

For the companies, the big advantage of the Senate bill is that it defers residential and single-line business surcharges for only two years, rather than permanently banning them. AT&T, meanwhile, prefers the way the Senate proposes to deal with the "other common carriers' differential."

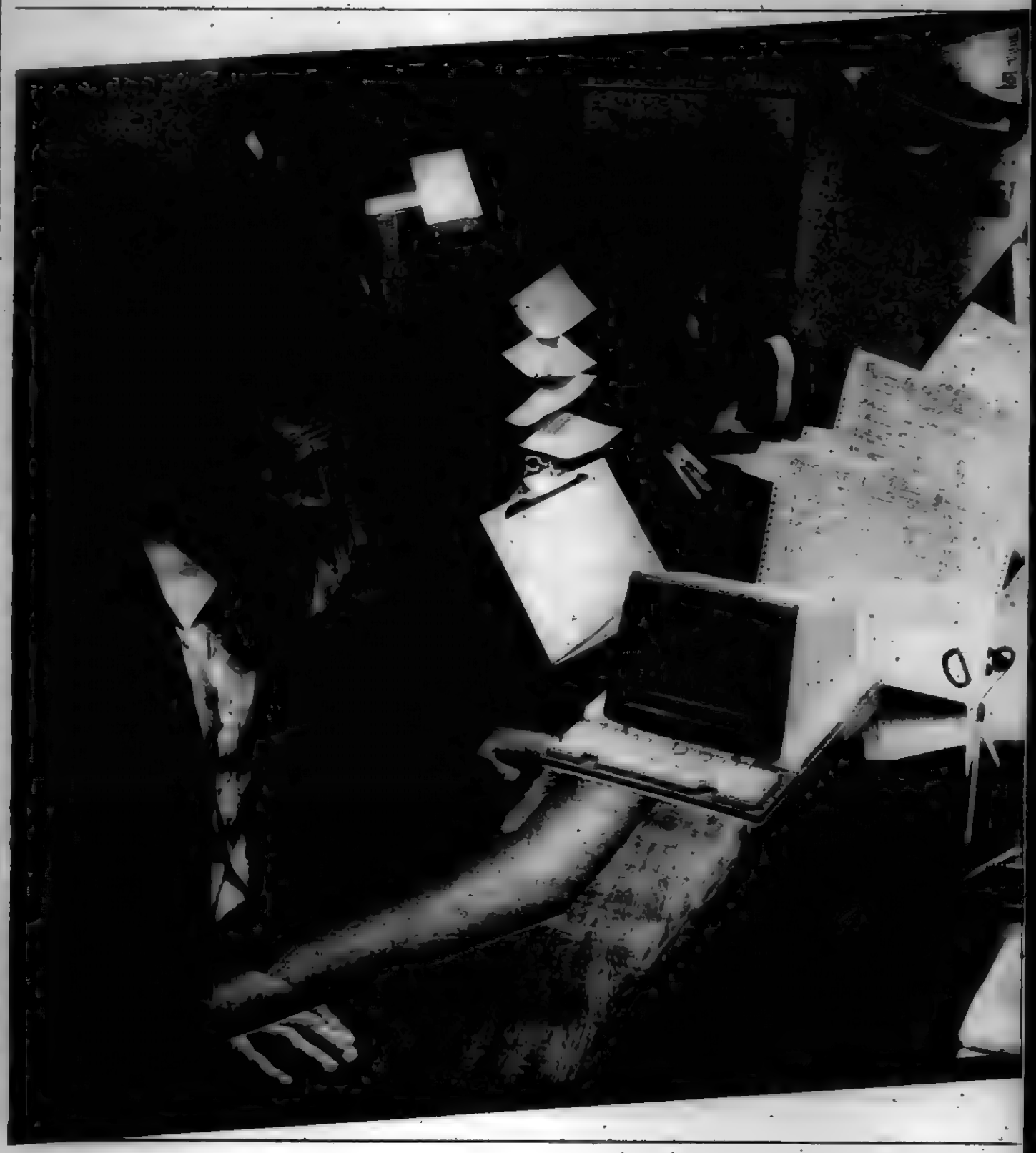
Presently, other common carriers pay considerably less than AT&T for access to local telephone networks because the other common carriers get poorer quality interconnection. (One result: other common carriers' customers must dial more digits to set up long-distance calls.) During the next two years, however, as electronic switches come into wider use, this qualitative difference in interconnection facilities is supposed to disappear gradually. Under the House bill, the differential in access charges does not start to decline until the other common carriers begin receiving improved interconnection service. Under the Senate bill, however, the differential would drop precipitously the first year the FCC's access charge plan is in effect, thereby raising the other common carriers' costs and forcing them to raise their rates relative to AT&T.

Brian Moir, Washington counsel for the International Communications Association (ICA), agrees with Jasper that there's a good chance S. 1660 will be passed by the Senate. He noted, however, that the Reagan administration and the FCC have joined the bulk of the telephone industry in criticizing the House bill directly and the Senate legislation by implication, so he thinks changes are likely before the measure reaches the president's desk.

Moratorium Option

What sort of changes? Moir — who served six years as legal counsel to the House Commerce Committee and its telecommunications subcommittee before going into private practice — believes the House bill's total ban on residential and single-line business surcharges might be replaced by a moratorium. To make this change more palatable to consumer advocates, the moratorium could be made longer than the two years specified in S. 1660 and could be phased in over more than the six years mandated by the FCC in its access charge plan.

In exchange, Moir said, the telephone carriers may have to accept the House-approved provision freez-



ing the AT&T/other common carriers' access charge differential until the specialized carriers obtain better quality interconnection.

Rate Fight Certain

Even if the access charge battle is resolved on Capitol Hill, another fight over rates is virtually certain at the FCC.

Last October, AT&T filed new interstate tariffs embodying the FCC access charge plan, and the Bell operating companies — along with independent telephone companies serving non-Bell areas — filed tariffs specifying their terms for supplying access facilities. Initial comments on the Bell operating companies' tariffs were filed late in November by about 60 organizations.

Because the carriers allegedly have failed to supply adequate information, "there simply is no basis on which the commission can conclude that . . . the estimated interstate access service revenue requirements are reasonable and reliable," said the Ad Hoc Telecommunications Users Committee, which includes such companies as Allis-Chalmers, Control Data Corp., General Motors Corp. and Sears Roebuck & Co. "There is potential in the tariffs [for] enhanced service providers, sharers and end users [to] be subjected to unreasonable, discriminatorily high local service charges."

In its comment, the ICA noted that the user must order and pay for his access circuit long before he actually uses it. The access tariffs do not require local telephone companies to maintain an inventory of access circuits, the association explained, so the only way a user can be sure of having facilities when he needs them is to file planned facilities orders.

Since planned facilities orders have to be placed at least 24 months before they are activated, "an [interstate customer] must know fully two years in advance where its new facilities will be located, exactly what facilities it will need and, if applicable, where its customers will be located," ICA said. "Plainly this type of arrangement taxes even the most sophisticated forecasting systems."

The tariffs also require the interstate customer to prepay "one full year's monthly charges in three installments over no longer than the first 14 months following the order date," the ICA observed. "Payments are due on the last day of the specified months, and any payment not received by the exchange carrier by the end of the first working day of the next month would . . . cancel the [Planned Facilities Orders]."

Most of the organizations commenting on the Bell operating companies' tariffs said the FCC should extend its investigation beyond April 3, the date the tariffs are presently scheduled to become effective. Given this consensus, it is believed that that is what the commission will do. Although the proposed rates would go into effect on April 3, they would be subject to change at the end of the investigation, and users might even get refunds. But because both the critics and the issues are numerous, the investigation is likely to take quite a while and ultimately end up in court.

Buying Methods to Change

Besides changing the way users buy transmission services, AT&T's divestiture will drastically change the way they obtain terminal equipment. Local telephone companies, as well as AT&T Information Systems, AT&T's deregulated subsidiary, will be selling, as well as leasing, new terminal equipment after Jan. 1. Users will have the option of buying or continuing to lease their already installed terminals.

In November, the FCC adopted a plan permitting this embedded base to be sold to its present users after divestiture. However, it is not yet clear what the

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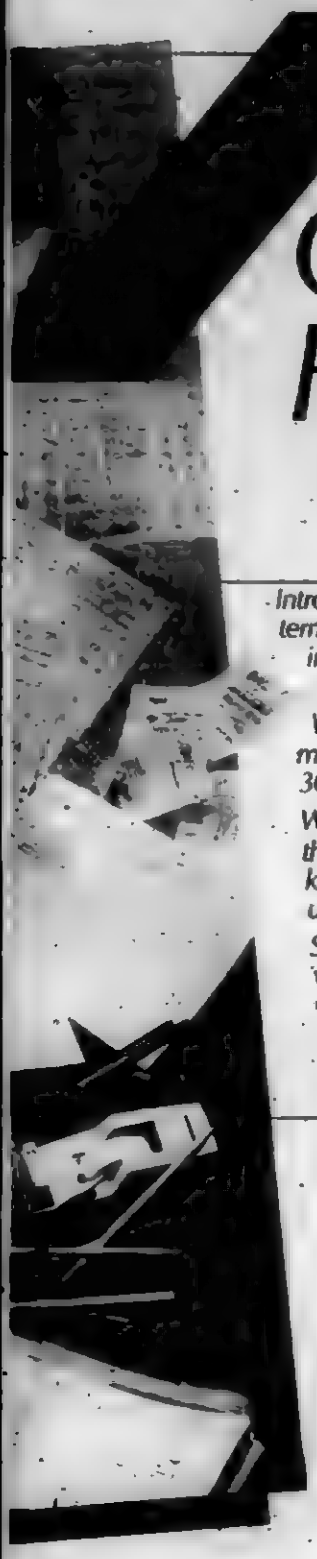

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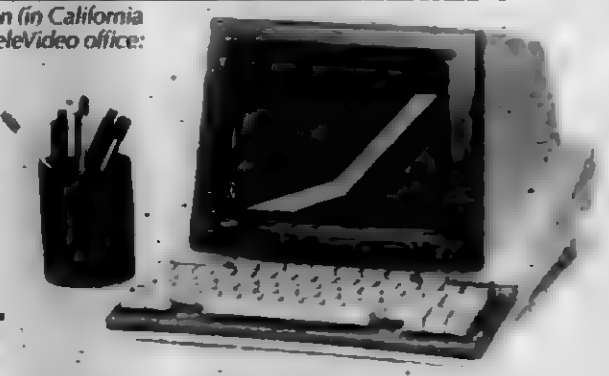

TeleVideo® Terminals

TeleVideo Systems, Inc.

THE AT&T DIVESTITURE

(Continued from Page 47)

sales price will be in every case. That's because the new owner of the equipment, AT&T Information Systems, does not plan to announce prices of several types of equipment until after Jan. 1, 1985. The list of equipment is broken down into some 20 equipment categories; it includes electronic private branch exchanges (PBX) (Series 700 and 800), data sets (Series 400, 600, 800) and various models of the Dataspeed 40 terminal.

How long users will have to wait for prices after Jan. 1 has not been specified. The FCC decision allows the company to wait until Jan. 1, 1986. AT&T said that "overall, it is estimated that roughly 75% of the multiline customer premises equipment (CPE) base will be made available for sale during 1984."

For the long term, the most significant feature of the CPE decision is that it promises to give users more control over what they buy, when and from whom — thus achieving a goal the FCC has been seeking since the 1960s; the Justice Department's antitrust suit against AT&T had a similar objective. It isn't clear, however, that users will gain similar control over transmission services.

Although it will be quite a while in some cases before sales prices for some already installed terminals are announced, users will be protected by the fact that several competing manufacturers offer similar equipment. The FCC order limits what AT&T can charge to rent embedded terminals between Jan. 1, 1984 and the date they are offered for sale. The order also limits what AT&T can charge to lease or rent terminals for a two-year period after sale prices are announced, thus giving users plenty of time to decide whether to retain or replace the equipment.

In the case of transmission services, the situation is much murkier. Not only are Congress and the FCC arguing about the commission's access charge plan, but telephone companies and their customers are arguing about the tariffs that implement that plan.

But there is another problem that may be even more significant.

Although AT&T currently carries over 90% of this country's interstate communications traffic, and most observers do not expect that percentage to decline markedly for a long time, former U.S. Assistant Attorney General William F. Baxter told Congress he believes the intercity market is on the verge of becoming competitive. His view is significant because the Justice Department has primary responsibility for monitoring the post-divestiture behavior of AT&T and the divested Bell operating companies.

In Congress, meanwhile, and at the FCC, great sympathy is being explicitly and implicitly expressed for the Bell operating companies. One indication: both S. 1660 and H.R. 4295, the pending telecommunications bills, tax users who bypass their local telephone company networks. However, all of the operating companies significantly threatened by bypass services have the resources to upgrade their networks so that business customers will be discouraged from migrating to bypass technology, and many of them are building upgrade facilities right now.

In other words, it is questionable whether any help is needed from Capitol Hill.

Last month, the FCC decided that the Bell operating companies, after divestiture, must abide by a "modified" interpretation of the Second Computer Inquiry decision. That decision says, essentially, that if AT&T or any of its operating company subsidiaries markets "enhanced" services or terminal equipment, it must be done through separate subsidiaries on a deregulated, nontariffed basis.

Possibly the most significant aspect of last month's FCC action was that three of the four commissioners who voted for it — Mark Fowler, Henry Rivera and Mimi Weyforth Dawson — did so reluctantly. They had expressed strong doubts about whether the divested Bell operating companies really need to be saddled with separate subsidiaries.

It is at least conceivable, though, that dimming the bright line separating regulated from unregulated services will enable the Bell operating companies to retain their present monopoly control of local exchange services. AT&T's long-distance monopoly may also be strengthened.

Ever since 1981, when Computer Decision II was issued, AT&T has been trying to do away with it. November's FCC decision could give this campaign a tremendous boost, particularly if, as seems certain, some Bell operating companies are allowed to establish unseparated divisions in place of separate subsidiaries.

As a result, it is quite likely the most important question facing the FCC and telecommunications users in 1984 will be whether Computer Decision II's bright line remains in place and preserves the limited competition achieved so far.

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White-Collar Crime

The Enemy Within

By Robert Batt

While the movie *War Games* and the recent spate of well-publicized computer break-ins have focused attention on the threat from outside hackers, the management information systems professional faces a potentially more damaging intrusion of corporate data from his own employees.

According to a recent report from the New York-based Research Institute of America (RIA), an estimated $70 billion is lost each year to white-collar, computer-related crime, fraud and embezzlement, of which up to 75% can be attributed to insiders.

"DP-related crimes originating from within the company itself are by far the biggest part of the problem. For example, it is much harder for outside hackers to identify the vulnerabilities of a software system than the insider who has access to the system for a much longer period of time and who knows the operating procedures of the company," commented Bob Abott, president of EDP Audit Controls, Inc., an Oakland, Calif.-based security consultant.

Since huge quantities of information are concentrated in one place, sensitive data can be easily copied or stolen, the RIA report, titled "Safeguarding Your Business Against Theft and Vandalism," pointed out.

In a world of large-scale data banks, information can be directly entered into a computer without any written record or proper authorization, and it can be changed without leaving any trace.

A dishonest programmer can bypass controls and surreptitiously enter information into the system, authorizing his own transactions, RIA said. "Many records can be altered in a brief period. An embezzler can alter just so many written checks or records in a given time. Given access to a computer, however, he may get away with millions in minutes," the RIA report said.

Banks, for example, have been the victims of a swindle called "breakage." The dishonest employee, assigned to distribute interest to customers' accounts, programs the computer to deposit in his own account the odd fractions of a penny or dollar left over on many accounts. It's a difficult threat to detect, said Barry Bergman of the San Mateo, Calif.-based Barrick Security Group, because an audit reveals only that the correct total interest was paid.

"The audit trail is invisible. This makes checking and cross-checking of data more difficult for people

(Continued on Page 52)

Robert Batt is a Computerworld West Coast correspondent.

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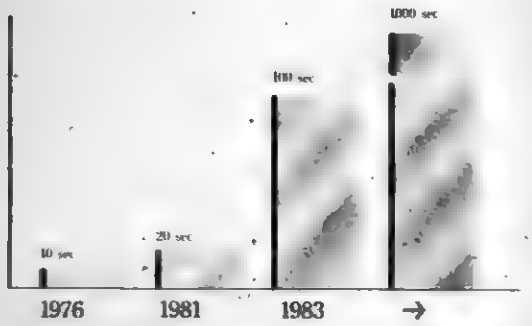

Our success can be summed up in a second.
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The TXP system also features parallel data paths. Manipulating 32 bits of information in a single cycle, two 16-bit operations in the same cycle.

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Most computer systems have very limited expandability. So if a company outgrows its computer's capacity, it usually means starting again from scratch.

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Then reprogramming.

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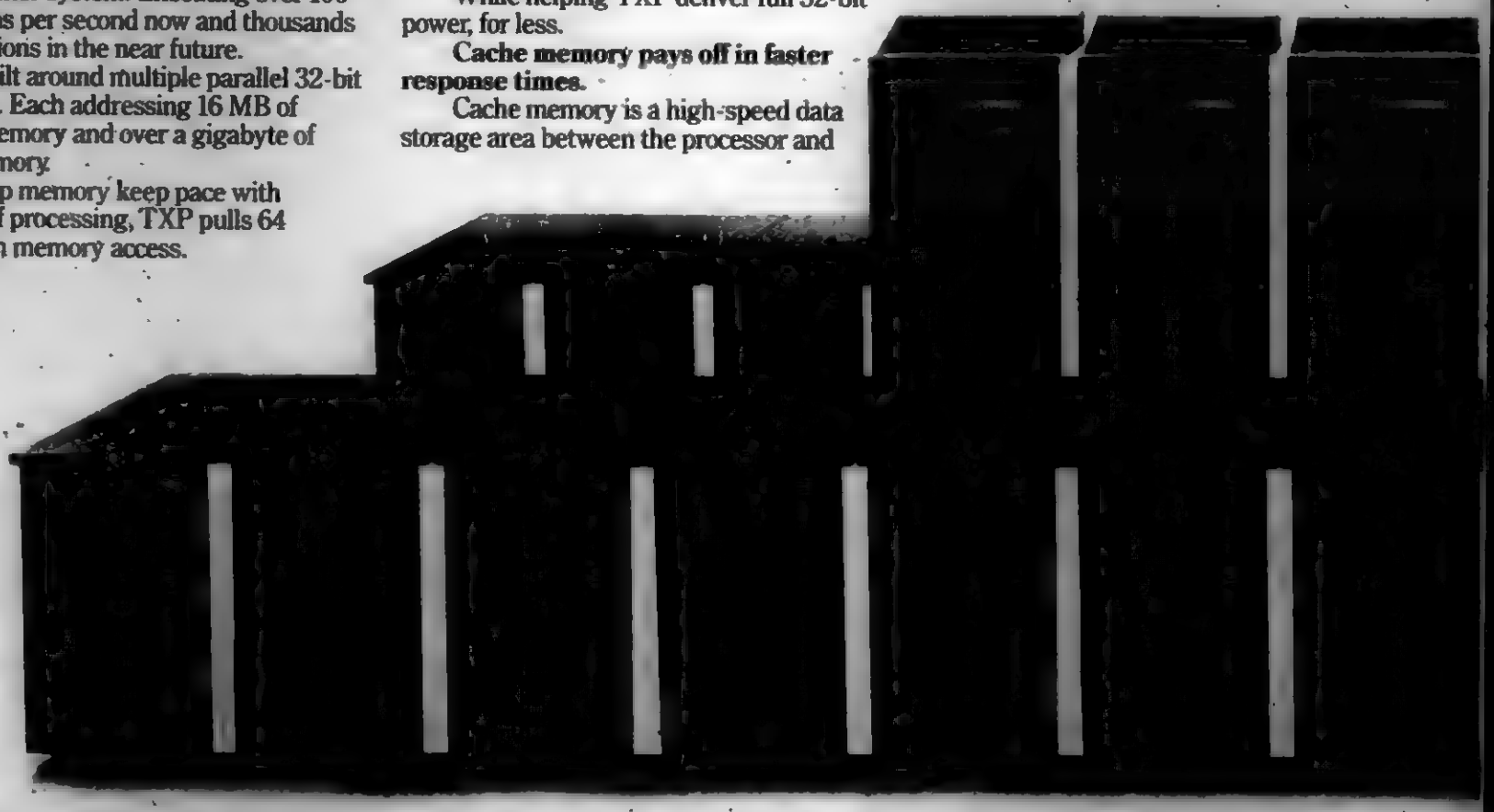

XP

computer in business today.

massive loss of revenue that's unavoidable during the switch-over.

Not so with the TXP system.

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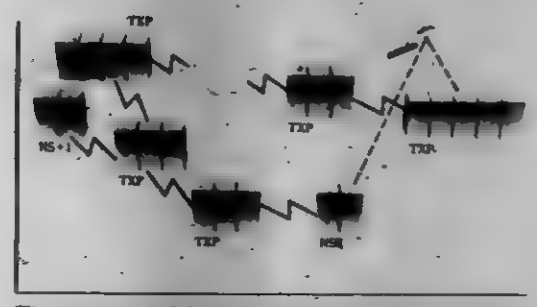

The most powerful computer network in business today. *Users access a single unified global data base from any of thousands of terminals anywhere in the system.*

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NonStop™ system compatibility from the people who started it all.

TXP can process more information and support more programs, users and devices than any other computer designed for on-line transaction processing.

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And for over eight straight years, despite attempts by others, we've continued to lead the industry.

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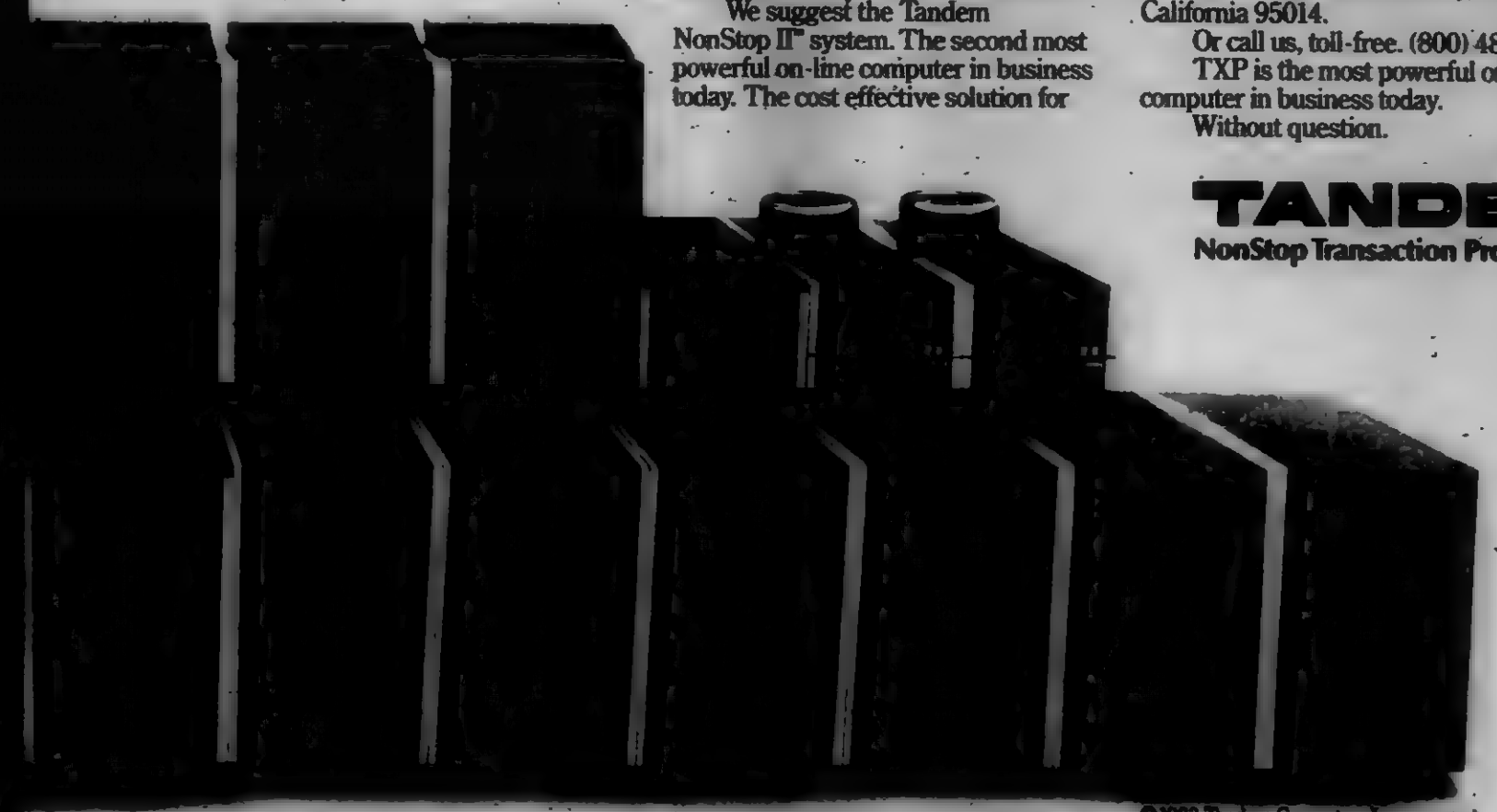

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WHITE-COLLAR CRIME

(Continued from Page 49)
used to dealing with ledgers and accounts," RIA pointed out.

According to Doug De Vries, computer security manager at Hewlett-Packard Co., as computer systems continue to expand and more people are connected to them, the risks of fraud and embezzlement increase, particularly through the use of computer networks linking personal computers with corporate mainframe data.

Enormous Potential

"Within three years, with the use of micros widespread throughout the office environment, the potential for misuse of information will be enormous," he warned. Both Digital Research, Inc.'s CP/M system software and Microsoft, Inc.'s MS-DOS operating system contain no passwords, and a would-be thief can copy what he wants, De Vries added.

In a recent speech to DP managers in Lake Tahoe, Calif., the HP executive declared, "Computer security is a growing problem because of the greater business dependence on DP. Vital corporate assets are involved, and distributed systems are becoming more complex. There is good reason to be worried about threats to the continuity of the integrity of corporate information."

Added Peter Neumann, assistant director of the computer science laboratory at SRI International, Inc. in Menlo Park, Calif.: "When you now think of the number of on-line data bases that are accessible by phone lines and the potential for altering critical data which could even threaten human life, you begin to shudder at the risks we are taking with inadequate computer security."

The RIA report noted: "Sensitive information can be stolen without anyone being present. A person at a remote terminal who knows how to bypass the codes and passwords can illegally retrieve information without leaving any clues to his identity."

Home Computing

The advent of home computing is going to add mightily to the problem, remarked Charlie Charlebois, director of international operations at the Tampa, Fla.-based security consulting firm of Stanley/Wacker, Inc.

Charlebois, a former Central Intelligence Agency staffer, said the introduction of home banking systems, for example, will confront data security managers with problems they have never had to face before.

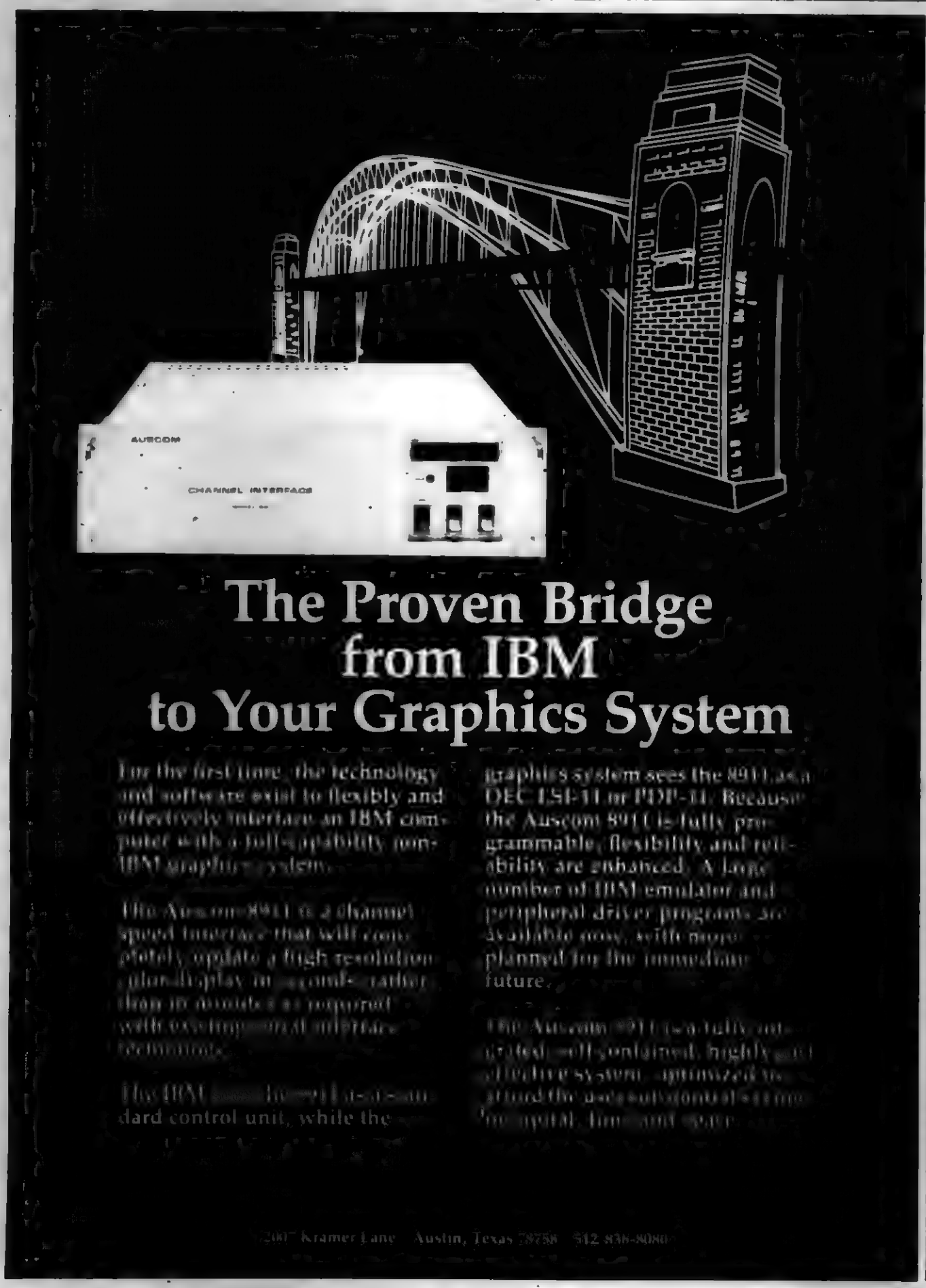
"There is definitely a danger in home computing because you have very little control, unlike security in your own building. Employees, particularly scientists and engineers, are now able to take classified information home, and the chances of abuse are markedly increased," Charlebois commented.

The explosion in microcomputers, while creating increased headaches for the computer security manager, offers the opportunity to increase corporate awareness of the need to protect corporate information and data rigorously, according to John O'Mara, executive director of the Boston-based Computer Security Institute.

"The theme for 1984 is the need to convey a sense of urgency. Awareness is the key to this problem. Security needs to have the [consent] of senior management, which will come out of the recognition that you can have protection without spending hundreds of thousands of dollars," he remarked.

For now, the battle appears to be an uphill one. According to De Vries, technology is the driving force in the computer field, with security desperately trying to catch up.

"It's going to be a tough business to be in, because as a security manager you are never going to catch up fully," the HP security manager concluded.



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WHITE-COLLAR CRIME

DP Crime: Where There's a Will, There's a Way

The first thing an industry expert will tell you about computer security is that no system is absolutely secure. When it comes to abusing corporate data, the old maxim of "Where there's a will there's a way," seems to apply to white-collar data processing criminals.

According to Peter Neumann, assistant director of the computer science laboratory at SRI International, Inc., "escalation" is the key word for those most concerned with denying employees unauthorized access to company data bases.

"Computer security is not a 100% thing. As systems improve, the types of security penetration will become more sophisticated and require more technology.

"While the likelihood of such a penetration is small, the risks are high, because in these days of corporate networks storing masses of vital information, it is the kind of crime that can destroy an entire company or even industry," Neumann attested.

The problem of trying to protect data from the unscrupulous insider is made even more difficult by the fact that many companies refuse to believe they have serious security problems. The "common reaction to business crime reports, consultants claimed, is, 'But our employees wouldn't steal.'"

Neumann's colleague, Donn Parker, senior management systems consultant at SRI, said that covering up a computer malpractice is also common because companies fear the effect of adverse publicity upon their businesses and future security efforts.

Parker has collected data on more than 1,100 reported cases of computer abuses.

"We believe that most cases of computer crime go unreported. Every computer security review we have done has revealed a significant number of computer-related losses that have not been reported," he commented.

Specific Steps

However, many experts agree that a number of specific steps can be taken by corporations to protect their data from employee misuse.

According to Doug De Vries, computer security manager at Hewlett-Packard Co., several factors should be evaluated in determining what security procedures a company should implement. These include:

- The role of computer systems in a company.
- The asset value of DP resources.
- The impact of downtime on the people depending on the DP resource.
- Rating the scale of probability of information vulnerability.
- Providing protection to the appropriate degree.

"Users must consciously choose protection based on the level of risk rather than close their eyes and hope that disaster will not strike. Ensuring the integrity of data is not free and, as a rule of thumb, 1% of a company's annual budget should be spent on data security," he urged.

De Vries outlined a number of specific actions a company can take to improve its security. These would include:

- Assigning a manager to deal with computer security who reports directly to the management information services director.
- Issuing written policies about security.
- Instituting regular, but unannounced, DP audits.

(Continued on Page 54)

many companies brag about the power of their computers, but very few about the performance of their service. They make a lot of noise about their hardware and software, but when it comes to service, they clam up, or promise what they can't deliver. Let's face it, very few companies have the resources to offer both a quality product and quality service.

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WHITE-COLLAR CRIME

(Continued from Page 53)

● Analyzing and implementing data security controls for the company as a whole, for specific data centers and programming groups.

● Developing computer security teams that involve the whole organization, not just the DP department.

In a recent report titled "Safeguarding Your Business Against Theft and Vandalism," the New York-based Research Institute of America recommended a number of procedures that can be implemented to help improve security. For example:

● All computer tapes and disks should be kept in a library where they can be logged out only with an authorized signature.

● Files should be classified in terms of their degrees of sensitivity to the company, with sensitive material being kept under lock and key in its own locations, accessible only to those authorized to work with the data.

● DP managers should insist on controlling the number of personal computer users and a log-in procedure for terminal users.

● Passwords should be carefully designed and controlled.

While creating a climate of awareness about the importance of security is an essential first step, technology must also play a role in deterring the would-be insider criminal.

According to SRI's Neumann, success in this area to date has been limited. "A great deal of research still needs to be done. Currently, there are small solutions for small problems, but there is no global solution to secure emerging technologies such as sophisticated computer networks.

Nevertheless, some progress is being made, industry experts claimed. Among the software security packages on the market are IBM's Resource Access Control Facility; ACF 2, developed by SKK, Inc. of Rosemont, Ill. for MVS, VS1 and VM users and marketed by Cambridge Systems Group; CGA Software Products Group, Inc.'s Top Secret; and Security Access Control from Electronic Data Systems Group appear to be the most popular, according to the observers.

On the hardware side, dial-up/call-back security devices are available from Digital Pathways, Inc. of Palo Alto, Calif., and San Francisco-based Leemah, while Futurex Security Systems of Fair Oaks, Calif., specializes in microcomputer encryption devices.

Encryption, however, has yet to achieve market favor. Most companies, De Vries said, only want to encrypt 5% of their most sensitive information and view the techniques as expensive. Neumann of SRI agreed. "There is this naive view that all you have to do is encrypt everything," he said scornfully.

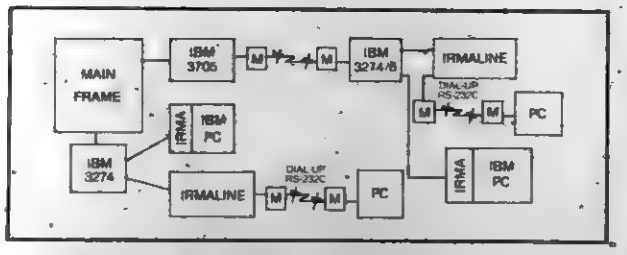
Voice-activated systems are now beginning to appear on the market. According to Research Institute of America in its report, one of the most interesting of these devices is a product called Computer Entry from Philadelphia-based manufacturer IMM Corp.

The product screens all calls from remote locations and allows valid callers to access particular files in the computer. When the computer phone number is dialed, a digital voice asks for identification.

If an incorrect code or no code is given, the voice may either ask the caller to try again, allowing for the possibility that an authorized user made a dialing mistake, or the modem may be immediately deactivated, not to be used until it is manually turned on. A third possibility is to have the device divert the call to a special phone in the data center for verification.

"While it's not clear to me that there are long-term solutions other than to continue to refine the computer operating software and architecture, manufacturers are slowly realizing there is a market for computer security devices," Neumann said.

Here are two beautiful ways to get small computers on line with the mainframe quickly, easily and economically—yours from DCA, home of the industry's first coaxial cable links between small computers and IBM 3270 networks.



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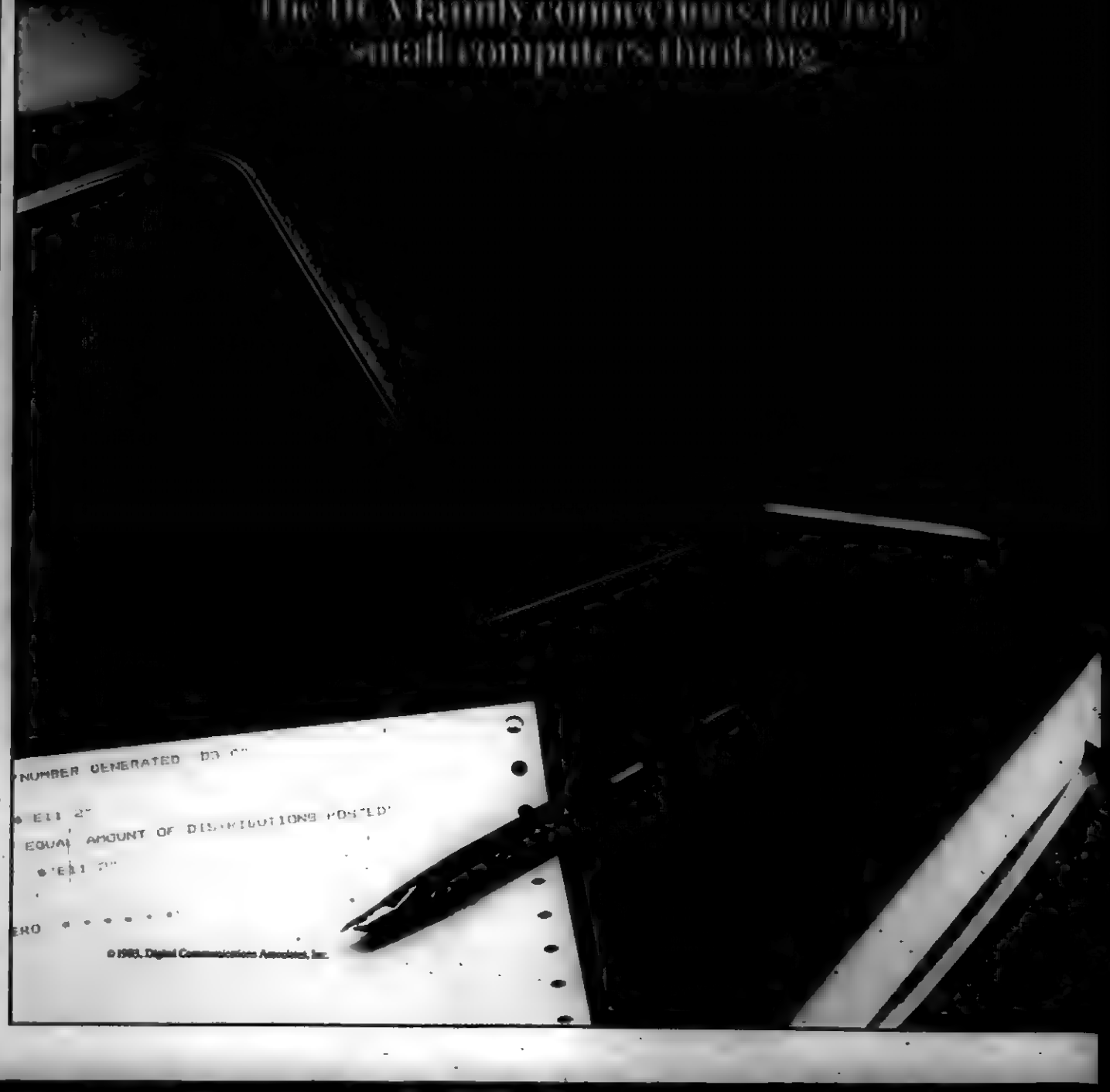

WHITE-COLLAR CRIME

Security Message Often Falls on Deaf Ears

"If anyone assumes that they have a completely secure computer system, they really have their head in the sand."

That comment from Peter Neumann, assistant director of the computer science laboratory at SRI International, Inc., sums up the seriousness of the situation facing security managers as they attempt to strengthen protection of their data processing systems from internal misuse.

Yet getting senior management and department heads to admit that a problem exists in the first place is a major exercise in communication, industry experts agree. When it comes to instilling a passion for securing one of the company's most vital assets — information — the message often falls on deaf ears.

"In the corporate culture, most people do not recognize that data may be of importance to someone else, and so while they are aware of the convention about security, in practice they do not do much about it," remarked security specialist Barry Bergman of Barrick Security Group.

According to Bill Stark, president of Stanley/Wacker, Inc., a Tampa, Fla.-based consulting firm, one of the most crucial areas where security considerations are ignored is in hiring new personnel. "There is such a frenzy for people to be hired, particularly in a small high-technology company that is expanding rapidly, that managers do not take the time to do the checking on new employees and singling out potential risks," he said.

Once a company has been burned, Stark continued, they are reluctant to admit to a breach of security, especially in the financial community where such an admission can lead to a rapid loss of credibility and funds. "They don't want to prosecute in order to avoid the adverse publicity, and they even fail to inform other prospective employers if asked to provide a reference for the felon," he asserted.

In many ways, therefore, misuse of corporate computer resources is a hidden problem. "It is going to take a couple of really mammoth computer heists to galvanize opinion in the data processing community and prompt effective action," Neumann added.

The employees who turn out to be computer criminals are hard to detect in advance. According to Donn Parker, senior management systems consultant at SRI International, who has interviewed over 40 perpetrators of computer crime, they are white-collar workers who see themselves as problem solvers and consider themselves basically honest. They view the use of computers against a corporation as an intellectual challenge rather than a crime to be punished.

The New York-based Research Institute of America (RIA) has recommended a number of hiring procedures designed to identify would-be troublemakers. It recommends companies:

- Design an application form that provides enough detailed information to enable a manager to verify the applicant's statements and dig more deeply into areas not mentioned.
- Verify all information given, including academic and job background.
- Query references in person or by telephone rather than by a form letter.
- Bring in an investigator for preemployment screening of applicants for sensitive company positions.

A clear indication that

(Continued on Page 56)

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WHITE-COLLAR CRIME

Consultant Calls System Software Weak Link

While many experts agree that banking, financial services and brokerage houses are the most vulnerable sectors for internal data processing crime, it is in a company's system software that the true security weaknesses lie, according to Bob Abott, president of EDP Audit Controls, Inc.

The Oakland, Calif.-based security consultant stressed that the key to secure data systems lies in increasing protection for the company's operating system and application software.

The former research worker at Lawrence Livermore Laboratory said that many software programs have properties that reveal themselves to users over time, properties that were not intended by the authors. As a result, a would-be criminal is able to begin construction of a knowledge base that can be used to abuse corporate data.

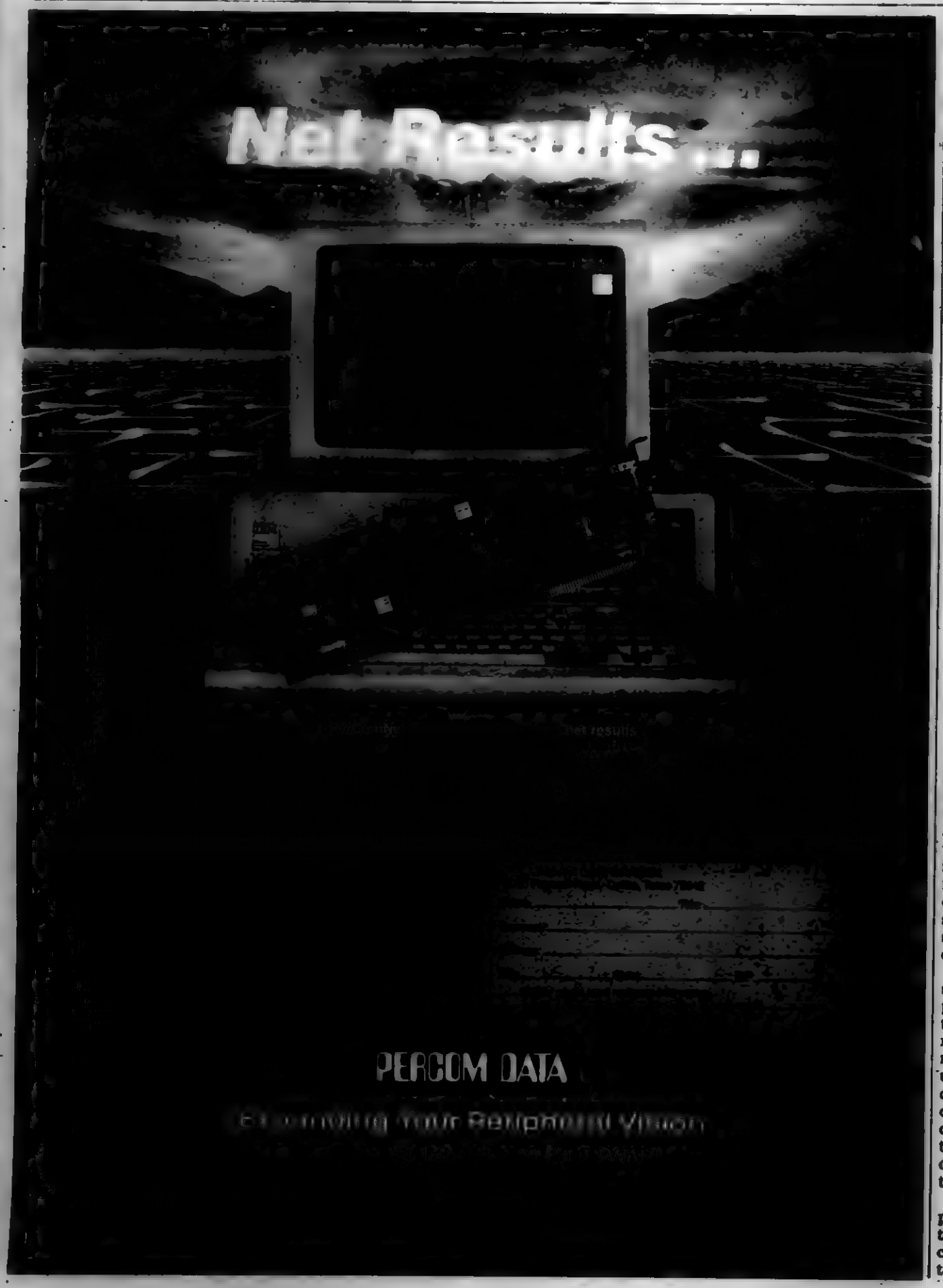
In a book titled *Security Analysis and Enhancement of Computer Operating Systems*, Abott has outlined the glitches in system software that allow security intrusions to occur. These include:

- Incomplete and inconsistent parameter validation.
- Implicit sharing of privileged or confidential data.
- Asynchronous validation or inadequate serialization, that is, timing errors brought about by the software itself.
- Inadequate identification, authentication and authorization of control access to software.
- Violation of prohibition or limit to software capabilities.
- Exploitable logic errors.

While radical improvements have been made in securing mainframe software over the past decade, he added, this knowledge base has not been applied to microcomputers. "Many personal computers have been designed with many of the flaws that pervaded mainframe software in the 1970s, because the people designing the new systems have not been schooled in computer security problems.

"The question is: Does the design of that new system software take into account the lessons of the past decade in computer security? How is it to be tested?" Abbot said.

Abott suggested, as one possible solution, the inclusion of a mandatory independent third-party statement attesting to the fact that a vendor's software meets industry-accepted standards.



Awareness Of Security

(Continued from Page 55)

the security problem is increasing comes from the Boston-based Computer Security Institute, which has seen its membership grow to more than 3,000 organizations in the last year. Its role is to emphasize practical, cost-effective long-term solutions to the problem of security through conferences and newsletters.

In order to generate more support for increased computer security, most industry analysts agree that senior management must get more involved. They must understand that no adequately secure commercial computer system exists today, based on the value of the data stored and the machine's processing capability.

Until more far-reaching progress is made, the potential for a major computer crime, bordering on a disaster, will persist.

Computer Crime

ILLUSTRATION BY: ALLEN WITBECKMOE

A Worldwide Concern

By Susan Blakeney

So you think the U.S. has the market cornered on computer crime?

Think again. According to an international survey recently conducted by *Computerworld*, computer criminals are popping up just about everywhere there's a computer. While the U.S., because of the sheer number of computers within its boundaries, may still take dubious credit for the lion's share of computer-related transgressions (annual U.S. losses are estimated at $100 million), some analysts say it's only a matter of time before the rest of the white-collar universe follows America's lead and catches the computer crime fever sweeping the U.S.

Computer industry watchers from seven countries contributed to the *Computerworld* survey: Australia, Brazil, France, Italy, Japan, Sweden and West Germany. Six of the seven respondents agreed that computer crime was considered a major problem in their country.

In Brazil, the banking industry is especially vociferous on the subject of computer crime. While they offered no estimates on the dollars lost to computer invasions, Brazilian bankers are said to be scrambling to wage a counterattack.

In Japan, losses to date are estimated at $30 million. In Sweden, authorities maintained that the computer crime problem costs $10 million a year — most of which they attribute to the illegal copying of software for resale on the black market. In West Germany, the average computer crime is valued at between $200,000 and $500,000, with an official annual figure unavailable at this time.

Then there's Italy, where "stealing is the way we do business," according to one industry expert there who requested anonymity. Here computer crime is considered a critical problem, but not as much as during the reign of the Red Brigade (the terrorist gang probably best re-

(Continued on Page 58)

Susan Blakeney, Computerworld international editor, is coordinator of the CW International News Network.

COMPUTER CRIME

(Continued from Page 57)

membered for holding U.S. Army Brig. Gen. James L. Dozier hostage for over a month at the end of '81). Apparently, the frequency of computer sabotage during that period prompted many companies to hastily implement physical security measures, "so the average security level can be considered good today," the survey revealed.

Even in Australia — the one country in *Computerworld*'s survey claiming computer crime did not pose a big threat — there have been 124 computer crimes reported, with damages estimated at $5 million. Furthermore, Australian computer security consultant Kevin J. Fitzgerald stressed, "What this represents as a percentage of the actual total, we don't know."

Fitzgerald did say, however, that computer crime is an extremely slippery subject for several reasons. First, many computer crimes are only discovered by accident, so nobody really knows how much damage is being done. At the same time, most companies don't want to admit publicly they have fallen victim to computer crime — especially banks. An expert in France summed up that nation's corporate attitude toward computer crime by saying, "They ignore it ... if they can."

On the other hand, the Japanese police department, which conducted its own survey on this subject, discovered that "most companies don't ignore the problem of computer crime ... but only 32% of them take measures to cope with it."

Computer Sin List

When asked what type of computer crime happens most frequently, the international experts overwhelmingly placed "copying and stealing software" at the top of the computer sin list. Other violations, in descending order of frequency, include:

- Input of unlawful data.
- Altering or destroying magnetically recorded data.
- Sabotage.
- Stealing information.
- Illegal use of computers.
- Illegal electronic funds transfers.
- Illegal use of automated teller machines.
- Unauthorized access to restricted or classified information.

In Sweden, rumors are rampant that several Soviet espionage incidents involving computers have occurred. The transcripts from these cases, however, are said to be classified because they involve military secrets.

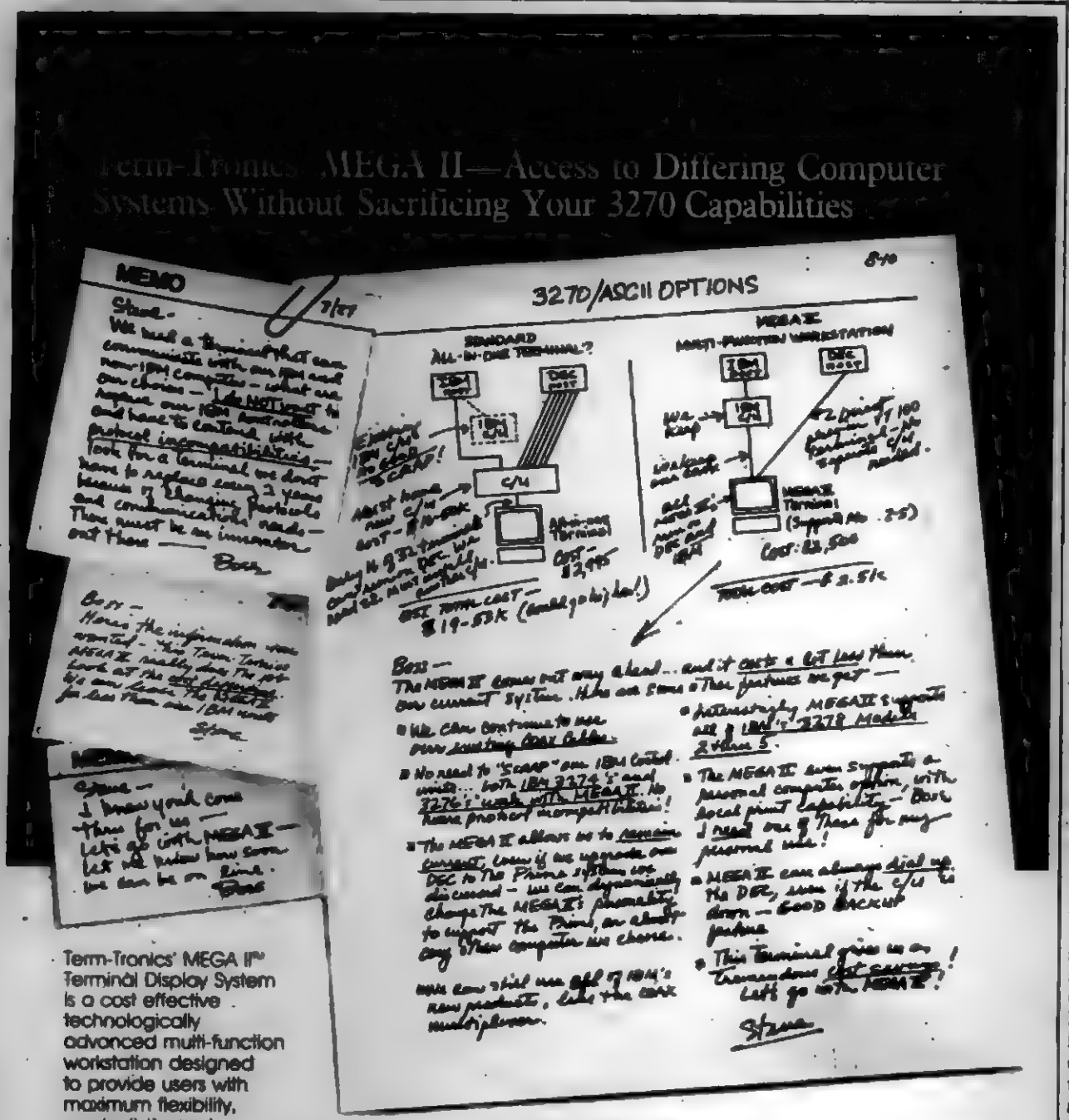
Deterrents to computer crime vary from country to country, but to a great extent they are still quite negligible. Only West Germany, for example, has a body of law that specifically addresses computer crime. Some 80 cases have gone before a court there, and depending on the nature of the crime, sentences have carried both fines and prison terms. In Japan, new laws are expected to be established within the next year to deal with this particular subject area.

In Australia, computer criminals are charged under white-collar crime legislation, and their penalties have been jail terms or fines. In other countries, general laws are applied to computer crime cases. In Sweden, for example, "ordinary crimes are committed by criminals using computers as tools," so people are tried under existing criminal laws. However, there are laws in Sweden that prohibit people from establishing personal files and forbid people to match personal data files. "This law was passed to prevent government agencies and corporations from collecting too much information about citizens," according to the survey results from Sweden.

What techniques and precautions are companies using to safeguard against computer crime? Most large companies around the world — with the exceptions of Japan and Australia, where employers appear to be more trusting — utilize tight access control with respect to their computer systems and their computer rooms. These companies also claim to have intrusion alarm systems for the computer rooms. Only a few very large companies employ guards for the computer room.

Everyone that responded to the security survey claimed that nearly all companies restrict worker access to the computer room and utilize identification codes or magnetic cards. In many countries, computer room access keys are used, although few companies strictly monitor the signing in and out of these keys. According to the recent official Japanese "Police Department White Paper," only 6.3% of the offices require use of a key and an identification code for access to their computers; and although many offices restrict handling of computer access keys, few companies keep track of these keys [CW, Nov. 7].

To protect sensitive data and preserve trade secrets, only Australians and Brazilians practice data encryption, the survey revealed. Also in Australia, compa-



nies use something called "avoidance security," a policy whereby no sensitive data can be committed to the computer's memory.

In Japan, it is generally felt that restricting access to the computer room with identification cards, restricting access to the system itself with user codes and restricting access to certain data files are sufficient precautions.

DP Criminals

Just what kind of people are involved in these wrongdoings? The "hacker" (America's sobriquet for the amateur computer prankster) is not considered a major problem in other countries.

In West Germany, the survey indicated that "90% [of computer crimes] are done by employees — the end users." This also rang true in the rest of the countries polled. Other potential criminals, in descending order of number of times mentioned, included: programmers, operators, bank employees and disgruntled employees. Japanese sources also mentioned "the titleholders in companies" as notable for being among the greatest offenders on the list of computer felons.

When asked if employers investigated people's backgrounds before hiring them, five out of seven respondents said yes, with Australia and Japan again dissenting. None of the countries polled, however, use polygraph testing during hiring; in fact, administering polygraphs is illegal in Australia and Sweden.

So what else is being done to combat computer crime? In Australia, extensive training courses are held for external auditors; special courses are conducted for fraud police; and the government has reportedly earmarked money for additional security training, the survey revealed.

In Japan, the police regularly hold conferences that address the issue of computer crime. Furthermore, 17% of all Japanese police offices are said to have implemented specific computer crime prevention

(Continued on Page 60)

Love, Money Drive International DP Crime

Love and money, not necessarily in that order, are the driving forces behind the international world of computer crime, according to a recent worldwide *Computerworld* survey on the subject.

In Sweden, for instance, three computer executives were separately seduced within the last 18 months by Soviet women and summarily coerced into giving up defense secrets and classified information. (All three eventually committed suicide.) According to Ragnar Eriksson of the National Police Headquarters in Stockholm, businessmen are extremely naive about computer espionage.

He urged employers to make greater use of psychological tests in order to predict a potential employee's psychological weaknesses.

In Japan, a 32-year-old bank clerk, at her lover's request, opened five different savings accounts under assumed names in five branch offices. She then began channeling funds into these accounts by entering "receipt of money" statements into the bank's computer system. After she accumulated over $500,000, she withdrew the money and ran away with her boyfriend. Six months later, international investigators discovered and arrested her in the Philippines.

In Australia, the sting again mixed romance with finance. An operator at the New South Wales state-run horse betting agency was changing the time clock in the computer system by three minutes. After a horse race, he would quickly telephone his girlfriend, an input clerk, with the winning horses and the amounts to put down. Authorities still don't know how much money he embezzled with this technique, but he was betrayed by his lady friend when he ditched her for another woman.

In West Germany

And in West Germany, the culprit was a programmer at a large German stock company. With the help of a program developed in-house, he fed salary information on fictitious people into his own salary account in the company's payroll system memory.

To circumvent the checkpoints in a normal payroll system, the felon developed his program to change the payments in such a way that they would never appear on any master list, nor would they generate wage slips.

This fraud was discovered by chance, and the offender was sentenced to jail for two years for illegally extorting $75,000 from his employer, sources said.

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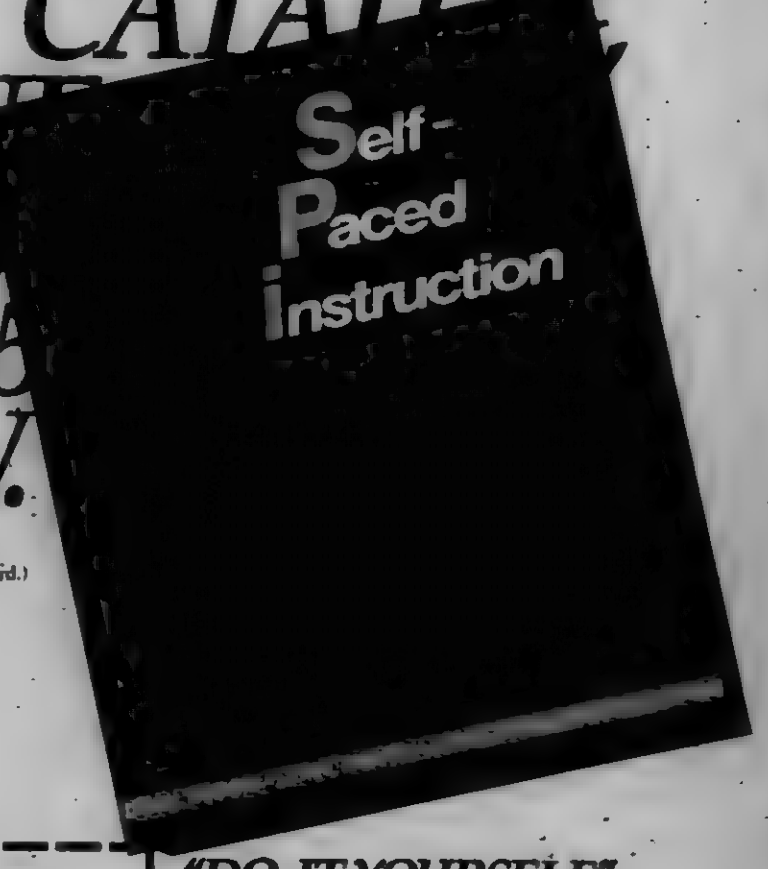

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COMPUTER CRIME

(Continued from Page 59)

programs.

West Germany also has specially trained police officers to investigate computer fraud cases, and additional training is presently being planned, according to the survey results.

In Sweden, the Society for Data Processing established a task force to study matters of computer security, and one task force recommendation resulted in the establishment of an international body for dealing with computer security within the cadre of the International Federation of Information Processing Societies.

In contrast, "nothing in particular" is being done to formally fight computer crime in Italy, according to the respondent, and this is also true in Brazil and France.

A number of interesting responses were elicited when *Computerworld* asked the international participants what else can and should be done to ward off future computer crime. The number one answer to this survey question, from six out of seven countries: Vendors should build more security features into their software.

Another suggested procedure, mentioned by more than half of the respondents, was tightening security in the work place. Participants in West Germany, Japan and Italy opted for harsher laws and better training programs for computer crime investigators.

The survey results from Italy stressed the importance of preventive organizational measures, such as splitting up tasks in the application development phase, tight production management in the computer room and the introduction of a security manager at every company.

In Australia, "More control is needed over people — it's really a people problem," according to Fitzgerald. His recommendations included changing people's attitudes toward computer crime.

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Fifth-Generation Computing

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Who's on First?

By Tom Henkel

Driven by the quest for both economic and political strength, world powers are currently staging a quiet war.

In this war, the biggest and strongest will not necessarily have an advantage over the small and weak. A single person's idea may prove the deciding factor.

In this war — the war over which nation will be first to develop the next generation of computer systems — the battlefield is the laboratory.

Computers have become so vital that today it is almost impossible to live without them. Corporations throughout the world would come to a grinding halt if they could no longer use computer systems. But perhaps the most important dependency on computer systems is for national defense.

Most world powers currently use sophisticated computer systems to design and control weapons. Without bigger and faster computer systems to build bigger and more effective weapons, some theorists contend, a world power could be rendered helpless in a few years.

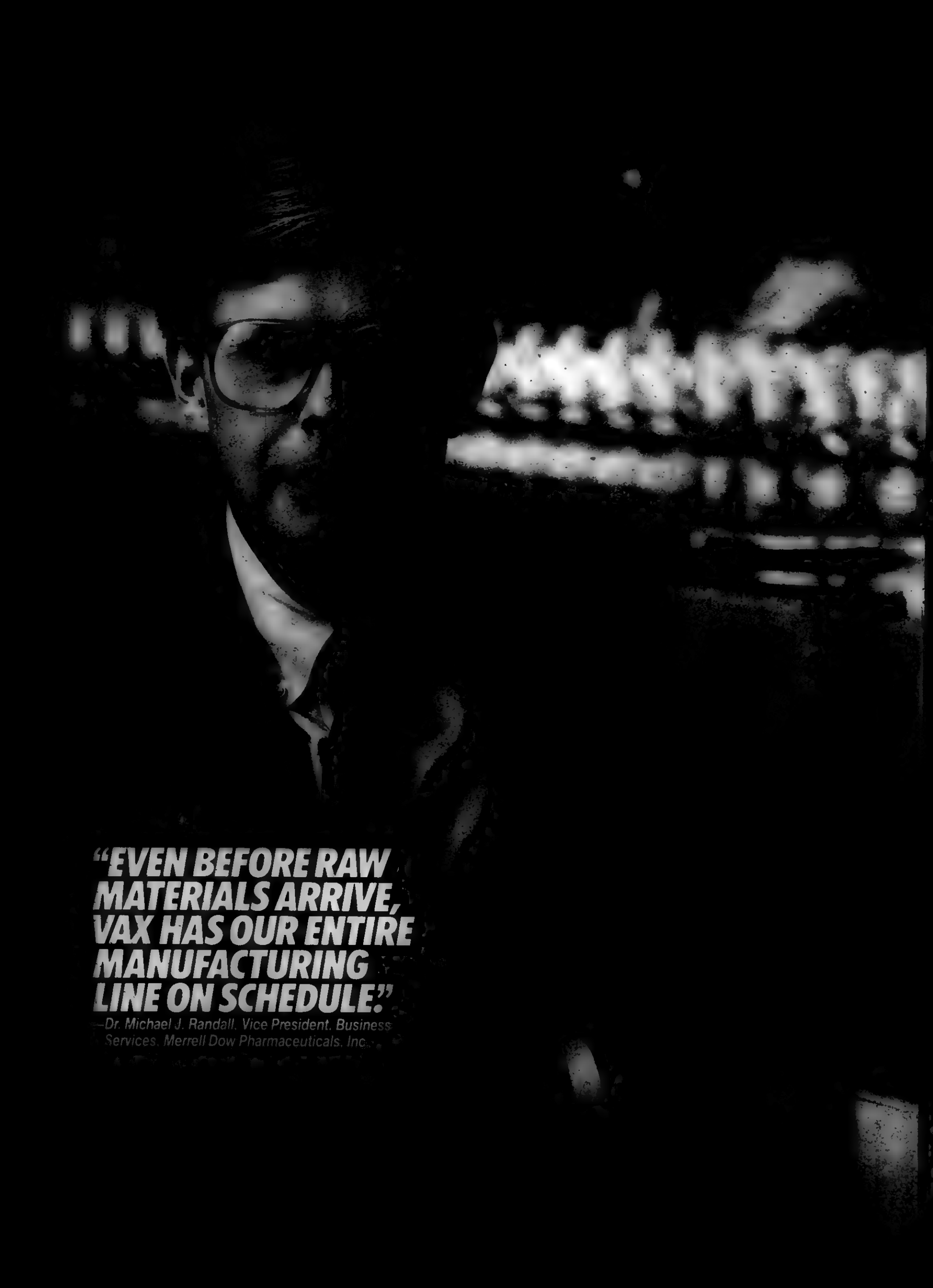
It is for these reasons that thousands of researchers are working to unlock the mysteries of physics and electronics which will permit the development of new computer systems. The 1980s may be remembered as the time when computing ceased to be identified as an industry and became a political force.

The current challenge involves what has been dubbed the fifth generation of computer systems.

The U.S. and Japan are the two major players vying to be the first to develop this new class of machines. France and the United Kingdom also have ongoing government-sponsored research projects. In addition, countless researchers in other countries are working on individual projects that eventually could lead to significant developments in computing.

(Continued on Page 66)

Tom Henkel is the senior editor/systems at Computerworld.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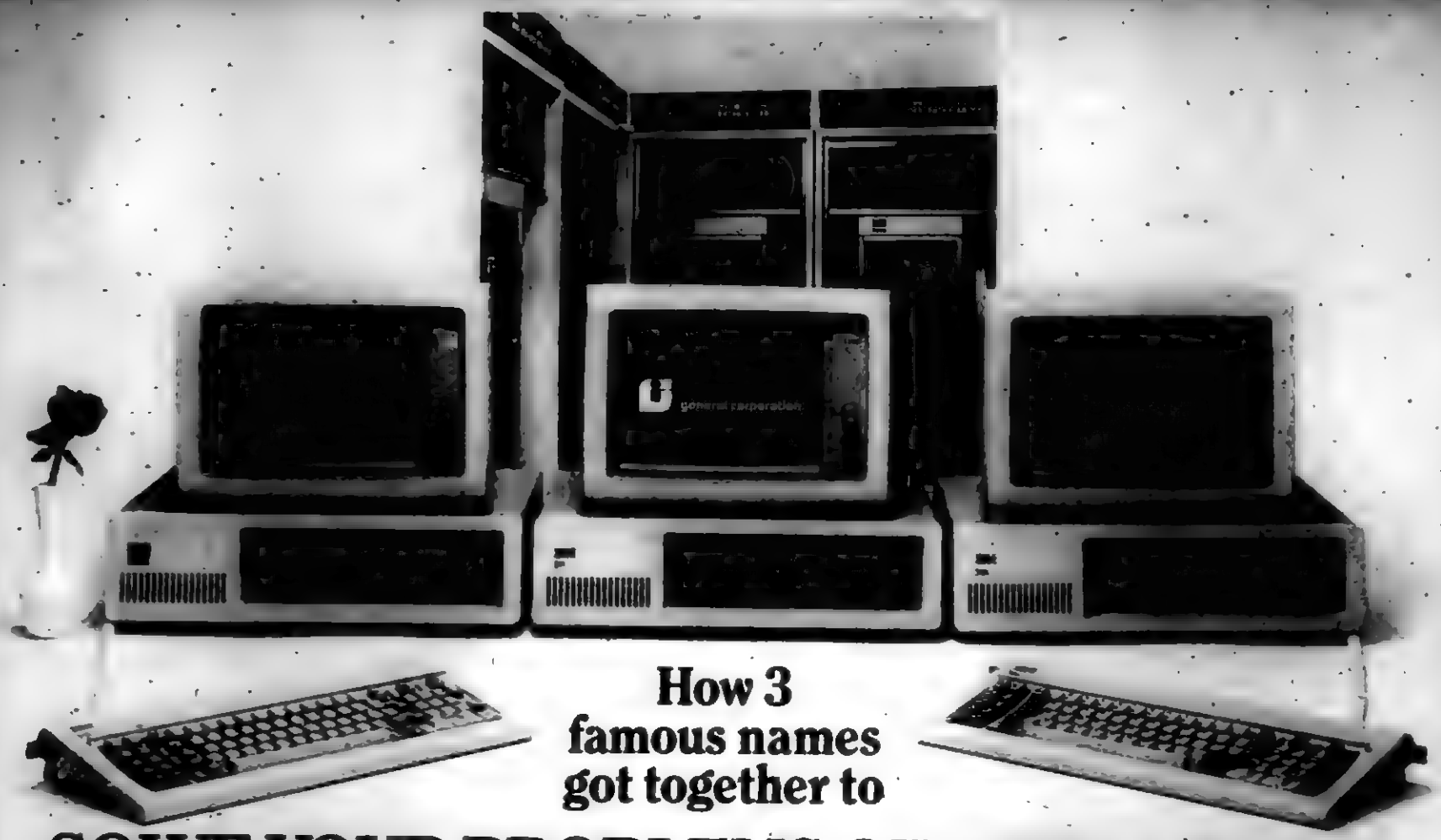

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FIFTH-GENERATION COMPUTING

U.S., Japan View Fifth Generation Differently

The U.S. and Japan are by far the front-runners in the race to the fifth generation. In many ways, the two countries are performing the same research; the difference between them is their philosophical approaches.

Traditionally, the U.S. has operated with the philosophy that business and government should maintain a polite distance. Business' job is to turn a profit; government's job is to enforce laws and collect taxes.

As a result, U.S. corporations have historically tended to focus attention on short-term projects. In many companies, a plan aimed at boosting next quarter's profits often gets more attention than a long-range plan which may not turn a profit for 10 years.

But when it comes to research, it is difficult to put a deadline on results. Consequently, a project with potential for a significant long-term pay-back may be pushed aside in favor of other projects.

Also stifling U.S. development of a new generation of systems is the market for such systems. The biggest profits appear to come from highly popular computer systems — units which will sell in the thousands, as opposed to a handful.

Many U.S. computer companies make use of large semiconductor houses, such as Motorola, Inc. and Fairchild Industries, Inc., to supply logic chips, memories and other components such as gate arrays for their processors. For the semiconductor houses, profits come from selling current items such as microprocessors rather than from developing new technologies.

To combat this trend, the U.S. Department of Defense's Defense Advanced Research Projects Agency (Darpa) has announced plans to pump money into various universities and companies to fund artificial intelligence research projects. However, the focus of the research project must be aimed at defense rather than at commercial applications.

A Darpa spokesman estimated it would spend about $50 million by the end of 1983 on assorted artificial intelligence projects at the business and university levels. The spokesman also pointed out that while Darpa is funding defense-oriented projects, a technology developed for a defense application can often be easily adapted for use in a commercial project. Darpa intends to make the technology developed under its funding available to industry.

Some Solutions

Control Data Corp. has found a way around the problem of funding projects with long-term rather than short-term payoffs. The firm recently allowed two of its top supercomputer architects, Neil Lincoln and Lloyd Thorndyke, to form their own company, ETA Systems, Inc. [CW, Aug 22.]

According to CDC Chairman William Norris, the two started their own company with CDC's blessing because CDC could no longer budget enough money to support adequately a supercomputer research project.

Of the U.S. computer makers, only IBM, which reportedly spent $3 billion in 1983 on research and development, appears able and willing to fund the major research projects necessary to produce a new generation of processor, noted Dr. Al Brenner, head of computing at the Department of Defense's Fermi Laboratory.

The quest for a U.S.-developed fifth-generation processor has an entrepreneurial flavor. Perhaps the most publicized effort has been that of the Microelectronics Computer Corp. (MCC), a research consortium of nine high-tech companies led by the former head of the National Security Agency, (Ret. Adm.) Bobby Inman. MCC was formed through the efforts of CDC's Norris to develop a high-tech research consortium.

In addition to CDC, other members of the consortium include: Honeywell, Inc.; Micro Devices, Inc.; Mostek, Inc.; NCR Corp.; National Semiconductor Corp.; Sperry Corp.; Allied Corp.; and Rockwell International Corp. MCC recently chose Austin, Texas, for its headquarters [CW, Dec. 19].

Thinking Machines, Inc., a Waltham, Mass., group of MIT researchers, is pooling the expertise of several leading experts, including one of MIT's leading artificial intelligence researchers, Marvin Minski, to work on new technologies. Both MCC and the Thinking Machines organizations are still in the formative stages and neither, at this point, has produced concrete plans for research.

In an effort to produce a faster supercomputer, three research organizations — Los Alamos National Laboratory, Lawrence Livermore Laboratory and SRI International, Inc. — have formed the Supercomputer Project Research Experiment for Research and Development (Spread), which hopes to develop a supercomputer 1,000 times faster than currently available processors. While American scientists contend that supercomputers should not be included in mention of the fifth generation, their presence is essential for at least the design and testing of new systems. Others also contend that supercomputers will eventually become an integral part of new technology processors, performing the number-crunching segments of complex problems.

In addition, leading universities such as MIT, Stanford University and Carnegie-Mellon University are working on individual projects that may contribute significantly toward development of a fifth-generation processor.

Although U.S. research efforts are operating independently, Dr. Paul Schneck, a researcher with the Office of Naval Research in Washington, D.C., noted the fragmentation may offer the U.S. a benefit over other countries because many different avenues are being explored.

"I don't think any of us has the right answers at this point," Schneck said. He pointed out that while there is redundancy in the U.S. efforts, there is less chance the U.S. will wind up throwing all its support behind a project which in the end proves impractical.

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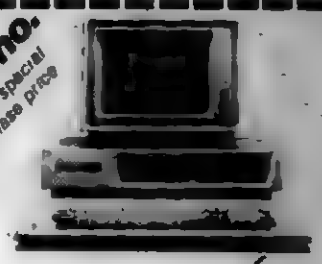

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FIFTH-GENERATION COMPUTING

(Continued from Page 61)

What exactly is a fifth-generation processor? Ironically, the term may not be concretely defined until someone actually makes one — perhaps 10 or 20 years from now. Currently, however, the term is being used to represent a genre of processors which exhibits significantly enhanced capabilities over currently available systems.

Dr. Al Brenner, head of computing at the U.S. Department of Defense Fermi Laboratory in Batavia, Ill., contends a fifth-generation processor is one capable of sophisticated artificial intelligence. Such a machine would execute logical, as opposed to mathematical, calculations.

However, John P. Riganti, a researcher with the U.S. National Bureau of Standards, notes the Japanese have defined the fifth generation to be a series of processors which, when available in the 1990s, may give Japan a stronger position in the electronics industry. Under that definition, a fifth-generation processor could include artificial intelligence processors or the high-speed, number-crunching processors known as supercomputers.

In contrast, American scientists seem to agree that new versions of supercomputers should not be included in the definition of fifth-generation processors. Newer versions of the supercomputers that exist today, such as those produced by Cray Research, Inc. and Control Data Corp., while they may employ vastly different technology, will function in basically the same manner and, thus, do not qualify as a new generation, the scientists say.

But researchers like Brenner admit the distinction between supercomputers and artificial intelli-

Japan's Approach to Fifth Generation

Unlike the U.S., which is taking a fragmented approach toward developing a fifth-generation processor, Japan is performing research in a highly controlled fashion.

With its Ministry of Trade and Industry (Miti) as a coordinator, Japan has focused the efforts of several government-sponsored projects, such as the Institute for New Generation Computer Technology and the Japan Information Processing Development Center, to work toward some commonly held goals. Each of the projects has a nine- to 10-year life span aimed at producing results sometime around the end of the century.

Japan's strong government control allows for focusing the research on several tracks. John P. Riganati, a researcher with the U.S. National Bureau of Standards, noted that the Japanese fifth-generation project, for example, is designed around 27 projects centering on seven major themes.

The benefit of this targeted approach is that Japan appears to have made the next generation of computer systems a national goal, uniting various forms of research and even some fierce competitors. The disadvantage, according to Paul Schneck, a researcher with the U.S. Office of Naval Research, is that tight governmental control may leave Japan with too narrow a focus.

Still relatively new, none of the Japanese research has yet produced a significant technological breakthrough. However, some Japanese members under the Miti umbrella, such as Hitachi Ltd. and NEC Information Systems, Inc., have announced supercomputers that appear to rival those produced in the U.S.

Some experts, including Schneck, contend that Japan is riding a no-lose wave. Even if it cannot meet its proposed 1990s goal for developing a new generation of processors, Japan will undoubtedly develop useful technologies as a result of the Miti-controlled research. Other observers added that Miti has already succeeded in breaking a long-standing stereotype about the Japanese — that they are masters at observing and copying the technologies of other countries, but lack the expertise to produce new technologies domestically.

Another advantage of the Miti approach is that it has made more readily available to scientists and researchers at the university level tools such as supercomputers, which are vital to developing and testing new technologies and circuit designs.

Schneck noted that relatively few U.S. researchers have ready access to supercomputers or the expertise to use them.

But the U.S. government has made an attempt to make more heretofore classified supercomputers and other resources available to researchers, he added.

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gence processors can be somewhat muddied by research that makes use of both logical and mathematical processing capabilities.

Many researchers are currently working to develop huge multiprocessors which incorporate many subsystems. Some, such as John Pinkston of the National Security Agency, have gone so far as to predict that computer systems may someday occupy the space of a small city, with thousands of processors linked together. Such a processor would manage its own work load, distributing tasks to the most capable components of the system.

Three Fronts to the Battle

Although an exact definition of fifth-generation processor is lacking, research is currently being conducted on three fronts: processors capable of performing artificial intelligence functions (such as expert systems, natural languages, visual and voice recognition and computer-aided instruction); supercomputers; and multiprocessors.

Technical problems appear to plague all three technologies. Dr. Paul Schneck, who is with the Office of Naval Research in Washington, D.C., recently pointed out that designers of computer systems have exhausted the obvious methods of increasing computer processing power. "Since we began building computers 30 years ago, there has been an order of magnitude [in speed increases] every half-dozen years or so." Now, researchers are facing the possibility that computer speed cannot be increased by technological advancements alone.

Scientists will have to resort to better packaging techniques and more efficient processor designs to boost performance, Schneck said.

All this research takes time and costs a phenomenal amount of money. IBM and Bell Laboratories have each spent millions over the past 10 years researching Josephson junctions, circuits which when cooled to near absolute zero lose virtually all resistance and allow dramatically increased switching speeds. In recent months, both organizations decided the Josephson approach is not practical for commercial systems and significantly cut back research [Nov. 14, 1983].

High risk and astronomical cost have driven many other computer makers away from serious research to develop the next generation of processors. The high cost has also curtailed some university research. To solve this problem, the governments of various countries have actively begun funding research projects. Perhaps the most popular of these is Japan's Ministry of Trade and Industry, the U.S. Department of Defense's Defense Advanced Research Projects Agency and the European Strategic Program of Research in Information Technology.

Europe Still at Starting Gate

If the quest for the fifth generation of computer systems was a horse race, some observers at the track would contend that European entries are still at the starting gate.

The European Strategic Program of Research in Information Technology (Esprit) is the only major cooperative effort among European high-technology firms to share research and development efforts. Still in the formative stages, the organization appears to have identified four major areas — microelectronics, artificial intelligence, office automation and computer-assisted manufacturing — as its focus.

Like Japan's Ministry of Trade and Industry (Miti), Esprit has given itself 10 years and a budget of upward of $800 million to set new technologies in motion.

Government-Funded Projects

In addition, individual countries, principally France and the UK, have ongoing government-funded research projects which may yield technological developments that could influence fifth-generation architectures.

France's Ministry de la Defense, for example, currently has two ongoing projects. The project dubbed Marianne is a supercomputer project aimed at developing a larger vector processor; Isis is a project aimed at linking multiple minicomputers into a multiprocessing system, according to Dr. Paul Schneck, a researcher with the Office of Naval Research.

Project Mariasis is a proposed project that will combine the results of the Marianne and Isis projects, possibly to form a vector multiprocessor.

UK officials are at the present time studying a recently produced government report that looks into the viability of a fifth-generation project.

Dr. Jim Howe, leader of artificial intelligence research at Scotland's University of Edinburgh, noted that his institution has several ongoing projects, which yield advances in use of the Lisp and Prolog artificial intelligence languages.

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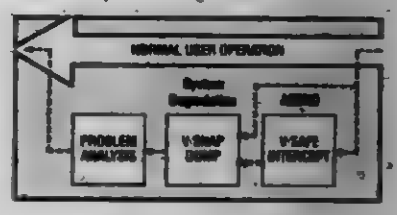

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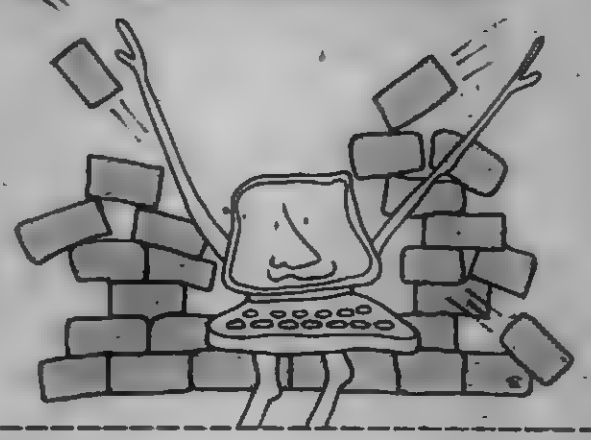

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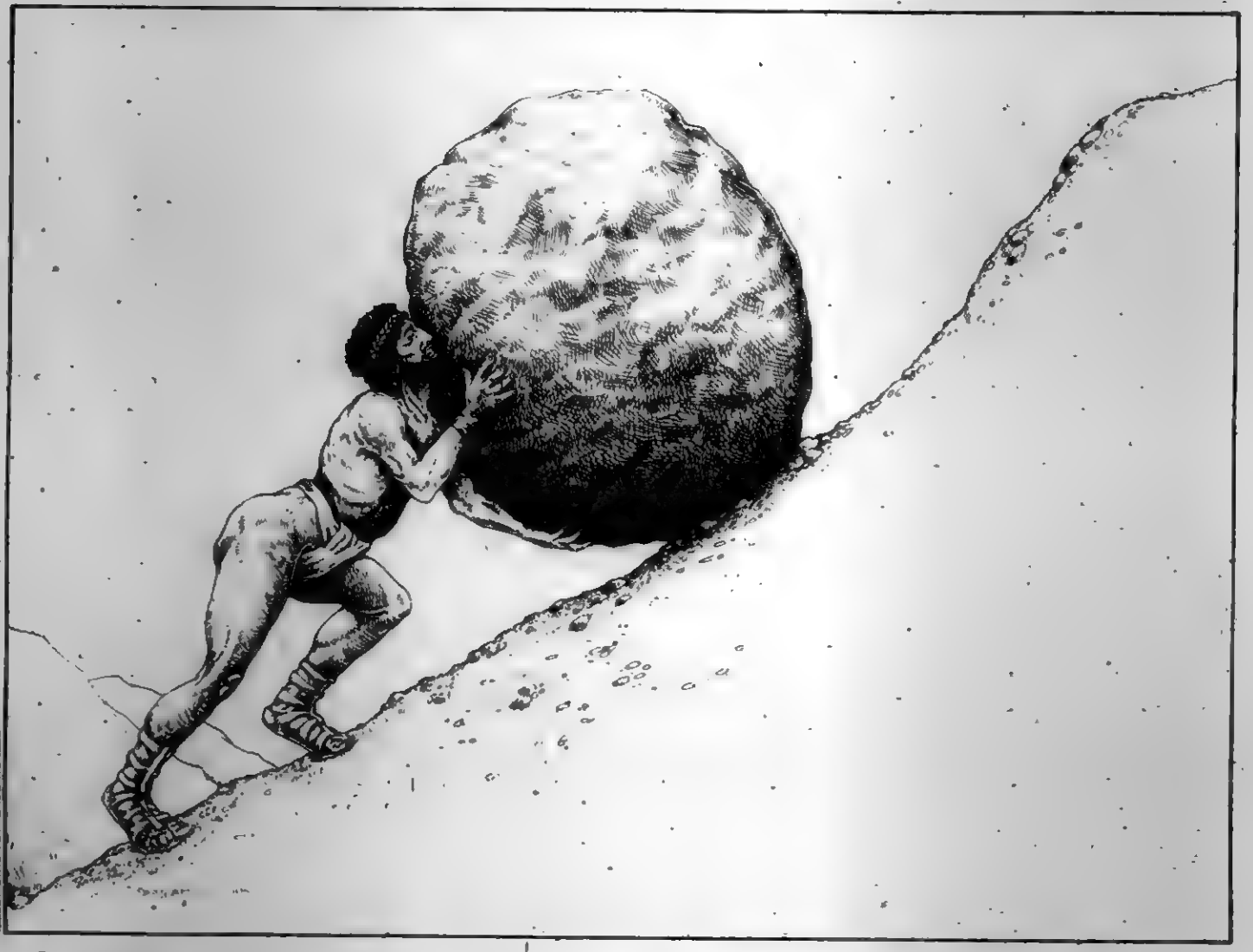

ILLUSTRATION BY GREG WENZEL

Pushing for Acceptance

By Paul Gillin

At Napco Industries, Inc. in Hopkins, Minn., the Information Services Department converted this year from IBM's DL/1 hierarchical data base management system (DBMS) to Applied Data Research, Inc.'s (ADR) Datacom/DB, a relational model.

Nate Gould, Napco's director of information services, was convinced that relational was the way to go because "We need to get at data in many different ways. With DL/1, we needed too many keys and indexes to get at data."

By the end of 1984, Napco's data base will fill seven IBM 3370 disk drives with an average of 15,000 to 20,000 transactions daily. And performance under Datacom/DB is at least as good as it was under DL/1, Gould said.

But the DP department at Inland Steel Co. in East Chicago, Ind., gave relational DBMS only a cursory look when it went shopping for a data base last year. "We're planning to do big things with our data base, like automated data capture from the factory floor. You can have very lengthy runtimes with relational," Jay Schwarz, Inland's data base administrator, said.

The company eventually settled on the inverted list architecture Adabas DBMS from Software AG of North America, Inc. to run on its IBM 3081 and Amdahl Corp. 470V/8 processors. "The main thing we were looking for was productivity gains," Schwarz said. "Adabas has a lot of nice features built around it, like the [Software AG] Natural language and security features. It was more functionally complete."

These contrasting examples highlight a debate that is heating up in the software industry as vendors and users show increasing interest in the improving technology of relational DBMS. While the relational architecture has been long admired for its ease-of-use features, vendors have begun to claim that the model is suitable for high-volume production applications, a claim that critics vigorously dispute.

Relational DBMS came into its own this year largely because of the endorsement of one vendor. In announcing Database 2 (DB2) and a version of its SQL for its MVS operating system last June, IBM told its largest users they could test the re-

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Paul Gillin is senior editor/software for Computerworld.

RELATIONAL DATA BASE MANAGEMENT SYSTEMS

lational waters without giving up the sanctity of their existing IBM IMS data bases. However, the computer giant was careful not to position DB2 as a replacement for IMS, but rather to position it as an adjunct containing extracted tables for use by nonprogrammers.

The year also saw the second largest data base vendor, Cullinet Software, Inc., announce IDMS/R, a relational version of its popular IDMS. Cincom Systems, Inc. followed by announcing Ultra, a relational system for Digital Equipment Corp. VAX-11 superminicomputers. These vendors joined such other systems software heavyweights as ADR and Computer Associates International, Inc. as recent converts to the relational view.

'It Really Has Arrived'

DB2 and IDMS/R were the most significant announcements to address the subject, according to observers. "There is no question" that the whole direction of data base is in relational, according to Ronald G. Ross, editor of the "Data Base Newsletter." "When you've got both IBM and its major competitor at the large end saying that relational has arrived, then it really has arrived."

But viable relational DBMS in a transaction-heavy environment is still at least five years in the future, Ross asserted. However, the pressure for more technically elegant DBMS models will come from the users rather than from DP, which marks a new trend.

"Relational DBMS was in the wraps of academia and was not well understood for years," said Bernard Plagman, president of The Plagman Group, Inc., a management consulting firm. "IBM has lifted that shroud in announcing DB2." Plagman predicted that "the primary use of relational DBMS for the early years will be as an information center product. Transaction-driven DBMS will remain traditional for years to come."

But some vendors are banking on the opposite trend. "We have been convinced that relational techniques will be much more viable in the '80s than others," said Mark Wasilko, marketing manager for CA-Universe at Computer Associates. First installed in April, Universe was Computer Associates' entry into the DBMS market. Of the more than 50 installations anticipated by the end of 1983, most are using Universe as their primary DBMS, Wasilko said.

The debate over response times "is only a small part of the issue in my book," compared with the challenge to DP control presented by microcomputers, Wasilko said. "With personal computers, users now have a new alternative to DP," Wasilko said, adding, "We're giving DP an alternative to loss of control in that they can now take advantage of their investment in the data center."

But that control may come at a price. "It's not a software problem; it's a hardware problem," said William Inmon, director of Coopers & Lybrand in Denver. "We're seeing some corporations using up mainframe after mainframe for relational processing."

Inmon said vendors are all wrong in touting relational DBMS as suitable for high-volume transactions. For example, relational

(Continued on Page 70)

What 'Relational DBMS' Means

While relational data base management systems (DBMS) became the talk of the data base industry in 1983, the definition of what the technology entails became cloudier.

Essentially, the relational DBMS provides a logical view of data using tables with rows and columns. Data structures are defined in logical rather than in physical terms. Relations are normalized — that is, there are no dependencies within a relation. Indexes and pointers are not needed to navigate the data base.

Only three functions are theoretically required to access specific data. The Select function retrieves rows based on a stated criterion. The Project function extracts columns, or attributes, from a relation. The Join function combines relations based on specific criteria.

Relational DBMS uses a very high-level language that should insulate the user from the need to know the underlying data structures.

As summed up by Ronald G. Ross, editor of the "Data Base Newsletter," "In relational, the user is absolutely unaware that any physical construct may be necessary to support his query, which is in a purely logical structure."

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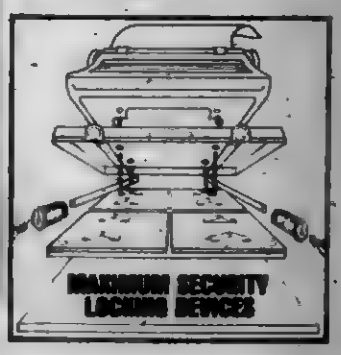

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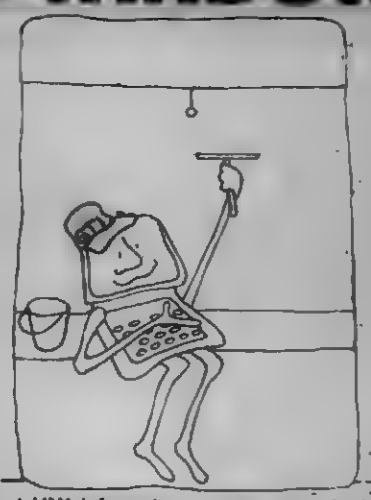

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RELATIONAL DATA BASE MANAGEMENT SYSTEMS

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systems routinely scan entire data bases in response to a SELECT command, a procedure that is acceptable in batch processing, but can destroy response times when performed on-line. "As long as the relational environment has capabilities for entire data base scans, you are not going to be able to achieve the throughput for high-volume transactions."

Furthermore, Inmon questioned the desirability of letting end users access the corporate data base. "It's taken 15 years to get operational systems up to the point [where] they are today," he said. "I sure hope we don't get something that will let users run amok in the data base."

Companies experiencing these kinds of problems usually take one of two unpleasant approaches, he said. They continue to throw hardware at performance problems or clamp down on data base usage. Either approach annoys the users.

A more palatable alternative that was tried successfully by a Coopers & Lybrand client was to offer users relational functions on micros with restricted access to the corporate data base, Inmon said. Although the initial user reaction was negative, the project later proved to ease demands on processing power while offering users the access they coveted.

Most observers agree that debate over the viability of "truly relational" production data bases is becoming secondary to the emerging need for relational-like features. Unfortunately, Ross said, this has led to a war of words in which the user is the ultimate loser.

"I would rebel against any vendor who told me he had a functional relational front end if I found out the data base was unable to support relational operations fully," Ross said. "But if he could demonstrate that his DBMS engine fully supported those functions, I would readily accept him into the fold of relational vendors."

ADR's Datacom was redesigned two years ago from an inverted list architecture into a structure the company calls "relational indexed." Like relational, data is stored in tables, but the DBMS also incorporates an index that is invisible to the user.

Datacom also makes extensive use of ADR's Datadictionary facility to define data bases, control users' authorization and functions and manage high-level application development. According to Stephen Gerrard, director of marketing for data base products at ADR, the aim is to "move these products more and more into the relational camp, but only if they can be used in a high-production environment.

"Academics may not agree with our implementation as a pure relational DBMS, but our goal is to have a relational data base for production, not for academic definition," he said. Gerrard claimed that over 95% of Datacom's more than 400 users employ the DBMS in high-transaction production environments. "We have not had users complain that it's not adequate."

A notable and successful holdout from the relational tide has been Computer Corp. of America (CCA). Sales of the company's modified inverted file Model 204 DBMS are growing 100% annually, and the company has no immediate plans to enter the relational arena, according to James B. Rothnie Jr., executive vice-president.

Rothnie criticized the "cultish sort of following" that has developed around the relational concept. "I think tabular data structures are shortsighted and will not be the wave of the future," he said. "On the research side, we've seen a shift away from relational into the areas of semantic data models and functional data models, both of which are basically network architectures."

In fact, Rothnie said, basic tabular structures have ease-of-use problems that are not recognized by vendors. "If you need information that accesses more than one relation, you have to perform a join which, I think, is virtually impossible for a user to understand," he said. "Languages like SQL and [Relational Technology, Inc.'s] Quel are good for programming, but not for users, and the reason is [exemplified in] joins."

The value of relational has been its use of high-level languages that limit user control under a relational structure, but that can provide big benefits when appended onto richer architectures, he said.

What is needed to bring relational into the production environment? Many observers agree that advances in I/O technology, which balance the need of the DBMS to scan large amounts of data, could make a difference. Associative memory, in which retrieval from the storage device is done on the basis of content rather than address, is a promising technology, Plagman said. Data base machines also present an attractive — albeit expensive — alternative by relieving the mainframe of some of the access burden.

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Information Centers

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The Users' Report

By George Harrar

The premise and promise of the information center is simply stated: Users can solve many of their own problems when provided with proper tools and techniques.

Two years ago, the information center was an appealing concept without a track record. Today, there is a record — the experiences of the companies which installed information centers early on. Is DP's applications backlog really reduced? Can fourth-generation software bring ease of use and productivity to the end user? Is the spread of personal computers throughout the company under control?

The information center promised much. Now the promises can be matched to reality by looking at the center not as an IBM concept, but rather as an up-and-running part of several large American companies.

Chemical Bank

Some came from an engineering background, others from credit and human relations. Not one member of Chemical's 12-member Office Technology Center staff had worked in a traditional DP position. "We tried before to have DP work with users," Assistant Vice-President Cecil Toulon Jr. said, "and it just didn't work. DP has to talk the language it does every day, and users talk their own language."

According to Toulon, "You don't have to justify buying a personal computer" at the giant New York bank. "If you get a senior vice-president to sign the purchase order, you can have one. That's the main reason for developing the center — to keep personal computing under control."

Since February of last year, the Office Technology Center has operated as much more than a personal tool for users. It is no less than a front-line means to corporate automation. "If we get the people at the top involved in the technology, the next step is the people under them," Toulon said. "So far we have worked with five or six executive vice-presidents and a similar number of senior vice-presidents. Once we get personal computers into of-

(Continued on Page 72)

George Harrar, senior editor/features, is responsible for Computerworld's *weekly In Depth section.*

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fices, then we can connect them to office systems to create a workstation."

The Office Technology Center Toulon directs labors to create a friendly image, making sure, for instance, that the logo on the center's seminar brochures won't "make users afraid." The "Office of Technology Center News," bearing the logo, will go out to 6,000 officers and professionals in 1984. "You must sell the information center," Toulon said. "Users still aren't sure DP is their friend, that it is something they can use. For 90% of our users, this is their first real introduction to DP. So you must use [public relations] and marketing tools to sell it."

Chemical Bank diverged from IBM's Information Center concept in designing the Office Technology Center to incorporate personal computing, office systems and time-sharing.

Corning Glass Works Corp.

An employee interest survey showed that 71% of the Corning professional staff wanted personal computing or time-sharing capability. In response, the Corning information center evolved from a mainframe service to one now complemented by personal computers. The justification: Eliminate outside time-sharing and reduce system backlog. The prime purpose: allow users to access data.

In 1981, there were 200 users corporatewide, with 1,000 hour/mo connect time and 30,000 CPU second/mo on an IBM 3033. By mid-1983, the number of users had jumped to 1,200, the connect hours per month to 5,000 and the CPU seconds per month to 70,000. "The key to the information center taking off was [IBM's] ADRS," said Doug Leupen, manager of Information Services at Corning's Health and Science division in Medfield, Mass. "That spreadsheet broke down barriers because you can become productive very quickly with it."

The ADRS departmental reporting software package provided the function aspect of a successful information center. Also key has been the support and education provided by a small central staff, which currently handles 600 to 700 phone inquiries a week.

In 1981, the information center was instructed to break even within one year, and it did so. But in 1982 came the ultimate test. "The corporation was going through a period of lower earnings," Leupen said, "and break-even companywide was cut by 6%. Yet the information center actually doubled in use that year, with full chargeback. Key managers were using the information center to help them lower their costs."

Corning, a multinational manufacturer specializing in materials and basic technology, is standardized on IBM-compatible hardware. Any terminal can log on through IBM's Systems Network Architecture to the corporate IBM 3033 mainframe in Corning, N.Y. "The big effort now," Leupen said, "is to integrate the personal computer into the information center concept. We're moving toward the work center concept of one terminal on one desk to serve many uses, such as word processing and spreadsheet."

The information center has not lessened the application backlog waiting at the door of data processing. "What really happens is you don't hit the backlog," Leupen said. "If a user senses his requirement won't be addressed for a year or so, he won't make it. The information center addresses the hidden backlog that can't be measured because you never know if it is there."

The recently implemented Focus data base management system from Information Builders, Inc. is considered to have the potential to become the most productive of the fourth-generation software tools. "Via Focus," Leupen said, "users can look at information in the mainframe through a CRT or pull it down to a personal computer for analysis or for making a graph." Other software packages commonly used are Foresight, a financial planning package from United Information Services, Inc.; SAS from SAS Institute, Inc.; PGF and Pecs, both from IBM; and Minitab, an online statistical system from Penn State University.

Denny's, Inc.

"In name, we're two years old," said Evan Wride of Denny's information center. "But we used the name improperly. In June, we restructured [the information center] properly as IBM defined it. We're treating the information center as a Big Eight accounting firm, a group of consultants."

Wride, as director of Communication and Administrative Systems, took over responsibility in June for an information center that "wasn't doing a good job in addressing new technology." In addition, he oversees Communication and Network Planning, reporting on a level with the directors of Systems Development, Computing Services and the Planning and Ac-

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counting Staff.

"Communications has been identified as the key, the glue that will tie the division together," Wride said. Fifteen regional offices comprise the restaurant division of this billion-dollar company. Currently these offices run by telephone, telex and typewriter. The information center, which was started as a development group using Focus instead of Cobol, is taking on a project management function. Top priority is making recommendations toward automating the offices with word processing, financial planning software and on-line access to the host computer.

"We're currently looking to hire a project leader, someone with the same skills as if he were on the systems development staff," Wride said. This person will join information center experts specializing in personal computers and Focus to make a formal project management team ready to automate the regional offices. "We will probably take two months for the requirements definition, then do a pilot," Wride said. "When it's working well, we'll do it for the whole corporation."

Using the information center as a project team means that the same staff which studied the end-user environment and surveyed end-user needs remains after the project is implemented to answer end users' questions and solve their problems. In contrast to many information centers, the Denny's version gets involved in projects typically taking up to three months to complete.

Dennison Manufacturing Co.

"I haven't had to justify the information center budget, amazingly enough," John Lucas said. "I'm prepared to do it. The return is so obvious that they haven't felt it necessary." Lucas manages the center at Dennison, a paper remanufacturer (maker of stickers and labels) now getting into high-tech products such as point-of-sale terminals and labeling equipment. "We explicitly don't have chargeback. If a user is accessing the

(Continued on Page 74)

IBM's Information Center: Where It All Began

In 1973, IBM Canada in Toronto dedicated several systems analysts to go into the user community to help users write reports rather than having them march through the regular systems function. By 1974, this operation was named an "information center," an idea ready to spread across Canada and south of the border.

"Our stated goal at the beginning," said Gwen Warlow, the information center manager, "was to provide education, consultation, minimal environment support and problem resolution. We were trying to assist our users to become self-sufficient, that's always been our goal. That user self-sufficiency goal has not changed, but some of the subsets under it have. We've grown and deepened our involvement with user planning, resource management and office systems. We work with users much more, help them with any of their personal computing needs."

Two thousand regular end users are served by the information staff of 25. The user community is expected to grow to 2,700 in 1984, with the user-to-staff ratio staying about 100:1.

"We're looking at a broader user population now," Warlow said. "Initially, we had people who had learned tools and coded for themselves. Later on, there were users who were prepared to work with tools and could make extracts and reports for themselves. Now many people are using menus and program function keys only. They want things programmed for them."

Warlow's background is in marketing and administration in information systems. Her staff includes some from marketing, some from information systems and others from customer service.

"I think the information center works best under information systems," she said. "I think of information systems as neutral, not in finance, administration, marketing or customer service."

Warlow believes the information center has improved the overall quality of projects submitted to systems development because end users are more sophisticated. "Now that they know how to use the tools, they are more realistic about the system they want," she said.

"Before, they would put a request in and prepare to go through the enhancement cycle. Now they build what they want right into the original request. They count on using end-user tools. The information center has achieved that," Warlow maintained.

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INFORMATION CENTERS

(Continued from Page 73)

mainframe, he just pays for computer time. If he's on a micro, he just pays for consumable supplies."

Lucas came from Honeywell, Inc., bringing 12 years of experience in financial analysis, Basic programming and time-sharing. One information center specialist and one temporary staff person report to him; he reports to the manager of User Systems within Management Information Systems (MIS). The main walk-in center, which serves about 250 microcomputer users and 35 to 40 users who work with mainframe products, is located within the MIS building at company headquarters in Framingham, Mass.

The new year launches a new effort to reach Dennison end users through satellite centers. "We started this idea ourselves," Lucas said. "We were looking at ways to put micros in the end-user community in the most effective way. There was no good alternative for the person who wanted to use a micro four or five hours a day, short of coming over to us. The satellite centers are more for people who understand what they're doing, working on ongoing applications." The satellite locations enable the end user who has "graduated" from the main information center to work on his own, closer to his office.

In the information center, Lucas maintains one ground rule — no programming. "It's strictly off-the-shelf software," he said. "We think we can support most people that way. If we had to program, we couldn't support as many people. [The center] would become dedicated to a special group of people."

In the micro area, 1-2-3 by Lotus Development Corp. is "preeminent," according to Lucas. For mainframe applications, the only fourth-generation language used is Infodata Systems, Inc.'s Inquire, the data base ad hoc query package allowing remote, multiuser accessing.

The Charleston, W. Va., information center, begun in September 1980, is one of two DP centers serving this multinational chemical, metal and carbon maker.

"It originated to support CMS installation when [IBM's] CMS was brand new," Robert Hutton, senior staff analyst, said. "Now people are getting comfortable with CMS, and throughout the company people are getting fairly heavily into personal computer use. So now the information center is becoming a resource for people using personal computers, mostly the larger ones from IBM and Apple [Computer, Inc.]."

Part of the center's purpose was to lessen applications backlog. "It has helped in CMS-supported systems," Hutton said. Software provided by the information center is designed, as Hutton said, "to be used directly by the user if he is willing to invest a little time." The software includes Inquire, SAS' Sasgraph and [Issco Graphics, Inc.'s] Telegraph.

Originally, the information center was aligned under the MIS position of applications manager. A year ago it shifted to the DP area, under supervision of the data center manager.

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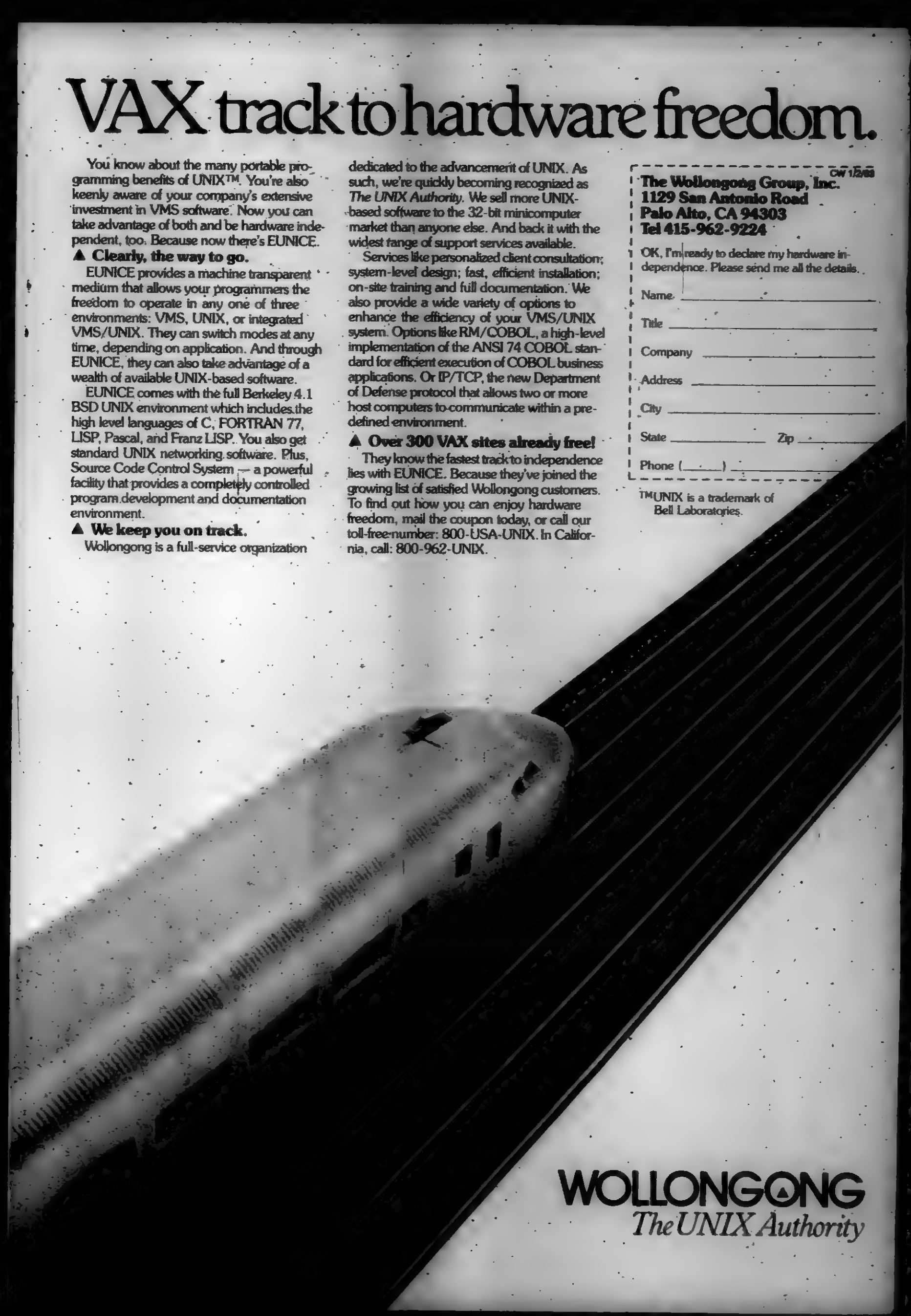

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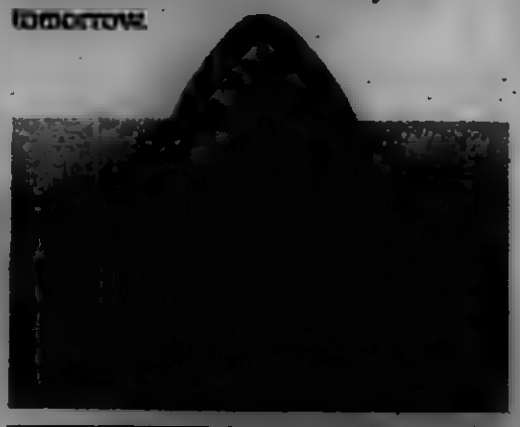

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Unix And the New Contenders

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By Jeffry Beeler

Among research and academic institutions, it long ago established itself as a standard and has seldom lacked for outspoken admirers willing at a moment's notice to recite its many virtues.

But in the commercial world, a host of well-documented shortcomings has kept it from realizing its full potential and has seriously slowed its acceptance by nontechnical end users.

Today, however, the picture is beginning to change. Nearly 15 years after its conception at Bell Laboratories, Inc., this long-time bit player in the international business systems drama is finally starting to emerge from obscurity and grab some of the limelight its fans consider long overdue.

Already it shows signs of becoming the preferred operating system for 16-bit personal computers and has even made modest inroads into central computing departments, where it can occasionally be found running on IBM 370s and comparable CPUs. Whether its limited successes on the business mainframe stage will continue and ultimately propel it into technological stardom and end-user acclaim is still open to debate.

As the 1983 calendar turns its last leaf and AT&T enters its first year of true deregulation, the evolution of this potentially influential software product will bear closer watching than ever before. What finally happens with it will present corporate management information systems (MIS) managers with new challenges and opportunities that will inevitably affect their ability to:

- Hire qualified programmers.
- Acquire the latest and most advanced programming languages and development tools.
- Sidestep the pitfalls of sudden hardware obsolescence while safeguarding their investment in existing software.
- Span the vast gulf separating personal computers and central mainframes.
- Keep pace with user demand for new, improved applications.

The object of all the attention and

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Jeffry Beeler is a Computerworld West Coast correspondent.

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industry speculation is, of course, AT&T's Unix, an operating system whose overall performance thus far has drawn decidedly mixed reviews, with raves in some quarters and boos in others.

Initially for Bell Only

First written in 1969 by Bell Labs scientists Ken Thompson and Dennis Ritchie, Unix was intended as a program development tool strictly for AT&T's own internal use. Then, in the early 1970s, the user audience substantially widened when Bell began making the product available to the outside world, particularly to universities and research facilities. Because its developer was then constrained from competing in the computer industry, the program was distributed to outsiders exclusively through licensing arrangements rather than being sold directly.

Since then, Unix has found its way into the hands of more than 2,200 licensees, among them some 700 institutions of higher learning, including MIT and the University of California, according to AT&T fact sheets. At the same time, the system has also continued to flourish within Bell itself, where it is currently installed on approximately 750 CPUs in 300 sites, per-

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IBM to Develop Its Own Unix Version

IBM will develop and support its own version of AT&T's Unix and make the operating system available across a broad range of processor models, from personal computers to host mainframes, according to industry analyst Robert Fertig.

As modified by IBM, the control program will be a "superset" of its AT&T counterpart and will "play" on the 4300 and 308X series as well as on CPUs that have yet to be announced, he predicted.

"IBM needs to support Unix because it doesn't want independent software firms to control its destiny," and because it has to interconnect otherwise incompatible hardware, the president of Greenwich, Conn.-based Enterprise Information Systems, Inc. said in a recent interview.

Fertig's remarks about the industry giant's operating systems plans put him in accord with market researcher Eileen Skrabutenas, who described Unix as one of AT&T's most important weapons in its impending computer industry showdown with IBM.

Because of its portability, Unix provides AT&T with a ready means of integrating a large corporation's existing systems organization with the hodgepodge of competing personal computers now proliferating among its end users. Such a capability for integrating dissimilar systems is currently unavailable from IBM, according to Skrabutenas, a senior analyst at Los Altos, Calif.-based Yates Ventures, Inc.

Skrabutenas also predicted that Unix will form the technological foundation for AT&T's first commercially available line of computing hardware, the initial models of which are expected to make their debut next year. Included in the anticipated equipment family will be an existing intelligent terminal that AT&T will upgrade with a Motorola, Inc. 68000 microprocessor to form the company's first Unix-based personal computer.

A second member of the predicted Unix-driven processor line will be a high-level CPU comparable in computing power to the Digital Equipment Corp. VAX-11 superminicomputer series, Skrabutenas said.

Like Unix itself, both the personal computer and the supermini were originally developed for internal AT&T use and are now being adapted for release to the outside world as the company finally enters the era of deregulation.

The advent of the first AT&T-supplied computing hardware line will significantly expand the business world's hardware options and propel AT&T into the front ranks of the computer industry. "In the past," Skrabutenas recalled, "the leading hardware vendors included IBM, DEC and [Hewlett-Packard Co.]. In the future, that select group will be joined by AT&T, which is the only company with enough clout to challenge IBM in the Fortune 1,000 environment."

The sudden entry of such a dominant new player into the equipment vendor ball game could spell big trouble for the "bunch" companies — Burroughs Corp., Sperry Corp., NCR Corp., Control Data Corp. and Honeywell, Inc. — some of which can ill afford increased competition in their traditional market niches, Skrabutenas warned.

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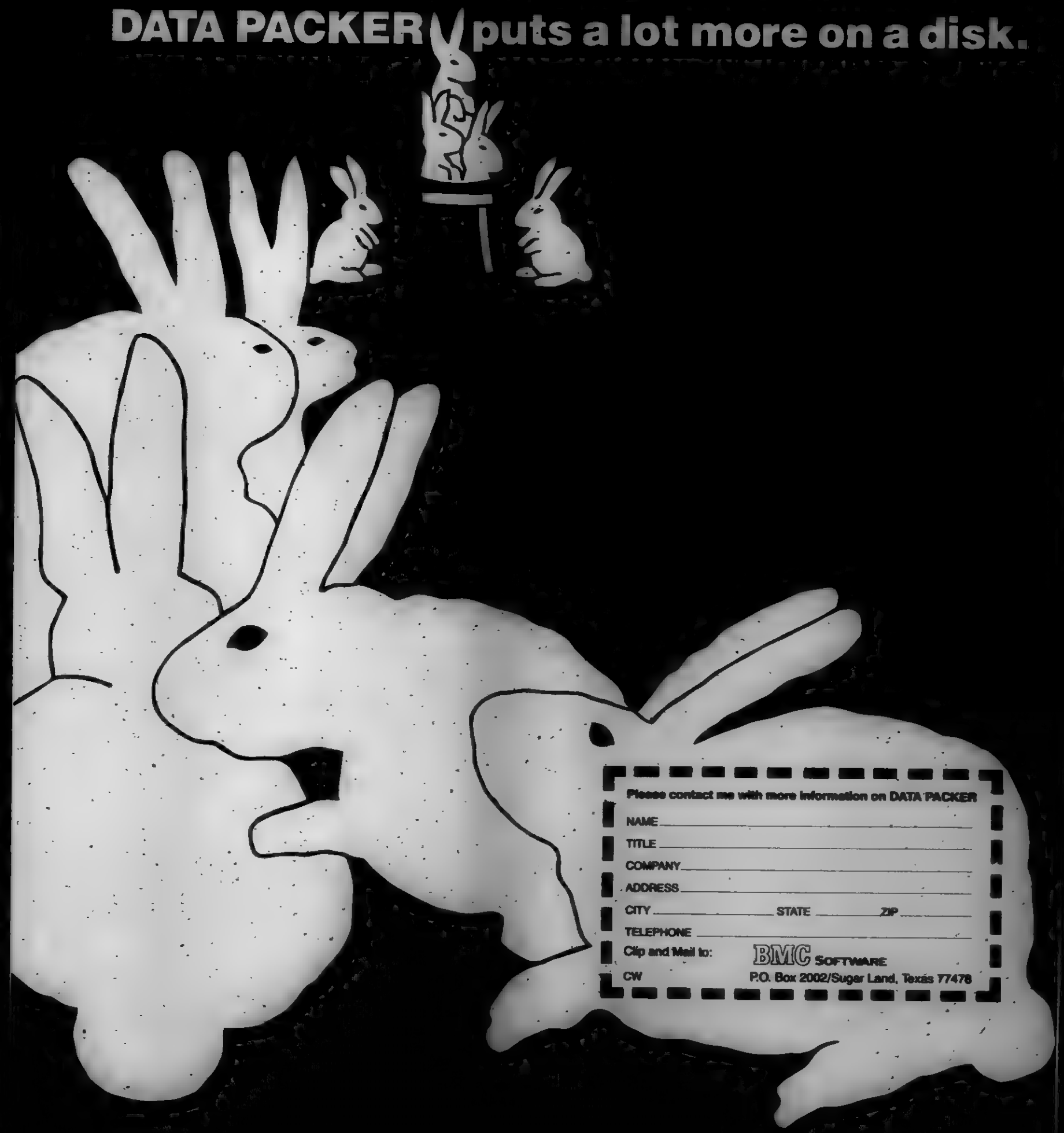

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UNIX AND THE NEW CONTENDERS

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forming hundreds of applications ranging from programming to office automation.

In the commercial world, however, efforts to spread the gospel of Unix have often met with stiff user resistance. The reason for the opposition has to do primarily with the operating system's obscure and complicated command structure — a feature well adapted to software development, but intimidating and difficult for computing novices.

To a large extent, therefore, Unix's long-term success in the commercial marketplace depends on AT&T's ability to simplify the program's user interface. Efforts to increase the software product's user-friendliness will probably rank among the firm's top Unix-related priorities during the coming year, according to John Ulett, marketing manager for Microsoft, Inc.'s Xenix operating system.

Corporate Standard?

On the question of whether large companies will ever adopt Unix as a standard, opinions diverge widely. One of the skeptics in the debate over Unix standardization is Fenwicke Holmes, president of the Santa Barbara, Calif.-based Information Academy, who retired earlier this year as information systems director for Del Monte Corp.

Holmes sees little chance for the vaunted AT&T operating system to displace the well-entrenched IBM software that has dominated corporate computing centers for years. "The world of large mainframes is an institution like the Catholic Church, and it would take an awful lot of drive to get it to change," he contended. In theory, he added, MIS departments "should be their companies' main agents for internal change." In practice, however, "they are often less adaptable to change than they should be because of their vast investment in Cobol, procedural languages and operating systems."

Other sources see Unix standardization in the mainframe realm as a distinct possibility. The benefits of converting big corporate hosts to Unix would be myriad, contends Jack Scanlon, vice-president of Western Electric's Processor and Software Systems Division.

According to Scanlon, because Unix is written almost entirely in C, it can be easily adapted to operate with many vendors' hardware. Thus, a Unix application originally written to run on Company A's processor can be quickly transported to Company B's.

For information systems directors, such portability greatly simplifies the problem of hardware selection by minimizing the potential ill effects of choosing incorrectly. With most other operating systems, "a data processing executive has to be as good a technologist as he is a manager," Scanlon said. "But if his company migrated to Unix, he

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CP/M, MS-DOS To Help Shape Future of Unix

Microsoft, Inc.'s MS-DOS and Digital Research, Inc.'s Concurrent CP/M are only two of the widely used microcomputer operating systems with which the Unix world will increasingly have to contend. Other software offerings that are also likely to play a role in shaping the AT&T operating system's future will include the Unix derivatives and look-alikes.

The distinction between the two classes of Unix-like operating systems lies in their source code, Eileen Skrabutenas, a senior analyst at Yates Ventures, Inc., explained. Unlike the derivatives, which use the same source code as their AT&T model, the look-alikes are based on their own proprietary programming.

Among the derivatives, which include examples such as Microsoft's Xenix operating system, one of the key trends for 1984 will be the addition of windowing capabilities, according to John Ulett, Microsoft product marketing manager.

Among the look-alikes, meanwhile, Skrabutenas foresees the development of a standard port between Unix's latest version, System V, and the microprocessors of four major chip manufacturers — Intel Corp., Motorola, Inc., National Semiconductor Corp. and Zilog, Inc. When it released System V last January, AT&T's Western Electric announced the signing of an agreement to develop versions of the modified operating system for the four semiconductor makers' processors.

The emergence of a standard System V interface will allow application software to be transported easily among the four microprocessor options and will simplify the integration of personal computers into existing mainframe environments, Skrabutenas predicted.

As players in the larger Unix world, the look-alikes are likely to be confined primarily to narrowly defined market niches, she added.

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Honeywell

(Continued on Page 80)

could be wrong occasionally in his hardware selection."

Portability also provides MIS heads with at least one other major payback: Because software houses will increasingly gravitate to Unix, the operating system will make available to its users a wide selection of the latest and most productive applications, Scanlon said.

Pick to End Self-Exile With Future Release

One of the computing field's least known software products may soon end its long self-exile in the industry backwaters and make a place for itself in the mainstream of commercial applications.

For years, Pick & Associates, Inc., the originators of the Pick operating system, have intentionally soft-pedaled their most cherished creation, whose many perceived shortcomings reportedly left the authors deeply dissatisfied and reluctant to seek widespread distribution. That combination of resolute perfectionism and distaste for aggressive promotion has made Pick "one of the industry's best-kept secrets," according to Janice Antonellis, a senior market analyst for International Data Corp.

Soon, however, the fog of secrecy surrounding the operating system may lift forever. An ongoing effort to rewrite Pick and, thus, rid it of its reputed drawbacks has finally begun to bear fruit in the form of a new Pick release, probably slated for introduction sometime next year, Antonellis said.

If reports of the imminent release prove true, the developers' long-delayed bid to push their products in earnest may finally be at hand, she added.

Pixies and Minows

Whether the expected promotion succeeds and thrusts Pick into a position of unaccustomed prominence may ultimately depend on the scope and judiciousness of the rumored software rewrite. By all accounts, the control program's strengths are manifold.

Like its nearest equivalent, Unix, Pick operates with a wide array of processor models and size classes, ranging from personal computers to mainframes.

The system also boasts a large library of application software, according to Eileen Skrabutenas, a senior analyst at Yates Ventures, Inc.

Unlike Unix, however, Pick still lacks support for a high-level programming language, Skrabutenas said. In fact, the only language available with the operating system is Pick Basic.

Among small businesses, where Skrabutenas expects Pick's influence to be felt most heavily, failure to support a high-level programming language might work to a commercial operating system's advantage. But in the Fortune 1,000 world, such a handicap usually means instant rejection.

So as a future enhancement, high-level language support ranks among the leading candidates for inclusion in Pick's next release, Skrabutenas said.

Whether Pick ever finds a significant place for itself in the big-business sun also depends heavily on future directions with Unix. "If Unix finally acquires an effective user interface, Pick won't gain much momentum," a source who asked not to be identified said.

"But if Unix fails to become significantly more user friendly than it has been in the past, Pick may have a promising future," the source contended.

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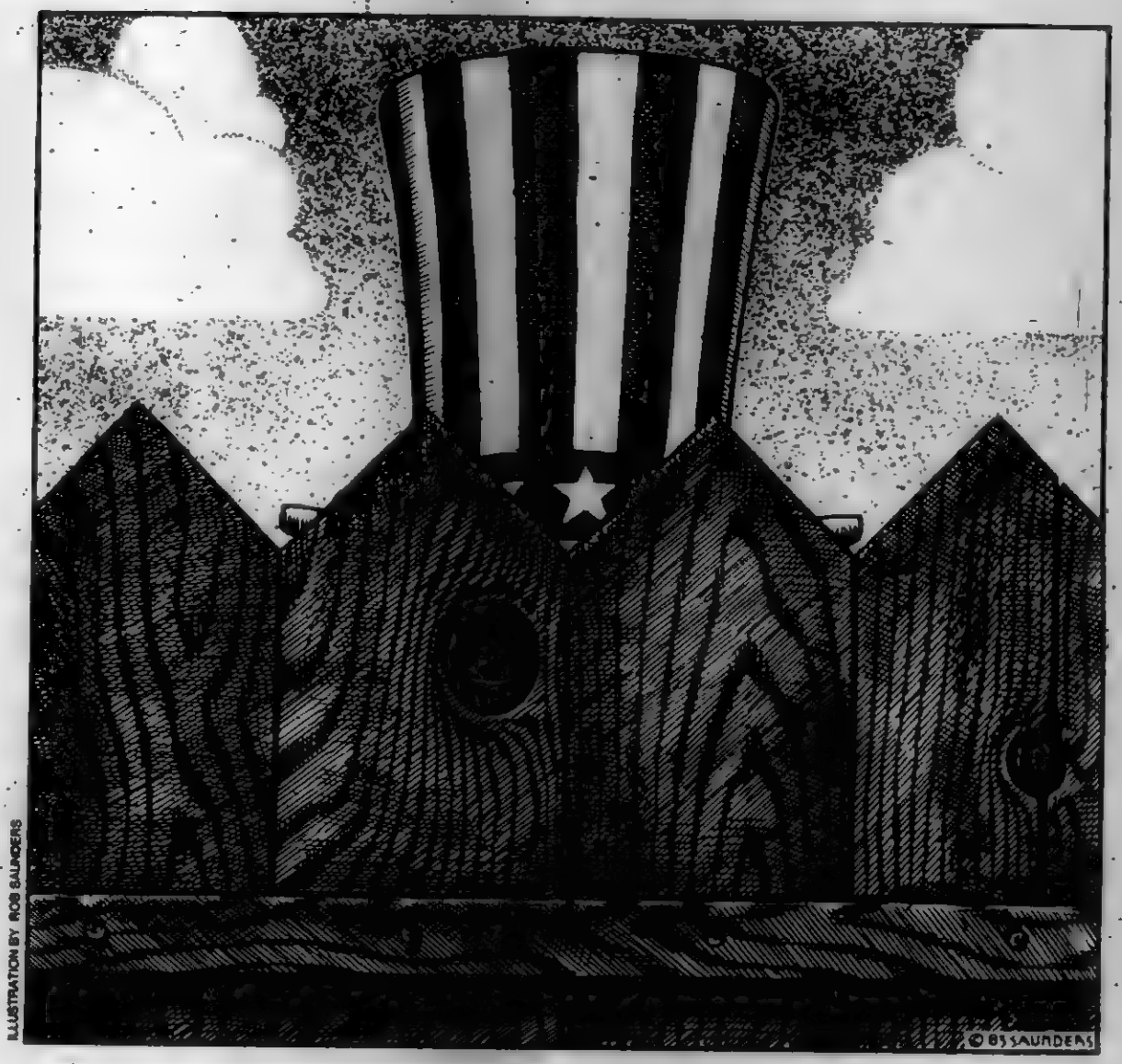
Privacy Issues In 1984



By Jake Kirchner

There was of course no way of knowing whether you were being watched at any given moment . . . You had to live — did live, from habit that became instinct — in the assumption that every sound you made was overheard, and, except in darkness, every movement scrutinized.

***— George Orwell's* 1984**

As the calendar turns to 1984, George Orwell's chilling negative utopia is much in the public consciousness. The terms "1984" and "Big Brother" are heard from every quarter, and many would have us believe that Orwell's society of complete government control and absolute lack of personal privacy is close at hand.

Actually, our society today is not at all similar to that depicted in the novel. But then Orwell's story was not a prediction, but a warning — a warning that we and our institutions are evolving in such a way that our powers of self-determination are slowly being eroded. Unfortunately, what most people think of when they hear "1984" is illustrated in the quote above; they form a mental image of Big Brother as an oppressive physical presence in the form of jackbooted, truncheon-wielding fascists relying on Peeping Tom electronics.

The Big Brother we really face is a much different beast.

In the novel, the most obvious instrument of government repression was television; every room was monitored, every action observed and every sound heard. Television is many things in our lives, not all of them beneficial. But except for scrutiny from observation cameras in some stores, public buildings and the like, most of us do not have to fear physical surveillance — at least not yet.

Computers, of course, were not well known in the late 1940s, when the novel was written. Today, many people think computers will be the primary instruments of repression. A recent Louis Harris opinion poll found that 77% of the general public and 79% of congressmen and their top aides are somewhat concerned to very concerned about threats to their privacy in the computer age. Another poll, conducted in Canada, revealed that more than half those surveyed fully expect their privacy will be invaded by computers or by government agencies and private sector organizations that use computers.

Certainly, computers make privacy invasion easy. Law enforcement agencies at every level are rapidly

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Jake Kirchner is a Computerworld correspondent based in Washington, D.C.

PRIVACY ISSUES IN 1984

(Continued from Page 85)

automating, in some cases for the purposes of surveillance. Bureaucratic and corporate organizations, not satisfied with the teeming data banks resident in their large mainframe systems, are deploying microcomputers by the tens of thousands with little or no thought to how all the personal data they process will be protected. And even the most minor financial transaction, it seems, requires one to fill out lengthy, detailed applications often demanding very personal and apparently irrelevant information — further grist for the computer mill.

But even with this trend to large-scale data gathering and lax security, the actual mechanism of computerized privacy invasion is not well understood. Most people seem to believe it will result from too many organizations having too much information on us. While that is no doubt a legitimate concern, little thought is given to how that information will come to be in the "wrong" hands.

We fear that government and corporate America will come to take our privacy away. In fact, our privacy is already gone to a great degree and, in fact, it was not taken; to a large extent, we gave it away, all too witting accomplices of Big Brother.

We traded our privacy for government benefits, ranging from food stamps and unemployment checks to public education and income tax deductions. We bartered it for medical insurance, house mortgages, car loans, credit cards and check-cashing privileges. In many cases, we did not like giving up all the personal information, but we did not seem to have much choice.

Reflecting on this recently, one privacy advocate said: "It's always a trade-off; it's always a balance . . . The question is: Do you want to fill out this incredibly obnoxious application or do you want a credit card? Do you want to fill out this disgusting application or do you want a job . . . If you don't have a job, getting one is the most important thing."

Our concern now is that all that data might be used against us, that it will be shared by the wrong people in ways we are not aware of and would not approve of if we did know. We do not like it, but we do not know what to do about it.

Citizen Concern

Citizens are concerned about privacy, but do not know how to safeguard it. Computerized bureaucracies and corporations pay lip service to the need to protect personal privacy, but in practice are more concerned about efficiency than privacy. Legislators, whom we might expect to be concerned about our rights to privacy, are just like the rest of us — deficits, crime, nuclear proliferation and unemployment seem to be much more immediate threats.

Computerworld recently asked a number of people interested in the privacy issue to comment on "the 1984 issue" and to speculate on the causes of and possible cures for the trend toward gradual privacy erosion.

If their remarks have any common thread, it is that the American public is very much concerned about privacy, but does not know how to protect it, and that is not likely to change unless citizens and legislators make a concerted effort to win back and preserve privacy rights.

A staff member of the U.S. House of Representatives' Subcommittee on Government Information, Justice and Agriculture, which has unsuccessfully pushed privacy legislation for years, said support for privacy measures is "a mile wide and an inch deep. People are willing to trade their privacy for every other benefit."

Why that is so is not immediately clear. Terril J. Steichen, director of former President Carter's Privacy Project and currently a private consultant and writer specializing in information technology topics, put it this way: "The public hates Big Brother. They like privacy but, unfortunately, they have very distorted perceptions of both."

Privacy loss, according to Steichen, results from the incremental gathering of data by many organizations plus a concomitant loss of individual control over use of that data.

Data gathering and sharing, he said, produce "data images" of citizens. Organizations make decisions about people based solely on those images, even though the data may be old, incomplete, inaccurate and biased. The person behind the data is no longer a factor.

To August Bequai, attorney and author of six books on white-collar crime and related subjects, privacy invasion is considered a sign of the times.

"Technology in and of itself doesn't mean anything," he declared. He pointed, rather, to what he sees as "a lack of sensitivity on the part of people as regards privacy . . . We've become less sensitive to the other person's rights — that's what privacy is, another person's rights."

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PRIVACY ISSUES IN 1984

Federal Record Poor for Privacy Protection

With so much concern today over privacy issues, the logical question to ask is why the government is not looking out for our privacy.

Why must we fear intrusion by government agencies? After all, 1984 also marks the 10-year point for the Privacy Act, passed to ensure individual privacy protection in government operations. But today, there is more government data gathering, more data sharing and less individual control over what agencies do with our data than ever.

According to a recent congressional report, the current administration has the worst record for privacy invasion of any since the Nixon years. The report accuses the Office of Management and Budget (OMB) — responsible for overseeing agencies' privacy practices — of almost complete failure to perform its duties under the Privacy Act.

Here again, lack of understanding plays a role. Government agencies, with some exceptions, do not seem to understand why they should be zealous about protecting personal privacy. They also often confuse privacy with security and think that keeping data secure is the same thing as protecting the privacy of the data subjects.

Reluctant Citizens

OMB Deputy Director Joseph R. Wright told a congressional subcommittee a few months ago that a public perception that government data banks can be tapped from outside might make citizens reluctant to supply data to the government, "thereby eroding the integrity of our data bases and ultimately affecting the quality of our programs."

What Wright did not say is that the same thing holds true for privacy protection. If citizens feel the government is not respecting the confidentiality of personal information, if the data is freely shared by other government and private entities, agencies may encounter resistance to their data-gathering efforts. But to the government, the threat is always from the outside, never from within the organization.

Commenting on that, Terril J. Steichen, director of former President Carter's privacy project and currently a private consultant and writer specializing in information technology topics, remarked, "The fox is not going to view himself as a mad slayer of chickens. He sees himself as playing a vital role in the world. No one, including the government bureaucrat, likes to have his integrity questioned. . . . [To him] all the bad people are outside."

Beyond that, as the House Government Operations Committee report put it, "Privacy interests frequently conflict with other important governmental interests, such as economy and efficiency." According to Steichen, "Government often presents privacy as a luxury that costs government money; [privacy is] sort of silly because it requires duplication of data gathering."

It seems clear that any push to rededicate the government to privacy protection will have to come from outside the bureaucracy itself and will have to be mandated by Congress. But the chances for congressional action on privacy matters are quite slim.

The only privacy legislation now before Congress is a bill by Rep. Glenn English (D-Okla.), chairman of the House Government Information, Justice and Agriculture Subcommittee, which calls for a separate government entity to oversee privacy protection. The bill, however, is controversial even within the subcommittee, primarily because it would establish a new agency in a time when the trend is toward less bureaucracy, and according to Capitol Hill sources, the bill will be moved slowly, if at all.

The legislation "needs a tremendous amount of additional support," a subcommittee aide said. And given the Republican-controlled Senate, particularly the Judiciary Committee headed by Strom Thurmond (R-S.C.), there is almost no possibility of getting Senate approval of any but the most minor privacy legislation during 1984.

In the Senate, the most that can be hoped for is tighter privacy regulations for agencies and a mandate for greater OMB vigilance in implementing the Privacy Act. The Senate Governmental Affairs Subcommittee on Oversight of Government Management will soon continue its investigation into agency use of computer matching, particularly as it relates to Internal Revenue Service data, but a subcommittee attorney said it is not clear what if any legislation might result from this initiative.

In addition, congressional privacy advocates on both sides of Capitol Hill are fully aware that the law enforcement community, especially the Federal Bureau of Investigation, has been able to gut or kill any privacy legislation for the last five years.

Any privacy protection mechanism makes law enforcement agencies fear they will lose access to data they feel they need to do their jobs, and to a certain extent they are correct. Congress to this point has not been able or willing to make it clear that, at least in terms of privacy, police in a free society must operate under some restraints.

The blame for this state of affairs, however, should not rest solely with any one ideology; liberal legislators, too, have been negligent about privacy protection. Not only have they not faced down law enforcement, they have also been quick to advocate increased data gathering and computer matching in social welfare programs.

Evidently, in a time of tight federal budgets, programs to help the needy must be run in a climate of fear, and recipients, who in many cases are the most defenseless, must give up their privacy rights and be treated as second-class citizens in order to qualify for benefits. This holds true at least for those who, because they are at the bottom of the economic scale, must wait at the end of the government giveaway line.

Few of the more fortunate among us recognize that we receive far more in government benefits — from mortgage interest deductions, corporate tax credits and the like — than does any fatherless family on food stamps. If we do not protect the privacy rights of the least among us, who will protect ours?

The question is not academic, according to August Bequai, attorney and author of six books on white-collar crime and related subjects, who has done considerable thinking about the future of privacy and data security in the U.S. He argues that automation combined with a growing lack of ethics in this country threatens more than our privacy.

"If you have the right formula, and by that I mean the instrumentalities to gain all sorts of information and the instrumentalities to control information and a lack of ethics, and . . . if the socio-politico-economic fabric of America suffers a traumatic event or events — recession, invasion, terrorist attack — the unethical, armed with this awesome technology, can deprive us of our privacy and our political freedoms.

"We've been spared this in our country, thank God," Bequai added. But, he said, "I find it hard to believe the naivete of people who are supposedly intelligent. . . . They say, 'So what?' "

Not Without Hope

Despite the gloomy assessment of many privacy advocates, 1984 is not a year without hope. Indeed, all those contacted by *Computerworld* were uniformly optimistic that the privacy situation can change. Bequai, seemingly the most pessimistic of all, contended that education at all levels can make us more sensitive to the need to protect our privacy and that of all citizens.

The year 1984 has spawned considerable interest in privacy. George Orwell's book and the current state of society will be the topics of seminars, hearings and meetings all across the country during the coming year. Those concerned about privacy are hoping these will lead to much more grass-roots support for privacy regulations and codes of conduct in government and the private [illegible]

John Shattuck, head of the Washington, D.C., office of the American Civil Liberties Union, which is working with a number of public interest and professional groups to elevate the privacy issue in the public and in state and federal legislatures, said the combination of increased public access to computer technology and the Orwellian year are creating a better climate for action on privacy matters.

Shattuck said any privacy legislative agenda probably will have to wait for a change in the control of the Senate and for a new president. But he also said he does not see any presidential candidate making privacy a campaign issue. This he attributed to "overarching issues," such as the economy and foreign policy, that are crowding out privacy matters.

But, he said, "If it weren't for the fact that the world is otherwise falling apart, [privacy] might be the top item of priority." In any event, Shattuck said, privacy is an issue whose time has come.

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Computer Matching

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An Ethical Exchange?

By John Gallant

I think there are some very distinct signs that Big Brother is around and watching. I don't mean that strictly in an Orwellian sense, but in the insidious ways computer matching has made possible. This widening exchange of information is the basis for a general surveillance system.

— John Shattuck, director of the Washington, D.C., office of the American Civil Liberties Union

Norma Rollins believes that important events — milestones, if you will — crystallize support for privacy issues.

Rollins, director of the New York Civil Liberties Union (NYCLU) Privacy Project, hopes that 1984 — in an Orwellian sense — will be the milestone that coalesces opposition to the widening use of computer matching.

"The last driving force behind a privacy issue was Watergate. The 1974 federal Privacy Act came about as a result of that," Rollins said. "Maybe 1984 will be the same for computer matching. That's a magic year. [George] Orwell's book may be just the thing to stimulate our thinking and to build a constituency once again."

Empowered by the U.S. Congress to regulate the use of computer matching on the federal level, the Office of Management and Budget (OMB) defines "computer matching" as a procedure "in which a computer is used to compare two or more automated systems of records or a system of records with a set of nonfederal records to find individuals who are common to more than one system or set." The definition is simple enough. But the benefits of computer matching, the future of efforts to limit its use and its impact on personal privacy in the heralded year of Big Brother are issues that are far from clear.

One thing, at least, is certain. The technique of computer matching will be used more often, and for a wider range of purposes, on both the state and federal levels. President Reagan has placed high priority on the eradication of fraud and inefficiency in federal benefit programs, instructing administrators to be "as mean as junkyard dogs" in their efforts to combat theft and waste. Under the Reagan administration's auspices, the technology

(Continued on Page 90)

John Gallant is a Computerworld staff writer.

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Micnet products

[illegible] suite of software which provides [illegible] to exchange data between [illegible]

COMPUTER MATCHING

(Continued from Page 38)

behind computer matching is constantly being refined.

"The most common problems in government programs are overpayment of benefits and erroneous payments to recipients whose assets exceed the income standards. Computer matching is simply the most efficient method to pinpoint data on assets and income and ensures that only the deserving get government benefits," said Thomas McBride, former inspector general of the U.S. Departments of Labor and Agriculture.

McBride, currently associate dean of the Stanford University Law School, also supervised the Computer Matching Project of the President's Council on Integrity and Efficiency. His former colleague on the project, U.S. Department of Health and Human Services (HHS) Inspector General Richard Kusserow, is even more adamant in his support of computer matching. Charged with protecting the department's $300 billion annual budget, Kusserow estimated that he and his staff initiate three-quarters of the matching programs undertaken by the 18 federal inspector generals.

"I hate the term 'computer matching,'" Kusserow said. "It's like a fingernail on a blackboard to my ears. This is nothing more than an automated auditing technique. It's a labor-saving technique, and if I wasn't using it, I should be fired. We're protecting the disadvantaged, the aged and the retarded. I want to be certain that only they get the benefits they're entitled to. I can't imagine anyone objecting to that. In this case, we're on the side of the angels."

Heavenly support notwithstanding, opponents of computer matching see in its widening use an increasing, dangerous impact on personal privacy. According to Ronald Plesser, former general counsel to the federal Privacy Protection Study Committee, the use of computer matching is leading to a "dangerous disintegration" of Fourth Amendment privacy rights.

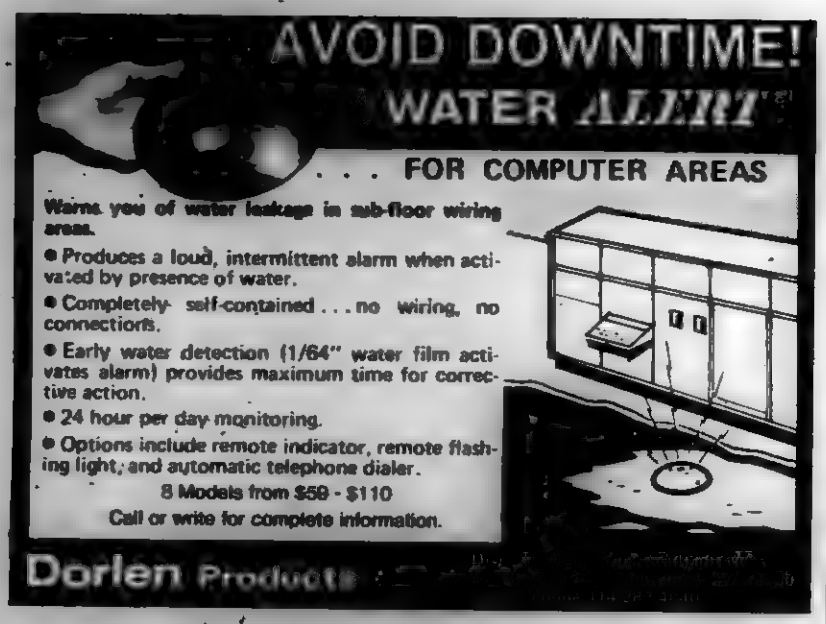
"The government is pretty well committed to the use of computer matching," Plesser explained. "There have been attempts to get as much information as possible from [Internal Revenue Service] files, and they're even thinking of using census data. I would be shocked if they did that. We can expect a greater use of private information by the government also. That's troubling."

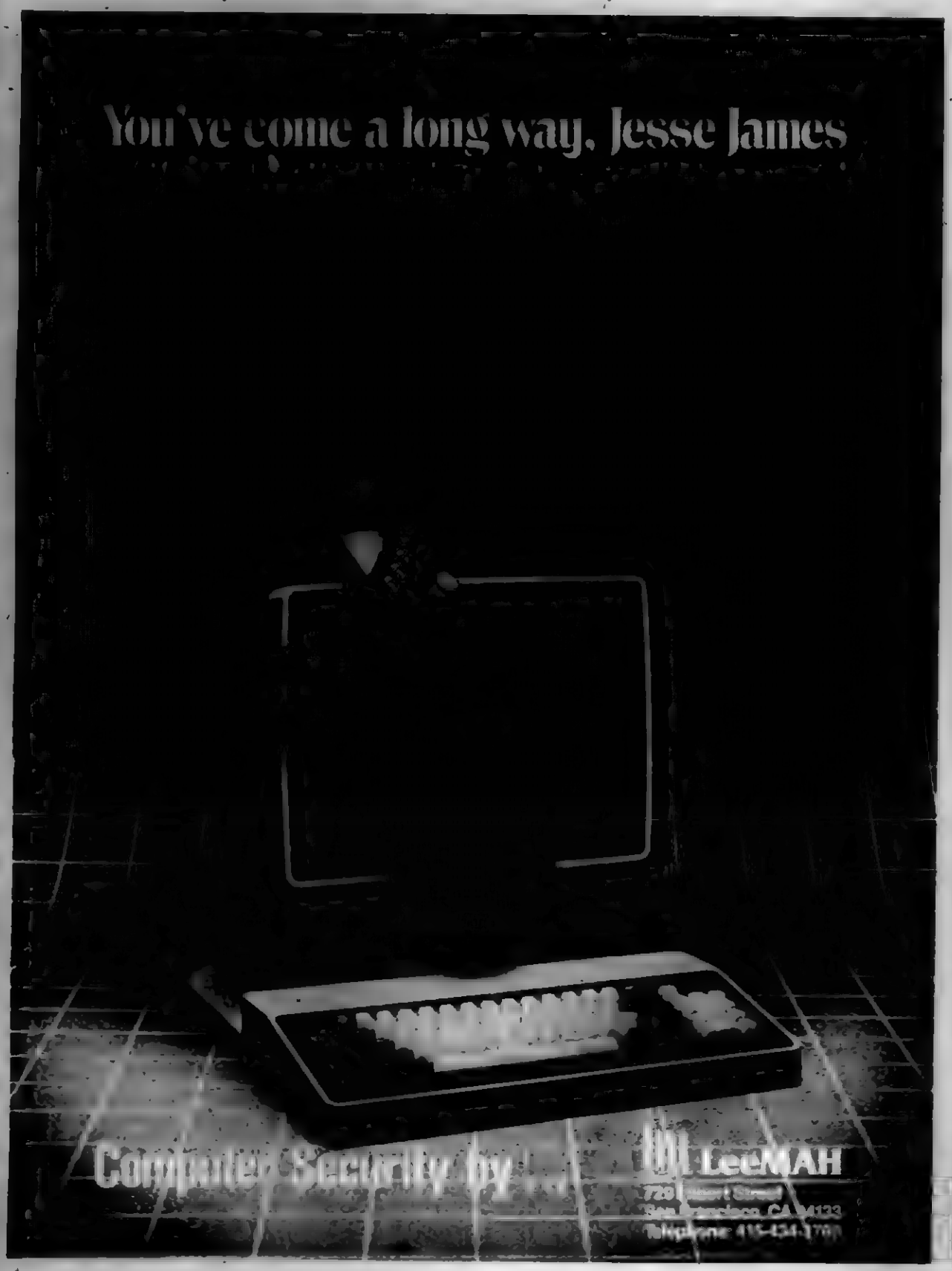
Robert Ellis Smith, publisher of the Washington, D.C.-based "Privacy Journal" newsletter, said the future promises a greater mass use of personal information, but no proportional rewards in terms of efficiency. "These programs won't do all the things they're supposed to do. Don't expect any great benefits from these techniques," he said.

Smith likened the use of computer matching to "a mass invasion of privacy," a problem that in the future will be aggravated by government's increasing reliance on private records. "The government is discovering that it doesn't even have to collect the data anymore. There are no laws limiting it from using private information," Smith said. "That means we'll have to rely on private organizations to protect our privacy rights, and if the price is right, they'll give up any information."

John Shattuck, director of the Washington, D.C., office of the American Civil Liberties Union, called computer matching "the fastest growing privacy invasion industry in government." He also criticized what he labeled the OMB's failure to regulate properly its use and a lack of congressional

(Continued on Page 93)





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2. **C Style and Portability**
   Speaker: Eric Allman, of Britton-Lee; Los Gatos, CA
3. **UNIX Systems Administration**
   Speakers: Ed Gould and Bob Kridle, of Mt. Xinu; Berkeley, CA
4. **Advanced Shell Programming**
   Speaker: Steve Bourne, of Silicon Graphics Inc.; Mountain View, CA
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/usr/group SESSIONS

USENIX SESSIONS

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7. **Keynote Address** – 9 a.m. - 10 a.m.
   Speaker: Jack M. Scanlon, Western Electric Company
8. **Joint Session** – 10:30 a.m. - Noon

9. **UNIX in Government** – 1:30 - 3 p.m.
11. **Market Research and UNIX** – 3:30 - 5 p.m.

10. **Networks** – 1:30 - 3 p.m.
12. **Distributed UNIX** – 3:30 - 5 p.m.

THURSDAY, JAN. 19

13. **Microcomputer to Mainframe Communications** – 8:30 - 10 a.m.
15. **Graphics Applications on Work Stations** – 10:30 - Noon
17. **UNIX to Microports** – 1:30 - 3 p.m.
19. **New Developments in Office Automation** – 3:30 - 5 p.m.

14. **Compilers and Languages** – 8:30 - 10 a.m.
16. **UNIX Directions** – 10:30 - Noon
18. **Applications** – 1:30 - 3 p.m.
20. **Implementations** – 3:30 - 5 p.m.

FRIDAY, JAN. 20

21. **Case Studies in Office Automation** – 8:30 - 10 a.m.
23. **UNIX Standards** – 10:30 - Noon

22. **Databasing** – 8:30 - 10 a.m.
24. **Open Session** – 10:30 - Noon

25. **Graphics - Computer Graphics Systems & Applications** – 1:30 - 3 p.m.
26. **Joint Session** – 3:30 - 5 p.m.

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COMPUTER MATCHING

(Continued from Page 90)

interest and oversight — concerns shared even by some advocates of computer matching.

"It's almost a runaway train," Shattuck said. "There are virtually no restrictions on its use. The OMB has not disapproved a single use of computer matching. It's my feeling that they haven't even reviewed most of them because there is so little organized opposition to it. Until the OMB begins to excercise regulatory authority over this, there is a tacit invitation for agencies to define as legitimate all uses of computer matching."

Because the technology behind computer matching has "mushroomed," according to NYCLU's Rollins, utilization of the techniques has outstripped government policies and individual protections. Without the creation of some sort of national computer matching oversight agency, individual privacy may face extinction, Rollins said.

"A few years ago, people were up in arms about a proposed central federal data bank. But we don't need it anymore. The central data bank may not exist physically, but the way computers can now share information, it's already in place. It's time we step back and make some rational decisions. If computer matching continues on this course, it may be too late in a couple of years," Rollins said.

Those privacy concerns have even prompted some advocates to admit that legislative action is overdue. According to former Inspector General McBride, the issue of computer matching will become a major legislative topic in the next few years. "I think government officials and taxpayers have strong concerns in making efficient use of benefit programs. But there is a need to balance that with privacy concerns. I'm confident that the large majority of congressmen represent a constituency that is concerned with both."

Whether that privacy constituency will arise is far from certain. "I don't see any evidence of legislative concern," Smith said. "It's very hard for people in political life to oppose computer matching, because it's touted as cutting fraud and waste."

Plesser added, "I wish it was true. But it won't happen. I'm not convinced that anyone — with very few exceptions — is interested in computer matching in either the Senate or the House."

According to HHS' Kusserow, the future does hold promise for legislative action, but in a far different sense. "There has been a lot of improvement in the way we use computer matching. We're trying to move these techniques to the front end, to pick up exceptions before they go into the data bank. We've made the process far less intrusive, or Congress would already have taken action against it. What you will see, though, is a legislative mandate to do more computer matching, to undertake some of these state-initiated programs on the federal level."

In Kusserow's view, the future of computer matching rests on efficiency rather than privacy. During his term there, the Computer Matching Project targeted its newsletter toward program administrators, offering tips on the use of computer-matching techniques, case histories and cost/benefit analyses of the programs. Kusserow emphasized that each computer-matching project must be "tested and refined in order to reduce the number of people who are intruded upon."

"No one questions my authority to audit the records of my agency," Kusserow added. "I'm mandated by Congress to do that. Because com-

(Continued on Page 94)

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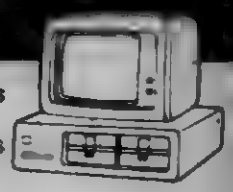

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COMPUTER MATCHING: AN ETHICAL EXCHANGE?

Privacy Advocates Assail 'Rogues' Gallery'

It would be difficult to find a federal department or agency that does not employ computer matching in some form. But it is individual states, most notably New York, which in many respects pioneered computer matching, initiating programs that have been or will be imitated on the national level.

During hearings on computer matching held last year by the Senate Government Management Oversight Subcommittee, the panel's chairman, Sen. William Cohen (R-Maine), estimated that federal agencies had implemented more than 85 matching programs and state agencies some 170. As far as privacy advocates are concerned, the following is a rogues' gallery of some of those computer matches:

● The Internal Revenue Service (IRS) is moving forward with its plan to begin matching its computerized files against commercially available lists of names, addresses and incomes of U.S. citizens in an attempt to identify people who fail to file tax returns. Planning to test the program early in 1984 in six of its 60 district offices, the agency is currently seeking bids for lists from private firms that estimate income from such sources as U.S. Bureau of the Census data, vehicle registration files and property assessment records. The IRS hopes the test will show the match can produce enough names of tax nonfilers to justify the costs [CW, Sept. 5, 1983].

● The Selective Service System began in 1982 to match its records against computerized Social Security Administration files for the names and addresses of American men who had failed to register for the draft. According to a spokeswoman, the agency hoped to track down the approximately 500,000 young men that Selective Service estimates did not register [CW, May 17, 1982].

Once the U.S. Departments of Defense and Transportation had reviewed the results of the match to winnow out those already serving in the U.S. Coast Guard and the military, the narrowed lists were forwarded to the IRS for another match to find current addresses for the nonregistrants. In a recent interview with *Computer-*

'1984' Seen Milestone

(Continued from Page 93)

puter matching only picks out exceptions, it is far more limiting than a general audit. I don't have to review 35 million records. I only need to look at the exceptions. In addition, I don't need any authorization to perform a standard audit, but I need approval for a computer match. That's added protection."

It remains to be seen whether 1984 provides the symbolic focus that crystallizes opposition to the indiscriminate use of computer matching. But Shattuck will be watching: "We are confronted with legal protections that haven't come up to date with the technology. I'm guardedly optimistic that Congress, the courts and the states will understand that they must take a hard look at this technology and its use. I'm hopeful; I can say that at least."

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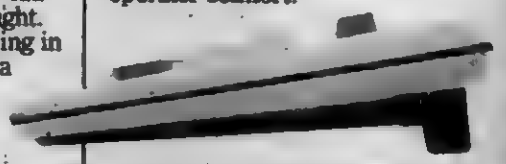

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COMPUTER MATCHING: AN ETHICAL EXCHANGE?

Of Agencies Employing Computer Matching

world, a spokeswoman for Selective Service said the agency has discontinued the use of Social Security data and now relies mainly on driver's license records obtained through individual contracts with state motor vehicle divisions.

● One of the most controversial of the computer matching projects to date is Massachusett's Bank Match Project. The commonwealth's Department of Public Welfare submits computer tapes bearing the Social Security numbers of all welfare recipients to more than 100 banks in an effort to snare recipients who have more money in their bank accounts than allowed by law. As of September, almost 1,200 of the 1,839 recipients whose benefits were initially terminated remained off the welfare rolls. The agency estimates that Bank Match has saved Massachusetts $6 million to date.

● Selective Service said it is only waiting input from the U.S. Department of Health and Human Services before it implements a program to compare periodically its computerized draft registration records against lists of absent fathers with child-support obligations. [CW, Oct. 24, 1983]. The Selective Service maintains information on some 11 million men between the ages of 18 and 23 who have filed with the agency since draft registration was reinstated in 1980.

● New York's Wage Reporting System is a quarterly computer match of public assistance and unemployment records against information on the reported earnings of the state's 8 million workers. State Department of Taxation and Finance wage data is compared with lists of public assistance recipients and unemployment insurance claimants submitted by the Social Services and Labor Departments. Matches are returned to those departments to be investigated.

In the Wage Reporting System's February 1982 annual report, the Commissioners of Social Services, Labor and Taxation claimed that the program had saved $23.7 million in public assistance payments and $14.5 million in unemployment insurance. Those figures were disputed by the New York Civil Liberties Union, which claimed that many of the costs of the program had not been taken into account.

● Implemented last year, the IRS' Offset Program is aimed at withholding tax returns to individuals delinquent in child-support payments. Using a consolidated list of those persons provided by the Department of Health and Human Services, the IRS runs a computer match against its master files and offsets individual tax returns by the amount of child support owed. In 1982, the IRS withheld $174 million as a result of 279,000 such offsets.

● In December 1982, the federal government announced it would begin garnishing the wages and pensions of almost 47,000 government and military employees and retirees unless they agreed to repay close to $68 million in delinquent student loans. The wage garnishment program was the result of a computer match of nearly 10 million government employee records against a list of student loan defaulters.

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Scrolling	Standard Scrolling	Smooth, Jump or Horizontal Scrolling Split Screen	Smooth or Jump Scroll Split Screen
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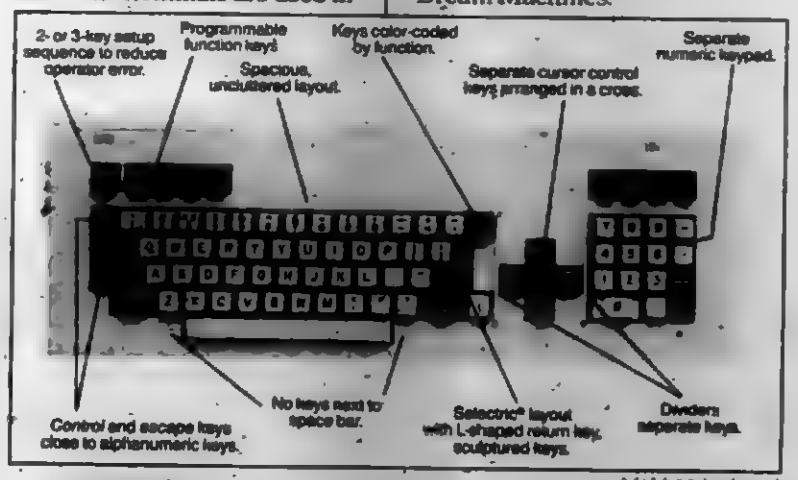

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ELECTION '84

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Butting Heads Over Industrial Policy

By Jake Kirchner

Election year 1984 opens with campaigns for the White House and for congressional seats already in full swing. In every national election, the economy in general — and jobs in particular — is a major point of contention between the Democrats and Republicans.

This year will be no different, even with the recovery advancing on almost every front. This is primarily a legacy of the painful recession that has accompanied much of the Reagan presidency.

In 1984's campaigns, the Democrats will claim that Reagan policies have been disastrous for the working man and point to the persistent high levels of unemployment over the last several years, levels that not even the recovery has brought down any significant degree. The Republicans, on the other hand, will point with much pride and self-congratulation to the economic turnaround that began in mid-1983. They will advance the argument that all is well again with the economy, that the recession was an unfortunate, but perhaps necessary, dose of medicine to get the country on a long-term healthy track and that as the economy continues to improve, more industries will rebound and hire more people.

While the candidates mount the stump to point the economic finger of blame at their opposition, they will be mindful that the electorate may well be moved to ask what can be done to ensure that the economy will continue to grow and unemployment continue to decline. The parties' strategies for future economic vitality will be articulated under the heading "industrial policy."

Industrial policy — the general term given to various approaches to what the government should or should not do to promote new industries and protect the old, thus ensuring sufficient employment levels for future generations — will provide the nails that fix the economic plank to the parties' platforms when they are constructed at the national conventions later this year.

With that in mind, the two parties are already developing their re spective industrial policies. While industrial policy has been one of the hottest topics in recent national

Jake Kirchner is a Computerworld correspondent based in Washington, D.C.

INDUSTRIAL POLICY

debate among economists, most of the practical application of various and opposing theories has centered in Congress, where the Republican and Democratic variations have already begun to emerge.

General Policy Outline

Although not all politicians have lined up behind one industrial policy approach or another, the general outline of the two parties' thinking can be summarized as follows:

Democrats believe the future economic health of the nation requires a collaboration of government, industry, labor and academia to determine the best method of future development.

Republicans believe the government should reconsider all laws, regulations and policies that have any bearing on the economy and redefine them to create an economic environment that allows industries to grow as much as possible in a generally unfettered free-market economy.

The Democrats describe their approach as a sensible, democratic means of joining all sectors of the economy to chart the most widely beneficial course for the economy. Republicans disdain that idea, scornfully referring to it as a doomed attempt to "pick winners and losers" from among today's industries through government interference, which they claim will be fraught with bureaucratic bungling and pork-barrel politics.

In the words of Treasury Secretary and Republican spokesman Donald T. Regan, the Democrats' approach is "a cure in search of a disease, a nostrum being pushed without evidence as to its efficacy for various misdiagnosed or imagined illnesses." Less diplomatic was Republican Congressman Thomas E. Petrie of Wisconsin, who said the Democrats' ideas are "perilously close to the corporate state of [Benito] Mussolini, the original model of fascism."

This is not to say there are not substantial areas of agreement between the two parties about certain "necessary" components of eco-

Both say high-technology industries — particularly computers, semiconductors, telecommunications and robotics — will be central to the U.S. economy.

Both parties say government policies, tax codes, capital investment regulations and antitrust laws must be structured to promote research and development and investment in plants and equipment. Both seek ways to increase productivity. Both would promote better math and science education and better, more wide-ranging employee job training programs to provide the workers that will be needed in future, high-tech America.

Republicans and Democrats say older industries must be encouraged and helped to modernize, that international trade must be advanced and U.S. industries must be protected from unfair foreign competition.

How, Not What

It is the question of how, not what, that divides the two parties and sets the stage for the election-year economic debate.

An outline of Democratic thinking was developed in November by the House Economic Stabilization Subcommittee of the Committee on Banking, Finance and Urban Affairs. Under the direction of subcommittee Chairman Rep. John J. LaFalce (D-N.Y.), the panel held 30 days of hearings, receiving testimony from more than 125 witnesses. The subcommittee's Democrats then produced a report, "Forging an Industrial Competitiveness Strategy" that will be the basis for industrial policy legislation in the House.

Defining what he called "key structural problems with the economy," LaFalce introduced an industrial policy legislation package, which prominently featured a provision for a Council on Industrial Competitiveness to "coordinate our existing set of industrial policies into a more effective competitive strategy." The council would be set up in the executive branch of the government and consist of high-level government officials and representatives of industry, labor, academia and public-interest groups. It would identify economic trends and problems and recommend economic strategies to the president and Congress.

The legislation also would mandate an Advanced Technology Foundation to promote applied research in the private sector. The most controversial provision in the package is a plan for a Bank for Industrial Competitiveness to channel needed capital into key U.S. industries. This would include monies for the so-called "sunrise industries" — the high-technology sector — and for older industries that must be revitalized to fend off competition from foreign firms with more modern plants and cheaper labor.

An ad hoc task force of Senate Democrats headed by Sen. Edward Kennedy (D-Mass.) shortly thereafter issued its own "Democratic Agenda" for providing future jobs, which embraced many of the same concepts, although the plan said the development bank at this point is only something that should be considered. The Senate Democrats also emphasized programs for promoting trade, worker training, education and R&D.

(Continued on Page 98)

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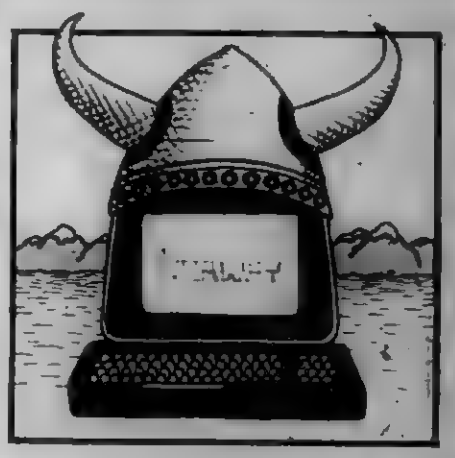

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(Continued from Page 97)

The Republicans are not so well advanced in their industrial policy planning, but much work has been done. For example, a White House Commission on Industrial Competitiveness, headed by Hewlett-Packard Co. President John A. Young, has been looking into R&D, productivity, education, training and foreign threats to U.S. industries.

More recently, House Republicans have formed a 234-member Task Force on High-Technology Initiatives, chaired by Rep. Ed Zschau, a former computer company president and first-term representative from California's Silicon Valley area. The group has aleady articulated a Republican approach to industrial policy, which the task force says will be backed by a legislative agenda for actions "compatible with a consistent and predictable policy of the role of government in relationship to the private sector."

This agenda "will focus on creating an environment in which high tech, new ideas and industrial growth are likely to flourish," the task force said, adding that this "climate for innovation" would include:

- A commitment to basic research.
- Incentives for risk taking by investors and entrepreneurs and an abundant supply of risk capital and a favorable regulatory climate.
- A strong educational capability, particulary in the sciences, providing a well-educated and technically trained work force.
- Expanding foreign and domestic market opportunities.

Battle Lines Drawn

So the lines of battle are drawn.

The Republicans will emphasize the economic turnaround and tout their plans to cement an economic climate that will enhance industrial competitiveness and ensure long-term economic health. A healthy economy, they will argue, will guarantee jobs and prosperity for all Americans.

The Democrats will constantly remind working Americans of the economic ills of the early 1980s. They will portray whatever final strategy they adopt as a concerted effort to ensure a more flexible and equitable economic order that will fend off any future job-killing recessions. They will promise to protect and modernize mainstream manufacturing sectors while providing the climate for explosive, industrywide high-technology growth.

The current unknown in the coming debate on the two parties' plans is, ironically, the economy.

If the recovery of 1983 turns into the boom of 1984 with drastically lowered unemployment, the industrial policy debate may well fall to the Republicans, who will claim the country should not change a successful program.

If the recovery stagnates and unemployment remains high, the Democrats will have a potent argument for their industrial policy agenda, an agenda they will portray as a major change of direction from failed Reaganomics.

Republicans' Policy

As outlined by the Republican Task Force on High Technology Initiatives, a possible Republican industrial policy might include the following:

- Increased federal funding of research carried out in universities and laboratories.
- A federal research and development project for advanced computer design.
- Federal promotion of research and development collaboration by U.S. companies, particularly through amended antitrust laws.
- Permanent tax credits for R&D.
- Tax incentives for risk capital investment.
- Tax credits and deductions for corporate contributions of cash and equipment to schools.
- An aggressive federal trade policy aimed at achieving fair and free trade.
- A government fiscal policy aimed at reducing the deficit, strengthening general economic health and encouraging personal savings and investment.

Democrats' Platform

According to Senate and House Democrats, federal actions under their industrial policy plans would include:

- An executive branch council of government, labor, business and public interest group representatives to develop a coordinated industrial policy program and encourage business, labor and government cooperation.
- Federal- and state-level centers to promote university and private-sector research and development.
- Clarified antitrust laws to encourage joint research and development in the private sector.
- Permanent tax credits for R&D.
- Improved investment in plants and equipment through federal support of state development finance agencies and consideration of a national development bank for direct federal financial support for industry.
- Education programs to include upgraded science, math and foreign language studies at all levels and vocational education programs targeted on emerging technologies and directed at disadvantaged youth, displaced homemakers and dislocated workers.
- Promotion of free international trade and government relief for industries that have been hurt by imports.
- Adjustment programs for workers and communities facing changing markets and technologies, including restructured unemployment insurance, improved training systems to help small firms and dislocated workers, community service employment for dislocated workers and adjustment assistance for companies and communities.

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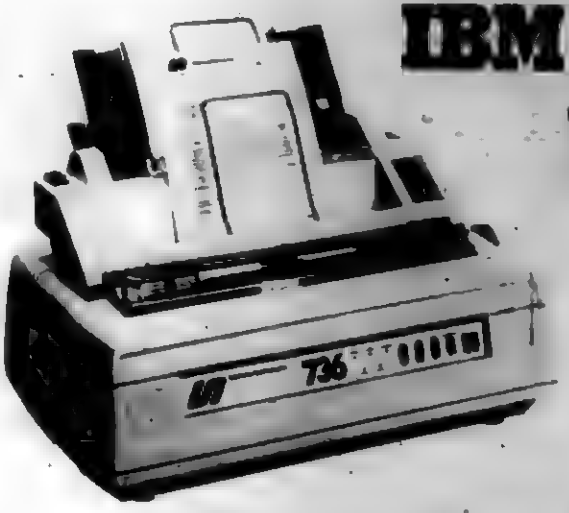

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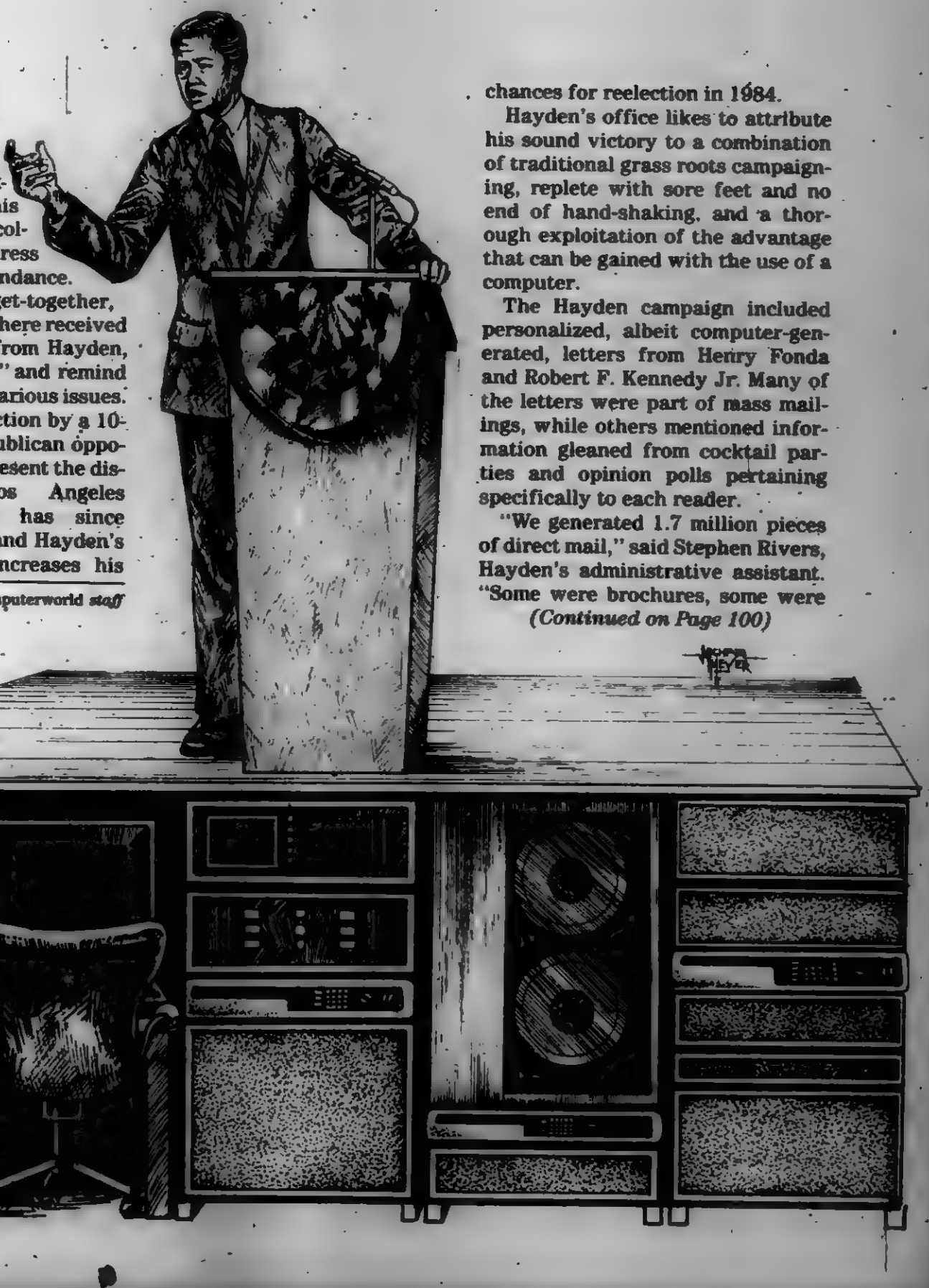
Election '84

The Automated Platform

By Katherine Hafner



When Tom Hayden was running for the California State Assembly in 1982, he attended countless cocktail parties where his aides made certain to collect the names and addresses of all those in attendance. Shortly after the get-together, people who had been there received a personalized letter from Hayden, "just to stay in touch" and remind them of his stand on various issues.

Hayden won the election by a 10-point margin. His Republican opponent in the race to represent the district of West Los Angeles (population 300,000) has since dropped out of sight, and Hayden's incumbency greatly increases his chances for reelection in 1984.

Hayden's office likes to attribute his sound victory to a combination of traditional grass roots campaigning, replete with sore feet and no end of hand-shaking, and a thorough exploitation of the advantage that can be gained with the use of a computer.

The Hayden campaign included personalized, albeit computer-generated, letters from Henry Fonda and Robert F. Kennedy Jr. Many of the letters were part of mass mailings, while others mentioned information gleaned from cocktail parties and opinion polls pertaining specifically to each reader.

"We generated 1.7 million pieces of direct mail," said Stephen Rivers, Hayden's administrative assistant. "Some were brochures, some were

(Continued on Page 100)

Katherine Hafner is a Computerworld staff writer.

ILLUSTRATION BY: MICHAEL MYER

(Continued from Page 99)

personalized letters. You determine whom you want to write to and the message you want to convey, and they are individually typed.

"Tom walked precincts every day, he met hundreds of voters and put information about their concerns into the computer for follow-up letters and phone calls," Rivers said. "Everyone he met would get input to our in-house computer and would get a personal letter."

Hayden's mode of operation is being duplicated by political candidates across the country, who are gearing up for the 1984 elections with the use of computer systems large and small, in-house or via outside direct-mail services.

Computers are being used for unprecedented precision in the identification and typecasting of voters. Census and other demographic data is used to figure out geographic areas for a candidate to concentrate on, and computers are used to gather and retain voluminous data about individual voters. Like Hayden's campaign in California, a candidate will start with a list of voters in a district, add as much information as possible about each person and then reach that person by using that information.

Heated Battle

Perhaps most heated of all is the battle between the Republican and Democratic National Committees, whose respective data processing systems generate thousands of direct-mail letters each week.

The Republican National Committee, which invested in its computer system as early as 1975, is far ahead of the Democrats with respect to the amount of computerized resources available to it. It holds a 7:1 advantage over the Democrats in the amount of direct mail it is able to generate and the number of donors and potential donors residing on the committee's data base.

The Republican National Committee also uses its system for sophisticated intracampaigning communications via internal electronic mail, automatic telephoning and ready-made press releases and proposed speeches for nonincumbents around the country.

When the Republicans first listed their donors on a Digital Equipment Corp. Decsystem 2060 with 5M bytes of memory in 1975, they started with about 25,000 names. By the 1982 election, that number had risen to 1.5 million, compared with the Democrats' base of 300,000 names residing on an IBM System/38 mainframe the committee purchased last March.

"We started a lot later than our opposiiton, and we're funded at a much lower level," conceded Ed Mills, management information systems director for the Democratic National Committee. "But I think we're closing the 7:1 ratio. We won't achieve parity by 1984, but we will close the gap. It's a long process."

The use of computers in elections has increased dramatically over the past few years, affecting every aspect of the political arena. In 1984, compared with two years ago, the number of state and local candidates using microcomputers to bolster their campaign strategies is likely to triple. For less than $10,000, a candidate can maintain some 200,000 names. And the 1984 presidential election is certain to pivot around the almighty megabyte more than ever before.

While it used to be a question of how many votes a candidate could buy for his dollar, the question now is how much computing power can be purchased. For instance, for the $12 million a political action committee pumps into a direct-mail drive, only $2 million is generally made to give to candidates.

Long-Term Implications

While there is little doubt that the introduction of computers into the electoral process is changing the face of elections in America, at issue are the long-term social implications for computers in politics.

"I'm certainly aware that the strategists want to balance the scales," commented Marc Rotenberg of the Public Interest Computer Association in Washington, D.C. "But if you're taking a step back and examining computers in the political process, you have to go back to some fundamental questions.

"There have always been situations where one party has power over the other," Rotenberg said. "The question you have to ask is what the new technology brings to the circumstances. We have increasingly refined data about people's life-styles, incomes and membership assocations. The level of information is carried much further than would have been possible in the past. We have begun in a sophisticated way to turn a political body into a commercial market."

A candidate's principal concern, Rotenberg said, is often with swing districts, where different types of people are examined together with pertinent factors such as their income and employment levels. If unemployment, for instance, is very high in a district, a candidate will stress new jobs.

"These things aren't new," Rotenberg said. "The question is what the computers do to that situation. The computer is a very powerful tool. For people who feel it wasn't the intention of our political system, it might be cause for concern. With technology, there's a point where a quantitative difference makes a qualitative difference.

"The extent to which computers are helping or hindering is difficult to judge," Rotenberg said. "Many politicians are more concerned with evening the game than the long-term perspective."

Behind every elaborate computer system, of course, is a lot of money — $1.5 million in the case of the Republicans and their mainframe. A hefty war chest invested in sophisticated technology can often, if not always, be a pivotal factor.

In the 1982 New York gubernatorial race between Mario Cuomo and Lew Lehrman, for instance, Lehrman spent some $8 million on his campaign. Lagging behind Cuomo in the polls, he sent letters to completely different consitituents, custom-tailored to each group's different concerns. Lehrman lost the election, but his last-ditch effort helped him narrow the gap considerably.

There are other, more subtle effects that the technological age can have on the electoral process.

Apropos the connotations that *1984* has carried ever since George Orwell wrote his ominous book by that title four decades ago, computers in the next election have introduced an element of paranoia into the voting procedure itself.

"If you felt that in general your political ideas were somehow being observed and correlated, you might change your patterns and possibly even your political opinions in order not to come under the heading of subversive," warned Michael Goldhaber, director of technology projects at the Institute for Policy Studies in Washington, D.C. "So you might feel that what you did in the voting booth was an extension of that."

Along with others, Goldhaber is concerned that the relative newness of such a rapidly changing technology makes it difficult for people to understand and work with computers, thus making the possibilities for new forms of manipulation a real danger.

Big Brother

"Obviously, before computers were around, there were other means of intimidation," Goldhaber said. "But it's not so much what computers can do, but that they are sensed as Big Brother. In the voting booth, you're never quite sure how secret the ballot is at this point. Uses of all sorts of procedures and polling can alter and manipulate the public mood."

According to Christopher Arterton, an associate professor of political science at Yale University, there are positive aspects to the presence of computers in the political process. "Instruments of communications have been so blunt in the past that candidates haven't been able to talk very specifically about issues they stand for," Arterton said. "Now candidates will be much more specific about programs they stand for and will speak to issues they know audiences will be interested in. That is, they will speak in detail about x and y without necessarily having x and y be contradictory."

Said political analyst Goldhaber: "I see the great challenge is to find ways to use new technologies to promote some sort of common human feeling, to maintain the sense that we're all part of the same community at bottom. In my view, that's the heart of any effort to have a democracy."

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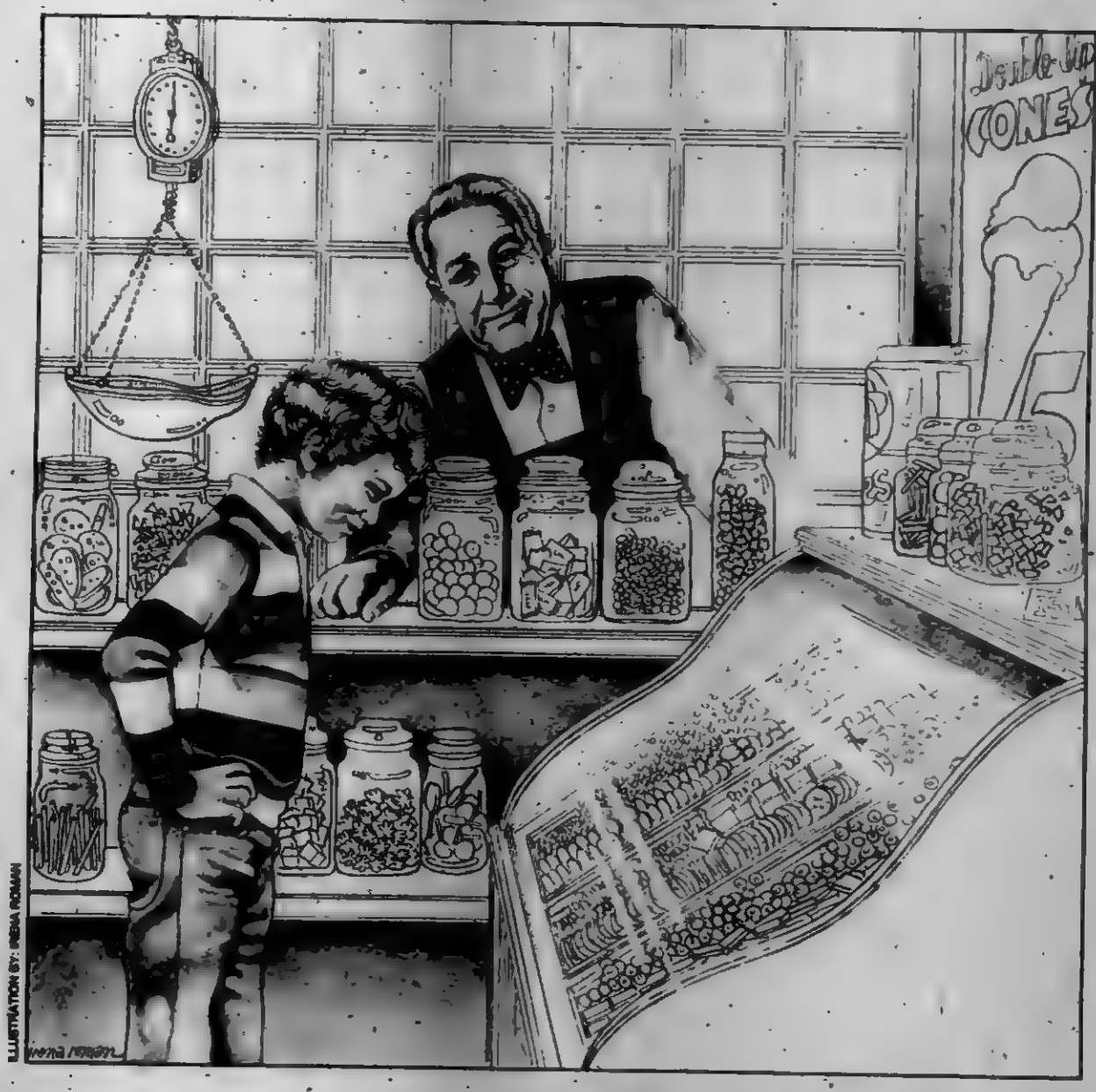
Third-Generation PBXs



Making the Right Choice

By Katherine Hafner

As private branch exchange technology floods the marketplace, the lines between successive generations are less distinct than ever before.

Before 1975, all PBXs were considered first generation — voice-only, with manual switching via a console operator. When Rolm Corp. and Northern Telecom, Inc. introduced their digital PBX systems, the second generation came and brought about a revolution.

Although second-generation PBXs were designed to carry voice only, they have since been modified to allow for data. But enhancing a voice-only PBX to carry data proved expensive and inadequate.

Thus, in 1980, the third-generation PBX was born, along with the concept of introducing the computer into the switching system itself. Designed to carry both voice and data, third-generation PBXs feature T-1 interface capabilities, remote switching units and nonblocking architecture.

Nonblocking capabilities can be of paramount importance when installing a voice-data PBX. Because voice conversations are generally short, in a voice-only system it is usually unnecessary to include enough talking paths to accommodate each pair of ports. Third-generation PBXs are "nonblocked," meaning they can handle the traffic load when all ports are busy.

As opposed to a blocking mode, where data transmitted carries a one-in-500 chance of blocking, nonblocking architecture carries a one-in-a-million chance of blockage. In addition, nonblocking architecture handles high-speed and low-speed data, voice and video, all in a nonblocking mode at relatively low cost.

Perhaps the most distinctive characteristic of the third-generation PBX is the fact that data-switching capabilities are not retrofitted on the system.

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Katherine Hafner is a Computerworld staff writer.

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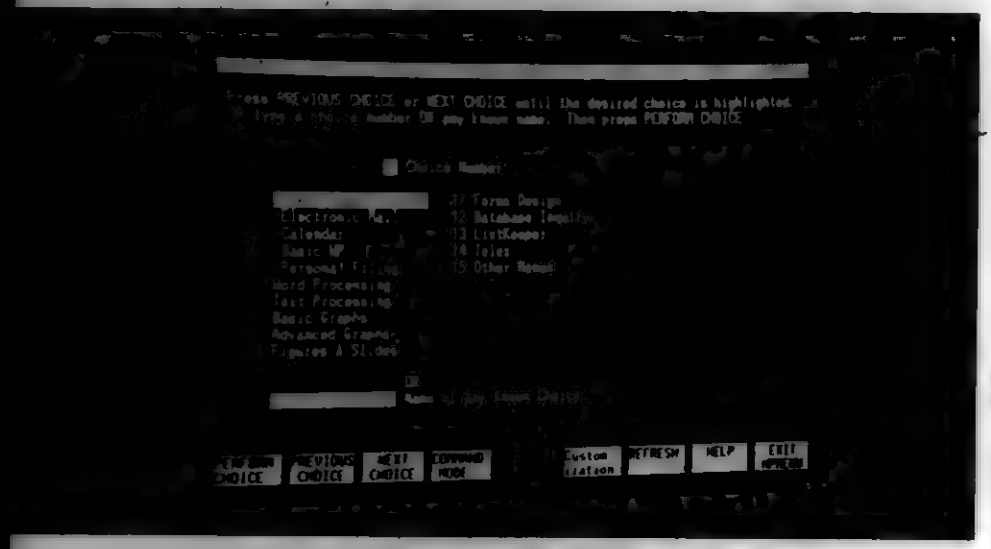

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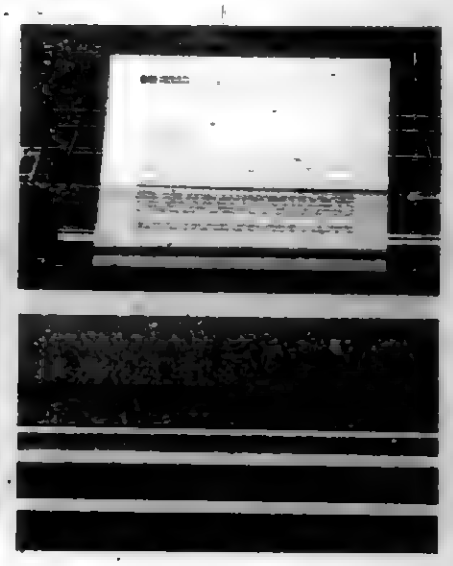

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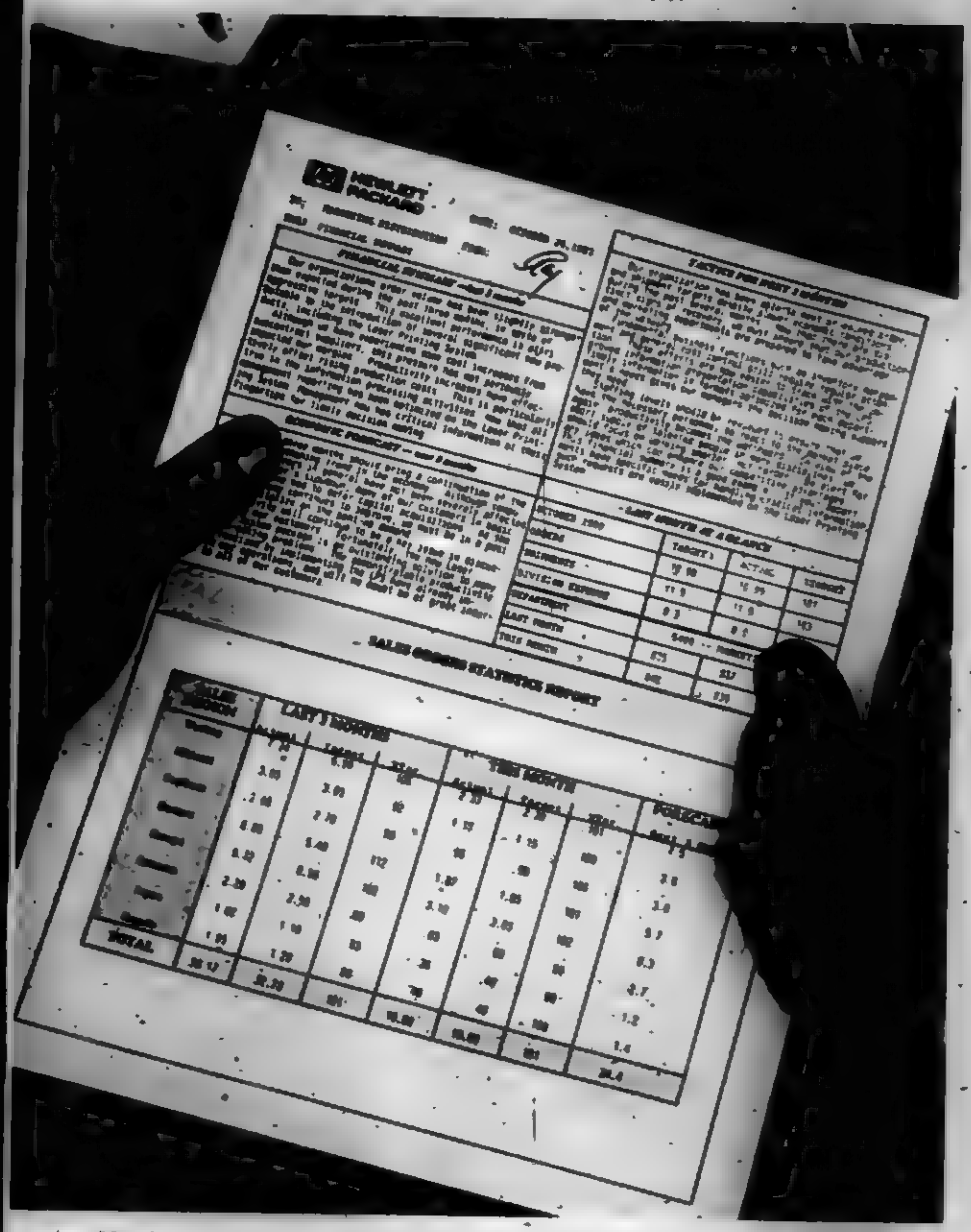

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THIRD-GENERATION PBXs

(Continued from Page 101)

"That's an important consideration," commented George Colony, president of Forrester Research, Inc., a Cambridge, Mass., consulting firm. "If you're going to have 10% to 20% of your handsets attached to terminals requiring large blocks of information moving through a PBX, you'll need a fast internal matrix and a high bandwidth matrix."

Starting with Intecom, Inc. and the introduction of its IBX in 1980 [CW, July 19, 1982], third-generation PBXs have inundated the market in the past two years: AT&T with its System/85; Mitel Corp. with the SX-2000 (to be installed in the third quarter of 1984); and Siemens Communications Systems, Inc. with the Saturn II and Saturn III, to name a few.

And just as users have familiarized themselves with the various third-generation PBXs available on the market in 1983, yet another advance in technology is sneaking up on them: so-called fourth-generation PBXs.

Depending on which side of the debate you choose to tune into, a fourth-generation PBX can assume two different guises: it can be a souped-up version of a third-generation PBX and labeled fourth generation for the sake of advertising hype; or a fourth-generation PBX can be viewed as a legitimate term for a brand new product, which is local-area-network-based, with simultaneous voice and data capabilities.

Specifically Ztel, Inc., with its Private Network Exchange (PNX) [CW, April 25, 1983] and CXC Corp. with its Rose, have announced systems that are said to combine the voice capabilities of a PBX with the short, bursty data traffic characteristic of a local-area network.

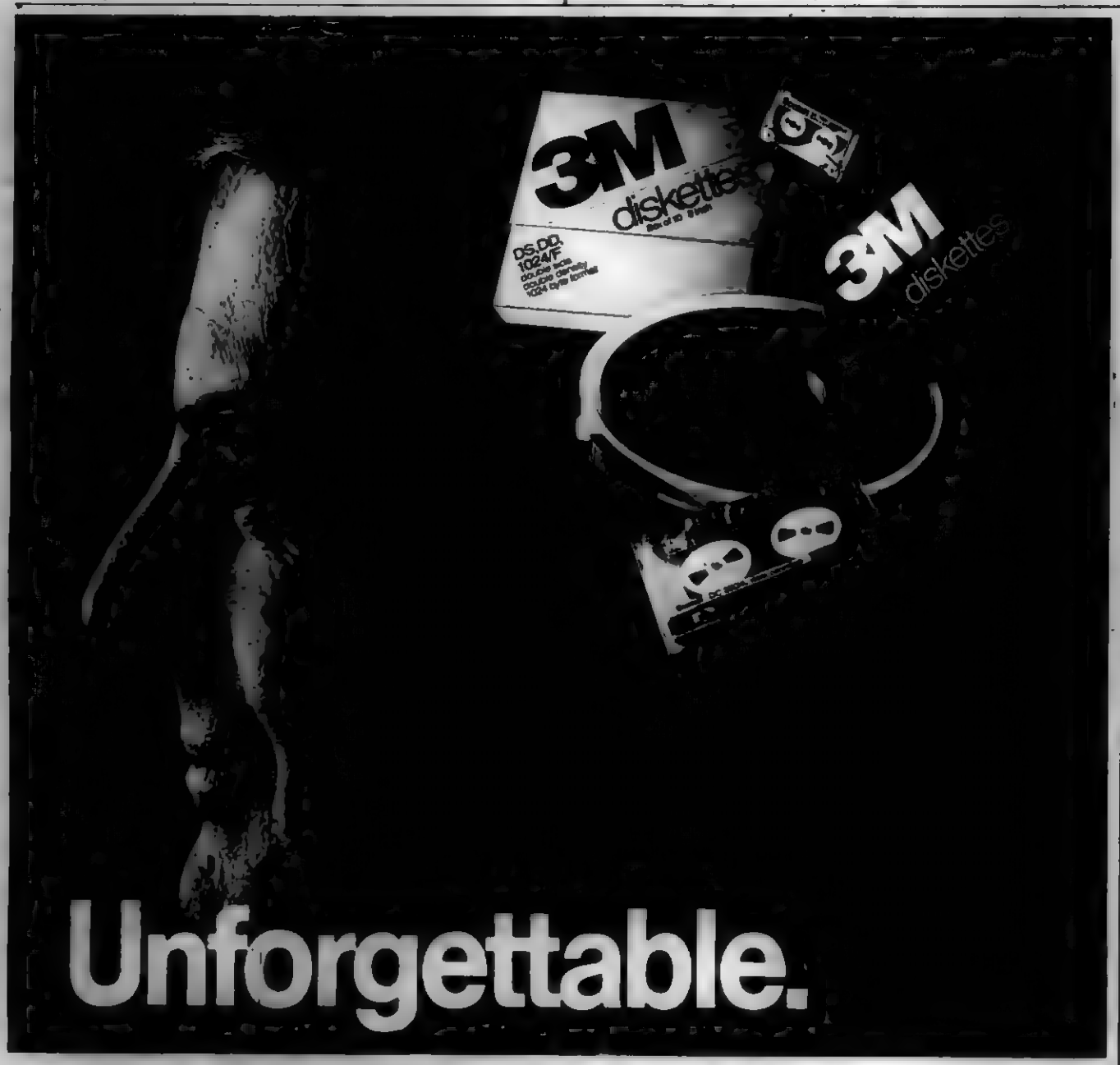
Whatever you choose to call the newest breed of PBX, it has sparked a brand new debate among communications soothsayers: Will the PBX eventually take hold as the most cost-effective and efficient method for short-haul communications, thus obviating the need for local-area networks?

Two Will Cohabit

The overriding opinion of many industry analysts is that the two technologies will cohabit.

"It appears that the industry is recognizing that the natural hub of any office will probably be a PBX," commented Alan Frost of the Eastern Management Group. "That's not saying local-area networks won't find a place. They will still be important for high data requirements and host-to-host exchange. But for routine office automation, the PBX will definitely step in."

"My feeling is the PBX will coexist with the local-area network, with the [local-area network] working as a connection for professional computers and handling the high-capacity functions, moving large documents or handling batch transfers to a nonimpact printer," Colony offered. "I suspect the IBM [local-area network] will coexist very nicely with the Rolm CBX. That will be the first elegantly planned interface between the [local-area network] and the PBX



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itself. They might even be sold together as a package."

As users remain wary of local-area networks, "mostly because of the tremendous wiring commitment," Colony said, "the user still understands that that kind of function is mandated within the company. Since the building is already wired for telephones, the first type of [local-area network] will be a PBX."

According to Colony, as the cost of communications lines diminishes between 10% and 15%, "it will be difficult for PBX vendors to make money just selling the PBX support," and future profits will lie in PBX applications.

Colony pointed to the significance of IBM's recent acquisition of 15% of Rolm in setting the pace for the future PBX market. "IBM is going to be a major new market dynamic in 1984," Colony said. "You're going to see Rolm distributing IBM products like the local-area network and personal computers. And you're going to see IBM distributing Rolm's CBX II. In fact, the Rolm CBX will perhaps become the prime market factor in 1984 because of its connection to IBM."

Strong Focus on Data

According to Colony, the major problem with next-generation PBXs is their strong focus on data. If a PBX is dedicated to data, the system's ability to handle voice can be greatly reduced, Colony cautioned.

"That's something the CXCs and Ztels have to watch out for," Colony said. "Because if you look at even 1987, in Fortune 1,000 companies with a third- or fourth-generation PBX, 75% of the capacity of the switch will still be going to plain old interactive voice. The mood is, 'Sure, give me the special features, but you've got to promise me we'll never lose a conversation.'"

For the data and telecommunications manager who has been given the responsibility for deciding which of these advanced switching systems to buy, the choices can be extremely confusing, especially when augmented with a healthy dose of marketing hyperbole and a plethora of vendors to choose from. (In 1978 there were six digital PBX manufacturers; today there are 20.)

'Shrewd Marketers'

"Systems are being sold by vendors who have solutions looking for problems," commented Edward Horrell, president of Mitchell & Horrell, Inc., a consulting firm in Memphis, Tenn.

"These guys are shrewd marketers. They all claim to have what you want: low cost, the technology, experience and delivery dates. That's all well and good, but you have to identify your specific needs. It is very important to document a three- to five-year communications plan. You must identify what you want to do and where you want to be and how you're going to get there. It sounds obvious and mundane, but it's incredibly important."

Whatever you choose to call the newest breed of PBX, it has sparked a brand new debate among communications soothsayers: Will the PBX eventually take hold as the most cost-effective and efficient method for short-haul communications, thus obviating the need for local-area networks? Many believe the two . . . will cohabit.

According to Horrell, communications managers have traditionally been perceived as "hard dollar specialists," whose purchasing decisions have been based on a comparison of fixed charges with the Bell system.

"Those days are gone now," Horrell said. "Now the [communications] manager goes in and says, 'These are our problems, these are the solutions and this is the cost. Because of that, the telecommunications industry is going to have to wake up soon in order to get up to snuff with the DP people."

"I recently had a parade of vendors come though for two-hour presentations with my client and it's always the last vendor out the door who looks the best. They all look good. The salesman makes them all look good," said James Morgan, principal at J. H. Morgan Consultants in Morristown, N.J.

Morgan suggests that companies in the market for a PBX designate a team of people for evaluating the products.

"In the past, when it was plain old telephone service, the telecommunications manager made the decision.

"The strong trend today is for a variety of people to make the decision. The team should consist of the telecommunications manager, the DP manager, the OA manager and the purchasing manager."

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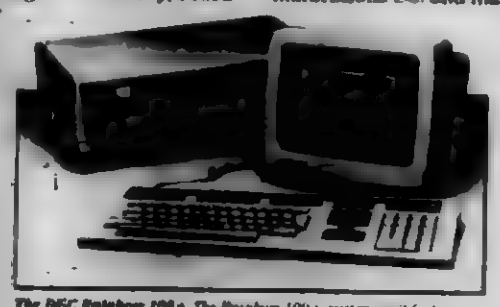

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EDITORIAL

Great Expectations

The American spirit took a beating in 1983. American lives were lost in the Middle East. Conflict and controversy raged in Central America. Tensions between the U.S. and the Soviet Union escalated dangerously. Even American relations with some of our closest European allies became strained.

Yet throughout the swings of the past several years from crisis to confidence, the march of technology has not only continued, but quickened dramatically. For most of us, its spread has been received joyfully, promising unimagined new capabilities in information management, dramatic productivity improvements and the promise of a more fulfilling life-style.

But high tech has also brought with it an unprecedented concern about the potential for its abuse. Americans are coming increasingly to question our country's reliance on computers for its national defense. Revelations of the adventures of teenage "hackers" this year have made us realize how vulnerable our information resources really are. And, ironically, new evidence is emerging that Korean Air Lines Flight 007 took its ill-fated course as the result of a computer data entry error.

Also, many Americans now worry about the vulnerability of their privacy to computerized invasion. A recent Louis Harris poll found that 77% of Americans are concerned about this issue, up from 64% just five years ago [CW, Dec. 12].

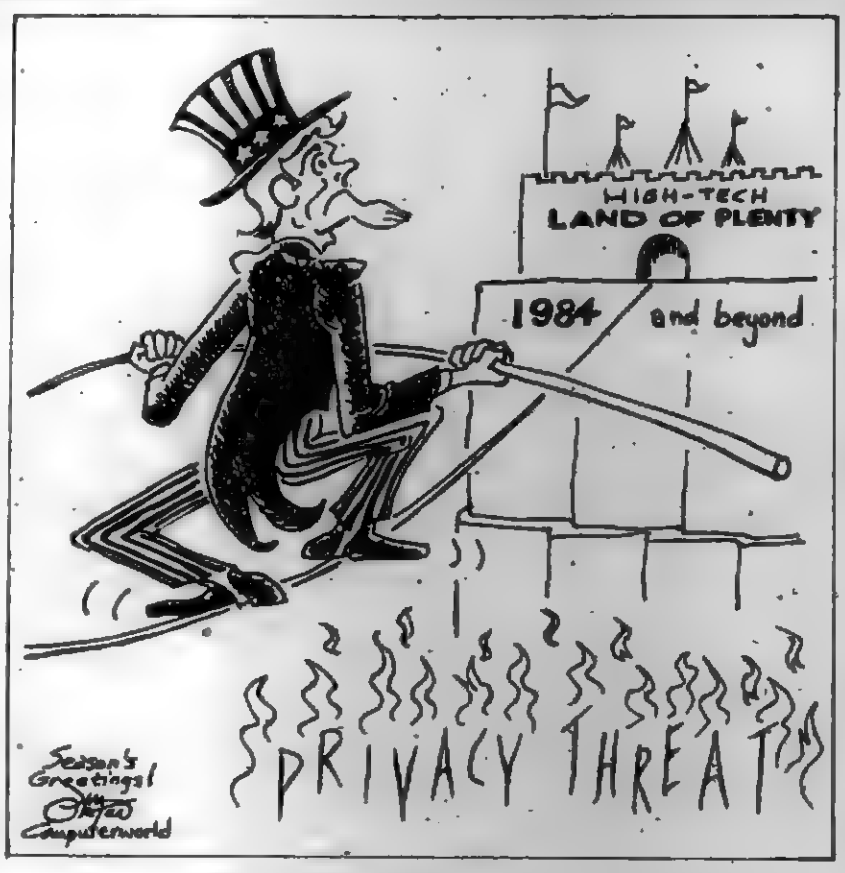
On the other hand, an overwhelming percentage of the survey respondents think science and technology has been generally beneficial. Over 90% see a big rise in productivity through the use of high tech in the work place.

The practical benefits of computers are becoming apparent in myriad new ways. New applications in expert systems have moved computers out of the hospital billing department and into the doctor's office, where they help physicians make more informed diagnoses. Computer-assisted design applications are helping engineers to work out potentially dangerous design problems before products reach the public. And Americans are discovering with delight that a computer in the home can be a welcome boost to their children's educations.

America's love/hate affair with the computer will intensify as the pace of technology quickens. The question remains which emotion will ultimately triumph. Clearly, public concern about the possible invasion of privacy from computers deserves notice. Legislation in this area is critical if computerphobia is to be overcome.

However, high technology also deserves an occasional pat on the back. Recent world events, at times, may have caused us to question the ability of humans to survive their own frailties. But computer technology has also set an example that we can all emulate. Even as suspicion about the motives and practices of some of our largest institutions has become ingrained in our consciousness, high-technology companies, with their high standards of competitive ethics, continue to top lists of the most respected companies.

As 1984 approaches, we cannot help but to be haunted by the specter of technological oppression raised by George Orwell's futuristic novel *1984*. However, we can also be buoyed by the possibilities that computer technology holds in store a truly better way of life. It is now more critical than ever that business and government unite to reassure the public that computer technology can and will be controlled. And it is up to all of us to applaud and encourage the true benefits we have gained from computer technology in recent years. Progress is stimulated by an atmosphere of acceptance, but stagnates in an atmosphere of fear.



LETTERS

Alternative Route

I agree with Harold Lundy's argument in the In Depth article "Justifying Subsecond Response Time" [CW, Nov. 21] that programmer productivity will improve significantly in the subsecond response time range. The question is: Will reprioritizing really help large TSO shops (and Roscoe or Wylbur shops for that matter) ever come close to subsecond response time, especially when production consistently requires high priorities?

The study does set the reader on the right path, but neglects to point out a fork in the road — and a path less traveled by.

Rather than shifting priorities and going through the gyrations that inevitably lead to an expensive CPU upgrade (and the same cycle of response time problems, reprioritizing and more upgrades and programmers working at all sorts of odd hours), a company should explore the alternative route, which is not only cheaper, but far better for the management information systems operation as a whole.

Many firms have taken the off-line, yet interactive, development route and reaped tremendous benefits as a result.

My firm needed a system that not only offered consistent subsecond response times, but powerful development tools, too — one that would allow us to continue programming in Cobol, communicate to multiple mainframes (from IBM and Sperry Corp.) and was, above all, affordable.

We found a product called Masetro, by Softlab Systems of San Francisco. It eats TSO's lunch (and Roscoe's and Wylbur's), but not mainframe resources. Our programmers are not only twice as productive, but they're home in time for dinner, too.

Robert Gregory
West Orange, N.J.

'Not the Usual Piffle'

I'd like to thank *Computerworld* for publishing Barry L. Abramson's article "Reducing Security Risks Associated With VM Access" [CW, Dec. 5]. This delightful piece of humor brightened an otherwise gray day here.

Abramson's situation is a perfect backdrop for comedy — sharing one VM virtual machine among six divisions. Where I sometimes pretend to work, a typical programmer will have six virtual machines for his own use.

Another masterstroke was to add the interminable series of prompts before allowing someone to edit a file. I invoke the EDIT command at least 100 times a day. I'm surprised Abramson didn't let his comic sense run free and have a team of system programmer commandos tunneling under the raised computer room floor to bomb the CPU into tiny pieces of silicon.

But the concept that makes Abramson's piece a work of genius, and not the usual piffle that we have to wade through in our daily lives, is the policy he describes of requiring all users to submit a written request for any given file to be erased.

What an idea! What opportunities for bureaucracy. The reams of paper. I can see it now: "Why do you want to erase that file? We'll just give you another zillion cylinders of storage — that way you can save *everything*."

I certainly hope Abramson has found a way to forbid people from using file modes A0 and A3, from giving out passwords and from insisting on working long hours from remote locations using dial-up lines. In fact, I hope Abramson finds a way to make sure that no power is provided to the CPU: That's a sure way to keep it secure.

Jonathan Seder
Menlo Park, Calif.

LECHT ON SCIENCE/Charles P. Lecht

George Orwell's Roasting: Medium-Well, Please

As we enter 1984, a crowd of folks who should be in the know will be asked their opinions of this year's state of affairs as compared with those depicted in George Orwell's monumental work with that date for its title. Virtually all these experts will observe that if he meant his novel's somber social portrait to serve as an actual forecast for 1984, he was way off base. Often enough, they will go on to say that any real threat of Orwell's dour vision being realized could be indefinitely postponed by increasing our defense spending, developing better surveillance techniques, providing more "pointed" education on who our "enemies" are and exercising yet more intelligent control over our free press.

Indeed, I surmise that if Orwell were around in 1984, he would surely be the subject of one of the grandest "roastings" of all time, although, curiously enough, there is ample reason to believe that it would be unwarranted. Notwithstanding the many discrepancies between the actual state of the world as we near 1984 and the vision Orwell would seem to have had of that same time, it is highly likely that his book was intended more as a parable or as an overarching cautionary tale than as straight prognostication. Indeed, it was some time before Orwell was persuaded to accept the title by which his work came to be known; evidently, his preference had been for *The Last Man in Europe*.

To an extent, the subject and substance of *1984* were drawn from the (barely disguised) fears provoked in Orwell by sociopolitical tendencies emerging in the late 1940s, not only in the West, but in the East and elsewhere. He almost certainly was not offering a literal forecast for 1984, although it must have occurred to him that many people might think so.

'Most every government, it seems safe to say, will take the position that the world in which it happens to be living is vastly different from Orwell's imagined one and, by its lights, vastly better. To the extent that any one of them would be prepared to acknowledge some Orwellian characteristics in itself, it would probably dismiss these as relatively minor (albeit warranted for some reason or other) when compared with the massive contamination afflicting the body politic in "enemy" countries.'

Had he done no more than create a great and enduring sci-fi novel (which he did), he would, in *1984*, have earned himself a degree of respect that rarely attaches to authors in that genre; for his ideas on totalitarianism were so thoroughly and convincingly worked through that he succeeded in giving to the language, in his own name and that of Big Brother, two shorthand terms by which the whole world now recognizes the sort of monstrous dictatorship that leaves us no moment or place of refuge from total terror. Whatever Orwell's actual intentions, we can be grateful to him for providing us with a special reason to reflect upon world government as we enter 1984 and to seek out new insights into it and ourselves. And this, we know, is always useful.

Orwellian Characteristics

Most every government, it seems safe to say, will take the position that the world in which it happens to be living is vastly different from Orwell's imagined one and, by its lights, vastly better. To the extent that any one of them would be prepared to acknowledge some Orwellian characteristics in itself, it would probably dismiss these as relatively minor (albeit warranted for some reason or other) when compared with the massive contamination afflicting the body politic in "enemy" countries.

Governmental variations upon this theme are as wide as the planet itself: from the Italians, who can be forgiven if they view any government they elect as fully Orwellian, after having lived through Mussolini, to the Soviets, who admit no trace of Orwellianism, apparently, viewing their enforced reeducation camps in Siberian subzero temperatures as a rewarding experience for their citizens who do not share the Communist party's opinions.

Just how much Orwellianism exists in any country is hard to determine, but I think there is strong (circumstantial) evidence to support the thesis that the world described in *1984* has more or less globally arrived in 1984. Certainly, most of the world takes the view that most of (the rest of) the world is comprised of more-or-less Orwellian, totalitarian states. The roughly equally populated East and West blocs appear to hold that opinion of each other, and both of them behave as though they regarded the Third World in that way.

Instrument of Propaganda

Did or did not Orwell's work foresee that an inevitable fixture of 1984 would be "the enemy," an instrument of propaganda utilized by one's own government to keep one alternately enflamed or terrorized into submission to the strictures of one's local polity? One need not look too closely at the "news" programming emanating from the respective ministries of Truth of East and West to confirm this sad actuality. Big Brother and his enemy seem almost to share the intimacy of the same object reflected in different mirrors, down to the last detail of olive branch and bomb.

Also, it is inarguable that Orwell's

(Continued on Page 108)

HUMAN CONNECTION/Jack Stonet

User Emancipation From Big DP Brother: 1984

The reality of life in 1984, at least within the microcosm of the computer society, is far different from the dire predictions of George Orwell in *1984*, wherein Big Brother and his followers placed the citizenry into a state of virtual slavery.

In the coming year, users are taking the strongest position ever to establish their independence from what many perceive to be the strangling bureaucracy of data processing departments. They are using the political leverage that derives from knowledge, experience and the headiness from installing successful systems themselves, albeit systems on the micros and small minis and, hence, of miniscule dimensions when compared with those running on the mainframes.

Not an insignificant number of users are even elevating themselves into lofty levels of arrogance, making the now oft-heard claim: "With only a personal computer and some quick code written for a $400 generalized data base manager, I've come on-stream with a superpowerful information system." Indulging in such an attitude, and using their gift of gab, users are surely venting their past frustrations with their computer center dealings to the top-level decision makers and attempting to use their personal computer expertise as leverage to get control over the data processing establishment.

'Without question, users are making life for DPers more miserable than ever; their ignorance in years past was difficult enough to deal with, but the high-and-mighty distain for computer professionals that some of them display in real time after a few hours of fooling around with a personal computer is really tough to swallow.'

Without question, users are making life for DPers more miserable than ever; their ignorance in years past was difficult enough to deal with, but the high-and-mighty disdain for computer professionals that some of them display in real time after a few hours of fooling around with a personal computer is really tough to swallow.

User Pseudoknowledge

However, to deal with the alarmingly rapid growth of user pseudoknowledge of computer systems, the answer is not — and cannot be — to avoid it, but to address it head on and in calm, measured, intelligent and rational ways. Here are some thoughts that may be useful to you if you are struggling with your users:

- If you have been around the business for more than just a few years, you surely know that for every generation of new equipment technologies, there arises a new wave of proliferation of machinery in the user areas that is typically acquired not with reasonable justification, but on a helter-skelter, seat-of-the-pants basis.

The current explosion in personal computers is no different, except that it is not untoward to learn of users who select their personals in more bizarre ways than ever, such as how their first graders work with Logo. Surely, central coordination — if not control — of personal computer acquisition is mandatory if the corporate coffers are not going to bleed to death from the constant demand from users for support of computing machines, software, documentation, training and supplies from every nook and cranny of the business.

- Your center must organize, if it has not already, a team of systems specialists whose sole job is to work with the users and help them to separate fact from fiction and whimsy from reality when it comes to the age-old issues of what computers can and cannot do and which ones are the right choices for the solution of user problems.

Users have to be straightened out on many matters that we take as given, but that come as shocks of enlightenment to many of them, such as that disk space is not infinite and some software will not handle files spread across volumes; some systems installed on "fast machines" run agonizingly slowly because the software is poorly written; formal training sessions are not the end of user learning, but rather they are the beginning of a life-long, self-developing experience; and they should search for answers to their trivial technical questions in the documentation, though not by pestering the data processing department.

Orwell's Roasting: Medium-Well, Please

(Continued from Page 107)
description of individual freedom in *1984* fulfills many of our views of its actuality in 1984. His thesis envisaged the subjugation and enslavement of the people by an increasingly automated, mind-controlling state. Certainly, our Communist neighbors, in our judgment, have lent more than sufficient credence to this vision of 1984. Alas, by theirs, so have we.

Startling, isn't it? Almost everyone in the world believes that the preponderance of the rest is in thrall to a Big Brotherly dictator. Each nation speaks of the slavery in which the governments of most others hold their respective populations; the enslavement process is said to be advanced by a group of soulless (that is, robot-like) order followers, whose threats are validated in the eyes of a quivering, cowering citizenry by the appearance on their screens of a fleshless, Big Brother video image. Americans affirm that individual freedom in 1984 is Orwellian for at least 75% of our brethren here on Earth, by my reckoning. Not bad, as an example of accuracy in a futurist.

And what is there to say for Orwell's view of history and books in *1984*? Subjected to brainwashing and physical torture, citizens are compelled to relearn history — or fail to do so at their peril. They are adjured to understand that to control the history books (and their analogs) is to control and, thus, to invent history.

Revised Histories

Since the turn of this century alone, many countries have seen fit to revise their official histories in response to political upheaval, economic dislocation, population migrations and other such traumatic manifestations.

Not long ago, some Germans believed that they could revise history by burning books and that it might even be more thorough if they incinerated a few flesh-and-blood authors and readers into the bargain.

It does not take too much imagination to intuit that the history of Persia endorsed by the Ayatollah Khomeini may vary from that promulgated by the supporters of the late Shah Rizah Pahlavi. Could we argue against the importance of knowing how to relearn history if, having been born into yesterday's version of it, we now wished to live happily in today's Iran, Cuba, Vietnam, USSR, People's Republic of China, Yugoslavia, Poland, Czechoslovakia, Hungary, Rumania, Tibet and so on? The official alternatives to reeducability have often been unpleasant, when they have not been terminal.

Examples of Orwell's accuracy as a forecaster (never mind whether he aspired to forecasting) abound. In Beirut, an international peacekeeping contingent could attest that war is peace. It is hard to think of a single communist country in which we, as Americans, would not see their freedom as slavery; as to their strength, we would just as surely view it as the product of the most lamentable, state-enforced ignorance.

All right, all right! Nineteen eighty-four may not resemble *1984* all that closely, but it is still too close for comfort. Consider this excerpt from the diary of the novel's protagonist, Winston: "April 4th, 1984. Last night to the flicks. All war films. One very good one of a ship full of refugees being bombed somewhere in the Mediterranean."

Lecht is chairman of Lecht Sciences, Inc., a New York-based think tank specializing in computer and communications technologies.

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December 14, 1983

'Next Time We Count the Votes by Hand.'

MSA Launches System Aimed At Two Types Of Manufacturers

ATLANTA — Management Science America, Inc. (MSA) has introduced packaged software tailored specifically for manufacturers with schedule-driven operations.

As a cost-free enhancement to the MSA Manufacturing System (MRP II), the features can be used by both repetitive manufacturers and job-shop manufacturers who have some repetitive processes in their operations, the vendor said.

According to the vendor, most manufacturers consider themselves either job shop or repetitive, although the majority are both.

The system operates on IBM mainframe hardware under Cullinet Software, Inc.'s IDMS, Datacom/DB, IBM's IMS and DL/1 or Cincom Systems, Inc.'s Total data base management systems.

The schedule-driven capabilities combine MRP II, Japanese methodology and zero-based inventory concepts. Using those features, manufacturers can establish a production schedule, set a production rate, check on production progress and report on production vs. schedule automatically in an on-line, real-time environment.

According to the vendor, the system provides maximum support of "just-in-time" inventory policies. It gives manufacturers stringent control over their materials and labor, since it automatically reduces inventory and accounts for labor used at various checkpoints in the production process, the vendor said.

The system is priced from $150,000 to $350,000, depending on the number of modules, hardware and operating environment.

MSA is located at 3445 Peachtree Road N.E., Atlanta, Ga. 30326.

With TI, IBM; Service Also Introduced

UIS Inks OEM Agreements

KANSAS CITY, Mo. — United Information Services, Inc. (UIS) has announced its entry into the microservices market with the signing of multimillion dollar OEM agreements with Texas Instruments, Inc. and IBM and the introduction of its Vista Service.

According to the company, Vista integrates microcomputer hardware and software into the UIS worldwide communications network and large-scale host and application software services. The OEM agreements authorized the sale of TI's Professional Computer and IBM's Personal Computer with the information services of UIS. Vista currently works with TI's Professional Computer, and UIS said it plans to announce the IBM Personal Computer link in January 1984.

In addition to providing stand-alone processing capabilities, the microcomputers reportedly will act as a window to UIS's teleprocessing services. The interface software — dubbed Vistacom — included at no extra charge with the microcomputer, is said to control all asynchronous communications with UIS host services.

A spokesman for UIS said that when host computer services and communications are needed, Vista users will have the ability to link into UIS's teleprocessing network. Micro software packaged with Vista will enable users to perform word processing, spreadsheet, business graphics and records management functions. All third-party software written under Microsoft, Inc.'s MS-DOS operating system will run on the micros without modification, the spokesman said.

Prices for Vista range from $5,545 for the base unit, which includes the system unit, CRT terminal, 256K bytes of random-access memory, internal modem, MS-DOS and one-year on-site maintenance, to $8,910 for the base unit plus a Winchester disk drive and a 150 char./sec printer.

More information is available from UIS, which can be reached through P.O. Box 8551, Kansas City, Mo. 64114.

Sorting Techniques Enhance Release 6.0 of IBM's DF/Sort

WHITE PLAINS, N.Y. — New sorting techniques that are said to enable large systems to handle more applications are included in Release 6.0 of IBM's Data Facility Sort (DF/Sort) for IBM MVS and MVS/XA operating systems.

The new version reduces sort time by 14% to 40% over IBM's OS/VS Sort Merge Release 5, the vendor said. Enhancements to Release 6.0 include improved fixed-length record sort performance; improved variable blocked, spanned record sort performance; sort performance optimized to larger region sizes; and improved merge performance for variable-length records.

The product is also said to feature improved message handling; new statistics messages; improved installation/execution options; extended parameter list support and MVS/XA support. It also includes several functions from IBM's DOS/VS-VM/SP Sort/Merge Version 2.

DF/Sort operates with all processors supported by IBM's VS1, MVS or MVS/XA. A basic license is $231, with a distributed systems licensing option charge of $173 available through IBM, 1133 Westchester Ave., White Plains, N.Y. 10604.

Investigating Financial Modeling Alternatives

By Len Bergstrom
Special to CW‡

In the first part of this two-part series, Len Bergstrom defined some of the criteria you should establish before investigating the alternatives of financial modeling software. Bergstrom now provides some guidelines for investigating the alternatives.

Once the company's criteria have been established, you are ready to investigate the alternatives. Both general and specific criteria should be evaluated.

General criteria relate to the vendor, while specific criteria are associated with the financial modeling systems themselves. Positive and negative dominant factors should be identified for either category and applied to the full range of potential candidates.

The remaining criteria are then established by major categories (such as modeling and reporting) and weighted by elements (such as financial functions and graphics) within each category. Critical requirements should be emphasized more heavily. Remember that 100% satisfaction is rarely accomplished. Your goal should be to select a product that best fulfills the majority of the company's requirements.

An overview of remote computing services vendors can quickly and easily determine whether a vendor has the general characteristics required. A vendor's history and outlook can provide a comfort factor for subsequent dealings. Also, the type of hardware and operating software may or may not be compatible with needs. Of more direct significance is the availability of the network relative to corporate locations.

Application availability is of prime importance. What major financial systems are available and how do they relate to one another? What about data management? Are your areas of importance able to be accommodated with major systems or companion products? What external data bases and access mechanisms are offered? What are the vendor's future plans? Other areas to consider include pricing structures, service options, system reliability and support, documentation, training and consulting.

If you are evaluating a system for use in house, you should be concerned with product capabilities and the viability of the vendor. The majority of software vendors are relatively young and small, so the kind of general criteria used for remote computing services vendors may not apply. The user must also be concerned with contract negotiations, including performance guarantees and rights to source code under certain conditions. Installations of the product by multiple companies help insure against potential disaster.

Once you determine that a vendor meets your general criteria, analyze whether specific criteria are met by the financial modeling system. Financial systems components are very different according to individual planning systems, both in regard to specific integral components and in style of implementation. Although most claim to be "English language," the low range is actually close to a true programming language. Special attention should be directed to report generation, functions for financial and statistical operations and ease of use of documentation.

Some vendors say everything needed by the user should be embedded in a single system. Others adopt the philosophy of concentrating on specific activ-

(Continued on Page 114)

Startech Announces Release 2.0 of 'Viewcom'

WOODSIDE, N.Y. — Startech Software Systems, Inc. has announced Release 2.0 of Viewcom, an IBM CICS printer terminal spooling and automatic batch report distribution system.

Viewcom's IBM Personal Computer option supports printing from an IBM mainframe running under CICS to be directed to up to three printers connected to an IBM Personal Computer, transparent to the applications running on the Personal Computer, a spokesman said.

This feature can print multiple reports concurrently from the mainframe's CICS Viewcom print queues. A maximum of three printers per Personal Computer can be active simultaneously.

The Viewcom interface runs as a background task in the Personal Computer, independent of the Personal Computer application.

Viewcom Release 2.0 provides automatic transfer facility from the batch spool queue as well as automatic security checking with user exits. Additional functions include automatic unattended printing of reports, a virtual multiregion option and intersystems communications capability of routing any report in the Viewcom queue to another CICS address space in the same CPU or in a remote CPU to any remote job-entry station or the central-site printer. These Viewcom features will also function in a multiregion option or intersystems communications environment, Startech said.

In addition to these routing capabilities, Viewcom allows instant report auditing by allowing users to access sections of the report before printing.

DOS/VSE support in Viewcom Release 2.0 has been enhanced to provide both automatic and interactive on-demand batch report transfers to the on-line CICS Viewcom print queue.

Viewcom Release 2.0 costs $4,995 for DOS and $7,995 for OS packages from Startech at 25-39 Borough Place, Woodside, N.Y. 11733.

Receipt Aid From CSU Runs On NCR 2950

CHICO, Calif. — California State University (CSU) at Chico has announced a cash receipting software package for use with the NCR Corp. Model 2950 terminal.

According to a CSU spokesman, the package prints receipts, locates and displays information about the transaction on the terminal, prompts for needed data and, at the end of each cashier cycle, transfers the data collected to a Control Data Corp. Cyber series mainframe. The package also is said to print reports with varying levels of detail, and it updates several subsidiary systems. It was designed to interface with the system-wide Financial Accounting System.

The vendor said that the program is easy to modify because of its modular structure.

For each transaction, a cashier selects the screen for that transaction type, then follows as it prompts for information. When the transaction is complete, a receipt is printed, a journal tape is printed, and checks are endorsed by slip number and receipt number.

The cash receipting package is said to be a collection of programs written in NCR Basic and Cobol. The NCR Basic programs operate on the NCR Model 2950 terminals, and the Cobol programs operate on the Cyber processor.

The package is priced at $5,000 from CSU, Chico, Business Affairs Office, Chico, Calif. 95929.

Intel Imax 432 Release For Its IAPX System Out

SANTA CLARA, Calif. — Intel Corp. has announced a release of the Imax 432 virtual memory operating system for its IAPX 432 micro-mainframe system line.

According to Intel, the Imax makes available blocks of main memory that contain data that is no longer being accessed and puts them through a process known as "garbage collection," which involves the deallocation of these unused memory blocks. After deallocation, the system performs a compaction process whereby it combines various-size blocks into large contiguous blocks to provide ample memory capacity.

Written in Ada, Imax 432 is said to make use of Ada's generic package concept. For example, the vendor said, a generic I/O sink module can be used to send data from a port to a disk system, a CRT display, a line printer or a laser printer. The programmer takes the generic package or module and fills in the specific information determined by the type of output device. The programmer does not have to write the entire output driver module and can instead work with the appropriate Imax generic module.

The cost of Imax is determined by quantity. The first copy is priced at $8,000 from Intel at 3065 Bowers Ave., Santa Clara, Calif. 95051.

Announcing the State of the Smart.

IBM 3270 Personal Computer

Utility Offered for MVS/XA

HOLMDEL, N.J. — CGA Software Products Group, Inc. has introduced a data center management utility designed for IBM's MVS/XA operating system.

According to the vendor, Single Image Software Version 7.1 is able to simplify error-handling diagnosis and reduce the number of load modules and library size requirements for the operating system. It reportedly supports recent IBM program temporary fixes in the MVS operating system.

The software is now available for lease at $625/mo per site with the vendor's Multiple Systems Integrity Facility, $7,500 per year with the Global Console Director, $7,512 per year with the Multiple Systems Manager and $1,525 per month or $18,300 per year for all three, according to a spokesman for the vendor.

Additional information about the utility is available from CGA Software Products Group, which is located at 960 Holmdel Road, Holmdel, N.J. 07733.

System Utilizes HP's Image DBMS

PHOENIX — EDP Construction Systems has introduced the CAS/3000, a menu-driven, interactive, real-time construction accounting system which utilizes Hewlett-Packard Co.'s Image data base management system on the HP Series 3000 processors.

According to the vendor, all subsystems are totally integrated, allowing single-entry processing and multicompany, divisional and departmental processing within a single data base.

Subsystems include accounts payable, general ledger, job cost and accounts receivable, the vendor said.

The price is $30,000 and includes one year of system maintenance and initial training. EDP Construction Systems is located at 2910 E. Camelback Road, Phoenix, Ariz. 85016.

Lexis, Nexis Now Available Via IBM Personal Computer

DAYTON, Ohio — Mead Data Central, a division of Mead Corp., has announced that its Lexis and Nexis data base services are now available via the IBM Personal Computer and other terminals.

Nexis and Lexis, previously available only via terminals leased from Mead Data Central, reportedly can be accessed through the IBM Personal Computer, the IBM Displaywriter, the IBM 3101 terminal and the Televideo 950 terminal.

The company also has reported that it is negotiating with other computer manufacturers regarding the use of those computers to access the data base services.

Prime-time connect rates for Lexis and Nexis reportedly are $90 per hour for up to five hours monthly, $75 per hour for six to 10 hours, $60 per hour for 41 to 100 hours and $30 per hour for more than 100 hours. Off-peak rates are $45 per hour for less than 100 hours and $30 per hour for more than 100 hours. In addition, there is a surcharge of 45 cents for each word search unit.

More information is available from Mead Data Central, 9393 Springboro Pike, P.O. Box 933, Dayton, Ohio 45401.

Source Members To Receive E-Com Service

MCLEAN, Va. — Source Telecomputing Corp. has announced that members of the Source, its on-line information and communication service, will now be able to utilize the U.S. Postal Service's Electronic Computer-Originated Mail (E-Com) from their microcomputers.

According to Source Telecomputing, the E-Com service provided on the Source is contracted through an E-Com-certified telecommunications carrier in New York, where messages are received from members of the Source, batched, processed, sent on to serving post offices and delivered as first-class mail. Reportedly, the arrangement allows individual members to use E-Com as often as necessary without having to send a minimum of 200 messages per day, which is required of E-Com's corporate clients.

E-Com is one of several messaging services provided through the Source. Messages can be composed on-line using the editing capabilities of the Source or off-line where they can be uploaded for electronic delivery. The three primary messaging services are E-Com, which costs $1.35 for the first page and 25 cents for subsequent pages; Western Union Mailgram messages, which range in cost from $3 to $5.15; and Sourcemail, which delivers messages to any other member of the Source beginning at 13 cents per minute.

The Source is said to be compatible with any microcomputer or terminal and can be accessed via a local telephone line in 500 U.S. cities. Costs include a one-time $100 membership fee, with basic hourly connect charges ranging from $7.75 to $20.75 from Source Telecomputing, 1616 Anderson Road, McLean, Va. 22102.

If you're looking for a personal computer that will satisfy your company's professionals and managers, IBM now has exactly what you need. The new IBM 3270 Personal Computer.

The fact is, many personal computers can be *too* personal for many business environments. Not the 3270 Personal Computer. Its strength is the ease with which it communicates with IBM hosts and office systems—in the next room or around the globe.

The 3270 Personal Computer is designed to accommodate the way people actually work. It can display in color up to seven windows of information at one time. Four with data from host computer applications (on the same or different hosts), two electronic notepads and one personal computer session. And despite its impressive capabilities, the 3270 Personal Computer is small enough to sit on a desk without taking it over.

The information windows can be moved, just as a person moves papers on a desk. They can be made bigger or smaller, put on top for immediate attention or temporarily hidden when not in use. Information on the screen can be processed, printed or exchanged between windows. And the 3270 Personal Computer can be programmed by the data processing professional to meet the needs of each end user or department.

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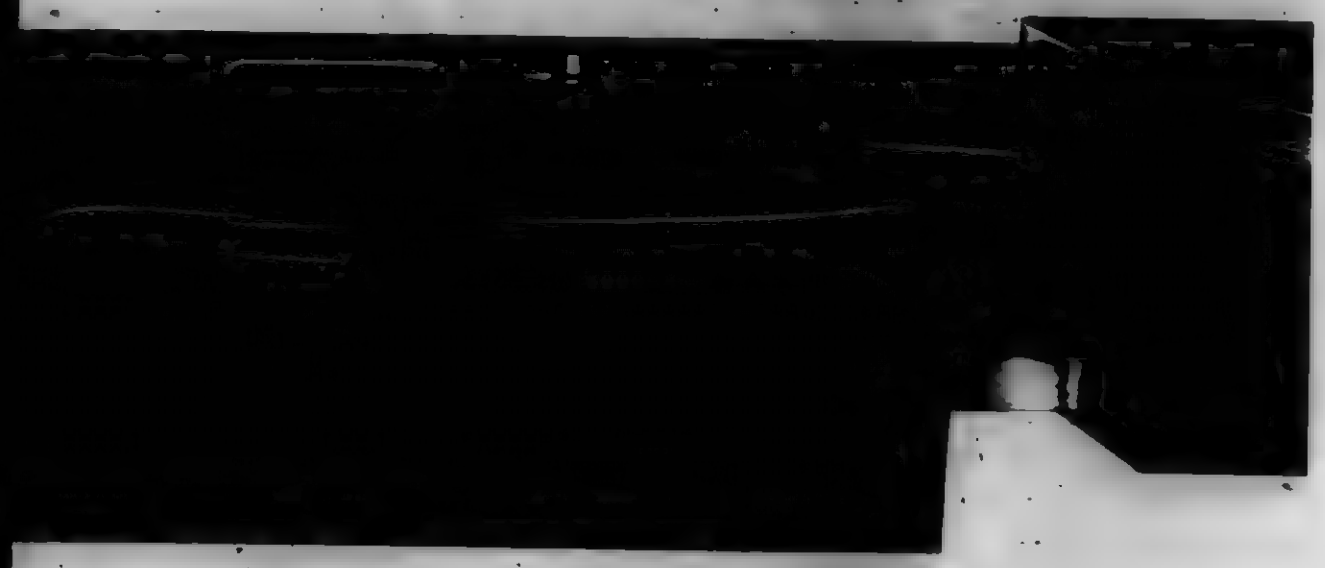

Genesys Launches 'Search-All' for IBM DOS, OS

LAWRENCE, Mass. — Genesys Software Systems, Inc. has announced what it describes as a one-button human resource information and decision system for mainframes using IBM's DOS and OS.

Search-All reportedly is designed to work with Genesys' IBM Payroll Accounting, Personnel Administration and Deferred/Cafeteria Benefits Management Systems. It is said to integrate into one application capabilities such as query, information generation, on-line report writing, modeling and forecasting.

Search-All is said to let users decide what to look for and what to do with it in determining alternatives and to refine qualifications continually. The system is said to be menu driven, eliminating the need for users to know complicated syntax.

According to Genesys, Search-All will be available Feb. 1 as a free added feature for its All-Screen package, or at $40,000 for DOS systems and $45,000 for OS systems. All-Screen reportedly costs $35,000. Genesys may be reached at 20 Ballard Way, Lawrence, Mass. 01843.

Price Hike Announced for 'DOS Jars'

McLEAN, Va. — Johnson Systems, Inc. has announced an immediate increase in the price of its DOS Jars Job Accounting Report System for use in IBM's DOS and OS operating system environments. The new permanent license fee is $7,500, including the DOS/Power/VS option, a spokesman said.

DOS Jars is an accounting, billing and performance measurement system that enables users to account accurately and bill equitably for all resources used in the DOS and OS environment. The package consolidates information about computer resources on IBM's System 370, 30 series, 4300 series and compatibles.

Johnson Systems' Marketing Services Department is located at 8300 Greensboro Drive, McLean, Va. 22102.

IBM 5080 Gets Graphics Tool

BOULDER, Colo. — Precision Visuals, Inc. has announced DI-3000, graphic tools support for the IBM 5080 Graphics System.

The system can be utilized by system integrators and application developers in engineering, scientific and computer-aided design installations.

Written in Ansi Fortran, DI-3000 is an integrated system of 200 user-callable subroutines developed in accordance with both Core and evolving Ansi standards, the vendor said.

The package supports a range of graphics terminals and hard copy devices and simplifies access to more advanced hardware features by presenting the application developer with a "virtual device" interface.

Prices for a 25-year license including the new driver will depend on the IBM host machine's class but will start at $12,000 for the 4300 series, $15,000 for the 3030 series and $19,000 for the 3080 series. The driver alone, which will be released concurrently with the IBM 5080 system, will range in price from $2,000 to $4,000 depending on mainframe.

Further information is available from Precision Visuals, 6260 Lookout Road, Boulder, Colo. 80301.

Tape System For HP 3000 Unwrapped

SAN JOSE, Calif. — Mednick Enterprises has announced the Tapes/3000 tape management system for the Hewlett-Packard Co. HP 3000 computer.

According to the vendor, Tapes/3000 reduces the risk of losing or overwriting data by requesting and cataloging magnetic tapes as they are used. The package reportedly also performs most tape librarian functions. It will accept data from on-line users and operators, from job streams and the HP 3000, and it uses the data to keep track of each tape in the system.

There are four programs in Mednick's tape processing system. The Tapes Maintenance program is used to maintain information about data set characteristics and tapes in the system. The File Request program is used to request input and output tapes to be used by the job or session. A Scratch program is used to automatically scratch all tapes that have expired according to the date or generation/version count. The Operator Utility program is for special cases such as handling missing scratch tapes, resetting in-use flags, inputting non-HP 3000 tapes into tapes and getting the current Scratch tape count.

Tapes/3000 is priced at $2,500 from Mednick Enterprises, located at 1680 Arbor Drive, San Jose, Calif. 95125.

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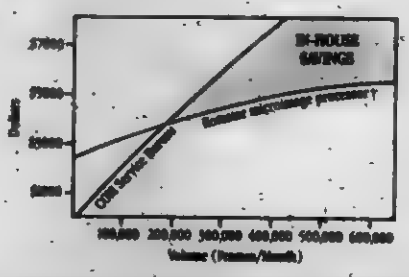

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Set of Design, Development Tools

National Semi Unveils 'Plan'

SANTA CLARA, Calif. — National Semiconductor Corp. has announced the Plan software package, a set of interactive design and development tools to simplify the implementation of systems with Monolithic Memories, Inc. Programmable Array Logic (PAL) devices.

The Plan system, according to the vendor, automatically selects the correct PAL configurations, reducing the amount of time spent in search and evaluation. The package consists of three programs, Plus, Serv and Prog, which were developed to guide designers from initial Boolean logic expressions through device selection and documentation to the actual programming of the devices.

The Plan package is said to interface with most programming systems and uses notations similar to those of Monolithic Memories' Palasm design tools. Its comprehensive messaging operation includes error alerts, device-selection guidance and prompts.

Serv allows assignment of the previously defined logic to a different device and reassigns pin-outs, provides pin-out diagrams, fuse maps or equations to the CRT terminal or printer for documentation. Prog provides the logic and device data to a device programmer for programming or verification, automatically selects the proper PAL and pin assignments and creates a permanent disk file representing the defined logic equations and the device fuse map in the chosen format.

The package is priced at $195 from National Semiconductor, 2900 Semiconductor Drive, M/S D3698, Santa Clara, Calif. 95051.

Fortran Engine Accelerator Off-Loads IBM, DEC Units

SEATTLE — Flexcomm Corp. has announced the Fortran Engine accelerator, which the company said can be used to off-load IBM mainframes and Digital Equipment Corp. VAX-11 minicomputers.

The accelerator is reportedly a turnkey system that uses a Gould, Inc. Concept 32 superminicomputer and Flexcomm's proprietary communications software executing in both the Gould processor and the host, which are connected by a high-bandwidth data link.

The Fortran Engine is said to allow an installation to recover large amounts of CPU resources that are currently consumed by computation-intensive Fortran applications.

The package offers conversion services to transport the existing Fortran applications to the Gould supermini, according to the vendor.

It will be priced at approximately $500,000, depending on configuration, from Flexcomm, which is located at 15245 Pacific Highway S., Seattle, Wash. 98188.

Madic Adds General Ledger Module To Corporate Information System

SANTA CLARA, Calif. — Madic Corp. has announced a general ledger module as an addition to its Corporate Information System, an integrated closed-loop management information system for manufacturers and distributors.

The general ledger contains features that enable users to produce detailed financial statements from multiple levels of general ledger files and runs on Pick Associates, Inc. and compatible computers.

According to the vendor, the module's major features include comprehensive audit trails, customized financial statements and an extensive budgeting system.

The Corporate Information System is available for $105,000 (individual modules not available) from Madic, 3960 Freedom Circle, Santa Clara, Calif. 95054.

Selecting Financial Modeling Systems

(Continued from Page 109)

ities with interfaces to various functions. Again, user criteria determine what style is most appropriate.

An in-depth benchmark problem review should be performed to learn how different systems accomplish identical tasks. While this is not a complete answer, it can provide some solid comparisons from which commonly used activities can be viewed. How easy are models to build and change? How does one ask "what if" questions, perform sensitivity analysis or do backward iteration or goal seeking?

Selected benchmark usage should be observed in light of the established criteria. If you need features such as automatic reordering of logic statements and the solution of simultaneous equations, the field of choice narrows dramatically. Benchmarks allow you to obtain an additional level of comfort. They are often "decision clinchers" in many feasibility studies.

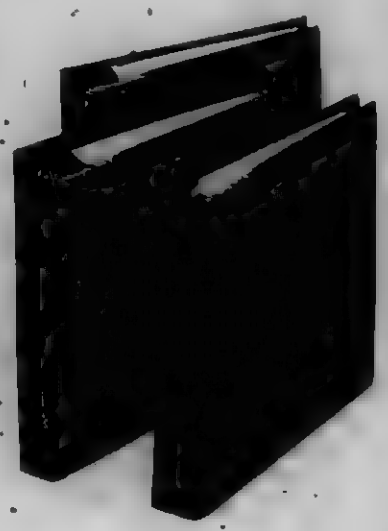
Comparative cost factors need to be understood. However, it is not a simple matter of looking at the different costs of CPU time. Connect charges and storage costs can far outweigh the cost of computations. Personnel time may turn out to be the overriding factor. The availability of discounts, minimums and initiation of service charges must be considered. Also, differing rates for remote job entry and remote and local batch processing can be influential, especially if you are willing to wait a few hours for results.

If you are selecting a product for in-house use, costs are a very different concern. Many authors offer their products on a free-trial basis before a license agreement is enacted. Maintenance, documentation, training and consulting are usually offered on a variety of terms. The effect of the product on system efficiency is difficult to ascertain unless the product is put up on your in-house environment.

The final step is to contact user references, especially those in your industry segment with similar applications and environments.

Now some disconcerting news: Once a system is carefully selected, your job is not complete. It is essential that users evaluate and periodically reevaluate their criteria and the changing means of satisfying those criteria.

Bergstrom is a principal and vice-president of consulting services at Real Decisions Corp. in Stamford, Conn.



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The Barrier Security Unit

Security Unit Said To Limit Access To Minis, Micros

ORANGE, Calif. — International Anasazi, Inc. has announced a data security device designed to limit access to minicomputers and microcomputers that receive data over 300 to 1,200 bit/sec dial-up asynchronous lines.

The Barrier reportedly allows calling terminals to connect with the dialed host only after accepting the appropriate user-programmable password. It is said that the user can program up to 63 characters for the access greeting message and another 63 characters for the access granting message.

According to the company, the Barrier is designed to hang up after three invalid password attempts. The unit is said to function with all 300 to 1,200 bit/sec modems and is installed between the modem and the secured computer.

The Barrier is available now in limited quantities and is scheduled to be available in large quantities by February 1984. It costs $369, according to the vendor. International Anasazi is located at Suite 202, 2914 E. Katella Ave., Orange, Calif. 92667.

Home Banking Seen Poised To Displace Check Writing

By Jim Bartimo
CW Staff

There are 100 million checks written each day in the United States totaling 40 billion annually, and each check is handled by an average of 10.2 people.

But within 10 years, writing checks could be displaced by computer-aided home banking just as many bank teller windows have been displaced by the automated teller machine (ATM).

Home banking usually refers to access by the customer to his account via a personal computer and modem. In addition to offering up-to-date account information, home banking may offer access to financial services, such as Individual Retirement Accounts, and the ability to send checks electronically.

At the Bank of America in San Francisco, one of the first complete home banking programs was introduced at the end of November, and 25,000 home banking programs are expected to be on-line by the end of 1984. The $8/month service is available 18 hours a day, seven days a week and eliminates much of the need for writing checks.

Customers can transfer funds directly from their accounts to many department stores, home mortgage companies and utilities. Users have constant access to their account status simply by dialing the bank's computer. Unlike most home banking programs restricted to IBM or other major micros, Bank of America accepts any communicating personal computer.

"We think home banking will play a significant role in banking," according to Maury Healy, vice-president/director of marketing/public relations. "Years ago, the trend was to have a lot of branches — then it was ATMs. The need for brick and mortar branches is lessening now as banks harness these new technologies."

Indeed, the development of ATMs is comparable to the development of home banking. While 50% of the computer-literate Silicon Valley customers of Bank of America use ATMs, it has taken at least 10 years for the cash-dispensing machines to

(Continued on Page 116)

Zstem Debuts for Zenith's Z100

VANCOUVER, B.C. — KEA Systems Ltd. has developed Zstem, a smart-terminal emulator for the Zenith Data Systems Corp. Z100 running under the firm's Z-DOS operating system.

Zstem emulates a Data General Corp. Dasher D200 terminal and is said to provide parallel and serial printer support and bidirectional file transfer capability. Zstem users may configure several features, including data rates from 45.5 bit/sec to 38.4K bit/sec, the number of data, parity and stop bits, flow-control protocols and half- or full-duplex communications.

Zstem-D200 costs $124.95 from KEA Systems, Department ZCW-2, 1L-811 Beach Ave., Vancouver, B.C., Canada V6Z 2B5.

Davoxnet Allows Transmission Of Voice, Data

MERRIMACK, N.H. — A series of products to form a network allowing simultaneous transmission of voice and data, in both IBM 3270 and asynchronous protocols, over standard twisted-pair telephone wire was introduced recently by Davox Communication Corp.

Known collectively as Davoxnet, the products include two workstations that can be connected to the Davox controller by either telephone wire or coaxial cable; an interface for converting the standard controller from telephone wire to coaxial cable and for adding an expansion controller connected by telephone wire; and a software package for file transfer between IBM Personal Computers and IBM mainframes and the Davoxnet components.

The 1911 Intelligent Terminal reportedly provides for IBM 3270, Digital Equipment Corp. VT100 and other asynchronous emulation along with hookup capability for $2,175. The Professional PC Deskset workstation provides an additional feature on an integrated feature phone for $2,375.

The eight-port Davoxnet Interface is priced at $750, and the PC/Host file transfer is priced at $800. The Smart Button Administrator enables workstation soft keys to be changed remotely by an administrator or automatically by a host program and costs $750.

More information is available from Davox, 6 Continental Blvd., P.O. Box 328, Merrimack, N.H. 03054.

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HP Net Analyzer Designed To Expand Test Capability

PALO ALTO, Calif. — Hewlett-Packard Co. has announced a network analyzer designed to expand testing capabilities for device characterization in the research and development laboratory and for production testing.

The HP 3577A network analyzer reportedly provides an integrated three-input receiver, graphics display and synthesized source. Also, the companion HP 35677A and HP 35677B S-parameter test sets are said to work with the network analyzer. The test sets reportedly also allow simultaneous display of transmission and reflection parameters.

The HP 3577A is said to be programmable over the HP Interface Bus. The company said simple programming codes minimize development time for automatic measurement software.

The product reportedly is useful for audio, video, baseband, intermediate-frequency and radio-frequency measurement problems and in areas such as sonar and digital communications.

The HP 3577A is said to cost $23,500, and the HP 35677A and HP 35677B cost $3,500 each, with delivery six weeks after receipt of orders. The company is located at 1820 Embarcadero Road, Palo Alto, Calif., 94303.

Terminal Ties Commands Of VT100, Tektronix 4027A

IRVINE, Calif. — CIE Terminals, Inc. announced recently a dual-personality, color graphics terminal that reportedly allows simultaneous use of Digital Equipment Corp.'s VT100 alphanumeric software commands and Tektronix, Inc.'s 4027A color graphics command structure and 4010/4014 emulation mode.

The CIT-467 employs Ansi X3.64 control sequences and provides rectangle, polygon, circle, arc and pie command functions, a company spokesman said. Compatible with 4027A graphics primitives, it also reportedly features full dot addressability, user-programmable scale factor and relocatable origin.

Video features include a 7- by 9-char. matrix, 132- by 80-char. column display, eight colors with 64 programmable combinations and a variable-speed smooth scroll up to 2,400 bit/sec, the spokesman said.

The unit costs $2,995 from 2505 McCabe Way, Irvine, Calif. 92714.

Fiberlink Units Announced For RS-232 Ports

WESTBURY, N.Y. — The Fiberlink Products Group of Math Associates, Inc. has announced a direct plug-in RS-232 Fiberlink, fiber-optic transmission system.

The XR-1150 reportedly connects two RS-232 serial ports between computer peripherals or microprocessors in the same manner as a standard interface cable. Contained within the shielded package is a full-duplex, 100K bit/sec optical transceiver said to allow operation at distances exceeding a mile between units.

Power for the XR-1150 can reportedly be supplied through spare pins on the integral DP-25P connector or by means of a plug-in ac adapter.

The units are priced at $349 per pair from Math Associates, 2200 Shames Drive, Westbury, N.Y. 11590.

Home Banking May Displace Check Writing

(Continued from Page 115)

become as widely accepted elsewhere.

Home banking "is certainly still in the initial phases," according to Sheldon Golub, of the American Banker's Association in New York.

But most banks are enthusiastic about the new technology for a number of reasons. One is that banks will save money when paper checks are handled electronically instead of by 10.2 people.

Another reason is that banks are looking for ways to keep their customers. "With home banking, you're talking about a far greater capability for investing," Golub said.

The increased investment opportunities come about when the time lag involved in withdrawal and deposit is eliminated. So, someone with $100,000 to invest for only two weeks would normally keep the cash in a savings account; but could instead quickly put it into a higher yield investment electronically, Golub pointed out.

But not all banks are as enthusiastic as Bank of America. Shawmut Bank of Boston recently completed a pilot project offering basic home banking services to 100 existing customers.

While waiting for the results of the project to be studied, the bank remains tight-lipped. "We really don't have much to say," said Barbara Roux, project manager of electronic banking services.

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Ven-Tel Micro Modems Bow

SANTA CLARA, Calif. — Ven-Tel, Inc. has introduced four modems designed for use with various personal computers, including the IBM Personal Computer and Personal Computer XT and the Hewlett-Packard Co. HP 150.

All four are autodial, autoanswer, 1,200 and 300 bit/sec and are designed to run with varied software packages, including Microstuf, Inc.'s Crosstalk-XVI.

The modems are the PC Modem Half-Card, PC Modem 1200, HP Internal Modem and 1200 Plus.

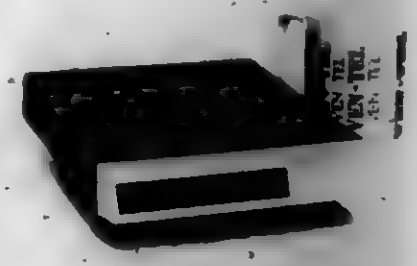
The PC Modem Half-Card reportedly was designed to fit in the small expansion slot on the Personal Computer XT, leaving a standard slot for additional memory or other peripherals, and to fit in any slot of the Personal Computer. The system reportedly features automatic dialing and logon, terminal emulation and automatic data capture. It is priced at $549.

The HP Internal Modem is designed to fit into one of the HP 150 expansion slots and is reportedly compatible with HP software, including DSN/Link and PFC. It is priced at $425.

The PC Modem 1200 is said to be a full-size version of the PC Modem Half-Card, fitting in the Personal Computer, Personal Computer XT, Compaq Computer Corp. computers and Eagle Computer, Inc. computers. It reportedly will cost $499.

The 1200 Plus stand-alone smart modem reportedly features LED lights on the front to allow easy monitoring of the phone call and both a self- and a remote-diagnostic test. It is priced at $499.

The four modems will be available in January. Ven-Tel is located at 2342 Walsh Ave., Santa Clara, Calif. 95051.



Ven-Tel, Inc. 1200 Plus

Transmission Units Debut, Said to Cut Errors, Misuse

CHERRY HILL, N.J. — Datatel, Inc. recently announced two data security units said to protect against unauthorized data transmission over telephone lines and to eliminate transmission errors for users of asynchronous terminals.

The DCP4010 Originating Unit is installed at the remote site, between terminal and modem, and the DCP4015 Answer Unit is installed at the central site, between computer and modem, a company spokesman said.

Each unit is programmed with a four-digit code that must be matched by the two units at either end of the transmission link; the DCP4010 is programmed with four thumb-wheel switches, and the answering unit is programmed with four dual in-line package switches. Other features include a cyclic redundancy check for error detection and data retransmission and a 16K-byte buffer for storage and protection against buffer overflow, a vendor spokesman said.

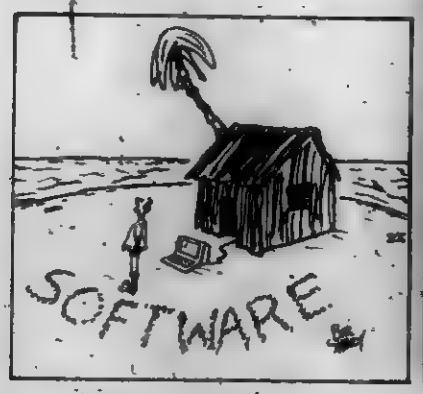
Pricing starts from $750 per unit from Datatel at Cherry Hill Industrial Center, Cherry Hill, N.J. 08003.

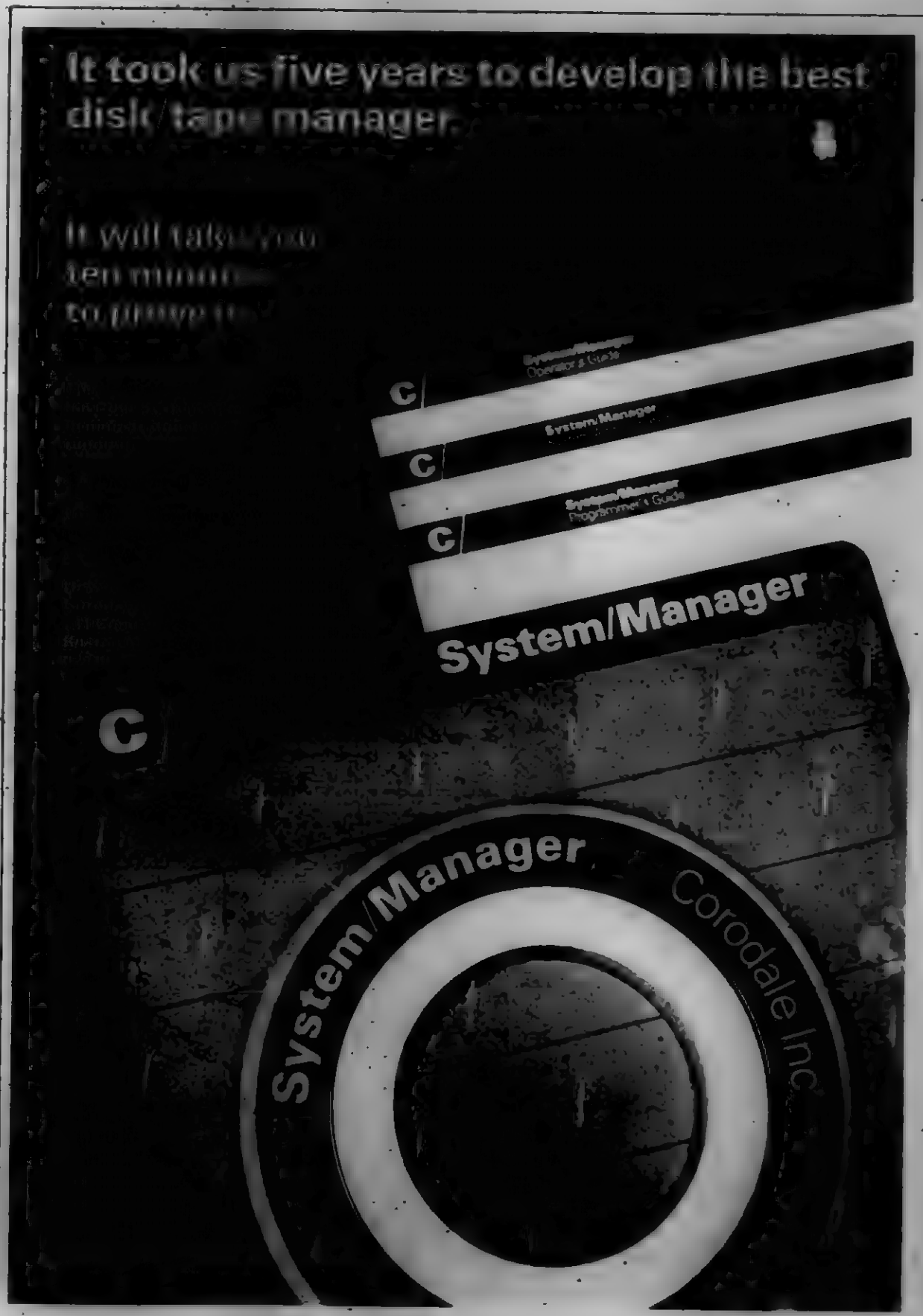
Cable Tester For Technicians Out For RS-232

SEATTLE — Datacom Northwest, Inc. has announced an RS-232 cable tester with a remote indicator for use on the bench or in the field by data communications technicians.

The Datacom RS-232 Cable Tester reportedly tests by two methods — the manual step mode or the continuous scan mode. Fifty LEDs are said to indicate connections on each end of the cable, while three more LEDs indicate open, short or continuity for each connection of the cable under test.

The device reportedly operates with the Datacom line of breakout boxes and pocket cablers. According to the company, the device will be available in January for $399. Additional information is available from Datacom Northwest, which is located at 11300 25th Ave. N.E., Seattle, Wash. 98125.





Modem Offers European Protocols

YOUNGSTOWN, Ohio — Western Datacom Co. has introduced an autoanswer, autodial modem that is said to enable any computer to telecommunicate with other modems located anywhere in the world.

Worldcom 200 is a standalone unit that uses the protocol of the country called, while maintaining compatibility with Federal Communications Commission (FCC) and Bell system standards for connections to the U.S. switched telephone network. The same RS-232C connection used for data also accepts dialing commands compatible with most half-duplex modems.

According to Western Datacom, the Worldcom 200 features FCC Part 68 registration with European protocols and tone or pulse dial on 1,200 bit/sec half-duplex lines or 300 bit/sec full-duplex lines. Operating modes include Bell 103/113, Bell 202, CCITT V.21, CCITT V.23 and videotex.

The price of the unit is $595 from Western Datacom, 5083 Market St., Youngstown, Ohio 44512.

Converters Eliminate Need for Leased Lines

HYANNIS, Mass. — Fibronics International, Inc. has introduced a pair of converters that use fiber optics between T1 modems or multiplexers, eliminating the need for leased telephone lines.

An FM-T1 converter translates into optical signals the 1.544M bit/sec bipolar T1 output and transmits the signals to the second FM-T1, which reconverts the information back to bipolar signals.

Prices for a pair of Fibronics FM-T1 fiber-optic converters start at $2,000. Delivery takes two to four weeks. More information is available from Fibronics International at 218 Main St., Hyannis, Mass. 02601.

Tektronix Offers Capability To 4115 Units

BEAVERTON, Ore. — Tektronix, Inc. has announced that its Autoconvergence capability is now a standard feature on all of the company's 4115 computer display terminals.

Autoconvergence is said to allow users to resolve the problem of color beams failing to intersect precisely at any point on a terminal.

Tektronix notes that beam convergence naturally drifts due to factors such as heat, position and equipment age, causing visual fatigue and loss of color information and images.

The 4115 terminal is priced at $19,950, according to the vendor.

More information is available from Tektronix, which can be contacted through P.O. Box 500, Beaverton, Ore. 97077.

Broadcast Scheduled For Feb. 9

WASHINGTON, D.C. — Tele-Update '84, a regulatory update for major telecommunications users, will be broadcast from here Feb. 9 to various teleconference locations around the country.

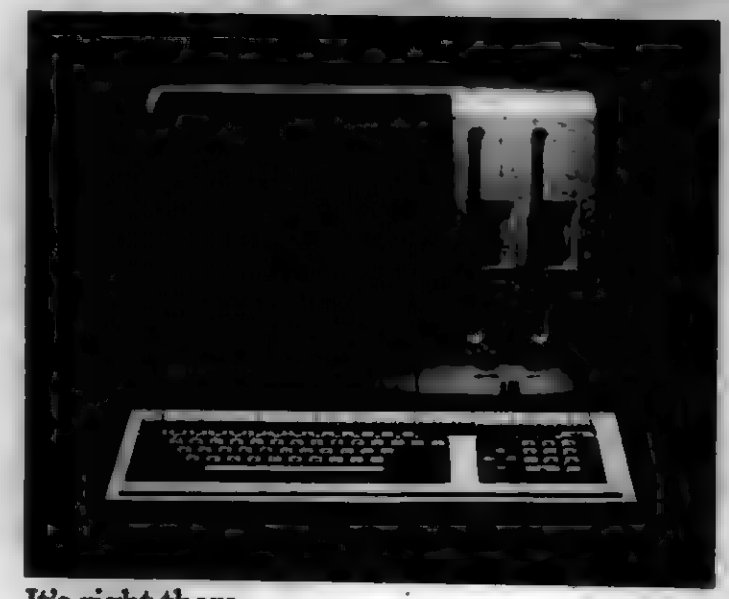
Sponsoring the conference is Jon Taylor and Co.'s Satellite Seminars.

The four-hour program tentatively is planned to include three panel discussions. The discussions will focus on topics such as: access charges, bypass systems and universal service, featuring participants from government agencies and Bell operating companies; deregulation of equipment and services, with representatives of the Federal Communications Commission, AT&T, other common carriers and the interconnect industry; and state regulation.

The program will feature two-way audio communications, according to the sponsors, and advance registration is priced at $75.

More information is available from Satellite Seminars through P.O. Box 356, Salt Lake City, Utah 84110.

CAN YOU FIND THE IBM* 3278 HIDDEN IN THIS PICTURE?



It's right there.

Inside the Advanced Personal Computer from NEC Information Systems.

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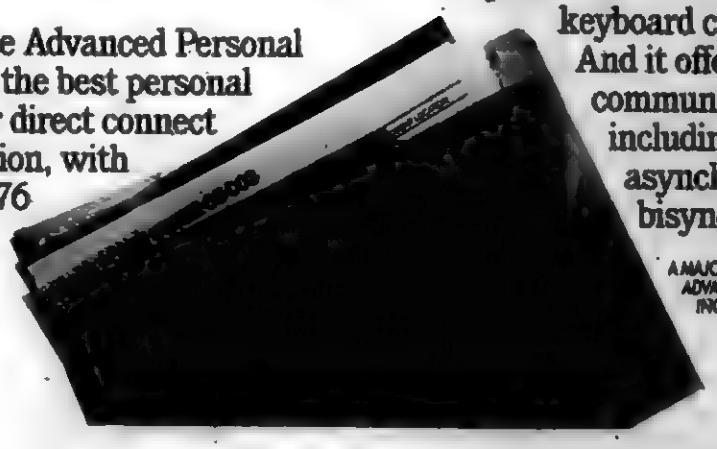
And the APC is fully compatible with all 15 different 3278 keyboard configurations.

And it offers a full range of communications protocols, including SNA/SDLC, asynchronous and bisynchronous.



A MAJOR INSURANCE COMPANY IS USING THE ADVANCED PERSONAL COMPUTER TO GREATLY INCREASE WORKER PRODUCTIVITY.

Prentice Announces Modem for Public Nets

SUNNYVALE, Calif. — Prentice Corp. has announced the 9600 A/B which, the company said, is a 9,600 bit/sec modem that functions over public-switched telephone networks.

The unit reportedly also operates over less expensive 3002-type unconditioned lines, and in leased-line operation, the 9600 A/B is compatible with CCITT Recommendation V.29. In both leased-line and public-switched network modes of operation, the unit conforms to CCITT Recommendations V.24 and EIA Standard RS-232C, according to the vendor.

The modem reportedly is designed for high-volume data communications between pairs of multiplexers in computer-to-computer data transfer applications or in medium-size to large networks. Said to be a compact desk modem unit, the 9600 A/B incorporates advanced large-scale integration for reduced power consumption.

The 9600 A/B is priced at $2,995 from Prentice, 266 Caspian Drive, P.O. Box 3544, Sunnyvale, Calif. 94088.

Seminars to Cover Micro Networks

MINNEAPOLIS — Architecture Technology Corp. recently announced "Personal Computer Local Networks," a series of seminars to be held at five locations in March and April.

The seminars are set for: Phoenix, March 8-9; Atlanta, March 15-16; Minneapolis, March 22-23; Washington, D.C., March 29-30; and San Francisco, April 12-13.

The registration fee is $645. Architecture Technology can be reached through P.O. Box 24344, Minneapolis, Minn. 55424.

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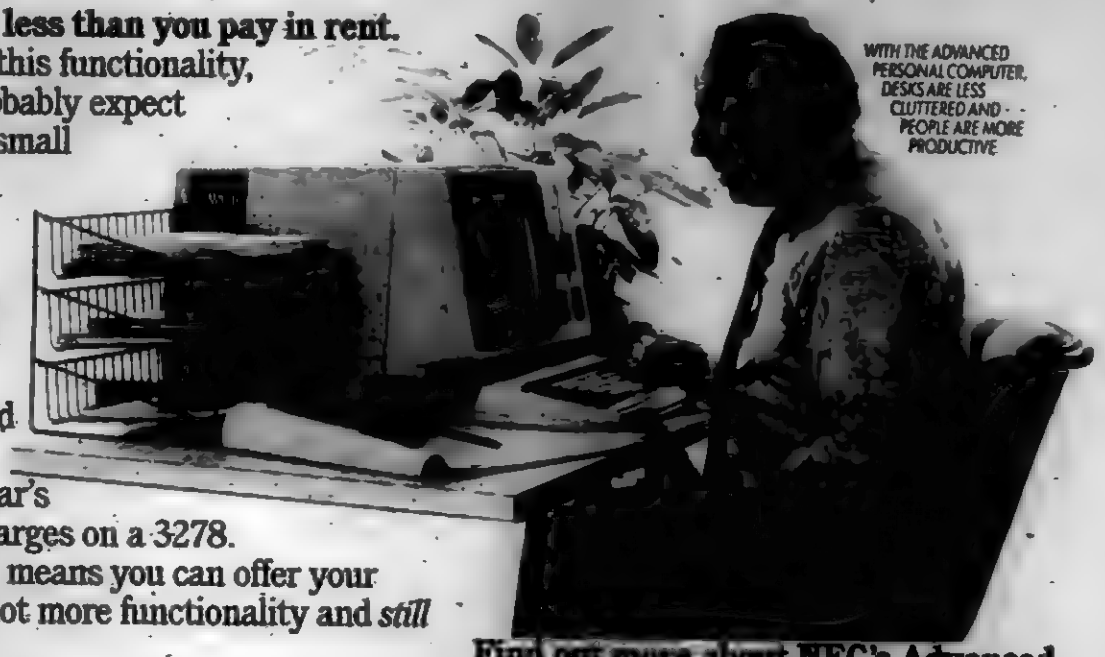

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The APC also offers you the best color-graphics in the industry, and a wide range of graphics software. The most storage capacity of any computer in its class. And the kind of reliability that NEC is famous for.

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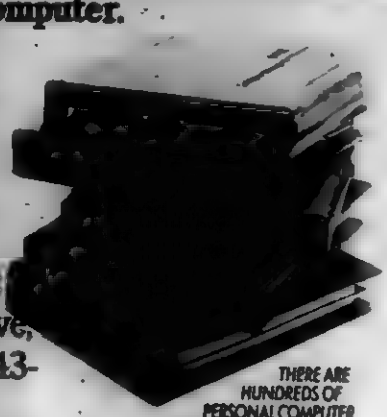
Find out more about NEC's Advanced Personal Computer.
For more information about the APC, or for the location of your nearest NEC representative, call 1-800-343-4419.



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NEC AND ME

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Terminal Enhanced By Addition Of Graphics

ANN ARBOR, Mich. — Ann Arbor Terminals, Inc. has combined a graphics controller with its Ambassador terminal to offer an integrated alphanumerics/graphics terminal with high-resolution output.

The graphics controller processes industry-standard Tektronix, Inc.'s 4010-4014 codes with a resolution of 768 pixels by 600 pixels, the vendor said.

According to the company, the user has control of the mapping from program drawing area to viewport, the size and angle of the alphagraphic characters and numerous graphics modes, including polygon draw and fill.

Over 50 graphics control parameters may be specified through either a set up [illegible] or commands.

Hard-copy graphics output to a dot matrix printer is standard, according to the vendor.

The alphanumeric features of the terminal reportedly include a 60-line display with vertical-scroll and zoom, Ansi-standard coding, editing and formatting controls and RS-232C printer output.

Thirty-eight keys are programmable on 60 levels with any Ascii string.

Common graphics commands may be downloaded to the function keys to facilitate execution, the company noted.

Data line monitoring functions provide diagnostics for checkout of both alphanumeric and graphics output, according to the vendor.

Displays may be set up to contain alphanumerics only, graphics only, or a combination of both, the vendor said.

The Ann Arbor Ambassador graphics terminal package reportedly is available for $3,090.

Ann Arbor Terminals is located at 6175 Jackson Road, Ann Arbor, Mich. 48103.

Provides Centralized Data Base

Netman Ready for VM/CMS Sites

SANTA MONICA, Calif. — California Software, Inc. has announced that its Netman data center and data communications management system is now available for IBM VM/CMS environments.

Netman is said to provide a centralized and integrated data base and to allow a user to perform inventory control, configuration management, order tracking, problem reporting, vendor analysis, failure notification, financial management, invoice verification, budget preparation and change management.

Netman VM/CMS includes more than 30 on-line screen, extensive batch and on-line reports and interfaces with popular report writer systems. It is said to utilize a single server machine to manage data base access for an unlimited number of users.

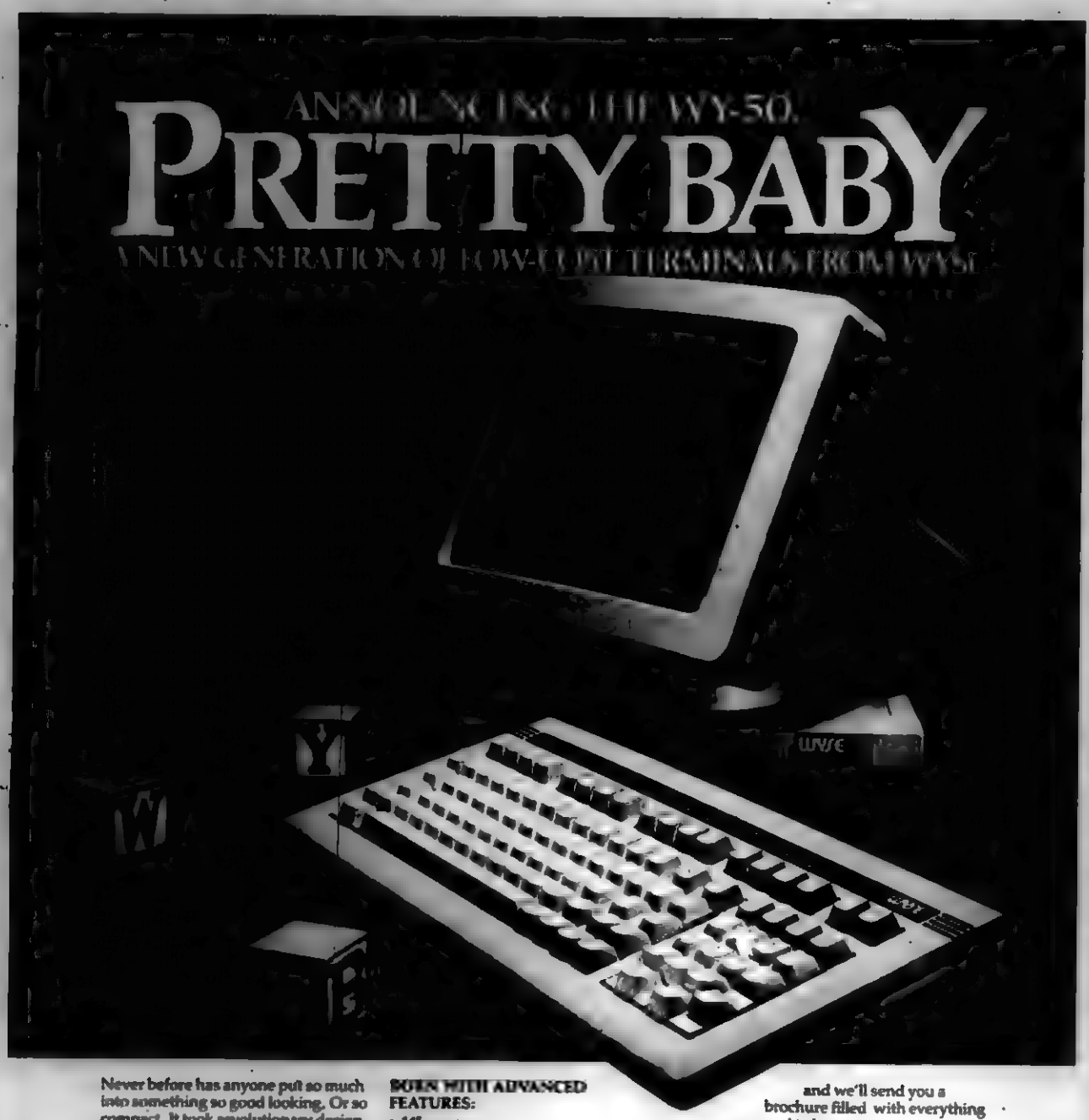
Netman VM/CMS is available now at an introductory license fee of $32,500 from California Software, 1460 Fourth St., Santa Monica, Calif. 90401.

IBM's PCjr Gets In-Board System

NORWOOD, Mass. — Microcom, Inc. has introduced an in-board communication system for IBM's PCjr.

Called Era 2, the system includes a 1,200 bit/sec modem and communications software. It incorporates the Microcom Networking Protocol for transfer of text or data files between personal computers and any other personal computer, minicomputer or mainframe. Era 2 also accesses remote data bases and utilities.

A free subscription to Dow Jones and an MCI Communications Corp. mail promotion are bundled with each Era 2 package. Priced at $429 per unit, the Era 2 carries a four-year warranty from Microcom, 1400A Providence Highway, Norwood, Mass. 02062.



Never before has anyone put so much into something so good looking. Or so compact. It took revolutionary design to do it. Design a lot of people couldn't accomplish for the price. But we did.

In fact, the birth of the WY-50 introduces a new standard for low cost terminals. It was conceived to give you 30% more viewing area. Developed to meet the most advanced European ergonomic standards. And best of all, delivered for a surprisingly low price.

The WY-50 sells for only $695.00.

BORN WITH ADVANCED FEATURES:
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Racal-Milgo Adds Omnimode 96 To Modem Line

MIAMI — Racal-Milgo, Inc. has introduced an addition to its Omnimode series of modems.

The Omnimode 96 reportedly operates at data rates of 4,800-, 7,200- and 9,600 bit/sec. The modem can reportedly be configured to operate with CCITT V.29 standards and for backward compatibility with the Racal-Milgo MPS 9601 or CMS 9601 modems. Test features for local and remote modems reportedly include standard tests, as well as CCITT V.54 loops.

Options on the modem include a Remote Modem Control and a multiport option for four-port operation, allowing data rates to be assigned in any combination of 2,400-, 4,800- and 7,200 bit/sec, according to a vendor spokesman.

The unit price for the Omnimode 96 ranges from $3,650 to $5,350, depending on the configuration. More information is available from Racal-Milgo at 8600 N.W. 41st St., Miami, Fla. 33166.

Ku-Band Tech Focus of Meet For February

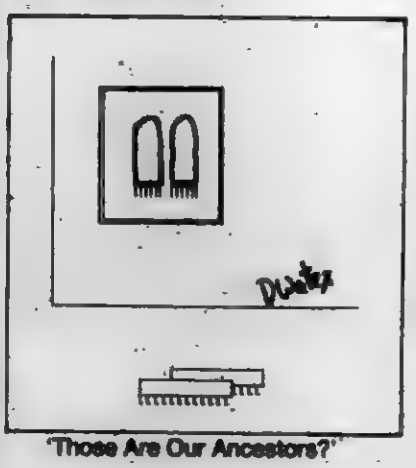
BETHESDA, Md. — Phillips Publishing, Inc. has announced a seminar to be held Feb. 16-17 in Washington, D.C., titled "Ku-Band Satellite Communications in the '80s."

The leader of the 1½-day seminar is Richard E. Wiley, former chairman of the Federal Communications Commission (FCC), one of the founding members of the law firm of Wiley, Johnson & Rein.

The topic of the seminar is the far-reaching impact which Ku-Band satellite technology will have on business and personal communications during the remainder of this decade.

According to the vendor, only one domestic Ku-Band satellite system is in operation, but the FCC has authorized an additional seven systems to be built and launched. The satellites are expected to have particular impact on business communications, because smaller earth station antennas for this band can be located on rooftops, making them accessible in high-density areas.

The price of the seminar is $595 per person. Phillips is located at Suite 1200N, 7315 Wisconsin Ave., Bethesda, Md. 20814.



'Those Are Our Ancestors?'

Compatible With IBM Personal Computer

Strategic Technologies Unveils Micro

ATLANTA — Strategic Technologies, Inc. has announced a briefcase microcomputer, the PC Traveler, which is software compatible with the IBM Personal Computer.

The unit weighs 28 lb and uses an Intel Corp. 80186 microprocessor. The PC Traveler uses Release 2.0 of Microsoft, Inc.'s MS-DOS operating system and features a 9¼-in. diagonal ac gas plasma display with an 80-col. by 25-line format. The vendor claims to be the first to offer a micro incorporating a gas plasma display.

Other features of the unit include an integrated printer that can accept both letterhead and fanfold stationery. The printer can operate at 80 char./sec and print 80 or 132 char./line. Multiple print fonts, character sets and dot-addressable graphics are also supported.

The PC Traveler includes a 6.2M-byte cartridge disk drive. Conventional half-height diskette drives are also available, the vendor said.

The PC Traveler comes with 128K bytes of standard random-access memory, which is expandable to 256K bytes. In addition, the unit can be equipped with an internal modem.

Strategic's PC Traveler

The PC Traveler costs $4,495, Strategic Technologies said from 7001 Peachtree Industrial Blvd., Building 3, Norcross, Ga. 30071.

Microfilm Aid Ties Indexing, Addressing

KINGSTON, N.J. — Advanced Data Management and Imtec Equipment, Inc. have announced Computer-Aided Retrieval (CAR) capability for the storage and access of microfilmed documents for their data base management software product, DRS.

This capability combines the indexing and rapid addressing features found in computer data bases with storage capabilities of microfilming. CAR was designed to be compatible with Digital Equipment Corp.'s PDP-11 minicomputers and VAX series superminicomputers and IBM's System 370, 4300 series and 30 series mainframes.

The price for CAR ranges from $15,000 to $52,000. Additional information is available from Advanced Data Management through 15-17 Main St., P.O. Box 601, Kingston, N.J.

CDC's Subsystems Boast 18M-, 30M-Byte Storage

MINNEAPOLIS, Minn. — Control Data Corp. has introduced two 5¼-in. Winchester disk subsystems that offer 18M and 30M bytes of storage, respectively. The units can be used with microcomputers employing an IBM architecture.

Called the Storagemaster 518 and 530 subsystems, the devices will be available in the first quarter of 1984 at Sears Business Systems Centers and participating Computerland outlets, the vendor said.

Based on CDC's Wren disk drives, which previously were only available to OEMs, each subsystem includes a disk drive, power supply and fan. A single-board controller is supplied for installation, without adjustment, in the IBM Personal Computer processor unit, the vendor said.

The Model 518 costs $2,595 and the 530 costs $3,390, the vendor said.

In addition, CDC announced the Storagemaster Premium series of 5¼- and 8-in. flexible diskettes. The diskettes are offered with 48 or 96/100 track/in. densities with single- or double-sided recording. Storage capacities range up to 1M byte per diskette with various format options available. The diskettes are available in packages of 10 and cost approximately $45 to $65 per package, Control Data said from 2200 Berkshire Lane, Minneapolis, Minn. 55441.

Charles River Introduces Two Processors

FRAMINGHAM, Mass. — Charles River Data Systems, Inc. has added two 32-bit processors to its Universe line of superminicomputers.

Called the Universe 68/35 and the Universe 68/67, the units are based on the Motorola, Inc. 68000 microprocessor and incorporate a 32-bit Motorola Versabus I/O bus. The units also offer a 4K-byte cache memory, the vendor said.

The Universe 68/35 features a 5½-in. Winchester disk drive with a formatted capacity of 35M bytes. The unit offers up to 3M bytes of main memory and can support up to 64 users. The 68/35 uses an integral 8-in., double-sided, double-density floppy disk drive for program loading and backup storage, the vendor said.

The Universe 68/67 uses a higher capacity 8-in. Winchester disk drive with a formatted capacity of 64M bytes. A built-in 45M-byte streaming tape drive is used for system backup. The Universe 68/67 comes with 512K bytes of main memory, which is expandable to 5M bytes, the vendor said.

Like other products in the Universe line, the 68/35 and 68/67 support the Unix operating system as well as Charles River's Unos operating system, the vendor said.

The Universe 68/35 including 512K bytes of main memory with byte parity checking, 35M bytes of Winchester disk storage and 1.25M bytes of floppy disk storage costs $14,900. Delivery time is 30 days, the vendor said.

The Universe 68/67 with 512K bytes of main memory, 64M bytes of Winchester disk storage and a 45M-byte streaming tape drive costs $24,900. The unit will be available in the first quarter of 1984, the vendor said.

Charles River Data is located at 983 Concord St., Framingham, Mass. 01701.

Polo Workstation Debuts

MOUNTAIN VIEW, Calif. — Polo Microsystems, Inc. has introduced an integrated personal computer workstation that includes monitor, dual disk drives and modem.

The Polo system is supplied with a 128K-byte CPU, expandable to 768K bytes, a 12-in. color monitor and two double-sided, double-density, 5¼-in., 360K-byte disk drives. Memory can be expanded an additional 10M bytes with the hard disk option. Microsoft, Inc.'s MS-DOS and Digital Research, Inc.'s CP/M emulator operating systems are standard.

Priced at approximately $3,400, the system is available from Polo Microsystems at 2570 El Camino Real W., Mountain View, Calif. 94040.

Ricoh Releases Printers, Floppy, Plotter

FAIRFIELD, N.J. — Ricoh of America, Inc. recently introduced a number of peripheral products, including several types of printers, an IBM-compatible floppy disk drive and a four-color plotter.

Among the printers is the LP 4120, a tabletop laser printer that operates at 12 page/min. It weighs 112 lb and provides four interchangeable type fonts. The printer also features overlay and portrait/landscape conversion capabilities and can be interfaced to a variety of data processing and networking systems, the company said.

Ricoh's line of three serial impact printers features a double-daisy printing wheel and bidirectional printing. All of the printers accept optional forms tractor feeder, letter guide and cut-sheet feeder. The units range in speed from the 20 char./sec 1200N to the 40 char./sec 1500Q to the 50 char./sec 1600Q.

The Ricoh TP-X is a thermal printer capable of printing up to 100 char./sec. The 24-element printing head delivers an output resolution of 180 dot/in.

The RF8160, a half-size, 8-in. double-sided floppy disk drive, features double-density design that accommodates up to 1.6M bytes of storage. It is said to be compatible with a range of IBM units, including the 3740 and 32 drives, the 3600 and 4964 double-sided drives and System/34 drives.

Finally, Ricoh has introduced the GP-1, a four-color ballpoint pen plotter/printer for business and personal computers. At a printing speed of up to 120mm/sec, the GP-1 can print in black, blue, red and green ballpoint and felt-tip pen type. It features 26 plotter commands and an oil pen that is said to last 1,000 meters.

The LP 4120, which has a suggested retail price of $14,000, will be available from Ricoh in the first quarter of 1984. The serial impact printers will be available at the same time from retailer Hamilton/Avnet. Suggested retail prices are $900 for the 1200N, $1,800 for the 1500Q and $2,700 for the 1600Q. Prices for the TP-X, RF8160 and GP-1, which will be released in the second quarter of 1984, are not yet available. More information is available from Ricoh, 20 Gloria Lane, Fairfield, N.J. 07006.

Multimodel Desktop Operates As Stand-Alone Using CP/M

MINNEAPOLIS — Computer Designed Systems, Inc. has introduced its Adviser Micro Plus, a multimodel desktop computer.

The unit can communicate with the company's Adviser series of interactive microcomputers or operate as a stand-alone system using Digital Research, Inc.'s CP/M operating system. Accounting and word processing software is available, in addition to programs for graphics and electronic spreadsheets, the vendor said.

The basic system comes with an 80-col. printer and a 12-in. CRT terminal that displays 80 columns by 24 lines. Also included is one 5½-in. disk drive. Storage capacity of the diskette drive versions ranges from 500K bytes to 2M bytes; optional hard disk storage is available, the vendor said.

A standard feature is a detachable 96-key typewriter keyboard with a 10-key calculator pad. Micro Plus is available in either monochrome or color versions, the vendor said.

The base price of Micro Plus is $2,000. More information is available from Computer Designed Systems, 10911 Olson Memorial Highway, Minneapolis, Minn. 55441.

Controller Joins DEC Processors, Industry Drives

GARDEN GROVE, Calif. — An emulating 5¼-in. floppy disk controller, said to feature Zilog, Inc. Z80-based design, is available from Distributed Logic Corp. (Dilog) for interfacing Digital Equipment Corp. LSI-11-11/23 Plus and Micro/PDP-11 processors to one or two 96 track/in., double-sided, double-density 5¼-in. floppy drives with industry-standard SA450 interface.

The Model DQ619 controller reportedly is contained on one dual-height printed-circuit board that includes all control and interface electronics for DEC RX02 disk drive emulation supported by DEC RT-11, RSX-11 and RSTS operating systems — without software patches or modifications.

The controller introduces dc motor control and includes 22-bit addressing for 4M-byte access, the vendor said. Other features include a full sector data buffer, on-board self-test and compatibility with DEC XII data reliability diagnostics.

The Model DQ619 costs $595 in quantities of 50. More information is available from Dilog at 12800 Garden Grove Blvd., Garden Grove, Calif. 92643.

Firm Announces RAM Board For IEEE-696 Bus

DALLAS — SDSystems, Inc. has announced the Expandoram IV, a random-access memory (RAM) expansion board for systems based on the IEEE-696 S-100 bus.

The product comes with 256K bytes of parity-checked memory. The board supports both 8- and 16-bit data transfers and may reside anywhere in the 24-bit address space of the IEEE-696 bus, the vendor said.

The Expandoram IV utilizes 150-nsec, 64K-byte dynamic RAM chips. The board is also designed to use 256K-byte RAM chips as they become available. The 256K-byte chip configurations yield a memory capacity of 1M byte, according to the vendor.

The Expandoram IV costs $1,145, the vendor said. SDSystems can be reached through P.O. Box 28810, Dallas, Texas 75238.

Disk Drive Series Targeted At OEM, Mini Markets

SANTA CLARA, Calif. — Memorex, Inc. has introduced a series of 8-in. Winchester disk drives with 166M bytes of storage aimed at the OEM small business computer and minicomputer markets.

The Memorex 230 series contains three models to match the storage requirements of small systems: Model 233 (83M bytes), Model 234 (1.1G bytes) and Model 236 (1.6G bytes). Each of the models has the industry standard storage module drive interface with a 1.2M byte/sec transfer rate, the vendor said.

The 230 series features 30-msec average access time with a switchable option that permits cartridge module drive interface users to integrate the drives without changing the interface.

The series permits 6.4G bytes of storage to be configured in the same space as a single 14-in. drive or 3.3G bytes in half the space, the company said.

Evaluation units will be available in January 1984, with production quantities available in March.

The Model 233 will be priced at $2,420, the Model 234 at $2,640 and the Model 236 at $3,080.

More information is available from the vendor, which is located at San Tomas at Central Expwy., Santa Clara, Calif. 95052.

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Brown Disc Manufacturing
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CDI
Celestial Software Inc.
Cermetek Microelectronics
Compaq Computer
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Computer Intelligence
ComputerKnowledge Corp.
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Corona Data Systems
Corvus
CPU Corporation
Creative Computer Products
Data Business Vision
Datamac
Data Storage Solutions
Data Translation Inc.
Decision Data Computer Corporation
Digital Communications Associates
Discortex Corp.
Distributed Logic Corp.
Dynax Distributors
Emulex Corporation
ENVAX Systems Inc.
ESC Technologies, Inc.
Everex Systems Inc.
Ferox Microsystems
Hayden Book Co. Inc.
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Human Edge Software Corp.
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Information Builders
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Interface Inc.
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MICRO MARKETWORLD
Micro-Design Inc.
Micro Line Inc.
Microtek Lab
National Instruments
NEC
Novation
Omega Software Inc.
Omni Graphics Inc.
On Trak Data Systems
OSM Computer Corp.
Palantir Software
Panamax Line Conditioning
P.C. Telemart
PC World
Pencept Inc.
Personal CAD Systems
Petroware
Phaze Information Machines
Prentice Hall Business & Professional Division
Printronix Inc.
Que Corporation
Racal-Vadic
Roland DG
RTCS/Real Time Computer Science Corp.
Santa Clara Systems
Seequa
Sensor-Based Systems
Software Automation Inc.
Softwaire Centre International
Software Solutions Inc.
Sorbus Service Division MAI
Sperry Corp.
Summagraphics Corporation
SWI International Systems
Sysprint Inc.
Systems Management Associates
Tall Grass Technology
TCS Software
Televideo Systems Inc.
3M Data Recording Products
Thunderhawk Corporation
Toshiba America Inc.
United Networking Systems Inc.
Vectrix Corp.
Verbatim Corporation
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(Exhibitors as of Dec. 15, 1983)

Shugart Offers Winchester Series, Microfloppy

SUNNYVALE, Calif. — Shugart Corp. has introduced a series of intelligent 5¼-in. Winchester disk drives that reportedly provide device independence from CPUs and a double-sided 3½-in., 1M-byte disk drive for desktop and portable computers.

The Shugart 700S series of Winchester disk drives, the 706S and 712S, are said to utilize intelligent small computer system interface controllers and half-height disk drives in an integrated, system-level product. The devices reportedly require only the connection of the drive to the host with the small computer system interface cable for integration.

The 706S is designed for a 5M-byte formatted capacity, and the 712S offers a 10M-byte formatted capacity. Both units reportedly have the intelligence to relieve the processor and controller of housekeeping functions such as formatting, data error detection and correction, defect mapping, data buffering, automatic retries and self-arbitration.

Shugart's latest microfloppy disk drive is the Shugart 350, which the company says occupies only one-fourth the volume of a standard 5¼-in. minifloppy drive.

The 350 reportedly operates with the Ansi working standard 3½-in. hard-shell cartridge media format, while providing 1M byte of unformatted capacity, 6-msec track-to-track access time and 80 tracks per side.

According to the company, the 350 may be incorporated into current systems with minimal impact on controllers and software investments and is quieter than minifloppies because it has only nine moving parts.

The 700S series and the 350 will be available for evaluation during the first quarter of 1984, with volume slated for the second quarter. The 350 costs about $200 in OEM quantities. The 706S costs $661, and the 712S costs $716 in OEM quantities.

Shugart is located at 475 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Personal Computer Unveiled By Royal Business Machines

WINDSOR, Conn. — Royal Business Machines, Inc. has introduced a personal computer that features 64K bytes of random-access memory and the ability to handle programs written under Digital Research, Inc.'s CP/M operating system.

Called the Royal Alphatronic Personal Computer, the system is based on a Zilog, Inc. Z80A microprocessor and includes 32K bytes of read-only memory (ROM), consisting partly of Microsoft, Inc.'s Basic Interpreter. According to the vendor, the computer addresses a variety of professional business and tutorial applications.

Built-in interfaces connect a cassette recorder, two disk drives and a Centronics Data Computer Corp.-type printer. An RS-232C communications interface has also been included for connection of printers, modems and other peripherals.

Any color or black-and-white television or professional-quality red-green-blue monitor can be used with the Alphatronic system. Depending on the monitor, the computer can display either 80 or 40 columns by 24 rows, allowing the flexibility of a wide range of programs. The system's high character resolution is provided by an 8- by 12-dot matrix, and eight foreground and eight background colors can be selected.

Keyboard features include a built-in 79-char. keyboard with 6 double programmable function keys (Ascii layout), separate numeric key pad, separate cursor control keys, two oversize return keys, positive touch keyboard and card holder for key function references.

Options include a line of ROM cartridges, which plug into the top left side of the computer for optional game and tutorial software, and two disk drives — a 5¼-in., slim-line double-density drive with controller (320K bytes) and a 5¼-in., slim-line double-density drive without controller (320K bytes).

The price for the computer is $695 from Royal Business Machines at 500 Day Hill Road, Windsor, Conn.

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Wednesday, February 1, 1984
User Sessions:

The Benefits of the IBM PC for Small Businesses
Financing Options and Tax Advantages
Available Add-Ons and Peripherals
Software: What's Available and How to Find It
What Do the Compatibles Have To Offer?
How I Became Compatible With My IBM PC
Medical/Dental Applications for the PC
The PC in the Law Office
PC's and Real Estate
Manufacturing Resource Planning with the PC.
Investment Software for the PC
CPA Software: The Bottom Line
Software for Insurance Applications
Distributed Control Software for the PC

Thursday, February 2, 1984
User Sessions:

The Anatomy of the IBM PC
Defining Levels of Compatibility Between Systems
Overview of Compatibles: Desktops and Portables
Word Processing Software
Database Management Software
Business Graphics Software
Analyzing Your Software Requirements
Overview of Major Business Applications Software
Integrated Software Solutions

Friday, February 3, 1984
User Sessions: The PC in the Corporate Environment

Review of Policy and Planning Issues
Implementation Strategies
Use of PC to Mainframe Communications (Includes Security Issues)
Local Networking for the PC

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For attendee and conference information, call CW Communications at 1-800-325-6000.
For information on exhibiting, call Mitch Hall Associates at 1-617-369-7406.

* signifies manufacturer's registered trademark.
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Interface Cable Out From IQ

BELLEVUE, Wash. — IQ Technologies, Inc. has announced the SC817 Smart Cable, an RS-232 interface cable.

The product interconnects computer systems, terminals, modems, printers and other devices with an RS-232 interface. The cable connects handshake lines used in specific applications and functions at transmission rates of up to 19.2K bit/sec, the vendor said.

The price is $119.95, according to IQ Technologies, which is located at Suite 308, 11811 N.E. First St., Bellevue, Wash. 98005.

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Bits & Pieces

Two Nonstop Power Units Designed for Applications

DALLAS — Bits Power Systems, Inc. has announced two uninterruptible power supplies (UPS) for computer applications requiring dedicated, continuous and isolated electrical power.

According to the vendor, the units are always on-line. Utility line power is used only to maintain a full charge on the internal gel-type batteries.

Model UPS-200 and UPS-400 have visual, audible and remote alarm functions. Standard full load backup time from internal batteries is 10 minutes. External 12V batteries may be plugged into a connector for extended backup time and automatic charging, the vendor said. Four standard grounded output receptacles are provided.

UPS-200 (200W) measures 5-in. high by 13-in. wide by 16-in. long and weighs 35 lb. Model 400 (400W) measures 6-in. high by 16-in. wide by 18-in. long and weighs 55 lb.

The price for the UPS-200 is $795 and $995 for the UPS-400.

Further information is available from Bits Power Systems, Suite B114, 11020 Audelia Road, Dallas, Texas 75243.

Plug-In Security Module, Software Back IBM Micros

ANNANDALE, Va. — Advanced Computer Security Concepts, Inc. has announced a plug-in module and associated software that will prevent unauthorized disclosure or modification of confidential or proprietary data on the IBM Personal Computer or Personal Computer XT.

The module contains a Zilog, Inc. Z80 microprocessor, 4K bytes of random-access memory, a minimum of 2K bytes of erasable programmable read-only memory, buffers and flags, a software implementation of the Data Encryption Standard, interface software and data protection software that enciphers all data residing on a diskette or hard disk. The data is deciphered only after being loaded into the memory and is again enciphered before being written back to the disk file, the vendor said.

The system operates under IBM PC-DOS Release 2.0 and costs $795. Further information is available from Advanced Computer Security Concepts, 4609 Logsdon Drive, Annandale, Va. 22003.

Desktop Chubb-8900 Offers Security Manager System

TORONTO — Chubb Engineered Systems has announced the desktop Chubb-8900, a computer-based security management system.

The unit can be handled by one operator and performs a variety of control/command functions, such as recording and controlling access via card readers, monitoring doors and intruder detection devices and signals heating, ventilation and air conditioning abnormalities. It can also unlock doors, turn lights on and off and sound required signals at prescheduled times or in response to specific conditions, the vendor said.

The system can handle 32 card readers, 5,000 pass cards and provide monitoring and command functions for 1,000 individual zones.

Prices begin at $35,000 and vary according to the size and complexity of the application, the vendor said.

Further information can be obtained from Chubb Engineered Systems at 80 Horner Ave., Toronto, Ont., Canada M8Z 4X9.

Storage Control Device Simplifies Winnie Use

SAN JOSE, Calif. — Priam Corp. has introduced an intelligent storage control device designed to simplify integration of Priam Winchester disk drives into multiuser computer environments.

The Delegate DS201 reportedly manages combinations of up to four 5¼-in., 8-in. and 14-in. Winchester disk drives with data rates of up to 1.8M byte/second has ports for ¼-in. tapes and floppy disks.

It contains an autonomous microprocessor with its own memory and I/O controllers, allowing it to delegate operations with minimal host involvement.

The DS201 is the second Delegate-series control device. It offers the ANSC Intelligent Peripheral Interface rather than the Smart-T interface of the earlier DS101.

The unit will be available during the first quarter of 1984 at a price of $975 in OEM quantities.

Priam Corp. is located at 20 W. Montague Expwy., San Jose, Calif. 95134.

Digital Optical Disk Drive Fits OEMs, Integrators

PARIS — Thomson-CSF Communications has announced the Gigadisc GD 1004, a read/write digital optical disk drive for OEMs and systems integrators.

The product is capable of storing 1G byte of formatted data on a single-sided, 12-in. optical disk. The unit is available in both a 19-in. rack-mountable version and a stand-alone tabletop unit, the vendor said.

The unit costs between $6,000 and $9,000 and is currently available in OEM quantities, the vendor said.

Thomson-CSF can be reached at 23 Rue de Courcelles, Bureau B.02, BP 96-08, 75362 Paris Cedex 08, France.

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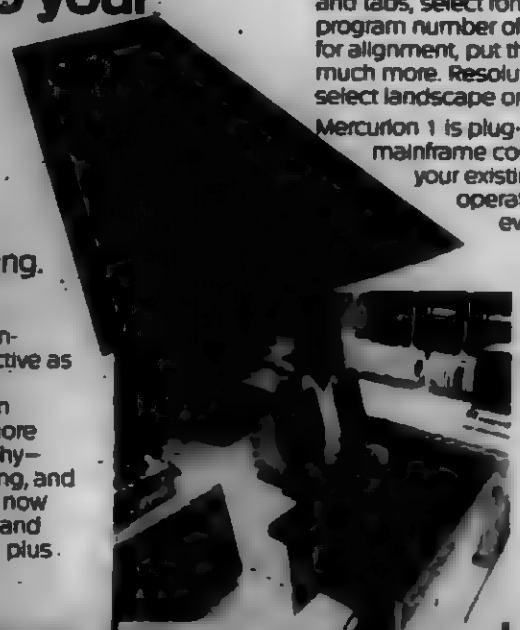

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As Info Equipment Proliferates

Flexibility Called for in Integrating OA

By Lynn Haber
CW Staff

FRAMINGHAM, Mass. — The critical role of communications for major business productivity gains has come to the forefront as the shift in office automation moves away from a fragmented approach toward a more integrated approach, according to a recent report published here.

"In present and future office environments, the nodal points for the communication of information will include workstations, computers, file servers, printers and other peripherals, personal computers and other types of equipment, as well as telephones and memos on paper. The ability to link all of these requires more flexible and more fully connective communications methods than those used in the past," according to "Office Networks," prepared by International Data Corp. (IDC).

The report praised the broad range of information processing equipment available to meet the changing office automation needs, but cautioned against this great flux which has resulted in a lack of standards in an environment of rapidly changing technology.

"With the availability of newer networking solutions for office communications comes the promise of higher level, cost-effective applications to support the automated office of the future. However, with this promise, some confusion exists," according to the report.

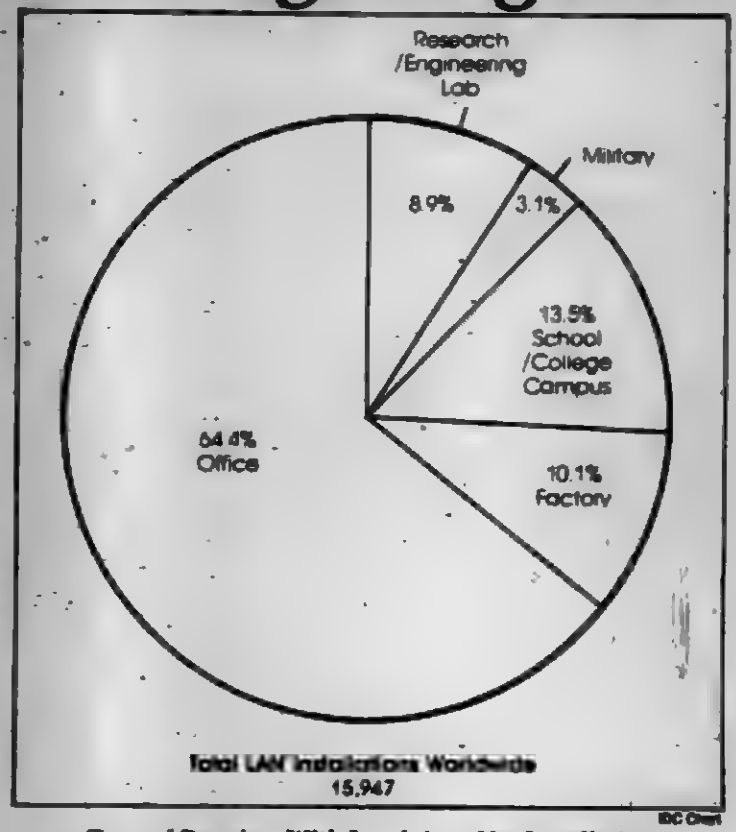
In the course of the study, IDC examined user needs and considerations for planning to implement an office communications network. Two important networking options explored were local-area networks and the voice/data private branch exchange (PBX).

According to the researchers, there are currently some 15,960 local-area networks of all types installed worldwide, with 64.4% of these in the office (see chart). The number of local-area networks installed worldwide is expected to reach 103,210 by the end of the year 1988.

The study also predicted an emergence of the PBX as a means of office networking. A number of third- and fourth-generation voice data PBXs have already become available, and these are expected to compete against local-area networks.

One constant theme throughout the report is the need for careful planning of an office network before any discussion of technology takes place. "The network in place should support the desired applications, not dictate what applications are possible. The best office network is the one that satisfies present, as well as future, business requirements," the report said.

The report is available for $3,500 from IDC, which may be reached at Five Speen St., Framingham, Mass. 01701.



Type of Premises With Local-Area Net Installation

HP Package Provides Networking For Its 9000

PALO ALTO, Calif. — Hewlett-Packard Co. recently announced a network package to provide local-area networking among its HP 9000 32-bit computers running under HP-UX, the company's version of the Unix operating system.

The HP LAN 9000 reportedly connects Series 500 computers via an Ethernet-compatible 10M bit/sec link and is said to allow users with little or no data communications knowledge to gain access to files, transfer files within a network, start or stop processes on other systems in the network and automatically communicate between processes running simultaneously.

The system is comprised of a microprocessor-based local-area network unit linked to a host HP 9000 computer through a dedicated HP-IB interface, a company spokesman said.

The network unit is connected to a 10M bit/sec coaxial cable, and software from the host is downloaded to the network unit to handle the transfer of information from the computer to other computers on the network via a transceiver and a cable, according to the vendor spokesman.

The package is priced at $5,035, and delivery is estimated at eight weeks after receipt of order. More information is available from Hewlett-Packard, 1820 Embarcadero Road, Palo Alto, Calif. 94303.

Inconix Local-Area Net Connects to IBM Micro

NATICK, Mass. — Inconix Corp. has introduced a local-area network that can be used for direct connection to the IBM Personal Computer via an RS-232 link.

The Cinchnet network provides for access by up to 124 Cinch Pac primary automation control units over a distance of 4,000 ft at a speed of 28.8K bit/sec without the need for polling, the company said. Each Cinch Pac offers local control intelligence for stand-alone operation without control instructions from or intervention by a host computer, a spokesman for the firm pointed out.

The combination of Cinch Pac with the Personal Computer via the network reportedly provides distributed digital control capability at a cost of about $1,000 per loop.

More information on the local-area network is available from Inconix, which is located at 10 Tech Circle, Natick, Mass. 01760.

Corvus Out With E-Mail, Software

SAN JOSE, Calif. — Corvus Systems, Inc. has announced an eight-program integrated software package for its Corvus personal workstation and an electronic mail package for various personal computers.

The Corvus Isys software package reportedly integrates a word processing package, a 225-row by 127-col. spreadsheet, business graphics, list management, data communications, sorting, rapid information retrieval and desk tools.

Corvus Isys allows the user to transfer data between programs and among computers using the Corvus Omninet local-area network. Computers on the network reportedly can share numerical data, standard text paragraphs or lists from common mass storage systems.

Corvus Omnimail is available for various personal computers, including those from Corvus; Apple Computer, Inc.; IBM; Digital Equipment Corp.; and Texas Instruments, Inc. It reportedly manages network mail traffic and allows users to track correspondence, edit, file and distribute messages and data parcels to several locations.

Corvus Isys, available now, and Omnimail, set for delivery in the first quarter of 1984, are priced at $495 each from Corvus Systems, 2029 O'Toole Ave., San Jose, Calif. 95131.

DG Offers Amber Screen

WESTBORO, Mass. — Data General Corp. has announced that its Dasher Model D210, D211, D410 and D460 workstations are now available with an amber video screen.

Said to be compatible with earlier green-phosphor Dasher models, the workstations can reportedly be used with existing applications, including Data General's Comprehensive Electronic Office (CEO) system.

The CEO package consists of word processing, information management and decision support products. The price for the amber monitors ranges from $820 to $1,610. DG can be reached at 4400 Computer Drive, Westboro, Mass. 01581.

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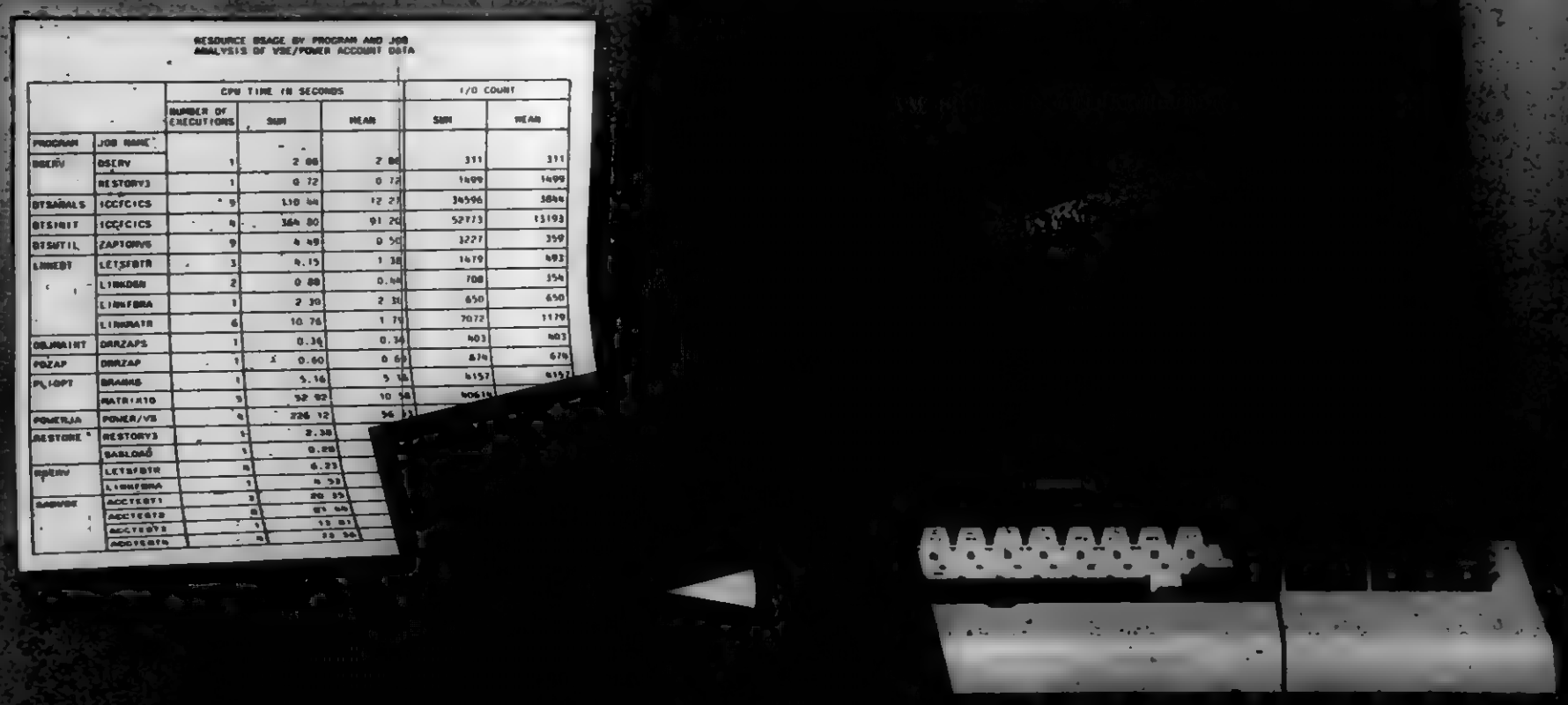

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To Increase 270% in '83, Report Says

Floppy Drive Shipments Skyrocketing

MOUNTAIN VIEW, Calif. — Worldwide shipments of floppy disk drives in 1983 will total an estimated 5.5 million units, up a whopping 270% over 1982's shipments, while growth to 23.6 million units shipped is expected by 1986, according to a recently released report from Disk/Trend, Inc.

The report showed further that a surge in 1983 shipments has made two-sided, 5¼-in. minifloppies the dominant flexible disk drive configuration. The trend to half-high versions of 5¼-in. drives is well established, the report found, especially with two-sided models from the Japanese manufacturers.

Considering worldwide unit shipments of all minifloppy drives, more than 90% of two-sided drives and more than 60% of one-sided drives will be half-high models by 1986, the study reported.

In addition, Disk/Trend's annual survey found that IBM is expected to start internal production of two-sided, 5¼-in. floppies next year with a program that will increase to production of an estimated 1 million drives in 1986.

However, the company's consumption of minifloppies by that time will be so great that IBM will likely buy as many minifloppies as it manufactures, the report said.

IBM's Plans for Drives

The report also noted that IBM will start using 1.6M-byte, 5¼-in. drives on new models in its Personal Computer line, which will supersede older word processing and small business systems. This will stimulate IBM's competitors to use compatible floppy drives, creating an active market in the U.S. for the 1.6M-byte format, originated in Japan.

This format will capture more than one-quarter of the 1986 shipment level of two-sided, 5¼-in. drives, the study said.

Other findings of the survey included:

- Despite continued confusion over competing microfloppy standards and stern competition from half-high 5¼-in. drives, microfloppies are starting to reach significant production quantities, with next year's worldwide shipments up to 810,000 units and shipments of more than three million expected by 1986.
- Worldwide shipments of 8-in. floppies are flat at present, with a slight growth for two-sided drives offset by declines in shipments of one-sided drives. After 1984, shipment declines of more than 10% (20% in 1985) are expected for drives in this category.
- For the first time in 1982, a different company held leadership in worldwide OEM shipments in each of the product groups analyzed. Tandon Corp. led in two-sided, 5¼-in. market share with 38%, and Shugart Corp. led in the one-sided, 8-in. market with 63%.

The study, prepared by James N. Porter, includes information on individual revenue and unit shipment projections for flexible disk drives in five separate product groups and provides statistics and analysis on installed drive populations, average OEM selling prices, competitive market shares of manufacturers and a basic review of competing data storage technologies.

The report also contains basic specifications of 285 flexible disk drives and profiles on 57 manufacturers of flexible disk drives worldwide.

The report is priced at $675 from Disk/Trend, located at 1224 Arbor Court, Mountain View, Calif. 94040.

Unit shipments in thousands	1982 Shipments	Forecast 1983	1984	1985	1986
8 inch drives					
One side	597.7	329.3	209.8	116.5	63.6
Two sides	1,032.5	1,301.8	1,429.4	1,340.7	1,098.0
8 INCH TOTAL	1,630.2	1,631.1	1,639.2	1,459.2	1,161.6
5.25 inch drives					
One side	2,120.1	3,636.2	4,446.7	4,835.2	4,662.6
Two sides	1,477.8	5,492.8	9,583.4	11,660.1	14,555.2
5.25 INCH TOTAL	3,597.9	9,129.0	13,030.1	16,495.3	19,416.0
Microfloppy drives	25.5	292.4	810.0	1,693.0	3,013.4
TOTAL, ALL DRIVES	5,253.6	11,052.5	15,479.3	19,647.5	23,592.8

Source: 1983 Disk/Trend Report

Worldwide Flexible Disk Drive Shipments

Distribution Of Software Electronically Fast Growing

By Lisa Raleigh
Special to CW‡

Electronic distribution of software is more than a probability favored by futurists. It's happening now, but is viable only for game software and other small programs at this time.

The potential for electronic distribution of business software will not be realized for many months and possibly years, according to industry analysts. Because business programs are so much larger than games, and because they require a great deal more support, many issues remain to be resolved.

It is already possible to download software from a central source via a modem to a retail store or even to an end-user location. However, the transmission of large programs requires a sizable chunk of time, sometimes more than an hour. Dealers wonder if their customers will sit still longer than 10 minutes waiting for a program to download.

Even if speed were not an issue, documentation and support remain untransmittable. An exception is on-line documentation, but that only makes large programs larger still. Also, even if big programs

(Continued on Page 132)

Xerox Merges Versatec, Office Products Division

LOS ANGELES — Xerox Corp. has announced the consolidation of two corporate organizations into a new division of the company and the appointment of a divisional president, according to Robert Adams, group vice-president and president of Xerox Systems Group.

The new Information Products Division will combine the resources of Versatec, Inc., a Xerox company in Santa Clara, Calif., and the Xerox Office Products Division in Dallas, where the new division will be located.

Named to head the Information Products Division is Renn Zaphiropoulos, president and co-founder of Versatec Co., who will retain his Versatec responsibilities and assume direction of three business units and staff functions in the former Office Products Division.

The three business units are electronic typing, information processing/personal computing and telecopiers, the company said.

In addition to Versatec's electrostatic printer and plotter line of equipment, the new division's products will include Xerox's Memorywriter typewriters, 860 information processing system, 820-II and 16/8 personal computers and 295, 455, and 495 Telecopier facsimile transceivers.

William C. Jackson Jr., former president of the Office Products Division, will join the Dallas-based Genra Group, which recently acquired Xerox's computer retail stores, as president.

Tandy's Model 2000 Seen Impacting IBM's Plans

By Jeffry Beeler
CW West Coast Bureau

With the recent announcement of its Model 2000 microcomputer, Tandy Corp. has gained a "temporary advantage" over IBM in the crowded IBM-compatible personal computer field and will force the industry giant to strengthen its next move in the personal computer arena.

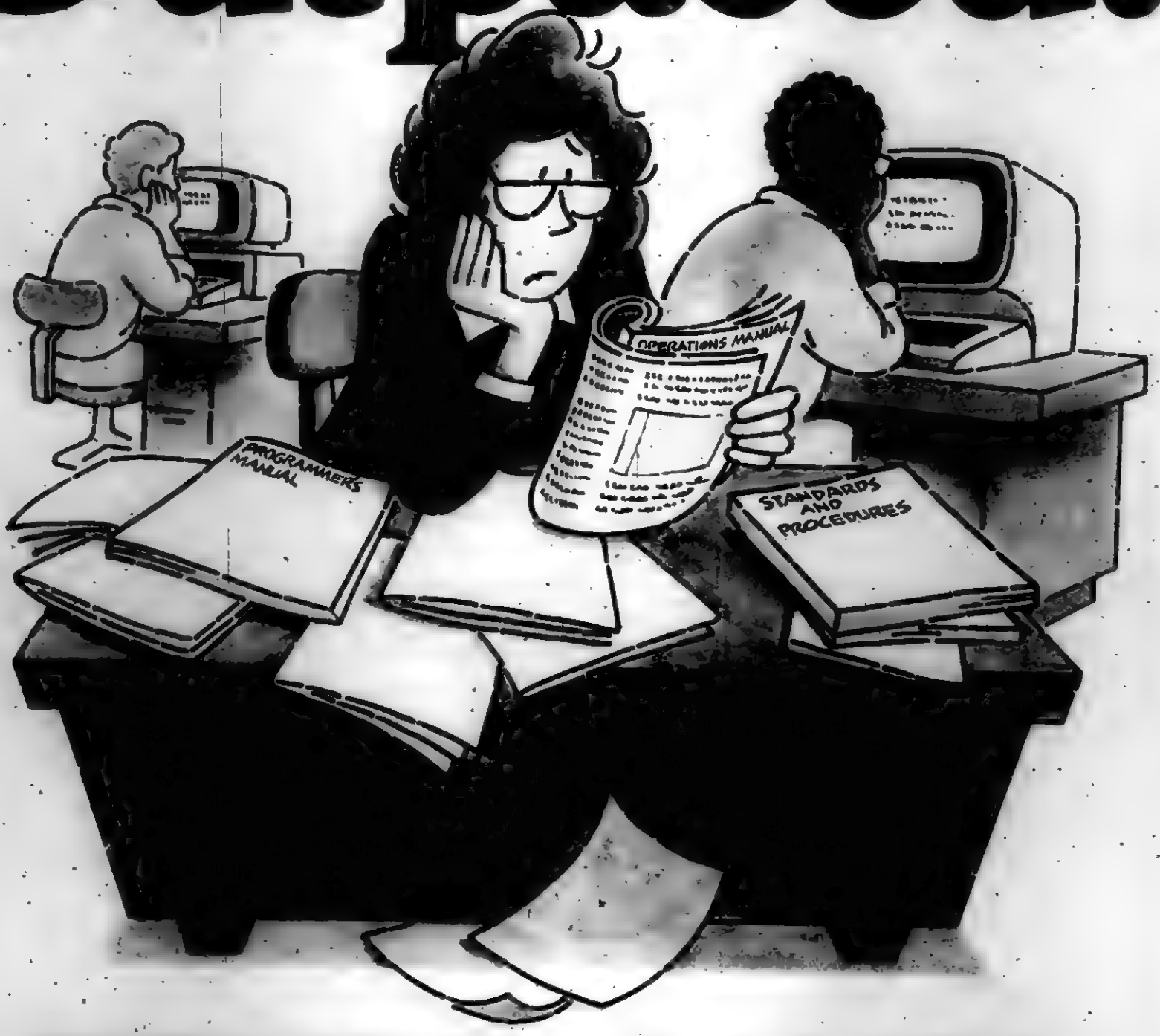
That assessment of the Tandy machine's market impact comes from industry analyst Robert Fertig, president of Greenwich, Conn.-based Enterprise Information Systems, Inc.

In response to Tandy's first IBM-compatible micro, Big Blue will probably add extra technological muscle to its long-rumored Popcorn Personal Computer, which Fertig envisions as a multiuser workstation incorporating a 32-bit Intel Corp. 8286 microprocessor.

The announcement of Tandy's Model 2000 has, in Fertig's view, also "pulled the rug out from under" Sperry Corp. and "completely neutralized" the latter company's own IBM-compatible micro only days after its formal debut at the Comdex/Fall '83 show [CW, Dec. 5]. The Sperry 16-bit machine incorporates a 7.16MHz Intel 8088-2 and boasts a 50% greater

(Continued on Page 134)

Outpaced.



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Local Nets Can't Aid Corporate User

Software Publisher Bemoans Lack of Micro Tools

By Robert Batt
CW West Coast Bureau

SAN DIEGO — The computer industry has created hundreds of thousands of "first-time losers" because of inadequate microcomputer software, an industry expert claimed recently.

Hal Tilbury, president of Bluebird Systems, Inc., a Carlsbad, Calif.-based software publisher, charged that the lack of powerful software means local-area networks are unsuited to the needs of today's corporate user.

"A first-time loser is one who soon discovers that what he bought won't do what he wanted, and disillusionment quickly sets in," Tilbury said here during a work session at the Multi-User Systems and Local Networks Forum, sponsored by Future Computing, Inc.

In large part, it is the computer industry that is to blame, he continued. "We blitz the buyer with Madison Avenue advertising campaigns that make micro-based software sound as if it is just as sophisticated as that found on a mainframe. We sell software designed for personal use to a business without taking the time to determine if it can do a job that it was never really designed to do."

Tilbury said local-area networks are not suited to provide the kind of transaction processing environment required by business data processing users.

What a business needs, he asserted, is the ability to do transaction processing from a centralized common data base, constantly and instantly available to the people in the organization who have a need to know. The user of the system must be allowed to initiate any job from any workstation at any time, and the software available has to be powerful and flexible enough to do the job, he added.

"No wonder the user became a loser. We didn't have the software he needed," Tilbury proclaimed. "The available micro-based software is all oriented to personal computing or support of a single-user work session and just does not match up to the user's needs."

'A first-time loser is one who soon discovers that what he bought won't do what he wanted, and disillusionment quickly sets in.' — Hal Tilbury, president of Bluebird Systems, Inc.

Local-area networks were not designed to accommodate transaction processing, Tilbury said. Rather, they were created out of the desire to allow several micros to share expensive disk and printer resources and to communicate with each other. While excellent for individual work session tasks such as word processing, graphics and spreadsheet analysis, local-area networks still do not fit the corporate bill.

Tilbury described local-area networks as too slow and expensive for the business environment. They cannot efficiently accommodate a common shared data base and cannot really handle true record-locking or file-sharing functions, he complained.

Furthermore, he said, the software used by local networks is Digital Research, Inc. CPM- or Microsoft, Inc. MS/DOS-based and consequently has been written for a single-user approach.

"Generally speaking, the most successful microcomputer software was written to accomplish a narrowly defined specific purpose. This has not been done with most micro-based operating systems, which have tried to be all things to all people."

Wang Offers Vision Support

SAN JOSE, Calif. — Wang Laboratories, Inc. has joined a growing list of computer makers offering support for Visicorp's Vision, the company's integrated operating environment product.

Wang and Visicorp have inked an agreement giving Wang exclusive marketing rights to Vision applications manager and related Vision software applications for Wang's personal computer. The agreement specifies that Wang will be responsible for the distribution, licensing and promotional activities associated with the marketing of Vision on Wang's micros.

In November, Visicorp reached a similar agreement with IBM for distribution of Vision on the IBM Personal Computer XT. Other computers that will support Vision include Compaq Computer Corp.'s Plus; Texas Instruments, Inc.'s Professional Computer; Honeywell, Inc.'s 7900 system; and Eagle Computer Corp.'s Spirit and PC Plus.

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Electronic Distribution of Business Software

(Continued from Page 129)

could be sent quickly, error-free transmissions cannot be guaranteed.

Piracy is another serious concern of software publishers who fear losing control when others take responsibility for making copies of their products. They worry that a legitimate copy may be difficult to tell from an illegal one when factory packaging is not part of the sale.

Nevertheless, interest in the concept is building. Eric Bedell, manager of retail marketing for Lotus Development Corp., reported that the subject is "the topic of the month," judging from the number of phone calls he receives each week from market researchers studying electronic distribution. Taylor Coleman, founder of Softwareland, an Ariz.-based chain of software stores, pointed to similar growing interest.

"I think it has a place down the road, but in the short run it's not viable," Coleman said. "The trend is toward bigger and bigger programs. The successful programs are monsters. It won't work until you can speed up the transmission time dramatically."

At 1,200 bit/sec, a 192K-byte program such as the Lotus 1-2-3 would take at least 20 minutes to transmit; at 300 bit/sec, it would take more than an hour and a half. These are minimum elapsed times, however. Many experts say additional time must be allowed to account for errors in transmission.

"There is a question of integrity. Even one bit dropped means that the program won't run" and would need to be sent again, according to Enzo Torresi, co-founder of San Jose, Calif.-based Businessland.

Consequently, an additional "20% to 30% error-correcting factor" is customarily tacked on to the average downloading time, said Dave Wagman, chairman of Softsel Computer Products, a physical software distributor which plans to undertake some form of electronic distribution in the future.

Wagman said one of his major concerns is proper documentation. "To send something electronically now, the program must be very small and must require no documentation. Getting the documentation to the customer will be a problem. You could put it on-line, but then you'd have even bigger programs to transmit," he said.

The significance of personal assistance is a factor many dealers and software developers emphasize when discussing the prospects for electronically distributed software.

"It's still important, on the average, that there be a human interaction in the sale of software," Wagman said. He cautioned, though, that this might not always be the case. "If it gets to the point where people don't need point-of-sale, then electronic distribution will displace retail," he said.

Supplemental Channel

Executives at both Softyme and PC Telemart claimed that electronic distribution will function as a supplemental channel, handling perhaps 10% of the software distributed.

Most retailers appear unconcerned that downloading services direct to users will take away their businesses. "A significant part of the cost of software is in the form of added value," said Rick Inatome, president of Inacomp Computer Centers, headquartered in Troy, Mich. "And I can speculate from the current state of software that the existing distribution channels will be necessary for a while. I'm very confident that I can continue to add value."

Packaging, too, is an area where electronic distribution is expected to run into some snags. The consumer-oriented marketing lessons they have learned over the last couple of years might not be applicable.

"The big issue is that it's a move toward products becoming intangible," Bedell said. "Packaging and merchandising have become very important as ways for software companies to distinquish themselves."

Beyond marketing considerations, the prospect of unpackaged products also raises many questions about security. An authorized program diskette can look exactly like one that has been illegally copied. "With electronic distribution, the software vendors will lose one important thing that they have today — the fact that every copy looks like it came from the manufacturer," Wagman noted.

Not surprisingly, no major software publishers have yet made a commitment to any type of electronic distribution scheme. Many of them cite the potential for piracy as their chief worry. Others, like Dennis Carelli, director of sales for Software Publishing, voiced concern about maintaining their existing channels. "It will be part of our distribution, but I can't say when," Carelli said. "The lifeblood of our firm is the retail dealer, so we're not going to do anything that takes away from the retailer."

Publishers may be slow to sign up, added Ester Dyson, president of Rosen Research, "because a lot of things have to be worked out. There's no rush, so they're waiting for the other guy to do it first. The idea will catch on, but it will take some time."

Raleigh is an associate editor at Micro Market World, *a sister publication of* Computerworld.

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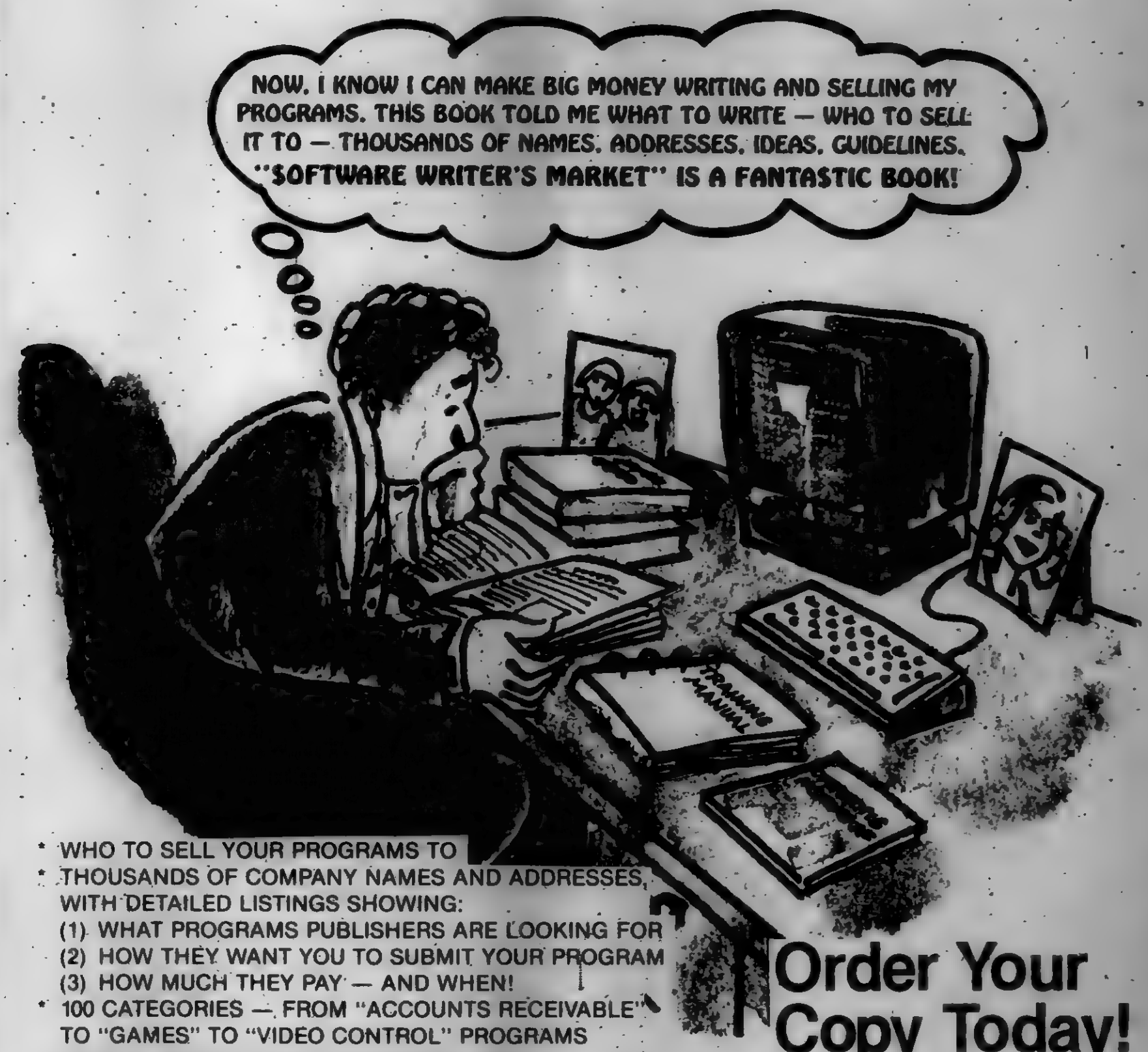

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Supershorts

Intel Corp. and **Inmos International, Inc.** of Colorado Springs, Colo., have entered into an agreement to develop methods for Chmos dynamic random-access memory (RAM) products. The two companies intend to work separately on dynamic RAM designs and Chmos technologies, but will keep key specifications consistent.

• • •

The University of Michigan's College of Engineering has received a grant of over 200 professional workstations from **Apollo Computer, Inc.** The workstations will be incorporated into the college's new computer-aided engineering network for engineering students and faculty for instructional and research programs.

• • •

Harris Corp. has given a Harris 800 superminicomputer to Clemson (S.C.) University. The gift will be used for research programs by faculty and students in the electrical and computer engineering department.

• • •

Wang Laboratories, Inc. and **Visicorp** have signed an agreement giving Wang exclusive marketing rights to the Vision application manager and related Vision software applications for the Wang Professional Computer. Under terms of the agreement, Wang will be responsible for the physical distribution, licensing and promotional activities associated with the marketing of the software.

• • •

Automatic Data Processing, Inc.'s **ADP Autonet** and **Digital Communications Associates, Inc.** (DCA) have announced a joint development project that enables both DCA communications products and Digital Equipment Corp.'s Unibus-compatible devices, including the PDP-11 and VAX-11 series computers, to link directly with the ADP Autonet public data network without the need for protocol conversion.

(Continued on Page 137)

Tandy Seen One Up on IBM, for Now

(Continued from Page 129)

execution speed than its IBM counterpart, the company said.

The new Tandy micro, announced only three days later, is built around an 8MHz Intel 8186 and reportedly offers twice the clock speed of the industry giant's micros. A reportedly superior microprocessor and doubled clock speed enables the Model 2000 to operate from 2.5 to four times faster than IBM's XT, according to Tandy executive vice-president Ron Stegall.

But if the Tandy machine constitutes something of a coup from a purely technological perspective, Fertig claimed that from a marketing standpoint the company's announcement may have been ill conceived.

"Tandy shot itself in the foot by introducing the 2000 at Comdex," Fertig said. "The company's sales force was caught off guard by the announcement and hadn't been trained to demonstrate or sell the product."

Fertig also faulted Tandy for neglecting to provide users of its existing systems with a clearly delineated migration path to the Model 2000. Because of its ability to run the same software as the IBM Personal Computer, the firm's latest offering lacks compatibility with its older sister systems, which support Tandy's own proprietary operating system.

The Model 2000 thus marks a sharp departure from its developer's traditional product direction and will "make the company's [existing] users wonder whether they're going to be left out in the cold," he said.

The abrupt change in product course will also create additional uncertainties among the firm's users about what systems moves their supplier is likely to make in the future, he added.

Fertig further criticized Tandy for reportedly failing to accompany its Model 2000 announcement with price cuts for the company's existing systems, thus creating a "lopsided" pricing structure that works to the old products' disadvantage. "Why would anyone want to buy one of Tandy's existing [personal computers] now that the 2000 has arrived on the scene?" he asked.

Taken together, Fertig concluded, the mistakes in Tandy's latest microcomputer introduction make the firm's entry into the world of IBM compatibility look "haphazard" and create the impression that the vendor acted "without considering all the possible ramifications."

Tandy's Stegall rejected Fertig's claim that Tandy failed to prepare adequately its sales force for the Model 2000's announcement. "Every one of our 6,500 sales people received four hours of training on the machine prior to its debut, he said.

Stegall also minimized the significance of the 2000's incompatibility with its sister systems and defended his firm as having compiled an impressive track record for "sharp" retail pricing. "The lack of compatibility with our other systems isn't really all that important because the Model 2000 was never intended as a replacement for any of our existing products," he said.

In any event, Stegall added, Tandy's history of supporting its customers with distinct migration paths has been "outstanding."

In general, he characterized the company's recent Model 2000 announcement as well planned and executed.

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By giving terminals local computing power, Convertible improves your host system's performance and extends its useful life. In short, Convertible saves you money by adding useful power to your terminal.

You don't have to buy a lot of computer to get a lot of computer power.

To get more information about Convertible and the address of the dealer nearest you, call (415) 468-5320 or write to Paradise Systems, Inc., 150 North Hill Drive, Brisbane, CA 94005.

There's more to the Convertible story. Convertible turns your terminal into an intelligent workstation for distributed processing.

Convertible is a registered trademark of Paradise Systems, Inc. CP/M is a registered trademark of Digital Research Corp.

PARADISE

Supershorts

(Continued from Page 134)

Chrysler Corp. and **Control Data Corp.** have signed a memorandum of intent to develop jointly a new generation of computer-aided design (CAD) software. The companies said the cooperative venture will significantly advance state-of-the-art software technology in mechanical CAD engineering and analysis. Chrysler plans to use the jointly developed software in its vehicle design and development programs. CDC will market the CAD programs through its computer products and services organizations.

* * *

A corporate grant of $417,955 from **Digital Equipment Corp.** has allowed Boston's Wentworth Institute of Technology to acquire DEC's VAX-11/780, 12 SLI-11 and 30 VT180 computers.

Datapoint Corp. has announced plans to participate in the Boston Computer and Communications Center, Boscom. The Datapoint Learning Center will feature the company's office-oriented products operating in a Tandem Computers, Inc. ARC local-area network environment and will emphasize a hands-on approach.

* * *

The American Electronics Association (AEA) has announced a 17% increase in new members in 1983. A total of 2,350 electronics and information technology companies are participating in the organization, according to the AEA year-end report. The number of AEA associates — financial, professional and business organizations that maintain close relationships on a continuing basis — increased from 397 in 1982 to 473 in 1983.

* * *

Joseph J. Kroger, president, Computer Systems operations at **Sperry Corp.**, has announced a consolidation of the office information systems and the communications terminals operations. The combined organization will be headed by Stuart J. Miller, vice-president, office information systems.

Nickels & Dimes

Compaq Computer Corp. has begun an initial over-the-counter offering of six million shares of common stock. The offering price per share was $11.

$$$

Analog Devices, Inc. has reported a 23% increase in sales and an 87% increase in net income for the fiscal year ended Oct. 29, 1983. Sales reached $214 million, and net income was $18.4 million.

$$$

Wyle Laboratories has reported sales for the quarter ended Oct. 31 of $79.7 million, up 53% over the same period last year. Net income was $2.5 million, or 33 cents per share, compared to a net loss of $1.5 million last year.

$$$

Televideo Systems, Inc. has reported sales of $168.7 million and net income of $22.4 million for the fiscal year ended Oct. 31, increases of 71% and 76%, respectively.

$$$

Western Digital Corp. has completed a public offering of 2.8 million common shares. Proceeds totaled $24.4 million, of which $17.5 million will be used to repurchase 2.2 million shares of the company's stock presently held by First Interstate Bank of California. Remaining proceeds will be used to reduce short-term debt.

$$$

AM International, Inc. has reported a $7.1 million increase in net income on a 4.4% increase in revenues for the first quarter of fiscal 1984, ended Oct. 29. Net income was $2.5 million, or 24 cents per share, compared with a net loss of $4.6 million, or 45 cents per share, for the first quarter of 1983.

$$$

Cambex Corp. has reported a loss of $1.9 million, or $1.09 per share, for the fiscal year ended Aug. 31, compared with income of $76,000, or 4 cents per share, for fiscal 1982.

More versatility than ever with Lee Data's 3270 terminal system

Integrated Personal Computing

Lee Data's new Personal Workstation now lets you enjoy all the advantages of professional business computing plus have both 3270 and asynchronous access to CPU-based applications—all from the same Lee Data workstation!

That's right! Completely-integrated, IBM-compatible personal computing—offering the latest functional capabilities and these value-added features:

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For confidential consideration, direct your resume, including salary history to:

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(617) 692-6200

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The individual we are seeking will provide pre-and post-sales support for third party application software vendors. Responsibilities will include: converting systems dependent code, converting, running and optimizing benchmarks, and consulting with vendor personnel on UNIX™ and MASSCOMP specific facilities. Some travel to customer sites will be required.

Qualifications for the position include: a minimum of 2 years FORTRAN programming experience, and 1 year experience as a UNIX™ user although 2 years experience as a systems programmer on any multi-user operating system may be substituted for the UNIX™ experience. Additional experience that would prove helpful would include experience in user support or as pre- or post-sales analyst for computer vendors in technical markets. Experience converting technical third-party software is also desirable.

OEM Marketing

The individual we are seeking will develop large OEM markets. Responsibilities will also include planning and executing strategies for future target OEM markets; as well as designing special promotional programs.

The qualified individual will have worked within the OEM environment for at least 4 years in a sales or marketing capacity dealing with technical applications. A BSEE or BSCS would be helpful.

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MVS SYSTEMS PROGRAMMERS

THE RECENT ACQUISITION of an MVS based IBM system has created the need for experienced IBM software specialists at Roadway's corporate headquarters in Akron, Ohio. Preferred candidates will have achieved good academic records while earning either (1) Associate's or Bachelor's Degree in Computer Science, Computer Programming, MIS or Data Processing, or (2) Bachelor's Degree, math or business-related major.

SUCCESSFUL CANDIDATES will have at least two years experience in

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- JES 2
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Your experience in the above areas will allow you to participate in establishing standards and directions for future growth.

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Akron, Ohio 44309-0471

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Susan Bisky
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Positions are available for qualified applicants throughout the country. To arrange for an interview in your area, call our headquarters directly or send resume with salary history to the address below. No agencies please.

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Owens-Corning Fiberglas, a world leading building materials manufacturer, is currently in need of an MIS Auditor to join its Corporate Audit Department. Responsibilities will include planning and executing audits of Corporate and Division MIS activities, verifying compliance and recommending improvements. Operating environment is large IBM mainframe and distributed TI minicomputers. Qualified applicants will be degreed with 2 years or more of MIS or Auditing experience and will possess a strong working knowledge of current data processing technologies and concepts. For confidential consideration, forward resume and salary history to: Cathy Provost, Owens-Corning Fiberglas, Fiberglas Tower, Toledo, OH 43659. Dept. T-5.

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data processing

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MINIMUM QUALIFICATIONS:
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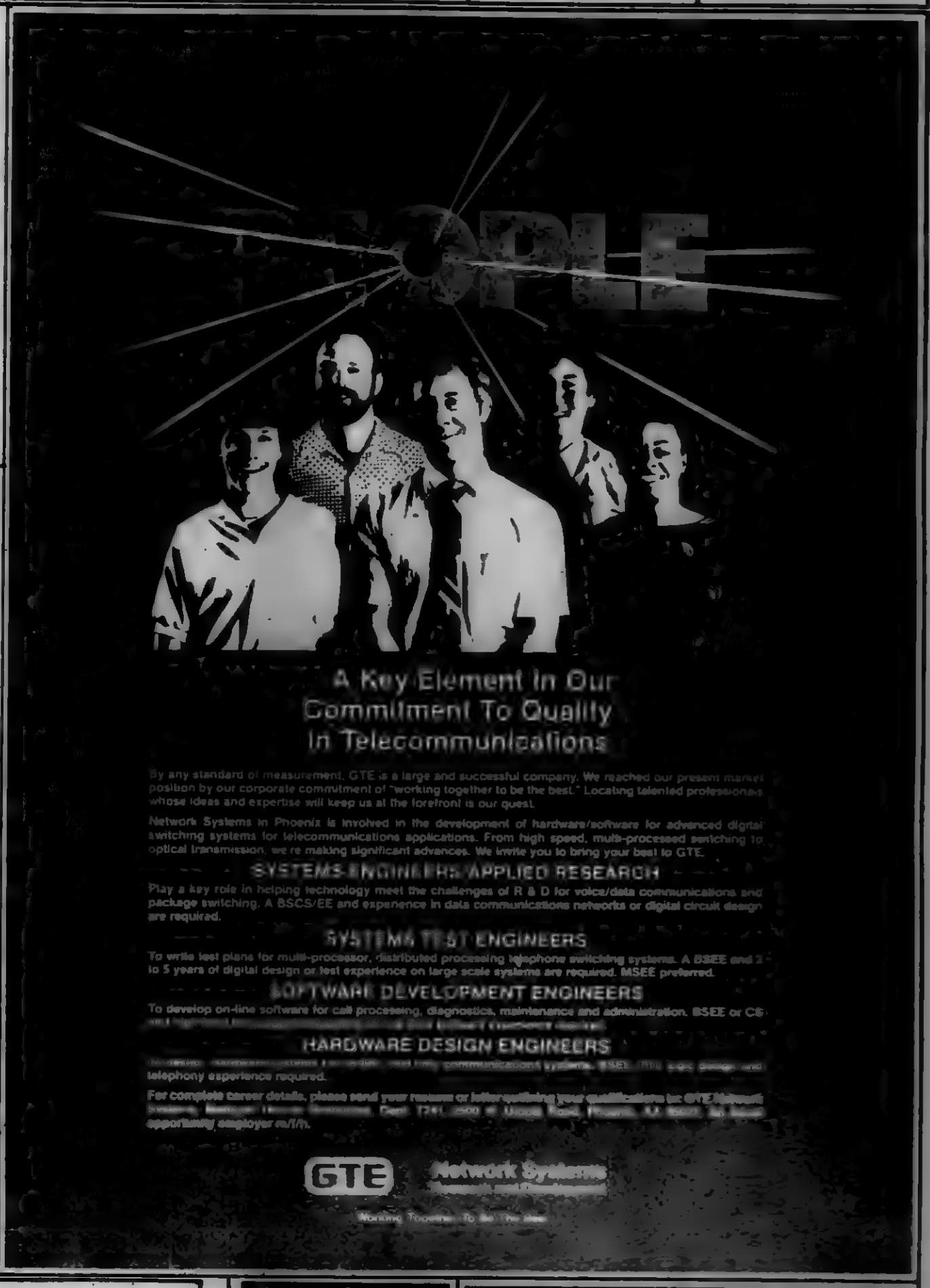

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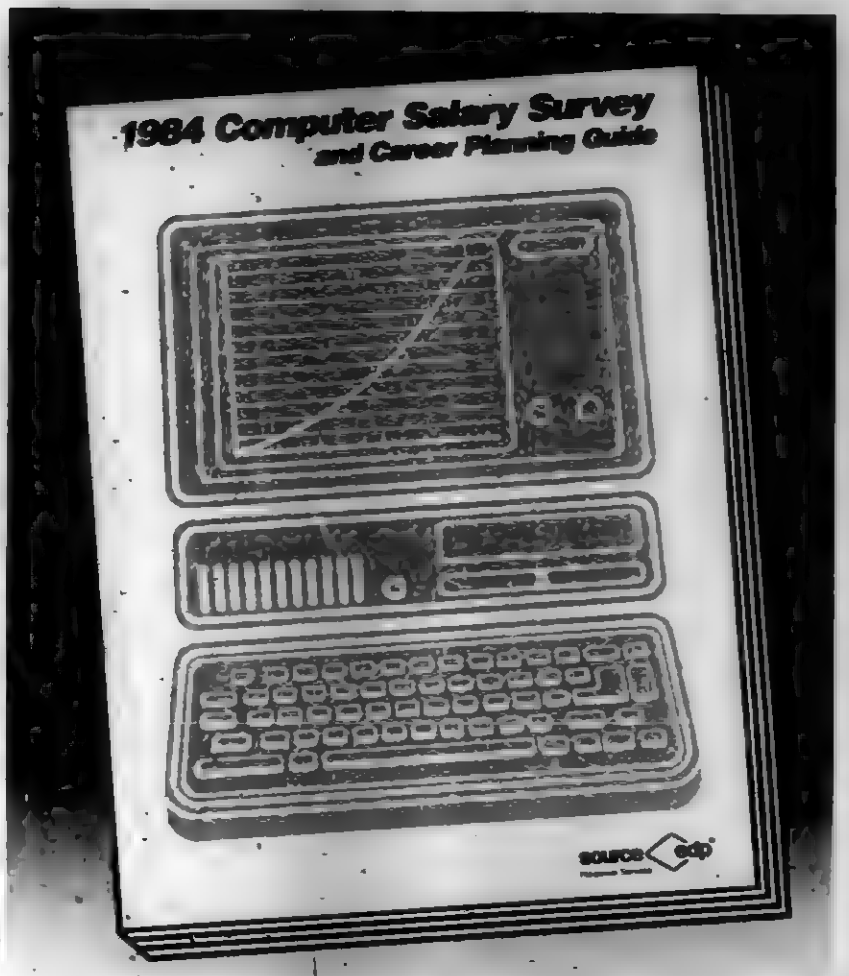

No doubt during 1983, you knew that many organizations took a hard line on awarding liberal salary increases.

The effects of the salary freeze were felt by many computer professionals. Firms enacted across-the-board cuts, lowered compensation ranges for "new hires," restricted bonuses and benefits or set forth other policies to lower their personnel costs in countless situations.

Yet, on the other hand, did you know that salaries for *some* computer professionals *soared* right on through the uncertain business outlook?

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Our *1984 Computer Salary Survey and Career Planning Guide* will give you new insight on trends that impact compensation, provide current salary figures and review ways the computer profession will be affected in the future. It will also explain why many computer professionals are able to advance their careers more successfully than others.

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- Why some professionals now earn as much as 25% more than they did last year.
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1984

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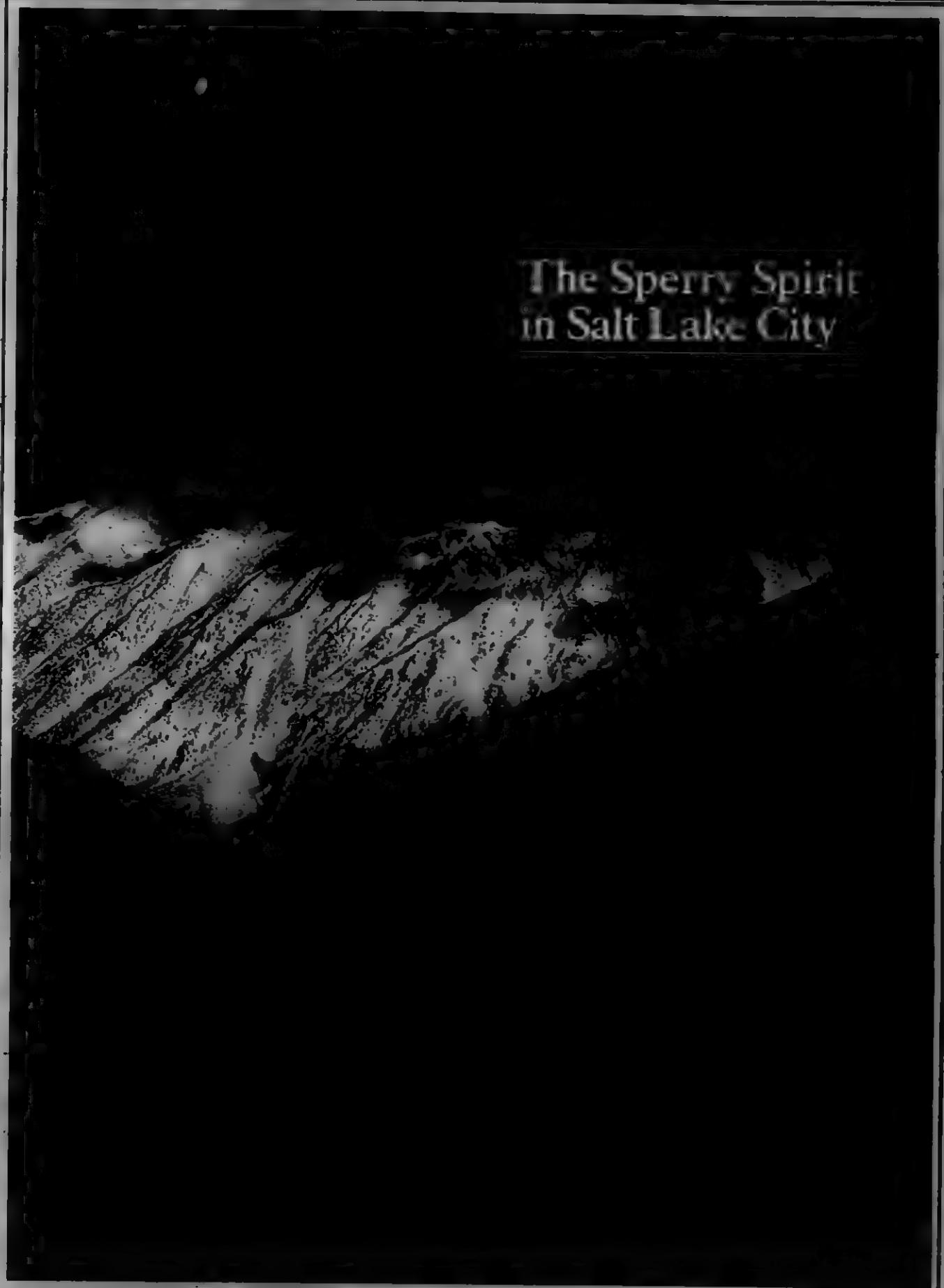

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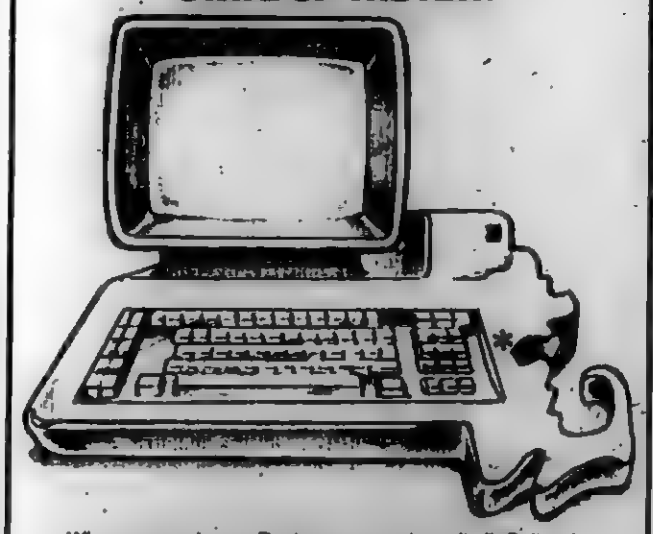

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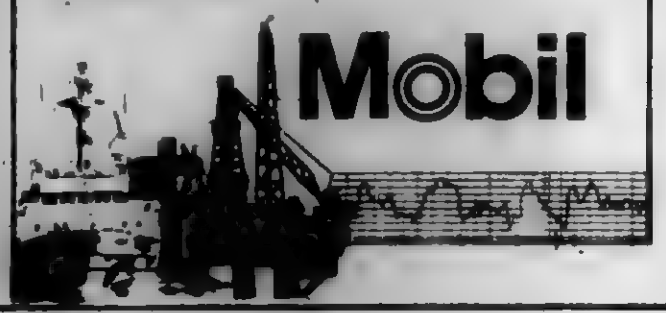

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Sohio

Geophysical Software Professionals

Discover Sohio in Dallas, Texas

Opportunities exist in our Geophysical Systems Development staff for individuals with experience in seismic systems development to develop state of the art seismic processing systems in a DEC VAX 11/780 - CRAY IS/X-MP environment.

The successful candidates will work within a structured analysis and design project team environment to provide seismic systems development support for the Geophysical Research and Development staff at Sohio's Geophysical Data Center in Dallas.

Geophysical Systems Analyst

Requires expertise in using structured analysis and design techniques to analyze, design, specify and test state of the art seismic systems for Sohio's aggressive exploration programs.

Minimum 3 years' experience in seismic software development including time series analysis or geophysical signal processing is required.

Individuals should have above average skills in interpersonal relations, written and oral communication. Project management skills are also desirable.

Geophysical Programmer Analyst

Seismic software experience, including development in seismic analysis and interpretation techniques (wavelet and/or velocity analysis, event tracking, filtering), signal processing and color graphics.

These positions require a BS or MS in geophysics or physics with strong skills in software development, or a BS or MS degree in computer science or math with strong skills in seismic software development.

Geophysical Data Base Analyst

Requires expertise in using structured analysis and design techniques to analyze, design, specify and test geophysical data base management systems for use with state of the art seismic interpretation systems.

BS or MS degree in computer science, math or related field is required. Minimum 3 years' training and experience in the analysis, design, specification and testing of software systems under a structured environment is required.

Individuals should have above average skills in interpersonal relations, written and oral communications. Project management skills are desirable.

All positions require familiarity with FORTRAN '77. Experience with DEC (VAX-11/750 & VAX 11/780) and CRAY IS/X-MP systems is desirable. DEC assembler, DEC systems internals, data base management systems, graphics software and hardware experience is preferred.

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The following positions are now open and require a minimum of a Bachelor's degree or equivalent combination of education and experience.

Applications Consultant (A340)

Individual will assist in the development of education software which achieves the dual purpose of curriculum enrichment and technical coherence. Qualifications include: Three to five years in applications development with particular emphasis on graphics. Must have at least two of the following languages: C, LISP, Fortran and Pascal.

Education/Support Specialist (A338)

Individual will: 1) evaluate educational needs of user community and provide educational courses and materials to meet needs; 2) plan and supervise on-site consulting to users in terminal rooms as well as a staff "hotline" for unresolved questions; and 3) organize and publish a library of Athena-developed courseware/software. Qualifications include: excellent administrative, organizational, verbal and written communication skills. Experience in preparation of educational materials and documentation formatters (i.e., nroff, Scribe or TEX). Familiarity with design of user interfaces, software verification or graphics systems desirable.

Operations Coordinator (A339)

Individual will assist in planning and performing the administrative and technical activities involved in hardware and software installation and operation of all Project Athena computers. Develop and implement procedures and establish control. Communicate with users and interface with hardware/software vendors. Assure system and user file backup and recovery. Qualifications include: experience with UNIX operating system, supervision of computer systems operations and maintenance, and logistics/support in academic environment. Excellent interpersonal and communication skills required.

Please send 2 copies of resume, referring to appropriate job number to: Ms. Sally Hansen, MIT Personnel Office, E19-238, 77 Massachusetts Avenue, Cambridge, MA 02139.

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Sacramento, CA

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Sohio

Discover Sohio in Dallas, Texas

Opportunities exist in our Geophysical Systems Development staff for individuals with experience in seismic systems development to develop state of the art seismic processing systems in a DEC VAX 11/780 - CRAY IS/X-MP environment.

The successful candidates will work within a structured analysis and design project team environment to provide seismic systems development support for the Geophysical Research and Development staff at Sohio's Geophysical Data Center in Dallas.

CRAY Software Optimizing Analysts

BS (MS preferred) in computer science, math, physics or geophysics with at least 2 years' code optimization experience on CRAY IS/X-MP systems is required. Experience with DEC systems (VAX-11/750, VAX-11/780) and FORTRAN '77 is preferred. Previous experience with seismic software development and geophysical signal processing is desirable.

Individuals should have interpersonal skills to effectively interact with Sohio's Geophysical R&D staff. Project management skills helpful.

It's time to consider joining the Sohio adventure where the compensation package, including benefits, is outstanding. The opportunity for visability is unequaled and — to top it off — Sohio has one of the best relocation programs in the industry. To find out more, send your resume, complete with salary history to: Dan Allman, SOHIO PETROLEUM COMPANY, Dept. D048, 5420 LBJ Freeway, Suite 800, Two Lincoln Centre, Dallas, Texas 75240.

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3. **SYSTEM PROGRAMMER** - DEC - 3-5 years experience in RSTS/E and VAX/ UMS.

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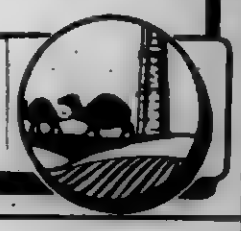

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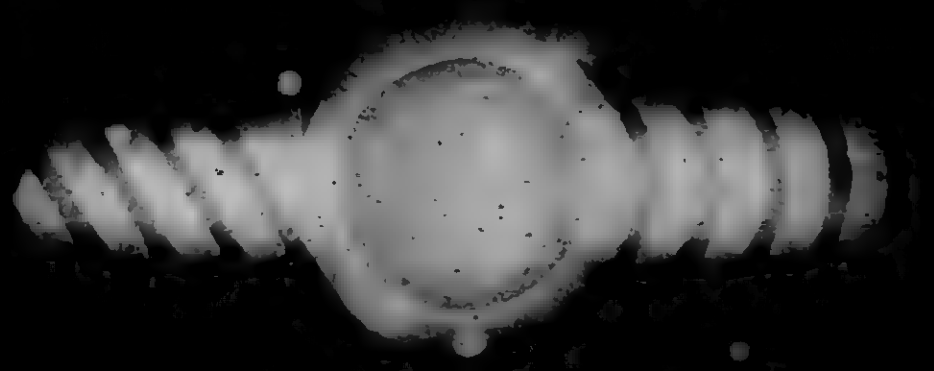

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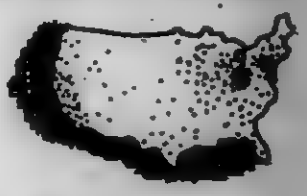

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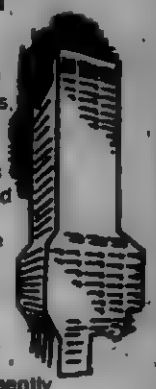

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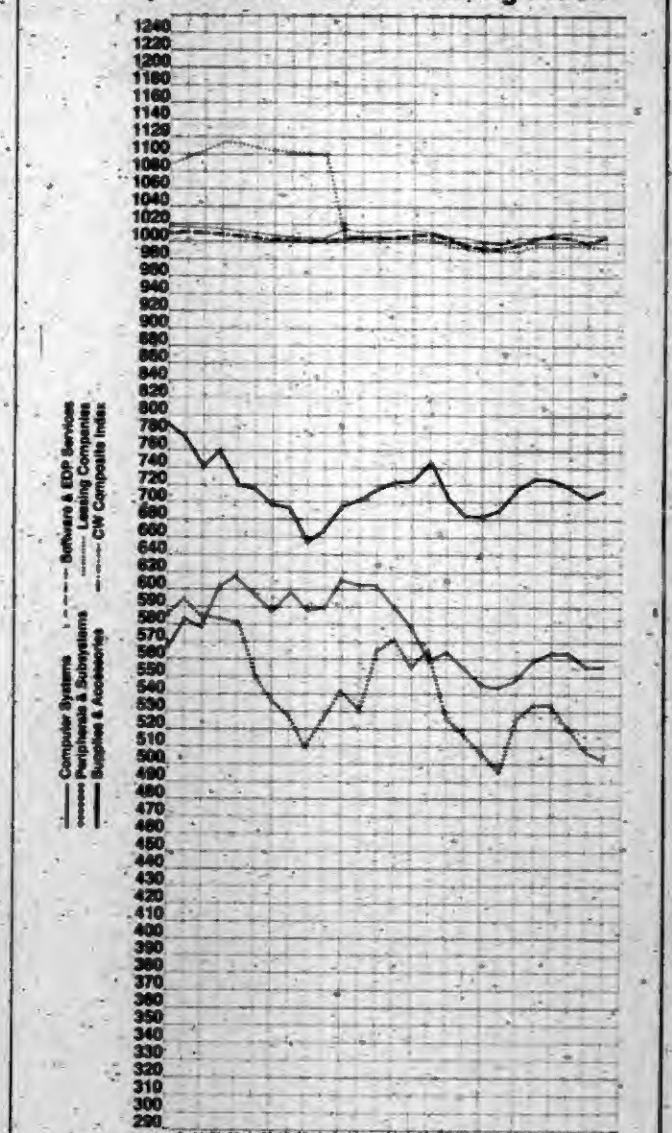

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All statistics compiled, computed and formatted by TRADE QUOTES INC. Cambridge, Mass. 02139

CLOSING PRICES WEDNESDAY, DECEMBER 21, 1983

	1982-83 RANGE (1)	CLOSE DEC 21 1983	WEEK NET CHANGE	WEEK PCT CHANGE
COMPUTER SYSTEMS				
D ALPHA MICROSYSTEMS	11- 24	14 1/2	- 1/4	-1.6
N ALTOS COMPUTER SYST	6- 29	10	+ 1/2	+5.2
A AMDAHL CORP	8- 36	18	-1 1/8	-5.8
D APPLE COMPUTER INC	18- 63	28 1/4	+ 7/8	+3.7
N AT&T	60- 70	65 3/8	- 1/2	-0.7
N BURROUGHS CORP	28- 50	49 3/4	+1 3/4	+3.6
D COMPUTER AUTOMATION	6- 17	6 1/2	+ 1/4	+4.0
A COMPUTER CONSOLES	8- 28	18 3/4	-1 3/8	-6.8
N CONTROL DATA CORP	21- 62	44	0	0.0
D CONVERGENT TECHNOL	18- 43	25 1/8	+2 3/4	+12.2
N CRAY RESEARCH INC	100+ 127	125 7/8	+2	+1.6
N DATA GENERAL CORP	10- 41	32 7/8	+ 1/8	+0.3
N DATAPOINT CORP	11- 36	27 1/4	-1 1/4	-4.3
N DIGITAL EQUIPMENT	62-132	70 3/8	+1 1/2	+2.1
N FICO INC	8- 18	13 3/8	+ 1/8	+0.9
N ELECTRONIC ASSOC.	5- 15	6 9/8	- 1/4	-3.8
N FLOATING POINT SYST	18- 44	35 1/2	0	0.0
N FORDHAM	22+ 37	35 1/8	+1 3/8	+4.0
D GENERAL AUTOMATION	3- 18	11	- 3/8	-3.3
N GOULD INC	20- 44	37 1/8	+ 1/2	+1.8
N HARRIS CORP	20- 51	46 1/4	+ 3/4	+1.8
N HEWLETT-PACKARD CO	22- 48	42 1/2	+2 1/2	+6.2
N HONEYWELL INC	80-138	137 3/4	+3 1/8	+2.3
N IBM	97-134	123 5/8	+2 3/4	+2.2
N ITI SYSTEMS INC	9- 14	9 1/2	+ 1/4	+4.1
N M/A-COM INC	18- 35	18 1/4	- 3/4	-3.7
D MAGNUSON COMP SYSTS	1- 5	1/2	+ 1/8	+33.3
N MANAGEMENT ASSIST	7- 19	18 1/4	- 1/4	-1.3
N MATSUSHITA ELEC(ADR)	47- 87	81 1/2	+3 1/4	+4.1
N MODULAR COMPUTER SYS	6- 16	7 5/8	0	0.0
N MOHAWK DATA SCI	10- 18	14 7/8	- 1/2	-3.2
N MOTOROLA INC	82-140	122 1/2	-1 5/8	-1.2
N NAT'L SEMICONDUCTOR	15- 66	16 3/4	+1	+6.3
N NCR	29-138	122 7/8	-4 3/8	-3.4
N PERKIN-ELMER	17- 37	28 7/8	+1 1/4	+4.5
N PRIME COMPUTER INC	11- 30	18 7/8	- 1/8	-0.7
N SPERRY CORP	21- 47	47	+1 1/4	+2.7
D TANDEM COMPUTERS INC	14- 46	38 3/8	+1 1/4	+3.4
N TANDY CORP	34- 69	43	0	0.0
D TELEVIDEO SYSTEMS	14- 41	16 3/4	- 7/8	-4.9
N TELTON CORP	8- 16	11	- 1/2	-4.3
N TEXAS INSTRUMENTS	71-170	138 1/4	+6 3/8	+3.7
A ULTIMATE CORP	8- 24	13 3/8	- 3/8	-2.9
D VECTOR GRAPHICS INC	2- 14	2	0	0.0
A WANG LABS "B"	13- 42	33	+ 1/4	+0.7
A WANG LABS "C"	11- 42	32 1/4	+ 3/4	+2.3
N XEROX CORP	35- 92	80 1/4	+ 1/4	+0.5
LEASING COMPANIES				
D BOOTHE FINANCIAL CP	11- 25	24	+ 1/4	+0.7
A COMDISCO INC	7- 42	18 3/8	-1 1/8	-5.7
O CONTINENTAL INFO SYS	3- 16	9 3/4	0	0.0
N DPF INC	5- 19	14 1/8	+ 1/2	+3.6
N U.S. LEASING	16- 47	38 5/8	-2 5/8	-6.8
COMPONENTS				
N ADVANCED MICRO DEV	13- 33	31 7/8	- 3/8	-1.1
O ADV'D SEMICONDUCTOR	12- 33	32 1/4	- 3/4	-2.2
N ANALOG DEVICES INC	18- 42	38 1/2	+ 1/8	+0.3
O ANALOGIC CORP	20- 27	26 3/4	+1	+5.0
N APPLIED MAGNETICS CP	18- 37	30	+2 1/8	+8.2
N TEXAS INSTRUMENTS	14- 39+	35	+ 3/8	+1.0

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	1982-83 RANGE (1)	CLOSE DEC 21 1983	WEEK NET CHANGE	WEEK PCT CHANGE
SOFTWARE & EDP SERVICES				
D ADVANCED COMP TECH	2- 8	4 1/4	+ 1/4	+6.2
D ADVANCED SYSTEMS INC	5- 22	20	- 1/8	-1.2
D AGS COMPUTERS INC	7- 32	27	+1	+3.8
D AMERICAN SOFTWARE	7- 31	18 1/4	- 3	-3.9
N AMACOMP INC	6- 23	7 3/4	- 1/4	-3.1
N ANALYSTS INTL CORP	6- 20	11 5/8	- 3/8	-3.1
A APPLIED DATA RES.	8- 37	28 1/4	+1 7/8	+8.0
D ASK COMPUTER SYSTEMS	8- 21	17	+ 3/4	+4.6
A ASTRONYME CORP, INC	1- 7	2 1/8	- 1/4	-10.8
N AUTOMATIC DATA PROC	21- 48	38 1/2	-1	-2.8
O CBA COMPUTER ASSOC	3- 17	13 1/8	- 7/8	-6.2
O COMPUTER ASSOC INT'L	8- 38	32 3/4	-1 3/4	-7.1
D COMPUTER HORIZONS	8- 20	15 1/4	+1	+8.1
D COMPUTER NETWORK	4- 10	6 3/8	+0	0.0
N COMPUTER SCIENCES	11- 23	18 3/8	+ 1/8	+0.6
O COMPUTER TASK GROUP	8- 22	15 1/4	-1	-6.1
D COMPUTER USAGE	2- 12	12 1/8	- 3/4	-5.7
D COMPUTONE SYSTEMS	5- 38	8 1/4	- 1/2	-7.8
D CONSERV CORP	5- 20	9 3/4	0	0.0
D CONSHARE	7- 16	13 1/8	+ 5/8	+5.0
N DALLAS SOFTWARE	12- 30	42	+1	+2.4
O CYCARE SYSTEMS INC	5- 27	17 3/8	+1 1/4	+7.8
O ELECTRONIC DATA SYST	10- 42	39 3/8	+ 3/8	+1.0
D HOGAN SYSTEM INC	18- 53	20 1/2	+1 1/2	+7.9
N GENERAL ELECTRIC CO	49- 58	57 5/8	+1 1/8	+1.9
A GTE CORP	38- 48	43 1/4	+ 1/2	+1.1
N INFORMATICS INC	10- 34	19 3/8	-1 1/4	-5.8
D INFOTRON SYSTEMS COR	25- 43	36 3/4	+ 1/2	+1.3
D KEANE ASSOCIATES	4- 15	6 1/8	- 1/4	-3.9
A LOGICON	8- 31	28 1/2	- 3/4	-2.6
D MDI COMMUNICATIONS	13- 34	18 3/8	-1 1/2	-7.5
D MGMT SCI AMER INC	8- 35	28 1/4	+1 3/4	+6.5
D MATHEMATICAL APP GRP	10- 23	18 1/2	+ 1/2	+2.8
D MICOM SYSTEMS INC	29- 50	43 3/4	+1 1/4	+2.9
D MONCHIK-WEBER CP	8- 22	7 3/4	- 1/4	-3.1
C NATIONAL DATA CORP	9- 26	20 7/8	0	0.0
D ON-LINE SOFTWARE INT	17- 37	19 1/2	+1	+5.4
D PANSOPHIC SYSTEMS	8- 30	18 3/4	- 3/8	-1.9
N PLANNING RESEARCH	8- 21	17 3/8	- 1/4	-1.4
D POLICY MGMT SYSTS CP	10- 35	29	- 1/2	-1.6
C PROGRAMMING & SYS	5- 8	6 3/4	0	0.0
D REYNOLDS & REYNOLD	17- 53	42	- 3/4	-1.7
D SEI CORP	11- 34	28 1/2	0	0.0
O SHARED MEDICAL SYST	13- 43	32 1/4	- 1/4	-0.7
D SCIENTIFIC COMPUTERS	8- 14	11 1/2	+ 1/4	+2.2
O SOFTWARE AG	9- 17	12	+1 3/8	+12.8
N TYMSHARE INC	12- 30	18 7/8	-8 1/2	-24.6
A URS CORP	9- 18	13 1/2	-1	-6.9
N WYLY CORP	7- 17	11	0	0.0
PERIPHERALS & SUBSYSTEMS				
P AM INTERNATIONAL	2- 7	3 3/4	0	0.0
A ANDERSON JACOBSON	8- 28	18 1/8	+ 3/8	+0.5
D AUTO-TROL TECHNOLOGY	8- 28	25	+ 7/8	+3.6
O BANCTEC INC	7- 33	14 3/4	- 1/2	-3.2
A BEEHIVE INT'L	4- 15	8 3/8	- 3/8	-4.8
A BOLT-BERANEK & NEW	3- 36	23 7/8	-1	-4.0
D CAMBEX CORP	1- 4	1 1/2	0	0.0
N CENTRONICS DATA COMP	6- 29	14 1/8	-1 3/8	-8.9
A CETEC CORP	6- 12	8 1/8	- 5/8	-8.1
D COMMTRONICS	3- 20	11 1/2	+ 3/8	+3.3

	1982-83 RANGE (1)	CLOSE DEC 21 1983	WEEK NET CHANGE	WEEK PCT CHANGE
D COMPUTER DEVICES INC	1- 23	1 1/2	+ 1/8	+20.0
N COMPUTER TRANSCEIVER	4- 12	7 3/8	+ 1/8	+1.7
A COMPUTERVISION CORP	18- 53	40 1/2	- 1/8	-0.3
A CONRAC CORP	16- 30	18 1/2	- 1/8	-0.7
A DATAPRODUCTS CORP	20- 41	20 1/2	0	0.0
A DATARAM CORP	5- 12	8 5/8	+ 1/8	1.7
D DATA SWITCH CORP	13- 41	30	+3 1/2	+13.2
D DATUM INC	2- 17	8	- 1/8	-1.5
D DECISION DATA COMPUT	2- 16	11	+ 3/8	+3.5
O DOCUTEL-OLIVETTI	11- 30	11 1/8	- 1/8	-1.1
N DTC	9- 11	7 1/2	- 3/8	-4.7
O EMDATA INC	11- 16	10 3/4	0	0.0
O EVANS & SUTHERLAND	10- 56	30	-1 3/4	-5.5
O GANDALF TECHNOLOGIES	8- 22	8 3/8	0	0.0
A GEN'L DATA COMM IND	6- 32	28 3/4	-2 1/4	-7.3
O GREAT SOUTHWEST IND	1- 6	3/4	- 1/4	-25.0
O HAZELTINE CORP	9- 31	25 1/8	- 1/8	-0.5
D ICOT CORP	3- 10	8 1/2	+ 1/8	+2.1
O INFORMATION INTL INC	6- 22	12 3/4	- 1/2	-3.7
B INFORMATION SCIENCE	17- 37	13 1/2	-1 1/2	-10.0
O INTEL CORP	11- 49	42	+1 3/4	+4.3
D IPL SYSTEMS INC	5- 16	9 1/2	+ 1/4	+4.7
A LUNDY ELECTRONICS	7- 19	10 5/8	- 3/4	-6.5
O MEGADATA CORP	9- 15	12 3/4	- 1/4	-1.9
A MDI DATA CORP	10- 37	19 1/8	- 1/8	-0.6
A MAGNUM CORP	9- 29	23 1/4	- 1/2	-2.1
D METWORK SYSTEMS CORP	8- 34	29	+1 1/8	+3.9
N NO AMERICAN PHILIPS	47- 70	57 1/4	+1 3/4	+3.0
N NORTHERN TELECOM LTD	22- 48	41 1/8	+1	+2.4
D OMEX	3- 6	3 1/2	0	0.0
O PARADYNE CORP	14- 34	18 3/8	+ 3/8	+2.0
A PENRIL CORP	7- 16	12 1/8	+ 1/8	+1.0
O PHOENIX AMERICAN INC	7- 17	17	+ 1/4	+1.5
N PLESSEY CO (ADR)	26+ 41	31 3/4	0	0.0
O PRINTRONIX INC	23- 34	27 1/2	+1	+2.7
O RAMTEK CORP	9- 26	11 1/8	- 7/8	-7.3
N RAYTHEON CO	42- 58	46 5/8	+ 1/4	+0.5
N RECOGNITION EQUIP	6- 17	12 1/8	0	0.0
N ROLM CORP	40- 80	51	-1	-1.9
A SANDERS ASSOCIATES	48-120	68 7/8	- 3/4	-1.1
D SCAN DATA	1- 3	3/8	0	0.0
C SCAN-TRON CORP	12- 17	16 1/2	+ 1/8	+0.7
N SCIENTIFIC ATLANTA	15- 23	19 3/4	+ 3/8	+2.0
N STORAGE TECHNOLOGY	14- 32	18 1/8	0	0.0
B SYKES DATATRONICS	4- 27	4 1/8	- 1/8	-2.9
C SYSTEMS & COMP TECH	29- 38	37	-1 1/8	-2.9
A T BAR INC	7- 17	8 7/8	- 3/8	-4.1
A TAB PRODUCTS CO	8- 30	24 1/8	+ 1/8	+0.5
D TANDON CORP	19- 39	26 1/2	+1	+3.1
A TEC INC	9- 12	8 1/8	+ 1/8	+0.3
N TEKTRONIX INC	34- 67	59	+1 1/8	+1.9
A TELEX	9- 22	24 1/8	+1 1/4	+5.5
O TESDATA SYSTEMS CP	3- 17	8	- 1/2	-5.8
N TIMEPLEX INC	7- 28	26	0	0.0
O VISUAL TECHNOLOGY	9- 28	18 1/8	-1	-5.1
SUPPLIES & ACCESSORIES				
N AMERICAN BUS PRODS	7- 23	22 5/8	+ 1/8	+0.5
N BARRY WRIGHT	13- 33	31 1/2	-1 1/4	-3.7
A DUPLEX PRODUCTS INC	12- 28	28 1/2	+ 1/2	+2.0
N ENNIS BUS. FORMS	9- 28	23 1/2	- 1/2	-2.0
N 3M COMPANY	43- 94	88	0	0.0
N MOORE CORP LTD	28- 51	42 3/8	- 7/8	-2.0
O STANDARD REGISTER	11- 34	32 1/8	+1 1/8	+4.0
N WALLACE BUS FORMS	11- 23	20	-1 1/4	-6.0

15 pointed questions to ask MSA or any software supplier

These questions will help you when you sit down with individual software companies.

They're tough questions. Relevant ones. And any supplier who is worth his salt should be able to answer them without backpedaling.

Ask MSA

We'll answer all these questions to your satisfaction—plus any others you may have.

In fact, we're probably the best equipped to answer them. Because MSA is *the* software company. We offer the most complete line of totally integrated systems in the software industry, including financial, human resource and manufacturing.

So you avoid the headache of trying to tie together individual systems. (And the even bigger headache of adding to them.)

With MSA's integrated systems, there's no unnecessary duplication of data or effort. Reporting is faster. All your company's information is more timely and accurate—and in the right form.

Our technical edge comes from experience

Staying ahead is easier for a company that's steeped in software technology. MSA has spent years developing, refining, testing and enhancing our systems.

This year alone, we'll invest $25 million to make sure all our systems are technologically razor sharp. That gives us a decided advantage over flash-in-the-pan technology that may not have the bug-free logic of a more experienced system.

It also gives you a decided advantage over "custom" systems you have to update yourself.

MSA relieves you of that time-consuming burden. We update and enhance your software for a full year. Then we continue this service for a surprisingly low annual fee.*

Maintenance includes keeping your system up-to-date technologically. Enhancing it with new features that make it work even harder for you.

And making sure it reflects changes in accounting procedures and government regulations, including 401(k), TEFRA, and FAS52. (That eliminates a lot of tedious work you normally have to do.)

Save this box. It can help you make an intelligent software decision.

1. Can you offer us a complete range of software systems designed to work together?
Or will we have to piece together a patchwork of systems?

2. Are your systems just record keepers, or can they really help us make decisions?
Can we pull together information from any of our integrated systems? In exactly the form we want it?

3. Can you provide business software for both mainframe and microcomputers?
Do you develop this software yourself or do you simply market it for another company?

4. Are your systems truly online so all of our information is current?
How many of your systems are online? How secure are they?

5. Will my company have to be the one that discovers the bugs in your brand new system?
Just how long have your systems actually been used, and how have they been tested?

6. Will you update your systems as technology advances and regulations change?
What are some of your most recent updates? Will you keep us current on regulatory changes?

7. Do your systems really do everything you say they will?
Or will we have to change them or add to them to get the features we want?

8. How long have you been in business?
What are your revenues? What is your growth record? Where will your company be five years from now?

9. How many systems has your company installed?
How many of these were installed in the past six months? How many of your earlier customers are still using—and liking—your systems?

10. Do your financial systems handle unlimited foreign currencies?
Do your financial systems use a common set of currency exchange rates?

11. Can you link our executives' computers directly to the mainframe—so they can get their own information?
Is that software available right now?

12. How will you make sure our own people thoroughly understand your system?
Do you have educational centers near us, or will we have to travel all the way across the country to find one? Will you be there to help during installation and after?

13. How many of your people specialize in software for my industry?
How many accountants work for you? Human resource specialists? Manufacturing experts?

14. Do your systems have built-in features that make them easier to use?
What happens if someone needs help figuring out a feature? Do you have online documentation that's easy to understand?

15. As my business changes will your system be flexible enough to change with it?
Or will we have to pay a lot to revamp it? Or even regenerate it?

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35,000 days of training

At MSA, we make sure your people have a firm grasp of our systems. Last year alone, we conducted more than 35,000 student days of customer training for over 1,800 companies. At education centers all over the world, as well as at our headquarters.

From training sessions to cassettes to complete, easy-to-understand documentation, MSA provides the most extensive Customer Education Programs in the industry.

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